MITSUBISHI

Analog-Digital Conversion Module

User's Manual

(Hardware)

A1S68AD

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

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

MODEL	A1S68AD-U(H/W)-E
MODEL CODE	13J749
IB (NA)-66575-C(0306) 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 logic controller system.
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 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 PLC in the environment specified in the General Specifications section in detailed manual.
  Using it an environment which does not meet the general specifications could cause electric shock, fire or malfunctions, and damage or deterioration of the module.
- 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]

⚠DANGER

- Do not touch the terminals while they are live.
  This will cause malfunctions.
- Start cleaning or terminal screw retightening after switching power off externally in all phases.
  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.
- Mount or dismount the module after switching power off externally in all phases.
  Not doing so can cause failure or malfunction of the module.
- If a voltage is input when a current input range is selected, failure may occur.
- 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.

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

1. General Description

This manual describes the specification and nomenclature of A1S68AD type analog-digital conversion module (hereafter called the “A1S68AD”), which is be used in combination with MELSEC-A series programmable controller CPU module (hereafter called the “PLC CPU”).

2. Performance Specifications

The following table shows the performance specifications of the A1S68AD.

<table>
<tr><th>Item</th><th colspan="2">Specification</th></tr>
<tr><td>Analog input</td><td colspan="2">Voltage:-10 to 0 to 10 VDC (input resistance : 1MΩ)
Current:0 to +20mA (input resistance : 250Ω)
Can be selected by setting DIP switches.</td></tr>
<tr><td>Digital output</td><td colspan="2">16-bit signed binary</td></tr>
<tr><td rowspan="2">I/O characteristics *1</td><td>Analog input value</td><td>Digital output value</td></tr>
<tr><td>0 to +10V
-10 to 10V
0 to 5V or 0 to 20mA
1 to 5V or 4 to 20mA</td><td>0 to +4000
-2000 to +2000
0 to +4000
0 to +4000</td></tr>
<tr><td rowspan="2">Maximum resolution</td><td>Analog input value</td><td>Digital output value</td></tr>
<tr><td>0 to +10V
-10 to 10V
0 to 5V
1 to 5V
0 to 20mA
4 to 20mA</td><td>2.5mA
5mA
1.25mA
1mA
5μA
4μA</td></tr>
<tr><td>Overall accuracy (accuracy to full scale)</td><td colspan="2">Within ±1% (Digital output value ±40)</td></tr>
<tr><td>Maximum conversion time</td><td colspan="2">0.5ms/channel (*2)</td></tr>
<tr><td>Absolute maximum input</td><td colspan="2">Voltage:±35V Current:+30mA</td></tr>
<tr><td>Number of analog input points</td><td colspan="2">8 channels/module</td></tr>
<tr><td>Insulation method</td><td colspan="2">Between input terminal and PLC power supply: Photocoupler insulation (Between channels: Not insulated)</td></tr>
<tr><td>Number of occupied I/O points</td><td colspan="2">Special, 32 points</td></tr>
<tr><td>Connection terminal</td><td colspan="2">20-terminal block</td></tr>
<tr><td>External power supply</td><td colspan="2">Unnecessary</td></tr>
<tr><td>Applicable wire size</td><td colspan="2">0.75 to 1.5mm^2</td></tr>
<tr><td>Applicable solderless terminal</td><td colspan="2">R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A</td></tr>
<tr><td>Internal current consumption (5VDC)</td><td colspan="2">0.4A</td></tr>
<tr><td>Weight</td><td colspan="2">0.32 kg</td></tr>
</table>

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

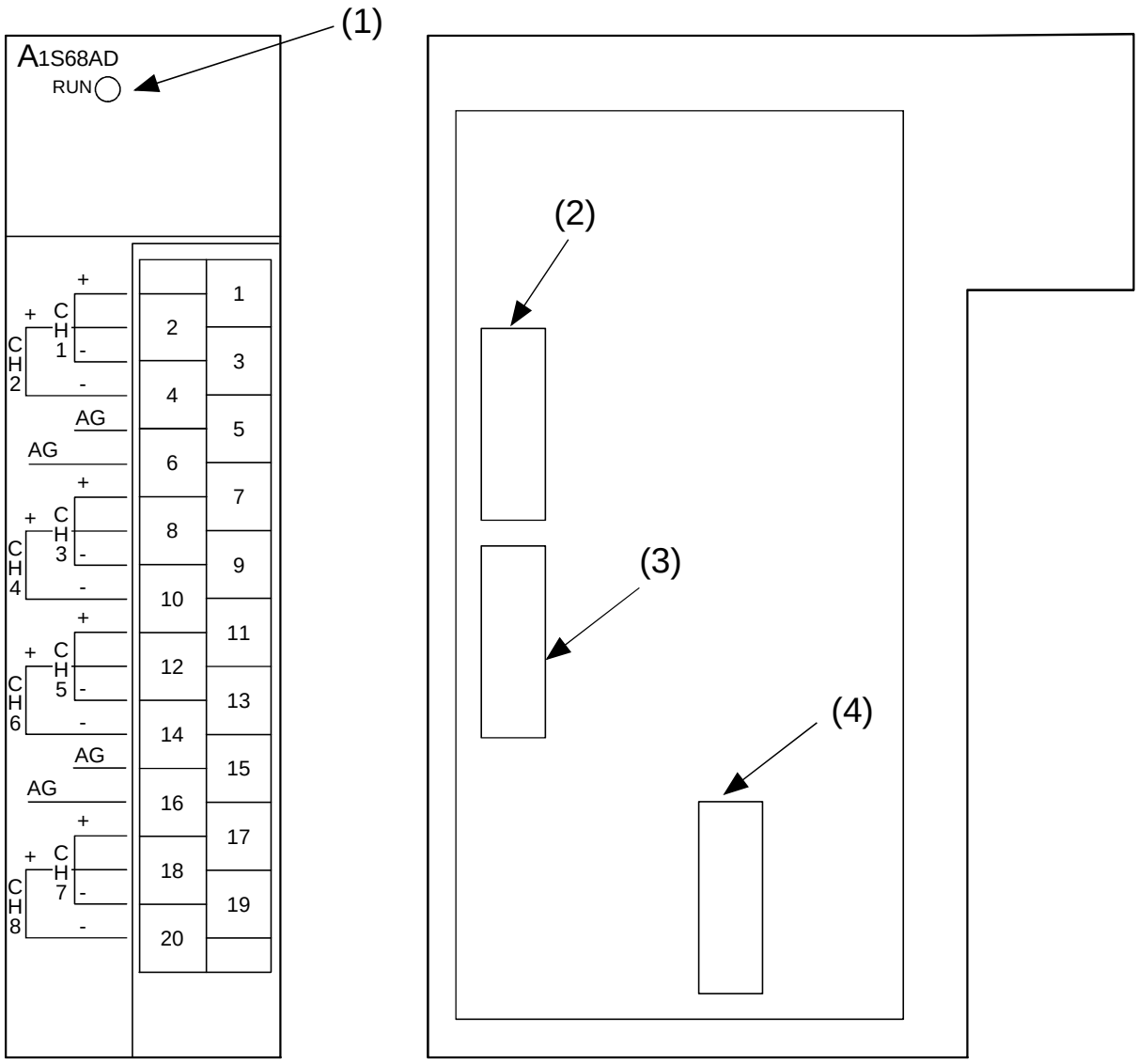
*2: The maximum conversion speed is 1ms/channel on all channels if averaging processing is set even for only one channel.

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

For the general specifications, refer to the detailed manual.

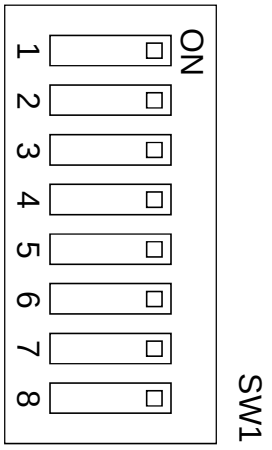
3. Nomenclature and Settings

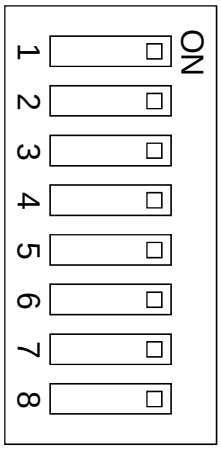
3.1 Nomenclature



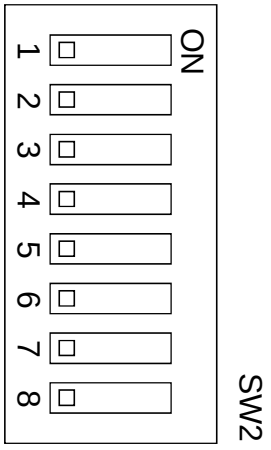
<table>
<tr><th>No</th><th>Name and appearance</th><th>Description</th></tr>
<tr><td>1)</td><td>“RUN” LED

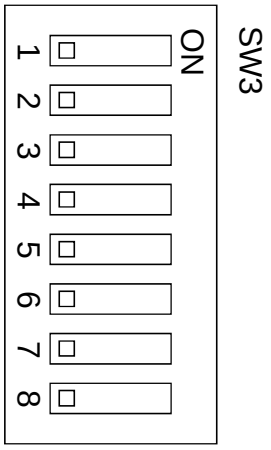
RUN ◌</td><td>Displays the operating status of the A1S68AD.
On :Normal operation.
Flash :Write disabled error or average time/count setting error.
Off :5 V power cut or watchdog timer error.</td></tr>
<tr><td>2)</td><td>Input range selector switch SW1

 
</td><td>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.

SW1 to SW3
 

1 ····· CH1
2 ····· CH2
3 ····· CH3
4 ····· CH4
5 ····· CH5
6 ····· CH6
7 ····· CH7
8 ····· CH8</td></tr>
<tr><td>3)</td><td>Input range selector switch SW2

 
</td><td>Setting of CH1
<table><tr><th>Input Range</th><th>SW1-1</th><th>SW2-1</th><th>SW3-1</th></tr><tr><td>-10 to 10V</td><td>OFF</td><td rowspan="2">OFF</td><td rowspan="4">OFF</td></tr><tr><td>0 to 10V</td><td>ON</td></tr><tr><td>0 to 5V</td><td>OFF</td><td rowspan="2">ON</td></tr><tr><td>1 to 5V</td><td>ON</td></tr><tr><td>0 to 20mA</td><td>OFF</td><td rowspan="2">ON</td><td rowspan="4">ON</td></tr><tr><td>4 to 20mA</td><td>ON</td></tr><tr><td>Setting disabled</td><td>OFF</td><td rowspan="2">OFF</td></tr><tr><td>Setting disabled</td><td>ON</td></tr></table>
Set CH2-CH8 in the same manner.</td></tr>
<tr><td>4)</td><td>Input range selector switch SW3

 
</td><td></td></tr>
</table>

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

4. Handling

4.1 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:

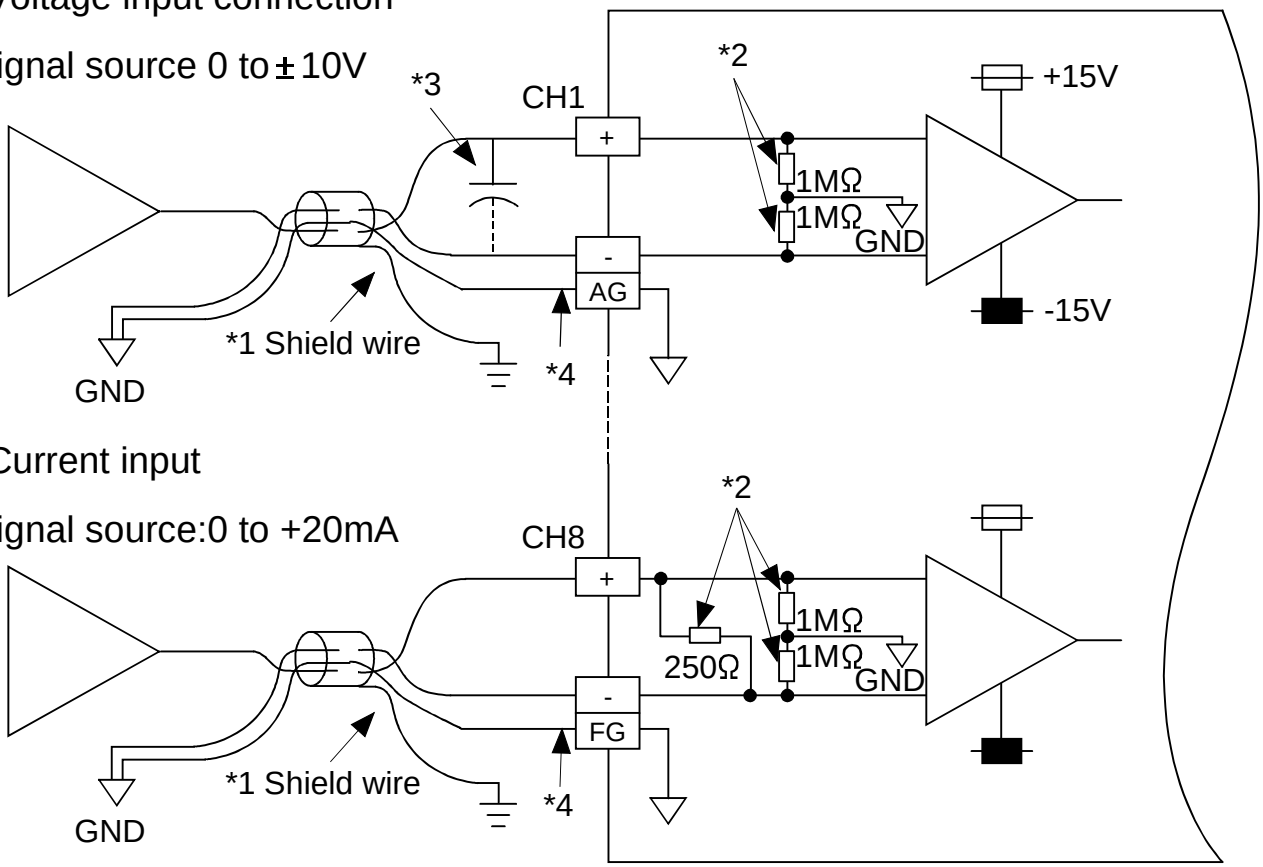
(1) Use separate cables for AC input current and external input signals to the A1S68AD. This can prevent the effects of surge or induction of the AC input current.
(2) Keep the external wiring at lease 10cm away from the main circuit, high-voltage wires or load-carrying wires other than those extending 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

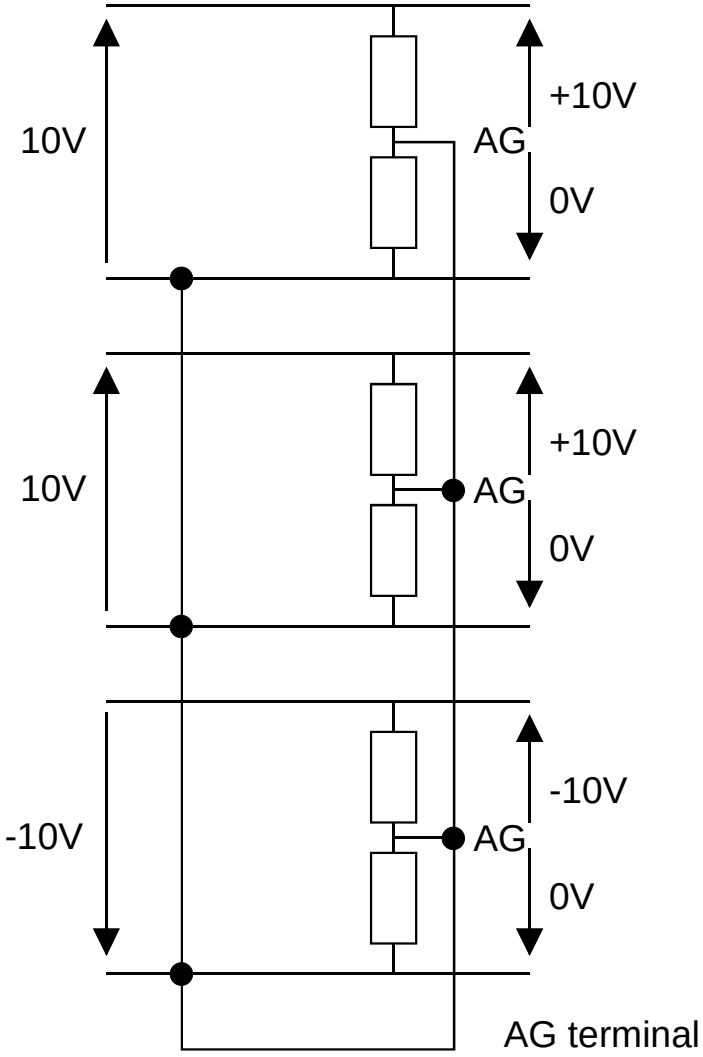
Signal source:0 to +20mA

*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 DIP switch.)

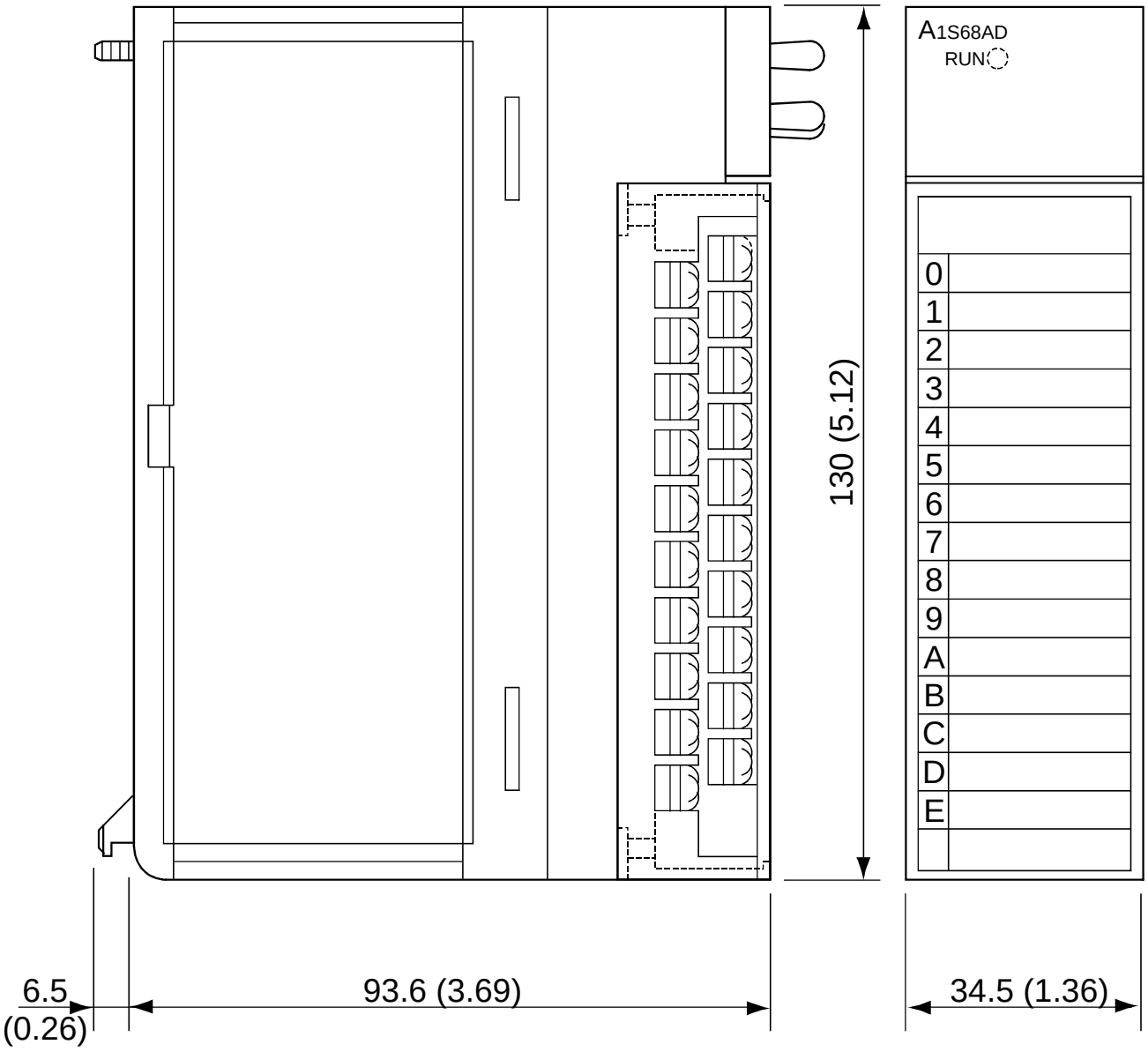
*3: If the external wiring causes noise or ripple, connect a capacitor of 0.1 to 0.47μF (25V or more voltage resistance parts) between the V and COM terminals.

*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)

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.

Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061 Tel : +1-847-478-2100
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. AV. Paulista 1471, Conj. 308, Sao Paulo City, Sao Paulo State, Brazil Tel : +55-11-283-2423
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB,UK Tel : +44-1707-276100
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo-Ingr.2 Via Paracelso 12, 20041 Agrate B., Milano, Italy Tel : +39-039-6053344
Spain	Mitsubishi Electric Europe B.V. Spanish Branch Carretera de Rubi 76-80 08190 - Sant Cugat del Valles, Barcelona, Spain Tel : +34-93-565-3131
France	Mitsubishi Electric Europe B.V. French Branch 25 Boulevard des Bouvets, F-92741 Nanterre Cedex, France TEL: +33-1-5568-5568
South Africa	Circuit Breaker Industries LTD. Tripswitch Drive, Elandsfontein Gauteng, South Africa Tel : +27-11-928-2000

Country/Region	Sales office/Tel
Hong Kong	Ryoden Automation Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong Tel : +852-2887-8870
China	Ryoden Automation Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : +86-21-6475-3228
Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
Korea	HAN NEUNG TECHNO CO.,LTD. 1F Dong Seo Game Channel Bldg., 660-11, Deungchon-dong Kangsec-ku, Seoul, Korea Tel : +82-2-3660-9552
Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 ALEXANDRA ROAD #05-01/02, MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943 Tel : +65-6473-2308
Thailand	F. A. Tech Co.,Ltd. 898/28,29,30 S.V.City Building,Office Tower 2,Floor 17-18 Rama 3 Road, Bangkpongpang, Yannawa, Bangkok 10120 Tel : +66-2-682-6522
Indonesia	P.T. Autoteknindo SUMBER MAKMUR Jl. Muara Karang Selatan Block A Utara No.1 Kav. No.11 Kawasan Industri/ Pergudangan Jakarta - Utara 14440 Tel : +62-21-663-0833
India	Messung Systems Put,Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C BHOSARI,PUNE-411026 Tel : +91-20-712-2807
Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, PostalBag, No 2, Rydalmere, N.S.W 2116, Australia Tel : +61-2-9684-7777

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : 1-8-12, OFFICE TOWER Z 14F HARUMI CHUO-KU 104-6212, JAPAN
NAGOYA WORKS : 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA, JAPAN

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