

# *DVP-ES2*

## INSTRUCTION SHEET

### 安裝說明 安装说明

- ▲ *Programmable Logic Controller*
- ▲ 可程式控制器
- ▲ 可编程控制器

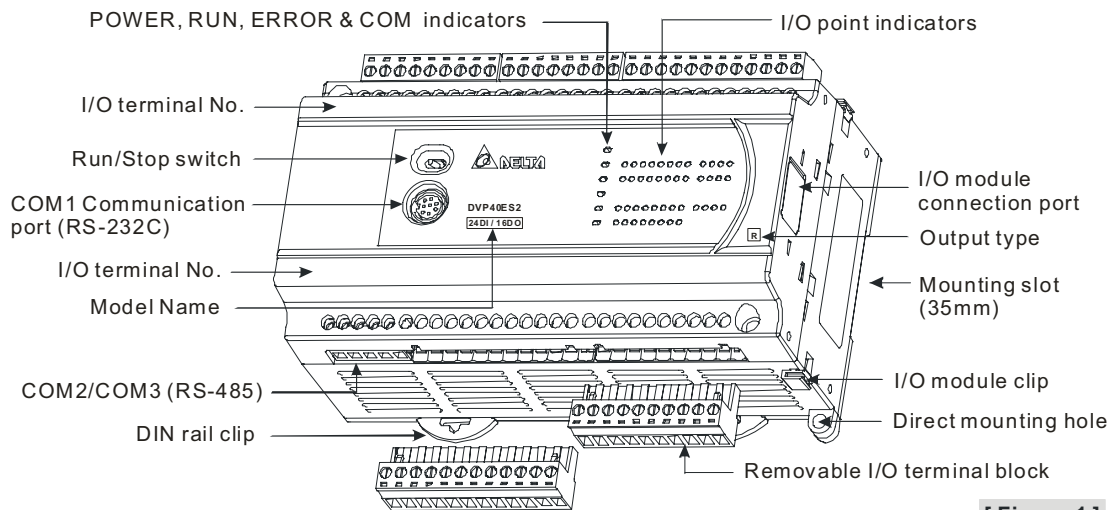


<http://www.delta.com.tw/industrialautomation>

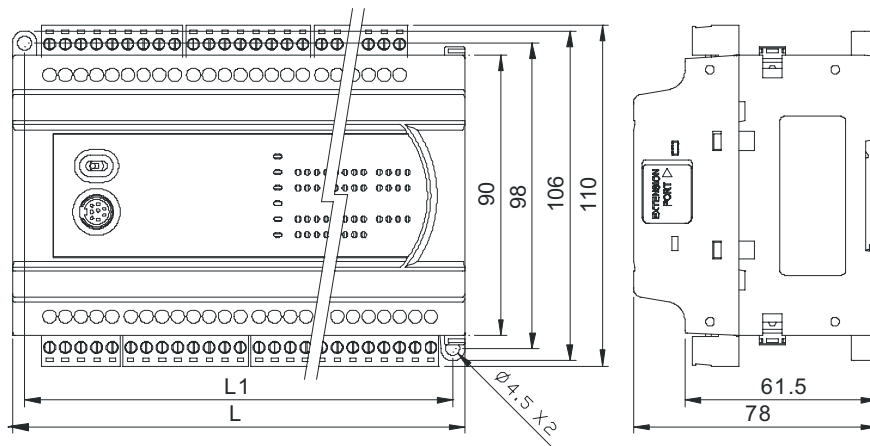
Thank you for choosing Delta's DVP-ES2 series PLC. DVP-ES2 series provides 16~ 60 points MPU and 8 ~ 32 points digital I/O module. The maximum I/O points including those on the MPU are 256 points. DVP-ES2 can be used for various applications with different I/O points, power supply, digital I/O and analog I/O modules.

- ✎ This instruction sheet provides only information on the electrical specification, general functions, installation and wiring. For detailed program design and applicable instructions for DVP-ES2, please refer to “DVP-ES2 Operation Manual: Programming”. For details on the optional peripheral, please refer to the instruction sheet enclosed in the package.
- ✎ DVP-ES2 series PLC 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 operating the enclosure) in case danger and damage on the device may occur.
- ✎ DO NOT connect the input AC power supply to any of the I/O terminals; otherwise serious damage may occur. Check all the wiring again before switching on the power. Make sure the ground terminal  $\oplus$  is correctly grounded in order to prevent electromagnetic interference.

## ■ Product Profile & Dimension



[ Figure 1 ]



[ Figure 2 ]

Unit: mm

Model name	16ES200R/T	24ES200R/T	32ES200R/T	40ES200R/T	60ES200R/T	20EX200R/T
L	105	125	145	165	225	145
L1	97	117	137	157	217	137

## ■ Electrical Specifications

Item	Model					
	16ES200□	24ES200□	32ES200□	40ES200□	60ES200□	20EX200□
Power supply voltage	100 ~ 240VAC (-15% ~ 10%), 50/60Hz ± 5%					
Connector	European standard removable terminal block (Pin pitch: 5mm)					
Operation	DVP-ES2 starts to run when the power rises to 95 ~ 100VAC and stops when the power drops to 70VAC. If the power is suddenly cut off, the MPU will continue running for 10ms.					
Power supply fuse	2A/250VAC					
Power consumption	30VA	30VA	30VA	30VA	30VA	30VA
DC24V current output	500mA	500mA	500mA	500mA	500mA	500mA
Power supply protection	DC24V output short circuit protection					
Voltage withstand	1,500VAC (Primary-secondary), 1,500VAC (Primary-PE), 500VAC (Secondary-PE)					
Insulation resistance	> 5MΩ at 500VDC (between all I/O points and ground)					
Noise immunity	ESD: 8KV Air Discharge EFT: Power Line: 2KV, Digital I/O: 1KV, Analog & Communication I/O: 1KV RS: 26MHz ~ 1GHz, 10V/m					
Grounding	The diameter of grounding wire shall not be less than that of L, N terminal of the power supply. (When many PLCs are in use at the same time, please make sure every PLC is properly grounded.)					
Environment	Operation: 0°C~55°C (temperature), 50~95% (humidity), pollution degree 2 Storage: -25°C~70°C (temperature), 5~95% (humidity)					
Vibration/shock resistance	International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/ IEC61131-2 & IEC 68-2-27 (TEST Ea)					
Weight	R: 377g T: 351g	R: 414g T: 387g	R: 489g T: 432g	R: 554g T: 498g	R: 696g T: 614g	R: 462g T: 442g

Input Point				
Input point type	Digital input			
Input type	DC (SINK or SOURCE)			
Input current	24VDC, 5mA			
Action level	Input No.	X0, X2	X1, X3 ~ X7	X10 ~ X17, X20 ~#1
	Off → On	>15VDC		
	On → Off	< 5VDC		
Response time	Off → On	2.5μs	20μs	10ms
	On → Off	5μs	50μs	10ms
Filter time	X0 ~ X7	Adjustable within 0 ~ 20ms in D1020 (Default: 10ms)		
Input impedance	4.7KΩ			

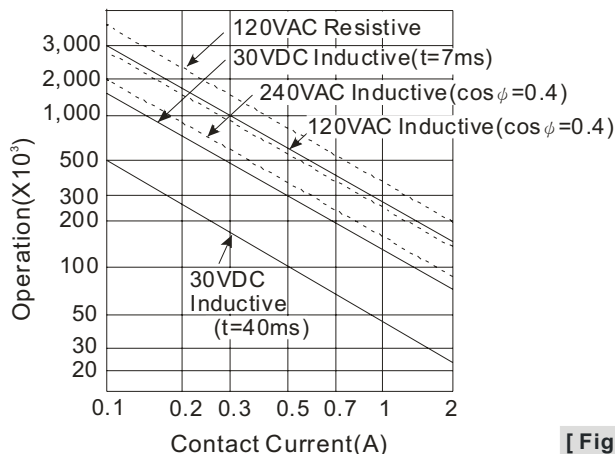
Output Point				
Output point type	Relay-R		Transistor-T	
Output point number	All		Y0, Y2	Y1, Y3   Y4~Y17, Y20~#1
Voltage specification	< 250VAC, 30VDC		5 ~ 30VDC #2	
Maximum load	Resistive	2A/1 point (5A/COM)	0.5A/1 point (4A/COM)	

Output Point					
	Inductive	#3	12W (24VDC)		
	Lamp	20WDC/100WAC	2W(24VDC)		
Response time	Off → On	Approx. .10ms	2μs	20μs	100μs
	On → Off		3μs	30μs	100μs

#1: Please refer to "I/O Terminal Layout" for the max. X/Y No. on each model.

#2: UP, ZP must work with external auxiliary power supply 24VDC (-15% ~ +20%), rated consumption approx. 1mA/point.

#3: Life curves



[ Figure 3 ]

### A/D and D/A Specifications (For EX2 Model Only)

Items	Analog Input (A/D)		Analog Output (D/A)	
	Voltage input	Current input	Voltage output	Current output
Analog I/O range	±10V	±20mA	±10V	0 ~ 20mA
Digital conversion range	-2,000 ~ +2,000	-2,000 ~ +2,000	-2,000 ~ +2,000	0 ~ +4,000
Resolution	12-bit ( $5\text{mV} = \frac{20\text{V}}{4000}$ )	12-bit ( $10\mu\text{A} = \frac{40\text{mA}}{4000}$ )	12-bit ( $5\text{mV} = \frac{20\text{V}}{4000}$ )	12-bit ( $5\mu\text{A} = \frac{20\text{mA}}{4000}$ )
Input impedance	> 1MΩ	250Ω	-	
Output impedance	-		0.5Ω or lower	
Tolerance carried impedance	-		> 5KΩ	< 500Ω
Overall accuracy	Non-linear accuracy: ±1% of full scale within the range of PLC operation temperature Maximum deviation: ±1% of full scale at 20mA and +10V			
Response time	2ms (set up in D1118) <sup>#1</sup>		2ms <sup>#2</sup>	
Absolute input range	±15V	±32mA	-	
Digital data format	2's complement of 16-bit, 12 significant bits			
Average function	Provided (set up in D1062) <sup>#3</sup>		-	
Isolation method	No Isolation between digital circuit and analog circuit			
Protection	Voltage output has short circuit protection, but a long period of short circuit may cause internal wire damage and open circuit of current output.			

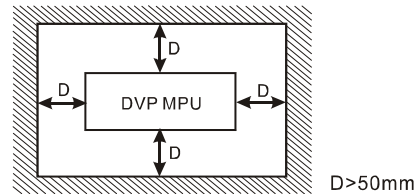
#1: When the scan period is longer than 2ms or the set value, the setting will follow the scan period.

#2: When the scan period is longer than 2ms, the setting will follow the scan period.

#3: When the sampling range is "1", the present value will be read.

## ■ Installation

Please install the PLC in an enclosure with sufficient space around it to allow heat dissipation, as shown in the figure.



- **Direct Mounting:** Please 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.

## ■ Wiring

1. Use the 12-24 AWG single-core bare wire or the multi-core wire for the I/O wiring. The PLC terminal screws should be tightened to 3.80 kg-cm (3.30 in-lbs) and please use 60/75°C copper conductor only.
2. DO NOT wire empty terminal. DO NOT place the input signal wire and output power wire in the same wiring circuit.
3. DO NOT drop tiny metallic conductor into the PLC while screwing and wiring.
  - Please attach the dustproof sticker to the PLC before the installation to prevent conductive objects from dropping in.
  - Tear off the sticker before running the PLC to ensure normal heat dissipation.

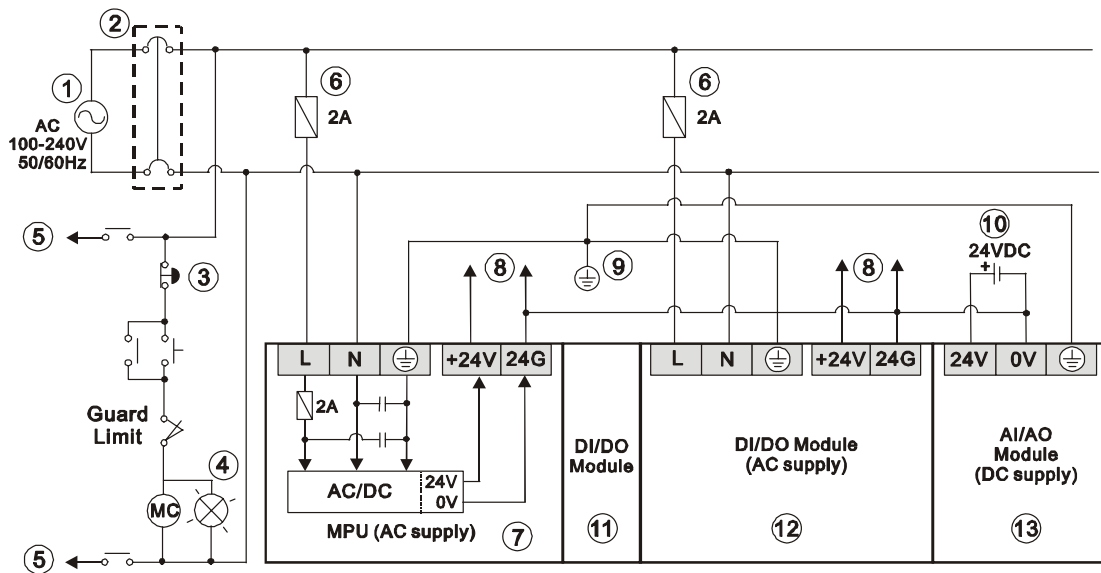
## ◆ Power Supply

The power input type for DVP-ES2 model is AC input. When operating DVP-ES2, please note the following points:

1. The range of the input voltage should be 100 ~ 240VAC. The power supply should be connected to L and N terminals. Please note that wiring AC110V or AC220V to +24V output terminal or digital input points will result in serious damage on the PLC.
2. The AC power inputs for the MPU and the digital I/O module should be ON or OFF at the same time.
3. Use 1.6mm wire (or longer) for the grounding of the PLC.
4. The power shutdown of less than 10ms will not affect the operation of the PLC. However, power shutdown time that is too long or the drop of power supply voltage will stop the running of the PLC, and all outputs will go "OFF". When the power returns to normal status, the PLC will automatically resume operation. (Care should be taken on the latched auxiliary relays and registers inside the PLC when programming.)
5. The +24V output is rated at 0.5A from MPU. DO NOT connect other external power supplies to this terminal. Every input terminal requires 5 ~ 7mA to be driven; e.g. the 16-point input will require approximately 100mA. Therefore, +24V terminal cannot give output to the external load that is more than 400mA.

## ◆ Safety Wiring

In PLC control system, many devices are controlled at the same time and actions of any device could influence each other, i.e. breakdown of any device may cause the breakdown of the entire auto-control system and danger. Therefore, we suggest you wire a protection circuit at the power supply input terminal. See the figure below.



[ Figure 4 ]

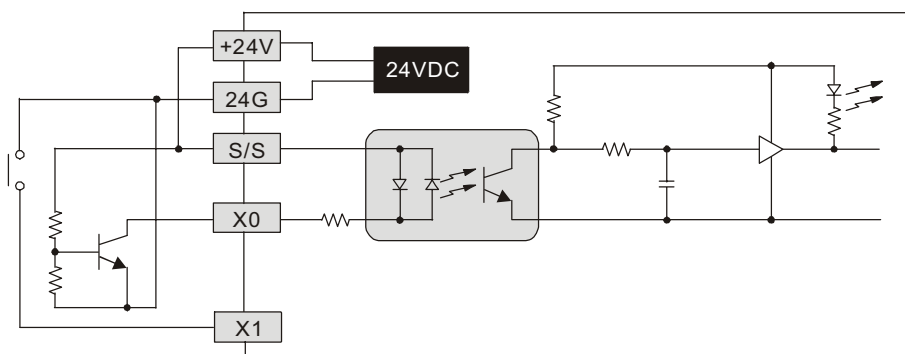
- |   |                                  |
|---|----------------------------------|
| ① AC power supply: 100 ~ 240VAC, 50/60Hz  | ② Breaker                        |
| ③ Emergency stop: This button cuts off the system power supply when accidental emergency takes place. |                                  |
| ④ Power indicator   | ⑤ AC power supply load           |
| ⑥ Power supply circuit protection fuse (2A)   | ⑦ DVP-PLC (main processing unit) |
| ⑧ DC power supply output: 24VDC, 500mA  | ⑨ Grounding resistance: < 100Ω   |
| ⑩ DC power supply: 24VDC  | ⑪ Digital I/O module (DC supply) |
| ⑫ Digital I/O module (AC supply)  | ⑬ Analog I/O module (DC supply)  |

### ◆ I/O 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

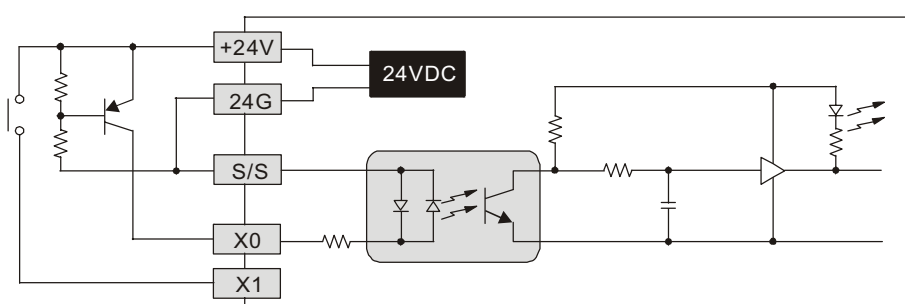
Input point loop equivalent circuit



[ Figure 5 ]

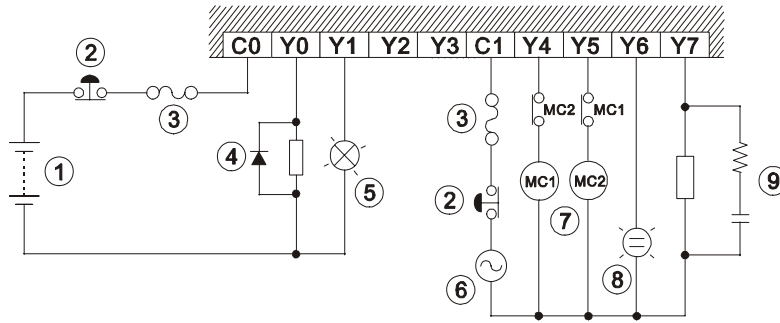
#### • DC Signal IN – SOURCE mode

Input point loop equivalent circuit

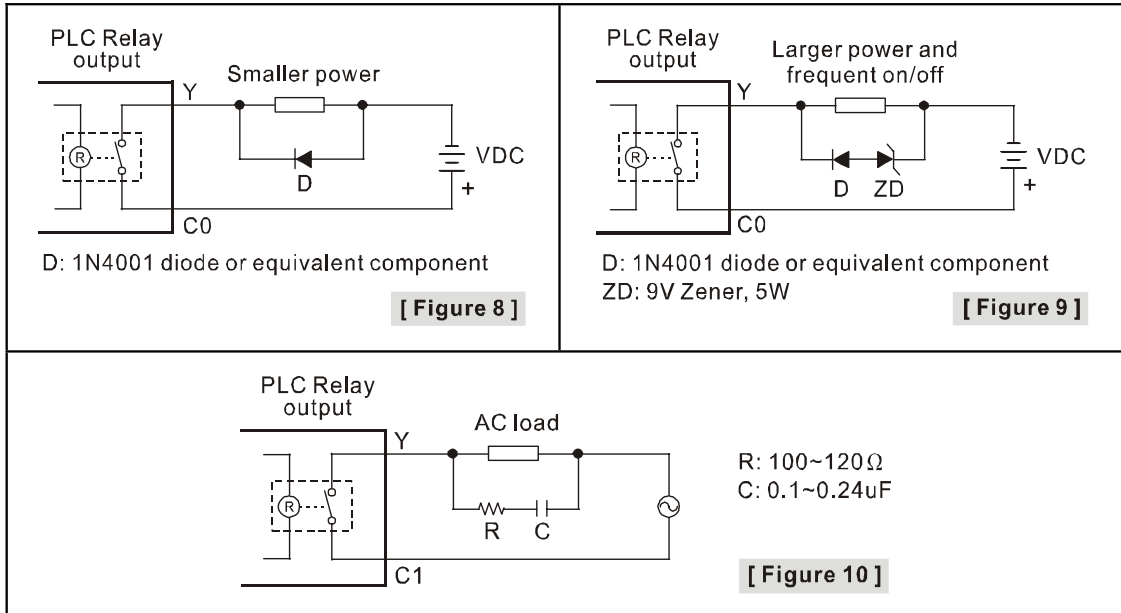


[ Figure 6 ]

• Relay (R) output circuit wiring



[ Figure 7 ]



- ① DC power supply

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- ② Emergency stop: Uses external switch

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

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- ④ Transient voltage suppressor: To extend the life span of contact.
  - 1. Diode suppression of DC load: Used when in smaller power (Figure 8)
  - 2. Diode + Zener suppression of DC load: Used when in larger power and frequent On/Off (Figure 9)

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- ⑤ Incandescent light (resistive load)

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- ⑥ AC power supply

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- ⑦ Manually exclusive output: For example, Y4 and Y5 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.

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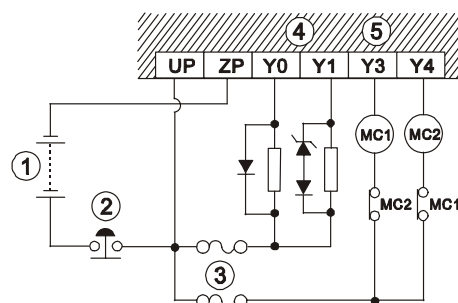
- ⑧ Neon indicator

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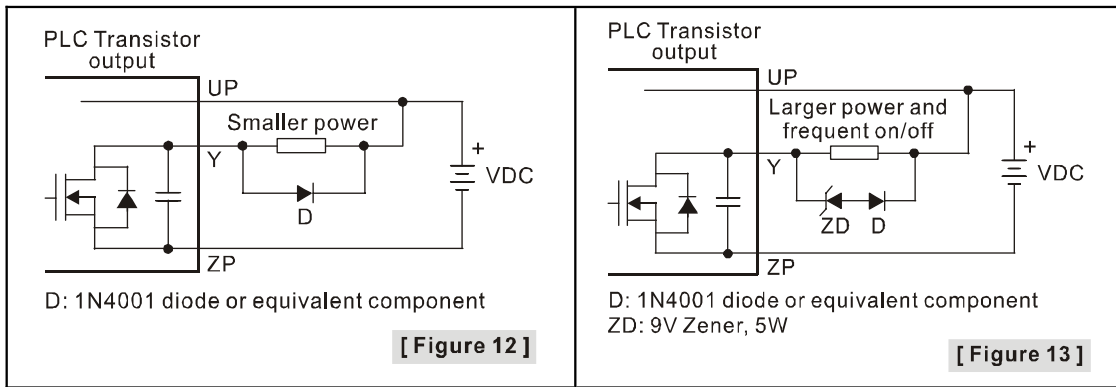
- ⑨ Absorber: To reduce the interference on AC load (Figure 10)

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• Transistor (T) output circuit wiring



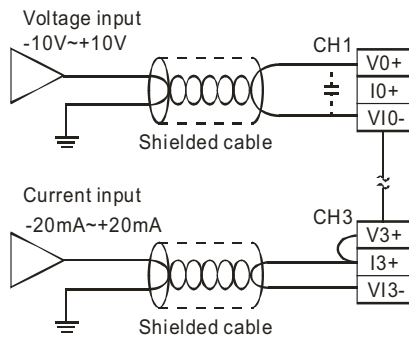
[ Figure 11 ]



- 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 12)
  2. Diode + Zener suppression: Used when in larger power and frequent On/Off (Figure 13)
- ⑤ 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.

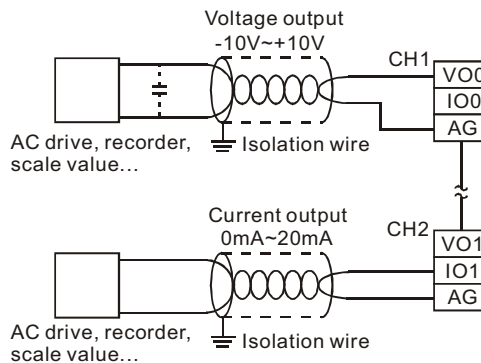
## ◆ A/D and D/A External Wiring (For EX2 Model Only)

### • A/D



[ Figure 14 ]

### • D/A



[ Figure 15 ]

Note: When the A/D module is connected to current signals, make sure to short-circuit “V+” and “I+” terminals.

## ■ I/O Terminal Layouts

### • DVP16ES200R/T

L	N	⊕	NC	+24V	24G	S/S	X0	X1	X2	X3	X4	X5	X6	X7
<b>DVP16ES2-R (8DI/8DO)</b>														
D+	D-	SG	D+	D-	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7

L	N	⊕	NC	+24V	24G	S/S	X0	X1	X2	X3	X4	X5	X6	X7
<b>DVP16ES2-T (8DI/8DO)</b>														
D+	D-	SG	D+	D-	UP	ZP	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7

### • DVP24ES200R/T

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	
<b>DVP24ES2-R (16DI/8DO)</b>																					
D+	D-	SG	D+	D-	+24V	24G	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7					

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	
<b>DVP24ES2-T (16DI/8DO)</b>																					
D+	D-	SG	D+	D-	+24V	24G	UP	ZP	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7					



• DVP32ES200R/T

L	N	⊕	NC	+24V	24G	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17		
<b>DVP32ES2-R (16DI/16DO)</b>																								
D+	D-	SG	D+	D-	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7	C2	Y10	Y11	Y12	Y13	C3	Y14	Y15	Y16	Y17

L	N	⊕	NC	+24V	24G	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17		
<b>DVP32ES2-T (16DI/16DO)</b>																								
D+	D-	SG	D+	D-	UP0	ZP0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	UP1	ZP1	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17

• DVP40ES200R/T

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	X20	
<b>DVP40ES2-R (24DI/16DO)</b>																						⇒
D+	D-	SG	D+	D-	+24V	24G	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7	C2	Y10	Y11	Y12	Y13	

X21	X22	X23	X24	X25	X26	X27
⇒						
C3	Y14	Y15	Y16	Y17		

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	X20	
<b>DVP40ES2-T (24DI/16DO)</b>																						⇒
D+	D-	SG	D+	D-	+24V	24G	UP0	ZP0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	UP1	ZP1	Y10	Y11	Y12	

X21	X22	X23	X24	X25	X26	X27
⇒						
Y13	Y14	Y15	Y16	Y17		

• DVP60ES200R/T

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	X20	
<b>DVP60ES2-R (36DI/24DO)</b>																						⇒
D+	D-	SG	D+	D-	+24V	24G	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	Y6	Y7	C2	Y10	Y11	Y12	Y13	

X21	X22	X23	X24	X25	X26	X27	X30	X31	X32	X33	X34	X35	X36	X37	X40	X41	X42	X43
⇒																		
C3	Y14	Y15	Y16	Y17	C4	Y20	Y21	Y22	Y23	C5	Y24	Y25	Y26	Y27				

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	X10	X11	X12	X13	X14	X15	X16	X17	X20	
<b>DVP60ES2-T (36DI/24DO)</b>																						⇒
D+	D-	SG	D+	D-	+24V	24G	UP0	ZP0	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7	UP1	ZP1	Y10	Y11	Y12	

X21	X22	X23	X24	X25	X26	X27	X30	X31	X32	X33	X34	X35	X36	X37	X40	X41	X42	X43
⇒																		
Y13	Y14	Y15	Y16	Y17	UP2	ZP2	Y20	Y21	Y22	Y23	Y24	Y25	Y26	Y27				

• DVP20EX200R/T

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	FE	V0+	I0+	VI0-	V1+	I1+	VI1-	V2+	I2+	VI2-		
<b>DVP20EX2-R (8DI/6DO/4AI/2AO)</b>																								
D+	D-	SG	D+	D-	+24V	24G	C0	Y0	Y1	Y2	Y3	C1	Y4	Y5	FE	V3+	I3+	VI3-	VO0	IO0	AG	VO1	IO1	AG

L	N	⊕	NC	S/S	X0	X1	X2	X3	X4	X5	X6	X7	FE	V0+	I0+	VI0-	V1+	I1+	VI1-	V2+	I2+	VI2-		
<b>DVP20EX2-T (8DI/6DO/4AI/2AO)</b>																								
D+	D-	SG	D+	D-	+24V	24G	UP	ZP	Y0	Y1	Y2	Y3	Y4	Y5	FE	V3+	I3+	VI3-	VO0	IO0	AG	VO1	IO1	AG