MITSUBISHI

Mitsubishi Programmable Controller

# CC-Link IE Field Network High-Speed Counter Module
# User's Manual

-NZ2GFCF-D62PD2

MODEL

# ●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. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

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

- In the case of a communication failure in the network, data in the master module are held. Check Data link status (each station) (SW00B0 to SW00B7) and configure an interlock circuit in the program to ensure that the entire system will operate safely.
- When the module is disconnected due to a communication failure in the network or the CPU module is in the STOP status, all outputs are held or turned off according to the parameter setting.
  Configure an interlock circuit in the program to ensure that the entire system will always operate safely even in such a case. If not, an accident may occur due to an incorrect output or malfunction.
- Outputs may remain on or off due to a failure of the module. Configure an external circuit for monitoring output signals that could cause a serious accident.
- Do not use any "use prohibited" signals as a remote input or output signal. These signals are reserved for system use. Do not write any data to the "use prohibited" area in the remote register. If these operations are performed, correct operation of the module cannot be guaranteed.

## [Design Precautions]

**⚠CAUTION**

- Do not install the communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- Do not install the control lines together with the main circuit lines or power cables. Keep a distance of 150mm or more between them. Failure to do so may result in malfunction due to noise.

## [Installation Precautions]

**⚠WARNING**

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

## [Installation Precautions]

**⚠CAUTION**

- Use the module in an environment that meets the general specifications in the user's manual for the module. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- Do not directly touch any conductive parts and electronic components of the module. Doing so can cause malfunction or failure of the module.
- Securely fix the module with a DIN rail.
- After the first use of the extension module, do not connect/disconnect the module more than 50 times (in accordance with IEC 61131-2).
- To connect an extension module to a main module, engage the respective connectors and securely lock the module joint levers. Incorrect connection may cause malfunction, failure, or drop of the module.
- Securely connect the cable connectors. Poor contact may cause malfunction.

## [Wiring Precautions]

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

## [Wiring Precautions]

| ⚠CAUTION |
|---|
| ● Ground the shield cable for the pulse input on the encoder side (relay box) with a ground resistance of 100Ω or less. Failure to do so may cause malfunction.<br>● Individually ground the FG terminal of the programmable controller with a ground resistance of 100Ω or less. Failure to do so may result in electric shock or malfunction.<br>● Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.<br>● Prevent foreign matter such as dust or wire chips from entering the module. Such foreign matter can cause a fire, failure, or malfunction.<br>● Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.<br>● Do not install the communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.<br>● Do not install the control lines together with the main circuit lines or power cables. Keep a distance of 150mm or more between them. Failure to do so may result in malfunction due to noise.<br>● When disconnecting the cable from the module, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.<br>● When an overcurrent caused by an error of an external device or a failure of the programmable controller flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.<br>● Connectors for external devices must be crimped with the tool specified by the manufacturer, or must be correctly soldered. Securely connect the connector to the module.<br>● Mitsubishi programmable controllers must be installed in control panels. Wiring and replacement of a module must be performed by qualified maintenance personnel with knowledge of protection against electric shock. For wiring methods, refer to "INSTALLATION AND WIRING" in this manual. |

## [Startup and Maintenance Precautions]

**⚠WARNING**

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal block screws or connector screws. Failure to do so may cause the module to fail or malfunction.

## [Startup and Maintenance Precautions]

**⚠CAUTION**

- Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire.
- Do not drop or apply strong shock to the module. Doing so may damage the module.
- Shut off the external power supply (all phases) used in the system before mounting or removing a module. Failure to do so may cause the module to fail or malfunction.
- Before handling the module or the cable to be connected to the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.
- 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.

## [Disposal Precautions]

**⚠CAUTION**

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

# ●CONDITIONS OF USE FOR THE PRODUCT●

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

# INTRODUCTION

Thank you for purchasing the CC-Link IE Field Network high-speed counter module (hereafter abbreviated as high-speed counter module).
This manual describes the operating procedure, system configuration, parameter settings, functions, and troubleshooting of the high-speed counter module.

Before using this product, please read this manual and the relevant manuals carefully and develop familiarity with the functions and performance of the high-speed counter module to handle the product correctly.
When applying the program examples introduced in this manual to an actual system, ensure the applicability and confirm that it will not cause system control problems.

■Target module: NZ2GFCF-D62PD2

**Remark**

Unless otherwise specified, this manual describes the program examples in which the remote I/O signals and remote registers are assigned for a high-speed counter module as follows.

- Remote input signal: RX00 to RX4F
- Remote output signal: RY00 to RY4F
- Remote register: RWr0 to RWr3F, RWw0 to RWw3F

For the assignment of remote I/O signals and remote registers, refer to the following.

User's manual for the master/local module used

# RELEVANT MANUALS

## (1) CC-Link IE Field Network (relevant) manuals

When using the CC-Link IE Field Network for the first time, refer to CC-Link IE Field Network Master/Local Module User's Manual first. The following shows the structure of the CC-Link IE Field Network manuals.

| Manual name<br><manual number (model code)> | Description |
|---|---|
| MELSEC-Q CC-Link IE Field Network Master/Local Module User's Manual<br><SH-080917ENG, 13JZ47> | Overview of the CC-Link IE Field Network, and specifications, procedures before operation, system configuration, installation, wiring, settings, functions, programming, and troubleshooting of the QJ71GF11-T2 |
| MELSEC-L CC-Link IE Field Network Master/Local Module User's Manual<br><SH-080972ENG, 13JZ54> | Overview of the CC-Link IE Field Network, and specifications, procedures before operation, system configuration, installation, wiring, settings, functions, programming, and troubleshooting of the LJ71GF11-T2 |

## (2) Operating manual

| Manual name<br><manual number (model code)> | Description |
|---|---|
| GX Works2 Version 1 Operating Manual (Common)<br><SH-080779ENG, 13JU63> | System configuration, parameter settings, and online operations of GX Works2, which are common to Simple projects and Structured projects |

# CONTENTS

# MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.

The following illustration is for explanation purpose only, and should not be referred to as an actual documentation

"" is used for screen names and items.

*1.* shows operating procedures.

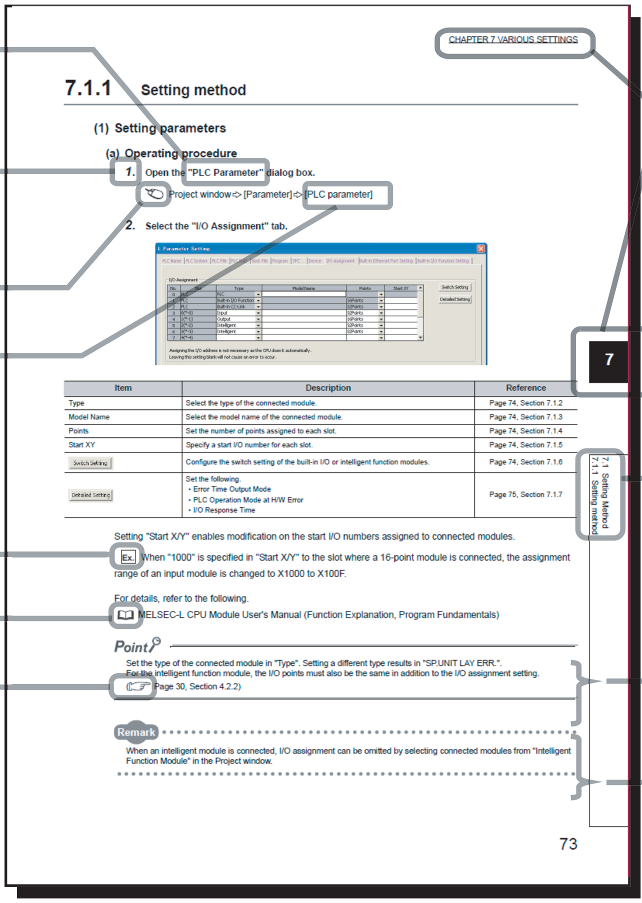
shows mouse operations.*1

[ ] is used for items in the menu bar and the project window.

Ex. shows setting or operating examples.

shows reference manuals.

shows reference pages.




The chapter of the current page is shown.

The section of the current page is shown.

Point shows notes that requires attention.

Remark shows useful information.

*1 The mouse operation example is provided below.

Menu bar

Ex. [Online] ⇨ [Write to PLC...]

Select [Online] on the menu bar, and then select [Write to PLC...].

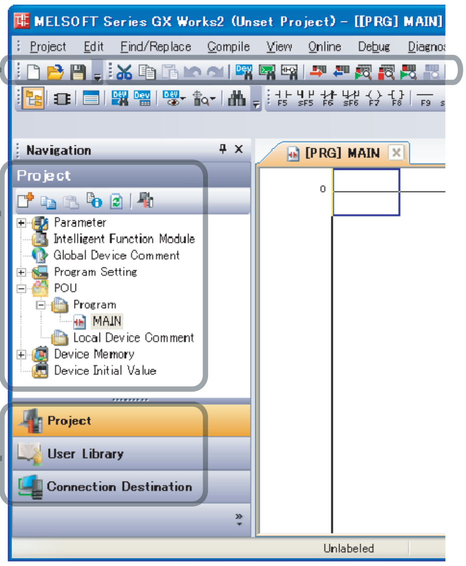
A window selected in the view selection area is displayed.

Ex. Project window ⇨ [Parameter] ⇨ [PLC Parameter]

Select [Project] from the view selection area to open the Project window.

In the Project window, expand [Parameter] and select [PLC Parameter].

View selection area



# TERM

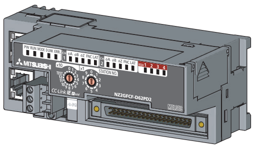
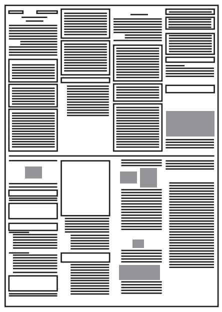
Unless otherwise specified, this manual uses the following terms.

| Term | Description |
|---|---|
| CC-Link IE Field Network | A high-speed and large-capacity open field network that is based on Ethernet (1000BASE-T) |
| GX Works2 | The product name of the software package for the MELSEC programmable controllers |
| REMFR | The abbreviation for ZP.REMFR.<br>This dedicated instruction is used in programs of the master/local module. |
| REMTO | The abbreviation for ZP.REMTO.<br>This dedicated instruction is used in programs of the master/local module. |
| Intelligent device station | A station that deals with bit data and word data.<br>The station can communicate with the master station and other local stations. The station cannot communicate with other remote I/O stations, remote device stations and intelligent device stations.<br>The station can perform the cyclic transmission and transient transmission. |
| Cyclic transmission | A function by which data are periodically exchanged among stations on the same network using link devices (RX, RY, RWw, and RWr) |
| Slave station | A generic term for stations other than a master station: local station, remote I/O station, remote device station, and intelligent device station |
| Data link | A generic term for cyclic transmission and transient transmission |
| Transient transmission | A function of communication with another station, which is used when requested by a dedicated instruction or GX Works2 |
| Network module | A generic term for the following modules:<br>• CC-Link IE Field Network module<br>• CC-Link IE Controller Network module<br>• Ethernet interface module<br>• MELSECNET/H module<br>• MELSECNET/10 module |
| Buffer memory | A memory in an intelligent function module, where data (such as setting values and monitoring values) are stored |
| Programming tool | Another term for GX Works2 |
| Master/local module | A generic term for the CC-Link IE Field Network master/local module |
| Master station | A station that controls CC-Link IE Field Network. The station can communicate with all stations.<br>Only one master station can be used in a network.<br>The station can perform the cyclic transmission and transient transmission. |
| Remote I/O station | A station that deals with bit data.<br>The station can communicate with the master station and other local stations. The station cannot communicate with other remote I/O stations, remote device stations and intelligent device stations.<br>The station can perform the cyclic transmission. |
| Remote device station | A station that deals with bit data and word data.<br>The station can communicate with the master station and other local stations. The station cannot communicate with other remote I/O stations, remote device stations and intelligent device stations.<br>The station can perform the cyclic transmission. |
| Remote buffer memory | Buffer memory in a remote device station |
| Remote register (RWr) | Word data input from a slave station to the master station (For some areas in a local station, data are output in the opposite direction.)<br>User's manual for the master/local module used |
| Remote register (RWw) | Word data output from the master station to a slave station (For some areas in a local station, data are output in the opposite direction.)<br>User's manual for the master/local module used |
| Remote output (RY) | Bit data output from the master station to a slave station (For some areas in a local station, data are output in the opposite direction.)<br>User's manual for the master/local module used |
| Remote input (RX) | Bit data input from a slave station to the master station (For some areas in a local station, data are output in the opposite direction.)<br>User's manual for the master/local module used |
| Link device | A device (RX, RY, RWr, or RWw) in a module on CC-Link IE Field Network |

| Term | Description |
|---|---|
| Link special relay (SB) | Bit data that indicates the operating status and data link status of a module on CC-Link IE Field Network |
| Link special register (SW) | Bit data that indicates the operating status and data link status of a module on CC-Link IE Field Network |
| Routing | A process of selecting paths for communication with other networks.<br>On CC-Link IE Field Network, set a network route with the routing parameter in advance to communicate with a station that is set a different network number.<br>A high-speed counter module does not need to set the routing parameter. Communications with other networks are performed according to the routing parameters set to the master station. |
| Local station | A station that includes a CPU module and can communicate with the master station and other local stations.<br>This station can create simplified CC-Link IE Controller Network by combining the master station and other local stations.<br>The station can perform the cyclic transmission and transient transmission. |
| Disconnection | A process of stopping data link if a data link error occurs |
| Main module | A module with the CC-Link IE Field Network communication function, which can be used as a single remote module. Extension modules can be connected to this module. |
| High-speed counter module | The abbreviation for the CC-Link IE Field Network high-speed counter module |
| Dedicated instruction | An instruction that simplifies programming for using functions of intelligent function modules |
| Extension module | A remote module that does not support the CC-Link IE Field Network communication function. This module cannot be used as a single module. However, connecting the module to the main module will increase the number of I/O points per station. |
| Extension I/O module | A generic term for extension modules where a digital signal can be input or output |
| Relay station | A station that includes two or more network modules. Data are passed through this station to stations on other networks. |
| Return | A process of restarting data link when a station recovers from an error |
| Reserved station | A station reserved for future use. This station is not actually connected, but counted as a connected station. |

# PACKING LIST

The following items are included in the package of this product. Before use, check that all the items are included.

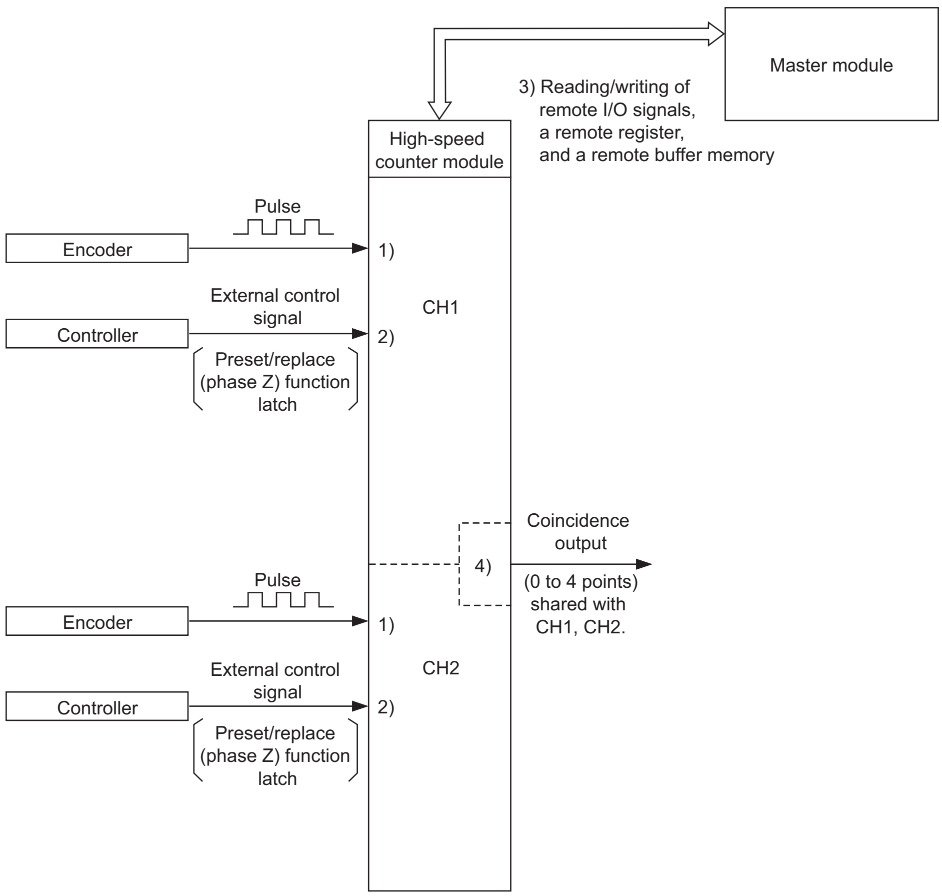
<table>
<tr><th colspan="2">High-speed counter module</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Module</td><td>Before Using the Product</td></tr>
</table>

# CHAPTER 1 HIGH-SPEED COUNTER MODULE



This chapter describes the operation, the application, and the features of the high-speed counter module.
The high-speed counter module is a remote device station of the CC-Link IE Field Network whose maximum counting speed of input pulse is 8Mpps (with differential input and 4 multiples of 2 phases).
The module has two channels and functions including the preset/replace function by external input or input from a master module, the latch counter function, counter function selection, external coincidence output by coincidence detection.

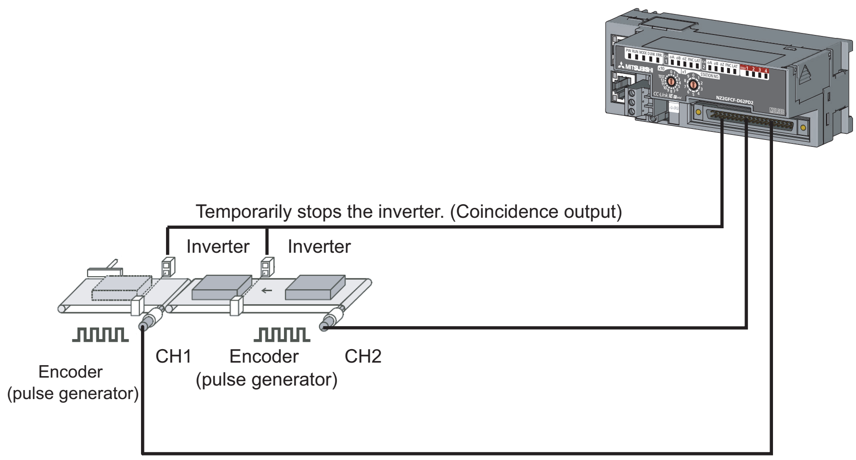
The following illustration shows the operation overview of the high-speed counter module.




1) Pulses input to a high-speed counter module are counted.
2) The preset/replace function can be performed, counting can be paused, and a counter value can be latched with an external control signal.
3) Status of the remote I/O signals, remote register, and remote buffer memory of a high-speed counter module can be checked with the program.
   Also, counting can be started/stopped; and the preset/replace function and the coincidence output function can be performed.
4) The coincidence output signal can be output by the coincidence output function.

# 1.1 Application

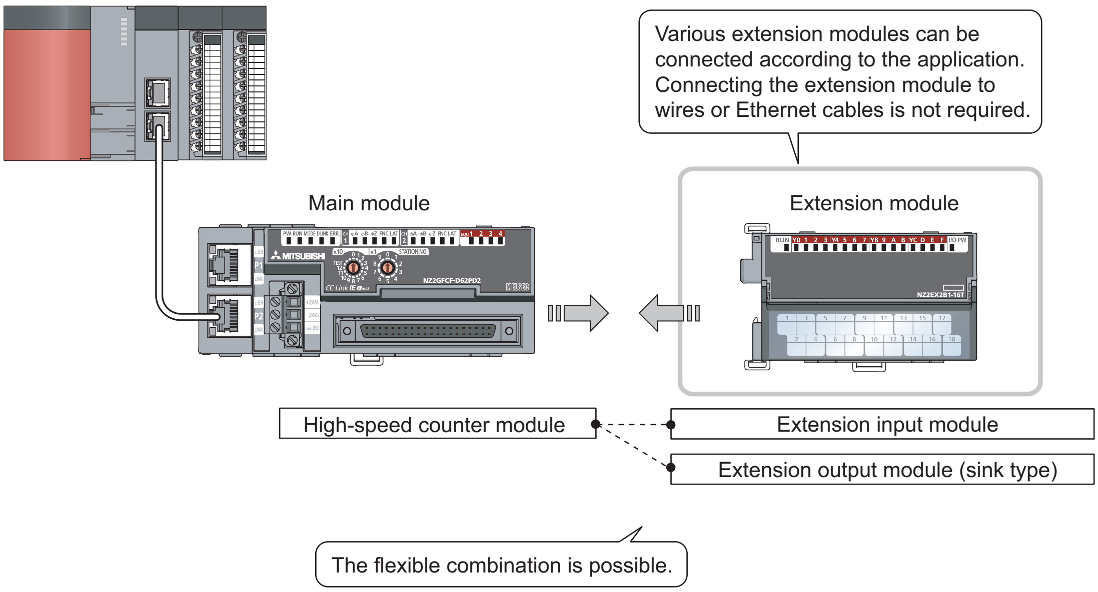
This module performs controls which are applicable to various applications by executing various functions according to count values of pulses input from the external device. The following describes an application example.



# 1.2 Features

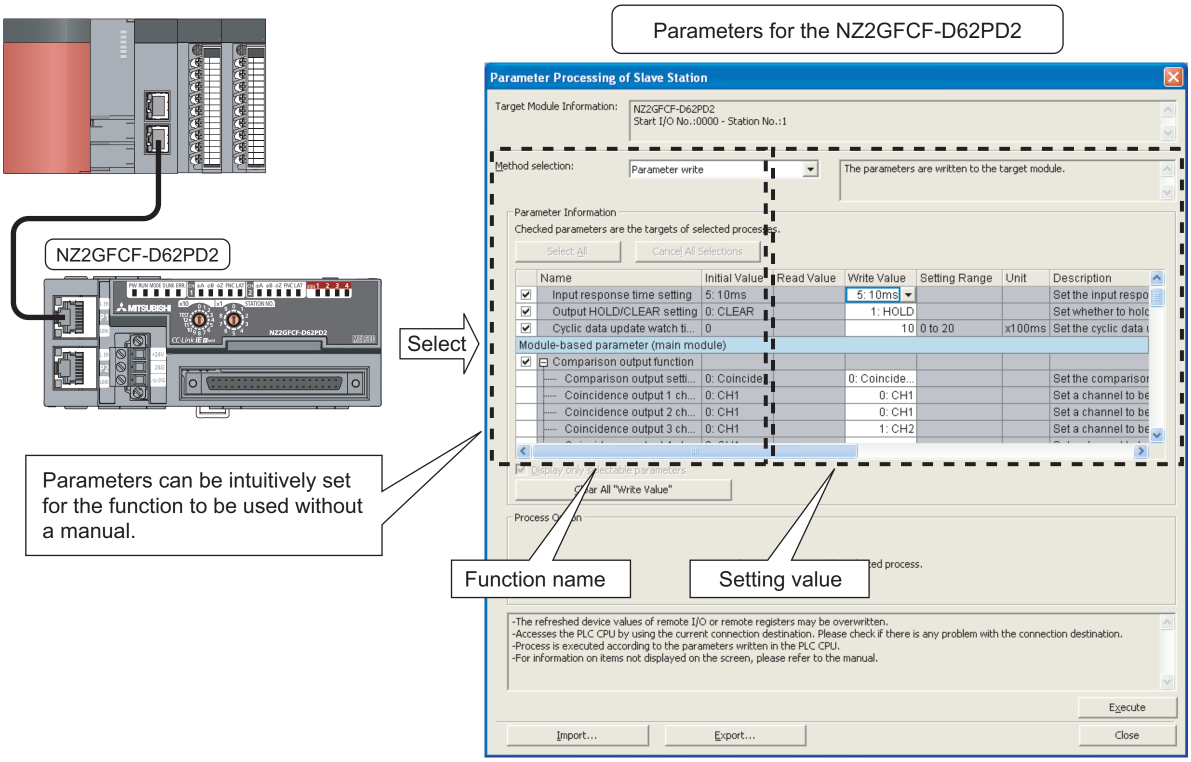
## (1) Available flexible system configuration

Adopting the connection block type enables the combination of the main module and extension module.
Because various extension modules can be connected, a flexible configuration can be achieved.
In addition, a poor contact of the extension module can be found promptly because the main module always monitors the connection status of the extension module.



## (2) Easy setting with CC IE Field configuration of GX Works2

Programming is reduced since the parameter can be configured on the window with the CC IE Field configuration of GX Works2. In addition, setting status and operation status of modules can be checked easily.




## (3) Easy station number setting

Because of the rotary switch on the front of the module, setting and checking the station number are easy.

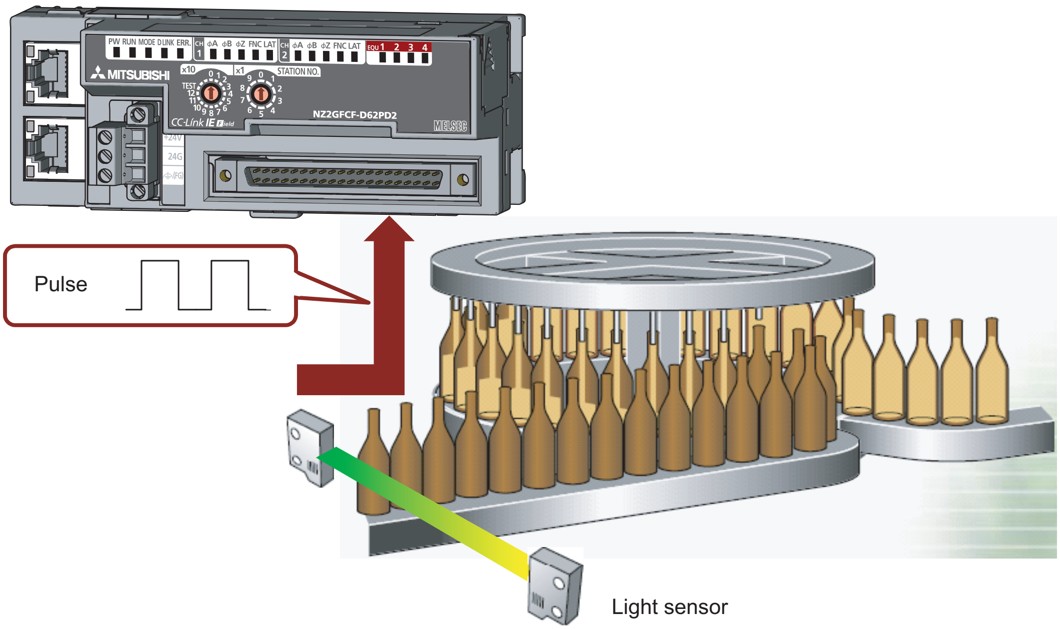
## (4) Error history function

The history of 15 errors and occurrence time can be stored in the module.
The error history helps the investigation for the cause when a problem occurs.

### (5) Pulse measurement function

Pulses can be measured with 100ns measurement resolution. The pulse width (ON width/OFF width) can be precisely measured. Various pulse measurement applications such as the workpiece length measurement or the transport/processing speed management of various types of transport equipment and processing equipment are available.

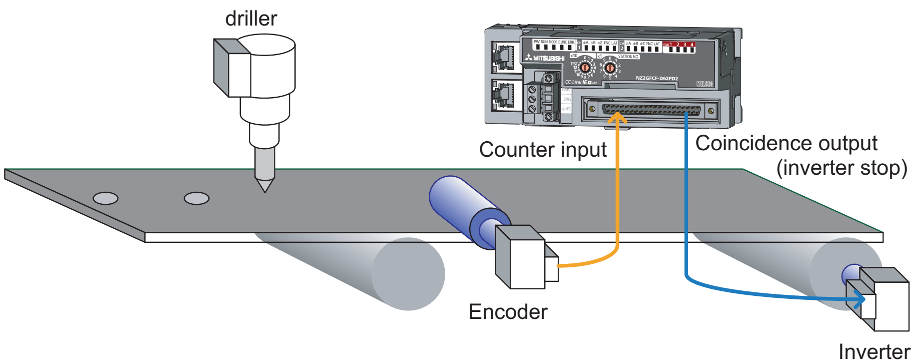
Example: Filling process (container type identification control)




### (6) Coincidence output function

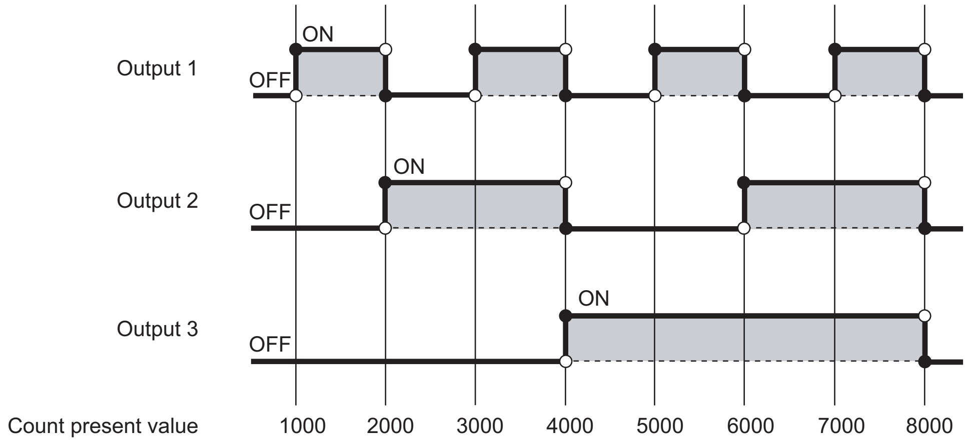
This function compares a preset value with the input count value. If they match, the function outputs a signal and thus the fixed-feed control is possible.

Control example: Drilling process (fixed-feed control)



## (7) Cam switch function

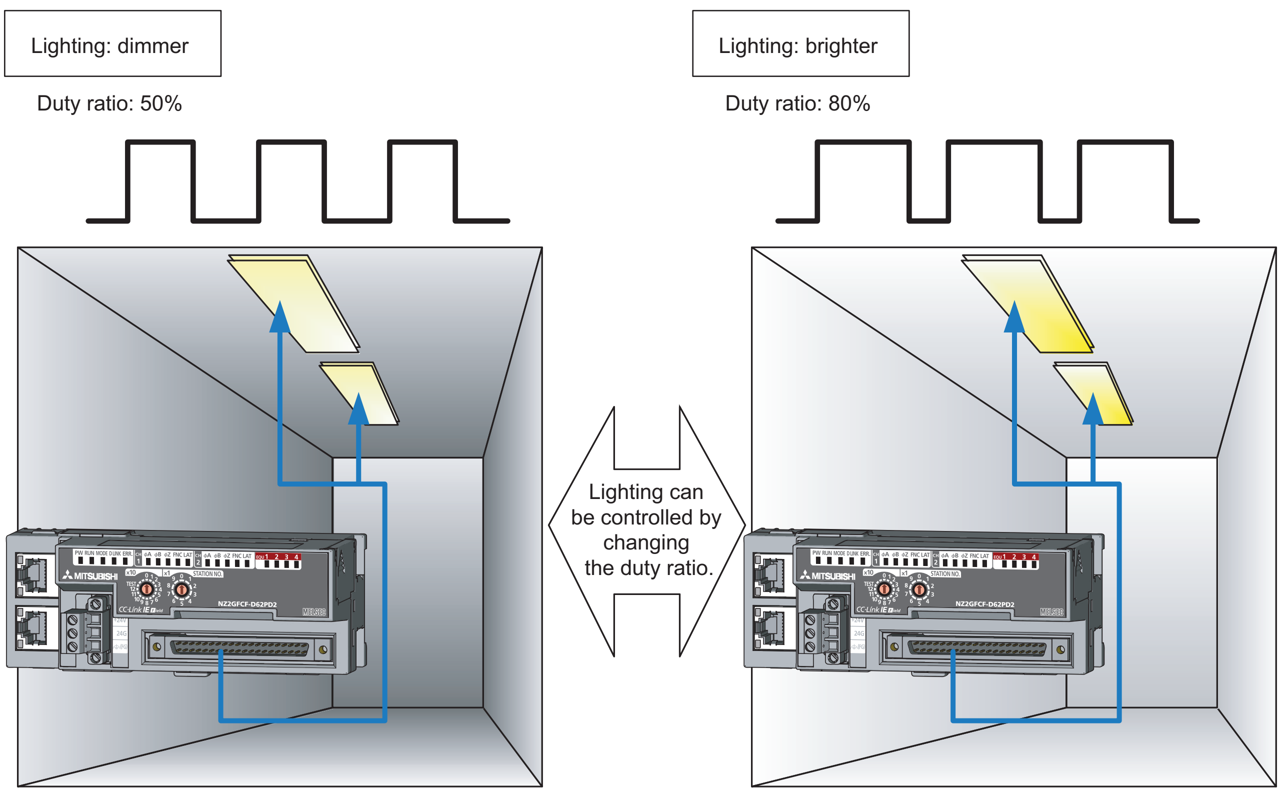
According to the input count present value, the ON/OFF status of output can be set for every preset point without any program. More precise ON/OFF control is available without scan time effect.
An extension output module is required for using this function.




## (8) PWM output function

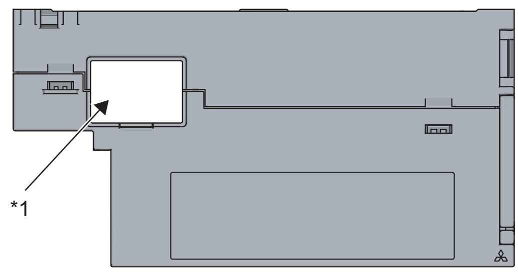
Up to 200kHz of the PWM waveform can be output. The duty ratio can be set by 0.1μs and this enables precise output control. The PWM output function enables controls such as dimming control according to duty ratio modification.

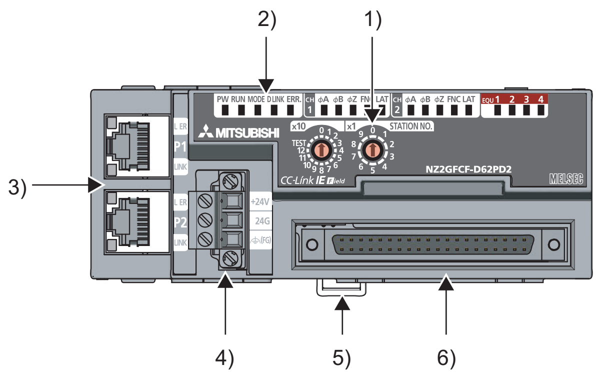
Example: Lighting control

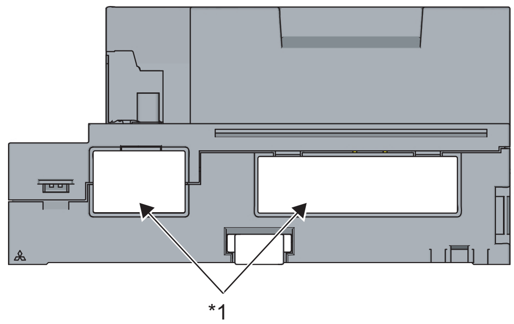


# CHAPTER 2 PART NAMES

This chapter describes the part names of the high-speed counter module.




*1 Do not remove this seal because it is used for a maintenance purpose.

| No. | Name | | Description |
|---|---|---|---|
| 1) | Station number setting switch | | A rotary switch for the following setting and test<br>• Station Number Setting (Page 55, Section 6.1)<br>• Unit Test (Page 227, Section 11.4)<br>When operating the station number setting switch, use a slotted screwdriver with 3.5mm or less width of the tip. |
| 2) | PW LED (green) | | Indicates the power supply status of the module. |
| | | ON | Power supply ON |
| | | OFF | Power supply OFF |
| | RUN LED (green) | | Indicates the operating status of the module. |
| | | ON | Operating normally |
| | | OFF | When a major error occurs |
| | MODE LED (green) | | Indicates the mode status of the module. |
| | | ON | In online mode |
| | | Flashing | In unit test mode |
| | | OFF | At the unit test completion |
| | D LINK LED (green) | | Indicates the data communication status between the module and the master module. |
| | | ON | Data link in operation (cyclic transmission in progress) |
| | | Flashing | Data link in operation (cyclic transmission stopped) |
| | | OFF | Data link not performed (disconnected) |
| | ERR. LED (red) | | Indicates the error status of the module. |
| | | ON | A moderate error or major error has occurred. |
| | | Flashing | A minor error (warning) has occurred. |
| | | OFF | Operating normally |
| | CH1ϕA/ϕB/ϕZ LED<br>CH2ϕA/ϕB/ϕZ LED<br>(green) | | Indicates the input status of the pulse input terminals in phase A, B, and Z. |
| | | ON | At voltage application |
| | | OFF | At no voltage application |
| | CH1FNC/LAT LED<br>CH2FNC/LAT LED<br>(green) | | Indicates the input status of the function/latch counter input terminal. |
| | | ON | At voltage application |
| | | OFF | At no voltage application |
| | EQU1 to EQU4 LED<br>(green) | | Indicates the output status of the coincidence output 1 to 4 terminals (EQU1 to EQU4). |
| | | ON | Signal output ON |
| | | OFF | Signal output OFF |

| No. | Name | | | Description |
|---|---|---|---|---|
| 3) | P1 | | | PORT1 connector for CC-Link IE Field Network (RJ45 connector)<br>Connect an Ethernet cable. (Page 65, Section 6.5)<br>There are no restrictions on the connection order of the cables for the "P1" connector and "P2" connector. |
| | | L ER LED (red) | ON | • The module has received abnormal data.<br>• The module is performing loopback. |
| | | | OFF | • The module has received normal data.<br>• The module is not performing loopback. |
| | | LINK LED (green) | ON | Linkup in progress |
| | | | OFF | Linkdown in progress |
| | P2 | | | PORT2 connector for CC-Link IE Field Network (RJ45 connector)<br>Connect an Ethernet cable. (Page 65, Section 6.5)<br>There are no restrictions on the connection order of the cables for the "P1" connector and "P2" connector. |
| | | L ER LED (red) | ON | (Same as the P1) |
| | | | OFF | |
| | | LINK LED (green) | ON | (Same as the P1) |
| | | | OFF | |
| 4) | Terminal block for module power supply and FG | | | A terminal block to connect the module power supply (24VDC) and FG. |
| 5) | DIN rail hook | | | A hook to mount a module on a DIN rail |
| 6) | Connectors for external devices (40 pins) | | | Connectors for encoders, controllers, and others<br>(For the terminal layouts, refer to Page 71, Section 6.6.3.) |

**Point**

When the phase Z of the encoder is connected to the phase Z pulse input terminal (Zn), a pulse is counted per rotation of the encoder. Therefore, lighting of the LEDs may be missed.

## (1) Module status and LED status

The following table lists the correspondence between the module status and the LED status.

| Module status | | Data link status | LED status | | | | |
|---|---|---|---|---|---|---|---|
| | | | PW LED | RUN LED | MODE LED | D LINK LED | ERR. LED |
| Disconnecting | | Disconnection | ON | ON | ON | OFF | OFF |
| Data link in operation | | Data link in operation | ON | ON | ON | ON | OFF |
| Reserved station specification in progress | | Cyclic stop | ON | ON | ON | Flashing | OFF |
| Link stop | | Cyclic stop | ON | ON | ON | Flashing | OFF |
| Communication error | | Cyclic stop | ON | ON | ON | Flashing | OFF |
| Error | Major | — | ON | OFF | *1 | *2 | ON*3 |
| Error | Moderate | — | ON | ON | *1 | *2 | ON |
| Warning | Minor | — | ON | ON | *1 | *2 | Flashing |
| Unit test | In progress | — | ON | ON | Flashing | OFF | OFF |
| Unit test | Normal completion | — | ON | ON | OFF | OFF | OFF |
| Unit test | Abnormal completion | — | ON | ON | OFF | OFF | ON |

*1 Either of ON or OFF.
*2 Either of ON, Flashing, or OFF.
*3 When the module is failed, the LED may not turn on.

# CHAPTER 3 SPECIFICATIONS

This chapter describes the specifications of the high-speed counter module.

## 3.1 General Specifications

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55°C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-25 to 75°C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6" rowspan="2">5 to 95%RF, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Compliant with JIS B 3502 and IEC 61131-2</td><td></td><td>Frequency</td><td>Constant acceleration</td><td>Half amplitude</td><td>Number of sweeps</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 8.4Hz</td><td>—</td><td>3.5mm</td><td rowspan="2">10 times each in X, Y, and Z directions</td></tr>
<tr><td>8.4 to 150Hz</td><td>9.8m/s$^2$</td><td>—</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 8.4Hz</td><td>—</td><td>1.75mm</td><td rowspan="2">—</td></tr>
<tr><td>8.4 to 150Hz</td><td>4.9m/s$^2$</td><td>—</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Compliant with JIS B 3502 and IEC 61131-2 (147m/s$^2$, 3 times each in X, Y, and Z directions)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="6">No corrosive gases</td></tr>
<tr><td>Operating altitude*1</td><td colspan="6">0 to 2000m</td></tr>
<tr><td>Installation location</td><td colspan="6">Inside a control panel*2</td></tr>
<tr><td>Overvoltage category*3</td><td colspan="6">II or less</td></tr>
<tr><td>Pollution degree*4</td><td colspan="6">2 or less</td></tr>
<tr><td>Equipment class</td><td colspan="6">Class I</td></tr>
</table>

*1 Do not use or store the high-speed counter module under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the high-speed counter module under pressure, please consult your local Mitsubishi representative.

*2 If the environment satisfies the operating ambient temperature, operating ambient humidity and other conditions, the module can be used even outside the control panel.

*3 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for the equipment with the rated voltage of 300V or less is 2500V.

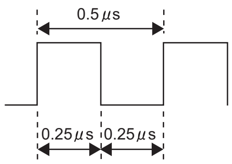
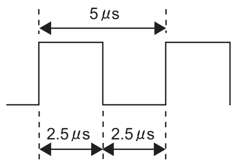
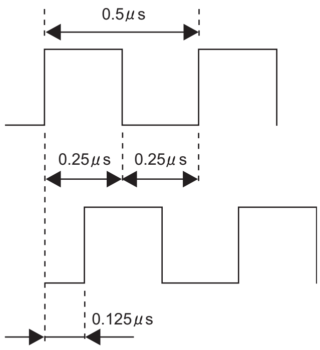
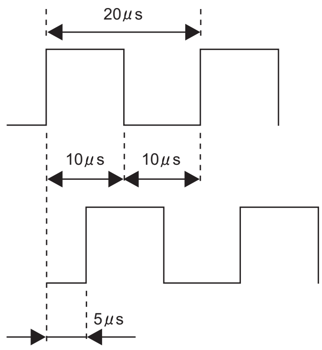
*4 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution degree 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

**Point**

To use the high-speed counter module complying with the EMC Directive, refer to "EMC and Low Voltage Directives" in this manual. (Page 286, Appendix 5)

# 3.2 Performance Specifications

The following table shows the performance specifications of the high-speed counter module.

| Item | | | Specifications | |
|---|---|---|---|---|
| Station type | | | Remote device station | |
| Availability of connecting extension module | | | Connectable (Max. one module) | |
| Counting speed switch setting[*1] | | | Differential input | DC input |
| | 1 multiple | | 10kpps/100kpps/200kpps/500kpps/1Mpps/2Mpps | 10kpps/100kpps/200kpps |
| | 2 multiples | | 10kpps/100kpps/200kpps/500kpps/1Mpps/2Mpps/ 4Mpps | 10kpps/100kpps/200kpps |
| | 4 multiples | | 10kpps/100kpps/200kpps/500kpps/1Mpps/2Mpps/ 4Mpps/8Mpps | 10kpps/100kpps/200kpps |
| Number of channels | | | 2 channels | |
| Count input signal | | | Differential input | DC input |
| | Phase | | 1-phase input (1 multiple/2 multiples), 2-phase input (1 multiple/2 multiples/4 multiples), CW/CCW | |
| | Signal level (ϕA, ϕB) | | EIA Standards RS-422-A, differential line driver level (AM26LS31 [manufactured by Texas Instruments] or equivalent) | 5/24VDC, 4 to 8mA |
| Counter | | | Differential input | DC input |
| | Counting speed (Maximum)[*2*3] | | 8Mpps (4 multiples of 2 phases) | 200kpps |
| | Counting range | | 32-bit signed binary (-2147483648 to 2147483647) | |
| | Format | | Count, subtraction count<br>Linear counter format, ring counter format<br>Preset/replace function, latch counter function | |
| | Minimum count pulse width (μs) (Duty ratio 50%) | | | |
| | | 1-phase input (1 multiple/2 multiples), CW/CCW | <br>(Minimum pulse width in 2 multiples of 1 phase: 0.25μs) | <br>(Minimum pulse width in 2 multiples of 1 phase: 2.5μs) |
| | | 2-phase input (1 multiple/2 multiples/4 multiples) | <br>(Minimum pulse width in 4 multiples of 2 phases: 0.125μs) | <br>(Minimum pulse width in 4 multiples of 2 phases: 5μs) |
| Coincidence detection | Comparison range | | 32-bit signed binary | |
| | Comparison condition | Coincidence output | Setting value < Count value<br>Setting value = Count value<br>Setting value > Count value | |
| | | Within-range output | Setting value (lower limit value) ≤ Count value ≤ Setting value (upper limit value) | |
| | | Out-of-range output | Count value < Setting value (lower limit value), Setting value (upper limit value) < Count value | |
| | Interrupt | | None | |

<table>
<tr><th colspan="2">Item</th><th colspan="2">Specifications</th></tr>
<tr><td rowspan="4">External input</td><td rowspan="2">Phase Z</td><td>Differential input</td><td>DC input</td></tr>
<tr><td>EIA Standards RS-422-A, differential line driver level (AM26LS31 [manufactured by Texas Instruments] or equivalent): 2 points</td><td>5/24VDC, 4 to 8mA: 2 points</td></tr>
<tr><td>Function</td><td colspan="2">5/24VDC, 7 to 12mA: 2 points</td></tr>
<tr><td>Latch counter</td><td colspan="2">5/24VDC, 7 to 12mA: 2 points</td></tr>
<tr><td>External output</td><td>Coincidence output</td><td colspan="2">Transistor (sink type) output: 4 points<br>5 to 24VDC 0.1A/point, 0.4A/common</td></tr>
<tr><td rowspan="3">Pulse measurement</td><td>Measurement item</td><td colspan="2">Pulse width (ON width/OFF width)</td></tr>
<tr><td>Measurement resolution</td><td colspan="2">100ns</td></tr>
<tr><td>Measurement points</td><td colspan="2">2 points/channel</td></tr>
<tr><td rowspan="4">Cam switch</td><td>Number of output points</td><td colspan="2">16 points</td></tr>
<tr><td>Number of steps per output point</td><td colspan="2">Maximum 16 steps/point</td></tr>
<tr><td>Control cycle</td><td colspan="2">0.5ms</td></tr>
<tr><td>Difference between each output duration in a channel</td><td colspan="2">Within the output response time of the extension output module</td></tr>
<tr><td rowspan="2">PWM output</td><td>Output frequency range</td><td colspan="2">DC and up to 200kHz</td></tr>
<tr><td>Duty ratio</td><td colspan="2">Any ratio (Can be set by 0.1μs)</td></tr>
<tr><td rowspan="2">Applicable wire size</td><td>For external device connection</td><td colspan="2">0.3mm$^2$ (22 AWG) (A6CON1 and A6CON4)<br>0.088 to 0.24mm$^2$ (28 to 24 AWG) (A6CON2)</td></tr>
<tr><td>For power supply</td><td colspan="2">Core: 0.5 to 1.5mm$^2$ (20 to 16 AWG)</td></tr>
<tr><td colspan="2">Applicable connector for external wiring</td><td colspan="2">A6CON1, A6CON2, A6CON4 (sold separately)</td></tr>
<tr><td colspan="2">External power supply</td><td colspan="2">24VDC (20.4 to 26.4VDC)<br>Current consumption: 220mA</td></tr>
<tr><td rowspan="2">Cyclic transmission</td><td>RX/RY points</td><td colspan="2">80 points + 16 points × number of extension modules</td></tr>
<tr><td>RWr/RWw points</td><td colspan="2">64 points</td></tr>
<tr><td colspan="2">Communication cable</td><td colspan="2">An Ethernet cable that meets the 1000BASE-T standard:<br>Category 5e or higher (double shielded, STP), straight cable</td></tr>
<tr><td colspan="2">External dimensions</td><td colspan="2">133mm × 68mm × 50mm</td></tr>
<tr><td colspan="2">Weight</td><td colspan="2">0.25kg</td></tr>
<tr><td rowspan="2">External connection system</td><td>Communication part</td><td colspan="2">RJ45 connector</td></tr>
<tr><td>Module power supply part</td><td colspan="2">Terminal block for module power supply and FG<br>Tightening torque range for terminal screw (M2.5 screw): 0.5 to 0.6N•m</td></tr>
<tr><td colspan="2">Applicable DIN rail</td><td colspan="2">TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)</td></tr>
<tr><td>Applicable solderless terminal</td><td>Terminal block for module power supply and FG</td><td colspan="2">TE 0.5-10 (Nichifu Co. Ltd.) [Applicable wire size: 0.5mm$^2$]<br>TE 0.75-10 (Nichifu Co. Ltd.) [Applicable wire size: 0.75mm$^2$]<br>TE 1.0-10 (Nichifu Co. Ltd.) [Applicable wire size: 0.9 to 1.0mm$^2$]<br>TE 1.5-10 (Nichifu Co. Ltd.) [Applicable wire size: 1.25 to 1.5mm$^2$]<br>AI 0.5-10WH (Phoenix Contact Co. Ltd.) [Applicable wire size: 0.5mm$^2$]<br>AI 0.75-10GY (Phoenix Contact Co. Ltd.) [Applicable wire size: 0.75mm$^2$]<br>AI 1-10RD (Phoenix Contact Co. Ltd.) [Applicable wire size: 1.0mm$^2$]<br>AI 1.5-10BK (Phoenix Contact Co. Ltd.) [Applicable wire size: 1.5mm$^2$]</td></tr>
</table>

*1 Counting speed setting can be done using the parameter setting. (☞ Page 80, Section 7.1)

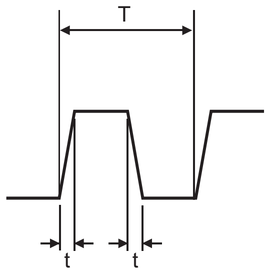
*2 Note that the count may be done incorrectly by inputting pulses whose phase difference is small between the phase A pulse and phase B pulse. To check the input waveform of the phase A pulse and phase B pulse, or to check phase difference between the phase A pulse and phase B pulse, refer to the following:

☞ Page 30, Section 3.2.1

*3 The counting speed is affected by the pulse rise/fall time. The applicable counting speed is listed below. Note that the count may be done incorrectly by counting pulses with long rise/fall time.

| **Counting speed switch setting** | **8Mpps 4Mpps 2Mpps** | **1Mpps** | **500kpps** | **200kpps** | **100kpps** | **10kpps** |
|---|---|---|---|---|---|---|
| Rise/fall time | Both 1- and 2-phase inputs | | | | | |
| t = 0.125μs | 2Mpps | 1Mpps | 500kpps | 200kpps | 100kpps | 10kpps |
| t = 0.25μs or less | 1Mpps | 1Mpps | 500kpps | 200kpps | 100kpps | 10kpps |
| t = 0.5μs or less | — | 500kpps | 500kpps | 200kpps | 100kpps | 10kpps |
| t = 1.25μs or less | — | — | 200kpps | 200kpps | 100kpps | 10kpps |
| t = 2.5μs or less | — | — | — | 100kpps | 100kpps | 10kpps |
| t = 25μs or less | — | — | — | — | 10kpps | 10kpps |
| t = 500μs | — | — | — | — | — | 500pps |
| | | | | | | |

*Counting speed = 1/T (pps)



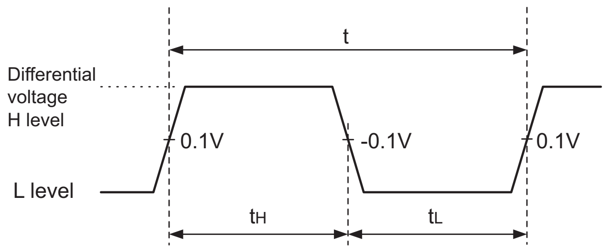
## 3.2.1 The input waveform and the phase difference between phase A pulse and phase B pulse

The count may be done incorrectly by inputting pulses whose phase difference is small between the phase A pulse and phase B pulse in 2-phase input.
The following figures show the pulse waveform to be input and the phase difference between the phase A pulse and phase B pulse. (Though the following are the cases for the differential input, they are also applied to the DC input.)
Though the following are the pulse waveform to be input and the phase difference measured at the maximum counting speed of each pulse input condition, they are also applied to the case measured at under the maximum counting speed.

### (1) Input waveform in 1-phase input

Input pulse waveform in 1-phase input must satisfy the condition shown below (the duty ratio is 50%).

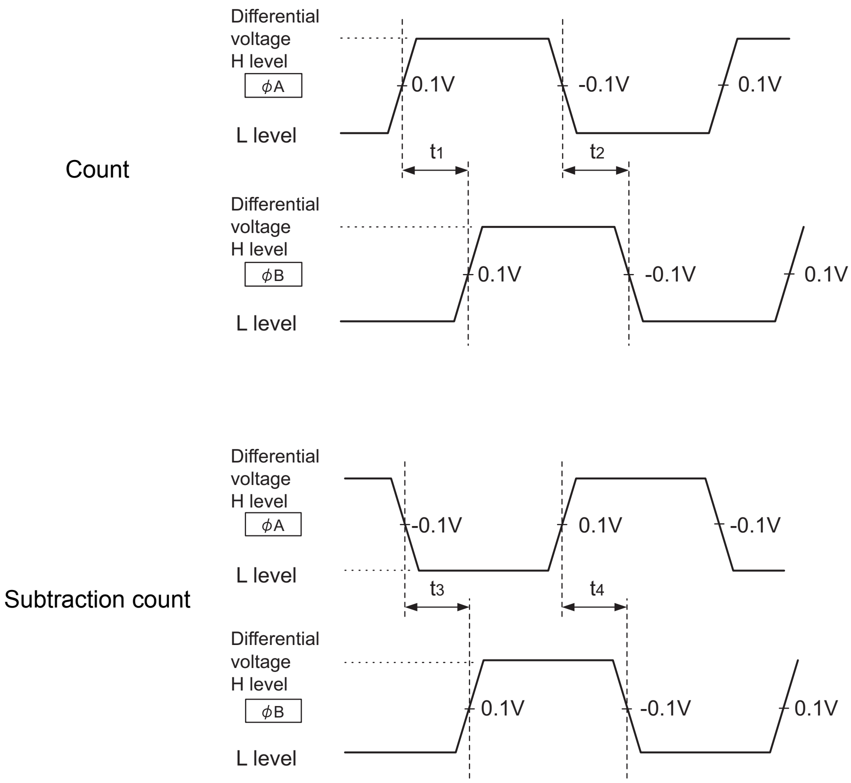
$t\ (= t_H + t_L) \geq 0.5\mu s$
$t_H, t_L \geq 0.25\mu s\ (= 0.5 \times t)$



## (2) Phase difference in 2-phase input

Input pulse waveform in 2-phase input must satisfy the above condition (the condition required for 1-phase input) and the conditions shown below.

$t_1, t_2, t_3, t_4 \geq 0.125\mu s$ (= 0.25 × t)

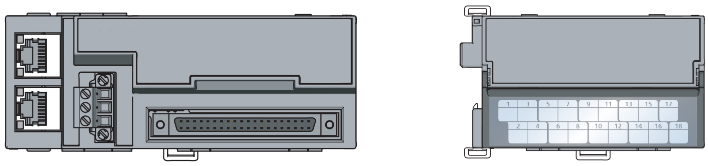


# 3.3 Calculating Current Consumption

The total current consumption of the modules is calculated by summing the module power supply current in the main module and extension module.
The power supply current in the extension module must be within 30mA.
For the value of the module power supply current, refer to the specifications of each module.

- Performance specifications of the high-speed counter module (Page 27, Section 3.2)
- Performance specifications of extension I/O module ( CC-Link IE Field Network Remote I/O Module User's Manual)

The value of the module power supply current in the extension module described in the specifications is the value of the module power supply current supplied from the main module.



# 3.4 Function List

The following table lists the functions of the high-speed counter module.

| Function name | Description | Operation mode*1 | Reference |
|---|---|---|---|
| Linear counter function | This function counts pulses between -2147483648 and 2147483647, and detects an overflow/underflow when the count value is outside the range. | Normal mode | Page 95, Section 8.2.1 |
| Ring counter function | This function repeatedly counts pulses between the upper limit value and lower limit value of the ring counter. | | Page 97, Section 8.2.2 |
| Comparison output function | This function compares the count value with the preset comparison condition, and outputs ON/OFF signals when they match. | | Page 102, Section 8.3 |
| Coincidence output function | This function compares the present count value with the preset coincidence detection point or a detection area and outputs ON/OFF signals from the coincidence output terminal when they match. | | Page 103, Section 8.3.2 |
| Preset/replace (at coincidence output) function | This function replaces the count value with any preset numerical value at the rising edge of Coincidence output 1 and 2. | | Page 114, Section 8.3.3 |
| Cam switch function | This function compares the count value with the preset output status (ON/OFF address) of the coincidence output, and outputs ON/OFF signals from the extension output module when they match.<br>The points for ON/OFF switch can be used up to 16 points.<br>An extension output module is required for using this function. | | Page 117, Section 8.3.4 |
| Preset/replace function | This function replaces the count value with any preset numerical value.<br>This function can be used with either of the following.<br>• CH□ Preset/replace command (RY21, RY39)<br>• CH□ Phase Z input terminal (Z1, Z2) of the connector for external devices | | Page 122, Section 8.4 |
| Latch counter function | This function acquires the count value and stores it in the remote register. | | — |
| Latch counter function by latch counter input terminal | This function stores the count value in the remote register.<br>• This function uses CH□ Latch counter input terminal (LATCH1, LATCH2) of the connector for external devices. | | Page 127, Section 8.5 |
| Latch counter function by counter function selection | This function stores the count value in the remote register.<br>This function can be used with either of the following.<br>• CH□ Selected counter function start command (RY25, RY3D)<br>• CH□ Function input terminal (FUNC1, FUNC2) of the connector for external devices | | Page 133, Section 8.8 |

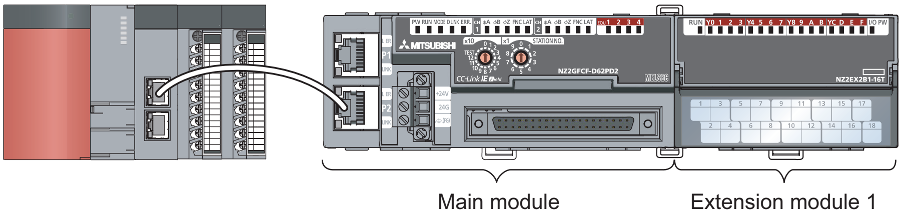
| Function name | | Description | Operation mode*1 | Reference |
|---|---|---|---|---|
| Counter function selection | | This function executes the counter function selection using both the program and CH□ Function input terminal (FUNC1, FUNC2) of the connector for external devices, or using either of them. | Normal mode | Page 129, Section 8.6 |
| | Count disable function | This function stops counting pulses while CH□ Count enable command (RY24, RY3C) is on. | | Page 131, Section 8.7 |
| | Latch counter function | This function acquires the count value and stores it in the remote register. | | Page 133, Section 8.8 |
| | Sampling counter function | This function counts pulses that are input during the preset sampling period. | | Page 136, Section 8.9 |
| | Periodic pulse counter function | This function stores the present value and difference value to the corresponding remote registers by the preset cycle time. | | Page 139, Section 8.10 |
| | Count disable/preset/replace function | According to the status change of CH□ Function input terminal (FUNC1, FUNC2) of the connector for external devices, this function executes the count disable function and preset/replace function without switching the functions. | | Page 142, Section 8.11 |
| | Latch counter/preset/replace function | According to the status change of CH□ Function input terminal (FUNC1, FUNC2) of the connector for external devices, this function executes the latch counter function and preset/replace function without switching the functions. | | Page 145, Section 8.12 |
| Frequency measurement function | | This function counts the pulses of the pulse input terminals in phase A and B, and automatically calculates the frequency. | Frequency measurement mode | Page 148, Section 8.13 |
| Rotation speed measurement function | | This function counts the pulses of the pulse input terminals in phase A and B, and automatically calculates the rotation speed. | Rotation speed measurement mode | Page 152, Section 8.14 |
| Pulse measurement function | | This function measures CH□ Function input terminal (FUNC1, FUNC2) or CH□ Latch counter input terminal (LATCH1, LATCH2) of the connector for external devices, and calculates the ON width. | Pulse measurement mode | Page 156, Section 8.15 |
| PWM output function | | This function outputs the specified PWM waveform from any coincidence output 1 to 4 terminals (EQU1 to EQU4). | PWM output mode | Page 160, Section 8.16 |
| Output HOLD/CLEAR setting function | | This function sets the output status of the extension output module (Y0 to YF) used as the output of Coincidence output (EQU1 to EQU4) and the cam switch function to HOLD or CLEAR. | Common to all modes | Page 167, Section 8.17 |
| Cyclic data update watch function | | This function monitors the cyclic data update interval. When the cyclic transmission remains to be stopped over the set watch time, this function holds or clears the value which is output just before. | | Page 168, Section 8.18 |
| Error notification function | | When a moderate error or a major error occurs in the high-speed counter module, this function notifies the master station of the error using the remote register and the remote input signal. | | Page 169, Section 8.19 |
| Function at the extension module installation | | One extension I/O module can be connected to one high-speed counter module.<br>The cam switch function can be used by connecting the extension I/O module. In addition, functions unique to the extension I/O module can be used. | | Page 172, Section 8.20 |
| CC-Link IE Field Network diagnostic function | | With this function, whether any network error occurs or not can be checked through GX Works2 connected to the CPU module. | | Page 175, Section 8.21 |

*1 The operation mode can be set in the parameter setting. For details, refer to the following.

Page 80, Section 7.1

# 3.5 List of Remote I/O Signals

This section lists I/O signals for a master/local module.
In the example of the I/O signal assignment described in this section, the remote I/O signals of the main module are assigned to the I/O numbers of RX0 to RX4F and RY0 to RY4F.
Remote input (RX) indicates the input signal from the high-speed counter module to the master/local module.
Remote output (RY) indicates the output signal from the master/local module to the high-speed counter module.
The remote I/O signals of the main module and extension module are assigned as shown below.




| Module | Remote input (RX) | Remote output (RY) |
|---|---|---|
| Main module | RX0 to RX4F | RY0 to RY4F |
| Extension module 1 | RX50 to RX5F | RY50 to RY5F |

For details on the remote I/O signals, refer to the following.

Page 236, Appendix 1

| Module type | Remote input signal direction: High-speed counter module → Master/local module | | Remote output signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|---|
| | Device number | Description | Device number | Description |
| Main module | RX0 | Use prohibited | RY0 | Use prohibited |
| | RX1 | Use prohibited | RY1 | Use prohibited |
| | RX2 | Use prohibited | RY2 | Use prohibited |
| | RX3 | Use prohibited | RY3 | Use prohibited |
| | RX4 | Use prohibited | RY4 | Use prohibited |
| | RX5 | Use prohibited | RY5 | Use prohibited |
| | RX6 | Use prohibited | RY6 | Use prohibited |
| | RX7 | Warning status flag | RY7 | Use prohibited |
| | RX8 | Initial data processing request flag | RY8 | Initial data processing completion flag |
| | RX9 | Initial data setting completion flag | RY9 | Initial data setting request flag |
| | RXA | Error status flag | RYA | Use prohibited |
| | RXB | Remote READY | RYB | Use prohibited |
| | RXC | Use prohibited | RYC | Use prohibited |
| | RXD | Use prohibited | RYD | Use prohibited |
| | RXE | Use prohibited | RYE | Use prohibited |
| | RXF | Use prohibited | RYF | Use prohibited |

| Module type | Remote input signal direction: High-speed counter module → Master/local module | | Remote output signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|---|
| | Device number | Description | Device number | Description |
| Main module | RX10 | Coincidence output 1 | RY10 | Reset command (Coincidence output 1) |
| | RX11 | Coincidence output 2 | RY11 | Reset command (Coincidence output 2) |
| | RX12 | Coincidence output 3 | RY12 | Reset command (Coincidence output 3) |
| | RX13 | Coincidence output 4 | RY13 | Reset command (Coincidence output 4) |
| | RX14 | Setting change completed (Coincidence output 1) | RY14 | Setting change request (Coincidence output 1) |
| | RX15 | Setting change completed (Coincidence output 2) | RY15 | Setting change request (Coincidence output 2) |
| | RX16 | Setting change completed (Coincidence output 3) | RY16 | Setting change request (Coincidence output 3) |
| | RX17 | Setting change completed (Coincidence output 4) | RY17 | Setting change request (Coincidence output 4) |
| | RX18 | Use prohibited | RY18 | Use prohibited |
| | RX19 | Use prohibited | RY19 | Use prohibited |
| | RX1A | Use prohibited | RY1A | Use prohibited |
| | RX1B | Use prohibited | RY1B | Use prohibited |
| | RX1C | Use prohibited | RY1C | Use prohibited |
| | RX1D | Use prohibited | RY1D | Use prohibited |
| | RX1E | Use prohibited | RY1E | Use prohibited |
| | RX1F | External power supply monitor state flag (for extension output module) | RY1F | External power supply monitor request flag (for extension output module) |
| | RX20 | Use prohibited | RY20 | CH1 Coincidence output enable command |
| | RX21 | CH1 Preset/replace completion | RY21 | CH1 Preset/replace command |
| | RX22 | Use prohibited | RY22 | CH1 Count down command |
| | RX23 | CH1 External preset/replace (Z Phase) request detection | RY23 | CH1 External preset/replace (Z Phase) request detection reset command |
| | RX24 | Use prohibited | RY24 | CH1 Count enable command |
| | RX25 | CH1 Counter function detection | RY25 | CH1 Selected counter function start command |
| | RX26 | CH1 Cam switch execute/PWM output | RY26 | CH1 Cam switch execute command/PWM output start command |
| | RX27 | CH1 Setting change completed (Sampling counter/Periodic pulse counter) | RY27 | CH1 Setting change request (Sampling counter/Periodic pulse counter) |
| | RX28 | CH1 Update flag reset completed (Latch count value/Sampling count value/Periodic pulse count value) | RY28 | CH1 Update flag reset command (Latch count value/Sampling count value/Periodic pulse count value) |
| | RX29 | CH1 Update flag (Latch count value/Sampling count value/Periodic pulse count value) | RY29 | Use prohibited |
| | RX2A | CH1 Latch count value update flag reset completed (Latch counter input terminal) | RY2A | CH1 Latch count value update flag reset command (Latch counter input terminal) |
| | RX2B | CH1 Latch count value update flag (Latch counter input terminal) | RY2B | Use prohibited |
| | RX2C | CH1 Update flag reset completed (Measured frequency value/Measured rotation speed value) | RY2C | CH1 Update flag reset command (Measured frequency value/Measured rotation speed value) |
| | RX2D | CH1 Update flag (Measured frequency value/Measured rotation speed value) | RY2D | Use prohibited |
| | RX2E | Use prohibited | RY2E | Use prohibited |
| | RX2F | Use prohibited | RY2F | Use prohibited |

| Module type | Remote input signal direction: High-speed counter module → Master/local module | | Remote output signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|---|
| | Device number | Description | Device number | Description |
| Main module | RX30 | Use prohibited | RY30 | CH1 Pulse measurement start command (Function input terminal) |
| | RX31 | CH1 Measured pulse value update flag reset completed (Function input terminal) | RY31 | CH1 Measured pulse value update flag reset command (Function input terminal) |
| | RX32 | CH1 Measured pulse value update flag (Function input terminal) | RY32 | CH1 Pulse measurement start command (Latch counter input terminal) |
| | RX33 | CH1 Measured pulse value update flag reset completed (Latch counter input terminal) | RY33 | CH1 Measured pulse value update flag reset command (Latch counter input terminal) |
| | RX34 | CH1 Measured pulse value update flag (Latch counter input terminal) | RY34 | Use prohibited |
| | RX35 | CH1 ON width setting change completed (PWM output) | RY35 | CH1 ON width setting change request (PWM output) |
| | RX36 | CH1 Error status | RY36 | CH1 Error reset command |
| | RX37 | CH1 Warning status | RY37 | Use prohibited |
| | RX38 | Use prohibited | RY38 | CH2 Coincidence output enable command |
| | RX39 | CH2 Preset/replace completion | RY39 | CH2 Preset/replace command |
| | RX3A | Use prohibited | RY3A | CH2 Count down command |
| | RX3B | CH2 External preset/replace (Z Phase) request detection | RY3B | CH2 External preset/replace (Z Phase) request detection reset command |
| | RX3C | Use prohibited | RY3C | CH2 Count enable command |
| | RX3D | CH2 Counter function detection | RY3D | CH2 Selected counter function start command |
| | RX3E | CH2 Cam switch execute/PWM output | RY3E | CH2 Cam switch execute command/PWM output start command |
| | RX3F | CH2 Setting change completed (Sampling counter/Periodic pulse counter) | RY3F | CH2 Setting change request (Sampling counter/Periodic pulse counter) |
| | RX40 | CH2 Update flag reset completed (Latch count value/Sampling count value/Periodic pulse count value) | RY40 | CH2 Update flag reset command (Latch count value/Sampling count value/Periodic pulse count value) |
| | RX41 | CH2 Update flag (Latch count value/Sampling count value/Periodic pulse count value) | RY41 | Use prohibited |
| | RX42 | CH2 Latch count value update flag reset completed (Latch counter input terminal) | RY42 | CH2 Latch count value update flag reset command (Latch counter input terminal) |
| | RX43 | CH2 Latch count value update flag (Latch counter input terminal) | RY43 | Use prohibited |
| | RX44 | CH2 Update flag reset completed (Measured frequency value/Measured rotation speed value) | RY44 | CH2 Update flag reset command (Measured frequency value/Measured rotation speed value) |
| | RX45 | CH2 Update flag (Measured frequency value/Measured rotation speed value) | RY45 | Use prohibited |
| | RX46 | Use prohibited | RY46 | Use prohibited |
| | RX47 | Use prohibited | RY47 | Use prohibited |

| Module type | Remote input signal direction: High-speed counter module → Master/local module | | Remote output signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|---|
| | Device number | Description | Device number | Description |
| Main module | RX48 | Use prohibited | RY48 | CH2 Pulse measurement start command (Function input terminal) |
| | RX49 | CH2 Measured pulse value update flag reset completed (Function input terminal) | RY49 | CH2 Measured pulse value update flag reset command (Function input terminal) |
| | RX4A | CH2 Measured pulse value update flag (Function input terminal) | RY4A | CH2 Pulse measurement start command (Latch counter input terminal) |
| | RX4B | CH2 Measured pulse value update flag reset completed (Latch counter input terminal) | RY4B | CH2 Measured pulse value update flag reset command (Latch counter input terminal) |
| | RX4C | CH2 Measured pulse value update flag (Latch counter input terminal) | RY4C | Use prohibited |
| | RX4D | CH2 ON width setting change completed (PWM output) | RY4D | CH2 ON width setting change request (PWM output) |
| | RX4E | CH2 Error status | RY4E | CH2 Error reset command |
| | RX4F | CH2 Warning status | RY4F | Use prohibited |
| Extension module 1 | RX50 to RX5F | Remote input (RX) of the connected extension module is assigned. | RY50 to RY5F | Remote output (RY) of the connected extension module is assigned. |

**Point**

Do not use any "Use prohibited" remote I/O signals. If any of the signals are used, correct operation of the module cannot be guaranteed.

## (1) Remote I/O signal of the extension module

The remote I/O signal differs depending on the model of the extension module.

- Extension I/O module

  Refer to the following.

  CC-Link IE Field Network Remote I/O Module User's Manual

# 3.6 List of Remote Register

This section lists remote registers for a master/local module.
In the example of the remote register assignment described in this section, the remote registers of the main module are assigned to the remote registers of RWr0 to RWr3F and RWw0 to RWw3F.
The remote registers are assigned per station regardless of the main module or the extension module.
Remote register (RWr) is the information input from the high-speed counter module to the master/local module.
Remote register (RWw) is the information output from the master/local module to the high-speed counter module.
For details on the remote register, refer to the following.

☞ Page 255, Appendix 2

| Remote register (RWr) signal direction: High-speed counter module → Master/local module | | Remote register (RWw) signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|
| **Device number** | **Description** | **Device number** | **Description** |
| RWr0 | Counter value greater/smaller signal | RWw0 | Point setting (Coincidence output 1)/ Lower limit value setting (Coincidence output 1) |
| RWr1 | EQU1 to EQU4 terminal status | RWw1 | |
| RWr2 | Cam switch output signal | RWw2 | Upper limit value setting (Coincidence output 1) |
| RWr3 | Cam switch output terminal status | RWw3 | |
| RWr4 | Use prohibited | RWw4 | Point setting (Coincidence output 2)/ Lower limit value setting (Coincidence output 2) |
| RWr5 | Use prohibited | RWw5 | |
| RWr6 | Use prohibited | RWw6 | Upper limit value setting (Coincidence output 2) |
| RWr7 | Use prohibited | RWw7 | |
| RWr8 | Use prohibited | RWw8 | Point setting (Coincidence output 3)/ Lower limit value setting (Coincidence output 3) |
| RWr9 | Use prohibited | RWw9 | |
| RWrA | Use prohibited | RWwA | Upper limit value setting (Coincidence output 3) |
| RWrB | Use prohibited | RWwB | |
| RWrC | Use prohibited | RWwC | Point setting (Coincidence output 4)/ Lower limit value setting (Coincidence output 4) |
| RWrD | Use prohibited | RWwD | |
| RWrE | Use prohibited | RWwE | Upper limit value setting (Coincidence output 4) |
| RWrF | Use prohibited | RWwF | |
| RWr10 | CH1 Present value | RWw10 | CH1 Ring counter lower limit value |
| RWr11 | | RWw11 | |
| RWr12 | CH1 Latch count value/Sampling count value/Periodic pulse count, difference value | RWw12 | CH1 Ring counter upper limit value |
| RWr13 | | RWw13 | |
| RWr14 | CH1 Periodic pulse count, present value | RWw14 | CH1 Preset value setting |
| RWr15 | | RWw15 | |
| RWr16 | CH1 Periodic pulse count value update check | RWw16 | CH1 Time unit setting (Sampling counter/Periodic pulse counter) |
| RWr17 | | RWw17 | CH1 Cycle setting (Sampling counter/Periodic pulse counter) |
| RWr18 | CH1 Latch count value (Latch counter input terminal) | RWw18 | CH1 Time unit setting (Frequency measurement/Rotation speed measurement) |
| RWr19 | | RWw19 | CH1 Moving average count (Frequency measurement/Rotation speed measurement) |
| RWr1A | CH1 Measured frequency value/Measured rotation speed value | RWw1A | CH1 Number of pulses per rotation |
| RWr1B | | RWw1B | |
| RWr1C | CH1 Measured pulse value (Function input terminal) | RWw1C | Use prohibited |
| RWr1D | | RWw1D | CH1 PWM output assignment setting |

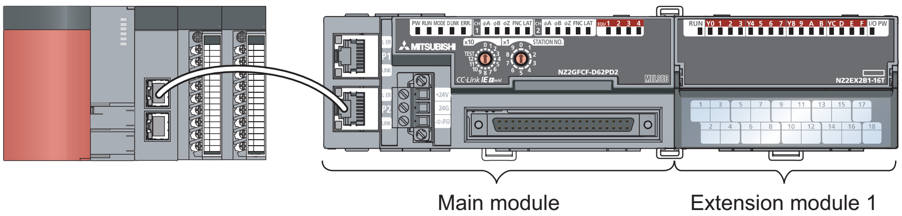
| Remote register (RWr) signal direction: High-speed counter module → Master/local module | | Remote register (RWw) signal direction: Master/local module → High-speed counter module | |
|---|---|---|---|
| Device number | Description | Device number | Description |
| RWr1E | CH1 Measured pulse value (Latch counter input terminal) | RWw1E | CH1 ON width setting (PWM output) |
| RWr1F | | RWw1F | |
| RWr20 | CH1 Status | RWw20 | CH1 Cycle setting (PWM output) |
| RWr21 | CH1 External input status | RWw21 | |
| RWr22 | CH1 Latest error code | RWw22 | Use prohibited |
| RWr23 | CH1 Latest warning code | RWw23 | Use prohibited |
| RWr24 | Use prohibited | RWw24 | Use prohibited |
| RWr25 | Use prohibited | RWw25 | Use prohibited |
| RWr26 | Use prohibited | RWw26 | Use prohibited |
| RWr27 | Use prohibited | RWw27 | Use prohibited |
| RWr28 | CH2 Present value | RWw28 | CH2 Ring counter lower limit value |
| RWr29 | | RWw29 | |
| RWr2A | CH2 Latch count value/Sampling count value/ Periodic pulse count, difference value | RWw2A | CH2 Ring counter upper limit value |
| RWr2B | | RWw2B | |
| RWr2C | CH2 Periodic pulse count, present value | RWw2C | CH2 Preset value setting |
| RWr2D | | RWw2D | |
| RWr2E | CH2 Periodic pulse count value update check | RWw2E | CH2 Time unit setting (Sampling counter/Periodic pulse counter) |
| RWr2F | | RWw2F | CH2 Cycle setting (Sampling counter/Periodic pulse counter) |
| RWr30 | CH2 Latch count value (Latch counter input terminal) | RWw30 | CH2 Time unit setting (Frequency measurement/Rotation speed measurement) |
| RWr31 | | RWw31 | CH2 Moving average count (Frequency measurement/Rotation speed measurement) |
| RWr32 | CH2 Measured frequency value/ Measured rotation speed value | RWw32 | CH2 Number of pulses per rotation |
| RWr33 | | RWw33 | |
| RWr34 | CH2 Measured pulse value (Function input terminal) | RWw34 | Use prohibited |
| RWr35 | | RWw35 | CH2 PWM output assignment setting |
| RWr36 | CH2 Measured pulse value (Latch counter input terminal) | RWw36 | CH2 ON width setting (PWM output) |
| RWr37 | | RWw37 | |
| RWr38 | CH2 Status | RWw38 | CH2 Cycle setting (PWM output) |
| RWr39 | CH2 External input status | RWw39 | |
| RWr3A | CH2 Latest error code | RWw3A | Use prohibited |
| RWr3B | CH2 Latest warning code | RWw3B | Use prohibited |
| RWr3C | Use prohibited | RWw3C | Use prohibited |
| RWr3D | Use prohibited | RWw3D | Use prohibited |
| RWr3E | Use prohibited | RWw3E | Use prohibited |
| RWr3F | Use prohibited | RWw3F | Use prohibited |

**Point**

Do not read or write the data to/from any "Use prohibited" remote registers. If the data is read or written from/to any of the registers, correct operation of the module cannot be guaranteed.
The remote register information is not stored in the nonvolatile memory of the high-speed counter module. Thus, the remote register information is initialized by turning off then on the power supply of the high-speed counter module.

# 3.7 List of Remote Buffer Memory

This section lists remote buffer memory areas of the high-speed counter module.
The remote buffer memory areas of the main module and extension module are assigned as shown below.




Ex. Example of the remote buffer memory in the manual

Coincidence output comparison condition setting (address: 0102H)
Setting item
Address of a high-speed counter module

For details on the remote buffer memory, refer to the following.

- Details of Remote Buffer Memory Addresses (Page 267, Appendix 3)

For details on the remote buffer memory of the connected extension module, refer to the following.

- User's manual for the connected extension module

○: Available ×: Unavailable

| Buffer memory address | | Area | Description | | Access method | |
|---|---|---|---|---|---|---|
| Decimal | Hexadecimal | | | | CC IE Field configuration of GX Works2 | REMFR instruction, REMTO instruction*1 |
| 0 to 255 | $0000_H$ to $00FF_H$ | Parameter area | Station-based parameter data | | ○*2 | ○ |
| 256 to 511 | $0100_H$ to $01FF_H$ | | Module-based parameter data | Main module | | |
| 512 to 767 | $0200_H$ to $02FF_H$ | | | Extension module 1 | | |
| 768 to 1279 | $0300_H$ to $04FF_H$ | | | System area | | |
| 1280 to 1535 | $0500_H$ to $05FF_H$ | Monitoring area | System area | | × | ○ |
| 1536 to 1791 | $0600_H$ to $06FF_H$ | | Module-based monitoring data | Main module | | |
| 1792 to 2047 | $0700_H$ to $07FF_H$ | | | Extension module 1 | | |
| 2048 to 2559 | $0800_H$ to $09FF_H$ | | | System area | | |
| 2560 to 4095 | $0A00_H$ to $0FFF_H$ | Error history area | Station-based error history data | | ○*2 | ○ |
| 4096 to 4351 | $1000_H$ to $10FF_H$ | Module control data area | Station-based control data | | × | ○ |
| 4352 to 4607 | $1100_H$ to $11FF_H$ | | Module-based control data | System area | | |
| 4608 to 4863 | $1200_H$ to $12FF_H$ | | | Extension module 1 | | |
| 4864 to 5375 | $1300_H$ to $14FF_H$ | | | System area | | |
| 5376 to 8191 | $1500_H$ to $1FFF_H$ | Extended parameter area | Cam switch function parameter data | | × | ○ |

*1 For the REMFR and REMTO instructions, refer to the following.
User's manual for the master/local module used
*2 For the access method, refer to the following.
• Parameter area (Page 80, Section 7.1)
• Error history area (Page 205, Section 11.1)

**Point**

Do not access the system area using the REMFR or REMTO instruction. Doing so may cause the module to malfunction.

## (1) Parameter area (address: $0000_H$ to $04FF_H$)

For the parameter area, parameters can be set using the CC IE Field configuration of GX Works2 or using the REMTO instruction.
The parameter in the parameter area is backed up to the nonvolatile memory.
The parameter backed up to the nonvolatile memory is read to the parameter area when the module power supply is turned off then on or the module returns from remote reset.

If the parameter is written from the parameter setting of the CC IE Field configuration of GX Works2, it is also written to the nonvolatile memory at that time. When the parameter is written using the REMTO instruction, it is written to the nonvolatile memory when Initial data setting request flag (RY9) is turned off then on. At this time, the parameter is written to the nonvolatile memory even though it is incorrect. When the power supply is turned off then on with an incorrect parameter written, the incorrect parameter is read from the nonvolatile memory and an error code is stored to CH□ Latest error code (RWr22, RWr3A). Take corrective action according to the error code list. (Page 208, Section 11.2)

| Type | Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | |
| Station-based parameter data | 0 | $0000_H$ | System area | — | — |
| | 1 | $0001_H$ | Input response time setting | $0005_H$ | R/W |
| | 2 | $0002_H$ | Output HOLD/CLEAR setting | $0000_H$ | R/W |
| | 3 | $0003_H$ | Cyclic data update watch time setting | 0 | R/W |
| | 4 to 255 | $0004_H$ to $00FF_H$ | System area | — | — |
| Module-based parameter data (main module) | 256 | $0100_H$ | Comparison output setting | 0 | R/W |
| | 257 | $0101_H$ | Coincidence output channel assignment setting | $0000_H$ | R/W |
| | 258 | $0102_H$ | Coincidence output comparison condition setting | $0000_H$ | R/W |
| | 259 | $0103_H$ | Preset/replace setting at coincidence output | $0000_H$ | R/W |
| | 260 | $0104_H$ | Cam switch output unit assignment setting | 0 | R/W |
| | 261 | $0105_H$ | Cam switch output channel assignment setting | $0000_H$ | R/W |
| | 262 to 287 | $0106_H$ to $011F_H$ | System area | — | — |
| | 288 | $0120_H$ | CH1 Operation mode setting | 0 | R/W |
| | 289 | $0121_H$ | CH1 Count source selection | 0 | R/W |
| | 290 | $0122_H$ | CH1 Pulse input mode | 0 | R/W |
| | 291 | $0123_H$ | CH1 Counting speed setting | 0 | R/W |
| | 292 | $0124_H$ | CH1 Counter format | 0 | R/W |
| | 293 | $0125_H$ | CH1 Phase Z setting | $0000_H$ | R/W |
| | 294 | $0126_H$ | CH1 Counter function selection | 0 | R/W |
| | 295 | $0127_H$ | CH1 Function input logic setting | 0 | R/W |

| Type | Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | |
| Module-based parameter data (main module) | 296 | $0128_H$ | CH1 Latch counter input logic setting | 0 | R/W |
| | 297 | $0129_H$ | CH1 External control input response time setting | $002A_H$ | R/W |
| | 298 | $012A_H$ | CH1 Pulse measurement setting (Function input terminal) | 0 | R/W |
| | 299 | $012B_H$ | CH1 Pulse measurement setting (Latch counter input terminal) | 0 | R/W |
| | 300 to 319 | $012C_H$ to $013F_H$ | System area | — | — |
| | 320 | $0140_H$ | CH2 Operation mode setting | 0 | R/W |
| | 321 | $0141_H$ | CH2 Count source selection | 0 | R/W |
| | 322 | $0142_H$ | CH2 Pulse input mode | 0 | R/W |
| | 323 | $0143_H$ | CH2 Counting speed setting | 0 | R/W |
| | 324 | $0144_H$ | CH2 Counter format | 0 | R/W |
| | 325 | $0145_H$ | CH2 Phase Z setting | $0000_H$ | R/W |
| | 326 | $0146_H$ | CH2 Counter function selection | 0 | R/W |
| | 327 | $0147_H$ | CH2 Function input logic setting | 0 | R/W |
| | 328 | $0148_H$ | CH2 Latch counter input logic setting | 0 | R/W |
| | 329 | $0149_H$ | CH2 External control input response time setting | $002A_H$ | R/W |
| | 330 | $014A_H$ | CH2 Pulse measurement setting (Function input terminal) | 0 | R/W |
| | 331 | $014B_H$ | CH2 Pulse measurement setting (Latch counter input terminal) | 0 | R/W |
| | 332 to 511 | $014C_H$ to $01FF_H$ | System area | — | — |
| Module-based parameter data (extension module 1) | 512 to 767 | $0200_H$ to $02FF_H$ | The remote buffer memory of the connected extension module is assigned. | — | — |
| — | 768 to 1279 | $0300_H$ to $04FF_H$ | System area | — | — |

*1 This is the value at default or initialization by Parameter area initialization command (address: $1002_H$).

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

**Point**

To activate the parameter data, turn off then on Initial data setting request flag (RY9). Writing the parameter data to the parameter area does not activate the parameter data.

### (a) Parameter area of the extension module

The remote buffer memory differs depending on the model of the extension module.

- Extension input module (NZ2EX2B1-16D)

| Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|
| Decimal | Hexadecimal | | | |
| 512 | $0200_H$ | Extension module identification code | $0000_H$ | R/W |
| 513 to 767 | $0201_H$ to $02FF_H$ | System area | — | — |

*1 This is the value at default or initialization by Parameter area initialization command (address: $1002_H$).

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

- Extension output module (NZ2EX2B1-16T)

| Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|
| Decimal | Hexadecimal | | | |
| 512 | $0200_H$ | Extension module identification code | $0000_H$ | R/W |
| 513 | $0201_H$ | System area | — | — |
| 514 | $0202_H$ | Number of ON times integration function enable | $0000_H$ | R/W |
| 515 to 767 | $0203_H$ to $02FF_H$ | System area | — | — |

*1 This is the value at default or initialization by Parameter area initialization command (address: $1002_H$).

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

## (2) Monitoring area (address: $0500_H$ to $09FF_H$)

| Type | Address | | Name | Default[*1] | Read/ Write[*2] |
|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | |
| Station-based monitoring data | 1280 to 1535 | $0500_H$ to $05FF_H$ | System area | — | — |
| Module-based monitoring data (main module) | 1536 | $0600_H$ | Channel assignment (Coincidence output 1 to 4) | $0000_H$ | R |
| | 1537 to 1567 | $0601_H$ to $061F_H$ | System area | — | — |
| | 1568 | $0620_H$ | CH1 Operation mode | 0 | R |
| | 1569 | $0621_H$ | CH1 Selected counter function | 0 | R |
| | 1570 to 1599 | $0622_H$ to $063F_H$ | System area | — | — |
| | 1600 | $0640_H$ | CH2 Operation mode | 0 | R |
| | 1601 | $0641_H$ | CH2 Selected counter function | 0 | R |
| | 1602 to 1791 | $0642_H$ to $06FF_H$ | System area | — | — |
| Module-based monitoring data (extension module 1) | 1792 to 2047 | $0700_H$ to $07FF_H$ | The remote buffer memory of the connected extension module is assigned. | — | — |
| — | 2048 to 2559 | $0800_H$ to $09FF_H$ | System area | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

### (a) Monitoring area of the extension module

The remote buffer memory differs depending on the model of the extension module.

- Extension input module (NZ2EX2B1-16D)

| Address | | Description | Default*1 | Read/Write*2 |
|---|---|---|---|---|
| Decimal | Hexadecimal | | | |
| 1792 | $0700_H$ | Extension module identification code | $0000_H$ | R |
| 1793 to 2047 | $0701_H$ to $07FF_H$ | System area | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.
*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

- Extension output module (NZ2EX2B1-16T)

| Address | | Description | | Default*1 | Read/Write*2 |
|---|---|---|---|---|---|
| Decimal | Hexadecimal | | | | |
| 1792 | $0700_H$ | Extension module identification code | | $0000_H$ | R |
| 1793 to 1807 | $0701_H$ to $070F_H$ | System area | | — | — |
| 1808 to 1809 | $0710_H$ to $0711_H$ | Number of ON times integration value | Y0 | 0 | R |
| 1810 to 1811 | $0712_H$ to $0713_H$ | | Y1 | 0 | R |
| 1812 to 1813 | $0714_H$ to $0715_H$ | | Y2 | 0 | R |
| 1814 to 1815 | $0716_H$ to $0717_H$ | | Y3 | 0 | R |
| 1816 to 1817 | $0718_H$ to $0719_H$ | | Y4 | 0 | R |
| 1818 to 1819 | $071A_H$ to $071B_H$ | | Y5 | 0 | R |
| 1820 to 1821 | $071C_H$ to $071D_H$ | | Y6 | 0 | R |
| 1822 to 1823 | $071E_H$ to $071F_H$ | | Y7 | 0 | R |
| 1824 to 1825 | $0720_H$ to $0721_H$ | | Y8 | 0 | R |
| 1826 to 1827 | $0722_H$ to $0723_H$ | | Y9 | 0 | R |
| 1828 to 1829 | $0724_H$ to $0725_H$ | | YA | 0 | R |
| 1830 to 1831 | $0726_H$ to $0727_H$ | | YB | 0 | R |
| 1832 to 1833 | $0728_H$ to $0729_H$ | | YC | 0 | R |
| 1834 to 1835 | $072A_H$ to $072B_H$ | | YD | 0 | R |
| 1836 to 1837 | $072C_H$ to $072D_H$ | | YE | 0 | R |
| 1838 to 1839 | $072E_H$ to $072F_H$ | | YF | 0 | R |
| 1840 to 2047 | $0730_H$ to $07FF_H$ | System area | | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.
*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

**Point**

Number of ON times integration value Y0 to Number of ON times integration value YF are written to a nonvolatile memory in the specified cycle.

### (3) Error history area (address: $0A00_H$ to $0FFF_H$)

| Type | Address |  | Description |  | Default[*1] | Read/ Write[*2] |
|---|---|---|---|---|---|---|
|  | Decimal | Hexadecimal |  |  |  |  |
| Station-based error history data | 2560 | $0A00_H$ | Error history 1 | Error code | $0000_H$ | R |
|  | 2561 | $0A01_H$ |  | Order of generation | $0000_H$ | R |
|  | 2562 | $0A02_H$ |  | [Error time] First two digits of the year/Last two digits of the year | $0000_H$ | R |
|  | 2563 | $0A03_H$ |  | [Error time] Month/Day | $0000_H$ | R |
|  | 2564 | $0A04_H$ |  | [Error time] Hour/Minute | $0000_H$ | R |
|  | 2565 | $0A05_H$ |  | [Error time] Second/$00_H$ (Fixed) | $0000_H$ | R |
|  | 2566 | $0A06_H$ |  | Error code details 1 | $0000_H$ | R |
|  | 2567 | $0A07_H$ |  | Error code details 2 | $0000_H$ | R |
|  | 2568 | $0A08_H$ |  | Error code details 3 | $0000_H$ | R |
|  | 2569 | $0A09_H$ |  | Error code details 4 | $0000_H$ | R |
|  | 2570 | $0A0A_H$ |  | Error code details 5 | $0000_H$ | R |
|  | 2571 | $0A0B_H$ |  | Error code details 6 | $0000_H$ | R |
|  | 2572 | $0A0C_H$ |  | Error code details 7 | $0000_H$ | R |
|  | 2573 | $0A0D_H$ |  | Error code details 8 | $0000_H$ | R |
|  | 2574 | $0A0E_H$ |  | Error code details 9 | $0000_H$ | R |
|  | 2575 | $0A0F_H$ |  | Error code details 10 | $0000_H$ | R |
| Station-based error history data | 2576 to 2591 | $0A10_H$ to $0A1F_H$ | Error history 2 | Same as Error history 1. |  |  |
|  | 2592 to 2607 | $0A20_H$ to $0A2F_H$ | Error history 3 | Same as Error history 1. |  |  |
|  | 2608 to 2623 | $0A30_H$ to $0A3F_H$ | Error history 4 | Same as Error history 1. |  |  |
|  | 2624 to 2639 | $0A40_H$ to $0A4F_H$ | Error history 5 | Same as Error history 1. |  |  |
|  | 2640 to 2655 | $0A50_H$ to $0A5F_H$ | Error history 6 | Same as Error history 1. |  |  |
|  | 2656 to 2671 | $0A60_H$ to $0A6F_H$ | Error history 7 | Same as Error history 1. |  |  |
|  | 2672 to 2687 | $0A70_H$ to $0A7F_H$ | Error history 8 | Same as Error history 1. |  |  |
|  | 2688 to 2703 | $0A80_H$ to $0A8F_H$ | Error history 9 | Same as Error history 1. |  |  |
|  | 2704 to 2719 | $0A90_H$ to $0A9F_H$ | Error history 10 | Same as Error history 1. |  |  |
|  | 2720 to 2735 | $0AA0_H$ to $0AAF_H$ | Error history 11 | Same as Error history 1. |  |  |
|  | 2736 to 2751 | $0AB0_H$ to $0ABF_H$ | Error history 12 | Same as Error history 1. |  |  |
|  | 2752 to 2767 | $0AC0_H$ to $0ACF_H$ | Error history 13 | Same as Error history 1. |  |  |
|  | 2768 to 2783 | $0AD0_H$ to $0ADF_H$ | Error history 14 | Same as Error history 1. |  |  |
|  | 2784 to 2799 | $0AE0_H$ to $0AEF_H$ | Error history 15 | Same as Error history 1. |  |  |
|  | 2800 to 4095 | $0AF0_H$ to $0FFF_H$ | System area |  | — | — |

*1 This is the value at default or initialization by Error history clear command (address: $1000_H$).

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

**Point**

The error history area is written to a nonvolatile memory when an error occurs.

## (4) Module control data area (address: $1000_H$ to $14FF_H$)

| Type | Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | |
| Station-based control data | 4096 | $1000_H$ | Error history clear command | $0000_H$ | R/W |
| | 4097 | $1001_H$ | Error history clear completed | $0000_H$ | R |
| | 4098 | $1002_H$ | Parameter area initialization command | $0000_H$ | R/W |
| | 4099 | $1003_H$ | Parameter area initialization completed | $0000_H$ | R |
| | 4100 | $1004_H$ | Module operation information initialization command | $0000_H$ | R/W |
| | 4101 | $1005_H$ | Module operation information initialization completed | $0000_H$ | R |
| | 4102 to 4351 | $1006_H$ to $10FF_H$ | System area | — | — |
| Module-based control data (main module) | 4352 to 4607 | $1100_H$ to $11FF_H$ | System area | — | — |
| Module-based control data (extension module 1) | 4608 to 4863 | $1200_H$ to $12FF_H$ | The remote buffer memory of the connected extension module is assigned. | — | — |
| — | 4864 to 5375 | $1300_H$ to $14FF_H$ | System area | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.
*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

### (a) Module control data area of the extension module

The remote buffer memory differs depending on the model of the extension module.

- Extension input module (NZ2EX2B1-16D)

| Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|
| Decimal | Hexadecimal | | | |
| 4608 to 4863 | $1200_H$ to $12FF_H$ | System area | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.
*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

- Extension output module (NZ2EX2B1-16T)

| Address | | Description | Default*1 | Read/ Write*2 |
|---|---|---|---|---|
| Decimal | Hexadecimal | | | |
| 4608 | $1200_H$ | Number of ON times integration value clear Y0 to YF | $0000_H$ | R/W |
| 4609 | $1201_H$ | Number of ON times integration value clear completed Y0 to YF | $0000_H$ | R |
| 4610 to 4863 | $1202_H$ to $12FF_H$ | System area | — | — |

*1 This is the value for when the module power supply is turned off then on or at the remote reset.
*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

### (5) Extended parameter area (address: $1500_H$ to $1FFF_H$)

| Type | Address | | Description | | Default[*1] | Read/ Write[*2] |
|---|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | | |
| Cam switch function parameter data | 5376 | $1500_H$ | Cam switch function, step type (Output 1) | | 0 | R/W |
| | 5377 | $1501_H$ | Cam switch function, number of steps (Output 1) | | 0 | R/W |
| | 5378 to 5379 | $1502_H$ to $1503_H$ | Cam switch function, step No.1 setting (Output 1) | | 0 | R/W |
| | 5380 to 5381 | $1504_H$ to $1505_H$ | Cam switch function, step No.2 setting (Output 1) | | 0 | R/W |
| | 5382 to 5383 | $1506_H$ to $1507_H$ | Cam switch function, step No.3 setting (Output 1) | | 0 | R/W |
| | 5384 to 5385 | $1508_H$ to $1509_H$ | Cam switch function, step No.4 setting (Output 1) | | 0 | R/W |
| | 5386 to 5387 | $150A_H$ to $150B_H$ | Cam switch function, step No.5 setting (Output 1) | | 0 | R/W |
| | 5388 to 5389 | $150C_H$ to $150D_H$ | Cam switch function, step No.6 setting (Output 1) | | 0 | R/W |
| | 5390 to 5391 | $150E_H$ to $150F_H$ | Cam switch function, step No.7 setting (Output 1) | | 0 | R/W |
| | 5392 to 5393 | $1510_H$ to $1511_H$ | Cam switch function, step No.8 setting (Output 1) | | 0 | R/W |
| | 5394 to 5395 | $1512_H$ to $1513_H$ | Cam switch function, step No.9 setting (Output 1) | | 0 | R/W |
| | 5396 to 5397 | $1514_H$ to $1515_H$ | Cam switch function, step No.10 setting (Output 1) | | 0 | R/W |
| | 5398 to 5399 | $1516_H$ to $1517_H$ | Cam switch function, step No.11 setting (Output 1) | | 0 | R/W |
| | 5400 to 5401 | $1518_H$ to $1519_H$ | Cam switch function, step No.12 setting (Output 1) | | 0 | R/W |
| | 5402 to 5403 | $151A_H$ to $151B_H$ | Cam switch function, step No.13 setting (Output 1) | | 0 | R/W |
| | 5404 to 5405 | $151C_H$ to $151D_H$ | Cam switch function, step No.14 setting (Output 1) | | 0 | R/W |
| | 5406 to 5407 | $151E_H$ to $151F_H$ | Cam switch function, step No.15 setting (Output 1) | | 0 | R/W |
| | 5408 to 5409 | $1520_H$ to $1521_H$ | Cam switch function, step No.16 setting (Output 1) | | 0 | R/W |
| | 5410 to 5503 | $1522_H$ to $157F_H$ | System area | | — | — |
| | 5504 to 5537 | $1580_H$ to $15A1_H$ | Cam switch output 2 | Same as Cam switch output 1. | | |
| | 5538 to 5631 | $15A2_H$ to $15FF_H$ | System area | | — | — |
| | 5632 to 5665 | $1600_H$ to $1621_H$ | Cam switch output 3 | Same as Cam switch output 1. | | |
| | 5666 to 5759 | $1622_H$ to $167F_H$ | System area | | — | — |
| | 5760 to 5793 | $1680_H$ to $16A1_H$ | Cam switch output 4 | Same as Cam switch output 1. | | |
| | 5794 to 5887 | $16A2_H$ to $16FF_H$ | System area | | — | — |
| | 5888 to 5921 | $1700_H$ to $1721_H$ | Cam switch output 5 | Same as Cam switch output 1. | | |
| | 5922 to 6015 | $1722_H$ to $177F_H$ | System area | | — | — |

| Type | Address | | Description | | Default*1 | Read/ Write*2 |
|---|---|---|---|---|---|---|
| | Decimal | Hexadecimal | | | | |
| Cam switch function parameter data | 6016 to 6049 | $1780_H$ to $17A1_H$ | Cam switch output 6 | Same as Cam switch output 1. | | |
| | 6050 to 6143 | $17A2_H$ to $17FF_H$ | System area | | — | — |
| | 6144 to 6177 | $1800_H$ to $1821_H$ | Cam switch output 7 | Same as Cam switch output 1. | | |
| | 6178 to 6271 | $1822_H$ to $187F_H$ | System area | | — | — |
| | 6272 to 6305 | $1880_H$ to $18A1_H$ | Cam switch output 8 | Same as Cam switch output 1. | | |
| | 6306 to 6399 | $18A2_H$ to $18FF_H$ | System area | | — | — |
| | 6400 to 6433 | $1900_H$ to $1921_H$ | Cam switch output 9 | Same as Cam switch output 1. | | |
| | 6434 to 6527 | $1922_H$ to $197F_H$ | System area | | — | — |
| | 6528 to 6561 | $1980_H$ to $19A1_H$ | Cam switch output 10 | Same as Cam switch output 1. | | |
| | 6562 to 6655 | $19A2_H$ to $19FF_H$ | System area | | — | — |
| | 6656 to 6689 | $1A00_H$ to $1A21_H$ | Cam switch output 11 | Same as Cam switch output 1. | | |
| | 6690 to 6783 | $1A22_H$ to $1A7F_H$ | System area | | — | — |
| | 6784 to 6817 | $1A80_H$ to $1AA1_H$ | Cam switch output 12 | Same as Cam switch output 1. | | |
| | 6818 to 6911 | $1AA2_H$ to $1AFF_H$ | System area | | — | — |
| | 6912 to 6945 | $1B00_H$ to $1B21_H$ | Cam switch output 13 | Same as Cam switch output 1. | | |
| | 6946 to 7039 | $1B22_H$ to $1B7F_H$ | System area | | — | — |
| | 7040 to 7073 | $1B80_H$ to $1BA1_H$ | Cam switch output 14 | Same as Cam switch output 1. | | |
| | 7074 to 7167 | $1BA2_H$ to $1BFF_H$ | System area | | — | — |
| | 7168 to 7201 | $1C00_H$ to $1C21_H$ | Cam switch output 15 | Same as Cam switch output 1. | | |
| | 7202 to 7295 | $1C22_H$ to $1C7F_H$ | System area | | — | — |
| | 7296 to 7329 | $1C80_H$ to $1CA1_H$ | Cam switch output 16 | Same as Cam switch output 1. | | |
| | 7330 to 8191 | $1CA2_H$ to $1FFF_H$ | System area | | — | — |

*1 This is the value at default or initialization by Parameter area initialization command (address: $1002_H$).

*2 This shows whether read or write from programs is possible.
R: Readable
W: Writable

**Point**

The extended parameter data is written to a nonvolatile memory at the rising edge (off to on) of Initial data setting request flag (RY9) or when the parameters are set on the parameter setting window. However, the extended parameters cannot be set on the parameter setting window. Set the extended parameters from the program before setting parameters on the parameter setting window.
The activation timing of the extended parameter data differs depending on the data type. Refer to the pages where details of each data are described.

# CHAPTER 4 THE PROCEDURE BEFORE OPERATION

This section describes the procedure before operation.

Check box

☐ **Setting a station number**

Set the station number for a high-speed counter module.

Page 55, Section 6.1

☐ **Connection**

When using an extension module, connect the extension module to the high-speed counter module.
Mount the high-speed counter module to a DIN rail.

Page 56, Section 6.2,
Page 58, Section 6.3

☐ **Wiring**

Connect the high-speed counter module to a power supply, Ethernet cables, and external devices.

Page 63, Section 6.4,
Page 65, Section 6.5,
Page 68, Section 6.6

☐ **Parameter settings and programming**

Set parameters and create a program.

Page 80, Section 7.1
Page 86, Section 7.2.1*1

*1 To replace the module, refer to this section.

**Point**

To replace the module, follow the procedure described below.

- Stop the operation of the system and remove the high-speed counter module.
- Prepare a new high-speed counter module and perform the procedure above from "Setting a station number" to "Parameter settings and programming". (The network parameter of the master station does not need to be set again.)
- After checking the operation, restart the control.

4

## Memo

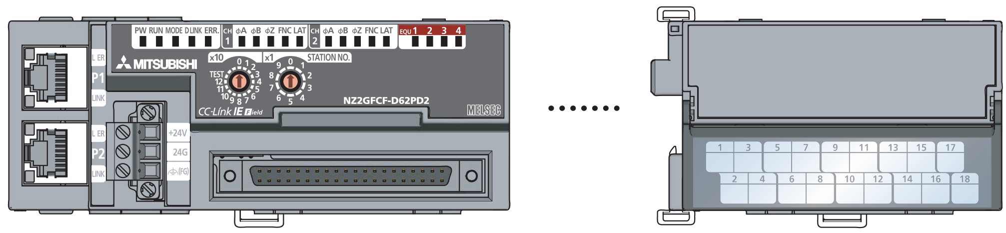
# CHAPTER 5 SYSTEM CONFIGURATION

This chapter describes system configuration using a high-speed counter module.
For CC-Link IE Field Network configuration, refer to the following.

User's manual for the master/local module used

## 5.1 High-Speed Counter Module System Configuration

The following shows system configuration using a high-speed counter module.



# 5.2 Applicable Systems

## (1) Applicable master station

When using a high-speed counter module, use the following products as a master station.

| Model | First five digits of serial number |
|---|---|
| QJ71GF11-T2 | "14102" or later |
| LJ71GF11-T2 | |

When a master station other than the above is used, the high-speed counter module cannot be used.

## (2) Connectable modules

One extension module can be connected to one high-speed counter module.

| Module | Model |
|---|---|
| Extension I/O module | NZ2EX2B1-16D |
| | NZ2EX2B1-16T |

## (3) Ethernet cable

For the specifications of the Ethernet cable, refer to the following.

User's manual for the master/local module used

## (4) Software package

GX Works2 is required for setting and diagnosing the high-speed counter module.

| Software | Version |
|---|---|
| GX Works2 | Version 1.98C or later |

# CHAPTER 6 INSTALLATION AND WIRING

This chapter describes the installation and wiring of the high-speed counter module.

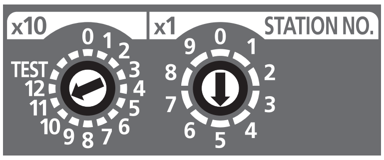
## 6.1 Station Number Setting

### (1) Setting procedure

Set the station number with the rotary switch on the front of the module. The setting value of the station number becomes valid when the module is powered on. Thus, set the station number when the module is powered off.

- The hundreds and tens places of the station number are set with x10.
- The ones place of the station number is set with x1.

Ex. To set the station number to 115, set the switch as shown below.




### (2) Setting range

Set the station number from 1 to 120. Setting the value other than 1 to 120 causes a communication error and the D LINK LED flashes.

Point

- Changing the station number setting switch while the module is powered on causes a minor error and flashes the ERR. LED.
  Returning the station number setting switch to the previous setting eliminates the error after five seconds and turns off the ERR. LED.
- Do not set a station number duplicated with other station numbers. If the station number is duplicated, a communication error occurs and the D LINK LED does not turn on.

# 6.2 Installation Environment and Installation Position

## 6.2.1 Installation environment

### (1) Installation location

Do not install the high-speed counter module to the place where:

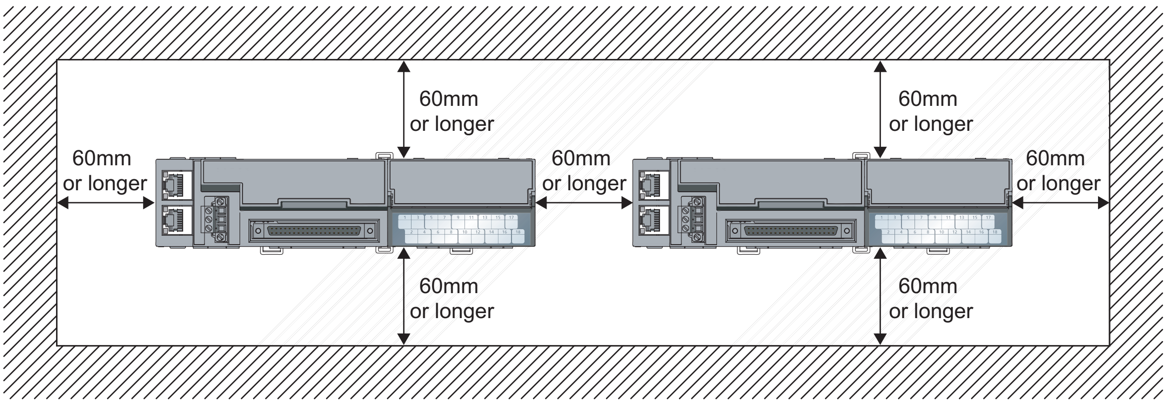
- Ambient temperature is outside the range of 0 to 55°C;
- Ambient humidity is outside the range of 5 to 95% RH;
- Condensation occurs due to rapid temperature change;
- Corrosive gas or combustible gas is present;
- Conductive powder such as dust and iron powder, oil mist, salinity, or organic solvent is filled;
- The high-speed counter module is exposed to direct sunlight;
- A strong electric field or strong magnetic field is generated; and
- The high-speed counter module is subject to vibration and shock.

### (2) Installation surface

Install the high-speed counter module on the flat surface. When the installation surface is uneven, excessive force is applied to the printed-circuit board and may cause a defect.

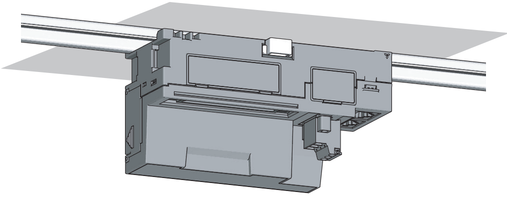
## 6.2.2 Installation position

When installing the high-speed counter module in a control panel, provide clearance of 60mm or longer between the module and the sides of the control panel or neighboring modules to ensure good ventilation and an easy module change.

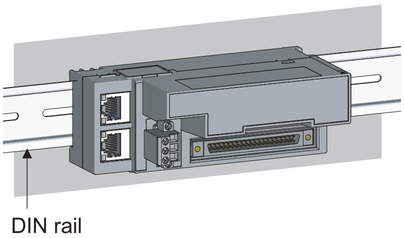


# 6.2.3 Installation direction

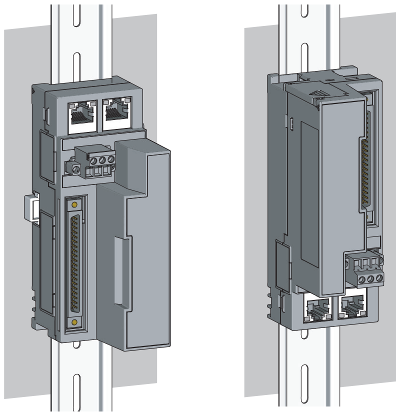
The high-speed counter module can be installed in six directions. Use the DIN rail to install the module.



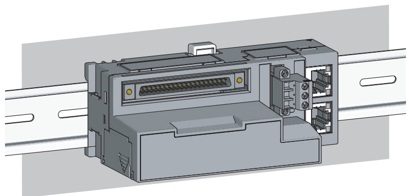
Downward installation



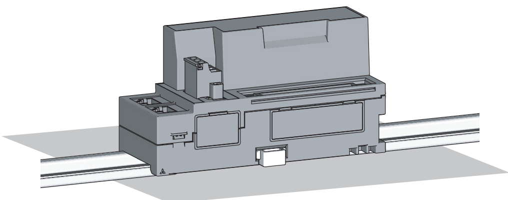

Horizontal installation



Vertical installation



Horizontal installation (upside down)

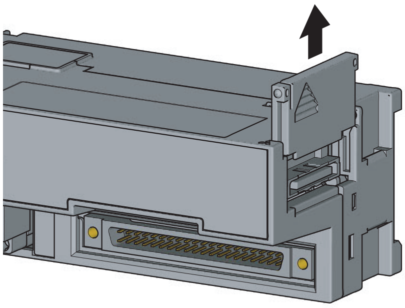


Upward installation

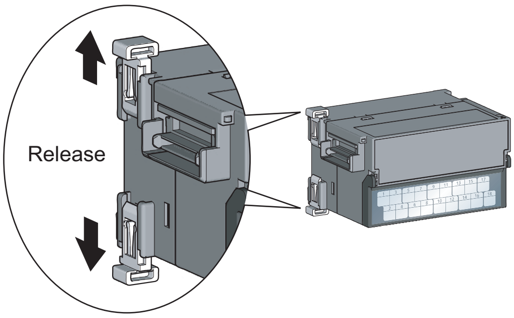
# 6.3 Installation

## 6.3.1 Connecting extension modules

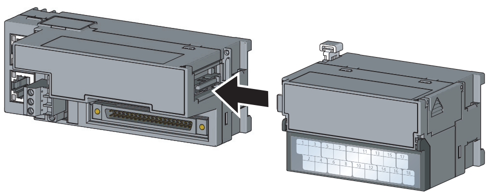
### (1) Connecting procedure



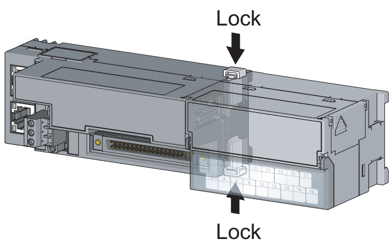
**1.** Remove the cover on the side of the module.
Do not dispose the removed cover, but store it.




**2.** Release the module joint levers (two points) on the side of the extension module. Slide the levers vertically.



**3.** Insert the connector of the extension module into that of the high-speed counter module so that they are securely engaged.




**4.** Lock the module joint levers (two points) on the side of the extension module. Slide the levers toward the module.
Check that the modules are securely connected.

### (2) Disconnecting procedure

Disconnect the modules by reversing the procedure above.

**Point**

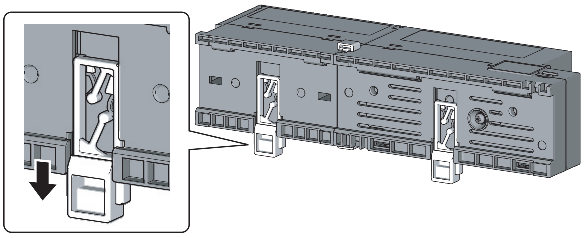
- Shut off the external power supply for the system in all phases before connecting or disconnecting extension modules.
- Lock the module joint levers securely. Failure to do so may cause malfunction, failure, or drop of the module.

## 6.3.2 Mounting the modules on a DIN rail

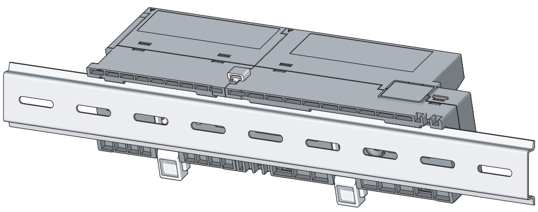
**Point**

An example of the use of the DIN rail stopper is described in the following procedure. Fix the module according to the manual of the DIN rail stopper used.

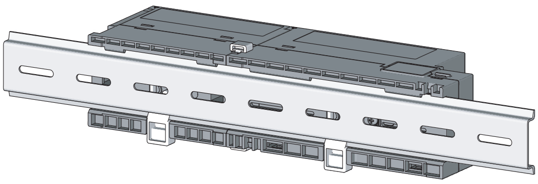
### (1) Mounting procedure



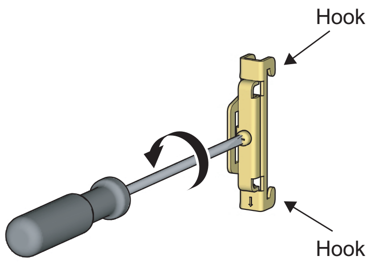
1. **Pull down all DIN rail hooks on the back of the modules.**
   The hook should be pulled down until it clicks.



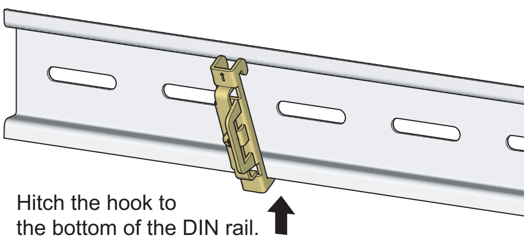
2. **Hang the upper tabs of the modules on a DIN rail, and push the modules in position.**



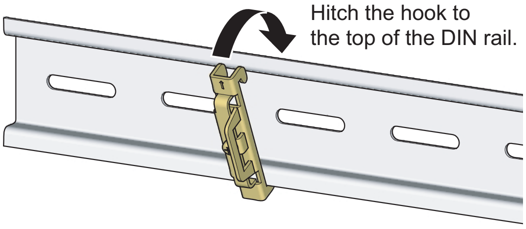
3. **Lock the DIN rail hooks to the DIN rail to secure the modules in position.**
   Push each hook up until it clicks. If the hooks are beyond the reach, use a tool such as a screwdriver.



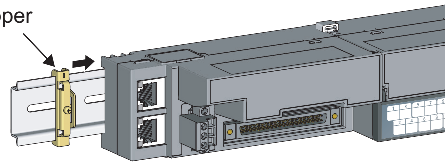

4. **Loosen the screw on DIN rail stopper.**



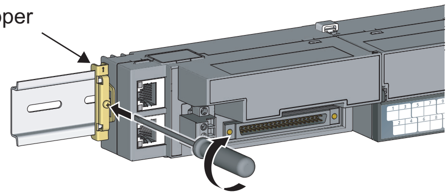

5. **Hitch the bottom hook of the DIN rail stopper to the bottom of the DIN rail.**
   Hitch the hook according to the orientation of the arrow on the front of the stopper.



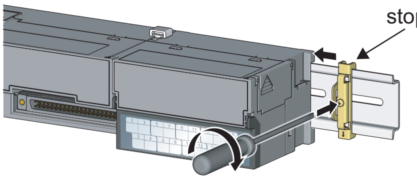

**6.** **Hitch the upper hook of the DIN rail stopper to the top of the DIN rail.**




**7.** **Slide the DIN rail stopper up to the left side of the modules.**



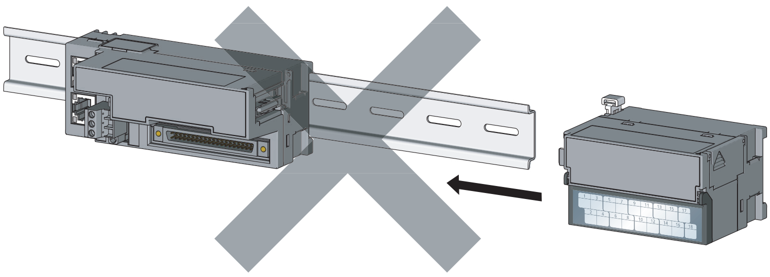

**8.** **Hold the DIN rail stopper in the direction opposite to the arrow on the stopper and tighten the screw with a screwdriver.**




**9.** **Install the DIN rail stopper on the right side of the module in the same procedure.**
Install the stopper upside down for the right side.

**Point**

- Do not slide modules from the edge of the DIN rail when mounting them. Doing so may damage the metal part located on the back of the module.



- Tighten the DIN rail mounting screws at intervals of 200mm or less.

### (2) Removal procedure

Remove the modules from the DIN rail by reversing the procedure above.

### (3) Applicable DIN rail model (compliant with IEC 60715)

- TH35-7.5Fe
- TH35-7.5Al

### (4) Interval between DIN rail mounting screws

Tighten the screws at intervals of 200mm or less.

### (5) DIN rail stopper

Use a stopper that is attachable to the DIN rail.

# 6.4 Wiring with Terminal Block for Module Power Supply and FG

## (1) Tightening torque

Tighten the terminal block screws within the following specified torque range.
Tightening the screws too much may damage the module case.

| Screw type | Tightening torque range |
|---|---|
| Terminal block mounting screw (M2.5 screw) | 0.2 to 0.3N•m |
| Terminal screw (M2.5 screw) | 0.5 to 0.6N•m |

## (2) Wire to be used

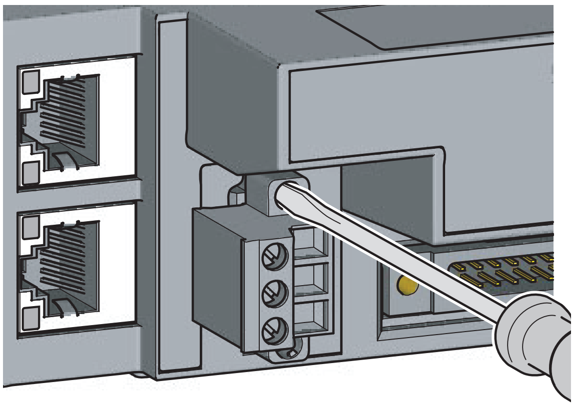
The following table describes the wire to be connected to the terminal block for module power supply and FG.

| Diameter | Type | Material | Temperature rating |
|---|---|---|---|
| 20 to 16 AWG | Stranded | Copper | 75°C or more |

For applicable solderless terminals, refer to the following.
Performance Specifications (Page 27, Section 3.2)

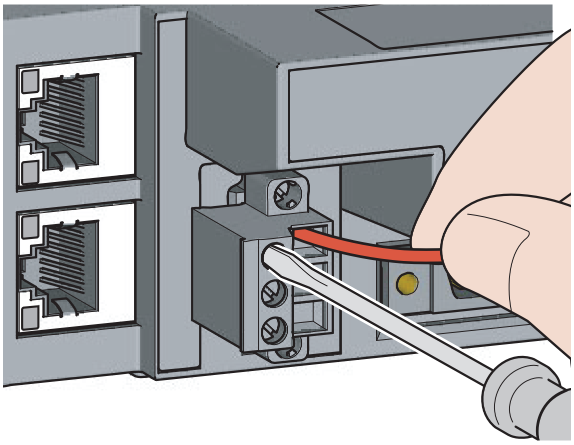
## (3) Installing and removing the terminal block

To remove the terminal block, loosen the terminal block mounting screw with a slotted screwdriver.
To install the terminal block, tighten the terminal block mounting screw.
Failure to secure the terminal block may cause drop, short circuit, malfunction.



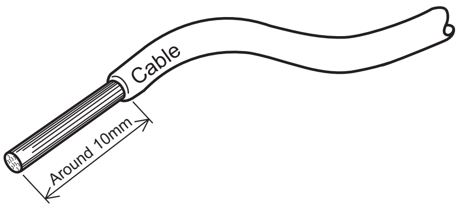
### (4) Connecting and disconnecting the cable

To connect the cable, insert the wire with the terminal screw loosened and tighten the screw. To disconnect the cable, pull out the wire with the terminal screw loosened with a slotted screwdriver.



### (5) Processing method of the cable terminal

Strip the cable about 10mm from the top.
To use a bar solderless terminal, connect it to the stripped part.



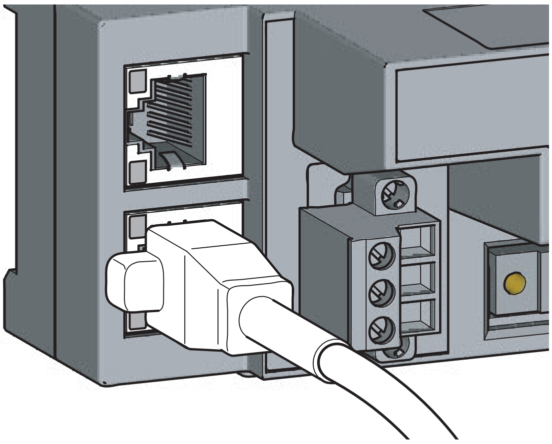
# 6.5 Wiring of Ethernet Cable

## (1) Connecting the Ethernet cable

### (a) Connecting

**1.** **Power off the power supplies of the high-speed counter module and the external device.**

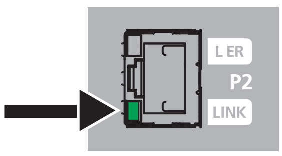
**2.** **Push the Ethernet cable connector into the high-speed counter module until it clicks. Pay attention to the connector's direction.**



**3.** **Power on the module.**

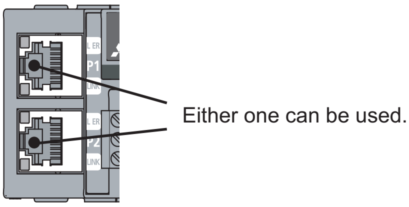
**4.** **Power on the external device.**

**5.** **Check that the LINK LED on the port into which the Ethernet cable is connected is on. The LINK LED may take a few seconds to turn on after power-on. If the LINK LED does not turn on, refer to the troubleshooting section and take a corrective action. (** Page 224, Section 11.3**)**

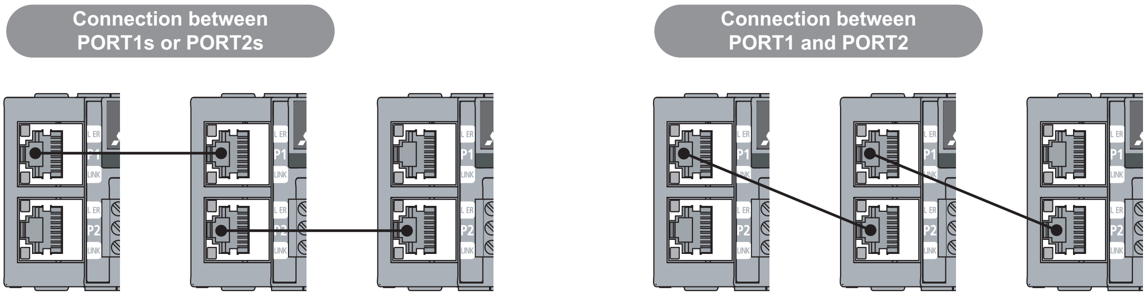


**Point**

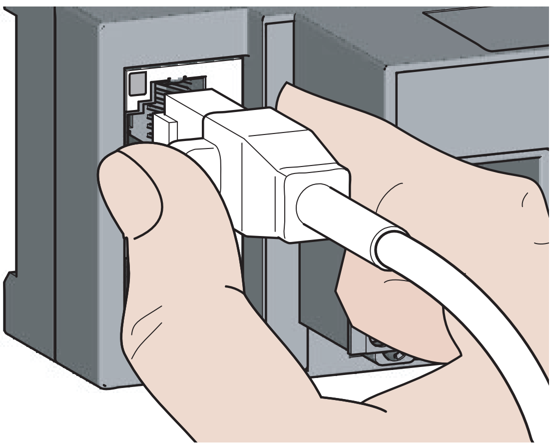
- PORT1 and PORT2 need not to be distinguished. When only one connector is used in star topology, either PORT1 or PORT2 can be connected.




- When two connectors are used in line topology or ring topology, an Ethernet cable can be connected to the connectors in any combination. For example, the cable can be connected between PORT1s and between PORT1 and PORT2.




### (b) Disconnecting



1. **Power off the high-speed counter module.**
2. **Press the latch down and unplug the Ethernet cable.**

## (2) Precautions

### (a) Laying Ethernet cables

- Place the Ethernet cable in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Do not touch the core of the connector of the cable or the module, and protect it from dirt and dust. If any oil from your hand, or any dirt or dust sticks to the core, it can increase transmission loss, causing data link to fail.
- Check the following:
  - The Ethernet cable is securely connected.
  - The Ethernet cable is not shorted.
  - The connectors are securely connected.

### (b) Broken cable latch

Do not use Ethernet cables with broken latches. Doing so may cause the cable to unplug or malfunction.

### (c) Connecting and disconnecting the Ethernet cable

Hold the connector part when connecting and disconnecting the Ethernet cable. Pulling the cable connected to the module may result in damage to the module or cable or malfunction due to poor contact.

### (d) Connectors without the Ethernet cable

To prevent dust from entering the module, attach the provided connector cover.

### (e) Maximum station-to-station distance (Maximum Ethernet cable length)

The maximum station-to-station distance is 100m. However, the distance may be shorter depending on the operating environment of the cable. For details, contact the manufacturer of the cables used.

### (f) Bending radius of the Ethernet cable

There are restrictions on the bending radius of the Ethernet cable. Check the bending radius in the specifications of the Ethernet cables used.

# 6.6 Wiring of Connectors for External Devices

This section describes how to wire the high-speed counter module with an encoder or a controller.

## 6.6.1 Wiring precautions

To obtain the maximum performance from the functions of the high-speed counter module and improve the system reliability, an external wiring with high durability against noise is required.
Precautions for the external wiring are as follows.

### (1) Wiring

- Terminals are prepared depending on the voltage of the signal to be input. Connecting to a terminal with a different voltage may cause malfunction of the module and failure of the connected devices.
- In 1-phase input, always connect a pulse input cable to the A-phase side.

### (2) Connectors for external devices

- Securely connect the connectors for external devices (A6CON1/A6CON2/A6CON4) to the high-speed counter module connectors and securely tighten the two screws.
- When disconnecting the cable from the high-speed counter module, do not pull the cable by the cable part. Hold the connector part of the cable. Pulling the cable connected to the module may result in malfunction or damage to the module or cable.

### (3) DC power supply

- Each DC power supply to be connected to the high-speed counter module, encoder, and controller must be connected to a different power supply.

## (4) Measures against noise

- The high-speed counter module may incorrectly count the pulses when pulse-state noises are input.
- When inputting high-speed pulses, take the following measures against noise.

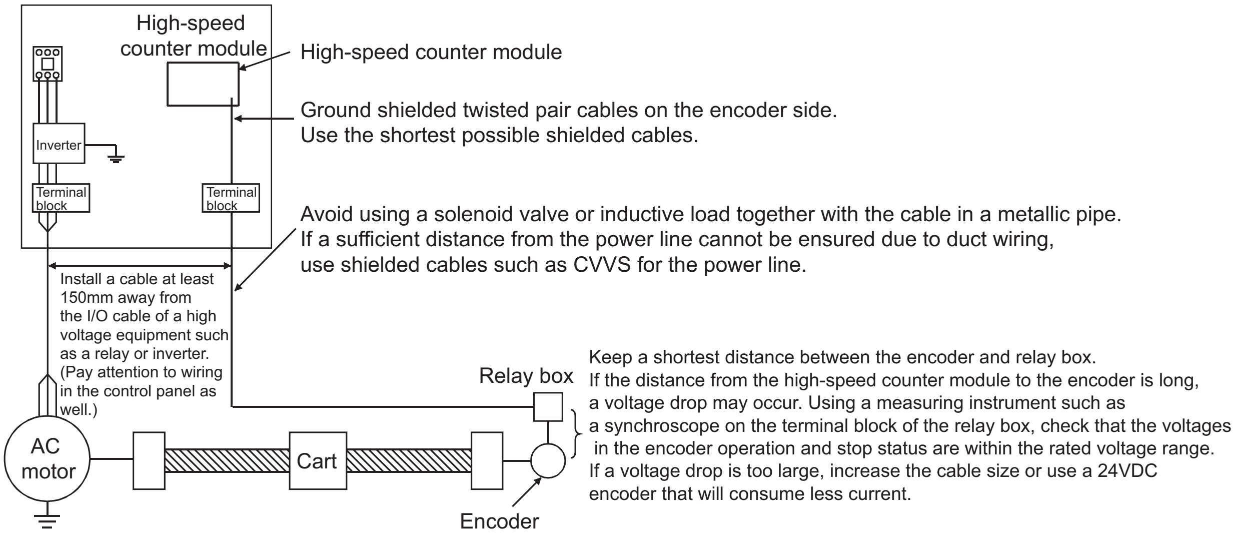
Measure 1

Use shielded twisted pair cables, and ground them on the encoder side with a ground resistance of 100Ω or less.

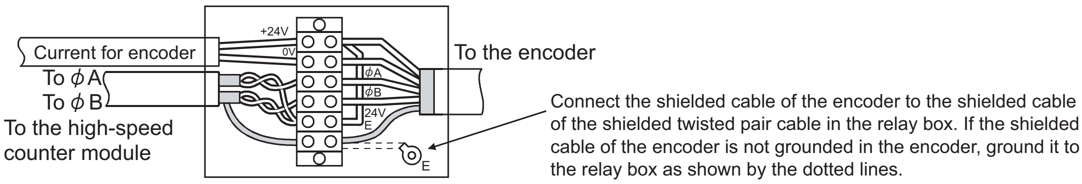
Measure 2

Use the shortest possible shielded twisted pair cables, placing them not parallel with noise-generating power cables or I/O cables and at a distance of 150mm or more.

- The following figure shows an example of a noise reduction measure.




- Ground the shielded twisted pair cable on the encoder side (relay box). (Wiring example: with a sink type encoder (24V))



# 6.6.2 Connectors for external devices

The connectors and crimp tools for use with the high-speed counter module must be purchased separately by the user.
The following tables list the connector types and the crimp tool.

## (1) Precautions

- Tighten the connector screws within the following specified torque range.

| Screw type | Tightening torque range |
|---|---|
| Connector screw (M2.6 screw) | 0.20 to 0.29N•m |

- Use copper wires having temperature rating of 75°C or more for the connectors.
- When required, use UL-approved connectors.

## (2) Connector types*1

| Type | Model | Applicable wire size |
|---|---|---|
| Soldering type<br>(straight out) | A6CON1 | 0.3mm$^2$ (22 AWG) (stranded) |
| Crimp type<br>(straight out) | A6CON2 | 0.088 to 0.24mm$^2$<br>(28 to 24 AWG) (stranded) |
| Soldering type<br>(straight out/diagonal out) | A6CON4 | 0.3mm$^2$ (22 AWG) (stranded) |

*1 The A6CON3 (pressure-displacement type, straight out) connector cannot be used for the high-speed counter module.

## (3) Connector crimp tool

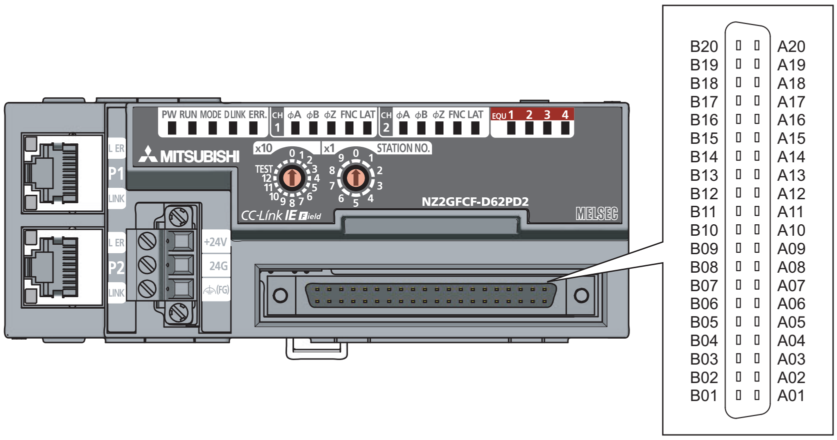
| Type | Model | Applicable wire size | Contact |
|---|---|---|---|
| Crimp tool | FCN-363T-T005/H | 0.088 to 0.24mm$^2$<br>(28 to 24 AWG) | FUJITSU COMPONENT LIMITED<br>http://www.fcl.fujitsu.com/en/ |

# 6.6.3 I/O interfaces with external devices

This section describes the high-speed counter module interfaces to connect with external devices.

## (1) Terminal layouts and pin numbers of connectors for external devices

The following figure and table show the terminal layouts and the pin numbers of the high-speed counter module connector for external devices.




| Pin number | Symbol | Pin number | Symbol |
|---|---|---|---|
| B20 | A1-24V | A20 | A1-5V |
| B19 | A1-DIF | A19 | A1-COM |
| B18 | B1-24V | A18 | B1-5V |
| B17 | B1-DIF | A17 | B1-COM |
| B16 | Z1-24V | A16 | Z1-5V |
| B15 | Z1-DIF | A15 | Z1-COM |
| B14 | A2-24V | A14 | A2-5V |
| B13 | A2-DIF | A13 | A2-COM |
| B12 | B2-24V | A12 | B2-5V |
| B11 | B2-DIF | A11 | B2-COM |
| B10 | Z2-24V | A10 | Z2-5V |
| B09 | Z2-DIF | A09 | Z2-COM |
| B08 | FUNC1-24V | A08 | LATCH1-24V |
| B07 | FUNC1-5V | A07 | LATCH1-5V |
| B06 | CTRLCOM | A06 | CTRLCOM |
| B05 | FUNC2-24V | A05 | LATCH2-24V |
| B04 | FUNC2-5V | A04 | LATCH2-5V |
| B03 | EQU1 | A03 | EQU2 |
| B02 | EQUCOM | A02 | EQUCOM |
| B01 | EQU3 | A01 | EQU4 |

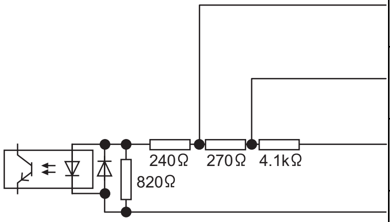
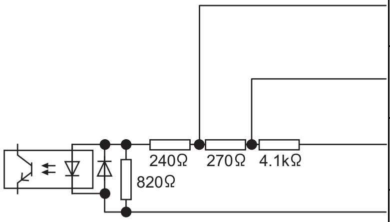
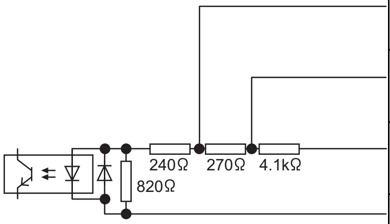
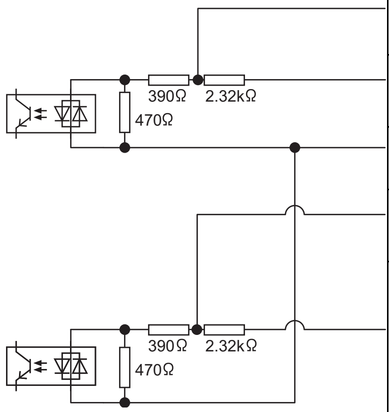
## (2) List of I/O signal details

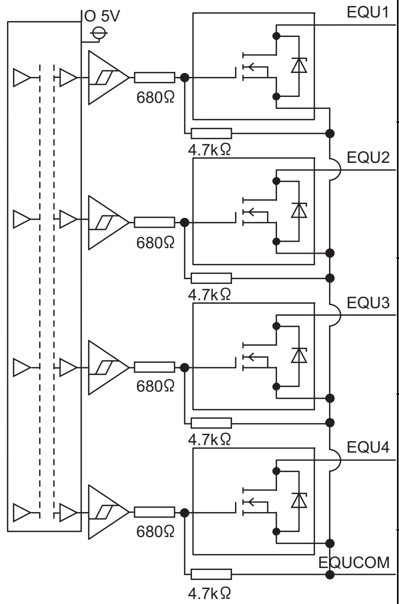
The following table lists the signals for the high-speed counter module connectors for external devices.

| I/O classification | Symbol | Pin number | Signal name | Description |
|---|---|---|---|---|
| Input | A1-24V | B20 | CH1 Phase A pulse input 24V (+) | • This signal inputs + (plus) side of phase A pulse. |
| | A1-5V | A20 | CH1 Phase A pulse input 5V (+) | |
| | A1-DIF | B19 | CH1 Phase A pulse differential input (+) | |
| | A1-COM | A19 | CH1 Phase A pulse input common (-) | • This signal inputs - (minus) side of phase A pulse. |
| | B1-24V | B18 | CH1 Phase B pulse input 24V (+) | • This signal inputs + (plus) side of phase B pulse. |
| | B1-5V | A18 | CH1 Phase B pulse input 5V (+) | |
| | B1-DIF | B17 | CH1 Phase B pulse differential input (+) | |
| | B1-COM | A17 | CH1 Phase B pulse input common (-) | • This signal inputs - (minus) side of phase B pulse. |
| | Z1-24V | B16 | CH1 Phase Z input 24V (+) | • This signal inputs + (plus) side of phase Z.<br>• Turn on this signal to replace a count value by the external signal.<br>• The count value is replaced with the preset value when this signal becomes on (when "CH1 Z phase (Preset) trigger setting" is set to "0: Rising"). |
| | Z1-5V | A16 | CH1 Phase Z input 5V (+) | |
| | Z1-DIF | B15 | CH1 Phase Z differential input (+) | |
| | Z1-COM | A15 | CH1 Phase Z input common (-) | • This signal inputs - (minus) side of phase Z. |
| | A2-24V | B14 | CH2 Phase A pulse input 24V (+) | • This signal inputs + (plus) side of phase A pulse. |
| | A2-5V | A14 | CH2 Phase A pulse input 5V (+) | |
| | A2-DIF | B13 | CH2 Phase A pulse differential input (+) | |
| | A2-COM | A13 | CH2 Phase A pulse input common (-) | • This signal inputs - (minus) side of phase A pulse. |
| | B2-24V | B12 | CH2 Phase B pulse input 24V (+) | • This signal inputs + (plus) side of phase B pulse. |
| | B2-5V | A12 | CH2 Phase B pulse input 5V (+) | |
| | B2-DIF | B11 | CH2 Phase B pulse differential input (+) | |
| | B2-COM | A11 | CH2 Phase B pulse input common (-) | • This signal inputs - (minus) side of phase B pulse. |
| | Z2-24V | B10 | CH2 Phase Z input 24V (+) | • This signal inputs + (plus) side of phase Z.<br>• Turn on this signal to replace a count value by the external signal.<br>• The count value is replaced with the preset value when this signal becomes on (when "CH2 Z phase (Preset) trigger setting" is set to "0: Rising"). |
| | Z2-5V | A10 | CH2 Phase Z input 5V (+) | |
| | Z2-DIF | B09 | CH2 Phase Z differential input (+) | |
| | Z2-COM | A09 | CH2 Phase Z input common (-) | • This signal inputs - (minus) side of phase Z. |
| | FUNC1-24V | B08 | CH1 Function input 24V | • Turn on this signal to execute the selected counter function start command by the external signal. |
| | FUNC1-5V | B07 | CH1 Function input 5V | |
| | FUNC2-24V | B05 | CH2 Function input 24V | |
| | FUNC2-5V | B04 | CH2 Function input 5V | |
| | LATCH1-24V | A08 | CH1 Latch counter input 24V | • Turn on this signal to latch a count value by the external signal.<br>• The count value is latched and stored in remote registers when this signal becomes on. |
| | LATCH1-5V | A07 | CH1 Latch counter input 5V | |
| | LATCH2-24V | A05 | CH2 Latch counter input 24V | |
| | LATCH2-5V | A04 | CH2 Latch counter input 5V | |
| | CTRLCOM | A06, B06 | Control input common | • Common for function input<br>• Common for latch counter input<br>• It is common between channels. |
| Output | EQU1 | B03 | Coincidence output 1 (+) | • With the coincidence output function activated, the high-speed counter module outputs a signal when the count value is matched with the preset comparison condition.<br>• When the PWM output function is used, the high-speed counter module outputs the PWM waveform. |
| | EQU2 | A03 | Coincidence output 2 (+) | |
| | EQU3 | B01 | Coincidence output 3 (+) | |
| | EQU4 | A01 | Coincidence output 4 (+) | |
| | EQUCOM | A02, B02 | Coincidence output common (-) | • It inputs 0V when Coincidence output 1 to 4 are used.<br>• Common for coincidence outputs<br>• It is common between channels. |

## (3) Interface with external devices

The following table lists the high-speed counter module interfaces to connect with external devices.

| I/O classification | Internal circuit | Pin number CH1 | Pin number CH2 | Signal name | Operation | Input voltage (guaranteed value) | Operating current (guaranteed value) | Response time |
|---|---|---|---|---|---|---|---|---|
| Input |   | B19 | B13 | Phase A pulse differential input (+) | — | AM26C31 or equivalent | — | — |
| | | A20 | A14 | Phase A pulse input 5V (+) | When ON | 4.5 to 5.5V | 4 to 8mA | — |
| | | | | | When OFF | 2V or lower | 1.0mA or lower | |
| | | B20 | B14 | Phase A pulse input 24V (+) | When ON | 21.6 to 26.4V | 4 to 6mA | — |
| | | | | | When OFF | 5V or lower | 1.0mA or lower | |
| | | A19 | A13 | Phase A pulse input common (-) | — | — | — | — |
| |   | B17 | B11 | Phase B pulse differential input (+) | — | AM26C31 or equivalent | — | — |
| | | A18 | A12 | Phase B pulse input 5V (+) | When ON | 4.5 to 5.5V | 4 to 8mA | — |
| | | | | | When OFF | 2V or lower | 1.0mA or lower | |
| | | B18 | B12 | Phase B pulse input 24V (+) | When ON | 21.6 to 26.4V | 4 to 6mA | — |
| | | | | | When OFF | 5V or lower | 1.0mA or lower | |
| | | A17 | A11 | Phase B pulse input common (-) | — | — | — | — |
| |   | B15 | B09 | Phase Z differential input (+) | When ON | AM26C31 or equivalent | — | — |
| | | | | | When OFF | | | — |
| | | A16 | A10 | Phase Z input 5V (+) | When ON | 4.5 to 5.5V | 4 to 8mA | 1.25μs or less |
| | | | | | When OFF | 2V or lower | 1.0mA or lower | 2.5μs or less |
| | | B16 | B10 | Phase Z input 24V (+) | When ON | 21.6 to 26.4V | 4 to 6mA | 1.25μs or less |
| | | | | | When OFF | 5V or lower | 1.0mA or lower | 2.5μs or less |
| | | A15 | A09 | Phase Z input common (-) | — | — | — | — |
| |   | B07 | B04 | Function input 5V | When ON | 4.5 to 5.5V | 7 to 12mA | 20μs or less |
| | | | | | When OFF | 2V or lower | 1.0mA or lower | 100μs or less |
| | | B08 | B05 | Function input 24V | When ON | 21.6 to 26.4V | 7 to 12mA | 20μs or less |
| | | | | | When OFF | 5V or lower | 1.0mA or lower | 100μs or less |
| | | B06, A06 | B06, A06 | Control input common | — | — | — | — |
| | | A07 | A04 | Latch counter input 5V | When ON | 4.5 to 5.5V | 7 to 12mA | 20μs or less |
| | | | | | When OFF | 2V or lower | 1.0mA or lower | 100μs or less |
| | | A08 | A05 | Latch counter input 24V | When ON | 21.6 to 26.4V | 7 to 12mA | 20μs or less |
| | | | | | When OFF | 5V or lower | 1.0mA or lower | 100μs or less |

<table>
<tr><th rowspan="2">I/O classification</th><th rowspan="2">Internal circuit</th><th colspan="2">Pin number</th><th rowspan="2">Signal name</th><th rowspan="2">Operation</th><th rowspan="2">Input voltage (guaranteed value)</th><th rowspan="2">Operating current (guaranteed value)</th><th rowspan="2">Response time</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td rowspan="5">Output</td><td rowspan="5">
</td><td>B03</td><td>—</td><td>Coincidence output 1 (+)</td><td colspan="3" rowspan="5">• Operating load voltage: 4.75 to 30VDC<br>• Maximum load current: 0.1A/point<br>• Maximum voltage drop at ON: 0.5V<br>• Response time<br>OFF → ON: 1μs or less<br>(rated load, resistive load)<br>ON → OFF: 1μs or less<br>(rated load, resistive load)</td><td rowspan="5">—</td></tr>
<tr><td>A03</td><td>—</td><td>Coincidence output 2 (+)</td></tr>
<tr><td>B01</td><td>—</td><td>Coincidence output 3 (+)</td></tr>
<tr><td>A01</td><td>—</td><td>Coincidence output 4 (+)</td></tr>
<tr><td>B02, A02</td><td>B02, A02</td><td>Coincidence output common (-)</td></tr>
</table>

*1 For EQU1 to EQU4, the assignment to CH1 or CH2 can be changed.

## (4) ON/OFF status of input signals

The ON/OFF status of input signals depends on external wiring and the logic setting.
The following table shows an example of CH□ Function input terminal (FUNC1, FUNC2).
The ON/OFF status for other input signals is the same as CH□ Function input terminal (FUNC1, FUNC2).

<table>
<tr><th>Logic status*1</th><th>External wiring</th><th>ON/OFF status of CH□ Function input terminal (FUNC1, FUNC2) in terms of the high-speed counter module</th></tr>
<tr><td rowspan="2">Positive logic</td><td>No voltage applied</td><td>OFF</td></tr>
<tr><td>Voltage applied</td><td>ON</td></tr>
<tr><td rowspan="2">Negative logic</td><td>No voltage applied</td><td>ON</td></tr>
<tr><td>Voltage applied</td><td>OFF</td></tr>
</table>

*1 Configure the logic setting by CH□ Function input logic setting (address: $0127_H$, $0147_H$). For details on the setting, refer to the following.

Page 267, Appendix 3

## 6.6.4 Encoders that can be connected

This section lists the encoders that can be connected to the high-speed counter module.

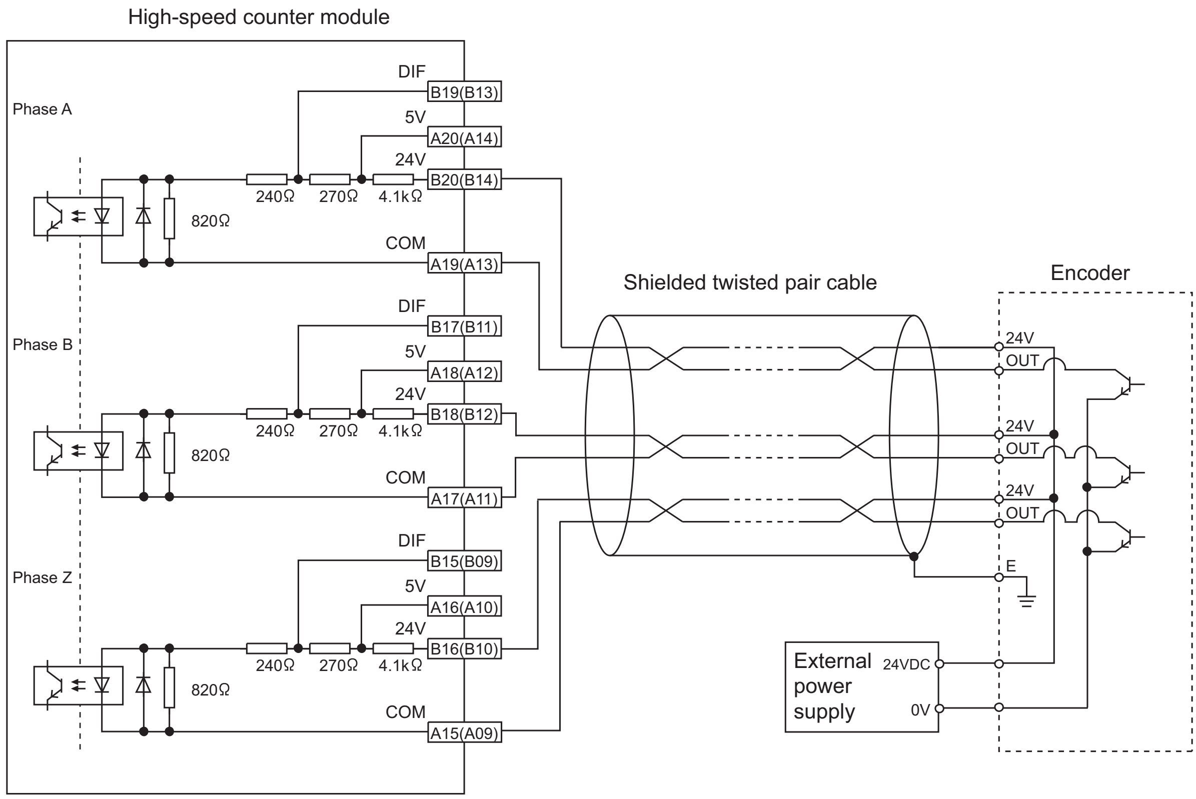
- Open collector output type encoders
- CMOS level voltage output type encoders
- Line driver output type encoders (AM26LS31 or equivalent)

Point

- Verify that the encoder output voltage meets the specifications of the high-speed counter module.
- TTL level voltage output type encoders cannot be used with the high-speed counter module.

# 6.7 Wiring Example (Between a High-Speed Counter Module and an Encoder)

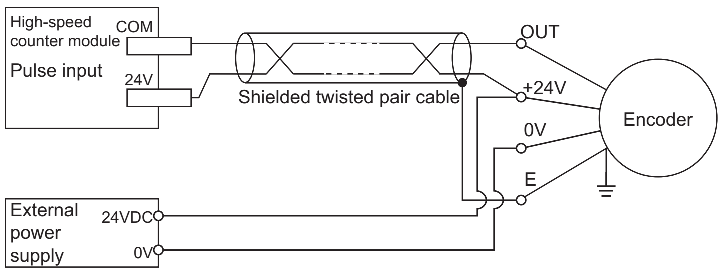
## (1) Example of wiring with an open collector output type encoder (24VDC)



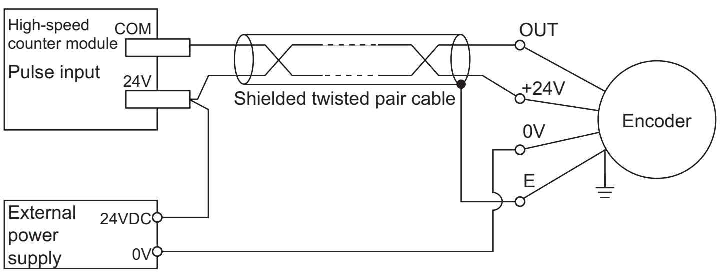

**Point**

When wiring the high-speed counter module and an encoder, separate power cables and signal cables. The following figure shows examples.

- Example of correct wiring

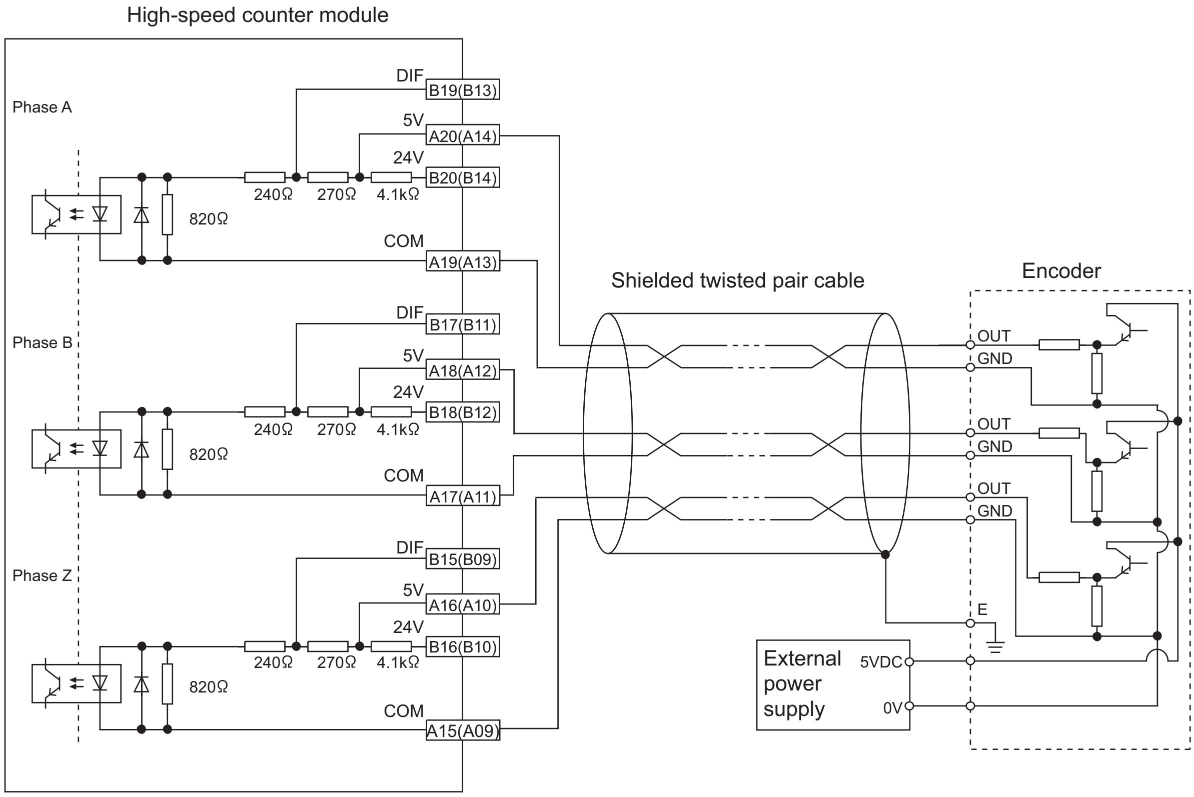



- Example of incorrect wiring

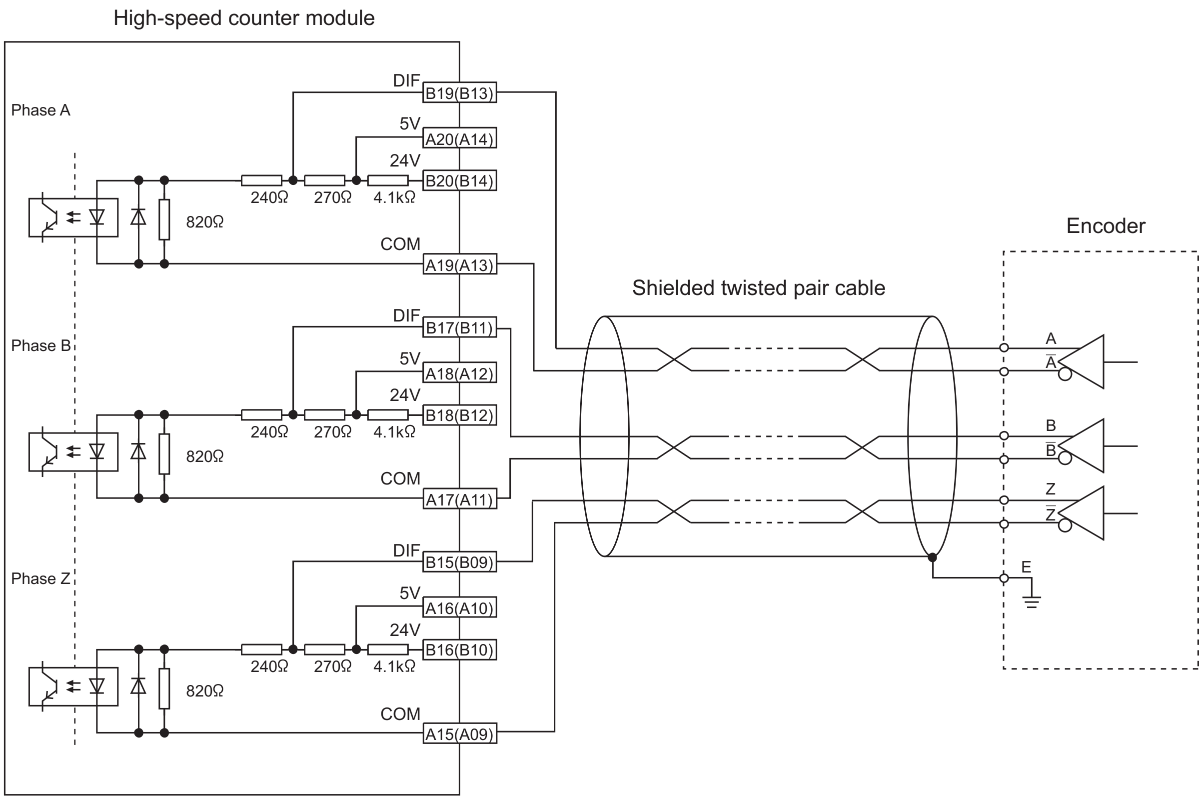



Because a current flows through the shielded twisted pair cables in the same direction, canceling effect does not work and pulses become susceptible to electromagnetic induction.

## (2) Example of wiring with a voltage output type encoder (5VDC)

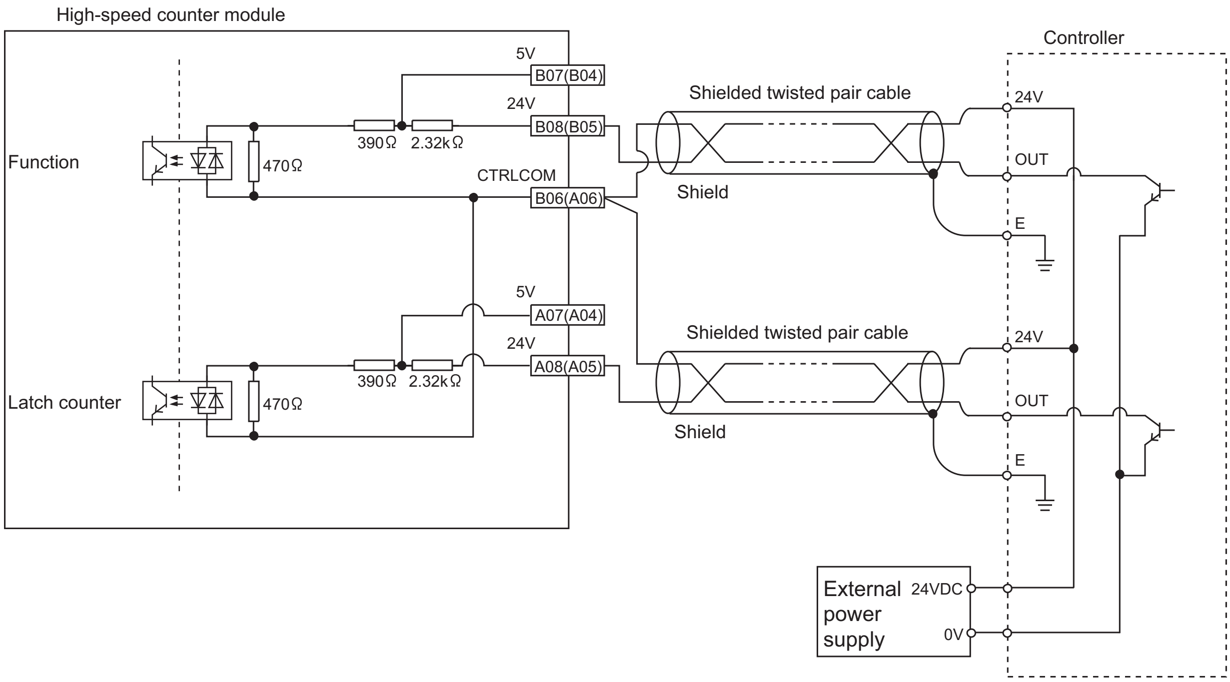



## (3) Example of wiring with a line driver (equivalent to AM26LS31) encoder

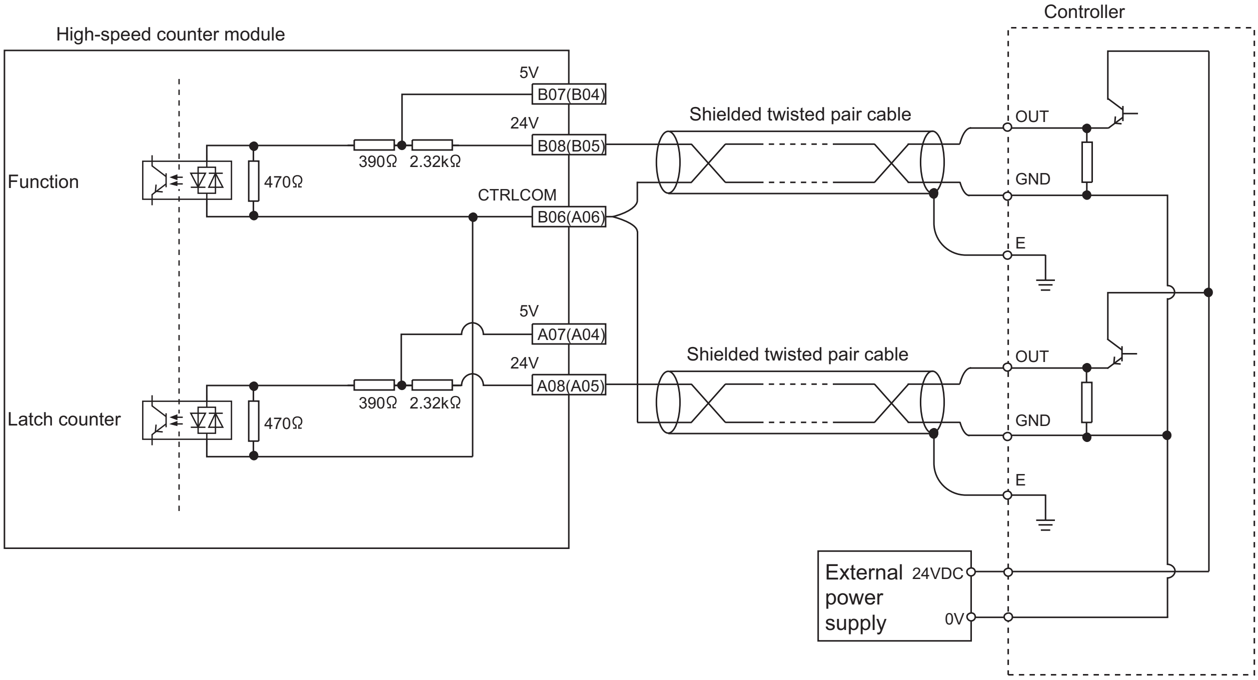


# 6.8 Wiring Example (Between a Controller and External Input Terminals)

## (1) Example of wiring with a sink type controller

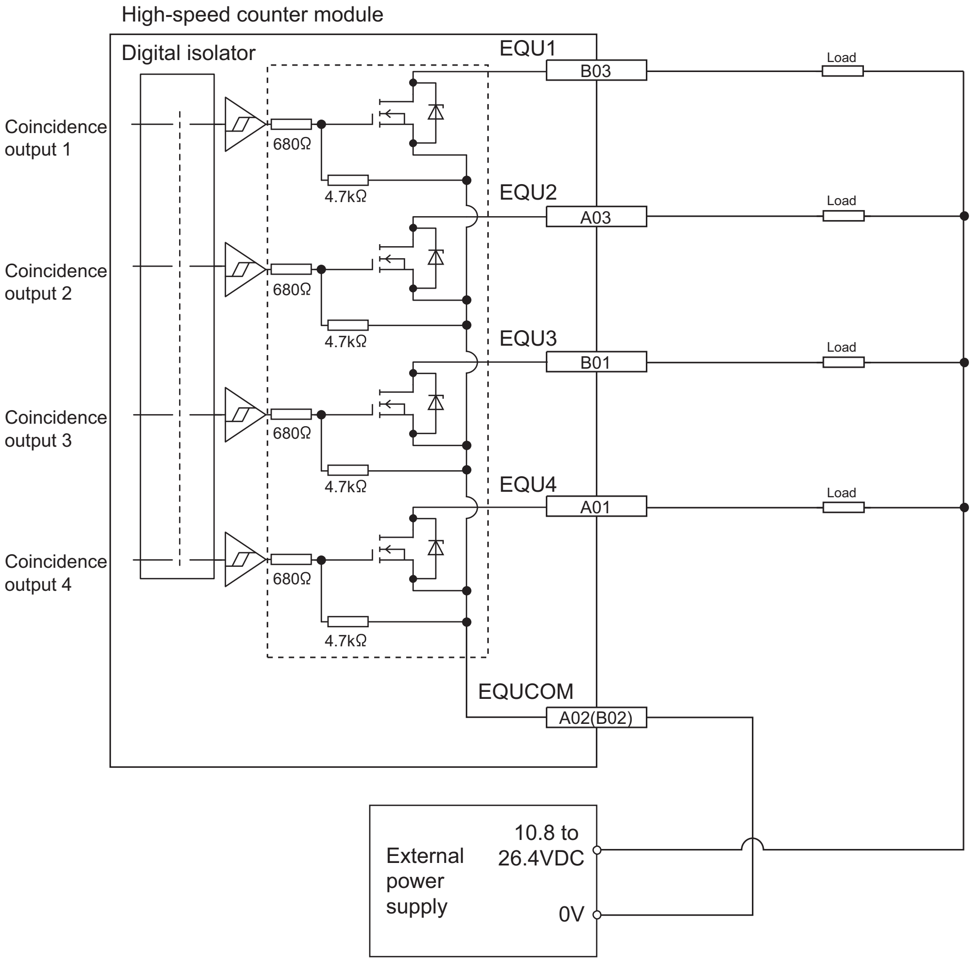



## (2) Example of wiring with a source type controller



# 6.9 Wiring Example (with Coincidence Output Terminals)

## (1) Example of wiring with coincidence output terminals (sink output type)



# CHAPTER 7 VARIOUS SETTINGS

This chapter describes the setting procedures of the high-speed counter module.

## 7.1 Parameter Setting

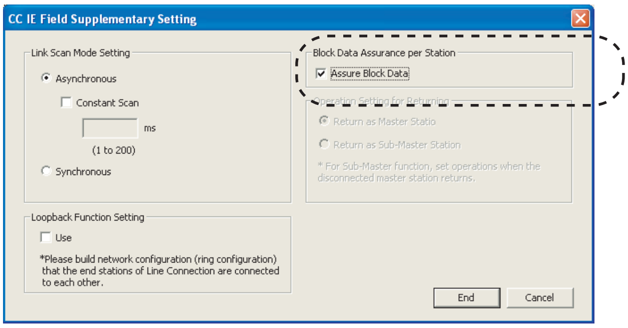
Set the parameter of this module with the network parameter written to the CPU module of the master station. When the setting in GX Works2 and the parameter written to the CPU module do not match, the parameter cannot be read and written. For the setting procedure of the master station, refer to the following.

User's manual for the master/local module used

Write and read the parameter setting of this module with the CPU module in the STOP status.
(Writing and reading are unavailable in the RUN status.)

**Remark**

- When points less than the ones of the high-speed counter module and extension module are set for the remote I/O signal and remote register, no error occurs. The cyclic transmission is performed for the data of the points set from the start.
- When using the high-speed counter module, do not invalidate Block Data Assurance per Station on the "CC IE Field Supplementary Setting" window.




Do not uncheck the box.

For the block data assurance per station, refer to the following.

User's manual for the master/local module used

- Do not set the parameter using the CCPASET instruction in the master station. Correct operation of the high-speed counter module cannot be guaranteed because the module operates with the block data assurance per station disabled when the CCPASET instruction is executed.

**1.** **Display the "CC IE Field Configuration" window.**

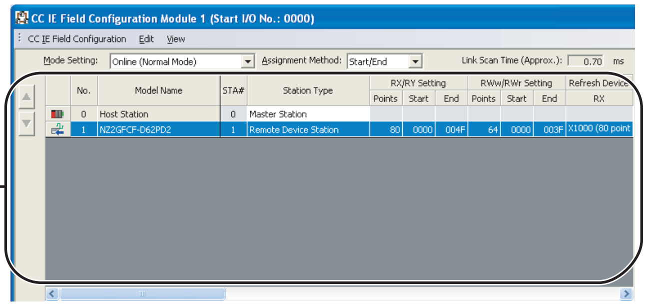
- When the master/local module is the QJ71GF11-T2

  Project window ➪ [Parameter] ➪ [Network Parameter] ➪ [Ethernet/CC IE/MELSECNET] ➪ CC IE Field Configuration Setting button

- When the master/local module is the LJ71GF11-T2

  Project window ➪ [Parameter] ➪ [Network Parameter] ➪ [Ethernet/CC IE Field] ➪ CC IE Field Configuration Setting button

**2.** **Select the high-speed counter module in "List of stations" on the "CC IE Field Configuration" window.**

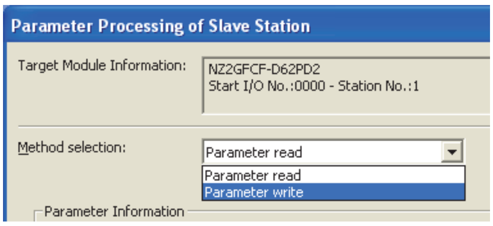



List of stations

**3.** **Open the "Parameter Processing of Slave Station" window.**

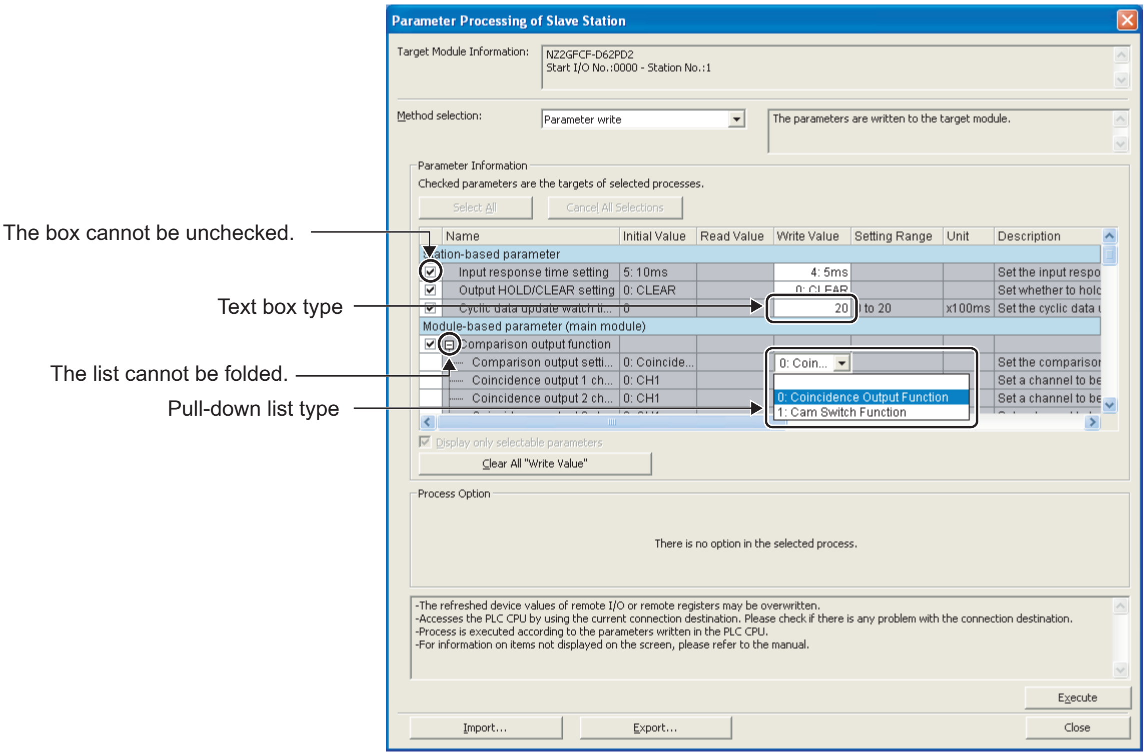
[CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**4.** **Set "Parameter write" for "Method selection".**



**5.** **Double-click the item to change the setting, and input the setting value.**

- Items to input from the pull-down list
  Double-click the item to set to display the pull-down list. Select the item.
- Items to input from the text box
  Double-click the item to set, and input the setting value.




| Setting item | Setting details | Reference |
|---|---|---|
| Input response time setting | 3: 2ms | Page 174, Section 8.20 (3) |
| | 4: 5ms | |
| | 5: 10ms | |
| | 6: 20ms | |
| | 7: 70ms | |
| Output HOLD/CLEAR setting | 0: CLEAR | Page 167, Section 8.17 |
| | 1: HOLD | |
| Cyclic data update watch time setting | • 0 (Not monitor)<br>• 1 to 20 (0.1 to 2 seconds, in increments of 100ms) | Page 168, Section 8.18 |
| Comparison output setting | 0: Coincidence Output Function<br>1: Cam Switch Function | Page 102, Section 8.3 |
| Coincidence output 1 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Coincidence output 2 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Coincidence output 3 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Coincidence output 4 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |

| Setting item | Setting details | Reference |
|---|---|---|
| Coincidence output 1 comparison condition setting | 0: Coincidence Output | Page 102, Section 8.3 |
| | 1: Within-range Output | |
| | 2: Out-of-range Output | |
| Coincidence output 2 comparison condition setting | 0: Coincidence Output | |
| | 1: Within-range Output | |
| | 2: Out-of-range Output | |
| Coincidence output 3 comparison condition setting | 0: Coincidence Output | |
| | 1: Within-range Output | |
| | 2: Out-of-range Output | |
| Coincidence output 4 comparison condition setting | 0: Coincidence Output | |
| | 1: Within-range Output | |
| | 2: Out-of-range Output | |
| Preset/replace setting at coincidence output (Coincidence output 1) | 0: Present value not replaced | Page 114, Section 8.3.3 |
| | 1: Present value replaced | |
| Preset/replace setting at coincidence output (Coincidence output 2) | 0: Present value not replaced | |
| | 1: Present value replaced | |
| Cam switch output unit assignment setting | 0: No Assignment | Page 117, Section 8.3.4 |
| | 1: Stage 1 | |
| Cam switch output 1 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 2 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 3 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 4 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 5 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 6 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 7 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 8 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 9 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 10 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 11 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 12 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 13 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Cam switch output 14 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |

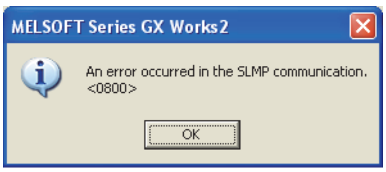
| Setting item | Setting details | Reference |
|---|---|---|
| Cam switch output 15 channel assignment setting | 0: CH1 | Page 117, Section 8.3.4 |
| | 1: CH2 | |
| Cam switch output 16 channel assignment setting | 0: CH1 | |
| | 1: CH2 | |
| Operation mode setting | 0: Normal Mode | Page 90, Section 7.3 |
| | 1: Frequency Measurement Mode | |
| | 2: Rotation Speed Measurement Mode | |
| | 3: Pulse Measurement Mode | |
| | 4: PWM Output Mode | |
| Count source selection | 0: A Phase/B Phase | Page 269, Appendix 3 (6) |
| | 1: Coincidence Output 1 | |
| | 2: Coincidence Output 2 | |
| Pulse input mode | 0: 1-Phase Multiple of 1 | Page 92, Section 8.1.1 |
| | 1: 1-Phase Multiple of 2 | |
| | 2: CW/CCW | |
| | 3: 2-Phase Multiple of 1 | |
| | 4: 2-Phase Multiple of 2 | |
| | 5: 2-Phase Multiple of 4 | |
| Counting speed setting | 0: 10kpps | Page 27, Section 3.2 |
| | 1: 100kpps | |
| | 2: 200kpps | |
| | 3: 500kpps | |
| | 4: 1Mpps | |
| | 5: 2Mpps | |
| | 6: 4Mpps | |
| | 7: 8Mpps | |
| Counter format | 0: Linear Counter | Page 95, Section 8.2 |
| | 1: Ring Counter | |
| Z phase (Preset) trigger setting | 0: Rising | Page 124, Section 8.4 (2) |
| | 1: Falling | |
| | 2: Rising + Falling | |
| | 3: During ON | |
| External preset/replace (Z Phase) request detection setting | 0: ON at detection | Page 124, Section 8.4 (2) |
| | 1: Not ON at detection | |
| Counter function selection | 0: Count Disable Function | Page 131, Section 8.7 |
| | 1: Latch Counter Function | Page 133, Section 8.8 |
| | 2: Sampling Counter Function | Page 136, Section 8.9 |
| | 3: Periodic Pulse Counter Function | Page 139, Section 8.10 |
| | 4: Count disable/Preset/replace Function | Page 142, Section 8.11 |
| | 5: Latch counter/Preset/replace Function | Page 145, Section 8.12 |
| Function input logic setting | 0: Positive Logic | Page 272, Appendix 3 (9) |
| | 1: Negative Logic | |
| Latch counter input logic setting | 0: Positive Logic | Page 272, Appendix 3 (9) |
| | 1: Negative Logic | |

| Setting item | Setting details | | | Reference |
|---|---|---|---|---|
| Z phase input response time setting | Setting | OFF → ON Response time | ON → OFF Response time | Page 273, Appendix 3 (10) |
| | 0 | 0.25μs | 2.5μs | |
| | 1 | 0.1ms | 0.1ms | |
| | 2 | 1.0ms | 1.0ms | |
| Function input response time setting | Setting | OFF → ON Response time | ON → OFF Response time | Page 273, Appendix 3 (10) |
| | 0 | 0.02ms | 0.1ms | |
| | 1 | 0.1ms | 0.1ms | |
| | 2 | 1.0ms | 1.0ms | |
| Latch counter input response time setting | Setting | OFF → ON Response time | ON → OFF Response time | Page 273, Appendix 3 (10) |
| | 0 | 0.02ms | 0.1ms | |
| | 1 | 0.1ms | 0.1ms | |
| | 2 | 1.0ms | 1.0ms | |
| Pulse measurement setting (Function input terminal) | 0: Pulse ON Width | | | Page 156, Section 8.15 |
| | 1: Pulse OFF Width | | | |
| Pulse measurement setting (Latch counter input terminal) | 0: Pulse ON Width | | | Page 156, Section 8.15 |
| | 1: Pulse OFF Width | | | |

**6.** **Click the Execute button to write the parameter to the high-speed counter module.**

**Point**

- When using the extension module, also set the parameter of the extension module.
  For the parameter of the extension module, refer to the following.
  Manual for the extension module used
- Set all the items for the parameter. If any blank exists, the parameter cannot be written to the high-speed counter module.
- To read the parameter from the high-speed counter module, set "Parameter read" for "Method selection" and click the Execute button.
- When the following message is displayed, take corrective action for the error code in <>. (Page 208, Section 11.2)




- When the parameters are written, the contents in the extended parameter area are stored in the nonvolatile memory.
- When writing the parameters while Initial data processing request flag (RX8) is off, set values in the remote registers (RWw) beforehand. The values in the remote registers (RWw) related to the setting values of the parameters are checked at the writing. If the setting is incorrect, an error occurs.

# 7.2 Changing the Parameter

## 7.2.1 Changing the network configuration

When changing the network configuration diverting the created project, set the parameter in the following procedure.

**1. Power off the module.**

**2. Connect the modules again according to the desired network configuration.**

**3. Power on the module.**

**4. Display the "CC IE Field Configuration" window.**

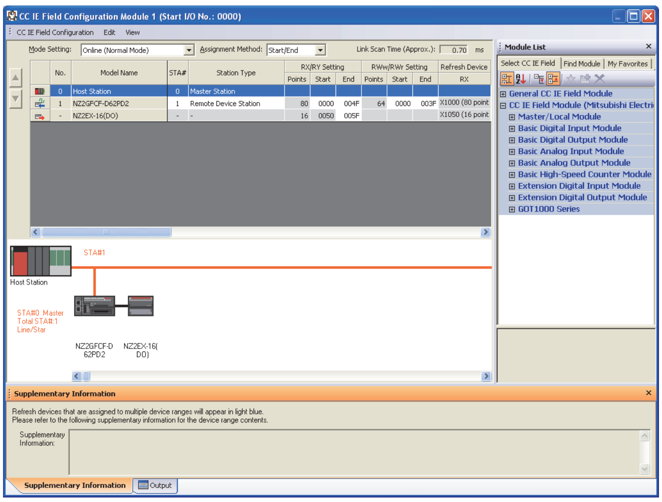
• When the master/local module is the QJ71GF11-T2

Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE/MELSECNET] ⇨ CC IE Field Configuration Setting button

• When the master/local module is the LJ71GF11-T2

Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE Field] ⇨ CC IE Field Configuration Setting button

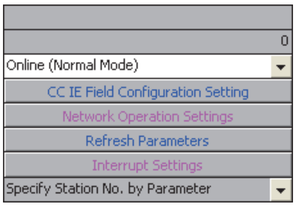
**5. Drag and drop a module to set the slave station. Input a numerical value to set the station number of the station. Change the value as necessary.**



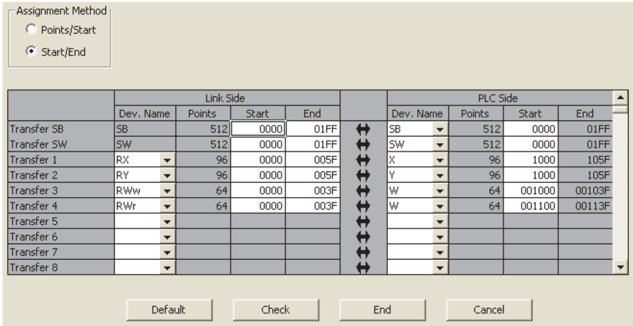

**6. Close the "CC IE Field Configuration" window.**

[CC IE Field Configuration] ⇨ [Close with Reflecting the Setting]

**7.** **Click the Refresh Parameters button to display the refresh parameter setting window.**

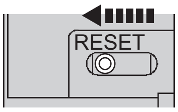



**8.** **Set the refresh parameter. Change the value as necessary.**

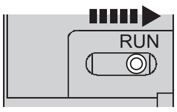



| | Link Side | | | | | PLC Side | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dev. Name | Points | Start | End | | Dev. Name | Points | Start | End |
| Transfer SB | SB | 512 | 0000 | 01FF | ↔ | SB | 512 | 0000 | 01FF |
| Transfer SW | SW | 512 | 0000 | 01FF | ↔ | SW | 512 | 0000 | 01FF |
| Transfer 1 | RX | 96 | 0000 | 005F | ↔ | X | 96 | 1000 | 105F |
| Transfer 2 | RY | 96 | 0000 | 005F | ↔ | Y | 96 | 1000 | 105F |
| Transfer 3 | RWw | 64 | 0000 | 003F | ↔ | W | 64 | 001000 | 00103F |
| Transfer 4 | RWr | 64 | 0000 | 003F | ↔ | W | 64 | 001100 | 00113F |
| Transfer 5 | | | | | ↔ | | | | |
| Transfer 6 | | | | | ↔ | | | | |
| Transfer 7 | | | | | ↔ | | | | |
| Transfer 8 | | | | | ↔ | | | | |

**9.** **Write the set parameter to the CPU module of the master station and reset the CPU module.**




**10.** **Change the status of the CPU module of the master station to RUN.**




**11.** **The network configuration setting is now completed.**

Set the module parameter of the slave station referring to procedure 4 or later in the following section.

- Parameter Setting (☞Page 80, Section 7.1)

**Point**

For the network configuration, match the settings in GX Works2 and the CPU module before setting the module parameter of the slave station. When they are not matched, the module parameter of the slave station cannot be written to the slave station.

## 7.2.2 Changing the parameter without changing the network configuration

To change only the created module parameter of the slave station without changing the network configuration, set the parameter in the following procedure.

**1. Display the "CC IE Field Configuration" window.**

• When the master/local module is the QJ71GF11-T2

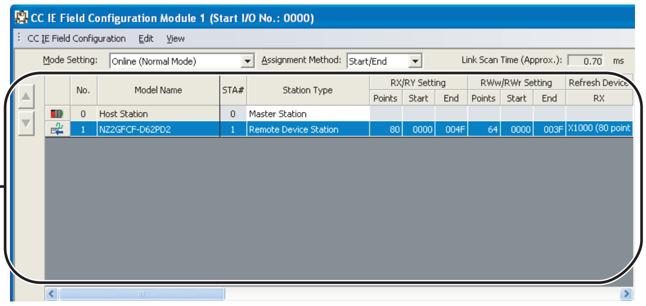
Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE/MELSECNET] ⇨ [CC IE Field Configuration Setting] button

• When the master/local module is the LJ71GF11-T2

Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE Field] ⇨ [CC IE Field Configuration Setting] button

**2. Select the high-speed counter module in "List of stations" on the "CC IE Field Configuration" window.**

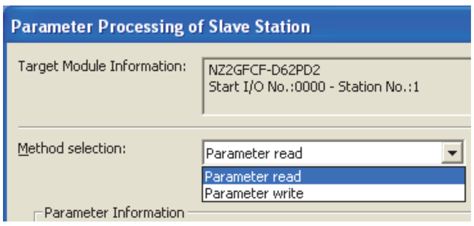
List of stations



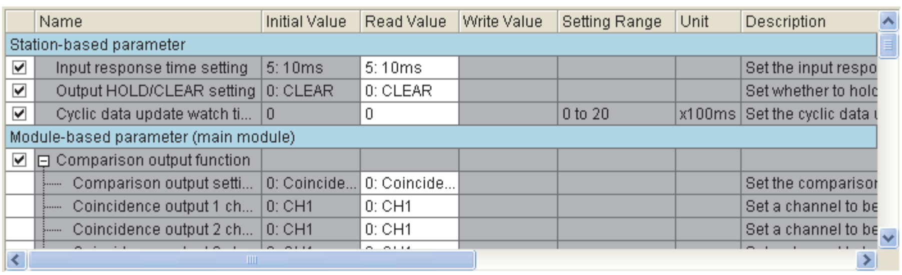

**3. Open the "Parameter Processing of Slave Station" window.**

[CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**4. Set "Parameter read" for "Method selection".**

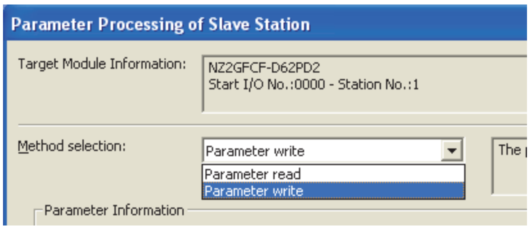



**5. Click the [Execute] button to read the parameter from the high-speed counter module.**

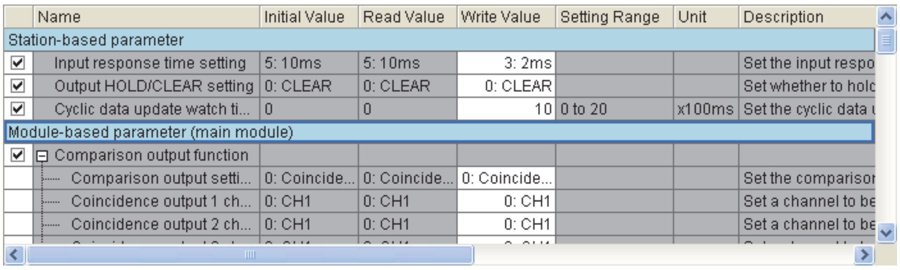


| | Name | Initial Value | Read Value | Write Value | Setting Range | Unit | Description |
|---|---|---|---|---|---|---|---|
| | Station-based parameter | | | | | | |
| ☑ | Input response time setting | 5: 10ms | 5: 10ms | | | | Set the input respo |
| ☑ | Output HOLD/CLEAR setting | 0: CLEAR | 0: CLEAR | | | | Set whether to hold |
| ☑ | Cyclic data update watch ti... | 0 | 0 | | 0 to 20 | x100ms | Set the cyclic data |
| | Module-based parameter (main module) | | | | | | |
| ☑ | ⊟ Comparison output function | | | | | | |
| | Comparison output setti... | 0: Coincide... | 0: Coincide... | | | | Set the comparison |
| | Coincidence output 1 ch... | 0: CH1 | 0: CH1 | | | | Set a channel to be |
| | Coincidence output 2 ch... | 0: CH1 | 0: CH1 | | | | Set a channel to be |

**6.** **Set "Parameter write" for "Method selection".**




**7.** **Check the read parameter and select the item to be changed from "Write Value". Then set a new value. For the item not to be changed, set the same value as "Read Value" for "Write Value".**



| | Name | Initial Value | Read Value | Write Value | Setting Range | Unit | Description |
|---|---|---|---|---|---|---|---|
| | Station-based parameter | | | | | | |
| ☑ | Input response time setting | 5: 10ms | 5: 10ms | 3: 2ms | | | Set the input respo |
| ☑ | Output HOLD/CLEAR setting | 0: CLEAR | 0: CLEAR | 0: CLEAR | | | Set whether to holc |
| ☑ | Cyclic data update watch ti... | 0 | 0 | 10 | 0 to 20 | x100ms | Set the cyclic data u |
| | Module-based parameter (main module) | | | | | | |
| ☑ | Comparison output function | | | | | | |
| | Comparison output setti... | 0: Coincide... | 0: Coincide... | 0: Coincide... | | | Set the comparisor |
| | Coincidence output 1 ch... | 0: CH1 | 0: CH1 | 0: CH1 | | | Set a channel to be |
| | Coincidence output 2 ch... | 0: CH1 | 0: CH1 | 0: CH1 | | | Set a channel to be |

**8.** **Click the Execute button to write the parameter to the high-speed counter module.**

The parameter change is completed.

# 7.3 Operation Mode List

This section lists the comparison output setting and counter function selection that can be combined with each operation mode.

○: Can be set/ —: Cannot be set

| Operation mode setting | Setting value *1 | Function name | Comparison output setting *2 | | Counter function selection *3 | Reference |
|---|---|---|---|---|---|---|
| | | | Coinci-dence | Cam | | |
| Normal mode | 0 | This mode operates according to the combination of each function and setting. | | | | |
| | | Linear counter function | ○ | ○ | — | Page 95, Section 8.2.1 |
| | | Ring counter function | ○ | ○ | — | Page 97, Section 8.2.2 |
| | | Comparison output function | | | | Page 102, Section 8.3 |
| | | Coincidence output function | ○ | — | — | Page 103, Section 8.3.2 |
| | | Preset/replace (at coincidence output) function | ○ | — | — | Page 114, Section 8.3.3 |
| | | Cam switch function | — | ○ | — | Page 117, Section 8.3.4 |
| | | Preset/replace function (using RY command or phase Z input terminal) | ○ | ○ | — | Page 122, Section 8.4 |
| | | Latch counter function by latch counter input terminal | ○ | ○ | — | Page 127, Section 8.5 |
| | | Count disable function | ○ | ○ | 0 | Page 131, Section 8.7 |
| | | Latch counter function (counter function selection) | ○ | ○ | 1 | Page 133, Section 8.8 |
| | | Sampling counter function | ○ | ○ | 2 | Page 136, Section 8.9 |
| | | Periodic pulse counter function | ○ | ○ | 3 | Page 139, Section 8.10 |
| | | Count disable/preset/replace function | ○ | ○ | 4 | Page 142, Section 8.11 |
| | | Latch counter/preset/replace function | ○ | ○ | 5 | Page 145, Section 8.12 |

| Operation mode setting | | Setting value *1 | Function name | | Comparison output setting *2 | | Counter function selection *3 | Reference |
|---|---|---|---|---|---|---|---|---|
| | | | | | Coinci-dence | Cam | | |
| Dedicated mode | Frequency measurement mode | 1 | In this mode, the pulses of the pulse input terminals in phase A and B are counted and the frequency is automatically calculated. | | | | | Page 148, Section 8.13 |
| | | | | Frequency measurement function | ○ | — | — | |
| | Rotation speed measurement mode | 2 | In this mode, the pulses of the pulse input terminals in phase A and B are counted and the rotation speed is automatically calculated. | | | | | Page 152, Section 8.14 |
| | | | | Rotation speed measurement function | ○ | — | — | |
| | Pulse measurement mode | 3 | In this mode, the ON width or OFF width of pulses input to the function input terminal or latch counter input terminal is measured. | | | | | Page 156, Section 8.15 |
| | | | | Pulse measurement function | ○ | — | — | |
| | PWM output mode | 4 | In this mode, the PWM waveform of 200kHz at a maximum is output from any coincidence output 1 to 4 terminals (EQU1 to EQU4). | | | | | Page 160, Section 8.16 |
| | | | | PWM output function | ○ | — | — | |
| Common | | — | Error notification function | | ○ | ○ | — | Page 169, Section 8.19 |
| | | | Output HOLD/CLEAR setting function | | ○ | ○ | — | Page 167, Section 8.17 |
| | | | Cyclic data update watch function | | ○ | ○ | — | Page 168, Section 8.18 |
| | | | Function at the extension I/O module installation | | | | | Page 172, Section 8.20 |
| | | | | Input function (extension input module) | ○ | — | — | |
| | | | | Output function (extension output module) | ○ | ○ | — | |
| | | | | Input response time setting function (extension input module) | ○ | — | — | |
| | | | | External power supply monitoring function (extension output module) | ○ | ○ | — | |
| | | | | Number of ON times integration function (extension output module) | ○ | — | — | |

*1 The value set in CH□ Operation mode setting (address: $0120_H$, $0140_H$)

*2 The value set in Comparison output setting (address: $0100_H$)

*3 The value set in CH□ Counter function selection (address: $0126_H$, $0146_H$)

# CHAPTER 8 FUNCTIONS

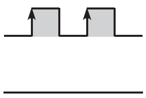
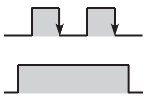
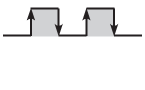
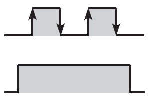
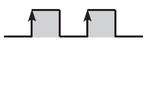
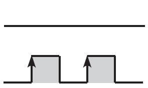
This chapter describes the high-speed counter module functions.

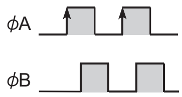
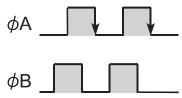
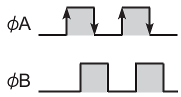
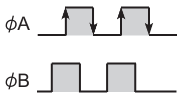
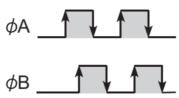
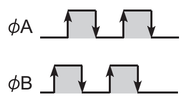
## 8.1 Pulse Input Modes and Counting Methods

### 8.1.1 Types of pulse input modes

There are six pulse input modes: 1-phase pulse input (1 multiple/2 multiples), CW/CCW pulse input, and 2-phase pulse input (1 multiple/2 multiples/4 multiples).

#### (1) Pulse input modes and count timing

| Pulse input mode | Count timing | | |
|---|---|---|---|
| 1-phase multiple of 1 | For counting up | ϕA<br>ϕB and CH□<br>Count down command<br>(RY22, RY3A)<br> | Counts on the rising edge (↑) of ϕA.<br>ϕB and CH□ Count down command (RY22, RY3A) are off. |
| | For counting down | ϕA<br>ϕB or CH□<br>Count down command<br>(RY22, RY3A)<br> | Counts on the falling edge (↓) of ϕA.<br>ϕB or CH□ Count down command (RY22, RY3A) is on. |
| 1-phase multiple of 2 | For counting up | ϕA<br>ϕB and CH□<br>Count down command<br>(RY22, RY3A)<br> | Counts on the rising edge (↑) and the falling edge (↓) of ϕA.<br>ϕB and CH□ Count down command (RY22, RY3A) are off. |
| | For counting down | ϕA<br>ϕB or CH□<br>Count down command<br>(RY22, RY3A)<br> | Counts on the rising edge (↑) and the falling edge (↓) of ϕA.<br>ϕB or CH□ Count down command (RY22, RY3A) is on. |
| CW/CCW | For counting up | ϕA<br>ϕB<br> | Counts on the rising edge (↑) of ϕA.<br>ϕB is off. |
| | For counting down | ϕA<br>ϕB<br> | ϕA is off.<br>Counts on the rising edge (↑) of ϕB. |

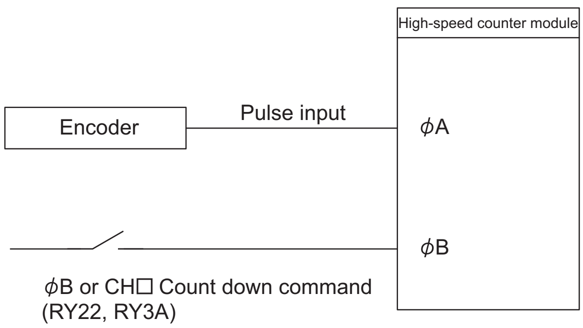
| Pulse input mode | Count timing | | |
|---|---|---|---|
| 2-phase multiple of 1 | For counting up |  | Counts on the rising edge (↑) of ϕA while ϕB is off. |
| | For counting down |  | Counts on the falling edge (↓) of ϕA while ϕB is off. |
| 2-phase multiple of 2 | For counting up |  | Counts on the rising edge (↑) of ϕA while ϕB is off.<br>Counts on the falling edge (↓) of ϕA while ϕB is on. |
| | For counting down |  | Counts on the rising edge (↑) of ϕA while ϕB is on.<br>Counts on the falling edge (↓) of ϕA while ϕB is off. |
| 2-phase multiple of 4 | For counting up |  | Counts on the rising edge (↑) of ϕA while ϕB is off.<br>Counts on the falling edge (↓) of ϕA while ϕB is on.<br>Counts on the rising edge (↑) of ϕB while ϕA is on.<br>Counts on the falling edge (↓) of ϕB while ϕA is off. |
| | For counting down |  | Counts on the rising edge (↑) of ϕA while ϕB is on.<br>Counts on the falling edge (↓) of ϕA while ϕB is off.<br>Counts on the rising edge (↑) of ϕB while ϕA is off.<br>Counts on the falling edge (↓) of ϕB while ϕA is on. |

**Point**

When using the phase B pulse input or CH☐ Count down command (RY22, RY3A) for 1-phase pulse input, turn off the unused signals.
When the phase B pulse input or CH☐ Count down command (RY22, RY3A) is on, countdown is performed with the phase A pulse input.

### (a) 1-phase pulse input

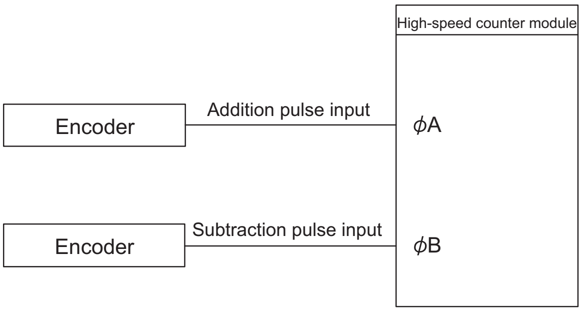
For 1-phase pulse input, multiple of 1 or multiple of 2 can be selected as a counting method.
The following figure shows the relationship between phase A pulse input and phase B pulse input or CH☐ Count down command (RY22, RY3A).



### (b) CW/CCW pulse input

For CW/CCW pulse input, pulses can be counted up with the phase A pulse input and counted down with the phase B pulse input.

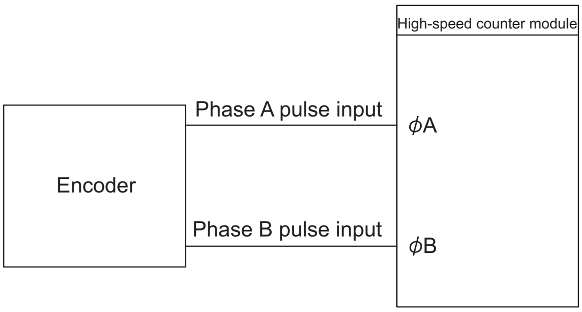
The following figure shows the relationship between phase A pulse input and phase B pulse input.




### (c) 2-phase pulse input

For 2-phase pulse input, multiple of 1, multiple of 2, or multiple of 4 can be selected as a counting method. The phase difference between phase A pulses and phase B pulses determines whether the pulses are counted up or down.

The following figure shows the relationship between phase A pulse input and phase B pulse input.



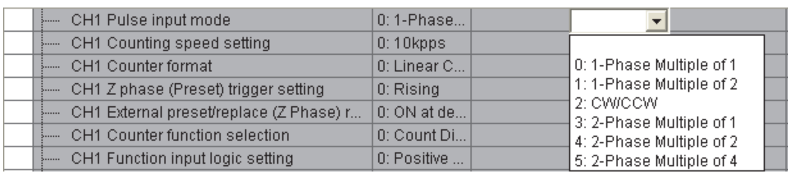

## 8.1.2 Counting method setting

Set the counting method in the CC IE Field configuration.

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. Set "CH□ Pulse input mode".**



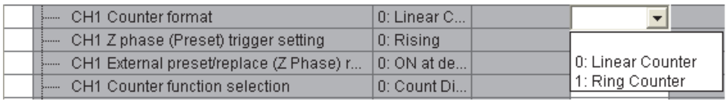
# 8.2 Counter Format Selection

Set the counter format in the CC IE Field configuration.

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

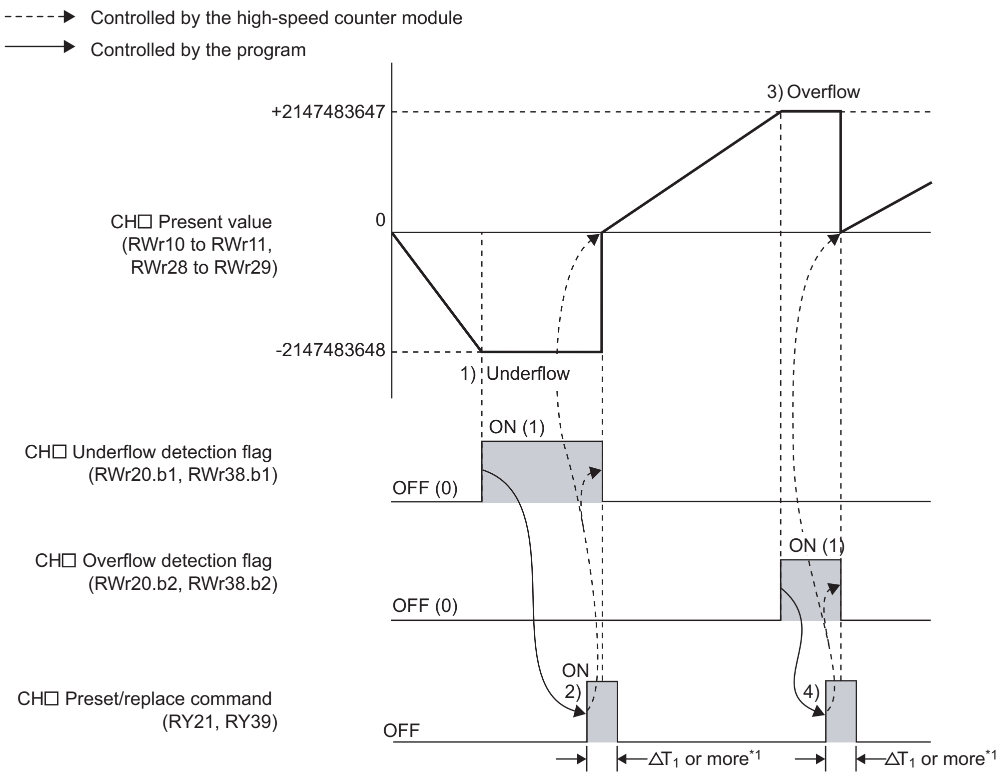
**2. Set "CH□ Counter format".**




## 8.2.1 Linear counter function

### (1) Operation of the linear counter

- When the linear counter is selected, pulses are counted between -2147483648 (lower limit value) and 2147483647 (upper limit value).
- The preset/replace function and the comparison output function can be used together.
- The following figure shows the relationship between CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) of the counter and remote registers at overflow and underflow for the linear counter function.




8.2 Counter Format Selection
8.2.1 Linear counter function

8

| No. | Description |
|---|---|
| 1) | For counting down from the lower limit value (-2147483648) in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29), the underflow error occurs and CH□ Underflow detection flag (RWr20.b1, RWr38.b1) is changed to Detected (1) from Not detected (0). For details on the underflow error, refer to the following. Page 96, Section 8.2.1 (2) |
| 2) | When CH□ Preset/replace command (RY21, RY39) is turned off then on to clear the underflow error, the value in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) and CH□ Underflow detection flag (RWr20.b1, RWr38.b1) is changed to Not detected (0) from Detected (1) . Counting in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) resumes. |
| 3) | For counting up from the upper limit value (2147483647) in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29), the overflow error occurs and CH□ Overflow detection flag (RWr20.b2, RWr38.b2) is changed to Detected (1) from Not detected (0). For details on the overflow error, refer to the following. Page 96, Section 8.2.1 (2) |
| 4) | When CH□ Preset/replace command (RY21, RY39) is turned off then on to clear the overflow error, the value in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) and CH□ Overflow detection flag (RWr20.b2, RWr38.b2) is changed to Not detected (0) from Detected (1). Counting in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) resumes. |

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

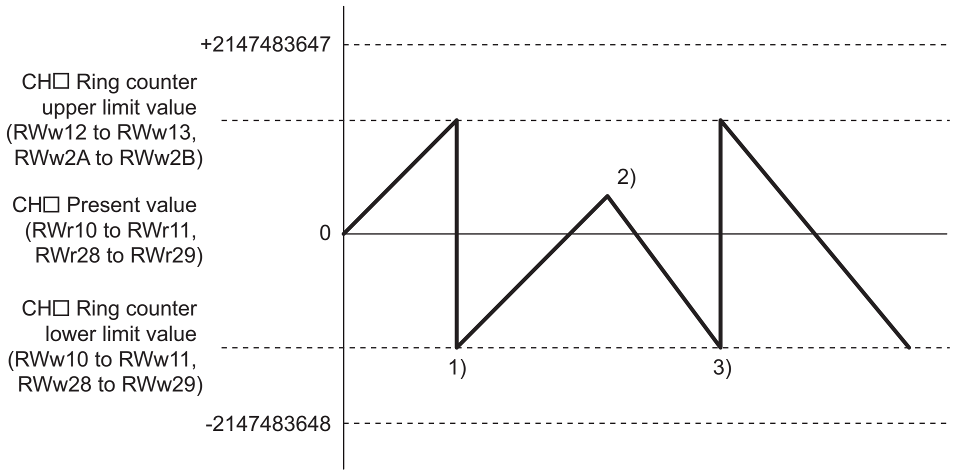
## (2) Overflow error and underflow error

- When "0: Linear Counter" is selected for "CH□ Counter format", the underflow error occurs at counting down from -2147483648 (lower limit value) in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) and the overflow error occurs at counting up from 2147483647 (upper limit value).
- If the overflow error occurs, CH□ Overflow detection flag (RWr20.b2, RWr38.b2) is set to Detected (1) and CH□ Overflow/underflow error (error code: □$200_H$) is stored in CH□ Latest error code (RWr22, RWr3A). Then, the counting stops. The value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) does not change from 2147483647 even when pulses are input.
- If the underflow error occurs, CH□ Underflow detection flag (RWr20.b1, RWr38.b1) is set to Detected (1) and CH□ Overflow/underflow error (error code: □$200_H$) is stored in CH□ Latest error code (RWr22, RWr3A). Then, the counting stops. The value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) does not change from -2147483648 even when pulses are input.
- An overflow and underflow error is cleared by the preset/replace function. After CH□ Overflow detection flag (RWr20.b2, RWr38.b2) and CH□ Underflow detection flag (RWr20.b1, RWr38.b1) are set to Not detected (0), the counting resumes. Though, CH□ Latest error code (RWr22, RWr3A) is held until it is reset. Reset CH□ Latest error code (RWr22, RWr3A) by CH□ Error reset command (RY36, RY4E).

# 8.2.2 Ring counter function

## (1) Operation of the ring counter

When "1: Ring Counter" is selected for "CH□ Counter format", pulses are counted repeatedly within the range between CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) and CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) specified by the user.
The overflow and underflow errors do not occur under the ring counter function.
The preset/replace function and the comparison output function can be used together under the ring counter function as well as under the linear counter function.
The following figure shows the relationship among CH□ Present value (RWr10 to RWr11, RWr28 to RWr29), CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29), and CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B).




| No. | Description |
|---|---|
| 1) | When CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is counted up from "CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) - 1", CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29). |
| 2) | Count-up pulse input is changed to count-down pulse input. |
| 3) | When CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is counted down from CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29), "CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) - 1" is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29). |

## (2) Counting range of the ring counter

One of the following three counting ranges of the ring counter is determined by the relationship among CH□ Present value (RWr10 to RWr11, RWr28 to RWr29), CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29), and CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) at the time when CH□ Count enable command (RY24, RY3C) is turned on or when the preset/ replace function is performed.

- Ring counter lower limit value ≤ Present value ≤ Ring counter upper limit value (This range is normally used.)
- "Present value < Ring counter lower limit value" or "Ring counter upper limit value < Present value"
- Ring counter lower limit value = Ring counter upper limit value

Set the ring counter upper limit value and the ring counter lower limit value according to the condition "Ring counter lower limit value ≤ Ring counter upper limit value". When CH□ Count enable command (RY24, RY3C) is turned off then on with the condition not satisfied, CH□ Ring counter upper/lower limit value setting error (error code: □210$_H$) is stored in CH□ Latest error code (RWr22, RWr3A) and counting does not start. To start counting, set the ring counter upper limit value and the ring counter lower limit value according to the condition "Ring counter lower limit value ≤ Ring counter upper limit value" and turn off then on CH□ Count enable command (RY24, RY3C). The OFF time must be longer than $\Delta T_1$.

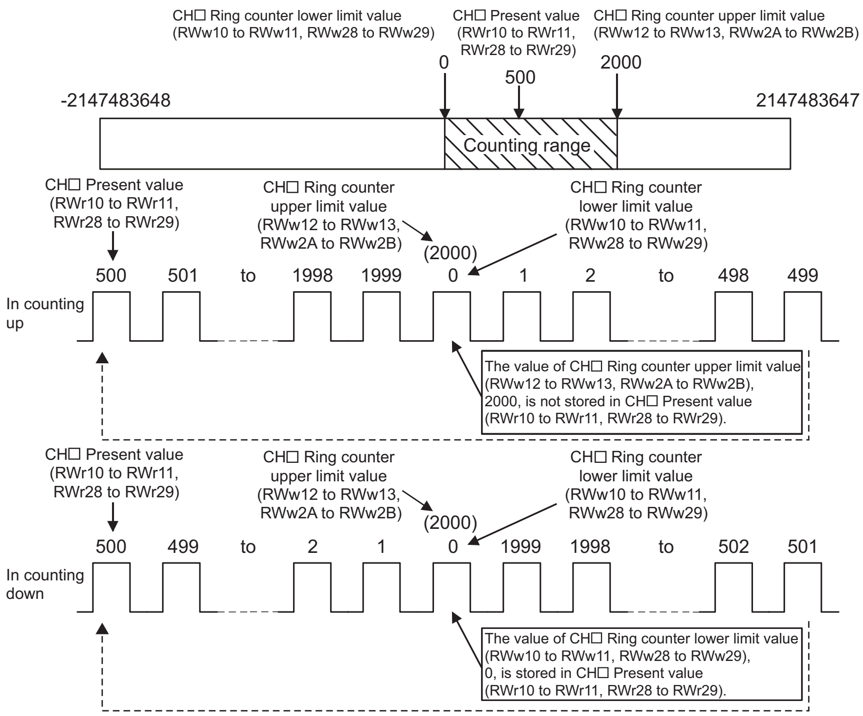
For $\Delta T_1$, refer to Page 283, Appendix 4.

### (a) Ring counter lower limit value ≤ Present value ≤ Ring counter upper limit value

- For counting up
  When the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) reaches CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B), the value in CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is automatically stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29).
- For counting down
  When the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) reaches CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29), the value in CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is held as the present value. The value "ring counter upper limit value - 1" is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) at the next count-down pulse input.

Both for counting up and down, the value in CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) is not stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29). (Except for the case that the present value equals to the ring counter upper limit value when CH☐ Count enable command (RY24, RY3C) is turned off then on, or when the preset/replace function is performed. When pulses are counted up or down in the status, the operation is the same as that of when pulses are counted from CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29).)

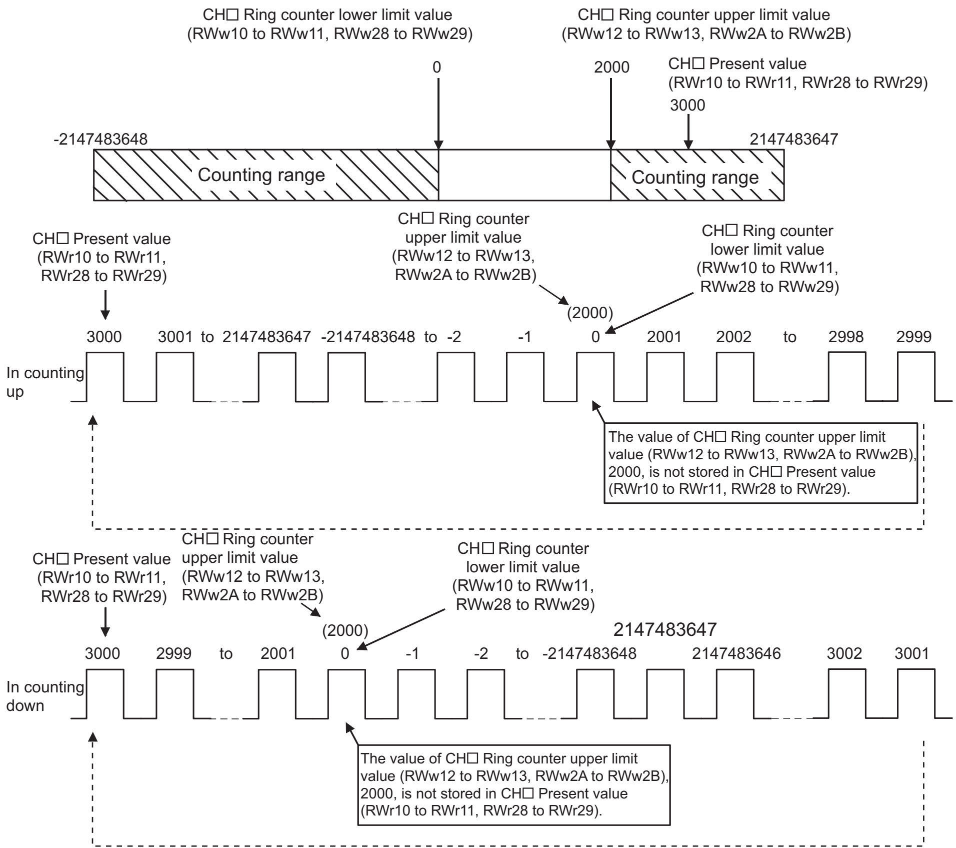
For example, if CH☐ Count enable command (RY24, RY3C) is turned on when CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is 0, CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) is 2000, and CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is 500, the counting range and the CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) change as follows.



### (b) "Present value < Ring counter lower limit value" or "Ring counter upper limit value < Present value"

- For counting up
  When the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) reaches CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29), the value in CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is held as the present value. The value "ring counter upper limit value + 1" is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) at the next count-up pulse input.
- For counting down
  When the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) reaches CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B), the value in CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is automatically stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29).

Both for counting up and down, the value in CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) is not stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29).
For example, if CH☐ Count enable command (RY24, RY3C) is turned on when CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) is 0, CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) is 2000, and CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is 3000, the counting range and the CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) change as follows.




### (c) Ring counter lower limit value = Ring counter upper limit value

When the ring counter lower limit value equals to the ring counter upper limit value, the counting range is from -2147483648 to 2147483647 regardless of CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29).

**Point**

- The setting values of CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) and CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) can be reflected by turning off then on Initial data processing completion flag (RY8) or by turning off then on Initial data setting request flag (RY9). In that case, however, monitoring data such as CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is cleared. For ordinary use, reflect the setting values by turning off then on CH☐ Count enable command (RY24, RY3C).
- When CH☐ Count enable command (RY24, RY3C) is on, the stored value does not change even if a value is written to CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) and CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B).
  Turn off CH☐ Count enable command (RY24, RY3C) before changing CH☐ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) and CH☐ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29). The OFF time must be longer than $\Delta T_1$.
  For $\Delta T_1$, refer to Page 283, Appendix 4.
- Always turn off CH☐ Count enable command (RY24, RY3C) before changing the counting range by the preset/replace function to prevent a miscount.

# 8.3 Comparison Output Function

The comparison output function outputs ON/OFF signals comparing the count value with any point or range set by the user.
The coincidence output function or the cam switch function can be selected depending on the processing method.
Set the comparison output function in the parameter setting window or Comparison output setting (address: $0100_H$).

## 8.3.1 Operation overview of the coincidence output function and the cam switch function

The following table shows the operation overview of the coincidence output function and the cam switch function.

| Item | | Coincidence output function | Cam switch function |
|---|---|---|---|
| Comparison target | | CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) | CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) |
| Number of output points per channel | | 0 to 4 points | 0 to 16 points |
| Comparison start timing | | When Initial data processing request flag (RX8) is off and Initial data setting completion flag (RX9) is off | When CH□ Cam switch execute (RX26, RX3E) is turned off then on |
| Setting item for comparison point/range | | • Point setting (Coincidence output 1 to 4)/Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD)<br>• Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF) | • Cam switch function parameter data (address: $1500_H$ to $1FFF_H$) |
| Change method of comparison point/range | | • Turning off then on Setting change request (Coincidence output 1 to 4) (RY14 to RY17)<br>• Turning off then on Initial data processing completion flag (RY8)<br>• Turning off then on Initial data setting request flag (RY9)*1 | Turning off then on CH□ Cam switch execute (RX26, RX3E) |
| Comparison result | Internal output | • Coincidence output 1 to 4 (RX10 to RX13)<br>• Counter value greater/smaller signal (RWr0) (only for coincidence output) | Cam switch output signal (RWr2) |
| | External output | Coincidence output 1 to 4 terminals (EQU1 to EQU4) | Output terminals of the extension output module |
| Preset/replace (at coincidence output) function | | Provided | Not provided |
| Output reset timing | | • When Reset command (Coincidence output 1 to 4) (RY10 to RY13) is turned off then on (for coincidence output)<br>• When values are counted outside the detection area (for within-range output or out-of-range output) | Automatically reset depending on Cam switch function, step No.1 to No.16 setting (Output 1 to 16) of remote buffer memory |
| External output enable timing | | When CH□ Coincidence output enable command (RY20, RY38) is turned off then on | When CH□ Cam switch execute (RX26, RX3E) is turned off then on after CH□ Cam switch execute command (RY26, RY3E) is turned off then on |

*1 When Initial data processing request flag (RX8) is on, the setting data is not checked.

# 8.3.2 Coincidence output function

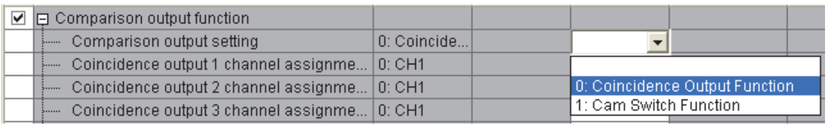
The coincidence output function compares CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) with a coincidence detection point or with an area divided by the coincidence output upper/lower limit value, and outputs the comparison result from Coincidence output 1 to 4 terminals (EQU1 to EQU4). At coincidence output, Coincidence output 1 to 4 (RX10 to RX13) turns on.
The unit to output the comparison result is called coincidence output.
Four points are assigned to coincidence output. The present value is compared with each point and the comparison result is output from the point.

## (1) Setting method of the coincidence output function

**1. Set "Parameter write" for "Method selection".**

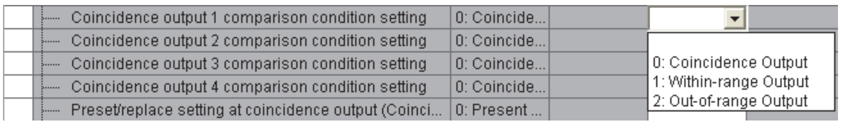
"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. Set "0: Coincidence Output Function" for "Comparison output setting".**




**3. Set a channel to be compared for "Coincidence output 1 to 4 channel assignment setting".**


**4. Set the comparison condition for "Coincidence output 1 to 4 comparison condition setting".**




**Point**

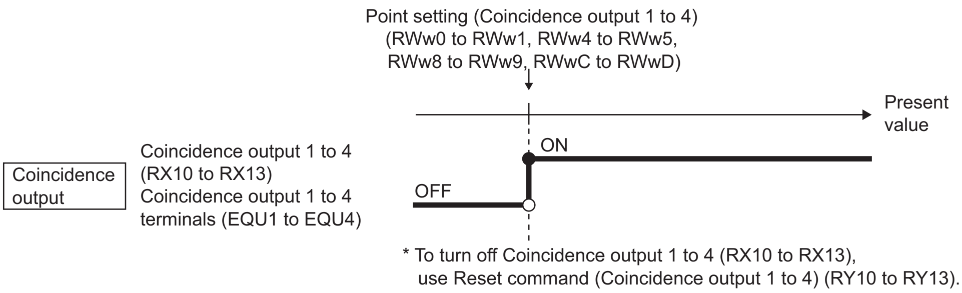
When "Operation mode setting" is set to a mode other than "0: Normal Mode", the setting of "Coincidence output 1 to 4 comparison condition setting" is ignored.

## (2) Comparison condition types and setting

Depending on the selected comparison condition, the range to be compared with the present value differs.

### (a) Coincidence output

Coincidence output 1 to 4 turn on when CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) matches with a point set in Point setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD).




### (b) Within-range output

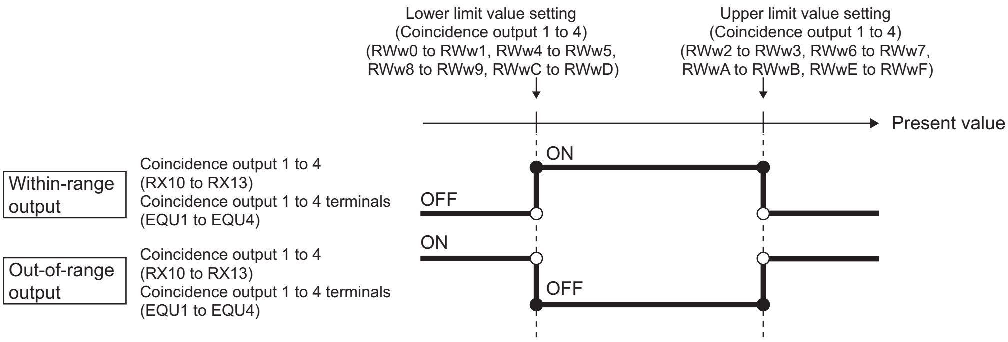
Coincidence output 1 to 4 turn on when both the following conditions are satisfied.

- When CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) or more
- When CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF) or less

### (c) Out-of-range output

Coincidence output 1 to 4 turn on when either of the following conditions is satisfied.

- When CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is less than Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD)
- When CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) exceeds Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF)



### (3) Comparison start timing of the coincidence output function

The coincidence output function starts comparison when "CH☐ Operation mode setting" is set to "0: Normal Mode", and when Initial data processing request flag (RX8) turns off then on.

The following table lists the timing of when the settings related to the coincidence output function are enabled.

○: Enable —: Disable

| Setting item | Timing of when settings are enabled | | | Reference |
|---|---|---|---|---|
| | When Initial data processing completion flag (RY8) is turned off then on | When Initial data setting request flag (RY9) is turned off then on | When Setting change request (Coincidence output 1 to 4) (RY14 to RY17) is turned off then on | |
| "Coincidence output 1 to 4 channel assignment setting" | — | ○ | — | — |
| "Coincidence output 1 to 4 comparison condition setting" | — | ○ | — | — |
| "Preset/replace setting at coincidence output (Coincidence output 1 to 2)"*3 | — | ○ | — | — |
| Point setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) | ○*1 | ○*2 | ○ | Page 261, Appendix 2 (7), Page 262, Appendix 2 (8) |
| Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) | ○*1 | ○*2 | ○ | Page 261, Appendix 2 (7), Page 262, Appendix 2 (8) |
| Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF) | ○*1 | ○*2 | ○ | Page 261, Appendix 2 (7), Page 262, Appendix 2 (8) |

*1 When Initial data processing request flag (RX8) is on, the setting data is checked.
*2 When Initial data processing request flag (RX8) is on, the setting data is not checked.
*3 For details on the preset/replace (at coincidence output) function, refer to the following.

Page 114, Section 8.3.3

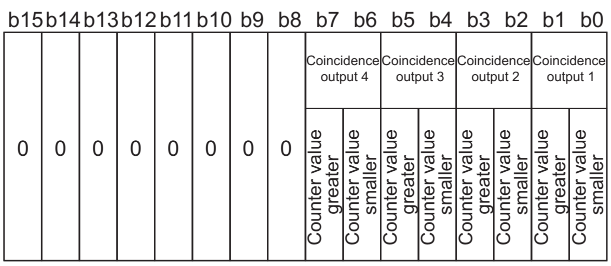
## (4) Output destination of comparison result for the coincidence output function

The following table lists the output destination of the comparison result for each comparison condition.

○: Enable —: Disable

| Setting item | Comparison condition | | | Output overview> |
|---|---|---|---|---|
| | Coincidence output | Within-range output | Out-of-range output | |
| Coincidence output 1 to 4 (RX10 to RX13) | ○ | ○ | ○ | Outputs the result whether the specified comparison condition was satisfied or not. |
| Coincidence output 1 to 4 terminals (EQU1 to EQU4) | ○ | ○ | ○ | |
| Counter value greater/smaller signal (RWr0) | ○ | — | — | Outputs a relationship (greater or smaller) between the present value and the point setting (coincidence output 1 to 4). |

The following table lists the details on Counter value greater/smaller signal (RWr0).

| Details | Bit name | Point setting (Coincidence output 1 to 4) | | |
|---|---|---|---|---|
| | | (Present value) > | (Present value) = | (Present value) < |
|  | Counter value smaller (Coincidence output 1 to 4) | 0 | 0 | 1 |
| | Counter value greater (Coincidence output 1 to 4) | 1 | 0 | 0 |

### (5) Output setting on Coincidence output 1 to 4 terminals (EQU1 to EQU4)

To output signals from Coincidence output 1 to 4 terminals (EQU1 to EQU4) to outside, enable output by turning on CH☐ Coincidence output enable command (RY20, RY38).

Doing so enables all coincidence outputs assigned to the target channel in "Coincidence output 1 to 4 channel assignment setting".

| Comparison condition | Comparison setting item | Setting details | Reference |
|---|---|---|---|
| Coincidence output | Point setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) | Set the point to be compared with the present value. | Page 261, Appendix 2 (7), Page 262, Appendix 2 (8) |
| Within-range output or out-of-range output | • Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF)<br>• Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) | Set the upper and lower limit values for the area to be compared with the present value.<br>When the upper limit value is less than the lower limit value, Upper limit value setting error (Coincidence output 1 to 4) (error code: ☐311$_H$ to ☐314$_H$) occurs. | Page 261, Appendix 2 (7), Page 262, Appendix 2 (8) |

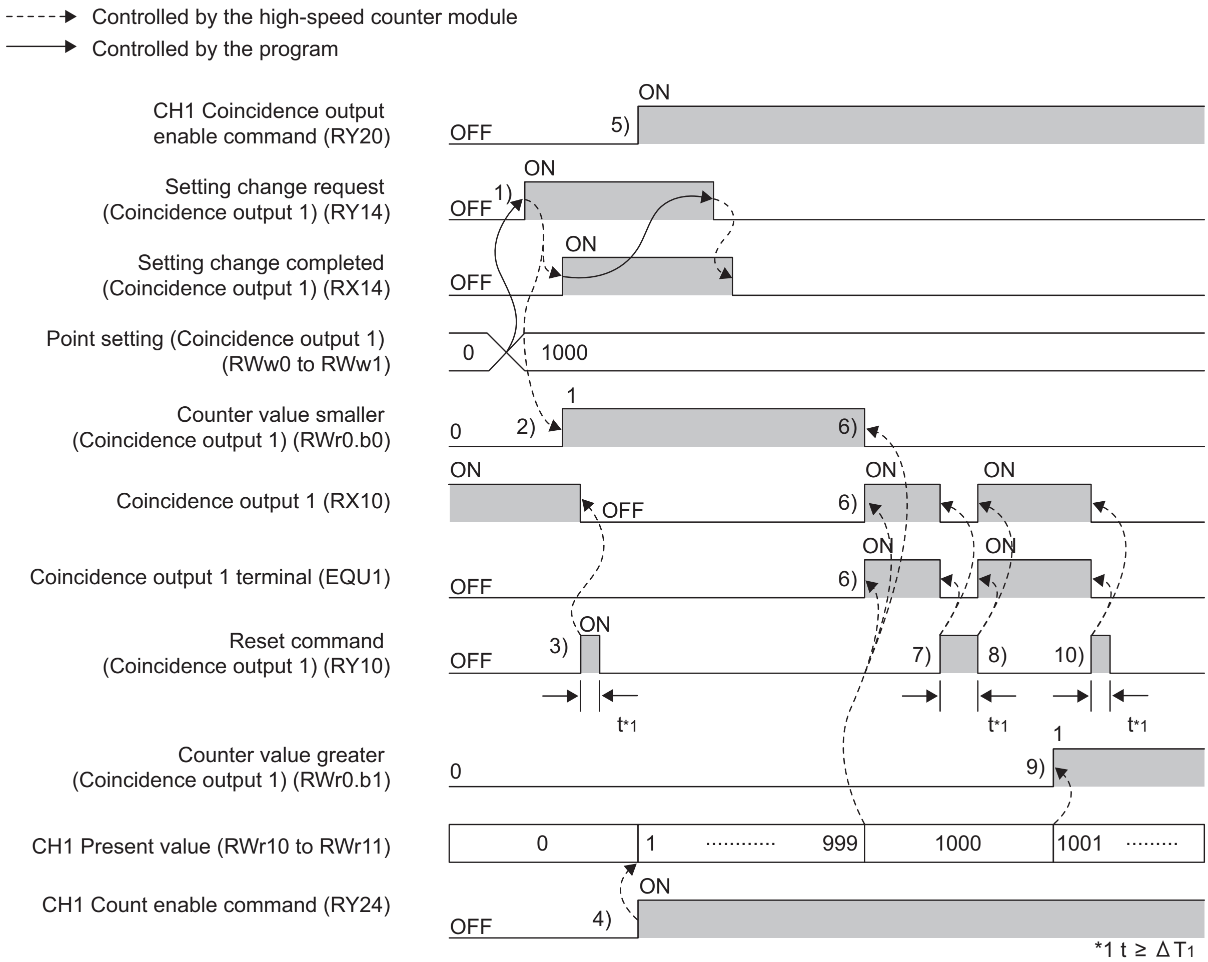
**Point**

Turning off then on Initial data processing completion flag (RY8) when the comparison condition is coincidence output or when the comparison setting item for within-range output (Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) to Upper limit value setting (Coincidence output 4) (RWwE to RWwF)) is 0 (default) turns on Coincidence output 1 to 4 (RX10 to RX13) because CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) of when Initial data processing request flag (RX8) is turned off is 0 (default). To turn off Coincidence output 1 to 4 (RX10 to RX13), set the comparison setting item to other than 0 or to a range that does not include 0 before turning off then on Initial data processing completion flag (RY8).

## (6) Operation example of each comparison condition

### (a) Operation example of coincidence output

The following figure shows the timing to enable Point setting (Coincidence output 1) and an operation example of when the present value matches Point setting (Coincidence output 1) (1000) for the case where coincidence output is set as the comparison condition. Note that Coincidence output 1 is assigned to CH1.



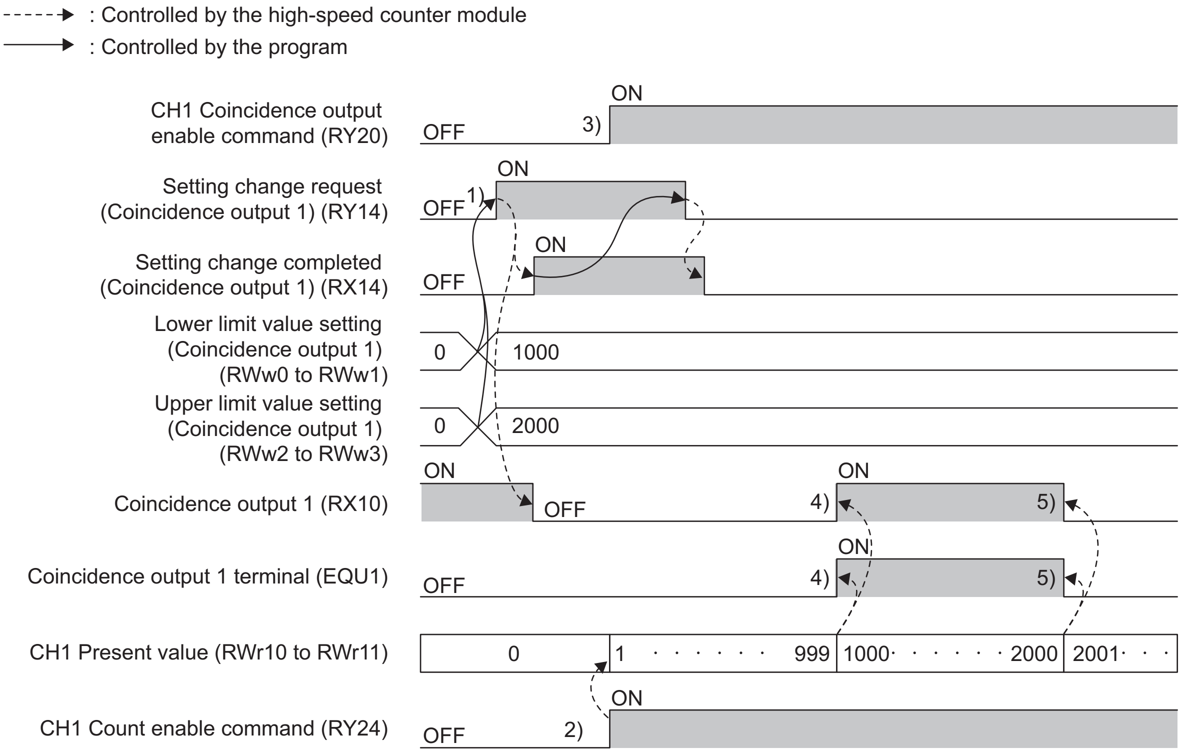
| No. | Description |
|---|---|
| 1) | Start comparison of the present value and a value set to Point setting (Coincidence output 1) (RWw0 to RWw1) in the following order.<br>(1) Write 1000 into Point setting (Coincidence output 1) (RWw0 to RWw1).<br>(2) Turn off then on Setting change request (Coincidence output 1) (RY14).<br>(3) The values set in Point setting (Coincidence output 1) (RWw0 to RWw1) are enabled when Setting change completed (Coincidence output 1) (RX14) turns on. After confirming that Setting change completed (Coincidence output 1) (RX14) turns on, turn off Setting change request (Coincidence output 1) (RY14). |
| 2) | When CH1 Present value (RWr10 to RWr11) is less than Point setting (Coincidence output 1) (RWw0 to RWw1), the value in Counter value smaller (Coincidence output 1) (RWr0.b0) is 1. |
| 3) | When Reset command (Coincidence output 1) (RY10) is turned on, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn off. |
| 4) | Turn off then on CH1 Count enable command (RY24) to start counting. |
| 5) | If performing coincidence output from the coincidence output 1 terminal (EQU1), turn on CH1 Coincidence output enable command (RY20). |
| 6) | When CH1 Present value (RWr10 to RWr11) equals to Point setting (Coincidence output 1) (RWw0 to RWw1), Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn on. Also, Counter value smaller (Coincidence output 1) (RWr0.b0) becomes 0. |
| 7) | If Reset command (Coincidence output 1) (RY10) is turned on while CH1 Present value (RWr10 to RWr11) and Point setting (Coincidence output 1) (RWw0 to RWw1) match, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn off. |
| 8) | If Reset command (Coincidence output 1) (RY10) is turned off while CH1 Present value (RWr10 to RWr11) and Point setting (Coincidence output 1) (RWw0 to RWw1) match, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn on again. |
| 9) | When CH1 Present value (RWr10 to RWr11) is more than Point setting (Coincidence output 1) (RWw0 to RWw1), the value in Counter value greater (Coincidence output 1) (RWr0.b1) is 1. |
| 10) | Turn on Reset command (Coincidence output 1) (RY10) to reset Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1). If Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) remain on, the next coincidence output cannot be detected. |

**Point**

- Coincidence output 1 to 4 (RX10 to RX13) turn on regardless of CH□ Coincidence output enable command (RY20, RY38).
- Set the ON time of Reset command (Coincidence output 1 to 4) (RY10 to RY13) to $\Delta T_1$ or longer.
  For $\Delta T_1$, refer to Page 283, Appendix 4.
- Due to coincidence detection processing inside the high-speed counter module, the counter value greater or smaller corresponding to Counter value greater/smaller signal (RWr0) is not updated at the same time when Coincidence output 1 to 4 (RX10 to RX13) turns off then on. Therefore, the counter value greater or smaller may be 1 even though it is not the correct value.
- Even if Point setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) is changed, the present value is not compared with the changed value unless Setting change request (Coincidence output 1 to 4) (RY14 to RY17) is turned off then on.

### (b) Operation example of within-range output

The following figure shows the timing to enable Lower limit value setting (Coincidence output 1) (1000) and Upper limit value setting (Coincidence output 1) (2000) and an operation example of when the present value reaches the setting range (1000 to 2000) for the case where within-range output is set as the comparison condition. Note that Coincidence output 1 is assigned to CH1.



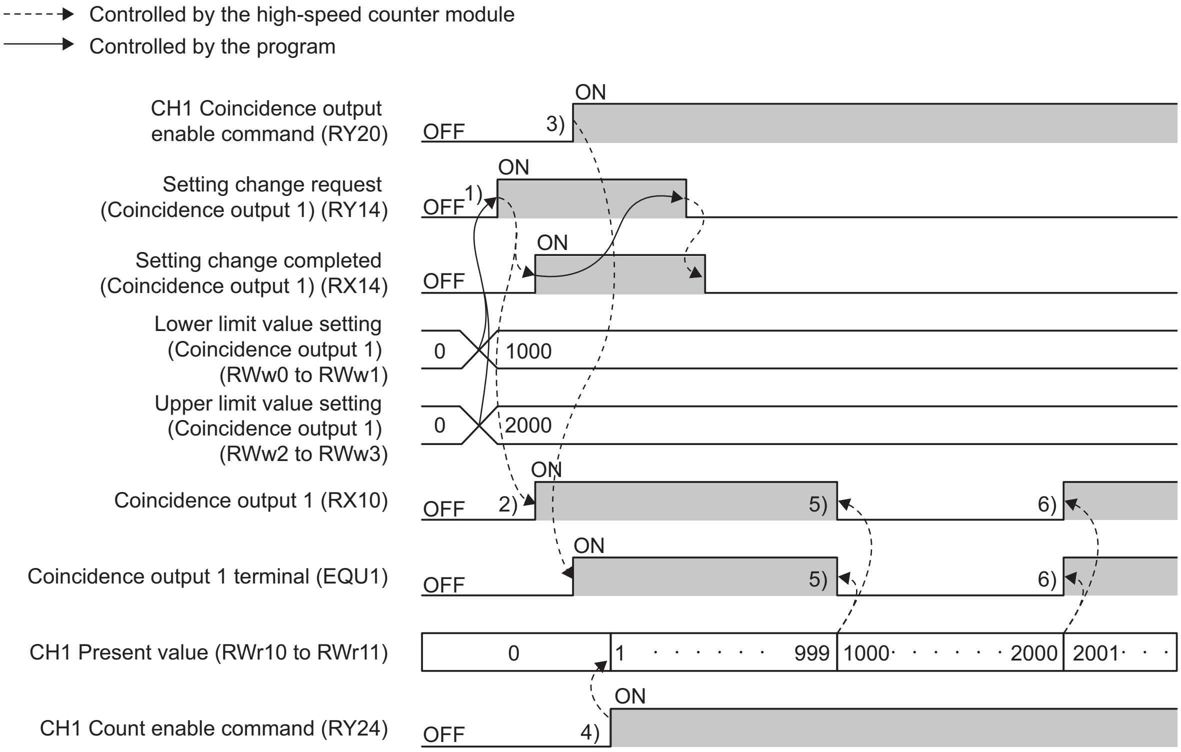

| No. | Description |
|---|---|
| 1) | Start comparison of the present value and values set to Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) in the following order.<br>(1) Write 1000 into Lower limit value setting (Coincidence output 1) (RWw0 to RWw1).<br>(2) Write 2000 into Upper limit value setting (Coincidence output 1) (RWw2 to RWw3).<br>(3) Turn off then on Setting change request (Coincidence output 1) (RY14).<br>(4) The values set for Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) are enabled when Setting change completed (Coincidence output 1) (RX14) turns on. After confirming that Setting change completed (Coincidence output 1) (RX14) turns on, turn off Setting change request (Coincidence output 1) (RY14). |
| 2) | Turn off then on CH1 Count enable command (RY24) to start counting. |
| 3) | If performing coincidence output from the coincidence output 1 terminal (EQU1), turn on CH1 Coincidence output enable command (RY20). |
| 4) | When CH1 Present value (RWr10 to RWr11) is Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) or more and the present value is within the specified range, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn on. |
| 5) | When CH1 Present value (RWr10 to RWr11) is more than Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) and the present value is outside the specified range, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn off. |

**Point**

- Coincidence output 1 to 4 (RX10 to RX13) turn on regardless of CH□ Coincidence output enable command (RY20, RY38).
- Even if Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) and Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF) are changed, the present value is not compared with the changed value unless Setting change request (Coincidence output 1 to 4) (RY14 to RY17) is turned off then on.

### (c) Operation example of out-of-range output

The following figure shows the timing to enable Lower limit value setting (Coincidence output 1) (1000) and Upper limit value setting (Coincidence output 1) (2000) and an operation example of when the present value reaches out of the setting range (1000 to 2000) for the case where out-of-range output is set as the comparison condition. Note that Coincidence output 1 is assigned to CH1.




| No. | Description |
|---|---|
| 1) | Start comparison of the present value and values set to Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) in the following order.<br>(1) Write 1000 into Lower limit value setting (Coincidence output 1) (RWw0 to RWw1).<br>(2) Write 2000 into Upper limit value setting (Coincidence output 1) (RWw2 to RWw3).<br>(3) Turn off then on Setting change request (Coincidence output 1) (RY14).<br>(4) The values set for Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) are enabled when Setting change completed (Coincidence output 1) (RX14) turns on. After confirming that Setting change completed (Coincidence output 1) (RX14) turns on, turn off Setting change request (Coincidence output 1) (RY14). |
| 2) | CH1 Present value (RWr10 to RWr11) becomes less than Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Coincidence output 1 (RX10) turns on since the present value is outside the specified range. |
| 3) | If performing coincidence output from the coincidence output 1 terminal (EQU1), turn on CH1 Coincidence output enable command (RY20). In this case, the coincidence output 1 terminal (EQU1) turns on immediately since Coincidence output 1 (RX10) is already on. |
| 4) | Turn off then on CH1 Count enable command (RY24) to start counting. |
| 5) | When CH1 Present value (RWr10 to RWr11) is Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) or more and the present value is within the specified range, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn off. |
| 6) | When CH1 Present value (RWr10 to RWr11) is more than Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) and the present value is outside the specified range, Coincidence output 1 (RX10) and the coincidence output 1 terminal (EQU1) turn on. |

**Point**

- Coincidence output 1 to 4 (RX10 to RX13) turn on regardless of CH□ Coincidence output enable command (RY20, RY38).
- Even if Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) and Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF) are changed, the present value is not compared with the changed value unless Setting change request (Coincidence output 1 to 4) (RY14 to RY17) is turned off then on.

## 8.3.3 Preset/replace (at coincidence output) function

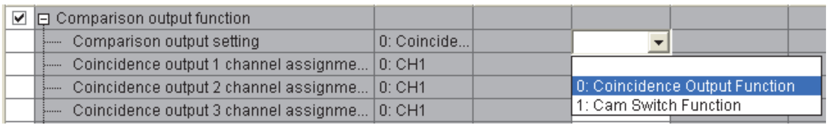
The preset/replace (at coincidence output) function performs the preset/replace function (replaces the present value with a value preset by the user) at the rising state (off to on) of Coincidence output 1 and 2.
The preset/replace by this function is performed to the channel assigned to Coincidence output 1 and 2.
This function is not available for Coincidence output 3 and 4.

### (1) Setting method of the preset/replace (at coincidence output) function

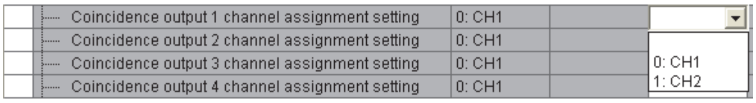
**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

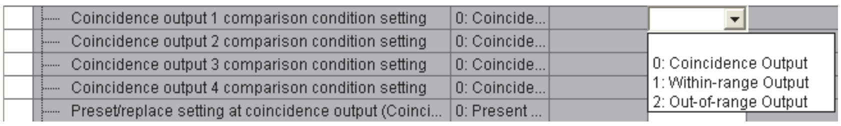
**2. Set "0: Coincidence Output Function" for "Comparison output setting".**



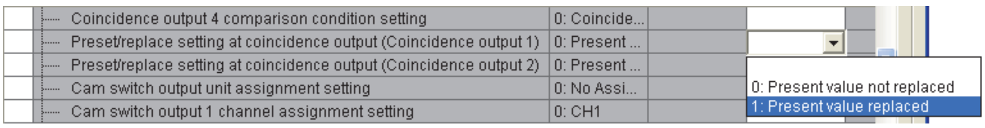

**3. Set a channel to be compared for "Coincidence output 1 to 4 channel assignment setting".**




**4. Set the comparison condition for "Coincidence output 1 to 4 comparison condition setting".**

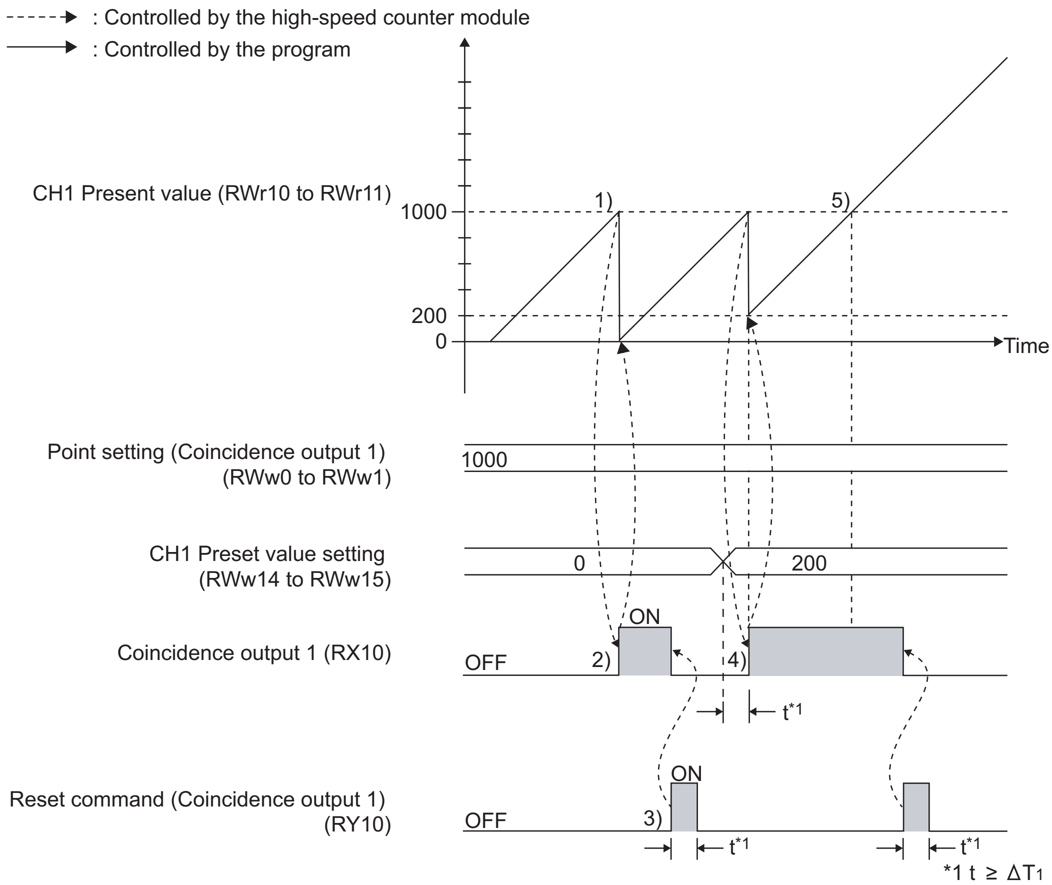



**5. Set "1: Present value replaced" for "Preset/replace setting at coincidence output (Coincidence output 1 to 2)".**



### (2) Operation example of the preset/replace (at coincidence output) function

The following figure shows an operation example in which the preset value (0 or 200) is stored to the present value when the present value reaches Point setting (Coincidence output 1) (1000). Note that the comparison condition of Coincidence output 1 is set to coincidence output, and it is assigned to CH1.




| No. | Description |
|---|---|
| 1) | When CH1 Present value (RWr10 to RWr11) equals to Point setting (Coincidence output 1) (RWw0 to RWw1), Coincidence output 1 (RX10) turns on. |
| 2) | The preset/replace function is performed at the rising state (off to on) of Coincidence output 1 (RX10). |
| 3) | Turn on Reset command (Coincidence output 1) (RY10) and turn off Coincidence output 1 (RX10) so that Coincidence output 1 (RX10) rises (off to on) when the next CH1 Present value (RWr10 to RWr11) = Point setting (coincidence output 1) (RWw0 to RWw1) is made. |
| 4) | If CH1 Preset value setting (RWw14 to RWw15) was changed in advance, the preset/replace function is performed with the changed value. |
| 5) | If Coincidence output 1 (RX10) was not reset, Coincidence output 1 (RX10) remains on without rising when CH1 Present value (RWr10 to RWr11) = Point setting (Coincidence output 1) (RWw0 to RWw1) is made. Therefore, the preset/replace function does not operate. |

**Point**

- While CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) is on, values cannot be replaced by this function as well as by CH☐ Preset/replace command (RY21, RY39). Turn off then on CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) to turn off CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B).
- Have a $\Delta T_1$ or longer interval after changing CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) until the value is replaced because there are maximum of $\Delta T_1$ delay until change in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is reflected.*1
- To perform the preset/replace function continuously using the same coincidence output, have a $\Delta T_1$ or longer interval. The preset/replace function may not operate if there is not a $\Delta T_1$ or longer interval.*1
  The following is the rough standard of an interval for performing the preset/replace function continuously using the same coincidence output.
  (|Point setting (Coincidence output 1 to 4)*2 - Preset value setting|) > (Input pulse speed (pps)/1000)
- When the preset/replace (at coincidence output) function is used under the condition where pulses are input in a counting speed of 2Mpps or faster, a pulse count difference (plus one or minus one pulse) occurs. Use the function after checking that the difference does not cause a problem for the system.

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

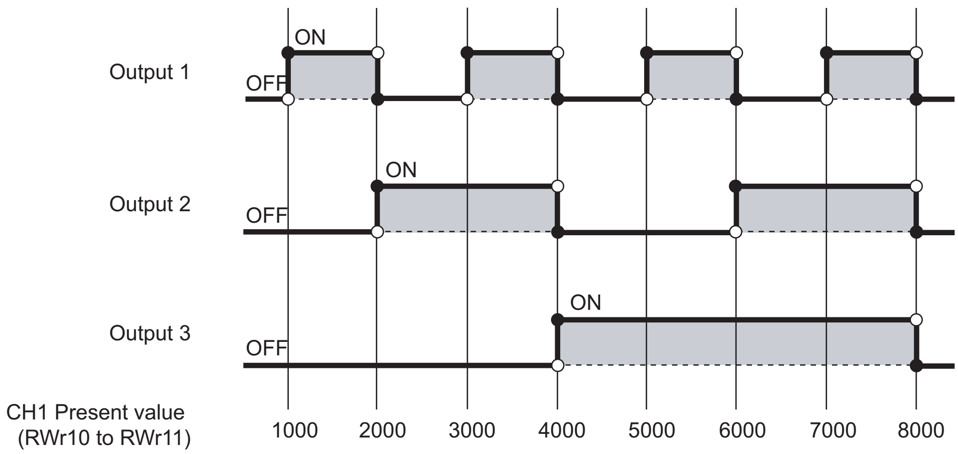
*2 Change this into Upper limit value setting (Coincidence output 1 to 4) or Lower limit value setting (Coincidence output 1 to 4) according to the comparison condition and the setting in which Coincidence output 1 to 4 turns on.

# 8.3.4 Cam switch function

The cam switch function allows users to output the ON/OFF status of any of the output terminals on the extension output module (Y0 to YF) according to the value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29).
The maximum of 16 steps of ON/OFF switching can be set per output point.
Up to 16 output points can be set.

Ex. The following figure and table show an operation example of output control according to CH1 Present value (RWr10 to RWr11) with CH1 being assigned to "Cam switch output 1 channel assignment setting", "Cam switch output 2 channel assignment setting", and "Cam switch output 3 channel assignment setting".

| CH1 Present value (RWr10 to RWr11) | Output 3 | Output 2 | Output 1 |
|---|---|---|---|
| -2147483648 to 999 | OFF | OFF | OFF |
| 1000 to 1999 | OFF | OFF | ON |
| 2000 to 2999 | OFF | ON | OFF |
| 3000 to 3999 | OFF | ON | ON |
| 4000 to 4999 | ON | OFF | OFF |
| 5000 to 5999 | ON | OFF | ON |
| 6000 to 6999 | ON | ON | OFF |
| 7000 to 7999 | ON | ON | ON |
| 8000 to 2147483647 | OFF | OFF | OFF |




8

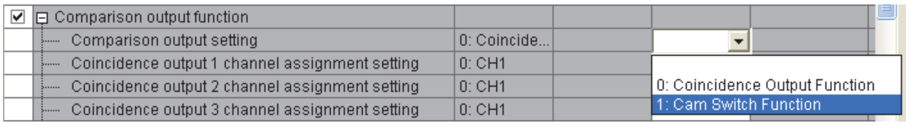
8.3 Comparison Output Function
8.3.4 Cam switch function

## (1) Setting method of the cam switch function

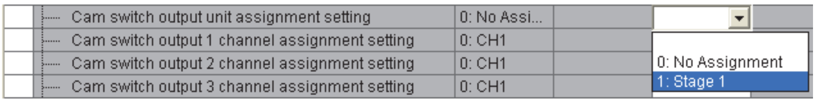
**1.** **Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

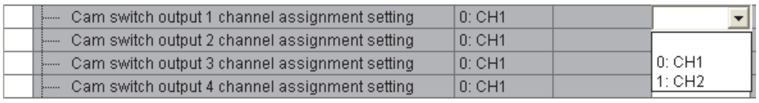
**2.** **Set "1: Cam Switch Function" for "Comparison output setting".**




**3.** **Set "1: Stage 1" for "Cam switch output unit assignment setting".**




**4.** **Set a channel to be compared for "Cam switch output 1 to 16 channel assignment setting".**




**5.** **Set Cam switch function parameter data (address: 1500$_H$ to 1FFF$_H$) in a program.**

For details, refer to the following.

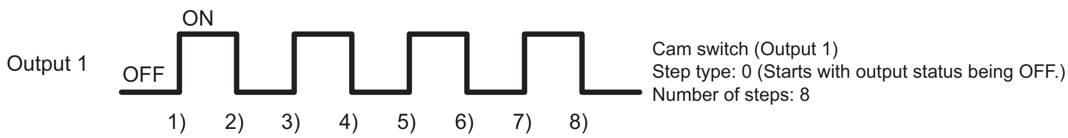
☞ Page 119, Section 8.3.4 (2)

**Point**

The cam switch function and the number of ON times integration function cannot be used together.

### (2) Output range setting

With the cam switch function, the maximum of 16 steps of ON/OFF switching can be set per output point.
The part where the ON/OFF signal status is switched is referred to as a step.

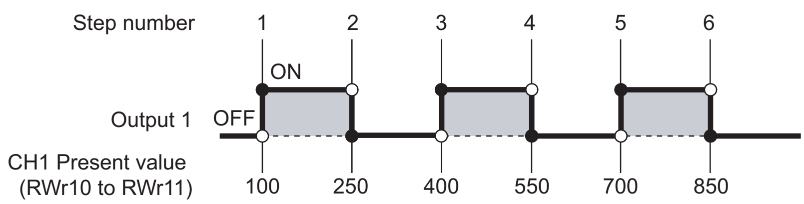



* 1) to 8) indicate the step number.

| Setting item | Setting details |
|---|---|
| Cam switch function, step type (Output 1 to 16) | Set the ON/OFF status of the output of the extension output module (Y0 to YF) at the time when the pulse counting starts. |
| Cam switch function, number of steps (Output 1 to 16) | Set the number of steps for the cam of Output 1 to 16. Setting range is 0 to 16.<br>In the case where the number of steps is 0, output is always off when set to be started from off in the step type setting and on when set to be started from on in the setting. |
| Cam switch function, step No.1 to No.16 setting (Output 1 to 16) | Set the count value where the ON/OFF status of the output of the extension output module (Y0 to YF) is switched. |

Ex. Cam switch function, step type (Output 1) (address: $1500_H$) is set to "Starts with output status being OFF ($0_H$)", and Cam switch function, number of steps (Output 1) (address: $1501_H$) is set to 6.
Note that Output 1 is assigned to CH1.

| Setting item | Setting value |
|---|---|
| Cam switch function, step type (Output 1) (address: $1500_H$) | 0 |
| Cam switch function, number of steps (Output 1) (address: $1501_H$) | 6 |
| Cam switch function, step No.1 setting (Output 1) (address: $1502_H$ to $1503_H$) | 100 |
| Cam switch function, step No.2 setting (Output 1) (address: $1504_H$ to $1505_H$) | 250 |
| Cam switch function, step No.3 setting (Output 1) (address: $1506_H$ to $1507_H$) | 400 |
| Cam switch function, step No.4 setting (Output 1) (address: $1508_H$ to $1509_H$) | 550 |
| Cam switch function, step No.5 setting (Output 1) (address: $150A_H$ to $150B_H$) | 700 |
| Cam switch function, step No.6 setting (Output 1) (address: $150C_H$ to $150D_H$) | 850 |
| Cam switch function, step No.7 setting (Output 1) (address: $150E_H$ to $150F_H$)<br>to<br>Cam switch function, step No.16 setting (Output 1) (address: $1520_H$ to $1521_H$) | Setting not necessary |



## (3) Minimum setting width of the ON/OFF status

To output the ON/OFF signal according to the setting, set the value of each step No. so that the following formula is satisfied.

$$\text{(Input pulse speed [pps]} \times \text{Allowed time [s])} \leq \left(\begin{array}{c}\text{Cam switch function,}\\ \text{step No.i + 1setting}\\ \text{(Output} \blacklozenge\text{)}\end{array}\right) - \left(\begin{array}{c}\text{Cam switch function,}\\ \text{step No.i setting}\\ \text{(Output} \blacklozenge\text{)}\end{array}\right)$$

- Allowable time: ($\Delta T_2 \times 2$) + (output response time of the extension output module*1)
- ◆: Cam switch output No. (1 to 16)
- i: Step No. (1 to 15)

For $\Delta T_2$, refer to Page 283, Appendix 4.

*1 Either of the output response time for switching on from off or that for switching off from on, whichever is longer

Ex. When the input pulse speed is 10kpps and the output response time of the extension output module is 1.5ms

Allowable time: (0.5ms × 2) + 1.5ms = 2.5ms

Setting width of the ON/OFF status: $(10 \times 10^3) \times (2.5 \times 10^{-3}) = 25$

Therefore, set the difference between the values of Cam switch function, step No.i setting (Output ◆) and Cam switch function, step No.i + 1 setting (Output ◆) to 25 or more.

## (4) Timing of when the cam switch function setting is enabled

The following table shows the timing of when the cam switch function is enabled.

CH□ Cam switch execute command (RY26, RY3E) is enabled while Initial data processing request flag (RX8) is off or Initial data setting completion flag (RX9) is off.

○: Enable —: Disable

| Setting item | Timing of when settings are enabled | |
|---|---|---|
| | When Initial data setting completion flag (RX9) is turned off then on | When CH□ Cam switch execute command (RY26, RY3E) is off then on |
| "Cam switch output unit assignment setting" | ○ | — |
| "Cam switch output 1 to 16 channel assignment setting" | ○ | — |
| Cam switch function, step type (Output ◆) (address: $1500_H + 80_H \times$ (◆ - 1)) | — | ○ |
| Cam switch function, number of steps (Output ◆) (address: $1501_H + 80_H \times$ (◆ - 1)) | — | ○ |
| Cam switch function, step No.i setting (Output ◆) (address: $1502_H + 80_H \times$ (◆ - 1) to $1521_H + 80_H \times$ (◆ - 1)) | — | ○ |

◆: Cam switch output No. (1 to 16)

i: Step No. (1 to 16)

**Point**

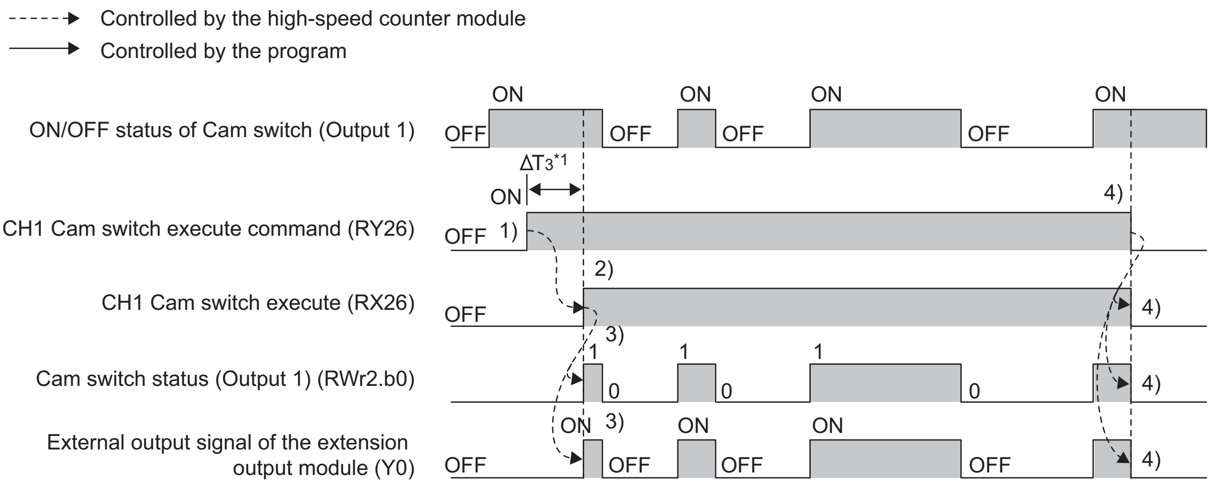
For all of Cam switch function, step type (Output ◆), Cam switch function, number of steps (Output ◆), and Cam switch function, step No.i setting (Output ◆) of cam switch output ◆ that is not used, set the default (0). When a value other than the default is set, output may be turned on when the cam switch function is performed.

In addition, when a value other than the default value is backed up to the nonvolatile memory by turning off then on Initial data setting request flag (RY9), the setting in the nonvolatile memory also must be set to the default. If the setting in the nonvolatile memory is not the default, the above setting item becomes the backed up value when the module power supply is turned off then on or the module returns from the remote reset.

## (5) Signal timing of the cam switch function

The following figure shows the signal timing of the cam switch function.

- Only Cam switch (Output 1) is used.
- Coincidence output 1 is assigned to CH1.
- "1: Stage 1" is assigned to "Cam switch output unit assignment setting".
- "0: CH1" is assigned to "Cam switch output 1 channel assignment setting".




| No. | Description |
|---|---|
| 1) | When CH1 Cam switch execute command (RY26) is turned off then on, the step setting of Cam switch (Output 1) is acquired and CH1 Cam switch execute (RX26) turns on. (If the value is changed while the cam switch function is in operation, the change is ignored.) |
| 2) | The cam switch function operates when CH1 Cam switch execute (RX26) turns on. |
| 3) | CH1 Present value (RWr10 to RWr11) and the step setting of Cam switch (Output 1) are compared and the result is output from Y0 of the extension output module. The output status can be checked by Cam switch status (Output 1) (RWr2.b0) of Cam switch output signal (RWr2). |
| 4) | When CH1 Cam switch execute command (RY26) is turned off, the operation is as follows:<br>• CH1 Cam switch execute (RX26) turns off.<br>• Cam switch status (Output 1) (RWr2.b0) becomes 0.<br>• Y0 of the extension output module is turned off. |

*1 For $\Delta T_3$, refer to Page 283, Appendix 4.

**Point**

Cam switch output signal (RWr2) turns on regardless of CH□ Count enable command (RY24, RY3C).

# 8.4 Preset/replace Function

The preset/replace function replaces the count value with any value preset by the user. This value is called a preset value.
This function can be used to start counting pulses from the preset value.
Perform this function by one of the following methods. This section describes No.1 and 2.

| No. | Method | Reference |
|---|---|---|
| 1 | Performing the preset/replace function by a program | Page 123, Section 8.4 (1) |
| 2 | Performing the preset/replace function by CH□ Phase Z input terminal (Z1, Z2) | Page 124, Section 8.4 (2) |
| 3 | Performing the preset/replace function by the preset/replace (at coincidence output) function | Page 114, Section 8.3.3 |
| 4 | Performing the preset/replace function by the count disable/preset/replace function | Page 142, Section 8.11 |
| 5 | Performing the preset/replace function by the latch counter/preset/replace function | Page 145, Section 8.12 |

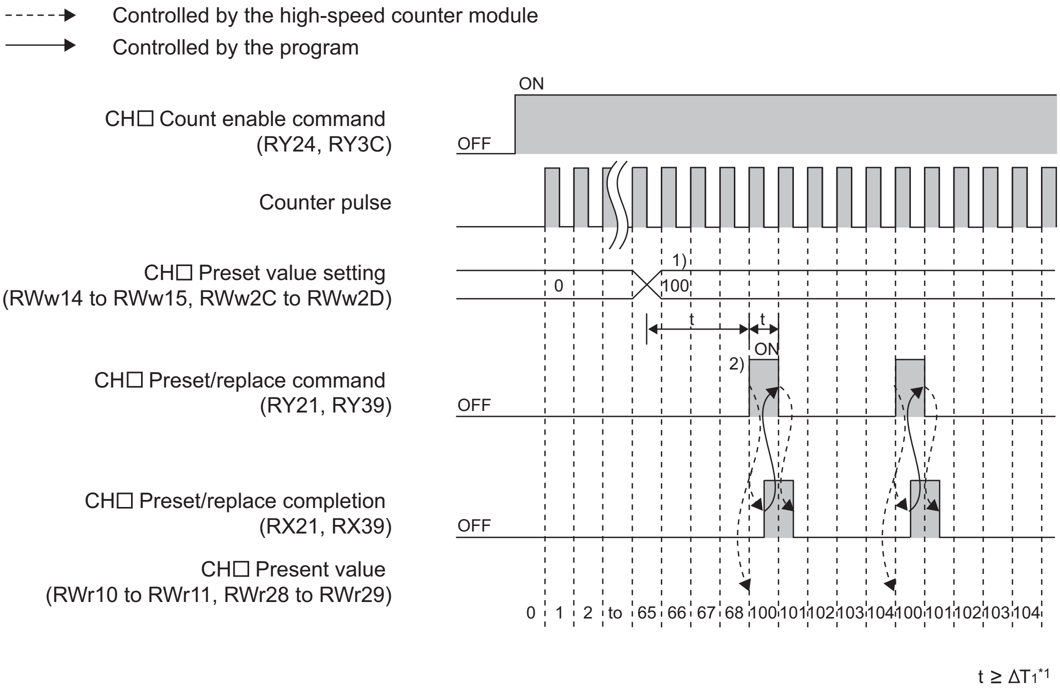
**Point**

All the above preset/replace functions cannot be performed while CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) is on.

## (1) Performing the preset/replace function by a program

The following figure shows an operation example of changing the present value to the preset value (100) at any timing.

Turning on CH□ Preset/replace command (RY21, RY39) by a program performs the preset/replace function.




| No. | Description |
|---|---|
| 1) | Write any value to CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) in 32-bit binary.<br>(Setting range: -2147483648 to 2147483647) |
| 2) | The value in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) at the rising edge (off to on) of CH□ Preset/replace command (RY21, RY39). Also, CH□ Preset/replace completion (RX21, RX39) turns on.<br>When turning off CH□ Preset/replace command (RY21, RY39) after checking CH□ Preset/replace completion (RX21, RX39) turns on, CH□ Preset/replace completion (RX21, RX39) turns off.<br>The value can be replaced regardless of the ON/OFF status of CH□ Count enable command (RY24, RY3C). |

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

## (2) Performing the preset/replace function by CH☐ Phase Z input terminal (Z1, Z2)

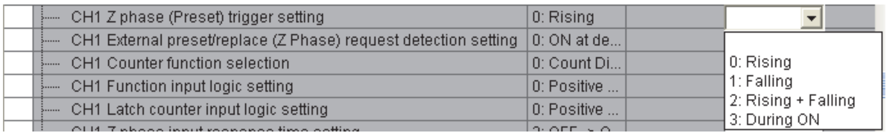
The preset/replace function by CH☐ Phase Z input terminal (Z1, Z2) can be performed when the set trigger condition is met.

### (a) Setting method of the condition for the preset/replace function by CH☐ Phase Z input terminal (Z1, Z2)

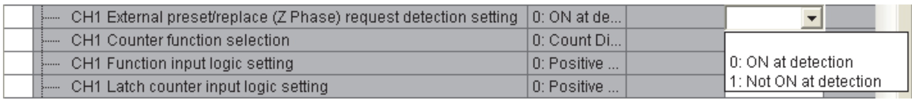
***1.*** **Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

***2.*** **Set "CH☐ Z phase (Preset) trigger setting".**

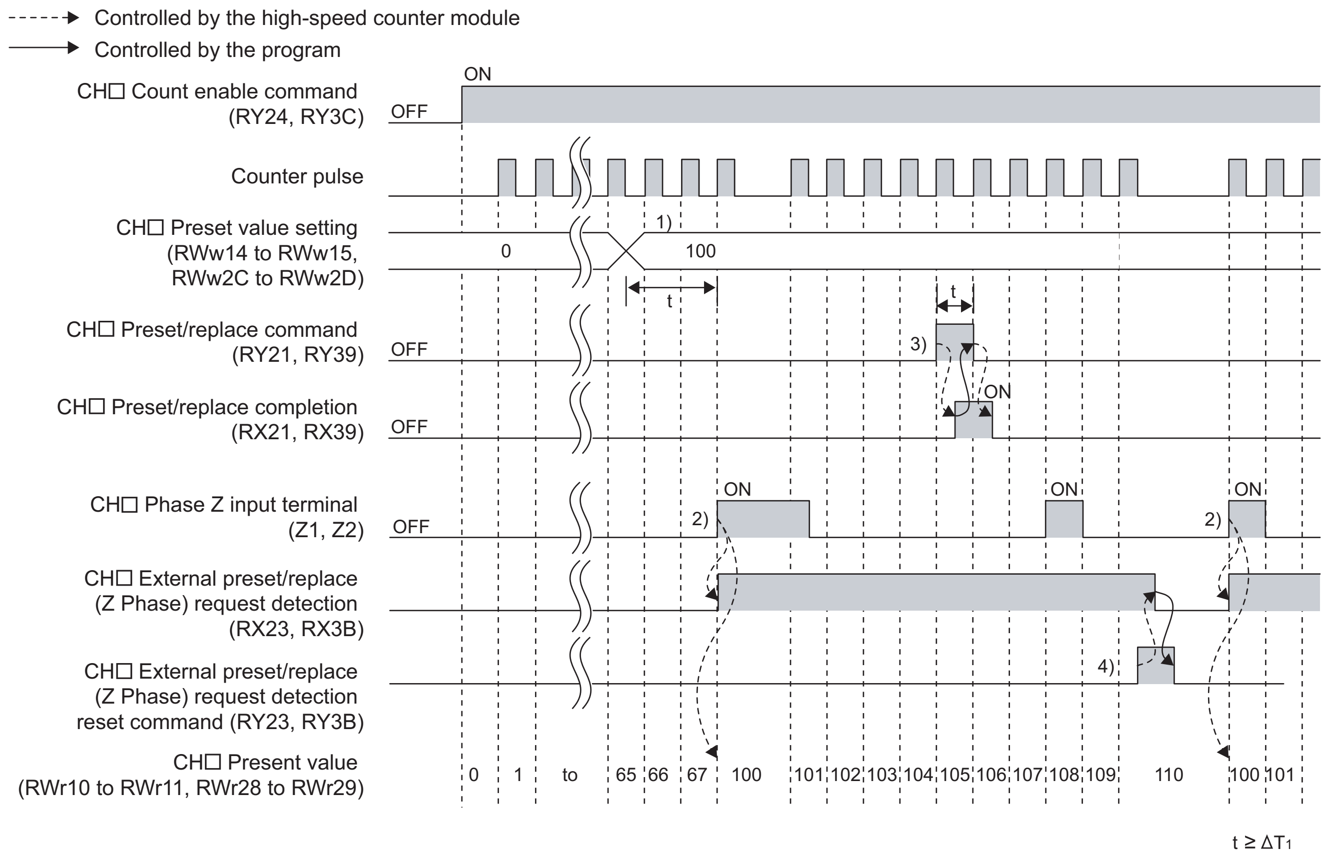



***3.*** **Set "CH☐ External preset/replace (Z Phase) request detection setting".**



### (b) Operation example of the preset/replace function by CH□ Phase Z input terminal (Z1, Z2)

The following figure shows an operation example of turning on CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) and changing the present value to the preset value (100) at the rising edge of CH□ Phase Z input terminal (Z1, Z2).




| No. | Description |
|---|---|
| 1) | Write any value to CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) in 32-bit binary.<br>(Setting range: -2147483648 to 2147483647) |
| 2) | The value in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) at the rising edge (off to on) of CH□ Phase Z input terminal (Z1, Z2). Also, CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) turns on.<br>The value can be replaced regardless of the ON/OFF status of CH□ Count enable command (RY24, RY3C). |
| 3) | While CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) is on, the value cannot be replaced by either CH□ Preset/replace command (RY21, RY39) or CH□ Phase Z input terminal (Z1, Z2).<br>Also, when CH□ Preset/replace command (RY21, RY39) is turned off then on, CH□ Preset/replace completion (RX21, RX39) turns on. However, the value is not replaced. Turn off CH□ Preset/replace completion (RX21, RX39) by turning off CH□ Preset/replace command (RY21, RY39). |
| 4) | When CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) turns off by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B), the value can be replaced. |

**Point**

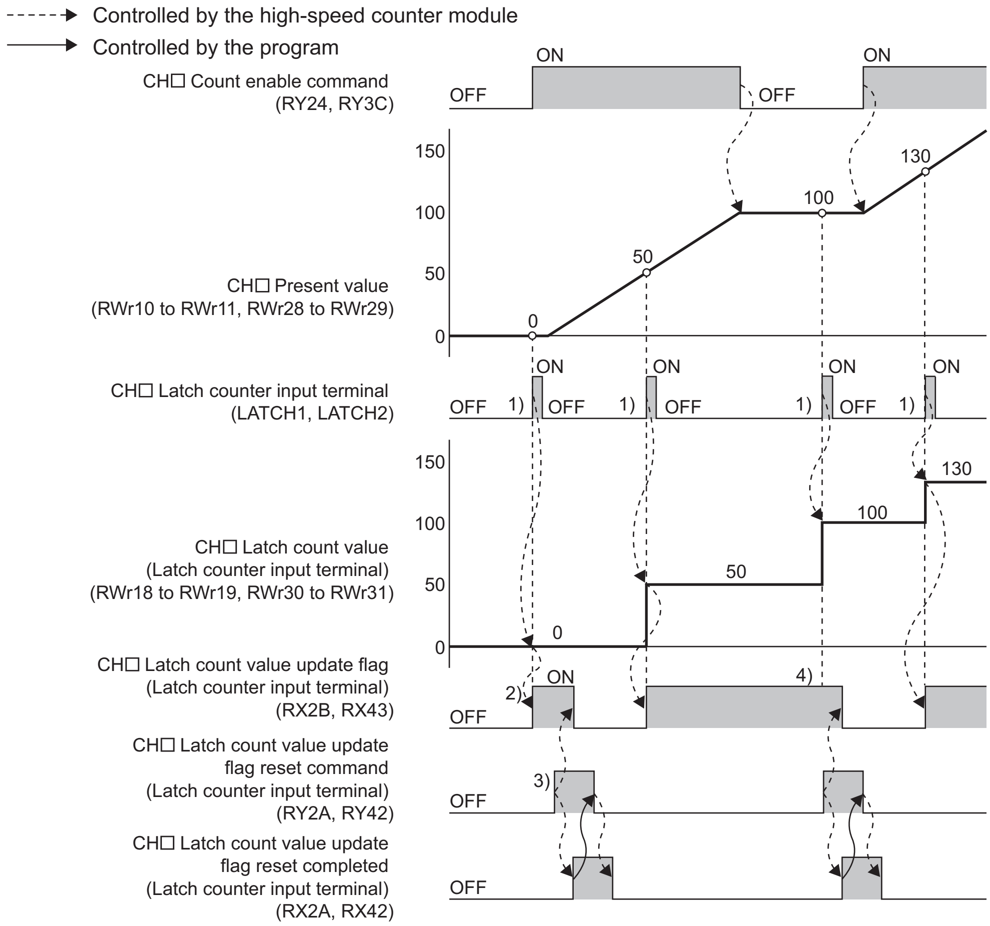
- While CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) is on, the value cannot be replaced by any methods. Replace the value after turning off CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) by turning on CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).
- Have a $\Delta T_1$ or longer interval after changing CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) until CH☐ Phase Z input terminal (Z1, Z2) is turned on because there are maximum of $\Delta T_1$ delay until change in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is reflected. An interval is not necessary when the preset/replace function is performed by the preset/replace command since there is a delay of when the preset/replace command is used.*1
- When the preset/replace function is performed by CH☐ Phase Z input terminal (Z1, Z2), the operation response time follows CH☐ Z phase input response time setting (address: $0129_H$.b0 to b1, $0149_H$.b0 to b1). Since CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is updated synchronizing with the internal control cycle, a maximum of delay time shown below occurs until the preset value is stored.
    - $\Delta T_1$*1 + Setting time of CH☐ Z phase input response time setting (address: $0129_H$.b0 to b1, $0149_H$.b0 to b1)

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

# 8.5 Latch Counter Function by Latch Counter Input Terminal

## (1) Latching the present value by the latch counter input terminal

The latch counter function by latch counter input terminal acquires the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) of the counter and stores it in the remote register when CH☐ Latch counter input terminal (LATCH1, LATCH2) is input.
The following figure shows an operation example of acquiring the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) as CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) at the rising edge of CH☐ Latch counter input terminal (LATCH1, LATCH2).




| No. | Description |
|---|---|
| 1) | The value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is stored in CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) at the rising edge of CH☐ Latch counter input terminal (LATCH1, LATCH2). |
| 2) | After CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated, CH☐ Latch count value update flag (Latch counter input terminal) (RX2B, RX43) turns on. |
| 3) | When CH☐ Latch count value update flag reset command (Latch counter input terminal) (RY2A, RY42) is turned off then on, the high-speed counter module turns off CH☐ Latch count value update flag (Latch counter input terminal) (RX2B, RX43) and turns on CH☐ Latch count value update flag reset completed (Latch counter input terminal) (RX2A, RX42).<br>After that, CH☐ Latch count value update flag reset completed (Latch counter input terminal) (RX2A, RX42) turns off when CH☐ Latch count value update flag reset command (Latch counter input terminal) (RY2A, RY42) is turned off. |
| 4) | CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated even if CH☐ Latch count value update flag (Latch counter input terminal) (RX2B, RX43) is on.<br>(The latch counter function operates regardless of the ON/OFF status of CH☐ Count enable command (RY24, RY3C).) |

**Point**

When the latch counter function is performed by CH□ Latch counter input terminal (LATCH1, LATCH2), the operation response time follows CH□ Latch counter input response time setting (address: $0129_H$.b4 to b5, $0149_H$.b4 to b5). Since CH□ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated synchronizing with the internal control cycle, a maximum of delay time shown below occurs until the acquired value is stored.

- $\Delta T_1$*1 + Setting time of CH□ Latch counter input response time setting (address: $0129_H$.b4 to b5, $0149_H$.b4 to b5)

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

# 8.6 Counter Function Selection

When CH□ Selected counter function start command (RY25, RY3D) or CH□ Function input terminal (FUNC1, FUNC2) is input, one of the functions shown below can be used.
The function can be selected for each channel.

## (1) Counter function selection list

○: Enable —: Disable

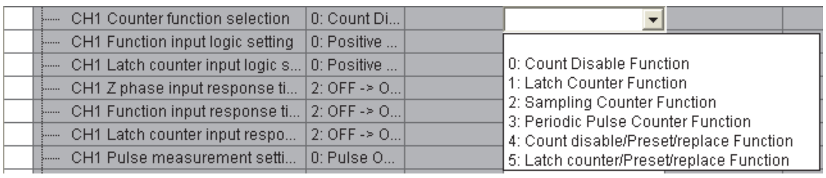
| Function name | Remote buffer memory setting | | | | Method | |
|---|---|---|---|---|---|---|
| | CH□ Operation mode setting (address: $0120_H$, $0140_H$) | CH□ Counter function selection (address: $0126_H$, $0146_H$) | CH□ Function input logic setting (address: $0127_H$, $0147_H$) | CH□ Function input response time setting (address: $0129_H$.b2 to b3, $0149_H$.b2 to b3) | CH□ Selected counter function start command (RY25, RY3D) | CH□ Function input terminal (FUNC1, FUNC2) |
| Count disable function | 0 | 0 | 0/1 | 00/01/10 | ○ | ○ |
| Latch counter function | 0 | 1 | 0/1 | 00/01/10 | ○ | ○ |
| Sampling counter function | 0 | 2 | 0/1 | 00/01/10 | ○ | ○ |
| Periodic pulse counter function | 0 | 3 | 0/1 | 00/01/10 | ○ | ○ |
| Count disable/preset/replace function | 0 | 4 | 0/1 | 00/01/10 | — | ○ |
| Latch counter/preset/replace function | 0 | 5 | 0/1 | 00/01/10 | — | ○ |

## (2) Setting method of the counter function selection

**1.** **Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2.** **For "CH□ Counter function selection", select a counter function to be used.**



**Point**

In the counter function selection, a delay occurs before the start of the selected function due to any of the following factors:

- Input response time of CH□ Function input terminal (FUNC1, FUNC2)
- Scan time of the program (for CH□ Selected counter function start command (RY25, RY3D))
- Link scan time of the network (for CH□ Selected counter function start command (RY25, RY3D))
- Internal control cycle in the high-speed counter module ($\Delta T_2 = 0.5$ms) (for CH□ Selected counter function start command (RY25, RY3D))*3

The count errors by these delays are as follows:

- Count error (maximum) which occurs when a function is performed by CH□ Function input terminal (FUNC1, FUNC2)

$$\frac{\text{Function input response time setting (max.) [ms]}}{1000}\ \text{(s)} \times \text{Pulse input speed [pps]}^{*1}$$

- Count error (maximum) which occurs when a function is performed by CH□ Selected counter function start command (RY25, RY3D)
  (When the master module is the QJ71GF11-T2 with Block Data Assurance per Station set and in the asynchronous mode)

$$\left(\frac{(\text{SM} \times \text{n2})\ [\text{ms}] + (\text{LS} \times 2)\ [\text{ms}] + \Delta T_1\ [\text{ms}]}{1000}\right) \text{(s)} \times \text{Pulse input speed [pps]}^{*1}$$

SM: Scan time of the program in the master station
LS: Link scan time
n2: Value obtained from (LS ÷ SM)
(The value after the decimal point shall be rounded up.)

For the sampling counter function and the periodic pulse counter function, a sampling/periodic time error due to a component error (±100ppm) occurs. The count error is as follows:

$$\text{Sampling/periodic time [s]}^{*2} \times \frac{100\ [\text{ppm}]}{1000000} \times \text{Pulse input speed [pps]}^{*1}$$

*1 Pulse input speed [pps] = pulse input frequency [Hz] × number of multiples [count]

*2 Sampling/periodic time [s] = Sampling/periodic time setting value × Sampling/periodic time unit [s]
(When the sampling/periodic time unit setting is 1 [ms], the sampling/periodic time is 0.001 [s]. When the unit setting is 10 [ms], the time is 0.01 [s].)

*3 For $\Delta T_1$ and $\Delta T_2$, refer to Page 283, Appendix 4.

# 8.7 Count Disable Function

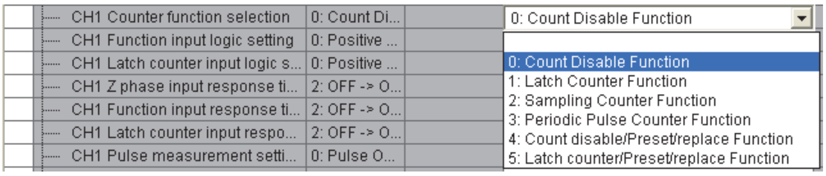
The count disable function stops the counting when CH☐ Function input terminal (FUNC1, FUNC2) or CH☐ Selected counter function start command (RY25, RY3D) is input during the counting.

## (1) Setting method of the count disable function

**1. Set "Parameter write" for "Method selection".**

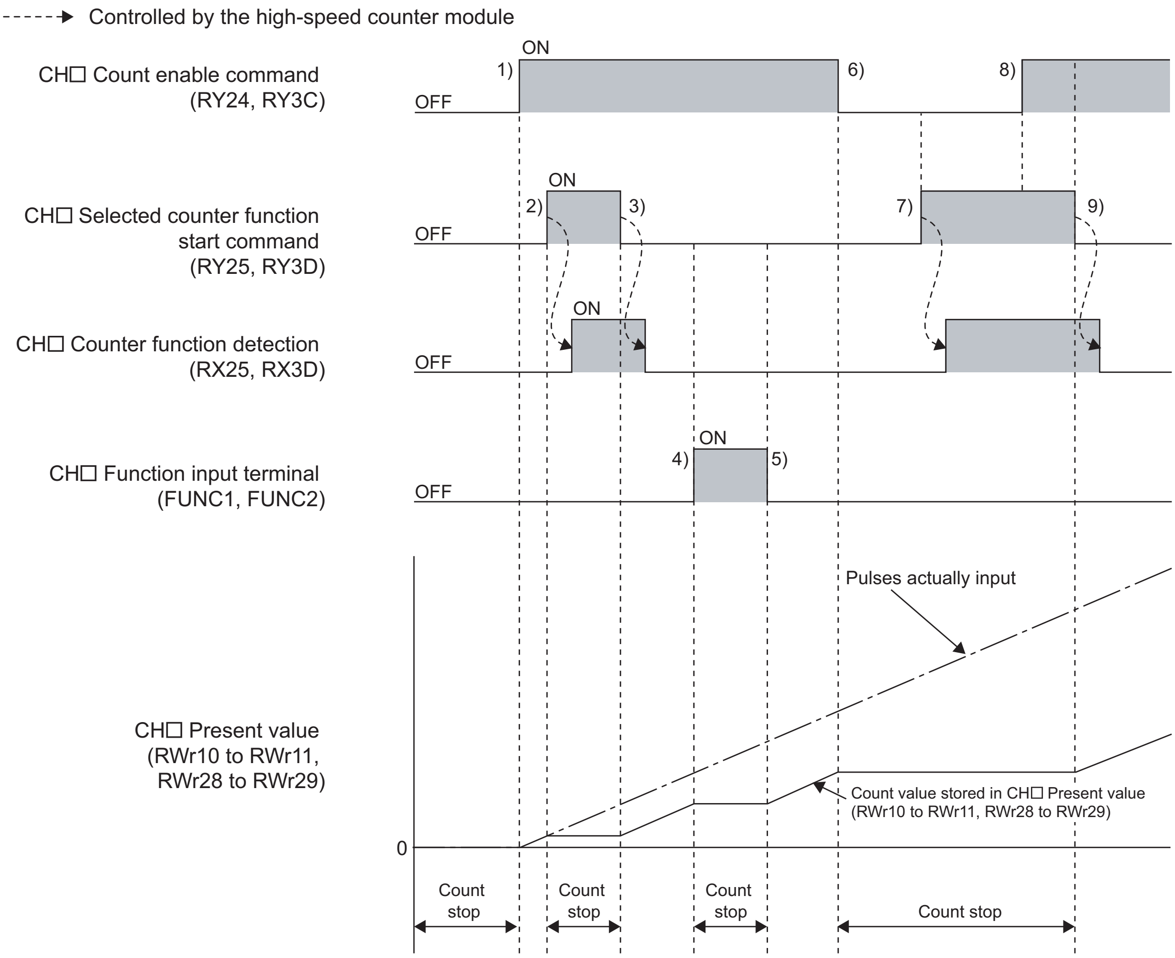
"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**2. Select "0: Count Disable Function" in "CH☐ Counter function selection".**




## (2) Operation example of the count disable function

The following figure shows an operation example of stopping the counting while CH☐ Selected counter function start command (RY25, RY3D) and CH☐ Function input terminal (FUNC1, FUNC2) are on.



| No. | Description |
|---|---|
| 1) | Counting starts by turning on CH☐ Count enable command (RY24, RY3C). |
| 2) | Counting stops by turning on CH☐ Selected counter function start command (RY25, RY3D).<br>Also, CH☐ Counter function detection (RX25, RX3D) turns on by turning on CH☐ Selected counter function start command (RY25, RY3D). |
| 3) | Counting resumes by turning off CH☐ Selected counter function start command (RY25, RY3D).<br>Also, CH☐ Counter function detection (RX25, RX3D) turns off by turning off CH☐ Selected counter function start command (RY25, RY3D). |
| 4) | Counting stops by turning on CH☐ Function input terminal (FUNC1, FUNC2). |
| 5) | Counting resumes by turning off CH☐ Function input terminal (FUNC1, FUNC2). |
| 6) | Counting stops by turning off CH☐ Count enable command (RY24, RY3C). |
| 7) | Counting stops regardless of CH☐ Selected counter function start command (RY25, RY3D) since CH☐ Count enable command (RY24, RY3C) is off. |
| 8) | Counting remains stopped even if CH☐ Count enable command (RY24, RY3C) is turned on since CH☐ Selected counter function start command (RY25, RY3D) is on. |
| 9) | Counting resumes by turning off CH☐ Selected counter function start command (RY25, RY3D). |

# 8.8 Latch Counter Function (Counter Function Selection)

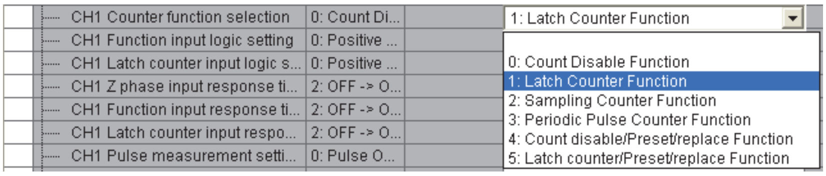
The latch counter function by counter function selection acquires CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) of the counter and stores it in the remote register when CH□ Function input terminal (FUNC1, FUNC2) or CH□ Selected counter function start command (RY25, RY3D) is input.

## (1) Setting method of the latch counter function (counter function selection)

**1. Set "Parameter write" for "Method selection".**

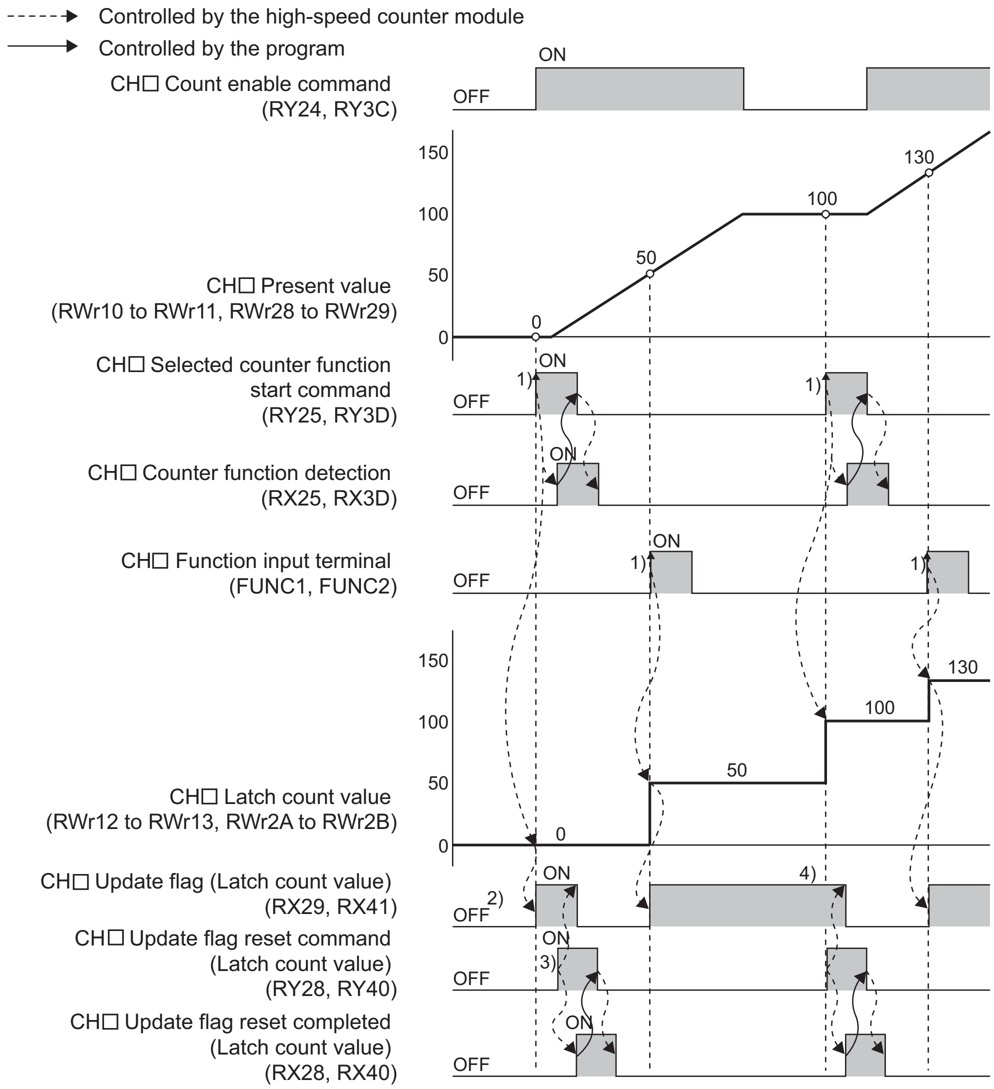
"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**2. Select "1: Latch Counter Function" in "CH□ Counter function selection".**



## (2) Operation example of the latch counter function (counter function selection)

The following figure shows an operation example of acquiring the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) as CH☐ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) at the rising edge of CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2).




| No. | Description |
|---|---|
| 1) | The value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is stored in CH☐ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) at the rising edge of CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2).<br>For CH☐ Selected counter function start command (RY25, RY3D), CH☐ Counter function detection (RX25, RX3D) turns on or off by turning on or off CH☐ Selected counter function start command (RY25, RY3D). |
| 2) | After CH☐ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated, CH☐ Update flag (Latch count value) (RX29, RX41) turns on. |
| 3) | When CH☐ Update flag reset command (Latch count value) (RY28, RY40) is turned off then on, the high-speed counter module turns off CH☐ Update flag (Latch count value) (RX29, RX41) and turns on CH☐ Update flag reset completed (Latch count value) (RX28, RX40). After that, CH☐ Update flag reset completed (Latch count value) (RX28, RX40) turns off when CH☐ Update flag reset command (Latch count value) (RY28, RY40) is turned off. |
| 4) | CH☐ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated even if CH☐ Update flag (Latch count value) (RX29, RX41) is on. (The latch counter function operates regardless of the ON/OFF status of CH☐ Count enable command (RY24, RY3C).) |

**Point**

- When the latch counter function is performed by CH□ Function input terminal (FUNC1, FUNC2), the operation response time follows CH□ Function input response time setting (address: $0129_H$.b2 to b3, $0149_H$.b2 to b3)). Since CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated synchronizing with the internal control cycle, a maximum of delay time shown below occurs until the acquired value is stored.
  - $\Delta T_1$[*1] + Setting time of CH□ Function input response time setting (address: $0129_H$.b2 to b3, $0149_H$.b2 to b3)

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

- The latch counter function cannot be performed while CH□ Selected counter function start command (RY25, RY3D) or CH□ Function input terminal (FUNC1, FUNC2) is on even if the other is turned on.

# 8.9 Sampling Counter Function

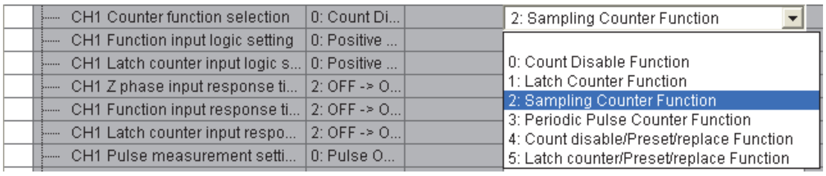
The sampling counter function counts pulses that are input during the specified sampling period (T) and stores it as CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) in the remote register.

## (1) Setting method of the sampling counter function

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**2. Select "2: Sampling Counter Function" in "CH☐ Counter function selection".**




## (2) Setting of the sampling period

Set the sampling period (T) by setting values to CH☐ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) and CH☐ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E). When CH☐ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on, the setting values are enabled.
However, the setting values are enabled from the next operation of sampling counter function if the settings are changed while the sampling counter function is being performed.

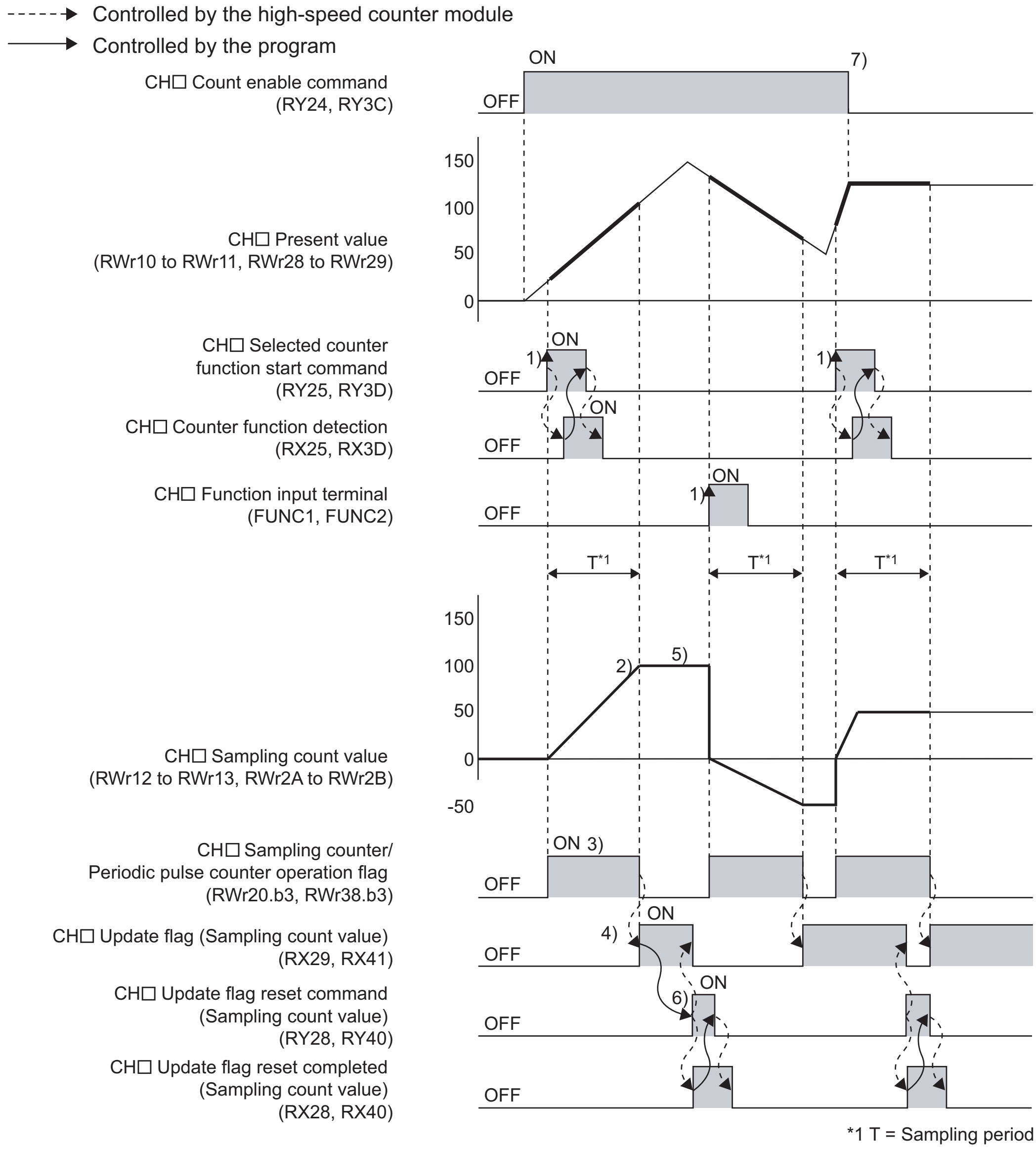
| Setting item | Setting range | Reference |
|---|---|---|
| CH☐ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) | 0: 1ms<br>1: 10ms | Page 264, Appendix 2 (11) |
| CH☐ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) | 1 to 65535 | |

**Point**

- Change the sampling period by CH☐ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F). When the period is changed by Initial data processing completion flag (RY8) or Initial data setting request flag (RY9), the items of the monitor value such as CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) are cleared.
- When changing the sampling period by using CH☐ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F), note the following:
  Do not execute the sampling counter function by CH☐ Function input terminal (FUNC1, FUNC2) from when CH☐ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned on until CH☐ Setting change completed (Sampling counter/Periodic pulse counter) (RX27, RX3F) turns on. Doing so may perform counting with the previous setting.

## (3) Operation example of the sampling counter function

The following figure shows an operation example of acquiring the number of the pulses input in the set sampling period (1ms) as CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B).



| No. | Description |
|---|---|
| 1) | Counting the input pulses starts from 0 at the rising edge of CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2).<br>For CH☐ Selected counter function start command (RY25, RY3D), CH☐ Counter function detection (RX25, RX3D) turns on or off by turning on or off CH☐ Selected counter function start command (RY25, RY3D). |
| 2) | Counting stops at the end of the preset sampling period. |
| 3) | While the sampling counter function is being performed, set CH☐ Sampling counter/Periodic pulse counter operation flag (RWr20.b3, RWr38.b3) to Operating (1). |
| 4) | At the end of each sampling period, CH☐ Update flag (Sampling count value) (RX29, RX41) turns on. |
| 5) | Even after the counting is completed, the values stored in CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) remain the same until CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2) is turned on again. When CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2) is turned on again, 0 is stored in CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) and the counting resumes. |
| 6) | When CH☐ Update flag reset command (Sampling count value) (RY28, RY40) is turned on, the high-speed counter module turns off CH☐ Update flag (Sampling count value) (RX29, RX41) and turns on CH☐ Update flag reset completed (Sampling count value) (RX28, RX40).<br>After that, CH☐ Update flag reset completed (Sampling count value) (RX28, RX40) turns off when CH☐ Update flag reset command (Sampling count value) (RY28, RY40) is turned off. |
| 7) | Although the sampling counter function operates regardless of the ON/OFF status of CH☐ Count enable command (RY24, RY3C), CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) is not counted while CH☐ Count enable command (RY24, RY3C) is off. At the end of the sampling period after CH☐ Count enable command (RY24, RY3C) is turned off, CH☐ Sampling counter/Periodic pulse counter operation flag (RWr20.b3, RWr38.b3) is set to Not operating (0) and CH☐ Update flag (Sampling count value) (RX29, RX41) turns on. |

**Point**

- The sampling counter function cannot be performed while CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2) is on even if the other is turned on.
- By turning off both CH☐ Selected counter function start command (RY25, RY3D) and CH☐ Function input terminal (FUNC1, FUNC2) and then turning on one of them during the operation of the sampling counter function, the pulses are counted from 0 again though the sampling period is continually measured.
- Depending on the pulse input speed and sampling period, the values stored in CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) may be over the upper limit value (2147483647) or below the lower limit value (-2147483648). In that case, the value stored in CH☐ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) remains the upper limit value (2147483647) or the lower limit value (-2147483648), and CH☐ Overflow/underflow error (Sampling count value/Periodic pulse count, difference value) (error code: ☐$050_H$) occurs. Despite this minor error, the sampling counter function keeps working till the end of the sampling period.
- To perform the sampling counter function again, reset CH☐ Update flag (Sampling count value) (RX29, RX41) before turning on again CH☐ Selected counter function start command (RY25, RY3D) or CH☐ Function input terminal (FUNC1, FUNC2). If it is not reset, whether its value was updated after the re-execution cannot be checked.

# 8.10 Periodic Pulse Counter Function

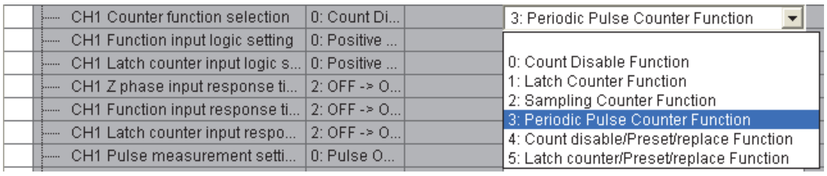
The periodic pulse counter function stores the values which are stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) and CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) in the remote register every specified cycle time (T).

## (1) Setting method of the periodic pulse counter function

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. Select "3: Periodic Pulse Counter Function" in "CH□ Counter function selection".**




## (2) Setting of the cycle time

Set the cycle time (T) by setting values to CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) and CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E). When CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on, the setting values are enabled.
However, the setting values are enabled from the next operation of periodic pulse counter function if the setting is changed while the periodic pulse counter function is being performed.

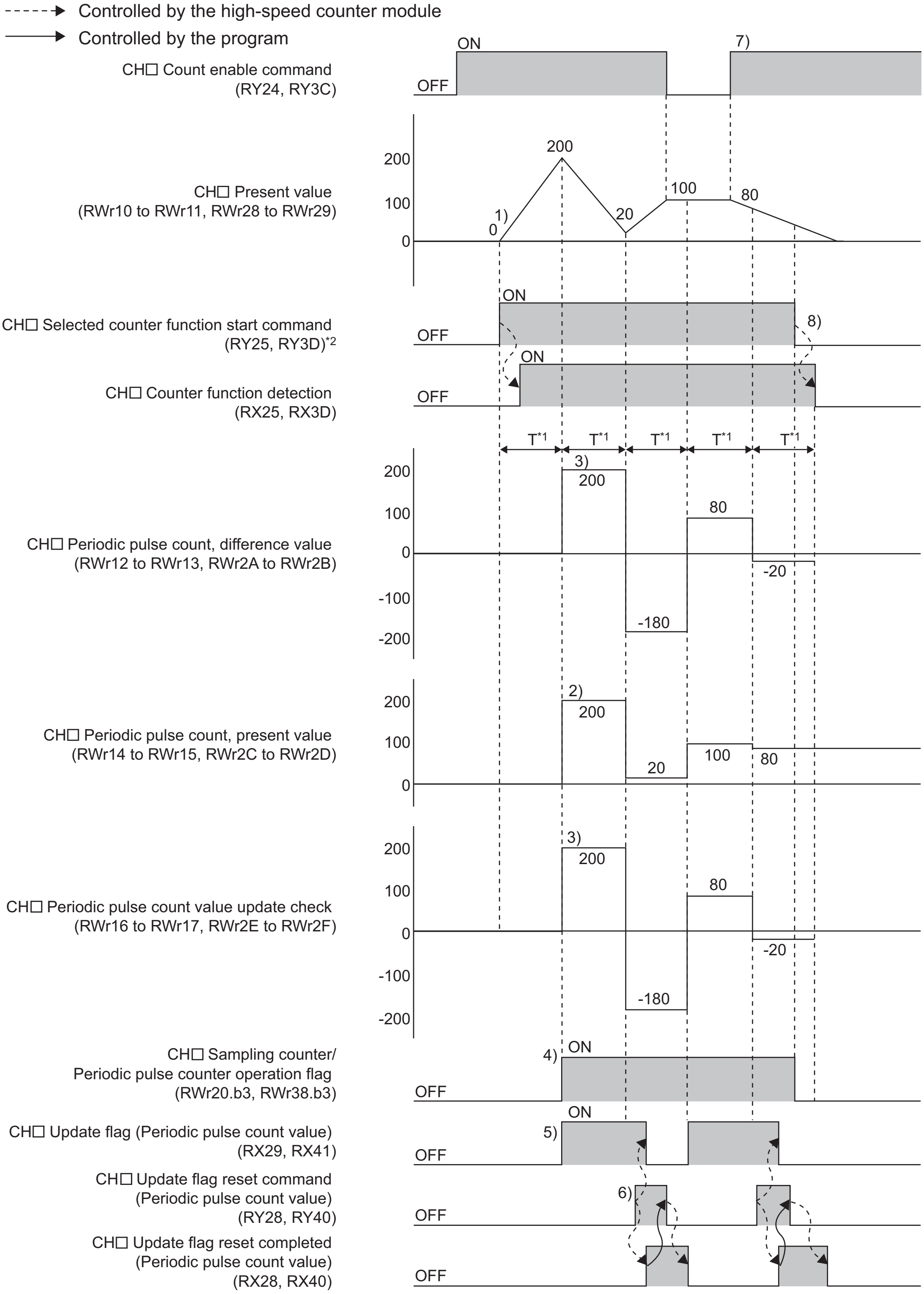
| Setting item | Setting range | Reference |
|---|---|---|
| CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) | 0: 1ms<br>1: 10ms | Page 264, Appendix 2 (11) |
| CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) | 1 to 65535 | |

**Point**

- Change the cycle time by CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F). When the cycle time is changed by Initial data processing completion flag (RY8) or Initial data setting request flag (RY9), the items of the monitor value such as CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) are cleared.
- When changing the cycle time by using CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F), note the following:
  Do not execute the periodic pulse counter function by CH□ Function input terminal (FUNC1, FUNC2) from when CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned on until CH□ Setting change completed (Sampling counter/Periodic pulse counter) (RX27, RX3F) turns on. Doing so may perform counting with the previous setting.

## (3) Operation example of the periodic pulse counter function

The following figure shows an operation example of storing each calculated value in CH☐ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH☐ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH☐ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) based on the value in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) counted within the preset cycle time (1ms).




*1 T = Cycle time

*2 Though the periodic pulse counter function can also be performed by CH□ Function input terminal (FUNC1, FUNC2), the status of CH□ Counter function detection (RX25, RX3D) does not change.

| No. | Description |
|---|---|
| 1) | Counting the input pulses starts from 0 at the rising edge of CH□ Selected counter function start command (RY25, RY3D) or CH□ Function input terminal (FUNC1, FUNC2).<br>For CH□ Selected counter function start command (RY25, RY3D), CH□ Counter function detection (RX25, RX3D) turns on or off by turning on or off CH□ Selected counter function start command (RY25, RY3D). |
| 2) | Every preset cycle time, the value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is stored in CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D). |
| 3) | Every preset cycle time, the difference of the count values between the previous one and the present one is stored in CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F). |
| 4) | While the periodic pulse counter function is being performed, set CH□ Sampling counter/Periodic pulse counter operation flag (RWr20.b3, RWr38.b3) to Operating (1). |
| 5) | CH□ Update flag (Periodic pulse count value) (RX29, RX41) turns on when CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) are updated. |
| 6) | When CH□ Update flag reset command (Periodic pulse count value) (RY28, RY40) is turned on, the high-speed counter module turns off CH□ Update flag (Periodic pulse count value) (RX29, RX41) and turns on CH□ Update flag reset completed (Periodic pulse count value) (RX28, RX40).<br>After that, CH□ Update flag reset completed (Periodic pulse count value) (RX28, RX40) turns off when CH□ Update flag reset command (Periodic pulse count value) (RY28, RY40) is turned off. |
| 7) | The periodic pulse counter function operates regardless of the ON/OFF status of CH□ Count enable command (RY24, RY3C). |
| 8) | The periodic pulse counter function is stopped by turning off both CH□ Selected counter function start command (RY25, RY3D) and CH□ Function input terminal (FUNC1, FUNC2). |



**Point**

- Use the periodic pulse count value after checking the values in CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) are equal. When they are different, the periodic pulse count value includes values before and after the end of the cycle time and there is a value discrepancy. Read again CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F).
- Depending on the pulse input speed and cycle time, the value in CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) may be over the upper limit value (2147483647) or below the lower limit value (-2147483648). (The value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is stored in CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D).) In that case, the values in CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) remain the upper limit value (2147483647) or the lower limit value (-2147483648), and CH□ Overflow/underflow error (Sampling count value/Periodic pulse count, difference value) (error code: □050) occurs. Despite this minor error, the periodic pulse counter function keeps working.
- To perform the periodic pulse counter function again, reset CH□ Update flag (Periodic pulse count value) (RX29, RX41) before turning on again CH□ Selected counter function start command (RY25, RY3D) or CH□ Function input terminal (FUNC1, FUNC2). If it is not reset, whether its value was updated after the re-execution cannot be checked.

# 8.11 Count Disable/preset/replace Function

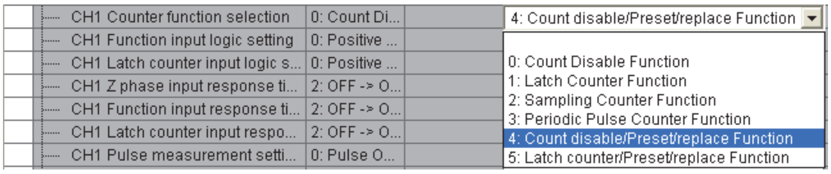
The count disable/preset/replace function executes the count disable function and the preset/replace function according to the status change of CH□ Function input terminal (FUNC1, FUNC2) without switching the functions by the counter function selection.

## (1) Setting method of the count disable/preset/replace function

**1.** **Set "Parameter write" for "Method selection".**

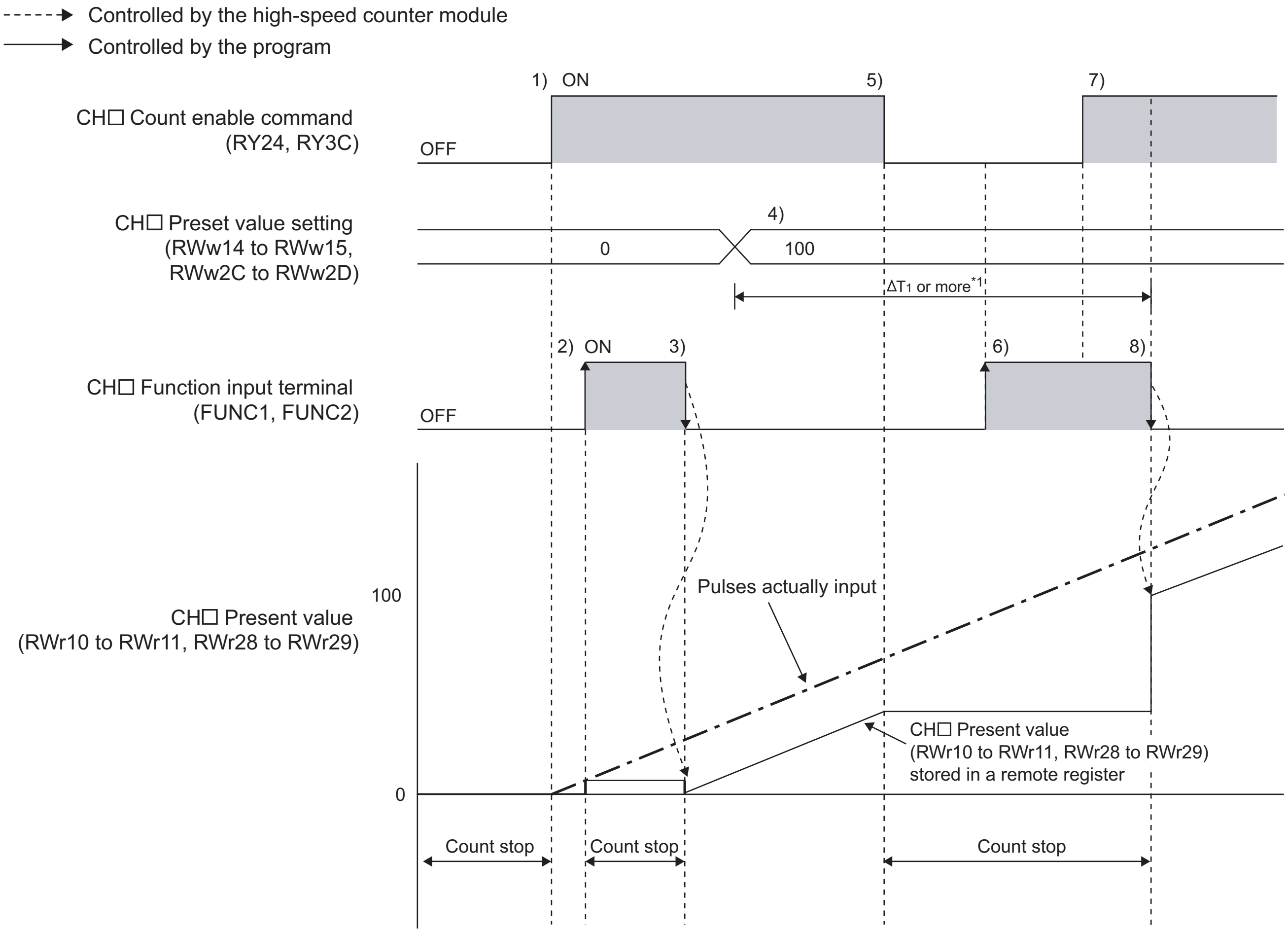
"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2.** **Select "4: Count disable/Preset/replace Function" in "CH□ Counter function selection".**



## (2) Operation example of the count disable/preset/replace function

The following figure shows an operation example of stopping counting while CH☐ Function input terminal (FUNC1, FUNC2) is on and storing the preset value (0 or 100) in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) at the falling edge of CH☐ Function input terminal (FUNC1, FUNC2).




*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

| No. | Description |
|---|---|
| 1) | Counting starts by turning on CH☐ Count enable command (RY24, RY3C). |
| 2) | Counting stops at the rising edge of CH☐ Function input terminal (FUNC1, FUNC2). |
| 3) | The value in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) at the falling edge of CH☐ Function input terminal (FUNC1, FUNC2), and the counting resumes. |
| 4) | Set any values to CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D). |
| 5) | Counting stops by turning off CH☐ Count enable command (RY24, RY3C). |
| 6) | Counting stops regardless of CH☐ Function input terminal (FUNC1, FUNC2) since CH☐ Count enable command (RY24, RY3C) is off. |
| 7) | Counting remains stopped even if CH☐ Count enable command (RY24, RY3C) is turned on since CH☐ Function input terminal (FUNC1, FUNC2) is on. |
| 8) | The value in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) at the falling edge of CH☐ Function input terminal (FUNC1, FUNC2), and the counting resumes. |

**Point**

- The count value cannot be replaced with the preset value while CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) is on.
  Replace the value after CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) turns off by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).
- Have a $\Delta T_1$ or longer interval after changing CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) until the value is replaced since there are maximum of $\Delta T_1$ delay until change in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is reflected. For $\Delta T_1$, refer to Page 283, Appendix 4.

# 8.12 Latch Counter/preset/replace Function

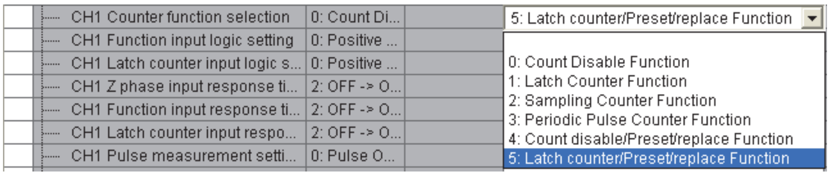
The latch counter/preset/replace function executes the latch counter function and the preset/replace function according to the status change of CH□ Function input terminal (FUNC1, FUNC2) without switching the functions by the counter function selection.

## (1) Setting method of the latch counter/preset/replace function

**1. Set "Parameter write" for "Method selection".**

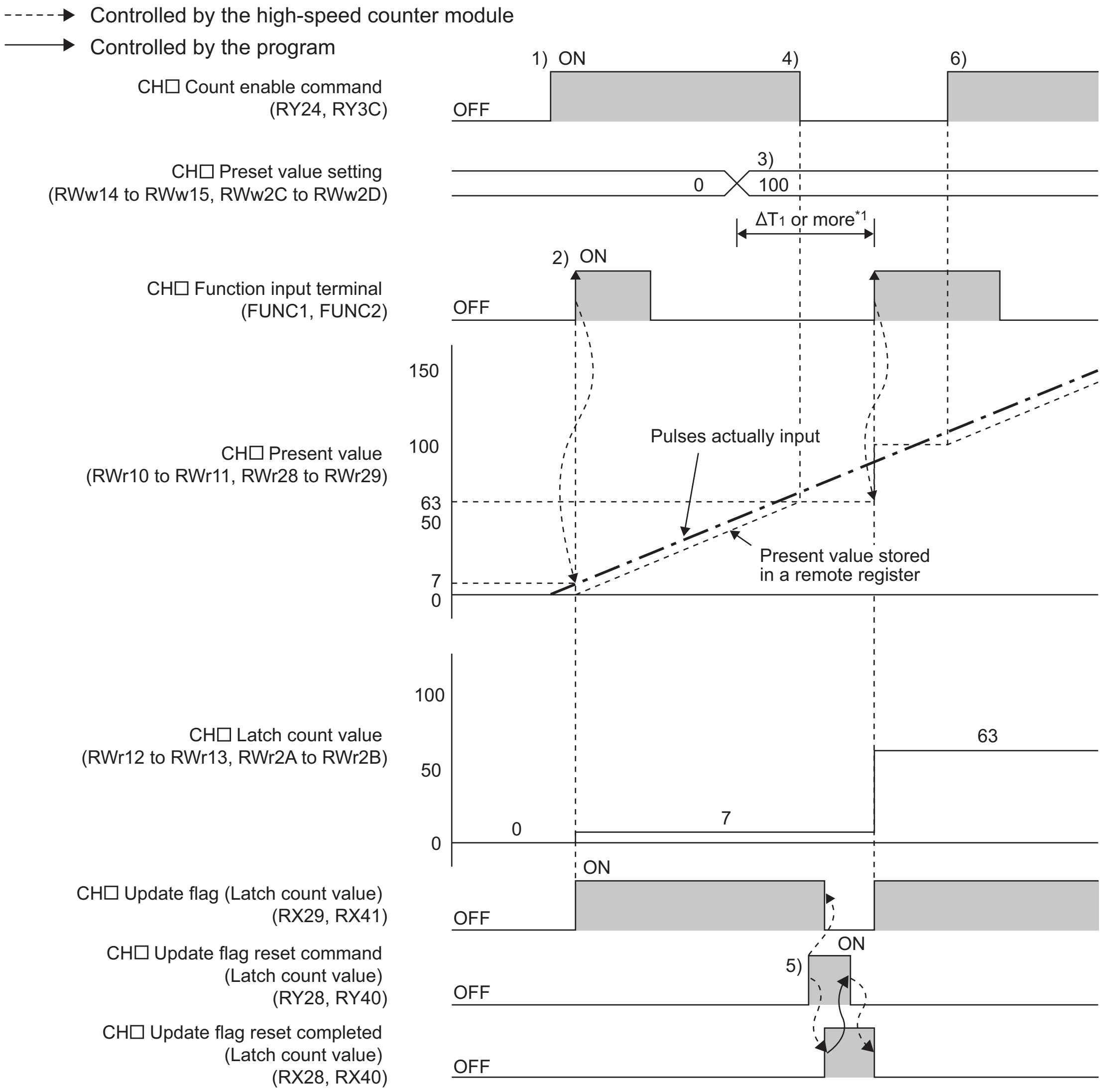
"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. Select "5: Latch counter/Preset/replace Function" in "CH□ Counter function selection".**



## (2) Operation example of the latch counter/preset/replace function

The following figure shows an operation example of storing the preset value (0 or 100) in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) after storing the value which are stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) in CH☐ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) at the rising edge of CH☐ Function input terminal (FUNC1, FUNC2).




*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

| No. | Description |
|---|---|
| 1) | Counting starts by turning on CH□ Count enable command (RY24, RY3C). |
| 2) | The value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is stored in CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B), and the value in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) is stored in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) at the rising edge of CH□ Function input terminal (FUNC1, FUNC2). After CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated, CH□ Update flag (Latch count value) (RX29, RX41) turns on. |
| 3) | Set any values to CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D). |
| 4) | Counting stops by turning off CH□ Count enable command (RY24, RY3C). |
| 5) | When CH□ Update flag reset command (Latch count value) (RY28, RY40) is turned off then on, the high-speed counter module turns off CH□ Update flag (Latch count value) (RX29, RX41) and turns on CH□ Update flag reset completed (Latch count value) (RX28, RX40).<br>After that, CH□ Update flag reset completed (Latch count value) (RX28, RX40) turns off when CH□ Update flag reset command (Latch count value) (RY28, RY40) is turned off. |
| 6) | Counting resumes by turning on CH□ Count enable command (RY24, RY3C). |

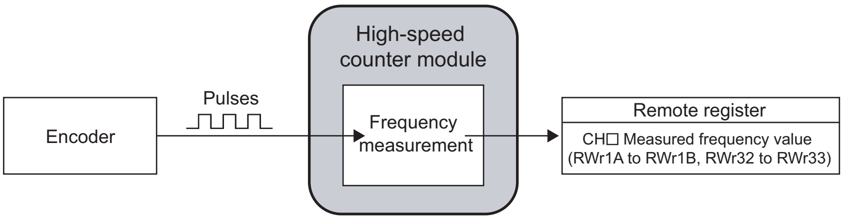
**Point**

- The count value cannot be replaced with the preset value while CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) is on.
  Replace the value after CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) turns off by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).
- Have a $\Delta T_1$ or longer interval after changing CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) until the value is replaced since there are maximum of $\Delta T_1$ delay until change in the preset value is reflected.*1
- When the latch counter function is performed by CH□ Function input terminal (FUNC1, FUNC2), the operation response time follows CH□ Function input response time setting (address: $0129_H$.b2 to b3, $0149_H$.b2 to b3). Since CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated synchronizing with the internal control cycle, a maximum of delay time shown below occurs until the acquired value is stored.
  - $\Delta T_1$*1 + Setting time of CH□ Function input response time setting (address: $0129_H$.b2 to b3, $0149_H$.b2 to b3)

*1 For $\Delta T_1$, refer to Page 283, Appendix 4.

# 8.13 Frequency Measurement Function

The frequency measurement function counts the pulses of the pulse input terminals in phase A and B, and automatically calculates the frequency.

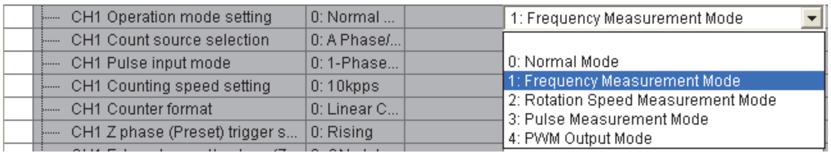



## (1) Setting method of the frequency measurement function

**1.** **Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2.** **Set "CH☐ Operation mode setting" to "1: Frequency Measurement Mode".**




## (2) Calculation of the frequency

The frequency measurement function calculates the frequency from the following formula.

- Frequency (Hz) = Count value per unit of time ÷ Unit of time*1

*1 Select a unit of time from 0.01s, 0.1s, or 1s.

Therefore, when the count value per unit of time is 0, the frequency is 0(Hz).

At subtraction count, the value of the frequency is negative.

## (3) Setting of the unit of time for frequency measurement

Set a unit of time by setting a value to CH☐ Time unit setting (Frequency measurement) (RWw18, RWw30).

| Setting item | Setting range | Reference |
|---|---|---|
| CH☐ Time unit setting (Frequency measurement) (RWw18, RWw30) | 0: 0.01s<br>1: 0.1s<br>2: 1s | — |

**Point**

- Whichever mode ("1: 1-Phase Multiple of 2", "4: 2-Phase Multiple of 2", or "5: 2-Phase Multiple of 4") is set in "CH☐ Pulse input mode" (Page 92, Section 8.1.1), the frequency (Hz) is calculated based on the count value per unit of time.
- When "1: 1-Phase Multiple of 2" is set in "CH☐ Pulse input mode" (Page 92, Section 8.1.1) and the input frequency in phase A is 10kHz (10000 per second), the measured frequency value becomes 20kHz since the pulse count is regarded as 20000 based on the calculation below.
  Pulse count = 10000 (pulse) × 2 = 20000 (pulse/s)
- Measurable frequency (minimum)
  The frequency is calculated from the count value per unit of time. However, the frequency smaller than the one in the following table cannot be measured correctly as the count value is in an integer number.

| Unit of time | Measurable frequency (minimum) |
|---|---|
| 1s | 1Hz |
| 0.1s | 10Hz |
| 0.01s | 100Hz |

When a unit of time is 0.01s and the input frequency is 1234Hz, the measured frequency value is 1200Hz or 1300Hz. By doing the moving average count, the fluctuation of the measured values can be lowered.

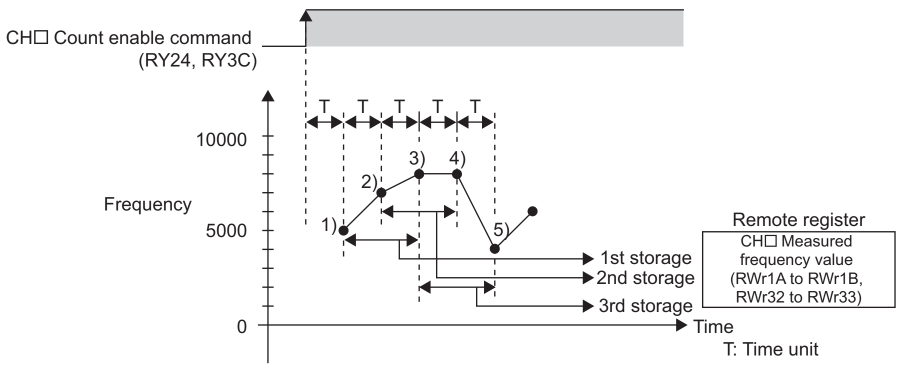
## (4) Moving average count

When the frequency measurement function is used, the fluctuation of the measured frequency values can be lowered by doing the moving average count.
Set the number of the moving average count to CH☐ Moving average count (Frequency measurement) (RWw19, RWw31).

| Setting item | Setting range | Reference |
|---|---|---|
| CH☐ Moving average count (Frequency measurement) (RWw19, RWw31) | 1 to 100<br>(When 1 is set, the operation is performed with the moving average count regarded as not being done.) | Page 265, Appendix 2 (12) |

After the specified number of counts are done, the average of the measured frequency values is stored in CH☐ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) as shown below.

Ex. When the number for CH☐ Moving average count (Frequency measurement) (RWw19, RWw31) is set to 3



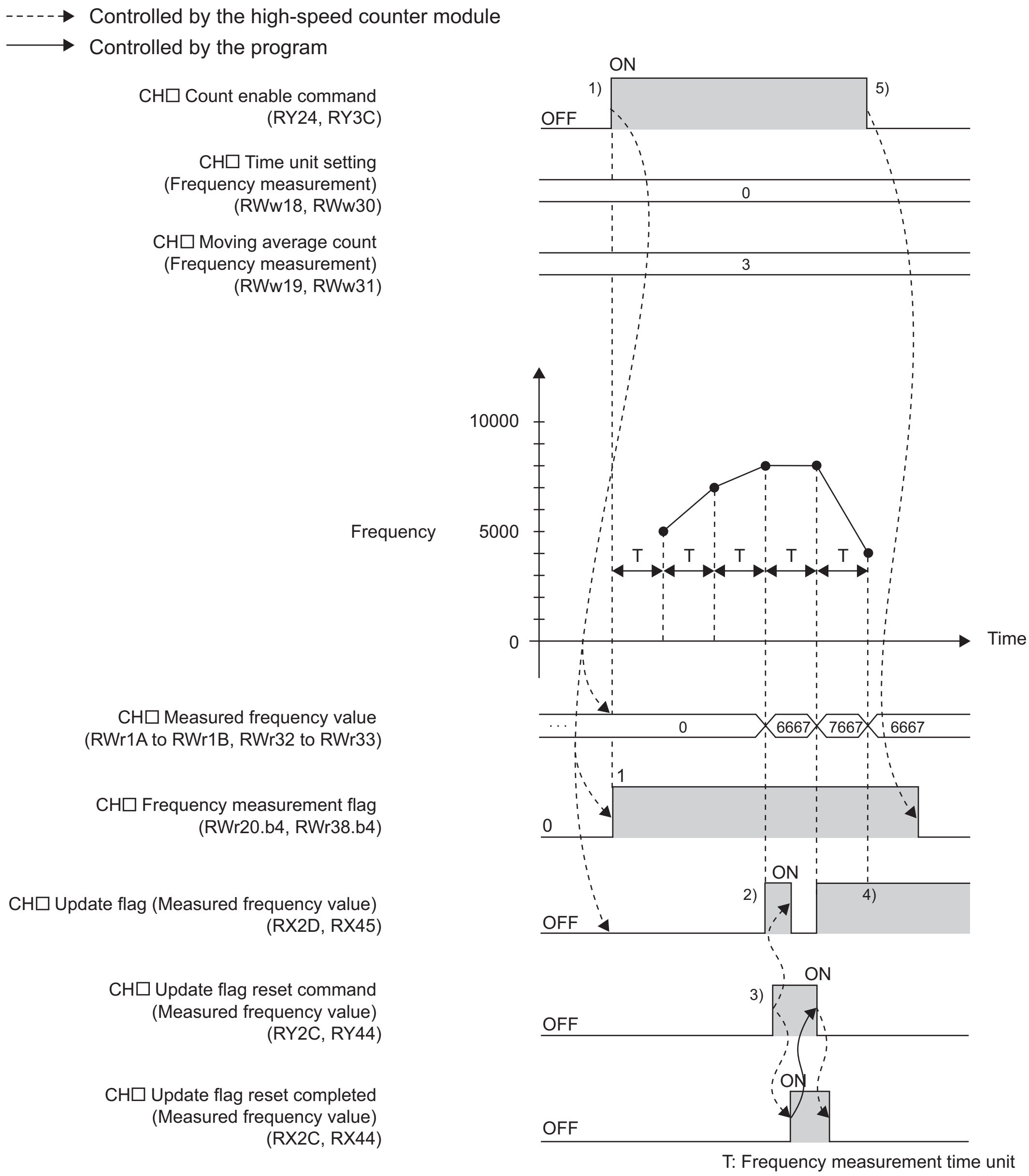

1st storage = 1)+2)+3)/3 = (5000+7000+8000)/3 ≒ 6667
2nd storage = 2)+3)+4)/3 = (7000+8000+8000)/3 ≒ 7667
3rd storage = 3)+4)+5)/3 = (8000+8000+4000)/3 ≒ 6667

**Point**

After the start of the frequency measurement, CH☐ Update flag (Measured frequency value) (RX2D, RX45) turns on every time the measured value is stored in the remote register.
The value previously stored in the remote register is held while CH☐ Update flag (Measured frequency value) (RX2D, RX45) is off. (Except at the start of the measurement)

## (5) Operation example of the frequency measurement function

The following figure shows an operation example of when CH☐ Time unit setting (Frequency measurement) (RWw18, RWw30) is set to 0.01s and CH☐ Moving average count (Frequency measurement) (RWw19, RWw31) is set to 3.



| No. | Description |
|---|---|
| 1) | The following processing is performed when CH□ Count enable command (RY24, RY3C) is turned on to turn CH□ Frequency measurement flag (RWr20.b4, RWr38.b4) to Operating (1).<br>• The values in CH□ Time unit setting (Frequency measurement) (RWw18, RWw30) and CH□ Moving average count (Frequency measurement) (RWw19, RWw31) are acquired. (If the value is changed during the frequency measurement, the change is ignored.)<br>• CH□ Update flag (Measured frequency value) (RX2D, RX45) turns off.<br>• The value in CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is cleared to 0. |
| 2) | CH□ Update flag (Measured frequency value) (RX2D, RX45) turns on when a value is stored in CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33). |
| 3) | When CH□ Update flag reset command (Measured frequency value) (RY2C, RY44) is turned off then on, the high-speed counter module turns off CH□ Update flag (Measured frequency value) (RX2D, RX45) and turns on CH□ Update flag reset completed (Measured frequency value) (RX2C, RX44).<br>After that, CH□ Update flag reset completed (Measured frequency value) (RX2C, RX44) turns off when CH□ Update flag reset command (Measured frequency value) (RY2C, RY44) is turned off. |
| 4) | CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is updated even when CH□ Update flag (Measured frequency value) (RX2D, RX45) is on. |
| 5) | CH□ Frequency measurement flag (RWr20.b4, RWr38.b4) changes to Not operating (0) when CH□ Count enable command (RY24, RY3C) is turned off. |

**Point**

- The margin of error (maximum) of the frequency measurement function is calculated from the following formula.

$$\text{Real frequency (Hz)} \times \frac{100\text{ (ppm)}}{1000000} + \frac{1}{\begin{matrix}\text{Time unit} \\ \text{(Frequency measurement) (S)}\end{matrix} \times \begin{matrix}\text{Moving average count} \\ \text{(Frequency measurement)}\end{matrix}}$$

**Ex.** The following table shows each value to be put into the formula.

| Item | Value |
|---|---|
| Real frequency (Hz) | 1234Hz |
| Time unit (Frequency measurement) (s) | 0.01s |
| Moving average count (Frequency measurement) | 2 times |

The margin of error (maximum) is calculated as shown below.

$$1234\text{ (Hz)} \times \frac{100\text{ (ppm)}}{1000000} + \frac{1}{0.01\text{ (s)} \times 2}$$

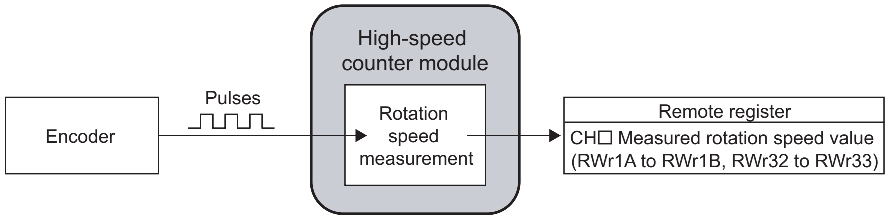
$$= 0.1234\text{ (Hz)} + 50\text{ (Hz)}$$

$$= 50.1234\text{ (Hz)}$$

- CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is updated without resetting CH□ Update flag (Measured frequency value) (RX2D, RX45).
- CH□ Update flag reset command (Measured frequency value) (RY2C, RY44) responds within $\Delta T_1$ after the action. For $\Delta T_1$, refer to the following.
  - Internal Control Cycle and Response Delay Time (Page 283, Appendix 4)

# 8.14 Rotation Speed Measurement Function

The rotation speed measurement function counts the pulses of the pulse input terminals in phase A and B, and automatically calculates the rotation speed.

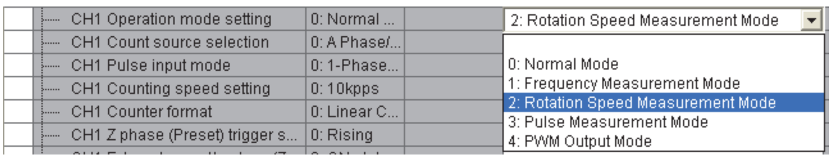



## (1) Setting method of the rotation speed measurement function

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**2. Set "CH□ Operation mode setting " to "2: Rotation Speed Measurement Mode".**




## (2) Calculation of the rotation speed

The rotation speed measurement function calculates the rotation speed from the following formula.

- Rotation speed (r/min) = (60 × Count value per unit of time) ÷ (Unit of time[*1] × Number of pulses per rotation[*2])

*1 Select a unit of time from 0.01s, 0.1s, or 1s.
*2 Set the number of pulses per rotation in the range of 1 to 8000000.

Therefore, when the count value per unit of time is 0, the rotation speed is 0(r/min).
At subtraction count, the value of the rotation speed is negative.

## (3) Setting of the unit of time for rotation speed measurement and the number of pulses per rotation

Set a unit of time to CH□ Time unit setting (Rotation speed measurement) (RWw18, RWw30).
Set the number of pulses per rotation to CH□ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33).

| Setting item | Setting range | Reference |
|---|---|---|
| CH□ Time unit setting (Rotation speed measurement) (RWw18, RWw30) | 0: 0.01s<br>1: 0.1s<br>2: 1s | — |
| CH□ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33) | 1 to 8000000 | — |

**Point**

- Whichever mode ("1: 1-Phase Multiple of 2", "4: 2-Phase Multiple of 2", or "5: 2-Phase Multiple of 4") is set in "CH☐ Pulse input mode" (Page 92, Section 8.1.1), the rotation speed (r/min) is calculated based on the count value per unit of time.
- Required pulse speed (minimum)
  The rotation speed is calculated from the count value per unit of time. However, the pulse speed lower than the one in the following table, the rotation speed cannot be measured correctly as the count value is in an integer number. Input the pulses with the speed shown below or higher.

| Unit of time | Required pulse speed (minimum) |
|---|---|
| 1s | 1pps |
| 0.1s | 10pps |
| 0.01s | 100pps |

When a unit of time is 0.01[s], the number of pulses per rotation is 60, and when the pulse input speed is 1234[pps], the value of the calculated rotation speed is 1200(r/min) or 1300(r/min). By doing the moving average count, the fluctuation of the measured values can be lowered.

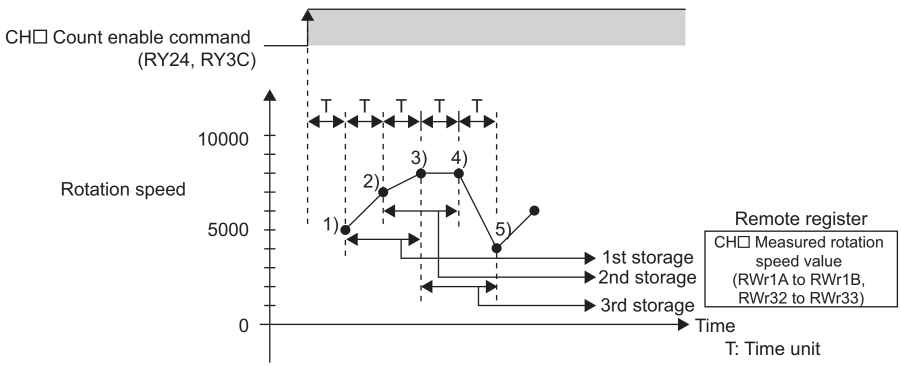
## (4) Moving average count

When the rotation speed measurement function is used, the fluctuation of the measured rotation speed can be lowered by doing the moving average count.
Set the number of the moving average count is set to CH☐ Moving average count (Rotation speed measurement) (RWw19, RWw31).

| Setting item | Setting range | Reference |
|---|---|---|
| CH☐ Moving average count (Rotation speed measurement) (RWw19, RWw31) | 1 to 100<br>(When 1 is set, the operation is performed with the moving average count regarded as not being done.) | Page 265, Appendix 2 (12) |

After the specified number of counts are done, the average of the measured values of the rotation speed is stored in CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) as shown below.

**Ex.** When the number for CH☐ Moving average count (Rotation speed measurement) (RWw19, RWw31) is set to 3

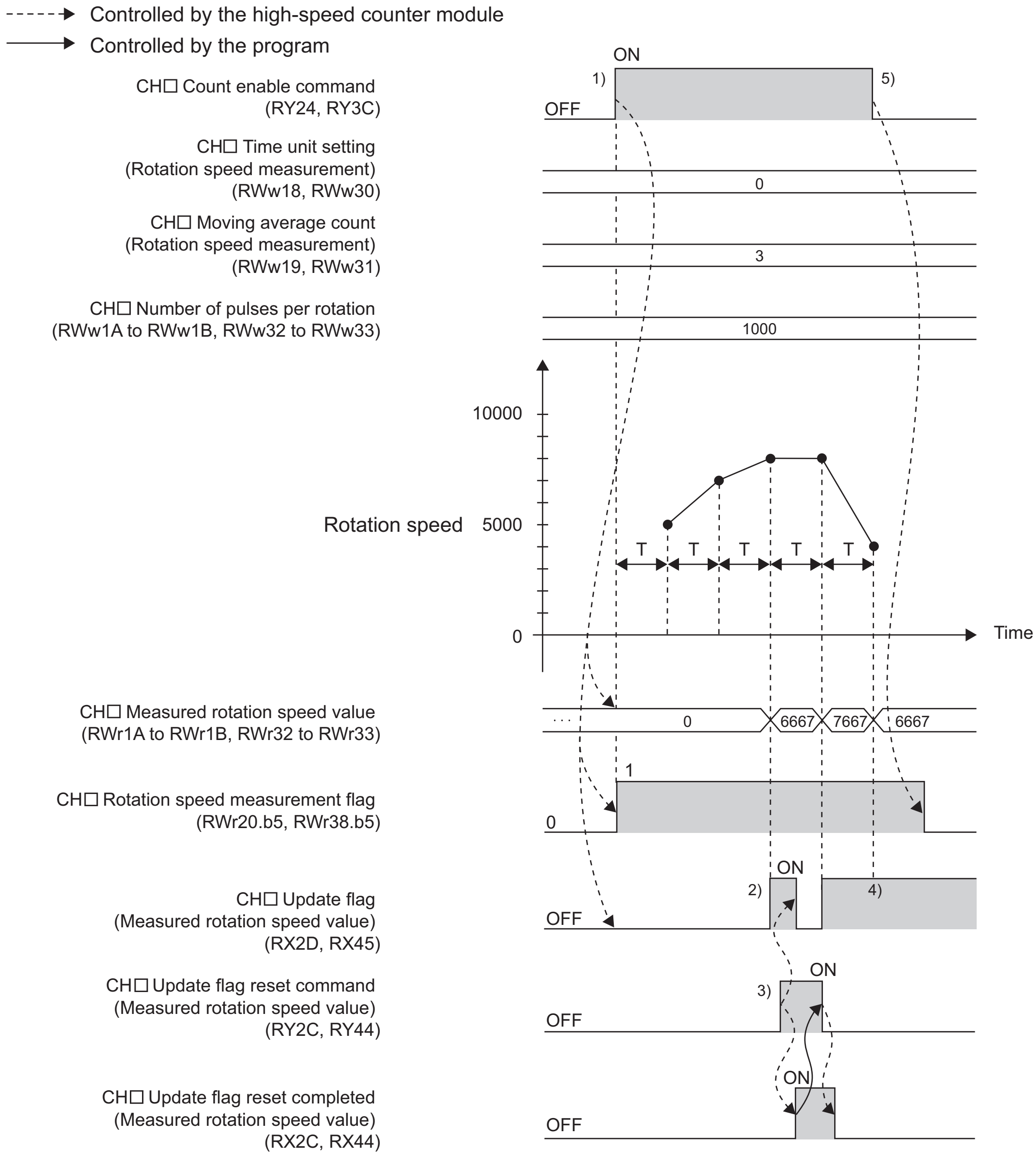



1st storage = 1)+2)+3)/3 = (5000+7000+8000)/3 ≒ 6667
2nd storage = 2)+3)+4)/3 = (7000+8000+8000)/3 ≒ 7667
3rd storage = 3)+4)+5)/3 = (8000+8000+4000)/3 ≒ 6667

## (5) Operation example of the rotation speed measurement function

The following figure shows an operation example with the following settings.

- CH□ Time unit setting (Rotation speed measurement) (RWw18, RWw30): 0.01s
- CH□ Moving average count (Rotation speed measurement) (RWw19, RWw31): 3
- CH□ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33): 1000



T: Rotation speed measurement time unit

| No. | Description |
|---|---|
| 1) | The following processing is performed when CH☐ Count enable command (RY24, RY3C) is turned on to turn CH☐ Rotation speed measurement flag (RWr20.b5, RWr38.b5) to Operating (1).<br>• The values of CH☐ Time unit setting (Rotation speed measurement) (RWw18, RWw30), CH☐ Moving average count (Rotation speed measurement) (RWw19, RWw31), and CH☐ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33) are acquired. (If the value is changed during the rotation speed measurement, the change is ignored.)<br>• CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) turns off.<br>• The value in CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is cleared to 0. |
| 2) | CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) turns on when a value is stored in CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33). |
| 3) | When CH☐ Update flag reset command (Measured rotation speed value) (RY2C, RY44) is turned off then on, the high-speed counter module turns off CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) and turns on CH☐ Update flag reset completed (Measured rotation speed value) (RX2C, RX44).<br>After that, CH☐ Update flag reset completed (Measured rotation speed value) (RX2C, RX44) turns off when CH☐ Update flag reset command (Measured rotation speed value) (RY2C, RY44) is turned off. |
| 4) | CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is updated even when CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) is on. |
| 5) | CH☐ Rotation speed measurement flag (RWr20.b5, RWr38.b5) changes to Not operating (0) when CH☐ Count enable command (RY24, RY3C) is turned off. |

**Point**

- After the start of the rotation speed measurement, CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) turns on every time the measured value is stored in CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33).
  The value previously stored in the remote register is held while CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) is off. (Except at the start of the measurement)
- The margin of error (maximum) of the rotation speed measurement function is calculated from the following formula.

$$\text{Actual rotation speed (r/min)} \times \frac{100\text{ (ppm)}}{1000000} + \frac{60}{\text{Time unit (Rotation speed measurement) (S)} \times \text{Moving average count (Rotation speed measurement)} \times \text{Number of pulses per rotation}}$$

**Ex.** The following table shows each value to be put into the formula.

| Item | Value |
|---|---|
| Actual rotation speed (r/min) | 1234r/min |
| Time unit (Rotation speed measurement) (s) | 0.01s |
| Moving average count (Rotation speed measurement) | 4 times |
| Number of pulses per rotation | 60 |

The margin of error (maximum) is calculated as shown below.

$$1234\text{ (r/min)} \times \frac{100\text{ (ppm)}}{1000000} + \frac{60}{0.01\text{ (s)} \times 4 \times 60}$$

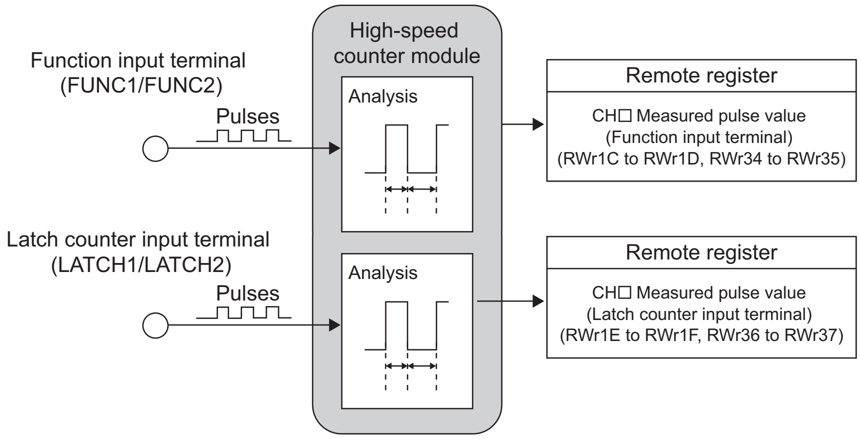
$$= 0.1234\text{ (r/min)} + 25\text{ (r/min)}$$

$$= 25.1234\text{ (r/min)}$$

- CH☐ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is updated without resetting CH☐ Update flag (Measured rotation speed value) (RX2D, RX45).
- CH☐ Update flag reset command (Measured rotation speed value) (RY2C, RY44) responds within $\Delta T_1$ after the action. For $\Delta T_1$, refer to the following.
  - Internal Control Cycle and Response Delay Time (Page 283, Appendix 4)

# 8.15 Pulse Measurement Function

The pulse measurement function measures the ON width or OFF width of pulses that are input to the external input terminals, CH□ Function input terminal (FUNC1, FUNC2) or CH□ Latch counter input terminal (LATCH1, LATCH2). When the next pulse is measured, the measured value is written over the previous value.

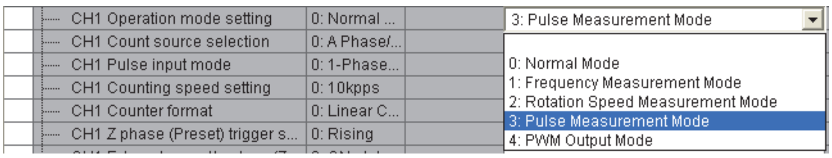



## (1) Setting method of the pulse measurement function

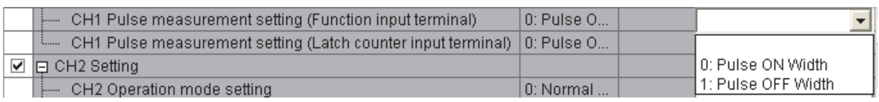
**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations"
➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

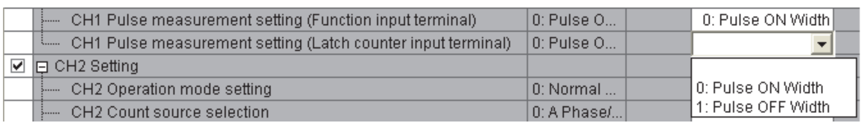
**2. Set "CH□ Operation mode setting " to "3: Pulse Measurement Mode".**




**3. Set the pulse width to be measured in "CH□ Pulse measurement setting (Function input terminal)".**




**4. Set the pulse width to be measured in "CH□ Pulse measurement setting (Latch counter input terminal)".**



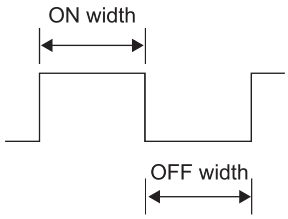
## (2) Terminals for the pulse measurement

The following table lists the terminals that are used for the pulse measurement for each channel.

| Channel | Terminals for the pulse measurement |
|---|---|
| CH1 | Function input terminal 1 (FUNC1) |
| | Latch counter input terminal 1 (LATCH1) |
| CH2 | Function input terminal 2 (FUNC2) |
| | Latch counter input terminal 2 (LATCH2) |

## (3) Pulse width to be measured

Set which pulse width (ON or OFF) is to be measured by using "CH□ Pulse measurement setting (Function input terminal)" and "CH□ Pulse measurement setting (Latch counter input terminal)".
The measured value is stored in CH□ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) or CH□ Measured pulse value (Latch counter input terminal) (RWr1E to RWr1F, RWr36 to RWr37).




| Pulse width to be measured | Setting value of pulse width to be measured | Description |
|---|---|---|
| Pulse ON width | 0 | The ON time of the input pulse is measured. |
| Pulse OFF width | 1 | The OFF time of the input pulse is measured. |

## (4) Measurable range of the pulses

The measurable range of the pulses is between 2000 and 2147483647 (0.2ms to approx. 214s). When the input pulses are beyond the measurable range, the error code ($\square660_H$ or $\square662_H$) is stored in CH□ Latest error code (RWr22, RWr3A) and Error status flag (RXA) and the ERR. LED turns on.
To resume the measurement, input the pulses once again, or perform the operation as shown below.

| Measurement to be resumed | Operation | Remarks |
|---|---|---|
| Measurement with the function input terminal | Turn off then on the F start command.*1 | The pulse measurement is not resumed until the F measurement flag or the L measurement flag changes to Not operating (OFF) after the F start command or L start command is turned off.*1 |
| Measurement with the latch counter input terminal | Turn off then on the L start command.*1 | |

*1 The abbreviations mean as the follows.
- F start command: CH□ Pulse measurement start command (Function input terminal) (RY30, RY48)
- L start command: CH□ Pulse measurement start command (Latch counter input terminal) (RY32, RY4A)
- F measurement flag: CH□ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6)
- L measurement flag: CH□ Pulse measurement flag (Latch counter input terminal) (RWr20.b7, RWr38.b7)

## (5) Update timing of the measured values of pulses

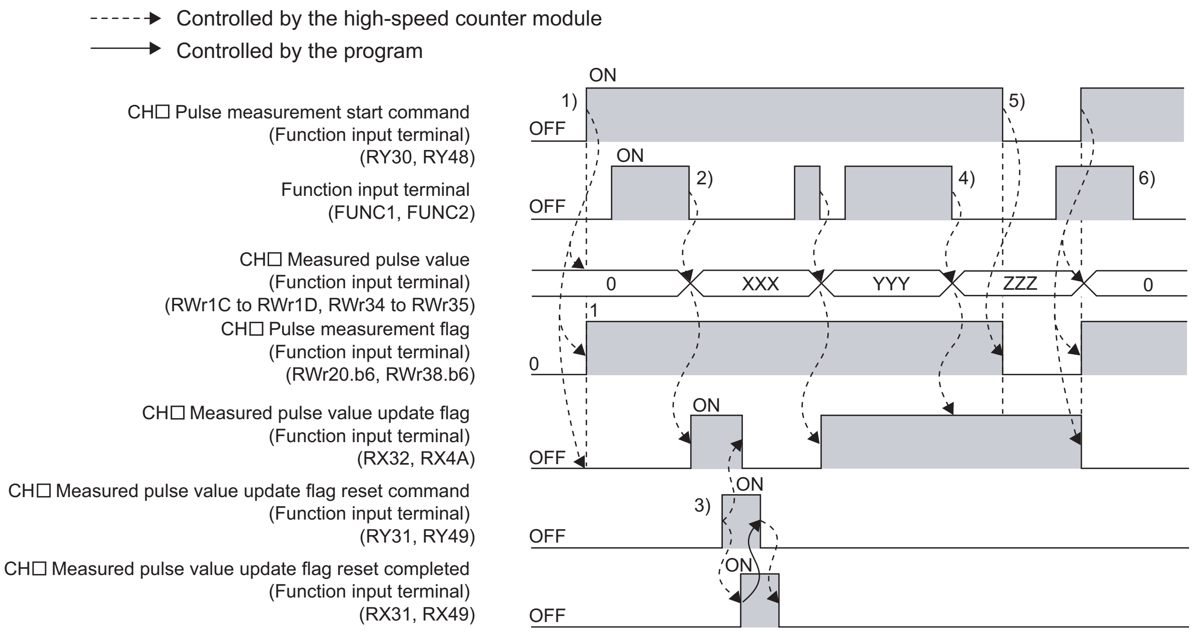
The measured pulse value is updated in the remote register every $\Delta T_2$ cycle. So when the measurement is done twice or more within $\Delta T_2$, only the latest measured value is stored in the remote registers. For details on $\Delta T_2$, refer to the following.

- Internal Control Cycle and Response Delay Time (Page 283, Appendix 4)

## (6) Operation example of the pulse measurement function

The following figure shows an operation example of the pulse measurement for the ON width with CH☐ Function input terminal (FUNC1, FUNC2).

The explanations in the following table are for the measurement with CH☐ Function input terminal (FUNC1, FUNC2). The same can be applied to the measurement with CH☐ Latch counter input terminal (LATCH1, LATCH2) except the difference of the terminals for the pulse measurement and the setting items. For details on the difference, refer to Page 159, Section 8.15 (7).




| No. | Description |
|---|---|
| 1) | When CH☐ Pulse measurement start command (Function input terminal) (RY30, RY48) is turned on, CH☐ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6) changes to Operating (1).<br>The following processing are performed. The remote input signal and remote register remain the same before the measured pulse value is stored.<br>• CH☐ Measured pulse value update flag (Function input terminal) (RX32, RX4A) turns off.<br>• The value in CH☐ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) changes to 0. |
| 2) | The following processing is performed when the measured pulse value is stored.<br>• CH☐ Measured pulse value update flag (Function input terminal) (RX32, RX4A) turns on. |
| 3) | When CH☐ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) is turned off then on, the high-speed counter module turns off CH☐ Measured pulse value update flag (Function input terminal) (RX32, RX4A) and turns on CH☐ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49).<br>After that, CH☐ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49) turns off when CH☐ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) is turned off. |
| 4) | CH☐ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) is updated even if CH☐ Measured pulse value update flag (Function input terminal) (RX32, RX4A) is on. |
| 5) | CH☐ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6) changes to Not operating (0) and the pulse measurement stops by turning off CH☐ Pulse measurement start command (Function input terminal) (RY30, RY48). |
| 6) | If the pulse (pulse ON width in this case) is input before CH☐ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6) changes to Operating (1), CH☐ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) is not updated even when CH☐ Function input terminal (FUNC1, FUNC2) is turned off. Note that the pulse that is input after the setting in CH☐ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6) changes to Operating (1) is to be measured. |

**Point**

When the pulse measurement function is executed with CH☐ Function input terminal (FUNC1, FUNC2), the time to be taken to update CH☐ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) varies according to the time set in "CH☐ Function input response time setting". (The same can be applied to the measurement with CH☐ Latch counter input terminal (LATCH1, LATCH2) except the differences such as the setting items.)

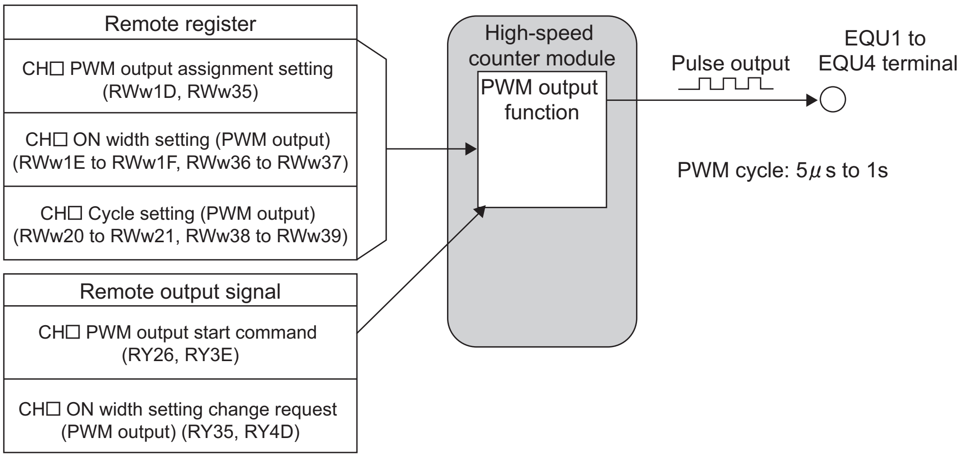
## (7) Pulse measurement difference between CH☐ Function input terminal (FUNC1, FUNC2) and CH☐ Latch counter input terminal (LATCH1, LATCH2)

The pulse measurement same as CH☐ Function input terminal (FUNC1, FUNC2) can be applied to the measurement with CH☐ Latch counter input terminal (LATCH1, LATCH2) except the difference of the terminals for the pulse measurement and the setting items.
The following table lists the differences of the setting items between both terminals.

| Input terminal, setting item | Pulse measurement (with function input terminal) | Pulse measurement (with latch counter input terminal) |
|---|---|---|
| Terminals for the pulse measurement | CH☐ Function input terminal (FUNC1, FUNC2) | CH☐ Latch counter input terminal (LATCH1, LATCH2) |
| Setting for pulse width to be measured | CH☐ Pulse measurement setting (Function input terminal) (address: $012A_H$, $014A_H$) | CH☐ Pulse measurement setting (Latch counter input terminal) (address: $012B_H$, $014B_H$) |
| Measured pulse value | CH☐ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) | CH☐ Measured pulse value (Latch counter input terminal) (RWr1E to RWr1F, RWr36 to RWr37) |
| Pulse measurement start command | CH☐ Pulse measurement start command (Function input terminal) (RY30, RY48) | CH☐ Pulse measurement start command (Latch counter input terminal) (RY32, RY4A) |
| Pulse measurement flag | CH☐ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6) | CH☐ Pulse measurement flag (Latch counter input terminal) (RWr20.b7, RWr38.b7) |
| Measured pulse value update flag | CH☐ Measured pulse value update flag (Function input terminal) (RX32, RX4A) | CH☐ Measured pulse value update flag (Latch counter input terminal) (RX34, RX4C) |
| Measured pulse value update flag reset command | CH☐ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) | CH☐ Measured pulse value update flag reset command (Latch counter input terminal) (RY33, RY4B) |
| Measured pulse value update flag reset completed | CH☐ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49) | CH☐ Measured pulse value update flag reset completed (Latch counter input terminal) (RX33, RX4B) |

# 8.16 PWM Output Function

The PWM output function outputs the PWM waveform (up to 200kHz) from one of the coincidence output 1 to 4 terminals (EQU1 to EQU4). Up to four points can be assigned for one channel. The same waveform is to be output to the assigned terminals. The ON width setting (PWM output) can be changed during PWM output.

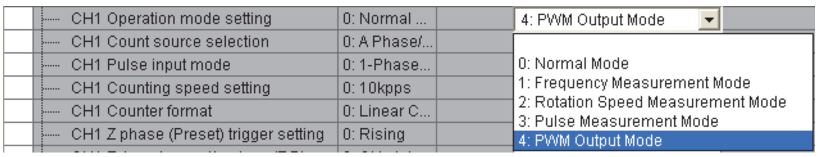



## (1) Setting method of the PWM output function

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ➪ Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪ [Parameter Processing of Slave Station]

**2. Set "CH☐ Operation mode setting" to "4: PWM Output Mode".**



## (2) Assignment of the PWM output terminals

To output the PWM waveform, assign Coincidence output 1 to 4 to the corresponding channel in "Coincidence output 1 to 4 channel assignment setting". Then, by using CH□ PWM output assignment setting (RWw1D, RWw35) of the remote register, assign which Coincidence output is used for the PWM waveform output. The following table shows the setting examples of the assignment.

Ex. Assignment example of the PWM output terminals (CH1)

| Ex. | Setting item | | Setting detail | Operation |
|---|---|---|---|---|
| 1 | Coincidence output 1 channel assignment setting | 0: CH1 | Coincidence output 1 to 2 are assigned to CH1 and Coincidence output 3 to 4 are assigned to CH2. | The error code (□670$_H$) is stored in CH□ Latest error code (RWr22, RWr3A) since no Coincidence output is assigned as the PWM output terminal. At this time, Error status flag (RXA) and the ERR. LED turns on. |
| | Coincidence output 2 channel assignment setting | 0: CH1 | | |
| | Coincidence output 3 channel assignment setting | 1: CH2 | | |
| | Coincidence output 4 channel assignment setting | 1: CH2 | | |
| | CH1 PWM output assignment setting (RWw1D) | 0000$_H$ | No PWM output terminals | |
| 2 | Coincidence output 1 channel assignment setting | 0: CH1 | Coincidence output 1 to 2 are assigned to CH1 and Coincidence output 3 to 4 are assigned to CH2. | Coincidence output 2 is assigned to the PWM output terminal and the operation is performed. |
| | Coincidence output 2 channel assignment setting | 0: CH1 | | |
| | Coincidence output 3 channel assignment setting | 1: CH2 | | |
| | Coincidence output 4 channel assignment setting | 1: CH2 | | |
| | CH1 PWM output assignment setting (RWw1D) | 0002$_H$ | Coincidence output 2 is assigned to the PWM output terminal. | |
| 3 | Coincidence output 1 channel assignment setting | 0: CH1 | Coincidence output 1 to 2 are assigned to CH1 and Coincidence output 3 to 4 are assigned to CH2. | Coincidence output 1 and Coincidence output 2 are assigned to the PWM output terminal and the operation is performed. (The same PWM waveform is output.) |
| | Coincidence output 2 channel assignment setting | 0: CH1 | | |
| | Coincidence output 3 channel assignment setting | 1: CH2 | | |
| | Coincidence output 4 channel assignment setting | 1: CH2 | | |
| | CH1 PWM output assignment setting (RWw1D) | 0003$_H$ | Coincidence output 1 and Coincidence output 2 are assigned to the PWM output terminal. | |

| Ex. | Setting item | | Setting detail | Operation |
|---|---|---|---|---|
| 4 | Coincidence output 1 channel assignment setting | 0: CH1 | Coincidence output 1 to 2 are assigned to CH1 and Coincidence output 3 to 4 are assigned to CH2. | The error code (□670$_H$) is stored in CH□ Latest error code (RWr22, RWr3A) since the Coincidence output is assigned to Coincidence output 3 that is used by CH2. At this time, Error status flag (RXA) and the ERR. LED turns on. |
| | Coincidence output 2 channel assignment setting | 0: CH1 | | |
| | Coincidence output 3 channel assignment setting | 1: CH2 | | |
| | Coincidence output 4 channel assignment setting | 1: CH2 | | |
| | CH1 PWM output assignment setting (RWw1D) | 0004$_H$ | Coincidence output 3 is assigned to the PWM output terminal. | |
| 5 | Coincidence output 1 channel assignment setting | 0: CH1 | Coincidence output 1 to 4 are assigned to CH1. | Coincidence output 1 to 4 are assigned to the PWM output terminal and the operation is performed. (The same PWM waveform is output from all the Coincidence output terminals.) |
| | Coincidence output 2 channel assignment setting | 0: CH1 | | |
| | Coincidence output 3 channel assignment setting | 0: CH1 | | |
| | Coincidence output 4 channel assignment setting | 0: CH1 | | |
| | CH1 PWM output assignment setting (RWw1D) | 000F$_H$ | Coincidence output 1 to 4 are assigned to the PWM output terminal. | |

**Point**

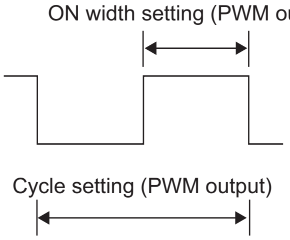
For Coincidence output that is assigned as the PWM output terminal in CH□ PWM output assignment setting (RWw1D, RWw35), the setting in "Coincidence output 1 to 4 comparison condition setting" is disabled.

### (3) Setting method of the output waveform

Set the output waveform by using CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) and CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39).
The following table lists the setting items.

| Setting item | Setting range | Description | Remarks |
|---|---|---|---|
| CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) | 0, 10 to 10000000*1 | Set the ON time of the output pulse. | 0.1μs per unit |
| CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39) | 50 to 10000000 | Set the cycle of the output pulse. | 0.1μs per unit |

*1 Set the value that is equal to or smaller than the one set to the cycle setting (PWM output).



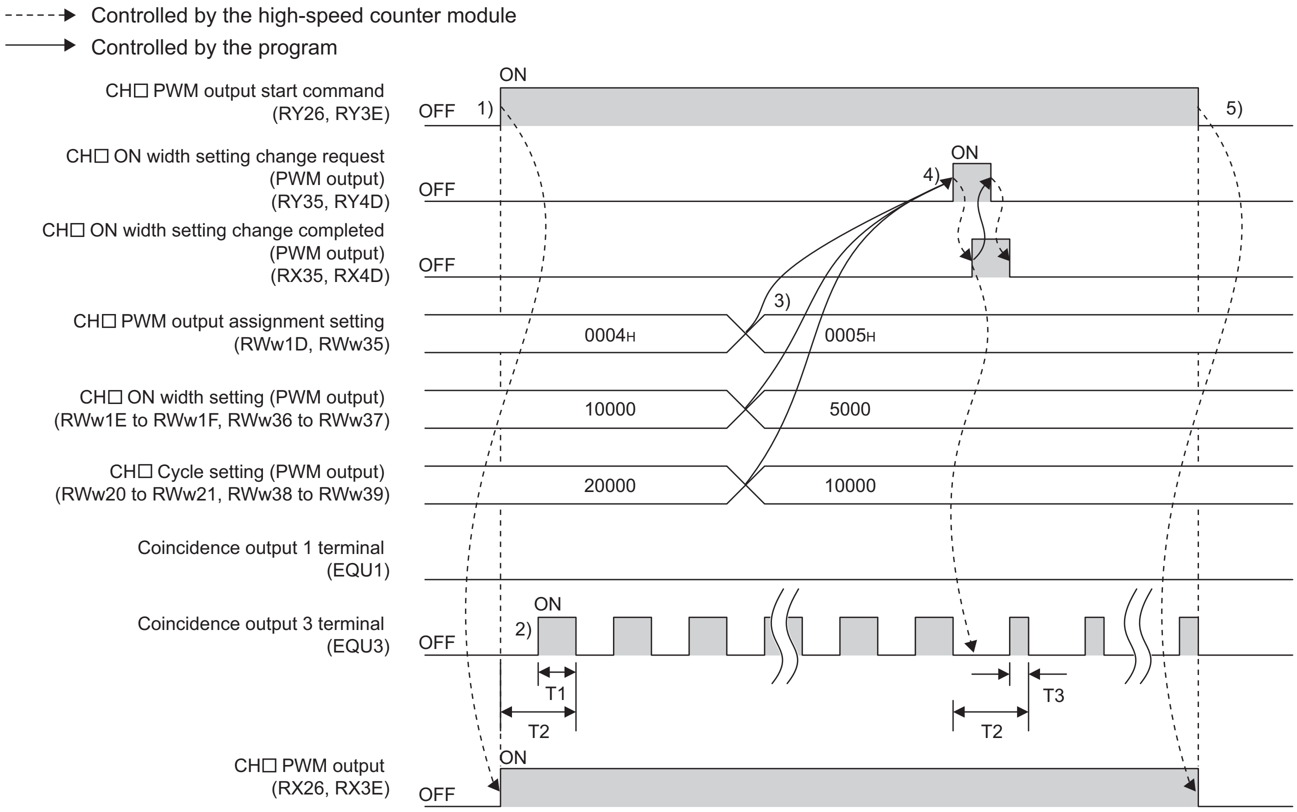

**Point**

- The ON width of the PWM output is calculated from the following formula according to the duty ratio to be specified.
  ON width of the PWM output = Cycle of the PWM output × Duty ratio [%] ÷ 100
- Given that output circuits or connected devices of the high-speed counter module do not affect the value, the margin of error (maximum) of each setting value is calculated as shown below.
  - ON width setting (PWM output) [μs] × 100 [ppm] ÷ 1000000 + 0.1 [μs]
  - Cycle setting (PWM output) [μs] × 100 [ppm] ÷ 1000000 + 0.1 [μs]

## (4) Operation example of the PWM output function

The following figure shows an operation example of outputting the PWM waveform whose cycle time is 2ms and ON time is 1ms to change the ON time to 0.5ms during PWM output.

Coincidence output is assigned to the corresponding channel in the "Coincidence output 3 channel assignment setting".

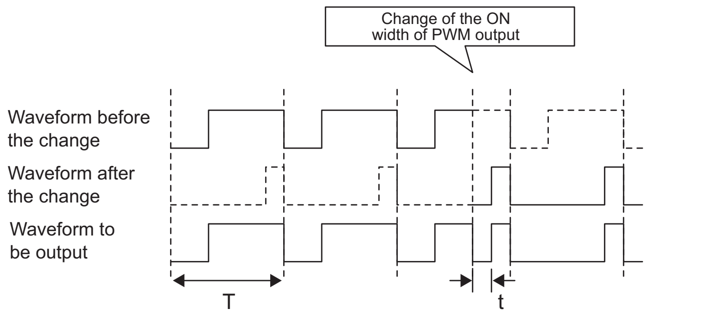



T1: ON width setting (PWM output) (1ms)
T2: Cycle setting (PWM output) (2ms)
T3: ON width setting (PWM output) (0.5ms)

| No. | Description |
|---|---|
| 1) | The following processing is performed when CH☐ PWM output start command (RY26, RY3E) is turned on to turn on CH☐ PWM output (RX26, RX3E).<br>• The values in CH☐ PWM output assignment setting (RWw1D, RWw35), CH☐ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37), and CH☐ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39) are acquired.<br>• The PWM waveform is output from one of the coincidence output 1 to 4 terminals (EQU1 to EQU4) based on the settings. (The PWM waveform is output starting with OFF.) |
| 2) | The PWM waveform continues to be output based on the acquired settings until CH☐ PWM output start command (RY26, RY3E) is turned off or CH☐ ON width setting change request (PWM output) (RY35, RY4D) is turned on. |
| 3) | When the values in CH☐ PWM output assignment setting (RWw1D, RWw35), CH☐ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37), and CH☐ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39) are changed, the PWM waveform is not changed. Only the value in CH☐ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) can be changed by CH☐ ON width setting change request (PWM output) (RY35, RY4D). |
| 4) | The following processing is performed when CH☐ ON width setting change request (PWM output) (RY35, RY4D) is turned off then on to turn on CH☐ ON width setting change completed (PWM output) (RX35, RX4D).<br>• The value in CH☐ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) is acquired.<br>• The PWM waveform is output from one of the coincidence output 1 to 4 terminals (EQU1 to EQU4) based on the settings. The change is reflected immediately.<br>Turn off CH☐ ON width setting change request (PWM output) (RY35, RY4D) when CH☐ ON width setting change completed (PWM output) (RX35, RX4D) turns on. CH☐ ON width setting change completed (PWM output) (RX35, RX4D) turns off when CH☐ ON width setting change request (PWM output) (RY35, RY4D) is turned off. |
| 5) | The following processing is performed when CH☐ PWM output start command (RY26, RY3E) is turned off to turn off CH☐ PWM output (RX26, RX3E).<br>• Turn off the coincidence output 1 to 4 terminals (EQU1 to EQU4) immediately. |

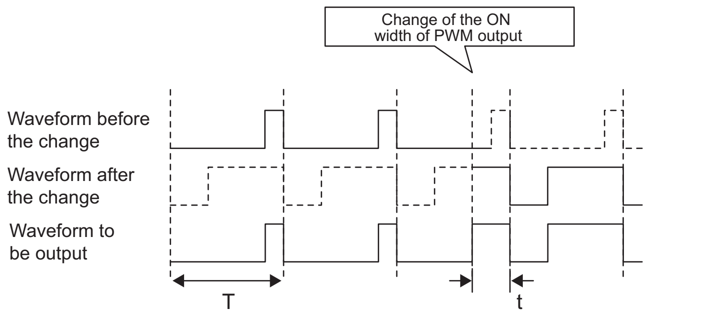
Point

- The waveform that is output from the coincidence output 1 to 4 terminals (EQU 1 to EQU4), the external output terminals, can be affected by output circuits or connected devices of the high-speed counter module and change its form. Therefore, check the waveform by using, for example, a synchroscope, and set the output waveform.
- When changing the cycle time of the PWM waveform, turn off CH□ PWM output start command (RY26, RY3E) to turn off CH□ PWM output (RX26, RX3E). After checking that CH□ PWM output (RX26, RX3E) is off, change the setting of CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39), and turn on CH□ PWM output start command (RY26, RY3E) again.
- When the ON time is changed during PWM output, the change is reflected immediately, therefore, the ON time before the change may be interrupted at the cycle in which the ON time is changed. When the ON time after the change is shorter than the ON time before the change, unnecessary OFF waveform may be output depending on the changing timing.




T: Cycle time
t: (Remaining ON width before the change) - (ON width after the change)

When the ON time after the change is longer than the ON time before the change, the ON waveform may be output at the time of the change depending on the changing timing.




T: Cycle time
t: (Remaining OFF width before the change) + (ON width after the change)

# 8.17 Output HOLD/CLEAR Setting Function

When the high-speed counter module is disconnected from data link, or the CPU module operating status is STOP, whether to hold or clear the last Coincidence output (EQU1 to EQU4) and the output status of the extension output module can be set. Set whether to hold or clear the values for all the output points of the module in a batch from the module parameter setting window of GX Works2 or the program.

## (1) Output HOLD/CLEAR setting and its operation

The following table lists the ON/OFF status of when HOLD or CLEAR is set for an output.

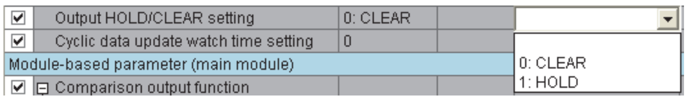
| Operating status | | "Output HOLD/CLEAR setting" "0: CLEAR" (default) | | "Output HOLD/CLEAR setting" "1: HOLD" | |
|---|---|---|---|---|---|
| | | Last output status OFF | Last output status ON | Last output status OFF | Last output status ON |
| Data link in operation | CPU module in RUN | OFF | ON | OFF | ON |
| | CPU module in STOP | OFF | OFF | OFF | ON |
| | CPU module in PAUSE | OFF | ON | OFF | ON |
| | CPU module in RESET | OFF | OFF | OFF | ON |
| During disconnection/cyclic stop | | OFF | OFF | OFF | ON |

## (2) Setting method

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. For "Output HOLD/CLEAR setting", select "0: CLEAR" or "1: HOLD".**




| Item | Setting range |
|---|---|
| Output HOLD/CLEAR setting | • 0: CLEAR<br>• 1: HOLD |

**Point**

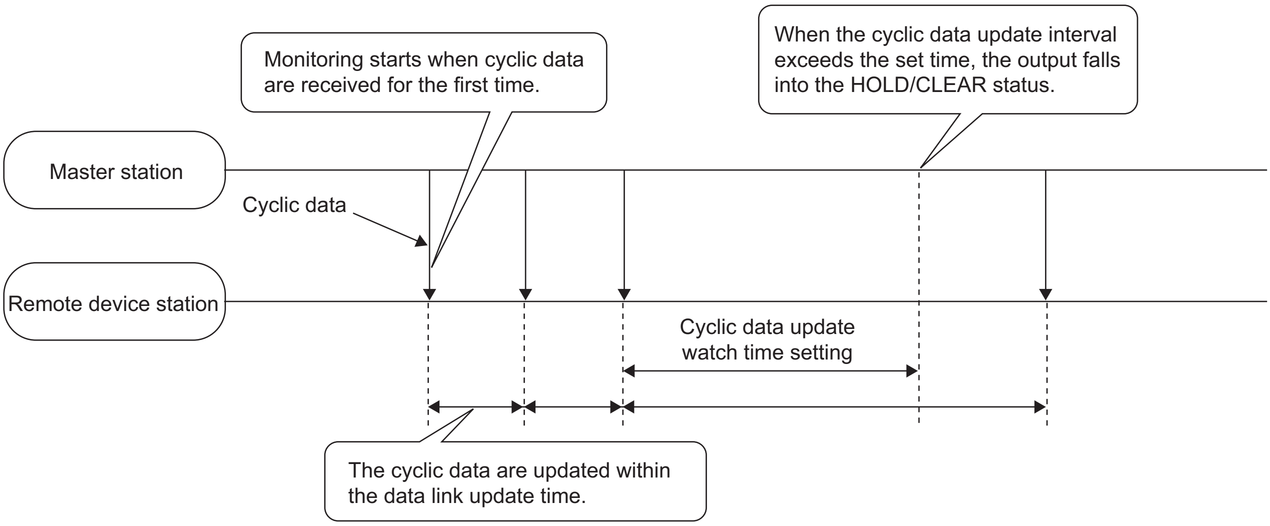
When the output status changes according to the change in the comparison result after the output is set to HOLD, the output of the following functions changes.

- Coincidence output (EQU1 to EQU4) of the coincidence output function
- Coincidence output (EQU1 to EQU4) of the PWM output function
- Output of the extension output module that is used as the output of the cam switch function (Y0 to YF)

# 8.18 Cyclic Data Update Watch Function

This function monitors the cyclic data update interval. When the cyclic transmission remains to be stopped over the set watch time, this function holds or clears the value which is output just before.
In the cyclic transmission stop status, the D LINK LED is flashing (Data link in operation (cyclic transmission stopped)) or off (Data link not performed (disconnected)).
Set whether to hold or clear the output value using the output HOLD/CLEAR setting function. For the output HOLD/CLEAR setting function, refer to the following.

- Output HOLD/CLEAR Setting Function (Page 167, Section 8.17)




## (1) Setting method

**1.** **Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2.** **For "Cyclic data update watch time setting", set the monitoring time.**


| Item | Setting range |
|---|---|
| Cyclic data update watch time setting | • 0 (Not monitor)<br>• 1 to 20 (0.1 to 2 seconds, in increments of 100ms) |

**Point**

Set the greater value for the cyclic data update watch time setting than that of the link scan time.

# 8.19 Error Notification Function

When an error or warning occurs, the high-speed counter module notifies the master station of it using remote input signals and remote registers.

**Remark**

The notification of the error or warning can be checked on the LED on the front of the module.
For details, refer to the following.
- PART NAMES (Page 21, CHAPTER 2)

## (1) Notification of an error

The high-speed counter module notifies the master station of an error in the following method.

| Item | Description | Reference |
|---|---|---|
| Error status flag (RXA) | Turns on when a moderate error or major error occurs. | Page 236, Appendix 1.1 |
| CH☐ Error status (RX36, RX4E) | Turns on when a moderate error or major error occurs for each channel. | |
| CH☐ Latest error code (RWr22, RWr3A)*1 | An error code is stored when a moderate error or major error occurs for each channel. | Page 260, Appendix 2 (6) |

*1 Errors independent from channels are station errors stored in CH1 Latest error code (RWr22).

### (a) Method for clearing an error

The method for clearing an error depends on the error type.

| Error type | Clearing an error |
|---|---|
| Major error | The error cannot be cleared. |
| Moderate error | Turn off then on CH☐ Error reset command (RY36, RY4E) or Initial data setting request flag (RY9) after removing the error cause. |

## (2) Notification of a warning

The high-speed counter module notifies the master station of a warning in the following method.

| Name | Description | Reference |
|---|---|---|
| Warning status flag (RX7) | Turns on when a minor error occurs. | Page 236, Appendix 1.1 |
| CH☐ Warning status (RX37, RX4F) | Turns on when a minor error occurs for each channel. | |
| CH☐ Latest warning code (RWr23, RWr3B)*1 | The error code is stored when a minor error occurs for each channel. | Page 260, Appendix 2 (6) |

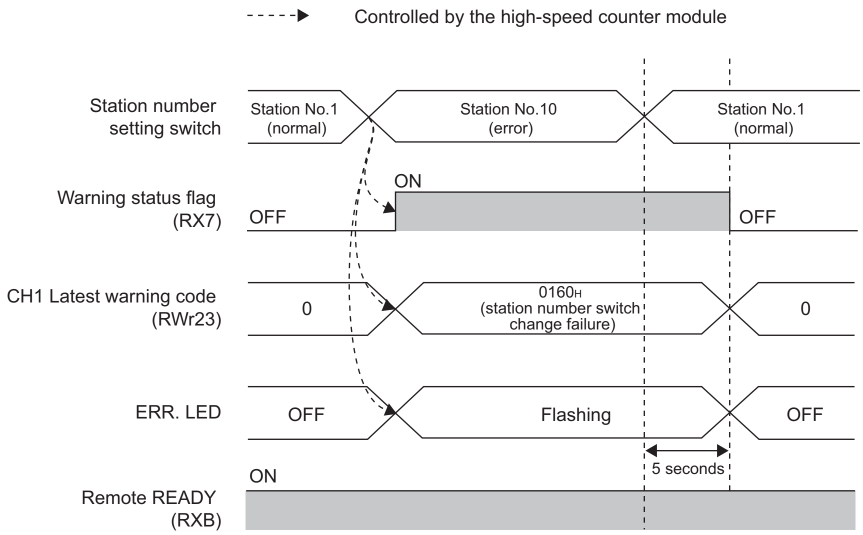
*1 Errors independent from channels are station errors stored in CH1 Latest warning code (RWr23).

### (a) Method for clearing a warning

| Error type | | Clearing an error | |
|---|---|---|---|
| Minor error | Warning | Error code: Other than □050H | A warning is cleared five seconds after the error cause is removed.*1 |
| | | Error code: □050H | Turning off then on CH□ Error reset command (RY36, RY4E) resets the warning status of each channel.*1 |

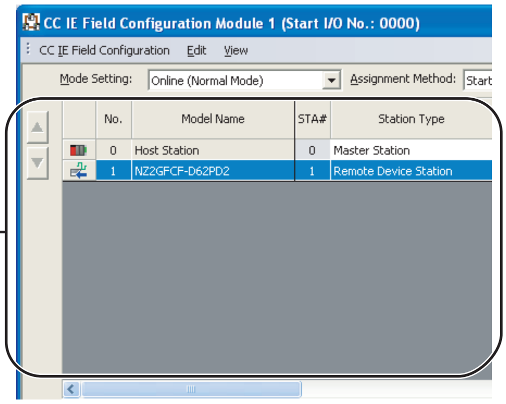
*1 A warning results in the following state five seconds after the error cause is removed or CH□ Error reset command (RY36, RY4E) is turned off then on.
- Warning status flag (RX7) turns off.
- CH□ Warning status (RX37, RX4F) of a channel where the error cause is removed turns off.
- CH□ Latest warning code (RWr23, RWr3B) of a channel where the error cause is removed is cleared.
- The ERR. LED turns off.

Ex. Operation to clear Station number switch change failure (error code: $0160_H$)



## (3) Method for clearing an error by executing the command of the slave station

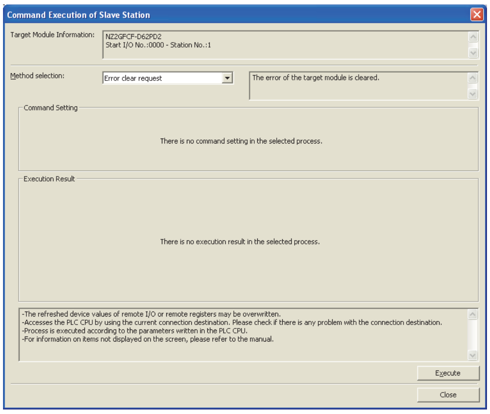
The following shows how to clear an error by executing the command of the slave station.



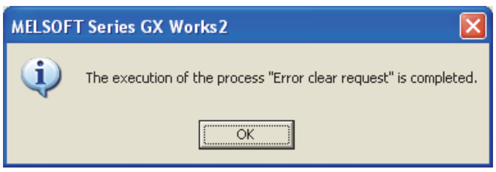

**1.** **Select the high-speed counter module in "List of stations" on the "CC IE Field Configuration" window.**

**2.** **Open the "Command Execution of Slave Station" window.**

[CC IE Field Configuration] ➪ [Command Execution of Slave Station]




**3.** **Set "Method selection" to "Error clear request" and click the Execute button.**




**4.** **When the window shown on the left is displayed, click the OK button.**

**5.** **The error for the high-speed counter module is cleared.**

# 8.20 Function at the Extension Module Installation

One extension I/O module can be connected to one high-speed counter module.
In addition, functions unique to the extension I/O module can be used.

Point

- Turn off the high-speed counter module before replacing the extension I/O module. If the extension module is removed when the module power supply is on, the error code ($1F00_H$) is stored to CH1 Latest error code (RWr22), Error status flag (RXA) turns on, and the ERR. LED turns on. The main module stops its operation.
- After replacing the extension I/O module, write the parameters again.

## (1) Functions available with an extension I/O module connected

| Function | Reference |
|---|---|
| Cam switch function | Page 117, Section 8.3.4 |
| External power supply monitoring function | Page 173, Section 8.20 (2) |
| Output HOLD/CLEAR setting function | Page 167, Section 8.17 |
| Cyclic data update watch function | Page 168, Section 8.18 |
| Input response time setting function | Page 174, Section 8.20 (3) |
| Number of ON times integration function*1 | CC-Link IE Field Network Remote I/O Module User's Manual |

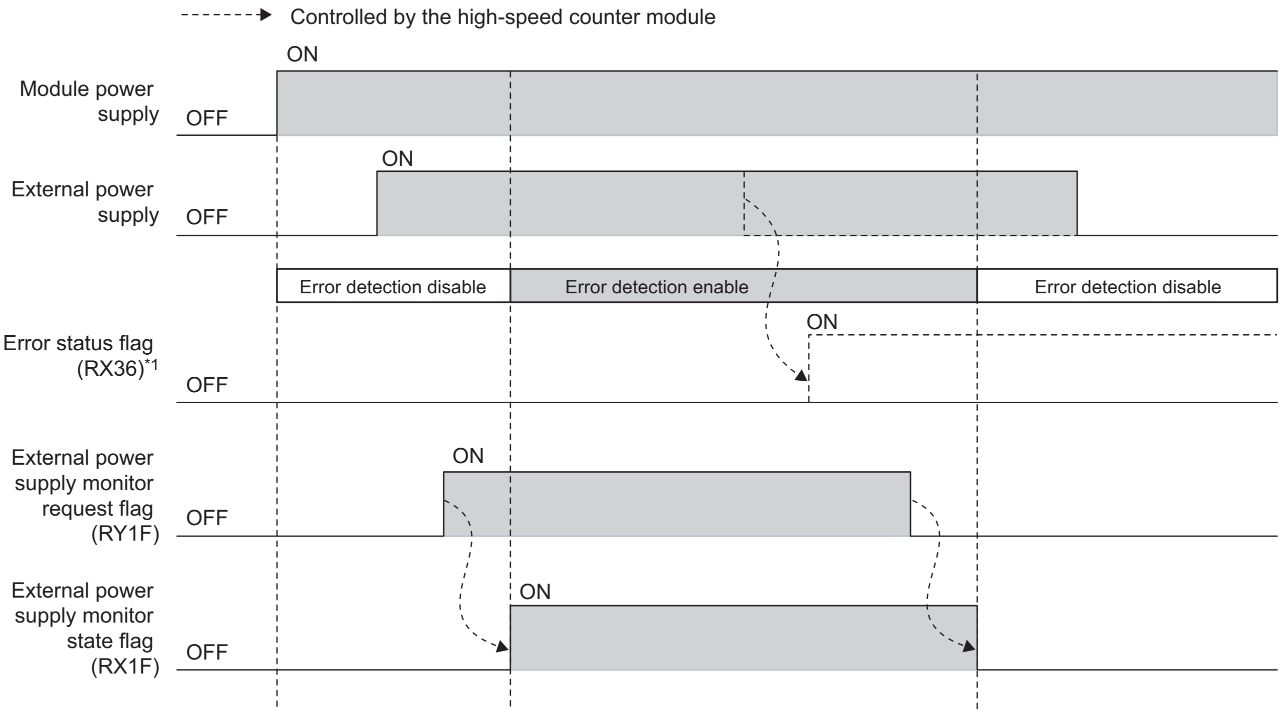
*1 The function cannot be used with the cam switch function.

## (2) External power supply monitoring function

Using this function, the high-speed counter module monitors the ON/OFF status of the external power supply and indicates it with the I/O PW LED on the extension output module.
By using External power supply monitor request flag (RY1F), a moderate error is generated when the external power supply is off. Thus, the ON/OFF status of the external power supply is notified and the extension output module can be stopped.

### (a) External power supply monitoring function

When the external power supply is turned off with External power supply monitor request flag (RY1F) on, a moderate error occurs. When using this function, check that the external power supply stabilizes before turning on External power supply monitor request flag (RY1F). When turning off the external power supply, turn off External power supply monitor request flag (RY1F) in advance.




*1 Errors which occur in the extension I/O module are displayed in the error area of CH1 of the high-speed counter module.

### (b) Setting and checking the external power supply monitoring function

| Item | Description | Reference |
|---|---|---|
| External power supply monitor request flag (RY1F) | Set whether to enable or disable the external power supply monitoring function. | Page 249, Appendix 1.2 |
| External power supply monitor state flag (RX1F) | Indicates whether the external power supply monitoring function is enabled or disabled. | Page 236, Appendix 1.1 |

## (3) Input response time setting function

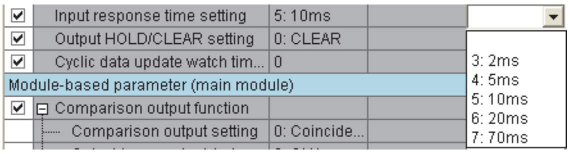
This function prevents an incorrect input due to noise by setting the response time until the extension input module recognizes an actual input as the X signal.
The input response time can be set from the module parameter setting window of GX Works2 or the program.

### (a) Setting method

**1. Set "Parameter write" for "Method selection".**

"CC IE Field Configuration" window ⇨ Select a high-speed counter module in "List of stations" ⇨ [CC IE Field Configuration] ⇨ [Parameter Processing of Slave Station]

**2. For "Input response time setting", select the appropriate input response time.**




| Item | Setting range |
|---|---|
| Input response time setting | • 3: 2ms<br>• 4: 5ms<br>• 5: 10ms<br>• 6: 20ms<br>• 7: 70ms |

**Point**

The extension input module may take in noise as an input depending on the input response time setting.
The pulse width which is taken in as an input varies depending on the response time set in parameters.
To set the input response time, consider fully the operating environment.
The following table shows the minimum values of the pulse widths which may be taken in as an input. The pulse widths lower than the values shown below can be filtered as noise.

| Value of input response time setting | 2ms | 5ms | 10ms | 20ms | 70ms |
|---|---|---|---|---|---|
| Minimum values of the pulse widths which may be taken in as an input (the maximum pulse widths which can be filtered as noise) | 0.15ms | 2ms | 4ms | 9ms | 36ms |

# 8.21 CC-Link IE Field Network Diagnostic Function

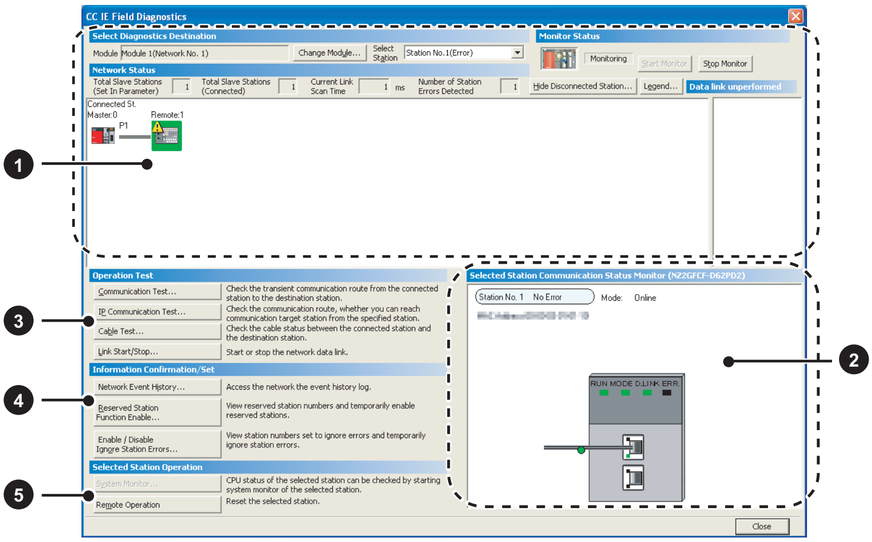
With this function, whether any network error occurs or not can be checked through GX Works2 connected to the CPU module.

## (1) How to use

**1.** **Connect GX Works2 to the CPU module.**

**2.** **Start CC-Link IE Field Network diagnostics from the menu of GX Works2.**

[Diagnostics] ⇨ [CC IE Field Diagnostics]



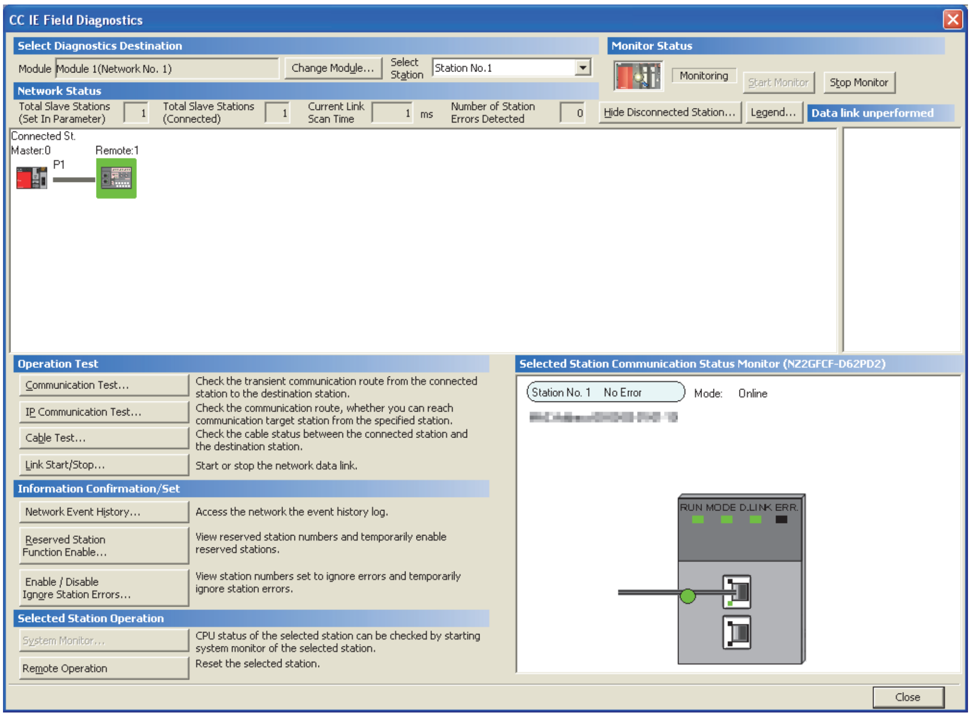
| Item to be diagnosed | | Description | Reference |
|---|---|---|---|
| 1 | Display of network configuration diagram and error status | The status of the CC-Link IE Field Network can be checked.<br>When an error or warning for the high-speed counter module occurs, an icon appears. | User's manual for the master/local module used |
| 2 | Display of selected-station status and error details | The communication status of the station selected in "Networks Status" can be checked.*1 | |
| 3 | Communication Test | The transient communication route and whether the communication is established from the connected station to the destination station can be checked. | |
| | IP Communication Test | The reaching time and the route of the IP communication from the connected station to the target station can be checked.<br>This function is unavailable for the high-speed counter module. | |
| | Cable Test | The cable status between the connected station and the destination station can be checked. | |
| | Link Start/Stop | The network data link can be started and stopped. | |
| 4 | Network Event History | The history of various events that occurred in the network can be checked. | |
| | Reserved Station Function Enable | A reservation for a station can be temporarily cancelled, and the cancellation can be disabled. Also, the station numbers for the modules set as reserved stations can be checked on a list. | |
| | Enable/Disable Ignore Station Errors | A station not set as an error invalid station can be temporarily set as an error invalid station, and the error invalid station setting can be disabled. Also, the station numbers for the modules set as (temporarily) error ignore stations can be checked on a list. | |
| 5 | System Monitor | The system monitor on the selected station is activated and the status of the module can be checked.<br>This function is unavailable for the high-speed counter module. | |
| | Remote Operation | The selected station can be reset through the remote operation. | Page 177, Section 8.21 (1) (a) |

*1 "Selected Station Communication Status Monitor", which appears at the bottom right in the window, indicates the communication status of the high-speed counter module. For the error and warning for the high-speed counter module, refer to the following.

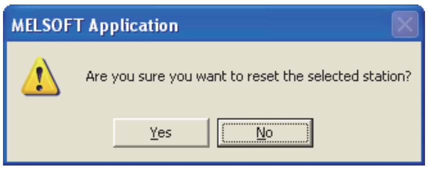
- Checking for The Error Codes and the Warning Codes (Page 205, Section 11.1)

### (a) Remote operation

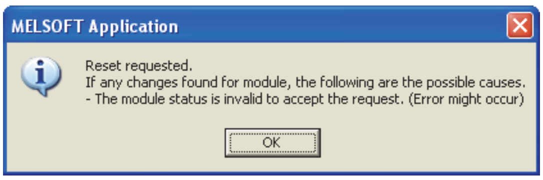
**1.** Select a slave station to be reset and click the [Remote Operation] button.




**2.** Clicking the [Yes] button on the following window starts the remote reset.




**3.** Click the [OK] button on the following window.



# CHAPTER 9 PROGRAMMING

This chapter describes the basic programs of the high-speed counter module.

## 9.1 Precautions for Programming

This section describes precautions to create CC-Link IE Field Network programs.

### (1) Cyclic transmission program

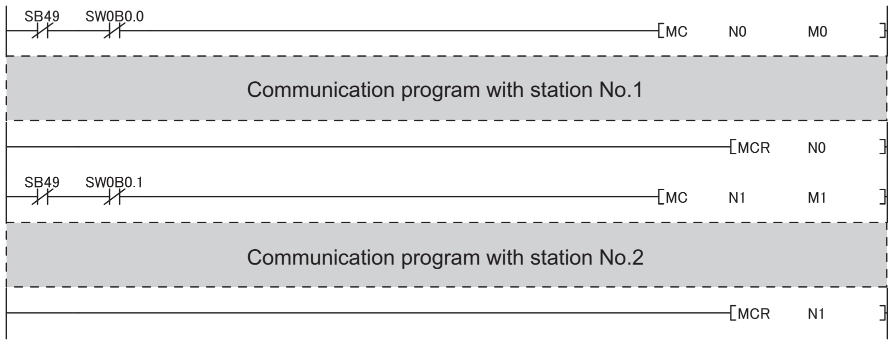
For a cyclic transmission program, interlock with the following link special relay (SB) and link special register (SW).

- Own station data link status (master station) (SB0049)
- Data link status (each station) (SW00B0 to SW00B7)

For the link special relay (SB) and link special register (SW), refer to the following.

User's manual for the master/local module used

Ex. Interlock example




### (2) Transient transmission program

For a transient transmission program, interlock with the following link special relay (SB) and link special register (SW).

- Own station baton pass status (master station) (SB0047)
- Baton pass status (each station) (SW00A0 to SW00A7)

For the link special relay (SB) and link special register (SW), refer to the following.

User's manual for the master/local module used

Ex. Interlock example

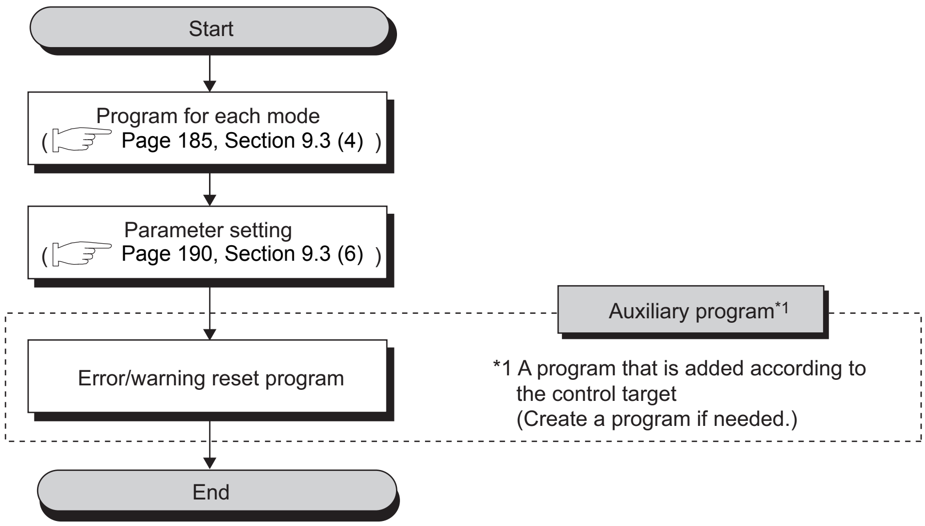
### (3) Initial data processing request flag (RX8) program

To operate the high-speed counter module, the initial processing is required.
Since the high-speed counter module does not operate until the initial processing is completed after the module is powered on, always check that Remote READY (RXB) is on after the initial processing is performed.
For Initial data processing request flag (RX8) program, refer to the following.

Page 181, Section 9.3

## 9.2 Procedure for Programming

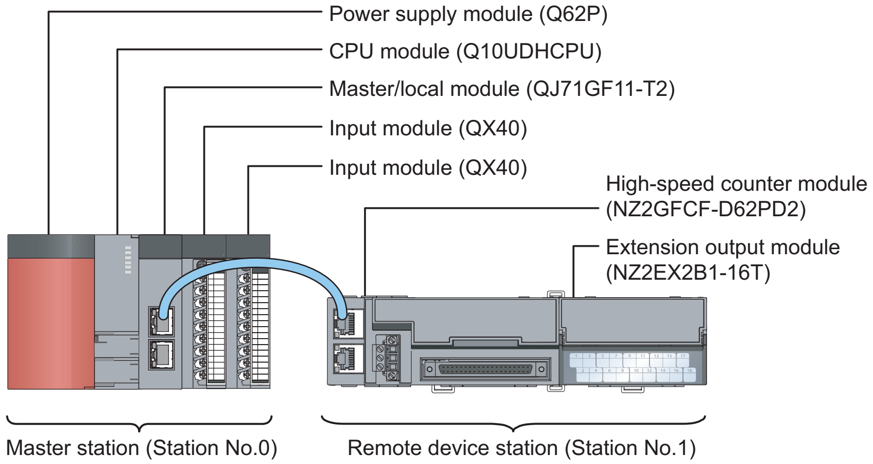
Create a program to count the pulses, according to the following procedure.



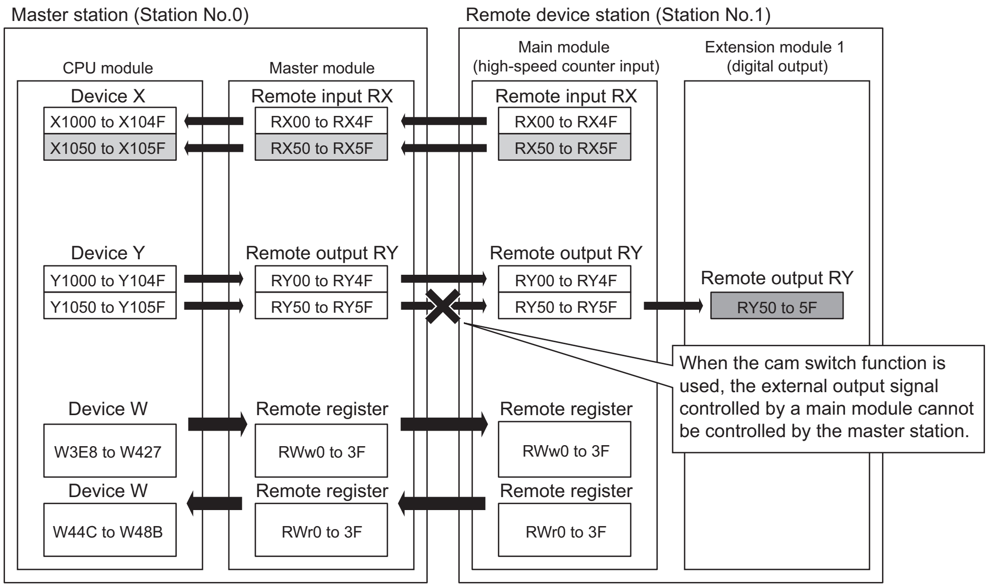
# 9.3 Program Example



## (1) System configuration




### (a) Link device assignment



## (2) Program condition

This program uses Coincidence output 1 and Coincidence output 2 of CH1 in the high-speed counter module.
The extension output module is used for outputting digital output signals and cam switch output signals.

## (3) Initial setting description

### (a) Remote buffer memory (parameter area) setting

| Setting item | Setting value |
|---|---|
| Input response time setting | 5: 10ms (Initial value) |
| Output HOLD/CLEAR setting | 1: HOLD |
| Cyclic data update watch time setting | 10 (× 100ms) |
| Comparison output setting | Set a value according to the comparison output function to be used. |
| Coincidence output 1 channel assignment setting | 0: CH1 (Initial value) |
| Coincidence output 2 channel assignment setting | 0: CH1 (Initial value) |
| Coincidence output 3 channel assignment setting | 1: CH2 |
| Coincidence output 4 channel assignment setting | 1: CH2 |
| Coincidence output 1 comparison condition setting | 0: Coincidence Output (Initial value) |
| Coincidence output 2 comparison condition setting | 1: Within-range Output |
| Coincidence output 3 comparison condition setting | 0: Coincidence Output (Initial value) |
| Coincidence output 4 comparison condition setting | 0: Coincidence Output (Initial value) |
| Preset/replace setting at coincidence output (Coincidence output 1) | 0: Present value not replaced (Initial value) |
| Preset/replace setting at coincidence output (Coincidence output 2) | 0: Present value not replaced (Initial value) |
| Cam switch output unit assignment setting | 1: Stage 1 |
| Cam switch output 1 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 2 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 3 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 4 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 5 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 6 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 7 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 8 channel assignment setting | 0: CH1 (Initial value) |
| Cam switch output 9 channel assignment setting | 1: CH2 |
| Cam switch output 10 channel assignment setting | 1: CH2 |
| Cam switch output 11 channel assignment setting | 1: CH2 |
| Cam switch output 12 channel assignment setting | 1: CH2 |
| Cam switch output 13 channel assignment setting | 1: CH2 |
| Cam switch output 14 channel assignment setting | 1: CH2 |
| Cam switch output 15 channel assignment setting | 1: CH2 |
| Cam switch output 16 channel assignment setting | 1: CH2 |
| CH1 Operation mode setting | Set a value according to the operation mode to be used. |
| CH1 Count source selection | 0: A Phase/B Phase (Initial value) |
| CH1 Pulse input mode | 3: 2-Phase Multiple of 1 |
| CH1 Counting speed setting | 2: 200kpps |
| CH1 Counter format | Set a value according to the counter format to be used. |
| CH1 Z phase (Preset) trigger setting | 0: Rising (Initial value) |

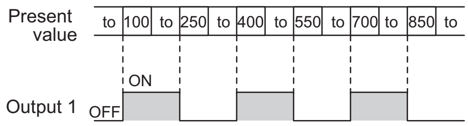
| Setting item | Setting value |
|---|---|
| CH1 External preset/replace (Z Phase) request detection setting | 0: ON at detection (Initial value) |
| CH1 Counter function selection | Set a value according to the counter function to be used. |
| CH1 Function input logic setting | 0: Positive Logic (Initial value) |
| CH1 Latch counter input logic setting | 0: Positive Logic (Initial value) |
| CH1 Z phase input response time setting | Set any response time. |
| CH1 Function input response time setting | Set any response time. |
| CH1 Latch counter input response time setting | Set any response time. |
| CH1 Pulse measurement setting (Function input terminal) | 0: Pulse ON Width (Initial value) |
| CH1 Pulse measurement setting (Latch counter input terminal) | 1: Pulse OFF Width |

Set the initial values for the parameters in CH2 and the extension output module.

### (b) Extended parameter (remote buffer memory) setting

Set the extended parameter (remote buffer memory) only when using the cam switch function.

Set it to operate Cam switch output 1 for CH1 Present value as shown below.




| Setting item | Setting details |
|---|---|
| Cam switch function, step type (Output 1) | 0: Starts with output status being OFF |
| Cam switch function, number of steps (Output 1) | 6 |
| Cam switch function, step No.1 setting (Output 1) | 100 |
| Cam switch function, step No.2 setting (Output 1) | 250 |
| Cam switch function, step No.3 setting (Output 1) | 400 |
| Cam switch function, step No.4 setting (Output 1) | 550 |
| Cam switch function, step No.5 setting (Output 1) | 700 |
| Cam switch function, step No.6 setting (Output 1) | 850 |

**Point**

- The setting value in the item related to the cam switch function is enabled when CH□ Cam switch execute command (RY26, RY3E) is turned off then on. However, the extended parameter is set before turning on then off Initial data setting request flag (RY9) to save the extended parameter to the nonvolatile memory in this program.
- The extended parameters can be read/written only by the REMFR/REMTO instruction unlike the parameters.

### (c) Remote register setting

| Setting item | Setting details (setting value) |
|---|---|
| Point setting (Coincidence output 1) (RWw0 to RWw1)*1 | 1000 |
| Lower limit value setting (Coincidence output 2) (RWw4 to RWw5)*1 | 1000 |
| Upper limit value setting (Coincidence output 2) (RWw6 to RWw7)*1 | 2000 |
| CH1 Ring counter lower limit value (RWw10 to RWw11)*2 | -5000 |
| CH1 Ring counter upper limit value (RWw12 to RWw13)*2 | 5000 |
| CH1 Preset value setting (RWw14 to RWw15) | 100 |
| CH1 Time unit setting (Sampling counter/Periodic pulse counter) (RWw16)*3 | 1ms(0) |
| CH1 Cycle setting (Sampling counter/Periodic pulse counter) (RWw17)*3 | 2000ms(2000) |
| CH1 Frequency measurement*4 | — |
| CH1 Time unit setting (Frequency measurement) (RWw18) | 0.01s(0) |
| CH1 Moving average count (Frequency measurement) (RWw19) | 3 |
| CH1 Rotation speed measurement*5 | — |
| CH1 Time unit setting (Rotation speed measurement) (RWw18) | 0.01s(0) |
| CH1 Moving average count (Rotation speed measurement) (RWw19) | 3 |
| CH1 Number of pulses per rotation (RWw1A to RWw1B) | 1000 |
| CH1 PWM output*6 | — |
| CH1 PWM output assignment setting (RWw1D) | Output to Coincidence output 1 ($0001_H$) |
| CH1 ON width setting (PWM output) (RWw1E to RWw1F) | 100.0us(1000) |
| CH1 Cycle setting (PWM output) (RWw20 to RWw21) | 200.0us(2000) |

*1 Set only when using the coincidence output function.
*2 Set only when using the ring counter function.
*3 Set only when using the sampling counter function or the periodic pulse counter function.
*4 Set only under the frequency measurement mode.
*5 Set only under the rotation speed measurement mode.
*6 Set only under the PWM output mode.

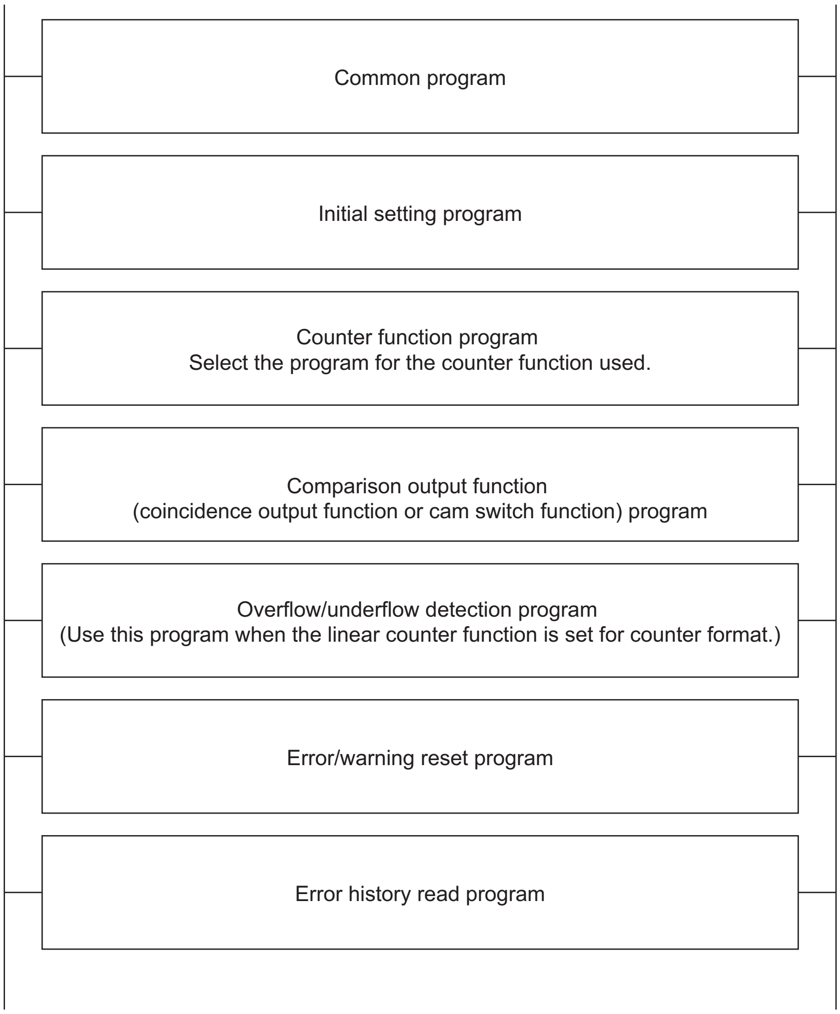
**Point**

If Initial data processing request flag (RX8) turns on when the module is powered on, always set the remote register.

## (4) Configuration of program examples

The following figure shows a configuration of a program example.

### (a) Program configuration under the normal mode




### (b) Program configuration under a mode other than the normal mode

Program examples under a mode other than the normal mode operate in a single-program example.

### (c) Error/warning reset program and error history read program

If an error or warning processing is required for a program example under a mode other than the normal mode, add the error/warning reset program and error history read program of the normal mode before the MCR instruction of each program.

## (5) Device for user

| Device | Description | |
|---|---|---|
| X20 | Count start signal | QX40 (X20 to X2F) |
| X21 | Present value read signal | |
| X22 | Coincidence output data setting signal | |
| X23 | Preset/replace command signal | |
| X24 | Count stop signal | |
| X25 | Coincidence output clear signal | |
| X26 | Counter function start signal | |
| X27 | Counter function stop signal | |
| X28 | Latch count data read signal | |
| X29 | Latch counter start signal | |
| X2A | Sampling count data read signal | |
| X2B | Sampling count start signal | |
| X2C | Periodic pulse count data read signal | |
| X2D | Periodic pulse count start signal | |
| X30 | Latch count value (Latch counter input terminal) read signal | QX40 (X30 to X3F) |
| X31 | Cam switch start signal | |
| X32 | Frequency measurement start signal | |
| X33 | Frequency measurement stop signal | |
| X34 | Rotation speed measurement start signal | |
| X35 | Rotation speed measurement stop signal | |
| X36 | Pulse measurement (Function input terminal) start signal | |
| X37 | Pulse measurement (Latch counter input terminal) start signal | |
| X38 | Pulse measurement (Function input terminal) stop signal | |
| X39 | Pulse measurement (Latch counter input terminal) stop signal | |
| X3A | PWM output start signal | |
| X3B | PWM output stop signal | |
| X3C | Error/warning reset start signal | |
| X3D | Error history read start signal | |

| Device | Description | |
|---|---|---|
| X1007 | Warning status flag | NZ2GFCF-D62PD2 (X1000 to X104F) |
| X1008 | Initial data processing request flag | |
| X1009 | Initial data setting completion flag | |
| X100A | Error status flag | |
| X100B | Remote READY | |
| X1010 | Coincidence output 1 | |
| X1011 | Coincidence output 2 | |
| X1012 | Coincidence output 3 | |
| X1013 | Coincidence output 4 | |
| X1014 | Setting change completed (Coincidence output 1) | |
| X1015 | Setting change completed (Coincidence output 2) | |
| X1016 | Setting change completed (Coincidence output 3) | |
| X1017 | Setting change completed (Coincidence output 4) | |
| X101F | External power supply monitor state flag (for extension output module) | |
| X1021 | CH1 Preset/replace completion | |
| X1023 | CH1 External preset/replace (Z Phase) request detection | |
| X1025 | CH1 Counter function detection | |
| X1026 | CH1 Cam switch execute/PWM output | |
| X1027 | CH1 Setting change completed (Sampling counter/Periodic pulse counter) | |
| X1028 | CH1 Update flag reset completed (Latch count value/Sampling count value/Periodic pulse count value) | |
| X1029 | CH1 Update flag (Latch count value/Sampling count value/Periodic pulse count value) | |
| X102A | CH1 Latch count value update flag reset completed (Latch counter input terminal) | |
| X102B | CH1 Latch count value update flag (Latch counter input terminal) | |
| X102C | CH1 Update flag reset completed (Measured frequency value/Measured rotation speed value) | |
| X102D | CH1 Update flag (Measured frequency value/Measured rotation speed value) | |
| X1031 | CH1 Measured pulse value update flag reset completed (Function input terminal) | |
| X1032 | CH1 Measured pulse value update flag (Function input terminal) | |
| X1033 | CH1 Measured pulse value update flag reset completed (Latch counter input terminal) | |
| X1034 | CH1 Measured pulse value update flag (Latch counter input terminal) | |
| X1035 | CH1 ON width setting change completed (PWM output) | |
| X1036 | CH1 Error status | |
| X1037 | CH1 Warning status | |

| Device | Description | |
|---|---|---|
| Y1008 | Initial data processing completion flag | NZ2GFCF-D62PD2 (Y1000 to Y104F) |
| Y1009 | Initial data setting request flag | |
| Y1010 | Reset command (Coincidence output 1) | |
| Y1011 | Reset command (Coincidence output 2) | |
| Y1012 | Reset command (Coincidence output 3) | |
| Y1013 | Reset command (Coincidence output 4) | |
| Y1014 | Setting change request (Coincidence output 1) | |
| Y1015 | Setting change request (Coincidence output 2) | |
| Y1016 | Setting change request (Coincidence output 3) | |
| Y1017 | Setting change request (Coincidence output 4) | |
| Y101F | External power supply monitor request flag (for extension output module) | |
| Y1020 | CH1 Coincidence output enable command | |
| Y1021 | CH1 Preset/replace command | |
| Y1022 | CH1 Count down command | |
| Y1023 | CH1 External preset/replace (Z Phase) request detection reset command | |
| Y1024 | CH1 Count enable command | |
| Y1025 | CH1 Selected counter function start command | |
| Y1026 | CH1 Cam switch execute command/PWM output start command | |
| Y1027 | CH1 Setting change request (Sampling counter/Periodic pulse counter) | |
| Y1028 | CH1 Update flag reset command (Latch count value/Sampling count value/Periodic pulse count value) | |
| Y102A | CH1 Latch count value update flag reset command (Latch counter input terminal) | |
| Y102C | CH1 Update flag reset command (Measured frequency value/Measured rotation speed value) | |
| Y1030 | CH1 Pulse measurement start command (Function input terminal) | |
| Y1031 | CH1 Measured pulse value update flag reset command (Function input terminal) | |
| Y1032 | CH1 Pulse measurement start command (Latch counter input terminal) | |
| Y1033 | CH1 Measured pulse value update flag reset command (Latch counter input terminal) | |
| Y1035 | CH1 ON width setting change request (PWM output) | |
| Y1036 | CH1 Error reset command | |
| Y1050 | LED signal for checking the coincidence output 1 | NZ2EX2B1-16T (Y1050 to Y105F) |
| Y1051 | LED signal for checking the coincidence output 2 | |
| Y1052 | LED signal for checking underflow occurrence | |
| Y1053 | LED signal for checking overflow occurrence | |
| Y1054 | LED signal for checking that PWM output is in process | |
| D1100 | Counter value greater/smaller signal | |
| D1116 to D1117 | CH1 Present value | |
| D1118 to D1119 | CH1 Latch count value/Sampling count value/Periodic pulse count, difference value | |
| D1120 to D1121 | CH1 Periodic pulse count, present value | |
| D1122 to D1123 | CH1 Periodic pulse count value update check | |
| D1124 to D1125 | CH1 Latch count value (Latch counter input terminal) | |
| D1126 to D1127 | CH1 Measured frequency value/Measured rotation speed value | |

| Device | Description |
|---|---|
| D1128 to D1129 | CH1 Measured pulse value (Function input terminal) |
| D1130 to D1131 | CH1 Measured pulse value (Latch counter input terminal) |
| D1132 | CH1 Status |
| D1134*1 | CH1 Latest error code |
| D1135*2 | CH1 Latest warning code |
| D3000 to D3239 | Error history 1 to15 |
| D3300 | Cam switch function, step type (Output 1) |
| D3301 | Cam switch function, number of steps (Output 1) |
| D3302 to D3303 | Cam switch function, step No.1 setting (Output 1) |
| D3304 to D3305 | Cam switch function, step No.2 setting (Output 1) |
| D3306 to D3307 | Cam switch function, step No.3 setting (Output 1) |
| D3308 to D3309 | Cam switch function, step No.4 setting (Output 1) |
| D3310 to D3311 | Cam switch function, step No.5 setting (Output 1) |
| D3312 to D3313 | Cam switch function, step No.6 setting (Output 1) |
| M0 | Communication ready flag (station No.1) |
| M10 | Initial setting completion |
| M100 | Parameter initial setting start |
| M101 | Parameter initial setting completion |
| M102 | Remote register initial setting start |
| M110 | REMTO instruction completion flag |
| M111 | REMTO instruction error completion flag |
| M112 | Parameter setting normal completion flag |
| M200 | REMFR instruction completion flag |
| M201 | REMFR instruction error completion flag |
| M202 | Error history read normal completion flag |
| SB0047 | Own station baton pass status (master station) |
| SB0049 | Own station data link status (master station) |
| SW00A0.0 | Baton pass status (each station) (station No.1) |
| SW00B0.0 | Data link status (each station) (station No.1) |
| N0 | Nesting (station No.1) |

*1 Stores the latest error (major error or moderate error), and holds it also after an error reset.

*2 Stores the latest warning (minor error), and holds it also after an error reset.

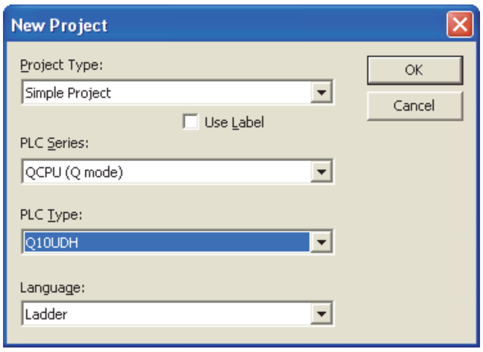
## (6) Setting procedure

Connect GX Works2 to the master station to configure the setting.

**1. Create a project on GX Works2.**

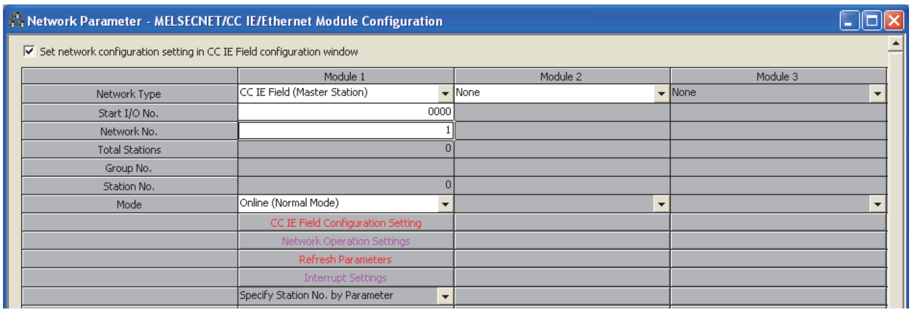
Select "QCPU (Q mode)" for "PLC Series" and select "Q10UDH" for "PLC Type".

[Project] ⇨ [New]



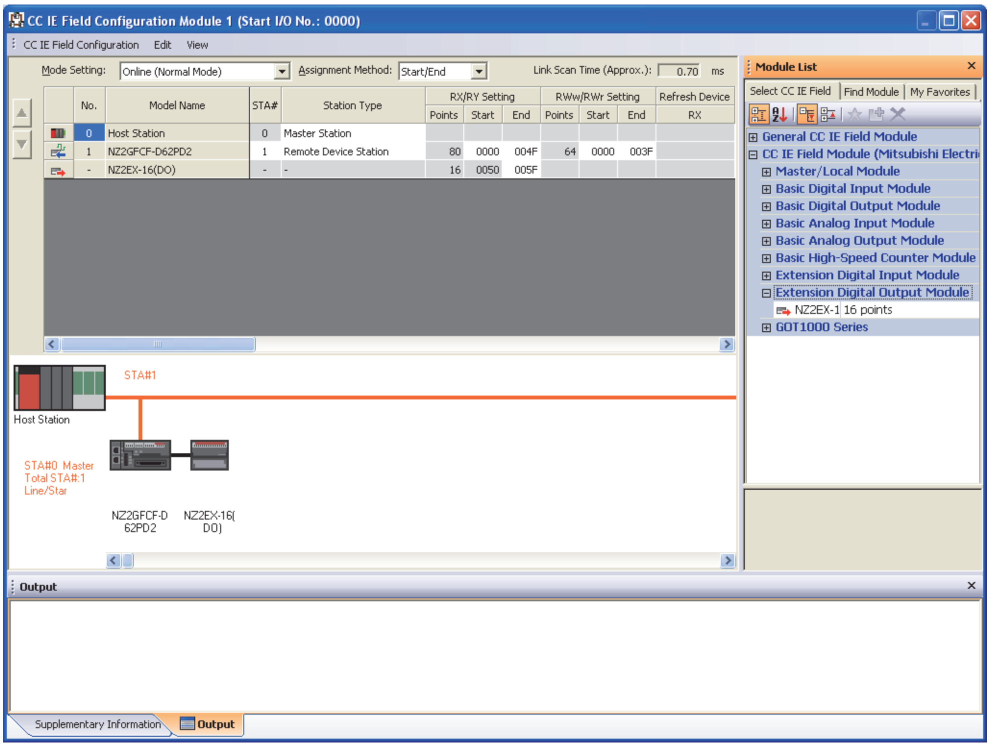

**2. Display the network parameter setting window and configure the setting as follows.**

Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE/MELSECNET]



**3.** **Display the "CC IE Field Configuration" window and configure the configuration and station number of the slave station as follows.**

[CC IE Field Configuration Setting] button

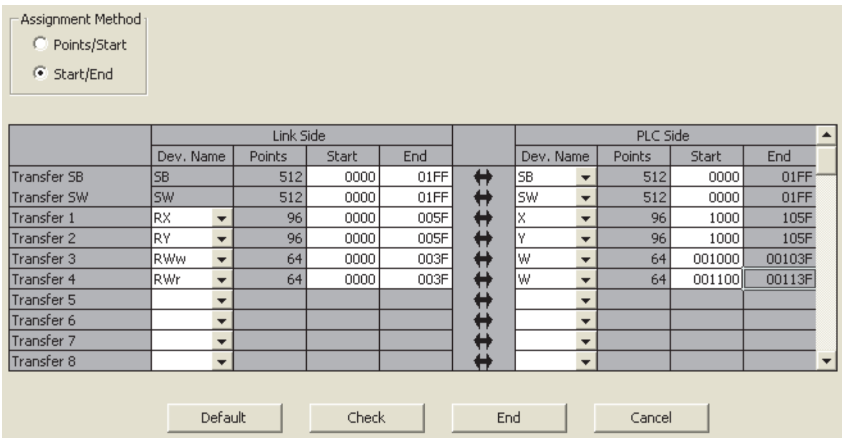



**4.** **Close the "CC IE Field Configuration" window.**

[CC IE Field Configuration] ➪ [Close with Reflecting the Setting]

**5.** **Display the refresh parameter setting window and configure the setting as follows.**

[Refresh Parameters] button



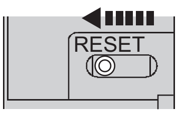
Assignment Method
- Points/Start
- Start/End (selected)

| | Link Side | | | | | PLC Side | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Dev. Name | Points | Start | End | | Dev. Name | Points | Start | End |
| Transfer SB | SB | 512 | 0000 | 01FF | ⇔ | SB | 512 | 0000 | 01FF |
| Transfer SW | SW | 512 | 0000 | 01FF | ⇔ | SW | 512 | 0000 | 01FF |
| Transfer 1 | RX | 96 | 0000 | 005F | ⇔ | X | 96 | 1000 | 105F |
| Transfer 2 | RY | 96 | 0000 | 005F | ⇔ | Y | 96 | 1000 | 105F |
| Transfer 3 | RWw | 64 | 0000 | 003F | ⇔ | W | 64 | 001000 | 00103F |
| Transfer 4 | RWr | 64 | 0000 | 003F | ⇔ | W | 64 | 001100 | 00113F |
| Transfer 5 | | | | | ⇔ | | | | |
| Transfer 6 | | | | | ⇔ | | | | |
| Transfer 7 | | | | | ⇔ | | | | |
| Transfer 8 | | | | | ⇔ | | | | |

Default Check End Cancel

**6.** **Write the set parameter to the CPU module of the master station and reset the CPU module, or turn off then on the power supply.**

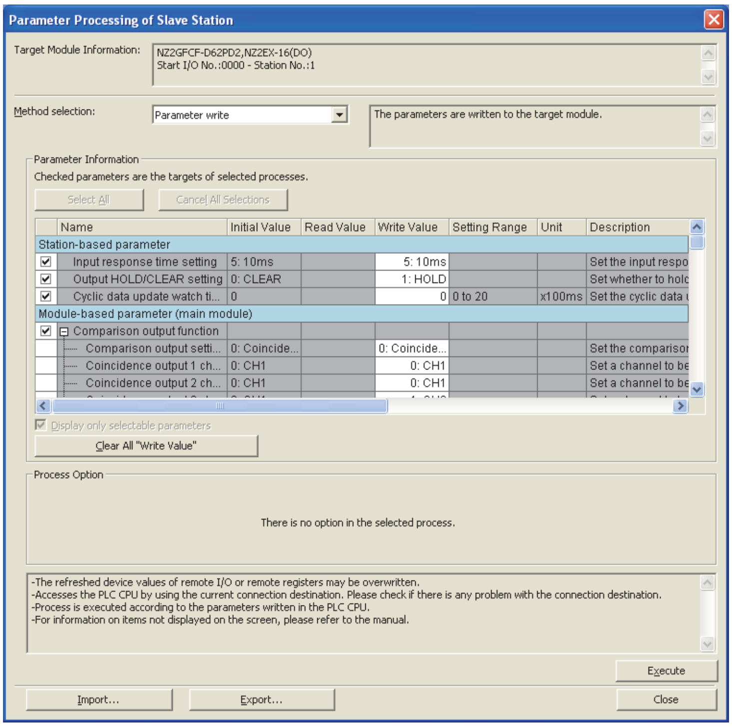
[Online] ➪ [Write to PLC...]




or Power OFF → ON

**7.** **Display the "Parameter Processing of Slave Station" window and change "Method selection" to "Parameter write" to set the following.**

[Ethernet/CC IE/MELSECNET] ➪ CC IE Field Configuration Setting button ➪
Select a high-speed counter module in "List of stations" ➪ [CC IE Field Configuration] ➪
[Parameter Processing of Slave Station]

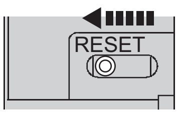



**8.** **Click the** Execute **button to write the parameter to the high-speed counter module.**

## (7) Setting method of the program

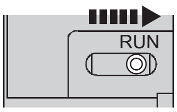
**1.** **Create a program in Page 193, Section 9.3 (8) to Page 202, Section 9.3 (13) on GX Works2 according to the mode or function to use.**

**2.** **Write the program to the CPU module of the master station and reset the CPU module, or turn off then on the power supply.**




or Power OFF→ON

**3.** **Change the status of the CPU module of the master station to RUN.**



## (8) Program example under the normal mode (when the coincidence output is set with the comparison output function)

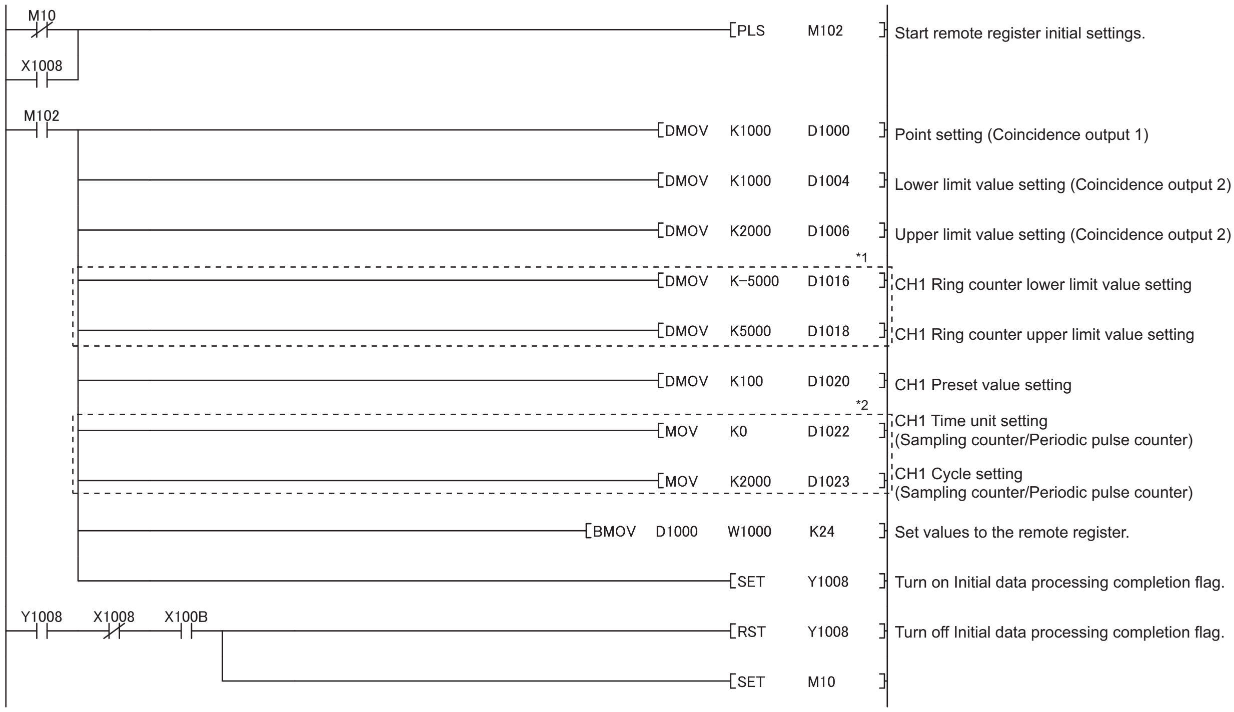
### (a) Common program


*1 Add the following MCR instruction at the end of the program.


**Point**

If the master station does not receive a response for several link scans from the high-speed counter module, the high-speed counter module is determined as a cyclic transmission faulty station and the corresponding bit of the data link status (each station) (SW00B0 to SW00B7) turns on.

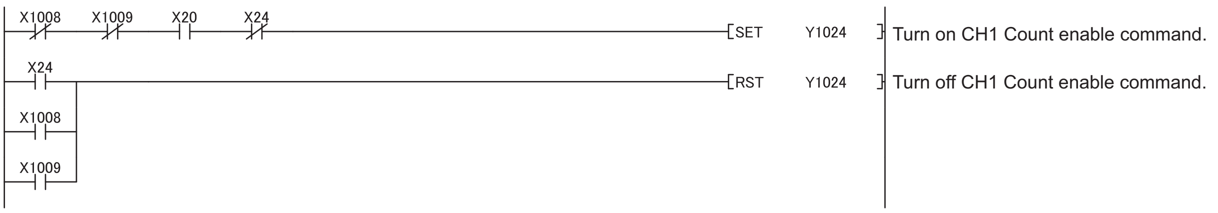
### (b) Initial setting program



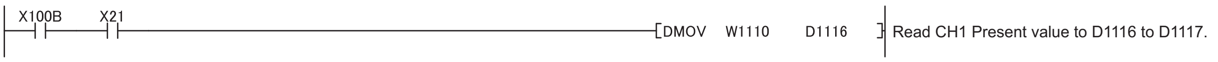

*1 Set only when using the ring counter function.
*2 Set only when using the sampling counter function or periodic pulse counter function.

## (c) Counter function programs

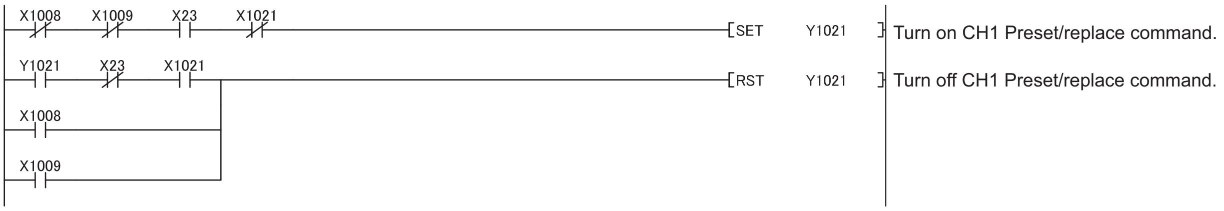
- Program for starting/stopping the counter



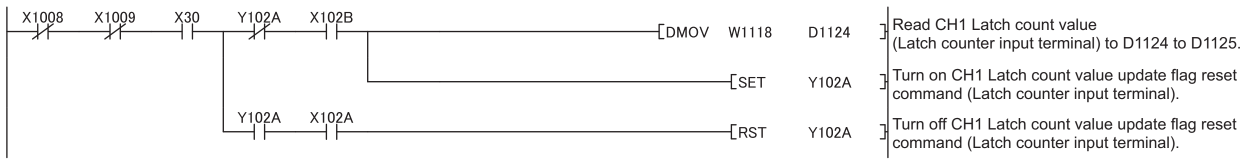

- Program for reading counter present value



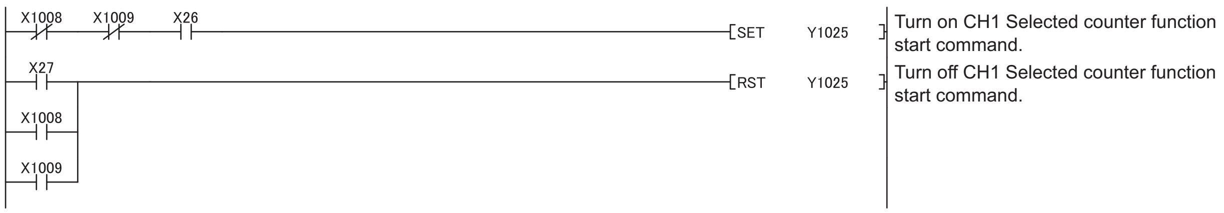

- Program for the preset/replace function




- Program for reading the latch count value (latch counter input terminal)

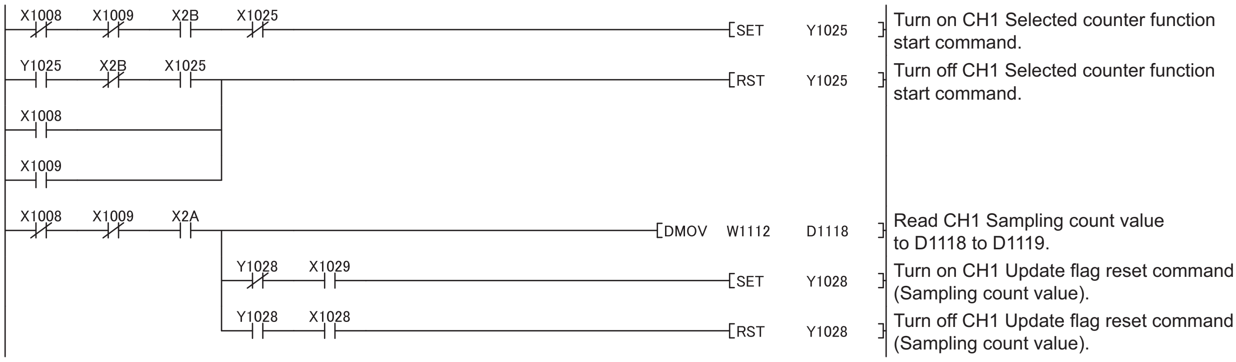



- Program for the count disable function

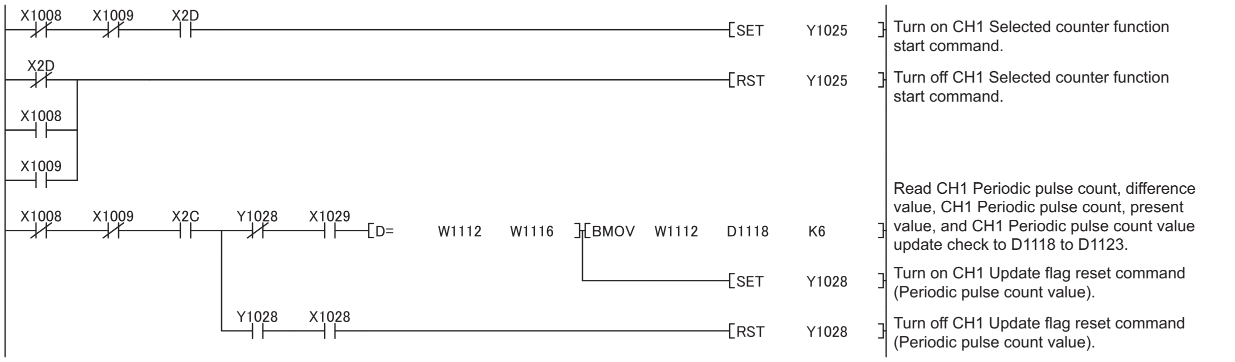



- Program for the latch counter function

- Program for the sampling counter function

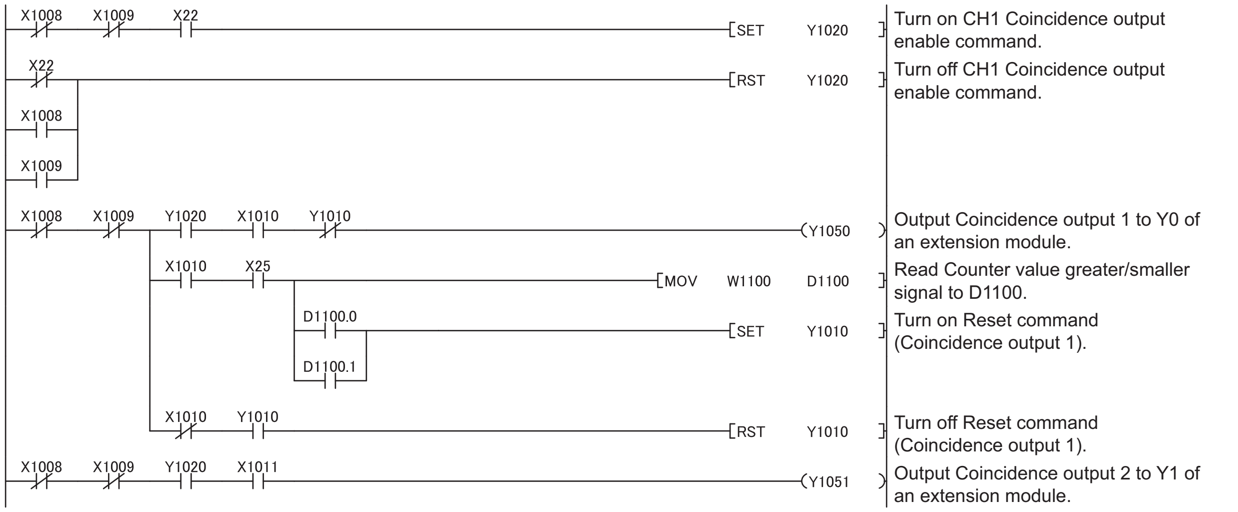



- Program for the periodic pulse counter function

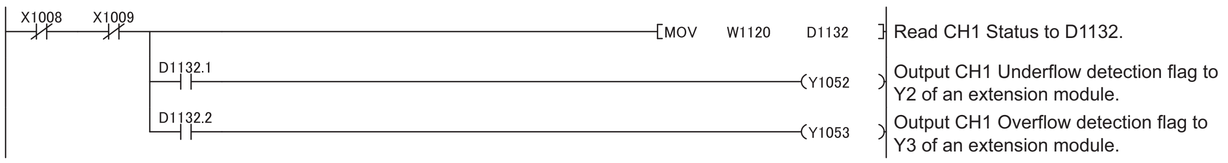


## (d) Program for the comparison output function

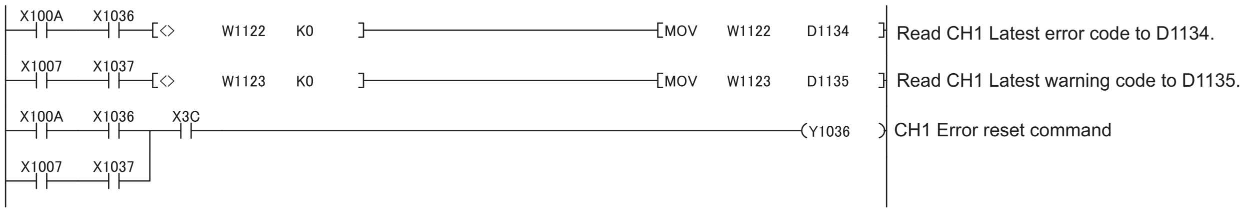
- Program for the coincidence output function



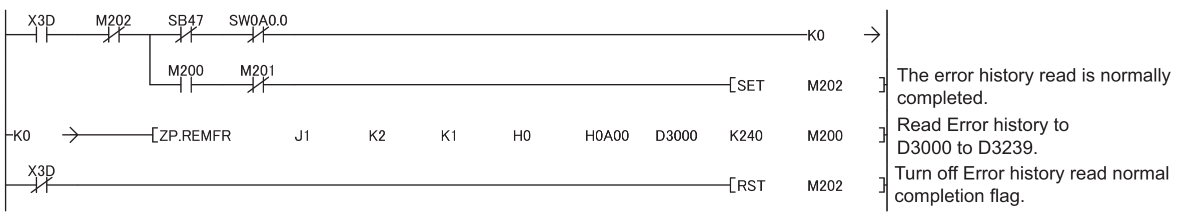

## (e) Program for overflow/underflow detection processing




## (f) Program for an error/warning reset




## (g) Program for reading the error history

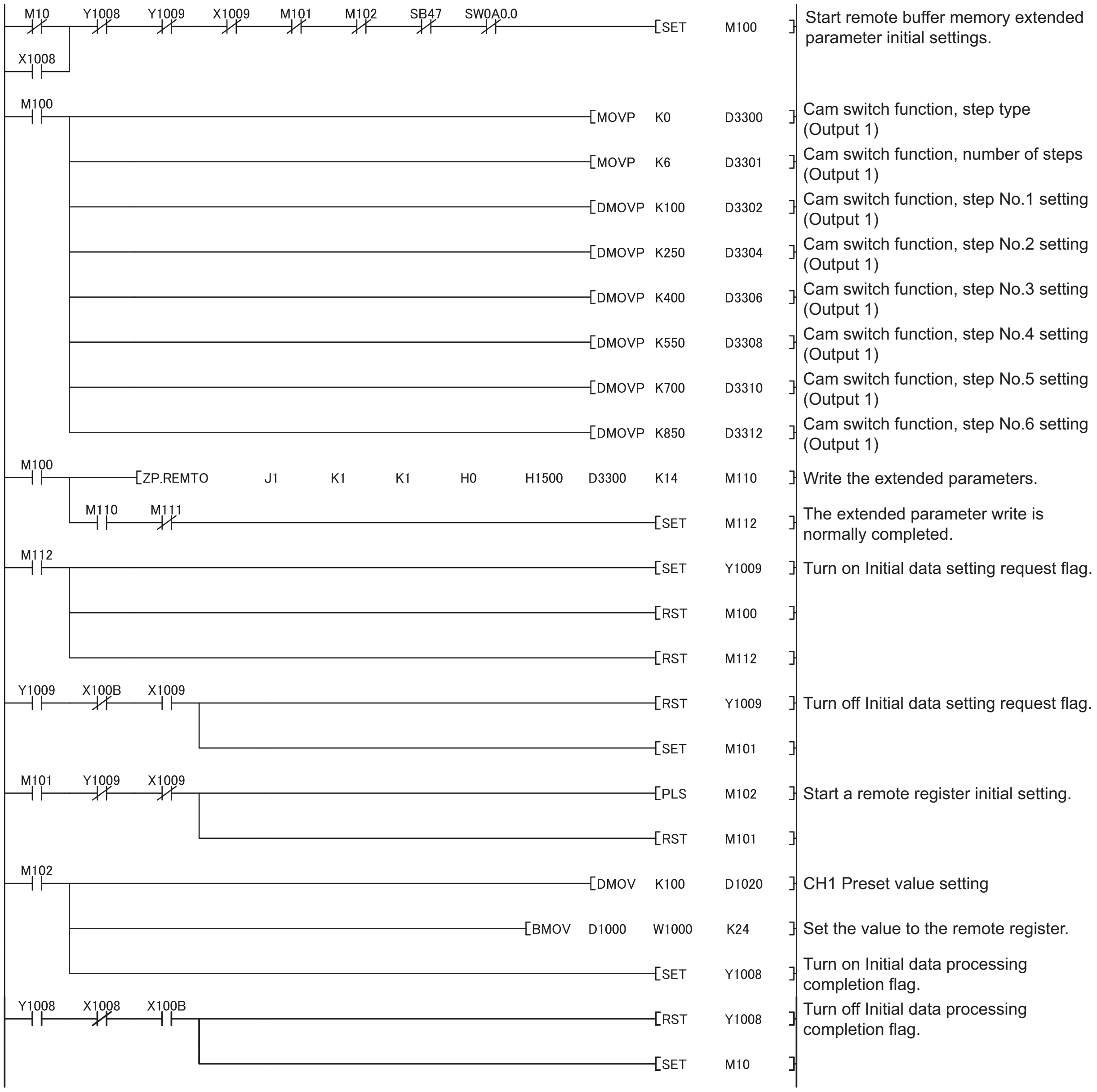


## (9) Program example under the normal mode (when the cam switch function is set with the comparison output function)

### (a) Common program

The program is the same as the program example of the normal mode. (Page 193, Section 9.3 (8) (a))

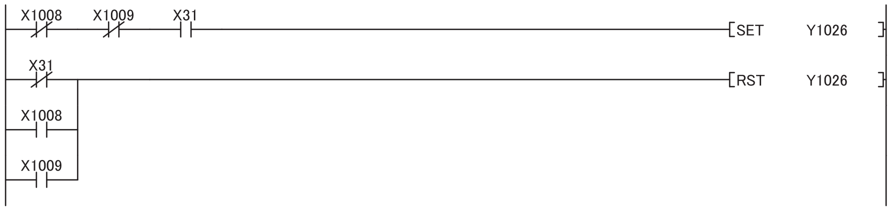
### (b) Initial setting program




### (c) Counter function programs

The program is the same as the program example of the normal mode. (Page 194, Section 9.3 (8) (c))

### (d) Program for the cam switch function




Turn on CH1 Cam switch execute command.
Turn off CH1 Cam switch execute command.

### (e) Program for overflow/underflow detection processing

The program is the same as the program example of the normal mode. (Page 196, Section 9.3 (8) (e))

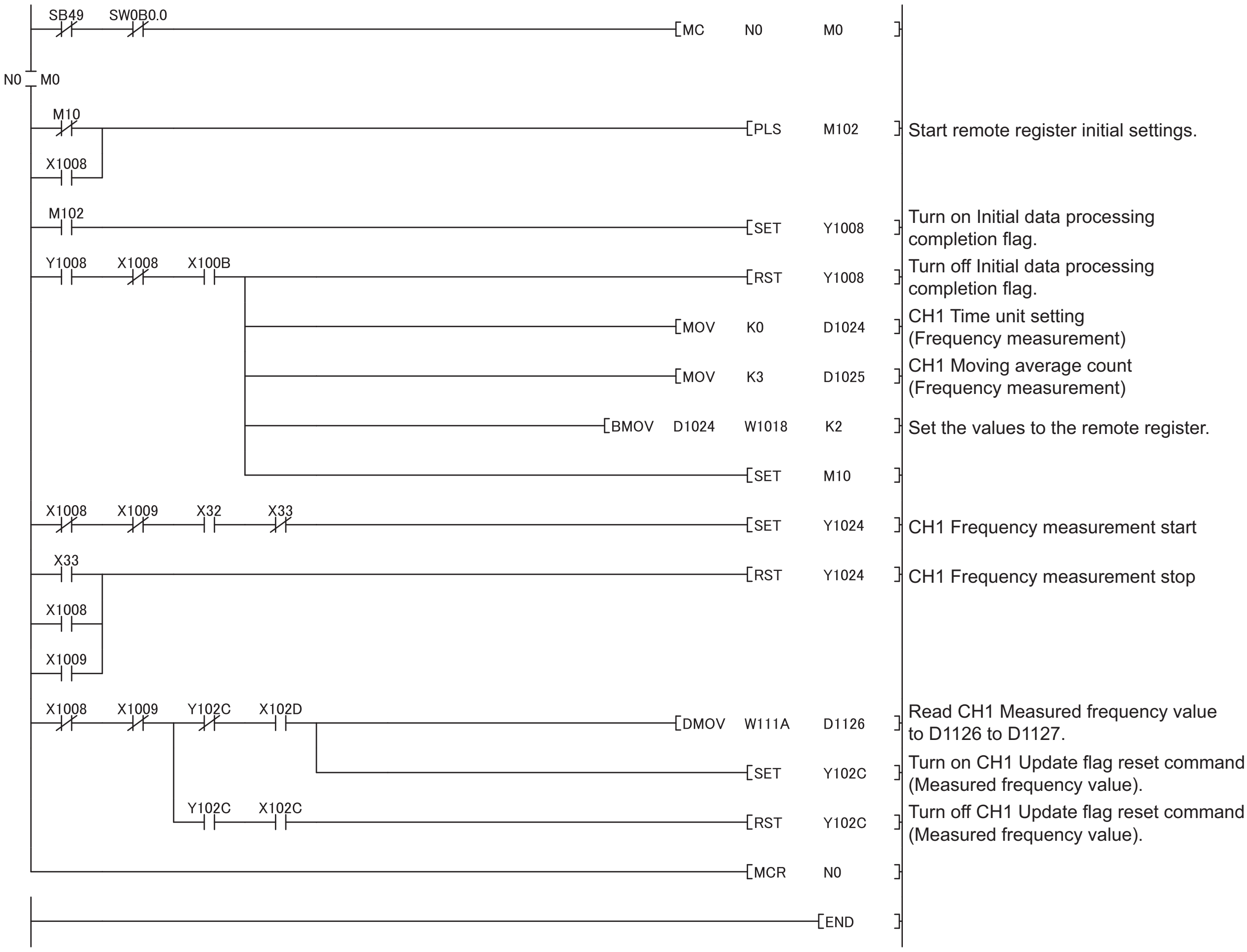
### (f) Program for an error/warning reset

The program is the same as the program example of the normal mode. (Page 196, Section 9.3 (8) (f))

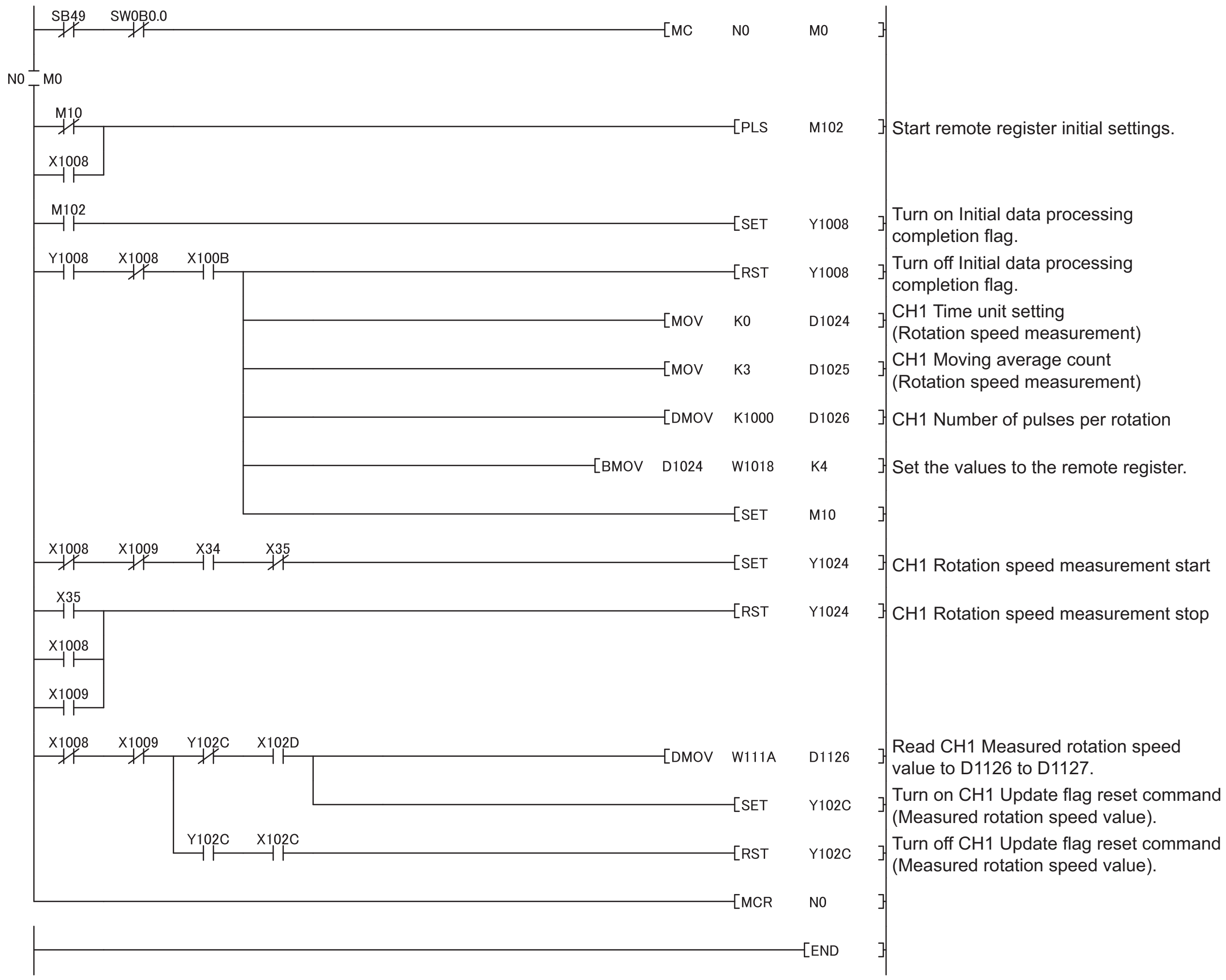
### (g) Program for reading the error history

The program is the same as the program example of the normal mode. (Page 196, Section 9.3 (8) (g))

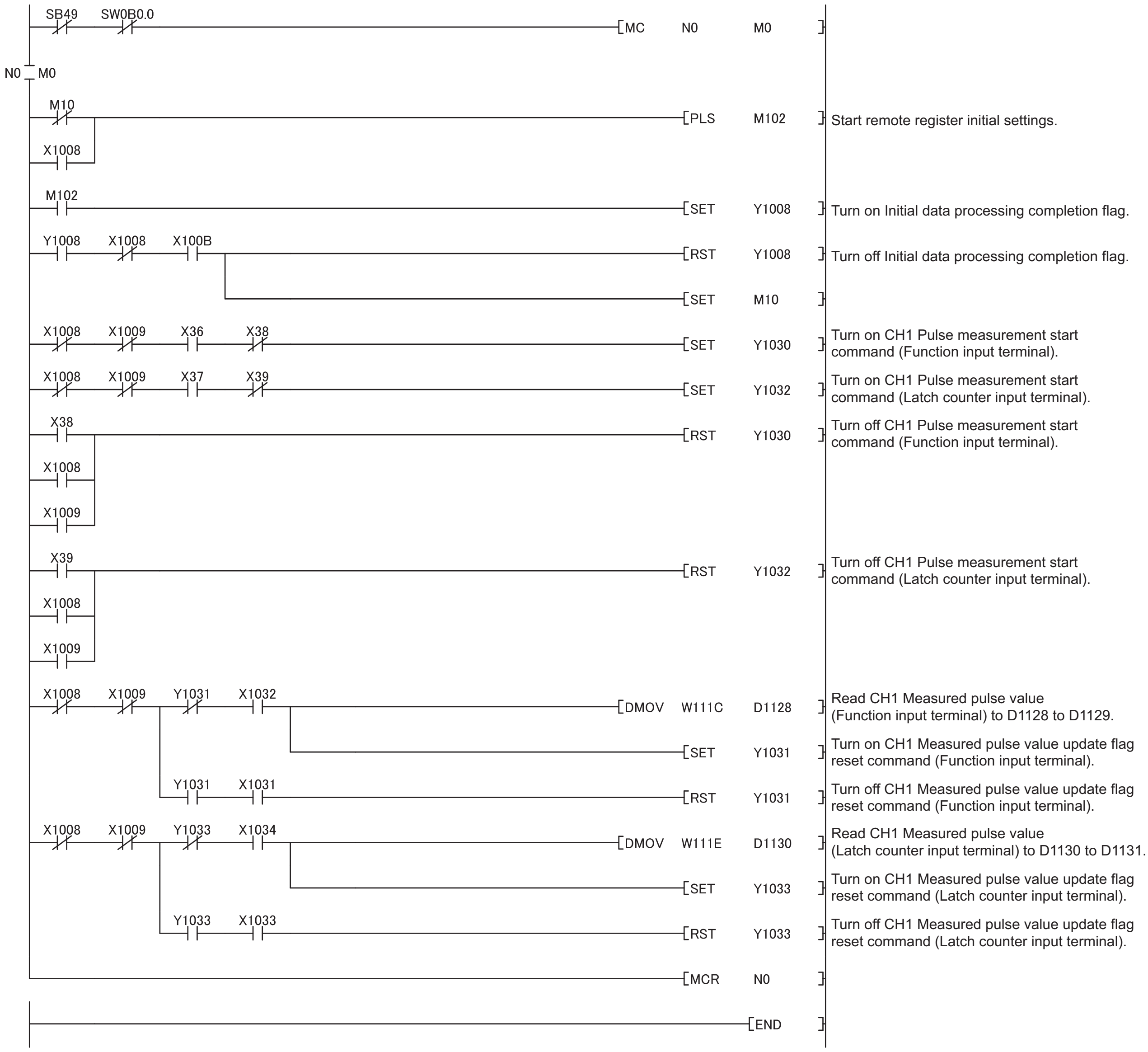
## (10)Program example of the frequency measurement mode



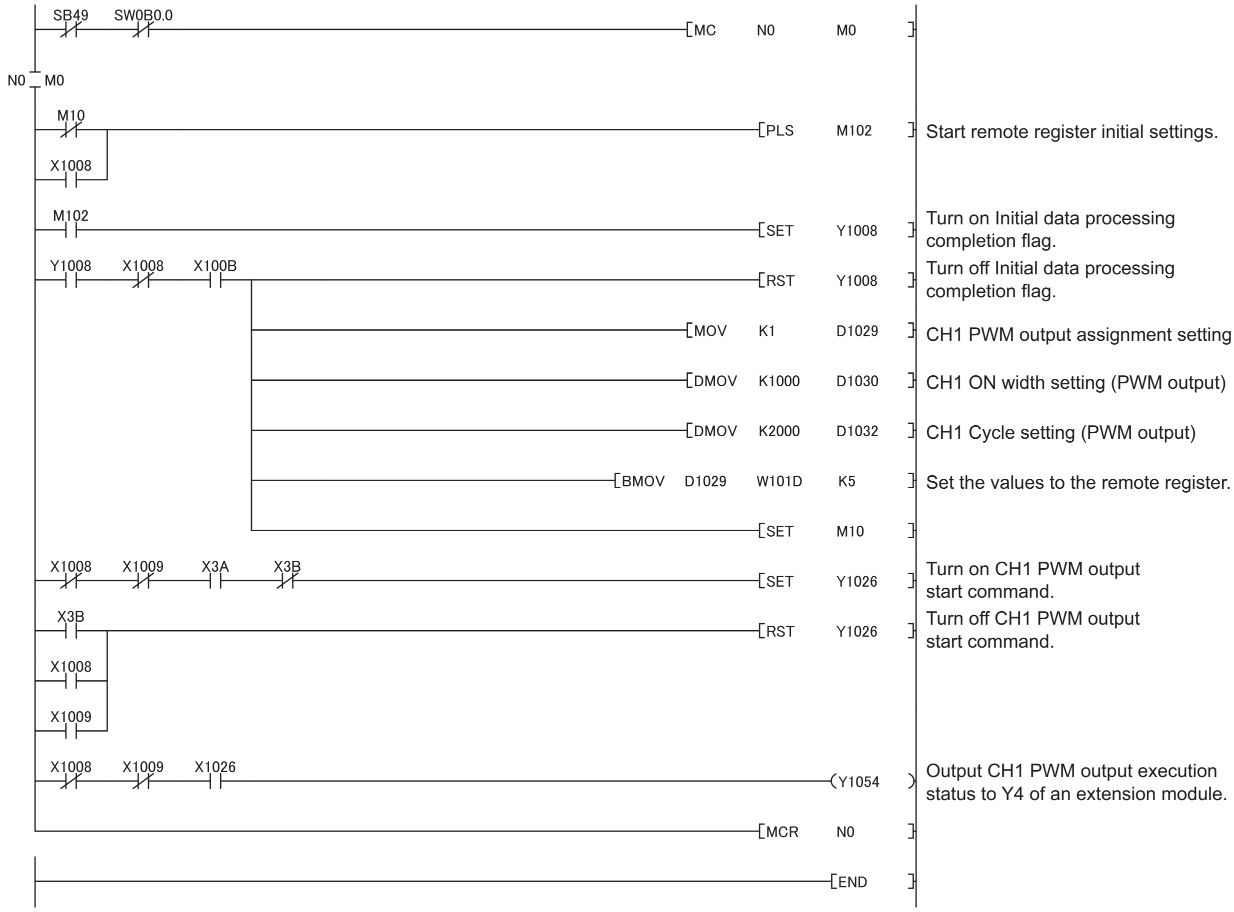
## (11)Program example of the rotation speed measurement mode



## (12)Program example of the pulse measurement mode



## (13)Program example of the PWM output mode



# CHAPTER 10 MAINTENANCE AND INSPECTION



The high-speed counter module has no special item to be inspected. However, to maintain the best condition of the system, perform the inspection in accordance with the items described in the user's manual of the CPU module used.

## Memo

# CHAPTER 11 TROUBLESHOOTING

This chapter describes errors that may occur while the high-speed counter module is used, and those troubleshooting.

## 11.1 Checking for the Error Codes and the Warning Codes



Error codes can be checked by any of the following methods:

- Checking by executing a command of the slave station (Page 205, Section 11.1 (1))
- Checking by CH□ Latest error code (RWr22, RWr3A) (Page 207, Section 11.1 (2))

Warning codes can be checked by any of the following methods:

- Checking by executing a command of the slave station (Page 205, Section 11.1 (1))
- Checking by CH□ Latest warning code (RWr23, RWr3B) (Page 207, Section 11.1 (3))

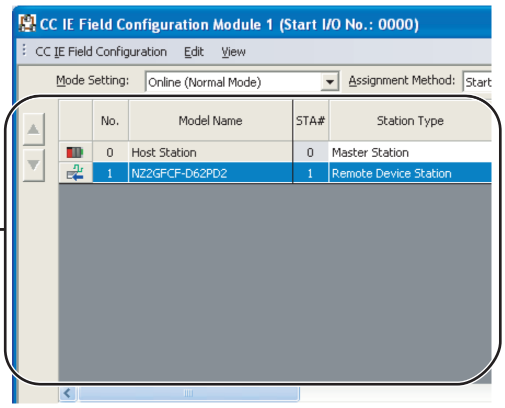
**Point**

- Errors of the high-speed counter module are detected at not only every station, but also every channel.
- Errors detected at a channel are stored in the remote register for the channel.
- Errors independent from channels are station errors stored in CH1 Latest error code (RWr22) or CH1 Latest warning code (RWr23).

### (1) Checking by executing a command of the slave station

This section describes how to check the errors by executing a command of the slave station.

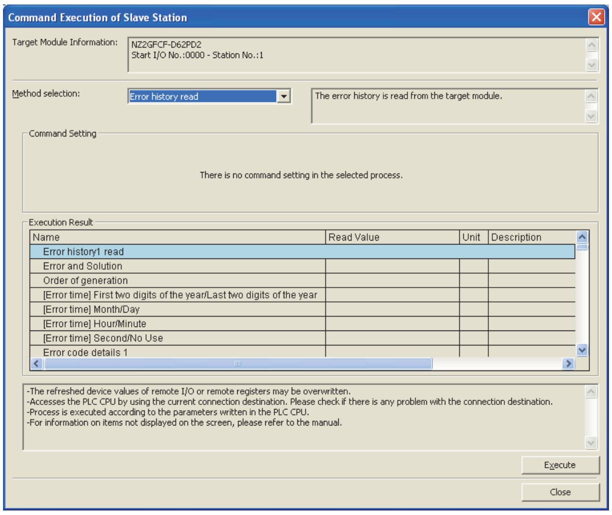
List of stations



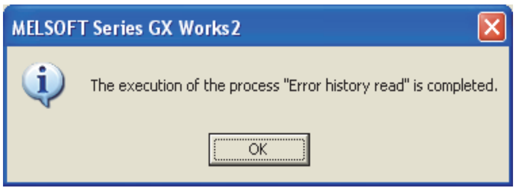

**1.** **Select the high-speed counter module in "List of stations" on the "CC IE Field Configuration" window.**

**2.** **Open the "Command Execution of Slave Station" window.**

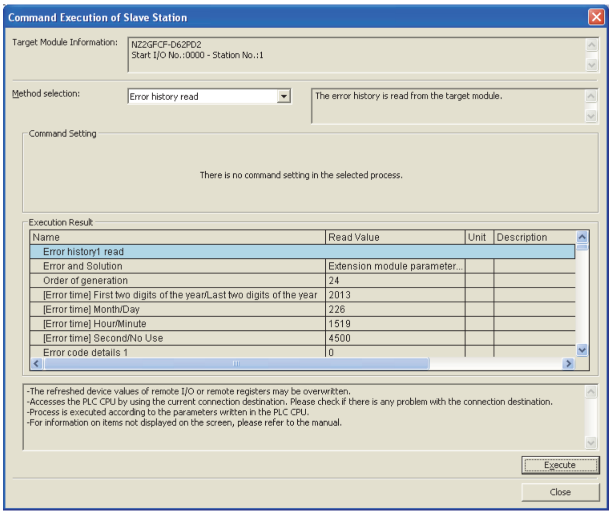
[CC IE Field Configuration] ⇨ [Command Execution of Slave Station]




**3.** **Set "Method selection" to "Error history read" and click the Execute button.**




**4.** **When the window shown on the left is displayed, click the OK button.**

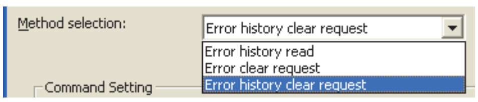



**5.** **The error history of the high-speed counter module is displayed in "Execution Result".**

| Item | Contents |
|---|---|
| Error and Solution | The action for the error is displayed. |
| Order of generation | The order of error occurrence is displayed. |
| [Error time] First two digits of the year/Last two digits of the year | The date and time of error occurrence is displayed.<br>(When the tens place of Month, Hour and Second is "0", the date and time are displayed without "0".) |
| [Error time] Month/Day | |
| [Error time] Hour/Minute | |
| [Error time] Second/No Use | |
| Error code details 1 to Error code details 10 | The value in the remote register Error code details 1 to 10 of when an error occurs is stored. |

## Point

- The error history registers 15 errors at a maximum. If 16 or more errors occur, errors are deleted from the oldest.
- If the same error occurs continuously, only the error that occurred first is stored to the error history.
- Even after the power of the module is turned off then on, the error history remains.
- To initialize the error history, set "Method selection" to "Error history clear request" on the "Command Execution of Slave Station" window and click the Execute button.

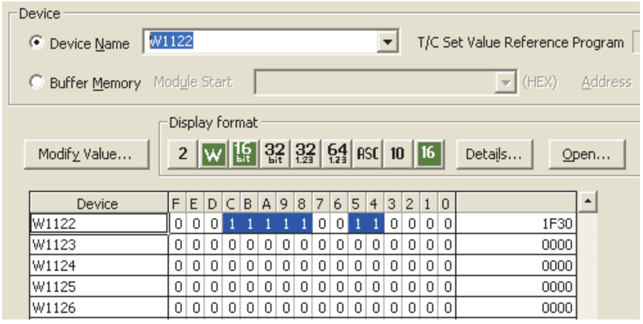


## (2) Checking by CH□ Latest error code (RWr22, RWr3A)

Check the latest error code with the remote register of the master/local module.

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

Ex. When the refresh target device for CH1 Latest error code (RWr22) is W1122

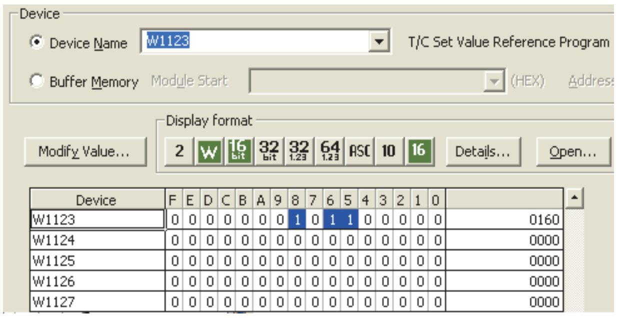



## (3) Checking by CH□ Latest warning code (RWr23, RWr3B)

Check the latest warning code with the remote register of the master/local module.

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

Ex. When the refresh target device for CH1 Latest warning code (RWr23) is W1123



# 11.2 Error Code List

This section describes error codes.
Error codes are classified by error number as follows.

| Error code | Classification | Reference |
|---|---|---|
| $0000_H$ to $3FFF_H$ $D529_H$, $D52B_H$ | High-speed counter module error | Page 208, Section 11.2 (1) |
| $D000_H$ to $DFFF_H$ ($D529_H$ and $D52B_H$ excluded) | CC-Link IE Field Network error | Page 223, Section 11.2 (2) |

## (1) Error code list ($0000_H$ to $3FFF_H$, $D529_H$, $D52B_H$)

The errors are classified into the following three types.

| Classification | Description |
|---|---|
| Major error | An error that cannot be recovered. The RUN LED turns off. |
| Moderate error | An error where the module cannot continue to operate. The ERR. LED turns on. |
| Minor error | An error where the module can continue to operate. The ERR. LED flashes. |

If an error occurs, check that the D LINK LED is on. Then take corrective actions as listed below.

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| $000B_H$ | Major error | Network number change error | The network number has been changed via the network. | *13 | | Take measures against noise and reset the module. If the same error occurs again, a module hardware failure may be the cause. Please consult your local Mitsubishi representative. |
| $000C_H$ | Major error | Station number change error | The station number has been changed via the network. | *13 | | Take measures against noise and reset the module. If the same error occurs again, a module hardware failure may be the cause. Please consult your local Mitsubishi representative. |
| $0010_H$ | Major error | Hardware error | Module hardware failure | *13 | | Power off then on the module. If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| $0105_H$ | Moderate error | Clock data out-of-range error | The clock data acquired from the CPU module are abnormal. | *3 | | Noise effect or a hardware failure may be the cause. If the same error occurs again after the measures against noise are taken, please consult your local Mitsubishi representative. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| $0110_H$ | Moderate error | Non-volatile memory data error (module operation information) | The module operation information stored in the nonvolatile memory is abnormal. | *16 | | • Initialize the module operation information in the nonvolatile memory by setting Module operation information initialization command (address: $1004_H$) to Not commanded (0) → Commanded (1) → Not commanded (0). Note that the number of ON times integration value is initialized to 0.<br>• Take measures against noise, such as using a shielded cable for connection.<br>• If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| $0120_H$ | Moderate error | Non-volatile memory data error (parameter) | The parameter data stored in the nonvolatile memory are abnormal. | *13 | | • Set the parameters in the nonvolatile memory to the default values by setting Parameter area initialization command (address: $1002_H$) to Not commanded (0) → Commanded (1) → Not commanded (0).<br>• Set the parameters again.<br>• Take measures against noise, such as using a shielded cable for connection.<br>• If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| $0130_H$ | Moderate error | Non-volatile memory data error (Extended parameter) | The extended parameter data stored in the nonvolatile memory are abnormal. | *13 | | • Set the parameters in the nonvolatile memory to the default values by setting Parameter area initialization command (address: $1002_H$) to Not commanded (0) → Commanded (1) → Not commanded (0).<br>• Set the parameters again.<br>• Take measures against noise, such as using a shielded cable for connection.<br>• If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| $0140_H$ | Minor error | Non-volatile memory data error (error history) | The error history data stored in the nonvolatile memory are abnormal. | *1 | | • The module recovers automatically soon after this error occurred. However, the preceding error history data are erased.<br>• Take measures against noise, such as using a shielded cable for connection.<br>• If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| $0150_H$ | Minor error | Remote buffer memory access error | The REMFR/REMTO instruction has accessed the range outside the remote buffer memory range. | *1 | | Correct the REMFR/REMTO instruction setting so that the instruction accesses the range within the remote buffer memory range. |
| $0160_H$ | Minor error | Station number switch change failure | The setting on the station number setting switch has been changed while the module power supply is on. | *1 | | Set the switch back to the station number which was set when the module was powered on. |
| $0330_H$ | Moderate error | Number of ON times integration function setting error | The number of ON times integration function is enabled when the cam switch function is selected. | *13 | | Set Number of ON times integration function enable (address: $0202_H$) to $0000_H$, and turn off then on Initial data setting request flag (RY9). |
| $0340_H$ | Moderate error | Cam switch output unit assignment setting error | A value other than 0 and 1 is set in Cam switch output unit assignment setting (address: $0104_H$). | *13 | | Set Cam switch output unit assignment setting (address: $0104_H$) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |
| $0800_H$ | Moderate error | Comparison output setting error | The setting in Comparison output setting (address: $0100_H$) is in one of the following cases.<br>• A value other than 0 and 1 is set.<br>• If 1 is set, the value in CH☐ Operation mode setting (address: $0120_H$, $0140_H$) is other than 0. | *13 | | Take the following actions, and turn off then on Initial data setting request flag (RY9).<br>• Set Comparison output setting (address: $0100_H$) to 0 or 1.<br>• Set CH☐ Operation mode setting (address: $0120_H$, $0140_H$) to 0. |
| $0850_H$ | Moderate error | Cyclic data update watch time setting error | A value other than 0 to 20 is set in Cyclic data update watch time setting (address: $0003_H$). | *13 | | Set Cyclic data update watch time setting (address: $0003_H$) to a value between 0 and 20, and turn off then on Initial data setting request flag (RY9). |
| $0F40_H$ | Moderate error | Input response time setting error | The lower 3 bits of Input response time setting (address: $0001_H$) is set to 000b, 001b, or 010b. | *13 | | Set the lower 3 bits of Input response time setting (address: $0001_H$) to a value other than 000b, 001b, and 010b, then turn on Initial data setting request flag (RY9). |
| $1341_H$ | Moderate error | Cam switch output unit assignment error | An extension output module does not exist where Cam switch output unit assignment setting (address: $0104_H$) assigns the module. | *13 | | Power off the module, and connect an extension output module where Cam switch output unit assignment setting (address: $0104_H$) assigns the module. Then power on the module. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| 1F00H | Major error | Extension module 1 connection error | The extension module is improperly connected or an extension module not allowed to be connected has been connected. | *13 | | Check the contact points on the extension module, and if the module is allowed to be connected. If the same error occurs again, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| 1F20H | Moderate error | External power supply OFF error | The external power supply for the extension output module is off while the external power supply monitoring function is enabled. | *14 | | • Check the external power supply status for the external output module.<br>• If this error occurs when the system starts or stops, change the timing of when the external power supply monitoring function is enabled. |
| 1F30H | Moderate error | Extension module parameter failure | The parameter for specifying the extension module type has specified a type different from the connected one. | *13 | | Correct the setting in Extension module identification code (address: 0200H) so that the setting matches the connected extension module and the module points. |
| □050H *15 | Minor error | CH□ Overflow/ underflow error (Sampling count value/Periodic pulse count, difference value) | The value in CH□ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), or CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) is outside the range of -2147483648 to 2147483647.<br>□ indicates the channel where settings are incorrect. | *2 | *3 | Adjust the values so that the product of Input pulse speed [pps] × Sampling/Periodic time [s] is within the range. |
| □200H | Moderate error | CH□ Overflow/underflow error | The value in CH□ Present value (RWr10 to RWr11, RWr28 to RWr29) is outside the range of -2147483648 to 2147483647 in the linear counter function operation.<br>□ indicates the channel where settings are incorrect. | *5 | *3 | Replace the present value with the preset value. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| $\square 210_H$ | Moderate error | CH□ Ring counter upper/lower limit value setting error | The value in CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B) is smaller than the value in CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) in the ring counter function operation.<br>□ indicates the channel where settings are incorrect. | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13<br>If CH□ Count enable command (RY24, RY3C) is turned off then on: *4 | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13<br>If CH□ Count enable command (RY24, RY3C) is turned off then on: *3 | Set the values that satisfy the condition "CH□ Ring counter lower limit value (RWw10 to RWw11, RWw28 to RWw29) ≤ CH□ Ring counter upper limit value (RWw12 to RWw13, RWw2A to RWw2B)", and perform one of the following operations.<br>• If Initial data processing request flag (RX8) is on, turn off then on Initial data processing completion flag (RY8).<br>• If the parameters are written with the parameter processing of the slave station, or Initial data setting completion flag (RX9) is on, turn off then on Initial data setting request flag (RY9).<br>• If Initial data processing request flag (RX8) and Initial data setting completion flag (RX9) are off, turn off then on CH□ Count enable command (RY24, RY3C). |
| $\square 30\Diamond_H$ | Moderate error | Comparison condition setting error (Coincidence output◇) | A value other than 00b to 10b is set in Coincidence output◇ of Coincidence output comparison condition setting (address: $0102_H$).<br>□ indicates the channel where settings are incorrect.<br>◇ indicates the number of Coincidence output on which this error occurred. | *13 | | Set coincidence output◇ of Coincidence output comparison condition setting (address: $0102_H$) to a value between 00b and 10b, and turn off then on Initial data setting request flag (RY9). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □31◇H | Moderate error | Upper limit value setting error (Coincidence output◇) | The value in Upper limit value setting (Coincidence output◇) is smaller than the value in Lower limit value setting (Coincidence output◇).<br>□ indicates the channel where settings are incorrect.<br>◇ indicates the number of Coincidence output on which this error occurred. | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13<br>If Setting change request (Coincidence output◇) (RY14 to RY17) is turned off then on: *6 | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13<br>If Setting change request (Coincidence output◇) (RY14 to RY17) is turned off then on: *3 | Set the values that satisfy the condition "Lower limit value setting (Coincidence output◇) ≤ Upper limit value setting (Coincidence output◇)", and perform one of the following operations.<br>• If Initial data processing request flag (RX8) is on, turn off then on Initial data processing completion flag (RY8).<br>• If the parameters are written with the parameter processing of the slave station, or Initial data setting completion flag (RX9) is on, turn off then on Initial data setting request flag (RY9).<br>• If Initial data processing request flag (RX8) and Initial data setting completion flag (RX9) are off, turn off then on Setting change request (Coincidence output◇) (RY14 to RY17). |
| □351H | Moderate error | Cam switch function, number of steps setting error (Output 1) | A value other than 0 to 16 is set in Cam switch function, number of steps (Output 1) (address: 1501H).<br>□ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, number of steps (Output 1) (address: 1501H) to a value between 0 and 16, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| □359H | Moderate error | Cam switch function, number of steps setting error (Output 9) | A value other than 0 to 16 is set in Cam switch function, number of steps (Output 9) (address: 1901H).<br>□ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, number of steps (Output 9) (address: 1901H) to a value between 0 and 16, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| □360H | Moderate error | Cam switch function, number of steps setting error (Output 10) | A value other than 0 to 16 is set in Cam switch function, number of steps (Output 10) (address: 1981H).<br>□ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, number of steps (Output 10) (address: 1981H) to a value between 0 and 16, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| □366H | Moderate error | Cam switch function, number of steps setting error (Output 16) | A value other than 0 to 16 is set in Cam switch function, number of steps (Output 16) (address: 1C81H).<br>□ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, number of steps (Output 16) (address: 1C81H) to a value between 0 and 16, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □391H | Moderate error | Cam switch function, step type setting error (Output 1) | A value other than 0 and 1 is set in Cam switch function, step type (Output 1) (address: 1500H). □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step type (Output 1) (address: 1500H) to 0 or 1, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| □399H | Moderate error | Cam switch function, step type setting error (Output 9) | A value other than 0 and 1 is set in Cam switch function, step type (Output 9) (address: 1900H). □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step type (Output 9) (address: 1900H) to 0 or 1, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| □3A0H | Moderate error | Cam switch function, step type setting error (Output 10) | A value other than 0 and 1 is set in Cam switch function, step type (Output 10) (address: 1980H). □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step type (Output 10) (address: 1980H) to 0 or 1, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| □3A6H | Moderate error | Cam switch function, step type setting error (Output 16) | A value other than 0 and 1 is set in Cam switch function, step type (Output 16) (address: 1C80H). □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step type (Output 16) (address: 1C80H) to 0 or 1, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| □401H | Moderate error | Cam switch function, step No. setting error (Output 1) | The values set in Cam switch function, step No.1 to No.16 setting (Output 1) (address: 1502H to 1521H) are not in the ascending order. □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step No.1 to No.16 setting (Output 1) (address: 1502H to 1521H) to values in the ascending order, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |
| □409H | Moderate error | Cam switch function, step No. setting error (Output 9) | The values set in Cam switch function, step No.1 to No.16 setting (Output 9) (address: 1902H to 1921H) are not in the ascending order. □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step No.1 to No.16 setting (Output 9) (address: 1902H to 1921H) to values in the ascending order, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| □410H | Moderate error | Cam switch function, step No. setting error (Output 10) | The values set in Cam switch function, step No.1 to No.16 setting (Output 10) (address: 1982H to 19A1H) are not in the ascending order. □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step No.1 to No.16 setting (Output 10) (address: 1982H to 19A1H) to values in the ascending order, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ | ⋮ |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □416$_H$ | Moderate error | Cam switch function, step No. setting error (Output 16) | The values set in Cam switch function, step No.1 to No.16 setting (Output 16) (address: $1C82_H$ to $1CA1_H$) are not in the ascending order. □ indicates the channel where settings are incorrect. | *7 | *3 | Set Cam switch function, step No.1 to No.16 setting (Output 16) (address: $1C82_H$ to $1CA1_H$) to values in the ascending order, and turn off then on CH□ Cam switch execute command (RY26, RY3E). |
| □501$_H$ | Moderate error | CH□ Time unit setting error (Sampling counter/ Periodic pulse counter) | A value other than 0 and 1 is set in CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E). □ indicates the channel where settings are incorrect. | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13 If CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on: *8 | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13 If CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on: *3 | Set CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) to 0 or 1, and perform one of the following operations.<br>• If Initial data processing request flag (RX8) is on, turn off then on Initial data processing completion flag (RY8).<br>• If the parameters are written with the parameter processing of the slave station, or Initial data setting completion flag (RX9) is on, turn off then on Initial data setting request flag (RY9).<br>• If Initial data processing request flag (RX8) and Initial data setting completion flag (RX9) are off, turn off then on CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F). |
| □502$_H$ | Moderate error | CH□ Cycle setting error (Sampling counter/ Periodic pulse counter) | CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) is set to 0. □ indicates the channel where settings are incorrect. | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13 If CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on: *8 | If the parameters are written with the parameter processing of the slave station, or Initial data processing completion flag (RY8) or Initial data setting request flag (RY9) is turned off then on: *13 If CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on: *3 | Set CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) to a value between 1 and 65535, and perform one of the following operations.<br>• If Initial data processing request flag (RX8) is on, turn off then on Initial data processing completion flag (RY8).<br>• If the parameters are written with the parameter processing of the slave station, or Initial data setting completion flag (RX9) is on, turn off then on Initial data setting request flag (RY9).<br>• If Initial data processing request flag (RX8) and Initial data setting completion flag (RX9) are off, turn off then on CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □601H | Moderate error | CH□ Moving average count setting error (Frequency measurement) | A value other than 1 to 100 is set in CH□ Moving average count (Frequency measurement) (RWw19, RWw31).<br>□ indicates the channel where settings are incorrect. | *9 | *3 | Set CH□ Moving average count (Frequency measurement) (RWw19, RWw31) to a value between 1 and 100, and turn off then on CH□ Count enable command (RY24, RY3C). |
| □602H | Moderate error | CH□ Time unit setting error (Frequency measurement) | A value other than 0 to 2 is set in CH□ Time unit setting (Frequency measurement) (RWw18, RWw30).<br>□ indicates the channel where settings are incorrect. | *9 | *3 | Set CH□ Time unit setting (Frequency measurement) (RWw18, RWw30) to a value between 0 and 2, and turn off then on CH□ Count enable command (RY24, RY3C). |
| □621H | Moderate error | CH□ Moving average count setting error (Rotation speed measurement) | A value other than 1 to 100 is set in CH□ Moving average count (Rotation speed measurement) (RWw19, RWw31).<br>□ indicates the channel where settings are incorrect. | *10 | *3 | Set CH□ Moving average count (Rotation speed measurement) (RWw19, RWw31) to a value between 1 and 100, and turn off then on CH□ Count enable command (RY24, RY3C). |
| □622H | Moderate error | CH□ Time unit setting error (Rotation speed measurement) | A value other than 0 to 2 is set in CH□ Time unit setting (Rotation speed measurement) (RWw18, RWw30).<br>□ indicates the channel where settings are incorrect. | *10 | *3 | Set CH□ Time unit setting (Rotation speed measurement) (RWw18, RWw30) to a value between 0 and 2, and turn off then on CH□ Count enable command (RY24, RY3C). |
| □623H | Moderate error | CH□ Number of pulses per rotation setting error | A value other than 1 to 8000000 is set in CH□ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33).<br>□ indicates the channel where settings are incorrect. | *10 | *3 | Set CH□ Number of pulses per rotation (RWw1A to RWw1B, RWw32 to RWw33) to a value between 1 and 8000000, and turn off then on CH□ Count enable command (RY24, RY3C). |
| □660H | Moderate error | CH□ Pulse measurement range overflow error (Function input terminal) | A pulse from CH□ Function input terminal (FUNC1 or FUNC2) is beyond the measurable range (approx. 214s).<br>□ indicates the channel where settings are incorrect. | *11 | *3 | Measure pulses within the measurable range.<br>To resume the measurement, take either of the following actions.<br>• Input the target pulses again.<br>• Turn off then on CH□ Pulse measurement start command (Function input terminal) (RY30, RY48). |
| □661H | Moderate error | CH□ Pulse measurement setting error (Function input terminal) | A value other than 0 and 1 is set in CH□ Pulse measurement setting (Function input terminal) (address: 012AH, 014AH).<br>□ indicates the channel where settings are incorrect. | *13 | | Set CH□ Pulse measurement setting (Function input terminal) (address: 012AH, 014AH) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □662$_H$ | Moderate error | CH□ Pulse measurement range overflow error (Latch counter input terminal) | A pulse from CH□ Latch counter input terminal (LATCH1 or LATCH2) is beyond the measurable range (approx. 214s).<br>□ indicates the channel where settings are incorrect. | *11 | *3 | Measure pulses within the measurable range.<br>To resume the measurement, take either of the following actions.<br>• Input the target pulses again.<br>• Turn off then on CH□ Pulse measurement start command (Latch counter input terminal) (RY32, RY4A). |
| □663$_H$ | Moderate error | CH□ Pulse measurement setting error (Latch counter input terminal) | A value other than 0 and 1 is set in CH□ Pulse measurement setting (Latch counter input terminal) (address: $012B_H$, $014B_H$).<br>□ indicates the channel where settings are incorrect. | *13 | | Set CH□ Pulse measurement setting (Latch counter input terminal) (address: $012B_H$, $014B_H$) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |
| □670$_H$ | Moderate error | CH□ PWM output assignment setting error | The setting in CH□ PWM output assignment setting (RWw1D, RWw35) is in either of the following cases.<br>• All the bits from b0 to b3 are not on.<br>• Coincidence output◇ bit which is assigned to the other channel is on.<br>□ indicates the channel where settings are incorrect. | *12 | *3 | Take the following actions, and turn off then on CH□ PWM output start command (RY26, RY3E).<br>• Turn on one or more bits from b0 to b3.<br>• Turn on Coincidence output◇ bit which is assigned to the target channel. |
| □671$_H$ | Moderate error | CH□ ON width setting error (PWM output) | A value other than 0 and 10 to 10000000 is set in CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37).<br>□ indicates the channel where settings are incorrect. | If CH□ PWM output start command (RY26, RY3E) is turned off then on: *12<br>If CH□ ON width setting change request (PWM output) (RY35, RY4D) is turned off then on: *1 | *3 | Set CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) to 0 or a value between 10 and 10000000, and perform either of the following operations.<br>• If CH□ PWM output (RX26, RX3E) is off, turn off then on CH□ PWM output start command (RY26, RY3E).<br>• If CH□ PWM output (RX26, RX3E) is on, turn off then on CH□ ON width setting change request (PWM output) (RY35, RY4D). |
| □672$_H$ | Moderate error | CH□ Cycle setting error (PWM output) | A value other than 50 to 10000000 is set in CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39).<br>□ indicates the channel where settings are incorrect. | *12 | *3 | Set CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39) to a value between 50 and 10000000, and turn off then on CH□ PWM output start command (RY26, RY3E). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □673$_H$ | Moderate error | CH□ ON width/Cycle setting error (PWM output) | The value in CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39) is smaller than the value in CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37).<br>□ indicates the channel where settings are incorrect. | If CH□ PWM output start command (RY26, RY3E) is turned off then on: *12<br>If CH□ ON width setting change request (PWM output) (RY35, RY4D) is turned off then on: *1 | *3 | Set the values that satisfy the condition "CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) ≤ CH□ Cycle setting (PWM output) (RWw20 to RWw21, RWw38 to RWw39)", and perform either of the following operations.<br>• If CH□ PWM output (RX26, RX3E) is off, turn off then on CH□ PWM output start command (RY26, RY3E).<br>• If CH□ PWM output (RX26, RX3E) is on, turn off then on CH□ ON width setting change request (PWM output) (RY35, RY4D). |
| □810$_H$ | Moderate error | CH□ Operation mode setting error | A value other than 0 to 4 is set in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$).<br>□ indicates the channel where settings are incorrect. | *13 | | Set CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) to a value between 0 and 4, and turn off then on Initial data setting request flag (RY9). |
| □811$_H$ | Moderate error | CH□ Count source selection setting error | The setting in CH□ Count source selection (address: 0121$_H$, 0141$_H$) is in either of the following cases.<br>• If the value in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) is 0, a value other than 0 to 2 is set.<br>• If the value in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) is 1 or 2, a value other than 0 is set.<br>□ indicates the channel where settings are incorrect. | *13 | | Take either of the following actions on CH□ Count source selection (address: 0121$_H$, 0141$_H$), and turn off then on Initial data setting request flag (RY9).<br>• If the value in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) is 0, set a value between 0 and 2.<br>• If the value in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) is 1 or 2, set 0. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □812$_H$ | Moderate error | CH□ Count source coincidence output setting error | Either of the following cases is the cause if the value in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) is 0, and the value in CH□ Count source selection (address: 0121$_H$, 0141$_H$) is 1 or 2.<br>• A value other than 0 and 4 is set in CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) of the other channel.<br>• A channel where CH□ Count source selection (address: 0121$_H$, 0141$_H$) is set is the same as the channel assigned to the corresponding bit of Coincidence output channel assignment setting (address: 0101$_H$).<br>□ indicates the channel where settings are incorrect. | *13 | | Take the following actions, and turn off then on Initial data setting request flag (RY9).<br>• Set CH□ Operation mode setting (address: 0120$_H$, 0140$_H$) for the other channel to 0 or 4.<br>• Set the corresponding bit of Coincidence output channel assignment setting (address: 0101$_H$) to the channel where CH□ Count source selection (address: 0121$_H$, 0141$_H$) is not set. |
| □813$_H$ | Moderate error | CH□ Pulse input mode setting error | A value other than 0 to 5 is set in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$).<br>□ indicates the channel where settings are incorrect. | *13 | | Set CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) to a value between 0 and 5, and turn off then on Initial data setting request flag (RY9). |
| □814$_H$ | Moderate error | CH□ Counting speed setting error | The setting in CH□ Counting speed setting (address: 0123$_H$, 0143$_H$) is in one of the following cases.<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 0, 2, or 3, a value other than 0 to 5 is set.<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 1 or 4, a value other than 0 to 6 is set.<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 5, a value other than 0 to 7 is set.<br>□ indicates the channel where settings are incorrect. | *13 | | Take one of the following actions on CH□ Counting speed setting (address: 0123$_H$, 0143$_H$), and turn off then on Initial data setting request flag (RY9).<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 0, 2, or 3, set a value between 0 and 5.<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 1 or 4, set a value between 0 and 6.<br>• If the value in CH□ Pulse input mode (address: 0122$_H$, 0142$_H$) is 5, set a value between 0 and 7. |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □815H | Moderate error | Coincidence output channel assignment setting error | The channel where the PWM output mode is selected is not assigned to the setting in Coincidence output channel assignment setting (address: 0101H). □ indicates the channel where settings are incorrect. | *13 | | Assign the channel where the PWM output mode is selected on Coincidence output channel assignment setting (address: 0101H), and turn off then on Initial data setting request flag (RY9). |
| □820H | Moderate error | CH□ Counter format setting error | A value other than 0 and 1 is set in CH□ Counter format (address: 0124H, 0144H). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Counter format (address: 0124H, 0144H) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |
| □821H | Moderate error | CH□ Counter function selection setting error | A value other than 0 to 5 is set in CH□ Counter function selection (address: 0126H, 0146H). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Counter function selection (address: 0126H, 0146H) to a value between 0 and 5, and turn off then on Initial data setting request flag (RY9). |
| □822H | Moderate error | CH□ Function input logic setting error | A value other than 0 and 1 is set in CH□ Function input logic setting (address: 0127H, 0147H). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Function input logic setting (address: 0127H, 0147H) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |
| □823H | Moderate error | CH□ Latch counter input logic setting error | A value other than 0 and 1 is set in CH□ Latch counter input logic setting (address: 0128H, 0148H). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Latch counter input logic setting (address: 0128H, 0148H) to 0 or 1, and turn off then on Initial data setting request flag (RY9). |
| □824H | Moderate error | CH□ Z phase input response time setting error | A value other than 00b to 10b is set in CH□ Z phase input response time setting (address: 0129H.b0 to b1, 0149H.b0 to b1). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Z phase input response time setting (address: 0129H.b0 to b1, 0149H.b0 to b1) to a value between 00b and 10b, and turn off then on Initial data setting request flag (RY9). |
| □825H | Moderate error | CH□ Function input response time setting error | A value other than 00b to 10b is set in CH□ Function input response time setting (address: 0129H.b2 to b3, 0149H.b2 to b3). □ indicates the channel where settings are incorrect. | *13 | | Set CH□ Function input response time setting (address: 0129H.b2 to b3, 0149H.b2 to b3) to a value between 00b and 10b, and turn off then on Initial data setting request flag (RY9). |

| Error code (hexadecimal) | Classification | Error name | Description and cause | Operation of when an error occurs | | Action |
|---|---|---|---|---|---|---|
| | | | | Error CH | The other CHs | |
| □826$_H$ | Moderate error | CH□ Latch counter input response time setting error | A value other than 00b to 10b is set in CH□ Latch counter input response time setting (address: 0129$_H$.b4 to b5, 0149$_H$.b4 to b5).<br>□ indicates the channel where settings are incorrect. | *13 | | Set CH□ Latch counter input response time setting (address: 0129$_H$.b4 to b5, 0149$_H$.b4 to b5) to a value between 00b and 10b, and turn off then on Initial data setting request flag (RY9). |
| D529$_H$ | Major error | Communication error 1 | The communication LSI is in failure. | *13 | | • Malfunction due to noise may be the cause. Check the cable distance or grounding condition of each device. Then take measures against noise.<br>• Conduct the unit test. If the same error occurs again, a hardware failure of the module may be the cause. Please consult your local Mitsubishi representative. |
| D52B$_H$ | Major error | Communication error 2 | | *13 | | |

*1 Keeps its operation with the normal setting value just before the error.

*2 Stores -2147483648 or 2147483647 in CH□ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), or CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F), and continues to count.

*3 Keeps its normal operation unless an error occurs.

*4 The ring counter function does not start counting.

*5 The linear counter function stops counting.

*6 Compares the count value with the normal setting value just before the error. The error does not affect Coincidence output◇ assigned to the error CH and the other functions.

*7 Does not execute the cam switch function. The error does not affect the other functions.

*8 Executes the sampling counter function or periodic pulse counter function with the normal setting value just before the error.

*9 Does not start to measure the frequency.

*10 Does not start to measure the rotation speed.

*11 Stops measuring pulses.

*12 Does not output the PWM waveform.

*13 Stops operations except the one on the error and updating EQU1 to EQU4 terminal status (RWr1), Cam switch output signal (RWr2), Cam switch output terminal status (RWr3), CH□ Status (RWr20, RWr38), and CH□ External input status (RWr21, RWr39).

*14 Continues its operation although the external output terminals of the extension output module are forced off. (Y0 LED to YF LED on the extension output module turn on or off depending on the output status.)

*15 A minor error which can be reset by turning off then on CH□ Error reset command (RY36, RY4E)

*16 Stores 0 in all the monitor data and keeps 0 until the module operation information is initialized. The number of ON times integration does not start.

**Point**

- When multiple errors occur, only the latest error code is stored in CH□ Latest error code (RWr22, RWr3A) or CH□ Latest warning code (RWr23, RWr3B). (Error codes which do not have □ on their names are stored in CH1.)
  Old errors can be checked with the error history of GX Works2.
  For the error history, refer to the following.
  - Checking by executing a command of the slave station (Page 205, Section 11.1 (1))
  - Error history 1 to 15 (address: $0A00_H$ to $0AEF_H$) (Page 276, Appendix 3 (14))
- Turning on CH□ Error reset command (RY36, RY4E) resets errors. However, the error causes are detected again and thus the error codes are stored again unless the error causes are removed.

### (a) Detailed error information list

Detailed information about errors is stored in Error code details 1 in Error history 1 to 15 (address: $0A00_H$ to $0AEF_H$). The following table lists the error codes with the detailed information.

| Error code (hexadecimal) | Classification | Error name | Error code details 1 | Error code details 2 to 10 |
|---|---|---|---|---|
| □$050_H$ | Minor error | CH□ Overflow/underflow error (Sampling count value/Periodic pulse count, difference value) | 0: Underflow<br>1: Overflow | 0 (fixed) |
| □$200_H$ | Moderate error | CH□ Overflow/underflow error | 0: Underflow<br>1: Overflow | 0 (fixed) |
| Error codes other than □ $050_H$ and □ $200_H$ | — | — | 0 (fixed) | 0 (fixed) |

## (2) Error code list (D000$_H$ to DFFF$_H$ (D529$_H$ and D52B$_H$ excluded))

When an error occurs, the ERR. LED does not turn on. The D LINK LED flashes or turns off.

Troubleshoot the problem with the CC-Link IE Field Network diagnostics. (Page 175, Section 8.21)

| Error code (hexadecimal) | Error name | Description and cause | Action |
|---|---|---|---|
| D0E0$_H$ | Station type mismatch | The network parameter is incorrect or outside the range. | In the network configuration settings of the master station, change the station type to the remote device station. |
| D0E1$_H$ | Own station reserved | The network parameter is incorrect or outside the range. | • In the network configuration settings of the master station, cancel the reserved station setting.<br>• Change the station number of the module to a station number that is not reserved. |
| D0E2$_H$ | Station No. already in use (own station) | The network parameter is incorrect or outside the range. | • Set a unique station number.<br>• After taking the above action, turn off then on or reset all the stations where this error has been detected. |
| D0E3$_H$ | Own station No. out of range | The network parameter is incorrect or outside the range. | Add the station information of the module in the network configuration settings of the master station. |
| D217$_H$ | Transient data command error | The transient data request command is incorrect. | Correct the request command at the request source, and retry the operation. |
| D2A0$_H$ | Receive buffer full | The target station is overloaded and cannot receive transient data. | • Check the network status using the CC-Link IE Field Network diagnostics of GX Works2.<br>• When the target station is overloaded and cannot receive transient data, send the data to the target station after a while. |
| D2A3$_H$ | Transient data length error | The received transient data is incorrect. | Correct the number of data (frame length) at the request source, and retry the operation. |
| D72A$_H$ | Station number switch out of range (a value other than 1 to 120) | A station number out of range has been set. | Set the station number within the allowable range. |
| DF01$_H$ | Transient data divided error | The divided transient data have been received. | Set the transient data size within the range that can be handled by the module. Then send the transient data that is not divided. |

**Point**

When multiple errors occur, only the latest error code is stored in CH□ Latest error code (RWr22, RWr3A) or CH□ Latest warning code (RWr23, RWr3B).
Old errors can be checked with the error history of GX Works2.
For the error history, refer to the following.

- Checking by executing a command of the slave station (Page 205, Section 11.1 (1))
- Error history 1 to 15 (address: 0A00$_H$ to 0AFF$_H$) (Page 276, Appendix 3 (14))

# 11.3 Checking the LEDs

This section describes how to troubleshoot the system by the LEDs.

**Point**

For troubleshooting with the LEDs of the extension I/O module, refer to the following.
CC-Link IE Field Network Remote I/O Module User's Manual

## (1) When the PW LED does not turn on

| Check item | Action |
|---|---|
| Is any LED other than the PW LED turned on? | When any LED other than the PW LED turns on, a hardware failure may be the cause. Please consult your local Mitsubishi representative. |
| Is the module power supply (24VDC) wired? | Wire the module power supply (24VDC). |
| Is the module power supply (24VDC) turned on? | Turn on the module power supply (24VDC). |
| Is the voltage of the module power supply (24VDC) within the specified range? | Set the voltage value within the range of performance specifications. |

## (2) When the RUN LED does not turn on

| Check item | Action |
|---|---|
| Does the voltage of the module power supplied externally reach to the voltage of the performance specifications? | Check that module power supply voltage is within the range of performance specifications. (Page 27, Section 3.2)<br>After the check, power off then on the module.<br>If the RUN LED does not turn on even after the module power supply is turned off then on, a module failure may be the cause. Please consult your local Mitsubishi representative. |
| Does any hardware error occur? | |

## (3) When the MODE LED flashes

| Check item | Action |
|---|---|
| Is the high-speed counter module in execution of the unit test? | When the high-speed counter module is in execution of the unit test, the D LINK LED turns on after the unit test is completed. Take corrective action according to the result of the unit test. (Page 227, Section 11.4) |

### (4) When the D LINK LED turns off

| Check item | Action |
|---|---|
| Does the own station in network operate normally? | Connect GX Works2 to the master station, and check that the own station is performing data link by CC-Link IE Field Network diagnostics. ( User's manual for the master/local module used) |
| Are 1000BASE-T-compliant Ethernet cables used? | Replace the cable with a 1000BASE-T-compliant Ethernet cable.<br>( User's manual for the master/local module used) |
| Is the station-to-station distance 100m or less? | Change the station-to-station distance to 100m or less. |
| Does the cabling condition (bend radius) meet the specifications? | Refer to the manual for the Ethernet cable used, and correct the bend radius. |
| Is any Ethernet cable disconnected? | Replace the Ethernet cable. |
| Do other stations connected to the high-speed counter module normally operate? | Check that the power supplies of the other stations are turned on. |
| Does the switching hub normally operate? | • Check that a 1000BASE-T-compliant switching hub is used.<br>( User's manual for the master/local module used)<br>• Check that the power supply of the switching hub is turned on. |
| Is the station number of the high-speed counter module duplicated with any of other stations? | Two or more duplicated stations exist.<br>Change the setting so that all the station numbers differ. |

### (5) When the D LINK LED flashes

| Check item | Action |
|---|---|
| Does the station number setting of the high-speed counter module match the station number of the high-speed counter module set in the network configuration settings of the master station or in the CC IE Field configuration? | Match the station number of the high-speed counter module with the station number set in the network configuration settings of the master station or in the CC IE Field configuration. |
| Is the station type remote device station? | Change the station type of the module to the remote device station in the network configuration settings of the master station. |
| Is the high-speed counter module a reserved station? | Change the setting of reserved/ignored error station to other than the reserved station in the network configuration settings of the master station. |
| Is stop of the data link checked through CC-Link IE Field Network diagnostics? | Check the link status through CC-Link IE Field Network diagnostics and start the link when the data link is stopped. |
| Is the station number setting switch set to other than 1 to 120? | The setting range for the station number setting switch is 1 to 120. Set the number between 1 and 120. |

## (6) When the L ER LED turns on

| Check item | Action |
|---|---|
| Are Ethernet cables normal? | • Check that 1000BASE-T-compliant Ethernet cables are used.<br>( User's manual for the master/local module used)<br>• Check that the station-to-station distance is 100m or less.<br>• Check that the Ethernet cables are not disconnected. |
| Does the switching hub in the system normally operate? | • Check that a 1000BASE-T-compliant switching hub is used.<br>( User's manual for the master/local module used)<br>• Check that the power supply of the switching hub is turned on. |
| Do other stations connected to the high-speed counter module normally operate? | Check that the power supplies of the other stations are turned on. |
| Is the mode of the module on the master station set to other than Online? | Change the mode of the module to Online. |
| Is there any noise affecting the system? | Check the wiring condition of the Ethernet cables. |
| Is the loopback function enabled for the master station? | When the loopback function is enabled, check that the ring topology is correctly configured for the port where the L ER LED is on. ( User's manual for the master/local module used) |

## (7) When the LINK LED turns off

| Check item | Action |
|---|---|
| Are Ethernet cables normal? | • Check that 1000BASE-T-compliant Ethernet cables are used.<br>( User's manual for the master/local module used)<br>• Check that the station-to-station distance is 100m or less.<br>• Check that the Ethernet cables are not disconnected. |
| Do the switching hub and other stations in the system normally operate? | • Check that a 1000BASE-T-compliant switching hub is used.<br>( User's manual for the master/local module used)<br>• Check that the power supplies of the switching hub and other stations are turned on. |

## (8) When the ERR. LED flashes/turns on

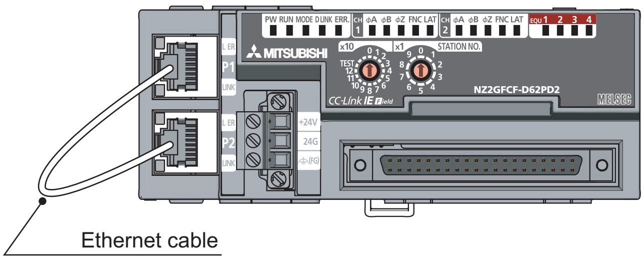
| Check item | Action |
|---|---|
| Does any error occur? | Identify the error cause of the high-speed counter module and take corrective action with GX Works2. |

# 11.4 Unit Test

Run a unit test to check if there is any abnormality in the high-speed counter module.

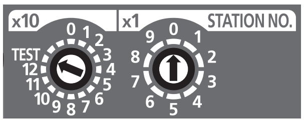
**1. Power off the module.**

**2. Connect the PORT1 and PORT2 of the high-speed counter module with an Ethernet cable.**




**3. Set the station number setting switch as follows.**

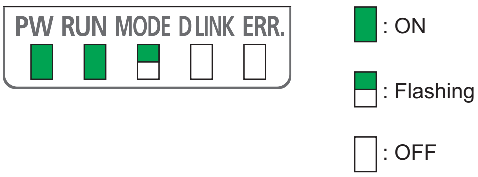
- x10: TEST
- x1: 0




**4. Power on the module.**

**5. Unit test begins.**

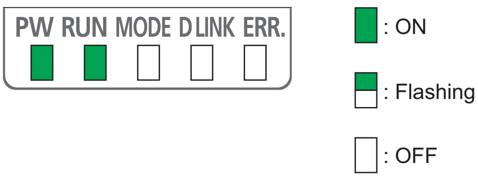
The MODE LED flashes while the unit test is being executed.



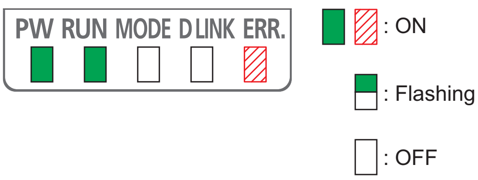

**6. The MODE LED turns off when the unit test is completed.**

- When completed
  The ERR. LED does not turn on, but remains off.
- When failed
  The ERR. LED turns on.
  If the test fails, replace the Ethernet cable and run the test again. If the test fails again, it may be due to a hardware failure in the high-speed counter module. Please consult your local Mitsubishi representative.

When completed




When failed




**Remark**

When unit test fails, the error details can be checked in the error history.
To check the error history, set the station number of the high-speed counter module and connect the module to the master station with an Ethernet cable.
For the error history, refer to the following.

- Checking by executing a command of the slave station (Page 205, Section 11.1 (1))
- Error history 1 to 15 (address: $0A00_H$ to $0AFF_H$) (Page 276, Appendix 3 (14))

# 11.5 Troubleshooting for Each Phenomenon

This section describes troubleshooting for each phenomenon.
Perform troubleshooting for each phenomenon when the high-speed counter module does not operate properly with no error. When an error occurs in the high-speed counter module, identify the error cause with GX Works2.

## 11.5.1 When the setting on the operation mode setting is the normal mode

### (1) When the module does not count or perform normal count

#### (a) When the module does not count

| Check item | Action |
|---|---|
| Is CH□ Count enable command (RY24, RY3C) on? | Turn on CH□ Count enable command (RY24, RY3C) in a program. |
| Is CH□ Function input terminal (FUNC1, FUNC2) off? | If the count disable function is selected for the counter function selection setting, pulses are not counted while CH□ Function input terminal (FUNC1, FUNC2) is on. Turn off CH□ Function input terminal (FUNC1, FUNC2). |
| Is the pulse input method the same as what has been selected in CH□ Pulse input mode (address: $0122_H$, $0142_H$)? | Change the pulse input method or the setting in CH□ Pulse input mode (address: $0122_H$, $0142_H$) so that they match. |
| Does the CPU module indicate any error? | If an error is indicated with the CPU module, refer to troubleshooting on the user's manual for the CPU module used. |
| Is the external wiring to φA and φB correct? | Check the external wiring and correct errors. |
| Do the LEDs of φA and φB turn on by applying a voltage to the pulse input terminals in φA and φB using devices such as a voltage stabilizer? | If the LEDs of φA and φB turn on, check the external wiring and wiring on the encoder side.<br>If the LEDs of φA and φB do not turn on, a module failure may be the cause. Please consult your local Mitsubishi representative. |

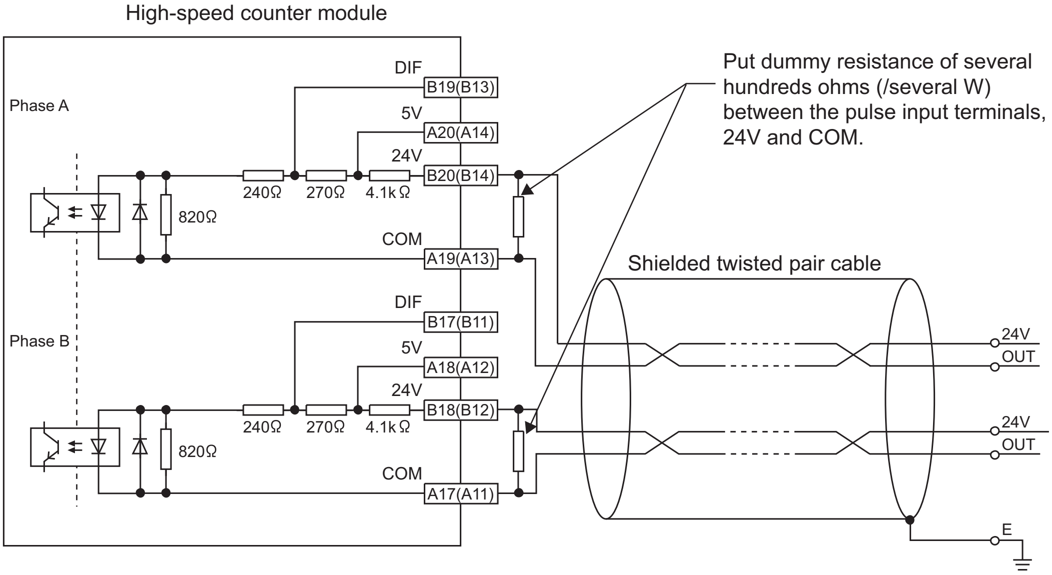
#### (b) When the module does not count normally

<table>
<tr><th colspan="2">Check item</th><th>Action</th></tr>
<tr><td colspan="2">Does a program used read out the present value in unit of 2 words (32 bits)?</td><td>Read out it in unit of 2 words (32 bits).</td></tr>
<tr><td colspan="2">Is the preset value within the count range of the ring counter when the counter format is the ring counter?</td><td>Set the preset value so that the value is within the count range of the ring counter.</td></tr>
<tr><td rowspan="4">Measures against noise</td><td>Are the shielded twisted pair cables used for pulse input wiring?</td><td>Use the shielded twisted pair cables for pulse input wiring.</td></tr>
<tr><td>Are measures against noise taken for the adjacent devices and inside the control panel?</td><td>Take noise reduction measures such as attaching a CR surge suppressor to the magnet switch.</td></tr>
<tr><td>Is the distance between the high voltage equipment and pulse input line kept enough?</td><td>Bundle up the pulse input lines in a single tube, and keep a distance of 150mm or more between the pulse input lines and the power line even inside the control panel.</td></tr>
<tr><td>Does any noise come from the grounded part of the high-speed counter module?</td><td>Separate the grounding cable of the high-speed counter module from the grounded part.<br>If the case of the high-speed counter module touches the grounded part, separate it.</td></tr>
</table>

| Check item | Action |
|---|---|
| Does the input pulse waveform meet the performance specifications? | Check the pulse waveform with a synchronoscope. If the input pulse does not meet the performance specifications, input pulses which meet the performance specifications. |
| Does the other channel show the same count result when the same input is applied to the other channel? | If a different count value appears, a module failure may be the cause. Please consult your local Mitsubishi representative. |

**Point**

- How to fix pulse form
  This portion describes how to fix pulse waveform by dummy resistance that can be used against noises from outside or distortion of pulse waveform.
  To fix pulse waveform effectively, increase load current inside cables by applying dummy resistance of several hundreds ohms (/several W) between the pulse input terminals connected to the encoder. The greater the load current, the more effective this method is.
- Effect
  - When the distance between the encoder and the high-speed counter module is long
    Distortion of waveform is fixed and the pulse waveform becomes stable.
  - When the pulse waveform is distorted due to noises from outside
    Taking the method above stabilizes pulse waveform; distortion of pulse waveform by noise can be reduced.
- Example of dummy resistance at 24VDC




- How to choose dummy resistance
  The following example describes how to choose the required resistance amount and rated-standard electricity of dummy resistance.
  <Example>
  - How to calculate the dummy resistance amount (at 24VDC)
    Calculation: $R = V \div I = 24V \div 35mA = 680\ \Omega$
  - How to calculate rated-standard electricity (at 24VDC)
    Calculation: $P_1 = V \times I = 24V \times 35mA = 0.84W$ (approximately 1W)
    Calculation including a margin: $P_2 = P_1 \times 2 = 0.84 \times 2 = 1.68W$ (approximately 2W)

  Result: Install dummy resistance of 680Ω (/2W) in between the pulse input terminals.

## (2) When the coincidence output function does not perform normal operation

### (a) When Coincidence output 1 to 4 (RX10 to RX13) do not turn on

| Check item | Action |
|---|---|
| Are Coincidence output 1 to 4 assigned properly? | Review the setting in Coincidence output channel assignment setting (address: $0101_H$). |
| Are the comparison conditions for Coincidence output 1 to 4 proper? | Review the setting in Coincidence output comparison condition setting (address: $0102_H$). |
| Is Initial data setting request flag (RY9) or Setting change request (Coincidence output 1 to 4) (RY14 to RY17) turned on after changing Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) to Upper limit value setting (Coincidence output 4) (RWwE to RWwF)? | Turn on Initial data setting request flag (RY9) or Setting change request (Coincidence output 1 to 4) (RY14 to RY17) after changing Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) to Upper limit value setting (Coincidence output 4) (RWwE to RWwF). |
| Is Reset command (Coincidence output 1 to 4) (RY10 to RY13) off? (Only when Coincidence output is selected as the comparison condition) | Turn off Reset command (Coincidence output 1 to 4) (RY10 to RY13). |
| Are the settings in Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) to Upper limit value setting (Coincidence output 4) (RWwE to RWwF) within the count range of the ring counter when the counter format is the ring counter? | Set Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) to Upper limit value setting (Coincidence output 4) (RWwE to RWwF) within the count range of the ring counter. |

### (b) When Coincidence output 1 to 4 (RX10 to RX13) does not turn off

| Check item | Action |
|---|---|
| Is the ON time of Reset command (Coincidence output 1 to 4) (RY10 to RY13) $\Delta T_1$*1 or longer? (Only when Coincidence output is selected as the comparison condition) | Set the ON time of Reset command (Coincidence output 1 to 4) (RY10 to RY13) to $\Delta T_1$*1 or longer. (Page 249, Appendix 1.2) |

*1 For $\Delta T_1$, refer to the following.
Page 283, Appendix 4

### (c) When only Coincidence output 1 to 4 terminals (EQU1 to EQU4) do not turn on

| Check item | Action |
|---|---|
| Is CH□ Coincidence output enable command (RY20, RY38) on? | Turn on CH□ Coincidence output enable command (RY20, RY38). |
| Is the external wiring to Coincidence output 1 to 4 terminals (EQU1 to EQU4) correct? | Check the external wiring and correct errors. |

#### (d) When the count value cannot be replaced with a preset value by the preset/replace (at coincidence output) function

| Check item | Action |
|---|---|
| Is CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) off? | Turn off CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B). Note that the ON/OFF time of CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) must be $\Delta T_1$*1 or longer. (☞ Page 249, Appendix 1.2) |
| Is Preset/replace setting at coincidence output (address: $0103_H$) set to "Present value replaced (1)"? | Set Preset/replace setting at coincidence output (address: $0103_H$) to Present value replaced (1). |
| Is Coincidence output 1 to 4 (RX10 to RX13) off? | This function replaces the count value with the preset value at the rising edge (OFF to ON) of Coincidence output 1 to 4 (RX10 to RX13). Turn off Coincidence output 1 to 4 (RX10 to RX13) before replacing the value. |
| Is the interval between every execution of this function $\Delta T_1$*1 or longer? | Set the interval of $\Delta T_1$*1 or longer between every execution of this function referring to the following. ☞ Page 114, Section 8.3.3 |
| Is the interval of $\Delta T_1$*1 or longer taken between change in the setting in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset? | Set the interval of $\Delta T_1$*1 or longer between change in the setting in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset. |

*1 For $\Delta T_1$, refer to the following.
☞ Page 283, Appendix 4

### (3) When the cam switch function does not perform normal operation

#### (a) When Cam switch output signal (RWr2) does not turn on or off

| Check item | Action |
|---|---|
| Is the cam switch output assigned properly? | Review the settings in Cam switch output unit assignment setting (address: $0104_H$) and Cam switch output channel assignment setting (address: $0105_H$). |
| For the step setting, is the minimum setting width of the ON/OFF status proper? | Review the minimum setting width of the ON/OFF status referring to the following. ☞ Page 117, Section 8.3.4 |
| Is the step setting within the count range of the ring counter when the counter format is the ring counter? | Review the step setting and set steps within the count range of the ring counter. |

#### (b) When only the output (Y0 to YF) of the extension output module does not turn on

| Check item | Action |
|---|---|
| Is the external power supply for the extension output module on? | Turn on the external power supply for the extension output module. |
| Is the external wiring at the output terminal of the extension output module correct? | Check the external wiring and correct errors. |

### (4) When the count value cannot be replaced with a value preset by the user

#### (a) When the preset/replace function by CH□ Preset/replace command (RY21, RY39) cannot be performed

| Check item | Action |
|---|---|
| Is CH□ Preset/replace completion (RX21, RX39) used as an interlock? | Turn on or off CH□ Preset/replace command (RY21, RY39) using CH□ Preset/replace completion (RX21, RX39) as an interlock. |
| Is CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) off? | Turn off CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).<br>Note that the ON/OFF time of CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) must be $\Delta T_1$[*1] or longer. (Page 249, Appendix 1.2) |

*1 For $\Delta T_1$, refer to the following.

Page 283, Appendix 4

#### (b) When the preset/replace function by CH□ Phase Z input terminal (Z1, Z2) cannot be performed

| Check item | Action |
|---|---|
| Is the external wiring to CH□ Phase Z input terminal (Z1, Z2) correct? | Check the external wiring and correct errors. |
| Is the interval of $\Delta T_1$[*1] or longer taken between change in the setting in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset? | Set the interval of $\Delta T_1$[*1] or longer between change in the setting in CH□ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset. |
| Is CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) off? | Turn off CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) by turning on CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).<br>Note that the ON/OFF time of CH□ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) must be $\Delta T_1$[*1] or longer. (Page 249, Appendix 1.2) |

*1 For $\Delta T_1$, refer to the following.

Page 283, Appendix 4

#### (c) When the preset/replace function by CH☐ Function input terminal (FUNC1, FUNC2) cannot be performed

| Check item | Action |
|---|---|
| Is the external wiring to CH☐ Function input terminal (FUNC1, FUNC2) correct? | Check the external wiring and correct errors. |
| Is the interval of $\Delta T_1$*1 or longer taken between change in the setting in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset? | Set the interval of $\Delta T_1$*1 or longer between change in the setting in CH☐ Preset value setting (RWw14 to RWw15, RWw2C to RWw2D) and the execution of preset. |
| Is CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) off? | Turn off CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) by turning on CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).<br>Note that the ON/OFF time of CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) must be $\Delta T_1$*1 or longer. (☞ Page 249, Appendix 1.2) |

*1 For $\Delta T_1$, refer to the following.
☞ Page 283, Appendix 4

### (5) When the counter function selection cannot be performed

#### (a) When turning on CH☐ Selected counter function start command (RY25, RY3D) does not perform the counter function selection

| Check item | Action |
|---|---|
| Does the selected function apply to CH☐ Selected counter function start command (RY25, RY3D)? | Check referring to the following.<br>Page 129, Section 8.6 |
| If the selected function is one that starts to work at the rising edge (OFF to ON) of CH☐ Selected counter function start command (RY25, RY3D), is CH☐ Counter function detection (RX25, RX3D) used as an interlock? | Turn on or off CH☐ Selected counter function start command (RY25, RY3D) using CH☐ Counter function detection (RX25, RX3D) as an interlock. |
| Is CH☐ Function input terminal (FUNC1, FUNC2) off? | Turn off CH☐ Function input terminal (FUNC1, FUNC2). |

#### (b) When the input from CH☐ Function input terminal (FUNC1, FUNC2) does not perform the counter function selection

| Check item | Action |
|---|---|
| Is the external wiring to CH☐ Function input terminal (FUNC1, FUNC2) correct? | Check the external wiring and correct errors. |
| Is CH☐ Selected counter function start command (RY25, RY3D) off? | Turn off CH☐ Selected counter function start command (RY25, RY3D). |

## 11.5.2 When the setting on the operation mode setting is the frequency measurement mode

### (1) When the module does not measure or perform normal measurement

Page 228, Section 11.5.1 (1)

## 11.5.3 When the setting on the operation mode setting is the rotation speed measurement mode

### (1) When the module does not measure or perform normal measurement

Page 228, Section 11.5.1 (1)

## 11.5.4 When the setting on the operation mode setting is the pulse measurement mode

### (1) When the module does not measure or perform normal measurement

#### (a) When the module does not measure

| Check item | Action |
|---|---|
| Does the CPU module indicate any error? | If an error is indicated with the CPU module, refer to troubleshooting on the user's manual for the CPU module used. |
| Is CH□ Pulse measurement start command (Function input terminal) (RY30, RY48) or CH□ Pulse measurement start command (Latch counter input terminal) (RY32, RY4A), the signal corresponding to the terminal to be measured, turned on? | Turn on the signal corresponding to the terminal to be measured, CH□ Pulse measurement start command (Function input terminal) (RY30, RY48) or CH□ Pulse measurement start command (Latch counter input terminal) (RY32, RY4A). |
| Are the external wirings to CH□ Function input terminal (FUNC1, FUNC2) and CH□ Latch counter input terminal (LATCH1, LATCH2) correct? | Check the external wiring and correct errors. |

#### (b) When the module does not measure normally

| Check item | | Action |
|---|---|---|
| Measures against noise | Are the shielded twisted pair cables used for pulse input wiring? | Use the shielded twisted pair cables for pulse input wiring. |
| | Are measures against noise taken for the adjacent devices and inside the control panel? | Take noise reduction measures such as attaching a CR surge suppressor to the magnet switch. |
| | Is the distance between the high voltage equipment and pulse input line kept enough? | Bundle up the pulse input lines in a single tube, and keep a distance of 150mm or more between the pulse input lines and the power line even inside the control panel. |
| | Does any noise come from the grounded part of the high-speed counter module? | Separate the grounding cable of the high-speed counter module from the grounded part.<br>If the case of the high-speed counter module touches the grounded part, separate it. |
| Does a program used read out the 2-word data such as a measured pulse value in unit of 2 words (32 bits)? | | Read out it in unit of 2 words (32 bits). |

# 11.5.5 When the setting on the operation mode setting is the PWM output mode

## (1) When the module does not perform normally

| Check item | | Action |
|---|---|---|
| Does the CPU module indicate any error? | | If an error is indicated with the CPU module, refer to troubleshooting on the user's manual for the CPU module used. |
| Are Coincidence output 1 to 4 assigned properly? | | Review the setting in Coincidence output channel assignment setting (address: $0101_H$) and CH□ PWM output assignment setting (RWw1D, RWw35). |
| Is the external wiring to Coincidence output 1 to 4 terminals (EQU1 to EQU4) correct? | | Check the external wiring and correct errors. |
| Is a resistive load connected to the coincidence output 1 to 4 terminals (EQU1 to EQU4)? | | Connect a resistive load since the output waveform is highly distorted by connecting a load other than a resistive load. |
| Measures against noise | Are the shielded twisted pair cables used for PWM output wiring? | Use the shielded twisted pair cables for PWM output wiring. |
| | Are measures against noise taken for the adjacent devices and inside the control panel? | Take noise reduction measures such as attaching a CR surge suppressor to the magnet switch. |
| | Is the distance between the high voltage equipment and PWM output line kept enough? | Bundle up the PWM output lines in a single tube, and keep a distance of 150mm or more between the PWM output lines and the power line even inside the control panel. |
| | Does any noise come from the grounded part of the high-speed counter module? | Separate the grounding cable of the high-speed counter module from the grounded part.<br>If the case of the high-speed counter module touches the grounded part, separate it. |

# APPENDICES

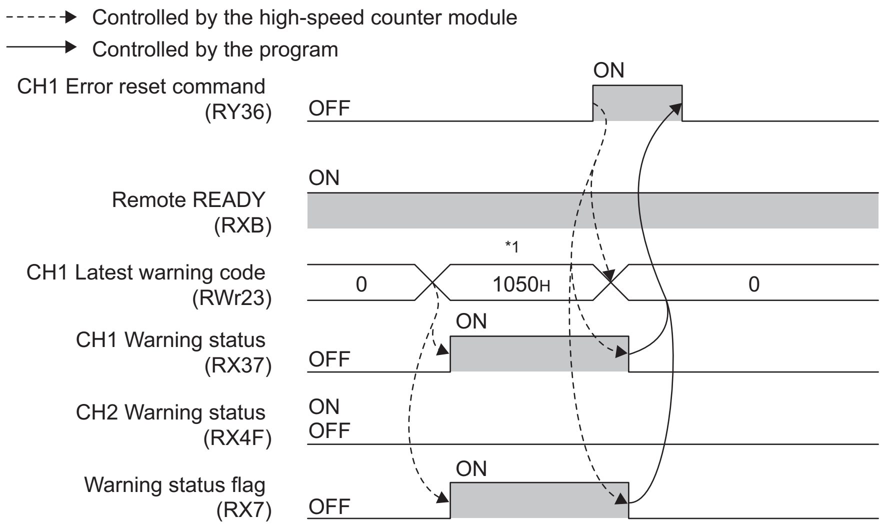
# Appendix 1 Details of Remote I/O Signals

## Appendix 1.1 Details of remote input signals

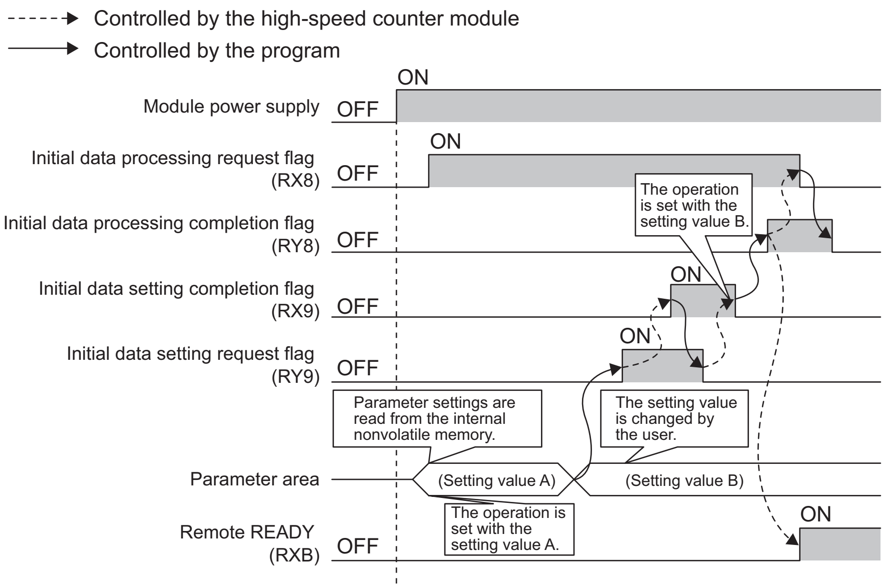
The following shows details of remote input signals.

<table>
<tr><th>Remote input (RX) No.</th><th>Signal name</th><th>Description</th></tr>
<tr><td>RX7</td><td>Warning status flag</td><td>

• This signal turns on when CH□ Warning status (RX37, RX4F) turns on.<br>
• This signal turns off when CH□ Warning status (RX37, RX4F) turns off.

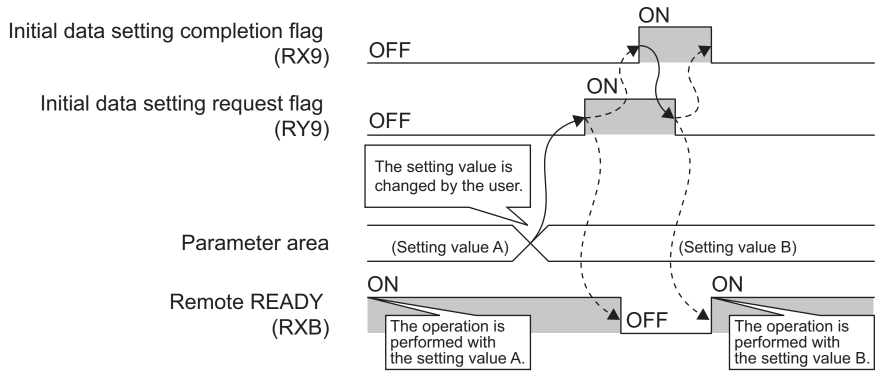


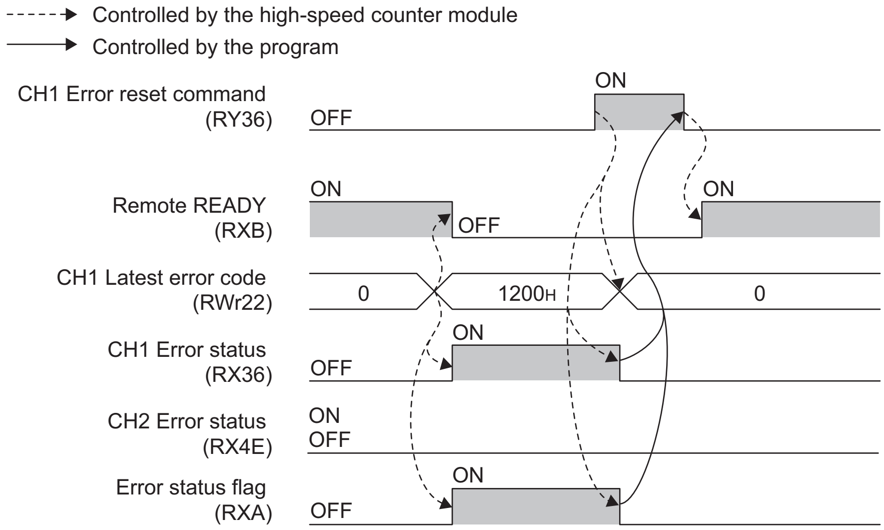
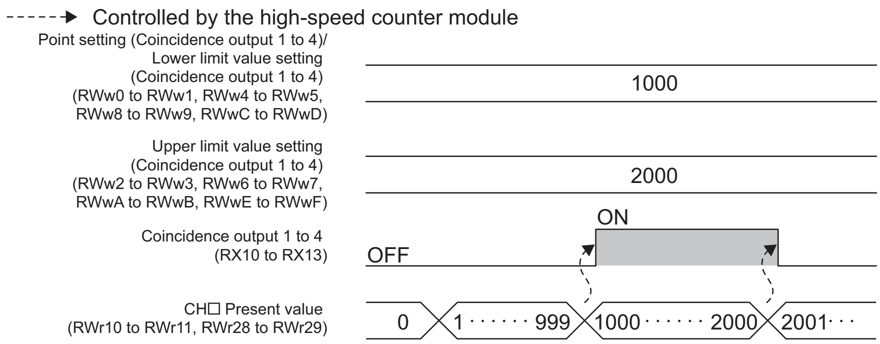

*1 This signal cannot be reset arbitrarily by output signals such as CH□ Error reset command (RY36, RY4E) depending on warning codes (error codes of minor errors). For details, refer to Page 208, Section 11.2.
</td></tr>
</table>

| Remote input (RX) No. | Signal name | Description |
|---|---|---|
| RX8 | Initial data processing request flag | • After the module is powered on or the remote reset is performed, this signal turns on to let the high-speed counter module request the initial setting.<br>• When this signal is on, set initial data to the remote register (RWw) and turn on Initial data processing completion flag (RY8).<br>• To change the setting in the parameter area of the remote buffer memory as well, change the setting in the parameter area, enable the setting values by turning on Initial data setting request flag (RY9), then turn on Initial data processing completion flag (RY8).<br>• While this signal is on, the high-speed counter module does not count pulses.<br><br>This signal turns off in the following case.<br>• Initial data processing completion flag (RY8) is turned on when all setting values of the remote register (RWw) and the remote buffer memory are normal.<br><br>This signal turns on in the following case.<br>• After the module is powered on or the remote reset is performed<br><br><br><br>• After checking that the initial data processing is completed (this signal turns off) and Initial data setting completion flag (RX9) turns off, turn on CH□ Count enable command (RY24, RY3C) to start pulse counting.<br>• Remote output signals other than CH□ Error reset command (RY36, RY4E) that are already turned on when this signal turns off are recognized as they are turned on right after this signal turns off.<br>• At the rising state of either of Coincidence output 1 or Coincidence output 2 for which the preset/replace (at coincidence output) function is enabled from the comparison result at when this signal turns off, the count value is replaced with the preset value. (However, this operation is performed only when Comparison output setting (address: $0100_H$) is set to Coincidence Output Function (0) and CH❑ Operation mode setting (address: $0120_H$, $0140_H$) is set to Normal Mode (0).)<br>• If an error occurs, such as when a value out of the setting range of the remote register (RWw) or the remote buffer memory is detected, this signal does not turn off even if Initial data processing completion flag (RY8) is turned off. (This signal remains on.) In this case, remove the error cause and turn on then off Initial data processing completion flag (RY8). In addition, the OFF time must be longer than $\Delta T_1$[*1].<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |

A

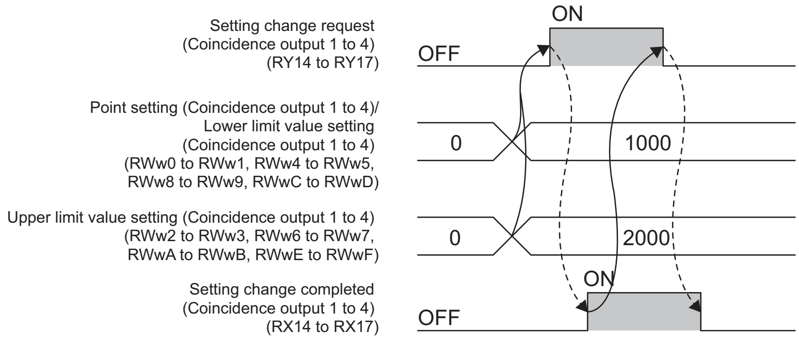
Appendix 1 Details of Remote I/O Signals
Appendix 1.1 Details of remote input signals

| Remote input (RX) No. | Signal name | Description |
|---|---|---|
| RX9 | Initial data setting completion flag | • This signal is used as an interlock for turning on/off Initial data setting request flag (RY9) when the setting values in the parameter area of the remote buffer memory are changed or the setting values of the extended parameter area are saved into the nonvolatile memory.<br>• While this signal is on, the high-speed counter module does not count pulses.<br><br>This signal turns off in the following cases.<br>• Until Initial data setting request flag (RY9) is turned on after the module is powered on<br>• Initial data setting request flag (RY9) is turned off when the setting values in the parameter area of the remote buffer memory are normal.<br><br>This signal turns on in the following case.<br>• When Initial data setting request flag (RY9) is turned on<br><br>Controlled by the high-speed counter module<br>Controlled by the program<br><br>• After checking that the initial data setting processing is completed (this signal turns off) and Initial data processing request flag (RX8) turns off, turn on CH□ Count enable command (RY24, RY3C) to start pulse counting.<br>• Remote output signals other than CH□ Error reset command (RY36, RY4E) that are already turned on when this signal turns off are recognized as they are turned on right after this signal turns off.<br>• When Initial data processing request flag (RX8) is off and at the rising state of either of Coincidence output 1 or Coincidence output 2 for which the preset/replace (at coincidence output) function is enabled from the comparison result at when this signal turns off, the count value is replaced with the preset value. (However, this operation is performed only when Comparison output setting (address: $0100_H$) is set to Coincidence Output Function (0) and CH□ Operation mode setting (address: $0120_H$, $0140_H$) is set to Normal Mode (0).)<br>• If an error occurs, such as when a value out of the setting range of the remote register (RWw) or the remote buffer memory is detected, this signal does not turn off even if Initial data setting request flag (RY9) is turned off. (This signal remains on.) In this case, remove the error cause and turn on then off Initial data setting request flag (RY9). In addition, the OFF time must be longer than $\Delta T_1$[*1].<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |

| Remote input (RX) No. | Signal name | Description |
|---|---|---|
| RXA | Error status flag | • This signal turns on when CH☐ Error status (RX36, RX4E) turns on.<br>• This signal turns off when CH☐ Error status (RX36, RX4E) turns off.<br> |
| RXB | Remote READY | • This signal turns on when the initial data setting processing is completed after the module is powered on or the remote reset is performed.<br>• This signal turns on after Initial data processing request flag (RX8) turns off.<br>• This signal turns on when Initial data processing request flag (RX8) is off and Initial data setting completion flag (RX9) is turned off.<br>• This signal turns off when Error status flag (RXA) turns on.<br>• This signal can be used as an interlock of programs.<br>(For the overview of the operation, refer to the descriptions of Initial data processing request flag (RX8), Initial data setting completion flag (RX9), and Error status flag (RXA).) |
| RX10 | Coincidence output 1 | • This signal turns on when the comparison condition of CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) is satisfied in the coincidence output function. (For details of the ON/OFF conditions of this signal, refer to Page 103, Section 8.3.2.)<br>• The ON condition can be changed with Coincidence output comparison condition setting (address: $0102_H$).<br>Ex. For within-range output operation<br><br>• Up to $\Delta T_1$[*1] delay occurs until this signal turns on after the comparison conditions of CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) are satisfied in the coincidence output function.<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |
| RX11 | Coincidence output 2 | |
| RX12 | Coincidence output 3 | |
| RX13 | Coincidence output 4 | |

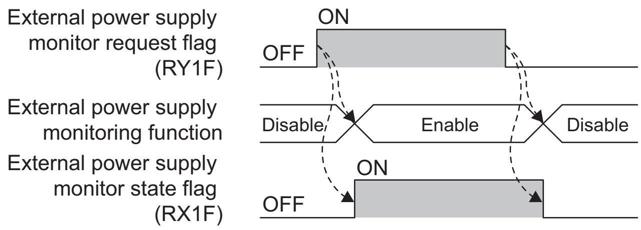
<table>
<tr><th>Remote input (RX) No.</th><th>Signal name</th><th>Description</th></tr>
<tr><td>RX14</td><td>Setting change completed (Coincidence output 1)</td><td rowspan="4">

• This signal turns on when the changes of the following remote registers (RWw) are reflected to the high-speed counter module in the coincidence output function.<br>
• Point setting (Coincidence output 1 to 4)/Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD)<br>
• Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF)<br>
• For Coincidence output 1, Setting change completed (Coincidence output 1) (RX14) turns on after the changes of Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) are reflected to the high-speed counter module by Setting change request (Coincidence output 1) (RY14).<br>
• For Coincidence output 1, Setting change completed (Coincidence output 1) (RX14) turns off when Setting change request (Coincidence output 1) (RY14) is turned off.<br>
• For Coincidence output 2 to 4, each corresponding remote I/O signals and remote register (RWw) are used.<br>
<br>
-----▶ Controlled by the high-speed counter module<br>
——▶ Controlled by the program<br>

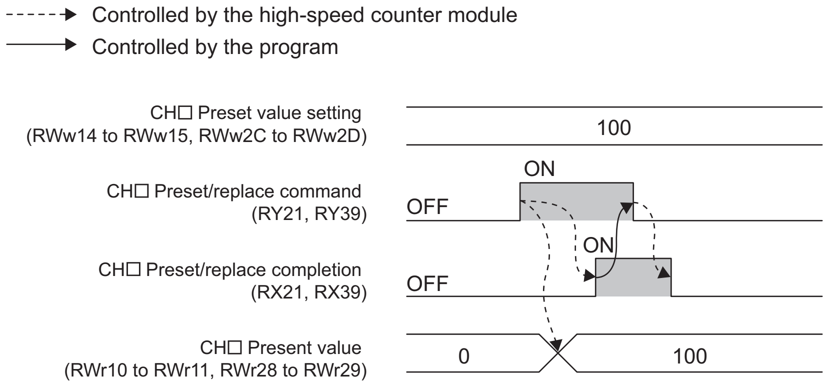
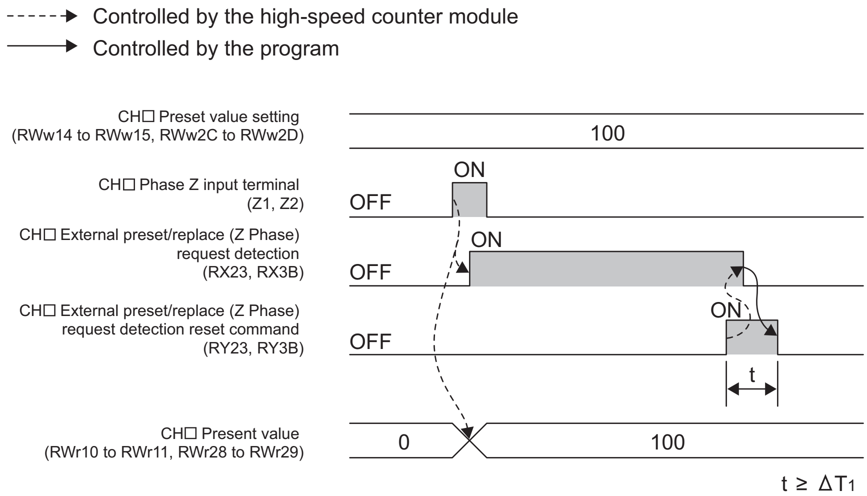


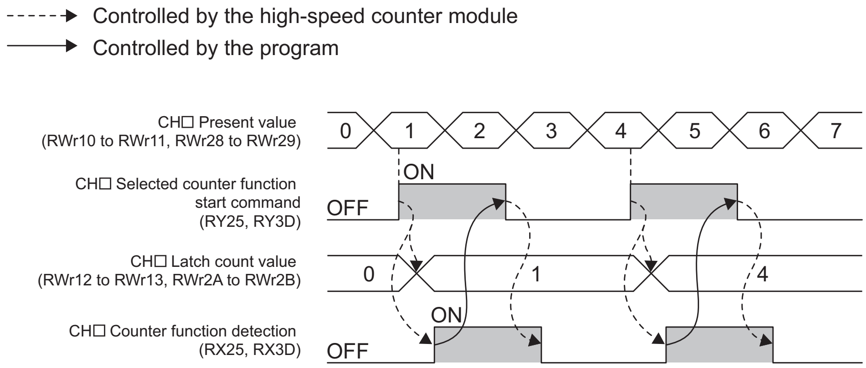
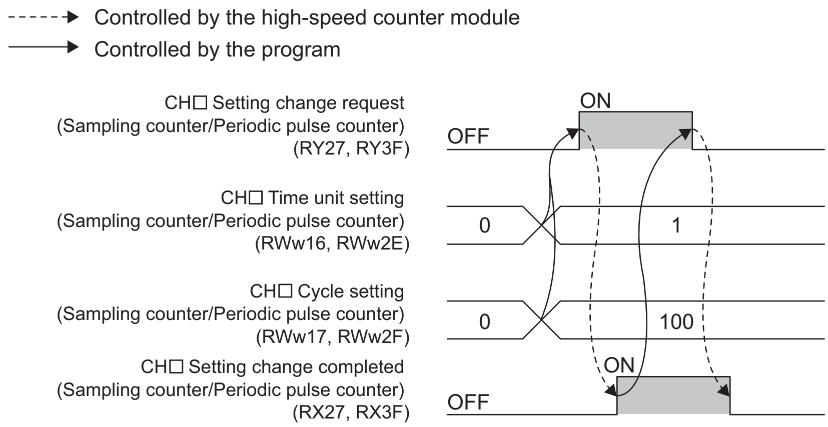

</td></tr>
<tr><td>RX15</td><td>Setting change completed (Coincidence output 2)</td></tr>
<tr><td>RX16</td><td>Setting change completed (Coincidence output 3)</td></tr>
<tr><td>RX17</td><td>Setting change completed (Coincidence output 4)</td></tr>
<tr><td>RX1F</td><td>External power supply monitor state flag</td><td>

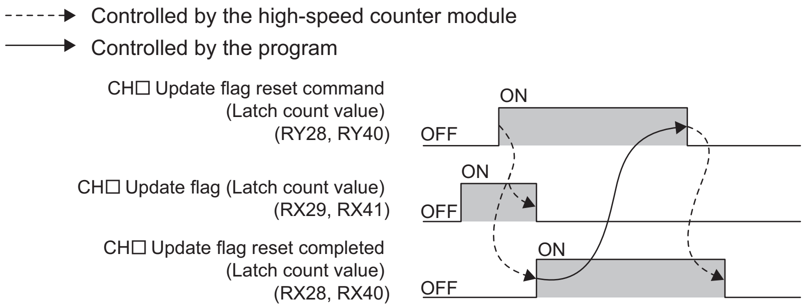
• This signal turns on when the external power supply monitoring function is enabled by turning on External power supply monitor request flag (RY1F).<br>
• This signal turns off when the external power supply monitoring function is disabled by turning off External power supply monitor request flag (RY1F).<br>
<br>
-----▶ Controlled by the high-speed counter module<br>



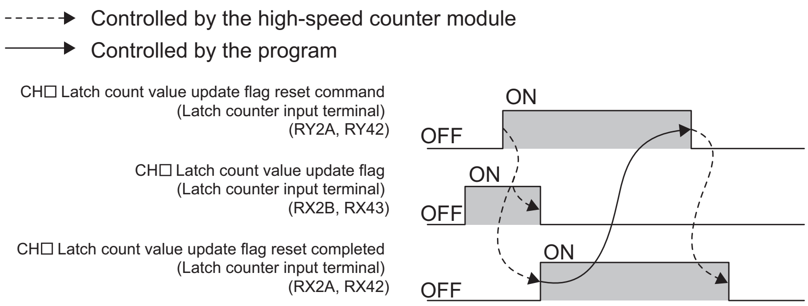
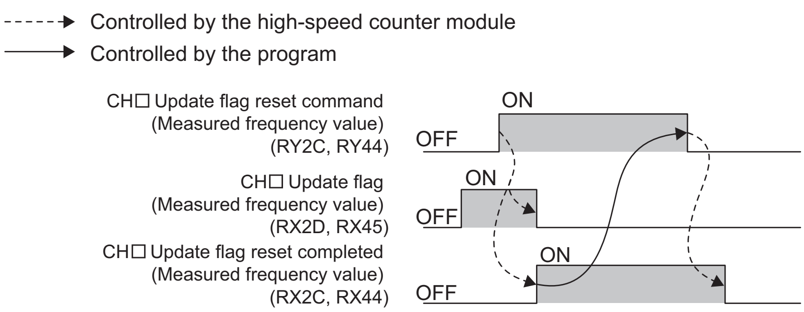

</td></tr>
</table>

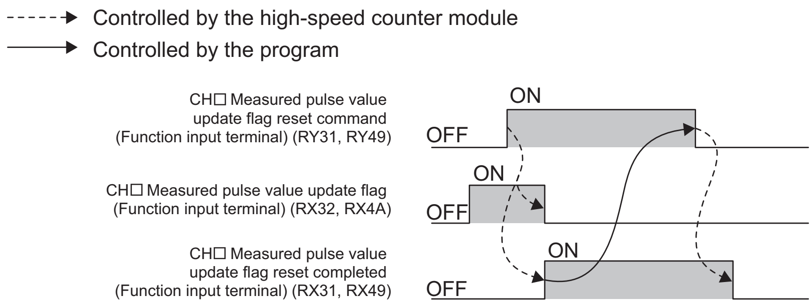
<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td>RX21</td><td>CH1</td><td rowspan="2">Preset/replace completion</td><td rowspan="2">• This signal turns on when the preset is completed by turning on CH☐ Preset/replace command (RY21, RY39).<br>• This signal turns off when CH☐ Preset/replace command (RY21, RY39) is turned off.<br><br><br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after the preset is completed.<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td>RX39</td><td>CH2</td></tr>
<tr><td>RX23</td><td>CH1</td><td rowspan="2">External preset/replace (Z Phase) request detection</td><td rowspan="2">• This signal turns on when a count value is replaced with the preset value by CH☐ Phase Z input terminal (Z1, Z2). Note that this signal does not turn on when Z phase (Preset) trigger setting (address: $0125_H$.b0 to b1, $0145_H$.b0 to b1) in CH☐ Phase Z setting (address: $0125_H$, $0145_H$) is set to During ON (11).<br>• This signal turns off when CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B) is turned on.<br>• The value is not replaced while this signal is on.<br>• Note that this signal does not turn on when External preset/replace (Z Phase) request detection setting (address: $0125_H$.b4, $0145_H$.b4) in CH☐ Phase Z setting (address: $0125_H$, $0145_H$) is set to Not ON at detection (1). This signal turns on only when External preset/replace (Z Phase) request detection setting (address: $0125_H$.b4, $0145_H$.b4) is set to ON at detection (0).<br>• The following figure shows the case when Z phase (Preset) trigger setting (address: $0125_H$.b0 to b1, $0145_H$.b0 to b1) in CH☐ Phase Z setting (address: $0125_H$, $0145_H$) is set to Rising (00).<br><br><br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after the preset is completed.<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td>RX3B</td><td>CH2</td></tr>
</table>

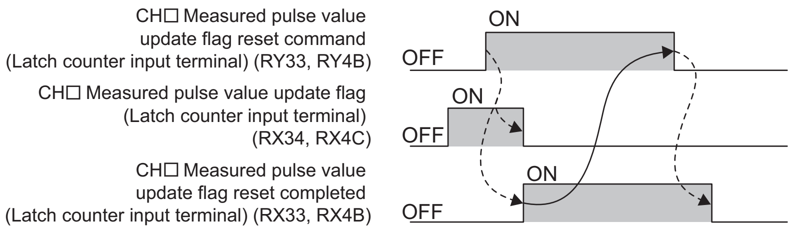
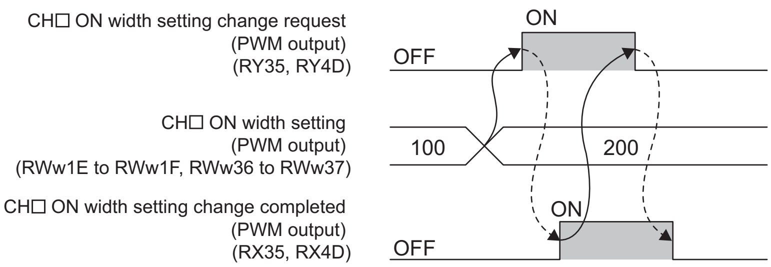
<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td>RX25</td><td>CH1</td><td rowspan="2">Counter function detection</td><td rowspan="2">• This signal turns on when the counter function starts by turning on CH□ Selected counter function start command (RY25, RY3D).<br>• This signal turns off when CH□ Selected counter function start command (RY25, RY3D) is turned off.<br>• The following figure shows an operation example of when the latch counter function is performed.<br>
</td></tr>
<tr><td>RX3D</td><td>CH2</td></tr>
<tr><td>RX26</td><td>CH1</td><td rowspan="2">Cam switch execute/PWM output</td><td rowspan="2">• This signal turns on when the cam switch function is started by turning on CH□ Cam switch execute command/PWM output start command (RY26, RY3E).<br>• This signal turns on when the PWM output is started by turning on CH□ Cam switch execute command/PWM output start command (RY26, RY3E).<br>• This signal turns off when CH□ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off.</td></tr>
<tr><td>RX3E</td><td>CH2</td></tr>
<tr><td>RX27</td><td>CH1</td><td rowspan="2">Setting change completed (Sampling counter/Periodic pulse counter)</td><td rowspan="2">• This signal turns on after the changes of CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) and CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F) by CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) are reflected to the high-speed counter module.<br>• This signal turns off when CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off.<br>
</td></tr>
<tr><td>RX3F</td><td>CH2</td></tr>
</table>

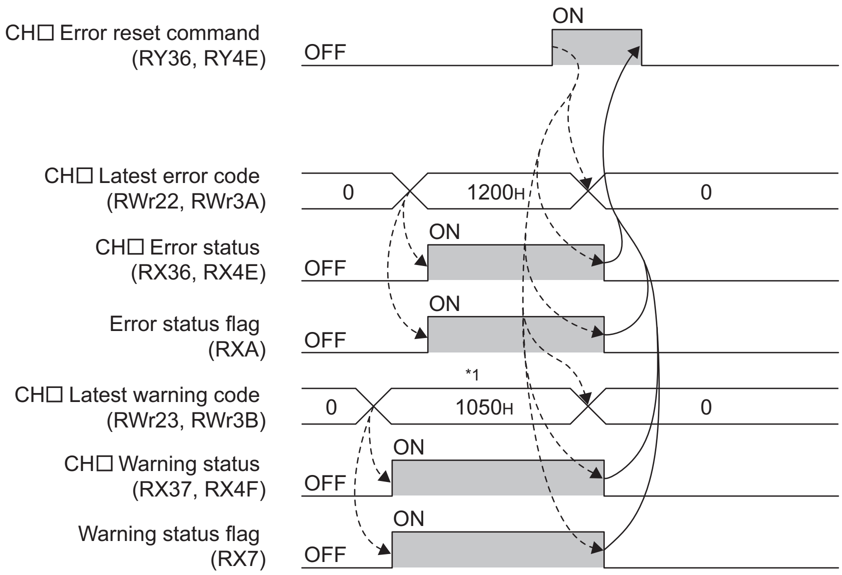
<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td>RX28</td><td>CH1</td><td rowspan="2">Update flag reset completed (Latch count value)</td><td rowspan="2">• This signal turns on when resetting CH□ Update flag (Latch count value) (RX29, RX41) by CH□ Update flag reset command (Latch count value) (RY28, RY40) is completed.<br>• This signal turns off when CH□ Update flag reset command (Latch count value) (RY28, RY40) is turned off.<br><br></td></tr>
<tr><td rowspan="3">RX40</td><td rowspan="3">CH2</td></tr>
<tr><td>Update flag reset completed (Sampling count value)</td><td>• This signal turns on when resetting CH□ Update flag (Sampling count value) (RX29, RX41) by CH□ Update flag reset command (Sampling count value) (RY28, RY40) is completed.<br>• This signal turns off when CH□ Update flag reset command (Sampling count value) (RY28, RY40) is turned off.<br>(The operation is the same as that of CH□ Update flag reset completed (Latch count value) (RX28, RX40) except the signal name.)</td></tr>
<tr><td>Update flag reset completed (Periodic pulse count value)</td><td>• This signal turns on when resetting CH□ Update flag (Periodic pulse count value) (RX29, RX41) by CH□ Update flag reset command (Periodic pulse count value) (RY28, RY40) is completed.<br>• This signal turns off when CH□ Update flag reset command (Periodic pulse count value) (RY28, RY40) is turned off.<br>(The operation is the same as that of CH□ Update flag reset completed (Latch count value) (RX28, RX40) except the signal name.)</td></tr>
</table>

<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td rowspan="2">RX29</td><td rowspan="2">CH1</td><td>Update flag (Latch count value)</td><td>• This signal turns on when CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated.<br>(Page 133, Section 8.8, Page 145, Section 8.12)<br>CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated without resetting this flag.<br>• This signal turns off when CH□ Update flag reset command (Latch count value) (RY28, RY40) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Latch count value (RWr12 to RWr13, RWr2A to RWr2B) is updated.<br>(For the overview of the operation, refer to the description of CH□ Update flag reset completed (Latch count value) (RX28, RX40).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td rowspan="2">Update flag (Sampling count value)</td><td rowspan="2">• This signal turns on when CH□ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) is updated.<br>(Page 136, Section 8.9)<br>• CH□ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) is updated without resetting this flag.<br>• This signal turns off when CH□ Update flag reset command (Sampling count value) (RY28, RY40) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Sampling count value (RWr12 to RWr13, RWr2A to RWr2B) is updated.<br>(For the overview of the operation, refer to the description of CH□ Update flag reset completed (Sampling count value) (RX28, RX40).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td rowspan="2">RX41</td><td rowspan="2">CH2</td></tr>
<tr><td>Update flag (Periodic pulse count value)</td><td>• This signal turns on when CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) are updated.<br>(Page 139, Section 8.10)<br>• CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) are updated without resetting this flag.<br>• This signal turns off when CH□ Update flag reset command (Periodic pulse count value) (RY28, RY40) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH□ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH□ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F) are updated.<br>(For the overview of the operation, refer to the description of CH□ Update flag reset completed (Periodic pulse count value) (RX28, RX40).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
</table>

| Remote input (RX) No. | Signal name | | Description |
|---|---|---|---|
| RX2A | CH1 | Latch count value update flag reset completed (Latch counter input terminal) | • This signal turns on when resetting CH☐ Latch count value update flag (Latch counter input terminal) (RX2B, RX43) by CH☐ Latch count value update flag reset command (Latch counter input terminal) (RY2A, RY42) is completed.<br>• This signal turns off when CH☐ Latch count value update flag reset command (Latch counter input terminal) (RY2A, RY42) is turned off.<br> |
| RX42 | CH2 | | |
| RX2B | CH1 | Latch count value update flag (Latch counter input terminal) | • This signal turns on when CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated.<br>(Page 127, Section 8.5)<br>• CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated without resetting this flag.<br>• This signal turns off when CH☐ Latch count value update flag reset command (Latch counter input terminal) (RY2A, RY42) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH☐ Latch count value (Latch counter input terminal) (RWr18 to RWr19, RWr30 to RWr31) is updated.<br>(For the overview of the operation, refer to the description of CH☐ Latch count value update flag reset completed (Latch counter input terminal) (RX2A, RX42).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |
| RX43 | CH2 | | |
| RX2C | CH1 | Update flag reset completed (Measured frequency value) | • This signal turns on when resetting CH☐ Update flag (Measured frequency value) (RX2D, RX45) by CH☐ Update flag reset command (Measured frequency value) (RY2C, RY44) is completed.<br>• This signal turns off when CH☐ Update flag reset command (Measured frequency value) (RY2C, RY44) is turned off.<br> |
| RX44 | CH2 | | |
| | | Update flag reset completed (Measured rotation speed value) | • This signal turns on when resetting CH☐ Update flag (Measured rotation speed value) (RX2D, RX45) by CH☐ Update flag reset command (Measured rotation speed value) (RY2C, RY44) is completed.<br>• This signal turns off when CH☐ Update flag reset command (Measured rotation speed value) (RY2C, RY44) is turned off.<br>(The operation is the same as that of CH☐ Update flag reset completed (Measured frequency value) (RX2C, RX44) except the signal name.) |

<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td>RX2D</td><td>CH1</td><td>Update flag (Measured frequency value)</td><td>• This signal turns on when CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is updated. (Page 148, Section 8.13)<br>• CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is updated without resetting this flag.<br>• This signal turns off when CH□ Update flag reset command (Measured frequency value) (RY2C, RY44) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Measured frequency value (RWr1A to RWr1B, RWr32 to RWr33) is updated.<br>(For the overview of the operation, refer to the description of CH□ Update flag reset completed (Measured frequency value) (RX2C, RX44).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td>RX45</td><td>CH2</td><td>Update flag (Measured rotation speed value)</td><td>• This signal turns on when CH□ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is updated. (Page 152, Section 8.14)<br>• CH□ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is updated without resetting this flag.<br>• This signal turns off when CH□ Update flag reset command (Measured rotation speed value) (RY2C, RY44) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Measured rotation speed value (RWr1A to RWr1B, RWr32 to RWr33) is updated.<br>(For the overview of the operation, refer to the description of CH□ Update flag reset completed (Measured rotation speed value) (RX2C, RX44).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td>RX31</td><td>CH1</td><td rowspan="2">Measured pulse value update flag reset completed (Function input terminal)</td><td rowspan="2">• This signal turns on when resetting CH□ Measured pulse value update flag (Function input terminal) (RX32, RX4A) by CH□ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) is completed.<br>• This signal turns off when CH□ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) is turned off.<br><br></td></tr>
<tr><td>RX49</td><td>CH2</td></tr>
<tr><td>RX32</td><td>CH1</td><td rowspan="2">Measured pulse value update flag (Function input terminal)</td><td rowspan="2">• This signal turns on when CH□ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) is updated.<br>• CH□ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) is updated without resetting this flag.<br>• This signal turns off when CH□ Measured pulse value update flag reset command (Function input terminal) (RY31, RY49) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Measured pulse value (Function input terminal) (RWr1C to RWr1D, RWr34 to RWr35) is updated.<br>(For the overview of the operation, refer to the description of CH□ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.</td></tr>
<tr><td>RX4A</td><td>CH2</td></tr>
</table>

| Remote input (RX) No. | | Signal name | Description |
|---|---|---|---|
| RX33 | CH1 | Measured pulse value update flag reset completed (Latch counter input terminal) | • This signal turns on when resetting CH□ Measured pulse value update flag (Latch counter input terminal) (RX34, RX4C) by CH□ Measured pulse value update flag reset command (Latch counter input terminal) (RY33, RY4B) is completed.<br>• This signal turns off when CH□ Measured pulse value update flag reset command (Latch counter input terminal) (RY33, RY4B) is turned off.<br><br>Controlled by the high-speed counter module<br>Controlled by the program<br> |
| RX4B | CH2 | | |
| RX34 | CH1 | Measured pulse value update flag (Latch counter input terminal) | • This signal turns on when CH□ Measured pulse value (Latch counter input terminal) (RWr1E to RWr1F, RWr36 to RWr37) is updated.<br>• CH□ Measured pulse value (Latch counter input terminal) (RWr1E to RWr1F, RWr36 to RWr37) is updated without resetting this flag.<br>• This signal turns off when CH□ Measured pulse value update flag reset command (Latch counter input terminal) (RY33, RY4B) is turned on.<br>• Up to $\Delta T_1$*1 delay occurs until this signal turns on after CH□ Measured pulse value (Latch counter input terminal) (RWr1E to RWr1F, RWr36 to RWr37) is updated.<br>(For the overview of the operation, refer to the description of CH□ Measured pulse value update flag reset completed (Latch counter input terminal) (RX33, RX4B).)<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |
| RX4C | CH2 | | |
| RX35 | CH1 | ON width setting change completed (PWM output) | • This signal turns on when the changes of CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) are reflected to the high-speed counter module by CH□ ON width setting change request (PWM output) (RY35, RY4D).<br>• This signal turns off when CH□ ON width setting change request (PWM output) (RY35, RY4D) is turned off.<br><br>Controlled by the high-speed counter module<br>Controlled by the program<br> |
| RX4D | CH2 | | |

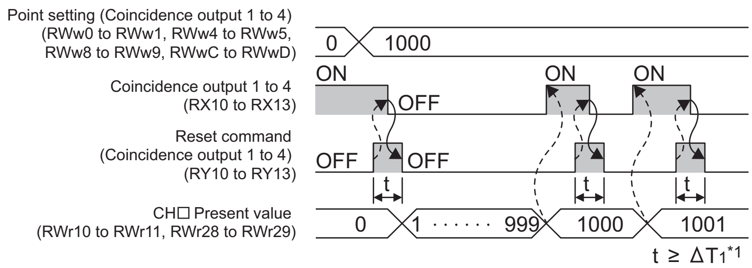
<table>
<tr><th>Remote input (RX) No.</th><th colspan="2">Signal name</th><th>Description</th></tr>
<tr><td>RX36</td><td>CH1</td><td rowspan="2">Error status</td><td rowspan="2">
• This signal turns on when a moderate error or major error occurs on a channel corresponding to this signal.<br>
• This signal turns off when CH□ Error reset command (RY36, RY4E) is turned on and no moderate error or major error newly occurs.<br>
<br>
- - - -▶ Controlled by the high-speed counter module<br>
——▶ Controlled by the program<br>


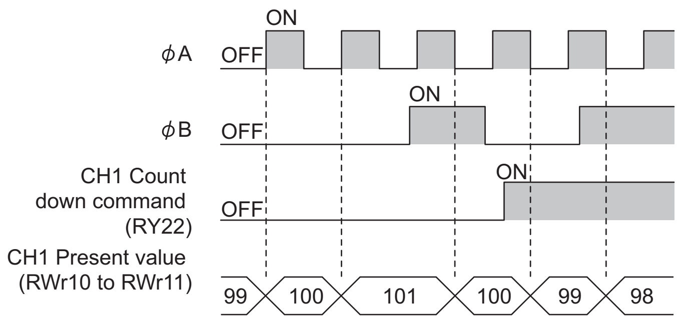
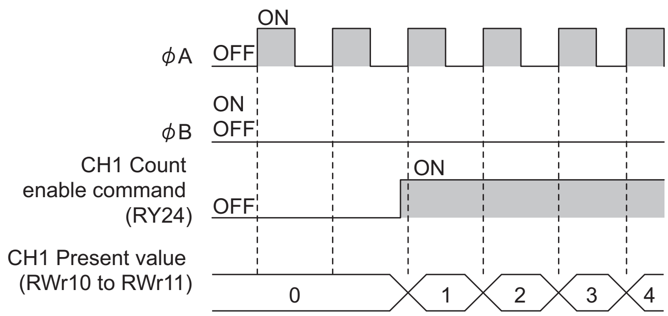
*1 This signal cannot be reset arbitrarily by output signals such as CH□ Error reset command (RY36, RY4E) depending on warning codes (error codes of minor errors). For details, refer to Page 208, Section 11.2.
</td></tr>
<tr><td>RX4E</td><td>CH2</td></tr>
<tr><td>RX37</td><td>CH1</td><td rowspan="2">Warning status</td><td rowspan="2">
• This signal turns on when a minor error occurs on a channel corresponding to this signal.<br>
• This signal turns off when CH□ Error reset command (RY36, RY4E) is turned on and no minor error newly occurs. Some warning codes (error codes of minor errors) cannot be reset by turning on CH□ Error reset command (RY36, RY4E). For details, refer to Page 208, Section 11.2.<br>
• This signal turns off when no minor error newly occurs five seconds after a minor error occurred. (For the overview of the operation, refer to the description of CH□ Error status (RX36, RX4E).) However, this signal may not turn off even after five seconds depending on warning codes (error codes of minor errors). For details, refer to Page 208, Section 11.2.
</td></tr>
<tr><td>RX4F</td><td>CH2</td></tr>
</table>

# Appendix 1.2 Details of remote output signals

The following shows details of remote output signals.

| Remote output (RY) No. | Signal name | Operation timing | Description |
|---|---|---|---|
| RY8 | Initial data processing completion flag | | • This signal is turned on when initial data processing has been completed after the module is powered on, the remote reset is performed, or parameters are initialized.<br>• When this signal is turned on, the high-speed counter module starts counting regarding the content of the remote register (RWw) as the initial value.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY9 | Initial data setting request flag | | • Turn on this signal to activate the setting data in the parameter area of the remote buffer memory. Turn on this signal to save the setting values of the extended parameter area into the nonvolatile memory.<br>• When this signal is turned on, the setting values in the parameter area of the remote buffer memory are reflected to the inside of the module. In addition, the setting values of the extended parameter area are saved into the nonvolatile memory.<br>• When this signal is turned on, all the following remote input signals turn off.<br>• Warning status flag (RX7)<br>• Error status flag (RXA)<br>• Remote READY (RXB)<br>• Coincidence output 1 to 4 (RX10 to RX13)<br>• Setting change completed (Coincidence output 1 to 4) (RX14 to RX17)<br>• CH□ Preset/replace completion (RX21, RX39)<br>• CH□ External preset/replace (Z Phase) request detection (RX23, RX3B)<br>• CH□ Counter function detection (RX25, RX3D)<br>• CH□ Cam switch execute/PWM output (RX26, RX3E)<br>• CH□ Setting change completed (Sampling counter/Periodic pulse counter) (RX27, RX3F)<br>• CH□ Update flag reset completed (Latch count value/Sampling count value/Periodic pulse count value) (RX28, RX40)<br>• CH□ Update flag (Latch count value/Sampling count value/Periodic pulse count value) (RX29, RX41)<br>• CH□ Latch count value update flag reset completed (Latch counter input terminal) (RX2A, RX42)<br>• CH□ Latch count value update flag (Latch counter input terminal) (RX2B, RX43)<br>• CH□ Update flag reset completed (Measured frequency value/Measured rotation speed value) (RX2C, RX44)<br>• CH□ Update flag (Measured frequency value/Measured rotation speed value) (RX2D, RX45)<br>• CH□ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49)<br>• CH□ Measured pulse value update flag (Function input terminal) (RX32, RX4A)<br>• CH□ Measured pulse value update flag reset completed (Latch counter input terminal) (RX33, RX4B)<br>• CH□ Measured pulse value update flag (Latch counter input terminal) (RX34, RX4C)<br>• CH□ ON width setting change completed (PWM output) (RX35, RX4D)<br>• CH□ Error status (RX36, RX4E)<br>• CH□ Warning status (RX37, RX4F)<br>• External input signals of the extension input module (RX50 to RX5F) |

| Remote output (RY) No. | Signal name | Operation timing | Description |
|---|---|---|---|
| RY9 | Initial data setting request flag | | • When this signal is turned on, all the remote registers (RWr) of the high-speed counter module are cleared to 0.<br>• When this signal is turned on, all the following remote buffer memory areas are cleared to 0.<br>• Channel assignment (Coincidence output 1 to 4) (address: $0600_H$)<br>• CH☐ Operation mode (address: $0620_H$, $0640_H$)<br>• CH☐ Selected counter function (address: $0621_H$, $0641_H$)<br>• For details of the ON/OFF timing of this signal, refer to Page 236, Appendix 1.1. |
| RY10 | Reset command (Coincidence output 1) | | • Turn on this signal to turn off Coincidence output 1 to 4 (RX10 to RX13) and coincidence output 1 to 4 terminals (EQU1 to EQU4).<br>• This signal is valid only when Coincidence Output Function (0) is selected in Comparison output setting (address: $0100_H$) and Coincidence Output (00) is selected in Coincidence output comparison condition setting (address: $0102_H$).<br>Controlled by the high-speed counter module<br>Controlled by the program<br><br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |
| RY11 | Reset command (Coincidence output 2) | | |
| RY12 | Reset command (Coincidence output 3) | | |
| RY13 | Reset command (Coincidence output 4) | | |
| RY14 | Setting change request (Coincidence output 1) | | • Turn on this signal to reflect the changes of the following remote registers (RWw) to the high-speed counter module in the coincidence output function.<br>• Point setting (Coincidence output 1 to 4)/Lower limit value setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD)<br>• Upper limit value setting (Coincidence output 1 to 4) (RWw2 to RWw3, RWw6 to RWw7, RWwA to RWwB, RWwE to RWwF)<br>• For Coincidence output 1, when Setting change request (Coincidence output 1) (RY14) is turned on, the changes of Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) and Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) are reflected to the high-speed counter module. After the setting value is reflected, Setting change completed (Coincidence output 1) (RX14) turns on.<br>• For Coincidence output 2 to 4, each corresponding remote I/O signals and remote register (RWw) are used.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY15 | Setting change request (Coincidence output 2) | | |
| RY16 | Setting change request (Coincidence output 3) | | |
| RY17 | Setting change request (Coincidence output 4) | | |
| RY1F | External power supply monitor request flag | | Turn on this signal to activate the external power supply monitoring function.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY20 | CH1 Coincidence output enable command | | • Turn on this signal to enable output to coincidence output 1 to 4 terminals (EQU1 to EQU4) in the coincidence output function.<br>• This signal is valid to all the coincidence output 1 to 4 terminals (EQU1 to EQU4) assigned to the channel.<br>• Up to $\Delta T_1$*1 is taken until this signal has been turned on.<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4. |
| RY38 | CH2 Coincidence output enable command | | |

<table>
<tr><th>Remote output (RY) No.</th><th colspan="2">Signal name</th><th>Operation timing</th><th>Description</th></tr>
<tr><td>RY21</td><td>CH1</td><td rowspan="2">Preset/replace command</td><td rowspan="2"></td><td rowspan="2">• Turn on this signal to replace a count value with the preset value.<br>• The value cannot be replaced by turning on this signal while CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) is on. Turn off CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) by using CH☐ External preset/replace (Z Phase) request detection reset command (RY23, RY3B).<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.)</td></tr>
<tr><td>RY39</td><td>CH2</td></tr>
<tr><td>RY22</td><td>CH1</td><td rowspan="2">Count down command</td><td rowspan="2"></td><td rowspan="2">• Turn on this signal to count down pulses.<br>• This signal is valid when 1-Phase Multiple of 1 (0) or 1-Phase Multiple of 2 (1) is selected for CH☐ Pulse input mode (address: $0122_H$, $0142_H$).<br>• Inputting pulse in phase B can also start counting down pulses.<br>• The following figure shows the overview of the operation (when 1-Phase Multiple of 1 (0) is selected for CH1 Pulse input mode (address: $0122_H$)).<br>• Up to $\Delta T_1$[*1] is taken until this signal has been turned on.<br>*1 For $\Delta T_1$, refer to Page 283, Appendix 4.<br><br></td></tr>
<tr><td>RY3A</td><td>CH2</td></tr>
<tr><td>RY23</td><td>CH1</td><td rowspan="2">External preset/replace (Z Phase) request detection reset command</td><td rowspan="2"></td><td rowspan="2">• Turn on this signal to turn off CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B).<br>• A count value cannot be replaced with the preset value while CH☐ External preset/replace (Z Phase) request detection (RX23, RX3B) is on.<br>• For the overview of the operation, refer to Page 236, Appendix 1.1.</td></tr>
<tr><td>RY3B</td><td>CH2</td></tr>
<tr><td>RY24</td><td>CH1</td><td rowspan="2">Count enable command</td><td rowspan="2"></td><td rowspan="2">• Turn on this signal to count pulses.<br>• The following figure shows the overview of the operation (when 1-Phase Multiple of 1 (0) is selected for CH1 Pulse input mode (address: $0122_H$)).<br><br></td></tr>
<tr><td>RY3C</td><td>CH2</td></tr>
</table>

| Remote output (RY) No. | Signal name | | Operation timing | Description |
|---|---|---|---|---|
| RY25 | CH1 | Selected counter function start command | | • Turn on this signal to perform the selected counter functions.<br>• When Count Disable Function (0) or Periodic Pulse Counter Function (3) is selected for CH□ Counter function selection (address: $0126_H$, $0146_H$), this signal is valid while being on.<br>• When Sampling Counter Function (2) or Latch Counter Function (1) is selected for CH□ Counter function selection (address: $0126_H$, $0146_H$), this signal becomes valid at the rising edge (off to on).<br>• When Count disable/Preset/replace Function (4) or Latch counter/Preset/replace Function (5) is selected for CH□ Counter function selection (address: $0126_H$, $0146_H$), this signal is invalid.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY3D | CH2 | | | |
| RY26 | CH1 | Cam switch execute command/PWM output start command | | • Turn on this signal to execute the cam switch function.<br>• Turn on this signal to start PWM output. |
| RY3E | CH2 | | | |
| RY27 | CH1 | Setting change request (Sampling counter/Periodic pulse counter) | | • Turn on this signal to activate the changes of CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) and CH□ Cycle setting (Sampling counter/Periodic pulse counter) (RWw17, RWw2F).<br>• When this signal is turned on, the setting values written into the above remote registers (RWw) are reflected to the high-speed counter module. After the setting values are reflected, CH□ Setting change completed (Sampling counter/Periodic pulse counter) (RX27, RX3F) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY3F | CH2 | | | |
| RY28 | CH1 | Update flag reset command (Latch count value) | | • Turn on this signal to reset CH□ Update flag (Latch count value) (RX29, RX41).<br>• When this signal is turned on, CH□ Update flag (Latch count value) (RX29, RX41) turns off. After resetting is completed, CH□ Update flag reset completed (Latch count value) (RX28, RX40) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| | | Update flag reset command (Sampling count value) | | • Turn on this signal to reset CH□ Update flag (Sampling count value) (RX29, RX41).<br>• When this signal is turned on, CH□ Update flag (Sampling count value) (RX29, RX41) turns off. After resetting is completed, CH□ Update flag reset completed (Sampling count value) (RX28, RX40) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY40 | CH2 | Update flag reset command (Periodic pulse count value) | | • Turn on this signal to reset CH□ Update flag (Periodic pulse count value) (RX29, RX41).<br>• When this signal is turned on, CH□ Update flag (Periodic pulse count value) (RX29, RX41) turns off. After resetting is completed, CH□ Update flag reset completed (Periodic pulse count value) (RX28, RX40) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY2A | CH1 | Latch count value update flag reset command (Latch counter input terminal) | | • Turn on this signal to reset CH□ Latch count value update flag (Latch counter input terminal) (RX2B, RX43).<br>• When this signal is turned on, CH□ Latch count value update flag (Latch counter input terminal) (RX2B, RX43) turns off. After resetting is completed, CH□ Latch count value update flag reset completed (Latch counter input terminal) (RX2A, RX42) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY42 | CH2 | | | |

| Remote output (RY) No. | Signal name | | Operation timing | Description |
|---|---|---|---|---|
| RY2C | CH1 | Update flag reset command (Measured frequency value) | | • Turn on this signal to reset CH□ Update flag (Measured frequency value) (RX2D, RX45).<br>• When this signal is turned on, CH□ Update flag (Measured frequency value) (RX2D, RX45) turns off. After resetting is completed, CH□ Update flag reset completed (Measured frequency value) (RX2C, RX44) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY44 | CH2 | Update flag reset command (Measured rotation speed value) | | • Turn on this signal to reset CH□ Update flag (Measured rotation speed value) (RX2D, RX45).<br>• When this signal is turned on, CH□ Update flag (Measured rotation speed value) (RX2D, RX45) turns off. After resetting is completed, CH□ Update flag reset completed (Measured rotation speed value) (RX2C, RX44) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY30 | CH1 | Pulse measurement start command (Function input terminal) | | • Turn on this signal to start measuring pulses using CH□ Function input terminal (FUNC1, FUNC2).<br>• When this signal is turned on, the measurement of pulses using CH□ Function input terminal (FUNC1, FUNC2) starts. When the measurement starts, Operating (1) is set in CH□ Pulse measurement flag (Function input terminal) (RWr20.b6, RWr38.b6). |
| RY48 | CH2 | | | |
| RY31 | CH1 | Measured pulse value update flag reset command (Function input terminal) | | • Turn on this signal to reset CH□ Measured pulse value update flag (Function input terminal) (RX32, RX4A).<br>• When this signal is turned on, CH□ Measured pulse value update flag (Function input terminal) (RX32, RX4A) turns off. After resetting is completed, CH□ Measured pulse value update flag reset completed (Function input terminal) (RX31, RX49) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY49 | CH2 | | | |
| RY32 | CH1 | Pulse measurement start command (Latch counter input terminal) | | • Turn on this signal to start measuring pulses using CH□ Latch counter input terminal (LATCH1, LATCH2).<br>• When this signal is turned on, the measurement of pulses using CH□ Latch counter input terminal (LATCH1, LATCH2) starts. When the measurement starts, Operating (1) is set in CH□ Pulse measurement flag (Latch counter input terminal) (RWr20.b7, RWr38.b7). |
| RY4A | CH2 | | | |
| RY33 | CH1 | Measured pulse value update flag reset command (Latch counter input terminal) | | • Turn on this signal to reset CH□ Measured pulse value update flag (Latch counter input terminal) (RX34, RX4C).<br>• When this signal is turned on, CH□ Measured pulse value update flag (Latch counter input terminal) (RX34, RX4C) turns off. After resetting is completed, CH□ Measured pulse value update flag reset completed (Latch counter input terminal) (RX33, RX4B) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY4B | CH2 | | | |
| RY35 | CH1 | ON width setting change request (PWM output) | | • Turn on this signal to activate the changes of CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) during PWM output.<br>• When this signal is turned on, CH□ ON width setting (PWM output) (RWw1E to RWw1F, RWw36 to RWw37) is reflected to the high-speed counter module. After the setting values are reflected, CH□ ON width setting change completed (PWM output) (RX35, RX4D) turns on.<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY4D | CH2 | | | |
| RY36 | CH1 | Error reset command | | • Turn on this signal to reset CH□ Latest error code (RWr22, RWr3A) and CH□ Latest warning code (RWr23, RWr3B).<br>(For the overview of the operation, refer to Page 236, Appendix 1.1.) |
| RY4E | CH2 | | | |

A

Appendix 1 Details of Remote I/O Signals
Appendix 1.2 Details of remote output signals

**Remark**

The figures in the operation timing indicate the following.

 This signal is valid while being on.

 This signal is valid at the rising edge (off to on).

**Point**

Set $\Delta T_1$ or longer for the ON/OFF time of the remote output signals.

For $\Delta T_1$, refer to Page 283, Appendix 4.

# Appendix 2 Details of Remote Registers

The following shows details of remote registers.

## (1) Remote registers (RWr0 to RWr1)

<table>
<tr><th colspan="2">Address (RWr)</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td colspan="2">0</td><td>Counter value greater/smaller signal</td><td>
• When the coincidence output function is selected and Coincidence output comparison condition setting (address: $0102_H$) is set to "Coincidence Output (00)", this area stores the magnitude relation between the values in Point setting (Coincidence output 1 to 4) (RWw0 to RWw1, RWw4 to RWw5, RWw8 to RWw9, RWwC to RWwD) and CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29).
<table>
<tr><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 rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td rowspan="2">0</td><td colspan="2">Coincidence output 4</td><td colspan="2">Coincidence output 3</td><td colspan="2">Coincidence output 2</td><td colspan="2">Coincidence output 1</td></tr>
<tr><td>Counter value greater</td><td>Counter value smaller</td><td>Counter value greater</td><td>Counter value smaller</td><td>Counter value greater</td><td>Counter value smaller</td><td>Counter value greater</td><td>Counter value smaller</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td colspan="8"></td></tr>
<tr><td colspan="8">0 (fixed)</td><td colspan="8"></td></tr>
</table>
Point setting (Coincidence output 1 to 4) > Present value ... Counter value greater: 0/Counter value smaller: 1<br>
Point setting (Coincidence output 1 to 4) = Present value ... Counter value greater: 0/Counter value smaller: 0<br>
Point setting (Coincidence output 1 to 4) < Present value ... Counter value greater: 1/Counter value smaller: 0<br>
• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared.
</td><td>$0000_H$</td></tr>
<tr><td colspan="2">1</td><td>EQU1 to EQU4 terminal status</td><td>
• This area stores the statuses of the coincidence output 1 to 4 terminals (EQU1 to EQU4).
<table>
<tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>EQU4</td><td>EQU3</td><td>EQU2</td><td>EQU1</td></tr>
<tr><td colspan="12">0 (fixed)</td><td colspan="4">0: OFF<br>1: ON</td></tr>
</table>
• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared.
</td><td>$0000_H$</td></tr>
</table>

## (2) Remote registers (RWr2 to RWr3)

| Address (RWr) CH1 | Address (RWr) CH2 | Name | Description | Default |
|---|---|---|---|---|
| 2 | | Cam switch output signal | • When the cam switch function is selected, this area stores the comparison result of "Cam switch function, step No.1 to No.16 setting (Output 1 to 16)" in the remote buffer memory and CH□ Present value (RWr10 to RWr11, RWr28 to RWr29).<br>b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0<br>16) 15) 14) 13) 12) 11) 10) 9) 8) 7) 6) 5) 4) 3) 2) 1)<br>0: OFF<br>1: ON<br>1) Cam switch status (Output 1)<br>2) Cam switch status (Output 2)<br>: :<br>15) Cam switch status (Output 15)<br>16) Cam switch status (Output 16)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | $0000_H$ |
| 3 | | Cam switch output terminal status | • This area stores the output terminal statuses of the extension output module assigned using the cam switch function.<br>b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0<br>16) 15) 14) 13) 12) 11) 10) 9) 8) 7) 6) 5) 4) 3) 2) 1)<br>0: OFF<br>1: ON<br>1) Cam switch status (Output 1)<br>2) Cam switch status (Output 2)<br>: :<br>15) Cam switch status (Output 15)<br>16) Cam switch status (Output 16)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | $0000_H$ |

## (3) Remote registers (RWr10 to RWr17, RWr28 to RWr2F)

| Address (RWr) CH1 | Address (RWr) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 10<br>11 | 28<br>29 | Present value | • This area stores the counter present value.<br>• The update cycle of this area is $\Delta T_2$. [*1]<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| 12<br>13 | 2A<br>2B | Latch count value | • This area stores the count value latched when the latch counter function (counter function selection) or the latch counter/preset/replace function is selected. (For the overview of the operation, refer to Page 133, Section 8.8 or Page 145, Section 8.12.)<br>• This area stores the value which is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) of when CH☐ Function input terminal (FUNC1, FUNC2) or CH☐ Selected counter function start command (RY25, RY3D) is input.<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| | | Sampling count value | • This area stores the count values in the sampling period when the sampling counter function is selected. (For the overview of the operation, refer to Page 136, Section 8.9.)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | |
| | | Periodic pulse count, difference value | • This area stores the count value per cycle time (the difference value) when the periodic pulse counter function is selected. (For the overview of the operation, refer to Page 139, Section 8.10.)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | |
| 14<br>15 | 2C<br>2D | Periodic pulse count, present value | • This area stores the value which is stored in CH☐ Present value (RWr10 to RWr11, RWr28 to RWr29) after the cycle time elapsed when the periodic pulse counter function is selected.<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| 16<br>17 | 2E<br>2F | Periodic pulse count value update check | • This area stores the same value as the value in CH☐ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) when the periodic pulse counter function is selected.<br>• When CH☐ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B) is not equivalent to CH☐ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F), a data mismatch occurs. Read again CH☐ Periodic pulse count, difference value (RWr12 to RWr13, RWr2A to RWr2B), CH☐ Periodic pulse count, present value (RWr14 to RWr15, RWr2C to RWr2D), and CH☐ Periodic pulse count value update check (RWr16 to RWr17, RWr2E to RWr2F).<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |

*1 For $\Delta T_2$, refer to Page 283, Appendix 4.

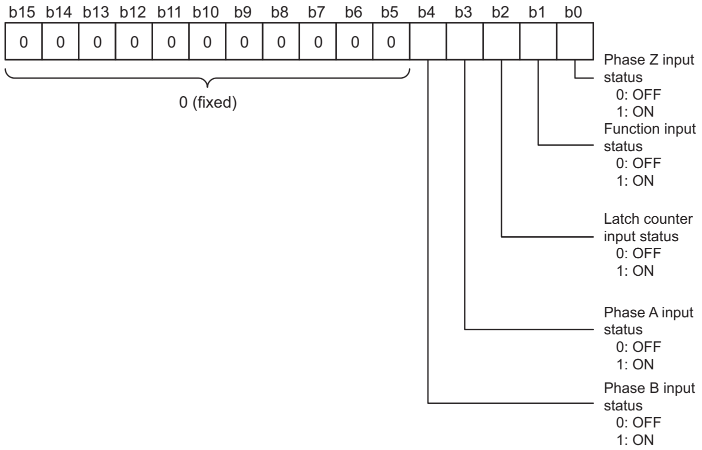
### (4) Remote registers (RWr18 to RWr1F, RWr30 to RWr37)

| Address (RWr) CH1 | Address (RWr) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 18<br>19 | 30<br>31 | Latch count value (Latch counter input terminal) | • This area stores the count value latched when the latch counter function by latch counter input terminal is selected.<br>(For the overview of the operation, refer to Page 127, Section 8.5.)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| 1A<br>1B | 32<br>33 | Measured frequency value | • This area stores the frequency value measured when the frequency measurement function is selected.<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| | | Measured rotation speed value | • This area stores the rotation speed value measured when the rotation speed measurement function is selected.<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | |
| 1C<br>1D | 34<br>35 | Measured pulse value (Function input terminal) | • This area stores the value of the ON width or OFF width of pulses input to CH□ Function input terminal (FUNC1, FUNC2) measured when the pulse measurement function is selected.<br>• The following shows the range of values which can be stored.<br>0 to 2147483647 (increments of 0.1μs)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| 1E<br>1F | 36<br>37 | Measured pulse value (Latch counter input terminal) | • This area stores the value of the ON width or OFF width of pulses input to CH□ Latch counter input terminal (LATCH1, LATCH2) measured when the pulse measurement function is selected.<br>• The following shows the range of values which can be stored.<br>0 to 2147483647 (increments of 0.1μs)<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |

## (5) Remote registers (RWr20, RWr38)

| Address (RWr) CH1 | Address (RWr) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 20 | 38 | Status | • This area stores various statuses as follows.<br>b15 b14 b13 b12 b11 b10 b9 b8: 0 0 0 0 0 0 0 0 — 0 (fixed)<br>b0: Count-up/ count-down status 0: Count-up 1: Count-down<br>b1: Underflow detection flag 0: Not detected 1: Detected<br>b2: Overflow detection flag 0: Not detected 1: Detected<br>b3: Sampling counter/ Periodic pulse counter operation flag 0: Not operating 1: Operating<br>b4: Frequency measurement flag 0: Not operating 1: Operating<br>b5: Rotation speed measurement flag 0: Not operating 1: Operating<br>b6: Pulse measurement flag (Function input terminal) 0: Not operating 1: Operating<br>b7: Pulse measurement flag (Latch counter input terminal) 0: Not operating 1: Operating<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | $0000_H$ |

## (6) Remote registers (RWr21 to RWr23, RWr39 to RWr3B)

| Address (RWr) CH1 | Address (RWr) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 21 | 39 | External input status | • This area stores the input statuses of phase Z, the function, the latch counter, phase A, and phase B of the external I/O connector.<br><br>• When CH☐ Operation mode setting (address:$0120_H$, $0140_H$) is set to either of Frequency Measurement Mode (1), Rotation Speed Measurement Mode (2), or PWM Output Mode (4), Function input status (RWr21.b1, RWr39.b1) is always OFF (0).<br>• With Negative Logic (1) being set in CH☐ Function input logic setting (address: $0127_H$, $0147_H$) or CH☐ Latch counter input logic setting (address: $0128_H$, $0148_H$), its input status changes to OFF (0) when a voltage is applied.<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | $0000_H$ |
| 22 | 3A | Latest error code | • This area stores the latest error code of the generated major error or moderate error.<br>• When multiple errors in the same category occur, this area stores the error code of the later error.<br>• When a moderate error occurs while a major error is occurring, this area does not store the error code of the moderate error.<br>• For the error code, refer to Page 208, Section 11.2. | $0000_H$ |
| 23 | 3B | Latest warning code | • This area stores the error code of the generated minor error.<br>• When multiple minor errors occur, this area stores the error code of the later error.<br>• For the error code, refer to Page 208, Section 11.2. | $0000_H$ |

## (7) Remote registers (RWw0 to RWw1)

<table>
<tr><th colspan="2">Address (RWw)</th><th rowspan="2">Item</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td rowspan="2" colspan="2">0<br>1</td><td>Point setting<br>(Coincidence output 1)</td><td>• When the coincidence output function is selected and a bit corresponding to Coincidence output 1 of Coincidence output comparison condition setting (address: $0102_H$) is set to "Coincidence Output (00)", set the point of coincidence output.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When Setting change request (Coincidence output 1) (RY14) is turned off then on</td><td rowspan="2">0</td></tr>
<tr><td>Lower limit value setting<br>(Coincidence output 1)</td><td>• When the coincidence output function is selected and a bit corresponding to Coincidence output 1 of Coincidence output comparison condition setting (address: $0102_H$) is set to "Within-range Output (01)" or "Out-of-range Output (10)", set the lower limit value.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When Setting change request (Coincidence output 1) (RY14) is turned off then on</td></tr>
</table>

### (8) Remote registers (RWw2 to RWwF)

| Address (RWw) | | Item | Description | Default |
|---|---|---|---|---|
| CH1 | CH2 | | | |
| 2<br>3 | | Upper limit value setting (Coincidence output 1) | • When the coincidence output function is selected and a bit corresponding to Coincidence output 1 of Coincidence output comparison condition setting (address: $0102_H$) is set to "Within-range Output (01)" or "Out-of-range Output (10)", set the upper limit value.<br>• When a bit corresponding to Coincidence output 1 of Coincidence output comparison condition setting (address: $0102_H$) is set to "Coincidence Output (00)", this setting value is not used.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When Setting change request (Coincidence output 1) (RY14) is turned off then on | 0 |
| 4<br>5 | | Point setting (Coincidence output 2)<br>Lower limit value setting (Coincidence output 2) | • This setting is for Coincidence output 2 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) except the coincidence output number. | 0 |
| 6<br>7 | | Upper limit value setting (Coincidence output 2) | • This setting is for Coincidence output 2 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) except the coincidence output number. | 0 |
| 8<br>9 | | Point setting (Coincidence output 3)<br>Lower limit value setting (Coincidence output 3) | • This setting is for Coincidence output 3 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) except the coincidence output number. | 0 |
| A<br>B | | Upper limit value setting (Coincidence output 3) | • This setting is for Coincidence output 3 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) except the coincidence output number. | 0 |
| C<br>D | | Point setting (Coincidence output 4)<br>Lower limit value setting (Coincidence output 4) | • This setting is for Coincidence output 4 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Point setting (Coincidence output 1)/Lower limit value setting (Coincidence output 1) (RWw0 to RWw1) except the coincidence output number. | 0 |
| E<br>F | | Upper limit value setting (Coincidence output 4) | • This setting is for Coincidence output 4 of the coincidence output function.<br>• The details on this area such as the setting range are the same as those of Upper limit value setting (Coincidence output 1) (RWw2 to RWw3) except the coincidence output number. | 0 |

## (9) Remote registers (RWw10 to RWw13, RWw28 to RWw2B)

| Address (RWw) CH1 | Address (RWw) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 10<br>11 | 28<br>29 | Ring counter lower limit value | • When the ring counter function is selected and CH□ Counter format (address: $0124_H$, $0144_H$) is set to Ring Counter (1), set the count range.<br>• Set the ring counter upper limit value as well.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When CH□ Count enable command (RY24, RY3C) is turned off then on | 0 |
| 12<br>13 | 2A<br>2B | Ring counter upper limit value | • When the ring counter function is selected and CH□ Counter format (address: $0124_H$, $0144_H$) is set to Ring Counter (1), set the count range.<br>• Set the ring counter lower limit value as well.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When CH□ Count enable command (RY24, RY3C) is turned off then on | 0 |

## (10)Remote registers (RWw14 to RWw15, RWw2C to RWw2D)

| Address (RWw) CH1 | Address (RWw) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 14<br>15 | 2C<br>2D | Preset value setting | • Set a count value to be replaced with the preset value for either of the preset/replace (at coincidence output) function, the preset/replace function, the count disable/preset/replace function, or the latch counter/preset/replace function.<br>• The following shows the setting range.<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) While Initial data processing request flag (RX8) and Initial data setting request flag (RY9) are off | 0 |

## (11)Remote registers (RWw16 to RWw17, RWw2E to RWw2F)

| Address (RWw) CH1 | Address (RWw) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 16 | 2E | Time unit setting (Sampling counter/Periodic pulse counter) | • Set a unit of time for the sampling counter function or the periodic pulse counter function.<br>• The following shows the setting range.<br>0: 1ms<br>1: 10ms<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on | 0 |
| 17 | 2F | Cycle setting (Sampling counter/Periodic pulse counter) | • Set the sampling period for the sampling counter function or the cycle time of the periodic pulse counter function.<br>• The following shows the setting range.<br>1 to 65535<br>(When CH□ Time unit setting (Sampling counter/Periodic pulse counter) (RWw16, RWw2E) is set to 1ms (0), the sampling period or the cycle time is indicated in increments of 1ms and when set to 10ms (1), in increments of 10ms.)<br>• The reflection timing of the setting value<br>1) When Initial data processing request flag (RX8) turns off<br>2) When Initial data setting request flag (RY9) is turned off then on (only while Initial data processing request flag (RX8) is off)<br>3) When CH□ Setting change request (Sampling counter/Periodic pulse counter) (RY27, RY3F) is turned off then on | 0 |

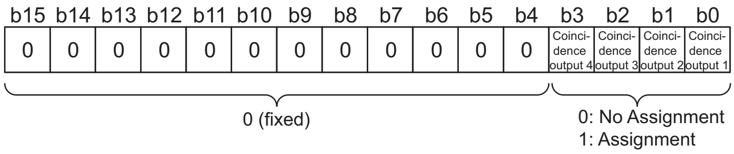
## (12)Remote registers (RWw18 to RWw19, RWw30 to RWw31)

<table>
<tr><th colspan="2">Address (RWw)</th><th rowspan="2">Item</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td rowspan="2">18</td><td rowspan="2">30</td><td>Time unit setting (Frequency measurement)</td><td>• Set a unit of time of frequency measurement for frequency measurement function.<br>• The following shows the setting range.<br>0: 0.01s<br>1: 0.1s<br>2: 1s<br>• The reflection timing of the setting value<br>When CH□ Count enable command (RY24, RY3C) is turned off then on</td><td rowspan="2">0</td></tr>
<tr><td>Time unit setting (Rotation speed measurement)</td><td>• Set a unit of time of rotation speed measurement for the rotation speed measurement function.<br>• The following shows the setting range.<br>0: 0.01s<br>1: 0.1s<br>2: 1s<br>• The reflection timing of the setting value<br>When CH□ Count enable command (RY24, RY3C) is turned off then on</td></tr>
<tr><td rowspan="2">19</td><td rowspan="2">31</td><td>Moving average count (Frequency measurement)</td><td>• Set the number of moving average count of frequency measurement for the frequency measurement function.<br>• The following shows the setting range.<br>1 to 100 (However, when 1 is set, the operation is performed with the moving average count regarded as not being done.)<br>• The reflection timing of the setting value<br>When CH□ Count enable command (RY24, RY3C) is turned off then on</td><td rowspan="2">0</td></tr>
<tr><td>Moving average count (Rotation speed measurement)</td><td>• Set the number of moving average count of rotation speed measurement for the rotation speed measurement function.<br>• The following shows the setting range.<br>1 to 100 (However, when 1 is set, the operation is performed with the moving average count regarded as not being done.)<br>• The reflection timing of the setting value<br>When CH□ Count enable command (RY24, RY3C) is turned off then on</td></tr>
</table>

## (13)Remote registers (RWw1A to RWw1B, RWw32 to RWw33)

<table>
<tr><th colspan="2">Address (RWw)</th><th rowspan="2">Item</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td>1A<br>1B</td><td>32<br>33</td><td>Number of pulses per rotation</td><td>• Set the number of pulses per rotation for the pulse measurement function.<br>• The following shows the setting range.<br>1 to 8000000<br>• The reflection timing of the setting value<br>When CH□ Count enable command (RY24, RY3C) is turned off then on</td><td>0</td></tr>
</table>

## (14)Remote registers (RWw1D to RWw21, RWw35 to RWw39)

| Address (RWw) CH1 | Address (RWw) CH2 | Item | Description | Default |
|---|---|---|---|---|
| 1D | 35 | PWM output assignment setting | • Select an output target from Coincidence output 1 to 4 to output the PWM waveform using the PWM output function.<br>• This setting applies only to coincidence outputs where the corresponding channels are assigned using Coincidence output channel assignment setting (address: $0101_H$). Two or more points can be set.<br>• The following shows the setting range.<br><br>• The reflection timing of the setting value<br>When CH☐ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | $0000_H$ |
| 1E<br>1F | 36<br>37 | ON width setting (PWM output) | • Set the ON width of the PWM waveform for the PWM output function.<br>• The following shows the setting range.<br>0, and 10 to 10000000 (increments of 0.1μs) (Set a value that is equal to or smaller than the value in the cycle setting (PWM output).)<br>• The reflection timing of the setting value<br>1) When CH☐ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on<br>2) When CH☐ ON width setting change request (PWM output) (RY35, RY4D) is turned off then on | 0 |
| 20<br>21 | 38<br>39 | Cycle setting (PWM output) | • Set the cycle of the PWM waveform for the PWM output function.<br>• The following shows the setting range.<br>50 to 10000000 (increments of 0.1μs)<br>• The reflection timing of the setting value<br>When CH☐ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |

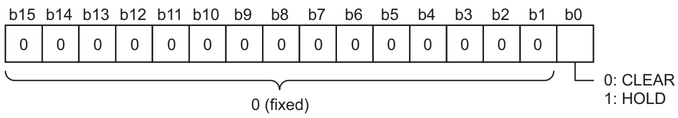
# Appendix 3 Details of Remote Buffer Memory Addresses

The following shows details of remote buffer memory addresses.

## (1) Station-based parameter data (address: $0001_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td colspan="2">$0001_H$</td><td>Input response time setting</td><td>• Set the input response time of the extension input module.<br>• The following shows the setting range.
<table>
<tr><th>Setting value</th><th>Input response time</th></tr>
<tr><td>$3_H$</td><td>2ms</td></tr>
<tr><td>$4_H$</td><td>5ms</td></tr>
<tr><td>$5_H$</td><td>10ms</td></tr>
<tr><td>$6_H$</td><td>20ms</td></tr>
<tr><td>$7_H$</td><td>70ms</td></tr>
</table>
• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on<br>• When an extension I/O module is not installed, this setting is ignored.</td><td>$0005_H$</td></tr>
</table>

## (2) Station-based parameter data (address: $0002_H$ to $0003_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td colspan="2">$0002_H$</td><td>Output HOLD/CLEAR setting</td><td>• Set whether to hold or clear the output of the high-speed counter module and the extension output module.<br>• The following shows the setting range.<br>
<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>$0000_H$</td></tr>
<tr><td colspan="2">$0003_H$</td><td>Cyclic data update watch time setting</td><td>• Set the time to monitor the data update interval of the cyclic transmission (watch time).<br>• When the cyclic transmission remains to be stopped over the cyclic data update watch time setting, the high-speed counter module is regarded as disconnected. Then the output status of the high-speed counter module and extension output module becomes HOLD or CLEAR. For details on output HOLD/CLEAR, refer to Page 167, Section 8.17.<br>• The following shows the setting range.<br>0 to 20 (increments of 100ms) (However, when 0 is set, monitoring is not performed.)<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>0</td></tr>
</table>

A

## (3) Module-based parameter data (address: $0100_H$ to $0101_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td colspan="2">$0100_H$</td><td>Comparison output setting</td><td>• Set the comparison output function.<br>• The following shows the setting range.<br>0: Coincidence Output Function<br>1: Cam Switch Function<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>0</td></tr>
<tr><td colspan="2">$0101_H$</td><td>Coincidence output channel assignment setting</td><td>• Set a channel to be compared for Coincidence output 1 to 4.<br>• The following shows the setting range.<br>
<table>
<tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>4)</td><td>3)</td><td>2)</td><td>1)</td></tr>
<tr><td colspan="12">0 (fixed)</td><td colspan="4">0: CH1<br>1: CH2</td></tr>
</table>
1) Coincidence output 1 channel assignment setting<br>2) Coincidence output 2 channel assignment setting<br>3) Coincidence output 3 channel assignment setting<br>4) Coincidence output 4 channel assignment setting<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>$0000_H$</td></tr>
</table>

## (4) Module-based parameter data (address: $0102_H$ to $0103_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td colspan="2">$0102_H$</td><td>Coincidence output comparison condition setting</td><td>• Set the comparison condition for Coincidence output 1 to 4.<br>• The following shows the setting range.<br>
<table>
<tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td colspan="2">Coincidence output 4</td><td colspan="2">Coincidence output 3</td><td colspan="2">Coincidence output 2</td><td colspan="2">Coincidence output 1</td></tr>
<tr><td colspan="8">0 (fixed)</td><td colspan="8">00: Coincidence Output<br>01: Within-range Output<br>10: Out-of-range Output</td></tr>
</table>
• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>$0000_H$</td></tr>
<tr><td colspan="2">$0103_H$</td><td>Preset/replace setting at coincidence output</td><td>• Set whether to replace a count value with the preset value at coincidence output or not.<br>• The following shows the setting range.<br>
<table>
<tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Coinci-dence output 2</td><td>Coinci-dence output 1</td></tr>
<tr><td colspan="14">0 (fixed)</td><td colspan="2">0: Present value not replaced<br>1: Present value replaced</td></tr>
</table>
• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>$0000_H$</td></tr>
</table>

## (5) Module-based parameter data (address: $0104_H$ to $0105_H$)

| Address (CH1) | Address (CH2) | Name | Description | Default |
|---|---|---|---|---|
| $0104_H$ | | Cam switch output unit assignment setting | • Set an extension output module to be used with the cam switch function.<br>• The following shows the setting range.<br>0: No Assignment<br>1: Stage 1<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $0105_H$ | | Cam switch output channel assignment setting | • Set channels to be compared for the outputs of the cam switch function.<br>• The following shows the setting range.<br>b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0<br>16) 15) 14) 13) 12) 11) 10) 9) 8) 7) 6) 5) 4) 3) 2) 1)<br>0: CH1<br>1: CH2<br>1) Cam switch output 1 channel assignment setting<br>2) Cam switch output 2 channel assignment setting<br>: :<br>15) Cam switch output 15 channel assignment setting<br>16) Cam switch output 16 channel assignment setting<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | $0000_H$ |

## (6) Module-based parameter data (address: $0120_H$ to $0121_H$, $0140_H$ to $0141_H$)

| Address (CH1) | Address (CH2) | Name | Description | Default |
|---|---|---|---|---|
| $0120_H$ | $0140_H$ | Operation mode setting | • Set the operation mode for channels.<br>• The following shows the setting range.<br>0: Normal Mode<br>1: Frequency Measurement Mode<br>2: Rotation Speed Measurement Mode<br>3: Pulse Measurement Mode<br>4: PWM Output Mode<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $0121_H$ | $0141_H$ | Count source selection | • Set the count source.<br>• The following shows the setting range.<br>0: A Phase/B Phase<br>1: Coincidence Output 1<br>2: Coincidence Output 2<br>• When CH□ Count source selection (address: $0121_H$, $0141_H$) is set to Coincidence Output 1 (1) or Coincidence Output 2 (2), pulses are counted up at the rising edge of the following signals.<br>Normal mode: Coincidence output 1 to 2 (RX10 to RX11)<br>PWM output mode: Coincidence output 1 to 2 terminals (EQU1 to EQU2)<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |

### (7) Module-based parameter data (address: $0122_H$ to $0123_H$, $0142_H$ to $0143_H$)

| Address | | Name | Description | Default |
|---|---|---|---|---|
| CH1 | CH2 | | | |
| $0122_H$ | $0142_H$ | Pulse input mode | • Set the pulse input mode.<br>• The following shows the setting range.<br>0: 1-Phase Multiple of 1<br>1: 1-Phase Multiple of 2<br>2: CW/CCW<br>3: 2-Phase Multiple of 1<br>4: 2-Phase Multiple of 2<br>5: 2-Phase Multiple of 4<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $0123_H$ | $0143_H$ | Counting speed setting | • Set the counting speed.<br>• The following shows the setting range.<br>0: 10kpps<br>1: 100kpps<br>2: 200kpps<br>3: 500kpps<br>4: 1Mpps<br>5: 2Mpps<br>6: 4Mpps<br>7: 8Mpps<br>• Always set 200kpps or slower to the counting speed when DC input is used for connecting.<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |

## (8) Module-based parameter data (address: $0124_H$ to $0125_H$, $0144_H$ to $0145_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td>$0124_H$</td><td>$0144_H$</td><td>Counter format</td><td>• Set the counter format.<br>• The following shows the setting range.<br>0: Linear Counter<br>1: Ring Counter<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>0</td></tr>
<tr><td>$0125_H$</td><td>$0145_H$</td><td>Phase Z setting</td><td>• Set the trigger condition to replace a count value with the preset value by CH□ Phase Z input terminal (Z1, Z2).<br>• Set whether to turn on CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) or not when a count value is replaced with the preset value by CH□ Phase Z input terminal (Z1, Z2).<br>• While CH□ Z phase (Preset) trigger setting (address: $0125_H$.b0 to b1, $0145_H$.b0 to b1) is on, CH□ External preset/replace (Z Phase) request detection setting (address: $0125_H$.b4, $0145_H$.b4) is disabled and CH□ External preset/replace (Z Phase) request detection (RX23, RX3B) is always off.<br>• The following shows the setting range.<br><table><tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>2)</td><td>0</td><td>0</td><td colspan="2">1)</td></tr><tr><td colspan="11">0 (fixed)</td><td></td><td colspan="2">0 (fixed)</td><td colspan="2"></td></tr></table>1) Z phase (Preset) trigger setting<br>00: Rising<br>01: Falling<br>10: Rising + Falling<br>11: During ON<br>2) External preset/replace (Z Phase) request detection setting<br>0: ON at detection<br>1: Not ON at detection<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on</td><td>$0000_H$</td></tr>
</table>

## (9) Module-based parameter data (address: $0126_H$ to $0128_H$, $0146_H$ to $0148_H$)

| Address | | Name | Description | Default |
|---|---|---|---|---|
| CH1 | CH2 | | | |
| $0126_H$ | $0146_H$ | Counter function selection | • Set the counter function which becomes valid when the value in CH□ Operation mode setting (address: $0120_H$, $0140_H$) is Normal Mode (0).<br>• The following shows the setting range.<br>0: Count Disable Function<br>1: Latch Counter Function<br>2: Sampling Counter Function<br>3: Periodic Pulse Counter Function<br>4: Count disable/Preset/replace Function<br>5: Latch counter/Preset/replace Function<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $0127_H$ | $0147_H$ | Function input logic setting | • Set the logic setting of CH□ Function input terminal (FUNC1, FUNC2).<br>• CH1 FNC LED and CH2 FNC LED turn on with any setting value when a voltage is applied.<br>• The following shows the setting range.<br>0: Positive Logic<br>1: Negative Logic<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $0128_H$ | $0148_H$ | Latch counter input logic setting | • Set the logic setting of CH□ Latch counter input terminal (LATCH1, LATCH2).<br>• CH1 LAT LED and CH2 LAT LED turn on with any setting value when a voltage is applied.<br>• The following shows the setting range.<br>0: Positive Logic<br>1: Negative Logic<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |

## (10)Module-based parameter data (address: $0129_H$, $0149_H$)

<table>
<tr><th colspan="2">Address</th><th rowspan="2">Name</th><th rowspan="2">Description</th><th rowspan="2">Default</th></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td>$0129_H$</td><td>$0149_H$</td><td>External control input response time setting</td><td>
• Set the input response time of CH□ Phase Z input terminal (Z1, Z2), CH□ Function input terminal (FUNC1, FUNC2), and CH□ Latch counter input terminal (LATCH1, LATCH2).<br>
• The following shows the setting range.
<table>
<tr><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>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td colspan="2">3)</td><td colspan="2">2)</td><td colspan="2">1)</td></tr>
<tr><td colspan="10">0 (fixed)</td><td colspan="6"></td></tr>
</table>
<table>
<tr><th colspan="3">1) Z phase input response time setting</th></tr>
<tr><th>Setting</th><th>OFF → ON<br>Response time</th><th>ON → OFF<br>Response time</th></tr>
<tr><td>00</td><td>0.25μs</td><td>2.5μs</td></tr>
<tr><td>01</td><td>0.1ms</td><td>0.1ms</td></tr>
<tr><td>10</td><td>1.0ms</td><td>1.0ms</td></tr>
</table>
<table>
<tr><th colspan="3">2) Function input response time setting</th></tr>
<tr><th>Setting</th><th>OFF → ON<br>Response time</th><th>ON → OFF<br>Response time</th></tr>
<tr><td>00</td><td>0.02ms</td><td>0.1ms</td></tr>
<tr><td>01</td><td>0.1ms</td><td>0.1ms</td></tr>
<tr><td>10</td><td>1.0ms</td><td>1.0ms</td></tr>
</table>
<table>
<tr><th colspan="3">3) Latch counter input response time setting</th></tr>
<tr><th>Setting</th><th>OFF → ON<br>Response time</th><th>ON → OFF<br>Response time</th></tr>
<tr><td>00</td><td>0.02ms</td><td>0.1ms</td></tr>
<tr><td>01</td><td>0.1ms</td><td>0.1ms</td></tr>
<tr><td>10</td><td>1.0ms</td><td>1.0ms</td></tr>
</table>
• When CH□ Function input logic setting (address: $0127_H$, $0147_H$) and CH□ Latch counter input logic setting (address: $0128_H$, $0148_H$) are set to Negative Logic (1), the OFF → ON response time and the ON → OFF response time invert. For example, when CH□ Latch counter input logic setting (address: $0128_H$, $0148_H$) is set to Negative Logic (1) and corresponding bits for this area are set to 00, the OFF → ON response time is 0.1ms.<br>
• The reflection timing of the setting value<br>
When Initial data setting request flag (RY9) is turned off then on
</td><td>$002A_H$</td></tr>
</table>

## (11)Module-based parameter data (address: $012A_H$ to $012B_H$, $014A_H$ to $014B_H$)

| Address | | Name | Description | Default |
|---|---|---|---|---|
| CH1 | CH2 | | | |
| $012A_H$ | $014A_H$ | Pulse measurement setting (Function input terminal) | • Set the pulse measurement target of CH□ Function input terminal (FUNC1, FUNC2).<br>• The following shows the setting range.<br>0: Pulse ON Width<br>1: Pulse OFF Width<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |
| $012B_H$ | $014B_H$ | Pulse measurement setting (Latch counter input terminal) | • Set the pulse measurement target of CH□ Latch counter input terminal (LATCH1, LATCH2).<br>• The following shows the setting range.<br>0: Pulse ON Width<br>1: Pulse OFF Width<br>• The reflection timing of the setting value<br>When Initial data setting request flag (RY9) is turned off then on | 0 |

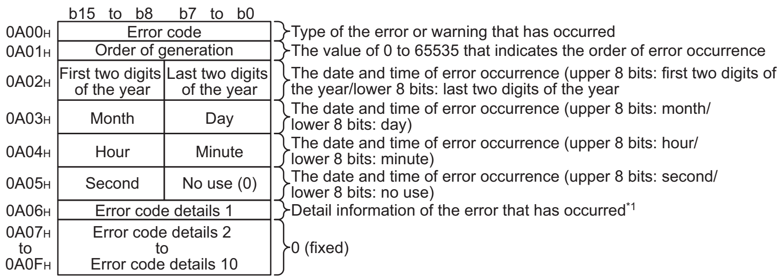
## (12)Module-based monitoring data (address: $0600_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $0600_H$ | Channel assignment (Coincidence output 1 to 4) | • This area stores the channel assignment statuses of coincidence outputs.<br>• The following shows the range of values which can be stored.<br>b15 b14 b13 b12 b11 b10 b9 b8: 0 0 0 0 0 0 0 0 — 0 (fixed)<br>b7 b6: Coincidence output 4; b5 b4: Coincidence output 3; b3 b2: Coincidence output 2; b1 b0: Coincidence output 1<br>00: No Assignment<br>01: CH1<br>10: CH2<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | $0000_H$ |

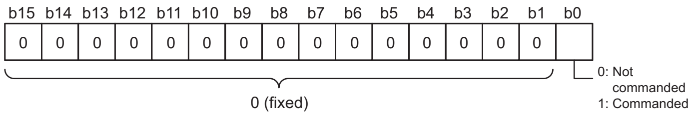
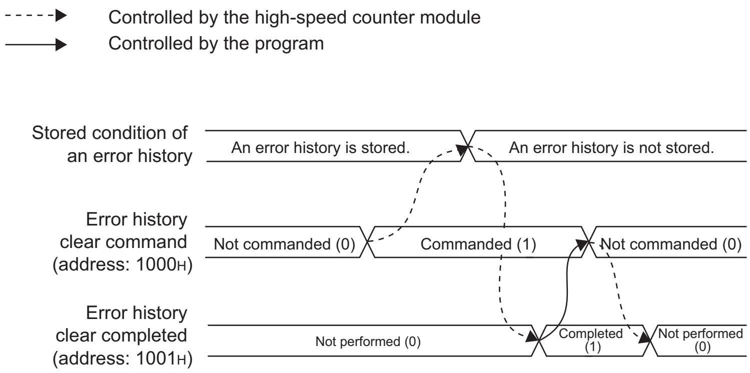
## (13)Module-based monitoring data (address: $0620_H$ to $0621_H$, $0640_H$ to $0641_H$)

| Address | | Name | Description | Default |
|---|---|---|---|---|
| CH1 | CH2 | | | |
| $0620_H$ | $0640_H$ | Operation mode | • This area stores the present operation mode.<br>• The following shows the range of values which can be stored.<br>0: Normal Mode<br>1: Frequency Measurement Mode<br>2: Rotation Speed Measurement Mode<br>3: Pulse Measurement Mode<br>4: PWM Output Mode<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |
| $0621_H$ | $0641_H$ | Selected counter function | • This area stores the counter function currently valid.<br>• The following shows the range of values which can be stored.<br>0: Count Disable Function<br>1: Latch Counter Function<br>2: Sampling Counter Function<br>3: Periodic Pulse Counter Function<br>4: Count disable/Preset/replace Function<br>5: Latch counter/Preset/replace Function<br>• When Initial data setting request flag (RY9) is turned off then on, the value in this area is cleared. | 0 |

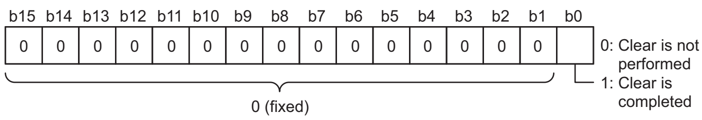
## (14)Station-based error history data (address: $0A00_H$ to $0AEF_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $0A00_H$<br>to<br>$0A0F_H$ | Error history 1 | • This area stores the error history when an error or a warning occurs.<br>• Up to 15 errors are stored in the error history.<br>• The latest history is stored in Error history 1 (address: $0A00_H$ to $0A0F_H$).<br>• Errors or warnings that occurred in the past are stored in Error history 2 to Error history 15 (address: $0A10_H$ to $0AEF_H$) in reverse chronological order.<br>• If 16 or more errors or warnings occur, errors or warnings are deleted from the oldest.<br>• The following shows the format of the stored values.<br><br><br>*1 For the details on Error code details 1, refer to the following.<br>(Page 222, Section 11.2 (1) (a))<br>• The clock information of the error that occurred is based on the clock information acquired from the CPU module of the master station. When an error has occurred before the clock information is acquired from the CPU module, the error time is not recorded. | $0000_H$ |
| ⋮ | ⋮ | ⋮ | ⋮ |
| $0AE0_H$<br>to<br>$0AEF_H$ | Error history 15 | • Same as Error history 1. | $0000_H$ |

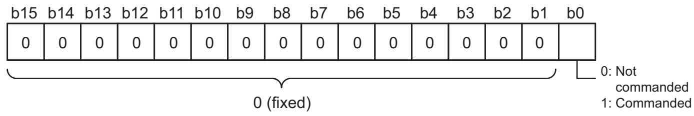
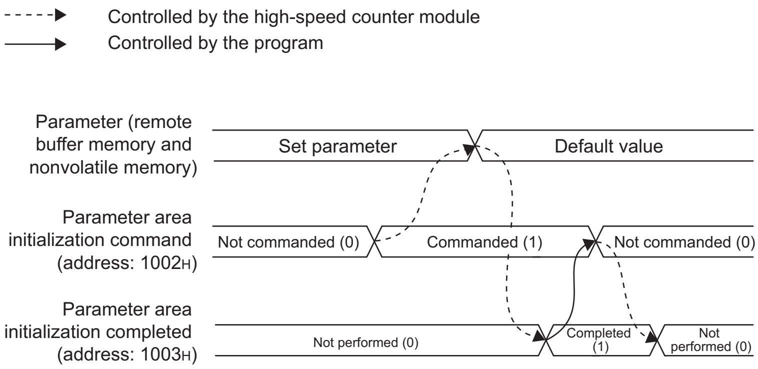
## (15)Station-based control data (address: $1000_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1000_H$ | Error history clear command | • The error history stored in the remote buffer memory and the nonvolatile memory is cleared by this command.<br>• The following shows the setting range.<br><br><br>• When Error history clear command (address: $1000_H$) is set to Commanded (1), the error history stored in the remote buffer memory and the nonvolatile memory is cleared and Error history clear completed (address: $1001_H$) changes to Clear is completed (1).<br><br><br>• Errors or warnings which have occurred are not reset even when Error history clear command (address: $1000_H$) is set to Commanded (1). Use CH□ Error reset command (RY36, RY4E) to reset them. | $0000_H$ |

## (16)Station-based control data (address: $1001_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1001_H$ | Error history clear completed | • When clearing the error history stored in the remote buffer memory and the nonvolatile memory is completed, Error history clear completed (address: $1001_H$) changes to Clear is completed (1).<br>• When Error history clear command (address: $1000_H$) is set to Not commanded (0), Error history clear completed (address: $1001_H$) changes to Clear is not performed (0).<br>• The following shows the range of values which can be stored.<br><br> | $0000_H$ |

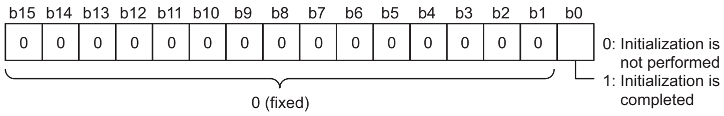
## (17)Station-based control data (address: $1002_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1002_H$ | Parameter area initialization command | • The parameter information and the extended parameter information stored in the remote buffer memory and the nonvolatile memory are initialized by this command.<br>• The following shows the setting range.<br><br><br>• When Parameter area initialization command (address: $1002_H$) is set to Commanded (1), the parameter information and the extended parameter information stored in the remote buffer memory and the nonvolatile memory are initialized and Parameter area initialization completed (address: $1003_H$) changes to Initialization is completed (1).<br><br> | $0000_H$ |

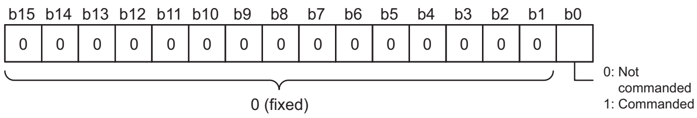
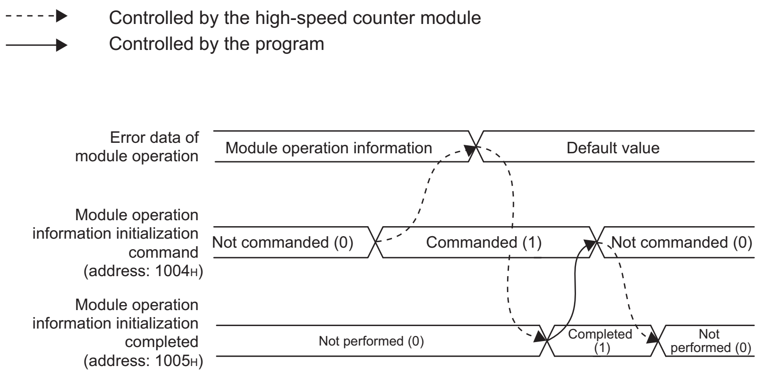
**Point**

- When Parameter area initialization command (address: $1002_H$) is executed, the following remote input signals and remote registers are not cleared. (Note that the following are the target data to be cleared by Initial data setting request flag (RY9).)
  - Warning status flag (RX7)
  - Error status flag (RXA)
  - CH☐ Error status (RX36, RX4E)
  - CH☐ Warning status (RX37, RX4F)
  - CH☐ Latest error code (RWr22, RWr3A)
  - CH☐ Latest warning code (RWr23, RWr3B)
- When initialization of the parameter information and the extended parameter information is completed, Initial data processing request flag (RX8) turns on. Set parameters using Initial data setting request flag (RY9) and remote registers using Initial data processing completion flag (RY8).

## (18)Station-based control data (address: $1003_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1003_H$ | Parameter area initialization completed | • When initialization of the parameter information and the extended parameter information stored in the remote buffer memory and the nonvolatile memory is completed, Parameter area initialization completed (address: $1003_H$) changes to Initialization is completed (1).<br>• When Parameter area initialization command (address: $1002_H$) is set to Not commanded (0), Parameter area initialization completed (address: $1003_H$) changes to Initialization is not performed (0).<br>• The following shows the range of values which can be stored.<br> | $0000_H$ |

## (19)Station-based control data (address: $1004_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1004_H$ | Module operation information initialization command | • The module operation information stored in the remote buffer memory and the nonvolatile memory is initialized by this command. The module operation information can be initialized only when Nonvolatile memory data error (module operation information) (error code: $0110_H$) has occurred.<br>• The following shows the setting range.<br><br>• When Module operation information initialization command (address: $1004_H$) is set to Commanded (1), the module operation information stored in the remote buffer memory and the nonvolatile memory is cleared and Module operation information initialization completed (address: $1005_H$) changes to Initialization is completed (1).<br> | $0000_H$ |

## (20)Station-based control data (address: $1005_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1005_H$ | Module operation information initialization completed | • When initialization of the module operation information stored in the remote buffer memory and the nonvolatile memory is completed, Module operation information initialization completed (address: $1005_H$) changes to Initialization is completed (1).<br>• When Module operation information initialization command (address: $1004_H$) is set to Not commanded (0), Module operation information initialization completed (address: $1005_H$) changes to Initialization is not performed (0).<br>• The following shows the range of values which can be stored.<br>b15 b14 b13 b12 b11 b10 b9 b8 b7 b6 b5 b4 b3 b2 b1 b0<br>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 [ ]<br>0 (fixed)<br>0: Initialization is not performed<br>1: Initialization is completed | $0000_H$ |

## (21)Extended parameter data (address: $1500_H$ to $1521_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1500_H$ | Cam switch function, step type (Output 1) | Set the step type for the cam of Output 1.<br>• Setting range<br>0: Starts with output status being OFF<br>1: Starts with output status being ON<br>• The reflection timing of the setting value<br>When CH□ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |
| $1501_H$ | Cam switch function, number of steps (Output 1) | Set the number of steps for the cam of Output 1.<br>• Setting range<br>0 to 16<br>• The reflection timing of the setting value<br>When CH□ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |
| $1502_H$<br>$1503_H$ | Cam switch function, step No.1 setting (Output 1) | Set the count value for switching ON and OFF of the output at the step No.1 of Output 1.<br>• Setting range<br>-2147483648 to 2147483647<br>• The reflection timing of the setting value<br>When CH□ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |
| ⋮ | ⋮ | ⋮ | ⋮ |
| $1520_H$<br>$1521_H$ | Cam switch function, step No.16 setting (Output 1) | Set the count value for switching ON and OFF of the output at the step No.16 of Output 1.<br>• Setting range<br>-2147483648to 2147483647<br>• The reflection timing of the setting value<br>When CH□ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |

## (22)Extended parameter data (address: $1580_H$ to $1CA1_H$)

| Address | Name | Description | Default |
|---|---|---|---|
| $1580_H$<br>to<br>$15A0_H$<br>$15A1_H$ | Cam switch function, step type (Output 2)<br>to<br>Cam switch function, step No.16 setting (Output 2) | For Output 2 to 16, set the step type and the number of steps for the cam, and set the count value for switching ON and OFF of the corresponding output at the step No.1 to No.16.<br>Since the details on these settings are the same as those of Output 1, refer to the following.<br>( Page 280, Appendix 3 (21))<br>• The reflection timing of the setting value<br>When CH☐ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |
| $1600_H$<br>to<br>$1620_H$<br>$1621_H$ | Cam switch function, step type (Output 3)<br>to<br>Cam switch function, step No.16 setting (Output 3) | | 0 |
| $1680_H$<br>to<br>$16A0_H$<br>$16A1_H$ | Cam switch function, step type (Output 4)<br>to<br>Cam switch function, step No.16 setting (Output 4) | | 0 |
| $1700_H$<br>to<br>$1720_H$<br>$1721_H$ | Cam switch function, step type (Output 5)<br>to<br>Cam switch function, step No.16 setting (Output 5) | | 0 |
| $1780_H$<br>to<br>$17A0_H$<br>$17A1_H$ | Cam switch function, step type (Output 6)<br>to<br>Cam switch function, step No.16 setting (Output 6) | | 0 |
| $1800_H$<br>to<br>$1820_H$<br>$1821_H$ | Cam switch function, step type (Output 7)<br>to<br>Cam switch function, step No.16 setting (Output 7) | | 0 |
| $1880_H$<br>to<br>$18A0_H$<br>$18A1_H$ | Cam switch function, step type (Output 8)<br>to<br>Cam switch function, step No.16 setting (Output 8) | | 0 |
| $1900_H$<br>to<br>$1920_H$<br>$1921_H$ | Cam switch function, step type (Output 9)<br>to<br>Cam switch function, step No.16 setting (Output 9) | | 0 |

| Address | Name | Description | Default |
|---|---|---|---|
| $1980_H$<br>to<br>$19A0_H$<br>$19A1_H$ | Cam switch function, step type (Output 10)<br>to<br>Cam switch function, step No.16 setting (Output 10) | For Output 2 to 16, set the step type and the number of steps for the cam, and set the count value for switching ON and OFF of the corresponding output at the step No.1 to No.16.<br>Since the details on these settings are the same as those of Output 1, refer to the following.<br>(Page 280, Appendix 3 (21))<br>• The reflection timing of the setting value<br>When CH☐ Cam switch execute command/PWM output start command (RY26, RY3E) is turned off then on | 0 |
| $1A00_H$<br>to<br>$1A20_H$<br>$1A21_H$ | Cam switch function, step type (Output 11)<br>to<br>Cam switch function, step No.16 setting (Output 11) | | 0 |
| $1A80_H$<br>to<br>$1AA0_H$<br>$1AA1_H$ | Cam switch function, step type (Output 12)<br>to<br>Cam switch function, step No.16 setting (Output 12) | | 0 |
| $1B00_H$<br>to<br>$1B20_H$<br>$1B21_H$ | Cam switch function, step type (Output 13)<br>to<br>Cam switch function, step No.16 setting (Output 13) | | 0 |
| $1B80_H$<br>to<br>$1BA0_H$<br>$1BA1_H$ | Cam switch function, step type (Output 14)<br>to<br>Cam switch function, step No.16 setting (Output 14) | | 0 |
| $1C00_H$<br>to<br>$1C20_H$<br>$1C21_H$ | Cam switch function, step type (Output 15)<br>to<br>Cam switch function, step No.16 setting (Output 15) | | 0 |
| $1C80_H$<br>to<br>$1CA0_H$<br>$1CA1_H$ | Cam switch function, step type (Output 16)<br>to<br>Cam switch function, step No.16 setting (Output 16) | | 0 |

# Appendix 4 Internal Control Cycle and Response Delay Time

For the high-speed counter module, responses are delayed by the causes shown in (1) to (3).

## (1) Scan time of the program in the master station (SM)

This scan time causes delays of remote I/O signals, remote registers, and remote buffer memory.

## (2) Link scan time (LS)

This is the time taken for sending data from each station on the network and finishing the one cycle.
For details, refer to the following.

User's manual for the master/local module used

## (3) Control cycle of the high-speed counter module ($\Delta T_2$)

Up to $\Delta T_1$ ($\Delta T_2 \times 2$) delay occurs until the high-speed counter module completes processing after the module reads remote output signals, remote registers, and remote buffer memory updated by the program.
In addition, the update timing of remote input signals, remote registers, and remote buffer memory fluctuates within one control cycle.

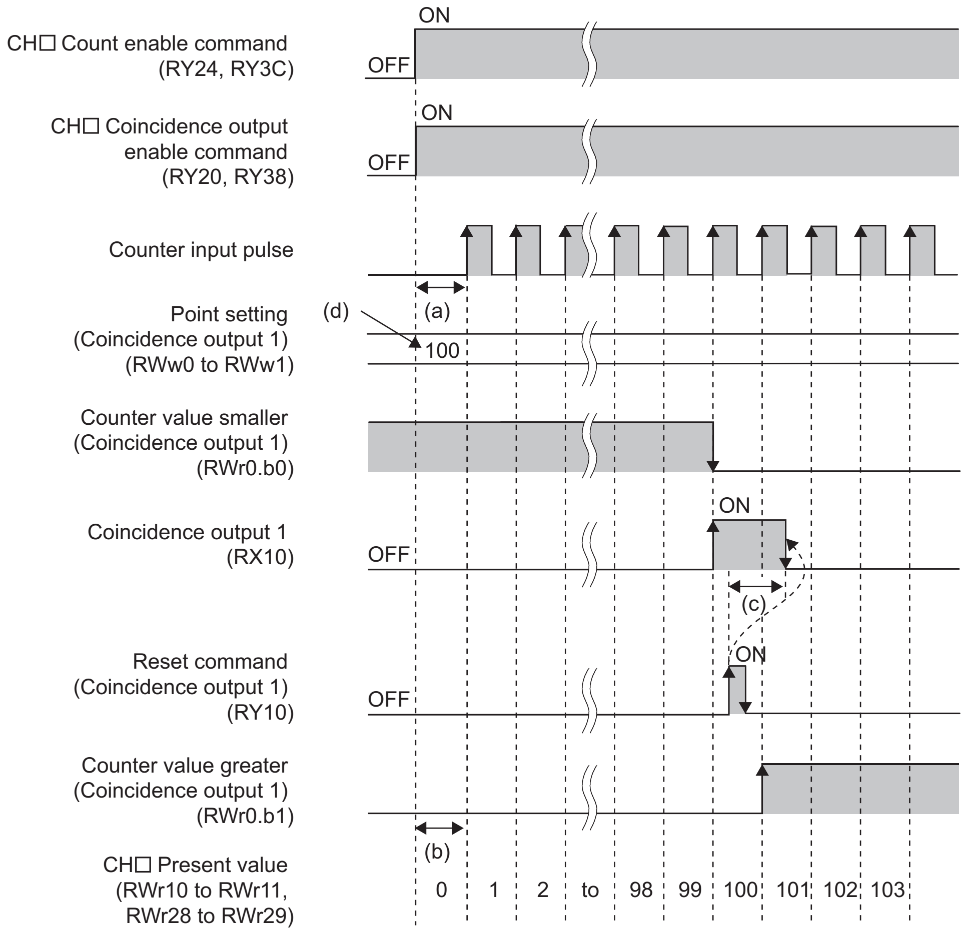
| Abbreviation | Description | Remarks |
|---|---|---|
| $\Delta T_1$ | Indicates the maximum delay time of internal processing. ($\Delta T_2 \times 2$).<br>Link scan time is not included in $\Delta T_1$. | — |
| $\Delta T_2$ | Internal control cycle time (0.5ms)<br>Link scan time is not included in $\Delta T_2$. | — |
| $\Delta T_3$ | Processing time for acquiring data for the maximum setting number of steps of cam switches (16 points × 16 steps) and analyzing them (40ms) | The smaller the number of steps, the shorter the processing time. |

## (4) Examples of response delay time

An example is described in (a) to (d) regarding the operation of the coincidence output function in the following condition.

- Master/local module is the QJ71GF11-T2
- Block data assurance per station is set
- Asynchronous mode

Ex. Operation of the coincidence output function




### (a) Processing time (Normal value): Master station (RY) → Remote device station (RY)

The following shows the processing time required until the high-speed counter module starts pulse input after CH☐ Count enable command (RY24, RY3C) is turned on.

(SM × n2) + (LS × 1) + Processing time of the high-speed counter module ($\Delta T_1$)

- SM: Scan time of the program in the master station
- LS: Link scan time
- n2: The value provided by rounding up the value after the decimal point of (LS ÷ SM)

### (b) Processing time (Normal value): Master station (RWr) ← Remote device station (RWr)

The following shows the processing time required until a count value is read by the master station after the count value is counted by the high-speed counter module.

(SM × 1) + (LS × n1) + Processing time of the high-speed counter module ($\Delta T_1$)

- SM: Scan time of the program in the master station
- LS: Link scan time
- n1: The value provided by rounding up the value after the decimal point of (SM ÷ LS)

### (c) Processing time (Normal value): Master station (RX) ← Remote device station (RX)

The following shows the processing time required until Coincidence output 1 (RX10) is transmitted to the master station after the high-speed counter module receives Reset command (Coincidence output 1) (RY10). (The processing time required for transmitting Reset command (Coincidence output 1) (RY10) to the high-speed counter module is not included.)

(SM × 1) + (LS × n1) + Processing time of the high-speed counter module ($\Delta T_1$)

- SM: Scan time of the program in the master station
- LS: Link scan time
- n1: The value provided by rounding up the value after the decimal point of (SM ÷ LS)

### (d) Processing time (Normal value): Master station (RWw) → Remote device station (RWw)

The following shows the transmission time required for setting Point setting (Coincidence output 1) (RWw0 to RWw1) to the high-speed counter module. (The processing time required for transmitting Setting change request (Coincidence output 1) (RY14) to the high-speed counter module is not included.)

(SM × n2) + (LS × 1) + Processing time of the high-speed counter module ($\Delta T_1$)

- SM: Scan time of the program in the master station
- LS: Link scan time
- n2: The value provided by rounding up the value after the decimal point of (LS ÷ SM)

# Appendix 5 EMC and Low Voltage Directives

Compliance to the EMC Directive, which is one of the EU Directives, has been a legal obligation for the products sold in European countries since 1996 as well as the Low Voltage Directive since 1997.
Manufacturers who recognize their products are compliant to the EMC and Low Voltage Directives are required to attach a "CE mark" on their products.

### (1) Sales representative in EU member states

Authorized representative in EU member states is shown below.
Name: Mitsubishi Electric Europe BV
Address: Gothaer Strasse 8, 40880 Ratingen, Germany

## Appendix 5.1 Measures to comply with the EMC directive

The EMC Directive specifies that "products placed on the market must be so constructed that they do not cause excessive electromagnetic interference (emissions) and are not unduly affected by electromagnetic interference (immunity)". This section summarizes the precautions on compliance with the EMC Directive of the machinery constructed with the module.
These precautions are based on the requirements and the standards of the regulation, however, it does not guarantee that the entire machinery constructed according to the descriptions will comply with abovementioned directives.
The method and judgement for complying with the EMC Directive must be determined by the person who constructs the entire machinery.

### (1) EMC Directive related standards

#### (a) Emission requirements

| Specification | Test item | Test details | Standard value |
|---|---|---|---|
| EN61131-2: 2007 | CISPR16-2-3<br>Radiated emission*2 | Radio waves from the product are measured. | • 30M-230MHz<br>QP: 40dBμV/m (10m in measurement range)*1<br>• 230M-1000MHz<br>QP: 47dBμV/m (10m in measurement range) |
| | CISPR16-2-1, CISPR16-1-2<br>Conducted emission*2 | Noise from the product to the power line is measured. | • 150k-500kHz<br>QP: 79dB, Mean: 66dB*1<br>• 500k-30MHz<br>QP: 73dB, Mean: 60dB |

*1 QP: Quasi-peak value, Mean: Average value
*2 The module is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the module installed in a control panel.

### (b) Immunity requirements

| Specification | Test item | Test details | Standard value |
|---|---|---|---|
| EN61131-2: 2007 | EN61000-4-2<br>Electrostatic discharge immunity*1 | Immunity test in which electrostatic is applied to the cabinet of the equipment. | • 8kV Air discharge<br>• 4kV Contact discharge |
| | EN61000-4-3<br>Radiated, radio-frequency, electromagnetic field immunity*1 | Immunity test in which electric fields are irradiated to the product. | 80% AM modulation@1kHz<br>• 80M-1000MHz: 10V/m<br>• 1.4G-2.0GHz: 3V/m<br>• 2.0G-2.7GHz: 1V/m |
| | EN61000-4-4<br>Electrical fast transient/burst immunity*1 | Immunity test in which burst noise is applied to the power line and signal line. | • AC/DC main power, I/O power, AC I/O (unshielded): 2kV<br>• DC I/O, analog, communication: 1kV |
| | EN61000-4-5<br>Surge immunity*1 | Immunity test in which lightning surge is applied to the power line and signal line. | • AC power line, AC I/O power, AC I/O (unshielded): 2kV CM, 1kV DM<br>• DC power line, DC I/O power: 0.5kV CM, DM<br>• DC I/O, AC I/O (shielded), analog*2, communication: 1kV CM |
| | EN61000-4-6<br>Immunity to conducted disturbances, induced by radio-frequency fields*1 | Immunity test in which high frequency noise is applied to the power line and signal line | 0.15M-80MHz, 80% AM modulation @1kHz, 10Vrms |
| | EN61000-4-8<br>Power-frequency magnetic field immunity*1 | Immunity test in which the product is installed in inductive magnetic field | 50Hz/60Hz, 30A/m |
| | EN61000-4-11<br>Voltage dips and interruption immunity*1 | Immunity test in which power supply voltage is momentarily interrupted | • Apply at 0%, 0.5 cycles and zero-cross point<br>• 0%, 250/300 cycles (50/60Hz)<br>• 40%, 10/12 cycles (50/60Hz)<br>• 70%, 25/30 cycles (50/60Hz) |

*1 The module is an open type device (a device designed to be housed in other equipment) and must be installed inside a conductive control panel. The tests were conducted with the programmable controller installed in a control panel.

*2 The accuracy of an analog-digital converter module may temporarily vary within ±10%.

## (2) Installation in a control panel

The module is open type devices and must be installed inside a control panel. This ensures safety as well as effective shielding of programmable controller-generated electromagnetic noise.

### (a) Control panel

- Use a conductive control panel.
- When securing the top or bottom plate using bolts, cover the grounding part on the control panel so that the part will not be painted.
- To ensure electrical contact between the inner plate and control panel, take measures such as covering the bolts so that conductivity can be ensured in the largest possible area.
- Ground the control panel with a thick ground cable so that low impedance can be ensured even at high frequencies.
- Holes in the control panel must be 10cm diameter or less. If the holes are larger than 10cm, radio wave may be emitted. In addition, because radio waves leak through a clearance between the control panel and its door, reduce the clearance as much as possible. The leakage of radio waves can be suppressed by the direct application of an EMI gasket on the paint surface.

Our tests have been carried out on a panel having the attenuation characteristics of 37 dB (max.) and 30 dB (mean) (measured by 3m method, 30 to 300MHz).

### (b) Wiring of power cables and ground cables

- Near the power supply part, provide a ground point to the control panel. Ground the FG terminal with the thickest and shortest possible ground cable (30cm or shorter).

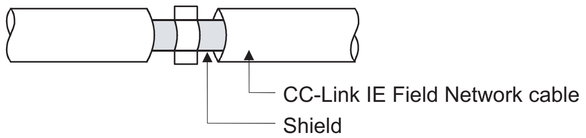
## (3) Cables

Use shielded cables for the cables which are connected to the module and run out from the control panel.
If a shielded cable is not used or not grounded correctly, the noise immunity will not meet the specified value.

### (a) Cables for the CC-Link IE Field Network

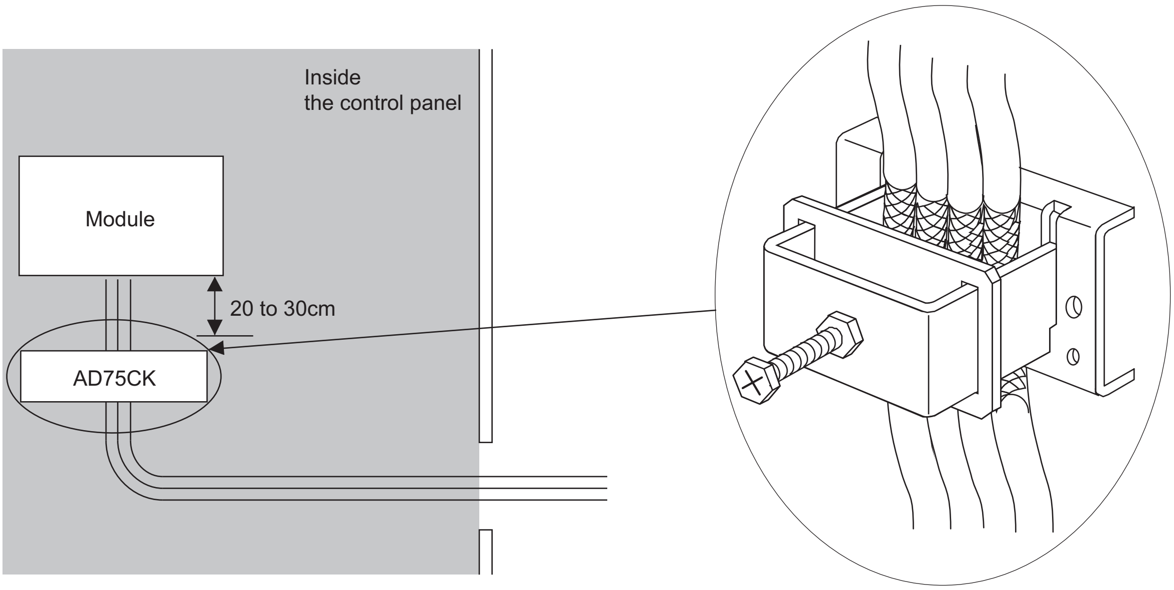
The precautions for using CC-Link IE Field Network cables are described below.

- Shielded cables should be used for the CC-Link IE Field Network. Strip a part of the jacket as shown below and ground the exposed shield in the largest possible area.




### (b) Grounding the cable clamp

Use shielded cables for external wiring and ground the shields of the external wiring cables to the control panel with the AD75CK-type cable clamp (Mitsubishi). (Ground the shield section 20 to 30cm away from the module.)




For details of the AD75CK, refer to the following.

AD75CK-type Cable Clamping Instruction Manual

## (4) External power supply

- Use a CE-marked product for an external power supply and always ground the FG terminal. (External power supply used for the tests conducted by Mitsubishi: TDK-Lambda DLP-120-24-1, IDEC PS5R-SF24, PS5R-F24)
- Use a power cable of 10m or shorter when connecting it to the module power supply terminal.

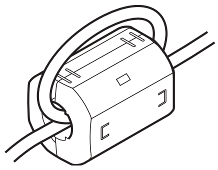
## (5) Encoder and controller

- Install the DC power connected to the encoder inside the same control panel as the high-speed counter module.
- Use a cable of 3m or shorter between the encoder for the open collector output and the pulse input terminal.
- Use a cable of 10m or shorter  between the encoder for the differential output and the pulse input terminal.
- Use cables of 30m or shorter between the high-speed counter module and the external output/the high-speed counter module and the pulse input terminal.
- Be sure to attach ferrite cores to the DC power cables to be connected to the high-speed counter module and the controller. The ferrite core ZCAT3035-1330 (manufactured by TDK Corporation) is recommended.

## (6) Others

### (a) Ferrite core

A ferrite core has the effect of reducing radiated noise in the 30MHz to 100MHz band. It is recommended to attach ferrite cores if shield cables coming out of the control panel do not provide sufficient shielding effects. Note that the ferrite cores must be attached at the position closest to the cable hole inside the control panel. If attached at an improper position, the ferrite core will not produce any effect.
For the FG terminal on a main module that is connected to the external power supply, the external power supply of an extension module, and CC-Link IE Field Network cables, attach a ferrite core 4cm away from the module. (Ferrite core used for the tests conducted by Mitsubishi: NEC TOKIN ESD-SR-250, TDK ZCAT3035-1330)

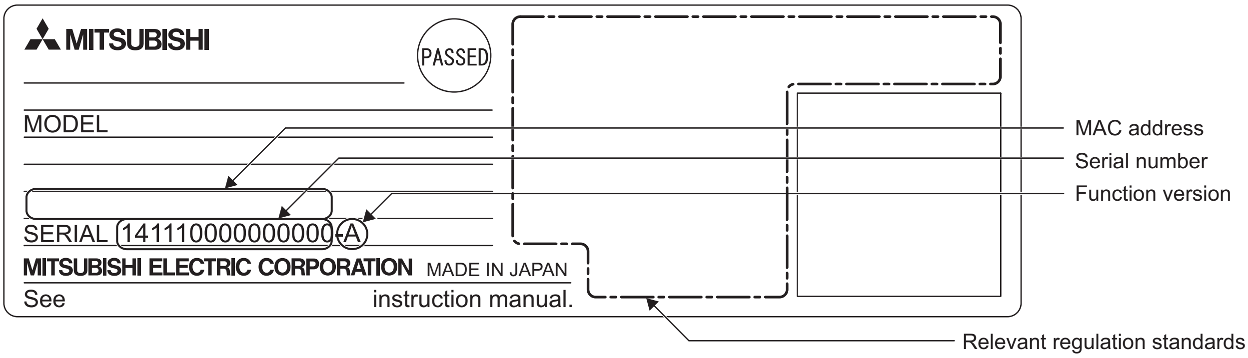


# Appendix 5.2 Requirements to compliance with the low voltage directive

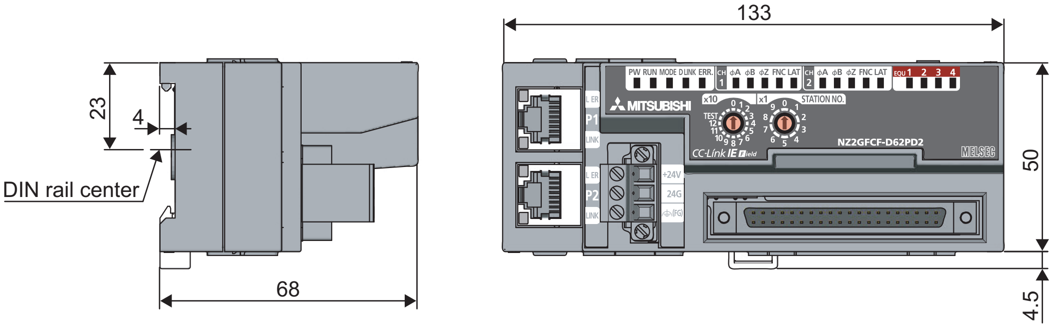
The module operates at the rated voltage of 24VDC. The Low Voltage Directive is not applied to the modules that operate at the rated voltage of less than 50VAC and 75VDC.

# Appendix 6 Checking Serial Number and Function Version

The serial number and function version of the high-speed counter module can be checked on the rating plate.



# Appendix 7 External Dimensions




(Unit: mm)

# INDEX

## D



## E



## F



I

## G



## I



## L



## M



## O



## P



## R



## S



## T

## U



## W



I

# REVISIONS

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

| Print date | *Manual number | Revision |
|---|---|---|
| March, 2013 | SH(NA)-081129ENG-A | First edition |

Japanese manual version SH-081128-A

# WARRANTY

Please confirm the following product warranty details before using this product.

## 1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.
[Gratis Warranty Term]
The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.
Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.
[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or that admitted not to be so by the user.

## 2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued.
Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not available after production is discontinued.

## 3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

## 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 of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

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SH(NA)-081129ENG-A

# CC-Link IE Field Network High-Speed Counter Module User's Manual

| | |
|---|---|
| MODEL | CCIEF-CT-U-E |
| MODEL CODE | 13JZ83 |
| SH(NA)-081129ENG-A(1303)MEE | |

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