Panasonic

Programmable Controller

FP7 Analog Output Unit

User's Manual

[Applicable models]
AFP7DA4H

WUME-FP7AOH-04

2024.4 | industry.panasonic.com/

(MEMO)

Introduction

Thank you for purchasing a Panasonic product. Before you use the product, please carefully read through the user's manual, and understand it in detail to use the product properly.

Types of Manual

- There are different types of user's manual for the FP7 series, as listed below. Please refer to a relevant manual for the unit and purpose of your use.
- The manuals can be downloaded from the Panasonic website:https://industry.panasonic.com/global/en/downloads/?tab=manual.

Unit name or purpose of use	Manual name	Manual code
FP7 Power Supply Unit	FP7 CPU Unit User's Manual (Hardware)	WUME-FP7CPUH
FP7 CPU Unit	FP7 CPU Unit Command Reference Manual	WUME-FP7CPUPGR
	FP7 CPU Unit User's Manual (Logging Trace Function)	WUME-FP7CPULOG
	FP7 CPU Unit User's Manual (Security Function)	WUME-FP7CPUSEC
Instructions for Built-in LAN Port	FP7 CPU Unit User's Manual (LAN Port Communication)	WUME-FP7LAN
	FP7 CPU Unit User's Manual (Ethernet Expansion Function)	WUME-FP7CPUETEX
	FP7 CPU Unit User's Manual (EtherNet/IP Communication)	WUME-FP7CPUEIP
	Web Server Function Manual	WUME-FP7WEB
Instructions for Built-in COM Port	FP7 Series User's Manual (SCU Communication)	WUME-FP7COM
FP7 Extension Cassette (Communication) (RS-232C / RS485 type)		
FP7 Extension Cassette (Communication) (Ethernet Type)	FP7 Series User's Manual (Communication Cassette Ethernet Type)	WUME-FP7CCET
FP7 Extension (Function) Cassette Analog Cassette	FP7 Analog Cassette User's Manual	WUME-FP7FCA
FP7 Digital Input / Output Unit	FP7 Digital Input / Output Unit User's Manual	WUME-FP7DIO
FP7 Analog Input Unit	FP7 Analog Input Unit User's Manual	WUME-FP7AIH
FP7 Analog Output Unit	FP7 Analog Output Unit User's Manual	WUME-FP7AOH
FP7 Thermocouple Multi-analog Input Unit	FP7 Thermocouple Multi-analog Input Unit FP7 RTD Input Unit User's Manual	WUME-FP7TCRTD
FP7 RTD Input Unit		
FP7 Multi Input / Output Unit	FP7 Multi Input / Output Unit User's Manual	WUME-FP7MXY
FP7 High-speed counter unit	FP7 High-speed Counter Unit User's Manual	WUME-FP7HSC
FP7 Pulse Output Unit	FP7 Pulse Output Unit User's Manual	WUME-FP7PG

Unit name or purpose of use	Manual name	Manual code
FP7 Positioning Unit	FP7 Positioning Unit User's Manual	WUME-FP7POSP
FP7 Serial Communication Unit	FP7 Series User's Manual (SCU Communication)	WUME-FP7COM
FP7 Multi-wire Link Unit	FP7 Multi-wire Link Unit User's Manual	WUME-FP7MW
FP7 Motion Control Unit	FP7 Motion Control Unit User's Manual	WUME-FP7MCEC
PHLS System	PHLS System User's Manual	WUME-PHLS
Programming Software FPWIN GR7	FPWIN GR7 Introduction Guidance	WUME-FPWINGR7

Safety Precautions

- Observe the following precautions to ensure personal safety or to prevent accidents.
- Before performing installation, operation, maintenance, or inspection, read this manual carefully to understand how to use the product correctly.
- Make sure that you fully understand the product, information on safety, and other precautions.
- This manual uses two safety symbols, different levels of safety precautions “Warning” and “Caution”, to indicate .

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not handled correctly, could result in death or serious injury of the user.

- Take safety measures outside the product to ensure the safety of the entire system even if this product fails or an error occurs due to external factors.
- Do not use this product in atmospheres that contain flammable gases.
  Doing so may result in explosion.
- Do not throw this product into the fire.
  Doing so may cause the batteries or other electronic parts to explode.

⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not handled correctly, could result in injury to the user or property damage.

- To prevent abnormal heat generation or smoke generation, use this product with some leeway from the guaranteed characteristics and performance values of the product.
- Do not disassemble or modify this product.
  Doing so may result in abnormal heat generation or smoke generation.
- Do not touch any terminals while the power is on.
  Doing so may result in electrical shock.
- Configure emergency stop and interlock circuits outside this product.
- Connect wires and connectors properly.
  Failure to do so may result in abnormal heat generation or smoke generation.
- Do not perform work (such as connection or removal) with the power turned on.
  Doing so may result in electrical shock.
- If this product is used in any way that is not specified by Panasonic, its protection function may be impaired.
- This product has been developed and manufactured for industrial use only.

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Handling Precautions

■ In this manual, the following symbols are used to indicate safety information that must be observed.

Stop	Indicates an action that is prohibited or a matter that requires caution.
!	Indicates an action that must be taken.
i Info.	Indicates supplemental information.
Note	Indicates details about the subject in question or information useful to remember.

1 2 Procedure	Indicates operation procedures.

Table of Contents

1 Unit Functions and Restrictions

1.1 Unit Functions and Operation

■ Features of analog output unit

The analog output unit converts its internal data into analog values to be output to inverters or other analog-driven equipment.

- Equipped with six types of output ranges (i.e., voltage ranges of -10 to +10 V, 0 to +10 V, 0 to +5 V, and +1 to +5 V and current ranges of 0 to +20 mA and +4 to +20 mA).

  Analog output unit: 4 channels
- A D/A conversion processing speed is as high as 25 μs/channel.
- Converts set digital values into analog data with up to 16 bit in a resolution range of 1/25,000 to 1/62,500.

1.2 Basic Operation of Analog Output Processing

1.2.1 Analog Output Processing

Analog output is processed as explained below.

■ Operation of analog output unit

(1) Writing digital data

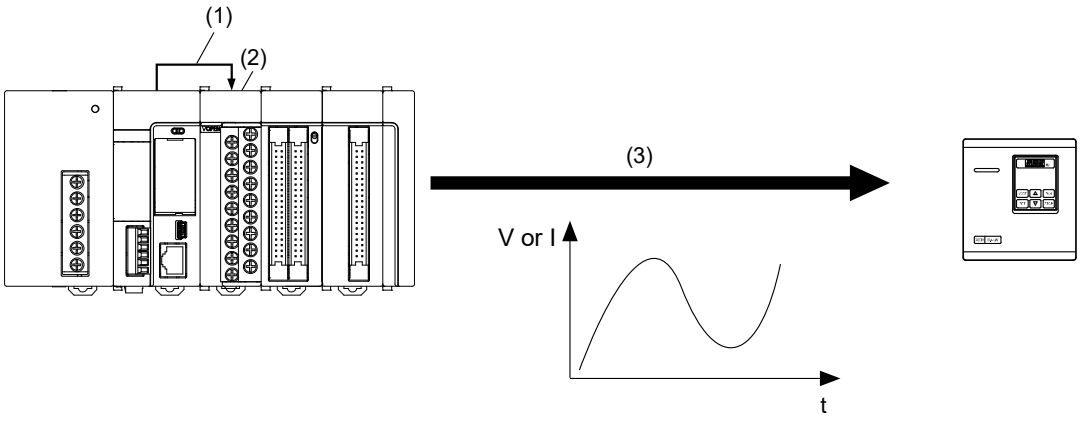
A user program is used to write digital data to the output relay area (WY) on a channel-by-channel basis so that the digital data will be output in analog form.

(2) Analog conversion processing

Data written to the unit is converted to an analog value in sequence automatically.

(3) Output to analog-driven equipment

Converted analog values are output to inverters or other analog-driven equipment.



■ Option settings

The following option setting functions are provided for analog output processing. Any of the option setting functions can be set, if necessary, by writing the function to the unit memory (UM) by using the configuration menu of the FPWIN GR7 or a user program.

- Offset / Gain processing
- Scale conversion
- Upper and lower output clipping
- Analog output hold while in PROG. mode

1.3 Restrictions on Units Combination

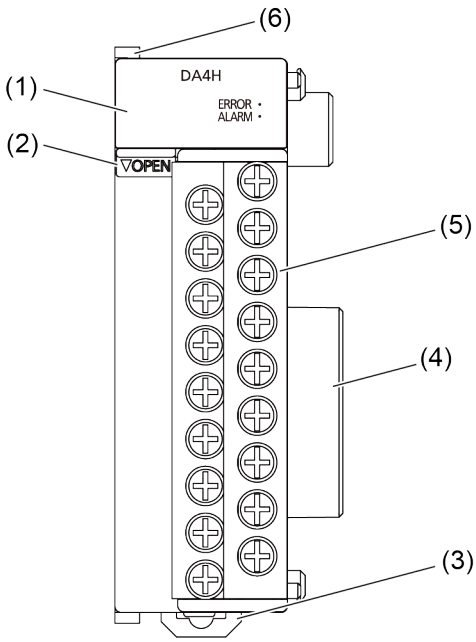
1.3.1 Limitations on the Power Consumption

The FP7 analog output unit has the following internal current consumption. When the system is configured, the other units being used should be taken into consideration, and a power supply unit with a sufficient capacity should be used.

Name	Product no.	Current consumption
FP7 analog output unit	AFP7DA4H	250 mA or less

2 Names and Functions of Parts

2.1 Analog Output Unit



■ Names and functions of parts

(1) Operation monitor LEDs

LED name	LED color	Contents
-	Blue	Lit when the CPU unit is turned on.
ERROR	Red	Lit if the configuration settings are beyond the allowable range.
ALARM	Red	Lit if the hardware has an error.

(2) Terminal block release lever

To remove the analog output terminal block, push the release lever downward.

(3) DIN rail attachment lever

This lever is used to fix the unit to the DIN rail.

(4) Unit connector

Connects with I/O units and high-function units.

(5) Analog output terminal block

The terminal block is removable. Remove the terminal block before wiring. Solderless terminals for M3 can be used.

(6) Fixing hook

This hook is used to fix two or more units to be connected.

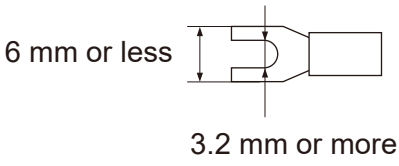
3 Wiring

3.1 Wiring of Terminal Block

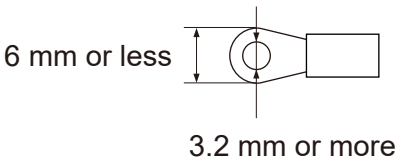
■ Suitable solderless terminals/wires

M3 terminal screws are used for the terminal. The following suitable solderless terminals are recommended for the wiring to the terminals

●Fork type terminal



●Round type terminal



■ Suitable solderless terminals

Manufacturer	Shape	Part no.	Suitable wires
J.S.T. Mfg Co., Ltd.	Round type	1.25-MS3	0.25 to 1.65 mm^2
	Fork type	1.25-B3A	
	Round type	2-MS3	1.04 to 2.63 mm^2
	Fork type	2-N3A	

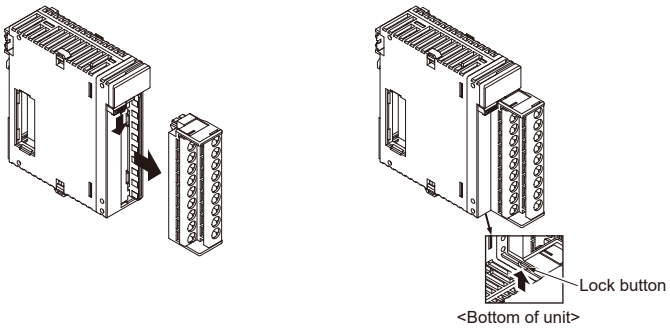
■ Suitable wires

Suitable wires	Tightening torque
AWG22 to 14 (0.3 mm^2 to 2.0 mm^2)	0.5 to 0.6 N·m

■ Connection to the terminal block

Remove the terminal block before beginning the wiring operations.

To remove the terminal block, push downward the release lever located at the top of the terminal block.

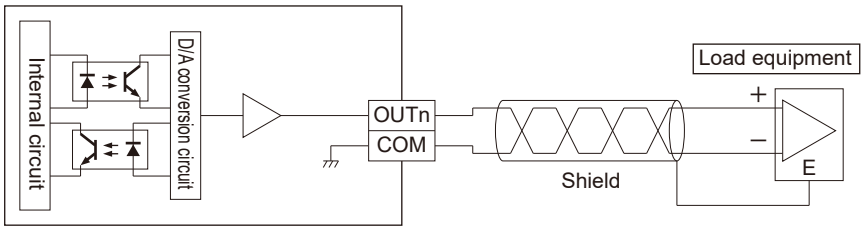


- Install the terminal block by inserting it all the way to its original position and pressing the lock button on the bottom of the unit. Then confirm that the terminal block is securely attached and cannot be removed.

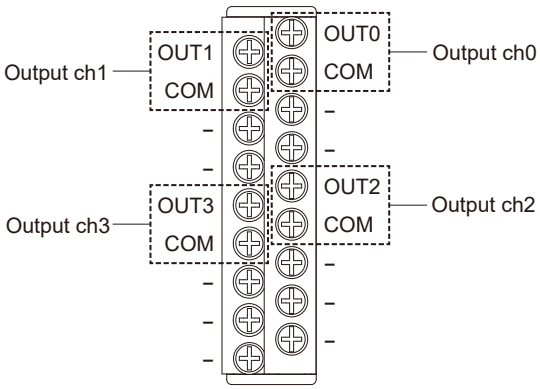
3.2 Analog Output Connections

3.2.1 Voltage Output (-10 to +10V, 0 to +10V, 0 to +5V, and +1 to +5 V)

■ **Internal circuit diagram and connection diagram**

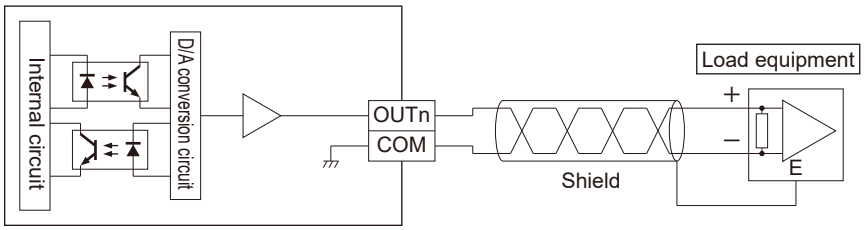


■ **Terminal layout**

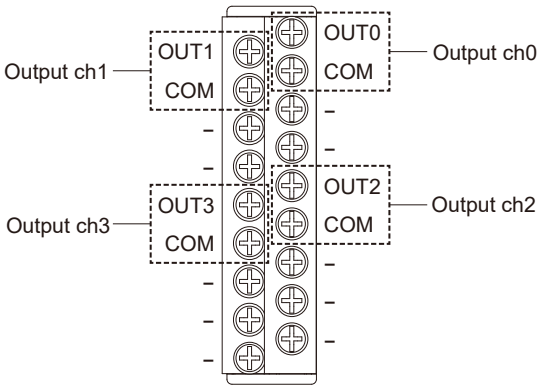


3.2.2 Current Output (0 to +20 mA and +4 to +20 mA)

■ **Internal circuit diagram and connection diagram**



■ Terminal layout



- Use double-core twisted-pair shielded wires for analog output signals.
- Ground the shielding of the shielded wire on the load equipment side. However, depending on the conditions of the external noise, it may be better to ground the shielding externally or not to ground the shielding.
- Do not place the analog output wiring close to AC lines, high-tension lines, or load lines other than PLC wires or bundle the analog output and other wires together.
- The NC terminals of the analog output terminal block are unused. Do not use these terminals to relay wires because the terminals include those connected internally.

4 Unit Settings and Data Writing

4.1 Confirming the I/O Number Allocations and First Word Number

4.1.1 Occupied I/O Area and I/O Allocations

In the FP7, digital data for analog output is allocated to the external output relay area and processed. Furthermore, control I/O signals are allocated to the FP7 to process errors and clip upper and lower output limits.

■ Input contact

Address								Name	Description
CH0		CH1		CH2		CH3			
WX0	X0	WX1	X10	WX2	X20	WX3	X30	Error flag	Turns ON when an error is detected.
	X1		X11		X21		X31	Upper limit of upper and lower output clipping	Turns ON when the output exceeds the upper limit of output clipping, provided that the upper and lower limit function is active.
	X2		X12		X22		X32	Lower limit of upper and lower output clipping	Turns ON when the output drops below the lower limit of output clipping, provided that the upper and lower limit function is active.
	X3 to XF		X13 to X1F		X23 to X2F		X33 to X3F	Not used	Do not use.

■ Output contact

Address								Name	Description
CH0		CH1		CH2		CH3			
WY0	Y0 to YF	WY2	Y20 to Y2F	WY4	Y40 to Y4F	WY6	Y60 to Y6F	D/A conversion data (16 bit)	Set a digital value corresponding to the analog output. <Voltage range> -10 to +10 V: -31,250 to +31,250 0 to +10 V or 0 to +5 V: 0 to +31,250 +1 to +5 V: 0 to +25,000 <Current range> +0 to +20 mA: 0 to +31,250 +4 to +20 mA: 0 to +25,000 * Apply a digital value within the set scale if scale conversion is set.
WY1	Y10	WY3	Y30	WY5	Y50	WY7	Y70	Upper and lower limit output clipping function execution relay	The upper and lower output limit clipping function is executed with the relay turned ON. With the relay turned OFF, the upper limit flag (Xn1) for upper and lower output clipping limits and the lower limit flag (Xn2) for upper and lower output clipping limits are turned OFF.

Address								Name	Description
CH0		CH1		CH2		CH3			
	Y11 to Y1F		Y31 to Y3F		Y51 to Y5F		Y71 to Y7F	Not used	Do not use.

(Note 1) The I/O numbers in the tables above show offset addresses. I/O numbers actually allocated are based on the first word number allocated to the unit. Example) If the first word number is "10", the D/A conversion data on CH0 and the error flag will be WY10 and X100, respectively.

4.1.2 Confirming the I/O Number Allocations

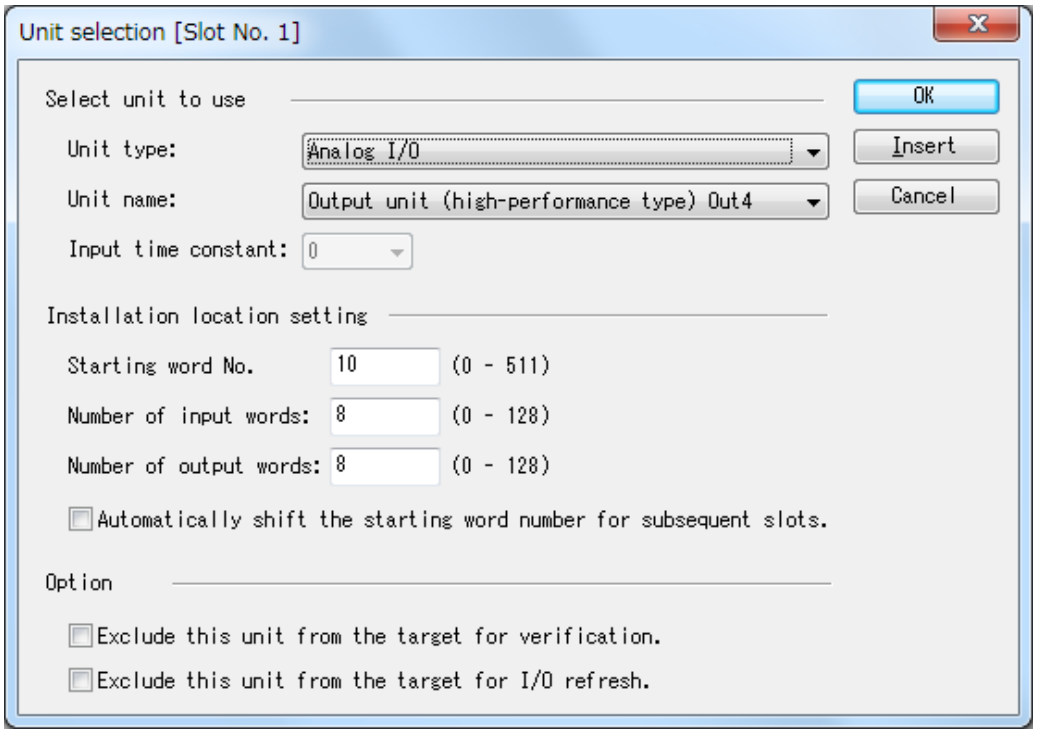
- I/O numbers and base word numbers are always necessary when writing programs. Always check to see if the numbers match the design.
- I/O numbers allocated are determined by the first word number.

4.1.3 Allocations to unit

Take the following procedure to set the first word number.

Procedure

1. Select **Options**>**FP7 Configuration** from the menu bar.
2. Select "I/O Map" from the field.
3. Double-click the target slot where the operating unit is to be inserted.
4. Select "Analog I/O" and "Output Unit"in the unit selection field.



5. Press the [OK] button.
The first word number specified is set.

4.2 Configuration Settings

4.2.1 Configuration of Analog Output Unit

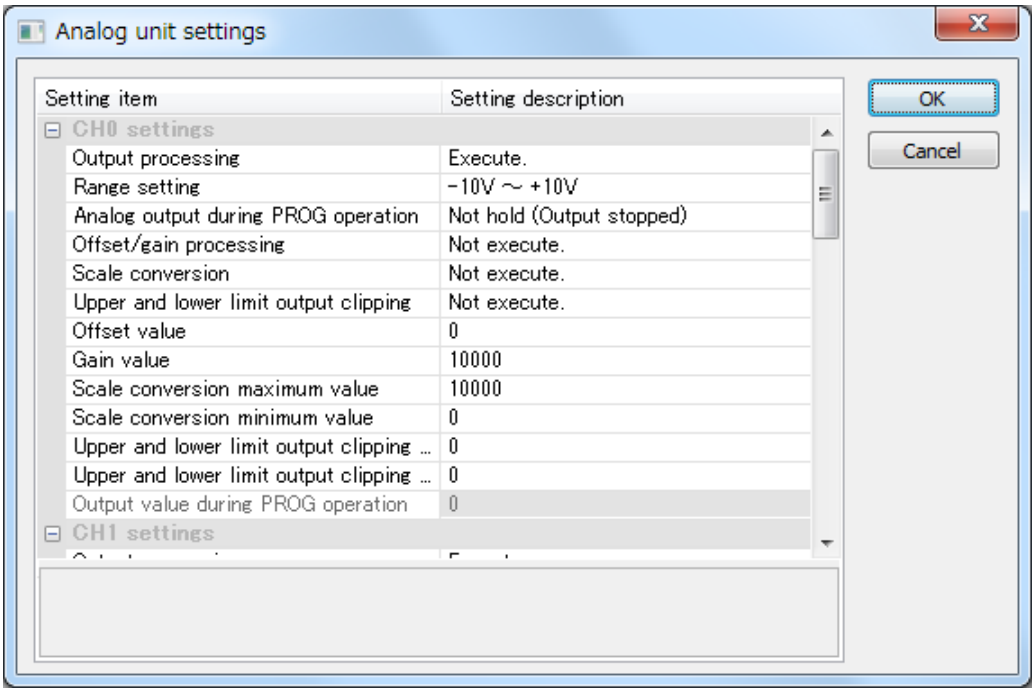
Use the FPWIN GR7 configuration menu to make analog output unit settings, such as output range, offset, and gain settings.

4.2.2 Setting method

The following steps are described on the condition that the analog output unit has been already allocated on the I/O map.

Procedure

1. Select **Options**>**FP7 Configuration** from the menu bar.
2. Select "I/O Map" from the field.
3. Select the slot where the analog output unit is registered and press the [Set details] button.
   The "Analog unit settings" dialog box is displayed.



4. Select the "Output processing" and "Range setting".
   Select option setting as required.
5. Press the [OK] button.

The set value will become effective when the set value is downloaded together with a corresponding program as a project.

4.2.3 Settings

Group	Setting item		Settings		Default
Basic setting items (per channel)	Output processing		Execute / Not execute		Execute
	Range setting		－10V～＋ 10V 0V～＋ 10V 0V～＋ 5V ＋ 1V～＋ 5V 0mA～＋ 20mA ＋ 4mA～＋ 20mA		-10V to +10 V
Option setting items (per channel)	Upper and lower output clipping		Execute / Not execute		Not execute
		Upper limit	-32,500 to +32,500		0
		Lower limit	-32,500 to +32,500		0
	Scale conversion		Execute / Not execute		Not execute
		Max. value	-30,000 to +30,000		10000
		Min. value	-30,000 to +30,000		0
	Offset / Gain processing		Execute / Not execute		Not execute
		Offset value	-3,000 to +3,000		0
		Gain value	+9,000 to +11,000		10000
	Analog output in PROG. mode		Non-hold / Current value hold / Desired value hold		Non-hold
		A digital value corresponding to the desired analog output	-10 to +10 V	-32,500 to +32,500	0
			0 to +10 V 0 to 5 V 0 to 20 mA	0 to +32,500	
			+1 to 5 V 4 to 20 mA	0 to +25,000	

4.2.4 Unit Setting and Conversion Processing Time

Conversion time varies with the configuration setting conditions.

■ Conversion processing execution / non-execution setting and conversion processing time

Select the execution or non-execution of the conversion processing of analog output on a channel-by-channel basis. This can save the conversion time for channels that do not execute conversion processing. A conversion time of 25 μs is required per channel.

Example) Conversion time for four channels

Converted in the order of ch0→ch1→ch2→ch3→ch0→ch1→ch2→ch3→.... (1 cycle = 100 μs)

Example) Conversion time for two channels (with CH2 and CH3 excluded).

Conversion is executed in the order of ch0→ch1→ch0→ch1→ch0→ch1→ch0→ch1→... and the conversion time for CH2 and CH3, which are excluded, is saved. (1 cycle = 50 μs)

4.3 Writing Analog Output Data

■ Basic operation of analog output

(1) Writing digital data

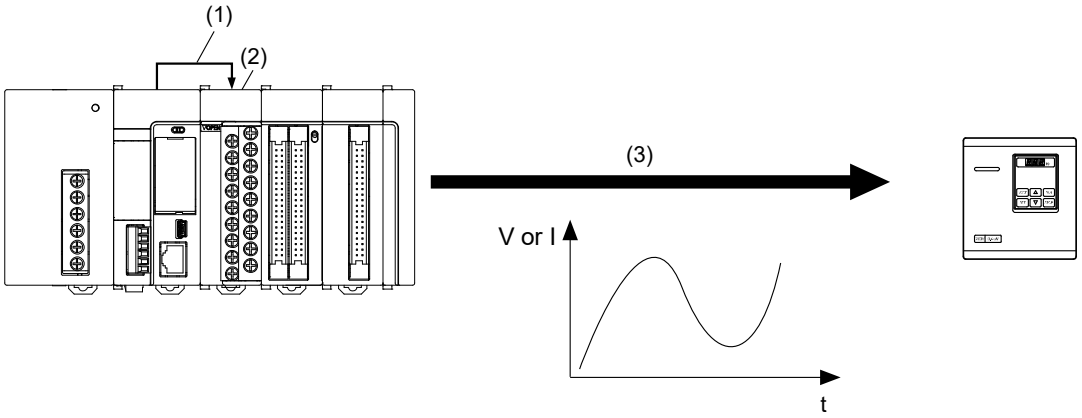
A user program is used to write digital data to the output relay area (WY) on a channel-by-channel basis so that the digital data will be output in analog form. The converted analog value varies with the setting of the range. The specified slot number varies depending on the installation position of the unit.

(2) Analog conversion processing

Data written to the unit is converted to an analog value in sequence automatically.

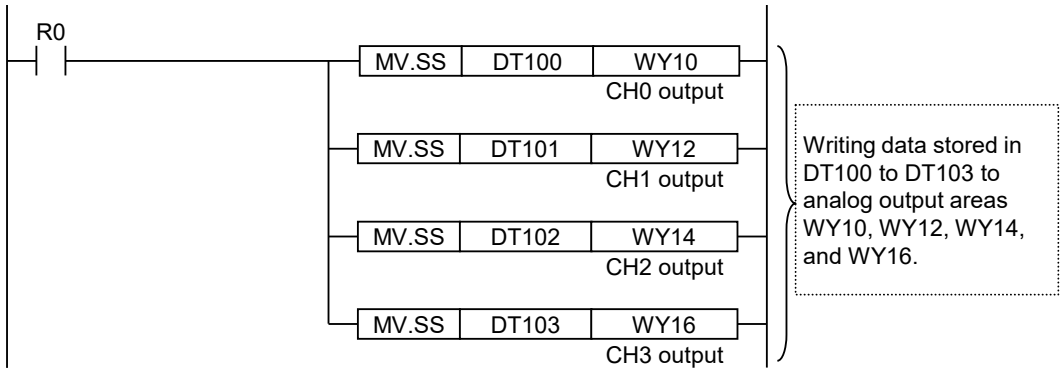
(3) Output to analog-driven equipment

Converted analog values are output to inverters or other analog-driven equipment.



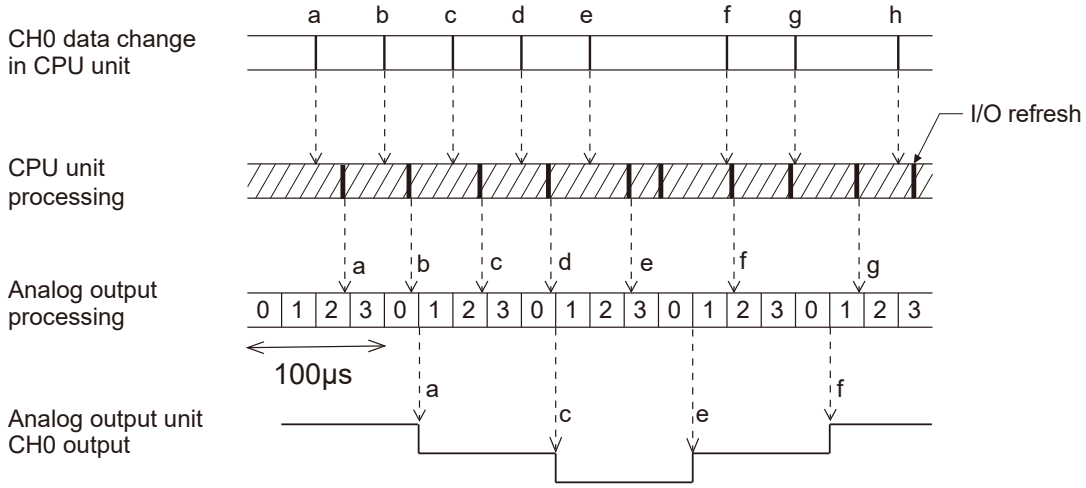
■ Overview of program

Writing data stored in DT100 to DT103 to analog output areas WY10, WY12, WY14, and WY16.



4.4 Timing Chart of Output Processing

- Data is written as output relay area data to the analog output unit at the I/O refreshing timing of the CPU unit.
- The processing of the analog output unit is not synchronized with the processing of the CPU unit. Therefore, the analog output unit converts the latest data from the CPU unit into an analog value and outputs it.
- The digital data conversion time of the analog output unit varies with the number of channels and the range of use.



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