MITSUBISHI

PROGRAMMABLE CONTROLLER

MELSEC-A

User's Manual

D/A converter module type A1S62DA (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

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▓ 1. GENERAL DESCRIPTION

1 GENERAL DESCRIPTION

This manual describes specifications, handling and wiring of an A1S62DA D/A converter module (hereinafter referred to as the A1S62DA)

1 1 Related Manual

- A1S62DA user's manual (IB-66335)
  Describes details of specifications, functions and programming of an A1S62DA

▓ 2. SPECIFICATIONS

2 SPECIFICATIONS

2 1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55 °C (See the important notice described below)				
Storage ambient temperature	–20 to 75 °C				
Operating ambient humidity	10 to 90 %RH, non condensing				
Storage ambient humidity	10 to 90 %RH, non condensing				
Vibration resistance	Conforms to *2 JIS C 0911	Frequency	Acceleration	Amplitude	Sweep Count
		10 to 55 Hz	—	0 075 mm (0 003 inch)	10 times *1(1 octave/ minute)
		55 to 150 Hz	9 8 m/s² (1 g)	—	
Shock resistance	Conforms to *2JIS C 0912 (98 m/s² (10 g) x 3 times in d directions)				

Item	Specifications
Noise durability	By noise simulator of 1500 Vpp noise voltage, 1 μs noise width and 25 to 60 Hz noise frequency
Dielectric withstand voltage	1500 VAC for 1 minute across AC external terminals and ground 500 VAC for 1 minute across DC external terminals and ground
Insulation resistance	500 MΩ or larger by 500 VDC insulation resistance tester across AC external terminals and ground
Grounding	Class 3 grounding; ground to the panel if proper trounding is not available
Operating ambience	Free of corrosive gases and mist Dust should be minimal
Cooling method	Self-cooling

REMARK

(1) One octave marked *1 indicates a change from the initial frequency to double or half frequency For example, any of the changes from 10 Hz to 20 Hz, from 20 Hz to 40 Hz, from 40 Hz to 20 Hz, and 20 Hz to 10 Hz are referred to as one octave

(2) *2JIS Japanese Industrial Standard

IMPORTANT

Restriction for UL standard approved products

In order to be recognized as UL listed products, the following restrictions apply;

(1) Operating ambient temperature is limited from 0 to 50 °C

(2) A class 2 power supply recognized by the UL standard must be used

Item		Specifications		
		Voltage Output	Current Output	
Digital input	1/4000	−4000 to 4000	0 to 4000	
	1/8000	−8000 to 8000	0 to 8000	
	1/12000	−12000 to 12000	0 to 12000	
Analog output		−10 to 0 to 10 VDC (External load resistance 2 KΩ to 1 MΩ)	0 to 20 mADC (External load resistance 0 to 600 Ω)	
I/O characteristics	Resolution	1/4000 1/8000/12000	Analog output value *1	1/4000 1/8000/12000	Analog output value *2
	Digital input value	4000 8000 12000 2000 4000 6000 0 0 0 −2000 −4000 −6000 −4000 −8000 −12000	10 V 5 V 0 V −5 V −10 V	4000 8000 12000 2000 4000 6000 0 0 0	20 mA 12 mA 4 mA
Maximum resolution of analog value	1/4000 1/8000 1/12000	2 5 mV (10 V) 1 25 mV (10 V) 0 83 mV (10 V)		5 μA (20 mA) 2 5 μA (20 mA) 1 7 μA (20 mA)	
Overall accuracy		±1 0 % (accuracy to the maximum value)		
Maximum conversion time		Maximum 25 msec/2 channels (same for 1 channel)		
Absolute maximum output		Voltage ±12 V Current 28 mA		
Output short circuit protection		Provided		
Analog output points		2 channels/module		
Isolation method		Photocoupler insulation between output terminals and PC power No insulation between channels		
Number of I/O points		32 points		
Offset/gain adjustment		By the test terminal (without using offset/gain adjusting knobs)		
Internal current consumption (5 VDC)		0 8 A		

*1   When the offset value is set to 0 V and the gain value is set to 10 V
*2   When the offset value is set to 4 mA and the gain value is set to 20 mA

*3 Overall accuracy

The overall accuracy is the accuracy of the maximum value of analog output

- Overall accuracy of the voltage (current) output is the accuracy when the output voltage setting is 10 volts (20 mA)

When the temperature is within the range of 0 °C to 55 °C, overall accuracy varies within ±1 0 % (100 mV) of 10 V
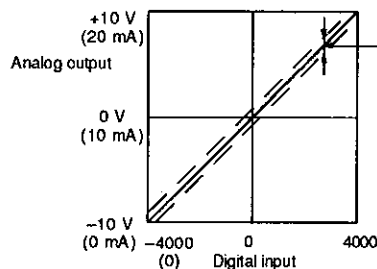
*4 The maximum conversion speed is the time from inputting the digital value to outputting the analog value

2 3 Input/Output Conversion Characteristics

(1) Input/Output conversion characteristics

Input/Output characteristics are provided to convert a digital value specified within the CPU into an analog value and are indicated by an inclination connected between an offset value and a gain value

(2) Offset/gain values

(a) The offset and gain values are defined as follows

1) Offset value

Voltage output from the A1S62DA when the digital value specified from the PC CPU is "0"

2) Gain value

Voltage output from the A1S62DA when digital value specified from the PC CPU is "4000" (when digital value resolution setting is 1/4000)

(b) Offset/gain values set in the factory are as shown below

Item	Current Output	Voltage Output
Offset value	4mA	0 V
Gain value	20mA	10 V

(c) Offset/gain value can be changed for each channel in the test mode
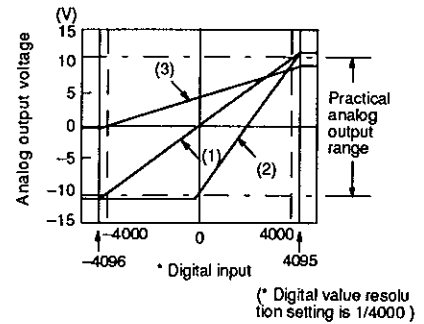
2 3 1 Voltage/Current output

(1) Input/Output conversion characteristic example

(a) Voltage output

The figure on the right shows the Input/Output conversion characteristics when the offset/gain setting is provided as follows.
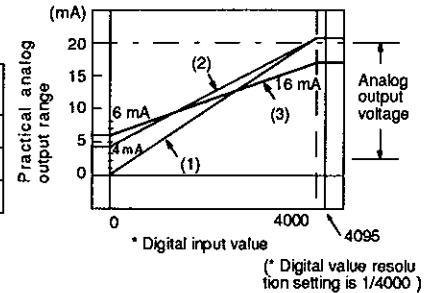
No	Offset Value	Gain Value
(1)	0 V	+10 V
(2)	−10 V	+10 V
(3)	+4 V	+8 V

(* Digital value resolution setting is 1/4000)

(b) Current output

The figure on the right shows the Input/Output conversion characteristics when the offset/gain setting is provided as follows

No	Offset Value	Gain Value
(1)	0 mA	20 mA
(2)	4 mA	20 mA
(3)	6 mA	16 mA

(* Digital value resolution setting is 1/4000)

(2) Relation between the offset/gain values and the analog output

Resolution of the A1S62DA can be changed as appropriate by offset/gain setting

However, an offset/gain value less than 0 mA cannot be set If the value is set incorrectly, an error may not occur, but an incorrect analog output may occur

Resolution and analog output are obtained as shown below

$$\text{(Resolution)} = \frac{\text{(Gain value)} - \text{(Offset value)}}{\text{(Resolution of digital value)}}$$

$$\text{(Analog output)} = \frac{\text{(Gain value)} - \text{(Offset value)}}{\text{(Resolution of digital value)}} \times \text{(Digital input)} + \text{(Offset value)}$$

$$= \text{(Resolution of analog value)} \times \text{(Digital input)} + \text{(Offset value)}$$

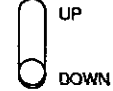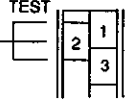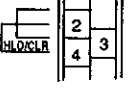As shown in Table Performance Specifications, the maximum of the analog value resolution of the A1S62DA varies with the resolution setting

The variation of the analog output value for a change of 1 in the digital input value may not be calculated as shown above
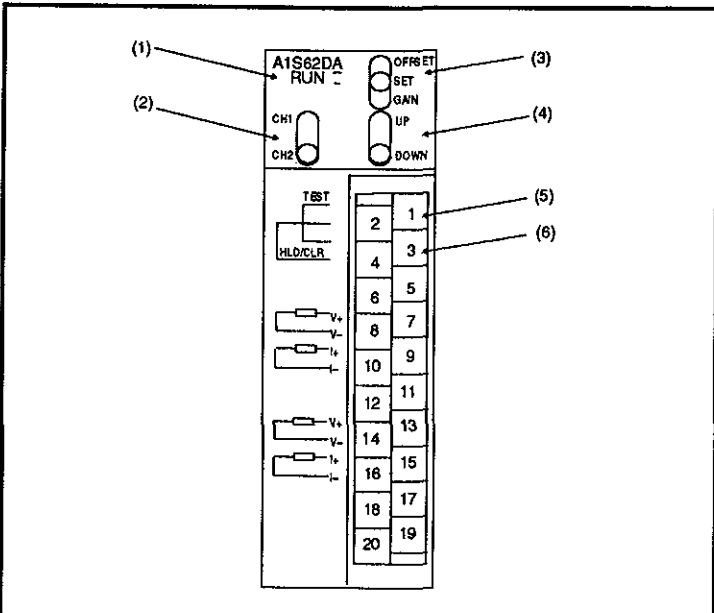
When the CPU is at RUN or STOP, or when an error occurs in the CPU, analog output values are controlled in accordance with the table below

Setting Combination / Output Status	HOLD/CLEAR Setting / D-A Conversion Output Enable Flag / Output Enable/Disable Setting	CLEAR				HOLD	
		Enable (ON)		Disable (OFF)		Enable (ON) / Disable (OFF)	
		Enable (0)	Disable (1)	Enable (0)	Disable (1)	Enable (0)	Disable (1)
Analog output at CPU STOP		Analog value converted from digital value is output	0 V/0 mA	Offset value is output	0 V/0 mA	Analog value converted from digital value is output	0 V/0 mA
Analog output at CPU STOP		Offset value is output	0 V/0 mA	Offset value is output	0 V/0 mA	Analog value before STOP is held	0 V/0 mA
Analog output at CPU error occurrence		0 V/0 mA	0 V/0 mA	0 V/0 mA	0 V/0 mA	0 V/0 mA	0 V/0 mA
Analog output at A1S62DA error occurrence		Analog value of the high or low limit is output	0 V/0 mA	Offset value is output	0 V/0 mA	Analog value of the high or low limit is output	0 V/0 mA

(2)	Channel select switch CH1 CH2	Used to specify a channel for the offset/gain adjustment
(3)	OFFSET/GAIN select switch OFFSET SET GAIN	OFFSET position: Sets the offset value GAIN position Sets the gain value SET position The offset/gain value is stored to the A1S62DA internal memory when the switch is moved from "OFFSET"/"GAIN" to "SET"
(4)	UP/DOWN switch UP DOWN	Increases or decreases the offset/gain value of the specified channel
(5)	Test mode terminals TEST 2 1 3	Connected between terminals No 1 and No 3 to set the offset/gain values
(6)	Output HOLD/CLEAR setting terminals HLD/CLR 2 4 3	Used to hold or clear the analog output at the time of CPU STOP Disconnected between terminal No 2 and No 4 CLEAR Connected between terminal No 2 and No 4 HOLD The analog output status of the HOLD/CLEAR setting varies with the setting of the D A conversion value output enable flag and the analog output enable/disable state

3. NOMENCLATURE

3   NOMENCLATURE

No	Description	Application
(1)	"RUN" LED	Indicates the operating status of the A1S62DA (Normal mode) On Indicates that the A1S62DA is functional Off The 5 VDC power is not supplied or A1S62DA is faulty Flash When a digital value is written which is outside the high or low limit, this LED flashes every second (Test mode) Off OFFSET/GAIN select switch is in the "SET" position Flash: When the offset/gain select switch is set to either the OFFSET or GAIN position, this LED flashes every half (0 5) second When the offset or gain has reached the upper or lower limit this LED flashes every tenth (0 10) of a second

4. OFFSET/GAIN SETTING

4   OFFSET/GAIN SETTING

Factory-set Offset/Gain Values

	Voltage Output	Current Output
Gain value	10 V	20 mA
Offset value	0 V	4 mA

The offset and gain values may be changed and fine tuned in the test mode

4 1 Notes on Offset/Gain Setting

(1) Do not select the test mode during execution of the D-A conversion

(2) Offset/gain setting is allowed within the following ranges:

    (a) Voltage   −10 V to 0 V to +10 V

    (b) Current   0mA to 20mA

(3) The defined value is stored when the OFFSET/GAIN select switch is set to the "SET" position

(4) Before switching from one channel to another in the test mode, the OFFSET/GAIN select switch should be in the "SET" position

(5) The "RUN" LED light flashes quickly, at one-tenth (0 10) of a second intervals to indicate that the offset/gain specified has exceeded the allowed range

4 2 Offset/Gain Setting Procedure

Start

Select test mode
Connect the TEST terminals (terminal No 1 and 3) to switch to the test mode.

Select channel.
After making sure that the OFFSET/GAIN select switch is in the "SET" position, set the channel select switch to its required position

Connect voltmeter.
Connect the voltmeter to the required channel

1 Select offset setting
Move the OFFSET/GAIN select switch to the "OFFSET" position
2 Adjust the offset value
Adjust the offset value using the UP/DOWN switch
3 Store the offset value
Move the OFFSET/GAIN select switch to the "SET" position to store the offset value
4 Select the gain setting
Move the OFFSET/GAIN select switch to the "GAIN" position
5 Adjust the gain value
Adjust the gain value using the UP/DOWN switch
6 Store the gain value
Move the OFFSET/GAIN select switch to "SET" position to store the gain value

NO — Channel setting complete?
YES

Leave test mode.
Disconnect the TEST terminals (terminal Nos 1 and 3)

End

6. OUTSIDE DIMENSIONS

6 OUTSIDE DIMENSIONS

93 6 (3 69)   34.5 (1.36)
6 5 (0.26)   7 3 (0 29)
130 (1.36)

Unit mm (in)

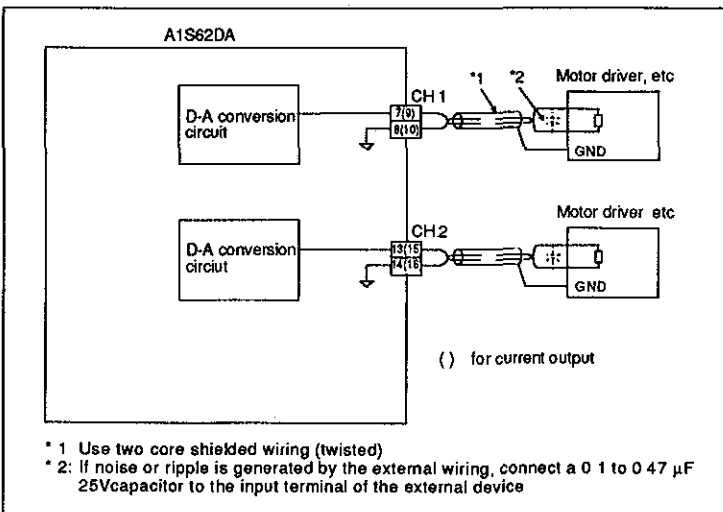| Item	Specifications
Connection terminal	20 point terminal block
Applicable wire size	0 75 to 1 5 mm^2
Applicable solderless terminal	1 25 3, 1 25-YS3A, V1 25-3, V1 25 YS3A
External dimensions mm (inch)	130 (5 12)(H) x 34 5 (1 36)(W) x 93 6 (3 69)(D)
Weight kg (lb)	0 32 Kg (0 70)

5. WIRING

5 WIRING

5 1 Wiring Instructions

(1) Separate the main power circuit and/or high voltage wiring from the control and signal wiring

(2) Where applicable, ground the shielding of all wires to a common ground point

5 2 Connection of A1S62DA and External Devices

A1S62DA

D-A conversion circuit — CH 1 — 7(9) 8(10) — *1 *2 — Motor driver, etc — GND

D-A conversion circiut — CH2 — 13(15) 14(16) — Motor driver etc — GND

( ) for current output

* 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 µF 25Vcapacitor to the input terminal of the external device

IMPORTANT

One channel cannot be used for both voltage output and current output at the same time

If both are used at the same time, the internal memory may be damaged Therefore, make sure to disconnect any unused terminals

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 can 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 non-grounded tools etc