

Thank you for 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 this manual in a convenient location for easy reference. This manual describes the mounting, wiring and specifications only. For detailed handling procedures and various function settings, please refer to separate SRZ Instruction Manual (IMS01T04-EC).

The above manuals can be downloaded from our website:
URL: http://www.rkcinst.com/english/manual_load.htm

Product Check

Z-DIO Instruction Manual (this manual).....	1
Joint connector cover (KSRZ-517A).....	2
Power terminal cover (KSRZ-518A).....	1

Safety Precautions



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

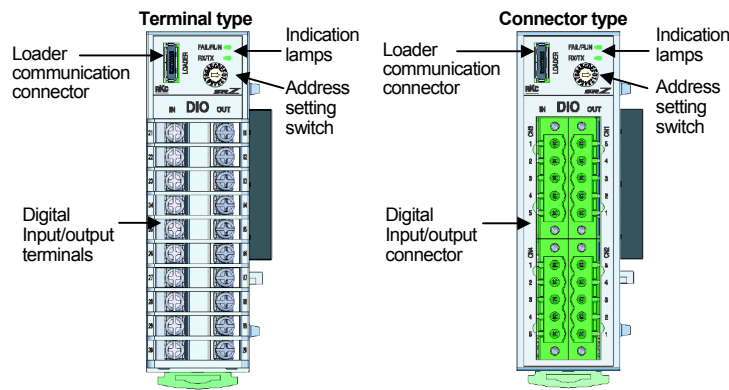
- This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment and nuclear energy.
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take adequate 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 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.
- To prevent instrument damage or failure, protect the power line and the input/output lines from high currents with a protection device such as fuse, circuit breaker, etc.
- 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 dispersion.
- 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, process control, computer technology and communications.
- 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. PARTS DESCRIPTION

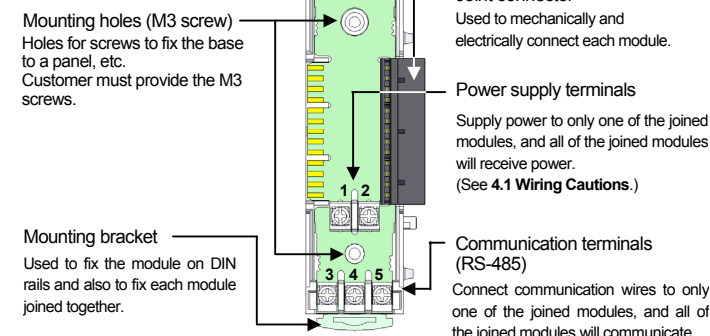
Module Mainframe



[Indication lamps]

- FAIL/RUN: When normal (RUN): A green lamp is on. Self-diagnostic error (FAIL): A green lamp flashes. Instrument abnormality (FAIL): A red lamp is on.
- RX/TX: During data send and receive: A green lamp turns on.

Base



Mounting holes (M3 screw): Holes for screws to fix the base to a panel, etc. Customer must provide the M3 screws.

Joint connector: Used to mechanically and electrically connect each module.

Power supply terminals: Supply power to only one of the joined modules, and all of the joined modules will receive power. (See 4.1 Wiring Cautions.)

Communication terminals (RS-485): Connect communication wires to only one of the joined modules, and all of the joined modules will communicate.

Mounting bracket: Used to fix the module on DIN rails and also to fix each module joined together.

2. COMMUNICATION SETTING

Set communication setting before mounting and wiring of the Z-DIO.

CAUTION

Do not separate the module mainframe from the base with the power turned on. If so, instrument failure may result.

2.1 Module Address Setting

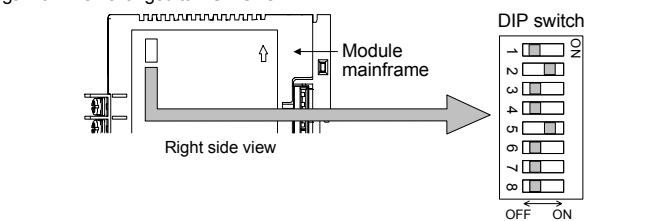
Set an address for the module using a small blade screwdriver.



- For RKC communication, the value obtained by adding "16" to the set address corresponds to the address used for the actual program.
- For Modbus, the value obtained by adding "17" to the set address corresponds to the address used for the actual program.
- To avoid problems or malfunction, do not duplicate an address on the same communication line.

2.2 Protocol Selections and Communication Speed Setting

Use the DIP switch on the right side of module to select communication speed, data bit configuration and protocol. The data changes become valid when the power is turned on again or when changed to RUN/STOP.



(The above figure is for the terminal type. However, the switch positions are the same for the connector type.)

1	2	Communication speed
OFF	OFF	4800 bps
ON	OFF	9600 bps
OFF	ON	19200 bps
ON	ON	38400 bps

Factory set value: 19200 bps

3	4	5	Data bit configuration
OFF	OFF	OFF	Data 7-bit, without parity, Stop 1-bit *
ON	OFF	OFF	Don't set this one
OFF	ON	OFF	Data 7-bit, Even parity, Stop 1-bit *
ON	ON	OFF	Data 7-bit, Odd parity, Stop 1-bit *
OFF	OFF	ON	Data 8-bit, without parity, Stop 1-bit
ON	OFF	ON	Don't set this one
OFF	ON	ON	Data 8-bit, Even parity, Stop 1-bit
ON	ON	ON	Data 8-bit, Odd parity, Stop 1-bit

Factory set value: Data 8-bit, without parity, Stop 1-bit

* When the Modbus communication protocol is selected, this setting becomes invalid.

6	Protocol
OFF	RKC communication
ON	Modbus

Factory set value: RKC communication

- Switch No. 7 and No. 8 must be always OFF. Do not set to ON.
- When two or more modules are connected on the same communication line, the DIP switch settings of all modules must be the same. However, when a Z-DIO module is joined to a Z-TIO-C/D module used for "PLC communication," set the communication speed and data bit configuration to the same settings as the Z-TIO-C/D module and set the communication protocol to "RKC communication."
- Connect a termination resistor between the communication terminals (No.3 and 4) of the module at the end of the communication line from the host computer.

3. MOUNTING



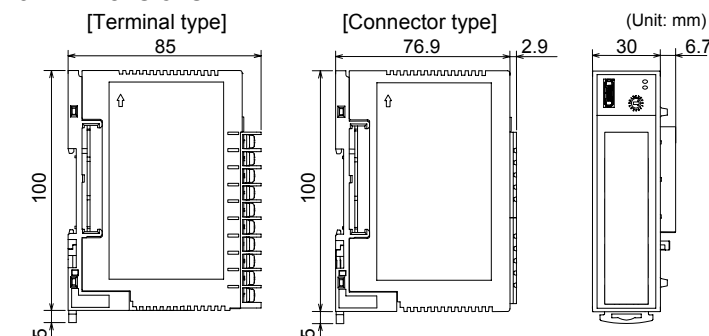
WARNING

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

3.1 Mounting Cautions

- (1) This instrument is intended to be used under the following environmental conditions. (IEC61010-1) [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]
 - Allowable ambient temperature: -10 to +50 °C
 - Allowable ambient humidity: 5 to 95 % RH (Absolute humidity: MAX. W. C 29.3 g/m³ dry air at 101.3 kPa)
 - Installation environment conditions: Indoor use, Altitude up to 2000 m
- (2) 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.
- (3) Take the following points into consideration when mounting this instrument in the panel.
 - Ensure at least 50 mm space on top and bottom of the instrument for maintenance and environmental reasons.
 - 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 50 °C, cool this instrument with a forced air fan, cooler, or the like. However, do not allow cooled air to blow this instrument directly.
 - 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.
- (4) This instrument is Permanently connected to equipment, please take the following points.
 - A switch or circuit-breaker shall be included in the building installation.
 - It 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.

3.2 Dimensions



- When the module is mounted on the panel, allow a minimum of 50 mm at the top and bottom of the module to attach the module to the mainframe.
- Space for connectors and cable must be considered when installing.
- For instruction of module joining, mounting and removal, refer to the Z-TIO Instruction Manual (IMS01T01-EC).

Up to 16 Z-DIO modules can be connected. The maximum number of SRZ modules (including other function modules) on the same communication line is 31.

In case of PLC communication, Z-DIO module cannot be connected to a Z-COM module.

4. WIRING



WARNING

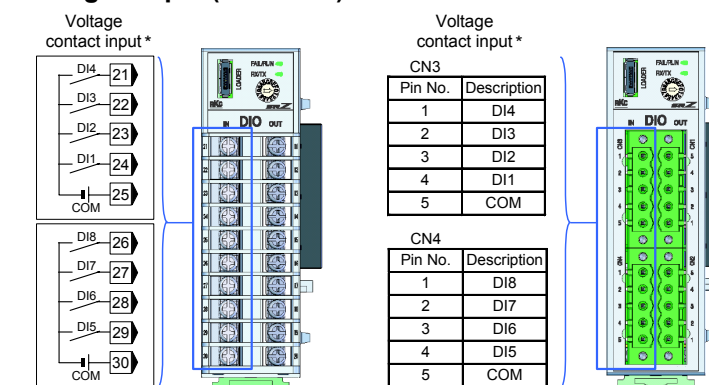
To prevent electric shock or instrument failure, do not turn on the power until all the wiring is completed.

4.1 Wiring Cautions

- To avoid noise induction, keep input/output signal wires away from instrument power line, load lines and power lines of other electric equipment.
- 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.
- About eight seconds are required as preparation time for contact output every time 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, supply power from a SELV circuit.
- A suitable power supply should be considered in the end-use equipment. The power supply must be in compliance with a limited-energy circuits (maximum available current of 8 A).
- Supply the power to only one of the joined modules. When power is supplied to any one of the joined modules, all of the joined modules will receive power.
- Select the power capacity which is appropriate for the total power consumption of all joined modules and the initial current surge when the power is turned on.
 - Power consumption (at maximum load): 70 mA max. (at 24 V DC)
 - Rush current: 10 A or less
- For the terminal type module, use the specified solderless terminals. Only these specified solderless terminals can be used due to the insulation between the terminals.
 - Screw Size: M3 × 7 (with 5.8 × 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 solderless terminals:
 - Manufactured by J.S.T MFG CO., LTD.
 - Circular terminal with isolation V1.25-MS3
 - (M3 screw, width 5.5 mm, hole diameter 3.2 mm)
- For the connector type module, use the following our connector (plug) [sold separately].
 - Connector type: SRZP-01 (Front-screw type)
 - SRZP-02 (Side-screw type)
 - Screw size: M2.5
 - Recommended tightening torque: 0.43 to 0.5 N·m (4.3 to 5.0 kgf·cm)
 - Used cable specifications:
 - Lead wire type:
 - Solid (AWG 28 [cross-section: 0.081 mm²] to 12 [cross-section: 3.309 mm²]) or
 - Twisted wire (AWG 30 [cross-section: 0.051 mm²] to 12 [cross-section: 3.309 mm²])
 - Stripping length: 9 to 10 mm (SRZP-01), 7 to 8 mm (SRZP-02)

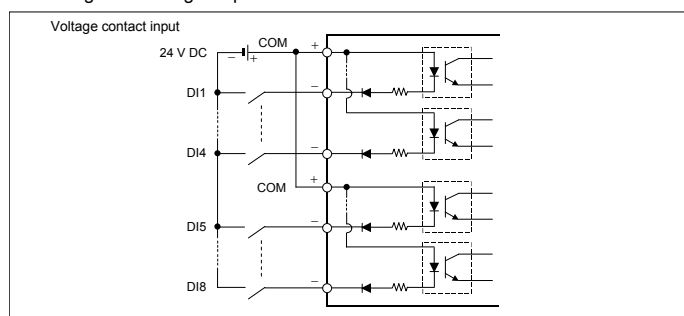
4.2 Terminal Configuration

Digital input (DI1 to DI8)

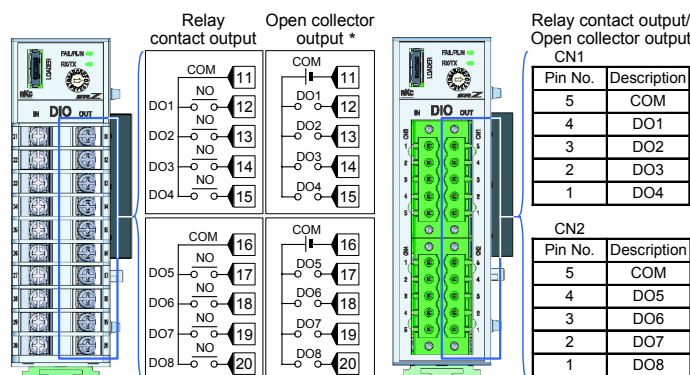


* An external power supply of 24 V DC is required for the voltage contact input.

Circuit configuration of digital input:

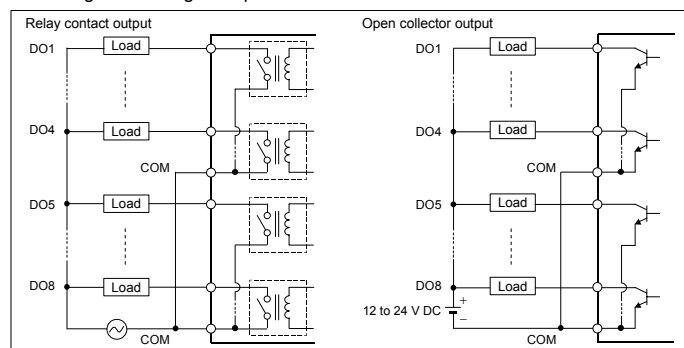


■ Digital output (DO1 to DO8)



* An external power supply of 12 to 24 V DC is required for the open collector output.

Circuit configuration of digital output:



■ Base

Terminal configurations of the base are the same as the base of Z-TIO module. For the details, see the Z-TIO Instruction Manual (IMS01T01-E0).

5. SPECIFICATIONS

Digital input (DI)

Number of inputs: None or 8 points (DI1 to DI8)
Input method: Voltage contact input (Sink type)
Capture judgment time: 250 ms

Digital output (DO)

Number of outputs: None or 8 points (DO1 to DO8)
Output method: Relay contact output, Open collector output (Sink type)
Contact rating: 250 V AC 1 A, 30 V DC 1 A

Digital input (DI) function

The following Z-TIO functions can be assigned as digital input: Memory area transfer, Operation mode, Interlock release, Auto/Manual transfer, Remote/Local transfer, RUN/STOP transfer, Area soak time stop function, EDS start signal

Digital output (DO) function

The following signals can be assigned as digital output: Z-TIO module: Event output 1 to 4 states, Heater break alarm (HBA) state, Temperature rise completion, Burnout state

Output distribution function

Outputs the value calculated by another channel of Z-TIO or Z-DIO modules from the DO.

Communication

Interface: Based on RS-485 EIA standard
Protocol: RKC communication (ANSI X3.28-1976 subcategory 2.5, B1) Modbus-RTU

General specifications

Power supply voltage: 24 V DC (Rating)
Power consumption: 70 mA max. (at 24 V DC)
Weight: Terminal type module: Approx. 150 g

6. COMMUNICATION DATA MAP

Diagram showing Modbus register addresses, data ranges, and symbols used in the map for digital input and output states.

Communication data (RKC communication)

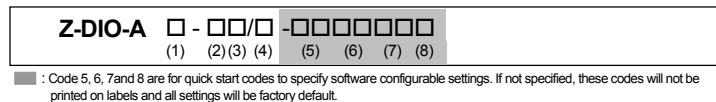
Table listing RKC communication data points including Name, RKC Identifier, Digits, Attribute, Data range, and Factory set value.

Table listing Modbus communication data points including Name, RKC Identifier, Digits, Attribute, Data range, and Factory set value.

Communication data (Modbus)

Table listing Modbus communication data points including Name, Modbus register address (Hex/Dec), Attribute, Data range, and Factory set value.

7. MODEL CODE



- (1) Wiring type
(2) Digital input (DI)
(3) Digital output (DO)
(4) Quick start code (DI/DO assignments)
(5) DI signal assignments (DI1 to DI8) [Quick start code 1]

- (8) Communication [Quick start code 1]
No code: No specify quick start code
1: RKC communication (ANSI X3.28) 2: Modbus

DI Assignment Code Table

Table mapping DI signals to code values and functions like Memory area transfer, Interlock release, and Operation mode.

Di signal will become valid at rising edge after the closed contact is held for 250ms.

Table for Memory area transfer showing assignments for DI1, DI2, and DI3 to memory areas 1-8.

Table for Operation mode transfer showing assignments for DI5 (D7) and DI6 (D8) to various operation modes.

DO Assignment Code Table

Table mapping DO signals to code values and functions like manual output, event outputs, and HBA status.

Table mapping DO5 to DO8 signals to code values and functions like manual output and comprehensive outputs.

Company information for RKC RKC INSTRUMENT INC., including headquarters location, phone, fax, and website.