OMRON

Model

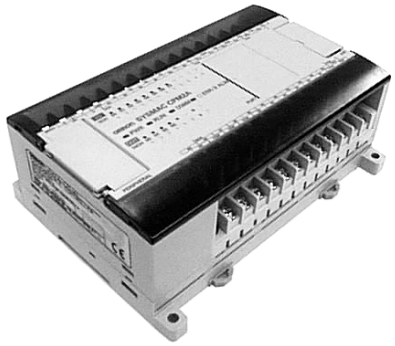
CPM2A-CPU41

Digital: 8x in; 4x out

Analog: 2x in; 1x out; 1x Pt100 in

INSTRUCTION SHEET

Thank you for purchasing an OMRON product. Read this thoroughly and familiarize yourself with the functions and characteristics of the product before using it. Keep this instruction sheet for future reference.



1618912-4A

■ Specifications

Digital inputs	Number of digital inputs	8 points
	Input voltage	24V (+10% / -15%)
	Input impedance	4.7kΩ
	Input current (typ.)	5mA
	ON voltage	14.4Vdc min.
	OFF voltage	5.0Vdc max.
	ON delay	8ms max.
	OFF delay	8ms max.
Digital outputs	Number of digital outputs	4, source type (PNP)
	Max. switching capacity	24Vdc (+10% / -15%) 0.3A / point
	Min. switching capacity	10mA
	Leakage current	0.1mA max.
	Residual voltage	1.5V max.
	ON delay	0.1ms max.
	OFF delay	1ms max.
Analog inputs	Number of analog inputs	2 voltage / current inputs
	Voltage input range	0...+5V 0...+10V
	Voltage resolution	8 bits
	Voltage accuracy	1% max. of full scale
	Max. voltage input	±15V continuous
	Current input range	0...20mA
	Current resolution	8 bits
	Current accuracy	1% max. of full scale
	Max. current input	±30mA continuous
Pt100 input	Number of Pt100 inputs	1 three wire input
	Min. Pt100 input signal	82.3Ω / -40° C
	Max. Pt100 input signal	194.1Ω / +250° C
	Resolution	0.1° C in 2's complement format
	Accuracy	1% max. of full scale
Analog output	Number of analog outputs	1 (voltage / current)
	Voltage output range	0...+10V (8 bits) -10...+10V (9 bits)
	Voltage output accuracy	1% max. of full scale
	Voltage output current	5mA max.
	Current output range	0...20mA (8 bits)
	Current output accuracy	1% max. of full scale
	Current output load resistance	500Ω max.

Conversion time	Conversion time	10ms max.(1)
Insulation	PC to digital inputs PC to digital outputs PC to analog inputs PC to analog outputs	500Vac 500Vac 500Vac 500Vac
Power consumption	at 24V input	105 mA
Dimensions	l x w x h	150 x 90 x 55 mm
Weight	without packing	500 grams

(1) This is the time required for a complete refresh of all analog channels.

- Voltage and current output can be used simultaneously as long as the total output current is 21mA or less.
- The data written to analog output CH11 is valid for voltage and current output.
- The data read from analog input CH01 is valid for voltage and current input.

■ Terminals

The following tables list the usage of both terminal blocks.

Input connector TB1

Pin	Name	Description
1	+24V	+ power supply
2	nc	
3	0V	- power supply
4	FG	frame ground
5	COM	COM input
6	00	00.00 input
7	01	00.01 input
8	02	00.02 input
9	03	00.03 input
10	04	00.04 input
11	05	00.05 input
12	06	00.06 input
13	07	00.07 input
14	nc	
15	nc	
16	nc	
17	nc	
18	V1+	V input 1
19	COM	common 1
20	I1+	I input 1
21	reserved	
22	V2+	V input 2
23	COM	common 2
24	I2+	I input 2
25	reserved	
26	PTA	Pt100 input A
27	PTB	Pt100 input B
28	PTB	Pt100 input B
29	nc	

Output connector TB2

Pin	Name	Description
1	nc	
2	nc	
3	00	10.00 output
4	COM	COM output
5	01	10.01 output
6	COM	COM output
7	02	10.02 output
8	COM	COM output
9	03	10.03 output
10	nc	
11	nc	
12	nc	
13	nc	
14	nc	
15	nc	
16	reserved	
17	nc	
18	reserved	
19	reserved	
20	reserved	
21	nc	
22	V OUT	V output
23	I OUT	I ouput
24	COM	COM ouput

NOTE: Reserved terminals should not be used.

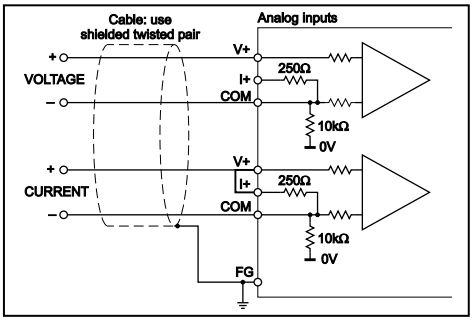
■ Range settings

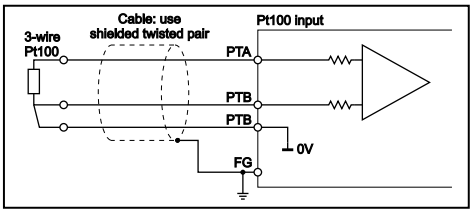
After applying power, always start writing a range set code to output CH11. Otherwise no analog conversion will take place.

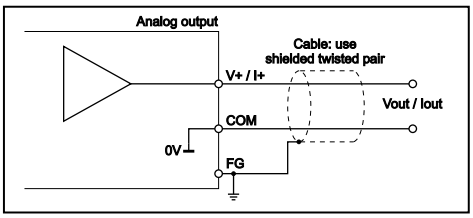
Range set code	OUTPUT	INPUT 1	INPUT 2
FF00	0 .. 10V 0 .. 20mA	0 .. 10V	0...10V
FF01	-10 .. 10V 0 .. 20mA	0 .. 10V	0...10V
FF02	0 .. 10V 0 .. 20mA	0 .. 5V 0 .. 20mA	0...10V
FF03	-10 .. 10V 0 .. 20mA	0 .. 5V 0 .. 20mA	0...10V
FF04	0 .. 10V 0 .. 20mA	0 .. 10V	0...5V 0...20mA
FF05	-10 .. 10V 0 .. 20mA	0 .. 10V	0...5V 0...20mA
FF06	0 .. 10V 0 .. 20mA	0 .. 5V 0 .. 20mA	0...5V 0...20mA
FF07	-10 .. 10V 0 .. 20mA	0 .. 5V 0 .. 20mA	0...5V 0...20mA

■ Analog wiring

The following illustrations show the connection of the analog inputs and outputs.



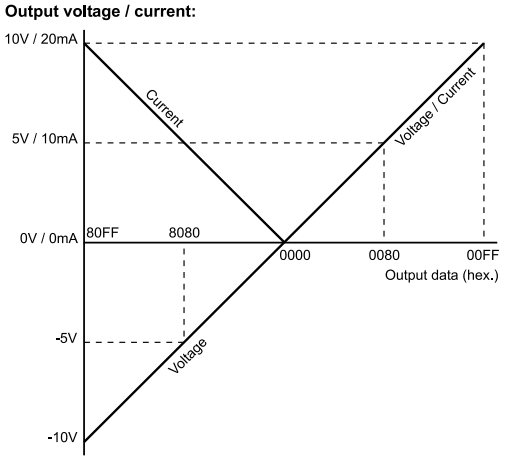




Note:

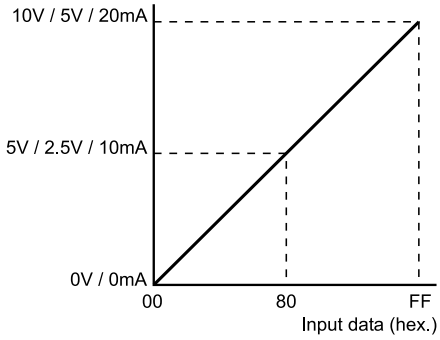
- For all analog I/O, shielded twisted-pair cables should be used.
- Do not wire power lines or other I/O lines alongside the analog wires.
- Connect the FG terminal of the unit to the DIN rail or system FG.
- Connect the shielding of all analog cables to the DIN rail or the system FG.

■ Analog input and output graphs



Note:
The sign bit of the analog output CH11 affects only the output voltage, not the output current. The output current is always positive.

Input voltage / current:



■ Channel allocation

CH00 : Digital inputs															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
x	x	x	x	x	x	x	x	d	d	d	d	d	d	d	d

d : databits
x : not used

CH01 : Analog inputs															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
d_2	d_2	d_2	d_2	d_2	d_2	d_2	d_2	d_1	d_1	d_1	d_1	d_1	d_1	d_1	d_1

d_1 : databits analog input 1
d_2 : databits analog input 2

CH02 : Pt100 input															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
err	sgn	d	d	d	d	d	d	d	d	d	d	d	d	d	d

d : databits
sgn : temperature sign bit (1 = negative temp.)
err : ranger error bit (1 = temp. out of range)

CH10 : Digital outputs															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
x	x	x	x	x	x	x	x	x	x	x	x	d	d	d	d

d : databits
x : not used

CH11 : Analog output															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
sgn	x	x	x	x	x	x	x	d	d	d	d	d	d	d	d

d : databits
x : not used
sgn : sign bit (1 = negative output voltage)

■ Pt100 temperature data format

The databits 0...13 represent the temperature with 0.1° C resolution in 2's complement format. Bit 14 represents the sign of the temperature. Bit 15 indicates whether the temperature is within the specified temperature range (-40° C...+275° C).

Example 1: the unit reads $00C8_{hex}$
Range error bit=0 and sign bit=0, so no conversion is required. $00C8_{hex}$ = 200_{dec} , so the temperature is 200 ÷ 10 = 20.0° C (R_{Pt100}=108Ω).

Example 2: the unit reads $7F38_{hex}$
Range error bit=0 and sign bit=1. The temperature is negative, so the result must be converted. This can be done by performing an XOR with #7FFF and adding 1 to the result: ($7F38_{hex}$ **XOR** $7FFF_{hex}$) + 1 = $C8_{hex}$ = 200_{dec} ➔ the temperature is -20.0° C (R_{Pt100}=92.2Ω).

Range error examples:
8B54 : range error bit=1, sign bit=0 ➔ the temperature is above +275.0° C or a broken wire occured.

FE0C : range error bit=1, sign bit=1 ➔ temperature is below -40.0° C.

NOTE: when the range error bit is set, the temperature readings may be out of tolerance or even invalid !

■ Unit status

- A fault in the analog circuit is reflected in bit 00 of the AR02 register. Under normal conditions this bit is 0. If a serious error occurs in the analog circuit, bit 00 goes high and the analog input values are no longer refreshed. The analog outputs fall to zero.
- The number of units that are connected to the expansion port is represented by the bits 08...11 of the AR02 register. With no external unit connected, the bits read 1. With one expansion unit, the bits read 2, and with 2 expansion units, the bits read 3.
- The maximum number of units that can be connected to the expansion port is restricted to 2.

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Note : Specifications subject to change without notice.