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

DVP-0130030-02
20240221

Smarter. Greener. Together.

Thank you for choosing Delta's DVP-ES2 series PLC. DVP-ES2 series provides 16~ 80 points PLC and 8 ~ 32 points digital I/O module. The maximum I/O points including those on the PLC are 256 points. DVP-ES2 series PLCs satisfy various applications in that they can be used with analog input/output modules. Users do not have to install any batteries in DVP-ES2 series PLCs. The PLC programs and the latched data are stored in the flash memories.

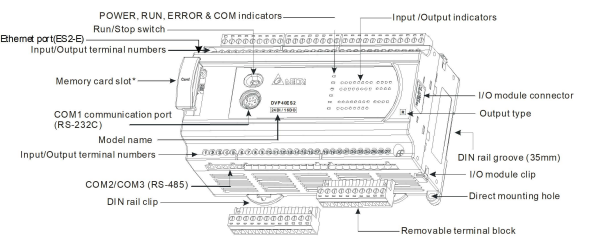
EN ✎ DVP-ES2 is an OPEN-TYPE device. It should be installed in a control cabinet free of airborne dust, humidity, electric shock and vibration. To prevent non-maintenance staff from operating DVP-ES2, or to prevent an accident from damaging DVP-ES2, the control cabinet in which DVP-ES2 is installed should be equipped with a safeguard. For example, the control cabinet in which DVP-ES2 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-ES2 is powered up. After DVP-ES2 is disconnected, Do NOT touch any terminals in a minute. Make sure that the ground terminal ⏚ on DVP-ES2 is correctly grounded in order to prevent electromagnetic interference.

FR ✎ DVP-ES2 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 a protection).

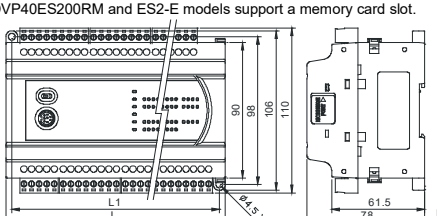
FR ✎ Ne pas appliquer la tension secteur sur les bornes d'entrées/Sorties, ou l'appareil DVP-ES2 pourra être endommagé. Merci de vérifier encore une fois le câblage avant la mise sous tension du DVP-ES2. Lors de la déconnection de l'appareil, ne pas toucher les connecteurs dans la minute suivante. Vérifier que la terre est bien reliée au connecteur de terre ⏚ afin d'éviter toute interférence électromagnétique.

■ Product Profile & Dimension



[Figure 1]

*: Only DVP40ES200RM and ES2-E models support a memory card slot.



[Figure 2]

Unit: mm

Model name		16ES2 00R/T	24ES2 00R/T	32ES2 00R/T	40ES2 00R/T	40ES2 00RM	58ES2 00R/T	60ES2 00R/T	80ES2 00R/T	20EX2 00R/T	32ES2 11T
L		105	125	145	165	165	225	225	302	145	145
L1		97	117	137	157	157	217	217	294	137	137
WT	R	377g	414g	489g	554g	562g	705g	696g	890g	462g	–
	T	351g	387g	432g	498g	–	622g	614g	785g	442g	321g

Model name		20ES2 00RE/ TE	32ES2 00RE/ TE	40ES2 00RE/ TE	60ES2 00RE/ TE
L		125	165	194	255
L1		117	157	186	247
WT	RE	453g	569g	630g	787g
	TE	416g	520g	574g	704g

■ Electrical Specifications

Item \ Model		32ES211T	All ES2 models except for 32ES211T
Power supply voltage		24VDC(-15~+20%)	100 ~ 240VAC (-15% ~ 10%); 50 / 60Hz ± 5%
Connector		European standard removable terminal block (Pin pitch: 5mm)	
Operation	ES 200	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 PLC will continue running for 10ms.	
	ES 211	DVP-ES2 starts to run when the power rises to 20.4VDC~28.8VDC and stops when the power drops to 17.5VDC. If the power is suddenly cut off, the PLC will continue running for 10ms.	
Power supply fuse		2.5A / 30VDC, Polyswitch	2A / 250VAC
Power		1.8W	30VA
DC24V current output*1		–	500mA
Power supply		–	DC24V output short circuit protection
Voltage withstand		1,500VAC (Primary-secondary), 1,500VAC (Primary-PE), 500VAC (Secondary-PE)	
Insulation		> 5MΩ at 500VDC (between all I/O points and ground)	
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 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 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), 5~95% (humidity), pollution degree 2 Storage: -25°C~70°C (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)	

*1: It is suggested that the power output should not be supplied to HMIs.

Input Point				
Input No.		X0 ~ X3 #1	X4 ~ X7	X10 ~ X17, X20 ~ #2
Input type		Digital input		
Input form		DC (SINK or SOURCE)		
Input current		24VDC, 5mA		
Input impedance		4.7KΩ		
Max. frequency		100kHz	10kHz	60Hz
Action level	Off → On	>15VDC		
	On → Off	< 5VDC		
Response time	Off → On	< 2.5μs	< 20μs	< 10ms
	On → Off	< 5μs	< 50μs	< 15ms
Filter time	X0 ~ X7	Adjustable within 0 ~ 20ms in D1020 (Default: 10ms)		

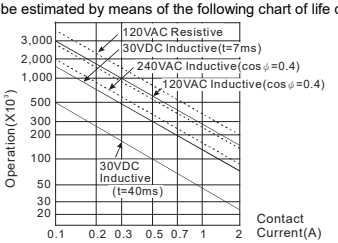
Output Point					
Output point type		Relay-R	Transistor-T		
Output point number		All	Y0, Y2	Y1, Y3	Y4 ~ Y17, Y20 ~ #2
Voltage specification		< 250VAC, 30VDC	5 ~ 30VDC #3		
Max. frequency		1Hz	100kHz	10kHz	1kHz
Leakage current		-	<100uA		
Maximum load	Resistive	2A/1 point (5A/COM)	0.5A/1 point (4A/COM) #5		
	Inductive	#4	15W (30VDC)		
	Lamp	20WDC/100WAC	2.5W(30VDC)		
Minimum load		1mA / 5V			
Response time	Off → On	Approx .10ms	< 2μs	< 20μs	< 100μs
	On → Off		< 3μs	< 30μs	< 100μs

#1: The counting frequency of X1 and X3 on the DVP-ES200 series PLCs and the DVP-EX200 series PLCs which are produced after 2013 is increased from 10 kHz to 100 kHz.

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

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

#4: The lifetime of IO relays may differ depending on operating voltage, load type (power factor cosø, time constant t) and different contact current. The number of operations during the lifetime can be estimated by means of the following chart of life curves.



[Figure 3]

#5: ZP for NPN COM, UP for PNP COM.

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

Items	Analog Input (A/D)			Analog Output (D/A)		
	Voltage	Current		Voltage	Current	
Analog I/O range	±10V	±20mA	4 ~ 20mA #1	±10V	0 ~ 20mA	4 ~ 20mA #1
Digital conversion range	±2,000	±2,000	0 ~ +2,000	±2,000	0 ~ +4,000	0 ~ +4,000
Resolution #2	12-bit					
Input impedance	> 1MΩ	250Ω		-		
Output impedance	-			≤ 0.5Ω	≥ 1MΩ	
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) #3			2ms #4		
Absolute input range	±15V	±32mA		-		
Digital data format	2's complement of 16-bit, 12 significant bits					

Items	Analog Input (A/D)		Analog Output (D/A)	
	Voltage	Current	Voltage	Current
Average function	Provided (set up in D1062)#5		-	
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.			

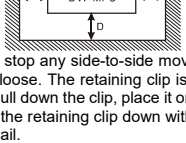
#1: V1.2 and above supports this mode. Please refer to the detailed explanation of D1115.
#2: Resolution formula

Analog Input (A/D)		Analog Output (D/A)	
Voltage	Current	Voltage	Current
$(5mV = \frac{20V}{4000})$	$(10\mu A = \frac{40mA}{4000})$	$(5mV = \frac{20V}{4000})$	$(5\mu A = \frac{20mA}{4000})$

#3: When the scan period is longer than 2ms or the set value, the setting will follow the scan period.
#4: When the scan period is longer than 2ms, the setting will follow the scan period.
#5: 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.

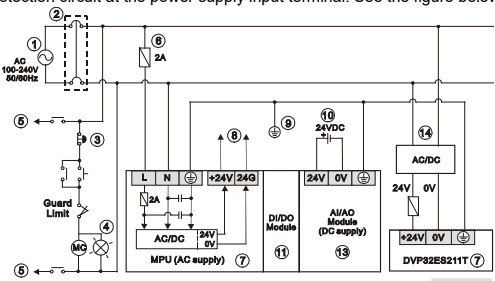
◆ Power Supply

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 PLC 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 PLC. 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]

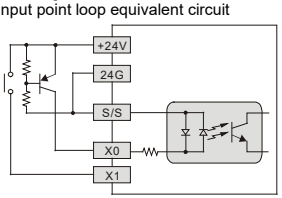
①	AC power supply:100 ~ 240VAC, 50/60Hz	②	Breaker
③	Emergency stop: This button cuts off the system power supply when accidental emergency takes place.		
④	Power indicator	⑤	AC power supply load
⑥	Power supply circuit protection fuse (2A)	⑦	DVP-PLC (main processing unit)
⑧	DC power supply output: 24VDC, 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)
⑭	DC power supply: 20.4VDC~28.8VDC		

◆ 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

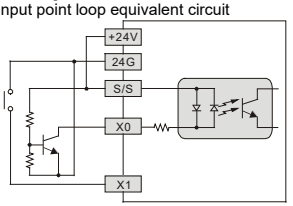
Input point loop equivalent circuit



[Figure 5]

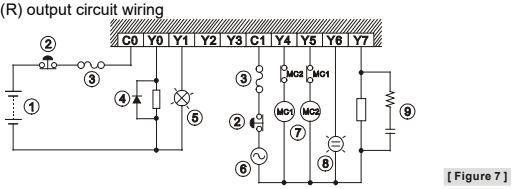
• DC Signal IN – SOURCE mode

Input point loop equivalent circuit

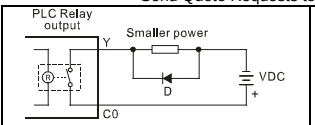


[Figure 6]

• Relay (R) output circuit wiring

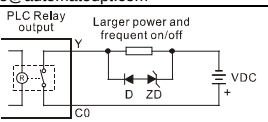


[Figure 7]



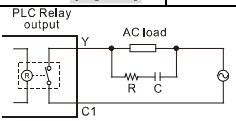
D: 1N4001 diode or equivalent component

[Figure 8]



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

[Figure 9]



[Figure 10]

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: 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)

⑤ Incandescent light (resistive load)

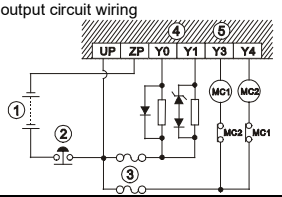
⑥ AC power supply

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.

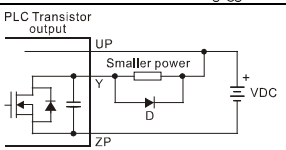
⑧ Neon indicator

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

- Transistor (T) output circuit wiring

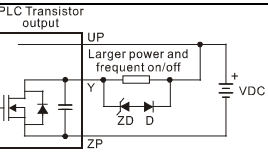


[Figure 11]



D: 1N4001 diode or equivalent component

[Figure 12]



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

[Figure 13]

① DC power supply ② Emergency stop

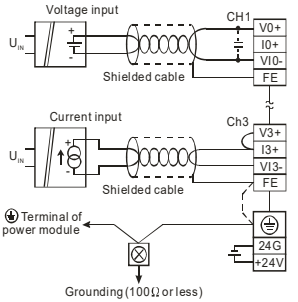
③ Circuit protection fuse

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.

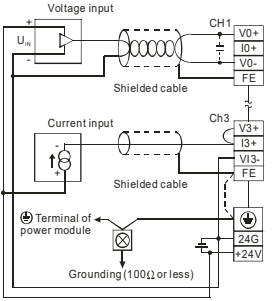
◆ A/D and D/A External Wiring (For EX2 Model Only)

• A/D: Active



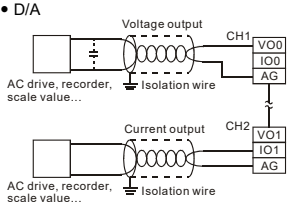
[Figure 14]

• A/D: Passive



[Figure 15]

• D/A



[Figure 16]

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

◆ RS-485 Wiring

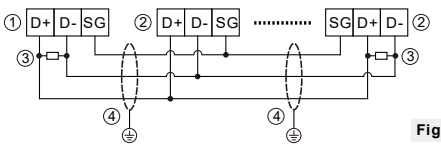


Figure 17

① Master node ② Slave node ③ Terminal resistor ④ Shielded cable

Note: 1. Terminal resistors are suggested to be connected to master and the last slave with resistor value of 120Ω.
2. To ensure communication quality, please apply double shielded twisted pair cable (20AWG) for wiring.
3. When voltage drop occurs between the internal ground references of two systems, connect the systems with Signal Ground point (SG) for achieving equal potential between systems so that a stable communication can be obtained.

◆ Ethernet (RJ45) Wiring

Please use the twisted pair CAT-5e to connect the Ethernet RJ45 communication port.

① Tx+	⑤ N/C
② Tx-	⑥ Rx-
③ Rx+	⑦ N/C
④ N/C	⑧ N/C

Note: The DVP-ES2-E series PLC is equipped with the Auto MDI/MDIX function. It does not need any jumper wire when it connects to the network device.

◆ Setting the Ethernet

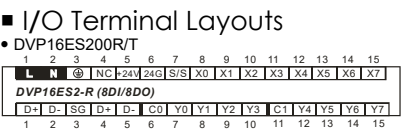
The DVP-ES2-E series PLC contains a built-in Ethernet communication port. Users have to set the network parameter before the PLC connects to other network devices. The default parameter setting values are 192.168.1.5 (the IP address) and 255.255.255.0 (the subnet mask). Users can set the parameter by using DCISoft, or by using the PLC program to write the values into the network control register (CR).

- Software: Start the DCIsoft, and connect the PC to the DVP-ES2-E series PLC through the ehternet cable. Enter “Communication Setting” page in DCISoft, and choose “Ethernet” communication port. Then, click “Search” to search for the picture representing the DVP-ES2-E series PLC. After users click the picture twice, the setting page appears. Finally, enter the related parameters, and click “Apply” to finish the setting.
- PLC program: Users use the instruction “To” to write the IP address (CR#88, 89) and the subnet mask (CR#90, 91). For example, when the IP address is 192.168.1.5, users write 192.168 (H’C0A8) into CR#89, and .1.5 into CR#88 (H’105).

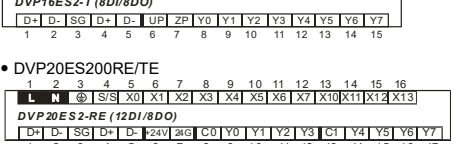
Note: When users use the instruction “From/To” to read the data from the network control register and write the data into it, the module number is K108.

■ I/O Terminal Layouts

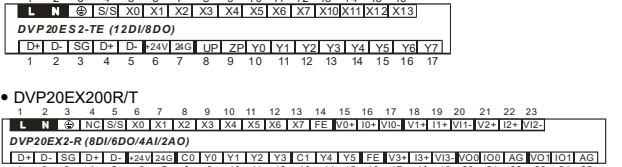
- DVP16ES200R/T



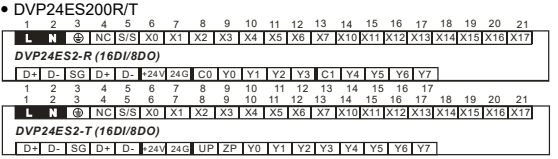
- DVP20ES200RE/TE



- DVP20EX200R/T

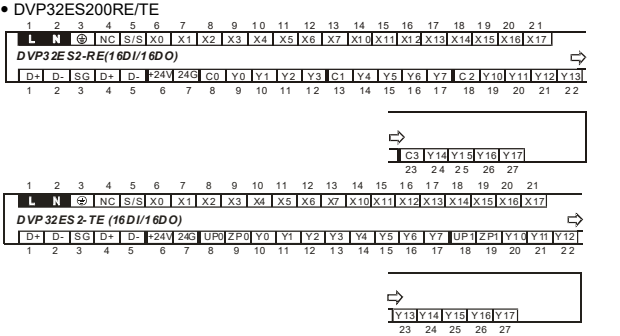


- DVP24ES200R/T

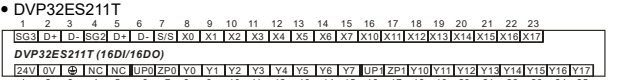


- DVP32ES200R/T

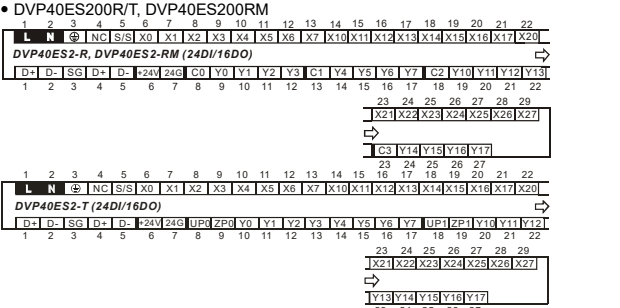
- DVP32ES200RE/TE



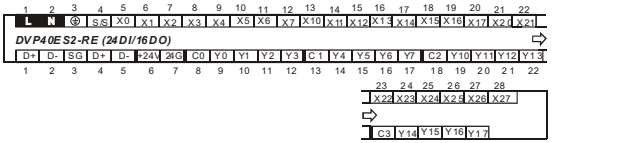
- DVP32ES211T

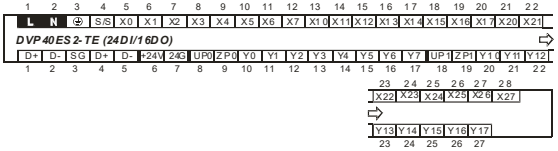


- DVP40ES200R/T, DVP40ES200RM



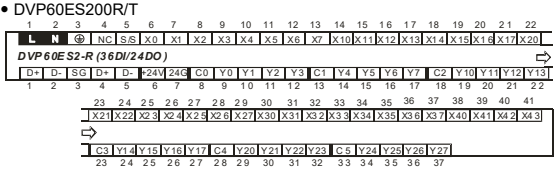
- DVP40ES200RE/TE



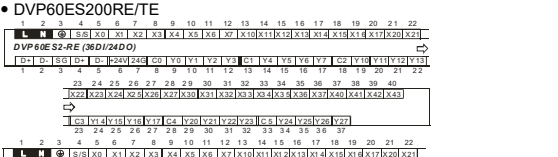


- DVP58ES200R/T

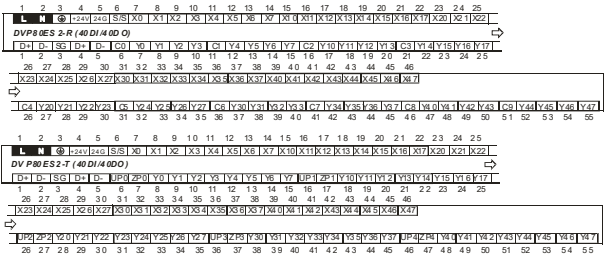
- DVP60ES200R/T



- DVP60ES200RE/TE



- DVP80ES200R/T



■ Precision of the RTC (Second/Month)

Temperature (°C/°F)	0/32	25/77	55/131
Maximum error (Second)	-117	52	-132

Duration in which the RTC is latched: One week (Only version 2.00 and above are supported.)