DVP-*SV*/*SV2*

Instruction Sheet

安　　裝　　說　　明
安　　裝　　说　　明

Compact, Multi-Functional, Multiple Instructions
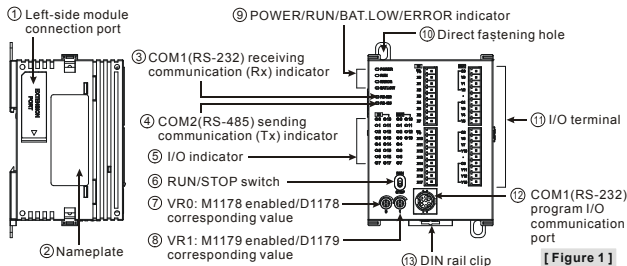微型·多功能·豐富指令集
微型·多功能·丰富指令集

△ ▲ELTA

Thank you for choosing Delta DVP-SV[#1]/DVP-SV2[#1]. The SV/SV2 is a 28-point (16 inputs + 12 outputs)/24-point (10 inputs + 12 outputs + 2 analog input channels) PLC MPU, offering various instructions and with 16k (SV)/30k (SV2) steps program memory, able to connect to all Slim type series extension models, including digital I/O (max. 512 points), analog modules (for A/D, D/A conversion and temperature measurement) and all kinds of high-speed extension modules. 4 groups of high-speed (200 kHz) pulse outputs (and two axes which generate 10 kHz outputs in 24SV2) and 2 two-axis interpolation instructions satisfy all kinds of applications. DVP-SV/SV2 is small in size and easy to install.
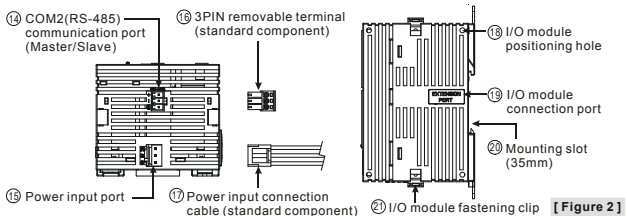
Note #1: DVP28SV11R/T is represented by SV, and DVP24SV11T2 and DVP28SV11R2/T2/S2 are represented by SV2.

- EN ✗ DVP-SV/SV2 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 DVP-SV/SV2, or to prevent an accident from damaging DVP-SV/SV2, the control cabinet in which DVP-SV/SV2 is installed should be equipped with a safeguard. For example, the control cabinet in which DVP-SV/SV2 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 DVP-SV/SV2 is powered up. After DVP-SV/SV2 is disconnected, Do NOT touch any terminals in a minute. Make sure that the ground terminal ⊕ on DVP-SV/SV2 is correctly grounded in order to prevent electromagnetic interference.
- FR ✗ DVP-SV/SV2 est un module OUVERT. Il doit être installé que dans une enceinte protectrice (boitier, 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 la protection).
- FR ✗ Ne pas appliquer la tension secteur sur les bornes d'entrées/Sorties, ou l'appareil DVP-SV/SV2 pourra être endommagé. Merci de vérifier encore une fois le câblage avant la mise sous tension du DVP-SV/SV2. 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

① Left-side module connection port
② Nameplate
③ COM1(RS-232) receiving communication (Rx) indicator
④ COM2(RS-485) sending communication (Tx) indicator
⑤ I/O indicator
⑥ RUN/STOP switch
⑦ VR0: M1178 enabled/D1178 corresponding value
⑧ VR1: M1179 enabled/D1179 corresponding value
⑨ POWER/RUN/BAT.LOW/ERROR indicator
⑩ Direct fastening hole
⑪ I/O terminal
⑫ COM1(RS-232) program I/O communication port
⑬ DIN rail clip

[Figure 1]

⑭ COM2(RS-485) communication port (Master/Slave)
⑮ Power input port
⑯ 3PIN removable terminal (standard component)
⑰ Power input connection cable (standard component)
⑱ I/O module positioning hole
⑲ I/O module connection port
⑳ Mounting slot (35mm)
㉑ I/O module fastening clip

[Figure 2]

■ **Electrical Specifications**

| Item \ Model	DVP28SV11R	DVP28SV11R2	DVP28SV11T	DVP24SV11T2 DVP28SV11T2	DVP28SV11S2
Power supply voltage	24VDC (-15% ~ 20%) (with counter-connection protection on the polarity of DC input power)				
Inrush current	Max. 2.2A@24VDC				
Fuse capacity	2.5A/30VDC, Polyswitch				
Power consumption	6W				
Insulation resistance	> 5MΩ (all I/O point-to-ground: 500VDC)				
Noise immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8kV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2kV, Digital I/O: 1kV, Analog & Communication I/O: 1kV Damped-Oscillatory Wave: Power Line: 1kV, Digital I/O: 1kV RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m				
Grounding	The diameter of grounding wire shall not be less than that of the wiring terminal of the power. (When PLCs are in use at the same time, please make sure every PLC is properly grounded.)				
Operation / storage	Operation: 0ºC ~ 55ºC (temperature); 5 ~ 95% (humidity); pollution degree 2 Storage: -25ºC ~ 70ºC (temperature); 5 ~ 95% (humidity)				
Agency approvals	UL508 European community EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC				
Vibration / shock immunity	International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)				
Weight (g)	260	260	240	240	230

Input Point				
Items \ Spec.	24VDC single common port input			
		200kHz	20kHz	10kHz
Input No.		X0, X1, X4, X5	X10, X11, X14, X15	X2, X3, X6, X7, X12, X13, X16, X17
Input voltage (±10%)		24VDC, 5mA		
Input impedance		4.7kΩ	3.3kΩ	4.7kΩ
Action level	Off→On	> 4mA (16.5V)	> 6mA (18.5V)	> 4mA (16.5V)
	On→Off	< 1.5mA (8V)	< 2.2mA (8V)	< 1.5mA (8V)
Response time	Off→On	< 150ns	< 3.5µs	< 8µs
	On→Off	< 3µs	< 20µs	< 60µs
Filter time		Adjustable within 10 ~ 60ms by D1020, D1021 (Default: 10ms)		

Note: 24SV2 does not support X12~X17.

Output Point				
Items \ Spec.		Relay	Transistor	
			High-speed	Low-speed
Output No.		Y0 ~ Y7, Y10 ~ Y13	Y0 ~ Y4, Y6	Y5, Y7, Y10 ~ Y13
Max. frequency		1Hz	200kHz	10kHz
Working voltage		250VAC, < 30VDC	5 ~ 30VDC [#1]	
Max. load	Resistive	1.5A/1 point (5A/COM)	0.3A/1 point @ 40˚C	
Max. load	Inductive	[#2]	9W (30VDC)	
	Lamp	20WDC/100WAC	1.5W (30VDC)	
Response time	Off→On	Approx. 10ms	0.2µs	20µs
	On→Off		0.2µs	30µs

#1: For a PNP output model, UP and ZP must be connected to a 24VDC (-15% ~ +20%) power supply. The rated consumption is 10mA/point.

#2: Life curves
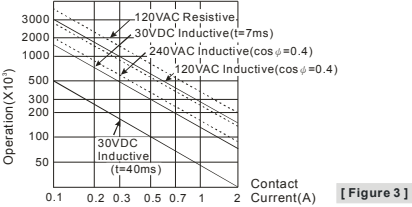
[Figure 3]

Specifications for analog inputs (Only applicable to DVP24SV11T2)		
	Voltage input	Current input
Analog input range	0 ~ 10V	0 ~ 20mA
Digital conversion range	0 ~ 4,000	0 ~ 2,000
Resolution	12-bit (2.5mV)	11-bit (10uA)
Input impedance	> 1MΩ	250Ω
Overall accuracy	±1% of full scale within the range of PLC operation temperature	
Response time	2ms (It can be set by means of D1118.)[#1]	
Absolute input range	±15V	±32mA
Digital data format	16-bit 2's complement (12 significant bits)	16-bit 2's complement (11 significant bits)
Average function	Provided (It can be set by means of D1062)[#2]	
Isolation method	No isolation between digital circuits and analog circuits	

#1: If the scan cycle is longer than 2 milliseconds or greater than the setting value, the scan cycle is given preference.
#2: If the value in D1062 is 1, the present value is read.

■ I/O Configuration

Model	Power	Input		Output		I/O configuration			
		Point	Type	Point	Type	Relay	Transistor (NPN) 28SV	Transistor (NPN) 24SV2	Transistor (PNP)
DVP28SV11R	24 VDC	16	DC (Sink Or Source)	12	Relay				
DVP28SV11R2		16		12	Relay				
DVP28SV11T		16		12	Transistor (NPN)				
DVP28SV11T2		16		12	Transistor (NPN)				
DVP24SV11T2		10		12					
DVP28SV11S2		16		12	Transistor (PNP)				

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▪ Installation

[Figure 4]

[Figure5]

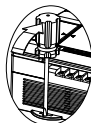[Figure 6]

Unit: mm

Please install the PLC in an enclosure with sufficient space around it to allow heat dissipation. See [Figure 5].

• **Direct Mounting:** Use M4 screw according to the dimension of the product.

• **DIN Rail Mounting:** When mounting the PLC to 35mm DIN rail, be sure to use the retaining clip to stop any side-to-side movement of the PLC and reduce the chance of wires being loose. The retaining clip is at the bottom of the PLC. To secure the PLC to DIN rail, pull down the clip, place it onto the rail and gently push it up. To remove the PLC, pull the retaining clip down with a flat screwdriver and gently remove the PLC from DIN rail. See [Figure 6].

▪ Wiring

1. Use 22-16AWG (1.5mm) single or multiple core wire on I/O wiring terminals. See the figure in the right hand side for its specification. PLC terminal screws should be tightened to 1.90 kg-cm (1.65 in-lbs) and please use only 60/75ºC copper conductor.

22-16AWG

< 1.5mm

2. DO NOT wire empty terminal. DO NOT place the I/O signal cable in the same wiring circuit.
3. DO NOT drop tiny metallic conductor into the PLC while screwing and wiring. Tear off the sticker on the heat dissipation hole for preventing alien substances from dropping in, to ensure normal heat dissipation of the PLC.
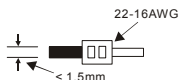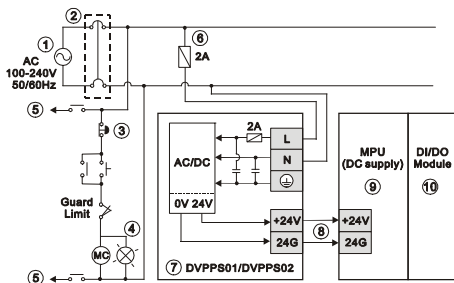
◆ Power Supply

The power input of DVP-SV/SV2 is DC. When operating DVP-SV/SV2, note the following points:

1. The power is connected to two terminals, 24VDC and 0V, and the range of power is 20.4 ~ 28.8VDC. If the power voltage is less than 20.4VDC, the PLC will stop running, all outputs go "Off", and the ERROR LED indicator will start to blink continuously.
2. The power shutdown for less than 10ms will not affect the operation of the PLC. However, the shutdown time that is too long or the drop of power voltage will stop the operation of the PLC, and all outputs will go off. When the power returns to normal status, the PLC will automatically resume the operation. (Please take care of the latched auxiliary relays and registers inside the PLC when doing the programming).

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◆ Safety Wiring

Since DVP-SV/SV2 is only compatible with DC power supply, Delta's power supply modules (DVPPS01/DVPPS02) are the suitable power supplies for DVP-SV/SV2. We suggest you install the protection circuit at the power supply terminal to protect DVPPS01 or DVPPS02. See the figure below.


[Figure 7]

①	AC power supply: 100 ~ 240VAC, 50/60Hz	②	Breaker
③	Emergency stop: This button cuts off the system power supply when accidental emergency takes place.		
④	Power indicator	⑤	AC power supply load
⑥	Power supply circuit protection fuse (2A)	⑦	DVPPS01/DVPPS02
⑧	DC power supply output: 24VDC, 500mA	⑨	DVP-PLC (main processing unit)
⑩	Digital I/O module		

◆ Input Point Wiring

There are 2 types of DC inputs, SINK and SOURCE. (See the example below. For detailed point configuration, please refer to the specification of each model.)
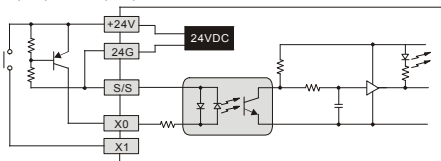
● DC Signal IN – SINK mode

Input point loop equivalent circuit

[Figure 8]
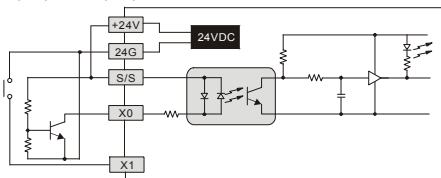
● DC Signal IN – SOURCE mode

Input point loop equivalent circuit

[Figure 9]

◆ Output Point Wiring

1. DVP-SV/SV2 has two output modules, relay and transistor. Be aware of the connection of shared terminals when wiring output terminals.
2. Output terminals, Y0, Y1, and Y2, of relay models use C0 common port; Y3, Y4, and Y5 use C1 common port; Y6, Y7, and Y10 use C2 common port; Y11, Y12, and Y13
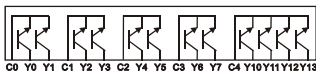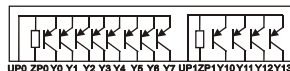
use C3 common port. See [Figure 10].

C0 Y0 Y1 Y2 C1 Y3 Y4 Y5 C2 Y6 Y7 Y10 C3 Y11Y12Y13
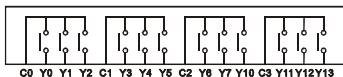
[Figure 10]

When the output points are enabled, their corresponding indicators on the front panel will be on.

3. The output terminals Y0 and Y1 of the transistor (NPN) model are connected to the common terminals C0. Y2 and Y3 are connected to the common terminal C1. Y4 and Y5 are connected to the common terminal C2. Y6 and Y7 are connected to the common terminal C3. Y10, Y11, Y12, and Y13 are connected to the common terminal C4. See [Figure 11a]. The output terminals Y0~Y7 on the transistor (PNP) model are connected to the common terminals UP0 and ZP0. Y10~Y13 are connected to the common terminals UP1 and ZP1. See [Figure 11b].
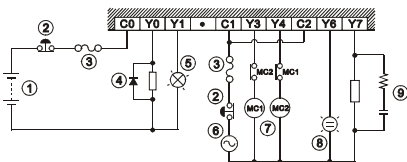

C0 Y0 Y1 C1 Y2 Y3 C2 Y4 Y5 C3 Y6 Y7 C4 Y10Y11Y12Y13

[Figure 11a]
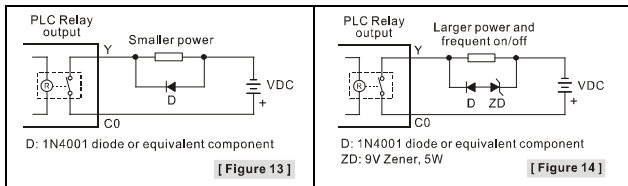

UP0 ZP0 Y0 Y1 Y2 Y3 Y4 Y5 Y6 Y7 UP1ZP1Y10Y11Y12Y13

[Figure 11b]

4. Isolation circuit: The optical coupler is used to isolate signals between the circuit inside PLC and input modules.
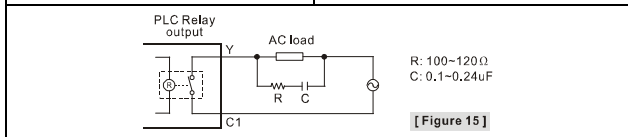
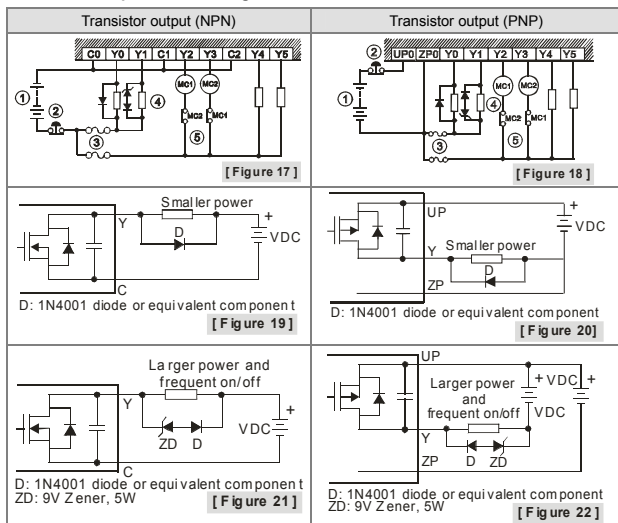● **Relay (R) output circuit wiring**

[Figure 12]

D: 1N4001 diode or equivalent component

[Figure 13]

D: 1N4001 diode or equivalent component
ZD: 9V Zener, 5W

[Figure 14]

R: 100~120Ω
C: 0.1~0.24uF

[Figure 15]

① DC power supply	② Emergency stop: Uses external switch

③ Fuse: Uses 5~10A fuse at the shared terminal of output contacts to protect the output circuit

④ Transient voltage suppressor (SB360 3A 60V): Extends the life span of contact.
   1. Diode suppression of DC load: Used when in smaller power [Figure 13]
   2. Diode + Zener suppression of DC load: Used when in larger power and frequent On/Off [Figure 14]

⑤ Incandescent light (resistive load)	⑥ AC power supply

⑦ Manually exclusive output: For example, Y3 and Y4 control the forward running and reverse running of the motor, forming an interlock for the external circuit, together with the PLC internal program, to ensure safe protection in case of any unexpected errors.

⑧ Neon indicator　　　⑨ Absorber: Reduces the interference on AC load [Figure 15]

● **Transistor output circuit wiring**

Transistor output (NPN)	Transistor output (PNP)
[Figure 17]	[Figure 18]
D: 1N4001 diode or equivalent component [Figure 19]	D: 1N4001 diode or equivalent component [Figure 20]
D: 1N4001 diode or equivalent component ZD: 9V Zener, 5W [Figure 21]	D: 1N4001 diode or equivalent component ZD: 9V Zener, 5W [Figure 22]

① DC power supply　　② Emergency stop　　③ Circuit protection fuse

④ The output of the transistor model is "open collector". If Y0/Y1 is set to pulse output, the output current has to be bigger than 0.1A to ensure normal operation of the model.
　　1. Diode suppression: Used when in smaller power [Figure 19] and [Figure 20]
　　2. Diode + Zener suppression: Used when in larger power and frequent On/Off [Figure 21] [Figure 22]
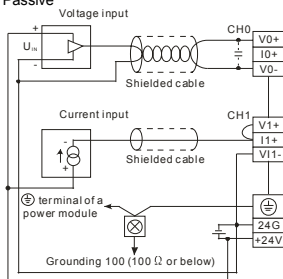
⑤ Manually exclusive output: For example, Y2 and Y3 control the forward running and reverse running of the motor, forming an interlock for the external circuit, together with the PLC internal program, to ensure safe protection in case of any unexpected errors.

◆ **A/D External Wiring (For DVP24SV11T2 Only)**

● Active

● Passive

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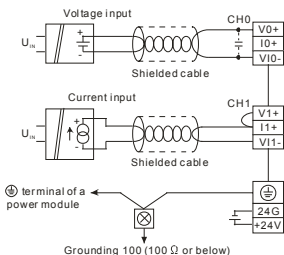
■ BAT.LOW LED Indicator

After the 24 V DC power is switched off, the data in the latched area will be stored in the SRAM memory, and the rechargeable battery will supply power to the SRAM memory. Therefore, if the battery is damaged or cannot be charged, the data in the program and latched area will be lost. If you need to permanently store the data in the program and latched data register, please refer to the mechanism of storing the data in the Flash ROM permanently and the mechanism of restoring the data in Flash ROM stated below.

Mechanism of storing the data in the Flash ROM permanently:

You can use WPLSoft (Options -> PLC<=>Flash) to indicate whether to permanently store the data in the latched area in Flash ROM memory (the new indicated data will replace all data previously saved in the memory).

Mechanism of restoring the data in Flash ROM:

If the rechargeable battery is in low voltage, resulting in possible loss of data in the program, the PLC will automatically restore the data in the latched area in the program and device D of Flash ROM into SRAM memory (M1176 = On) next time when DC24V is re-powered. The ERROR LED flashing will remind you that if the recorded program is able to resume its execution. You only need to shut down and re-power the PLC once to restart its operation (RUN).

1. The rechargeable lithium-ion battery in DVP-SV/SV2 is mainly used on the latched procedure and data storage.
2. The lithium-ion battery has been fully charged in the factory and is able to retain the latched procedure and data storage for 6 months. If DVP-SV/SV2 has not been powered for less than 3 months, the life of the battery does not decrease. To prevent the electricity emitted by the battery from resulting in short life of the battery, before disconnecting DVP-SV/SV2 for a long time, you need to power DVP-SV/SV2 for 24 hours to charge the battery.
3. If the lithium-ion battery is put in an environment in which temperature is above 40°C, or if it is charged for more than 1000 times, its effect becomes bad, and the time for which the data can be stored is less than 6 moths.
4. The lithium-ion battery is rechargeable, and has a longer life span than an ordinary battery. However, it still has its own life cycle. When the power in the battery is not sufficient to retain the data in the latched area, please send it to the distributor for repair.
5. Please be aware of the date of manufacturing. The charged battery can sustain for 6 months from its date of manufacture. If you find that the BAT.LOW indicator stays on after PLC is powered, it means the battery voltage is low and the battery is being charged. DVP-SV/SV2 has to remain on for more than 24 hours to fully charge the battery. If the indicator turns from on to "flash" (every 1 second), it means that the battery cannot be charged anymore. Please correctly process your data in time and send the PLC back to the distributor for repair.

■ Accuracy (second /month) of RTC

Temperature (ºC/ºF)	0/32	25/77	55/131
Max. inaccuracy (second)	-117	52	-132