

# Scalable DC Current/Voltage Display

# K3TJ

## Highly-Functional, Scalable Digital Display with Versatile, Easy-to-read Red or Green LED

- Select highly-visible, 14.2 mm, red or green LED display
- Wide scalability, including negative settings
- Average process setting enables value to be displayed for a maximum of 4 seconds
- Selectable display setting rounds rightmost digit to a choice of three predetermined settings.
- Zero limit setting display for any value less than set value
- Display adjustment for three brightness levels



## Ordering Information

### DC Voltage Input Model

Voltage measurement range	Display color	Supply voltage	
		100 to 240 VAC	24 VDC (internally insulated)
1 to 5 VDC, 0 to 5 VDC, and 0 to 10 VDC	Red	K3TJ-V111R	K3TJ-V116R
	Green	K3TJ-V111G	K3TJ-V116G

### DC Current Input Model

Current measurement range	Display color	Supply voltage	
		100 to 240 VAC	24 VDC (internally insulated)
4 to 20 mA DC	Red	K3TJ-A111R	K3TJ-A116R
	Green	K3TJ-A111G	K3TJ-A116G

### Model Number Legend

K3TJ-□□□□□  
1 2 3 4 5

#### 1, 2. Input Code

V1: DC voltage input  
1 to 5 VDC, 0 to 5 VDC, and  
0 to 10 VDC

A1: DC current input 4 to 20 mA

#### 3. Series No.

1: Present series

#### 4. Supply Voltage

1: 100 to 240 VAC

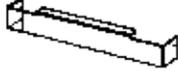
e: 24 VDC (internally insulated)

#### 5. Display Color

R: Red LED

G: Green LED

## ■ ACCESSORIES (ORDER SEPARATELY)

Description	Appearance	Part Number
Water-resistant Soft Front Cover		<b>K32-L49SC</b>
Terminal Cover The Terminal Cover is used to protect against electric shock but is not waterproof.		<b>K32-L49TC</b>

**Note:** 1. Use the Mounting Adapters provided with the K3TJ to mount the above accessories.

## Specifications

### ■ RATINGS

Supply voltage		100 to 240 VAC (50/60 Hz); 24 VDC (internally insulated)
Operating voltage range		-15% to 10% of supply voltage
Power consumption		Approx. 7.7 VA (max. AC load); approx. 2.8 W (max. DC load)
Insulation resistance		10 M $\Omega$ min. (at 500 VDC) between external terminals and case
Dielectric strength		2000 VAC for 1 minute between input terminals and power supply 2000 VAC for 1 minute between external terminals and case
Noise immunity	AC Model	$\pm$ 1500 V on power supply terminals in normal or common mode
	DC Model	$\pm$ 480 V on power supply terminals in normal mode and $\pm$ 1,500 V on power supply terminals in common mode
Vibration resistance	Malfunction	10 to 55 Hz, 0.5-mm single amplitude for 10 minutes each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hours each in X, Y, and Z directions
Shock resistance	Malfunction	98 m/s <sup>2</sup> (approx. 10G) for 3 times each in 6 directions.
	Destruction	294 m/s <sup>2</sup> (approx. 30G) for 3 times each in 6 directions
Ambient temperature	Operating	-10° to 55°C; 14° to 131°F (with no icing)
	Storage	-20° to 65°C; -4° to 149°F (with no icing)
Ambient humidity	Operating	35% to 85% (with no condensation)
Ambient atmosphere		Must be free of corrosive gas
Approvals	UL	File No. E41515
	CSA	File No. LR67027

**Note:** An initial current of approximately 0.25 A will flow for approximately 35 ms the moment the K3TJ is turned on.

## ■ CHARACTERISTICS

Input signal	DC voltage/current (4 to 20 mA, 1 to 5 V, 0 to 5 V, and 0 to 10 V)	
Sampling time	0.5 s	
Display refresh period	0.5 s	
Process value averaging method	Simple average/movement average	
No. of process value averaging operation	1, 2, 4, or 8 times	
Max. displayed digits	4 digits (–1,999 to +9,999)	
Display	7-segment red or green LED with a character height of 14.2 mm (0.56 in)	
Decimal display	Selected by the Up and Down Keys and dip switch settings	
Scaling function	Shift/Scaling adjustment is possible with the Up and Down Keys and dip switch settings	
Scaling range	–1,999 to +9,999	
Zero-limit range	0 to 99 digits	
Zero-suppress function	Available	
External control	Process value hold (by short-circuiting the rear terminals)	
Case material	Heat-resistant ABS/PC	
Enclosure rating	Front panel: Case: Terminals:	IP51 (see note) IP20 IP00 } Refer to IEC
Memory protection	Non-volatile memory (no backup battery is required)	

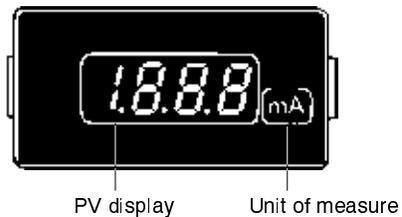
**Note:** IP51 is ensured with the Water-resistant Soft Front Cover, which can be ordered separately. Without the Water-resistant Soft Front Cover, the front panel meets the requirements of IP50 instead.

## ■ MEASURING RANGES

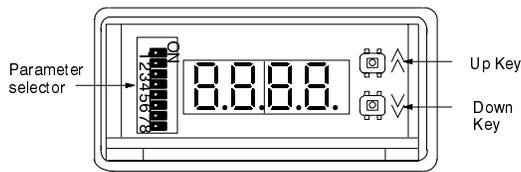
Measuring range	Input impedance	Reliability	Max. permissible continuous load
Voltage (DC)	1 to 5 VDC	1 M $\Omega$	$\pm 0.1\%rdg \pm 1$ digit
	0 to 5 VDC	1 M $\Omega$	$\pm 0.1\%rdg \pm 1$ digit
	0 to 10 VDC	1 M $\Omega$	$\pm 0.1\%rdg \pm 1$ digit
Current (DC)	4 to 20 mA DC	100 $\Omega$	$\pm 0.1\%rdg \pm 1$ digit

**Note:** The measurement accuracy values stated in the above table are guaranteed at an ambient temperature of  $25 \pm 5$  °C.

## Nomenclature

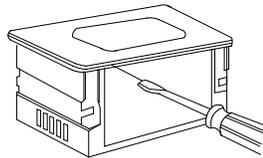


# Operation



## Removal of Front Panel

Insert a flat-blade screwdriver into the groove on the bottom of the front panel and pull the front panel off.



With Front Panel Removed

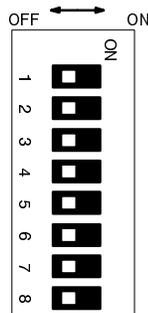
No.	Name	Parameter
1	Parameter selector	When any one of dip switches 1 to 8 is set to ON, the corresponding setting item can be changed.
2, 3	Up  Key, Down  Key	The Up and Down Keys are used to change the set value when the corresponding dip switch is set to ON.

## PARAMETER LIST

Parameter name	Operation	Setting method
Display shift	By setting a shift value, the displayed value will be shifted and displayed.	Set with the dip switch selections and key input.
Scaling value	By setting a scaling value, the input signal will be converted and displayed. Negative value scaling is possible.	
Decimal point	The decimal point position can be selected.	
Average display	Displays the process value for 4 s maximum after a simple average or movement average process.	
Zero-limit range input	Zero will be displayed for any value below the zero-limit value.	
2-digit step display	Rounds the rightmost digit to 0, 2, 4, 6, or 8.	
5-digit step display	Rounds the rightmost digit to 0 or 5.	
Rightmost digit at 0	Rounds the rightmost digit to 0.	
Display brightness adjustment	Adjusts the brightness of the display to one of three levels.	

## Dip Switch Settings

When a dip switch is set to OFF, the corresponding set value that has been changed will be stored in the non-volatile memory. Any data that has been previously set will be kept in the non-volatile memory regardless of whether the K3TJ is turned on or off. The following table lists the parameters assigned to dip switches 1 to 8.



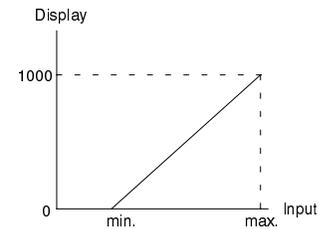
Pin no.	Setting
1	Input range
2	Display shift
3	Scaling
4	Decimal point
5	Averaging
6	Zero limit
7	Step display
8	Display brightness

## Factory Setting

The K3TJ is factory-set to display 0 when the minimum input range value is input and display 1,000 when the maximum input range value is input.

### DC Voltage Input Model

Input range	Display
0- to 5-VDC input	0 to 1000
1- to 5-VDC input	
0- to 10-VDC input	



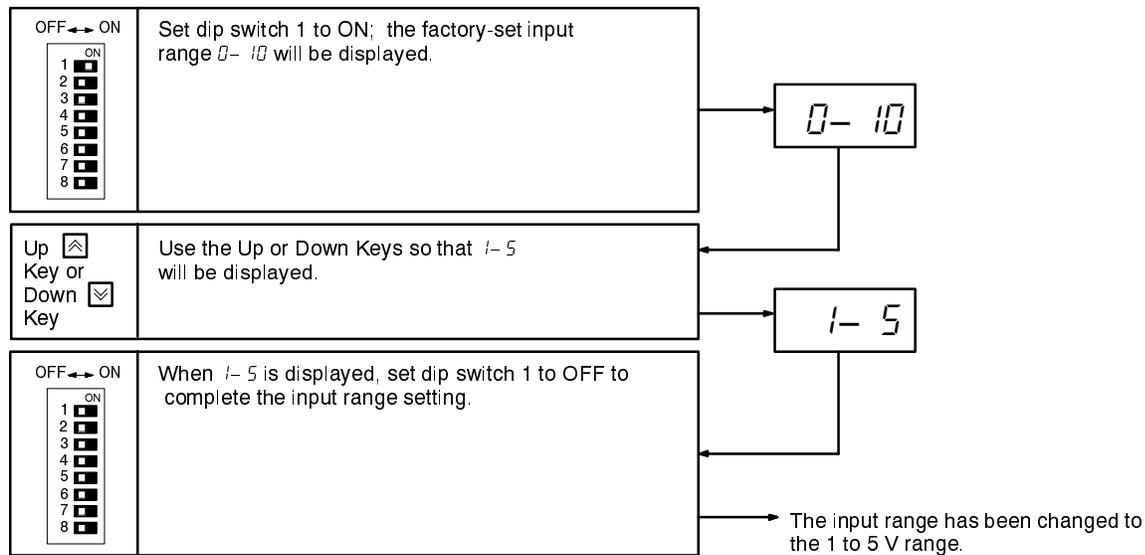
### DC Current Input Model

Input range	Display
4 to 20 mA DC input	0 to 1000

## 1. Input Range Setting

Select the 0- to 5-V, 1- to 5-V, or 0- to 10-V input range on the DC Voltage Input Model and 4- to 20-mA input range on the DC Current Input Model.

**Example:** When selecting the 1- to 5-V input range on the DC Voltage Input Model



### DC Voltage Input Model

Display	Input range
0- 5	0 to 5 VDC
1- 5	1 to 5 VDC
0- 10	0 to 10 VDC (factory-set)

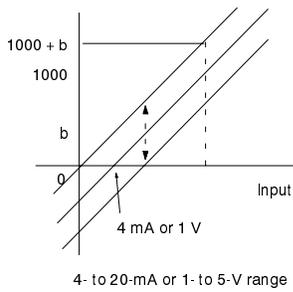
### DC Current Input Model

Display	Input range
4-20	4 to 20 mA DC

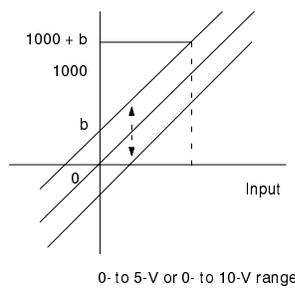
## 2. Display Shift Adjustment

The display can be shifted within a range of -1,999 to 9,999.

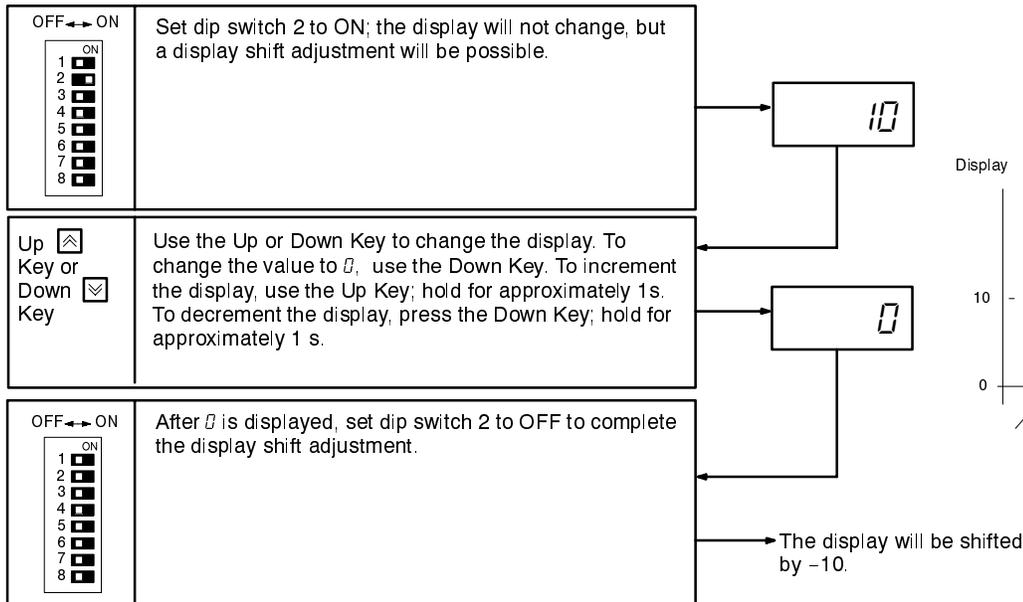
Display after shifting



Display after shifting



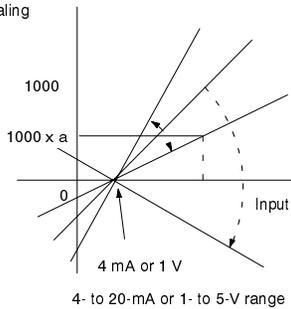
**Example:** When shifting from 10 to 0



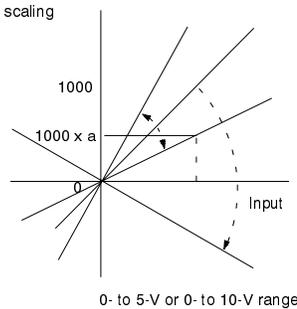
## 3. Scaling Adjustment

The K3TJ is factory-set to display 0 to 1,000 for the minimum and maximum input range value. By setting the scaling, the K3TJ can be scaled within a range of 0 to 9,999 or 0 to -1,999.

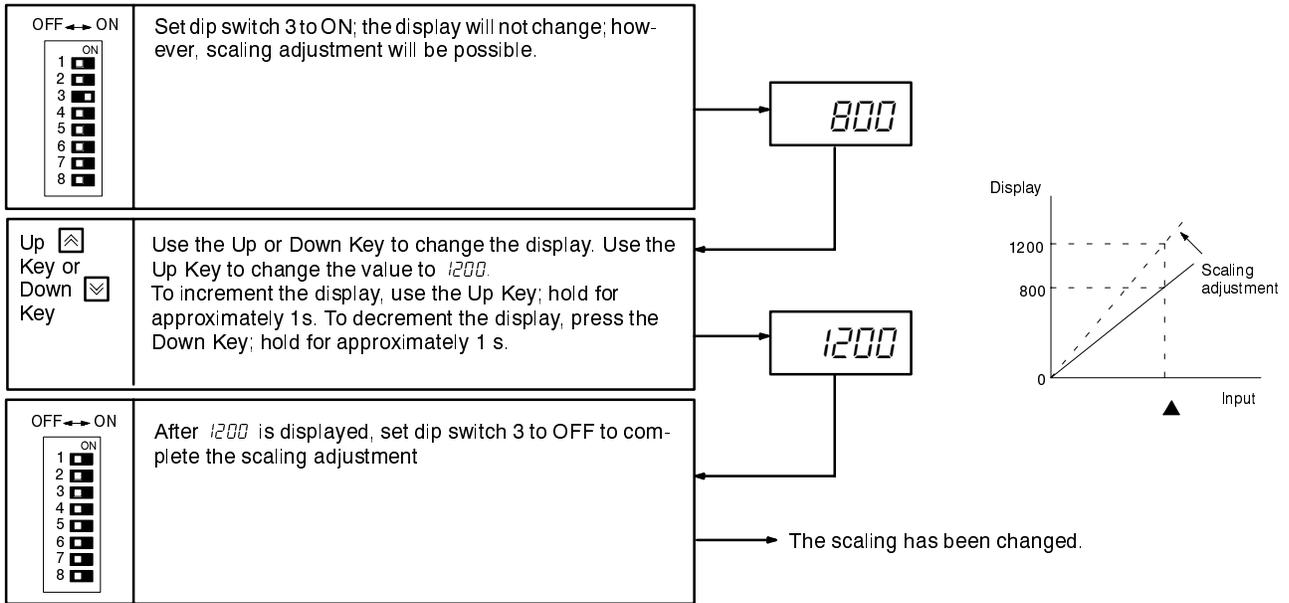
Display after scaling



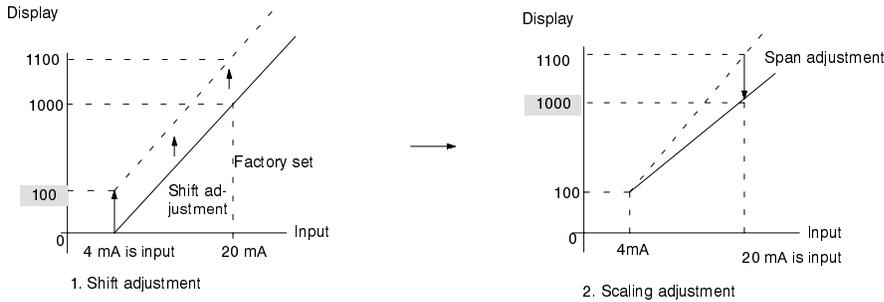
Display after scaling



**Example:** When adjusting the factory set value 800 to a scaling value of 1200

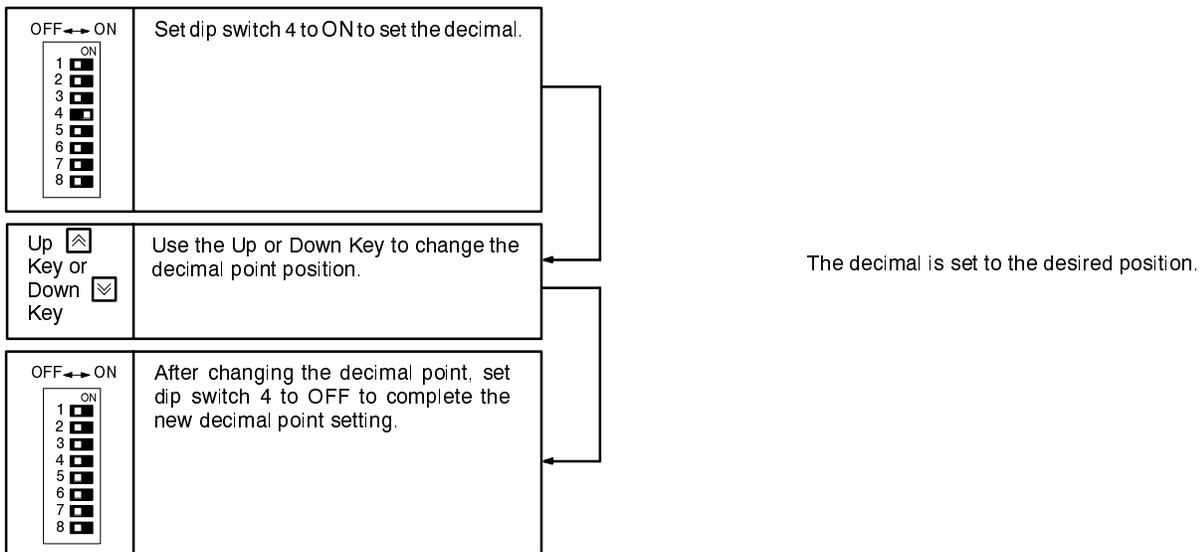


**Example:** 4 to 20 mA is scaled to be 100 to 1,000.



- Note:**
1. At the time of scaling adjustment, the starting point for changing the inclination of the straight line will be the minimum value of the input range. Therefore, when using only a part of the input range, repeat shifting and scaling adjustments several times.
  2. Turn the K3TJ off and on while pressing both the Up  and Down  Keys so that the K3TJ's shifting and scaling settings will return to the ones preset before shipping.

#### 4. Decimal Point Setting



Display	Decimal point
0000	No decimal point (factory-set)
000.0	Next to $10^1$ digit on the left
00.00	Next to $10^2$ digit on the left
0.000	Next to $10^3$ digit on the left

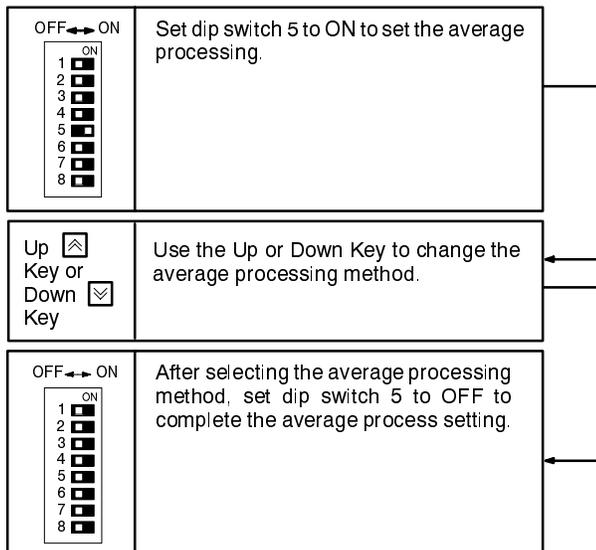
**Note:** In the case of a range of 0.001 to 0.999,  $-0.001$  to  $-0.999$  will be displayed.

## 5. Average Process Setting

There are two ways to input signals: the simple average processing method and the movement average processing method.

In the simple average processing method, the mean value is displayed after sampling  $n$  times. This method is effective when the user requires a long display refresh period.

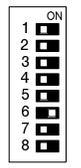
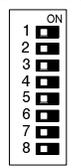
In movement average processing method, the sampling data obtained from sampling  $n$  times including the present sampling operation is averaged and displayed. This method is effective for removing the periodical noise overlapped with the input signals.



Display	Average processing
$i$	No averaging (factory set)
$R-2$	Simple average processing by sampling twice
$R-4$	Simple average processing by sampling four times
$R-8$	Simple average processing by sampling eight times
$b-2$	Moving average processing by sampling twice
$b-4$	Moving average processing by sampling four times
$b-8$	Moving average processing by sampling eight times

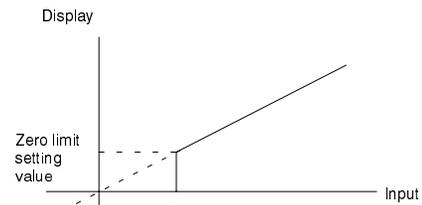
### 6. Zero Limit Setting

Zero limit setting enables the K3TJ to display zero for any value less than the set value. This is effective if the user needs to have the K3TJ display zero instead of a negative value or the user needs to have the K3TJ display zero for the minimum input range value. The setting range is from 00 to 99. When no zero limit is set, *∞FF* will be displayed.

OFF ↔ ON 	Set dip switch 6 to ON to set the zero limit.
Up  Key or Down  Key	Use the Up or Down Key to input the zero limit value. To increment the display, use the Up Key; hold for approximately 1 s. To decrement the display, press the Down Key; hold for approximately 1 s.
OFF ↔ ON 	After setting the zero limit, set dip switch 6 to OFF to complete the zero limit setting.

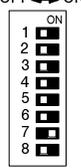
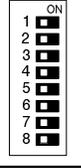
Display	Zero limit setting
99 to 00	Zero limit setting range
∞FF	No zero limit (factory set)

#### Zero Limit Setting Range



### 7. Step Display Setting

Step display setting is used to change the step of the displayed rightmost digit changes. This setting is effective if the input signal repeatedly displays *999* and *1000* and is difficult to read. The following table shows the step display patterns.

OFF ↔ ON 	Set dip switch 7 to ON to set the step display.
Up  Key or Down  Key	Use the Up or Down Key to select the display pattern.
OFF ↔ ON 	After selecting the display pattern, set dip switch 7 to OFF to complete the step display setting.

Display	Step display pattern
1	No step display (factory set)
2	With every two digits
5	With every five digits
10	With every ten digits (the rightmost digit is fixed to 0)

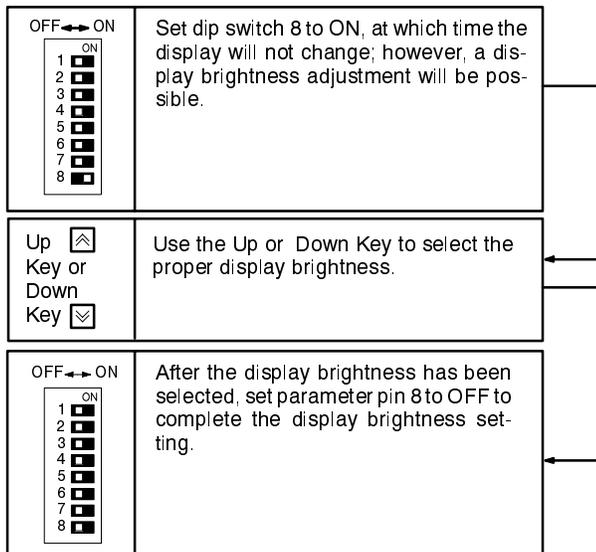
#### Step Display Parameter

The display step of the rightmost digit can be selected. The 2-digit step will be displayed in increments of 2's (1002>1004>1006>etc.). The 5-digit step will be displayed in increments of 5's (1005>1010>1015>etc.). The Fixed to zero will be displayed in increments of 10's (1000>1010>1020>etc.).

Input value		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Displayed value	2-digit step	0	2	4	6	8	10	12	14								
	5-digit step	0			5						10						15
	Fixed to be zero	0										10					

## 8. Display Brightness Adjustment

It is possible to change the display brightness in three steps.



## ■ ERROR MESSAGE

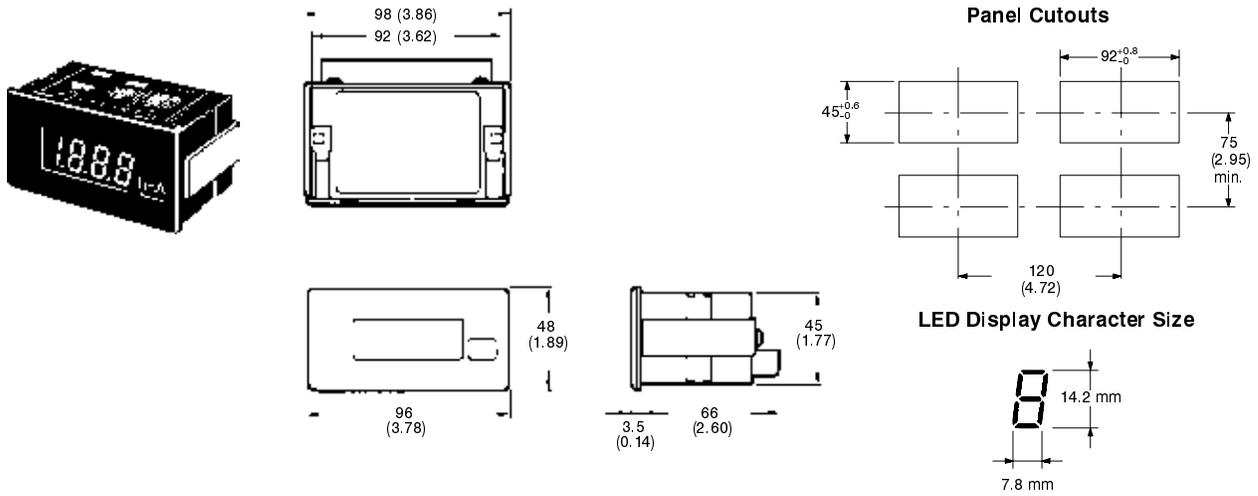
Refer to the following table in the case of an error.

Display	Cause	Remedy
E 01	The internal memory has malfunctioned.	Turn the K3TJ off and on. If the error condition of the K3TJ does not change, consult your OMRON representative.
E 02	The non-volatile memory has malfunctioned.	
E 03	The calibration value stored in the non-volatile memory has been corrupted.	
E 10	The input range set value stored in the non-volatile memory has been corrupted.	Select the input range again according to the input range setting procedure.
E 11	The shift value stored in the non-volatile memory has been corrupted.	Execute display shift again according to the display shift adjustment procedure.
E 12	The scaling value stored in the non-volatile memory has been corrupted.	Execute scaling again according to the scaling adjustment procedure.
E 13	The decimal point set value stored in the non-volatile memory has been corrupted.	Set the decimal point again according to the decimal point setting procedure.
E 14	The average processing set value stored in the non-volatile memory has been corrupted.	Select average processing again according to the average processing setting procedure.
E 15	The zero limit value stored in the non-volatile memory has been corrupted.	Set the zero limit value again according to the zero limit value setting procedure.
E 16	The step value stored in the non-volatile memory has been corrupted.	Set the step display pattern again according to the step display setting procedure.
E 17	The brightness setting value in the non-volatile memory has been corrupted.	Set the display brightness again according to the display brightness adjustment procedure.

**Note:** To reset the K3TJ's shifting and scaling settings to Factory Presets, turn the K3TJ OFF and ON again while pressing both the Up and Down Keys.

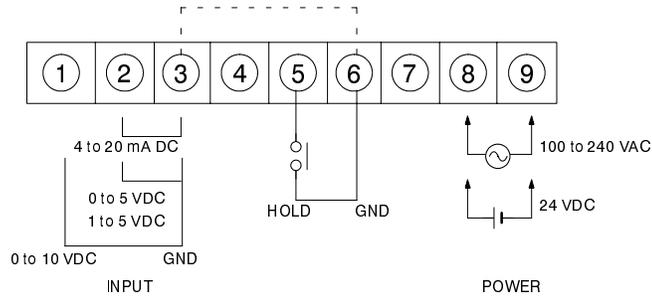
# Dimensions

Unit: mm (inch)



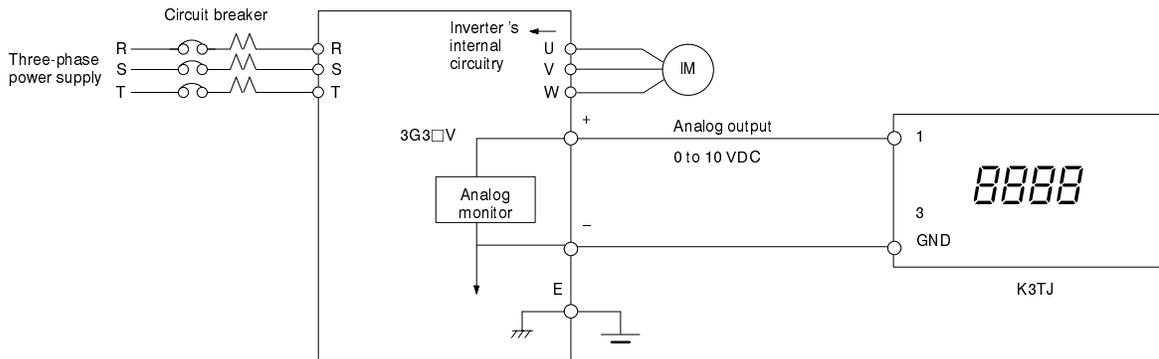
# Installation

## EXTERNAL CONNECTIONS



**Note:** Terminals 3 and 6 are connected internally. The power supply terminals are insulated from other circuits.

## Connection Example with Inverter



## Precautions

### Installation

#### Location

- Never use the K3TJ Scalable Digital Display in areas where corrosive gas (particularly sulfuric or ammonia gas) is generated.
- Do not use the K3TJ in a location subject to severe shock or vibration, excessive dust, or excessive moisture.
- Select an installation location where the K3TJ can be used at an ambient operating temperature  $-10^{\circ}$  to  $55^{\circ}\text{C}$  ( $14^{\circ}$  to  $131^{\circ}\text{F}$ ).
- Verify that panel thickness is 1 to 3.2 mm (0.04 to 0.13 in).
- Verify that the panel area and cut-out opening will allow the K3TJ to be installed as perfectly horizontal as possible.

#### Installation Procedure

1. Insert the K3TJ into the panel cut-out.
2. Secure the K3TJ with the mounting bracket, fastening the mounting screws with a tightening torque of 5 kgf/cm<sup>2</sup> (0.49 N/m). Always attach the mounting bracket before wiring.
3. Then, wire the terminals.

#### Removal Procedure

1. Loosen the screws and widen the bracket.
2. Always remove the wiring before removing the mounting bracket.

### Attach the Unit Label

Select the applicable unit label from the unit label sheet provided with the K3TJ, and attach it to the bottom-right side of the display.



# OMRON

OMRON ELECTRONICS, INC.

One East Commerce Drive  
Schaumburg, IL 60173

1-800-55-OMRON

OMRON CANADA, INC.

885 Milner Avenue  
Scarborough, Ontario M1B 5V8

416-286-6465

Cat. No. GC1PWE

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ASH & ALAIN

Authorised Distributors:-

ASH & ALAIN INDIA PVT LTD

S-100, F.I.E.E., Okhla Industrial Area, Phase-ii, New Delhi-110020(India)

Tel : 011-43797575 Fax : 011-43797574 E-mail : sales@ashalain.com