

FZ110/FZ400/FZ900 Manual

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Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the instrument, carefully read all the instructions in this manual. Please place this manual in a convenient location for easy reference.
This manual describes installation and wiring of FZ110/FZ400/FZ900 controllers.

For detailed handling procedures and key operations, refer to separate FZ110/FZ400/FZ900 Instruction Manual.
The manual can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm

WARNING

- To prevent injury to persons, damage to the instrument and the equipment, a suitable external protection device shall be required.
- All wiring must be completed before power is turned on to prevent electric shock, fire or damage to the instrument and the equipment.
- This instrument must be used in accordance with the specifications to prevent fire or damage to the instrument and the 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 may 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 plant.)
- 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.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the input signal and the wires for instrument power supply, source of power and loads.
- 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 of 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 to operating personnel.

- All precautions described in this manual should be taken to avoid damage to the instrument or equipment.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- All wiring must be in accordance with local codes and regulations.
- To prevent instrument damage as a result of failure, protect the power line and the input/output lines from high currents with a suitable overcurrent protection device with adequate breaking capacity such as a fuse, circuit breaker, etc.
- A malfunction in this product may occasionally make control operations impossible or prevent alarm outputs, resulting in a possible hazard. Take appropriate measures in the end use to prevent hazards in the event of malfunction.
- 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 dissipation.
- 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 may occur. Use a soft, dry cloth to remove stains from the instrument.
- To avoid damage to the instrument display, do not rub with an abrasive material or push the front panel with a hard object.

NOTICE

- This manual assumes that the reader has a fundamental knowledge of the principles of electricity, process control, computer technology and communications.
- The figures, diagrams and numeric values used in this manual are only for explanation purposes.
- 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.
- Various symbols are used on the equipment, and they have the following meaning:
 - ~: Alternating current
 - ==: Direct current
 - : Reinforced insulation
 - ⊕: Safety precaution
- This symbol is used where the instruction manual needs to be consulted for the safety of both the operator and the equipment. Carefully read the cautions in this manual before using the instrument.

1. MOUNTING

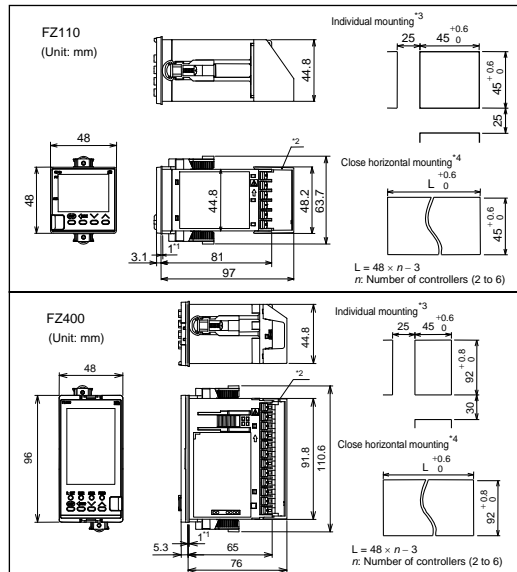
WARNING

To prevent electric shock or instrument failure, always turn off the power before mounting or removing the instrument.

1.1 Mounting Cautions

- This instrument is intended to be used under the following environmental conditions. (IEC 61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
- Use this instrument within the following environment conditions:
 - Allowable ambient temperature: -10 to +55 °C
 - Allowable ambient humidity: 5 to 95 %RH (Absolute humidity: MAX. W. C 29 g/m³ dry air at 101.3 kPa)
- Installation environment conditions: Indoor use
 - Altitude up to 2000 m
 - Short-term temporary overvoltage: 1440 V
 - Long-term temporary overvoltage: 490 V
- 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.
- Mount this instrument in the panel considering the following conditions:
 - Ensure at least 50 mm space on top and bottom of the instrument for maintenance and operating environment.
 - Do not mount this instrument directly above equipment that generates large amount of heat (heaters, transformers, semi-conductor functional devices, large-wattage resistors).
 - If the ambient temperature rises above 55 °C, cool this instrument with a forced air fan, cooler, etc. Cooled air should not blow directly on this instrument.
 - In order to improve safety and the immunity to withstand noise, mount this instrument as far away as possible from high voltage equipment, power lines, and rotating machinery.
 - High voltage equipment Do not mount within the same panel.
 - Power lines: Separate at least 200 mm.
 - Rotating machinery: Separate as far as possible.
- For correct functioning mount this instrument in a horizontal position.
- In case this instrument is connected to a supply by means of a permanent connection, a switch or circuit-breaker shall be included in the installation. This shall be in close proximity to the equipment and within easy reach of the operator. It shall be marked as the disconnecting device for the equipment.

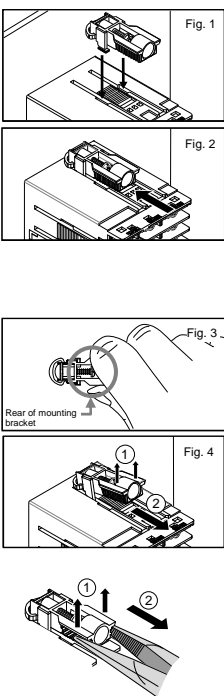
1.2 Dimensions



1.3 Procedures of Mounting and Removing

■ Mounting procedures

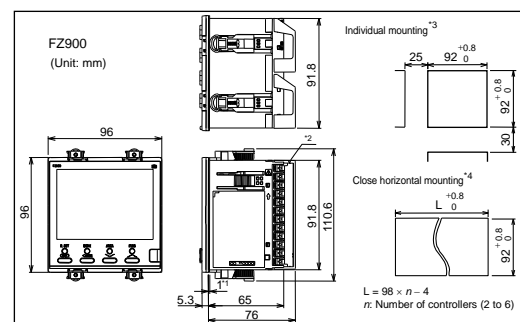
- Prepare the panel cutout as specified in 1.2 Dimensions.
- Insert the instrument through the panel cutout.
- Insert the mounting bracket into the mounting groove of the instrument. (Fig. 1)
- Push the mounting bracket forward until the bracket is firmly secured to the panel. (Fig. 2)
- Tighten the screw for the mounting bracket with a Phillips screwdriver. Do not over-tighten the screw. Recommended tightening torque: 0.15 N·m (1.5 kgf·cm)
- The other mounting bracket(s) should be installed in the same way as described in 3 to 5.



■ Removal procedures

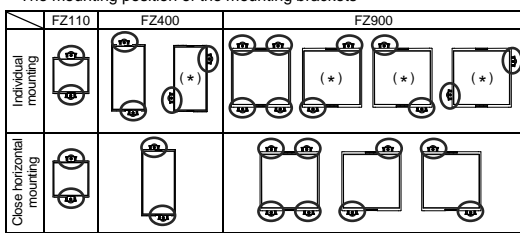
- Turn the power OFF.
- Remove the wiring.
- Loosen the screw of the mounting bracket.
- Remove the mounting bracket by pulling it up (Fig. 4 ①) and forward (Fig. 4 ②) while holding the rear (Fig. 3).
- The other mounting bracket(s) should be removed in the same way as described in 3 and 4.
- Pull out the instrument from the mounting cutout while holding the front panel frame of this instrument.

Use long-nose pliers to remove the mounting brackets from the instrument that is installed in a narrow space or installed closely to each other in a vertical position.



Panel thickness: 1 to 10 mm (When mounting multiple FZ110/400/900 controllers close together, the panel strength should be checked to ensure proper support.)
*1 Gasket (optional)
*2 Terminal cover (optional) [sold separately]
*3 To keep the instrument as waterproof as possible, make sure that the panel surface has no burr or distortion where the hole is to be cut out.
*4 Remove the gasket. When the FZ110/400/900 is mounted closely protection will be compromised and they will not meet IP65 standards.

■ The mounting position of the mounting brackets



2. WIRING

WARNING

To prevent electric shock or instrument failure, do not turn on the power until all wiring is completed. Make sure that the wiring is correct before applying power to the instrument.

2.1 Wiring Cautions

- For thermocouple input, use the appropriate 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.
- Signal connected to Voltage input and Current input shall be low voltage defined as "SELV" circuit per IEC 60950-1.
- If there is electrical noise in the vicinity of the instrument that could affect operation, use a noise filter.
 - Shorten the distance between the twisted power supply wire pitches to achieve the most effective noise reduction.
 - Always install the noise filter on a grounded panel. Minimize the wiring distance between the noise filter output and the instrument power supply terminals to achieve the most effective noise reduction.
 - Do not connect fuses or switches to the noise filter output wiring as this will reduce the effectiveness of the noise filter.
- Allow approximately 5 seconds for contact output when the instrument is turned on. Use a delay relay when the output line is used for an external interlock circuit.
- Power supply wiring must be twisted and have a low voltage drop.
 - For an instrument with 24 V power supply input, supply power from "SELV" circuit defined as IEC 60950-1.
 - This instrument is not provided with an overcurrent protection device. For safety install an overcurrent protection device (such as a fuse) with adequate breaking capacity close to the instrument.
 - Fuse type: Time-lag fuse (Approved fuse according IEC 60127-2 and/or UL 248-14)
 - Fuse rating: Rated voltage 250 V AC
 - Rated current: 0.5 A (for 24 V AC/DC type) 1 A (for 100 to 240 V AC type)
- Use the solderless terminal appropriate to the screw size.
 - Screw size: M3 x 7 (with 5.8 x 5.8 square washer)
 - Recommended tightening torque: 0.4 N·m (4 kgf·cm)
 - Applicable wire: Solid/twisted wire of 0.25 to 1.65 mm²
 - Specified dimension: Refer to Fig. at the right
 - Specified solderless terminal:
 - Manufactured by J.S.T MFG CO., LTD.
 - Circular terminal with isolation V1.25-MS3

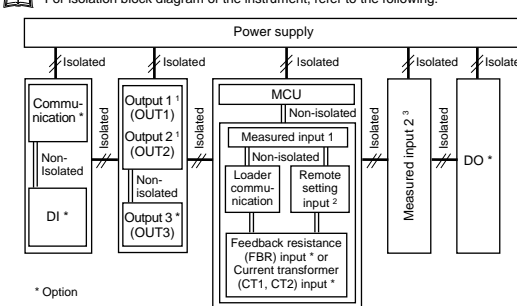
Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.

If solderless terminal lugs other than the recommended dimensions are used, terminal screws may not be tightened. In that case, bend each solderless terminal lug before wiring. If the terminal screw is forcibly tightened, it may be damaged.

Up to two solderless terminal lugs can be connected to one terminal screw. The requirements of reinforced insulation can be still complied with in this condition. When actually doing this, place one solderless terminal lug over the other as illustrated right.

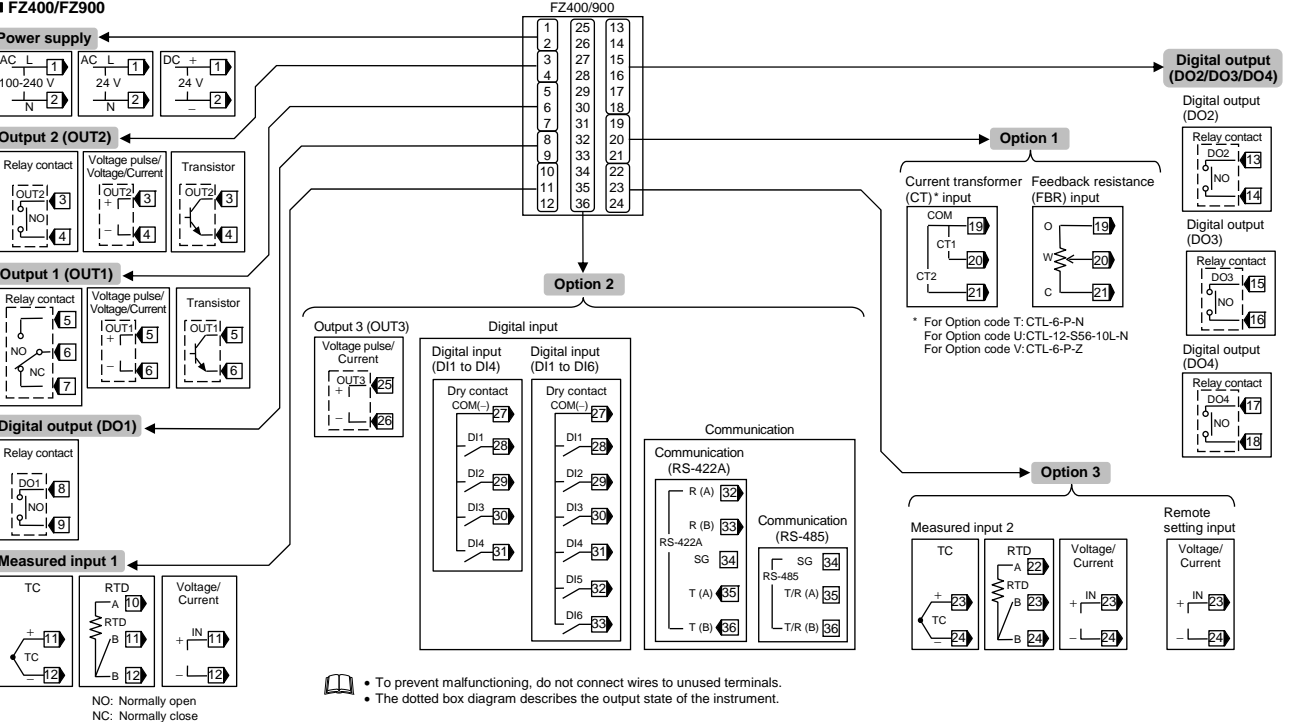
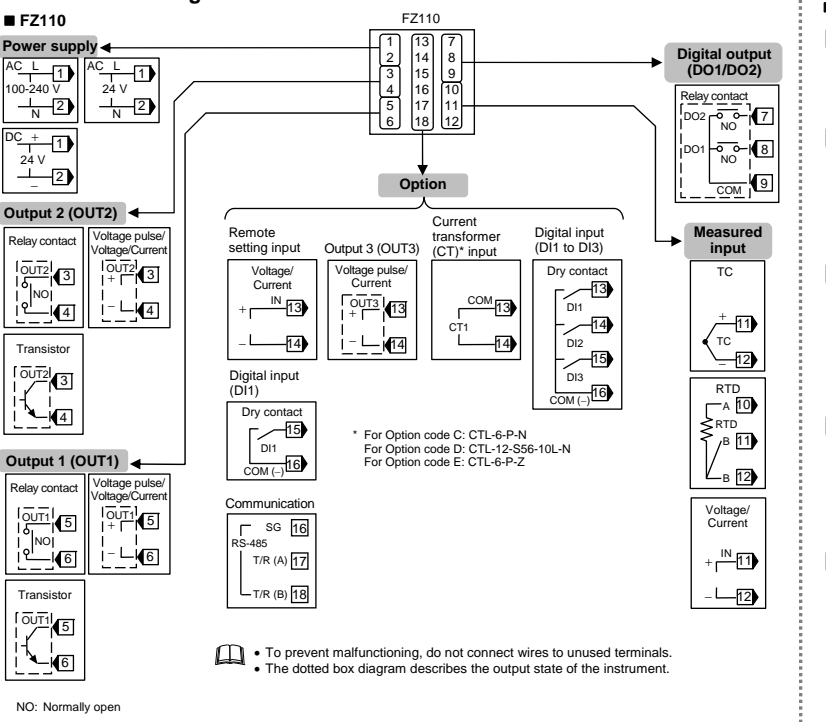
When tightening a screw of the instrument, make sure to fit the screwdriver properly into the screw head mounted tilted or flat as shown in the right figure. Tightening the screw with excessive torque may damage the screw thread.

For isolation block diagram of the instrument, refer to the following:

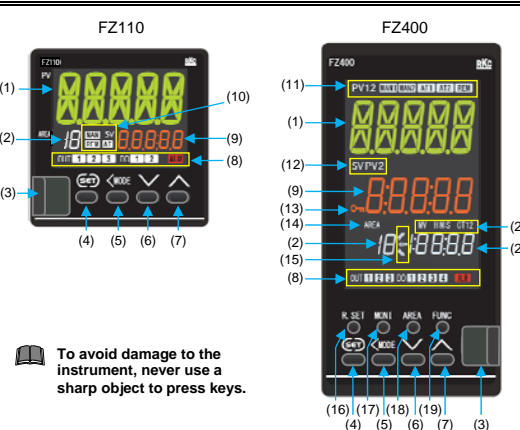


* Option
1 Outputs are isolated if either OUT1 or OUT2 is "relay contact output." If both outputs are not "relay contact output," outputs are not isolated.
2 For FZ110 (optional)
3 For FZ400/900 (optional)

2.2 Terminal Configuration



3. PARTS DESCRIPTION



- (1) Measured value (PV) display [Yellow-green] Displays Measured value (PV) or various parameter symbols.
- (2) Memory area display [White] Displays the memory area No. (1 to 16)
- (3) Loader communication connector Setting and monitoring on a computer (PC) is possible if the controller is connected with our cable to a PC via our USB communication converter COM-K2 (sold separately)*. Our communication software* must be installed on the PC.
* For the COM-K2*, refer to the official RKC website.
* Only available as a download from the official RKC website (<http://www.rkcinst.com>).

- (4) SET key Used for calling up parameters and set value registration.
- (5) Shift key Shifts digits when settings are changed. Used to switch the modes.
- (6) Down key Decreases numerals.
- (7) Up key Increases numerals.
- (8) OUT1 to 3 lamp [White] Lights when Outputs 1 to 3 (OUT1 to 3) are turned on.
DO1 to 4 lamp [White] Lights when Digital outputs 1 to 4 (DO1 to 4) are turned on. (FZ110: DO1 and DO2)

- (9) ALM lamp [Red] Lights when any of the following occurs.
 - Event 1 to 4
 - Heater break alarm (HBA) 1 or 2
 - Control loop break alarm (LBA) 1 or 2
 - Input error of input 1 or 2
- (10) Set value (SV) display [Orange] Displays Set value (SV) or various parameter set values.
- (11) Only for FZ110
 - Manual (MAN) mode lamp [White] Lights in Manual (MAN) mode. When lit, the SV display unit shows a manipulated output value.
 - Remote (REM) mode lamp [White] Lights in Remote (REM) mode. When lit, the SV display unit shows a remote setting input value.
 - SV display lamp [White] Lights when the SV display unit shows a Set value (SV).
 - AT lamp [White] Flashes when Autotuning (AT) is activated. (After AT is completed: AT lamp will go out) Lights during Startup tuning (ST) execution. (After ST is completed: AT lamp will go out)
- (12) PV1/2 display lamp [White] PV1 Lights when the Input 1_Measured value (PV) is displayed on the PV display unit. PV2 Lights when the Input 2_Measured value (PV) is displayed on the PV display unit.
- (13) Manual (MAN) mode lamp [White] Lights when Input 1 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 1_Measured value.
- (14) Manual (MAN)2 mode lamp [White] Lights when Input 2 is in Manual (MAN) mode. When lit, the SV display unit shows an Input 2_Measured value.
- (15) AT1 lamp [White] Flashes when Autotuning (AT) is activated on Input 1. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 1. (After ST is completed: AT lamp will go out)

- (16) AT2 lamp [White] Flashes when Autotuning (AT) is activated on Input 2. (After AT is completed: AT lamp will go out) Lights when Startup tuning (ST) is activated on Input 2. (After ST is completed: AT lamp will go out)
- (17) Remote (REM) mode lamp [White] Lights in Remote (REM) mode. When lit, the SV display unit shows a remote setting input value.
- (18) SV display lamp [White] Lights when the SV display unit shows a Set value (SV).
- (19) PV2 display lamp [White] PV2 Lights when the Input 2_Measured value (PV) is displayed on the SV display unit.
- (20) Set lock display [Orange] Lights when the settings are locked.
- (21) AREA display lamp [White] Lights when Memory area is displayed.
- (22) Displays the ramp status [White] SV ramp status is displayed; (rise, soak, fall)
- (23) R.SET key The parameters can be scrolled backwards.
- (24) MONI key Used to switch screens. When the MONI key is pressed while any screen other than Monitor & SV setting mode is displayed, the screen returns the PV/SV Monitor.
- (25) AREA key When the AREA key is pressed, the screen is switched to the Memory area transfer screen.
- (26) FUNC key The selected function can be assigned to this key for a direct access to it.
- (27) Manipulated output value (MV) display [White] Displays one of the following*: Manipulated output value (MV), Memory area soak time, or Current transformer (CT) input value.
- (28) MV display lamp [White] Lights when Manipulated output value (MV) is displayed on the MV display.
- (29) H:M:S display lamp [White] Lights when time (hour:minute:second) is displayed on the MV display.
- (30) CT1/2 display lamp [White] CT1 lights when the Current transformer 1 (CT1) input value is displayed on the MV display. CT2 lights when the Current transformer 2 (CT2) input value is displayed on the MV display.

The below items are for FZ400/900 only.
* Outputs, such as control output, retransmission output, event output, are assigned to Outputs 1 to 3 (OUT1 to 3) and Digital outputs 1 to 4 (DO1 to 4).
* Outputs are assigned in Engineering mode. For detailed, refer to separate FZ110/FZ400/FZ900 Instruction Manual [Part 2] (IMR03A05-ED).

* FZ400: Orange, FZ900: White
* Functions are configured in the Engineering mode. For detailed, refer to separate FZ110/FZ400/FZ900 Instruction Manual [Part 2] (IMR03A05-ED).

