2013-01-30

5011696703-SX23

DVP-*SX2*

Instruction Sheet
Bilgi Dökümani
安 裝 說 明
安 装 说 明

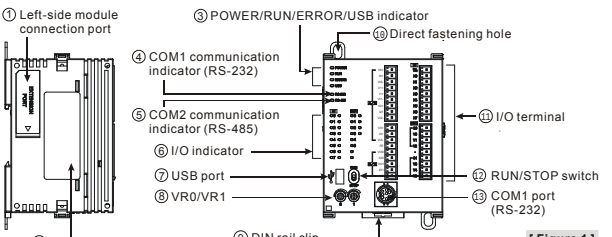
Multi-Functional, Built-in Analog I/O, Multiple Instructions
Çok Fonksiyonlu, Dahili Analog I/O, Gelişmiş Komut Seçenekleri
多功能內建類比 I/O 豐富指令集
多功能内建模拟量 I/O 丰富指令集

▪ ENGLISH ▪

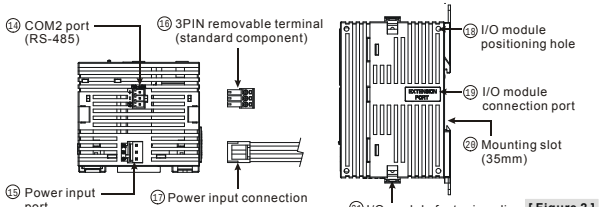
Thank you for choosing Delta DVP-SX2. DVP-SX2 is a 20-point (8DI + 6 DO + 4AI + 2AO) PLC MPU, offering various instructions and is with 16k steps program memory, able to connect with all Slim series extension models, including digital input/output (max. 480 input/output extension points), analog modules (A/D, D/A transformation and temperature units) and all kinds of new high-speed extension modules. Its 2-group high-speed (100kHz) pulse outputs and the one new 2-axis interpolation instructions satisfy all kinds of applications. DVP-SX2 is small in size, and it can be installed easily. Users do not have to install any batteries in DVP-SX2 series PLCs. The PLC programs and the latched data are stored in the high-speed flash memories.

- This instruction sheet provides only information on the electrical specification, general functions, installation and wiring. For detailed program design and applicable instructions for DVP-SX2, please refer to "DVP-SX2 Operation Manual: Programming". For details on the optional peripheral, please refer to the instruction sheet enclosed in the package.
- This is an OPEN TYPE PLC. The PLC should be kept in an enclosure away from airborne dust, humidity, electric shock risk and vibration. Also, it is equipped with protective methods such as some special tools or keys to open the enclosure, in order to prevent hazard to users or damage on the PLC.
- DO NOT connect the AC main circuit power supply to any of the input/output terminals, or it may damage the PLC. Check all the wiring prior to power up. To prevent any electromagnetic noise, make sure the PLC is properly grounded ⏚ . DO NOT touch terminals when power on.

■ Product Profile



[Figure 1]



[Figure 2]

■ Electrical Specifications

Item \ Model	DVP20SX211R	DVP20SX211T	DVP20SX211S
Power supply voltage	24VDC (-15% ~ 20%) (with counter-connection protection on the polarity of DC input power) DVPPS01(PS02): input 100-240VAC, output 24VDC/1A(PS02: 2A)		
Inrush current	Max. 7.5A@24VDC		
Fuse capacity	2.5A/30VDC, Polyswitch		
Power consumption	4.7W	4W	4W
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 RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m		

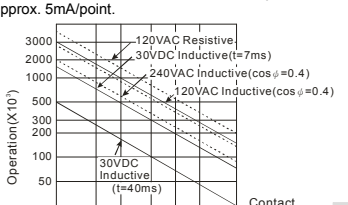
Item \ Model	DVP20SX211R	DVP20SX211T	DVP20SX211S
Grounding	The diameter of grounding wire cannot be smaller than the wire diameter of terminals 24V and 0V (All DVP units should be grounded directly to the ground pole).		
Operation / storage	Operation: 0°C ~ 55°C (temp.), 50 ~ 95% (humidity), Pollution degree2 Storage: -25°C ~ 70°C (temp.), 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 (g)	243g	224g	227g

Items \ Spec.		Input Point		
		24VDC (-15% ~ 20%) single common port input		
Input No.		X0, X2	X1, X3	X4 ~ X7
Input type		DC (SINK or SOURCE)		
Input Current (± 10%)		24VDC, 5mA		
Input impedance		4.7K Ohm		
Action level	Off→On	> 15VDC		
	On→Off	< 5VDC		
Response time	Off→On	< 2.5μs	< 10μs	< 20us
	On→Off	< 5μs	< 20μs	< 50us
Filter time		Adjustable within 0 ~ 20ms by D1020 (Default: 10ms)		

Items \ Spec.		Output Point			
		Relay	Transistor		
Output No.		Y0 ~ Y5	Y0, Y2	Y1, Y3	Y4, Y5
Max. frequency		1Hz	100kHz	10kHz	1kHz
Working voltage		250VAC, < 30VDC	5 ~ 30VDC [#1]		
Max. load	Resistive	1.5A/1 point (5A/COM)	SX211T: 0.5A/1 point (3A/ZP) SX211S: 0.3A/1 point (1.8A/UP)		
	Inductive	[#2]	15W (30VDC)		
	Lamp	20WDC/100WAC	2.5W (30VDC)		
Response time	Off→On	Approx. 10 ms	2μs	20μs	100μs
	On→Off		3μs	30μs	100μs

#1: DVP20SX211T: UP, ZP must work with external auxiliary power supply 24VDC (-15% ~ +20%), rated consumption approx. 3mA/point.
DVP20SX211S: UP, ZP must work with external auxiliary power supply 5~30VDC, rated consumption approx. 5mA/point.

#2: Life curves



[Figure 3]

A/D and D/A Specifications

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 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) [#3]			2ms [#4]		

Items	Analog Input (A/D)		Analog Output (D/A)	
	Voltage	Current	Voltage	Current
Absolute input range	±15V	±32mA	-	
Digital data format	2's complement of 16-bit, 12 significant bits			
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: 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.

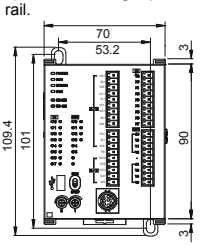
■ I/O Configuration

Model	Input		Output		I/O configuration							
	Point	Type	Point	Type	Relay		NPN		PNP	
20SX211R	8	DC (Sink Or Source)	6	Relay	V0+	S/S	V0+	S/S	V0+	S/S
					I0+	X0	I0+	X0	I0+	X0
					VI0-	X1	VI0-	X1	VI0-	X1
20SX211T				NPN Transistor	V1+	X2	V1+	X2	V1+	X2
					I1+	X3	I1+	X3	I1+	X3
					VI1-	X4	VI1-	X4	VI1-	X4
					V2+	X5	V2+	X5	V2+	X5
					I2+	X6	I2+	X6	I2+	X6
					VI2-	X7	VI2-	X7	VI2-	X7
20SX211S				PNP Transistor	V3+	C0	V3+	UP	V3+	UP
					I3+	Y0	I3+	ZP	I3+	ZP
					VI3-	Y1	VI3-	Y0	VI3-	Y0
					FE	Y2	FE	Y1	FE	Y1
					VO0	●	VO0	Y2	VO0	Y2
					IO0	C1	IO0	Y3	IO0	Y3
SX2-R/T/S	4	Analog Input	2	Analog output	VO1	Y3	VO1	Y4	VO1	Y4
					IO1	Y4	IO1	Y5	IO1	Y5
					AG	Y5	AG	●	AG	●

■ Dimension & Installation

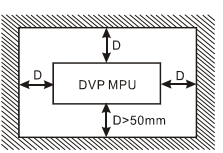
Please install the PLC in an enclosure with sufficient space around it to allow heat dissipation, as shown in the [Figure 5].

- **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.



Unit: mm

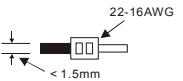
[Figure 4]



[Figure 5]

■ Wiring

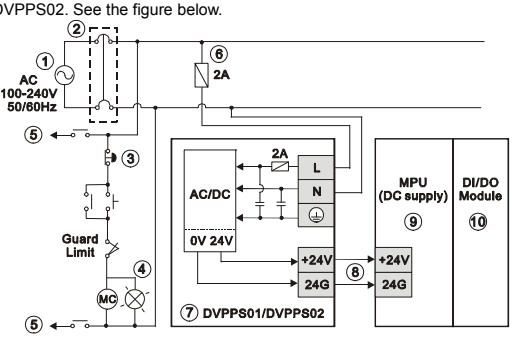
1. Use 22-16AWG (1.5mm) single or multiple core wire on I/O wiring terminals. See the figure in the right hand side for its specification. PLC terminal screws should be tightened to 1.90 kg-cm (1.65 in-lbs) and please use only 60/75ºC copper conductor.



2. DO NOT wire empty terminal and 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.

◆ Safety Wiring

Since DVP-SX2 is only compatible with DC power supply, Delta power supply modules (DVPPS01/DVPPS02) are suitable power supplies for DVP-SX2. Users are suggested to install the protection circuit at the power supply terminal to protect DVPPS01 or DVPPS02. See the figure below.



[Figure 6]

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	

◆ Power Supply

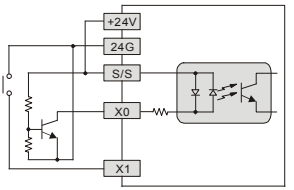
The power input of DVP-SX2 series is DC. When operating DVP-SX2 series, please note the following points:

1. The power is connected to the two terminals, 24VDC and 0V, and the range of power is 20.4 ~ 28.8VDC. If the power voltage is less than 20.4VDC, PLC will stop running, all outputs will go “Off” and ERROR indicator will flash continuously.
2. The power shutdown of less than 10 ms will not affect the operation of the PLC. However, power 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 operation. (Care should be taken on the latched auxiliary relays and registers inside the PLC when programming).

◆ Input Point Wiring

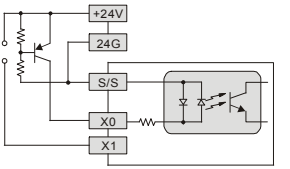
There are 2 types of DC inputs, SINK and SOURCE. (See the example below. For detailed point configuration, please refer to the specification of each model.)

• DC Signal IN – SINK mode
Input point loop equivalent circuit



[Figure 7]

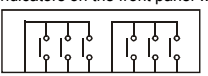
• DC Signal IN – SOURCE mode
Input point loop equivalent circuit



[Figure 8]

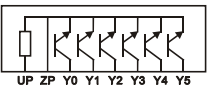
◆ Output Point Wiring

1. DVP-SX2 series have three output modules, relay and transistor (NPN/PNP). 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; as shown in the [Figure 9]. When output points are enabled, their corresponding indicators on the front panel will be on.

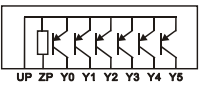


[Figure 9]

3. The output terminals Y0~Y5 of the transistor (NPN) model are connected to the common terminals UP and ZP. See [Figure 10a]. The output terminals Y0~Y5 on the transistor (PNP) model are connected to the common terminals UP and ZP. See [Figure 10b].



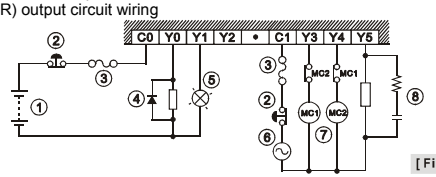
[Figure 10a]



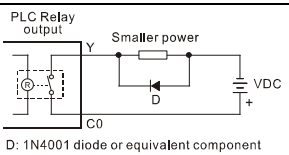
[Figure 10b]

4. Isolation circuit: The optical coupler is used to isolate signals between the circuit inside PLC and input modules.

• Relay (R) output circuit wiring

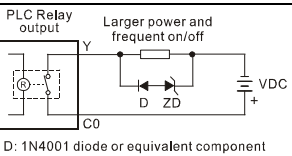


[Figure 11]



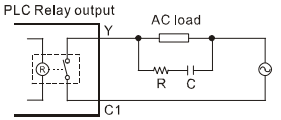
D: 1N4001 diode or equivalent component

[Figure 12a]



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

[Figure 12b]



[Figure 13]

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): To extend the life span of contact.
1. Diode suppression of DC load: Used when in smaller power (Figure 12a)
2. Diode + Zener suppression of DC load: Used when in larger power and frequent On/Off (Figure 12b)

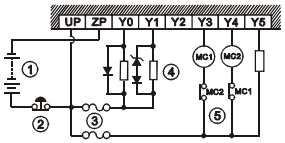
⑤ Incandescent light (resistive load) ⑥ AC power supply

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.

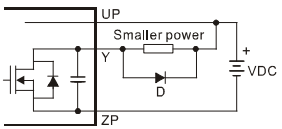
⑧ Absorber: To reduce the interference on AC load (Figure 13)

• Transistor (T) output circuit wiring

Transistor output - NPN type (SX211T):



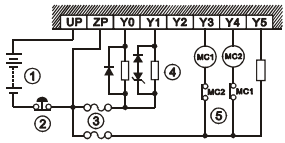
[Figure14a]



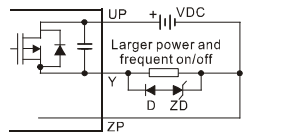
D: 1N4001 diode or equivalent component

[Figure 15a]

Transistor output - PNP type (SX211S):



[Figure14b]



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

[Figure 15b]

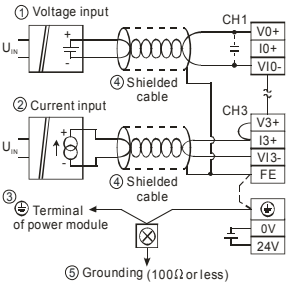
① DC power supply ② Emergency stop ③ Circuit protection fuse

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 15a)
2. Diode + Zener suppression: Used when in larger power and frequent On/Off (Figure 15b)

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.

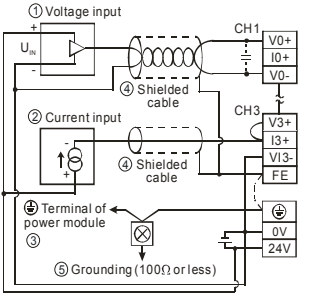
◆ A/D and D/A External Wiring

• A/D: Active



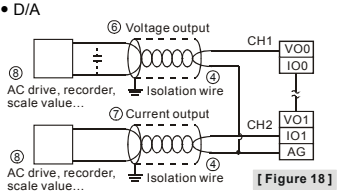
[Figure 16]

• A/D: Passive



[Figure 17]

• D/A



[Figure 18]

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

◆ RS-485 Wiring

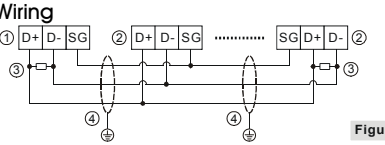


Figure 19

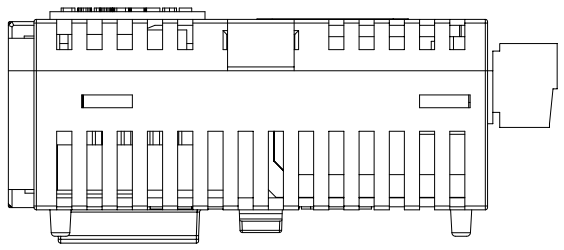
① Master node	② Slave node
③ Terminal resistor	④ Shielded cable

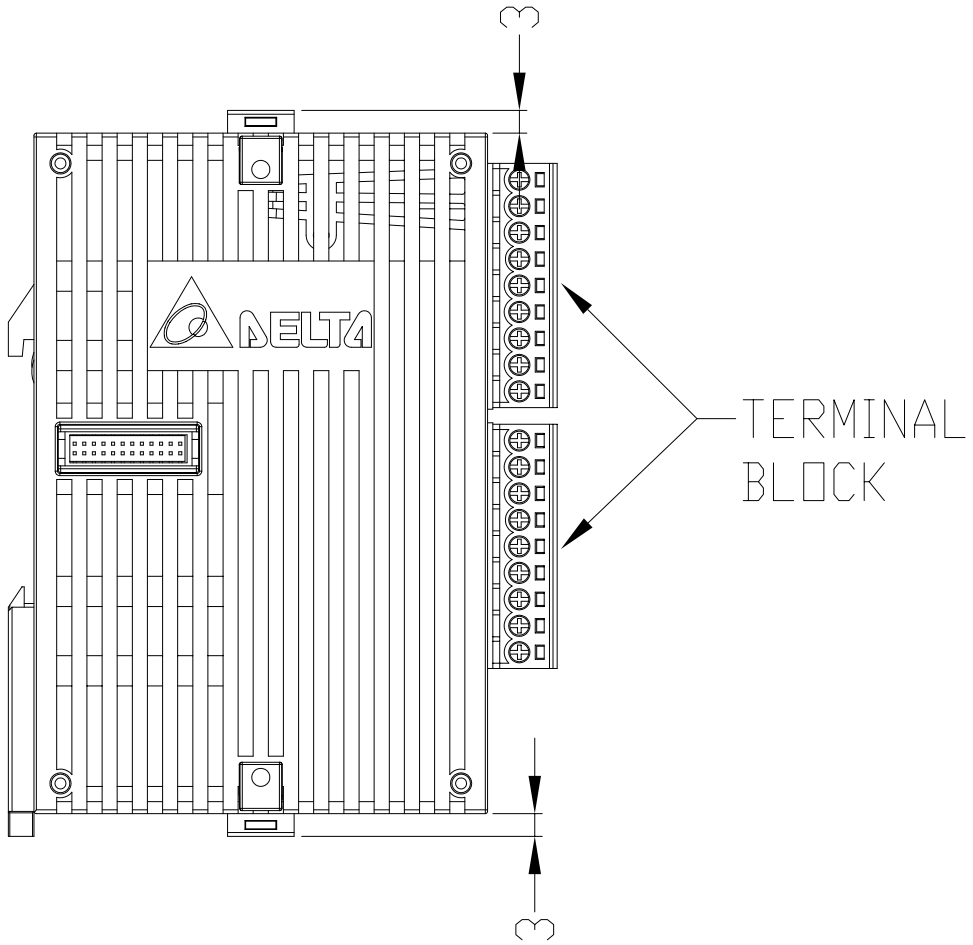
Note: 1. Terminal resistors are suggested to be connected to master and the last slave with resistor value of 120Ω.
2. To ensure communication quality, please apply double shielded twisted pair cable (20AWG) for wiring.
3. When voltage drop occurs between the internal ground references of two systems,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

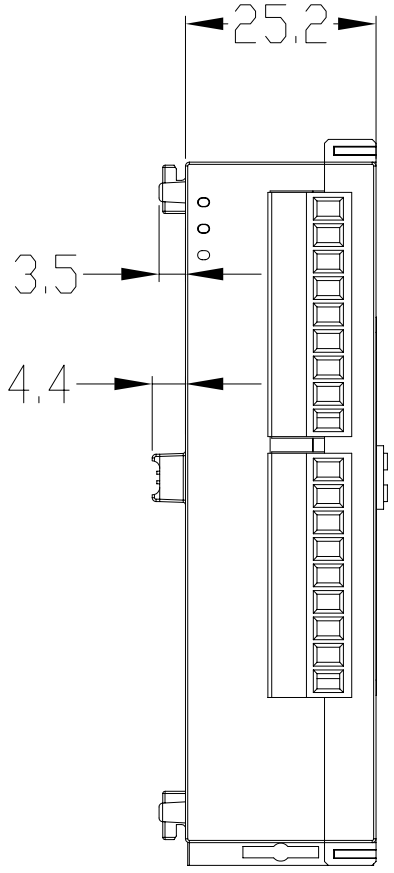
■ Precision of the RTC (Second/Month)

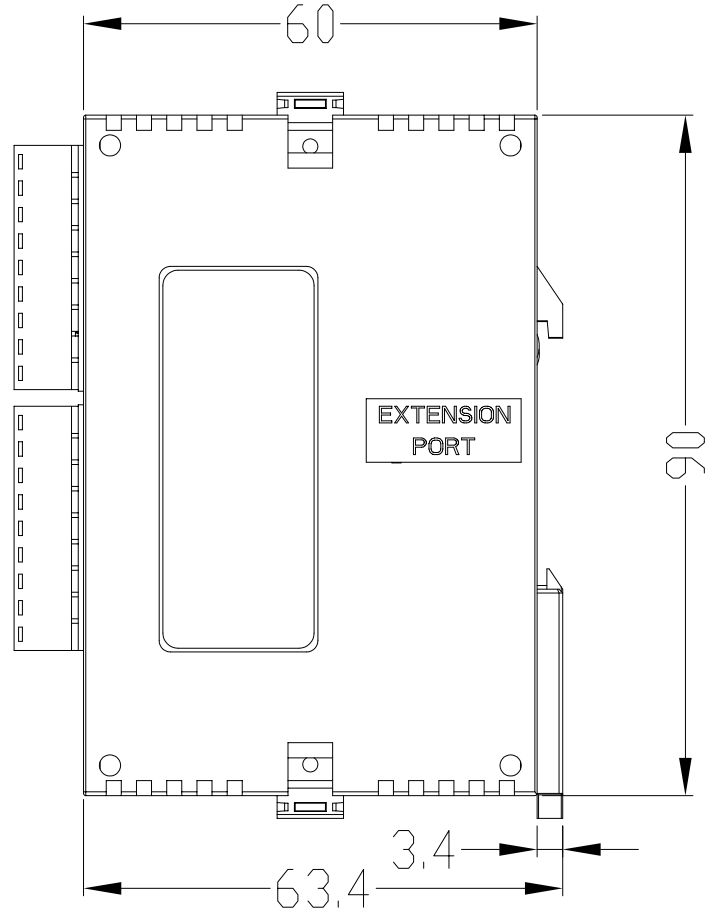
Temperature (°C/°F)	0/32	25/77	55/131
Maximum error (Second)	-117	52	-132

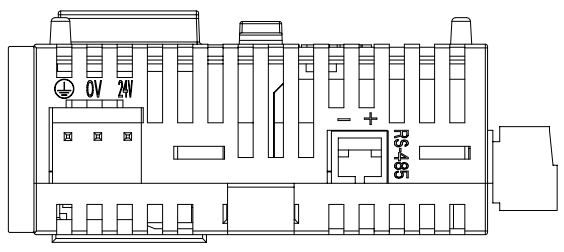
Duration in which the RTC is latched: One week (Only version 2.00 and above are supported.)




3
TERMINAL
BLOCK
3
DELTA


25.2
3.5
4.4


60
EXTENSION
PORT
90
3.4
63.4


0V
24V
RS-485