

# MITSUBISHI A/D converter module type A68AD-S2

Mitsubishi General-Purpose Programmable Controller  
**User's Manual**  
(Hardware)

Thank you for purchasing the Mitsubishi general-purpose programmable controller MELSEC-A series.

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



Type	A68AD-S2-U-H/W-E
Type Code	13JL77

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## SAFETY PRECAUTIONS

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in this manual. Also pay careful attention to safety and handle the module properly.

These precautions apply only to Mitsubishi equipment. Refer to the CPU module user's manual for a description of the PC 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

- In case of the external power supply failure or the programmable controller (PLC) failure, set up a safety circuit outside the PC so that the entire system can operate safely. The mis-output and malfunction may cause an accident.

### DESIGN PRECAUTIONS

#### CAUTION

- Use the PLC in an environment that meets the general specifications contained in this manual. Using this PLC in an environment outside the range of the general specifications could result in electric shock, fires, malfunctions, and damage to or deterioration of the product.
- Do not bunch the control wires with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.9 inch) or more from each other. Failure to do so may result in noise that would cause malfunctions.

### INSTALLATION PRECAUTIONS

#### CAUTION

- Securely insert the module fixing latches on the bottom of the module into the base module cutouts before mounting. Failure to correctly mount the module could cause malfunctions, failure or dropping.
- Do not directly touch the module's conductive parts. Doing so could cause malfunctions or failure in the module.

### WIRING PRECAUTIONS

#### CAUTION

- Ground the AG and FG terminals to the protected grounding conductor when there are a lot of noise. Failure to ground these terminals may cause malfunctions.
- When wiring PLC, check the rated voltage and terminal layout of the wiring, and make sure the wiring is done correctly. Connecting a power supply that differs from the rated voltage or wiring it incorrectly may cause fires or failure.
- Tighten the terminal screws within the range of specified torque. If the terminal screws are loose, it may result in short circuits or malfunctions. Tightening the screws too far may cause damage to the screw, resulting in short circuits, or malfunctions.
- Be sure there are no foreign substances such as sawdust or wiring debris inside the module. Such debris could cause fires, failure, malfunctions.

### STARTUP AND MAINTENANCE PRECAUTIONS

#### CAUTION

- Do not touch the connector while the power is on. Doing so could cause malfunctions.
- Make sure to switch all phases of the external power supply off before cleaning or re-tightening terminal screws. If you do not switch off the external power supply, it will cause failure or malfunctions of the module.
- Do not disassemble or modify the modules. Doing so could cause failure, malfunctions, injury, or fires.
- Make sure to switch all phases of the external power supply off before mounting or removing the module. If you do not switch off the external power supply, it will cause failure or malfunctions of the module.

### OPERATING PRECAUTIONS

#### DANGER

- Do not output (turn ON) the "usage disable" signal as an output signal to special modules from the PLC CPU. Outputting the "usage disable" signal may cause PLC system malfunctions.

### DISPOSAL PRECAUTIONS

#### CAUTION

- When disposing of this product, treat it as industrial waste.

### About Manuals

The following product manuals are available.

#### Related manual

Manual name	Manual No. (Model Code)
A/D converter module type A68AD-S2 User's Manual	SH-4009 (13JL76)

Please read A68AD-S2 Module User's Manual (Details) before using this module.

## 1. OVERVIEW

This manual describes the specifications and handling of the A68AD-S2 type analog/digital converter module (hereinafter, A68AD-S2) used in combination with the MELSEC-A Series CPU module (hereinafter PLC CPU).

- (1) Product in the same package  
After unpacking, please confirm that the following product is contained.

Product Name	No. of Items
A68AD-S2 type analog/digital converter module	1

## 2. PERFORMANCE SPECIFICATIONS

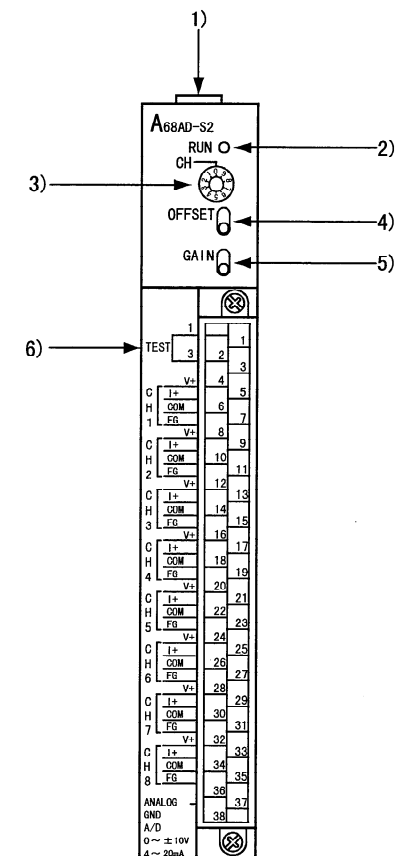
The performance specifications of the A68AD-S2 are described below:

Item	Performance specifications	
Analog input	Voltage: -10 to 0 to 10VDC (Input resistance 1M Ω)	Select and use the following with the input terminals: * The current input can also be used as -20 to 0 to 20mA.
	Current: 4 to 20mA DC (Input resistance 250 Ω)	
Digital output	ACPU 16-bit coded binary (-2048 to 2047)	
Input/output characteristics	Analog input	Digital output
	10V	2000
	5V or 20mA	1000
	0V or 4mA	0
	-5V or -12mA	-1000
	-10V	-2000
Maximum resolution	Voltage 5mV (1/2000) Current 20 μA (1/1000)	
Overall accuracy	Within ±1% (Accuracy in respect to maximum value)	
Maximum conversion speed	Maximum 2.5ms/channel	
Maximum absolute input	Voltage: ±15V, current: ±30mA	
No. of analog input points	8 channels/module	
Insulation method	Between input terminal and PC power supply . . . . . Photo coupler insulation Between each channel . . . . . Not insulated	
No. of occupied input/output points	32 points	
Connection terminal	38-point terminal block	
Applicable wire size	0.75 to 2mm <sup>2</sup> (applicable tightening torque 7kgf.cm)	
Applicable crimp terminal	V1.25-3 V1.25-YS3A V2-S3 V2-YS3A	
Internal current consumption (DC5V)(A)	0.39	
Weight(kg)	0.3 (0.661b)	

Refer to the User's Manual of the PLC CPU for the general specifications.

## 3. PART IDENTIFICATION

### 3.1 Part Identification



NO.	Name	Description
1)	Module fixing hook	Hook for fixing the A68AD-S2 to the base unit
2)	RUN LED	Indicates the operating status of A68AD-S2. (Normal mode) ON: During normal operation Flicker: At write data error or A68AD-S2 hardware error OFF: 5V power off watch dog timer error (Test mode) ON: When the OFFSET switch or GAIN switch is located at the ON position. OFF: When both the OFFSET switch or GAIN switch is located at the OFF position.
3)	CHANNEL select switch*1	Used to select a channel for the offset adjustment and gain adjustment. (No processing at positions 0 and 9.)
4)	OFFSET switch*1	At the ON position, stores the applied analog input value into the A68AD-S2 as an offset value.
5)	GAIN switch*1	At the ON position, stores the applied analog input value into the A68AD-S2 as a gain value.
6)	Test mode terminal*1	Prior to offset/gain setting, connect together terminals 1 and 3.

\* 1 Valid only during the test mode.

## 4. LOADING AND INSTALLATION

### 4.1 Handling Precautions

- 1) Do not drop or put a great impact on the module case and the terminal block because they are made of resin.
- 2) Do not take the printed circuit board of the module out of the case. It may result in a failure.
- 3) Be careful not to let foreign matter such as filings or wire chips get inside the module while wiring. Remove all foreign matters if any get inside.
- 4) Tighten the module installation screws and terminal screws within the range as follows:

Screw Area	Tightening Torque Range N·cm (kg·cm) [lb·inch]
Terminal block terminal screws (M3 screw)	39 to 59N·cm {4 to 6kgf·cm} [3.5 to 5.2]
Terminal block installation screws (M4 screw)	78 to 118N·cm {8 to 12kgf·cm} [6.93 to 10.4]

### 4.2 Installation Environment

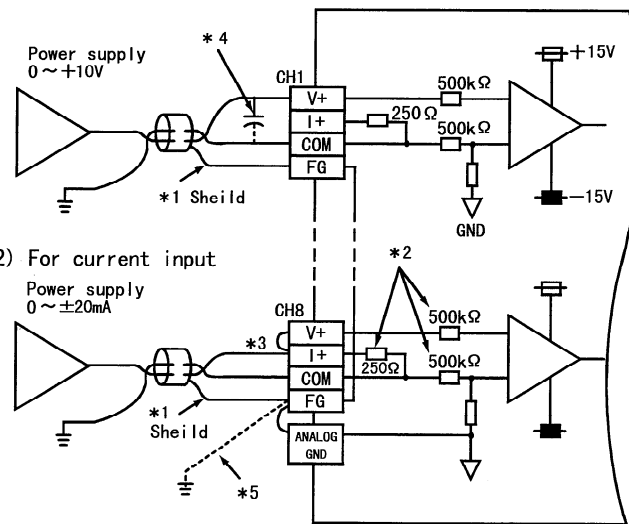
Never install the A series in the following environments:

- 1) Locations where the ambient temperature is outside the range of 0 to 55°C.
- 2) Locations where the ambient humidity is outside the range of 10 to 90% RH.
- 3) Locations where dew condensation takes place due to sudden temperature changes.
- 4) Locations where there are corrosive and/or combustible gasses.
- 5) Locations where there is a high level of conductive powder (such as dust and iron filings, oil mist, salt, and organic solvents).
- 6) Locations exposed to the direct rays of the sun.
- 7) Locations where strong power and magnetic fields are generated.
- 8) Locations where vibration and shock are directly transmitted to the main module.

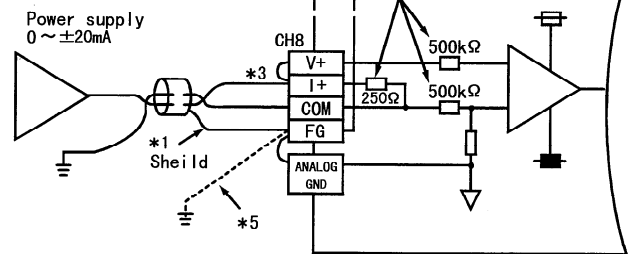
### 5.2 Module connection example

The following shows the wiring method for the A68AD-S2.

(1) For Voltage input



(2) For current input

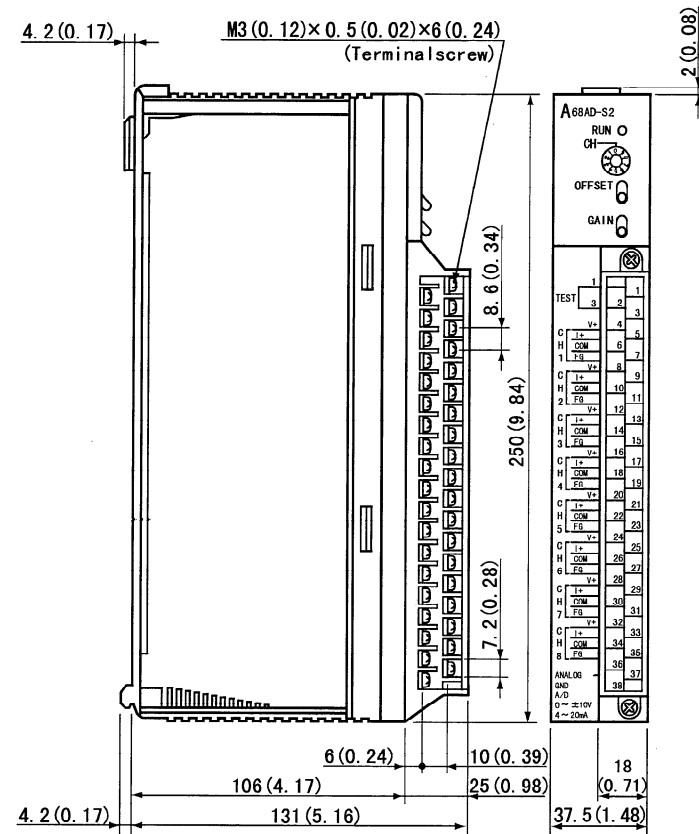


- \*1 Use a 2-core twisted shield wire for the power supply.
- \*2 Indicates the input resistance of the A68AD-S2.
- \*3 For current input, always connect the (V+) and (I+) terminals.
- \*4 If noise or ripple is generated in the external wiring, connect an approx. 0.1 to 0.47 μ F25WV capacitor between terminal V and COM.
- \*5 If the noise is great, ground the module. In some cases the power supply module's FG should also be grounded.

#### POINT

The A68AD-S2's FG terminal and PLC power supply module's FG terminal are not connected.

## 6. EXTERNAL DIMENSIONS



Unit : mm (inch)

## 5. WIRING

The following describes the precautionary items on wiring as well as wiring to the external devices.

### 5.1 Precautions when Wiring

To obtain the maximum performance from the functions of A68AD-S2 and improve the system reliability, a wiring with the high durability against the noise is required. The external wiring precautions described below make more improvement in the wiring not to be affected by the noise.

- 1) Use separate cables for the AC and the analog input to the A68AD-S2, in order not to be affected by the AC side surge or conductivity.
- 2) Do not bundle or place the cable close to the main circuit line, high voltage line or load carrying wires from other than the PLC. It is influenced more easily by the noise, surge, or conductivity.
- 3) Place a one-point grounding on the PLC side for the shield line or shield cable. However, depending on the external noise conditions, it may be better to have a grounding externally.
- 4) The A68AD-S2 uses a photo coupler insulation between the input terminals and PLC, however, insulation is not used between the channels. Take note to the following cautions when using multiple channels with one module.
  1. The analog input COM terminals are connected internally, so the COM terminal's voltage level or current level must be the same.
  2. If the COM terminals are not at the same level, use another A68AD-S2 or insulate between the channels externally, and establish the analog input.

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