

PLC Communication Quick Instruction Manual

Module Type Controller SRZ

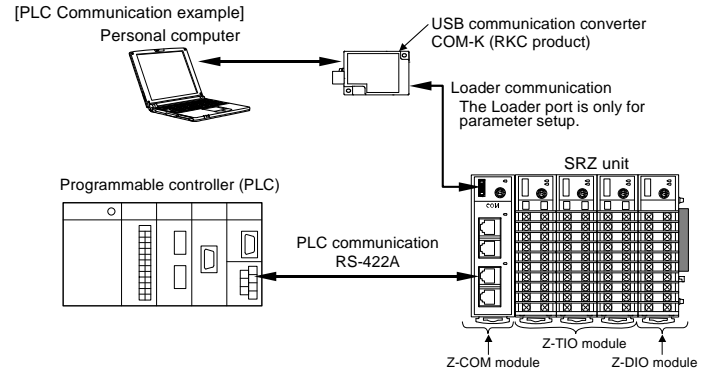
Communication Extension Module Z-COM

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Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of your new instrument, carefully read all the instructions in this manual. Please place the manual in a convenient location for easy reference.

1. OUTLINE

Using the setting examples below, this section explains the configuration when SRZ unit is connected to a programmable controller (PLC). In addition, PLC communication environmental settings are required to communicate with the PLC. The PLC communication environmental settings are set by the Loader communication (Environmental settings can also be made in the Host communication), so the personal computer, USB communication converter COM-K and SRZ unit must be connected.



This manual describes the preparation for conducting PLC communication between the Z-COM and PLC. For the data map, Host communication, the installation, the detail handling procedures and various function settings, please read if necessary the following separate manuals.

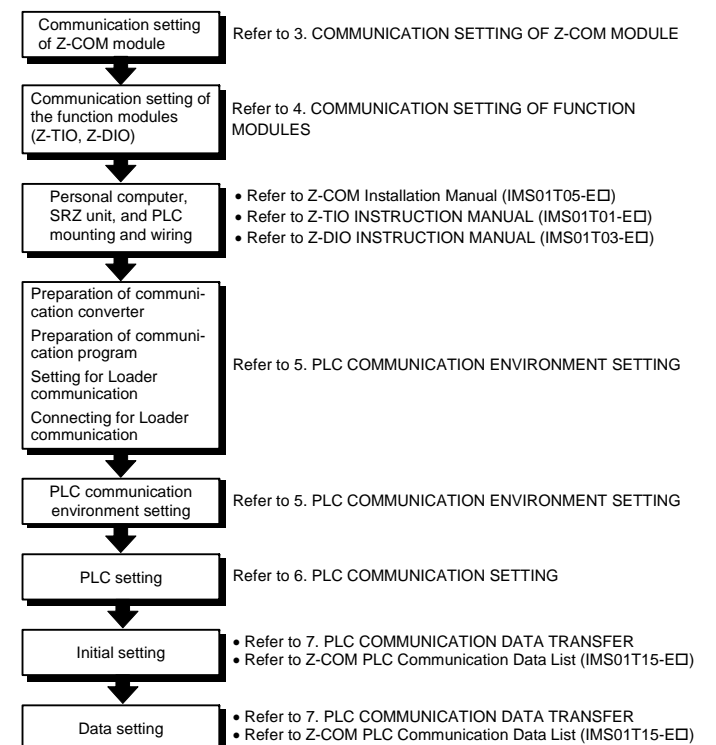
- Z-COM Installation Manual (IMS01T05-ED): Enclosed with Z-COM
- Z-COM Host Communication Quick Instruction Manual (IMS01T09-ED): Enclosed with Z-COM
- Z-COM PLC Communication Data List (IMS01T15-ED): Enclosed with Z-COM
- Z-COM Instruction Manual (IMS01T22-ED): Separate*
- Z-COM Host Communication Instruction Manual (IMS01T23-ED): Separate*
- Z-TIO INSTRUCTION MANUAL (IMS01T01-ED): Enclosed with Z-TIO
- Z-TIO Host Communication Quick Instruction Manual (IMS01T02-ED): Enclosed with Z-TIO
- Z-DIO INSTRUCTION MANUAL (IMS01T03-ED): Enclosed with Z-DIO
- SRZ Instruction Manual (IMS01T04-ED): Separate*

* Download free or purchase hard copy

When using a Z-COM module joined together with Z-CT modules, refer to Z-COM Instruction Manual (IMS01T22-ED) or Z-CT Instruction Manual [Detailed version] (IMS01T21-ED).

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

2. HANDLING PROCEDURES



3. COMMUNICATION SETTING OF Z-COM MODULE

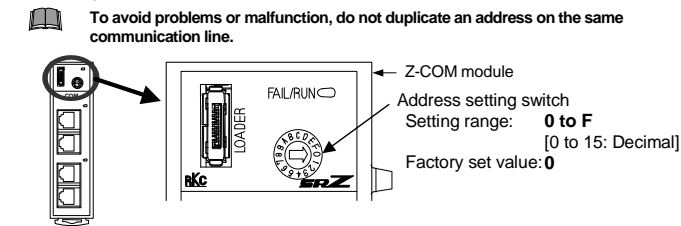
Set communication setting before mounting and wiring of the Z-COM.

CAUTION

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

3.1 Unit Address Setting

Set an address for the SRZ unit using a small blade screwdriver. In this example, the unit address is set to "0."



Address setting for PLC communication

Up to four Z-COM modules can be connected to a PLC communication port. Therefore the unit address uses the four Z-COM modules as a group. For Z-COM modules which are multi-drop connected to the same PLC communication port, use successive numbers assigned to any one of four groups shown in the following table as their addresses.

Always set the unit address of each group including 0, 4, 8 or C. 0, 4, 8 or C becomes the master for communication transfer.

When the PLC and SRZ unit are connected one-to-one, use the factory set value "0."

| Group | Address setting switch | Group | Address setting switch |
|---------|------------------------|---------|------------------------|
| Group 1 | 0 (Master) | Group 3 | 8 (Master) |
| | 1 | | 9 |
| | 2 | | A |
| | 3 | | B |
| Group 2 | 4 (Master) | Group 4 | C (Master) |
| | 5 | | D |
| | 6 | | E |
| | 7 | | F |

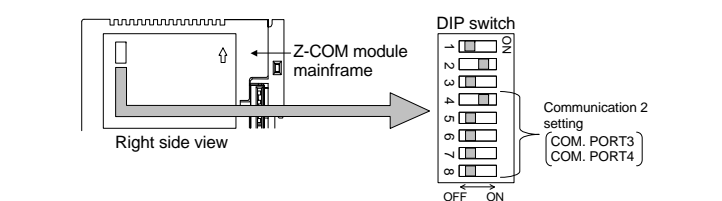
Address setting for Loader communication

When Loader communication is performed, the host computer and SRZ unit communicate on a one-to-one basis, and the unit address is fixed at "0." Even when an address setting switch is set to other than 0, communication is performed with unit address 0.

3.2 Protocol Selections and Communication Speed Setting

Use the DIP switch on the right side of the Z-COM module to select Communication speed, Data bit configuration and protocol. Because PLC communication is performed in this example, configure communication 2 (COM. PORT 3, COM. PORT 4).

The data change become valid the power of the Z-COM module is turned on again or when control is switched from STOP to RUN.



Contents of the DIP switch

Communication 1 (COM. PORT1 and COM. PORT2) setting

Use switches No. 1, No. 2, and No. 3 to set the Communication speed, Communication protocol and Data bit configuration for Communication 1.

| 1 | 2 | Communication speed |
|-----|-----|-------------------------------|
| OFF | OFF | 4800 bps |
| ON | OFF | 9600 bps |
| OFF | ON | 19200 bps (Factory set value) |
| ON | ON | 38400 bps |

| 3 | Communication protocol and Data bit configuration |
|-----|--|
| OFF | Host communication (RKC communication) Data 8-bit, without parity, Stop 1-bit (Factory set value *) |
| ON | Host communication (Modbus) Data 8-bit, without parity, Stop 1-bit |

* Factory set values when the Communication protocol is not specified at the order.

Communication 2 (COM. PORT3 and COM. PORT4) setting

Use switches No. 4, No. 5, No. 6, and No. 7 to set the Communication speed, Communication protocol and Data bit configuration for Communication 2.

| 4 | Communication speed |
|-----|-------------------------------|
| OFF | 9600 bps |
| ON | 19200 bps (Factory set value) |

| 5 | 6 | 7 | Communication protocol and Data bit configuration |
|-----|-----|-----|---|
| OFF | OFF | OFF | Host communication (RKC communication) Data 8-bit, without parity, Stop 1-bit (Factory set value *) |
| ON | OFF | OFF | Host communication (Modbus) Data 8-bit, without parity, Stop 1-bit |
| OFF | ON | OFF | PLC communication MITSUBISHI MELSEC series special protocol • A-compatible 1C frame (format 4) • AnA/AnUCPU common command (QR/QW) • QnA-compatible 3C frame (format 4) command (0401/1401) (Register type: ZR register only) Data 7-bit, without parity, Stop 1-bit |
| ON | ON | OFF | PLC communication OMRON SYMAC series special protocol C mode command (RD/WD, RE/WE) Data 7-bit, Even parity, Stop 2-bit |
| OFF | OFF | ON | PLC communication MITSUBISHI MELSEC series special protocol A-compatible 1C frame (format 4) ACPU common command (WR/WW) Data 7-bit, without parity, Stop 1-bit |
| ON | OFF | ON | PLC communication YOKOGAWA FA-M3R special protocol Data 8-bit, without parity, Stop 1-bit |
| OFF | ON | ON | Do not set this one |
| ON | ON | ON | Do not set this one |

* Factory set values when the Communication protocol is not specified at the order.

Settings of Communication speed, Communication protocol and Data bit configuration can be set even by the Loader communication or Host communication. For the communication data, refer to Communication setting data of Z-COM module on the next page.

DIP switch setting validity/invalidity

Set switch No.8 to "ON" when performing communication by the communication settings set via Host communication or Loader communication. When set to "ON," the DIP switch settings are disabled.

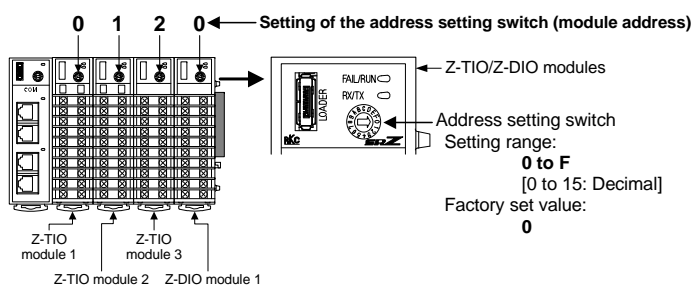
| 8 | DIP switch setting validity/invalidity |
|-----|---|
| OFF | Valid (Factory set value) |
| ON | Invalid (According to the settings in Host communication or Loader communication) |

4. COMMUNICATION SETTING OF FUNCTION MODULES

4.1 Address Setting of Z-TIO/Z-DIO Module

Only make the module address setting to make the Z-TIO and Z-DIO module communication settings. The SRZ unit performs internal communication (RS-485) between the Z-COM module and the function module (Z-TIO, Z-DIO), so the Communication protocol, Communication speed and Data bit configuration do not need to be set. A module address is set for each function module type. In this example, the module address is set to the address shown below.

To avoid problems or malfunction, do not duplicate an address in a function module of the same type on the same communication line.



4.2 For the SRZ Unit's Temperature Control Channel

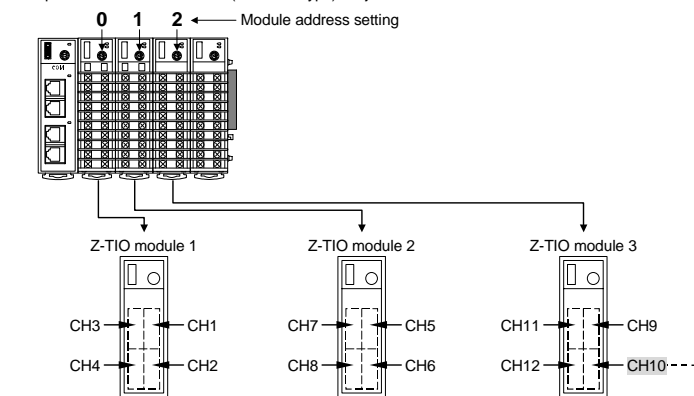
Setting the Z-TIO module address determines the temperature control channel number used for communication. To each Z-TIO module address, the relevant temperature control channel is assigned. Each temperature control channel number can be calculated from the following equation.

Temperature control channel number of communication = [Module address setting] × [Maximum channel number of the function module] + [Channel number in a module]

^aWhen the setting is A to F, it is a decimal number.

^bFor the Z-TIO module, it is calculated by "4."

Example: When 3 Z-TIO modules (4-channel type) are joined



Z-TIO module 3: The temperature control channel number used for communication of channel 2 ← 2 × 4 + 2 = 10

4.3 Digital Input/Output Channel of Z-DIO Module

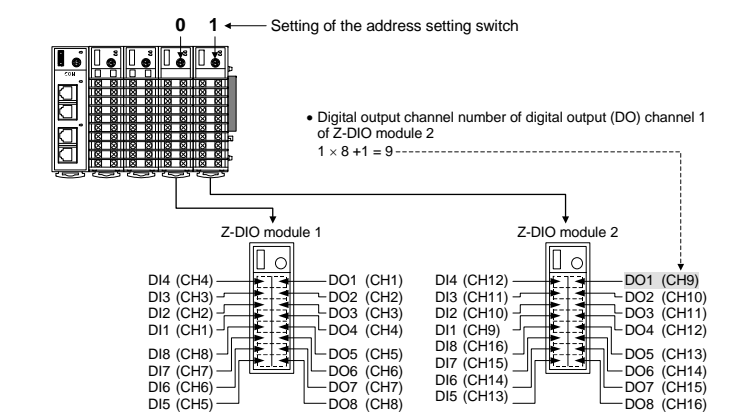
Setting the Z-DIO module address determines the digital input/output channel number of SRZ unit. To each Z-DIO module address, the relevant digital input/output channel is assigned. Each digital input/output channel can be calculated from the following equation.

Digital input/output channel number = [Module address setting] × [Maximum channel number of the function module] + [Input (or output) channel number in a module]

^aWhen the setting is A to F, it is a decimal number.

^bFor the Z-DIO module, it is calculated by "8."

Example: When 2 Z-DIO modules are joined



5. PLC COMMUNICATION ENVIRONMENT SETTING

The PLC communication environmental (system data) settings must be made to perform PLC communication. The System data settings are made by the Loader communication (System data settings can also be made in the Host communication). The System data contains setting items (refer to the setting item table of next page) and monitor items. The monitor items require space (corresponding to 8 words) in the PLC register.

For the monitor items, refer to Z-COM PLC Communication Data List (IMS01T15-ED).

5.1 Preparation of USB Communication Converter

To perform Loader communication, our converter and a communication cable are required.

- USB communication converter COM-K (With USB cable) *
- Loader communication cable W-BV-01 [optional]
- To use the Loader communication, USB driver for COM-K must be installed on the personal computer. The USB driver for COM-K can be downloaded from our website:
URL: <http://www.rkcinst.com/>

5.2 Preparation of Communication Program

A communication program must be created on the customer's side to use Loader communication. Refer to the RKC communication protocol to create a communication program.

For the RKC communication protocol, refer to Z-COM Host Communication Instruction Manual (IMS01T23-ED).

5.3 Setting of Loader Communication

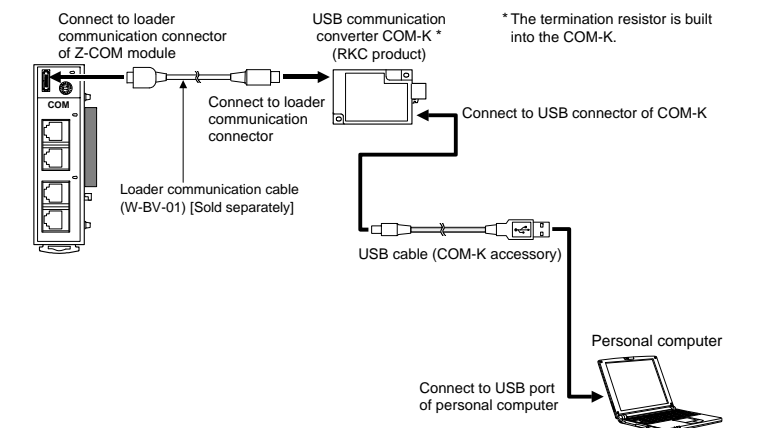
Set the communication settings of the host computer to the same settings as the Z-COM module. When Loader communication is used, the Communication speed, Communication protocol, and Data bit configuration of the Z-COM module are fixed.

(There is no need to configure the communication settings of the Z-COM module.)

Unit address: 0
Communication speed: 38400 bps
Data bit configuration: Data 8-bit, Without parity, Stop 1-bit

5.4 Connection for Loader Communication

Connect SRZ unit to the personal computer. When the personal computer has a USB connector, connect the USB communication converter between the personal computer and the Z-COM module.



5.5 Setting of System Data (setting items)

- Turn on the power of the SRZ unit. (PLC power is off.)
- On the personal computer, set the communication data of PLC communication environment indicated below.

Setting item table R/W: Read/Write

| Name | RKC Identifier | Modbus register address | | Digits | Attribute | Data range and Number of data | Factory set value |
|--|----------------|-------------------------|-------|--------|-----------|---|-------------------|
| | | HEX | DEC | | | | |
| Station number | QV | 8008 | 32776 | 7 | R/W | 0 to 31 (MITSUBISHI PLC or OMRON PLC) 1 to 31 (YOKOGAWA PLC) | Note 1 |
| PC number ¹ [CPU number] | QW | 8009 | 32777 | 7 | R/W | 0 to 255 (MITSUBISHI PLC) 1 to 4 (YOKOGAWA PLC) | Note 2 |
| Register type ² | QZ | 800A | 32778 | 7 | R/W | MITSUBISHI MELSEC series 0: D register 3: ZR register * 1: R register 4 to 29: Unused 2: W register *Method of specifying consecutive numbers when 32767 of R register is exceeded. OMRON SYSMAC series 0: DM register (Data memory) 1 to 9: Unused 10 to 22: EM register (Extended data memory) [Specify the bank No.] Set the bank No.+10. 23 to 28: Unused 29: EM register (Extended data memory) [Specify the current bank] YOKOGAWA FA-M3R 0: D register (data register) 1: R register (shared register) 2: W register (link register) 3: Unused 4: B register (file register) 5 to 29: Unused | 0 |
| Register start number ^{2,3} (High-order 4 bit) | QS | 800B | 32779 | 7 | R/W | 0 to 15: QnA compatible 3C frame | 0 |
| Register start number ² (Low-order 16 bit) | QX | 800C | 32780 | 7 | R/W | 0 to 9999: MITSUBISHI MELSEC series A-compatible 1C frame, ACPUCPU common command (WR/WW) OMRON SYSMAC series 0 to 65535: MITSUBISHI MELSEC series A-compatible 1C frame, AnA/AnUCPU common command (QR/QW), QnA-compatible 3C frame command (0401/1401) YOKOGAWA FA-M3R | 1000 |
| System data address bias ^{2,4} | QQ | 800D | 32781 | 7 | R/W | 0 to 65535 (When the OMRON SYSMAC series is used: 0 to 9999) | 2100 |
| COM module link recognition time ⁴ | QT | 800E | 32782 | 7 | R/W | 0 to 255 seconds | 10 |
| PLC scanning time | VT | 800F | 32783 | 7 | R/W | 0 to 3000 ms | 255 |
| PLC communication start time | R5 | 8010 | 32784 | 7 | R/W | 1 to 255 seconds | 5 |
| Slave mapping method ⁵ | RK | 8012 | 32786 | 7 | R/W | 0: Bias from the address setting switch [Register address + (Remainder of set value of address setting switch/4) × System data address bias] 1: Bias disabled | 0 |

Note 1: MITSUBISHI PLC and OMRON PLC: 0 YOKOGAWA PLC: 1
Note 2: MITSUBISHI PLC: 255 YOKOGAWA PLC: 1

- This item is not used for the OMRON SYSMAC series.
- Usable register ranges and types vary depending on used CPU types. For register ranges and types that can actually be used, see the PLC instruction manual.
- Only enabled when the ZR register is selected.
- Use the factory set value when the PLC and SRZ unit are connected one-to-one.
- In this example, set the factory set value.

Communication setting data of Z-COM module

Z-COM settings of Communication speed, Communication protocol and Data bit configuration can be set even by the Loader communication or Host communication.

Set switch No.8 to "ON" when performing communication by the communication settings set via Host communication or Loader communication. When set to "ON," the DIP switch settings are disabled.

If you changed the communication setting data, the data change become valid the power of the Z-COM module is turned on again or when control is switched from STOP to RUN.

R/W: Read/Write

| Name | RKC Identifier | Modbus register address | | Digits | Attribute | Data range and Number of data | Factory set value |
|--|----------------|-------------------------|-------|--------|-----------|---|-------------------|
| | | HEX | DEC | | | | |
| Communication 1 protocol | VK | 8000 | 32768 | 1 | R/W | 0: RKC communication 1: Modbus | 0 |
| Communication 1 communication speed | VL | 8001 | 32769 | 1 | R/W | 0: 4800 bps 2: 19200 bps 1: 9600 bps 3: 38400 bps | 2 |
| Communication 1 data bit configuration | VM | 8002 | 32770 | 7 | R/W | Modbus: 0 to 2 RKC communication: 0 to 5 Refer to Table 1 (Data bit configuration). | 0 |
| Communication 1 interval time | VN | 8003 | 32771 | 7 | R/W | 0 to 250 ms | 10 |

R/W: Read/Write

| Name | RKC Identifier | Modbus register address | | Digits | Attribute | Data range and Number of data | Factory set value |
|--|----------------|-------------------------|-------|--------|-----------|---|-------------------|
| | | HEX | DEC | | | | |
| Communication 2 protocol | VP | 8004 | 32772 | 1 | R/W | 0: RKC communication 1: Modbus 2: MITSUBISHI MELSEC series special protocol • A-compatible 1C frame (format 4) AnA/AnUCPU common command (QR/QW) • QnA-compatible 3C frame (format 4) command (0401/1401) Register type: ZR register only 3: OMRON SYSMAC series special protocol 4: MITSUBISHI MELSEC series special protocol A-compatible 1C frame (format 4) ACPUCPU common command (WR/WW) 5: YOKOGAWA FA-M3R special protocol | 0 |
| Communication 2 communication speed | VU | 8005 | 32773 | 1 | R/W | 0: 4800 bps 2: 19200 bps 1: 9600 bps 3: 38400 bps | 2 |
| Communication 2 data bit configuration | VW | 8006 | 32774 | 7 | R/W | Modbus: 0 to 2 RKC communication: 0 to 5 PLC communication: 0 to 11 Refer to table 1 (Data bit configuration). | 0 |
| Communication 2 interval time | VX | 8007 | 32775 | 7 | R/W | 0 to 250 ms | 10 |

Table 1: Data bit configuration

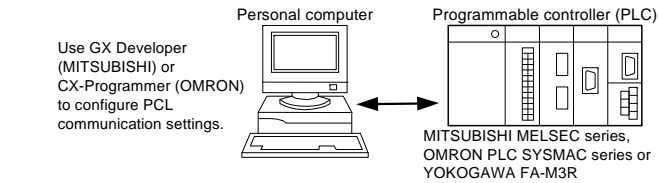
| Set value | Data bit | Parity bit | Stop bit | Modbus | RKC communication | PLC communication |
|-----------|----------|------------|----------|---------------|-------------------|-------------------|
| 0 | 8 | Without | 1 | Can be set | Can be set | Can be set |
| 1 | 8 | Even | 1 | | | |
| 2 | 8 | Odd | 1 | | | |
| 3 | 7 | Without | 1 | | | |
| 4 | 7 | Even | 1 | Cannot be set | Cannot be set | Can be set |
| 5 | 7 | Odd | 1 | | | |
| 6 | 8 | Without | 2 | | | |
| 7 | 8 | Even | 2 | | | |
| 8 | 8 | Odd | 2 | | | |
| 9 | 7 | Without | 2 | | | |
| 10 | 7 | Even | 2 | | | |
| 11 | 7 | Odd | 2 | | | |

Data range: Modbus: 0 to 2 RKC communication: 0 to 5 PLC communication: 0 to 11

6. PLC COMMUNICATION SETTING

Sets the communication items of PLC side.

The setting item varies depending on the PLC. The details of the setting procedure for the PLC, refer to the instruction manual for the PLC being used.



MITSUBISHI MELSEC series

Recommend setting example

| Item | Description |
|------------------------------------|--|
| Protocol | Format 4 protocol mode |
| Station number | 00 |
| Computer link/multi-drop selection | Computer link |
| Communication rate | Set the same as Z-COM |
| Operation setting | Independent |
| Data bit | 7 |
| Parity bit | Without |
| Stop bit | 1 |
| Sum check code | Provided |
| Writing during RUN | Allowed |
| Setting modification | Allowed |
| Termination resistor | Connect the termination resistor attached to the PLC |

OMRON SYSMAC series

Recommend setting example

| Item | Description |
|---------------------------|----------------------------------|
| Serial communication mode | High-order link |
| Unit number (Model No.) | 0 |
| Start bit | 1 |
| Data bit | 7 |
| Stop bit | 2 |
| Parity bit | Even |
| Transmission speed | Set the same as Z-COM |
| I/O port selection | RS-422A |
| Synchronization selection | Internal synchronization |
| CTS selection | 0 V (always ON) |
| 5 V supply | OFF |
| Termination resistor | Termination resistor is inserted |

YOKOGAWA FA-M3R

Recommend setting example

| Item | Description |
|----------------------|---|
| Station number | 01 |
| Start bit | 1 |
| Data bit | 8 |
| Stop bit | 1 |
| Parity bit | Without |
| Check sum | None |
| Communication rate | Set the same as Z-COM |
| Termination resistor | Set the termination switch to 2-wire mode or 4-wire mode to conform to the wiring system being used (2-wire or 4-wire). |

7. PLC COMMUNICATION DATA TRANSFER

The data transmitted between the PLC and the SRZ unit is compiled in the PLC communication data map. In the PLC communication data map the communication data is classified into System data (monitor items), Request commands, Monitor groups, and Setting groups.

For the PLC communication data map, refer to the **Z-COM PLC Communication Data List (IMS01T15-ED)**.

7.1 Data Transfer Type

Data transfer between PLC and SRZ unit are executed by Request command. For the Request command, both Setting request bit and Monitor request bit are available.

Setting request bit (PLC → SRZ)

This command requests that the SRZ unit read the communication data of the Setting group on the PLC side.

[Processing]

- Just when "1" is set to the Setting request bit, the SRZ unit starts reading the data from the PLC side.
- All data of the setting communication group is transferred from PLC to the SRZ unit.
- After data transmission is completed, the Setting request bit becomes "0."

Monitor request bit (PLC ← SRZ)

This command requests that the SRZ unit write the communication data of the Setting group on the PLC side.

[Processing]

- Just when "1" is set to the Monitor request bit, the SRZ unit starts writing the data to the PLC side.
- All data of the setting communication group is transferred from SRZ unit to the PLC.
- After data transmission is completed, the Monitor request bit becomes "0."

Monitor group

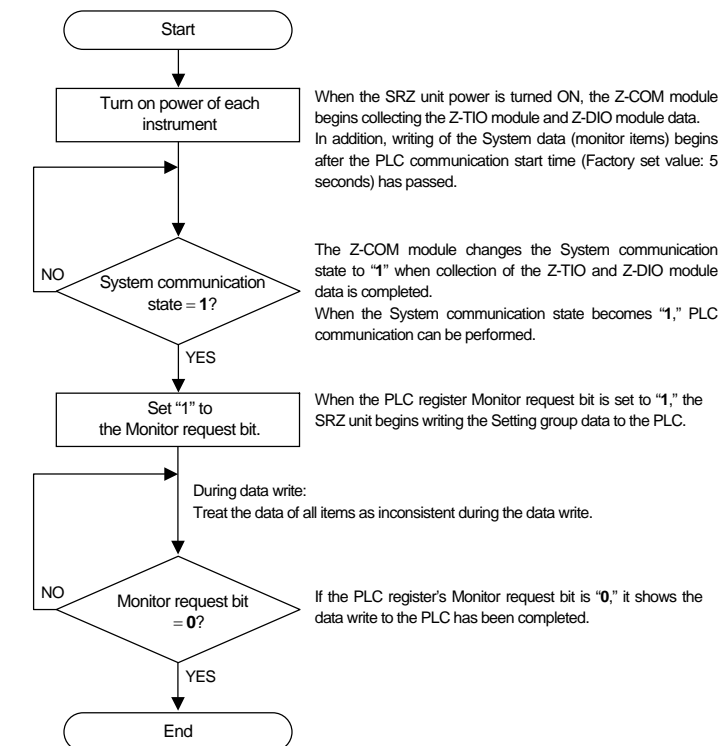
The Monitor group communication data is always transferred as monitor data between the PLC and the SRZ unit regardless of the Request command setting.

7.2 Data Transfer Procedures

Change each set value of SRZ unit from the PLC after the initial settings are made.

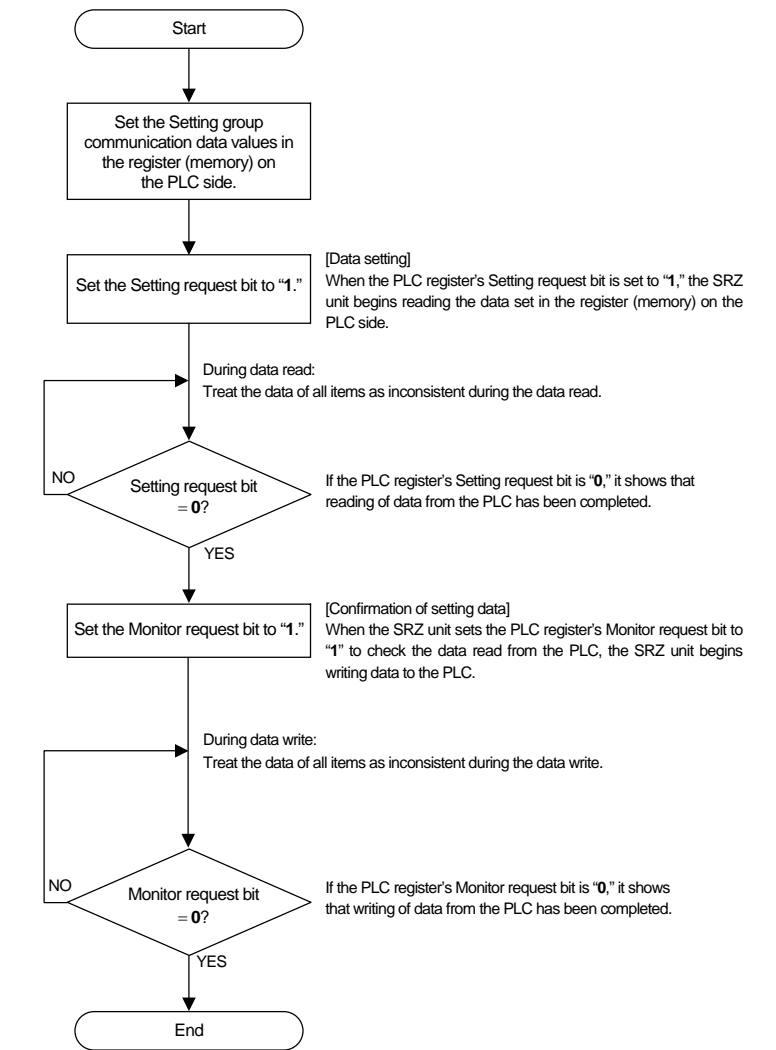
If each set value of SRZ unit is changed from the PLC without setting the initial values, it is re-written to "0" with each set value of the PLC at that time set to "0."

Initial setting



Data setting

When the Setting group communication data is transferred from PLC to the SRZ unit.



Data processing precautions

The data type is treated as binary data with a sign and without a decimal point. For this reason, carefully express and set the data. (Excluding the bit data)

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