

MITSUBISHI

Channel Isolated RTD Input Module

User's Manual
(Hardware)

Q68RD3-G

Thank you for purchasing the Mitsubishi programmable controller MELSEC-Q series.

Prior to use, please read this and relevant manuals thoroughly to fully understand the product.

MELSEC-Q
Mitsubishi Programmable
Controller

MODEL	Q68RD3-G-U-HW
MODEL CODE	13JY54
IB(NA)-0800405-A(0802)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before use.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the User's Manual for the CPU module.


In this section, the safety precautions are ranked as "DANGER" and "CAUTION".



Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Note that the  CAUTION level may lead to a serious consequence according to the circumstances.

Always follow the precautions of both levels because they are important to personal safety.

Please keep this manual accessible when required and always forward it to the end user.

[DESIGN PRECAUTIONS]

DANGER

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

Writing data into the "system area" or outputting a signal for "prohibited to use" may cause a programmable controller system malfunction.

CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other.

They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that may cause malfunction.

[INSTALLATION PRECAUTIONS]

CAUTION

- Use the programmable controller in the environment conditions given in the general specifications in the User's Manual for the CPU module. Failure to do so may cause an electric shock, fire, malfunction, or damage to or deterioration of the product.
- While pressing the installation lever located at the bottom of the module, insert the module fixing projection into the fixing hole in the base unit, and mount the module with using the hole as a supporting point. Incorrect module mounting may cause a malfunction, failure, or drop of the module. After mounting the module to the base unit securely hold the module with module fixing bracket.
- The screws must be tightened within the specified torque range. If the screw is too loose, it may cause a drop or malfunction. Excessive tightening may damage the screw and/or the module, resulting in a drop or malfunction.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module. Failure to do so may cause damage to the product.
- Do not directly touch any conductive part or electronic part of the module. Doing so may cause a malfunction or failure of the module.

[WIRING PRECAUTIONS]

CAUTION

- Always ground the shielded cables for the programmable controller.
There is a risk of electric shock or malfunction.
- For wiring and connection, properly press, crimp or solder the connector with the tools specified by the manufactures and attach the connector to the module securely.
- Be careful to prevent foreign matter such as dust or wire chips from entering the module.
Failure to do so may cause a fire, failure or malfunction.
- A protective film is attached to the module top to prevent foreign matter such as wire chips from entering the module during wiring.
Do not remove the film during wiring.
Be sure to remove it for heat dissipation before system operation.
- Be sure to place the cables connected to the module in a duct or clamp them.
If not, dangling cables may swing or inadvertently be pulled, resulting in damage to the module and/or cables, or malfunctions due to poor cable connection.
- When disconnecting the external wiring cable connected to the module, do not pull it by holding the cable part. Disconnect the cable with connector with holding the connector plugged into the module. Pulling the cable part with the cable still connected to the module may cause a malfunction or damage to the module and/or cable.
- Do not place a module near the equipment that generates magnetic noise.

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Manual

The following manual is also related to this product.
Order it if necessary.

Related manual

Manual name	Manual No. (Model code)
Channel Isolated RTD Input Module Q68RD3-G/GX Configurator-TI (SW1D5C-QTIU)	SH-080722ENG (13JZ06)

Compliance with the EMC and Low Voltage Directives

- (1) For programmable controller system
To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to Chapter 9 "EMC AND LOW VOLTAGE DIRECTIVES" of the QCPU User's Manual (Hardware Design, Maintenance and Inspection).
The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.
- (2) For the product
For the compliance of this product with the EMC and Low Voltage Directives, refer to Section 5.1 "Wiring Precautions".

1. OVERVIEW

This manual describes the specifications and part names of type Q68RD3-G channel isolated RTD input module (hereinafter abbreviated as Q68RD3-G) that is used with the MELSEC-Q series CPU module. First, open the package of the Q68RD3-G and check that the following is included.

Table 1.1 Packing List

Model	Product name	Quantity
Q68RD3-G	Q68RD3-G Channel isolated RTD input module	1

2. PERFORMANCE SPECIFICATIONS

The following table shows the performance specifications of the Q68RD3-G.

(1) List of Performance Specifications

Table 2.1 List of performance specifications

Item		Specifications			
Number of channels		8 channels			
Output	Temperature conversion value	16-bit signed binary (-2000 to 8500)			
	Scaling value	16-bit signed binary			
Usable RTD		Pt100 (JIS C 1604-1997, IEC 751 1983), JPt100 (JIS C 1604-1981), Ni100(DIN 43760 1987)			
Measured temperature range	Pt100	-200 to 850°C			
	JPt100	-180 to 600°C			
	Ni100	-60 to 180°C			
Temperature detecting output current		1.0mA or less			
Degree of conversion accuracy *2	Pt100	-200 to 850°C *1	±0.8°C (Ambient Temperature: 25±5°C) ±2.4°C (Ambient Temperature: 0 to 55°C)		
		-20 to 120°C *1	±0.3°C (Ambient Temperature: 25±5°C) ±1.1°C (Ambient Temperature: 0 to 55°C)		
		0 to 200°C *1	±0.4°C (Ambient Temperature: 25±5°C) ±1.2°C (Ambient Temperature: 0 to 55°C)		
	JPt100	-180 to 600°C *1	±0.8°C (Ambient Temperature: 25±5°C) ±2.4°C (Ambient Temperature: 0 to 55°C)		
		-20 to 120°C *1	±0.3°C (Ambient Temperature: 25±5°C) ±1.1°C (Ambient Temperature: 0 to 55°C)		
		0 to 200°C *1	±0.4°C (Ambient Temperature: 25±5°C) ±1.2°C (Ambient Temperature: 0 to 55°C)		
	Ni100	-60 to 180°C *1	±0.4°C (Ambient Temperature: 25±5°C) ±1.2°C (Ambient Temperature: 0 to 55°C)		
	Resolution		0.1°C		
	Conversion speed		320ms/8 channels *3		
Number of analog input points		8 channels			
Isolation specifications		Specific isolated area	Isolation method	Dielectric withstand voltage	Isolation resistance
		Between RTD input and programmable controller power supply	Transformer isolation	500VACrms for 1min.	500VDC 10MΩ or more
		Between RTD input channels	Transformer isolation	1000VACrms for 1min.	

Item	Specifications
Wire break detection	Capable (channels respectively) *4
Maximum number of writes for Flash memory	50,000
Number of I/O points occupied	16 points (I/O assignment: Intelligent 16 points)
External wiring connection system	40-pin connector
Applicable wire size	0.3mm ² (AWG#22) or less
External device connection connector (option)	A6CON4
Internal current consumption (5 VDC)	0.54A
Weight	0.20kg
Outline dimensions	102(H) × 27.4(W) × 130(D)mm

- *1 If the resistance thermometer detectors detect the value out of measuring range listed in the table, it corresponds to the maximum at more than 850°C or the minimum at less than -200°C.
- *2 The sum between the degree of conversion accuracy for Q68RD3-G and that of the tolerances for the resistance thermometer detectors is the degree of accuracy for connecting the resistance thermometer detectors.
The calculational procedure for degree of accuracy is as follows.
(Degree of accuracy)=(Degree of conversion accuracy)+(Degree of tolerance of resistance thermometer detector)

Table 2.2 Pt100 Tolerances (JIS C 1604-1997)

Class	Tolerance
A	± (0.15+0.002 t)°C
B	± (0.3+0.005 t) °C

Table 2.3 JPt100 Tolerances (JIS C 1604-1981)

Class	Tolerance
0.15	± (0.15+0.0015 t)°C
0.2	± (0.15+0.002 t)°C
0.5	± (0.3+0.005 t)°C

Table 2.4 Ni100 Tolerances (DIN 43760)

Class	Tolerance
0 to 250 °C	± (0.4+0.007 t)°C
-60 to 0 °C	± (0.4+0.0028 t)°C

Example 1 Pt100 detecting range: From -200°C to 850°C
Ambient temperature of Pt100: 40°C
Resistance thermometer detectors: Class A of Pt100 detector
Measuring temperature: 800°C

$$(\text{Degree of accuracy}) = (\pm 2.4^{\circ}\text{C}) + \{\pm(0.15^{\circ}\text{C} + 0.002 \times 800^{\circ}\text{C})\} = \pm 4.15^{\circ}\text{C}$$

The degree of conversion accuracy at 40°C, the ambient temperature

Pt100 tolerances at 800°C Class A detected

Example 2 Pt100 detecting range: From -200°C to 850°C
Ambient temperature of Pt100: 25°C
Resistance thermometer detector: Class B of Pt100 detector
Measuring temperature: 500°C

$$(\text{Degree of accuracy}) = (\pm 0.8^{\circ}\text{C}) + \{\pm(0.3^{\circ}\text{C} + 0.005 \times 500^{\circ}\text{C})\} = \pm 3.6^{\circ}\text{C}$$

The degree of conversion accuracy at 25°C, the ambient temperature

Pt100 tolerances at 500°C Class B detected

- *3 The conversion speed indicates how long it takes the value of measured temperature to be stored into the buffered memory at sampling. Regardless of the number of channels permitting the conversion, the value of measured temperature resulted from all channels is stored into the buffered memory per 320ms.
- *4 The output at detecting wire break has a choice among "Upscale", "Downscale" and "Given value".

3. IMPLEMENTATION AND INSTALLATION

3.1 Handling Precautions

- (1) Do not drop or give a strong impact to the case.
- (2) Do not remove the printed-circuit board of the module from the case.
Doing so may cause a failure.
- (3) Be careful to prevent foreign matters such as cutting chips or wire chips from entering the module.
Failure to do so may cause a fire, failure or malfunction.
- (4) A protective film is attached to the module top to prevent foreign matter such as wire chips from entering the module during wiring.
Do not remove the film during wiring.
Be sure to remove it for heat dissipation before system operation.
- (5) Tighten the module fixing screw within the following specified range.
Insufficient tightening torque could result in short, failure or malfunction.

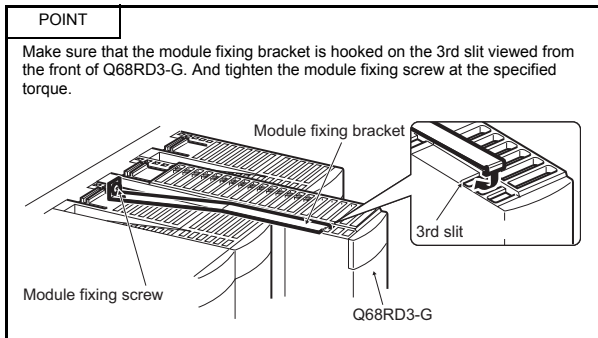
Table 3.1 Tightening torque

Screw	Tightening torque range
Module fixing screw (M3)	0.36 to 0.48N·m
Connector screw of module (M2.6)	0.20N·m

- (6) When mounting the module to the base unit, insert the module fixing projection into the fixing hole in the base unit, and mount the module with using the hole as a supporting point.
Incorrect module mounting may cause a malfunction, failure, or drop of the module.
- (7) Always make sure to touch the grounded metal to discharge the electricity charged in the body, etc., before touching the module.
Failure to do so may cause a failure or malfunctions of the module.

3.1.1 Mounting module fixing bracket

Hold the Q68RD3-G with module fixing bracket after the Q68RD3-G is mounted to the base unit.



3.2 Installation Environment

Refer to the user's manual of the CPU module used.

4. PART NAMES

The following explains the part names of the Q68RD3-G.

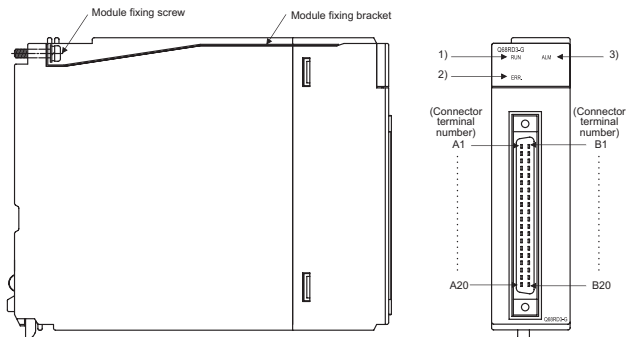


Table 4.1 Part names

Number	Name	Description
1)	RUN LED	Displays the operating status of the Q68RD3-G. On: Normal operation Flashing: During offset/gain setting mode Off: 5V power supply interrupted, watchdog timer error occurred, or online module change enabled.
2)	ERR. LED	Displays the error status of the Q68RD3-G. On: Error Flashing: Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than zero. Off: Normal operation
3)	ALM LED	Displays the warning status of the Q68RD3-G. On: Warning (process alarm, rate alarm) occurring Flashing: Detecting the wire break Off: Normal operation

Table 4.2 Signal name

A1	□ □ □	B1
A2	□ □ □	B2
A3	□ □ □	B3
A4	□ □ □	B4
A5	□ □ □	B5
A6	□ □ □	B6
A7	□ □ □	B7
A8	□ □ □	B8
A9	□ □ □	B9
A10	□ □ □	B10
A11	□ □ □	B11
A12	□ □ □	B12
A13	□ □ □	B13
A14	□ □ □	B14
A15	□ □ □	B15
A16	□ □ □	B16
A17	□ □ □	B17
A18	□ □ □	B18
A19	□ □ □	B19
A20	□ □ □	B20

Seen from the front
of the module

Terminal number	Signal name	Terminal number	Signal name
A1	CH1 A1	B1	CH1 B1
A2	CH1 b1	B2	---
A3	---	B3	CH2 b2
A4	CH2 A2	B4	CH2 B2
A5	---	B5	---
A6	CH3 A3	B6	CH3 B3
A7	CH3 b3	B7	---
A8	---	B8	CH4 b4
A9	CH4 A4	B9	CH4 B4
A10	---	B10	---
A11	CH5 A5	B11	CH5 B5
A12	CH5 b5	B12	---
A13	---	B13	CH6 b6
A14	CH6 A6	B14	CH6 B6
A15	---	B15	---
A16	CH7 A7	B16	CH7 B7
A17	CH7 b7	B17	---
A18	---	B18	CH8 b8
A19	CH8 A8	B19	CH8 B8
A20	---	B20	---

* For actual wiring, refer to Section 5.2 External Wiring.

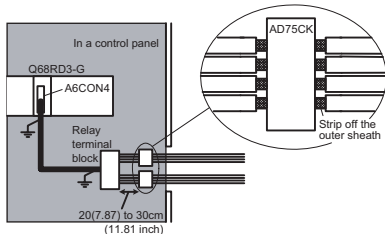
5. WIRING

The following explains the wiring precautions and module connection example.

5.1 Wiring Precautions

External wiring that is less susceptible to noise is required as a condition of enabling a highly reliable system and making full use of the capabilities of Q68RD3-G.

- (1) Use separate cables for the AC control circuit and the external input signals of the Q68RD3-G to avoid the influence of the AC side surges and inductions.
- (2) Always place the RTD at least 100mm away from the main circuit cables and AC control circuit lines. Fully keep it away from high-voltage cables and circuits, which include high frequency waves, such as an inverter's load circuit. Not doing so will cause the module more susceptible to noises, surges and inductions.
- (3) The following wiring is required for the product to comply with the EMC and Low Voltage Directives.

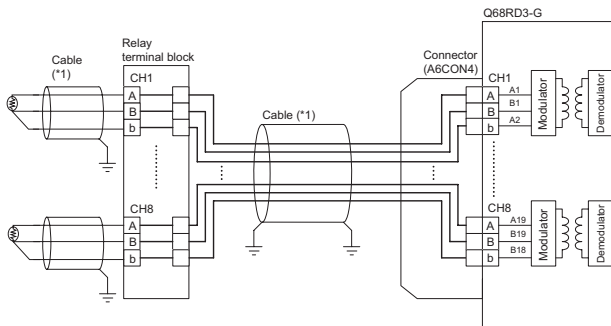


- (a) Use shielded cables for every external wiring and use the AD75CK cable clamp to ground to the panel. AD75CK can ground four cables together when using cables with outer diameter of about ϕ 7mm.
- (b) For wiring between A6CON4 and a relay terminal block, use shielded cables to ground to the panel. In addition, keep the wiring distance within 3m.
- (c) Before touching the relay terminal block, always touch the grounded metal to discharge the electricity charged in the body.

5.2 External Wiring

(1) Wiring procedure

- 1) For wiring, set a relay terminal block to outside.
- 2) Connect the RTD to the relay terminal block.
- 3) Use A6CON4 to wire between the relay terminal block and Q68RD3-G.



- *1 Always use shielded cable.
In addition, always ground the shield.



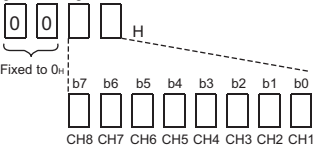
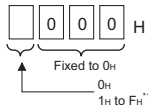
5.3 Intelligent Function Module Switch Settings

(1) Setting item

Intelligent function module switch has switches 1 to 5. The setting is executed with 16-bit data.

When not setting the intelligent function module switch, the default of switches 1 to 5 is 0.

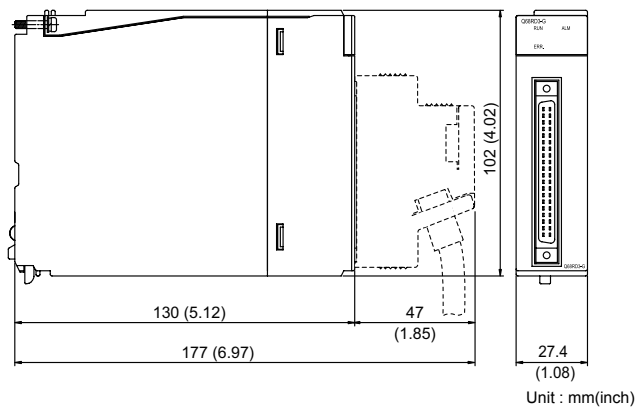
Table 5.1 Intelligent Function Module Switch Settings

Setting Item																					
<p>Switch 1</p> <p>Measuring range setting (CH1 to CH4)</p>  <p>CH4 CH3 CH2 CH1</p>	<table border="1"> <thead> <tr> <th>Resistance thermometer detector</th> <th>Measuring range</th> <th>Setting value</th> </tr> </thead> <tbody> <tr> <td rowspan="3">New JIS (Pt100)</td> <td>-200 to 850 °C</td> <td>0</td> </tr> <tr> <td>-20 to 120 °C</td> <td>1</td> </tr> <tr> <td>0 to 200 °C</td> <td>4</td> </tr> <tr> <td rowspan="3">Old JIS (JPt100)</td> <td>-180 to 600 °C</td> <td>2</td> </tr> <tr> <td>-20 to 120 °C</td> <td>3</td> </tr> <tr> <td>0 to 200 °C</td> <td>5</td> </tr> <tr> <td>Ni100</td> <td>-60 to 180 °C</td> <td>8</td> </tr> </tbody> </table>	Resistance thermometer detector	Measuring range	Setting value	New JIS (Pt100)	-200 to 850 °C	0	-20 to 120 °C	1	0 to 200 °C	4	Old JIS (JPt100)	-180 to 600 °C	2	-20 to 120 °C	3	0 to 200 °C	5	Ni100	-60 to 180 °C	8
Resistance thermometer detector	Measuring range	Setting value																			
New JIS (Pt100)	-200 to 850 °C	0																			
	-20 to 120 °C	1																			
	0 to 200 °C	4																			
Old JIS (JPt100)	-180 to 600 °C	2																			
	-20 to 120 °C	3																			
	0 to 200 °C	5																			
Ni100	-60 to 180 °C	8																			
<p>Switch 2</p> <p>Measuring range setting (CH5 to CH8)</p>  <p>CH8 CH7 CH6 CH5</p>	<p>When setting the other values than those above, range setting error 10 □ (The square □ refers to the channel number) occurs and the value of the resistance thermometer does not convert to that of measured temperature.</p>																				
<p>Switch 3</p> <p>Offset/gain setting</p>  <p>b7 b6 b5 b4 b3 b2 b1 b0</p> <p>CH8 CH7 CH6 CH5 CH4 CH3 CH2 CH1</p> <p>0: Factory setting 1: Users range setting</p>																					
<p>Switch 4</p> <p>Mode setting</p>  <p>0H : Normal mode 1H to FH+1 : Offset/gain setting mode</p>																					
Switch 5	0H : Fixed *2																				

*1 Setting any value within the setting range will provide the same operation. When the setting range is 1_H to F_H, set 1_H for example.

*2 Setting a value other than "0_H" results in an error.

6. EXTERNAL DIMENSIONS



Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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When exported from Japan, this manual does not require application to the Ministry of Economy, Trade and Industry for service transaction permission.

Specifications subject to change without notice.