MITSUBISHI

Q64AD, Q68ADV, Q68ADI
A/D Converter Module

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

User's Manual (Hardware)

MODEL	Q-A/D-U-H
MODEL Number	13JQ51

IB-0800034-E (0706) 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]

⚠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 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.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base unit while pressing the installation lever located a t the bottom of the module downward.
  Improper installation may result in malfunction , breakdown or the module coming loose and dropping. Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Switch all phases of the external power supply off when mounting or removing the module.
  Not doing so may cause 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.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits 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.

About This Manual

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

Related Manual

Manual Name	Manual No. (Model code)
A/D Converter Module User's Manual	SH-080055 (13JR03)

Conformation to the EMC Directive and Low Voltage Instruction
When complying with EMC Directives and Low-Voltage Directives by assembling a Mitsubishi PLC compatible with EMC Directive and Low-Voltage Directives into the user product, refer to Chapter 3 "EMC Directives and Low-Voltage Directives" in the User's Manual (Hardware Section) for the CPU module being 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.

1. Overview

This manual explains specifications and the names of the components for the Q64DA type analog digital module (hereafter Q64AD), the Q68ADV type A/D converter module (hereafter Q68ADV) and the Q68ADI A/D converter module (hereafter Q68ADI), all of which are used in combination with the MELSEC-Q Series CPU module. In this manual, the Q64AD, Q68ADV and the Q68ADI are referred to as A/D converter modules.

2. Specifications

The specifications for the A/D conversion module are shown in the following table. For general specifications for the A/D module, refer to the operation manual for the CPU module being used.

Item \ Type	Q64AD	Q68ADV	Q68ADI
Number of analog inputs	4 points (4 channels)	8 points (8 channels)	8 points (8 channels)
Analog input	Voltage	-10 to 10V DC (Input resistance 1 M Ω)	———
	Current	0 to 20 mA DC (Input resistance 250 Ω)	———	0 to 20 mA DC (Input resistance 250 Ω)
Digital output	16-bit signed binary (normal resolution mode: –4096 to 4095, high resolution mode:–12288 to 12287, –16384 to 16383)		

I/O characteristics maximum resolution

Analog input range		Normal resolution mode: Digital output value	Normal resolution mode: Maximum resolution	High resolution mode: Digital output value	High resolution mode: Maximum resolution
Voltage	0 to 10V	0 to 4000	2.5mV	0 to 16000	0.625mV
	0 to 5 V		1.25 mV	0 to 12000	0.416 mV
	1 to 5 V		1.0 mV		0.333 mV
	– 10 to 10 V	– 4000 to 4000	2.5 mV	– 16000 to 16000	0.625 mV
	Users range setting		0.375 mV	– 12000 to 12000	0.333 mV
Current	0 to 20 mA	0 to 4000	5 μ A	0 to 12000	1.66 μ A
	4 to 20 mA		4 μ A		1.33 μ A
	Users range setting	– 4000 to 4000	1.37 μ A	– 12000 to 12000	1.33 μ A

Accuracy (Accuracy in respect to maximum digital output value)

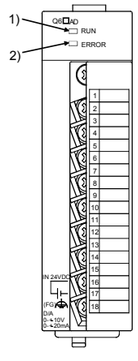
Analog input range		Normal resolution mode: Ambient temperature 0 to 55°C, With temperature drift correction	Normal resolution mode: Ambient temperature 0 to 55°C, Without temperature drift correction	Normal resolution mode: Ambient temperature 25 ± 5 °C	High resolution mode: Ambient temperature 0 to 55°C, With temperature drift correction	High resolution mode: Ambient temperature 0 to 55°C, Without temperature drift correction	High resolution mode: Ambient temperature 25 ± 5 °C
Voltage	0 to 10V	±0.3% (±12digit*)	±0.4% (±16digit*)	±0.1% (±48digit*)	±0.3% (±48digit*)	±0.4% (±64digit*)	±0.1% (±16digit*)
	– 10 to 10 V						
	0 to 5 V				±0.3% (±36digit*)	±0.4% (±48digit*)	±0.1% (±12digit*)
	1 to 5 V						
	Users range setting						
Current	0 to 20 mA						
	4 to 20 mA						
	Users range setting						

* Digit indicates a digital value.

Item \ Type	Q64AD	Q68ADV	Q68ADI
Conversion speed	80 μ s/ channel (When there is temperature drift, the time calculated by adding 160 μ s will be used regardless of the number of channels used)		
Absolute maximum input	Voltage: ± 15 V Current: ± 30 mA		
Insulation method	Between I/O terminal and PLC power supply: Photocoupler insulation Between channels: Not insulated		
Number of occupied points	16 points		
Connecting terminals	18 points terminal block		
Applicable wire size	0.3 to 0.75 mm^2		
Applicable solderless terminals	R1.25 - 3 (A solderless terminals with sleeves cannot be used)		
Internal current consumption (5 V DC)	0.63 A	0.64 A	0.64 A
Weight	0.18 kg	0.19 kg	0.19 kg

3. Part Names

This section explains the names of the components for the A/D conversion module.



Terminal number	Signal name					
	Q64AD		Q68ADV		Q68ADI	
1	CH1	V+	CH1	V+	CH1	I+
2		V–		V–		I–
3		I+	CH2	V+	CH2	I+
4		SLD		V–		I–
5	CH2	V+	CH3	V+	CH3	I+
6		V–		V–		I–
7		I+	CH4	V+	CH4	I+
8		SLD		V–		I–
9	CH3	V+	CH5	V+	CH5	I+
10		V–		V–		I–
11		I+	CH6	V+	CH6	I+
12		SLD		V–		I–
13	CH4	V+	CH7	V+	CH7	I+
14		V–		V–		I–
15		I+	CH8	V+	CH8	I+
16		SLD		V–		I–
17	A.G. (ANALOG GND)					
18	FG					

Number	Name	Description
1)	RUN LED	Displays the operating status of the A/D conversion module. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power supply interrupted or watch dog timer error
2)	ERROR LED	Displays the error status of the A/D conversion module. On : Error Off : Normal operation Flashing : Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than zero "0".

4. Handling Precautions

(1) Do not drop the module or cause it to receive strong impact.
(2) Tighten the terminal screws for the module to the specified torque shown below. Insufficient tightening torque could result in shorts, failures or malfunction.

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

5. Wiring

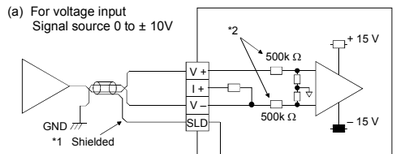
5.1 Wiring precautions

(1) Use separate cables for the external output signal or external power supply for the AC and Q64AD, Q68ADV, Q68ADI converter modules. Take steps to prevent the AC side from being affected by surge or inductance.
(2) Ground one point of the shield for shielded wires or shielded cables.

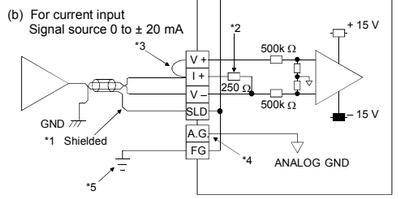
5.2 External wiring

(1) Q64AD

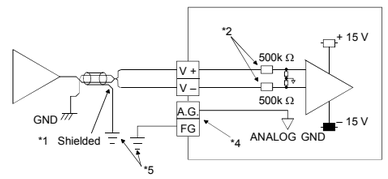
(a) For voltage input
Signal source 0 to ± 10V



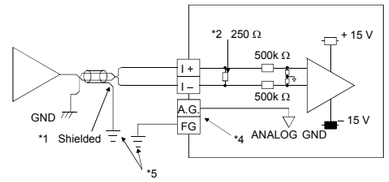
(b) For current input
Signal source 0 to ± 20 mA



(2) Q68ADV



(3) Q68ADI



*1 Use a twisted two core shielded wire for the power wire.
*2 Shows input resistance.
*3 If current input, always connect to (V+) and (I+) terminals.
*4 "A.G." terminal does not normally require wiring. However, it can be used as GND for compatible equipment ground under the following conditions.
(1) When there is a difference in polarity between "A.G" and "GND for compatible equipment".
(2) As an alternative for 0V input when only the + side is open on a ± wire.
*5 Always use a ground. In addition, ground the FB of the power supply module.

5.3 Switch setting for intelligent functional module

The settings for the intelligent function module are performed using the I/O allocation settings for the GX Developer.

	Setting	
Switch 1	Input range setting □□□□ H CH4 CH3 CH2 CH1	Analog input range / Input range setting value: 4 to 20 mA: 0 H *1 0 to 20 mA: 1 H 1 to 5 V: 2 H 0 to 5 V: 3 H – 10 to 10 V: 4 H 0 to 10 V: 5 H User range setting: F H
Switch 2	Input range setting □□□□ H CH8 CH7 CH6 CH5	
Switch 3	Not used	
Switch 4	□□□□ H 00H: With temperature drift correction 01 to FFH (numeric value other than 00H)*: Without temperature drift correction 0H: Normal resolution mode 1 to FH (numeric value other than 0H)*: High resolution mode 0H: Normal mode (A/D conversion processing) 1 to FH (numeric value other than 0H)*: Offset/gain setting mode The mode setting method is different from that of the function version A module. See point.	
Switch 5	0 : Fixed	

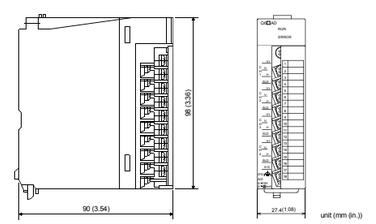
* Setting any value within the setting range will provide the same operation.
When the setting range is 1 to FH, set 1 for example.

Depending on the type of module used, the settings for A/D unit input range are shown below.
- Q64AD ..... 0H to 5H, FH
- Q68ADV ..... 0H, 2H to 5H, FH
  *1 When the setting is 0H, the input operating range will be 0 to 10 V.
- Q68ADI ..... 0H, 1H, FH

Point

Setting of the offset/gain setting mode differs for function version A and function version B.
In the offset/gain setting mode, confirm that the RUN LED is flickering, and then set the offset/gain.
If the RUN LED is not flickering, check whether switch 4 is set correctly.

6. External Dimensions



Warranty

Mitsubishi Electric shall not be liable for any loss caused by reasons for which Mitsubishi is not held accountable, lost business opportunities or unrealized gain on the customer's side resulting from failure of the product, or any other damage, secondary disaster, accident, damage to equipment other than the product or disruption of other business operations arising out of special circumstances which may or may not have been predicted at Mitsubishi.

⚠For safe use of the product

- This product is manufactured as a general-purpose product intended for general industrial use only. It is not designed nor manufactured for use in an equipment or system affecting human lives.
- If you are considering to use this product in equipment or systems for nuclear power generation, power generation, aerospace, medical or passenger transport applications, consult our sales representatives.
- This product is manufactured under our strict quality control system. However, if the product is used in the intended facility in such a way that a failure of the product may lead to serious accident or loss, incorporate backup or fail-safe functions into the system design.

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