

# SP400/SP500

## Instruction Manual

IMSP01-E5

Thank you purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

### SYMBOLS

**WARNING** : This mark indicates precautions that must be taken if there is danger of electric shock, fire, etc., which could result in loss of life or injury.

**CAUTION** : This mark indicates that if these precautions and operating procedures are not taken, damage to the instrument may result.



: This mark indicates that all precautions should be taken for safe usage.



: This mark indicates important information on installation, handling and operating procedures.



: This mark indicates supplemental information on installation, handling and operating procedures.



: This mark indicates where additional information may be located.



### WARNING

- An external protection device must be installed if failure of this instrument could result in damage to the instrument, equipment or injury to personnel.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to instrument and equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to instrument and equipment.
- This instrument is not intended for use in locations subject to flammable or explosive gases.
- Do not touch high-voltage connections such as power supply terminals, etc. to avoid electric shock.
- RKC is not responsible if this instrument is repaired, modified or disassembled by other than factory-approved personnel. Malfunction can occur and warranty is void under these conditions.

### CAUTION

- This product is intended for use with industrial machines, test and measuring equipment. (It is not designed for use with medical equipment and nuclear energy.)
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take additional measures.

- Be sure to provide an appropriate surge control circuit respectively for the following:
  - If input/output or signal lines within the building are longer than 30 meters.
  - If input/output or signal lines leave the building, regardless the length.
- This instrument is designed for installation in an enclosed instrumentation panel. All high-voltage connections such as power supply terminals must be enclosed in the instrumentation panel to avoid electric shock by operating personnel.
- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- All wiring must be in accordance with local codes and regulations.
- All wiring must be completed before power is turned on to prevent electric shock, instrument failure, or incorrect action.

The power must be turned off before repairing work for input break and output failure including replacement of sensor, contactor or SSR, and all wiring must be completed before power is turned on again.
- Prevent metal fragments or lead wire scraps from falling inside instrument case to avoid electric shock, fire or malfunction.
- Tighten each terminal screw to the specified torque found in the manual to avoid electric shock, fire or malfunction.
- For proper operation of this instrument, provide adequate ventilation for heat dispensation.
- Do not connect wires to unused terminals as this will interfere with proper operation of the instrument.
- Turn off the power supply before cleaning the instrument.
- Do not use a volatile solvent such as paint thinner to clean the instrument. Deformation or discoloration will occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to instrument display, do not rub with an abrasive material or push front panel with a hard object.

### NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity and process control.
- The figures, diagrams and numeric values used in this manual are only for purpose of illustration.
- RKC is not responsible for any damage or injury that is caused as a result of using this instrument, instrument failure or indirect damage.
- RKC is not responsible for any damage and/or injury resulting from the use of instruments made by imitating this instrument.
- Periodic maintenance is required for safe and proper operation of this instrument. Some components have a limited service life, or characteristics that change over time.
- Every effort has been made to ensure accuracy of all information contained herein. RKC makes no warranty expressed or implied, with respect to the accuracy of the information. The information in this manual is subject to change without prior notice.
- No portion of this document may be reprinted, modified, copied, transmitted, digitized, stored, processed or retrieved through any mechanical, electronic, optical or other means without prior written approval from RKC.

# 1. PRODUCT CHECK

Before using this product, check each of the following. If any of the products are missing, damaged, or if your manual is incomplete, please contact RKC sales office or the agent.

- Model code
- Check that all of the items delivered are complete. (Refer to below)
- Check that there are no scratch or breakage in external appearance (case, front panel, or terminal, etc).

**Vertical type: SP400-□□/□**  
(1)(2)(3)

**Horizontal type: SP500-□□/□**  
(1)(2)(3)

(1) Input type: K: Type **K** J: Type **J** R: Type **R** S: Type **S** B: Type **B** E: Type **E** T: Type **T** N: Type **N** L: Type **L**  
U: Type **U** D: RTD input V: Voltage/current input

(2) TF (Transfer switch) function:

N: None (Number of inputs: 6) T: With TF function (Number of inputs: 5)

(3) Case color: N: White A: Black

**<Accessories>**

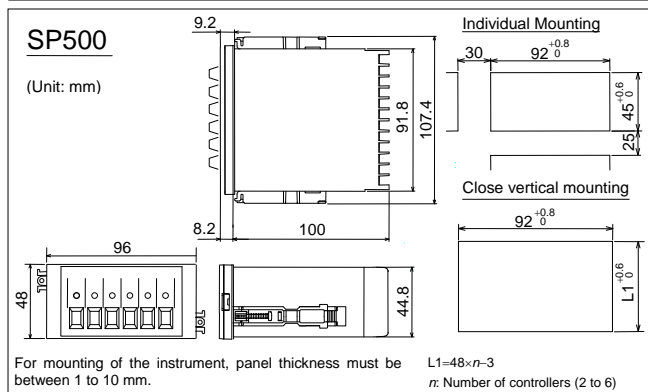
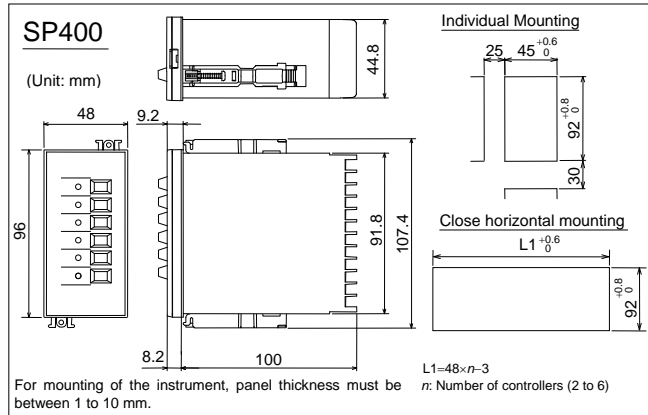
- Mounting brackets: 2
- Instruction manual [IMSP01-E5]: 1

## 2. MOUNTING

### 2.1 Mounting Cautions

- (1) This instrument is intended to be used under the following environmental conditions. **(IEC61010-1)**  
[OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- (2) Use this instrument within the following ambient temperature and ambient humidity.
  - Allowable ambient temperature: 0 to 50 °C
  - Allowable ambient humidity: 45 to 85 %RH  
(Absolute humidity: MAX. W. C 29.3 g/m<sup>3</sup> dry air at 101.3 kPa)
- (3) Avoid the following conditions when selecting the mounting location:
  - Rapid changes in ambient temperature which may cause condensation.
  - Corrosive or inflammable gases.
  - Direct vibration or shock to the mainframe.
  - Water, oil, chemicals, vapor or steam splashes.
  - Excessive dust, salt or iron particles.
  - Excessive induction noise, static electricity, magnetic fields or noise.
  - Direct air flow from an air conditioner.
  - Exposure to direct sunlight.
  - Excessive heat accumulation.

### 2.2 Dimensions



### 2.3 Mounting Procedures

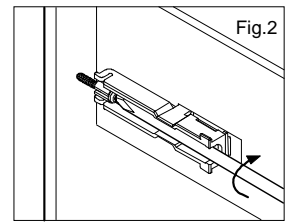
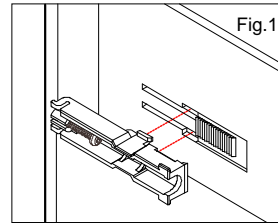
**<Mounting Procedures>**

1. Prepare the panel cutout as specified in **2.2 Dimensions**.
2. Insert the instrument through the panel cutout.
3. Insert the mounting bracket into the mounting groove of the instrument. Do not push the mounting bracket forward. (Fig. 1)
4. Secure the bracket to the instrument by tightening the screw. Take care to refrain from moving the bracket forward.
5. Only turn about one full revolution after the screw touches the panel. (Fig. 2)



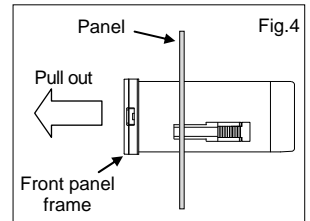
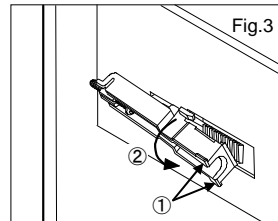
If the screw has been rotated too tight, the screw may turn idle. In such a case, loosen the screw once and tighten it again until the instrument is firmly fixed.

6. The other mounting bracket should be installed in the same way as described in **3. to 5.**



**<Removal Procedures>**

1. Turn the power OFF.
2. Remove the wiring.
3. Loosen the screw of the mounting bracket.
4. Hold the mounting bracket by the edge (①) and tilt it (②) to remove from the case. (Fig. 3)
5. The other mounting bracket should be removed in the same way as described in **3. and 4.**
6. Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument. (Fig. 4)



SP500 is used in the above figures for explanation, but the same mounting procedures also apply to SP400.

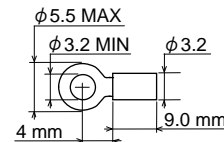


When using two or more selector units, be sure to use the one with TF function. (Refer to **3.3 Wiring Example [P. 4.]**)

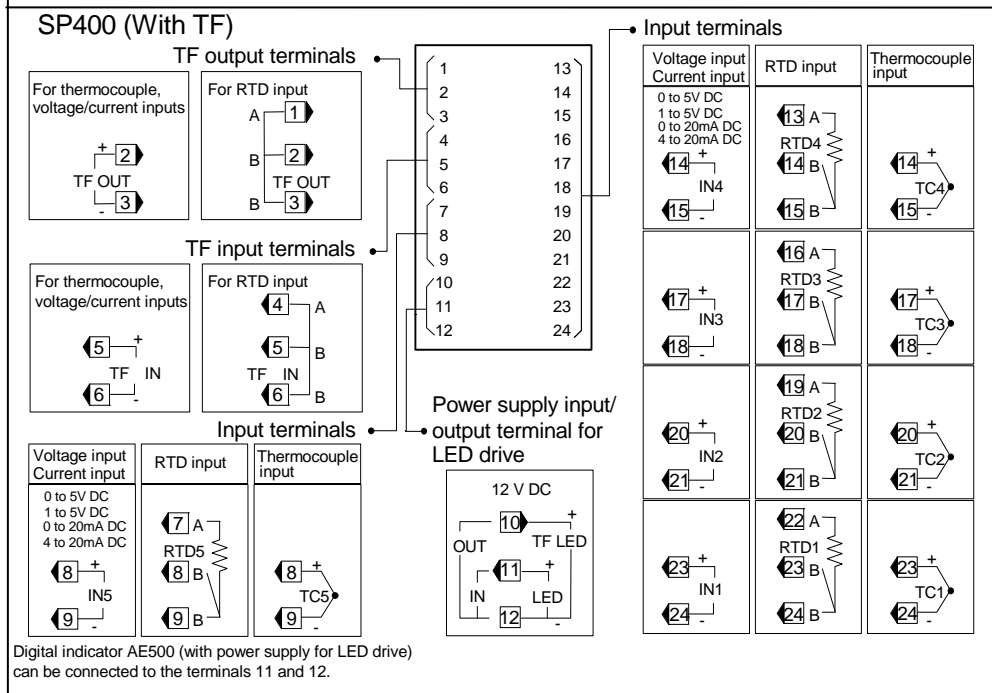
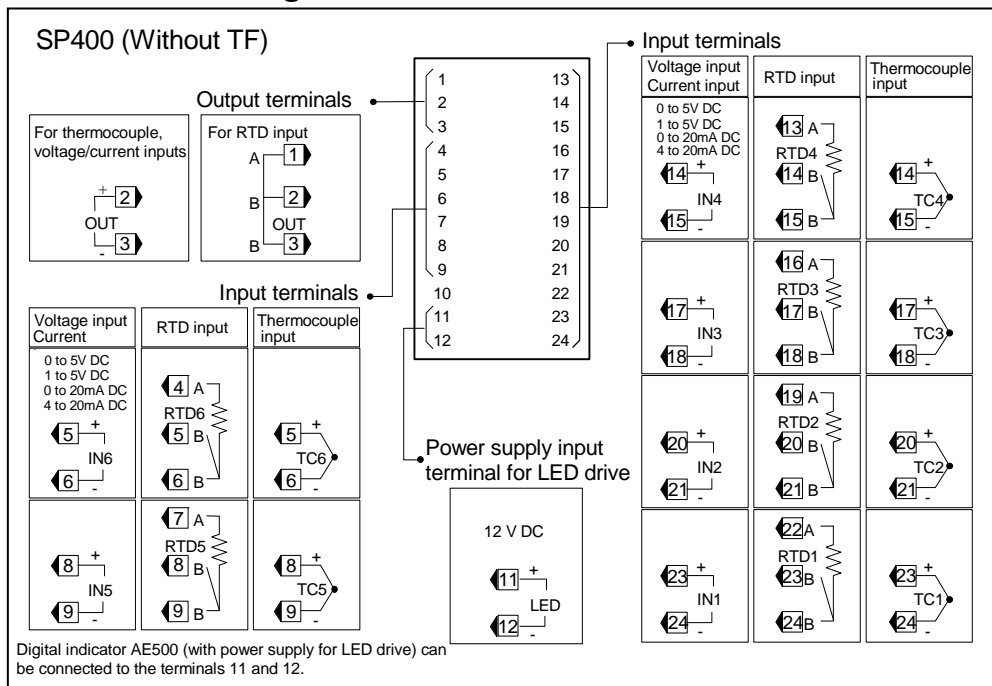
# 3. WIRING

## 3.1 Wiring Cautions

- If you select an unused measured input channel, terminals of which are open, the indicator shows over-scale, underscale or a value around zero.
- For thermocouple input, use the specified compensation wire.
- For RTD input, use low resistance lead wire with no difference in resistance between the three lead wires.
- To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.
- The power for the input selector is supplied from a digital indicator AE500 (with power supply for LED drive).
- Use the solderless terminal appropriate to the screw size.
  - Screw size: M3 x 6
  - Recommended tightening torque: 0.4 N·m [4 kgf·cm]
  - Specified solderless terminals: With isolation
- Make sure that the any wiring such as solderless terminal is not in contact with the adjoining terminals.



## 3.2 Terminal Configuration



## Specifications

### Input:

- Number of inputs: 5 points with TF, 6 points without TF

The input number when TF (transfer switch) is fitted is shown in brackets. In order to increase the number of inputs connect with additional units in serial.

- Number of the connection: Up to 2 selectors (with TF) + 1 selector (without TF)

Display of input selection: LED lights by external power supply.

### Switch function:

- Switching life: 10,000 operations

Contact resistance: Less than 50 mΩ (initial value), and less than 100 mΩ after 10,000 operations

Switching timing: Non-shooting

Switching force: 550±150 gf, within ± 10 % of initial value after 10,000 operations

### Current consumption:

- 4 mA max.

### Weight:

- SP400: Approx. 250 g
- SP500: Approx. 250 g

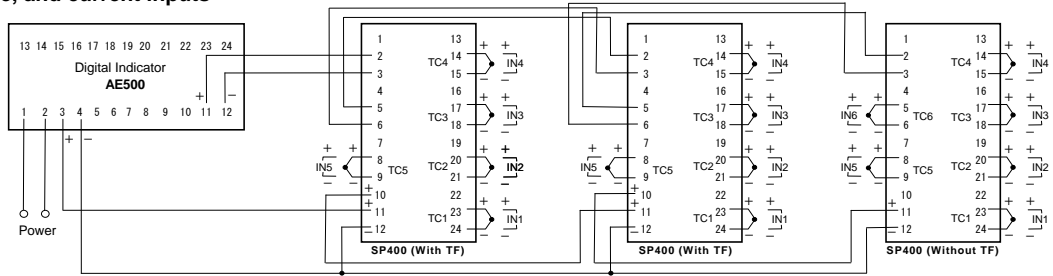


The terminal arrangement of SP500 is as shown in the following diagram, but the terminal configuration of SP500 is the same as that of SP400.

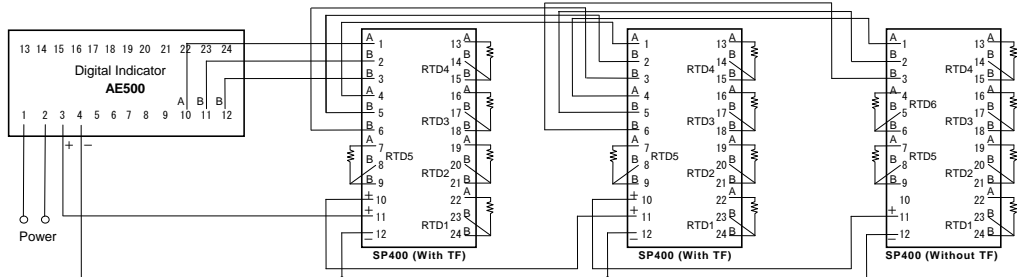


### 3.3 Wiring Example

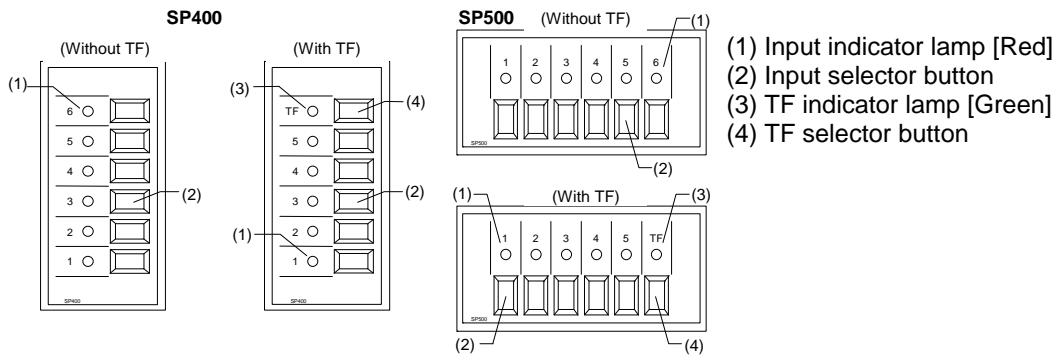
#### ● Thermocouple, voltage, and current inputs



#### ● RTD inputs



## 4. PARTS DESCRIPTION



## 5. OPERATION OF SELECTOR UNIT

Press the button with the number corresponding to the input to be measured. The relevant input indicator lamp [red] then lights. The selected pressed button can be released by pressing any other unpressed button.

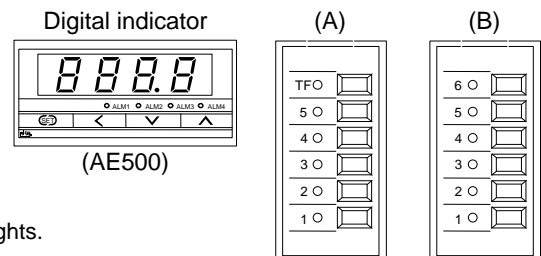
#### ■ When using the selector with TF

If any selectors with TF are connected between the digital indicator and the selectors with the input to be selected, press TF button on all of these selectors. TF indicator lamp [green] then lights.

#### <Example>

When measuring the input No. 5 on the selector (B) and then the input No. 3 on the selector (A) in the figure:

1. Press the TF button on the selector (A).  
TF indicator lamp [green] then lights.
2. Press the input selector button No. 5 on the selector (B).  
Input indicator lamp No. 5 lights (red).
3. Softly press any button other than No. 5 on the selector (B) to release the button No. 5.  
The Input indicator lamp No. 5 then goes off.
4. Press the input selector button No. 3 on the selector (A).  
TF indicator lamp then goes off and the input indicator lamp No. 3 then lights.



Apply power to the digital indicator after the input signal wiring has been completed.



Do not press two or more buttons at the same time, as this may cause the instrument to malfunction.



The alarm output of the digital indicator may be turned on depending the timing of input selection.

The first edition: AUG. 1999  
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