MITSUBISHI ELECTRIC

Changes for the Better

August 2012

New Product Release

No. 333E

Mitsubishi Electric Programmable Controller

MELSEC *L series*

L60DA4

Digital-analog converter module

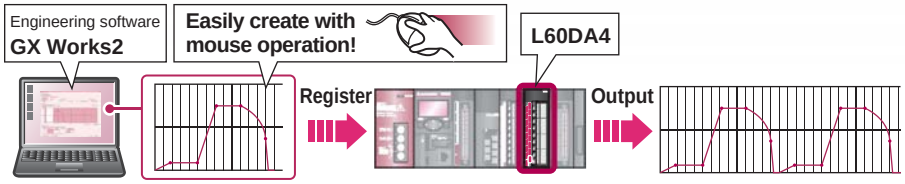
High-speed and smooth continuous analog outputs!

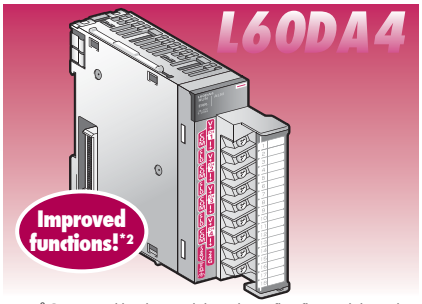
New! Industry First*1 wave output function!

*1 As of April 2012, Mitsubishi Electric Corp. survey

What is the wave output function?

With this function, wave data for the target analog values to be output are registered in a digital-analog (D/A) converter module.
The wave data with digital values are continuously output as analog at a preset conversion cycle.





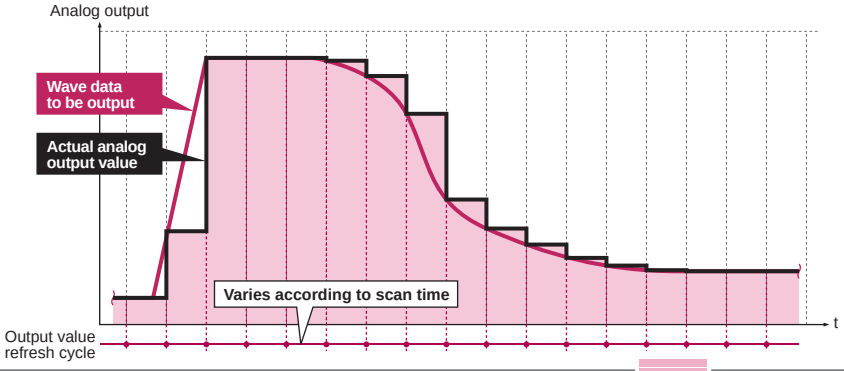
*2 Supported by the modules whose first five serial number digits are 14041 or later.

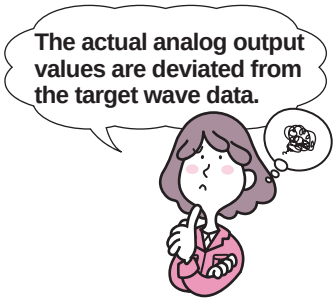
Using the wave output function

Realize high-speed and smooth continuous analog output which does not rely on the sequence scan time.

To output analog values with the sequence program control

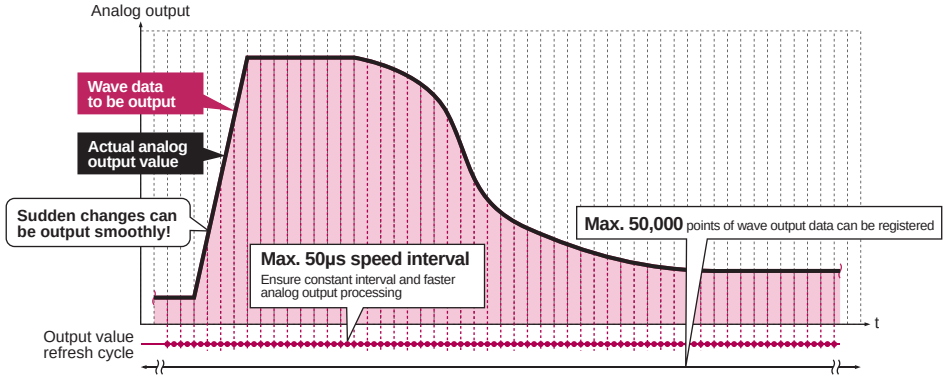
Analog output values at each scan time.





To output analog values with the wave output function

Analog output values at a specific interval.



Point1 Easy to use! Just create and store wave data!

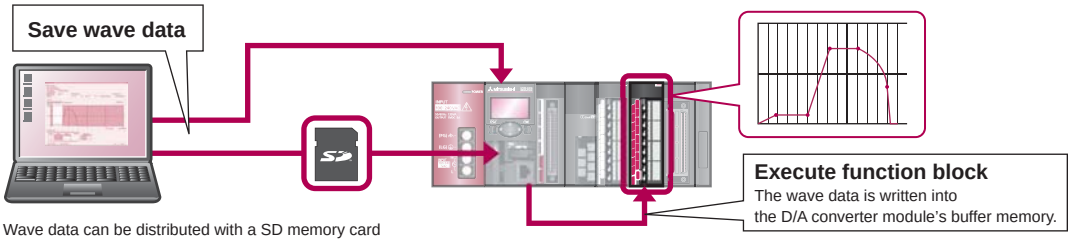
How to use the wave output function

Wave data can be created with easy mouse operation using the “Create Wave Output Data”*1 tool in GX Works2.
The created wave data are registered in a D/A converter module and can be output as smooth continuous analog values.

*1 Supported with GX Works2 Ver. 1.87R or later.

STEP 1 Using GX Works2, create wave data to be output as analog.

STEP 2 Save the wave data in the CPU module’s file register (or SD memory card), and execute a function block (FB)*2.



Wave data can be distributed with a SD memory card if a personal computer is not available.

*2 For the acquisition of FB, please contact your local Mitsubishi representative.

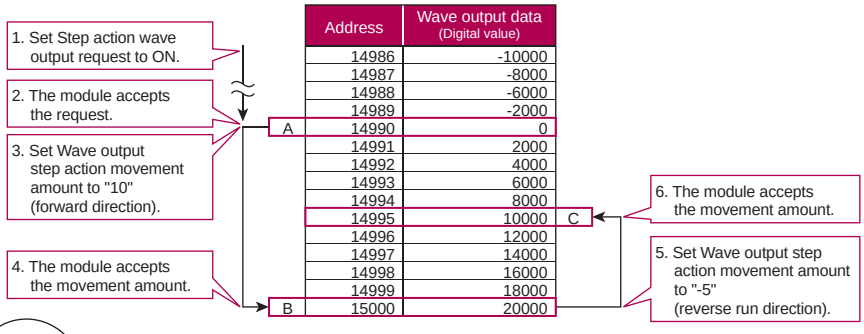
Point2 Easily adjust wave output data!

Wave output data (digital value) on the D/A module buffer memory address can be adjusted even while the D/A module is running by using the wave output step action function. This function is perfect for confirming analog output values and for adjusting the created wave output data.

Wave output step action function New!

To output the designated buffer memory address values as analog

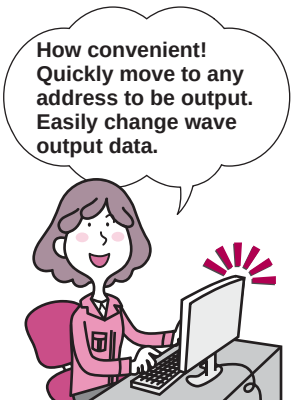
Example: Wave output step action in the "-10 to 10V" output range while the wave output is running.

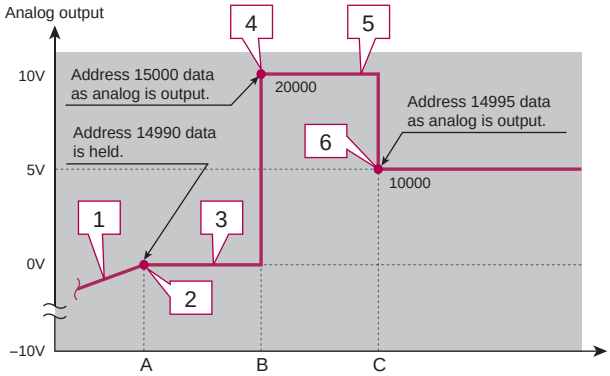


Address	Wave output data (Digital value)
14986	-10000
14987	-8000
14988	-6000
14989	-2000
14990 (A)	0
14991	2000
14992	4000
14993	6000
14994	8000
14995	10000 (C)
14996	12000
14997	14000
14998	16000
14999	18000
15000 (B)	20000

Wave output data on any address can be changed flexibly, so analog output values are ideally adjusted.

Address	Wave output data (Digital value)
14992	4000
14993	6000
14994	8000 → 8200
14995	10000
	12000





Function List

Item	Description
D/A conversion enable/disable function	This function sets whether to enable or disable D/A conversion for each channel. Disabling the D/A conversion for unused channels reduces the conversion cycles.
D/A output enable/disable function	This function sets whether to output the D/A conversion value or the offset value for each channel. The conversion speed is constant, regardless of the output enable/disable status.
Range switching function	The output range to use can be selected from the factory default range (4 to 20mA,0 to 20mA, 1 to 5V, 0 to 5V, or -10 to 10V) and user range (user range setting).
Offset/gain setting function	This function compensates for errors in analog output values.
Analog output HOLD/CLEAR function	This function sets whether to hold the output analog value (HOLD) or clear the output analog value (CLEAR), according to the CPU module operating status (RUN, STOP, or stop error).
Analog output test when CPU module is in STOP status	When the CPU module is in STOP operation status, forcibly turning CH□ Output enable/disable flag (Y1 to Y4) ON outputs the D/A-converted analog value.
Scaling function	This function scales a digital value into a value within the range of the set scaling lower limit value to scaling upper limit value. The programming for scale conversion can be omitted.
Warning output function	This function outputs a warning when the digital value enters the preset warning output range.
Wave output function NEW	This function imports the prepared wave data (digital value) and outputs the data (analog value) in the set conversion cycle. A faster and smoother control than a program control is achieved by the automatic output of the control wave data registered in the D/A converter module for the analog (torque) control such as pressing machines and injection molding machines. The control can be executed only by registering the wave data to the D/A converter module. Therefore, the program-less control is available for the repeat control such as the line control, and man-hours for programming can be reduced.
Wave output step action function NEW	This function changes addresses and data values to be output to change the analog output flexibly at any timing in the wave output mode. This function is useful for the analog output test in the wave output mode and for debugging the wave output function.
External power supply READY flag (X7)	This signal turns ON when the external power supply 24VDC is supplied. When the flag is OFF, 0V/0mA are output to analog output values regardless of other settings.
Error log function	This function stores up to 16 errors and alarms that occur on the D/A converter module to the buffer memory as history.
Module error collection function	This function collects the errors and alarms caused in the D/A converter module into the CPU module.
Error clear function	Clearing the error from the system monitor at error occurrence is possible.
Save/restoration of offset/gain value	The offset/gain value of the user range setting can be saved or restored.

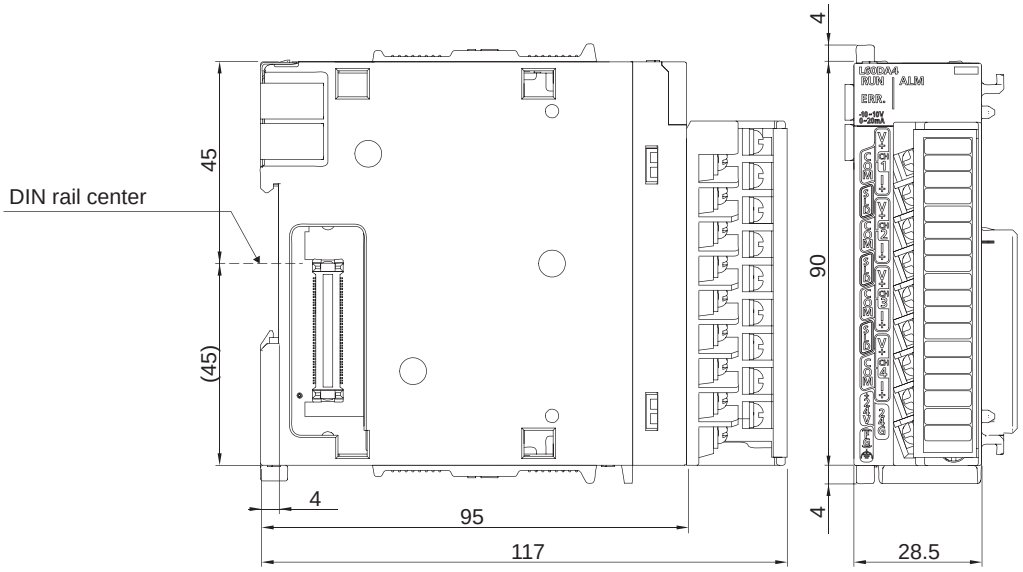
Performance Specifications

Item		Specifications			
Number of analog output points		4 points (4 channels)			
Digital input		-20480 to 20479			
	When using the scaling function	-32768 to 32767			
Analog output	Voltage	-10 to 10 VDC (external load resistance 1kΩ to 1MΩ)			
	Current	0 to 20 mADC (external load resistance 0Ω to 600Ω)			
I/O characteristics, resolution*1		Analog output range		Digital value	Resolution
		Voltage	0 to 5V	0 to 20000	250μV
			1 to 5V		200μV
			-10 to 10V	-20000 to 20000	500μV
			User range setting		333μV*2
		Current	0 to 20mA	0 to 20000	1000nA
			4 to 20mA		800nA
			User range setting	-20000 to 20000	700nA*2
Accuracy (accuracy for the maximum value of analog output value)*3	Ambient temperature 25±5°C	Within ±0.1% (voltage: ±10mV, current: ±20μA)			
	Ambient temperature 0 to 55°C	Within ±0.3% (voltage: ±30mV, current: ±60μA)			
Conversion speed	Normal output mode	20μs/channel			
	Wave output mode	50μs/channel 80μs/channel			
Number of offset/gain settings		Up to 50000 counts			
Output short protection		Protected			
Insulation method		Between I/O terminals and programmable controller power supply: photocoupler isolation Between output channels: no insulation Between external power supply and analog output: transformer insulation			
Dielectric withstand voltage		Between I/O terminals and programmable controller power supply: 500VACrms for 1 minute Between external power supply and analog output: 500VACrms for 1 minute			
Insulation resistance		Between I/O terminals and programmable controller power supply: 500VDC 10MΩ or higher			
Number of occupied I/O points		16 points (I/O assignment: Intelligent 16 points)			
Connected terminal		18-point terminal block			
Applicable wire size		0.3 to 0.75mm²			
Applicable solderless terminal		R1.25 to 3 (solderless terminals with sleeve are not usable)			
External power supply		24VDC +20%, -15%			
		Ripple, spike 500mVp-p or lower			
		Inrush current: 4.3A, 1000μs or shorter			
		Current consumption: 0.18A			
Internal current consumption (5VDC)		0.16A			
Weight		0.20kg			

*1: For details on the I/O conversion characteristics, refer to "Appendix 3, I/O conversion characteristic of D/A conversion" in the manual.
*2: Maximum resolution in the user range setting.
*3: Except when receiving noise influence. Warm up (power on) the module for 30 minutes to satisfy the accuracy shown in the table.

External Dimensions

L60DA4



Unit: mm

Product List

Product name	Model
MELSEC-L series digital-analog converter module	L60DA4

* SD memory card is a trademark of Panasonic Corporation, SanDisk Corporation and Toshiba Corporation.
* The SD logo is a trademark of SD-3C and LLC.

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