Model

CPM1A-TS101-DA

TEMPERATURE SENSOR
AND ANALOG OUTPUT UNIT

INSTRUCTION SHEET

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

2704351-2A

■ Specifications

Number of analog outputs	1 output: to be used as voltage output or current output	
Output signal range	Voltage output	0V to +10V -10V to +10V
	Current output	4mA to 20mA
Resolution	Voltage output	1/256 (0 to 10V) 1/512 (-10 to 10V)
	Current output	1/256
Accuracy	Voltage output	1.0% max. (full scale)
	Current output	1.0% max. (full scale)
Number of Pt100 inputs	2 three wire inputs	
Input signal range	Pt100 minimum	82.3 Ω / -40 °C
	Pt100 maximum	194.1 Ω / +250 °C
Resolution	Pt100 input 1	0.1 °C in 2's complement format
	Pt100 input 2	0.1 °C in 2's complement format
Accuracy	Pt100 input 1	1.0% max. (full scale)
	Pt100 input 2	1.0% max (full scale)
Conversion time (See Note.)	60 ms. max. / Unit	
Max. output current	Voltage output	5mA
Max. load resistance	Current output	500Ω
Max. total output current (Unit)	21 mA	
PC signal	Voltage output	8-bit binary + sign bit (80FF to 0000 to 00FF hexadecimal)
	Current output	8-bit binary (0000 to 00FF hexadecimal)
External connections	9-pin terminal block (non-removable)	
Insulation	Between output/input terminals and PC : photocouplers	
	Between output terminals individual : none	
Power consumption	40mA max. (5VDC) 40mA max. (24VDC)	
Dimensions	66(W) x 50(H) x 90(D) mm	
Weight	150 gram max.	

Note   This is the time for a complete refresh
of in- and outputs of the unit

- Voltage output and current output can be used simultaneously.
- Data written to the output channel is valid for current
 and voltage output.

■ Terminals for external wiring

	2	4	6	8	
1	3	5	7	9	
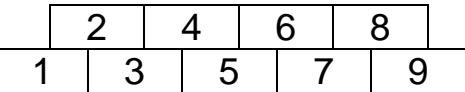
1.   voltage output
2.   current output
3.   common output
4.   Pt100 input 1A
5.   Pt100 input 1B
6.   Pt100 input 1B
7.   Pt100 input 2A
8.   Pt100 input 2B
9.   Pt100 input 2B

■ Setting the ranges

The first thing to do, after starting up, is setting the ranges.
In order to set ranges, a range setting code is needed.
These codes can be found in the table below.

Range set code	OUTPUT
FF00	0 to 10 V 4 to 20 mA
FF01	-10 to 10 V 4 to 20 mA

NOTE Always start with setting the ranges after power up otherwise
the CPM1A-TS101-DA will not convert any input or output.

■ Channel allocation:

CPU	Output channel TS101-DA	Input channel 1 TS101-DA	Input channel 2 TS101-DA
10CDx	11	1	2
20CDx	11	1	2
30CDx	12	2	3
40CDx	12	2	3
60CDx	13	3	4

■ IR bit allocation:

| 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
eb	sb	d	d	d	d	d	d	d	d	d	d	d	d	d	d

Bits 0 – 13:
  databits

bit 14, sign bit:
 0 positive temperature
  1 negative temperature

bit 15, error bit:
  0 temperature within range
  1 temperature out of range

■ Output / input wiring:

- Connect shielded twisted-pair cables to the analog
  inputs and outputs.

- Do not install power lines or high-tension lines close
  to the analog inputs and outputs.

- The shielded wires must be grounded on the backplane
  close to the Unit.
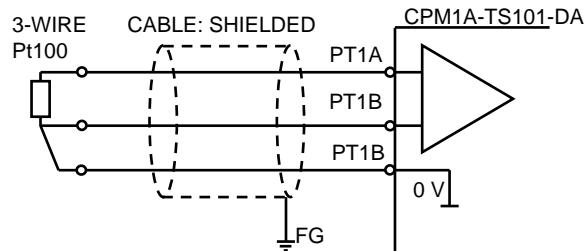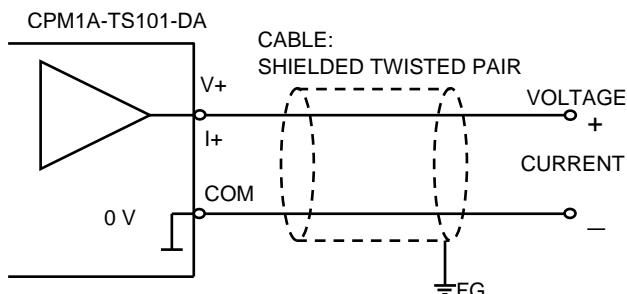
■ Data output
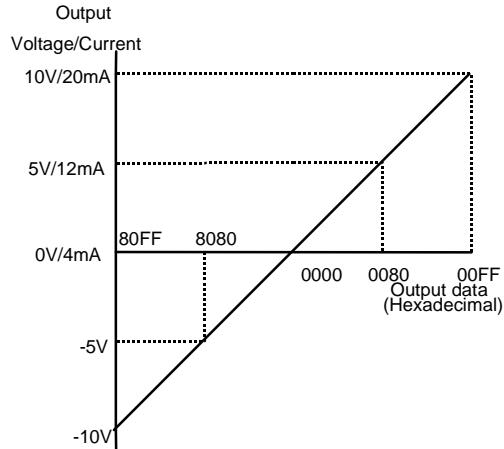
■ Examples of temperature readings

The 16 databits that are generated by the TS101-DA have a 2's
complement format and have a 0.1 °C resolution. Bits 0 – 13 indicate the
actual temperature, bit 14 indicates the sign, bit 15 indicates a range error.
Example 1: the display reads 00C8 hex, range error bit = 0, sign bit = 0 so
no conversion is necessary, 00C8 hex = 200 dec, the temperature is 200 /
10 = 20.0 °C. (Pt100 resistance is 108 Ω.)
Example 2: the display reads 7F38 hex, , range error bit = 0, sign bit = 1
so conversion to postive sign is necessary:
7F38 =
0111 1111 0011 1000 bin.
1111 1111 1111 1111 bin.-

1000 0000 1100 0111 bin + 1 bin = 1000 0000 1100 1000 bin, as
only the last 14 bits indicate temperature, which equals 200 dec, the
temperature is –200 / 10 = –20 °C. (Pt100 resistance is 92.2 Ω)
Range error examples:
8ABE, range error bit = 1, sign bit = 0, temperature is +275.0 °C
FE0C, range error bit = 1, sign bit = 1, temperature is –50.0 °C

**Remark: temperature readings may be invalid when using the TS101-
DA past the temperature range –40 °C to +250 °C.**

■ Dimensions