























## RTD 모듈 특징

RTD 변환모듈은 PT100, JPT100, PT1000, Ni1000 측온 저항체의 입력을 받아 온도를 측정하여 온도 (°C, °F) 및 부호 있는 14(혹은 16)비트 디지털 값으로 변환하는 모듈입니다.

### ▶ 특징

- 1) PT100, JPT100, PT1000, Ni1000 에 의해 변환된 온도를 섭씨(°C), 화씨(°F)로 나타내고 온도 값은 소수점 한자리까지 변환합니다.
- 2) 측정된 온도 -200°C~600°C(PT100/1000/JPT100) 또는 -50°C~160°C(Ni1000)를 -192 ~ 16191(0 ~ 65000), -8192 ~ 8191(-32768~32767), 0~16000(0 ~ 64000), -8000 ~ 8000(-32000 ~ 32000) 범위로 변환합니다.
- 3) 측정된 온도 -200°C~600°C(PT100/1000/JPT100) 또는 -50°C~160°C(Ni1000)의 범위를 벗어난 경우 -250°C~650°C(PT100/PT1000/JPT100) 또는 -60°C~170°C(Ni1000)까지 표현합니다.
- 4) -192 ~ 16191(0 ~ 65000), -8192 ~ 8191(-32768~32767) 범위의 경우, 측정 온도 -200°C~600°C(PT100/1000/JPT100) 또는 -50°C~160°C(Ni1000) 내에서는 0~16000(0 ~ 64000), -8000 ~ 8000(-32000 ~ 32000)까지 표현합니다.  
해당 측정 온도 범위를 초과할 경우에 -192 ~ 16191(0 ~ 65000), -8192 ~ 8191(-32768~32767)까지 표현합니다.
- 5) 사용자가 최소 온도 값과 최대 온도 값을 설정하면 최소 온도 값을 0(0), -8000(-32000)으로, 최대 온도 값을 16000(64000), 8000(32000)으로 변환합니다. 그 이상의 온도에 대해서는 범위 설정에 따라 -192~16191(0~65000), -8192~8191(-32768~32767)까지 표현 가능합니다.
- 6) 각 채널별로 측온 저항체 및 케이블의 단선과 측정범위 초과를 검출하는 기능이 있습니다.
- 7) 한 모듈로 4 점의 센서(PT100, JPT100, PT1000, Ni1000)를 접속하여 사용할 수 있습니다.
- 8) LED 는 정상상태에서 점등되고 예러일 경우 0.3 초 간격으로 깜빡입니다.
- 9) 백금, 니켈 측온 저항체 온도를 저항의 형태로 감지하는 센서입니다. 백금 측온 저항체 PT100, JPT100 은 0°C 온도에 대해서 100.0Ω 출력력을 합니다. 백금 측온 저항체 PT1000 은 0°C 온도에 대해서 1000.00Ω 출력력을 합니다. 니켈 측온 저항체 Ni1000 은 0°C 온도에 대해서 1000.00Ω 출력력을 합니다.



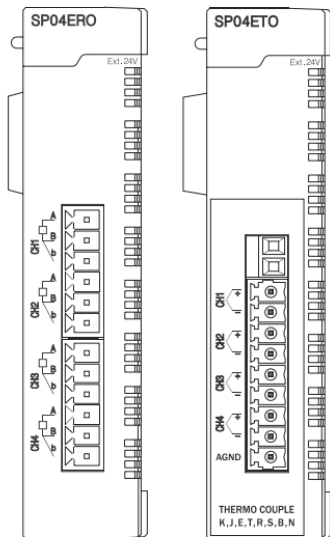
## RTD 모듈 배선 방법

채널	A 단자	B 단자	b 단자
1 Ch	1 단자	2 단자	3 단자
2 Ch	4 단자	5 단자	6 단자
3 Ch	7 단자	8 단자	9 단자
4 Ch	10 단자	11 단자	12 단자
24V 외부입력	모듈 하부 별도 결선		

## TC 모듈 배선 방법

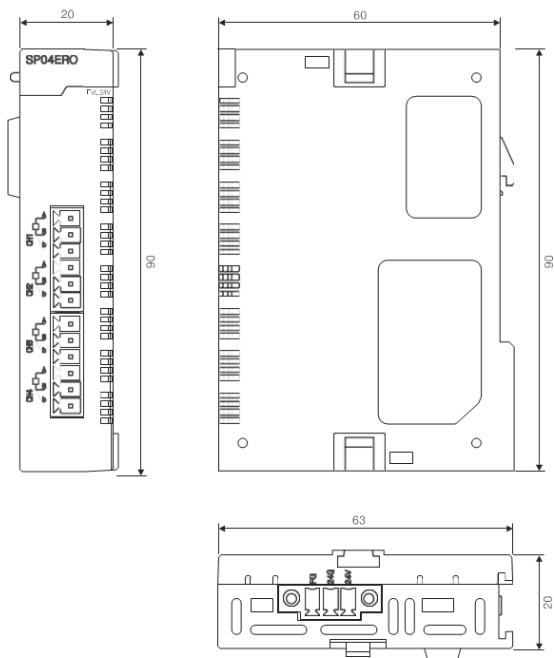
채널	A 단자	B 단자
1 Ch	1 단자	2 단자
2 Ch	3 단자	4 단자
3 Ch	5 단자	6 단자
4 Ch	7 단자	8 단자
AGND	9 단자 Analog GND	
24V 외부입력	모듈 하부 별도 결선	

# 외형



# 외형 치수도

(단위 : mm)



Korean

## 품질보증

본 제품은 각종 국제 안전 규격에 의한 테스트를 철저히 수행하고 그에 따른 품질관리 및 전기용품 안전관리법에 의거하여 안전 인증을 받아 제조된 제품입니다. 또한 제조물책임법에 따른 의무도 준수하였습니다.

본 제품은 ㈜씨이몬에서 보증하며, 고장 발생 시 아래의 보증규정에 의거하여 서비스를 받으실 수 있습니다.

### 제품 보증 규정

1. 본 제품의 설치와 사용방법에 관한 자세한 내용은 첨부된 설치안내서에 설명되어 있습니다. 보다 상세한 내용이 서술되어 있는 매뉴얼은 전자문서 형태로 인터넷을 이용하여 다운로드 가능하며, 대리점 또는 당사 영업 담당자에게 문의하시면 손쉽게 확보하실 수 있습니다. 본 제품의 사용방법을 준수하지 않아서 생긴 피해나 위험은 당사에서 책임지지 않습니다.
2. 본 제품을 공급 받은 후에 제조물에 결함이 존재하는 사실이 발견되면 즉시 당사에 알려 주셔야 합니다. 이를 하지않음으로써 발생하는 문제에 대해서는 당사에서 책임지지 않습니다.
3. 하드웨어, 소프트웨어 및 펌웨어를 포함한 모든 싸이몬 제품(이하 '제품'으로 표기)의 보증기간은 출하일로부터 20 개월입니다. 이 기간에 발생한 제품 하자 또는 제조 결함에 대해 당사는 해당 제품을 교환 또는 수리하여 드립니다. 구매 후 30 일 이내 반송된 제품의 경우 당사의 보증 규정에 따라 리퍼 제품 또는 새 제품으로 교환 될 수 있습니다. 수리 또는 교환된 제품에 대해서는 6 개월 또는 원래 주어진 보증기간의 잔여 기간 중, 더 긴 기간을 보증 적용합니다.
4. 다음과 같은 경우에는 무상보증기간 내이라도 출장비, 부품비, 수리비등에 대하여 유상 서비스를 받게 됩니다. 또한 제품 보증이 적용되지 않습니다.
  - 1) 천재지변에 의한 고장 및 손상
  - 2) 타 업체가 수리하여 제품의 내용을 변경 또는 손상시킨 경우
  - 3) 허가된 (당사) A/S 요원에 의하지 않은 개봉, 수리, 변경 등의 경우
  - 4) 사용자의 부주의에 의한 고장 또는 손상
  - 5) 사용자의 임의 변경 사용 등에 의한 고장 또는 손상
  - 6) 전원장이나 연결 기기 장애로 발생한 고장 또는 손상
  - 7) 외부 충격이나 파손, 누수 등에 의한 고장 또는 손상
  - 8) 제품의 제조일자 또는 제품 일련번호가 제거되거나 훼손된 경우
  - 9) 인터넷 또는 기타 서비스를 통하여 제품에 전송되는 데이터나 콘텐츠에 대한 경우
  - 10) 당사 출하시 과학, 기술 수준에서는 예상이 불가능한 사유에 의한 경우
5. 위 보증은 본 제품에 한하며, 본 제품을 이용한 시스템 구성이나 응용 시에는 반드시 안정성을 사용자가 고려하여 사용해야 하며, 본 제품을 적용한 응용시스템은 책임지지 않습니다.











**Precautions for mounting (⚠ Caution)** 

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Use the PLC in an environment that meets the general specifications given in this manual.

Using this PLC in any environment outside the range of the general specifications could result in electric shock, fire, malfunction, or damage to or deterioration of the product.

Please ensure that each module is installed correctly in its place. Loosely or incorrectly installed pieces may result in malfunction, failure, or free-fall.

The PLC power supply should be turned off before mounting the module. Not doing so could cause an electric shock or damage to the device.

Install I/O devices or extension connectors correctly. If they are installed incorrectly, it may result in an input or output failure.

Do not convey direct vibration into the PLC. Doing so could cause electric shock, fire or malfunctions.

After wiring work, please make sure to close the terminal cover before turning on the power for the PLC system.

When using the SP04ETO, be careful not to damage the NTC temperature sensor.

**Precautions for wiring (⚠ Warning)** 

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Make sure to check the device's rated voltage and circuit arrangement before wiring. Failure to do so may cause electric shock or damage to the device.

Make sure to close the terminal cover before turning on the power of the PLC system after wiring work. Failure to do so may cause electric shock.

**Precautions for wiring (⚠ Caution)** 

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Make sure to check the device's regular voltage and sequence of terminals. Failure to do so may cause fire, electric shock, and malfunctions.

Make sure to tighten the screws with standard torque. Loose connections may cause a short circuit, fire, or malfunctions.

When grounding the FG ground terminals, be sure to conduct the product with at least D type (Class 3) grounding. Not doing so could result in electric shock or malfunctions.

When wiring, make sure that wiring debris does not enter the module. Failure to do so may cause fire, equipment damage or malfunctions.

## Precautions for wiring of RTD & TC Module ( Caution) ---

Cables for module input signals should be separate from AC power to prevent the influence of surge or induction noise occurring from AC.

Select a cable considering the ambient temperature and allowable current. AWG16-28 is recommended.

If the wiring is too close to a heat-generating device, or directly contacted with oil for long periods of time, it may cause a short circuit, breakdown, or malfunction.

In the case of wiring together with a high-voltage cable or power line, a malfunction or breakdown may occur.

Our TC modules are non-isolated between channels and use FG in common.

An FG connection is recommended. In particular, FG reinforcement is strongly recommended when the measured values fluctuate quickly.

When the TC sensor is connected to multiple sources at the same time, electrical interference may occur between them. So, it is not recommended to use simultaneous common connections (this is the main cause of abnormal measurements).

If it is necessary to use another company's model, you must connect the FG of our model with that of the other company's model.

## Precautions for test run and repair ( Warning) ---

Please do not touch the terminals when the power is on. Doing so could cause an electric shock or malfunctions.

When cleaning or tightening the screws, turn off the power of the PLC and all other systems. Failure to do so could cause an electric shock or malfunctions.

Do not charge, disassemble, heat up, short, or solder the battery. Doing so could cause the battery to heat up, rupture, or ignite, thereby harming the user.

### Precautions for test run and repair ( Caution) ---

Do not dissociate the PCB from the module's casing or make any modifications to the device. Doing so may cause fire, electric shock or malfunction.

When mounting or separating the module, make sure to turn off power to the PLC and all other devices. Failure to do so could cause an electric shock or malfunctions.

Use radio, walkie-talkie or cellphone devices at least 30cm away from the PLC. Not doing so could result in malfunction.

### Precautions for disposal ( Caution) ---

When the product is disposed of, it should be done according to your country's regulations for similar types of industrial waste. Not doing so may cause an occurrence of toxic substances or explosions.

## General Specifications

Items	Specification				Standards
Operating Temp.	-10°C-65°C				-
Storage Temp.	-25°C-80°C				-
Operating Humidity	5-95% RH, Non-condensing				-
Storage Humidity	5-95% RH, Non-condensing				-
Vibration	<b>For discontinuous vibration</b>				IEC 61131-2
	<b>Frequency</b>	<b>Acceleration</b>	<b>Amplitude</b>	<b>Times</b>	
	$5 \leq f < 9$ Hz	-	3.5 mm	10 times in X, Y, Z	
	$9 \leq f \leq 150$ Hz	$9.8 \text{ m/s}^2$ (1G)	-		
	<b>Continuous vibration</b>				
	<b>Frequency</b>	<b>Acceleration</b>	<b>Amplitude</b>	<b>Times</b>	
	$5 \leq f < 9$ Hz	-	1.75 mm	10 times in X, Y, Z	
$9 \leq f \leq 150$ Hz	$4.9 \text{ m/s}^2$ (0.5G)	-			
Shocks	<ul style="list-style-type: none"> <li>• Max. impact acceleration: <math>147 \text{ m/s}^2</math> (15G)</li> <li>• Authorized time: 11 ms</li> <li>• Pulse wave: Sign half-wave pulse (3 times each in X, Y, Z)</li> </ul>				IEC 61131-2
Noise	Square Wave Impulse Noise	$\pm 2$ kV		CIMON Standard	
	Electrostatic Discharge	$\pm 4$ kV (contact), $\pm 8$ kV (air)		IEC 61131-2 IEC 61000-4-2	
	Radiated Electromagnetic Field Noise	80-1000 MHz, 10 V/m		IEC 61131-2 IEC 61000-4-3	
	Fast Transient Burst Noise (Voltage)	CPU, Power		2 kV	IEC 61131-2 IEC 61000-4-4
Digital/Analog I/O (AC)					
Digital/Analog I/O (DC)		1 kV			
Communication					
Ambient Conditions	No corrosive gas or dust				
Altitude	2,000 m or less				
Pollution	Pollution Degree 2 or less				
Cooling	Natural air cooling				



## Performance Specifications (CM3-SP04ERO(-A))

Items		Specification
<b>RTD Type</b>		PT100, JPT100, PT1000, Ni1000 (DIN43760), Ni1000 (TCR5000)
<b>Range of Temperature Input</b>		PT100: -200.0-600°C (18.52-313.71 Ω) JPT100: -200.0-600°C (17.14-317.31 Ω) PT1000: -200.0-600°C (185.2-3137.1 Ω) Ni1000 (DIN 43760): -50.0-160°C (742.6-2065.9 Ω) Ni1000 (TCR5000): -50.0-160°C (790.9-1863.6 Ω)
<b>Digital Conversion</b>		Digital converted value (14-bit): -192-16191 (-8192-8191, 0-16000, -8000-8000) Digital converted value (16-bit): 0-65000 (-32768-32767, 0-64000, -32000-32000) Detected Temp. value: -2000-6000 (First decimal place value * 10) or -500-1600 (First decimal place value * 10)
<b>Detecting of Wires Disconnection</b>		3 wires available from each channel
<b>Accuracy</b>		±0.1% (full scale)
<b>Max Conversion Rate</b>		40 ms/4 Channels
<b>Temperature Input points</b>		4 Channels/1 Module
<b>Insulation Type</b>		Between input terminal and PLC: photo coupler insulation between channels: no insulation
<b>Terminal Block</b>		12 points Terminal Block
<b>Current Consumption (mA)</b>	<b>+3.3 V</b>	40
	<b>+24 V</b>	10

## Performance Specification (CM3-SP04ETO(-A))

Items		Specification			
<b>Thermocouple Type</b>		K, J, E, T, B, R, S, N type			
<b>Digital Conversion</b>		Digitally converted value: 0-16000 (-8000-8000)/ - 192-16191 (-8192-8191) Converted temperature value: Range of measured temperature (one digit after the decimal point * 10)			
<b>Range of Temperature Input</b>		Thermocouple Types	DIN Code	Range of measured Temp. (°C)	Range of measured Voltage (μV)
		K	ITS-90	-200.0-1200.0	-5891-48838
		J		-200.0-800.0	-7890-48494
		E		-200.0-600.0	-8825-45093
		T		-200.0-400.0	-5603-20872
		B		400.0-1800.0	787-13591
		R		-0.0-1750.0	0-20877
		S		-0.0-1750.0	0-18503
N	-200.0-1250.0	-3990-45694			
<b>RJC</b>		Automatic			
<b>Detecting the Breaking of Wires</b>		Per channel			
<b>Accuracy</b>		±[(Full Scale) x 0.3% + 1°C (RJC Error)]			
<b>Max Converted Tare</b>		50 ms/4 Channels			
<b>No. of Input Channels</b>		4 Channels/Module			
<b>Type of Insulation</b>		Between input terminal and PLC: photo coupler Insulation between channels: no insulation			
<b>Connection Terminal</b>		9-point terminal			
<b>Current Consumption (mA)</b>	<b>+3.3 V</b>	40			
	<b>+24 V</b>	10			

## Features of RTD Module (SP04ERO(-A))

RTD conversion module converts temperatures of PT100, JPT100, PT1000, NI1000 into (°C, °F) or 14-bit (or 16-bit) digital value.

- 1) Used to convert temperature from PT100, JPT100, PT1000, or Ni1000 into a decimal value (°C, °F) with one decimal place of accuracy. It can output a digital value in the range of -192–16191 (0–65000), -8192–8191 (-32768–32767), 0–16000 (0–64000), -8000–8000 (-32000–32000).
- 2) RTD module converts temperature from -200–600°C (PT100/PT1000/JPT100) or -50–160°C (Ni1000) into a digital value in the range of -192–16191 (0–65000), -8192–8191 (-32768–32767), 0–16000 (0–64000), -8000–8000 (-32000–32000).
- 3) If the measured temperature exceeds the range of -200–600°C (PT100/PT1000/JPT100) or -50–160°C (Ni1000), the temperature will be always displayed within the range of -250–650°C (PT100/PT1000/JPT100) or -60–170°C (Ni1000).
- 4) Using the digital value range -192–16191 (0–65000) and -8192–8191 (-32768–32767) will display the temperature of -200–600°C (PT100/PT1000/JPT100) or -50–160°C (Ni1000) as 0–16000 (0–64000), -8000–8000 (-32000–32000). The temperature that exceeds the range will be displayed within -192–16191 (0–65000) or -8192–8191 (-32768–32767).
- 5) If the user customizes maximum and minimum temperature values, the minimum values will be displayed as 0 (0) or -8000 (-32000). The maximum values will be displayed as 16000 (64000) or 8000 (32000). The temperature that exceeds the custom temperature range will be displayed within the range of -192–16191 (0–65000) or -8192–8191 (-32768–32767).
- 6) Detection of thermocouple errors, broken cables, and values outside of the measurement range.
- 7) There are 4 channels (PT100, JPT100, PT1000, Ni1000) per RTD module.
- 8) In case of normal status, the LED is on. In case of error, LED will blink at 0.3 s intervals.
- 9) PT100, JPT100: 0°C → 100.0 Ω output  
PT1000: 0°C → 1000.00 Ω output  
Ni1000: 0°C → 1000.00 Ω output

## Features of TC Module (SP04ETO(-A))

TC is the conversion module that measures temperature from a thermocouple (K, J, E, T, B, R, S, N) and converts temperatures into (°C, °F), or a 14-bit digital value.

- 1) Can show minimum -200°C and maximum +1200°C temperature value, or digital value  
-192-16191 (-8192-8191).
- 2) If the maximum and minimum temperature values are set, values outside of the range are rounded to the minimum 0 (-8000) or maximum 16000 (8000) each.
- 3) Detection of thermocouple errors, broken cables, and values outside of the measurement range.
- 4) There are 4 thermocouple points to use.
- 5) The reference junction compensation is made automatically by the temperature sensor in the terminal.
- 6) User can calibrate temperature in 0.1°C increments (buffer memory 75).

## Wiring of RTD (SP04ERO(-A))

Chanel	A Terminal	B Terminal	b Terminal
CH 1	Terminal 1	Terminal 2	Terminal 3
CH 2	Terminal 4	Terminal 5	Terminal 6
CH 3	Terminal 7	Terminal 8	Terminal 9
CH 4	Terminal 10	Terminal 11	Terminal 12
24 V External	Connection: bottom of module		

## Wiring of TC (SP04ETO(-A))

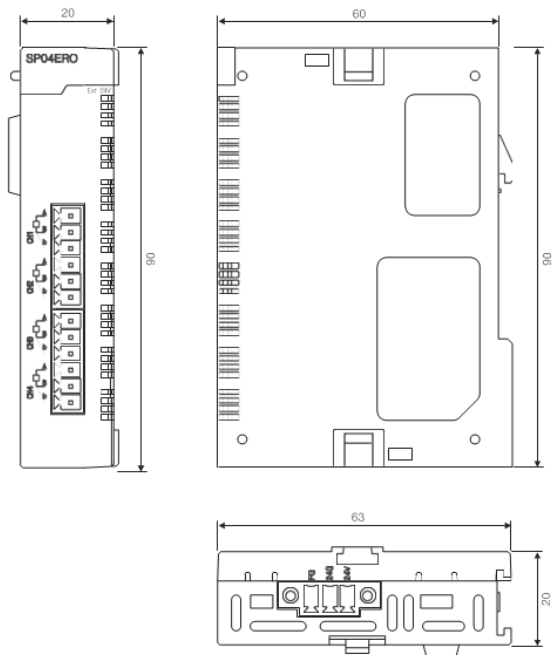
Channel	+ Terminal	- Terminal
CH 1	Terminal 1	Terminal 2
CH 2	Terminal 3	Terminal 4
CH 3	Terminal 5	Terminal 6
CH 4	Terminal 7	Terminal 8
AGND	Terminal 9	
24 V External	Connection: bottom of module	



## Dimensions

► Both SP04ERO(-A) and SP04ETO(-A) have the same dimensions.

(Unit: mm)







## Product Warranty

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