MITSUBISHI

Channel Isolated Digital-Analog Converter Module

User's Manual

(Hardware)

Q66DA-G

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC-Q Series.

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.

MELSEC-Q
Mitsubishi Programmable Logic Controller

MODEL	Q-66D/A-G-U-HW
MODEL CODE	13JY12
IB(NA)-0800362-C(0610)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.
These precautions apply only to Mitsubishi equipment. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.
These ● SAFETY PRECAUTIONS ● classify the safety precautions into two categories: "DANGER" and "CAUTION".

⚠ DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.
⚠ CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by **⚠ CAUTION** may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

- 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.
- At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module.
  In such case, wait until the analog output becomes stable to start controlling the external device.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION
● Use the PLC in an environment that meets the general specifications given in the User's Manual of the CPU module being used. Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
● While pressing the installation lever located at the bottom of module, insert the module fixing tab into the fixing hole in the base unit until it stops. Improper installation may result in malfunction, breakdown or the module coming loose and dropping. After mounting the module to the base unit securely hold the module with module fixing bracket.
● Tighten the screws within the range of specified torque. If the screws are loose, it may cause the module to fallout, short circuits, or malfunction. If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
● Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module. Not doing so may cause damage to the module.
● Do not directly touch the conductive area or electronic components of the module. Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

⚠ CAUTION
● Always ground the FG terminal for the PLC. There is a risk of electric shock or malfunction.
● Be careful not to let foreign matters such as sawdust or wire chips get inside the module. These may cause fires, failure or malfunction.
● The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring. Do not remove this film until the wiring is complete. Before operating the system, be sure to remove the film to provide adequate heat ventilation.

Revisions

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

Print Date	*Manual Number	Revision
Aug., 2006	IB(NA)-0800362-A	First edition
Sep., 2006	IB(NA)-0800362-B	Correction Chapter 2, Section 5.3
Oct., 2006	IB(NA)-0800362-C	Correction Chapter 2, Section 5.3, Chapter 6

CONTENTS

About This Manual

The following manuals are also related to this product.
Order them if necessary.

Relevant Manual

Manual name	Manual Number (Model code)
Channel Isolated Digital-Analog Converter Module User's ManualQ66DA-G / GX Configurator-DA	SH-080648ENG (13JR97)

Conformance to the EMC Directive/Low Voltage Directive

When incorporating the Mitsubishi PLC into other machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3, "EMC Directives and Low Voltage Directives" of the User's Manual (Hardware) included with the CPU module or base unit used.
The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.
By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

1. Overview

This manual explains specifications and the names of the components and handling for the type Q66DA-G channel isolated digital-analog converter module (hereafter Q66DA-G) which are used in combination with the MELSEC-Q Series CPU module.
After unpacking, confirm that the following products are enclosed.

Table 1.1 Packing list

Model code	Quantity
Q66DA-G	1
FG terminal L-Shaped metal fitting	1

2. Performance Specifications

The specifications for the Q66DA-G are shown in the following table. For general specifications, refer to the operation manual for the CPU module being used.

Table 2.1 Performance Specifications

<table>
<tr><td colspan="2">Item</td><td>Specifications</td></tr>
<tr><td colspan="2">Number of analog output points</td><td>6 points (6 channels)</td></tr>
<tr><td colspan="2">Digital input</td><td>16-bit signed binary (normal resolution mode:-4096 to 4095
high resolution mode: -12288 to 12287, -16384 to 16383)</td></tr>
<tr><td>Using scaling function</td><td></td><td>16-bit signed binary (-32768 to 32767)</td></tr>
<tr><td rowspan="2">Analog output</td><td>Voltage</td><td>-12 to 12VDC (External load resistance: 1k to 1MΩ)</td></tr>
<tr><td>Current</td><td>0 to 20mADC (External load resistance: 0 to 600Ω)
0 to 22mADC (External load resistance: refer to *3)</td></tr>
<tr><td colspan="2">I/O characteristics maximum resolution</td><td>
<table>
<tr><td colspan="2" rowspan="2">Analog output range</td><td colspan="2">Normal resolution mode</td><td colspan="2">High resolution mode</td></tr>
<tr><td>Digital input value</td><td>Maximum resolution</td><td>Digital input value</td><td>Maximum resolution</td></tr>
<tr><td rowspan="5">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25mV</td><td rowspan="2">0 to 12000</td><td>0.416mV</td></tr>
<tr><td>1 to 5V</td><td>1.0mV</td><td>0.333mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="3">-4000 to 4000</td><td>2.5mV</td><td>-16000 to 16000</td><td>0.625mV</td></tr>
<tr><td>User range setting 2</td><td>0.75mV</td><td rowspan="2">-12000 to 12000</td><td>0.400mV</td></tr>
<tr><td>User range setting 3</td><td>0.375mV</td><td>0.210mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20mA</td><td rowspan="2">0 to 4000</td><td>5μA</td><td rowspan="2">0 to 12000</td><td>1.66μA</td></tr>
<tr><td>4 to 20mA</td><td>4μA</td><td>1.33μA</td></tr>
<tr><td>User range setting 1</td><td>-4000 to 4000</td><td>1.5μA</td><td>-12000 to 12000</td><td>0.95μA</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">Accuracy (Accuracy relative to maximum analog output value)</td><td>Reference accuracy *1</td><td>Within ±0.1% (Voltage: ±10mV, Current: ±20 μA)</td></tr>
<tr><td>Temperature coefficient *2</td><td>±80ppm/°C(0.008%/°C)</td></tr>
<tr><td colspan="2">Conversion speed</td><td>6ms/channel</td></tr>
<tr><td rowspan="2">Absolute maximum output</td><td>Voltage</td><td>±13V</td></tr>
<tr><td>Current</td><td>23mA</td></tr>
<tr><td colspan="2">Maximum number of writes for Flash memory</td><td>MAX. 50,000 times</td></tr>
</table>

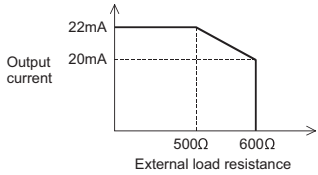
Table 2.1 Performance Specifications (Continued)

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Output short-circuit protection</td><td>Available</td></tr>
<tr><td>Isolation specifications</td><td>
<table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between the output terminal and PLC power supply</td><td rowspan="3">Transformer isolation</td><td>500VAC rms, 1min.</td><td rowspan="3">500VDC 10MΩ or more</td></tr>
<tr><td>Between analog output channels</td><td>1000VAC rms, 1min.</td></tr>
<tr><td>Between external supply power and analog output</td><td>500VAC rms, 1min.</td></tr>
</table>
</td></tr>
<tr><td>Number of I/O occupied points</td><td>16 points
(I/O assignment: Intelli 16 points)</td></tr>
<tr><td>External wiring connection system</td><td>40-pin connector</td></tr>
<tr><td>Applicable wire size</td><td>0.3 mm^2 (AWG #22)</td></tr>
<tr><td>External device connection connector (option)</td><td>A6CON4</td></tr>
<tr><td rowspan="4">External supply power</td><td>24VDC, +20%, -15%</td></tr>
<tr><td>Ripple, spike within 500 mV p-p</td></tr>
<tr><td>Inrush current: 4.8A, within 400 μs</td></tr>
<tr><td>0.22A</td></tr>
<tr><td>Internal current consumption (5 VDC)</td><td>0.62A</td></tr>
<tr><td>Weight</td><td>0.22kg</td></tr>
</table>

*1:Accuracy of offset/gain setting at ambient temperature
Q66DA-G needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).

*2:Accuracy per temperature change of 1℃
Example: Accuracy when temperature changes from 25 to 30℃
0.1% (Reference accuracy) + 0.008%/℃ (temperature coefficient)
×5℃ (temperature change difference) = 0.14%

*3:The following indicates the external load resistance when output current is 20mA or more.



3. Part Names

This section explains the names of the components for the Q66DA-G.

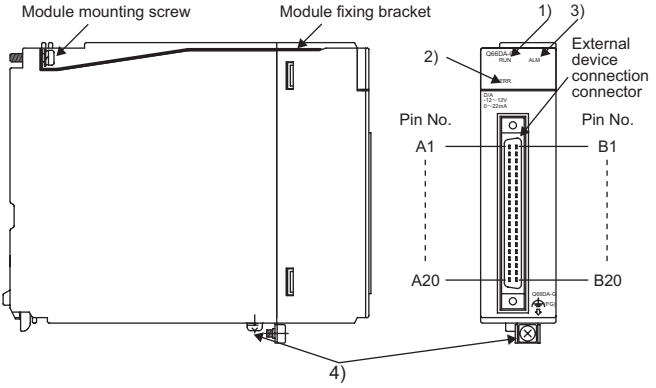


Table 3.1 Names of Part

No.	Name	Description
1)	RUN LED	Displays the operating status of the Q66DA-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 Q66DA-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	Indicates the warning status of the Q66DA-G. On : During warning output occurrence Off : Normal operation
4)	FG terminal L-Shaped metal fitting	Metal fitting to wire for FG of the Q66DA-G

Table 3.2 Signal layout

Pin No.	Signal name	Pin No.	Signal name
A1	CH1 V+	B1	CH1 COM
A2	CH1 I+	B2	-
A3	-	B3	-
A4	CH2 V+	B4	CH2 COM
A5	CH2 I+	B5	-
A6	-	B6	-
A7	CH3 V+	B7	CH3 COM
A8	CH3 I+	B8	-
A9	-	B9	-
A10	CH4 V+	B10	CH4 COM
A11	CH4 I+	B11	-
A12	-	B12	-
A13	CH5 V+	B13	CH5 COM
A14	CH5 I+	B14	-
A15	-	B15	-
A16	CH6 V+	B16	CH6 COM
A17	CH6 I+	B17	-
A18	-	B18	-
A19	24VDC	B19	24VDC
A20	24GDC	B20	24GDC

4. Handling Precautions

(1) Do not drop the module or cause it to receive strong impact.

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

(3) 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.

(4) Tighten the screws to the specified torque shown below.
Insufficient tightening torque could result in shorts, failures or malfunction.

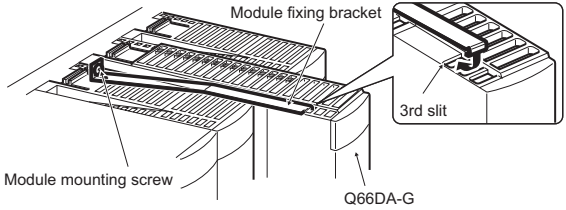
Screw location	Tightening torque range
Module mounting screw (M3 screw)	0.36 to 0.48 N•m
FG terminal screw (M3 screw)	0.42 to 0.58 N•m

4.1 Mounting module fixing bracket

Hold the Q66DA-G with module fixing bracket after the Q66DA-G is mounted to the base unit.

POINT

Make sure that the module fixing bracket is hooked on the 3rd slit viewed from the front of Q66DA-G.
And tighten the module mounting screw at the specified torque.



5. Wiring

5.1 Wiring precautions

(1) Use separate cables for the AC control circuit and the external input signals of the Q66DA-G to avoid the influence of the AC side surges and inductions.

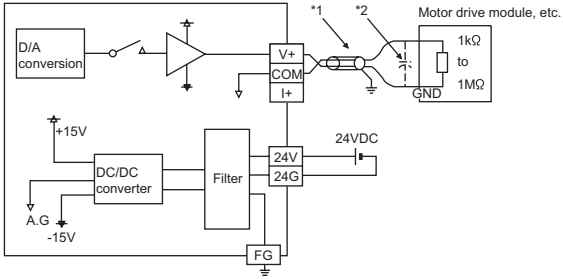
(2) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the PLC. This may increase the effects of noise, surges and induction.

(3) The shield wire or the shield of the shielded cable must be grounded at one end.

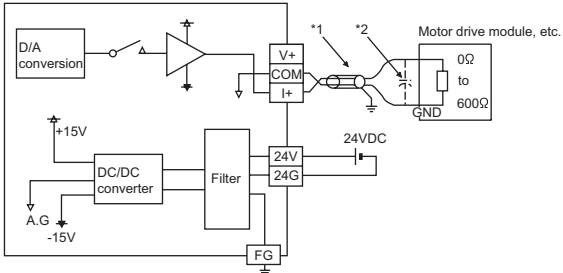
(4) When the right mounting module of the Q66DA-G is difficulty in wiring, wire after removing the Q66DA-G.

5.2 External wiring

(1) For voltage output



(2) For current output



*1:Use a twisted two core shielded wire for the power wire.

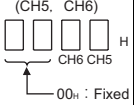
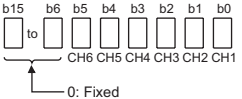
*2:If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μ F25V condenser between the V+/I+ terminal and COM.

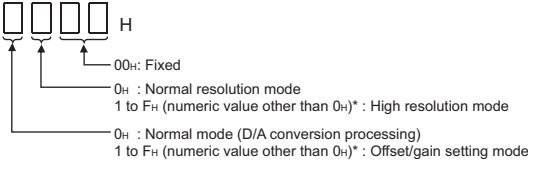
IMPORTANT
Q66DA-G needs to be powered on 30 minutes prior to operation for compliance to the specification (accuracy).Therefore, power on 30 minutes prior to offset/gain setting or after online module replacement.

5.3 Switch setting for intelligent functional module

The settings for the intelligent function module are performed using the I/O assignment settings for the GX Developer. It can be easy to set by inputting using hexadecimal-4 digits.

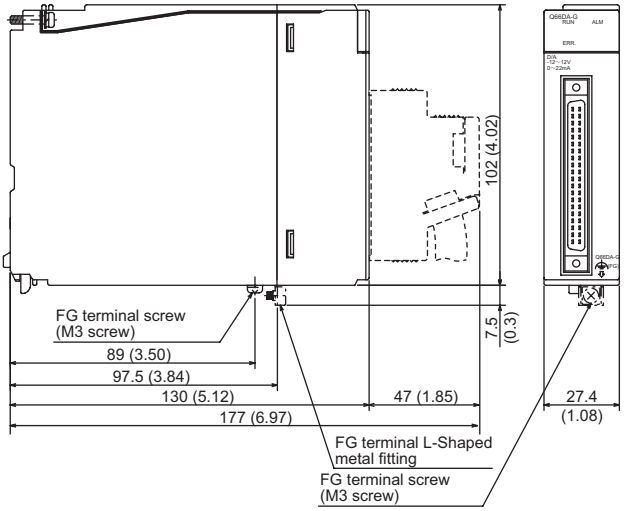
Table 5.1 Switch setting for intelligent function module

<table>
<tr><th>Switch No.</th><th colspan="2">Setting item</th></tr>
<tr><td>Switch 1</td><td>Output range setting
(CH1 to CH4)
 
</td><td>
<table>
<tr><th>Analog output range</th><th>Output range setting value</th></tr>
<tr><td>4 to 20mA</td><td>0H</td></tr>
<tr><td>0 to 20mA</td><td>1H</td></tr>
<tr><td>1 to 5V</td><td>2H</td></tr>
<tr><td>0 to 5V</td><td>3H</td></tr>
<tr><td>-10 to 10V</td><td>4H</td></tr>
<tr><td>User range setting 3
(0 to 5V)</td><td>DH</td></tr>
<tr><td>User range setting 2
(-10 to 10V)</td><td>EH</td></tr>
<tr><td>User range setting 1
(0 to 20mA)</td><td>FH</td></tr>
</table>
</td></tr>
<tr><td>Switch 2</td><td>Output range setting
(CH5, CH6)
 
</td><td></td></tr>
<tr><td>Switch 3</td><td colspan="2"> 

HOLD/CLEAR function setting
0: CLEAR
1: HOLD</td></tr>
<tr><td>Switch 4</td><td colspan="2"> 
</td></tr>
<tr><td>Switch 5</td><td colspan="2">0: Fixed</td></tr>
</table>

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

6. External Dimensions



Unit: mm (inch)

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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