

DVP01HC-H2 High-Speed Counter Module

Instruction Sheet

Warning

- Switch off the power when wiring.
- DVP01HC-H2 is an OPEN TYPE device and therefore should be installed in an enclosure free of airborne dust, humidity, electric shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required for opening the enclosure) in case danger and damage on the device may occur.
- DO NOT connect AC input power supply to any of the I/O terminals; otherwise, serious damage may occur. Check all the wiring again before switching on the power.

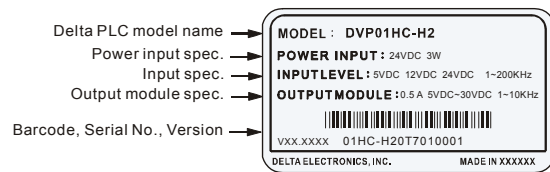
1 Introduction

1.1 Model Explanation and Peripherals

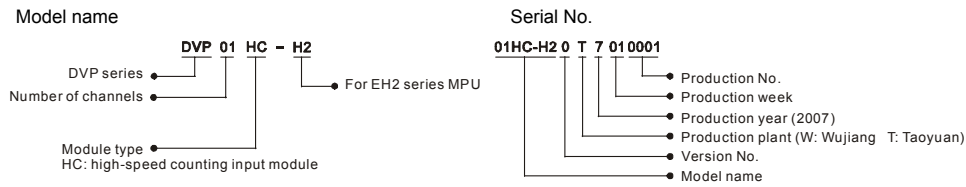
DVP01HC-H2 hardware high-speed counting input module is able to accept external counting pulse signals of 200KHz. DVP-EH2 series MPU writes or reads the data in DVP01HC-H2 through FROM/TO instructions. There are 33 16-bit control registers (CR) in DVP01HC-H2. The 32-bit parameters are composed of 2 continuous control registers. The module can execute itself after the control registers in the module are set up.

- The program of MPU can designate the counting mode (1-phase, 2-phase, 16-bit or 32-bit) by writing TO instruction into the control register in the module. When you wire, be sure to connect 24V, A24+, B24+, P24+, D24+, A12+, B12+, A5+, B5+, P5+ and D5+ to the positive potential, and -, PRE-, DIS-, A- and B- to the negative potential.
- The source of input signals can be a 1-phase or 2-phase encoder. The voltage level can be 5V, 12V or 24V. In addition, DVP01HC-H2 offers instruction input terminal (PRESET) and disabling counting instruction input terminal (DISABLE) for setting up the initial value.
- DVP01HC-H2 has 2 output points, YH0 and YH1. When the present value in the hardware high-speed counter equals the set value, the corresponding output point will start to execute. The transistors of the output points are independent and isolated.

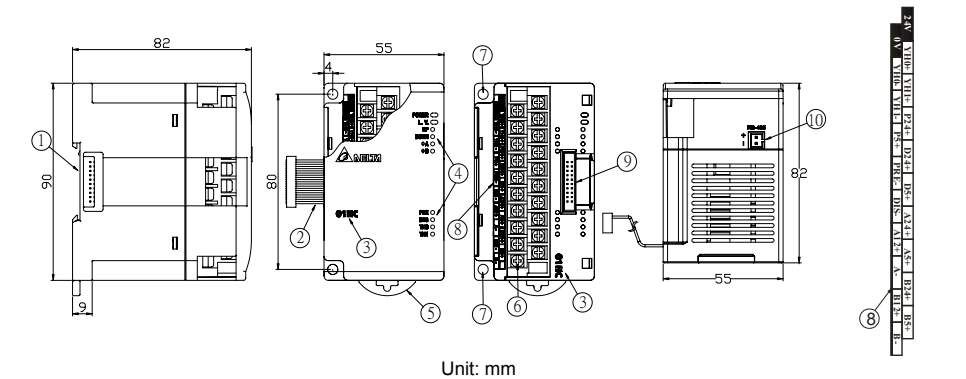
Nameplate Explanation



Model/Serial No. Explanation



1.2 Product Profile and Outline

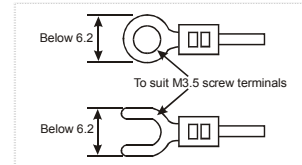


- | | |
|---|---|
| ① DIN rail (35mm) | ⑥ Terminals |
| ② Extension unit/extension module connection port | ⑦ Mounting hole |
| ③ Model name | ⑧ I/O terminals |
| ④ POWER, RUN, ERROR indicators | ⑨ Extension unit/extension module mounting port |
| ⑤ DIN rail clip | ⑩ RS-485 communication port |

LED Indicators

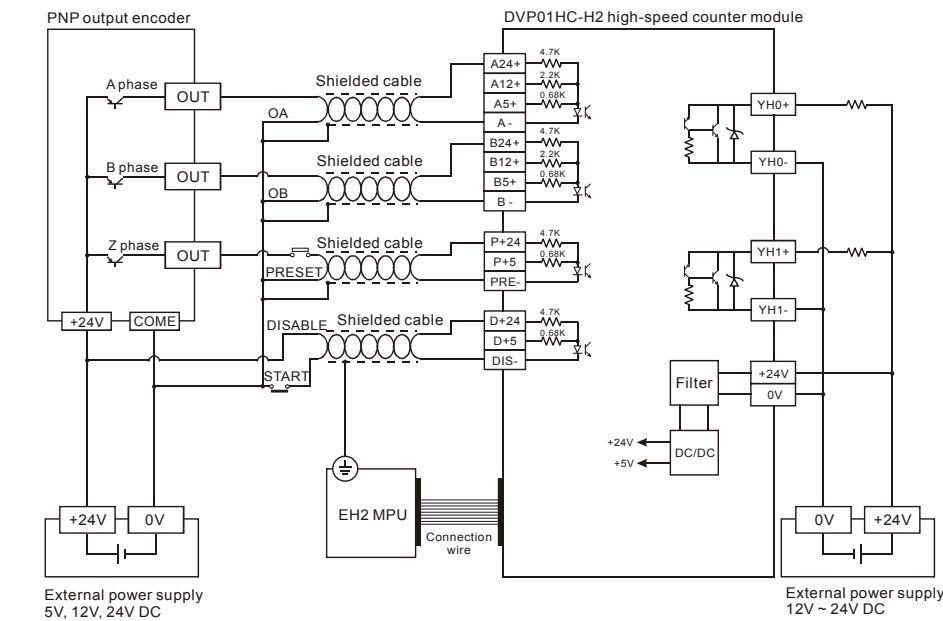
POWER	Power indicator. On when there is external +24V power input
L.V.	Low voltage indicator. On when the external power input is lower than 19V
UP	Counting up indicator
DOWN	Counting down indicator
φ A	On when input point A is On
φ B	On when input point B is On
PRE	Preset indicator. On when the external terminal (PRE) is On
DIS	Disable indicator. On when the external terminal (DIS) is On
YH0 - YH1	On when output points YH0 and YH1 are On

1.3 Wiring



- Use O-type or Y-type terminal. See the figure in the left for its specification. The PLC terminal screws should be tightened to 5 ~ 8 kg-cm (4.3 ~ 6.9 in-lbs).
- DO NOT place the I/O signal wires and power supply wire in the same wiring circuit.
- Use only 60/75°C copper conductor.

External Wiring



Note:

- If you are using a NPN output encoder, make sure the polarity of the terminal to be wired with the input terminal on DVP01HC-H2 is correct.
- The start-up current for DVP01HC-H2 $I_{PEAK} = 0.8A$; normal working current $I_{MAX} = 0.2A$ (the input voltage is set as +24V).

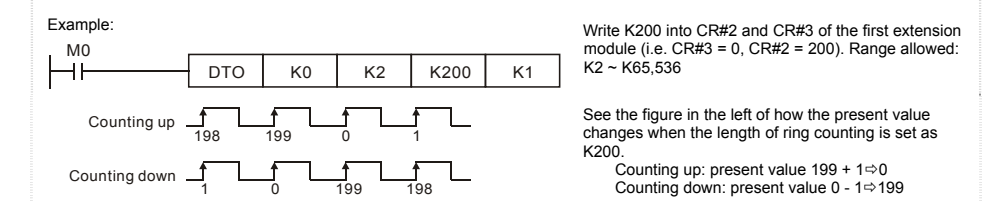
2 Function Specifications

Item	1-phase input		2-phase (A, B) input		
	1 input	2 inputs	Normal frequency	Double frequency	4 times frequency
Voltage level	Terminals [A24+], [B24+]: DC24V ±10% Terminals [P24+], [D24+]: DC12V ~ 24V ±10% Terminals [A12+], [B12+]: DC12V ±10% Terminals [A5+], [B5+], [P5+], [D5+]: DC5V ±10% Select only one suitable voltage level for each "+" signal.				
Max. counting frequency	200KHz	200KHz	200KHz	100KHz	50KHz
Pulse form	<p>t1: time of rising/falling ≤ 0.8us t2: On/Off pulse width ≥ 2.5us t3: Phase difference between A- and B- phase ≥ 1us PRESET input: Input pulse width ≥ 50us DISABLE input: Input pulse width ≥ 50us</p>				

Item	1-phase input		2-phase (A, B) input		
	1 input	2 inputs	Normal frequency	Double frequency	4 times frequency
Counting spec.	Mode	There are 3 counting modes: Counting up/down (A-/B- phase, 2-phase 2 inputs), forward/reverse pulse (1-phase 2 inputs) and counting pulse/direction (1-phase 1 input)			
	Range	32-bit mode: -2,147,483,648 ~ +2,147,483,647 16-bit mode: 0 ~ 65,536 (Upper limit is set in CR#2, 3)			
	Comparison method	There are 3 comparison values corresponding to 2 output points, YH0 and YH1. When the present value = set value, the output point will be On by real-time hardware circuit comparison and output settings.			
Output signal	Output type	YH0+: Output point YH0; transistor: collector YH0-: Output point YH0; transistor: emitter YH1+: Output point YH1; transistor: collector YH1-: Output point YH1; transistor: emitter			
	Output	5V ~ 30V DC, 0.5A			
Series connection with DVP-PLC		The modules are numbered from 0 to 7 automatically by their distance from the MPU. Max. 8 modules are allowed to connect to the MPU and will not occupy any digital I/O points.			

3 Control Registers

DVP-01HC high-speed counting module						
CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#0	H 415E		○	R	Model name	Set up by the system, read only. DVP01HC-H2 model code = H'6120
#1	H 415F		×	R/W	Counting up/down	Range: 0 ~ 1 (Default = K0) 1-phase 1 input (internal CR) counting up/down setting Up: 0, Down: 1
#3	#2 H 4160		×	R/W	Length of ring counting	16-bit counting mode, default = K65, 536



Note:

- Write in values in 32-bit.
- Writing in values is only allowed when the value to be written in is bigger than or equals the present value.
- The setting up is only allowed when the counter stops counting and the counting mode is a 16-bit one.

CR#						
HW	LW	Address	Latched	Attribute	Content	Description
#4	H 4162		×	R/W	Instruction	Instruction (Default = K0)

CR#4	'0' (Off)	'1' (On)
b0	Counting disabled	Counting enabled
b1	YH0 output disabled	YH0 output enabled
b2	YH1 output disabled	YH1 output enabled
b3	YH0/YH1 enabled independently	YH0/YH1 enabled interactively
b4	Preset disabled	Preset enabled
b5 ~ b7	Reserved	
b8	N/A	Reset error flag
b9	N/A	Reset YH0 output
b10	N/A	Reset YH1 output
b11	N/A	Set up YH0 output
b12	N/A	Set up YH1 output
b13 ~ b15	Reserved	

- When b0 is set as 1, terminal DIS will be Off. The counter will allow input pulse signals.
- When b1 is set as 1, YH0 hardware comparison output will be enabled.
- When b2 is set as 1, YH1 hardware comparison output will be enabled.
- When b3 is set as 1, YH0 and YH1 outputs will be interlocked, i.e. when YH0 = On, YH1=Off and when YH1 = On, YH0 = Off. When b3 is set as 0, YH0 and YH1 outputs will work independently.
- When b4 is set as 0, terminal PRE will be disabled.
- When b8 is set as 1, all error flags (CR#29) will be reset.
- When b9 is set as 1, YH0 output will be reset to Off.
- When b10 is set as 1, YH1 output will be reset to Off.
- When b11 is set as 1, YH0 output will be set as On.
- When b12 is set as 1, YH1 output will be set as On.

Note:

- After setting up CR#4 is completed, b8 ~ b12 will be automatically reset to 0.
- Before setting up the counting mode in CR#5, you have to disable the counting first (set b0 as 0).

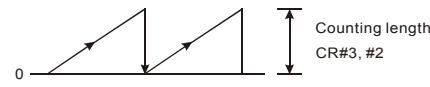
CR#						
HW	LW	Address	Latched	Attribute	Content	Description
#5	H 4163		×	R/W	Counting mode	Range: K0 ~ K11 (Default = K0)

Counting mode		Setting of CR#5	
		32-bit	16-bit
2-phase 2 inputs	Normal frequency	K0	K1
	Double frequency	K2	K3
	4 times frequency	K4	K5
1-phase 2 inputs	Counting up/down (forward/reverse pulses)	K6	K7
1-phase 1 input	Counting up/down (external input control) *1	K8	K9
	Counting up/down (internal CR)*2	K10	K11

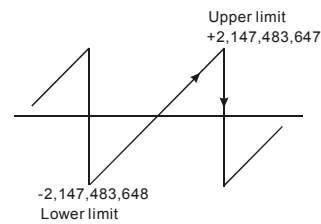
*1: Counting up/down is controlled by external input.

*2: Counting up/down is controlled by internal control register CR#1.

16-bit counting mode
When in 16-bit counting mode, all present values are positive value. Range: 0 ~ 65,536. When overflow occurs during the counting, the present value will turn from upper limit to 0, or 0 to upper limit. The upper limit is set by CR#2, CR#3.



32-bit counting mode
When in 32-bit counting mode, the counting range will be -2,147,483,648 ~ 2,147,483,647. When overflow occurs during the counting, the present value will turn from upper limit to lower limit, or lower limit to upper limit. The upper limit is fixed as +2,147,483,647, and lower limit -2,147,483,648.



Note:

- CR#5 can only be written in when the counter is disabled (bit0 of CR#4 = 0).
- After CR#5 is written, some CRs will be initialized, i.e. CR#1: 0; CR#2, 3: 65,536; CR#10: 0; CR#12, 13: 32,767; CR#14, 15: 32,767; CR#20, 21: 0; CR#22, 23: 0; CR#24, 25: 0.

1-phase 1 input (K8 ~ K11)

Counting up/down controlled by external input (K8 ~ K9)

1-phase 2 inputs (K6 ~ K7)

Counting up/down controlled by internal CR (K10 ~ K11)

1-phase 2 input counting (K6 ~ K7)

2-phase 2 inputs (K0 ~ K5)

Normal frequency (K0 ~ K1)

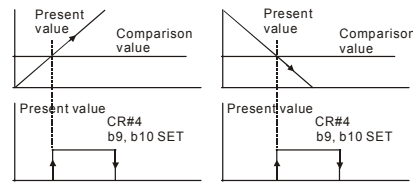
Double frequency (K2 ~ K3)

4 times frequency (K4 ~ K5)

CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#6 ~ #9		Reserved				
#11	#10	H4168	X	R/W	Preset value	Preset value in the counter (Default = K0) <i>Note: Writing in preset value in 16-bit mode will clear CR#11 to 0.</i>
#13	#12	H416A	X	R/W	YH0 comparison value	YH0 output comparison value (Default = K32,767) <i>Note: Writing in YH0 comparison value in 16-bit mode will clear CR#13 to 0.</i>
#15	#14	H416C	X	R/W	YH1 comparison value	YH1 output comparison value (Default = K32,767) <i>Note: Writing in YH1 comparison value will clear CR#15 to 0.</i>

When the present value in the counter equals the set comparison value, YH0/YH1 output will be On and latched. You can use b9 and b10 of CR#4 to clear the output points.

If you use PRESET or TO instruction to make the present value equal the comparison value, YH0/YH1 output will be Off. Only when the counting (+1 or -1) occurs will the present value be compared with the set value. When the two values are equal, the output point will immediately be On.



CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#16 ~ #19		Reserved				
#21	#20	H4172	X	R/W	Present value in counter	Default = K0 <i>Note:</i> 1. Write in values in 32-bit. 2. In the 16-bit mode, the value written in has to be smaller than the length of ring counting in CR#2. 3. In the 16-bit mode, writing in present value will clear CR#21 to 0.
#23	#22	H4174	X	R/W	Max. present value	Default = K0
#25	#24	H4176	X	R/W	Min. present value	Default = K0
#26	H4178	X	R		Comparison result	-

CR#26	'0' (Off)	'1' (On)	CR#26	'0' (Off)	'1' (On)
YH0	b2	SV ≤ PV	YH1	b6	SV ≤ PV
	b1	SV ≠ PV		b5	SV ≠ PV
	b0	SV ≥ PV		b4	SV ≥ PV

PV: present value; SV: set value

CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#27	H4179	O	R	Action status	Counting up/down indication, On/Off status of terminals	

CR#27	'0' (Off)	'1' (On)	CR#27	'0' (Off)	'1' (On)
b0	-	Counting up	b4	PRE input Off	PRE input On
b1	-	Counting down	b5	DIS input Off	DIS input On
b2	A input Off	A input On	b6	YH0 input Off	YH0 input On
b3	B input Off	B input On	b7	YH1 input Off	YH1 input On

CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#29	H417B	X	R/W	Errors	Register for storing all errors. See the table below for information of errors.	

CR#29		Error			
b0 ~ b3		Reserved			
b4		CR# designated by FROM/TO instruction exceeds the range.			
b5		Overflow when the present value in counting up exceeds the upper limit (upper limit for 16-bit mode in CR#2, 3; upper limit for 32-bit mode is K2,147,483,647)			
b6		Overflow when the present value in counting down falls below the lower limit (lower limit for 16-mode is 0; lower limit for 32-bit mode is K-2,147,483,648)			
b7 ~ b15		Reserved			

CR#		Address	Latched	Attribute	Content	Description
HW	LW					
#30	H417C	O	R	Firmware version	Displaying the current firmware version in hex	
#31	H417D	O	R/W	Communication address	For setting up RS-485 communication address Range: 01 ~ 254 (Default = K1)	
#32	H417E	O	R/W	Baud rate	For setting up communication speed: 4,800/9,600/19,200/38,400/57,600 bps ASCII data format: 7-bit, even bit, 1 stop bit (7, E, 1) RTU data format: 8-bit, even bit, 1 stop bit (8, E, 1) b0: 4,800 bps b1: 9,600 bps (default) b2: 19,200 bps b3: 38,400 bps b4: 57,600 bps b5 ~ b14: reserved b15: ASCII/RTU mode switch	

CR#0 ~ CR#32 :

The corresponding parameter addresses H415E ~ H417E are for users to read/write data by RS-485 communication.

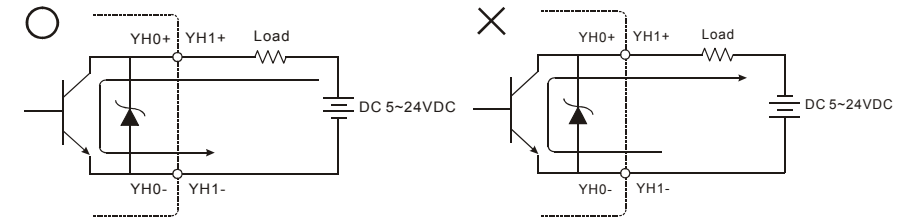
- Communication baud rate: 4,800/9,600/19,200/38,400/57,600 bps.
- Modbus ASCII/RTU communication protocols: ASCII data format (7-bit, even bit, 1 stop bit (7, E, 1)); RTU data format (8-bit, even bit, 1 stop bit (8, E, 1)).
- Function: 03H (read register data); 06H (write 1 word datum to register); 10H (write many word data to register).

4 Trial Operation & Troubleshooting

Connecting MPU with DVP01HC-H2

Switch off the power of the MPU and DVP01HC-H2 when wiring.

- Open the connection port on DVP-EH2 MPU and connect DVP01HC-H2 with DVP-EH2 by a connection wire. All extension modules for DVP-EH2 series MPU can be connected in series without a particular connection sequence.
- DVP01HC-H2 has to be connected to an external +24V DC power supply.
- Check if the load circuit of output points YH0 and YH1 work normally before switching on the power. Connect a Zener diode between YH0+ and YH0- and YH1+ and YH1- inside DVP01HC-H2 in parallel. Incorrectly connecting the parity of YH0+ and YH0- will result in the circuit being On and unexpected outcomes.



- Check if the circuits of A phase and B phase are correctly connected to the input terminals of voltage level (+24V, +12V and +5V) before switching on the power. Connecting +24V signal to the +5V input terminal may result in malfunction of the internal circuit.
- After the MPU is powered, it will start to detect the extension module. If there is no +24V DC input to DVP01HC-H2, or the power is supplied after the detection from the MPU is completed, the MPU will detect the existence of the extension module through bus. However, because of being in low voltage status, DVP01HC-H2 will not be able to execute counting.
- Maximum 8 extension modules (DI/DO modules not included) are allowed to be connected to DVP-EH2 series MPU. When the power is switched on, DVP-EH2 will store the codes of the connected modules into D1320 ~ D1327 in order. The model code of DVP01HC-H2 is H6120. HPP or other monitoring software will check the special D corresponding to H6120 to see if the connection is in normal status.

Troubleshooting

- Power indication: When the MPU is powered, the POWER indicator on the front panel of DVP01HC-H2 will be On (green). That the indicator is not On indicates that the 24V DC power supply from DVP01HC-H2 is too big. Please prepare a 24V DC power supplier.
- Low voltage indication: When the L.V. indicator on DVP01HC-H2 is On, it indicates that the input voltage for DVP01HC-H2 is insufficient. DVP01HC-H2 will not be enabled at this time.

5 Control Registers for Counting Modes

CR#		Parameter	Counting mode		
Hi word	Lo word		Normal counting	Ring counting (16-bit)	Comparison output
-	#1	Counting up/down	⊙	⊙	⊙
#3	#2	Length of ring counting	-	⊙	-
-	#4	Instruction	⊙	⊙	⊙
-	#5	Counting mode	⊙	⊙	⊙
#13	#12	YH0 comparison value	-	-	⊙
#15	#14	YH1 comparison value	-	-	⊙

⊙ refers to the control register in the counting mode.

How to set up counting modes

- Make sure CR#4 is set as DISABLE, and there is no pulse input.
- Set the parameters for the counting mode (e.g. set up CR#1 ~ CR#15, except for CR#4).
- Set CR#4 as ENABLE and start the counting.

Note:

- After CR#4 or CR#5 is set up, we suggest you wait for 1ms to ensure the setup is completed.
- DO NOT modify the counting mode and parameter when DVP01HC-H2 is in counting status.
- To modify the counting or setting, reset the setting in "DISABLE" status.