Ethernet [Modbus/TCP] Communication Converter

COM-JL [For FB100/FB400/FB900] Quick Instruction Manual

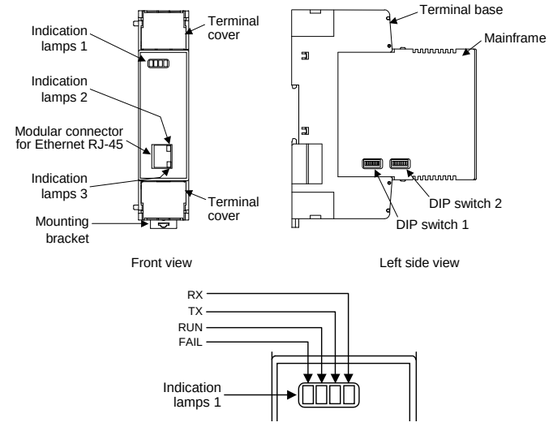
IMR01Y15-E4

This manual describes the basic operation method of the COM-JL. For the installation, the communication data, the detail handling procedures and various function settings, please refer to the following separate manuals.

- COM-JL [For FB100/FB400/FB900] Installation Manual (IMR01Y05-E□): Attached to the product
- COM-JL [For FB100/FB400/FB900] Communication Data List (IMR01Y21-E□): Attached to the product
- COM-JL [For FB100/FB400/FB900] Instruction Manual (IMR01Y10-E□): Separate volumes (Download or sold separately)

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

1. PARTS DESCRIPTION



● Indication lamps 1

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

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: sold separately).
Terminal base	Part of the terminal and base of COM-JL (There is the termination resistor transfer switch in the inside of terminal base)
Mainframe	Part of the mainframe of COM-JL

2. HANDLING PROCEDURES

COM-JL setting → Refer to **3. COMMUNICATION SETTING**

Mounting and Wiring →
- Refer to **COM-JL [For FB100/FB400/FB900] Installation Manual (IMR01Y05-E□)**
- For controller, refer to **FB100 Installation Manual (IMR01W12-E□)** or **FB400/FB900 Installation Manual (IMR01W01-E□)**

Controller setting →
- Refer to **4. COMMUNICATION SETTING OF CONTROLLER**
- Refer to **FB100 Communication Quick Manual (IMR01W15-E□)** or **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**

IP address setting → Refer to **5. IP ADDRESS SETTING**

To avoid error at operation start-up, COM-JL must be powered on LAST (after the controller, PLC, etc.).

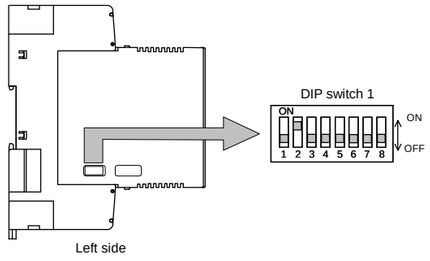
3. COMMUNICATION SETTING

⚠ CAUTION

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

Controller Communication Speed Setting

Set a communication speed of controller communication.



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

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)

4. COMMUNICATION SETTING OF CONTROLLER

Set the communication setting of controller (FB100/400/900) as follows.

- Protocol: Modbus
- Device address: 1 to 31
- Communication speed: 19200 bps (Factory set value)
- Data bit configuration: Data 8-bit, Without parity bit, Stop 1-bit

For setting method, refer to **FB100 Communication Quick Manual (IMR01W15-E□)** or **FB400/FB900 Communication Quick Manual (IMR01W07-E□)**.

There are two address settings for the controller (FB100/400/900) connecting to the COM-JL: Continuous setting and Free setting. (Set by the COM-JL communication data.)
- 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 31.

5. IP ADDRESS SETTING

Set an IP address of a COM-JL.
For types of IP address setting are available: Setting by Web browser, Setting by Telnet, Setting by DeviceInstaller and Setting by DIP switch. This section describes the only IP address setting by Web browser.

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 address (192.168.1.1) and you do not know the current address, set the IP address using DeviceInstaller or the DIP switches.

For the IP address setting by Telnet, DeviceInstaller and DIP switch, refer to **COM-JL [For FB100/FB400/FB900] Instruction Manual (IMR01Y10-E□)**.

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 **COM-JL [For FB100/FB400/FB900] Installation Manual (IMR01Y05-E□)**.

2. 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, change the IP address of the Client to "192.168.1. □" (□: Any value in the range of 0 to 255, but other than 1).

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

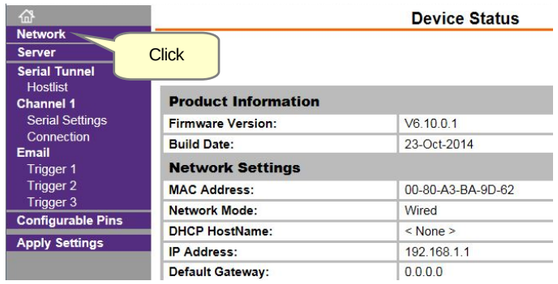
■ Setting example

An example of setting the IP address of 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.

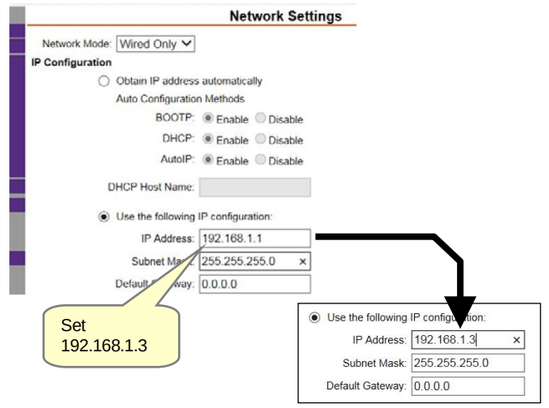
1. Start the Web browser; enter the present IP address "192.168.1.1" into the address bar and then press the Enter key.

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.



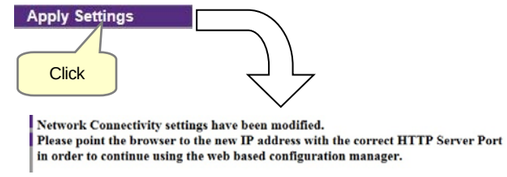
Do not click any keys except those specified. Device failure and other problems may occur.

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



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.

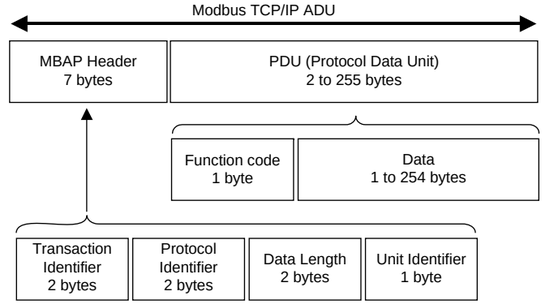
6. MODBUS/TCP PROTOCOL

Modbus/TCP is an open field network provided with the Modbus protocol on the TCP/IP protocol of Ethernet.
The data request side (such as computer) is called Client and the data response (supply) side (COM-JL) is called Server.

For details of protocol, refer to **COM-JL [For FB100/FB400/FB900] Instruction Manual (IMR01Y10-E□)**.

6.1 Message Configuration

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



■ 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

6.2 Message Format

■ 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 three registers from 0000H to 0002H are the read out.

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		03H
Register address	High	00H
	Low	00H
Quantity (Number of words)	High	00H
	Low	03H

MBAP Header
First register address
The setting must be between 1 (0001H) and 125 (007DH).

Normal response message [Server]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	09H
Unit Identifier		00H
Function code		03H
Number of data (byte)		06H
First register contents	High	00H
	Low	78H
Next register contents	High	00H
	Low	00H
Next register contents	High	00H
	Low	14H

MBAP Header
→ Number of registers × 2

Exception response message [Server]

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
→ When the data exceeds the setting range

■ 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 0580H

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	05H
	Low	80H
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	05H
	Low	80H
Write data	High	00H
	Low	64H

Contents will be the same as request message data

Exception response message [Server]

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

■ 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
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	06H
Unit Identifier		00H
Function code		08H
Test code	High	00H
	Low	00H
Data	High	1FH
	Low	34H

MBAP Header
Test code must be set to 00H
Any pertinent data

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		08H
Test code	High	00H
	Low	00H
Data	High	1FH
	Low	34H

Contents will be the same as request message data

Exception response message [Server]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	03H
Unit Identifier		00H
80H + Function code		88H
Exception code		06H

MBAP Header
→ When server is busy

■ 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 30 (1EH) are written to the register 0580H and 0581H (two in total)

Request message [Client]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	0BH
Unit Identifier		00H
Function code		10H
Register address	High	05H
	Low	80H
Quantity (Number of words)	High	00H
	Low	02H
Number of data (byte)		04H
Data to first register	High	00H
	Low	64H
Data to next register	High	00H
	Low	1EH

MBAP Header
First register address
The setting must be between 1 (0001H) and 123 (007BH).
→ Number of registers × 2

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		10H
Register address	High	05H
	Low	80H
Quantity (Number of words)	High	00H
	Low	02H

MBAP Header
First register address

Exception response message [Server]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	03H
Unit Identifier		00H
80H + Function code		90H
Exception code		03H

MBAP Header
→ When the data exceeds the setting range

■ 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 30 (1EH) are written to the register 0580H and 0581H (two in total)

Request message [Client]

Transaction Identifier	High	00H
	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
	Low	00H
Read quantity (Number of words)	High	00H
	Low	01H
Write register address	High	05H
	Low	80H
Write quantity (Number of words)	High	00H
	Low	02H
Number of write data (byte)		04H
Written data to first register	High	00H
	Low	64H
Written data to next register	High	00H
	Low	1EH

MBAP Header
First read register address
The setting must be between 1 (0001H) and 118 (0076H).
First write register address
The setting must be between 1 (0001H) and 118 (0076H).
→ Number of write registers × 2

Normal response message [Server]

Transaction Identifier	High	00H
	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
Read register contents	High	00H
	Low	78H

MBAP Header
→ Number of write registers × 2

Exception response message [Server]

Transaction Identifier	High	00H
	Low	00H
Protocol Identifier	High	00H
	Low	00H
Data Length	High	00H
	Low	03H
Unit Identifier		00H
80H + Function code		97H
Exception code		03H

MBAP Header
→ When the data exceeds the setting range

☞ For the list of register address for the controller, refer to **COM-JL [For FB100/FB400/FB900] Communication Data List (IMR01Y21-E□)**.

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