

DVP02DA-E2

DVP04DA-E2

Instruction Sheet

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Analog Output Module

類比輸出模組

模拟输出模块

DVP-0280230-01
20211108

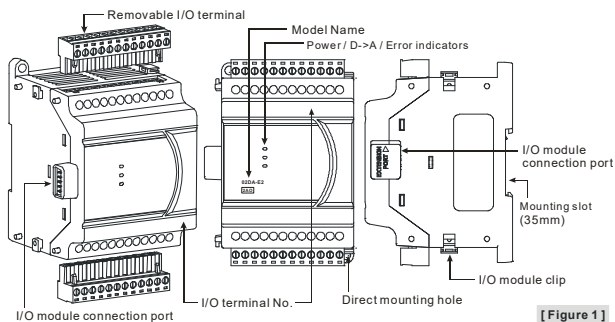


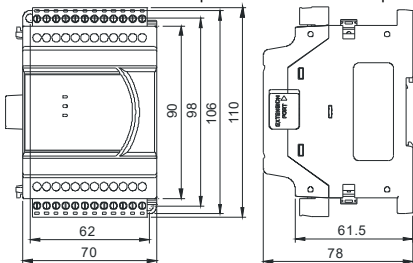
Smarter. Greener. Together.

Thank you for choosing Delta's DVP series PLC. DVP02DA-E2 (DVP04DA-E2) analog output module receives 2 (4) groups of 16-bit digital data from the PLC MPU and converts the digital data into 2 (4) points analog output signals (voltage or current). In addition, you can access the data in the module by applying FROM/TO instructions or write the output value of channels directly by using MOV instruction (Please refer to allocation of special registers D9900 ~ D9999).

- EN ✗ DVP02DA-E2 (DVP04DA-E2) is an OPEN-TYPE device. It should be installed in a control cabinet free of airborne dust, humidity, electric shock and vibration. To prevent non-maintenance staff from operating DVP02DA-E2 (DVP04DA-E2), or to prevent an accident from damaging DVP02DA-E2 (DVP04DA-E2), the control cabinet in which DVP02DA-E2 (DVP04DA-E2) is installed should be equipped with a safeguard. For example, the control cabinet in which DVP02DA-E2 (DVP04DA-E2) is installed can be unlocked with a special tool or key.
- EN ✗ DO NOT connect AC power to any of I/O terminals, otherwise serious damage may occur. Please check all wiring again before DVP02DA-E2 (DVP04DA-E2) is powered up. After DVP02DA-E2 (DVP04DA-E2) is disconnected, Do NOT touch any terminals in a minute. Make sure that the ground terminal (⊕) on DVP02DA-E2 (DVP04DA-E2) is correctly grounded in order to prevent electromagnetic interference.
- FR ✗ DVP02DA-E2 (DVP04DA-E2) est un module OUVERT. Il doit être installé que dans une enceinte protectrice (boîtier, armoire, etc.) saine, dépourvue de poussière, d'humidité, de vibrations et hors d'atteinte des chocs électriques. La protection doit éviter que les personnes non habilitées à la maintenance puissent accéder à l'appareil (par exemple, une clé ou un outil doivent être nécessaire pour ouvrir a protection).
- FR ✗ Ne pas appliquer la tension secteur sur les bornes d'entrées/Sorties, ou l'appareil DVP02DA-E2 (DVP04DA-E2) pourra être endommagé. Merci de vérifier encore une fois le câblage avant la mise sous tension du DVP02DA-E2 (DVP04DA-E2). Lors de la déconnection de l'appareil, ne pas toucher les connecteurs dans la minute suivante. Vérifier que la terre est bien reliée au connecteur de terre (⊕) afin d'éviter toute interférence électromagnétique.

■ Product Profile & Dimension

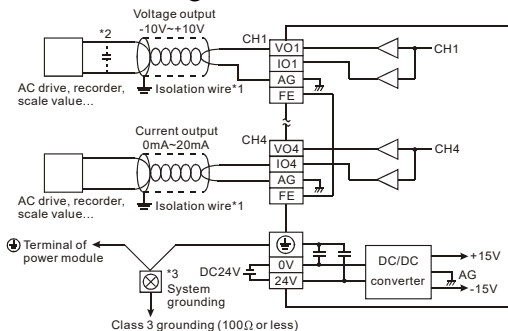




[Figure 2]

Unit: mm

External Wiring



[Figure 3]

Note 1: Please isolate analog output and other power wiring.

Note 2: If noise interferes from loaded input wiring terminal is significant, please connect a capacitor with $0.1 \sim 0.47\mu\text{F}$ 25V for noise filtering.

Note 3: Please connect \oplus power module terminal and \ominus analog output module terminal to system earth point and make system earth point be grounded or connects to machine cover.

I/O Terminal Layout

• DVP02DA-E2

DVP02DA-E2 (2AO)

24V	0V	\oplus	FE	FE	FE	VO1	IO1	AG	VO2	IO2	AG
1	2	3	4	5	6	7	8	9	10	11	12

• DVP04DA-E2

VO1	IO1	AG	FE	VO2	IO2	AG	FE	VO3	IO3	AG	FE
1	2	3	4	5	6	7	8	9	10	11	12
DVP04DA-E2 (4AO)											
24V	0V	\oplus	FE	VO4	IO4	AG	FE				
1	2	3	4	5	6	7	8				

Electrical Specifications

Digital/Analog module (02D/A & 04D/A)	
Power supply voltage	24VDC (20.4VDC ~ 28.8VDC) (-15% ~ +20%)

Digital/Analog module (02D/A & 04D/A)	
Max. rated power consumption	02DA: 1.5W, 04DA: 3W, supply by external power source.
Connector	European standard removable terminal block (Pin pitch: 5mm)
Protection	Voltage output is protected by short circuit. Short circuit lasting for too long may cause damage on internal circuits. Current output can be open circuit.
Operation/storage temperature	Operation: 0°C~55°C (temperature), 5~95% (humidity), Pollution degree2 Storage: -25°C~70°C (temperature), 5~95% (humidity)
Vibration/shock immunity	International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/ IEC61131-2 & IEC 68-2-27 (TEST Ea)
Series connection to DVP-PLC MPU	The modules are numbered from 0 to 7 automatically by their distance from MPU. Max. 8 modules are allowed to connect to MPU and will not occupy any digital I/O points.

■ Functions Specifications

Digital/Analog module	Voltage output	Current output	
Range of analog output	-10V ~ 10V	0 ~ 20mA	4mA ~ 20mA
Range of digital conversion	-32,000 ~ +32,000	0 ~ +32,000	0 ~ +32,000
Max./Min. range of digital data	-32,768 ~ +32,767	0 ~ +32,767	-6,400 ~ +32,767
Hardware Resolution	14 bits	14 bits	14 bits
Max. output current	5mA	—	
Tolerance load impedance	1K Ω ~ 2M Ω	0 ~ 500 Ω	
Analog output channel	2 channels or 4 channels / each module		
Output impedance	0.5 Ω or lower		
Overall accuracy	$\pm 0.5\%$ when in full scale (25°C, 77°F) $\pm 1\%$ when in full scale within the range of 0 ~ 55°C (32 ~ 131°F)		
Response time	400 μ s / each channel		
Digital data format	2's complement of 16 bits		
Isolation method	Optical coupler isolation between analog circuits and digital circuits. No isolation among analog channels. 500VDC between digital circuits and Ground 500VDC between analog circuits and Ground 500VDC between analog circuits and digital circuits 500VDC between 24VDC and Ground		

■ Control Register

CR#	Attrib.		Register name	Explanation
#0	O	R	Model name	Set up by the system, model code: DVP02DA-E2 = H'0041; DVP04DA-E2 = H'0081
#1	O	R	Firmware version	Display the current firmware version in hex.
#2	O	R/W	CH1 output mode setting	Output mode: Default = H'0000. Take CH1 for example:

CR#	Attrib.		Register name	Explanation
#3	O	R/W	CH2 output mode setting	Mode 0 (H'0000): Voltage output ($\pm 10V$) Mode 1 (H'0001): Current output (0~+20mA)
#4	O	R/W	CH3 output mode setting	Mode 2 (H'0002): Current output (+4~+20mA)
#5	O	R/W	CH4 output mode setting	Mode -1 (H'FFFF): All channels are unavailable
#16	X	R/W	CH1 output signal value	Voltage output range: K-32,000~K32,000. Current output range: K0~K32,000. Default: K0. CR#18~CR#19 of DVP02DA-E2 are reserved.
#17	X	R/W	CH2 output signal value	
#18	X	R/W	CH3 output signal value	
#19	X	R/W	CH4 output signal value	
#28	O	R/W	Adjusted Offset value of CH1	Set the adjusted Offset value of CH1 ~ CH4. Default = K0 Definition of Offset: The corresponding voltage (current) input value when the digital output value = 0
#29	O	R/W	Adjusted Offset value of CH2	
#30	O	R/W	Adjusted Offset value of CH3	
#31	O	R/W	Adjusted Offset value of CH4	
#34	O	R/W	Adjusted Gain value of CH1	Set the adjusted Gain value of CH1 ~ CH4. Default = K16,000. Definition of Gain: The corresponding voltage (current) input value when the digital output value = 16,000
#35	O	R/W	Adjusted Gain value of CH2	
#36	O	R/W	Adjusted Gain value of CH3	
#37	O	R/W	Adjusted Gain value of CH4	
Adjusted Offset Value, Adjusted Gain Value: Note1: When using Mode 2, the channel do NOT provide setups for adjusted Offset or Gain value. Note2: When input mode changes, the adjusted Offset or Gain value automatically returns to defaults.				
#40	O	R/W	Function: Set value changing prohibited	Prohibit set value changing in CH1 ~ CH4. Default= H'0000.
#41	X	R/W	Function: Save all the set values	Save all the set values. Default =H'0000.
#43	X	R	Error status	Register for storing all error status. Refer to table of error status for more information.
#100	O	R/W	Function: Enable/Disable limit detection	Upper and lower bound detection, b0~b3 corresponds to CH1~CH4 (0: Disable/ 1: Enable). Default= H'0000.
#101	X	R/W	Upper and lower bound status	Display the upper and lower bound status. (0: Not exceed /1: Exceeds upper or lower bound value), b0~b3 corresponds to Ch1~Ch4 for lower bound detection result; b8~b11 corresponds to CH1~CH4 for upper bound detection result..
#102	O	R/W	Set value of CH1 upper bound	Set value of CH1~CH4 upper bound. Default = K32000.
#103	O	R/W	Set value of CH2 upper bound	
#104	O	R/W	Set value of CH3 upper bound	
#105	O	R/W	Set value of CH4 upper bound	Set value of CH1~CH4 lower bound. Default = K-32000.
#108	O	R/W	Set value of CH1 lower bound	
#109	O	R/W	Set value of CH2 lower bound	
#110	O	R/W	Set value of CH3 lower bound	
#111	O	R/W	Set value of CH4 lower bound	Set value of CH1~CH4 lower bound. Setting
#114	O	R/W	Output update time of CH1	

CR#	Attrib.	Register name	Explanation
#115	O R/W	Output update time of CH2	range:K0~K100. Default =H'0000.
#116	O R/W	Output update time of CH3	
#117	O R/W	Output update time of CH4	
#118	O R/W	LV output mode setting	Set the output mode of CH1~CH4 when the power is at LV (low voltage) condition. Default= H'0000.

Symbols:

O: When CR#41 is set to H'5678, the set value of CR will be saved.

X: set value will not be saved.

R: able to read data by using FROM instruction.

W: able to write data by using TO instruction.

※ CR#43: Error status value. See the table below:

Description					
bit0	K1 (H'1)	Power supply error	bit11	K2048(H'0800)	Upper / lower bound setting error
bit1	K2 (H'2)	Reserved	bit12	K4096(H'1000)	Set value changing prohibited
bit2	K4 (H'4)	Upper / lower bound error	bit13	K8192(H'2000)	Communication breakdown on next module
bit9	K512(H'0200)	Mode setting error			
<p>↗Note: Each error status is determined by the corresponding bit (b0 ~ b13) and there may be more than 2 errors occurring at the same time. 0 = normal; 1 = error</p>					

※ Module Reset (available for firmware V1.12 or above): When modules need reset, write H'4352 to CR#0, then wait for one second and then power off and restart. The instruction initializes all parameter setups. To avoid the resetting process affecting the normal operation of other modules, it is recommended to connect only one module at a time.

■ Explanation on Special Registers D9900~D9999

When DVP-ES2 MPU is connected with modules, registers D9900~D9999 will be reserved for storing values from modules. You can apply MOV instruction to operate values in D9900~D9999.

When ES2 MPU is connected with DVP02DA-E2/DVP04DA-E2, the configuration of special registers is as below:

Module #0	Module #1	Module #2	Module #3	Module #4	Module #5	Module #6	Module #7	Description
D1320	D1321	D1322	D1323	D1324	D1325	D1326	D1327	Model Code
D9900	D9910	D9920	D9930	D9940	D9950	D9960	D9970	CH1 output value
D9901	D9911	D9921	D9931	D9941	D9951	D9961	D9971	CH2 output value
D9902	D9912	D9922	D9932	D9942	D9952	D9962	D9972	CH3 output value
D9903	D9913	D9923	D9933	D9943	D9953	D9963	D9973	CH4 output value

■ Adjust D/A Conversion Curve

Users can adjust the conversion curves according to the actual needs by changing the Offset value (CR#28 ~ CR#31) and Gain value (CR#34 ~ CR#37).

Gain: The corresponding voltage/current input value when the digital output value = 16,000.

Offset: The corresponding voltage/current input value when the digital output value = 0.

- Equation for voltage output Mode0: $0.3125mV = 20V/64,000$

$$Y(V) = \left[\frac{X \times (\text{Gain} - \text{Offset})}{16000} + \text{Offset} \right] \times \left(\frac{10(V)}{32000} \right)$$

Y=Voltage output, X=Digital input

- Equation for current output Mode1: $0.625\mu\text{A} = 20\text{mA}/32,000$

$$Y(\text{mA}) = \left[\frac{X \times (\text{Gain} - \text{Offset})}{16000} + \text{Offset} \right] \times \left(\frac{20(\text{mA})}{32000} \right)$$

Y=Current output, X=Digital input

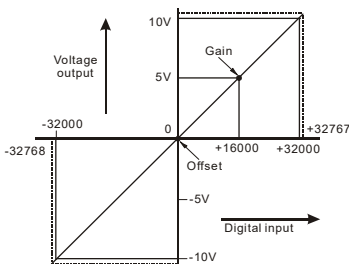
- Equation for current output Mode2: $0.5\mu\text{A} = 16\text{mA}/32,000$

Adopt the equation of current output mode 1, substitute Gain for 19,200(12mA) and Offset for 6,400(4mA)

$$Y(\text{mA}) = \left[\frac{X \times (19200 - 6400)}{16000} + 6400 \right] \times \left(\frac{20(\text{mA})}{32000} \right)$$

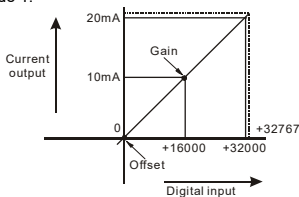
Y=Current output, X=Digital input

- Voltage output – mode 0:



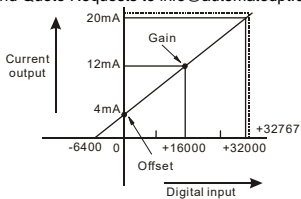
Mode 0 (CR#2 ~ CR#5)	-10V ~ +10V · Gain = 5V (16,000) · Offset = 0V (0)
Range of digital data	-32,000 ~ +32,000
Max./Min. range of digital data	-32,768 ~ +32,767

- Current output – mode 1:



Mode 1 (CR#2 ~ CR#5)	0mA ~ +20mA · Gain = 10mA (16,000) · Offset = 0mA (0)
Range of digital data	0 ~ +32,000
Max./Min. range of digital data	0 ~ +32,767

- Current output – mode 2:



Mode 2 (CR#2 ~ CR#5)	$4\text{mA} \sim +20\text{mA} \cdot \text{Gain} = 12\text{mA} (19,200) \cdot \text{Offset} = 4\text{mA} (6,400)$
Range of digital data	0 ~ +32,000
Max./Min. range of digital data	-6400 ~ +32,767