Ethernet [Modbus/TCP]
Communication Converter

COM-JL
[For SRJ]

Instruction Manual

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 purpose.

- 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.

  $\sim$: 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.

- Ethernet is a registered trademark of Xerox Corp.
- Modbus is a registered trademark of Schneider Electric.
- Windows and Microsoft Internet Explorer are registered trademark of Microsoft Corporation in the U.S.A. and other countries.
- XPort and DeviceInstaller are trademark of Lantronix Inc.
- Company names and product names used in this manual are the trademarks or registered trademarks of the respective companies.

Safety Precautions

■ Pictorial Symbols (safety symbols)

Various pictorial symbols are used in this manual to ensure safe use of the product, to protect you and other people from harm, and to prevent damage to property. The symbols are described below.
Be sure you thoroughly understand the meaning of the symbols before reading this manual.

⚠ **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.

⚠ 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 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.

For Proper Disposal

When disposing of each part used for this instrument, always follows the procedure for disposing of industrial wastes stipulated by the respective local community.

IMR01Y51-E1

Symbols

■ Pictorial Symbols (safety symbols)

NOTE : 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.

■ Abbreviation symbols

These abbreviations are used in this manual:

Abbreviation symbols	Name	Abbreviation symbols	Name
PV	Measured value	TC (input)	Thermocouple (input)
SV	Set value	RTD (input)	Resistance temperature detector (input)
MV	Manipulated output value	LBA	Control loop break alarm
AT	Autotuning	LBD	LBA deadband
OUT	Output		

About This Manual

There are four manuals pertaining to this product. Please be sure to read all manuals specific to your application requirements.

The following manuals can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm.

Manual	Manual Number	Remarks
COM-JL [For SRJ] Installation Manual	IMR01Y48-E□	This manual is enclosed with instrument. This manual explains the mounting and wiring.
COM-JL [For SRJ] Quick Operation Manual	IMR01Y49-E□	This manual is enclosed with instrument. This manual explains the parts description, communication setting, and message format.
COM-JL [For SRJ] Communication Data List	IMR01Y50-E□	This manual is enclosed with instrument. This list is a compilation of the communication data items.
COM-JL [For SRJ] Instruction Manual	**IMR01Y51-E1**	This manual you are reading now. This manual describes mounting, wiring, communication setting, protocol, communication data, troubleshooting and product specification.

📖 Read this manual carefully before operating the instrument. Please place the manual in a convenient location for easy reference.

Contents

1. OUTLINE

This manual describes the communication specifications, mounting, wiring, setting and data instructions for the Ethernet [Modbus/TCP] Communication Converter COM-JL [For SRJ].

Ethernet [Modbus/TCP] Communication Converter COM-JL [For SRJ] (hereafter called COM-JL) is communication converter to connect the RKC module type temperature controller SRJ (hereafter called Controller) to Ethernet.
The COM-JL supports Modbus/TCP protocol.

📖   Modbus/TCP is an open field network provided with the Modbus protocol on the TCP/IP protocol of Ethernet.

📖   The data request side is called "client" (such as computer) and the data response (supply) side is called "server" (COM-JL).

📖   Basically, one client corresponds to one server (COM-JL) (i.e. one to one). However, one client can communicate with two or more servers depending on the program on the client side, but two or more clients cannot communicate with one server.
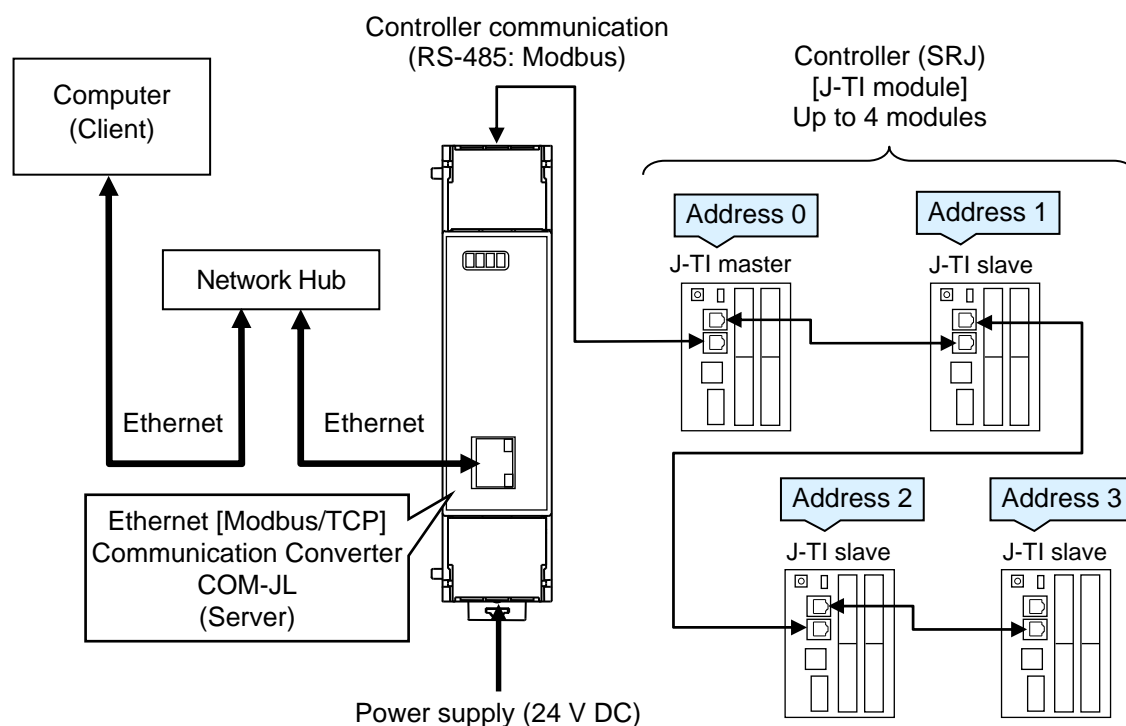
1.1 Product Check

Before using this product, check each of the following:

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

Accessories	Q'TY	Remarks
☐ COM-JL [For SRJ] Installation Manual (IMR01Y48-E☐)	1	Enclosed with instrument
☐ COM-JL [For SRJ] Quick Instruction Manual (IMR01Y49-E☐)	1	Enclosed with instrument
☐ COM-JL [For SRJ] Communication Data List (IMR01Y50-E☐)	1	Enclosed with instrument
☐ COM-JL [For SRJ] Instruction Manual (IMR01Y51-E1)	1	This manual (sold separately) *

* This manual can be downloaded from the official RKC website:
http://www.rkcinst.com/english/manual_load.htm

📖 If any of the products are missing, damaged, or if your manual is incomplete, please contact RKC sales office or the agent.

1.2 Model Code

Check whether the delivered product is as specified by referring to the following model code list. If the product is not identical to the specifications, please contact RKC sales office or the agent.

COM- JL- 1 * 05
(1) (2)

(1) Communication type

1: Modbus/TCP

(2) Corresponding to the RKC controller

05: SRJ (J-TI)

1.3 Parts Description

Front view   Left side view

[Details of Indication lamps]
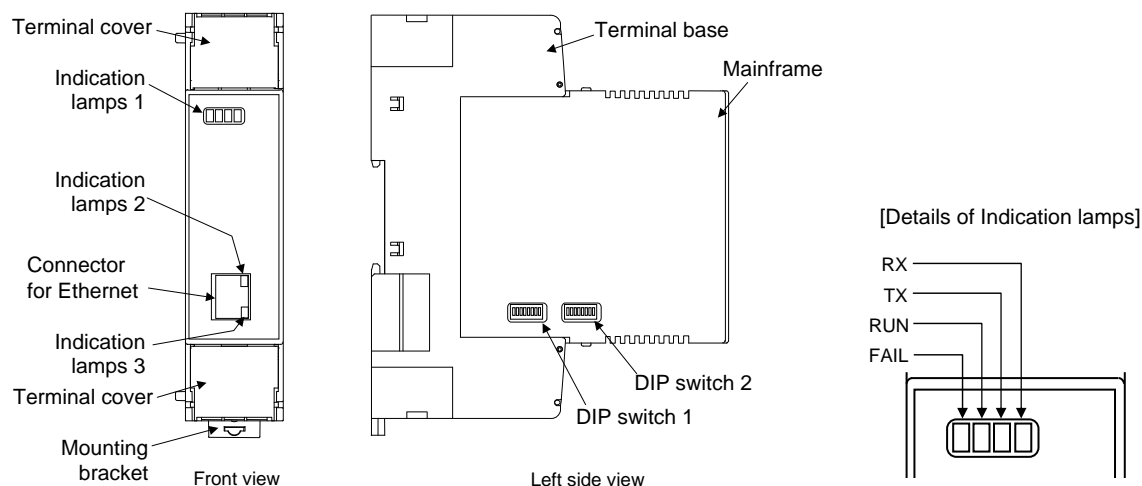
● **Indication lamps 1**

FAIL [Red]	• Instrument normality:	Turns off
	• Instrument abnormality:	Turns on
RUN [Green]	• When normal:	Turns on
	• Operation error:	Flashes slowly
	• Data collection just after the power is turned on:	Flashes rapidly
TX [Green]	During data send:	Flashes
RX [Green]	During data receive:	Flashes

● **Indication lamps 2**

Link	10BASE-T link:	Amber lamp: ON
	100BASE-TX link:	Green lamp: ON

● **Indication lamps 3**

Activity	Half-duplex; activity:	Amber lamp: ON
	Full-duplex; activity:	Green lamp: ON

● **Connector for Ethernet**

ETHERNET	Modular connector for Ethernet RJ-45

● **Switches**

DIP switch 1	Set the communication speed for controller communication
DIP switch 2	**Do not change this setting** (Use it only in IP address setting by DIP switch)

● **Others**

Terminal cover	Terminal covers above and below the COM-JL
Mounting bracket	• Used for the DIN rail mounting • When panel mounted, two mounting brackets are required for the upper and lower sides (one required for the upper side: separately sold).
Terminal base	Part of the terminal and base of COM-JL (There is the termination resistor setting switch in the inside of terminal base)
Mainframe	Part of the mainframe of COM-JL

2. HANDLING PROCEDURES

Conduct necessary setting before operation according to the procedure described below.

COM-JL setting	Set the controller communication speed by DIP switch. ☞ Refer to **5. COMMUNICATION SETTING (P. 17)**
↓	
Mounting	Install the COM-JL. ☞ • Refer to **3. MOUNTING (P. 5)** • For controller (SRJ), refer to **SRJ Instruction Manual (IMS01X03-E□)**
↓	
Wiring and Connection	Connect power supply wires to the COM-JL, and also connect the COM-JL to the controller and the COM-JL to the client (host computer), respectively. ☞ • Refer to **4. WIRING (P. 8)** • For controller (SRJ), refer to **SRJ Instruction Manual (IMS01X03-E□)**
↓	
Controller setting	Set communication parameters of controller. ☞ Refer to **J-TI Installation Manual (IMS01X01-E□)** and **SRJ Instruction Manual (IMS01X03-E□)**
↓	
IP address setting	Set IP address of COM-JL. ☞ Refer to **6. IP ADDRESS SETTING (P. 18)**
↓	
Data setting	Set data for COM-JL and controllers. ☞ Refer to **7. MODBUS/TCP PROTOCOL (P. 32)**

3. MOUNTING

This chapter describes installation environment, mounting cautions, dimensions and mounting procedures.

> ## ⚠ 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. **(IEC 61010-1)** [OVERVOLTAGE CATEGORY II, POLLUTION DEGREE 2]

(2) Use this instrument within the following ambient temperature and ambient humidity.
   - Allowable ambient temperature: −10 to +50 °C
   - Allowable ambient humidity: 5 to 95 %RH
     (Absolute humidity: MAX.W.C 29.3 g/m^3 dry air at 101.3 kPa)
   - Installation environment conditions: Indoor use
     Altitude up to 2000 m

(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.

(4) Take the following points into consideration when mounting this instrument.
   - Provide adequate ventilation space so that heat does not build up.
   - 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 the 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.
   - For correct functioning mount this instrument in a horizontal position.

(5) 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.

3.2 Dimensions

109.5

3 30

(Unit: mm)

125

78

5
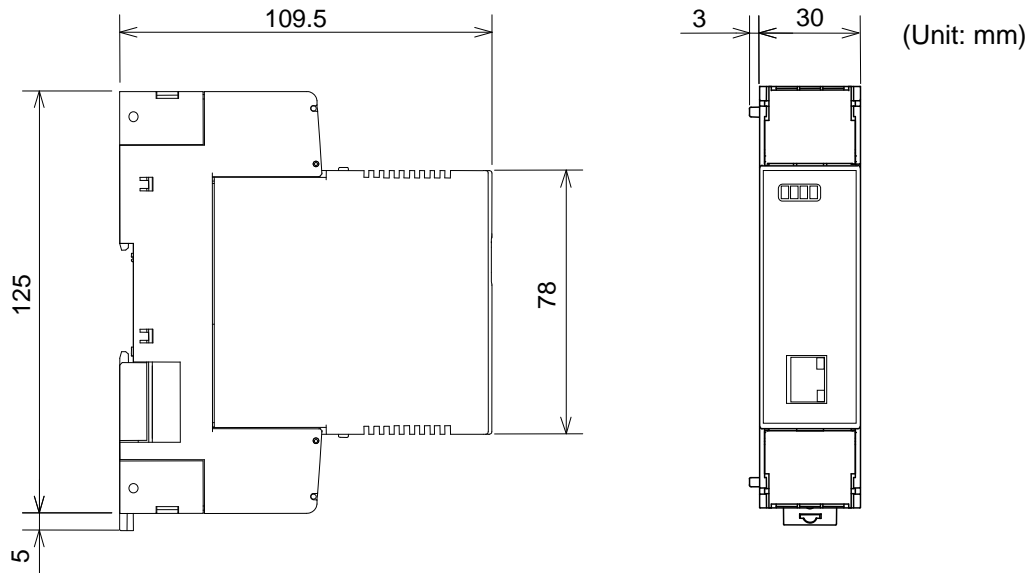
3.3 DIN Rail Mounting

■ Mounting procedures

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

2. Slide the mounting bracket up to secure the instrument to the DIN rail (C).

DIN rail

Mounting bracket

(A) Pull down

(B) Push

(C) Locked
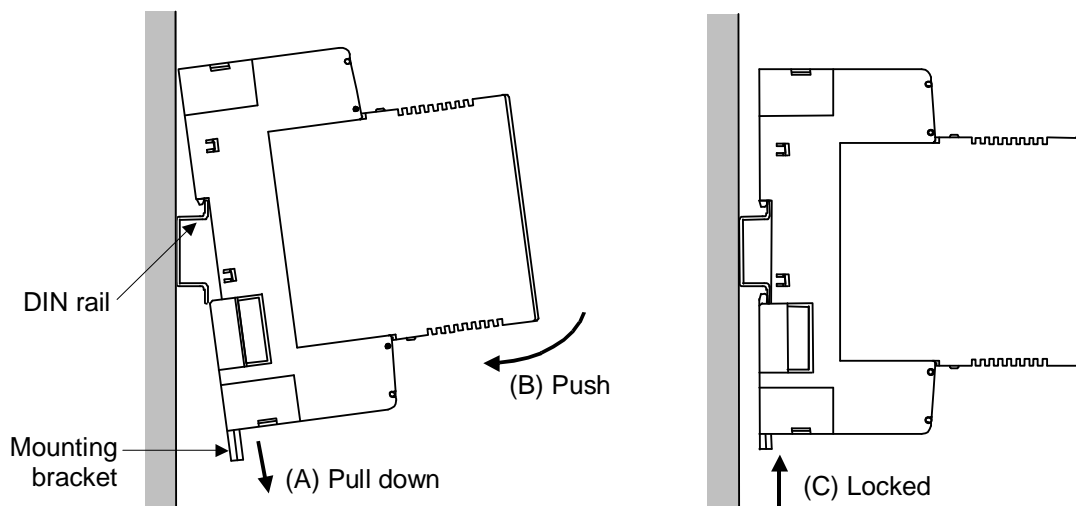
■ Removing procedures

1. Turn the power OFF.

2. Remove the wiring.

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

(B) Lift and take off
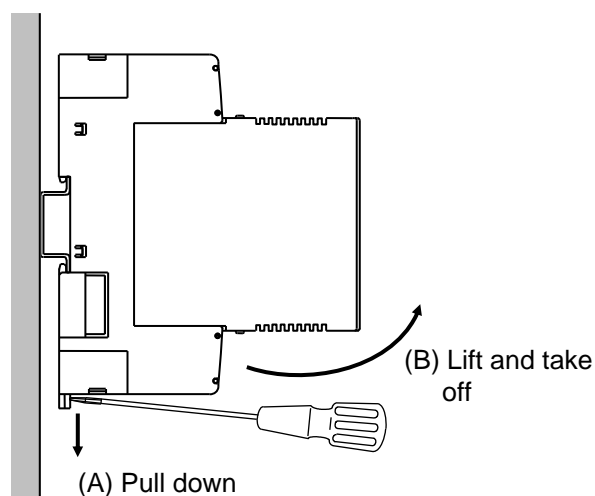
(A) Pull down

3.4 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 instrument (B) sold separately (KSRX-55) and then insert it in the rear of the terminal board at top of the instrument 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.

(B) Insert

Mounting bracket (Sold separately) (KSRX-55)

(A) Pull down

Mounting holes

Mounting dimensions (Unit: mm)

130.5 ± 0.2

M3
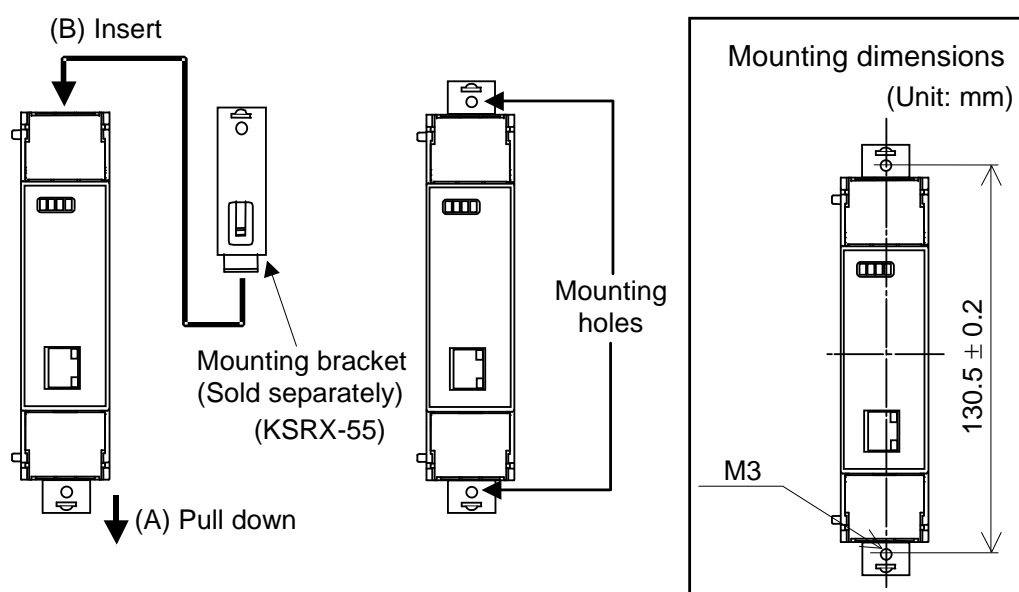
4. WIRING

This chapter describes wiring cautions, terminal configuration and connections.

4.1 Wiring Cautions

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

- To avoid noise induction, keep communication signal wire 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.
- Power supply wiring must be twisted and have a low voltage drop.
- For an instrument with 24 V power supply input, supply power from a "SELV" circuit defined as IEC 60950-1.
- 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).
- Use the solderless terminal appropriate to the screw size.
  Screw size: M3 × 6 (with 5.8 × 5.8 square washer)
  Recommended tightening torque:
                    0.4 N・m (4 kgf・cm)
  Specified dimension: Refer to Fig. at right
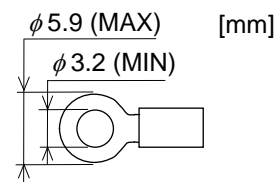
  ϕ 5.9 (MAX)   [mm]
  ϕ 3.2 (MIN)
- Make sure that during field wiring parts of conductors cannot come into contact with adjacent conductive parts.

4.2 Terminal Configuration

The terminal layout is as follows.

A fuse (rated current: 5 A) is installed inside the terminal block.
If the instrument will not turn on even after it has been powered on, the fuse may be blown.
Contact RKC sales office or the agent.

Controller communication

Upper-side terminal

RS-485

T/R(A)

T/R(B) [1]

[5] SG

[4]

[3] [2] [1]

[7] [6] [5] [4]

⌐ ¬ : The part of internal wiring
└ ┘

[11] [10] [9] [8]

[14] [13] [12]

Power supply

[9]

[12]

+ DC −

24 V

Lower-side terminal

Ground

[8]

FG
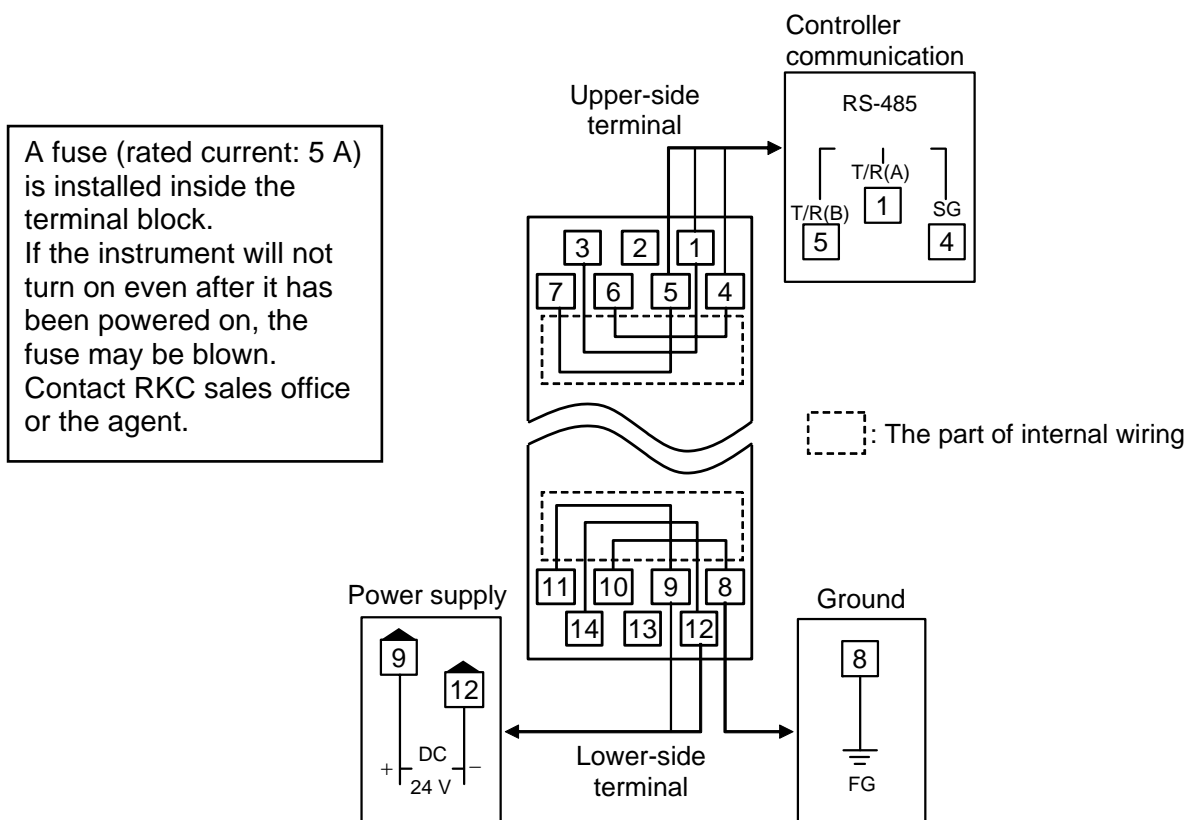
📖   As controller communication terminal Nos. 1, 4 and 5 are internally connected to terminal Nos. 3, 6 and 7, any terminals can be used.

📖   As ground and power supply terminal Nos. 8, 9 and 12 are internally connected to terminal Nos. 10, 11 and 14, any terminals can be used.

📖   Terminal No. 2 and No. 13 is not used.

4.3 **Connection to Ethernet**

Connect COM-JL to Ethernet.

■ **Pin layout of connector**

COM-JL

Modular connector
for Ethernet
RJ-45

8: Unused
7: Unused
6: RX−
5: Unused
4: Unused
3: RX+
2: TX−
1: TX+
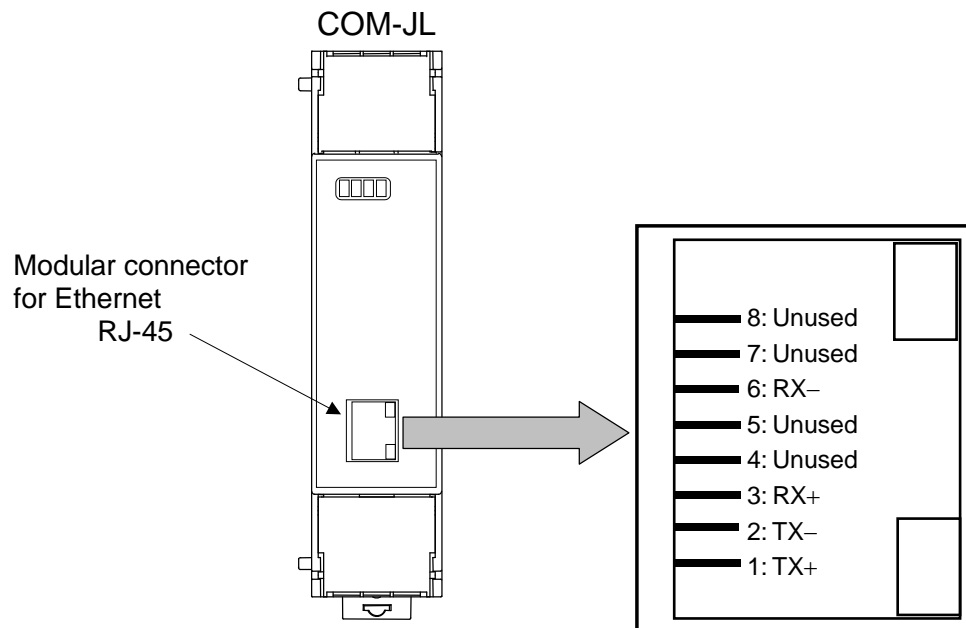
■ **Connector pin number and signal details**

Pin No.	Signal name	Symbol
1	Send data +	TX+
2	Send data −	TX−
3	Receive data +	RX+
4	Unused	—
5	Unused	—
6	Receive data −	RX−
7	Unused	—
8	Unused	—

The cable must be provided by the customer.
Used cable: The cable is based on the 10BASE-T or the 100BASE-TX standard of Ethernet.
Used connector: RJ-45 type

IMR01Y51-E1

■ Wiring example

● When directly connected to client

Use a cross cable when directly connected to the client (such as computer).

```
     Computer                                    COM-JL
        TX+  ──────────╲    ╱──────────  TX+
        TX−  ──────────  ╲╱            ──  TX−
                          ╳
        RX+  ──────────  ╱╲            ──  RX+
        RX−  ──────────╱    ╲──────────  RX−

                          ▲
                     Cross cable
```
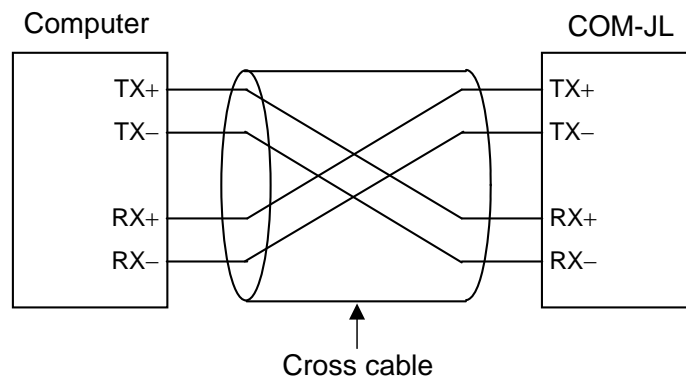
● When use network hub

Use straight cables when connected to the network hub.

```
   Computer              Network hub                COM-JL
     TX+ ──      ── TX+ ──╲  ╱── TX+ ──      ── TX+
     TX− ──      ── TX− ──  ╳  ── TX− ──      ── TX−
                           ╱  ╲
     RX+ ──      ── RX+ ──╱    ╲── RX+ ──      ── RX+
     RX− ──      ── RX− ──      ── RX− ──      ── RX−

            ▲                              ▲
      Straight cable                 Straight cable
```
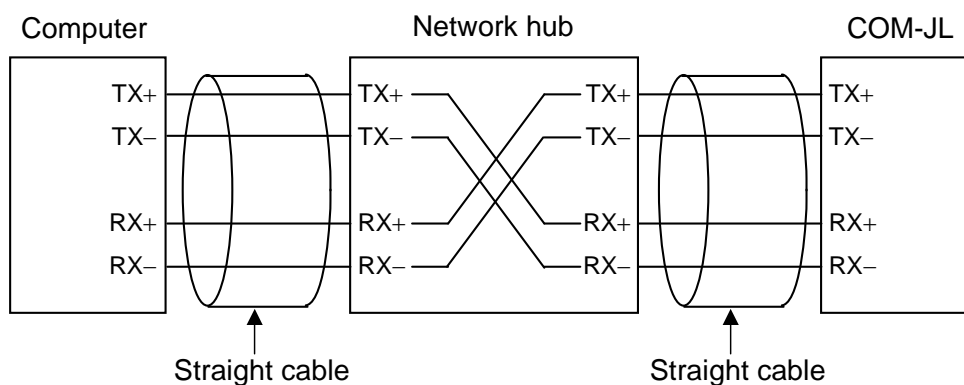
📖 Cross cables may be used depending on the connecting device used. Therefore, follow the instructions for the respective device.

4.4 Connection to the Controllers

Conduct wiring between the COM-JL and controller (SRJ) as shown in the following.

■ SRJ (J-TI module) communication terminal number and signal details

Terminal No.	Signal name	Symbol
3	Send/Receive data	T/R (A)
4	Send/Receive data	T/R (B)
5	Signal ground	SG

Communication terminal number

■ Wiring

Controller (SRJ [J-TI module])

R1: Internal termination resister (120 Ω 1/2 W)

R2: Termination resister (120 Ω 1/2 W, attached)
Switch between ON and OFF using toggle switch No. 2 of the communication setting switch.

Host communication connector (COM. OUT)

6	SG
5	T/R (A)
4	T/R (B)
3	SG
2	Internal communication
1	Internal communication

R2

COM-JL

RS-485

SG 4
T/R (A) 1
T/R (B) 5
R1
(−)
(+)

Paired wire

Shielded twisted pair wire

Host communication connector (COM. IN)

6	SG
5	T/R (A)
4	T/R (B)
3	SG
2	T/R (B)
1	T/R (A)

(−)
(+)

Up to 4 J-TI modules can be connected.

📖 The cable must be provided by the customer.

📖 The termination resistor existing within the COM-JL can be connected or disconnected by the switch. (Factory set value: Termination resistor connected)
[Refer to **4.6 Installation of Termination Resistor (P. 15)**]

☞ For termination resistor setting of the SRJ (J-TI module), refer to **J-TI Installation Manual (IMS01X01-E□)** or **SRJ Instruction Manual (IMS01X03-E□)**.

4.5 System Configuration Example

■ When directly connected to client

Controller communication (RS-485: Modbus)

Computer (Client)

Address 0 — J-TI master — Connect to COM.OUT
Address 1 — J-TI slave

Connect to COM.IN

Ethernet

Address 2 — J-TI slave
Address 3 — J-TI slave

Ethernet [Modbus/TCP] Communication Converter COM-JL (Server)

Power supply (24 V DC)
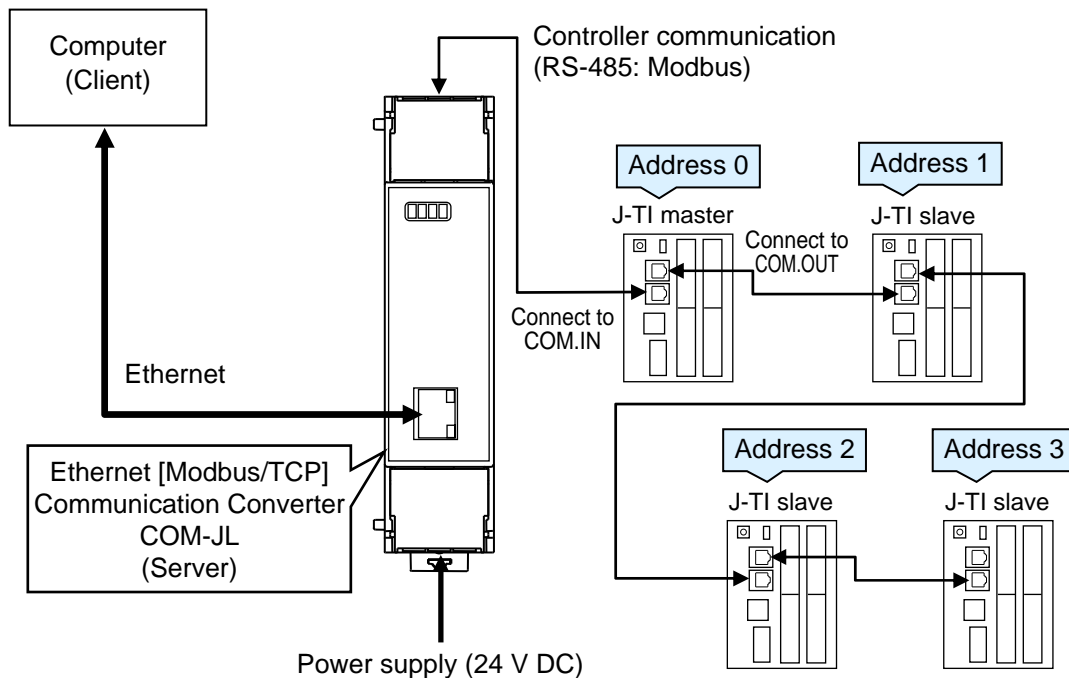
> Up to 4 SRJ modules (J-TI module) can be connected to one COM-JL.

■ When use network hub

Controller communication (RS-485: Modbus)

Computer (Client)

Network Hub

Address 0 — J-TI master — Connect to COM.OUT
Address 1 — J-TI slave

Connect to COM.IN

Ethernet   Ethernet

Address 2 — J-TI slave
Address 3 — J-TI slave

Ethernet [Modbus/TCP] Communication Converter COM-JL (Server)

Power supply (24 V DC)

> Up to 4 SRJ modules (J-TI module) can be connected to one COM-JL.

Basically, one client corresponds to one server (COM-JL) (i.e. one to one). However, one client can communicate with two or more servers depending on the program on the client side, but two or more clients cannot communicate with one server.
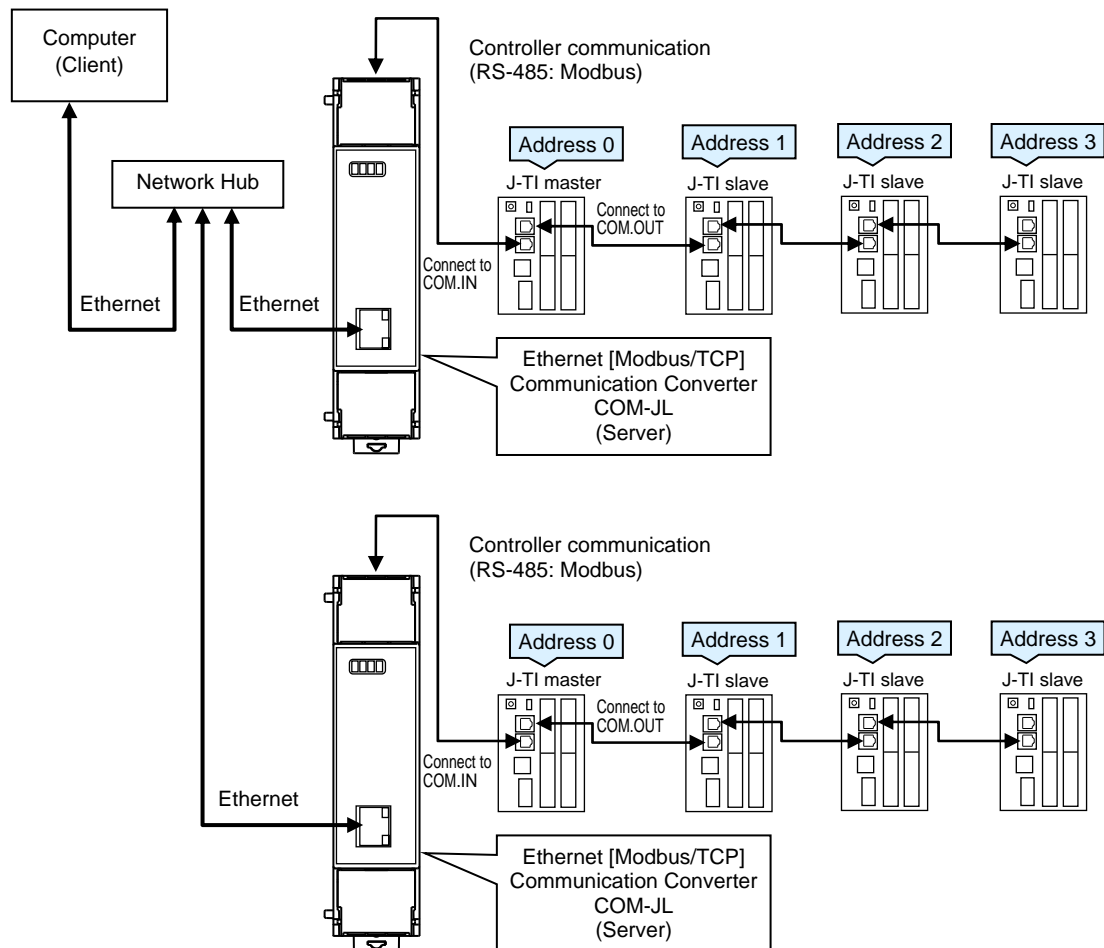
4.6 Installation of Termination Resistor

Procedure for setting a termination resistor to controller communication (RS-485) and its setting position are described in the following.

■ Termination resistor setting position

If the COM-JL is connected to the extreme end of the communication line, install one termination resistor each to the COM-JL and the controller (module of the SRJ) located most distantly from the COM-JL.
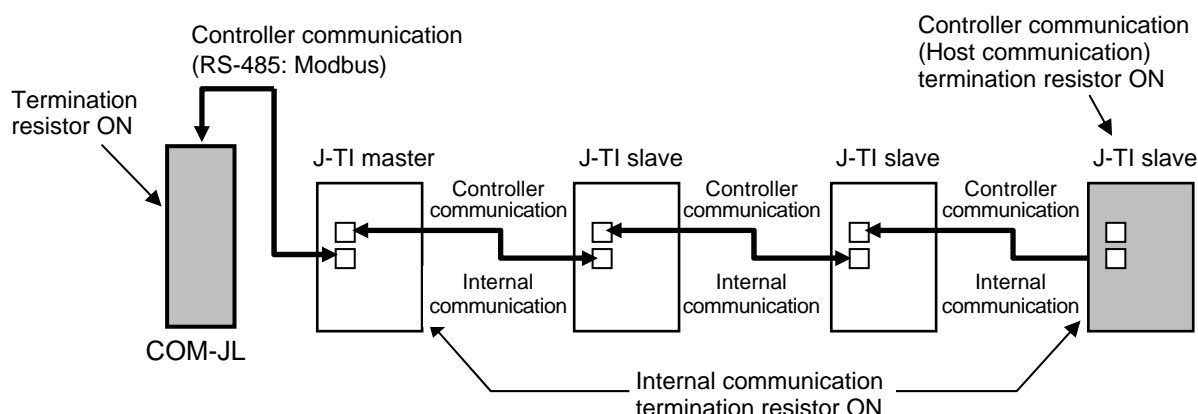
  The communication among the SRJ modules (J-TI module) also manages the data exchange through the internal communication. In addition to the termination resistor setting for the controller communication (host communication), setting the termination resistor for the internal communication is also required.

☞   For termination resistor setting of the SRJ (J-TI module), refer to **J-TI Installation Manual (IMS01X01-E□)** or **SRJ Instruction Manual (IMS01X03-E□)**.

■ Setting procedure of termination resistor

As the COM-JL is internally provided with a selector switch for choosing the ON/OFF of a termination resistor, it is not required to externally install the termination resistor.
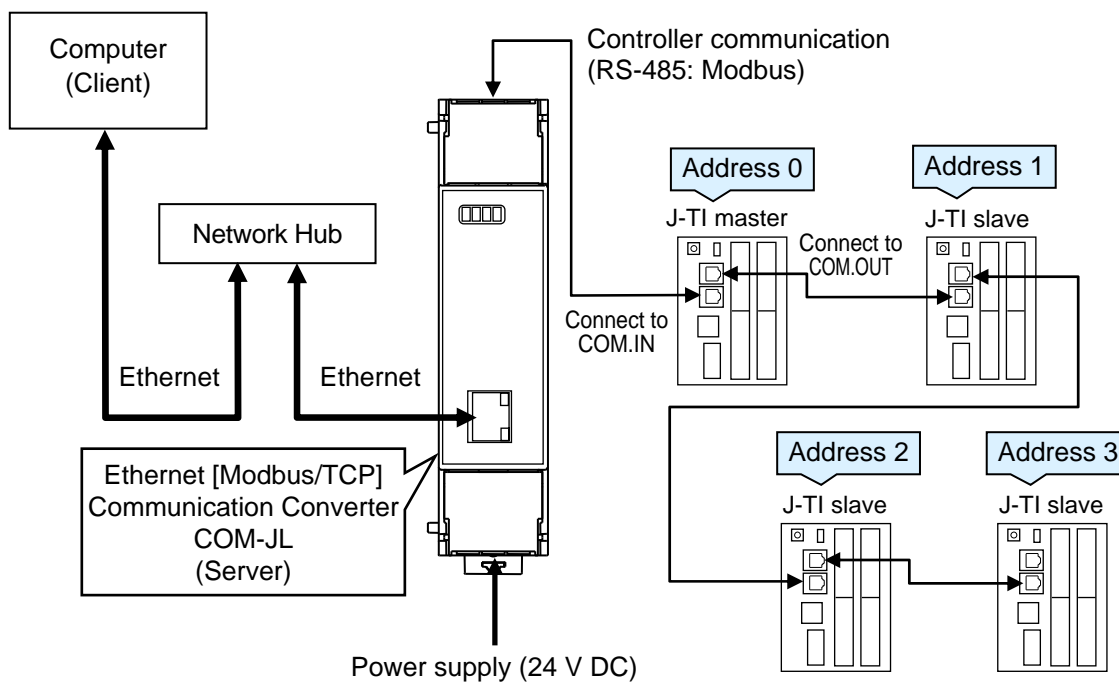(Factory set value: Termination resistor connected)

1. Turn off the power supply of the COM-JL.

> 📖 **NOTE**
>
> **Do not separate the mainframe from terminal base with the power turned on. If so, instrument failure may result.**

2. Pull out the mainframe itself toward you while pushing the locks at its top and bottom (1), and then separate it from the terminal base (2).

Upper-side lock

Top view

Lower-side lock

Bottom view

Terminal base

Mainframe

(1) Push

(2) Pull out

(1) Push

Removing the module mainframe
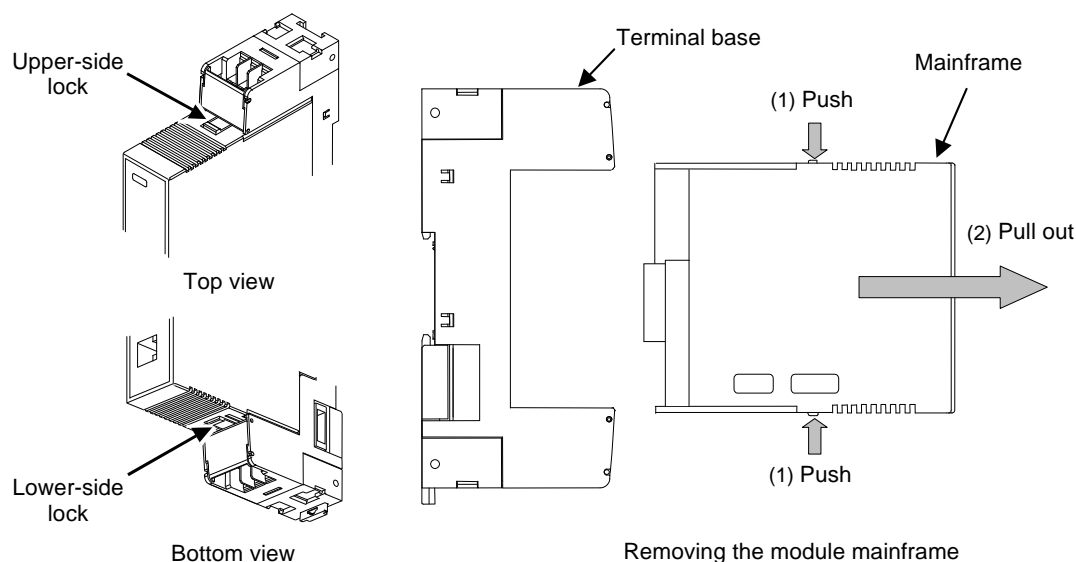
3. Turn on the termination resistor transfer switch in the terminal base.
The COM-JL is shipped from the factory with the selector switch set to "ON: Termination resistor connected."

Termination resistor transfer switch

Termination resistor OFF

Termination resistor ON (120 Ω 1/2 W)

Factory set value: ON
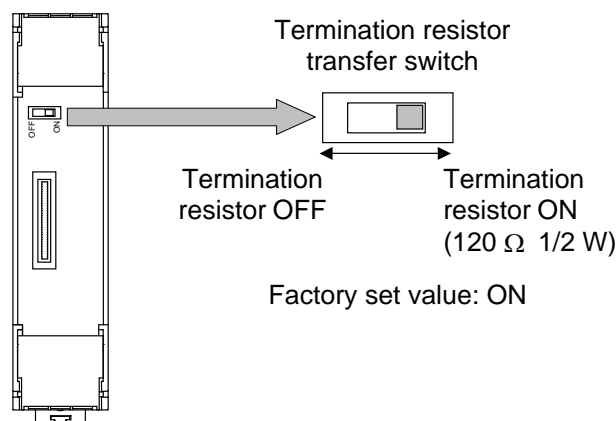
A terminal base of the state which removed module mainframe

4. Push the mainframe thus separated in the terminal base until firmly locked.

Terminal base

Mainframe

Push the module
mainframe until
firmly locked
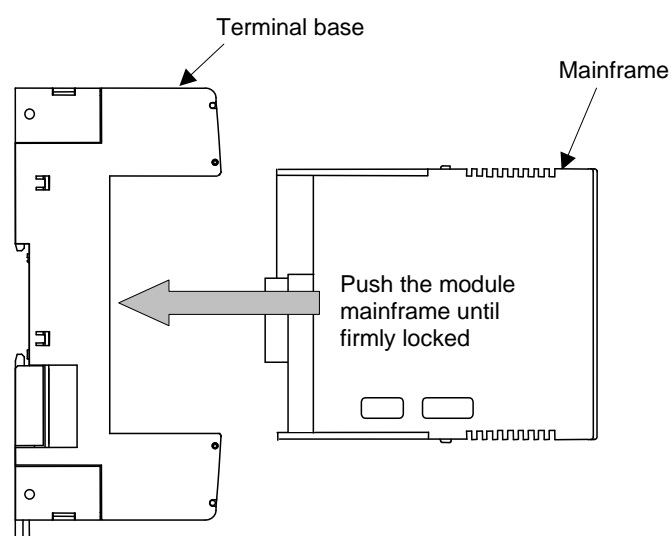
Mounting the module mainframe

5. COMMUNICATION SETTING

The speed of communication with the controller (SRJ) is set by the dip switch at the left side of the COM-JL.

DIP switch 1

Left side view
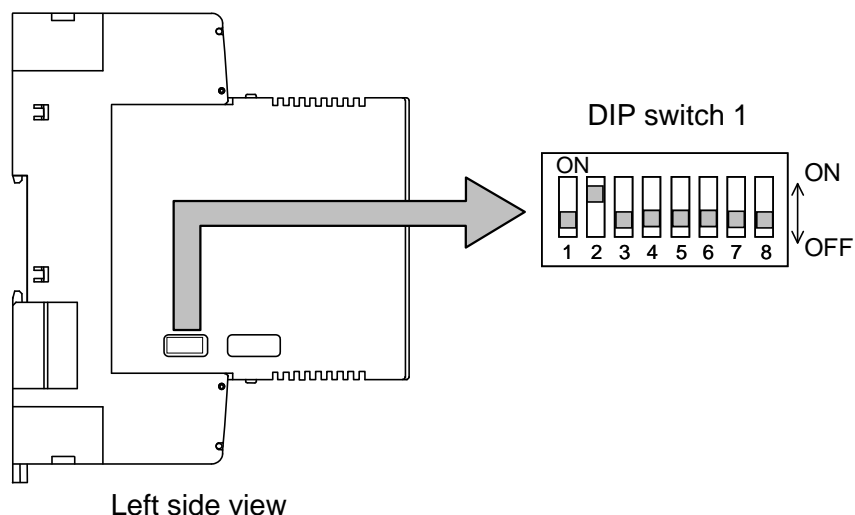
1	2	Controller communication speed
OFF	OFF	38400 bps
ON	OFF	9600 bps
OFF	ON	19200 bps
ON	ON	38400 bps

Factory set value: 19200 bps

3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	Fixed (Do not change the factory set value)

Another controller communication setting
Data bit configuration: Data 8-bit, Without parity bit, Stop 1-bit

Do not change the setting of DIP switch 2.
(Use it only in IP address setting by DIP switch)

6. IP ADDRESS SETTING

Set an IP address of a COM-JL.

Four types of IP address setting are available: "setting by Web browser," "setting by Telnet," "setting by DeviceInstaller" and "setting by DIP switch."

📖 **NOTE**

Confirm the IP address number to the network administrator of the network (LAN) to which the COM-JL is connected.

📖 If the IP address has been changed from the factory set value (192.168.1.1) and you do not know the current address, set the IP address using DeviceInstaller or the DIP switches.

6.1 Setting by the Web Browser

It is possible to set the IP address by using the Web browser (such as Internet Explorer).

■ Preparations before setting

When setting the IP address by Web browser, it is necessary to coincide the 1st to 3rd bytes and masking range of the IP address of the client (computer) which starts Web browser with those of the IP address of the COM-JL.

1. Connect the COM-JL and client, and then turn on the power.

   ☞ For wiring procedure, refer to **4. WIRING (P. 8)**.

2. Change the IP address of the client.
   The IP address of the COM-JL is set to a factory set value of "192.168.1.1." As it is necessary to coincide the 1st to 3rd byte values of this IP address with those of the IP address of the client.

   Setting value: 192.168.1. □ (□: Any value in the range of 0 to 255, but other than 1)

3. Change the subnet mask of the client.
   As the subnet mask of the COM-JL is "255.255.255.0," also change the subnet mask of the client.

   Setting value: 255.255.255.0

📖 After the IP address of the server is set, return the present IP address of the client to the original address or change to the address meeting the network to be connected.

📖 It is possible to set the IP address of the COM-JL using the client already connected to the network. **However, as the IP address of the client is changed, that client is disconnected from the network so far connected**.
   In addition, when setting the IP address by this method, confirm to the network administrator whether or not no problem arises.

■ Setting example

An example of setting the IP address of the COM-JL to "192.168.1.3" is shown in the following.

📖　Screens and operations used in the following explanation are just examples and dependent on the version of the "XPort" installed on the product.
For details of setting the XPort, please visit the website of Lantronix.

1. Start the Web browser; enter the present IP address "192.168.1.1" into the address bar and then press the Enter key.

> 🌐 http://192.168.1.1/

2. **Web Manager** is started and the first screen (Device Status) is displayed.
Click **Network** in the main menu on the left of the screen.

XPort　**LANTRONIX®**

Device Status

Click

Product Information	
Firmware Version:	V6.10.0.1
Build Date:	23-Oct-2014
Network Settings	
MAC Address:	00-80-A3-BA-9D-62
Network Mode:	Wired
DHCP HostName:	< None >
IP Address:	192.168.1.1
Default Gateway:	0.0.0.0
DNS Server:	0.0.0.0
MTU:	1400
Line settings	
Line 1:	RS232, 38400, 8, Even, 1, None.

Main menu:
Network
Server
Serial Tunnel
　Hostlist
Channel 1
　Serial Settings
　Connection
Email
　Trigger 1
　Trigger 2
　Trigger 3
Configurable Pins
Apply Settings
Apply Defaults

📖 **NOTE**

> **Do not click any keys except those specified. Device failure and other problems may occur.**

3. Display the Network Settings screen.
Set IP Address to "192.168.1.3" and click OK.

📖 **NOTE**

Do not change any items other than the IP Address. If so, device failure or error may result.

4. Clicking the **Apply Settings** button on the Menu display updates the setting to display the following message.

5. Enter the new IP address "192.168.1.3" into the address bar as instructed by message and then press the Enter key. Thus, a new IP address setting screen appears to end the setting.

6.2 Setting by Telnet

Set the IP address by the software "Telnet" attached to Windows.

■ Preparations before setting

When setting the IP address by Telnet, it is necessary to coincide the 1st to 3rd bytes and masking range of the IP address of the client (computer) which starts Telnet with those of the IP address of the COM-JL.

1. Connect the COM-JL and client, and then turn on the power.

☞   For wiring procedure, refer to **4. WIRING (P. 8)**.

2. Change the IP address of the client.
The IP address of the COM-JL is set to a factory set value of "192.168.1.1." As it is necessary to coincide the 1st to 3rd byte values of this IP address with those of the IP address of the client.

Setting value: 192.168.1. □   (□: Any value in the range of 0 to 255, but other than 1)

3. Change the subnet mask of the client.
As the subnet mask of the COM-JL is "255.255.255.0," also change the subnet mask of the client.

Setting value: 255.255.255.0

📖   After the IP address of the server is set, return the present IP address of the client to the original address or change to the address meeting the network to be connected.

📖   It is possible to set the IP address of the COM-JL using the client already connected to the network. **However, as the IP address of the client is changed, that client is disconnected from the network so far connected**.
In addition, when setting the IP address by this method, confirm to the network administrator whether or not no problem arises.

■ **Setting example**

An example of setting the IP address of the COM-JL to "192.168.1.3" is shown in the following.

📖 Screens used in the following explanation are just examples and dependent on the version of the "Telnet."

📖 Telnet may be disabled by default on Windows.
To activate Telnet on windows, proceed as follows.
Click [Control Panel], [Programs], [Turn Windows features on or off] and check "Telnet client" in the list.

1. Display the MS-DOS prompt (command prompt); enter the following command and then press the Enter key. (Description below is example when Windows is C drive.)

> C:¥>telnet 192.168.1.1 9999

2. Device information on the module (COM-JL) whose IP address is "192.168.1.1" is displayed. Finally, as the message "Press Enter for Setup Mode" is displayed, press the Enter key to go into Setup Mode.

> MAC address 0080A3BA9D62
> Software version V6.10.0.1 (141023) XPTEXE
>
> Press Enter for Setup Mode

📖 If the timing of pressing the Enter key is late, the message "Connection with Host was cut off" is displayed and thus the client is disconnected from the COM-JL. Therefore if the message "Press Enter for Setup Mode" is displayed, immediately press the Enter key. If disconnected, try again from "*1.* ."

3. If entered into Setup Mode, the present Ethernet information is displayed.
Finally, eight choices are displayed as "Change Setup:." Therefore enter "0" after "Your choice ?" and then press the Enter key.

> *** basic parameters
> Hardware: Ethernet TPI
> IP addr 192.168.1.1, no gateway set
> DNS Server not set
> DHCP FQDN option: Disabled
>
> *** Security
> SNMP is   enabled
> SNMP Community Name: public
> Telnet Setup is   enabled
> TFTP Download is   enabled
> Port 77FEh is   enabled
> 77FEh Access Mode is Read & Write
> Web Server is   enabled
> Web Setup is   enabled
> ECHO is   disabled
> Enhanced Password is   disabled
> Port 77F0h is   enabled
>
> Continued on the next page.

Continued from the previous page.

```
        (snip)

- Trigger 1
Serial trigger input: disabled
    Channel: 1
    Match: 00,00
Triger input1: X
Triger input2: X
Triger input3: X
Message:
Priority : L
Min. notification interval: 1 s
Re-notification interval   : 0 s

- Trigger 2
Serial trigger input: disabled
    Channel: 1
    Match: 00,00
Triger input1: X
Triger input2: X
Triger input3: X
Message:
Priority : L
Min. notification interval: 1 s
Re-notification interval   : 0 s

- Trigger 3
Serial trigger input: disabled
    Channel: 1
    Match: 00,00
Triger input1: X
Triger input2: X
Triger input3: X
Message:
Priority : L
Min. notification interval: 1 s
Re-notification interval   : 0 s


Change Setup:
    0 Server
    1 Channel 1
    3 E-mail
    5 Expert
    6 Security
    7 Defaults
    8 Exit without save
    9 Save and exit          Your choice ? 0
```

Enter "0" (Server), and press the Enter key.

4. Selecting "0: Server" makes ready to set the IP address.
Enter the IP address one byte by one byte.
As the following display appears, enter "192" into the first byte and then press the Enter key.

> IP Address : (192) 192

Next, enter "168" into the second byte and then press the Enter key.

> IP Address : (192) 192.(168) 168

Enter "1" into the third byte and then press the Enter key.

> IP Address : (192) 192.(168) 168.(001) 1

Enter "3" into the fourth byte and then press the Enter key.

> IP Address : (192) 192.(168) 168.(001) 1.(001) 3

5. After the IP address is entered, the following display appears. Therefore press the Enter key to proceed to the next.

> IP Address : (192) 192.(168) 168.(001) 1.(001) 3
> Set Gateway IP Address (N) ?

In addition, as one line is displayed, press the Enter key to proceed to the next.

> IP Address : (192) 192.(168) 168.(001) 1.(001) 3
> Set Gateway IP Address (N) ?
> Netmask: Number of Bits for Host Part (0=default) (0)

Further, as more one line is displayed, press the Enter key to proceed to the next.

> IP Address : (192) 192.(168) 168.(001) 1.(001) 3
> Set Gateway IP Address (N) ?
> Netmask: Number of Bits for Host Part (0=default) (0)
> Set DNS Server IP addr (N) ?

Further, as more one line is displayed, press the Enter key to proceed to the next.

> IP Address : (192) 192.(168) 168.(001) 1.(001) 3
> Set Gateway IP Address (N) ?
> Netmask: Number of Bits for Host Part (0=default) (0)
> Set DNS Server IP addr (N) ?
> Change telnet/Web Manager password (N) ?

6. As "Change Setup:" is displayed again, enter "9" after "Your choice ?" and then press the Enter key.

Change Setup:
   0 Server
   1 Channel 1
   3 E-mail
   5 Expert
   6 Security
   7 Defaults
   8 Exit without save
   9 Save and exit ───────── Your choice ? 9

> Enter "9" (Save and exit), and press the Enter key.
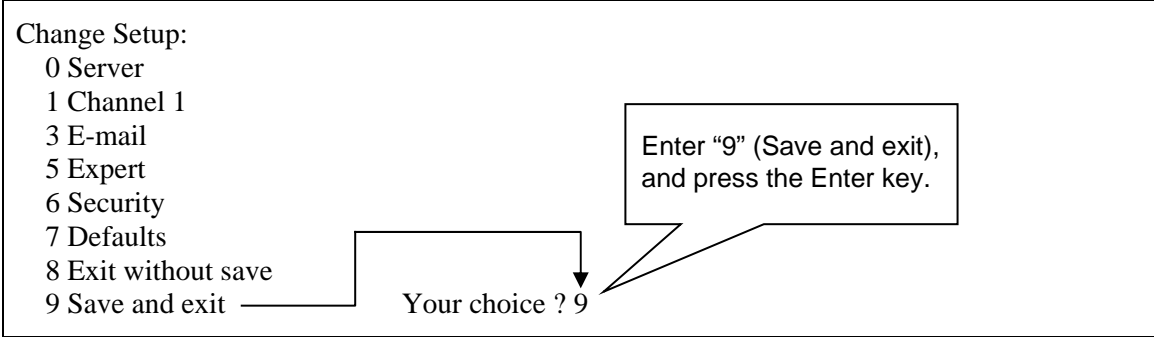
7. "Parameters stored ..." is displayed and thus the setting is finished.

Parameters stored ...

Connection with Host was cut off

6.3 Setting by DeviceInstaller

Use the special tool DeviceInstaller to configure IP address and TCP port settings.

DeviceInstaller can be downloaded from the Web site of Lantronix Inc..
For the detailed setting procedures, see the documentation attached to the DeviceInstaller.

📖 Before DeviceInstaller can be used, Microsoft's ".NET Framework" must be installed.
".NET Framework" can be downloaded from Microsoft's Web site.

📖 Screens used in the following explanation are just examples and dependent on the version of the "DeviceInstaller."

■ Setting outline

1. Connect the COM-JL and client, and then turn on the power.

☞ For wiring procedure, refer to **4. WIRING (P. 8)**.

2. Start the DeviceInstaller, and click the "Assign IP" icon.
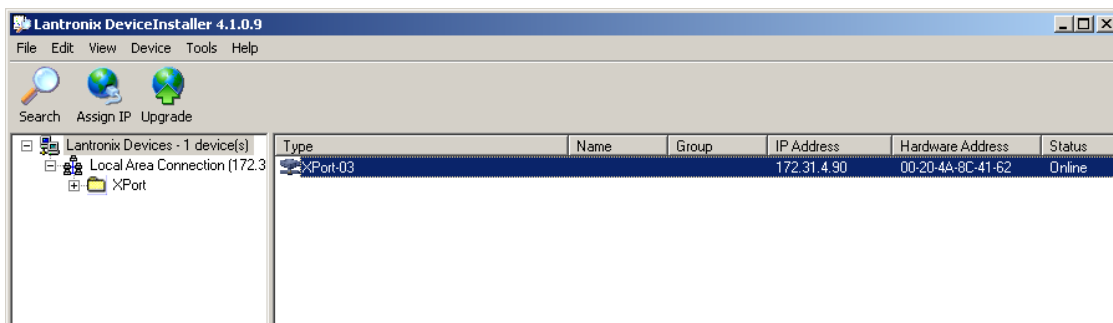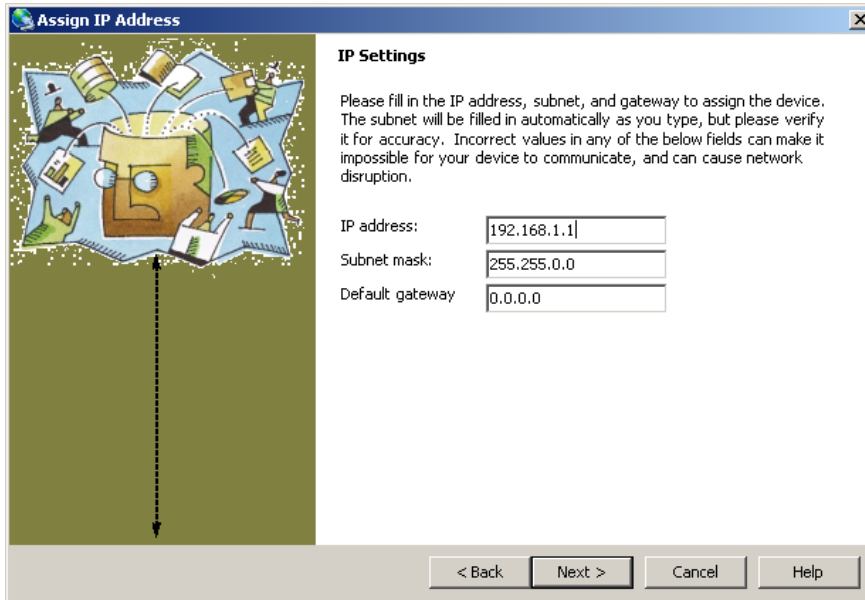
3. Select the "Assign a specific IP address", and click the "Next >" button.
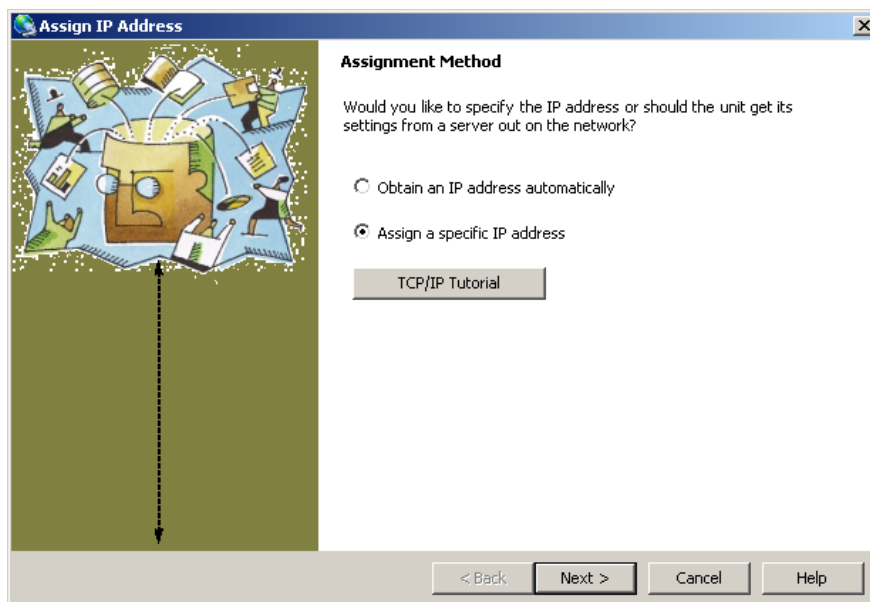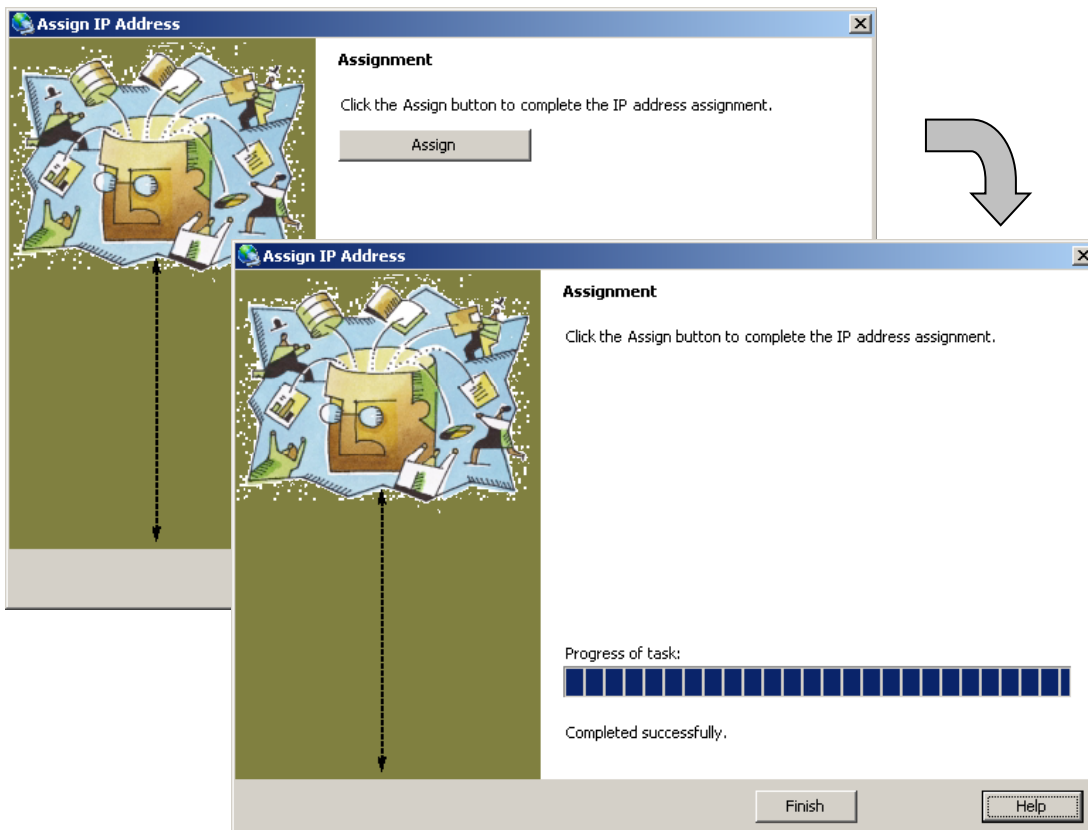
4. Enter the IP address, and click "Next >" button.

📖 Check that the subnet mask value is "255.255.255.0".

5. Click the "Assign" button to set the IP address.

6.4 Setting by the DIP Switch

It is possible to set the IP address by DIP switch with Ethernet not connected.
DIP switches used are "DIP switch 1" and "DIP switch 2" on the left side of the module.
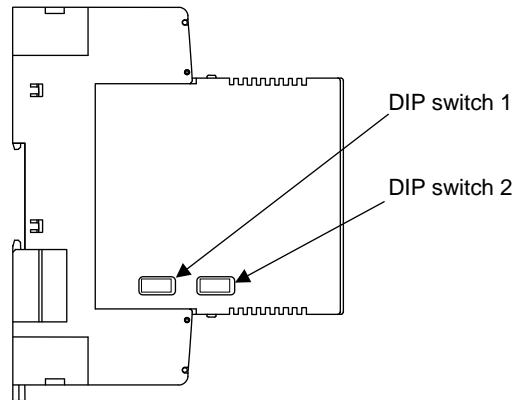
Left side view of COM-JL

📖 Factory set value of an IP address of a COM-JL is "192.168.1.1."

■ Setting example

An example of setting the IP address of the COM-JL to "192.168.1.3" is shown in the following.

1. Setting preparations

Turn on No. 6 and off No. 7 of DIP switch 1 with the power turned off.
It does not matter whether Nos. 1 to 5 and No. 8 of DIP switch 1 is turned on or off.

DIP switch 1

ON

ON
OFF

1 2 3 4 5 6 7 8

No. 6: ON
No. 7: OFF
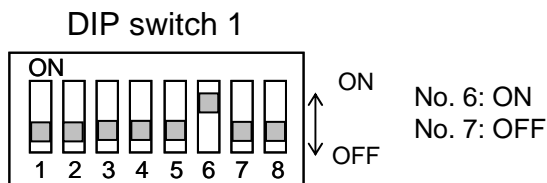
2. Power ON

Turning the power on goes to IP address setup mode. Thus, the FAIL lamp lights.
In addition, the first byte (most significant byte) of the IP address is set to the entry wait state.
(RUN lamp: ON, TX lamp: ON, RX lamp: OFF)

RX lamp
OFF

FAIL lamp
ON

RUN lamp
ON

TX lamp
ON
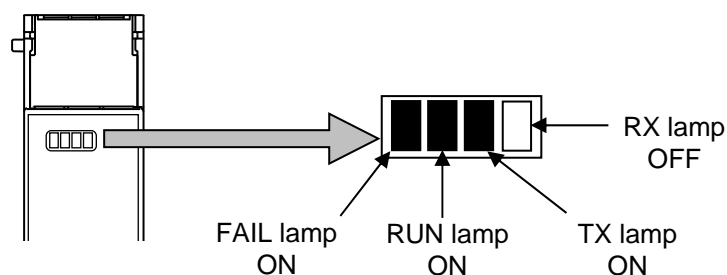
3. Input the first byte "192"

Enter the first byte (most significant byte) by DIP switch 2. As the first byte (most significant byte) is entered with "192," this number corresponds to a binary number of "11000000." Conduct the following setting with No. 8 of DIP switch 2 set to the most significant bit.

DIP switch 2

ON

OFF

1 2 3 4 5 6 7 8

ON
OFF

No. 1 to 6: OFF
No. 7, 8:   ON
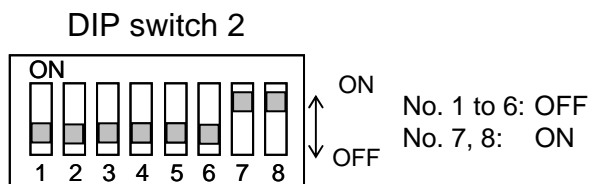
4. Decision of the first byte input

In order to establish the setting of DIP switch 2, turn off No. 6 of DIP switch 1.
In addition, the second byte of IP address is set to the entry wait state.
(RUN lamp: ON, TX lamp: OFF, RX lamp: OFF)

DIP switch 1

ON

1 2 3 4 5 6 7 8

No. 6
OFF

RX lamp
OFF

FAIL lamp   RUN lamp   TX lamp
ON   ON   OFF
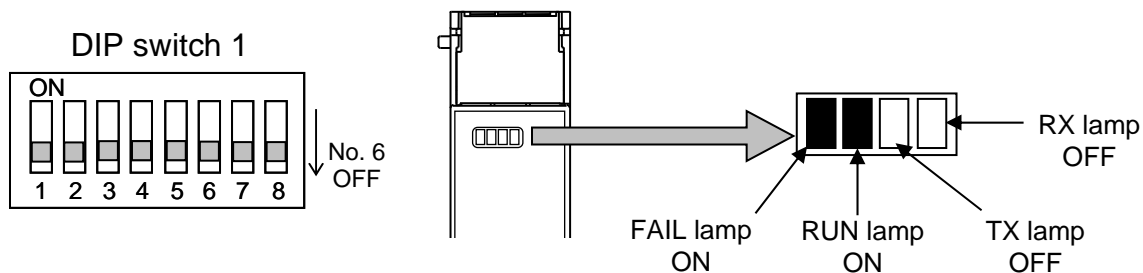
5. Input the second byte "168"

Enter the second byte by DIP switch 2. As the second byte is entered with "168," this number corresponds to a binary number of "10101000." Conduct the following setting with No. 8 of DIP switch 2 set to the most significant bit.

DIP switch 2

ON

OFF

1 2 3 4 5 6 7 8

ON
OFF

No. 1, 2, 3, 5, 7: OFF
No. 4, 6, 8:   ON
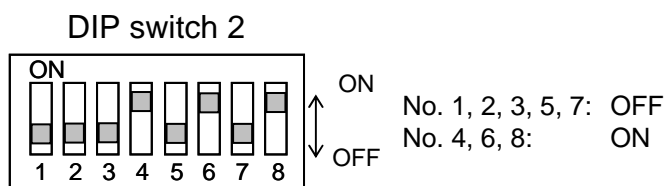
6. Decision of the second byte input

In order to establish the setting of DIP switch 2, turn on No. 6 of DIP switch 1.
In addition, the third byte of IP address is set to the entry wait state.
(RUN lamp: OFF, TX lamp: ON, RX lamp: OFF)

DIP switch 1

ON

1 2 3 4 5 6 7 8

No. 6
ON

RX lamp
OFF

FAIL lamp   RUN lamp   TX lamp
ON   OFF   ON
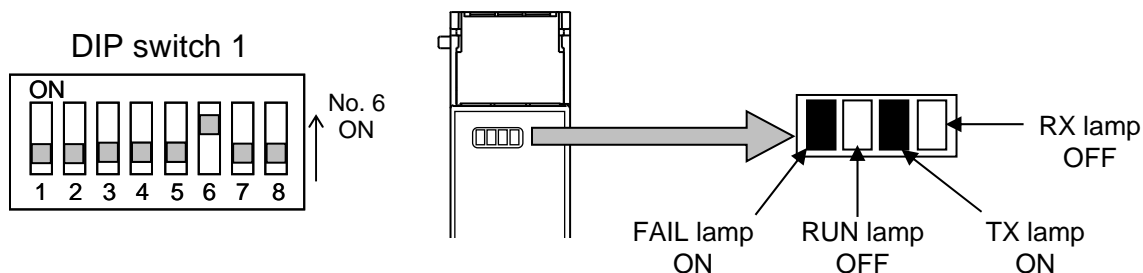
7. **Input the third byte "1"**

Enter the third byte by DIP switch 2. As the third byte is entered with "1," this number corresponds to a binary number of "00000001." Conduct the following setting with No. 8 of DIP switch 2 set to the most significant bit.

DIP switch 2

No. 1:   ON
No. 2 to 8: OFF
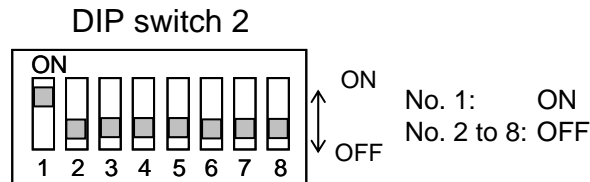
8. **Decision of the third byte input**

In order to establish the setting of DIP switch 2, turn off No. 6 of DIP switch 1.
In addition, the fourth byte of IP address is set to the entry wait state.
(RUN lamp: OFF, TX lamp: OFF, RX lamp: OFF)

DIP switch 1

No. 6 OFF

RX lamp OFF

FAIL lamp ON
RUN lamp OFF
TX lamp OFF
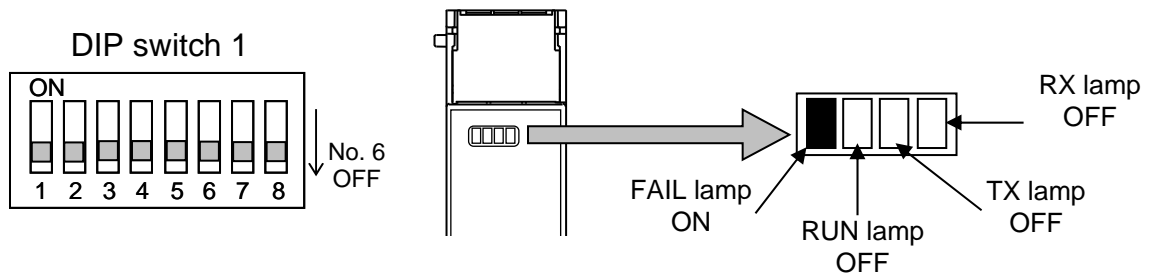
9. **Input the fourth byte "3"**

Enter the fourth byte by DIP switch 2. As the fourth byte is entered with "3," this number corresponds to a binary number of "00000011." Conduct the following setting with No. 8 of DIP switch 2 set to the most significant bit.

DIP switch 2

No. 1, 2:   ON
No. 3 to 8: OFF
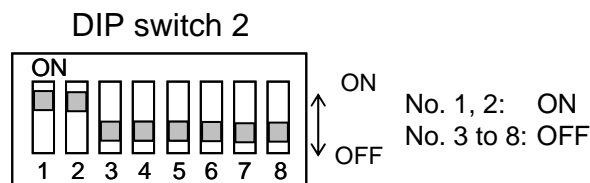
10. **Decision of the fourth byte input**

In order to establish the setting of DIP switch 2, turn on No. 6 of DIP switch 1. Thus, the IP address setting is finished and the FAIL lamp goes off.
(RUN lamp: OFF, TX lamp: OFF, RX lamp: OFF)

DIP switch 1

No. 6 ON

RX lamp OFF

FAIL lamp OFF
RUN lamp OFF
TX lamp OFF
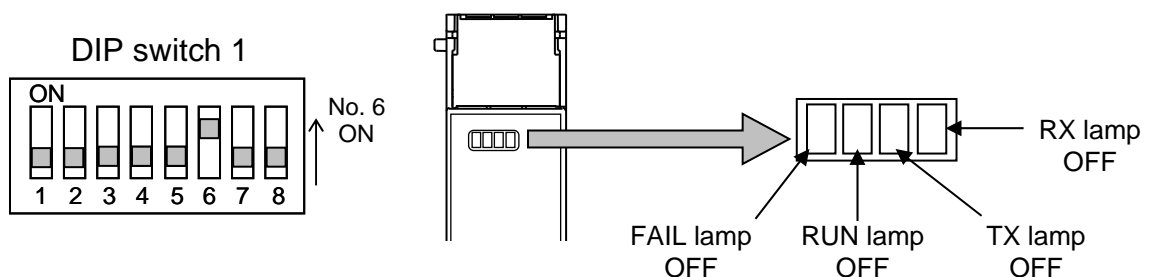
11. **Decision of the IP address**

After a lapse of a few seconds, the RUN lamp lights and the IP address is established.

The FAIL, TX and RX lamps flash until the IP address is established and they go off after the IP address is established.
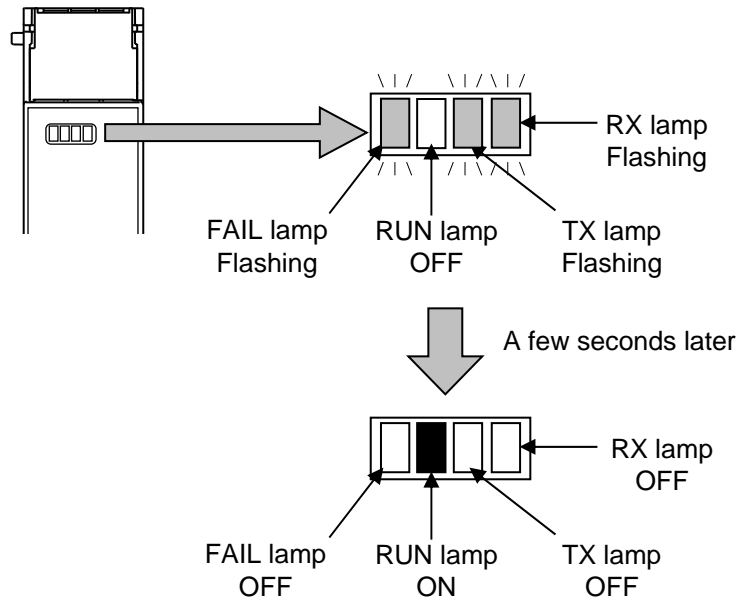
12. **Power OFF**

Turn the power off and also turn off No. 6 of DIP switch 1. In addition, turn off all Nos. of DIP switch 2.

If the power is turned on, operation starts at the IP address thus set.

7. MODBUS/TCP PROTOCOL

Modbus/TCP is an open field network provided with the Modbus protocol on the TCP/IP protocol of Ethernet.

The data request side is called "client" (such as computer) and the data response (supply) side is called "server" (COM-JL).

7.1 Message Configuration

Modbus ADU (Application Data Unit) on TCP/IP is in the following configuration.

Modbus TCP/IP ADU

MBAP Header 7 bytes	PDU (Protocol Data Unit) 2 to 255 bytes

	Function code 1 byte	Data 1 to 254 bytes

Transaction Identifier 2 bytes	Protocol Identifier 2 bytes	Data Length 2 bytes	Unit Identifier 1 byte
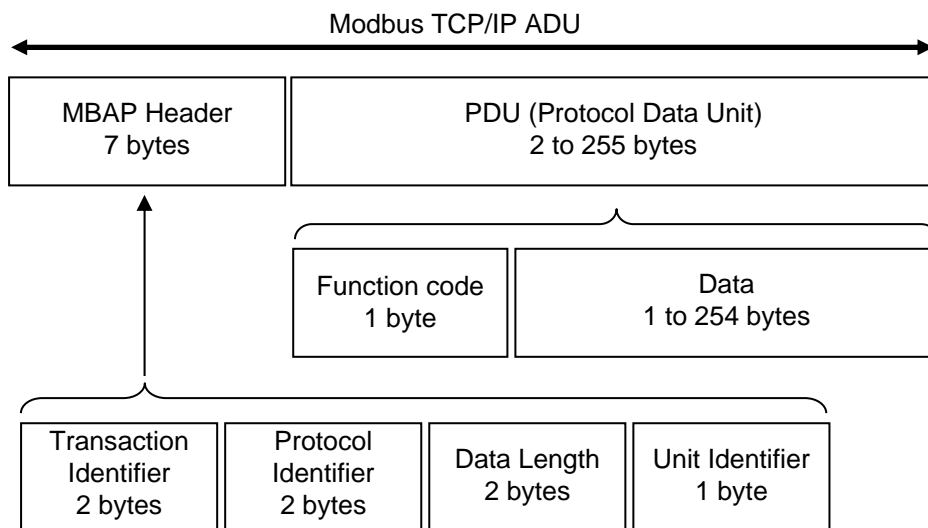
■ MBAP Header

MBAP (Modbus Application Protocol) header contains the following fields: Transaction Identifier, Protocol Identifier, Data Length and Unit Identifier.

Fields	Length	Request (Client)	Response (Server)
Transaction Identifier	2 bytes	Unused However, data corresponding to two bytes is sent According to need, request and the response are used in order to take consistency	Returns data from the client as is
Protocol Identifier	2 bytes	"0" fixed (Modbus protocol = 0)	Returns data from the client as is
Data Length	2 bytes	The total number of bytes of Unit Identifier and PDU (256 bytes max.)	The total number of bytes of Unit Identifier and PDU (256 bytes max.)
Unit Identifier	1 byte	Unused However, data corresponding to one byte is sent According to need, request and the response are used in order to take consistency	Returns data from the client as is

■ PDU

PDU (Protocol Data Unit) consists of two blocks: function codes and data.

Fields	Length	Request (Client)	Response (Server)

Function code	1 byte	03H: Read holding registers
		06H: Write single register
		08H: Diagnostics (loopback test)
		10H: Write multiple registers
		17H: Read/Write multiple registers
			Normal response
			  Returns data from the client as is
			Error response
			  80H + Function code

Data	1 to 254 bytes	Data meeting the function code	Normal response
			  Data meeting the function code
			Error response
			  Exception code
			  01H: Illegal function code
			  02H: Illegal register address
			  03H: Illegal data value
			  04H: Server failure
			  06H: Server busy

7.2 Function Code

● **Function code contents**

Function code	Function	Contents
03H	Read holding registers	Measured value, Control output value, Current transformer input value, Event status, etc.
06H	Write single register	Set value, PID constants, Event set value, etc.
08H	Diagnostics (loopback test)	Loopback test
10H	Write multiple registers	Set value, PID constants, Event set value, etc.
17H	Read/Write multiple registers	Measured value, Control output value, Current transformer input value, Event status, Set value, PID constants, Event set value, etc.

● **Message (PDU) length of each function [Unit: byte]**

Function code	Function	Request message		Response message	
		Min	Max	Min	Max
03H	Read holding registers	5	5	4	252
06H	Write single register	5	5	5	5
08H	Diagnostics (loopback test)	5	5	5	5
10H	Write multiple registers	8	252	5	5
17H	Read/write multiple registers	12	246	4	238

7.3 Server (COM-JL) Responses

■ **Normal response**

• In the response message of the read holding registers, the server (COM-JL) returns the "Function code," "Number of data items" and the "Read out data" as the response message.

• In the response message of the write single register and diagnostics (loopback test), the server (COM-JL) returns the same message as the request message.

• In the response message of the write multiple registers, the server (COM-JL) returns the "Function code," the "Register address number" and the "Number of register" as the response message.

• In the response message of the read/write multiple registers, the server (COM-JL) returns the "Function code," "Number of write data items" and the "Read out data" as the response message.

■ **Defective message response**

- If the request message from the client is defective, except for transmission error, the server (COM-JL) returns the exception response message without any action.

Function code
Exception code

Exception response message

- If the self-diagnostic function of the server (COM-JL) detects an error, the server will return an exception response message to all request messages.

- The function code of each exception response message is obtained by adding "80H" to the function code of the request message.

Exception code	Contents	Causes
01H	Illegal function code	An unsupported function code was specified
02H	Illegal register address	When the mismatched register address is specified.
03H	Illegal data value	• The number of specified data points was out of the following range during data read or write. 　　Function code 03H: 1 to 125 　　Function code 10H: 1 to 123 　　Function code 17H: 1 to 118 • When the data written exceeds the setting range
04H	Server failure	State under which the server cannot normally respond (An error occurred in the server)
06H	Server busy	State under which the server cannot immediately respond (The server is being initialized)

Exception code priority order
　01H > 03H > 02H > 04H > 06H
- Order of a no response in PDU data length error
　When Specified PDU data length < Received PDU data length:
　　　　　　　01H > No response in PDU data length error > 03H
　When Specified PDU data length > Received PDU data length:
　　　　　　　No response in PDU data length error > 01H
- Order when reading/writing the register contents
　When there is 02H or 03H only for read processing:
　　　　　　　01H > 04H > 06H > 03H > 02H
- Order when out of the setting range
　For 03H when out of the setting range: 01H > 02H > 04H > 06H > 03H

■ **No response**

The server (COM-JL) ignores the request message and does not respond when:
- The IP address does not coincide.
- The server (COM-JL) is not connected to the network.
- The PDU (Protocol Data Unit) data length is abnormal.
　When the PDU data length specified by the request message does not coincide with the number of bytes received as one TCP packet.
　COM-JL determines whether or not communication messages correspond to one packet by time-out (approx. 12 ms) between characters.

7.4 Message Format

7.4.1 Read holding registers [03H]

The request message specifies the starting register address number and quantity of register addresses to be read.

The contents of the registers are entered in the response message as data, divided into two parts: the high-order eight bits and low-order eight bits, arranged in the order of the register numbers.

Example: The contents of the four registers from 0000H to 0003H are the read out.

Request message [Client]

Transaction Identifier	High	00H	
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	MBAP Header
Data Length	High	00H	
	Low	06H	
Unit Identifier		00H	
Function code		03H	
Register address	High	00H	First register address
	Low	00H	
Quantity	High	00H	The setting must be between 1 (0001H) and
(Number of words)	Low	04H	125 (007DH).

Normal response message [Server]

Transaction Identifier	High	00H	
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	MBAP Header
Data Length	High	00H	
	Low	0BH	
Unit Identifier		00H	
Function code		03H	
Number of data (byte)		08H	→ Number of registers × 2
First register	High	01H	
contents	Low	24H	
Next register	High	01H	
contents	Low	1BH	
Next register	High	01H	
contents	Low	2BH	
Next register	High	01H	
contents	Low	22H	

Exception response message [Sever]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	03H
Unit Identifier		00H
80H + Function code		83H
Exception code		03H

MBAP Header (Transaction Identifier through Unit Identifier)

When the data exceeds the setting range (Exception code)

7.4.2 Write single register [06H]

The request message specifies data to be written into the designated register.
Write data items are arranged in the request message in order starting from the smallest register address number. In addition, each register address is assigned in the order of high-order eight bits and low-order eight bits, respectively.

Example: When 100 (64H) is written to the register 0B00H

Request message [Client]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	06H
Unit Identifier		00H
Function code		06H
Register address	High	0BH
	Low	00H
Write data	High	00H
	Low	64H

MBAP Header

Any data within the range

Normal response message [Server]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	06H
Unit Identifier		00H
Function code		06H
Register address	High	0BH
	Low	00H
Write data	High	00H
	Low	64H

Contents will be the same as request message data

Exception response message [Sever]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	03H
Unit Identifier		00H
80H + Function code		86H
Exception code		03H

MBAP Header

When the data exceeds the setting range

7.4.3 Diagnostics (Loopback test) [08H]

The client's request message will be returned as the response message from the server.
This function checks the communication system between the client and server (COM-JL).

Example: Loopback test

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		00H	
Function code		08H	
Test code	High	00H	Test code must be set to 00H
	Low	00H	
Data	High	1FH	Any pertinent data
	Low	34H	

Normal response message [Server]

Transaction Identifier	High	00H	
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	Contents will be the same as request message data
Unit Identifier		00H	
Function code		08H	
Test code	High	00H	
	Low	00H	
Data	High	1FH	
	Low	34H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		00H	
80H + Function code		88H	
Exception code		06H	When server is busy

7.4.4 Write multiple registers [10H]

Each data is written to registers in specified quantities starting from the specified register address.
Write data items are arranged in the request message in order starting from the smallest register address number. In addition, each register address is assigned in the order of high-order eight bits and low-order eight bits, respectively.

Example: When 100 (64H) and 120 (78H) are written to the register 0B00H and 0B01H (two in total)

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	0BH	
Unit Identifier		00H	
Function code		10H	
Register address	High	0BH	First register address
	Low	00H	
Quantity	High	00H	The setting must be between 1 (0001H) and
(Number of words)	Low	02H	123 (007BH).
Number of data (byte)		04H	→ Number of registers × 2
Data to first register	High	00H	
	Low	64H	
Data to next register	High	00H	
	Low	78H	

Normal response message [Server]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	06H	
Unit Identifier		00H	
Function code		10H	
Register address	High	0BH	First register address
	Low	00H	
Quantity	High	00H	
(Number of words)	Low	02H	

Exception response message [Sever]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	03H	
Unit Identifier		00H	
80H + Function code		90H	
Exception code		03H	→ When the data exceeds the setting range

7.4.5 Read/write multiple registers [17H]

The contents of consecutive registers in specified quantities are read starting from the specified register address. Each data is written to registers in specified quantities starting from the specified register address.

Example: When data is read from the register 0000H (one in total) and then 100 (64H) and 120 (78H) are written to the register 0B00H and 0B01H (two in total)

Request message [Client]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	0FH	
Unit Identifier		00H	
Function code		17H	
Read register address	High	00H	First read register address
	Low	00H	
Read quantity (Number of words)	High	00H	The setting must be between 1 (0001H) and 118 (0076H).
	Low	01H	
Write register address	High	0BH	First write register address
	Low	00H	
Write quantity (Number of words)	High	00H	The setting must be between 1 (0001H) and 118 (0076H).
	Low	02H	
Number of write data (byte)		04H	Number of write registers × 2
Written data to first register	High	00H	
	Low	64H	
Written data to next register	High	00H	
	Low	78H	

Normal response message [Server]

Transaction Identifier	High	00H	MBAP Header
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	
Data Length	High	00H	
	Low	05H	
Unit Identifier		00H	
Function code		17H	
Number of write data (byte)		04H	Number of write registers × 2
Read register contents	High	00H	
	Low	6EH	

Exception response message [Sever]

Transaction Identifier	High	00H	
	Low	00H	
Protocol Identifier	High	00H	
	Low	00H	MBAP Header
Data Length	High	00H	
	Low	03H	
Unit Identifier		00H	
80H + Function code		97H	
Exception code		03H	→ When the data exceeds the setting range

7.5 Data Configuration

7.5.1 Data scale

The numeric range of data used in this protocol is 0000H to FFFFH. Only the set value within the setting range is effective.

📖　FFFFH represents −1.

■ Data processing with decimal points

The Modbus/TCP protocol does not recognize data with decimal points during communication.

● Data without decimal points

Burnout state monitor	COM-JL error code
Event 1 state monitor	Number of connected controller in controller communication
Event 2 state monitor	Number of connected channel in controller communication
Control loop break alarm (LBA) state monitor	Action mode selection
Error code	Number of connectable controller channels
ROM version	Transmmision wait time of controller communication
PID/AT transfer	Backup memory state monitor
Auto/Manual transfer	No. 1 Controller type
RUN/STOP transfer	⋮
Control loop break alarm (LBA) time	No. 31 Controller type
Integral time [heat-side]	Controller type (batch setting)
Derivative time [heat-side]	No. 1 Controller state
Control response parameter	⋮
PV digital filter	No. 31 Controller state
Proportional cycle time [heat-side]	No. 1 Controller address
Input range number	⋮
Decimal point position monitor	No. 31 Controller address
Event 1 type	Automatic acquisition of controller address
Event 1 hold action	
Event 2 type	
Event 2 hold action	
Hot/Cold start	
Control action	
Action (high) at input error	
Action (low) at input error	
Operation mode	
Control loop break alarm (LBA) usage selection	
Transistor output selection	
Event timer	
Interval time	
Operation mode holding setting	
Communication speed	

Example: When Integral time [heat-side] is 240 seconds,
240 = 00F0H

Integral time [heat-side]	High	00H
	Low	F0H

● **Data with one decimal place**

Measured value (PV)
Set value (SV) monitor
Manipulated output value (MV) monitor [heat-side]
Event 1 set value (EV1)
Event 2 set value (EV2)
LBA deadband (LBD)
Set value (SV)
Proportional band [heat-side]
PV bias
Manual manipulated output value
Input scale high monitor
Input scale low monitor
Input error determination point (high)
Input error determination point (low)
Event 1 differential gap
Event 2 differential gap
Start determination point
Manipulated output value at input error
AT bias

Example: When Set value (SV) is 120.0 °C, 120.0 is processed as 1200,
1200 = 04B0H

Set value (SV)	High	04H
	Low	B0H

7.5.2 Caution for handling communication data

- In this communication, the variables that memory area includes handles different address with for control area and for setting area.

- If data (holding register) exceeding the accessible address range is accessed, an error response message is returned.

- Read data of unused item is a default value.

- Any attempt to write to an unused item is not processed as an error. Data cannot be written into an unused item.

- If data range or address error occurs during data writing, it is not processed as an error. Except the data that error occurred, normal data is written in data register. Therefore, it is necessary to confirm data after the end of setting data.

- Communication data includes data that becomes RO (read only) depending on the specification. No error occurs even if data is written when set to RO. However in this case, no data is written.

☞   For details, refer to **8. COMMUNICATION DATA LIST (P. 48)**.

8. COMMUNICATION DATA LIST

8.1 Reference to Communication Data List

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
1	Measured value (PV)	0000	0	64	RO	Input scale low to Input scale high (Low limit of input range to High limit of input range)	—
2	Unused	0040	64	64	—	—	—

(above the table, labels (1) through (6) point to: (1) Name, (2) Register address, (3) Number of data items, (4) Attribute, (5) Data range, (6) Factory set value)

(1) Name: Communication data name is written.

Symbol:

♦: Engineering setting data

♥: Communication data for each module

(2) Register address: The register start number of each communication item

(Vacant numbers becomes unused.)

HEX: Hexadecimal

DEC: Decimal

(3) Number of data items: Number of communication data items is written.

The address in the register address column will be the head address, and the number of data items is indicated in this column.

📖 In the case of 8-channel type (J-TI-B modules), the number of the data per one module is the same as 16-channel type (J-TI-A modules).

(16 channels × 4 modules = 64)

(4) Attribute: A method of how communication data items are read or written when viewed from the host computer is described.

RO: Read only data

Data direction

Host computer   ⟵   Controller

R/W: Read and Write data

Data direction

Host computer   ⟷   Controller

(5) Data range: The reading range or the writing range of communication data is written.

📖 Bit image of bit data is as follows.

16-bit data

Bit 15 ·························· Bit 0
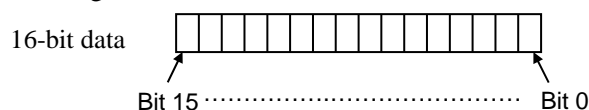
(6) Factory set value: The factory set value of communication data is written.

📖 CH9 to CH16 of J-TI-B (8-channel type) are as follows.

Operation mode: "0: Unused"

Communication data except in the operation mode: Invalid [1]

[1] Communication data in CH9 to CH16 are equal to the factory set values for CH1 to CH8. When the data is written, it is written properly, but not used.

📖 In the case of the communication data [2] corresponding to each module, as for the data of the module which is not connected, become to "Read data: 0" and "Write data: invalid".

[2] Communication data with a ♥ mark in the name column

📖 Communication data includes both Normal setting data and Engineering setting data [3]. The attribute of the data in the Engineering setting data is RO (read only) during RUN (control).

[3] Communication data with a ♦ mark in the name column.

⚠ **WARNING**

Communication data in the Engineering setting data should be set according to the application before setting any parameter related to operation. Once the communication data in the Engineering setting data is set correctly, no further changes need to be made to parameters for the same application under normal conditions. If they are changed unnecessarily, it may result in malfunction or failure of the instrument. RKC will not bear any responsibility for malfunction or failure as a result of improper changes in the Engineering setting data.

📖 **NOTE**

Communication data in Engineering setting data is settable only when the controller is in STOP mode. However, only checking can be made even in the RUN state.

☞ For details on the data, refer to **SRJ Instruction Manual (IMS01X03-E☐)**.

8.2 SRJ (J-TI module) Communication Data Items

No.	Name	Register address HEX	Register address DEC	Number of data items	Attri-bute	Data range	Factory set value
1	Measured value (PV)	0000	0	64	RO	Input scale low to Input scale high (Low limit of input range to High limit of input range)	—
—	Unused	0040	64	64	—	—	—
—	Unused	0080	128	64	—	—	—
2	Set value (SV) monitor	00C0	192	64	RO	Input scale low to Input scale high (Low limit of input range to High limit of input range)	—
—	Unused	0100	256	64	RO	—	—
3	Burnout state monitor	0140	320	64	RO	0: OFF 1: ON	—
—	Unused	0180	384	64	—	—	—
4	Event 1 state monitor	01C0	448	64	RO	0: OFF 1: ON	—
5	Event 2 state monitor	0200	512	64	RO		—
—	Unused	0240	576	64	—	—	—
—	Unused	0280	640	64	—	—	—
—	Unused	02C0	704	64	—	—	—
6	Control loop break alarm (LBA) state monitor	0300	768	64	RO	0: OFF 1: ON	—
7	Manipulated output value (MV) monitor [heat-side]	0340	832	64	RO	−5.0 to +105.0 %	—
—	Unused	0380	896	64	—	—	—
8	Error code ♥	03C0	960	64	RO	Bit data Bit 0: Data back-up error Bit 1: CVM address duplication or setting error Bit 2: Module configuration error Bit 3: Adjustment data error Bit 4: A/D conversion error Bit 5 to Bit 7: Unused Data 0: OFF 1: ON [Decimal number: 0 to 31]	—
—	Unused	0400 ⋮ 073F	1024 ⋮ 1855	—	—	—	—
9	ROM version ♥	0740	1856	64	RO	Version of ROM built in the instrument	—
—	Unused	0780	1920	64	—	—	—
—	Unused	07C0	1984	64	—	—	—

♥ Communication data for each module

Continued from the previous page.

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
10	PID/AT transfer	0800	2048	64	R/W	0: PID control 1: Autotunig (AT) * * Automatically reverts to 0 after autotuning ends.	0
11	Auto/Manual transfer	0840	2112	64	R/W	0: Auto mode 1: Manual mode	0
—	Unused	0880	2176	64	—	—	—
12	RUN/STOP transfer ♥	08C0	2240	64	R/W	0: RUN mode (Control start) 1: STOP mode (Control stop)	0
—	Unused	0900	2304	64	—	—	—
—	Unused	0940	2368	64	—	—	—
13	Event 1 set value	0980	2432	64	R/W	• Deviation high, Deviation low −Input span to +Input span • Deviation high/low, Band 0.0 to Input span	0.0
14	Event 2 set value	09C0	2496	64	R/W	• Process high, Process low Input scale low to Input scale high (Low limit of input range to High limit of input range)	0.0
—	Unused	0A00	2560	64	—	—	—
—	Unused	0A40	2624	64	—	—	—
15	Control loop break alarm (LBA) time	0A80	2688	64	R/W	1 to 7200 seconds	480
16	LBA deadband (LBD)	0AC0	2752	64	R/W	0.0 to Input span	0.0
17	Set value (SV)	0B00	2816	64	R/W	Input scale low to Input scale high (Low limit of input range to High limit of input range)	0.0
18	Proportional band [heat-side]	0B40	2880	64	R/W	0.0 to Input span (Unit: °C [°F]) (0.0: ON/OFF action)	10.0
19	Integral time [heat-side]	0B80	2944	64	R/W	1 to 3600 seconds	240
20	Derivative time [heat-side]	0BC0	3008	64	R/W	0 to 3600 seconds (0: PI action)	60
21	Control response parameter	0C00	3072	64	R/W	0: Slow 1: Medium 2: Fast [When the P or PD action is selected, this setting becomes invalid]	2
—	Unused	0C40 ⋮ 0FFF	3136 ⋮ 4095	—	—	—	—

♥ Communication data for each module

Continued from the previous page.

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
22	PV bias	1000	4096	64	R/W	−Input span to +Input span	0.0
23	PV digital filter	1040	4160	64	R/W	0 to 100 seconds (0: Unused)	0
—	Unused	1080 ⋮ 11BF	4224 ⋮ 4543	—	—	—	—
24	Proportional cycle time [heat-side]	11C0	4544	64	R/W	1 to 100 seconds This settings are only effective for CH1 of the J-TI master. Settings made on channels other than CH1 of the J-TI master are ignored. J-TI master: J-TI module of the communication address 0, 4, 8 or C	2
—	Unused	1200	4608	64	—	—	—
25	Manual manipulated output value	1240	4672	64	R/W	−5.0 to +105.0 % When "Running" is set in the Auto mode: Normal response (Same action as writing to RO)	0.0
—	Unused	1280 ⋮ 147F	4736 ⋮ 5247	—	—	—	—
26	Input range number ♦	1480	5248	64	R/W	• TC input 0: K 0.0 to 400.0 °C 1: K 0.0 to 800.0 °C 2: K 0.0 to 1300.0 °C 3: R 0.0 to 1700.0 °C • RTD input 10: Pt100 0.0 to 400.0 °C 11: Pt100 0.0 to 600.0 °C 12: Pt100 0.0 to 800.0 °C When the input range is switched, wait for three seconds or more before running the system.	Same as the input range of the input range code specified at the time of J-TI module order.
—	Unused	14C0	5312	64	—	—	—
27	Decimal point position monitor	1500	5376	64	RO	0: No decimal place 1: One decimal place	—
28	Input scale high monitor	1540	5440	64	RO	High limit of input range	—
29	Input scale low monitor	1580	5504	64	RO	Low limit of input range	—

♦ Engineering setting data

Continued from the previous page.

No.	Name	Register address HEX	Register address DEC	Number of data items	Attri-bute	Data range	Factory set value
30	Input error determination point (high)	15C0	5568	64	R/W	Input error determination point (low) to Input scale high [Input error determination point (low) to High limit of input range]	Input scale high (High limit of input range)
31	Input error determination point (low)	1600	5632	64	R/W	Input scale low to Input error determination point (high) [Low limit of input range to Input error determination point (high)]	Input scale low (Low limit of input range)
—	Unused	1640 ⋮ 1C3F	5696 ⋮ 7231	—	—	—	—
32	Event 1 type ♦	1C40	7232	64	R/W	0: None 1: Process high [a] 2: Process low [a] 3: Deviation high [b] 4: Deviation low [b] 5: Deviation high/low [b] 6: Band [b] [a] Event hold action is available. [b] Event hold and re-hold action is available.	If the Event type is specified by the initial setting code when J-TI module ordering, that Event type will be the factory set value. If the Event type is not specified: 3
33	Event 1 hold action ♦	1C80	7296	64	R/W	Bit data Bit 0: with/without hold action Bit 1: with/without re-hold action Bit 2 to Bit 7: Unused Data 0: None 1: Supplied [Decimal number: 0 to 3] Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored.	If the Event type is specified by the initial setting code when J-TI module ordering, the factory set value of Event hold action differs depending on the Event type. If the Event type is not specified: 1
—	Unused	1CC0	7360	64	—	—	—
34	Event 1 differential gap ♦	1D00	7424	64	R/W	0.0 to Input span	2.0

♦ Engineering setting data

Continued from the previous page.

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
—	Unused	1D40	7488	64	—	—	—
—	Unused	1D80	7552	64	—	—	—
35	Event 2 type	1DC0	7616	64	R/W	0: None 1: Process high [a] 2: Process low [a] 3: Deviation high [b] 4: Deviation low [b] 5: Deviation high/low [b] 6: Band [b] [a] Event hold action is available. [b] Event hold and re-hold action is available.	If the Event type is specified by the initial setting code when J-TI module ordering, that Event type will be the factory set value. If the Event type is not specified: 4
36	Event 2 hold action	1E00	7680	64	R/W	Bit data Bit 0: with/without hold action Bit 1: with/without re-hold action Bit 2 to Bit 7: Unused Data 0: None 1: Supplied [Decimal number: 0 to 3] Setting hold or re-hold action on the event that is not available with hold and re-hold actions will just be ignored.	If the Event type is specified by the initial setting code when J-TI module ordering, the factory set value of Event hold action differs depending on the Event type. If the Event type is not specified: 1
—	Unused	1E40	7744	64	—	—	—
37	Event 2 differential gap ♦	1E80	7808	64	R/W	0.0 to Input span	2.0
—	Unused	1EC0 ⋮ 243F	7872 ⋮ 9279	—	—	—	—
38	Hot/Cold start	2440	9280	64	R/W	0: Hot start 1 1: Hot start 2 2: Cold start	1

♦ Engineering setting data

Continued from the previous page.

No.	Name	Register address HEX	Register address DEC	Number of data items	Attri-bute	Data range	Factory set value
39	Start determination point	2480	9344	64	R/W	0.0 to Input span 0.0: Operation starts from any start state selected by Hot/Cold start	0.0
—	Unused	24C0 ⋮ 25BF	9408 ⋮ 9663	—	—	—	—
40	Control action ♦	25C0	9664	64	R/W	0: Brilliant II PID control (direct action) 1: Brilliant II PID control (reverse action)	1
—	Unused	2600 ⋮ 277F	9728 ⋮ 10111	—	—	—	—
41	Action (high) at input error	2780	10112	64	R/W	0: Control continues (with the latest output) 1: Manipulated output value at input error (Manual mode) The Operation mode is switched to the Manual mode and the Manipulated output at Input error is output.	0
42	Action (low) at input error	27C0	10176	64	R/W	2: Manipulated output value at input error (Auto mode) The Operation mode remains in the Auto mode and the Manipulated output at Input error is output. When the error is recovered, the operation mode is switched to the PID control.	0
43	Manipulated output value at input error	2800	10240	64	R/W	−5.0 to +105.0 % Actual output value is restricted by the Output limiter.	0.0
—	Unused	2840 ⋮ 2B3F	10304 ⋮ 11071	—	—	—	—
44	AT bias	2B40	11072	64	R/W	−Input span to +Input span	0.0
—	Unused	2B80 ⋮ 4CBF	11136 ⋮ 19647	—	—	—	—
45	Operation mode	4CC0	19648	64	R/W	0: Unused (Neither monitor nor control is performed.) 1: Monitor (Only data monitor is performed.) 2: Monitor + Event function (Data monitor and event action [including LBA] are performed.) 3: Control (Control is performed.)	3

♦ Engineering setting data

Continued from the previous page.

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
—	Unused	4D00 ⋮ 4EFF	19712 ⋮ 20223	—	—	—	—
46	Control loop break alarm (LBA) usage selection	4F00	20224	64	R/W	0: Unused 1: Used	0
47	Transistor output selection	4F40	20288	64	R/W	0: No assignment 1: CH1 to CH8 2: CH9 to CH16 * 3: CH17 to CH24 4: CH25 to CH32 * 5: CH33 to CH40 6: CH41 to CH48 * 7: CH49 to CH56 8: CH57 to CH64 * * Assignable only for the J-TI-A These settings are only effective for CH1 to CH8 of the J-TI master. Settings made on channels other than CH1 to CH8 of the J-TI master are ignored. CH1 to CH8 of the J-TI master correspond to address 0 to 7 of the J-CVM. J-TI master: J-TI module of the communication address 0, 4, 8 or C	0
48	Event timer ♦	4F80	20352	64	R/W	0 to 255 seconds	0
49	Interval time ♥	4FC0	20416	64	R/W	0 to 100 ms	0

50	Operation mode holding setting ♥	5000	20480	64	R/W	0: Not hold
						  Initialize the operation mode to
						  "1: Monitor"
						1: Hold
							1

51	Communication speed ♦ ♥	5040	20544	64	R/W	0: 19200 bps 1: 38400 bps The data changes become valid when the power is turned on again.	1

♦ Engineering setting data

♥ Communication data for each module

8.3 COM-JL Communication Data Items

The register addresses, FA00H (64000) or more are used for checking and changing each set value of the COM-JL.

♠ These items become valid by turning off the power of the COM-JL once, and then turning it on again after the settings are changed.

★ This setting (factory set value: 64) causes each address to be shifted by 64 for each communication item in the SRJ (J-TI module) Communication Data. **Therefore, exercise sufficient care if you change the setting as the data mappings will also change.**

♣ The value of this item should always be set to 6 (J-TI module). (Factory set value: 6)

No.	Name	Register address		Number of data items	Attribute	Data range	Factory set value
		HEX	DEC				
—	Unused	FA00 ⋮ FA07	64000 ⋮ 64007	—	—	—	—
1	COM-JL error code	FA08	64008	1	RO	Bit data Bit 0: Memory backup error Bit 1: RAM error Bit 2: Controller configuration error Bit 3: Unused Bit 4: Ethernet hardware error Bit 5 to Bit 15: Unused Data 0: OFF 1: ON [Decimal number: 0 to 23]	—
—	Unused	FA09	64009	—	—	—	—
2	Number of connected controller in controller communication	FA0A	64010	1	RO	0 to 31	—
3	Number of connected channel in controller communication	FA0B	64011	1	RO	0 to 128	—
4	Action mode selection ♠	FA0C	64012	1	R/W	Bit data Bit 0: Address setting * 　　0: Continuous setting 　　1: Free setting Bit 1 to Bit 15: Unused [Decimal number: 0 to 1]	Bit 0: 1 Bit 1 to 15: 0 [Decimal number: 1]
5	Number of connectable controller channels ♠ ★	FA0D	64013	1	R/W	1 to 128	64

* There are two address settings for the controller (SRJ) connecting to the COM-JL: continuous setting and free setting.
  • For the continuous setting (factory set value), consecutive numbers starting from 1 are set to each controller.
  • Free settings can be made in the range of 1 to 32.

Continued from the previous page.

No.	Name	Register address HEX	Register address DEC	Number of data items	Attri-bute	Data range	Factory set value
6	Transmmision wait time of controller communication	FA0E	64014	1	R/W	0 to 100 ms	0
7	Backup memory state monitor	FA0F	64015	1	RO	0: The content of the backup memory does not coincide with that of the RAM. 1: The content of the backup memory coincides with that of the RAM	—
—	Unused	FA10 ⋮ FA27	64015 ⋮ 64039	—	—	—	—
8	No. 1 Controller type ♣	FA28	64040	1	R/W	0 to 65534 6: J-TI module	6
9	No. 2 Controller type ♣	FA29	64041	1	R/W	0 to 65534 6: J-TI module	6
10	No. 3 Controller type ♣	FA2A	64042	1	R/W	0 to 65534 6: J-TI module	6
11	No. 4 Controller type ♣	FA2B	64043	1	R/W	0 to 65534 6: J-TI module	6
12	No. 5 Controller type ♣	FA2C	64044	1	R/W	0 to 65534 6: J-TI module	6
13	No. 6 Controller type ♣	FA2D	64045	1	R/W	0 to 65534 6: J-TI module	6
14	No. 7 Controller type ♣	FA2E	64046	1	R/W	0 to 65534 6: J-TI module	6
15	No. 8 Controller type ♣	FA2F	64047	1	R/W	0 to 65534 6: J-TI module	6
16	No. 9 Controller type ♣	FA30	64048	1	R/W	0 to 65534 6: J-TI module	6
17	No. 10 Controller type ♣	FA31	64049	1	R/W	0 to 65534 6: J-TI module	6
18	No. 11 Controller type ♣	FA32	64050	1	R/W	0 to 65534 6: J-TI module	6
19	No. 12 Controller type ♣	FA33	64051	1	R/W	0 to 65534 6: J-TI module	6
20	No. 13 Controller type ♣	FA34	64052	1	R/W	0 to 65534 6: J-TI module	6
21	No. 14 Controller type ♣	FA35	64053	1	R/W	0 to 65534 6: J-TI module	6
22	No. 15 Controller type ♣	FA36	64054	1	R/W	0 to 65534 6: J-TI module	6
23	No. 16 Controller type ♣	FA37	64055	1	R/W	0 to 65534 6: J-TI module	6
24	No. 17 Controller type ♣	FA38	64056	1	R/W	0 to 65534 6: J-TI module	6

Continued from the previous page.

No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
25	No. 18 Controller type ♣	FA39	64057	1	R/W	0 to 65534 6: J-TI module	6
26	No. 19 Controller type ♣	FA3A	64058	1	R/W	0 to 65534 6: J-TI module	6
27	No. 20 Controller type ♣	FA3B	64059	1	R/W	0 to 65534 6: J-TI module	6
28	No. 21 Controller type ♣	FA3C	64060	1	R/W	0 to 65534 6: J-TI module	6
29	No. 22 Controller type ♣	FA3D	64061	1	R/W	0 to 65534 6: J-TI module	6
30	No. 23 Controller type ♣	FA3E	64062	1	R/W	0 to 65534 6: J-TI module	6
31	No. 24 Controller type ♣	FA3F	64063	1	R/W	0 to 65534 6: J-TI module	6
32	No. 25 Controller type ♣	FA40	64064	1	R/W	0 to 65534 6: J-TI module	6
33	No. 26 Controller type ♣	FA41	64065	1	R/W	0 to 65534 6: J-TI module	6
34	No. 27 Controller type ♣	FA42	64066	1	R/W	0 to 65534 6: J-TI module	6
35	No. 28 Controller type ♣	FA43	64067	1	R/W	0 to 65534 6: J-TI module	6
36	No. 29 Controller type ♣	FA44	64068	1	R/W	0 to 65534 6: J-TI module	6
37	No. 30 Controller type ♣	FA45	64069	1	R/W	0 to 65534 6: J-TI module	6
38	No. 31 Controller type ♣	FA46	64070	1	R/W	0 to 65534 6: J-TI module	6
39	Controller type (batch setting)	FA47	64071	1	R/W	0 to 65534 4: SRJ	4
40	No. 1 Controller state	FA48	64072	1	RO	Bit data Bit 0: Presence or absence of controller	—
41	No. 2 Controller state	FA49	64073	1	RO	Bit 1: Presence or absence of abnormal response	—
42	No. 3 Controller state	FA4A	64074	1	RO	Bit 2 to Bit 15: Unused Data 0: Absence	—
43	No. 4 Controller state	FA4B	64075	1	RO	1: Presence [Decimal number: 0 to 3]	—
44	No. 5 Controller state	FA4C	64076	1	RO		—
45	No. 6 Controller state	FA4D	64077	1	RO		—
46	No. 7 Controller state	FA4E	64078	1	RO		—
47	No. 8 Controller state	FA4F	64079	1	RO		—

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No.	Name	Register address HEX	Register address DEC	Number of data items	Attri-bute	Data range	Factory set value
48	No. 9 Controller state	FA50	64080	1	RO	Bit data Bit 0: Presence or absence of controller	—
49	No. 10 Controller state	FA51	64081	1	RO	Bit 1: Presence or absence of abnormal response	—
50	No. 11 Controller state	FA52	64082	1	RO	Bit 2 to Bit 15: Unused	—
51	No. 12 Controller state	FA53	64083	1	RO	Data 0: Absence 1: Presence	—
52	No. 13 Controller state	FA54	64084	1	RO	[Decimal number: 0 to 3]	—
53	No. 14 Controller state	FA55	64085	1	RO		—
54	No. 15 Controller state	FA56	64086	1	RO		—
55	No. 16 Controller state	FA57	64087	1	RO		—
56	No. 17 Controller state	FA58	64088	1	RO		—
57	No. 18 Controller state	FA59	64089	1	RO		—
58	No. 19 Controller state	FA5A	64090	1	RO		—
59	No. 20 Controller state	FA5B	64091	1	RO		—
60	No. 21 Controller state	FA5C	64092	1	RO		—
61	No. 22 Controller state	FA5D	64093	1	RO		—
62	No. 23 Controller state	FA5E	64094	1	RO		—
63	No. 24 Controller state	FA5F	64095	1	RO		—
64	No. 25 Controller state	FA60	64096	1	RO		—
65	No. 26 Controller state	FA61	64097	1	RO		—
66	No. 27 Controller state	FA62	64098	1	RO		—
67	No. 28 Controller state	FA63	64099	1	RO		—
68	No. 29 Controller state	FA64	64100	1	RO		—
69	No. 30 Controller state	FA65	64101	1	RO		—
70	No. 31 Controller state	FA66	64102	1	RO		—
—	Unused	FA67	64103	—	—	—	—

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No.	Name	Register address		Number of data items	Attri-bute	Data range	Factory set value
		HEX	DEC				
71	No. 1 Controller address	FA68	64104	1	R/W	1 to 99 0: No controller is connected	1
72	No. 2 Controller address	FA69	64105	1	R/W	1 to 99 0: No controller is connected	2
73	No. 3 Controller address	FA6A	64106	1	R/W	1 to 99 0: No controller is connected	3
74	No. 4 Controller address	FA6B	64107	1	R/W	1 to 99 0: No controller is connected	4
75	No. 5 Controller address	FA6C	64108	1	R/W	1 to 99 0: No controller is connected	5
76	No. 6 Controller address	FA6D	64109	1	R/W	1 to 99 0: No controller is connected	6
77	No. 7 Controller address	FA6E	64110	1	R/W	1 to 99 0: No controller is connected	7
78	No. 8 Controller address	FA6F	64111	1	R/W	1 to 99 0: No controller is connected	8
79	No. 9 Controller address	FA70	64112	1	R/W	1 to 99 0: No controller is connected	9
80	No. 10 Controller address	FA71	64113	1	R/W	1 to 99 0: No controller is connected	10
81	No. 11 Controller address	FA72	64114	1	R/W	1 to 99 0: No controller is connected	11
82	No. 12 Controller address	FA73	64115	1	R/W	1 to 99 0: No controller is connected	12
83	No. 13 Controller address	FA74	64116	1	R/W	1 to 99 0: No controller is connected	13
84	No. 14 Controller address	FA75	64117	1	R/W	1 to 99 0: No controller is connected	14
85	No. 15 Controller address	FA76	64118	1	R/W	1 to 99 0: No controller is connected	15
86	No. 16 Controller address	FA77	64119	1	R/W	1 to 99 0: No controller is connected	16
87	No. 17 Controller address	FA78	64120	1	R/W	1 to 99 0: No controller is connected	17
88	No. 18 Controller address	FA79	64121	1	R/W	1 to 99 0: No controller is connected	18
89	No. 19 Controller address	FA7A	64122	1	R/W	1 to 99 0: No controller is connected	19
90	No. 20 Controller address	FA7B	64123	1	R/W	1 to 99 0: No controller is connected	20
91	No. 21 Controller address	FA7C	64124	1	R/W	1 to 99 0: No controller is connected	21
92	No. 22 Controller address	FA7D	64125	1	R/W	1 to 99 0: No controller is connected	22
93	No. 23 Controller address	FA7E	64126	1	R/W	1 to 99 0: No controller is connected	23

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| No. | Name | Register address | | Number of data items | Attri-bute | Data range | Factory set value |
		HEX	DEC				
94	No. 24 Controller address	FA7F	64127	1	R/W	1 to 99 0: No controller is connected	24
95	No. 25 Controller address	FA80	64128	1	R/W	1 to 99 0: No controller is connected	25
96	No. 26 Controller address	FA81	64129	1	R/W	1 to 99 0: No controller is connected	26
97	No. 27 Controller address	FA82	64130	1	R/W	1 to 99 0: No controller is connected	27
98	No. 28 Controller address	FA83	64131	1	R/W	1 to 99 0: No controller is connected	28
99	No. 29 Controller address	FA84	64132	1	R/W	1 to 99 0: No controller is connected	29
100	No. 30 Controller address	FA85	64133	1	R/W	1 to 99 0: No controller is connected	30
101	No. 31 Controller address	FA86	64134	1	R/W	1 to 99 0: No controller is connected	31
102	Automatic acquisition of controller address *	FA87	64135	1	R/W	0: Do not execute the automatic acquisition 1: Execute the automatic acquisition	0

* The controller address automatic acquisition set "1: Execute the automatic acquisition," performs the automatic acquisition of the controller address by turning on the power again.
  Automatically reverts to "0: Do not execute the automatic acquisition" after automatic acquisition ends.

9. TROUBLESHOOTING

This section explains probable causes and treatment procedures if any abnormality occurs in the instrument. For any inquiries, please contact RKC sales office or the agent, to confirm the specifications of the product.

If it is necessary to replace a device, always strictly observe the warnings below.

⚠ **WARNING**

- To prevent electric shock or instrument failure, always turn off the system power before replacing the instrument.

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

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

- To prevent electric shock or instrument failure, do not touch the inside of the instrument.

- All wiring must be performed by authorized personnel with electrical experience in this type of work.

⚠ **CAUTION**

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

◼ COM-JL

Problem	Probable cause	Solution
RUN lamp does not light up	Power not being supplied	Check external breaker etc.
	Appropriate power supply voltage not being supplied	Check the power supply and supply the normal power
	Power supply terminal contact defect	Retighten the terminals
	Power supply section defect	Replace COM-JL
RUN lamp flashes rapidly	Data collection just after the power is turned on	After data collection, the lamp goes on, if normal
RUN lamp flashes slowly	Memory backup error	Turn on the power again
		Write setting value once again
	Controller configuration error Disconnection of the controller connection	Confirm the controller connection condition and connect correctly
	Input error The IP address was not normally set by DIP switch	Confirm the IP address setting and set this correctly
FAIL lamp is lit	Appropriate power supply voltage not being supplied	Check the power supply and supply the normal power
	Hardware error	Replace COM-JL

◼ Communication

Problem	Probable cause	Solution
• Cannot set the IP address • The client and the server are not in the connected state (the client cannot recognize the server)	The IP address class and subnet mask of the client do not coincide with those of the server	Coincide the IP address class and subnet mask of the client with those of the server
	The network related software was started before the connection of the Ethernet cable	First connect the Ethernet cable and then start the network related software
No response	Wrong connection, no connection or disconnection of the communication cable	Confirm the connection method or condition and connect correctly
	Breakage, wrong wiring, or imperfect contact of the communication cable	Confirm the wiring or connector and repair or replace the wrong one
	Wrong IP address setting	Confirm the settings and set them correctly
	There is length of query message exceeds set range	
	The number of data points is not twice the specified number of data points at the time of data write	

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Problem	Probable cause	Solution
Error code: 01H	Function code error (Specifying nonexistent function code)	Confirm the function code
Error code: 02H	When the mismatched address is specified	Confirm the address of holding register
Error code: 03H	When the data written exceeds the setting range	Confirm the setting data
	When the number of specified data points was out of a range of 1 to 125 during data read (function code: 03H)	
	When the number of specified data points was out of a range of 1 to 123 during data write (function code: 10H)	
	When the number of specified data points was out of a range of 1 to 118 during data read/write (function code: 17H)	
Error code: 04H	State under which the server (COM-JL) cannot normally respond [An error occurred in the server (COM-JL)]	Remove the cause of the error occurring in the server (COM-JL).
Error code: 06H	State under which the server (COM-JL) cannot immediately respond [The server (COM-JL) is being initialized]	Conduct communication again after initialization is finished.

10. SPECIFICATIONS

■ Ethernet communication

Physical layer: Ethernet
                                        10BASE-T/100BASE-TX automatic recognition

Application layer: Modbus/TCP

Communication data: Based on Modbus message format

Connector type: RJ-45

■ Controller communication

Interface: Based on RS-485, EIA standard

Synchronous method: Start/Stop synchronous type

Connection method: 2-wire system, half-duplex multi-drop connection

Protocol: Modbus-RTU

Communication speed: 9600 bps, 19200 bps, 38400 bps

Data bit configuration: Start bit: 1
                                    Data bit: 8
                                    Parity bit: Without
                                    Stop bit: 1

Maximum connections: Four J-TI modules *
                                    * Up to single J-TI master and three J-TI slaves can be connected.

Connection method: Terminals

Termination resistor: Built-in terminal base of COM-JL [ON/OFF select with switch (120 Ω)]

■ Self-diagnostic function

Self-diagnostic items:

Self-diagnostic items	Error displays	Communication at error
RAM value error	FAIL lamp ON	Exception code = 04h
Power supply voltage monitoring	FAIL lamp ON Other lamps OFF	Communication line open No communication response
Data backup error	RUN lamp flashes	Error code 1
Module configuration error (Cannot recognize the controller)	RUN lamp flashes	Error code 4
Ethernet hardware error	RUN lamp flashes	No communication response or Error code 8

■ General specifications

Power supply voltage: 21.6 to 26.4 V DC [Including power supply voltage variation]
(Rating 24 V DC)

Current consumption (at maximum load):
110 mA max. (at 24 V DC)

Rush current: 12 A or less

Insulation resistance: Between communication terminal and grounding:
20 MΩ or more at 500 V DC
Between power supply terminal and grounding:
20 MΩ or more at 500 V DC
Between power supply terminal and communication terminal:
20 MΩ or more at 500 V DC

Withstand voltage: Refer to table shown below

Time: 1 min.	Grounding terminal	Power supply terminal
Grounding terminal		
Power supply terminal	600 V AC	
Communication terminal	600 V AC	600 V AC

Power failure: A power failure of 20 ms or less will not affect the control action.

Memory backup: Backed up by non-volatile memory
Number of writing: Approx. 100 times
Data storage period: Approx. 10 years

Vibration: Amplitude: < 1.5 mm (5 to 9 Hz)
Acceleration: < 5 m/s^2 (9 to150 Hz)
Each direction of XYZ axes

Shock: Height 50 mm or less
Each direction of XYZ axes (de-energized state)

Allowable ambient temperature:
−10 to +50 °C

Allowable ambient humidity:
5 to 95 %RH
(Absolute humidity: MAX.W.C 29.3 g/m^3 dry air at 101.3 kPa)

Installation environment conditions:
Indoor use
Altitude up to 2000 m

Operating environments 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.

Weight:	Approx. 180 g	
Dimensions:	30 × 125 × 109.5 mm (W × H × D)	

■ Standard

Safety standards:	UL:	UL 61010-1
	cUL:	CAN/CSA-C22.2 No.61010-1
CE marking:	LVD:	EN61010-1
	EMC:	EN61326-1
RCM:	EN55011	

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