MITSUBISHI

Digital-Analog Conversion Module

User's Manual

(Hardware)

A1S68DAV/DAI

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	AJ68DAV-U(H/W)-E
MODEL CODE	13J809
IB (NA)-66586-E(0707) MEE	

A MELSEC

● 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

- Provide a failsafe circuit to ensure that the system as whole can continue to function safely even if there is an external power supply fault or PLC failure.
  Otherwise there will be danger of accidents due to erroneous outputs or misoperation.
  (1) The status of analog output differs depending on the settings for the functions that control analog output. Make the settings with enough care. For details of the analog output status, refer to Section 3.4.4 of the detailed manual.
  (2) Normal output may not be obtained from output terminals or their internal circuits. Provide an external circuit to monitor output signals whose disruption could cause serious accidents.

⚠ 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 communication cable at least 100mm (3.94inch) away from the main circuit or power line.
  Otherwise, noise or malfunctions will occur.
- 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 in use.
  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.
- Install the module by engaging the module mounting projections on the lower part of the module in the mounting holes of the base unit.
  Incorrect installation could result in malfunctions, failure of detachment.

[WIRING PRECAUTIONS]

⚠CAUTION

- Ground the FG terminal using third class grounding or higher exclusively for the PLC. If you do not, the PLC will malfunction.
- 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 to the specified torque.
  Loose terminal screws will cause a short, fire or malfunctioning.
- 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.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws.
  Not doing so can cause the module to fail or malfunction.

⚠CAUTION

- Do not disassemble or tamper will the module.
  This will cause failure, malfunctions, injuries or fire.
- 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 mount/remove the module onto/from base unit more than 50 times (IEC61131-2-compliant), after the first use of the product.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so may cause the module to fail or malfunction.

[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)
D/A converter module type A1S68DAV/DAI User's Manual	IB-66587

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. General Description

This manual gives the specifications and handling instructions for the A1S68DAV digital to analog converter module (hereafter called the "A1S68DAV") and the A1S68DAI digital to analog current converter module (hereafter called the "A1S68DAI"), which are used in combination with a MELSEC A series compact building block type PLC CPU (hereafter called the "PLC CPU")

A1S68DAV is used to convert incoming digital values (16-bit signed binary data) which are set with the PLC CPU to analog values (voltage outputs ranging from -10V to 10V).

A1S68DAI is used to convert incoming digital values (16-bit signed binary data) which are set with the PLC CPU to analog values (voltage output ranging from 4mA to 20mA).

A1S68DAV and A1S68DAI are referred to as "A1S68DAV/DAI" or "module" in this manual.

1.1 Related manuals
The following manuals given the specifications, handling, and programming method for the A1S68DAV/DAI.
A1S68DAV/DAI User's Manual (IB-66587)

2. Performance Specifications

The performance specifications of the A1S68DAV/DAI are tabled below.
For the general specifications, refer to the user's manual for the PLC CPU are using.

Item	Specification			
	A1S68DAV		A1S68DAI	
Digital input value	-2048 to 2047		0 to 4095	
Analog output	-10 to 0 to 10 VDC (External load resistance: 2KΩ to 1MΩ)		4 to 20mADC (External load resistance: 0 to 600Ω)	
I/O characteristics	Digital input value	Analog output value	Digital input value	Analog output value
	2000	10V	4000	20mA
	1000	5V	2000	12mA
	0	0V	0	4mA
	-1000	-5V		
	-2000	-10V		
Maximum resolution of analog value	5mA		4μA	
Overall accuracy (accuracy to maximum value)	±1% (±100mV)		±1% (±200μA)	
Maximum conversion time	Maximum 4ms [*1]/8 channels			
Output short protection	Provided			
Analog output points	8 channels/module			
Insulation method	Photocoupler insulation between output terminals and PLC power.			
Offset/gain adjustment	Not provided			
Number of I/O points	Special, 32			
Connection terminal	20 point terminal block (M3.5 × 7screws)			
Applicable wire size	0.75 to 1.5mm^2			
Applicable solderless terminal	R1.25-3, 1.25-YS3A, RAV1.25-3, V1.25-YS3A			
Internal current consumption (5VDC)	0.65A		0.85A	
Weight	0.22kg [*2]			

*1: If the frequency of access from the PLC CPU using FROM/TO instructions is high (e.g.scan time of 5ms or less with access every scan), this can be extended up to about 6ms.

*2: The weight in hardware version "F" or earlier is 0.28kg.
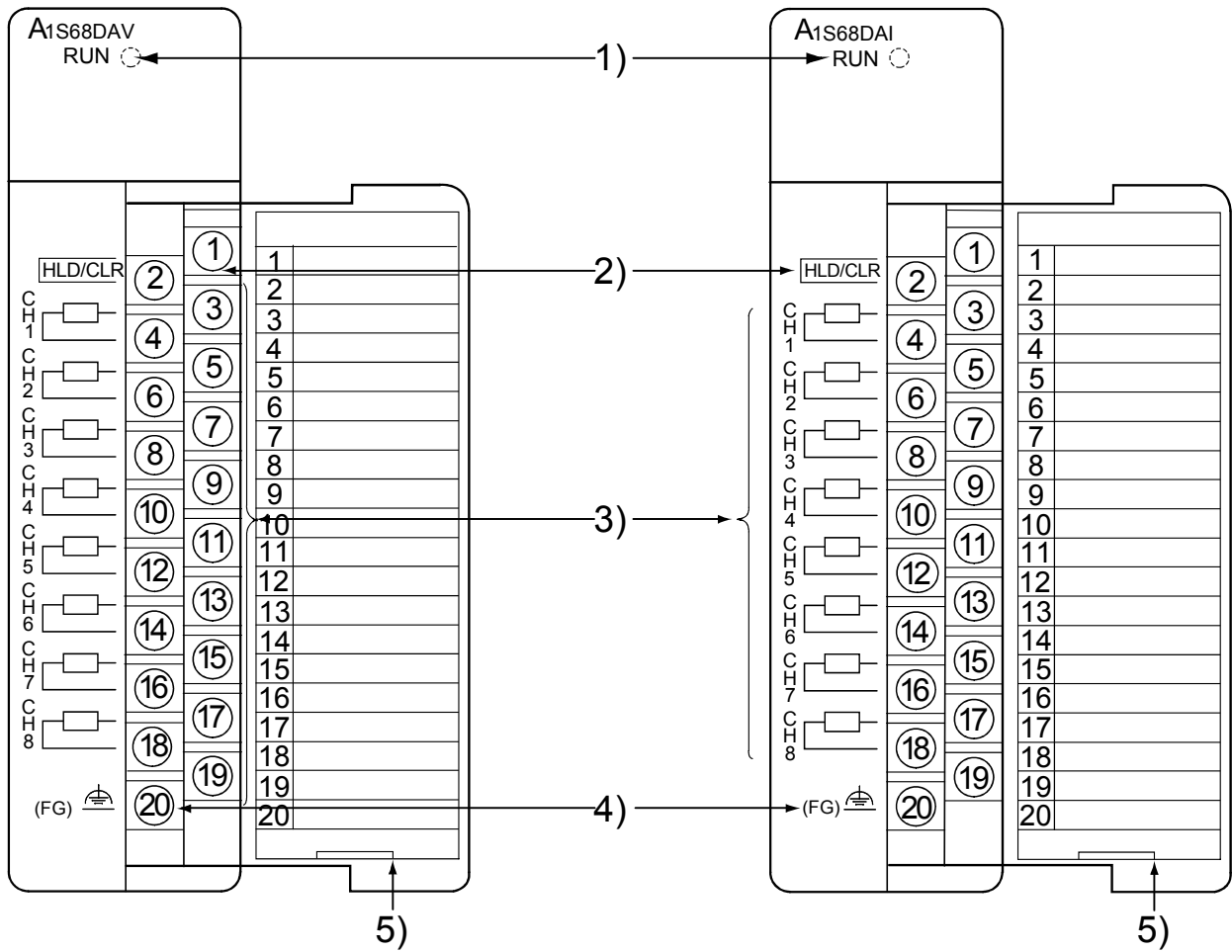
How to check the hardware version
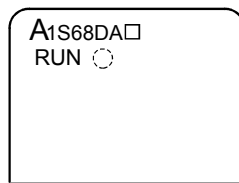The hardware version for the A1S68DAV/DAI can be checked on the label on the front of the module.

A1S68DA□
RUN ○

Software Version

Hardware Version

Front of Module
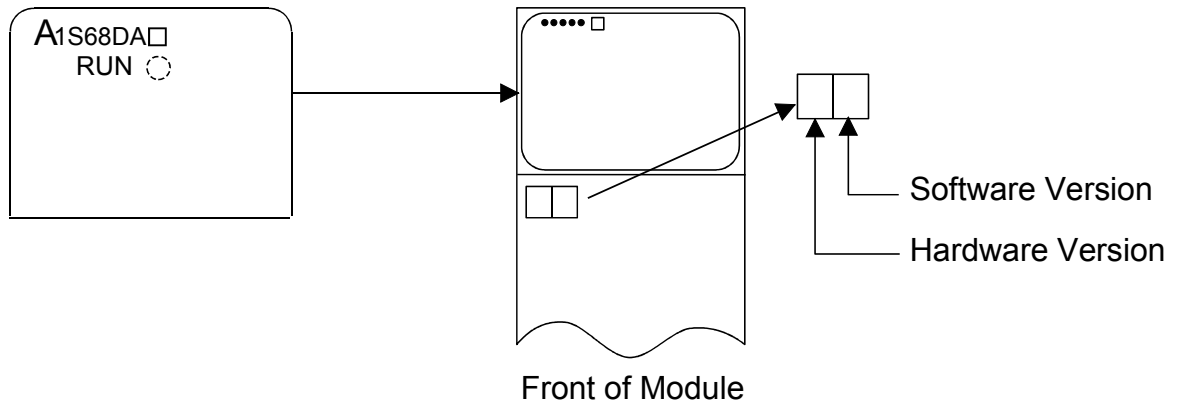
3. Nomenclature and Settings

The name of each part of the A1S68DAV/DAI is indicated below.

A1S68DA□
RUN ◌

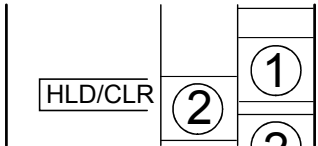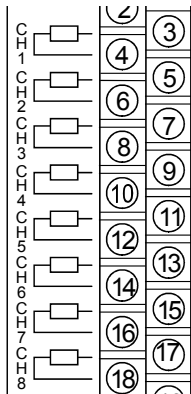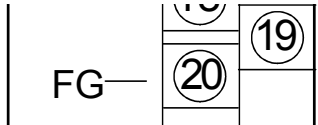Hardware version
"F" or earlier

No	Name and appearance	Description
1)	"RUN" LED RUN ◯	LED that indicates the operating status of the A1S68DAV/DAI. On :Normal operation. Off :5VDC power supply cut, watchdog timer error, or PLC CPU error. Flash :Write data error.
2)	Analog output hold/clear setting terminals (terminal No.1,2) HLD/CLR ② ①	Terminals that set the analog output status when the PLC CPU is in the STOP status. The hold or clear status is set by shorting/opening the connection between terminals 1 and 2. When shorted : At a PLC CPU STOP, the analog value before the (HOLD) STOP is output. When open : At a PLC CPU STOP, the analog value shown below (CLEAR) is output. • A1S68DAV ....0V • A1S68DAI 4mA
3)	Analog output terminals (terminal No.3 to 18)	Terminal that output the digital to analog converted values to external destinations in each channel. | Channel	Terminal No.	Channel	Terminal No.
---------	--------------	---------	--------------
1	3, 4	5	11, 12
2	5, 6	6	13, 14
3	7, 8	7	15, 16
4	9, 10	8	17, 18	
4)	FG terminal (Terminal No.20) FG— ⑳ ⑲	Frame ground terminal
5)	Code sheet	Filled out to indicate the application of each terminal

4. Handling

4.1 Caution on handling

(1) The case module of the A1S68DAV/DAI is made of resin: do not drop is or subject it to strong impact.

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

(3) Make sure that no wire offcuts or other debris enters the top of the module during wiring.
If anything does enter the module, remove it.

(4) Tighten the module mounting and the terminal screws as specified below.

Screw	Tightening torque range (N • cm)
Module mounting 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

The precautions and wiring method for making connection to external devices are as given below.

5.1 Wiring instructions
Inorder for the A1S68DAV/DAI to realize its optimum performance, and to ensure reliable system operation, the external wiring must have minimum susceptibility to noise.
The following cautions therefore apply when configuring the external wiring of the A1S68DAV/DAI.
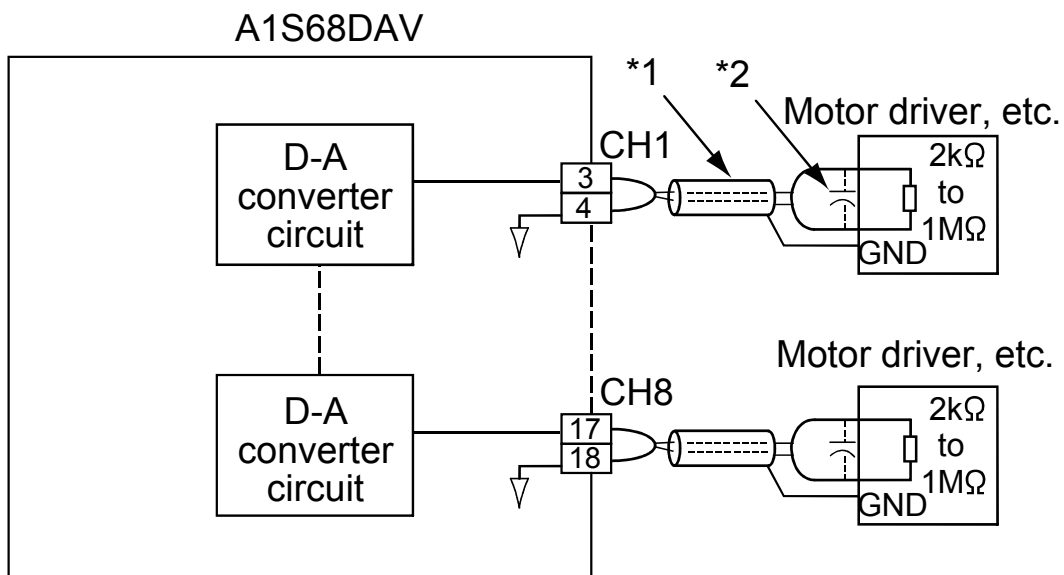   (1) Do not bundle the external wiring together with main circuit or high-voltage lines, or load-bearing wires other than those of the PLC.
        This will increase susceptibility to noise and the effects of surges and induction.
    (2) Ground the shielding of shielded wires and shielded cables at one point.

5.2 Module connection example
    (1) An example of the wiring to external devices in the case of an A1S68DAV is shown below.

A1S68DAV

D-A converter circuit	CH1 *1 *2	Motor driver, etc.
	3 / 4	2kΩ to 1MΩ GND
D-A converter circuit	CH8	Motor driver, etc.
	17 / 18	2kΩ to 1MΩ GND

*1: Use two-core shielded wiring (twisted).
*2: If noise or ripple is generated by the external wiring, connect a 0.1 to 0.47μF (25V or more voltage resistance parts) capacitor to the input terminal of the external device.

(2) An example of the wiring to external devices in the case of an A1S68DAI is shown
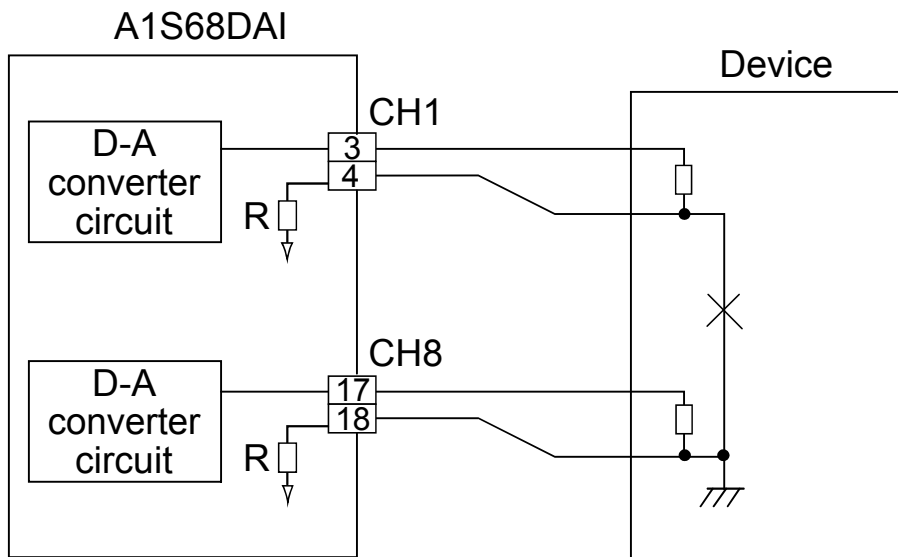below.
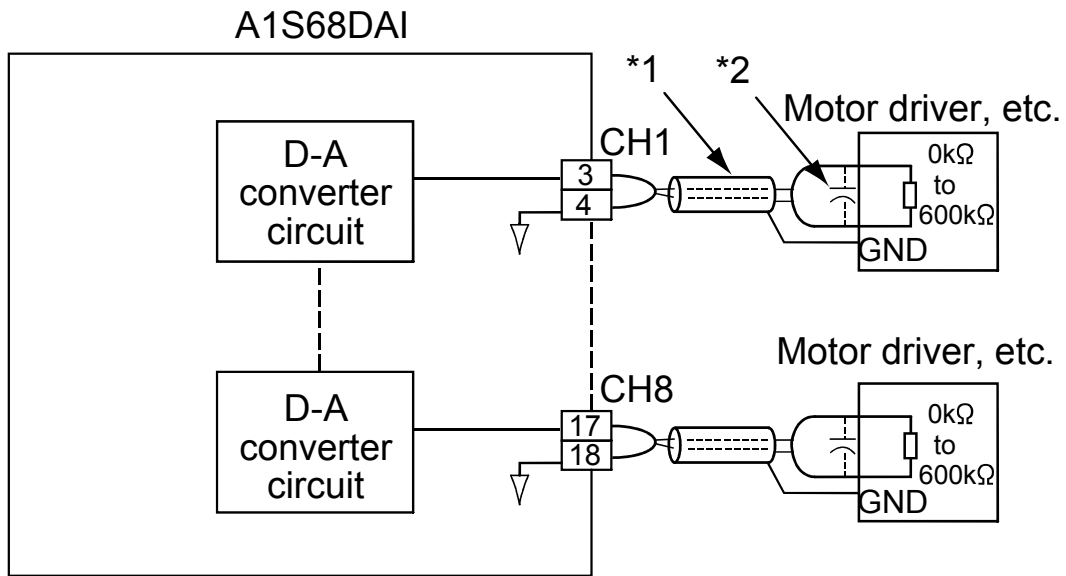
A1S68DAI

*1: Use two-core shielded wiring (twisted).
*2: If noise or ripple is generated by the external wiring, connect a 0.1 to 0.47μF (25V or
more voltage resistance parts) capacitor to the input terminal of the external device.

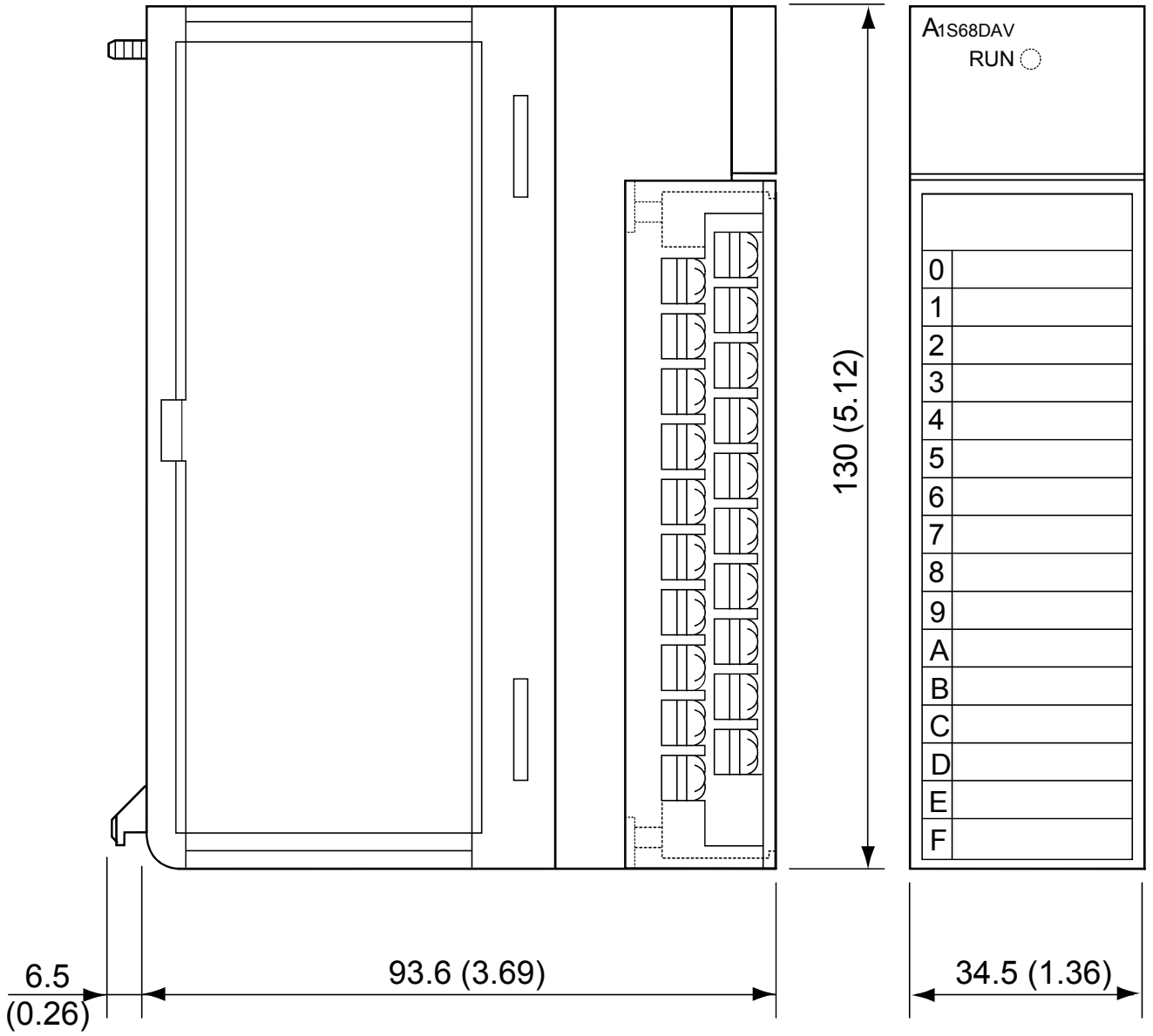| Important |
| --- |
| A device with a shared current common line cannot be connected to an A1S68DAI.
If such a devices is connected, normal output will not be possible

 |

6. Outside Dimensions

(1) A1S68DAV

6.5
(0.26)

93.6 (3.69)

130 (5.12)

A1S68DAV
RUN ○

0
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F

34.5 (1.36)

Unit:mm(inch)

(2) A1S68DAI

6.5
(0.26)

93.6 (3.69)

130 (5.12)

A1S68DAI
RUN ◯

0	
1	
2	
3	
4	
5	
6	
7	
8	
9	
A	
B	
C	
D	
E	
F	

34.5 (1.36)
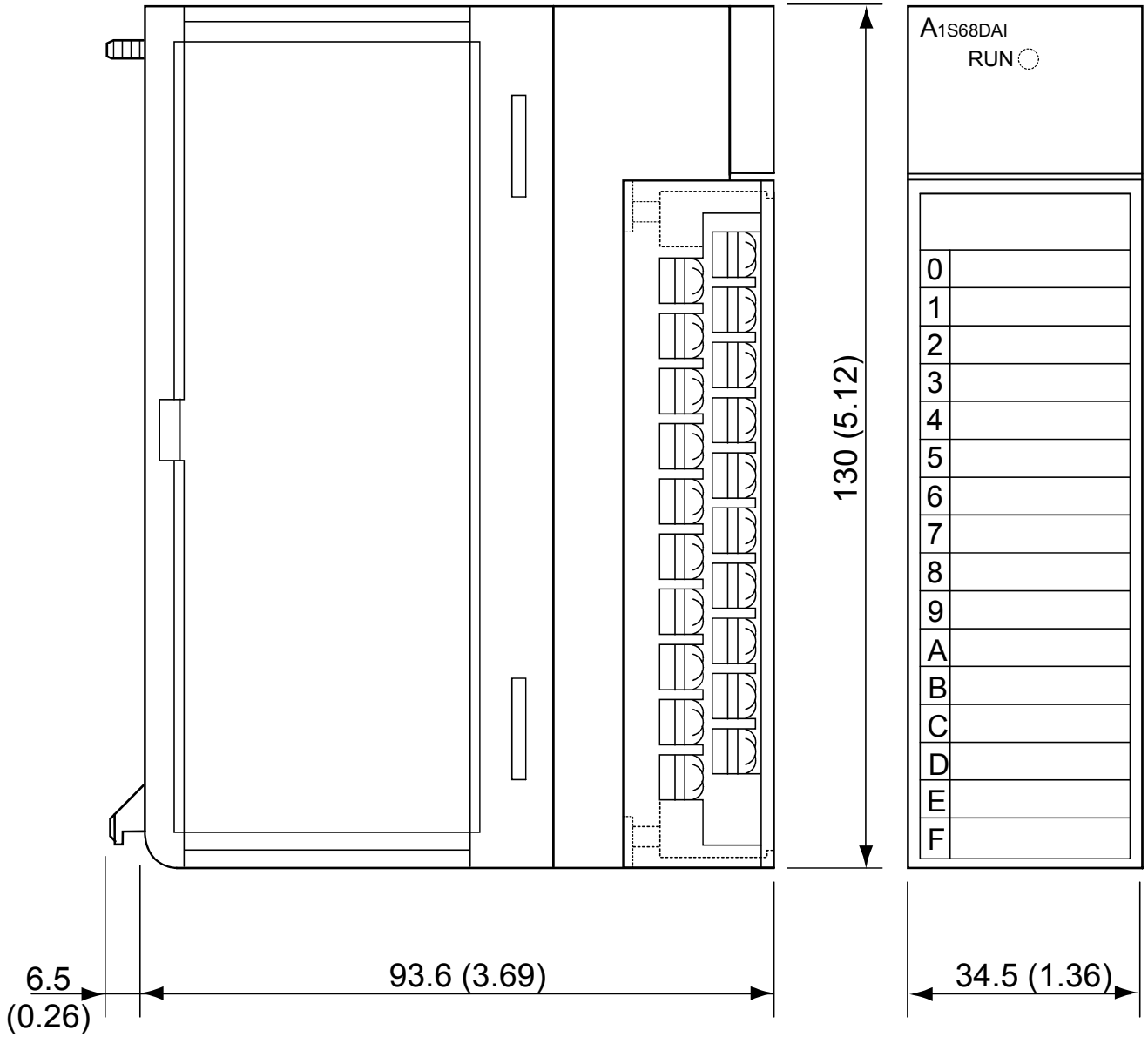
Unit:mm(inch)

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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