Module Type Controller SRZ

Communication Extension Module

Z-COM

PLC Communication Quick Instruction Manual

IMS01T14-E4

Thank you for purchasing this RKC product. In order to achieve maximum performance and ensure proper operation of the 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.
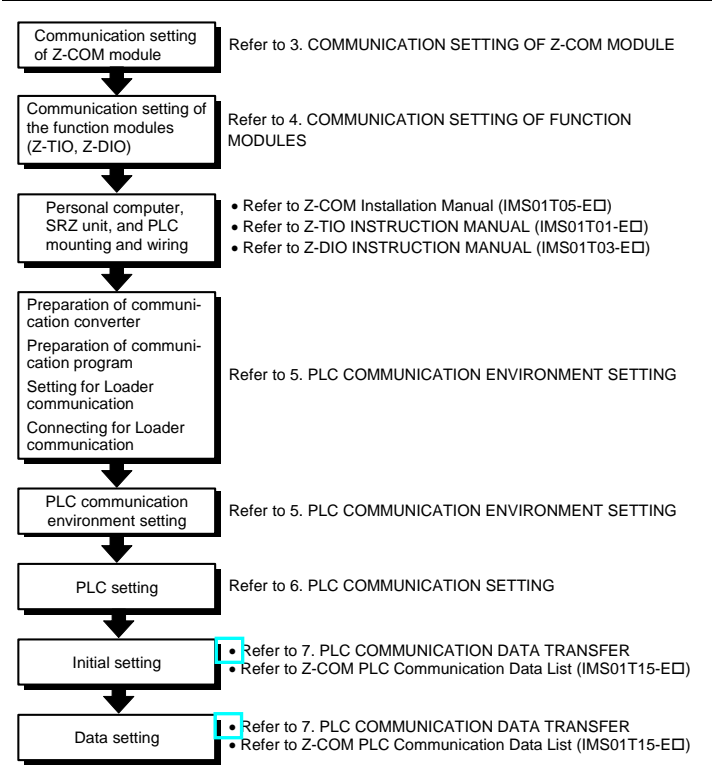
[PLC Communication example]
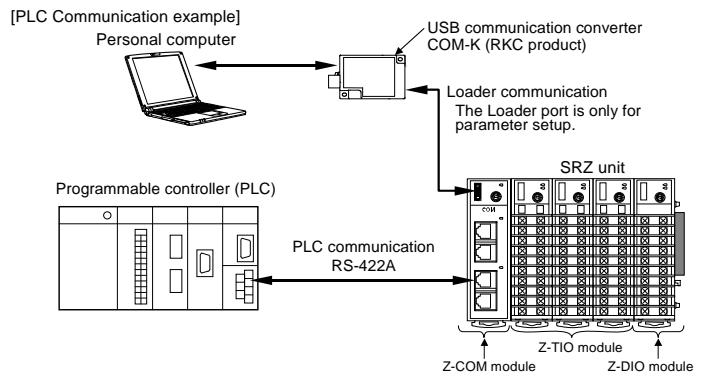
This manual describes the preparation for conducting PLC communication between the Z-COM and PLC. For the data map, Host communication, the installation, the detail handling procedures and various function settings, please read if necessary the following separate manuals.

- Z-COM Installation Manual (IMS01T05-E□):   Enclosed with Z-COM
- Z-COM Host Communication Quick Instruction Manual (IMS01T09-E□):   Enclosed with Z-COM
- Z-COM PLC Communication Data List (IMS01T15-E□):   Enclosed with Z-COM
- Z-COM Instruction Manual (IMS01T22-E□):   Separate*
- Z-COM Host Communication Instruction Manual (IMS01T23-E□):   Separate*
- Z-TIO INSTRUCTION MANUAL (IMS01T01-E□):   Enclosed with Z-TIO
- Z-TIO Host Communication Quick Instruction Manual (IMS01T02-E□):   Enclosed with Z-TIO
- Z-DIO INSTRUCTION MANUAL (IMS01T03-E□):   Enclosed with Z-DIO
- SRZ Instruction Manual (IMS01T04-E□):   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-E□)** or **Z-CT Instruction Manual [Detailed version] (IMS01T21-E□)**.

📖 These manuals can be downloaded from the official RKC website:
URL: http://www.rkcinst.com/english/manual_load.htm

2. HANDLING PROCEDURES

Communication setting of Z-COM module	Refer to 3. COMMUNICATION SETTING OF Z-COM MODULE
Communication settings of the function modules (Z-TIO, Z-DIO)	Refer to 4. COMMUNICATION SETTING OF FUNCTION MODULES
Personal computer, SRZ unit, and PLC mounting and wiring	• Refer to Z-COM Installation Manual (IMS01T05-E□) • Refer to Z-TIO INSTRUCTION MANUAL (IMS01T01-E□) • Refer to Z-DIO INSTRUCTION MANUAL (IMS01T03-E□)
Preparation of communication converter Preparation of communication program Setting for Loader communication Connecting for Loader communication	Refer to 5. PLC COMMUNICATION ENVIRONMENT SETTING
PLC communication environment setting	Refer to 5. PLC COMMUNICATION ENVIRONMENT SETTING
PLC setting	Refer to 6. PLC COMMUNICATION SETTING
Initial setting	• Refer to 7. PLC COMMUNICATION DATA TRANSFER • Refer to Z-COM PLC Communication Data List (IMS01T15-E□)
Data setting	• Refer to 7. PLC COMMUNICATION DATA TRANSFER • Refer to Z-COM PLC Communication Data List (IMS01T15-E□)

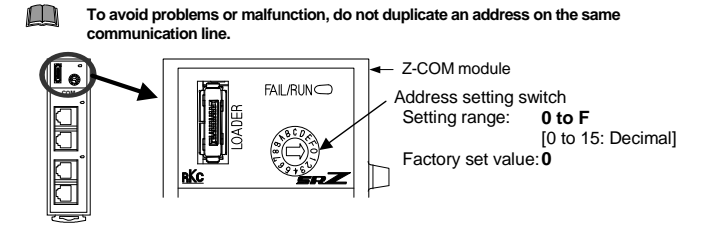# 3. COMMUNICATION SETTING OF Z-COM MODULE

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."

📖 **To avoid problems or malfunction, do not duplicate an address on the same communication line.**

Z-COM module

FAIL/RUN

Address setting switch
Setting range: **0 to F**
[0 to 15: Decimal]
Factory set value: **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.**

Right side view
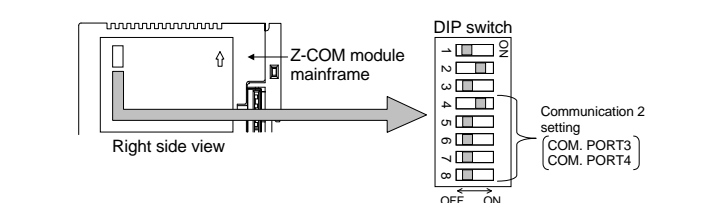
■ Contents of the DIP switch

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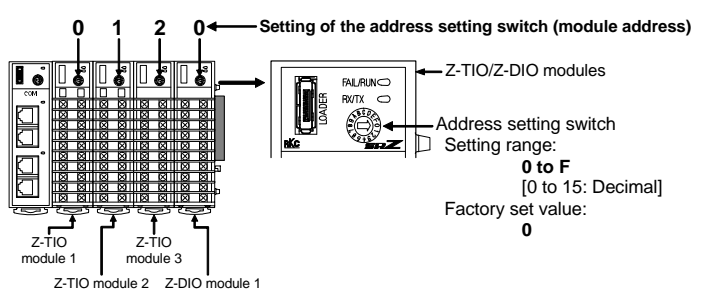
8	DIP switch setting validity/invalidity
OFF	Valid (Factory set value)
ON	Invalid (According to the settings in Host communication or Loader communication)

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.**

Setting of the address setting switch (module address)

Z-TIO/Z-DIO modules

Address setting switch
Setting range: **0 to F**
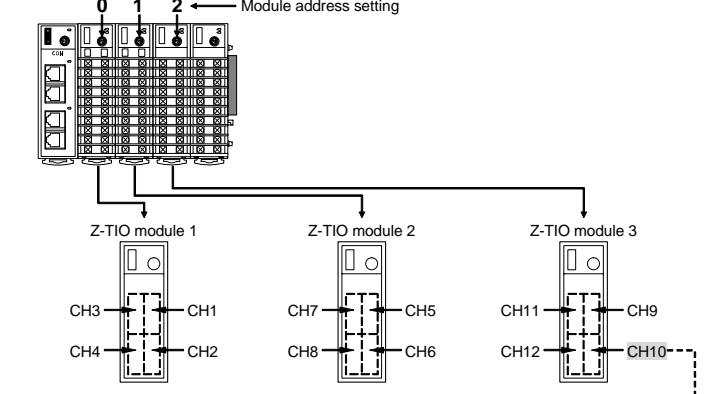[0 to 15: Decimal]
Factory set value: **0**

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 [a]] × [Maximum channel number of the function module [b]] + [Channel number in a module]

[a] When the setting is A to F, it is a decimal number.
[b] For the Z-TIO module, it is calculated by "4."

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

Module address setting

Z-TIO module 1   Z-TIO module 2   Z-TIO module 3

CH3 — CH1   CH7 — CH5   CH11 — CH9
CH4 — CH2   CH8 — CH6   CH12 — CH10

• Z-TIO module 3: The temperature control channel number used for communication of channel 2
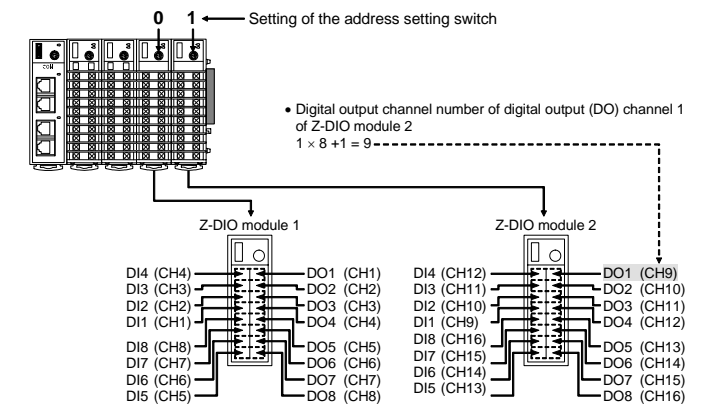$2 \times 4 + 2 = 10$

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 [a]] × [Maximum channel number of the function module [b]] + [Input (or output) channel number in a module]

[a] When the setting is A to F, it is a decimal number.
[b] For the Z-DIO module, it is calculated by "8."

Example: When 2 Z-DIO modules are joined

Setting of the address setting switch

• Digital output channel number of digital output (DO) channel 1 of Z-DIO module 2
$1 \times 8 + 1 = 9$

Z-DIO module 1

DI4 (CH4)	DO1 (CH1)
DI3 (CH3)	DO2 (CH2)
DI2 (CH2)	DO3 (CH3)
DI1 (CH1)	DO4 (CH4)
DI8 (CH8)	DO5 (CH5)
DI7 (CH7)	DO6 (CH6)
DI6 (CH6)	DO7 (CH7)
DI5 (CH5)	DO8 (CH8)

Z-DIO module 2

DI4 (CH12)	DO1 (CH9)
DI3 (CH11)	DO2 (CH10)
DI2 (CH10)	DO3 (CH11)
DI1 (CH9)	DO4 (CH12)
DI8 (CH16)	DO5 (CH13)
DI7 (CH15)	DO6 (CH14)
DI6 (CH14)	DO7 (CH15)
DI5 (CH13)	DO8 (CH16)

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-E□)**.

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

RKC can provide communication program "PROTEM2" or "WinUCI-SRZ." (Free of charge)
Download this tool from the RKC official website. Then install this tool on your personal computer.

☞ For the RKC communication protocol, refer to **Z-COM Host Communication Instruction Manual (IMS01T23-E□)**.
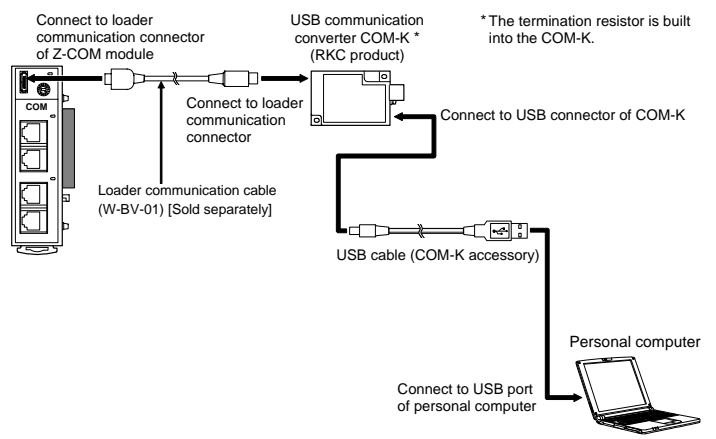
5.3 Setting of Loader Communication

Set the communication settings of the host computer to the same settings as the Z-COM module. Set the Communication speed, Communication protocol, and Data bit configuration of Host computer using PROTEM2 or WinUCI-SRZ. 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.

Connect to loader communication connector of Z-COM module

USB communication converter COM-K * (RKC product)

* The termination resistor is built into the COM-K.

Connect to loader communication connector

Connect to USB connector of COM-K

Loader communication cable (W-BV-01) [Sold separately]

USB cable (COM-K accessory)

Personal computer

Connect to USB port of personal computer

5.5 Setting of System Data (setting items)

1. Turn on the power of the SRZ unit. (PLC power is off.)
2. 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 HEX	Modbus Register address DEC	Digits	Attribute	Data range and Number of data	Factory set value
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, ACPU 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
[1] This item is not used for the OMRON SYSMAC series.
[2] 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.
[3] Only enabled when the ZR register is selected.
[4] Use the factory set value when the PLC and SRZ unit are connected one-to-one.
[5] In this example, set the factory set value.

3. Turn the SRZ unit's power OFF and ON again. When the power is turned ON, the changed System data values are enabled.

■ 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 HEX	Modbus register address DEC	Digits	Attribute	Data range and Number of data	Factory set value
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

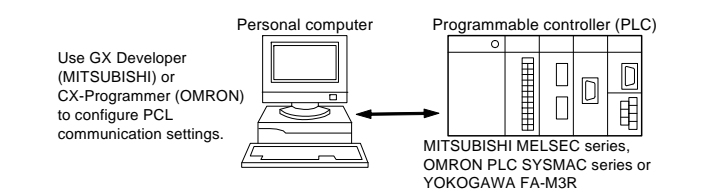| Name	RKC Identifier	Modbus register address HEX	Modbus register address DEC	Digits	Attribute	Data range and Number of data	Factory set value
Communication 2 protocol	VP	8004	32772	1	R/W	0: RKC communication 1: Modbus 2: MITSUBISHI MELSEC series special protocol ● A-compatible 1C frame (format 4) AnA/AnUCPU 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) ACPU 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		
1	8	Even	1			
2	8	Odd	1		Can be set	
3	7	Without	1			
4	7	Even	1			
5	7	Odd	1			Can be set
6	8	Without	2	Cannot be set		
7	8	Even	2			
8	8	Odd	2		Cannot be set	
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

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6. PLC COMMUNICATION SETTING

Sets the communication items of PLC side.

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

Use GX Developer (MITSUBISHI) or CX-Programmer (OMRON) to configure PCL communication settings.

Personal computer → Programmable controller (PLC)

MITSUBISHI MELSEC series, OMRON PLC SYSMAC series or YOKOGAWA FA-M3R

■ 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-E□)**.

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]
(1) Just when "1" is set to the Setting request bit, the SRZ unit starts reading the data from the PLC side.
(2) All data of the setting communication group is transferred from PLC to the SRZ unit.
(3) 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]
(1) Just when "1" is set to the Monitor request bit, the SRZ unit starts writing the data to the PLC side.
(2) All data of the setting communication group is transferred from SRZ unit to the PLC.
(3) After data transmission is completed, the Monitor request bit becomes "0."
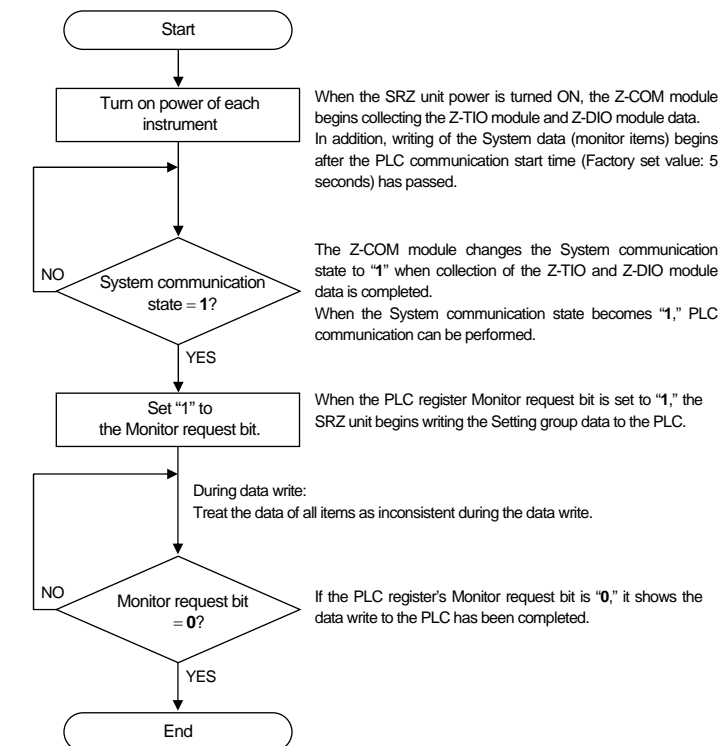
■ Monitor group

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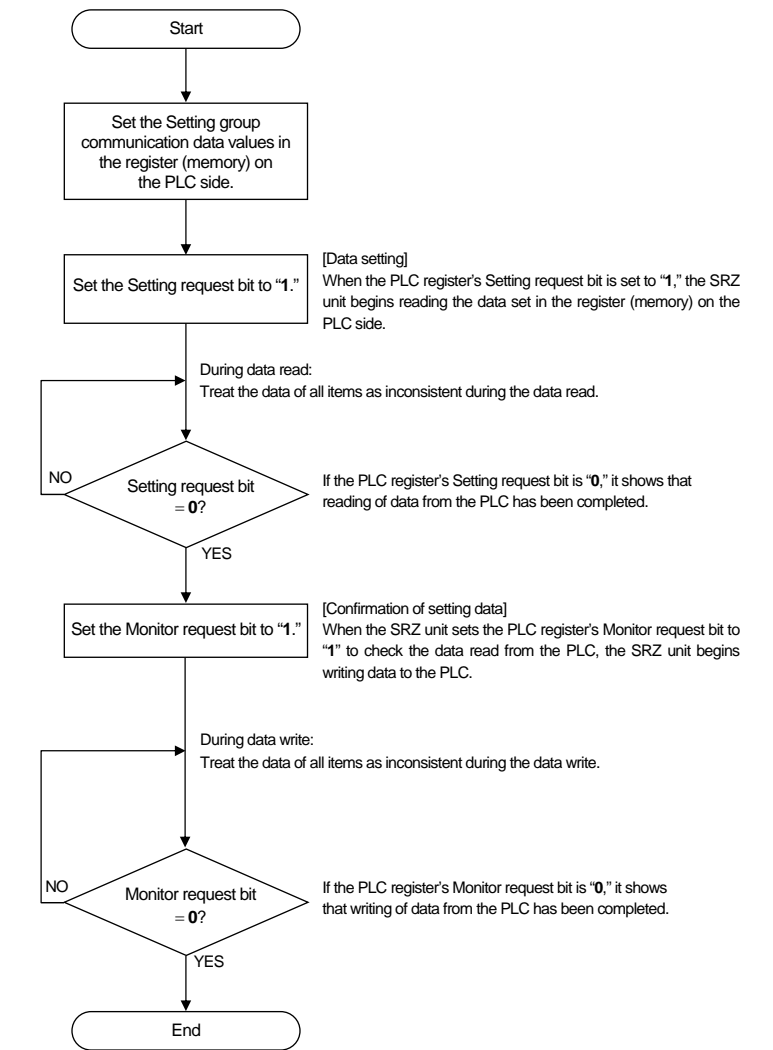If each set value of SRZ unit is changed from the PLC without setting the initial values, it is re-written to "0" with each set value of the PLC at that time set to "0."

■ Initial setting

Start

Turn on power of each instrument
→ When the SRZ unit power is turned ON, the Z-COM module begins collecting the Z-TIO module and Z-DIO module data.
In addition, writing of the System data (monitor items) begins after the PLC communication start time (Factory set value: 5 seconds) has passed.

System communication state = 1? — NO ↑
→ The Z-COM module changes the System communication state to "1" when collection of the Z-TIO and Z-DIO module data is completed.
When the System communication state becomes "1," PLC communication can be performed.

YES ↓

Set "1" to the Monitor request bit.
→ When the PLC register Monitor request bit is set to "1," the SRZ unit begins writing the Setting group data to the PLC.

During data write:
Treat the data of all items as inconsistent during the data write.

Monitor request bit = 0? — NO ↑
→ If the PLC register's Monitor request bit is "0," it shows the data write to the PLC has been completed.

YES ↓

End

■ Data setting

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

Start

↓

Set the Setting group communication data values in the register (memory) on the PLC side.

↓

Set the Setting request bit to "1."
→ [Data setting]
When the PLC register's Setting request bit is set to "1," the SRZ unit begins reading the data set in the register (memory) on the PLC side.

During data read:
Treat the data of all items as inconsistent during the data read.

Setting request bit = 0? — NO ↑
→ If the PLC register's Setting request bit is "0," it shows that reading of data from the PLC has been completed.

YES ↓

Set the Monitor request bit to "1."
→ [Confirmation of setting data]
When the SRZ unit sets the PLC register's Monitor request bit to "1" to check the data read from the PLC, the SRZ unit begins writing data to the PLC.

During data write:
Treat the data of all items as inconsistent during the data write.

Monitor request bit = 0? — NO ↑
→ If the PLC register's Monitor request bit is "0," it shows that writing of data from the PLC has been completed.

YES ↓

End

■ 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)