CJ1W-PDC/PH41U/AD04U

A Single Unit Handling All Types of Inputs such as Temperature Sensor Inputs and Analog Signal Inputs (e.g., 4 to 20 mA or 1 to 5 V)

- A Unit supports four input channels, each of which can be set to a platinum resistance thermometer, thermocouple, and DC signal (current, voltage). All inputs are isolated.

CJ1W-PH41U   **CJ1W-AD04U**

Features

- Supports a maximum of four inputs in one Unit: resistance thermometer, thermocouple, and DC current/voltage. (The input type is set separately for each input.)
- Isolation between input channels prevents unwanted current paths between input channels.
- Scaled values are transferred to the CPU Unit in four digits hexadecimal with voltage/current inputs.
- Process value alarm with two alarms for each input
- Alarm ON-delay timer and hysteresis for process value
- Zero/Span adjustment capability during operation
- Input error detection
- Maximum or minimum process value can be specified for when an input error is detected.
- A Unit with fully universal inputs, high-speed and high-resolution (256,000 resolution, 60 ms/ch is available.)

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Ordering Information

International Standards

• The standards are abbreviated as follows: U: UL, U1: UL (Class I Division 2 Products for Hazardous Locations), C: CSA, UC: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.

• Contact your OMRON representative for further details and applicable conditions for these standards.

Process I/O Units

Isolated-type Thermocouple Input Units

Unit classification	Product name	Input points	Signal range selection	Signal range	Conversion speed (resolution)	Accuracy (at ambient temperature of 25°C)	External connection	No. of unit numbers allocated	Current consumption (A)		Model	Standards
									5 V	24 V		
CJ1 Special I/O Units	Process Input Units (Isolated-type Thermocouple Input Units)	2 inputs	Set separately for each input	Thermocouple: B, E, J, K, L, N, R, S, T, U, WRe5-26, PLII DC voltage: ±100 mV	Conversion speed: 10 ms/ 2 inputs, Resolution: 1/64,000	Standard accuracy: ±0.05% of F.S. *1	Removable terminal block	1	0.18	0.06 *2	CJ1W-PTS15	UC1, CE
		4 inputs	Common inputs	Thermocouple: R, S, K, J, T, L, B	Conversion speed: 250 ms/ 4 inputs	Accuracy: (±0.3% of PV or ±1°C, whichever is larger) ±1 digit max. *3			0.25	–	CJ1W-PTS51	

Note: This unit cannot be used, with the Machine Automation Controller NJ-series.

*1. The accuracy depends on the sensors used and the measurement temperatures. For details, refer to the user's manual.

*2. This is for an external power supply, and not for internal current consumption.

*3. L and −100°C or less for K and T are ±2°C±1 digit max., and 200°C or less for R and S is ±3°C±1 digit max. No accuracy is specified for 400°C or less for B.

Isolated-type Resistance Thermometer Input Units

Unit classification	Product name	Input points	Signal range selection	Signal range	Conversion speed (resolution)	Accuracy (at ambient temperature of 25°C)	External connection	No. of unit numbers allocated	Current consumption (A)		Model	Standards
									5 V	24 V		
CJ1 Special I/O Units	Process Analog Input Units (Isolated-type Resistance Thermometer Input Units)	4 inputs	Common inputs	Resistance thermometer: Pt100, JPt100	Conversion speed: 250 ms/ 4 inputs	Accuracy: ±0.3% of PV or ±0.8°C, whichever is larger, ±1 digit max.	Removable terminal block	1	0.25	–	CJ1W-PTS52	UC1, CE

Note: This unit cannot be used, with the Machine Automation Controller NJ-series.

* This is for an external power supply, and not for internal current consumption.

Isolated-type DC Input Units

Unit classification	Product name	Input points	Signal range selection	Conversion speed (resolution)	Accuracy (at ambient temperature of 25°C)	External connection	No. of unit numbers allocated	Current consumption (A)		Model	Standards
								5 V	24 V		
CJ1 Special I/O Units	Isolated-type DC Input Units	2 inputs	DC voltage: 0 to 1.25 V, −1.25 to 1.25 V, 0 to 5 V, 1 to 5 V, −5 to 5 V, 0 to 10 V, −10 to 10 V, ±10 V selectable range DC current: 0 to 20 mA, 4 to 20 mA	Conversion speed: 10 ms/ 2 inputs Resolution: 1/64,000	Accuracy: ±0.05% of F.S.	Removable terminal block	1	0.18	0.09 *	CJ1W-PDC15	UC1, CE

* This is for an external power supply, and not for internal current consumption.

Isolated-type Units with Universal Inputs

Unit classification	Product name	Input points	Signal range selection	Signal range	Conversion speed (resolution)	Accuracy (at ambient temperature of 25°C)	External connection	No. of unit numbers allocated	Current consumption (A)		Model	Standards
									5 V	24 V		
CJ1 Special I/O Units	Process Input Units (Isolated-type Units with Universal Inputs)	4 inputs	Set separately for each input	Fully universal inputs: Pt100, JPt100, Pt1000, K, J, T, L, R, S, B, 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 5 V, 0 to 10 V	Conversion speed: 250 ms/ 4 inputs	Accuracy: Platinum resistance thermometer input: ±0.3% of PV or ±0.8°C, whichever is larger) ±1 digit max. Thermocouple input: (±0.3% of PV or ±1.5°C, whichever is larger) ±1 digit max. *1 Voltage or current input: ±0.3% of F.S. ±1 digit max.	Removable terminal block	1	0.32	–	**CJ1W-AD04U**	UC1, CE, L
		4 inputs	Set separately for each input	Universal inputs: Pt100 (3-wire), JPt100 (3-wire), Pt1000 (3-wire), Pt100 (4-wire), K, J, T, E, L, U, N, R, S, B, WRe5-26, PL II, 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 1.25 V, 0 to 5 V, 0 to 10 V, ±100 mV selectable range −1.25 to 1.25 V, −5 to 5 V, −10 to 10 V, ±10 V selectable range, potentiometer	Resolution (conversion speed): 1/256,000 (conversion cycle: 60 ms/ 4 inputs) 1/64,000 (conversion cycle: 10 ms/ 4 inputs) 1/16,000 (conversion cycle: 5 ms/ 4 inputs)	Standard accuracy: ±0.05% of F.S.			0.30	–	**CJ1W-PH41U** *2	UC1, CE

*1. L and −100°C or less for K and T are ±2°C±1 digit max., and 200°C or less for R and S is ±3°C±1 digit max. No accuracy is specified for 400°C or less for B.

*2. Do not connect a Relay Contact Output Unit in the same CPU Rack or Expansion Rack as the CJ1W-PH41U Isolated-type Universal Input Unit.

System Overview

These Analog I/O Units belong to the CJ-series Special I/O Unit group.
• They can be mounted to CJ-series CPU Racks or Expansion I/O Racks.

The number of Units that can be mounted to one Rack (either a CPU Rack or Expansion I/O Rack) depends upon the maximum current supplied by the Power Supply Unit and the current consumption by the other Units.
There are no restrictions on Rack position.
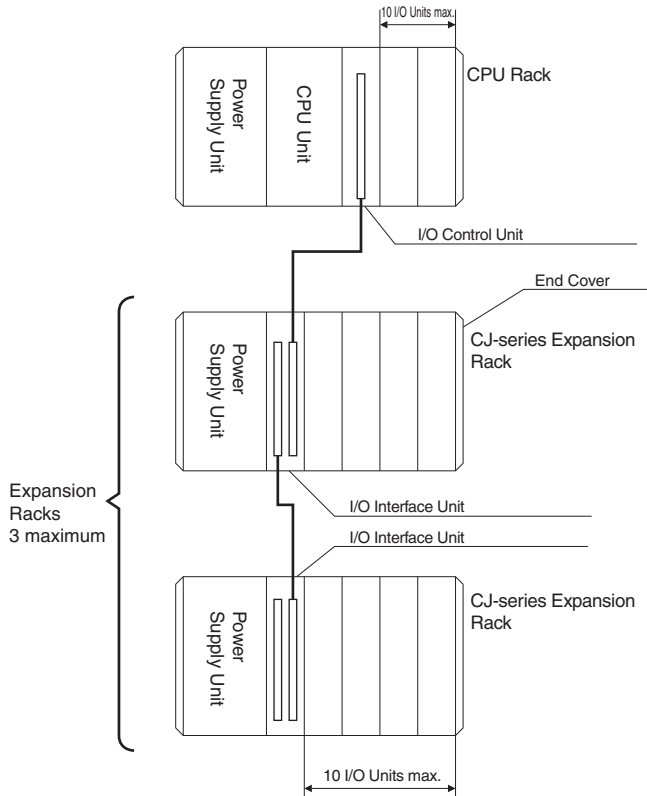
Note: I/O addresses for Special I/O Units are allocated according to the unit number set on the switches on the front panel, and not according to the slot position in which they are mounted.

Mountable Racks

Model	NJ system		CJ system (CJ1, CJ2)		CP1H system	NSJ system	
	CPU Rack	**Expansion Rack**	**CPU Rack**	**Expansion Backplane**	**CP1H PLC**	**NSJ Controller**	**Expansion Backplane**
CJ1W-PTS15 **CJ1W-PTS51** **CJ1W-PTS52**	Not supported		10 Units	10 Units (per Expansion Backplane)	2 Units	Not supported	10 Units (per Expansion Backplane)
CJ1W-PDC15 **CJ1W-AD04U** **CJ1W-PH41U**	10 Units	10 Units (per Expansion Rack)					

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Common Specification

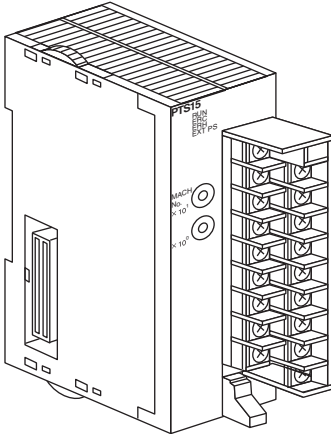| Item	Specification
Unit classification	CJ-series Special I/O Unit
Dimensions	31 × 90 × 65 mm (W × H × D)
Weight	150 g max.
Maximum number of Units	40 Units (10 Units × 4 Racks) Confirm that the total current consumption of all the Units (including the CPU Unit) mounted to a single CPU Rack or Expansion Rack does not exceed the maximum power supplied by the Power Supply Unit.
Ambient operating temperature	0 to 55°C
Ambient operating humidity	10% to 90% (with no condensation)

Current consumption

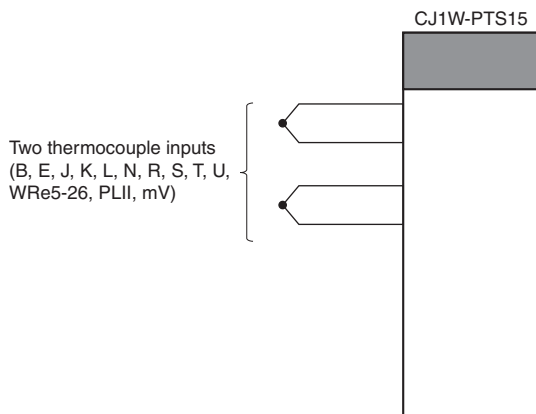| Name	Model	Current consumption (power)		
		5 V	24-V relay driver current	24-V external
Isolated-type Thermocouple Input Unit	CJ1W-PTS51	0.25 A (1.25 W)	–	Not used.
	CJ1W-PTS15	0.18 A (0.9 W)	–	0.06 A
Isolated-type Resistance Thermometer Input Unit (Pt100, JPt100)	CJ1W-PTS52	0.25 A (1.25 W)	–	Not used.
Isolated-type Direct Current Input Unit	CJ1W-PDC15	0.18 A (0.9 W)	–	0.09 A
Isolated-type Universal Input Unit	CJ1W-AD04U	0.32 A (1.6 W)	–	Not used.
	CJ1W-PH41U	0.30 A (1.5 W)	–	Not used.

CJ1W-PTS15 Isolated-type Thermocouple Input Unit

Overview

The CJ1W-PTS15 Isolated-type Thermocouple Input Unit provides two direct thermocouple inputs, and sends the data to the CPU Unit each cycle. All inputs are isolated.

System Configuration

CJ1W-PTS15

Two thermocouple inputs
(B, E, J, K, L, N, R, S, T, U,
WRe5-26, PLII, mV)

Specifications

Item		Specifications
Model		CJ1W-PTS15
Applicable Controller		CJ Series
Unit classification		CJ-series Special I/O Unit
Mounting position		CJ-series CPU Rack or CJ-series Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for data exchange with CPU Unit	Special I/O Unit Area (Operation Data)	10 words/Unit Thermocouple Input Unit to CPU Unit: All process values, process value alarms (LL, L, H, HH), conversion data enabled flags, sensor errors.
	DM Area words allocated to Special I/O Units (Setting parameter)	100 words/Unit CPU Unit to Thermocouple Input Unit: Temperature sensor type, input range (user set), process value alarm setting (L, H), zero/span adjustment value.
	Expansion Control/ Monitor Area words (Expansion Operation Data)	35 words/Unit CPU Unit to Thermocouple Input Unit: Hold function selection start/reset, adjustment period control, control bits Thermocouple Input Unit to CPU Unit: Adjustment period warnings/notices (for each input), peak and bottom values, top and valley values
	Expansion Setting Area words (Expansion Setting parameter)	46 words/Unit CPU Unit to Thermocouple Input Unit: Expansion Setting Area settings, adjustment period control, peak and bottom detection, top and valley detection
Number of temperature sensor inputs		2
Temperature sensor type		The sensor type, input range, and scaling can be set individually for each of 2 inputs, which are each selectable from B, E, J, K, L, N, R, S, T, U, WRe5-26, PL II, and mV.
Scaling		Data to be stored in the allocated words in the CIO area must be scaled (with the minimum and maximum values set by user) (2 inputs set separately). For example, data can be stored at 0% to 100%.
Data storage in the CIO Area		The value derived from carrying out the following processing in order of the actual process data in the input range is stored in four digits hexadecimal (binary values) in the allocated words in the CIO Area. 1) Mean value processing → 2) Scaling → 3) Zero/span adjustment → 4) Output limits
Accuracy (25°C)		±0.05% (Depends on the Sensor used and the measured temperature. Refer to *Accuracy by Sensor Type and Measured Temperature Range* on page 9 for details.)
Temperature coefficient		±0.01%/°C (For full scale of electromotive force. *)
Resolution		1/64000
Cold junction compensation error		±1°C, at 20 ±10°C
Maximum signal input		±120 mV
Input impedance		20 kΩ min.
Input disconnection detection current		0.1 μA (typical)
Warmup time		45 min
Response time		100 ms (travel time from input 0% to 90%, for ±100 mV step input and with moving average for 4 samples)
Conversion period		10 ms/2 inputs
Maximum time to store data in CPU Unit		Conversion period + one CPU Unit cycle
Disconnection detection		Detects disconnections at each input and turns ON the Disconnection Detection Flag. Hardware detection time: Approx. 0.5 s max. The process value overrange direction for when a disconnection occurs can be specified. (High: 115% of set input range; low: −15% of set input range)

Item		Specifications
Function	Mean value processing (input filter)	Calculates the moving average for the specified number of process values (1 to 128), and stores that value in the CIO Area as the process value.
	Process value alarm	Process value 4-point alarm (LL, L, H, HH), alarm hysteresis, and ON-delay timer (0 to 60 s) are available.
	Rate-of-change calculation	Calculates the amount of change per comparison time interval (1 to 16 s).
	Rate-of-change alarm	Rate-of-change 2-point alarm (L, H), alarm hysteresis (shared with process value alarm), and ON-delay timer (0 to 60 s, shared with process value alarm) are available.
	Adjustment period control	When zero/span adjustment is executed, the date is internally recorded at the Unit. When the preset zero/span adjustment period and number of days notice have elapsed (allocated in Expansion Setting Area), this function turns ON a warning flag to give notice that it is time for readjustment.
	Peak and bottom detection	This function detects the maximum (peak) and minimum (bottom) analog input values, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF, and stores them in the Expansion Control/Monitor Area.
	Top and valley detection	This function detects the top and valley values for analog inputs, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF, and stores them in the Expansion Control/Monitor Area.
Isolation		Between inputs and Controller signals, and between inputs: Isolation by transformer for power supply, and by photocoupler for signals. Cold junction compensation circuit: No isolation from input 2
Insulation resistance		20 MΩ (at 500 V DC) between inputs
Dielectric strength		Between inputs: 1,000 V AC, at 50/60 Hz, for 1 min, leakage current 10 mA max.
External connections		Terminal block (detachable)
Unit number settings		Set by rotary switches on front panel, from 0 to 95.
Indicators		Four LED indicators on front panel (for normal operation, errors detected at the Thermocouple Input Unit, errors related to the CPU Unit, and use of external power supply).
Front panel connector		Sensor input connector terminal block (detachable)
Effect on CPU Unit cycle time		0.3 ms
Current consumption		5 V DC at 180 mA max.
External power supply		24 VDC +10%/−15% 60 mA max., inrush current: 20 A for 1 ms max. (The external 24-VDC power supply must be isolated.)
Dimensions		31 × 90 × 65 mm (W × H × D)
Weight		150 g max.
Standard accessories		Two cold junction sensors (installed in terminal block)

* The method for calculating the error in temperature measurements, including the temperature coefficient, is given below. The "full scale of electromotive force" is the difference between the high limit and low limit converted to electromotive force for each thermocouple.

Example

Ambient temperature:	30 °C
Temperature Sensor:	K thermocouple (−270 to 1,372 °C)
Measured temperature:	500 °C

From electromotive force table

−270 °C:	−6.458 mV
1,372 °C:	54.86 mV
	Full scale: 61.344

Electromotive conversion of temperature coefficient:

$$61.344 \text{ mV} \times \pm 0.01\%/°C = \pm 6.13 \text{ } \mu V/°C$$

Error in electromotive force at 30°C:

$$\pm 6.13 \text{ } \mu V/°C \times (30°C − 25°C) = 30.65 \text{ } \mu V/°C$$

Temperature difference between measurement point and terminals on Unit (ambient temperature)
(based on ambient temperature of 30 °C and Measured temperature of 500 °C):

$$470 °C$$

Electromotive force per °C at a measured temperature of 470 °C (from the electromotive force tables for a K thermocouple):

$$43 \text{ } \mu V/°C$$

Error in temperature coefficient: $\pm 30.65 \text{ } \mu V \div 43 \text{ } \mu V/°C = \pm 0.7°C$

Error in measured temperature = Accuracy $\pm$ Error from temperature coefficient + Error in cold junction compensation = $\pm 0.8°C + \pm 0.7°C + \pm 1.0°C = \pm 2.5°C$

Sensor Type and Input Range

The Temperature Sensor type and input range are set in the allocated words in the DM Area for every four inputs. The input range can be set anywhere within the measurable input ranges shown in the following table. Accuracy and resolution, however, are not determined from the set input range, but rather from the measurable input range shown in the following table. Therefore, accuracy and resolution do not change even when a narrow input range is set.

Sensor type	DM Area setting	Measurable input range
B	0	0 to 1,820°C
E	1	−270 to 1,000°C
J	2	−210 to 1,200°C
K	3	−270 to 1,372°C
N	4	−270 to 1,300°C
R	5	−50 to 1,768°C
S	6	−50 to 1,768°C
T	7	−270 to 400°C
mV	8	−100 to 100 mV
L	9	−200 to 900°C
U	10	−200 to 600°C
WRe5-26	11	0 to 2,300°C
PLII	12	0 to 1,300°C

Accuracy by Sensor Type and Measured Temperature Range

Sensor type	Temperature range	Standard accuracy	Details
B	0 to 1,820°C	±1.8°C (±0.1%)	400 to 800°C: ±3°C Less than 400°C: Accuracy is not specified.
E	−270 to 1,000°C	±0.6°C (±0.05%)	−250 to 200°C: ±1.2°C Less than −250°C: Accuracy is not specified.
J	−210 to 1,200°C	±0.7°C (±0.05%)	
K	−270 to 1,372°C	±0.8°C (±0.05%)	−250 to 200°C: ±2°C Less than −250°C: Accuracy is not specified.
N	−270 to 1,300°C	±0.8°C (±0.05%)	−200 to 150°C: ±1.6°C Less than −200°C: Accuracy is not specified.
R	−50 to 1,769°C	±1.8°C (±0.1%)	0 to 100°C: ±2.5°C Less than 0°C: Accuracy is not specified.
S	−50 to 1,769°C	±1.8°C (±0.1%)	0 to 100°C: ±2.5°C Less than 0°C: 3.2°C
T	−270 to 400°C	±0.35°C (±0.05%)	−180 to 0°C: ±0.7°C −200 to −180°C: ±1.3°C Less than −200°C: Accuracy is not specified.
L	−200 to 900°C	±0.5°C (±0.05%)	
U	−200 to 600°C	±0.4°C (±0.05%)	−100 to 0°C: ±0.5°C Less than −100°C: ±0.7°C
WRe5-26	0 to 2,315°C	±1.2°C (±0.05%)	More than 2,200°C: ±1.4°C
PLII	0 to 1,395°C	±0.7°C (±0.05%)	

Terminal Block Diagram
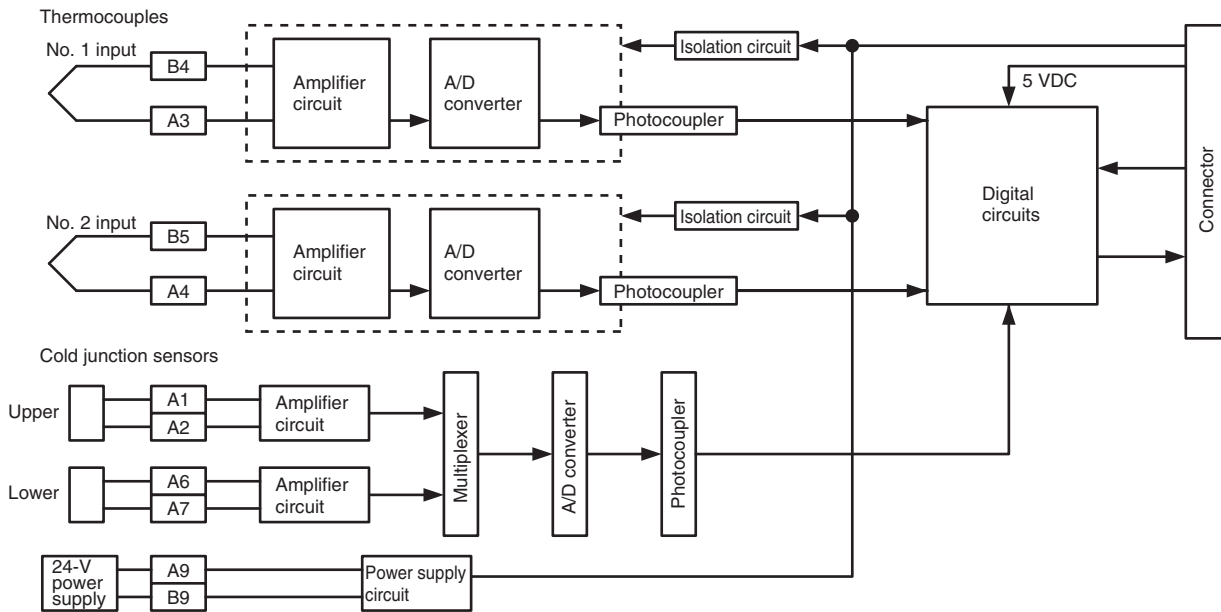
Terminal Connection Diagram
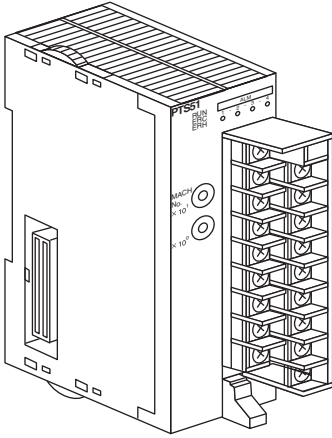
Input Circuit
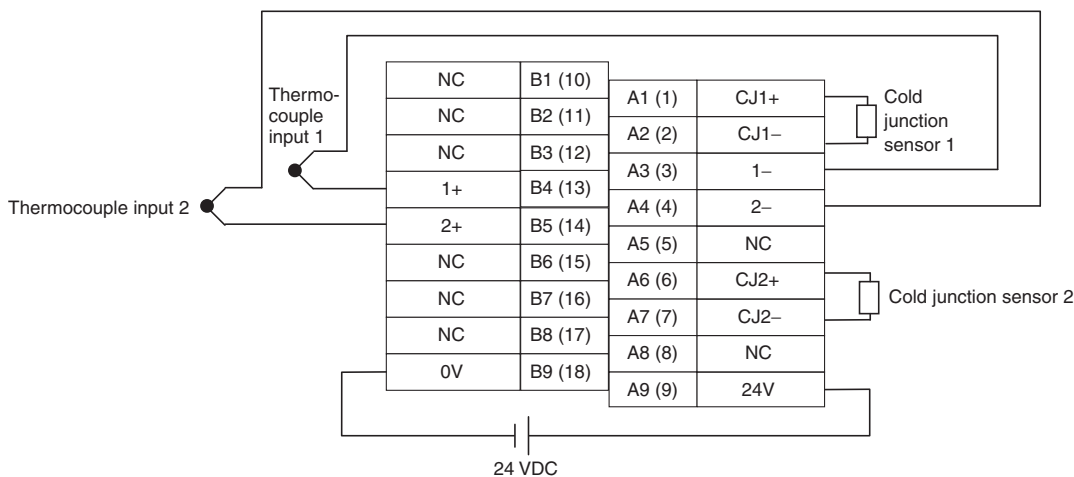
24 VDC

Note: Action for Unused Input Terminals
- Short-circuit the positive (+) and negative (−) sides of the thermocouple input section using a lead wire. For example, short terminals A4 and B5 for No. 2 thermocouple input.
- Cold junction sensors are mounted between A1 and A2, and A6 and A7 before shipment. If one of the cold junction sensors is disconnected, cold junction compensation will stop and correct measurement of temperatures cannot be made. Always make sure the cold junction sensors are connected when using the Units.
- Cold junction sensors are calibrated separately for each Unit and connected circuit, so correct temperatures will not be measured if a cold junction sensor from another Unit is used or if the two cold junction sensors in a Unit are swapped. Use the cold junction sensors as they are provided, without making any changes.
- Always ground the GR terminal on the Power Supply Unit of the Controller.
- If the input device uses a voltage generator, temperature compensator, or similar device, then ground the input device if it has a ground terminal.
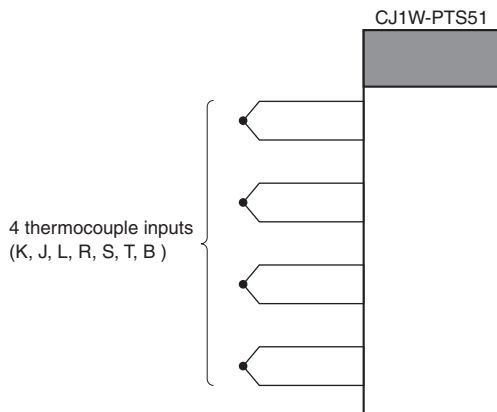
CJ1W-PTS51 Isolated-type Thermocouple Input Unit

Overview

The CJ1W-PTS51 Isolated-type Thermocouple Input Unit provides four direct thermocouple inputs, and sends the data to the CPU Unit each cycle. All inputs are isolated.

System Configuration

CJ1W-PTS51

4 thermocouple inputs
(K, J, L, R, S, T, B)

Specifications

Item		Specifications
Model		CJ1W-PTS51
Applicable Controller		CJ Series
Unit classification		CJ-series Special I/O Unit
Mounting position		CJ-series CPU Rack or CJ-series Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for data exchange with CPU Unit	Special I/O Unit Area (Operation Data)	10 words/Unit Thermocouple Input Unit to CPU Unit: All process values, process value alarms (L, H), conversion data enabled flag, sensor errors, cold junction sensor errors
	DM Area words allocated to Special I/O Units (Setting parameter)	100 words/Unit CPU Unit to Thermocouple Input Unit: Temperature sensor type, input range (same for all I/O), process value alarm setting (L, H), zero/span adjustment value.
Number of temperature sensor inputs		4
Temperature sensor types		Selectable from K, J, L, R, S, T, B. (Same setting for all inputs.)
Data storage in the CIO Area		The actual process data in the input range is stored in four digits hexadecimal (binary or BCD values) in the allocated words in the CIO Area.
Accuracy (25°C) (See note.)		With Celsius selected: ±0.3% of PV or ±1°C, whichever is greater, ±1 digit max. With fahrenheit selected: ±0.3% of PV or ±2°F, whichever is greater, ±1 digit max. However, the accuracy of K and T at −100°C or lower and L is ±2°C ±1 digit max. The accuracy of R and S at 200°C or lower is ±3°C ±1 digit max. The accuracy of B at 400°C or lower is not specified. PV: Process value data
Temperature characteristics		Refer to *Temperature Characteristics According to Thermocouple Type* on page 14.
Warmup time		30 min
Conversion period		250 ms/4 inputs
Maximum time to store data in CPU Unit		Conversion period + one CPU Unit cycle
Sensor error detection		Input Types Other Than B: A Sensor error is detected and the Sensor Error Flag is turned ON if the upper or lower limit of the set input range is exceeded by 20°C or 20°F. The process value overrange direction when a Sensor error occurs can be specified (high: set input range +20°C or +20°F, low: set input range -20°C or -20°F). B Input Type: A Sensor error is detected and the Sensor Error Flag is turned ON if the upper limit of 1,820°C or 3,220°F or the lower limit of 0°C or 0°F is exceeded. The process value overrange direction when a Sensor error occurs can be specified (high: set input range 1,820°C or 3,220°F, low: set input range 0°C or 0°F).
Function	Process value alarm	Process value 2-point alarm (HH, H, LL, L), alarm hysteresis, and ON-delay timer (0 to 60 s) are available. External alarm outputs: One per input (H or L).

	External alarm outputs	NPN outputs (with short-circuit protection)
		    External power supply voltage: 20.4 to 26.4 V DC
		    Max. switching capacity: 100 mA (for one output)
		    Leakage current: 0.3 mA max.
		    Residual voltage: 3 V max.

Isolation		Between inputs and Controller signal: Transformer for power supply and photocoupler for signals Between each input: Transformer for power supply and photocoupler for signals.
Insulation resistance		20 MΩ max. (at 500 V DC). Between all output and NC terminals and external AC terminals (Power Supply Unit) Between all input terminals and external AC terminals (Power Supply Unit) Between all input terminals and all output terminals Between all external DC terminals (input, output, and NC terminals) and FG plate Between all input and output terminals and all NC terminals
Dielectric strength		Between all output and NC terminals and external AC terminals (Power Supply Unit) 2,000 VAC, 50/60 Hz 1 min., detection current: 1 mA Between all input terminals and external AC terminals (Power Supply Unit) Between all input terminals and all output terminals Between all external DC terminals (input, output, and NC terminals) and FG plate 1,000 VAC, 50/60 Hz 1 min., detection current: 1 mA Between all channels 500 VAC, 50/60 Hz 1 min., detection current: 1mA
External connections		Terminal block (detachable)
Unit number settings		Set by rotary switches on front panel, from 0 to 95.
Indicators		Seven LED indicators on front panel (for normal operation, errors detected at the Thermocouple Input Unit, errors related to the CPU Unit, and four indicators for external alarm outputs.)
Current consumption (supplied from Power Supply Unit)		5 V DC at 250 mA max.
Dimensions		31 × 90 × 65 mm (W × H × D)
Weight		150 g max.

Sensor Type and Input Range

The Temperature Sensor type and input range are set in the allocated words in the DM Area for every four inputs.
The measurable data range is ±20 digits wider than the sensor input range.

Set-ting	Input	°C			°F		
		16-bit binary	BCD		16-bit binary	BCD	
			F□□□ indicates minus sign.	Leftmost bit indicates minus sign.		F□□□ indicates minus sign.	Leftmost bit indicates minus sign.
0	K: −200 to 1300°C (−300 to 2300°F)	FF38 to FFFF to 0514 (−200 to −1 to 1300)	F200 to 1300 (−200 to 1300)	8200 to 1300 (−200 to 1300)	FED4 to FFFF to 08FC (−300 to −1 to 2300)	F300 to 2300 (−300 to 2300)	F300 to 2300 (−300 to 2300)
1	K: 0.0 to 500°C (0.0 to 900.0°F)	0000 to 1388 (0.0 to 500.0)	0000 to 5000 (0.0 to 500.0)	0000 to 5000 (0.0 to 500.0)	0000 to 2328 (0.0 to 900.0)	0000 to 9000 (0.0 to 900.0)	0000 to 7999 *2 (0.0 to 799.9)
2	J: −100 to 850°C (−100 to 1500°F)	FF9C to FFFF to 0352 (−100 to −1 to 850)	F100 to 0850 (−100 to 850)	8100 to 0850 (−100 to 850)	FF9C to FFFF to 05DC (−100 to −1 to 1500)	F100 to 1500 (−100 to 1500)	8100 to 1500 (−100 to 1500)
3	J: 0.0 to 400.0°C (0.0 to 750.0°F)	0000 to 0FA0 (0.0 to 400.0)	0000 to 4000 (0.0 to 400.0)	0000 to 4000 (0.0 to 400.0)	0000 to 1D4C (0.0 to 750.0)	0000 to 7500 (0.0 to 750.0)	0000 to 7500 (0.0 to 750.0)
4	T: −200 to 400°C (−300 to 700.0°F)	F830 to FFFF to 0FA0 (-200.0 to -0.1 to 400.0)	F999 to 4000 *2 (−99.9 to 400.0)	A000 to 4000 (-200.0 to 400.0)	F448 to FFFF to 1B58 (-300.0 to -0.1 to 700.0)	F999 to 7000 *2 (−99.9 to 700.0)	B000 to 7000 (−300.0 to 700.0)
5	L: −100 to 850°C (−100 to 1500°F)	FF9C to FFFF to 0352 (−100 to −1 to 850)	F100 to 0850 (−100 to 850)	8100 to 0850 (−100 to 850)	FF9C to FFFF to 05DC (−100 to −1 to 1500)	F100 to 1500 (−100 to 1500)	8100 to 1500 (−100 to 1500)
6	L: 0.0 to 400.0°C (0.0 to 750.0°F)	0000 to 0FA0 (0.0 to 400.0)	0000 to 4000 (0.0 to 400.0)	0000 to 4000 (0.0 to 400.0)	0000 to 1D4C (0.0 to 750.0)	0000 to 7500 (0.0 to 750.0)	0000 to 7500 (0.0 to 750.0)
7	R: 0 to 1700°C (0 to 3000°F)	0000 to 06A4 (0 to 1700)	0000 to 1700 (0 to 1700)	0000 to 1700 (0 to 1700)	0000 to 0BB8 (0 to 3000)	0000 to 3000 (0 to 3000)	0000 to 3000 (0 to 3000)
8	S: 0 to 1700°C (0 to 3000°F)	0000 to 06A4 (0 to 1700)	0000 to 1700 (0 to 1700)	0000 to 1700 (0 to 1700)	0000 to 0BB8 (0 to 3000)	0000 to 3000 (0 to 3000)	0000 to 3000 (0 to 3000)
9	B: 400 to 1800°C *1 (750 to 3200°F)	0190 to 0708 (400 to 1800)	0400 to 1800 (400 to 1800)	0400 to 1800 (400 to 1800)	02EE to 0C80 (750 to 3200)	0750 to 3200 (750 to 3200)	0750 to 3200 (750 to 3200)

Note: If the indication range is exceeded, a sensor error will occur and the sensor error bit will turn ON. The process value will be clamped at the lower or upper limit of the indication range, depending on the setting for data direction at sensor error.

*1. The lower limit for B thermocouples is 0°C/°F.

*2. The indicator range for BCD display will be clamped at the lower (or upper) limit in the region between the lower (or upper) limit of the setting range and the point where a sensor error occurs.
For 0.1°C/0.1°F indication with minus sign indicated by leftmost 4 bits (bits 12 to 15): Lower limit = .99.9, Upper limit = 999.9.
For 0.1°C/0.1°F indication with minus sign indicated by leftmost bit (bit 15): Lower limit = .799.9, Upper limit = 799.9.

Temperature Characteristics According to Thermocouple Type

Thermocouple	Temperature range	Set value error when ambient temperature changes by 1°C
R	0 to 200 °C	±0.43°C
	200 to 1,000°C	±0.29°C
	1,000 to 1,700°C	±285 ppm of PV
S	0 to 200 °C	±0.43°C
	200 to 1,000°C	±0.29°C
	1,000 to 1,700°C	285 ppm of PV
B	400°C or less	Not specified.
	400 to 800°C	±0.43°C
	800 to 1,000°C	±0.29°C
	1,000 to 1,800°C	285 ppm of PV
K	−200 to −100°C	±0.29°C
	−100 to 400°C	±0.11°C
	400 to 1,300°C	±285 ppm of PV
J	−100 to 400°C	±0.11°C
	400 to 850°C	±285 ppm of PV
T	−200 to −100°C	±0.29°C
	−100 to 400°C	±0.11°C
L	−100 to 400°C	±0.11°C
	400 to 850°C	±285 ppm of PV

The measured temperature error is calculated as shown in the following example.

Item	Details
Ambient temperature	30°C
Thermocouple type	K
Measured temperature (PV)	500°C
Reference accuracy (25°C)	±0.3% of PV or ±1°C, whichever is greater, ±1 digit. In this example, ±1.5°C.
Temperature characteristics	400 to 1,300°C: ±285 ppm of PV. In this example, 285 ppm × 500°C = 0.143°C.
Change in ambient temperature	5°C (25 to 30°C).

Overall accuracy =
Reference accuracy + Temperature characteristic x Change in ambient temperature = ±1.5°C + ±0.143°C × 5 = Approx. ±2.2°C ± 1 digit.

Terminal Block Diagram

Thermocouple

Terminal	Block
A2	No. 1 input → Amplifier circuit → Double integral A/D → Photocoupler
A1	Reference power supply

No. 1 input — A2 / A1 — Amplifier circuit — Double integral A/D — Photocoupler — Reference power supply

No. 2 input — B2 / B1 — Amplifier circuit — Double integral A/D — Photocoupler — Reference power supply

No. 3 input — A6 / A5 — Amplifier circuit — Double integral A/D — Photocoupler — Reference power supply

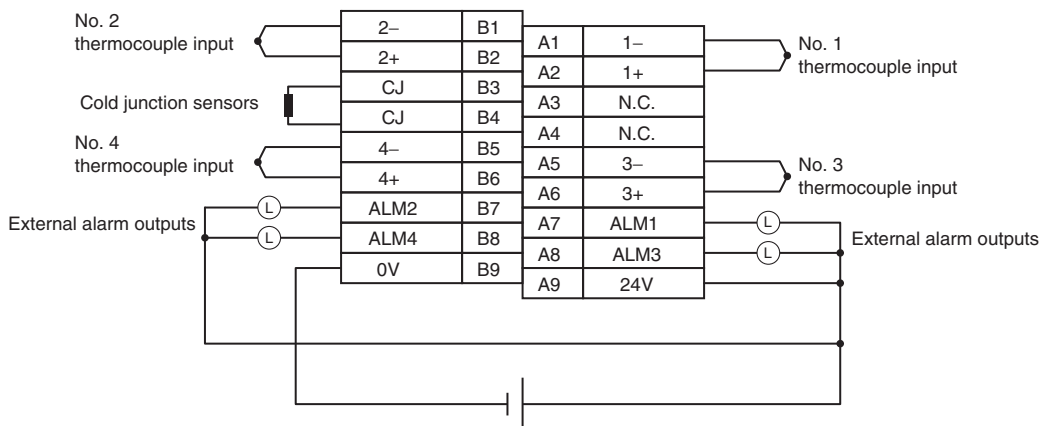No. 4 input — B6 / B5 — Amplifier circuit — Double integral A/D — Photocoupler — Reference power supply

Cold junction sensors — B3 / B4 — Amplifier circuit — Double integral A/D — Photocoupler — Reference power supply

Isolation circuit — 5 V DC — Digital circuits — Connector

Terminal Connection Diagram

No. 2 thermocouple input				No. 1 thermocouple input
2−	B1	A1	1−	
2+	B2	A2	1+	
CJ	B3	A3	N.C.	
CJ	B4	A4	N.C.	
4−	B5	A5	3−	
4+	B6	A6	3+	
ALM2	B7	A7	ALM1	
ALM4	B8	A8	ALM3	
0V	B9	A9	24V	

No. 2 thermocouple input
Cold junction sensors
No. 4 thermocouple input
External alarm outputs
No. 1 thermocouple input
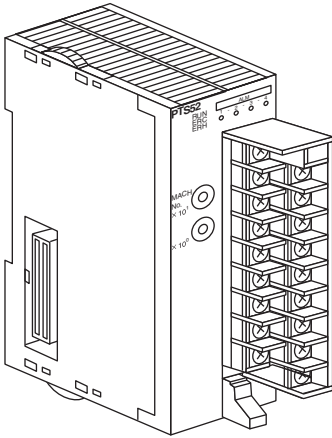No. 3 thermocouple input
External alarm outputs

Note: Action for Unused Input Terminals
- Short-circuit the positive (+) and negative (−) sides of the thermocouple input section using a lead wire. For example, short terminals A3 and A2 for No. 1 thermocouple input.
- Cold junction sensors are mounted before shipment. If one of the cold junction sensors is disconnected, cold junction compensation will stop and correct measurement of temperatures cannot be made. Always make sure the cold junction sensors are connected when using the Units.
- Cold junction sensors are calibrated separately for each Unit and connected circuit, so correct temperatures will not be measured if a cold junction sensor from another Unit is used or if the two cold junction sensors in a Unit are swapped. Use the cold junction sensors as they are provided, without making any changes.
- Do not connect anything to NC terminals. Do not use NC terminals as relay terminals.
- Always ground the GR terminal on the Power Supply Unit of the Controller.
- If the input device uses a voltage generator, temperature compensator, or similar device, then ground the input device if it has a ground terminal.
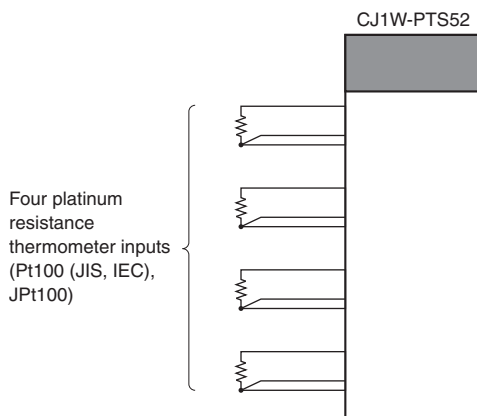
CJ1W-PTS52 Isolated-type Resistance Thermometer Input Unit (Pt100, JPt100)

Overview

The CJ1W-PTS52 Isolated-type Resistance Thermometer Input Unit provides four direct platinum resistance thermometer inputs, and sends the data to the CPU Unit each cycle. All inputs are isolated.

System Configuration

CJ1W-PTS52

Four platinum resistance thermometer inputs (Pt100 (JIS, IEC), JPt100)

Specifications

Item		Specifications
Model		CJ1W-PTS52
Applicable Controller		CJ Series
Unit classification		CJ-series Special I/O Unit
Mounting position		CJ-series CPU Rack or CJ-series Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for data exchange with CPU Unit	Special I/O Unit Area (Operation Data)	10 words/Unit Resistance Thermometer Input Unit to CPU Unit: All process values, process value alarms (L, H), conversion data enabled flags, sensor errors.
	DM Area words allocated to Special I/O Units (Setting parameter)	100 words/Unit CPU Unit to Resistance Thermometer Input Unit: Temperature sensor type, input range (user set), process value alarm setting (L, H), zero/span adjustment value.
Number of temperature sensor inputs		4
Temperature sensor type		Pt100 (JIS, IEC), JPt100 Sensor type, input range, and scaling to industrial units are the same for all I/O.
Data storage in the CIO Area		The actual process data in the input range is stored in four digits hexadecimal (binary or BCD values) in the allocated words in the CIO Area.
Accuracy (25°C)		± 0.3% of PV or ± 0.8°C, whichever is greater, ± 1 digit max. ± 0.3% of PV or ± 1.6°F, whichever is greater, ± 1 digit max. PV: Process value data
Temperature characteristics		Refer to *Temperature Characteristics According to Platinum Resistance Thermometer Type* on page 18.
Sensing method		3-wire method
Influence of conductor resistance		0.4°C/Ω max.
Warmup time		10 min
Conversion period		250 ms/4 inputs
Maximum time to store data in CPU Unit		Conversion period + one CPU Unit cycle
Sensor error detection		Detects sensor error at each input and turns ON the Sensor error Flag. Hardware detection time: Approx. 0.5 s max. The process value overrange direction for when a sensor error occurs can be specified. (High: +20 digit of set input range; low: −20 digit of set input range)
Function	Process value alarm	Process value 2-point alarm (H, L), alarm hysteresis, and ON-delay timer (0 to 60 s are available).

	External alarm outputs	NPN outputs (with short-circuit protection)
		    External power supply voltage: 20.4 to 26.4 V DC
		    Max. switching capacity: 100 mA (for one output)
		    Leakage current: 0.3 mA max.
		    Residual voltage: 3 V max.

Isolation		Between inputs and Controller signal: Transformer for power supply and photocoupler for signals Between each input: Transformer for power supply and photocoupler for signals
Insulation resistance		20 MΩ max. (at 500 V DC). Between all output and NC terminals and external AC terminals (Power Supply Unit) Between all input terminals and external AC terminals (Power Supply Unit) Between all input terminals and all output terminals Between all external DC terminals (input, output, and NC terminals) and FG plate Between all input and output terminals and all NC terminals
Dielectric strength		Between all output and NC terminals and external AC terminals (Power Supply Unit) 2,000 V AC, 50/60 Hz 1 min., detection current: 1 mA Between all input terminals and external AC terminals (Power Supply Unit) Between all input terminals and all output terminals Between all external DC terminals (input, output, and NC terminals) and FG plate 1,000 V AC, 50/60 Hz 1 min., detection current: 1 mA Between all channels 500 VAC, 50/60 Hz 1 min., detection current: 1 mA
External connections		Terminal block (detachable)
Unit number settings		Set by rotary switches on front panel, from 0 to 95.
Indicators		Seven LED indicators on front panel (for normal operation, errors detected at the Resistance Thermometer Input Unit, errors detected at the CPU Unit, and four indicators for external alarm outputs.)
Current consumption		5 V DC at 250 mA max
Dimensions		31 × 90 × 65 mm (W × H × D) **Note:** The height including the Backplane is 145 mm.
Weight		150 g max.

Sensor Type and Input Range

The Platinum Resistance Thermometer type and input range are set in the allocated words in the DM Area for every four inputs.

The measurable data range is ±20 digits wider than the sensor input range.

Set-ting	Input	°C			°F		
		16-bit binary	BCD		16-bit binary	BCD	
			F□□□ indicates minus sign.	Leftmost bit indicates minus sign.		Leftmost 4 bits (bits 15 to 12) indicate minus sign.	Leftmost bit (bit 15) indicates minus sign.
0	Pt100: −200.0 to 650.0°C (−300.0 to 1200.0°F)	F830 to FFFF to 1964 (−200.0 to −0.1 to 650.0)	F999 to 6500 * (−99.9 to 650.0)	A000 to 6500 (−200.0 to 650.0)	F448 to FFFF to 2EE0 (−300.0 to −0.1 to 1200.0)	F999 to 9999 * (−99.9 to 999.9)	B000 to 7999 * (−300.0 to 799.9)
1	JPt100: −200.0 to 650.0°C (−300.0 to 1200.0°F)	F830 to FFFF to 1964 (−200.0 to −0.1 to 650.0)	F999 to 6500 * (−99.9 to 650.0)	A000 to 6500 (−200.0 to 650.0)	F448 to FFFF to 2EE0 (−300.0 to −0.1 to 1200.0)	F999 to 9999 * (−99.9 to 999.9)	B000 to 7999 * (−300.0 to 799.9)
2 to 9	Do not set.				Do not set.		

Note: If the indication range is exceeded, a sensor error will occur and the sensor error bit will turn ON. The process value will be clamped at the lower or upper limit of the indication range, depending on the setting for data direction at sensor error.

* The indicator range for BCD display will be clamped at the lower (or upper) limit in the region between the lower (or upper) limit of the setting range and the point where a sensor error occurs.
  For 0.1°C/0.1°F indication with minus sign indicated by leftmost 4 bits (bits 12 to 15): Lower limit = −99.9, Upper limit = 999.9.
  For 0.1°C/0.1°F indication with minus sign indicated by leftmost bit (bit 15): Lower limit = −799.9, Upper limit = 799.9.

Temperature Characteristics According to Platinum Resistance Thermometer Type

Platinum Resistance Thermometer	Temperature range	Set value error when ambient temperature changes by 1°C
Pt100	−200 to 200°C	±0.06°C
	200 to 650°C	285 ppm of PV
JPt100	−200 to 200°C	±0.06°C
	200 to 650°C	285 ppm of PV

The measured temperature error is calculated as shown in the following example.

Item	Details
Ambient temperature	30°C
Platinum Resistance Thermometer	Pt100
Measured temperature (PV)	500°C
Reference accuracy (25°C)	±0.3% of PV or ±0.8°C, whichever is greater, ±1 digit. In this example, ±1.5°C.
Temperature characteristics	200 to 650°C: 285 ppm of PV. In this example, 285 ppm × 500°C = 0.143°C.
Change in ambient temperature	5°C (25 to 30°C)

Overall accuracy =

Reference accuracy + Temperature characteristic × Change in ambient temperature = ±1.5°C + ±0.143°C × 5 = Approx. ± 2.2°C ±1 digit.

Terminal Block Diagram
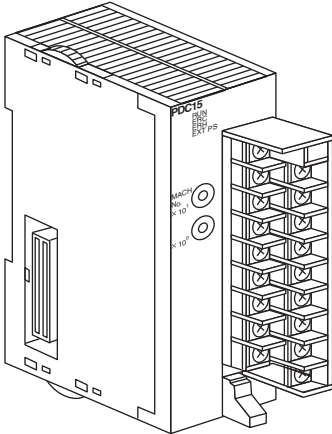
Input Circuit
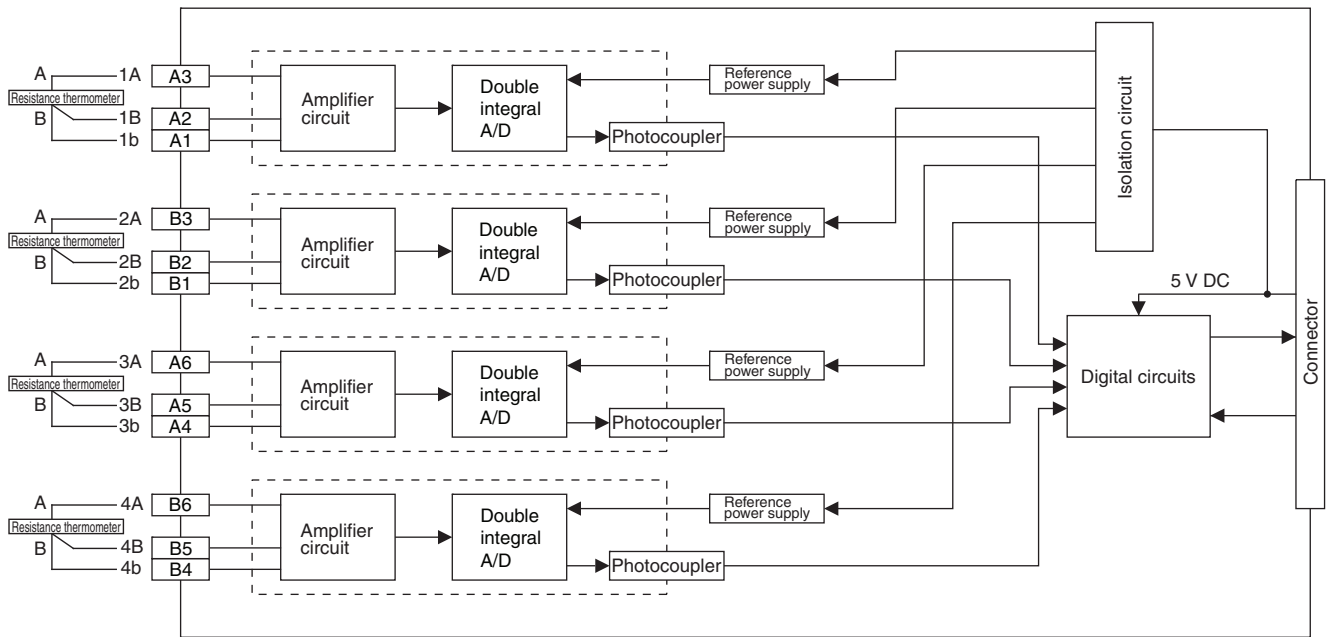
Terminal Connection Diagram
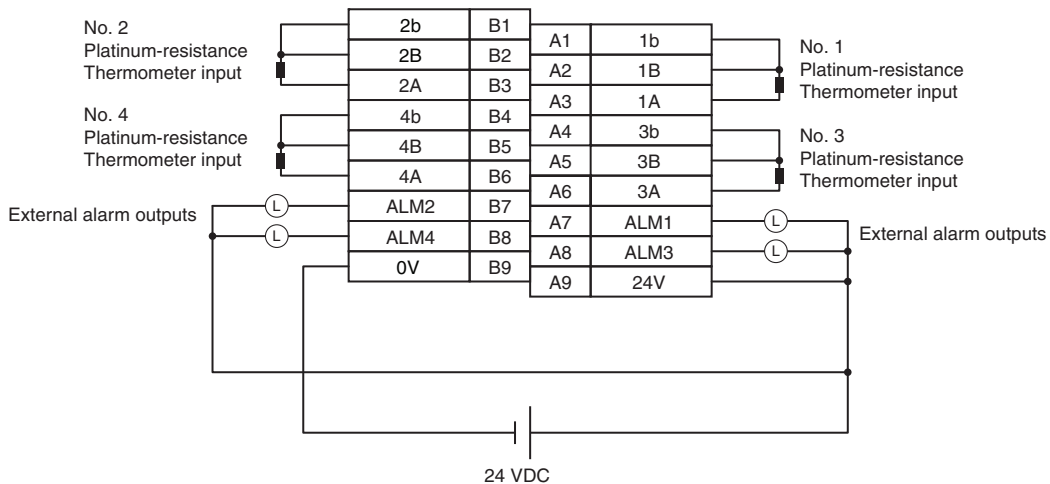
Note: 1. Wire the same length to A, B, and b, so that the impedance will be the same. In particular, do not short circuit between B and b at the terminal block.

    2. For unused input terminals, connect approximately 100 Ω between the platinum-resistance thermometer input terminals A and B and short terminals B and b with a lead wire. If resistance is not connected between terminals A and B and terminals B and b are shorted or if terminals A and B and terminals B and b are left open, the alarm output will turn ON and the ALM indicator will light.

    3. Always ground the GR terminal on the Power Supply Unit of the Controller.

    4. If the input device uses a voltage generator, temperature compensator, or similar device, then ground the input device if it has a ground terminal.
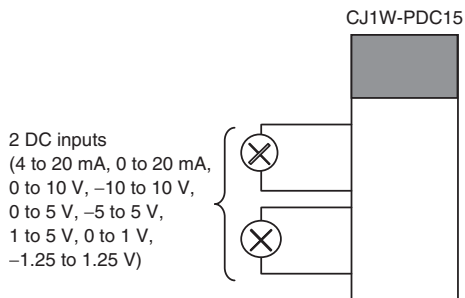
CJ1W-PDC15 Isolated-type Direct Current Input Unit

Overview

The CJ1W-PDC15 Isolated-type Direct Current Input Unit provides two direct-current inputs, and sends the data to the CPU Unit each cycle. All inputs are isolated.
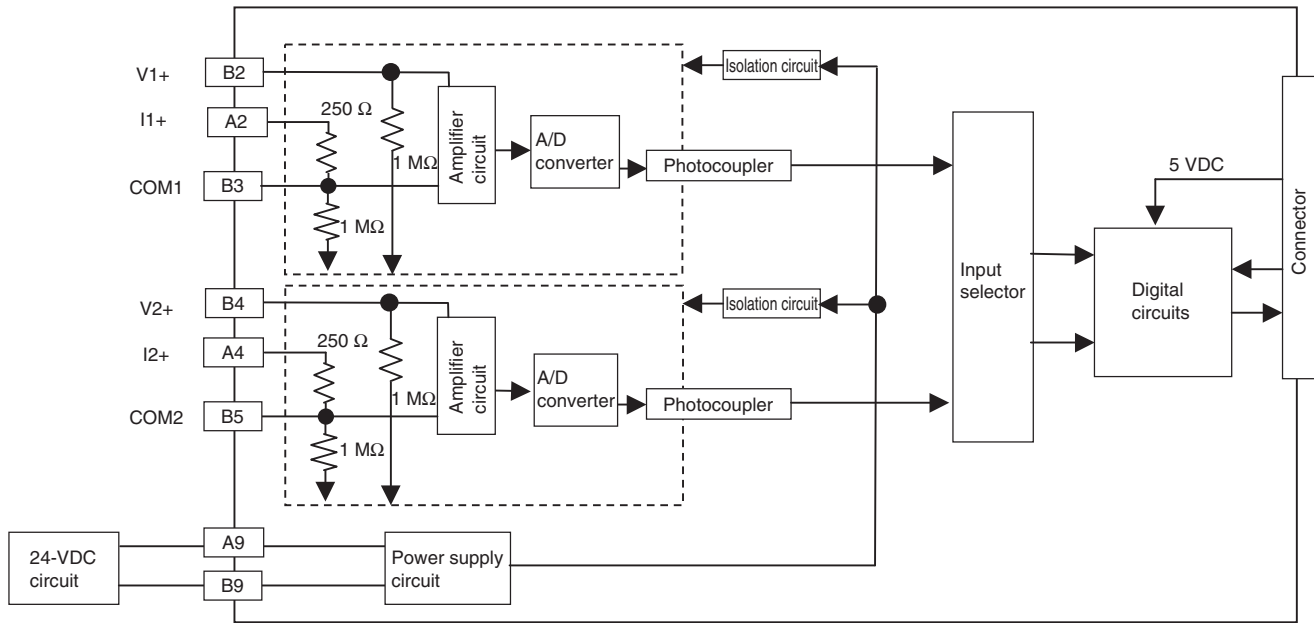
System Configuration

CJ1W-PDC15

2 DC inputs
(4 to 20 mA, 0 to 20 mA,
0 to 10 V, −10 to 10 V,
0 to 5 V, −5 to 5 V,
1 to 5 V, 0 to 1 V,
−1.25 to 1.25 V)

Specifications

Item		Specifications
Model		CJ1W-PDC15
Applicable Controller		CJ/NJ Series
Unit classification		CJ-series Special I/O Unit
Mounting position		CPU Rack or Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for data exchange with CPU Unit	Special I/O Unit Area (Operation Data)	10 words/Unit Direct Current Input Unit to CPU Unit: All process values, process value alarms (LL, L, H, HH), rate-of-change values, rate-of-change alarms (L, H), disconnection alarms, cold junction sensor errors, adjustment period end/notice
	DM Area words allocated to Special I/O Units (Setting parameter)	100 words/Unit CPU Unit to Direct Current Input Unit: Input signal type, scaling of process value in industrial units, process value alarm setting (L, H), inrush input upper limit, inrush input upper limit time, zero/span adjustment value, Square root function. Temperature input signal type, input range (user set), scaling of process value data to be stored in allocated words in CIO area, rate-of-change input range, scaling of rate-of-change data, number of items for moving average, process value alarm setting (LL, L, H, HH), rate-of-change alarm setting (L, H), zero/span adjustment value
	Expansion Control/Monitor Area (Expansion Operation Data)	35 words/Unit CPU Unit to Direct Current Input Unit: Bits for beginning or resetting the hold function selection, adjustment period control, control bits Direct Current Input Unit to CPU Unit: Adjustment period notices, peak and bottom values, top and valley values, integral values
	Expansion Setting Area (Expansion Setting parameter)	46 words/Unit CPU Unit to Direct Current Input Unit: Expansion Setting Area settings, adjustment period control, peak and bottom detection, top and valley detection, integral value calculation
Number of inputs		2
Input signal type		4 to 20 mA, 0 to 20 mA, 0 to 10 V, −10 to 10 V, 0 to 5 V, −5 to 5 V, 1 to 5 V, 0 to 1.25 V, −1.25 to 1.25 V (separate for each input), and ±10-V user-set range (specified range within −10.000 V to 10.000 V)
Scaling		Data to be stored in the allocated words in the CIO area must be scaled (Any minimum and maximum values can be set.) (2 inputs set separately.) Data can be converted at 0% to 100%.
Data storage in the CIO Area		The value derived from carrying out the following processing in order of the actual process data in the input range is stored in four digits hexadecimal (binary values) in the allocated words in the CIO Area. 1) Mean value processing → 2) Scaling → 3) Zero/span adjustment → 4) Square root calculation → 5) Output limits
Accuracy (25°C)		±0.05%
Temperature coefficient		±0.008%/°C
Resolution		1/64,000
Input signal range		For 4 to 20 mA, 0 to 20 mA, 0 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 1.25 V inputs: −15 to 115% For −10 to 10 V, −5 to 5 V, −1.25 to 1.25 V inputs: −7.5 to 107.5%
Input impedance		For current inputs: 250 Ω (typical) For voltage inputs: 1 MΩ min.
Warmup time		10 min
Conversion period		10 ms/2 inputs
Maximum time to store data in CPU Unit		Conversion period + one CPU Unit cycle
Input error detection		Check only for 4 to 20 mA and 1 to 5 V. Error detected for −17.2% (1.25 mA, 0.3125 V) or less and 112.5% (22 mA, 5.5 V) or more.
Operation at input disconnection		For 4 to 20 mA and 1 to 5 V: Stores −15% process value. For all other ranges: Stores same process value as 0-V or 0-mA inputs.
Input disconnection detection delay time		Approx. 1 s.

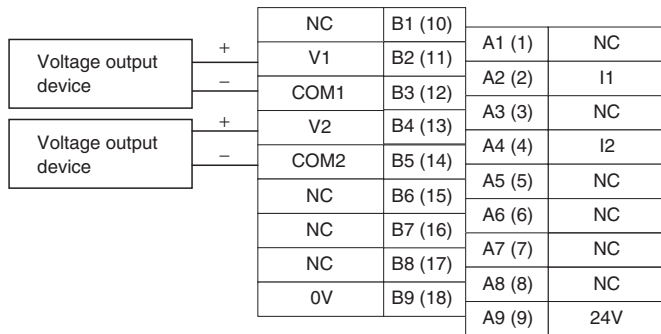| Item		Specifications
Function	**Mean value processing (input filter)**	Calculates the moving average for the past specified number of process values (1 to 128 can be specified), and stores that value in the CIO Area as the process value.
	Process value alarm	Process value 4-point alarm (LL, L H, HH), hysteresis, and ON-delay timer (0 to 60 s) are available.
	Rate-of-change calculation	Calculates the amount of change per comparison time interval (1 to 16 s).
	Rate-of-change alarm	Rate-of-change 2-point alarm (H, L), alarm hysteresis, and ON-delay timer (0 to 60 s are available, shared with process value alarm).
	Square root calculation	When the maximum value for process value scaling is A and the minimum value is B, $$\text{Output} = \sqrt{(A-B)\times(\text{input}-B)} + B$$ Drop-out: Output approx. 7% max. linear (output = input) characteristic **Note: 1.** The square root function can only be used when the maximum scaling value is greater than the minimum scaling value. The square root will not be found if the maximum is smaller than the minimum. **2.** When the square root function is used, set the scaling values after square root calculation (e.g., for flow rates or other values) for the process value scaling A and B settings.
	Adjustment period control	When zero/span adjustment is executed, the date is internally recorded at the Unit. When the preset zero/span adjustment period and the notice of days remaining set in the Expansion Setting Area have elapsed, this function turns ON a warning flag to give notice that it is time for readjustment.
	Peak and bottom detection	Detects the maximum (peak) and minimum (bottom) analog input values, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF. These values are stored as the peak and bottom values in the Expansion Control/Monitor Area.
	Top and valley detection	This function detects the top and valley values for analog inputs, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF. These values are stored as the top and valley values in the Expansion Control/Monitor Area.
	Integral value calculation	This function calculates the analog input value's time integral. The integral value is calculated and output to the Expansion Control/Monitor Area when the Integral Value Calculation Start Bit in the Expansion Control/Monitor Area is turned ON.
Isolation		Between inputs and between inputs and Controller signals: Isolation by transformer and photocoupler.
Insulation resistance		20 MΩ (at 500 V DC) between all inputs
Dielectric strength		Between inputs: 1,000 V AC, at 50/60 Hz, for 1 min, leakage current 10 mA max.
External connections		Terminal block (detachable)
Unit number settings		Set by rotary switches on front panel, from 0 to 95.
Indicators		Four LED indicators on front panel (for normal operation, errors detected at the Direct Current Input Unit, and errors detected at the CPU Unit).
Front panel connector		Sensor input connector terminal block (detachable)
Current consumption		5 V DC at 180 mA max.
External power supply		24 V DC +10%/−15% 90 mA max., inrush current: 20 A for 1 ms max. (The external 24-VDC power supply must be isolated.)
Dimensions		31 × 130 × 65 mm (W × H × D)
Weight		150 g max.
Standard accessories		Short bars (for current input)

Accuracy and Resolution in ±10-V User-set Range

The ±10-V user-set range allows the input signal's input range to be set to any range within −10.000 V to 10.000 V. Accuracy and resolution, however, are not determined by the input range, but rather by the measurable input range (−10.000 V to 10.000 V). Therefore, accuracy and resolution do not change even if a narrow input range is set.
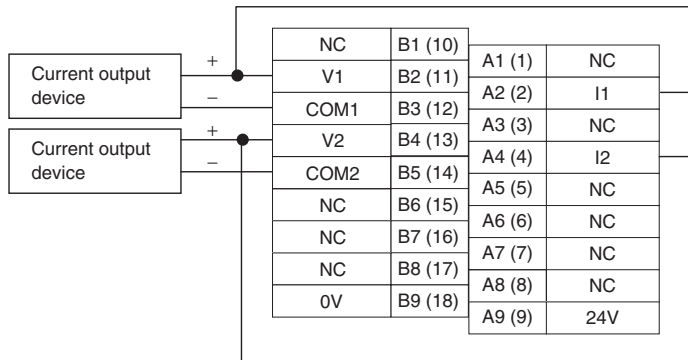
Terminal Block Diagram

V1+	B2	
I1+	A2	250 Ω
COM1	B3	1 MΩ

Amplifier circuit → A/D converter → Photocoupler → Isolation circuit

V2+	B4	
I2+	A4	250 Ω
COM2	B5	1 MΩ

Amplifier circuit → A/D converter → Photocoupler → Isolation circuit

Input selector → Digital circuits → Connector

5 VDC

24-VDC circuit — A9 / B9 — Power supply circuit

Terminal Connection Diagram

Voltage Inputs

Voltage output device				
+ / −	NC	B1 (10)	A1 (1)	NC
	V1	B2 (11)	A2 (2)	I1
	COM1	B3 (12)	A3 (3)	NC
Voltage output device + / −	V2	B4 (13)	A4 (4)	I2
	COM2	B5 (14)	A5 (5)	NC
	NC	B6 (15)	A6 (6)	NC
	NC	B7 (16)	A7 (7)	NC
	NC	B8 (17)	A8 (8)	NC
	0V	B9 (18)	A9 (9)	24V

Current inputs

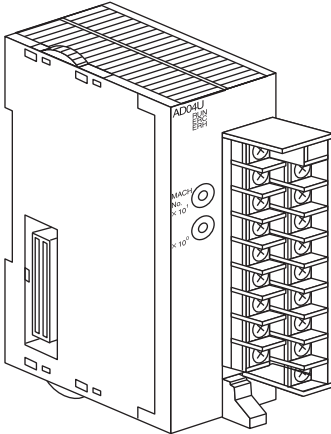| Current output device				
+ / −	NC	B1 (10)	A1 (1)	NC
	V1	B2 (11)	A2 (2)	I1
	COM1	B3 (12)	A3 (3)	NC
Current output device + / −	V2	B4 (13)	A4 (4)	I2
	COM2	B5 (14)	A5 (5)	NC
	NC	B6 (15)	A6 (6)	NC
	NC	B7 (16)	A7 (7)	NC
	NC	B8 (17)	A8 (8)	NC
	0V	B9 (18)	A9 (9)	24V

Note: 1. In both of the above cases, leave all unused inputs open between the positive and negative terminals (e.g., between B2 and B3 for voltage input No. 1).
2. Always ground the GR terminal on the Power Supply Unit of the Controller.
3. If the input device uses a voltage generator, temperature compensator, or similar device, then ground the input device if it has a ground terminal.
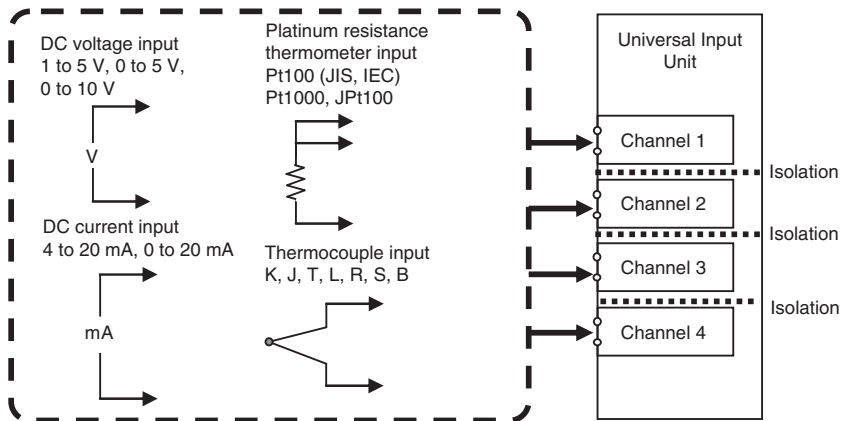4. Always short-circuit the V and I terminals when using current input.

CJ1W-AD04U Isolated-type Universal Input Unit

Overview

The CJ1W-AD04U Universal Input Unit is CJ-series Special I/O Unit with four input channels on each Unit. Each input channel can be set independently to one of four input types: DC voltage, DC current, thermocouple, or resistance thermometer. All inputs are isolated.

System Configuration

Specifications

Item		Specifications
Model		CJ1W-AD04U
Applicable Controller		CJ/NJ Series
Type of Unit		CJ-series Special I/O Unit
Mounting position		CPU Rack or Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for exchanging data with the CPU Unit	Special I/O Unit Area words in the CIO Area (Operation Data)	10 words/Unit Isolated-type Universal Input Unit to CPU Unit: All process values, process value alarms (L, H), conversion data enabled flag, input errors, cold junction sensor errors
	Special I/O Unit words in the DM Area (Setting parameter)	100 words/Unit CPU Unit to Isolated-type Universal Input Unit: Input type, scaling upper and lower limits, process value alarm setting (L, H), zero/span adjustment value, alarm ON delay time, alarm hysteresis, Expansion Setting Area settings
	Expansion Setting Area (Expansion Setting parameter)	1 word/Unit CPU Unit to Isolated-type Universal Input Unit: Process value alarm output
Number of inputs		4
Input type		Platinum resistance thermometer: Pt100 (JIS, IEC), Pt1000, or JPt100 Thermocouple: K, J, T, L, R, S, or B Current: 4 to 20 mA, or 0 to 20 mA Voltage: 1 to 5 V, 0 to 5 V, or 0 to 10 V Each input can be set independently.
Scaling (Voltage and current inputs)		Data to be stored in the allocated words in the CIO area must be scaled (with user-set minimum and maximum values for data and offsets). The inputs are set individually.
Data storage in the Special I/O Unit Area in the CIO Area		Voltage inputs and current inputs: The values derived from carrying out the following processing in order of the actual process data in the input range are stored in four digits hexadecimal (binary values) in the allocated words in the Special I/O Unit Area. 1) Scaling → 2) Zero/span adjustment → 3) Output limits Temperature input: The values derived from carrying out the following processing in order of the actual process data in the input range are stored in four digits hexadecimal (binary values) in the allocated words in the Special I/O Unit Area. 1) °C/°F conversion → 2) Zero/span adjustment → 3) Output limits (The stored data is always stored ten times the value of the actual temperature.)
Accuracy (25°C) (These values do not include the sensor error.)		Platinum resistance thermometers: (±0.3% of PV or ±0.8°C, whichever is greater) ±1 digit max. Typical thermocouple inputs: (±0.3% of PV or ±1.5°C, whichever is greater) ±1 digit max. Special cases: The accuracy of L is ±2°C ±1 digit max. The accuracy of K and T at −100°C or less is ±2°C ±1 digit max. The accuracy of R and S at 200°C or less is ±3°C 1 digit max. The accuracy of B at 400°C or less is not specified. Voltage inputs and current inputs: (±0.3% FS) ±1 digit max.
Temperature coefficient		±100 ppm/°C max. (for full scale)
Resolution		1/12,000 (for voltage or current input) (Please refer to the Input Types and Input Ranges on page 26 for details on temperature input.)
Input signal range		Voltage inputs and current inputs: −5% to 105% of measurable input range set in scaling Temperature inputs: ±20°C or ±20°F for the high or low limits of the sensor range
Maximum rated input		Voltage Input: ±15 V Current Input: ±30 mA
Input impedance		Temperature: 10 kΩ min. Voltage Input: 1 MΩ min. Current Input: 250 Ω (rated value)
Warm-up time		30 min
Thermocouple inputs		Internal temperature sensor is used for cold junction compensation.
Platinum resistance thermometers		Measurement method: 3-wire method Allowable lead wire resistance: 20 Ω max. per wire Input detection current: 1.1 mA

Item	Specifications
A/D conversion time	250 ms/4 inputs
Maximum time to store data in CPU Unit	Conversion period + one CPU Unit cycle

Input error detection	An input error can be detected. (except for voltage and current inputs of 0 to 20 mA, 0 to 5 V, 0 to 10 V)
	Detection level
	  Temperature input: If the temperature exceeds the high or low limit of the sensor range by 20°C or 20°F.
	  +1 to +5 V: input signal < 0.3 V
	  4 to 20 mA: input signal < 1.2 mA
	Input Error Flag turns ON when a disconnection occurs or each input value is out of input range.
	Process value clamp direction can be specified when input error occurs.

Process value alarm	Two process value alarms (L, H), hysteresis, and ON-delay timer (0 to 60 s) can be set. Bits of process value alarm can be copied to selectable addresses in the Expansion Setting Area settings.
Isolation	Between inputs and Controller signals, and between inputs: Isolation by transformer for power supply, and by photocoupler for signals.
Insulation resistance	20 MΩ (at 500 V DC) between all inputs
Dielectric strength	Between all inputs: 500 V AC, at 50 or 60 Hz, for 1 min, leakage current 1 mA max.
External connections	Terminal block (detachable)
Indicators	Three LED indicators on front panel (for normal operation, errors detected at the Universal Input Unit, and errors detected at the CPU Unit).
Unit number settings	Set by rotary switches on front panel, from 0 to 95.
Current consumption (supplied by Power Supply Unit)	5 V DC at 320 mA max.
Dimensions	31 × 90 × 65 mm (W × H × D)
Weight	150 g max.

Input Types and Input Ranges

The input type and range are set in the DM Area for each input.

Sensor type		DM area setting	Measurable input range	
Resistance thermometers	**Pt100**	0 (0000 hex)	−200.0 to 650.0°C	−300.0 to 1200.0°F
	JPt100	3 (0003 hex)	−200.0 to 650.0°C	−300.0 to 1200.0°F
	Pt1000	7 (0007 hex)	−200.0 to 650.0°C	−300.0 to 1200.0°F
Thermocouples	**K**	21 (0015 hex)	−200.0 to 1300.0°C	−300.0 to 2300.0°F
	J	23 (0017 hex)	−100.0 to 850.0°C	−100.0 to 1500.0°F
	T	25 (0019 hex)	−200.0 to 400.0°C	−300.0 to 700.0°F
	L	33 (0021 hex)	−100.0 to 850.0°C	−100.0 to 1500.0°F
	R	36 (0024 hex)	0.0 to 1700.0°C	0.0 to 3000.0°F
	S	37 (0025 hex)	0.0 to 1700.0°C	0.0 to 3000.0°F
	B	38 (0026 hex)	100.0 to 1800.0°C	300.0 to 3200.0°F
DC signal	**4 to 20 mA**	48 (0030 hex)	4 to 20 mA	
	0 to 20 mA	49 (0031 hex)	0 to 20 mA	
	1 to 5 V	50 (0032 hex)	1 to 5 V	
	0 to 5 V	53 (0035 hex)	0 to 5 V	
	0 to 10 V	54 (0036 hex)	0 to 10 V	

The measured temperature error is calculated as shown in the following example.
Example:

Item	Details
Ambient temperature	30°C
Thermocouple type	K
Measured Temperature (PV)	500°C
Reference accuracy (25°C)	±0.3°C of PV or ±1.5°C, whichever is greater, ±1 digit. In this example, ±1.5°C
Temperature characteristics	When the coefficient is ±100 ppm FS/°C, the characteristic in this example is 100 ppm × 1500°C = 0.15°C
Change in ambient temperature	25°C → 30°C = 5°C

Overall accuracy =
Reference accuracy + Temperature characteristic × Change in ambient temperature = ±1.5°C + (±0.15°C) × 5°C = ±2.3°C ±1 digit.
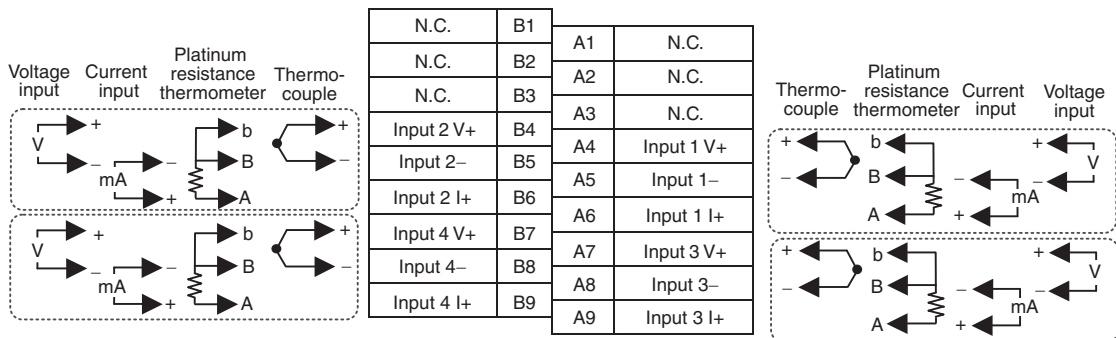
Terminal Block Diagram

Internal Configuration

CJ-series PC
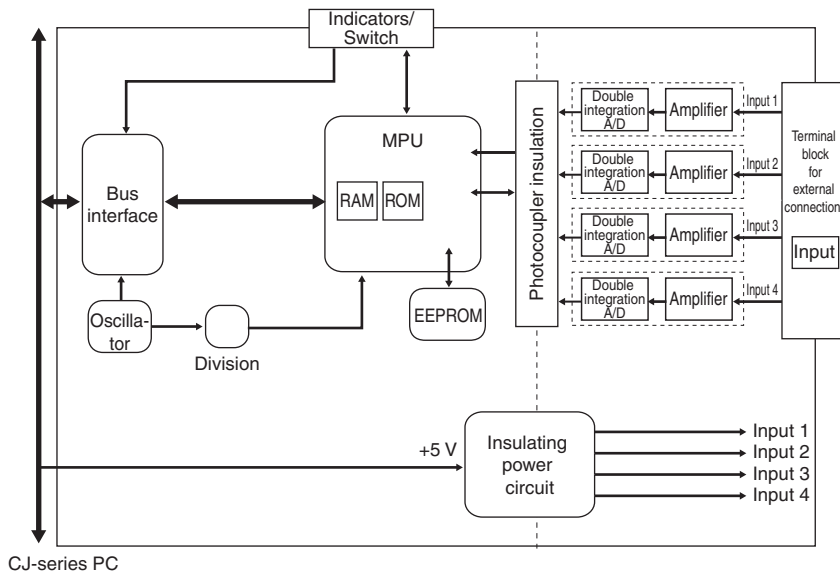
Terminal Connection Diagram

Terminal Arrangement

The following diagram shows the signal names associated with the connecting terminals.

N.C.	B1		
N.C.	B2	A1	N.C.
N.C.	B3	A2	N.C.
Input 2 V+	B4	A3	N.C.
Input 2−	B5	A4	Input 1 V+
Input 2 I+	B6	A5	Input 1−
Input 4 V+	B7	A6	Input 1 I+
Input 4−	B8	A7	Input 3 V+
Input 4 I+	B9	A8	Input 3−
		A9	Input 3 I+

Wiring Analog Inputs

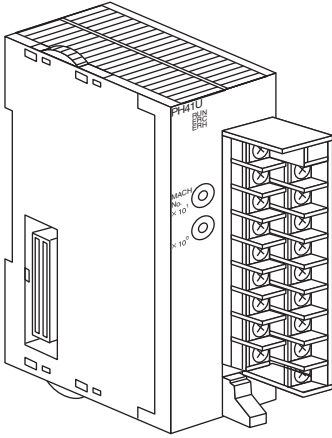Ground the shield of the shielded cable to protect against the affects of noise.
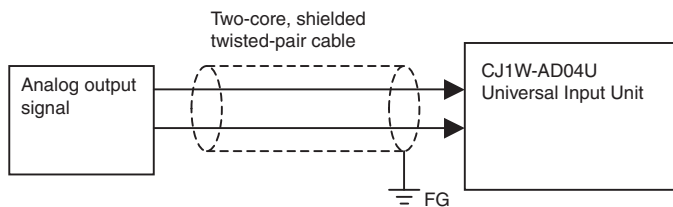
Note: 1. Be sure to wire the correct terminals when wiring voltage inputs. The Unit may fail if a voltage input is wired incorrectly.
    2. Do not connect anything to terminals that are not being used.
    3. Do not connect anything to NC terminals. Do not use NC terminals as relay terminals.
    4. Wire the same lengths to A, B, and b so that the impedance will be the same. In particular, do not short circuit between B and b at the terminal block.
    5. Always ground the GR terminal on the Power Supply Unit of the Controller.
    6. If the input device uses a voltage generator, temperature compensator, or similar device, ground the input device if it has a ground terminal.
    7. The cold junction compensators are individually calibrated for each Unit and each input circuit. If the terminal block from a different Unit is used, temperature measurements will not be accurate. Always use the terminal block that is delivered with the Unit.
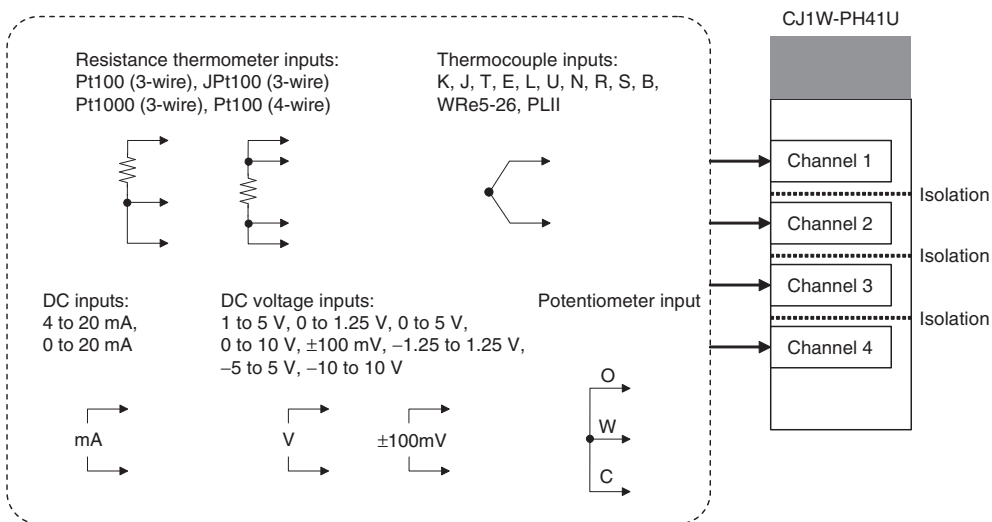
CJ1W-PH41U Isolated-type Universal Input Unit

Overview

The CJ1W-PH41U Isolated-type Universal Input Unit supports four input channels, each of which can be set to a resistance thermometer, thermocouple, DC signal, or potentiometer input. All inputs are isolated.

System Configuration

Resistance thermometer inputs:
Pt100 (3-wire), JPt100 (3-wire)
Pt1000 (3-wire), Pt100 (4-wire)

Thermocouple inputs:
K, J, T, E, L, U, N, R, S, B,
WRe5-26, PLII

DC inputs:
4 to 20 mA,
0 to 20 mA

DC voltage inputs:
1 to 5 V, 0 to 1.25 V, 0 to 5 V,
0 to 10 V, ±100 mV, −1.25 to 1.25 V,
−5 to 5 V, −10 to 10 V

Potentiometer input

mA

V

±100mV

O
W
C

CJ1W-PH41U

Channel 1

Isolation

Channel 2

Isolation

Channel 3

Isolation

Channel 4

Specifications

Item		Specifications
Model		CJ1W-PH41U
Applicable Controller		CJ/NJ Series
Type of Unit		CJ-series Special I/O Unit
Mounting position		CPU Rack or Expansion Rack
Maximum number of Units		40 (within the allowable current consumption and power consumption range)
Unit numbers		00 to 95 (Cannot duplicate Special I/O Unit numbers.)
Areas for exchanging data with the CPU Unit	Special I/O Unit Area words in the CIO Area (Operation Data)	10 words/Unit
		Isolated-type Universal Input Unit to CPU Unit: All process values, process value alarms (LL, L, H, HH), rate-of-change alarms (L, H), input errors (such as disconnection alarms), cold junction sensor errors, and zero/span adjustment period end/notices.
	Special I/O Unit words in the DM Area (Setting parameter)	100 words/Unit
		CPU Unit to Isolated-type Universal Input Unit: Operation settings, input type, input range (user set), temperature unit, process value clamp direction for input burnout, scaling upper and lower limits, scaling offset value, alarm hysteresis, alarm ON/OFF delay time, number of items for moving average, Expansion Setting Area settings, process value alarm setting (L, H), zero/span adjustment value.
	Expansion Control/ Monitor Area (Expansion Operation Data)	46 words/Unit
		CPU Unit to Isolated-type Universal Input Unit: Hold function selection start/reset, integral value calculation start/reset, zero/span adjustment period flag Isolated-type Universal Input Unit to CPU Unit: All rate-of-change values, zero/span adjustment period notices (all inputs), EEPROM errors, day of final adjustment date, top and valley detection flags, peak and bottom values, top and valley values, integral value.
	Expansion Setting Area (Expansion Setting parameter)	100 words/Unit
		CPU Unit to Isolated-type Universal Input Unit: Expansion Control/Monitor Area settings, square root calculation enable, rate-ofchange input range, rate-of-change comparison time interval, rate-of-change scaling upper and lower limits, zero/span adjustment position, zero/span adjustment period and notice of days remaining, top and valley hysteresis, integral value calculation integer unit and integer coefficient, temperature resistance thermometer compensation enable, temperature resistance thermometer reference resistance, cold junction compensation method, process value alarm settings (LL, HH), rate-of-change alarm settings (L, H).
Number of inputs		4
Input type	Resolution: 1/256,000 (Conversion period: 60 ms)	Pt100 (JIS, IEC 3-wire), JPt100 (3-wire), Pt1000 (3-wire), Pt100 (JIS, IEC 4-wire), K, J, T, E, L, U, N, R, S, B, WRe5-26, PLII, 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 1.25 V, 0 to 5 V, 0 to 10 V, ±100 mV user-set range, −1.25 to 1.25 V, −5 to 5 V, −10 to 10 V, ±10 V user-set range, potentiometer (all inputs). The input type, input range, and scaling can be set for individual inputs. The input range for DC inputs, however, can be set only for input types with user-set input ranges.
	Resolution: 1/64,000 (Conversion period: 10 ms)	Pt100 (JIS, IEC 3-wire), JPt100 (3-wire), Pt100 (JIS, IEC 4-wire), K, J, T, E, L, U, N, R, S, B, WRe5-26, PLII, 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 1.25 V, 0 to 5 V, 0 to 10 V, ±100 mV user-set range, −1.25 to 1.25 V, −5 to 5 V, −10 to 10 V, ±10 V user-set range (all inputs). The input type, input range, and scaling can be set for individual inputs. The input range for DC inputs, however, can be set only for input types with user-set input ranges.
	Resolution: 1/16,000 (Conversion period: 5 ms)	K, E
Applicable standards for resistance thermometer and thermocouple inputs		Pt100: JIS C1604-1997, IEC 60751-95 JPt100: JIS C1604-1989 K, J, T, E, N, R, S, B: JIS C1602-1995 L, U: DIN 43710-1985 WRe5-26: ASTM E988-96 PLII: ASTM E1751-00
Scaling		Data to be stored in the allocated words in the CIO area must be scaled (with user-set minimum and maximum values for data and offsets). The inputs are set individually. Data can be converted at 0% to 100%.
Data storage in the Special I/O Unit Area in the CIO Area		The values derived from carrying out the following processing in order of the actual process data in the input range are stored in four digits hexadecimal (binary values) in the allocated words in the Special I/O Unit Area. 1) Averaging → 2) Scaling → 3) Zero/span adjustment → 4) Square root calculation → 5) Offset compensation → 6) Output limits
Accuracy (25°C)		Resistance thermometer and thermocouple inputs: ±0.05% (The accuracy depends on the input type and the measured temperature. For details, refer to the *Accuracy and Temperature Coefficient According to Resistance Thermometer and Thermocouple Input Types and Measured Temperatures* on page 34. Current or voltage input: ±0.05% Potentiometer input: ±1%

Item	Specifications
Temperature coefficient	Resistance thermometer and thermocouple inputs: The temperature coefficient depends on the input type and the measured temperature. For details, refer to the *Accuracy and Temperature Coefficient According to Resistance Thermometer and Thermocouple Input Types and Measured Temperatures* on page 34. Current or voltage input: ±80 ppm/°C (for full scale) Potentiometer input: ±100 ppm/°C (for full scale)
Cold junction compensation error	Thermocouple input: ±1.2°C
Resolution	1/256,000 (Conversion period: 60 ms) (See note.), 1/64,000 (Conversion period: 10 ms), 1/16,000 (Conversion period: 5 ms) **Note:** The resolution for potentiometer inputs is 1/4,000.
Input signal range	Resistance thermometer, thermocouple, ±100 mV user-set inputs: −15% to 115% of measurable input range 4 to 20 mA, 1 to 5 V, 0 to 1.25 V, 0 to 5 V, 0 to 10 V inputs: −15% to 115% 0 to 20-mA inputs: 0% to 115% −1.25 to 1.25 V, −5 to 5 V, −10 to 10 V, ±10 V user-set range inputs: −7.5% to 107.5% Potentiometer input: −15% to 115% of 0 to 2,500 Ω
Influence of lead wire resistance	Resistance thermometer inputs: 0.06°C/Ω (20 Ω max.) (3-wire) 0.006°C/Ω (20 Ω max.) (4-wire)
Input detection current	Resistance thermometer inputs: Approx. 0.21 mA (3-wire), approx. 0.42 mA (4-wire) Potentiometer input: Approx. 0.21 mA
Absolute maximum ratings	Thermocouple, ±100 mV user-set range inputs: ±130 mV Current inputs: 30 mA Voltage inputs (excluding ±100 mV user-set range): ±15 V
Input impedance	Thermocouple, ±100 mV user-set range inputs: 20 kΩ min. Current inputs: 150 Ω max. Voltage inputs (excluding ±100 mV user-set range): 1 MΩ min.
Input disconnection detection current	Thermocouple, ±100 mV user-set range inputs: Approx. 0.1 µA
Warmup time	Resistance thermometer inputs: 30 min Thermocouple, ±100 mV user-set range inputs: 45 min Current or voltage inputs (excluding ±100 mV user-set range): 30 min Potentiometer input: 10 min
Response time	1/256,000 resolution: Resistance thermometer inputs: 180 ms max. (travel time from input 0% to 90%, for step input and with moving average for 1 sample) Thermocouple, ±100 mV user-set range inputs: 180 ms max. (travel time from input 0% to 90%, for ±100 mV step input and with moving average for 1 sample) Current or voltage input: 180 ms max. (travel time from input 0% to 90%, for ±10 V step input and with moving average for 1 sample) Potentiometer input: 180 ms max. (travel time from input 0% to 90%, for step input and with moving average for 1 sample) 1/64,000 resolution: Resistance thermometer inputs: 100 ms max. (travel time from input 0% to 90%, for step input and with moving average for 4 samples) Thermocouple, ±100 mV user-set range inputs: 100 ms max. (travel time from input 0% to 90%, for ±100 mV step input and with moving average for 4 samples) Current or voltage inputs: 100 ms max. (travel time from input 0% to 90%, for ±10 V step input and with moving average for 4 samples) 1/16,000 resolution: Thermocouple inputs: 100 ms max. (travel time from input 0% to 90%, for ±100 mV step input and with moving average for 4 samples)
Conversion period	60 ms/4 inputs (1/256,000 resolution), 10 ms/4 inputs (1/64,000 resolution, 5 ms/4 inputs (1/16,000 resolution)
Maximum time to store data in CPU Unit	Conversion period + one CPU Unit cycle

Item		Specifications
Input disconnection and input error detection		Resistance thermometer, thermocouple, ±100 mV user-set range, potentiometer inputs: 　Input Error Flag turns ON when a disconnection occurs or when 115% or −15% of the measurable input range is exceeded. 　The process value clamp direct direction for when a disconnection occurs can be specified. (High: 115% of set input range. Low: −15% of set input range.) 　Disconnection detection time: 　　Approx. 5 s max. (4-wire Pt100) 　　Approx. 1 s max. (±100 mV user-set range) 　　Approx. 0.5 s max. (not 4-wire Pt100 or ±100 mV user-set range) 4 to 20 mA, 1 to 5 V, 0 to 1.25 V, 0 to 5 V, 0 to 10 V inputs: 　An error is detected and the Input Error Flag turns ON when a disconnection occurs or when 115% or −15% of the measurable input range is exceeded. 　When a disconnection occurs in the 4 to 20 mA/1 to 5 V range, the −15% process value is stored. When a disconnection occurs in any other range, a process value the same as for a 0 V input is stored. 0 to 20 mA inputs: 　An error is detected and the Input Error Flag turns ON when 115% of the measurable input range is exceeded. When a disconnection occurs, a process value the same as for a 0 mA input is stored. −1.25 to 1.25 V, −5 to 5 V, −10 to 10 V, ±10 V user-set range inputs: 　An error is detected and the Input Error Flag turns ON when 107.5% or −7.5% of the measurable input range is exceeded. When a disconnection occurs, a process value the same as for a 0 V input is stored.
Function	**Process value alarm**	Four process value alarms (HH, H, LL, L), hysteresis, and ON/OFF-delay timer (0 to 60 s) can be set.
	Rate-of-change calculation	Calculates the amount of change per process value comparison time interval (Either 1 to 16 s or the conversion period can be set.)
	Rate-of-change alarm	Two rate-of-change alarms (H, L), hysteresis, and ON/OFF-delay timer (0 to 60 s) can be set (shared with process value alarm).
	Process value averaging (input filter)	Calculates the moving average for the specified number of past process values (1 to 128), and stores that value in the CIO Area as the process value.
	Square root extraction	When the process value scaling maximum value is A and the minimum value is B: $$\text{Output} = \sqrt{(A - B) \times (\text{input} - B)} + B$$ Dropout: Output approx. 7% maximum linear (output = input) characteristics **Note: 1.** The square root function is enabled for DC inputs only. It is not performed for temperature inputs. 　　**2.** The square root function is enabled only when the maximum scaling value is greater than the minimum value. It is not performed when the minimum value is greater. 　　**3.** When performing square root calculation, set the maximum and minimum scaling values to the scaling values following square root extraction of the flowrate or other input value.
	Adjustment period control	When zero/span adjustment is executed, the date is internally recorded at the Unit. When the preset zero/span adjustment period and the notice of days remaining set in the Expansion Setting Area have elapsed, this function turns ON a warning flag to give notice that it is time for readjustment.
	Peak and bottom detection	Detects the maximum (peak) and minimum (bottom) process values, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF. These values are stored as the peak and bottom values in the Expansion Control/Monitor Area.
	Top and valley detection	This function detects the top and valley values for process values, from when the Hold Start Bit (output) allocated to the Expansion Control/Monitor Area turns ON until it turns OFF. These values are stored as the top and valley values in the Expansion Control/Monitor Area.
	Integral value calculation	This function calculates the process value's time integral. The integral value is calculated and the result is output to the Expansion Control/Monitor Area when the Integral Value Calculation Start Bit in the Expansion Control/Monitor Area is turned ON.
	Cold junction compensation method	Specifies whether cold junction compensation is to be executed internally or externally. **Note:** This function is supported only for thermocouple inputs.
	Resistance thermometer input compensation	Compensation is enabled for a connected resistance thermometer by setting the resistance for 23°C. **Note:** This function is supported only for resistance thermometer inputs.
Isolation		Between inputs and Controller signals, and between inputs: Power supply = Transformer, Signal = Digital isolator
Insulation resistance		20 MΩ (at 500 V DC) between all inputs
Dielectric strength		Between all inputs: 500 V AC, at 50 or 60 Hz, for 1 min, leakage current 10 mA max.
External connections		Terminal block (detachable)
Unit number settings		Set by rotary switches on front panel, from 0 to 95.
Indicators		Three LED indicators on front panel (for normal operation, errors detected at the Universal Input Unit, and errors detected at the CPU Unit).
Front panel connector		Input connector terminal block (detachable)

Item	Specifications
Current consumption (supplied by Power Supply Unit)	5 V DC at 300 mA max.
Dimensions	31 × 90 × 65 mm (W × H × D)
Weight	150 g max.
Standard accessories	One cold junction sensor (mounted to terminal block)

Input Types and Input Ranges

The input type and range are set in the DM Area for each input. Each input range can be set within the measurable input range shown in the following table. (DC input ranges are user-set.) The accuracy and resolution are determined by the measurable input ranges shown in the table, and not by the set input ranges. The accuracy and resolution are not changed by narrowing the input range.

Resolution: 1/256,000

Input type	DM Area settings	Measurable input range
Pt100 (3-wire)	0	−200.00 to 850.00°C
JPt100 (3-wire)	3	−200.00 to 500.00°C
Pt1000 (3-wire)	7	−200.00 to 850.00°C
Pt100 (4-wire)	9	−200.00 to 850.00°C
	10	0.000 to 50.000°C
K	15	−200.0 to 1300.0°C
	16	−20.00 to 600.00°C
J	17	−200.0 to 1200.0°C
	18	−20.00 to 600.00°C
T	19	−200.00 to 400.00°C
E	20	−200.0 to 1000.0°C
L	21	−200.0 to 900.0°C
U	22	−200.0 to 600.0°C
N	23	−200.0 to 1300.0°C
R	24	−50.0 to 1700.0°C
S	25	−50.0 to 1700.0°C
B	26	0.0 to 1800.0°C
WRe5-26	27	0.0 to 2300.0°C
PLII	28	0.0 to 1300.0°C
4 to 20 mA	30	4 to 20 mA
0 to 20 mA	31	0 to 20 mA
1 to 5 V	32	1 to 5 V
0 to 1.25 V	34	0 to 1.25 V
0 to 5 V	35	0 to 5 V
0 to 10 V	36	0 to 10 V
±100 mV user-set range	37	−100 to 100 mV
±1.25 V	38	−1.25 to 1.25 V
±5 V	39	−5 to 5 V
±10 V	40	−10 to 10 V
±10 V user-set range	41	−10 to 10 V
Potentiometer	50	0 to (100 to 2500) Ω

Resolution: 1/64,000

Input type	DM Area settings	Measurable input range
Pt100 (3-wire)	0	−200.00 to 850.00°C
JPt100 (3-wire)	3	−200.00 to 500.00°C
Pt100 (4-wire)	9	−200.00 to 850.00°C
K	15	−200.0 to 1300.0°C
J	17	−200.0 to 1200.0°C
T	19	−200.00 to 400.00°C
E	20	−200.0 to 1000.0°C
L	21	−200.0 to 900.0°C
U	22	−200.0 to 600.0°C
N	23	−200.0 to 1300.0°C
R	24	−50.0 to 1700.0°C
S	25	−50.0 to 1700.0°C
B	26	0.0 to 1800.0°C
WRe5-26	27	0.0 to 2300.0°C
PLII	28	0.0 to 1300.0°C
4 to 20 mA	30	4 to 20 mA
0 to 20 mA	31	0 to 20 mA
1 to 5 V	32	1 to 5 V
0 to 1.25 V	34	0 to 1.25 V
0 o 5 V	35	0 to 5 V
0 to 10 V	36	0 to 10 V
±100 mV user-set range	37	−100 to 100 mV
±1.25 V	38	−1.25 to 1.25 V
±5 V	39	−5 to 5 V
±10 V	40	−10 to 10 V
±10 V user-set range	41	−10 to 10 V

Resolution: 1/16,000

| Input type	DM Area settings	Measurable input range
K	15	−200.0 to 1300.0°C
E	20	−200.0 to 1000.0°C

Accuracy and Temperature Coefficient According to Resistance Thermometer and Thermocouple Input Types and Measured Temperatures

| Input classification		Measured temperature (°C)	Standard accuracy °C (%)	Temperature coefficient *1 °C/°C (ppm/°C) *2
Temperature sensor type	Temperature range (°C)			
Pt100 (3-wire)	−200.00 to 850.00	−200.00 to −50.00	±0.5°C (±0.05%)	±0.08°C/°C (±78ppm/°C)
		−50.00 to 150.00	±0.21°C (±0.02%)	±0.03°C/°C (±29ppm/°C)
		150.00 to 850.00	±0.5°C (±0.05%)	±0.08°C/°C (±78ppm/°C)
JPt100 (3-wire)	−200.00 to 500.00	Same as on the left.	±0.4°C (±0.05%)	±0.07°C/°C (±96ppm/°C)
Pt1000 (3-wire)	−200.00 to 850.00	Same as on the left.	±0.5°C (±0.05%)	±0.09°C/°C (±85ppm/°C)
Pt100 (4-wire)	−200.00 to 850.00	Same as on the left.	±0.5°C (±0.05%)	±0.02°C/°C (±17ppm/°C)
	0.000 to 50.000	Same as on the left.	±0.025°C (±0.05%)	±0.005°C/°C (±90ppm/°C)
K	−200.0 to 1300.0	Same as on the left.	±0.75°C (±0.05%)	±0.08°C/°C (±50ppm/°C)
	−20.00 to 600.00	Same as on the left.	±0.3°C (±0.05%)	±0.03°C/°C (±48ppm/°C)
J	−200.0 to 1200.0	−200.0 to 0.0	±0.7°C (±0.05%)	±0.13°C/°C (±96ppm/°C)
		0.0 to 1200.0		±0.06°C/°C (±42ppm/°C)
	−20.00 to 600.00	Same as on the left.	±0.3°C (±0.05%)	±0.04°C/°C (±72ppm/°C)
T	−200.00 to 400.00	−200.00 to −180.00	±1.3°C (±0.22%)	±0.05°C/°C (±75ppm/°C)
		−180.00 to 0.00	±0.7°C (±0.12%)	
		0.00 to 400.00	±0.33°C (±0.055%)	
E	−200.0 to 1000.0	−200.0 to 0.0	±0.6°C (±0.05%)	±0.12°C/°C (±100ppm/°C)
		0.0 to 1000.0		±0.06°C/°C (±50ppm/°C)
L	−200.0 to 900.0	Same as on the left.	±0.5°C (±0.05%)	±0.04°C/°C (±40ppm/°C)
U	−200.0 to 600.0	−200.0 to −100.0	±0.7°C (±0.09%)	±0.06°C/°C (±75ppm/°C)
		−100.0 to 0.0	±0.5°C (±0.07%)	
		0.0 to 600.0	±0.4°C (±0.05%)	
N	−200.0 to 1300.0	−200.0 to −150.0	±1.6°C (±0.11%)	±0.11°C/°C (±70ppm/°C)
		−150.0 to −100.0	±0.75°C (±0.05%)	
		−100.0 to 1300.0		±0.08°C/°C (±50ppm/°C)
R	−50.0 to 1700.0	−50.0 to 0.0	±3.2°C (±0.19%)	±0.13°C/°C (±77ppm/°C)
		0.0 to 100.0	±2.5°C (±0.15%)	±0.11°C/°C (±60ppm/°C)
		100.0 to 1700.0	±1.75°C (±0.1%)	
S	−50.0 to 1700.0	−50.0 to 0.0	±3.2°C (±0.19%)	±0.13°C/°C (±77ppm/°C)
		0.0 to 100.0	±2.5°C (±0.15%)	±0.11°C/°C (±60ppm/°C)
		100.0 to 1700.0	±1.75°C (±0.1%)	
B	0.0 to 1800.0	0.0 to 400.0	May not be accurate.	May not be accurate.
		400.0 to 800.0	±3°C (±0.17%)	±0.12°C/°C (±66ppm/°C)
		800.0 to 1800.0	±1.8°C (±0.1%)	
WRe5-26	0.0 to 2300.0	0.0 to 1500.0	±1.15°C (±0.05%)	±0.13°C/°C (±58ppm/°C)
		1500.0 to 2200.0		±0.21°C/°C (±91ppm/°C)
		2200.0 to 2300.0	±1.4°C (±0.07%)	
PLII	0.0 to 1300.0	Same as on the left.	±0.65°C (±0.05%)	±0.07°C/°C (±57ppm/°C)

*1. Error in process value when ambient temperature changes by 1°C.
*2. For full-scale.

Block Diagram
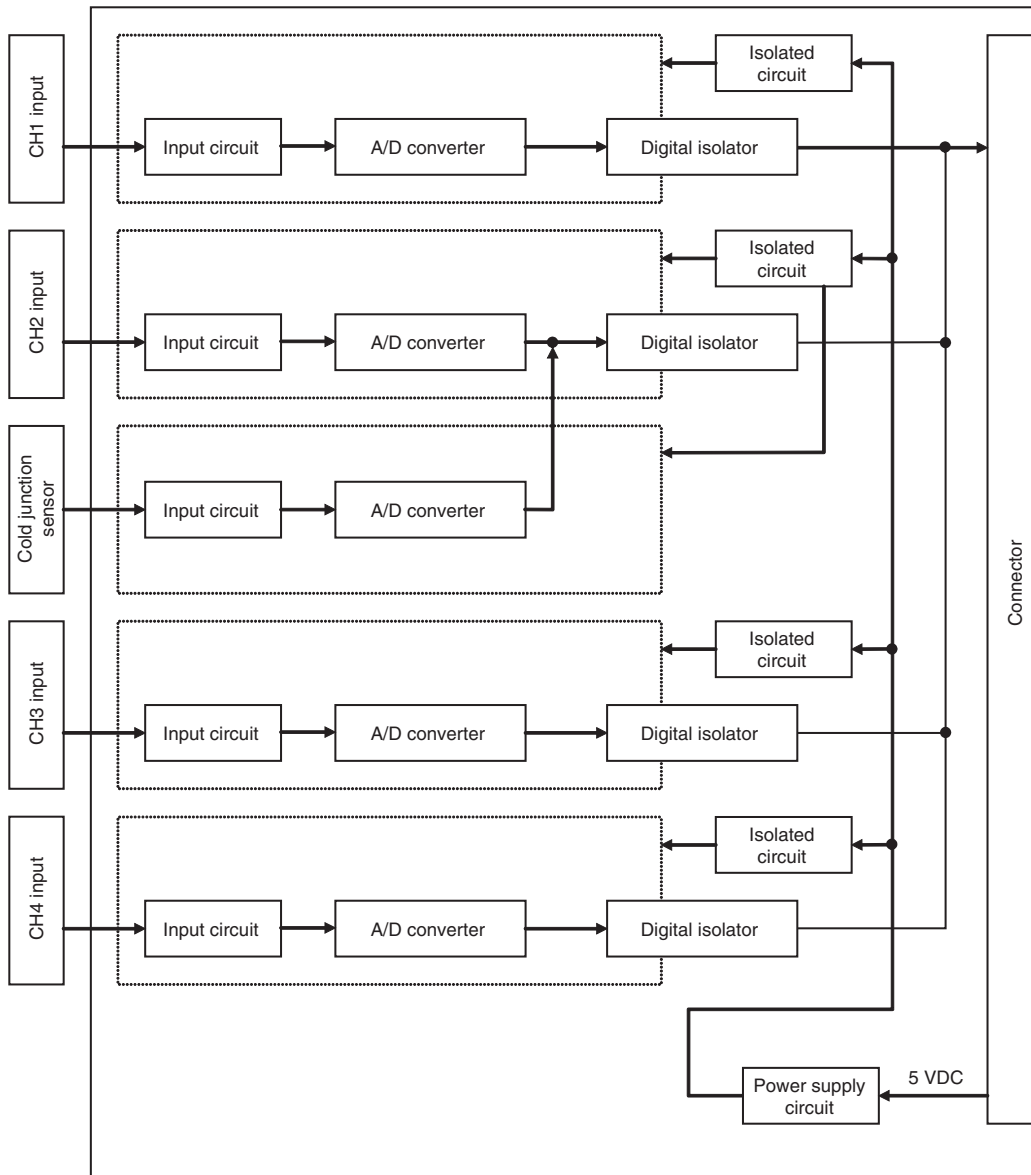
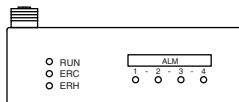## Terminal Connection Diagram
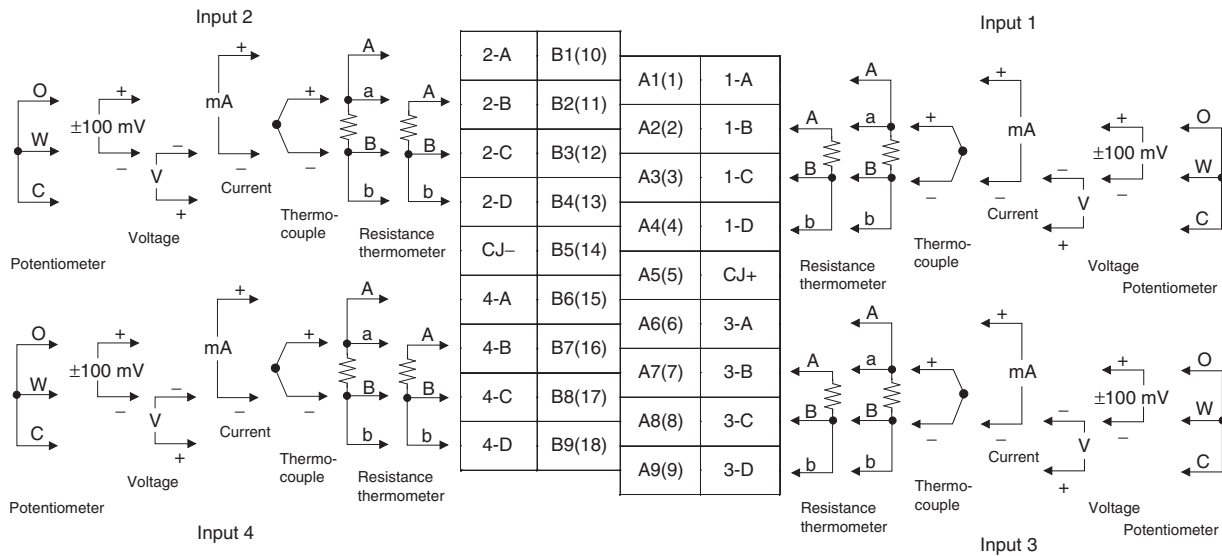
Note: 1. When wiring voltage inputs, be careful not to connect the wrong terminals. Incorrect wiring may damage the Unit.
  2. Do not remove the cold junction sensors that are connected to the CJ+ and CJ– terminals. If they are removed, compensation will not be executed and temperatures will not be correctly measured.
  3. Use the cold junction sensors that are included with the product. Cold junction sensors are calibrated for particular Units and connection circuits. If a sensor from another Unit is used, temperatures cannot be correctly measured.
  4. Use shielded cable when the resolution selection is set to 2 (1/16,000).
  5. Use the same wiring length for connecting to A, B, a, and b, so that the impedance will be the same. In particular (for resistance thermometers), do not connect the A-a and B-b terminals.
  6. Do not connect anything to unused terminals.
  7. Be sure to ground the GR terminal at the Power Supply Unit for the Controller.
  8. Be sure to ground all input devices (such as voltage generators, temperature calibrators, and resistors) that have ground terminals.
  9. Do not mount an Isolated-type Universal Input Unit on the same CPU Rack or the same Expansion Rack as a CJ1W-OC□□□ Contact Output Unit. The Universal Input Unit measures process values at high resolution, and the noise that is generated from relay output switching can adversely affect these operations.
  10. If the CPU Rack and an Expansion Rack are lined up horizontally on the control panel and a Relay Output Unit is mounted in the same Rack as the CJ1W-PH41U, keep the Racks separated by at least 70 mm.
  11. If for some reason it is not possible to avoid mounting them on the same Rack, then mount them as far apart as possible and take measures such as installing a surge suppressor in the relay output circuit wiring.
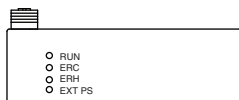
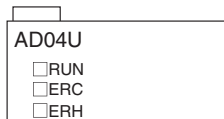## Nomenclature and Functions
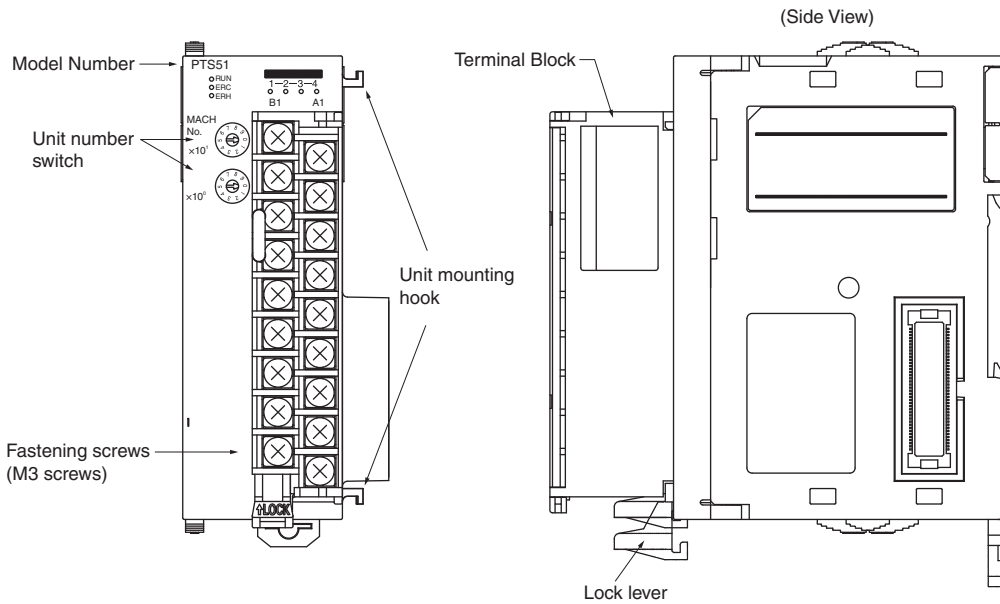
Front Panel LED Indicators
CJ1W-PTS5☐

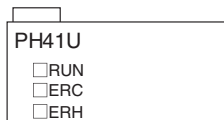| LED	Meaning	Indicator	Operating status
RUN (green)	Operating	Lit	Operating normally.
		Not lit	Unit has stopped exchanging data with the CPU Unit.
ERC (red)	Error detected by Unit	Lit	Sensor error has occurred or data setting is out of range in a parameter.
		Not lit	Operating normally.
ERH (red)	Error in the CPU Unit	Lit	Error has occurred during data exchange with the CPU Unit, or Analog I/O Unit's unit number is set incorrectly, or there is a mounting error.
		Not lit	Operating normally.
ALM1 to ALM4 (yellow)	External alarm outputs	Lit	External alarm output ON.
		Not lit	External alarm output OFF.

CJ1W-PTS15/PDC15

LED	Meaning	Indicator	Operating status
RUN (green)	Operating	Lit	Operating normally.
		Not lit	Unit has stopped exchanging data with the CPU Unit.
ERC (red)	Error detected by Unit	Lit	Data setting is out of range in a parameter.
		Not lit	Operating normally.
ERH (red)	Error in the CPU Unit	Lit	Error has occurred during data exchange with the CPU Unit, or Analog I/O Unit's unit number is set incorrectly, or there is a mounting error.
		Not lit	Operating normally.
EXT PS	External power supply	Lit	External 24-VDC power supply
		Not lit	No external power supply

CJ1W-AD04U

```
AD04U
   □RUN
   □ERC
   □ERH
```

| LED	Meaning	Indicator	Operating status
RUN (green)	Operating	Lit	Operating normally.
		Not lit	Unit has stopped exchanging data with the CPU Unit.
ERC (red)	Error detected by Unit	Lit	Data setting is out of range in a parameter, or input error has occurred.
		Not lit	Operating normally.
ERH (red)	Error in the CPU Unit	Lit	Error has occurred during data exchange with the CPU Unit, or Analog I/O Unit's unit number is set incorrectly, or there is a mounting error.
		Not lit	Operating normally.

CJ1W-PH41U

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PH41U
   □RUN
   □ERC
   □ERH
```

LED	Meaning	Indicator	Operating status
RUN (green)	Operating	Lit	Operating normally.
		Not lit	Unit has stopped exchanging data with the CPU Unit.
ERC (red)	Error detected by Unit	Lit	Data setting is out of range in a parameter.
		Not lit	Operating normally.
ERH (red)	Error in the CPU Unit	Lit	Error has occurred during data exchange with the CPU Unit, or Analog I/O Unit's unit number is set incorrectly, or there is a mounting error.
		Not lit	Operating normally.

Unit Number Switches

Use the unit number switches to set the specific unit number for each Special I/O Unit mounted in a CPU Rack or Expansion Backplane. The unit number must be the one registered in the Unit Configuration.
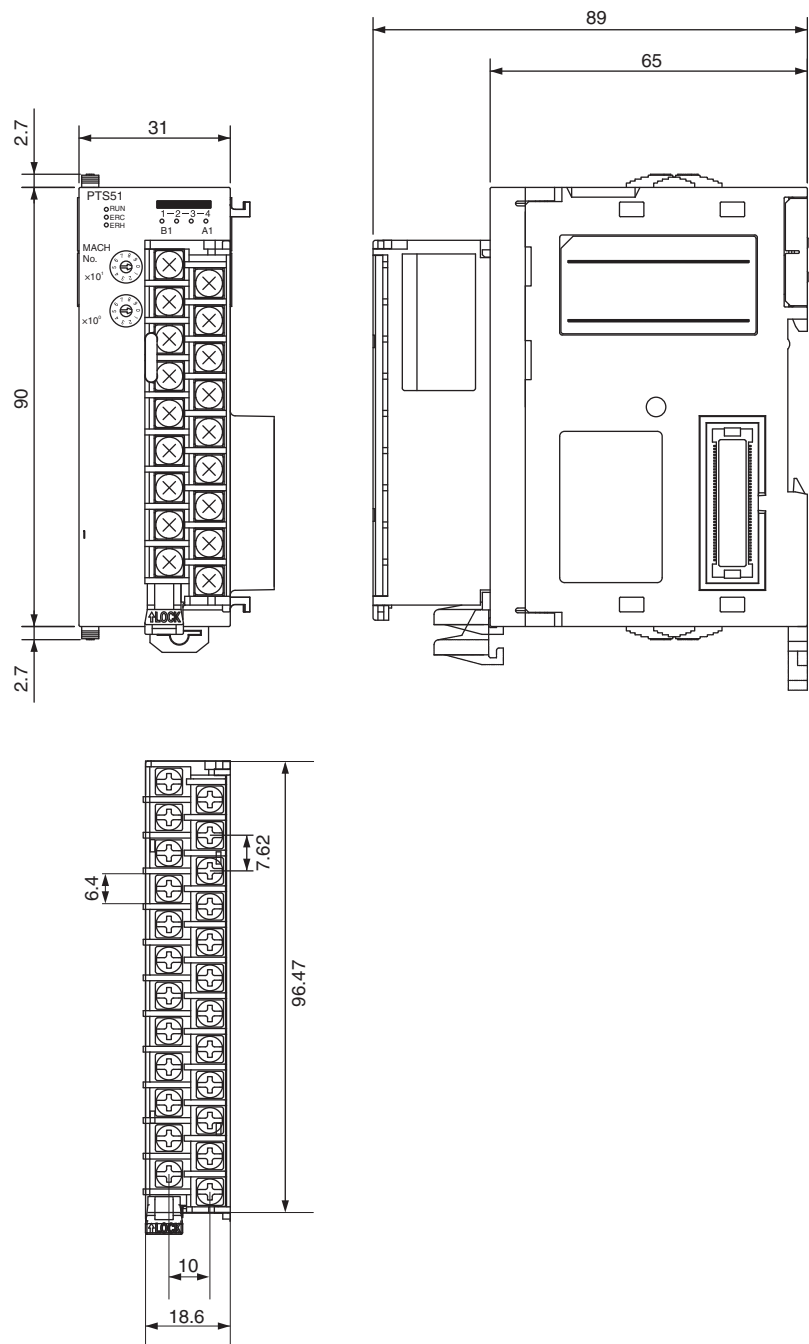
Unit Number Switches
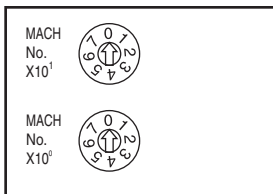
Switch Settings	Unit No.
00	0
01	1
02	2
03	3
04	4
05	5
06	6
07	7
08	8
09	9
10	10
to	to
95	95

Dimension

(Unit: mm)

Terminal Block

Related Manuals

Cat. No.	Model	Manual name	Application	Contents
W368	CJ1W-PTS□□ CJ1W-PDC□□ CJ1W-AD04U CJ1W-PH41U	CJ-series Analog I/O Unit Operation Manual	Learning about the functions and operating procedures for the CJ-series Analog I/O Unit Operation Manual.	The functions and operating procedures when CJ-series Analog I/O Unit is used in the CJ-series system configuration are described.
W466	CJ1W-AD04U/ AD04U-SL	CJ-series Universal Input Units Operation Manual	Information on using the Analog I/O Units.	Provides information on using the CJ-series Analog I/O Units.
W498	CJ1W-PDC15 CJ1W-AD04U CJ1W-PH41U	CJ-series Analog I/O Units Operation Manual for NJ-series CPU Units	Learning about the functions and operating procedures when CJ-series Analog I/O Unit is used in the NJ Series system configuration.	The functions and operating procedures when CJ-series Analog I/O Unit is used in the NJ Series system configuration are described.

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