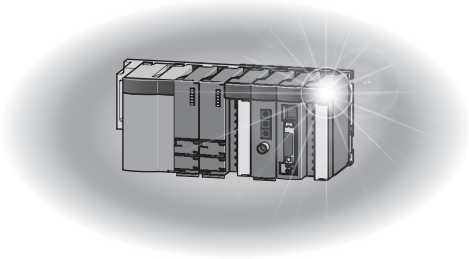
MITSUBISHI ELECTRIC

Programmable Controller

MELSEC Q series

High-Speed Counter Module User's Manual

-QD62
-QD62E
-QD62D
-GX Configurator-CT (SW0D5C-QCTU-E)



• 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

- Do not write any data to the "system area" of the buffer memory in the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.
- Outputs may remain on or off due to a failure of the external output transistor. Configure an external circuit for monitoring output signals that could cause a serious accident.

⚠ CAUTION

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

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[Security Precautions]

⚠WARNING

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

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting may cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may result in damage to the product.
- Do not directly touch any conductive part or electronic component of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ CAUTION

- Connectors for external devices must be crimped with the tool specified by the manufacturer or must be correctly soldered. Incomplete connections may cause short circuit, fire, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.
- 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.
- 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.
  Pulling the cable connected to the module may result in malfunction or damage to the module or cable.
- Individually ground the shielded cables on the encoder side (relay box) with a ground resistance of 100Ω or less.
  Failure to do so may cause malfunction.
- 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.

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[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 connector screws or module fixing screws.
  Failure to do so may result in electric shock or cause the module to fail or malfunction.
  Undertightening can cause drop of the screw, short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

⚠ CAUTION

- Do not disassemble or modify the module.
  Doing so may cause failure, malfunction, injury, or a fire.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the module to/from the base unit more than 50 times (IEC 61131-2 compliant).
  Exceeding the limit of 50 times may cause malfunction.
- Before handling the module, touch a conducting object such as a grounded metal to discharge the static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[Disposal Precaution]

⚠ CAUTION

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

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• CONDITIONS OF USE FOR THE PRODUCT •

(1) MELSEC 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 ELECTRIC 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 ELECTRIC USER'S, 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 Electric 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 Electric 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 Electric representative in your region.

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

REVISIONS

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

Revision date	* Manual Number	Description
Dec., 1999	SH(NA)-080036-A	First edition
Oct., 2000	SH(NA)-080036-B	Correction About the Generic Terms and Abbreviation, Section 2.1, Section 7.2.2, 7.3.3, 7.6.1
Jun., 2001	SH(NA)-080036-C	Standardize the name from software package (GPP function) to Product name (GX Developer). Standardize the name from utility package (QCTU) to Product name (GX Configurator-CT). Addition Section 2.2, 2.3 Correction SAFETY PRECAUTIONS, Conformation to the EMC Directive and Low Voltage Instruction, About the Generic Terms and Abbreviations, Product Structure, Section 2.1, Section 3.2, 3.5, Section 6.2, Section 7.2, 7.2.1, 7.2.2, 7.3.3
Feb., 2002	SH(NA)-080036-D	Correction About the Generic Terms and Abbreviation, Section 2.1, Section 7.2.1, 7.2.2
Feb., 2003	SH(NA)-080036-E	Correction SAFETY PRECAUTIONS, INTRODUCTION, CONTENTS, About the Generic Terms and Abbreviations, Section 2.1, Section 3.5, Section 4.3, Section 5.4, Section 7.2.2, Section 7.3.2, Section 7.3.3, Section 7.4 to Section 7.6, Section 8.1.1, INDEX
May, 2003	SH(NA)-080036-F	Correction Section 2.3, Section 5.3
Jun., 2004	SH(NA)-080036-G	Addition Section 2.4 Correction SAFETY PRECAUTIONS, Section 4.1, Section 5.1.3, Section 7.4, Section 7.6.1, Section 8.1, Section 8.2
Oct., 2004	SH(NA)-080036-H	Correction SAFETY PRECAUTIONS, Section 2.1, Section 4.1
Jul., 2005	SH(NA)-080036-I	Correction Section 6.5, Section 8.2
Feb., 2006	SH(NA)-080036-J	Correction Conformation to the EMC Directive and Low Voltage Instruction, Section 2.2, Section 7.2.2

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

Revision date	* Manual Number	Description
Jun., 2007	SH(NA)-080036-K	Correction CONTENTS, About the Generic Terms and Abbreviations, Section 3.1, Section 3.3.2, Section 4.1, Section 4.3 to 4.5, Section 5.1.1, Section 5.2, Section 5.3, Section 6.4, Section 6.5, Section 7.3.1 to 7.3.3, Section 7.4 to 7.6, Chapter 8, Section 8.1.1, Section 8.3, Section 9.1 to 9.3, INDEX
Jan., 2008	SH(NA)-080036-L	Correction CONTENTS, About the Generic Terms and Abbreviations, Section 2.2, Section 2.5, Section 7.2.2, Section 7.3.2, Section 7.3.3, Section 7.4, Section 7.6 Addition Section 2.3
May, 2008	SH(NA)-080036-M	Correction SAFETY PRECAUTIONS, Compliance with the EMC and Low Voltage Directives, About the Generic Terms and Abbreviations, Section 2.1, Section 2.5, Section 3.5, Section 4.1, Section 4.4.2, Section 7.2.1, Section 7.3.1, Section 7.3.3
Mar., 2009	SH(NA)-080036-N	Correction About the Generic Terms and Abbreviations, Section 1.1, Section 2.1, Section 4.4.5, Section 6.2 to Section 6.5, Section 7.2.1, Section 7.6.1, Chapter 8 Section numbers changed Section 4.5 → Section 4.5.1, 4.5.2, Section 8.1 → Section 8.1.1, Section 8.2 → Section 8.1.2 Addition Section 4.5, Section 8.2

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

Revision date	* Manual Number	Description
Sep., 2010	SH(NA)-080036-O	Correction SAFETY PRECAUTIONS, About the Generic Terms and Abbreviations, Chapter 1, Section 1.1, Section 2.1, Section 2.3, Section 2.5, Section 3.1, Section 3.2, Section 3.3, Section 3.3.1, Section 3.3.2, Section 3.4, Section 3.5, Section 4.3, Section 4.4.1 to Section 4.4.4, Section 4.5.1, Section 5.1.1, Section 5.1.3, Section 5.2.1, Section 5.2.2, Section 5.3, Section 5.4, Section 6.1, Section 6.1.1, Section 6.1.2, Section 6.2 to Section 6.5, Section 7.1, Section 7.2.1, Section 7.3.3, Section 7.5, Section 7.6.1, Chapter 8, Section 8.1.1, Section 8.1.2, Section 8.2.1, Section 8.2.2, Section 8.3, Section 9.1 to Section 9.3, Appendix 1 Addition CONDITIONS OF USE FOR THE PRODUCT, Section 9.4 to Section 9.6
Jul., 2012	SH(NA)-080036-P	Correction SAFETY PRECAUTIONS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, ABOUT THE GENERIC TERMS AND ABBREVIATIONS, PACKING LIST, Section 2.1, Section 2.5, Section 4.2, Section 4.4.1, Section 4.4.5, Section 4.5.1, Section 4.5.2, Section 5.1.3, Section 5.2.1, Section 5.3, Section 6.1.1, Section 6.5, Section 7.2.1, Section 7.2.2, Section 7.3.1, Section 7.3.2, Section 7.3.3, Section 7.4, Section 7.5, Section 7.6.1, Section 8.1.1, Section 8.1.2, Section 8.2.1, Section 8.2.2, Section 9.1, Section 9.2, Section 9.3
Sep., 2016	SH(NA)-080036-Q	Correction SAFETY PRECAUTIONS, Section 2.1, 2.2, 2.4, 3.5, 3.6, 4.4.1 to 4.4.3, 5.3, 7.2.1, 9.3, Appendix 1
Jul., 2024	SH(NA)-080036-R	Correction SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, INTRODUCTION, ABOUT THE GENERIC TERMS AND ABBREVIATIONS, Section 3.4, 4.3

Japanese Manual Version SH-080035-V

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC-Q series programmable controller.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the Q series programmable controller you have purchased, so as to ensure correct use.

CONTENTS

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

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

- QCPU User's Manual (Hardware Design, Maintenance and Inspection)
- Safety Guidelines

  (This manual is included with the CPU module or base unit.)

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

(2) Additional measures

No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.

ABOUT THE GENERIC TERMS AND ABBREVIATIONS

This manual describes the Type QD62, QD62E and QD62D high-speed counter module using the following generic terms and abbreviations, unless otherwise specified.

Generic Term/Abbreviation	Description
QD62	An abbreviation for the Type QD62 high-speed counter module
QD62E	An abbreviation for the Type QD62E high-speed counter module
QD62D	An abbreviation for the Type QD62D high-speed counter module
QD62(E/D)	A generic term for the QD62, QD62E and QD62D
DOS/V personal computer	DOS/V-compatible personal computer of IBM PC/AT® and its compatible
GX Developer	Product name of the software package for the MELSEC programmable controllers
GX Works2	
GX Configurator-CT	An abbreviation for the counter module setting/monitor tool, GX Configurator-CT (SW0D5C-QCTU-E)
QCPU (Q mode)	A generic term for the Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU, Q12PRHCPU, Q00UJCPU, Q00UCPU, Q01UCPU, Q25PRHCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, and Q100UDEHCPU
Redundant CPU	A generic term for the Q12PRHCPU and Q25PRHCPU

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PACKING LIST

The product package contains the following.

Model Name	Product	Quantity
QD62	Type QD62 high-speed counter module	1
QD62E	Type QD62E high-speed counter module	1
QD62D	Type QD62D high-speed counter module	1
SW0D5C-QCTU-E	GX Configurator-CT Version 1 (1-license product) (CD-ROM)	1
SW0D5C-QCTU-EA	GX Configurator-CT Version 1 (Multiple-license product) (CD-ROM)	1

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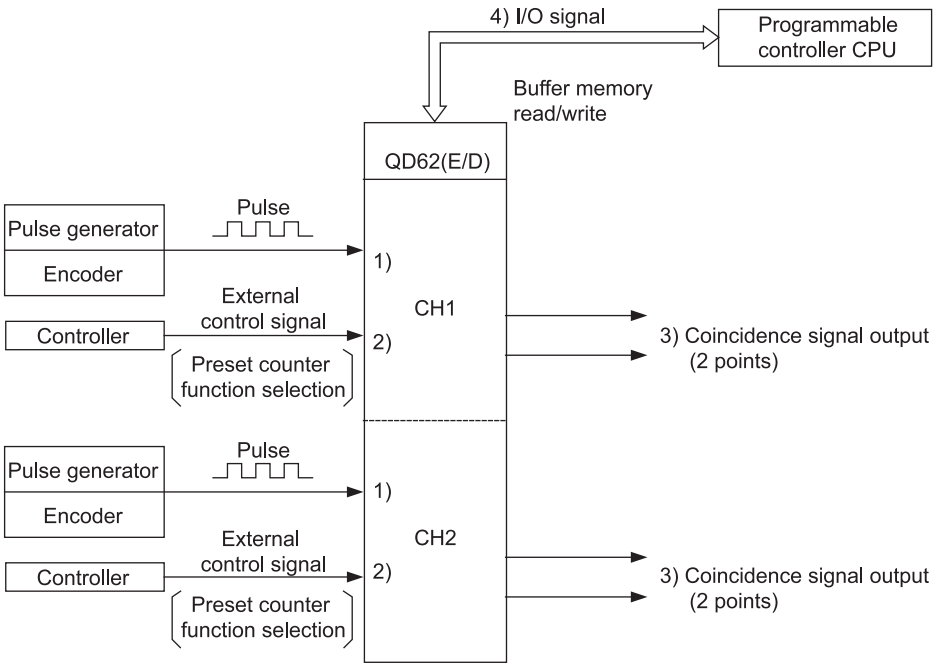
1 OVERVIEW

This User's Manual describes the specifications, handling and programming method for the QD62, QD62E and QD62D high-speed counter modules (QD62 (E/D)) used together with the MELSEC-Q series CPUs.
The QD62(E/D) modules are available with the following I/O types, maximum counting speeds and number of channels.

Item	QD62	QD62E	QD62D
I/O type	DC input sinking output	DC input sourcing output	Differential input sinking output
Maximum counting speed	200 kPPS		500 kPPS
Number of channels	2 channels		

The QD62(E/D) modules have the following input methods for 1 phase/2 phase pulse input:
• Phase 1 pulse input multiple of 1 • Phase 1 pulse input multiple of 2 • CW/CCW
• Phase 2 pulse input multiple of 1 • Phase 2 pulse input multiple of 2
• Phase 2 pulse input multiple of 4
See Section 5.1 for details on the input methods.

An overview of QD62 (E/D) operation is shown in the figure below.



1) Counts the pulses to be input to the QD62 (E/D).
2) Preset or counter function can be selected with an external control signal.
3) The present count value and the coincidence output point setting value can be compared to output a coincidence signal.
4) Using the sequence program, the I/O signal and buffer memory status of the QD62 (E/D) can be verified.
Also, count start/stop, preset, and counter function can be selected.

1.1 Features

The features of the QD62(E/D) are as follows:

(1) Counting can be performed in a wide range (The count value can be expressed within the range between -2147483648 and 2147483647)
- A count value is stored in 32-bit signed binary.
- The number of channels is 2.

(2) The maximum counting speed can be changed
The maximum speed of the QD62D can be changed by selecting from among 500 k, 200 k, 100 k and 10 k, while that of the QD62 and QD62E can be selected from among 200 k, 100 k and 10 k. This allows an error-free count even with gradual rise/fall pulses.

(3) Pulse input can be selected
The pulse input can be selected from 1 phase multiple of 1, 1 phase multiple of 2, 2 phase multiple of 1, 2 phase multiple of 2, 2 phase multiple of 4, CW and CCW.

(4) Counter format can be selected
Either one of the following counter formats can be selected.

(a) Linear counter format
A count from -2147483648 to 2147483647 is possible and if the count exceeds the range, an overflow will be detected.

(b) Ring counter format
This type counts pulses repeatedly within the range between the ring counter upper limit and the ring counter lower limit.

(5) Coincidence output is possible
Any channel coincidence output point can be preset to compare with the present counter value to output the ON/OFF signal output, or to start an interrupt program.

(6) Selection can be made from four counter functions
One of the following four functions can be selected.

(a) Count disable function
This function stops counting pulses by inputting a signal while CH□ Count enable command (Y4, YC) is on.

(b) Latch counter function
This function latches the present value of the counter when the signal was input.

(c) Sampling counter function
This function counts the pulses that were input within the preset time period from the signal input.

(d) Periodic pulse counter function
This function stores the present and previous values of the counter at each preset time interval while the signal is being input.

(7) Execution of the preset function and the selected counter function with an external control signal

(a) The preset function can be performed by applying a voltage to the preset input terminal.

(b) The function selected from counter function selection can be performed by applying a voltage to the function start input terminal.

(8) Easy settings using the GX Configurator-CT

The use of GX Configurator-CT sold separately allows you to execute the QD62(E/D) setting on screen, resulting in reducing the number of sequence programs.

Also, the use of GX Configurator-CT makes it easy to check the setting status and operating status for modules.

(9) A blown fuse in the external output section can be detected

A blown fuse in the external output section can be detected; it is notified by the input signal X and the LED display on the module.

2 SYSTEM CONFIGURATION

This chapter explains the system configuration of the QD62 (E/D).

2.1 Applicable Systems

This section describes the applicable systems.

(1) Applicable modules and base units, and the number of mountable modules

(a) When mounted with a CPU module

For the CPU modules and base units applicable to the QD62 (E/D) as well as the number of mountable modules, refer to the user's manual for the CPU module used.

Note the following when mounting the QD62 (E/D) with a CPU module.

- Depending on the combination with other modules or the number of mounted modules, power supply capacity may become insufficient. Consider the power supply capacity before mounting modules, and if the power supply capacity is insufficient, change the combination of the modules.
- Mount modules within the number of I/O points for the CPU module. If the number of slots is within the available range, a module can be mounted on any slot.

REMARK

When the module is used with a C Controller module, refer to the user's manual for the C Controller module.

(b) When mounted on a MELSECNET/H remote I/O station

For the MELSECNET/H remote I/O station and base units applicable to the QD62 (E/D) as well as the number of mountable modules, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Support of the multiple CPU system

When using the QD62 (E/D) in a multiple CPU system, refer to the following manual first.

- QCPU User's Manual (Multiple CPU System)

(3) Supported software packages

Relation between the system containing the QD62 (E/D) and software package is shown in the following table.

GX Developer or GX Works2 is required for the QD62(E/D).

		Software Version		
		GX Developer	GX Configurator-CT	GX Works2
Q00J/Q00/Q01CPU	Single CPU system	Version 7 or later	Version 1.10L or later (cannot be used with the SW0D5C-QCTU-E 50F or earlier versions)	Refer to the GX Works2 Version 1 Operating Manual (Common).
	Multiple CPU system	Version 8 or later		
Q02/Q02H/Q06H/Q12H/ Q25HCPU	Single CPU system	Version 4 or later	SW0D5C-QCTU-E 00A or later	
	Multiple CPU system	Version 6 or later	SW0D5C-QCTU-E 50F or later	
Q02PH/Q06PHCPU	Single CPU system	Version 8.68W or later	Version 1.13P or later (cannot be used with the SW0D5C-QCTU-E 50F or earlier versions)	
	Multiple CPU system			
Q12PH/Q25PHCPU	Single CPU system	Version 7.10L or later		
	Multiple CPU system			
Q12PRH/Q25PRHCPU	Redundant system	Version 8.45X or later	Version 1.16S or later	
Q00UJCPU/Q00UCPU/ Q01UCPU	Single CPU system	Version 8.76E or later	Version 1.25AB or later	
	Multiple CPU system			
Q02U/Q03UD/ Q04UDH/Q06UDHCPU	Single CPU system	Version 8.48A or later		
	Multiple CPU system			
Q10UDHCPU/ Q20UDHCPU	Single CPU system	Version 8.76E or later		
	Multiple CPU system			
Q13UDH/Q26UDHCPU	Single CPU system	Version 8.62Q or later		
	Multiple CPU system			
Q03UDE/Q04UDEH/ Q06UDEH/Q13UDEH/ Q26UDEHCPU	Single CPU system	Version 8.68W or later		
	Multiple CPU system			
Q10UDEHCPU/ Q20UDEHCPU	Single CPU system	Version 8.76E or later		
	Multiple CPU system			
CPU module other than the above	Single CPU system	Not available	Not available	
	Multiple CPU system			
If installed in a MELSECNET/H remote I/O station		Version 6 or later	SW0D5C-QCTU-E 50F or later	

POINT

When using GX Works2, refer to the following.

- GX Works2 Version1 Operating Manual (Common)
- GX Works2 Version1 Operating Manual (Intelligent Function Module)

(4) Connector

For the QD62(E/D), the connector is sold separately.

See Section 4.3 and make separate arrangements for the connector.

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2.2 About Use of the QD62 (E/D) with the Q00J/Q00/Q01CPU

Here, use of the QD62 (E/D) with the Q00J/Q00/Q01CPU is explained.

(1) Number of QD62s (E/D) that can be mounted when the Q00J/Q00/Q01CPU is used

For the number of mountable QD62s (E/D) when Q00J/Q00/Q01CPU is used, refer to the user's manual for the CPU module used.

(2) Limitations when using the Q00J/Q00/Q01CPU

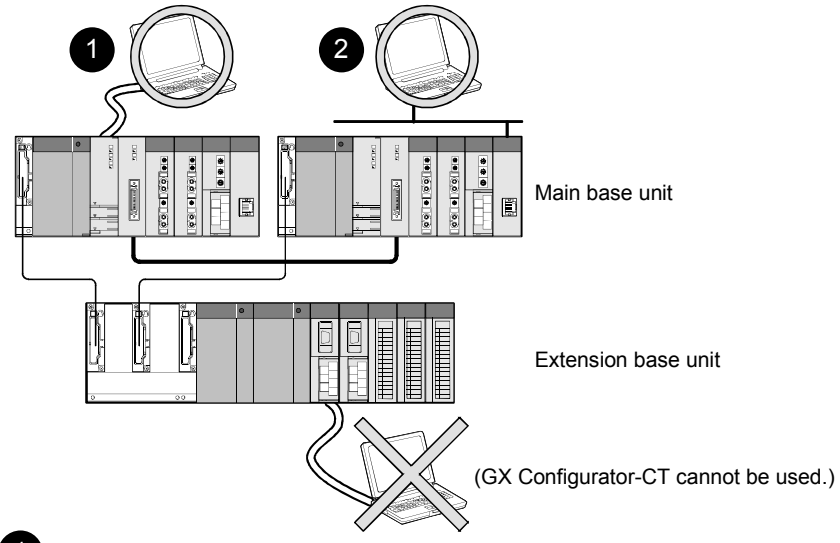
To use the coincidence detection interrupt function, use the Q00J/Q00/Q01CPU of function version B or later.

2.3 About Use of the QD62 (E/D) with the Redundant CPU

Here, use of the QD62 (E/D) with the Redundant CPU is explained.

(1) GX Configurator-CT

When using GX Developer to access the Redundant CPU through the intelligent function module on the extension base unit, GX Configurator-CT cannot be used. Connect a personal computer to the Redundant CPU with a communication path indicated below.



1 Direct connection to the CPU

2 Connection through an intelligent function module on the main base unit
(Through Ethernet module, MELSECNET/H module, or CC-Link module)

2.4 About Use of the QD62 (E/D) on the MELSECNET/H Remote I/O Station

Here, use of the QD62 (E/D) on the MELSECNET/H remote I/O station is explained.

(1) Number of QD62s (E/D) that can be mounted when the MELSECNET/H remote I/O station is used

For the number of mountable QD62s (E/D) when the MELSECNET/H remote I/O station is used, refer to the Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Limitations when using the remote I/O station

(a) The coincidence detection interrupt function cannot be used.

(b) When the QD62 (E/D) is used on the MELSECNET/H remote I/O station, a delay will occur due to the link scan time. Therefore, fully verify that there will be no problem with controllability in the target system.

Example) When processing is executed using the counter value input by a sequence program, variations will occur due to a delay in the link scan time.

2.5 How to Check the Function Version/Serial No./Software Version

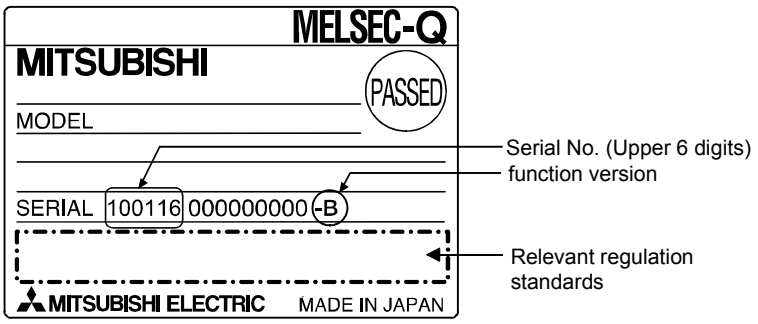
Check the function version and serial No. of the QD62(E/D) and the GX Configurator-CT software version by the following methods.

(1) Checking the function version and serial No. of the QD62(E/D)

The serial number and function version of the QD62(E/D) can be checked on the rating plate, on the front of the module, and on the System monitor window in GX Developer.

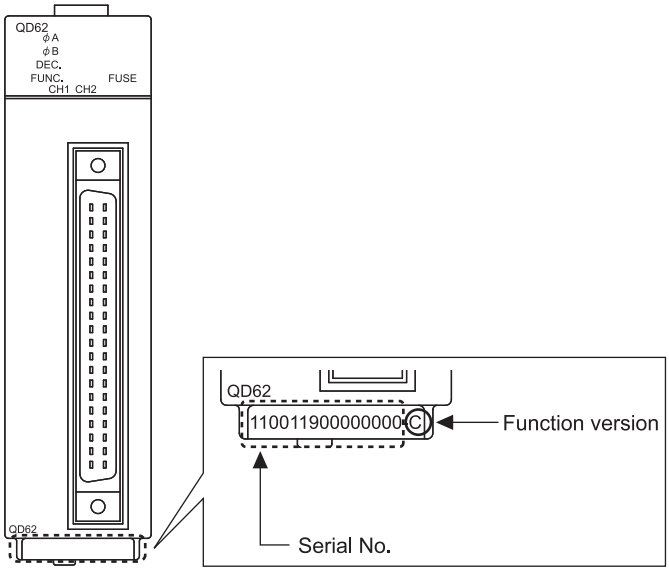
(a) Confirming the serial number on the rating plate

The rating plate is situated on the side face of the QD62(E/D).



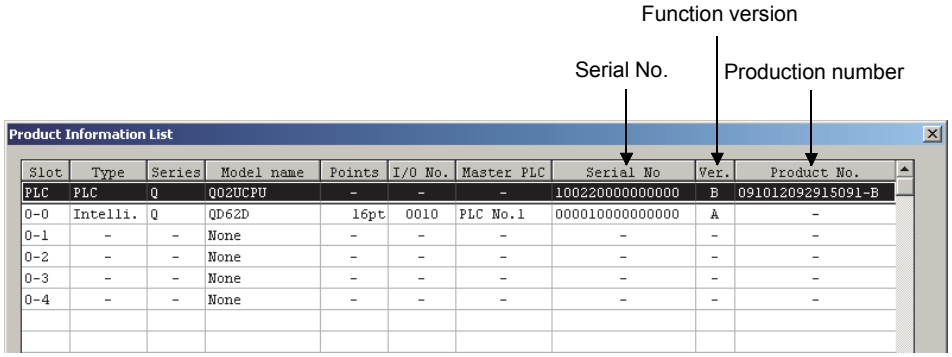
(b) Checking on the front of the module

The serial No. on the rating plate is also indicated on the front of the module (lower part).



(c) Confirming the serial number on the system monitor (Product Information List)

To display the system monitor, select [Diagnostics] → [System monitor] → Product Inf. List of GX Developer.



Slot	Type	Series	Model name	Points	I/O No.	Master PLC	Serial No	Ver.	Product No.
PLC	PLC	Q	Q02UCPU	-	-	-	100220000000000	B	091012092915091-B
0-0	Intelli.	Q	QD62D	16pt	0010	PLC No.1	000010000000000	A	-
0-1	-	-	None	-	-	-	-	-	-
0-2	-	-	None	-	-	-	-	-	-
0-3	-	-	None	-	-	-	-	-	-
0-4	-	-	None	-	-	-	-	-	-

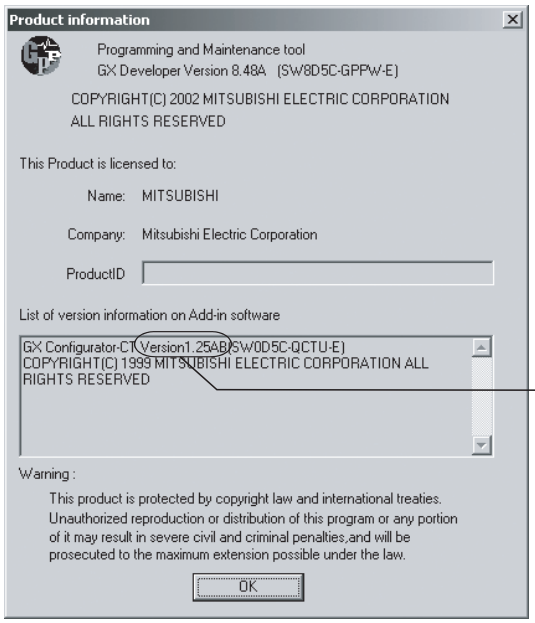
POINT

The serial No. on the rating plate may be different from the serial No. displayed on the product information window of GX Developer.

- The serial No. on the rating plate indicates the management information of the product.
- The serial No. displayed on the product information window of GX Developer indicates the function information of the product.
  The function information of the product is updated when a new function is added.

(2) Checking the software version of GX Configurator-CT

The software version of GX Configurator-CT can be checked by selecting [Help] → [Product information] of GX Developer.



("Product information" window of GX Developer Version 8)

REMARK

The version indication for the GX Configurator-CT has been changed as shown below from the SW0D5C-QCTU-E 50F upgrade product.

Previous product		Upgrade and subsequent versions
SW0D5C-QCTU-E 50F	→	GX Configurator-CT Version 1.10L

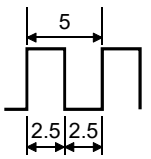
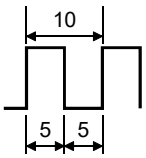
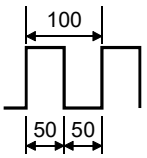
3 SPECIFICATIONS

The following describes the performance specifications, I/O signals for the CPU module and buffer memory specifications of the QD62(E/D).
For the general specifications of the QD62(E/D), see the User's Manual for the CPU module used.

3.1 Performance Specifications

The following describes the performance specifications of the QD62(E/D):

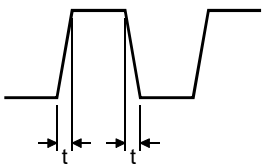
(1) QD62 (DC input sinking output type) performance specifications

Item \ Model name		QD62		
Counting speed switch settings ＊1		200 k (100 k to 200 kPPS)	100 k (10 k to 100 kPPS)	10 k (10 kPPS or less)
I/O occupied points		16 points (I/O assignment: Intelligent 16 points)		
Number of channels		2 channels		
Count input signal	Phase	1-phase input (1 multiple/2 multiples), 2-phase input (1 multiple/2 multiples/4 multiples), CW/CCW input		
	Signal level (ϕA, ϕB)	5/12/24 V DC 2 to 5 mA		
Counter	Counting speed (max) ＊2	200 kPPS	100 kPPS	10 kPPS
	Counting range	32-bit signed binary values (-2147483648 to 2147483647)		
	Model	UP/DOWN Preset counter + Ring counter function		
	Minimum count pulse width (Duty ratio 50 %)	 (Unit:μs) (Min. phase differential for 2-phase input: 1.25 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 2.5 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 25 μ s)
Coincidence output	Comparison range	32-bit signed binary values		
	Comparison result	Set value < Count value Set value = Count value Set value > Count value		
External input	Preset	5/12/24 V DC 2 to 5 mA		
	Function start			
External output	Coincidence output	Transistor (sinking type) output: 2 points/channel 12/24 V DC 0.5 A/point 2 A/common		
5 V DC internal current consumption		0.30 A		
Weight		0.11 kg		

＊1: The counting speed switch settings can be set using the intelligent function module switch.

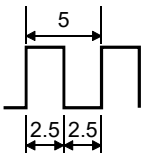
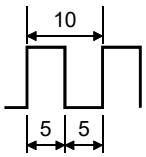
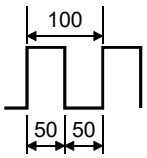
＊2: Counting speed is affected by pulse rise and fall time. Possible counting speeds are shown in the following table. Note that if a pulse that has a large rise and/or fall time is counted, a miscount may occur.

Counting speed switch settings	200 k	100 k	10 k
Rise/fall time	Both 1 and 2 phase input		
t = 1.25 μ s or less	200 kPPS	100 kPPS	10 kPPS
t = 2.5 μ s or less	100 kPPS	100 kPPS	10 kPPS
t = 25 μ s or less	—	10 kPPS	10 kPPS
t = 500 μ s	—	—	500 PPS



3 - 1

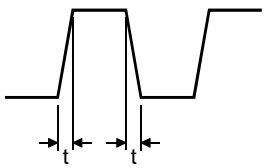
(2) QD62E (DC input sourcing output type) performance specifications

Item \ Model name		QD62E		
Counting speed switch settings ＊1		200 k (100 k to 200 kPPS)	100 k (10 k to 100 kPPS)	10 k (10 kPPS or less)
I/O occupied points		16 points (I/O assignment: Intelligent 16 points)		
Number of channels		2 channels		
Count input signal	Phase	1-phase input (1 multiple/2 multiples), 2-phase input (1 multiple/2 multiples/4 multiples), CW/CCW input		
	Signal level (ϕA, ϕB)	5/12/24 V DC 2 to 5 mA		
Counter	Counting speed (max) ＊2	200 kPPS	100 kPPS	10 kPPS
	Counting range	32-bit signed binary values (-2147483648 to 2147483647)		
	Model	UP/DOWN Preset counter + Ring counter function		
	Minimum count pulse width (Duty ratio 50 %)	 (Unit:μs) (Min. phase differential for 2-phase input: 1.25 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 2.5 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 25 μ s)
Coincidence output	Comparison range	32-bit signed binary values		
	Comparison result	Set value < Count value Set value = Count value Set value > Count value		
External input	Preset	5/12/24 V DC 2 to 5 mA		
	Function start			
External output	Coincidence output	Transistor (sourcing type) output: 2 points/channel 12/24 V DC 0.1 A/point 0.4 A/common		
5 V DC internal current consumption		0.33 A		
Weight		0.11 kg		

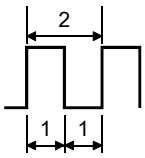
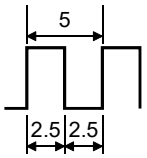
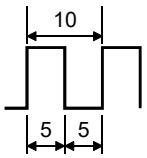
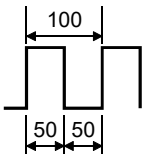
＊1: The counting speed switch settings can be set using the intelligent function module switch.

＊2: Counting speed is affected by pulse rise and fall time. Possible counting speeds are shown in the following table. Note that if a pulse that has a large rise and/or fall time is counted, a miscount may occur.

Counting speed switch settings	200 k	100 k	10 k
Rise/fall time	Both 1 and 2 phase input		
t = 1.25 μ s or less	200 kPPS	100 kPPS	10 kPPS
t = 2.5 μ s or less	100 kPPS	100 kPPS	10 kPPS
t = 25 μ s or less	—	10 kPPS	10 kPPS
t = 500 μ s	—	—	500 PPS



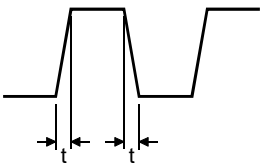
(3) QD62D (differential input sinking output type) performance specifications

Item \ Model name		QD62D			
Counting speed switch settings ＊1		500 k (200 k to 500 kPPS)	200 k (100 k to 200 kPPS)	100 k (10 k to 100 kPPS)	10 k (10 kPPS or less)
I/O occupied points		16 points (I/O assignment: Intelligent 16 points)			
Number of channels		2 channels			
Count input signal	Phase	1-phase input (1 multiple/2 multiples), 2-phase input (1 multiple/2 multiples/4 multiples), CW/CCW input			
	Signal level (ϕA, ϕB)	EIA Standard RS-422-A Differential line driver level (AM26LS31 [manufactured by Texas Instruments] or equivalent)			
Counter	Counting speed (max) ＊2	500 kPPS	200 kPPS	100 kPPS	10 kPPS
	Counting range	32-bit signed binary values (-2147483648 to 2147483647)			
	Model	UP/DOWN Preset counter + Ring counter function			
	Minimum count pulse width (Duty ratio 50 %)	 (Unit:μs) (Min. phase differential for 2-phase input: 0.5 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 1.25 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 2.5 μ s)	 (Unit:μs) (Min. phase differential for 2-phase input: 25 μ s)
Coincidence output	Comparison range	32-bit signed binary values			
	Comparison result	Set value < Count value Set value = Count value Set value > Count value			
External input	Preset	5/12/24 V DC 2 to 5 mA (EIA Standard RS-422-A Differential Line Driver may be connected)			
	Function start				
External output	Coincidence output	Transistor (sinking type) output: 2 points/channel 12/24 V DC 0.5 A/point 2 A/common			
5 V DC internal current consumption		0.38 A			
Weight		0.12 kg			

＊1: The counting speed switch settings can be set using the intelligent function module switch.

＊2: Counting speed is affected by pulse rise and fall time. Possible counting speeds are shown in the following table. Note that if a pulse that has a large rise and/or fall time is counted, a miscount may occur.

Counting speed switch settings	500 k	200 k	100 k	10 k
Rise/fall time	Both 1 and 2 phase input			
t = 0.5 μ s or less	500 kPPS	200 kPPS	100 kPPS	10 kPPS
t = 1.25 μ s or less	200 kPPS	200 kPPS	100 kPPS	10 kPPS
t = 2.5 μ s or less	—	100 kPPS	100 kPPS	10 kPPS
t = 25 μ s or less	—	—	10 kPPS	10 kPPS
t = 500 μ s	—	—	—	500 PPS



3.2 Function List

The QD62(E/D) functions are listed below.

Name		Function	Reference section
Linear counter function		Values from -2147483648 to 2147483647 can be counted. If the count exceeds the range, this function detects an overflow.	Section 5.2.1
Ring counter function		This function counts pulses repeatedly within the range between the ring counter upper limit and the ring counter lower limit.	Section 5.2.2
Coincidence output function		Compares the coincidence output point of any preset channel with the present counter value, and outputs the ON/OFF signal.	Section 5.3
	Coincidence detection interrupt function	Generates an interrupt signal to the CPU module when coincidence is detected, and starts the interrupt program.	
Preset function		Rewrites the present counter value to any numeric value.	Section 5.4
Counter function selection	Disable count function	Stops the pulse count while the count enable command is being executed.	Section 6.2
	Latch counter function	Stores the present counter value at the time the counter function selection start command signal is input in the buffer memory.	Section 6.3
	Sampling counter function	Counts the pulses that are input during the preset sampling time period from the time the counter function selection start command is input, and stores the count in the buffer memory.	Section 6.4
	Periodic pulse counter function	This function stores the present and previous counter values to the buffer memories at the preset cycle (T) while the counter function selection start command signal is input.	Section 6.5

POINT

(1) Each function can be used together with other functions.
However, select either of the linear counter function or the ring counter function and any one of the counter functions from counter function selection.

(2) The preset function and the function selected from counter function selection can also be performed by the following external inputs.
- When using the preset function, apply a voltage to the preset input terminal.
- When using the function selected from counter function selection, apply a voltage to the function start input terminal.

3.3 I/O Signals for the CPU Module

3.3.1 List of I/O signals

The I/O signals of the QD62(E/D) for the CPU module are listed in the table below.
For the I/O numbers (X/Y) and I/O addresses indicated in this and succeeding sections, it is assumed that the QD62(E/D) is mounted into I/O slot 0 of the standard base module.

Input signal (Signal direction: QD62(E/D) → CPU module)			Output signal (Signal direction: CPU module → QD62(E/D))		
Device No.	Signal name		Device No.	Signal name	
X0	Module ready		Y0	CH1	Coincidence signal No. 1 reset command
X1	CH1	Counter value large (point No. 1)	Y1		Preset command
X2		Counter value coincidence (point No. 1)	Y2		Coincidence signal enable command
X3		Counter value small (point No. 1)	Y3		Down count command
X4		External preset request detection	Y4		Count enable command
X5		Counter value large (point No. 2)	Y5		External preset detection reset command
X6		Counter value coincidence (point No. 2)	Y6		Counter function selection start command
X7		Counter value small (point No. 2)	Y7		Coincidence signal No. 2 reset command
X8	CH2	Counter value large (point No. 1)	Y8	CH2	Coincidence signal No. 1 reset command
X9		Counter value coincidence (point No. 1)	Y9		Preset command
XA		Counter value small (point No. 1)	YA		Coincidence signal enable command
XB		External preset request detection	YB		Down count command
XC		Counter value large (point No. 2)	YC		Count enable command
XD		Counter value coincidence (point No. 2)	YD		External preset detection reset command
XE		Counter value small (point No. 2)	YE		Counter function selection start command
XF	Fuse broken detection flag		YF		Coincidence signal No. 2 reset command

3.3.2 Functions of I/O signals

The details of the I/O signals for the QD62(E/D) are listed in the table below.

(1) Input signals

Device No. CH1	Device No. CH2	Signal name QD62(E/D) → CPU module	Description
X0		Module ready	• This signal turns on when the QD62(E/D) is ready for counting operation after the CPU module is powered on or reset. • Counting operation is not performed while this signal is off.
X1	X8	Counter value large (point No.1)	• This signal turns on when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) > CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) • This signal turns off when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) ≦ CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
X2	X9	Counter value coincidence (point No.1)	• This signal turns on when the following condition is met. And then, the on status will be latched. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) = CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) • This signal is turned off by CH□ Coincidence signal No.1 reset command (Y0, Y8). • This signal is on immediately after the CPU module is powered on or reset because both of the following buffer memories are set to "0". CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
X3	XA	Counter value small (point No.1)	• This signal turns on when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) < CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) •This signal turns off when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) ≧ CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
X4	XB	External preset request detection	• This signal is turned on by a preset command from an external input terminal. And then, the on status will be latched. • This signal is turned off by CH□ External preset detection reset command (Y5, YD).
X5	XC	Counter value large (point No.2)	• This signal turns on when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) > CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39) • This signal turns off when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) ≦ CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39)
X6	XD	Counter value coincidence (point No.2)	• This signal turns on when the following condition is met. And then, the on status will be latched. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) = CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39) • This signal is turned off by CH□ Coincidence signal No.2 reset command (Y7, YF). • This signal is on immediately after the CPU module is powered on or reset because both of the following buffer memories are set to "0". CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39)

Device No.		Signal name QD62(E/D) CPU module	Description
CH1	CH2		
X7	XE	Counter value small (point No.2)	• This signal turns on when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) < CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39) • This signal turns off when the following condition is met. CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) ≧ CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39)
XF		Fuse broken detection flag	This signal turns on when a fuse in the coincidence signal output part is blown.

(2) Output signals

Device No.		Signal name CPU module → QD62(E/D)	Operation timing	Description
CH1	CH2			
Y0	Y8	Coincidence signal No.1 reset command		This signal is turned on to reset CH□ Counter value coincidence (point No.1) (X2, X9).
Y1	Y9	Preset command		This signal is turned on to perform the preset function.
Y2	YA	Coincidence signal enable command		This signal is turned on to output the status of CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Counter value coincidence (point No.2) (X6, XD) to the external terminal.
Y3	YB	Down count command		This signal is turned on to count down pulses in the 1-phase pulse input mode. The module counts down pulses when the phase B pulse input or CH□ Down count command (Y3, YB) is turned on. For counting up, check that the phase B pulse input and CH□ Down count command (Y3, YB) are off.
Y4	YC	Count enable command		This signal is turned on to perform counting operation.
Y5	YD	External preset detection reset command		This signal is turned on to reset CH□ External preset request detection (X4, XB).
Y6	YE	Counter function selection start command		This signal is turned on to perform the selected counter function.
				• Latch counter function • Sampling counter function
				• Count disable function • Periodic pulse counter function
Y7	YF	Coincidence signal No.2 reset command		This signal is turned on to reset CH□ Counter value coincidence (point No.2) (X6, XD).

REMARK

The symbols used in the operation timing column signify the following:

-  ····· Enabled while the signal is in ON status.
-  ····· Enabled at signal rise (from OFF to ON).

3.4 Buffer Memory Assignments

(1) Buffer memory assignment list

Buffer memory assignments for the QD62 (E/D) are listed in the table below.
For details on the buffer memories, refer to this section (2) to this section (12).

Address				Set data		Initial value *1	Read/write
CH1		CH2					
Hexadecimal	Decimal	Hexadecimal	Decimal				
0H	0	20H	32	Preset value setting *2	(L)	0	Read/write enabled
1H	1	21H	33		(H)		
2H	2	22H	34	Present value *2	(L)	0	Read only
3H	3	23H	35		(H)		
4H	4	24H	36	Coincidence output point set No. 1 *2	(L)	0	Read/write enabled
5H	5	25H	37		(H)		
6H	6	26H	38	Coincidence output point set No. 2 *2	(L)		
7H	7	27H	39		(H)		
8H	8	28H	40	Overflow detection flag		0	Read only
9H	9	29H	41	Counter function selection setting		0	Read/write enabled
AH	10	2AH	42	Sampling/periodic setting			
BH	11	2BH	43	Sampling/periodic counter flag		0	Read only
CH	12	2CH	44	Latch count value *2	(L)		
DH	13	2DH	45		(H)		
EH	14	2EH	46	Sampling count value *2	(L)		
FH	15	2FH	47		(H)		
10H	16	30H	48	Periodic pulse count previous value *2	(L)		
11H	17	31H	49		(H)		
12H	18	32H	50	Periodic pulse count present value *2	(L)		
13H	19	33H	51		(H)		
14H	20	34H	52	Ring counter minimum value *2	(L)	0	Read/write enabled
15H	21	35H	53		(H)		
16H	22	36H	54	Ring counter maximum value *2	(L)		
17H	23	37H	55		(H)		
18H to 1FH	24 to 31	38H to 3FH	56 to 63	System area		—	—

*1: The initial values are set when the power is turned on or the CPU module is reset.

*2: Read or write values in the 32-bit signed binary format. (Be sure to use two words at a time.)

POINT

(1) The system area and the areas not listed in the table are for the system and are not available for users.
If they are written by user, the functions of the QD62(E/D) are not guaranteed.

(2) All data in the buffer memory of the QD62(E/D) are initialized when the QD62(E/D) is powered on or the CPU module is reset.
For this reason, to save the necessary data, write/read the data to/from the buffer memory by executing the FROM/DFRO/TO/DTO instructions in the sequence program or performing auto refresh to the devices in the CPU module.

(2) CH□ Preset value setting (Un\G0, Un\G1, Un\G32, Un\G33)

- This area is used to set the values that are preset in the counter.
- The setting range is between -2147483648 and 2147483647 (32-bit signed binary).

(3) CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35)

- The present values for the counter are stored.
- A present value is stored in this area without delay after a pulse is counted.
- The stored value range is between -2147483648 and 2147483647 (32-bit signed binary).

(4) CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39)

- This area is used to write the setting values of the coincidence output points to be compared with the present counter value.
- Two coincidence detection output points, CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) and CH□ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39), can be set for each channel.
- The setting range is between -2147483648 and 2147483647 (32-bit signed binary).

(5) CH□ Overflow detection flag (Un\G8, Un\G40)

- A counter overflow occurrence status is stored when the counter format is linear counter.
- The following values corresponding to the overflow occurrence status are stored in this area.

Condition	Buffer memory content
No overflow detection	0
Overflow occurred	1

(6) CH□ Counter function selection setting (Un\G9, Un\G41)

- This area is used to set the data for which a counter function is selected.
- The relationships between the selected counter function and set value are shown below.

Counter function selection	Set value
Count disable function	0
Latch counter function	1
Sampling counter function	2
Periodic pulse counter function	3

(7) CH□ Sampling/periodic setting (Un\G10, Un\G42)

- This area is used to write the time setting values of the sampling counter function and periodic pulse counter function during counter function selection.
- The setting range is between 1 and 65535 (16-bit signed binary)*1. The setting unit is 10 (ms).

*1: When setting a value between 32768 and 65535 using a sequence program, set the value in hexadecimal.
For example, for "62500", set the value "$F424_H$".
Example) When "420" is set in this area
420 × 10= 4200 [ms]

(8) CH□ Sampling/periodic counter flag (Un\G11, Un\G43)

- This area is used to store the function operating status while the sampling counter function and periodic pulse counter function are being executed during counter function selection.
- One of the values corresponding to the function operation status shown in the table below is stored in this area.

Operating status	Buffer memory content
Idling function	0
Executing function	1

(9) CH□ Latch count value (Un\G12, Un\G13, Un\G44, Un\G45)

- This area is used to store the latch count values when the latch counter function is executed.
- The stored value range is between -2147483648 and 2147483647 (32-bit signed binary).

(10) CH□ Sampling count value (Un\G14, Un\G15, Un\G46, Un\G47)

- This area is used to store the sampling count values when the sampling counter function is executed.
- The stored value range is between -2147483648 and 2147483647 (32-bit signed binary).

(11) CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49)
CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51)

- The stored value range is between -2147483648 and 2147483647 (32-bit signed binary).

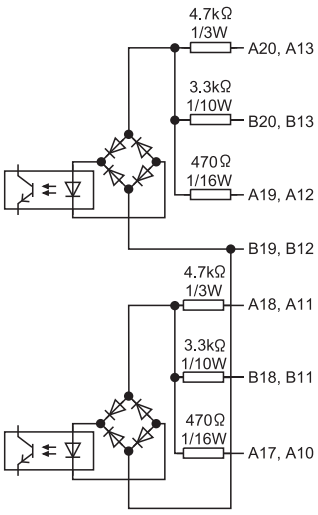
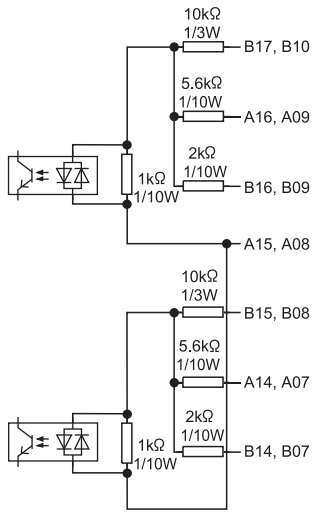
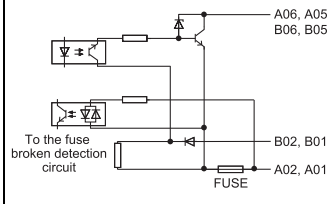
(12) CH□ Ring counter minimum value (Un\G20, Un\G21, Un\G52, Un\G53)
CH□ Ring counter maximum value (Un\G22, Un\G23, Un\G54, Un\G55)

- This area is used to set the count range when the counter format is ring counter.
- The setting range is between -2147483648 and 2147483647 (32-bit signed binary).

3.5 Interface with External Devices

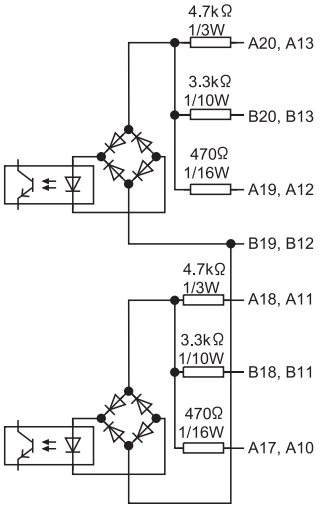
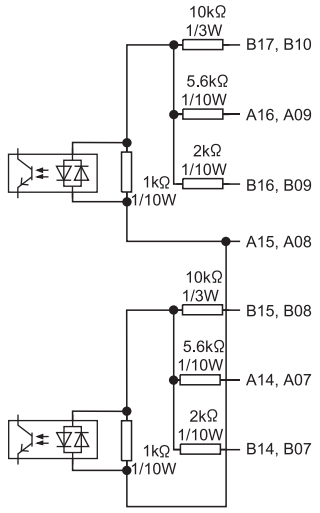
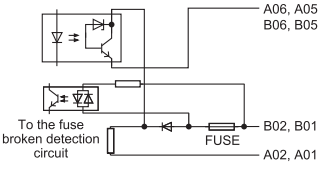
The table below lists the external device interface for the QD62(E/D).

(1) QD62 (DC input sinking output type)

I/O classification	Internal circuit	Terminal number ＊1 CH1	Terminal number ＊1 CH2	Signal name	Operation	Input voltage (guaranteed value)	Operating current (guaranteed value)
Input		A20	A13	Phase A pulse input 24 V	When ON	21.6 to 26.4 V	2 to 5 mA
					When OFF	5 V or less	0.1 mA or less
		B20	B13	Phase A pulse input 12 V	When ON	10.8 to 13.2 V	2 to 5 mA
					When OFF	4 V or less	0.1 mA or less
		A19	A12	Phase A pulse input 5 V	When ON	4.5 to 5.5 V	2 to 5 mA
					When OFF	2 V or less	0.1 mA or less
		B19	B12	ABCOM	—		
		A18	A11	Phase B pulse input 24 V	When ON	21.6 to 26.4 V	2 to 5 mA
					When OFF	5 V or less	0.1 mA or less
		B18	B11	Phase B pulse input 12 V	When ON	10.8 to 13.2 V	2 to 5 mA
					When OFF	4 V or less	0.1 mA or less
		A17	A10	Phase B pulse input 5 V	When ON	4.5 to 5.5 V	2 to 5 mA
					When OFF	2 V or less	0.1 mA or less
		—	—	—	—		
		B17	B10	Preset input 24 V	When ON	21.6 to 26.4 V	2 to 5 mA
					When OFF	5 V or less	0.1 mA or less
		A16	A09	Preset input 12 V	When ON	10.8 to 13.2 V	2 to 5 mA
					When OFF	4 V or less	0.1 mA or less
		B16	B09	Preset input 5 V	When ON	4.5 to 5.5 V	2 to 5 mA
					When OFF	2 V or less	0.1 mA or less
		A15	A08	CTRLCOM	Response time	OFF → ON 0.5 ms or less	ON → OFF 1 ms or less
		B15	B08	Function start input 24 V	When ON	21.6 to 26.4 V	2 to 5 mA
					When OFF	5 V or less	0.1 mA or less
		A14	A07	Function start input 12 V	When ON	10.8 to 13.2 V	2 to 5 mA
					When OFF	4 V or less	0.1 mA or less
		B14	B07	Function start input 5 V	When ON	4.5 to 5.5 V	2 to 5 mA
					When OFF	2 V or less	0.1 mA or less
		—	—	—	Response time	OFF → ON 0.5 ms or less	ON → OFF 1 ms or less
Output		A06	A05	EQU1 (Coincidence output point No. 1)	Operating voltage 10.2 to 30 V Maximum load current 0.5 A/point, 2 A/common Maximum voltage drop when ON 1.5 V Response time OFF → ON 0.1 ms or less ON → OFF 0.1 ms or less (rated load, resistive load)		
		B06	B05	EQU2 (Coincidence output point No. 2)			
		B02, B01		12/24 V	Input voltage 10.2 to 30 V Current consumption 8 mA (TYP 24 V DC) Common for all channels		
		A02, A01		0 V			

＊1: Terminal numbers A03, A04, B03 and B04 are not used.

(2) QD62E (DC input sourcing output type)

<table>
<tr><th rowspan="2">I/O classification</th><th rowspan="2">Internal circuit</th><th colspan="2">Terminal number ＊1</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></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td rowspan="20">Input</td><td rowspan="10"> 
</td><td>A20</td><td>A13</td><td>Phase A pulse input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B20</td><td>B13</td><td>Phase A pulse input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>A19</td><td>A12</td><td>Phase A pulse input 5 V</td><td>When ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>2 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B19</td><td>B12</td><td>ABCOM</td><td colspan="3">—</td></tr>
<tr><td>A18</td><td>A11</td><td>Phase B pulse input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B18</td><td>B11</td><td>Phase B pulse input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>A17</td><td>A10</td><td>Phase B pulse input 5 V</td><td>When ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>2 V or less</td><td>0.1 mA or less</td></tr>
<tr><td rowspan="10"> 
</td><td>B17</td><td>B10</td><td>Preset input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>A16</td><td>A09</td><td>Preset input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B16</td><td>B09</td><td>Preset input 5 V</td><td>When ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>2 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>A15</td><td>A08</td><td>CTRLCOM</td><td>Response time</td><td>OFF →ON 0.5 ms or less</td><td>ON →OFF 1 ms or less</td></tr>
<tr><td>B15</td><td>B08</td><td>Function start input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>A14</td><td>A07</td><td>Function start input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B14</td><td>B07</td><td>Function start input 5 V</td><td>When ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>When OFF</td><td>2 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>—</td><td>—</td><td>—</td><td>Response time</td><td>OFF →ON 0.5 ms or less</td><td>ON →OFF 1 ms or less</td></tr>
<tr><td rowspan="4">Output</td><td rowspan="4"> 
</td><td>A06</td><td>A05</td><td>EQU1 (Coincidence output point No. 1)</td><td colspan="3" rowspan="2">Operating voltage 10.2 to 30 V
Maximum load current 0.1 A/point, 0.4 A/common
Maximum voltage drop when ON 1.5 V
Response time OFF → ON 0.3 ms or less
ON → OFF 0.3 ms or less (rated load, resistive load)</td></tr>
<tr><td>B06</td><td>B05</td><td>EQU2 (Coincidence output point No. 2)</td></tr>
<tr><td colspan="2">B02, B01</td><td>12/24 V</td><td colspan="3" rowspan="2">Input voltage 10.2 to 30 V
Current consumption 8 mA (TYP 24 V DC)
Common for all channels</td></tr>
<tr><td colspan="2">A02, A01</td><td>0 V</td></tr>
</table>

＊1: Terminal numbers A03, A04, B03 and B04 are not used.

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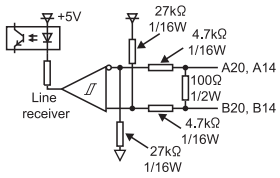
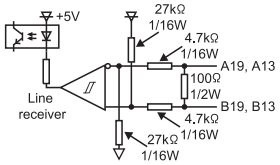
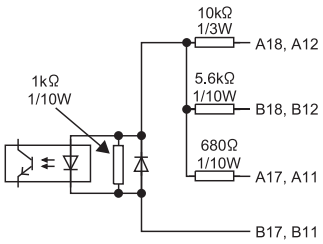
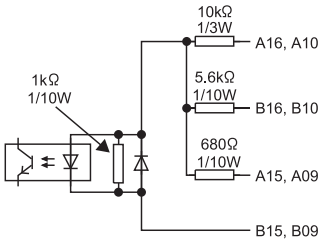
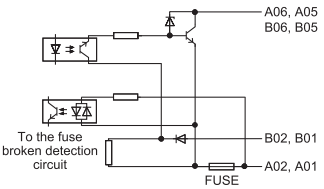
(3) QD62D (Differential input sinking output type)

<table>
<tr><th rowspan="2">I/O classification</th><th rowspan="2">Internal circuit</th><th colspan="2">Terminal number ＊1</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></tr>
<tr><th>CH1</th><th>CH2</th></tr>
<tr><td rowspan="12">Input</td><td rowspan="4"> 
</td><td>A20</td><td>A14</td><td>Phase A pulse input</td><td colspan="3" rowspan="4">Line receiver (AM26C32 [manufactured by Texas Instruments Japan Limited.] or equivalent) that conforms to RS-422-A in EIA Standard
The specifications of the line receiver are as follows:
• VIT+ differential input ON voltage (H level threshold voltage): 0.1V
• VIT- differential input OFF voltage (L level threshold voltage): -0.1V
• Vhys hysteresis (VIT+ - VIT-): 60mV
(A current type line driver cannot be used.)</td></tr>
<tr><td>B20</td><td>B14</td><td>Phase $\overline{A}$ pulse input</td></tr>
<tr><td rowspan="2"> 
</td><td>A19</td><td>A13</td><td>Phase B pulse input</td></tr>
<tr><td>B19</td><td>B13</td><td>Phase $\overline{B}$ pulse input</td></tr>
<tr><td rowspan="8"> 
</td><td rowspan="2">A18</td><td rowspan="2">A12</td><td rowspan="2">Preset input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td rowspan="2">B18</td><td rowspan="2">B12</td><td rowspan="2">Preset input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td rowspan="2">A17</td><td rowspan="2">A11</td><td rowspan="2">Preset input 5 V</td><td>When ON</td><td>2.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>1 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B17</td><td>B11</td><td>PRSTCOM</td><td>Response time</td><td>OFF →ON
0.5 ms or less</td><td>ON →OFF
1 ms or less</td></tr>
<tr><td rowspan="8"> 
</td><td rowspan="2">A16</td><td rowspan="2">A10</td><td rowspan="2">Function start input 24 V</td><td>When ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>5 V or less</td><td>0.1 mA or less</td></tr>
<tr><td rowspan="2">B16</td><td rowspan="2">B10</td><td rowspan="2">Function start input 12 V</td><td>When ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>4 V or less</td><td>0.1 mA or less</td></tr>
<tr><td rowspan="2">A15</td><td rowspan="2">A09</td><td rowspan="2">Function start input 5 V</td><td>When ON</td><td>2.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td>When OFF</td><td>1 V or less</td><td>0.1 mA or less</td></tr>
<tr><td>B15</td><td>B09</td><td>FUNCCOM</td><td>Response time</td><td>OFF →ON
0.5 ms or less</td><td>ON →OFF
1 ms or less</td></tr>
<tr><td rowspan="4">Output</td><td rowspan="4"> 
</td><td>A06</td><td>A05</td><td>EQU1
(Coincidence output point No. 1)</td><td colspan="3" rowspan="2">Operating voltage 10.2 to 30 V
Maximum load current 0.5 A/point, 2 A/common
Maximum voltage drop when ON 1.5 V
Response time OFF → ON 0.1 ms or less
ON → OFF 0.1 ms or less (rated load, resistive load)</td></tr>
<tr><td>B06</td><td>B05</td><td>EQU2
(Coincidence output point No. 2)</td></tr>
<tr><td colspan="2">B02, B01</td><td>12/24 V</td><td colspan="3" rowspan="2">Input voltage 10.2 to 30 V
Current consumption 8 mA (TYP 24 V DC)
Common for all channels</td></tr>
<tr><td colspan="2">A02, A01</td><td>0 V</td></tr>
</table>

＊1: Terminal numbers A08, A07, A03, A04, B08, B07, B04 and B03 are not used.

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3.6 Encoders that can be Connected

The encoders that can be connected to the QD62(E/D) are described below.

(1) Encoders that can be connected to the QD62 and QD62E

- Open collector output type encoders
- Voltage output type encoders
  (Verify that the output voltage and output current of the encoder meet the specifications for the QD62 and QD62E.)

(2) Encoders that can be connected to the QD62D

- Line driver output type encoders
  (Verify that the encoder output voltage meets the specifications for the QD62D.)

POINT
The following encoders cannot be used with the QD62(E/D). • TTL level voltage output type encoders

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4 SETUP AND PROCEDURE BEFORE STARTING THE OPERATION

The following describes the procedure prior to the QD62(E/D) operation, the name and setting of each part of the QD62(E/D), and wiring method.

4.1 Handling Precautions

The following are the precautions for handling the QD62(E/D).

(1) Do not drop the module casing or connector, or do not subject it to strong impact.

(2) Do not remove the PCB of each module from its case. Doing so may cause breakdowns.

(3) Be careful not to let foreign particles such or wire chips get inside the module. These may cause fire, breakdowns and malfunctions.

(4) The top surface of the module is covered with a protective film to prevent foreign objects such as wire chips from entering the module when wiring. Do not remove this film until the wiring is complete.
Before operating the system, be sure to remove the film to provide adequate heat ventilation.

(5) Tighten the screws such as module fixing screws within the following ranges.
If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.

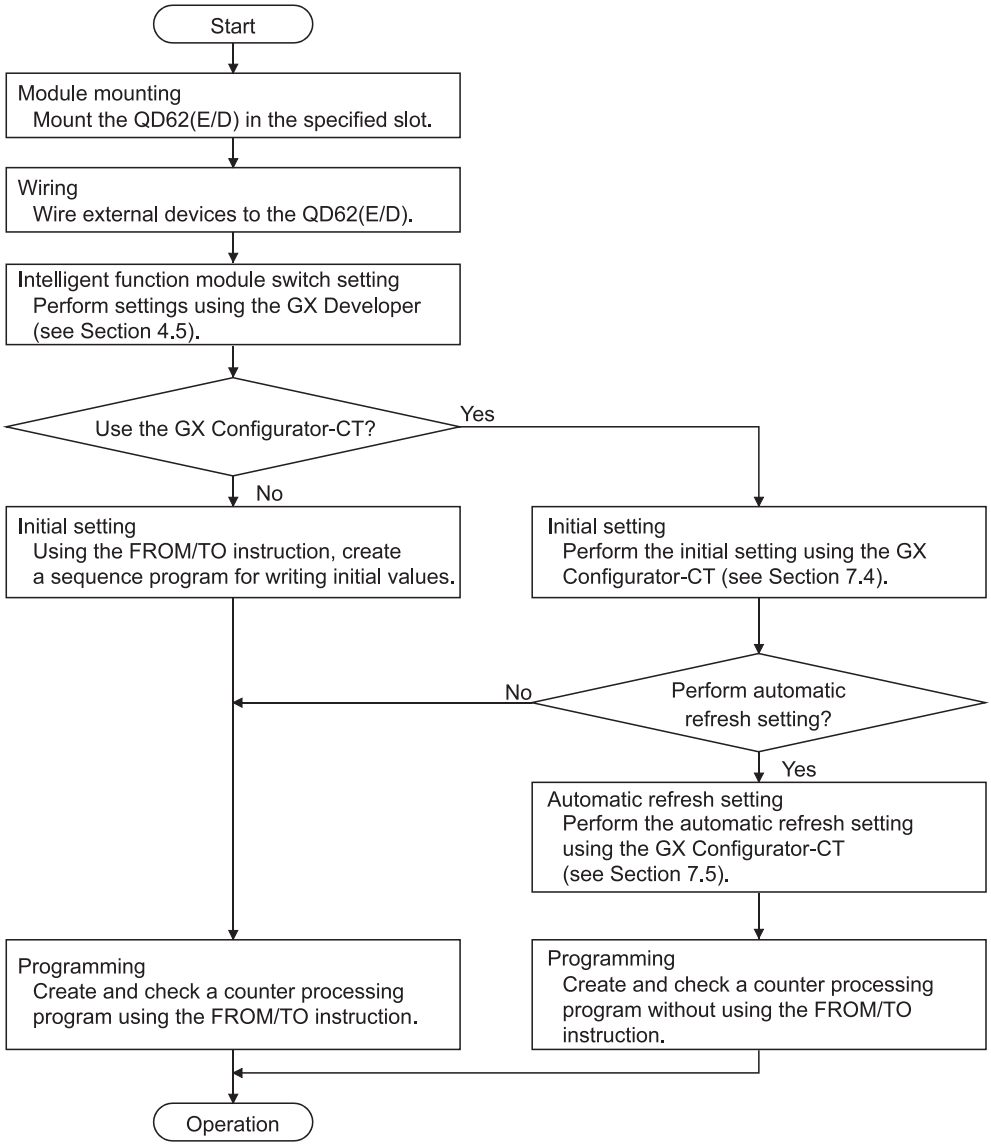
Screw location	Tightening torque range
Module fixing screw (M3 screw)*1	0.36 to 0.48 N · m
Connector screw (M2.6 screw)	0.20 to 0.29 N · m

* 1 The module can be easily fixed onto the base unit using the hook at the top of the module.
However, it is recommended to secure the module with the module fixing screw if the module is subject to significant vibration.

(6) To mount the module on the base unit, fully insert the module fixing latch into the fixing hole in the base unit and press the module using the hole as a fulcrum.
Improper installation may result in a malfunction or breakdown of the module, or may cause the module to fall off.

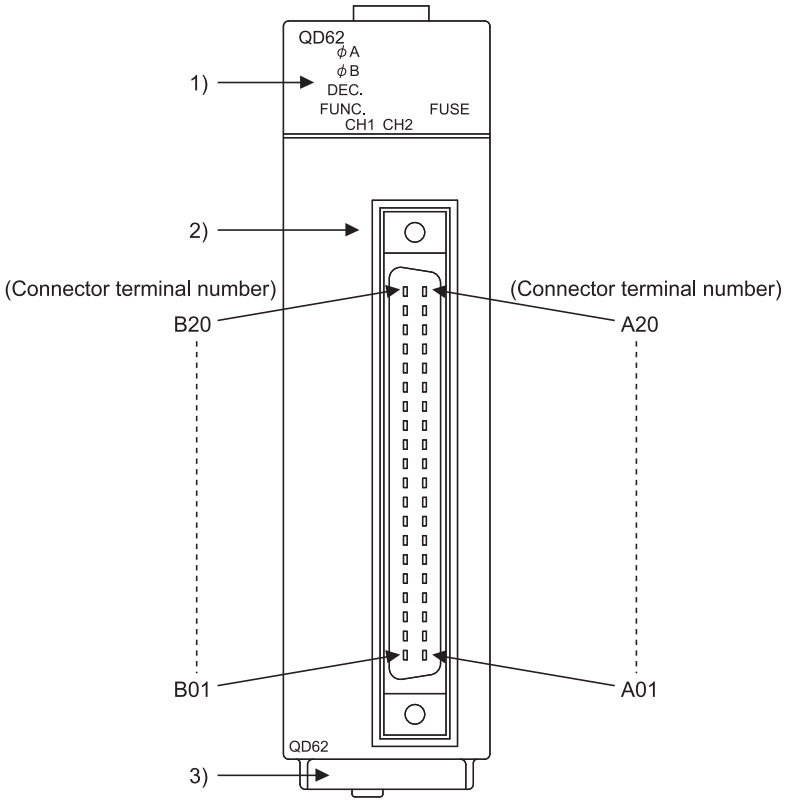
4.2 Procedure Before Starting the Operation

The figure below shows the steps that should be followed before starting the QD62(E/D) operation.



4.3 Part Identification Nomenclature

The names of the parts used in the QD62(E/D) are shown below:



Number	Name		Description
1)	LED	ϕA	On: A voltage is being applied to phase A pulse input terminal.
		ϕB	On: A voltage is being applied to phase B pulse input terminal.
		DEC.	On: Pulses are being counted down.
		FUNC.	On: A voltage is being applied to function start input terminal.
		FUSE	On: A voltage is being applied to the external power supply input terminal while the fuse in the coincidence signal output part is blown.
2)	Connector for external devices (40 pins)		A connector for I/O signal cables to/from external devices
3)	Serial number display		Displays the serial number of the QD62(E/D).

(1) Connector for external devices

The connectors for use with the QD62(E/D) should be purchased separately by the user.

The connector types are listed below.

(a) Precautions

- Use copper wires having temperature rating of 75°C or more for the connectors.
- Tighten the connector screws within the following specified torque range.

(b) Connector types

Type	Model name	Applicable wire size
Soldering type, straight out	A6CON1	0.3mm^2(22AWG) (stranded)
Solderless type, straight out	A6CON2	0.088 to 0.24mm^2(28AWG to 24)(stranded)
Pressure-welding type, straight out	A6CON3	28AWG (stranded) 30AWG (solid)
Soldering type, usable for straight out and diagonal out	A6CON4	0.3mm^2 (22AWG) (stranded)

(c) Connector crimping tool, pressure-displacement tool

Type	Model name	Applicable wire size	Contact
Crimping tool	N363TT005H	0.088 to 0.24mm^2 (28AWG to 24)	OTAX CO., LTD.
Pressure-displacement tool	N367TT012H (locator plate)	28AWG (stranded) 30AWG (solid)	
	N707TT001H (cable cutter)		
	N707TT101H (hand press)		

4.4 Wiring

The following explains how to wire the encoder and the controller to the QD62(E/D).

4.4.1 Wiring precautions

In order to fully utilise the functions of the QD62(E/D) and ensure system reliability, external wiring having a minimum of noise effect must be provided.
The precautions regarding external wiring are described below.

(1) Different terminals have been prepared for connection depending on the voltage of the input signal. Connecting a terminal of incorrect voltage may result in malfunction or mechanical failure.

(2) For 1-phase input, always perform pulse input wiring on the Phase A side.

(3) When pulse status noise is input, the QD62(E/D) may miscount.

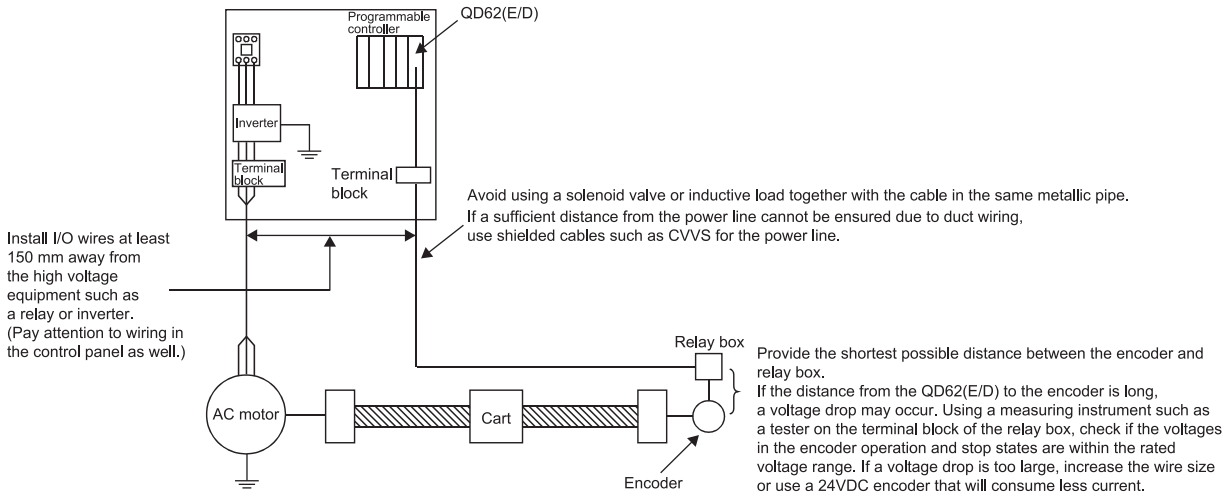
(4) Always provide the following measures against noise for high-speed pulse input:

(a) Use shielded twisted pair cables.

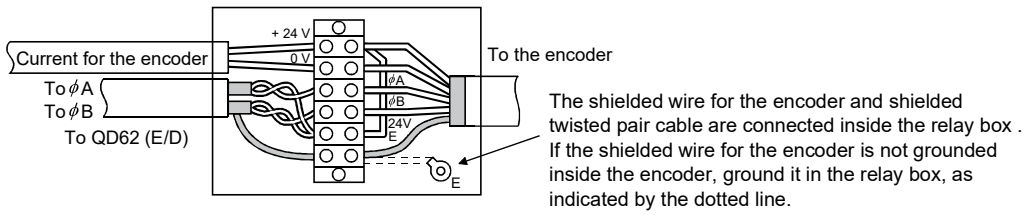
(b) Avoid placing the shielded twisted pair cables or input/output cables. Place the cable at least 150 mm from such wires and perform wiring using the least distance as possible.

(c) Individually ground the shielded cables on the encoder side (relay box) with a ground resistance of 100Ω or less.

(d) An example of wiring incorporating measures against noise is shown below:

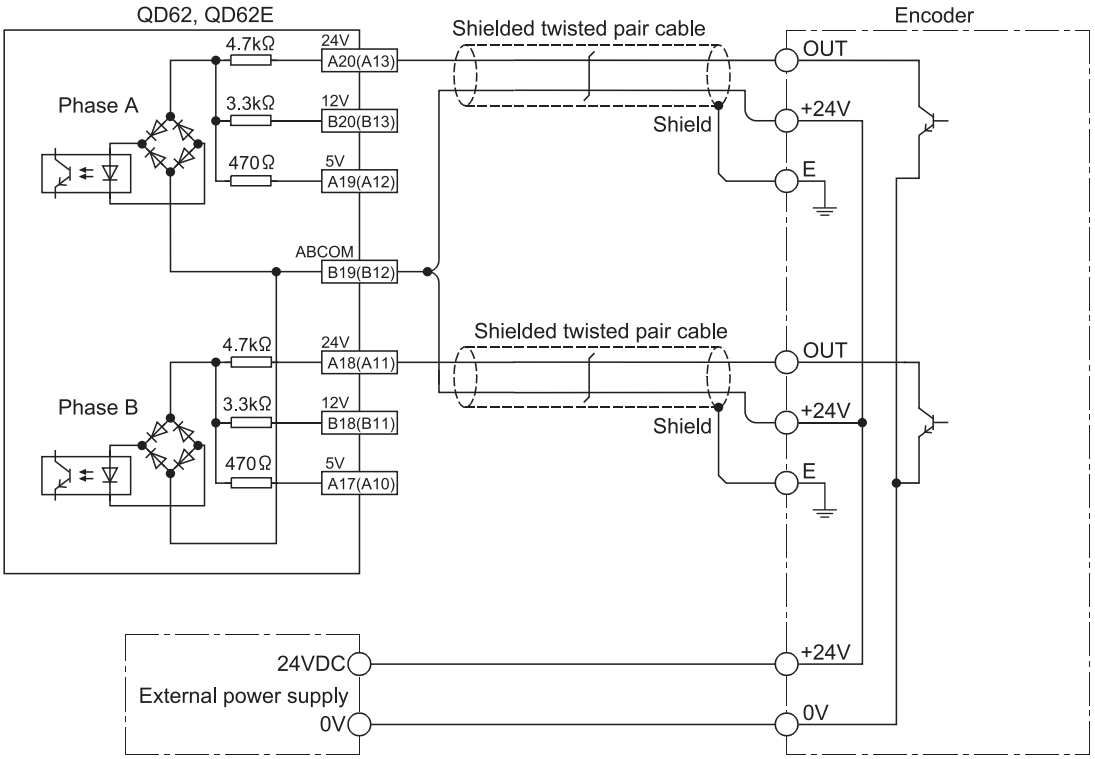


- Ground the shielded twisted pair cable on the encoder side (relay box). (Wiring example: with an open collector output type encoder (24 V DC))



4.4.2 Wiring example of a module and an encoder

(1) Wiring example with an open collector output type encoder (24 V DC)

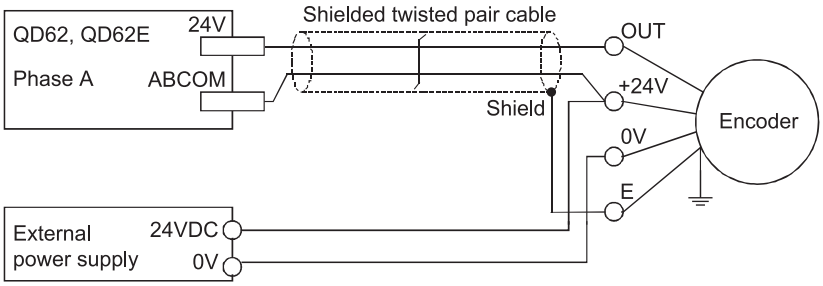


In parentheses, terminal numbers of channel 2 are shown.

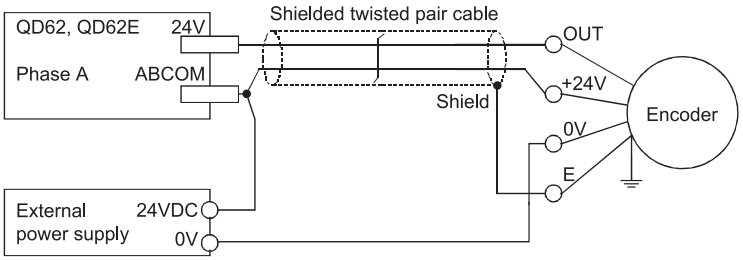
POINT

When wiring the QD62, QD62E, and the encoder, separate the power supply cable and signal cable. The following diagram shows an example.

[Wiring example]

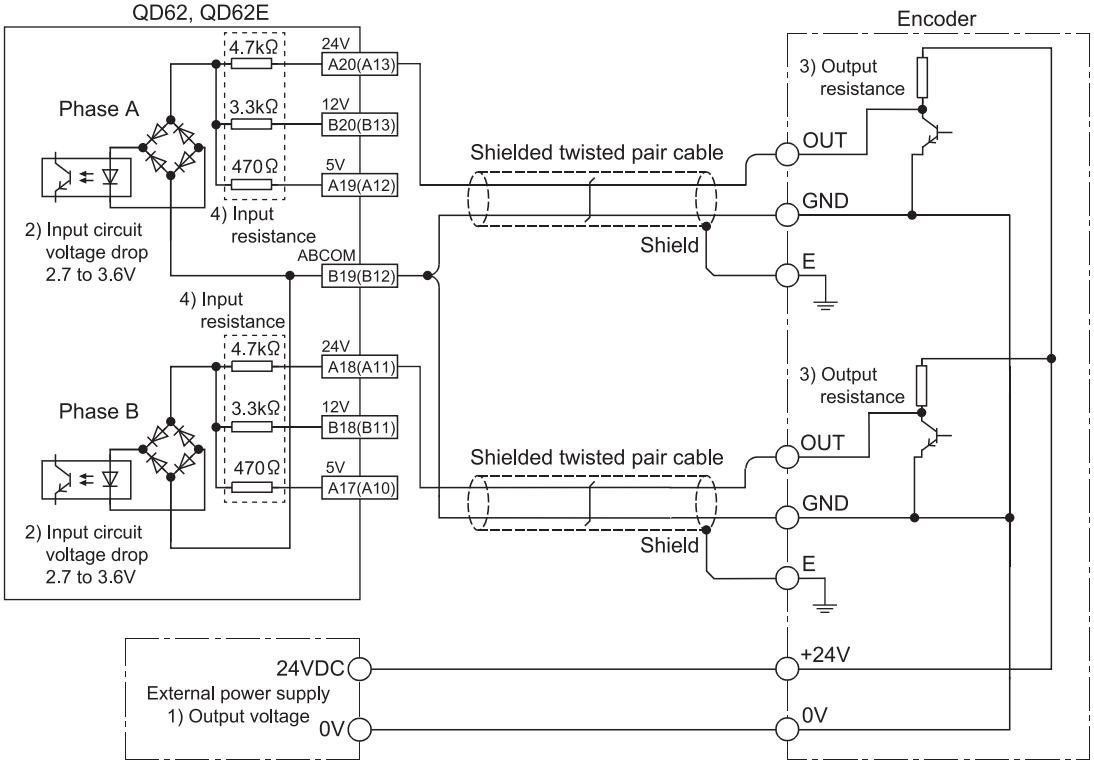


[Incorrect wiring example]



Because currents flow in the same direction in the shielded twisted pair cable, canceling effect will be lost and electromagnetic induction may occur.

(2) Wiring example with a voltage output type encoder (with output resistance) (24V DC)



In parentheses, terminal numbers of channel 2 are shown.

When wiring the module with a voltage output type pulse generator, input the value of 3) Output resistance in the formula below and check whether the pulse input current obtained by the formula meets the specifications of the input current. In addition, check the operations using an actual module.

$$\text{Pulse input current} = \frac{\text{1) Output voltage - 2) Input circuit voltage drop}}{\text{3) Output resistance + 4) Input resistance}}$$

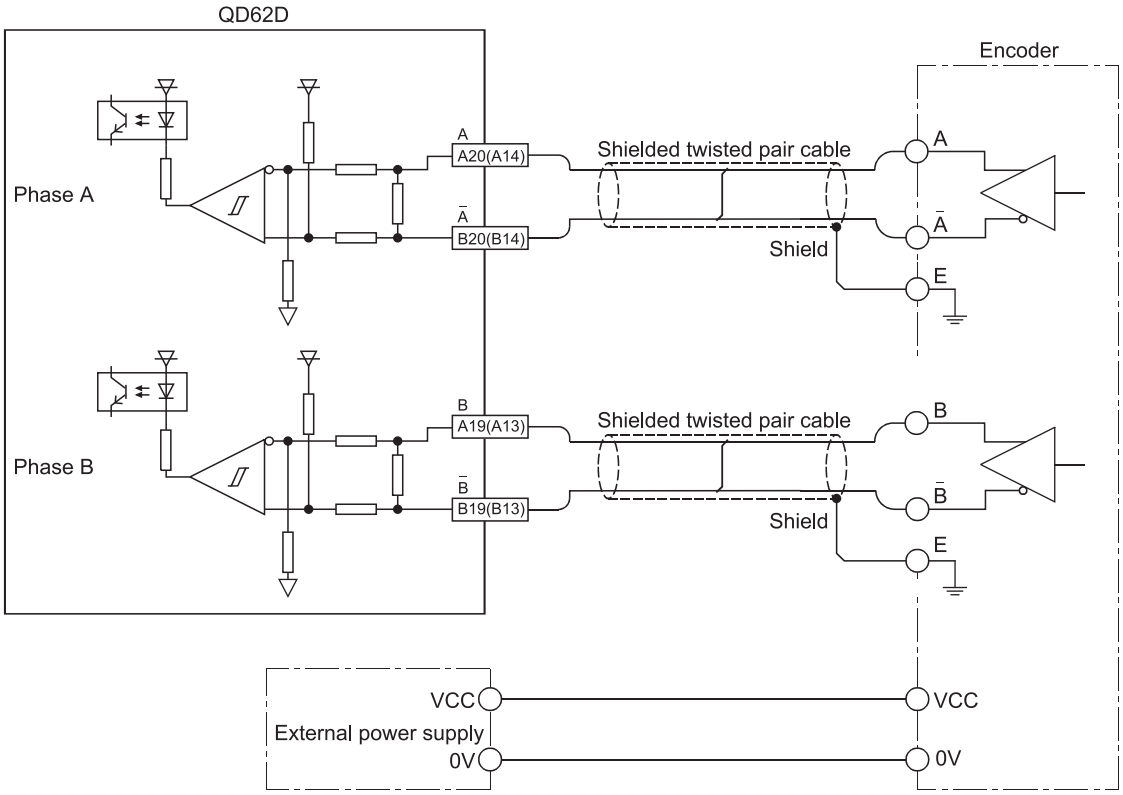
Use an input terminal satisfying the specifications of input current as an input resistance.

Example) The following are the examples of pulse input current calculations when the module is wired with a 24VDC output pulse generator with an output resistance of 1kΩ. For these calculations, use a 24VDC input terminal as an input resistance.

- Pulse input current (Min) = (24V - 3.6V) ÷ (1kΩ + 4.7kΩ) = 3.58mA
- Pulse input current (Max) = (24V - 2.7V) ÷ (1kΩ + 4.7kΩ) = 3.74mA

The pulse input current obtained from the calculations above (Min:3.58mA to Max:3.74mA) is within the range of input specifications (input ON current: 2 to 5mA).

(3) Wiring example with a driver (equivalent to AM26LS31) encoder



In parentheses, terminal numbers of channel 2 are shown.

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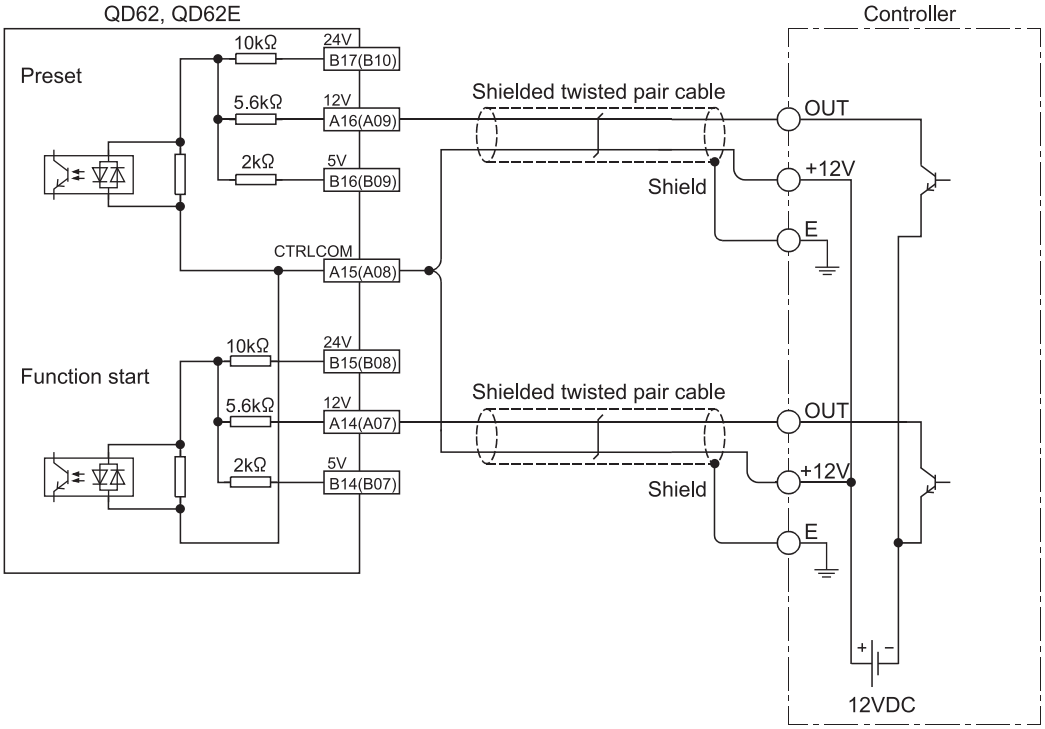
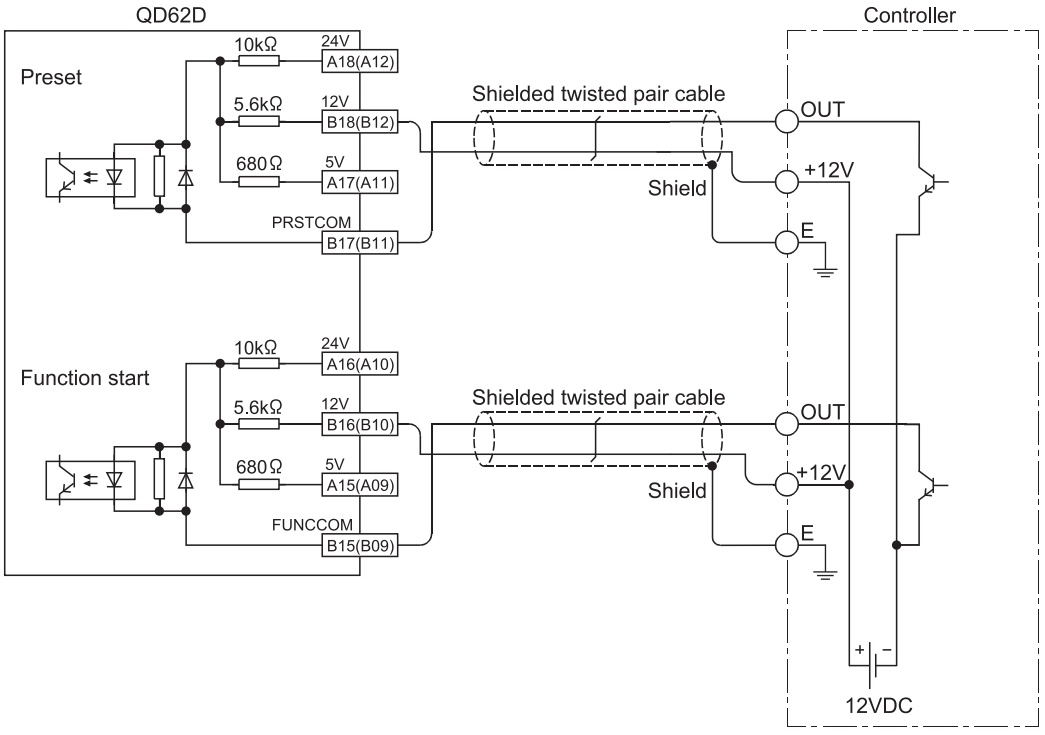
4.4.3 Wiring example of a controller and an external input terminal

(1) When the controller (sink loading type) is 12 V DC

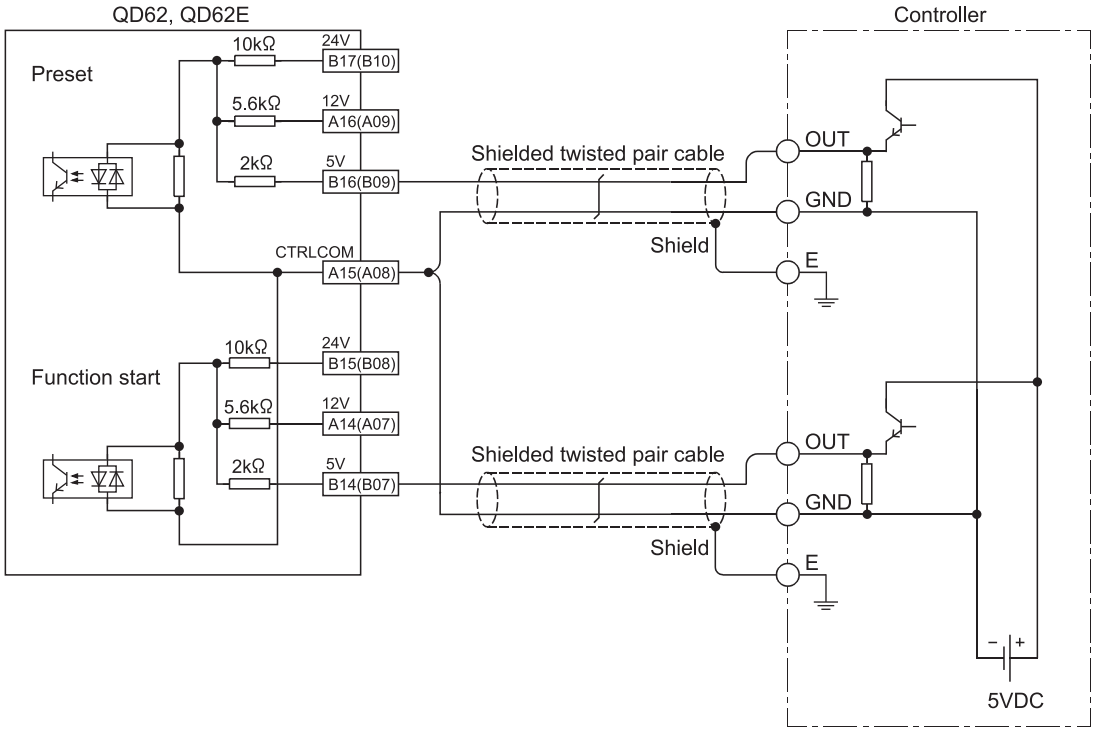


In parentheses, terminal numbers of channel 2 are shown.

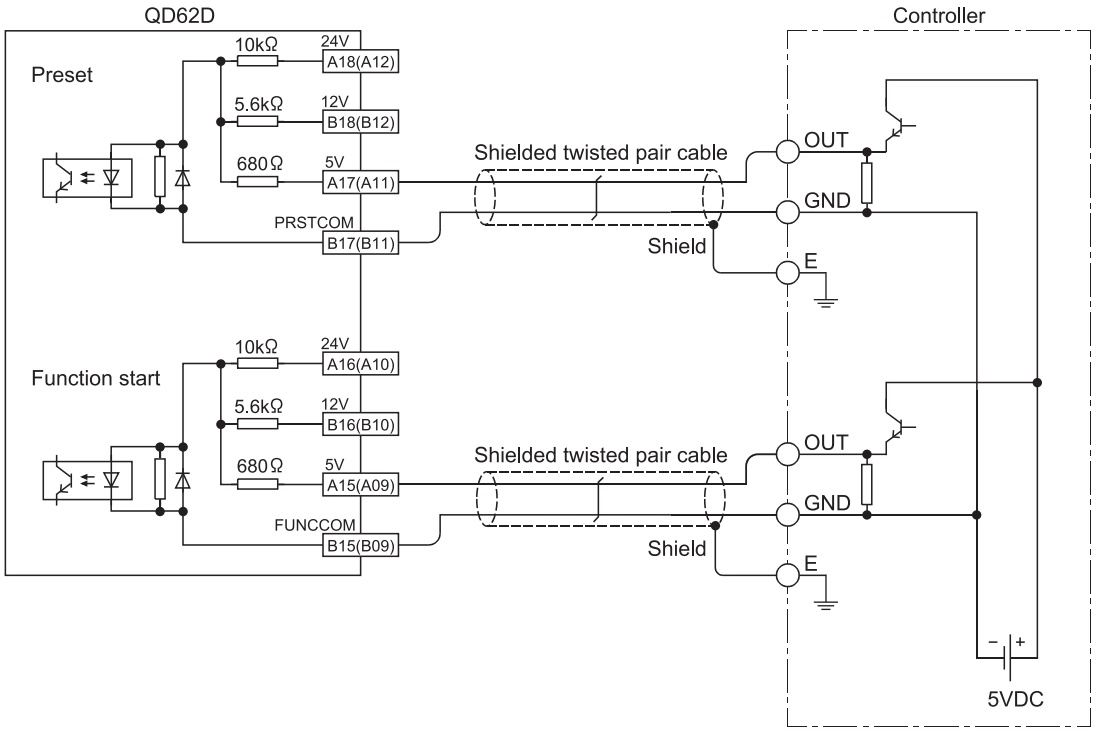


In parentheses, terminal numbers of channel 2 are shown.

(2) When the controller (source loading type) is 5 V DC



In parentheses, terminal numbers of channel 2 are shown.



In parentheses, terminal numbers of channel 2 are shown.

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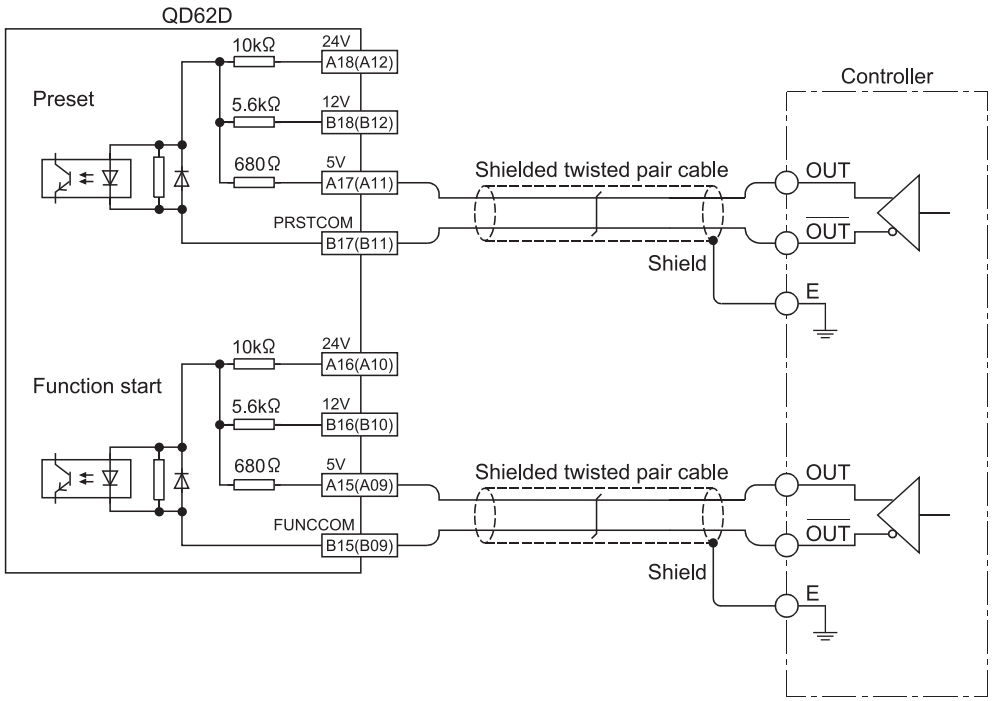
(3) When the controller is a line driver

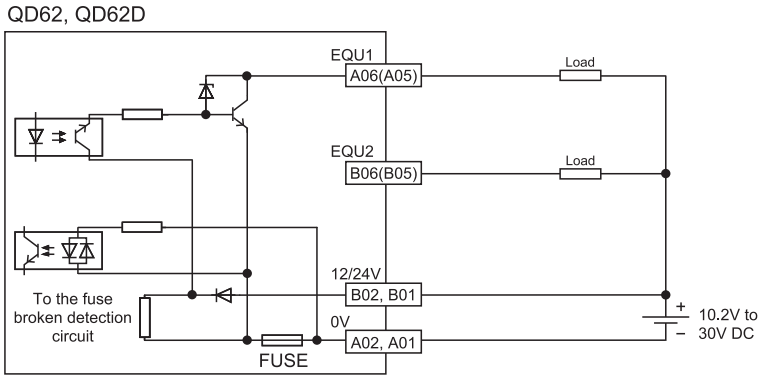


In parentheses, terminal numbers of channel 2 are shown.

4.4.4 Wiring example with an external output

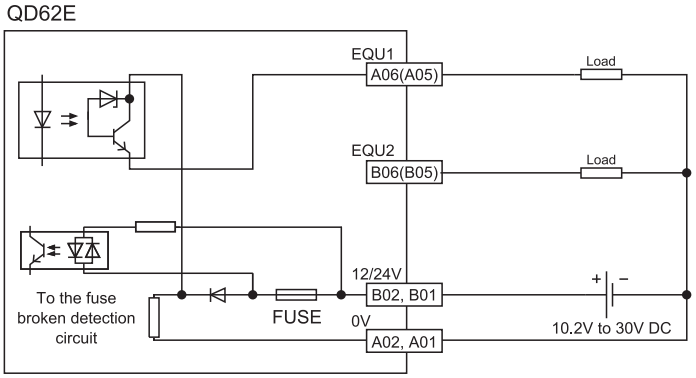
When the coincidence output (EQU terminal) is used, an external power supply of 10.2 to 30 V DC will be required for operation of the internal photocopier. A wiring example is shown below.

(1) For QD62, QD62D (Sink output type)



In parentheses, terminal numbers of channel 2 are shown.

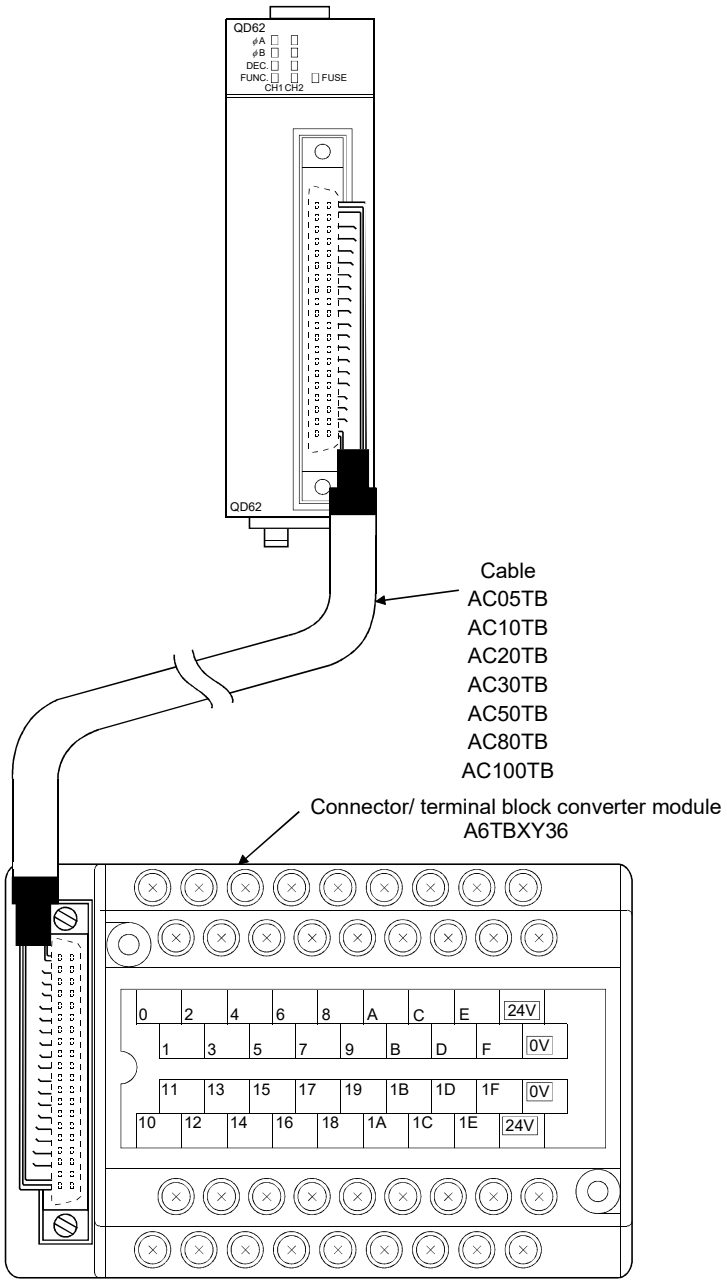
(2) For QD62E (Source output type)



In parentheses, terminal numbers of channel 2 are shown.

4.4.5 Using the connector/terminal block converter module

(1) The figure below shows the wiring when a connector/terminal block converter module and a cable are used in the QD62 (E/D).



(2) The following table lists the signal names and the corresponding connector side terminal numbers and terminal block side terminal symbols, when a connector/terminal block converter module is used in the QD62(E/D) .

For the QD62 and QD62E

	Signal name	Connector side terminal number	Terminal block side terminal symbol
CH1	Phase A pulse input 24 V	A20	10
	Phase A pulse input 12 V	B20	0
	Phase A pulse input 5 V	A19	11
	ABCOM	B19	1
	Phase B pulse input 24 V	A18	12
	Phase B pulse input 12 V	B18	2
	Phase B pulse input 5 V	A17	13
	Preset input 24 V	B17	3
	Preset input 12 V	A16	14
	Preset input 5 V	B16	4
	CTRLCOM	A15	15
	Function start input 24 V	B15	5
	Function start input 12 V	A14	16
	Function start input 5 V	B14	6
	EQU1 (Coincidence output point No. 1)	A06	1E
	EQU2 (Coincidence output point No. 2)	B06	E
CH2	Phase A pulse input 24 V	A13	17
	Phase A pulse input 12 V	B13	7
	Phase A pulse input 5 V	A12	18
	ABCOM	B12	8
	Phase B pulse input 24 V	A11	19
	Phase B pulse input 12 V	B11	9
	Phase B pulse input 5 V	A10	1A
	Preset input 24 V	B10	A
	Preset input 12 V	A09	1B
	Preset input 5 V	B09	B
	CTRLCOM	A08	1C
	Function start input 24 V	B08	C
	Function start input 12 V	A07	1D
	Function start input 5 V	B07	D
	EQU1 (Coincidence output point No. 1)	A05	1F
	EQU2 (Coincidence output point No. 2)	B05	F
12/24 V		B02 B01	24 V
0 V		A02 A01	0 V

For the QD62D

	Signal name	Connector side terminal number	Terminal block side terminal symbol
CH1	Phase A pulse input	A20	10
	Phase $\overline{A}$ pulse input	B20	0
	Phase B pulse input	A19	11
	Phase $\overline{B}$ pulse input	B19	1
	Preset input 24 V	A18	12
	Preset input 12 V	B18	2
	Preset input 5 V	A17	13
	PRSTCOM	B17	3
	Function start input 24 V	A16	14
	Function start input 12 V	B16	4
	Function start input 5 V	A15	15
	FUNCCOM	B15	5
	EQU1 (Coincidence output point No. 1)	A06	1E
	EQU2 (Coincidence output point No. 2)	B06	E
CH2	Phase A pulse input	A14	16
	Phase $\overline{A}$ pulse input	B14	6
	Phase B pulse input	A13	17
	Phase $\overline{B}$ pulse input	B13	7
	Preset input 24 V	A12	18
	Preset input 12 V	B12	8
	Preset input 5 V	A11	19
	PRSTCOM	B11	9
	Function start input 24 V	A10	1A
	Function start input 12 V	B10	A
	Function start input 5 V	A09	1B
	FUNCCOM	B09	B
	EQU1 (Coincidence output point No. 1)	A05	1F
	EQU2 (Coincidence output point No. 2)	B05	F
12/24 V		B02 B01	24 V
0 V		A02 A01	0 V

REMARK

If a connector/terminal block converter module is used in the QD62D, the terminals on the terminal block side with symbols, C, D, 1C and 1D are not used.

4.5 Setting from GX Developer

This section explains the GX Developer settings required to operate the QD62(E/D).

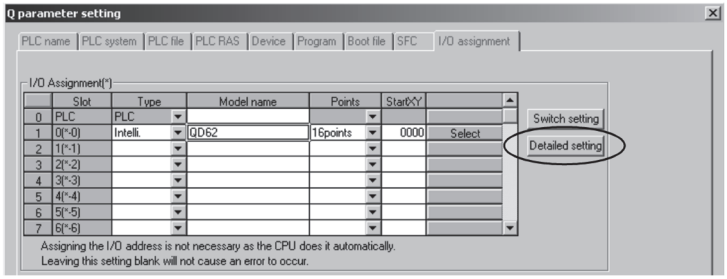
4.5.1 Intelligent function module detailed setting

Sets an external output method for the CPU stop error and a CPU module operation method for the QD62 (E/D) error detection.

1) Double-click "PLC parameter" in the project window in GX Developer.

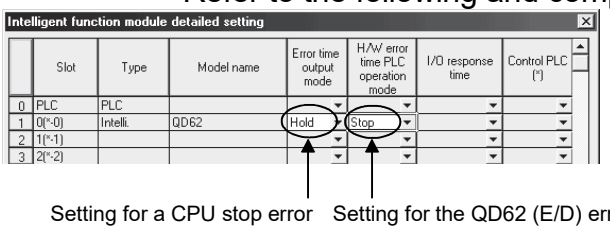
2) Click the "I/O assignment" tab.

3) Set the following items for the slot where the QD62(E/D) is mounted, and then click Detailed setting.



Item	Description
Type	Select "Intelli.".
Model	Enter the model name of the module.
Points	Select "16points".
Start XY	Enter the start I/O number of the QD62(E/D).

4) Clicking Detailed setting displays the "Intelligent function module detailed setting" window.
Refer to the following and complete the setting.

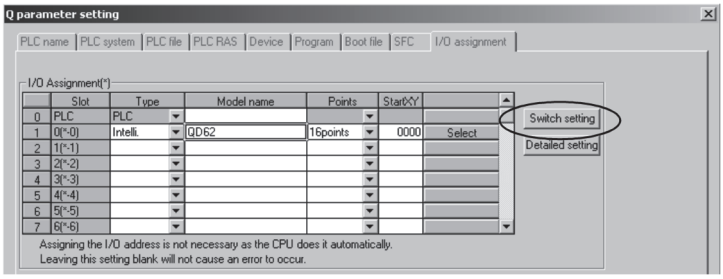


Item	Description
Error time output mode	Sets to either clear or hold the module output status when a CPU stop error occurs. Clear: Turns off all of the coincidence signal external outputs when a CPU stop error occurs. (Default) Hold: Holds the same on or off status before the CPU is stopped for the coincidence signal external outputs when a CPU stop error occurs.
H/W error time PLC operating mode	Sets to either stop or continue the CPU module operation when an intelligent function module error (SP.UNIT DOWN) is detected. Stop: Stops the CPU module operation when the QD62 (E/D) error is detected. (Default) Continue: Continues the programs for modules other than those in which an error was detected when the QD62 (E/D) error is detected. The QD62 (E/D) error (SP.UNIT DOWN) is detected when the Unit READY flag is not in the READY status due to a module hardware failure.

4.5.2 Switch setting for intelligent function module

Five switches (switch numbers 1 to 5) are available for the intelligent function module and they are set with 16 bit data.
If the switches for the intelligent function module are not set, the default value of 0 is used for switches 1 to 5.

1) Click the I/O assignment tab of the PC parameter window in GX Developer. (Refer to Section 4.5.1)



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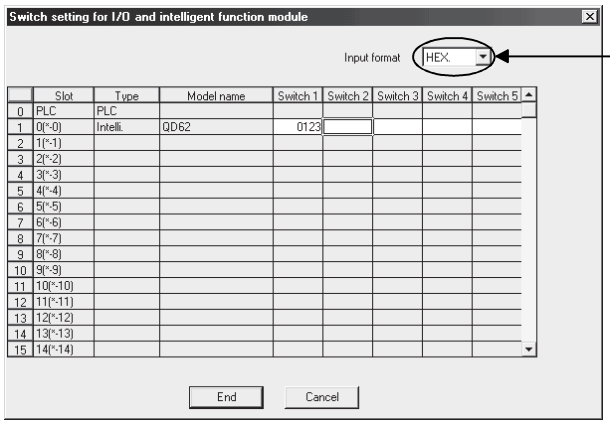
2) Click the Switch setting button. Consequently, the Switch setting for the "I/O and intelligent function module" window will be displayed.



Item	Data item		Description	Reference
Switch 1 (for channel 1)	0 □ □ □ H	Pulse input mode 0: 1-phase multiple of 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	Sets the pulse input mode.	Section 5.1.1
		Counting speed setting 0: 10 k PPS 1: 100 k PPS 2: 200 k PPS 3: 500 k PPS (Only for the QD62D)	Sets the counting speed.	Section 3.1
		Counter format 0: Linear counter 1: Ring counter	Sets the counter format.	Section 5.1.1 Section 5.1.2
Switch 2 (for channel 2)	Same data item as the switch 1 (for CH1).			-
Switch 3 Switch 4 Switch 5	No settings (blank) When any item is set, delete the settings and leave the field blank.			-

POINT

The counting speed setting of 500kPPS can only be used with the QD62D. Setting the counting speed to 500k PPS for the QD62 and QD62E may cause miscounts. Thus, do not use this setting for the QD62 and QD62E.
The reserved switches in the intelligent function module switch setting items are for system use, not for users. Therefore, always fix them to 0. If used (changed from 0 to 1) by a user, the operations of the QD62(E/D) are not ensured.

3) After the setting, click the End button.

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MEMO

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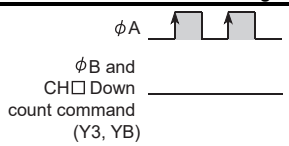
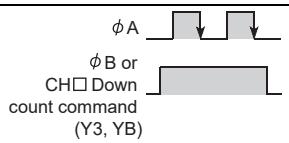
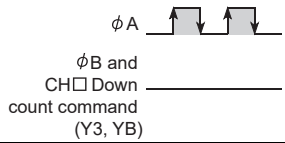
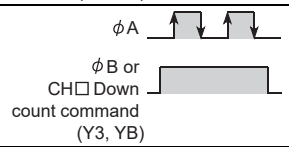
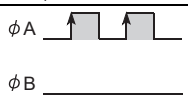
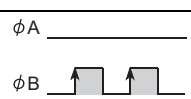
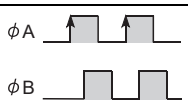
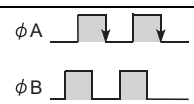
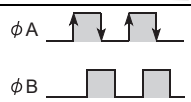
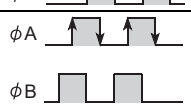
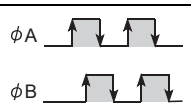
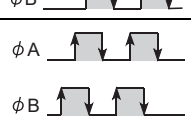
5 BASIC USAGE

This section explains the basic usage of the QD62(E/D).

5.1 Pulse Input and Counting Method

5.1.1 Types of pulse input methods

Six types of the pulse input methods are available. These include 1 phase multiple of 1, 1 phase multiple of 2, CW/CCW pulse input, 2 phase multiple of 1, 2 phase multiple of 2, and 2 phase multiple of 4. The following table shows the pulse input methods and count timings.

Pulse input method	Count timing		
1-phase multiple of 1	For addition count		Count at ϕA rise (↑) ϕB and CH□ Down count command (Y3, YB) are OFF
	For subtraction count		Count at ϕA fall (↓) ϕB or CH□ Down count command (Y3, YB) is ON
1-phase multiple of 2	For addition count		Count at ϕA rise (↑) and fall (↓) ϕB and CH□ Down count command (Y3, YB) are OFF
	For subtraction count		Count at ϕA rise (↑) and fall (↓) ϕB or CH□ Down count command (Y3, YB) is ON
CW/CCW	For addition count		Count at ϕA rise (↑) ϕB is OFF
	For subtraction count		ϕA is OFF Count at ϕB rise (↑)
2-phase multiple of 1	For addition count		Count at ϕA rise (↑) when ϕB is OFF
	For subtraction count		Count at ϕA fall (↓) when ϕB is OFF
2-phase multiple of 2	For addition count		Count at ϕA rise (↑) when ϕB is OFF Count at ϕA fall (↓) when ϕB is ON
	For subtraction count		Count at ϕA rise (↑) when ϕB is ON Count at ϕA fall (↓) when ϕB is OFF
2-phase multiple of 4	For addition count		Count at ϕA rise (↑) when ϕB is OFF Count at ϕA fall (↓) when ϕB is ON Count at ϕB rise (↑) when ϕA is ON Count at ϕB fall (↓) when ϕA is OFF
	For subtraction count		Count at ϕA rise (↑) when ϕB is ON Count at ϕA fall (↓) when ϕB is OFF Count at ϕB rise (↑) when ϕA is OFF Count at ϕB fall (↓) when ϕA is ON

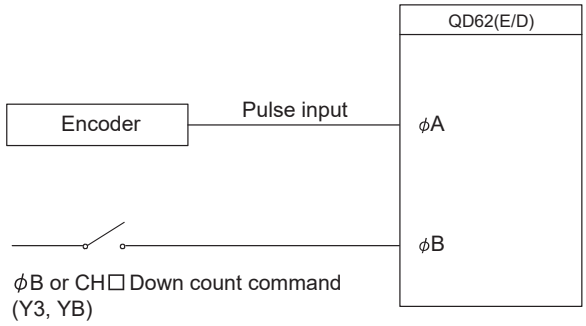
5 - 1

POINT

For 1-phase pulse input and counting up, make sure that the phase B pulse input and CH□ Down count command (Y3, YB) are off before inputting pulses to phase A.
When the phase B pulse input or CH□ Down count command (Y3, YB) is on, pulses are counted down in phase A pulse input.

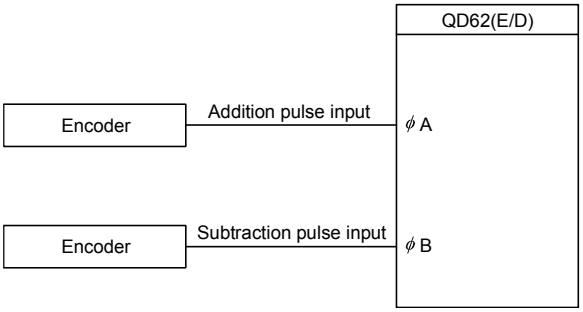
(1) Phase 1 pulse input

For phase 1 pulse input, either a multiple of 1 or multiple of 2 count method can be selected.
The following figure shows the relationship between phase A pulse input and phase B pulse input or CH□ Down count command (Y3, YB).



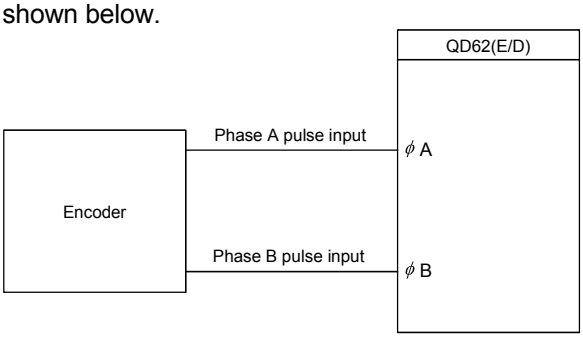
(2) CW/CCW pulse input

For CW/CCW pulse input, the up count is performed when there is a phase A pulse input, and the down count is performed when there is a phase B pulse input.
The relationship between the phase A pulse input and phase B pulse input is shown below.



(3) Phase 2 pulse input

For phase 2 pulse input, either a multiple of 1, multiple of 2, or multiple of 4 count method can be selected.
The phase difference between the phase A pulse and phase B pulse determines whether the up count or down count is performed.
The relationship between the phase A pulse input and phase B pulse input is shown below.



5.1.2 Setting the count method

The count method is set using the GX Developer intelligent function module switch setting.
See Section 4.5 for details on the setting method.

5.1.3 Reading the present values

This section explains the methods of reading the present values stored in the buffer memory or the count values when counter function selection is executed.

(1) The present value is stored in CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) regardless of the counter function used.
When the latch counter, the sampling counter, or the periodic pulse counter function is performed, each count value is stored in the buffer memory listed in the table below.

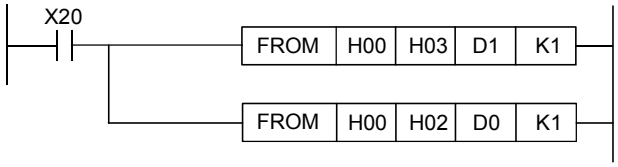
Description		Present value	Counter function selection count value			
			Latch count value	Sampling count value	Periodic pulse count previous value	Periodic pulse count present value
Buffer memory address	CH1	Un\G2, Un\G3	Un\G12, Un\G13	Un\G14, Un\G15	Un\G16, Un\G17	Un\G18, Un\G19
	CH2	Un\G34, Un\G35	Un\G44, Un\G45	Un\G46, Un\G47	Un\G48, Un\G49	Un\G50, Un\G51

(2) The present value and the counter function selection count values are stored in the buffer memories in 32-bit signed binary.
The latest count values can be read from the buffer memories because the buffer memory data are automatically updated by count operation.

POINT

When reading the present values or the counter function selection count values, use the DFRO instruction and always read values in two-word units. When reading the values in one-word units, if the count values are updated in the middle of read processing, a mismatch may occur between the data contents of the lower and higher words, possibly causing the system to read incorrect count values.
[Program example]

[Example of an undesirable program]



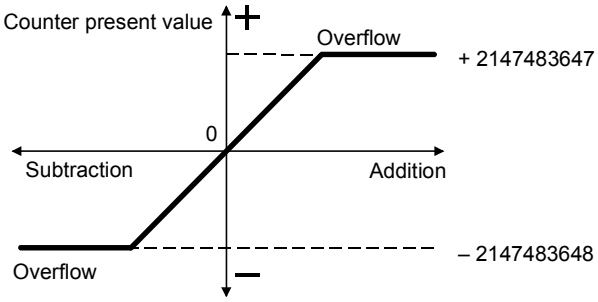
5.2 Selecting the Counter Format

Select either linear counter or ring counter with the GX Developer intelligent function module switch setting.
See Section 4.5 for details on the setting method.

5.2.1 Selecting the linear counter

(1) Linear counter operation

When the linear counter is selected, the count operation is performed between -2147483648 (minimum value) and 2147483647 (maximum value).
The linear counter can be used in combination with the preset function and the coincidence output function.



(2) Overflow error

(a) When the counter format is linear counter, an overflow error occurs if the present counter value exceeds -2147483648 (minimum value) during subtraction or exceeds 2147483647 (maximum value) during addition.

(b) When an overflow error occurs, "1" is stored in CH□ Overflow detection flag (Un\G8, Un\G40), the counting stops, and the present value does not change from -2147483648 or 2147483647 even if pulses are input.

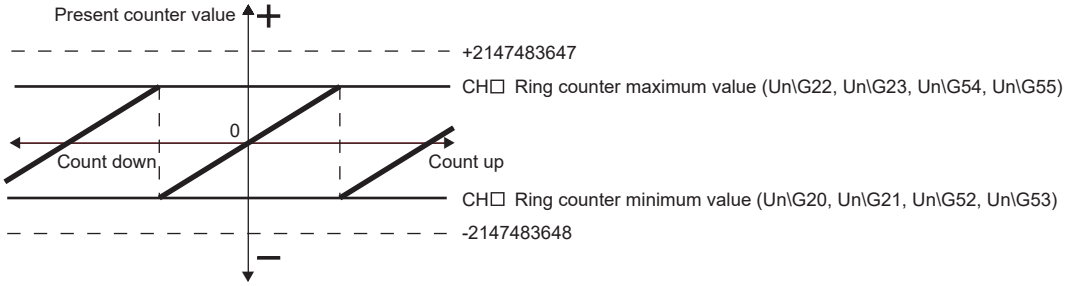
(c) The overflow error can be cleared by performing the preset function. When the preset function is performed, "0" is stored in CH□ Overflow detection flag (Un\G8, Un\G40) and the counting can be resumed.

(d) Occurrence of overflow error can be checked on the System Monitor window. For details, refer to Section 9.1.

5.2.2 Selecting the ring counter

(1) Ring counter operation

This function repeatedly counts pulses between the range specified in CH□ Ring counter minimum value (Un\G20, Un\G21, Un\G52, Un\G53) and CH□ Ring counter maximum value (Un\G22, Un\G23, Un\G54, Un\G55).
When the ring counter is being selected, an overflow error does not occur.
The ring counter can be used in combination with the preset function and the coincidence output function.

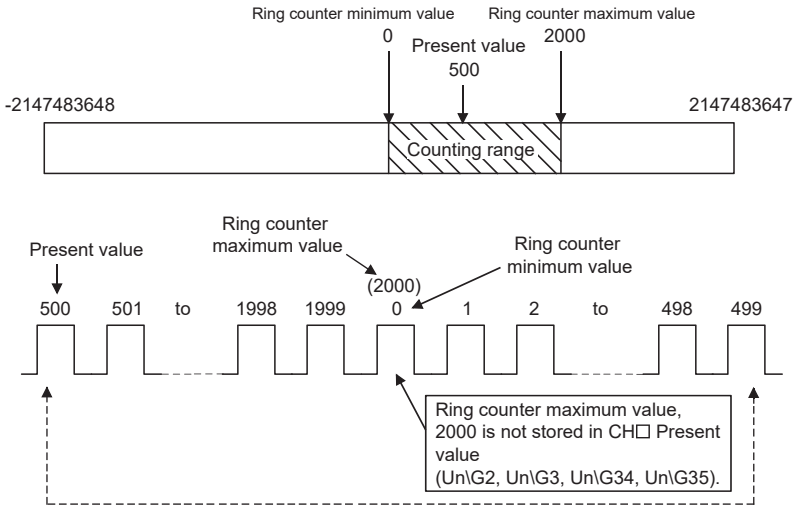


(2) Ring counter count range

The count range of the ring counter is determined by the relationship between CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) and the ring counter lower/upper limits when CH□ Count enable command (Y4, YC) is turned on or when the preset function is performed.
Normally the range used is "ring counter minimum value ≦ present value ≦ ring counter maximum value".

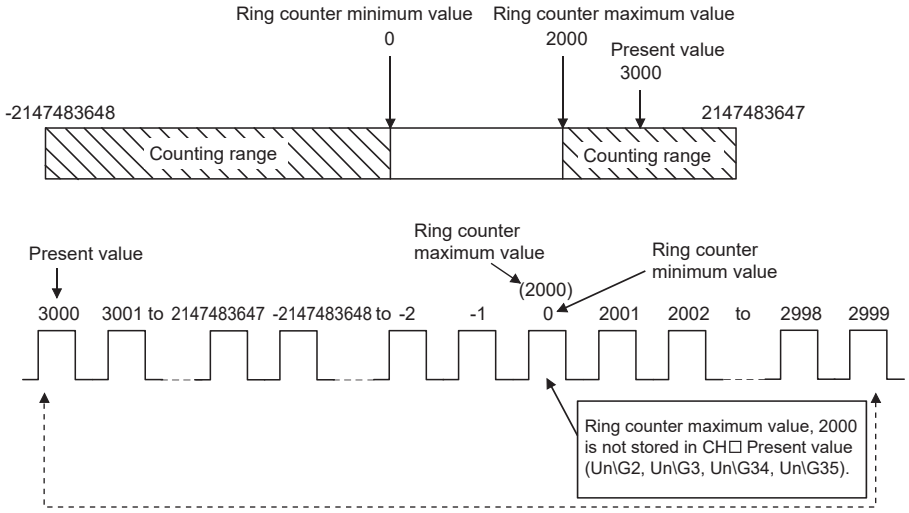
- For up count
  When the present value reaches the ring counter maximum value, the ring counter minimum value is automatically stored as the present value.
- For down count
  Even if the present value reaches the ring counter minimum value, the ring counter minimum value will be retained as is. With the next subtraction pulse, (ring counter maximum value -1) will be stored as the present value.

In counting up and down, the ring counter upper limit value is not stored in CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35).
For example, if the count is enabled with the ring counter minimum value of 0, the ring counter maximum value of 2000 and the present value of 500, the count range and present value will change as shown in the figure below.



(a) The ring counter will operate as follows when the "present value < ring counter minimum value" or "ring counter maximum value < present value".
- For up count
  Even if the present value reaches the ring counter minimum value, the ring counter minimum value will be retained as is. With the next addition pulse, (ring counter maximum value +1) will be stored as the present value.
- For down count
  When the present value reaches the ring counter maximum value, the ring counter minimum value is automatically stored as the present value.

In counting up and down, the ring counter upper limit value is not stored in CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35).
For example, if the count is enabled with the ring counter minimum value of 0, the ring counter maximum value of 2000 and the present value of 3000, the count range and present value will change as shown in the figure below.



(b) When "Ring counter lower limit = Ring counter upper limit" is met, a value that can be expressed in 32-bit signed binary (-2147483648 to 2147483647) will be the counting range, regardless or the present value.

POINT

(1) While CH□ Count enable command (Y4, YC) is on, even if values are written to CH□ Ring counter minimum value (Un\G20, Un\G21, Un\G52, Un\G53) and CH□ Ring counter maximum value (Un\G22, Un\G23, Un\G54, Un\G55), the stored values do not change.
Turn off CH□ Count enable command (Y4, YC) before changing the ring counter upper/lower limit value.

(2) Turn off CH□ Count enable command (Y4, YC) before changing the count range by the preset function.

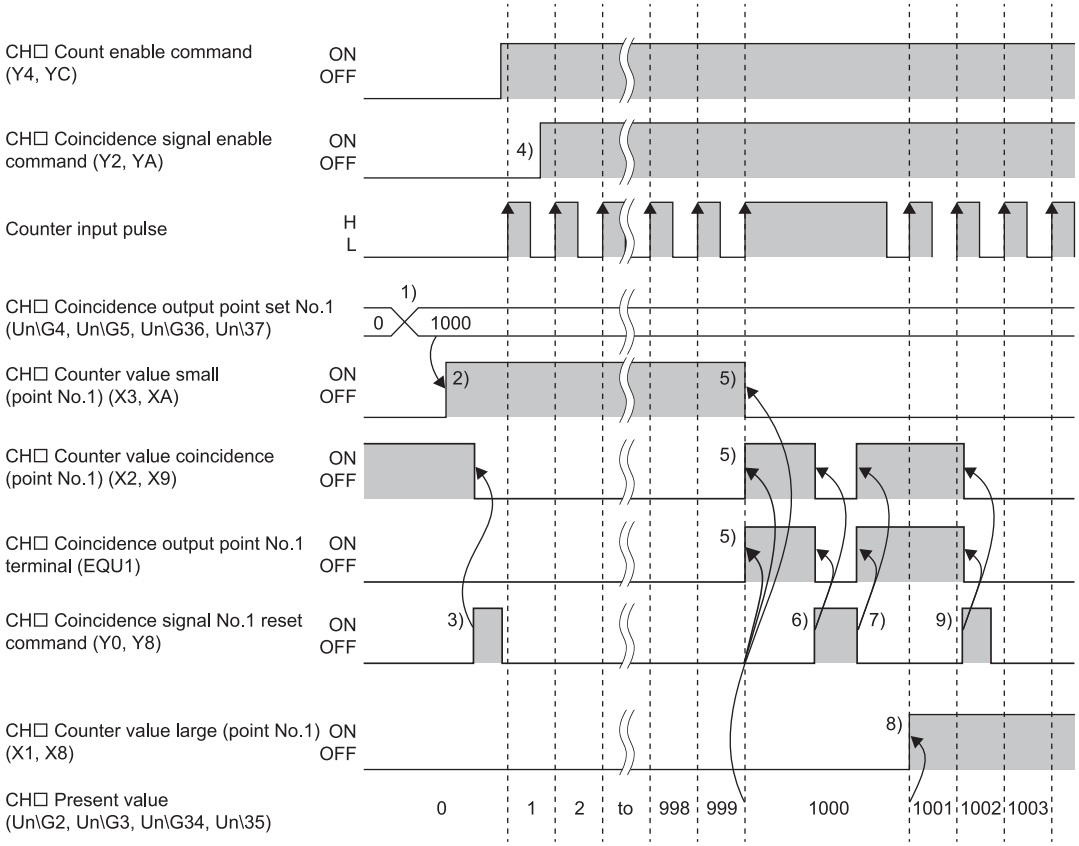
5.3 Using the Coincidence Output Function

The coincidence output function presets any count value, compares it with the present counter value, and outputs a signal when they match. For the coincidence output, 2 points can be set for each channel.
When using external output of the coincidence signal, turn on CH□ Coincidence signal enable command (Y2, YA) beforehand.

(1) Coincidence Output Operation

The I/O numbers (X/Y) and the buffer memory addresses used in (1) are for coincidence output point No.1.
For the I/O numbers and buffer memory addresses for coincidence output point No.2, refer to the following.

- Section 3.3.1 (List of I/O signals)
- Section 3.4 (Buffer Memory Assignments)



Number	Description
1)	Start the comparison by using the value set in CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37).
2)	When the following condition is met, CH□ Counter value small (point No.1) (X3, XA) turns on. • CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) < CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
3)	Turning on CH□ Coincidence signal No.1 reset command (Y0, Y8) turns off CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Coincidence output point No.1 terminal (EQU1).
4)	To output the coincidence signal from CH□ Coincidence output point No.1 terminal (EQU1), turn on CH□ Coincidence signal enable command (Y2, YA).
5)	When the following condition is met, CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Coincidence output point No.1 terminal (EQU1) turn on. In addition, CH□ Counter value small (point No.1) (X3, XA) turns off. • CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) = CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
6)	Turning on CH□ Coincidence signal No.1 reset command (Y0, Y8) while the values are matched turns off CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Coincidence output point No.1 terminal (EQU1).
7)	Turning off CH□ Coincidence signal No.1 reset command (Y0, Y8) while the values are matched turns on CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Coincidence output point No.1 terminal (EQU1) again.
8)	When the following condition is met, CH□ Counter value large (point No.1) (X1, X8) turns on. • CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) > CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37)
9)	Turn on CH□ Coincidence signal No.1 reset command (Y0, Y8) to reset CH□ Counter value coincidence (point No.1) (X2, X9) and CH□ Coincidence output point No.1 terminal (EQU1). If CH□ Counter value coincidence (point No.1) (X2, X9) remains on, the next coincidence output cannot be detected.

POINT

Perform the following before turning on CH□ Coincidence signal enable command (Y2, YA).

(1) Using any of the following methods, make the coincidence output point setting value and present value different.
- Changing the coincidence output point setting
- Changing the present value by preset
- Inputting a pulse and changing the present value

(2) Turn off, on, and then off CH□ Coincidence signal No.1 reset command (Y0, Y8).
When CH□ Coincidence signal enable command (Y2, YA) is turned on before counting starts or while the coincidence output point setting value matches the present value, coincidence output is performed.

(3) CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) and CH□ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) are both "0" immediately after the CPU module is powered on or reset. Therefore, CH□ Counter value coincidence (point No.1) (X2, X9) turns on.

(2) Output status setting during a CPU stop error

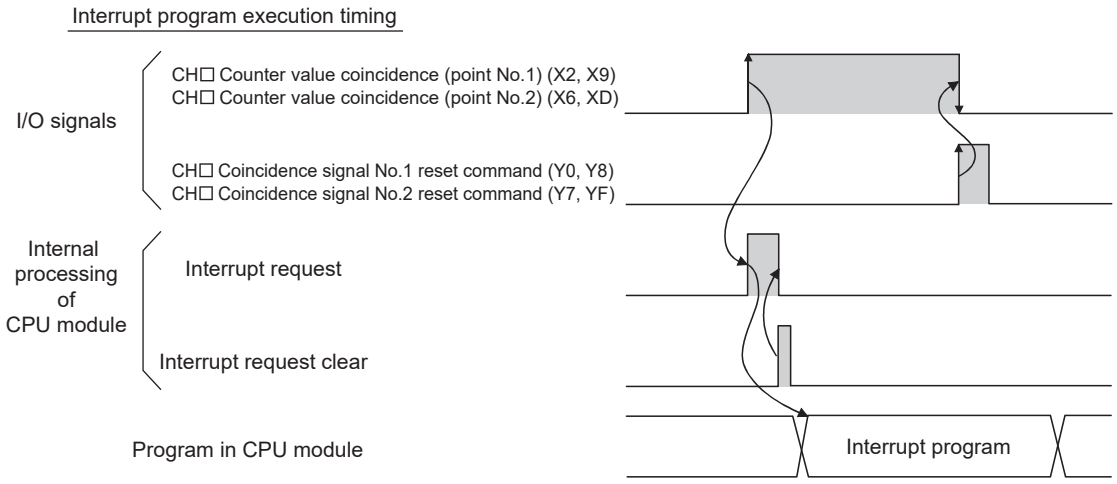
The output status (clear/hold) can be set for the external output signal when a CPU stop error occurs.
The output status is set using the GX Developer I/O assignment.
See Section 4.5 for details on the I/O assignment setting method.

(3) Coincidence detection interrupt function

The coincidence detection interrupt function allows making an interrupt request to a CPU module at the time of coincidence detection to start the interrupt program. (When the CPU module is a Q00J/Q00/Q01CPU, use function version B or later.)

(a) With the MELSEC-Q series intelligent function module, each module can have up to 16 points of interruption factors (SI).
The QD62 (E/D) has 4 points of interrupt factors corresponding to the coincidence outputs shown below.

SI No.	Interruption factor
0	Channel 1: Coincidence detection for coincidence output point No. 1
1	Channel 1: Coincidence detection for coincidence output point No. 2
2	Channel 2: Coincidence detection for coincidence output point No. 1
3	Channel 2: Coincidence detection for coincidence output point No. 2
4 to 15	Vacant



(b) Select "PLC parameter" - "PLC system" - "Intelligent function module setting" - "Interrupt pointer settings" to set the interrupt factors (SI) of the QD62(E/D) and interrupt pointers of the CPU module.

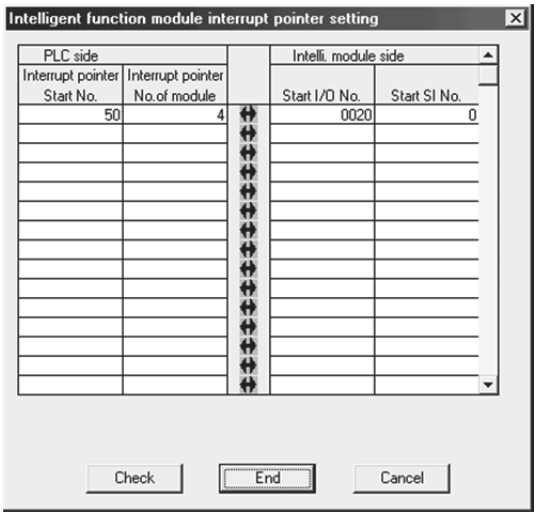
1) CPU side [Interrupt pointer start No.]
Set the start interrupt pointer number of the CPU module.
Setting range: 50 to 255

2) PLC side "Interrupt pointer No. of module"
Set the number of interrupt factors (SI).
Setting range: 1 to 4

3) Intelli. module side "Start I/O No."
Set the start I/O number of the QD62(E/D).
Setting range: 0000 to 0FF0 (H)

4) Intelli. module side "Start SI No."
Set the start interrupt factor (SI) No. of the QD62(E/D).
Setting range: 0 to 3

The following example shows SI 0 to 3 of the QD62(E/D) installed in the slot where the start I/O is 20 being assigned to interrupt pointers I50 to I53.



(c) The following two methods are available for using only specific SI numbers:

1) Method using the parameter interrupt pointer setting
The interruption factors are used only for the start SI number and the additional number of pointers, only which are specified in the "Intelligent function module interrupt point setting" window. For example, if the start SI number is set as 1 and the number of pointers is set as 2, only SI 1 and 2 are used. Also, the interrupt function cannot be used when the parameter interrupt pointer setting has not been set.

2) Method using the IMASK instruction from the sequence program
When the IMASK instruction is used, interrupt program execution enable/disable (interrupt mask) can be set for each interrupt pointer number.
For details on the IMASK instruction, refer to the MELSEC-Q/L Programming Manual (Common Instruction).

POINT

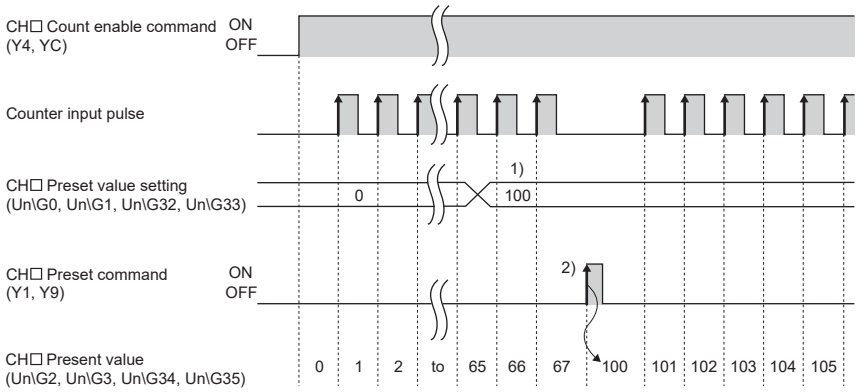
A coincidence detection interrupt occurs when the counter value coincidence signal rises (off to on). Thus, the next interrupt request does not occur unless the coincidence signal is reset and the counter value coincidence signal is turned OFF.

5.4 Using the Preset Function

The preset function rewrites the present counter value to any numeric value called the preset value. The preset function can be used when starting the pulse count from the preset value.
The preset function has two preset methods: preset using a sequence program and preset using an external control signal.

(1) Preset using a sequence program

Perform the preset function by turning on CH□ Preset command (Y1, Y9) in the sequence program.



Number	Description
1)	Write a value to CH□ Preset value setting (Un\G0, Un\G1, Un\G32, Un\G33) in 32-bit signed binary.
2)	On the rising edge (off to on) of CH□ Preset command (Y1, Y9), the value stored in CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) is replaced with the value stored in CH□ Preset value setting (Un\G0, Un\G1, Un\G32, Un\G33). The preset function is performed regardless of the on/off status of CH□ Count enable command (Y4, YC).

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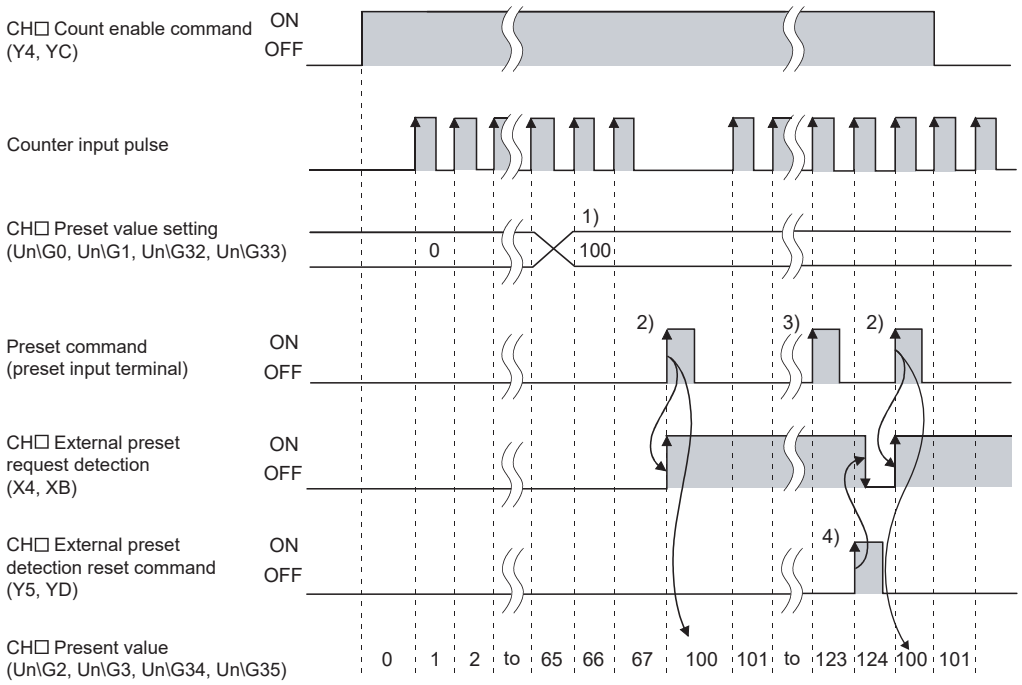
(2) Preset using an external control signal

Preset is performed by applying ON voltage to the preset input terminal for external input.



Number	Description
1)	Write a value to CH□ Preset value setting (Un\G0, Un\G1, Un\G32, Un\G33) in 32-bit signed binary.
2)	On the rising edge (off to on) of the preset command (when a voltage is applied to the preset input terminal), the value stored in CH□ Present value (Un\G2, Un\G3, Un\G34, Un\G35) is replaced with the value stored in CH□ Preset value setting (Un\G0, Un\G1, Un\G32, Un\G33). The preset function is performed regardless of the on/off status of CH□ Count enable command (Y4, YC).

POINT

While CH□ External preset request detection (X4, XB) is on (3)), the preset function cannot be performed even if a voltage is applied to the preset input terminal or CH□ Preset command (Y1, Y9) is turned on.

The preset function can be performed when CH□ External preset request detection (X4, XB) is turned off by turning on CH□ External preset detection reset command (Y5, YD) (4)).

6 CONVENIENT USAGE

6.1 Selecting the Counter Function

By selecting the counter function with the counter function selection setting, the disable count function, latch counter function, sampling counter function and periodic pulse counter function can be used.
To select a counter function, write the corresponding value shown in the following table to CH□ Counter function selection setting (Un\G9, Un\G41).
To perform the selected counter function, input the counter function selection start command by applying a voltage to the function start input terminal or by turning on CH □ Counter function selection start command (Y6, YE) with sequence program.
Also, for the counter function selection, only one of the following four functions can be used.

Counter function selection	Set value	Remarks
Disable count function	0	Initial value (default)
Latch counter function	1	
Sampling counter function	2	
Periodic pulse counter function	3	

(1) Disable count function

This function stops counting pulses by inputting the counter function selection start command while CH□ Count enable command (Y4, YC) is on.

(2) Latch counter function

This function latches the present value when the counter function selection start command is input to CH□ Latch count value (Un\G12, Un\G13, Un\G44, Un\G45).

(3) Sampling counter function

This function counts the input pulses during the preset sampling period since the time the counter function selection start command was entered.

(4) Periodic pulse counter function

This function stores the present value and previous value for each preset periodic time while the counter function selection start command is being entered.

POINT

(1) Change the counter function while CH□ Counter function selection start command (Y6, YE) is off.
(2) The selected counter function can be performed by turning on CH□ Counter function selection start command (Y6, YE) or by applying a voltage to the function start input terminal. Note that a signal that is input first takes priority.
(3) Time (T) for the sampling counter function or the periodic pulse counter function can be set by writing a value within the range of 1 to 65535 to CH□ Sampling/periodic setting (Un\G10, Un\G42). The value can be set in increments of 10 ms.
(Example) When CH□ Sampling/periodic setting (Un\G10, Un\G42) is set to 420
420 × 10 = 4200 (ms)

6.1.1 Reading the counter function selection count value

The counter function selection count values are stored when the counter function selection is executed.
When the latch counter, the sampling counter, or the periodic pulse counter function is performed, each count value is stored in the buffer memory listed in the table below.

Contents		Present value	Counter function selection count value			
			Latch count value	Sampling count value	Periodic pulse count previous value	Periodic pulse count present value
Buffer memory address	CH1	Un\G2, Un\G3	Un\G12, Un\G13	Un\G14, Un\G15	Un\G16, Un\G17	Un\G18, Un\G19
	CH2	Un\G34, Un\G35	Un\G44, Un\G45	Un\G46, Un\G47	Un\G48, Un\G49	Un\G50, Un\G51

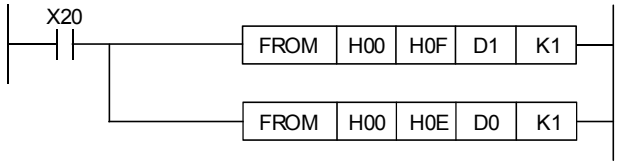
The present value and the counter function selection count values are stored in the buffer memories in 32-bit signed binary.
Also, since the contents of the buffer memory are automatically updated by the count operation, the latest count values can be read from the buffer memory.

POINT

(1) When reading the present and counter function selection count values, use the DFRO instruction and always read values in two-word units. When reading values in one-word units, if the count values are updated in the middle of read processing, a mismatch may occur between the data contents of the lower and higher words, possibly causing the system to read incorrect count values.

[Program example]

[Example of an undesirable program]



(2) Although the latch count value and present periodic pulse count value are stored in different addresses, the same values are always stored (updated at the same time). Thus, when the latch counter function or periodic pulse counter function is executed, the present periodic pulse count value and latch count value do not retain their previous values.

6.1.2 Count error

A count error may occur while the selected counter function is performed by external input (a voltage is applied to the function start input terminal) or by sequence program (CH□ Counter function selection start command (Y6, YE) is turned on).

(1) Count error (maximum) due to input response delay when using an external input

$$\left(\frac{1\ [\text{ms}]}{1000}\right)[\text{s}] \times \text{pulse input speed [PPS]} \times \text{multiple [count]}$$

(2) Count error (maximum) when the counter function selection is executed by a sequence program

$$\left(\frac{1\ \text{scan time [ms]}}{1000}\right)[\text{s}] \times \text{pulse input speed [PPS]} \times \text{multiple [count]}$$

(3) Count error (maximum) due to the internal clock when executing the sampling counter function and periodic pulse counter function

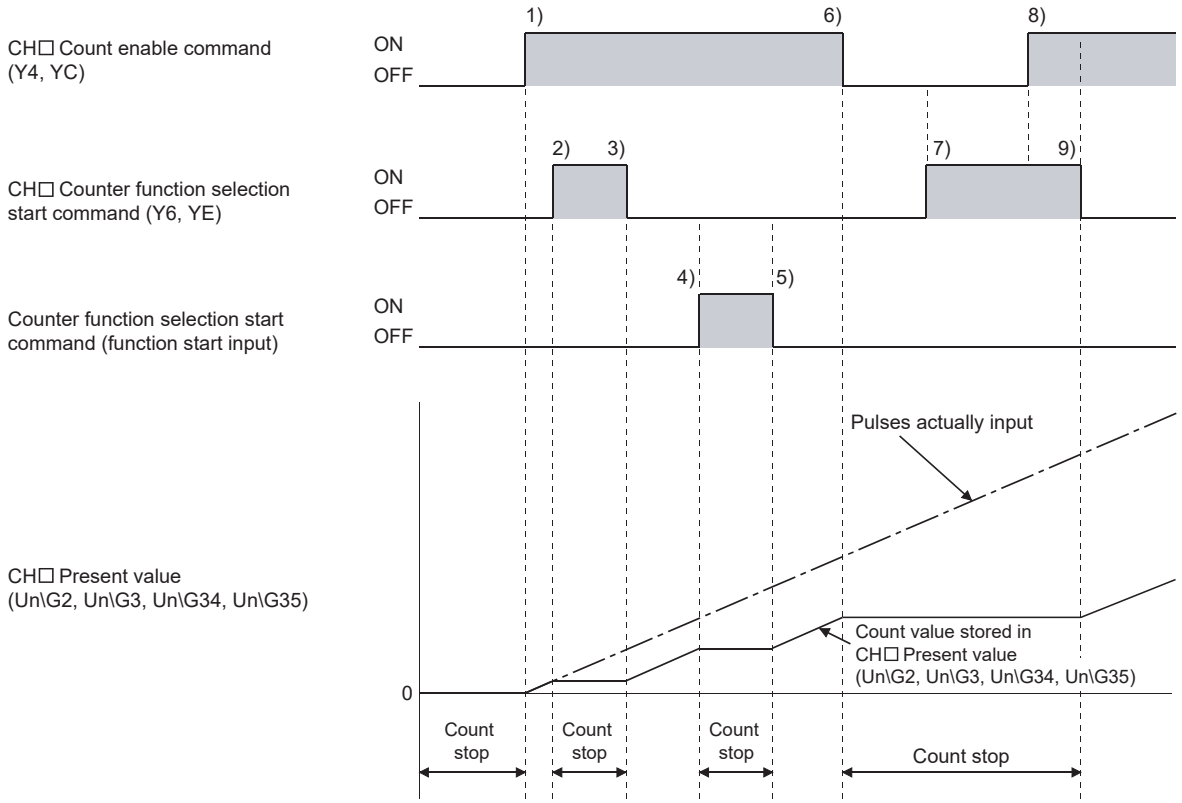
$$\left(\frac{\text{Sampling/cycle time setting value x 10 [ms]}}{1000}\right)[\text{s}] \times \frac{\text{Error in parts dimensions, 100 [ppm]}}{1000000}$$

$$\times \text{Pulse input speed [pps]} \times \text{Multiplier factor [count]}$$

$$= \frac{(\text{Sampling/cycle time setting value (unit: 10ms))} \times \text{Pulse input speed [pps]} \times \text{Multiplier factor [count]}}{1000000}$$

6.2 Using the Disable Count Function

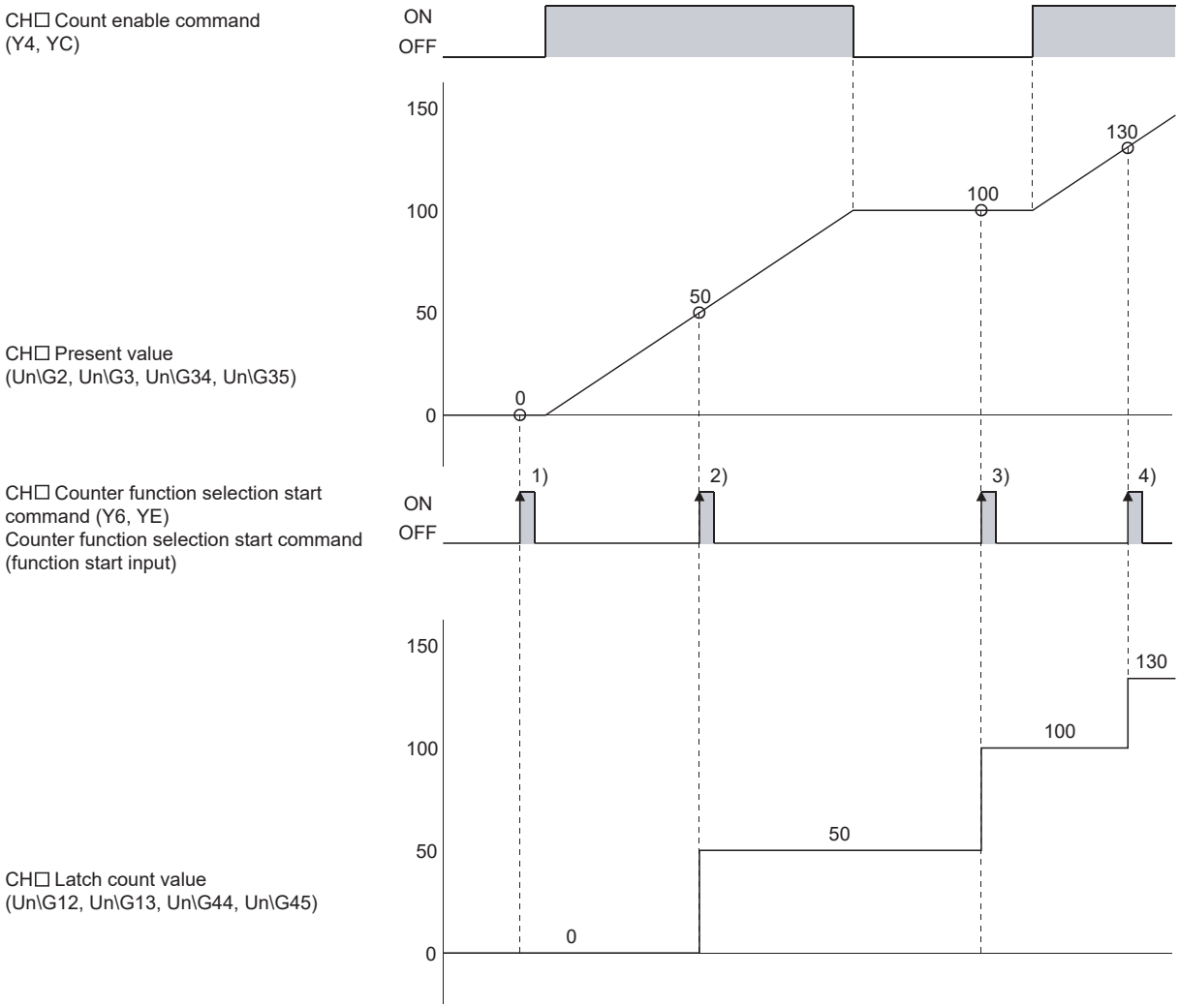
The disable count function stops the count operation while the count enable command is ON.
The relationships between the count enable command, counter function selection start command and the present counter value are illustrated below.



Number	Description
1)	Count starts when CH☐ Count enable command (Y4, YC) is turned on.
2)	Count stops when CH☐ Counter function selection start command (Y6, YE) is turned on.
3)	Count restarts when CH☐ Counter function selection start command (Y6, YE) is turned off.
4)	Count operation stops when the count function selection start command (function start input) turns on.
5)	Count operation resumes when the count function selection start command (function start input) turns off.
6)	Count stops when CH☐ Count enable command (Y4, YC) is turned off.
7)	Count stops regardless of the on/off status of CH☐ Counter function selection start command (Y6, YE) because CH☐ Count enable command (Y4, YC) is off.
8)	Even though CH☐ Count enable command (Y4, YC) is turned on, count remains stopped because CH☐ Counter function selection start command (Y6, YE) is on.
9)	Count restarts when CH☐ Counter function selection start command (Y6, YE) is turned off.

6.3 Using the Latch Counter Function

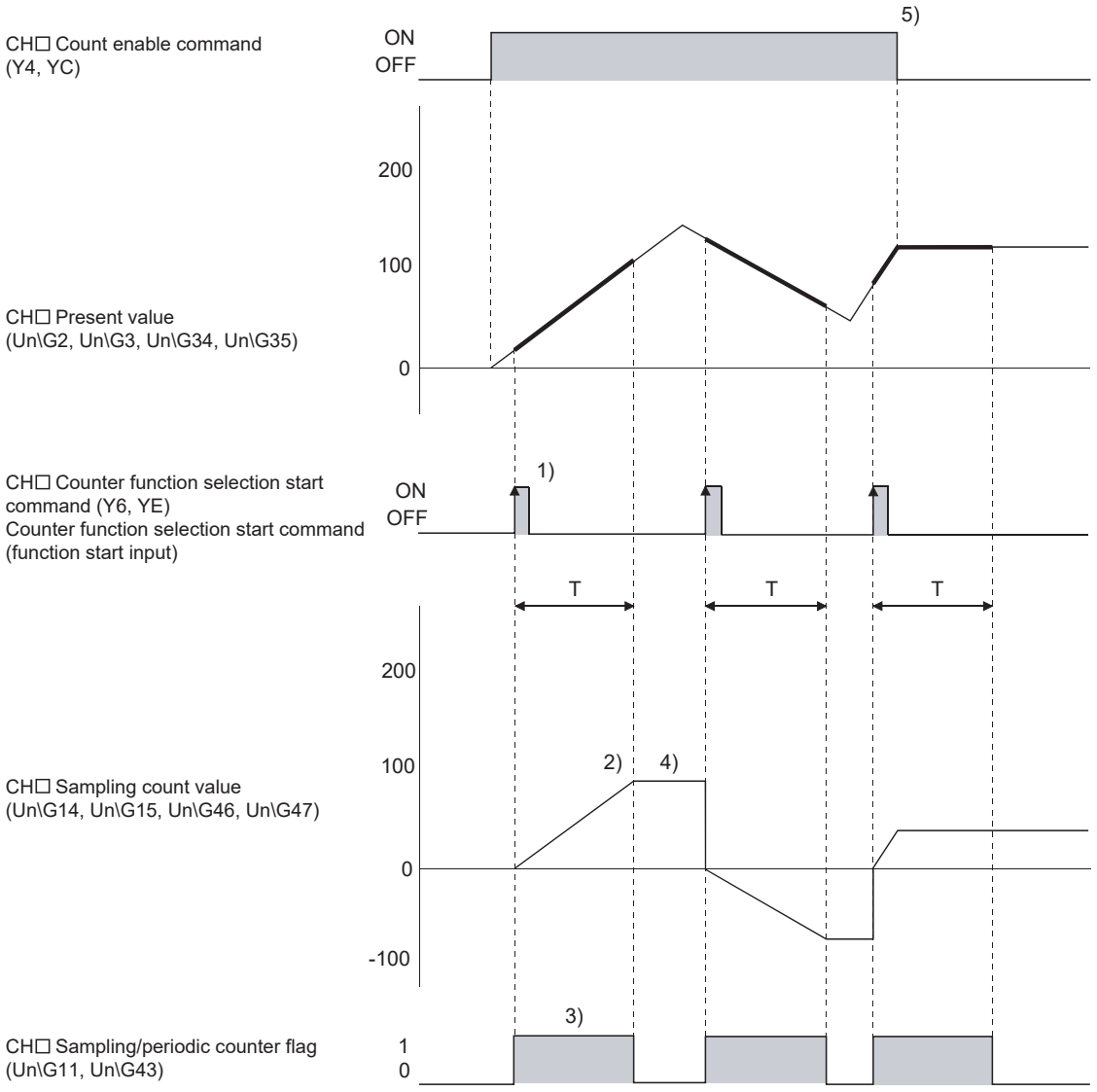
The latch counter function latches the present counter value at the time a signal was entered.
The following figure shows the relationship among the present value of the counter, the counter function selection start command, and CH□ Latch count value (Un\G12, Un\G13, Un\G44, Un\G45).



At the rise of CH□ Counter function selection start command (Y6, YE) or the counter function selection start command (function start input) of 1) to 4), the present value of the counter is stored in CH□ Latch count value (Un\G12, Un\G13, Un\G44, Un\G45).
The latch counter function can be performed regardless of whether CH□ Count enable command (Y4, YC) is on or off.

6.4 Using the Sampling Counter Function

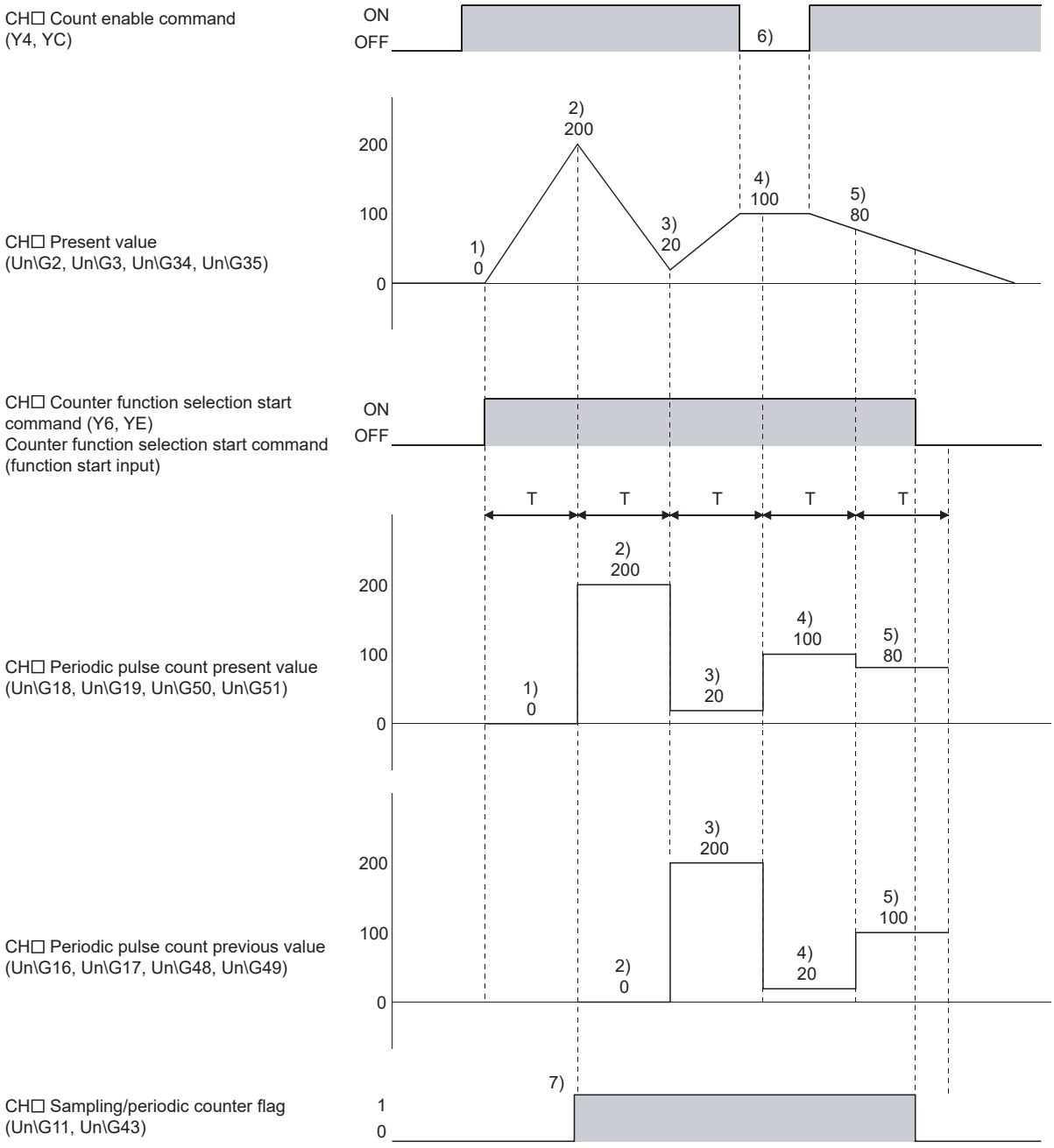
This function counts the pulses input in the specified sampling time (T).
The relationships between the signals, buffer memory, etc. in the sampling counter function are illustrated below.



Number	Description
1)	Input pulses are counted from 0 on the rising edge of CH☐ Counter function selection start command (Y6, YE) or the counter function selection start command (function start input).
2)	When the specified sampling time period elapses, the count stops.
3)	While the sampling counter function is performed, "1" is stored in CH☐ Sampling/periodic counter flag (Un\G11, Un\G43).
4)	Even after the sampling counter function is performed, the value stored in CH☐ Sampling count value (Un\G14, Un\G15, Un\G46, Un\G47) is held.
5)	The sampling counter function is performed regardless the on/off status of CH☐ Count enable command (Y4, YC).

6.5 Using the Periodic Pulse Counter Function

This function stores the present and the previous values of the counter to CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51) and CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49), respectively, at the preset cycle (T).
The relationships between the signals, buffer memory, etc. in the periodic pulse counter function are illustrated below.

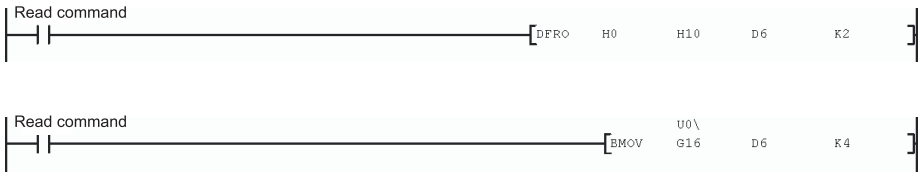


Number	Description
1)	The present counter value, 0, is stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51).
2)	The present counter value, 200, is stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51). The value 0, which had been stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51), is then stored in CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49).
3)	The present counter value, 20, is stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51). The value 200, which had been stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51), is then stored in CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49).
4)	The present counter value, 100, is stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51). The value 20, which had been stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51), is then stored in CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49).
5)	The present counter value, 80, is stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51). The value 100, which had been stored in CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51), is then stored in CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49).
6)	The periodic pulse counter function is performed regardless the on/off status of CH□ Count enable command (Y4, YC).
7)	While the periodic pulse counter function is performed, "1" is stored in CH□ Sampling/periodic counter flag (Un\G11, Un\G43).

POINT

Note the following when reading CH□ Periodic pulse count previous value (Un\G16, Un\G17, Un\G48, Un\G49) and CH□ Periodic pulse count present value (Un\G18, Un\G19, Un\G50, Un\G51).

(1) When reading values using a sequence program, use the DFRO instruction or the BMOV instruction and read values in four-word units.
[Program example]



Depending on the relation between the update timings of the previous and present values inside the module and the read timing in the sequence program, the previous value and the present value may be the same.
In that case, read values gain.
(See Section 8.1.2, Section 8.2.2.)

(2) When reading values using the auto refresh setting, only the value in the device to where the present value is written may change depending on the relation between the update timings of the previous and present values inside the module and the auto refresh timing.
In that case, read values using a sequence program.
For details, see (1) above.

MEMO

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7 UTILITY PACKAGE (GX Configurator-CT)

7.1 Functions of the Utility Package

Table 7.1 lists the functions of the utility package.

Table 7.1 Utility package (GX Configurator-CT) function list

Function	Description	Reference section
Initial setting	(1) Performs initial settings for each channel to operate the QD62 (E/D). Sets values for the following items that require initial setting. • CH☐ Preset value setting • CH☐ Coincidence output point set No.1 • CH☐ Coincidence output point set No.2 • CH☐ Counter function selection setting • CH☐ Sampling/periodic setting [unit: 10 ms] • CH☐ Ring counter maximum value • CH☐ Ring counter minimum value (2) The data for which initial setting has been completed is registered in the parameters of the CPU module, and automatically written to the QD62 (E/D) when the CPU module is placed in the RUN status.	Section 7.4
Auto refresh	(1) The QD62 (E/D)'s buffer memory is configured for automatic refresh. • CH☐ Preset value • CH☐ Latch count value • CH☐ Sampling count value • CH☐ Periodic pulse counter present value • CH☐ Periodic pulse counter previous value • CH☐ Sampling/periodic counter flag • CH☐ Overflow detection flag (2) Values set for auto refresh and stored in the QD62 (E/D)'s buffer memory are automatically read out when the END instruction is executed in the CPU module.	Section 7.5
Monitoring/test	The buffer memory and I/O signals of the QD62 (E/D) are monitored or tested. • X/Y device • CH☐ Present value • CH☐ Preset function • CH☐ Coincidence output function • CH☐ Counter selection function • CH☐ Ring counter function	Section 7.6

7 - 1

7.2 Installing and Uninstalling the Utility Package

For how to install or uninstall the utility package, refer to "Method of installing the MELSOFT Series" included in the utility package.

7.2.1 Handling precautions

The following explains the precautions on using the utility package.

(1) For safety

Since the utility is add-in software for GX Developer, read "Safety Precautions" and the basic operating procedures in the GX Developer Operating Manual.

(2) About installation

GX Configurator-CT is add-in software for GX Developer Version 4 or later. Therefore, GX Configurator-CT must be installed on the personal computer that has already GX Developer Version 4 or later installed.

(3) Display error of Intelligent function module utility

Insufficient system resource may cause the window to be displayed inappropriately while using the Intelligent function module utility.
If this occurs, close the Intelligent function module utility, GX Developer (program, comments, etc.), and other applications, and then start GX Developer and Intelligent function module utility again.

(4) To start the Intelligent function module utility

(a) In GX Developer, select "QCPU (Q mode)" for PLC series and specify a project. If any PLC series other than "QCPU (Q mode)" is selected, or if no project is specified, the Intelligent function module utility will not start.

(b) Multiple Intelligent function module utilities can be started.
However, [Open file] and [Save file] operations under [Intelligent function module parameter] are allowed for one Intelligent function module utility only. Only the [Monitor/test] operation is allowed for the other utilities.

(5) Switching between two or more Intelligent function module utilities

When two or more Intelligent function module utility windows cannot be displayed side by side, select a window to be displayed on the top of others using the task bar.

(6) Number of parameters that can be set in GX Configurator-CT

When multiple intelligent function modules are mounted, the number of parameter settings must not exceed the following limit.

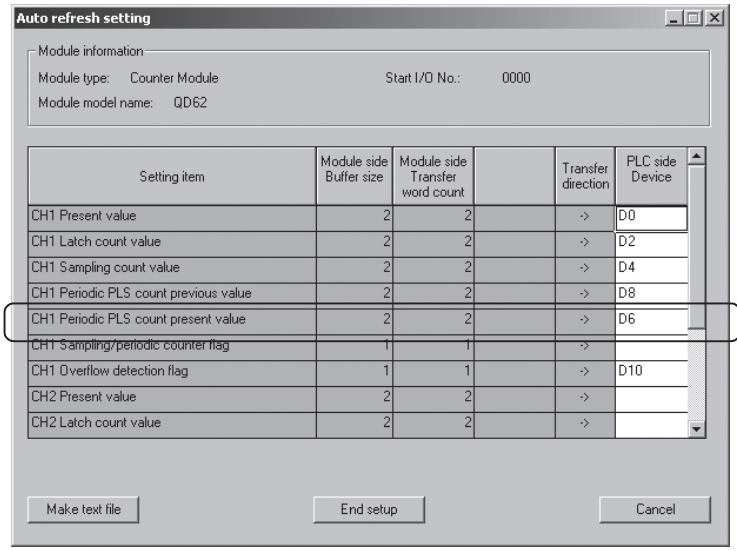
When intelligent function modules are installed to:	Maximum number of parameter settings	
	Initial setting	Auto refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q02PH/Q06PH/Q12PH/Q25PHCPU	512	256
Q12PRH/Q25PRHCPU	512	2048
Q00UJ/Q00U/Q01UCPU	512	2048
Q02UCPU	2048	1024
Q03UD/Q04UDH/Q06UDH/ Q10UDH/Q13UDH/Q20UDH/ Q26UDH/Q03UDE/Q04UDEH/ Q06UDEH/Q10UDEH/Q13UDEH/ Q20UDEH/Q26UDEHCPU	4096	2048
CPU modules other than the above	Not available	Not available
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed to the MELSECNET/H remote I/O station, configure the settings in GX Configurator-CT so that the number of parameter settings for all the intelligent function modules does not exceed the limit of the MELSECNET/H remote I/O station. Calculate the total number of parameter settings separately for the initial setting and for the auto refresh setting.

The number of parameters that can be set for one module in GX Configurator-CT is as shown below.

Target module	Initial setting	Auto refresh setting
QD62/QD62E/QD62D	8 (Fixed)	14 (Max.)

Example) Counting the number of parameter settings in Auto refresh setting



The number of settings in this one line is counted as one setting.
The number of settings is not counted by columns.
Add up all the setting items in this setting window, then add them to the total for the other intelligent function modules to get a grand total.

7.2.2 Operating environment

This section explains the operating environment of the personal computer that runs GX Configurator-CT.

Item		Description
Installation (Add-in) target ＊1		Add-in to GX Developer Version 4 (English version) or later ＊2
Computer		A personal computer with any of the operating systems below
	CPU	Refer to the next page "Operating system and performance required for personal computer".
	Required memory	
Hard disk space	For installation	65 MB or more
	For operation	10 MB or more
Display		800 × 600 dots or more resolution ＊3
Operating system		Microsoft® Windows® 95 Operating System (English version) Microsoft® Windows® 98 Operating System (English version) Microsoft® Windows® Millennium Edition Operating System (English version) Microsoft® Windows NT® Workstation Operating System Version 4.0 (English version) Microsoft® Windows® 2000 Professional Operating System (English version) Microsoft® Windows® XP Professional Operating System (English version) SP1 or later Microsoft® Windows® XP Home Edition Operating System (English version) SP1 or later Microsoft® Windows Vista® Home Basic Operating System (English version) Microsoft® Windows Vista® Home Premium Operating System (English version) Microsoft® Windows Vista® Business Operating System (English version) Microsoft® Windows Vista® Ultimate Operating System (English version) Microsoft® Windows Vista® Enterprise Operating System (English version) Microsoft® Windows® 7 Starter Operating System (English version) ＊4 Microsoft® Windows® 7 Home Premium Operating System (English version) ＊4 Microsoft® Windows® 7 Professional Operating System (English version) ＊4 Microsoft® Windows® 7 Ultimate Operating System (English version) ＊4 Microsoft® Windows® 7 Enterprise Operating System (English version) ＊4

＊1: Install GX Configurator-CT in GX Developer Version 4 or higher in the same language.

＊2: GX Configurator-CT is not applicable to GX Developer Version 3 or earlier.

＊3: When Windows Vista® or Windows® 7 is used, resolution of 1024 × 768 dots or more is recommended.

＊4: When 32-bit Windows® 7 is used, add GX Configurator-CT Version 1.29AF or later in GX Developer Version 8.91V or later.
When 64-bit Windows® 7 is used, add GX Configurator-CT Version 1.29AF or later in GX Developer Version 8.98C or later.

Operating system and performance required for personal computer

Operating system	Performance required for personal computer	
	CPU	Memory
Windows® 95	Pentium® 133 MHz or more	32 MB or more
Windows® 98	Pentium® 133 MHz or more	32 MB or more
Windows® Me	Pentium® 150 MHz or more	32 MB or more
Windows NT® Workstation 4.0	Pentium® 133 MHz or more	32 MB or more
Windows® 2000 Professional	Pentium® 133 MHz or more	64 MB or more
Windows® XP	Pentium® 300 MHz or more	128 MB or more
Windows Vista®	Pentium® 1 GHz or more	1 GB or more
Windows® 7	Pentium® 1 GHz or more	1 GB or more (32-bit) 2 GB or more (64-bit)

POINT

- The functions shown below are not available for Windows® XP, Windows Vista® , and Windows® 7.
  If any of the following functions is attempted, this product may not operate normally.
  Start of application in Windows® compatible mode
  Fast user switching
  Remote desktop
  Large fonts (Details setting of Display Properties)
  DPI setting other than 100%
  Also, GX Configurator-CT is not supported by 64-bit Windows® XP and 64-bit Windows® Vista .
- A user with USER authority or higher can access GX Configurator-CT for Windows Vista® and Windows® 7.
- When Windows® 7 is used, the following functions are not available.
  Windows XP Mode
  Windows Touch

7.3 Explanation of Utility Package Operations

7.3.1 How to perform common utility package operations

(1) Control keys

Special keys that can be used for operation of the utility package and their applications are shown in the table below.

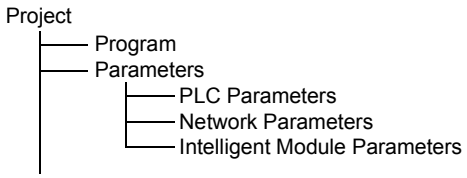
Key	Application
Esc	Cancels the current entry in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Used in combination with the mouse operation to select multiple cells for test execution.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents in the cell.
Back space	Deletes the character where the cursor is positioned.
↑ ↓ ← →	Moves the cursor.
Page Up	Moves the cursor one page up.
Page Down	Moves the cursor one page down.
Enter	Completes the entry in the cell.

(2) Data created with the utility package

The following data or files that are created with the utility package can be also handled in GX Developer. Figure 7.1 shows respective data or files are handled in which operation.

<Intelligent function module parameter>

(a) This represents the data created in Auto refresh setting, and they are stored in an intelligent function module parameter file in a project created by GX Developer.



(b) Steps 1) to 3) shown in Figure 7.1 are performed as follows:

1) From GX Developer, select:
[Project] → [Open project] / [Save]/ [Save as]
2) On the intelligent function module selection window of the utility, select:
[Intelligent function module parameter] → [Open parameters] / [Save parameters]

3) From GX Developer, select:
[Online] → [Read from PLC] / [Write to PLC] → "Intelligent function module parameters"
Alternatively, from the intelligent function module selection window of the utility, select:
[Online] → [Read from PLC] / [Write to PLC]

<Text files>

(a) A text file can be created by clicking the Make text file button on the initial setting, Auto refresh setting, or Monitor/Test window. The text files can be utilized to create user documents.

(b) Text files can be saved in any directory.
However, a path (folder where the file is to be saved) cannot be created during Make text file operation, so create a folder in advance for saving the file using Windows® Explorer.

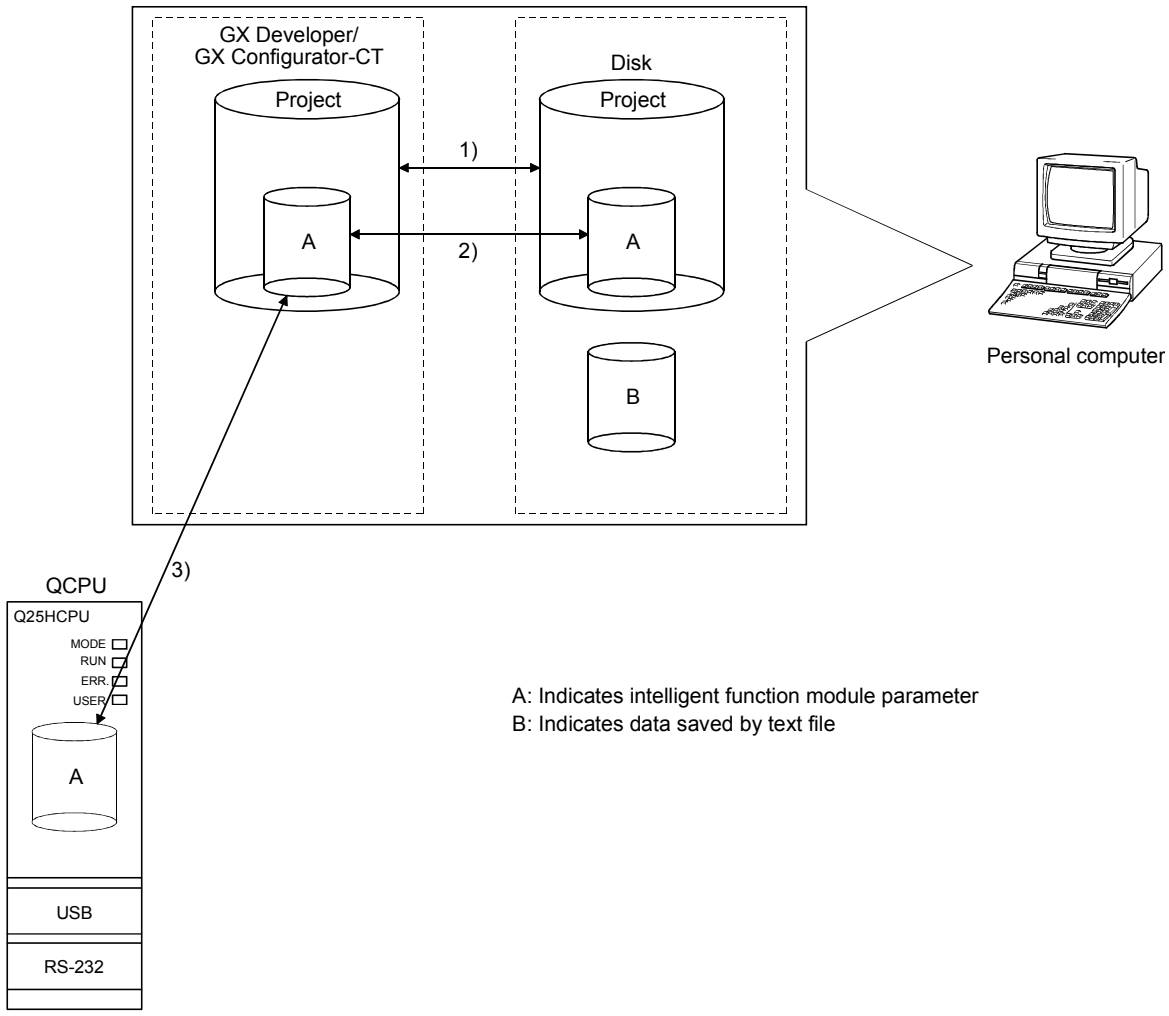
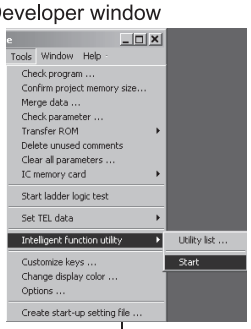


Figure 7.1 Correlation chart for data created with the utility package

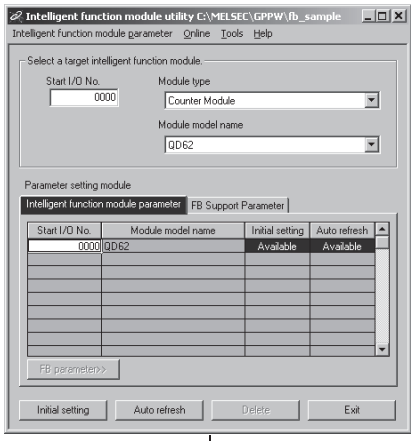
7.3.2 Operation overview

GX Developer window



[Tools] → [Intelligent function utility] → [Start]

Window for intelligent function module parameter setting module select



See Section 7.3.3

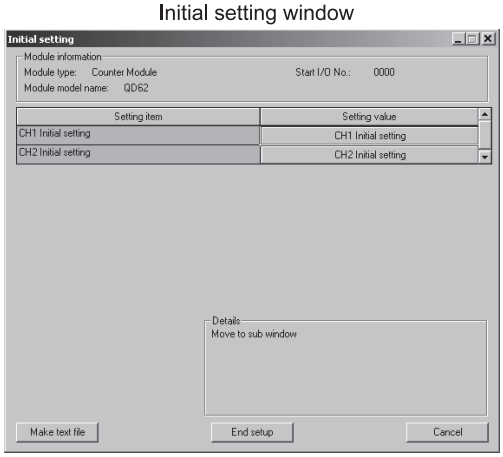
Enter "Start I/O No.", then select "Module type" and "Module model name".

1)

Initial setting

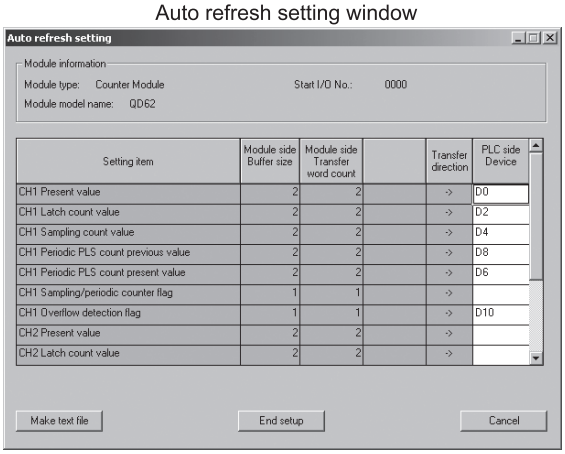
Auto refresh

Initial setting window



See Section 7.4

Auto refresh setting window

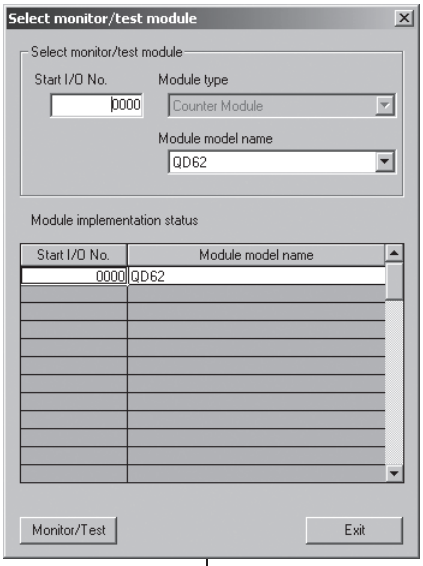


See Section 7.5

1)

[Online]→ [Monitor/test]

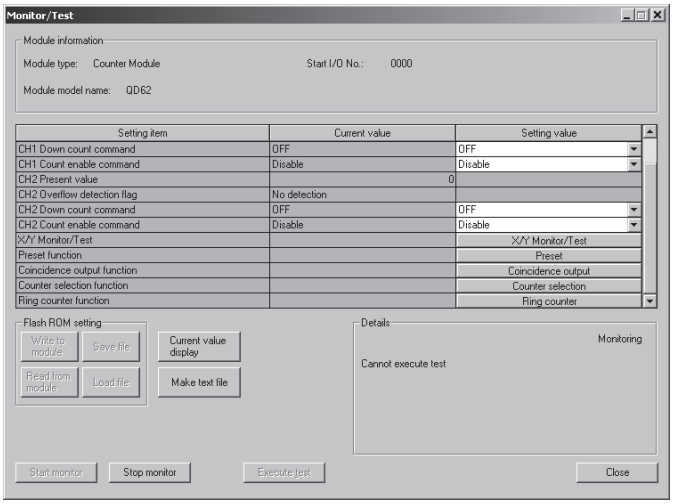
Select monitor/test module window



Monitor/test

Select a module to be monitored/tested.

Monitor/test window



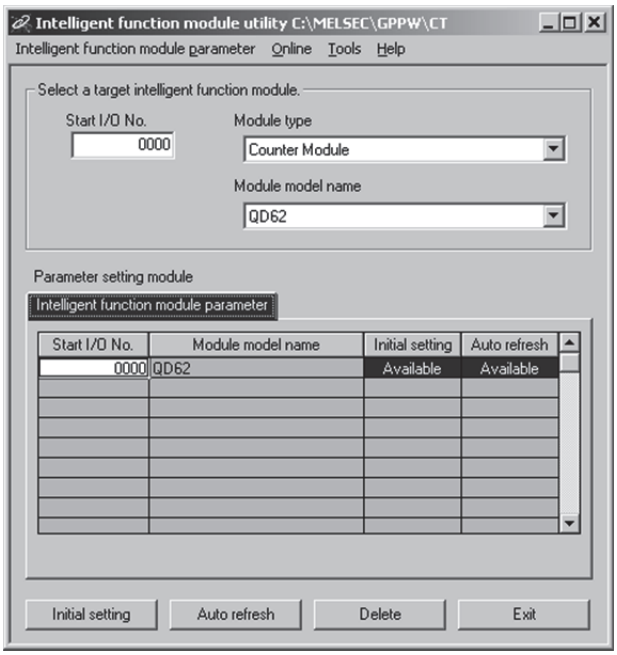
See Section 7.6

7.3.3 Starting the Intelligent function module utility

[Operating procedure]

Intelligent function module utility is started from GX Developer.
[Tools] → [Intelligent function utility] → [Start]

[Setting window]



[Explanation of items]

(1) Activation of other windows

Following windows can be displayed from the intelligent function module utility window.

(a) Initial setting window
"Start I/O No. ＊1 " → "Module type" → "Module model name" →
Initial setting

(b) Auto refresh setting window
"Start I/O No. ＊1" → "Module type" → "Module model name"→
Auto refresh

(c) Select monitor/test module window
[Online] → [Monitor/Test]

＊1 Enter the start I/O No. in hexadecimal

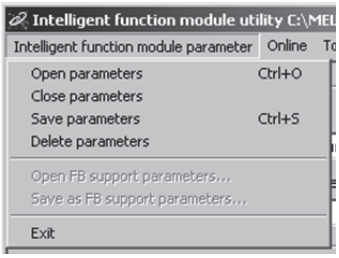
(2) Command buttons

Delete	Deletes the initial setting and auto refresh setting of the selected module.
Exit	Closes this window.

(3) Menu bar

(a) File menu

Intelligent function module parameters of the project opened by GX Developer are handled.



[Open parameters] : Reads a parameter file.

[Close parameters] : Closes the parameter file. If any data are modified, a dialog asking for file saving will appear.

[Save parameters] : Saves the parameter file.

[Delete parameters] : Deletes the parameter file.

[Open FB support parameters] : Opens a FB support parameter file.

[Save as FB support parameters] : Saves a FB support parameter.

[Exit] : Closes this window.

(b) Online menu

[Monitor/Test] : Activates the Select monitor/test module window.

[Read from PLC] : Reads intelligent function module parameters from the CPU module.

[Write to PLC] : Writes intelligent function module parameters to the CPU module.

POINT

(1) Saving intelligent function module parameters in a file

Since intelligent function module parameters cannot be saved in a file by the project saving operation of GX Developer, save them on the shown module selection window.

(2) Reading/writing intelligent function module parameters from/to a CPU module using GX Developer

(a) Intelligent function module parameters can be read from and written into a CPU module after having been saved in a file.

(b) Set the target CPU module in GX Developer: [Online] → [Transfer setup].

(c) When the QD62 (E/D) is mounted to the remote I/O station, use "Read from PLC" and "Write to PLC" of GX Developer.

(3) Checking the required utility

While the start I/O is displayed on the Intelligent function module utility setting window, "＊" may be displayed for the model name.

This means that the required utility has not been installed or the utility cannot be started from GX Developer.

Check the required utility, selecting [Tools] → [Intelligent function utility] → [Utility list...] in GX Developer.

7.4 Initial Settings

[Purpose of operation]

Perform the initial settings for each channel to operate the QD62 (E/D).
Set the following initial setting parameters:

- Preset value
- Coincidence output point set No.1
- Coincidence output point set No.2
- Counter function selection setting
- Sampling/periodic setting
- Ring counter maximum value
- Ring counter minimum value

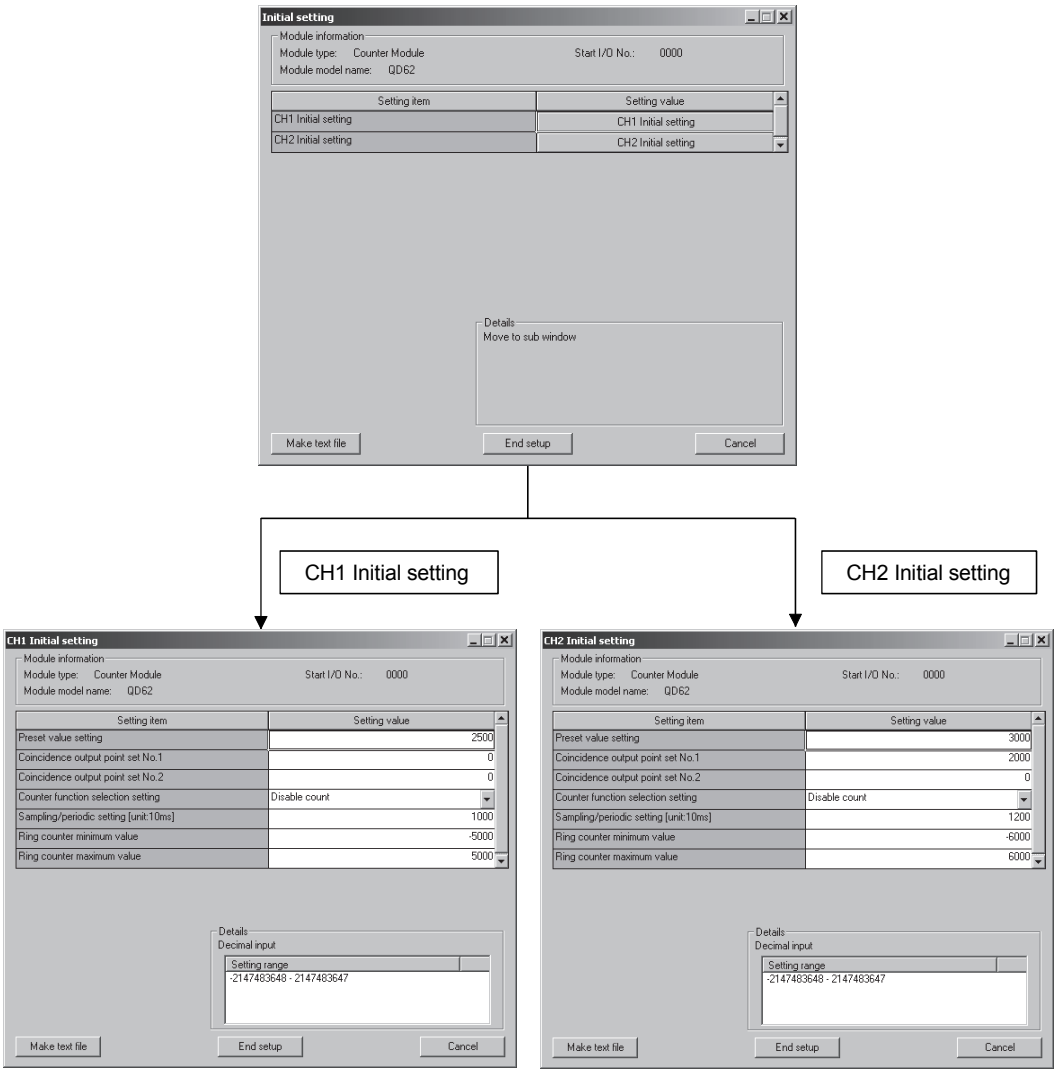
These initial settings eliminate the need to set sequence programs.

[Startup procedure]

"Start I/O No. ∗" → "Module type" → "Module model name" → Initial setting

∗ Enter the start I/O No. in hexadecimal

[Setting window]



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[Explanation of items]

(1) Command buttons

Make text file	Creates a file containing the displayed data in text file format.
End setup	Saves the set data and ends the operation.
Cancel	Cancels the setting and ends the operation.

POINT

Initial settings are stored in the intelligent module parameters.
After being written to the CPU module, the initial setting is made effective by either (1) or (2).

(1) Cycle the RUN/STOP switch of the CPU module: STOP → RUN → STOP → RUN.

(2) With the RUN/STOP switch set to RUN, turn off and then on the power or reset the CPU module.

If the initialization settings have been written by a sequence program, the initialization settings will be executed during the STOP → RUN of the CPU module. Arrange so that the initial settings written by the sequence program are re-executed during the STOP → RUN of the CPU module.

7.5 Auto Refresh

[Purpose]

Set the QD62 (E/D) buffer memory to be automatically refreshed, for each channel.

Set the following auto refresh setting parameters:

- Present value
- Latch count value
- Sampling count value
- Periodic pulse counter present value
- Periodic pulse counter previous value
- Sampling/periodic counter flag
- Overflow detection flag

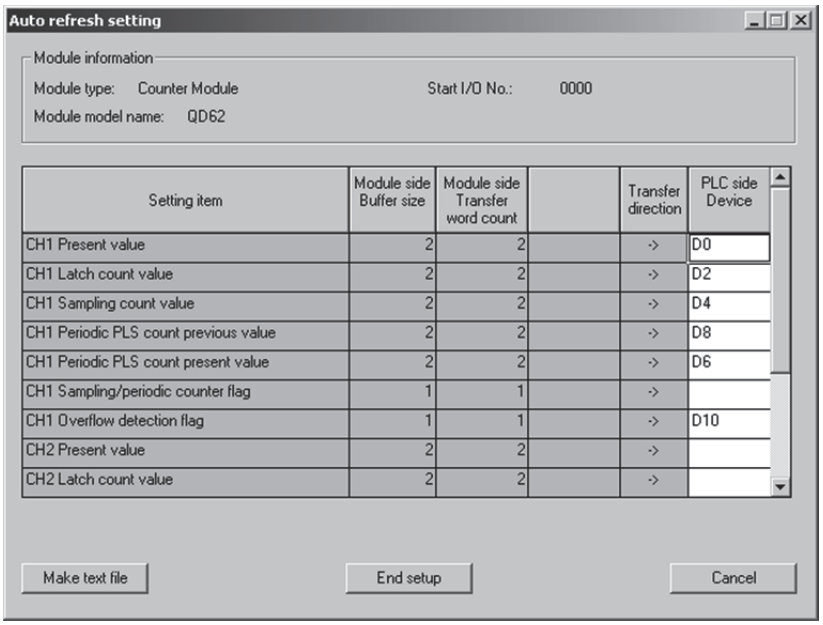
This auto refresh setting eliminates the need for reading and writing by sequence programs.

[Operating procedure]

"Start I/O No.＊" → "Module type" → "Module model name" → Auto refresh

＊ Enter the start I/O No. in hexadecimal.

[Setting window]



[Explanation of items]

(1) Items

Module side Buffer size : Displays the buffer memory size of the setting item.

Module side Transfer word count : Displays the number of words to be transferred.

Transfer direction : "←" indicates that data are written from the CPU module to the buffer memory.
"→" indicates that data are loaded from the buffer memory to the CPU module.

PLC side Device : Enter a CPU module side device that is to be automatically refreshed.
Applicable devices are X, Y, M, L, B, T, C, ST, D, W, R, and ZR.

When using bit devices X, Y, M, L or B, set a number that can be divided by 16 points (examples: X10, Y120, M16, etc.)
Also, buffer memory data are stored in a 16-point area, starting from the specified device number. For example, if X10 is entered, data are stored in X10 to X1F.

(2) Command buttons

Make text file	Creates a file containing the displayed data in text file format.
End setup	Saves the set data and ends the operation.
Cancel	Cancels the setting and ends the operation.

POINT

- The auto refresh settings are stored in an intelligent function module parameter file.
  The auto refresh settings become effective by turning the power OFF and then ON or resetting the CPU module after writing the intelligent function module parameters to the CPU module.
- The auto refresh settings cannot be changed from sequence programs. However, processing equivalent to auto refresh can be added using the FROM/TO instruction in the sequence program.

7.6 Monitoring/Test

7.6.1 Monitoring/Test

[Purpose]

Start buffer memory monitoring/testing and I/O signal monitoring/testing from this window.

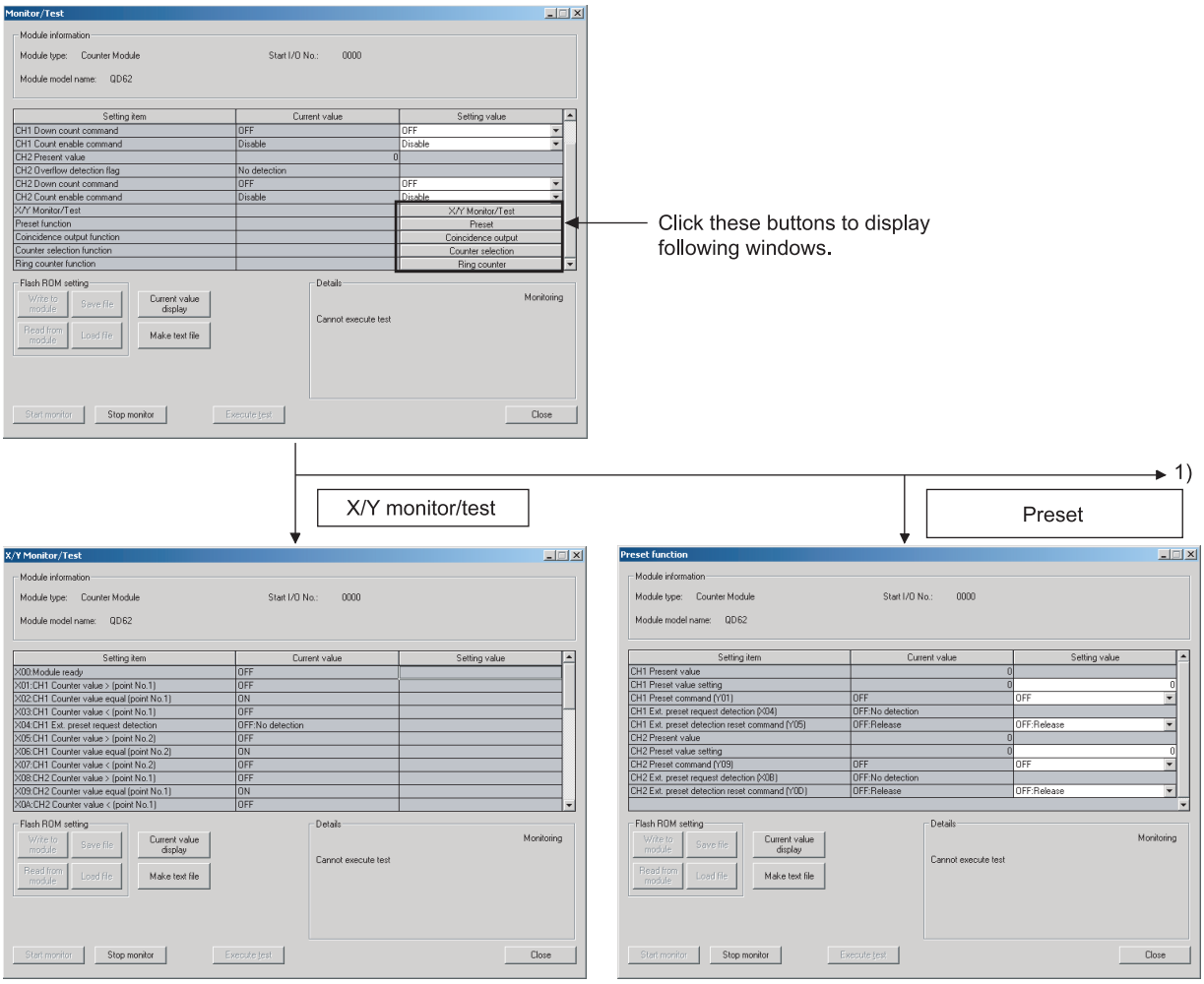
[Operating procedure]

"Select monitor/test module" window → "Start I/O No. ∗1" → "Module type " → "Module model name" → Monitor/test

∗1 Enter the start I/O No. in hexadecimal

The window can also be started from System monitor of GX Developer Version 6 or later.
Refer to the GX Developer Operating Manual for details.

[Setting window]



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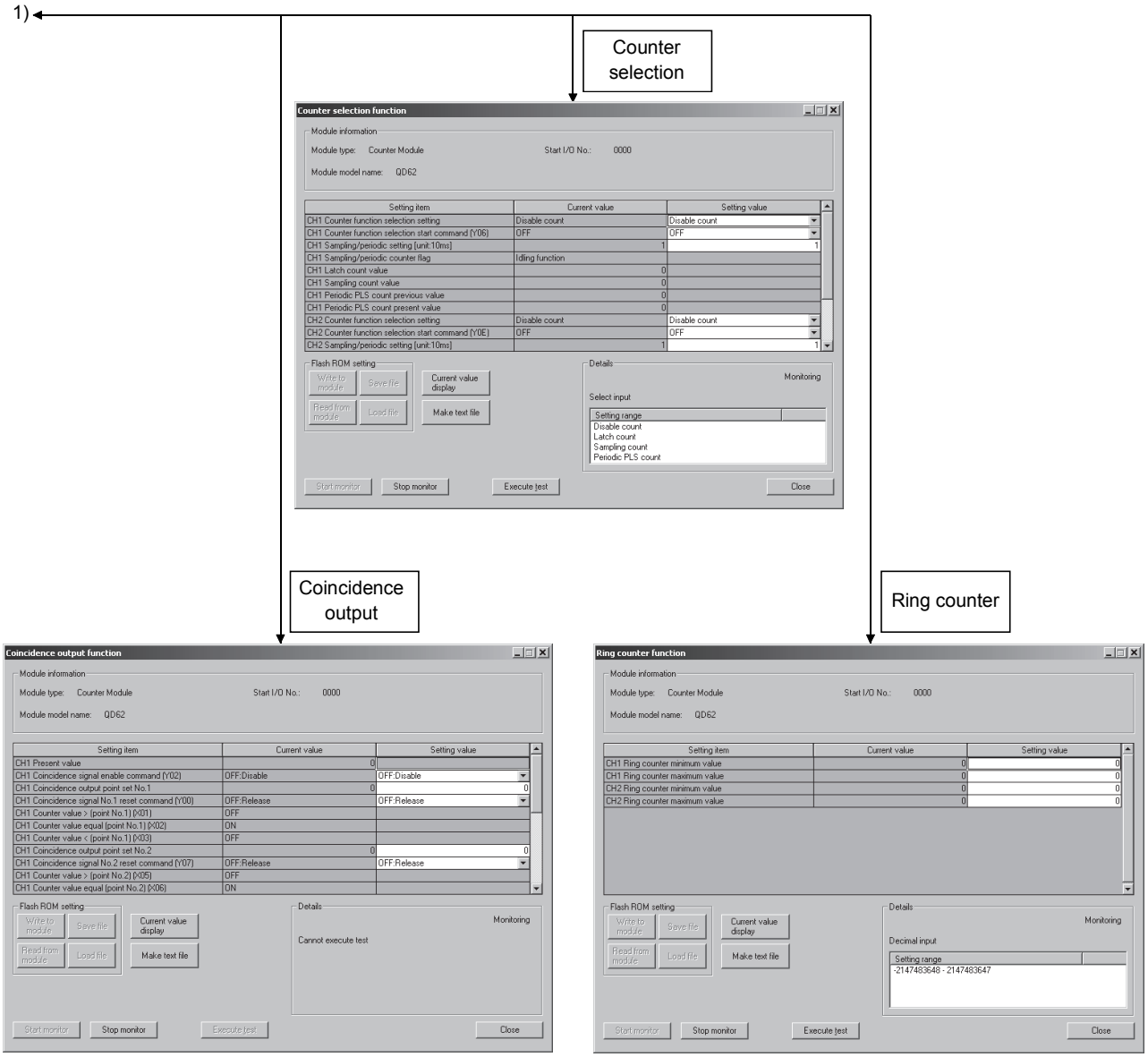
1)
Counter selection
Counter selection function
Module information
Module type: Counter Module
Start I/O No.: 0000
Module model name: QD62
Setting item
Current value
Setting value
CH1 Counter function selection setting
Disable count
CH1 Counter function selection start command (Y06)
OFF
CH1 Sampling/periodic setting [unit:10ms]
CH1 Sampling/periodic counter flag
Idling function
CH1 Latch count value
CH1 Sampling count value
CH1 Periodic PLS count previous value
CH1 Periodic PLS count present value
CH2 Counter function selection setting
CH2 Counter function selection start command (Y0E)
CH2 Sampling/periodic setting [unit:10ms]
Flash ROM setting
Write to module
Save file
Read from module
Load file
Current value display
Make text file
Details
Monitoring
Select input
Setting range
Disable count
Latch count
Sampling count
Periodic PLS count
Start monitor
Stop monitor
Execute test
Close
Coincidence output
Ring counter
Coincidence output function
CH1 Present value
CH1 Coincidence signal enable command (Y02)
OFF:Disable
CH1 Coincidence output point set No.1
CH1 Coincidence signal No.1 reset command (Y00)
OFF:Release
CH1 Counter value > (point No.1) (X01)
CH1 Counter value equal (point No.1) (X02)
ON
CH1 Counter value < (point No.1) (X03)
CH1 Coincidence output point set No.2
CH1 Coincidence signal No.2 reset command (Y07)
CH1 Counter value > (point No.2) (X05)
CH1 Counter value equal (point No.2) (X06)
Cannot execute test
Ring counter function
CH1 Ring counter minimum value
CH1 Ring counter maximum value
CH2 Ring counter minimum value
CH2 Ring counter maximum value
Decimal input
-2147483648 - 2147483647

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[Explanation of items]

(1) Items

Setting item : Displays I/O signals and buffer memory names.

Current value : Monitors the I/O signal states and present buffer memory values.

Setting value : Enter or select values to be written into the buffer memory for test operation.

(2) Command buttons

Current value display	Displays the current value of the item selected. (This is used to check the text that cannot be displayed in the current value field. However, in this utility package, all items can be displayed in the display fields).
Make text file	Creates a file containing the displayed data in text file format.
Start monitor / Stop monitor	Selects whether or not to monitor current values.
Execute test	Performs a test on the selected items. To select more than one item, select them while holding down the Ctrl key.
Close	Closes the window that is currently open and returns to the previous window.

REMARK

The following explains an example to change settings for the selected test operation to the following:

- Counter function selection setting : Sampling counter function
- Counter function selection start command (Y06) : ON
- Sampling/periodic setting [unit: 10 ms] : 1000 ms

(1) Set "Sampling counter function" in the setting value field for CH□ Counter function selection setting.

(2) Set "ON" in the setting value field for CH□ Counter function selection start command (Y06).

(3) Click the setting value field for CH□ Sampling/periodic setting [unit: 10 ms].

(4) After entering the sampling time, press the Enter key.
At this point, nothing has been written to the QD62 (E/D).

(5) Select the setting value fields that were specified in steps 1 to 4 while holding down the Ctrl key.
Multiple items can also be selected by dragging with the mouse.

(6) Click Execute test to execute write operation.
Once write operation is completed, the values that were written will be displayed in the current value field.

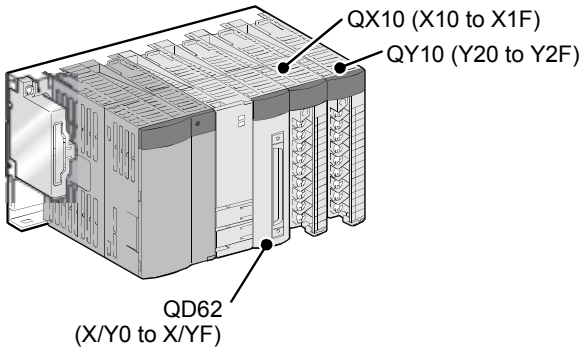
8 PROGRAMMING

This chapter describes programs of the QD62 (E/D).
When applying any of the program examples introduced in this chapter to the actual system, verify the applicability and confirm that no problem occurs in the system control.

8.1 Using Programs in Normal System Configuration

This section describes program examples based on the following system configuration and conditions.

(1) System configuration



(2) Setting conditions of the intelligent function module switch

Set the pulse input mode, counting speed setting, and counter format with the intelligent function module switch on GX Developer. (See Section 4.5.)

Channel	Pulse input mode	Counting speed setting	Counter format
CH1	2-phase multiple of 1	200 kPPS	User setting

(3) Program conditions

This program uses QD62 to perform counting with the conditions listed below.

Item	Setting value
Preset value	2500
Coincidence output point No. 1	1000
Ring counter minimum value ＊1	–5000
Ring counter maximum value ＊1	5000
Sampling time setting ＊2	10000 ms
Periodic pulse time setting ＊3	5000 ms

＊1 Set only when a ring counter function is used
＊2 Set only when the sampling counter function is used
＊3 Set only when the periodic pulse counter function is used

POINT

Programs that were used in earlier products such as A1SD62(E/D/D-S1) cannot be used because the I/O signals and the buffer memory configuration of these products differ from those of QD62(E/D). The conventional dedicated instructions cannot be used.

8.1.1 Program example when GX Configurator-CT is used

(1) List of devices

Device	Function	
D0 to D1	Device that current value is written by auto refresh	
D2 to D3	Device that latch count value is written by auto refresh	
D4 to D5	Device that sampling count value is written by auto refresh	
D6 to D7	Device that periodic pulse count previous value is written by auto refresh	
D8 to D9	Device that periodic pulse count present value is written by auto refresh	
D10	Overflow status storage	
D20 to D35	Interrupt enabled flag storage for the IMASK instruction	
X10	Count operation start signal	QX10 (X10 to X1F)
X11	Current value read signal	
X12	Coincidence output data setting signal	
X13	Preset command signal	
X14	Count operation stop signal	
X15	Coincidence LED clear signal	
X16	Counter function execution start signal	
X17	Counter function execution stop signal	
X18	Latch count data read signal	
X19	Latch execution signal	
X1A	Sampling count data read signal	
X1B	Sampling count start signal	
X1C	Periodic pulse count data read signal	
X1D	Periodic pulse count start signal	
Y20	Coincidence confirmation LED signal	QY10 (Y20 to Y2F)
Y21	Overflow occurrence confirmation LED signal	
X0	Module ready	QD62(E/D) (X/Y0 to X/YF)
X2	Counter value coincidence (point No. 1)	
Y0	Coincidence signal No. 1 reset command	
Y1	Preset command	
Y2	Coincidence signal enable command	
Y4	Count enable command	
Y6	Counter function selection start command	

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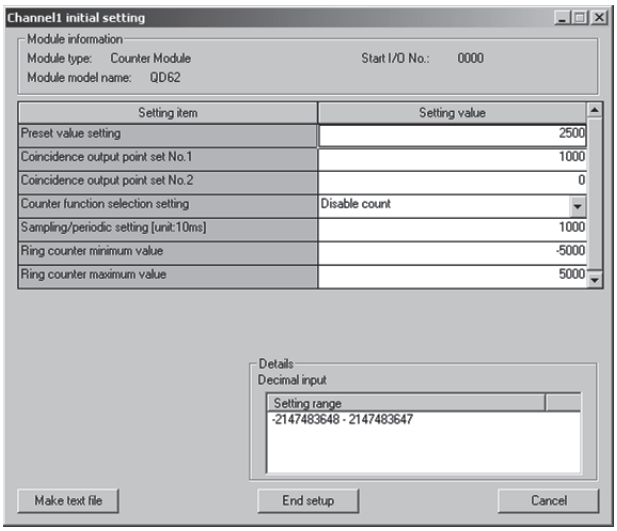
(2) Operating GX Configurator-CT

(a) Initial settings (see Section 7.4)

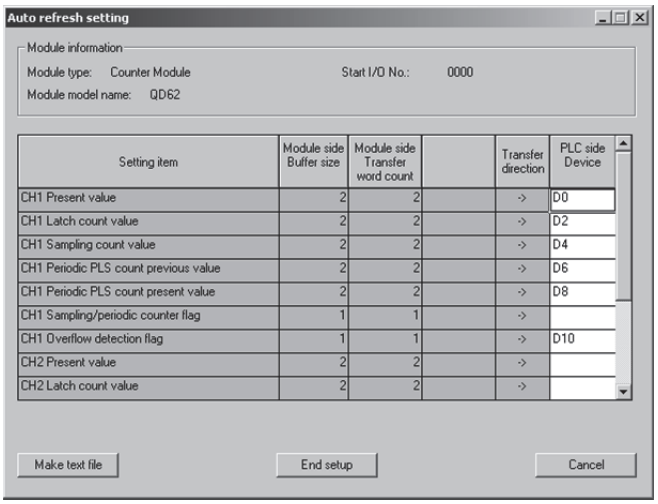
Set the values on the window as shown below.



Setting item	Description	Setting
Preset value setting	Set the preset value.	2500
Coincidence output point set No. 1	Set the value for coincidence output point No. 1.	1000
Coincidence output point set No. 2	This is not used.	—
Counter function selection setting	Set the counter function to be used. When a counter function is not used, sets any function.	Set according to the function used.
Sampling/periodic setting [Unit: 10 ms]	Set "1000" when the sampling counter function is used.	1000
	Set "500" when the periodic pulse counter function is used.	500
Ring counter minimum value	Set only when the ring counter function is used.	-5000
Ring counter maximum value	Set only when the ring counter function is used.	5000

(b) Auto refresh settings (see Section 7.5)

Set the values as shown in the window below. (Use channel 1.)

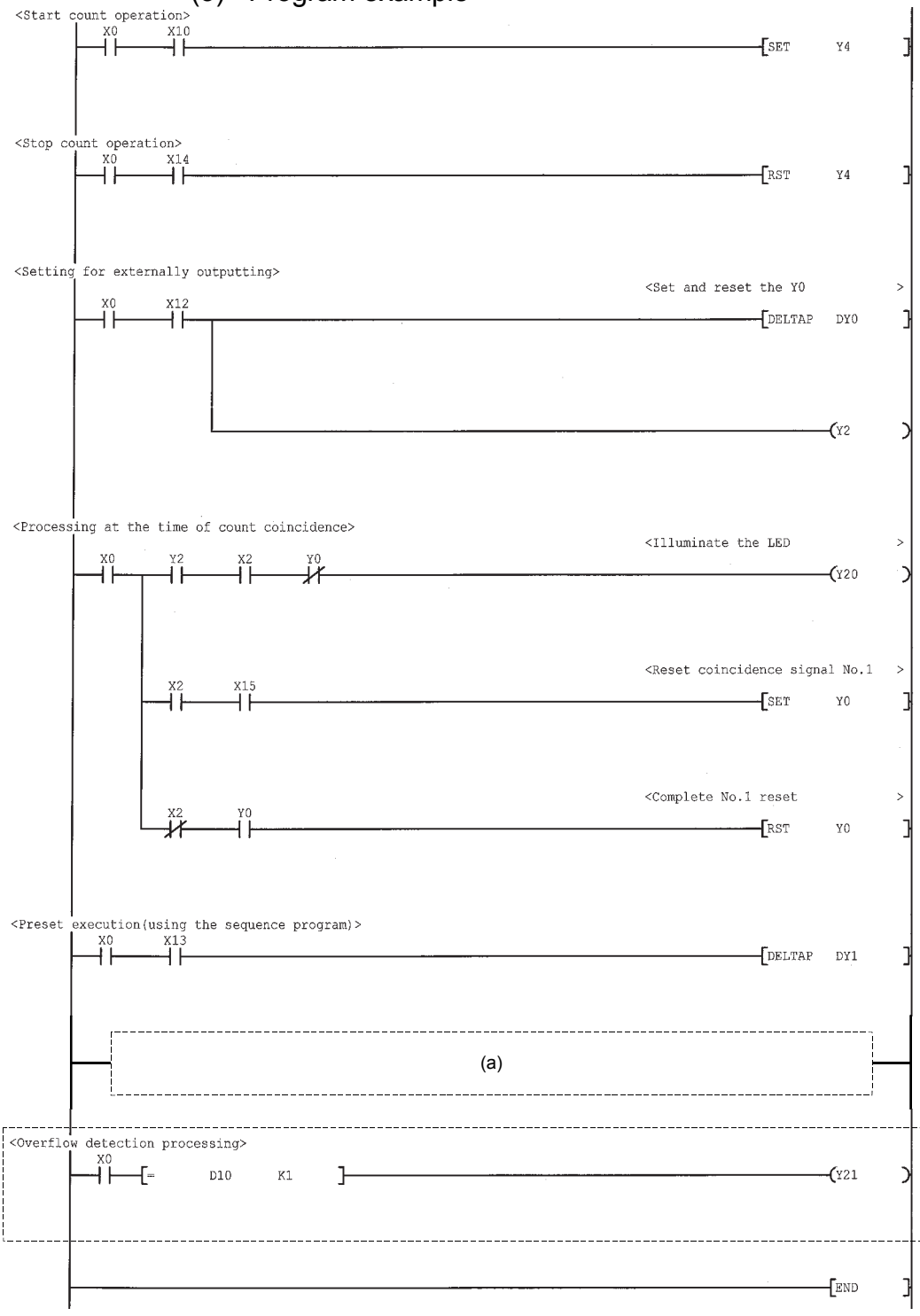


Setting item	Description	Setting
CH1 Present value	Set the device for storing the present value.	D0
CH1 Latch count value	Set the device for storing the latch count value.	D2
CH1 Sampling count value	Set the device for storing the sampling count value when the sampling counter function is used.	D4
CH1 Periodic PLS counter previous value	Set the device for storing the previous periodic pulse count value when the periodic pulse counter function is used.	D6
CH1 Periodic PLS counter present value	Set the device for storing the present periodic pulse count value when the periodic pulse counter function is used.	D8
CH1 Sampling/periodic counter flag	This is not used.	—
CH1 Overflow detection flag	Set the device for storing the overflow detection result when the linear counter function is used.	D10

(c) Writing the intelligent module parameters (see Section 7.3.3)

Write the intelligent module parameters to the CPU module. This operation is performed using the intelligent module parameter setting module selection window.

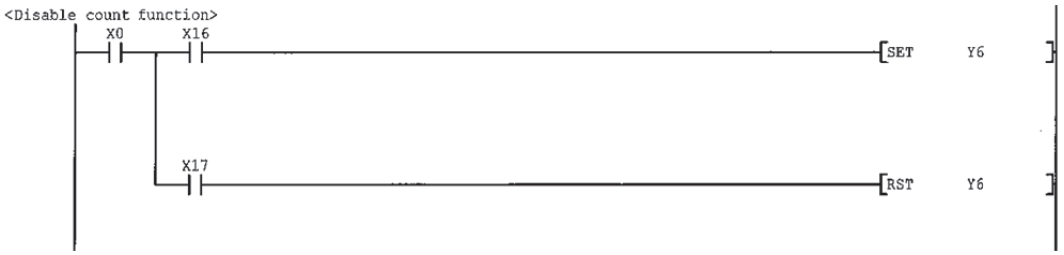
(3) Program example



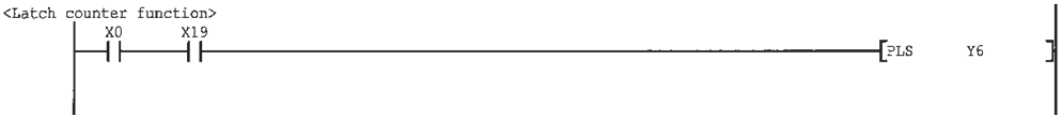
Set only when the linear counter is used

(a) When using the functions listed below, use the following programs.

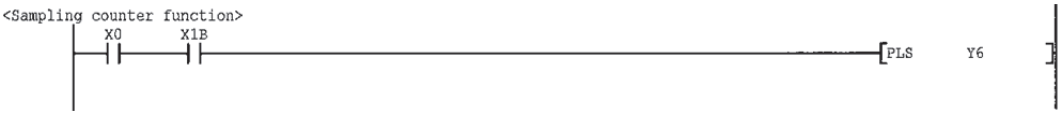
1) When the disable count function is used



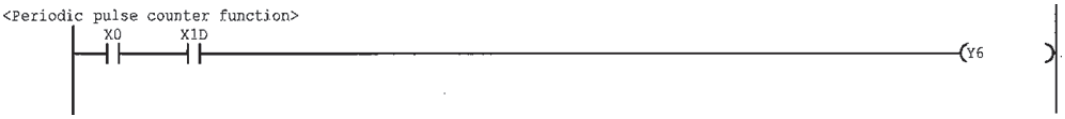
2) When the latch counter function is used



3) When the sampling counter function is used



4) When the periodic pulse counter function is used

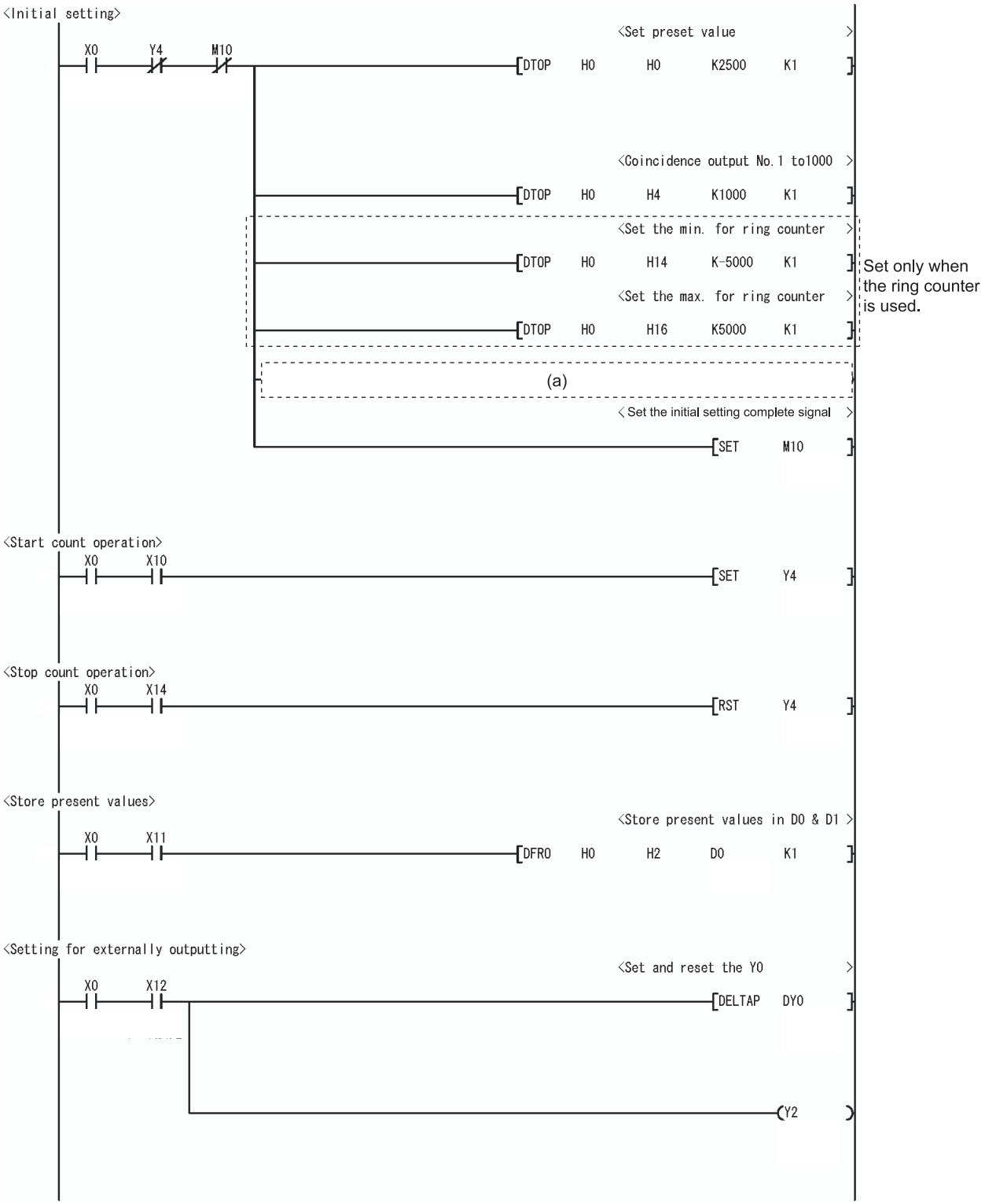


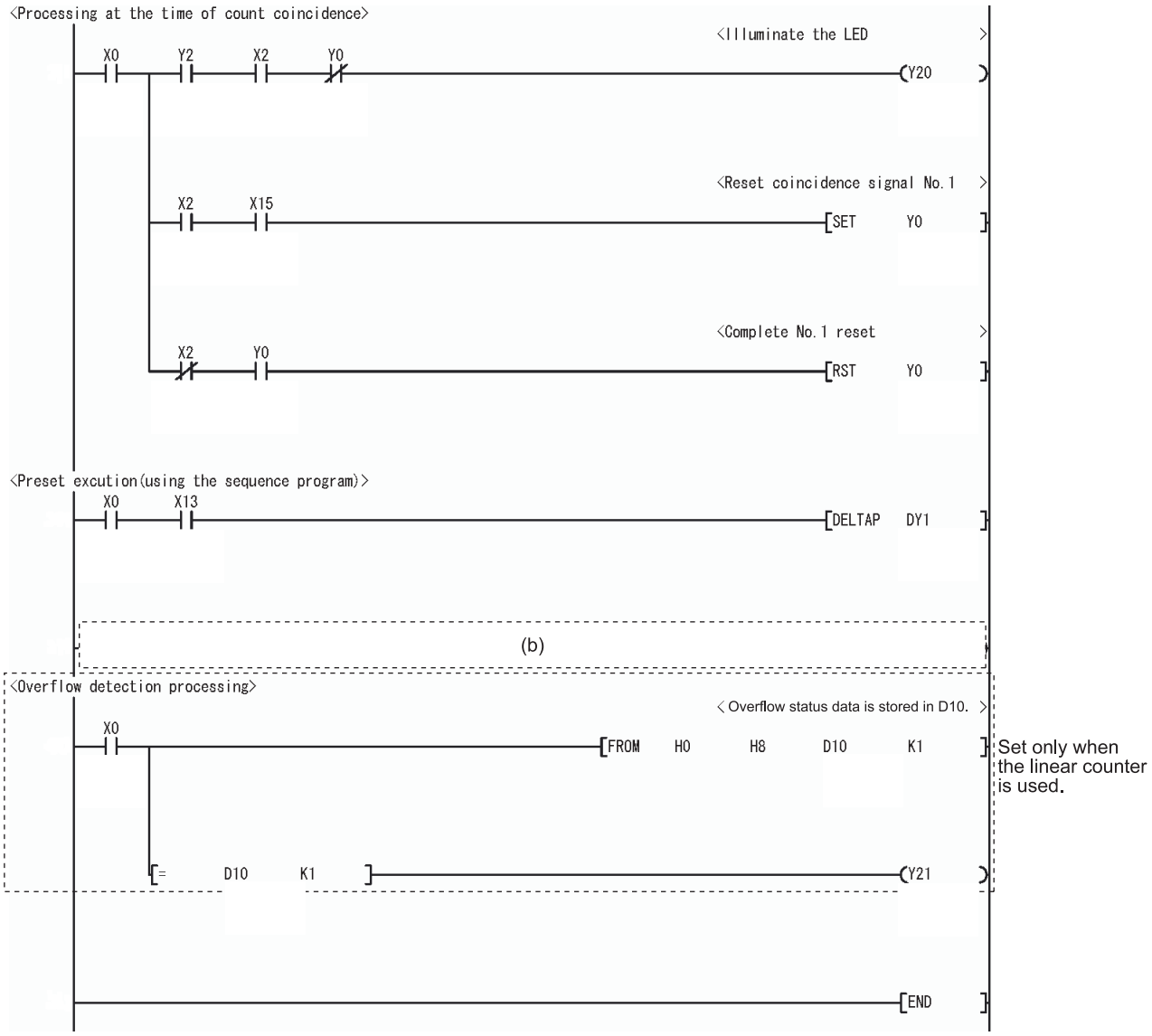
8.1.2 Program example when GX Configurator-CT is not used

(1) List of devices

Device	Function	
D0 to D1	Present value	
D2 to D3	Latch count value	
D4 to D5	Sampling count value	
D6 to D7	Periodic pulse count previous value	
D8 to D9	Periodic pulse count present value	
D10	Overflow status storage	
D20 to D35	Interrupt enabled flag storage for the IMASK instruction	
X10	Count operation start signal	QX10 (X10 to X1F)
X11	Current value read signal	
X12	Coincidence output data setting signal	
X13	Preset command signal	
X14	Count operation stop signal	
X15	Coincidence LED clear signal	
X16	Counter function execution start signal	
X17	Counter function execution stop signal	
X18	Latch count data read signal	
X19	Latch execution signal	
X1A	Sampling count data read signal	
X1B	Sampling count start signal	
X1C	Periodic pulse count data read signal	
X1D	Periodic pulse count start signal	
Y20	Coincidence confirmation LED signal	QY10 (Y20 to Y2F)
Y21	Overflow occurrence confirmation LED signal	
X0	Module ready	QD62(E/D) (X/Y0 to X/YF)
X2	Counter value coincidence (point No. 1)	
Y0	Coincidence signal No. 1 reset command	
Y1	Preset command	
Y2	Coincidence signal enable command	
Y4	Count enable command	
Y6	Counter function selection start command	
M10	Initial setting complete signal	

(2) Program example





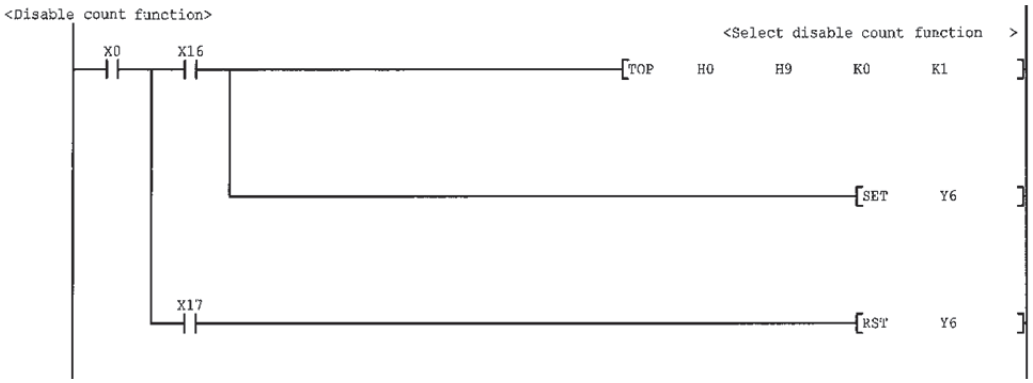
(a) When using the sampling counter function and the periodic pulse counter function, use the following programs.

1) When the sampling counter function is used

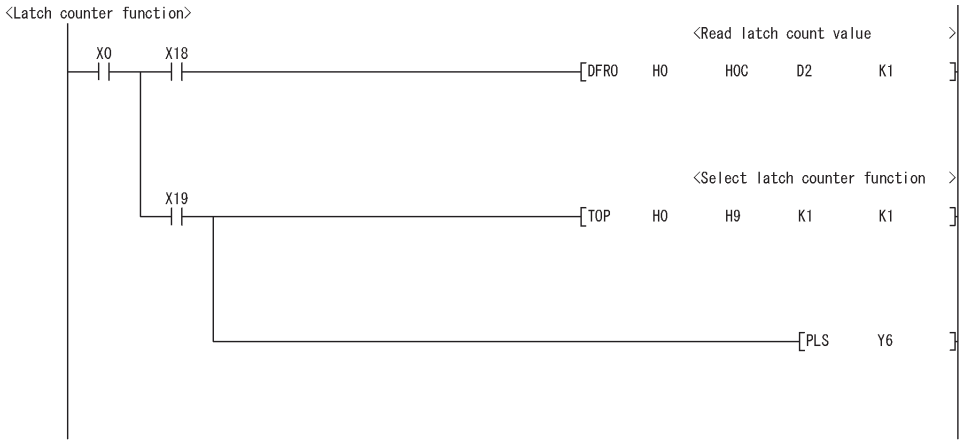
2) When the periodic pulse counter function is used

(b) When using the functions listed below, use the following programs.

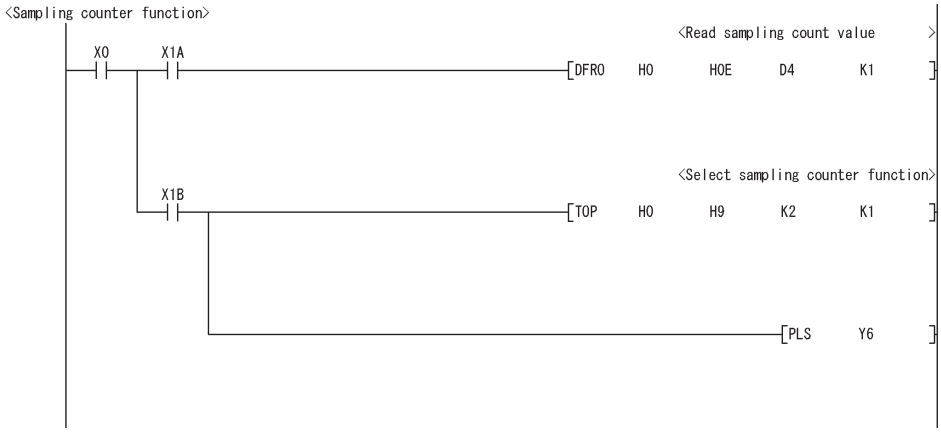
1) When the disable count function is used



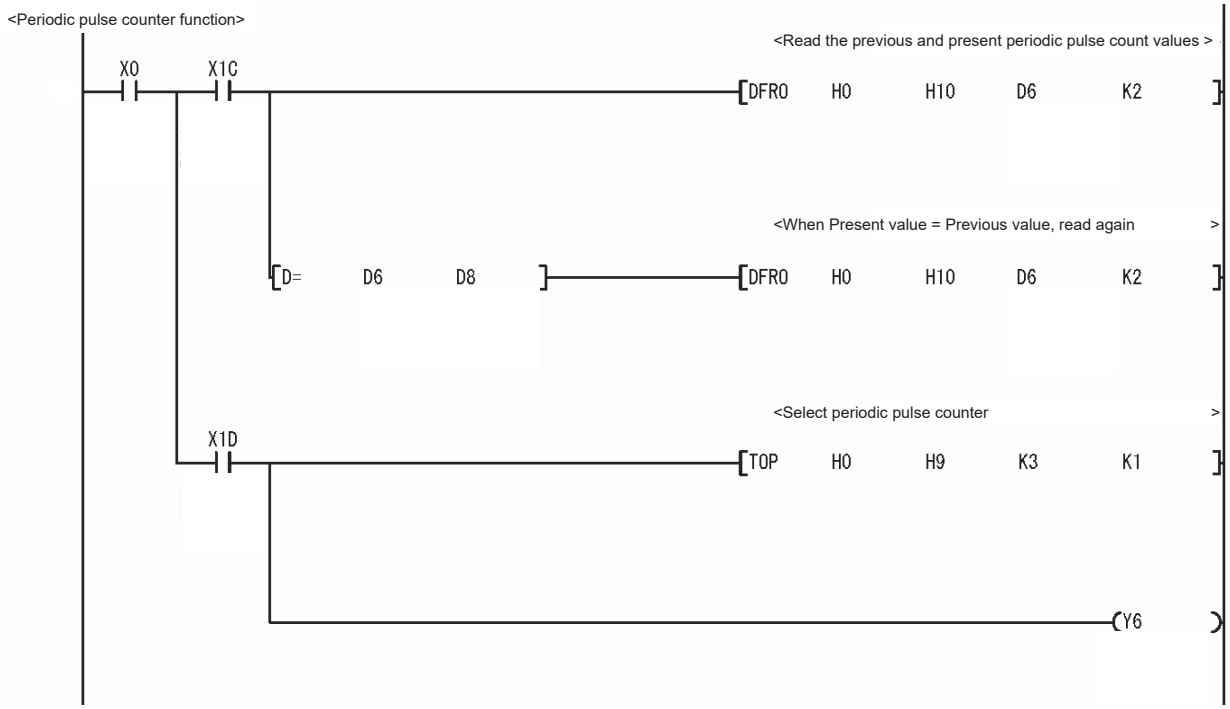
2) When the latch counter function is used



3) When the sampling counter function is used



4) When the periodic pulse counter function is used



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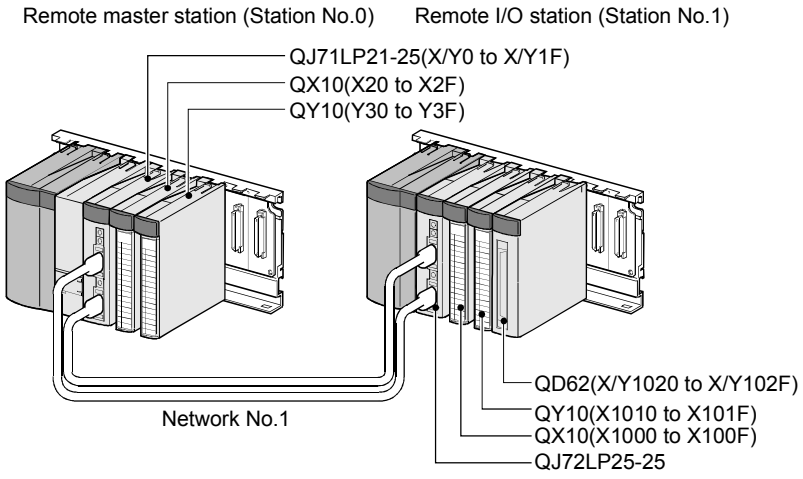
8.2 Using Programs on Remote I/O Network

This section describes program examples based on the following system configuration and conditions.

(1) System configuration



(2) Setting conditions of the intelligent function module switch

Set the pulse input mode, counting speed setting, and counter format with the intelligent function module switch on GX Developer. (See Section 4.5.)

Channel	Pulse input mode	Counting speed setting	Counter format
CH1	2-phase multiple of 1	200 kPPS	User setting

(3) Program conditions

The CPU module mounted on the remote master station reads the values counted under the following condition by using the QD62 in a program.

Item	Setting value
Preset value	2500
Coincidence output point No. 1	1000
Ring counter minimum value ＊1	-5000
Ring counter maximum value ＊1	5000
Sampling time setting ＊2	10000 ms
Periodic pulse time setting ＊3	5000 ms

＊1 Set only when a ring counter function is used
＊2 Set only when the sampling counter function is used
＊3 Set only when the periodic pulse counter function is used

POINT

Programs that were used in earlier products such as A1SD62(E/D/D-S1) cannot be used because the I/O signals and the buffer memory configuration of these products differ from those of QD62(E/D). The conventional dedicated instructions cannot be used.

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8.2.1 Program example when GX Configurator-CT is used

(1) List of devices

Device	Function	
W0 to W1	Device that current value flag is written by auto refresh	
W2 to W3	Device that latch count value flag is written by auto refresh	
W4 to W5	Device that sampling count value is written by auto refresh	
W6 to W7	Device that periodic pulse count previous value is written by auto refresh	
W8 to W9	Device that periodic pulse count present value is written by auto refresh	
W10	Overflow status storage	
D20 to D35	Interrupt enabled flag storage for the IMASK instruction	
X20	Count operation start signal	QX10 (X20 to X2F)
X21	Current value read signal	
X22	Coincidence output data setting signal	
X23	Preset command signal	
X24	Count operation stop signal	
X25	Coincidence LED clear signal	
X26	Counter function execution start signal	
X27	Counter function execution stop signal	
X28	Latch count data read signal	
X29	Latch execution 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	
Y30	Coincidence confirmation LED signal	QY10 (Y30 to Y3F)
Y31	Overflow occurrence confirmation LED signal	
X1020	Module ready	QD62 (X/Y1020 to X/Y102F)
X1022	Counter value coincidence (point No. 1)	
Y1020	Coincidence signal No. 1 reset command	
Y1021	Preset command	
Y1022	Coincidence signal enable command	
Y1024	Count enable command	
Y1026	Counter function selection start command	
T1 to T5	Interlock for own station and other stations	

(2) GX Developer operation (Network parameter setting)

• Network type : MNET/H [Remote master]
• Starting I/O No. : 0000H
• Network type : 1
• Total stations : 1
• Mode : Online
• Network range assignment :

StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	256	1000	10FF	256	0000	00FF	256	1000	10FF	256	0000	00FF

StationNo.	M station -> R station			M station <- R station			M station -> R station			M station <- R station		
	B			B			W			W		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1							160	0100	019F	160	0000	009F

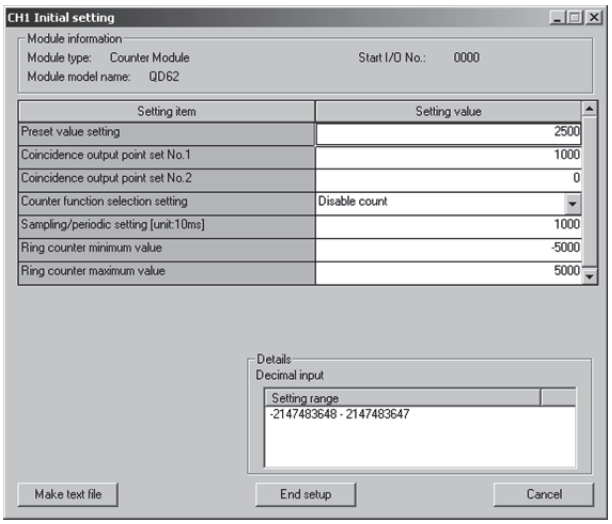
• Refresh parameters :

	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
Random cyclic	LB				⇔				
Random cyclic	LW				⇔				
Transfer1	LB	8192	0000	1FFF	⇔	B	8192	0000	1FFF
Transfer2	LW	8192	0000	1FFF	⇔	W	8192	000000	001FFF
Transfer3	LX	256	1000	10FF	⇔	X	256	1000	10FF
Transfer4	LY	256	1000	10FF	⇔	Y	256	1000	10FF
Transfer5					⇔				
Transfer6					⇔				

(3) Operating GX Configurator-CT

(a) Initial settings (see Section 7.4)

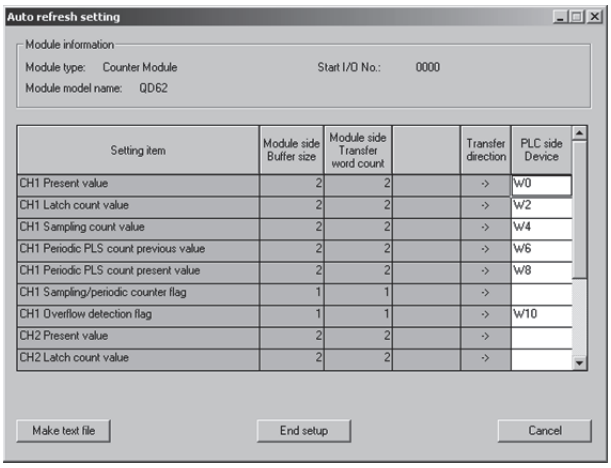
Set the values on the window as shown below.



Setting item	Description	Setting
Preset value setting	Set the preset value.	2500
Coincidence output point set No. 1	Set the value for coincidence output point No. 1.	1000
Coincidence output point set No. 2	This is not used.	—
Counter function selection setting	Set the counter function to be used. When a counter function is not used, sets any function.	Set according to the function used.
Sampling/periodic setting [Unit: 10 ms]	Set "1000" when the sampling counter function is used.	1000
	Set "500" when the periodic pulse counter function is used.	500
Ring counter minimum value	Set only when the ring counter function is used.	-5000
Ring counter maximum value	Set only when the ring counter function is used.	5000

(b) Auto refresh settings (see Section 7.5)

Set the values as shown in the window below. (Use channel 1.)

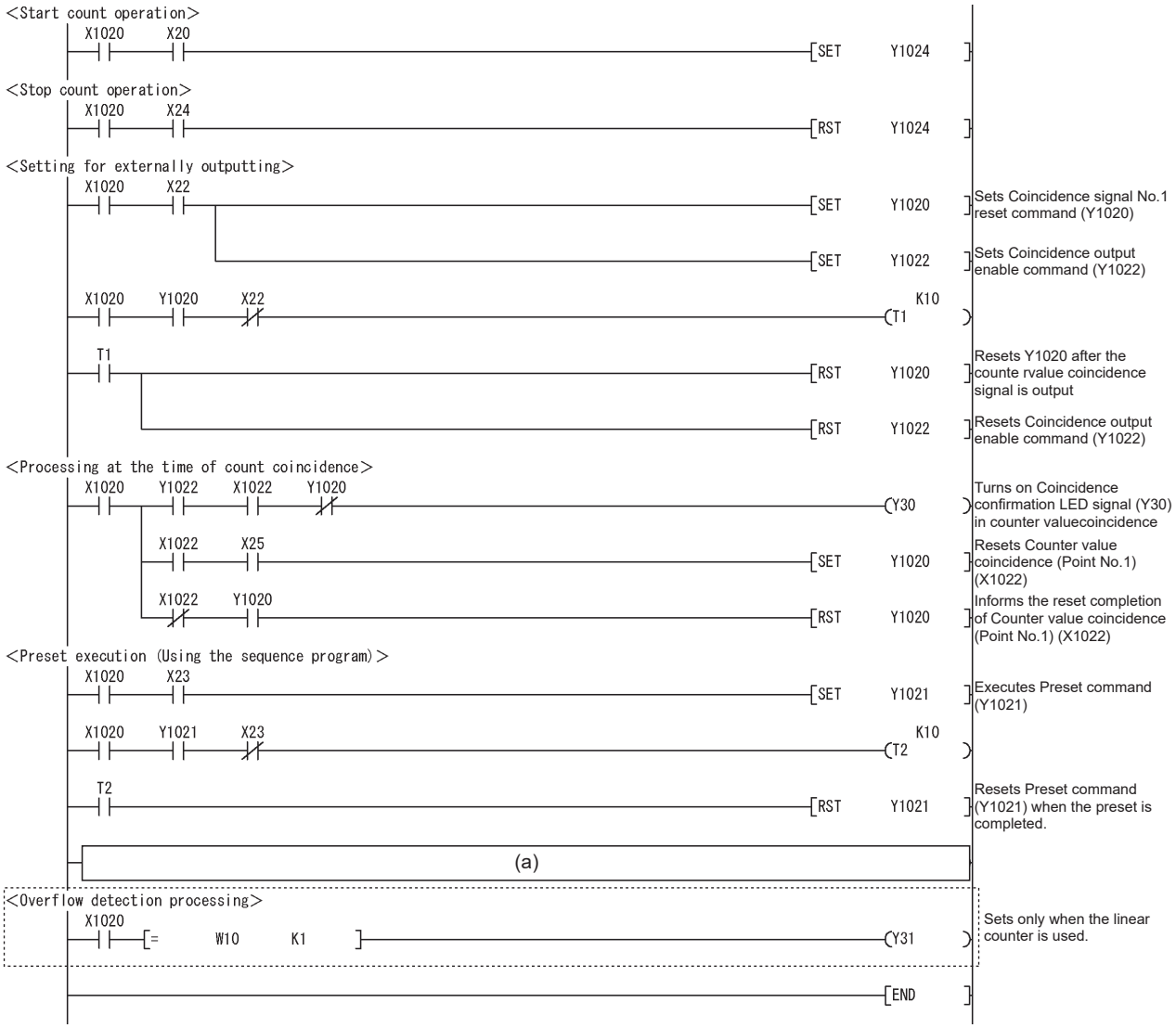


Setting item	Description	Setting
CH1 Present value	Set the device for storing the present value.	W0
CH1 Latch count value	Set the device for storing the latch count value.	W2
CH1 Sampling count value	Set the device for storing the sampling count value when the sampling counter function is used.	W4
CH1 Periodic PLS counter previous value	Set the device for storing the previous periodic pulse count value when the periodic pulse counter function is used.	W6
CH1 Periodic PLS counter present value	Set the device for storing the present periodic pulse count value when the periodic pulse counter function is used.	W8
CH1 Sampling/periodic counter flag	This is not used.	—
CH1 Overflow detection flag	Set the device for storing the overflow detection result when the linear counter function is used.	W10

(c) Writing the intelligent module parameters (see Section 7.3.3)

Write the intelligent module parameters to the CPU module. This operation is performed using the intelligent module parameter setting module selection window.

(4) Program example



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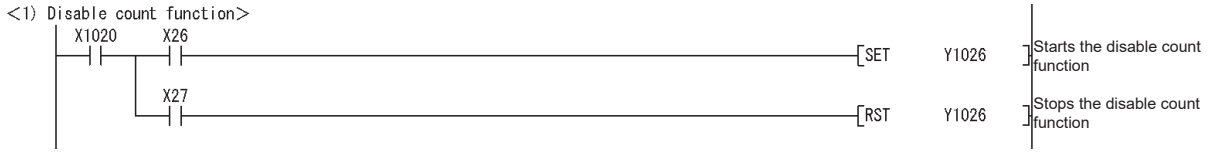
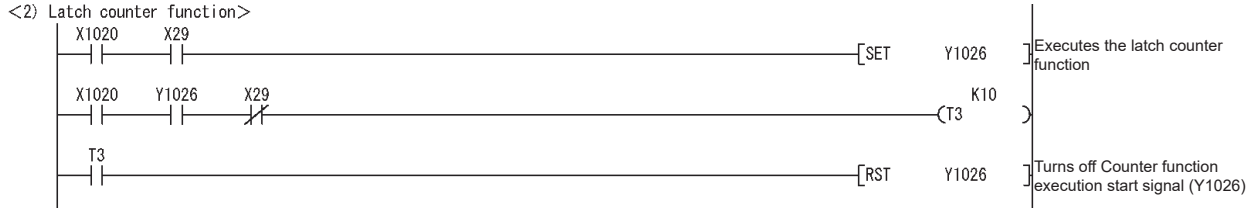
(a) When using the functions listed below, use the following programs.

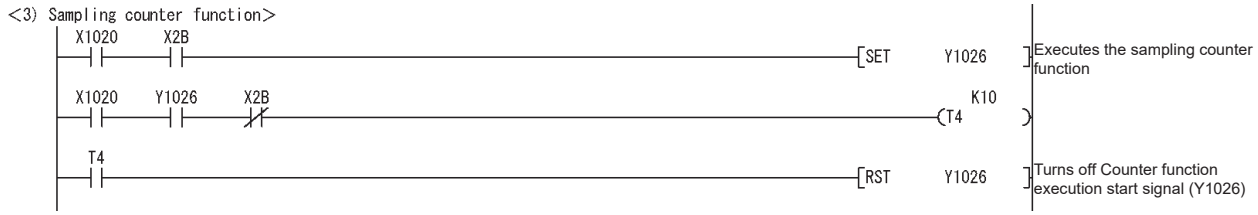
1) When the disable count function is used



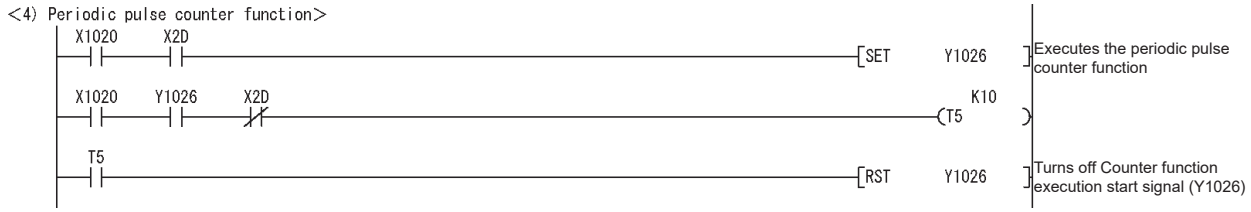
2) When the latch counter function is used



3) When the sampling counter function is used



4) When the periodic pulse counter function is used



8.2.2 Program example when GX Configurator-CT is not used

(1) List of devices

Device	Function	
D0 to D1	Present value storage	
D2 to D3	Latch count value storage	
D4 to D5	Sampling count value storage	
D6 to D7	Periodic pulse count previous value storage	
D8 to D9	Periodic pulse count present value storage	
D10	Overflow status storage	
D20 to D35	Interrupt enabled flag storage for the IMASK instruction	
D50	Periodic pulse count previous value/periodic pulse count present value reread counter	
D60 to D61	Periodic pulse count previous value temporary storage	
D62 to D63	Periodic pulse count present value temporary storage	
X20	Count operation start signal	QX10 (X20 to X2F)
X21	Current value read signal	
X22	Coincidence output data setting signal	
X23	Preset command signal	
X24	Count operation stop signal	
X25	Coincidence LED clear signal	
X26	Counter function execution start signal	
X27	Counter function execution stop signal	
X28	Latch count data read signal	
X29	Latch execution 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	
Y30	Coincidence confirmation LED signal	QY10 (Y30 to Y3F)
Y31	Overflow occurrence confirmation LED signal	
X1020	Module ready	QD62 (X/Y1020 to X/Y102F)
X1022	Counter value coincidence (point No. 1)	
Y1020	Coincidence signal No. 1 reset command	
Y1021	Preset command	
Y1022	Coincidence signal enable command	
Y1024	Count enable command	
Y1026	Counter function selection start command	
M10	Initial setting complete signal	
M20 to M25	Interlock for own station and other stations	
M100	Master module status check device (for the MC and MCR instructions)	
M101	Initial setting completion flag	
M102		

Device	Function
M200 to M207	Z(P).REMTO instruction completion device
M210, M211	
M214, M215	
M218, M219	
M224, M225	
M300, M301	
M208, M209	Z(P). REMFR instruction completion device
M212, M213	
M216, M217	
M220, M221	
D100, D101	Write data storage device for REMTO instruction (for initial setting)
D104, D105	
D109	
D120 to D123	
D210	
SB20	Network module status
SB47	Baton pass status of own station
SB49	Data link status of own station
SW70	Baton pass status of each station
SW74	Cyclic transmission status of each station
SW78	Parameter communication status of each station
T1 to T9	Interlock for own station and other stations
T100 to T104	

(2) GX Developer operation (Network parameter setting)

- Network type : MNET/H [Remote master]
- Starting I/O No. : 0000H
- Network type : 1
- Total stations : 1
- Mode : Online
- Network range assignment :

StationNo.	M station -> R station						M station <- R station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	256	1000	10FF	256	0000	00FF	256	1000	10FF	256	0000	00FF

- Refresh parameters :

	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
Random cyclic	LB				⇔				
Random cyclic	LW				⇔				
Transfer1	LB	8192	0000	1FFF	⇔	B	8192	0000	1FFF
Transfer2	LW	8192	0000	1FFF	⇔	W	8192	000000	001FFF
Transfer3	LX	256	1000	10FF	⇔	X	256	1000	10FF
Transfer4	LY	256	1000	10FF	⇔	Y	256	1000	10FF
Transfer5					⇔				
Transfer6					⇔				

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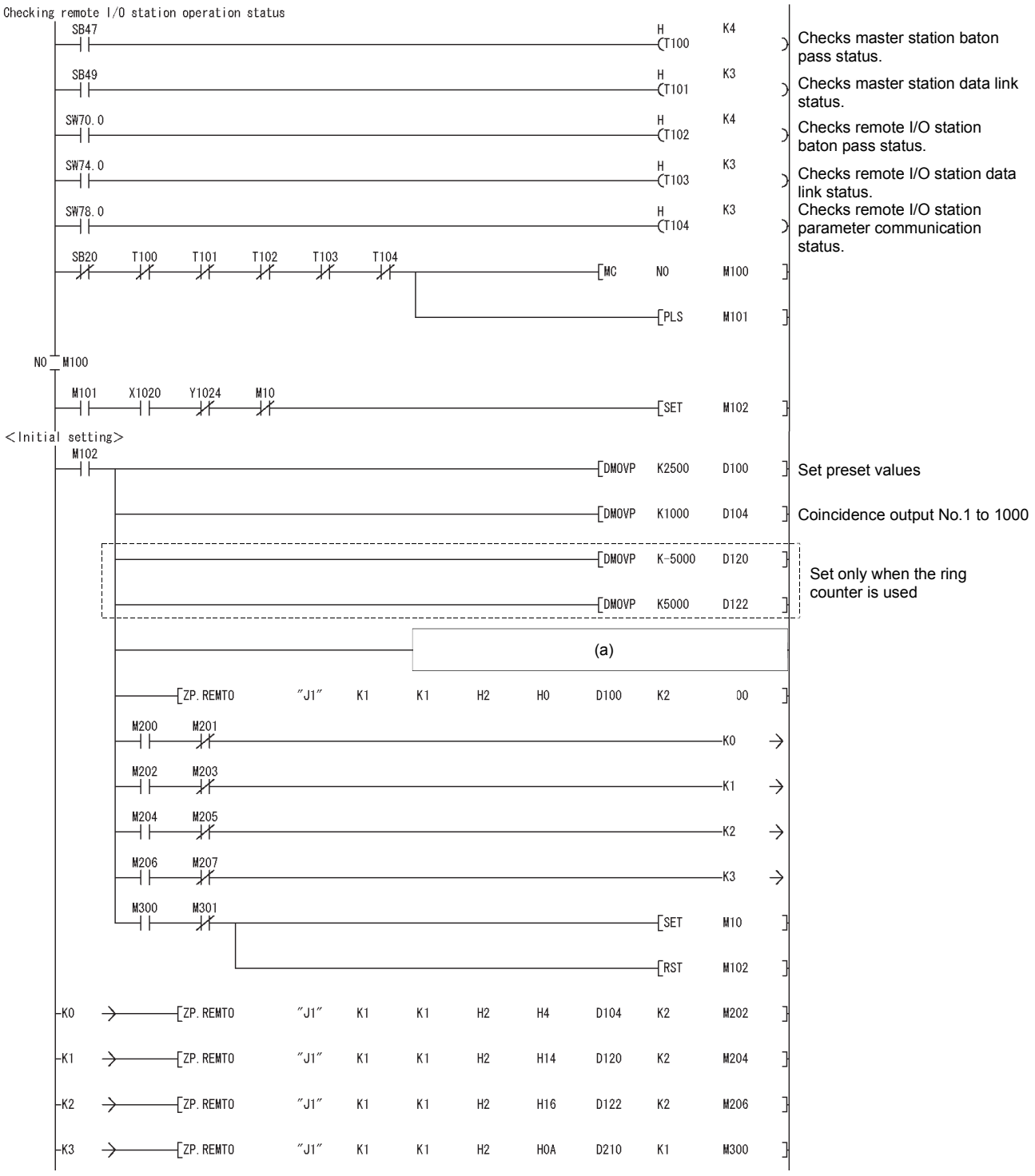
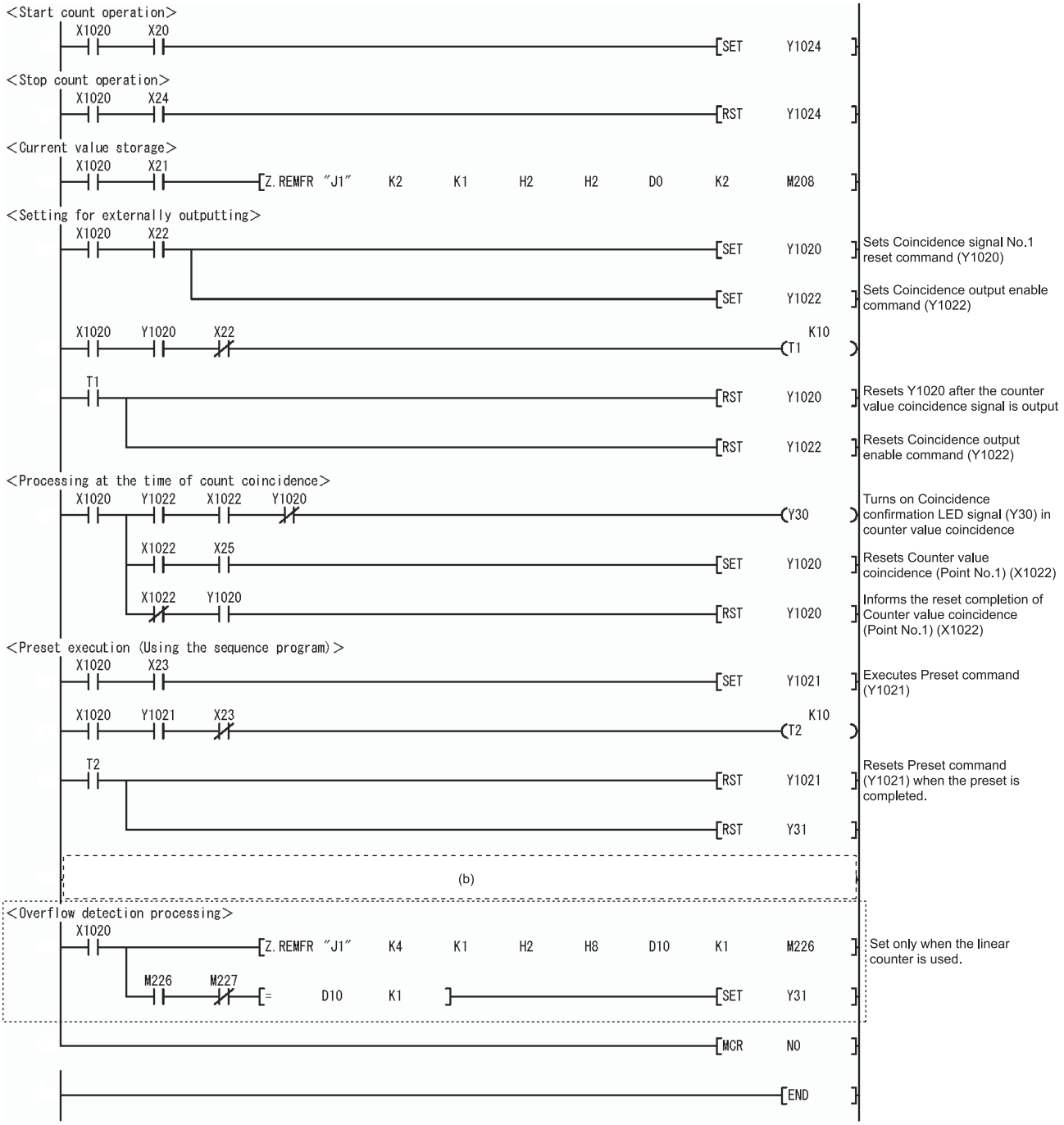
(3) Program example




<Start count operation>
X1020 X20 SET Y1024
<Stop count operation>
X1020 X24 RST Y1024
<Current value storage>
X1020 X21 Z.REMFR "J1" K2 K1 H2 H2 D0 K2 M208
<Setting for externally outputting>
X1020 X22 SET Y1020
Sets Coincidence signal No.1 reset command (Y1020)
SET Y1022
Sets Coincidence output enable command (Y1022)
X1020 Y1020 X22 K10 T1
T1 RST Y1020
Resets Y1020 after the counter value coincidence signal is output
RST Y1022
Resets Coincidence output enable command (Y1022)
<Processing at the time of count coincidence>
X1020 Y1022 X1022 Y1020 Y30
Turns on Coincidence confirmation LED signal (Y30) in counter value coincidence
X1022 X25 SET Y1020
Resets Counter value coincidence (Point No.1) (X1022)
X1022 Y1020 RST Y1020
Informs the reset completion of Counter value coincidence (Point No.1) (X1022)
<Preset execution (Using the sequence program)>
X1020 X23 SET Y1021
Executes Preset command (Y1021)
X1020 Y1021 X23 K10 T2
T2 RST Y1021
Resets Preset command (Y1021) when the preset is completed.
RST Y31
(b)
<Overflow detection processing>
X1020 Z.REMFR "J1" K4 K1 H2 H8 D10 K1 M226
Set only when the linear counter is used.
M226 M227 = D10 K1 SET Y31
MCR N0
END

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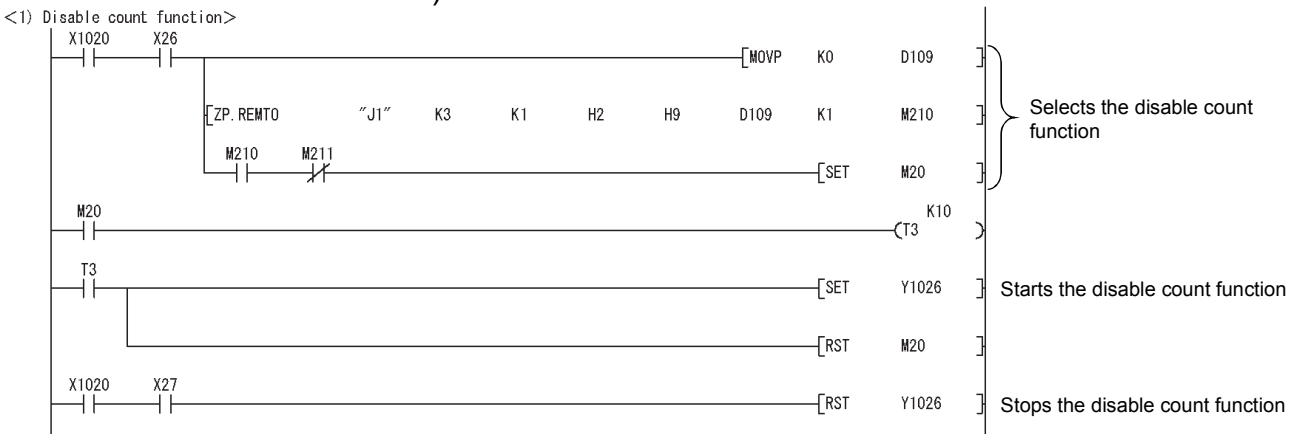
(a) When using the sampling counter function and the periodic pulse counter function, use the following programs.

1) When the sampling counter function is used

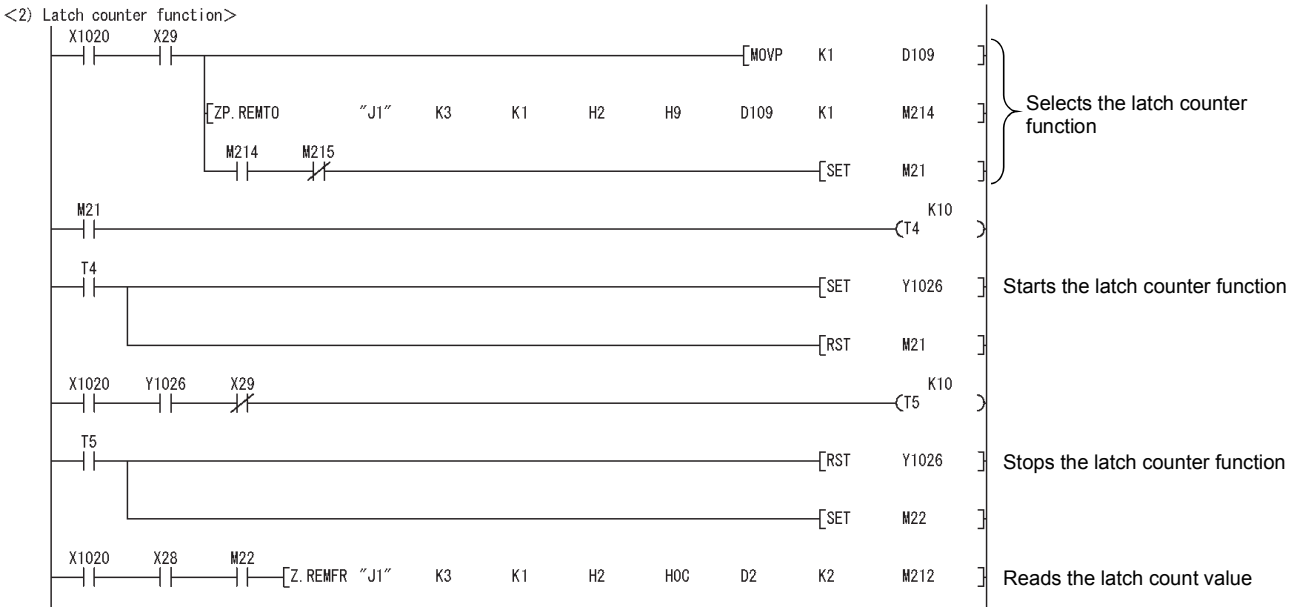
2) When the periodic pulse counter function is used

(b) When using the functions listed below, use the following programs.

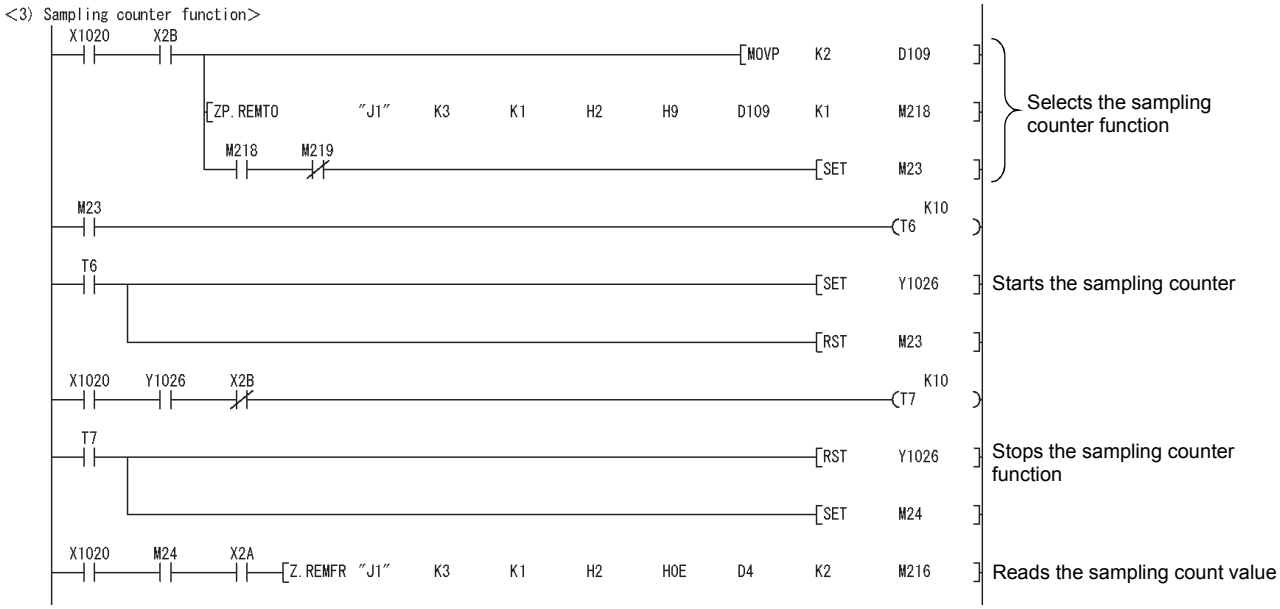
1) When the disable count function is used



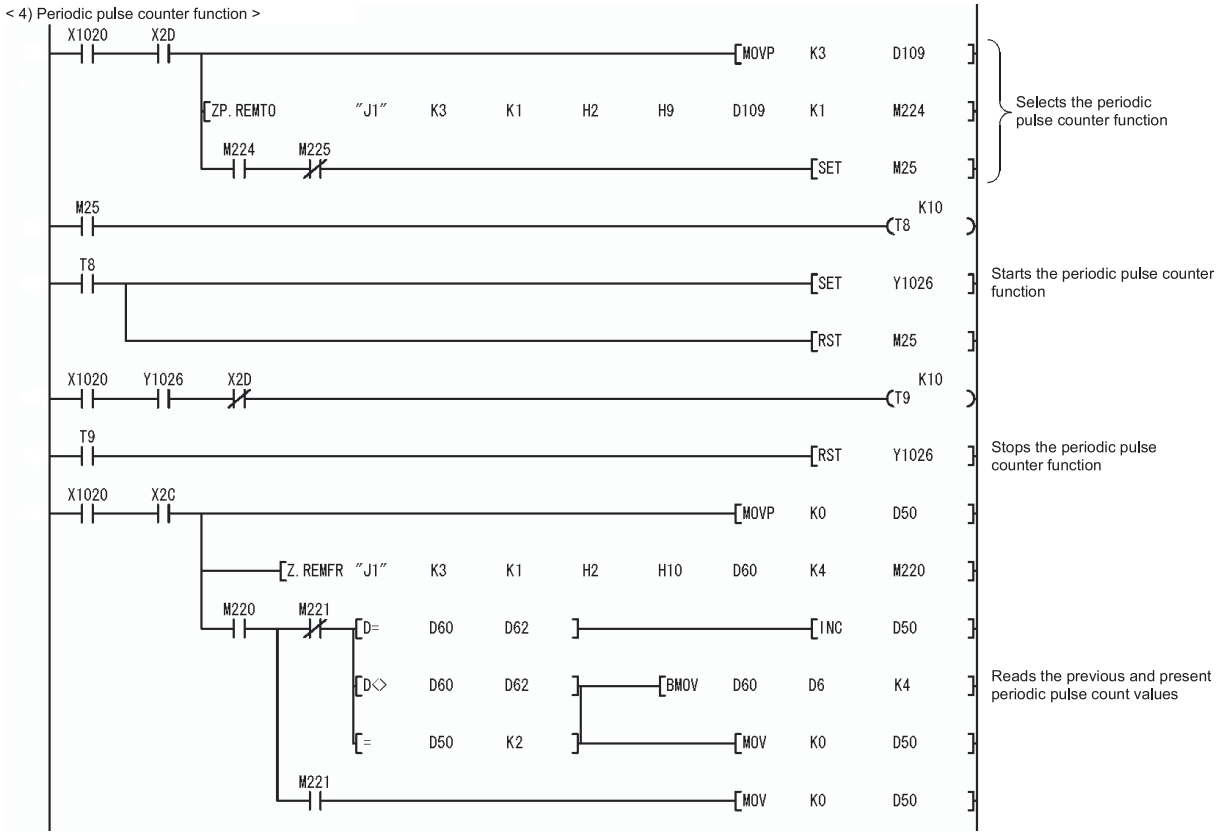
2) When the latch counter function is used



3) When the sampling counter function is used



4) When the periodic pulse counter function is used



POINT

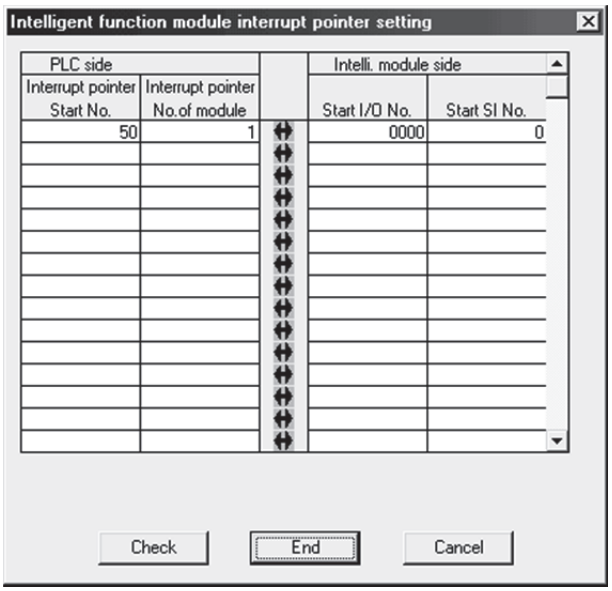
When values are read by the REMFR instruction in a cycle close to the cycle of the periodic pulse counter function, the periodic pulse count previous and present values may be the same even after they were reread.
In that case, review the sequence program so that the read cycle by the REMFR instruction becomes about the half of the cycle of the periodic pulse counter function.
Values are read by the REFMR instruction in a cycle nearly the same as the rising cycle of the REMFR instruction completion device (M220 in the program example).
Calculate the rising cycle by integrating current scan time (SD520, SD521) during which the completion device turns off and on in the sequence program every scan.

8.3 Example of a Program Using the Coincidence Detection Interrupt Function

The following describes an example of a program that starts an interrupt program upon detection of coincidence with the channel 1 coincidence output point No. 1.

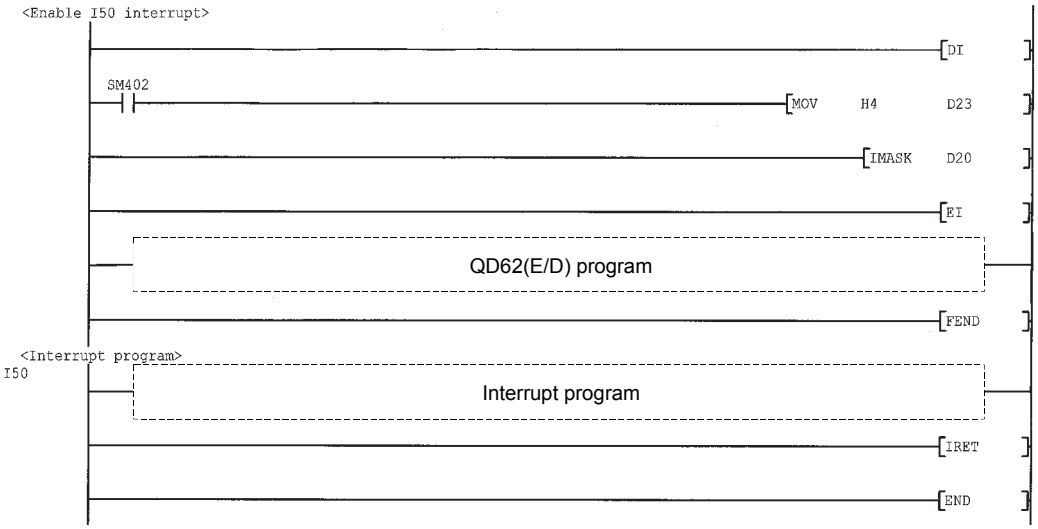
(1) Interrupt point setting

Set the interrupt pointer by selecting "PLC parameter" - " PLC system" - "Intelligent functional module setting" - "Interrupt point settings" in the project data list of GX Developer.



(2) Program example

Before using an interrupt pointer, an interrupt must be enabled using the IMASK instruction.



POINT

- When the above described program is executed, only I50 interrupt program is execution-enabled and other interrupt programs are execution-disabled.
  When executing interrupt programs other than I50, set the corresponding bit for interrupt program to be executed to 1 (enabled).
- For details on the IMASK instruction, refer to the MELSEC-Q/L Programming Manual (Common Instruction).

9 TROUBLESHOOTING

The following explains the types of errors that may occur when the QD62(E/D) is used, and how to troubleshoot them.

9.1 Error Information

The error information detected by the QD62(E/D) is listed in the following chart.

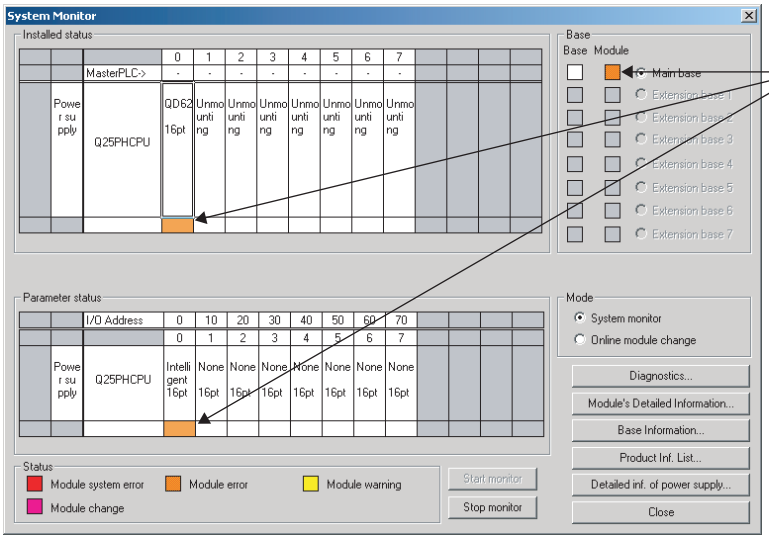
Description/cause	Error information display location	Action
Overflow error 1) When the linear counter was used, an add pulse was further input from the current value 2147483647 2) When the linear counter was used, a subtract pulse was further input from the current value -2147483648	1) Module status display on the GX Developer system monitor window For how to check, refer to this section (1). No status display: No overflow detected (no error) Module error : Overflow being occurred 2) Overflow detection flag The following value is stored in CH□ Overflow detection flag (Un\G8, Un\G40). 0: No overflow detected 1: Overflow being occurred 3) "Module error status bit" of the module information read with the UNIRD instruction 00: No overflow detected (no module error) 10: Overflow being occurred (Moderate error)	Preset to clear the overflow error.
Fuse broken detection 1) The fuse for the coincidence signal external output section has blown.	1) FUSE LED on the front of the module (red) Off: No broken fuse detected On: Broken fuse detected 2) Fuse broken detection flag (XF) Off: No broken fuse detected On: Broken fuse detected 3) "Broken fuse occurrence indicating bit" of the module information read with the UNIRD instruction Off: No broken fuse detected On: Broken fuse detected	Please consult your local Mitsubishi representative.

POINT

If voltage is not being supplied to the external power supply input terminal, a broken fuse will not be detected.

(1) Checking an overflow error in the System Monitor window

Display the System Monitor window of GX Developer by the following operation.
[Diagnostics] → [System monitor]



While an overflow error occurs, an orange icon indicating a module error is displayed.

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9.2 The Module Does Not Start Counting Operation

Check item	Action
Doesn't the CPU module indicate an error?	If the LED on the CPU module indicates an error, correct the error with reference to troubleshooting in the CPU module's manual for normal operation.
Do the LEDs of ϕA and ϕB turn ON by directly applying voltage using such as voltage stabilizer to pulse input terminals of ϕA and ϕB?	If they turn ON, check the external wiring and encoder side and correct the error. If they remain OFF, it is a hardware failure. Please consult your local Mitsubishi representative.
Is the external wiring of ϕA and ϕB normal?	Check the external wiring and correct the error.
Is CH□ Count enable command (Y4, YC) on?	Turn on CH□ Count enable command (Y4, YC) using a sequence program.
Are the pulse input method and pulse input mode set with the intelligent function module switch setting the same?	Match the pulse input method with the pulse input mode made on the intelligent function module switch setting.
Is CH□ Counter function selection start command (Y6, YE) off or is a voltage not applied to the function start input terminal?	If the count disable function is selected, turn off CH□ Counter function selection start command (Y6, YE) or the function start input terminal.
Is an overflow error occurring?	Preset to clear the overflow error.

9.3 The Module Does Not Count Pulses Correctly

Check item	Action
Is the external wiring of ϕA and ϕB normal?	Check the external wiring and correct the error. The module may miscount when ABCOM terminal is connected to a pulse signal. Connect the ABCOM terminal with external power (5V/12V/24V) or GND terminal (refer to Section 4.4.2).
Is the maximum speed of input pulse within the range of the counting speed made on the intelligent function module switch setting?	Correct the counting speed setting in the intelligent function module switch setting to meet the maximum speed of the input pulse.
Does the input pulse waveform meet the performance specifications?	Check the pulse waveform with synchronoscope. When the input pulse does not meet the performance specifications, input the pulse which meets the performance specifications.
Are the count value data handled in 32 bit-signed binary in the sequence program?	Correct the sequence program so that the count value data are handled in 32-bit signed binary.
Are the shielded twisted pair cables used for pulse input wiring?	Use the shielded twisted pair cables for pulse input wiring.
Doesn't any noise come from the ground part of the QD62(E/D)?	Separate the ground cable of the QD62(E/D) from the ground part. When the QD62(E/D) case touches to the ground part, separate it.
Has the measures against noise been taken to the adjacent devices and inside the control panel?	Take noise reduction measures (e.g. attach a CR surge suppressor to the magnet switch).
Is the distance between the high voltage equipment and pulse input line kept enough?	Bundle the pulse input lines and put them in a single tube, and keep a distance of 150 mm or more with the power line even inside the control panel.
Has the same count been input for both CH1 and CH2 and are the count values the same?	If the count values are different, it is a hardware failure. Please consult your local Mitsubishi representative.
Is the preset value, which replaces the present value, within the count range of the ring counter? (This item is for the ring counter function only.)	Set the preset value within the count range of the ring counter.

9.4 Coincidence Output Function Does Not Operate Correctly

Check item	Action
Are CH☐ Coincidence signal No.1 reset command (Y0, Y8) and CH☐ Coincidence signal No.2 reset command (Y7, YF) off?	Turn off CH☐ Coincidence signal No.1 reset command (Y0, Y8) and/or CH☐ Coincidence signal No.2 reset command (Y7, YF).
Are the values in CH☐ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) and CH☐ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39) set within the count range of the ring counter? (This item is for the ring counter function only.)	Set the value(s) in CH☐ Coincidence output point set No.1 (Un\G4, Un\G5, Un\G36, Un\G37) and/or CH☐ Coincidence output point set No.2 (Un\G6, Un\G7, Un\G38, Un\G39) within the count range of the ring counter.
Is CH☐ Coincidence signal enable command (Y2, YA) on?	Turn on CH☐ Coincidence signal enable command (Y2, YA).
Is a voltage applied to the power supply terminal for external coincidence output?	Apply a voltage to the power supply terminal for external coincidence output.
Is the external wiring for the coincidence output point No.1 terminal (EQU1) and the coincidence output point No.2 terminal (EQU2) correct?	Check the external wiring and make necessary corrections.

9.5 Coincidence Detection Interrupt Does Not Occur

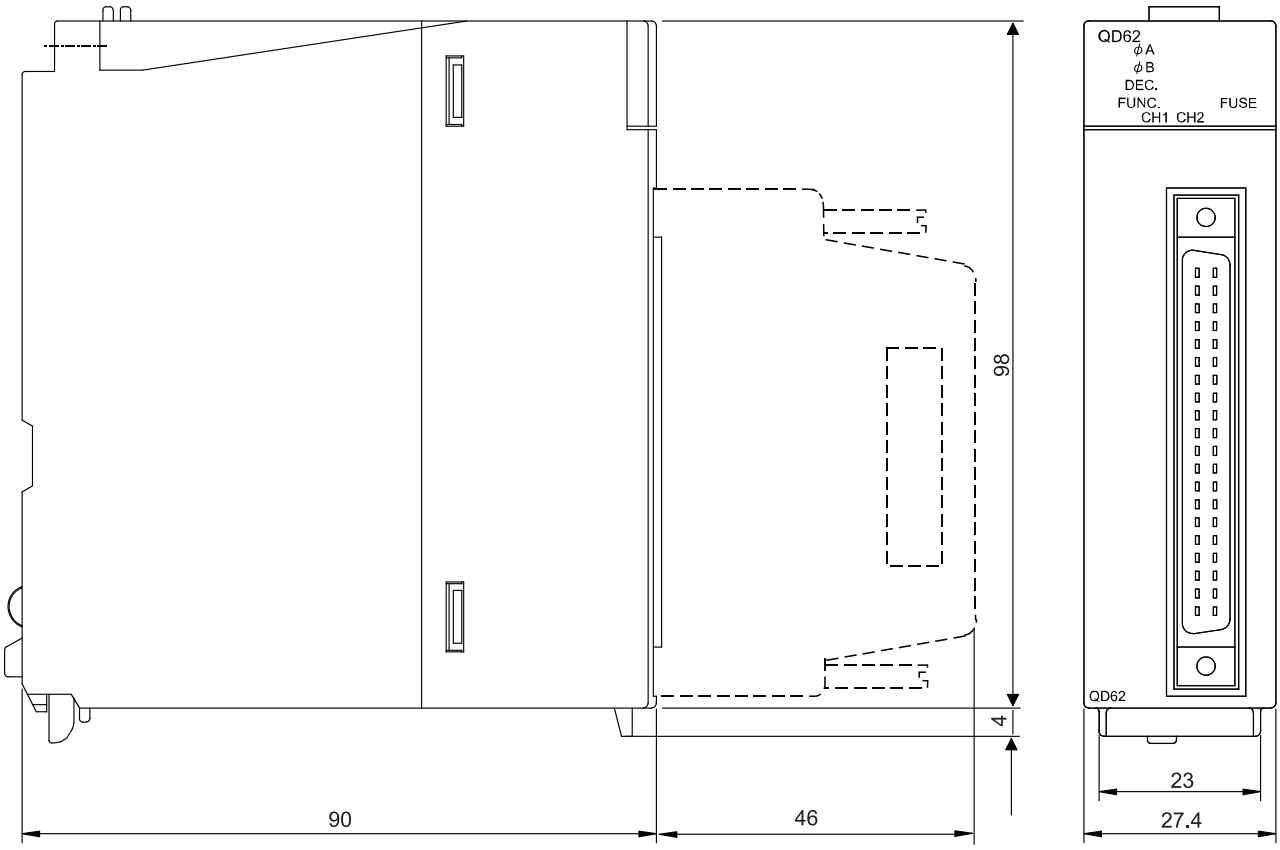
Check item	Action
Is the intelligent function module interrupt pointer setting in PLC parameter correct?	Review the intelligent function module interrupt pointer setting.
Is Program execution control instruction, such as the IMASK instruction, correctly used?	Review the sequence program.
Are CH☐ Counter value coincidence (point No.1) (X2, X9) and CH☐ Counter value coincidence (point No.2) (X6, XD) off?	Reset (turn off) CH☐ Counter value coincidence (point No.1) (X2, X9) and/or CH☐ Counter value coincidence (point No.2) (X6, XD) using CH☐ Coincidence signal No.1 reset command (Y0, Y8) and/or CH☐ Coincidence signal No.2 reset command (Y7, YF).

9.6 Present Value Cannot Be Replaced with the Preset Value

Check item	Action
Is CH☐ External preset request detection (X4, XB) off?	Reset (turn off) CH☐ External preset request detection (X4, XB) using CH☐ External preset detection reset command (Y5, YD).
Is the external wiring for the preset input terminal correct?	Check the external wiring and make necessary corrections.

APPENDICES

Appendix 1 External Dimension Diagram



Unit: mm

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Appendix 2 Difference Between A1SD62, A1SD62E and A1SD62D (S1)

The following table lists the difference between A1SD62, A1SD62E and A1SD62D (S1).

Function \ Model name		QD62	D62E	D62D	A1SD62	A1SD62E	A1SD62D (S1)
Counting		32-bit signed binary counter (-2147483648 to 2147483647)			32-bit unsigned binary counter (0 to 16777215)		
Number of I/O occupied points		16 points			32 points		
Maximum counting speed		200 kPPS		500 kPPS	100 kPPS		200 kPPS
CW/CCW pulse input		Function available			No function		
Counter	Linear counter function	Function available			No function		
	Ring counter function	Function available (Preset and coincidence output function can be used independently of the ring counter setting)			Function available (The ring counter operation only between the preset value and the coincidence output point. Setting values cannot be changed during operation)		
	Coincidence detection function	Function available (program interrupt allowed)			Function available (coincidence detection only)		
	Overflow detection function	Function available			No function		
Maximum and minimum value settings for the ring counter function		Can be set			Cannot be set		
Utility package support		Function available			No function		
Fuse broken detection		Function available (Only broken fuses are detected, LED display)			Function available (Both broken fuses and external power off are detected)		

POINT

Programs that were used in earlier products such as A1SD62 (E/D/D-S1) cannot be used because the I/O signals and the buffer memory configuration of these products differ from those of QD62 (E/D). The conventional dedicated instructions cannot be used.

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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 to:

(1) Damages caused by any cause found not to be the responsibility of Mitsubishi.

(2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.

(3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.

(4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. 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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TRADEMARKS

SH(NA)-080036-R(2407)MEE
MODEL: QD62(E/D)-U-S-E
MODEL CODE: 13JL95

MITSUBISHI ELECTRIC CORPORATION

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