

# **MELSEC System Q**

Programmable Logic Controllers

User's Manual

## **Channel Isolated Pulse Input Module QD60P8-G GX Configurator-CT**

# • SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals 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 CPU module User's Manual.

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 save this manual to make it accessible when required and always forward it to the end user.

## [Design Precautions]

### **DANGER**

- Do not write data into the "read-only area" in the buffer memory of the intelligent function module. In addition, do not turn ON/OFF the "Reserved (N/A)" signals among the I/O signals transferred to/from the PLC CPU.  
Doing so can malfunction the PLC system.

### **CAUTION**

- Do not bunch the control wires or pulse input wires 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 module 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 doing so may cause electric shock or damage to the module.  
In the system where a CPU module supporting the online module change is used and on the MELSECNET/H remote I/O stations, modules can be replaced online (during energizing).  
However, there are some restrictions on replaceable modules and the replacement procedures are predetermined for each module.  
For details, refer to the chapter of the online module change in this manual.
- 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]

### DANGER

- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.  
These 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.
- The cables connected to the module should be placed in a duct or fixed. Not doing so can cause the module or cables to be damaged when the cables swing, more or are pulled carefully, for example or to malfunction due to poor cable connection.

## [Wiring Precautions]

### CAUTION

- When removing the cable from the module, do not pull the cable.  
When disconnecting a cable without a terminal block, unscrew on the part that is connected to the module.  
Pulling the cable that is still connected to the module may cause malfunction or damage to the module or cable.
- Always ground the shielded cable for the PLC.  
There is a risk of electric shock or malfunction.
- 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.

## [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.  
In the system where a CPU module supporting the online module change is used and on the MELSECNET/H remote I/O stations, modules can be replaced online (during energizing).  
However, there are some restrictions on replaceable modules and the replacement procedures are predetermined for each module.  
For details, refer to the chapter of the online module change in this manual.
- Do not mount/remove the module onto/from base unit more than 50 times (IEC 61131-2-compliant), after the first use of the product.  
Failure to do so may cause the module to malfunction due to poor contact of connector.
- 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
Jun., 2002	SH (NA)-080313E-A	First edition
Feb., 2003	SH (NA)-080313E-B	Correction SAFETY PRECAUTIONS, Section 2.1, Section 2.2, Section 6.2.2, Section 6.4, Section 6.5, Section 9.1.1
Jun., 2004	SH (NA)-080313E-C	Addition of program example for use on the remote I/O network. Correction SAFETY PRECAUTIONS, Section 2.2, Section 4.1, Section 6.4, Section 6.6, Chapter 7, Section 8.1, Section 8.3.2

Japanese Manual Version SH-080312-D

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## INTRODUCTION

Thank you for purchasing the Mitsubishi programmable logic controller MELSEC-Q Series.  
Always read through this manual, and fully comprehend the functions and performance of the Q Series PLC before starting use to ensure correct usage of this product.

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## About Manuals

The following manuals are also related to this product.

### **Related Manuals**

Manual Name	Manual Number (Model Code)
Channel Isolated Pulse Input Module User's Manual (Hardware) Describes the performance, specifications, I/O interface, part identification nomenclature, and startup procedure of the type QD60P8-G Channel Isolated Pulse Input Module.  (The manual is supplied with the module.)	IB-0800229 (13JT94)

## Using This Manual

### ■ Manual Makeup

- (1) To know the features and overview of this product (Chapter 1)  
Section 1.1 gives the overview and Section 1.2 the features.
- (2) To know the system configuration (Chapter 2)  
Chapter 2 describes the system configuration, usable PLC CPUs, etc.
- (3) To know the system performance and function list (Chapter 3)  
Sections 3.1 to 3.4 provides the performance specifications, list of functions, I/O signals and list of buffer memory. Section 3.5 describes the interface with external devices.
- (4) To know the module installation and setting (Chapter 4)  
Chapter 4 describes the wiring example of the module and the setting method necessary for start of operation.
- (5) To know the functions and their setting methods (Chapter 5)  
Chapter 5 provides the functions and their setting methods.
- (6) To perform initial setting, etc. from the optional utility package (Chapter 6)  
Chapter 6 gives the method for operating the utility package.
- (7) To know the example of operating the QD60P8-G using a sequence program (Chapter 7)  
Chapter 7 provides a sequence program example.
- (8) To change the module without stopping the system (Chapter 8)  
Chapter 8 provides the method for changing the module without stopping the system (online module change).
- (9) To know the error code and corresponding remedy when an error occurs in the module (Chapter 9)  
Chapter 9 gives the troubleshooting and list of error codes.

■ Numeric values used in this manual

- The buffer memory addresses and error codes are represented in decimal.
- The X/Y devices are represented in hexadecimal.
- The values read/written from/to the buffer memory and the values set using the intelligent function module switches are represented in either of decimal and hexadecimal. A hexadecimal value is ended by "H".

(Example) 10.....10 Decimal

10H.....16 Hexadecimal

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 refer to Chapter 3, "EMC Directive and Low Voltage Instruction" of the using CPU module User's Manual (Hardware).

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.

To make this product conform to the EMC directive and low voltage instruction, please refer to Section 4.4.1 "Wiring precautions".

## Generic Terms and Abbreviations

Unless specially noted, the following generic terms and abbreviations are used in this manual.

Generic term/abbreviation	Details of generic term/abbreviation
PLC CPU	Generic term for PLC CPU on which QD60P8-G can be mounted.
QD60P8-G	Abbreviation for type QD60P8-G Channel Isolated Pulse Input Module.
Personal computer	DOS/V-compatible personal computer of IBM PC/AT <sup>®</sup> or its compatible.
GX Developer	Abbreviation for GX Developer (SW4D5C-GPPW-E or later).
GX Configurator-CT	Abbreviation for counter module setting/monitoring tool GX Configurator-CT (SW0D5C-QCTU-E).
QCPU (Q mode)	Generic term for the Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q12PHCPU and Q25PHCPU.
QnPHCPU	Generic term for the Q12PHCPU and Q25PHCPU.

## Component List

The component list of this product is given below.

Type	Component	Quantity
QD60P8-G	Type QD60P8-G Channel Isolated Pulse Input Module	1
SW0D5C-QCTU-E	GX Configurator-CT Version 1 (1-license product) (CD-ROM)	1
SW0D5C-QCTU-EA	GX Configurator-CT Version 1 (Volume-license product) (CD-ROM)	1

## CHAPTER 1 OVERVIEW

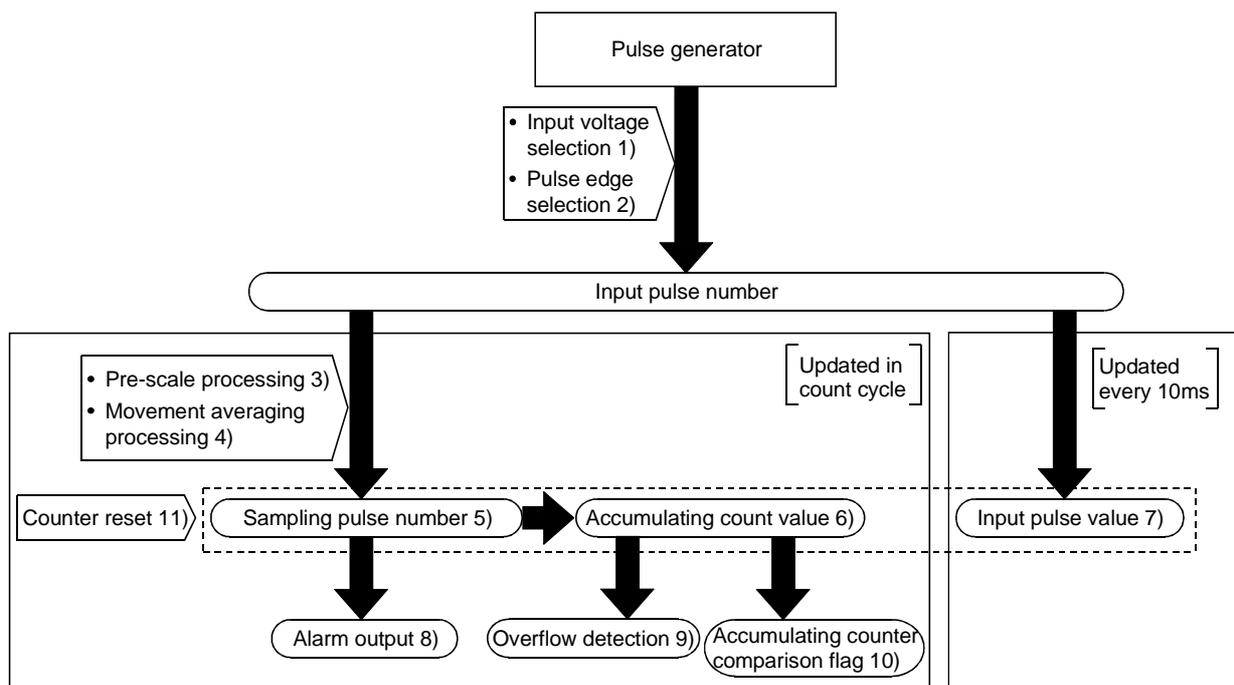
## 1.1 Overview

This User's Manual describes the specifications, handling, wiring and programming methods of the Channel Isolated Pulse Input Module (QD60P8-G) used with the MELSEC-Q series PLC CPU.

The QD60P8-G counts the input pulse number (speed, rotation speed, instant flux or similar) and measures the quantity the length, accumulating flux and so forth. The input pulse value is updated every 10ms. The QD60P8-G updates the accumulating count value and the pulse number after movement averaging processing or similar (sampling pulse number) at intervals of the count cycle setting value.

## 1.2 Features

## (1) Wide range of functions



- 1) **Pulse input voltage**  
A single module accepts the pulse inputs of 5VDC/12 to 24VDC.
- 2) **Pulse edge selection**  
It is allowed to select the rise or fall of the input pulses to be counted.
- 3) **Pre-scale function**  
The input pulse number is multiplied by any value to convert the pulse number.
- 4) **Movement averaging function**  
The values of the sampling pulse number are averaged by the specified number of times to calculate the average value.

- 5) **Sampling pulse number indication**

The value obtained by performing pre-scale conversion on the pulse number entered in the count cycle set to the count cycle setting value is displayed. If the input pulse number is not uniform, movement averaging processing can be performed to average the input pulse number. The count range is 0 to 32767.
  - 6) **Accumulating count value indication**

The accumulating value of the sampling pulse number is displayed in the set count cycle. The count range is 0 to 99999999, and you can select whether to use the accumulating counter as the linear counter or ring counter.
  - 7) **Input pulse value indication**

The pulse number actually input is displayed every 10ms. Since the input pulse number is displayed every 10ms, the module can be used as a counter. (The input pulse value is updated every 10ms. Note this when using the module as a counter.) The count range is 0 to 2147483647.
  - 8) **Alarm output**

It is allowed to set four setting values, i.e. upper/upper limit value, upper/lower limit value, lower/upper limit value and lower/lower limit value, for the sampling pulse number to output alarms.
  - 9) **Accumulating counter overflow detection**

If the accumulating count value overflows (exceeds 99999999) in the linear counter mode, the accumulating counter overflow detection flag turns ON to indicate that an overflow error has occurred.
  - 10) **Accumulating counter comparison output**

If the accumulating count value reaches or exceeds the comparison output setting value, the accumulating counter comparison flag turns ON.
  - 11) **Counter reset**

The sampling pulse number, accumulating count value and input pulse value can be reset at any timing.
- (2) **Counting speed range of the input pulse can be changed**

By changing the input filter, the input pulse speed is available within the range 0 to 30kpps.
  - (3) **8 channels of pulse inputs in one module**

One module has 8 channels of pulse inputs to configure a system at low costs.
  - (4) **Channel isolated**

The channels are isolated from each other. (Dielectric withstand voltage: 1780VAC for 1 minute)

(5) Online module change

It is possible to change the module without stopping the system.

(6) Easy setting by utility package

Utility package (GX Configurator-CT) is sold separately.

The utility package enables the initial setting and auto refresh setting to be made on the screen, reducing the sequence programs as well as resulting in easy monitoring of the setting and operating status.

## CHAPTER 2 SYSTEM CONFIGURATION

## 2.1 Applicable system

This section explains the applicable system.

(1) Applicable modules and numbers of QD60P8-G modules that may be mounted

The following table indicates the CPU modules and network modules (for remote I/O stations) which accept the QD60P8-G, and the number of QD60P8-G modules that can be mounted.

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) Base unit which the conversion can be installed

The QD60P8-G can be mounted in any I/O slot<sup>\*3</sup> of a base unit.

However, combining it with other mounted modules may result in a power supply shortage depending on the number of modules to be mounted. Thus, always take into consideration the power supply capacity when mounting modules.

\*3: Within the I/O point ranges of the CPU modules and network modules (for remote I/O stations)

(3) Compatibility with a multiple PLC system

First read the QCPU (Q mode) User's Manual (Function Explanation, Program Fundamentals) if the QD60P8-G is used with a multiple PLC system. Perform PLC write of the intelligent function module parameters to the control PLC of the QD60P8-G only.

(4) Compatibility with online module change

The QD60P8-G supports the online module change function.

<b>POINT</b>
The QD60P8-G does not have the products of function versions A and B. The products of function version C include the functions of the products function versions A and B.

(5) Software packages supported

Correspondence between systems which use QD60P8-G and software packages are as shown below.

The GX Developer is necessary when using a QD60P8-G.

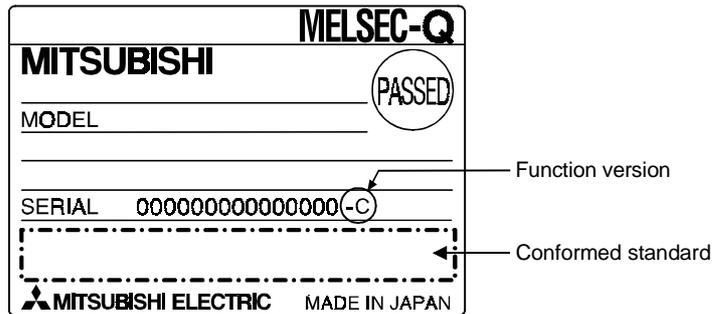
		Software Version	
		GX Developer	GX Configurator-CT
Q00J/Q00/Q01CPU	Single PLC system	Version 7 or later	Version 1.14Q or later
	Multiple PLC system	Version 8 or later	
Q02/Q02H/Q06H/ Q12H/Q25HCPU	Single PLC system	Version 4 or later	
	Multiple PLC system	Version 6 or later	
Q12PH/Q25PHCPU	Single PLC system	Version 7.10L or later	
	Multiple PLC system		
If installed in a MELSECNET/H remote I/O station		Version 6 or later	

2.2 How to check the function version and the software version

This function version of the QD60P8-G and the software version of the GX Configuration-CT can be checked in the following methods.

(1) How to check the function version of the QD60P8-G

- (a) Method using the rated plate on the module side face  
Check the alphabet at the end of "SERIAL"

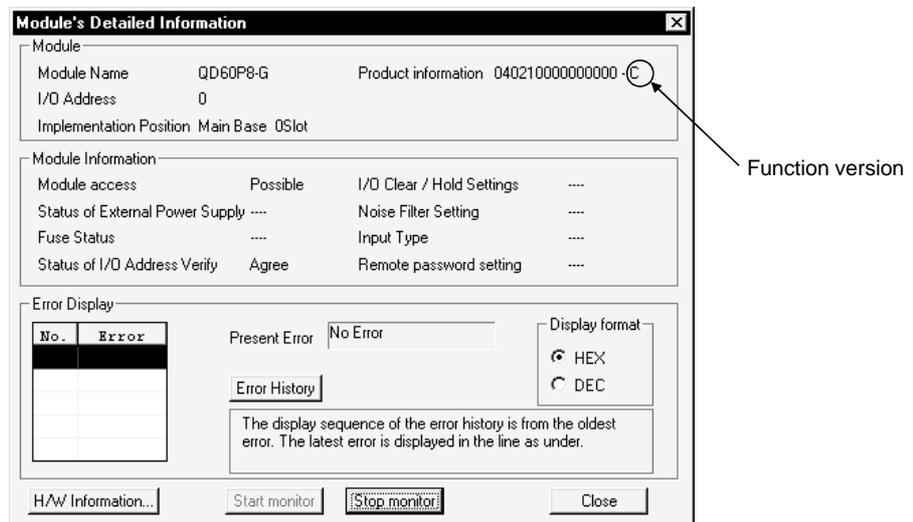


- (b) Method using the GX Developer  
Check the alphabet at the end of "Product information" displayed on "Module's Detailed Information" dialog box of GX Developer.

[Operation of GX Developer]

Click the [Diagnostics] → [System monitor] menu and click the Module's Detailed Information button in the displayed window.

<Module's Detailed Information dialog box of GX Developer>

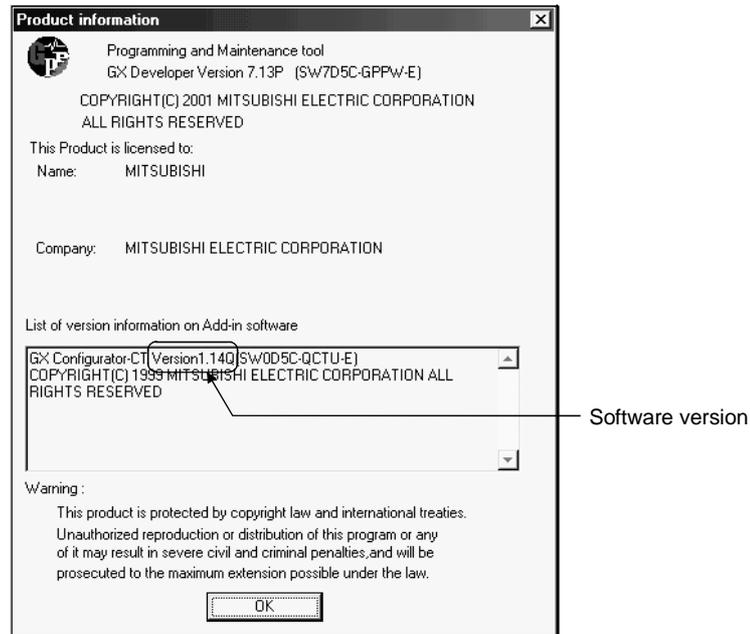


- (2) How to check the software version of the GX Configurator-CT  
Check the "Product information" dialog box displayed on "Help" of GX Developer.

[Operation of GX Developer]

Click the [Help] → [Production information] menu.

<Product information dialog box of GX Developer>



CHAPTER 3 SPECIFICATIONS

This chapter explains the performance specifications of the QD60P8-G, the I/O signals for the PLC CPU, and the specifications of the buffer memory.

For the general specifications of the QD60P8-G, refer to the User's Manual (Hardware) of the used CPU module.

3.1 Performance specifications

The following table indicates the performance specifications of the QD60P8-G.

Model name		QD60P8-G							
Counting speed switch settings*1		30kpps	10kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
Number of I/O occupied points		32 points (I/O assignment: 32 points for intelligent function module)							
Number of channels		8 channels							
Count input signal	Phase	1-phase input							
	Signal level	5VDC/12 to 24VDC							
Input derating		Refer to the derating chart (Next page)							
Counter	Counting speed (Max.) *2	30kpps	10kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
	Counting range	Sampling pulse number : 16-bits binary values (0 to 32767)							
		Accumulating count value : 32-bits binary values (0 to 99999999)							
	Count type	Input pulse value : 32-bits binary values (0 to 2147483647)							
Minimum count pulse width (Duty ratio 50%)									
	<p>For 1 min at 1500VAC between AC external connecting terminals and general grounding                      For 1 min at 500VAC between DC external connecting terminals and general grounding                      For 1 min at 1780VAC between channels</p>								
Dielectric withstand voltage		<p>For 1 min at 1500VAC between AC external connecting terminals and general grounding                      For 1 min at 500VAC between DC external connecting terminals and general grounding                      For 1 min at 1780VAC between channels</p>							
Insulation resistance		5MΩ or more at 500VDC between AC external connecting terminals and general grounding							
Connected terminal		18 points terminal block							
Applicable wire size		0.3 to 0.75mm <sup>2</sup>							
Applicable solderless terminals		R1.25-3 (A solderless terminals with sleeves cannot be used.)							
Internal current consumption (5VDC)		0.58A							
Weight		0.17kg							
External dimensions		27.4 (1.08) (W) X 98 (3.86) (H) X 90 (3.54) (D) [mm (in.)]							

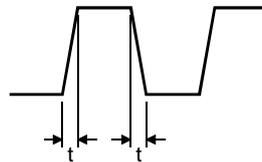
\*1: To change the counting speed, use the intelligent function module switch. (For details, refer to "Section 4.5 Switch setting for intelligent function module".)

\*2: The counting speed is affected by the rise/fall time of pulses. The countable counting speeds are indicated in the table on the next page. Note that counting the pulses of long rise/fall time may result in miscounting.

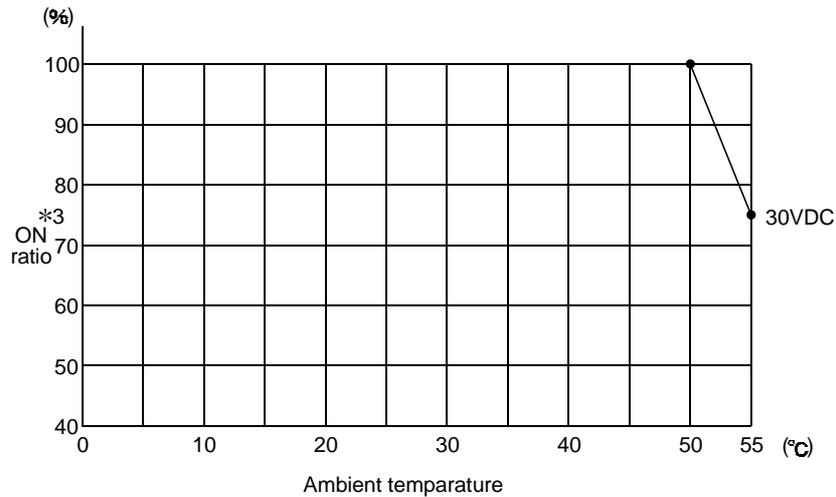
<Rise/Fall time and the corresponding counting speed switch settings>

Rise/Fall Time	Counting speed switch settings							
	30kpps	10kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
t = 8.4μs or less	30kpps	10kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
t = 25μs or less	10kpps	10kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
t = 250μs or less	-	1kpps	1kpps	100pps	50pps	10pps	1pps	0.1pps
t = 2.5ms or less	-	-	100pps	100pps	50pps	10pps	1pps	0.1pps
t = 5ms or less	-	-	-	50pps	50pps	10pps	1pps	0.1pps
t = 25ms or less	-	-	-	-	10pps	10pps	1pps	0.1pps
t = 250ms or less	-	-	-	-	-	1pps	1pps	0.1pps
t = 2.5s or less	-	-	-	-	-	-	0.1pps	0.1pps
t = 5s	-	-	-	-	-	-	-	0.05pps

3



<Derating Chart>



\*3: "ON" indicates the status where voltage is applied to pules input terminals.

3.2 List of functions

The following table indicates the QD60P8-G functions.

Name		Details	Reference
Accumulating counter	Linear counter function	This function counts from 0 to 99999999 and detects an overflow when the count range is exceeded.	Section 5.2.1
	Ring counter function	This function repeats counting between 0 and 99999999.	Section 5.2.2
	Comparison output function	This function turns ON the accumulating counter comparison flag when the accumulating count value reaches or exceeds the comparison output setting value. (The accumulating counter comparison flag turns OFF at a comparison signal reset request.)	Section 5.4
Sampling counter	Count cycle change function	This function changes the count cycle of the sampling pulse number or accumulating count value.	Section 5.1.4
	Movement averaging function	This function performs movement averaging processing by the specified number of times if there are variations in the sampling pulse number.	Section 5.7
	Pre-scale function	This function converts the input pulse number into the unit pulse number when its weight per pulse is a fraction.	Section 5.6
	Alarm output function	This function sets the upper/upper limit value, upper/lower limit value, lower/upper limit value and lower/lower limit value for the sampling pulse number converted by the pre-scale function to output alarms.	Section 5.8
Counter reset function		This function resets the sampling pulse number, accumulating count value or input pulse value. A reset can be made at any timing.	Section 5.5
Pulse edge selection function		This function selects whether the rise or fall of an input pulse will be used for counting. (This setting can be made for each channel using the intelligent function module switch.)	Section 4.5
Count enable function		This function starts input pulse count operation when the count enable signal is turned ON.	Section 5.1.2
Online module change function		This function changes the module without stopping the system. (Perform an online module change according to the messages of GX Developer.)	Chapter 8
Utility function		This function uses the utility package (GX Configurator-CT) to perform initial setting, auto refresh setting, monitor/test or similar from within the software without using sequence programs.	Chapter 6

<b>POINT</b>
<p>The above functions can be used in combination.                  However, the linear counter function and ring counter function cannot be used together.                  Please select either of them.</p>

3.3 I/O signals for PLC CPU

3.3.1 List of I/O signals

The following table indicates the I/O signals of the QD60P8-G for the PLC CPU. The I/O numbers (X/Y) and I/O addresses indicated in this chapter and later assume that the QD60P8-G is installed on the I/O slot No. 0 of the main base unit.

Input signal (Signal direction: QD60P8-G → PLC CPU)			Output signal (Signal direction: PLC CPU → QD60P8-G)		
Device No.	Signal name		Device No.	Signal name	
X0	Module READY		Y0	Reserved (N/A) *	
X1	Operating condition setting complete flag		Y1	Operating condition setting request flag	
X2 to X7	Reserved (N/A) *		Y2 to Y7	Reserved (N/A) *	
X8	CH1	Error occurrence	Y8	CH1	Error reset request
X9	CH2		Y9	CH2	
XA	CH3		YA	CH3	
XB	CH4		YB	CH4	
XC	CH5		YC	CH5	
XD	CH6		YD	CH6	
XE	CH7		YE	CH7	
XF	CH8		YF	CH8	
X10	CH1	Accumulating counter comparison flag	Y10	CH1	Comparison signal reset request
X11	CH2		Y11	CH2	
X12	CH3		Y12	CH3	
X13	CH4		Y13	CH4	
X14	CH5		Y14	CH5	
X15	CH6		Y15	CH6	
X16	CH7		Y16	CH7	
X17	CH8		Y17	CH8	
X18 to X1F	Reserved (N/A) *		Y18	CH1	Count enable
			Y19	CH2	
			Y1A	CH3	
			Y1B	CH4	
			Y1C	CH5	
			Y1D	CH6	
			Y1E	CH7	
			Y1F	CH8	

\*: Write is inhibited to the I/O (X/Y) reserved for the system.

3.3.2 Details of I/O signals

The I/O signals of the QD60P8-G are detailed below.

(1) Details of input signals (QD60P8-G → PLC CPU)

The following table indicates the ON/OFF timings and functions of the input signals.

Device No.	Signal name		Details	Initial value *1
X0	Module READY		<ul style="list-style-type: none"> <li>OFF: Not Prepared/ Watch dog timer error</li> <li>ON : Prepared</li> </ul> <ul style="list-style-type: none"> <li>This signal judges whether the QD60P8-G is normal or abnormal in the sequence program. This signal turns ON when the module starts normally at power-on or reset operation.</li> <li>This signal turns OFF at occurrence of a watch dog timer error.</li> </ul>	OFF
X1	Operating condition setting complete flag		<ul style="list-style-type: none"> <li>OFF: Operating condition setting</li> <li>ON : Operating condition setting complete</li> </ul> <ul style="list-style-type: none"> <li>This signal is used as an interlock for turning ON/OFF the operating condition setting request flag (Y1) when the function, such as the comparison output function, is selected or the setting value is changed.</li> <li>When this signal is OFF, input pulses are not counted.</li> <li>After confirming that the operating condition setting is completed (this signal has turned ON), turn ON the count enable signal (Y18 to Y1F) to start pulse counting.</li> </ul>	OFF
X8	CH1	Error occurrence	<ul style="list-style-type: none"> <li>OFF: No error occurrence</li> <li>ON : Error occurrence</li> </ul> <ul style="list-style-type: none"> <li>This signal turns ON if an error exists in the overflow detection or initial setting data. (The details of the error can be confirmed from the "system monitor" screen of GX Developer.)</li> <li>This signal turns OFF when the error reset request (Y8 to YF) is turned ON.</li> <li>The "error code" is stored into the buffer memory of the corresponding channel (refer to Section 3.4.2 for details).</li> </ul>	OFF
X9	CH2			
XA	CH3			
XB	CH4			
XC	CH5			
XD	CH6			
XE	CH7			
XF	CH8			

\*1: Initial value set at power-on or when the PLC CPU is reset.

Device No.	Signal name		Details	Initial value *1
X10	CH1	Accumulating counter comparison flag	<ul style="list-style-type: none"> <li>• This signal turns ON if the "accumulating count value" reaches or exceeds the "comparison output setting value". The "accumulating count value" is stored into the buffer memory for each channel. Set the "comparison output setting value" to the buffer memory for each channel. (Refer to Section 3.4.2 for details.)</li> <li>• This signal remains ON until the comparison signal reset request (Y10 to Y17) turns ON.</li> <li>• Once turned OFF, this signal does not turn ON until the accumulating count value reaches the comparison output setting value again after it has been reset.</li> </ul> <p>-----&gt; Executed by QD60P8-G                      —————&gt; Executed by sequence program</p> <p>The diagram consists of three vertically aligned waveforms. The top waveform shows the 'Accumulating count value' as a sawtooth wave that increases linearly and then resets. A horizontal dashed line represents the 'Comparison output setting value'. A vertical dashed line indicates the 'Count cycle setting value'. The middle waveform shows the 'Accumulating counter comparison flag (X10 to X17)', which transitions from OFF to ON when the count value reaches the setting value and returns to OFF when the reset request signal is active. The bottom waveform shows the 'Comparison signal reset request (Y10 to Y17)', which is a pulse that triggers the flag to turn OFF.</p>	OFF
X11	CH2			
X12	CH3			
X13	CH4			
X14	CH5			
X15	CH6			
X16	CH7			
X17	CH8			

\*1: Initial value set at power-on or when the PLC CPU is reset.

(2) Details of output signals (PLC CPU → QD60P8-G)

The following table indicates the ON/OFF timings and functions of the output signals.

Device No.	Signal name		Details	Initial value *1
Y1	Operating condition setting request flag		OFF: No operating condition setting request ON : Operating condition setting request	OFF
Y8	CH1	Error reset request	OFF: No error reset request ON : Error reset request	OFF
Y9	CH2			
YA	CH3			
YB	CH4			
YC	CH5			
YD	CH6			
YE	CH7			
YF	CH8			
Y10	CH1	Comparison signal reset request	OFF: No comparison signal reset request ON : Comparison signal reset request	OFF
Y11	CH2			
Y12	CH3			
Y13	CH4			
Y14	CH5			
Y15	CH6			
Y16	CH7			
Y17	CH8			
Y18	CH1	Count enable	OFF: Count operation stop ON : Count operation start	OFF
Y19	CH2			
Y1A	CH3			
Y1B	CH4			
Y1C	CH5			
Y1D	CH6			
Y1E	CH7			
Y1F	CH8			

\*1: Initial value set at power-on or when the PLC CPU is reset.

3.4 Buffer memory

3.4.1 List of buffer memory assignments

The following table indicates the assignment of the QD60P8-G buffer memory. Refer to Section 3.4.2 for details of the buffer memory areas.

The initial values are set to the buffer memory at power-on or when the PLC CPU is reset. (When power is switched OFF, the setting values in the buffer memory are not retained.)

The sequence program or PLC CPU's auto refresh function, reads/writes the buffer memory contents.

The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after the data have been written to the buffer memory.

Buffer memory address								Setting details	Initial value	Read/Write	
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8				
0	32	64	96	128	160	192	224	Sampling pulse number	0	Read only	
1	33	65	97	129	161	193	225	Comparison output selection		Read/Write enabled	
2	34	66	98	130	162	194	226	Comparison output setting value			(L)
3	35	67	99	131	163	195	227			(H)	
4	36	68	100	132	164	196	228	Movement averaging processing selection		Read/Write enabled	
5	37	69	101	133	165	197	229	Number of movement averaging processing			
6	38	70	102	134	166	198	230	Pre-scale function selection			
7	39	71	103	135	167	199	231	Pre-scale setting value			
8	40	72	104	136	168	200	232	Accumulating count value		(L)	Read only
9	41	73	105	137	169	201	233			(H)	
10	42	74	106	138	170	202	234	Input pulse value		(L)	
11	43	75	107	139	171	203	235			(H)	
12	44	76	108	140	172	204	236	Overflow detection flag			
13	45	77	109	141	173	205	237	Counter reset request		Read/Write enabled	
14	46	78	110	142	174	206	238	Carry over detection flag		Read only	
15	47	79	111	143	175	207	239	Carry over reset request		Read/Write enabled	
16	48	80	112	144	176	208	240	Error code		Read only	
17	49	81	113	145	177	209	241	Alarm output selection		Read/Write enabled	
18	50	82	114	146	178	210	242	Alarm output flag		Read only	
19	51	83	115	147	179	211	243	Alarm output setting value upper/upper limit		Read/Write enabled	
20	52	84	116	148	180	212	244	Alarm output setting value upper/lower limit			
21	53	85	117	149	181	213	245	Alarm output setting value lower/upper limit			
22	54	86	118	150	182	214	246	Alarm output setting value lower/lower limit			
23	55	87	119	151	183	215	247	Count cycle change function selection			
24	56	88	120	152	184	216	248	Count cycle setting value			
25 to 31	57 to 63	89 to 95	121 to 127	153 to 159	185 to 191	217 to 223	249 to 255	Reserved (N/A)	—	—	

\*1: Initial value set at power-on or when the PLC CPU is reset.

3.4.2 Details of buffer memory

The following table indicates the functions and setting values of the buffer memory areas.

Item	Details	Initial value	Buffer memory address															
			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8								
Sampling pulse number	<ul style="list-style-type: none"> <li>Stores the pulse number obtained by converting the input pulses into the unit pulse number using the pre-scale function.</li> <li>When the count enable signal (Y18 to Y1F) turns ON, count operation starts. The count range is 0 to 32767.</li> <li>The update timing is the interval set in the "count cycle setting value" of the buffer memory. (The initial value of the count cycle is 1s.)</li> </ul>	0	0	32	64	96	128	160	192	224								
Comparison output selection	<ul style="list-style-type: none"> <li>Set whether the comparison output function is valid or invalid.</li> <li>If the setting value is other than 0 or 1, a comparison output setting range outside error (error code: 200) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> </ul> [Setting value] 0: Comparison output function invalid 1: Comparison output function valid	0	1	33	65	97	129	161	193	225								
Comparison output setting value	<ul style="list-style-type: none"> <li>Set the value to be compared with the "accumulating count value" of the buffer memory.</li> <li>If the setting value is outside the range, a comparison output setting range outside error (error code: 200) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> <li>The relationships between the accumulating count value, comparison output setting value and accumulating counter comparison flag (X10 to X17) ON/OFF are as indicated below.</li> </ul> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Setting value and accumulating count value</th> <th style="width: 50%;">Accumulating counter comparison flag (X10 to X17)</th> </tr> </thead> <tbody> <tr> <td>Setting value &gt; accumulating count value</td> <td>OFF</td> </tr> <tr> <td>Setting value = accumulating count value</td> <td>ON</td> </tr> <tr> <td>Setting value &lt; accumulating count value</td> <td>ON</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>The accumulating counter comparison flag is cleared by turning ON the comparison signal reset request (Y10 to Y17) of the corresponding channel.</li> <li>When the accumulating counter is operating as a linear counter, the accumulating counter comparison flag that was turned OFF once does not turn ON until the accumulating count value reaches the comparison output setting value again after it has been reset. When the accumulating counter is operating as a ring counter, the flag turns ON when the accumulating count value reaches the comparison output setting value again in the ring processing.</li> </ul> [Setting range: 0 to 99999999]	Setting value and accumulating count value	Accumulating counter comparison flag (X10 to X17)	Setting value > accumulating count value	OFF	Setting value = accumulating count value	ON	Setting value < accumulating count value	ON	0	2 3	34 35	66 67	98 99	130 131	162 163	194 195	226 227
Setting value and accumulating count value	Accumulating counter comparison flag (X10 to X17)																	
Setting value > accumulating count value	OFF																	
Setting value = accumulating count value	ON																	
Setting value < accumulating count value	ON																	

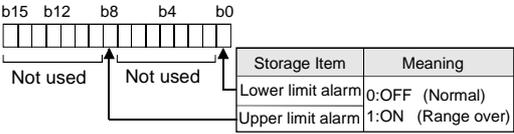
\*: Refer to Section 9.3 for details of the error codes.

Item	Details	Initial value	Buffer memory address																					
			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8														
Movement averaging processing selection	<ul style="list-style-type: none"> <li>When "movement averaging processing" is set in the movement averaging processing selection, movement averaging processing is performed on the "sampling pulse number" of the buffer memory by the number of times set in the "number of movement averaging processing" of the buffer memory.</li> <li>When the setting value is other than 0 or 1, a movement averaging setting range outside error (error code: 300) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> </ul> [Setting value] 0: Sampling processing 1: Movement averaging processing	0	4	36	68	100	132	164	196	228														
Number of movement averaging processing	<ul style="list-style-type: none"> <li>Set the number of times to perform movement averaging processing on the "sampling pulse number" of the buffer memory.</li> <li>When "movement averaging processing" is selected in the "movement averaging processing selection" of the buffer memory, the initial value of this buffer memory is "0". Therefore, if you run the PLC CPU without setting the value, a movement averaging setting range outside error (error code: 300) will occur.</li> <li>If the setting value is outside the range, a movement averaging setting range outside error (error code: 300) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> </ul> [Setting range: 2 to 60]	0	5	37	69	101	133	165	197	229														
Pre-scale function selection	<ul style="list-style-type: none"> <li>The pre-scale function converts the input pulse number per count cycle into the unit pulse number when the weight per pulse is a fraction, and stores the result of conversion into the "sampling pulse number" of the buffer memory. The following operation formula is used at this time.                Sampling pulse number =                    Input pulse value per count cycle × pre-scale setting value                    × unit magnification                The converted sampling pulse number is rounded down to the decimal point.</li> </ul> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Pre-scale function selection (Unit magnification)</th> <th>Setting value</th> </tr> </thead> <tbody> <tr> <td>Pre-scale function invalid</td> <td>0</td> </tr> <tr> <td>× 1</td> <td>1</td> </tr> <tr> <td>× 0.1</td> <td>2</td> </tr> <tr> <td>× 0.01</td> <td>3</td> </tr> <tr> <td>× 0.001</td> <td>4</td> </tr> <tr> <td>× 0.0001</td> <td>5</td> </tr> </tbody> </table> <ul style="list-style-type: none"> <li>If the setting value is other than the above values, a pre-scale setting range outside error (error code: 400) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> </ul>	Pre-scale function selection (Unit magnification)	Setting value	Pre-scale function invalid	0	× 1	1	× 0.1	2	× 0.01	3	× 0.001	4	× 0.0001	5	0	6	38	70	102	134	166	198	230
Pre-scale function selection (Unit magnification)	Setting value																							
Pre-scale function invalid	0																							
× 1	1																							
× 0.1	2																							
× 0.01	3																							
× 0.001	4																							
× 0.0001	5																							

\*: Refer to Section 9.3 for details of the error codes.

Item	Details	Initial value	Buffer memory address							
			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Pre-scale setting value	<ul style="list-style-type: none"> <li>Set the pre-scale setting value.</li> <li>The pre-scale function calculates the "sampling pulse number" of the buffer memory with the following operation formula: Sampling pulse number = input pulse value per count cycle × pre-scale setting value × unit magnification Note that if the pre-scale setting value is "0", the displayed sampling pulse number becomes 0 from the above operation formula, and therefore, it seems as if pulses are not counted although they are actually counted.</li> <li>If the setting value is outside the range, a pre-scale setting range outside error (error code: 400) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1). [Setting range: 0 to 32767]</li> </ul>	0	7	39	71	103	135	167	199	231
Accumulating count value	<ul style="list-style-type: none"> <li>Stores the accumulating value of the "sampling pulse number" of the buffer memory.</li> <li>The accumulating count value can be used when either the linear counter or ring counter is selected.</li> <li>The accumulating count range is 0 to 99999999 for both the linear counter and ring counter.</li> <li>If the accumulating count value exceeds 99999999 when the accumulating counter is used as the linear counter, the "overflow detection flag" of the buffer memory turns ON.</li> <li>When the operating condition setting request flag (Y1) is turned ON or "1" is set in the "counter reset request" of the buffer memory, the accumulating count value is reset.</li> <li>The update timing is the same as the cycle of the sampling pulse number. (It is the interval set in the "count cycle setting value" of the buffer memory.)</li> </ul>	0	8 9	40 41	72 73	104 105	136 137	168 169	200 201	232 233
Input pulse value	<ul style="list-style-type: none"> <li>Stores the actually entered pulse number.</li> <li>This value is not converted into the unit pulse number by the pre-scale function, unlike the "sampling pulse number" and "accumulating count value" of the buffer memory.</li> <li>The count indication range is 0 to 2147483647.</li> <li>When the operating condition setting request flag (Y1) is turned ON or "1" is set in the "counter reset request" of the buffer memory, the input pulse value is reset.</li> <li>If an overflow error (error code: 100) occurs, this value is kept counted when the count enable (Y18 to Y1F) is ON.</li> <li>The update timing is fixed at 10ms. Therefore, take care when using the module as a counter.</li> </ul>	0	10 11	42 43	74 75	106 107	138 139	170 171	202 203	234 235
Overflow detection flag	<ul style="list-style-type: none"> <li>If the "accumulating count value" of the buffer memory exceeds 99999999 when the accumulating counter is used as the linear counter, the overflow detection flag turns ON. At the same time, an overflow error (error code: 100) occurs and count operation is stopped.</li> <li>When the overflow error has occurred, the accumulating count value does not change from 99999999 if pulses are input after the error occurrence. The "sampling pulse number" of the buffer memory is reset.</li> <li>The overflow error is cleared by setting "1" in the "counter reset request" of the buffer memory. Count operation is resumed after the error is cleared.</li> <li>The error is also cleared by turning ON the error reset request (Y8 to YF). To resume count operation, however, turn ON the operating condition setting request flag (Y1) or set "1" in the counter reset request. [Detection value] 0: No overflow detection (OFF) 1: Overflow detection (ON)</li> </ul>	0	12	44	76	108	140	172	204	236

\*: Refer to Section 9.3 for details of the error codes.

Item	Details	Initial value	Buffer memory address							
			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Counter reset request	<ul style="list-style-type: none"> <li>Setting "1" in the counter reset request resets the "sampling pulse number", "accumulating count value" or "input pulse value" of the buffer memory.</li> <li>When a reset is made, the input pulses are invalid for a maximum of 20ms.</li> <li>If count operation has been stopped due to the detection of an overflow when the accumulating counter is used as the linear counter, the count operation is resumed after completion of a counter reset.</li> <li>If the setting value is other than 1, the setting is ignored.</li> </ul> [Setting value] 1: Reset request (The value automatically turns to "0" after completion of a counter reset.)	0	13	45	77	109	141	173	205	237
Carry over detection flag	<ul style="list-style-type: none"> <li>If the "accumulating count value" of the buffer memory exceeds 99999999 when the accumulating counter is used as the ring counter, the carry over detection flag turns ON.</li> <li>Unlike the overflow detection flag, count operation is continued.</li> <li>The carry over detection flag is reset by setting "1" in the "carry over reset request" of the buffer memory.</li> <li>Unlike the overflow detection flag, an error does not occur if the carry over flag turns ON.</li> </ul> [Detection value] 0: No carry over detection (OFF) 1: Carry over detection (ON)	0	14	46	78	110	142	174	206	238
Carry over reset request	<ul style="list-style-type: none"> <li>Set the carry over reset request.</li> <li>If the setting value is other than 1, the setting is ignored.</li> </ul> [Setting value] 1: Reset request (The value automatically turns to "0" after completion of a carry over reset.)	0	15	47	79	111	143	175	207	239
Error code	<ul style="list-style-type: none"> <li>Stores the error code.</li> <li>The latest error code is always stored into the error code.</li> </ul>	0	16	48	80	112	144	176	208	240
Alarm output selection	<ul style="list-style-type: none"> <li>Set whether an alarm will be output or not for the "sampling pulse number" of the buffer memory.</li> <li>If the setting value is other than 0 or 1, an alarm output setting range outside error (error code: 500) occurs.</li> </ul> [Setting value] 0: Alarm output function invalid 1: Alarm output function valid	0	17	49	81	113	145	177	209	241
Alarm output flag	<ul style="list-style-type: none"> <li>When "alarm output function valid" has been set in the "alarm output selection" of the buffer memory, the alarm output flag turns ON if the sampling pulse number exceeds the upper/upper limit value or lower/lower limit value.</li> </ul> 	0	18	50	82	114	146	178	210	242

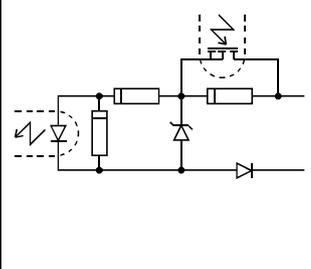
\*: Refer to Section 9.3 for details of the error codes.

Item	Details	Initial value	Buffer memory address							
			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Alarm output setting value upper/upper limit	<ul style="list-style-type: none"> <li>Set the alarm output setting values (upper/upper limit, upper/lower limit, lower/upper limit, lower/lower limit).</li> <li>The following setting values can also be set: upper/upper limit = upper/lower limit, lower/upper limit = lower/lower limit. However, an alarm output setting range outside error (error code: 500) occurs if the setting value is outside the setting range or the following relation expression is not established. Upper/upper limit <math>\geq</math> upper/lower limit &gt; lower/upper limit <math>\neq</math> lower/lower limit</li> </ul> To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value (value that will establish the above relation expression and is within the setting range), and then turn ON the operating condition setting request flag (Y1). [Setting range: 0 to 32767]	0	19	51	83	115	147	179	211	243
Alarm output setting value upper/lower limit			20	52	84	116	148	180	212	244
Alarm output setting value lower/upper limit			21	53	85	117	149	181	213	245
Alarm output setting value lower/lower limit			22	54	86	118	150	182	214	246
Count cycle change function selection	<ul style="list-style-type: none"> <li>Set whether the count cycle change function is valid or invalid.</li> <li>Set the count cycle in the "count cycle setting value" of the buffer memory.</li> <li>By setting "count cycle change function selection valid", the update timing of the "sampling pulse number" or "accumulating count value" of the buffer memory becomes the time set in the "count cycle setting value" of the buffer memory.</li> <li>When "count cycle change function selection invalid" is set, the count cycle is fixed at 1s.</li> <li>If the setting value is other than 0 or 1, a count cycle setting range outside error (error code: 600) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> </ul> [Setting value] 0: Count cycle change function selection invalid 1: Count cycle change function selection valid	0	23	55	87	119	151	183	215	247
Count cycle setting value	<ul style="list-style-type: none"> <li>Set the count cycle of the "sampling pulse number" or "accumulating count value" of the buffer memory.</li> <li>If the setting value is other than the following values, a count cycle setting range outside error (error code: 600) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a value within the setting range and then turn ON the operating condition setting request flag (Y1).</li> </ul> [Setting value] 0: 1s 1: 100ms 2: 200ms 3: 500ms	0	24	56	88	120	152	184	216	248

\*: Refer to Section 9.3 for details of the error codes.

3.5 Interface with external devices

The internal circuit of the QD60P8-G interface for connection of external devices is shown in a schematic diagram.

Input/Output	Internal circuit	Terminal number	Signal name	Operation	Input voltage (guaranteed value)	Operating current (guaranteed value)	
Input		1, 3, 5, 7, 9, 11, 13, 15	CH1 to 8 V+	At ON	5VDC *	3.5V to 5.5V	4mA or more
					12 to 24VDC *	10.2 to 30V	4mA or more
		2, 4, 6, 8, 10, 12, 14, 16	CH1 to 8 V-	At OFF	5VDC *	1.0V or less	0.5mA or less
					12 to 24VDC *	2.0V or less	0.5mA or less
-	-	17 18	FG	-	-	-	

\*: Use the intelligent function module switch to change between 5VDC and 12 to 24VDC.  
 (For details, refer to "Section 4.5 Switch setting for intelligent function module".)

Signal layout of each channel

	Terminal number	Signal name
CH1	1	CH1 V+
	2	CH1 V-
CH2	3	CH2 V+
	4	CH2 V-
CH3	5	CH3 V+
	6	CH3 V-
CH4	7	CH4 V+
	8	CH4 V-
CH5	9	CH5 V+
	10	CH5 V-
CH6	11	CH6 V+
	12	CH6 V-
CH7	13	CH7 V+
	14	CH7 V-
CH8	15	CH8 V+
	16	CH8 V-

## CHAPTER 4 SETUP AND PROCEDURE BEFORE OPERATION

The following describes the procedure prior to the QD60P8-G operation, the name and setting of each part of the QD60P8-G, and wiring method.

### 4.1 Handling precautions

The following are the precautions for handling the QD60P8-G.

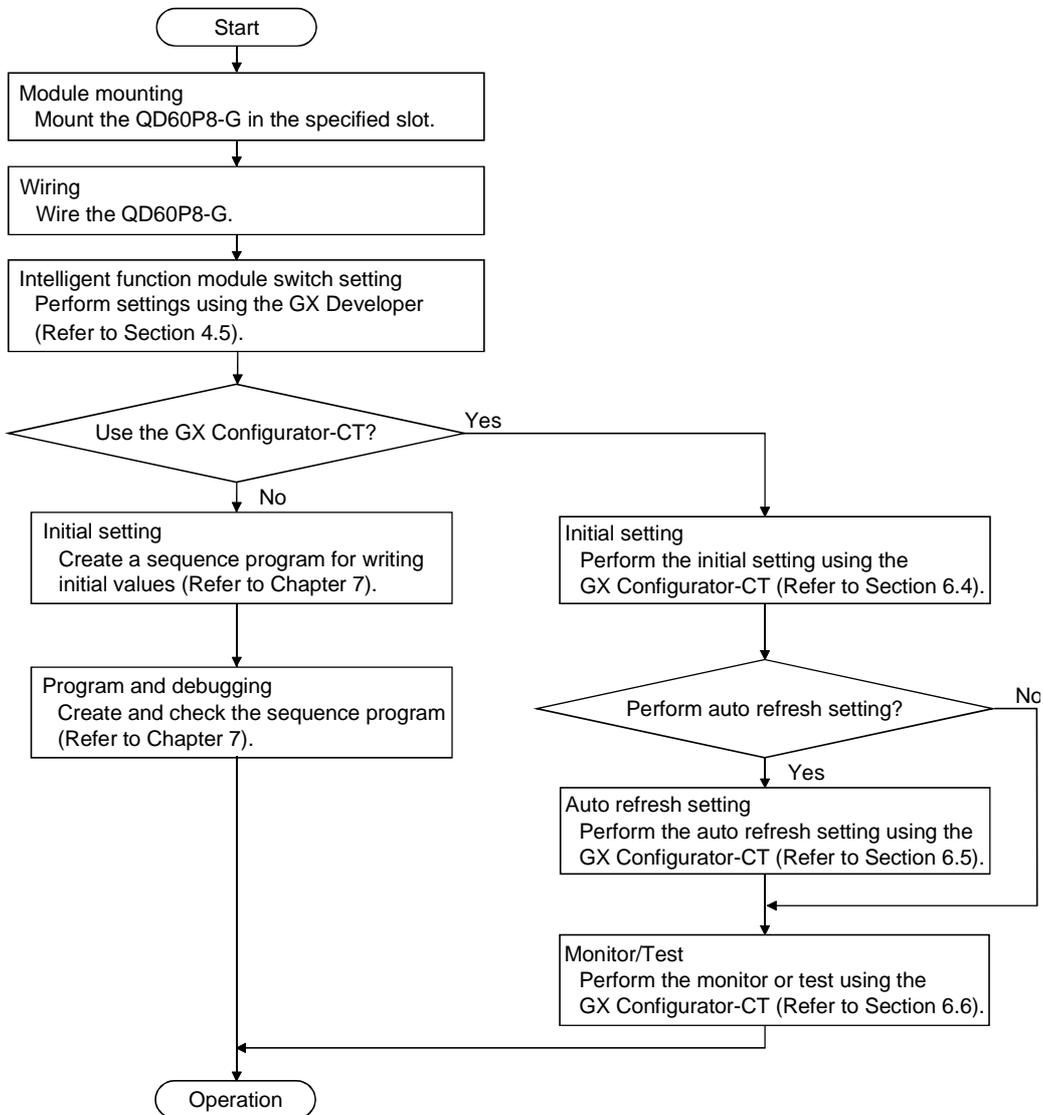
- (1) Do not drop the module casing, or do not subject it to strong impact.
- (2) Do not remove the PCB of each module from its case. Doing so may cause breakdowns.
- (3) Be careful not to let foreign matters such as sawdust or wire chips get inside the module. These may cause fires, failure and malfunction.
- (4) The top surface of the module is covered with a 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.
- (5) Tighten the mounting and terminal screws of the module to the following specified torques.  
Undertightening can cause a short circuit, failure or malfunction.

Screw location	Tightening torque range
Module mounting screw (M3 screw)	36 to 48N•cm
Terminal block terminal screw (M3 screw)	42 to 58N•cm
Terminal block mounting screw (M3.5 screw)	66 to 89N•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 operation

The figure below shows the steps that should be followed before starting the QD60P8-G operation.

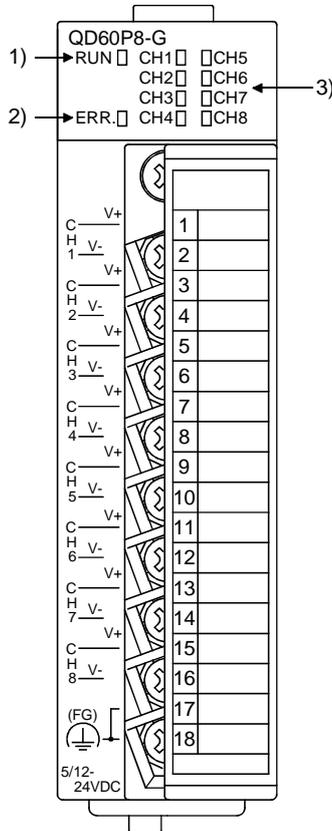


4

4.3 Part identification nomenclature

(1) Part identification nomenclature

The following are the part names of the QD60P8-G.



(2) LED Display

The LEDs turn ON/OFF as described below depending on the operating status of the module.

Number	Name	Details
1)	RUN LED	Indicates the operating status of the QD60P8-G. ON : Operating normally. OFF : 5V power is OFF, watch dog timer error occurred, in the module changeable status during online module change
2)	ERR. LED	Indicates the error status of the QD60P8-G. ON : Error is occurring OFF : Operating normally.
3)	CH1 to CH8 LED	Displays the voltage application status of the input terminals. ON : Voltage is being applied to the CH1 to CH8 pulse input terminal. OFF : No voltage applied to pulse input terminals of CH1 to CH8.

## 4.4 Wiring

This section explains how to wire the pulse generator to the QD60P8-G. The following are the precautions for wiring the QD60P8-G. Read these precautions together with "Section 4.1 Handling precautions" to ensure work safety.

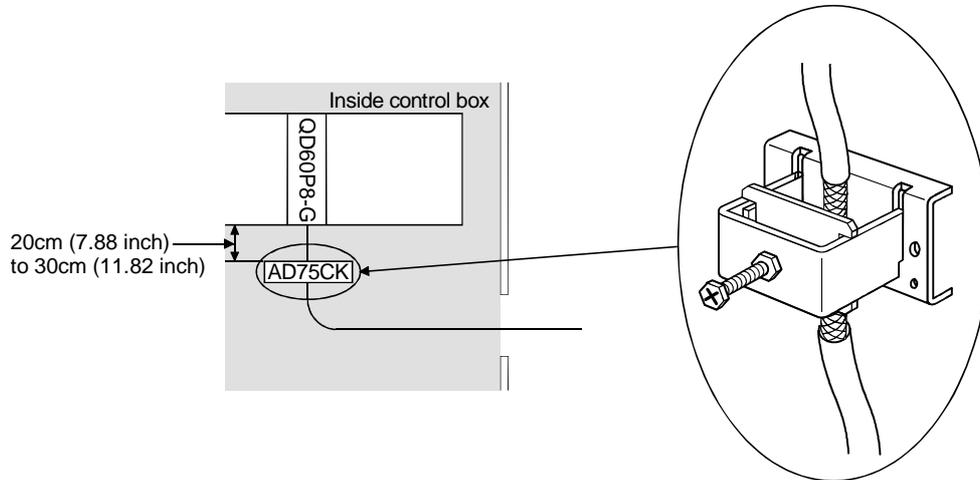
### 4.4.1 Wiring precautions

In order to fully utilise the functions of the QD60P8-G and ensure system reliability, external wiring having a minimum of noise effect must be provided.

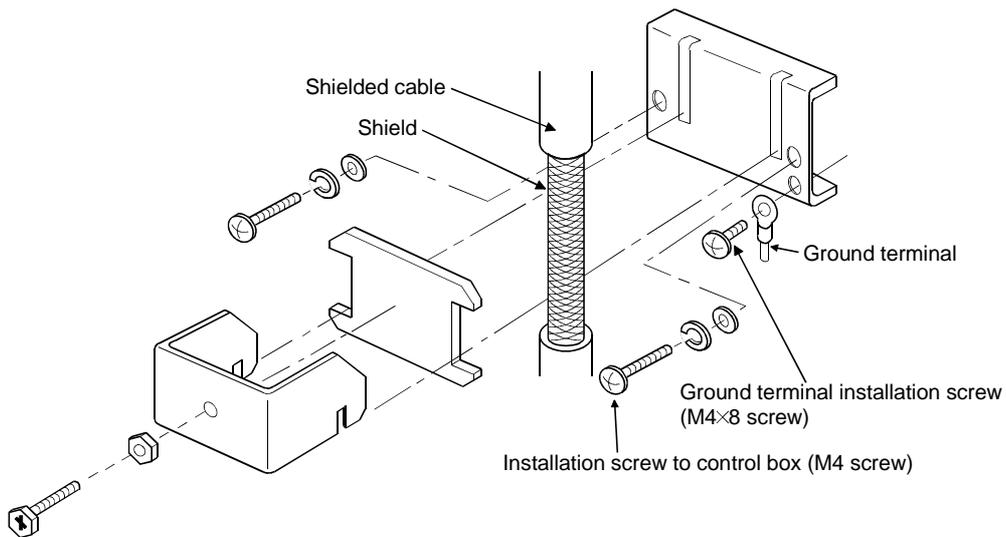
The precautions regarding external wiring are described below.

- (1) Use separate cables with the AC control circuit and QD60P8-G's external input signals to avoid the influence of AC side surges and induction.
- (2) Do not run the cable close to, or bundle them with, the main circuit and high-voltage cables and the load cables from other than the PLC.  
Failure to do so will make the cables susceptible to noise, surges and induction.
- (3) If there may be the effect of noise when a cable to be connected to the QD60P8-G and the power line are installed close to each other, use a general shielded cable as a countermeasure against noise.  
The shield must be grounded on the QD60P8-G side.
- (4) No solderless terminals with insulation sleeves can be used on the terminal block.  
It is recommended to cover the electric wire connecting section of each solderless terminal with a marking tube or insulating tube.
- (5) The cables connected to the QD60P8-G should be placed in a duct or fixed. Not doing so can cause the QD60P8-G or cables to be damaged when the cables swing, move or are pulled carelessly, for example, or to malfunction due to poor cable connection.

- (6) To comply with the EMC Directive and Low-Voltage Directive, always ground the QD60P8-G to the control box using shielded cables and AD75CK cable clamping (Mitsubishi Electric make).



[How to ground shielded cable using AD75CK]



Using the AD75CK, you can tie four cables of about 7mm outside diameter together for grounding.

(For details, refer to the AD75CK-type Cable Clamping Instruction Manual<IB-68682>.)

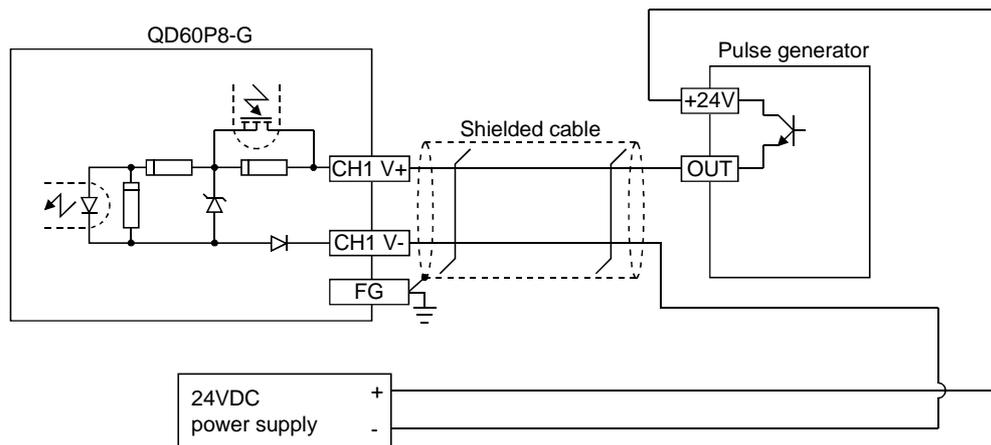
4.4.2 Wiring example

This section shows an example of wiring the QD60P8-G and pulse generator. In the wiring example of this section, only CH1 is wired. Also, in this example, the voltage of the external power supply is 24VDC as the electrical specifications of the pulse generator.

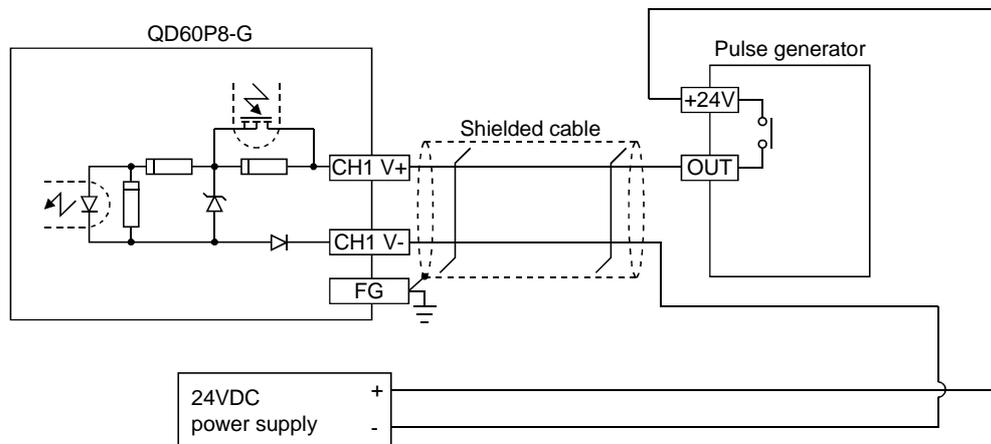
**⚠ DANGER**

- 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.
- Do not apply the voltage exceeding the value set on the "Intelligent function module switch setting" dialog box to the terminals. Failure to observe this may cause fire or failure.

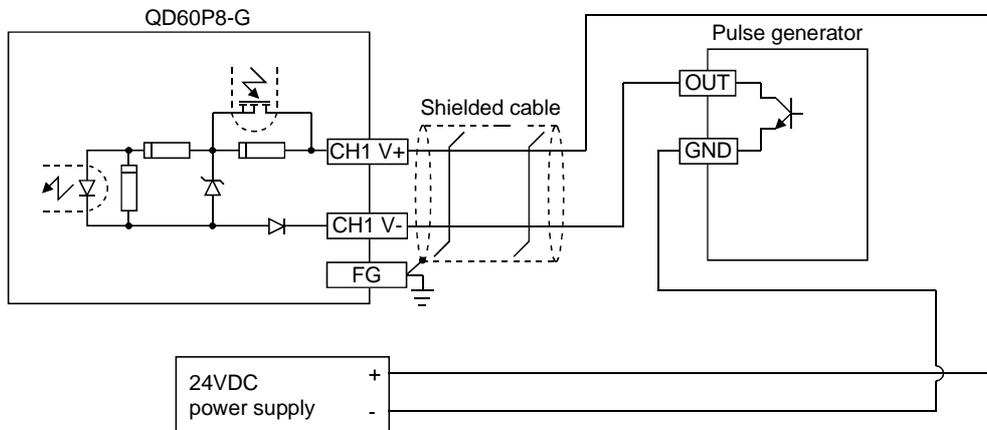
(1) Wiring example with a sink logic type pulse generator  
 (a) For transistor output



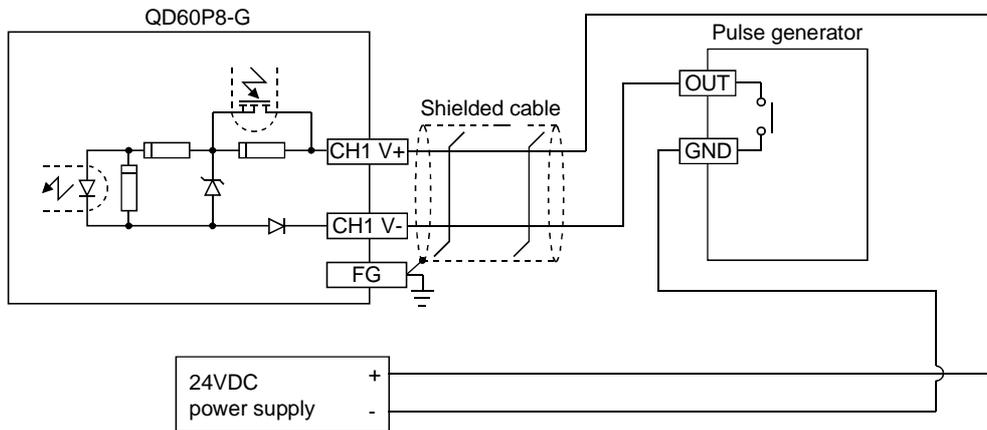
(b) For contact output



(2) Wiring example with a source logic type pulse generator  
 (a) For transistor output



(b) For contact output



4.5 Switch setting for intelligent function module

Settings for QD60P8-G input voltage selection, pulse edge selection, linear counter or ring counter selection, and input filter setting can be made by the GX Developer intelligent function module switch setting.

Make the intelligent function module switch setting in the "I/O assignment setting" PLC parameter of the QCPU using GX Developer.

- The intelligent function module switch has switches 1 to 5, and is set at 16 bits data.
- If the intelligent function module switch setting is not operated, the default setting for switches 1 to 5 is 0.

The settings made with the intelligent function module switches are made valid after power-on or PLC CPU reset. You cannot change the settings during operation.

Switch No.	Setting items	Setting details/bit assignment	Default value
Switch 1	Input voltage selection		0000H
Switch 2	Pulse edge selection		0000H
	Linear counter or Ring counter selection		

Switch No.	Setting items	Setting details/bit assignment	Default value										
Switch 3	Input filter setting (CH1 to CH4)	<table border="1"> <thead> <tr> <th>Setting items</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>CH1 Input filter</td> <td>0:30kpps 1:10kpps</td> </tr> <tr> <td>CH2 Input filter</td> <td>2:1kpps 3:100pps</td> </tr> <tr> <td>CH3 Input filter</td> <td>4:50pps 5:10pps</td> </tr> <tr> <td>CH4 Input filter</td> <td>6:1pps 7:0.1pps</td> </tr> </tbody> </table>	Setting items	Meaning	CH1 Input filter	0:30kpps 1:10kpps	CH2 Input filter	2:1kpps 3:100pps	CH3 Input filter	4:50pps 5:10pps	CH4 Input filter	6:1pps 7:0.1pps	0000H
Setting items	Meaning												
CH1 Input filter	0:30kpps 1:10kpps												
CH2 Input filter	2:1kpps 3:100pps												
CH3 Input filter	4:50pps 5:10pps												
CH4 Input filter	6:1pps 7:0.1pps												
Switch 4	Input filter setting (CH5 to CH8)	<table border="1"> <thead> <tr> <th>Setting items</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>CH5 Input filter</td> <td>0:30kpps 1:10kpps</td> </tr> <tr> <td>CH6 Input filter</td> <td>2:1kpps 3:100pps</td> </tr> <tr> <td>CH7 Input filter</td> <td>4:50pps 5:10pps</td> </tr> <tr> <td>CH8 Input filter</td> <td>6:1pps 7:0.1pps</td> </tr> </tbody> </table>	Setting items	Meaning	CH5 Input filter	0:30kpps 1:10kpps	CH6 Input filter	2:1kpps 3:100pps	CH7 Input filter	4:50pps 5:10pps	CH8 Input filter	6:1pps 7:0.1pps	0000H
Setting items	Meaning												
CH5 Input filter	0:30kpps 1:10kpps												
CH6 Input filter	2:1kpps 3:100pps												
CH7 Input filter	4:50pps 5:10pps												
CH8 Input filter	6:1pps 7:0.1pps												
Switch 5		Vacant											

(1) Input voltage selection (Switch 1: lower 8 bits)

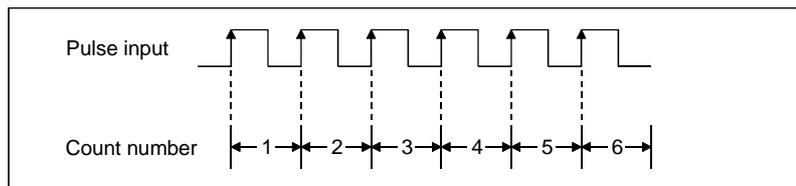
Set the level of the input signal on each channel.

(2) Pulse edge selection (Switch 2: lower 8 bits)

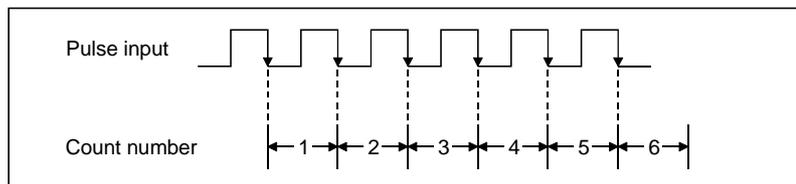
Set the pulse edge (rise edge/fall edge) on each channel.

For pulse edge selection, the differences between the rise edge and fall edge and the count timings are shown below.

1) Rise edge



2) Fall edge



(3) Linear counter or Ring counter selection (Switch 2: upper 8 bits)

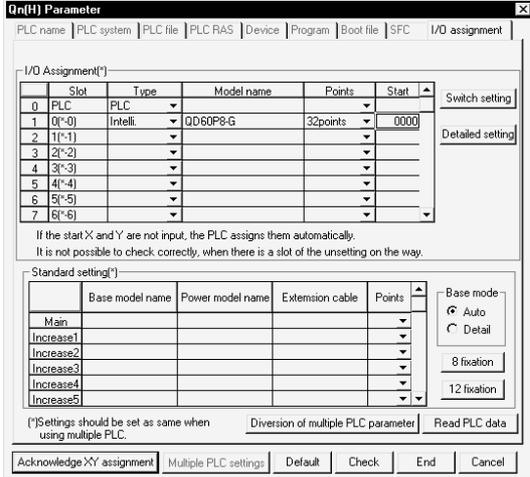
Set the count type (linear counter or ring counter) on each channel.

(4) Input filter setting (Switch 3, Switch 4)

Set the input pulse counting speed (maximum) on each channel.

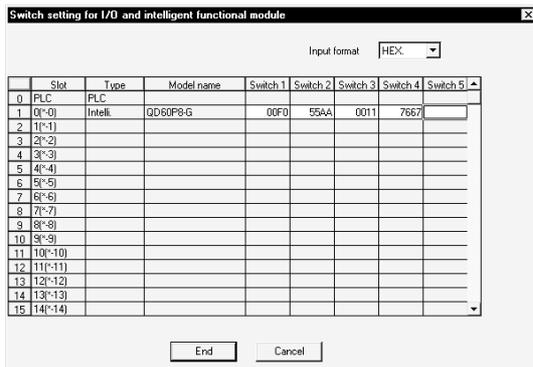
Operating procedure

Using GX Developer, make settings with the QCPU PLC parameter "I/O assignment setting" screen.



- (a) I/O assignment setting screen  
Specify the following for the slot where the QD60P8-G is mounted.

Type : Select "Intelli."  
 Model name : Enter the module's model name.  
 Points : Select 32 points.  
 Start XY : Enter the start I/O signal for the QD60P8-G.



- (b) Switch setting for I/O and intelligent function module  
Click on **Switch setting** on the I/O assignment setting screen to display the screen at left and set switches 1 to 4. The setting can easily be done if values are entered in hexadecimal. Change the input format to hexadecimal and enter values.

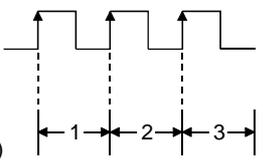
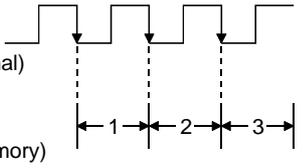
CHAPTER 5 DETAILS AND SETTING OF FUNCTIONS

This chapter explains the details and settings of the QD60P8-G functions.

5.1 Count operation

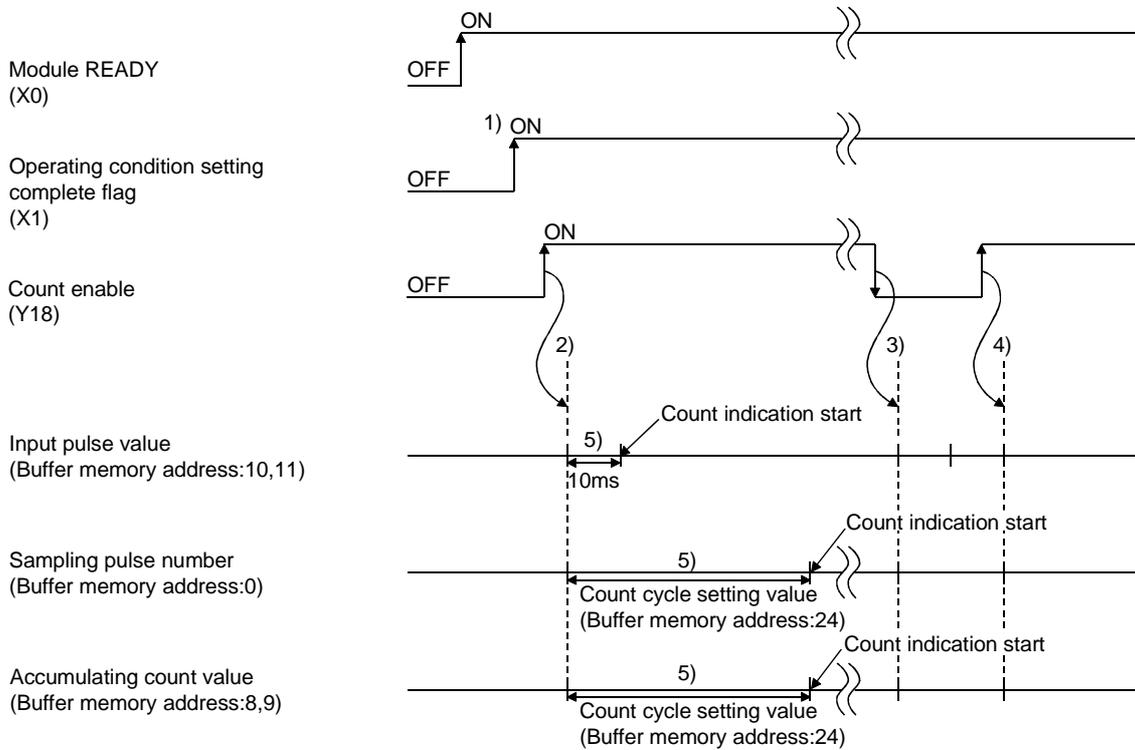
5.1.1 Pulse input method

The pulse input method of the QD60P8-G is 1-phase input and addition count. (Subtraction count is not available.) However, it is allowed to set whether pulses will be counted on the rise or fall by using the intelligent function module switches. Refer to Section 4.5 for details of the switch settings of intelligent function module.

Pulse input method	Count timing	
1-phase	Pulse input from pulse generator (external)  Input pulse value (QD60P8-G buffer memory)	Counted on rise (↑) of pulses
	Pulse input from pulse generator (external)  Input pulse value (QD60P8-G buffer memory)	Counted on fall (↓) of pulses

5.1.2 Input pulse count operation

This section explains the input pulse count operation of the QD60P8-G. (For CH1)



5

Number	Details
1)	When the operating condition setting complete flag (X1) turns ON, pulse count operation is enabled. If any setting value or similar is in error, count operation cannot be performed since the operating condition setting complete flag (X1) does not turn ON.
2)	When the count enable (Y18) is turned ON, the count operation of CH1 starts.
3)	The count enable (Y18) turns OFF and pulse count operation stops.
4)	The count enable (Y18) turns ON and pulse count operation is restarted.
5)	The indications of the "sampling pulse number" and "accumulating count value" of the buffer memory are updated in the cycle set in the "count cycle setting value" of the buffer memory. (Refer to Section 5.1.4) (The update timing of the "input pulse value" of the buffer memory is fixed at 10ms.)

**REMARK**

In the pulse count operation of the QD60P8-G, is delayed due to the control cycle (10ms). Refer to Section 5.9 for details.

5.1.3 Count value reading

This section explains how to read the count values (sampling pulse number, accumulating count value, input pulse value) stored in the buffer memory.

The accumulating count value and input pulse value are stored in the buffer memory as two words (32 bits). When reading the count value from the module, always read two words together.

The buffer memory addresses where the count values are stored are as follows.

Item	Buffer memory address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Sampling pulse number	0	32	64	96	128	160	192	224
Accumulating count value	8	40	72	104	136	168	200	232
	9	41	73	105	137	169	201	233
Input pulse value	10	42	74	106	138	170	202	234
	11	43	75	107	139	171	203	235

The buffer memory addresses of the counter reset requests for resetting the count values are as follows.

Item	Buffer memory address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Counter reset request	13	45	77	109	141	173	205	237

The update timings of the count values are as follows.

Item	Update timing
Sampling pulse number	Count cycle setting value (Refer to Section 5.1.4)
Accumulating count value	
Input pulse value	10ms

**POINT**

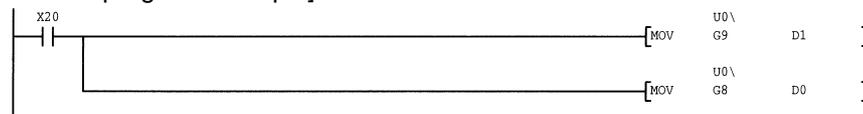
When reading the accumulating count value or input pulse value, always read two words together.

If it is read in single word unit, a wrong count value may be read due to a data mismatch between the lower word and upper word when the count value is updated halfway during read.

[Program example]



[Incorrect program example]



## 5.1.4 Count cycle changing

This section describes how to change the count cycles of the sampling pulse number and accumulating count value.

To change the count cycle, set "1: Count cycle change function selection valid" in the "count cycle change function selection" of the buffer memory. (Whether the function is valid or invalid can be selected on each channel.)

Further, set the count cycle in the "count cycle setting value" of the buffer memory.

Item	Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Count cycle change function selection	0: Count cycle change function selection invalid *								
	1: Count cycle change function selection valid	23	55	87	119	151	183	215	247
Count cycle setting value	0: 1s								
	1: 100ms								
	2: 200ms	24	56	88	120	152	184	216	248
	3: 500ms								

\*: "When "count cycle change function selection invalid" is set, the count cycle is 1s (fixed).

**POINT**

- If the setting value is other than the above values, a count cycle setting range outside error (error code: 600) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).
- The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after setting the values to the buffer memory.

5.2 Count type selection

Select the linear counter or ring counter by setting with the intelligent function module switch.

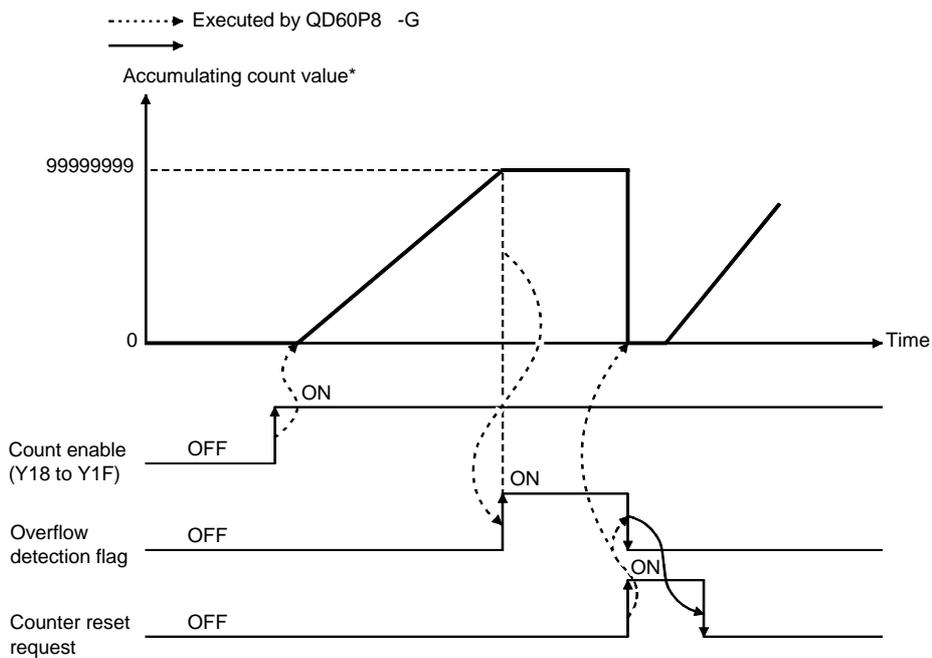
Refer to Section 4.5 for details of the setting method.

5.2.1 Linear counter operation

When the linear counter is selected, count operation is performed between 0 and 99999999.

If the "accumulating count value" of the buffer memory exceeds 99999999, the "overflow detection flag" of the buffer memory turns ON and an overflow error (error code: 100) occurs.

The linear counter can be used with the comparison output function (refer to Section 5.4), pre-scale function (refer to Section 5.6), movement averaging function (refer to Section 5.7) and alarm output function (refer to Section 5.8).



\*: The accumulating count value is updated in the cycle set in the "count cycle setting value" of the buffer memory. (Refer to Section 5.1.4)

• Overflow error

An overflow error (error code: 100) occurs if the "accumulating count value" of the buffer memory exceeds 99999999 when the count type is the linear counter. If the overflow error occurs, count operation is stopped, and the "accumulating count value" of the buffer memory does not change from 99999999 if pulses are input. Also, the "sampling pulse number" of the buffer memory is reset.

The overflow error is cleared by setting "1" in the "counter reset request" of the buffer memory. Count operation is resumed after the error is cleared. The error is also cleared by turning ON the error reset request (Y8 to YF). To resume count operation, however, turn ON the operating condition setting request flag (Y1) or set "1" in the "counter reset request" of the buffer memory.

When checking for the module error at occurrence of an overflow error, click the [Diagnosis] - [System monitor] menu on GX Developer and monitor the system.

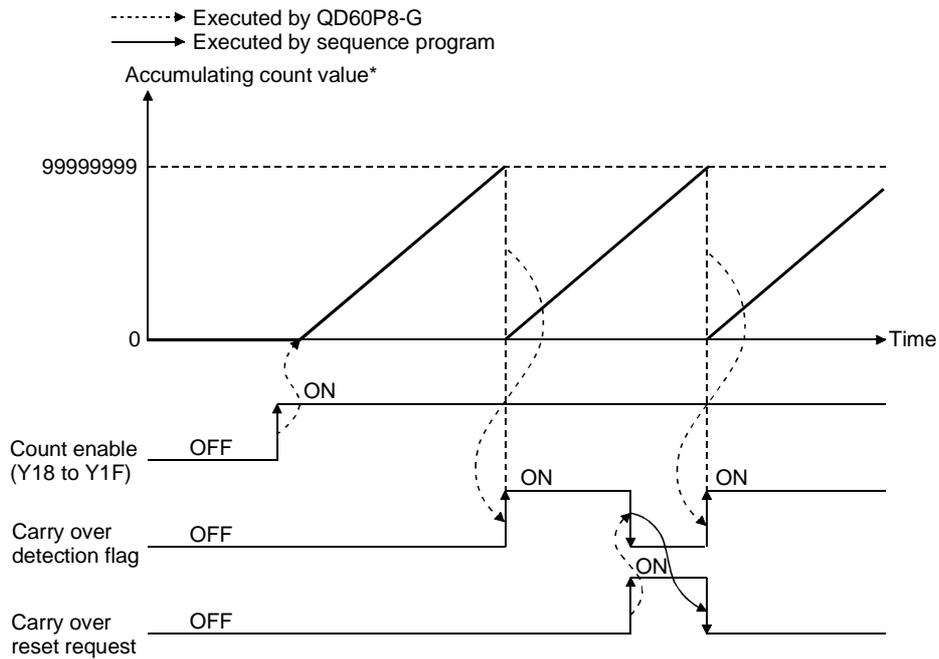
Item	Read value/Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Accumulating count value	0 to 99999999	8	40	72	104	136	168	200	232
		9	41	73	105	137	169	201	233
Overflow detection flag	0: No overflow detection (OFF) 1: Overflow detection (ON)	12	44	76	108	140	172	204	236
Counter reset request	1: Reset request (The value automatically turns to "0" after completion of a counter reset.)	13	45	77	109	141	173	205	237

5.2.2 Ring counter operation

When the ring counter is selected, count operation is repeated between 0 and 99999999.

If the "accumulating count value" of the buffer memory exceeds 99999999, the accumulating count value returns to 0 and the "carry over detection flag" of the buffer memory turns ON.

The ring counter can be used with the comparison output function (refer to Section 5.4), pre-scale function (refer to Section 5.6), movement averaging function (refer to Section 5.7) and alarm output function (refer to Section 5.8).



\*: The accumulating count value is updated in the cycle set in the "count cycle setting value" of the buffer memory. (Refer to Section 5.1.4)

Item	Read value/Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Accumulating count value	0 to 99999999	8	40	72	104	136	168	200	232
		9	41	73	105	137	169	201	233
Carry over detection flag	0: No carry over detection (OFF)	14	47	79	111	143	175	207	239
	1: Carry over detection (ON)								
Carry over reset request	1 : Reset request (The value automatically turns to "0" after completion of a carry over reset.)	15	48	80	112	144	176	208	240

**POINT**

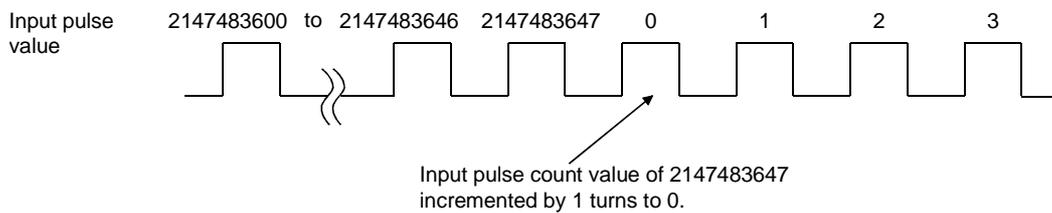
The carry over detection flag is not cleared until a carry over reset request is given. Once cleared, the carry over detection flag does not turn ON until the accumulating count value exceeds 99999999 again.

5.3 Input pulse value

The pulse number entered into the QD60P8-G is stored into the "input pulse value" of the buffer memory. This value is counted when the count enable (Y18 to Y1F) is ON.

The input pulse value is not converted into the unit pulse number by the pre-scale function (refer to Section 5.6), unlike the "sampling pulse number" and "accumulating count value" of the buffer memory. If an overflow error occurs, the value is counted when the count enable (Y18 to Y1F) is ON.

The count type of the input pulse value is a ring counter of 0 to 2147483647.



Item	Read value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Input pulse value	0 to 2147483647	10	42	74	106	138	170	202	234
		11	43	75	107	139	171	203	235

The buffer memory addresses for resetting the input pulse values are as follows.

Item	Buffer memory address							
	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Counter reset request	13	45	77	109	141	173	205	237

<b>POINT</b>
<ul style="list-style-type: none"> <li>• The update timing of the input pulse value is fixed at 10ms. Therefore, take care when using the module as a counter. (Refer to Section 5.9)</li> <li>• When reading the input pulse value, always read two words together. If it is read in single word unit, a wrong count value may be read due to a data mismatch between the lower word and upper word when the count value is updated halfway during read.</li> </ul>

## 5.4 Comparison output function

The comparison output function compares any count value set in the "comparison output setting value" of the buffer memory with the "accumulating count value" of the buffer memory, and if the "accumulating count value" is equal to or greater than the "comparison output setting value", turns ON the accumulating counter comparison flag (X10 to X17).

Set one point of the comparison output setting value for each channel.

The buffer memory addresses related to the setting of the comparison output function are as follows.

Item	Read value/Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Comparison output selection	0: Comparison output function invalid								
	1: Comparison output function valid	1	33	65	97	129	161	193	225
Comparison output setting value	0 to 99999999	2	34	66	98	130	162	194	226
		3	35	67	99	131	163	195	227
Accumulating count value	0 to 99999999	8	40	72	104	136	168	200	232
		9	41	73	105	137	169	201	233

The I/O signals (X/Y devices) related to the setting of the comparison output function are as follows.

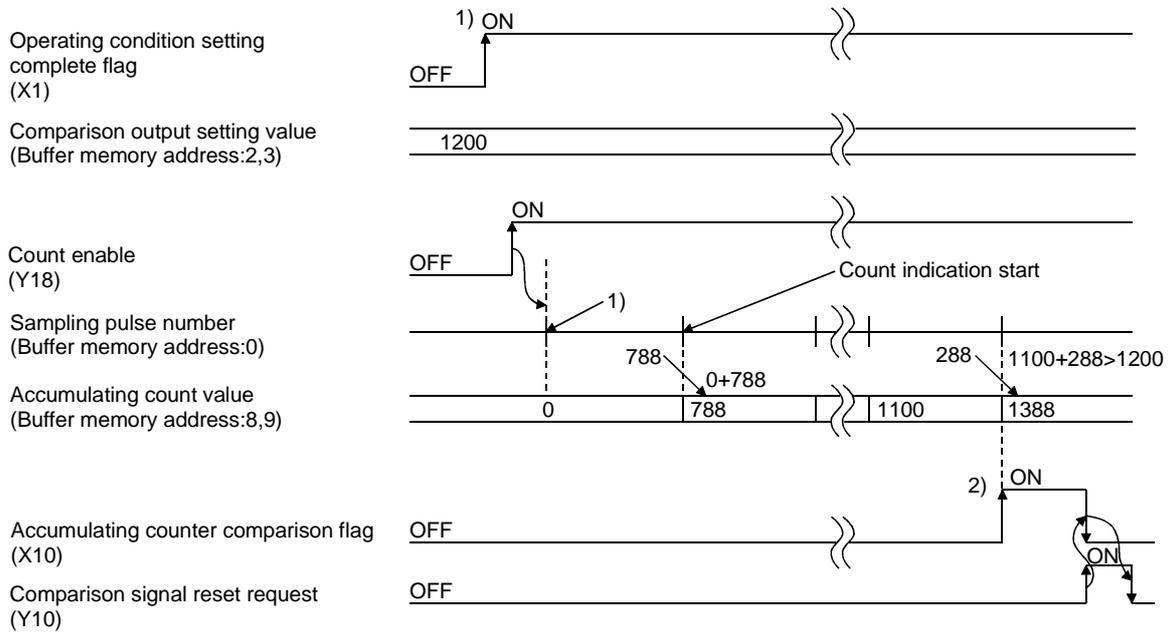
Item	Read value/Setting value	X/Y device							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Accumulating counter comparison flag	OFF: Accumulating count value < Comparison output setting value								
	ON: Accumulating count value $\geq$ Comparison output setting value	X10	X11	X12	X13	X14	X15	X16	X17
Comparison signal reset request	OFF: No comparison signal reset request								
	ON: Comparison signal reset request	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17

**POINT**

- If the value outside the range is set to any of the above buffer memory addresses, a comparison output setting range outside error (error code: 200) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a value within the setting range and then turn ON the operating condition setting request flag (Y1).
- The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after setting the values to the buffer memory.

Outline of comparison output function operation

The following gives the outline of the comparison output function operation. (For CH1)



Number	Details
1)	Count operation is started when the count enable (Y18) is turned ON with the operating condition setting complete flag (X1) ON.
2)	When the "accumulating count value" is equal to or greater than the "comparison output setting value", the accumulating counter comparison flag (X10) turns ON. Since the accumulating count value is updated at intervals of the count cycle setting value (refer to Section 5.1.2), the accumulating counter comparison flag is also turned ON at the timing of the count cycle setting value.

**POINT**

The accumulating counter comparison flag (X10 to X17) is reset when the comparison signal reset request (Y10 to Y17) is turned ON. When the accumulating counter is operating as a linear counter, the accumulating counter comparison flag (X10 to X17) that was turned OFF once does not turn ON until the accumulating count value reaches the comparison output setting value again after it has been reset.

If the accumulating counter is operating as a ring counter, the flag turns ON when the accumulating count value reaches the comparison output setting value again in the ring processing.

## 5.5 Counter reset function

Setting "1" in the "counter reset request" of the buffer memory resets the "sampling pulse number", "accumulating count value" or "input pulse value" of the buffer memory.

Item	Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Counter reset request	1: Reset request (The value automatically turns to "0" after completion of a counter reset.)	13	45	77	109	141	173	205	237

**POINT**

- When the counter is reset, input pulses are invalid for a maximum of 20ms.
- When the accumulating counter is the linear counter, count operation that was stopped due to the detection of an overflow is started after completion of a counter reset.
- If a value other than 1 is set, the setting is ignored.

5.6 Pre-scale function

The pre-scale function converts the input pulse number into the unit pulse number when its weight per pulse is a fraction.

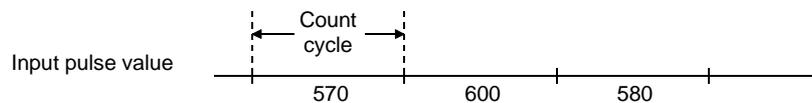
The pre-scale function converts the input pulse value per count cycle into the unit pulse number using the following operation formula. The result of conversion is stored into the "sampling pulse number" of the buffer memory.

$$\text{Sampling pulse number} = \text{input pulse value per count cycle} \times \text{pre-scale setting value} \times \text{unit magnification}$$

(The converted sampling pulse number is rounded down to the decimal point.)

Item	Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Pre-scale function selection (Unit magnification)	0: Pre-scale function invalid								
	1: × 1								
	2: × 0.1	6	38	70	102	134	166	198	230
	3: × 0.01								
	4: × 0.001								
5: × 0.0001									
Pre-scale setting value	0 to 32767	7	39	71	103	135	167	199	231

(Input pulse value per count cycle)



(Example)

If the input pulse value per count cycle is 1000, the pre-scale setting value is 5832, and the pre-scale function selection is 4

$$\begin{aligned} \text{Sampling pulse number} &= \text{input pulse value per count cycle} \times \text{pre-scale setting value} \times \text{unit magnification} \\ &= 1000 \times 5832 \times 0.001 \\ &= 5832 \end{aligned}$$

This value is added to the accumulating count value.

**POINT**

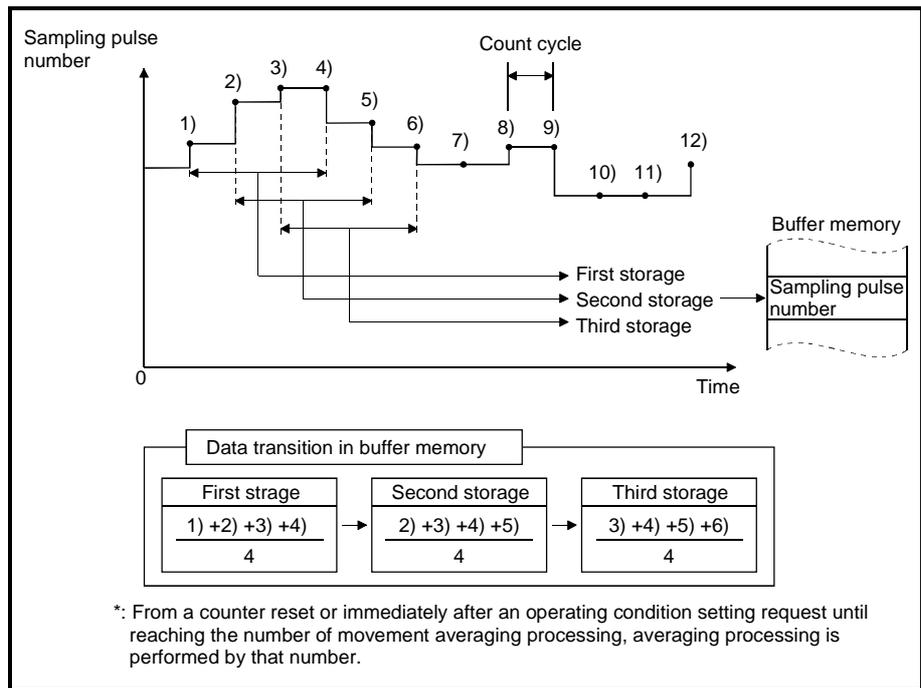
- Note that if the pre-scale setting value is set to 0, the sampling pulse number calculated with the above operation formula becomes 0, and it seems as if pulses are not counted although they are actually counted.
- If the setting value is other than the above values, a pre-scale setting range outside error (error code: 400) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).
- The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after setting the values to the buffer memory.

5.7 Movement averaging function

The movement averaging function averages the values of the sampling pulse number, which were imported in the count cycle (refer to Section 5.1.4), by the specified number of times to calculate the average value. This function is used when variations occur in the values of the sampling pulse number.

The following shows the outline of movement averaging function operation.

Movement averaging processing performed when the setting number is four times



Item	Read value/Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Sampling pulse number	0 to 32767	0	32	64	96	128	160	192	224
Movement averaging processing selection	0: Sampling processing 1: Movement averaging processing	4	36	68	100	132	164	196	228
Number of movement averaging processing	2 to 60	5	37	69	101	133	165	197	229

<b>POINT</b>
<ul style="list-style-type: none"> <li>• If the setting value is other than the above values, a movement averaging setting range outside error (error code: 300) occurs. To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel. After this, set a correct value and then turn ON the operating condition setting request flag (Y1).</li> <li>• The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after setting the values to the buffer memory.</li> </ul>

5.8 Alarm output function

With "alarm output function valid" set in the "alarm output selection" of the buffer memory, the alarm output function outputs an alarm if the "sampling pulse number" of the buffer memory exceeds the upper/upper limit value or lower/lower limit value. The alarm is turned OFF if the sampling pulse number is below the upper/lower limit value or above the lower/upper limit value after the output of the alarm.

To set the alarm output function, set four points: upper/upper limit value, upper/lower limit value, lower/upper limit value and lower/lower limit value.

The buffer memory addresses related to the setting of the alarm output function are as follows.

Item	Setting value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Alarm output selection	0: Alarm output function invalid 1: Alarm output function valid	17	49	81	113	145	177	209	241
Alarm output setting value upper/upper limit	0 to 32767	19	51	83	115	147	179	211	243
Alarm output setting value upper/lower limit		20	52	84	116	148	180	212	244
Alarm output setting value lower/upper limit		21	53	85	117	149	181	213	245
Alarm output setting value lower/lower limit		22	54	86	118	150	182	214	246

If the setting value is other than in the above values or does not establish the following relation expression, an alarm output setting range outside error (error code: 500) occurs.

$$\text{Upper/upper limit} \geq \text{upper/lower limit} > \text{lower/upper limit} \geq \text{lower/lower limit}$$

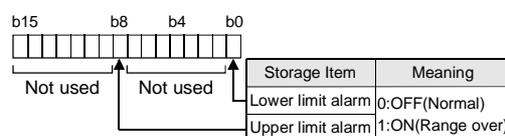
To clear the error, turn ON the error reset request (Y8 to YF) of the corresponding channel.

After this, set a correct value (value that will establish the above relation expression and is within the setting range), and then turn ON the operating condition setting request flag (Y1).

The buffer memory addresses related to the alarm output are as follows.

Item	Read value	Buffer memory address							
		CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Sampling pulse number	0 to 32767	0	32	64	96	128	160	192	224
Alarm output flag	bit0: Lower limit alarm bit8: Upper limit alarm	18	50	82	114	146	178	210	242

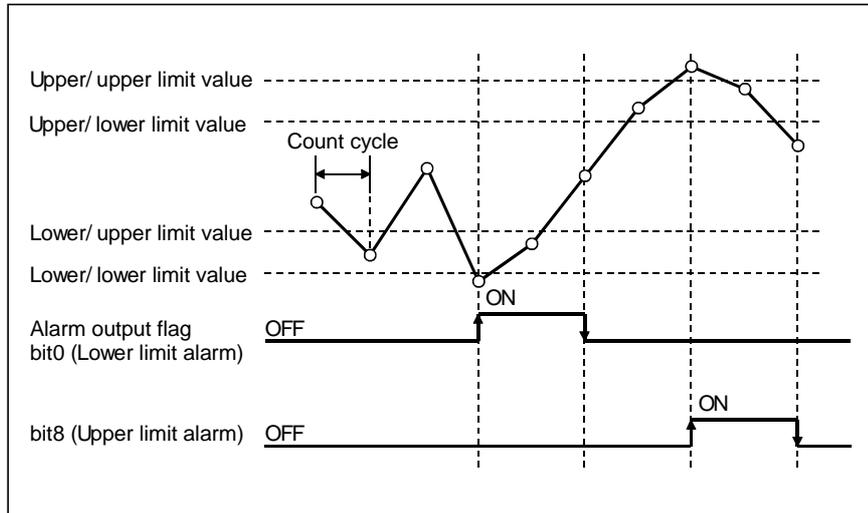
[Bit pattern of alarm output]



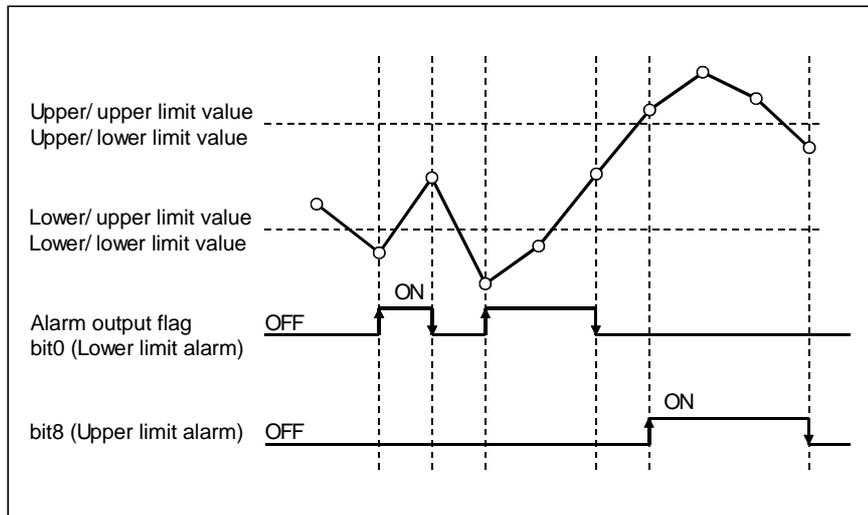
Outline of alarm output function operation

The following gives the outline of the alarm output function operation.

- Example of alarm output operation



- Assuming that the upper/upper limit = upper/lower limit and lower/upper limit = lower/lower limit, operation is performed as shown below.



**POINT**

- Since the "sampling pulse number" of the buffer memory is updated at intervals of the count cycle setting value (refer to Section 5.1.4), the alarm output flag also turns ON/OFF at the timing of the count cycle setting value.
- The settings are reflected on the module by turning ON the operating condition setting request flag (Y1) after setting the values to the buffer memory.

### 5.9 Count response delay time

The count value of the QD60P8-G is delayed for the following reasons. Please take this into consideration when using the module as a counter.

- A delay occurs due to the scan time of a sequence program at the time of count start processing using the count enable (Y18 to Y1F).
- A delay occurs due to the control cycle (10ms). A maximum of 20ms (one control cycle  $\times$  2) delay occurs from when the count enable (Y18 to Y1F) is turned ON/OFF until the "input pulse value" of the buffer memory is displayed. Similarly, a delay also occurs at a counter reset request.

The calculation expression of the delay time is as indicated below.

$$\text{Maximum delay time [ms]} = (1 \text{ scan time} + 20) \text{ [ms]}$$

## CHAPTER 6 UTILITY PACKAGE (GX Configurator-CT)

The counter module utility package (GX Configurator-CT) is software designed to make initial setting, auto refresh setting, monitor/test of the QD60P8-G using dedicated screens, without being conscious of the I/O signals and buffer memory. Use the utility package with GX Developer (SW4D5C-GPPW-E or later).

### 6.1 Utility package functions

The following table gives the lists the functions of the utility package.

Utility package (GX Configurator-CT) function list

Function	Details	Reference
Initial setting	<p>Make initial setting for operating the QD60P8-G for each channel. Set the values of the items which require initial setting. [Setting items]</p> <ul style="list-style-type: none"> <li>• CH <input type="checkbox"/> Comparison output selection</li> <li>• CH <input type="checkbox"/> Comparison output setting value</li> <li>• CH <input type="checkbox"/> Movement averaging processing selection</li> <li>• CH <input type="checkbox"/> Number of movement averaging processing</li> <li>• CH <input type="checkbox"/> Pre-scale function selection</li> <li>• CH <input type="checkbox"/> Pre-scale setting value</li> <li>• CH <input type="checkbox"/> Alarm output selection</li> <li>• CH <input type="checkbox"/> Alarm output setting value upper/upper limit</li> <li>• CH <input type="checkbox"/> Alarm output setting value upper/lower limit</li> <li>• CH <input type="checkbox"/> Alarm output setting value lower/upper limit</li> <li>• CH <input type="checkbox"/> Alarm output setting value lower/lower limit</li> <li>• CH <input type="checkbox"/> Count cycle change function selection</li> <li>• CH <input type="checkbox"/> Count cycle setting value</li> </ul> <p>(The initially set data are registered to the PLC CPU parameters, and when the PLC CPU is set to the RUN status, they are written to the QD60P8-G automatically.)</p>	Section 6.4
Auto refresh setting	<p>Set the buffer memory batch to be automatically refreshed for each channel of the QD60P8-G. [Auto refresh target buffer memory values]</p> <ul style="list-style-type: none"> <li>• Sampling pulse number</li> <li>• Comparison output selection</li> <li>• Comparison output setting value</li> <li>• Movement averaging processing selection</li> <li>• Number of movement averaging processing</li> <li>• Pre-scale function selection</li> <li>• Pre-scale setting value</li> <li>• Accumulating count value</li> <li>• Input pulse value</li> <li>• Overflow detection flag</li> <li>• Counter reset request</li> <li>• Carry over detection flag</li> <li>• Carry over reset request</li> <li>• Error code</li> <li>• Alarm output selection</li> <li>• Alarm output flag</li> <li>• Alarm output setting value upper/upper limit</li> <li>• Alarm output setting value upper/lower limit</li> <li>• Alarm output setting value lower/upper limit</li> <li>• Alarm output setting value lower/lower limit</li> <li>• Count cycle change function selection</li> <li>• Count cycle setting value</li> </ul> <p>(The values stored in the automatically refreshed QD60P8-G buffer memory are read automatically when the END instruction of the PLC CPU is executed.)</p>	Section 6.5
Monitor/Test	<p>Monitors and tests the buffer memory and I/O signals for the QD60P8-G.</p> <p>X/Y Monitor/Test CH <input type="checkbox"/> Monitor/Test</p>	Section 6.6

## 6.2 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.

### 6.2.1 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.

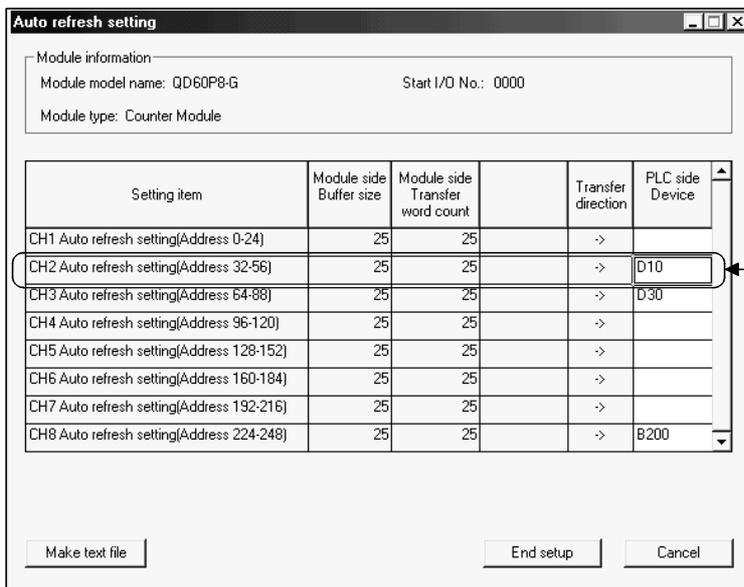
Intelligent function module installation object	Maximum number of parameter settings	
	Initial setting	Auto refresh setting
Q00J/Q00/Q01CPU	512	256
Q02/Q02H/Q06H/Q12H/Q25HCPU	512	256
Q12PH/Q25PHCPU	512	256
MELSECNET/H remote I/O station	512	256

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 auto 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	Auto refresh setting
QD60P8-G	24 (Fixed)	8 (Maximum number of settings)

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



The number of settings in the 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.

## 6.2.2 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	For installation
free space	For operation
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

## 6.3 Explanation of utility package operations

### 6.3.1 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 6.1 shows which operation uses which data or file.

#### <Intelligent function module parameters>

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



- (b) Steps 1) to 3) shown in Figure 6.1 are performed using the following operations.

- 1) Operating using GX Developer.  
[Project] → [Open project] / [Save] / [Save as]
- 2) Operating on the intelligent function 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 function module parameter"  
 Or, operate on the intelligent function 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.

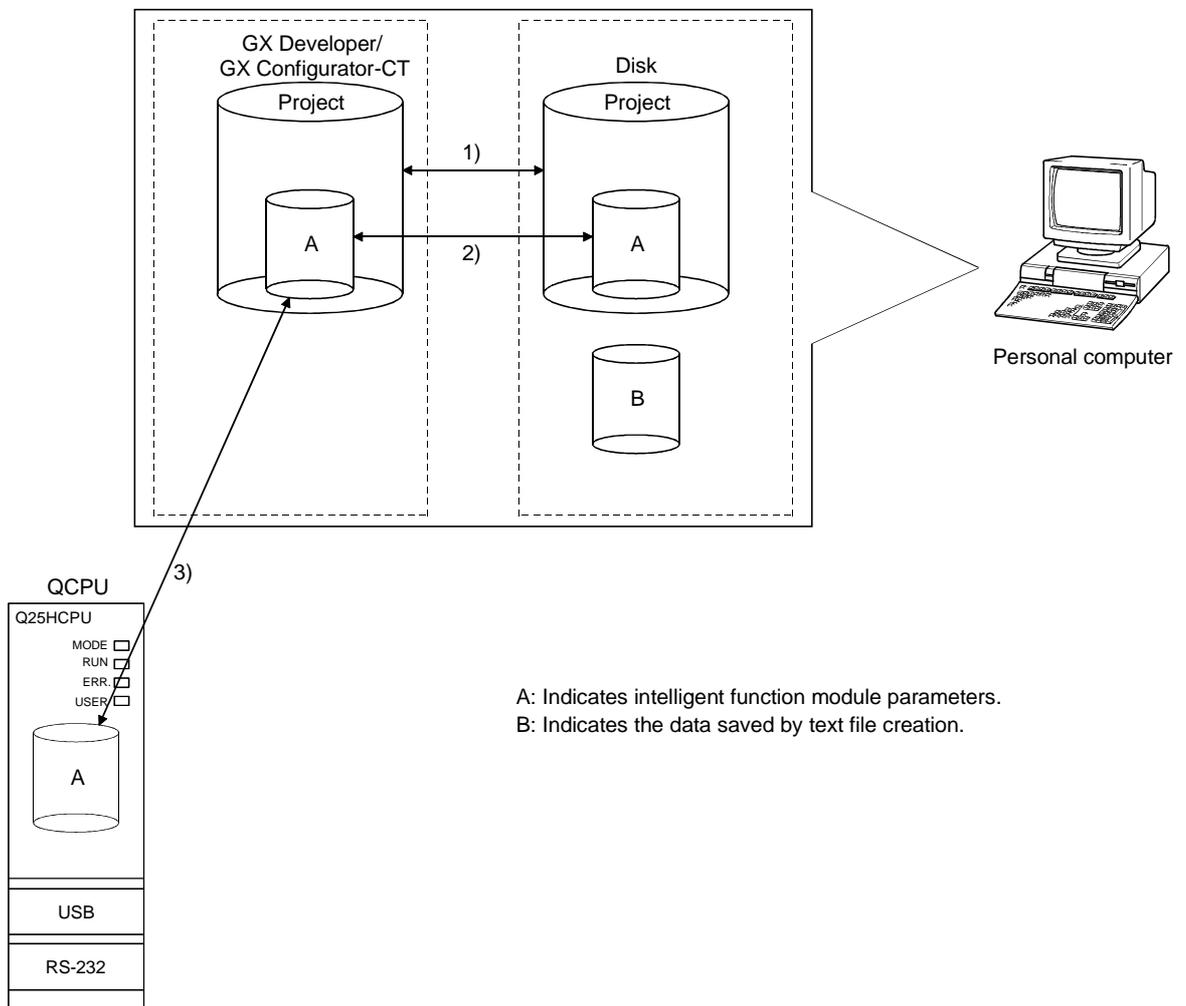
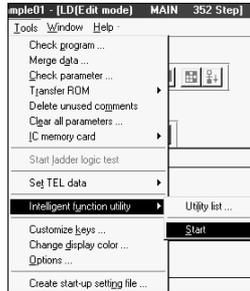


Figure 6.1 Correlation diagram for data created using the utility package

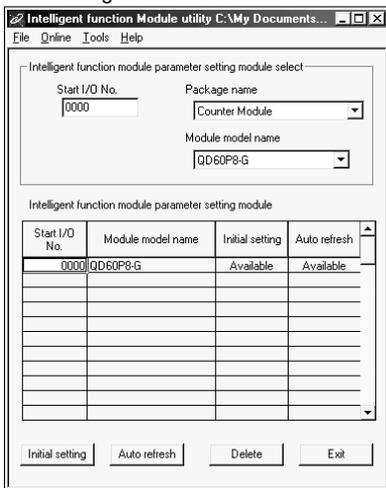
6.3.2 Operation overview

GX Developer screen



[Tools] - [Intelligent function utility] - [Start]

Intelligent function module parameter setting module selection screen



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

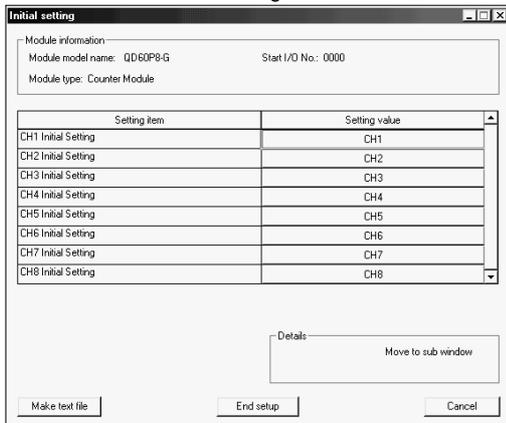
Refer to Section 6.3.3

Next page 1)

Initial setting

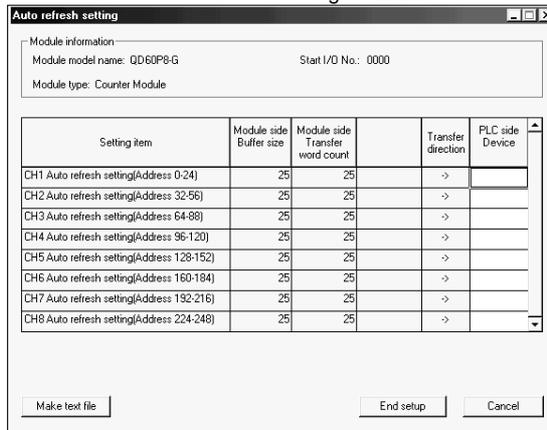
Auto refresh

Initial setting screen



Refer to Section 6.4

Auto refresh setting screen



Refer to Section 6 5



## 6.3.3 Starting the intelligent function module utility

## [Purpose of operation]

Start the utility from GX Developer, and display the intelligent function module parameter setting module select screen. The initial setting, auto refresh setting 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]

Start I/O No.	Module model name	Initial setting	Auto refresh
0000	QD60P8-G	Available	Available

## [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.

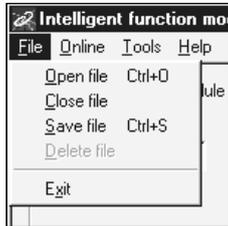
**Exit**

Ends the intelligent function module parameter setting module select screen.

## (3) Menu bar

## (a) File items

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



[Open file] : Opens the parameter file.

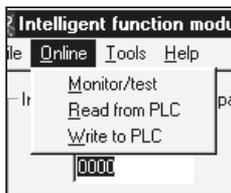
[Close file] : Closes the parameter file. If changes have been made, the dialog box asking whether to save the file appears.

[Save file] : Saves the parameter file.

[Delete file] : Deletes the parameter file.

[Exit] : Ends the intelligent function module parameter setting module selection screen.

## (b) Online items



[Monitor/test] : Starts the select monitor/test module screen.

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

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

## POINT

## (1) Saving the intelligent function module parameter files

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

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

(a) Once the intelligent function 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 mounting the QD60P8-G on a remote I/O station, use Read from PLC and Write to PLC of GX Developer.

## (3) Checking for the required utility

Start I/O No. 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.

6.4 Initial setting

[Purpose of operation]

Make initial setting for operating the QD60P8-G for each channel. There are the following setting items as the initial setting data (buffer memory).

- Comparison output selection
- Comparison output setting value
- Movement averaging processing selection
- Number of movement averaging processing
- Pre-scale function selection
- Pre-scale setting value
- Alarm output selection
- Alarm output setting value upper/upper limit
- Alarm output setting value upper/lower limit
- Alarm output setting value lower/upper limit
- Alarm output setting value lower/lower limit
- Count cycle change function selection
- Count cycle setting value

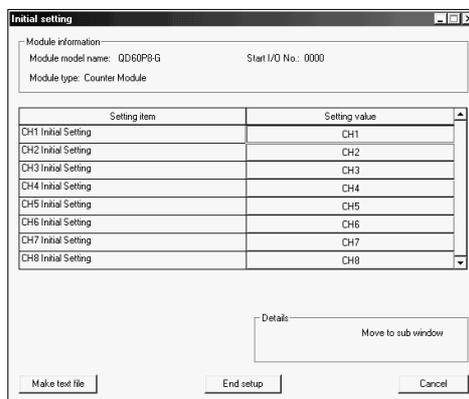
This initial setting makes sequence program setting unnecessary. For more information on the setting details, refer to Section 3.4.2

[Startup procedure]

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

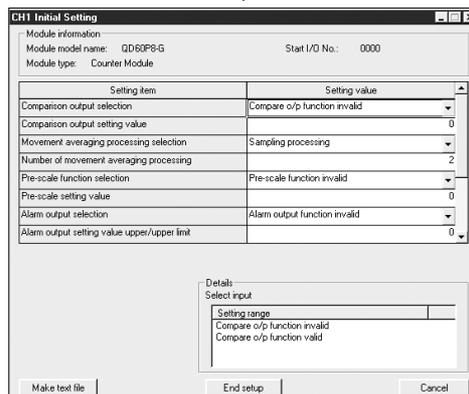
\* Enter the start I/O No. in hexadecimal.

[Setting screen]



Move to sub window

CH1 Initial Setting



## [Explanation of items]

## (1) Explanation of the command buttons

<input type="button" value="Make text file"/>	Outputs the screen display in a text file format.
<input type="button" value="End setup"/>	Confirms the entry of set data and ends the operation.
<input type="button" value="Cancel"/>	Cancels the set data and ends the operation.

**POINT**

Initial settings are stored in the intelligent function 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.

6.5 Auto refresh setting

[Purpose of operation]

Set the QD60P8-G buffer memory to be automatically refreshed, for each channel.

There are the following buffer memory items to be automatically refreshed for each channel.

- Sampling pulse number
- Comparison output selection
- Comparison output setting value
- Movement averaging processing selection
- Number of movement averaging processing
- Pre-scale function selection
- Pre-scale setting value
- Accumulating count value
- Input pulse value
- Overflow detection flag
- Counter reset request
- Carry over detection flag
- Carry over reset request
- Error code
- Alarm output selection
- Alarm output flag
- Alarm output setting value upper/upper limit
- Alarm output setting value upper/lower limit
- Alarm output setting value lower/upper limit
- Alarm output setting value lower/lower limit
- Count cycle change function selection
- Count cycle setting value

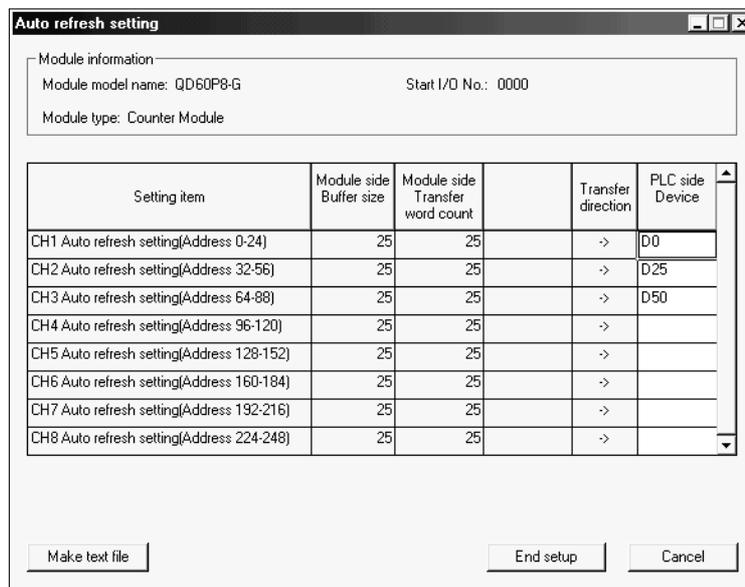
These auto refresh settings eliminate the need for reading by a sequence program.

[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

Creates a file containing the displayed screen data in a text file format.

Confirms the entry of set data and ends the operation.

Cancels the set data and ends the operation.

**POINTS**

- At the time of auto refresh, the buffer memory contents are batch-read (25 words) for each channel. The order of storing the data into the CPU module side devices is the same as that of buffer memory assignment (refer to Section 3.4.1).
- The auto refresh settings are stored in the intelligent function module parameters. Once the intelligent function 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 the sequence program.

6.6 Monitor/test

[Purpose of operation]

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

[Startup procedure]

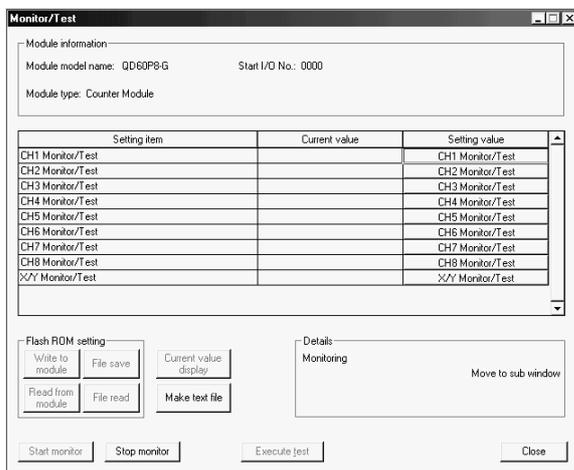
Select monitor/test module screen → "Start I/O No. \*" → "Package name" → "Module model name" → **Monitor/test**

\* 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.

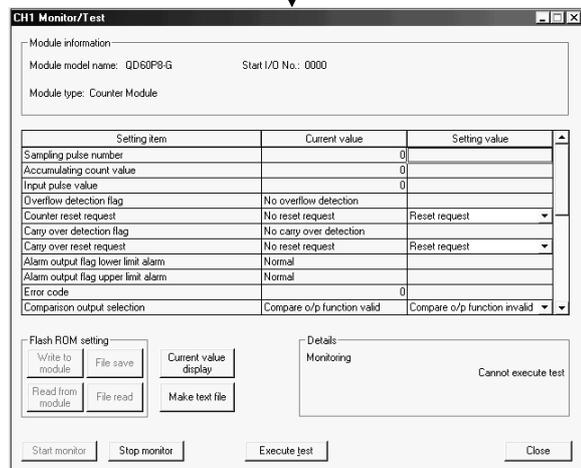
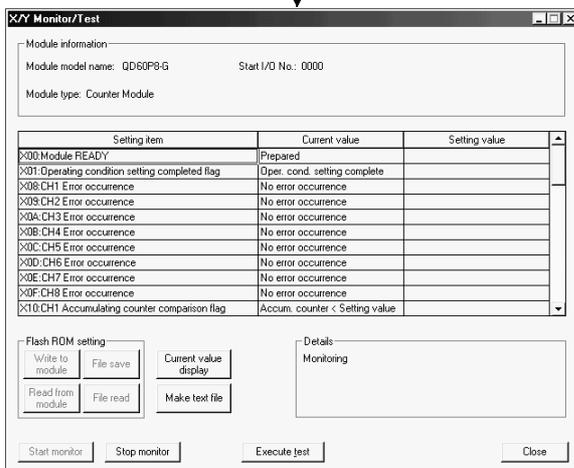
[Setting screen]



Move to sub window

**X/T Monitor/Test**

**CH1 Monitor/Test**



## [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

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).

Makes a file consisting of the displayed screen contents in a text file format.

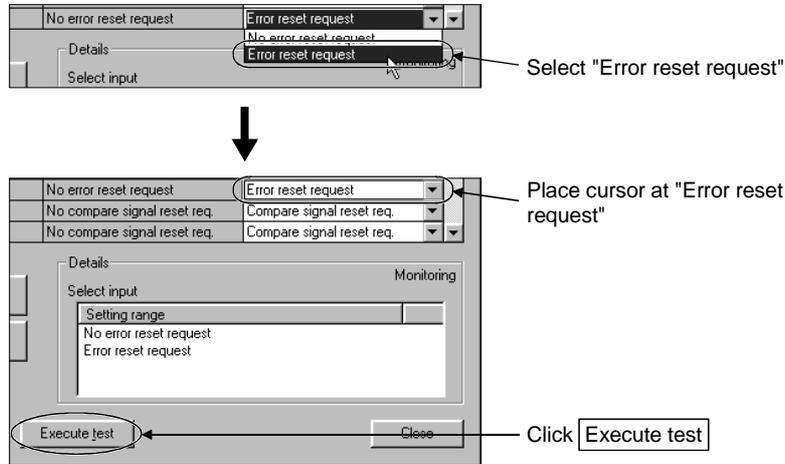
/

Selects whether or not to monitor the current values.

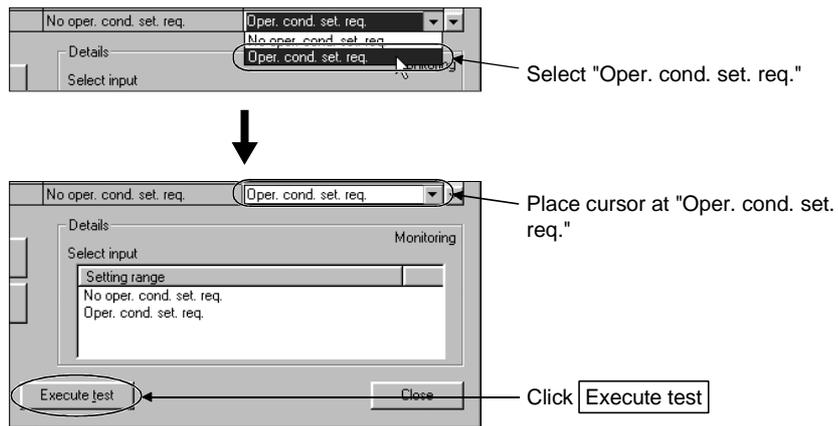
Tests the selected item. To select more than one item, select each additional item while holding down the  key.

(Example)

Click this button after selecting "Error reset request" in the setting (value) field of "Error reset request" on the X/Y Monitor/Test screen.



Perform similar operation also for the "Operating condition setting request flag".



**Close** Closes the currently displayed screen and returns to the previously displayed screen.

<b>POINT</b>
<ul style="list-style-type: none"> <li>• To reflect the new settings (values) on the module, you have to choose "Operating condition setting request" for the "Operating condition setting request flag" and click <b>Execute test</b>.</li> <li>• "Error reset request"/"Comparison signal reset request" turns to "No request" automatically if the error occurrence (X8 to XF)/accumulating counter comparison flag (X10 to X17) turns "OFF" at the time of test execution.</li> </ul>

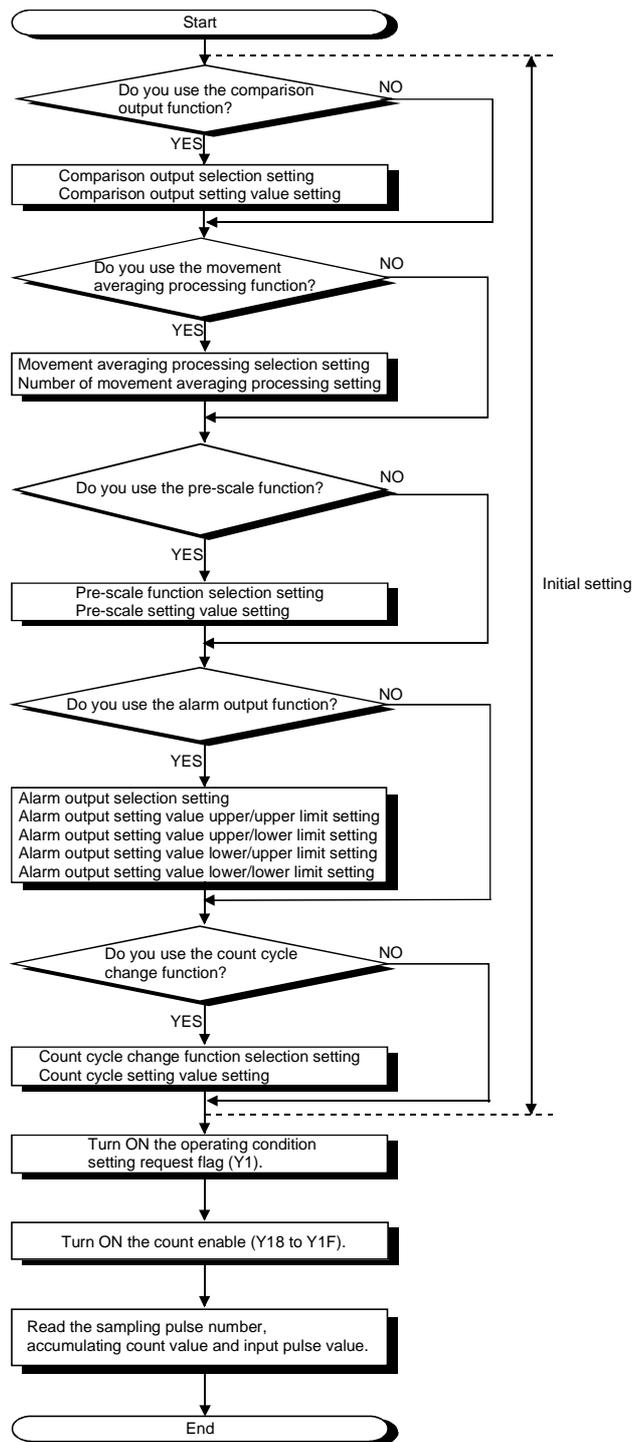
## CHAPTER 7 PROGRAMMING

This chapter describes a sequence program for use of the QD60P8-G. Using the utility package (GX Configurator-CT), the QD60P8-G can operate the system without using a sequence program. Refer to Chapter 6 for details of how to operate the utility package (GX Configurator-CT).

When diverting the program example introduced in this chapter to the actual system, fully check that there are no problems in the controllability of the system.

7.1 Programming procedure

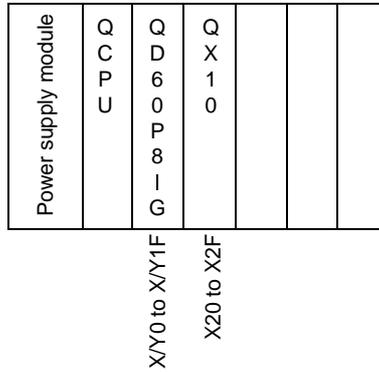
This section explains the programming procedure for the QD60P8-G. In the following procedure, create the program that performs the initial setting of the QD60P8-G, then turns ON the operating condition setting request flag (Y1), and turns ON the count enable (Y18 to Y1F) to start count operation.



7.2 For use in normal system configuration

System configuration used in the program explanation

(1) System configuration



(2) Program conditions

The program performs the initial setting of the CH1 of the QD60P8-G, then turns ON the operating condition setting request flag (Y1), and turns ON the count enable (Y18) to start count operation.

Set the input voltage selection, pulse edge selection, linear counter/ring counter selection and input filter setting using the intelligent function module switch of GX Developer. (Refer to Section 4.5 for details of setting the intelligent function module switch.)

- Input voltage selection : 12 to 24VDC
- Pulse edge selection : Rise edge
- Linear counter or Ring counter selection : Linear counter
- Input filter setting (CH1) : 30kpps

## (3) List of devices used

In Section 7.2.1 program example, the used devices are assigned as indicated in the following table.

The I/O numbers for QD60P8-G indicate those when QD60P8-G is mounted in the 0-slot of the main base unit.

If it is mounted in the slot other than the 0-slot of the main base unit, change the I/O number to that for the position where QD60P8-G was installed.

In addition, change the external inputs, internal relays and data registers, according to the system used.

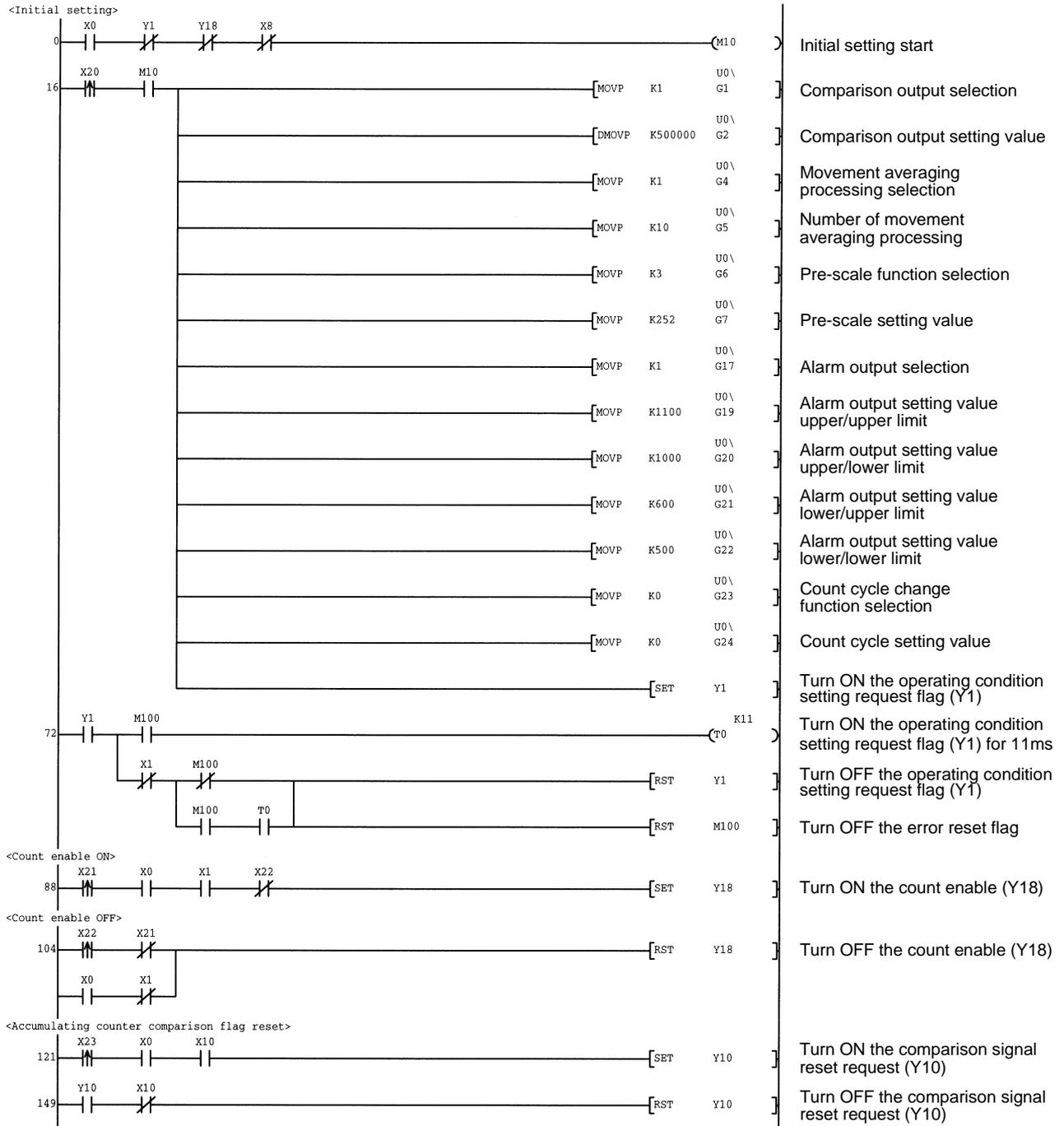
## Inputs/outputs, external inputs, and internal relays of QD60P8-G

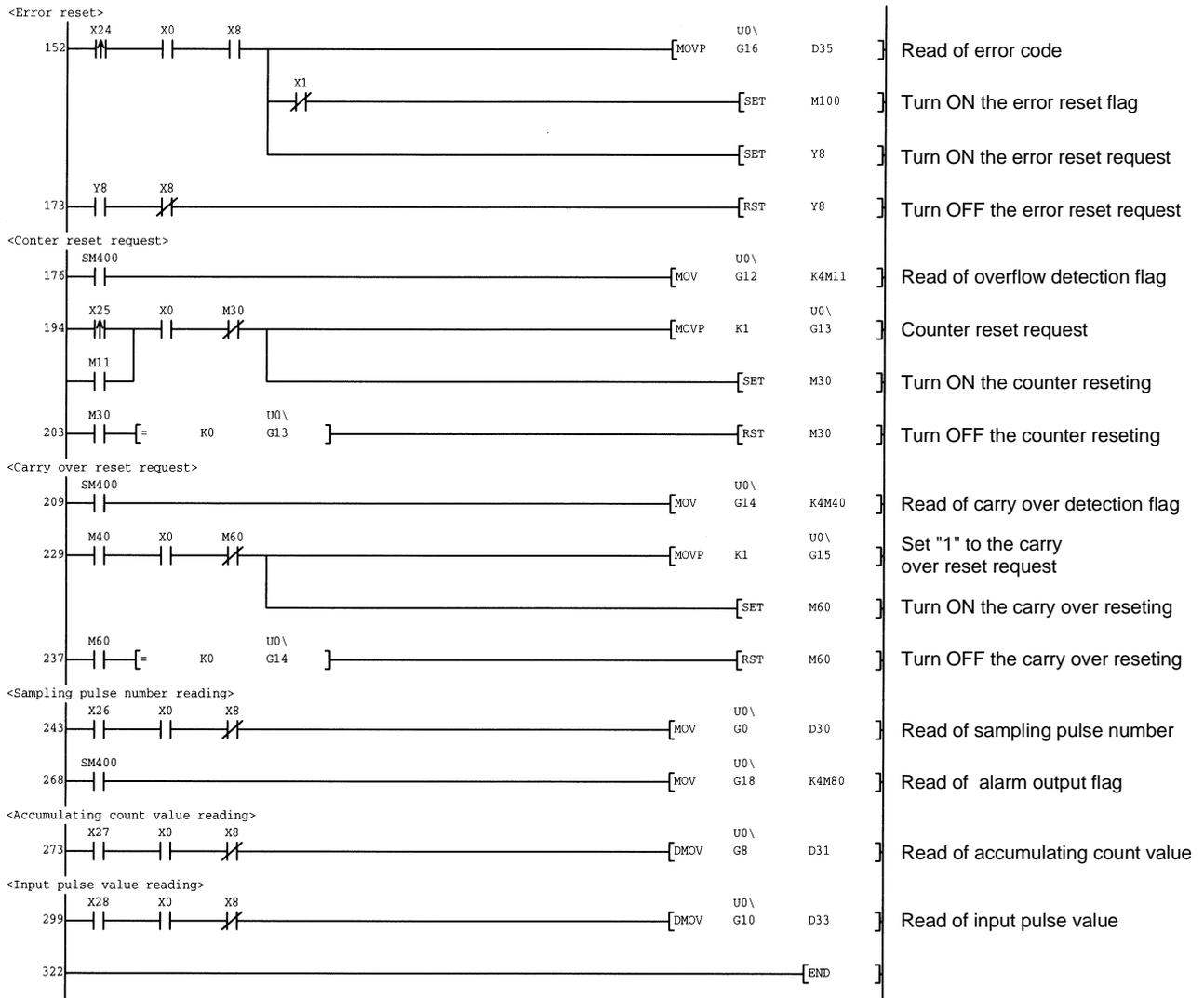
Device name		Device	Application
		CH1	
Input/output of QD60P8-G	Inputs	X0	Module READY
		X1	Operating condition setting complete flag
		X8	Error occurrence
		X10	Accumulating counter comparison flag
	Outputs	Y1	Operating condition setting request flag
		Y8	Error reset request
		Y10	Comparison signal reset request
		Y18	Count enable
External input (command)		X20	Data setting command
		X21	Count enable ON command
		X22	Count enable OFF command
		X23	Comparison signal reset command
		X24	Error reset command
		X25	Counter reset request command
		X26	Sampling pulse number read command
		X27	Accumulating count value read command
Internal relay		X28	Input pulse value read command
		M10	Data setting enable
		M11	Overflow detection flag
		M30	Counter resetting
		M40	Carry over detection flag
		M60	Carry over resetting
		M80	Alarm output flag
		M100	Error reset flag

## Data registers

Device name	Device	Buffer memory address	Data stored	
Data registers	D30	0	Sampling pulse number	
	D31	8	Accumulating count value	(L)
	D32	9		(H)
	D33	10	Input pulse value	(L)
	D34	11		(H)
	D35	16	Error code	

7.2.1 Program example







## (4) List of devices used

In Section 7.3.1 program example, the used devices are assigned as indicated in the following table.

The I/O numbers for QD60P8-G indicate those when QD60P8-G is mounted on Slot 2 of the remote I/O station.

If it is mounted on the slot other than Slot 2 of the remote I/O station, change the I/O numbers to those for the position where QD60P8-G was installed.

In addition, change the external inputs, internal relays and data registers, according to the system used.

## Inputs/outputs, external inputs, and internal relays of QD60P8-G

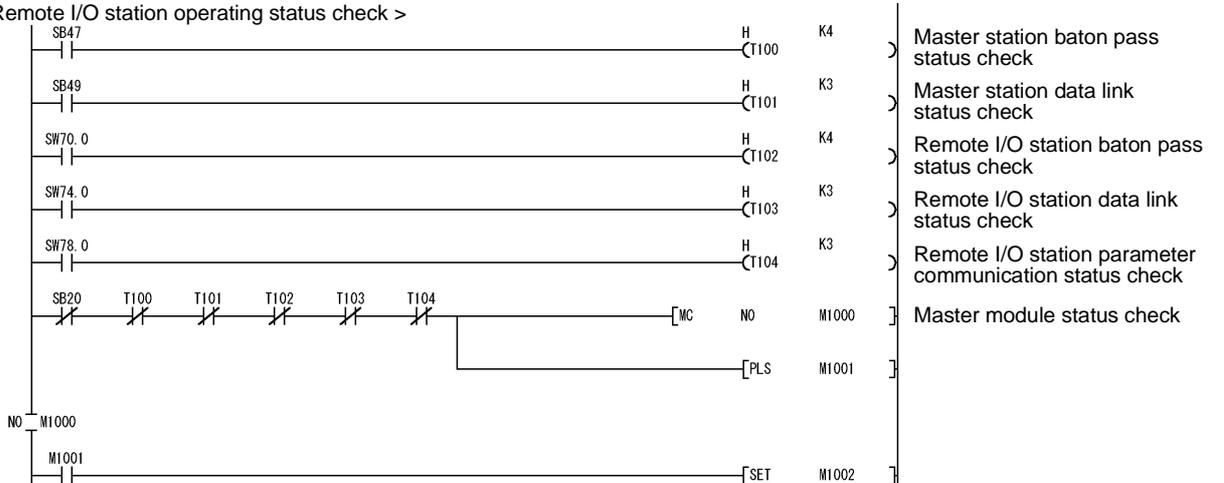
Device name		Device	Application
		CH1	
Input/output of QD60P8-G	Inputs	X120	Module READY
		X121	Operating condition setting complete flag
		X128	Error occurrence
		X130	Accumulating counter comparison flag
	Outputs	Y121	Operating condition setting request flag
		Y128	Error reset request
		Y130	Comparison signal reset request
		Y138	Count enable
External input (command)		X20	Data setting command
		X21	Count enable ON command
		X22	Count enable OFF command
		X23	Comparison signal reset command
		X24	Error reset command
		X25	Counter reset request command
		X26	Sampling pulse number read command
		X27	Accumulating count value read command
Internal relay		X28	Input pulse value read command
		M10	Data setting enable
		M11	Overflow detection flag
		M30	Counter resetting
		M40	Carry over detection flag
		M60	Carry over resetting
		M80	Alarm output flag
		M100	Error reset flag

## Data registers

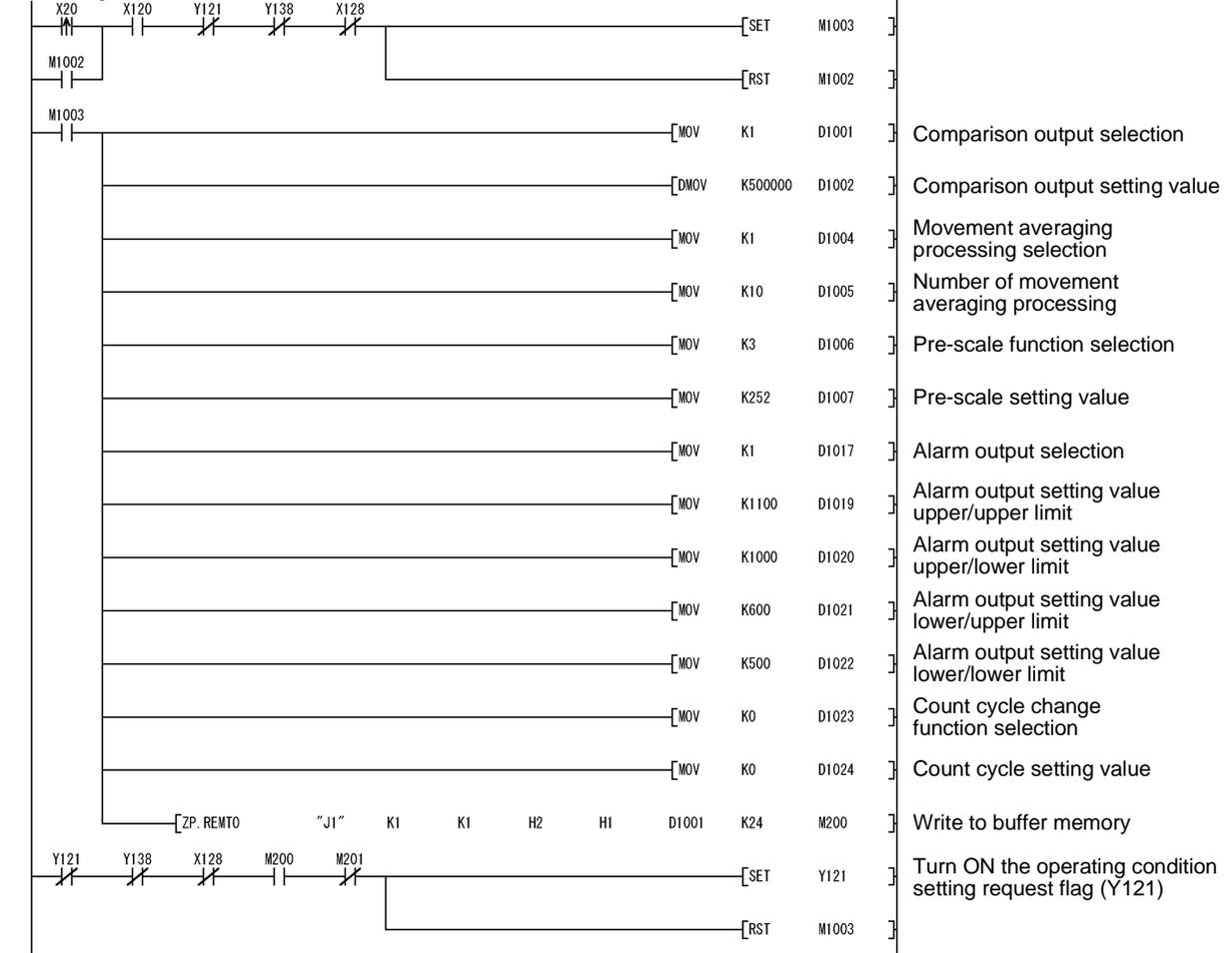
Device name	Device	Buffer memory address	Data stored	
Data registers	D30	0	Sampling pulse number	
	D31	8	Accumulating count value	(L)
	D32	9		(H)
	D33	10	Input pulse value	(L)
	D34	11		(H)
	D35	16	Error code	

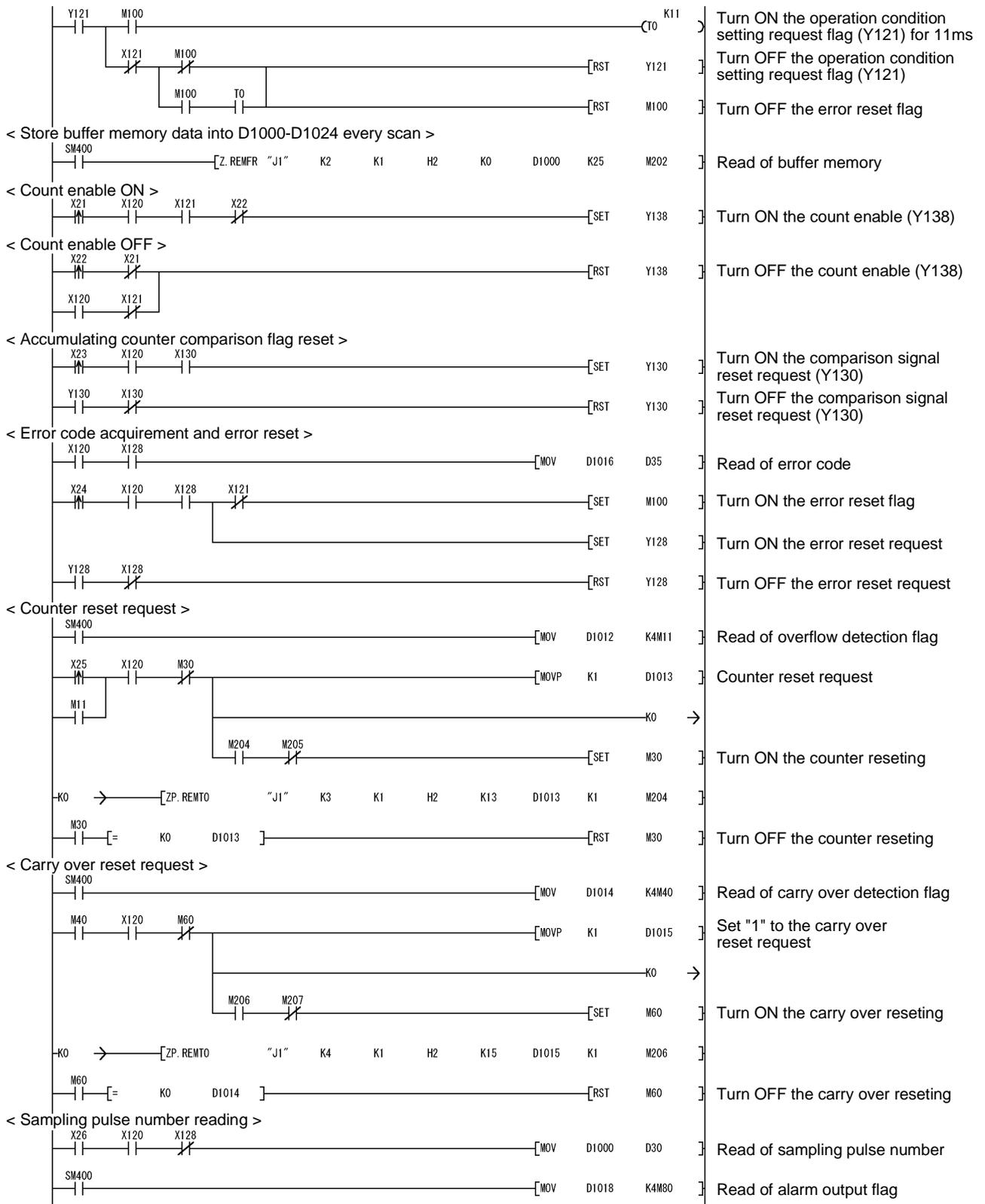
7.3.1 Program example

< Remote I/O station operating status check >

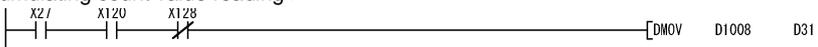


< Initial setting >



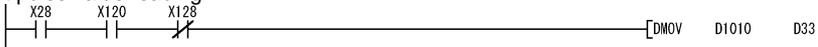


< Accumulating count value reading >

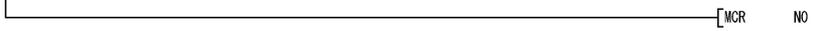


] Read of accumulating count value

< Input pulse value reading >



] Read of input pulse value





## CHAPTER 8 ONLINE MODULE CHANGE

When changing a module online, carefully read the QCPU User's Manual (Hardware Design, Maintenance and Inspection), section 12.4.1 "Online module change".

This chapter describes the functions of an online module change. Perform an online module change by operating GX Developer.

POINT
<p>(1) Perform an online module change after making sure that the system outside the PLC will not malfunction.</p> <p>(2) To prevent an electric shock and malfunction of operating modules, provide means such as switches for powering off each of the external power supply and external devices connected to the module to be replaced online.</p> <p>(3) To prevent an electric shock, always turn OFF the input pulse signal from the pulse generator connected to the module to be changed online.</p> <p>(4) After the module has become faulty, the buffer memory contents cannot be confirmed. Therefore, prerecord the settings (The whole buffer memory contents that can be written refer to Section 3.4.1).</p> <p>(5) It is recommended to perform an online module change in the actual system in advance to ensure that it would not affect the other modules by checking the following:</p> <ul style="list-style-type: none"><li>• Means of cutting off the connection to external devices and its configuration are correct.</li><li>• Switching ON/OFF does not bring any undesirable effect.</li></ul> <p>(6) Do not mount/remove the module onto/from base unit more than 50 times (IEC61131-2-compliant), after the first use of the product. Failure to do so may cause the module to malfunction due to poor contact of connector.</p>

## 8.1 Online module change conditions

The PLC CPU, MELSECNET/H remote I/O module, GX Developer and base unit given below are needed to perform an online module change.

(1) PLC CPU

The Q12PHCPU or Q25PHCPU is needed.

For precautions for multiple PLC system configuration, refer to the Process CPU User's Manual (Function Explanation/Program Fundamentals).

(2) MELSECNET/H remote I/O module

The module of function version D or later is necessary.

(3) GX Developer

GX Developer of Version 7.10L or later is necessary.

GX Developer of Version 8.18U or later is required to perform an online module change on the remote I/O station.

(4) Base unit

1) When the slim type main base unit (Q3□SB) is used, an online module change cannot be performed.

2) When the power supply module unnecessary type extension base unit (Q5□B) is used, online module change cannot be performed for the modules on all the base units connected.

8.2 Online module change operations

The following gives the operations performed for an online module change.

No. * 3	PLC CPU operation ○: Executed ×: Not executed					(User operation) * 3	(Intelligent function module operation)
	X/Y refresh	FROM/TO instruction * 1	Device test	GX Configurator-CT			
				Initial setting parameter	Monitor/test		
(1)	○	○	○	×	○	(1) Operation stop Turn OFF all Y signals that were turned ON by a sequence program.	Module is operating.
(2)	×	×	×	×	×	(2) Dismounting of module Operate GX Developer to start an online module change. Click the [Execution] button of GX Developer to make the module dismountable. Dismount the corresponding module (QD60P8-G).	Module stops operating. • RUN LED turns OFF.
(3)	○	×	×	○	×	(3) Mounting of new module Mount a new module (QD60P8-G). After mounting the module, click the [Execution] button of GX Developer.	X/Y refresh resumes and the module starts. • RUN LED turns ON. • Default operation (X0 remains OFF) (When there are initial setting parameters, operation is performed according to the initial setting parameters at this point.)
(4)	○	×	○	×	○	Operation check before control start (4) Operation check Click the [Cancel] button of GX Developer to leave the online mode. Conduct an operation test on the new module using "Device test" of GX Developer or "Monitor/test" of GX Configurator-CT.	Module operates according to test operation *2
(5)	○	○	○	×	○	(5) Resumption of control Operate GX Developer to resume the online module change mode, and click the [Execution] button to resume control.	X0 (Module Ready) turns ON. Start is made when X0 turns from OFF to ON. Operation is performed according to the initial setting sequence.*2

\* 1: Access to the intelligent function module device (U□G□) is included.

\* 2: In the absence of the operation marked \* 2, the operation of the intelligent function module is the operation performed prior to that.

\* 3: The item numbers (1) to (5) correspond to the operation step numbers of "Section 8.3 Online module change procedure".

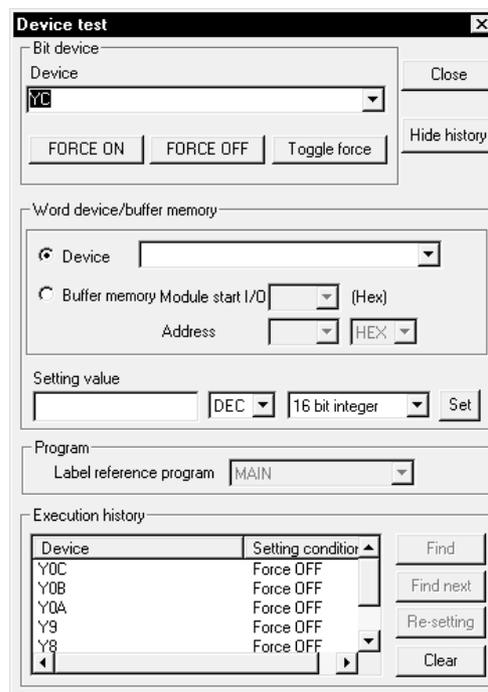
### 8.3 Online module change procedure

The online module change procedure is explained separately for the case where GX Configurator-CT was used for initial setting and for the case where a sequence program was used for initial setting.

#### 8.3.1 GX Configurator-CT was used for initial setting

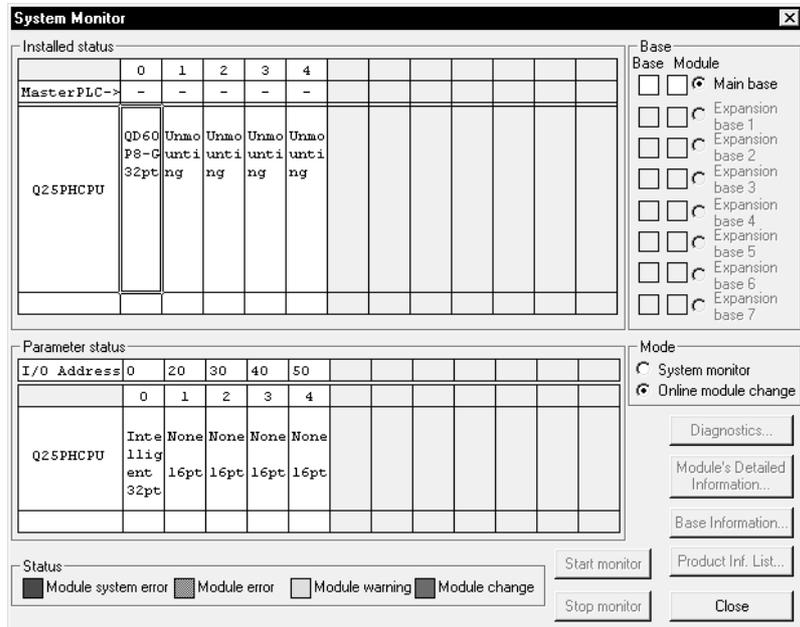
##### (1) Operation stop

Turn OFF all output signals (Y devices) from the sequence program or the device test of GX Developer to stop the module operation.

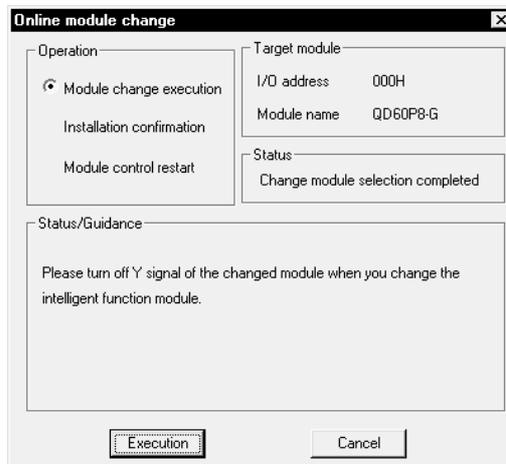


(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the "OK" button and perform the operation in (2)(c) and later.



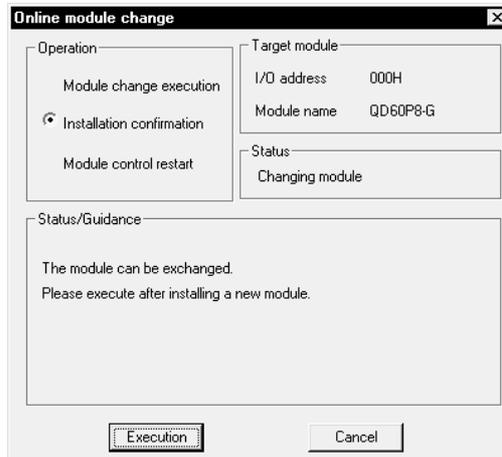
- (c) After confirming that the "RUN" LED of the module has turned OFF, disconnect the external wiring and dismount the module.

**POINT**

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

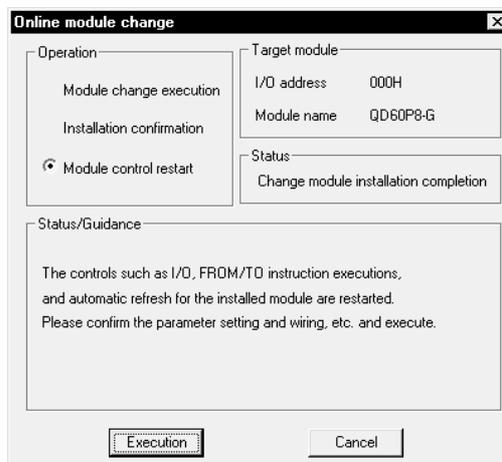
## (3) Mounting of new module

- (a) Mount a new module to the same slot and connect the external wiring.
- (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.



## (4) Operation check

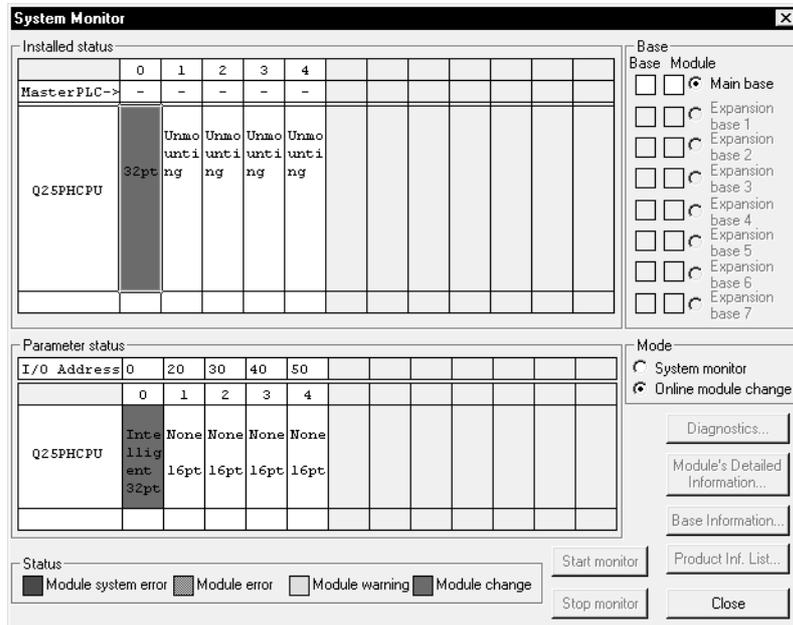
- (a) When making an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.

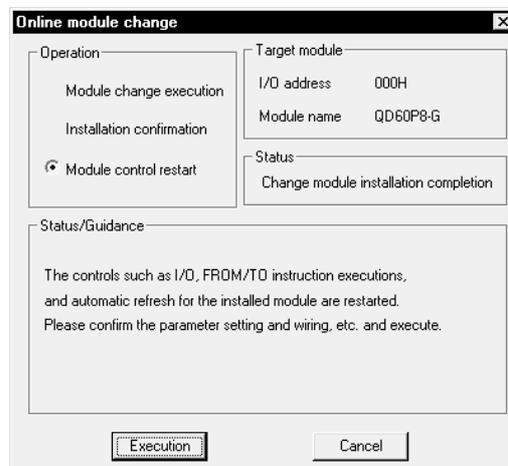


(c) Click the [Close] button to close the System monitor screen.



(5) Resumption of control

(a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



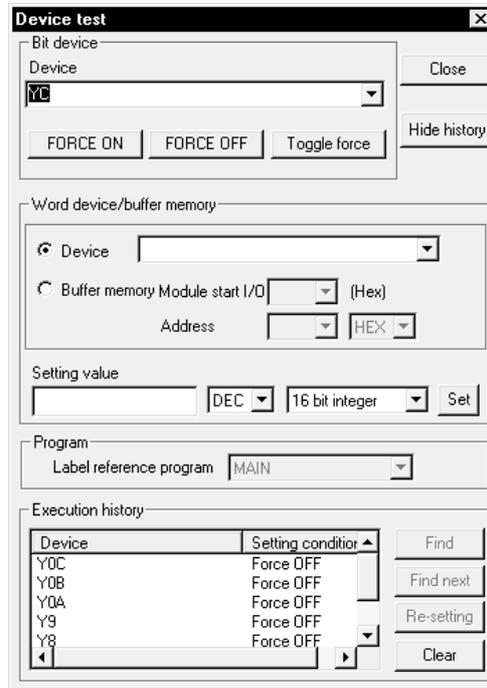
(b) The "Online module change completed" screen appears.



## 8.3.2 Sequence program was used for initial setting

## (1) Operation stop

- (a) Turn OFF all output signals (Y devices) from the sequence program or the device test of GX Developer to stop the module operation.



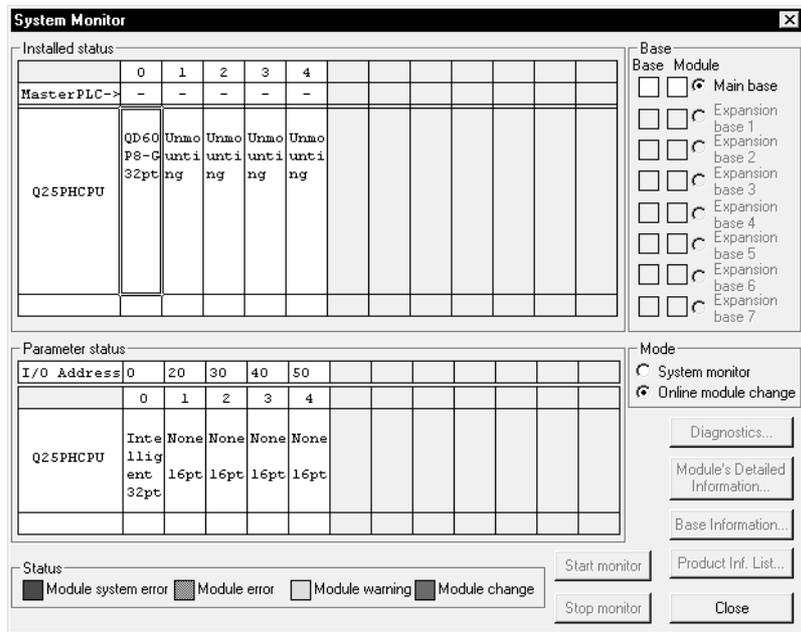
- (b) Prerecord the writable buffer memory contents that have been set initially in the sequence program.  
Choose [Online] - [Monitor] - [Buffer memory batch] on GX Developer, monitor the buffer memory, and record the values.

**POINT**

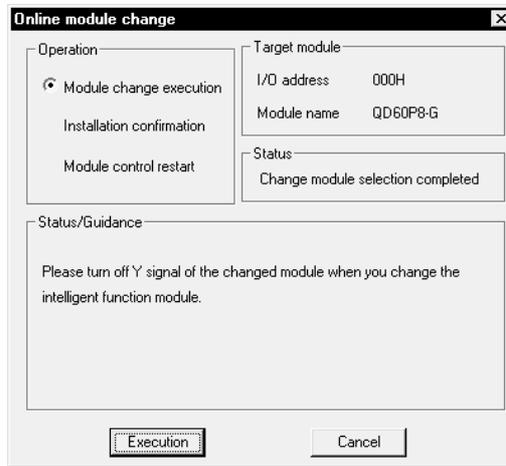
If a CPU continuation error (e.g. SP. UNIT DOWN, UNIT VERIFY ERR.) has occurred due to the fault of the module to be changed, the buffer memory contents cannot be confirmed.

(2) Dismounting of module

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to enter the "Online module change" mode, double-click the module to be changed online to display the "Online module change" screen.



- (b) Click the "Execution" button to enable a module change.



If the following error screen appears, click the [OK] button and perform the operation in (2) (c) and later.



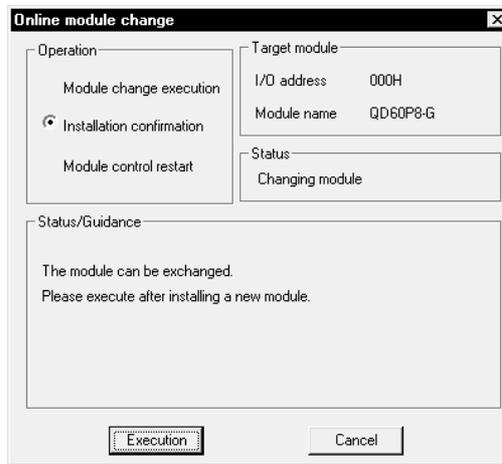
- (c) After confirming that the "RUN" LED of the module has turned OFF, disconnect the external wiring and dismount the module.

**POINT**

Always dismount the module. If mounting confirmation is made without the module being dismounted, the module will not start properly and the "RUN" LED will not be lit.

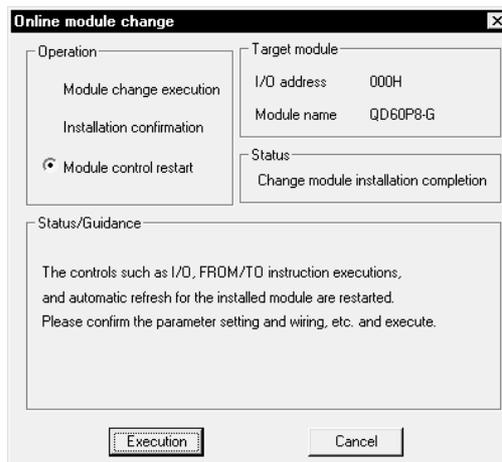
(3) Mounting of new module

- (a) Mount a new module to the same slot and connect the external wiring.
- (b) After mounting the module, click the [Execution] button and make sure that the "RUN" LED is lit. Module Ready (X0) remains OFF.

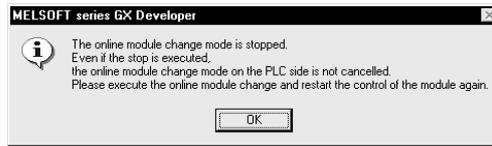


(4) Operation check

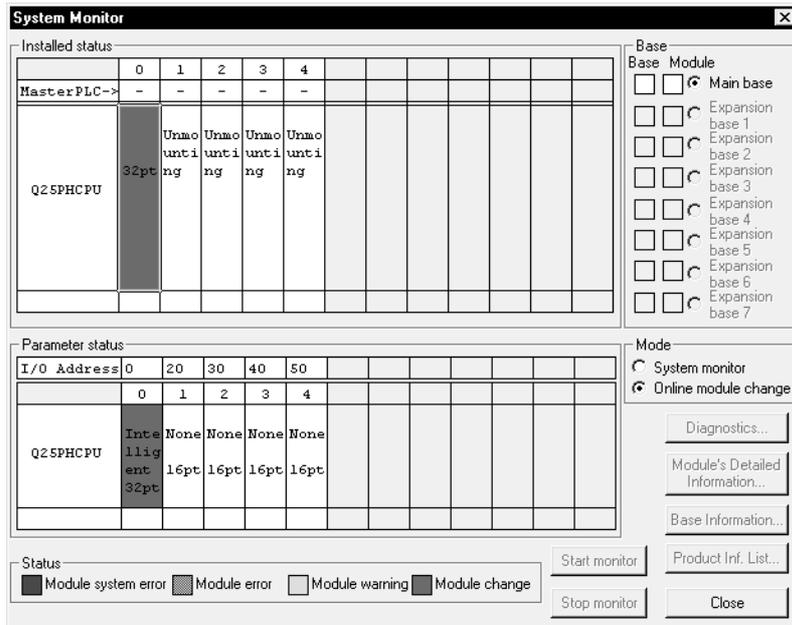
- (a) To make an operation check, click the [Cancel] button to cancel control resumption.



- (b) Click the [OK] button to leave the "Online module change" mode.



- (c) Click the [Close] button to close the System monitor screen.



- (d) Choose [Online] - [Debug] - [Device test] on GX Developer, and set the buffer memory contents recorded in step (1)(b) to the buffer memory.
- (e) Since the new module is in a default status, it must be initialized by a sequence program after control resumption. Before performing initialization, check whether the contents of the initialization program are correct or not.
  - 1) Normal system configuration
 

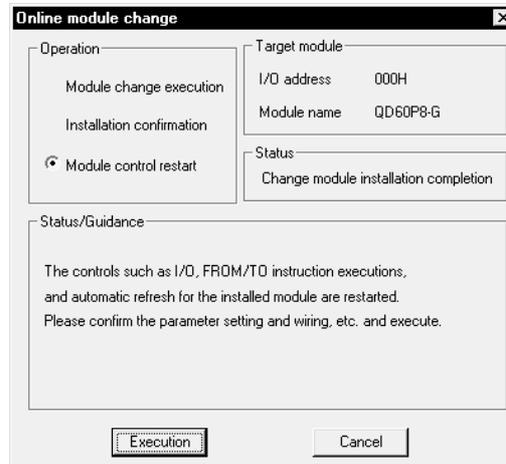
The sequence program should perform initialization on the leading edge of Module Ready (X9) of the QD60P8-G.

When control resumption is executed, Module Ready (X0) turns ON and initialization is performed. (If the sequence program performs initialization only one scan after RUN, initialization is not performed.)
  - 2) When used on remote I/O network
 

Insert a user device that will execute initialization at any timing (initialization request signal) into the sequence program. After control resumption, turn ON the initialization request signal to perform initialization. (If the sequence program performs initialization only one scan after a data link start of the remote I/O network, initialization is not performed.)

## (5) Resumption of control

- (a) After choosing [Diagnosis] - [Online module change] on GX Developer to redisplay the "Online module change" screen, click the [Execution] button to resume control. The FROM/TO instruction for the module resumes.



- (b) The "Online module change completed" screen appears.



#### 8.4 Precautions for online module change

The following are the precautions for online module change.

- (1) Always perform an online module change in the correct procedure. A failure to do so can cause a malfunction or failure.
- (2) When an online module change is made, the following buffer memory values are cleared to "0".
  - Sampling pulse number
  - Accumulating count value
  - Input pulse value

## CHAPTER 9 TROUBLESHOOTING

## 9.1 Troubleshooting

This section explains the troubleshooting for the cases where the count of input pulses cannot be started and the input pulse count value is incorrect during use of the QD60P8-G.

## (1) When the RUN LED is turned OFF

Check item	Corrective action
Is the power being supplied?	Confirm that the supply voltage for the power supply module is within the rated range.
Is the capacity of the power supply module adequate?	Calculate the current consumption of the CPU module, I/O module and intelligent function module mounted on the base unit to see if the power supply capacity is adequate.
Has a watch dog timer error occurred?	Reset the PLC CPU and verify that it is lit. If the RUN LED does not light even after doing this, the module may be malfunctioning. Contact the nearest branch office or agency with a details of the occurring problem.
Is the module correctly mounted on the base unit?	Check the mounting condition of the module.
Is a module change enabled during an online module change?	Refer to Chapter 8 and take corrective action.

## (2) When the "ERR." LED is turned ON

Check item	Corrective action
Is an error being generated?	Confirm the error code and take corrective action described in Section 9.3.

## (3) When count cannot be started or normal count cannot be made

Check item		Corrective action
Is the terminal block external wiring normal?		Refer to Section 3.5, and check and correct the external wiring.
Noise preventive measure	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 module grounding section?	Separate the module's ground cable. If the module's 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) as a guideline.
Is the "CH□" LED lit when a voltage is applied to the pulse input terminal by a stabilized power supply or similar?		If the LED lights up, check the external wiring and the pulse generator side and make necessary corrections. If the LED is not lit, the possible cause of a module fault. Contact the nearest branch office or agency with a details of the occurring problem.
Does the "input voltage selection" in setting with the intelligent function module switch match the actual input pulse voltage.		Correct the "input voltage selection" in setting with the intelligent function module.
Is the edge (rise/fall) of the counted pulses correct?		Check whether pulses are counted on the rise or fall, and correct the "pulse edge selection" in setting with the intelligent function module.
Is the maximum speed of input pulses within the range of the counting speed set to the "input filter setting" in setting with the intelligent function module?		Correct the "input filter setting" in setting with the intelligent function module to match the maximum speed of input pulses.
Does the input pulse waveform satisfy the performance specifications?		Observe and check the pulse waveform with a synchroscope or similar, and if the input pulses do not satisfy the performance specifications, enter the input pulses that satisfy the performance specifications.
If the "accumulating count value" or "input pulse value" of the buffer memory read on a two-word (32-bit) unit when it is read in the sequence program?		Read two words together.
Are the count values on multiple channels the same when the same pulse is input to the multiple channels?		If the count values are different, the possible cause is a module fault. Contact the nearest branch office or agency with a details of the occurring problem.
Is the count enable (Y18 to Y1F) ON?		Turn the count enable (Y18 to Y1F) ON using a sequence program.
Is the "overflow detection flag" of the buffer memory* "1"?		Set "1" in the "counter reset request" of the buffer memory* to reset the counter.
Is the "pre-scale setting value" of the buffer memory* "0"?		Set a value other than "0" in the "pre-scale setting value" of the buffer memory*.

\*: Refer to Section 3.4 for details of the buffer memory.

9.1.1 Confirming the error definitions using system monitor of GX Developer

Choosing Module's detailed information in the system monitor of GX Developer allows you to confirm the error code.

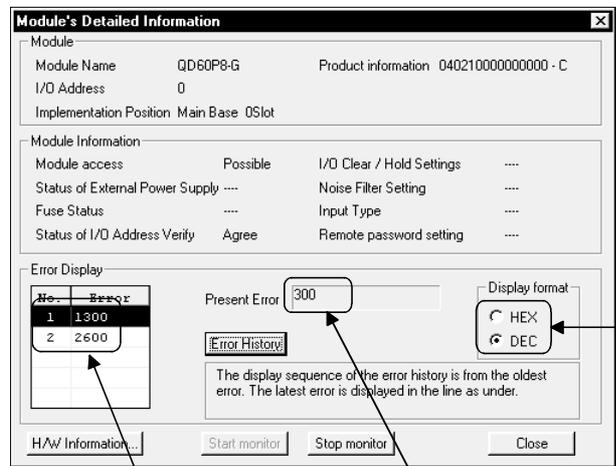
(1) Operation of GX Developer

Choose [Diagnostics] → [System monitor] → "QD60P8-G module" and choose Module's Detailed Information.

(2) Confirmation of error code

The error code appears in the latest error code field.

(By pressing the Error History button, the definition shown as the latest error code appears at No. 1.)



[Display format]  
Select "Decimal".  
(The error codes indicated in "Section 9.3 List of errors" are in decimal.)

[Error display details]



CHn (1 ≤ n ≤ 8)

[Present Error]

Means error code 300  
"Movement averaging setting range outside error".

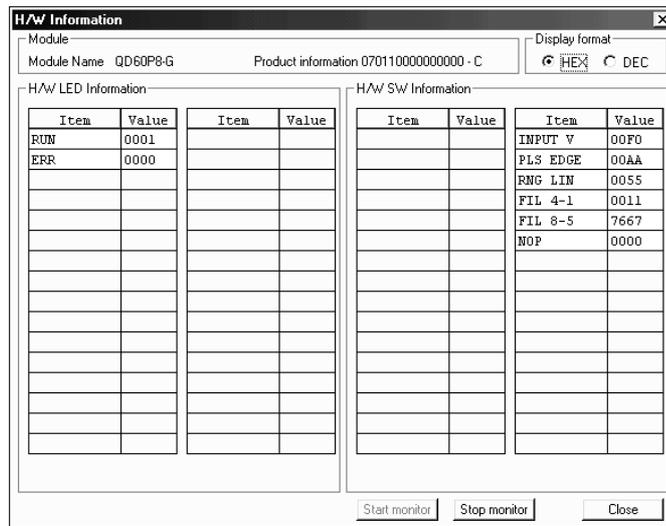
Error code of CHn

(3) Confirmation of Module's detailed information

Check the module information, the LED statuses, and the statuses of setting with the intelligent function module from "H/W Information" of Module's detailed information that can be displayed on the system monitor of GX Developer (Version 7.17T or later).

[Setting procedure]

Chose [Diagnostics] → [System monitor] → "QD60P8-G module" and choose "Module's Detailed Information" → H/W Information.



[H/W LED Information]

H/W LED information displays the following information.

Item	Signal name	Value
RUN	"RUN" LED of QD60P8-G	0: LED OFF
ERR	"ERR." LED of QD60P8-G	1: LED ON

[H/W SW Information]

The setting status of the intelligent function module switches are displayed.

Item	Signal name	Corresponding switch	Value	
INPUT V	Input voltage selection	Switch 1	For details, refer to "Section 4.5 Switch setting for intelligent function module".	
PLS EDGE	Pulse edge selection	Switch 2		Lower 8 bits
RNG LIN	Linear counter or Ring counter selection			Upper 8 bits
FIL 4-1	Input filter setting (CH1 to CH4)	Switch 3		
FIL 8-5	Input filter setting (CH5 to CH8)	Switch 4		
NOP	—	Switch 5		

## 9.2 Error details

### (1) Types of errors

The following errors are detected by the QD60P8-G.

#### (a) Overflow error

This error occurs if the accumulating count value overflows (exceeds 99999999) when the count type of the accumulating counter is the linear counter.

To clear this error, turn ON the error reset request (Y8 to YF). Further, to start count operation properly, set "1" in the "counter reset request" of the buffer memory.

#### (b) Buffer memory setting range outside error

This error occurs if any setting error is found by a check made on the values set to the buffer memory when the operating condition setting request flag (Y1) turns ON. It occurs if any setting value in the "comparison output setting value" or similar of the buffer memory is outside the range.

To clear this error, set a correct value and turn ON the operating condition setting request flag (Y1) again.

#### (c) Intelligent function module switch setting error

This error occurs if any setting error is found by a check made on the setting values of the switch settings for intelligent function module set in the PLC parameters when power is switched from OFF to ON or the PLC CPU is reset.

To clear this error, set a correct value on GX Developer, perform write to PLC, and then switch power from OFF to ON or reset the PLC CPU.

#### (d) Module error

This error occurs if a fault occurs in the module for some reason.

Change the module if the error occurs again after power is switched from OFF to ON or the PLC CPU is reset.

(2) Error storage

If any of the settings made in the buffer memory or the setting with the intelligent function module is outside the setting range, the error occurrence (X8 to XF) turns ON and the error code corresponding to the error definition is stored into the buffer memory.

By checking the "error code" of the buffer memory, you can identify the error cause.

CH	X/Y device		Buffer memory address of Error code
	Error occurrence	Error reset request	
1	X8	Y8	16
2	X9	Y9	48
3	XA	YA	80
4	XB	YB	112
5	XC	YC	144
6	XD	YD	176
7	XE	YE	208
8	XF	YF	240

(3) Confirmation of error definitions

GX Developer or GX Configurator-CT is required to check the error definition. For details of how to check the error definition, refer to "Section 9.1.1 Confirming the error definitions using system monitor of GX Developer" or "Chapter 6 Utility Package (GX Configurator-CT)". (Refer to Section 9.3 for details of the error codes.)



9.3 List of errors

The following table shows the error details and remedies to be taken when an error occurs.

Error code	Error name	Error	Operation status at error occurrence
000	Normal status	—	—
100	Overflow error	When the linear counter was selected, the accumulating count value exceeded 99999999.	Count operation is stopped.
200	Comparison output setting range outside error	The value set in the "comparison output selection" or "comparison output setting value" of the buffer memory is outside the setting range.	Count operation cannot be started.
300	Movement averaging setting range outside error	The value set in the "movement averaging processing selection" or "number of movement averaging processing" of the buffer memory is outside the setting range.	
400	Pre-scale setting range outside error	The value set in the "pre-scale function selection" or "pre-scale setting value" of the buffer memory is outside the setting range.	
500	Alarm output setting range outside error	<ul style="list-style-type: none"> <li>The value set in the "alarm output selection", "alarm output setting value upper/upper limit", "alarm output setting value upper/lower limit", "alarm output setting value lower/upper limit" or "alarm output setting value lower/lower limit" of the buffer memory is outside the setting range.</li> <li>The upper and lower relationships between the "alarm output setting values" of the buffer memory are illegal.</li> </ul>	
600	Count cycle setting range outside error	The value set in the "count cycle change function selection" or "count cycle setting value" of the buffer memory is outside the setting range.	

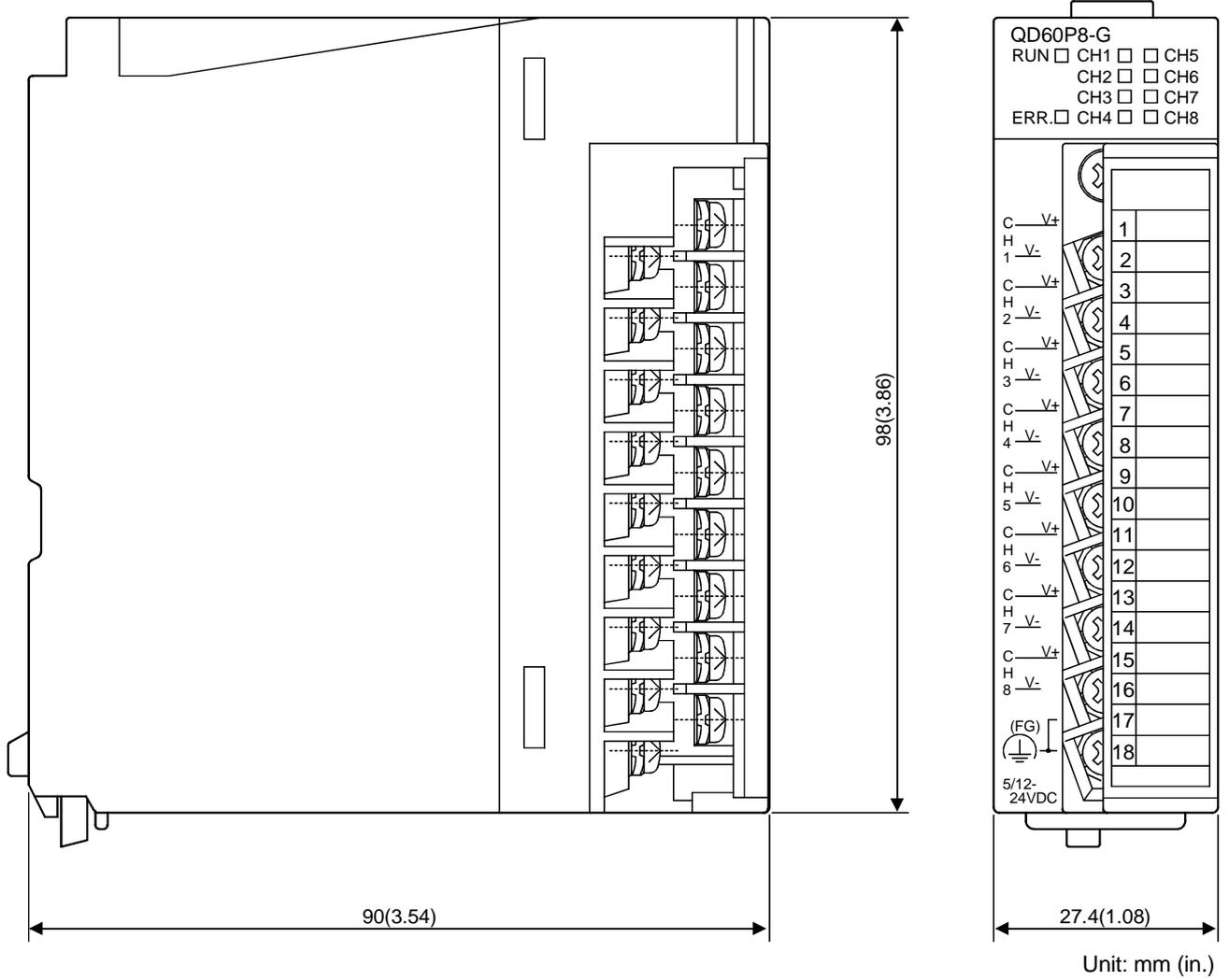


Error code	Error name	Error	Operation status at error occurrence
810	Switch setting error	Any of the setting values of setting with the intelligent function module set on GX Developer is in error.	<ul style="list-style-type: none"> <li>Count operation cannot be performed.</li> <li>If an error occurs in any of the channels, all channels result in an error.</li> </ul>
820	PLC CPU error	An error occurred in the PLC CPU.	Module READY (X0) turns OFF.
830	PLC CPU watch dog timer error	The watch dog timer error of the PLC CPU occurred.	
840	Module error	A module power off error occurred.	
850	Hardware error	Hardware fault.	

Related buffer memory address									Setting range	Remedy
CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8			
Refer to "Section 4.5 Switch setting for intelligent function module".										Set the correct setting value on GX Developer, perform write to PLC, and then switch power from OFF to ON or reset the PLC CPU.
—	—	—	—	—	—	—	—	—	—	Switch power from OFF to ON or reset the PLC CPU.
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	Change the module.

APPENDIX

Appendix 1 External dimension diagram





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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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