DELTA DVP04DA-H2 Analog Output Module Instruction Manual

Contents

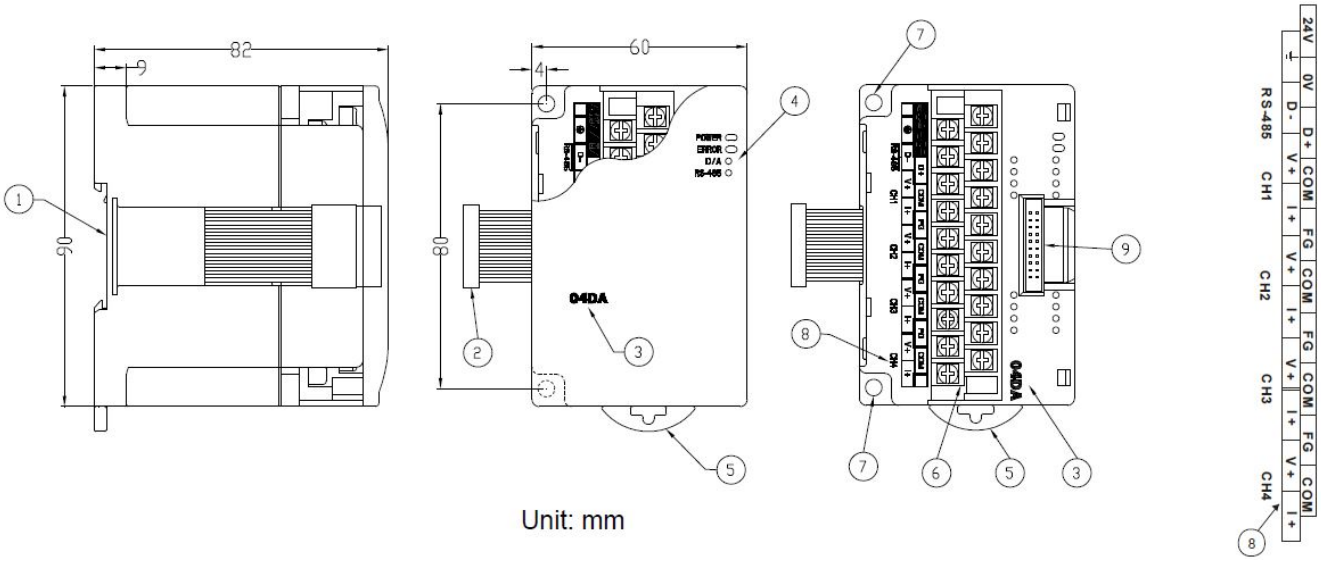
DELTA DVP04DA-H2 Analog Output Module

Warning

- DVP04DA-H2 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 DVP04DA-H2, or to prevent an accident from damaging DVP04DA-H2, the control cabinet in which DVP04DA-H2 is installed should be equipped with a safeguard. For example, the control cabinet in which DVP04DA-H2 is installed can be unlocked with a special tool or key.
- DO NOT connect AC power to any of I/O terminals, otherwise serious damage may occur. Please check all wiring again before DVP04DA-H2 is powered up. After DVP04DA-H2 is disconnected, Do NOT touch any terminals in a minute. Make sure that the ground terminal ⏚ on DVP04DA-H2 is correctly grounded in order to prevent electromagnetic interference.

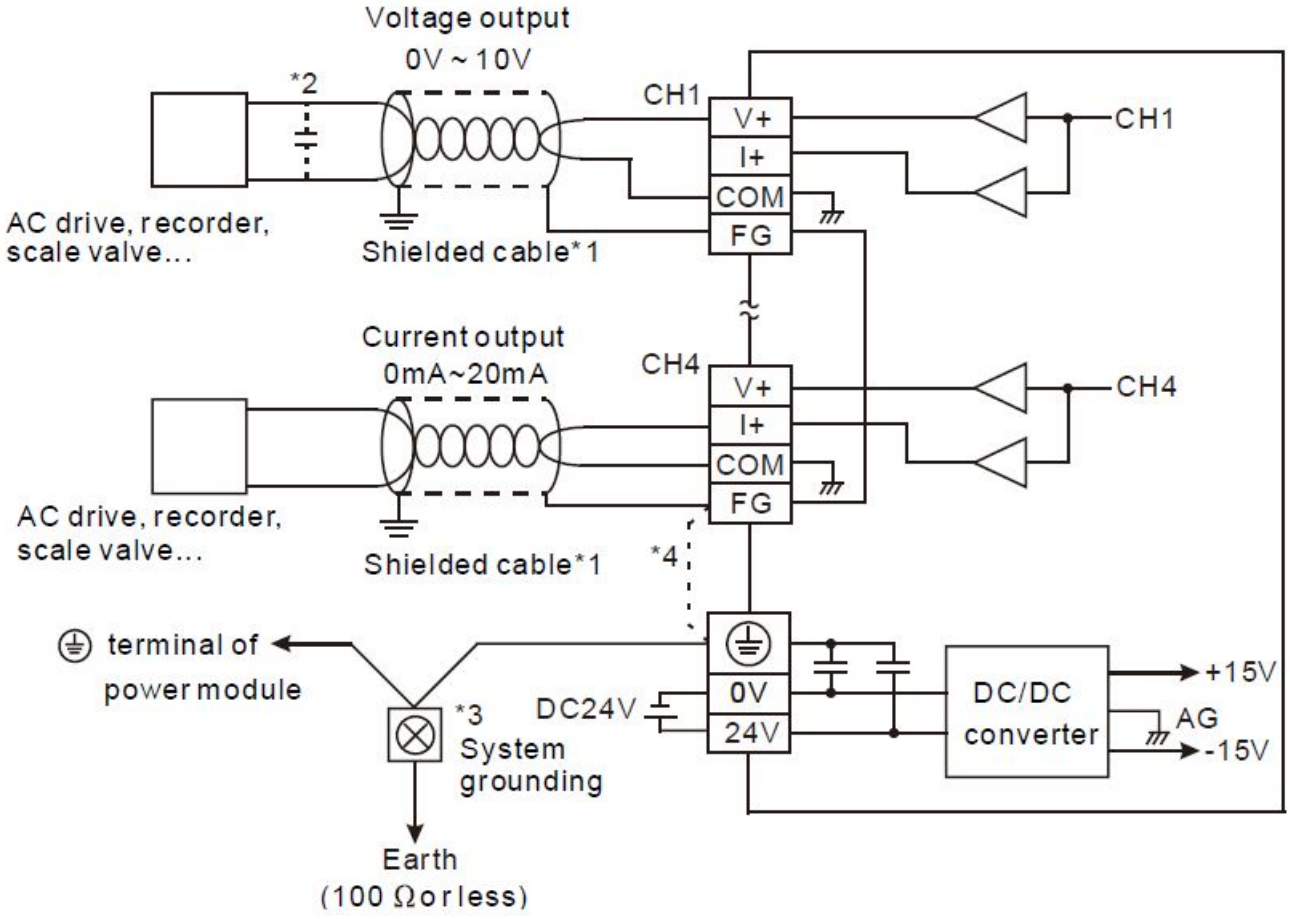
Introduction

- **Model Explanation & Peripherals**
  - Thank you for choosing Delta DVP series PLC. The data in DVP04DA-H2 can be read or written FROM/TO instructions given by the program of DVP-EH2 series MPU. The analog signal output module receives 4 groups of 12-bit digital data from PLC MPU and converts the data into 4 points of analog signals for output in either voltage or current.
  - You can select voltage or current output by wiring. Range of voltage output: 0V ~ +10V DC (resolution: 2.5mV). Range of current output: 0mA ~ 20mA (resolution: 5μA).
- **Product Profile (Indicators, Terminal Block, I/O Terminals)**



1. DIN rail (35mm)
2. Connection port for extension modules
3. Model name
4. POWER, ERROR, D/A indicator
5. DIN rail clip
6. Terminals
7. Mounting hole
8. I/O terminals
9. Mounting port for extension modules

External Wiring



- **Note 1:** When performing analog output, please isolate other power wirings.
- **Note 2:** If the ripples at the loaded input terminal are too significant that causes noise interference on the wiring, connect the wiring to 0.1 ~ 0.47μF 25V capacitor.
- **Note 3:** Please connect the  terminal on both the power modules and DVP04DA-H2 to the system earth point and ground the system contact or connect it to the cover of power distribution cabinet.
- **Note 4:** If there is much noise, please connect the terminal FG to the ground terminal.
- **Warning:** DO NOT wire empty terminals .

Specifications

Digital/Analog (4D/A) module	Voltage output	Current output
Power supply voltage	24V DC (20.4V DC ~ 28.8V DC) (-15% ~ +20%)	
Analog output channel	4 channels/module	
Range of analog output	0 ~ 10V	0 ~ 20mA
Range of digital data	0 ~ 4,000	0 ~ 4,000
Resolution	12 bits (1LSB = 2.5mV)	12 bits (1LSB = 5μA)
Output impedance	0.5Ω or lower	
Overall accuracy	±0.5% when in full scale (25°C, 77°F) ±1% when in full scale within the range of 0 ~ 55°C, 32 ~ 131°F	
Responding time	3ms × the number of channels	
Max. output current	10mA (1KΩ ~ 2MΩ)	–
Tolerable load impedance	–	0 ~ 500Ω
Digital data format	11 significant bits out of 16 bits are available; in 2’s complement.	
Isolation	Internal circuit and analog output terminals are isolated by optical coupler. No isolation among analog channels.	
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.	
Communication mode (RS-485)	Supported, including ASCII/RTU mode. Default communication format: 9600, 7, E, 1, ASCII; refer to CR#32 for details on the communication format. Note1: RS-485 cannot be used when connected to CPU series PLCs. Note2: Use extension module wizard in ISPSoft to search or modify the control register (CR) in the modules.	
When connected to DVP-PLC MPU in series	The modules are numbered from 0 to 7 automatically by their distance from MPU. No.0 is the closest to MPU and No.7 is the furthest. Maximum 8 modules are allowed to connect to MPU and will not occupy any digital I/O points.	

Other Specifications

Power supply	
Max. rated power consumption	24V DC (20.4V DC ~ 28.8V DC) (-15% ~ +20%), 4.5W, supplied by external power.
Environment	
Operation/storage	Operation: 0°C ~ 55°C (temperature); 5 ~ 95% (humidity); pollution degree 2 Storage : -25°C ~ 70°C (temperature); 5 ~ 95% (humidity)
Vibration/shock immunity	International standards: IEC 61131-2, IEC 68-2-6 (TEST Fc)/IEC 61131-2 & IEC 68-2 -27 (TEST Ea)

Control Registers

<table>
<tr><td colspan="2">CR RS-485
parameter Latched</td><td></td><td></td><td>Register content</td><td>b15</td><td>b14</td><td>b13</td><td>b12</td><td>b11</td><td>b10</td><td>b9</td><td>b8</td><td>b7</td><td>b6</td><td>b5</td><td>b4</td><td>b3</td><td>b2</td><td>b1</td><td>b0</td></tr>
<tr><td colspan="5">address</td></tr>
<tr><td>#0</td><td>H’4032</td><td>○</td><td>R</td><td>Model name</td><td colspan="16">Set up by the system. DVP04DA-H2 model code = H’6401.
The user can read the model name from the program and see if the extension module exists.</td></tr>
<tr><td>#1</td><td>H’4033</td><td>○</td><td>R/W</td><td>Output mode setting</td><td colspan="16">Reserved | CH4 | CH3 | CH2 | CH1
Output mode: Default = H’0000 Mode 0: Voltage output (0V ~ 10V) Mode 1: Voltage output (2V ~ 10V)
Mode 2: Current output (4mA ~ 20mA)
Mode 3: Current output (0mA ~ 20mA)</td></tr>
<tr><td colspan="21">CR#1: The working mode of the four channels in the analog input module. There are 4 modes for each channel which can be set up separately. For example, if the user needs to set up CH1: mode 0 (b2 ~ b0 = 000); CH2: mode 1 (b5 ~ b3 = 001), CH3: mode 2 (b8 ~ b6 = 010) and CH4: mode 3 (b11 ~ b9 = 011), CR#1 has to be set as H’000A and the higher bits (b12 ~
b15) have to be reserved. Default value = H’0000.</td></tr>
<tr><td>#6</td><td>H’4038</td><td>╳</td><td>R/W</td><td>CH1 output value</td><td colspan="16" rowspan="2"></td></tr>
<tr><td>#7</td><td>H’4039</td><td>╳</td><td>R/W</td><td>CH2 output value</td></tr>
</table>

#8	H'403A	╳	R/W	CH3 output value	Range of output value at CH1 ~ CH4: K0 ~ K4,000 Default = K0 (unit: LSB)
#9	H'403B	╳	R/W	CH4 output value	
#18	H'4044	○	R/W	Adjusted OFFSET value of CH1	Range of OFFSET at CH1 ~ CH4: K-2,000 ~ K2,000 Default = K0 (unit: LSB) Adjustable voltage-range: -2,000 LSB ~ +2,000 LSB Adjustable current-range: -2,000 LSB ~ +2,000 LSB Note: When modifying CR#1, adjusted OFFSET is changed to default.
#19	H'4045	○	R/W	Adjusted OFFSET value of CH2	
#20	H'4046	○	R/W	Adjusted OFFSET value of CH3	
#21	H'4047	○	R/W	Adjusted OFFSET value of CH4	
#24	H'404A	○	R/W	Adjusted GAIN value of CH1	Range of GAIN at CH1 ~ CH4: K0 ~ K4,000 Default = K2,000 (unit: LSB) Adjustable voltage-range: 0 LSB ~ +4,000 LSB Adjustable current-range: 0 LSB ~ +4,000 LSB Note: When modifying CR#1, adjusted GAIN is changed to default.
#25	H'404B	○	R/W	Adjusted GAIN value of CH2	
#26	H'404C	○	R/W	Adjusted GAIN value of CH3	
#27	H'404D	○	R/W	Adjusted GAIN value of CH4	

CR#18 ~ CR#27: Please note that: GAIN value – OFFSET value = +400LSB ~ +6,000 LSB (voltage or current). When GAIN – OFFSET is small (steep oblique), the resolution of output signal will be finer and variation on the digital value will be greater. When GAIN – OFFSET is big (gradual oblique), the resolution of output signal will be rougher and variation on the

digital value will be smaller.

<table>
<tr><td>#30</td><td>H’4050</td><td>╳</td><td>R</td><td>Error status</td><td>Register for storing all error status.
See the table of error status for more information.</td></tr>
<tr><td colspan="6">CR#30: Error status value (See the table below)
Note: Each error status is determined by the corresponding bit (b0 ~ b7) and there may be more than 2 errors occurring at the same time. 0 = normal; 1 = error.
Example: If the digital input exceeds 4,000, error (K2) will occur. If the analog output exceeds 10V, both analog input value error K2 and K32 will occur.</td></tr>
<tr><td>#31</td><td>H’4051</td><td>○</td><td>R/W</td><td>Communication address</td><td>For setting up RS-485 communication address.
Range: 01 ~ 254. Default = K1</td></tr>
<tr><td>#32</td><td>H’4052</td><td>○</td><td>R/W</td><td>Communication format</td><td>6 communication speeds: 4,800 bps /9,600 bps /19,200 bps / 38,400 bps /57,600 bps /115,200 bps. Data formats include:
ASCII: 7, E, 1/ 7,O,1 / 8,E,1 / 8,O,1 / 8,N,1 / 7,E,2 / 7,O,2 / 7,N,2 / 8,E,2 / 8,O,2 / 8,N,2
RTU: 8, E, 1 / 8,O,1 / 8,N,1 / 8,E,2 / 8,O,2 / 8,N,2
Default: ASCII,9600,7,E,1 CR#32=H‘0002
Please refer to✽CR#32 at the bottom of the page for more details.</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td><table><tr><td>Reserved</td><td>CH4</td><td>CH3</td><td>CH2</td><td>CH1</td></tr></table></td></tr>
</table>

#33	H’4053	○	R/W	Return to default; OFFSET/ GAIN tuning authorization	Default = H’0000. Take the setting of CH1 for example: 1. When b0 = 0, the user is allowed to tune CR#18 (OFFSET) and CR#24 (GAIN) of CH1. When b0 = 1, the user is not allowed to tune CR#18 (OFFSET) and CR#24 (GAIN) of CH1. 2. b1 represents whether the OFFSET/GAIN tuning registers are latched. b1 = 0 (default, latched); b1 = 1 (non-latched). 3. When b2 = 1, all settings will return to default values. (except CR#31, CR#32)
CR#33: For authorizations on some internal functions, e.g. OFFSET/GAIN tuning. The latched function will store the output setting in the internal memory before the power is cut off.					
#34	H’4054	○	R	Firmware version	Displaying the current firmware version In hex; e.g. version 1.0A is indicated as H’010A.
#35 ~ #48					For system use.
Symbols: ○ : Latched (when written in through RS-485 communication); ╳: Non-latched; R: Able to read data by FROM instruction or RS-485 communication; W: Able to write data by TO instruction or RS-485 communication. LSB (Least Significant Bit): For voltage output: 1LSB = 10V/4,000 = 2.5mV. For current output: 1LSB = 20mA/4,000 = 5μA.					

- **Reset Module (Firmware V4.06 or above):** Having connected the external power 24V, write the reset code H’4352 in CR#0, then disconnect and reboot to complete the setup.
- **CR#32 Communication Format Setting:**

- **Firmware V4.04 (and lower):** Data format (b11~b8) is not available, ASCII format is 7, E, 1 (code H'00xx), RTU format is 8, E, 1 (code H'C0xx/H'80xx).
- **Firmware V4.05 (and higher):** Refer to the following table for setup. For new communication format, please take note that modules in the original setting code H'C0xx/H'80xx is to 8E1 for RTU.

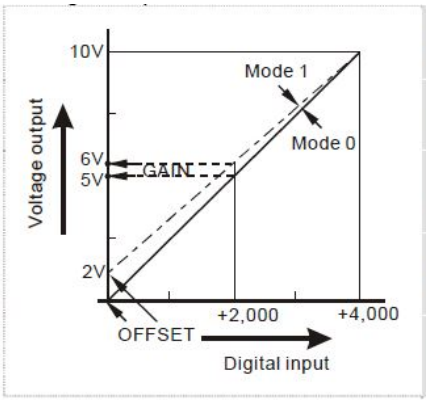
b15 ~ b12		b11 ~ b8				b7 ~ b0	
ASCII/RTU & High/Low Bit Exchange of CRC		Data Format				Communication Speed	
Description							
H'0	ASCII	H'0	7,E,1*1	H'6	7,E,2*1	H'01	4800 bps
H'8	RTU, No High/Low Bit Exchange of CRC	H'1	8,E,1	H'7	8,E,2	H'02	9600 bps
		H'2	–	H'8	7,N,2*1	H'04	19200 bps
H'C	RTU, High/Low Bit Exchange of CRC	H'3	8,N,1	H'9	8,N,2	H'08	38400 bps
		H'4	7,O,1*1	H'A	7,O,2*1	H'10	57600 bps
		H'5	8.O,1	H'B	8,O,2	H'20	115200 bps

Ex: To setup 8N1 for RTU (High/Low Bit Exchange of CRC), communication speed is 57600 bps, write H'C310 in CR #32.
Note *1. Supports ASCII mode ONLY.
CR#0 ~ CR#34: The corresponding parameter addresses H'4032 ~ H'4054 are for users to read/write data by RS-485 communication. When using RS-485, the user has to separate the module with MPU first.

1. Function: H'03 (read register data); H'06 (write 1 word datum to register); H'10 (write many word data to register).
2. Latched CR should be written by RS-485 communication to stay latched. CR will not be latched if written by MPU through TO/DTO instruction.

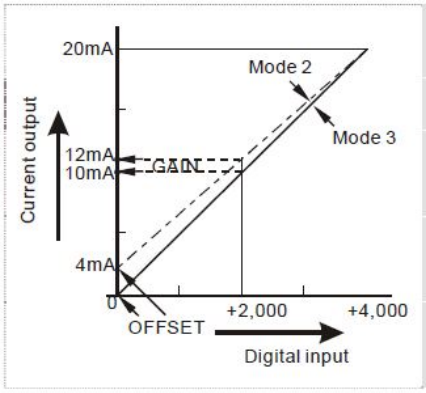
Adjusting D/A Conversion Curve

Voltage output mode



CR#1 mode 0	GAIN = 5V (2,000$_{LSB}$). OFFSET = 0V (0$_{LSB}$).
CR#1 mode 1	GAIN = 6V (2,400$_{LSB}$). OFFSET = 2V (800$_{LSB}$).
GAIN	The voltage output value when the digital input value = K2,000. Range: 0$_{LSB}$ ~ +4,000$_{LSB}$.
OFFSET	The voltage output value when the digital input value = K0. Range: -2,000$_{LSB}$ ~ +2,000$_{LSB}$.
GAIN - OFFSET	Range: +400$_{LSB}$ ~ +6,000$_{LSB}$.

Current output mode



CR#1 mode 2	GAIN = 12mA (2,400$_{LSB}$). OFFSET = 4mA (800$_{LSB}$).
CR#1 mode 3	GAIN = 10mA (2,000$_{LSB}$). OFFSET = 0mA (0$_{LSB}$).
GAIN	The current output value when the digital input value = K2,000. Range: 0$_{LSB}$ ~ +4,000$_{LSB}$.
OFFSET	The current output value when the digital input value = K0. Range: -2,000$_{LSB}$ ~ +2,000$_{LSB}$.
GAIN - OFFSET	Range: +400$_{LSB}$ ~ +6,000$_{LSB}$.

Documents / Resources

	DELTA DVP04DA-H2 Analog Output Module [pdf] Instruction Manual DVP04DA-H2, DVP04DA-H2 Analog Output Module, Analog Output Module, Output Module