MITSUBISHI ELECTRIC

MELSEC System Q

Programmable Logic Controllers

User's Manual

High-Speed Counter Modules QD62, QD62E, QD62D GX Configurator-CT

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Version G

MITSUBISHI ELECTRIC INDUSTRIAL AUTOMATION

• SAFETY PRECAUTIONS •

(Always read before starting use.)

Before using this product, please read this manual introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the User's Manual for the CPU module to use.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

◇! DANGER	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 medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances.
Always follow the instructions of both levels because they are important to personal safety.

Please store this manual in a safe place and make it accessible when required. Always forward it to the end user.

[DESIGN PRECAUTIONS]

◇! DANGER

- Do not write data into the "system area" of the buffer memory of intelligent function modules.
  Writing data into the "system area" may cause a PLC system malfunction.
- Depending on the malfunction of the external output transistor, there may be cases where the output is ON or OFF status. Install external monitoring circuitry for output signals that may lead to major accidents.

⚠ CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.
  They should be installed 150 mm(5.9 inch) or more from each other.
  Not doing so could result in noise that may cause malfunction.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an environment that meets the general specifications contained in the CPU User's Manual.
  Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Then, securely mount the module with the fixing hole as a supporting point.
  Improper installation may result in malfunction, breakdown or the module coming loose and dropping. Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  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.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not ding so may cause electric shock or damage to the module.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Perform correct pressure-displacement, crimp-contact or soldering for connector wire connections using the tools specified by the manufactures.
  Attach connectors to the module securely.
- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.
  They may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts 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.
- Be sure to fix communication cables or power supply cables leading from the module by placing them in the duct or clamping them.
  Cables not placed in the duct or without clamping may hang or shift, allowing them to be accidentally pulled, which may cause a module malfunction and cable damage.
- When removing the communication cable from the module, do not pull the cable. When removing the cable with a connector, hold the connector on the side that is connected to the modules.
  Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Always ground the shielded cable on the encoder side (relay box).
  Otherwise, malfunction may occur.
- When wiring, be sure to verify the rated voltage of the product as well as the terminal layout. Fire or failure may result if incorrect voltage is input or incorrect wiring is performed.
- Connecting terminals with incorrect voltage may result in malfunction or mechanical failure.

[STARTUP/MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not disassemble or modify the module.
  Doing so could cause failure, malfunction, injury or fire.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause failure or malfunction of the module.
- Do not touch the connector while the power is on.
  Doing so may cause malfunction.
- Switch all phases of the external power supply off when cleaning or retightening the terminal screws and module installation screws.
  Not doing so may cause failure or malfunction of the module.
  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 damages to the screws and/or the module, resulting in the module falling out, short circuits or malfunction.
- Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
  Failure to do so may cause a failure or malfunctions of the module.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- When disposing of the product, handle it as industrial waste.

REVISIONS

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

Print Date	＊ Manual Number	Revision
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

Japanese Manual Version SH-080035-J

INTRODUCTION

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

CONTENTS

Conformation to the EMC Directive and Low Voltage Instruction

For details on making Mitsubishi PLC conform to the EMC directive and low voltage instruction when installing it in your product, please see Chapter 3, "EMC Directive and Low Voltage Instruction" of the User's Manual (Hardware) of the PLC CPU to use.

The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.

By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

About the Generic Terms and Abbreviations

Unless otherwise specified, this manual uses the following generic terms and abbreviations to describe the Type QD62, QD62D and QD62E high-speed counter module.

Generic Term/Abbreviation	Description of the abbreviation/general terms
DOS/V personal computer	DOS/V-compatible personal computer of IBM PC/AT® and its compatible
GX Developer	Generic product name of the product types SWnD5C-GPPW-E, SWnD5C-GPPW-EA, SWnD5C-GPPW-EV and SWnD5C-GPPW-EVA. "n" in the model name is 4 or greater.
QCPU (Qmode)	Generic term of Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU, Q25PHCPU
GX Configurator-CT	Generic term of counter module setting/monitor tool GX Configurator-CT (SW0D5C-QCTU-E)
QD62	Abbreviation of the Type QD62 high-speed counter module
QD62E	Abbreviation of the Type QD62E high-speed counter module
QD62D	Abbreviation of the Type QD62D high-speed counter module
QD62(E/D)	Generic term of QD62, QD62E and QD62D

Product Structure

The product structure of this product is given in the table below.

Model Name	Product Name	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

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.

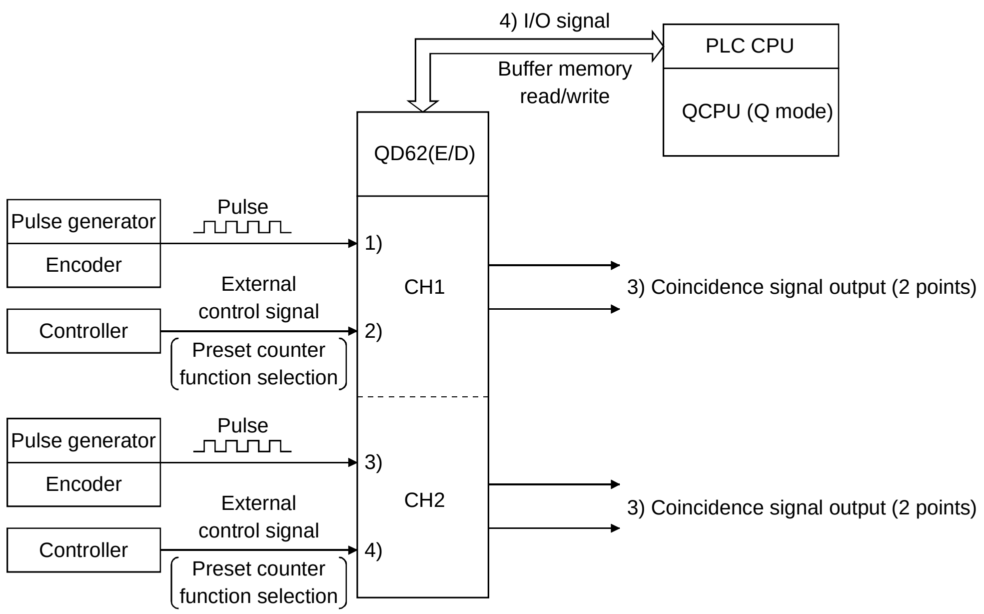
Item	QD62	QD62E	QD62D
I/O type	DC input sinking output	DC input sourcing output	Differential input sinking output
Maximum counting speed	200 kPPS		500 kPPS
Number of channels	2 channels		

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(ED) 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)
The count values are stored as 2-channel 32-bit signed binary codes.

(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 200k, 100k and 10k. 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
Counting is performed repeatedly between the ring counter maximum value and minimum value.

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

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

(c) 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.

(d) Disable count function
This function inputs a signal while executing the count enable command to stop pulse counting.

(7) The preset function/counter selection function can be executed using an external control signal

By applying voltage to the preset terminal/function start terminal of an external terminal, preset function/counter function selection can be executed.

(8) Easy settings using the utility package

A utility package is sold separately (GX Configurator-CT).
The utility package is not a required item. However, it can be used to set initial settings and automatic refresh settings onscreen, reduce sequence programs, and check settings and operating status.

(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 CONFIGURATIONS

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

2.1 Applicable System

2

This section explains the applicable system.

(1) Applicable CPU and number of modules that can be mounted

The CPU module and network module (for remote I/O station) that can have the QD62 (E/D) and the number of modules that can be mounted are listed below.

Applicable module		Number of modules that can be installed	Remarks
CPU module	Q00JCPU	Maximum 16	(＊1)
	Q00CPU Q01CPU	Maximum 24	
	Q02CPU Q02HCPU Q06HCPU Q12HCPU Q25HCPU	Maximum 64	Can be installed in Q mode only (＊1)
	Q12PHCPU Q25PHCPU	Maximum 64	(＊1)
Network module	QJ72LP25-25 QJ72BR15 QJ72LP25G QJ71LP25GE	Maximum 64	MELSECNET/H Remote I/O station (＊2)

＊1 See User's Manual (Function Explanation, Program Fundamentals) for the CPU module to use.
＊2 See Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network).

(2) Mountable base unit

QD62 (E/D) can be mounted on any of the base unit’s I/O slots (＊3). However, depending on combinations with other mounted modules and the number of mountings, there may be cases where the power capacity is insufficient. Be sure to consider the power capacity when mounting the module.

＊3 Must be inside the point number range of 1 CPU unit and network module (for remote I/O station).

(3) Compatibility with a multiple PLC system

First read the QCPU (Q mode) User's Manual (Function Explanation, Program Fundamentals) if the QD62 (E/D) is used with a multiple PLC system.

(a) Compatible QD62 (E/D)
In case of using the QD62 (E/D) with the multiple PLC system, there is no restriction by the version.

(b) Intelligent function module parameters
Perform PLC write of the intelligent function module parameters to the control PLC of the QD62 (E/D) only.

(4) Software packages supported

Correspondence between systems which use QD62 (E/D) and software packages are as shown below.
The GX Developer is necessary when using a QD62 (E/D).

		Software Version	
		GX Developer	GX Configurator-CT
Q00J/Q00/Q01CPU	Single PLC system	Version 7 or later	Version 1.10L or later (cannot be used with the SW0D5C-QCTU-E 50F or earlier versions)
	Multiple PLC system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single PLC system	Version 4 or later	SW0D5C-QCTU-E 00A or later
	Multiple PLC system	Version 6 or later	SW0D5C-QCTU-E 50F or later
Q12PH/Q25PHCPU	Single PLC system	Version 7.10L or later	Version 1.13P or later (cannot be used with the SW0D5C-QCTU-E 50F or earlier versions)
	Multiple PLC system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	SW0D5C-QCTU-E 50F or later

(5) Connector

For the QD62(D/E), the connector is sold separately.
See Section 4.3 and make separate arrangements for the connector.

2.2 How to Check Software Version

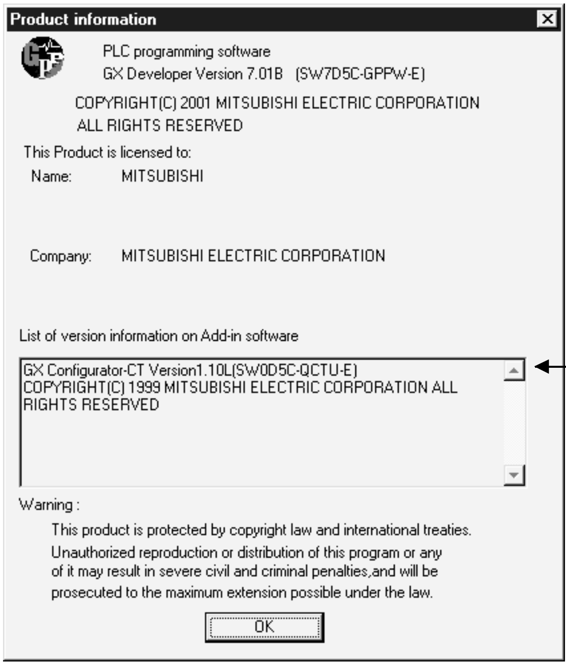
This section describes how to check the GX Configurator-CT software version.

(1) How to check the GX Configurator-CT software version

The GX Configurator-CT software version can be checked in GX Developer's "Product information" screen.

[Startup procedure]

GX Developer → "Help" → Product information



Software version

(In the case of GX Developer Version 7)

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

2.3 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 QD62 (E/D) that can be installed when the Q00J/Q00/Q01CPU is used

See Section 2.1 concerning the number of QD62 (E/D) that can be installed when the Q00J/Q00/Q01CPU is 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.

2.4 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 QD62 (E/D) that can be installed when the remote I/O station is used

See Section 2.1 concerning the number of QD62 (E/D) that can be installed when the remote I/O station is used.

(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.

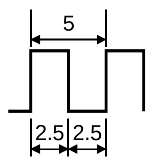
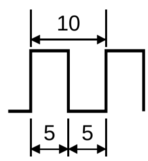
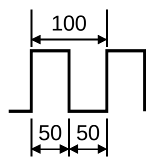
3 SPECIFICATIONS

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

3.1 Performance Specifications

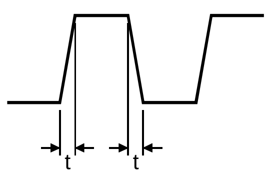
The following describes the performance specifications of the QD62(E/D):

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

Item		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, 2-phase 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 (μ s) (Duty ratio 50 %)	 (Min. phase differential for 2-phase input: 1.25 μ s)	 (Min. phase differential for 2-phase input: 2.5 μ s)	 (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/1 point 2 A/1 common		
5V DC internal current consumption (A)		0.30		
Weight (kg)		0.11		

＊1: The counting speed switching 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



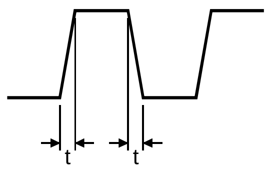
(2) QD62E (DC input sourcing output type) performance specifications

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, 2-phase 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 (μs) (Duty ratio 50 %)	5 2.5 2.5 (Min. phase differential for 2-phase input: 1.25 μs)	10 5 5 (Min. phase differential for 2-phase input: 2.5 μs)	100 50 50 (Min. phase differential for 2-phase input: 25 μs)
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/1 point 0.4 A/1 common		
5V DC internal current consumption (A)		0.33		
Weight (kg)		0.11		

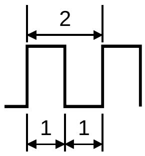
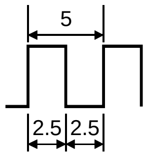
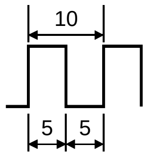
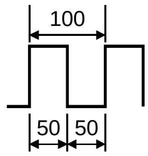
∗1: The counting speed switching can be set using the intelligent function module switch.

∗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 μs or less	200 kPPS	100 kPPS	10 kPPS
t = 2.5 μs or less	100 kPPS	100 kPPS	10 kPPS
t = 25 μs or less	—	10 kPPS	10 kPPS
t = 500 μs	—	—	500 PPS



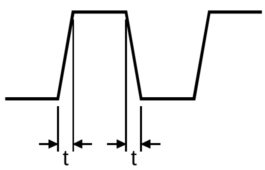
(3) QD62D (differential input sinking output type) performance specifications

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, 2-phase 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 (μ s) (Duty ratio 50 %)	 (Min. phase differential for 2-phase input: 0.5 μ s)	 (Min. phase differential for 2-phase input: 1.25 μ s)	 (Min. phase differential for 2-phase input: 2.5 μ s)	 (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/1 point 2 A/1 common			
5 V DC internal current consumption (A)		0.38			
Weight (kg)		0.12			

∗1: The counting speed switching 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		Repeatedly executes counting between the ring counter maximum and minimum values.	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 PLC CPU when coincidence is detected, and starts the interrupt program.	
Preset function		Rewrites the present counter value to any numeric value. Performs preset using the sequence program or external preset input.	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	While the counter function selection start command signal is being input, stores the present value in the buffer memory at preset interval.	Section 6.5

* The functions can be used in combination. However, only either one of the linear counter function or ring counter function can be used, and only one of the four counter functions can be selected.

3.3 I/O Signals for the PLC CPU

3.3.1 List of I/O signals

The I/O signals for the QD62(E/D) PLC CPU 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) → PLC CPU)			Output signal (Signal direction PLC CPU → QD62(E/D))		
Device No.	Signal name		Device No.	Signal name	
X00	Module ready		Y00	CH1	Coincidence signal No. 1 reset command
X01	CH1	Counter value large (point No. 1)	Y01		Preset command
X02		Counter value coincidence (point No. 1)	Y02		Coincidence signal enable command
X03		Counter value small (point No. 1)	Y03		Down count command
X04		External preset request detection	Y04		Count enable command
X05		Counter value large (point No. 2)	Y05		External preset detection reset command
X06		Counter value coincidence (point No. 2)	Y06		Counter function selection start command
X07		Counter value small (point No. 2)	Y07		Coincidence signal No. 2 reset command
X08	CH2	Counter value large (point No. 1)	Y08	CH2	Coincidence signal No. 1 reset command
X09		Counter value coincidence (point No. 1)	Y09		Preset command
X0A		Counter value small (point No. 1)	Y0A		Coincidence signal enable command
X0B		External preset request detection	Y0B		Down count command
X0C		Counter value large (point No. 2)	Y0C		Count enable command
X0D		Counter value coincidence (point No. 2)	Y0D		External preset detection reset command
X0E		Counter value small (point No. 2)	Y0E		Counter function selection start command
X0F	Fuse broken detection flag		Y0F		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.		Signal name QD62(E/D) → PLC CPU	Description
CH1	CH2		
X00		Module ready	Turns ON when the count preparation for QD62(E/D) is completed at the time of PLC CPU power on or reset operation, and count processing is performed. When Module ready (X00) is OFF, count processing is not performed.
X01	X08	Counter value large (point No. 1)	Turns ON when the present value (CH1: 2_H to 3_H, CH2: 22_H to 23_H) > coincidence output point No. 1 setting (CH1: 4_H to 5_H, CH2: 24_H to 25_H).
X02	X09	Counter value coincidence (point No. 1)	Turns ON when the present value = coincidence output point No. 1 setting and the present value is latched. Turns OFF with the coincidence signal No. 1 reset command (Y00/Y08).
X03	X0A	Counter value small (point No. 1)	Turns ON when the present value < coincidence output point No. 1 setting.
X04	X0B	External preset request detection	Turns ON with a preset command signal from the external input terminal, and the request is latched. Turns OFF with the external preset detection reset signal (Y05/Y0D).
X05	X0C	Counter value large (point No. 2)	Turns ON when the present value > coincidence output point No. 2 setting (CH1: 6_H to 7_H, CH2: 26_H to 27_H).
X06	X0D	Counter value coincidence (point No. 2)	Turns ON when the present value = coincidence output point No. 2 setting and the present value is latched. Turns OFF with the coincidence signal No. 2 reset command (Y07/Y0F).
X07	X0E	Counter value small (point No. 2)	Turns ON when the present value < coincidence output point No. 2 setting.
X0F		Fuse broken detection flag	Fuse broken detection flag (X0F) turns ON when a fuse in the coincidence signal output section is blown.

(2) Output signals

Device No. CH1	Device No. CH2	Signal name PLC CPU → QD62 (E/D)	Operation timing	Description
Y00	Y08	Coincidence signal No. 1 reset command		Turns ON when the counter value coincidence (point No. 1) signal (X02/X09) is reset.
Y01	Y09	Preset command		Turns ON when the preset function is executed.
Y02	Y0A	Coincidence signal enable command		Turns ON when the counter value coincidence signal (X02/X09, X06/X0D) is output to the external terminal.
Y03	Y0B	Down count command		Turns ON when a subtraction count is executed in the 1 phase pulse input mode.
Y04	Y0C	Count enable command		Turns ON when the count operation is performed.
Y05	Y0D	External preset detection reset command		Turns ON when the external preset request detection signal (X04/X0B) is reset.
Y06	Y0E	Counter function selection start command		Turns ON when counter function selection is executed.
				• Latch counter function • Sampling counter function
				• Count disable function • Periodic pulse counter function
Y07	Y0F	Coincidence signal No. 2 reset command		Turns ON when the counter value coincidence (point No. 2) signal (X06/X0D) is reset.

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 (without battery backup) for the QD62 (E/D) are listed in the table below.

The initial values are set for the buffer memory when the power is turned on or the PLC CPU is reset.

The contents of the buffer memory can be read/written using the FROM/TO commands in the sequence program or the automatic refresh function of the PLC CPU.

Address				Set data		Initial value ＊1	Read/write
CH1		CH2					
Hexadecimal	Decimal	Hexadecimal	Decimal				
0H	0	20H	32	Preset value setting	(L)	0	Read/write enabled
1H	1	21H	33		(H)		
2H	2	22H	34	Present value	(L)	0	Read only
3H	3	23H	35		(H)		
4H	4	24H	36	Coincidence output point set No. 1	(L)	0	Read/write enabled
5H	5	25H	37		(H)		
6H	6	26H	38	Coincidence output point set No. 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	(L)		
DH	13	2DH	45		(H)		
EH	14	2EH	46	Sampling count value	(L)		
FH	15	2FH	47		(H)		
10H	16	30H	48	Periodic pulse count previous value	(L)		
11H	17	31H	49		(H)		
12H	18	32H	50	Periodic pulse count present value	(L)		
13H	19	33H	51		(H)		
14H	20	34H	52	Ring counter minimum value	(L)	0	Read/write enabled
15H	21	35H	53		(H)		
16H	22	36H	54	Ring counter maximum value	(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 PLC CPU is reset.

(2) Preset value setting (Buffer memory addresses CH1: 0_H to 1_H, CH2: 20_H to 21_H)

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

(3) Present value (Buffer memory addresses CH1: 2_H to 3_H, CH2: 22_H to 23_H)

- The present values for the counter are stored.
- The range of the values that are read is from –2147483648 to 2147483647 (32-bit signed binary values).

(4) Coincidence output point set No. 1 and No. 2 (Buffer memory addresses CH1: 4_H to 7_H, CH2: 24_H to 27_H)

- This area is used to write the setting values of the coincidence output points to be compared with the present counter value.
- No. 1 and No.2 coincidence output points can be set for each channel.
- The setting range is from –2147483648 to 2147483647 (32-bit signed binary value).

(5) Overflow detection flag (Buffer memory addresses CH1: 8_H, CH2: 28_H)

- 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) Counter function selection setting (Buffer memory addresses CH1: 9_H, CH2: 29_H)

- 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) Sampling/periodic setting (Buffer memory addresses CH1: A_H, CH2: $2A_H$)

- 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 from 1 to 65535 (16-bit binary values) and the time unit is 10[ms].

  Example) When 420 is set for the sampling/periodic setting in the buffer memory
  420 × 10= 4200 [ms]

(8) Sampling/periodic counter flag (Buffer memory addresses CH1: B_H, CH2: $2B_H$)

- 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) Latch count value (Buffer memory addresses CH1: C_H to D_H, CH2: $2C_H$ to $2D_H$)

- This area is used to store the latch count values when the latch counter function is executed.
- The range of the values to be read is from –2147483648 to 2147483647 (32-bit signed binary values).

(10) Sampling count value (Buffer memory addresses CH1: E_H to F_H, CH2: $2E_H$ to $2F_H$)

- This area is used to store the sampling count values when the sampling counter function is executed.
- The range of the values to be read is from –2147483648 to 2147483647 (32-bit signed binary values).

(11) Periodic pulse count previous and present value (Buffer memory addresses CH1: 10_H to 13_H, CH2: 30_H to 33_H)

- This area is used to store the present and previous values for the periodic pulse count when the periodic pulse counter function is executed.
- The range of the values to be read is from –2147483648 to 2147483647 (32-bit signed binary values).

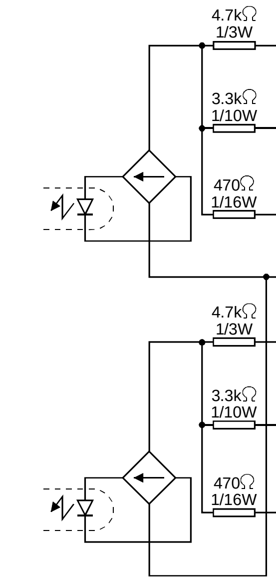
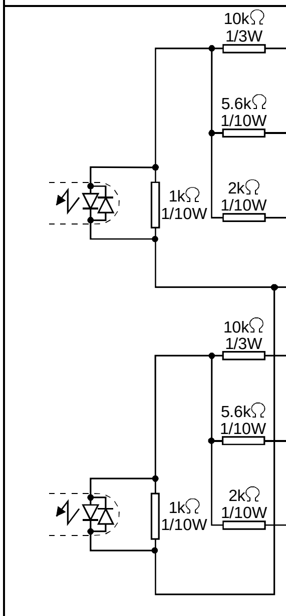
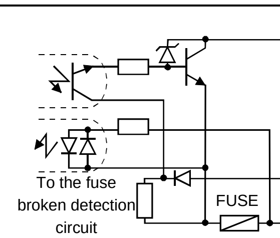
(12) Ring counter minimum and maximum value (Buffer memory addresses CH1: 14_H to 17_H, CH2: 34_H to 37_H)

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

3.5 Interface with External Devices

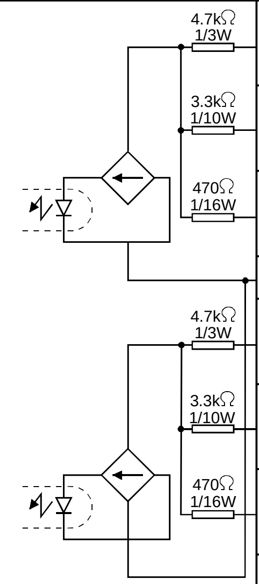
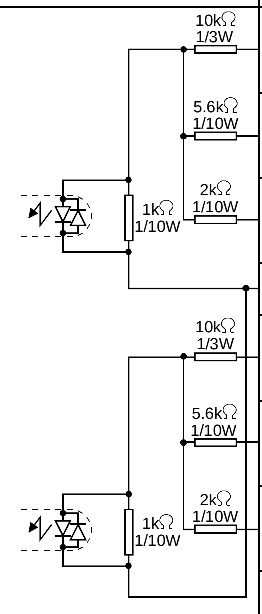
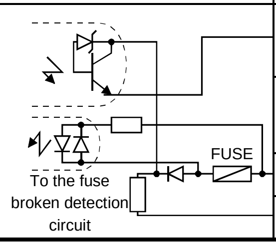
The table below lists the external device interface for the QD62(E/D).

(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	B08	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/1 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)		
		A02, A01		0 V			

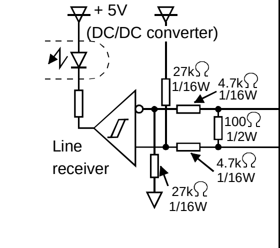
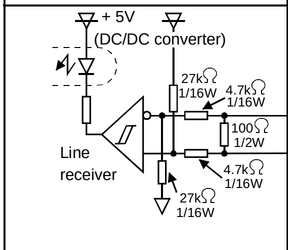
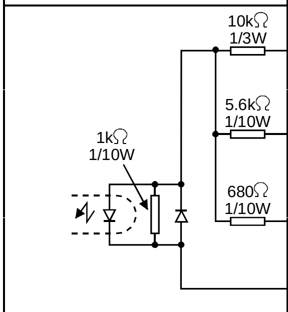
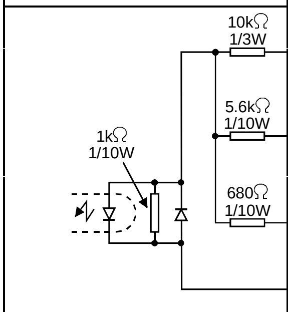
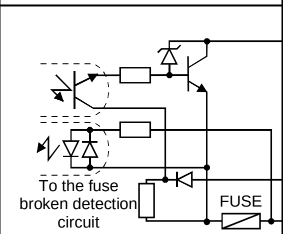
＊1: Terminal numbers A03, A04, B03 and B04 are not used.

(2) QD62E (DC input sourcing 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	B08	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 0.1 A/point, 0.4 A/1 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)		
		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)		
		A02, A01		0 V			

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

(3) QD62D (Differential 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	A14	Phase A pulse input	Line driver level (Am26LS31 [manufactured by Texas Instruments] or equivalent) that conforms to RS-422-A in EIA Standard EIA standard RS-422-A line driver level Equivalent to Am26LS31 (made by Japan Texas Instruments, Inc.) V_{hys} Hysteresis (VT+ - VT-) 60 mV $V_{IH(E)}$ "H" level enable input voltage: 2 V or higher $V_{IL(E)}$ "L" level enable input voltage: 0.8 V or lower ＊ A current type line driver cannot be used.		
		B20	B14	Phase $\overline{A}$ pulse input			
		A19	A13	Phase B pulse input			
		A19	B13	Phase $\overline{B}$ pulse input			
		A18	A12	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
		B18	B12	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
		A17	A11	Preset input 5 V	When ON	2.5 to 5.5 V	2 to 5 mA
					When OFF	1 V or less	0.1 mA or less
		B17	B11	PRSTCOM	Response time	OFF →ON 0.5 ms or less	ON →OFF 1 ms or less
		A16	A10	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
		B16	B10	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
		A15	A09	Function start input 5 V	When ON	2.5 to 5.5 V	2 to 5 mA
					When OFF	1 V or less	0.1 mA or less
		B15	B09	FUNCCOM	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/1 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)		
		A02, A01		0 V			

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

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
- CMOS level voltage output type encoders
  (Verify that the encoder output voltage meets 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

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.

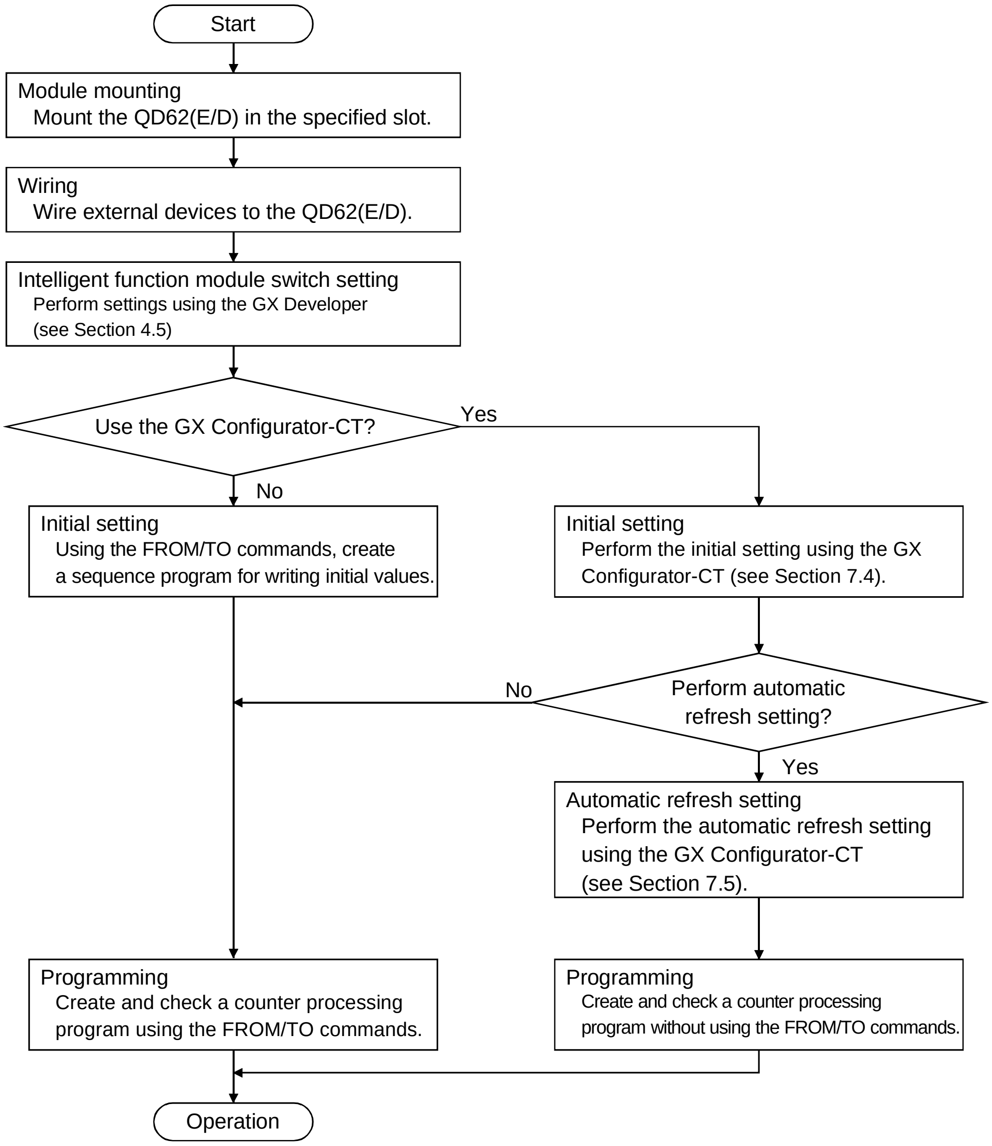
(5) Tighten the mounting screws using torque within the following range. If the screws are loose, it may cause short-circuits, breakdowns or malfunctions.

Screw location	Clamping torque range
Module mounting screws (M3 screws)	36 to 48 N · cm

(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.

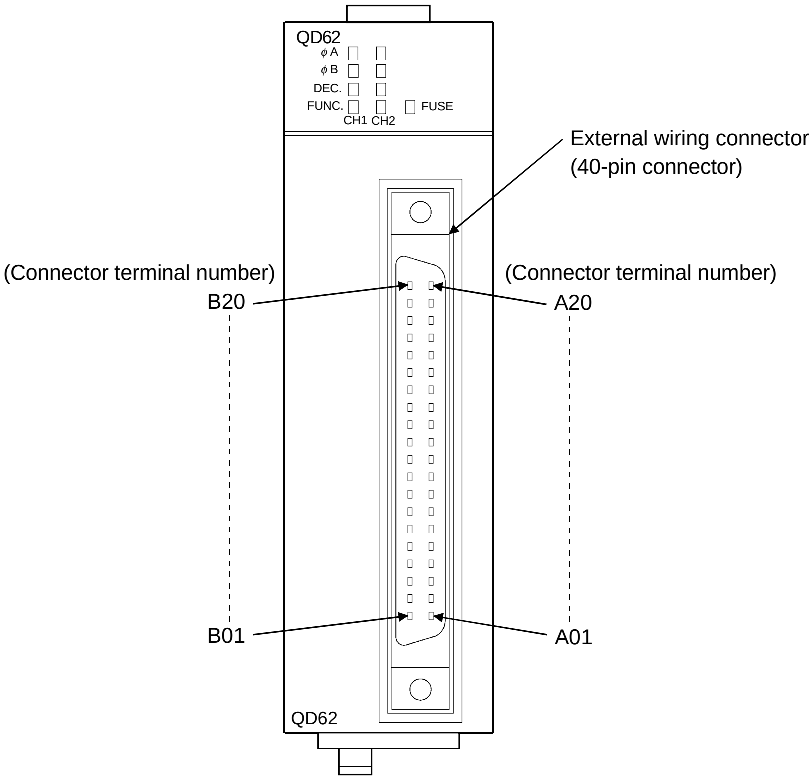
4.2 Procedure Before Starting the Operation

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:



LED name	Description
φA	Lit : Voltage is being applied to the Phase A pulse input terminal.
φB	Lit : Voltage is being applied to the Phase B pulse input terminal.
DEC.	Lit : Counter is in the process of subtraction.
FUNC.	Lit : Voltage is being applied to the function start input terminal.
FUSE	Lit : Voltage is being applied to the external power supply input terminal while the fuse in the coincidence signal output section is broken.

(1) External wiring Connector

The connectors for use with the QD62(E/D) should be purchased separately by the user.
The connector types are listed below.

(a) Connector types

Type	Model name
Soldering type, straight out	A6CON1
Solderless type, straight out	A6CON2
Pressure-welding type, straight out	A6CON3
Soldering type, usable for straight out and diagonal out	A6CON4

4.4 Wiring

The following explains how to wire the pulse generator 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.

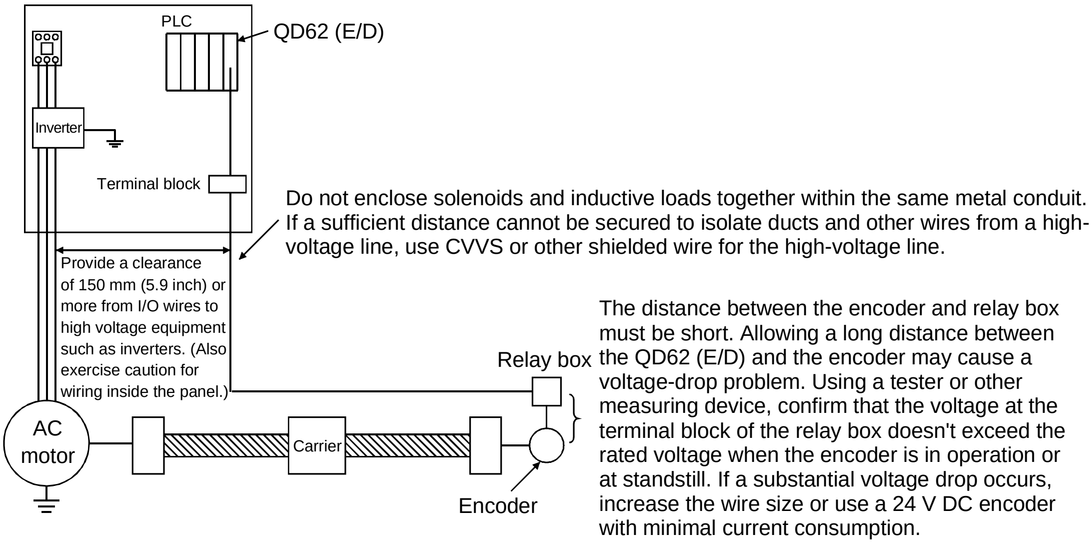
(1) Different terminals have been prepared for connection depending on the voltage of the input signal. Connecting a terminal of incorrect voltage may result in malfunction or mechanical failure.

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

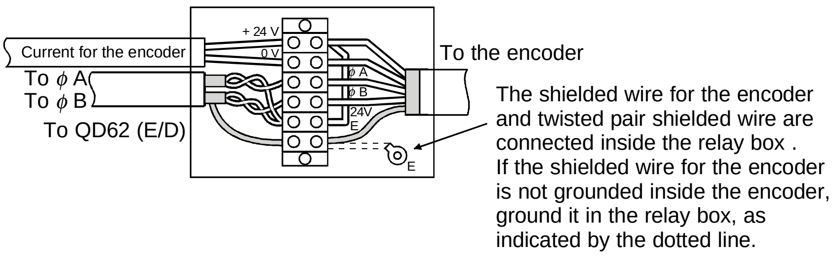
(3) For the QD62(E/D), count will be performed if pulse status noise is input and a miscount will result.

(4) Provide the following measures against noise for high-speed pulse input:
   (a) Always use a shielded twisted pair cable and provide grounding.
   (b) Avoid placing the twisted pair cables or input/output cables. Place the cable at least 150 mm (5.9 inch) from such wires and perform wiring using the least distance as possible.

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

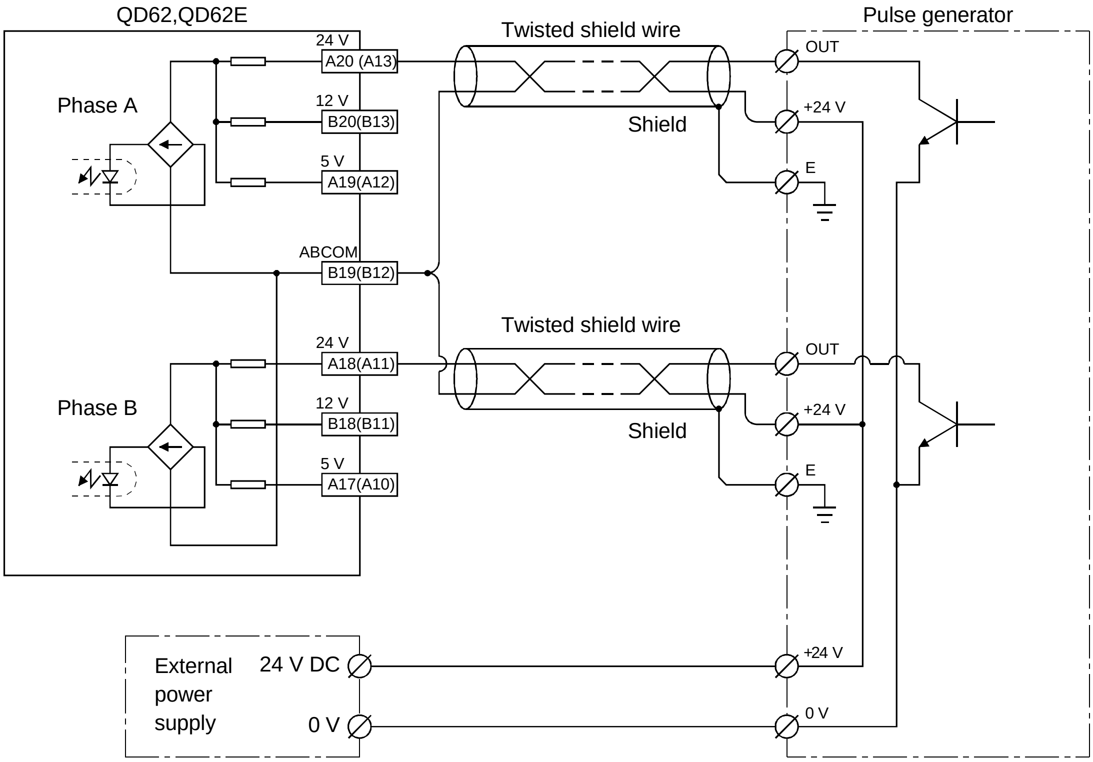


• Grounding the twisted pair shielded wire is performed on the encoder side (relay box). (This example shows connection with 24 V sink load.



4.4.2 Wiring example of a module and a pulse generator

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

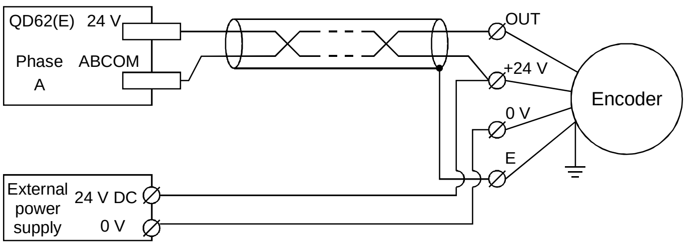


The number inside the ( ) indicates the terminal number for channel 2.

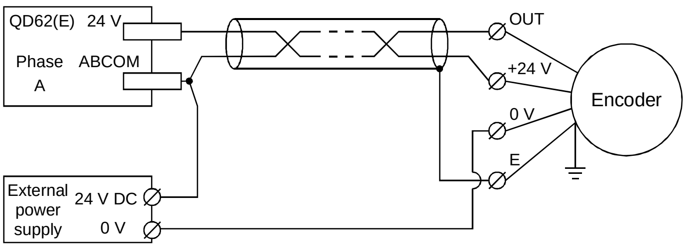
POINT

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

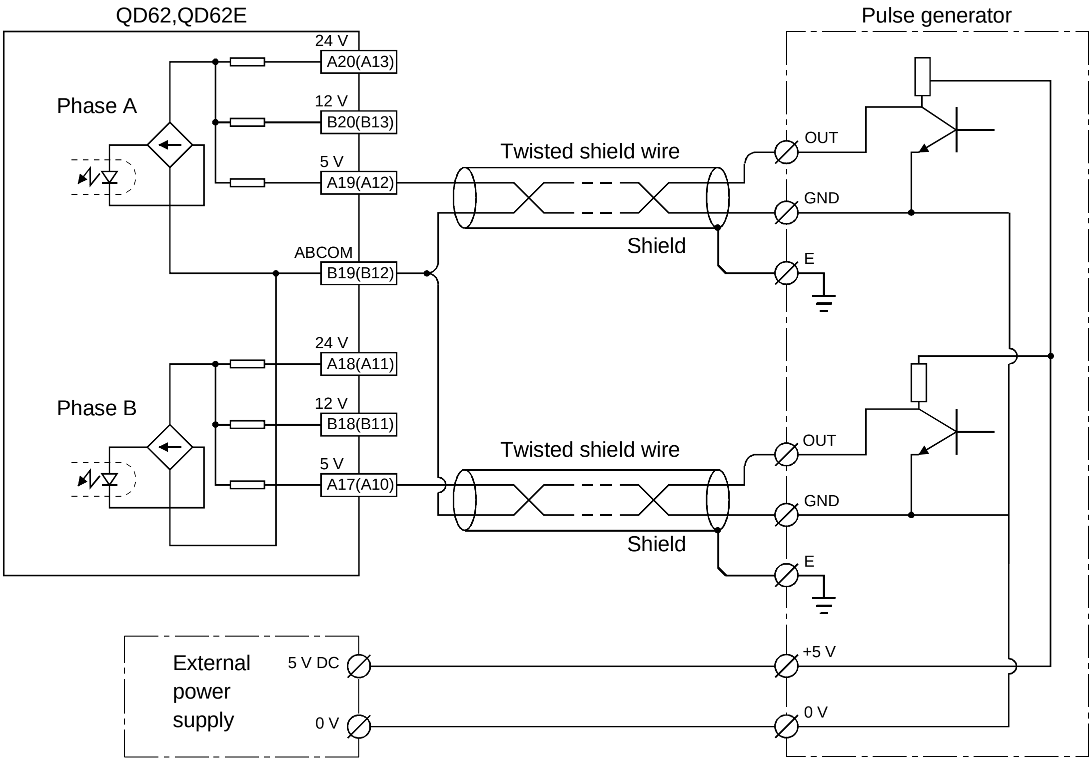
[Wiring example]



[Incorrect wiring example]

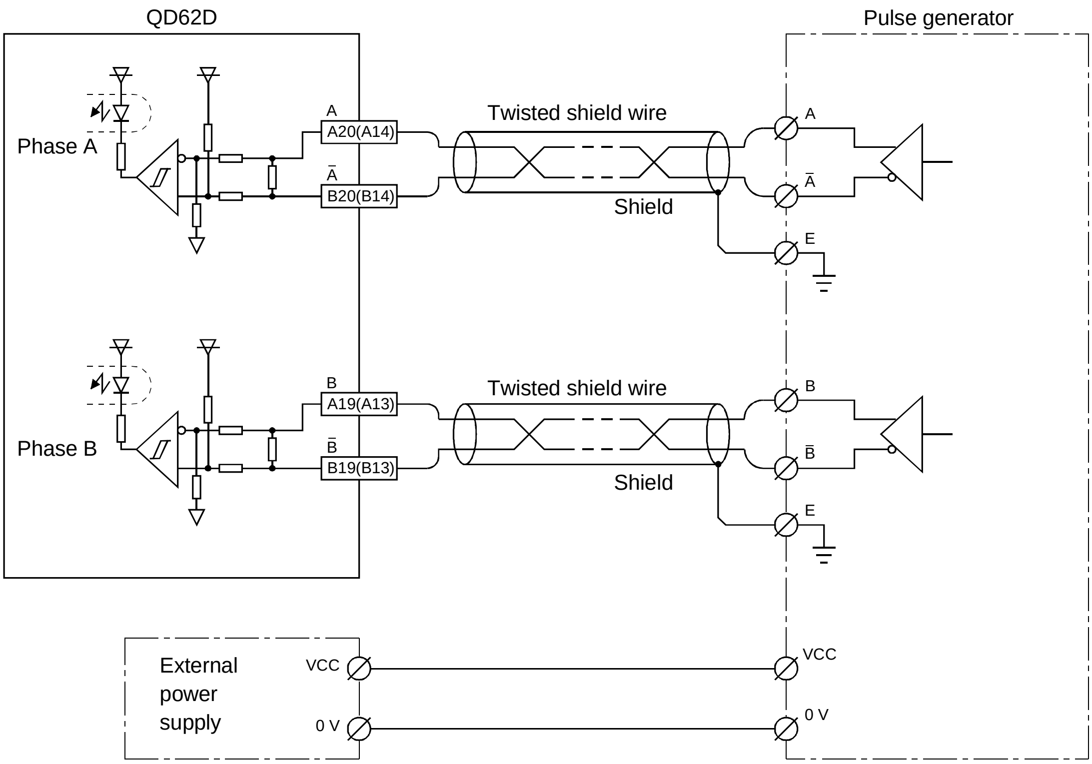


(2) Wiring example with a voltage output type pulse generator (5 V DC)



The number inside the ( ) indicates the terminal number for channel 2.

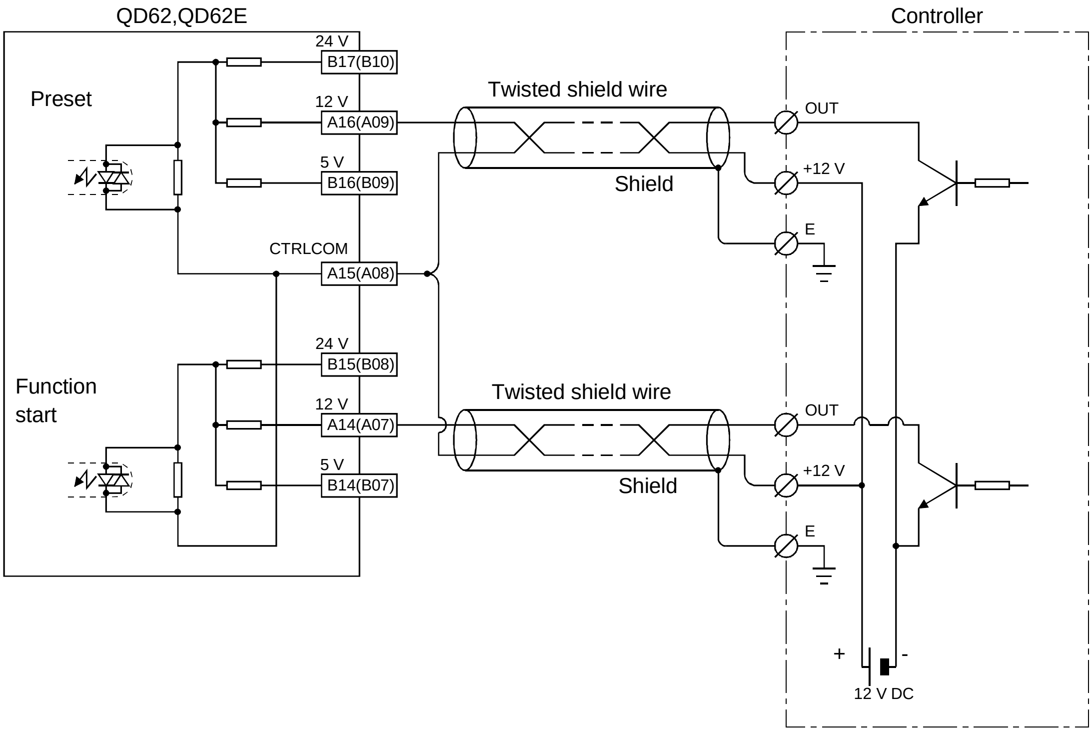
(3) Wiring example with a driver (equivalent to Am26LS31) pulse generator

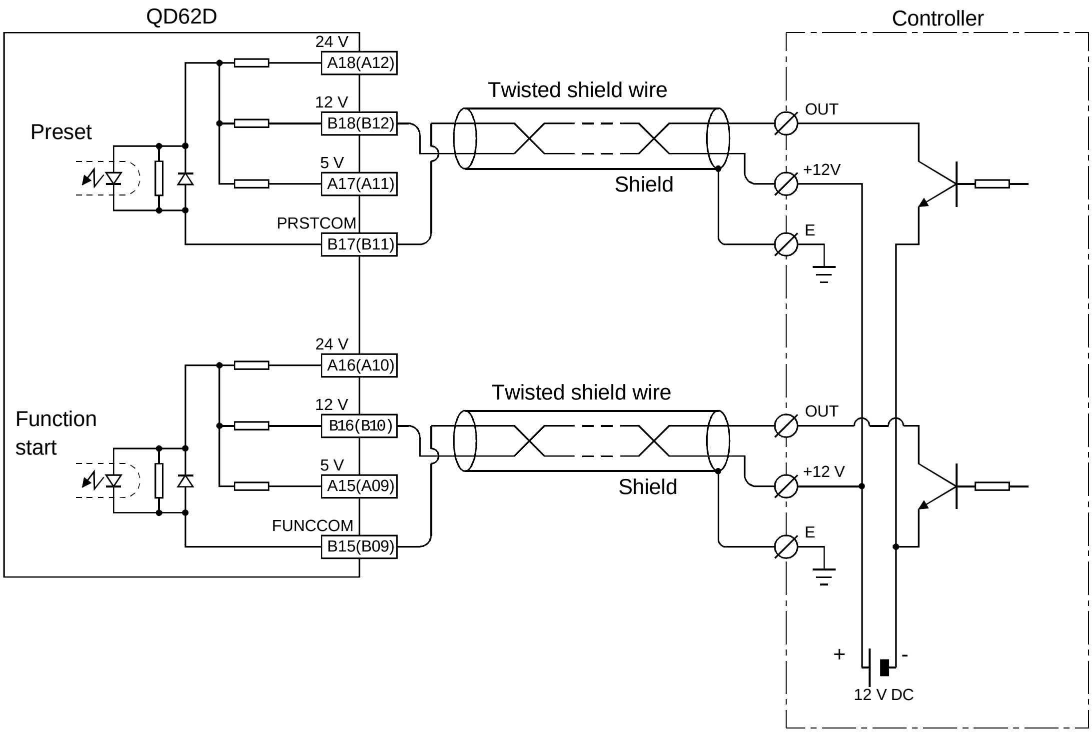


The number inside the ( ) indicates the terminal number for channel 2.

4.4.3 Wiring example of a controller and an external input terminal

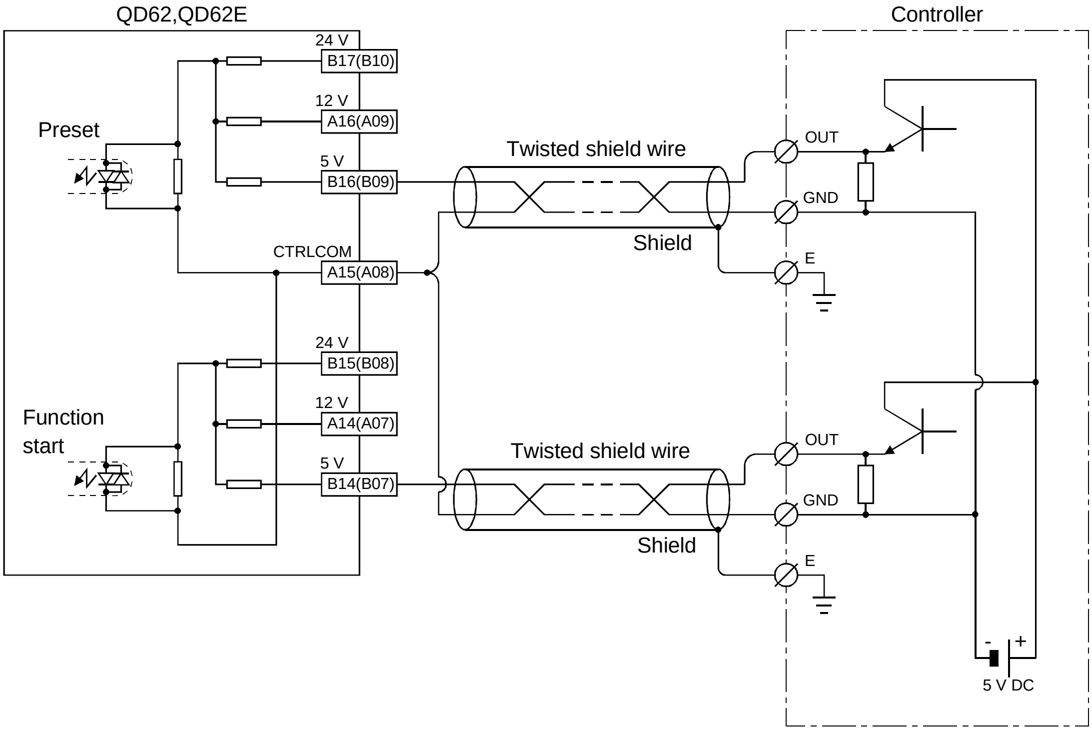
(1) When the controller (sink loading type) is 12 V DC

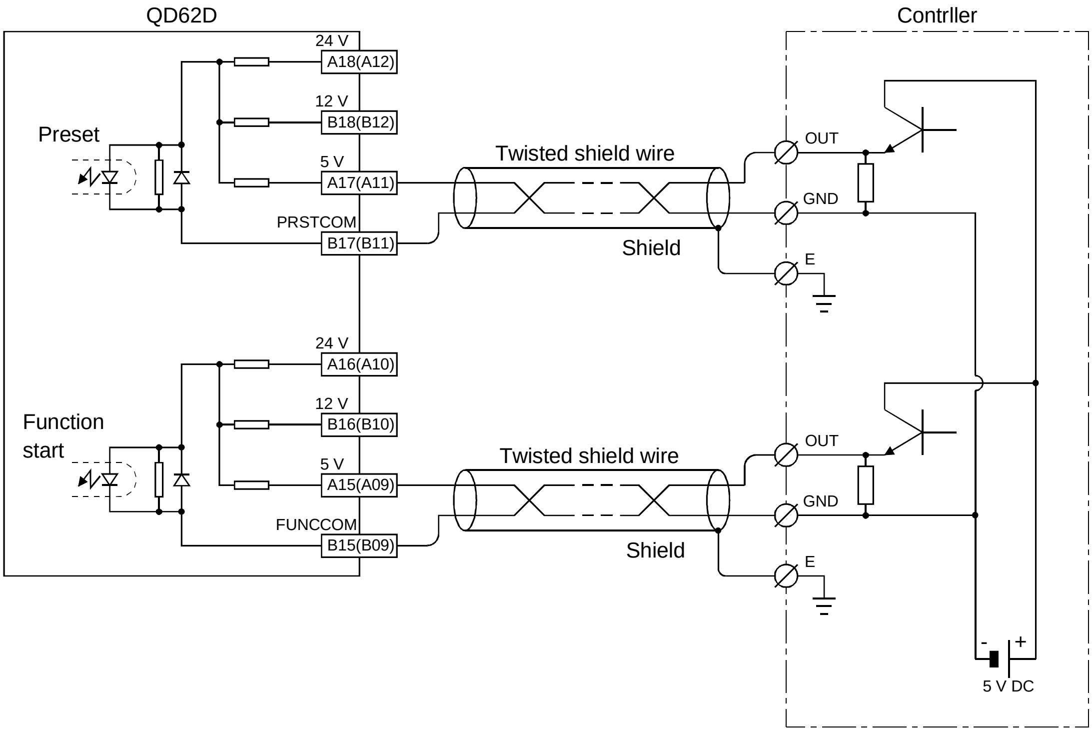




The number inside the ( ) indicates the terminal number for channel 2.

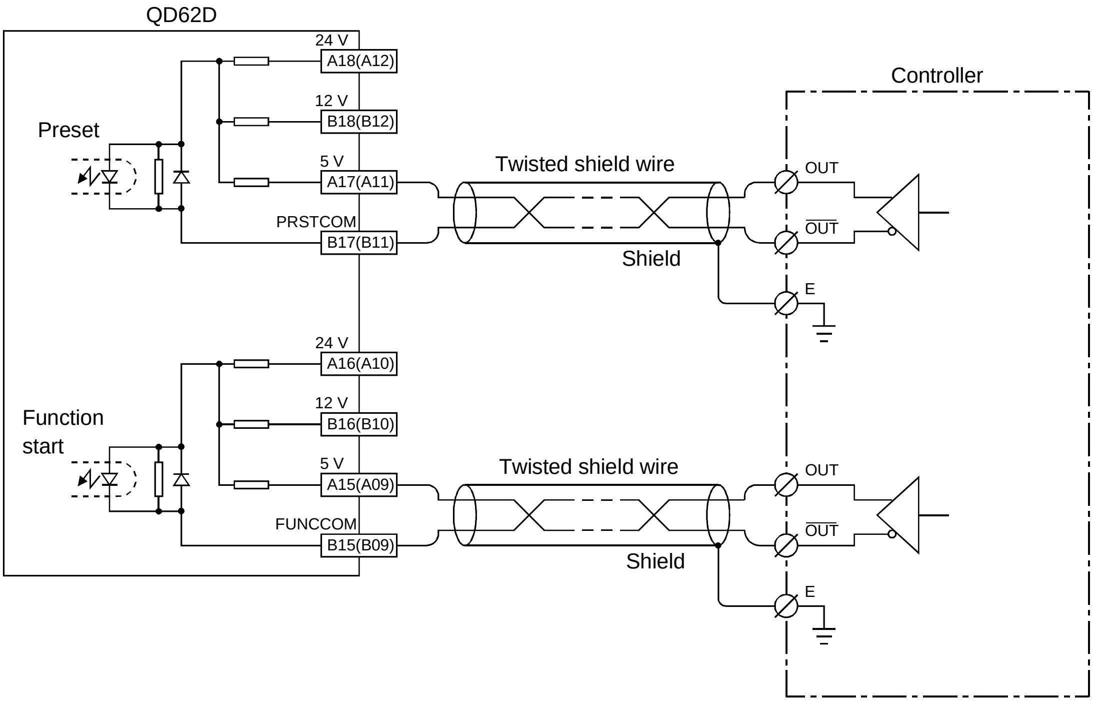
(2) When the controller (source loading type) is 5 V DC





The number inside the ( ) indicates the terminal number for channel 2.

(3) When the controller is a line driver

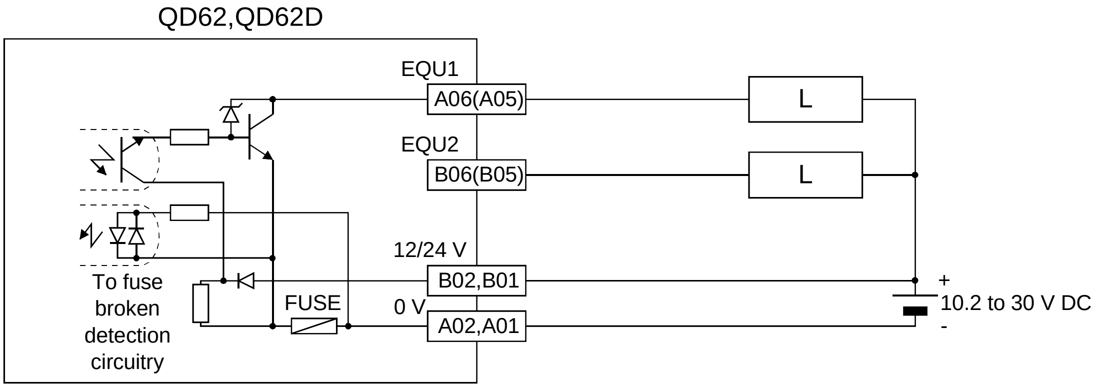


The number inside the ( ) indicates the terminal number for channel 2.

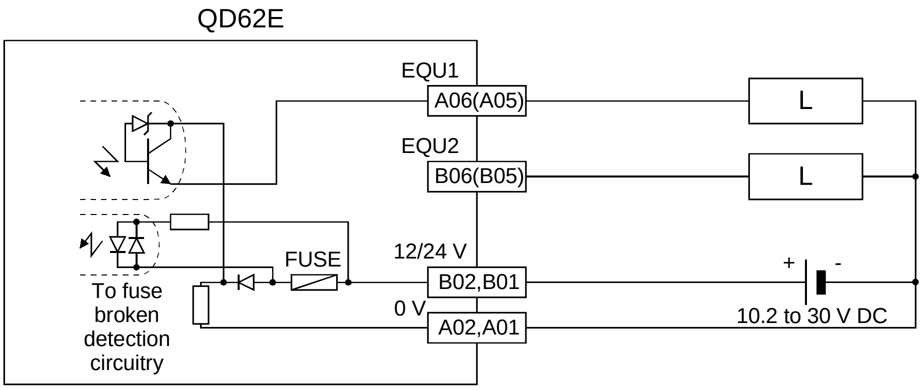
4.4.4 Wiring example with an external output

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)



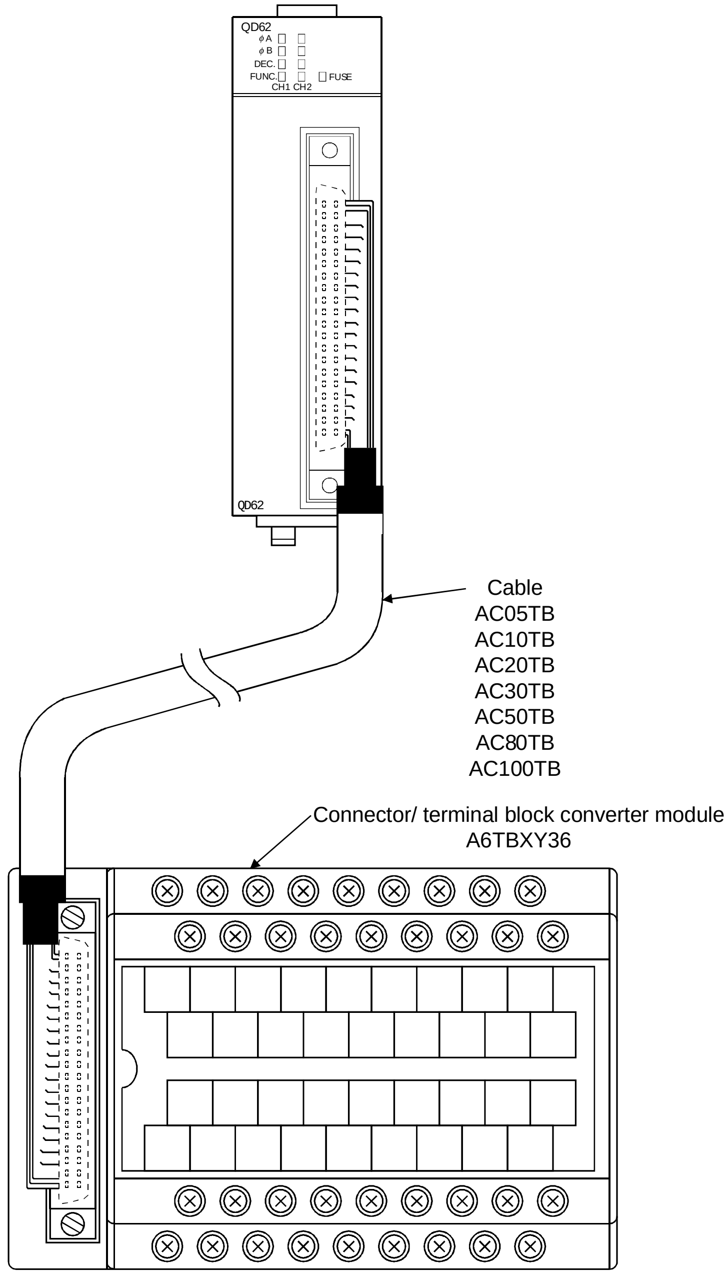
(2) For QD62E (Source output type)



The number inside the ( ) indicates the terminal number for channel 2.

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

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

For the QD62D

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

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 Switch Settings for the Intelligent Function Module

This section explains the switch settings for the intelligent function module. These switch settings are performed with the GX Developer I/O assignments.

(1) Switch setting for the 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.

	Data item	
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
Switch 2 (for channel 2)		Counting speed setting 0: 10 k PPS 1: 100 k PPS 2: 200 k PPS 3: 500 k PPS (Only for the QD62D)
		Counter format 0: Linear counter 1: Ring counter
Switch 3	Reserved	
Switch 4	Reserved	
Switch 5	Reserved	

(Example) Target channel: Channel 2;
Counter format: Ring counter; Counting speed setting: 200 k PPS;
Pulse input mode setting: 2 phase multiple of 1

Set as switch 2 = 0123H

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.

(2) Detailed settings

The error time output mode and H/W error time PLC operation mode are set in the detailed settings for the intelligent function module.

(a) Error time output mode

Sets to either clear or hold the module output status when a PLC CPU stop error occurs.

- Clear : Tuns OFF all of the coincidence signal external outputs.
- Hold : Holds the same ON/OFF status before the CPU is stopped for the coincidence signal external outputs.

(b) H/W error time PLC operating mode

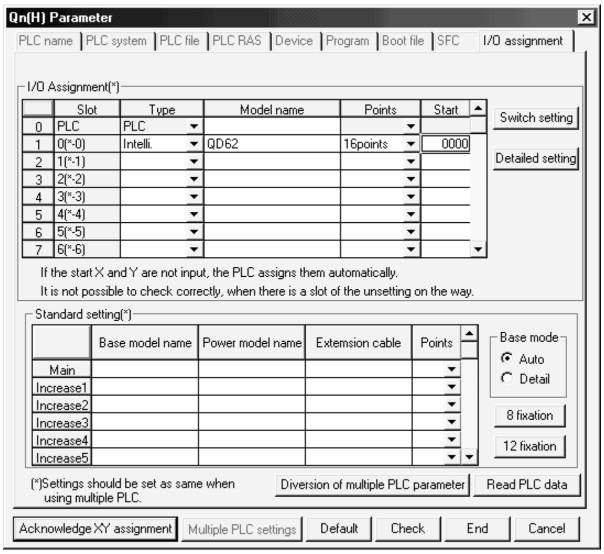
Sets to either stop or continue the PLC CPU operation for each module when an intelligent function module error (SP.UNIT DOWN) is detected.

- Stop : PLC CPU stops operation.
- Continue : PLC CPU continues the execution of the programs for modules other than those in which an error was detected.

An intelligent function module error in the QD62(E/D) is detected when the Unit READY flag is not in the READY state due to a module hardware failure.

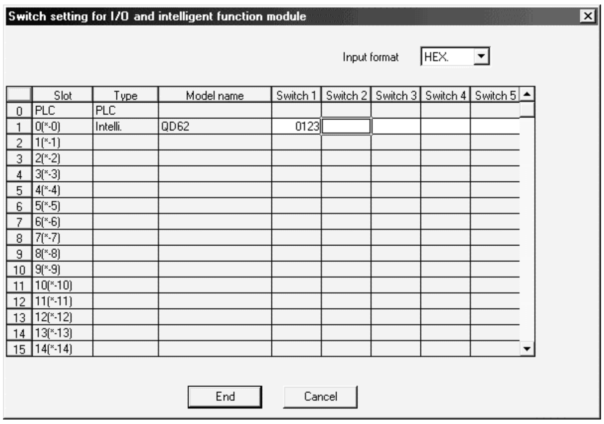
(3) Operating procedure

Perform settings, starting with the GX Developer I/O assignment screen.

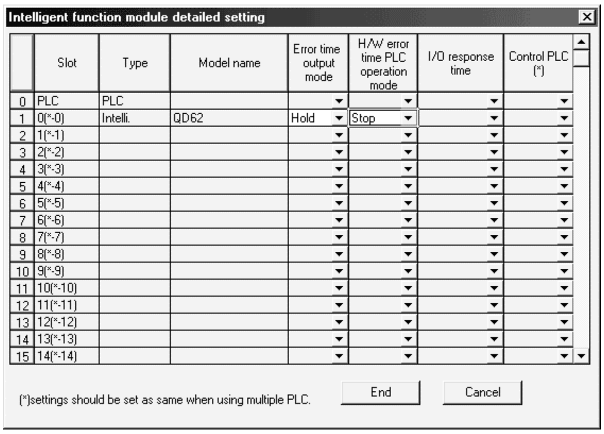


(a) I/O assignment screen
Specify the following for the slot where the QD62(E/D) is mounted.

Type : Select "Intelli."
Model name : Enter the module's model name.
Points : Select 16 points.
Start XY : Enter the start I/O signal for the QD62(E/D).



(b) Switch setting for I/O and intelligent function module
Click on [Switch Setting] on the I/O assignment screen to display the screen at left and set switches 1 to 5. The setting can easily be done if values are entered in hexadecimal. Change the input format to hexadecimal and enter values.



(c) Intelligent function module detailed setting
Click on [Detailed Setting] on the I/O assignment screen to display the screen at left, and then set the error time output mode and H/W error time PLC operation mode.

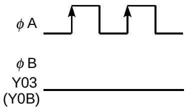
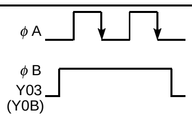
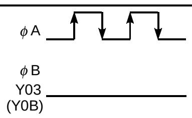
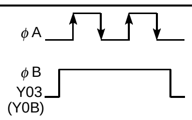
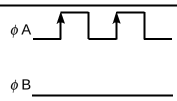
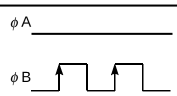
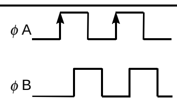
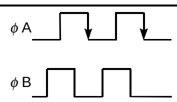
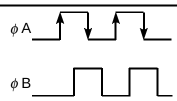
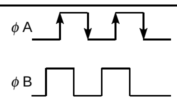
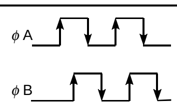
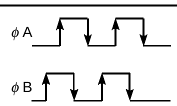
5 BASIC USAGE

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

5.1 Understanding the Pulse Input and Counting Method

5.1.1 Types of pulse input methods

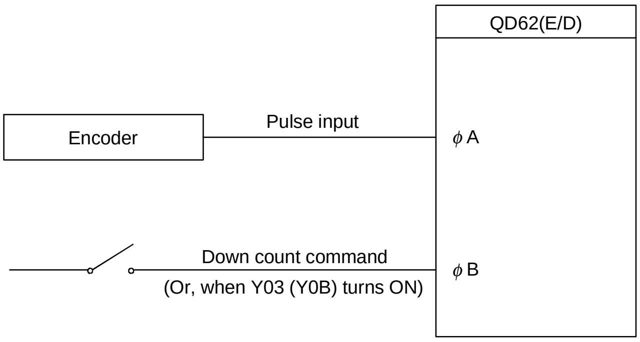
Six types of the pulse input methods are available. These include 1 phase multiple of 1, 1 phase multiple of 2, CW/CCW pulse input, 2 phase multiple of 1, 2 phase multiple of 2, and 2 phase multiple of 4. The following table shows the pulse input methods and count timings.

Pulse input method	Count timing		
1-phase multiple of 1	For addition count		Count at ϕA rise (↑) ϕB, Y03 (Y0B) are OFF.
	For subtraction count		Count at ϕA fall (↓) ϕB, Y03 (Y0B) are ON.
1-phase multiple of 2	For addition count		Count at ϕA rise (↑) and fall (↓) ϕB, Y03(Y0B) are OFF
	For subtraction count		Count at ϕA rise (↑) and fall (↓) ϕB, Y03(Y0B) are 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

(1) Phase 1 pulse input

For phase 1 pulse input, either a multiple of 1 or multiple of 2 count method can be selected.

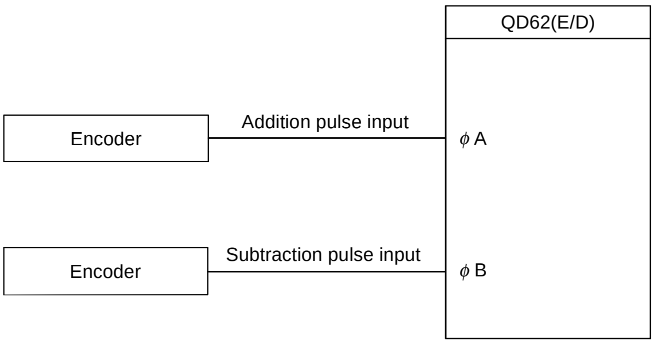
The relationship between the phase A pulse input and the down count command is shown below.



(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.

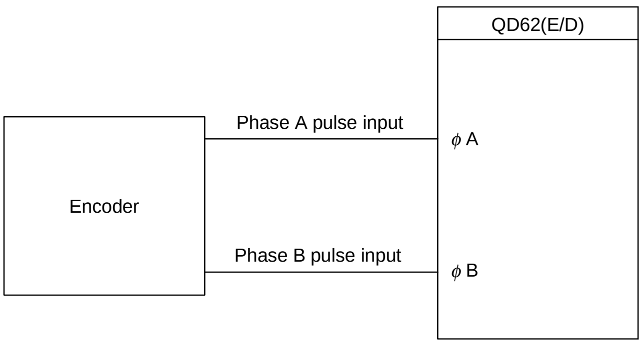


(3) Phase 2 pulse input

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.
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) When any function is used, the present value is stored into the buffer memory for storing the present value. When the latch counter, sampling counter or periodic pulse counter function is executed, the count value is stored into the buffer memory for storing the counter function selection count value at the addresses shown in the table below, aside from the buffer memory for storing the present value.

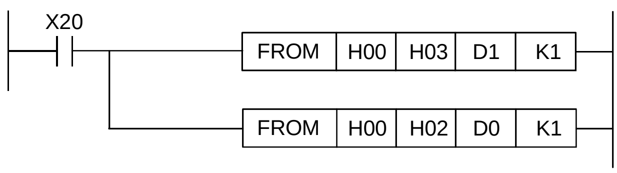
Description		Present value	Counter function selection count value			
			Latch count value	Sampling count value	Periodic pulse count previous value	Periodic pulse count present value
Buffer memory address	CH1	2_H to 3_H	C_H to D_H	E_H to F_H	10_H to 11_H	12_H to 13_H
	CH2	22_H to 23_H	$2C_H$ to $2D_H$	$2E_H$ to $2F_H$	30_H to 31_H	32_H to 33_H

(2) Both the present values and counter function selection count values are stored in the buffer memory as 32-bit signed binary values. In addition, 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

When reading the present values or the counter function selection count values, use the DFRO command 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]



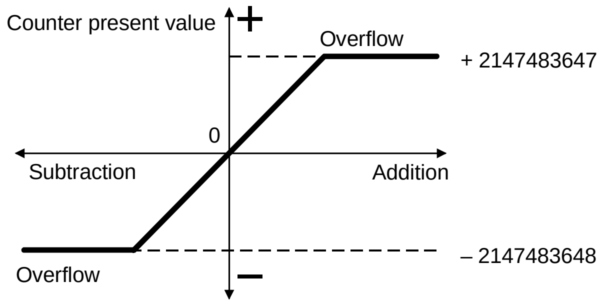
5.2 Selecting the Counter Format

Select either linear counter or ring counter with the GX Developer intelligent function module.
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 +2147483637 (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 the buffer memory overflow detection flag (addresses CH1: 8H, CH2: 28 H) and the count stops . Even if a pulse is input, the present value will not change from –2147483648 or +2147483647.

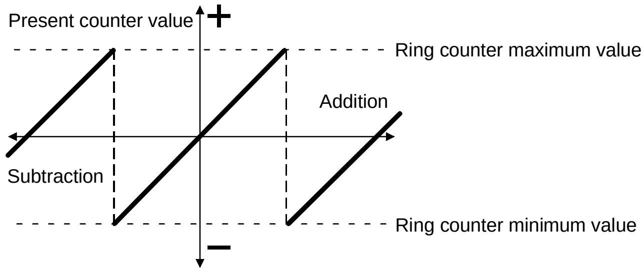
(c) Performing a preset will cancel the overflow error.
When a preset is performed, 0 is stored in the buffer memory overflow detection flag and the count resumes.

(d) When an overflow error occurs, a generated module error can be viewed on the system monitor by clicking "Diagnosis" - "System monitor" menu in the GX Developer.

5.2.2 Selecting the ring counter

(1) Ring counter operation

When the ring counter is selected, the count operation is performed repeatedly between the ring counter minimum value (addresses CH1: 14_H to 15_H, CH2: 34_H to 35_H) and maximum value (addresses CH1: 16_H to 17_H, CH2: 36_H to 37_H) that were set arbitrarily in the buffer memory.
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.

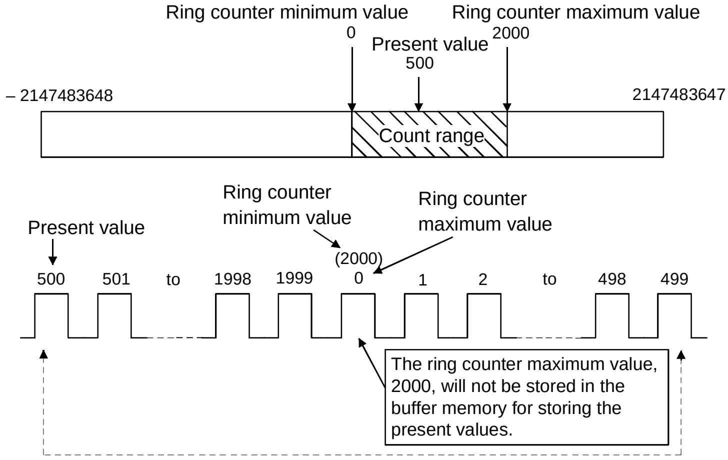


(2) Ring counter count range

The count range for the ring counter is determined by the relationship between the present values in the buffer memory (addresses CH1: 2_H to 3_H, CH2: 22_H to 23_H) at the time the count enable command {Y04 (Y0C)} turns ON or a preset is executed and the ring counter minimum value/maximum value.
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.

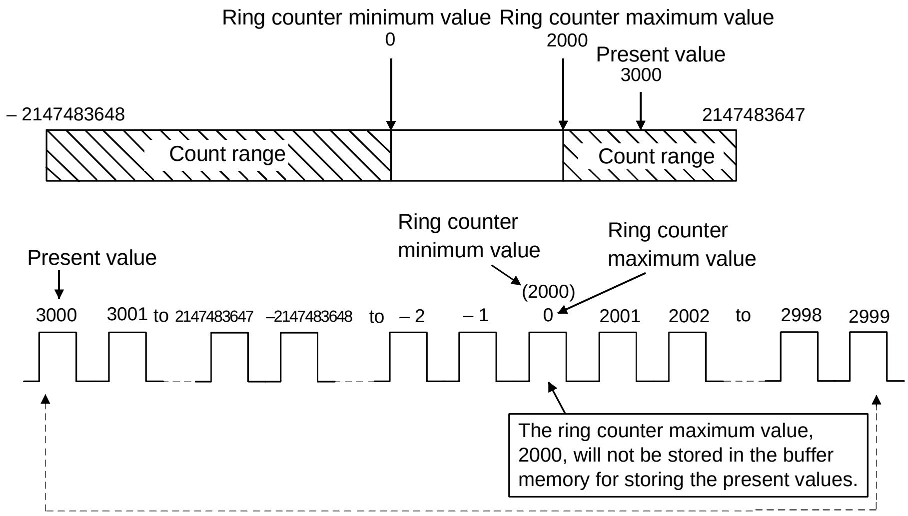
Whether during up count or down count, the ring counter maximum value will not be stored in the buffer memory for storing the present values.
For example, if the count is enabled with the ring counter minimum value of 0, the ring counter maximum value of 2000 and the present value of 500, the count range 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.

Whether during up count or down count, the ring counter maximum value will not be stored in the buffer memory for storing the present values.
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 the "ring counter's minimum value is equal to the ring counter's maximum value", the count range will cover any value that can be expressed in 32-bit signed binary values (-2147483648 to +2147483637), regardless of the present value.

POINTS

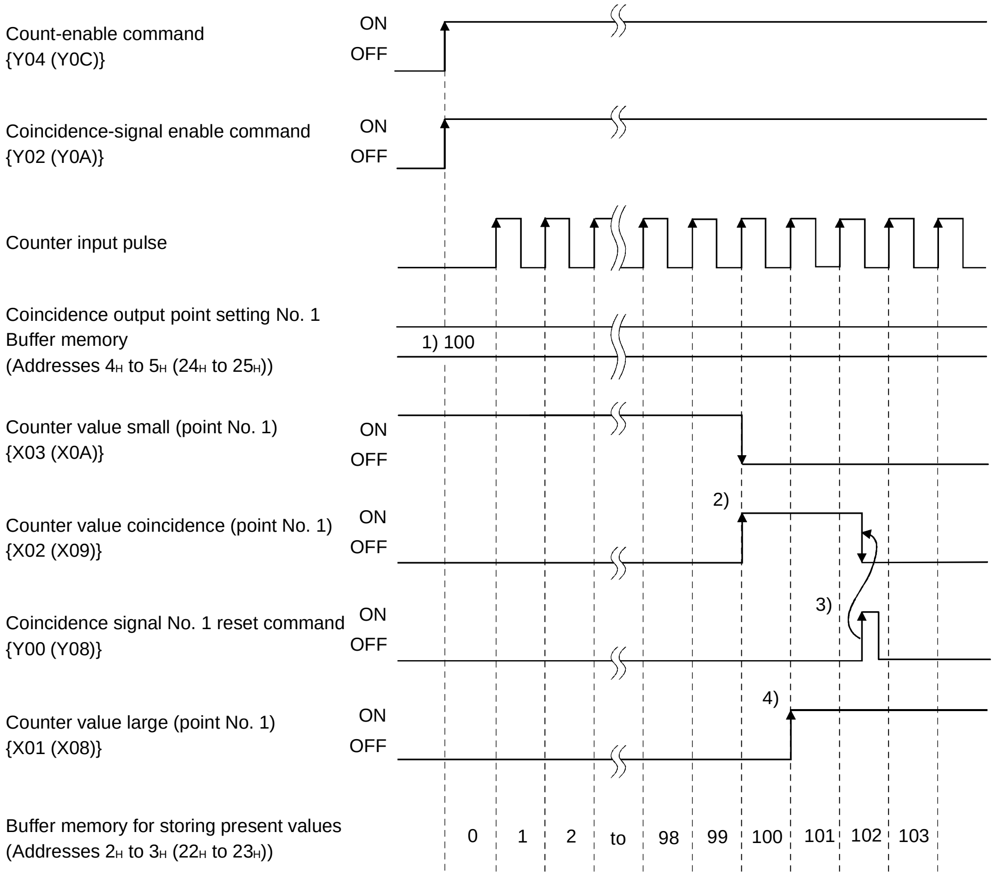
(1) When the count enable command {Y04(Y0C)} is ON, the set values for the buffer memory will not change even if values are written as the minimum value and maximum value of the ring counter. To change the ring counter maximum and minimum value settings, first turn the count enable command OFF.

(2) When the count range is to be changed using preset, always change it after first turning the count enable command {Y04(Y0C)} OFF.

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. To use the coincidence signal external output, turn ON the coincidence signal enable command {Y02(Y0A)}.

(1) Coincidence Output Operation



Number	Description
1)	The coincidence output point set values are written in advance as 32-bit signed binary values in the coincidence output point No. 1 buffer memory {addresses 4_H to 5_H (24_H to 25_H)}.
2)	When the count value becomes the coincidence output point set value, the counter value small signal turns OFF and the counter value coincidence signal turns ON.
3)	When the coincidence signal reset command is turned ON, the counter value coincidence signal is reset. If the counter value coincidence signal stays ON, the next coincidence signal cannot be output.
4)	When the counter value becomes greater than the coincidence output point set value, the counter value large signal turns ON.

POINT

With the coincidence output function, set the coincidence output point before turning the coincidence signal enable command ON, then reset the coincidence signal (turning the command OFF to ON to OFF).
If the coincidence signal enable command is turned ON without performing the above operation, the coincidence output will be performed since the coincidence output point and present count value match in the initial state .

(2) Output status setting during a CPU stop error

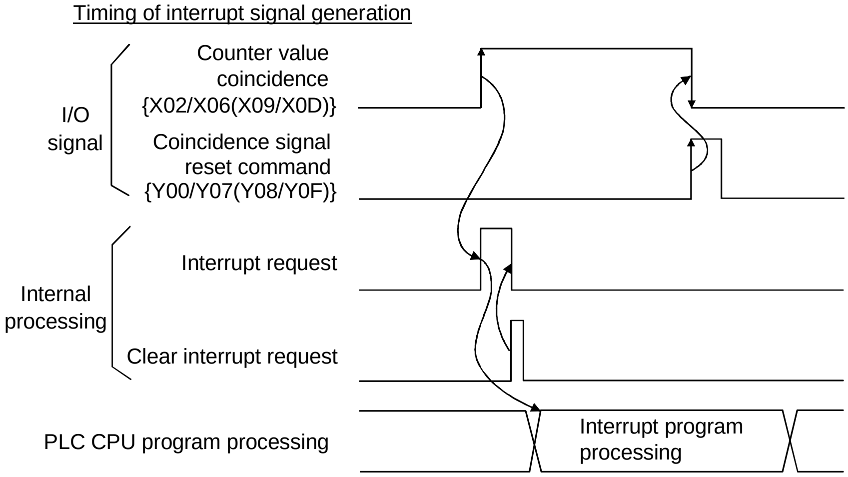
The output status (clear/hold) can be set for the external output signal when a CPU stop error occurs.
The output status is set using the GX Developer I/O assignment.
See Section 4.5 for details on the I/O assignment setting method.

(3) Coincidence detection interrupt function

The coincidence detection interrupt function generates an interrupt request for the PLC CPU during coincidence detection. The interrupt processing program can be started using this interrupt request.
(When the PLC CPU 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

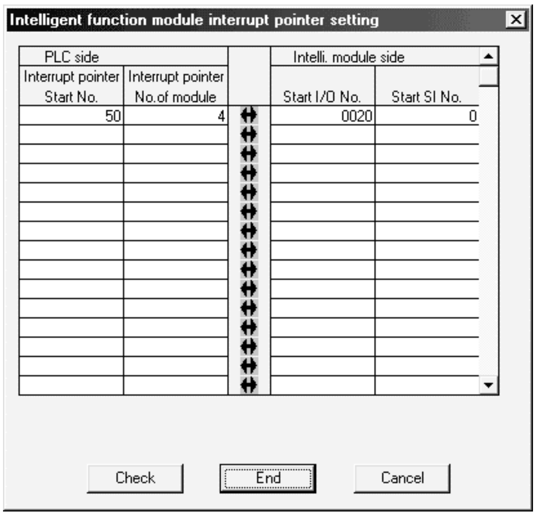


(b) Assignment of the interruption factors (SI) and the interrupt pointers for PLC CPU are set by selecting "PLC parameter" - "PLC system" - "Intelligent function module setting" - "Interrupt pointer settings".

1) PLC side "Interrupt pointer start No."
Specify the starting number for the PLC CPU interrupt pointer.
Setting range: 50 to 255

2) PLC side "Interrupt pointer No. of units"
   Specify the number of units for the interrupt execution conditions set by the "Interrupt setting".
   Setting range: 1 to 16 (units)
3) Intelli. unit side "Start I/O No."
   Specify the start I/O number for the intelligent function module that performed the interrupt setting.
   Setting range: 0000 to 0FF0 (H)
4) Intelli. unit side "Start SI No."
   Specify the number of the intelligent function module interrupt pointer that was set by the interrupt setting, "Interrupt (SI) No.".
   Setting range: 0 to 15

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 dialog box for the "Intelligent function module's interrupt point setting." 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 command from the sequence program
   When the IMASK command is used, interrupt program execution enable/disable (interrupt mask) can be set for each interrupt pointer number. Refer to the Q (Q Mode)/QnA Programming Manual for details on the IMASK command.

POINT

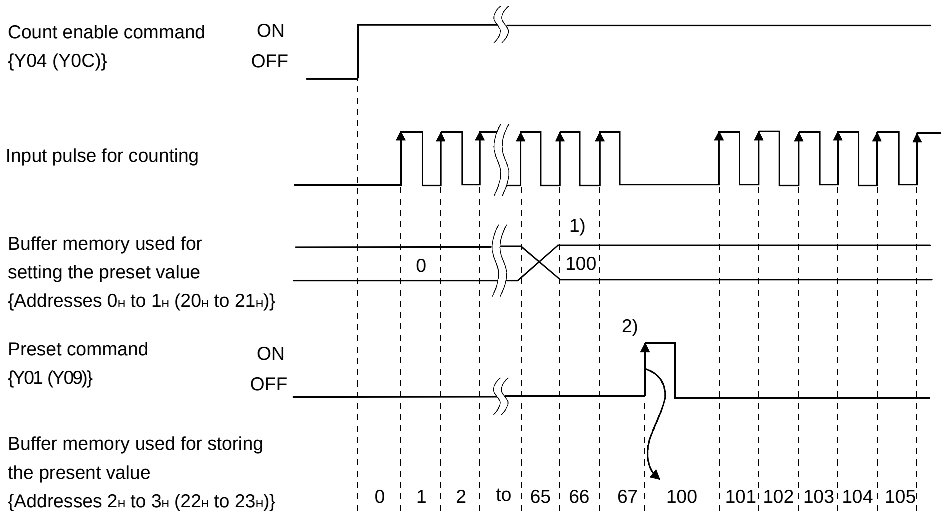
A coincidence detection interrupt occurs when the counter value coincidence signal rises (OFF → ON). Thus, the next interrupt request does not occur unless the coincidence signal is reset and the counter value coincidence signal is turned OFF.

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

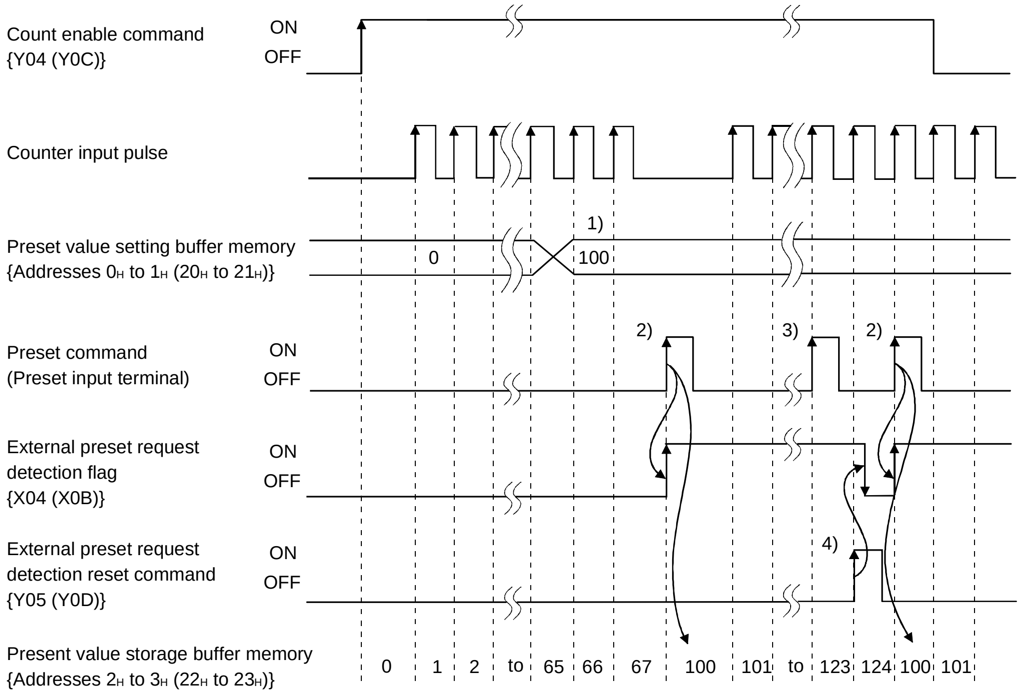
Preset is performed by turning the preset command {Y01(Y09)} ON using the sequence program.



Number	Description
1)	Any numeric value is written in 32-bit binary format into the preset value setting buffer memory (Addresses 0_H to 1_H (20_H to 21_H)) for the QD62 (E/D).
2)	At the start (OFF to ON) of the preset command, the preset value in the preset value setting buffer memory is preset in the present value storage buffer memory. Preset can be executed regardless of whether the count enable command {Y04(Y0C)} is ON or OFF.

(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)	Any numeric value is written in 32-bit binary format into the preset value setting buffer memory (Addresses 0_H to 1_H (20_H to 21_H)) for the QD62(E/D).
2)	At the start (OFF to ON) of the preset command (voltage applied to the preset input terminal), the preset value in the preset value setting buffer memory is preset in the present value storage buffer memory. Preset can be executed regardless of whether the count enable command {Y04(Y0C)} is ON or OFF.

POINT

While the external preset request detection flag {X04(X0B)} is ON (3), preset cannot be executed even if voltage is applied to the preset terminal or the preset command {Y01(Y09)} is turned ON. Preset can be performed by turning ON (4) the external preset request detection reset command {Y05(Y0D)} and turning OFF the external preset request detection flag.

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.
The counter function selection can be executed by writing the data shown in the table below into the counter function selection setting buffer memory (address 9_H (29_H)} and by using the counter function selection start command (voltage applied to the function start input terminal or turning Y06 (Y0E) ON using the 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 the count while the counter function selection start command is being entered when the count enable command (Y04 (Y0C)) is ON.

(2) Latch counter function

This function latches the present value at the time the counter function selection start command was entered to the latch count value (addresses C_H to D_H ($2C_H$ to $2D_H$).

(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.

POINTS

(1) Change the counter function while the counter function selection start command is OFF.
(2) The counter function selection can be executed either by turning Y06 (Y0E) ON or applying voltage to the function start input terminal. Also, the signal that was entered first takes precedence.
(3) Time settings for the sampling counter function and the periodic pulse counter function are performed by writing data in a range from 1 to 65535 into the sampling/periodic setting buffer memory {address A_H ($2A_H$)}. The time unit is 10 ms.
(Example) When 420 is specified in the sampling/periodic time setting buffer memory
$$\text{Setting time} = 420 \times 10 = 4200\ [\text{ms}]$$

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. The count values when the latch counter, sampling counter and periodic pulse counter functions are executed are stored in the counter function selection count value storage buffer memory at the addresses shown 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	2_H to 3_H	C_H to D_H	E_H to F_H	10_H to 11_H	12_H to 13_H
	CH2	22_H to 23_H	$2C_H$ to $2D_H$	$2E_H$ to $2F_H$	30_H to 31_H	32_H to 33_H

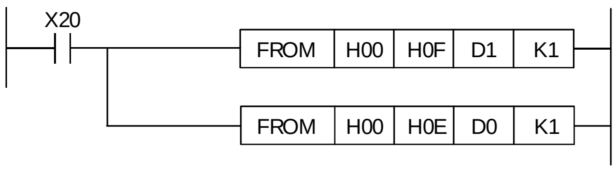
The present values and counter function selection count values are stored as 32-bit signed binary values in the buffer memory. Also, since the contents of the buffer memory are automatically updated by the count operation, the latest count values can be read from the buffer memory.

POINTS

(1) When reading the present and counter function selection count values, use the DFRO command 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

With the counter function selection, an error occurs in the count when it is executed using an external input (voltage applied to the function start input terminal) or by a sequence program (counter function selection start command ON).
The following explains how to calculate the count error.

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

1 [ms] × pulse input speed [PPS] × multiple [count]

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

1 scan time [s] × pulse input speed [PPS] × multiple [count]

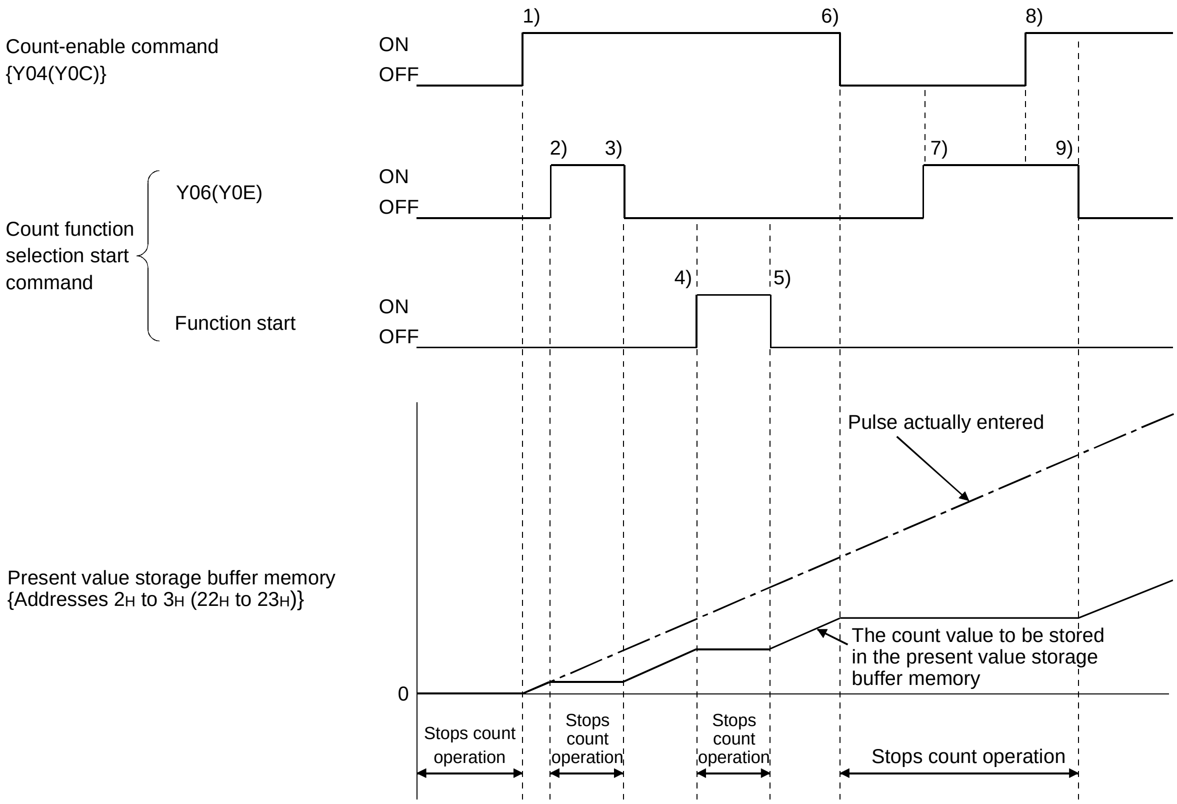
(3) Count error (maximum) due to the internal clock when executing the sampling counter function and periodic pulse counter function

$$\frac{\text{Setting time [s]} \times \text{pulse input speed [PPS]} \times \text{multiple [count]}}{10000}$$

6.2 Using the Disable Count Function

The disable count function stops the count operation while the count enable command is ON.

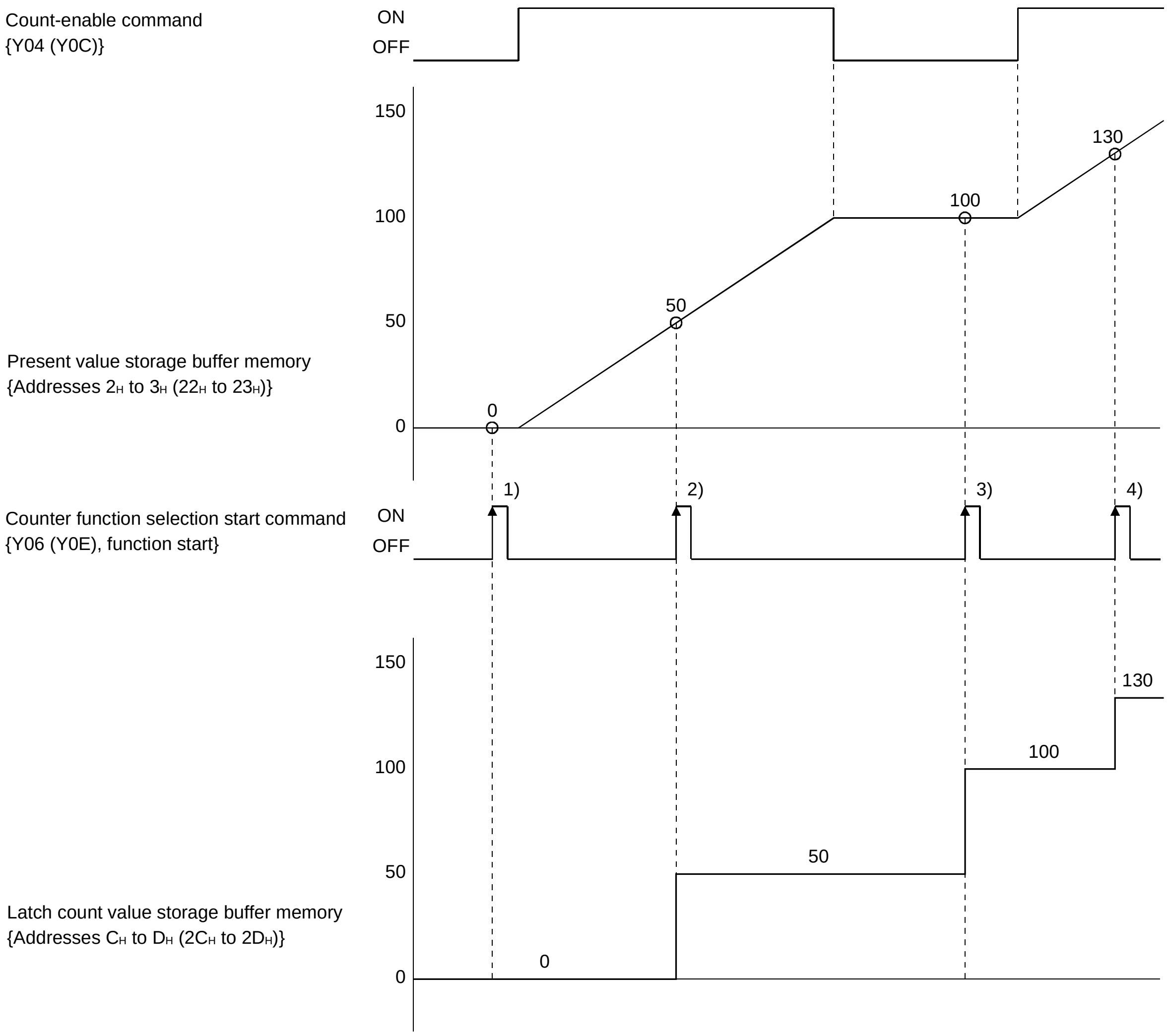
The relationships between the count enable command, counter function selection start command and the present counter value are illustrated below.



Number	Description
1)	Count operation starts when the count enable command {Y04 (Y0C)} turns ON.
2)	Count operation stops when the counter function selection start command {Y06 (Y0E)} turns ON.
3)	Count operation resumes when the counter function selection start command {Y06 (Y0E)} turns OFF.
4)	Count operation stops when the count function selection start command (function start) turns on.
5)	Count operation resumes when the count function selection start command (function start) turns off.
6)	Count operation stops when the count enable command turns OFF.
7)	Count operation stops regardless of the status of the counter function selection start command since the count enable command is OFF.
8)	Count operation stays stopped even if the count enable command turns ON, since the counter function selection start command is ON.
9)	Count operation resumes when the counter function selection start command turns OFF.

6.3 Using the Latch Counter Function

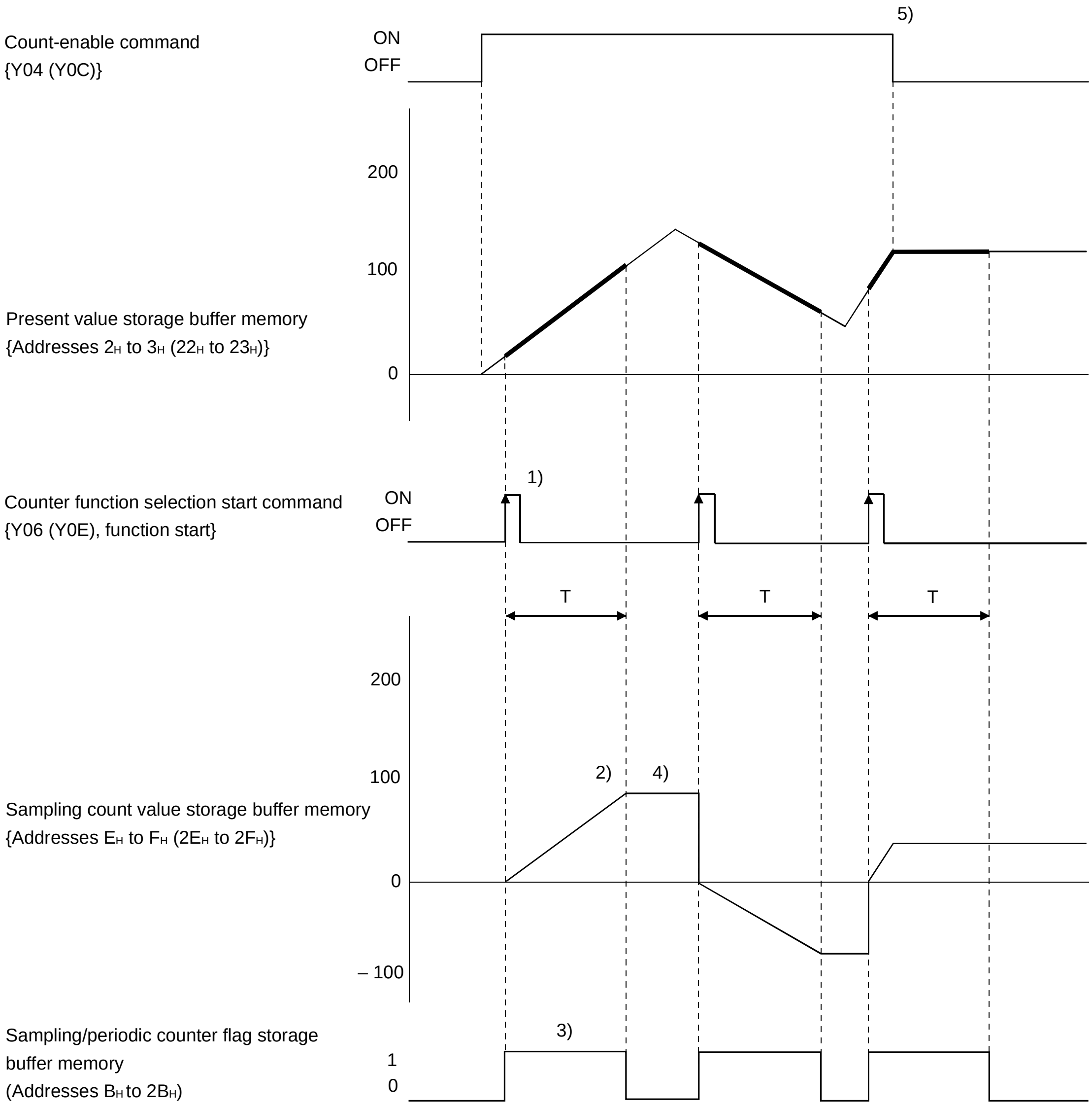
The latch counter function latches the present counter value at the time a signal was entered.
The relationships between the present counter value for the latch counter function, the counter function selection start command and the latch count value storage buffer memory are illustrated below:



When the counter function selection start command {Y06 (Y0E), function start input} rises at points indicated by 1) to 4) in the figure above, the present counter value is stored in the latch count value storage buffer memory {addresses C_H to D_H ($2C_H$ to $2D_H$)}. The latch counter function is executed regardless of whether the count enable command {Y04 (Y0C)} turns ON/OFF.

6.4 Using the Sampling Counter Function

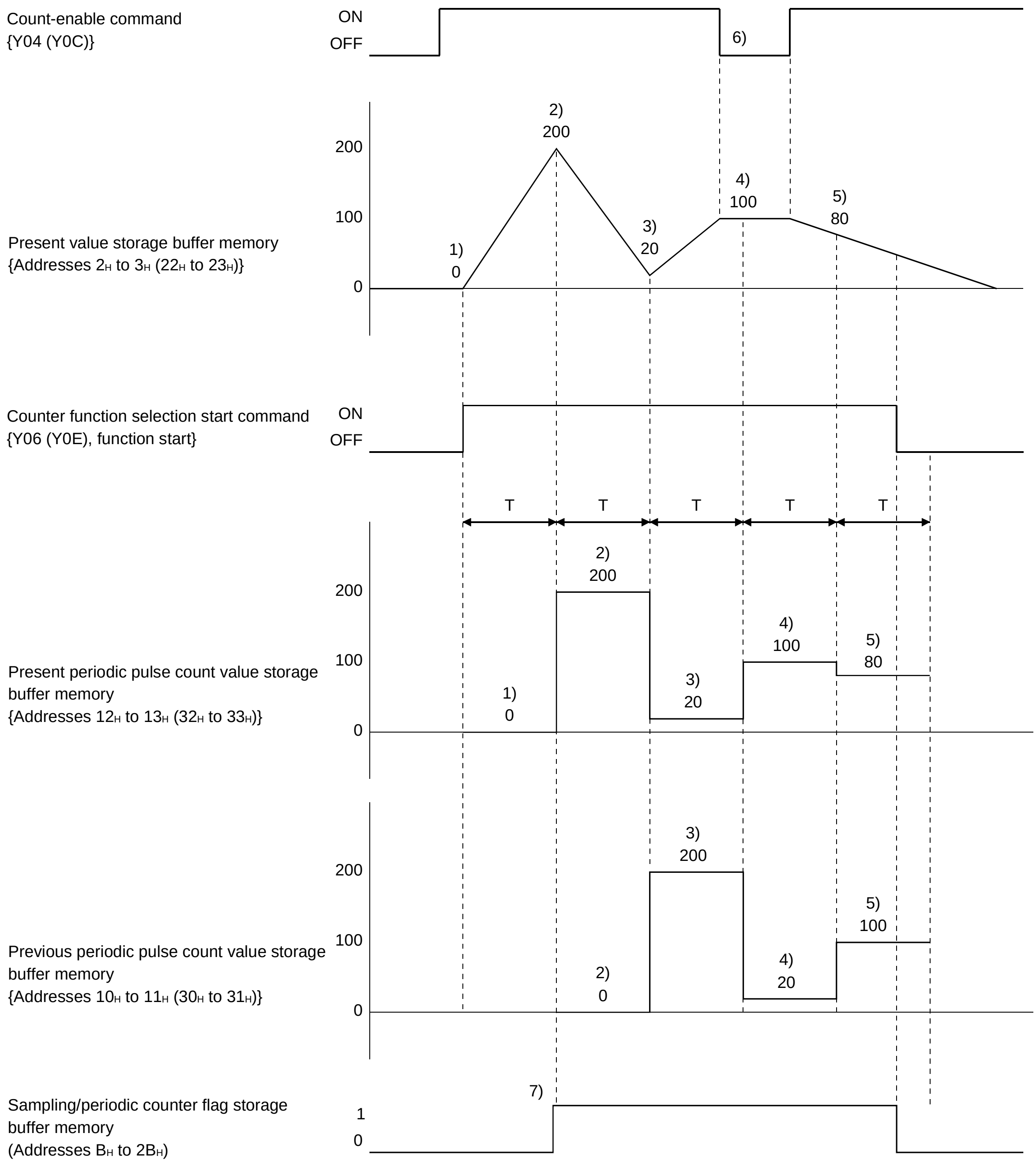
The sampling counter function counts the pulses that are entered during the specified sampling time period.
The relationships between the signals, buffer memory, etc. in the sampling counter function are illustrated below.



Number	Description
1)	The pulses entered are counted from 0 at the rise of the counter function selection start command {Y06 (Y0E), function start input}.
2)	When the specified sampling time period elapses, the count stops.
3)	While the sampling counter function is being executed, 1 is stored in the sampling/periodic counter flag storage buffer memory {address B_H ($2B_H$)}.
4)	Even if the execution of the sampling counter function ends, the value in the sampling count value storage buffer memory is saved.
5)	The sampling counter function is executed regardless of whether the count enable command {Y04 (Y0C)} turns ON/OFF.

6.5 Using the Periodic Pulse Counter Function

The periodic pulse counter function stores the present and previous counter values for each specified periodic time (T) as the present and previous values.
The relationships between the signals, buffer memory, etc. in the periodic pulse counter function are illustrated below.



Number	Description
1)	The present counter value of 0 is stored in the present periodic pulse count value storage buffer memory {addresses 12H to 13H (32H to 33H)} (hereinafter called the present value buffer memory).
2)	The present counter value of 200 is stored in the present value buffer memory. The value 0 that has been stored in the present value buffer memory will be stored in the previous periodic pulse count value storage buffer memory {addresses 10H to 11H (30H to 31H)} (hereinafter called the previous value buffer memory).
3)	The present counter value of 20 is stored in the present value buffer memory. The value 200 that has been stored in the present value buffer memory will be stored in the previous value buffer memory.
4)	The present counter value of 100 is stored in the present value buffer memory. The value 20 that has been stored in the present value buffer memory will be stored in the previous value buffer memory.
5)	The present counter value of 80 is stored in the present value buffer memory. The value 100 that has been stored in the present value buffer memory will be stored in the previous value buffer memory.
6)	The periodic pulse counter function is executed regardless of whether the count enable command {Y04 (Y0C)} is ON or OFF.
7)	Value 1 is stored in the sampling/periodic counter flag storage buffer memory {address BH (2BH)} while the periodic pulse counter function is being executed.

7 UTILITY PACKAGE (GX Configurator-CT)

7.1 Utility Package Functions

Table 7.1 shows a list of the utility package functions.

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 PLC CPU parameters, and automatically written to the QD62 (E/D) when the PLC CPU is placed in the RUN status.	Section 7.4
Auto refresh	(1) Sets for each channel the QD62 (E/D) buffer memory that refreshes automatically. • 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 stored in the buffer memory of the QD62 (E/D) where automatic refresh is set are automatically read when the PLC CPU executes the END command.	Section 7.5
Monitor/test	Monitors and tests the buffer memory and I/O signals for the QD62 (E/D). • X/Y device • CH□ Preset function • CH□ Coincidence output function • CH□ Counter selection function • CH□ Ring counter function	Section 7.6

7.2 Installing and Uninstalling the Utility Package

See "Method of installing the MELSOFT Series" attached with the utility package regarding the install and uninstall operation for the utility package.

7.2.1 User precautions

The following explains the precautions on using the Utility package:

(1) Important safety information

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

(2) About installation

GX Configurator-CT is an add-in software package for GX Developer Version 4 or later products. Therefore, install GX Configurator-CT in a personal computer in which GX Developer Version 4 or later product has been installed.

(3) About display screen errors while using the intelligent function module utility

There may be cases in which the screen will not properly display while the intelligent function module utility is being used, due to a lack of system resources. If this occurs, close the intelligent function module utility first, and then close GX Developer (program, comments, etc.) and other applications. Next, restart GX Developer and the intelligent function module utility.

(4) To start the intelligent function module utility

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

(b) Multiple intelligent function module utilities can be started.
However, the [Open file]/[Save file] parameter operations of the intelligent function module can only be performed by a single intelligent function module utility. Other intelligent function module utilities can perform the [Monitor/test] operation only.

(5) How to switch screens when two or more intelligent function module utilities are started

When two or more intelligent function module utility screens cannot be displayed side by side, use the task bar to display the desired intelligent function module utility screen on top of other screens.

(6) About the number of parameters that can be set in GX Configurator-CT

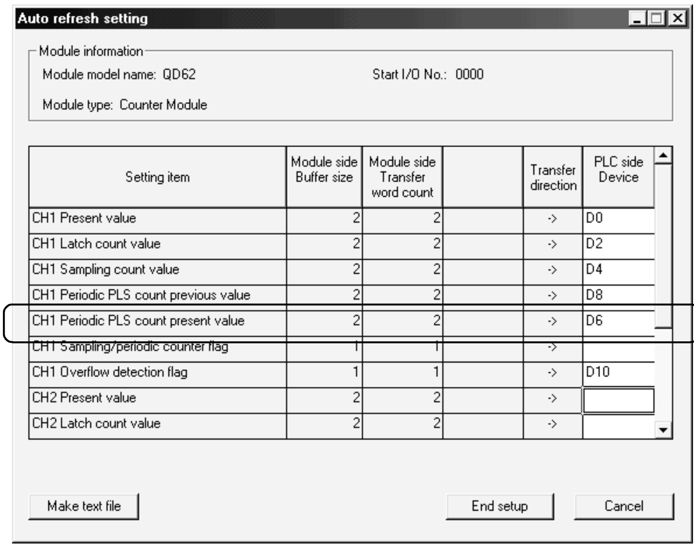
The number of parameters that can be set by the GX Configurator for an intelligent function module installed in the CPU module and in a remote I/O station of the MELSECNET/H network system is limited.

Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Automatic refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256
MELSECNET/H remote I/O station	512	256

For example, if multiple intelligent function modules are installed in a remote I/O station, set the GX Configurator so that the number of parameter settings of all the intelligent function modules does not exceed the maximum number of parameter settings.The total number of parameter settings is calculated separately for the initial setting and for the automatic refresh setting.
The number of parameter settings that can be set for one module in the GX Configurator-CT is as shown below.

Object Module	Initial setting	Automatic refresh setting
QD62/QD62E/QD62D	8 (Fixed)	14 (Maximum number of settings)

Example) Counting the number of parameter settings in the automatic 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 screen, then add them to the total for the other intelligent function modules to get a grand total.

7.2.2 Operating environment

The operating environment of the personal computer where the GX Configurator-CT is used is explained.

Item		Peripheral devices
Installation (Add-in) destination ∗1		Add-in to GX Developer Version 4 (English version) or later ∗2
Computer main unit		Personal computer on which Windows® operates.
	CPU	Refer to the following table "Used operating system and performance required for personal computer".
	Required memory	
Hard disk free space	For installation	65 MB or more
	For operation	10 MB or more
Display		800 × 600 dot 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) Microsoft® Windows® XP Home Edition Operating System (English version)

∗1: Install the GX Configurator-CT in GX Developer Version 4 or higher in the same language.
GX Developer (English version) and GX Configurator-CT (Japanese version) cannot be used in combination, and GX Developer (Japanese version) and GX Configurator-CT (English version) cannot be used in configuration.

∗2: GX Configurator-CT cannot be used as an add-in with GX Developer Version 3 or earlier versions.

∗3: Setting fonts Size of Windows® for "Large Fonts" may cause the text to extend off screen. Therefore, choose "Small Fonts".

Used operating system and performance required for personal computer

Operating system		Performance Required for Personal Computer	
		CPU	Required memory
Windows® 95		Pentium® 133MHz or more	32MB or more
Windows® 98		Pentium® 133MHz or more	32MB or more
Windows® Me		Pentium® 150MHz or more	32MB or more
Windows NT® Workstation 4.0		Pentium® 133MHz or more	32MB or more
Windows® 2000 Professional		Pentium® 133MHz or more	64MB or more
Windows® XP Professional	"XP compatibility mode" and "Fast User Switching" are not supported.	Pentium® 300MHz or more	128MB or more
Windows® XP Home Edition		Pentium® 300MHz or more	128MB or more

7.3 Explanation of Utility Package Operations

7.3.1 How to perform common utility package operations

(1) Available control keys

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

Name of key	Application
Esc	Cancels a newly entered value when entering data in a cell. Closes the window.
Tab	Moves between controls in the window.
Ctrl	Uses together with the mouse when multiple cells are selected in the Test selected.
Delete	Deletes the character where the cursor is positioned. When a cell is selected, clears all of the setting contents.
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	Confirms the value entered in the cell.

(2) Data to be created with the utility package

The data and files shown below that are created with the utility package are also used by GX Developer operations. Figure 7.1 shows which operation uses which data or file.

<Intelligent module parameters>

(a) This data is created with the auto refresh setting, and stored in the intelligent module parameter file of the project to be created using GX Developer.

```
Project
  ├── Program
  ├── Parameters
  │     ├── PLC Parameters
  │     ├── Network Parameters
  │     └── Intelligent Module Parameters
  │
```

(b) Steps 1) to 3) shown in Figure 7.1 are performed using the following operations.

1) Operating using GX Developer.
[Project] → [Open project] / [Save] / [Save as]

2) Operating on the intelligent module parameter setting module selection screen of the utility.
[File] → [Open file] / [Save file]

3) Operating using GX Developer.
[Online] → [Read from PLC] / [Write to PLC] → "Intelligent module parameter"
Or, operate on the intelligent module parameter setting module selection screen of the utility.
[Online] → [Read from PLC] / [Write to PLC]

<Text file>

(a) A text file can be created by performing the initial setting or auto refresh setting, or selecting [Make text file] on the monitor/test screen. Text files can be utilized to create user documents.

(b) Text files can be saved to 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.

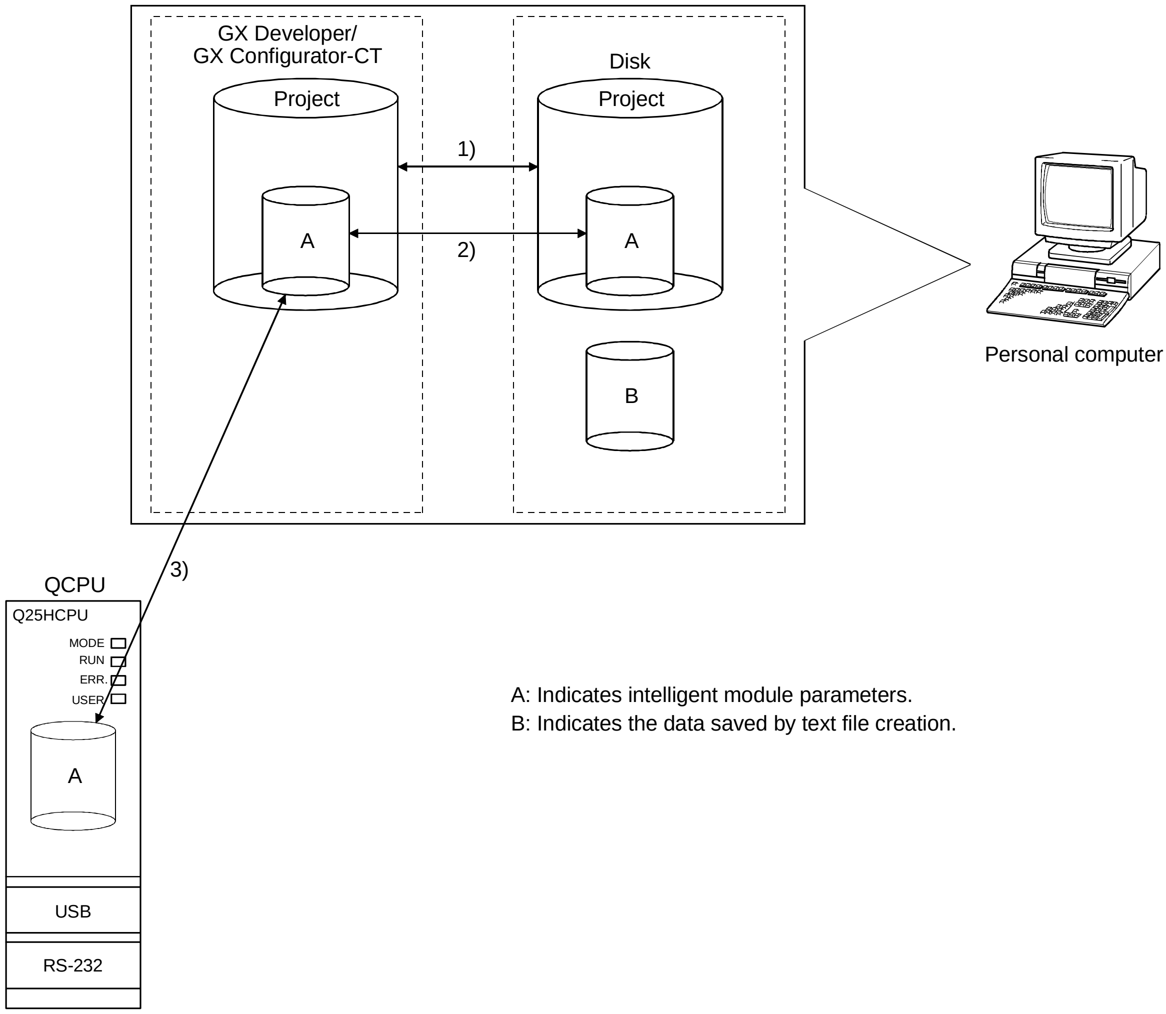
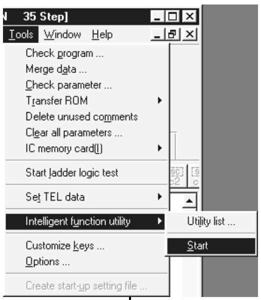


Figure 7.1 correlation diagram for data created using the utility package

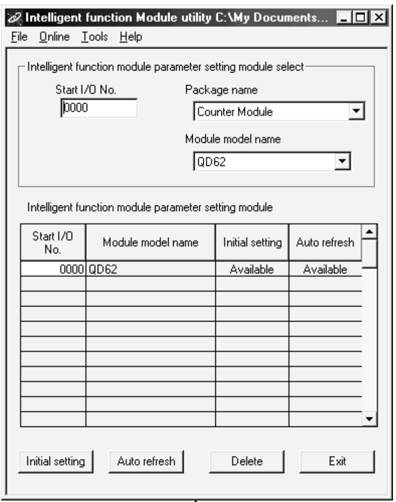
7.3.2 Operation overview

GX Developer screen



[Tools] – [Intelligent function utility] – [Start]

Intelligent module parameter setting module selection screen



See Section 7.3.3

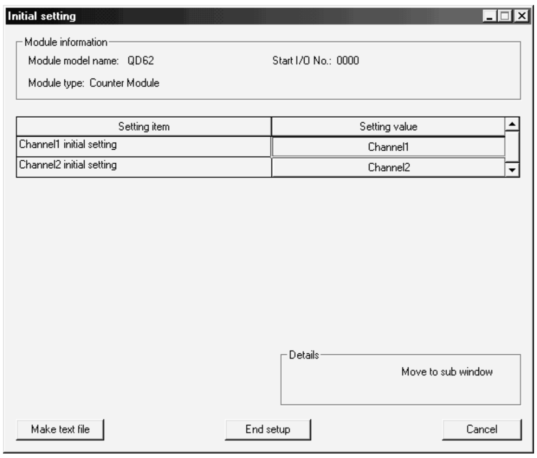
Enter "Start I/O No.", then select "Package name" and "Module model name".

1)

Initial setting

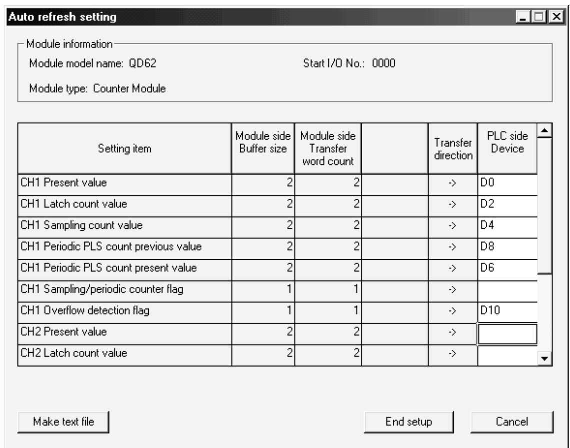
Auto refresh

Initial setting screen



See Section 7.4

Auto refresh setting screen

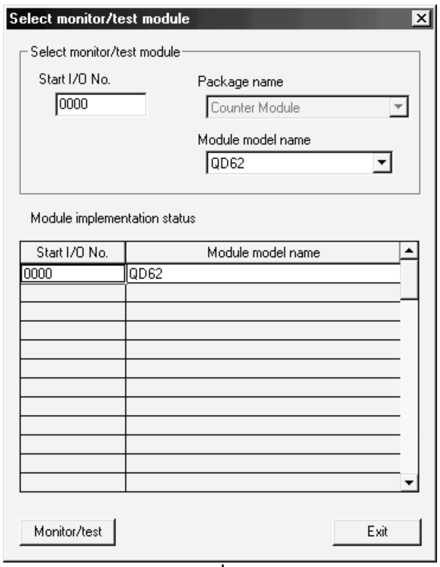


See Section 7.5

1)

[Online] – [Monitor/test]

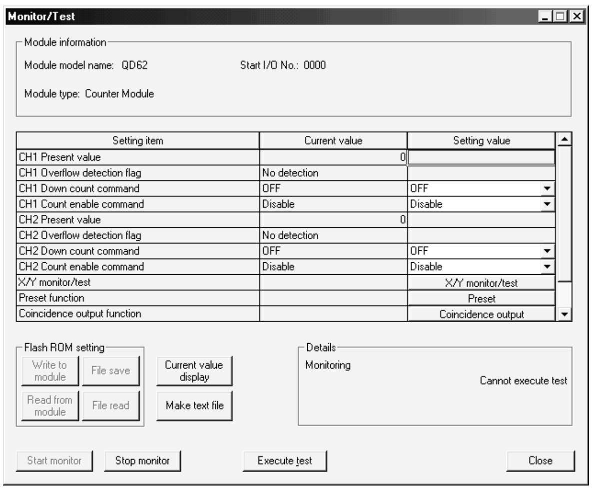
Select monitor/test module screen



Monitor/test

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

Monitor/test screen



See Section 7.6

7.3.3 Starting the intelligent function utility

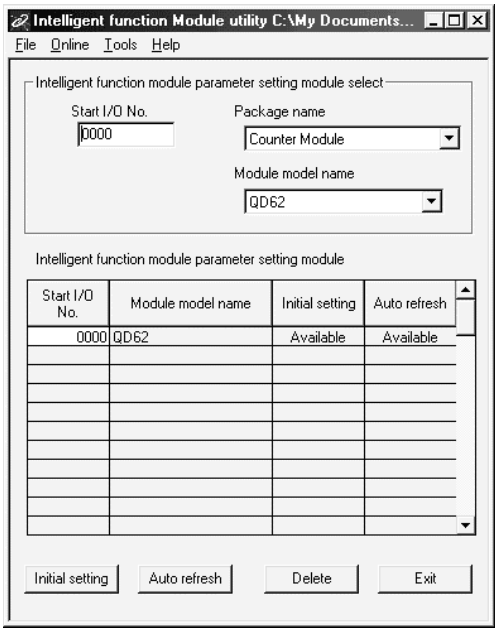
[Purpose of operation]

Start the utility from GX Developer, and display the intelligent module parameter setting module selection screen. The initial setting, auto refresh and select monitor/test module (selecting the module for which monitoring/testing is to be performed) screens can be started from this screen.

[Startup procedure]

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

[Setting screen]



[Explanation of items]

(1) How to start each screen

(a) Starting the initial setting
"Start I/O No.*" → "Package name" → "Module model name" →
Initial setting

(b) Starting the auto refresh setting
"Start I/O No.*" → "Package name"→ "Module model name"→
Auto refresh

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

* Enter the start I/O No. in hexadecimal

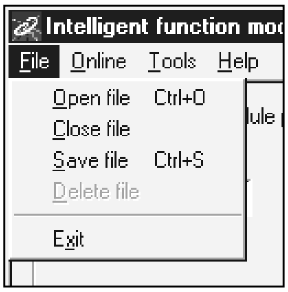
(2) Explanation of the screen command buttons

Delete Deletes the initial settings and auto refresh setting for the selected module.

Exit Ends the intelligent module parameter setting module selection screen.

(3) Menu bar

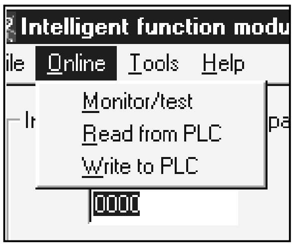
(a) File items



File operations are performed for the intelligent module parameters for the project opened by GX Developer.

[Open file] : Opens the parameter file.
[Close file] : Closes the parameter file. If changes have been made, the dialog box asking whether to save the file appears.
[Save file] : Saves the parameter file.
[Delete file] : Deletes the parameter file.
[Exit] : Ends the intelligent module parameter setting module selection screen.

(b) Online items



[Monitor/test] : Starts the select monitor/test module screen.
[Read from PLC] : Reads the intelligent module parameters from the CPU module.
[Write to PLC] : Writes the intelligent module parameters to the CPU module.

POINT

(1) Saving the intelligent module parameter files

Since these files cannot be saved using the GX Developer's project save operation, save the files using the intelligent module parameter setting module selection screen mentioned above.

(2) Reading and writing the intelligent module parameters to and from a PLC using GX Developer.

(a) Once the intelligent module parameters are saved in a file, they can be read from and written to the PLC.

(b) Set the target PLC CPU using [Online] → [Transfer setup] of GX Developer.

(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 for the required utility

The head I/O is displayed in the Intelligent function module utility setting screen, but a "*" may be displayed for the model name.

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

Check for the required utility in [Tools] - [Intelligent function utility] - [Utility list...] in GX Developer, and set it.

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

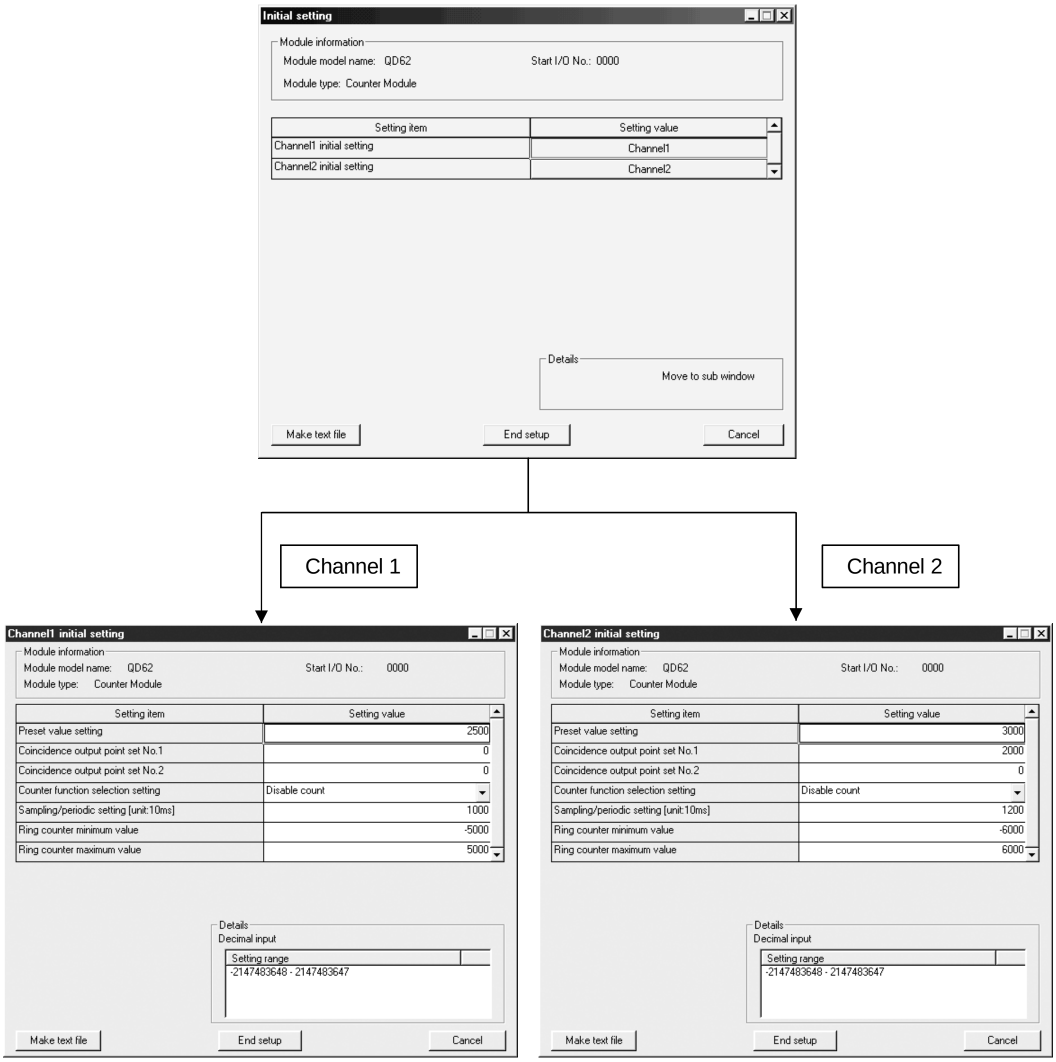
These initial settings eliminate the need to set sequence programs.

[Startup procedure]

"Start I/O No. ＊" → "Package name" → "Module model name" → Initial setting

＊ Enter the start I/O No. in hexadecimal

[Setting screen]



[Explanation of items]

(1) Explanation of the command buttons

Make text file	Outputs the screen display in a text file format.
End setup	Confirms the entry of set data and ends the operation.
Cancel	Cancels the set data 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 of operation]

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

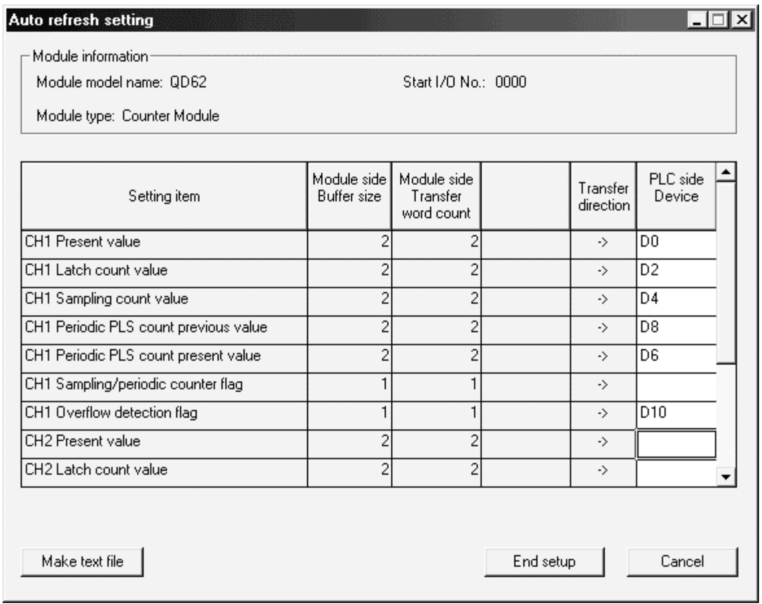
These auto refresh settings eliminate the need for reading by a sequence program.

[Startup procedure]

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

＊ Enter the start I/O No. in hexadecimal

[Setting screen]



[Explanation of items]

(1) Contents of the screen display

Module side buffer size	: Displays the size of the setting item buffer memory.
Module side transfer word count	: Displays the number of words to transfer.
Transfer direction	: "←" indicates that data at the PLC CPU side is written to the buffer memory. "→" indicates that data is read from the buffer memory to the PLC CPU side.
PLC side device	: Enter the device at the CPU module to be automatically refreshed. The devices that can be used include 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). Also, buffer memory data is stored in 16-point portions starting with the device number that has been set. For example, if X10 is set, data will be stored to X10 through X1F.

(2) Explanation of the command buttons

Make text file	Creates a file containing the displayed screen data in a text file format.
End setup	Confirms the entry of set data and ends the operation.
Cancel	Cancels the set data and ends the operation.

POINTS

- The auto refresh settings are stored in the intelligent module parameters. Once the intelligent module parameters are written to the CPU module, they can be enabled by turning the power OFF and then ON, or resetting the CPU module.
- Auto refresh settings cannot be changed from the sequence program. However, it is possible to add a process similar to auto refresh by using the FROM/TO commands of the sequence program.

7.6 Monitor/Test

7.6.1 Monitor/Test

[Purpose of operation]

Start the buffer memory monitoring/testing, and I/O signals monitoring/testing from this screen.

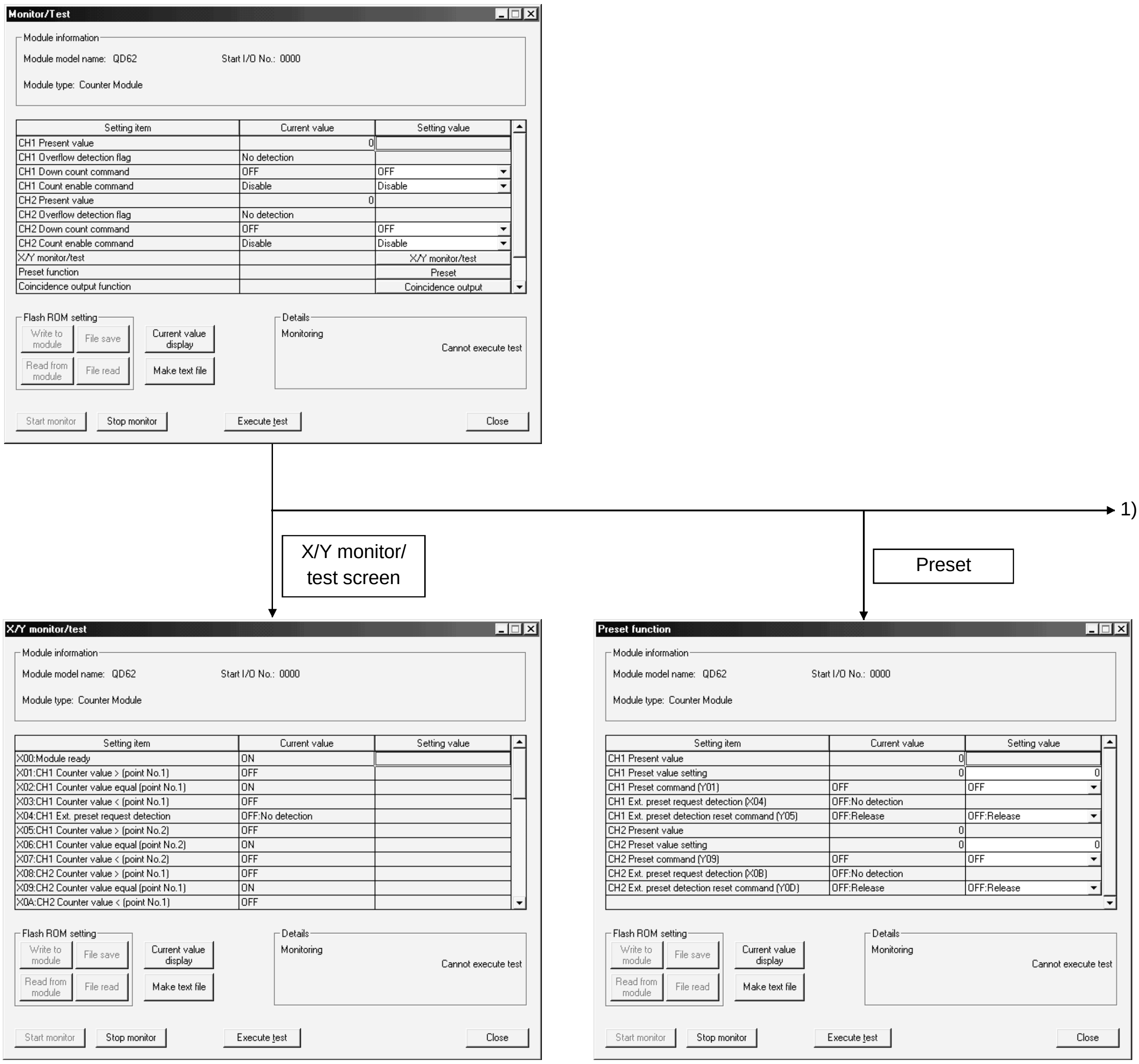
[Startup procedure]

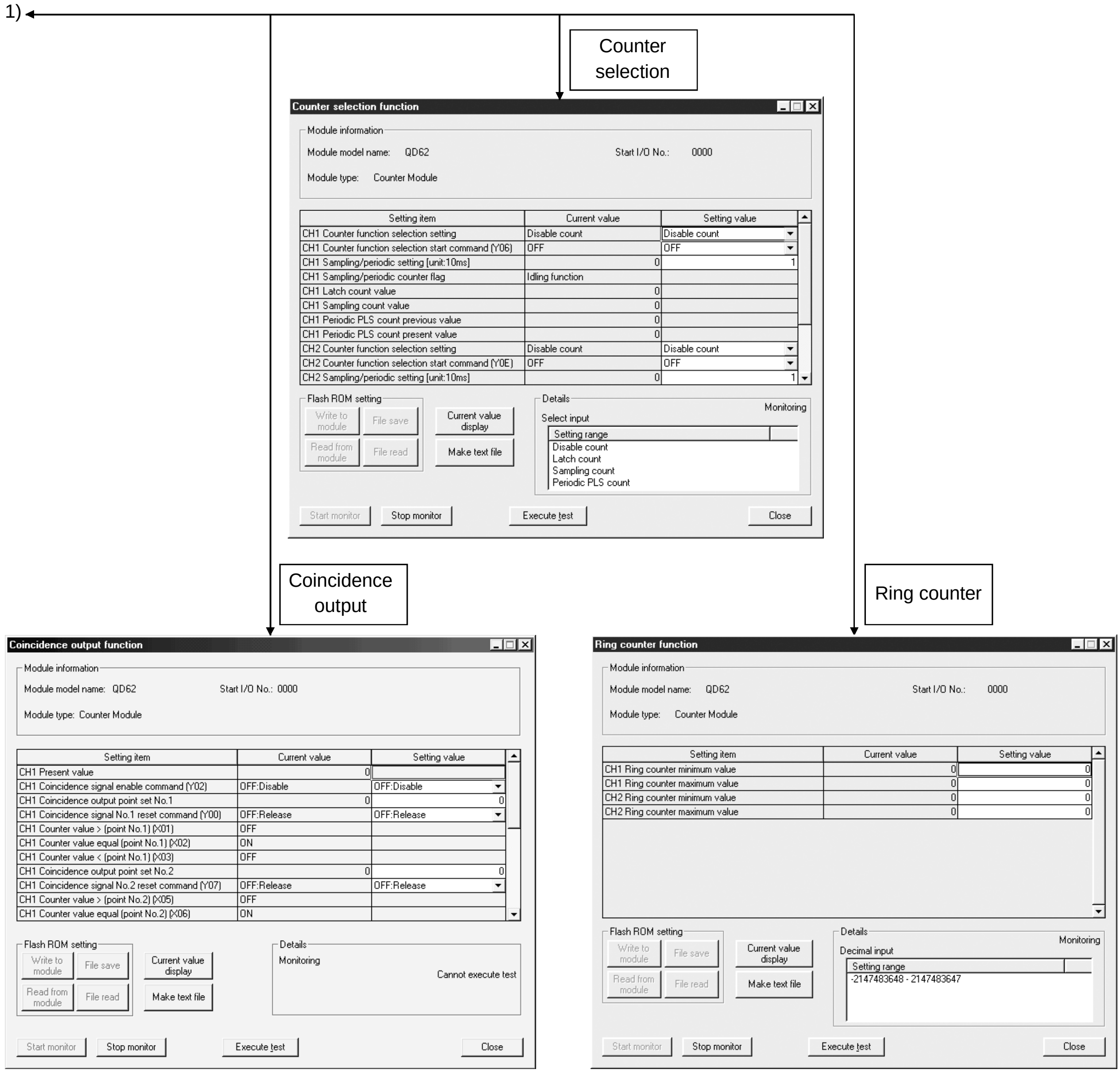
Select monitor/test module screen → "Start I/O No. ＊" → "Package name" → "Module model name" → Monitor/test

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

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

[Setting screen]




1)
Counter selection
Counter selection function
Module information
Module model name: QD62
Start I/O No.: 0000
Module type: Counter Module
Setting item
Current value
Setting value
CH1 Counter function selection setting
Disable count
Disable count
CH1 Counter function selection start command (Y06)
OFF
OFF
CH1 Sampling/periodic setting [unit:10ms]
0
1
CH1 Sampling/periodic counter flag
Idling function
CH1 Latch count value
0
CH1 Sampling count value
0
CH1 Periodic PLS count previous value
0
CH1 Periodic PLS count present value
0
CH2 Counter function selection setting
Disable count
Disable count
CH2 Counter function selection start command (Y0E)
OFF
OFF
CH2 Sampling/periodic setting [unit:10ms]
0
1
Flash ROM setting
Write to module
File save
Read from module
File read
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
Coincidence output function
Module information
Module model name: QD62
Start I/O No.: 0000
Module type: Counter Module
Setting item
Current value
Setting value
CH1 Present value
0
CH1 Coincidence signal enable command (Y02)
OFF:Disable
OFF:Disable
CH1 Coincidence output point set No.1
0
0
CH1 Coincidence signal No.1 reset command (Y00)
OFF:Release
OFF:Release
CH1 Counter value > (point No.1) (X01)
OFF
CH1 Counter value equal (point No.1) (X02)
ON
CH1 Counter value < (point No.1) (X03)
OFF
CH1 Coincidence output point set No.2
0
0
CH1 Coincidence signal No.2 reset command (Y07)
OFF:Release
OFF:Release
CH1 Counter value > (point No.2) (X05)
OFF
CH1 Counter value equal (point No.2) (X06)
ON
Flash ROM setting
Write to module
File save
Read from module
File read
Current value display
Make text file
Details
Monitoring
Cannot execute test
Start monitor
Stop monitor
Execute test
Close
Ring counter
Ring counter function
Module information
Module model name: QD62
Start I/O No.: 0000
Module type: Counter Module
Setting item
Current value
Setting value
CH1 Ring counter minimum value
0
0
CH1 Ring counter maximum value
0
0
CH2 Ring counter minimum value
0
0
CH2 Ring counter maximum value
0
0
Flash ROM setting
Write to module
File save
Read from module
File read
Current value display
Make text file
Details
Monitoring
Decimal input
Setting range
-2147483648 - 2147483647
Start monitor
Stop monitor
Execute test
Close

[Explanation of items]

(1) Contents of the screen display

Setting item : Displays the I/O signal or buffer memory name.
Current value : Displays the I/O signal status or present buffer memory value for monitoring.
Setting value : Select or enter a value to be written to the buffer memory with a test operation.

(2) Explanation of the command buttons

Current value display	Displays the current value of the selected item. (This command button is used to check 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	Makes a file consisting of the displayed screen contents in a text file format.
Start monitor / Stop monitor	Selects whether or not to monitor the current values.
Execute test	Tests the selected item. To select more than one item, select each additional item while holding down the Ctrl key.
Close	Closes the currently displayed screen and returns to the previously displayed screen.

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.

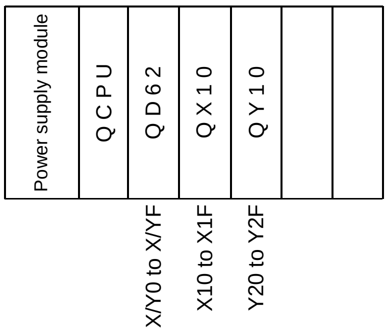
(6) Click Execute test to execute write operation.
Once write operation is completed, the values that were written will be displayed in the current value field.

8 PROGRAMMING

Using a sample system configuration shown below, this chapter explains details of the QD62 (E/D) programs in the following two scenarios: when GX Configurator-CT is used and when GX Configurator-CT is not used.
When diverting any of the program examples introduced in this chapter to the actual system, fully verify that there are no problems in the controllability of the target system.

System configuration used in the program explanation

(1) System configuration



(2) Program conditions

This program uses QD62 to perform counting with the conditions listed below.
Set the pulse input mode, counting speed setting and ring/linear counter selection with the GX Developer intelligent function module switch.

- Pulse input mode : 2 phase multiple of 1
- Counting speed setting : 200 kPPS
- Applicable channel : Channel 1

(a) Contents of initial setting

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 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.

(b) Devices used by the user

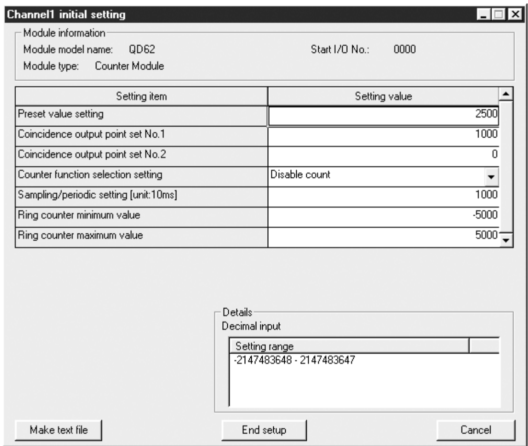
Description	Device	Description	Device
Count operation start signal	X10	Periodic pulse count data read signal	X1C
Current value read signal	X11	Periodic pulse count start signal	X1D
Coincidence output data setting signal	X12	Coincidence confirmation LED signal	Y20
Preset command signal	X13	Overflow occurrence confirmation LED signal	Y21
Count operation stop signal	X14	Initial setting complete signal	M10
Coincidence LED clear signal	X15	Current value storage	D0 to D1
Counter function execution start signal	X16	Latch count value storage	D2 to D3
Counter function execution stop signal	X17	Sampling count value storage	D4 to D5
Latch count data read signal	X18	Periodic pulse count present value storage	D6 to D7
Latch execution signal	X19	Periodic pulse count previous value storage	D8 to D9
Sampling count data read signal	X1A	Overflow status storage	D10
Sampling count start signal	X1B	Interrupt enabled flag storage for the IMASK instruction	D20 to D35

8.1 Program Example When GX Configurator-CT is Used

8.1.1 Operating GX Configurator-CT

(1) Initial settings (see Section 7.4)

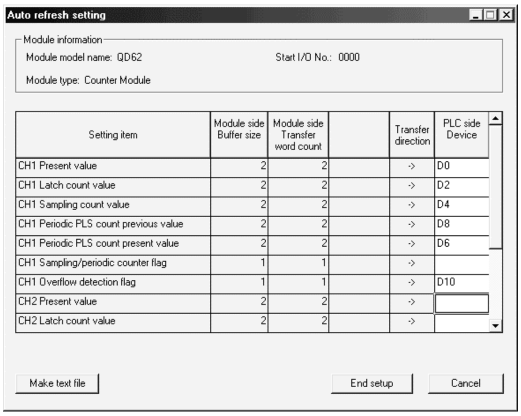
Set the values on the screen as shown below.



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

(2) Auto refresh settings (see Section 7.5)

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

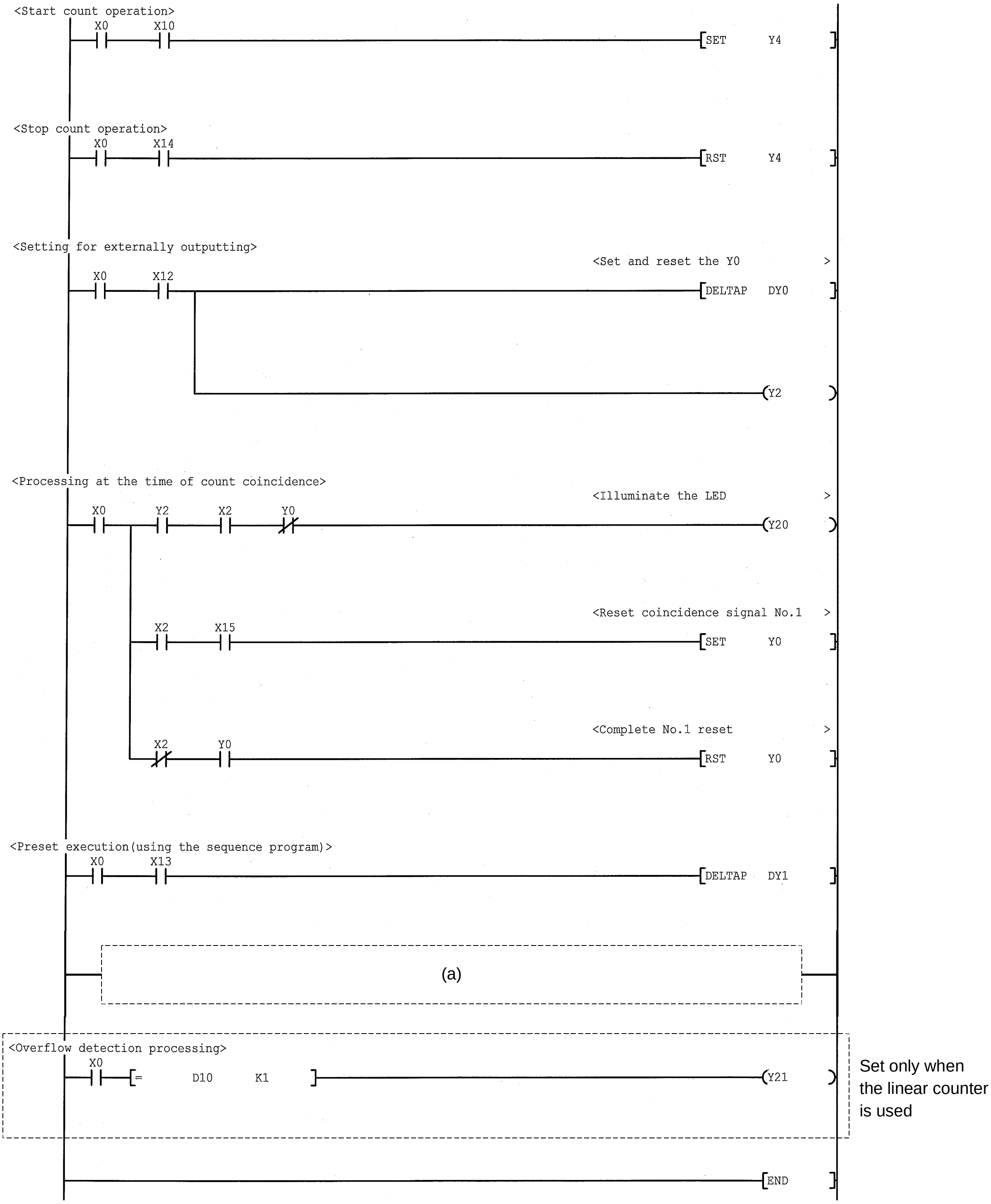


Setting item	Description	Setting
CH1 Present value	Set the device for storing the present value.	D0
CH1 Latch count value	Set the device for storing the latch count value.	D2
CH1 Sampling count value	Set the device for storing the sampling count value when the sampling counter function is used.	D4
CH1 Periodic PLS counter previous value	Set the device for storing the previous periodic pulse count value when the periodic pulse counter function is used.	D8
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.	D6
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

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

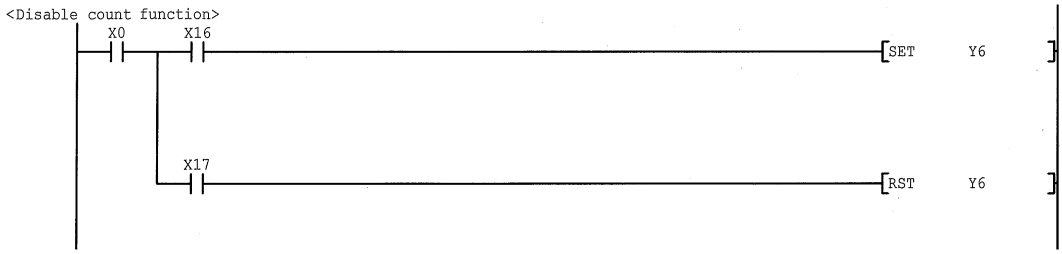
Write the intelligent module parameters to the PLC CPU. This operation is performed using the intelligent module parameter setting module selection screen.

8.1.2 Program example

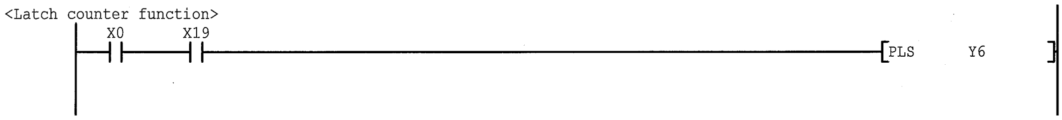


(a) When using the functions listed below, the following programs are inserted.

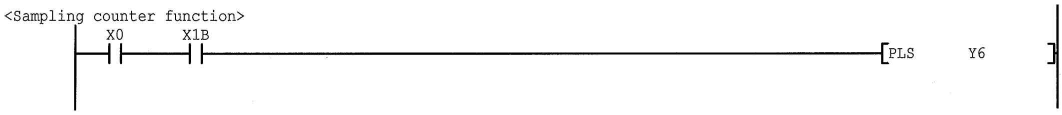
1) When the disable count function is used



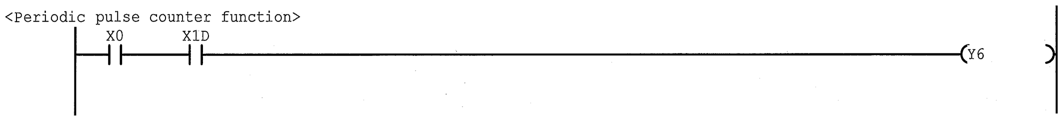
2) When the latch counter function is used



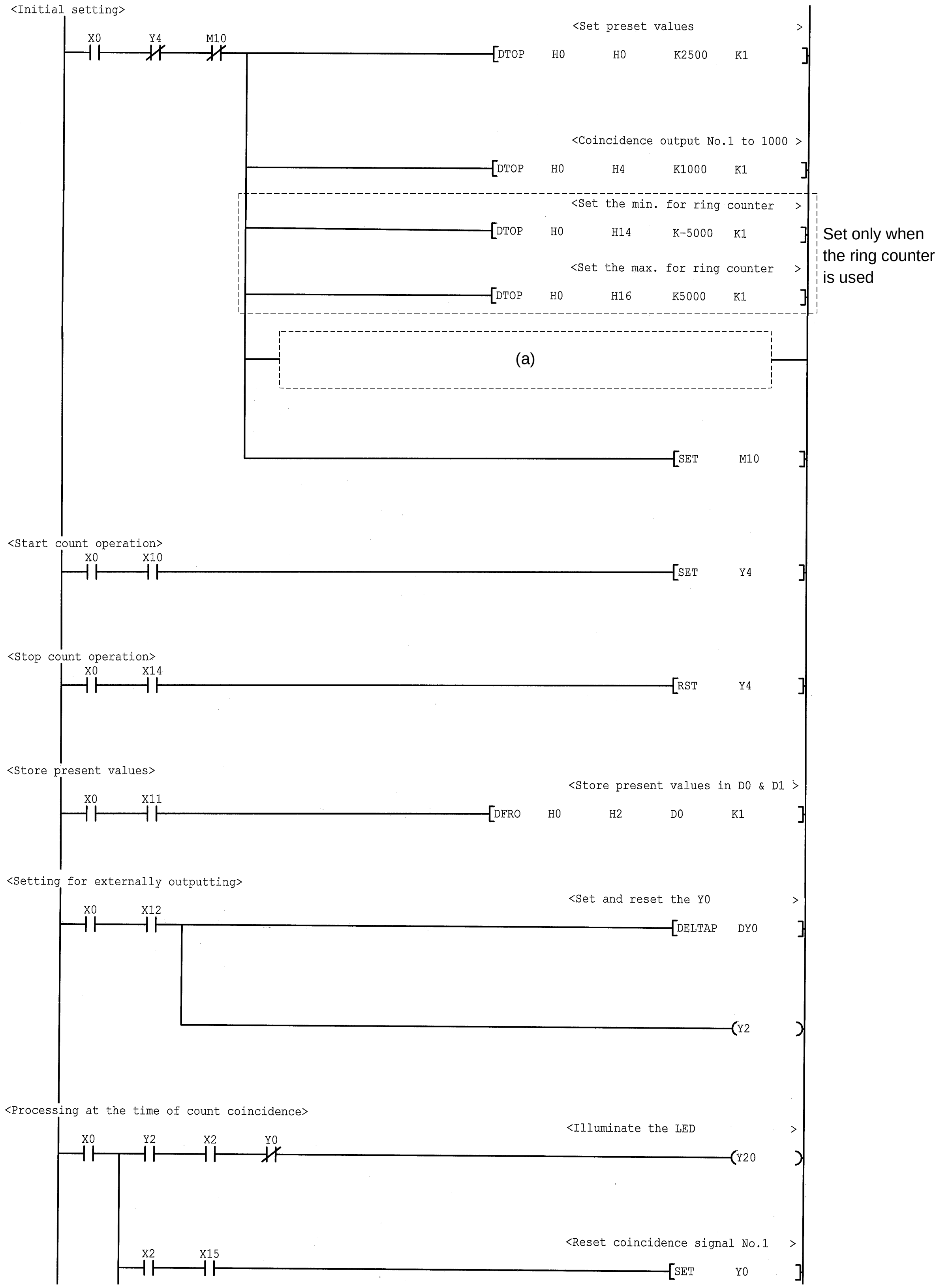
3) When the sampling counter function is used

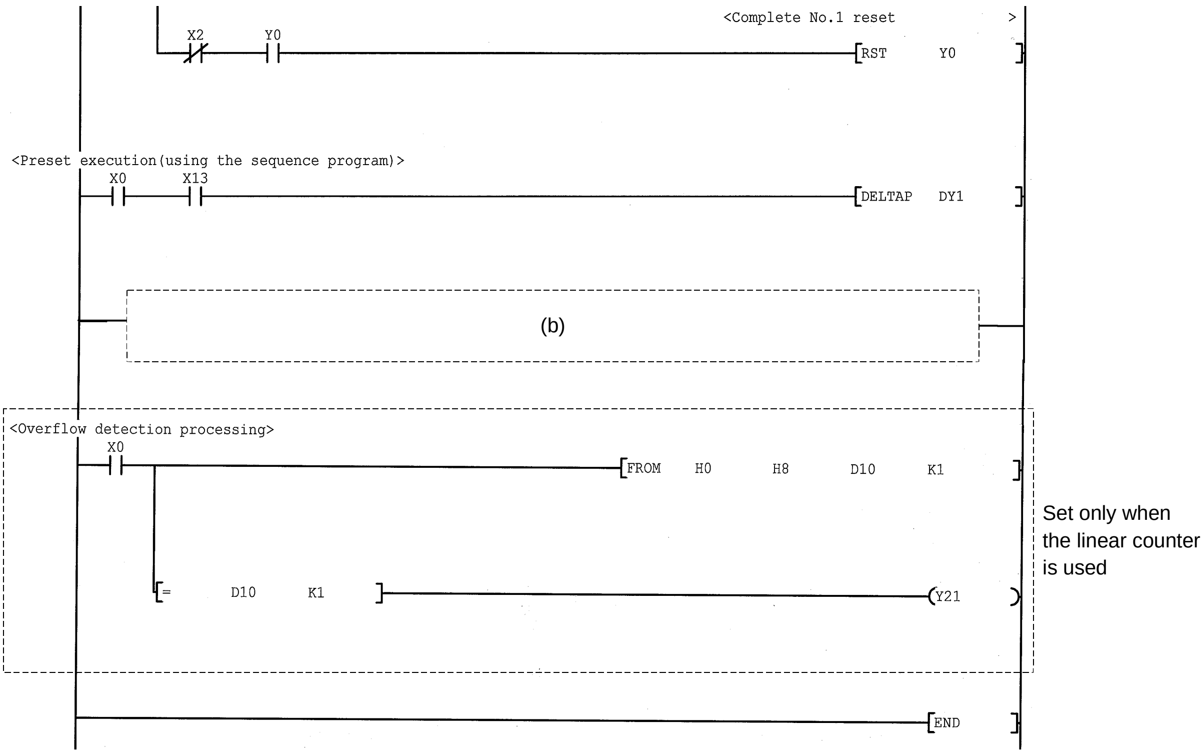


4) When the periodic pulse counter function is used



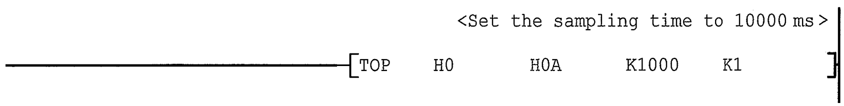
8.2 Program Example when GX Configurator-CT is not Used



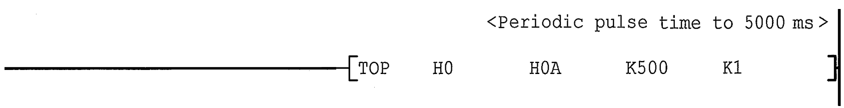


(a) When using the sampling counter function and the periodic pulse counter function, the following programs are inserted

1) When the sampling counter function is used

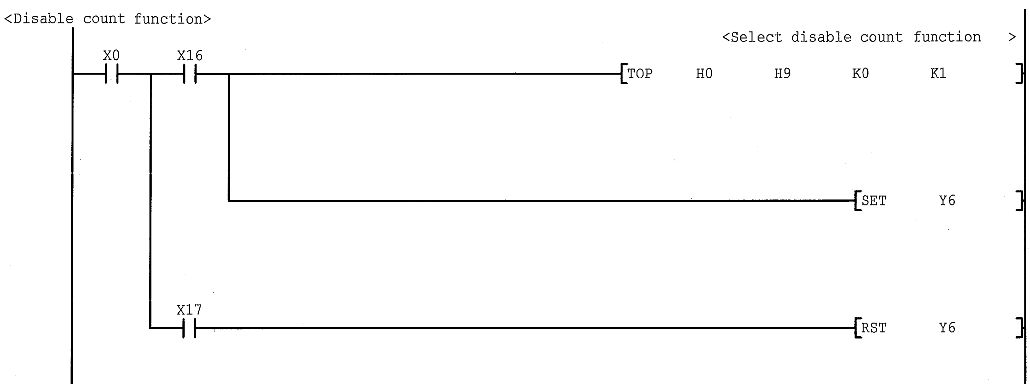


2) When the periodic pulse counter function is used

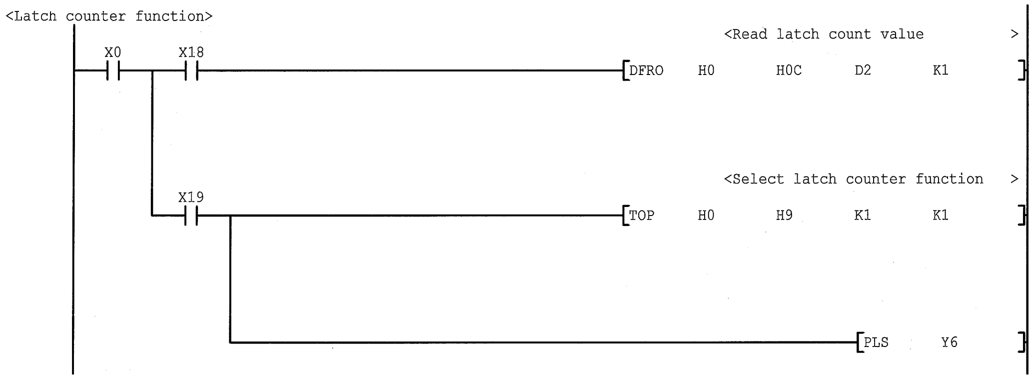


(b) When using the functions listed below, the following programs are inserted

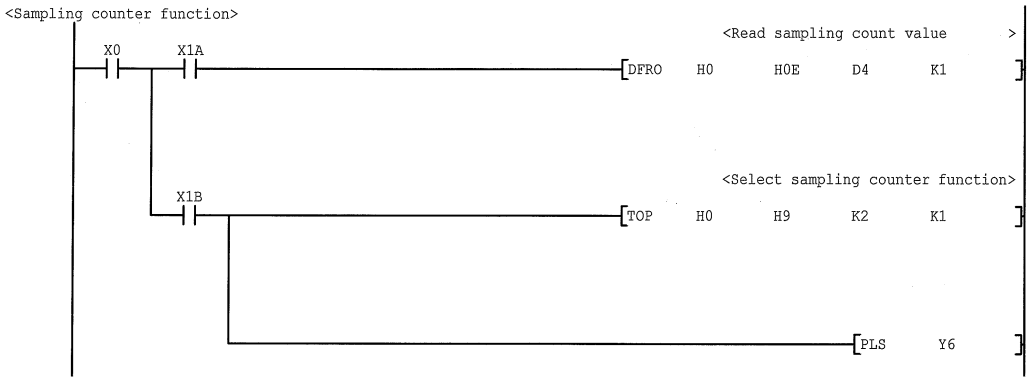
1) When the disable count function is used



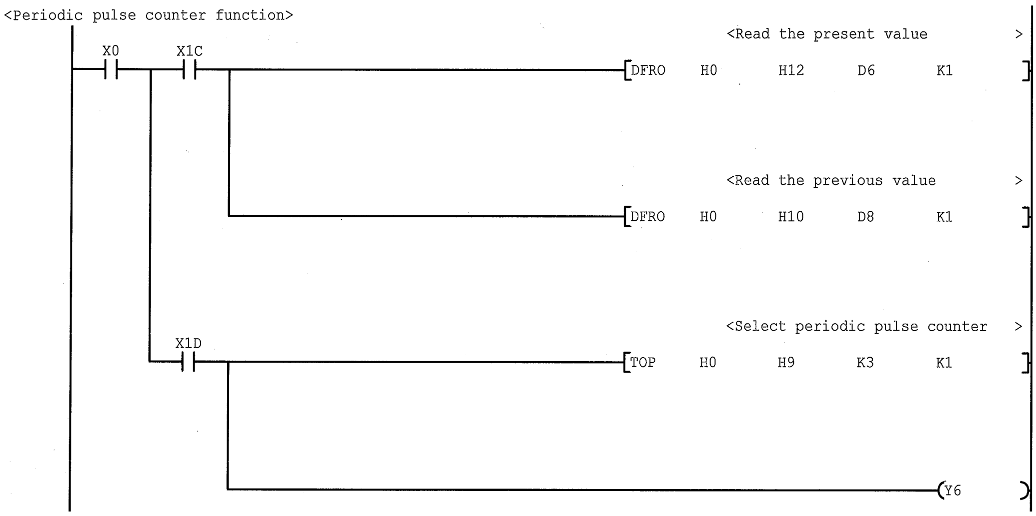
2) When the latch counter function is used



3) When the sampling counter function is used



4) When the periodic pulse counter function is used

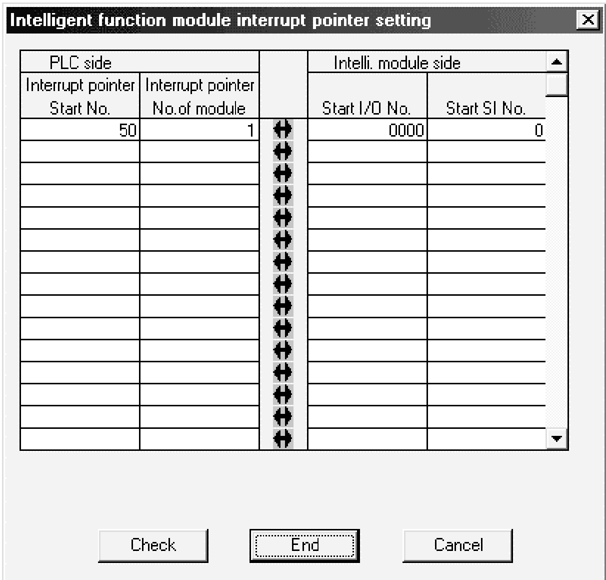


8.3 Example of a Program Using the Coincidence Detection Interrupt Function

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.

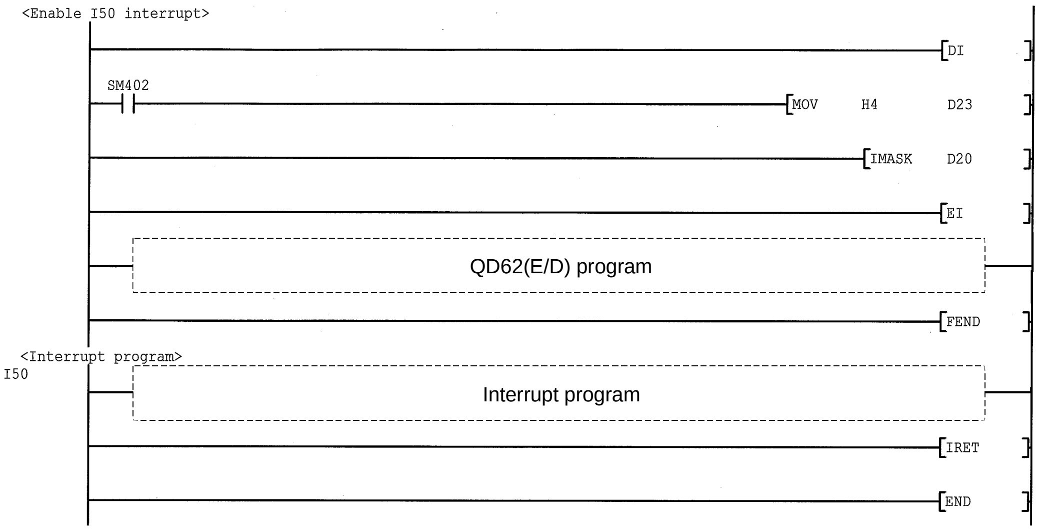
(1) Interrupt point setting

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.



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	Corrective 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 -2147483647	1) Module status display on the GX Developer system monitor screen No status display: No overflow detected (no error) Module error : Overflow being occurred 2) Overflow detection flag The following value is stored in buffer memory address 08_H (28_H) 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 (X0F) 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	The fuse must be replaced by a technician from the Service Center. Consult with our branch office or distributor with detailed description.

POINT

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

9

9.2 The Count Operation is not Working

Check item	Corrective action
Is the PLC CPU showing an error display?	If the PLC CPU is showing an error display, correct the operation by following the troubleshooting instructions in the manual for the PLC CPU in use.
Is the ϕA and ϕB external wiring normal?	Check and correct the external wiring.
When voltage is directly applied to the ϕA and ϕB pulse input terminals, does the ϕA and ϕB LED light up?	If the LED lights up, check the external wiring and the pulse generator side and make necessary corrections. If the LED does not light up, this is a hardware error so contact our branch office or distributor for consultation and give details of the malfunction.
Is the count enable instruction {Y04 (Y0C0)} ON?	Turn the count enable instruction {Y04 (Y0C0)} ON using a sequence program.
Is the counter function selection start instruction {Y06 (Y0E)} ON or is voltage being applied to the function start input terminals?	If the disable count function has been set with the counter selection function, turn OFF the counter function selection start instruction {Y06 (Y0E)} or the function start input terminal.
Is an overflow error occurring?	Preset to clear the overflow error.

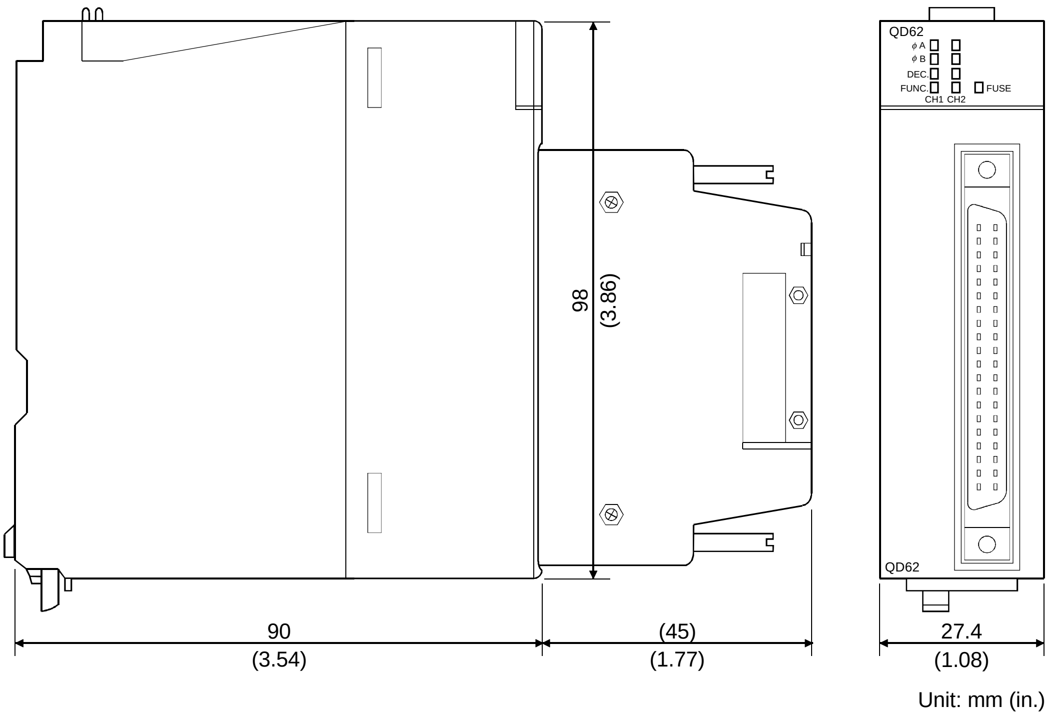
9.3 The Count Value is not Normal

Check item	Corrective action
Does the pulse input method match the pulse input mode set by parameter switch setting?	Match the pulse input method and the pulse input mode set by the parameter setting switch.
Is the maximum input pulse speed within the range of the counting speed set by parameter switch setting?	Change the counting speed set by parameter switch setting so that it is in line with the maximum input pulse speed.
Does the pulse waveform that was input meet the performance specifications?	Check the pulse waveform by observing it with a synchroscope, and input the correct waveform pulse if it does not conform to the performance specifications.
Is the count value data processed as binary 32-bit data in a sequence program?	Change the sequence program so that the count value data is processed as binary 32-bit data.
Does the pulse input wiring use a twisted pair shielded cable?	Use a twisted pair shielded cable for the pulse input wiring.
Is noise entering from the QD62 (E/D)'s grounding section?	Separate the QD62 (E/D)'s ground cable. If the QD62 (E/D) case is contacting the grounding section, detach it.
Have noise preventive measures been taken inside the panel and for adjacent equipment?	Take noise preventative measures such as attaching a CR surge suppressor to a magnet switch.
Is there sufficient clearance between high voltage equipment and pulse input lines?	Wire the pulse input line independently inside the panel, separate the pulse input line from the power line by at least 150 mm (5.9 in.).
Has the same count been input for both CH1 and CH2 and are the count values the same?	When the count values are different, this is a hardware error. Contact our branch office or distributor for consultation and give details of the problem.

APPENDIX

Appendix 1 External Dimension Diagram

QD62,QD62E,QD62D



A value in parentheses shows the reference measurement when the A6CON1 is installed.

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

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

Function		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 starting use.

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 dealer or Mitsubishi Service Company.
Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[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 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 possible 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 chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.
Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.
When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

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