

MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

Digital-analog conversion module type A1S68DAV/DAI (Hardware)

INTRODUCTION

Thank you for choosing the Mitsubishi MELSEC-A Series of General Purpose Programmable Controllers. Please read this manual carefully so that the equipment is used to its optimum. A copy of this manual should be forwarded to the end user.

**MITSUBISHI
ELECTRIC**
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Specifications subject to change without notice

Cautions on Safety

(Please read before using the module)

Please carefully read this manual and related ones mentioned herein to ensure safety and operate this module properly.

The following cautions are applicable only to the module. For the cautions on safety relating to the PC CPU system, see the PC CPU User's Manual.


The cautions in this cautions on safety are classified into two ranks, "DANGER" and "CAUTION", according to their importance.

 DANGER

A warning given when improper operation could result in a dangerous situation causing death or serious injuries.

 CAUTION

A caution given when improper operation could result in a dangerous situation causing moderate or injuries, and physical damage to the module, etc.

Even failure to observe a caution marked  CAUTION may bring about a serious accident depending on the situation. Do not fail to follow the cautions. Retain this manual for consultation whenever necessary, and provide a copy to the end user.

Cautions on Design

 CAUTION

- Provide a failsafe circuit to ensure that the system as a whole can continue to function safely even if there is an external power supply fault or PC failure. Otherwise there will be danger of accidents due to erroneous outputs or misoperation.

- (1) The correspondence between analog outputs and the settings for the functions that control analog output are shown below. Check these settings carefully.

Setting Combination	HOLD/CLEAR Setting	CLEAR				HOLD	
		Enabled (ON)		Disabled (OFF)		Enabled (ON)/Disabled (OFF)	
Execution Status	DA Conversion Value Output Enabled/Disabled	Enabled (0)	Disabled (1)	Enabled (0)	Disabled (1)	Enabled (0)	Disabled (1)
	PC CPU in RUN status	DA conversion value output enabled	0 V/0 mA	0 V/4 mA	0 V/0 mA	0 V/0 mA	DA conversion value output
PC CPU in STOP status		0 V/4 mA	0 V/0 mA	0 V/4 mA	0 V/0 mA	Analog value before STOP executed output	0 V/0 mA
On occurrence of PC CPU error		0 V/0 mA					
On occurrence of remote I/O station link error (when installed in a remote I/O station)		0 V/0 mA					

- (2) Normal outputs 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 100 mm away from the main circuit or power line. Otherwise, noise or malfunctions will occur.

Cautions on Installation

 CAUTION

- Use the PC in the environment specified in the General Specifications section in this manual. Using it in 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.

Cautions on Wiring

 CAUTION

- Ground the FG terminal using third class grounding or higher exclusively for the PC. If you do not, the PC will malfunction.
- Before connecting wires to the PC, 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 malfunctions.
- Take all possible measures to prevent chips or wire scraps from entering the module. Entry of foreign material will cause fire, failure of malfunctions.

[Cautions on Start-Up and Maintenance]

⚠ DANGER

- Do not touch the terminals while they are live. This will cause malfunctions.
- Switch the power off before cleaning the module or retightening the terminal screws. If the power is left on, the module will break down or malfunction.

⚠ CAUTION

- Do not disassemble or tamper with the module. This will cause failure, malfunctions, injuries or fire.
- Switch the power off before installing or removing the module. If the power is left on, the module will break down or malfunction.

[Cautions on Disposal]

⚠ CAUTION

- Dispose of the module as industrial waste.

1. GENERAL DESCRIPTION

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 PC CPU (hereafter called the "PC CPU").

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

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

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

1.1 Related Manuals

The following manuals give the specifications, handling, and programming method for the A1S68DAV/DAI.

A1S68DAV/DAI User's Manual (1B)

2. PERFORMANCE SPECIFICATIONS

2. PERFORMANCE SPECIFICATIONS

The performance specifications of the A1S68DAV/DAI are tabulated below.

Item	Specifications			
	A1S68DAV		A1S68DAI	
Digital input	2048 to 2047		0 to 4096	
Analog output	10 to 0 to 10 VDC (External load resistance: 2 kΩ to 1 MΩ)		4 to 20 mA DC (External load resistance: 0 to 600 Ω)	
I/O characteristics	Digital input value	Analog output value	Digital input value	Analog output value
	2000	10 V	4000	20 mA
	1000	5 V	2000	12 mA
	0	0 V	0	4 mA
	-1000	5 V		
	-2000	10 V		
Maximum resolution of analog value	5 mV		4 μA	
Overall accuracy	± 1% (accuracy to the maximum value)			
Maximum conversion time	Maximum 4 ms/8 channels			
Output short protection	Provided			
Analog output points	8 channels/module			
Insulation method	Photocoupler insulation between output terminals and PC power			
Offset/gain adjustment	Not provided			
Number of I/O points	Special, 32			
Connection terminal	20 point terminal block (M3.5 x 7 screw)			
Applicable wire size	0.7 to 1.5 mm ²			
Applicable solderless terminal	R1 25-3, I 25-YS3, RAV1 25-3, V1.25 YS3A			
Internal current consumption (5 VDC)	0.65 A		0.85 A	
Weight kg (lb)	0.28 (0.62)		0.28 (0.62)	

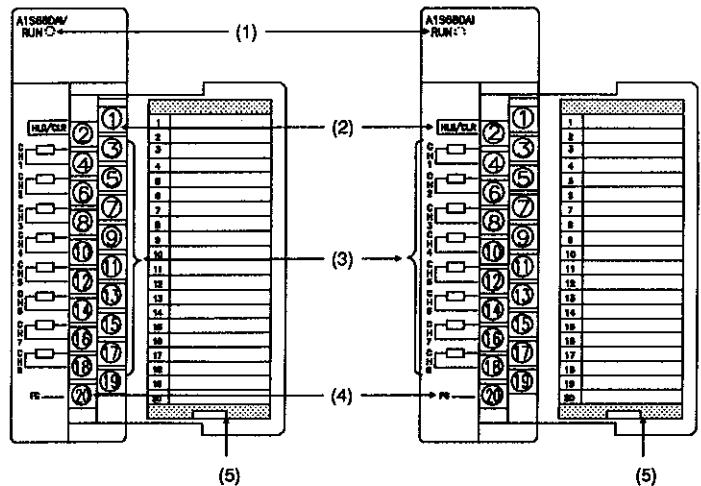
*1: If the frequency of access from the PC CPU using FROM/TO instructions is high (e.g. scan time of 5 ms or less with access every scan), this can be extended up to about 6 ms.

For the general specifications refer to the User's Manual for the PC CPU you are using.

3. NOMENCLATURE AND SETTINGS

3. NOMENCLATURE AND SETTINGS

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



No	Name and Appearance	Description																				
(1)	RUN LED RUN ()	LED that indicates the operating status of the A1S68DAV/DAI. On : Normal operation Off : 5 VDC power supply cut, watchdog timer error, or PC CPU error Flashing : write data error																				
(2)	Analog output hold/clear setting terminals (terminal No. 1, 2) 	Terminals that set the analog output status when the PC 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 PC CPU STOP, the analog value before the STOP is output (HOLD). When open : At a PC CPU STOP, the analog value shown below is output (CLEAR). • A1S68DAV : 0 V • A1S68DAI : 4 mA																				
(3)	Analog output terminals (terminal No. 3 to 18) 	Terminals that output the digital to analog converted values to external destinations in each channel. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Channel</th> <th>Terminal No.</th> <th>Channel</th> <th>Terminal No.</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3, 4</td> <td>5</td> <td>11, 12</td> </tr> <tr> <td>2</td> <td>5, 6</td> <td>6</td> <td>13, 14</td> </tr> <tr> <td>3</td> <td>7, 8</td> <td>7</td> <td>15, 16</td> </tr> <tr> <td>4</td> <td>9, 10</td> <td>8</td> <td>17, 18</td> </tr> </tbody> </table>	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
Channel	Terminal No.	Channel	Terminal No.																			
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3	7, 8	7	15, 16																			
4	9, 10	8	17, 18																			
(4)	FG terminal (Terminal No. 20) 	Frame ground terminal																				
(5)	Code sheet	Filled out to indicate the application of each terminal																				

4. HANDLING

4. HANDLING

4.1 Cautions on Handling

- The case of the A1S68DAV/DAI is made of resin. Do not drop it or subject it to strong impact.
- Do not remove the printed circuit board from the case. This could cause failure.
- 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.
- Tighten the module mounting and terminal screws as specified below.

Screw	Tightening Torque Range N cm (kg cm) [lb inch]
Module mounting screw (M4 screw)	78 to 118 (8 to 12) [6.93 to 10.39]
Terminal block terminal screw (M3.5 screw)	59 to 88 (6 to 9) [5.2 to 7.79]
Terminal block mounting screw (M4 screw)	78 to 118 (8 to 12) [6.93 to 10.39]

5. WIRING

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

5. WIRING

5.1 Wiring Instructions

In order 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

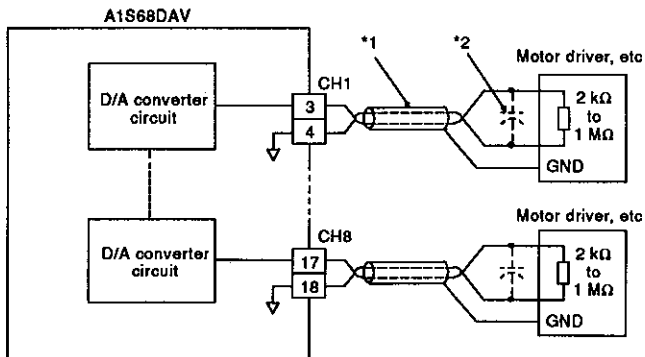
- (1) Do not bundle the external wiring together with main circuit or high-voltage lines, or load-bearing wires other than those of the PC

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

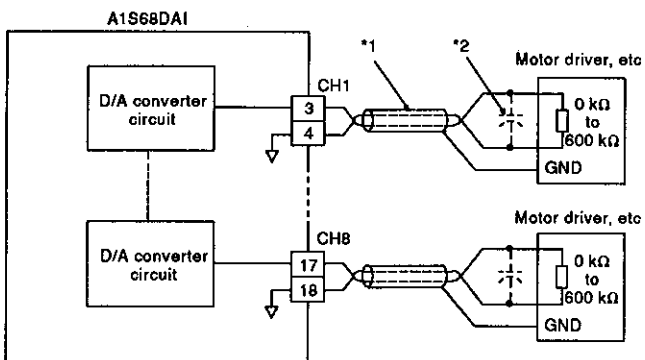
- (1) An example of the wiring to external devices in the case of an A1S68DAV is shown below



*1: Use two-core shielded wiring (twisted)

*2 If noise or ripple is generated by the external wiring, connect a 0.1 to 0.47 μ F 25WV 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

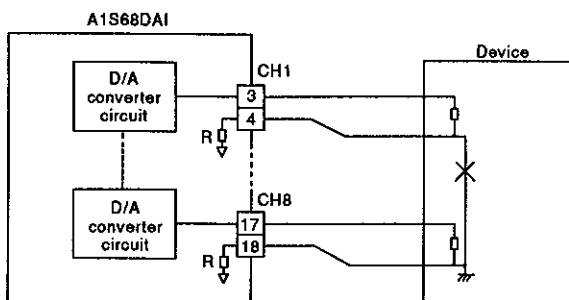


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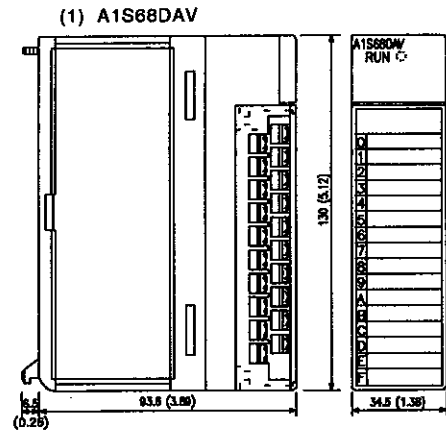
IMPORTANT

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

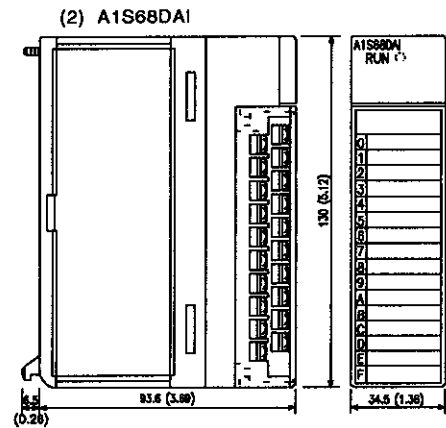


6. OUTSIDE DIMENSIONS

6. OUTSIDE DIMENSIONS



Unit: mm (Inch)



Unit: mm (Inch)

REVISIONS

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Aug., 1995	

IMPORTANT

- (1) Design the configuration of a system to provide an external protective or safety interlocking circuit for the PCs
- (2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them, take the following precautions:
 - (a) Ground human body and work bench
 - (b) Do not touch the conductive areas of the printed circuit board and its electrical parts with ungrounded tools, etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment.

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation. Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.