MITSUBISHI

Analog-Digital Converter Module

User's Manual

(Hardware)

A1S68AD

Thank you for purchasing the Mitsubishi programmable controller MELSEC-A Series.

Prior to use, please read both this manual and detailed manual thoroughly to fully understand the product.

Model	A1S68AD-U-HW
MODEL CODE	13JY17
IB(NA)-0800371-C(1112)MEE	

● SAFETY PRECAUTIONS ●

(Always read before starting use)

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.
The instructions given this manual are concerned with this product. Refer to the User's Manual of the CPU module in use for details on the safety instructions for the programmable controller system.
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.

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 bundle the control wire and the communication cable with the main circuit or power line or keep them close to one another.
  Keep the control wire and the connection cable at least 100mm (3.94inch) away from the main circuit or power line: otherwise, noise or malfunctions will occur.

[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 cause an electric shock, fire, malfunction, or damage to or deterioration of the product. ● Insert the tabs at the bottom of the module into the holes in the base module before installing module. Be sure to install the module in the base module with screws tightened to the specified torque. Improper installation may cause erroneous operation, accident, or the module to fall out.

[WIRING PRECAUTIONS]

⚠CAUTION
● Before connecting wires to the PLC, check the rated voltage and the terminal arrangement. Connecting power of a different voltage or wiring incorrectly will result in fire or failure. ● Tighten the terminal screws within the specified torque range. Undertightening can cause a short circuit or malfunction. Overtightening can cause a short circuit or malfunction due to damage of the screws or module. ● Take all possible measures to prevent chips or wire scraps from entering the module. Entry of foreign material will cause fire, failure of malfunctions.

[STARTING AND MAINTENANCE PRECAUTIONS]

⚠ WARNING
● Do not touch the terminals while they are live. This will cause malfunctions. ● Make sure to switch all phases of the external power supply off before cleaning or re-tightening the terminal screws. Failure to do so will cause failure or malfunction of the module. Not doing so can cause failure or malfunction of the module.

⚠CAUTION
● Do not disassemble or tamper will the module. This will cause failure, malfunctions, injuries or fire. ● Make sure to switch all phases of the external power supply off before mounting or removing the module. Failure to do so will cause failure or malfunction of the module. ● If a voltage is input when a current input range is selected, failure may occur. ● Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant) ● 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 malfunction of the module.

[DISPOSAL PRECAUTIONS]

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

● CONDITIONS OF USE FOR THE PRODUCT ●

(1) Mitsubishi C Controller system ("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.

REVISIONS

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

Print Date	*Manual Number	Revision
Mar., 2008	IB(NA)-0800371-A	First edition
May,2008	IB(NA)-0800371-B	Partial correction Chapter 3
Dec.,2011	IB(NA)-0800371-C	Partial correction SAFETY PRECAUTIONS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, Chapter 2 Addition SAFETY PRECAUTIONS (Chinese), CONDITIONS OF USE FOR THE PRODUCT

CONTENTS

About the Manuals

The following product are available for this equipment.
Refer to the table given below to choose suitable manuals.

Detailed Manual

Manual name	Manual No. (Model code)
Analog-Digital Converter Module type A1S68AD User's Manual	IB-66576 (13J757)

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 one of the following manuals.
• User's manual for the CPU module used
• User's manual (hardware) for the CPU module or base unit used
The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures
No additional measures are necessary for the compliance of this product with EMC and Low Voltage Directives.

1. General Description

This manual provides the specifications and part names of the analog-digital converter module type A1S68AD (hereinafter referred to as "A1S68AD"), which is designed to use with the MELSEC-A series CPU module.

2. Performance Specifications

The following table shows the performance specifications of the A1S68AD.

Item	Specification	
Analog input	Voltage:-10 to 0 to +10 VDC (input resistance : 1MΩ or more) Current:0 to +20mA (input resistance : 250Ω) *3	
Digital output	16-bit signed binary	
I/O characteristics *1	Analog input value	Digital output value
	0 to +10V -10 to 10V 0 to 5V or 0 to 20mA 1 to 5V or 4 to 20mA	0 to +4000 -2000 to +2000 0 to +4000 0 to +4000
Maximum resolution	Analog input value	Digital output value
	0 to +10V -10 to 10V 0 to 5V 1 to 5V 0 to 20mA 4 to 20mA	2.5mV 5mV 1.25mV 1mV 5μA 4μA
Overall accuracy (accuracy to full scale)	Within ±1% (Digital output value ±40)	
Maximum conversion time	0.5ms/1 channel *2	
Absolute maximum input	Voltage:±35V Current:±30mA *4	
Number of analog input points	8 channels/1 module	
Insulation method	Between input terminal and PLC power supply: Photocoupler insulation (Between channels: Not insulated)	
Number of occupied I/O points	Special, 32 points	
Connection terminal	20-terminal block	
External power supply	Unnecessary	
Applicable wire size	0.75 to 1.5mm^2	
Applicable solderless terminal	R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A	
Internal current consumption (5VDC)	0.4A	
Weight	0.27 kg	

*1: The switch is set to an analog input value of 0 to +10V on delivery.

*2: The maximum conversion speed is 1ms/channel on all channels if averaging processing is set even for only one channel.

*3: For the selecting method of voltage input or current input, refer to Chapter 3.

*4: Current value indicates value of instant input current that does not break module inner electrical resistance.

POINT
The overall accuracy is applicable to the following analog input ranges: Voltage: -10 to 0 to +10V Current: 0 to +20mA

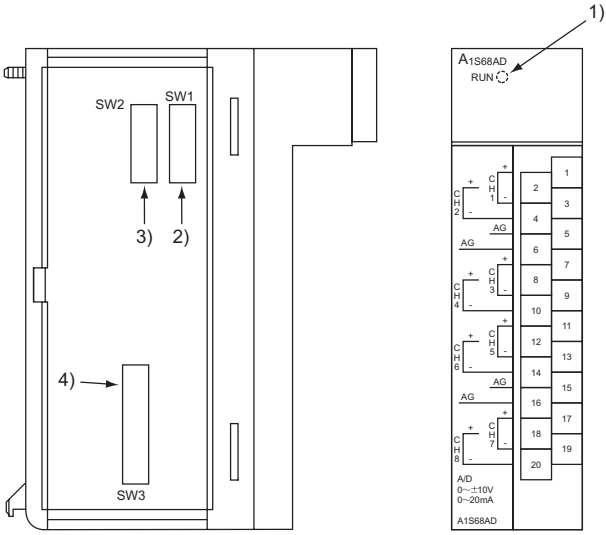
Refer to the user's manual for the CPU module in use for details on the general specifications.

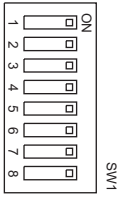
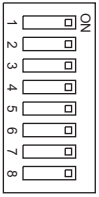
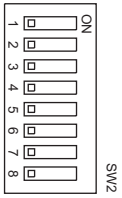
3. Nomenclature and Settings

The following gives the Names and settings of each section for each part of the A1S68AD

In this manual, modules whose hardware versions V or later are used for description.

For the names and settings for each part of modules whose hardware version U or earlier, refer to the Analog-Digital Converter Module type A1S68AD User's Manual (IB-66576).



No.	Name and appearance	Description
1)	"RUN" LED RUN	Displays the operating status of the A1S68AD. On :Normal operation. Flash :Write disabled error or average time/count setting error. Off :5 V power cut or watchdog timer error.
2)	Input range selector switch SW1 	Used to set the input range of each channel. (Factory default: 0 to 10V) The DIP switch numbers 1-8 correspond to the channel numbers. 
3)	Input range selector switch SW2 	Setting of CH1 Set CH2-CH8 in the same manner.
4)	Input range selector switch SW3 	

Input Range	SW1-1	SW2-1	SW3-1
-10 to 10V	OFF	OFF	OFF
0 to 10V	ON		
0 to 5V	OFF	ON	
1 to 5V	ON		
0 to 20mA	OFF	ON	ON
4 to 20mA	ON		
Setting disabled	OFF	OFF	
Setting disabled	ON		

Caution
If voltage input appears when a current input range is selected, a failure may occur.

4. Caution on Handling

(1) The module case and the terminal block are made of resin.
Do not drop the module or subject it to shock.

(2) Do not remove the printed circuit board from the module case.
This could cause failure.

(3) During wiring, take all possible measures to prevent wire scraps or foreign matter from entering the module.
If anything enters the module, remove it completely.

(4) Tighten the module mounting screws and the terminal screws to the torques specified in the following table:

Screw	Tightening torque range (N•cm)
Module installation screw (M4 screw)	78 to 118
Terminal block terminal screw (M3.5 screw)	59 to 88
Terminal block mounting screw (M4 screw)	78 to 118

5. Wiring

This section gives the cautions on wiring and connection example for the module.

5.1 Cautions on Wiring

To establish a highly reliable system by making the best use of the A1S68AD functions, external wiring that is not susceptible to the effects of noise is required.
The cautions on external wiring are presented below:

(1) Use separate cables for AC input current and external input signals to the A1S68AD. This can prevent the effects of surge or induction of the AC input current.

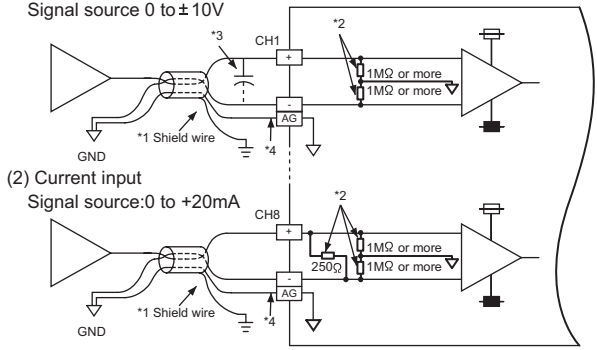
(2) Keep the external wiring at lease 10cm away from the main circuit, high-voltage wires or load-carrying wires other than those extending from the PLC: otherwise, the wiring will be affected by noise, surge or induction.

(3) Generally, ground the shielded wire or shielded cable at one point on the PLC CPU. However, depending on the external noise level, it may be advisable to ground it an external location.

5.2 Module connection example

The figure below shows an example of voltage input and current input connections.

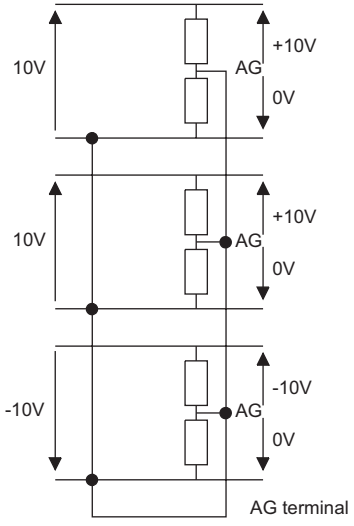
(1) Voltage input connection
Signal source 0 to ± 10V



(2) Current input
Signal source:0 to +20mA

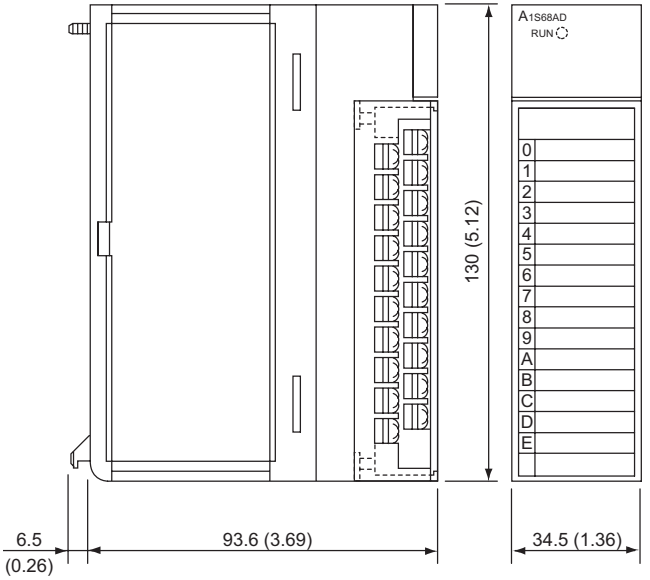
*1: Use a 2-pole twist shielded wire.
*2: Represents the input resistors of the A1S68AD. (For voltage input, turn off the 250Ω resistor with the Input range selector switch.)
*3: If the external wiring causes noise or ripple, connect a capacitor of 0.1 to 0.47μF (25V or more voltage resistance parts) between the V and COM terminals.

*4: AG is the GND terminal of the analog circuit. Connecting it to the GND terminal of an external device is not mandatory, but a higher level of accuracy may be obtained when it is connected.
If there are three or more channels of the input range of -10 to 10V and the external devices connected to the channels shares a common line, the AG terminal must be connected the shared common line of the external device.
(See the figure below.)



POINT
When the current input is selected, do not connect the sink type output device and the source output device together. If this happens, normal A/D conversion value cannot be stored.

6. Outside Dimensions



Unit:mm(inch)

MEMO

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.

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