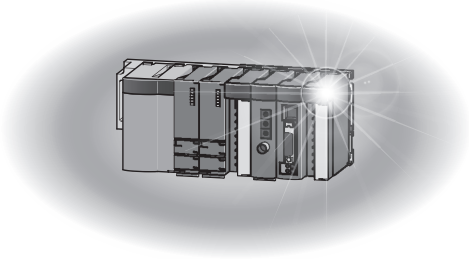
MITSUBISHI ELECTRIC

Mitsubishi Programmable Controller

MELSEC Q series

Load Cell Input Module User's Manual

-Q61LD



●SAFETY PRECAUTIONS●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.

In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

⚠WARNING

- Do not write any data to the "system area" of the buffer memory in the intelligent function module. Also, do not use any "use prohibited" signals as an output signal from the programmable controller CPU to the intelligent function module.
  Doing so may cause malfunction of the programmable controller system.

[Design Precautions]

⚠CAUTION

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

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications in the user's manual for the CPU module used.
  Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect interconnection may cause malfunction, failure, or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
  Tighten the screw within the specified torque range.
  Undertightening can cause drop of the screw, short circuit, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may result in damage to the product.
  A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used.
  Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure.
  For details, refer to the relevant chapter in this manual
- Do not directly touch any conductive parts and electronic components of the module.
  Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

⚠ WARNING

- After installation and wiring, attach the included terminal cover to the module before turning it on for operation.

[Wiring Precautions]

⚠CAUTION

- Ground the FG terminal to the protective ground conductor dedicated to the programmable controller.
  Failure to do so may result in electric shock or malfunction.
- Tighten the terminal screw within the specified torque range.
  Undertightening can cause short circuit, fire, or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
  Such foreign matter can cause a fire, failure, or malfunction.
- A protective film is attached to the top of the module to prevent foreign matter, such as wire chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove it for heat dissipation before system operation.
- Place the cables in a duct or clamp them.
  If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
  Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Connecting a module to a terminal with a different voltage may cause malfunction of the module and failure of the connected devices.
- Shut off the external power supply (all phases) used in the system before mounting or removing the module.
  Failure to do so may apply an excessive voltage to the load cell, resulting in heat generation or damage of the load cell.

[Startup and Maintenance Precautions]

⚠WARNING

- Do not touch any terminal while power is on.
  Doing so will cause electric shock.
- Shut off the external power supply (all phases) used in the system before cleaning the module or retightening the terminal screws or module fixing screws.
  Failure to do so may result in electric shock. Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.

[Startup and Maintenance Precautions]

⚠ CAUTION
● Do not disassemble or modify the module. Doing so may cause failure, malfunction, injury, or a fire. ● Shut off the external power supply (all phases) used in the system before mounting or removing the module. Failure to do so may cause the module to fail or malfunction. A module can be replaced online (while power is on) on any MELSECNET/H remote I/O station or in the system where a CPU module supporting the online module change function is used. Note that there are restrictions on the modules that can be replaced online, and each module has its predetermined replacement procedure. For details, refer to the relevant chapter in this manual. ● After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit may cause malfunction. ● Before handling the module, touch a grounded metal object to discharge the static electricity from the human body. Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

⚠ CAUTION
● When disposing of this product, treat it as industrial waste.

●CONDITIONS OF USE FOR THE PRODUCT●

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

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

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

INTRODUCTION

Thank you for purchasing the Mitsubishi MELSEC-Q series programmable controllers.
This manual describes the operating procedure, system configuration, parameter settings, functions, programming, and troubleshooting of the Q61LD load cell input module (hereafter abbreviated as Q61LD).

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

■Relevant module: Q61LD

Remark

- Unless otherwise specified, this manual describes the program examples in which the I/O numbers of X/Y00 to X/Y0F are assigned for the Q61LD.
  For I/O number assignment, refer to the following manuals.
  - QnUCPU User's Manual (Function Explanation, Program Fundamentals)
  - Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals)
- Operating procedures are explained using GX Works2. When using GX Developer, refer to the following.
  - When Using GX Developer (Page 251, Appendix 3)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance

To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to the manual included with the CPU module or base unit.
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures

To ensure that this product maintains EMC and Low Voltage Directives, please refer to the manual included with the CPU module or base unit.

RELEVANT MANUALS

(1) CPU module user's manual

Manual name <manual number (model code)>	Description
QCPU User's Manual (Hardware Design, Maintenance and Inspection) <SH-080483ENG, 13JR73>	Specifications of the hardware (CPU modules, power supply modules, base units, extension cables, and memory cards), system maintenance and inspection, troubleshooting, and error codes
QnUCPU User's Manual (Function Explanation, Program Fundamentals) <SH-080807ENG, 13JZ27>	Functions, methods, and devices for programming
Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals) <SH-080808ENG, 13JZ28>	

(2) Programming manual

Manual name <manual number (model code)>	Description
MELSEC-Q/L Programming Manual (Common Instruction) <SH-080809ENG, 13JW10>	Detailed description and usage of instructions used in programs

(3) Operating manual

Manual name <manual number (model code)>	Description
GX Works2 Version 1 Operating Manual (Common) <SH-080779ENG, 13JU63>	System configuration, parameter settings, and online operations (common to Simple project and Structured project) of GX Works2
GX Developer Version 8 Operating Manual <SH-080373E, 13JU41>	Operating methods of GX Developer, such as programming, printing, monitoring, and debugging

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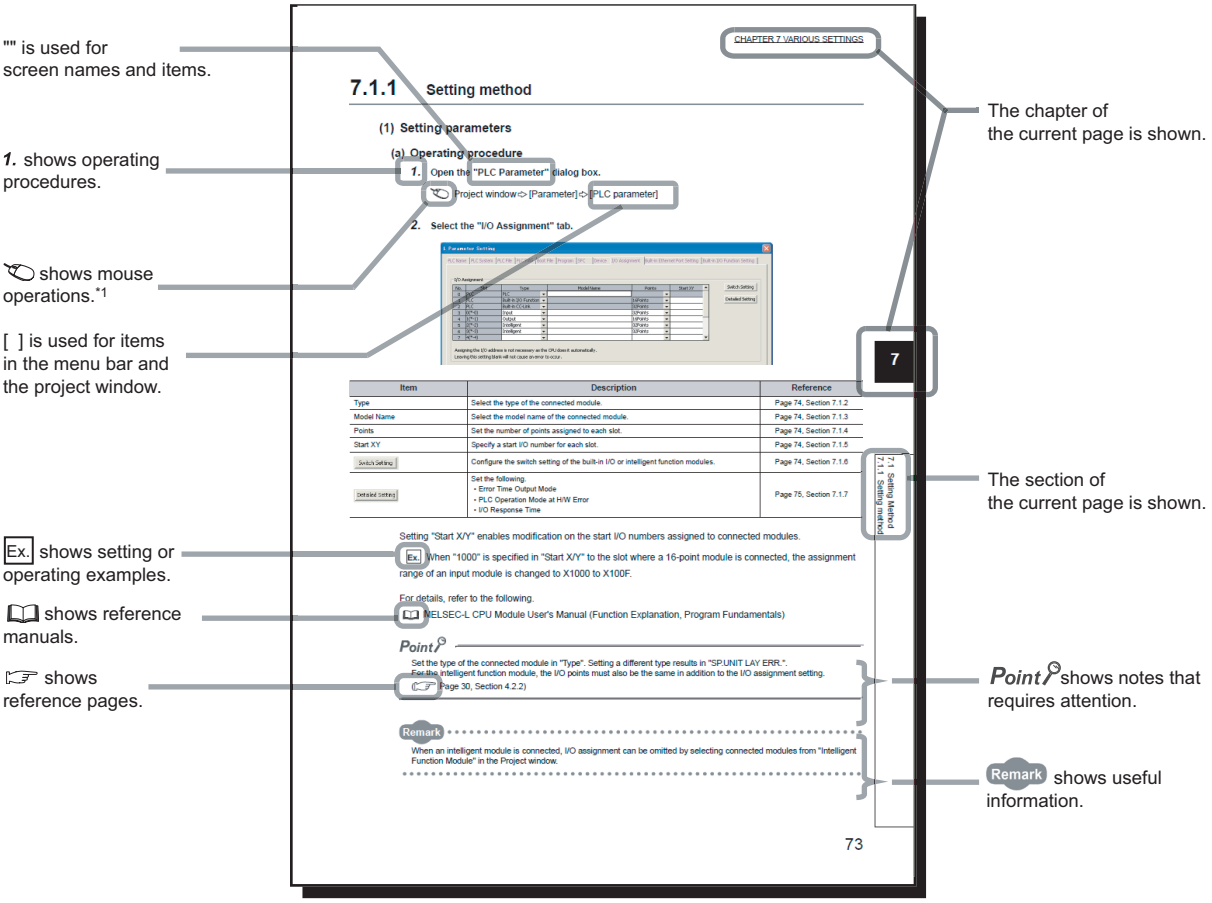
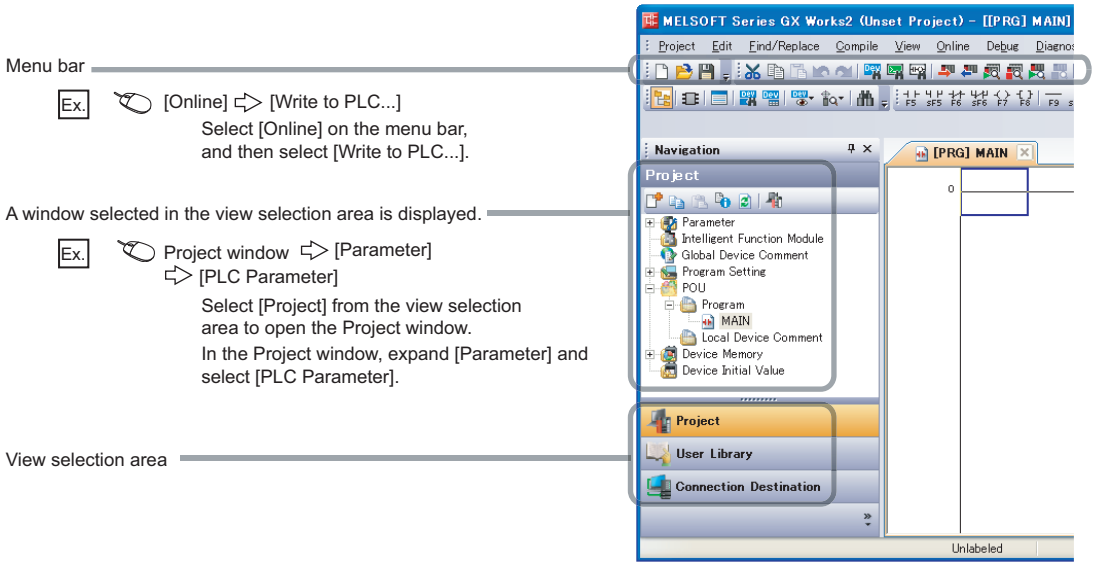
MANUAL PAGE ORGANIZATION

In this manual, pages are organized and the symbols are used as shown below.
The following illustration is for explanation purpose only, and should not be referred to as an actual documentation.

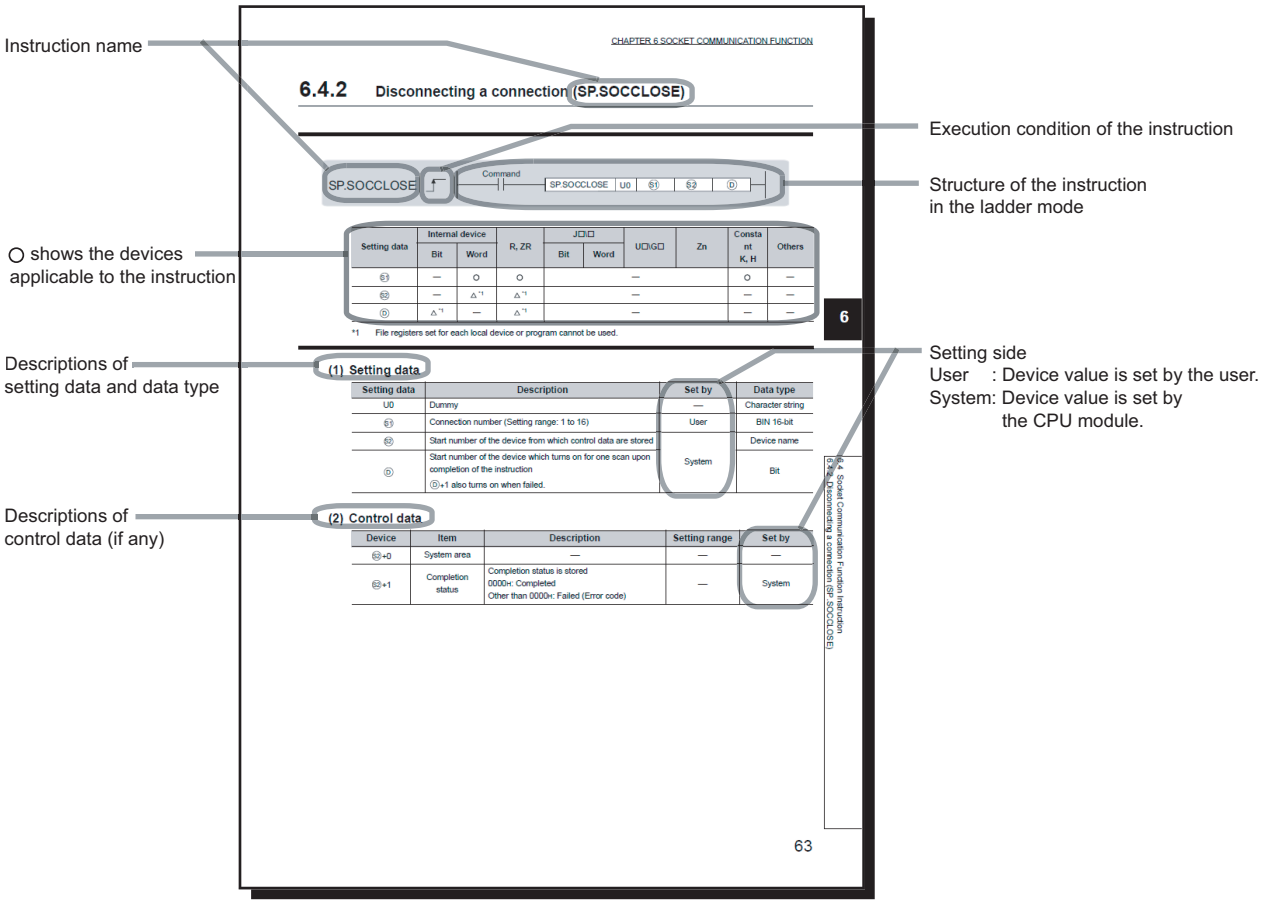


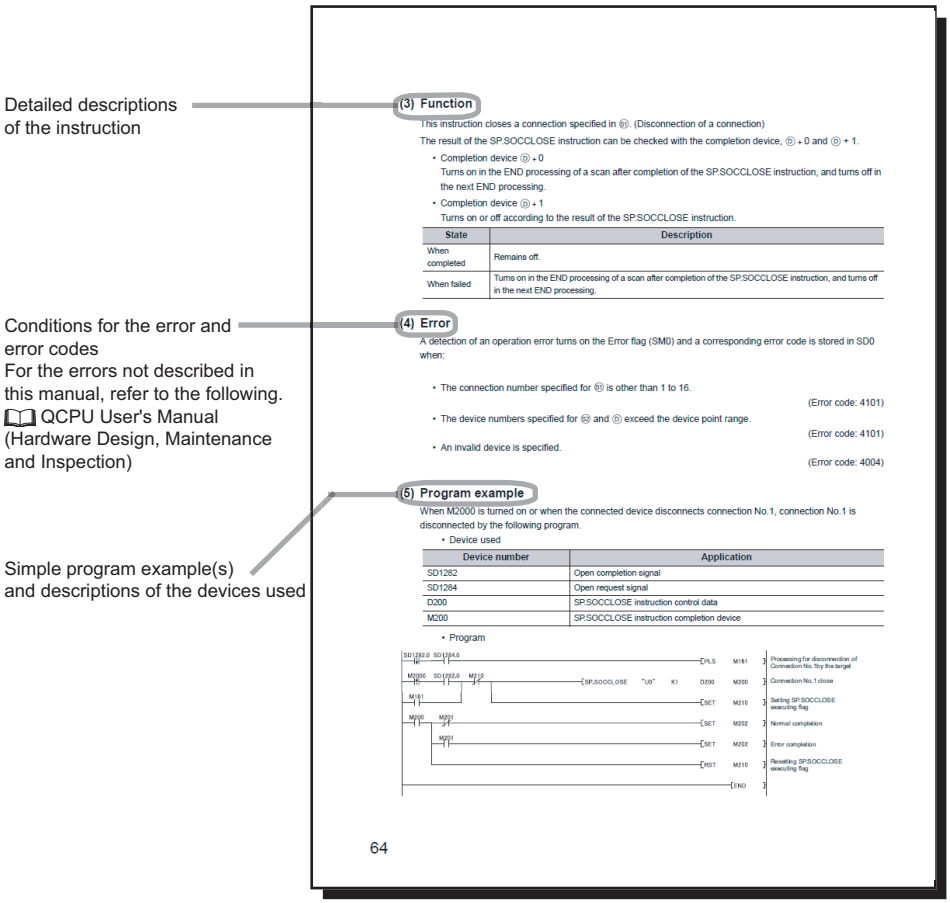
*1 The mouse operation example is provided below.



Pages describing instructions are organized as shown below.

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





• Instructions can be executed under the following conditions.

Execution condition	Any time	During on	On the rising edge	During off	On the falling edge
Symbol	No symbol				

• The following devices can be used.

Setting data	Internal device (system, user)		File register	Link direct device J□\□		Intelligent function module U□\G□	Index register Zn	Constant*3	Others *3
	Bit	Word		Bit	Word				
Applicable device*1	X, Y, M, L, SM, F, B, SB, FX, FY*2	T, ST, C, D, W, SD, SW, FD, @□	R, ZR	-		U□\G□	Z	K, H, E, $	P, I, J, U, DX, DY, N, BL, TR, BL\S, V

*1 For details on each device, refer to the following.

QnUCPU User's Manual (Function Explanation, Program Fundamentals)

Qn(H)/QnPH/QnPRHCPU User's Manual (Function Explanation, Program Fundamentals)

*2 FX and FY can be used for bit data only, and FD for word data only.

*3 In the "Constant" and "Others" columns, a device(s) that can be set for each instruction is shown.

• The following data types can be used.

Data type	Description
Bit	Bit data or the start number of bit data
BIN 16-bit	16-bit binary data or the start number of word device
BIN 32-bit	32-bit binary data or the start number of double-word device
BCD 4-digit	Four-digit binary-coded decimal data
BCD 8-digit	Eight-digit binary-coded decimal data
Real number	Floating-point data
Character string	Character string data
Device name	Device name data

TERMS

Unless otherwise specified, this manual uses the following terms.

Term	Description
Q61LD	The abbreviation for the Q61LD load cell input module
QCPU	Another term for the MELSEC-Q series CPU module
Process CPU	A generic term for the Q02PHCPU, Q06PHCPU, Q12PHCPU, and Q25PHCPU
Redundant CPU	A generic term for the Q12PRHCPU and Q25PRHCPU
Factory default setting	A generic term for analog input ranges of 0 to 10V, 0 to 5V, 1 to 5V, -10 to 10V, 0 to 20mA, and 4 to 20mA
GX Works2	The product name of the software package for the MELSEC programmable controllers
GX Developer	
Buffer memory	The memory of an intelligent function module used to store data (such as setting values and monitored values) for communication with a CPU module
Load cell	A sensor that converts a load (such as force, weight, and torque) into an electric signal. A load cell is also referred to as a load transducer. When a load is applied to a load cell, the load cell converts the load into an electric signal and outputs the signal.
Remote sensing method	A wiring method to stabilize a voltage applied to a load cell. An applied voltage varies depending on the resistance of a cable that changes according to temperature change. By connecting six cables to a load cell on the side where a voltage is applied, the applied voltage is stabilized.
Ratiometric method	A wiring method to proportion variation in a load cell input signal to variation in the reference voltage of an A/D converter. An error is minimized by using the same power supply for the reference voltage and for a voltage applied to the load cell.
Rated capacity	The maximum load that can be applied to a load cell. Tare weight is included.
A/D conversion output value	A digital value converted from an analog signal (load cell output voltage) that is input to a programmable controller as an output value
Digital output value	A numeric value (0 to 10000) converted from an A/D conversion output value according to a resolution (1/10000FS)
Gross weight output value	An A/D conversion output value after two-point calibration and tare zero offset are performed
Connection box	A device used to extend connection cables to a load cell
Summing box	A device required when multiple load cells are used. Output signals from multiple load cells connected in parallel are summed to form a single output.
Gain drift	Gain variation caused by temperature change
Zero drift	Zero-point variation caused by temperature change

PACKING LIST

The product package contains the following.

Model	Product	Quantity
Q61LD	Q61LD load cell input module	1

CHAPTER 1 OVERVIEW

1.1 Features

(1) Parallel connection of up to four load cells

Up to four 350Ω load cells can be connected to the Q61LD in parallel.
Also, the 6-wire type remote sensing method and the ratiometric method are used.

(2) High accuracy to fully exploit the excellent performance of the load cell

- Nonlinearity: Within ±0.01%/FS (accuracy at ambient temperature 25°C, module alone)
- Zero drift: Within ±0.25μ/V°C RTI
- Gain drift: Within ±15ppm/°C

(3) Selectable rated output of the load cell

The output range of the load cell is selectable from 0.0 to 1.0mV/V, 0.0 to 2.0mV/V, and 0.0 to 3.0mV/V.

(4) Maximum weighing capacity

The rated values of the weighing machine can be specified within a range up to five digits (1 to 99999). (Excluding any decimal point or unit symbol)

(5) Easy to obtain the actual weight value

By setting the rated capacity (the maximum weighing capacity) of the weighing machine, the actual weight value can be obtained by scaling the converted value according to the specified range.

(6) Various weight conversion methods are available

The following methods are available for the conversion process:

- Sampling processing
- Count average processing
- Moving average processing
- Combination use of count average and moving average

(7) Warning output function (upper and lower limit alarm outputs)

A warning signal can be output when the gross weight output value reaches the upper or lower limit set by the user.

(8) Input signal error detection function

Any error in the gross weight output value can be detected upon weighing or upon setting the zero point.

(9) Online module change is available

The module can be replaced without stopping the system.

Furthermore, the settings before replacement can be maintained through the following operations to use sequence programs:

- Maintaining the two-point setting value and two-point calibration value set in the Q61LD before online module change.
- Transferring the two-point setting value and the two-point calibration value to another Q61LD mounted on a different slot.

(10) Easy setting by GX Works2

The number of programs can be reduced since the initial settings and auto refresh setting can be performed on the window.

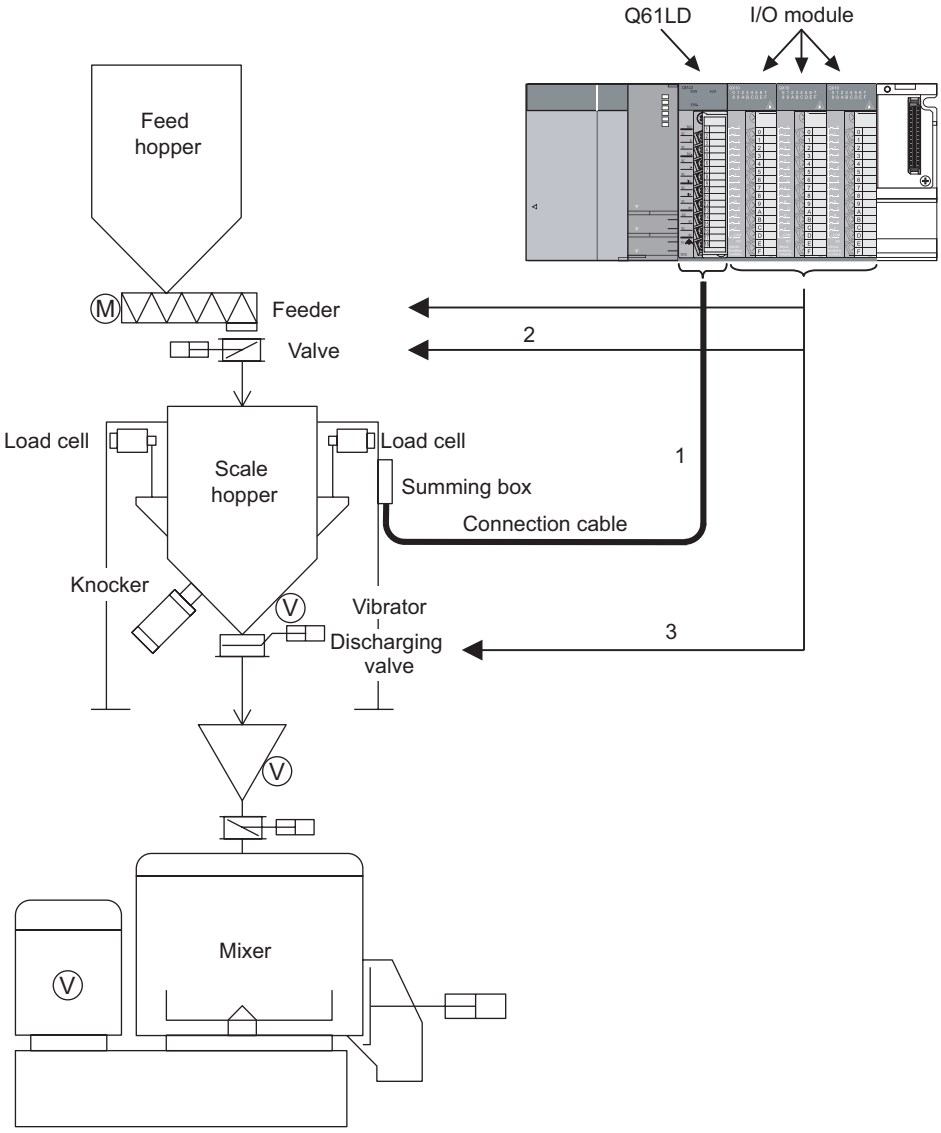
Also, checking the setting and operation status of modules becomes easier.

1.2 Control System to Use the Q61LD

The Q61LD can be used as a weighing machine by connecting a load cell and performing actual load calibration.

Ex. Control system for constant amount powder dispenser

1. **Measures the weight of the material in the scale hopper using the Q61LD.**
2. **Controls the valve and feeder to control the dispensing amount of the material.**
3. **Controls the discharging valve to put the measured material in the mixer.**
   Removes any material attached from the scale hopper by using the knocker or vibrator, if necessary.



CHAPTER 2 SYSTEM CONFIGURATION

This chapter describes the system configuration of the Q61LD.

2.1 Applicable Systems

This section describes the applicable systems.

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

(a) When mounted with a CPU module

The following table shows the CPU modules applicable to the Q61LD, the number of mountable modules, and applicable base units.

Depending on the combination with other mounted modules and the number of mounted modules, power supply capacity may become insufficient.

Pay attention to the power supply capacity before mounting modules.

If the power supply capacity is insufficient, review the combination of the modules.

Applicable CPU module			Number of mountable modules[*1]	Applicable base unit[*2]	
CPU type		CPU model		Main base unit	Extension base unit
Programmable controller CPU	Basic model QCPU	Q00JCPU	Up to 16	○	○
		Q00CPU	Up to 24		
		Q01CPU			
	High performance model QCPU	Q02CPU	Up to 64	○	○
		Q02HCPU			
		Q06HCPU			
		Q12HCPU			
		Q25HCPU			
	Process CPU	Q02PHCPU	Up to 64	○	○
		Q06PHCPU			
		Q12PHCPU			
		Q25PHCPU			
	Redundant CPU	Q12PRHCPU	Up to 53	×	○
		Q25PRHCPU			

Applicable CPU module			Number of mountable modules*1	Applicable base unit*2	
CPU type		CPU model		Main base unit	Extension base unit
Programmable controller CPU	Universal model QCPU	Q00UJCPU	Up to 16	○	○
		Q00UCPU	Up to 24		
		Q01UCPU			
		Q02UCPU	Up to 36		
		Q03UDCPU	Up to 64		
		Q04UDHCPU			
		Q06UDHCPU			
		Q10UDHCPU			
		Q13UDHCPU			
		Q20UDHCPU			
		Q26UDHCPU			
		Q03UDECPU			
		Q04UDEHCPU			
		Q06UDEHCPU			
		Q10UDEHCPU			
		Q13UDEHCPU			
		Q20UDEHCPU			
		Q26UDEHCPU			
		Q50UDEHCPU			
		Q100UDEHCPU			
	Safety CPU	QS001CPU	N/A	×	×*3
C Controller module		Q06CCPU-V-H01	Up to 64	○	○
		Q06CCPU-V			
		Q06CCPU-V-B			
		Q12DCCPU-V			

○: Applicable ×: N/A

*1 Limited to the number of I/O points on the CPU module.
*2 Mountable to any I/O slot of the applicable base unit.
*3 No extension base unit can be connected to a safety CPU module.

Remark

To use the Q61LD with a C Controller module, refer to the user's manual for the C Controller module.

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

The following table shows the network modules applicable to the Q61LD, the number of mountable modules, and applicable base units.

Depending on the combination with other mounted modules and the number of mounted modules, power supply capacity may become insufficient.

Pay attention to the power supply capacity before mounting modules.

If the power supply capacity is insufficient, review the combination of the modules.

Applicable network module	Number of mountable modules*1	Applicable base unit*2	
		Main base unit in the remote I/O station	Extension base unit in the remote I/O station
QJ72LP25-25	Up to 64	○	○
QJ72LP25G			
QJ72BR15			

○: Applicable ×: N/A

*1 Limited to the number of I/O points on the network module.

*2 Mountable to any I/O slot of the applicable base unit.

Remark

The basic model QCPU and C Controller modules cannot be used in a MELSECNET/H remote I/O network.

(2) Application to a multiple CPU system

When using the Q61LD in a multiple CPU system, refer to the following.

QCPU User's Manual (Multiple CPU System)

(a) Compatible Q61LD

The Q61LD is of the function version C from the first product, and applicable to a multiple CPU system.

(b) Intelligent function module parameters

Write intelligent function module parameters only to the control CPU of the Q61LD.

(3) Online module change

The Q61LD is of the function version C from the first product, and applicable to online module change.

For more details, refer to the following.

• ONLINE MODULE CHANGE (☞ Page 192, CHAPTER 10, Page 268, Appendix 5)

(4) Compatible software packages

The following table shows the systems and corresponding compatible software versions to be used with the Q61LD.

When using the Q61LD, GX Works2 or GX Developer is required.

Item		Software version	
		GX Works2	GX Developer
Q00J/Q00/Q01CPU	Single CPU system	Version 1.14Q or later	Version 7 or later
	Multiple CPU system		Version 8 or later
Q02/Q02H/Q06H/Q12H/Q25HCPU	Single CPU system		Version 4 or later
	Multiple CPU system		Version 6 or later
Q02PH/Q06PHCPU	Single CPU system	Not available	Version 8.68W or later
	Multiple CPU system		
Q12PH/Q25PHCPU	Single CPU system		Version 7.10L or later
	Multiple CPU system		
Q12PRH/Q25PRHCPU	Redundant CPU system		Version 8.45X or later
Q00UJ/Q00U/Q01UCPU	Single CPU system	Version 1.14Q or later	Version 8.76E or later
	Multiple CPU system		
Q02U/Q03UD/Q04UDH/Q06UDHCPU	Single CPU system		Version 8.48A or later
	Multiple CPU system		
Q10UDH/Q20UDHCPU	Single CPU system		Version 8.76E or later
	Multiple CPU system		
Q13UDH/Q26UDHCPU	Single CPU system		Version 8.62Q or later
	Multiple CPU system		
Q03UDE/Q04UDEH/Q06UDEH/Q13UDEH/Q26UDEHCPU	Single CPU system		Version 8.68W or later
	Multiple CPU system		
Q10UDEH/Q20UDEHCPU	Single CPU system		Version 8.76E or later
	Multiple CPU system		
Q50UDEH/Q100UDEHCPU	Single CPU system	Version 1.25B or later	Not available
	Multiple CPU system		
When installing in a MELSECNET/H remote I/O station		Version 1.34L or later	Version 6 or later

2.2 When Using the Q61LD with Redundant CPU

When using the Q61LD with Redundant CPU, dedicated instructions cannot be used.

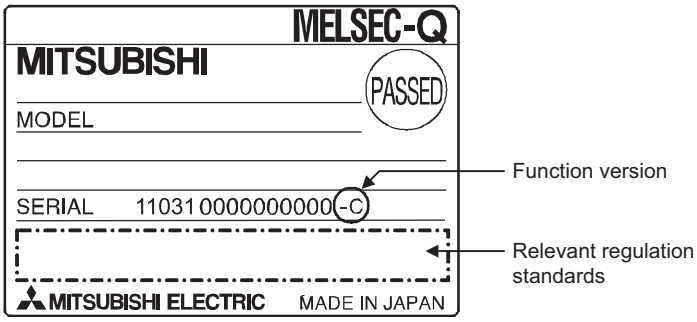
2.3 Checking the Function Version and Serial Number

The function version and the serial number of the Q61LD can be checked at the following.

- Rating plate
- Front of the module
- System monitor of the programming tool

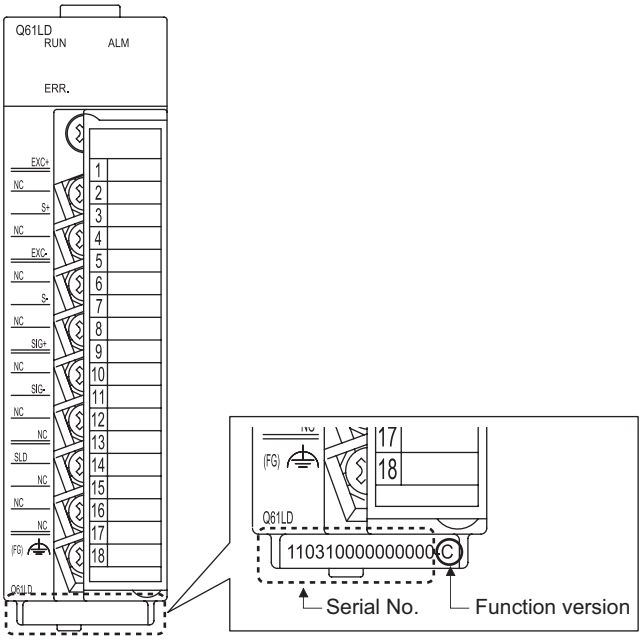
(1) Checking on the rating plate

The rating plate is located on the side of the Q61LD.



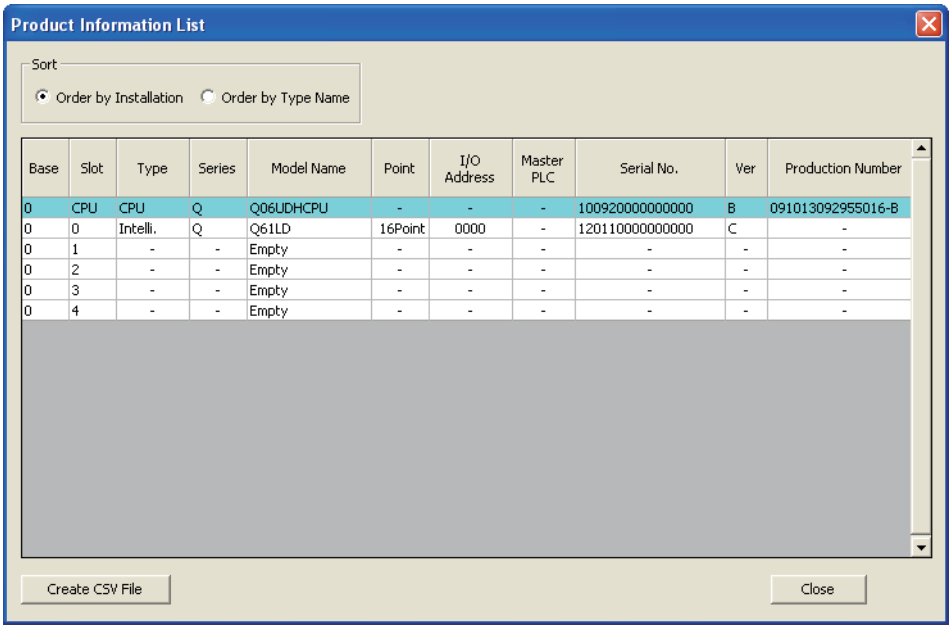
(2) Checking on the front of the module

The serial number and function version, same as the ones on the rating plate, are shown on the bottom front of the module.



(3) Checking on the System monitor

[Diagnostics] ⇨ [System Monitor] ⇨ Product Information List button.



(a) Production number display

Note that "-" will be displayed for the Q61LD since the module is not featured with production number display.

Point

The serial number to be displayed on the "Product Information List" window may differ from that on the rating plate and on the front of the module.

- The serial number shown on the rating plate (and on the front of the module) is part of management information of the product.
- The serial number shown on the "Product Information List" window represents functional information of the product. The functional information of the product will be updated when a function is added.

CHAPTER 3 SPECIFICATIONS

This chapter describes the performance specifications, function list, I/O signals list, and list of buffer memory areas.

3.1 Performance Specifications

The following table shows the performance specifications for the Q61LD.

Item	Specification				
Analog input (load cell output) points	1 point (1 channel)				
Analog input (load cell output)	0.0 to 3.3mV/V				
Load cell applied voltage	5VDC ±5%, output current within 60mA (four 350Ω load cells can be connected in parallel.) 6-wire type (combined use of remote sensing method and ratiometric method)				
Digital output	32-bit signed binary 0 to 10000				
Gross weight output (maximum weighing capacity output value)	32-bit signed binary -99999 to 99999 (Excluding any decimal point or unit symbol)				
ZERO point adjustment range	0.0 to 3.0mV/V				
Gain adjustment range	0.3 to 3.2mV/V				
Analog input range (load cell rated output)	0.0 to 1.0mV/V, 0.0 to 2.0mV/V, 0.0 to 3.0mV/V				
I/O characteristics, maximum resolution[*1]	**Analog input range**		**Digital output value**	**Gross weight output value**	**Maximum resolution**
	Load cell rated output	**Module analog input value**			
	0 to 1.0mV/V	0 to 5.0mV/V	0 to 10000	-99999 to 99999	0.5μV
	0 to 2.0mV/V	0 to 10.0mV/V			1.0μV
	0 to 3.0mV/V	0 to 15.0mV/V			1.5μV
Accuracy (accuracy relative to analog input (load cell rated output) of a module)	Nonlinearity: Within ±0.01%/FS (ambient temperature 25°C) Zero drift: Within ±0.25μV/°C RTI Gain drift: Within ±15ppm/°C				
Sampling cycle	10ms				
Response time[*2]	0.4s or less (0 to 90%)				
Absolute maximum input	±2.5V				
Number of writes to non-volatile memory (FeRAM)	Maximum 10^{12} times				
Insulation method	Photocoupler isolation				
Dielectric withstand voltage	Between input terminal and programmable controller power supply: 500VAC, 1 minute				
Insulation resistance	Between input terminal and programmable controller power supply: 500VDC 10MΩ or more				
Number of occupied I/O points	16 points (I/O assignment: intelligent 16 points)				
External connection system	18-point terminal block				
Applicable wire size	0.3 to 0.75mm^2				
Applicable solderless terminal	R1.25-3 (Sleeved solderless terminals cannot be used.)				
Internal current consumption (5VDC)	0.48A				
External dimensions	98 (H) × 27.4 (W) × 90 (D)(mm)				
Weight	0.17kg				

*1 The unit [mV/V] applies to the rated output voltage of load cells. Because 5VDC is supplied to load cells from the Q61LD, the analog input voltage to the module will be five times the specified rated output value.

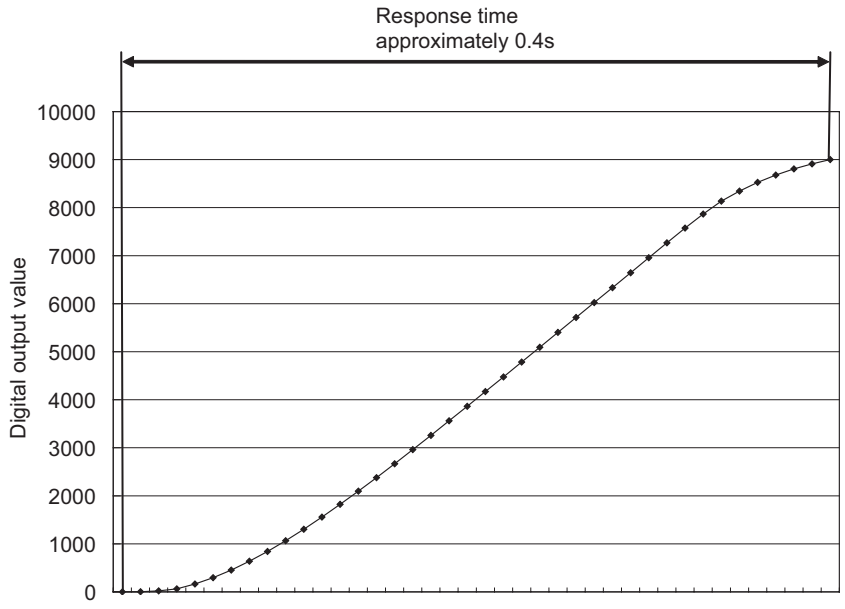
*2 The time measured from the instant when the input signal level is suddenly changed to the time when the corresponding change in the A/D converted output value reaches a specified percentage of the final value to be settled upon.

(☞ Page 26, Section 3.1 (1))

(1) Response time

The time measured from the instant when the input signal level is suddenly changed to the time when the corresponding change in the A/D converted output value reaches a specified percentage of the final value to be settled upon.

When the analog input voltage to the module is suddenly changed from 0 to 15.0mV, it will take about 0.4 seconds before the digital output value reaches 90.00% of the final value.



3.1.1 Conversion characteristics

The term "conversion characteristics" refers to the relationship between the input signal and output data, where the analog input signal (load cell output voltage) from an external source to the programmable controller is converted to the digital output value or the gross weight output value.

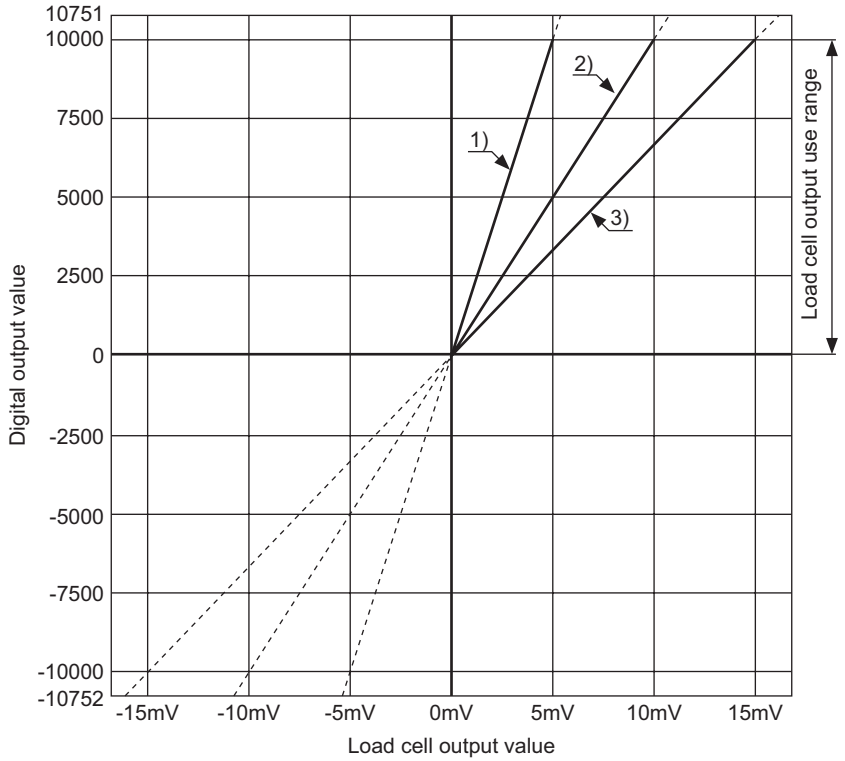
- The gradient of the line from the zero value to the span value (☞ Page 28, Section 3.1.1 (1))
- The gradient of the line connecting the ZERO and SPAN points, when the signal is converted to the gross weight output value (☞ Page 29, Section 3.1.1 (2))

This section explains the conversion characteristics when the tare zero offset function is not used.
For the tare zero offset function, refer to the following.

- Tare Zero Offset Function (☞ Page 51, Section 4.6)

(1) Analog to digital conversion characteristics

The following figure shows the analog to digital conversion characteristics of the Q61LD.



No.	Analog input range setting (load cell rated output)	Zero value	Span value	Digital output value*1	Maximum resolution
1)	1mV/V	0mV	5mV	0 to 10000	0.5μV
2)	2mV/V	0mV	10mV		1.0μV
3)	3mV/V	0mV	15mV		1.5μV

*1 When the analog input voltage exceeds the corresponding range of the digital output data, the resulting digital output value will be fixed to the maximum value (10751) or the minimum value (-10752).

Point

- Use the Q61LD within the specified analog input range (load cell rated output) and the digital output range. When the digital output range is exceeded, the maximum resolution and accuracy specifications of the Q61LD may not be guaranteed. (The above broken lines indicate the out-of-range areas for the digital output data.)
- Do not apply a voltage of -2.5V or lower or 2.5V or higher. It can cause a failure of the Q61LD.

(2) Characteristics of gross weight output value

The gross weight output values become available after two-point calibration is performed.

Ex. The characteristics are shown for the following conditions:

1. **Two-point calibration value**

- Load cell rated capacity (Un\G50, Un\G51): 2500
- Load cell rated output (Un\G52): 30 (3.0mV/V)
- Number of load cells in connection (Un\G53): 4
- Maximum weighing capacity setting (Un\G56, Un\G57): 6000

2. **Analog input voltages for two-point calibration**

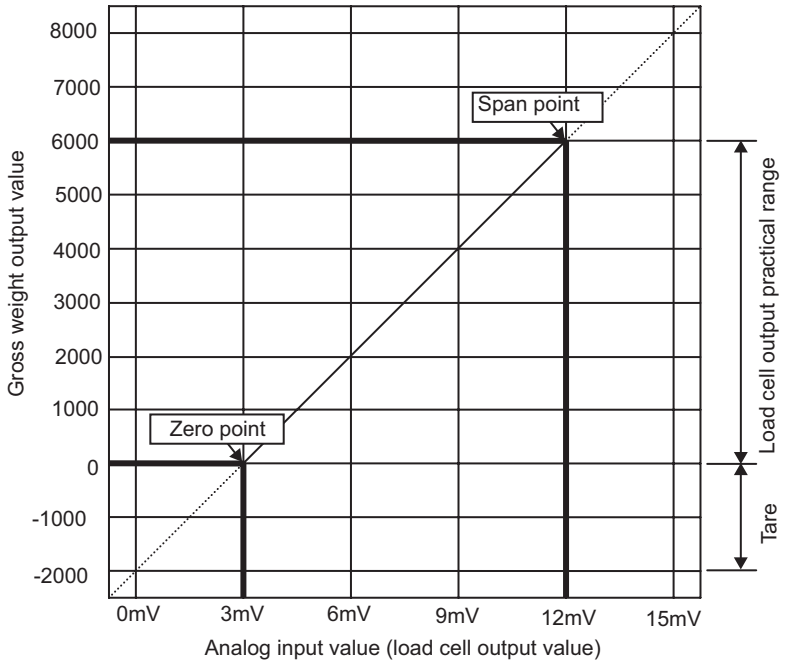
- ZERO point: 3mV
- SPAN point: 12mV

3. **Load cell output when it is loaded with the rated capacity**

- Analog input = Load cell rated output [mV/V] × Load cell applied voltage output [V] = 3.0 × 5 = 15mV
- The load cell rated capacity is calculated as follows:

$$\text{Load cell rated capacity} = \text{Load cell rated capacity (Un\G50, Un\G51)} \times \text{Number of load cells in connection (Un\G53)}$$
$$= 2500 \times 4$$
$$= 10000$$

The following figure shows the characteristic curve:



Point

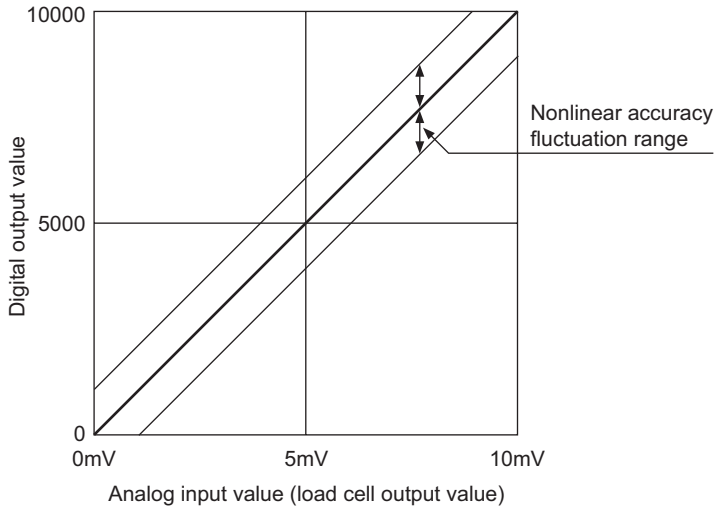
- Use an analog input voltage of 0mV/V or higher for the ZERO point and a voltage within the analog input range (within the load cell rated output) for the SPAN point.
- The gain adjustment range of the Q61LD is 0.3mV/V to 3.2mV/V.
  The load cell output voltage swing from ZERO point to SPAN point must be 0.3mV/V or higher and 3.0mV/V or lower. Do not use the range exceeding 3.0mV/V.

3.1.2 Accuracy

The accuracy of the Q61LD in terms of the analog input range (load cell rated output) will be maintained within the range listed in the specification, even when the input characteristics are changed by changing the ZERO and SPAN point settings and/or the analog input range.

Ex. For the load cell rated output of 2mV/V:
When the ambient temperature is 25°C, the nonlinear accuracy is within ±0.01%/FS (± one digit, rounded up to the nearest integer).
The temperature drift where ambient temperature is 0 to 55°C is as follows:

- Zero drift: Within ±0.14% (±14 digits, rounded up to the nearest integer)
- Gain drift: Within ±0.08% (±9 digits, rounded up to the nearest integer)
- Integrated accuracy: Within ±0.23% (±23 digits, rounded up to the nearest integer)



When the rated output of a load cell is 2mV/V, the zero drift, gain drift, and integrated accuracy are calculated by the following equations:

- Zero drift (△: Change of the ambient temperature)

$$\text{Zero drift} = 10000\text{digit} \times \frac{0.25\mu\text{V/℃RTI}}{2\text{mV/V} \times 5\text{V}} \times \Delta t$$

- Gain drift (△: Change of the ambient temperature)

$$\text{Gain drift} = 10000\text{digit} \times 15\text{ppm/℃} \times \Delta t$$

- Integrated accuracy (△: Change of the ambient temperature)

$$\text{Integrated accuracy} = \text{Nonlinear accuracy} + (\text{Zero drift} \times \Delta t) + (\text{Gain drift} \times \Delta t)$$

Point

- Zero drift can be automatically corrected by using the zero tracking function.
  - Zero Tracking Function (☞ Page 86, Section 4.10)
- Even when the tare zero offset function is used to expand the input range, the accuracy is guaranteed only with reference to the load cell rated output.

3.1.3 Number of parameters

Regarding the initial setting and auto refresh setting for the Q61LD, the number of parameters to be set must not exceed the maximum number of parameters that can be set with the CPU module, including the parameters of other intelligent function modules.

For the maximum number of parameters allowed to be set with the CPU module, refer to the following.

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

(1) Number of parameters with the Q61LD

The following number of parameters can be set for each Q61LD:

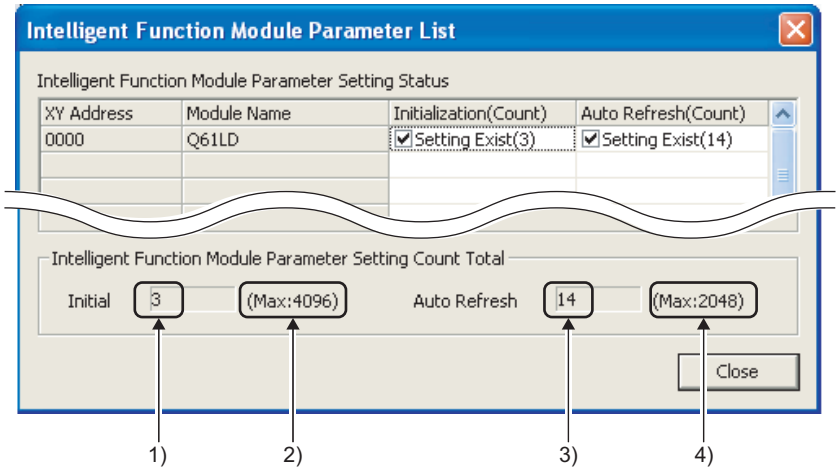
Target module	Initial setting	Auto refresh setting
Q61LD	3	14 (Max.)

(2) How to check

The number of parameters set as well as the maximum number of parameters that can be set in an intelligent function module can be checked by the following operation procedures:

Project window ⇨ [Intelligent Function Module] ⇨ Right-click

⇨[Intelligent Function Module Parameter List]



No.	Description
1)	The total number of initial setting parameters checked in the window
2)	The maximum number of initial setting parameters allowed to be set
3)	The total number of auto refresh setting parameters checked in the window
4)	The maximum number of auto refresh setting parameters allowed to be set

3.2 Function List

This section lists the functions of the Q61LD.

Function	Description	Reference
Conversion enable/disable function	Enables or disables the conversion.	Page 49, Section 4.4
Tare zero offset function[*1]	• Offsets the load cell output voltage that corresponds to the fixed tare weight to make it suitable to the input condition and to improve the accuracy. • Automatically offsets the fixed tare weight part of the load cell output voltage and sets Instrumentation amplifier gain setting (Un\G80) and A/D converter gain setting (Un\G81) to their optimal values while keeping the maximum weighing capacity setting within the input range.	Page 51, Section 4.6
Gravitational acceleration correction function[*1]	Corrects weight error due to any difference of gravitational acceleration that may be present if the calibration site of the weighing machine differs from its installation site. The setting is unnecessary if the calibration site is same as the installation site.	Page 56, Section 4.7
Two-point calibration function[*1]	To use the Q61LD as a weighing machine, this function performs necessary adjustments to work with the load cell. To accurately calibrate the gross weight output value, an actual load (standard weight) is put on the load cell.	Page 60, Section 4.8
Weight conversion method	One of the following processing is made to the gross weight output value and the digital output value to reduce fluctuations in the output value. • Sampling processing • Count average processing • Moving average processing • Combination use of count average and moving average	Page 82, Section 4.9
Zero tracking function	Automatically corrects for any slow zero drifts or sensitive zero point fluctuations. Time and variation width are the parameters to be set for this function.	Page 86, Section 4.10
Zero set/reset function	Adjusts the zero point of the weighing machine. This adjustment assumes the case where the zero point of the weighing machine has moved after a two-point calibration.	Page 89, Section 4.11
Input signal error detection function	• Weighing capacity over When the division nine of the full scale (maximum weighing capacity setting) is exceeded, the "Weighing capacity over" bit of the Input signal error detection flag will be set to ON (1). • Outside the zero point range When zero set is made exceeding the range of zero point adjustment, the "Outside the zero point range" bit will be set to ON (1). • Input signal error When the weight exceeds the upper limit of the gross weight arbitrarily set, the "Input signal error" bit will be set to ON (1). • Conversion over When the analog input (load cell output) exceeds the conversion range, the "Conversion over" bit will be set to ON (1).	Page 91, Section 4.12
Warning output function	When the gross weight output value falls within a predefined range, a warning will be produced.	Page 100, Section 4.13
Center point (1/4 scale) detection function	This function detects the center point of the scale for the gross weight output value. The minimum division is further divided by four; if the measurement is found to be at the center point of the minimum division, Center point status (X2) will be set to ON.	Page 102, Section 4.14
Stable status	When the following condition is satisfied, Stable status (X1) will be set to ON to show the stable status of Gross weight output value (Un\G100, Un\G101). • The variation of the gross weight output value is contained within a predefined width of variation and the status is maintained for a specified period of time.	Page 105, Section 4.15
Maximum and minimum values hold function	Writes the maximum and minimum digital output values to the buffer memory area.	Page 106, Section 4.16

Function	Description	Reference
Output value hold function	Temporarily holds the gross weight output value and the digital output value. While being held, the output value will not change even if the load cell output voltage is changed.	Page 106, Section 4.17
Default setting registration function	This command resets the values set in the buffer memory to the default values. At the same time, the zero correction value of zero point adjustment is cleared (set to zero).	Page 107, Section 4.18

*1 As the data is stored in a non-volatile memory (FeRAM) in the Q61LD, the parameters set for these functions will not be erased even when the power is turned off.

CHAPTER 4 FUNCTION

This chapter describes the function details available with the Q61LD and the setting methods.

4.1 General Characteristics of Load Cells

This section describes the general characteristics of load cells.

(1) Notation of load cell output

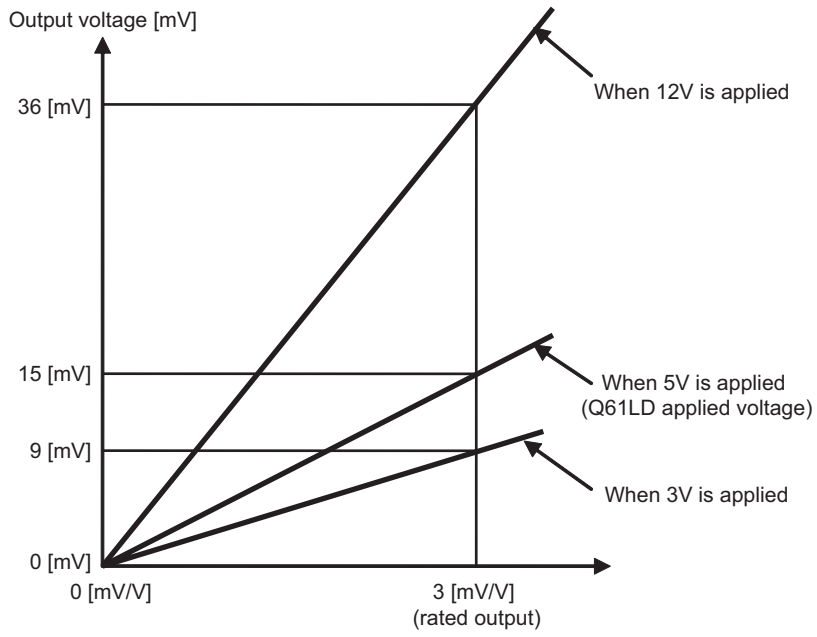
When a constant load is applied to the load cell, the output voltage is proportional to the voltage applied to the load cell.

Accordingly, the unit [mV/V] is used to represent the load cell output level, meaning the output voltage in mV per applied voltage of 1V.

Since the applied voltage from the Q61LD to the load cell is fixed at 5V, the actual load cell output voltage will be 5mV when the output is 1mV/V. However, it is normally unnecessary to be aware of the applied voltage.

Ex. The example assumes the following load cell specifications:

- Load cell rated capacity (Un\G50, Un\G51): 1000kg
- Load cell rated output (Un\G52): 3.0mV/V
- Number of load cells in connection (Un\G53): 1
- Applied voltage: As in the figure below

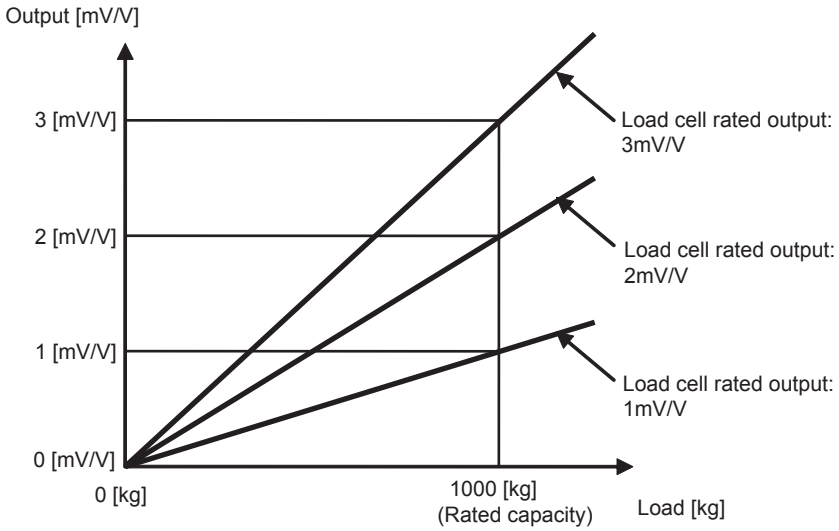


(2) Rated capacity and rated output

When a load is applied on the load cell, the output voltage proportional to the load (weight) will be obtained, and when the load corresponds to the rated capacity is applied, the rated output will be obtained.

Ex. The example assumes the following load cell specifications:

- Load cell rated capacity (Un\G50, Un\G51): 1000kg
- Load cell rated output (Un\G52): As in the figure below
- Number of load cells in connection (Un\G53): 1
- Applied voltage: 5V

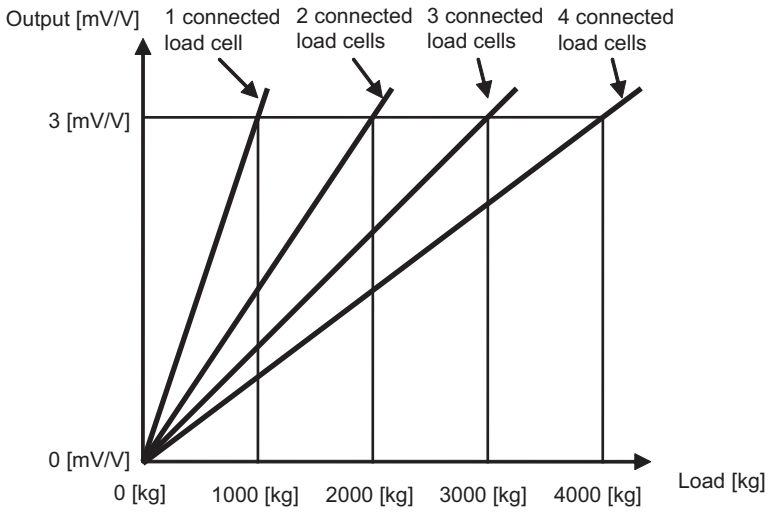


(3) Parallel connection of load cells

By connecting a number of identical load cells in parallel, the resulting load cell system may be regarded as a single load cell, of which rated capacity is the rated capacity of each load cell times the number of load cells connected, as the load is distributed across the load cells.

Ex. The example assumes the following load cell specifications:

- Load cell rated capacity (Un\G50, Un\G51): 1000kg
- Load cell rated output (Un\G52): 3.0mV/V
- Number of load cells in connection (Un\G53): As in the figure below
- Applied voltage: 5V



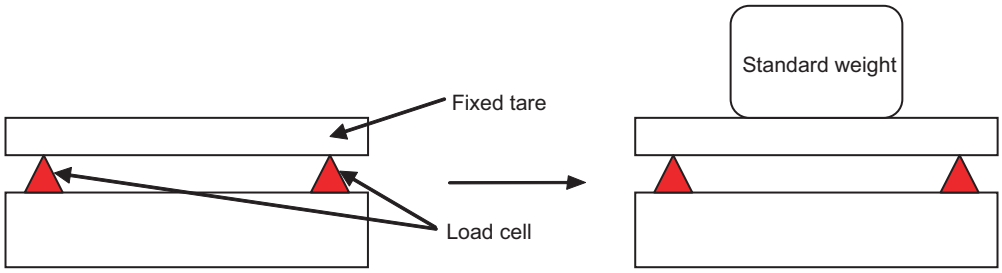
4.2 Fixed Tare, Gross Weight, and Net Weight

(1) Fixed tare

The fixed tare refers to the fixed, permanent weight on the load cells not subjected to the measurement, such as that of the stand or hopper, to be necessary when a weighing machine is built using load cells.
In the case of the platform scale as in the figure below, the table supported by load cells, on which the items to be measured will be placed, is referred to as "fixed tare".
By completing the following tasks, the system can be used as a weighing machine by implementing the fixed tare.

(a) Procedures

1. **When performing two-point zero calibration, do not put anything on the fixed tare.**
   When the tare zero offset function is enabled, the load cell output reading corresponding to the gross weight of the fixed tare on the load cells is automatically cancelled to provide the electrical reading of 0mV/V (fixed tare is removed from the output) and an adequate gain is selected.
2. **After completing the two-point zero calibration, place a standard weight on the platform to perform the two-point span calibration.**



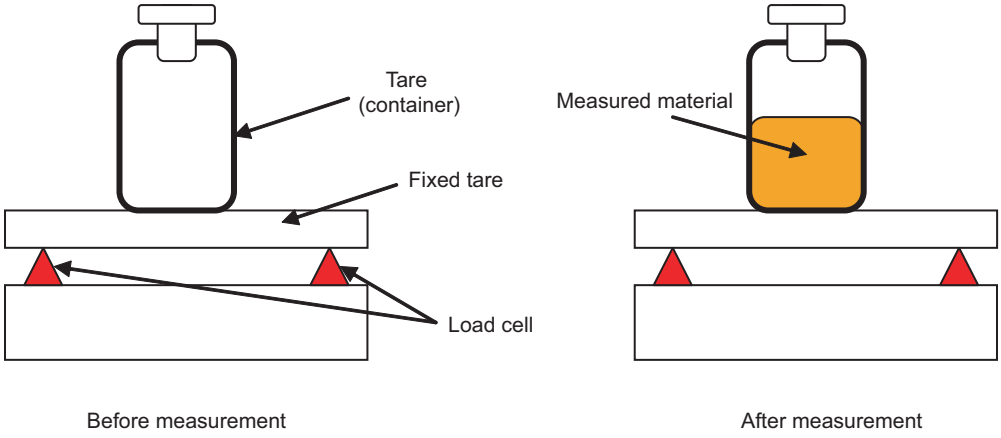
Two-point zero calibration　　Two-point span calibration

(2) Gross weight and net weight

The gross weight (GROSS) refers to the total weight including the tare (measuring container) and the subject to be measured.

The net weight (NET) refers to the weight excluding the tare (measuring container).

The term "tare" refers to the measuring container in which the subject to be measured is placed upon measuring the weight.



The net weight (NET) can be calculated from Gross weight output value (Un\G100, Un\G101) by using the following method:

- Before start measuring the weight of the subject, store Gross weight output value (Un\G100, Un\G101) as the tare.
  (If the zero point of the gross weight is shifted due to any deposit, the zero set/reset function can be used to deal with this. (☞ Page 89, Section 4.11))
- Start measuring the weight of the subject to be weighed.
  By subtracting the tare weight from Gross weight output value (Un\G100, Un\G101), the net weight (NET) can be calculated.
  Net weight = Gross weight output value (Un\G100, Un\G101) – Tare

(3) When fixed tare is frequently changed

When it is necessary to frequently change the measuring container (tare), if the two-point zero calibration is performed each time the measuring container is changed while regarding the measuring container as fixed tare, it may result in the following problems:

- The two-point zero calibration takes time.
- When Tare zero offset (Un\G54) is set to Used (0), Input signal error detection flag (Un\G114. b3) can be set to Conversion over (1) when the measuring container is removed.
- If a large fixed tare is used, it can unintentionally exceed the rated capacity of the load cell.

To prevent the above listed problems from occurring, it is advised to manually calculate the net weight if the measuring container has to be frequently changed.

4.3 Operation of Gross Weight Output Value (Un\G100, Un\G101) and Digital Output Value (Un\G102, Un\G103)

This section describes the operation of Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) for the cases when the tare zero offset function is used and not used.
For details on the tare zero offset function, refer to the following.

- Tare Zero Offset Function (☞ Page 51, Section 4.6)

4.3.1 When the tare zero offset function is not used

This section describes the operation of Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) for the case the tare zero offset function is not used.

(1) Gross weight output value (Un\G100, Un\G101)

Gross weight output value (Un\G100, Un\G101) will be 0 at the input load of the two-point zero calibration (ZERO point) and will be the maximum weighing capacity value at the input load of the two-point span calibration (SPAN point).

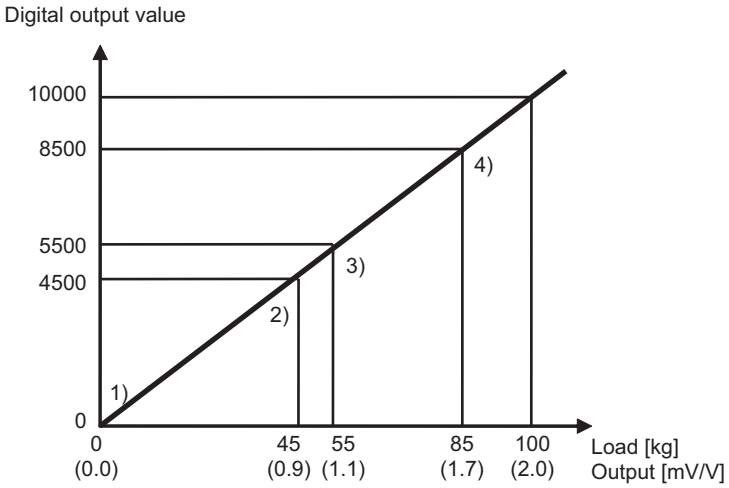
For details on the two-point zero calibration and two-point span calibration, refer to ☞ Page 60, Section 4.8.

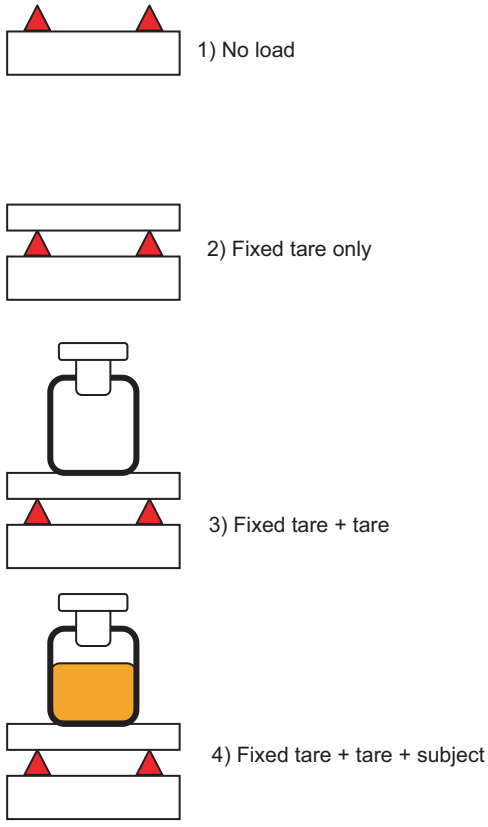
(2) Digital output value (Un\G102, Un\G103)

Digital output value (Un\G102, Un\G103) is the output of the conversion process to convert the analog input from the load cell to the corresponding digital data, where the unloaded level (output: 0mV/V) to the load cell rated output is converted to the output data of 0 to 10000.

Ex. When setting under the following conditions:

- Load cell rated capacity (Un\G50, Un\G51): 100kg
- Load cell rated output (Un\G52): 2.0mV/V
- Number of load cells in connection (Un\G53): 4
- Fixed tare weight: 45kg
- Tare weight: 10kg





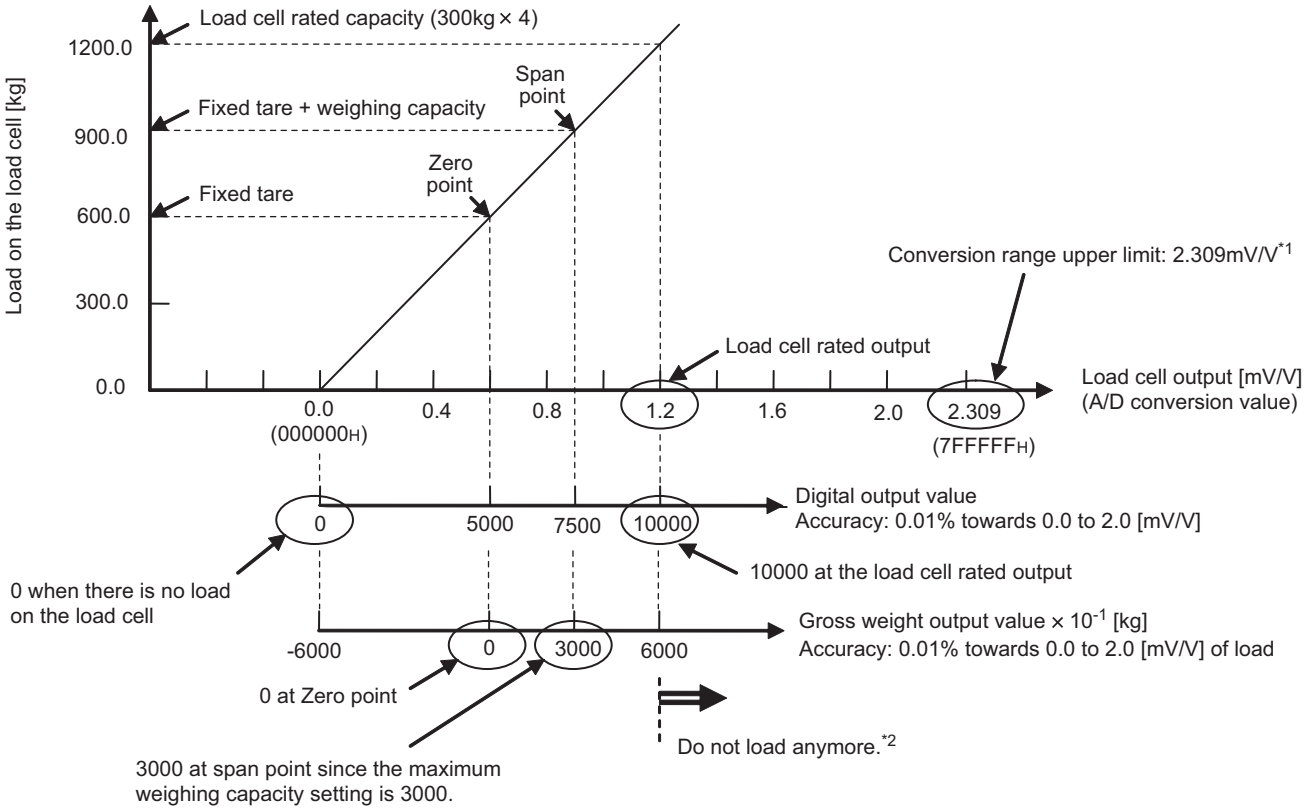
(3) Outline of Processing

Ex. This section describes the outline of the setting and processing when the weight of 300kg is measured using four load cells under the following conditions: (The fixed tare weight is assumed to be 600kg.)

- Rated capacity: 300kg
- Rated output: 1.2mV/V

Description	Address	Setting value
Load cell rated capacity	Un\G50, Un\G51	3000 (300.0kg)
Load cell rated output	Un\G52	12 (1.2mV/V)
Number of load cells in connection	Un\G53	4
Maximum weighing capacity setting	Un\G56, Un\G57	3000 (300.0kg)
Decimal point position	Un\G59	1_H ($\times 10^{-1}$)
Unit	Un\G60	1_H (kg)
Fixed tare weight	—	600.0kg

- Gross weight output value (Un\G100, Un\G101)
  For the load cell load of 600.0kg to 900.0kg, the output value of 0 to 3000 (maximum weighing capacity) will be produced.
- Digital output value (Un\G102, Un\G103)
  The level from the unloaded load cell output of 0mV/V up to Load cell rated capacity (Un\G52) is converted to the output value of 0 to 10000.
  The accuracy is 0.01% for 2.0mV/V.



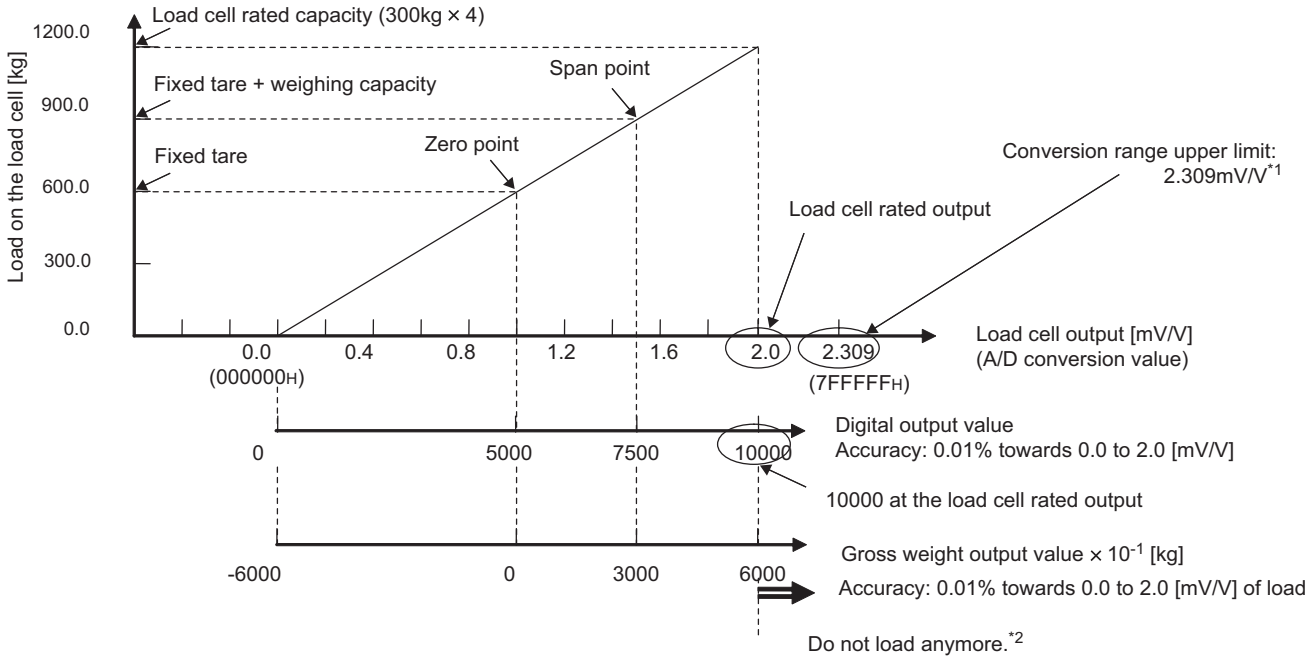
*1 As Load cell rated output (Un\G52) is within the range of 1.1mV/V to 2.0mV/V, the instrumentation amplifier gain of 0 to 2.0mV/V will be applied.

*2 While the Q61LD itself can operate up to the input level of about 2.309mV/V, the load cell may be damaged because the level of 1.2mV/V exceeds the corresponding load cell specification limit.

(a) Modified case 1

When Load cell rated output (Un\G52) shown in the example conditions is changed from 1.2mV/V to 2.0mV/V:

- Gross weight output value (Un\G100, Un\G101)
  Although the ZERO point and SPAN point will change, the output value of 0 to 3000 (maximum weighing capacity) for the load cell load of 600.0kg to 900.0kg is unchanged.
- Digital output value (Un\G102, Un\G103)
  In the previous example, Digital output value (Un\G102, Un\G103) was 10000 for the load cell output of 1.2mV/V, as Load cell rated output (Un\G52) was 1.2mV/V.
  When Load cell rated output (Un\G52) is changed to 2.0mV/V, Digital output value (Un\G102, Un\G103) will be 10000 for the input of 2.0mV/V.
  In either case, the accuracy is 0.01% for 2.0mV/V.



*1 Even if Load cell rated output (Un\G52) is changed from 1.2mV/V to 2.0mV/V, as it is still within the range of 1.1mV/V to 2.0mV, the instrumentation amplifier gain of 0 to 2.0mV/V will be applied.

*2 While the Q61LD itself can operate up to the input level of about 2.309mV/V, the load cell may be damaged because the level of 2.0mV/V exceeds the corresponding load cell specification limit.

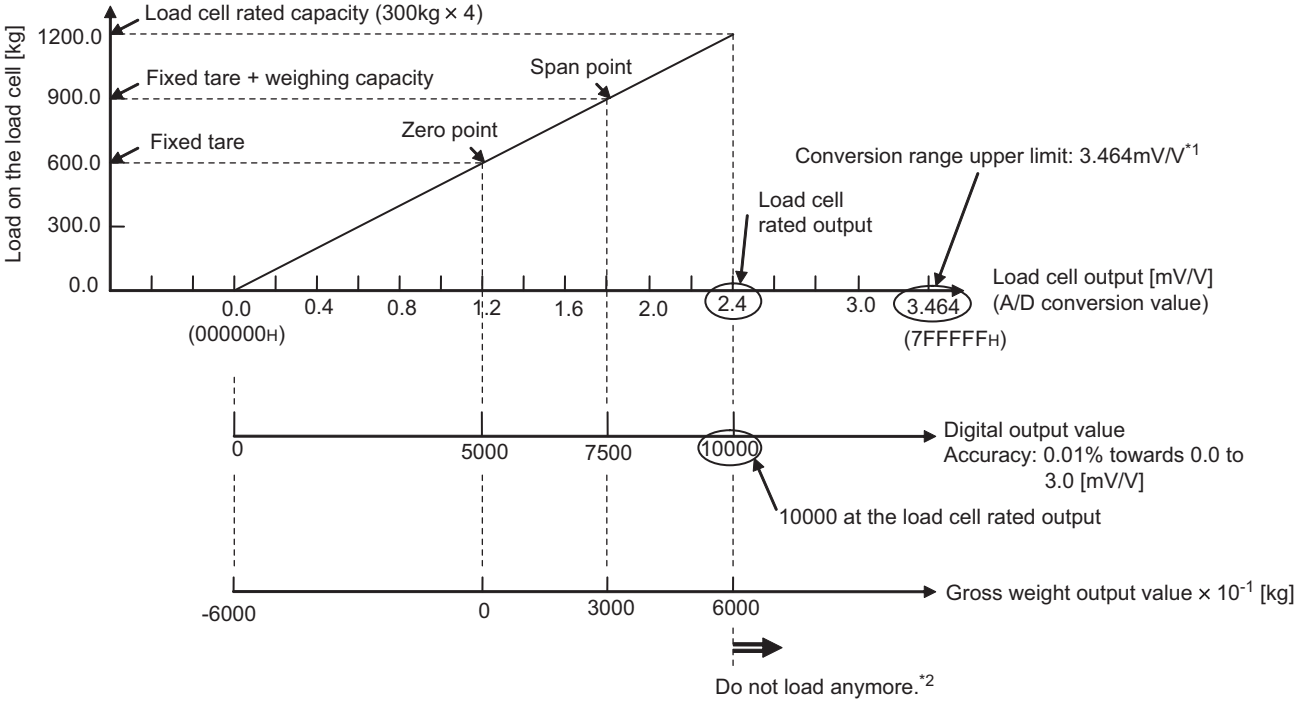
(b) Modified case 2

When Load cell rated output (Un\G52) shown in the example conditions is changed from 1.2mV/V to 2.4mV/V:

- Gross weight output value (Un\G100, Un\G101)
  Although the ZERO point and SPAN point will change, the output value of 0 to 3000 (maximum weighing capacity) for the load cell load of 600.0kg to 900.0kg is unchanged.
- Digital output value (Un\G102, Un\G103)
  In the previous example, Digital output value (Un\G102, Un\G103) was 10000 for the load cell output of 1.2mV/V, as Load cell rated output (Un\G52) was 1.2mV/V.
  When Load cell rated output (Un\G52) is changed to 2.4mV/V, Digital output value (Un\G102, Un\G103) will be 10000 for the input of 2.4mV/V.
  The accuracy is 0.01% for 3.0mV/V.

Point

When Load cell rated output (Un\G52) is changed from 1.2 mV/V to 2.4mV/V, the conversion range becomes different.
When Load cell rated output (Un\G52) is 2.4mV/V, the instrumentation amplifier gain must be capable of converting the load cell output of 0mV/V to 3.0mV/V.



*1 When Load cell rated output (Un\G52) is changed from 1.2mV/V to 2.4mV/V, as it is within the range of 2.1mV/V to 3.0mV/V, the instrumentation amplifier gain of 0 to 3.0mV/V will be applied.

*2 While the Q61LD itself can operate up to the input level of about 3.646mV/V, the load cell may be damaged because the level of 2.4mV/V exceeds the corresponding load cell specification limit.

4.3.2 When the tare zero offset function is used

This section describes the system operation when the tare zero offset function is used.
When using the tare zero offset function, set Tare zero offset output value (Un\G82, Un\G83) properly.

(1) Gross weight output value (Un\G100, Un\G101)

Gross weight output value (Un\G100, Un\G101) will be 0 at the input load of the two-point zero calibration (ZERO point) and will be the maximum weighing capacity value at the input load of the two-point span calibration (SPAN point).

For details on the two-point zero calibration and two-point span calibration, refer to ☞ Page 60, Section 4.8.

(2) Digital output value (Un\G102, Un\G103)

Do not use this value although it will change proportionally to the load. The accuracy is not guaranteed.

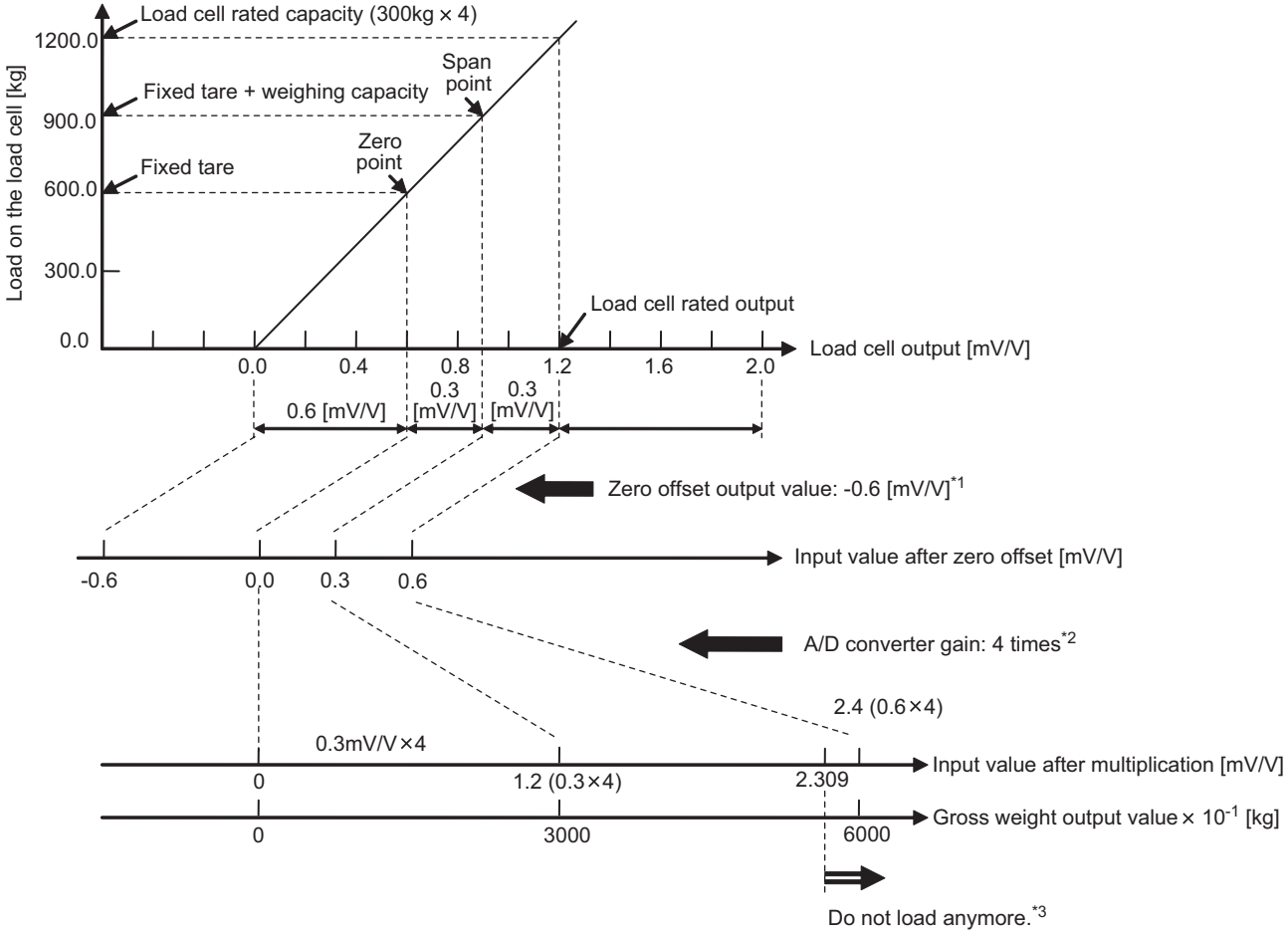
(3) Outline of Processing

Ex. This section describes the outline of the setting and processing when the weight of 300kg is measured using four load cells under the following conditions: (The fixed tare weight is assumed to be 600kg.)

- Rated capacity: 300kg
- Rated output: 1.2mV/V

Description	Address	Setting value
Load cell rated capacity	Un\G50, Un\G51	3000 (300.0kg)
Load cell rated output	Un\G52	12 (1.2mV/V)
Number of load cells in connection	Un\G53	4
Maximum weighing capacity setting	Un\G56, Un\G57	3000 (300.0kg)
Decimal point position	Un\G59	1_H ($\times 10^{-1}$)
Unit	Un\G60	1_H (kg)
Fixed tare weight	—	600.0kg

- Gross weight output value (Un\G100, Un\G101)
  For the load cell load of 600.0kg to 900.0kg, the output value of 0 to 3000 (maximum weighing capacity) will be produced.



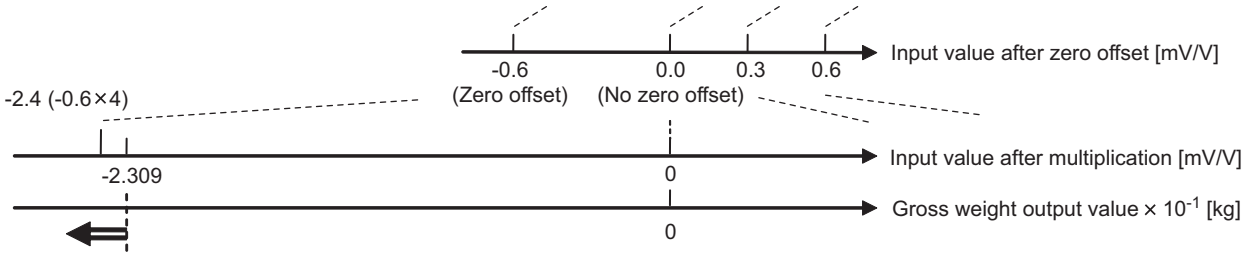
*1 As the fixed tare weight corresponds to 0.6mV/V, it is offset by -0.6mV/V by the tare zero offset output value.

*2 Since Load cell rated output (Un\G52) is 1.2mV/V while the load cell output from ZERO point to SPAN point is 0.3mV/V, the A/D converter gain of 4 times is the optimum value.

*3 Although the load cell can be loaded up to the level of 1.2mV/V output (corresponding to 2.4mV/V after amplification), a conversion over error may result since the conversion range of the Q61LD is limited to 2.3mV/V.

(a) When fixed tare is removed

When Tare zero offset (Un\G54) is used, removing the fixed tare may result in conversion over.
This is because the input voltage to the A/D converter becomes negative when the fixed tare is removed, as it has been offset by the amount of the fixed tare weight (the negative voltage is then amplified with A/D converter gain).

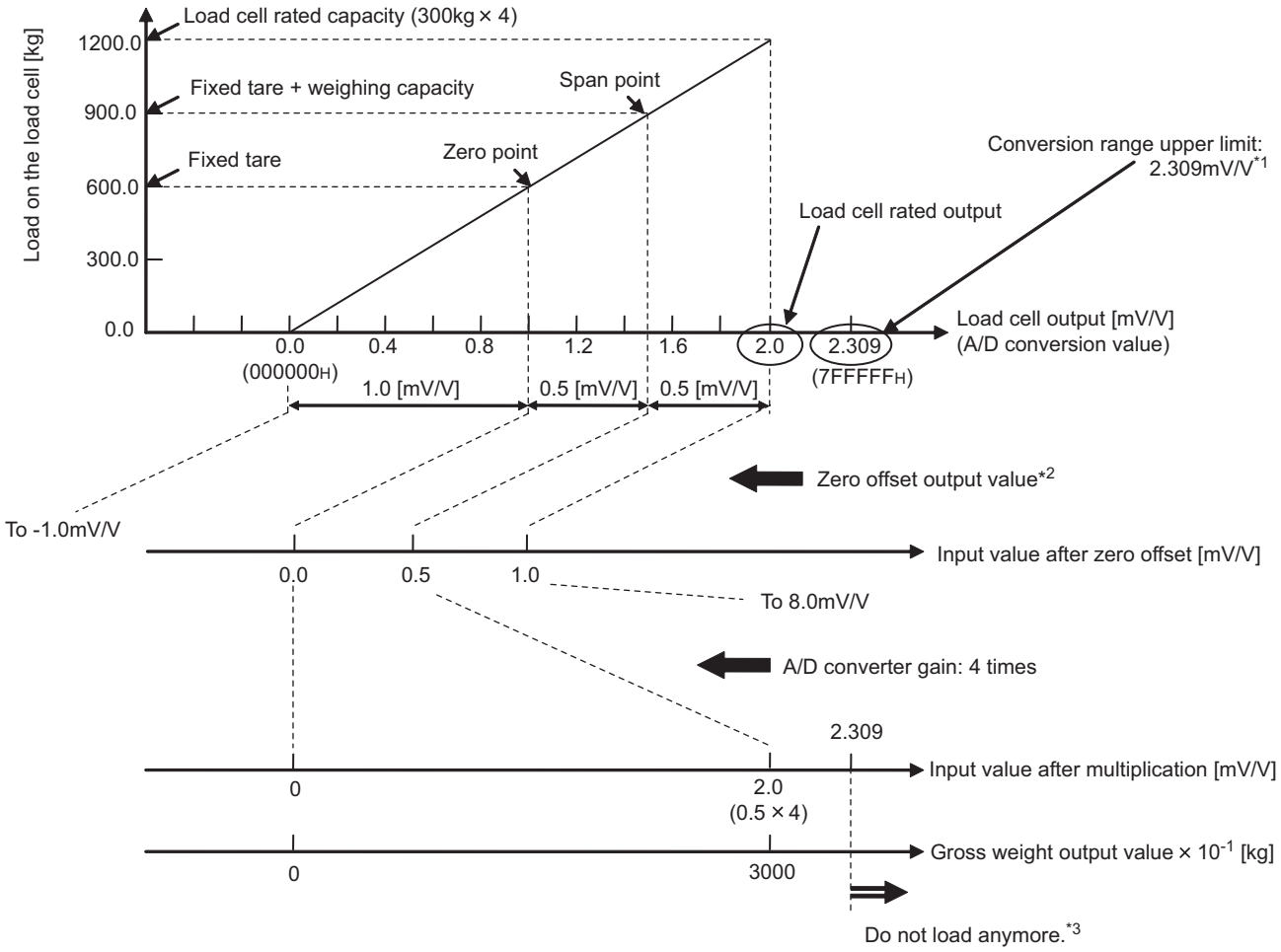


When the load on the load cell is completely eliminated by removing the fixed tare, the zero offset output value (-0.6mV/V) is multiplied by 4 in A/D converter gain. Although, the converter input value exceeds the conversion range on the minus side.

(b) Modified case 1

When Load cell rated output (Un\G52) shown in the example conditions is changed from 1.2mV/V to 2.0mV/V:

- The tare zero offset output value will increase.
  If Load cell rated output (Un\G52) increases without the conversion range change, the ZERO point will also increase.
  Accordingly, the tare zero offset output value will change from -0.6mV/V to 1.0mV/V.
- The A/D converter gain will be unchanged.
  Since the ratio of the maximum weighing capacity to Load cell rated capacity (Un\G50, Un\G51) is unchanged, the A/D converter gain of 4 times will remain unchanged.



*1 Even if Load cell rated output (Un\G52) is changed from 1.2mV/V to 2.0mV/V, as it is still within the range of 1mV/V to 2.0mV, the instrumentation amplifier gain of 0 to 2.0mV/V will be applied.

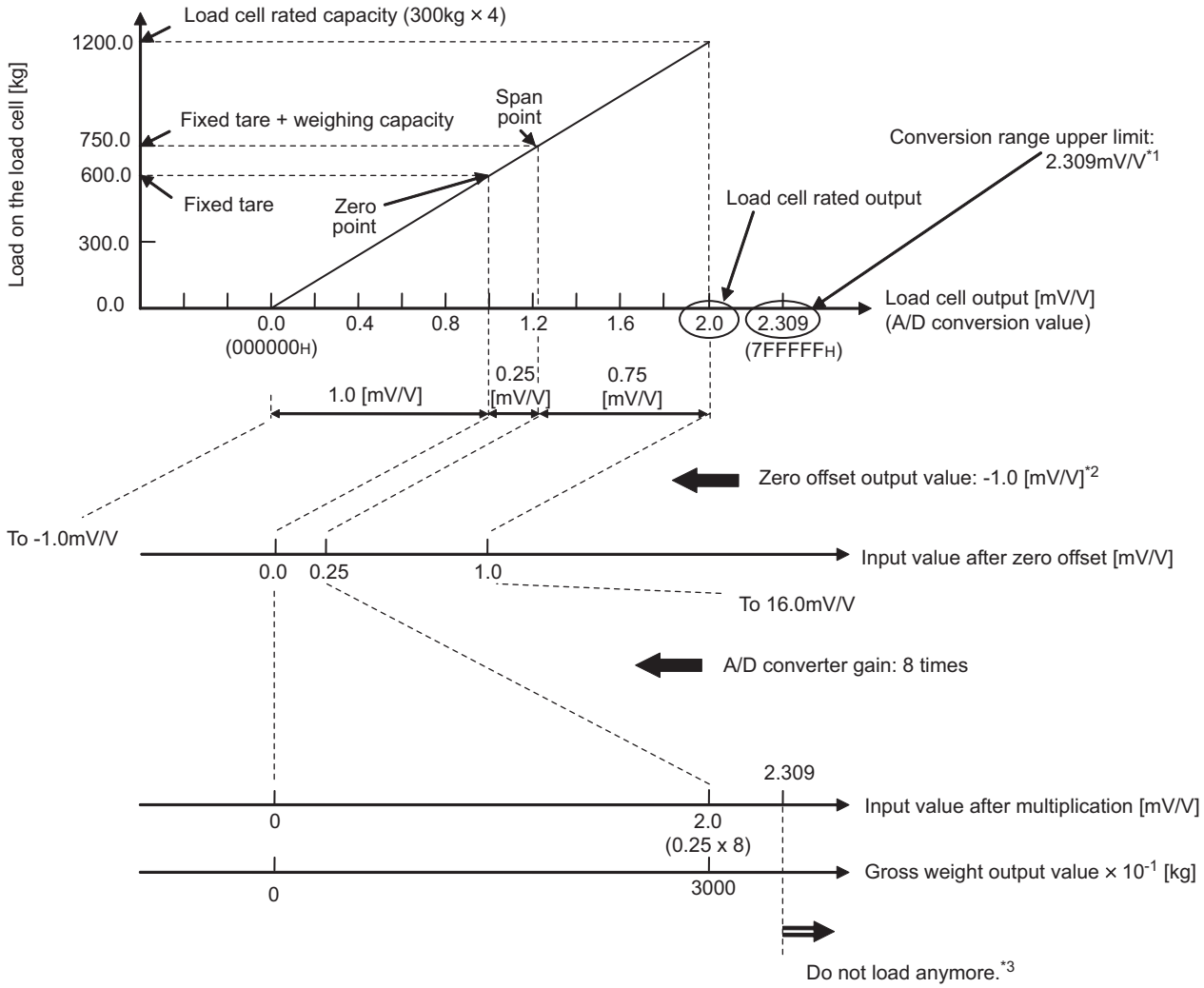
*2 As the fixed tare weight corresponds to 1.0mV/V, it is offset by -1.0mV/V by the tare zero offset output value.

*3 Although the load cell can be loaded up to the level of 2.0mV/V output (corresponding to 8.0mV/V after amplification), a conversion over error may result since the conversion range of the Q61LD is limited to 2.309mV/V.

(c) Modified case 2

When Load cell rated output (Un\G52) is changed from 1.2mV/V to 2.0mV/V and Maximum weighing capacity setting (Un\G56, Un\G57) is changed from 3000 to 1500 in the example conditions:

- The tare zero offset output value is unchanged.
  The ZERO point is unchanged because only Maximum weighing capacity setting (Un\G56, Un\G57) has been changed.
  Accordingly, the tare zero offset output value is unchanged.
- The A/D converter gain will be increased.
  As Maximum weighing capacity setting (Un\G56, Un\G57) has been halved, the usable range of the weighing machine corresponding to Load cell rated output (Un\G52) will also be halved.
  Because of this, the optimal A/D converter gain is changed from 4 times to 8 times.



*1 Even if Load cell rated output (Un\G52) is changed from 1.2mV/V to 2.0mV/V, as it is still within the range of 1mV/V to 2mV/V, the instrumentation amplifier gain of 0 to 2.0mV/V will be applied.

*2 As the fixed tare weight corresponds to 1.0mV/V, it is offset by -1.0mV/V by the tare zero offset output value.

*3 Although the load cell can be loaded up to the level of 2.0mV/V output (corresponding to 16.0mV/V after amplification), a conversion over error may result since the conversion range of the Q61LD is limited to 2.309mV/V.

4.4 Conversion Enable/Disable Function

This function is used for the setting to enable or disable the conversion.

(1) Setting method

Set "Conversion enable/disable" to "0: Enable".

Project window ⇨ [Intelligent Function Module] ⇨ Module name

4.5 Setting Load Cell Specifications

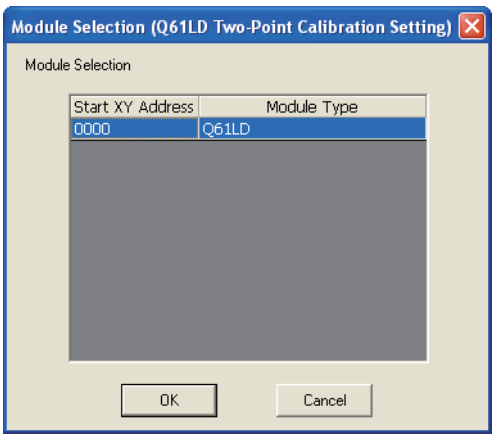
Set Load cell rated capacity (Un\G50, Un\G51), Load cell rated output (Un\G52), and Number of load cells in connection (Un\G53) to be used for the weighing machine.

Ex. When setting under the following conditions:

- Load cell rated capacity (Un\G50, Un\G51): 250kg
- Load cell rated output (Un\G52): 2.0mV/V
- Number of load cells in connection (Un\G53): 4
- Decimal point position (Un\G59): 10^{-2}
- Unit (Un\G60): 1kg

(1) Setting method

Use the "Scale Initial Setting" window for the setting.



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(Continued to the next page)

1. **Select the module to use the tare zero offset function and click the OK button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

(Continued)

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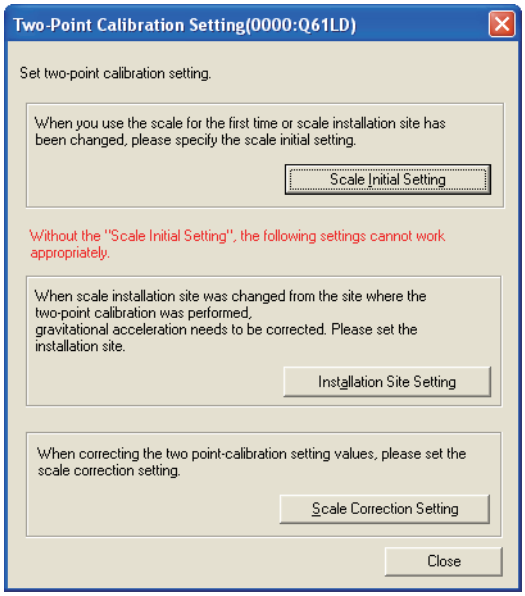

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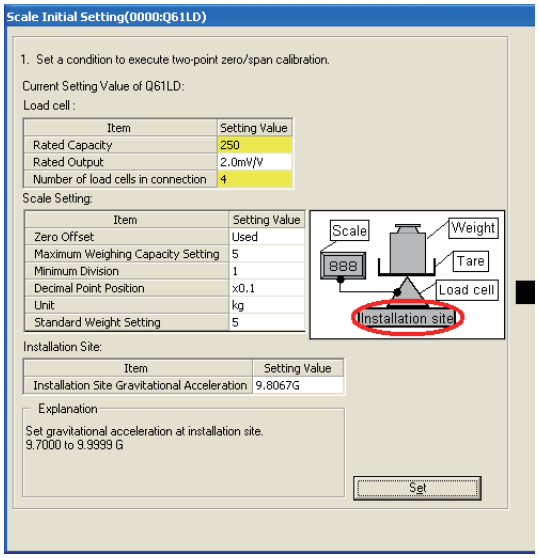
2. Click the Scale Initial Setting button.



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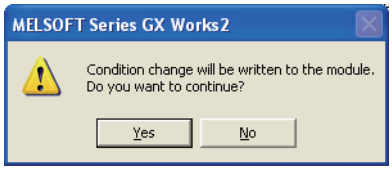
3. Set "Rated Capacity" to 250, "Rated Output" to 2.0mV/V, and "Number of load cells in connection" to 4.

4. Click the Set button.

↓



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5. Click the Yes button.

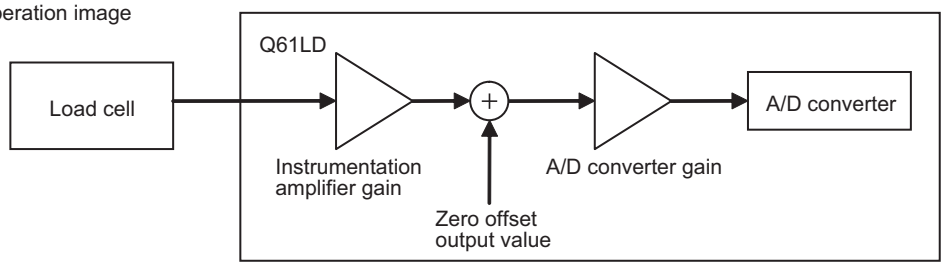
↓

6. The setting is complete.

4.6 Tare Zero Offset Function

This function expands the usable range of the load cell to effectively utilize the input range of the A/D converter.
The usable range refers to the load cell output range from "no load" to "the maximum weighing capacity" as a weighing machine with fixed tare.
The load cell output corresponding to the fixed tare weight is offset by the fixed tare output value stored in the Q61LD.
Also, Instrumentation amplifier gain setting (Un\G80) and A/D converter gain setting (Un\G81) are automatically adjusted to their optimum values, on condition that the load cell output at the maximum weighing capacity does not exceed about 86.6% of the conversion input range to the A/D converter.

Operation image



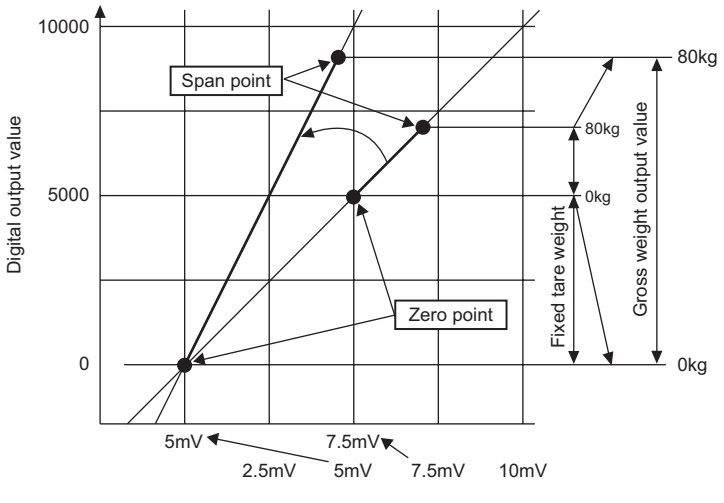
While a load cell of which rated output is 3.0mV/V or less may be connected to the Q61LD, the input range available for conversion (with no conversion over error) depends on the combination of Instrumentation amplifier gain setting (Un\G80) and A/D converter gain setting (Un\G81).

Point

- When using the tare zero offset function, do not use Digital output value (Un\G102, Un\G103). The accuracy is not guaranteed.
- When using the tare zero offset function, set Tare zero offset output value (Un\G82, Un\G83) properly. (☞ Page 52, Section 4.6 (1))

Ex. When setting under the following conditions:

- Load cell rated capacity (Un\G50, Un\G51): 100kg
- Load cell rated output (Un\G52): 2.0mV/V
- Number of load cells in connection (Un\G53): 4
- Maximum weighing capacity setting (Un\G56, Un\G57): 80kg
- Fixed tare weight: 200kg



(1) Setting method

The setting may be either automatically performed at the time of two-point zero calibration or manually performed by the user through manual calculation of the setting values. (Normally, automatic setting is convenient.)

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)

Point

- The following parameters are used to set A/D converter gain setting (Un\G81) and Tare zero offset output value (Un\G82, Un\G83):
  - Load cell rated capacity (Un\G50, Un\G51)
  - Load cell rated output (Un\G52)
  - Number of load cells in connection (Un\G53)
  - Maximum weighing capacity setting (Un\G56, Un\G57)

(2) When using automatic setting

If Two-point calibration method setting (Un\G41) is set to Automatic setting (0), the following three parameters are set automatically upon two-point zero calibration. (☞ Page 61, Section 4.8.2)

If automatic setting has been made, the parameters cannot be changed by Two-point calibration setting request (Y7).

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)

(a) Parameter adjustment in automatic setting

The automatic setting will be performed in such a way that the calculation result of the following equation is larger than 0.5 and equal to or less than 1.

$$1 \geq \frac{\text{Maximum weighing capacity setting} \times \text{Rated output [mV/V]} \times \text{A/D converter gain setting}}{\text{Rated capacities} \times \text{Connection numbers} \times \text{Instrumentation amplifier gain setting}}$$

If operating conditions different from the actual ones are set, the A/D converter gain setting (Un\G81) will not automatically be set to a proper value. Depending on the conditions set, Input signal error detection flag (Un\G114. b3) will result in Conversion over (1).

(b) How to calculate the tare zero offset output value

When the two-point zero calibration is performed, Tare zero offset output value (Un\G82, Un\G83) will be automatically adjusted and registered in such a way that the analog input [mV] (load cell output) corresponding to the fixed tare weight [kg] is set to 0 [mV].

Tare zero offset output value (Un\G82, Un\G83) for the analog input (load cell output) [mV] that corresponds to the A/D converter output value of 8388607 can be set in the range of 0 to 65535. (Tare zero offset output value "0" corresponds to 0 [mV].)

The fixed tare weight [kg] offset by the tare zero offset function is calculated as follows:

$$\text{Fixed tare weight [kg]} = \frac{\text{Tare zero offset output value} \times 8388607}{\text{Two-point span calibration value} \times 65535} \times \text{Maximum weighing capacity setting value [kg]}$$

Point

- If Tare zero offset (Un\G54) is set to Not used (1), Tare zero offset output value (Un\G54) is always regarded as 0.
- When using the tare zero offset function, do not use Digital output value (Un\G102, Un\G103). The accuracy is not guaranteed. When using Digital output value (Un\G102, Un\G103), set Tare zero offset (Un\G54) to Not used (1).

(3) When setting is performed by the user

Set Two-point calibration method setting (Un\G41) to User setting (1) and perform the two-point calibration.

The setting value (☞ Page 52, Section 4.6 (1)) can be changed by Two-point calibration request (Y7).

For the setting procedures, refer to ☞ Page 61, Section 4.8.2.

(a) Instrumentation amplifier gain setting (Un\G80)

The optimum gain must be selected from the following three cases.

For details on Instrumentation amplifier gain setting (Un\G80), refer to ☞ Page 143, Section 6.2 (30).

No.	Load cell rated output (Un\G52) setting value	Optimum Instrumentation amplifier gain setting (Un\G80)	Conversion range	Corresponding A/D converter output value (Max: $7FFFFF_H$)
1)	0.3mV/V ≤ Rated output ≤ 1.0mV/V	Gain for converting the input of 0 to 1mV/V*1 (Setting value: 0)	-1.154 to 0 to 1.154 [mV/V]	800000_H to 0_H to $7FFFFF_H$
2)	1.0mV/V ≤ Rated output ≤ 2.0mV/V	Gain for converting the input of 0 to 2mV/V*1 (Setting value: 1)	-2.309 to 0 to 2.309 [mV/V]	
3)	2.0mV/V ≤ Rated output ≤ 3.0mV/V	Gain for converting the input of 0 to 3mV/V*1 (Setting value: 2)	-3.464 to 0 to 3.464 [mV/V]	

*1 Even if the rated output level is applied from the load cell to the module, about 13.4% or more margin can be provided against the upper limit of the conversion range.
When the rated output of the load cell is set to 2.0mV/V
This is the case 2) shown in the above table. Instrumentation amplifier gain setting (Un\G80) will be set to an adequate value to handle the input range of 0 to 2mV/V.
In this case, the upper limit of the A/D converter output value will be about 7266009 ($7FFFFF_H$ × 2.0/2.309); about 86.6% of the conversion range will be used.
Note that conversion over error will be presented when the A/D converter output value reaches the lower limit (800000_H) or upper limit ($7FFFFF_H$).

*2 For the conversion range upon using the fixed tare, refer to the operation of Gross weight output value (Un\G100, Un\G101) (☞ Page 39, Section 4.3).

(b) A/D converter gain setting (Un\G81)

Select the setting value from 1 (0_H), 2 (1_H), 4 (2_H), 8 (3_H), 16 (4_H), and 32 (5_H) times in such a way that the following equation is satisfied:

$$1 \geq \frac{\text{Maximum weighing capacity setting (Un\G56, Un\G57)}}{\text{Rated capacities (Un\50, Un\G51)} \times \text{Connection numbers (Un\G53)}} \times \text{A/D converter gain setting (Un\G81)} \geq 0.5$$

For details on A/D converter gain setting (Un\G81), refer to ☞ Page 144, Section 6.2 (31).

Ex. When setting under the following conditions:

- Load cell rated capacity (Un\G50, Un\G51): 3000 (300.0kg)
- Number of load cells in connection (Un\G53): 4
- Maximum weighing capacity setting (Un\G56, Un\G57): 2000 (200.0kg)

Select the highest possible A/D converter gain setting (Un\G81) on condition that the following conditions are satisfied:

$$1 \geq \frac{200}{300 \times 4} \times \text{A/D converter gain setting (Un\G81)} \geq 0.5$$

In this case, due to the relationship of 1 ≥ 0.166 × A/D converter gain setting (Un\G81) ≥ 0.5, the resulting A/D converter gain setting (Un\G81) will be 4 times.

(c) Tare zero offset output value (Un\G82, Un\G83)

Calculate the optimum value based on the following setting.

For details on Tare zero offset output value (Un\G82, Un\G83), refer to ☞ Page 145, Section 6.2 (32).

- Set A/D converter gain setting (Un\G81) to ×1 (0_H).
- Set Tare zero offset output value (Un\G82, Un\G83) to 0.
- Digital output value (Un\G102, Un\G103) including the actual fixed tare load

$$\text{Zero offset output value (Un\G82, Un\G83)} = \frac{\text{Digital output value (Un\G102, Un\G103) due to the fixed tare}}{11547^{*1}} \times \frac{\text{Rated output (Un\G52)}}{\text{Maximum input mV/V when Instrumentation amplifier gain setting (Un\G80) is set}^{*2}} \times 65535$$

*1 This is the calculated digital output value corresponding to the upper limit of the conversion range. The actual digital output value will be clamped at 10751.

*2 Substitute 1.0mV/V, 2.0mV/V, or 3.0mV/V for the setting value of 0_H, 1_H, or 2_H, respectively.

Ex. When Load cell rated output (Un\G50, Un\G51) is set to 1.2mV/V and the system is loaded with the fixed tare, and if Digital output value (Un\G102, Un\G103) is 5213:

5213/11547 × 1.2/2.0 × 65535 = 17752

Accordingly, set Tare zero offset output value (Un\G82, Un\G83) to 17752.

(d) Setting range of the parameters related to two-point calibration

Set so that the conversion range is not exceeded when the input voltage is multiplied by Instrumentation amplifier gain setting (Un\G80) and A/D converter gain setting (Un\G81) values. The equation is as follows:

$$1 \geq \frac{\text{Maximum weighing capacity setting (Un\G56, Un\G57)}}{\text{Rated capacities (U\G50, Un\G51)} \times \text{Connection numbers (Un\G53)}} \times \frac{\text{Rated output (Un\G52)}}{\text{Instrumentation amplifier gain setting (Un\G80)}^{*1}} \times \text{A/D converter gain setting (Un\G81)} \geq 0.5$$

1: The rate against the load cell rated output

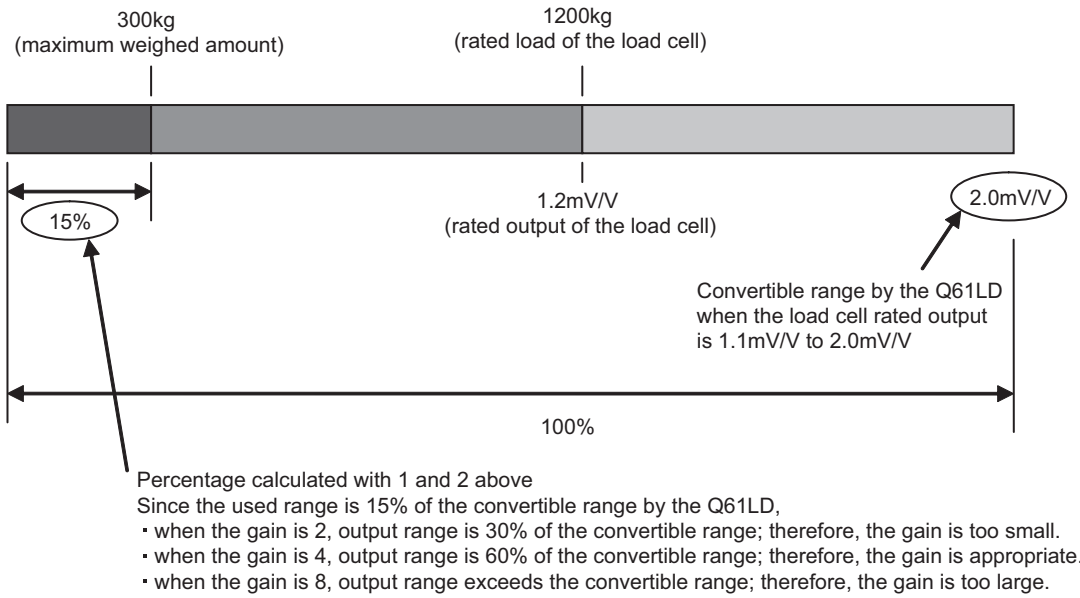
2: The rate of the convertible range which corresponds to the load cell rated output

3: Select a gain value from 1,2,4,8,16, and 32

Ex. When setting under the following conditions:

- Load cell rated capacity (Un\G50, Un\G51): 3000 (300.0kg)
- Number of load cells in connection (Un\G53): 4
- Maximum weighing capacity setting (Un\G56, Un\G57): 3000 (300.0kg)

1. **As Maximum weighing capacity setting (Un\G56, Un\G57) is 300.0kg and Load cell rated capacity (Un\G50, Un\G51) is 300.0kg × 4 = 1200.0kg, the maximum weighing capacity corresponds to 25% of Load cell rated output (Un\G52).**
2. **As Load cell rated output (Un\G52) is 1.2mV/V, Instrumentation amplifier gain setting (Un\G80) is set to a value suitable to the range of 0 to 2mV/V. Accordingly, 60% (1.2 / 2.0 = 0.6) of the conversion range available with the Q61LD is used.**
3. **From the relationship of 25% × 60% = 15%, the range to be used for weighing corresponds to 60% of the capacity of the Q61LD when four load cells are used in parallel (× 4), with the optimum A/D converter gain. (If it is multiplied by 8, it exceeds 100% of the capacity and conversion over error will be produced within the weighing range.)**



4.7 Gravitational Acceleration Correction Function

This function corrects weight errors due to any difference of gravitational acceleration that may be present if the weighing machine is to be calibrated at a site other than its installation site.
The setting is unnecessary if the calibration is to be performed at the installation site.

(1) Correction of gravitational acceleration

If the value of gravitational acceleration can be found for the target locations, the gravitational acceleration values at the two-point calibration site and at the actual installation site can be set to correct the error.
The setting range of gravitational acceleration is 9.7000 to 9.9999. The timing of gravitational acceleration setting in relation to the two-point calibration must be as follows:

- Before performing two-point calibration, set the gravitational acceleration value of the calibration target site to Installation site gravitational acceleration (Un\G64, Un\G65).
  When the two-point span calibration is performed, the value set in Installation site gravitational acceleration (Un\G64, Un\G65) is automatically stored in Calibration site gravitational acceleration (Un\G66, Un\G67).
- If the installation site of the scale is different from the calibration site, set Installation site gravitational acceleration (Un\G64, Un\G65) value after the two-point calibration has been completed.
- If two-point calibration is performed again after changing the site, the value set in Installation site gravitational acceleration (Un\G64, Un\G65) is automatically stored in Calibration site gravitational acceleration (Un\G66, Un\G67).

(2) Correction equation

The correction equation is as follows:

$$\begin{array}{c}\text{Gross weight output value}\\(\text{Un\G100,Un\G101})\end{array} = \begin{array}{c}\text{Gross weight}\\\text{before correction}\end{array} \times \begin{array}{c}\text{Calibration site gravitational acceleration}\\(\text{Un\G66,Un\G67})\end{array} \div \begin{array}{c}\text{Installation site gravitational acceleration}\\(\text{Un\G64,Un\G65})\end{array}$$

Ex. When two-point calibration is performed at Location A (9.789m/s^2) and the scale is to be used at Location B (9.805m/s^2)
If the object weighs 1000.0kg at Location A and weighed again at Location B, the gross weight output value will change as follows because the gravitational acceleration is higher at Location B:

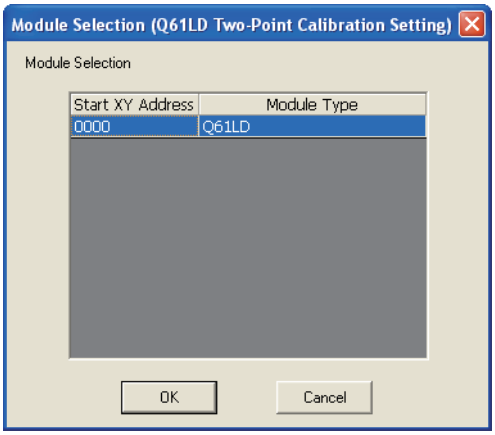
Gross weight output value (Un\G100, Un\G101) = 1000.0 (kg) × 9.805 (m/s^2) × 9.798 (m/s^2) = 1000.7 (kg)

If Installation site gravitational acceleration (Un\G64, Un\G65) is set to 97980 and Calibration site gravitational acceleration (Un\G66, Un\G67) is set to 98050, the correction will be made as follows:

$$\begin{array}{c}\text{Gross weight output value}\\(\text{Un\G100, Un\G101})\end{array} = 1000.7\ (\text{kg}) \times 97980\ (\text{Location A}) \div 98050\ (\text{Location B}) = 1000.0\ (\text{kg})$$

(3) Setting method

Use the "Scale Initial Setting" window for the setting.



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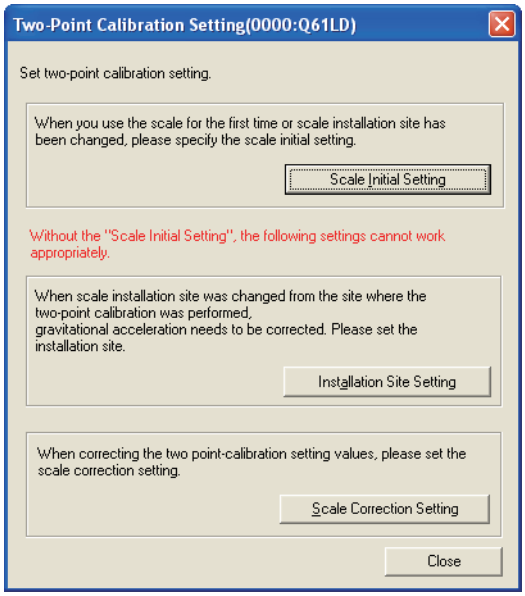

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1. **Select the module to use the gravitational acceleration correction function and click the** OK **button.**

[Tool] ➪ [Intelligent Function Module Tool] ➪ [Analog Module] ➪ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

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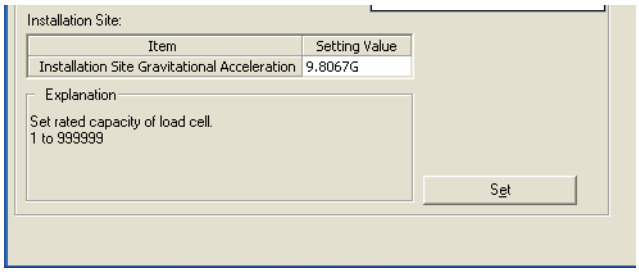

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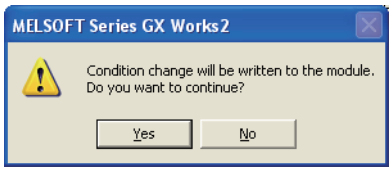

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3. **Set the value for "Installation Site Gravitational Acceleration" and click the [Set] button. The setting range of gravitational acceleration is 9.7000 to 9.9999.**

4. **Click the [Yes] button.**

5. **The setting is complete.**

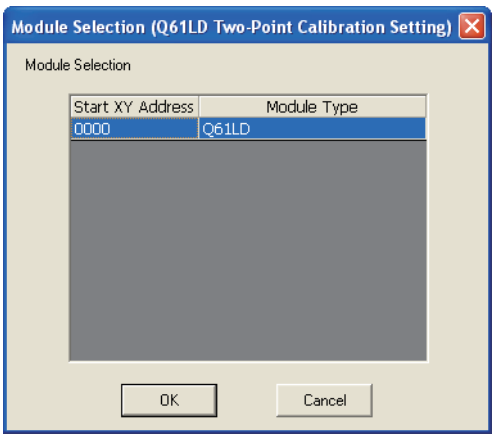
Point

- When two-point span calibration is performed, the installation site gravitational acceleration value is automatically registered as the calibration site gravitational acceleration value. For the procedures of two-point span calibration, refer to the following.
  - Two-point Calibration Function (☞ Page 60, Section 4.8)
- The correction equation in the module is as follows:

$$\text{Gross weight output value (Un\G100, Un\G101)} = \text{Gross weight value before correction} \times \frac{\text{Installation site gravitational acceleration}}{\text{Calibration site gravitational acceleration (Un\G66, Un\G67)}}$$

(4) When the installation site is changed

At the installation site of the weighing machine, set "Installation Site Gravitational Acceleration" again.



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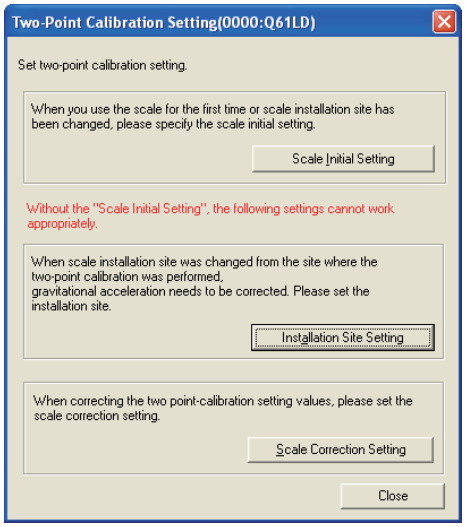

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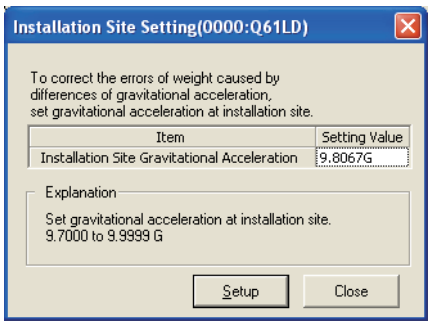

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1. **Select the module for which the installation site of the weighing machine has been changed and click the OK button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the Installation Site Setting button.**

3. **Set the value for "Installation Site Gravitational Acceleration" and click the Setup button. The setting range of gravitational acceleration is 9.7000 to 9.9999.**

4. **The setting for the installation site is complete.**

4.8 Two-point Calibration Function

This function performs necessary adjustments to work with the load cell to use the Q61LD as a weighing machine. For example, by placing an actual load (weight) of 250kg on the scale, the calibration work accurately adjusts Gross weight output value (Un\G100, Un\G101) to 250.00kg.
This adjustment is referred to as two-point calibration.

4.8.1 Precautions for two-point calibration

Precautions for performing two-point calibration are as follows:

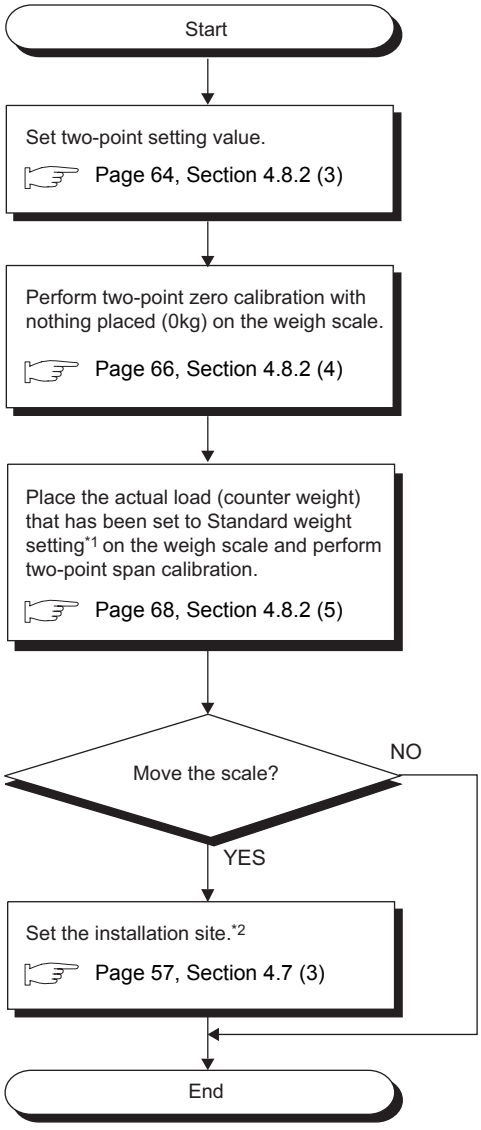
- Perform two-point calibration in the actual weighing machine configuration.
- Perform two-point zero calibration before performing two-point span calibration.
- Before performing two-point calibration, check the environment of the weighing machine.
  Check that no load is applied on the scale, such as an object making contact with the scale, electric wires, or air tubing.
- Before performing two-point calibration, power on and warm up the Q61LD system for at least 15 minutes.
- In case of a failure of the module, document the buffer memory data used for the two-point calibration.
- If any error is present when the two-point calibration has been completed, the two-point setting value and two-point calibration value are not saved in the non-volatile memory device (FeRAM) in the Q61LD. Perform two-point calibration again only after checking the error code and taking corrective actions.
- Even in the two-point calibration mode, the gross weight output value and digital output value are written to and saved in the respective buffer memory areas as in the case of the normal mode. However, the output value will not be converted to the correct gross weight output value until the two-point calibration is completed.

4.8.2 Setting method

The following flow charts shows the settings and procedures of two-point calibration.
If a sequence program is to be used for two-point calibration, refer to the following.

- Two-point Calibration when a Sequence Program is Used (☞ Page 252, Appendix 4)

(1) When two-point calibration is performed for the first time

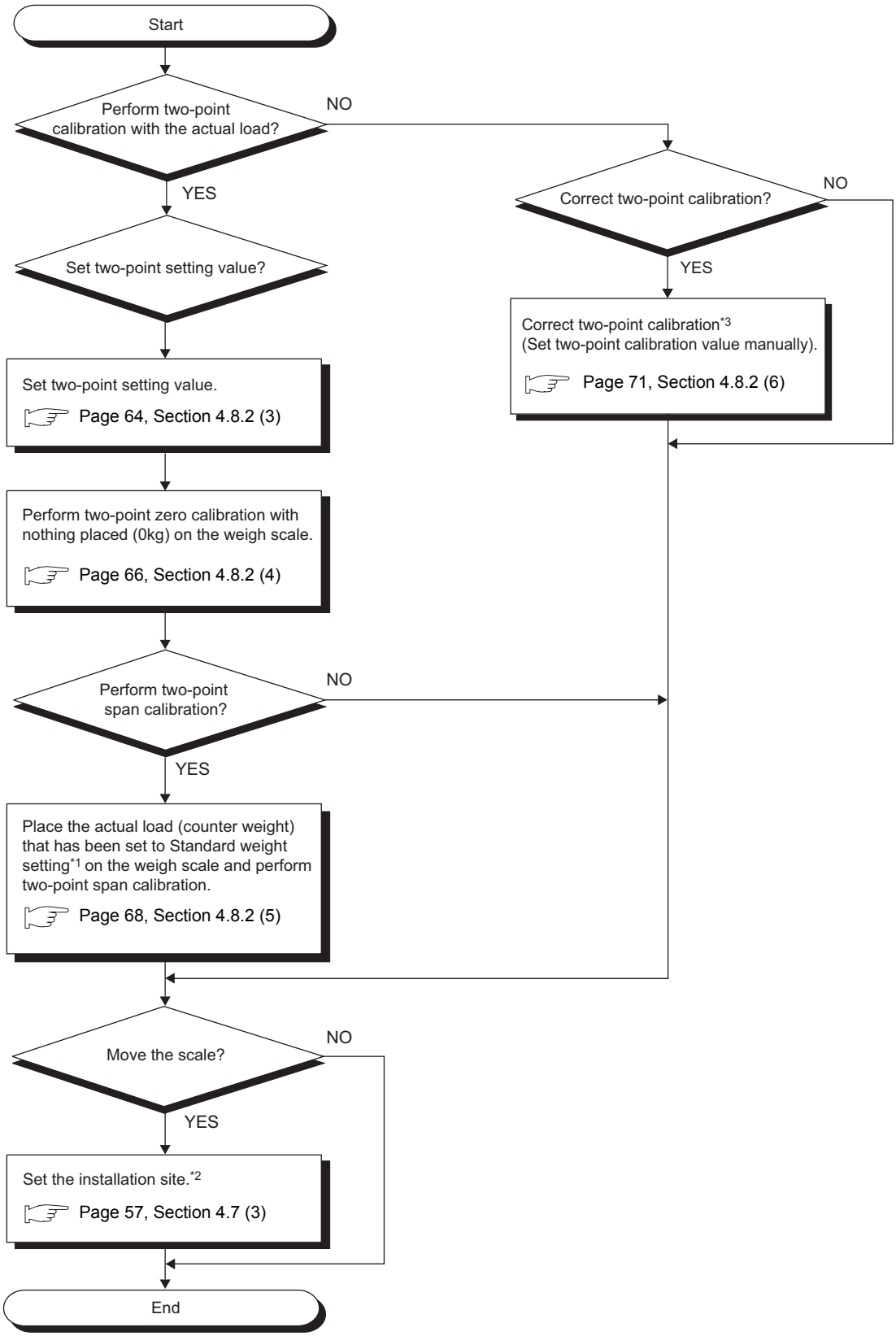


*1 When executing the two-point span calibration, set in advance the weight of the actual load (standard weight) to be placed.

*2 If the installation site of the weighing machine is different from the calibration site, set it again at the installation site. For details on the gravitational acceleration correction function, refer to the following.

- Gravitational Acceleration Correction Function (☞ Page 56, Section 4.7)

(2) When two-point calibration has been performed once



*1 When executing the two-point span calibration, set in advance the weight of the actual load (standard weight) to be placed.

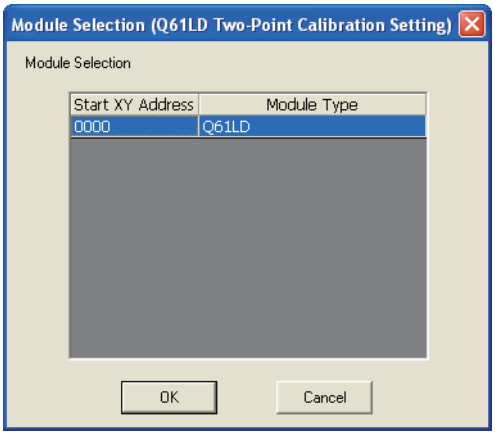
*2 If the installation site of the weighing machine is different from the calibration site, set it again at the installation site. For details on the gravitational acceleration correction function, refer to the following.

• Gravitational Acceleration Correction Function (☞ Page 56, Section 4.7)

*3 This procedure is used after any backup data of the two-point calibration value is reflected to the system or when any fine adjustment is required after two-point calibration has been done once.

(3) Scale Initial Setting

Configure the system according to the specifications of the weighing machine.
Use the "Scale Initial Setting" window for the setting.



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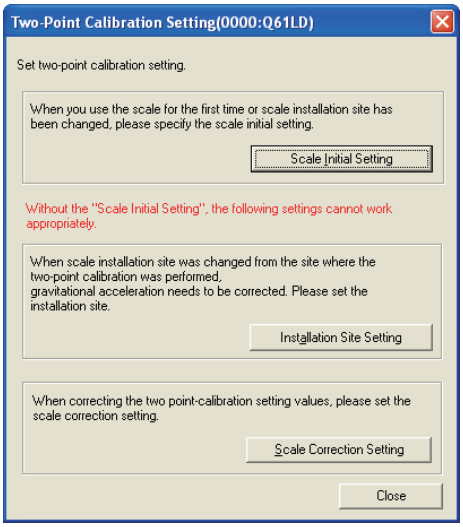

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

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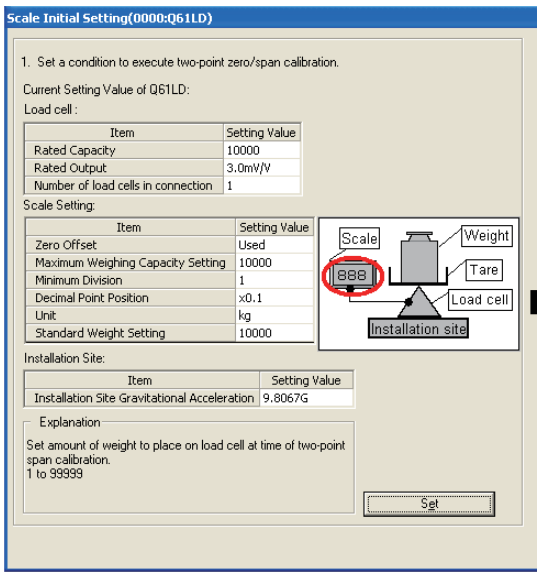

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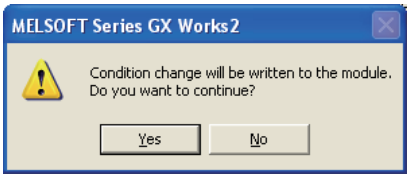

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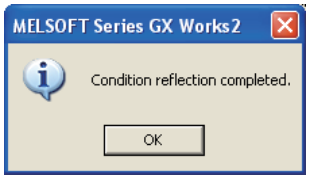


3. **Enter appropriate values in the initial setting items and click the Set button.**

4. **Click the Yes button.**

5. **The setting is complete.**

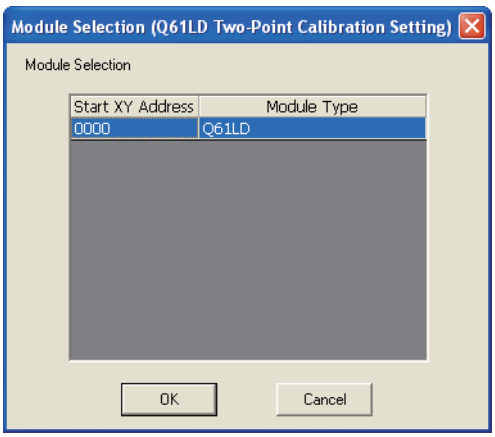
Item		Description	Setting value
Load cell	Rated Capacity	Set the load cell rated capacity.	1 to 999999
	Rated Output	Set the load cell rated output in 0.1mV/V increments.	0.3 to 3.0
	Number of load cells in connection	Set the number of load cells connected in parallel.	1 to 4
Scale Setting	Zero Offset	Set the tare zero offset function to Used or Not used.	• Used • Not used
	Maximum Weighing Capacity Setting	Set the rated capacity as a weighing machine.	1 to 99999
	Minimum Division	Set the minimum division of Gross weight output value (Un\G100, Un\G101).	• 1 • 2 • 5 • 10 • 20 • 50

Item		Description	Setting value
Scale Setting	Decimal Point Position	Set the decimal point position of Gross weight output value (Un\G100, Un\G101).	• 0 • × 0.1 • × 0.01 • × 0.001 • × 0.0001
	Unit	Set the unit of Gross weight output value (Un\G100, Un\G101).	• g • kg • t
	Standard Weight Setting*1	Set the weight value (mass) of the standard weight to be placed on the scale upon two-point span calibration.	1 to 99999
Installation Site	Installation Site Gravitational Acceleration	Set the gravitational acceleration at the installation site.	9.7000 to 9.9999

*1 Normally, the standard weight for performing the two-point calibration must be set to the same value as the maximum weighing capacity setting value.

(4) Two-point zero calibration

Use the "Scale Initial Setting" window for the setting.



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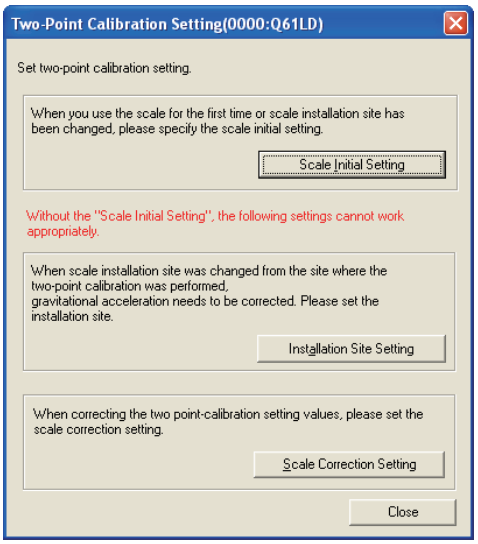

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

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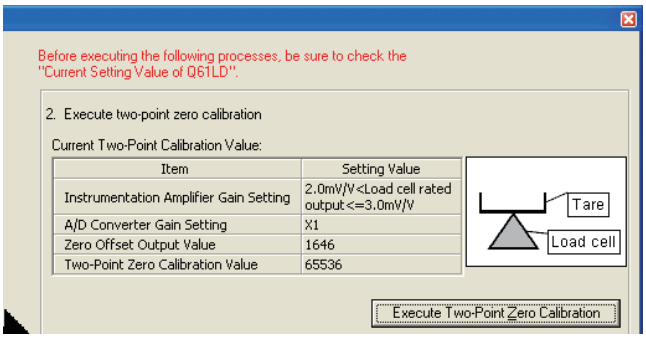

3. **With nothing placed on the weighing machine (0kg) except for the fixed tare, click the** Execute Two-Point Zero Calibration **button.**

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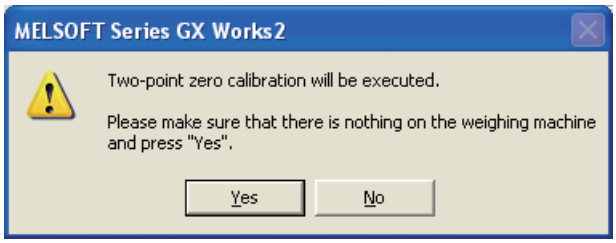

4. **Click the** Yes **button.**

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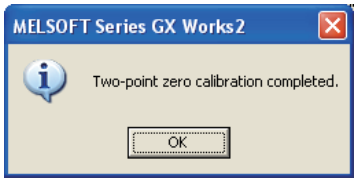


5. **The two-point zero calibration will be completed.**

6. **Once the two-point zero calibration has been completed, the zero point adjustment and zero tracking correction values are cleared to 0 and the following values are automatically set:**

- **"Instrumentation Amplifier Gain Setting"**
- **"A/D Converter Gain Setting"**
- **"Zero Offset Output Value"**
- **"Two-Point Zero Calibration Value"**

Point

With nothing placed on the weighing machine (with the fixed tare), keep the "0kg" state until the two-point zero calibration is completed.

(a) When setting "Zero Offset" to "Used" and performing the two-point zero calibration

Set the "Count average setting" and "Moving average setting" fields within the range of values specified below:

- When "Averaging processing method setting" is set to "0: Sampling Processing": There is no limit.
- When "Averaging processing method setting" is set to "2: Count Average":

  1000ms ≥ Count average setting × 10ms
- When "Averaging processing method setting" is set to "3: Moving Average":

  1000ms ≥ Moving average setting × 10ms
- When "Averaging processing method setting" is set to "5: Combination Use of Count Average and Moving Average":

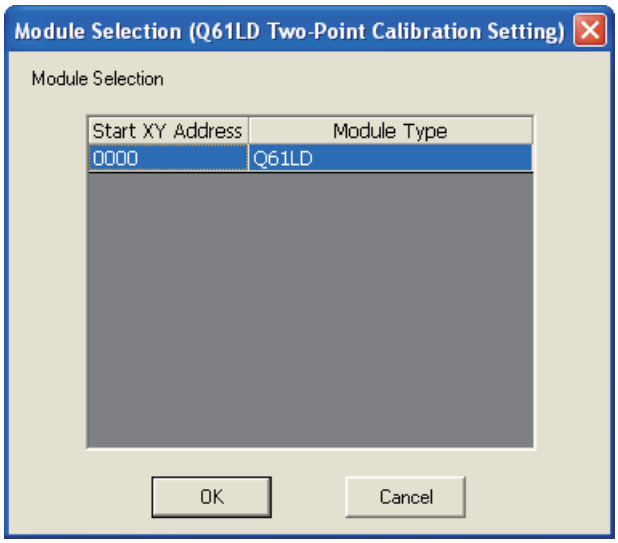
  1000ms ≥ Count average setting × Moving average setting × 10ms

(b) If the fixed tare weight has been changed

Only two-point zero calibration must be performed before using the machine again.
However, if the amount of fixed tare weight difference exceeds ±111% of Maximum weighing capacity setting (Un\G56, Un\G57), Input signal error detection flag (Un\G114. b3) may be set to "Conversion over (1)".
If two-point zero calibration is performed while the "Conversion over (1)" error is present, there may be a case that two or more two-point zero calibration operations are required for completing it normally.
After completing the two-point zero calibration operation, turn on and off Error clear request (YF). If Conversion over (1) error persists, perform the two-point zero calibration again.

(5) Two-point span calibration

Use the "Scale Initial Setting" window for the setting.



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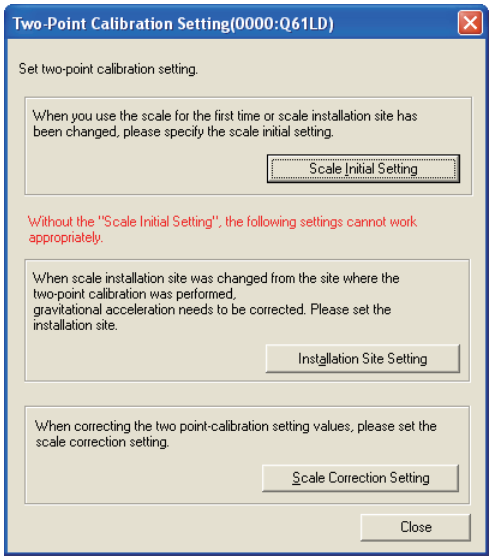

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

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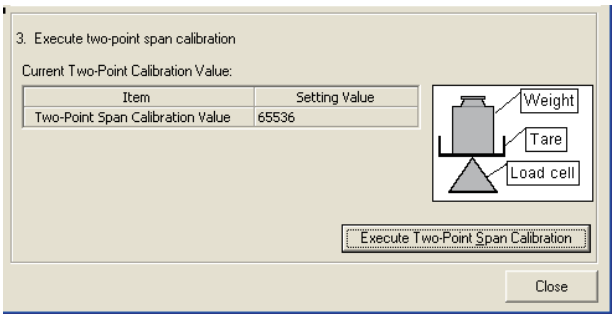

3. **Click the** Execute Two-Point Span Calibration **button.**

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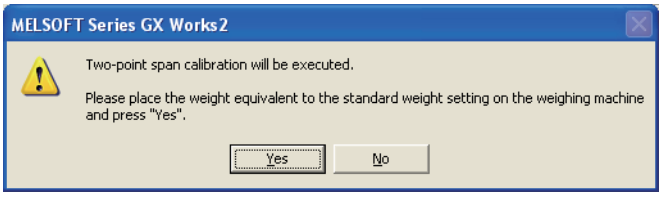

4. **Place a standard weight of which weight (mass) is the same as the standard weight setting on the weighing machine and click the** Yes **button.**

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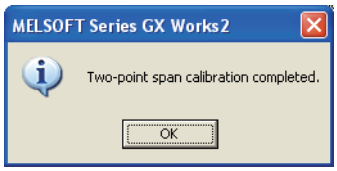


5. **The two-point span calibration is completed.**

6. **When two-point span calibration is completed, the following parameters are automatically set:**
- **"Calibration Site Gravitational Acceleration"**
- **"Two-Point Span Calibration Value"**

Point

Avoid any fluctuation of the actual load (standard weight) on the weighing machine until the two-point span calibration is fully completed.

(a) When the actual load (standard weight) is smaller than the maximum weighing capacity setting value

If the actual load (standard weight) is insufficient to provide the load corresponding to the maximum weighing capacity set for the system because of the structure of the scale or due to the unavailability of standard weights, the calibration may be performed using an actual load of which weight (mass) is less. In this case, perform the calibration according to the following procedures:

- For "Maximum Weighing Capacity Setting Value", set the maximum weight the scale can actually weigh.
- For "Standard Weight Setting," set the weight of the standard weight to be used upon calibration.

However, note that the accuracy will be degraded in proportion to the weight of the standard weight used for the calibration if it is smaller than the maximum weighing capacity setting value.

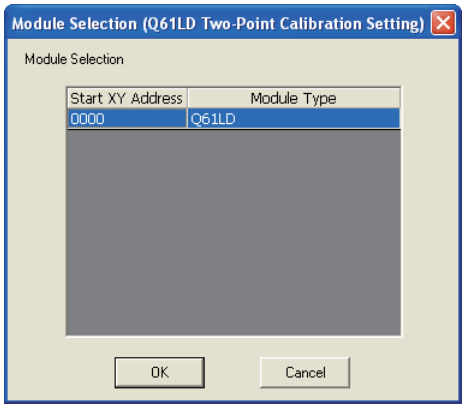
Ex. When the maximum weighing capacity of the weighing machine is 1000kg and the calibration weight of 600kg is used:

- "Maximum Weighing Capacity Setting": 1000
- "Standard Weight Setting": 600

By performing two-point span calibration with an actual load (standard weight) of 600kg on the weighing machine, the system can be used as a weighing machine of which the maximum weighing capacity is 1000kg.

(6) Scale correction setting

This section explains the procedures to correct the two-point calibration value.



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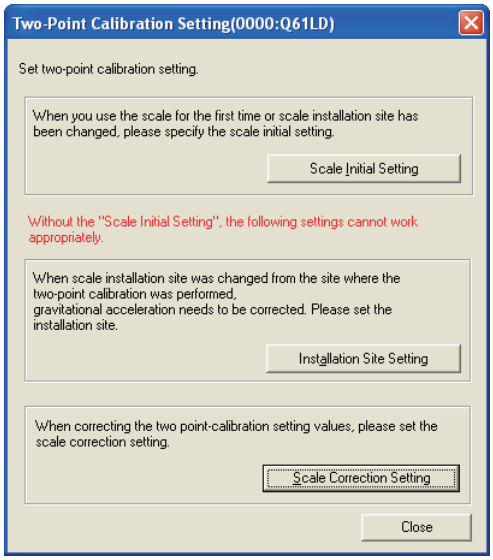

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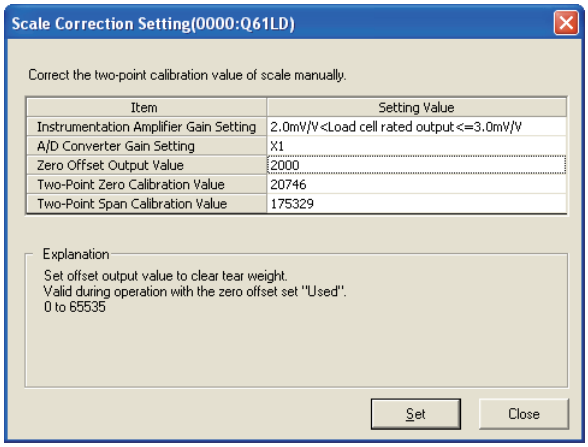

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1. **Select the module to apply correction and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Correction Setting **button.**

3. **Enter appropriate values in the items to be corrected and click the** Set **button.**

(Continued)

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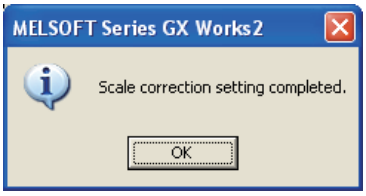


4. **The scale correction setting will be completed.**

Item	Description	Setting value
Instrumentation Amplifier Gain Setting	Set the gain optimum to the rated output setting of the load cell.	• 0.3mV/V ≤ Load cell rated output ≤ 1.0mV/V • 1.0mV/V < Load cell rated output ≤ 2.0mV/V • 2.0mV/V < Load cell rated output ≤ 3.0mV/V
A/D Converter Gain Setting	Set the A/D converter gain. This value is valid during operation if the tare zero offset function is set to "Used".	• × 1 • × 2 • × 4 • × 8 • × 16 • × 32
Zero Offset Output Value	Set the offset output value to cancel the fixed tare weight. This value is valid during operation if the tare zero offset function is set to "Used".	0 to 65535
Two-Point Zero Calibration Value	Set the two-point zero calibration value.	-8388608 to 8388607
Two-Point Span Calibration Value	Set the two-point span calibration value.	1 to 8388607

4.8.3 Calculation of gross weight output value

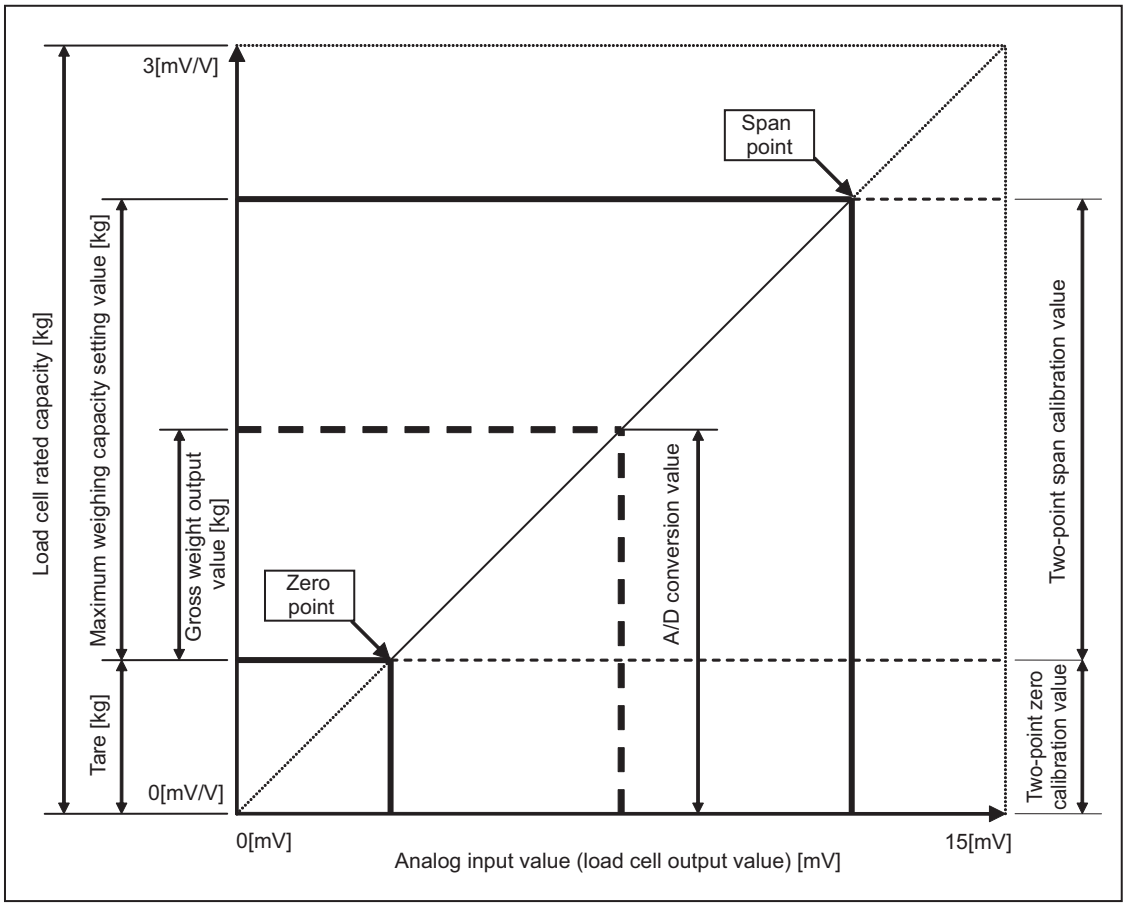
Based on the load cell rated output (analog input) and two-point calibration, the gross weight output value can be calculated by the following equation: Gross weight output value [mV] = Analog input [mV] – Fixed tare weight [mV]

The analog input (load cell output) [mV/V] refers to the load cell output (analog input) [mV] when 1[V] is applied to the load cell. Because the load cell voltage supplied from the Q61LD is 5[V], the following equation is satisfied: Analog input [mV] = Load cell output [mV/V] × 5 [V]

Also, the load cell rated output [mV/V] is the load cell output level when the load cell is loaded by the load cell rated capacity [kg].

Multiple load cells connected in parallel can be regarded as a single load cell of which rated capacity is n times the capacity of each cell, where n is the number of identical load cells connected in parallel.

$$\text{Analog input [mV]} = \frac{\text{Weight value [kg]}}{\text{Load cell rated capacity [kg]} \times \text{Number of load cells in connection}} \times \text{Load cell rated output [mV/V]} \times 5\ [\text{V}]$$



4.8.4 When calibration is performed without an actual load

When two-point calibration does not require accuracy, calibration can be performed without using an actual load. This type of calibration is useful for the level meter of the storage silo, torque meter, pressure gage, and others. This section describes how to perform such type of calibration.

When calibration with an actual load is not performed, configure the following settings.

- Set Tare zero offset (Un\G54) to Not used (1).
- Perform two-point zero calibration. (The two-point span calibration is not performed.)

For the setting by using a sequence program, refer to the following.

- When calibration is performed without an actual load (☞ Page 263, Appendix 4.3)

(1) When using Digital output value (Un\G102, Un\G103)

A value of 0 to 10000, which is converted from the signal of 0 [mV/V] to Load cell rated output (Un\G52), is stored as Digital output value (Un\G102, Un\G103).

When Digital output value (Un\G102, Un\G103) is used, set Tare zero offset (Un\G54) to Not used (1) and set Load cell rated output (Un\G52) to an adequate value for the load cell to be used.

Point

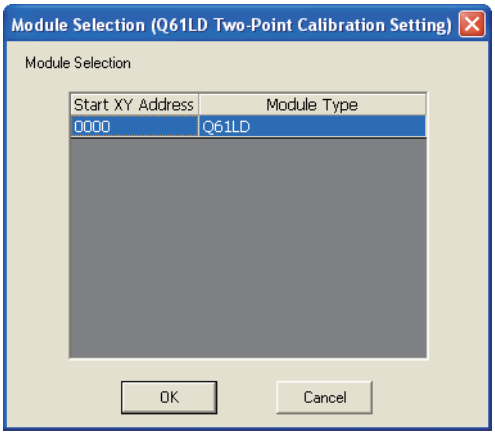
- Digital output value (Un\G102, Un\G103) cannot be used for some functions. The following functions cannot be used:
  - Stable status
  - Center point (1/4 scale) detection function
  - Warning output function
  - Zero set/reset function
  - Input signal error detection function*1

*1 Although Input signal error detection signal (XC) as well as Input signal error detection flag (Un\G114) will be operational, these are error flags for the gross weight output value except for Input signal error detection function (Un\G114. b3). Ignore these signals when using Digital output value (Un\G102, Un\G103).

- Correction to Digital output value (Un\G102, Un\G103) can be made by setting the following buffer memory areas. For more details, refer to the Setting Data Details (☞ Page 126, Section 6.2).
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)

(a) Setting method

Use the "Scale Initial Setting" window for the setting.



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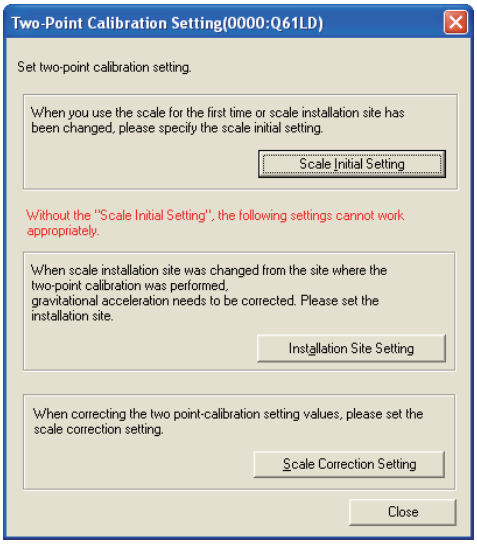

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

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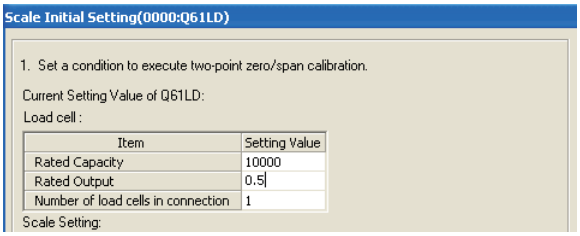

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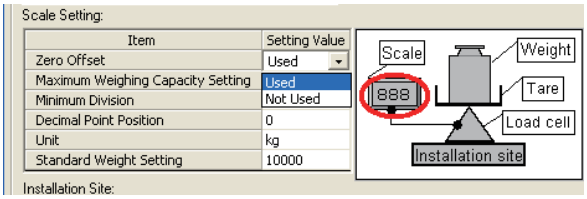

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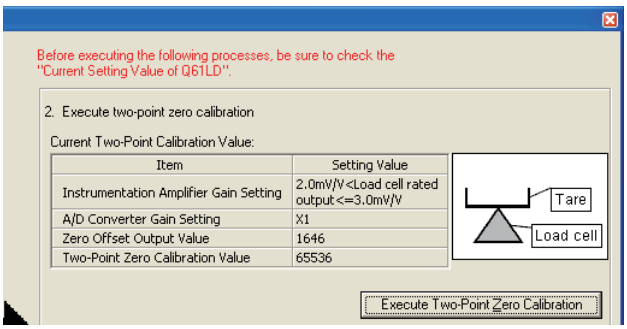

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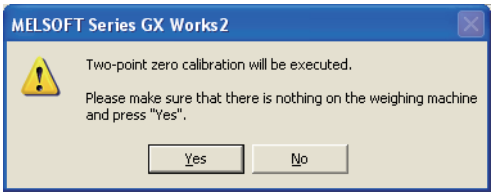

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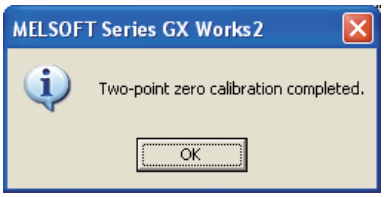


3. **Set the "Rated Output" value.**
The setting range of the rated output is 0.3 to 3.0.

4. **Set "Zero Offset" to "Not Used".**
Leave other parameters unchanged from the default values.

5. **With nothing placed on the weighing machine (0kg) except for the fixed tare, click the** Execute Two-Point Zero Calibration **button.**

6. **Click the** Yes **button.**

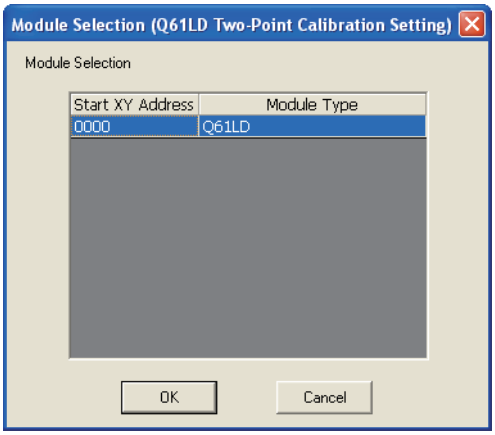
7. **The two-point zero calibration will be completed.**

Point

- With nothing placed on the weighing machine (with the fixed tare), keep the "0kg" state until the two-point zero calibration is completed.
- Set the specified load cell rated output of the load cell to be actually connected.
  Multiple load cells connected in parallel can be regarded as a single load cell of which rated capacity is n times the capacity of each cell, where n is the number of identical load cells connected in parallel.

(2) Setting to use Gross weight output value (Un\G100, Un\G101)

Use the "Scale Initial Setting" window for the setting.



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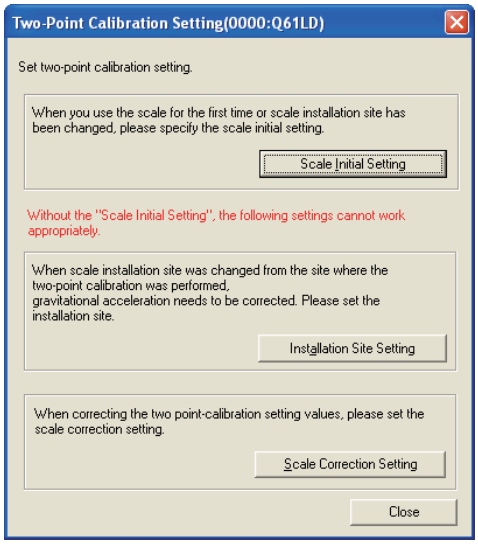

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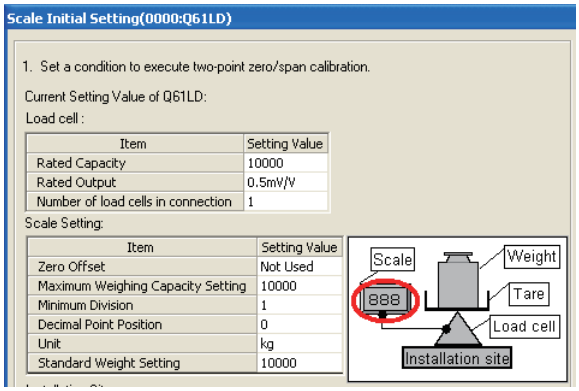

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

3. **Set the conditions to be used for two-point calibration.**
For the setting values, refer to Setting details (☞ Page 80, Section 4.8.4 (3)).

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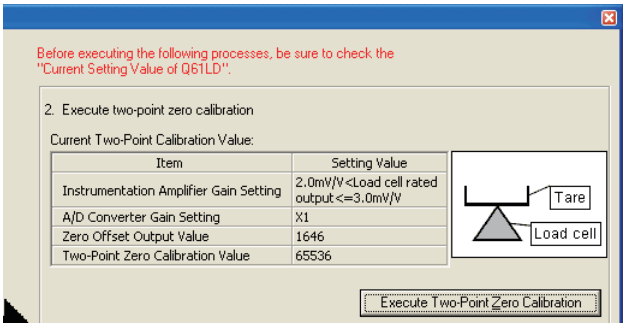

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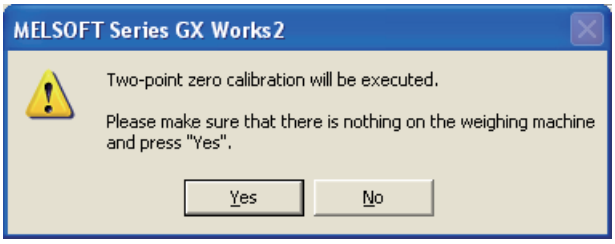

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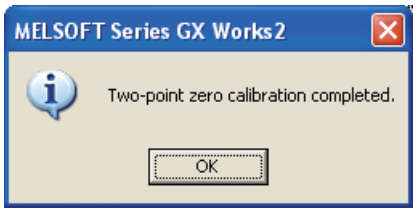

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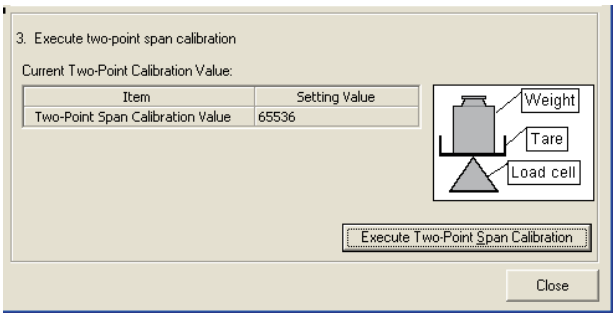

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4. **Perform two-point zero calibration.**

5. **With nothing placed on the weighing machine (0kg) except for the fixed tare, click the** Execute Two-Point Zero Calibration **button.**

6. **Click the** Yes **button.**

7. **The two-point zero calibration will be completed.**

8. **Perform two-point span calibration.**

9. **Enter the calculated value to "Two-Point Span Calibration Value". Refer to Calculating the two-point span calibration value (☞ Page 81, Section 4.8.4 (4)).**

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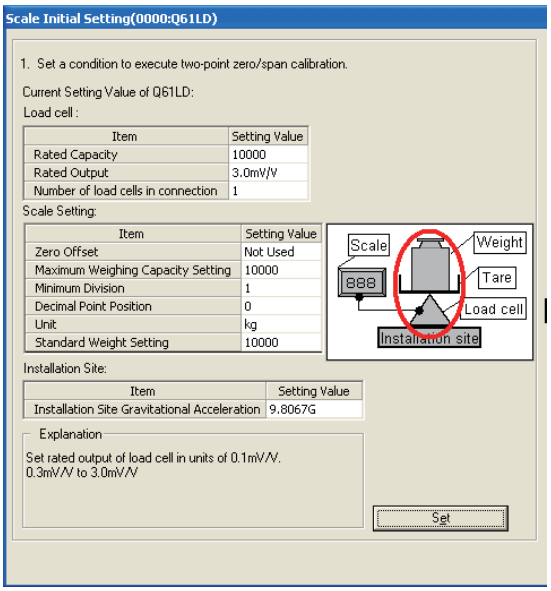

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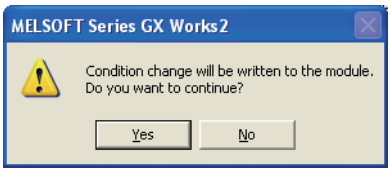
10. **Click the** Set **button.**



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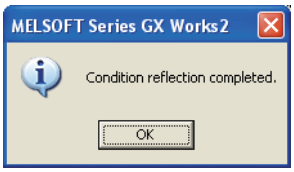
11. **Click the** Yes **button.**



12. **Reflection of the conditions have been completed.**

Point

- Perform two-point calibration in the actual weighing machine configuration.
- As two-point span calibration has not been done, automatic setting of Calibration site gravitational acceleration (Un\G66, Un\G67) will not be made.
  Leave the values of Installation site gravitational acceleration (Un\G64, Un\G65) and Calibration site gravitational acceleration (Un\G66, Un\G67) unchanged from their default values.
- Satisfy the following conditions:

$$1 \geq \frac{\text{Maximum weighing capacity setting} \times \text{Rated output [mV/V]} \times \text{A/D converter gain setting}^{*1}}{\text{Rated capacities} \times \text{Connection numbers} \times \text{Instrumentation amplifier gain setting}^{*2}}$$

- Otherwise, the following status will result:
  - An error will be registered in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.

*1 Set A/D converter gain setting (Un\G81) to 1, 2, 4, 8, 16, or 32 (times).

*2 Set Instrumentation amplifier gain setting (Un\G80) to 1.0mV/V, 2.0mV/V, or 3.0mV/V.

(3) Setting details

The following table shows the setting details for two-point calibration.

Item		Description	Setting value
Load cell	Rated Capacity	Set the load cell rated capacity.	1 to 999999
	Rated Output	Set the load cell rated output in 0.1mV/V increments.	0.3 to 3.0
	Number of load cells in connection	Set the number of load cells connected in parallel.	1 to 4
Scale Setting	Zero Offset	Set the tare zero offset function to "Not Used".	Not Used
	Maximum Weighing Capacity Setting	Set the rated capacity as a weighing machine.	1 to 99999
	Minimum Division	Set the minimum division of Gross weight output value (Un\G100, Un\G101).	• 1 • 2 • 5 • 10 • 20 • 50
	Decimal Point Position	Set the decimal point position of Gross weight output value (Un\G100, Un\G101).	• 0 • × 0.1 • × 0.01 • × 0.001 • × 0.0001
	Unit	Set the unit of Gross weight output value (Un\G100, Un\G101).	• g • kg • t
	Standard Weight Setting*1	Set the weight value (mass) of the standard weight to be placed on the scale upon two-point span calibration.	Set the weight value (mass) of the standard weight to be placed on the scale upon two-point span calibration.

*1 Satisfy the following conditions:

$$\text{Standard weight setting} \leq \text{Maximum weighing capacity setting} \leq \text{Load cell rated capacity} \times \text{Number of load cells in connection}$$

If the above conditions are not satisfied, two-point span calibration will not be performed and the following status will result:

- An error will be registered in Latest error code (Un\G190).
- Error flag (XF) turns on.
- Conversion is performed with the settings before error occurrence.

(4) Calculating the two-point span calibration value

The formula is as follows:

$$\text{Two-point span calibration value} = \frac{\text{Maximum weighing capacity setting} \times \text{Load cell rated output [mV/V]} \times \text{Factory default span setting value}}{\text{Load cell rated capacity} \times \text{Number of load cells in connection} \times \text{Instrumentation amplifier gain setting [mV/V]}^{*1}}$$

*1 Set Instrumentation amplifier gain setting (Un\G80) to 1.0mV/V, 2.0mV/V, or 3.0mV/V.

Depending on the value set for Instrumentation amplifier gain setting (Un\G80), different buffer memory areas will be referenced.

Assign the appropriate value to the formula by referring to the following buffer memory addresses.

Value set for Instrumentation amplifier gain setting (Un\G80)	Buffer memory address to be referenced
0.3mV/V ≤ Load cell rated output ≤ 1.0mV/V	1.0mV/V span calibration value (Un\G1616, Un\G1617)
1.0mV/V < Load cell rated output ≤ 2.0mV/V	2.0mV/V span calibration value (Un\G1620, Un\G1621)
2.0mV/V < Load cell rated output ≤ 3.0mV/V	3.0mV/V span calibration value (Un\G1624, Un\G1625)

4.9 Weight Conversion Method

Weight conversion refers to the process to convert an analog signal (load cell output signal) from the outside of the programmable controller to Digital output value (Un\G102, Un\G103) and Gross weight output value (Un\G100, Un\G101) for storing into the buffer memory.
After the conversion is completed, Conversion completion signal (XE) turns on and Conversion completion flag (Un\G113) is set to Conversion completion (1).
The following four processing methods are available for weight conversion:

- Sampling processing
- Count average
- Moving average
- Combination use of count average and moving average

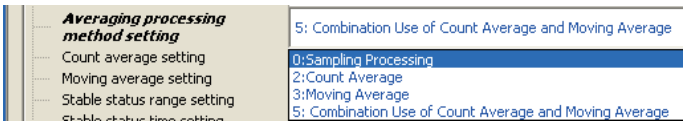
(1) Sampling processing

After the measurement, the resulting Digital output value (Un\G102, Un\G103) and Gross weight output value (Un\G100, Un\G101) are stored into the buffer memory.
The update cycle of measured values (sampling cycle) is 10ms.

(a) Setting method

Set "Averaging processing method setting" to "0: Sampling Processing".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



(2) Count average processing

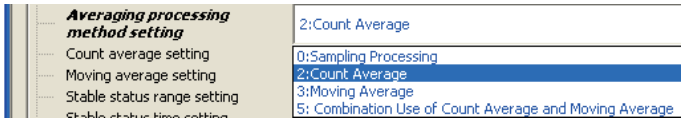
The sampling processing is executed for a predefined number of times and the resulting data is averaged after excluding the maximum and minimum values. Then, the averaged values are stored into the buffer memory. The processing time is calculated as follows:

Processing time = (Number of sampling × 10) ms

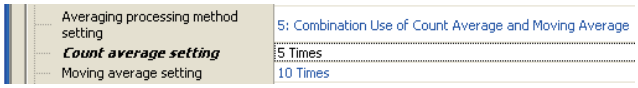
(a) Setting method

1. Set "Averaging processing method setting" to "2: Count Average".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



2. Set the value (number of times) for "Count average setting".

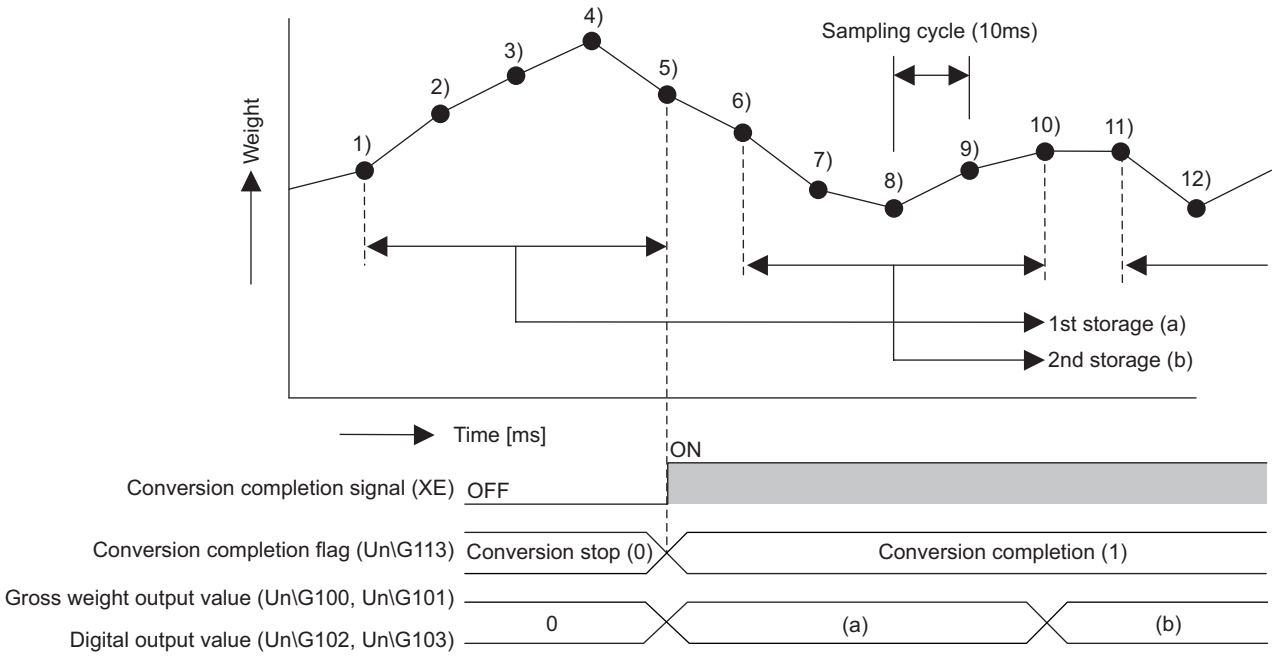


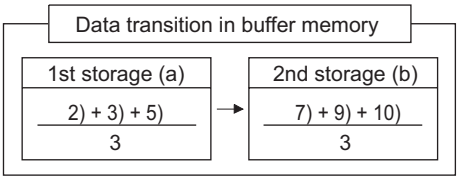
Item	Setting value
Count average setting	4 to 255

Ex. When "Count average setting" is set to 5 times:

5 × 10 = 50 (ms)

The average value will be output every 50ms.





(3) Moving average processing

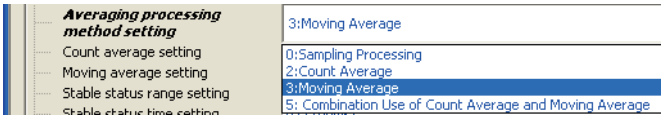
Each time the data is sampled, the resulting Digital output value (Un\G102, Un\G103) and Gross weight output value (Un\G100, Un\G101) are averaged over a predefined number of samples. Then, the averaged values are stored into the buffer memory.

As the moving average processing is performed for each sample, the latest Digital output value (Un\G102, Un\G103) and Gross weight output value (Un\G100, Un\G101) can be obtained.

(a) Setting method

1. Set "Averaging processing method setting" to "3: Moving Average".

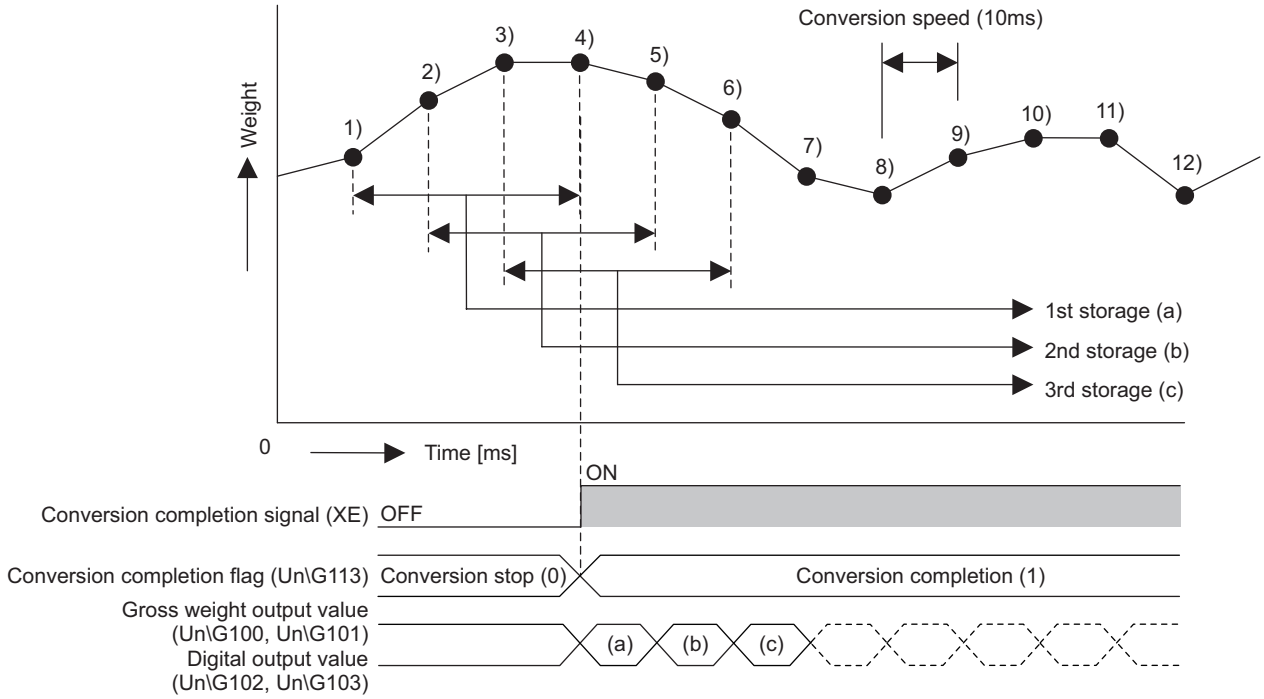
Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]

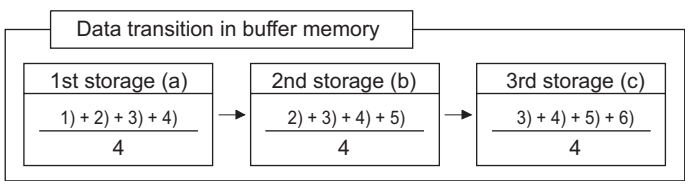


2. Set the value (the number of times) for "Moving average setting".

Item	Setting value
Moving average setting	2 to 255

Ex. When "Moving average setting" is set to 4 times:





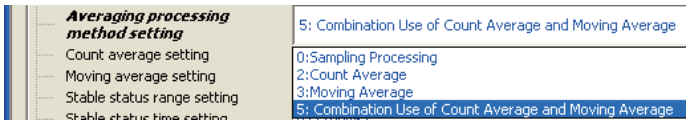
(4) Combination use of count average and moving average

The output values of the count average processing are moving average processed and stored into the buffer memory.

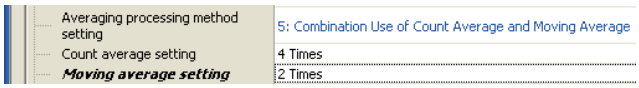
(a) Setting method

1. Set "Averaging processing method setting" to "5: Combination Use of Count Average and Moving Average".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]

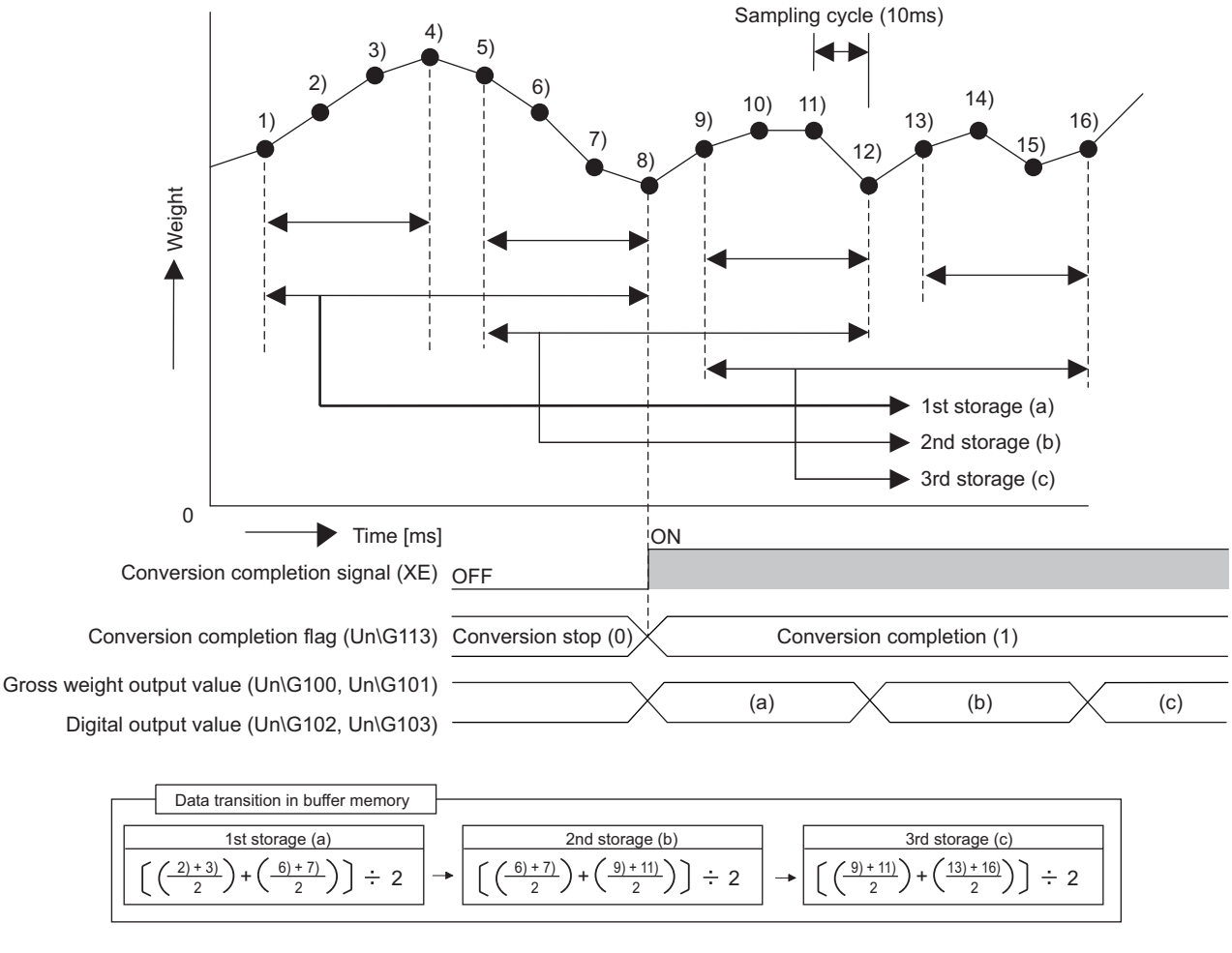


2. Set corresponding values for "Count average setting" and "Moving average setting".



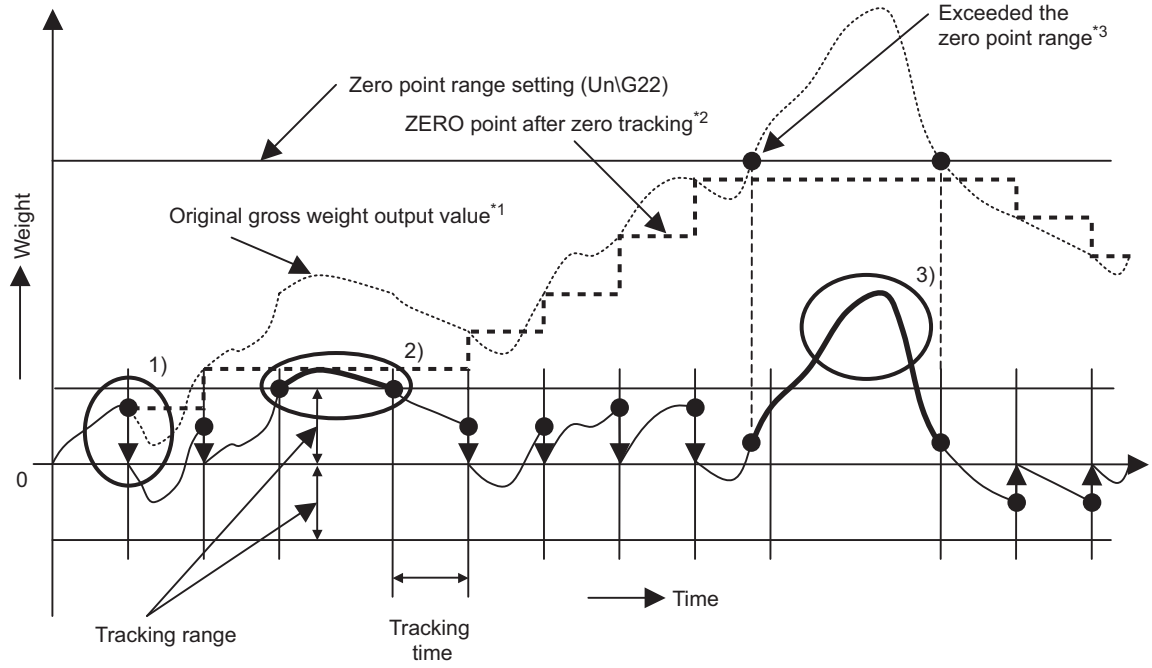
Item	Setting value
Count average setting	4 to 255
Moving average setting	2 to 255

Ex. When "Count average setting" is set to 4 times and "Moving average setting" is set to 2 times:



4.10 Zero Tracking Function

This function automatically adjusts the zero point when Gross weight output value (Un\G100, Un\G101) does not return to 0 even when no measuring load is on the scale due to temperature change or any accretion on the scale after the previous two-point calibration.
If the zero tracking time has passed while Gross weight output value (Un\G100, Un\G101) is kept within the zero tracking range, zero point adjustment will be performed automatically and Gross weight output value (Un\G100, Un\G101) will be set to 0.
This zero point adjustment will not affect the variation range of the output value.
The range within which the correction can be made is determined by Zero point range setting (Un\G22).



*1 Gross weight output value (Un\G100, Un\G101) when zero tracking is not performed. When zero set is performed, this value becomes Gross weight output value (Un\G100, Un\G101).
*2 After correction, Gross weight output value will be 0 at this weight value.
*3 If the zero point after zero tracking exceeds the zero point range set, zero tracking will not be performed.

No.	Description
1)	As Gross weight output value (Un\G100, Un\G101) is within the range of 0± Zero tracking range setting (Un\G6) for the duration of Zero tracking time setting (Un\G7) set, the zero point is corrected and Gross weight output value (Un\G100, Un\G101) is set to 0.
2)	As Gross weight output value (Un\G100, Un\G101) exceeds the range of Zero tracking range setting (Un\G6), zero point correction will not be performed.
3)	As the zero point after zero point correction exceeds the range set by Zero point range setting (Un\G22), zero point correction will not be performed. If it is found that zero tracking is not working, perform the zero reset operation and check if Gross weight output value (Un\G100, Un\G101) is inside the zero point range. If necessary, perform proper corrective actions such as to remove any accretion on the weighing machine.

When the total amount of correction by the zero point adjustment function exceeds the range set by Zero point range setting (Un\G22) with reference to the ZERO point set in the two-point calibration, the following status will result:

- The zero tracking function will stop functioning until it returns to within the range set by Zero point range setting (Un\G22).
- When zero set is performed, Input signal error detection flag (Un\G114. b0) will result in Outside the zero point range (1). (☞ Page 92, Section 4.12 (3))

If Gross weight output value (Un\G100, Un\G101) does not return to 0 when no measuring object is on the scale with zero tracking function being used, this may be the case.

Take measures such as removing any accretion from the weighing machine or performing two-point zero calibration to reset the zero point.

(1) Zero tracking range setting and zero tracking time setting

(a) Zero tracking range setting

Set the reference range of change to perform automatic zero point adjustment when the zero point has changed after two-point calibration due to temperature change or any accretion on the scale.

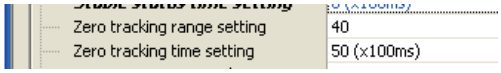
(b) Zero tracking time setting

Set the reference time to perform automatic zero point adjustment when the zero point has changed after two-point calibration due to temperature change or any accretion on the scale.

(2) Setting method

1. **Set values for "Zero tracking range setting" and "Zero tracking time setting".**

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



Item	Setting value
Zero tracking range setting	0 to 100 (× 1/4 of "Minimum Division"*1)
Zero tracking time setting	0 to 100 (× 100ms)*2

*1 Set Minimum division (Un\G58) in the "Scale Initial Setting" window. (☞ Page 64, Section 4.8.2 (3))

*2 Although it is set in 100ms increments, the internal processing is performed with the interval of 10ms × Count average setting (Un\G2).

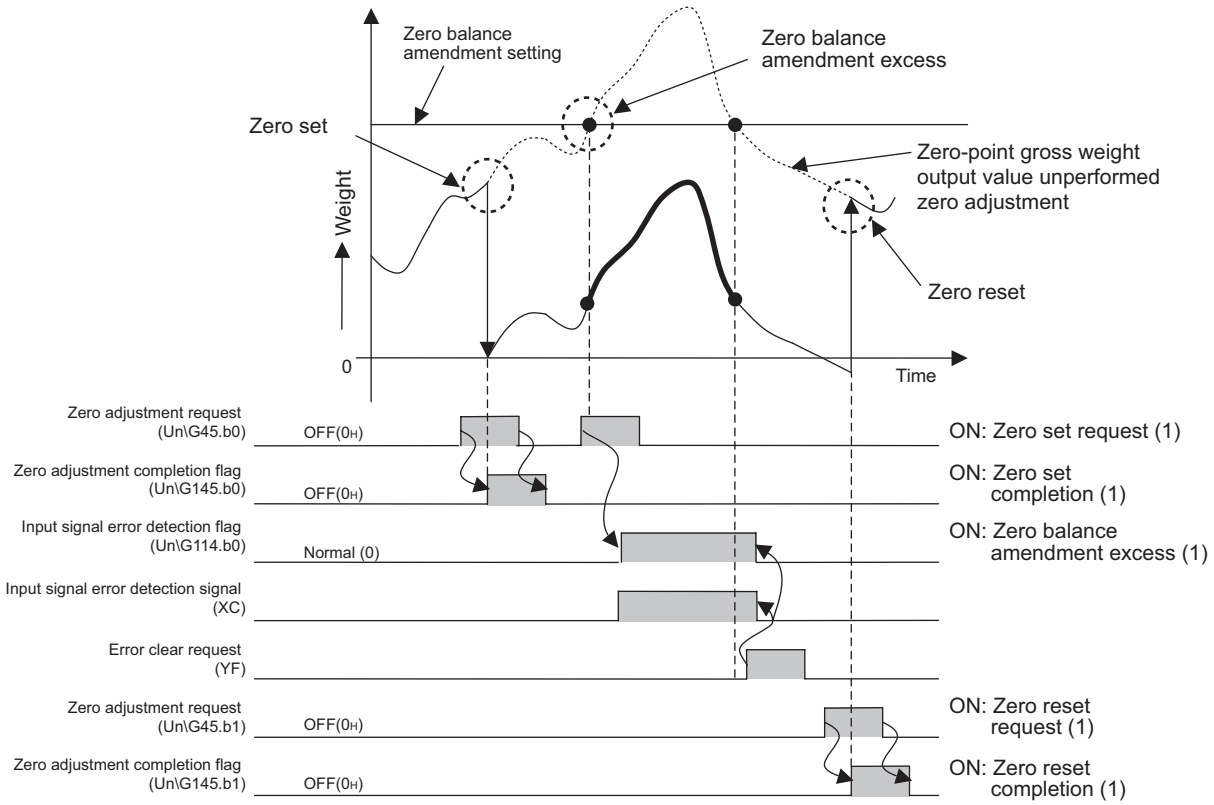
Point

When Zero tracking range setting (Un\G6) and Zero tracking time setting (Un\G7) are set to 0, zero tracking will not be performed.

Ex. When setting the tracking range to 10 divisions and the tracking time to 5 seconds:
Set "Zero tracking range setting" to 40 and "Zero tracking time setting" to 50.

4.11 Zero Set/Reset Function

This function uses the sequence program to adjust the zero point when the zero point has changed after two-point calibration due to temperature change or any accretion on the scale.



(1) Zero set and zero reset

(a) Zero set

The sequence program is used to adjust the zero point. Gross weight output value (Un\G100, Un\G101) is set to 0.

(b) Zero reset

The correction made by zero point adjustment is cleared to 0, and the zero value of Gross weight output value (Un\G100, Un\G101) is reset to the value after the two-point calibration value.

(2) Occurrence and clearing of Outside the zero point range

(a) Occurrence of Outside the zero point range

If zero set is performed while the amount of correction by zero point adjustment exceeds the range set by Zero point range setting (Un\G22) with reference to the ZERO point set in the two-point calibration, the following status will result:

- Input signal error detection signal (XC) turns on.
- Input signal error detection flag (Un\G114. b0) is set to Outside the zero point range (1).
- The ALM LED flashes.

(b) Clearing of Outside the zero point range

When Error clear request (YF) is turned on after Gross weight output value (Un\G100, Un\G101) has been returned to within the setting range, the following status will result:

- Input signal error detection signal (XC) turns off.
- Input signal error detection flag (Un\G114. b0) returns to Normal (0).
- The ALM LED turns off.

(3) Setting method

(a) Zero set

Set Zero point adjustment request (Un\G45. b0) to Zero set requested (1).

(b) Zero reset

Set Zero point adjustment request (Un\G45. b1) to Zero reset requested (1).

4.12 Input Signal Error Detection Function

This function detects errors of the analog signal supplied from outside the programmable controller.
When an error is detected, Input signal error detection signal (XC) turns on and the ALM LED starts flashing. Also, the bit corresponding to the error of Input signal error detection flag (Un\G114) will be turned on.
This function can detect the following four types of input signal errors:

- Input signal error
- Weighing capacity over
- Outside the zero point range
- Conversion over

(1) Input signal error (available only in the normal mode)

This notification will be provided when the input signal level exceeds a level arbitrarily specified by the user (separately from weighing capacity over).

(a) Occurrence of input signal error

When Gross weight output value (Un\G100, Un\G101) satisfies the following condition, Input signal error detection flag (Un\G114. b2) will be set to Input signal error (1).

$$\begin{array}{c}\text{Gross weight}\\ \text{output value}\\ \text{(Un\G100, Un\G101)}\end{array} > \begin{array}{c}\text{Maximum weighing}\\ \text{capacity setting}\end{array} + \begin{array}{c}\text{Maximum weighing}\\ \text{capacity setting}\end{array} \times \begin{array}{c}\text{Input signal error}\\ \text{detection setting}\end{array} [\%]$$

However, the conversion of Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) will continue.

(b) Clearing the input signal error

After Gross weight output value (Un\G100, Un\G101) has returned to a normal value, turn on and off Error clear request (YF).
When the input signal error is cleared, it will result in the following status:

- Input signal error detection flag (Un\G114. b2) is set to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

(2) Weighing capacity over (available only in the normal mode)

This notification will be provided when the load on the scale exceeds the maximum weighing capacity.

(a) Occurrence of weighing capacity over

When Gross weight output value (Un\G100, Un\G101) exceeds 90% of the Maximum weighing capacity setting (Un\G56, Un\G57), Input signal error detection flag (Un\G114. b1) will be set to Weighing capacity over (1).
However, the conversion of Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) will continue.

$$\begin{array}{c}\text{Gross weight output value}\\ \text{(Un\G100, Un\G101)}\end{array} > \begin{array}{c}\text{Maximum weighing}\\ \text{capacity setting}\end{array} + \text{Minimum division}^{*1} \times 9$$

*1 Set Minimum division (Un\G58) in the "Scale Initial Setting" window.

(b) Clearing the weighing capacity over

Ex. 1 When Weighing capacity over (1) occurs in the normal mode while "Conversion-over/automatic restoration setting (Usable later than product)" is set to "0: Auto Stop":
After returning Gross weight output value (Un\G100, Un\G101) to a normal value, turn on and off Error clear request (YF).
When the weighing capacity over is cleared, the following status will result:

- Input signal error detection flag (Un\G114. b1) is reset to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

Ex. 2 When Weighing capacity over (1) occurs in the normal mode while "Conversion-over/automatic restoration setting (Usable later than product)" is set to "1: Auto Restoration":
After returning Gross weight output value (Un\G100, Un\G101) to a normal value, the following status will result:

- Input signal error detection flag (Un\G114. b1) is reset to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

(3) Outside the zero point range (available only in the normal mode)

This notification will be provided when it is necessary to perform a corrective action, such as to remove any accretion on the scale, under the following condition:

- When the zero offset is excessive and zero set operation is required.

(a) Occurrence of outside the zero point range

- When zero set operation is performed while the current zero offset is exceeding Zero point range setting (Un\G22) value, as referenced from the zero point at the time of the previous two-point calibration, Input signal error detection flag (Un\G114. b0) will be set to Outside the zero point range (1).
- When the following condition is satisfied, it will be turned on by the resolution (unit) of Minimum division (Un\G58)*1 or less, which is the resolution of Two-point span calibration value (Un\G86, Un\G87).

*1 Minimum division (Un\G58) is set in the "Scale Initial Setting" window.

$$\text{Gross weight output value (Un\G100, Un\G101)} > \text{Maximum weighing capacity setting} \times \text{Zero point range setting [\%]}$$

- Zero point adjustment will not be preformed and the conversion of Gross weight output value (Un\G100, Un\G101) will continue.

For details on the zero set/reset function, refer to Zero set/reset function. (☞ Page 89, Section 4.11)

(b) Clearing the outside the zero point range

After returning Gross weight output value (Un\G100, Un\G101) to a normal value, turn on and off Error clear request (YF).
When Outside the zero point range is cleared, the following status will result:

- Input signal error detection flag (Un\G114. b0) is reset to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

(4) Conversion over (available in any mode)

This notification will be provided when the input signal exceeds the range of input values that can be converted.

(a) Occurrence of conversion over

Ex. 1 When "Conversion-over/automatic restoration setting (Usable later than product)" is set to "1: Auto Restoration" in the normal mode or when the system is in the two-point calibration mode:
Input signal error detection flag (Un\G114. b3) will be set to Conversion over (1) when the analog input (load cell output) exceeds the conversion range.
Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) will be fixed at their values at the time of conversion over occurrence.

Ex. 2 When "Conversion-over/automatic restoration setting (Usable later than product)" is set to "0: Auto Stop" in the normal mode:
An error (error code: 99) will occur and the conversion process will be suspended when the analog input (load cell output) exceeds the conversion range.
Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) will be set to 0.

(b) Clearing the conversion over

Ex. 1 When conversion over occurs in the normal mode while "Conversion-over/automatic restoration setting (Usable later than product)" is set to "1: Auto Restoration":
When the analog input (load cell output) is within the conversion range again, the following status will result:

- Input signal error detection flag (Un\G114. b3) is reset to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

The conversion of Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) continues.

Ex. 2 When conversion over occurs in the two-point calibration mode:
After returning the analog input (load cell output) to within the conversion range, turn on and off Error clear request (YF).

- Input signal error detection flag (Un\G114. b3) is reset to Normal (0).
- Input signal error detection signal (XC) turns off.
- The ALM LED turns off.

Point

If an error (error code: 99) occurs, the conversion processing resumes by turning on and off Error clear request (YF) after the analog input (load cell output) is returned to within the conversion range.
If the conversion process does not resume, take a proper action by referring to the following.

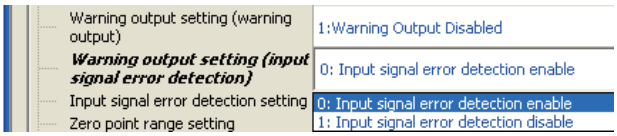
- Error Code List (☞ Page 225, Section 11.1)

(5) Setting method

(a) Input signal error

1. Set "Warning output setting (input signal error detection)" to "0: Input signal error detection enable".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



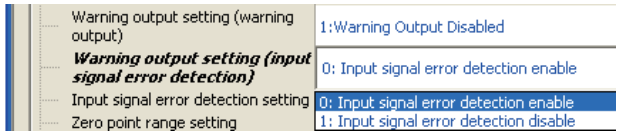
2. Enter a proper value into "Input signal error detection setting".

Item	Setting value
Input signal error detection setting	0.0 to 25.0

(b) Weighing capacity over

1. Set "Warning output setting (input signal error detection)" to "0: Input signal error detection enable".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]

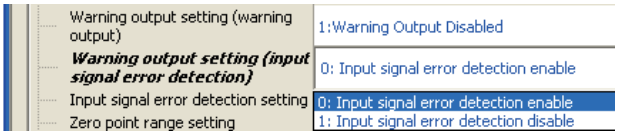


2. Set "Conversion-over/automatic restoration setting (Usable later than product)" to "0: Auto Stop" or "1: Auto Restoration".

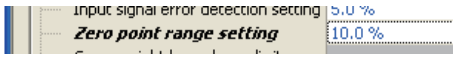
(c) Outside the zero point range

1. Set "Warning output setting (input signal error detection)" to "0: Input signal error detection enable".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



2. Enter a value into "Zero point range setting".

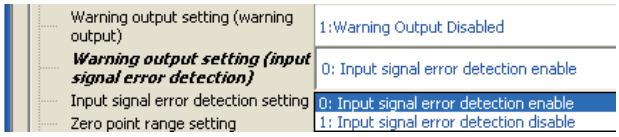


Item	Setting value
Zero point range setting	0.0 to 10.0

(d) Conversion over

1. Set "Warning output setting (input signal error detection)" to "0: Input signal error detection enable".

Project window ⇨ [Intelligent Function Module] ⇨ Module name ⇨ [Parameter]



2. Set "Conversion-over/automatic restoration setting (Usable later than product)" to "0: Auto Stop" or "1: Auto Restoration".

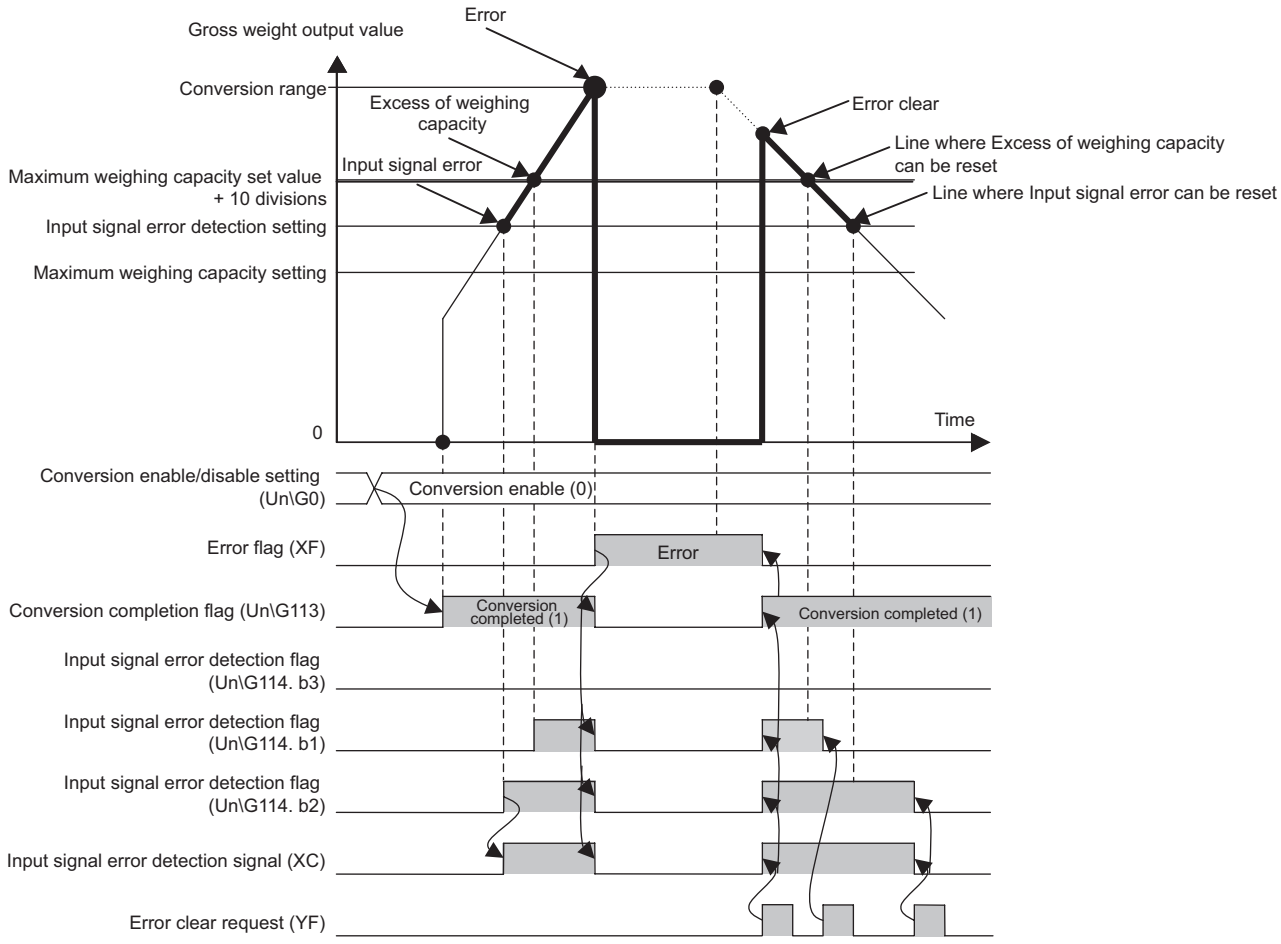
4.12.1 Operation upon input signal error by the status of Conversion-over/automatic restoration setting (Un\G19)

The system operation upon occurrence of an input signal error largely depends on the status of Conversion-over/automatic restoration setting (Un\G19).

(1) When Conversion-over/automatic restoration setting (Un\G19) is set to Auto stop (0)

When Conversion-over/automatic restoration setting (Un\G19) is set to Auto stop (0), the conversion process will stop as soon as Input signal error detection flag (Un\G114. b3) is set to Conversion over (1).
At this time, Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) are fixed to 0 and all the bits of Input signal error detection flag (Un\G114) are set to OFF (0).
For any other input errors detected, Error clear request (YF) is required to clear them.

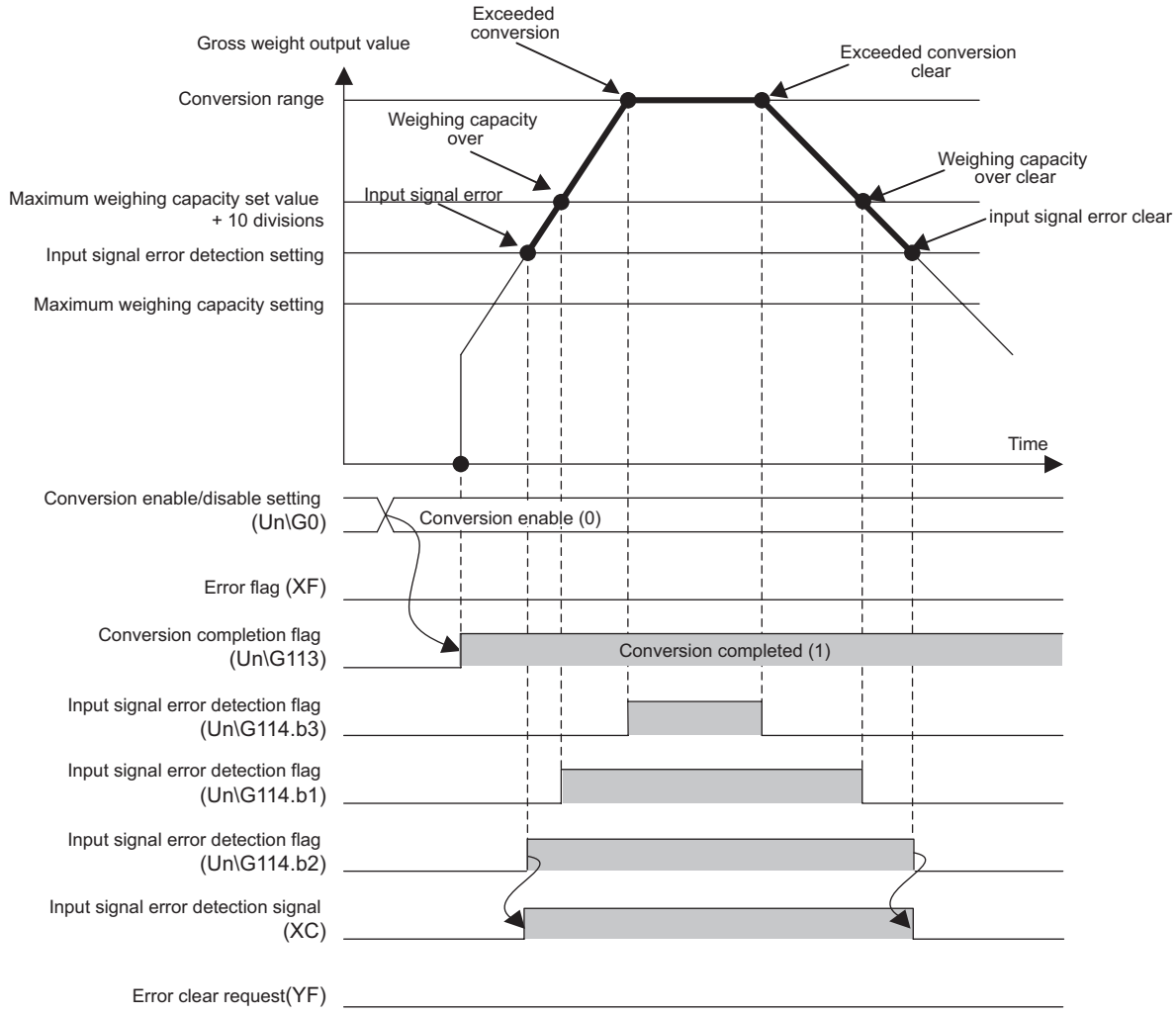
Ex. The following timing chart shows the operation of auto stop for conversion over.



(2) When Conversion-over/automatic restoration setting (Un\G19) is set to Auto restoration (1)

When Conversion-over/automatic restoration setting (Un\G19) is set to Auto restoration (1), the conversion process continues even after Input signal error detection flag (Un\G114. b3) is set to Conversion over (1).
At this time, Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103) are fixed to the values at the time of conversion over occurrence.
Once the signal level returns to within the conversion range, the Conversion over (1) status of Input signal error detection flag (Un\G114. b3) will automatically be cleared.
Although the Weighing capacity over (1) status of Input signal error detection flag (Un\G114. b1) will not automatically be restored, by setting Warning output setting (Un\G20. b8) to Input signal error detection disable (1), the Input signal error (1) status of Input signal error detection flag (Un\G114. b2) will not be generated and thus it returns to the normal status once Gross weight output value (Un\G100, Un\G101) returns to normal.

Ex. When Conversion-over/automatic restoration setting (Un\G19) is set to Auto restoration (1), and Warning output setting (Un\G20. b8) is set to Input signal error detection disable (1)



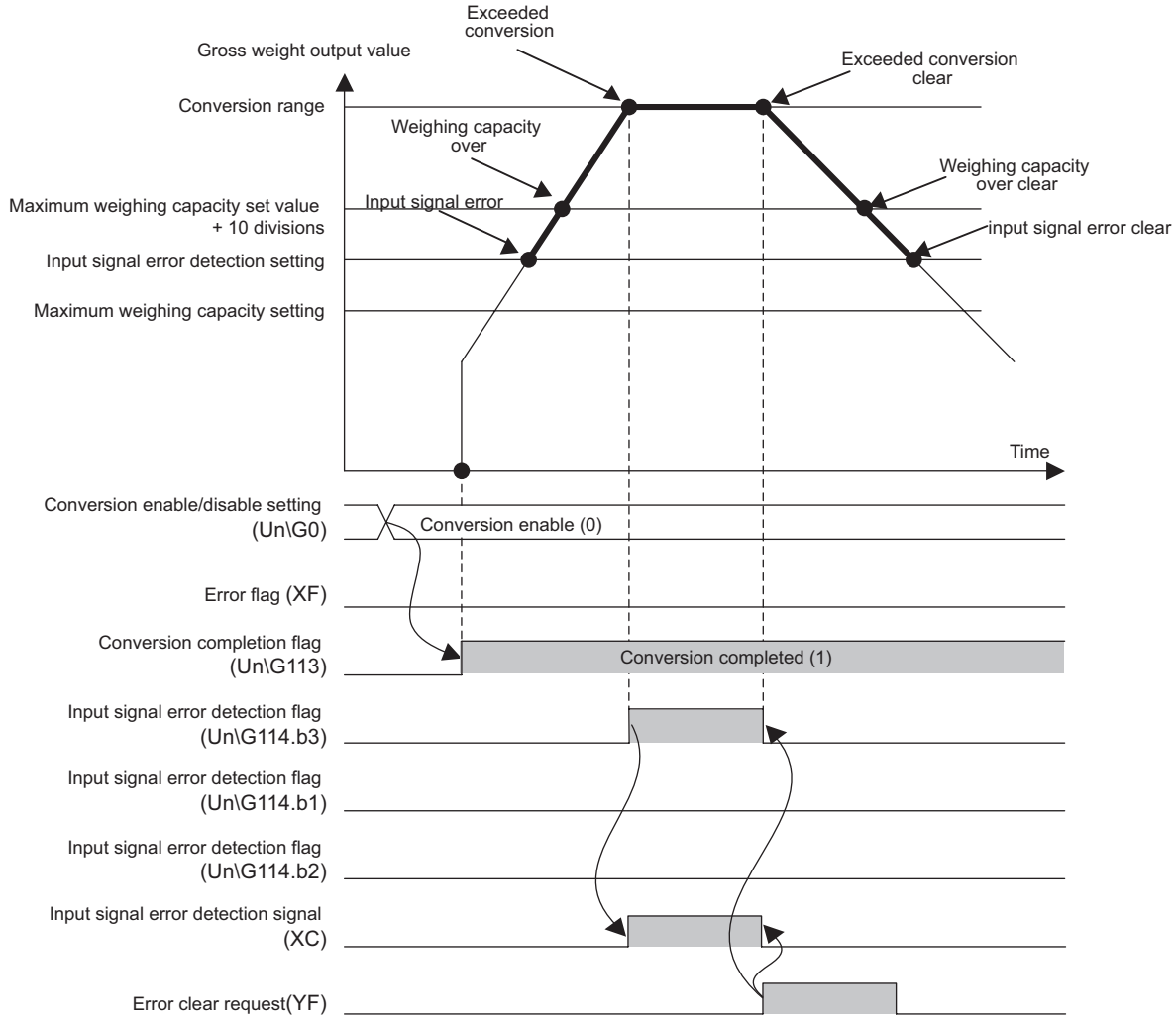
Point

- Conversion over (1) or errors (error code: 99) may be caused by a number of factors including disconnection of load cell connection cables, wrong wiring, wrong parameter settings, and module failures.
- When the load cell connection cable is disconnected, the input will be indefinite due to high impedance, and it can exceed the conversion range.

(3) In the case of two-point calibration mode

In this mode, only the conversion over status indication will be operational.

Regardless of the status of Conversion-over/automatic restoration setting (Un\G19), the conversion process will not stop even with the Conversion over (1) status of Input signal error detection flag (Un\G114. b3).

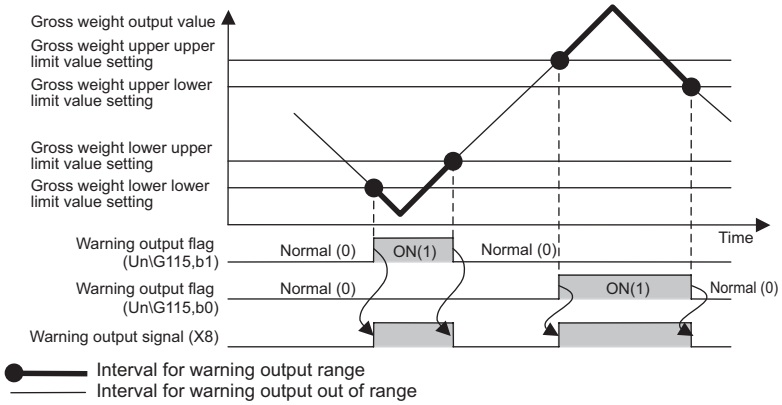


Point

Conversion over (1) or errors (error code: 99) may be caused by a number of factors including disconnection of load cell connection cables, wrong wiring, wrong parameter settings, and module failures.

4.13 Warning Output Function

When the gross weight output value falls within a predefined range, a warning will be produced.
This function can be used only in the normal mode.



(1) Occurrence and clearing of warning

(a) Occurrence of warning

Under the following conditions, a warning will be issued in increments of the value set in Minimum division (Un\G58)(☞ Page 64, Section 4.8.2 (3)).

- When the value is larger than Gross weight upper upper limit value setting (Un\G30, Un\G31) or when the value is smaller than Gross weight lower lower limit value setting (Un\G24, Un\G25) and thus it is within the warning output range

When a warning has been issued, the status of the Q61LD will be as follows:

- The bits corresponding to the upper and lower limit values of Warning output flag (Un\G115) will be set to Alarm ON (1).
- Warning output signal (X8) turns on.
- The ALM LED turns on.

Ex. When Minimum division (Un\G58) is set to 10 and Gross weight upper upper limit value setting (Un\G30, Un\G31) is set to 1005:
The upper limit alarm will turn on when Gross weight output value (Un\G100, Un\G101) has changed from 1000 to 1010.

(b) Clearing the warning

After a warning has been issued, the warning will be automatically cleared under the following conditions in increments of the value set in Minimum division (Un\G58).

- When the value becomes smaller than Gross weight upper lower limit value setting (Un\G28, Un\G29) or larger than Gross weight lower upper limit value setting (Un\G26, Un\G27) and thus it returned to within the range of normal operation

Once the warning is cleared, the status of the Q61LD will be as follows:

- The bits corresponding to the upper and lower limit values of Warning output flag (Un\G115) will be set to Normal (0).
- Warning output signal (X8) turns off.
- The ALM LED turns off.

Ex. When Minimum division (Un\G58) is set to 10 and Gross weight upper lower limit value setting (Un\G28, Un\G29) is set to 905:
The upper limit alarm will turn off when Gross weight output value (Un\G100, Un\G101) has changed from 910 to 900.

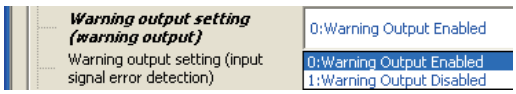
Point

When Warning output setting (Un\G20) is set to Warning output disabled (1), values from Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31) are ignored.

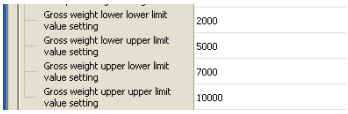
(2) Setting method

1. Set the "Warning output setting (warning output)" to "0: Warning Output Enabled".

Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Parameter]



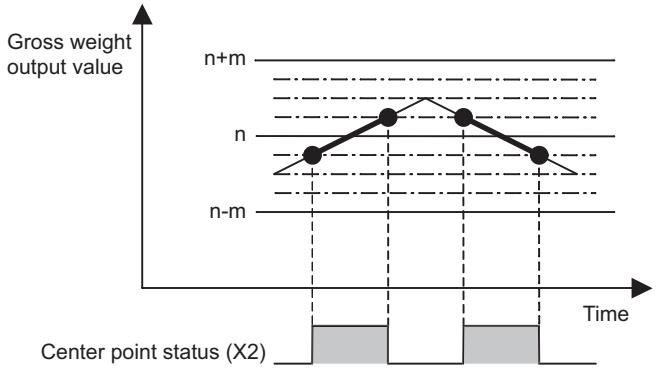
2. Set values in "Gross weight lower lower limit value setting", "Gross weight lower upper limit value setting", "Gross weight upper lower limit value setting", and "Gross weight upper upper limit value setting".



Item	Setting value
Gross weight lower lower limit value setting	-99999 to 99999
Gross weight lower upper limit value setting	
Gross weight upper lower limit value setting	
Gross weight upper upper limit value setting	

4.14 Center Point (1/4 scale) Detection Function

This function automatically detects the center point of Gross weight output value (Un\G100, Un\G101).
The center point is determined by dividing Minimum division (Un\G58) by 4.
If Gross weight output value (Un\G100, Un\G101) is within the center point range, Center point status (X2) turns on.
The center point (1/4 scale) detection function is available in all modes.



n: Gross weight output value (Un\G100, Un\G101) (integral multiple of Minimum division (Un\G58))
m: Minimum division (Un\G58)

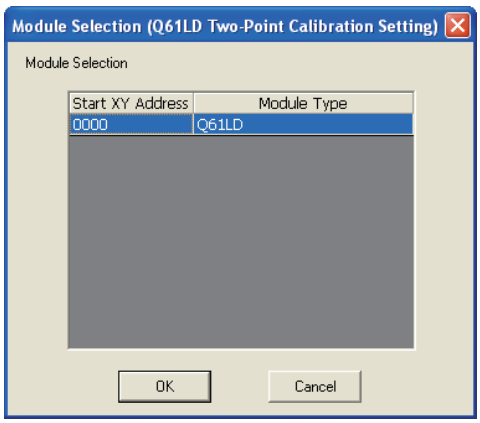
Point

This function can be used to check the zero point when zero point adjustment is performed.
For details on zero point adjustment, refer to the following.

- Zero Set/Reset Function (☞ Page 89, Section 4.11)

Ex. When Minimum division (Un\G58) of 5 is selected and n = 10:
Center point status (X2) turns on when Gross weight output value (Un\G100, Un\G101) is within 10 ± 1.25 (5/4 = 1.25).

(1) Setting method



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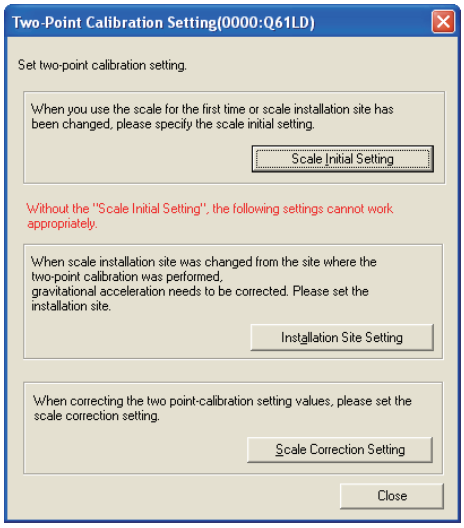

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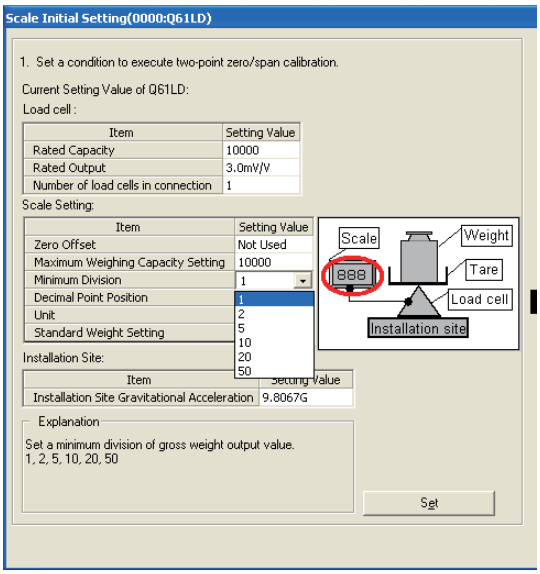

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(Continued to the next page)

1. **Select the module to be used and click the** OK **button.**

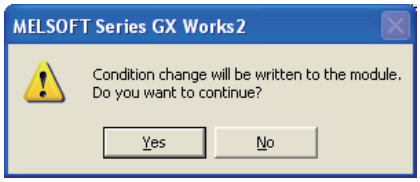
[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Two-Point Calibration Setting]

2. **Click the** Scale Initial Setting **button.**

3. **Select a value from the pull down menu to set "Minimum Division" and click the** Set **button.**

(Continued)

↓



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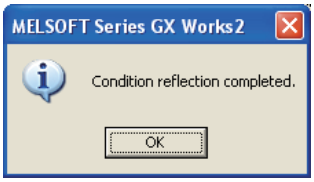
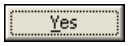


4. **Click the**  **button.**

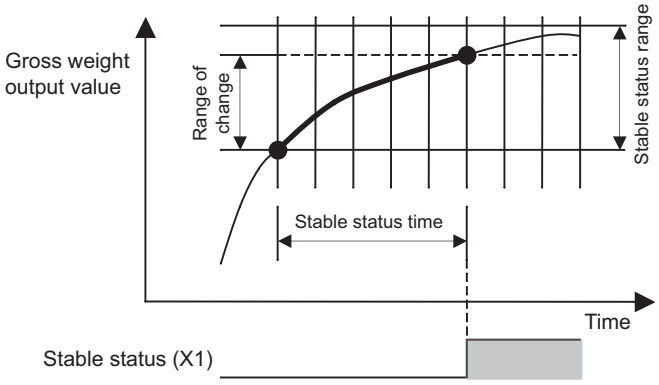
5. **Reflection of the condition is completed.**

4.15 Stable Status

This function checks if Gross weight output value (Un\G100, Un\G101) is stable or not.
Stable status (X1) turns on when the following condition is satisfied:

- The range of variation of Gross weight output value (Un\G100, Un\G101) is continuously within the range specified by Stable status range setting (Un\G4) for the duration defined by Stable status time setting (Un\G5) or longer.

This function is convenient for such applications as constant amount control, where the stability of the weighing machine is to be checked before starting and after completing the measurement.
This function can be used in every mode.
For each weight conversion, the variation of Gross weight output value (Un\G100, Un\G101) is compared with the value of Stable status range setting (Un\G4). If the variation is larger than Stable status time setting (Un\G5), Stable status (X1) turns off.



(1) Setting method

1. Set a value in "Stable status range setting".

2. Set a value in "Stable status time setting".

Item	Setting value
Stable status range setting	0 to 100 (× Minimum division (Un\G58)*1)
Stable status time setting	0 to 100 (× 100ms)*2

*1 Set Minimum division (Un\G58) in the "Scale Initial Setting" window.
Scale Initial Setting (Page 64, Section 4.8.2 (3))

*2 Although it is set in 100ms increments, the internal processing is performed with the interval of 10ms times "Count average setting".

Point

If either "Stable status range setting" or "Stable status time setting" is set to 0, the stable status function is disabled.

4.16 Maximum and Minimum Values Hold Function

The maximum and minimum output values are stored in the areas from Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107).
When conversion starts by turning on and off Operating condition setting request (Y9), the new maximum and minimum values are stored.

(1) Setting details

No setting is required because the maximum and minimum values are automatically stored in the areas from Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107).

Point

As the data of Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107) can be rewritten through a sequence program, the maximum and minimum values within a specific period can be checked.

4.17 Output Value Hold Function

This function temporarily holds output values.
When Output value hold request (Y3) is turned on, the output value will be held.
However, when the CPU module key switch is moved to STOP position or an error occurs, Output value hold request (Y3) is turned off.

(1) Output values to be held

When Output value hold request (Y3) is turned on, the following output values will not be updated even if the load cell output is changed.

- Gross weight output value (Un\G100, Un\G101)
- Digital output value (Un\G102, Un\G103)
- Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107)
- Maximum digital output value (L) (Un\G108) to Minimum digital output value (H) (Un\G111)

Point

Even while the output data is held, the internal processing continues. (Warning output signal (X8) and Input signal error detection signal (XC) operate.)

4.18 Default Setting Registration Function

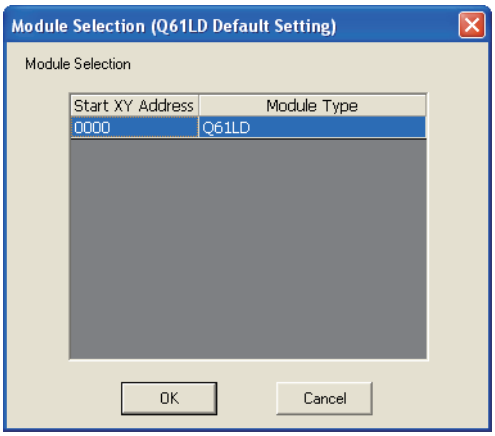
This function changes the set value in the buffer memory back to default values. Simultaneously, zero reset is performed, and the correction made on the zero point by zero point adjustment is cleared to 0.
For buffer memory areas whose values are to be changed back to the default, refer to the following.

- List of Buffer Memory Addresses (☞ Page 118, Section 6.1)

This function is available in the two-point calibration mode and cannot be used in the normal mode.
For details on zero reset, refer to the following.

- Zero Set/Reset Function (☞ Page 89, Section 4.11)

(1) Setting method



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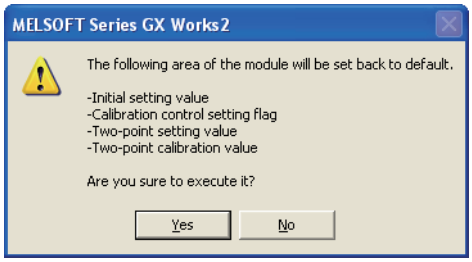

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1. **Select the module to be used and click the** OK **button.**

[Tool] ⇨ [Intelligent Function Module Tool] ⇨ [Analog Module] ⇨ [Q61LD Default Setting]

2. **Click the** Yes **button.**

3. **The default setting is completed.**

Point

- Once the default setting registration has been performed, the previous setting values cannot be restored.
- After the default setting registration, perform two-point calibration. If a record of previous calibration values is available, the data can be written to the system from GX Works2.
- While the default setting is being registered, do not perform the following operation:
  - Turning on and off Two-point setting request (Y7)
  - Turning on and off Operating condition setting request (Y9)
  - Setting Two-point calibration request (Un\G43)
- If the default setting registration fails, Default value writing completion flag (Un\G149. b8) will be set to Default value writing failed (1). In such a case, remove the error cause and try the default setting registration again. For details on the error causes, refer to the following.
  - TROUBLESHOOTING (Page 225, CHAPTER 11)

CHAPTER 5 I/O SIGNALS SENT TO/FROM CPU MODULE

This chapter describes the Q61LD I/O signals.

5.1 I/O Signals List

This section lists the I/O signals sent to/from the Q61LD.

Input signal (signal direction: CPU module ← Q61LD)		Output signal (signal direction: CPU module → Q61LD)	
Device No.	**Signal name**	**Device No.**	**Signal name**
X0	Module ready	Y0	Use prohibited*1
X1	Stable status	Y1	
X2	Center point status	Y2	
X3	Output value hold status flag	Y3	Output value hold request
X4	Use prohibited*1	Y4	Use prohibited*1
X5		Y5	
X6		Y6	
X7	Two-point setting completion flag	Y7	Two-point setting request
X8	Warning output signal	Y8	Use prohibited*1
X9	Operating condition setting completion flag	Y9	Operating condition setting request
XA	Two-point calibration mode status flag	YA	Two-point calibration mode switch request
XB	Use prohibited*1	YB	Use prohibited*1
XC	Input signal error detection signal	YC	
XD	Maximum and minimum values reset completion flag	YD	Maximum and minimum values reset request
XE	Conversion completion signal	YE	Use prohibited*1
XF	Error flag	YF	Error clear request

Point

Use prohibited signals indicated with *1 are only for system use.
If any of them is turned on and off in a sequence program, the performance of the Q61LD is not guaranteed.

5.2 I/O Signal Details

This section describes the I/O signals of the Q61LD in detail. For details on the functions that use these signals, refer to the following.

- FUNCTION (☞ Page 34, CHAPTER 4)

(1) Module ready (X0)

(a) In the normal mode

- This signal turns on when a CPU module is powered on or reset, as soon as the module is ready for conversion, then the Q61LD performs conversion.
- While this signal is off, the Q61LD does not perform any conversion.

(b) In the two-point calibration mode

- The Q61LD performs conversion even when Module ready (X0) is off.

(c) Off condition

This signal turns off when the Q61LD is in the following status.

- In two-point calibration mode
- When a watchdog timer error has occurred[*1] (conversion is not performed.)

*1 This error occurs when sequence program operation is not completed within the set time due to such as a hardware error. The RUN LED turns off when a watchdog timer error occurs.

(2) Stable status (X1)

This signal can be used in every mode.

(a) On condition

This signal turns on in the following status.

- The variation range of a value stored in Gross weight output value (Un\G100, Un\G101) becomes within the range set to Stable status range setting (Un\G4), and the status remains longer than the period set to Stable status time setting (Un\G5).

(b) Off condition

This signal turns off in the following status.

- When the variation range and setting range of Gross weight output value (Un\G100, Un\G101) are compared at each sampling cycle, the variation range exceeds the setting range.

(3) Center point status (X2)

This signal can be used in every mode.

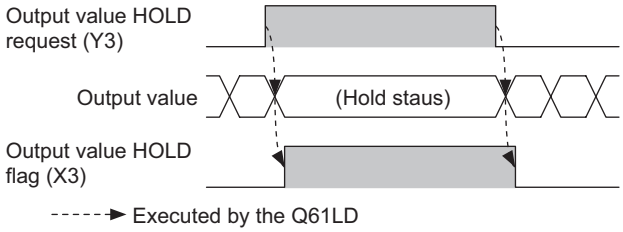
(a) On condition

This signal turns on in the following status.

- Gross weight output value (Un\G100, Un\G101) is within the range of a center point (±1/4 of the value set to Minimum division (Un\G58)).

(4) Output value hold status flag (X3)/Output value hold request (Y3)

- When Output value hold request (Y3) is turned on, the following output values are held and Output value hold status flag (X3) turns on.
  - Gross weight output value (Un\G100, Un\G101)
  - Digital output value (Un\G102, Un\G103)
  - Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107)
- While Output value hold request (Y3) is on, the above output values are not updated but is held even when the analog input (load cell output) changes.
- Use Output value hold status flag (X3) as an interlock to turn on and off Output value hold request (Y3).



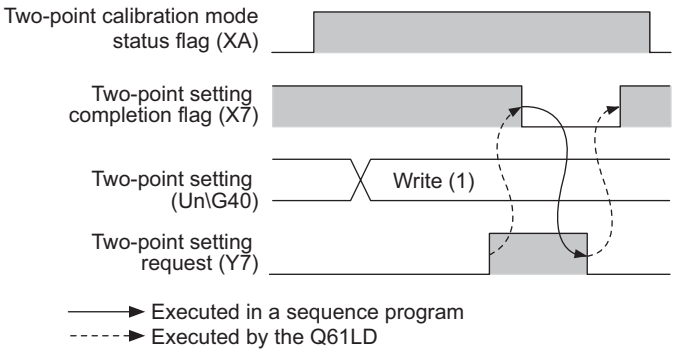
Point

When the CPU module key switch is moved to STOP position or an error occurs while Output value hold request (Y3) is on, the following status occurs.

- Output value hold request (Y3) turns off.
- The output value is no longer held.

(5) Two-point setting completion flag (X7)/Two-point setting request (Y7)

- When Two-point setting request (Y7) is turned on, Two-point setting completion flag (X7) will turn off. Turn on and off Two-point setting request (Y7) to read or write the following setting data.
  - Load cell rated capacity (Un\G50, Un\G51)
  - Load cell rated output (Un\G52)
  - Number of load cells in connection (Un\G53)
  - Tare zero offset (Un\G54)
  - Maximum weighing capacity setting (Un\G56, Un\G57)
  - Minimum division (Un\G58)
  - Decimal point position (Un\G59)
  - Unit (Un\G60)
  - Standard weight setting (Un\G62, Un\G63)
  - Installation site gravitational acceleration (Un\G64, Un\G65)
  - Calibration site gravitational acceleration (Un\G66, Un\G67)
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)
  - Instrumentation amplifier gain setting (Un\G80)
  - A/D converter gain setting (Un\G81)
  - Tare zero offset output value (Un\G82, Un\G83)
  - Two-point zero calibration value (Un\G84, Un\G85)
  - Two-point span calibration value (Un\G86, Un\G87)
- When Two-point setting request (Y7) is turned off, Two-point setting completion flag (X7) will turn on.
- Use Two-point setting completion flag (X7) as an interlock to turn on and off Two-point setting request (Y7).



(6) Warning output signal (X8)

This signal can be used only in the normal mode.

(a) On condition

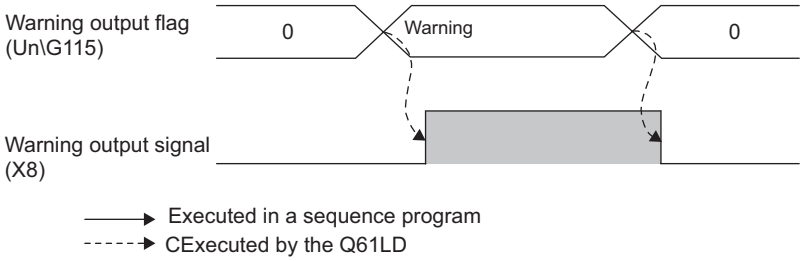
This signal turns on in the following status.

- A value stored in Gross weight output value (Un\G100, Un\G101) is larger than or equal to the value stored in Gross weight upper upper limit value setting (Un\G30, Un\G31), or smaller or equal to the value stored in Gross weight lower lower limit value setting (Un\G24, Un\G25).

(b) Off condition

This signal turns off in the following status.

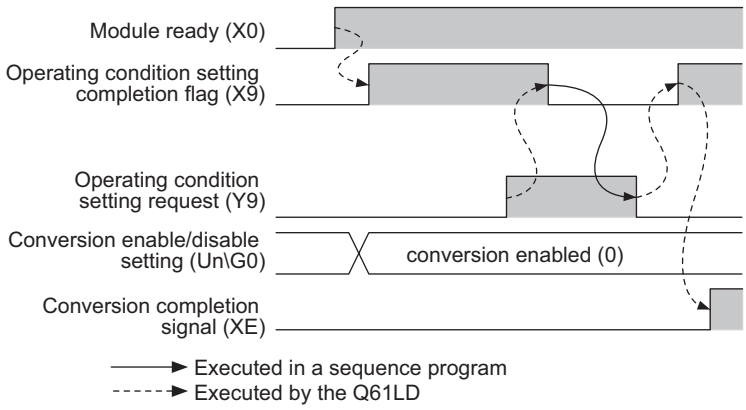
- Gross weight output value (Un\G100, Un\G101) returns to within the setting range, which is smaller than Gross weight upper lower limit value setting (Un\G28, Un\G29) or is larger than Gross weight lower upper limit value setting (Un\G26, Un\G27).



(7) Operating condition setting completion flag (X9)/Operating condition setting request (Y9)

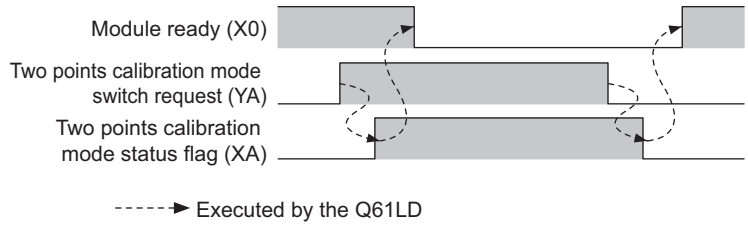
- When Module ready (X0) turns on, Operating condition setting completion flag (X9) will turn on.
- Turn on and off Operating condition setting request (Y9) to enable the following settings.
  - Conversion enable/disable setting (Un\G0)
  - Averaging processing method setting (Un\G1)
  - Count average setting (Un\G2)
  - Moving average setting (Un\G3)
  - Stable status range setting (Un\G4)
  - Stable status time setting (Un\G5)
  - Zero tracking range setting (Un\G6)
  - Zero tracking time setting (Un\G7)
  - Conversion-over/automatic restoration setting (Un\G19)
  - Warning output setting (Un\G20)
  - Input signal error detection setting (Un\G21)
  - Zero point range setting (Un\G22)
  - Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31)
- When Operating condition setting request (Y9) is turned on, Operating condition setting completion flag (X9) will turn off.
- When Operating condition setting request (Y9) is turned off, Operating condition setting completion flag (X9) will turn on.

  Use Operating condition setting completion flag (X9) as an interlock to turn on and off Operating condition setting request (Y9).



(8) Two-point calibration mode status flag (XA)/Two-point calibration mode switch request (YA)

- Turn on Two-point calibration mode switch request (YA) to change the following settings or to enable Two-point calibration request (Un\G43).
  - Load cell rated capacity (Un\G50, Un\G51)
  - Load cell rated output (Un\G52)
  - Number of load cells in connection (Un\G53)
  - Tare zero offset (Un\G54)
  - Maximum weighing capacity setting (Un\G56, Un\G57)
  - Minimum division (Un\G58)
  - Decimal point position (Un\G59)
  - Unit (Un\G60)
  - Standard weight setting (Un\G62, Un\G63)
  - Installation site gravitational acceleration (Un\G64, Un\G65)
  - Calibration site gravitational acceleration (Un\G66, Un\G67)
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)
  - Instrumentation amplifier gain setting (Un\G80)
  - A/D converter gain setting (Un\G81)
  - Tare zero offset output value (Un\G82, Un\G83)
  - Two-point zero calibration value (Un\G84, Un\G85)
  - Two-point span calibration value (Un\G86, Un\G87)
- When Two-point calibration mode switch request (YA) is turned on, Two-point calibration mode status flag (XA) will turn on and the Q61LD will operate in the two-point calibration mode.
- When the Q61LD operates in the two-point calibration mode, Module ready (X0) will turn off.
- Use Two-point calibration mode status flag (XA) as an interlock to turn on and off Two-point calibration mode switch request (YA).



Point

When the CPU module key switch is moved to STOP position or an error occurs while Two-point calibration mode switch request (YA) is on, the following status occurs.

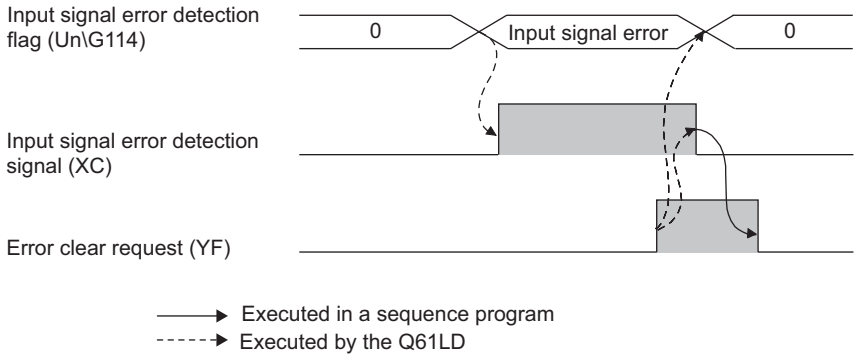
- Two-point calibration mode switch request (YA) turns off, and therefore the Q61LD operates in the normal mode.

(9) Input signal error detection signal (XC)

(a) On condition

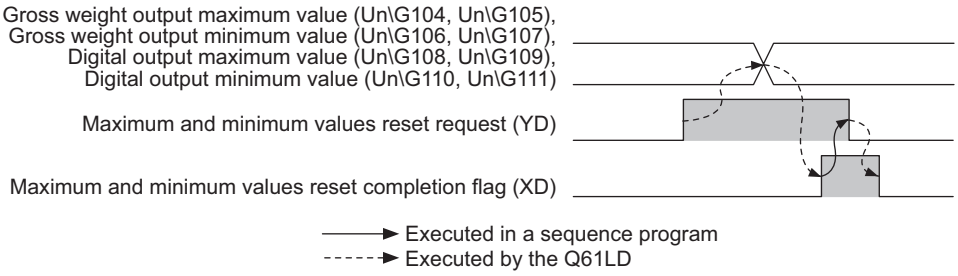
This signal turns on in the following status.

- Input signal error detection flag (Un\G114) detects any of the following: Weighing capacity over (1), Outside the zero point range (1), Input signal error (1), and Conversion over (1).
- The condition under which Input signal error detection signal (XC) turns on and the status in which Input signal error detection signal (XC) has turned on depend on Weighing capacity over (1), Outside the zero point range (1), Input signal error (1), and Conversion over (1).



(10)Maximum and minimum values reset completion flag (XD)/Maximum and minimum values reset request (YD)

- When Maximum and minimum values reset request (YD) is turned on, the maximum and minimum values of gross weight output and digital output stored in Maximum gross weight output value (L) (Un\G104) to Minimum gross weight output value (H) (Un\G107), and Maximum digital output value (L) (Un\G108) to Minimum digital output value (H) (Un\G111) are updated to the current values.
- When the maximum and minimum values of gross weight output and digital output are cleared, Maximum and minimum values reset completion flag (XD) turns on.
  Use Maximum and minimum values reset completion flag (XD) as an interlock to turn on and off Maximum and minimum values reset request (YD).

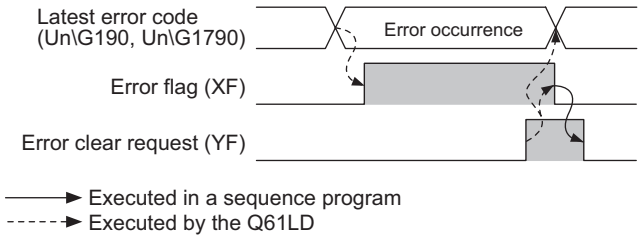


(11)Conversion completion signal (XE)

This signal turns on upon completion of conversion.

(12) Error flag (XF)/Error clear request (YF)

- If an error occurs and the corresponding error code is stored in Latest error code (Un\G190, Un\G1790), Error flag (XF) and the ERR. LED will turn on.
- When Error clear request (YF) is turned on, Error flag (XF) turns off, the value stored in Latest error code (Un\G190, Un\G1790) is cleared, and the ERR. LED will turn off.
  In addition, Input signal error detection signal (XC) turns off, and the ALM LED turns off.
  Use Error flag (XF) as an interlock to turn on and off Error clear request (YF).



CHAPTER 6 BUFFER MEMORY

This chapter describes the buffer memory of the Q61LD.

6.1 Buffer Memory List

This section lists the buffer memory assignment of the Q61LD.

Point

Do not write any data to the “system area” and the area in the buffer memory where data writing from sequence programs is disabled.
Doing so may cause malfunction.

○: Enabled ×: Disabled

Address		Data type[*1]	Description	Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal					
0_H	0	Pr	Conversion enable/disable setting	0001_H	R/W[*3]	○
1_H	1		Averaging processing method setting	5_H		
2_H	2		Count average setting	10		
3_H	3		Moving average setting	10		
4_H	4		Stable status range setting	0		
5_H	5		Stable status time setting			
6_H	6		Zero tracking range setting			
7_H	7		Zero tracking time setting			
8_H	8	—	System area	—	—	—
⋮	⋮					
12_H	18					
13_H	19	Pr	Conversion over/automatic restoration setting	0_H	R/W[*3]	○
14_H	20		Warning output setting	101_H		
15_H	21		Input signal error detection setting	50		
16_H	22		Zero point range setting	100		
17_H	23	—	System area	—	—	—

Address		Data type[*1]	Description	Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal					
18_H	24	Pr	Gross weight lower lower limit value setting (L)	0	R/W[*3]	○
19_H	25		Gross weight lower lower limit value setting (H)			
$1A_H$	26		Gross weight lower upper limit value setting (L)			
$1B_H$	27		Gross weight lower upper limit value setting (H)			
$1C_H$	28		Gross weight upper lower limit value setting (L)			
$1D_H$	29		Gross weight upper lower limit value setting (H)			
$1E_H$	30		Gross weight upper upper limit value setting (L)			
$1F_H$	31		Gross weight upper upper limit value setting (H)			
20_H	32	—	System area	—	—	—
⋮	⋮					
27_H	39					
28_H	40	Pr	Two-point setting	0000_H	R/W[*3]	○
29_H	41		Two-point calibration method setting			
$2A_H$	42		Two-point calibration setting			
$2B_H$	43		Two-point calibration request			
$2C_H$	44	—	System area	—	—	—
$2D_H$	45	Pr	Zero point adjustment request	0000_H	R/W[*3]	○
$2E_H$	46	—	System area	—	—	—
$2F_H$	47					
30_H	48	Pr	Default setting registration	0_H	R/W[*3]	○
31_H	49	—	System area	—	—	—
32_H	50	Pr	Load cell rated capacity (L)	10000	R/W[*3]	○
33_H	51		Load cell rated capacity (H)			
34_H	52		Load cell rated output	30		
35_H	53		Number of load cells in connection	1		
36_H	54		Tare zero offset function	0_H		
37_H	55	—	System area	—	—	—
38_H	56	Pr	Maximum weighing capacity setting (L)	10000	R/W[*3]	○
39_H	57		Maximum weighing capacity setting (H)			
$3A_H$	58		Minimum division	0_H		
$3B_H$	59		Decimal point position			
$3C_H$	60		Unit	1_H		
$3D_H$	61	—	System area	—	—	—

Address		Data type[*1]	Description	Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal					
$3E_H$	62	Pr	Standard weight setting (L)	10000	R/W[*3]	○
$3F_H$	63		Standard weight setting (H)			
40_H	64		Installation site gravitational acceleration (L)	98067		
41_H	65		Installation site gravitational acceleration (H)			
42_H	66		Calibration site gravitational acceleration (L)			
43_H	67		Calibration site gravitational acceleration (H)			
44_H	68		Digital output zero correction value (L)	0		
45_H	69		Digital output zero correction value (H)			
46_H	70		Digital output span correction value (L)			
47_H	71		Digital output span correction value (H)			
48_H	72	—	System area	—	—	—
⋮	⋮					
$4F_H$	79					
50_H	80	Pr	Instrumentation amplifier gain setting	2_H	R/W[*3]	○
51_H	81		A/D converter gain setting	0_H		
52_H	82		Tare zero offset output value (L)	0		
53_H	83		Tare zero offset output value (H)			
54_H	84	Pr	Two-point zero calibration value (L)	—	R/W[*3]	○
55_H	85		Two-point zero calibration value (H)			
56_H	86		Two-point span calibration value (L)			
57_H	87		Two-point span calibration value (H)			
58_H	88	—	System area	—	—	—
⋮	⋮					
63_H	99					
64_H	100	Md	Gross weight output value (L)	0	R	×
65_H	101		Gross weight output value (H)			
66_H	102		Digital output value (L)			
67_H	103		Digital output value (H)			
68_H	104		Maximum gross weight output value (L)			
69_H	105		Maximum gross weight output value (H)			
$6A_H$	106		Minimum gross weight output value (L)			
$6B_H$	107		Minimum gross weight output value (H)			
$6C_H$	108		Maximum digital output value (L)			
$6D_H$	109		Maximum digital output value (H)			
$6E_H$	110		Minimum digital output value (L)			
$6F_H$	111		Minimum digital output value (H)			
70_H	112	—	System area	—	—	—
71_H	113	Md	Conversion completion flag	0000_H	R	×
72_H	114		Input signal error detection flag			
73_H	115		Warning output flag			

Address		Data type[*1]	Description			Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal							
74_H	116	—	System area			—	—	—
⋮	⋮							
$8E_H$	142							
$8F_H$	143	Md	Two-point calibration completion flag			0000_H	R	×
90_H	144	—	System area			—	—	—
91_H	145	Md	Zero point adjustment completion flag			0000_H	R	×
92_H	146	—	System area			—	—	—
93_H	147							
94_H	148	Pr	Default setting registration command			0_H	R/W	×
95_H	149	Md	Default value writing completion flag				R	
96_H	150	—	System area			—	—	—
⋮	⋮							
BD_H	189							
BE_H	190	Md	Latest error code			0	R	×
BF_H	191		Error occurrence time	First two digits of the year	Last two digits of the year			
$C0_H$	192			Month	Day			
$C1_H$	193			Hour	Minute			
$C2_H$	194			Second	Day of the week			
$C3_H$	195	—	System area			—	—	—
⋮	⋮							
$64D_H$	1613							
$64E_H$	1614	Pr	1.0mV/V zero calibration value (L)			—	R/W[3]	×
$64F_H$	1615		1.0mV/V zero calibration value (H)					
650_H	1616		1.0mV/V span calibration value (L)					
651_H	1617		1.0mV/V span calibration value (H)					
652_H	1618		2.0mV/V zero calibration value (L)					
653_H	1619		2.0mV/V zero calibration value (H)					
654_H	1620		2.0mV/V span calibration value (L)					
655_H	1621		2.0mV/V span calibration value (H)					
656_H	1622		3.0mV/V zero calibration value (L)					
657_H	1623		3.0mV/V zero calibration value (H)					
658_H	1624		3.0mV/V span calibration value (L)					
659_H	1625		3.0mV/V span calibration value (H)					
$65A_H$	1626	—	System area			—	—	—
⋮	⋮							
$6FD_H$	1789							

Address		Data type[*1]	Description			Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal							
$6FE_H$	1790	Md	Latest error code			0	R	×
$6FF_H$	1791		Error occurrence time	First two digits of the year	Last two digits of the year			
700_H	1792			Month	Day			
701_H	1793			Hour	Minute			
702_H	1794			Second	Day of the week			
703_H	1795	—	System area			—	—	—
⋮	⋮							
707_H	1799							
708_H	1800	Md	History 1 Error code (latest)			0	R	×
709_H	1801		Error occurrence time	First two digits of the year	Last two digits of the year			
$70A_H$	1802			Month	Day			
$70B_H$	1803			Hour	Minute			
$70C_H$	1804			Second	Day of the week			
$70D_H$	1805		History 2 Error code/Error occurrence time (Data structure is the same as History 1)					
⋮	⋮							
711_H	1809							
712_H	1810		History 3 Error code/Error occurrence time (Data structure is the same as History 1)					
⋮	⋮							
716_H	1814							
717_H	1815		History 4 Error code/Error occurrence time (Data structure is the same as History 1)					
⋮	⋮							
$71B_H$	1819							

Address		Data type[*1]	Description	Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal					
$71C_H$	1820	Md	History 5 Error code/Error occurrence time (Data structure is the same as History 1)	0	R	×
⋮	⋮					
720_H	1824					
721_H	1825		History 6 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
725_H	1829					
726_H	1830		History 7 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$72A_H$	1834					
$72B_H$	1835		History 8 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$72F_H$	1839					
730_H	1840		History 9 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
734_H	1844					
735_H	1845		History 10 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
739_H	1849					
$73A_H$	1850		History 11 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$73E_H$	1854					
$73F_H$	1855		History 12 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
743_H	1859					
744_H	1860		History 13 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
748_H	1864					
749_H	1865		History 14 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$74D_H$	1869					
$74E_H$	1870		History 15 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
752_H	1874					
753_H	1875		History 16 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
757_H	1879					
758_H	1880		History 17 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$75C_H$	1884					
$75D_H$	1885		History 18 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
761_H	1889					

Address		Data type[*1]	Description	Default	Read/Write[*2]	Default setting registration command
Hex (H)	Decimal					
762_H	1890	Md	History 19 Error code/Error occurrence time (Data structure is the same as History 1)	0	R	×
⋮	⋮					
766_H	1894					
767_H	1895		History 20 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$76B_H$	1899					
$76C_H$	1900		History 21 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
770_H	1904					
771_H	1905		History 22 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
775_H	1909					
776_H	1910		History 23 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$77A_H$	1914					
$77B_H$	1915		History 24 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$77F_H$	1919					
780_H	1920		History 25 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
784_H	1924					
785_H	1925		History 26 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
789_H	1929					
$78A_H$	1930		History 27 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$78E_H$	1934					
$78F_H$	1935		History 28 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
793_H	1939					
794_H	1940		History 29 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
798_H	1944					
799_H	1945		History 30 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$79D_H$	1949					
$79E_H$	1950		History 31 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7A2_H$	1954					
$7A3_H$	1955		History 32 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7A7_H$	1959					

Address		Data type*1	Description	Default	Read/Write*2	Default setting registration command
Hex (H)	Decimal					
$7A8_H$	1960	Md	History 33 Error code/Error occurrence time (Data structure is the same as History 1)	0	R	×
⋮	⋮					
$7AC_H$	1964					
$7AD_H$	1965		History 34 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7B1_H$	1969					
$7B2_H$	1970		History 35 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7B6_H$	1974					
$7B7_H$	1975		History 36 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7BB_H$	1979					
$7BC_H$	1980		History 37 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7C0_H$	1984					
$7C1_H$	1985		History 38 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7C5_H$	1989					
$7C6_H$	1990		History 39 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7CA_H$	1994					
$7CB_H$	1995		History 40 Error code/Error occurrence time (Data structure is the same as History 1)			
⋮	⋮					
$7CF_H$	1999					

*1 Pr indicates setting data and Md indicates monitor data.

*2 Indicates whether reading from and writing to a sequence program are enabled.
R: Reading enabled, W: Writing enabled

*3 Data must be written to the buffer memory under the following interlock condition (buffer memory write conditions) of I/O signals.

• Operating condition setting

• Two-point setting

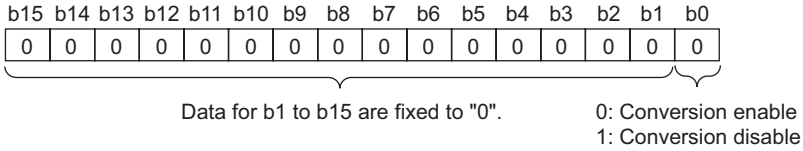
6.2 Setting Data Details

This section describes the buffer memory of the Q61LD in detail. For details on the functions that use this buffer memory, refer to the following.

- FUNCTION (☞ Page 34, CHAPTER 4)

(1) Conversion enable/disable setting (Un\G0)

Whether to enable or disable gross weight output and digital output is set.



(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

Conversion disable (1) is set by default.

(2) Averaging processing method setting (Un\G1)

A method for averaging processing is set. Set the following to the buffer memory.

Description		Setting value
Sampling processing		0_H
Averaging processing	Count average	2_H
	Moving average	3_H
	Combination use of count average and moving average	5_H

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

Combination use of count average and moving average (5_H) is set by default.

Point

- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- When Count average (2_H), Moving average (3_H), or Combination use of count average and moving average (5_H) has been selected for the average processing method setting, set the count to Count average setting (Un\G2) and Moving average setting (Un\G3).

(3) Count average setting (Un\G2)

Set the count average to Count average setting (Un\G2) when Count average (2_H) or Combination use of count average and moving average (5_H) is set to Averaging processing method setting (Un\G1). The setting range is as follows.

Description	Setting range
Count average	4 to 255 (counts)

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default count is 10.

Point

- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- When Sampling processing (0_H) is set for Averaging processing method setting (Un\G1), any value written to Count average setting (Un\G2) is ignored.
- In two-point zero calibration mode, the setting range is limited for each averaging processing method. For details on the limitation of the setting range, refer to the following.
  - Two-point zero calibration (Page 254, Appendix 4.1 (1))

(4) Moving average setting (Un\G3)

Set the moving average to Moving average setting (Un\G3) when Moving average (3_H) or Combination use of count average and moving average (5_H) is set to Averaging processing method setting (Un\G1). The setting range is as follows.

Description	Setting range
Moving average	2 to 255 (counts)

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default count is 10.

Point

- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- When Sampling processing (0_H) is set for Averaging processing method setting (Un\G1), any value written to Moving average setting (Un\G3) is ignored.
- In two-point zero calibration mode, the setting range is limited for each averaging processing method. For details on the limitation of the setting range, refer to the following.
  - Two-point zero calibration (Page 254, Appendix 4.1 (1))

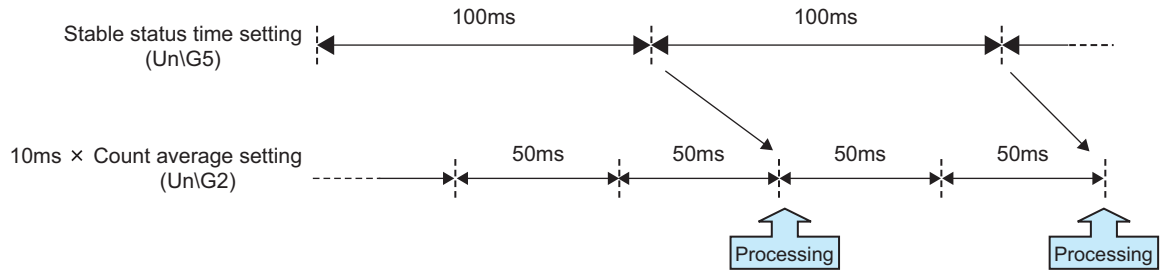
(5) Stable status range setting (Un\G4)/Stable status time setting (Un\G5)

Configure the setting for detecting that Gross weight output value (Un\G100, Un\G101) are stable.
Stable status ranges are set for Gross weight output value (Un\G100, Un\G101).
The setting range is as follows.

Description	Setting range
Stable status range setting (Un\G4)	0 to 100 (× Minimum division (Un\G58))
Stable status time setting (Un\G5)	0 to 100 (× 100ms)

Setting "0" to either of the settings disables the stable status function.
Stable status time setting (Un\G5) can be set in increments of 100ms. Note that, however, it is actually processed with a shift of "10ms × Count average setting (Un\G2)" (time required for storing Gross weight output value (Un\G100, Un\G101) in the buffer memory) from the time setting.

Ex. When the following setting is configured:
- Stable status time setting (Un\G5): 1
- Count average setting (Un\G2): 5



(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default value is 0.

Point

If a value outside the setting range is written, an error occurs and the following status results.
- An error code is stored in Latest error code (Un\G190).
- Error flag (XF) turns on.
- Conversion is performed with the settings before error occurrence.

(6) Zero tracking range setting (Un\G6)/Zero tracking time setting (Un\G7)

This setting is used for automatically correcting a zero point that has been changed due to a temperature change, foreign matter adherence on a weighing machine, or other such reasons after two-point calibration.

Zero tracking ranges are set for Gross weight output value (Un\G100, Un\G101).

The setting range is as follows.

For details on the zero tracking function, refer to the following.

- Zero Tracking Function (☞ Page 86, Section 4.10)

Description	Setting range
Zero tracking range setting (Un\G6)	0 to 100 (× 1/4 of Minimum division (Un\G58))
Zero tracking time setting (Un\G7)	0 to 100 (× 100ms)

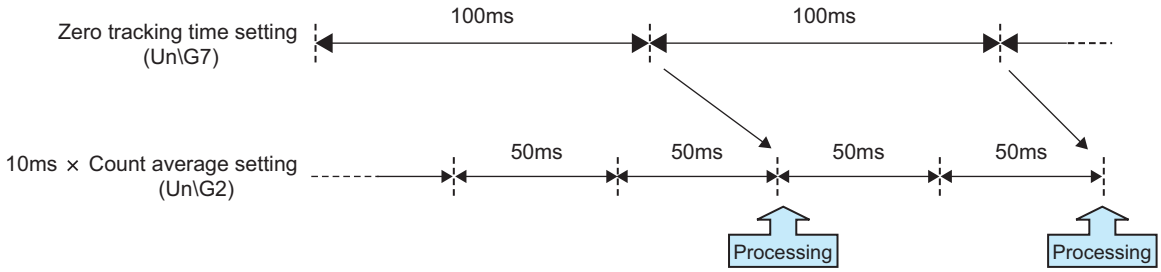
Setting "0" to either of the settings disables the zero tracking function.

For Zero tracking range setting (Un\G6), even if 1/4 of Minimum division (Un\G58) does not become an integer, it is internally calculated to two places of decimals and checked.

Zero tracking time setting (Un\G7) can be set in increments of 100ms. Note that, however, it is actually processed with a shift of "10ms × Count average setting (Un\G2)" (time required for storing Gross weight output value (Un\G100, Un\G101) in the buffer memory) from the time setting.

Ex. When the following setting is configured:

- Zero tracking time setting (Un\G7): 1
- Count average setting (Un\G2): 5



(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default value is 0.

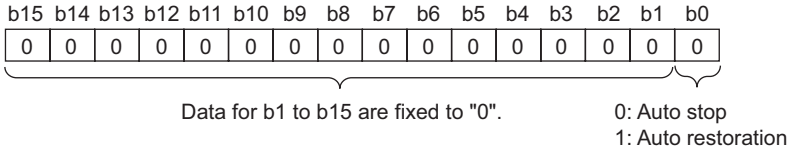
Point

- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- When a ZERO point correction value exceeds Zero point range setting (Un\G22), automatic setting is disabled.

(7) Conversion over/automatic restoration setting (Un\G19)

This setting is used to specify whether to stop operation or restore automatically when the following status occurs in normal mode.

- An analog input (load cell output) exceeds the conversion range.
- Weighing capacity over (1) is set to Input signal error detection flag (Un\G114. b1).



(a) Enabling the settings

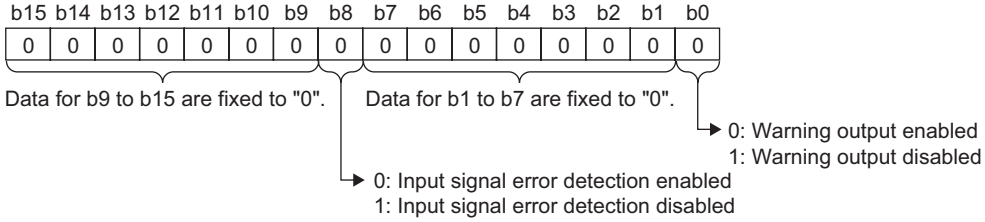
Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

Auto stop (0) is set by default.

(8) Warning output setting (Un\G20)

This setting is used to specify whether to output or stop warnings (upper and lower limit alarms) or input signal error detection warnings.



(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

Warning output disabled (1) and Input signal error detection disable (1) are set by default.

(9) Input signal error detection setting (Un\G21)

This setting is used to set the value by which an analog input value error is detected. The setting range is as follows.

Description	Setting range (ratio against maximum weighing capacity setting value)
Input signal error detection setting	0 to 250 (0.0 to 25.0%)

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default value is 50 (5.0%).

Point

- If Input signal error detection disable (1) is set to Warning output setting (Un\G20. b8), any value set in Input signal error detection setting (Un\G21) is ignored.
- Values can be set in increments of 0.1% but is processed in units of Minimum division (Un\G58) (rounded down at the minimum division).
- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.

(10) Zero point range setting (Un\G22)

This setting is used to set the range in which zero point adjustment is automatically performed if the zero point has been changed due to reasons such as a temperature change and foreign matter adherence of a weighing machine after two-point calibration. Zero point range setting is required. The setting range is as follows.

Description	Setting range (ratio against maximum weighing capacity setting value)
Zero point range	0 to 100 (0.0 to 10.0%)

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

The default value is 100 (10.0%).

Point

- Values can be set in increments of 0.1% but is processed in units of Minimum division (Un\G58) (rounded down at the minimum division).
- If a value outside the setting range is written, an error occurs and the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.

(11)Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31)

This setting is used to set the range in which a warning (upper or lower limit alarm) is caused. The setting range is as follows.

Description	Setting range
Gross weight lower lower limit value setting	-99999 to 99999
Gross weight lower upper limit value setting	
Gross weight upper lower limit value setting	
Gross weight upper upper limit value setting	

(a) Enabling the settings

Turn on and off Operating condition setting request (Y9) to enable the settings.

(b) Default

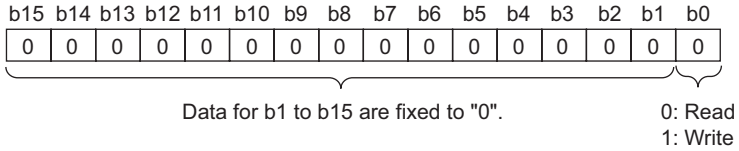
The default value is 0.

Point

- If Warning output disabled (1) is set to Warning output setting (Un\G20. b0), any value set in Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31) is ignored.
- Set a value outside the setting range or under the following condition: lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value ≤ maximum weighing capacity setting value. If the value that has been set fails to satisfy the conditions, the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.

(12)Two-point setting (Un\G40)

This setting is used to specify whether to read or write data required for two-point calibration from or to the buffer memory.



(a) Enabling the settings

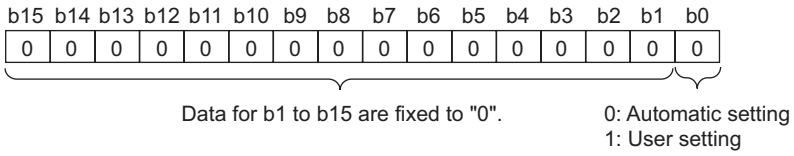
Turn on and off Two-point calibration mode switch request (YA).

(b) Default

Read (0) is set by default.

(13)Two-point calibration method setting (Un\G41)

Select automatic setting or user setting to configure the settings for two-point calibration values.
When two-point calibration processing is performed with automatic setting selected, optimum calibration values are stored automatically.
When performing two-point calibration processing with user setting selected, set a value using a sequence program.



The buffer memory addresses for setting Two-point calibration method setting (Un\G41) are as follows.

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)
- Two-point zero calibration value (Un\G84, Un\G85)*1
- Two-point span calibration value (Un\G86, Un\G87)*1

*1 Direct setting is also enabled in user setting mode.

(a) Default

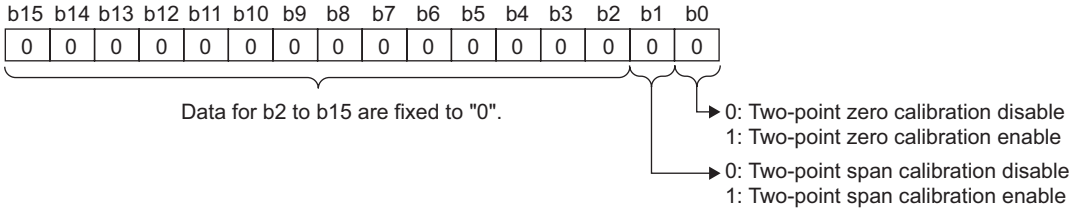
Automatic setting (0) is set by default.

Point

- The following two-point calibration values are stored in non-volatile memory (FeRAM) so that the data will not be erased when the power is cut off.
  - Instrumentation amplifier gain setting (Un\G80)
  - A/D converter gain setting (Un\G81)
  - Tare zero offset output value (Un\G82, Un\G83)
  - Two-point zero calibration value (Un\G84, Un\G85)
  - Two-point span calibration value (Un\G86, Un\G87)
- The conditions for setting values are complicated, so automatic setting is normally useful rather than user setting.

(14)Two-point calibration setting (Un\G42)

This setting is used to specify whether to enable or disable two-point calibration.

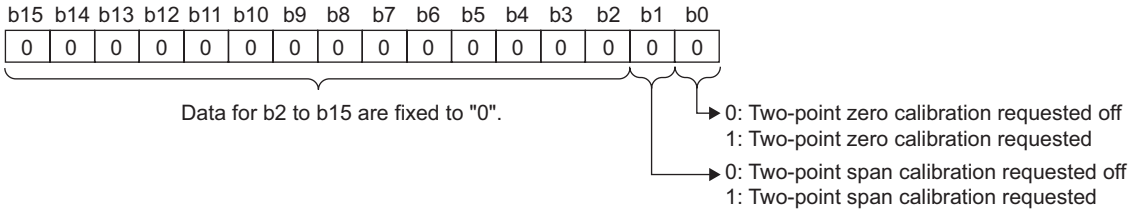


(a) Default

Two-point zero calibration disable (0), and Two-point span calibration disable (0) are set by default.

(15)Two-point calibration request (Un\G43)

This setting requests two-point calibration. Two-point zero calibration and two-point span calibration cannot be requested simultaneously.



(a) Default

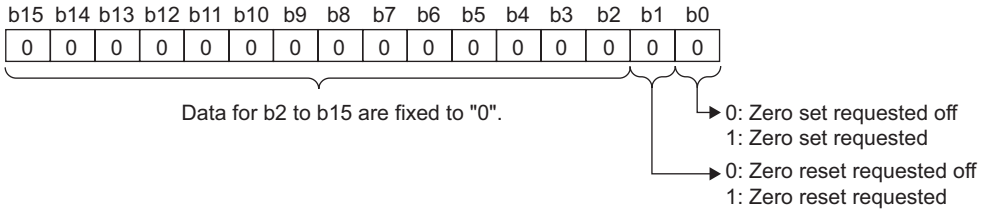
Two-point zero calibration not requested (0) and Two-point span calibration not requested (0) are set by default.

Point

- Set the following before two-point calibration.
  - Load cell rated capacity (Un\G50, Un\G51)
  - Load cell rated output (Un\G52)
  - Number of load cells in connection (Un\G53)
  - Tare zero offset (Un\G54)
  - Maximum weighing capacity setting (Un\G56, Un\G57)
  - Minimum division (Un\G58)
  - Decimal point position (Un\G59)
  - Unit (Un\G60)
  - Standard weight setting (Un\G62, Un\G63)
  - Installation site gravitational acceleration (Un\G64, Un\G65)
  - Calibration site gravitational acceleration (Un\G66, Un\G67)
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)
- If Two-point zero calibration disable (0) is set to Two-point calibration setting (Un\G42. b0) and Two-point span calibration disable (0) is set to Two-point calibration setting (Un\G42. b1), the setting of Two-point calibration request (Un\G43) is ignored.

(16)Zero point adjustment request (Un\G45)

This setting is used to correct a zero point that has been changed due to a temperature change, foreign matter adherence on a weighing machine, or other such reasons after two-point calibration.



(a) Default

Zero set not requested (0) and Zero reset not requested (0) are set by default.

Point

After completing a zero set or zero reset, reset Zero set not requested (0) and Zero reset not requested (0) for Zero point adjustment request (Un\G45).

(17)Default setting registration (Un\G48)

This setting is used to specify whether to enable or disable Default setting registration command (Un\G148).

b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data for b1 to b15 are fixed to "0".

0: Default setting registration disable
1: Default setting registration enable

(a) Default

Default setting registration disable (0) is set by default.

(18)Load cell rated capacity (Un\G50, Un\G51)

This setting is used to set a load cell rated capacity.

The setting range is 1 to 999999 (32-bit signed binary).

(a) Default

The default value is 10000.

Point

- Satisfy the following conditions.
  - Set a value within the setting range.
  - $\text{Standard weight setting (Un\G62, Un\G63)} \leq \text{Maximum weighing capacity setting (Un\G56, Un\G57)} \leq \text{Load cell rated capacity (Un\G50, Un\G51)} \times \text{Number of load cells in connection (Un\G53)}$
  - $1 \geq \dfrac{\text{Capacity setting (Un\G56,Un\G57)} \times \text{Rated output [mV/V]} \times \text{A/D converter gain setting (Un\G81)}^{*1}}{\text{Rated capacities (Un\G50, Un\G51)} \times \text{Connection numbers (Un\G53)} \times \text{Instrumentation amplifier gain setting (Un\G80)}^{*2}}$

*1 For A/D converter gain setting (Un\G81), assign 1, 2, 4, 8, 16, or 32 (times).

*2 For Instrumentation amplifier gain setting (Un\G80), assign 0_H=1.0mV/V, 1_H=2.0mV/V, or 2_H=3.0mV/V.

- If the value that has been set fails to satisfy the conditions, the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- If an error occurs, the setting becomes invalid and the value that has been in the buffer memory is reset to the original value before the setting request was issued.

(19)Load cell rated output (Un\G52)

This setting is used to set a load cell rated output.

The setting range is 3 to 30 (0.3mV/V to 3.0mV/V).

(a) Default

The default value is 30 (3.0mV/V).

Point

- Satisfy the following conditions.
  - Set a value within the setting range.
  - $1 \geq \dfrac{\text{Capacity setting (Un\G56,Un\G57)} \times \text{Rated output [mV/V]} \times \text{A/D converter gain setting (Un\G81)}^{*1}}{\text{Rated capacities (Un\G50, Un\G51)} \times \text{Connection numbers (Un\G53)} \times \text{Instrumentation amplifier gain setting (Un\G80)}^{*2}}$

*1 For A/D converter gain setting (Un\G81), assign 1, 2, 4, 8, 16, or 32 (times).

*2 For Instrumentation amplifier gain setting (Un\G80), assign 0_H=1.0mV/V, 1_H=2.0mV/V, or 2_H=3.0mV/V.

- If the value that has been set fails to satisfy the conditions, the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- If an error occurs, the setting becomes invalid and the value that has been in the buffer memory is reset to the original value before the setting request was issued.

(20)Number of load cells in connection (Un\G53)

This setting is used to set the number of load cells in parallel connection.

The setting range is 1 to 4 (load cells).

(a) Default

The default value is 1 (load cell).

Point

If the setting fails to satisfy the conditions, an error occurs.

For details on the conditions and the information on errors that occur, refer to the following.

- Load cell rated capacity (Un\G50, Un\G51) (☞ Page 135, Section 6.2 (18))

(21)Tare zero offset (Un\G54)

This setting is used to specify whether or not the tare zero offset function is used.

Fixed tare function	Setting value
Used	0_H
Not used	1_H

(a) Default

Used (0_H) is set by default.

Point

- If Not used (1H) is set to Tare zero offset (Un\G54), any value written to A/D converter gain setting (Un\G81) or Tare zero offset output value (Un\G82, Un\G83) is ignored.
- If a value outside the setting range is written, the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- If an error occurs, the setting becomes invalid and the value that has been in the buffer memory is reset to the original value before the setting request was issued.
- When the tare zero offset function is used, it may take a few seconds to perform two-point zero calibration. When performing two-point calibration, do not change the analog input until Two-point calibration completion flag (Un\G143. b0) shows Two-point zero calibration completion (1) after Two-point calibration request (Un\G43. b0) executes Two-point zero calibration requested (1).

(22)Maximum weighing capacity setting (Un\G56, Un\G57)

This setting is used to set the rated capacity value required for use as a weighing machine.

The setting range is 1 to 99999 (32-bit signed binary).

(a) Default

The default value is 10000.

Point

If the setting fails to satisfy the conditions, an error occurs.

For details on the conditions and the information on errors that occur, refer to the following.

- Load cell rated capacity (Un\G50, Un\G51) (☞ Page 135, Section 6.2 (18))

(23)Minimum division (Un\G58)

This setting is used to set the minimum division of Gross weight output value (Un\G100, Un\G101). Digital output value (Un\G102, Un\G103) does not affect this setting.
Gross weight output value (Un\G100, Un\G101) changes according to the value of minimum division relative to 0.
Set a multiple of minimum division for Maximum weighing capacity setting (Un\G56, Un\G57). Warnings are detected in units of minimum divisions of Gross weight output value (Un\G100, Un\G101).

Minimum division	Setting value
1	0_H
2	1_H
5	2_H
10	3_H
20	4_H
50	5_H

Ex. Suppose Maximum weighing capacity setting (Un\G56, Un\G57) is set to 10001 and Minimum division (Un\G58) is set to 10 (3_H);
When Gross weight output value (Un\G100, Un\G101) becomes 10100, not 10092, Input signal error detection flag (Un\G114. b1) becomes Weighing capacity over (1). (Input signal error detection flag (Un\G114. b1) becomes Weighing capacity over (1) under the following condition.)

$$\begin{array}{c}\text{Gross weight}\\ \text{output value}\\ \text{(Un\G100, Un\G101)}\end{array} > \begin{array}{c}\text{Maximum weighing}\\ \text{capacity setting}\\ \text{(Un\G56, Un\G57)}\end{array} + \begin{array}{c}\text{Minimum}\\ \text{division}\\ \text{(Un\G58)}\end{array} \times 9$$

(a) Default

1 (0_H) is set by default.

Point

- If a value outside the setting range is written, the following status results.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- If an error occurs, the setting becomes invalid and the value that has been in the buffer memory is reset to the original value before the setting request was issued.

(24)Decimal point position (Un\G59)

This setting is used to specify how many digits after the decimal point of the load cell rated capacity, maximum weighing capacity, and standard weight are displayed as a digital output.
This setting does not affect Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103).

Decimal point position	Setting value
$\times 10^{0}$	0_H
$\times 10^{-1}$	1_H
$\times 10^{-2}$	2_H
$\times 10^{-3}$	3_H
$\times 10^{-4}$	4_H

(a) Default

$\times 10^{0}(0_H)$ is set by default.

Point

If the setting fails to satisfy the conditions, an error occurs.
For details on the conditions and the information on errors that occur, refer to the following.

- Minimum division (Un\G58) (Page 138, Section 6.2 (23))

(25)Unit (Un\G60)

This setting is used to set the units of load cell rated capacity, maximum weighing capacity, and standard weight.
This setting does not affect Gross weight output value (Un\G100, Un\G101) and Digital output value (Un\G102, Un\G103).

Unit	Setting value
g	0_H
kg	1_H
t	2_H

(a) Default

kg (1_H) is set by default.

Point

If the setting fails to satisfy the conditions, an error occurs.
For details on the conditions and the information on errors that occur, refer to the following.

- Minimum division (Un\G58) (Page 138, Section 6.2 (23))

(26)Standard weight setting (Un\G62, Un\G63)

This setting is used to set the standard weight to be put on the load cell when two-point span calibration is requested by Two-point calibration request (Un\G43).

Usually, as much standard weight as specified by Maximum weighing capacity setting (Un\G56, Un\G57) is put on the load cell to perform two-point span calibration.

The setting range is 1 to 99999 (32-bit signed binary).

(a) Default

The default value is 10000.

Point

- Satisfy the following conditions.
  - A value within the setting range
  - Standard weight setting ≤ Maximum weighing capacity setting (Un\G56, Un\G57) ≤ Load cell rated capacity (Un\G50, Un\G51) × Number of load cells in connection (Un\G53)
- If the value that has been set fails to satisfy the conditions, the following status occurs.
  - An error code is stored in Latest error code (Un\G190).
  - Error flag (XF) turns on.
  - Conversion is performed with the settings before error occurrence.
- If an error occurs, the setting becomes invalid and the value that has been in the buffer memory is reset to the original value before the setting request was issued.

(27)Installation site gravitational acceleration (Un\G64, Un\G65)

This setting is used to set the gravitational acceleration at the installation site.

The setting corrects weight errors caused by a difference in gravitational acceleration when the calibration site differs from the installation site.

This setting is not required when the calibration site and installation site are the same.

The setting range is 97000 to 99999 (9.7000 to 9.9999G) (32-bit signed binary).

(a) Default

The default value is 98067 (9.8067G).

Point

If the setting fails to satisfy the conditions, an error occurs.

For details on the conditions and the information on errors that occur, refer to the following.

- Minimum division (Un\G58) (☞ Page 138, Section 6.2 (23))

(28)Calibration site gravitational acceleration (Un\G66, Un\G67)

This setting is used to set the gravitational acceleration at the calibration site.

The setting corrects weight errors caused by a difference in gravitational acceleration when the calibration site differs from the installation site.

This setting is not required when the calibration site and installation site are the same.

The setting range is 97000 to 99999 (9.7000 to 9.9999G) (32-bit signed binary).

(a) Default

The default value is 98067 (9.8067G).

Point

If the setting fails to satisfy the conditions, an error occurs.
For details on the conditions and the information on errors that occur, refer to the following.

- Minimum division (Un\G58) (Page 138, Section 6.2 (23))

(29)Digital output zero correction value (Un\G68, Un\G69)/Digital output span correction value (Un\G70, Un\G71)

This setting is used to correct Digital output value (Un\G102, Un\G103).

The setting is used to correct zero point misalignment due to individual differences among load cells when Digital output value (Un\G102, Un\G103) is used. This setting does not affect Gross weight output value (Un\G100, Un\G101).

The setting range are as follows (32-bit signed binary).

- Zero calibration value: -65536 to 65535
- Span calibration value: -65536 to 65535 (-65.536% to 65.535%)

Digital output zero correction value (Un\G68, Un\G69) and Digital output span correction value (Un\G70, Un\G71) can be calculated by the following formula.

$$\text{Digital output value (Un\G102, Un\G103)} \times \text{Span calibration value [\%]} + \text{Zero correction value}$$

Ex. 1. When Digital output value (Un\G102, Un\G103) 0 to 9800 is corrected to 0 to 10000;
Because the correction value for 98000 is 200, the rate of Digital output span correction value (Un\G70, Un\G71) is as follows.

200×104.167=208

Accordingly, Digital output span correction value (Un\G70, Un\G71) is 2041 (2.041%).

Ex. 2. When Digital output value (Un\G102, Un\G103) 200 to 10200 is corrected to 0 to 10000;
Because the correction value is -200, Digital output span correction value (Un\G70, Un\G71) is -200.

Ex. 3. When Digital output value (Un\G102, Un\G103) 200 to 9800 is corrected to 0 to 10000;
Because span range 9600 correspond to 10000 and the rate of Digital output span correction value (Un\G70, Un\G71) is 400 per 900, calculation is performed as follows.

400÷9800=0.0416666・・・

Accordingly, Digital output span correction value (Un\G70, Un\G71) is 4.1666.... Because any number cannot be set after the fourth decimal place, the value is rounded off to four decimal places and 4167 is set.

In addition, by performing 4.167% span correction, the output value 200 before correction becomes as follows.

200×104.167=208

Accordingly, Digital output span correction value (Un\G70, Un\G71) becomes -208.

Point

If the setting fails to satisfy the conditions, an error occurs.
For details on the conditions and the information on errors that occur, refer to the following.

- Minimum division (Un\G58) (Page 138, Section 6.2 (23))

(30)Instrumentation amplifier gain setting (Un\G80)

- This setting is used to set gain for amplifying the input from the load cell. Input is amplified in combination with A/D converter gain setting (Un\G81).
- An optimal value is determined by Load cell rated output (Un\G52) and can be set by either Automatic setting (0), or User setting (1) of Two-point calibration method setting (Un\G41).
  Note that if Two-point calibration method setting (Un\G41) is set to User setting (1), the conditions for setting values are complicated. Usually, it is more convenient to set Two-point calibration method setting (Un\G41) to Automatic setting (0).
- Under the following conditions, the most proper value is automatically set according to Load cell rated output (Un\G52).
  Two-point calibration method setting (Un\G41) is set to Automatic setting (0), and Two-point calibration request (Un\G43. b0) is set to Two-point zero calibration requested (1).

Load cell rated output	Setting value
0.3mV/V ≤ rated output ≤ 1.0mV/V	0_H
1.0mV/V ≤ rated output ≤ 2.0mV/V	1_H
2.0mV/V ≤ rated output ≤ 3.0mV/V	2_H

Point

- If the setting fails to satisfy the conditions, an error occurs.
  For details on the conditions and the information on errors that occur, refer to the following.
  - Minimum division (Un\G58) (☞ Page 138, Section 6.2 (23))
- When Two-point calibration method setting (Un\G41) is set to Automatic setting (0), any value directly set in Instrumentation amplifier gain setting (Un\G80) is ignored.

(31)A/D converter gain setting (Un\G81)

- This setting is used to set gain for amplifying the input from the load cell. Input is amplified in combination with Instrumentation amplifier gain setting (Un\G80).
- This setting is enabled when Tare zero offset (Un\G54) is set to Used (0).
- A/D converter gain can be set by setting Two-point calibration method setting (Un\G41) to either Automatic setting (0) or User setting (1).
- An optimal value is determined by three values set in Load cell rated capacity (Un\G50, Un\51), Number of load cells in connection (Un\G53), and Maximum weighing capacity setting (Un\G56, Un\57).
- Under the following conditions, the most proper value is automatically set.
  Two-point calibration method setting (Un\G41) is set to Automatic setting (0), and Two-point calibration request (Un\G43. b0) is set to Two-point zero calibration requested (1).

A/D converter gain setting	Setting value
× 1	0_H
× 2	1_H
× 4	2_H
× 8	3_H
× 16	4_H
× 32	5_H

Point

- If the setting fails to satisfy the conditions, an error occurs.
  For details on the conditions and the information on errors that occur, refer to the following.
  - Minimum division (Un\G58) (Page 138, Section 6.2 (23))
- When Tare zero offset (Un\G54) is set to Not used (1), A/D converter gain setting works as × 1 even when any other value is written.
- When Two-point calibration method setting (Un\G41) is set to Automatic setting (0), any value directly set in A/D converter gain setting (Un\G81) is ignored.

(32)Tare zero offset output value (Un\G82, Un\G83)

- An offset output value is set to erase the fixed tare weight.
- This setting is enabled when Tare zero offset (Un\G54) is set to Used (0). When Tare zero offset (Un\G54) is set to Not used (1), tare zero offset output value is assumed to be 0.
- A tare zero offset output value can be set by Automatic setting (0) or User setting (1) of Two-point calibration method setting (Un\G41).
- To set an output value while setting Two-point calibration method setting (Un\G41) to Automatic setting (0), perform Two-point zero calibration requested (1) of Two-point calibration request (Un\G43. b0). An optimal value is set automatically.
- When using this setting with Two-point calibration method setting (Un\G41) set to User setting (1), refer to Tare Zero Offset Function (☞ Page 51, Section 4.6).
- The setting range is 0 to 65535 (0 to -110%) (32-bit signed binary).

Point

- If the setting fails to satisfy the conditions, an error occurs.
  For details on the conditions and the information on errors that occur, refer to the following.
  - Minimum division (Un\G58) (☞ Page 138, Section 6.2 (23))
- Because Tare zero offset output value (Un\G82, Un\G83) increases in the negative direction, the setting range is 0 to -110%.

(33)Two-point zero calibration value (Un\G84, Un\G85)

This setting is used to set the two-point zero calibration value.

The setting range is -8388608 to 8388607 (32-bit signed binary).

Point

- If the setting fails to satisfy the conditions, an error occurs.
  For details on the conditions and the information on errors that occur, refer to the following.
  - Minimum division (Un\G58) (☞ Page 138, Section 6.2 (23))
- If Two-point calibration method setting (Un\G41) is set to Automatic setting (0) when the sequence program is used, the setting of Two-point zero calibration value is ignored.
- Usually, perform operation with Two-point calibration method setting (Un\G41) set to Automatic setting (0). Calibration with Two-point calibration method setting (Un\G41) set to User setting (1) is performed when calibration value backup data is applied or when fine adjustment is required after calibration is once performed with Two-point calibration method setting (Un\G41) set to Automatic setting (0).

(34)Two-point span calibration value (Un\G86, Un\G87)

This setting is used to set the two-point span calibration value.

The setting range is 1 to 8388607 (32-bit signed binary).

Point

- If the setting fails to satisfy the conditions, an error occurs.
  For details on the conditions and the information on errors that occur, refer to the following.
  - Minimum division (Un\G58) (☞ Page 138, Section 6.2 (23))
- If Two-point calibration method setting (Un\G41) is set to Automatic setting (0) when the sequence program is used, the setting of Two-point zero calibration value is ignored.
- Usually, perform operation with Two-point calibration method setting (Un\G41) set to Automatic setting (0). Calibration with Two-point calibration method setting (Un\G41) set to User setting (1) is performed when calibration value backup data is applied or when fine adjustment is required after calibration is once performed with Two-point calibration method setting (Un\G41) set to Automatic setting (0).

(35)Gross weight output value (Un\G100, Un\G101)

- Gross weight output values are stored.
- Each gross weight output value is represented in 32-bit signed binary.
- Gross weight output values are analog input data (load cell output) represented in weight values (32-bit signed binary) by the following settings.
  - Load cell rated capacity (Un\G50, Un\G51)
  - Load cell rated output (Un\G52)
  - Number of load cells in connection (Un\G53)
  - Tare zero offset (Un\G54)
  - Maximum weighing capacity setting (Un\G56, Un\G57)
  - Minimum division (Un\G58)
  - Decimal point position (Un\G59)
  - Unit (Un\G60)
  - Standard weight setting (Un\G62, Un\G63)
  - Installation site gravitational acceleration (Un\G64, Un\G65)
  - Calibration site gravitational acceleration (Un\G66, Un\G67)
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)
  - Instrumentation amplifier gain setting (Un\G80)
  - A/D converter gain setting (Un\G81)
  - Tare zero offset output value (Un\G82, Un\G83)
  - Two-point zero calibration value (Un\G84, Un\G85)
  - Two-point span calibration value (Un\G86, Un\G87)

(36)Digital output value (Un\G102, Un\G103)

- Conversion values 0 to 10000 are stored for Load cell output 0 [mV/V] to Load cell rated output (Un\G52).
- Each digital output value is represented in 32-bit signed binary.
- This setting is valid while the Q61LD runs with Tare zero offset (Un\G54) set to Not used (1). (☞ Page 27, Section 3.1.1)

(37)Maximum gross weight output value (Un\G104, Un\G105)/Minimum gross weight output value (Un\G106, Un\G107)

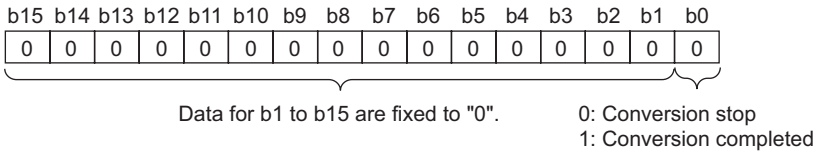
- The maximum and minimum values of Gross weight output value (Un\G100, Un\G101) are stored in 32-bit signed binary every sampling cycle (10ms).
- Even if averaging processing is set, the maximum and minimum values are stored every sampling cycle (10ms).
- The stored values are cleared if Operating condition setting request (Y9) is turned on and off, or if Maximum and minimum values reset request (YD) is turned on.

(38)Maximum digital output value (Un\G108, Un\G109)/Minimum digital output value (Un\G110, Un\G111)

- The maximum and minimum values of Digital output value (Un\G102, Un\G103) are stored in 32-bit signed binary.
- The stored values are reset to the present values if Operating condition setting request (Y9) is turned on and off, or if Maximum and minimum values reset request (YD) is turned on.

(39)Conversion completion flag (Un\G113)

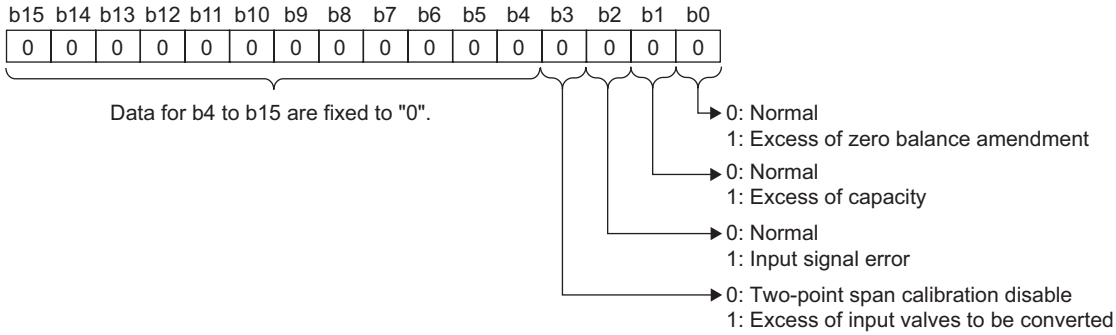
Conversion status can be confirmed.



- Upon completion of the first conversion after conversion permission is given, Conversion completion (1) is set.
- Conversion completion signal (XE) is turned on upon completion of conversion.
  When Operating condition setting request (Y9) is turned on and off, the signal returns to default 0, and is set to Conversion completion (1) again upon completion of the first conversion.

(40)Input signal error detection flag (Un\G114)

Error detection results of an analog input (load cell output) and Gross weight output value (Un\G100, Un\G101) are stored.



(a) Status of Input signal error detection flag (Un\G114)

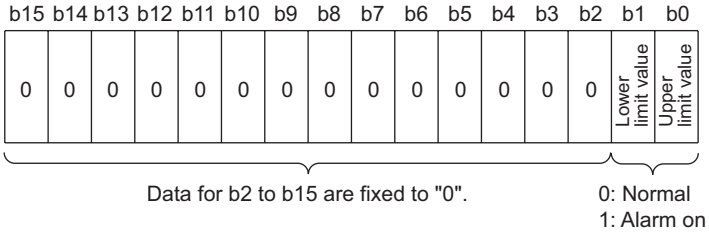
- When the range set in Input signal error detection setting (Un\G21) is exceeded, Input signal error (1) is set.
- When 90% of Maximum weighing capacity setting (Un\G56, Un\G57) is exceeded, Weighing capacity over (1) is set.
- When zero point adjustment is performed beyond the range set in Zero point range setting (Un\G22) starting from the zero point at two-point calibration, Outside the zero point range (1) is set.
- When an analog input exceeds the conversion range during setting Auto restoration (1) in Conversion-over/automatic restoration setting (Un\G19) in normal mode or during operation in two-point calibration mode, Conversion over (1) is set.
- When the same occurs during setting Auto stop (0) in Conversion-over/automatic restoration setting (Un\G19) in normal mode, an error occurs and an error code is stored in Latest error code (Un\G1790).
- When an input signal error, weighing capacity over, outside the zero point range, or conversion over is detected, Input signal error detection signal (XC) turns on.

(b) Clearing of Input signal error detection flag (Un\G114)

- When an input signal error or outside the zero point range occurs, set Gross weight output value (Un\G100, Un\G101) back into the setting range and turn on and off Error clear request (YF).
- When conversion over occurs in two-point calibration mode, set analog input back into the conversion range and turned on and off Error clear request (YF).
- When weighing capacity over occurs during setting Auto restoration (1) in Conversion-over/automatic restoration setting (Un\G19) in normal mode, Input signal error detection flag is cleared if Gross weight output value (Un\G100, Un\G101) is set back into the setting range.
- When conversion over occurs during setting Auto restoration (1) in Conversion-over/automatic restoration setting (Un\G19) in normal mode, Input signal error detection flag is cleared if an analog input is set back into the setting range.
- When weighing capacity over occurs during setting Auto stop (0) in Conversion-over/automatic restoration setting (Un\G19) in normal mode, set Gross weight output value (Un\G100, Un\G101) back into the setting range, and turn on and off Error clear request (YF).

(41)Warning output flag (Un\G115)

Whether a warning output when the gross weight output value falls outside the setting range is an upper limit warning or a lower limit warning can be confirmed.



(a) Status of Warning output flag (Un\G115)

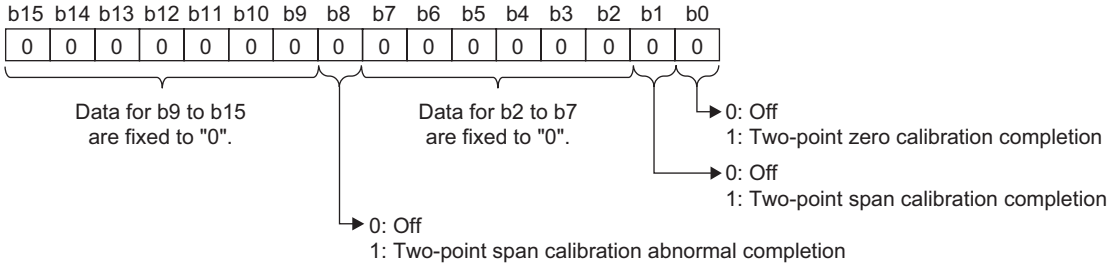
- When a gross weight output value falls outside the ranges set in Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31), this flag turns to Alarm ON (1).
- When a warning is detected, Warning output signal (X8) also turns on.

(b) Clearing of Warning output flag (Un\G115)

When a gross weight output value falls within the setting range, the flag is automatically cleared.

(42)Two-point calibration completion flag (Un\G143)

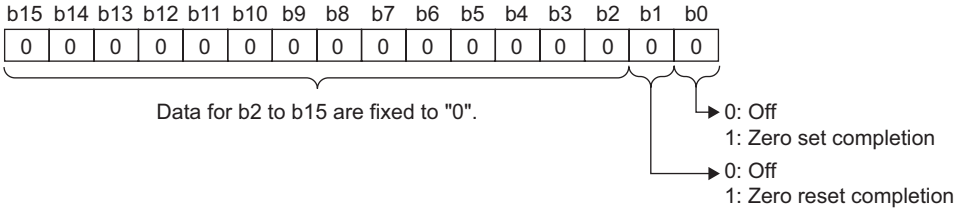
The status of two-point calibration can be checked.



- When a two-point zero calibration is completed, Two-point calibration completion flag (Un\G143. b0) turns to Two-point zero calibration completion (1).
- When a two-point span calibration is completed, Two-point calibration completion flag (Un\G143. b1) turns to Two-point span calibration completion (1).
- When Two-point calibration request (Un\G43. b0) is returned to Two-point zero calibration not requested (0) and Two-point calibration request (Un\G43. b1) is returned to Two-point span calibration requested (0), Two-point calibration completion flag (Un\G143) returns to Off (0).
- When a two-point zero calibration or two-point span calibration is completed abnormally, Two-point calibration completion flag (Un\G143. b8) also turns to Two-point calibration failed (1).

(43)Zero point adjustment completion flag (Un\G145)

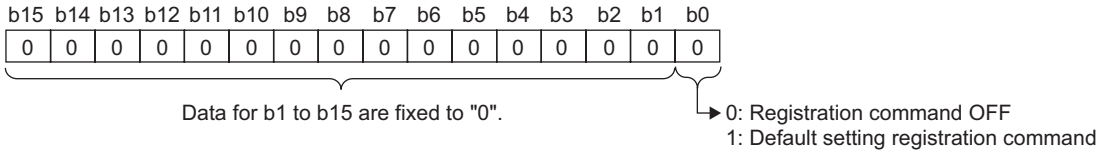
The status of zero set or zero reset can be checked.



- When zero set is completed, Zero point adjustment completion flag (Un\G145. b0) turns to zero set completion (1). When zero reset is completed, Zero point adjustment completion flag (Un\G145. b1) turns to zero reset completion (1).
- When Zero point adjustment request (Un\G45) is set back to Zero set not requested (0) or Zero reset not requested (0), Zero point adjustment completion flag (Un\G145. b0) or Zero point adjustment completion flag (Un\G145. b1) is also set back to Off (0).

(44)Default setting registration command (Un\G148)

This command resets the values set in the buffer memory to the default values.



When the default setting registration is completed, Default value writing completion flag (Un\G149. b0) turns to Default value writing completion (1). Set Default setting registration command (Un\G148) back to Registration command Off (0).

For the buffer memory addresses that are set back to the default values, refer to the following.

- Buffer Memory List (☞ Page 118, Section 6.1)

(a) Default

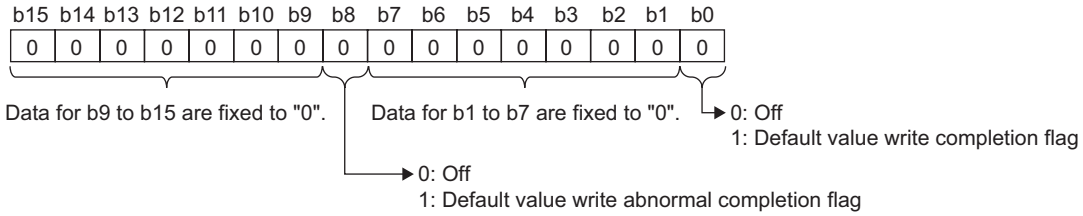
Registration command Off (0) is set by default.

Point

- After Default setting registration command (1) is set, the original set value cannot be restored.
- After Default setting registration command (1) is set, two-point calibration must be performed. Calibration values, if recorded, can be written from the sequence program.
- After default setting value writing is completed, Default setting registration (Un\G48) returns to Default setting registration disable (0).
- While a default setting registration command is in progress, Two-point setting request (Y7), Operating condition setting request (Y9), and Two-point calibration request (Un\G43) must not be executed. Otherwise, an error occurs.

(45)Default value writing completion flag (Un\G149)

The status of default value writing can be checked.

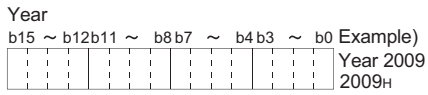
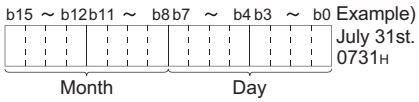
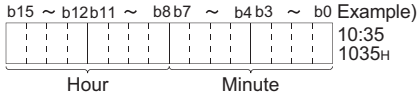
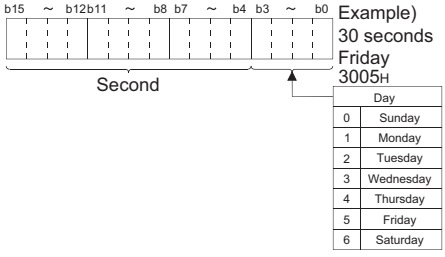


- When the default setting registration by Default setting registration command (Un\G148) is completed, Default value writing completion flag (Un\G149. b0) turns to Default value writing completion (1).
- After Default value writing completion (1) is stored in Default value writing completion flag (Un\G149. b0), set Default setting registration command (Un\G148) back to Registration command Off (0).
  Default value writing completion flag (Un\G149. b0) returns to Off (0).
- When the default value registration is completed abnormally, Default value writing completion flag (Un\G149. b8) turns to Default value writing failed (1), and Default value writing completion flag (Un\G149. b0) turns to Default value writing completion (1).

(46)Latest error code (Un\G190, Un\G1790)/Error occurrence time (Un\G191 to Un\G194, Un\G1791 to Un\G1794)

The latest error code detected by the Q61LD and the error occurrence time can be checked.

- Error codes related to the channel are stored in Latest error code (Un\G190).
- Error codes unrelated to the channel are stored in Latest error code (Un\G1790).
- The time of the latest error occurrence is stored in BCD code in Error occurrence time (Un\G191 to Un\G194, Un\G1791 to Un\G1794).

Buffer memory address	Storage contents
Un\G191, Un\G1791	
Un\G192, Un\G1792	
Un\G193, Un\G1793	
Un\G194, Un\G1794	

(47)Error history□Error code (Un\G1800 to Un\G1999)

Up to 40 errors that occurred in the Q61LD are recorded.

	b15 to b8	b7 to b0
Un\G1800	Error code	
Un\G1801	First two digits of the year	Last two digits of the year
Un\G1802	Month	Day
Un\G1803	Hour	Minute
Un\G1804	Second	Day of the week

The history of up to 40 errors including those related to the channel (errors stored in areas from Un\G190 to Un\G194) and those unrelated to the channel (errors stored in areas from Un\G1790 to Un\G1794) are stored in chronological order.

In addition, latest error information is stored in areas from Un\G1800 to Un\G1804, and the oldest error information is stored in areas from Un\G1995 to Un\G1999.

CHAPTER 7 PROCEDURES AND SETTINGS BEFORE SYSTEM OPERATION

This chapter describes the procedures and wirings for connecting the Q61LD to the system.

7.1 Handling Precautions

- Do not drop or apply excessive shock to the enclosure of the main unit.
- Do not remove the printed-circuit board of the module from the enclosure.
  It may cause a failure.
- Pay attention to prevent foreign matters such as chips of metal or wire from entering the module.
  It can cause fire, failure, or malfunction.
- A protective film is attached on top of the module to prevent foreign matters, such as wire or metal chips, from entering the module during wiring.
  Do not remove the film during wiring.
  Remove the film before operating the system for not to prevent heat dissipation.
- Tighten the module fixing and other screws with the tightening torque range specified in the following table:

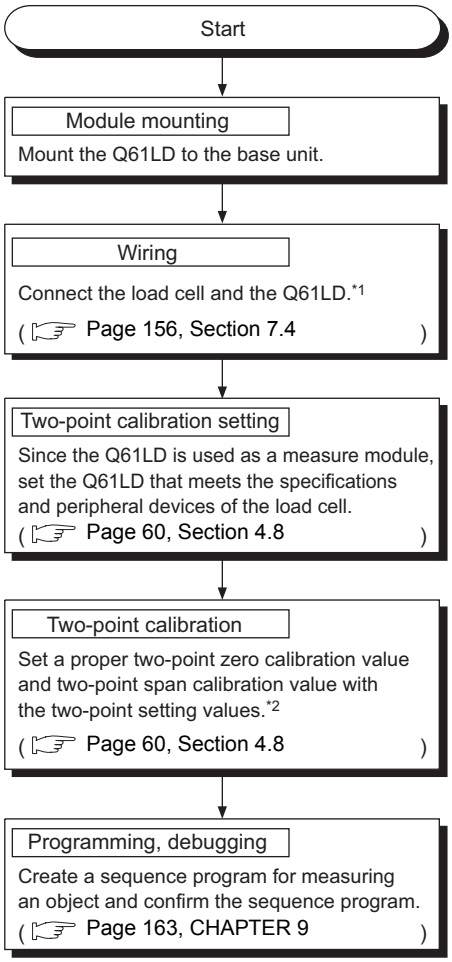
Screw location	Tightening torque range
Module fixing screw (M3)*1	0.36 to 0.48N·m
Terminal block terminal screw (M3)	0.42 to 0.58N·m
Terminal block mounting screw (M3.5)	0.66 to 0.89N·m

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

- To mount the module, while pressing the module mounting lever located in the lower part of the module, fully insert the module fixing projection(s) into the hole(s) in the base unit and press the module until it snaps into place.
  Incorrect mounting can cause malfunction, failure or drop of the module.
  When using the programmable controller in an environment of frequent vibrations, fix the module with a screw.
- Before handling the module, discharge the static electricity from your body by touching an object such as grounded metal.
  Failure to discharge static electricity can cause a failure or malfunction of the module.

7.2 Procedure Before Operation

The procedure of system operation is shown below.

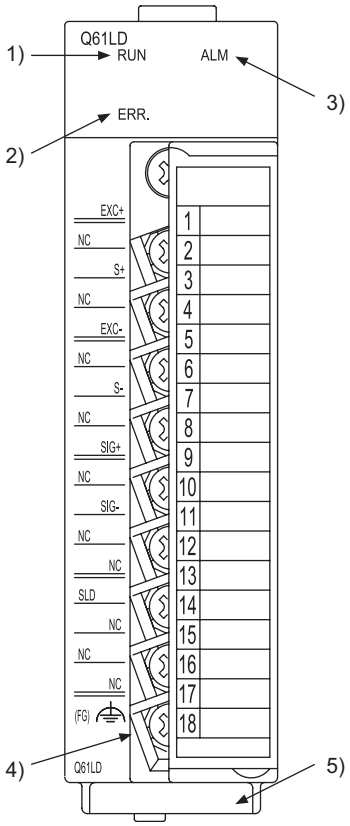


*1 If Conversion enable/disable setting (Un\G0) is set to Conversion enable (0) before completing the wiring, it can cause an error.
The wiring must be made in the 6-wire or 4-wire type. If multiple load cells are to be connected in parallel, be sure to use a summing box.

*2 The calibration values may be set by the user. However, it is done for the case any backup data of the two-point calibration value is to be reflected to the system or when any fine adjustment is required after automatic adjustment has been performed once.

7.3 Part Names

This section describes the part names of the Q61LD.



Terminal number	Signal name	
1	EXC+	2.5VDC Load cell applied voltage terminal (+)
2	NC	Spare
3	S+	Sense
4	NC	Spare
5	EXC-	-2.5VDC Load cell applied voltage terminal (-)
6	NC	Spare
7	S-	Sense
8	NC	Spare
9	SIG+	Load cell output Terminal (+) (analog input)
10	NC	Spare
11	SIG-	Load cell output Terminal (-) (analog input)
12	NC	Spare
13	NC	Spare
14	SLD	Shield ground terminal
15	NC	Spare
16	NC	Spare
17	NC	Spare
18	FG	FG terminal

No.	Name	Description
1)	RUN LED*1	Indicates the operating status of the Q61LD. ON: Normal operation Flashing: Two-point calibration mode OFF: 5VDC power is interrupted, watchdog timer error generated, or when the module can be replaced by online module change
2)	ERR. LED	Indicates the error status of the Q61LD. ON: Error Flashing: Switch setting error (error code: 2) OFF: Normal operation
3)	ALM LED	Indicates the warning status of the Q61LD. ON: Warning (upper and lower limit alarm) Flashing: Input signal error (Input signal error, weighing capacity over, outside the zero point range, or conversion over) OFF: Normal operation
4)	Terminal block	Used for connecting load cells and other wiring.
5)	Serial number display	Displays the serial number of the Q61LD.

*1 When the module is installed in a MELSECNET/H Remote I/O station, the RUN LED remains off until the data link starts to function normally, even after the module is powered on. Once the data link is established, the RUN LED will turn on.

7.4 Wiring

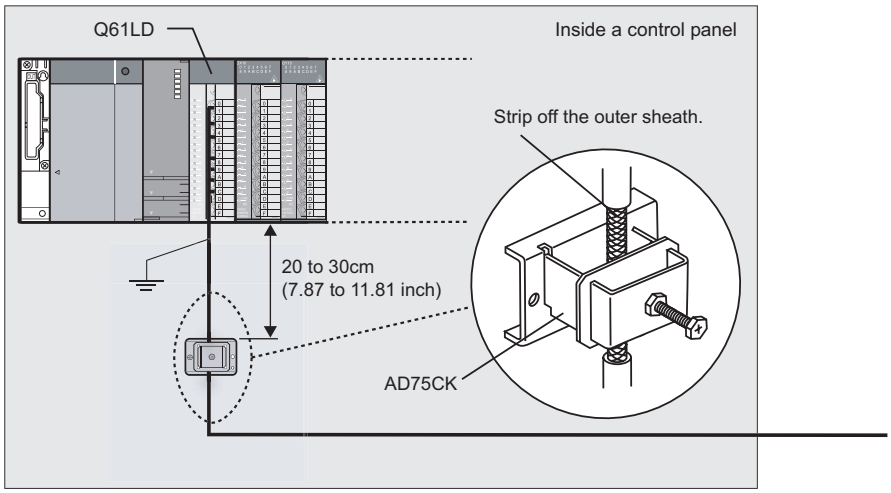
This section describes wiring precautions and examples of module connection.

7.4.1 Wiring precautions

To make full use of the capabilities of the Q61LD and to realize a highly reliable system, the external wiring must be less susceptible to noise.

The precautions for external wiring are listed below:

- Separate the load cell cables from main circuit lines or other AC control cables by at least 100mm.
  Keep a sufficient distance from high voltage lines or any circuit with harmonic components such as a main inverter load circuit.
  Otherwise, the load cell lines may be susceptible to noise, surge, or induction.
- Use shielded cables to connect load cells. Separate the load cell lines from AC lines and other noisy lines (such as for electric power devices and digital devices).
- Use separate cables for AC control circuits and external input signals of the Q61LD to avoid any influence of AC surges or induction.
- Solderless terminals with insulation sleeve cannot be used for terminal blocks.
  It is recommended to cover the ferrule of solderless terminals with a marking tube or insulation tubing.
- Ground the shield of shielded wires or shielded cables at a single point.
- Before starting the wiring work to connect load cells, disconnect all lines of the external power supply to the system.
  Failure to disconnect all lines can result in an excessive voltage applied to the load cell, causing heat generation or damage of the load cell.
- To comply with the EMC and Low Voltage Directives, use shielded twisted pair cables and the AD75CK cable clamp (supplied by Mitsubishi) to ground the shields to the panel.



For more details, refer to the following.

AD75CK-type Cable Clamping Instruction Manual

7.4.2 External wiring

Examples of external wiring of the Q61LD are shown below.

For the wiring, the following two points are recommended:

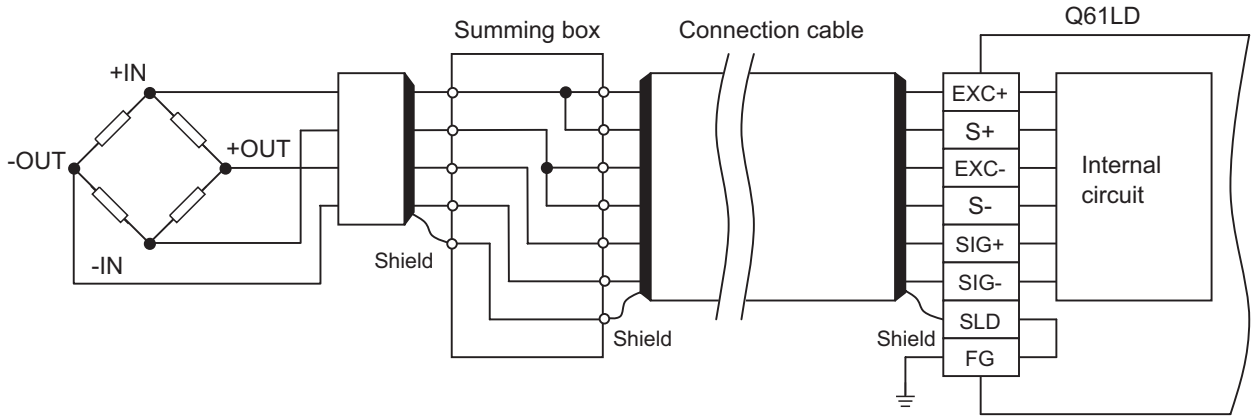
- Use 6-wire type connection.
- Install the summing box at a location near to the load cell side.

In addition, the resistance of the conducting wire that connects between the Q61LD and the load cell must not exceed 5Ω.

(1) 6-wire type connection

The analog input (load cell output) terminals of the Q61LD are designed for the 6-wire type to use remote sensing.

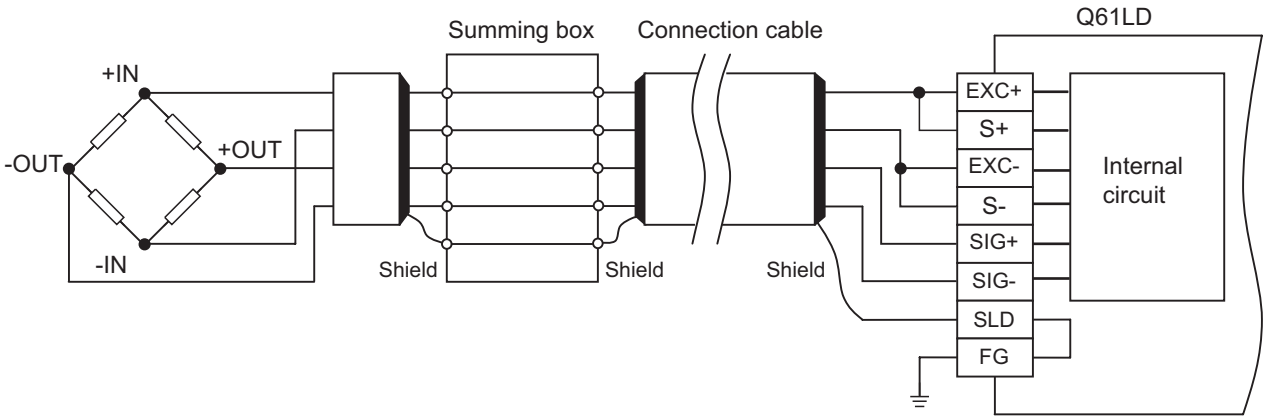
The following figure shows the connection example of the 6-wire type.



(2) 4-wire type connection

Although the analog input (load cell output) interface of the Q61LD is designed for the 6-wire type, it is also compatible with 4-wire type connection by connecting EXC+ to S+ and EXC- to S-.

The following figure shows the connection example of the 4-wire type.



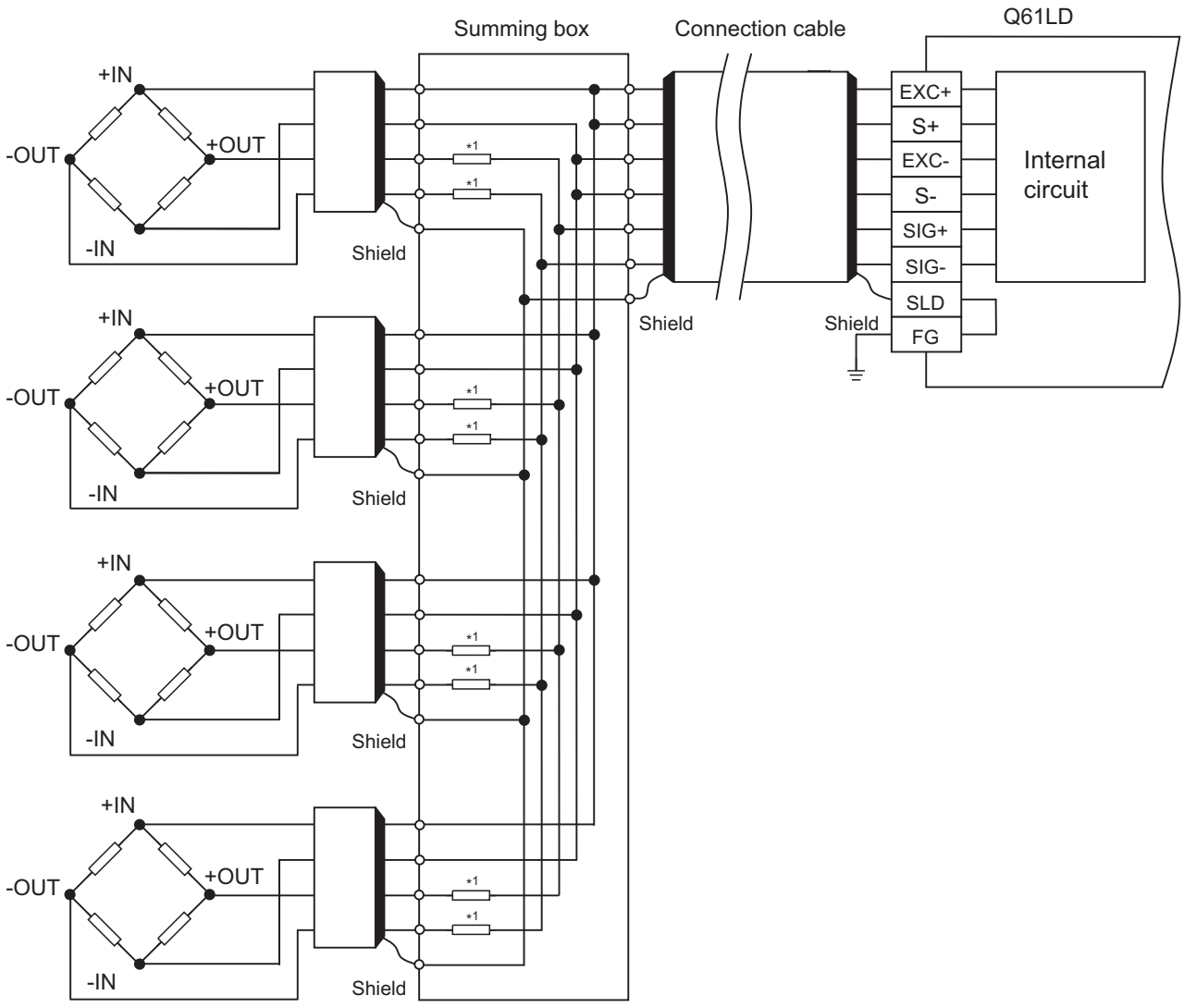
Point

When the 4-wire type is used for connecting the Q61LD to the load cell, connect EXC+ to S+ and EXC- to S-, and never leave the S+ and S- terminals open circuit.
If the terminals are left open circuit, an excessive voltage may be applied to the load cell, to cause over-heating or damage of the load cell.

(3) Parallel connection of load cells

By connecting multiple load cells to the Q61LD in parallel, a hopper scale system or track scale system can be implemented.

The following figure shows the example of parallel connection.



*1 The averaging resistors (R) must have the resistance value of 300 to 500Ω with an excellent temperature coefficient (e.g., the ppm/°C value must not be better than that of the module performance), and the relative ratio must be equal among the resistors.
For proper selection, please consult with the manufacturer of the load cell.
The averaging resistors (R) are not required if the load cell output voltages have been adjusted assuming parallel connection.

Point

Multiple load cells used require the same specifications.
Multiple load cells connected in parallel can be regarded as a single load cell of which rated capacity is n times the capacity of each cell, where n is the number of identical load cells connected in parallel.

CHAPTER 8 VARIOUS SETTINGS

This chapter describes the procedures of various settings.

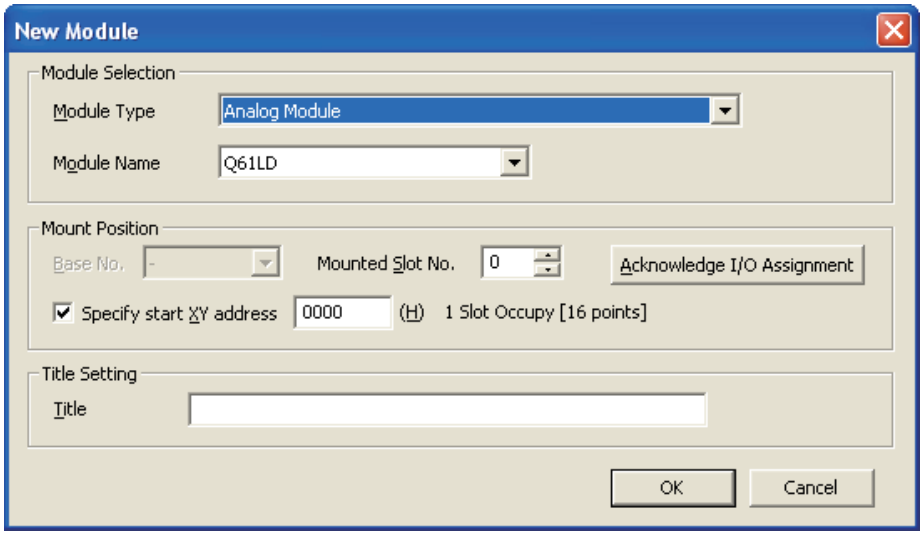
8.1 Adding Modules

This section describes how to add the Q61LD to be used in a project.

(1) How to add a new module

The necessary settings are to be made in the "New Module" window.

Project window ⇨ [Intelligent Function Module] ⇨ Right-click ⇨ [New Module]



Item		Description
Module Selection	Module Type	Select "Analog Module".
	Module Name	Select "Q61LD".
Mount Position	Base No.	Specify the base number to which the target module is to be mounted.
	Mounted Slot No.	Specify the slot number to mount the Q61LD.
	Specify start XY address	Set the start I/O number (in hex number) corresponding to the mounted slot number. It is also allowed to manually set the number.
Title Setting	Title	Set an appropriate title of your choice.

8.2 Parameter Setting

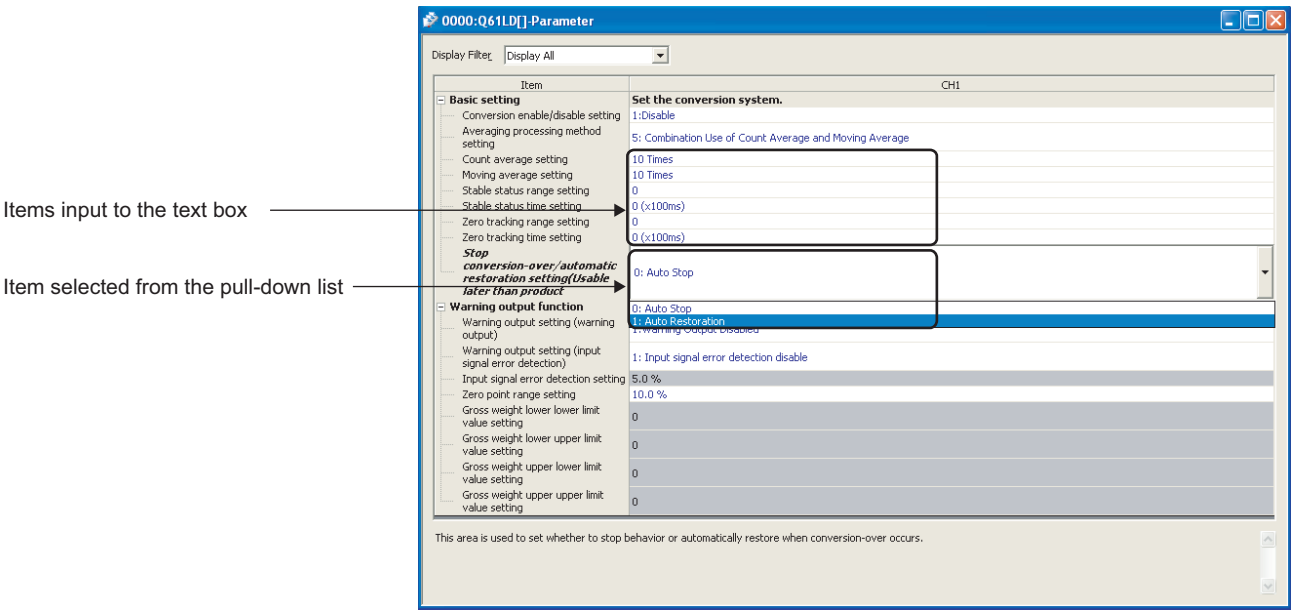
Use the “Parameter” window to set various parameters.

(1) Setting method

The parameters are set in the "Parameter" window.

1. **Startup "Parameter".**

Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Parameter]



2. **Double-click on the item to be set and enter the parameter value.**

- Text box entry
  Double-click on the item to be set and enter the numerical value.
- Entry from pull-down list
  Double-click on the item to show the pull-down list and select a desired item.

Item		Setting value	Reference
Basic setting	Conversion enable/disable setting	• 0: Enable • 1: Disable	Page 49, Section 4.4
	Averaging processing method setting	• 0: Sampling Processing • 2: Count Average • 3: Moving Average • 5: Combination Use of Count Average and Moving Average	Page 82, Section 4.9
	Count average setting	4 to 255	
	Moving average setting	2 to 255	
	Stable status range setting	0 to 100 ("Minimum division")	Page 105, Section 4.15
	Stable status time setting	0 to 100 (× 100ms)	
	Zero tracking range setting	0 to 100 (× 1/4 of "Minimum division")	Page 86, Section 4.10
	Zero tracking time setting	0 to 100 (× 100ms)	
	Conversion-over/automatic restoration setting (Usable later than product	• 0: Auto Stop • 1: Auto Restoration	Page 91, Section 4.12
Warning output function	Warning output setting (warning output)	• 0: Warning Output Enabled • 1: Warning Output Disabled	Page 100, Section 4.13
	Warning output setting (input signal error detection)	• 0: Input signal error detection enable • 1: Input signal error detection disable	
	Input signal error detection setting	0.0 to 25.0	
	Zero point range setting	0.0 to 10.0	
	Gross weight lower lower limit value setting	-99999 to 99999	
	Gross weight lower upper limit value setting	-99999 to 99999	
	Gross weight upper lower limit value setting	-99999 to 99999	
	Gross weight upper upper limit value setting	-99999 to 99999	

8.3 Auto Refresh Setting

This setting is used to transfer buffer memory data to a specified device.

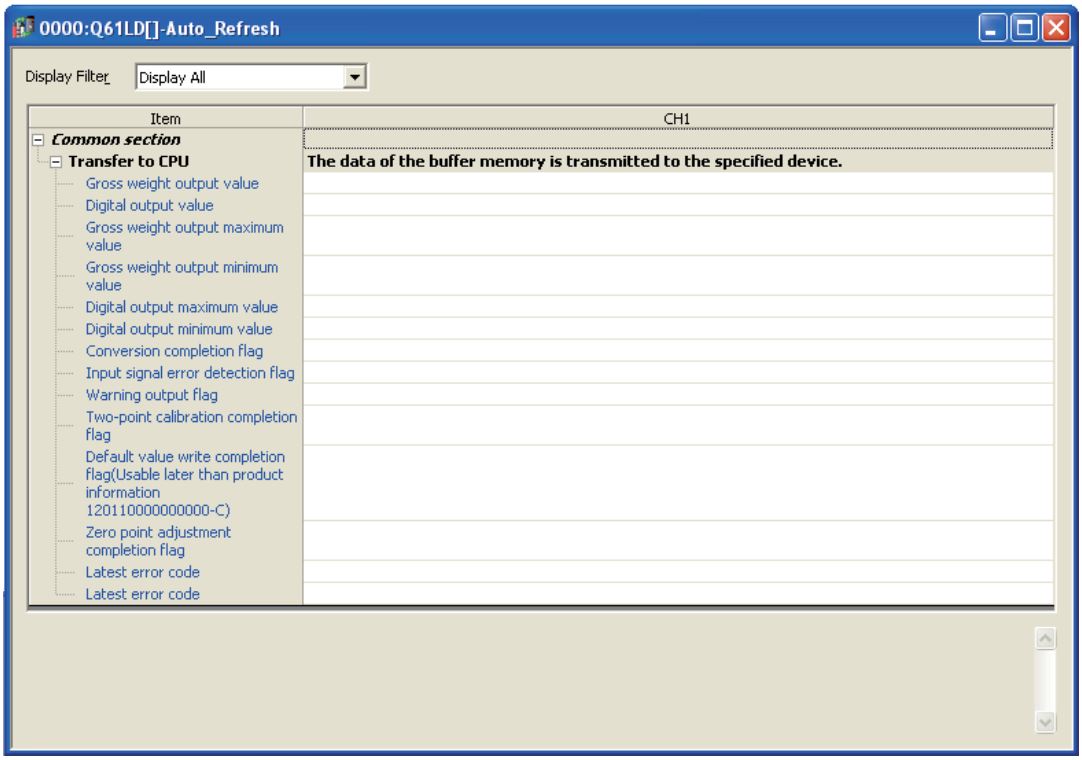
(1) Setting method

The setting is made in the "Auto_Refresh" window.

1. Start up "Auto_Refresh".

Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Auto_Refresh]

2. Click on the item to be set and enter the target device to be automatically refreshed.



8.4 Two-point Calibration

For the two-point calibration setting, refer to the following.

- Setting method (☞ Page 61, Section 4.8.2)

8.5 Default Setting Registration

For the default setting registration, refer to the following.

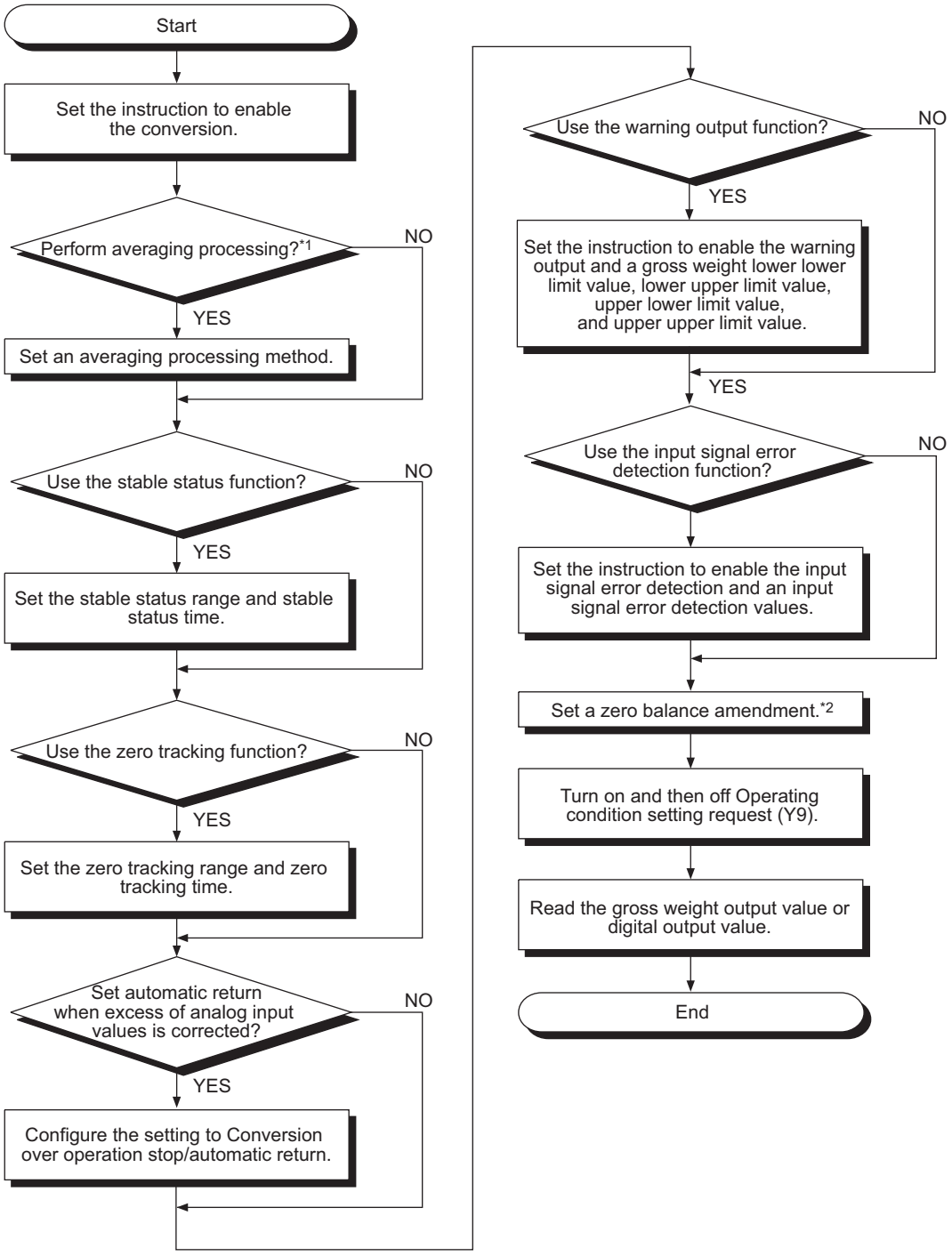
- Default Setting Registration Function (☞ Page 107, Section 4.18)

CHAPTER 9 PROGRAMMING

This chapter describes programming for the Q61LD.
When applying the program examples introduced in this chapter to an actual system, ensure the applicability and confirm that it will not cause system control problems.

9.1 Programming Procedure

Create a program in which a gross weight output value is read with the Q61LD.



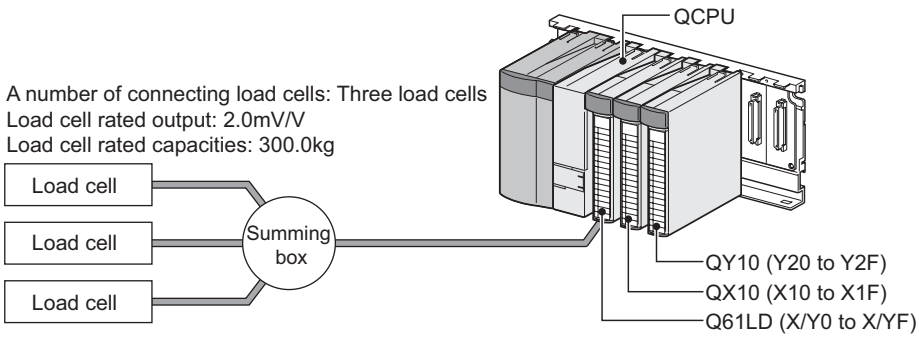
*1 If gross weight output values are not stable after two-point zero calibration or two-point span calibration, perform averaging processing before two-point calibration.

*2 Always set the range.

9.2 Programming in Normal System Configuration

Program examples are shown in the following system configuration.

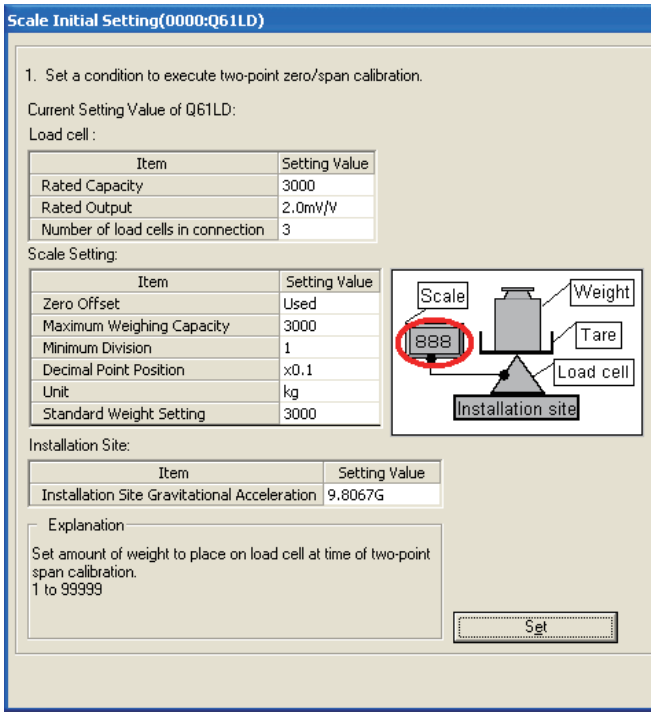
(1) System configuration



(2) Programming conditions

(a) Scale Initial Setting

Make the following settings in the "Scale Initial Setting" window and perform two-point calibration.



Item	Description
Rated Capacity	Set 300.0kg.
Rated Output	Set 2.0mV/V.
Number of load cells in connection	Set 3 modules.
Zero Offset	Use the tare zero offset function.
Maximum Weighing Capacity	Set 300.0kg.
Minimum Division	Set 0.1kg.
Decimal Point Position	Set × 10^{-1} (first decimal place).
Unit	Set kg.
Standard Weight Setting	Set 300.0kg.
Installation Site Gravitational Acceleration	Set 9.8067G.

(b) Initial setting value

Item	Description
Conversion enable/disable setting	Enable conversion.
Averaging processing method setting	Set combination use of count average and moving average.
Count average setting	Set 10 times.
Moving average setting	Set 16 times.
Stable status range setting	Set 0.2kg.
Stable status time setting	Set 1.0 second.
Zero tracking range setting	Set 0.05kg (1/2 scale).
Zero tracking time setting	Set 10.0 second.
Conversion-over/automatic restoration setting	Set Auto Stop.
Warning output setting (warning output)	Set Warning output enable.
Warning output setting (input signal error detection)	Set Input signal error detection setting to enable.
Input signal error detection setting	Set 5.0% (15.0kg).
Zero point range setting	Set ±10.0% (30.0kg).
Gross weight lower lower limit value setting	Set -10.0kg.
Gross weight lower upper limit value setting	Set -5.0kg.
Gross weight upper lower limit value setting	Set 245.0kg.
Gross weight upper upper limit value setting	Set 250.0kg.

(c) Zero point adjustment request (Un\G45)

Set Zero point adjustment request (Un\G45) to correct the zero point.

(3) Device list

Device	Function	
X0	Module ready	Q61LD (X/Y0 to X/YF)
X1	Stable status	
X2	Center point status	
X3	Output value hold status flag	
X7	Two-point setting completion flag	
X8	Warning output signal	
X9	Operating condition setting completion flag	
XA	Two-point calibration mode status flag	
XC	Input signal error detection	
XE	Conversion completion signal	
XF	Error flag	
Y7	Two-point setting request	
Y9	Operating condition setting request	
YF	Error clear request	
X19	Error clear command	QX10 (X10 to X1F)
X1A	Zero set command	
X1B	Zero reset command	
Y20 to Y2F	Error code display (4 digits in BCD)	QY10 (Y20 to Y2F)
D14, D15	Near zero point setting	
D34	Input signal error detection flag	
D35	Warning output flag	

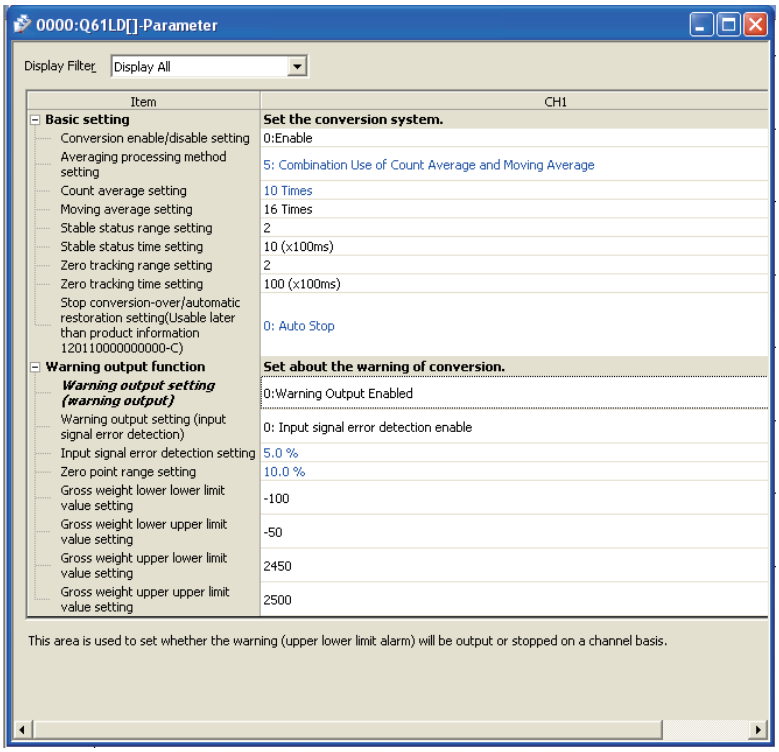
Device	Function
D36	Zero point adjustment completion flag
M0	Operating condition setting command
M1	Gross weight output conversion in processing
M2	Near zero point
M3	Outside the zero point range
M4	Weighing capacity over
M5	Input signal error detection
M6	Gross weight upper limit
M7	Gross weight lower limit
M8	Stable status output
M9	Center zero point output
M12	Conversion over
M40	Simultaneous request interlock

(4) Program example using intelligent function module parameters

(a) Parameter setting

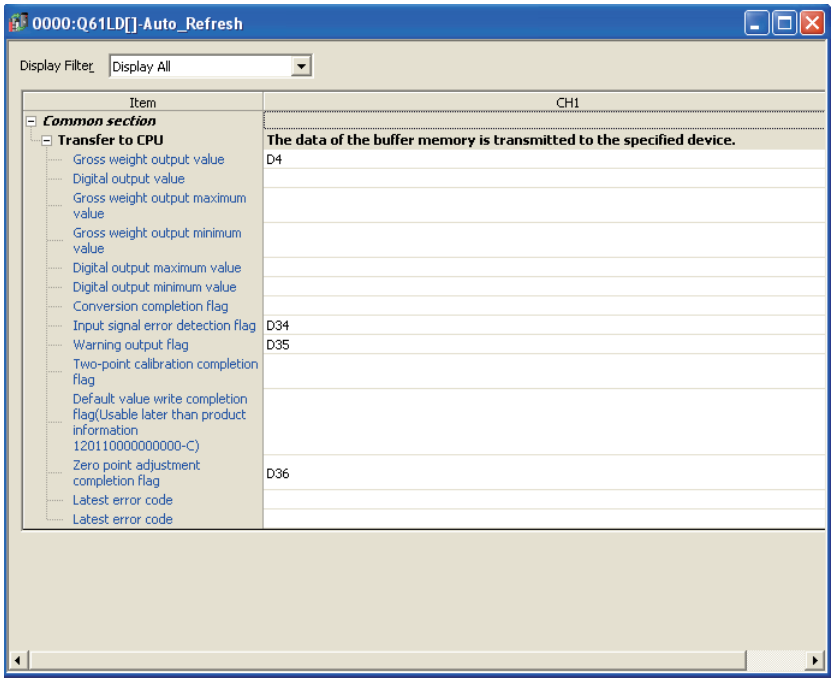
Set the initial settings to parameters.

Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Parameter]



(b) Auto refresh setting

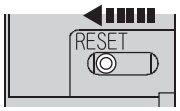
Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Auto_Refresh]



(c) Writing intelligent function module parameters

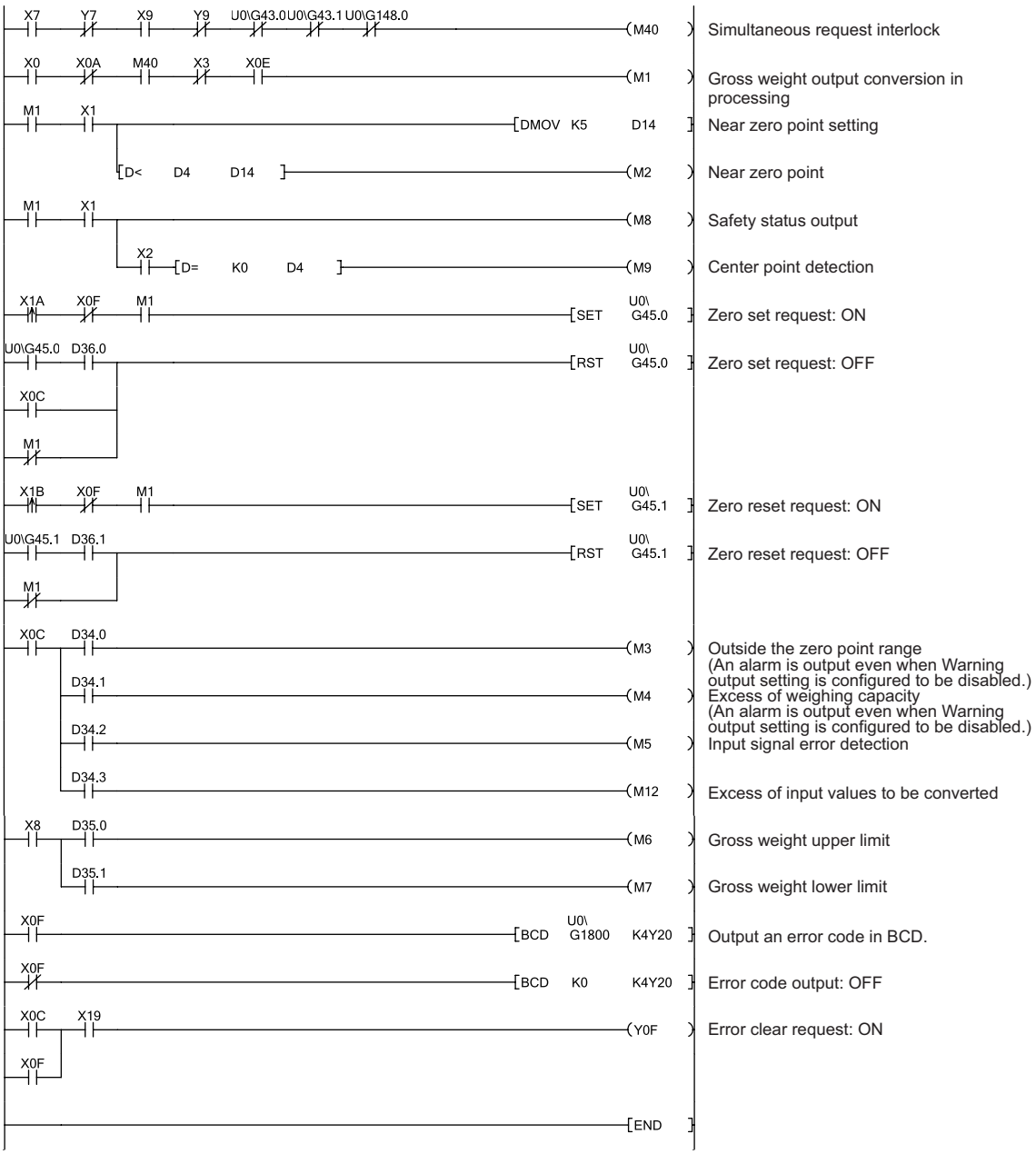
Write the set parameters to the CPU module. Then reset the CPU module or power off and on the programmable controller.

[Online] ⇨ [Write to PLC]



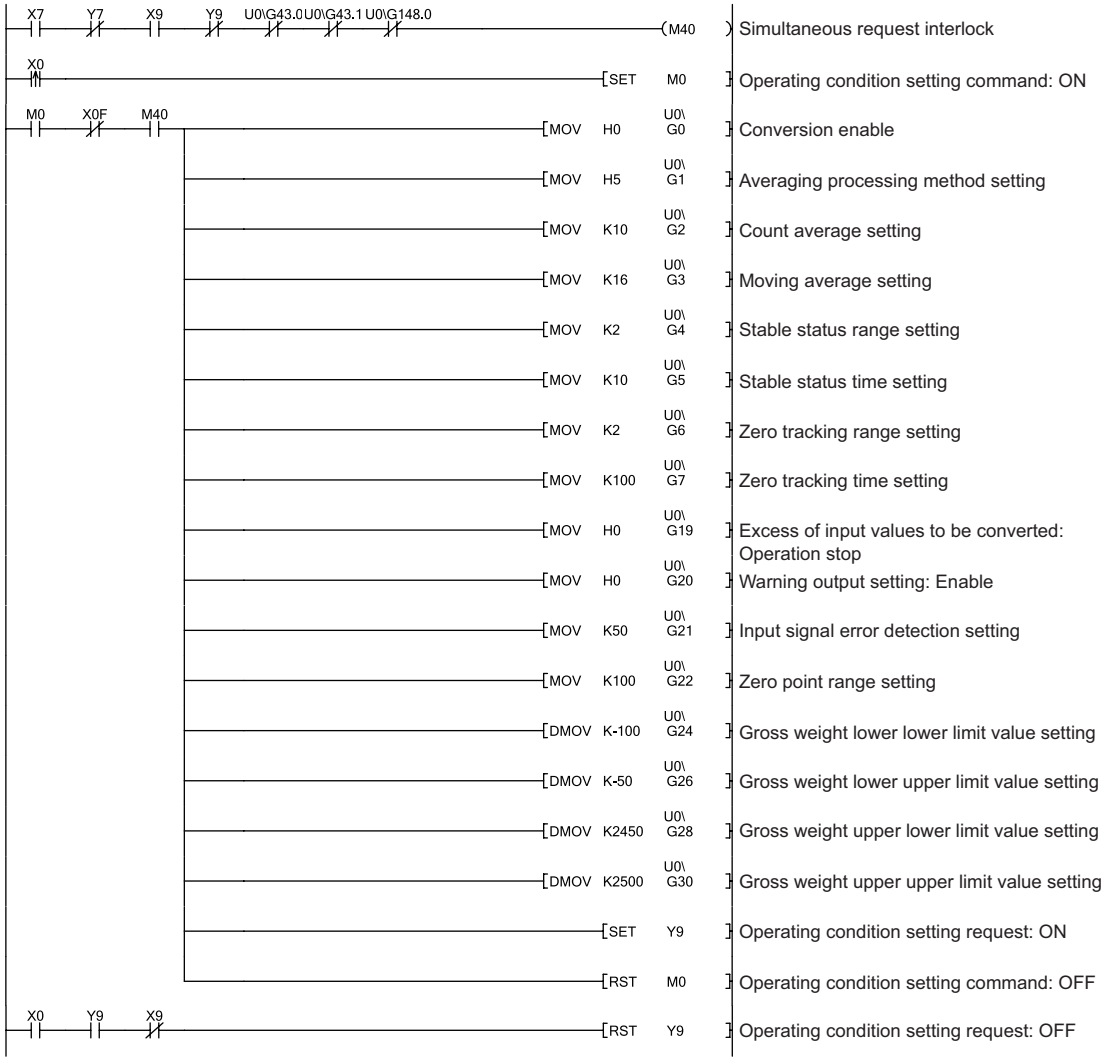
or Power off → on

(d) Program example

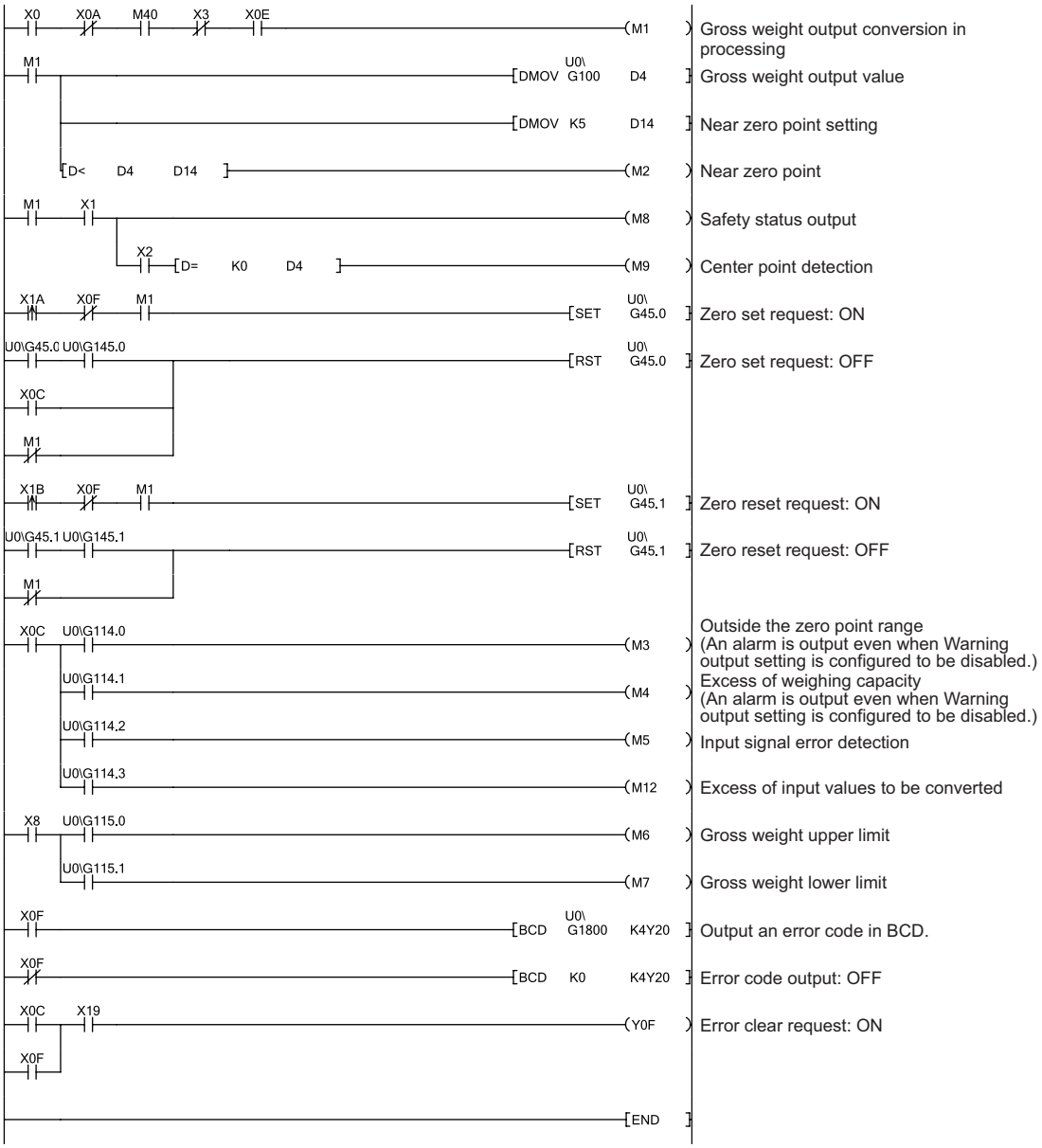


(5) Program example without using intelligent function module parameters

(a) Initial setting for reading a gross weight output value



(b) Reading a gross weight output value



Remark

For details on how to calculate a gross weight output value, refer to the following.

- Calculation of gross weight output value (☞ Page 73, Section 4.8.3)

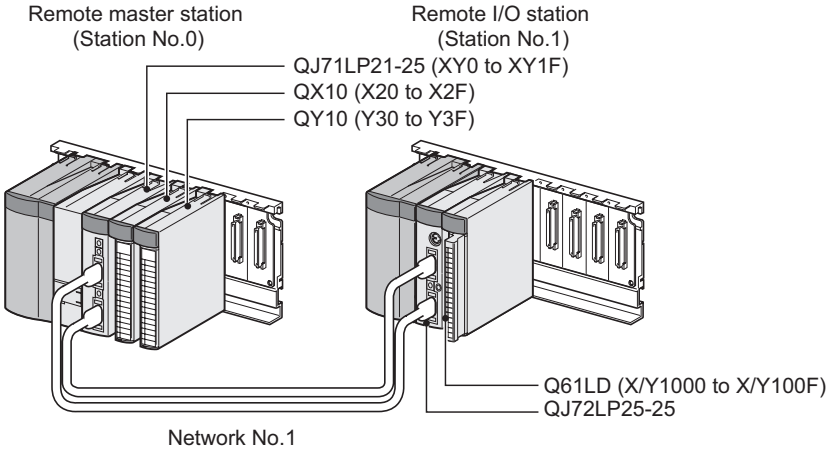
9.3 Programming for Remote I/O Network

This section describes a system configuration using the Q61LD in the remote I/O network and some program examples.

Point

- For details on MELSECNET/H remote I/O network, refer to the following.
  Q Corresponding MELSECNET/H Network System Reference Manual (Remote I/O network)
- For a program example for constant amount control, refer to the following.
  Program Example for Constant Amount Control (Page 187, Section 9.4)

(1) System configuration



(2) Programming conditions

The programming conditions are the same as those for use in the normal system configuration.

- Programming conditions (Page 166, Section 9.2 (2))

(3) Device list

Device	Function	
X29	Error clear command	QX10 (X20 to X2F)
X2A	Zero set command	
X2B	Zero reset command	
X2C	Initial setting request signal	
Y30 to Y3F	Error code display (4 digits in BCD)	QY10 (Y30 to Y3F)
X1000	Module ready	Q61LD (X/Y1000 to X/Y100F)
X1001	Stable status	
X1002	Center point status	
X1003	Output value hold status flag	
X1008	Warning output signal	
X1009	Operating condition setting completion flag	
X100C	Input signal error detection	
X100E	Conversion completion signal	
X100F	Error flag	
Y1009	Operating condition setting request	
Y100F	Error clear request	
D1000 to D1007	Devices storing data that are written with the Z(P).REMTO instruction (Initial setting value, zero point adjustment request)	
D1019 to D1022		
D1024 to D1031		
D1045		
D1100 to D1111		
D1113 to D1115		
D1145		
D1190		
M0	Gross weight output conversion in processing	
M2	Outside the zero point range	
M3	Weighing capacity over	
M4	Input signal error detection	
M5	Gross weight upper limit	
M6	Gross weight lower limit	
M7	Conversion over	
M8	Stable status output	
M9	Center zero point output	
M100	Master module status check device (for execution of the MC and MCR instructions)	
M101	Initial setting auxiliary device	
M102	Initial setting auxiliary device	
M103	Initial setting start flag storage device	
M104	Initial setting completion flag storage device	

Device	Function
M210 to M212	Completion devices and auxiliary devices of the Z(P).REMTO instruction
M220 to M222	
M230 to M232	
M260 to M262	
M270 to M272	
M280 to M282	
M290 to M292	
M300 to M302	Completion devices and auxiliary devices of the Z(P).REMFR instruction
M310 to M312	
M320 to M322	
M330 to M332	
SB20	Network module status
SB47	Master station baton pass status
SB49	Master station data link status
SW70	Remote I/O station baton pass status
SW74	Remote I/O station data link status
SW78	Remote I/O station parameter communication status
T100 to T104	High-speed timer for interlock for master station and remote I/O station
W4	Gross weight output value
W34	Input signal error detection flag
W35	Setting a device storing a warning output flag
W36	Zero point adjustment completion flag

(4) Precautions when using dedicated instructions, Z(P).REMTO and Z(P).REMFR

Dedicated instructions Z(P).REMTO and Z(P).REMFR for reading and writing the buffer memory in an intelligent function module on a remote I/O station are executed for over several scans. Therefore, they cannot be synchronized with X/Y signals.

To read the gross weight output value of the Q61LD, Conversion completion flag (Un\G113) must be read together.

Also, when changing the initial setting, an interlock needs to be provided to prevent Z(P).REMFR from being executed.

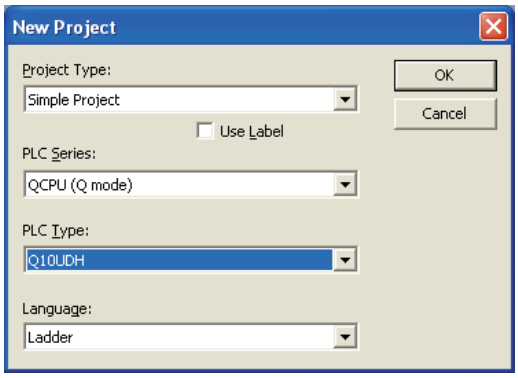
Refer to the processing for reading a gross weight output value in a program example provided in this section.

(5) Setting on the master station side

1. Create a GX Works2 project.

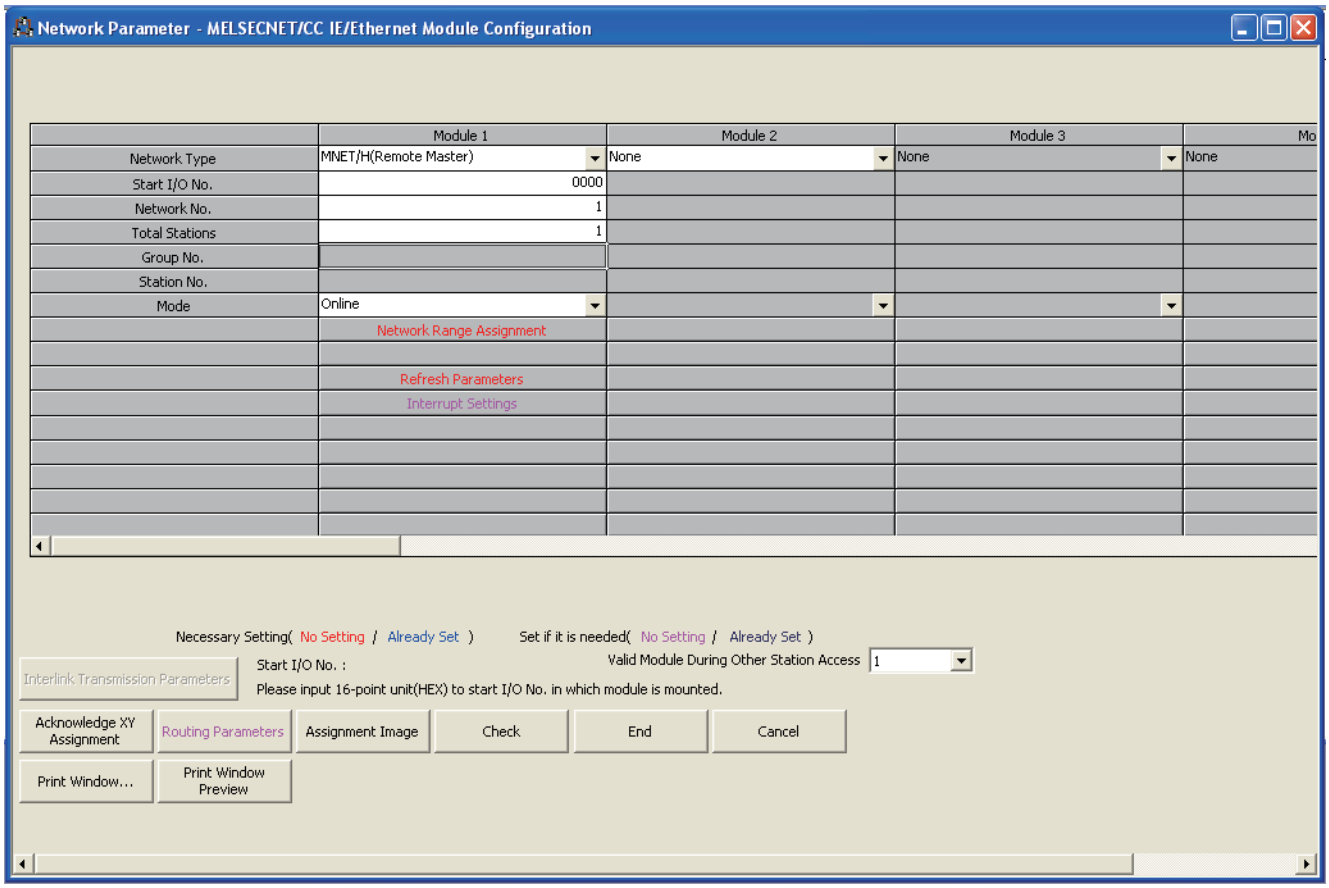
Select "QCPU (Q mode)" from "PLC Series", and select the CPU module to be used from "PLC Type".

[Project] ⇨ [New Project]



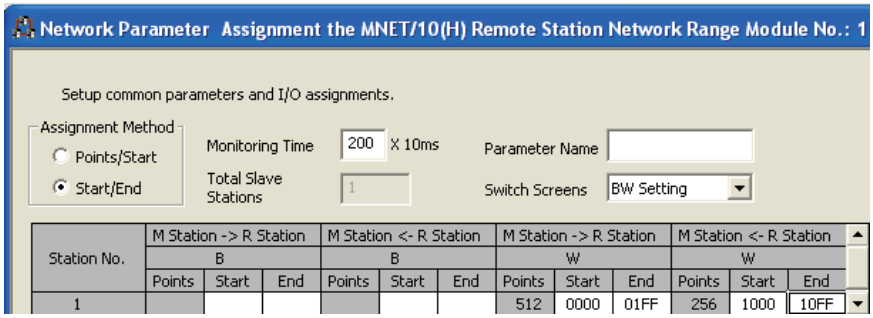
2. Open the network parameter setting window and set the following.

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

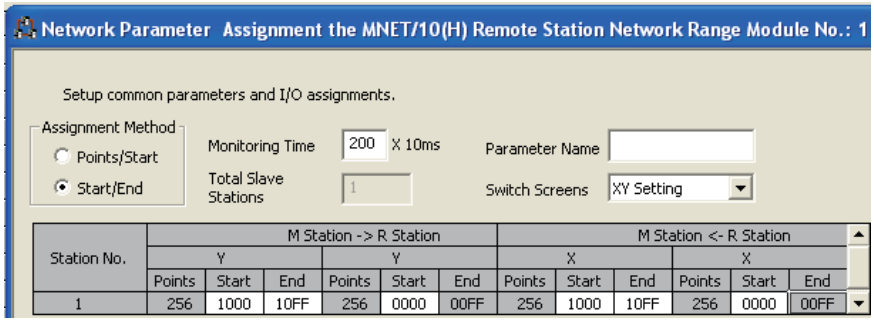


3. **Open the network range assignment window and set the following.**

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

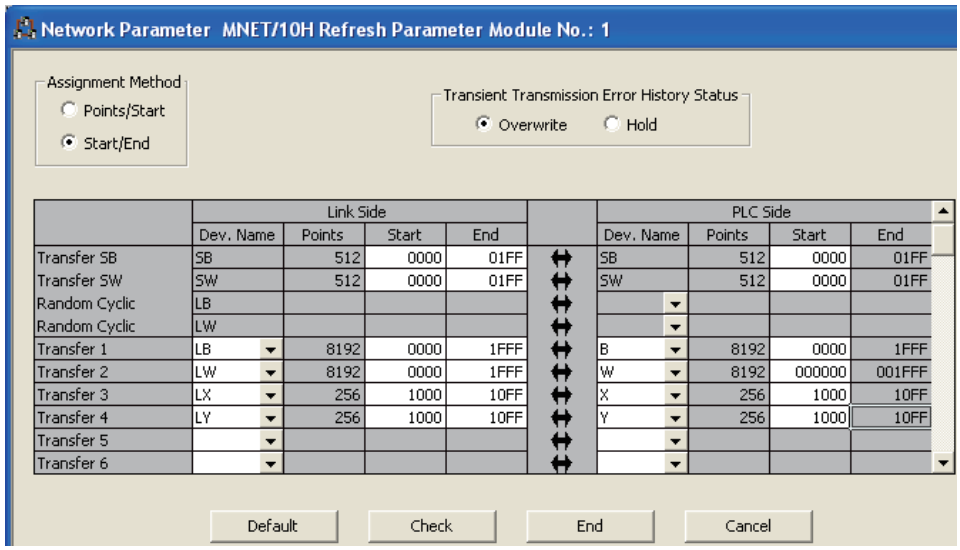


Project window ⇨ [Parameter] ⇨ [Network Parameter] ⇨ [Ethernet/CC IE/MELSECNET] ⇨ Network Range Assignment button ⇨"Switch Screens" ⇨ "XY Setting"



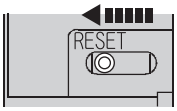
4. **Open the Refresh Parameters setting window and set the following.**

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



5. Write the set parameters to the CPU module of the master station. Then reset the CPU module or power off and on the programmable controller.

[Online] ⇨ [Write to PLC]



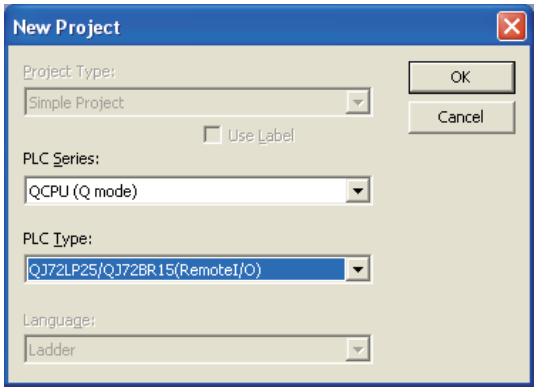
or Power off → on

(6) Setting on remote I/O station side

1. Create a QX Works2 project.

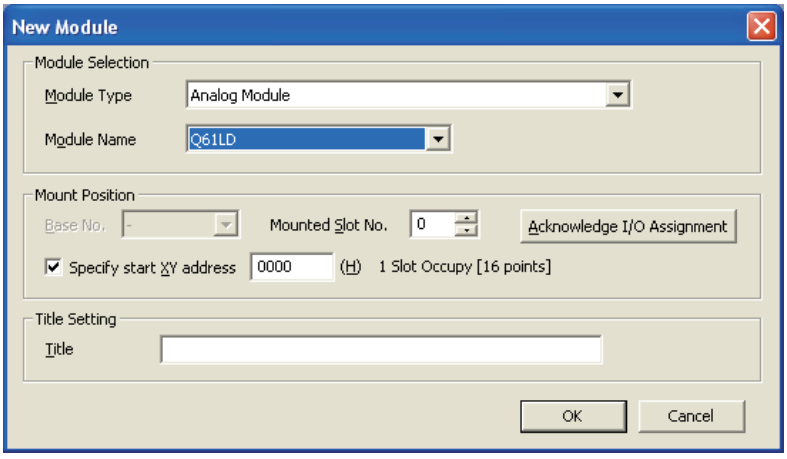
Select "QCPU (Q mode)" from "PLC Series" and select "QJ72LP25/QJ72BR15(Remote I/O)" from "PLC Type".

[Project] ⇨ [New Project]



2. Add Q61LD to the GX Works2 project.

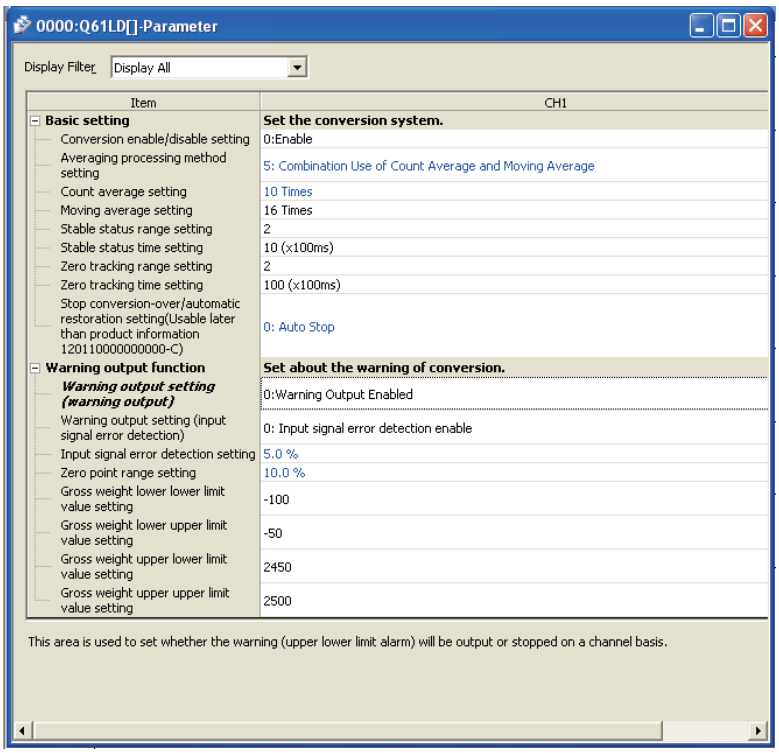
Project window ⇨ [Intelligent Function Module] ⇨ Right-click ⇨ [New Module]



3. Open the Q61LD initial setting window and set the following.

When creating a program without using intelligent function module parameters, skip this step.

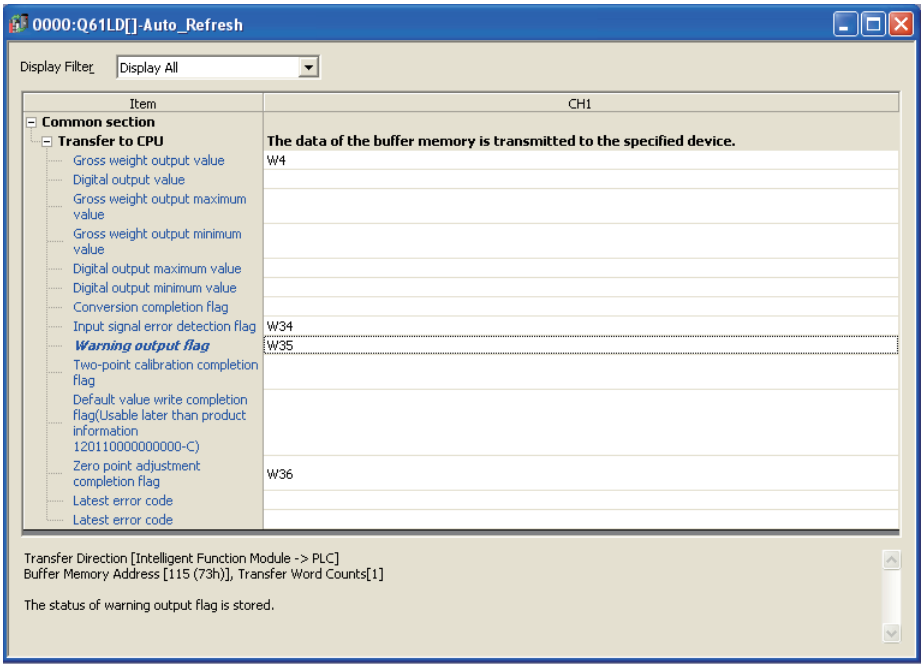
Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Parameter]



4. **Open the Q61LD auto refresh setting window and set the following.**

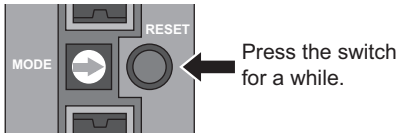
When creating a program without using intelligent function module parameters, skip this step.

Project window ⇨ [Intelligent Function Module] ⇨ Module Name ⇨ [Auto_Refresh]

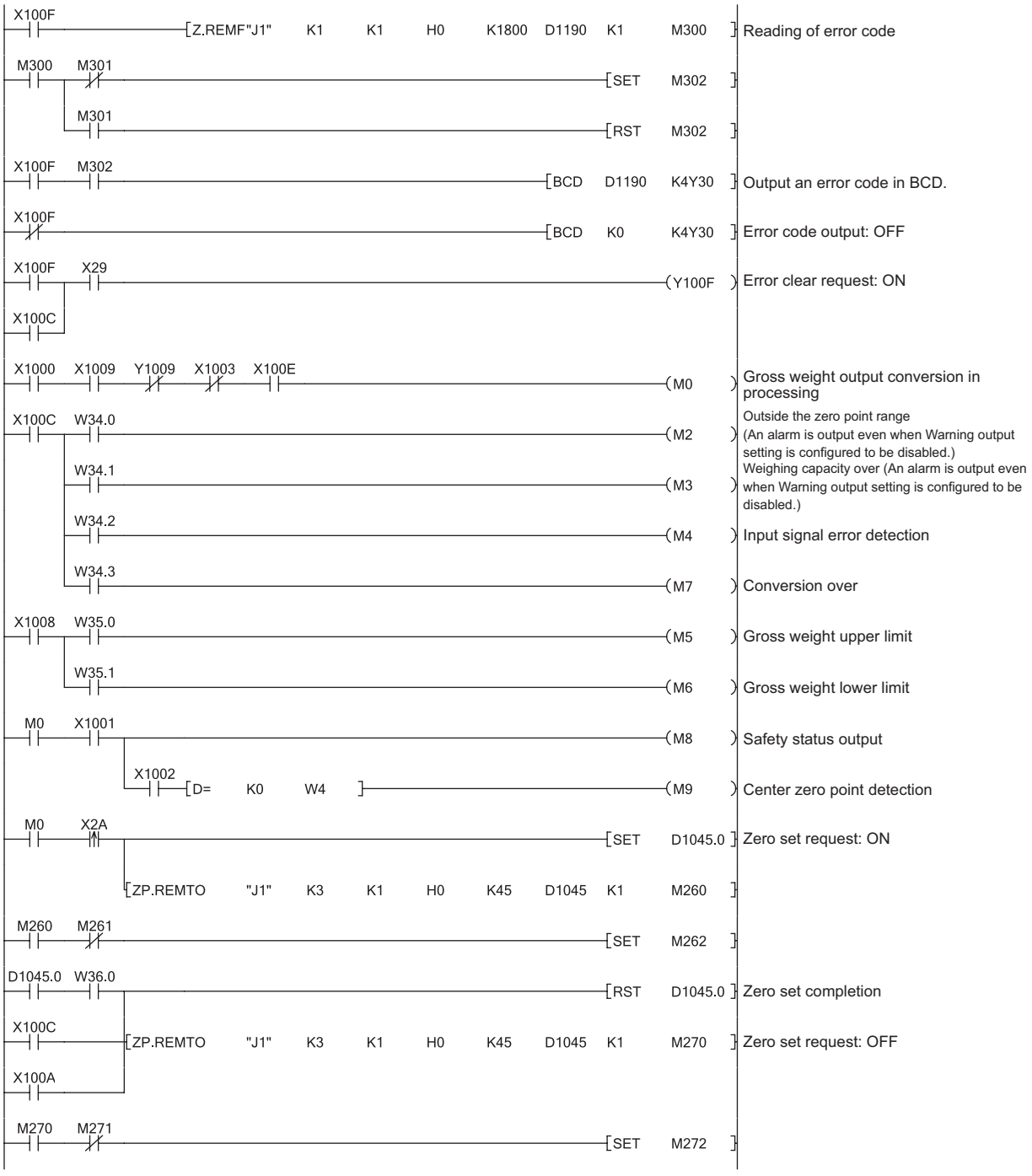


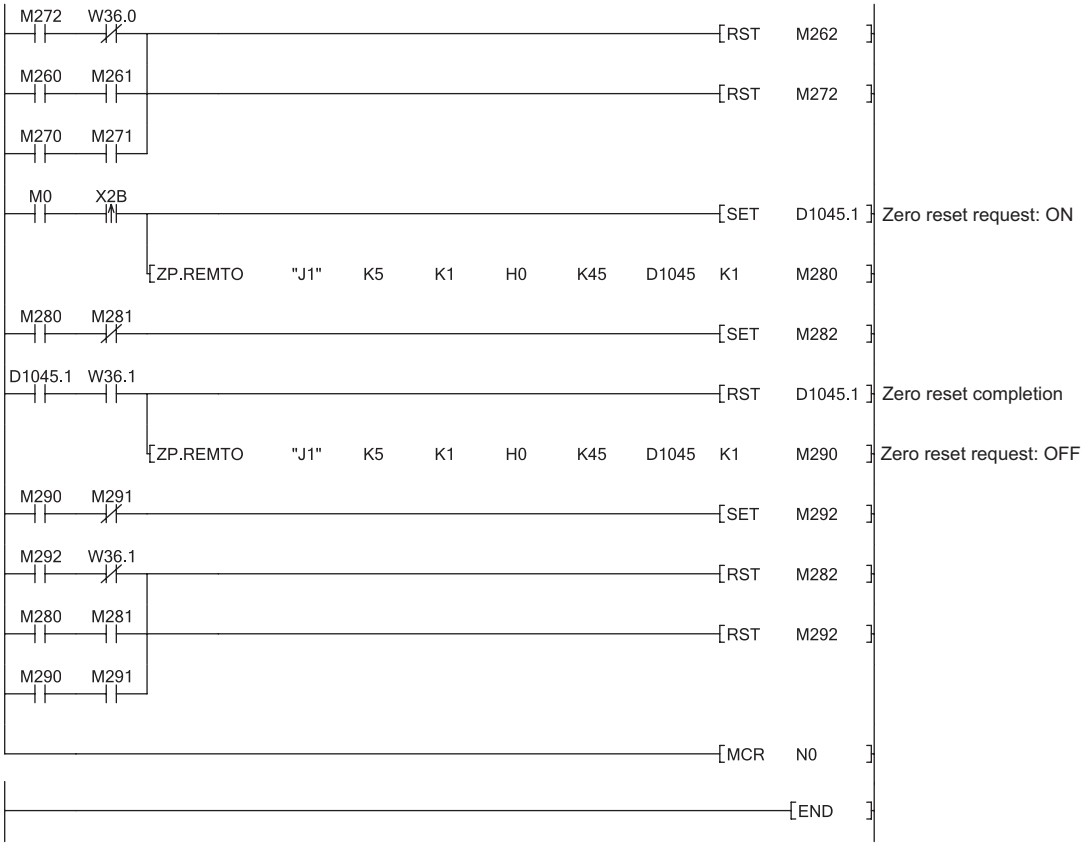
5. **Write the set parameters to the remote I/O module, and reset the remote I/O module.**

[Online] ⇨ [Write to PLC]



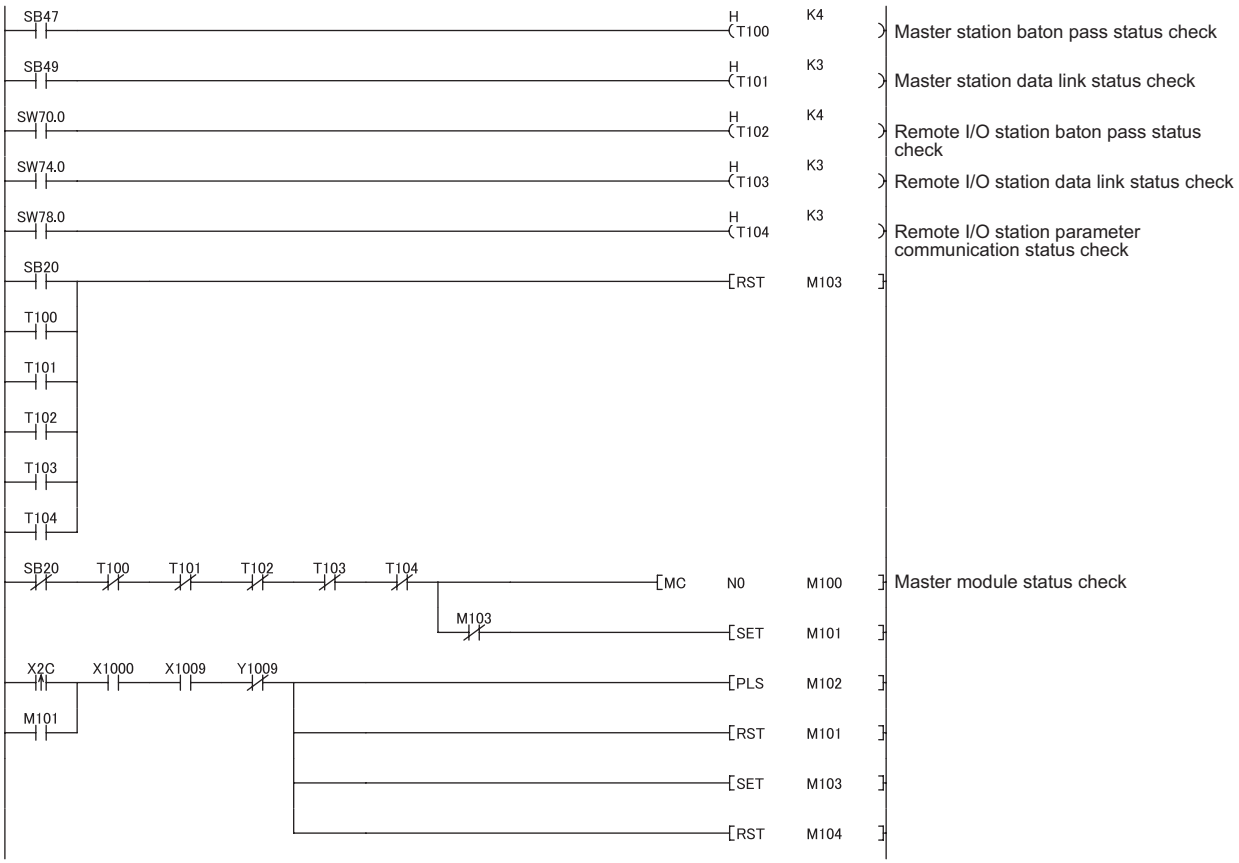
(7) Program example



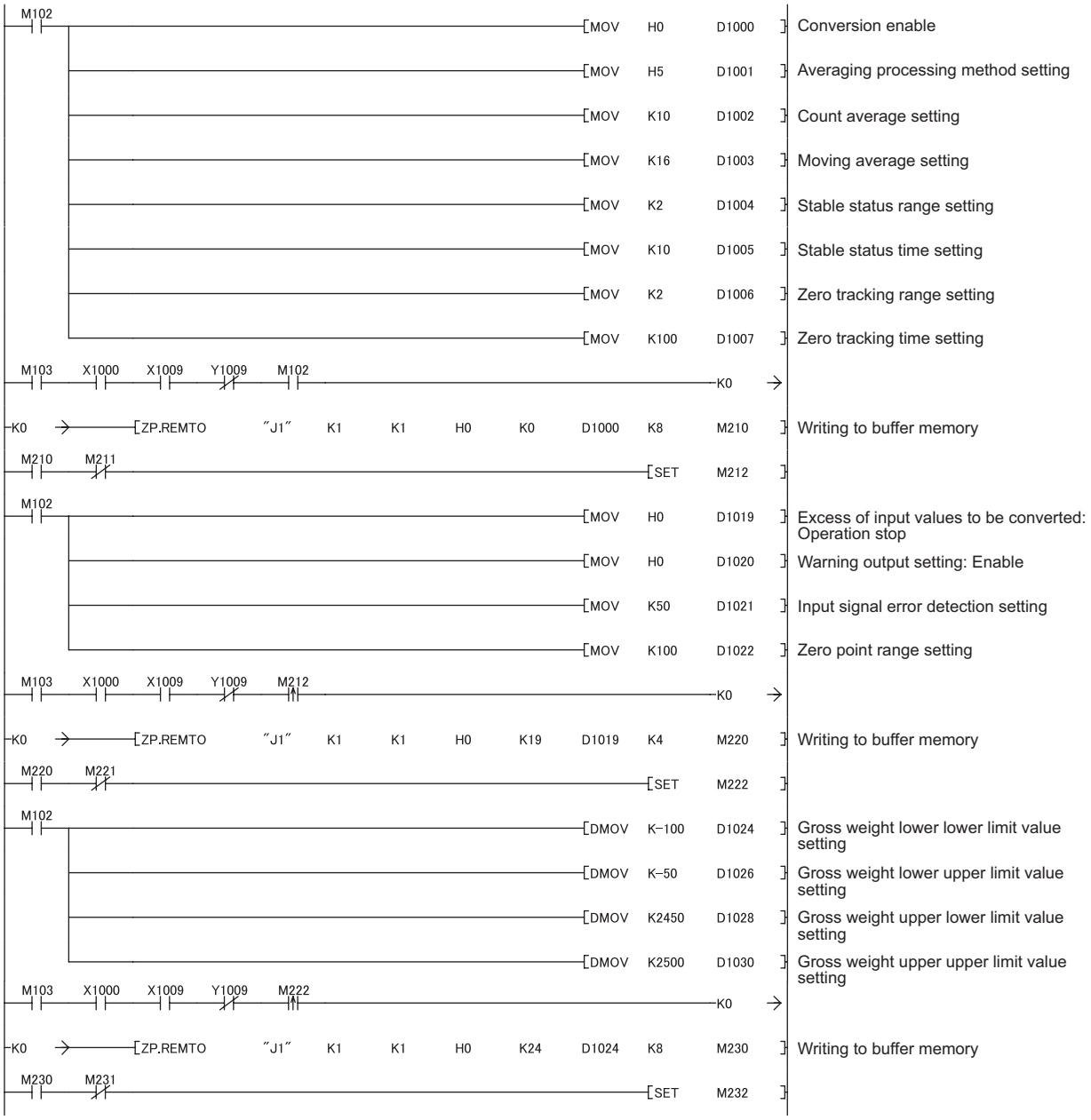

M272 W36.0
RST M262
M260 M261
RST M272
M270 M271
M0 X2B
SET D1045.1
Zero reset request: ON
ZP.REMTO "J1" K5 K1 H0 K45 D1045 K1 M280
M280 M281
SET M282
D1045.1 W36.1
RST D1045.1
Zero reset completion
ZP.REMTO "J1" K5 K1 H0 K45 D1045 K1 M290
Zero reset request: OFF
M290 M291
SET M292
M292 W36.1
RST M282
M280 M281
RST M292
M290 M291
MCR N0
END

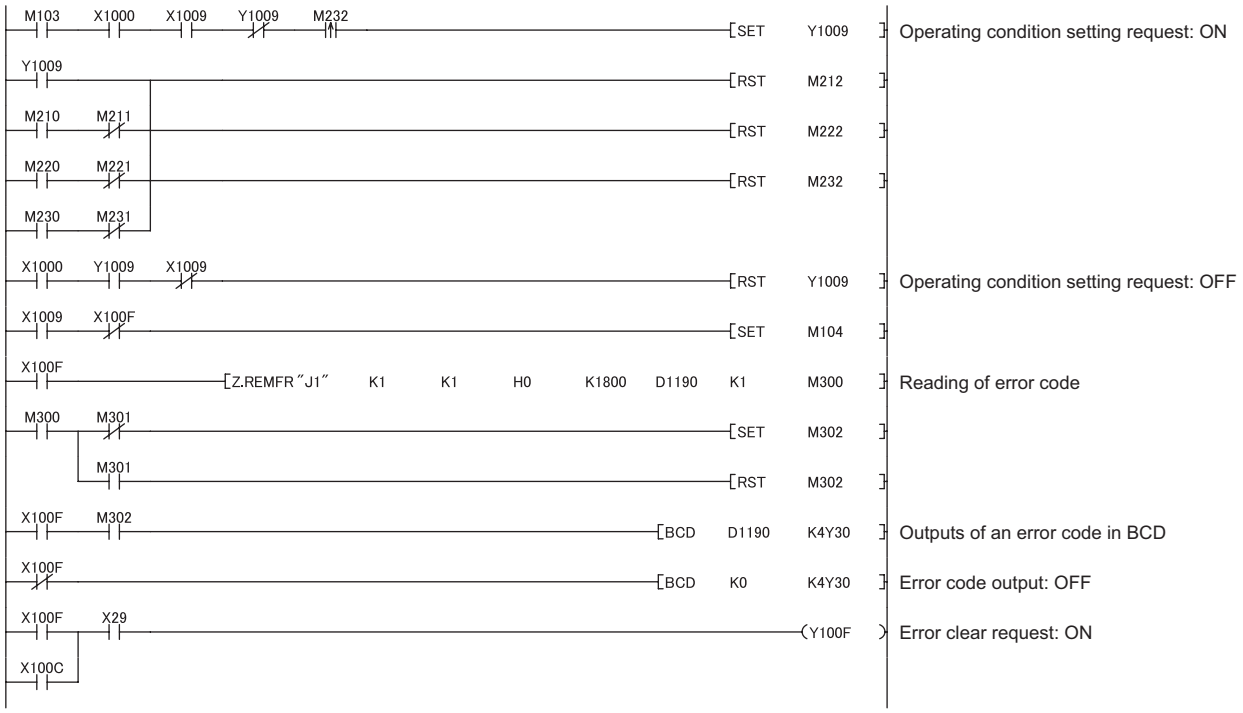
(8) Program example without using intelligent function module parameters

(a) Checking the operating status of remote I/O station

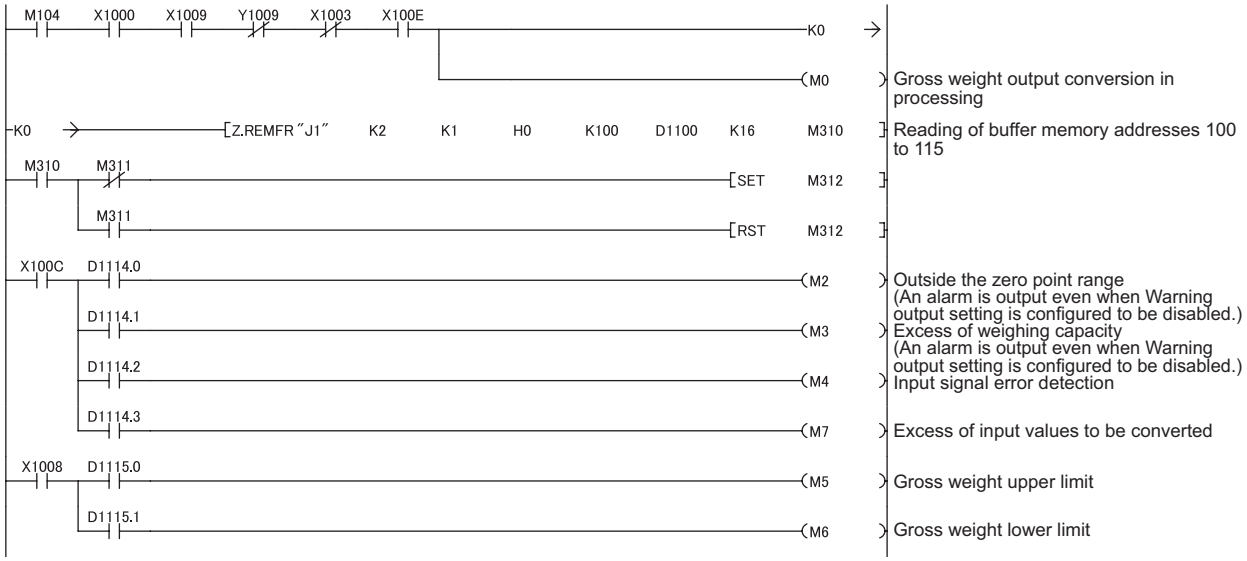


(b) Initial setting for reading a gross weight output value

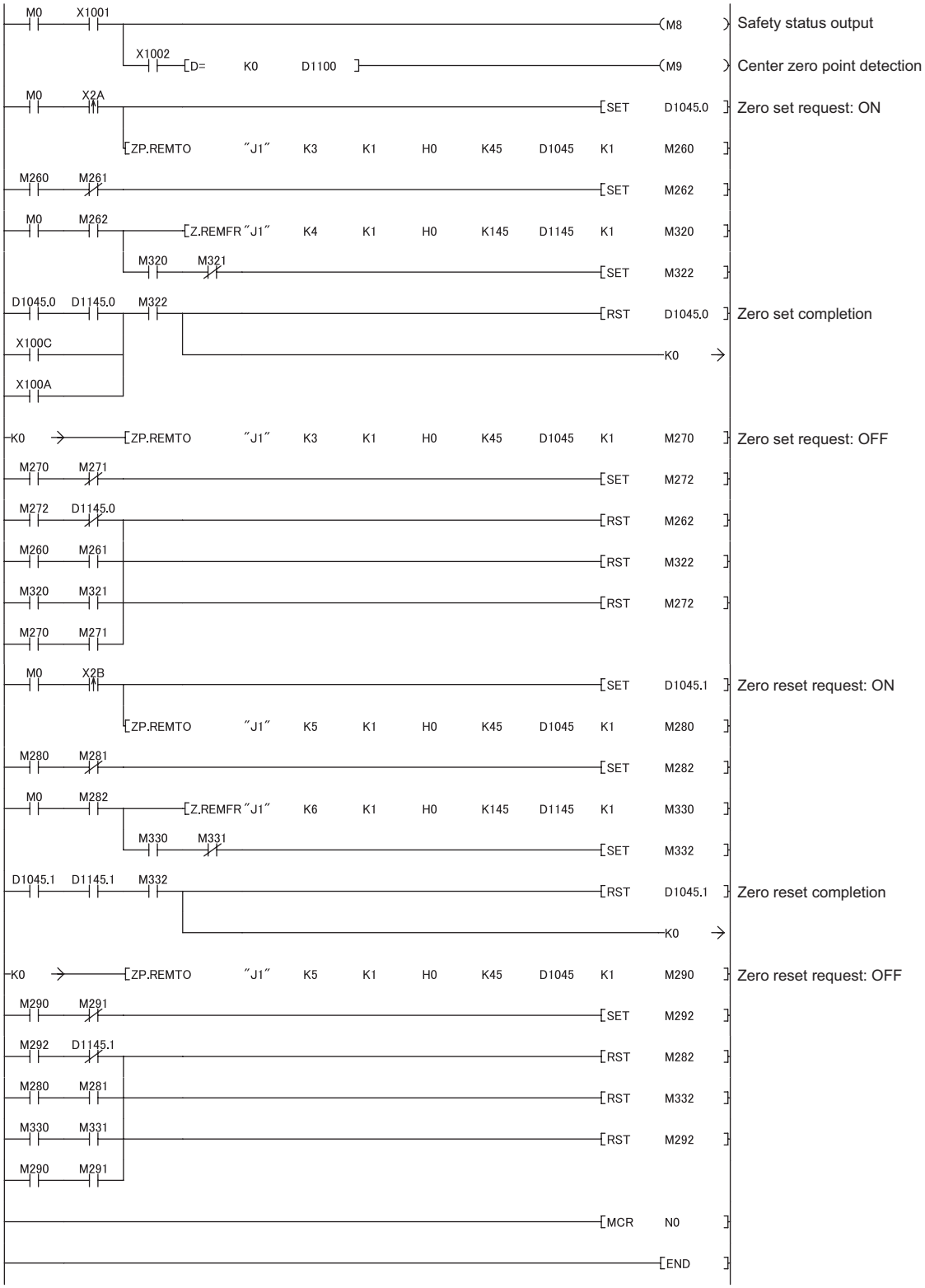




(c) Reading gross weight output value, digital output value, input signal error detection flag, and warning output flag



(d) Zero set/reset

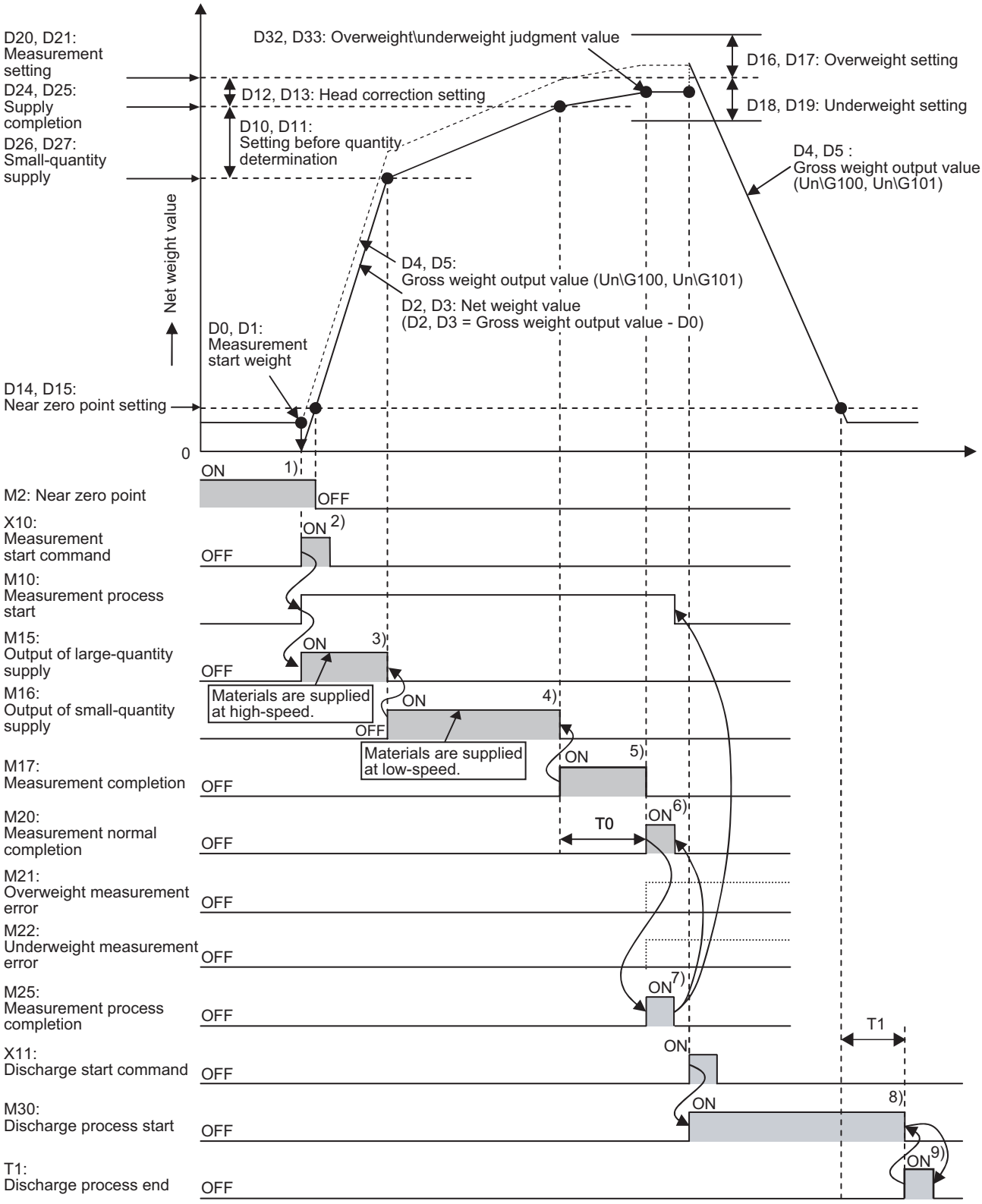


9.4 Program Example for Constant Amount Control

Create a constant amount control program as an example of user application.

Under constant amount control, materials are sent out by a certain amount from a tank such as a constant amount control hopper.

Use this program example together with the one provided in Page 165, Section 9.2.



No.	Item	Description
1)	Computer zero point check	Checks that the weight output value is equal to or smaller than the near zero setting (the weighing hopper is empty). Even when the weighing hopper is empty, the value is often not "0kg" due to material adherence or across the ages. Therefore, when the value is below an allowable range (near zero point setting), the system starts measurement assuming that the weighing hopper is empty.
2)	Tare zero weight storage	Stores the gross weight output value immediately before start of measurement.
3)	Output of large-quantity supply	Supplies materials at high speed until the net weight value (gross weight output value – gross weight value stored immediately before start of measurement) exceeds the setting before quantity determination.
4)	Output of small-quantity supply	Supplies materials at low speed after the net weight value exceeds the setting before quantity determination.
5)	Waiting for measurement completion and stabilization	Closes the supply valve when the net weight value exceeds measurement completion (measurement setting value – head correction setting). While the supply valve is closed, the materials floating in the air cannot be detected. For this reason, the discharge valve is closed before head correction setting so that the measurement value matches the setting value when the material floating in the air lands.
6)	Measurement completion	Waits until the gross weight output value is stable and checks for overweight/underweight measurement errors.
7)	Measurement process end	Proceeds to the next process upon completion of measurement without problems.
8)	Discharge process start	Opens the discharge valve and puts the measured material into the mixer. Operates the knocker and vibrator to discharge the material smoothly.
9)	Discharge process end	Waits until the gross weight output value is stable below the near zero setting value and ends as discharge completion.

(1) System configuration

For the system configuration, refer to the following.

- Programming in Normal System Configuration (☞ Page 165, Section 9.2 (1))

(2) Programming conditions

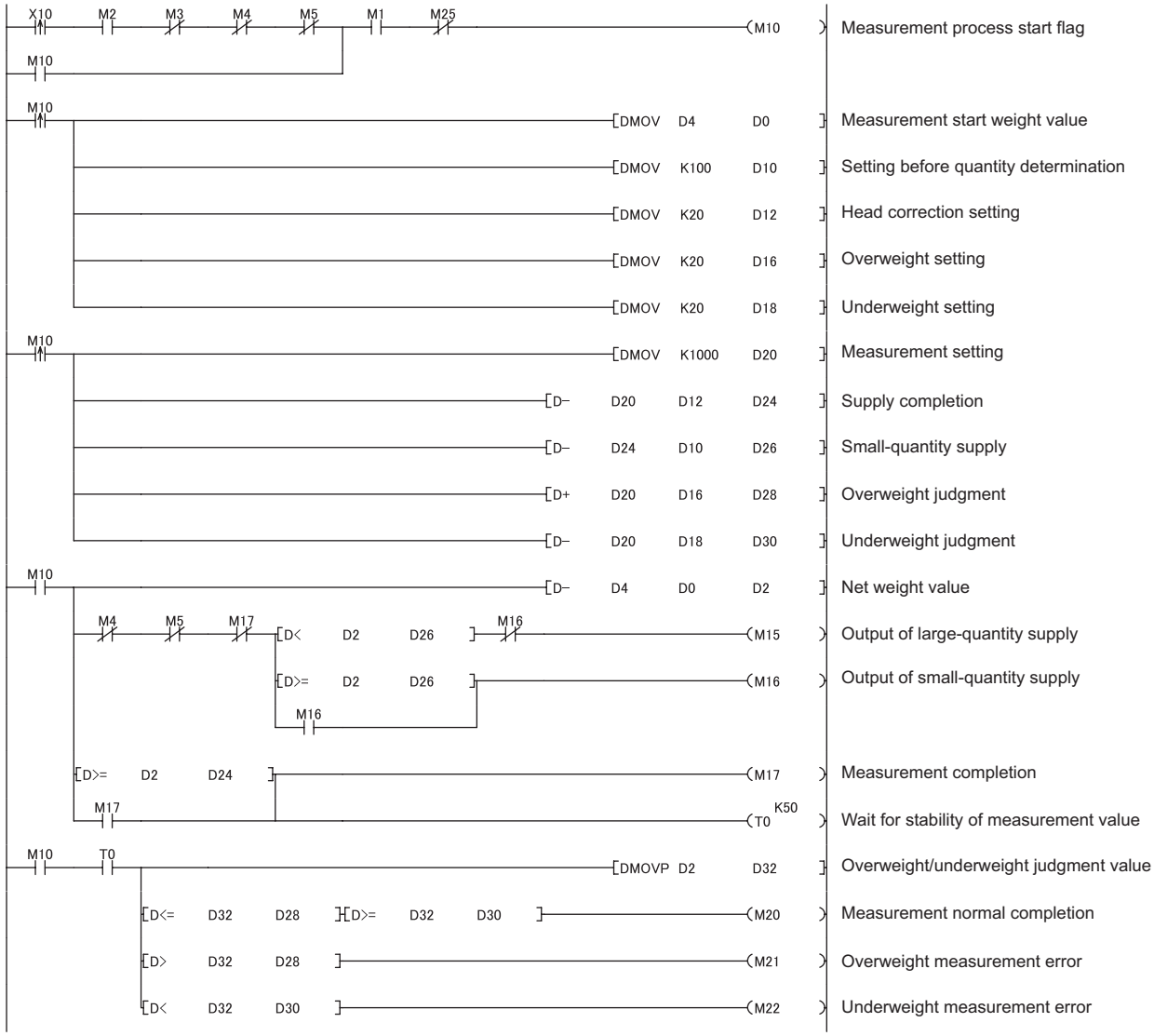
For the programming conditions, refer to the following.

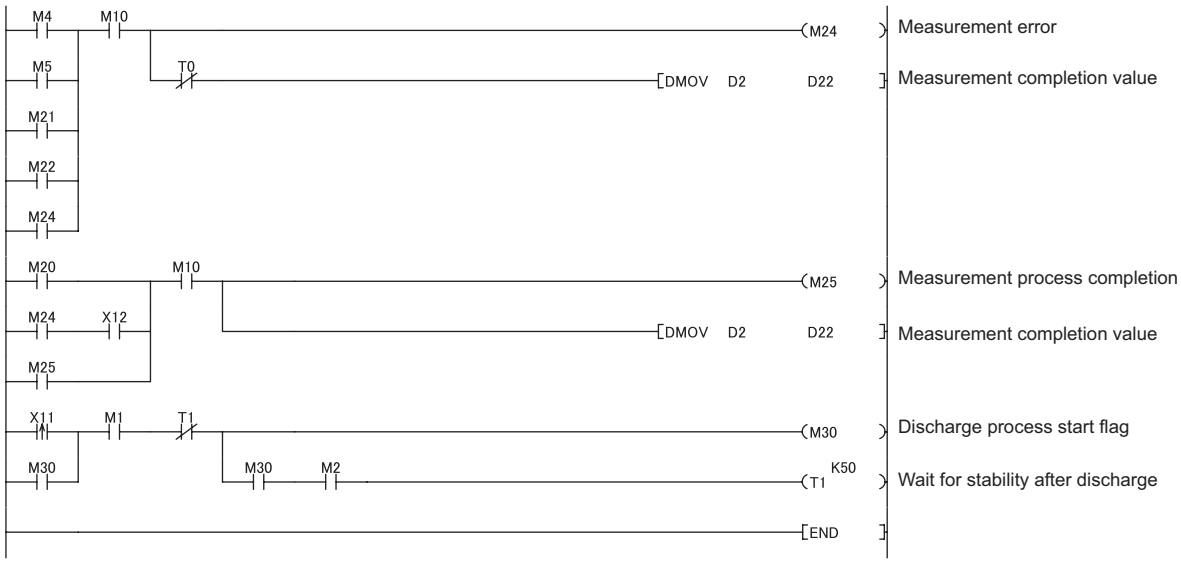
- Programming in Normal System Configuration (☞ Page 166, Section 9.2 (2))

(3) Device list

Device	Function	
X10	Measurement start	QX10 (X10 to X1F)
X11	Discharge start	
X12	Error check	
D0, D1	Measurement start weight value	
D2, D3	Net weight value	
D4, D5	Gross weight output value	
D10, D11	Setting before quantity determination	
D12, D13	Head correction setting	
D16, D17	Overweight setting	
D18, D19	Underweight setting	
D20, D21	Measurement setting	
D22, D23	Measurement completion value	
D24, D25	Supply completion	
D26, D27	Small-quantity supply	
D28, D29	Overweight judgment	
D30, D31	Underweight judgment	
D32, D33	Overweight/underweight judgment value	
M1	Gross weight output conversion in processing	
M2	Near zero point	
M3	Outside the zero point range	
M4	Weighing capacity over	
M5	Input signal error detection	
M10	Measurement process start flag	
M15	Output of large-quantity supply	
M16	Output of small-quantity supply	
M17	Measurement completion	
M20	Measurement normal completion	
M21	Overweight measurement error	
M22	Underweight measurement error	
M24	Measurement error	
M25	Measurement process completion	
M30	Discharge process start flag	
T0	Measurement completion/stabilization timer	
T1	Discharge completion/stabilization timer	

(4) Program example




M4
M10
M24
Measurement error
M5
T0
DMOV D2 D22
Measurement completion value
M21
M22
M24
M20
M10
M25
Measurement process completion
M24
X12
DMOV D2 D22
Measurement completion value
M25
X11
M1
T1
M30
Discharge process start flag
M30
M30
M2
T1 K50
Wait for stability after discharge
END

CHAPTER 10 ONLINE MODULE CHANGE

This chapter describes the online module change procedure using GX Works2.
Online module change through GX Works2 can be performed only when the Q61LD is used in the MELSECNET/H remote I/O network. If the Q61LD is not used in the MELSECNET/H remote I/O network, use GX Developer to perform the online module change. (☞ Page 268, Appendix 5)

When performing an online module change, read the following.

📖 QCPU User's Manual (Hardware Design, Maintenance and Inspection)

10.1 Precautions for Online Module Change

This section describes the precautions on online module change.

- Perform an online module change by the correct procedure. (☞ Page 196, Section 10.4) Using incorrect procedures can cause malfunction or failure.
- Perform an online module change after making sure that the system outside the programmable controller will not malfunction.
- 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.
- Record the following data in advance since the data may not be correctly saved after module failure.
  If the data in the module is lost and no external record is available, two point calibration must be performed again using an actual load (standard weight).
  Refer to Save/Restoration Setting List (☞ Page 222, Section 10.9)
- 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 following:
  - Means of disconnection from external devices and its configuration are correctly implemented.
  - Turning relevant switches on and off will not adversely affect the system.
  - After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit of 50 times may cause malfunction.
  - Dedicated instructions cannot be executed during online module change. When using dedicated instructions to execute save/restoration, execute it on another (separate) system*1. If a separate system is unavailable, perform restoration by writing relevant data to the buffer memory.
  - The accuracy after online module change is 3 times lower than the one before the change. Perform two-point calibration again as appropriate.
  - In case of sudden system failure, it is advised to always make a substitute means available.

*1 Even if the module is used in a remote I/O station, the save/restoration must be performed with another system, which is the one mounted in the main base unit. (Another system mounted in a remote I/O station cannot perform the save/restoration operation.)

10.2 Conditions of Online Module Change

For online module change, the following MELSECNET/H remote I/O module, Q61LD, GX Works2, and base unit are required.

Remark

Online module change is available on the Q61LD from the first product.

(1) MELSECNET/H remote I/O module

Use the module of function version D or later.

(2) GX Works2

Use GX Works2 Version 1.34L or later.

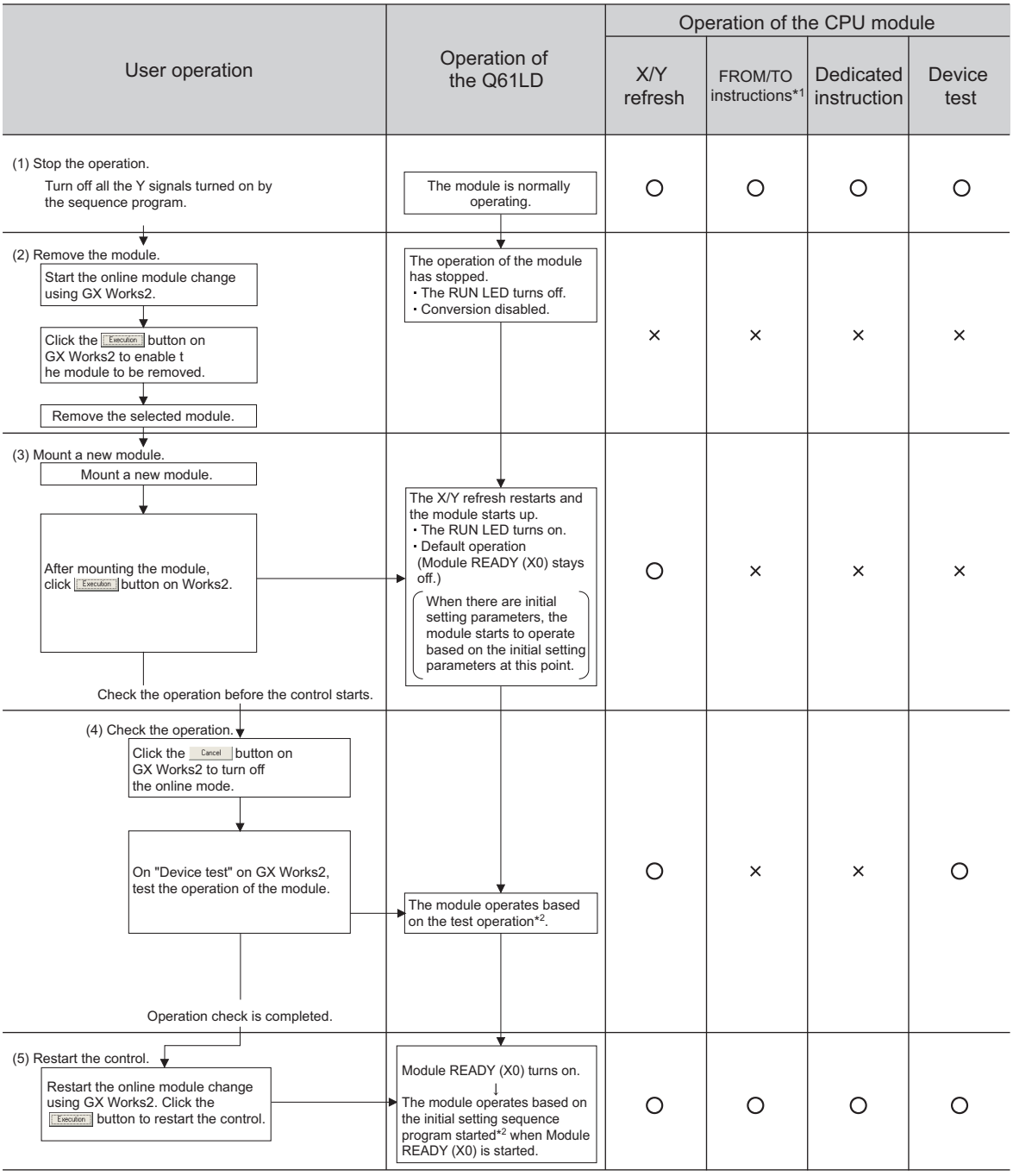
(3) Base unit

- When the slim type main base unit (Q3 ☐ SB) is used, online module change cannot be performed.
- When an extension base unit that requires no power supply module (Q5 ☐ B) is used, all modules mounted on the base unit cannot be changed online.

10.3 Operation during Online Module Change

This section describes the operation during online module change.

○: Executed ×: Not executed



*1 Includes access to the intelligent function module device (U□\G□).

*2 In the absence of the operation marked *2, the intelligent function module performs the operation previous to the marked one.

*3 When another system is not available, the following data must be recorded before changing a module, and the recorded data must be set to the buffer memory after the change. (Save/Restoration Setting List ☞ Page 222, Section 10.9)

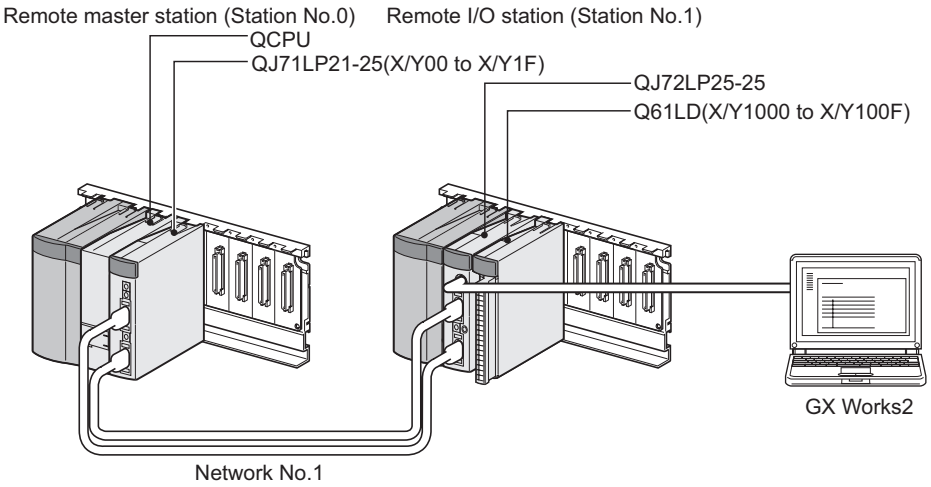
10.4 Procedures of Online Module Change

Online module change is performed by operating a GX Works2 connected to a remote I/O module.
This section describes respective procedure for the cases when parameters are set from GX Works2 and when parameters are set by a sequence program.

Parameter setting	Another system	Reference
Configuration function	Available	Page 198, Section 10.5
	Unavailable	Page 210, Section 10.7
Sequence program	Available	Page 204, Section 10.6
	Unavailable	Page 216, Section 10.8

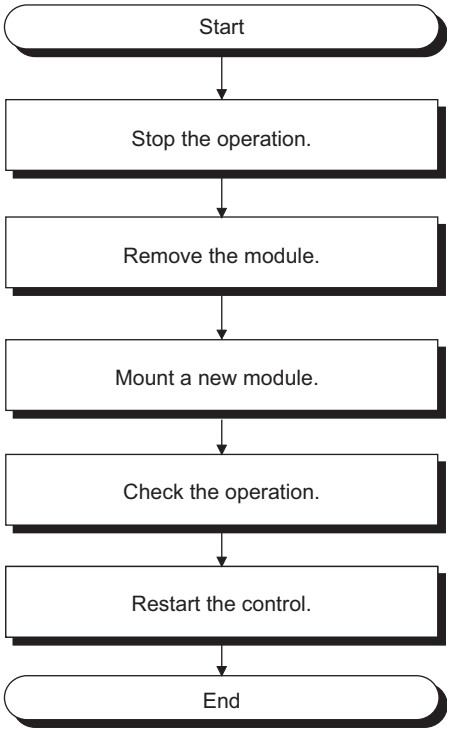
(1) System configuration

The following system configuration is used to explain the procedure of online module charge.



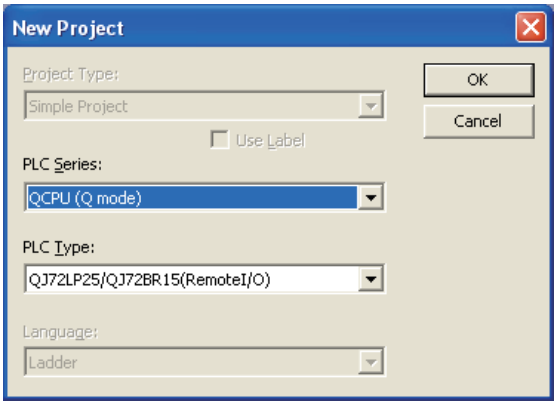
(2) Procedures

The procedure of online module change is shown below.



10.5 When Parameters are Set by the Configuration Function (When Another System is Available)

(1) Stopping the operation



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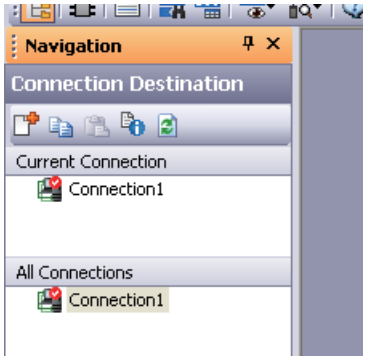

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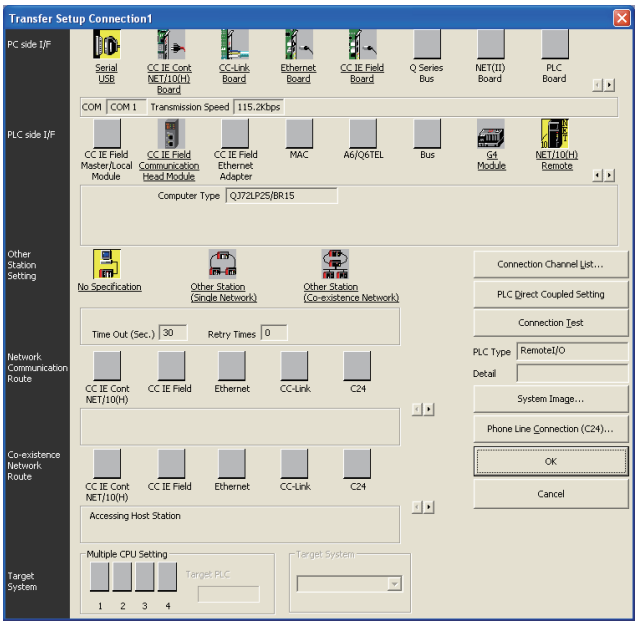

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(Continued to the next page)

1. **Create a new project.**

[Project] ⇨ [New]

2. **In the "PLC Type" field, select "QJ72LP25/QJ72BR15(RemoteI/O)" and click the** OK **button.**

3. **Open the "Connection Destination" window.**

Navigation window ⇨ Connection destination view ⇨ (Connection data name)

4. **Set it to enable access to the modules of the remote I/O station and click the** OK **button.**

(Continued)

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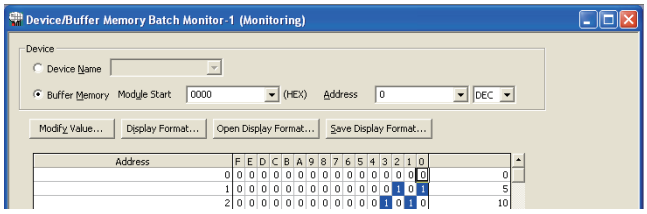

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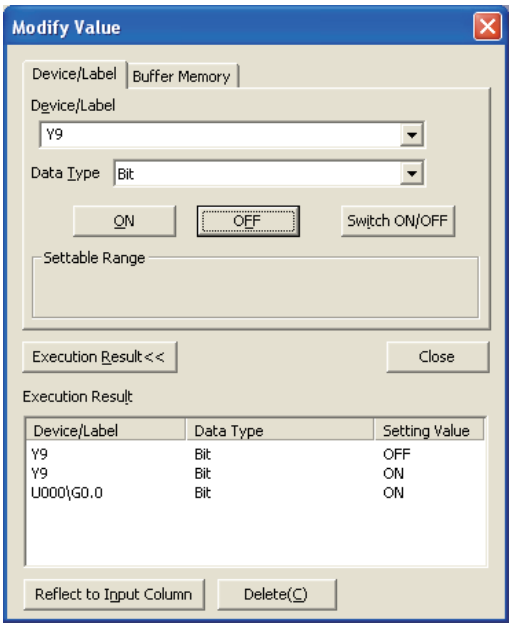


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

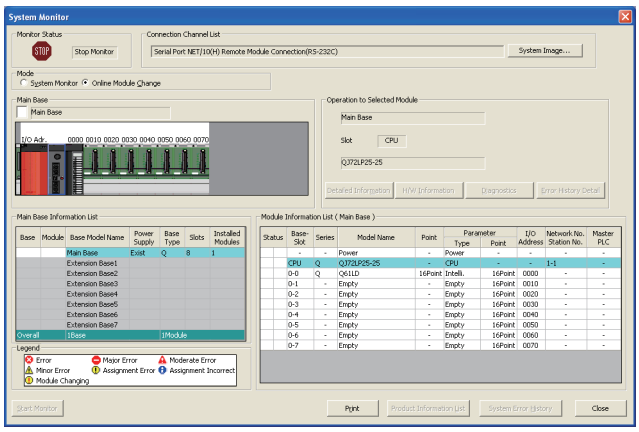
6. **Enter the buffer memory address of Conversion enable/disable setting (Un\G0) to display it.**

7. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**

8. **Turn on Operating condition setting request (Y9).**

9. **Check Conversion completion flag (Un\G113) to confirm that the conversion is stopped and turn off Operating condition setting request (Y9).**

(2) Removing the module



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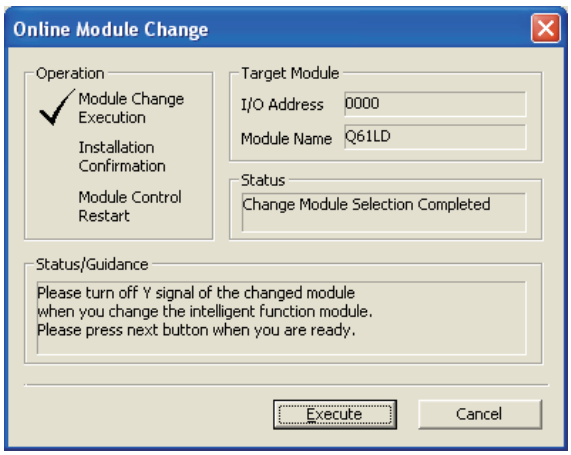


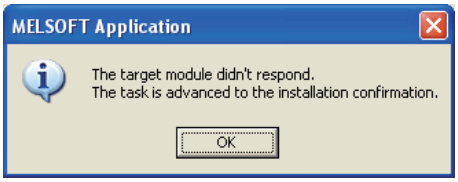
1. **Open the "System Monitor" window of the remote I/O station.**

[Diagnostics] ⇨ [Online Module Change]

2. **Select "Online Module Change" in "Mode" and double-click the module to be changed online.**

3. **Click the [Execute] button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory, refer to Save/Restoration Setting List (☞Page 222, Section 10.9).**



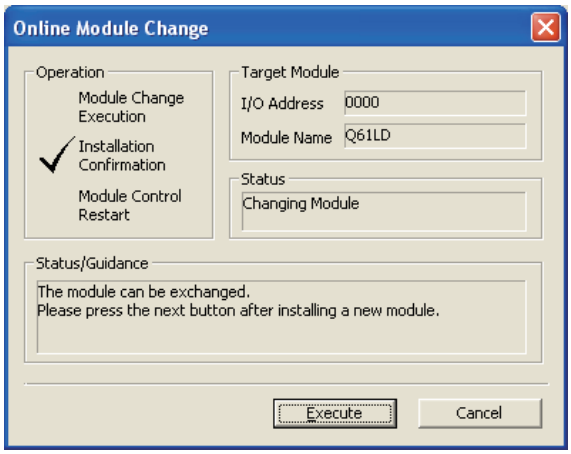
5. **Click the [OK] button and perform the operation in ☞Page 201, Section 10.5 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

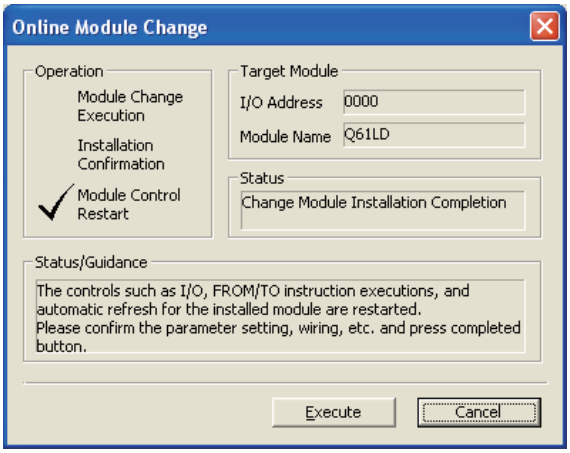
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. **Install the removed module and a new module to another (separate) system.**
2. **Use the G(P).OGLOAD instruction to save the setting data to the CPU device. For details on the G(P).OGLOAD instruction, refer to Page 242, Appendix 1.1.**
3. **Use the G(P).OGSTOR instruction to restore the data set by the user. For details on the G(P).OGSTOR instruction, refer to Page 246, Appendix 1.2.**
4. **Remove the new module from the separate system and insert it into the same slot where the original module was mounted. Then mount the terminal block.**
5. **Mount the new module to the same slot and connect external wires.**
6. **After the module is secured in place, click the Execute button and check that the RUN LED turns on. Module ready (X0) remains off.**

(4) Checking the operation



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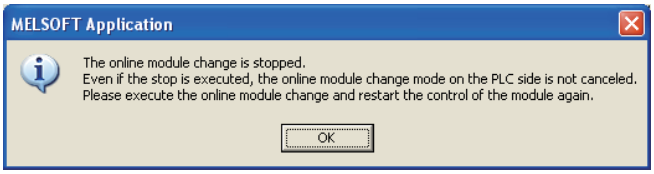

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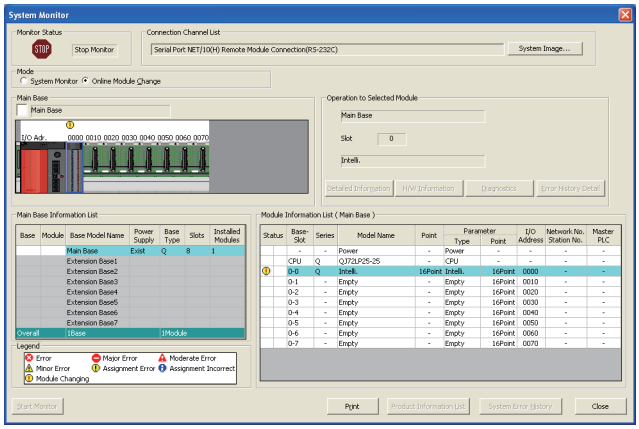

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1. **To check the operation, click the** Cancel **button to cancel the start of control.**

2. **Click the** OK **button to suspend the "Online Module Change" mode.**

3. **Click the** Close **button to close the "System Monitor" window.**

(Continued)

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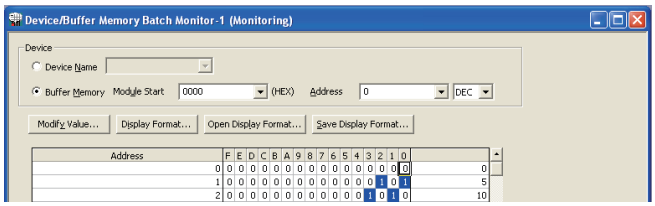


4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch Monitor]

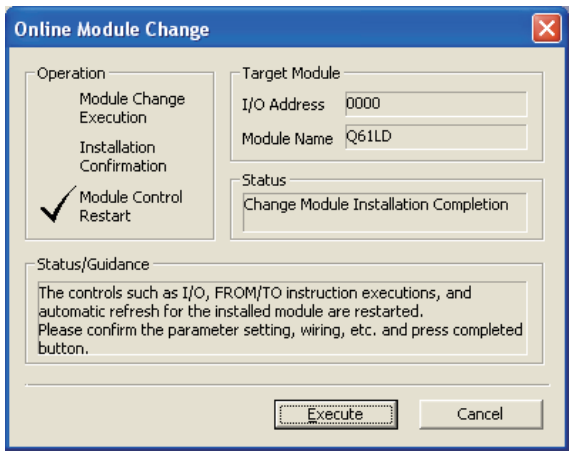
5. **Monitor the buffer memory address of Conversion enable/disable setting (Un\G0) to check if it is set to Conversion enable (0).**

6. **Monitor the buffer memory address of Gross weight output value (Un\G100, Un\G101) to check if the conversion is being normally performed.**

7. **Before the control is started, check the following status of the Q61LD. If an error occurs, refer to Troubleshooting (Page 235, Section 11.2) to take corrective actions.**

- **The RUN LED is on.**
- **The ERR. LED is off.**
- **Error flag (XF) is off.**

(5) Restarting control



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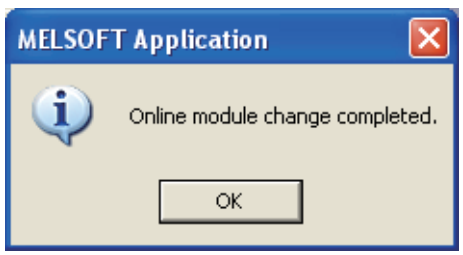


1. **Open the "Online Module Change" window again.**

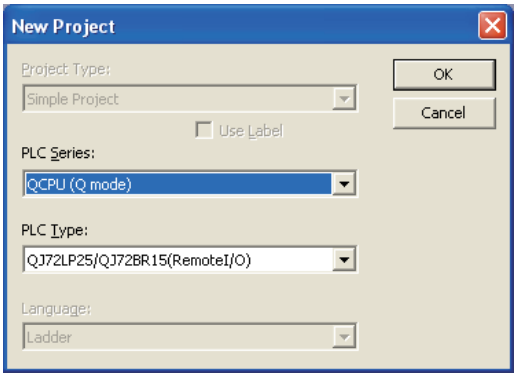
[Diagnostics] ⇨ [Online Module Change]

2. **Click the Execute button to restart control. Module ready (X0) turns on.**

3. **This completes the online module change procedures.**

10.6 When Parameters are Set by a Sequence Program (When Another System is Available)

(1) Stopping the operation



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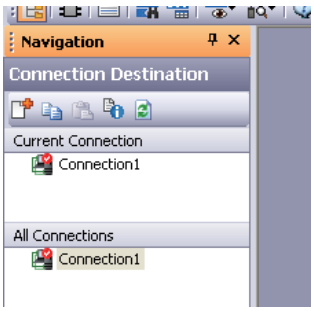

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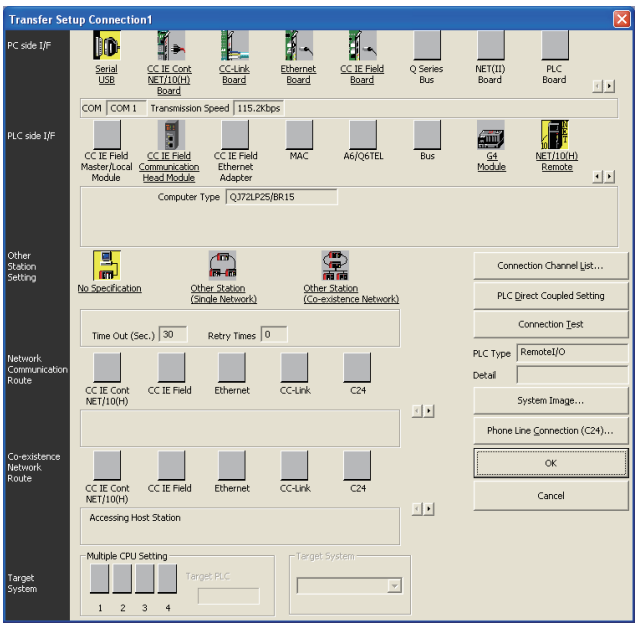

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1. **Create a new project.**

[Project] ⇨ [New]

2. **In the "PLC Type" field, select "QJ72LP25/QJ72BR15(RemoteI/O)" and click the** OK **button.**

3. **Open the "Connection Destination" window.**

Navigation window ⇨ Connection destination view ⇨ (Connection data name)

4. **Set it to enable access to the modules of the remote I/O station and click the** OK **button.**

(Continued)

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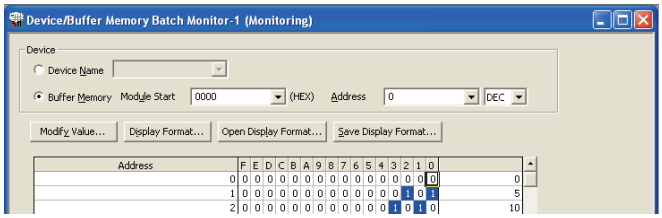

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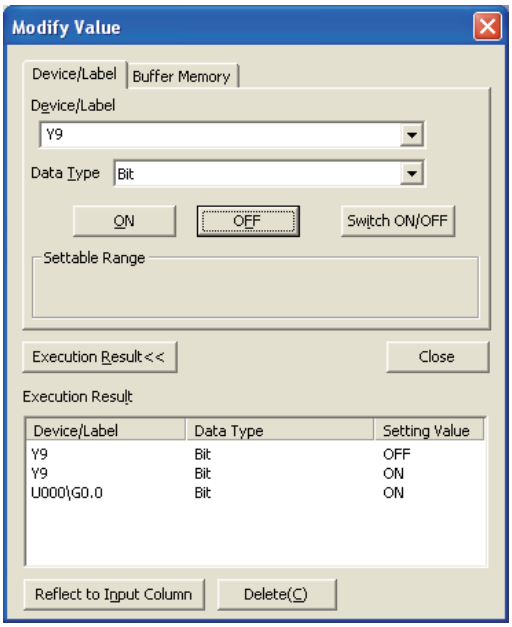


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

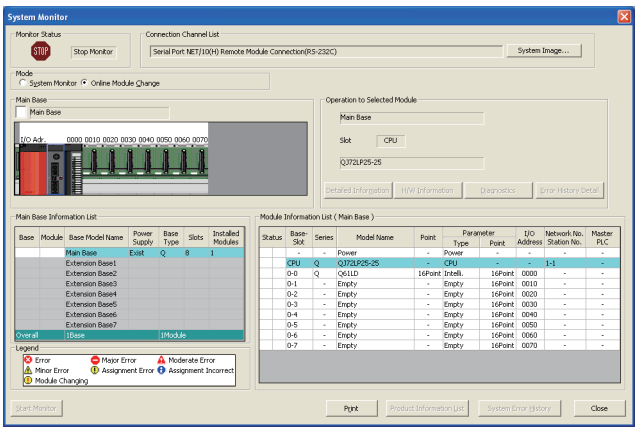
6. **Enter the buffer memory address of Conversion enable/disable setting (Un\G0) to display it.**

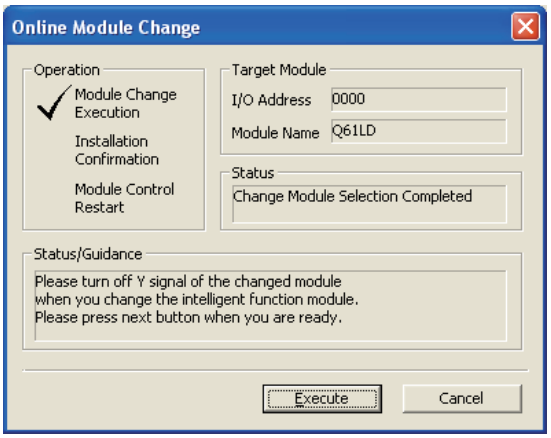
7. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**

8. **Turn on Operating condition setting request (Y9).**

9. **Check Conversion completion flag (Un\G113) to confirm that the conversion is stopped and turn off Operating condition setting request (Y9).**

(2) Removing the module





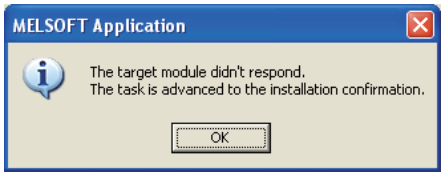
1. **Open the "System Monitor" window of the remote I/O station.**

[Diagnostics] ⇨ [Online Module Change]

2. **Select "Online Module Change" in "Mode" and double-click the module to be changed online.**

3. **Click the [Execute] button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory, refer to Save/Restoration Setting List (☞Page 222, Section 10.9).**



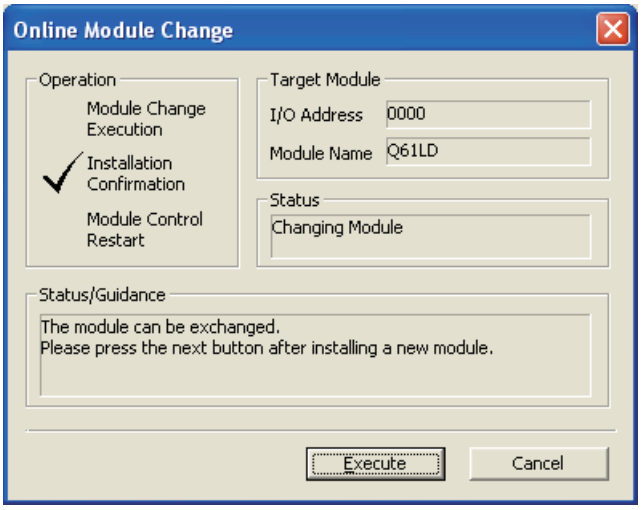
5. **Click the [OK] button and perform the operation in ☞Page 207, Section 10.6 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

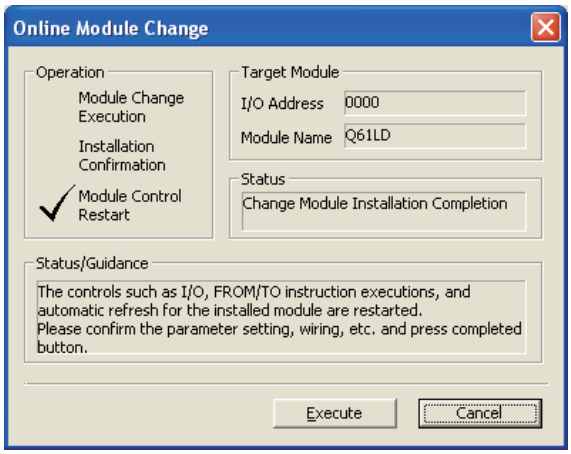
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. Mount the removed module and a new module to another (separate) system.
2. Use the G(P).OGLOAD instruction to save the setting data to the CPU device. For details on the G(P).OGLOAD instruction, refer to Page 242, Appendix 1.1.
   For details on the target buffer memory, refer to Save/Restoration Setting List (Page 222, Section 10.9).
   Use the G(P).OGSTOR instruction to restore the data set by the user. For details on the G(P).OGSTOR instruction, refer to Page 246, Appendix 1.2.
3. Remove the new module from the separate system and insert it into the same slot where the original module was mounted. Then mount the terminal block.
4. Mount the new module to the same slot and connect external wires as appropriate.
5. After the module is secured in place, click the Execute button and check that the RUN LED turns on. Module ready (X0) remains off.

(4) Checking the operation



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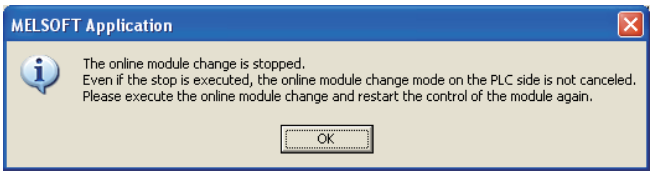

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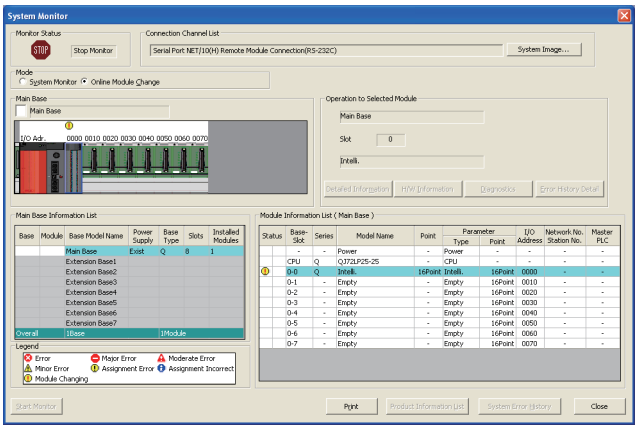

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1. **To check the operation, click the** Cancel **button to cancel the start of control.**

2. **Click the** OK **button to suspend the "Online Module Change" mode.**

3. **Click the** Close **button to close the "System Monitor" window.**

(Continued)

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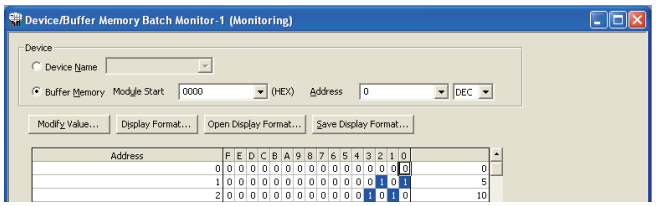

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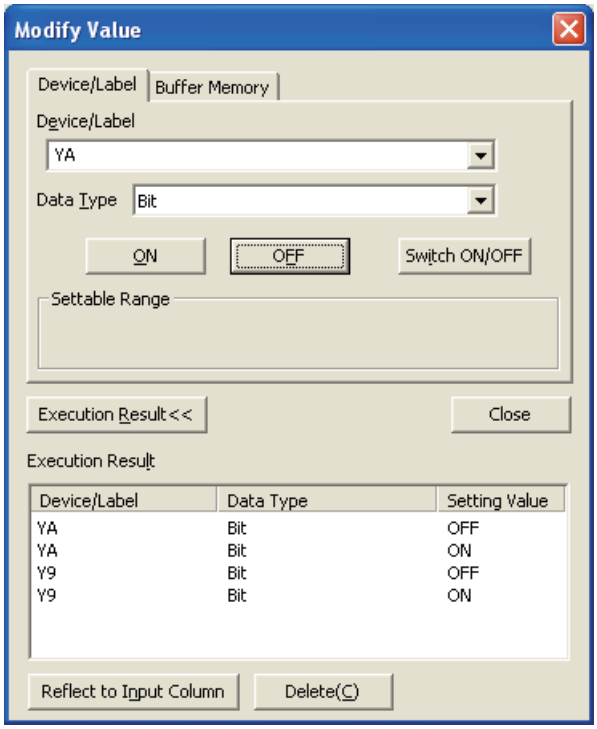


4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

5. **Set Conversion enable/disable setting (Un\G0) to Conversion enable (0).**

6. **Turn on and off Operating condition setting request (Y9).**

7. **Monitor the buffer memory address of Gross weight output value (Un\G100, Un\G101) to check if the conversion is being normally performed.**

8. **Turn off Two-point calibration mode switch request (YA) to switch to the normal mode.**

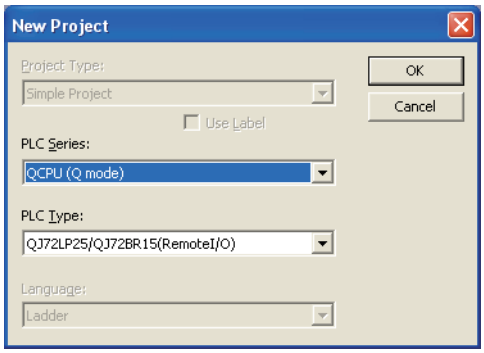
9. **Before the control is started, check the following points on the Q61LD. If an error occurs, refer to Troubleshooting (☞ Page 235, Section 11.2) to take corrective actions.**

• The RUN LED is on.
• The ERR. LED is off.
• Error flag (XF) is off.

10. **Since the new module is in default, initial setting must be configured through a sequence program after starting control. Before configuring the initial setting, check the following point to see if the content of the initial setting program is correct:**
• Add an user device to perform the initial setting (Initial setting request signal) in the sequence program at any timing. After the control restarted, turn on Initial setting request signal to perform the initial setting. (The settings will not be configured if the sequence program is specified to configure the settings only to one scan after the data link of the remote I/O network is established.)

10.7 When Parameters are Set by the Configuration Function (When Another System is Unavailable)

(1) Stopping the operation



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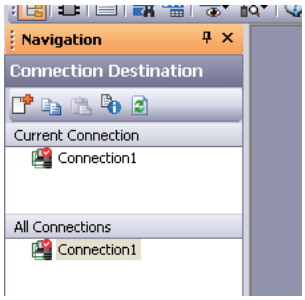

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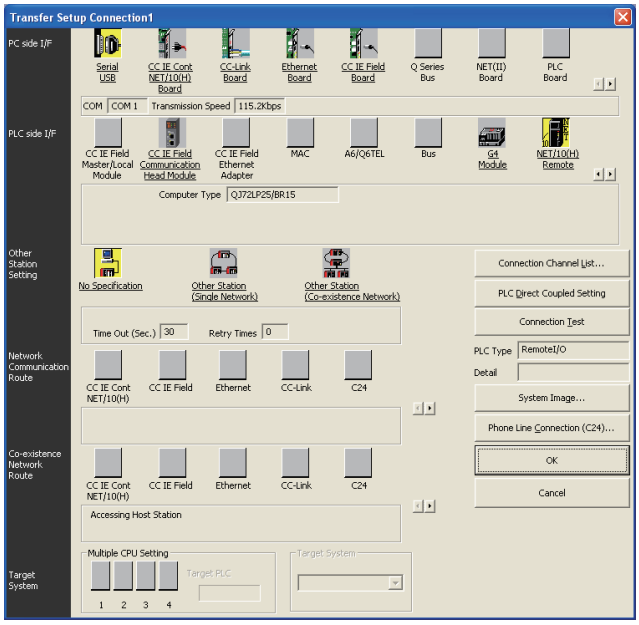

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1. **Create a new project.**

[Project] ⇨ [New]

2. **In the "PLC Type" field, select "QJ72LP25/QJ72BR15(RemoteI/O)" and click the** OK **button.**

3. **Open the "Connection Destination" window.**

Navigation window ⇨ Connection destination view ⇨ (Connection data name)

4. **Set it to enable access to the modules of the remote I/O station and click the** OK **button.**

(Continued)

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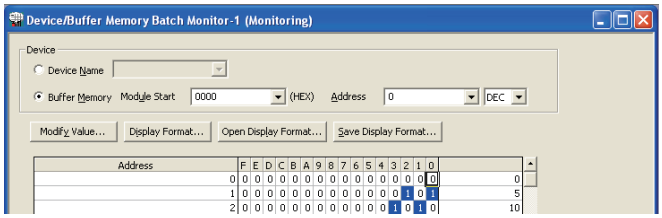

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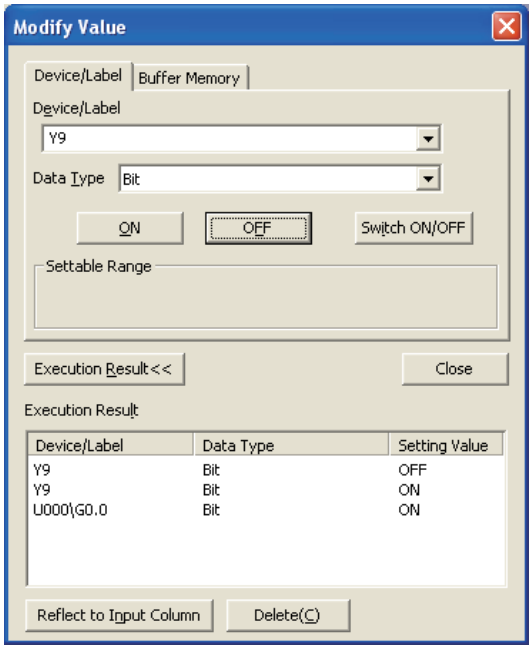


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

6. **Enter the buffer memory address of Conversion enable/disable setting (Un\G0) to display it.**

7. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**

8. **Turn on Operating condition setting request (Y9).**

9. **Check Conversion completion flag (Un\G113) to confirm that the conversion is stopped and turn off Operating condition setting request (Y9).**

10. **If the content of the buffer memory has not been recorded beforehand, record the content by referring to the following procedures 11 to 14.**

11. **Set Two-point setting (Un\G40) to Read (0).**

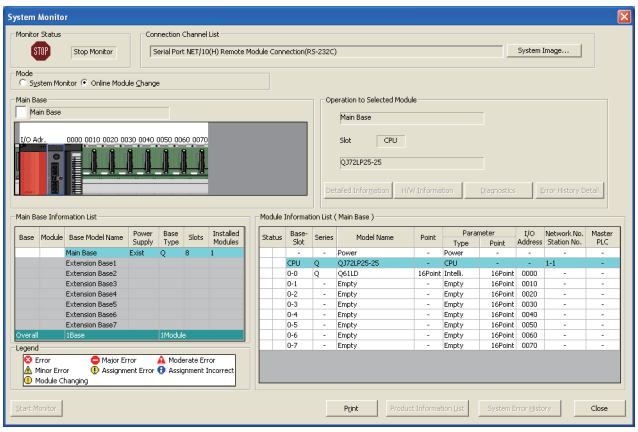
12. **Turn on Two-point setting request (Y7).**

13. **After checking that Two-point setting completion flag (X7) is off, turn off Two-point setting request (Y7).**

14. **Record the content of the save/restoration settings.**

Save/Restoration Setting List (☞ Page 222, Section 10.9)

(2) Removing the module



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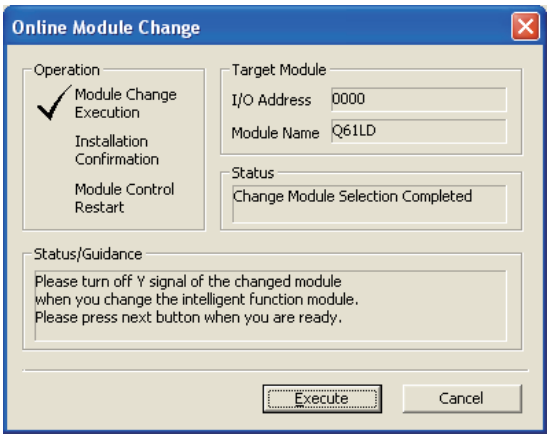


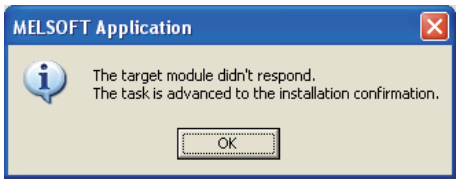
1. **Open the "System Monitor" window of the remote I/O station.**

[Diagnostics] ⇨ [Online Module Change]

2. **Select "Online Module Change" in "Mode" and double-click the module to be changed online.**

3. **Click the [Execute] button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory, refer to Save/Restoration Setting List (☞Page 222, Section 10.9).**



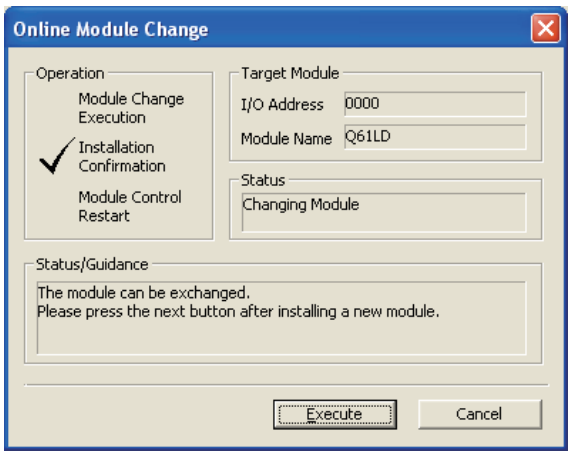
5. **Click the [OK] button and perform the operation in ☞Page 213, Section 10.7 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

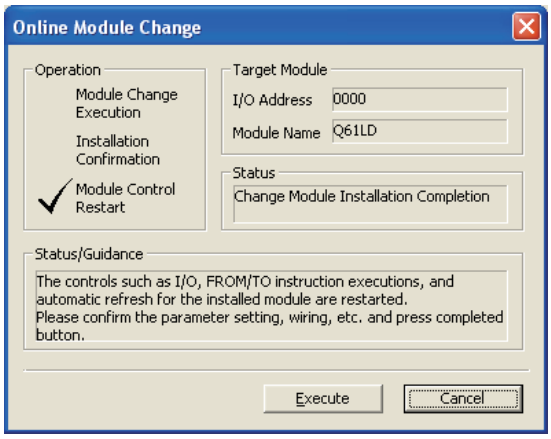
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. **Mount the new module to the same slot and connect external wires.**
2. **After the module is secured in place, click the [Execute] button and check that the RUN LED turns on. Module ready (X0) remains off.**

(4) Checking the operation



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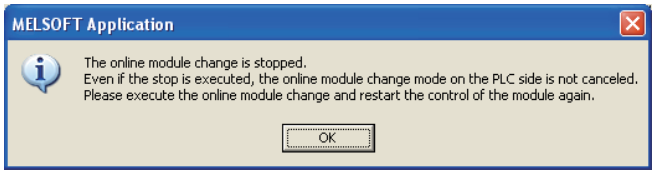

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1. **To check the operation, click the [Cancel] button to cancel "Module Control Restart".**
2. **Click the [OK] button to suspend the "Online Module Change" mode.**

(Continued)

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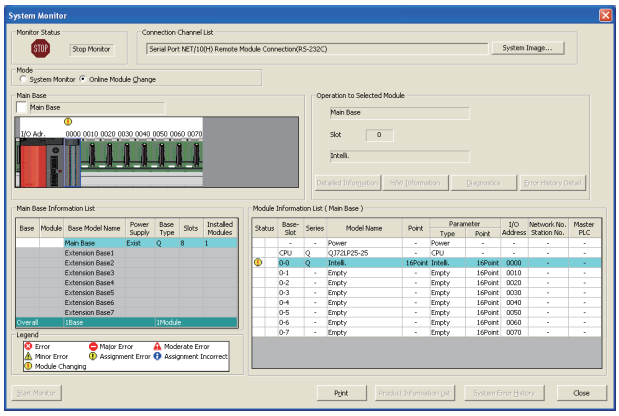

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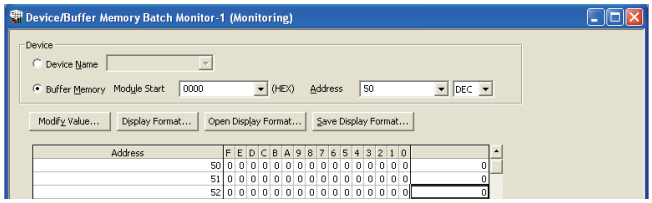

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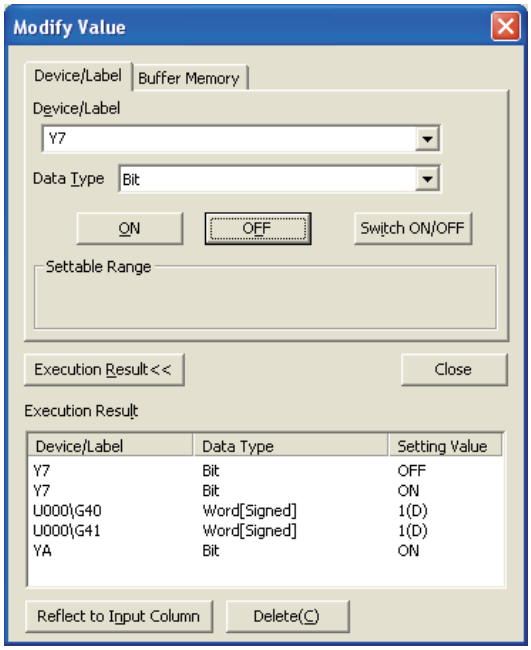


3. **Click the** Close **button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ➪ [Monitor] ➪ [Device/Buffer Memory Batch]

5. **Display and select the buffer memory data of which content has been recorded beforehand and click the** Modify Value... **button.**

6. **Turn on Two-point calibration mode switch request (YA) to switch to the two-point calibration mode.**

7. **Set the buffer memory data with the settings that have been recorded beforehand.**

8. **For Two-point zero calibration value (Un\G84, Un\G85) and Two-point span calibration value (Un\G86, Un\G87), multiply the values by the corresponding correction factors.**

9. **Set Two-point calibration method setting (Un\G41) to User setting (1) and Two-point setting (Un\G40) to Write (1).**

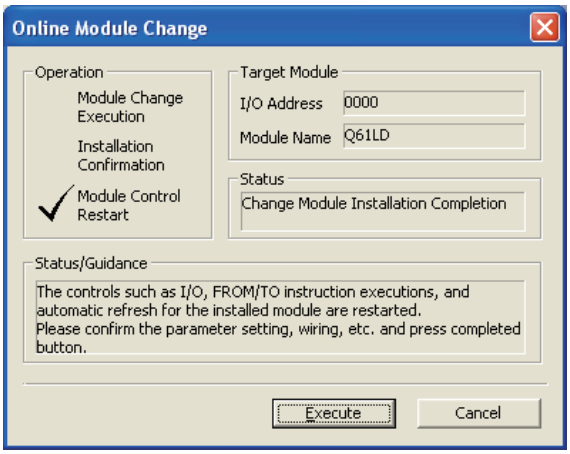
10. **Turn on Two-point setting request (Y7).**

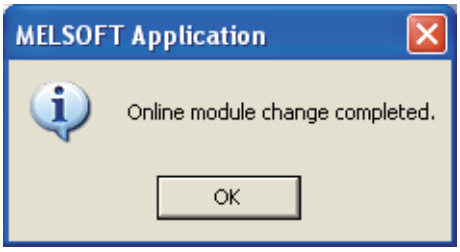
11. **After checking that Two-point setting completion flag (X7) is off, turn off Two-point setting request (Y7).**

12. **Before the control is started, check the following status of the Q61LD. If an error occurs, refer to Troubleshooting (☞ Page 235, Section 11.2) to take corrective actions.**

- **The RUN LED is on.**
- **The ERR. LED is off.**
- **Error flag (XF) is off.**

(5) Restarting control





1. **Open the "Online Module Change" window again.**

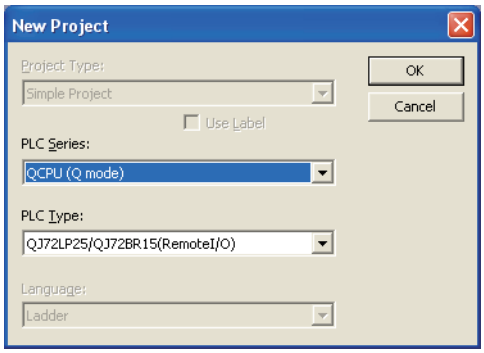
[Diagnostics] ⇨ [Online Module Change]

2. **Click the** Execute **button to restart control.**
Module ready (X0) turns on.

3. **This completes the online module change procedures.**

10.8 When Parameters are Set by a Sequence Program (When Another System is Unavailable)

(1) Stopping the operation



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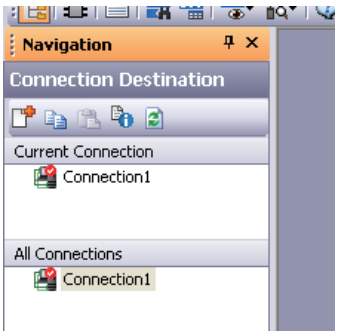

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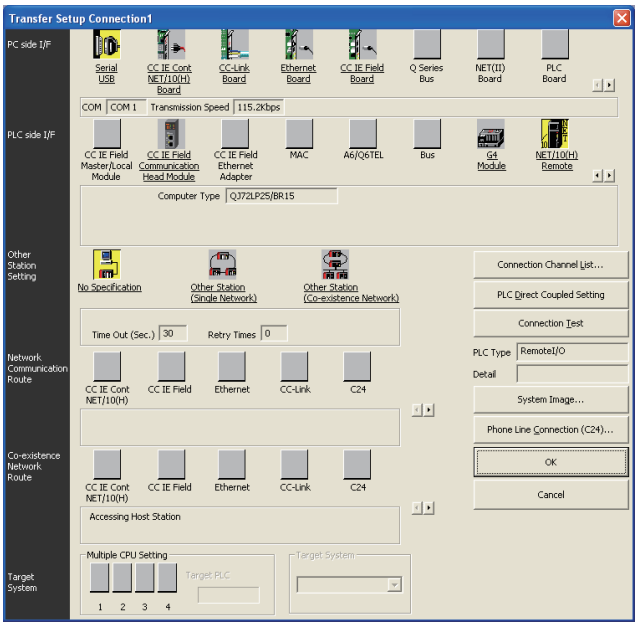

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1. **Create a new project.**

[Project] ⇨ [New]

2. **In the "PLC Type" field, select "QJ72LP25/QJ72BR15(RemoteI/O)" and click the** OK **button.**

3. **Open the "Connection Destination" window.**

Navigation window ⇨ Connection destination view ⇨ (Connection data name)

4. **Set it to enable access to the modules of the remote I/O station and click the** OK **button.**

(Continued)

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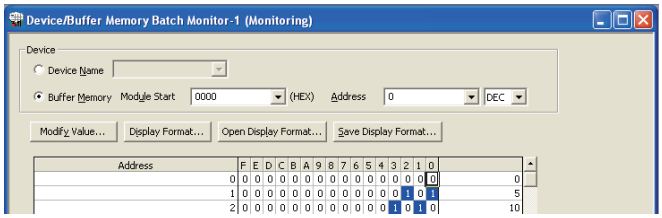

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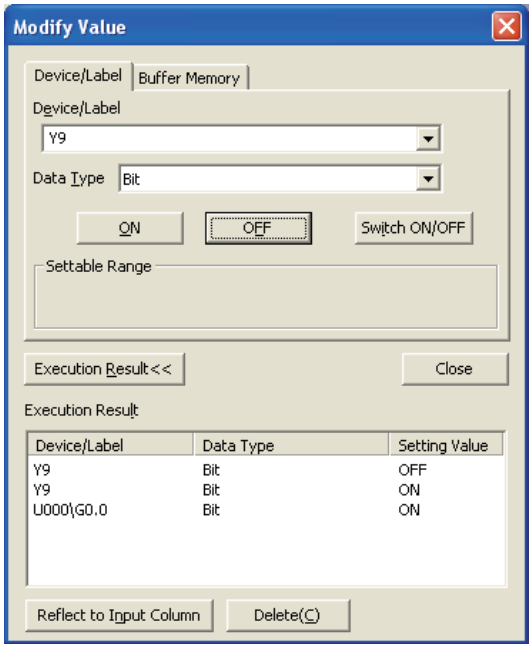


5. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

6. **Enter the buffer memory address of Conversion enable/disable setting (Un\G0) to display it.**

7. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**

8. **Turn on Operating condition setting request (Y9).**

9. **Check Conversion completion flag (Un\G113) to confirm that the conversion is stopped and turn off Operating condition setting request (Y9).**

10. **If the content of the buffer memory has not been recorded beforehand, record the content by referring to the following procedures 11 to 14.**

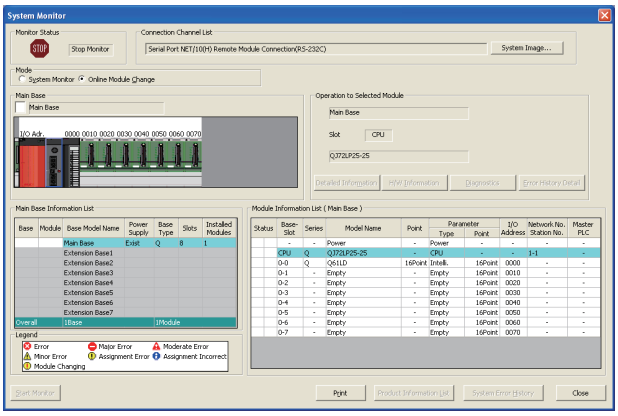
11. **Set Two-point setting (Un\G40) to Read (0).**

12. **Turn on Two-point setting request (Y7).**

13. **After checking that Two-point setting completion flag (X7) is off, turn off Two-point setting request (Y7).**

14. **To record the setting details, refer to Save/Restoration Setting List (☞ Page 222, Section 10.9).**

(2) Removing the module



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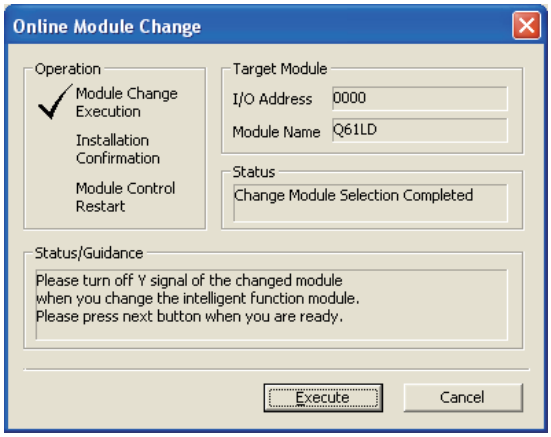


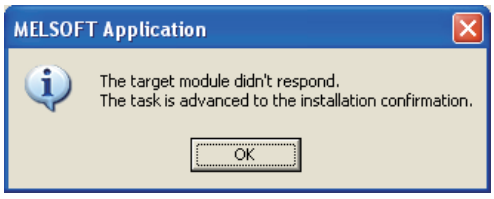
1. **Open the "System Monitor" window of the remote I/O station.**

[Diagnostics] ⇨ [Online Module Change]

2. **Select "Online Module Change" in "Mode" and double-click the module to be changed online.**

3. **Click the** [Execute] **button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory, refer to Save/Restoration Setting List (☞Page 222, Section 10.9).**



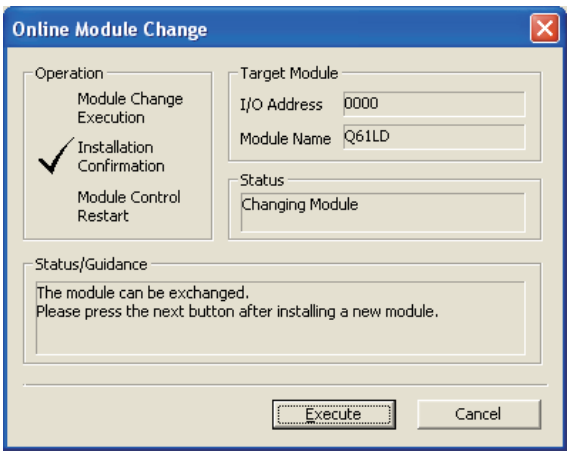
5. **Click the** [OK] **button and perform the operation in ☞Page 219, Section 10.8 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

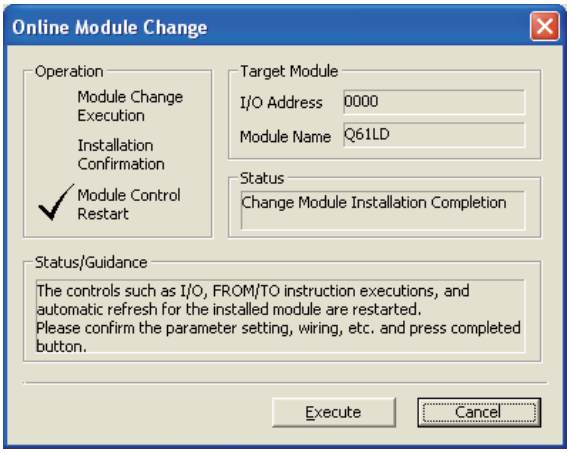
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. **Mount the new module to the same slot and connect external wires.**
2. **After the module is secured in place, click the [Execute] button and check that the RUN LED turns on. Module ready (X0) remains off.**

(4) Checking the operation



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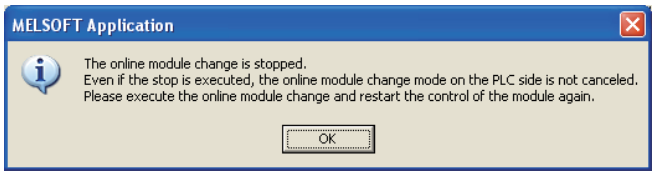

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1. **To check the operation, click the [Cancel] button to cancel the start of control.**
2. **Click the [OK] button to suspend the "Online Module Change" mode.**

(Continued)

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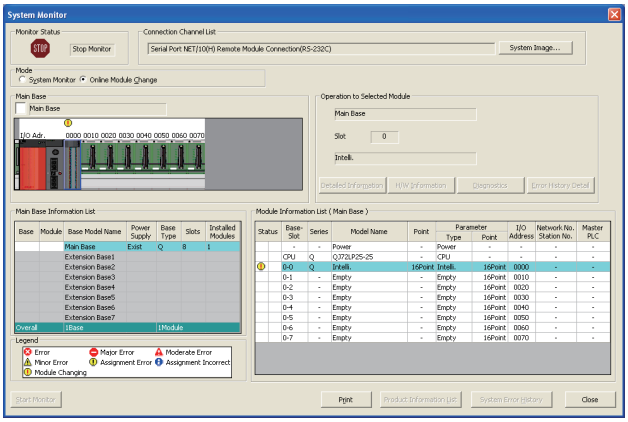

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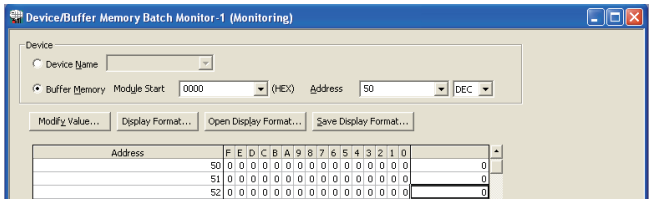

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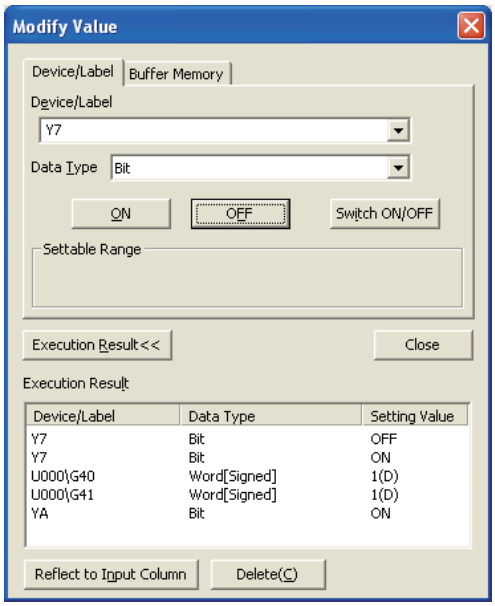

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3. **Click the Close button to close the "System Monitor" window.**

4. **Open the "Device/Buffer Memory Batch Monitor" window.**

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]

5. **Display and select the buffer memory data of which content has been recorded beforehand and click the Modify Value... button.**

6. **Turn on Two-point calibration mode switch request (YA) to switch to the two-point calibration mode.**

7. **Set the buffer memory data with the settings that have been recorded beforehand.**

8. **Set Two-point calibration method setting (Un\G41) to User setting (1) and Two-point setting (Un\G40) to Write (1).**

9. **Turn on Two-point setting request (Y7).**

10. **After checking that Two-point setting completion flag (X7) is off, turn off Two-point setting request (Y7).**

(Continued)
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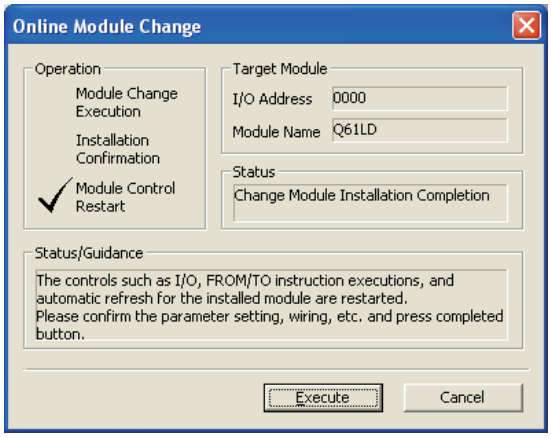
11. **Before the control is started, check the following points on the Q61LD. If an error occurs, refer to Troubleshooting (☞ Page 235, Section 11.2) to take corrective actions.**
• The RUN LED is on.
• The ERR. LED is off.
• Error flag (XF) is off.

12. **Since the new module is in default, initial setting must be configured through a sequence program after starting control. Before configuring the initial setting, check the following point to see if the content of the initial setting program is correct:**
• Add an user device to perform the initial setting (Initial setting request signal) in the sequence program at any timing. After the control restarted, turn on Initial setting request signal to perform the initial setting. (The settings will not be configured if the sequence program is specified to configure the settings only to one scan after the data link of the remote I/O network is established.)

(5) Restarting control



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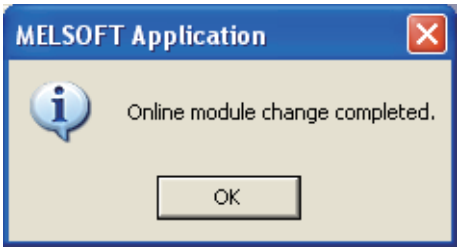


1. **Open the "Online Module Change" window again.**

[Diagnostics] ⇨ [Online Module Change]

2. **Click the Execute button to restart control. Module ready (X0) turns on.**

3. **This completes the online module change procedures.**

10.9 Save/Restoration Setting List

This section lists the data that are saved/restored during online module change.
Record the data to be saved (two-point setting value, two-point calibration value, and factory default setting value) beforehand if another system is not available or to be prepared for the case the data may not be correctly saved due to module failure.

Address		Data type	Description	Target
Hex (H)	Decimal			
32_H	50	Pr	Load cell rated capacity (L)	Two-point setting value
33_H	51		Load cell rated capacity (H)	
34_H	52		Load cell rated output	
35_H	53		Number of load cells in connection	
36_H	54		Tare zero offset function	
38_H	56		Maximum weighing capacity setting (L)	
39_H	57		Maximum weighing capacity setting (H)	
$3A_H$	58		Minimum division	
$3B_H$	59		Decimal point position	
$3C_H$	60		Unit	
$3E_H$	62		Standard weight setting (L)	
$3F_H$	63		Standard weight setting (H)	
40_H	64		Installation site gravitational acceleration (L)	
41_H	65		Installation site gravitational acceleration (H)	
42_H	66		Calibration site gravitational acceleration (L)	
43_H	67		Calibration site gravitational acceleration (H)	
44_H	68		Digital output zero correction value (L)	
45_H	69		Digital output zero correction value (H)	
46_H	70		Digital output span correction value (L)	
47_H	71		Digital output span correction value (H)	
50_H	80		Instrumentation amplifier gain setting	Two-point calibration value
51_H	81		A/D converter gain setting	
52_H	82		Tare zero offset output value (L)	
53_H	83		Tare zero offset output value (H)	
54_H	84		Two-point zero calibration value (L)[*1]	
55_H	85		Two-point zero calibration value (H)[*1]	
56_H	86		Two-point span calibration value (L)[*1]	
57_H	87		Two-point span calibration value (H)[*1]	
$64E_H$	1614		1.0mV/V zero calibration value (L)	Factory default setting value
$64F_H$	1615		1.0mV/V zero calibration value (H)	
650_H	1616		1.0mV/V span calibration value (L)	
651_H	1617		1.0mV/V span calibration value (H)	
652_H	1618		2.0mV/V zero calibration value (L)	
653_H	1619		2.0mV/V zero calibration value (H)	
654_H	1620		2.0mV/V span calibration value (L)	

Address		Data type	Description	Target
Hex (H)	Decimal			
655_H	1621	Pr	2.0mV/V span calibration value (H)	Factory default setting value
656_H	1622		3.0mV/V zero calibration value (L)	
657_H	1623		3.0mV/V zero calibration value (H)	
658_H	1624		3.0mV/V span calibration value (L)	
659_H	1625		3.0mV/V span calibration value (H)	

*1 When dedicated instructions are used, the value is restored being multiplied by the correction factor.

• Correction Factor Calculating Method (☞ Page 224, Section 10.10)

10.10 Correction Factor Calculating Method

When another system is not available or when the data has not been normally saved due to any module failure, it becomes necessary to manually restore the data. In such a case, for Two-point zero calibration value (Un\G84, Un\G85) and Two-point span calibration value (Un\G86, Un\G87), multiply the original value by an applicable correction factor before the restoration.

The two-point zero calibration value and two-point span calibration value after online module change must be as given below:

Two-point zero calibration value after replacement = Two-point zero calibration value before replacement × Correction factor

Two-point span calibration value after replacement = Two-point span calibration value before replacement × Correction factor

(1) Correction factor

The following equation is used to calculate the correction factor:

$$\text{Correction factor} = 1 + \frac{\text{Factory default span setting value of replaced module} - \text{Factory default span setting value of replacing module}}{\text{Factory default span setting value of replacing module}} \times \text{A/D converter gain setting}$$

(a) Factory default span calibration value

For the factory default span calibration value, the buffer memory address to be referenced depends on the setting value of Instrumentation amplifier gain setting (Un\G80).

Assign the appropriate value to the formula by referring to the following buffer memory addresses.

Instrumentation amplifier gain setting (Un\G80) value	Buffer memory address to be referenced
0.3mV/V ≤ Load cell rated output ≤ 1.0mV/V (0_H)	1.0mV/V span calibration value (Un\G1616, Un\G1617)
1.0mV/V < Load cell rated output ≤ 2.0mV/V (1_H)	2.0mV/V span calibration value (Un\G1620, Un\G1621)
2.0mV/V < Load cell rated output ≤ 3.0mV/V (2_H)	3.0mV/V span calibration value (Un\G1624, Un\G1625)

(b) A/D converter gain setting

Substitute the value of A/D converter gain setting (Un\G81) (1, 2, 4, 8, 16, or 32 (times)).

CHAPTER 11 TROUBLESHOOTING

This chapter describes the errors that could be detected by the Q61LD and also describes troubleshooting.

11.1 Error Code List

This section describes the error codes that could be generated by the Q61LD.

(1) Method for checking error codes

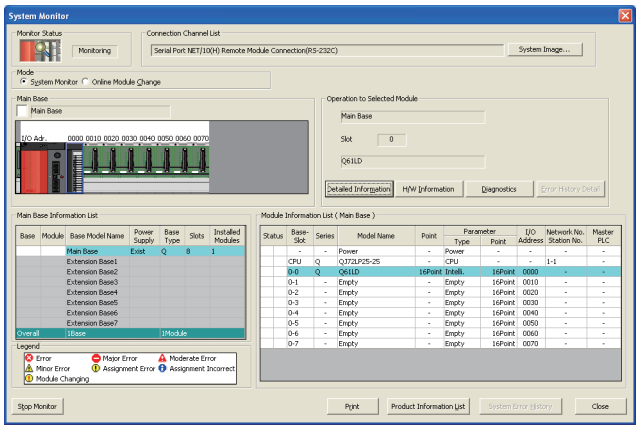
The error codes generated by the Q61LD can be checked by the following methods.
Use these methods according to the purpose and application.

- Checking with Module's Detailed Information (☞ Page 226, Section 11.1 (1) (a))
- Checking with Latest Error Code (Un\G190, Un\G1790) (☞ Page 226, Section 11.1 (1) (b))

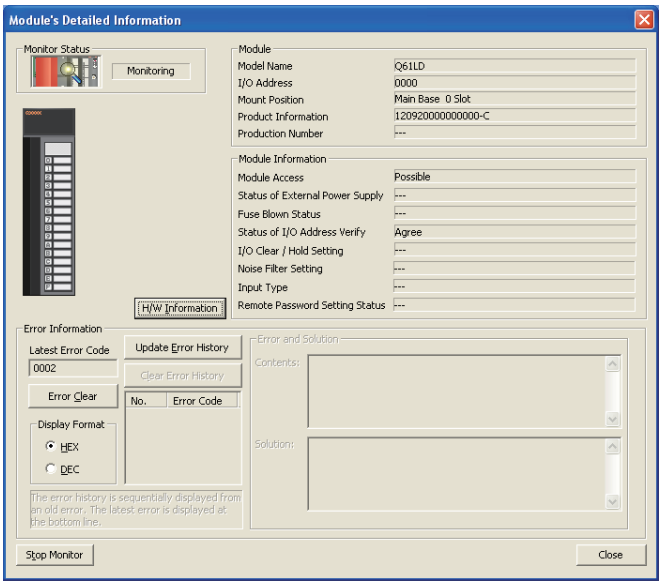
(a) Checking with Module's Detailed Information

The following shows how to check Module's Detailed Information for errors.

[Diagnostics] ⇨ [System Monitor]



↓



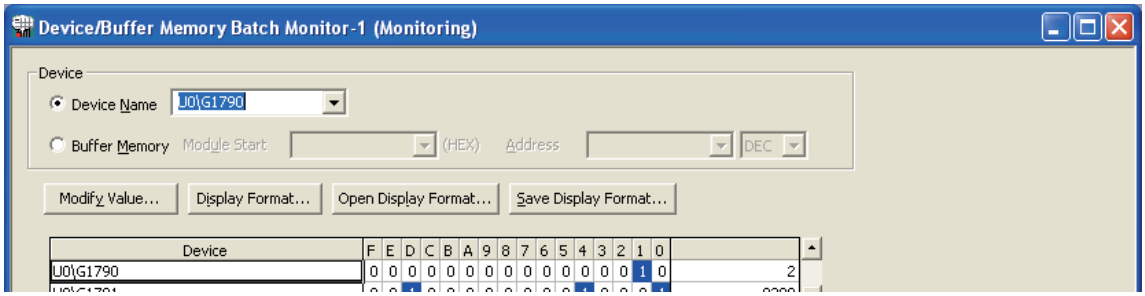
1. **Select Q61LD from "Main Block" and click the** **button.**

2. **"Module's Detailed Information" of the Q61LD is displayed.**

(b) Checking with Latest error code (Un\G190, Un\G1790)

The following shows how to check Latest Error Code (Un\G1790) for errors.

[Online] ⇨ [Monitor] ⇨ [Device/Buffer Memory Batch]



(2) Storage area for latest error code and error occurrence time

If an error occurs when the data is written to or read from the CPU module, the Q61LD writes the corresponding error code to the buffer memory.

Latest error code	Error occurrence time	Error code to be stored (decimal)
Un\G1790	Un\G1791 to Un\G1794	1, 2, 99, 100, 161 to 163
Un\G190	Un\G191 to Un\G194	Other than 1, 2, 99, 100, 161 to 163

(3) Error history storage

Up to last 40 errors are stored in Error history (Un\G1800 to Un\G1999).

Point

- The data of error occurrence time is stored on the basis of the CPU module time information. If the error occurrence time is wrong, check the time setting of the CPU module.
- When using the Q61LD in the MELSECNET/H remote I/O network, the time information is transferred as shown below. Therefore, the sequence of power supply for the system and the error occurrence timing may result in storing wrong information at the time of error occurrence.
  - CPU module → MELSECNET/H master module → MELSECNET/H remote module → Q61LD

(4) Error code list

Errors are classified into two levels: moderate (module error) and minor (module warning).

When a moderate error occurs, conversion processing is not performed.

When a minor error occurs, conversion processing is performed with the settings that the system operated normally last time.

The Q61LD uses only one channel. Therefore, there are two types of errors, the errors unrelated to the channel and the errors related to the channel, listed in the following tables, respectively.

(a) Errors unrelated to the channel

If the following errors occur, the error codes are written to Latest error code (Un\G1790).

The errors indicated as error codes 1 and 2 cannot be cleared even if Error clear request (YF) is turned on.

Error code (decimal)	Error level	Description	Corrective action
1	Moderate	A hardware error of the module	Power on and off the module again. If the same error occurs, the module may be in failure. Please consult your local Mitsubishi representative.
2	Moderate	A value other than 0 is set to the Switch 5 in the intelligent function module switch setting.	Set 0 to the Switch 5 in the intelligent function module switch setting of GX Developer.
99	Moderate	An analog input (load cell output) that exceeds the conversion range is applied.	To clear the error, restore an analog input (load cell output) value to the one within the conversion range and turn on Error clear request (YF). If the error is not cleared, check if the load cell connection cable is disconnected or cables are wired improperly. The cables that are not wired could be the cause of the error. If the error still exists after these actions are taken, the module may be in failure. Please consult your local Mitsubishi representative.
100	Moderate	The values that have been set to the following are invalid. • Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71) Or, the values that have been set to the following are invalid. • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87) Otherwise, two-point calibration is performed with the setting of Conversion enable/disable setting (Un\G0) set to Conversion disable (1).	Set Conversion enable/disable setting (Un\G0) to Conversion enable (0) to perform two-point calibration again, or set values in the following. • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87) If the same error occurs, the module may be in failure. Please consult your local Mitsubishi representative.
161	Minor	The G(P).OGSTOR instruction is executed in the two-point calibration mode.	Do not execute the G(P).OGSTOR instruction in the two-point calibration mode.
162	Minor	The G(P).OGSTOR instruction is executed consecutively.	Execute the G(P).OGSTOR instruction only once for one module.
163	Minor	The G(P).OGSTOR instruction is executed for a model that differs from the one for which the G(P).OGLOAD instruction was executed.	Execute G(P).OGSTOR instruction for the same model.

(b) Errors related to the channel

If the following errors occur, the error codes are written to Latest error code (Un\G190).

Error code (decimal)	Error level	Description	Corrective action
1100	Minor	The value set in Load cell rated capacity (Un\G50, Un\G51) is outside the range of 1 to 999999.	Reset the value of Load cell rated capacity (Un\G50, Un\G51) within the range of 1 to 999999.
1101	Minor	The value set in Load cell rated output (Un\G52) is outside the range of 3 to 30.	Reset the value of Load cell rated output (Un\G52) within the range of 3 to 30.
1102	Minor	The value set in Number of load cells in connection (Un\G53) is outside the range of 1 to 4.	Reset the value of Number of load cells in connection (Un\G53) within the range of 1 to 4.
1103	Minor	The value set in Tare zero offset (Un\G54) is other than 0 and 1.	Reset the value of Tare zero offset (Un\G54) to 0 or 1.
1110	Minor	The value set in Maximum weighing capacity setting (Un\G56, Un\G57) is outside the range of 1 to 99999.	Reset the value of Maximum weighing capacity setting (Un\G56, Un\G57) within the range of 1 to 99999.
1111	Minor	The value set in Maximum weighing capacity setting (Un\G56, Un\G57) does not meet the condition "Maximum weighing capacity setting ≤ Load cell rated capacity × Number of load cells in connection".	Reset the values of Load cell rated capacity (Un\G50, Un\G51), Number of load cells in connection (Un\G53), and Maximum weighing capacity setting (Un\G56, Un\G57).
1112	Minor	The value set in Minimum division (Un\G58) is outside the range of 0 to 5.	Reset the value of Minimum division (Un\G58) within the range of 0 to 5.
1113	Minor	The value set in Decimal point position (Un\G59) is outside the range of 0 to 4.	Reset the value of Decimal point position (Un\G59) within the range of 0 to 4.
1114	Minor	The value set in Unit (Un\G60) is outside the range of 0 to 2.	Reset the value of Unit (Un\G60) within the range of 0 to 2.
1120	Minor	The value set in Standard weight setting (Un\G62, Un\G63) is outside the range of 1 to 99999.	Reset the value of Standard weight setting (Un\G62, Un\G63) within the range of 1 to 99999.
1121	Minor	The value set in Standard weight setting (Un\G62, Un\G63) does not meet the condition "Standard weight setting ≤ Maximum weighing capacity setting".	Reset the values of Maximum weighing capacity setting (Un\G56, Un\G57) and Standard weight setting (Un\G62, Un\G63).
1122	Minor	The value set in Installation site gravitational acceleration (Un\G64, Un\G65) is outside the range of 97000 to 99999.	Reset the value of Installation site gravitational acceleration (Un\G64, Un\G65) within the range of 97000 to 99999.
1123	Minor	Calibration site gravitational acceleration (Un\G66, Un\G67) is outside the range of 97000 to 99999.	Reset the value of Calibration site gravitational acceleration (Un\G66, Un\G67) within the range of 97000 to 99999.
1124	Minor	The value set in Digital output zero correction value (Un\G68, Un\G69) is outside the range of -65536 to 65535.	Reset the value of Digital output zero correction value (Un\G68, Un\G69) within the range of -65536 to 65535.
1125	Minor	The value set in Digital output span correction value (Un\G70, Un\G71) is outside the range of -65536 to 65535.	Reset the value of Digital output span correction value (Un\G70, Un\G71) within the range of -65536 to 65535.
1150	Minor	The value set in Instrumentation amplifier gain setting (Un\G80) is outside the range of 0 to 2.	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the value of Instrumentation amplifier gain setting (Un\G80) within the range of 0 to 2.

Error code (decimal)	Error level	Description	Corrective action
1151	Minor	The setting of Instrumentation amplifier gain setting (Un\G80) does not meet that of Load cell rated output (Un\G52).	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the values of Instrumentation amplifier gain setting (Un\G80) and Load cell rated output (Un\G52).
1152	Minor	The value set in A/D converter gain setting (Un\G81) is outside the range of 0 to 5.	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the value of A/D converter gain setting (Un\G81) within the range of 0 to 5.
1153	Minor	The value set in A/D converter gain setting (Un\G81) does not meet the following conditions. $1 \geq \frac{\text{Capacity setting} \times \text{Rated output [mV/V]} \times \text{A/D converter gain setting}}{\text{Rated capacities} \times \text{Connection numbers} \times \frac{\text{Instrumentation amplifier}}{\text{gain setting}}}$ (Set the values corresponding to 1, 2, 4, 8, 16, and 32 (times) for A/D converter gain setting (Un\G81).) (Set 0_H for 1.0mV/V, 1_H for 2.0mV/V, and 2_H for 3.0mV/V for Instrumentation amplifier gain setting (Un\G80).)	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the values of Load cell rated capacity (Un\G50, Un\G51), Load cell rated output (Un\G52), Number of load cells in connection (Un\G53), Maximum weighting capacity setting (Un\G56, Un\G57), Instrumentation amplifier gain setting (Un\G80), and A/D converter gain setting (Un\G81).
1160	Minor	The value set in Tare zero offset output value (Un\G82, Un\G83) is outside the range of 0 to 65535.	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the value of Tare zero offset output value (Un\G82, Un\G83) within the range of 0 to 65535.
1161	Minor	The value set in Two-point zero calibration value (Un\G84, Un\G85) is outside the range of -8388608 to 8388607.	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the value of Two-point zero calibration value (Un\G84, Un\G85) within the range of -8388608 to 8388607.
1162	Minor	The value set in Two-point span calibration value (Un\G86, Un\G87) is outside the range of 1 to 8388607.	Set Two-point calibration method setting (Un\G41) to Automatic setting (0) to perform two-point calibration, or reset the value of Two-point span calibration value (Un\G86, Un\G87) within the range of 1 to 8388607.
1200	Minor	The value set in Averaging processing method setting (Un\G1) is other than 0, 2, 3, and 5.	Reset the value of Averaging processing method setting (Un\G1) to any value of 0, 2, 3, and 5.
1201	Minor	The value set in Count average setting (Un\G2) is outside the range of 4 to 255.	Reset the value of Count average setting (Un\G2) within the range of 4 to 255.
1202	Minor	The value set in Moving average setting (Un\G3) is outside the range of 2 to 255.	Reset the value of Moving average setting (Un\G3) within the range of 2 to 255.
1203	Minor	The value set in Stable status range setting (Un\G4) is outside the range of 0 to 100.	Reset the value of Stable status range setting (Un\G4) within the range of 0 to 100.
1204	Minor	The value set in Stable status time setting (Un\G5) is outside the range of 0 to 100.	Reset the value of Stable status time setting (Un\G5) within the range of 0 to 100.
1205	Minor	The value set in Zero tracking range setting (Un\G6) is outside the range of 0 to 100.	Reset the value of Zero tracking range setting (Un\G6) within the range of 0 to 100.
1206	Minor	The value set in Zero tracking time setting (Un\G7) is outside the range of 0 to 100.	Reset the value of Zero tracking time setting (Un\G7) within the range of 0 to 100.
1210	Minor	The value set in Input signal error detection setting (Un\G21) is outside the range of 0 to 250.	Reset the value of Input signal error detection setting (Un\G21) within the range of 0 to 250.
1211	Minor	The value set in Zero point range setting (Un\G22) is outside the range of 0 to 100.	Reset the value of Zero point range setting (Un\G22) within the range of 0 to 100.

Error code (decimal)	Error level	Description	Corrective action
1220	Minor	A value set in Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31) is outside the range of -99999 to 99999.	Reset the values of Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31) within the range of -99999 to 99999.
1221	Minor	A value set in Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31) does not meet the condition "lower lower limit value ≤ lower upper limit value ≤ upper lower limit value ≤ upper upper limit value ≤ maximum weighing capacity setting value.	Reset the values of Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31).
1230	Minor	The value of Two-point calibration request (Un\G43) is set to 3.	After performing two-point zero calibration, perform two-point span calibration. (Two-point zero calibration and two-point span calibration cannot be requested simultaneously.)
1231	Minor	Two-point span calibration is requested while two-point zero calibration is requested.	Perform two-point span calibration after Two-point calibration completion flag (Un\G143. b0) is set to Two-point zero calibration completion (1).
1234	Minor	Two-point setting request (Y7) is on while Two-point calibration request (Un\G43) is being set.	Proceed to two-point setting after two-point calibration is completed.
1235	Minor	Default setting registration command (Un\G148) is set to Default setting registration command (1) while Two-point calibration request (Un\G43) is being set.	Proceed to default setting registration after two-point calibration is completed.
1242	Minor	Two-point calibration request (Un\G43) is set simultaneously when Default setting registration command (Un\G148) is set to Default setting registration command (1).	Proceed to two-point calibration after default setting registration is completed.

Point

- The operations to be performed when multiple errors occur are as follows.
  - If multiple errors related to the channel occur, the error code of the error that occurred last is stored in Latest error code (Un\G190).
  - If multiple errors unrelated to the channel occur, the error code of the error that occurred last is stored in Latest error code (Un\G1790).
  - All errors that have occurred, whether related or unrelated to the channel, are stored in chronological order in Error history (Un\G1800 to Un\1999).
- When one mode switches to another, errors are cleared.

(5) Conditions where no error occurs even if the set data is outside the setting range

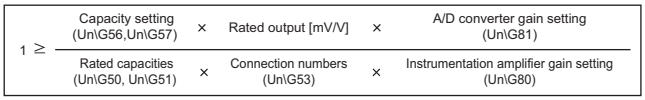
The table below lists the conditions and setting data where no error occurs even if the set data is outside the setting range.

Condition	Setting data where no error occurs even if the set data is outside the setting range
Conversion enable/disable setting (Un\G0) is set to Conversion disable (1).	All the setting data
Warning output setting (Un\G20. b0) is set to Warning output disabled (1).	Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31)
Warning output setting (Un\G20. b8) is set to Input signal error detection disable (1).	Input signal error detection setting (Un\G21)
Averaging processing method setting (Un\G1) is set to Sampling processing (0).	Count average setting (Un\G2), Moving average setting (Un\G3)
Averaging processing method setting (Un\G1) is set to Count average (2_H).	Moving average setting (Un\G3)
Averaging processing method setting (Un\G1) is set to Moving average (3_H).	Count average setting (Un\G2)
Tare zero offset (Un\G54) is set to Not used (1).	Tare zero offset output value (Un\G82, Un\G83)

(6) Conditions where the set data is not activated even if the setting was changed

The table below lists the conditions and setting data where the set data is not activated even if the setting was changed.

Condition	Setting data not activated regardless of the setting change
Moderate error status[*1]	Conversion enable/disable setting (Un\G0)
Two-point calibration method setting (Un\G41) is set to Automatic setting (0)[*1].	• Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)
Tare zero offset (Un\G54) is set to Not used (1)[*1].	• A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83)
Settings that do not satisfy the following conditions (in the case of two-point calibration by automatic setting)[*2] Standard weight setting (Un\G62, Un\G63) ≤ Maximum weighing capacity setting (Un\G56, Un\G57) ≤ Load cell rated capacity (Un\G50, Un\G51) × Number of load cells in connection (Un\G53)	• Conversion enable/disable setting (Un\G0) • Averaging processing method setting (Un\G1) • Count average setting (Un\G2) • Moving average setting (Un\G3) • Stable status range setting (Un\G4) • Stable status time setting (Un\G5) • Zero tracking range setting (Un\G6) • Zero tracking time setting (Un\G7) • Conversion-over/automatic restoration setting (Un\G19) • Warning output setting (Un\G20) • Input signal error detection setting (Un\G21) • Zero point range setting (Un\G22) • Gross weight lower lower limit value setting (L) (Un\G24) to Gross weight upper upper limit value setting (H) (Un\G31). • Two-point setting (Un\G40) • Two-point calibration method setting (Un\G41) • Two-point calibration setting (Un\G42) • Two-point calibration request (Un\G43) • Zero point adjustment request (Un\G45) • Default setting registration (Un\G48)

Condition	Setting data not activated regardless of the setting change
Settings that do not satisfy the following conditions (in the case of two-point calibration by user setting)*2  $1 \geq \frac{\text{Capacity setting (Un\G56,Un\G57)}}{\text{Rated capacities (Un\G50, Un\G51)}} \times \text{Rated output [mV/V]} \times \frac{\text{A/D converter gain setting (Un\G81)}}{\text{Connection numbers (Un\G53)} \times \text{Instrumentation amplifier gain setting (Un\G80)}}$ (Set the values corresponding to 1, 2, 4, 8, 16, and 32 (times) for A/D converter gain setting (Un\G81).) (Set 0_H for 1.0mV/V, 1_H for 2.0mV/V, and 2_H for 3.0mV/V for Instrumentation amplifier gain setting (Un\G80).)	• Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71) • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)

*1 These are the conditions where no error occurs even though a corresponding setting request (Two-point calibration setting request (Y7) or Operating condition setting request (Y9)) is turned on and off. The setting change is ignored and the value in the buffer memory remains the same as the one before the request.

*2 These are the conditions where an error occurs when Two-point calibration setting request (Y7) is turned on and off if a setting is outside the setting range. The setting change is ignored and the value in the buffer memory remains the same as the one before the request.

11.2 Troubleshooting

11.2.1 When the RUN LED turns off

Check item	Corrective action
Is power supplied?	Check that the supply voltage of the power supply module is within the rated range.
Is the capacity of the power supply module sufficient?	Calculate the current consumption of each module mounted on the base unit, and make sure that the capacity of the power supply module is sufficient.
Has a watchdog timer error occurred?	Reset the CPU module and check that the RUN LED turns on. If the RUN LED does not turn on, the module may be in failure. Please consult your local Mitsubishi representative.
Are the modules mounted correctly on the base unit?	Check the module mounting status.
Is the module in the online module change enable status?	Refer to the chapter explaining the online module change and take corrective actions. (☞ Page 192, CHAPTER 10, Page 268, Appendix 5)

11.2.2 When the RUN LED flashes

Check item	Corrective action
Is the module in the two-point calibration mode?	Turn off Two-point calibration mode switch request (YA) to switch the mode to the normal mode.

11.2.3 When the ERR. LED flashes

Check item	Corrective action
Is the setting value of the intelligent function module switch 5 other than 0?	Set 0 for the intelligent function module switch 5 in GX Developer.

11.2.4 When the ERR. LED turns on

Check item	Corrective action
Has an error occurred?	Check the error code and take corrective actions. • Error Code List (☞ Page 227, Section 11.1 (4))

11.2.5 When the ALM LED flashes

Check item	Corrective action
Has an input signal error occurred?	Check Input signal error detection flag (Un\G114). If Outside the zero point range is shown, remove foreign matters or perform zero reset, and check the shift range from the ZERO point. For other types of errors, check the wiring and input voltage.

11.2.6 When the ALM LED turns on

Check item	Corrective action
Has a warning (upper or lower limit alarm) occurred?	Check Warning output flag (Un\G115).

11.2.7 When Input signal error detection signal (XC) turns on

Check item	Corrective action
Is the load cell connected correctly?	Connect the load cell correctly.
Are the resistance values between +IN and -IN and between +OUT and -OUT of the load cell correct?	Remove the load cell from the connection terminal and measure the resistance of the load cell itself.
Is the 5VDC ±5% voltage supplied between +IN and -IN of the load cell?	Perform a visual check and continuity check over the connection cable between EXC+ and EXC- and between S+ and S- terminals to check for faulty locations.
Is the voltage between the load cell signal terminals SIG+ and SIG- correct?	Measure the voltage between the load cell signal terminals SIG+ and SIG-. The voltage is calculated with the following formula. $\text{Load cell output voltage [mV]} = \frac{\text{Load cell actual load [kg]} \times \text{Load cell rated output [mV/V]} \times 5\ \text{[V]}}{\text{Load cell rated capacity [kg]} \times \text{Number of load cells in connection}}$ Check whether the polarity on the connection is correct. (The polarity of load cell is different between the compressive load and tensile load.)
Is a voltage resulting in an input signal error input?	Check Input signal error detection flag (Un\G114) to see whether such voltage is input. Check whether the relevant parameter value is set and enabled as expected.

11.2.8 When a measured weight value cannot be read

Check item	Corrective action
Is Conversion enable/disable setting (Un\G0) set to Conversion disable (1)?	Set Conversion enable/disable setting (Un\G0) to Conversion enable (0).
Is the CPU module set to STOP?	Set the CPU module to RUN.

11.2.9 When a measured weight value is abnormal

Check item	Corrective action	
Is the cable connected to the load cell disconnected or removed?	Perform a visual check and continuity check over the connection cable for faulty locations.	
Has Operating condition setting request (Y9) been executed?	Turn on and off Operating condition setting request (Y9) to check whether a value is stored in Gross weight output value (Un\G100, Un\G101).	
Are the values set in the following correct? • Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71)	Check the following settings on the monitor window of the programming tool. • Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71) If the setting is incorrect, turn on Two-point calibration mode switch request (YA) to switch the mode to two-point calibration mode and reset the value.	
	When two-point calibration is performed, take the action written in the right column.	Perform two-point calibration again.
Are the values set in the following correct? • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)	When the following setting values are corrected by users, take the action written in the right column. • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)	Check the following setting values on the monitor window of the programming tool. • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87) If the calibration value is incorrect, turn on Two-point calibration mode switch request (YA) to switch the mode to two-point calibration mode and rewrite the calibration value.

Point

The module may be in failure if the measured weight value cannot be read after proper corrective actions have been taken according to the above check items.
Please consult your local Mitsubishi representative.

11.2.10 When the two-point zero calibration is completed abnormally

Check item	Corrective action
Is Two-point calibration request (Un\G43. b0) set to Two-point zero calibration requested (1) in the normal mode? Or, is Two-point calibration request (Un\G43. b0) set to Two-point zero calibration requested (1) with Two-point calibration setting (Un\G42) not set to Two-point zero calibration enable (1)?	Set Two-point calibration request (Un\G43. b0) to Two-point zero calibration requested (1) in the two-point calibration mode. Or, set Two-point calibration setting (Un\G42. b0) to Two-point zero calibration enable (1) and set Two-point calibration request (Un\G43. b0) to Two-point calibration zero calibration requested (1).

11.2.11 When the two-point span calibration is completed abnormally

Check item	Corrective action
Is Two-point calibration request (Un\G43. b1) set to Two-point span calibration requested (1) in the normal mode? Or, is Two-point calibration request (Un\G43. b1) set to Two-point span calibration requested (1) with Two-point calibration setting (Un\G42. b1) not set to Two-point span calibration enable (1)?	Set Two-point calibration request (Un\G43. b1) to Two-point span calibration requested (1) in the two-point calibration mode. Or, set Two-point calibration setting (Un\G42. b1) to Two-point span calibration enable (1) and set Two-point calibration request (Un\G43. b1) to Two-point calibration span calibration requested (1).

11.2.12 When the default setting registration is completed abnormally

Check item	Corrective action
Is Default setting registration command (Un\G148) set to Default setting registration command (1) in the normal mode? Or, is Default setting registration command (Un\G148) set to Default setting registration command (1) with Default setting registration (Un\G48) not set to Default setting registration enable (1)?	Set Default setting registration command (Un\G148) to Default setting registration command (1) in the two-point calibration mode. Or, set Default setting registration (Un\G48) to Default setting registration enable (1) and set Default setting registration command (Un\G148) to Default setting registration command (1).

11.2.13 Checking the Q61LD status using system monitor of GX Works2

The LED status and the setting status of the intelligent function module switch can be checked by selecting Q61LD H/W information on the GX Works2 system monitor.

(1) H/W information

(a) H/W LED information

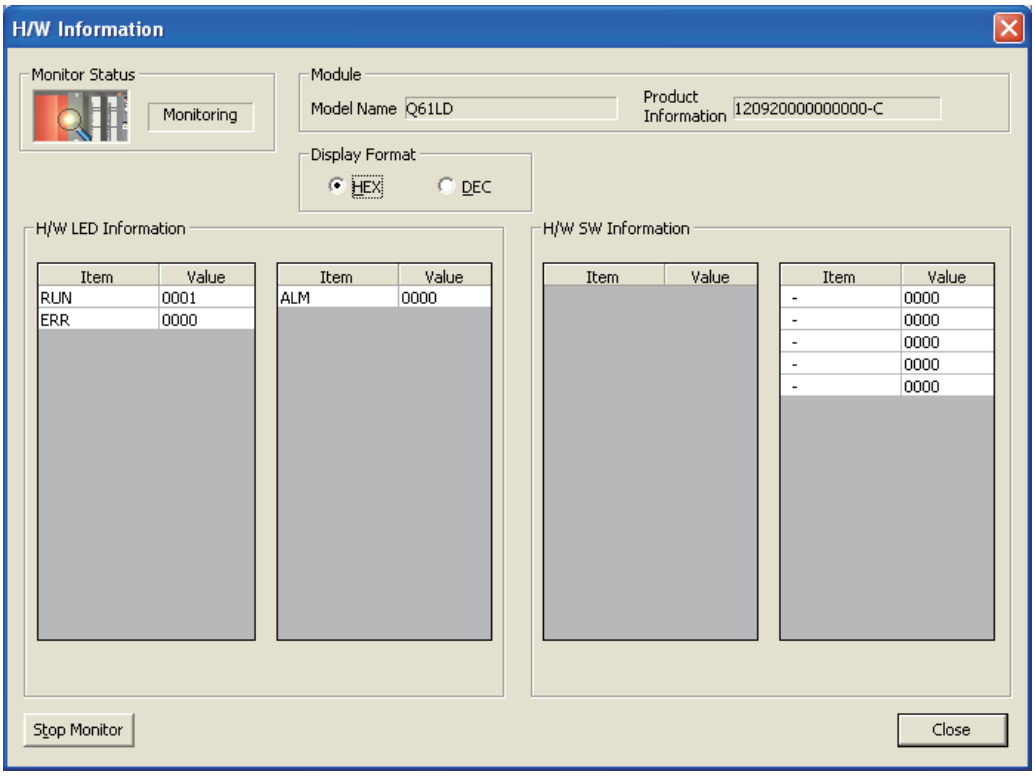
The LED lighting status is displayed.

LED name	Lighting status
RUN LED	0000_H: Indicates that the LED is off.
ERR. LED	0001_H: Indicates that the LED is on.
ALM LED	0000_H and 0001_H is displayed alternately: Indicates that the LED is flashing.

(b) H/W switch information

The setting status of the intelligent function module switch is displayed.

The Q61LD does not require the intelligent function module switch setting.



APPENDICES

Appendix 1 Dedicated Instructions

(1) Dedicated instruction list

The following table lists dedicated instructions available for the Q61LD.

Instruction	Description
G(P).OGLOAD	Reads the following data into the CPU module. • Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71) • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)
G(P).OGSTOR	Writes the following data from the CPU module to the Q61LD. • Load cell rated capacity (Un\G50, Un\G51) • Load cell rated output (Un\G52) • Number of load cells in connection (Un\G53) • Tare zero offset (Un\G54) • Maximum weighing capacity setting (Un\G56, Un\G57) • Minimum division (Un\G58) • Decimal point position (Un\G59) • Unit (Un\G60) • Standard weight setting (Un\G62, Un\G63) • Installation site gravitational acceleration (Un\G64, Un\G65) • Calibration site gravitational acceleration (Un\G66, Un\G67) • Digital output zero correction value (Un\G68, Un\G69) • Digital output span correction value (Un\G70, Un\G71) • Instrumentation amplifier gain setting (Un\G80) • A/D converter gain setting (Un\G81) • Tare zero offset output value (Un\G82, Un\G83) • Two-point zero calibration value (Un\G84, Un\G85) • Two-point span calibration value (Un\G86, Un\G87)

Point

When the Q61LD is mounted on a MELSECNET/H remote I/O station, the dedicated instructions cannot be used.

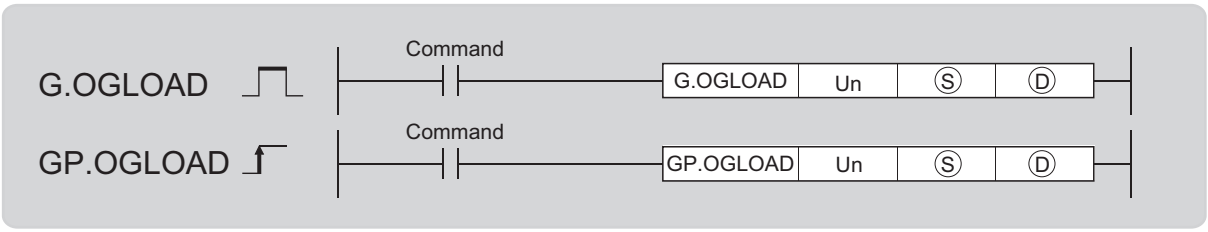
(2) Available devices

The following table lists devices available for the dedicated instructions.

Internal device		File register	Constant
Bit*1	Word		
X, Y, M, L, F, V, B	T, ST, C, D, W	R, ZR	—

*1 By using these devices as bit data, a word device can be specified by bit.
Specify a word device by bit in the format of "word-device.bit No".
(A bit number is specified in hexadecimal.)
For example, bit 10 of D0 is specified by D0.A.
Note that timer (T), retentive timer (ST), and counter (C) cannot be specified by bit.

Appendix 1.1 G(P).OGLOAD



Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	–	○		–					
Ⓓ	○			–					

(1) Setting data

Device	Description	Setting range	Data type
Un	Head I/O number of module	0 to FE_H	16-bit binary
Ⓢ	Head number of the device storing control data	Within the specified device range	Device name
Ⓓ	Device turned on for one scan on completion of the processing of the dedicated instruction In the event of abnormal completion, Ⓓ+1 also turns on.	Within the specified device range	Bit

(2) Control data*1

Device	Item	Setting data	Setting range	Set by
Ⓢ	System area	—	—	—
Ⓢ+1	Completion status	Stores status of when the instruction is completed. 0: Normal completion Except 0: Abnormal completion		System
Ⓢ+2	System area	—	—	—
Ⓢ+3				
Ⓢ+4	Load cell rated capacity (L)			System
Ⓢ+5	Load cell rated capacity (H)			
Ⓢ+6	Load cell rated output			
Ⓢ+7	Number of load cells in connection			
Ⓢ+8	Tare zero offset function			
Ⓢ+9	System area			
Ⓢ+10	Maximum weighing capacity setting (L)			
Ⓢ+11	Maximum weighing capacity setting (H)			
Ⓢ+12	Minimum division			
Ⓢ+13	Decimal point position			
Ⓢ+14	Unit			
Ⓢ+15	System area			
Ⓢ+16	Standard weight setting (L)			
Ⓢ+17	Standard weight setting (H)			
Ⓢ+18	Installation site gravitational acceleration (L)			
Ⓢ+19	Installation site gravitational acceleration (H)			
Ⓢ+20	Calibration site gravitational acceleration (L)			
Ⓢ+21	Calibration site gravitational acceleration (H)			
Ⓢ+22	Digital output zero correction value (L)			
Ⓢ+23	Digital output zero correction value (H)			
Ⓢ+24	Digital output span correction value (L)			
Ⓢ+25	Digital output span correction value (H)			
Ⓢ+26 ⋮ Ⓢ+33	System area			
Ⓢ+34	Instrumentation amplifier gain setting			
Ⓢ+35	A/D converter gain setting			
Ⓢ+36	Tare zero offset output value (L)			
Ⓢ+37	Tare zero offset output value (H)			
Ⓢ+38	Two-point zero calibration value (L)			

Device	Item	Setting data	Setting range	Set by
Ⓢ+39	Two-point zero calibration value (H)	—	—	System
Ⓢ+40	Two-point span calibration value (L)			
Ⓢ+41	Two-point span calibration value (H)			
Ⓢ+42 ⋮ Ⓢ+85	System area			

*1 Setting is unnecessary. If setting is configured, the data will not be read properly.

(3) Function

This function reads the following data from the Q61LD into the CPU module.

For the buffer memory areas whose data are to be read, refer to the following.

- Dedicated instruction list (☞ Page 240, Appendix 1 (1))

There are two types of interlock signals for the G(P).OGLOAD instruction: completion device Ⓓ and completion status indication device Ⓓ+1.

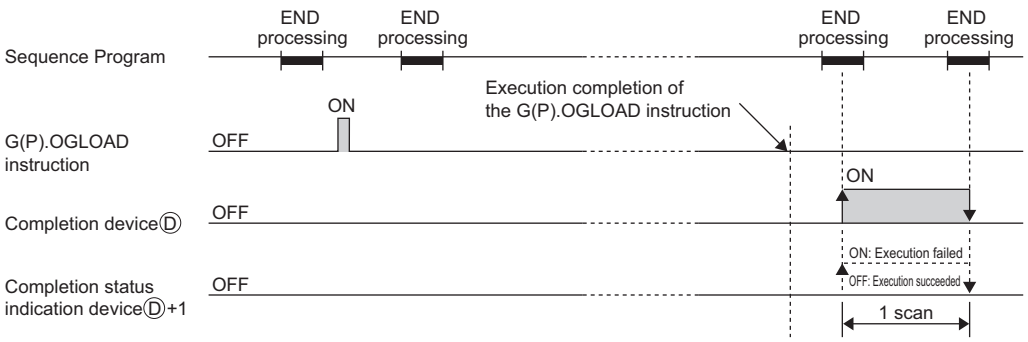
(a) Completion device

This device turns on at the END processing in the scan where the G(P).OGLOAD instruction is completed, and turns off at the next END processing.

(b) Completion status indication device

This device turns on and off depending on the completion status of the G(P).OGLOAD instruction.

- Normal completion: Remains off and does not change.
- Abnormal completion: Turns on at the END processing in the scan where the G(P).OGLOAD instruction is completed, and turns off at the next END processing.

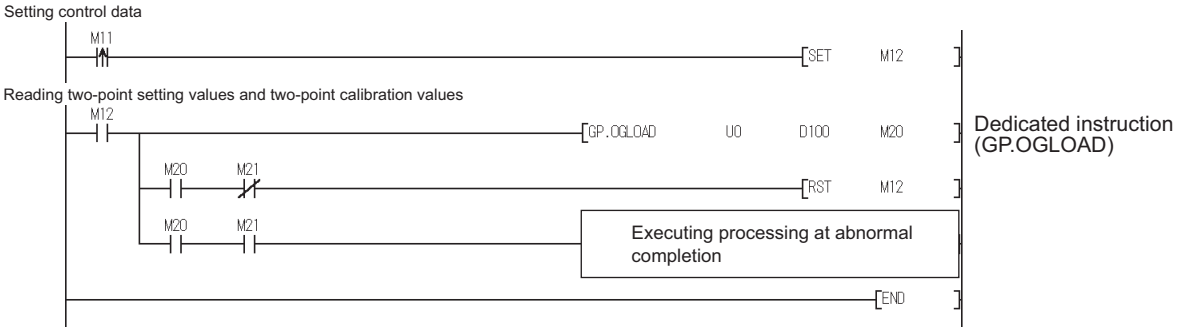


(4) Error

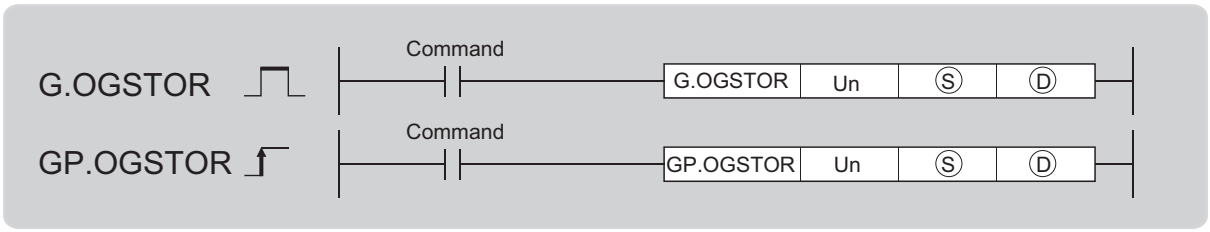
There are no corresponding error codes.

(5) Program example

When M11 is turned on, this program reads the data at the relevant buffer memory addresses from the Q61LD, which is mounted on the slot to which I/O numbers X/Y0 to X/YF are assigned, to D100 to D185.



Appendix 1.2 G(P).OGSTOR



Setting data	Internal device		R, ZR	J□\□		U□\G□	Zn	Constant K, H, $	Others
	Bit	Word		Bit	Word				
Ⓢ	–	○		–					
Ⓓ	○			–					

(1) Setting data

Device	Description	Setting range	Data type
Un	Head I/O number of module	0 to FE_H	16-bit binary
Ⓢ*1	Head number of the device storing control data	Within the specified device range	Device name
Ⓓ	Device turned on for one scan on completion of the processing of the dedicated instruction In the event of abnormal completion, Ⓓ+1 also turns on.	Within the specified device range	Bit

*1 When executing the G(P).OGLOAD instruction, specify the device specified in Ⓢ.
Do not change the data that have been read with the G(P).OGLOAD instruction. If the data is changed, normal operation is not guaranteed.

(2) Control data*1

Device	Item	Setting data	Setting range	Set by
Ⓢ	System area	—	—	—
Ⓢ+1	Completion status	Stores status of when the instruction is completed. 0: Normal completion Except 0: Abnormal completion		System
Ⓢ+2	System area	—	—	—
Ⓢ+3				
Ⓢ+4	Load cell rated capacity (L)			System
Ⓢ+5	Load cell rated capacity (H)			
Ⓢ+6	Load cell rated output			
Ⓢ+7	Number of load cells in connection			
Ⓢ+8	Tare zero offset function			
Ⓢ+9	System area			
Ⓢ+10	Maximum weighing capacity setting (L)			
Ⓢ+11	Maximum weighing capacity setting (H)			
Ⓢ+12	Minimum division			
Ⓢ+13	Decimal point position			
Ⓢ+14	Unit			
Ⓢ+15	System area			
Ⓢ+16	Standard weight setting (L)			
Ⓢ+17	Standard weight setting (H)			
Ⓢ+18	Installation site gravitational acceleration (L)			
Ⓢ+19	Installation site gravitational acceleration (H)			
Ⓢ+20	Calibration site gravitational acceleration (L)			
Ⓢ+21	Calibration site gravitational acceleration (H)			
Ⓢ+22	Digital output zero correction value (L)			
Ⓢ+23	Digital output zero correction value (H)			
Ⓢ+24	Digital output span correction value (L)			
Ⓢ+25	Digital output span correction value (H)			
Ⓢ+26 ⋮ Ⓢ+33	System area			
Ⓢ+34	Instrumentation amplifier gain setting			
Ⓢ+35	A/D converter gain setting			
Ⓢ+36	Tare zero offset output value (L)			
Ⓢ+37	Tare zero offset output value (H)			
Ⓢ+38	Two-point zero calibration value (L)			

Device	Item	Setting data	Setting range	Set by
Ⓢ+39	Two-point zero calibration value (H)	—	—	System
Ⓢ+40	Two-point span calibration value (L)			
Ⓢ+41	Two-point span calibration value (H)			
Ⓢ+42 ⋮ Ⓢ+85	System area			

*1 Setting is unnecessary. If setting is configured, the data will not be written properly.

(3) Function

This function recovers the following data from the CPU module to a new Q61LD.

For the buffer memory areas whose data are to be recovered, refer to the following.

- Dedicated instruction list (☞ Page 240, Appendix 1 (1))

There are two types of interlock signals for the G(P).OGSTOR instruction: completion device Ⓓ and completion status indication device Ⓓ+1.

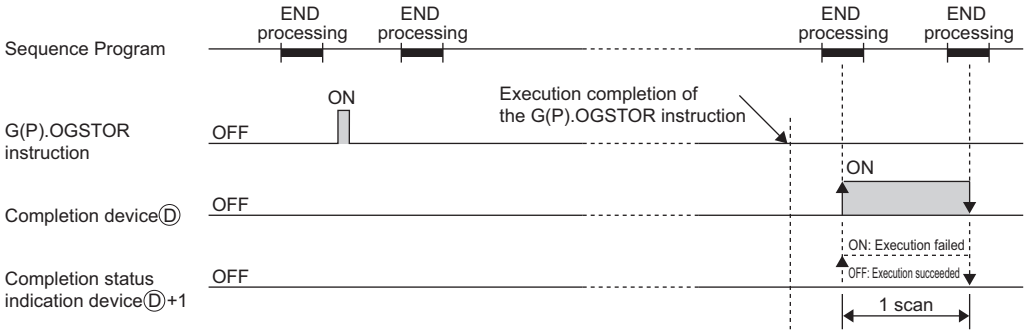
(a) Completion device

This device turns on at the END processing in the scan where the G(P).OGSTOR instruction is completed, and turns off at the next END processing.

(b) Completion status indication device

This device turns on and off depending on the completion status of the G(P).OGSTORE instruction.

- Normal completion: Remains off and does not change.
- Abnormal completion: Turns on at the END processing in the scan where the G(P).OGSTOR instruction is completed, and turns off at the next END processing.



- The accuracy after online module change is 3 times lower than the one before the change. (Perform a two-point calibration again as necessary.)

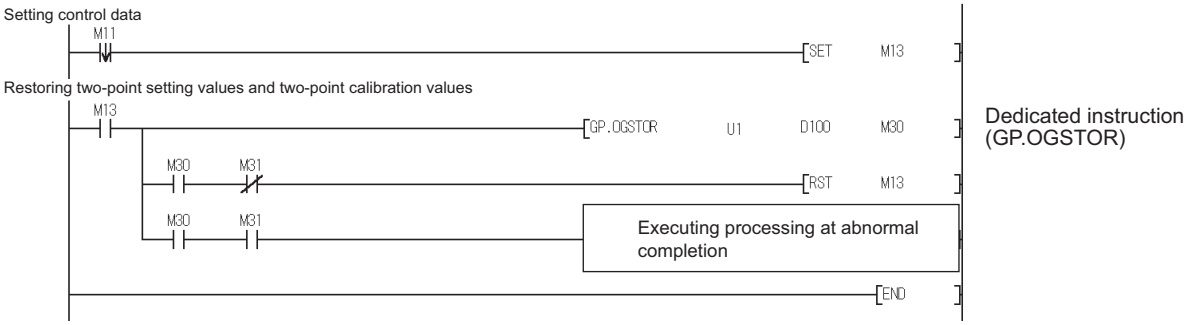
(4) Error

In the event of the following errors, the corresponding error code is stored in the completion status area Ⓢ+1.

Error code	Case resulting in operation error
161	The G(P).OGSTOR instruction is executed in the offset/gain setting mode.
162	The G(P).OGSTOR instructions are executed consecutively.
163	• The G(P).OGSTOR instruction is executed to the model that differs from the one to which the G(P).OGLOAD instruction was executed. • The G(P).OGSTOR instruction is executed before the G(P).OGLOAD instruction.

(5) Program example

When M11 is turned off, this program recovers the data at the target buffer memory addresses to the Q61LD mounted on the slot to which I/O numbers X/Y10 to X/Y1F are assigned.



Appendix 2 Additions and Changes of Functions by Upgrade

The functions and specifications of the Q61LD are added or changed by the version upgrade.
The functions available for the Q61LD depend on the first five digits of the serial number.

Functions added/changed	Description	First 5 digits of product information	Reference
Conversion-over/automatic restoration setting	Using Conversion-over/automatic restoration setting (Un\G19), the operation in case of a weighing capacity over or conversion over can be set to auto stop or auto restoration.	12011 or later	Page 91, Section 4.12
Default setting registration function	Restores the setting values in the following buffer memory areas to the default values. For the buffer memory areas whose data are to be changed back to the default, refer to the following. • Buffer Memory List (☞ Page 118, Section 6.1)		Page 107, Section 4.18

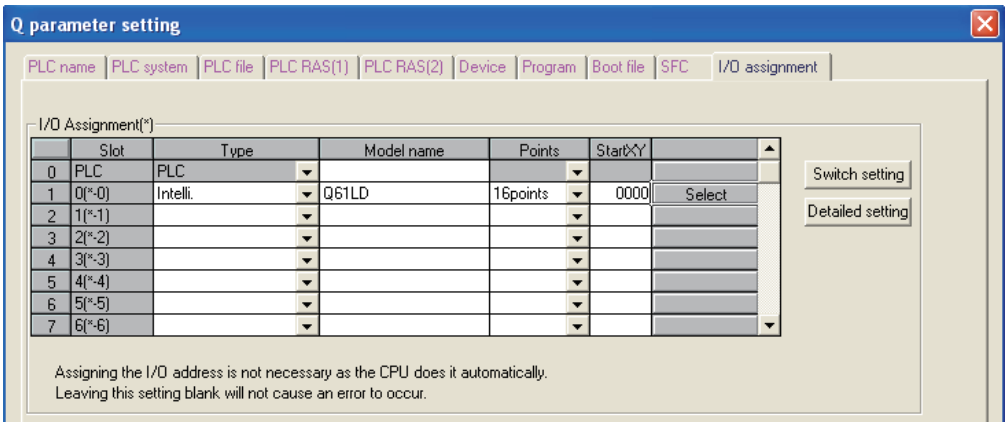
Appendix 3 When GX Developer is Used

This section describes the operation method using GX Developer.

(1) I/O assignment

Perform I/O assignment from "I/O Assignment" of "PLC Parameter".

Parameter ⇨ [PLC parameter] ⇨ [I/O assignment]



Item	Description
Type	Select "Intelli.".
Model name	Enter the model name of the module.
Points	Select 16 points.
Start XY	Enter the start I/O number of the Q61LD. (Option)

(2) Intelligent function module switch setting

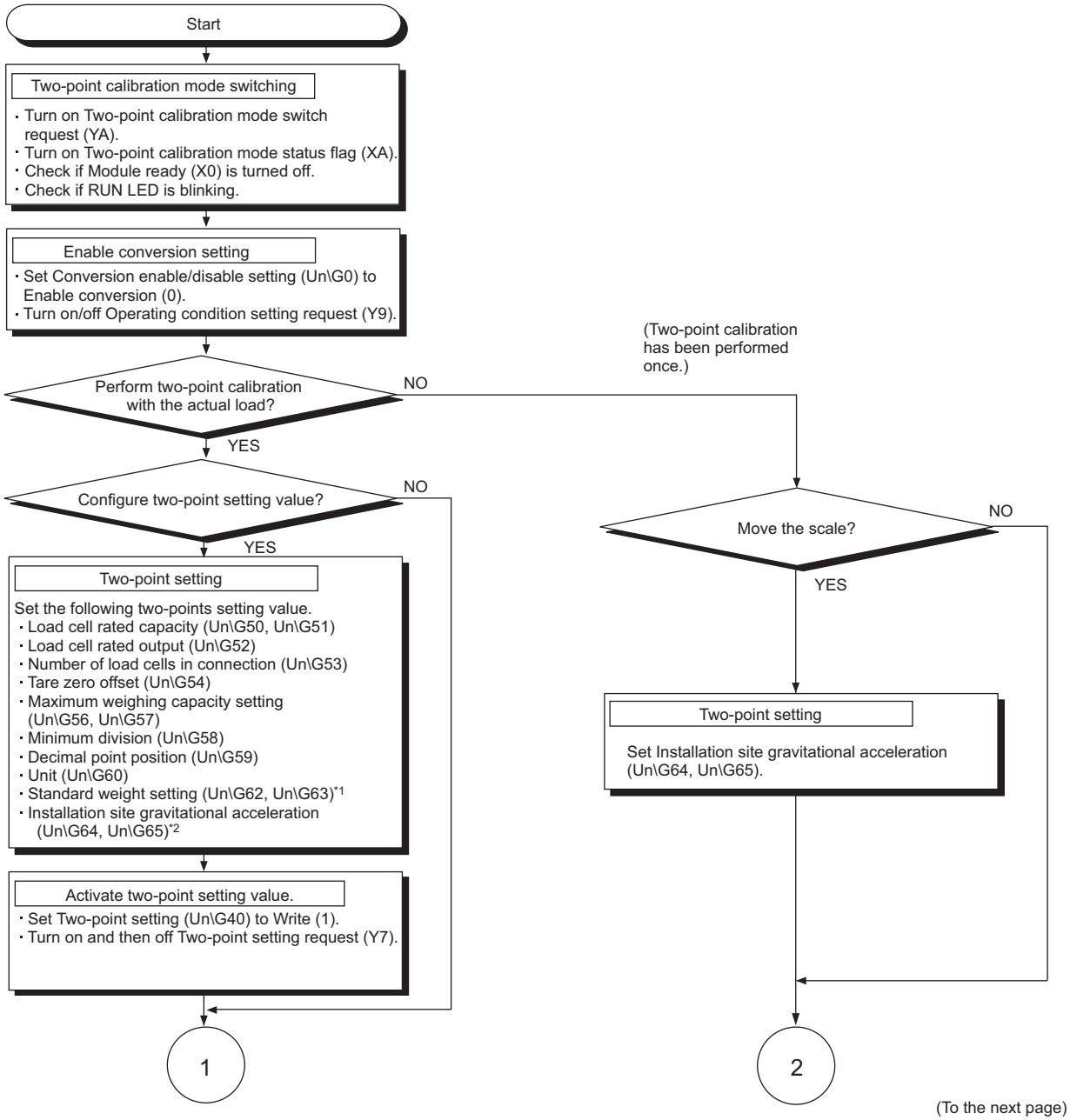
The Q61LD does not use the intelligent function module switch.

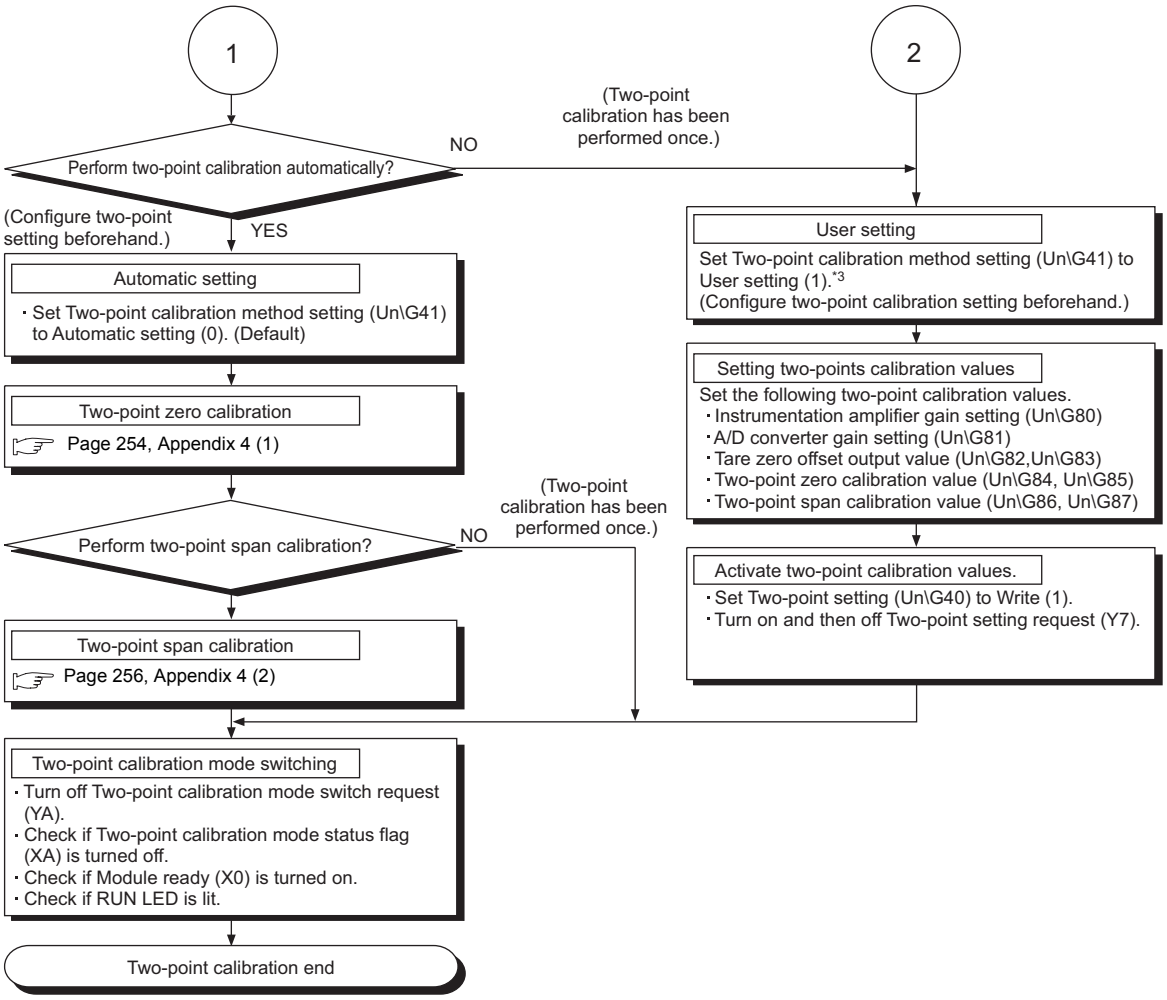
If the intelligent function module switch is set using GX Developer, an error may occur.

Appendix 4 Two-point Calibration when a Sequence Program is Used

Appendix 4.1 Setting and procedure

The following figure shows the setting and procedure of two-point calibration.





*1 When executing the two-point span calibration, set the weight of the actual load (standard weight) to be placed in advance.

*2 When the calibration site of the weighing machine differs from the installation site, configure the setting again at the installation site.
For details on the gravitational acceleration correction function, refer to the following.

• Gravitational Acceleration Correction Function (☞ Page 56, Section 4.7)

*3 Perform user setting when any fine adjustment is necessary after the backup of the set data in the following buffer memory areas are reflected, or after the automatic setting was performed once.

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)
- Two-point zero calibration value (Un\G84, Un\G85)
- Two-point span calibration value (Un\G86, Un\G87)

(1) Two-point zero calibration

Perform two-point zero calibration with nothing placed (0kg) on the weighing machine.

1. **Configure the following settings.**

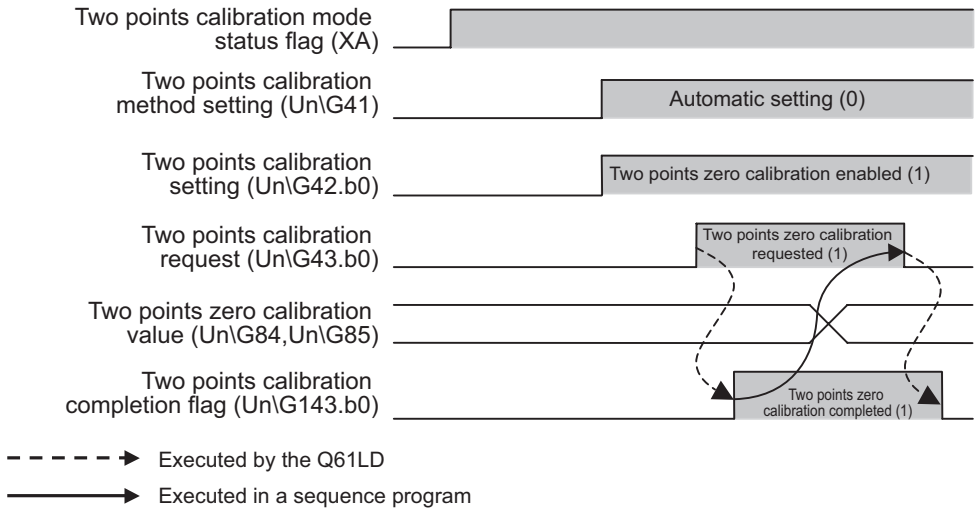
- Set Two-point calibration method setting (Un\G41) to Automatic setting (0) (default).
- Set Two-point calibration setting (Un\G42. b0) to Two-point zero calibration enable (1).
- Set Two-point calibration request (Un\G43. b0) to Two-point zero calibration requested (1).

2. **The settings above clear the correction made by the zero point adjustment and zero tracking to 0, and the optimum values are automatically stored in the following buffer memory areas.**

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)
- Two-point zero calibration value (Un\G84, Un\G85)

3. **When calibration is completed, Two-point calibration completion flag (Un\G143. b0) turns to Two-point zero calibration completion (1).**
After completion, set Two-point calibration request (Un\G43. b0) back to Two-point zero calibration not requested (0).
When a two-point zero calibration is completed abnormally, Two-point calibration completion flag (Un\G143. b8) also turns to Two-point calibration failed (1). Remove error causes, and set Two-point calibration request (Un\G43. b0) to Two-point zero calibration requested (1) again. For details on the error causes, refer to the following.

- TROUBLESHOOTING (☞ Page 225, CHAPTER 11)



Point

- After setting Two-point calibration request (Un\G43. b0) to Two-point zero calibration requested (1), place nothing (0kg) on the weighing machine until Two-point calibration completion flag (Un\G143. b0) turns to Two-point zero calibration completion (1).
  It may take a few seconds to complete two-point zero calibration.
- When performing two-point zero calibration with Tare zero offset (Un\G54) set to Used (0) and Two-point calibration method setting (Un\G41) set to Automatic setting (0), set the values of Count average setting (Un\G2) and Moving average setting (Un\G3) to within the following ranges.
  - When Averaging processing method setting (Un\G1) is Sampling processing (0): There is no limit.
  - When Averaging processing method setting (Un\G1) is Count average (2_H)

    1000ms ≥ Count average setting × 10ms
  - When Averaging processing method setting (Un\G1) is Moving average (3_H)

    1000ms ≥ Moving average setting × 10ms
  - When Averaging processing method setting (Un\G1) is Combination use of count average and moving average (5_H)

    1000ms ≥ Count average setting × Moving average setting × 10ms

(2) Two-point span calibration

Perform two-point span calibration with the weight of actual load (standard weight) of Standard weight setting (Un\G62, Un\G63) placed on the weighing machine.

1. **Configure the following settings.**

- Set Two-point calibration method setting (Un\G41) to Automatic setting (0) (default).
- Set Two-point calibration setting (Un\G42. b1) to Two-point span calibration enable (1).
- Set Two-point calibration request (Un\G43. b1) to Two-point span calibration requested (1).

2. **The settings above automatically perform the following.**

• The set value of Installation site gravitational acceleration (Un\G64, Un\G65) is stored in Calibration site gravitational acceleration (Un\G66, Un\G67).

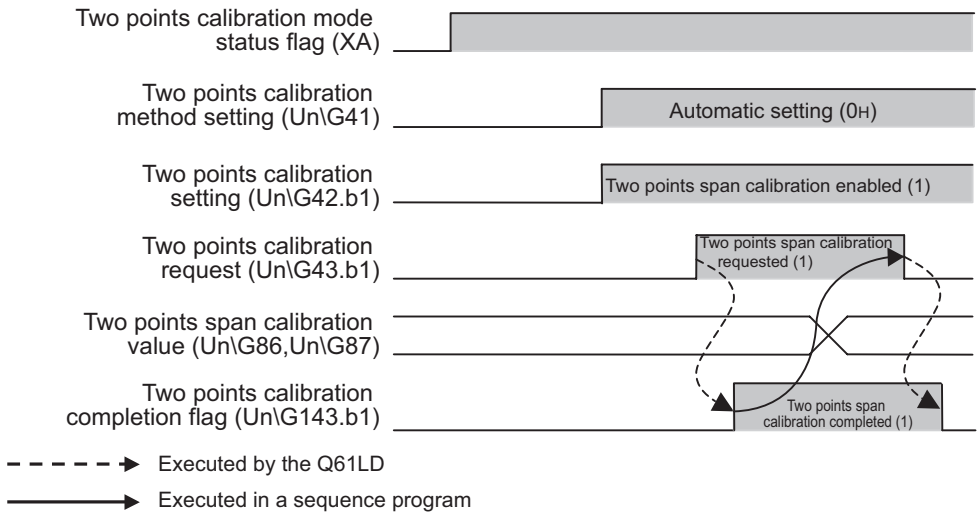
• Values are stored in Two-point span calibration value (Un\G86, Un\G87).

3. **After calibration is completed, Two-point calibration completion flag (Un\G143. b1) turns to Two-point span calibration completion (1).**

Set Two-point calibration request (Un\G43. b1) back to Two-point span calibration not requested (0).

When a two-point span calibration is completed abnormally, Two-point calibration completion flag (Un\G143. b8) also turns to Two-point calibration failed (1). Remove error causes, and set Two-point calibration request (Un\G43. b1) to Two-point span calibration requested (1) again. For details on the error causes, refer to the following.

• TROUBLESHOOTING (☞ Page 225, CHAPTER 11)



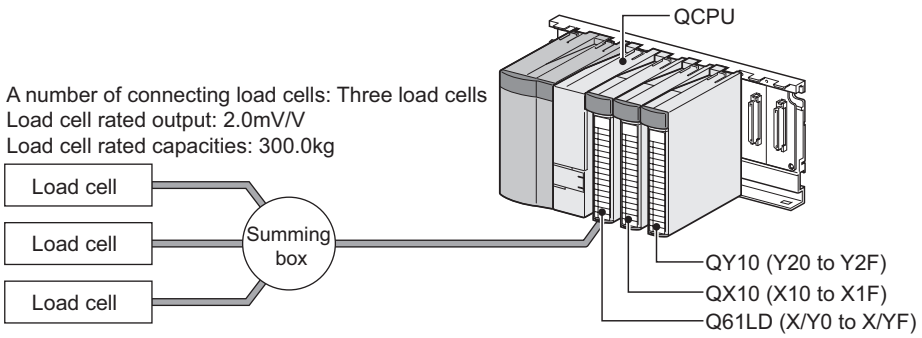
Point

- After Two-point calibration request (Un\G43. b1) is set to Two-point span calibration requested (1), do not change the actual load (standard weight) placed on the weighing machine until Two-point calibration completion flag (Un\G143. b1) turns to Two-point span calibration completion (1).
- In the two-point span calibration, use the analog input (load cell output) in the range of 0.3mV/V to 3.0mV/V.

Appendix 4.2 Program example for two-point calibration

This section describes a program example for two-point calibration.

(1) System configuration



(2) Two-point setting value

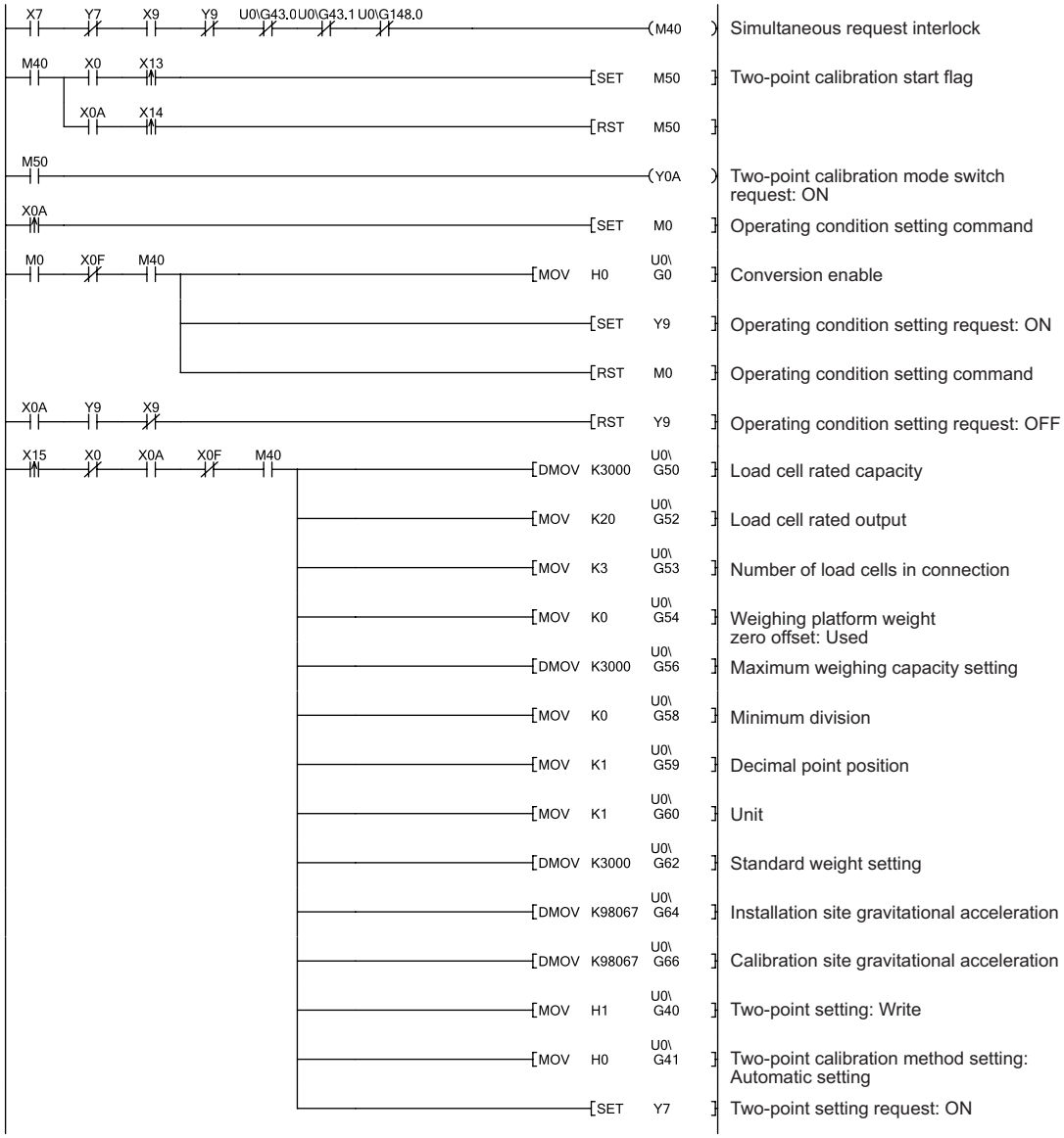
Buffer memory	Setting value	Description
Load cell rated capacity (Un\G50, Un\G51)	3000	Set 300.0kg.
Load cell rated output (Un\G52)	20	Set 2.0mV/V.
Number of load cells in connection (Un\G53)	3	Set 3 modules.
Tare zero offset (Un\G54)	0_H	Use the tare zero offset function.
Maximum weighing capacity setting (Un\G56, Un\G57)	3000	Set 300.0kg.
Minimum division (Un\G58)	0	Set 0.1kg.
Decimal point position (Un\G59)	1_H	Set $\times 10^{-1}$ (first decimal place).
Unit (Un\G60)	1_H	Set kg.
Standard weight setting (Un\G62, Un\G63)	3000	Set 300.0kg.

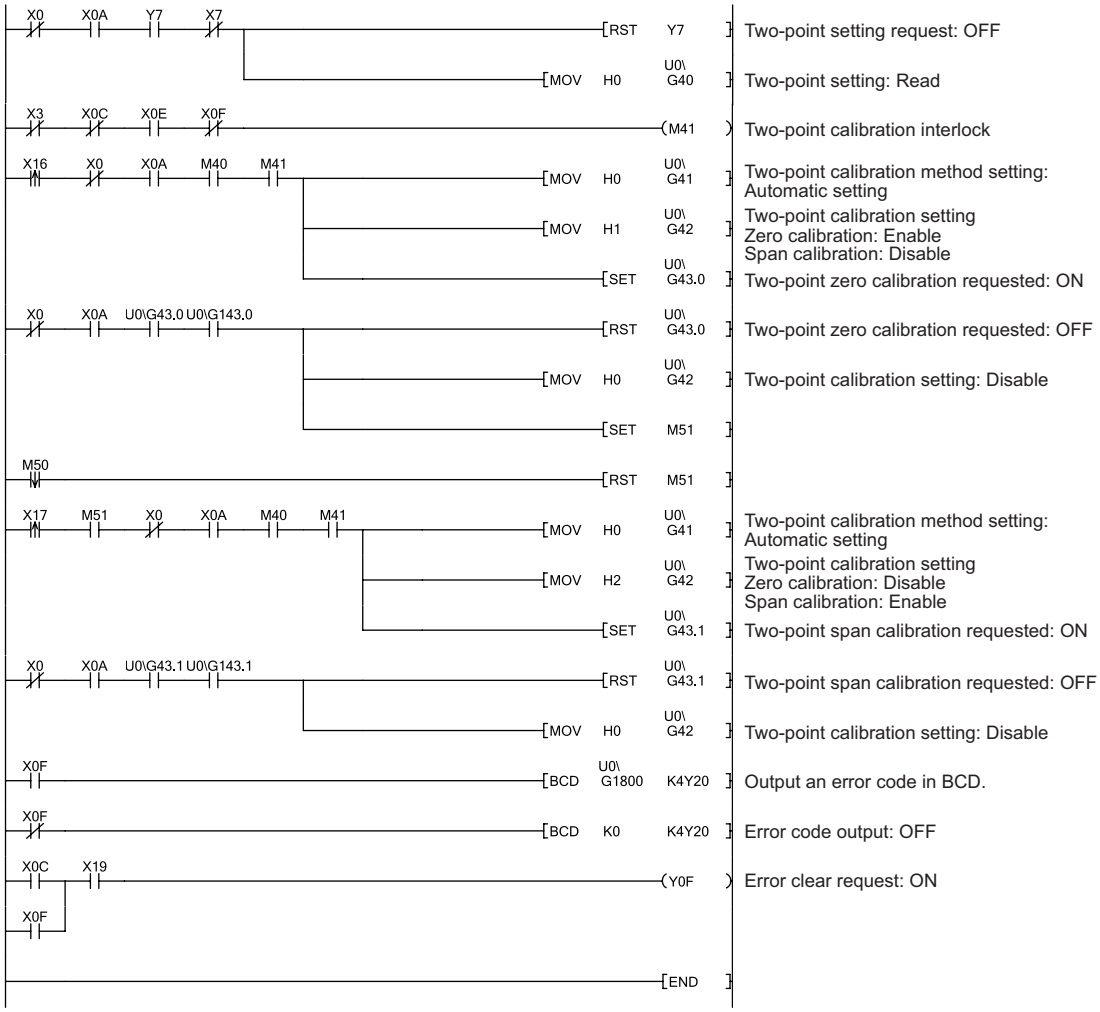
(3) Devices used by users

Device	Function	
X0	Module ready	Q61LD (X/Y0 to X/YF)
X3	Output value hold status flag	
X7	Two-point setting completion flag	
X9	Operating condition setting completion flag	
XA	Two-point calibration mode status flag	
XC	Input signal error detection signal	
XE	Conversion completion signal	
XF	Error flag	
Y7	Two-point setting request	
Y9	Operating condition setting request	
YA	Two-point calibration mode switch request	
YF	Error clear request	
X13	Two-point calibration start	QX10 (X10 to X1F)
X14	Two-point calibration completion	
X15	Two-point setting command	
X16	Two-point zero calibration command	
X17	Two-point span calibration command	
X18	Two-point calibration value start of reading	
X19	Error clear command	
Y20 to Y2F	Error code display (4 digits in BCD)	QY10 (Y20 to Y2F)
D80	Instrumentation amplifier gain setting	
D81	A/D converter gain setting	
D82, D83	Tare zero offset output value	
D84, D85	Two-point zero calibration value	
D86, D87	Two-point span calibration value	
M0	Operating condition setting command	
M40	Simultaneous request interlock	
M41	Two-point calibration interlock	
M50	Two-point calibration start flag	
M51	Two-point zero calibration completion	
M52	Two-point calibration value read-in-process flag	

(4) Program example (automatic setting)

(a) Two-point setting and two-point calibration





Point

- Satisfy the following condition for setting.
  If Two-point setting request (Y7) is turned on or off without satisfying the condition, the values in the buffer memory areas are overwritten to the one before the change.

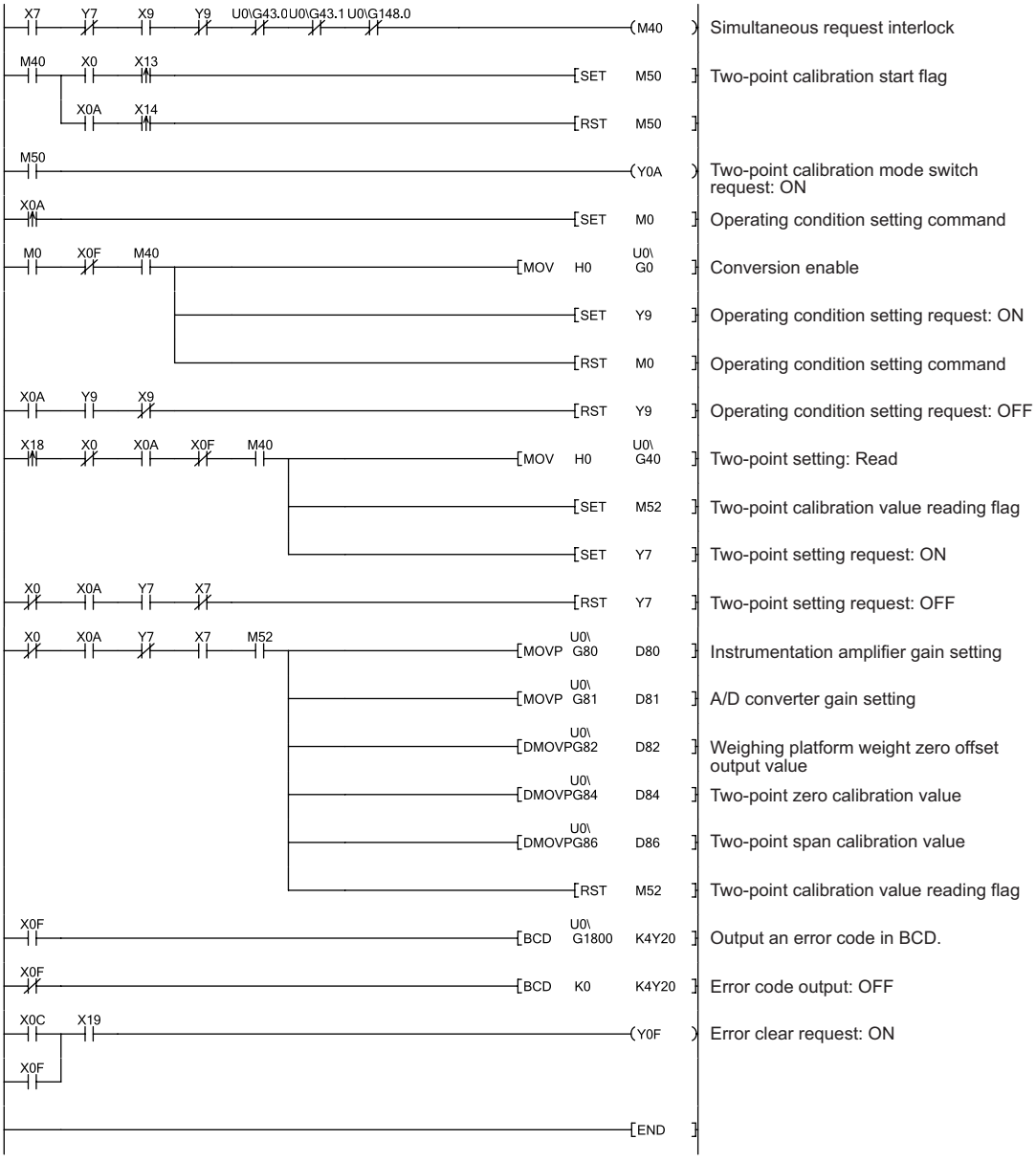
$$\begin{array}{c}\text{Standard}\\ \text{weight setting}\\ \text{(Un\G62, Un\G63)}\end{array} \leq \begin{array}{c}\text{Maximum weighing}\\ \text{capacity setting}\\ \text{(Un\G56, Un\G57)}\end{array} \leq \begin{array}{c}\text{Load cell}\\ \text{rated capacity}\\ \text{(Un\G50, Un\G51)}\end{array} \times \begin{array}{c}\text{Number of load cells}\\ \text{in connection}\\ \text{(Un\G53)}\end{array}$$

- If module change is presumed after completion of two-point calibration, it is recommended to save the following setting values to the CPU file register or latch area using the G(P).OGLOAD instruction.
  - Instrumentation amplifier gain setting (Un\G80)
  - A/D converter gain setting (Un\G81)
  - Tare zero offset output value (Un\G82, Un\G83)
  - Two-point zero calibration value (Un\G84, Un\G85)
  - Two-point span calibration value (Un\G86, Un\G87)

(5) Program example (user setting)

Perform user setting when any fine adjustment is necessary after the backup of the calibration data are reflected, or after the automatic setting was performed once.

(a) Reading two-point calibration values

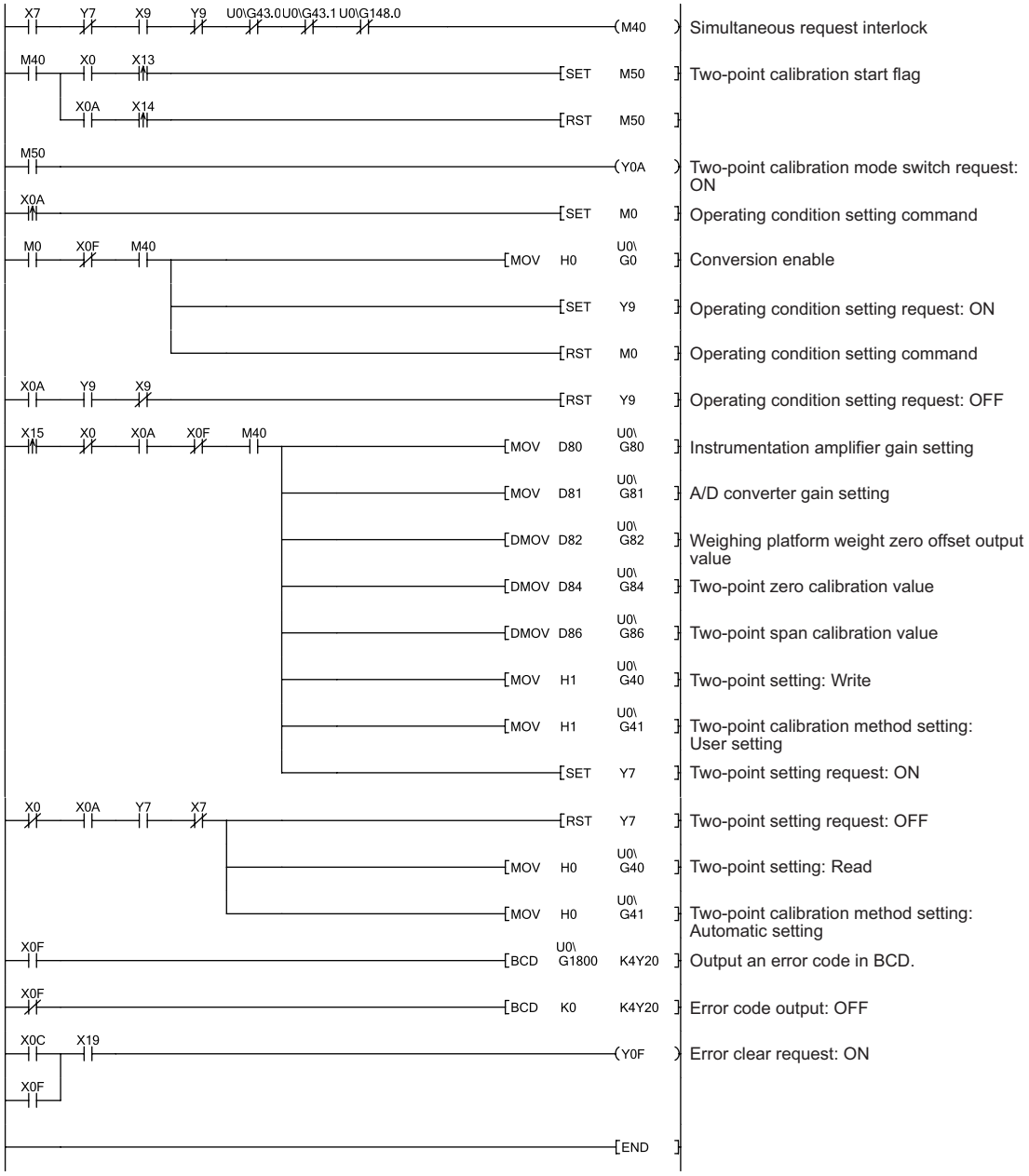


Point

If module change is presumed after completion of two-point calibration, it is recommended to save Two-point calibration value (Un\G80 to Un\G87) to the CPU file register or latch area using the G(P).OGLOAD instruction.

- Instrumentation amplifier gain setting (Un\G80)
- A/D converter gain setting (Un\G81)
- Tare zero offset output value (Un\G82, Un\G83)
- Two-point zero calibration value (Un\G84, Un\G85)
- Two-point span calibration value (Un\G86, Un\G87)

(b) Writing two-point calibration values



Point

After the shift to the two-point calibration mode, do not perform the following. Otherwise, the data in non-volatile memory (FeRAM) becomes abnormal and the Q61LD may not run correctly.

- Powering off the programmable controller CPU
- Resetting the programmable controller CPU

Appendix 4.3 When calibration is performed without an actual load

When two-point calibration does not require accuracy, calibration can be performed without using an actual load. This type of calibration is useful for the level meter of the storage silo, torque meter, pressure gage, and others. This section describes how to perform such type of calibration.

When calibration with an actual load is not performed, configure the following settings.

- Set Tare zero offset (Un\G54) to Not used (1).
- Perform two-point zero calibration. (The two-point span calibration is not performed.)

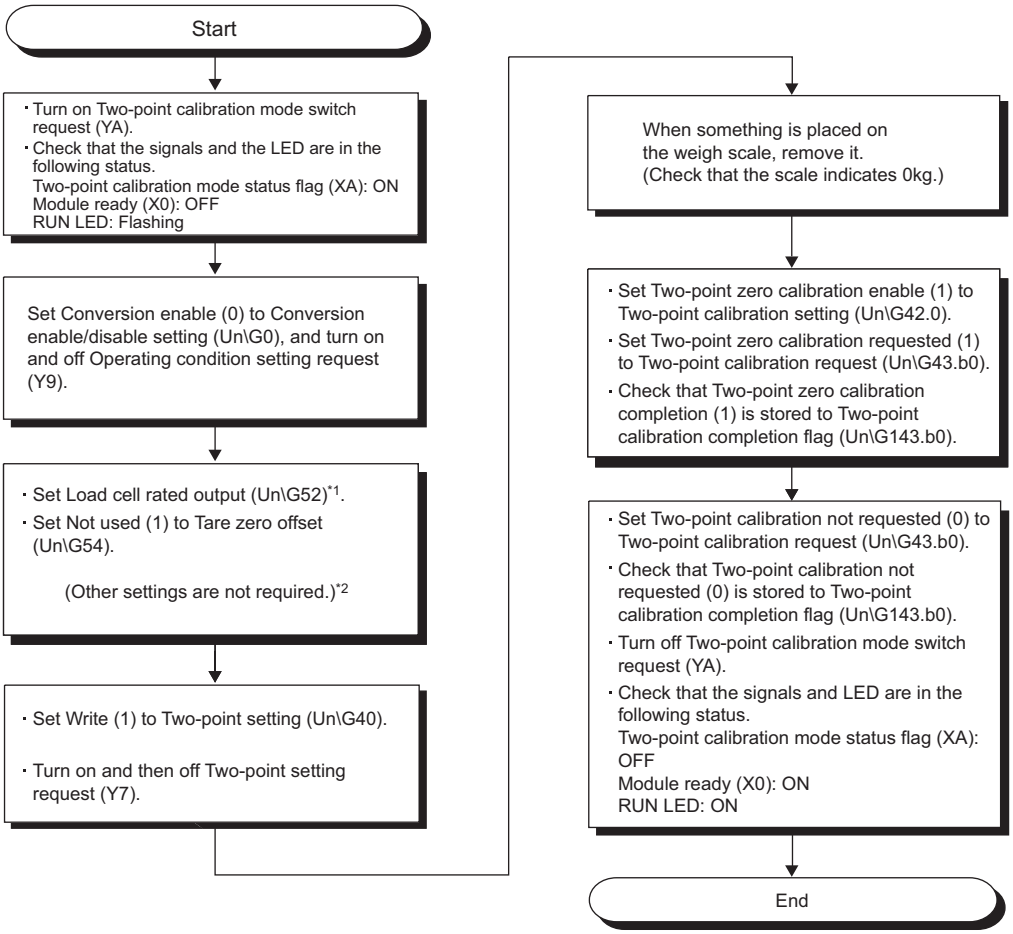
(1) When using Digital output value (Un\G102, Un\G103)

Digital output value (Un\G102, Un\G103) to be stored is the value of 0 to 10000 after conversion from the analog signal of 0[mV/V] to Load cell rated output (Un\G52).

When Digital output value (Un\G102, Un\G103) is used, set Tare zero offset (Un\G54) to Not used (1), and set the value according to the load cell that uses Load cell rated output (Un\G52).

Thereafter, set Two-point calibration request (Un\G43. b0) to Two-point zero calibration request (1).

The setting procedure is shown below.



*1 Set the specifications of the load cell rated output of the actually connected load cell. Multiple load cells connected in parallel can be regarded as a single load cell of which rated capacity is n times the capacity of each cell, where n is the number of identical load cells connected in parallel.

• Parallel connection of load cells (☞ Page 158, Section 7.4 (3))

*2 Leave the set values in the following buffer memory areas unchanged.

- Load cell rated capacity (Un\G50, Un\G51)
- Number of load cells in connection (Un\G53)
- Maximum weighing capacity setting (Un\G56, Un\G57)
- Minimum division (Un\G58)
- Decimal point position (Un\G59)
- Unit (Un\G60)
- Standard weight setting (Un\G62, Un\G63)
- Installation site gravitational acceleration (Un\G64, Un\G65)
- Calibration site gravitational acceleration (Un\G66, Un\G67)

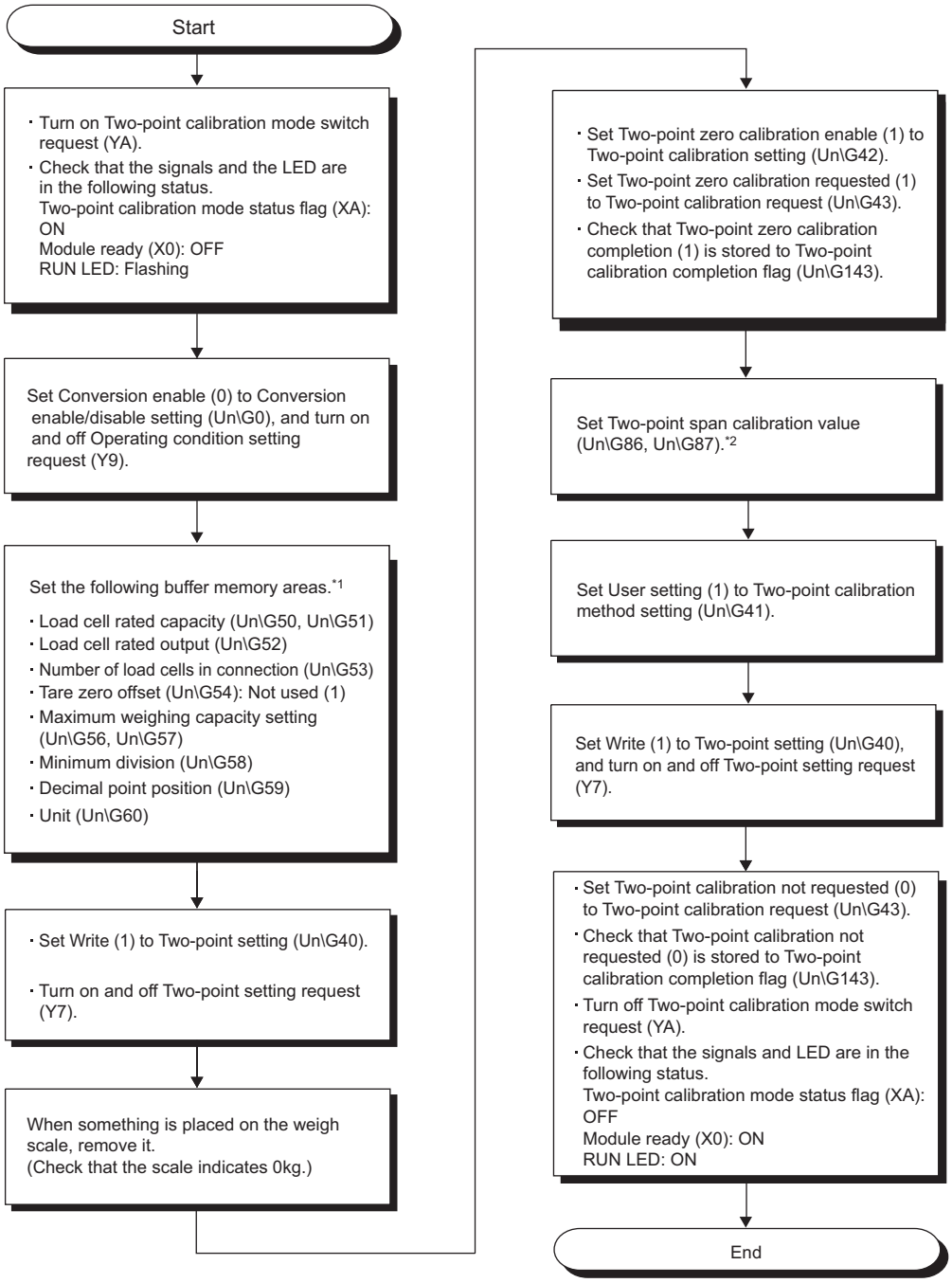
Point

- After setting Two-point calibration request (Un\G43. b0) to Two-point zero calibration requested (1), place nothing (0kg) on the weighing machine until Two-point calibration completion flag (Un\G143. b0) turns to Two-point zero calibration completion (1).
  It may take a few seconds to complete two-point zero calibration.
- The following functions can be used for Digital output value (Un\G102, Un\G103).
  - Conversion enable/disable setting (Un\G0)
  - Averaging processing method setting (Un\G1)
  - Count average setting (Un\G2)
  - Moving average setting (Un\G3)
  - Digital output zero correction value (Un\G68, Un\G69)
  - Digital output span correction value (Un\G70, Un\G71)
  - Output value hold request (Y3)
  - Maximum and minimum values reset request (YD)

  Input signal error detection signal (XC) and Input signal error detection flag (Un\G114) operate.
  However, ignore these signal and flag, except when Input signal error detection flag (Un\G114. b3) turns to Conversion over (1), because they are error flags for Gross weight output value (Un\G100, Un\G101).
- Digital output value (Un\G102, Un\G103) can be corrected by setting Digital output correction value (Un\G68 to Un\G71).

(2) When Gross weight output value (Un\G100, Un\G101) is used

The setting procedure is shown below.



*1 Configure the setting the same as when executing actual load calibration.
If the following condition is not satisfied, an error code is stored in Latest error code (Un\G190), Error flag (XF) turns on, and conversion is processed with the settings before the error occurrence.

$$\text{Standard weight setting (Un\G62, Un\G63)} \leq \text{Maximum weighing capacity setting (Un\G56, Un\G57)} \leq \text{Load cell rated capacity (Un\G50, Un\G51)} \times \text{Number of load cells in connection (Un\G53)}$$

*2 Refer to Setting Two-point span calibration value (Un\G86, Un\G87) (☞ Page 267, Appendix 4.3 (2) (a)).

(a) Setting Two-point span calibration value (Un\G86, Un\G87)

Enter the calculated value to Two-point span calibration value (Un\G86, Un\G87).

The formula is as follows:

$$\text{Two-point span calibration value} = \frac{\text{Maximum weighing capacity setting (Un\G56, Un\G57)} \times \text{Load cell rated output [mV/V] (Un\G52)} \times \text{Factory default span calibration value}}{\text{Load cell rated capacity (Un\G50, Un\G51)} \times \text{Number of load cells in connection (Un\G53)} \times \text{Instrumentation amplifier gain setting [mV/V]}}$$

*1 For Instrumentation amplifier gain setting (Un\G80), assign the value of 0_H = 1.0mV/V, 1_H = 2.0mV/V, or 2_H = 3.0mV/V.

For the factory default span calibration value, the buffer memory address to be referenced depends on the setting value of Instrumentation amplifier gain setting (Un\G80).

Apply values to the formula referring to the following buffer memory areas.

Setting value of Instrumentation amplifier gain setting (Un\G80)	Buffer memory address to be referenced
0.3mV/V ≤ Load cell rated output ≤ 1.0mV/V (0_H)	1.0mV/V span calibration value (Un\G1616, Un\G1617)
1.0mV/V < Load cell rated output ≤ 2.0mV/V (1_H)	2.0mV/V span calibration value (Un\G1620, Un\G1621)
2.0mV/V < Load cell rated output ≤ 3.0mV/V (2_H)	3.0mV/V span calibration value (Un\G1624, Un\G1625)

Appendix 5 Online Module Change (When GX Developer is Used)

This section describes the online module change procedure using GX Developer.

When performing an online module change, read the following.

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

Appendix 5.1 Precautions for online module change

This section describes the precautions on online module change.

- Perform an online module change by the correct procedure. (Page 271, Appendix 5.4) Failure to follow the correct procedure can cause the module to fail or malfunction.
- Perform an online module change after making sure that the system outside the programmable controller will not malfunction.
- 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.
- Record the following data in advance since the data may not be correctly saved after module failure.
  When data saving is not available and the above data has not been recorded, two-point calibration must be performed again by using an actual load (standard weight).
  Refer to Save/Restoration Setting List (Page 222, Section 10.9).
- 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 following:
  - Means of disconnection from external devices and its configuration are correctly implemented.
  - Turning relevant switches on and off will not adversely affect the system.
  - After the first use of the product, do not mount/remove the module to/from the base unit, and the terminal block to/from the module more than 50 times (IEC 61131-2 compliant) respectively. Exceeding the limit of 50 times may cause malfunction.
  - Dedicated instructions cannot be executed during online module change. When using dedicated instructions to execute save/restoration, execute it on another (separate) system*1. If a separate system is unavailable, perform restoration by writing relevant data to the buffer memory.
  - The accuracy after online module change is 3 times lower than the one before the change. Perform two-point calibration again as appropriate.
  - In case of sudden system failure, it is advised to always make a substitute means available.

*1 Even if the module is used in a remote I/O station, the save/restoration must be performed with another system, which is the one mounted in the main base unit. (Another system mounted in a remote I/O station cannot perform the save/restoration operation.)

Appendix 5.2 Execution condition of online module change

To change a module online, the following CPU module, MELSECNET/H remote I/O module, Q61LD, GX Developer, and base unit are required.

Remark

Online module change is available on the Q61LD from the first product.

(1) CPU module

Use a process CPU or Redundant CPU.

For precautions on the multiple CPU system configuration, refer to the following.

QCPU User's Manual (Multiple CPU System)

For precautions on the redundant system configuration, refer to the following.

QnPRHCPU User's Manual (Redundant System)

(2) MELSECNET/H remote I/O module

Use the module of function version D or later.

(3) GX Developer

Use GX Developer Version 7.10L or later.

User GX Developer Version 8.17T or later to change a module on a remote I/O station online.

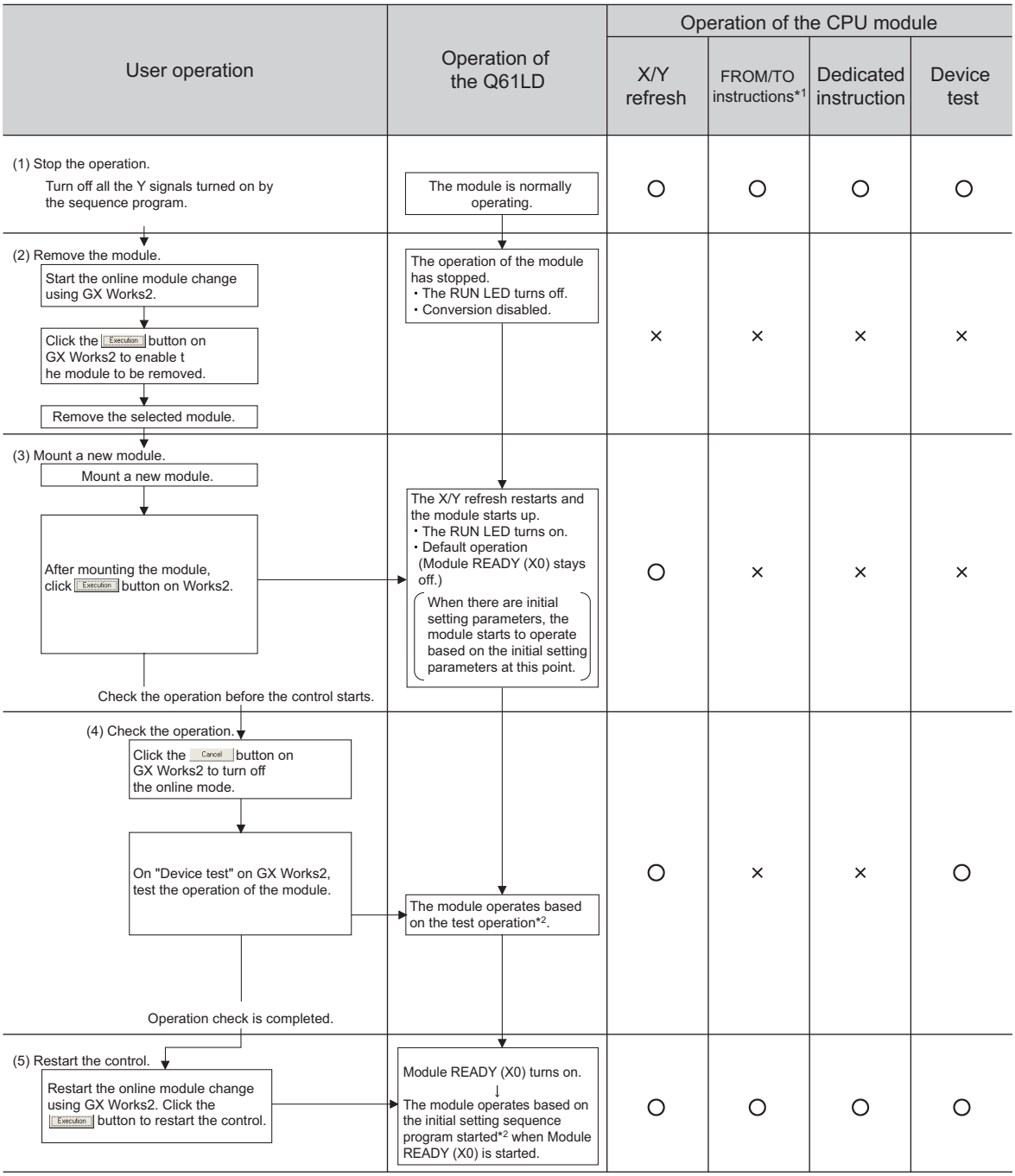
(4) Base unit

- When the slim type main base unit (Q3 ☐ SB) is used, online module change cannot be performed.
- When an extension base unit that requires no power supply module (Q5 ☐ B) is used, all modules mounted on the base unit cannot be changed online.

Appendix 5.3 Operation during online module change

This section describes the operation during online module change.

○: Executed ×: Not executed



*1 Includes access to the intelligent function module device (U□\G□).

*2 In the absence of the operation marked *2, the intelligent function module performs the operation previous to the marked one.

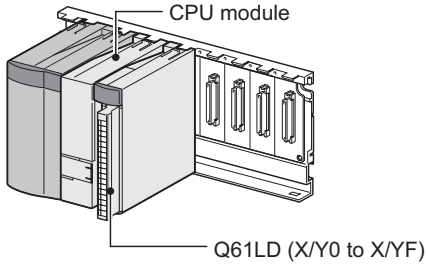
*3 When another system is not available, the following data must be recorded before changing a module, and the recorded data must be set to the buffer memory after the change. (Save/Restoration Setting List ☞ Page 222, Section 10.9)

Appendix 5.4 Procedures of online module change

This section describes respective procedures for the cases when another system is available and when not available.

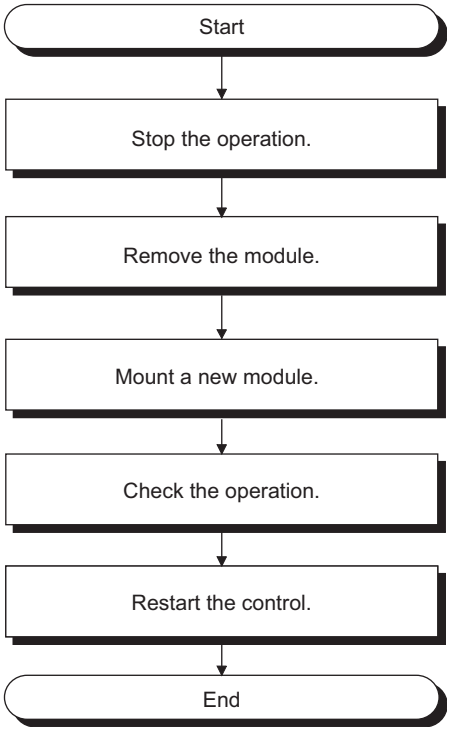
(1) System configuration

The following system configuration is used to explain the procedure of online module change.



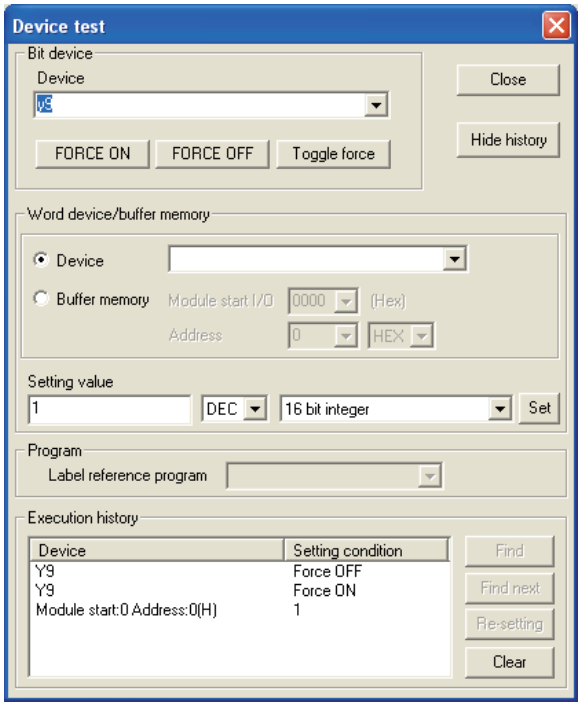
(2) Procedures

The procedure of online module change is shown below.



Appendix 5.5 When another system is available

(1) Stopping the operation

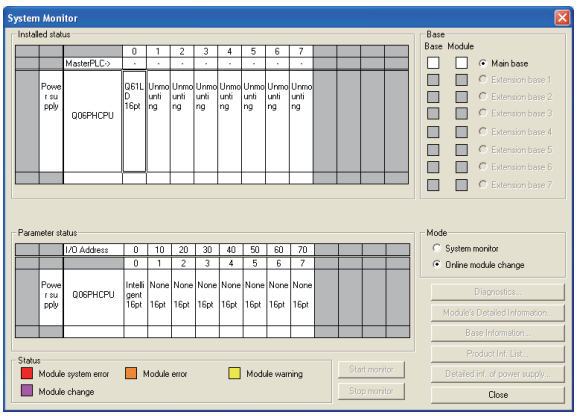


1. **Open the "Device test" window.**

   [Online] ⇨ [Debug] ⇨ [Device test]

2. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**
3. **Turn Operating condition setting request (Y9) from off to on.**
4. **Check Conversion completion flag (Un\G113) to confirm that conversion has stopped, and turn off Operating condition setting request (Y9).**

(2) Removing the module



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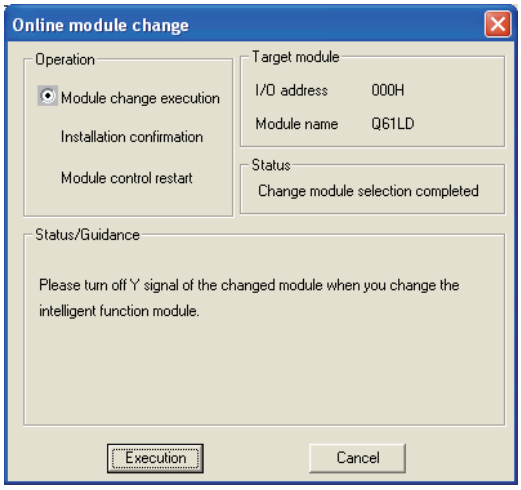


1. **Open the "System Monitor" window.**

[Diagnostics] ⇨ [Online module change]

2. **Select "Online Module Change" in "Mode" and double-click the module to be changed online.**

3. **Click the Execution button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory areas, refer to Save/Restoration Setting List (☞ Page 222, Section 10.9).**

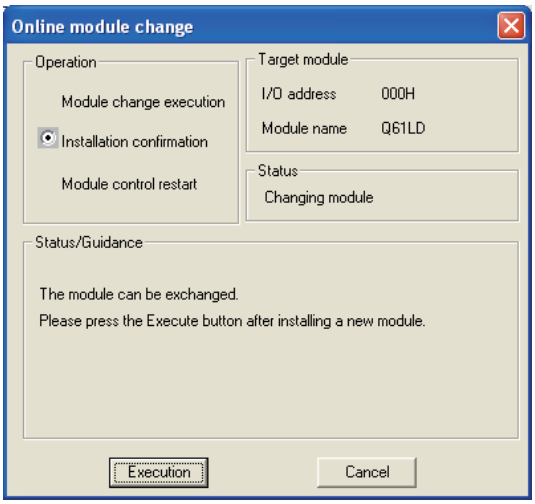
5. **Click the OK button to perform the operation in ☞ Page 274, Appendix 5.5 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

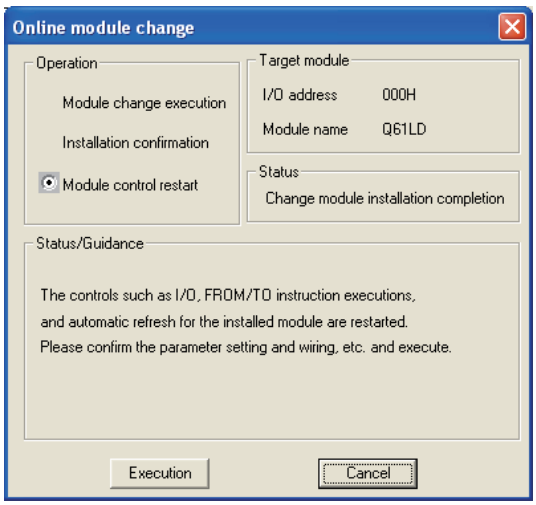
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. Mount the removed module and a new module to another (separate) system.
2. Use the G(P).OGLOAD instruction to save the following setting data to the CPU device. For details on the G(P).OGLOAD instruction, refer to Page 242, Appendix 1.1.
   Use the G(P).OGSTOR instruction to restore the data set by the user. For details on the G(P).OGSTOR instruction, refer to Page 246, Appendix 1.2.
3. Remove the new module from the separate system and insert it into the same slot where the original module was mounted. Then, mount the terminal block.
4. Mount the new module to the same slot and connect external wires.
5. After the module is secured in place, click the Execution button and check that the RUN LED turns on. Module ready (X0) remains off.

(4) Checking the operation



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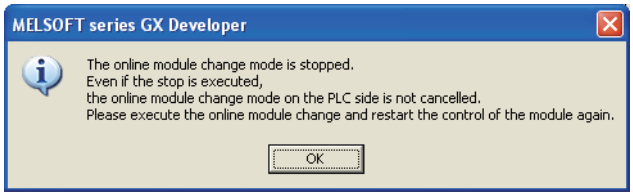

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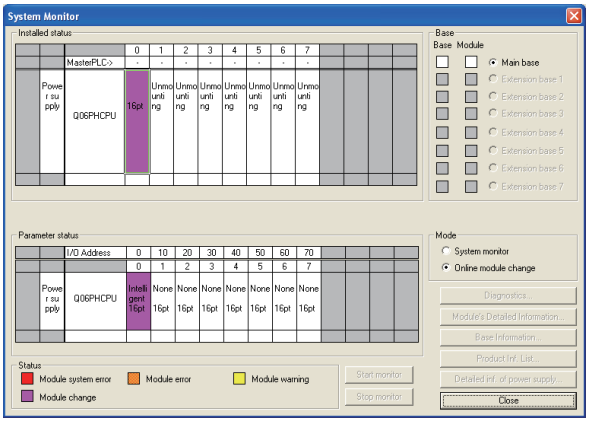

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(Continued to the next page)

1. **To check the operation, click the Cancel button to cancel the restart.**

2. **Click the OK button to suspend the "Online module change" mode.**

3. **Click the Close button to close the "System Monitor" window.**

(Continued)

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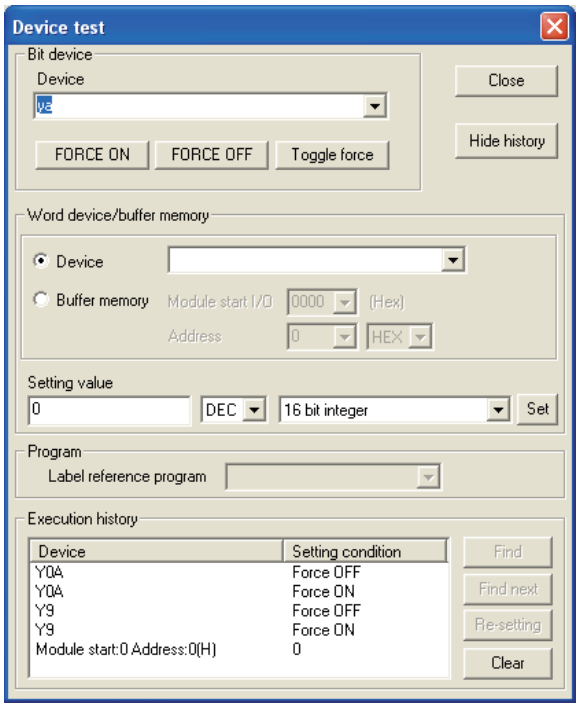


4. **Open the "Device test" window.**

[Online] ⇨ [Debug] ⇨ [Device test]

5. **Set Conversion enable/disable setting (Un\G0) to Conversion enable (0).**

6. **Turn on and off Operating condition setting request (Y9).**

7. **Turn Two-point calibration mode switch request (YA) from off to on so that the module switches to the two-point calibration mode.**

8. **Monitor Gross weight output value (Un\G100, Un\G101) to check if the value has been correctly converted.**

9. **Turn Two-point calibration mode switch request (YA) from on to off so that the module switches to the normal mode.**

10. **Before starting control, check the following items of the Q64ADH. If anything is wrong, refer to Troubleshooting (☞ Page 235, Section 11.2) to take corrective actions.**

• The RUN LED is on.

• The ERR. LED is off.

• Error flag (XF) is off.

11. **Since the new module is in default, initial setting must be configured through a sequence program after starting control. Before configuring the initial setting, check the following point to see if the content of the initial setting program is correct:**

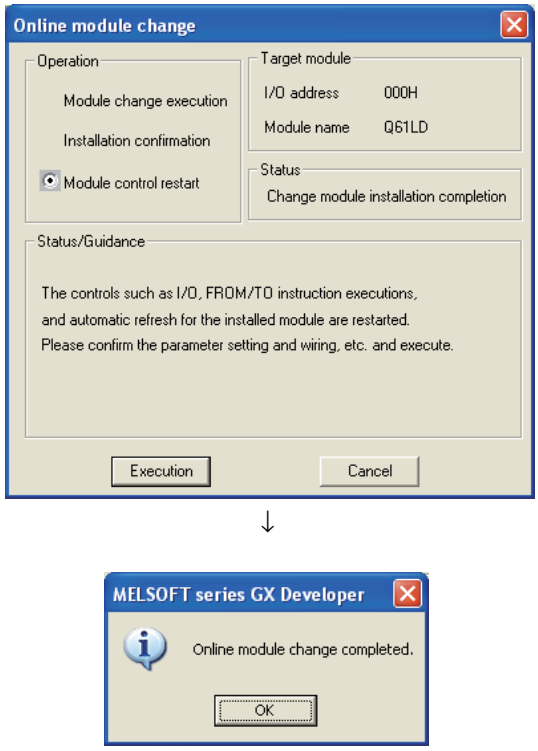
• For the standard system configuration

Use a sequence program that configures the initial setting at the rising edge of Module ready (X0). When the module control is restarted, Module ready (X0) turns on and the initial setting is configured. (The settings will not be configured if the program is specified to configure the settings only to one scan after a RUN.)

• When the module is used in a remote I/O network

Add an user device to perform the initial setting (Initial setting request signal) in the sequence program at any timing. After the control restarted, turn on Initial setting request signal to perform the initial setting (The settings will not be configured if the sequence program is specified to configure the settings only to one scan after the data link of the remote I/O network is established.)

(5) Restarting control



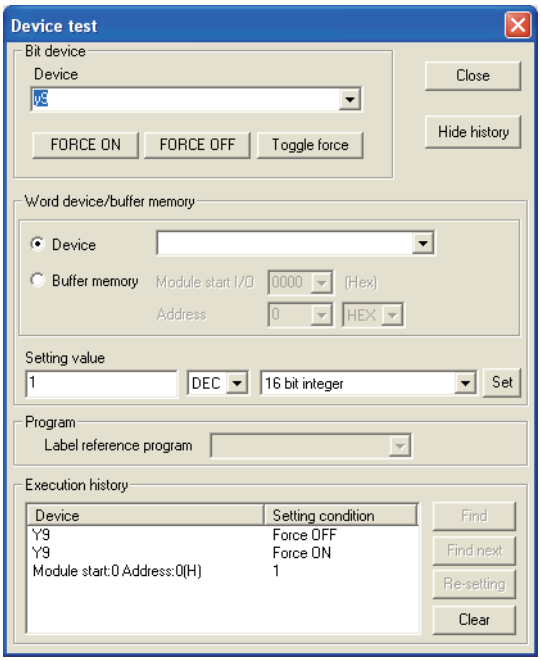
1. **Open the "Online module change" window again.**

2. **Click the [Execution] button to restart control.**
Module ready (X0) turns on.

3. **This completes the online module change procedures.**

Appendix 5.6 When another system is not available

(1) Stopping the operation



1. **Open the "Device test" window.**

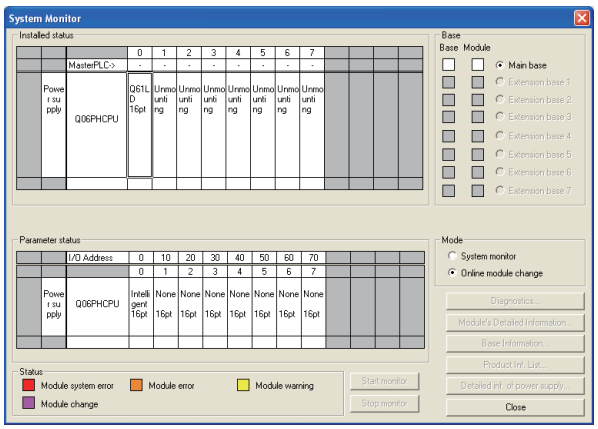
   [Online] ⇨ [Debug] ⇨ [Device test]

2. **Set Conversion enable/disable setting (Un\G0) to Conversion disable (1).**
3. **Turn Operating condition setting request (Y9) from off to on.**
4. **Check Conversion completion flag (Un\G113) to confirm that conversion has stopped, and turn off Operating condition setting request (Y9).**
5. **If the content of the buffer memory has not been recorded beforehand, record the content by referring to the following procedures 6 to 9.**
6. **Set Two-point setting (Un\G40) to Read (0).**
7. **Turn Two-point setting request (Y7) from off to on.**
8. **After checking that Two-point setting completion flag (X7) is off, turn off Two-point setting request (Y7).**
9. **Record the content of the save/restoration settings. Save/Restoration Setting List (☞Page 222, Section 10.9)**

Point

Before restarting the module control, perform two-point calibration device test on GX Developer, according to the flowchart for two-point calibration shown in Setting and procedure (☞Page 252, Appendix 4.1).
Restarting the module control without two-point calibration will operate the module in default.

(2) Removing the module



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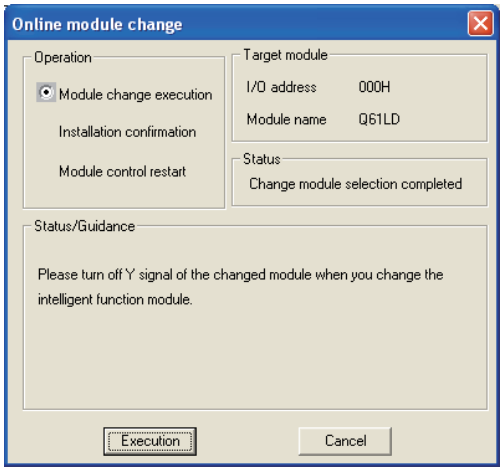


1. **Open the "System Monitor" window.**

[Diagnostics] ⇨ [Online module change]

2. **Select "Online module change" in "Mode" and double-click the module to be changed online.**

3. **Click the Execution button to make the module replaceable.**

4. **If the following error window is displayed, the target buffer memory data cannot be saved for backup. For details on the target buffer memory, refer to Save/Restoration Setting List (☞Page 222, Section 10.9).**

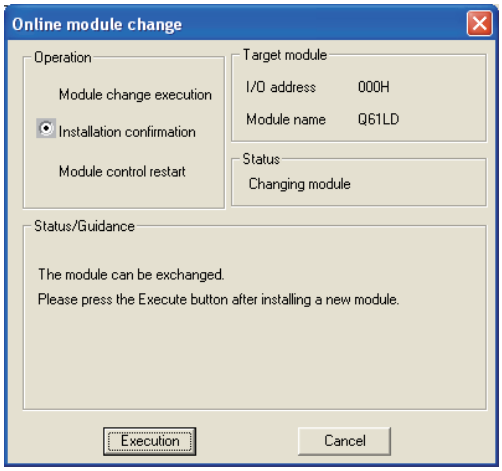
5. **Click the OK button and perform the operation in ☞Page 280, Appendix 5.6 (3).**

6. **After checking that the RUN LED of the module is off, remove external connections and remove the module.**

Point

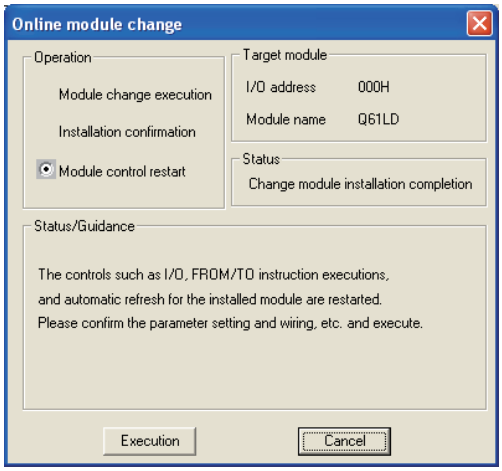
Always remove the module. If installation confirmation is executed without actually removing the module, the module will not start normally and the RUN LED will not turn on.

(3) Mounting a new module



1. **Mount the new module to the same slot and connect external wires.**
2. **After the module is secured in place, click the [Execution] button and check that the RUN LED turns on. Module ready (X0) remains off.**

(4) Checking the operation



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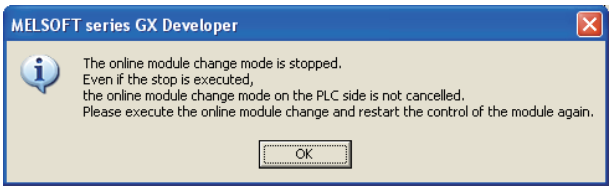

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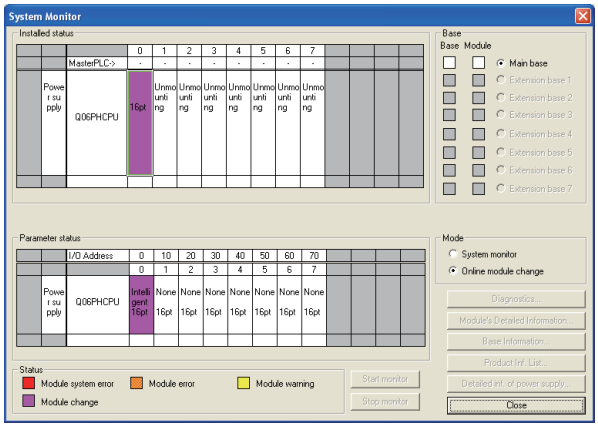

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1. **To check the operation, click the [Cancel] button to cancel the restart.**

2. **Click the [OK] button to suspend the "Online module change" mode.**

3. **Click the [Close] button to close the "System Monitor" window.**

(Continued)

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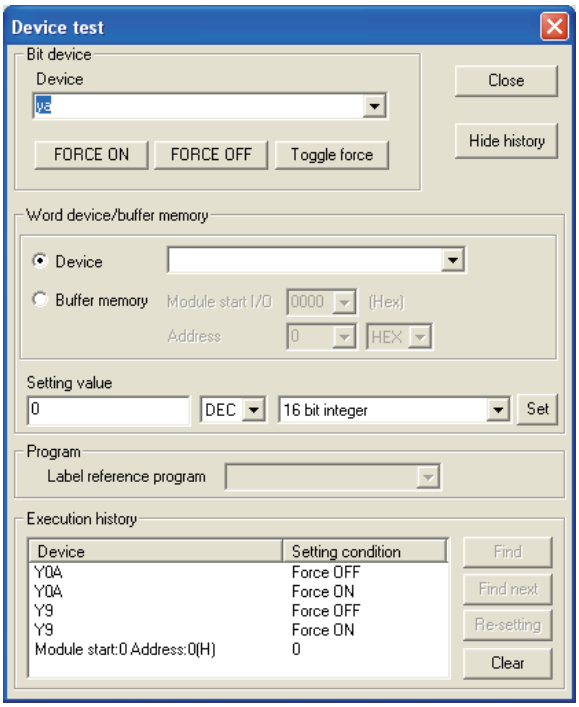

4. **Open the "Device test" window.**

[Online] ⇨ [Debug] ⇨ [Device test]

5. **Set Conversion enable/disable setting (Un\G0) to Conversion enable (0).**

6. **Turn on and off Operating condition setting request (Y9).**

7. **Turn Two-point calibration mode switch request (YA) from off to on so that the module switches to the two-point calibration mode.**

8. **Monitor Gross weight output value (Un\G100, Un\G101) to check if the value has been correctly converted.**

9. **Set the buffer memory data with the settings that have been recorded beforehand.**

10. **Multiply Two-point zero calibration value (Un\G84, Un\G85) and Two-point span calibration value (Un\G86, Un\G87) by the correction factor.**

11. **Set Two-point calibration method setting (Un\G41) to User setting (1), and Two-point setting (Un\G40) to Write (1).**

12. **Turn Two-point setting request (Y7) off and on.**

13. **Check that Two-point setting completion flag (X7) is off, and turn off Two-point setting request (Y7).**

14. **Monitor Gross weight output value (Un\G100, Un\G101) to check if the value has been correctly converted. If the zero point is displaced, adjust the zero point with Zero point adjustment request (Un\G45). If the zero point is significantly displaced, perform a two-point zero calibration.**

15. **Turn Two-point calibration mode switch request (YA) from on to off so that the module switches to the normal mode.**

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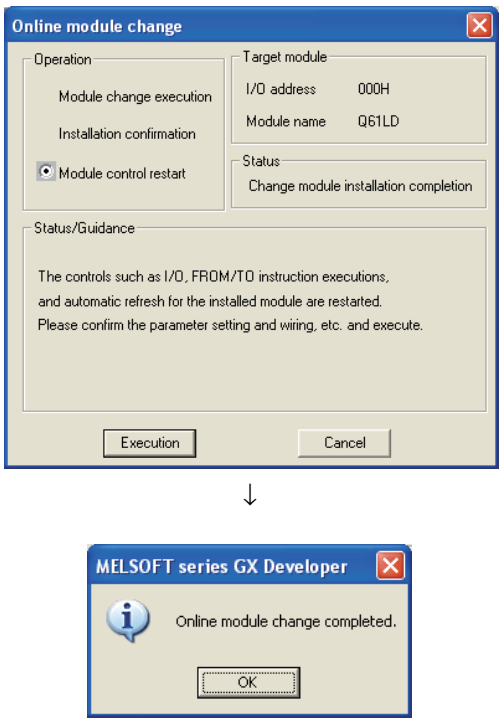
16. **Before starting control, check the following items of the Q61LD. If an error occurs, refer to Troubleshooting (☞Page 235, Section 11.2) to take corrective actions.**
• The RUN LED is on.
• The ERR. LED is off.
• Error flag (XF) is off.

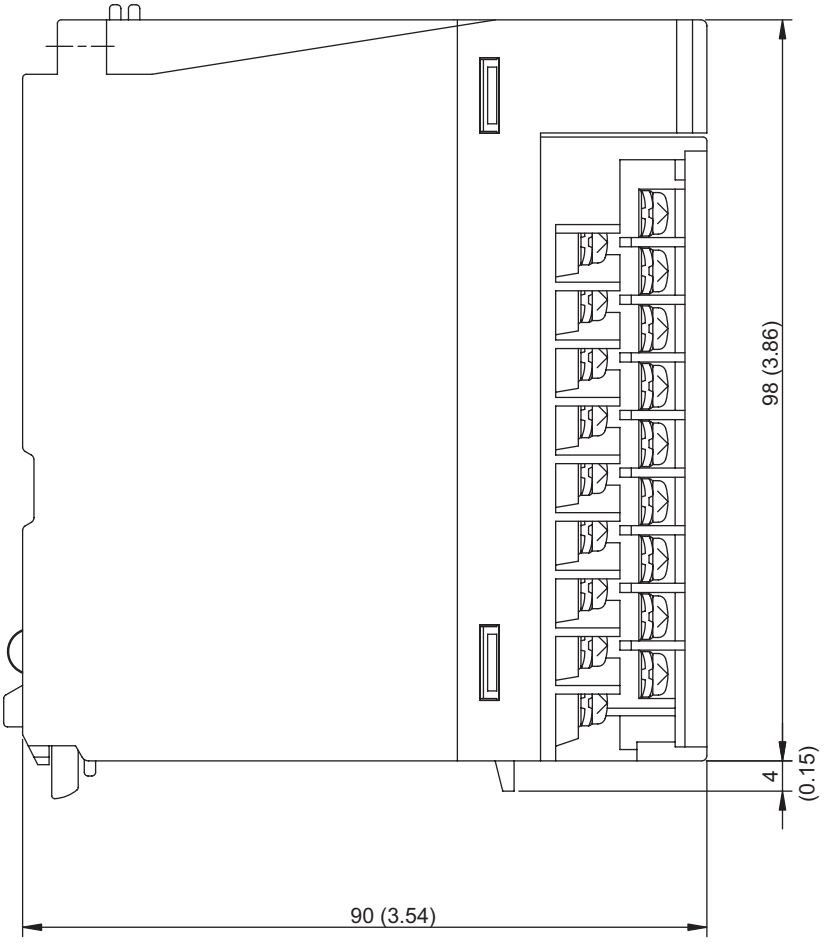
17. **Since the new module is in default, initial setting must be configured through a sequence program after starting control. Before configuring the initial setting, check the following point to see if the content of the initial setting program is correct:**
• For the standard system configuration
Use a sequence program that configures the initial setting at the rising edge of Module ready (X0). When the module control is restarted, Module ready (X0) turns on and the initial setting is configured. (The settings will not be configured if the program is specified to configure the settings only to one scan after a RUN.)
• When the module is used in a remote I/O network
Add an user device to perform the initial setting (Initial setting request signal) in the sequence program at any timing. After the control restarted, turn on Initial setting request signal to perform the initial setting. (The settings will not be configured if the sequence program is specified to configure the settings only to one scan after the data link of the remote I/O network is established.)

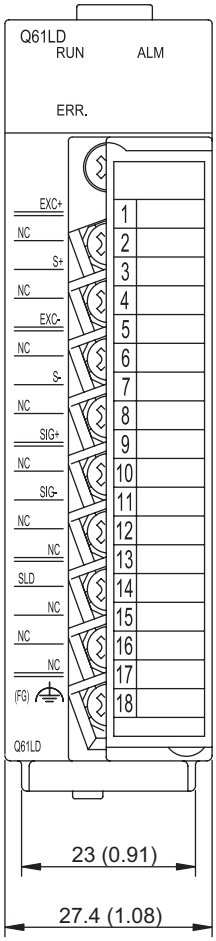
(5) Restarting control



1. Open the "Online module change" window again.
2. Click the [Execution] button to restart control.
   Module ready (X0) turns on.
3. This completes the online module change procedures.

Appendix 6 External Dimensions





Unit: mm

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REVISIONS

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

Print date	*Manual number	Revision
May 2009	SH(NA)-080821ENG-A	First edition
January 2011	SH(NA)-080821ENG-B	Partial correction SAFETY PRECAUTION, GENERIC TERMS AND ABBREVIATIONS, Section 2.1, 3.1.1, 3.2.2, 3.3.1, 3.4.2 to 3.4.4, 3.4.10, 3.4.13, 3.5.3, 3.5.6, 3.5.8, 4.1, 4.5, 4.8 to 4.10, 5.4.1, 5.5.2, 6.1 to 6.3, 7.4.1, 7.5, 8.1, Appendix 1.1 to 1.3 Addition CONDITIONS OF USE FOR THE PRODUCT, Section 3.4.5, 3.4.15, 3.5.10, 4.14, 5.6, 8.2.10 to 8.2.12, Appendix 2
February 2012	SH(NA)-080821ENG-C	Complete revision due to layout change of the manual

Japanese manual version SH-080820-E

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1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.
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[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.
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(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.
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    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.
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MODEL: Q61LD-U-SY-E
MODEL CODE: 13JZ31

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