Panasonic **INSTRUCTION MANUAL**

Controller Ultra-compact Digital Panel

CA2 Series

CME-CA2(00) No.0024-75V

Thank you very much for using our products. Please read this Instruction Manual carefully and thoroughly for the correct and optimum use of this product. Kindly keep this manual in a convenient place for quick reference.

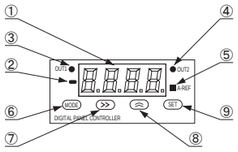
WARNING

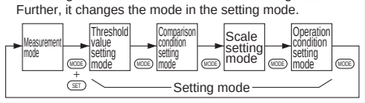
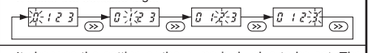
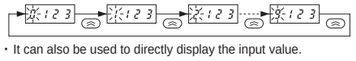
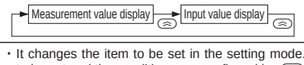
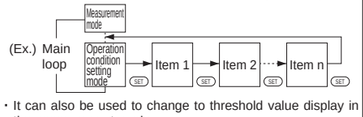
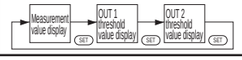
- Never use this product with a device for personnel protection.
- In case of using devices for personnel protection, use products which meet laws and standards, such as OSHA, ANSI or IEC etc., for personnel protection applicable in each region or country.

1 OUTLINE

- **CA2** series is an ultra-compact type two threshold level setting digital panel controller, which compares the analog input signal with the threshold values and outputs an ON / OFF signal.
  Besides being used for analog sensors, it can be used as the controller for various analog devices to realize different control functions.

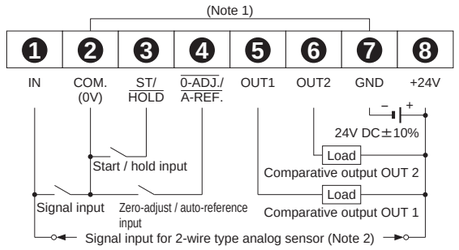
2 FUNCTIONAL DESCRIPTION



	Description	Function
①	Display (Red)	・Measurement mode: Display of scaled measured value, input value, OUT 1 threshold value and OUT 2 threshold value ・Setting mode : Display of setting menu and setting parameters ・Error : Display of error code
②	Polarity indicator (Red)	・Lights up when the displayed value or the threshold value is negative.
③	OUT 1 operation indicator (Orange)	・Measurement mode: Lights up when OUT 1 is ON. Blinks when display is changed to OUT 1 threshold value display. ・Setting mode : Blinks when OUT 1 threshold value and comparison conditions are set or when zero scale of scaling is set.
④	OUT 2 operation indicator (Orange)	・Measurement mode: Lights up when OUT 2 is ON. Blinks when display is changed to OUT 2 threshold value display. ・Setting mode : Blinks when OUT 2 threshold value and comparison conditions are set or when full scale of scaling is set.
⑤	Auto-reference operation indicator (Green)	・Lights up when auto-reference function is used.
⑥	Mode key (MODE)	・When SET key is pressed while pressing MODE key, the sensor changes from measurement mode to setting mode. Further, it changes the mode in the setting mode. 
⑦	Shift key (>>)	・It shifts the settable digit. 
⑧	Increment key (∧)	・It changes the setting or the numerical value to be set. The setting is shown on the display. The setting is selected by ∧ and confirmed by SET. When a numerical value is to be set, the settable digit blinks. The blinking digit is incremented by pressing ∧ key.  ・It can also be used to directly display the input value. 
⑨	Set key (SET)	・It changes the item to be set in the setting mode. The item to be set and the conditions are confirmed by SET key.  ・It can also be used to change to threshold value display in the measurement mode. 

3 I/O CIRCUIT AND WIRING DIAGRAM

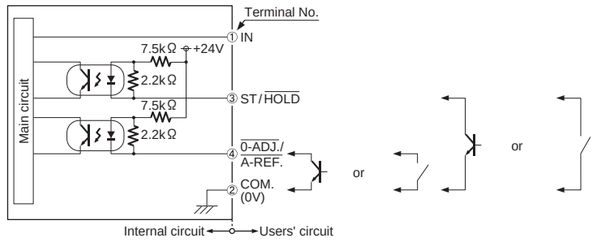
● Terminal arrangement and wiring diagram



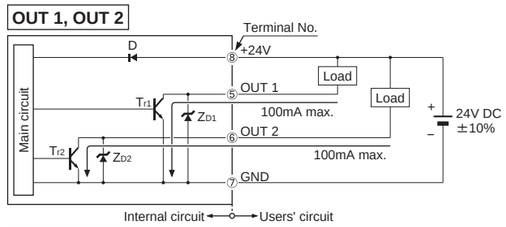
Notes: 1) COM. (0V) is internally connected to GND.
2) If the shield wire of the analog sensor is connected, make sure to connect it to GND (Terminal No. 7).

● Input circuit diagram

IN, ST/HOLD, 0-ADJ./A-REF.

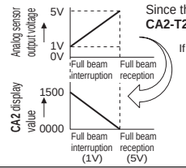
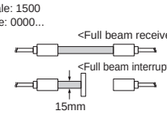
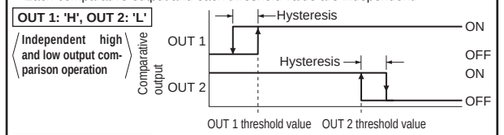
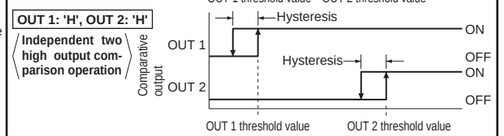
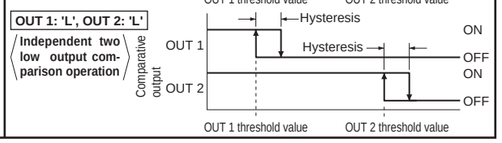


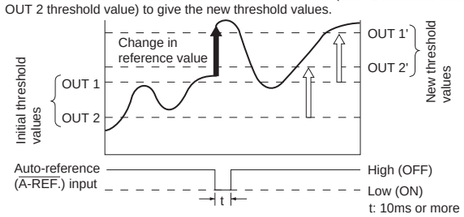
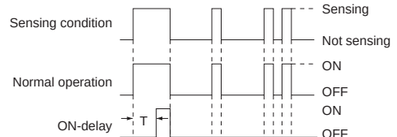
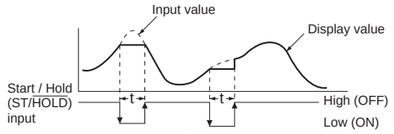
OUT 1, OUT 2



Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}: Surge absorption zener diode
T_{r1}, T_{r2} : NPN output transistor

4 FUNCTIONS AT A GLANCE

Function	Details
Scale setting function	・Using this function, the input value range can be converted to an arbitrary display range (span of max. 4,000 Nos. within -9,999 to +9,999) ・The values which are desired to be displayed by the extreme values of the input value range are input as 'zero scale' and 'full scale'. (Ex.) In case 'beam interrupted width' is to be displayed when using the analog sensor **LA** series having an output of 1 to 5V.  Since the **LA** series outputs an analog voltage of 1 to 5V, **CA2-T2**, which has an input range of 1 to 5V, is used. If Zero scale: 1500 Full scale: 0000... 
Threshold value setting function	・Using this function, the threshold levels for OUT 1 and OUT 2 can be set from -9,999 to +9,999. ・'H' and 'L' are displayed in the threshold value setting mode. If 'H' is set, high level comparison operation is obtained, and if 'L' is set, low level comparison operation is obtained. ・Each comparative output and each threshold value are independent. **OUT 1: 'H', OUT 2: 'L'** **Independent high and low output comparison operation**  **OUT 1: 'H', OUT 2: 'H'** **Independent two high output comparison operation**  **OUT 1: 'L', OUT 2: 'L'** **Independent two low output comparison operation** 

Function	Details
Hysteresis setting function	・This function enables independent setting of the hysteresis (difference between ON and OFF) of the comparative outputs (OUT 1, OUT 2) in the range 1 to 3,999.
Auto-reference function	・This function automatically compensates the threshold values according to a change in the reference input value. ・When the auto-reference (A-REF.) input is made Low, the measured value at that instant is added or subtracted from each threshold value (OUT 1 threshold value, OUT 2 threshold value) to give the new threshold values.  ・It can be selected whether auto-reference function is used or not. ・Auto-reference operation indicator (green) lights up when auto-reference function is used. ・Auto-reference function cannot be used when zero-adjust function is selected.
Zero-adjust (0-ADJ.) function	・By making the zero-adjust (0-ADJ.) input low for 10ms or more, the output value is forcibly made '0' and measurement is then done by taking the measured value at this instant as standard '0'. ・Zero-adjust (0-ADJ.) cannot be input when using auto-reference function. ・If zero-adjust backup function is used, the input value is stored even when the power supply is switched off. ・To cancel the zero-adjust function, put the zero-adjust setting to OFF. In this case, the standard value will return to the value before zero-adjust input.
Comparative output timer function	・ON-delay: It makes short duration sensing signal ineffective ・OFF-delay: It extends the output signal by a fixed time interval (0 to 99.99 sec.) **Time chart**  Delay interval: 0 to 99.99 sec. (settable in units of 0.01 sec.)
Start / Hold function	・This function maintains the output display and the comparative outputs (OUT 1, OUT 2) based on the input value at start / hold (ST/HOLD) input falling edge and restores normal operation at the start / hold input rising edge.  Input signal condition t: 10ms or more (sampling rate 200 times/sec.) 100ms or more (sampling rate 20 times/sec.) 200ms or more (sampling rate 10 times/sec.) 400ms or more (sampling rate 5 times/sec.)
Memory clear function	・This function clears all settings and returns the controller to the initial setting condition. This function is activated by pressing SET key while pressing >> key for 3 sec., or more, when the threshold value setting mode '*CoNP.*' is being displayed.
Power supply ON-delay function	・This function delays the commencement of measurement by the set time interval (0 to 9,999 sec.) from the instant the power supply is switched on.
Display refresh rate selection function	・This function selects the refresh rate of the measurement value display from 20 times/sec., 10 times/sec., 5 times/sec., 2.5 times/sec., 1 time/sec. and 0.5 time/sec. ・It does not affect the comparison operation.
Sampling rate selection function	・This function selects the sampling rate for measurement from 200 times/sec., 20 times/sec., 10 time/sec. and 5 time/sec.
Decimal point position setting function	・This function sets the position of the decimal point.
Zero-suppression setting function	・This function removes an unnecessary '0' in the upper digits. (Ex.): 0460 → 460
LSD (least significant digit) fixed '0' display function	・This function fixes the least significant digit display to '0'. ・It merely fixes the least significant digit display and does not affect the comparison operation.
Key-protect function	・This function makes ∧ key ineffective so that the set conditions are not changed by mistake. [When the protect function is canceled, ∧ key is usable.]

5 SETTING MENU

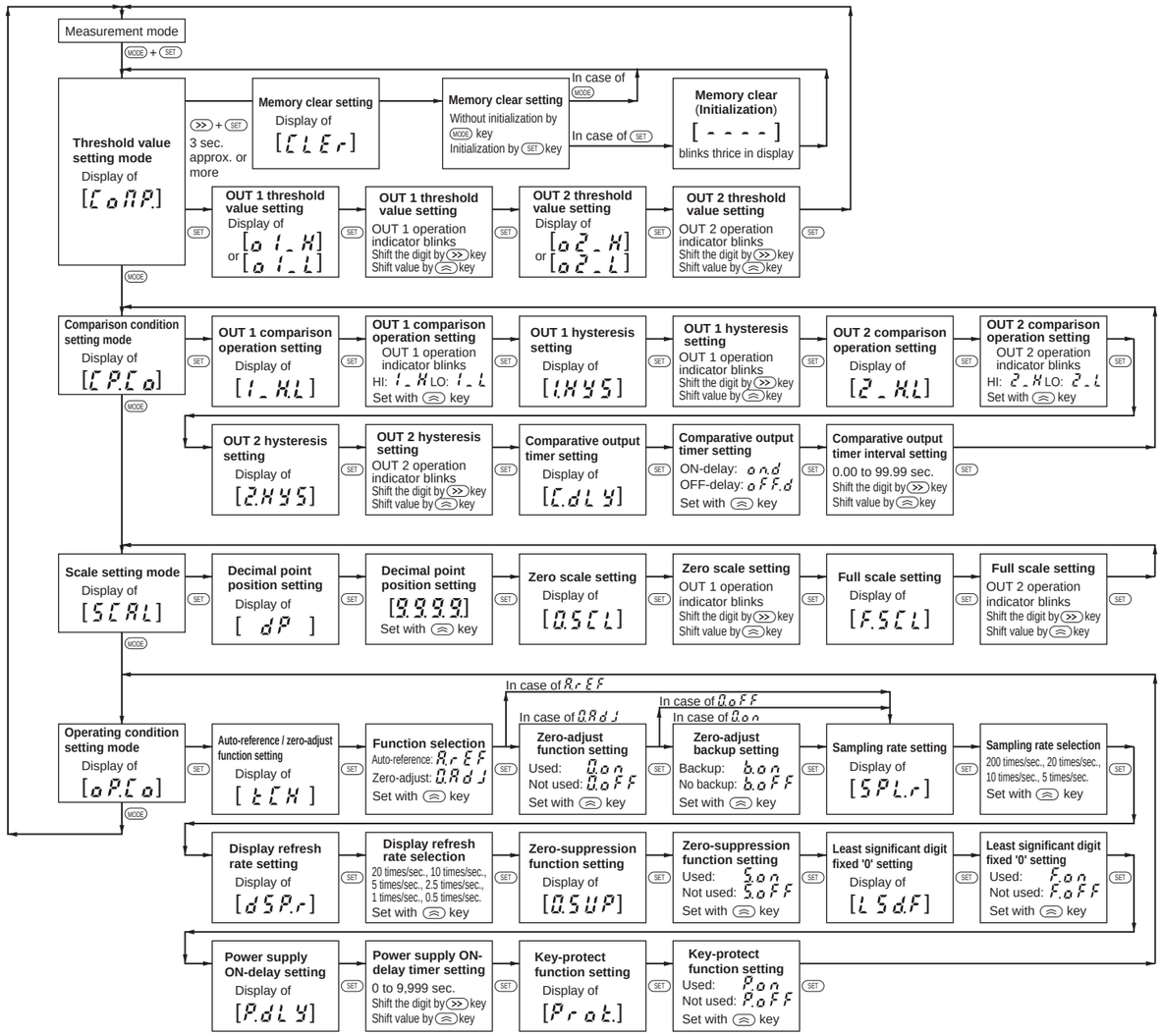
Menu display	Description
CoNP.	It indicates that the controller is in the 'threshold value setting mode'.
CLEr	Memory clear function is set. Press SET key to return the controller to the 'threshold value setting mode' after initialization of the set values. Press MODE key to return the controller to the 'threshold value setting mode' without initialization of the set values.
o1_H *o1_L*	The threshold value for OUT 1 is set. In case of '*o1_H*', high output comparison operation is obtained, and in case of '*o1_L*', low output comparison operation is obtained. Select '*o1_H*' or '*o1_L*' comparison operation condition in the 'comparison condition setting mode'. Shift the digit by >> key and set the value by ∧ key. The threshold value can be set in the range -9,999 to +9,999. OUT 1 operation indicator blinks at the time of OUT 1 threshold value setting.
o2_H *o2_L*	The threshold value for OUT 2 is set. In case of '*o2_H*', high output comparison operation is obtained, and in case of '*o2_L*', low output comparison operation is obtained. Select '*o2_H*' or '*o2_L*' comparison operation condition in the 'comparison condition setting mode'. Shift the digit by >> key and set the value by ∧ key. The threshold value can be set in the range -9,999 to +9,999. OUT 2 operation indicator blinks at the time of OUT 2 threshold value setting.

Menu display	Description
CP.Co	It indicates that the controller is in the 'comparison condition setting mode'.
1_HL	The comparison operation condition of OUT 1 is set. Set with ∧ key. '*1_H*': Sets high output comparison operation. '*1_L*': Sets low output comparison operation. OUT 1 operation indicator blinks at the time of setting.
1HYS	The hysteresis for OUT 1 for going from ON to OFF is set. Shift the digit by >> key and set the value by ∧ key. The hysteresis value can be set in the range 1 to 3,999. OUT 1 operation indicator blinks at the time of hysteresis value setting. At the time of setting the hysteresis, if the value exceeds 1 to 3,999, the error display '*Er 13*' blinks.
2_HL	The comparison operation condition of OUT 2 is set. Set with ∧ key. '*2_H*': Sets high output comparison operation. '*2_L*': Sets low output comparison operation. OUT 2 operation indicator blinks at the time of setting.
2HYS	The hysteresis for OUT 2 for going from ON to OFF is set. Shift the digit by >> key and set the value by ∧ key. The hysteresis value can be set in the range 1 to 3,999. OUT 2 operation indicator blinks at the time of hysteresis value setting. At the time of setting the hysteresis, if the value exceeds 1 to 3,999, the error display '*Er 13*' blinks.
C.dLY	The timer for OUT 1 or OUT 2 output for operating from OFF to ON, or ON to OFF is set. '*ond*': Sets the timer for operating from OFF to ON. '*oFFd*': Sets the timer for operating from ON to OFF. Set with ∧ key. The timer can be set in the range 0.00 to 99.99 sec. Shift the digit by >> key and set the value by ∧ key.
SCAL	It indicates that the controller is in the 'scale setting mode'.
dP	The decimal point position of the set scale value is set. Set the value with ∧ key. '*9999*': Decimal point is set at the right of 10^1 digit. '*9999*': Decimal point is set at the right of 10^2 digit. '*9999*': Decimal point is set at the right of 10^3 digit. '*9999*': Decimal point does not light up. The decimal point position of the threshold value is automatically set accordingly.
0.SCL	The zero scale value of scaling is set. Shift the digit by >> key and set the value by ∧ key. The zero scale value can be set in the range -9,999 to +9,999. OUT1 operation indicator blinks at the time of zero scale value setting.
F.SCL	The full scale value of scaling is set. Shift the digit by >> key and set the value by ∧ key. The full scale value can be set in the range 'zero scale value ±4,000' (however, within the range -9,999 to +9,999). OUT 2 operation indicator blinks at the time of full scale value setting. At the time of setting the full scale value, if the span exceeds 4,000, the error display '*Er 11*' blinks.
oP.Co	It indicates that the controller is in the 'operating condition setting mode'.
tCH	Use of either auto-reference function or zero-adjust function is set. Set with ∧ key. '*ArEF*': Set if auto-reference function is to be used. '*AAdJ*': Set if zero-adjust function is to be used.
0.AdJ	Whether zero-adjust function is to be used or not is set. Set with ∧ key. '*Aon*': Set if zero-adjust function is to be used. '*AoFF*': Set if zero-adjust function is not to be used. If '*Aon*' is set, whether backup of zero-adjust value is done or not is set. Set with ∧ key. '*bon*': Set if zero-adjust value backup is to be done. '*boFF*': Set if zero-adjust value backup is not to be done.
SPLr	The sampling rate for measurement is set. Measurement is done at a max. sampling rate of 200 times/sec. Select from 200 times/sec., 20 times/sec., 10 times/sec. and 5 times/sec. Set with ∧ key.
dSPr	The display refresh rate for measurement value display is set. Select from 20 times/sec., 10 times/sec., 5 times/sec., 2.5 times/sec., 1 time/sec. and 0.5 time/sec. Set with ∧ key.
0.SUP	Whether zero suppression function is to be used or not is set. Set with ∧ key. '*Son*': Set if zero suppression function is to be used. '*SoFF*': Set if zero suppression function is not to be used.
LSdF	Whether the lowest digit display is to be fixed at '0' or not is set. Set with ∧ key. '*Fon*': Set if display is to be fixed at '0'. '*FoFF*': Set if display is not to be fixed at '0'.
Pdly	The delay time till commencement of measurement after power supply switch on is set. Shift the digit by >> key and set the value by ∧ key. The delay time can be set in the range 0 to 9,999 sec. After the power supply is switched on, countdown for the delay time is displayed and measurement starts when it reaches 0 sec.
Prot.	Whether key-protect, which disallows any change of the set parameters in the set mode, is enabled or not is set. Set with ∧ key. '*Pon*': Set if key-protect is to be enabled. (parameter change not possible) '*PoFF*': Set if key-protect is not to be enabled. (parameter change possible)

6 SETTING PROCEDURE

- In the setting mode, the measurement is stopped and the comparative outputs are maintained. The setting mode is changed by (MODE) key and the items are changed by (SET) key.
  Press (SET) key while pressing (MODE) key to change from measurement mode to setting mode.
  When the set conditions are to be changed, the earlier set conditions are displayed. When new conditions are to be set, they are confirmed by pressing (SET) key.
  If (MODE) key is pressed during the setting condition for an item in a setting mode, the controller goes to the next setting mode without the condition of that item being set.

- Check if the sensor is in the key-protect mode. If the keys are not accessible, release the key-protect function before setting.
- The conditions which are set are stored in a backup memory (EEPROM). Kindly note that the EEPROM has a life span and its guaranteed life is 1,000,000 write operation cycles. Further, note that the guaranteed life for zero-adjust backup is 10,000,000 write operation cycles.



- In order to return the set values to the initial values (memory clear), press (SET) key for 3 sec., or more, while pressing (>>) key in the threshold value setting mode '[CoMP.]'. After '[CLEr]' is displayed, if you press (SET) key '- - - -' blinks thrice, and the set values are initialized.

Initial value table

Item	Initial value
Threshold value	OUT 1: 1500, OUT 2: 0500
Comparison operation	OUT 1: High output comparison operation '1_H' OUT 2: Low output comparison operation '2_L'
Hysteresis	OUT 1: 0005, OUT 2: 0005
Comparative output timer	ON-delay 'ond', 00.00 sec.
Decimal point	99.99 (Two digits after decimal point)
Zero scale	0000
Full scale	4000
Auto-reference / zero-adjust function	Zero-adjust function is used 'Aon' Zero-adjust backup: Backup done 'bon' Zero-adjust value: Clear
Sampling rate	5 times/sec.
Display refresh rate	2.5 times/sec.
Zero-suppression	Not used 'SoFF'
Least significant digit fixed '0' setting	Not fixed 'FoFF'
Power supply ON-delay timer	0000 sec.
Key-protect function	Not used 'PoFF'

7 ERROR DISPLAY AND CORRECTIVE

- The error code blinks if an error occurs. Take appropriate corrective action as given below.

Error code	Error description	Corrective action
Er01	Fault in CPU memory	Switch off the power supply, wait for 5 sec., or more, and then switch it on again. If normal operation is not restored, contact our sales office.
Er02	Fault in memory (EEPROM)	
Er03	Auto-zero count data of the CPU memory has become abnormal.	
Er05	The zero scale value data inside the memory (EEPROM) has become abnormal.	
Er06	The full scale value data inside the memory (EEPROM) has become abnormal.	
Er11	The scale setting exceeds the max. allowed span of 4000.	Carry out (Setting procedure from 'Er11' blinking display), given below, and set the span [the absolute value of (Full scale value) - Zero scale value)] to be 4,000 or less.
Er12	At the time of auto-reference input, the set value exceeds the setting range.	Check the set value.
Er13	The hysteresis has been set exceeding the allowable setting range 1 to 3,999.	Carry out (Setting procedure from 'Er13' blinking display), given below, and reset the hysteresis to be in the range 1 to 3,999.
Er20	Excessive current due to short-circuit.	Switch off the power supply and check the load.
Er21	The input is short circuited for input range 4 to 20mA type controller.	Check the input signal, input terminals and input wires.

Setting procedure from 'Er11' blinking display

'Er11' blinking display → Press (MODE) key and return to scale setting mode 'SCAL'.

Setting procedure from 'Er13' blinking display

'Er13' blinking display → Press (MODE) key and return to comparison condition setting mode 'CP.Co'.

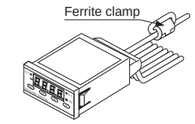
8 MAJOR SPECIFICATIONS

Item \ Model No.	CA2-T1	CA2-T2	CA2-T3	CA2-T4	CA2-T5
Supply voltage	24V DC±10% Ripple P-P 10% or less				
Power consumption	2.8W or less				
Analog input: Input range	4 to 20mA	1 to 5V	±1V	±5V	±10V
Analog input: Input impedance	20Ω	1MΩ			
Analog input: Input No.	1 No.				
Analog input: Input method	Single end input				
Analog input: A / D conversion method	Successive approximation method				
Analog input: Sampling rate	Selectable from 200 times / sec., 20 times / sec., 10 times / sec. or 5 times / sec.				
Zero-adjust input (0-ADJ.) Auto-reference input (A-REF.)	Signal condition: Negative logic, Input time: 10ms or more Signal level: ON ... 1.5V or less (output current: 10mA or less) OFF ... Supply voltage or open Guaranteed No. of zero-adjust input usage: 10 million times or less (for zero-adjust backup setting)				
Start / hold input	High level (supply voltage or open): Start Low level (1.5V or less): Hold				
Comparative output (OUT 1, OUT 2)	NPN open-collector transistor ・Maximum sunk current: 100mA ・Applied voltage: 35V DC or less (between output and 0V) ・Residual voltage: 1.3V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)				
Comparative output (OUT 1, OUT 2): Response time	5ms or less (when start / hold input is used at a sampling rate of 200 times/sec.)				
Comparative output (OUT 1, OUT 2): Hysteresis	Variable from 1 to 3,999				
Display	4 digit 7 segment red LED display (letter height 8mm)				
Display: Display refresh rate	Selectable from 20 times/sec., 10 times/sec., 5 times/sec., 2.5 times/sec., 1 time/sec. or 0.5 time/sec.				
Display: Display range	Selectable span of max. 4,000 Nos. between -9999 to +9999 is displayed. ('+' is not displayed)				
Display: Display accuracy	±(0.1 %F.S. + 1 digit) at 23±5℃, 35 to 85% RH				
Display: Temperature characteristics	±0.5 %F.S. at 0 to +50℃				
Setting resolution	1 digit				
Threshold value setting range	-9999 to +9999				
Ambient temperature	0 to +55℃ (No dew condensation), Storage: -20 to +70℃				
Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH				
Backup memory	Non-volatile memory (EEPROM), Guaranteed write operations: 1 million or less				
Material	Polycarbonate				
Connecting method	Terminal block connection				
Weight	55g approx.				

9 CAUTIONS

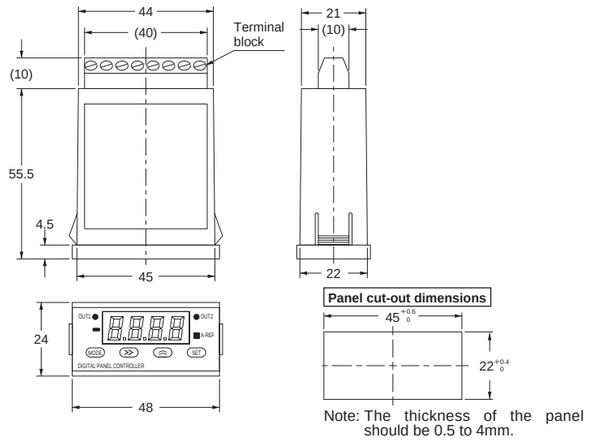
- This product has been developed / produced for industrial use only.
- Before handling this product, remove any electrostatic charge that may be present on your body. There is a danger of this product getting damaged due to the electrostatic charge.
- Make sure that the power supply is off while wiring.
- Take care that wrong wiring will damage the sensor.
- Verify that the supply voltage variation is within the rating.
- If power is supplied from a commercial switching regulator, ensure that the frame ground (F.G.) terminal of the power supply is connected to an actual ground.
- In case noise generating equipment (switching regulator, inverter motor, etc.) is used in the vicinity of this controller, connect the frame ground (F.G.) terminal of the equipment to an actual ground.
- Do not install the product in the following places:
  - ・Places having excessive dust, dirt and steam or in places where it may come in direct contact with water, oil or chemicals.
  - ・Places where flammable or corrosive gas is generated.
  - ・Places where it is directly exposed to sunlight or where the ambient temperature exceeds the range 0 to +50℃.
  - ・Places where the relative humidity exceeds the range 35 to 85% RH or where dew condensation occurs because of a rapid variation in temperature.
  - ・Places subject to intense vibrations or shock.
  - ・Near devices generating a large amount of heat (e.g., heater, transformer, high wattage resistance, etc.)
  - ・Near devices generating large high frequency noise.
- Do not use during the warming-up time (5 min. approx.) after the power supply is switched on.
- Do not run the wires together with high-voltage lines or power lines or put them in the same raceway. This can cause malfunction due to induction.
- This sensor is suitable for indoor use only.
- If this product is to be used as a CE (European standard EMC directive) approved product, make sure to connect ferrite clamps, with one loop, on all the connection cables, as shown in the figure below.

  <Recommended ferrite clamp>
  Noise filter for signal line manufactured by TDK
  ZCAT3035-1330



- This is a CE conformity product complying with EMC Directive. The standard with regard to immunity that applies to this product is EN 61000-6-2, and in order to meet the standard, every cable connected to this product must be within 10m with 0.3mm², or more, cable. However, in case CE conformity is not required, the cable length can be up to 100m with 0.3mm², or more, cable.

10 DIMENSIONS (Unit: mm)



Note: The thickness of the panel should be 0.5 to 4mm.

11 INTENDED PRODUCTS FOR CE MARKING

- The models listed under '**8 MAJOR SPECIFICATIONS**' come with CE Marking. As for all other models, please contact our office.

Panasonic Electric Works SUNX Co., Ltd.