Module Type Controller *SRX*

Digital Output Module

X-DO-A/X-DO-B

Instruction Manual

IMS01N05-E1

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.

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

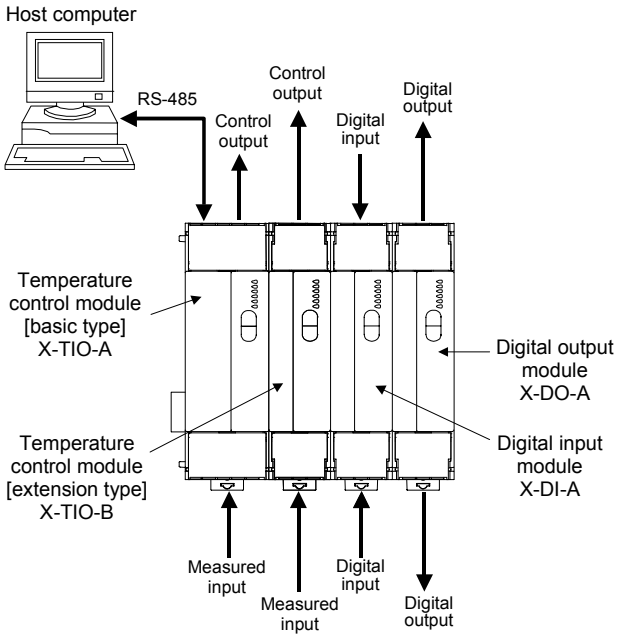
- This is a Class A instrument. In a domestic environment, this instrument may cause radio interference, in which case the user may be required to take adequate measures.
- This instrument is protected from electric shock by reinforced insulation. Provide reinforced insulation between the wire for the 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.
- 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.
- 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 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.
- Do not connect modular connectors to telephone line.

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.
- 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. OUTLINE

Two types of digital output (DO) module are available: the X-DO-A with 12 output channels (terminal block only) and the X-DO-B with 28 output channels (12-point terminal block/ 16-point connector).
As the digital output (DO) module is not provided with terminals for power supply and host communication, it is always used together with the module (temperature control module [basic type] X-TIO-A, etc.) with terminals for power supply and host communication.



SRX configuration example

■ Contents of digital input signal

The signal of the following can be selected.

● Temperature control (TIO) module

Burnout state, Event 1 state, Event 2 state, Heater break alarm (HBA) state, Control loop break alarm (LBA) state, Program end state, Pattern end state, Wait state, Time signal 1 to 16 output state

● Digital input (DI) module

Input state of DI module CH1 to 28

The DO channel is assigned by communication.
For details, see the **Module Type Controller SRX Communication Instruction Manual (IMS01N01-E□)**.

2. PRODUCT CHECK

Check whether the delivered product is as specified by referring to the following model code.

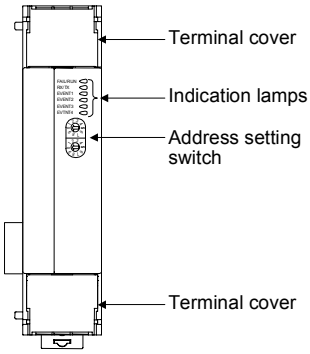
X–DO– □
(1)

(1) Type
A: Output 12 points
(Only terminal blocks)
B: Output 28 points
(Terminal block: 12 points, Connector: 16 points)

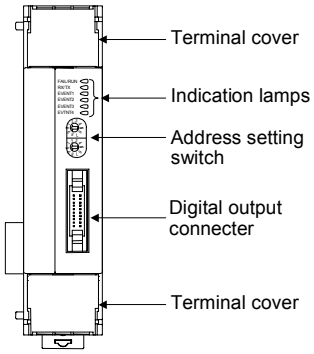
■ Accessories
Instruction Manual (IMS01N05-E1)..... 1

3. PARTS DESCRIPTION

[X-DO-A]



[X-DO-B]



[Indication lamps]

- FAIL/RUN
  When normally: A green lamp turns on (RUN)
  When abnormally: A red lamp turns on (FAIL)
- RX/TX
  During data send and receive: A green lamp turns on
- EVENT 1 to 4
  Event output ON: A green lamp turns on

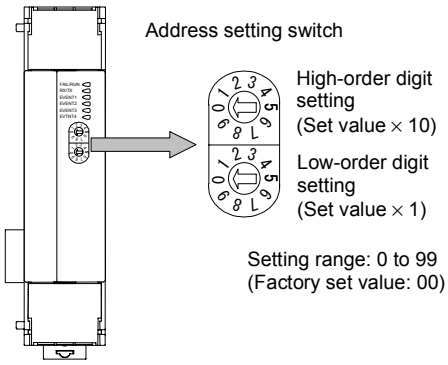
  Event 1 to 4 is assigned to every DO channel.
  If several DO channels are assigned to one EVENT lamp, the lamp is lit by the *OR* operation of outputs from each DO channel.

4. COMMUNICATION SETTING

Set communication setting before mounting and wiring of SRX.

4.1 Module Address Setting

Set an address of module. For this setting, use a small blade screwdriver.

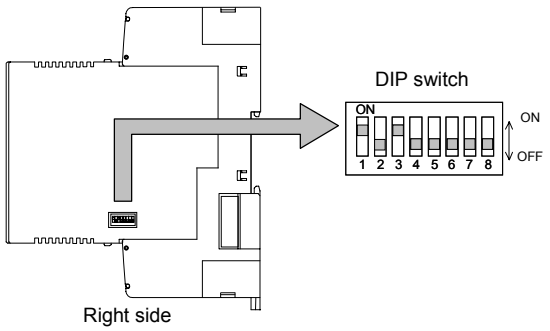


- **For Modbus, the value obtained by adding "1" to the set address corresponds to the address used for the actual program.**
- **Set the module address such that it is different to the other addresses on the same line. Otherwise, problems or malfunction may result.**

The above figure is X-DO-A module. The figure of X-DO-B module is the same as a X-DO-A module.

4.2 Protocol Selections and Communication Speed Setting

With the DIP switch which there is on the right side of module, select communication speed, data bit configuration, protocol and termination resistor of internal data bus.



1	2	Communication speed
OFF	OFF	2400 bps
ON	OFF	9600 bps
OFF	ON	19200 bps
ON	ON	38400 bps

Factory set value: 9600 bps

3	4	5	Data bit configuration
OFF	OFF	OFF	Data 7-bit, without parity *
OFF	OFF	ON	Data 7-bit, Even parity *
OFF	ON	ON	Data 7-bit, Odd parity *
ON	OFF	OFF	Data 8-bit, without parity
ON	OFF	ON	Data 8-bit, Even parity
ON	ON	ON	Data 8-bit, Odd parity

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

Factory set value: Data 8-bit, without parity

6	Protocol selection
OFF	RKC communication
ON	Modbus

Factory set value: RKC communication

8	Internal data bus termination resistor setting
OFF	Termination resistor OFF
ON	Termination resistor ON

Factory set value: Termination resistor OFF

- **Switch No. 7: OFF fixed (Don't change this one)**
- **When two or more modules are connected on the same line for their use, set DIP switches corresponding to the switches, 1 to 6 on all of the modules to the same positions. In addition, always turn on the switch, 8 (with the internal bus termination resistance connected) in module of both ends.**
- **Be changed into communication time setting mode by using switch No. 4, 5 and 6.**

For communication time setting mode, see the **Module Type Controller SRX Communication Instruction Manual (IMS01N01-E□)**.

5. MOUNTING

WARNING

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

5.1 Mounting Cautions

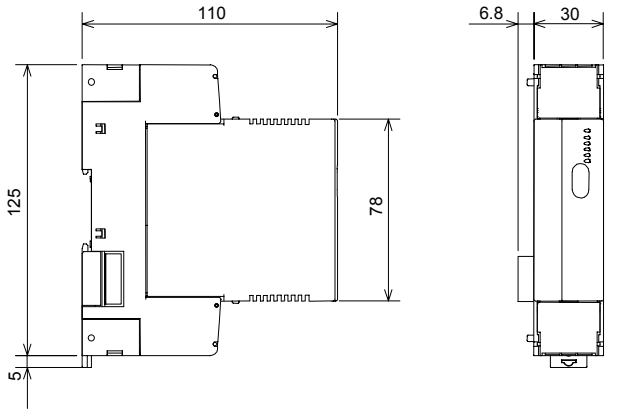
(1) This instrument is intended to be used under the following environmental conditions. **(IEC61010-1)**
[OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]

(2) Avoid the following when selecting the mounting location.
- Ambient temperature of less than −10 °C or more than +50 °C.
- Ambient humidity of less than 5 % or more than 95 % RH.
- 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.

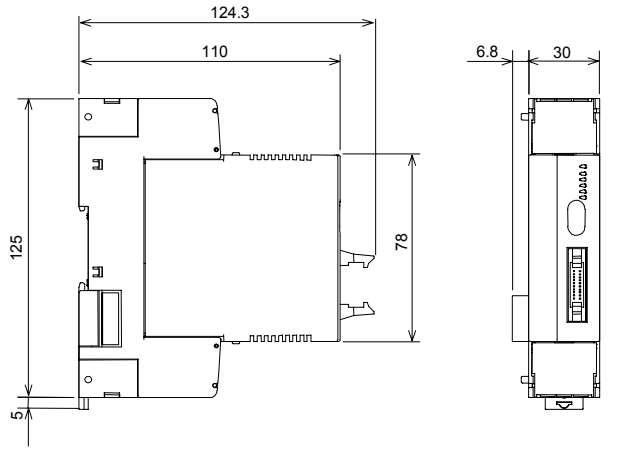
(3) Mounting consideration
- Install the module 200 mm away from the main power line.
- Ensure at least 50 mm space on top and bottom of the control unit for maintenance and environmental reasons.

5.2 Dimensions

[X-DO-A] (Unit: mm)



[X-DO-B] (Unit: mm)



5.3 DIN rail Mounting

■ Mounting procedures

1. Pull down the mounting bracket at the bottom of the module. (A) Attach the hooks on the top of the module to the DIN rail and push the lower section into place on the DIN rail. (B)

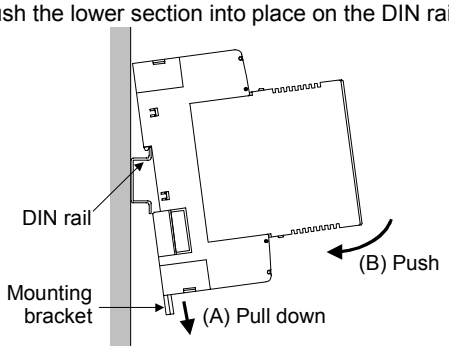


Fig. 1

2. Slide the mounting bracket up to secure the module to the DIN rail. (Fig. 2)

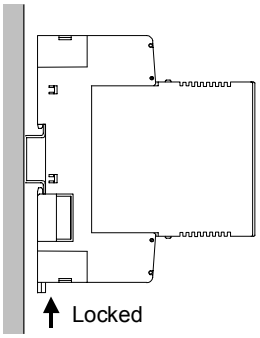
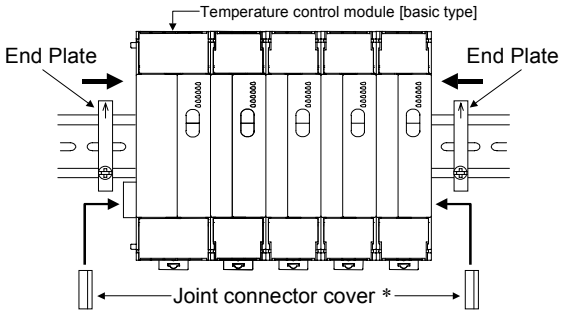


Fig. 2

■ End Plate mounting

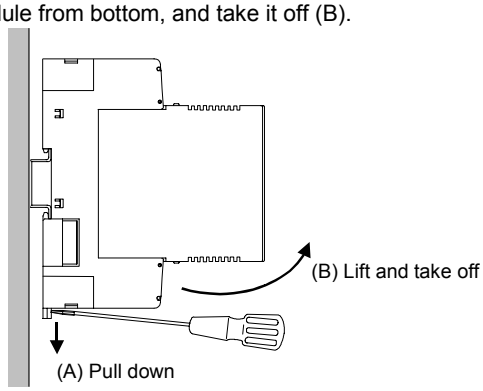
Hold tight both ends of the modules jointed together with the end plates attached to the temperature control module [basic type] and then fix the end plates with screws.



* For the conservation of the contact of connector, install a joint connector cover (be attached to the temperature control module [basic type]) in module of both ends.

■ Removing procedures

Pull down a mounting bracket with a blade screwdriver (A). Lift the module from bottom, and take it off (B).



5.4 Panel Mounting

■ Mounting procedures

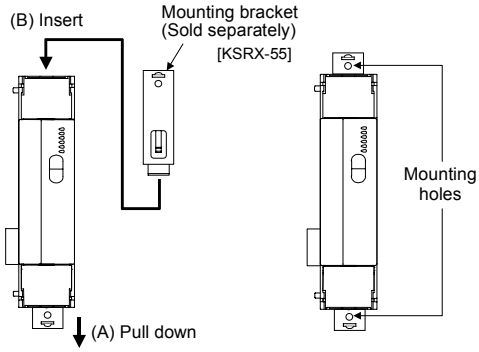
1. Pull down the mounting bracket (A) until locked and that a mounting hole appears.

2. Prepare one mounting bracket per module (B) sold separately (KSRX-55) and then insert it in the rear of the terminal board at top of the module until locked but a mounting hole does not disappear.

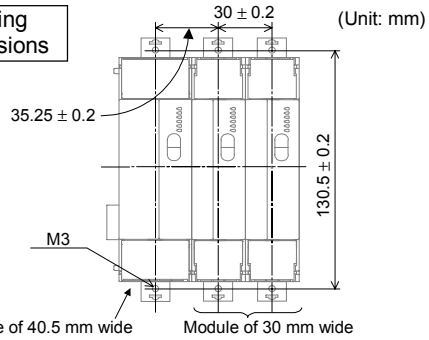
3. Mount each module directly on the panel with screws which are inserted in the mounting holes of the top and bottom mounting brackets.

Recommended tightening torque: 0.3 N·m (3 kgf·cm)

The customer needs to provide the M3 size screws. Select the screw length that matches the mounting panel.



Mounting dimensions



5.5 Jointing Each Module

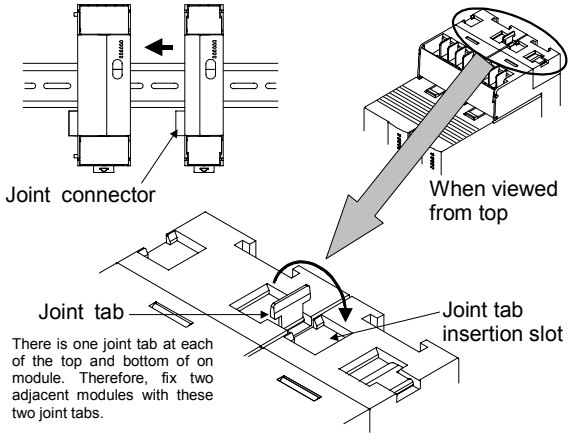
Up to 31 SRXs consisting of the each modules can be jointed together. Joint these modules according to the following procedure.

■ Jointing procedure

1. Mount the modules on the DIN rail and then joint these modules together with the joint connector while sliding the relevant module.

2. Lift each of the joint tabs located at the top and bottom of the module and then insert it in the slot of the adjacent module to fix these two modules.

For panel mounting, first joint each module and then mount it on the panel.



6. WIRING

WARNING

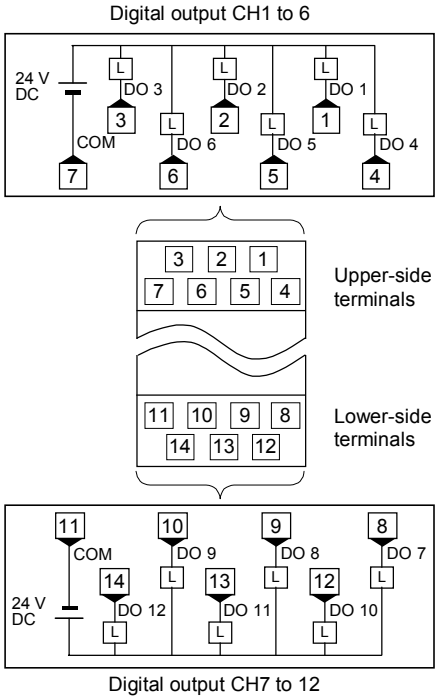
To prevent electric shock or instrument failure, do not turn on the power until all the wiring is completed.

CAUTION

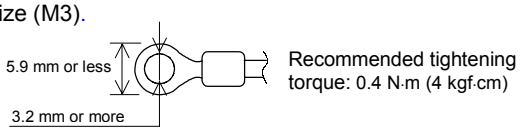
To avoid noise induction, keep input signal wire away from instrument power line, load lines and power lines of other electric equipment.

■ Terminal configuration

●X-DO-A/X-DO-B (common)

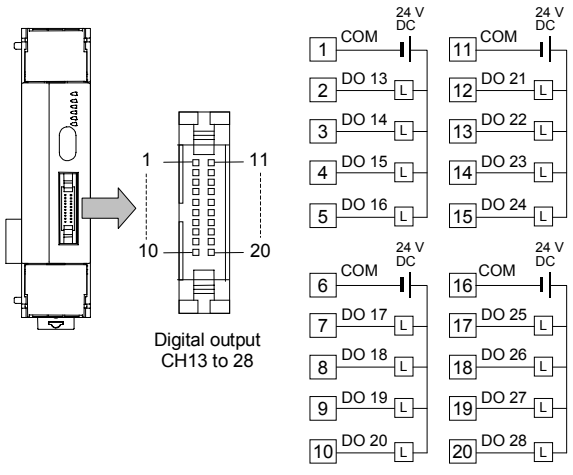


Use the solderless terminal appropriate to the screw size (M3).



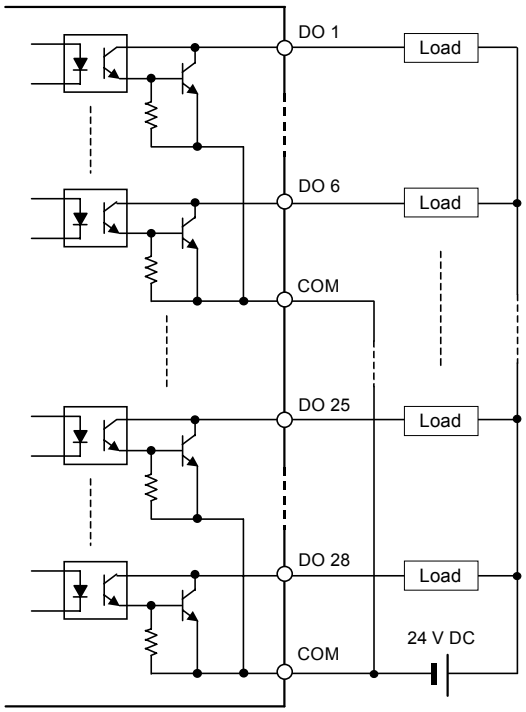
■ Pin layout of connector

●X-DO-B



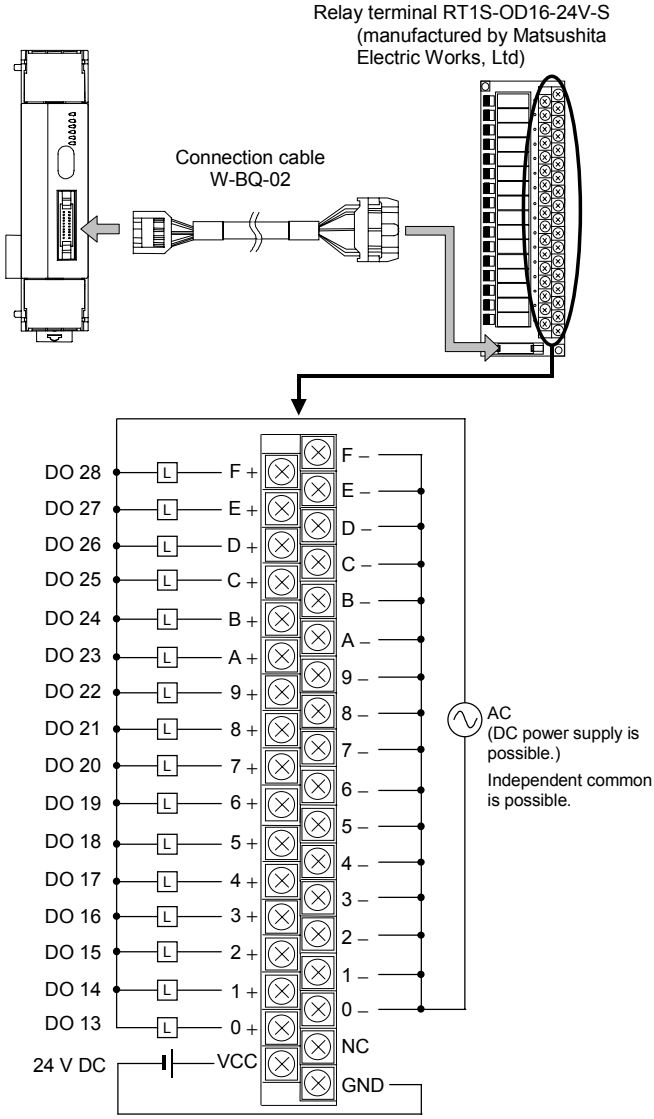
Pin Nos. 1 and 6, and pin Nos. 11 and 16 are internally connected, respectively.

■ Circuit configuration

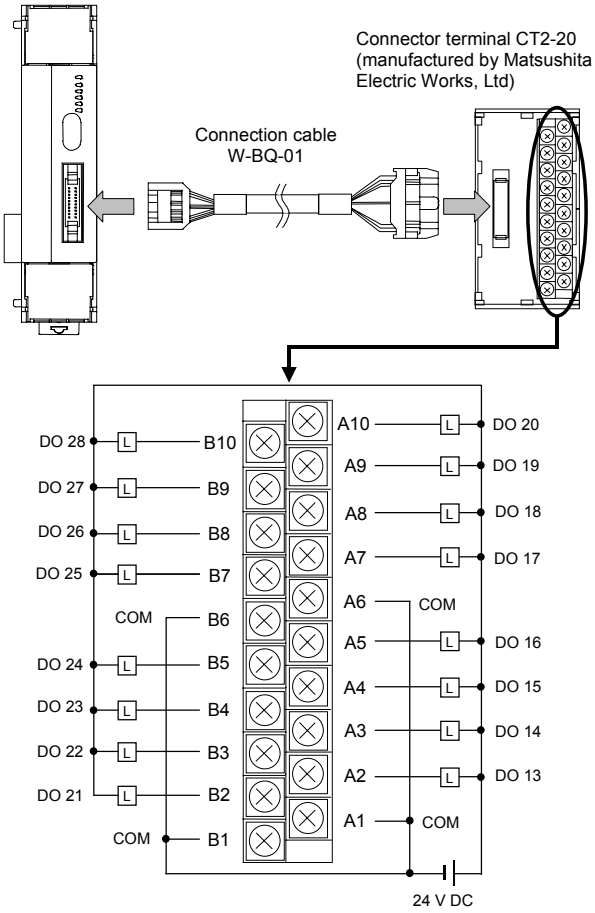


■ Connection example

●Relay contact output (Relay terminal connection)



● **Transistor output**
(Connector terminal connection)



For the connection cable, use the RKC product (Sold separately).
Cable type: W-BQ-01-3000 [Standard cable length: 3 m]
(For connector terminal connection)
W-BQ-02-3000 [Standard cable length: 3 m]
(For relay terminal connection)

- Recommended connector terminal:
  Manufactured by Matsushita Electric Works, Ltd
  CT2-20 (DIN rail mounting type)
  CT2-M-20 (direct mounting type)
- Recommended relay terminal:
  Manufactured by Matsushita Electric Works, Ltd
  RT1S-OD16-24V-S

7. FUNCTIONS

Contents of Digital Output Signal

Each status of the temperature control (TIO) module or the digital input (DI) module is assigned to each DO channel as its corresponding output signal.

■ Temperature control (TIO) module

Each status of the TIO module described in the following is assigned to each DO channel.

Burnout state, Event 1 state, Event 2 state, Heater break alarm (HBA) state, Control loop break alarm (LBA) state, Program end state, Pattern end state, Wait state, Time signal 1 to 16 output state

■ Digital input (DI) module

Each status of the DI module described in the following is assigned to each DO channel.

Input state of DI module CH1 to 28

8. SPECIFICATIONS

■ Outputs

Output type: Transistor output (sink type)
Rated load: 24 V DC
Maximum load current: 50 mA/point
ON voltage: 2 V max.

Number of outputs: X-DO-A: 12 points (6 points/common): Terminal
X-DO-B: 28 points
Terminal: 12 points (6 points/common)
Connector: 16 points (4 points/common)

■ Digital output function

The signal of the following can be selected.

Temperature control (TIO) module:
Burnout state, Event 1 state, Event 2 state, Heater break alarm (HBA) state, Control loop break alarm (LBA) state, Program end state, Pattern end state, Wait state, Time signal 1 to 16 output state

Digital input (DI) module:
Input state of DI module CH1 to 28

■ LED display

Number of display: 6 points
Display contents: Operation: RUN/FAIL lamp
Communication: RX/TX lamp
Event: EVENT1 to 4 lamps

■ Communications

Communication interface: Based on RS-485, EIA standard
Communication protocol: RKC communication or Modbus
Connection: Internal bus

■ Others

Power supply voltage: 24 V DC
(Supplied by temperature control module [basic type])
Current consumption: X-DO-A: 70 mA max./module
X-DO-B: 90 mA max./module
Ambient temperature range:
−10 to +50 °C
Ambient humidity range: 5 to 95 %RH (Non condensing)
Absolute humidity:
MAX.W.C 29 g/m^3 dry air at 101.3 kPa
Weight: X-DO-A: Approx. 150 g
X-DO-B: Approx. 160 g

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RKC® RKC INSTRUMENT INC.
HEADQUARTERS: 16-6, KUGAHARA 5-CHOME, OHTA-KU
TOKYO 146-8515 JAPAN
PHONE: 03-3751-9799 (+81 3 3751 9799)
E-mail: info@rkcinst.co.jp
FAX: 03-3751-8585 (+81 3 3751 8585)