Energy Measuring Unit Programming Manual (CC-Link)
For ver.2 remote device station

MODEL

EMU4-FD1-MB

- Before operating the instrument, you should first read thoroughly this operation manual for safe operation and optimized performance of the product.
  Deliver this user's manual to the end user.

LEN160603

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1. General Description

This manual describes the programming methods that should be created by the user for monitoring measurement value of Energy Measuring Unit (called Measuring Unit from here on) with the CC-Link (in remote net ver2 mode or remote net additional mode).

In programming, read the following related manuals in addition to this manual.

Table 1.1 Related Manual

Manual Name	Manual No.
CC-Link System Master/Local Module User's Manual type QJ61BT11N	SH-080394E (13JR64)
MELSEC-L CC-Link System Master/Local Module User's Manual	SH-080895ENG (13JZ41)
User's Manual for Measuring Unit	Supplied with product or download.

NOTICE

When using EcoMonitorLight (EMU4-FD1-MB), Optional Plug-in Module "EMU4-CM-C" is necessary. CC-Link communication is not available without the optional plug-in module. In this manual, EcoMonitorLight (MU4-FD1-MB),

POINT

The EMU4-FD1-MB must be handled after setting of the remote device station version. Set the remote device station version with the "Setting Menu 7" of the EMU4-FD1-MB

Use the following as a guideline in setting the remote device station version and set the version at Energy measuring unit.

Mode select setting	Guideline for selection
Ver.1 remote device station (Ver.1 compatible slave station)	Select this when utilizing the conventional program, because of compatibility with Measuring unit previous EMU4.
Ver.2 remote device station (Ver.2 compatible slave station)	Select this when configuring a new system or the being newly added to the existing system in combination with the applicable master module.

This programming manual is for ver.2 remote device station.

For use in the ver.1 remote device station (Ver.1 compatible slave station), refer to the following manual.

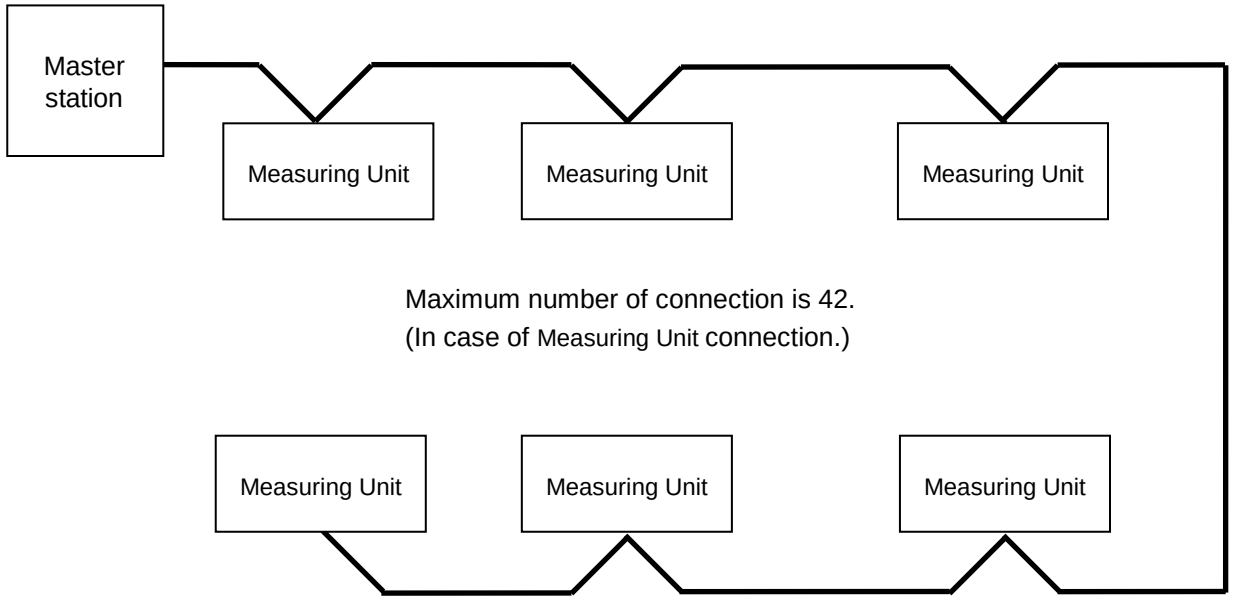
・Energy Measuring Unit Programing Manual (CC-Link)(For ver.1 remote device station)..... LEN160602

2. Specification

CC-Link specification is shown in Table 2.1 when Measuring Unit is set the “Ver2.00” (ver.2 remote device station).

Table 2.1 CC-Link Specification (For Ver2.00)

Item	Specification
CC-Link station type	Remote device station (ver.2 remote device station)
Number of occupied stations	1 station (Expanded cyclic setting: Octuplet)
Maximum number of stations per master station	42 stations (In case of connecting only remote device station occupied by 1 station (Octuplet).)
Transmission speed	156kbps/625kbps/2.5Mbps/5Mbps/10Mbps
Remote I/O (RX, RY)	128 points each
Remote register (RWw, RWr)	32 points each



System Configuration (CC-Link)

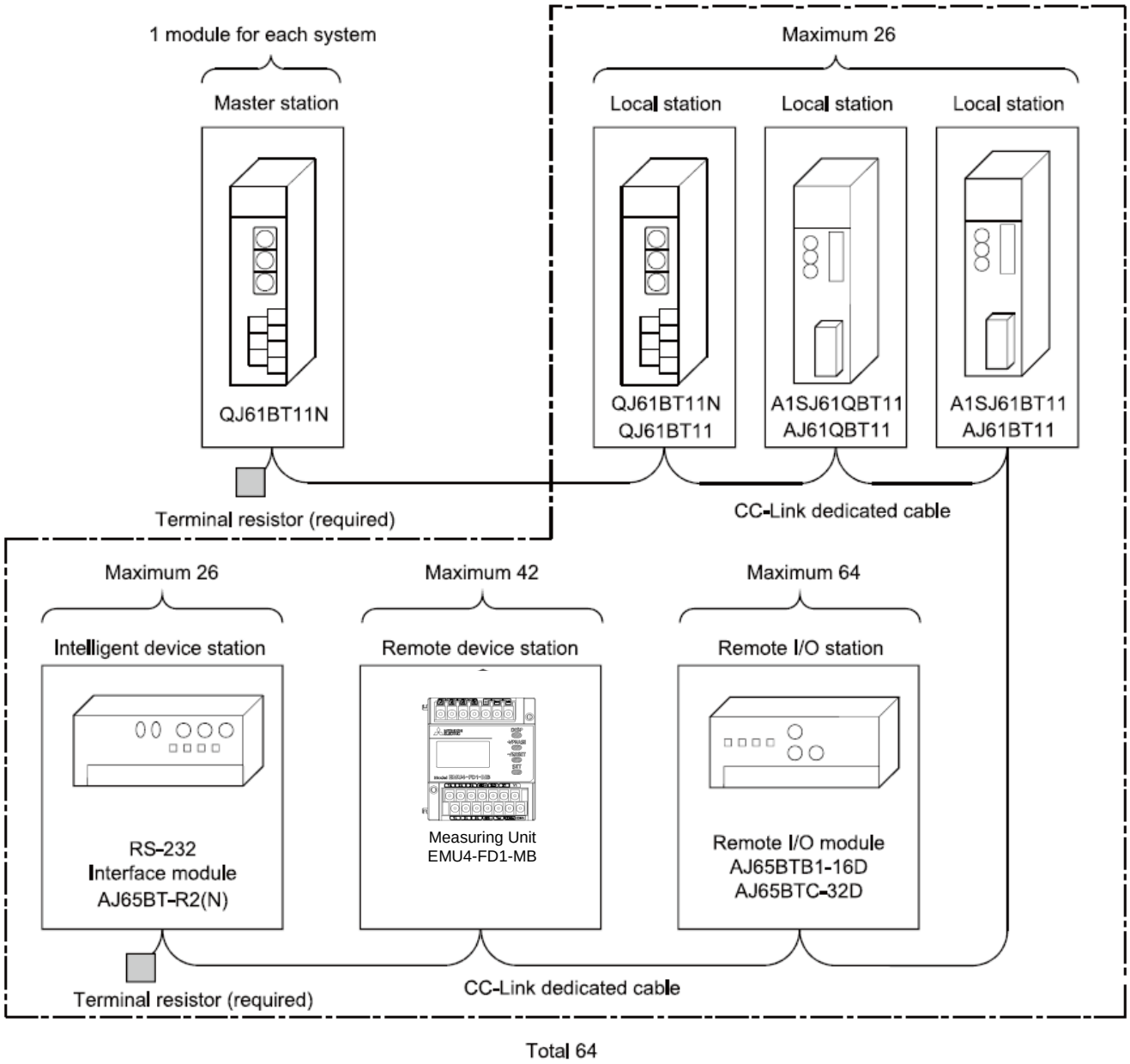
3. Configuration Conditions of CC-Link System

3.1 Remote net ver.2 mode, remote net additional mode

A total of 64 remote I/O stations, remote device stations, local stations, standby master stations, or intelligent device stations can be connected to a single master station.

However, the following conditions must all be satisfied.

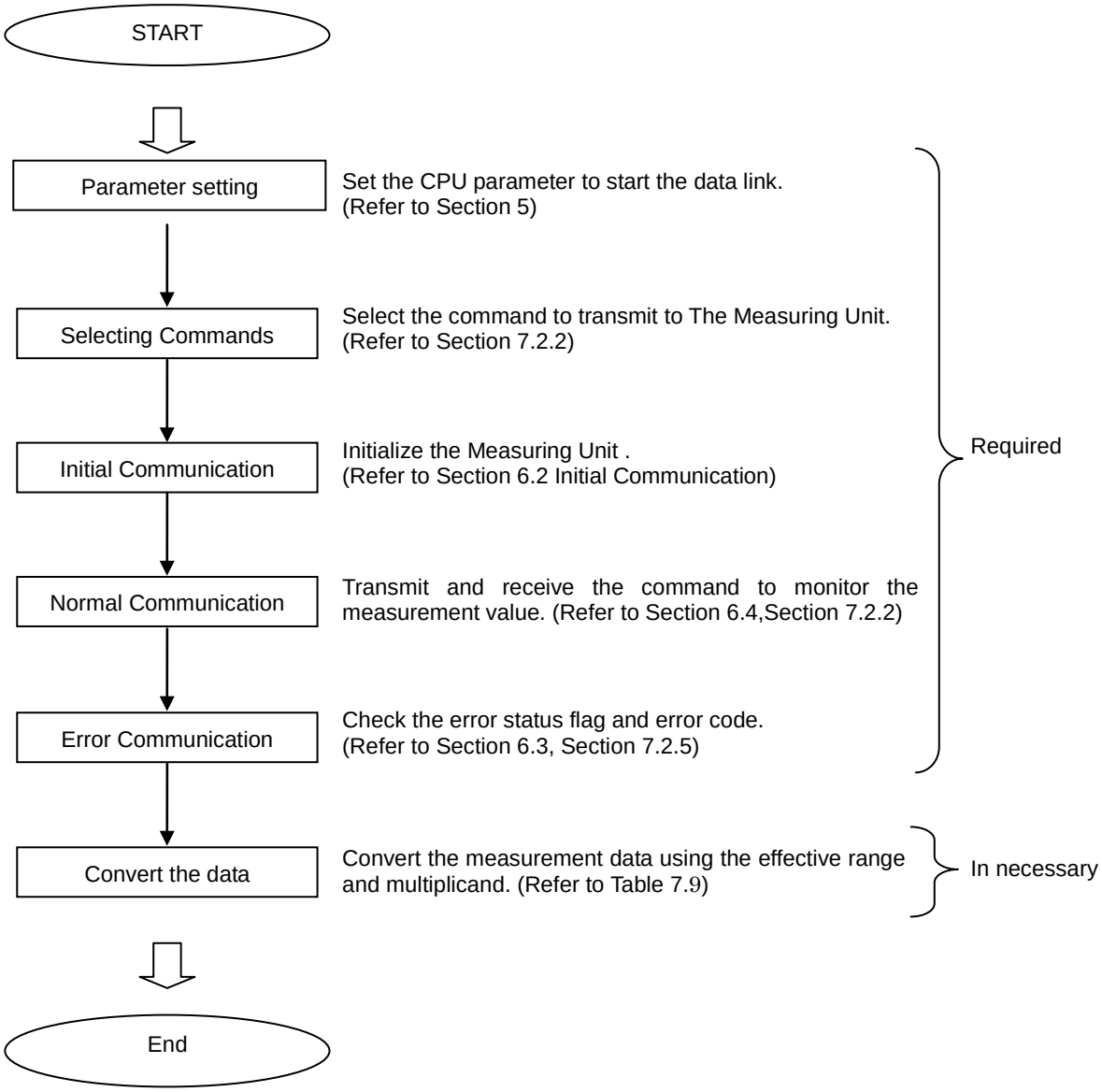
<table>
<tr><td>Condition 1</td><td>{(a＋a2＋a4＋a8)
＋(b＋b2＋b4＋b8)×2
＋(c＋c2＋c4＋c8)×3
＋(d＋d2＋d4＋d8)×4}≦64</td><td rowspan="3">a: The total number of ver.1 compatible slave stations that occupy 1 station, and ver.2 compatible slave stations that occupy 1 station which are set to “Single”.
b: The total number of ver.1 compatible slave stations that occupy 2 stations, and ver.2 compatible slave stations that occupy 2 stations which are set to “Single”.
c: The total number of ver.1 compatible slave stations that occupy 3 stations, and ver.2 compatible slave stations that occupy 3 stations which are set to “Single”.
d: The total number of ver.1 compatible slave stations that occupy 4 stations, and ver.2 compatible slave stations that occupy 4 stations which are set to “Single”.
a2: The number of ver.2 compatible stations that occupy 1 station which are set to “Double”.
b2: The number of ver.2 compatible stations that occupy 2 stations which are set to “Double”.
c2: The number of ver.2 compatible stations that occupy 3 stations which are set to “Double”.
d2: The number of ver.2 compatible stations that occupy 4 stations which are set to “Double”.
a4: The number of ver.2 compatible stations that occupy 1 station which are set to “Quadruple”.
b4: The number of ver.2 compatible stations that occupy 2 stations which are set to “Quadruple”.
c4: The number of ver.2 compatible stations that occupy 3 stations which are set to “Quadruple”.
d4: The number of ver.2 compatible stations that occupy 4 stations which are set to “Quadruple”.
a8: The number of ver.2 compatible stations that occupy 1 station which are set to “Octuplet”.
(Energy measuring unit is applied)
b8: The number of ver.2 compatible stations that occupy 2 stations which are set to “Octuplet”.
c8: The number of ver.2 compatible stations that occupy 3 stations which are set to “Octuplet”.
d8: The number of ver.2 compatible stations that occupy 4 stations which are set to “Octuplet”.</td></tr>
<tr><td>Condition 2</td><td>[{(a×32)＋(a2×32)＋(a4×64)＋(a8×128)}
＋{(b×64)＋(b2×96)＋(b4×192)＋(b8×384)}
＋{(c×96)＋(c2×160)＋(c4×320)＋(c8×640)}
＋{(d×128)＋(d2×224)＋(d4×448)＋(d8×896)}]
≦8192</td></tr>
<tr><td>Condition 3</td><td>[{(a×4)＋(a2×8)＋(a4×16)＋(a8×32)}
＋{(b×8)＋(b2×16)＋(b4×32)＋(b8×64)}
＋{(c×12)＋(c2×24)＋(c4×48)＋(c8×96)}
＋{(d×16)＋(d2×32)＋(d4×64)＋(d8×128)}]
≦2048</td></tr>
<tr><td>Condition 4</td><td>{(16×A) + (54×B) + (88×C)} ≦ 2304</td><td>A: Number of remote I/O stations ≦ 64
B: Number of remote device stations ≦ 42
(Measuring Unit is applied.)
C: Number of local stations, standby master stations and intelligent device stations ≦ 26</td></tr>
</table>


1 module for each system
Master station
QJ61BT11N
Terminal resistor (required)
Maximum 26
Local station
Local station
Local station
QJ61BT11N
QJ61BT11
A1SJ61QBT11
AJ61QBT11
A1SJ61BT11
AJ61BT11
CC-Link dedicated cable
Maximum 26
Intelligent device station
RS-232
Interface module
AJ65BT-R2(N)
Maximum 42
Remote device station
Measuring Unit
EMU4-FD1-MB
Maximum 64
Remote I/O station
Remote I/O module
AJ65BTB1-16D
AJ65BTC-32D
Terminal resistor (required)
CC-Link dedicated cable
Total 64

4. Programming

4.1 Programming Procedure

Create a program which executes the “Monitoring of the measurement values” by following the procedure below:



5. Parameter Settings

5.1 Procedure from Parameter Settings to Data Link Startup

The following explains the procedure from setting the parameters to stating the data link.

5.1.1 CPU Parameter Area and Master Module Parameter Memory

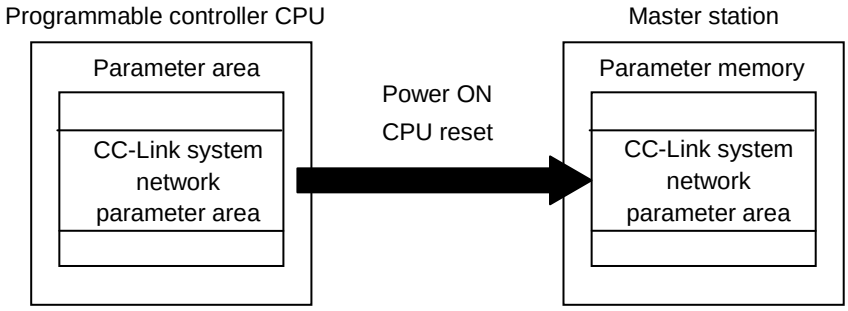
(1) CPU Parameter Area

This area is used to set the basic values for controlling the programmable controller system and the network parameters that control the CC-Link system.

(2) Master Station Parameter Memory

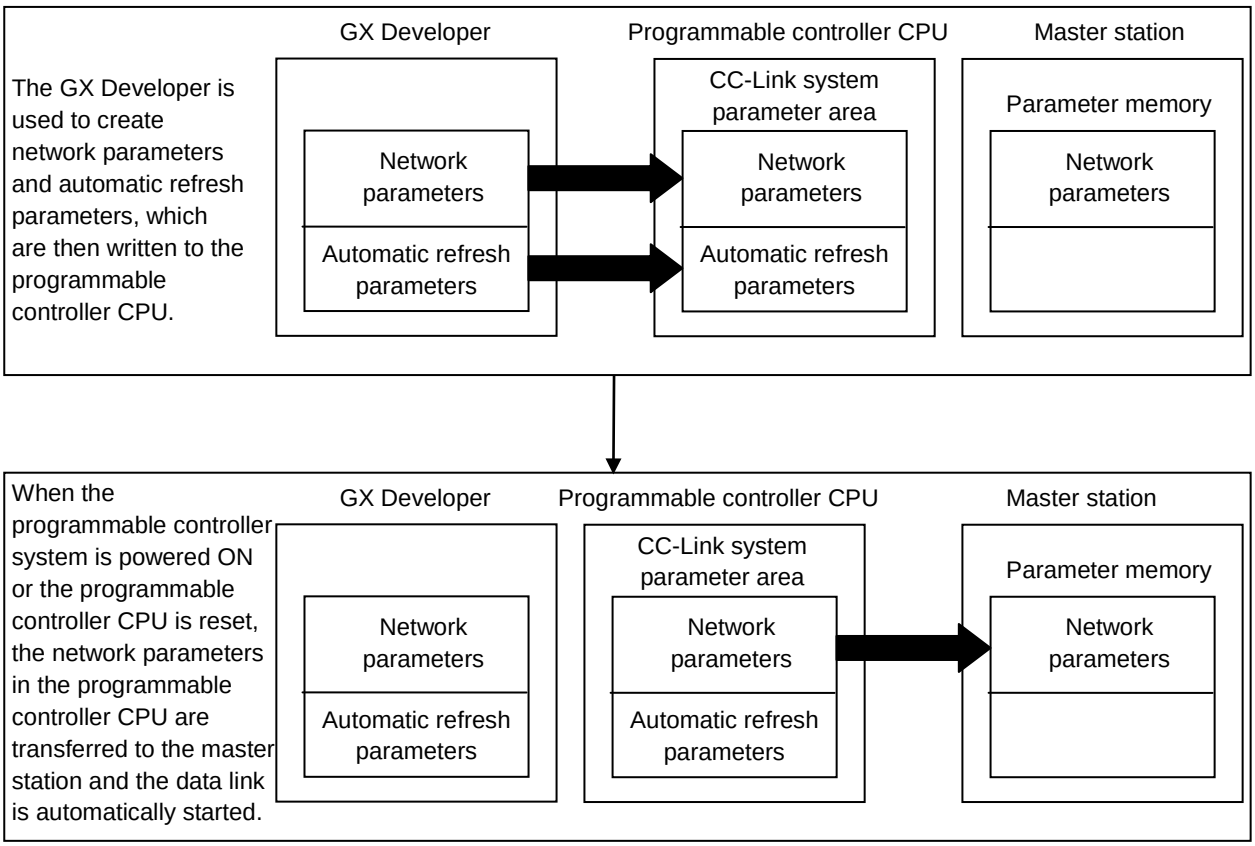
This area stores the network parameters for the CC-Link system.

When the module is powered OFF or the programmable controller CPU is reset, the network parameters are erased.



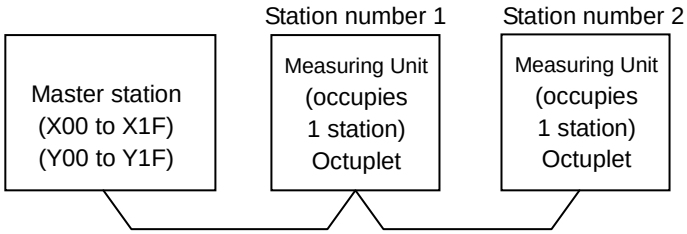
5.1.2 Procedure for Parameter Settings to Data Link Startup with GX Developer

Follow the procedure below for parameter settings to data link startup:



5.2 Example of Parameter Settings with GX Developer (Remote net ver.2 mode)

This section explains the parameter settings using the GX Developer. For more details on the GX Developer operation, refer to the GX Developer Operating Manual. The explanations in this section are based on the following example of the system configuration.



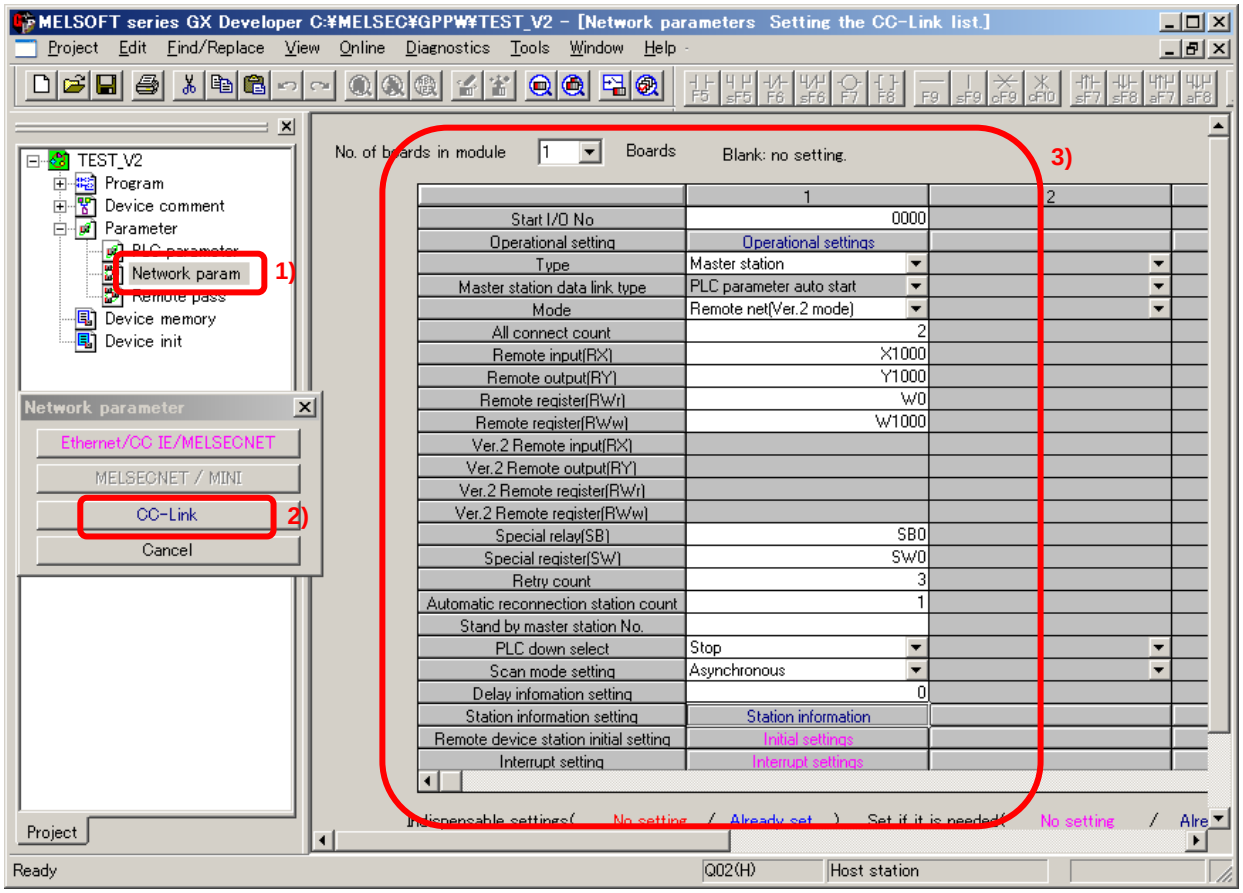
5.2.1 Master Station Network Parameter Settings

1) Double-click on the “Network param”.

2) Click on the “CC-Link” on the “Network parameter” screen.

3) Set the parameters as required.

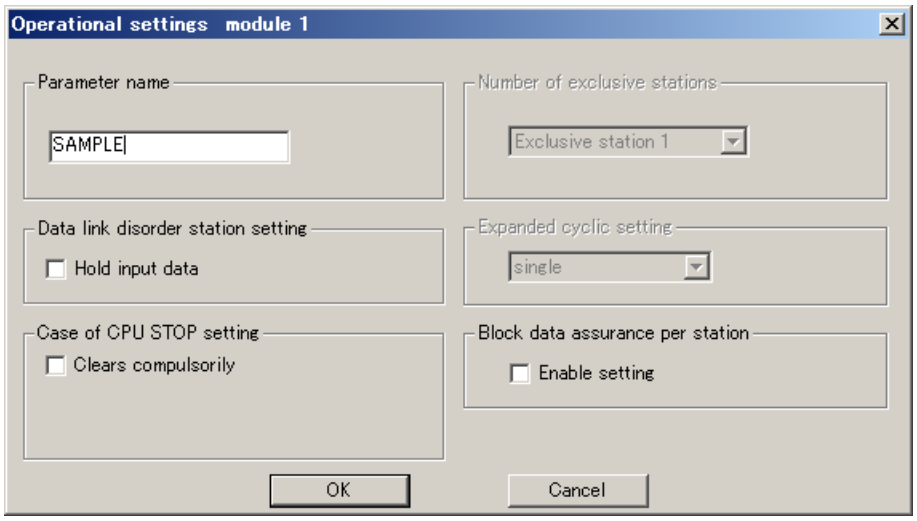
The following describes an example of the parameter settings.



Setting Item	Description	Example for settings	Remarks
No.of boards in module	Set the "No. of boards in module " for which the network parameters are to be set.	1	
Start I/O No	Set the "Start I/O No." for the master station.	0000	Set the same setting of Start XY in PC parameters setting.
Operational settings	Set the following: ・Parameter name ・Data link err station setting ・Case of CPU Stop setting ・Block data assurance per station	Refer to next page.	Even if the Parameter name is not set, this will not affect the operation of the CC-Link system
Type	Set the station type.	Master station	
Mode	Set the CC-Link mode.	Remote net (Ver.2 mode)	“Remote net ver.2 mode “ and “Remote net additional mode” can be also used in case of the QJ61BT11N.
All connect count	Set the total number of connected stations in the CC-Link system including reserved stations.	2 (modules)	Set the total number of connected stations in the CC-Link system including reserved stations.
Remote input (RX)	Set the remote input (RX) refresh device.	X1000	Device name - Select from X, M, L, B, D, W, R or ZR. Device number - Within the range of the device points that the CPU has.
Remote output (RY)	Set the remote output (RY) refresh device.	Y1000	Device name - Select from Y, M, L, B, T, C, ST, D, W, R or ZR. Device number - Within the range of the device points that the CPU has.
Remote register (RWr)	Set the remote register (RWr) refresh device.	W0	Device name - Select from M, L, B, D, W, R, or ZR. Device number - Within the range of the device points that the CPU has.
Remote register (RWw)	Set the remote register (RWw) refresh device.	W1000	Device name - Select from M, L, B, T, C, ST, D, W, R, or ZR. Device number - Within the range of the device points that the CPU has.
Special relay (SB)	Set the link special relay (SB) refresh device.	SB0	Device name - Select from M, L, B, D, W, R, SB or ZR. Device number - Within the range of the device points that the CPU has.
Special register (SW)	Set the link special register (SW) refresh device.	SW0	Device name - Select from M, L, B, D, W, R, SW or ZR. Device number - Within the range of the device points that the CPU has.
Retry count	Set the number of retries for "Retry count", when a communication error occurs.	3	
Automatic reconnection station count	Set the number of modules that can return to system operation by a single link scan.	1	
Standby master station No.	Set the station number for the standby master station	Blank	Blank: No standby master station specified.
PLC down select	Set the data link status for "PLC down select", when a master station programmable controller CPU error occurs.	Stop	
Scan mode setting	Set whether the link scan for the sequence scan is synchronous or asynchronous.	Asynchronous	
Delay information setting	Set for the link scan delay time.	0	Unit:50μs
Station information settings	Set the station data.	Refer to the next page.	

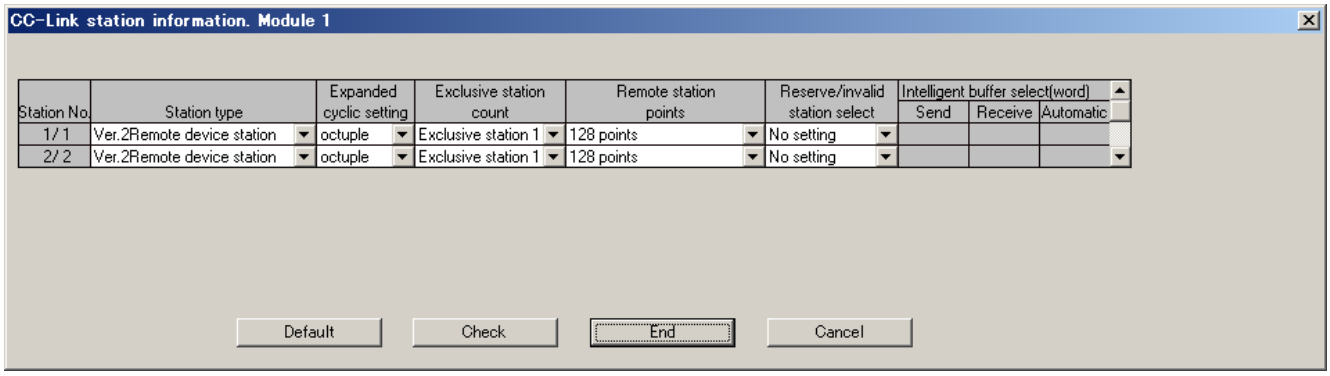
POINT
(1) For the automatic refresh parameter setting, set the start device only. Devices are automatically assigned until the last station number including reserved stations and occupied stations. In the example of the system configuration in this section, the last station number is "2". Therefore, total of remote I/O points is 256 points (128 x 2 = 256) and total of remote registers points is 64 points (32 x 2 = 64). If refresh device of remote input (RX) is set to "X1000" and that of remote registers (RWr) is set to "W0", the end devices will be "X10FF" and "W3F" respectively. (2) When setting X, Y, B, W, SB and SW as refresh devices, make setting so that they do not overlap with the device numbers used on the other networks, etc.

《Example for Operational settings》



Setting Item	Description	Example for settings	Remarks
Parameter name	Set the Parameter name.	“SAMPLE”	Even if the Parameter name is not set, this will not affect the operation of the CC-Link system
Data link disorder station setting	Set the input status for the data link error station.	Clear ("Hold input data" not checked)	
Case of CPU Stop setting	Set the slave station refresh/compulsory clear setting at programmable controller CPU STOP.	Refresh ("Clears compulsorily " not checked)	
Block data assurance per station	Set the block guarantee of cyclic data per station.	Disable ("Enable setting" not checked)	

《Example for Station information settings》



Setting Item	Description	Example for settings	Remarks
Station type	Set the station data.	Ver2. Remote device station	Set the “ver2.00” in Setting Menu 7 of Measuring Unit.
Expanded cyclic setting		octuplet	Measuring Unit cannot use other than “octuplet”.
Number of occupied stations *		Occupies 1 station	Set the “Occupies 1 station” in case of the Measuring Unit.
Remote station points		128 points	Set the “128 points” in case of the Measuring Unit.
Reserved/invalid station select		No setting	

* "Number of exclusive stations" on the screen is described as "Number of occupied stations" in this manual.

"Exclusive station 1" on the screen is described as "Occupies 1 station" in this manual

6. Communication Between the Master Station and Measuring Unit

6.1 Communication Guideline

There are three communication statuses (Initial Communication, Normal Communication, and Error Communication) between the Master station and Measuring Unit.
In the normal communication, alarm status and digital input status of Measuring Unit can be monitored using bit data (remote input RX). Furthermore, the following can be performed by using remote input, remote output and remote registers.

- Monitoring by Pattern
- Monitoring by Command (1H).
- Setting by Command (2H).

For a monitoring by pattern, some measuring values can be monitored by selecting a bit of RY. Measuring values which can be monitored have been already grouping in Measuring Unit in advance. Please select the necessary group in a bit of RY.

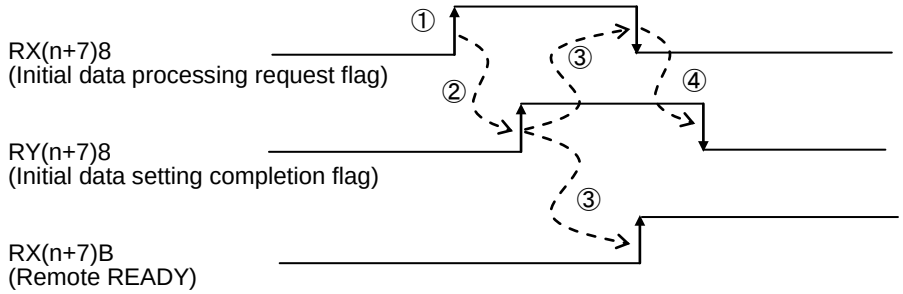
For a monitoring by command (1H), you can select any measurement items to be monitored. Measuring Unit has unique codes (called unit No., group No. and channel No.) for each measurement items. You can monitor the selected measurement items by writing these codes to the remote registers.

For a setting by command (2H), you can set for Measuring Unit settings.

* All measuring items can be monitored even when it is not displayed in Measuring Unit.

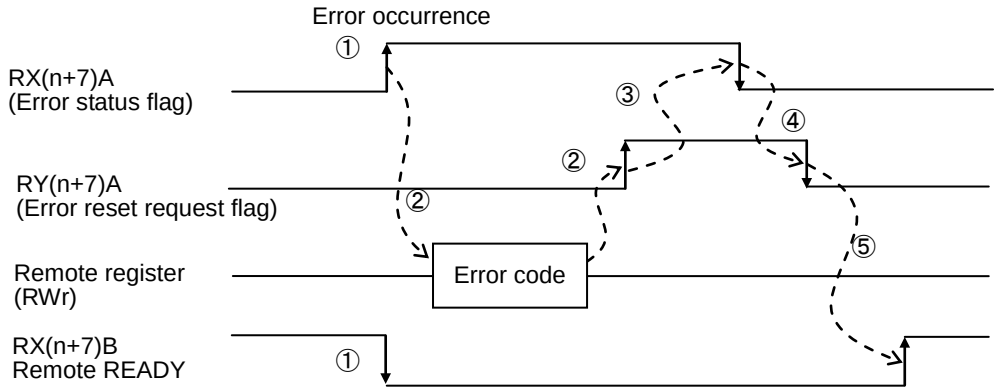
6.2 Initial Communication

Initial communication is performed at the beginning after the power supply is turned on or hardware is reset.
Refer to section 7.1 about the remote input RX and the remote output RY.



①After the power supply is turned on, or hardware is reset, the initial data processing request flag is turned on by Measuring Unit.
②After the initial data processing request flag is turned on, turn on the initial data setting completion flag.
③After the initial data setting completion flag is turned on, the initial data processing request flag is turned off and the remote READY is turned on.
④After the initial data processing request flag is turned off, turned off the initial data setting completion flag.

6.3 Error Communication



①When an error occurs in Measuring Unit, error status flag is turned on and the remote READY is turned off.
②When the error status flag is turned on, read the error code from the remote register RWr. Eliminate the cause of the error while referring to the red error code. When resuming communication with Measuring Unit, turn on the error reset request flag.
③After the error reset request flag is turned on, the error status flag is turned off.
④After the error status flag is turned off, turn off the error reset request flag.
⑤After the error reset request flag is turned off, the remote READY is turned on and normal communication is resumed.

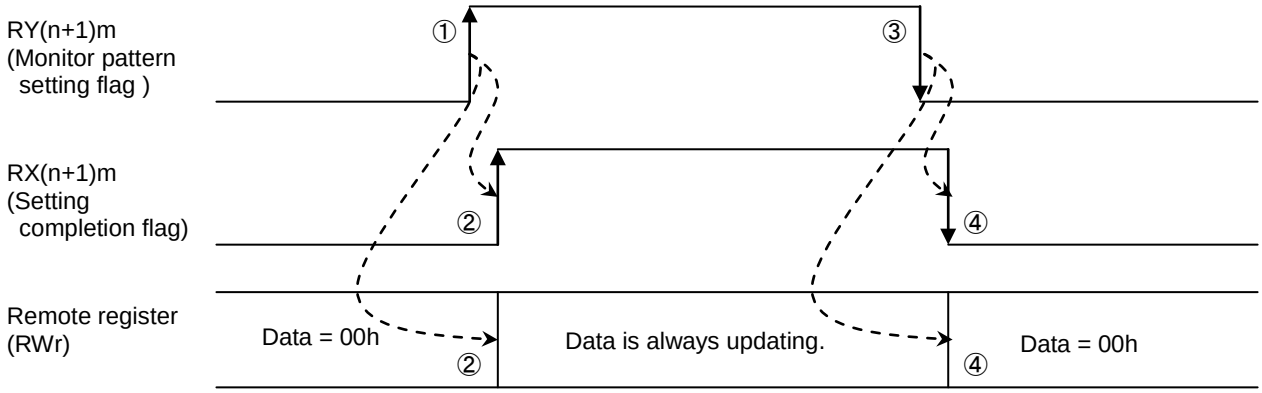
Note: Refer to “7.2.5 About error occurrence” for error code.

6.4 Normal Communication

After initial data processing is complete, allows the monitoring by pattern, monitoring by command (1H) and setting by command (2H).

6.4.1 Monitoring by Pattern

Up to 16 measuring values can be monitored by setting a bit of RY. Measuring values which can be monitored have been already grouping in Measuring Unit in advance. Therefore, select the necessary group in a bit of RY. (Refer to section 7.1.2)



(1) Start of monitor

①Turns on monitor pattern setting flag(RY(n+1)m) which will be monitored.

②Corresponding setting completion flag(RX(n+1)m) is turned on when the measuring values can be monitored at Measuring Unit. At this time, Measuring values are stored in remote registers (RWr) each time the measuring data of Measuring Unit is updating.

(2) End of monitor

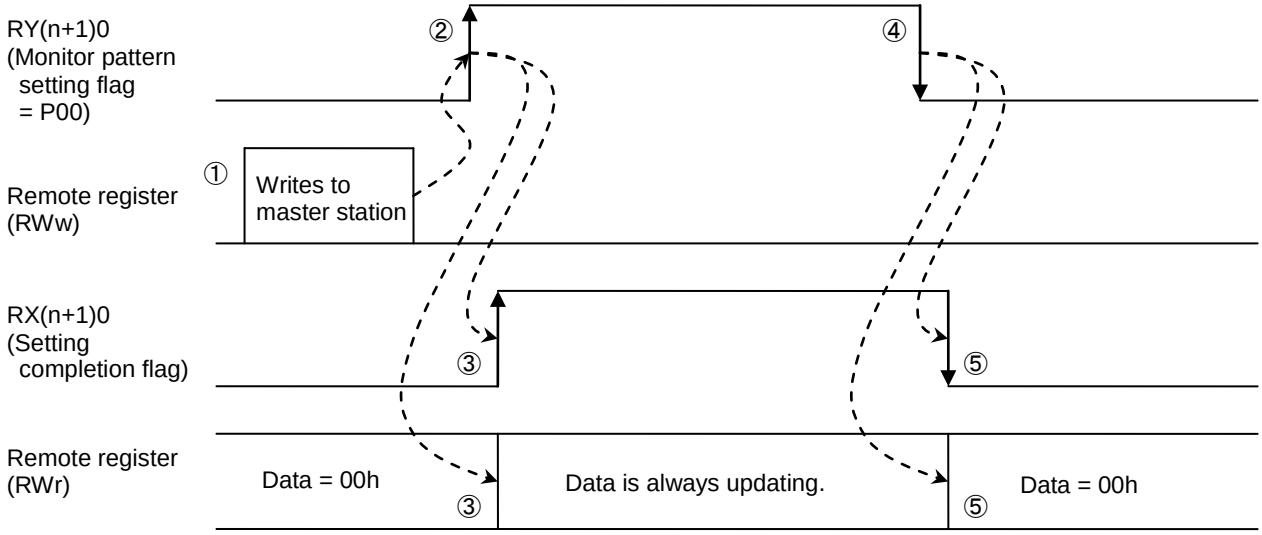
③Turns off monitor pattern setting flag(RY(n+1)m).

④Corresponding setting completion flag(RX(n+1)m) is turned off and remote registers are 00h.

Note: When turns on multiple monitor pattern setting flag (RY (n+1)*), setting completion flag is not turned on. At this time, error status flag (RX (n+7)A) is turned on, and remote READY (RX (n+7)B) is turned off.

6.4.2 Monitoring by Command (1H)

Up to 8 measuring values can be monitored by setting the unique codes (called unit No., group No. and channel No.).



(1) Start of monitor

①Writes the Unit No., group No. and channel No. for measuring items to be monitored to remote registers(RWw).

②Turns on monitor pattern setting flag(RY(n+1)0).

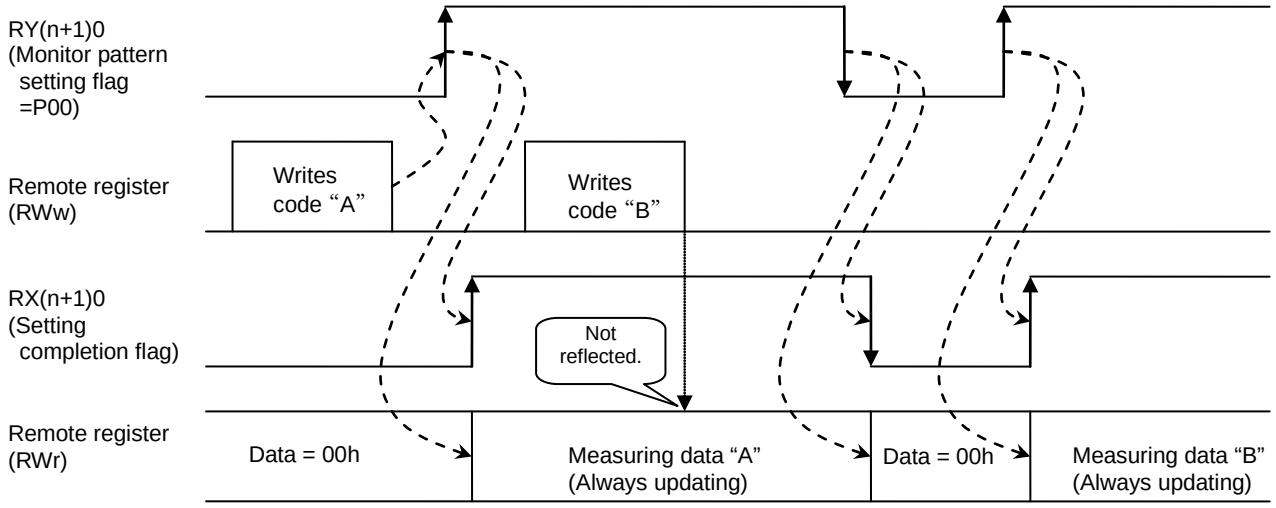
③When the measuring values can be monitored with Measuring Unit, corresponding setting completion flag(RX(n+1)0) is turned on. At this time, Measuring values are stored in remote registers (RWr) each time the measuring data of Measuring Unit is updating.

(2) End of monitor

④Turns off monitor pattern setting flag(RY(n+1)0).

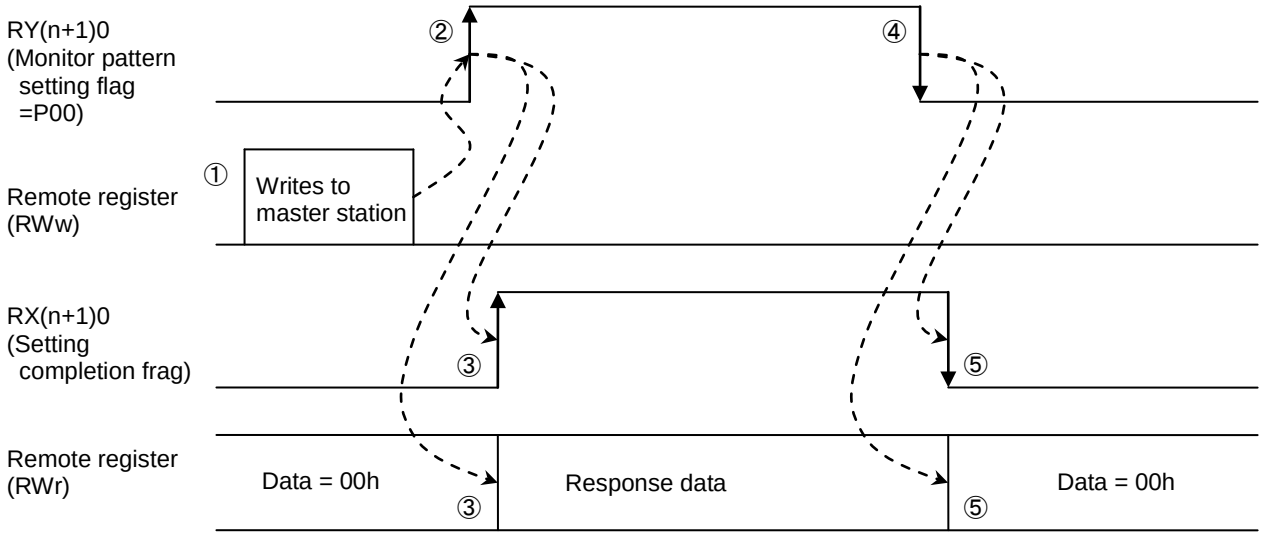
⑤Corresponding setting completion flag(RX(n+1)m) is turned off and remote registers are 00h.

Note: When monitor pattern setting flag (RY(n+1)0) remains on, measuring items in remote registers(RWr) is not reflected if remote registers (RWw) is changed. To change measuring items, turns on monitor pattern setting flag (RY (n+1)0) after changing remote registers (RWw).



6.4.3 Setting by Command (2H)

A setting item of Measuring Unit can be set by setting the unique codes (called unit No., group No. and channel No.) and setting data.



(1) Setting

①Writes the Unit No., group No, channel No. and setting data to remote registers(RWw).

②Turns on monitor pattern setting flag(RY(n+1)0).

③After checking for data at Measuring Unit, corresponding setting completion flag(RX(n+1)0) is turned on. At this time, response data are stored in remote registers(RWr).

(2) End of setting

④Turns off monitor pattern setting flag(RY(n+1)0).

⑤Corresponding setting completion flag(RX(n+1)m) is turned off and remote registers are 00h.

Note: When monitor pattern setting flag (RY (n+1)0) remains on, setting data of Measuring Unit is not reflected if remote registers (RWw) is changed. To change setting data, turns on monitor pattern setting flag (RY (n+1)0) after writing remote registers (RWw).

7. Remote I/O and Remote Register

7.1 Remote Input RX, Remote Output RY

The remote input RX and remote output RY are used to communicate for bit data between the master station and Measuring Unit.

7.1.1 Remote input RX

The allocation of the remote input RX of Measuring Unit is shown in the table below.

Device No.	Signal name	EMU4-FD1-MB	Description		Note
			OFF(0)	ON(1)	
RXn0	Alarm of Pulse	○	Non-Alarm state	Alarm state	Note2 Note3
RXn1	Reserved	—	—	—	
RXn2	Alarm of Demand current	○	Non-Alarm state	Alarm state	Note 2
RXn3	Alarm of Demand Active power	○	Non-Alarm state	Alarm state	Note 2
RXn4	Contact input	○	OFF(OPEN)	ON(CLOSE)	Note 4
RXn5	Alarm (total)	○	Non-Alarm state	Alarm state	Note 2
RXn6	Reserved	—	—	—	
RXn7	Reserved	—	—	—	
RXn8	Alarm of Voltage	○	Non-Alarm state	Alarm state	Note 2
RXn9 to RXnC	Reserved	—	—	—	
RXnD	Alarm of Power factor	○	Non-Alarm state	Alarm state	Note 2
RXnE	Reserved	—	—	—	
RXnF	Reserved	—	—	—	
RX(n+1)0	Setting completion flag P00	○	Not receiving	Receiving	
RX(n+1)1 to RX(n+1)7	Reserved	—	—	—	
RX(n+1)8	Setting completion flag P08	○	Not receiving	Receiving	
RX(n+1)9	Setting completion flag P09	○	Not receiving	Receiving	
RX(n+1)A	Setting completion flag P10	○	Not receiving	Receiving	Note 5
RX(n+1)B	Setting completion flag P11	○	Not receiving	Receiving	
RX(n+1)C	Setting completion flag P12	○	Not receiving	Receiving	Note 5
RX(n+1)D to RX(n+7)7	Reserved	—	—	—	
RX(n+7)8	Initial data processing request flag	○	Power OFF, remote READY ON, or error status flag ON	Power supply is turned ON or hardware reset	Note 1
RX(n+7)9	Reserved	—	—	—	
RX(n+7)A	Error status flag	○	No error occurrence	Error occurrence	Note 1
RX(n+7)B	Remote READY	○	Monitoring or setting are not possible	Normally communication status	Note 1
RX(n+7)C to RX(n+7)F	Reserved	—	—	—	

Note 1: For the details, refer to “6.Communication Between the Master Station and Measuring Unit”.

Note 2: This is only output when alarm use in measuring unit.

Note 3: Alarm of Pulse count is available only when Setting of external input signal of EMU4-FD1-MB is setup Pulse input. .

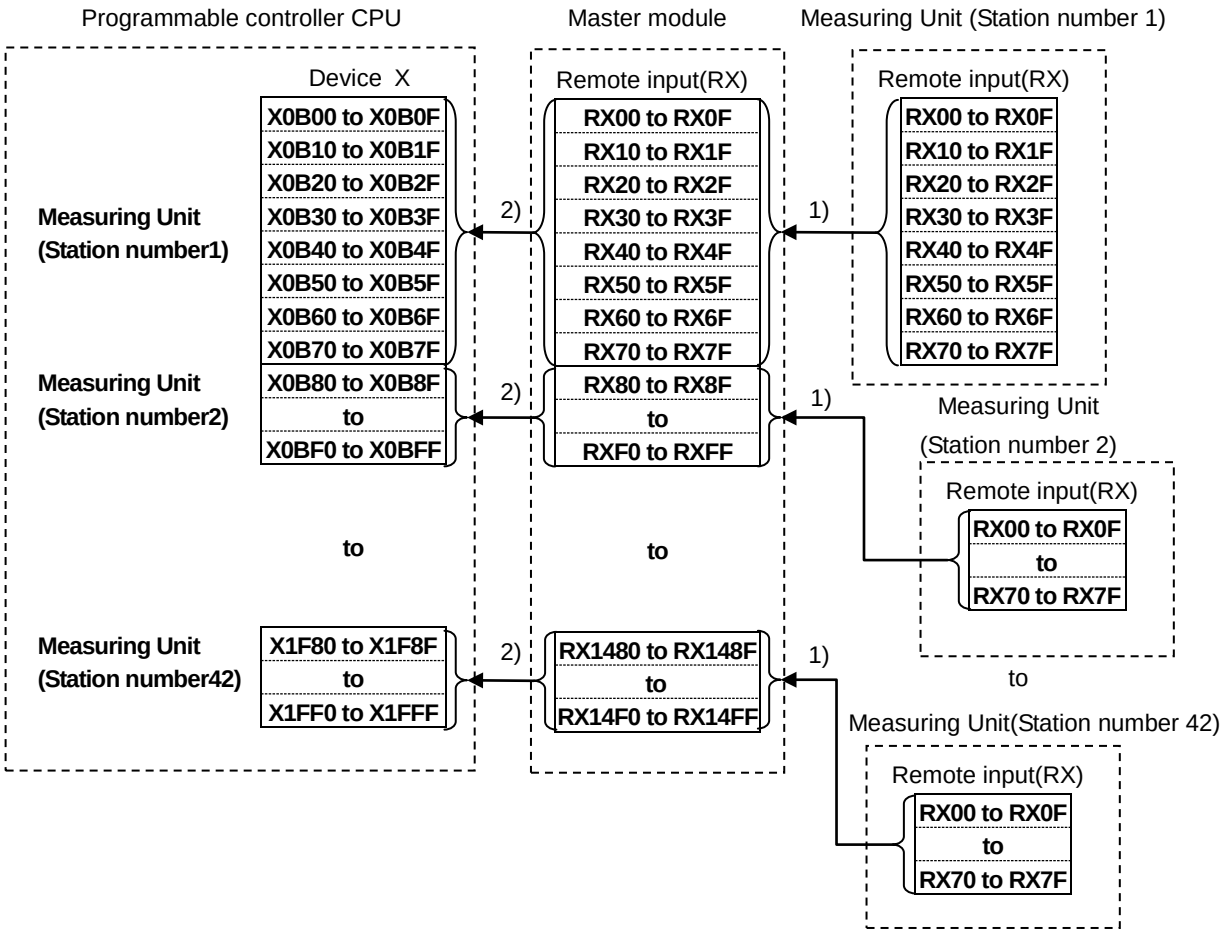
Note 4: Contact Input is available only when Setting of external input signal of EMU4-FD1-MB is setup Contact input.

Note 5: This is only available when phase wire system is 3P4W in EMU4-FD1-MB.

(1) Relationships between programmable controller CPU, master module and Measuring Unit(RX)

1) The input status of Measuring Unit is stored automatically (for each link scan) in the master station's "remote input RX" buffer memory.

2) The input status stored in the "remote input RX" buffer memory is stored in the CPU device set with the automatic refresh parameters.



Station number	Device No.			Station number	Device No.			Station number	Device No.		
1	X0B00	to	X0B7F	15	X1200	to	X127F	29	X1900	to	X197F
2	X0B80	to	X0BFF	16	X1280	to	X12FF	30	X1980	to	X19FF
3	X0C00	to	X0C7F	17	X1300	to	X137F	31	X1A00	to	X1A7F
4	X0C80	to	X0CfF	18	X1380	to	X13FF	32	X1A80	to	X1AFF
5	X0D00	to	X0D7F	19	X1400	to	X147F	33	X1B00	to	X1B7F
6	X0D80	to	X0DFF	20	X1480	to	X14FF	34	X1B80	to	X1BFF
7	X0E00	to	X0E7F	21	X1500	to	X157F	35	X1C00	to	X1C7F
8	X0E80	to	X0EFF	22	X1580	to	X15FF	36	X1C80	to	X1CFF
9	X0F00	to	X0F7F	23	X1600	to	X167F	37	X1D00	to	X1D7F
10	X0F80	to	X0FFF	24	X1680	to	X16FF	38	X1D80	to	X1DFF
11	X1000	to	X107F	25	X1700	to	X177F	39	X1E00	to	X1E7F
12	X1080	to	X10FF	26	X1780	to	X17FF	40	X1E80	to	X1EFF
13	X1100	to	X117F	27	X1800	to	X187F	41	X1F00	to	X1F7F
14	X1180	to	X11FF	28	X1880	to	X18FF	42	X1F80	to	X1FFF

Device No. is determined to “X0B00 to X1FFF” if refresh device of remote input (RX) is set to “X0B00”.

7.1.2 Remote Output RY

The allocation of the remote output RY of Measuring Unit is shown in the table below.

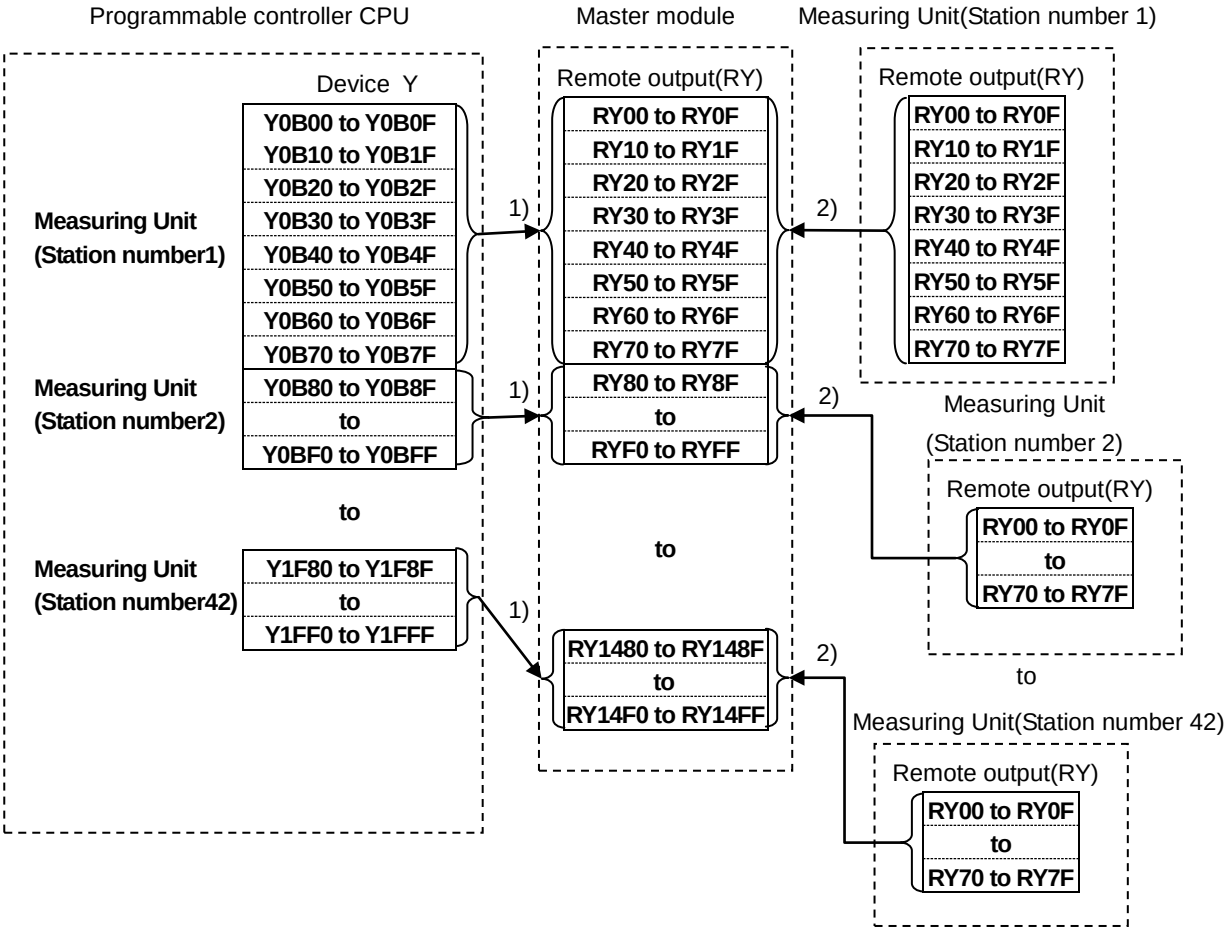
Device No.	Signal name	EMU4-FD1-MB	Description		Note
			ON (1) → OFF (0)	OFF (0) → ON (1)	
RYn0 to RYnF	Reserved	–	–	–	
RX(n+1)0	Monitor pattern setting flag P00	○	Not setting	Setting	
RY(n+1)1 to RY(n+1)7	Reserved	–	–	–	
RY(n+1)8	Monitor pattern setting flag P08	○	Not setting	Setting	
RY(n+1)9	Monitor pattern setting flag P09	○	Not setting	Setting	
RY(n+1)A	Monitor pattern setting flag P10	○	Not setting	Setting	Note 2
RY(n+1)B	Monitor pattern setting flag P11	○	Not setting	Setting	
RY(n+1)C	Monitor pattern setting flag P12	○	Not setting	Setting	Note 2
Ry(n+1)D to RY(n+7)7	Reserved	–	–	–	
RY(n+7)8	Initial data process request flag	○	Power OFF, remote READY ON, or error status flag ON	Power supply is turned ON or hardware reset	
RY(n+7)9	Reserved	–	–	–	
RY(n+7)A	Error status flag	○	No error occurrence	Error occurrence	
RY(n+7)B to RY(n+7)F	Reserved	–	–	–	

Note 1: For the details, refer to “6.2 Initial communication” , “6.3 Error communication”

Note 2:This is only available when phase wire system is 3P4W in EMU4-FD1-MB. .

Relationships between programmable controller CPU, master module and Measuring Unit (RY)

1) The on/off data of the CPU device set with the automatic refresh parameters is stored in the "remote output RY" buffer memory.
2) Remote output RY is automatically set to on/off (for each link scan) according to the output status stored in the "remote output RY" buffer memory.



Station number	Device No.			Station number	Device No.			Station number	Device No.		
1	Y0B00	to	Y0B7F	15	Y1200	to	Y127F	29	Y1900	to	Y197F
2	Y0B80	to	Y0BFF	16	Y1280	to	Y12FF	30	Y1980	to	Y19FF
3	Y0C00	to	Y0C7F	17	Y1300	to	Y137F	31	Y1A00	to	Y1A7F
4	Y0C80	to	Y0CfF	18	Y1380	to	Y13FF	32	Y1A80	to	Y1AFF
5	Y0D00	to	Y0D7F	19	Y1400	to	Y147F	33	Y1B00	to	Y1B7F
6	Y0D80	to	Y0DFF	20	Y1480	to	Y14FF	34	Y1B80	to	Y1BFF
7	Y0E00	to	Y0E7F	21	Y1500	to	Y157F	35	Y1C00	to	Y1C7F
8	Y0E80	to	Y0EFF	22	Y1580	to	Y15FF	36	Y1C80	to	Y1CFF
9	Y0F00	to	Y0F7F	23	Y1600	to	Y167F	37	Y1D00	to	Y1D7F
10	Y0F80	to	Y0FFF	24	Y1680	to	Y16FF	38	Y1D80	to	Y1DFF
11	Y1000	to	Y107F	25	Y1700	to	Y177F	39	Y1E00	to	Y1E7F
12	Y1080	to	Y10FF	26	Y1780	to	Y17FF	40	Y1E80	to	Y1EFF
13	Y1100	to	Y117F	27	Y1800	to	Y187F	41	Y1F00	to	Y1F7F
14	Y1180	to	Y11FF	28	Y1880	to	Y18FF	42	Y1F80	to	Y1FFF

Device No. is determined to “Y0B00 to Y1FFF” if refresh device of remote output (RY) is set to “Y0B00”.

7.2 Remote Register (RWr, RWw)

The remote registers RWr and RWw are used to communicate word data between the master station and Measuring Unit. Because it occupiers 1 station (Expanded cyclic setting: octuplet), the remote registers RWr and RWw each have 32 words in length.

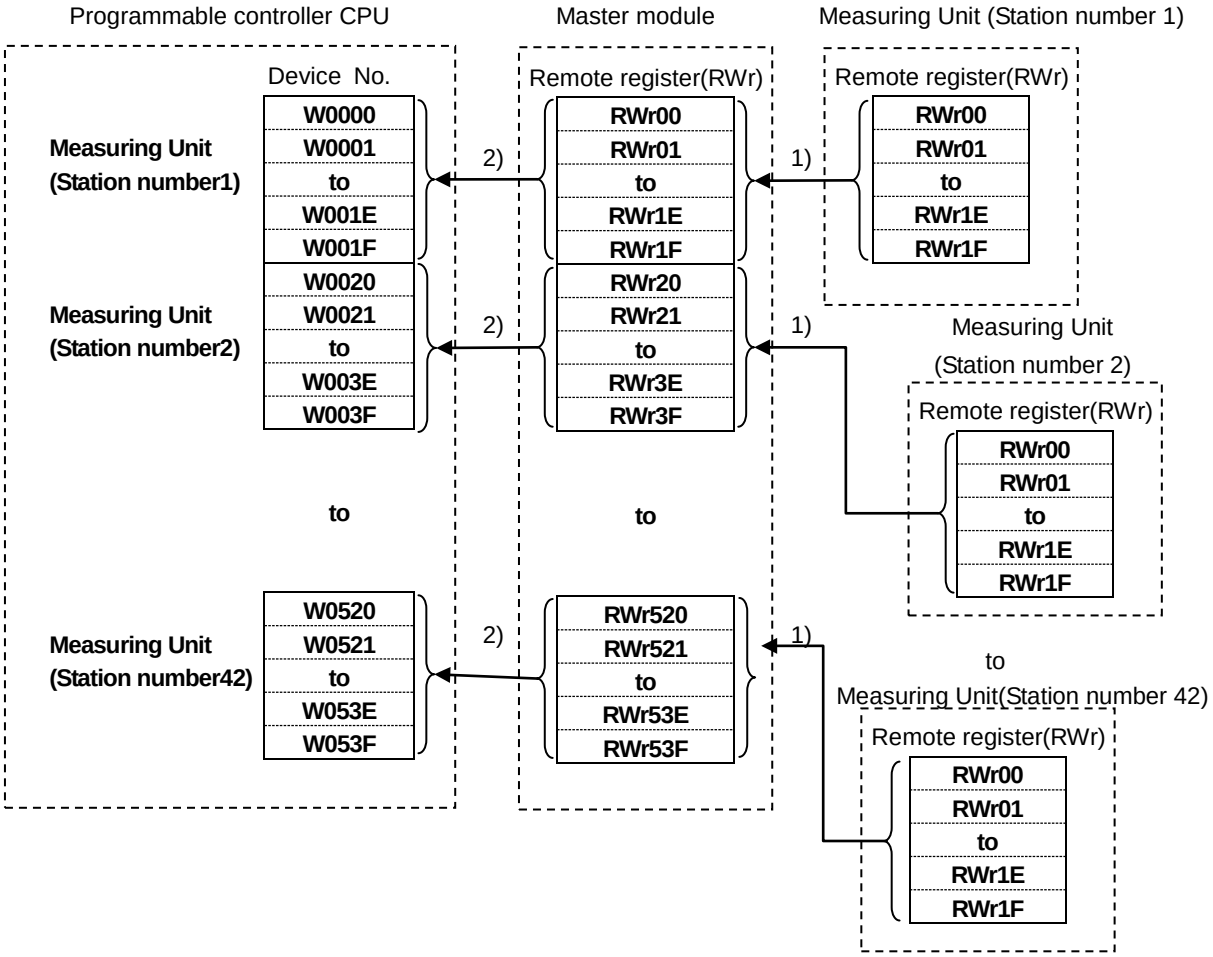
For monitoring by pattern, it is not necessary to use remote registers (RWw). Selected measuring values which are set a bit of RY are stored in remote registers (RWr).

For monitoring by command (1H) and setting by command (2H), it is necessary to use remote registers (RWw). Measuring Unit has unique codes (called unit No., group No. and channel No.) for each measurement items and setting items. It becomes possible to monitor each measurement values or set each parameter by writing into the remote registers (RWw) of the master station command and the related data allocated to the item you want to monitor or set.

(1) Relationships between programmable controller CPU, master module and Measuring Unit(RWr)

1) The remote registers RWr data of a remote device station is automatically stored in the "remote registers Rwr" buffer memory of the master station.

2) The remote registers RWr data of Measuring Unit stored in the "remote registers RWr" buffer memory is stored in the CPU device set with the automatic refresh parameters.



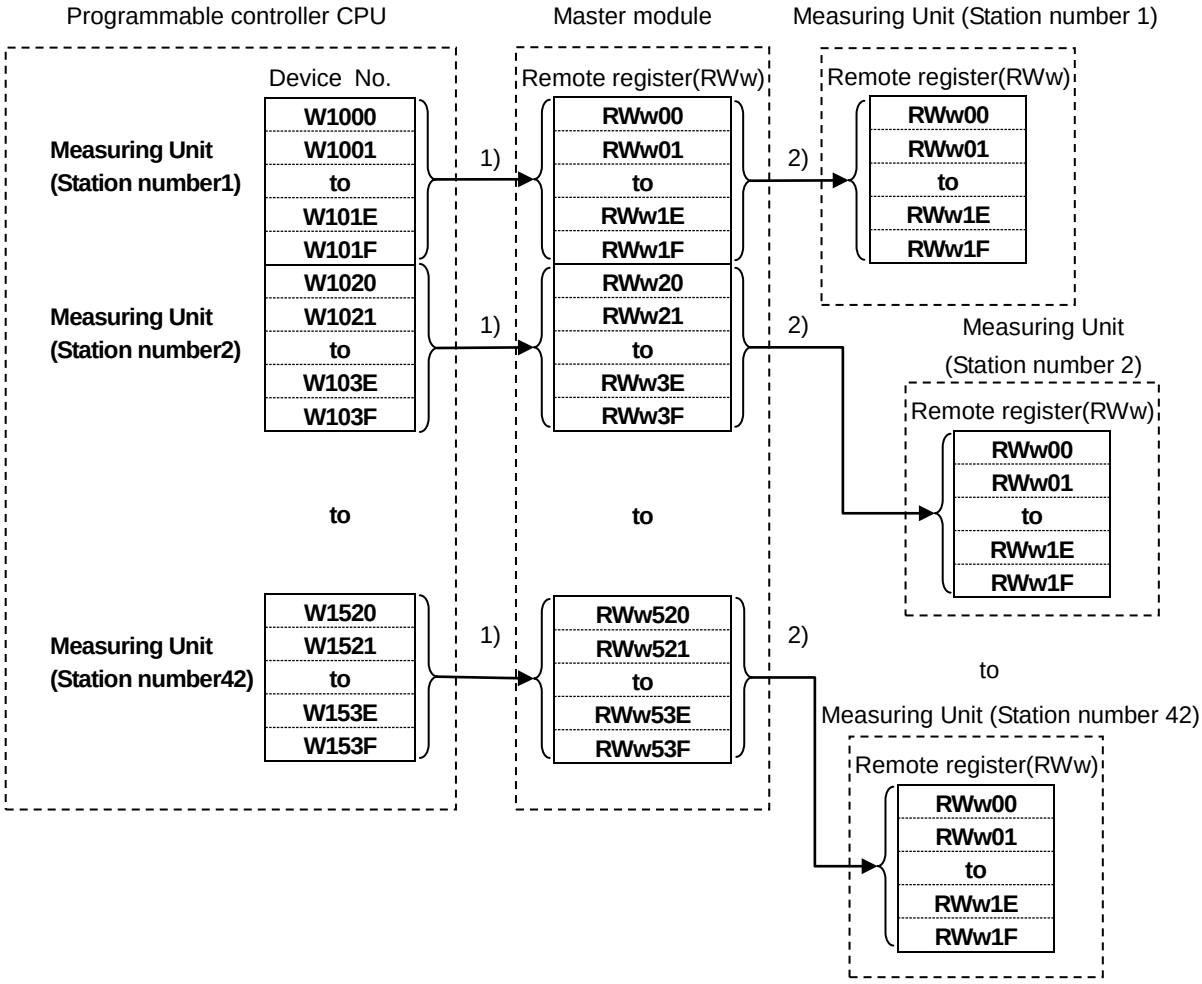
Station number	Device No.			Station number	Device No.			Station number	Device No.		
1	W0000	to	W001F	15	W01C0	to	W01DF	29	W0380	to	W039F
2	W0020	to	W003F	16	W01E0	to	W01FF	30	W03A0	to	W03BF
3	W0040	to	W005F	17	W0200	to	W021F	31	W03C0	to	W03DF
4	W0060	to	W007F	18	W0220	to	W023F	32	W03E0	to	W03FF
5	W0080	to	W009F	19	W0240	to	W025F	33	W0400	to	W041F
6	W00A0	to	W00BF	20	W0260	to	W027F	34	W0420	to	W043F
7	W00C0	to	W00DF	21	W0280	to	W029F	35	W0440	to	W045F
8	W00E0	to	W00FF	22	W02A0	to	W02BF	36	W0460	to	W047F
9	W0100	to	W011F	23	W02C0	to	W02DF	37	W0480	to	W049F
10	W0120	to	W013F	24	W02E0	to	W02FF	38	W04A0	to	W04BF
11	W0140	to	W015F	25	W0300	to	W031F	39	W04C0	to	W04DF
12	W0160	to	W017F	26	W0320	to	W033F	40	W04E0	to	W04FF
13	W0180	to	W019F	27	W0340	to	W035F	41	W0500	to	W051F
14	W01A0	to	W01BF	28	W0360	to	W037F	42	W0520	to	W053F

Device No. is determined to “W0000 to W053F” if refresh device of remote registers (RWr) is set to “W0”.

(2) Relationships between programmable controller CPU, master module and Measuring Unit(RWw)

1) The transmission data of the CPU device set with the automatic refresh parameters is stored in the "remote registers RWw" buffer memory.

2) The data stored in the "remote registers RWw" buffer memory is automatically sent to the remote registers RWw of each remote device station.



Station number	Device No.			Station number	Device No.			Station number	Device No.		
1	W1000	to	W101F	15	W11C0	to	W11DF	29	W1380	to	W139F
2	W1020	to	W103F	16	W11E0	to	W11FF	30	W13A0	to	W13BF
3	W1040	to	W105F	17	W1200	to	W121F	31	W13C0	to	W13DF
4	W1060	to	W107F	18	W1220	to	W123F	32	W13E0	to	W13FF
5	W1080	to	W109F	19	W1240	to	W125F	33	W1400	to	W141F
6	W10A0	to	W10BF	20	W1260	to	W127F	34	W1420	to	W143F
7	W10C0	to	W10DF	21	W1280	to	W129F	35	W1440	to	W145F
8	W10E0	to	W10FF	22	W12A0	to	W12BF	36	W1460	to	W147F
9	W1100	to	W111F	23	W12C0	to	W12DF	37	W1480	to	W149F
10	W1120	to	W113F	24	W12E0	to	W12FF	38	W14A0	to	W14BF
11	W1140	to	W115F	25	W1300	to	W131F	39	W14C0	to	W14DF
12	W1160	to	W117F	26	W1320	to	W133F	40	W14E0	to	W14FF
13	W1180	to	W119F	27	W1340	to	W135F	41	W1500	to	W151F
14	W11A0	to	W11BF	28	W1360	to	W137F	42	W1520	to	W153F

Device No. is determined to “W1000 to W153F” if refresh device of remote registers (RWw) is set to “W1000”.

7.2.1 Monitor Pattern

The following table shows correspondence between RY and grouped measuring items.

Table 7.1 Correspondence between RY and grouped measuring items.

(Model: EMU4-FD1-MB)

Device.	P08	P09	P10	P11	P12
	RY(n+1)8	RY(n+1)9	RY(n+1)A	RY(n+1)B	RY(n+1)C
RWr00	Phase 1 current (Inst.)[A]	Phase 1 current demand (Inst.)[A]	Phase N current (Inst.)[A]	Phase 1 current (Inst.)[A]	Phase N current (Inst.)[A]
RWr01					
RWr02				Phase 2 current (Inst.)[A]	Phase N current demand (Inst.)[A]
RWr03					
RWr04	Phase 2 current (Inst.)[A]	Phase 2 current demand (Inst.)[A]	Phase N current demand (Inst.)[A]	Phase 3 current (Inst.)[A]	1-N Voltage (Inst.)[V]
RWr05					
RWr06				Phase 1 current demand (Inst.)[A]	2-N Voltage (Inst.)[V]
RWr07					
RWr08	Phase 3 current (Inst.)[A]	Phase 3 current demand (Inst.)[A]	1-N Voltage (Inst.)[V]	Phase 2 current demand (Inst.)[A]	3-N Voltage (Inst.)[V]
RWr09					
RWr0A				Phase 3 current demand (Inst.)[A]	Average current (Inst.)[A]
RWr0B					
RWr0C	1-2 Voltage (Inst.)[V]	Total active power demand (Inst.)[kW]	2-N Voltage (Inst.)[V]	1-2 Voltage (Inst.)[V]	Average current demand (Inst.)[A]
RWr0D					
RWr0E				2-3 Voltage (Inst.)[V]	Average L-L voltage (Inst.)[V]
RWr0F					
RWr10	2-3 Voltage (Inst.)[V]	Total power factor (Inst.)[%]	3-N Voltage (Inst.)[V]	3-1 Voltage (Inst.)[V]	Average L-N voltage (Inst.)[V]
RWr11					
RWr12				Total active power (Inst.)[kW]	00h (No items)
RWr13					
RWr14	3-1 Voltage (Inst.)[V]	Frequency (Inst.)[Hz]	00h (No items)	Total active power demand (Inst.)[kW]	00h (No items)
RWr15					
RWr16				Total reactive power (Inst.)[kvar]	00h (No items)
RWr17					
RWr18	Total active power (Inst.)[kW]	Total reactive power (Inst.)[kvar]	00h (No items)	Total power factor (Inst.)[%]	00h (No items)
RWr19					
RWr1A				Frequency (Inst.)[Hz]	00h (No items)
RWr1B					
RWr1C	Active energy import[kWh]	Reactive energy import lag [kvarh]	00h (No items)	Active energy import[kWh]	00h (No items)
RWr1D					
RWr1E				Reactive energy import lag [kvarh]	00h (No items)
RWr1F					
Group format	①	①	①	②	②

Inst.: Instantaneous value

Note:[] shows the unit of measuring element in upper table.

Note: Phase 2 current (demand), Phase 3 current (demand), 2-3 Voltage, 3-1 Voltage are turned to 00h when phase wire system is 1P2W in EMU4-FD1-MB.

Note: For the power factor, “+” is showed lag, “-“ is showed lead as with Measuring Unit’s display.

*1: P10,P12 is available only when phase wire system is 3P4W.

Error state flag RX(n+7)A turn to ON and RWr00～RWr1F turn to 00h when phase wire system is not 3P4W.

(1) Group format ①

For group format ①, Up to 8 measuring items can be monitored per a group. 4 words are used per measuring item.

Group format ①

	b15 b8	b7 b0
RWr00	Channel No.	Group No.
RWr01	Index number	00h
RWr02	Low data	
RWr03	High data	
RWr04	Channel No.	Group No.
RWr05	Index number	00h
RWr06	Low data	
RWr07	High data	
RWr08	Channel No.	Group No.
RWr09	Index number	00h
RWr0A	Low data	
RWr0B	High data	
RWr0C	Channel No.	Group No.
RWr0D	Index number	00h
RWr0E	Low data	
RWr0F	High data	
RWr10	Channel No.	Group No.
RWr11	Index number	00h
RWr12	Low data	
RWr13	High data	
RWr14	Channel No.	Group No.
RWr15	Index number	00h
RWr16	Low data	
RWr17	High data	
RWr18	Channel No.	Group No.
RWr19	Index number	00h
RWr1A	Low data	
RWr1B	High data	
RWr1C	Channel No.	Group No.
RWr1D	Index number	00h
RWr1E	Low data	
RWr1F	High data	

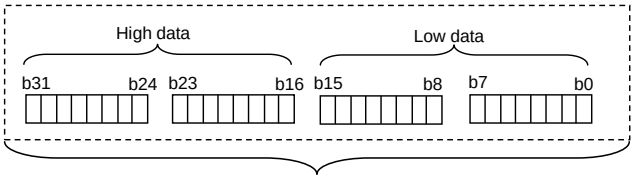
<Channel No., Group No.>
Measuring Unit returns fixed data determined for each measuring items. (About fixed data, refer to Table 7.2)
(Example: When selected phase 1 current (Inst), channel No.is 21h, group No. is 01h.)

<Multiplicand>
Multiplicand is fixed for each items according to phase wire system, primary voltage and primary current.(For details, refer to Table 7.9)

■Correspondence of index number and multiplicand.

Index number	Multiplicand	Remarks
04H	$\times 10^{4}$	Actual value = Numerical value × Multiplicand
03H	$\times 10^{3}$	
02H	$\times 10^{2}$	
01H	$\times 10$	
00H	$\times 1$	
FFH	$\times 10^{-1}$	
FEH	$\times 10^{-2}$	
FDH	$\times 10^{-3}$	
FCH	$\times 10^{-4}$	
FBH	$\times 10^{-5}$	

<Numerical value>



Numerical value: 32-bit integer with a sign
-2147483648～2147483647
(80000000H～7FFFFFFFH)

■Example: Active power

Index number	Data (Numerical value)	Actual value
FFH	000000FFH ⇒ 255	255×10^{-1}=25.5[kW]
00H	FFFFFF01H ⇒ -255	-255×1=-255[kW]

■Example: power factor

Index number	Data (Numerical value)	Actual value
FFH	000003E3H ⇒ 995	995×10^{-1}=99.5[%]
FFH	FFFFFC1DH⇒ -995	-995×10^{-1}=-99.5[%]

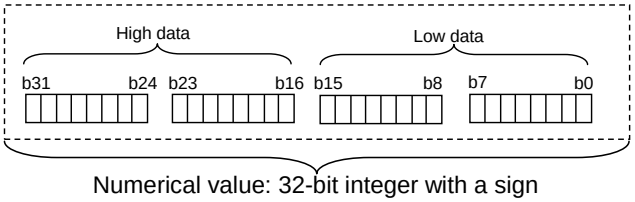
(2) Group format ②

For group format ②, Up to 16 measuring items can be monitored per a group. 2 words are used per measuring item. However, it is necessary to be multiplied by using Table 7.9 because there is no multiplicand data .

Group format ②

	b15 b8	b7 b0
RWr00	Low data	
RWr01	High data	
RWr02	Low data	
RWr03	High data	
RWr04	Low data	
RWr05	High data	
RWr06	Low data	
RWr07	High data	
RWr08	Low data	
RWr09	High data	
RWr0A	Low data	
RWr0B	High data	
RWr0C	Low data	
RWr0D	High data	
RWr0E	Low data	
RWr0F	High data	
RWr10	Low data	
RWr11	High data	
RWr12	Low data	
RWr13	High data	
RWr14	Low data	
RWr15	High data	
RWr16	Low data	
RWr17	High data	
RWr18	Low data	
RWr19	High data	
RWr1A	Low data	
RWr1B	High data	
RWr1C	Low data	
RWr1D	High data	
RWr1E	Low data	
RWr1F	High data	

<Numerical value>



Numerical value: 32-bit integer with a sign
-2147483648～2147483647
(80000000H～7FFFFFFFH)

Format of numerical value is same to group format ①.
This format is not containing multiplicand data. Therefore, Confirm the multiplicand fixed according to phase wire system, primary voltage and primary current by Table 7.9, and multiply it using sequence program.

■Example: Phase 1 current
When setting of primary current is 200A, multiplicand is $\times 10^{-1}$ according to section Table 7.9.

Data(Numerical value)	Actual value
000000FFH ⇒ 255	$255 \times 10^{-1} = 25.5$[A]

■Example: Active power
When settings are follows, multiplicand is ×100 according to section Table 7.9.

・Phase wire system: 3P3W
・Primary voltage: 6600V
・Primary current: 1200A

Data(Numerical value)	Actual value
0000FFFFH ⇒ 65535	65535×100＝6553500[kWh]

7.2.2 When Monitoring by Command(1H)

Up to 8 measuring values can be monitored by setting the unit No., group No. and channel No. to remote registers (RWw). Monitor pattern setting flag (RX (n+1)0) is used to send the command. (For details, refer to section 6.4.2)

The command can be sent only when the remote READY (RX (n+7)B) is ON.

1H	Data Monitor

Remote register RWw (Programmable controller→Measuring Unit)

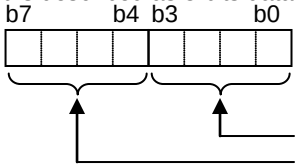
	b15 – b8	b7 – b0		
RWw00	Group No.	Unit No.	1H	Item 1
RWw01	00H	Channel No.		
RWw02	00H	00H		
RWw03	00H	00H		
RWw04	Group No.	Unit No.	1H	Item 2
RWw05	00H	Channel No.		
RWw06	00H	00H		
RWw07	00H	00H		
to	to			
RWw1C	Group No.	Unit No.	1H	Item 8
RWw1D	00H	Channel No.		
RWw1E	00H	00H		
RWw1F	00H	00H		

Remote register RWr (Measuring Unit→Programmable controller)

	b15 – b8	b7 – b0	
RWr00	Channel No.	Group No.	Item 1
RWr01	Index number	(Error code)	
RWr02	Low data		
RWr03	High data		
RWr04	Channel No.	Group No.	Item 2
RWr05	Index number	(Error code)	
RWr06	Low data		
RWr07	High data		
to	to		
RWr1C	Channel No.	Group No.	Item 8
RWr1D	Index number	(Error code)	
RWr1E	Low data		
RWr1F	High data		

* At normal communication, Error code is 00h.
About the other error code, refer to Table 7.10.

* It is described as 8 bits data by combining the unit No. (high 4 bits) and the command (low 4 bits)



Command: Data range is 0H to 7H
Unit No.: Data range is 1H
Unit No. is 1H when use EMU4-FD1-MB

For example, When the unit No. is 0H and the command is 1H, it becomes “01H”.

- Measuring Unit can monitor the value of measurement items which are not displayed.
- The measurement items are assigned Unit No., Group No. and Channel No. (Refer to Table 7.2)
- Store the unused space to 00H when monitoring items are fewer than 8.
- The details of data format are shown in the Table 7.2 to 7.2.4Data format of Monitoring by Command (1H) and Setting by Command (2H)
- The monitoring items are changed with the setting of phase wire system.(Refer to Table 7.2)
- When combined command(2H), an error occurs.
- In case of monitoring the present value and its maximum continuously according to the renewal data timing of Measuring Unit, the maximum may be smaller than the present value.

Table 7.2 Group Channel List for Data Monitor Command (1H) (1/5)

Group (H)	Channel (H)	Data type	Content name				EMU4-FD1-MB				Data format
							1P2W	1P3W	3P3W	3P4W	
F0	02	Set-up	Model code				○	○	○	○	⑤
E0	11		Primary current	A			○	○	○	○	
E0	12		Primary voltage (L-L)	V			○	○	○	○	④
E0	1B		Primary voltage (L-N)	V			—	—	—	○	
E0	1C		Secondary voltage (L-L/L-N)	V			○	○	○	○	
E0	13		Phase wire system				○	○	○	○	
02	E0		Time constant for DA	sec			○	○	○	○	⑤
08	E0		Time constant for DW	sec			○	○	○	○	
E0	1E		Secondary current				○	○	○	○	④
01	01	Measurement	Average current	A	Inst.		○	○	○	○	
01	21		Phase 1 current	A	Inst.		○	○	○	○	
01	41		Phase 2 current	A	Inst.		—	○	○	○	
01	61		Phase 3 current	A	Inst.		—	○	○	○	
01	81		Phase N current	A	Inst.		—	—	—	○	①
02	21		Phase 1 current demand	A	Inst.		○	○	○	○	
02	41		Phase 2 current demand	A	Inst.		—	○	○	○	
02	61		Phase 3 current demand	A	Inst.		—	○	○	○	
02	81		Phase N current demand	A	Inst.		—	—	—	○	
03	21	Measurement	1-N voltage	V	Inst.		—	—	—	○	
03	41		2-N voltage	V	Inst.		—	—	—	○	
03	61		3-N voltage	V	Inst.		—	—	—	○	
05	01		Average L-L voltage	V	Inst.		○	○	○	○	
05	21		1-2 voltage	V	Inst.		○	○	○	○	
05	41		2-3 voltage	V	Inst.		—	○	○	○	
05	61		3-1 voltage	V	Inst.		—	○	○	○	①
07	01		Active power	kW	Inst.	Total	○	○	○	○	
08	01		Active power demand	kW	Inst.	Total	○	○	○	○	
09	01		Reactive power	kvar	Inst.	Total	○	○	○	○	
0B	01		Apparent power	kVA	Inst.	Total	—	—	—	○	
0D	01		Power factor	%	Inst.	Total	○	○	○	○	
0F	01		Frequency	Hz	Inst.		○	○	○	○	
63	21	Measurement	1-2 harmonic voltage	V	RMS.	Total	○	○	○	—	
4D	21		1-2 harmonic voltage	V	RMS.	1st	○	○	○	—	
4F	21		1-2 harmonic voltage	V	RMS.	3rd	○	○	○	—	
51	21		1-2 harmonic voltage	V	RMS.	5th	○	○	○	—	
53	21		1-2 harmonic voltage	V	RMS.	7th	○	○	○	—	①
55	21		1-2 harmonic voltage	V	RMS.	9th	○	○	○	—	
57	21		1-2 harmonic voltage	V	RMS.	11th	○	○	○	—	
59	21		1-2 harmonic voltage	V	RMS.	13th	○	○	○	—	
5B	21		1-2 harmonic voltage	V	RMS.	15th	○	○	○	—	
76	86	Measurement	1-2 voltage THD	%	Inst.	Total	○	○	○	—	
76	73		1-2 voltage harmonic distortion	%	Inst.	3rd	○	○	○	—	
76	75		1-2 voltage harmonic distortion	%	Inst.	5th	○	○	○	—	
76	77		1-2 voltage harmonic distortion	%	Inst.	7th	○	○	○	—	
76	79		1-2 voltage harmonic distortion	%	Inst.	9th	○	○	○	—	①
76	7B		1-2 voltage harmonic distortion	%	Inst.	11th	○	○	○	—	
76	7D		1-2 voltage harmonic distortion	%	Inst.	13th	○	○	○	—	
76	7F		1-2 voltage harmonic distortion	%	Inst.	15th	○	○	○	—	

Inst.: Instantaneous value. RMS.: Root-Mean-Square value.

Table 7.2 Group Channel List for Data Monitor Command (1H) (2/5)

Group (H)	Channel (H)	Data type	Content name				EMU4-FD1-MB				Data format
							1P2W	1P3W	3P3W	3P4W	
63	41	Measurement	2-3 harmonic voltage	V	RMS.	Total	—	○	○	—	①
4D	41		2-3 harmonic voltage	V	RMS.	1st	—	○	○	—	
4F	41		2-3 harmonic voltage	V	RMS.	3rd	—	○	○	—	
51	41		2-3 harmonic voltage	V	RMS.	5th	—	○	○	—	
53	41		2-3 harmonic voltage	V	RMS.	7th	—	○	○	—	
55	41		2-3 harmonic voltage	V	RMS.	9th	—	○	○	—	
57	41		2-3 harmonic voltage	V	RMS.	11th	—	○	○	—	
59	41		2-3 harmonic voltage	V	RMS.	13th	—	○	○	—	
5B	41		2-3 harmonic voltage	V	RMS.	15th	—	○	○	—	
76	9C	Measurement	2-3 voltage THD	%	Inst.	Total	—	○	○	—	①
76	89		2-3 voltage harmonic distortion	%	Inst.	3rd	—	○	○	—	
76	8B		2-3 voltage harmonic distortion	%	Inst.	5th	—	○	○	—	
76	8D		2-3 voltage harmonic distortion	%	Inst.	7th	—	○	○	—	
76	8F		2-3 voltage harmonic distortion	%	Inst.	9th	—	○	○	—	
76	91		2-3 voltage harmonic distortion	%	Inst.	11th	—	○	○	—	
76	93		2-3 voltage harmonic distortion	%	Inst.	13th	—	○	○	—	
76	95		2-3 voltage harmonic distortion	%	Inst.	15th	—	○	○	—	
4B	21	Measurement	1-N harmonic voltage	V	RMS.	Total	—	—	—	○	①
35	21		1-N harmonic voltage	V	RMS.	1st	—	—	—	○	
37	21		1-N harmonic voltage	V	RMS.	3rd	—	—	—	○	
39	21		1-N harmonic voltage	V	RMS.	5th	—	—	—	○	
3B	21		1-N harmonic voltage	V	RMS.	7th	—	—	—	○	
3D	21		1-N harmonic voltage	V	RMS.	9th	—	—	—	○	
3F	21		1-N harmonic voltage	V	RMS.	11th	—	—	—	○	
41	21		1-N harmonic voltage	V	RMS.	13th	—	—	—	○	
43	21		1-N harmonic voltage	V	RMS.	15th	—	—	—	○	
77	86	Measurement	1-N voltage THD	%	Inst.	Total	—	—	—	○	①
77	73		1-N voltage harmonic distortion	%	Inst.	3rd	—	—	—	○	
77	75		1-N voltage harmonic distortion	%	Inst.	5th	—	—	—	○	
77	77		1-N voltage harmonic distortion	%	Inst.	7th	—	—	—	○	
77	79		1-N voltage harmonic distortion	%	Inst.	9th	—	—	—	○	
77	7B		1-N voltage harmonic distortion	%	Inst.	11th	—	—	—	○	
77	7D		1-N voltage harmonic distortion	%	Inst.	13th	—	—	—	○	
77	7F		1-N voltage harmonic distortion	%	Inst.	15th	—	—	—	○	

Inst.: Instantaneous value. RMS.: Root-Mean-Square value.

Table 7.2 Group Channel List for Data Monitor Command (1H) (3/5)

Group (H)	Channel (H)	Data type	Content name				EMU4-FD1-MB				Data format
							1P2W	1P3W	3P3W	3P4W	
4B	41	Measurement	2-N harmonic voltage	V	RMS.	Total	—	—	—	○	①
35	41		2-N harmonic voltage	V	RMS.	1st	—	—	—	○	
37	41		2-N harmonic voltage	V	RMS.	3rd	—	—	—	○	
39	41		2-N harmonic voltage	V	RMS.	5th	—	—	—	○	
3B	41		2-N harmonic voltage	V	RMS.	7th	—	—	—	○	
3D	41		2-N harmonic voltage	V	RMS.	9th	—	—	—	○	
3F	41		2-N harmonic voltage	V	RMS.	11th	—	—	—	○	
41	41		2-N harmonic voltage	V	RMS.	13th	—	—	—	○	
43	41		2-N harmonic voltage	V	RMS.	15th	—	—	—	○	
77	9C	Measurement	2-N voltage THD	%	Inst.	Total	—	—	—	○	①
77	89		2-N voltage harmonic distortion	%	Inst.	3rd	—	—	—	○	
77	8B		2-N voltage harmonic distortion	%	Inst.	5th	—	—	—	○	
77	8D		2-N voltage harmonic distortion	%	Inst.	7th	—	—	—	○	
77	8F		2-N voltage harmonic distortion	%	Inst.	9th	—	—	—	○	
77	91		2-N voltage harmonic distortion	%	Inst.	11th	—	—	—	○	
77	93		2-N voltage harmonic distortion	%	Inst.	13th	—	—	—	○	
77	95		2-N voltage harmonic distortion	%	Inst.	15th	—	—	—	○	
4B	61	Measurement	3-N harmonic voltage	V	RMS.	Total	—	—	—	○	①
35	61		3-N harmonic voltage	V	RMS.	1st	—	—	—	○	
37	61		3-N harmonic voltage	V	RMS.	3rd	—	—	—	○	
39	61		3-N harmonic voltage	V	RMS.	5 th	—	—	—	○	
3B	61		3-N harmonic voltage	V	RMS.	7th	—	—	—	○	
3D	61		3-N harmonic voltage	V	RMS.	9th	—	—	—	○	
3F	61		3-N harmonic voltage	V	RMS.	11th	—	—	—	○	
41	61		3-N harmonic voltage	V	RMS.	13th	—	—	—	○	
43	61		3-N harmonic voltage	V	RMS.	15th	—	—	—	○	
77	B2	Measurement	3-N voltage THD	%	Inst.	Total	—	—	—	○	①
77	9F		3-N voltage harmonic distortion	%	Inst.	3rd	—	—	—	○	
77	A1		3-N voltage harmonic distortion	%	Inst.	5th	—	—	—	○	
77	A3		3-N voltage harmonic distortion	%	Inst.	7th	—	—	—	○	
77	A5		3-N voltage harmonic distortion	%	Inst.	9th	—	—	—	○	
77	A7		3-N voltage harmonic distortion	%	Inst.	11th	—	—	—	○	
77	A9		3-N voltage harmonic distortion	%	Inst.	13th	—	—	—	○	
77	AB		3-N voltage harmonic distortion	%	Inst.	15th	—	—	—	○	
33	21	Measurement	Phase 1 harmonic current	A	RMS.	Total	○	○	○	○	①
1D	21		Phase 1 harmonic current	A	RMS.	1st	○	○	○	○	
1F	21		Phase 1 harmonic current	A	RMS.	3rd	○	○	○	○	
21	21		Phase 1 harmonic current	A	RMS.	5th	○	○	○	○	
23	21		Phase 1 harmonic current	A	RMS.	7th	○	○	○	○	
25	21		Phase 1 harmonic current	A	RMS.	9th	○	○	○	○	
27	21		Phase 1 harmonic current	A	RMS.	11th	○	○	○	○	
29	21		Phase 1 harmonic current	A	RMS.	13th	○	○	○	○	
2B	21		Phase 1 harmonic current	A	RMS.	15th	○	○	○	○	
75	86	Measurement	Phase 1 current THD	%	Inst.	Total	○	○	○	○	①
75	73		Phase 1 current harmonic distortion	%	Inst.	3rd	○	○	○	○	
75	75		Phase 1 current harmonic distortion	%	Inst.	5th	○	○	○	○	
75	77		Phase 1 current harmonic distortion	%	Inst.	7th	○	○	○	○	
75	79		Phase 1 current harmonic distortion	%	Inst.	9th	○	○	○	○	
75	7B		Phase 1 current harmonic distortion	%	Inst.	11th	○	○	○	○	
75	7D		Phase 1 current harmonic distortion	%	Inst.	13th	○	○	○	○	
75	7F		Phase 1 current harmonic distortion	%	Inst.	15th	○	○	○	○	

Inst.: Instantaneous value. RMS.: Root-Mean-Square value.

Table 7.2 Group Channel List for Data Monitor Command (1H) (4/5)

Group (H)	Channel (H)	Data type	Content name				EMU4-FD1-MB				Data format
							1P2W	1P3W	3P3W	3P4W	
33	41	Measurement	Phase 2 harmonic current	A	RMS.	Total	—	—	—	○	①
1D	41		Phase 2 harmonic current	A	RMS.	1st	—	—	—	○	
1F	41		Phase 2 harmonic current	A	RMS.	3rd	—	—	—	○	
21	41		Phase 2 harmonic current	A	RMS.	5th	—	—	—	○	
23	41		Phase 2 harmonic current	A	RMS.	7th	—	—	—	○	
25	41		Phase 2 harmonic current	A	RMS.	9th	—	—	—	○	
27	41		Phase 2 harmonic current	A	RMS.	11th	—	—	—	○	
29	41		Phase 2 harmonic current	A	RMS.	13th	—	—	—	○	
2B	41		Phase 2 harmonic current	A	RMS.	15th	—	—	—	○	
75	9C	Measurement	Phase 2 current THD	%	Inst.	Total	—	—	—	○	①
75	89		Phase 2 current harmonic distortion	%	Inst.	3rd	—	—	—	○	
75	8B		Phase 2 current harmonic distortion	%	Inst.	5th	—	—	—	○	
75	8D		Phase 2 current harmonic distortion	%	Inst.	7th	—	—	—	○	
75	8F		Phase 2 current harmonic distortion	%	Inst.	9th	—	—	—	○	
75	91		Phase 2 current harmonic distortion	%	Inst.	11th	—	—	—	○	
75	93		Phase 2 current harmonic distortion	%	Inst.	13th	—	—	—	○	
75	95		Phase 2 current harmonic distortion	%	Inst.	15th	—	—	—	○	
33	61	Measurement	Phase 3 harmonic current	A	RMS.	Total	—	○	○	○	①
1D	61		Phase 3 harmonic current	A	RMS.	1st	—	○	○	○	
1F	61		Phase 3 harmonic current	A	RMS.	3rd	—	○	○	○	
21	61		Phase 3 harmonic current	A	RMS.	5th	—	○	○	○	
23	61		Phase 3 harmonic current	A	RMS.	7th	—	○	○	○	
25	61		Phase 3 harmonic current	A	RMS.	9th	—	○	○	○	
27	61		Phase 3 harmonic current	A	RMS.	11th	—	○	○	○	
29	61		Phase 3 harmonic current	A	RMS.	13th	—	○	○	○	
2B	61		Phase 3 harmonic current	A	RMS.	15th	—	○	○	○	
75	B2	Measurement	Phase 3 current THD	%	Inst.	Total	—	○	○	○	①
75	9F		Phase 3 current harmonic distortion	%	Inst.	3rd	—	○	○	○	
75	A1		Phase 3 current harmonic distortion	%	Inst.	5th	—	○	○	○	
75	A3		Phase 3 current harmonic distortion	%	Inst.	7th	—	○	○	○	
75	A5		Phase 3 current harmonic distortion	%	Inst.	9th	—	○	○	○	
75	A7		Phase 3 current harmonic distortion	%	Inst.	11th	—	○	○	○	
75	A9		Phase 3 current harmonic distortion	%	Inst.	13th	—	○	○	○	
75	AB		Phase 3 current harmonic distortion	%	Inst.	15th	—	○	○	○	
1D	81	Measurement	Phase N harmonic current	A	RMS.	1st	—	—	—	○	①
1F	81		Phase N harmonic current	A	RMS.	3rd	—	—	—	○	
21	81		Phase N harmonic current	A	RMS.	5th	—	—	—	○	
23	81		Phase N harmonic current	A	RMS.	7th	—	—	—	○	
25	81		Phase N harmonic current	A	RMS.	9th	—	—	—	○	
27	81		Phase N harmonic current	A	RMS.	11th	—	—	—	○	
29	81		Phase N harmonic current	A	RMS.	13th	—	—	—	○	
2B	81		Phase N harmonic current	A	RMS.	15th	—	—	—	○	
75	C8	Measurement	Phase N current THD	%	Inst.	Total	—	—	—	○	①
75	B5		Phase N current harmonic distortion	%	Inst.	3rd	—	—	—	○	
75	B7		Phase N current harmonic distortion	%	Inst.	5th	—	—	—	○	
75	B9		Phase N current harmonic distortion	%	Inst.	7th	—	—	—	○	
75	BB		Phase N current harmonic distortion	%	Inst.	9th	—	—	—	○	
75	BD		Phase N current harmonic distortion	%	Inst.	11th	—	—	—	○	
75	BF		Phase N current harmonic distortion	%	Inst.	13th	—	—	—	○	
75	C1		Phase N current harmonic distortion	%	Inst.	15th	—	—	—	○	

Inst.: Instantaneous value. RMS.: Root-Mean-Square value.

Table 7.2 Group Channel List for Data Monitor Command (1H) (5/5)

Group (H)	Channel (H)	Data type	Content name				EMU4-FD1-MB				Data format
							1P2W	1P3W	3P3W	3P4W	
80	01	Measurement	Active energy (import)	kWh	count		○	○	○	○	②
80	63		Active energy (export)	kWh	count		○	○	○	○	
81	01		Reactive energy (import lag)	kvar	count		○	○	○	○	
80	64		Active energy (import)	kWh	count	expand	○	○	○	○	
80	65		Active energy (export)	kWh	count	expand	○	○	○	○	
81	66		Reactive energy (import lag)	kvar	count	expand	○	○	○	○	
83	01		Pulse count	pulse	count		○	○	○	○	
87	01		Operating time	min	count		○	○	○	○	
8B	01		Periodic active energy	kWh	count		○	○	○	○	
83	01		Pulse count	pulse	count		○	○	○	○	⑥
87	01		Operating time	hour			○	○	○	○	
A0	31	Alarm state	Alarm state		Alarm		○	○	○	○	③

Inst.: Instantaneous value. RMS.: Root-Mean-Square value.

7.2.3 When Setting by Command (2H)

Settings of Measuring Unit can be set by communication.

Monitor pattern setting flag (RX (n+1)0) is used to send the command. (For details, refer to section 6.4.2)

The command can be sent only when the remote READY (RX (n+7)B) is ON.

2H	Data Set

Remote register RWw（Programmable controller→Unit）

	b15 b8	b7 b0
RWw00	Group No.	Unit No. / Command 2H
RWw01	Index number	Channel No.
RWw02	Low data	
RWw03	High data	
RWw04	00H	00H
RWw05	00H	00H
RWw06	00H	00H
RWw07	00H	00H
to	to	
RWw1C	00H	00H
RWw1D	00H	00H
RWw1E	00H	00H
RWw1F	00H	00H

Remote register RWr（Unit→Programmable controller）

	b15 b8	b7 b0
RWr00	Channel No.	Group No.
RWr01	00H	(Error code)
RWr02	00H	00H
RWr03	00H	00H
RWr04	00H	00H
RWr05	00H	00H
RWr06	00H	00H
RWr07	00H	00H
to	to	
RWr1C	00H	00H
RWr1D	00H	00H
RWr1E	00H	00H
RWr1F	00H	00H

* At normal communication, Error code is 00h.
About the other error code, refer to Table 7.10.

- A setting item of Measuring Unit can be set by storing Group No., Channel No. and setting data to remote register(RWw).
- About Group No. and Channel No., refer to Table 7.3
- The details of data format are shown in the 7.2.4Data format of Monitoring by Command (1H) and Setting by Command (2H)

* After writing the set-up value, about 5 seconds (max 2 seconds) is needed to restart the measurement based on new set-up value.

Table 7.3 Group Channel List for Data Set Command (2H)

Hex		Content name	EMU4-FD1-MB		Data format
Group	Channel		Range	Setting unit	
E0	11	Primary current	1.0A to 6000.0A	(Note1)	④
E0	12	Primary voltage (L-L)	1V to 6600V	(Note2)	④
E0	1B	Primary voltage (L-N)	1V to 6600V	(Note3)	④
E0	1C	Secondary voltage (L-L/L-N)	1V to 220V	1V	④
E0	13	Phase Wire system	1: 1P2W 2: 1P3W 3: 3P3W 4: 3P4W	—	⑤
02	E0	Time constant for DA	0 to 1800s	(Note4)	⑤
08	E0	Time constant for DW	0 to 1800s	(Note4)	⑤
80	01	Active energy (import)	0 to 999999×Multiplicand (Note5)	1×Multiplicand	②
80	63	Active energy (export)	0 to 999999×Multiplicand (Note5)	1×Multiplicand	②
81	01	Reactive energy (import lag)	0 to 999999×Multiplicand (Note5)	1×Multiplicand	②
A1	3A	16bit set register	Refer to 7.2.4	—	⑦

Note 1: From the most significant digit to 3 digits can be freely setting in the range from 100.0A to 6000.0A.

Note 2: Effective value of primary voltage (L-L) is follows.

・3P3W or 1P2W

From the most significant digit to 3 digits can be freely setting in the range from 1000V to 6600V..

When setup 110V, 220V or 440V, Setup is Direct setup(Not use VT) in EMU4-FD1-MB.

・1P3W

110V is valid only.

・3P4W

From the most significant digit to 3 digits can be freely setting in the range from 1000V to 6600V.

Set value	Direct voltage	Set value	Direct voltage
110V	63.5/110V	400V	230/400V
173V	100/173V	415V	240/415V
182V	105/182V	420V	242/420V
190V	110/190V	430V	250/430V
199V	115/199V	440V	254/440V
208V	120/208V	460V	265/460V
220V	127/220V	480V	277/480V
380V	220/380V		

*From the most significant digit to 3 figures can be freely set up in the range.

Note 3: Setup of phase voltage is only available in 3P4W.

From the most significant digit to 3 digits can be freely setting in the range from 1000V to 6600V.

Setup is Direct setup (Not use VT) when setup in below value.

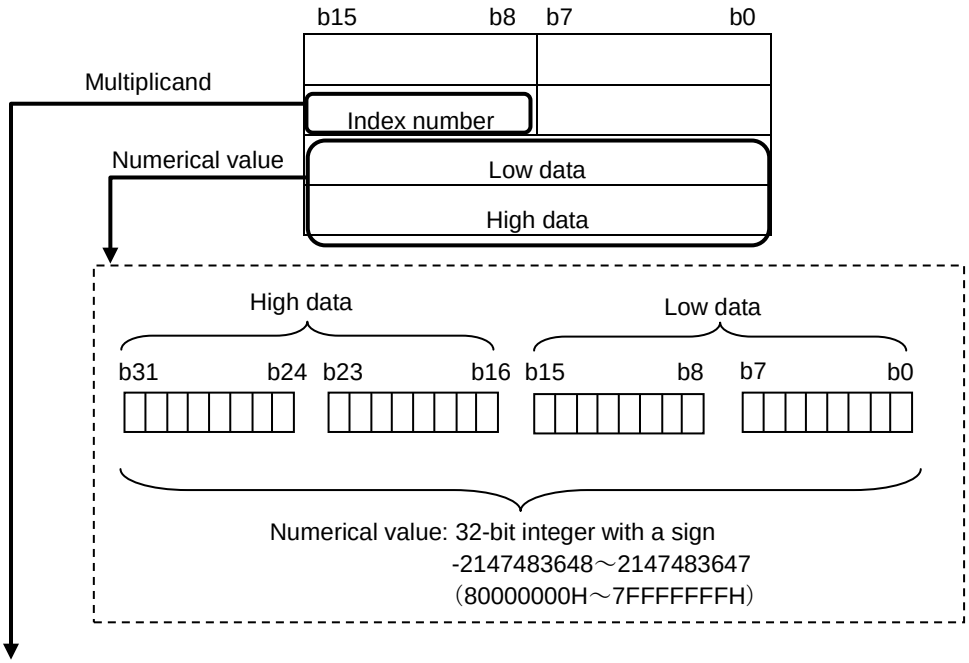
Set value	Direct voltage
63.5V	63.5/110V
100V	100/173V
105V	105/182V
110V	110/190V
115V	115/199V
120V	120/208V
127V	127/220V
220V	220/380V
230V	230/400V
240V	240/415V
242V	242/420V
250V	250/430V
254V	254/440V
265V	265/460V
277V	277/480V

Note 4: The set value is the second unit value. (For example of 2 minutes, set as 120 seconds.) About setting range, please refer to each user's manuals.

Note 5: Multiplying factor differs according to settings of phase wiring, primary voltage and primary current. For details, refer to 7.2.4.

7.2.4 Data format of Monitoring by Command (1H) and Setting by Command (2H)

Table 7.2 Data Format (1/7)

Data	Data Format ①
Measurement Current, Voltage, Active power, Reactive power, Apparent power, Power factor, Frequency, etc. Format①	

＜Multiplicand＞

Multiplicand is fixed for every item according to settings of primary current, primary voltage, and phase wiring. (Refer to Table 7.9)

Index number	Multiplicand	Remarks
01H	×10	Actual value = Numerical value × Multiplicand
00H	×1	
FFH	$\times 10^{-1}$	
FEH	$\times 10^{-2}$	
FDH	$\times 10^{-3}$	

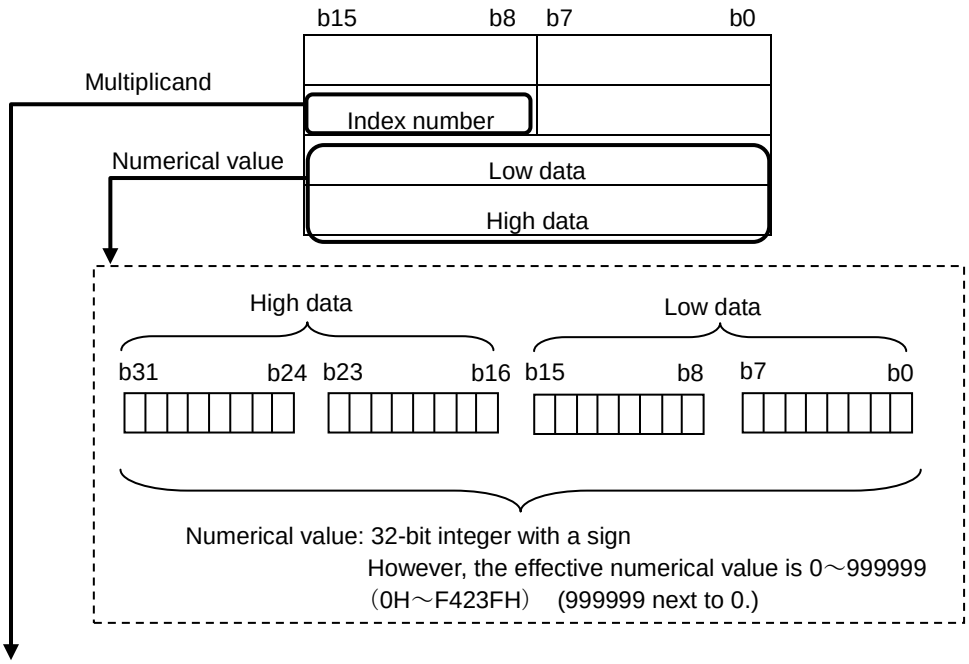
＜Example: Active power＞

Data	Multiplicand	Numerical value	Actual value
FF000000FFH	FFH⇒$\times 10^{-1}$	000000FFH⇒255	255×10^{-1}= 25.5[kW]
00000000FFH	00H⇒×1	000000FFH⇒255	255×1 = 255[kW]
FFFFFFFF01H	FFH⇒$\times 10^{-1}$	FFFFFF01H⇒-255	-255×10^{-1}= -25.5[kW]
00FFFFFF01H	00H⇒×1	FFFFFF01H⇒-255	-255×1 = -255[kW]

Note: For the active power (demand) and reactive power, ±1638.3MW (Mvar) becomes the upper (lower) value.

Note: For the power factor, “+” is showed lag, “-“ is showed lead as with Measuring Unit’s display.

Table 7.3 Data Format (2/7)

Data	Data Format ②
Measurement Active energy Reactive energy Format②	

＜Multiplicand＞

Multiplicand is fixed for every item according to settings of primary current, primary voltage, and phase wire system. (Refer to Table 7.9)

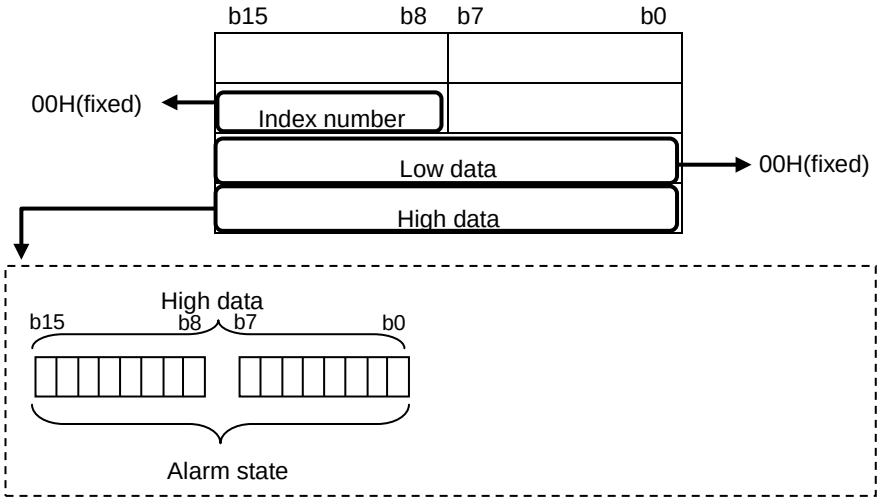
Index number	Multiplicand	Remarks
04H	$\times 10^{4}$	Actual value = Numerical value × Multiplicand
03H	$\times 10^{3}$	
02H	$\times 10^{2}$	
01H	×10	
00H	×1	
FFH	$\times 10^{-1}$	
FEH	$\times 10^{-2}$	
FDH	$\times 10^{-3}$	
FCH	$\times 10^{-4}$	
FBH	$\times 10^{-5}$	

＜Example: Active Energy＞

Data	Multiplicand	Numerical value	Actual value
FF000000FFH	FFH⇒$\times 10^{-1}$	000000FFH⇒255	255×10^{-1} = 25.5[kWh]
00000000FFH	00H⇒×1	000000FFH⇒255	255×1 = 255[kWh]

Note: For active energy export and reactive energy export (lag/lead), communication data is unsigned.

Table 7.4 Data Format (3/7)

Data	Data Format ③
Alarm state Format③	

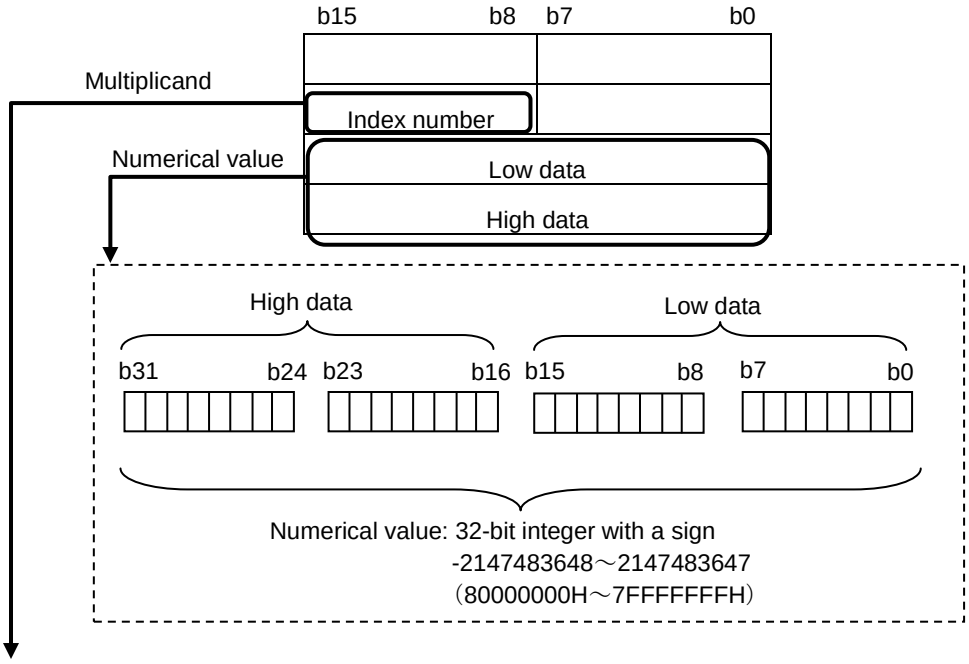
＜The allocation of the alarm ＞

Bit	Set data			EMU4-FD1-MB
	Content	OFF(0)	ON(1)	
b0	Alarm Pulse count	Non-Alarm state	Alarm state	○
b1	Reserved	–	–	–
b2	Alarm demand current	Non-Alarm state	Alarm state	○
b3	Alarm demand electric power	Non-Alarm state	Alarm state	○
b4	Contact input	OFF(Open)	ON(Close)	○
b5	Alarm (Total)	Non-Alarm state	Alarm state	○
b6	Reserved	–	–	–
b7	Reserved	–	–	–
b8	Alarm voltage	Non-Alarm state	Alarm state	○
b9	Reserved	–	–	–
b10	Reserved	–	–	–
b11	Reserved	–	–	–
b12	Reserved	–	–	–
b13	Alarm Power factor	Non-Alarm state	Alarm state	○
b14	Reserved	–	–	–
b15	Reserved	–	–	–

Note1: b0(Alarm pulse count) is only available when External input signal setup of EMU4-FD1-MB is pulse input.

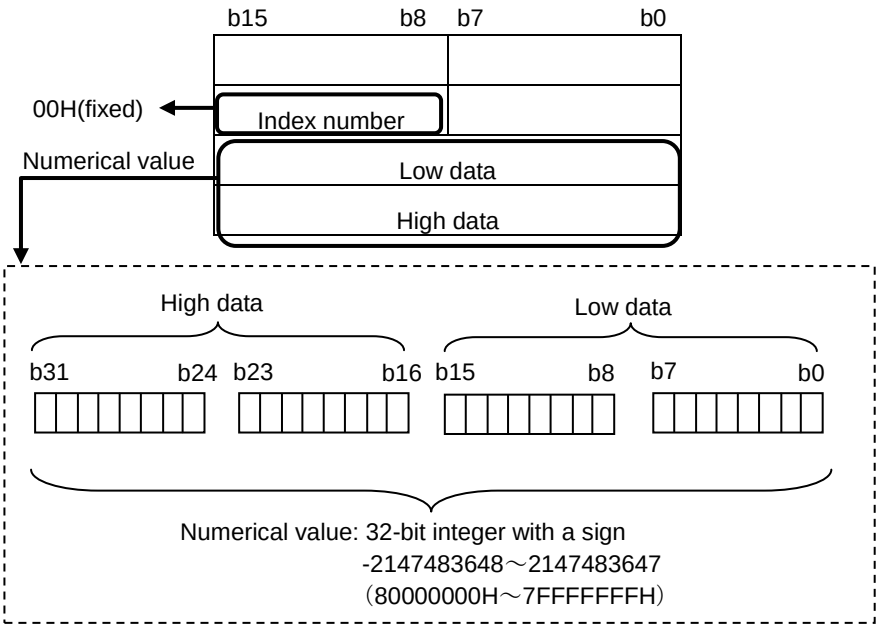
Note2:b4(Contact input) is only available when External input signal setup of EMU4-FD1-MB is contact input.

Table 7.5 Data Format (4/7)

Data Set-up	Data Format ④
Primary current Secondary current Primary voltage (L-L) Primary voltage (L-N) Secondary voltage (L-L/L-N) Secondary current Format④	 ＜Multiplicand＞ Multiplicand is fixed for every item according to settings of primary current, primary voltage, Secondary voltage, Secondary current, and phase wiring. (Refer to Table 7.9) Index number = 00H: The actual value is the numeric value. Index number = FFH: The actual value is 10^{-1} times the numeric value. ＜Example: Primary current, Primary voltage＞

Set-up value	Multiplicand	Numerical value	Data
Set-up value = 100.0A (Effective range = one place of decimals)	×10^{-2}⇒FEH	10000⇒2710H	FF000003E8H
Set-up value = 400.0A (Effective range = Integer)	×10^{-1}⇒FFH	400⇒0190H	FF00000190H
Set-up value = 110.0V (Effective range = one place of decimals)	×10^{-1}⇒FFH	1100⇒044CH	FF00000FFCH
Set-up value = 3300V (Effective range = Integer)	×1⇒00H	3300⇒0CE4H	0000000CE4H

Table 7.6 Data Format (5/7)

Data	Data Format ⑤
Set-up Phase wiring Time constant Model code Format⑤	

＜Data(Numerical value)＞

1) Phase wiring

Phase wiring	Data	Note
Single phase 2 wire (1P2W)	00000001H	About setting range, please refer to the instrument manual.
Single phase 3 wire (1P3W)	00000002H	
Three phase 3 wire (3P3W)	00000003H	
Three phase 4 wire (3P4W)	00000004H	

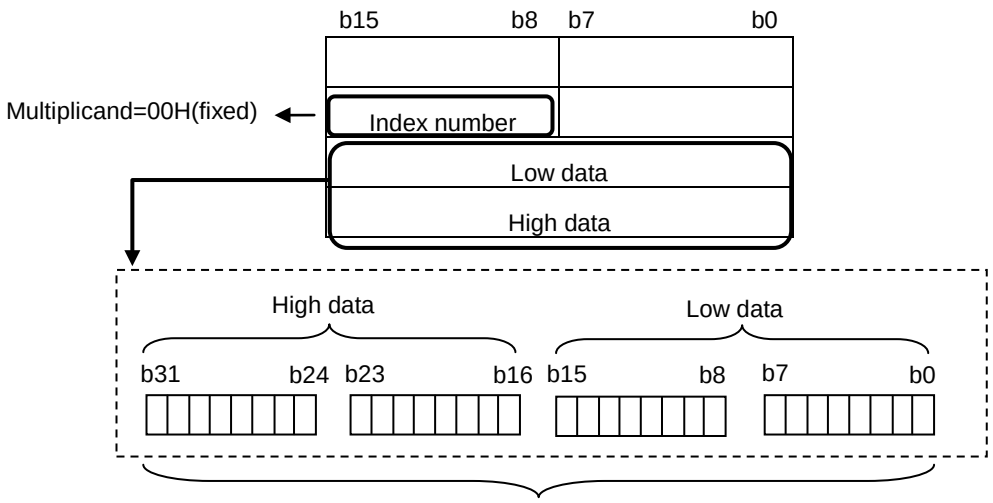
2) Time constant for demand

Example	Data	Note
2 minutes = 120 seconds	00000078H	The range of 0 (= 0H) to 1800 seconds (= 708H)can be set up per second.

3) Model code

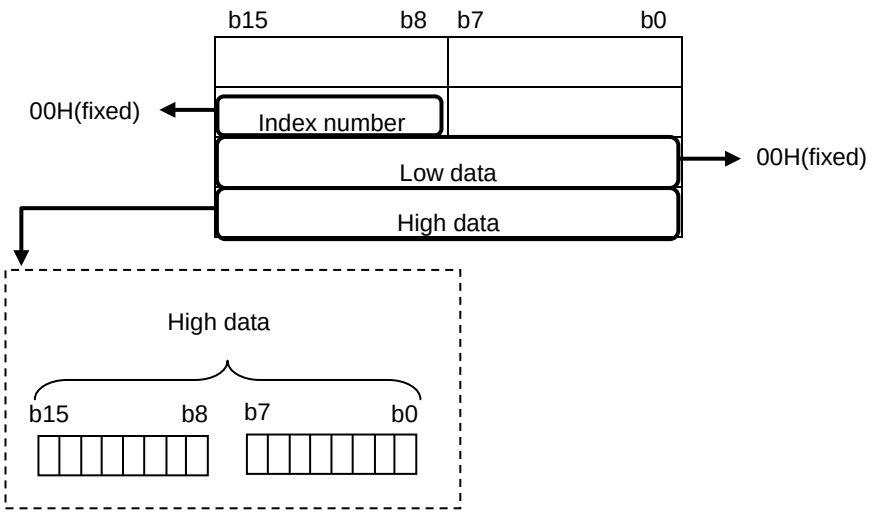
Model Name	Data	Note
EMU4-FD1-MB	0000000BH	

Table 7.7 Data Format (6/7)

Data	Data Format ⑥
Set-up Pulse count Operating time Format⑥	 Numerical value: 32-bit integer with a sign However, the effective numerical value is 0～999999 （0H～F423FH） (999999 next to 0.) ＜Example: Measured data＞

Set-up value	Multiplicand	Numerical value	Data
Pulse count	00H⇒×1	000000FFH⇒255	255×1＝255[pulse]
Operating time	00H⇒×1	0000003CH⇒60	60×1＝60[hour]

Table 7.8 Data Format (7/7)

Data	Data Format ⑦
Set-up 16bit set register Format⑦	 Note: Reserved area, set to 0. 16bit set register:Refer to next page.

Bit		Data			EMU4-FD1-MB	Note
		Content	OFF(0)	ON(1)		
High data	b0	Reset of all alarm	Not reset	executed	○	
	b1	Reset of all max/min value and counting of energy	Not reset	executed	○	Note1
	b2	Unusable	—	—	—	
	b3	Unusable	—	—	—	
	b4	Unusable	—	—	—	
	b5	Unusable	—	—	—	
	b6	Unusable	—	—	—	
	b7	Unusable	—	—	—	
	b8	Reset of all digital input latch	Not clear	clear	○	
	b9	Reset external input	Not reset	executed	○	Note2
	b10	Unusable	—	—	—	
	b11	Unusable	—	—	—	
	b12	Unusable	—	—	—	
	b13	Unusable	—	—	—	
	b14	Reset of counting of all energy	Not reset	executed	○	
	b15	Unusable	—	—	—	

Note1: Below integrated value is reset depending on the models.
EMU4-FD1-MB: Electric Energy, Reactive energy, Pulse count, Operating time , Periodic Energy, Electric Power conveted

Note2: Below items is reset depending on the models.
EMU4-FD1-MB: Pulse count, Operating time , Periodic Energy, Electric power conveted

7.2.5 Effective Range and Multiplicand

The conditions of multiplying factor by setup of each element are shown below.

Table 7.9 Effective Ranges and Multiplicand

Element	Condition	Mode	Multiplying factor
Voltage Harmonics voltage	Please refer to (3) Voltage and Harmonics voltage data format for more details.		
Current Current demand Harmonics current	Please refer to (4) Current, demand current, harmonics current data format for more details.		
Active power Active power demand Reactive power Apparent power	Please refer to (1) Electric power and Reactive power data for more details.		
Active energy Reactive energy	Please refer to (2) Electric energy and reactive energy for more details.		
Frequency	-	-	$\times 10^{-1}$
Power factor	-	-	$\times 10^{-1}$
Content rate Harmonics distortion	-	-	$\times 10^{-1}$

Note1: Data is primary voltage (phase voltage) when phase wire system is 3P4W.

(1) Electric power and Reactive power data

Vertical axis: Primary current setting value Horizontal axis: Primary voltage setting value, Phase wire system setting value.

Phase Wire system	1P2W								1P3W	3P3W							
V / A	110	220	440	690	1100	2200	3300	6600	110	110	220	440	690	1100	2200	3300	6600
5	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit
6	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit
7.5	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit
8	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit
10	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit
12	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit
15	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit
20	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	2digit	1digit
25	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit
30	3digit	3digit	2digit	2digit	2digit	2digit	2digit	1digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit
40	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit
50	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit	3digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit
60	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit
75	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
80	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
100	3digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
120	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1
150	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1
200	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	x1
250	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1
300	2digit	2digit	1digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1
400	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
500	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
600	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
750	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
800	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
1000	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
1200	1digit	1digit	1digit	1digit	x1	x1	x1	x1	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x10
1500	1digit	1digit	1digit	1digit	x1	x1	x1	x1	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x10
1600	1digit	1digit	1digit	1digit	x1	x1	x1	x1	1digit	1digit	1digit	x1	x1	x1	x1	x1	x10
2000	1digit	1digit	1digit	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x1	x10
2500	1digit	1digit	1digit	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x10	x10
3000	1digit	1digit	x1	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x10	x10
4000	1digit	1digit	x1	x1	x1	x1	x10	x10	1digit	1digit	x1	x1	x1	x1	x10	x10	x10
5000	1digit	1digit	x1	x1	x1	x1	x10	x10	1digit	1digit	x1	x1	x1	x1	x10	x10	x10
6000	1digit	x1	x1	x1	x1	x10	x10	x10	x1	1digit	x1	x1	x1	x1	x10	x10	x10

Phase Wire system	3P4W															
V / A	63.5 / 110	100 / 173	105 / 182	110 / 190	115 / 199	120 / 208	127 / 220	200 / 346	220 / 380	230 / 400	240 / 415	242 / 420	250 / 430	254 / 440	265 / 460	277 / 480
5	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
6	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
7.5	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
8	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
10	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
12	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit
15	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit
20	3digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
25	3digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
30	3digit	3digit	3digit	3digit	3digit	3digit	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
40	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
50	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
60	3digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
75	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
80	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
100	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
120	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
150	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit
200	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
250	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
300	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
400	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
500	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
600	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
750	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
800	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
1000	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
1200	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
1500	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1
1600	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
2000	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
2500	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
3000	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
4000	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
5000	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
6000	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1

Note : 3 digit means three decimal places ($\times 10^{-3}$) and 2 digit means two decimal places ($\times 10^{-2}$) and 1 digit means 1 decimal places ($\times 10^{-1}$)

Note : x1 means integer×1 and x10 means integer×10.

Note : Reply error of out of range of channel according upper table.

(2) Electric energy and reactive energy

Phase wire system	1P2W								1P3W	3P3W							
V / A	110	220	440	690	1100	2200	3300	6600	110	110	220	440	690	1100	2200	3300	6600
5	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit
6	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit
7.5	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
8	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
10	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit
12	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1
15	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1
20	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	x1
25	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1
30	2digit	2digit	1digit	1digit	1digit	1digit	1digit	x1	2digit	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1
40	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
50	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	2digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
60	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	2digit	1digit	1digit	1digit	1digit	x1	x1	x1
75	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
80	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
100	2digit	1digit	1digit	1digit	1digit	x1	x1	x1	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1
120	1digit	1digit	1digit	1digit	x1	x1	x1	x1	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x10
150	1digit	1digit	1digit	1digit	x1	x1	x1	x1	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x10
200	1digit	1digit	1digit	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x1	x10
250	1digit	1digit	1digit	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x10	x10
300	1digit	1digit	x1	x1	x1	x1	x1	x10	1digit	1digit	1digit	x1	x1	x1	x1	x10	x10
400	1digit	1digit	x1	x1	x1	x1	x10	x10	1digit	1digit	x1	x1	x1	x1	x10	x10	x10
500	1digit	1digit	x1	x1	x1	x1	x10	x10	1digit	1digit	x1	x1	x1	x1	x10	x10	x10
600	1digit	x1	x1	x1	x1	x10	x10	x10	x1	1digit	x1	x1	x1	x1	x10	x10	x10
750	1digit	x1	x1	x1	x1	x10	x10	x10	x1	x1	x1	x1	x1	x10	x10	x10	x10
800	1digit	x1	x1	x1	x1	x10	x10	x10	x1	x1	x1	x1	x1	x10	x10	x10	x10
1000	1digit	x1	x1	x1	x1	x10	x10	x10	x1	x1	x1	x1	x1	x10	x10	x10	x10
1200	x1	x1	x1	x1	x10	x10	x10	x10	x1	x1	x1	x1	x10	x10	x10	x10	x100
1500	x1	x1	x1	x1	x10	x10	x10	x10	x1	x1	x1	x1	x10	x10	x10	x10	x100
1600	x1	x1	x1	x1	x10	x10	x10	x10	x1	x1	x1	x10	x10	x10	x10	x10	x100
2000	x1	x1	x1	x10	x10	x10	x10	x100	x1	x1	x1	x10	x10	x10	x10	x10	x100
2500	x1	x1	x1	x10	x10	x10	x10	x100	x1	x1	x1	x10	x10	x10	x10	x100	x100
3000	x1	x1	x10	x10	x10	x10	x10	x100	x1	x1	x1	x10	x10	x10	x10	x100	x100
4000	x1	x1	x10	x10	x10	x10	x100	x100	x1	x1	x10	x10	x10	x10	x100	x100	x100
5000	x1	x1	x10	x10	x10	x10	x100	x100	x1	x1	x10	x10	x10	x10	x100	x100	x100
6000	x1	x10	x10	x10	x10	x100	x100	x100	x10	x1	x10	x10	x10	x10	x100	x100	x100

Phase wire system	・3P4W															
V / A	63.5 / 110	100 / 173	105 / 182	110 / 190	115 / 199	120 / 208	127 / 220	200 / 346	220 / 380	230 / 400	240 / 415	242 / 420	250 / 430	254 / 440	265 / 460	277 / 480
5	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
6	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
7.5	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
8	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
10	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
12	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit
15	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit
20	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
25	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
30	2digit	2digit	2digit	2digit	2digit	2digit	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
40	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
50	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
60	2digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
75	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
80	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
100	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
120	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit
150	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1
200	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
250	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
300	1digit	1digit	1digit	1digit	1digit	1digit	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
400	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
500	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
600	1digit	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
750	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
800	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
1000	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
1200	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
1500	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x10
1600	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1	x10	x10	x10	x10
2000	x1	x1	x1	x1	x1	x1	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10
2500	x1	x1	x1	x1	x1	x1	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10
3000	x1	x1	x1	x1	x1	x1	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10
4000	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10
5000	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10
6000	x1	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10	x10

Note : 2 digit means two decimal places ($\times 10^{-2}$) and 1 digit means 1 decimal places ($\times 10^{-1}$)

Note : x1 means integer×1 and x10 means integer×10 and x100 means integer×100.

(3) Voltage and Harmonics voltage data format

Primary voltage	EMU4-FD1-MB
Less than 300V	Decimal 1 digit
300V or more	Intenger×1

Note: This value is primary voltage (phase voltage) when wire phase system is 3P4W.

(4) Current, demand current, harmonics current data format

Primary voltage	EMU4-FD1-MB
Less than 40A	Decimal 3 digit
40A or more Less than 400A	Decimal 2 digit
400A or more Less than 4000A	Decimal 1 digit
4000A or more	Intenger×1

7.2.5 About Error Occurrence

When the command and related data transmitted to Measuring Unit is improper or Measuring Unit is in H/W error, RX (n+7)A (Error status flag) becomes 1 (ON), the error code shown in Table 7.10 is returned as reply data.

Table 7.10 Error Code

Error Description	Error Code (Hex.)
Illegal command or packet length	40h
Invalid group number	41h
Invalid channel number	42h
Measuring Unit is in set-up mode	43h, 44h
Invalid unit number	45h
Invalid data for set-up	51h

If an error occurs, the error code is written into the RWrn as shown in the figure below, and RX(n+7)A (error status flag) is turned on (error occurrence) and RX(n+7)B (remote READY) is turned off (normal communication stop).
For the error resetting method, refer to “6.3 Error Communication”.

8. Abbreviations and Special Terms

Abbreviations and special terms used in this manual are shown below:

Abbreviation and Special Terms	Description
Master station	Station which controls remote stations and local stations. One station is required for one system.
Local station	Station with the CPU which can communicate with master station and other local stations.
Remote I/O station	Remote station which deals with bit information only.
Remote device station	Remote station which deals with bit information and word information.
Remote station	General name for remote I/O station and remote device station. Controlled by a master station.
Intelligent device station	Station that can perform transient transmission.
RX	Remote input
RY	Remote output
RWw	Remote register (write area)
RWr	Remote register (read area)
Demand value	The demand value is an approximate average value during the demand time period. When it is set to 0, each demand present value becomes equivalent to the present value.
Command	Identification code allocated to items to be monitored or set. Energy measuring unit uses a special-purpose command that is transmitted to monitor each measurement value or set each parameter.

9. Program Example

9.1 Sample program 1

(1) Program Content

This program example is assumed the system configuration in below.

・CC-Link master unit: Mounting in Slot No.0.

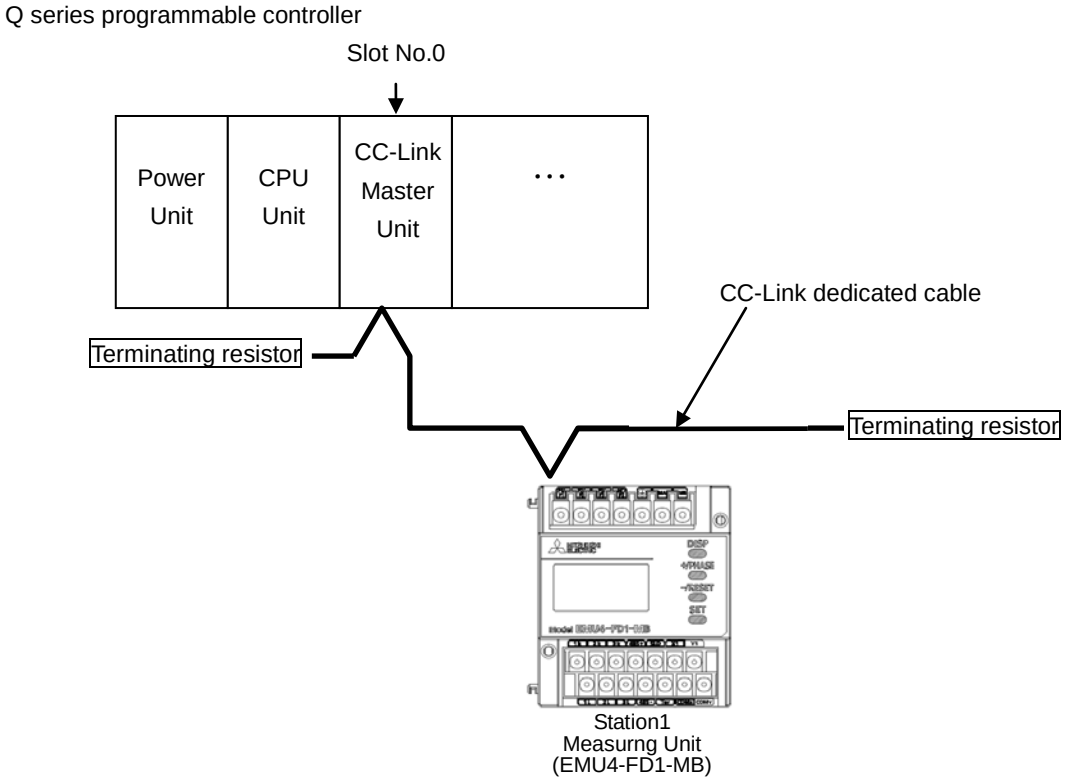
・CC-Link master unit: First XY: 0000.

・CC-Link parameter setting: Please refer to (3) Parameter Settings.

・No. of Measuring unit (EMU4-FD1-MB): 1

・Station No. of Measuring unit (EMU4-FD1-MB): 1

(2) System Configuration

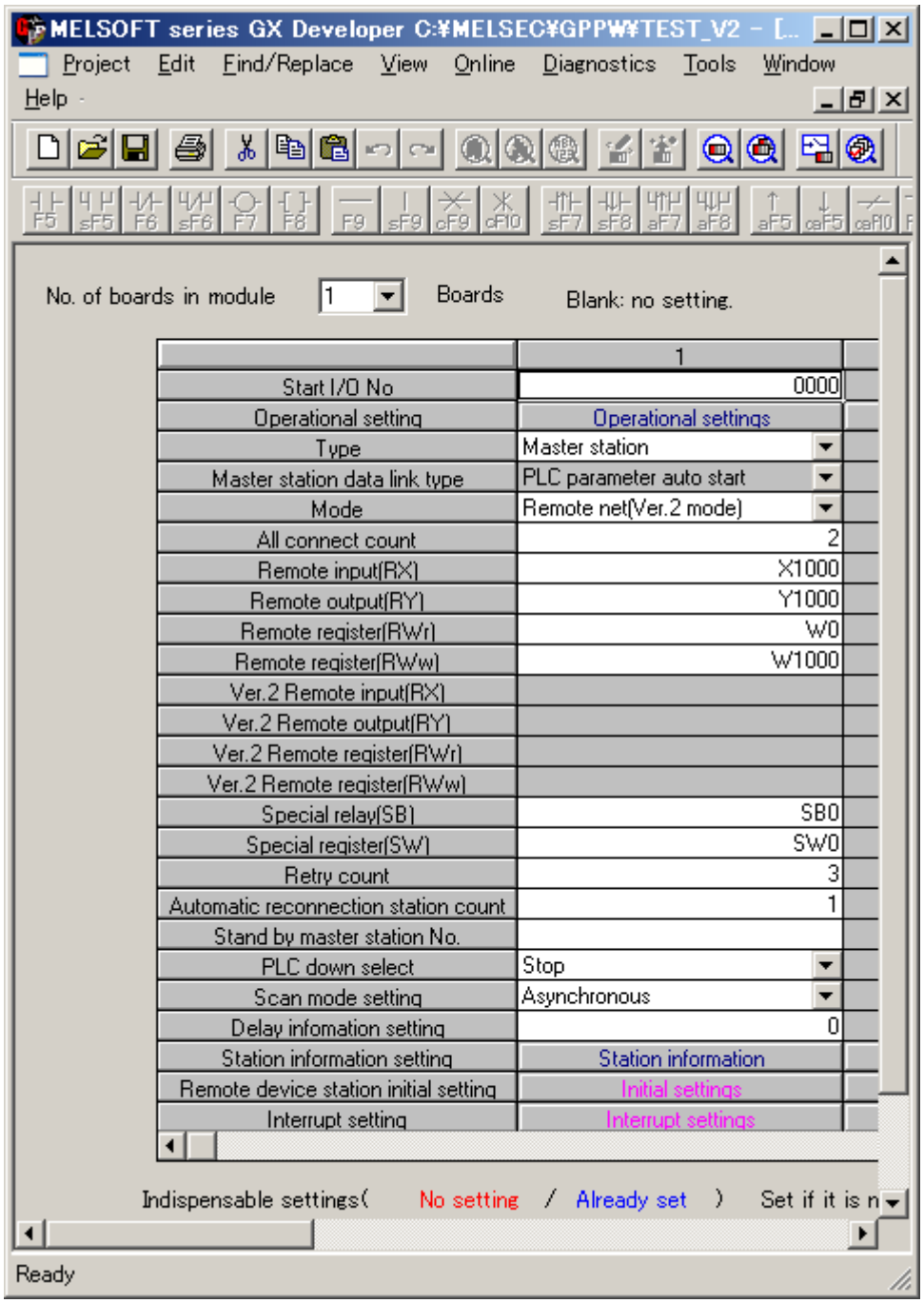


(3) Parameter Settings

Parameter settings are set as following with GX Developer.

9.1.1 Network Parameter Settings and Auto Refresh Parameter Settings

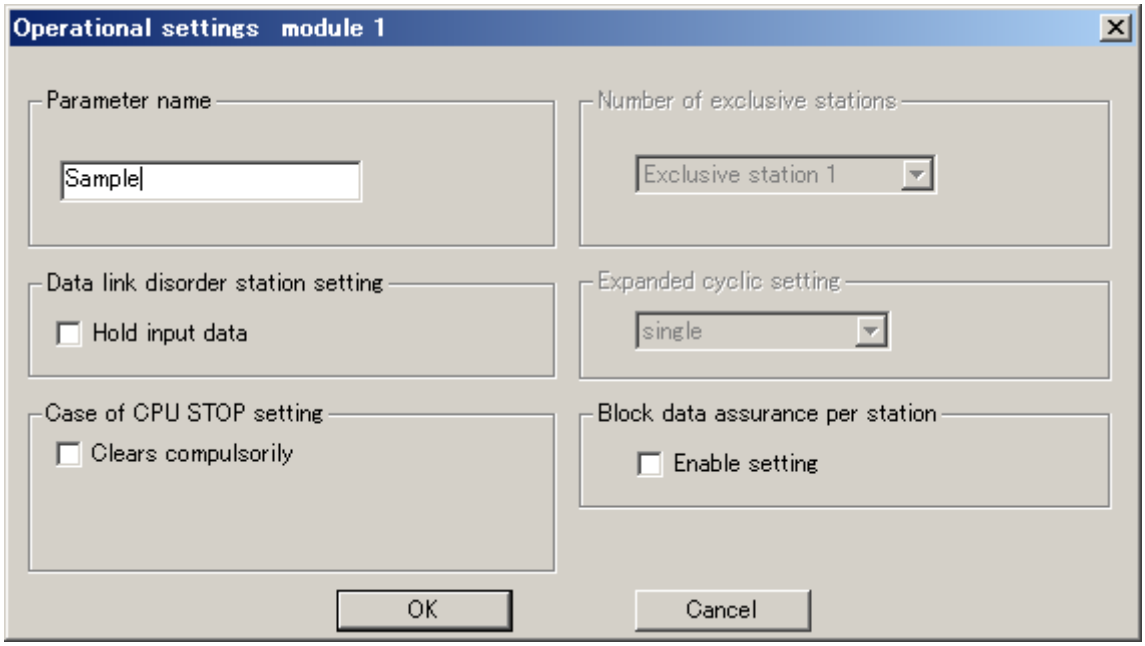
The following is shown CC-Link network parameter settings and auto refresh parameter settings.



Setting Item	Description	Example for settings	Remarks
No.of boards in Module	Set the "No. of boards in module" for which the network parameters are to be set.	1	
Start I/O No	Set the "Start I/O No." for the master station	0000	Set the same setting of Start XY in PC parameter setting
Type	Set the station type.	Master station	
Mode	Set the CC-Link mode.	Remote net (Ver.2 mode)	"Remote net ver.2 mode "and "Remote net additional mode" can be also used in case of the QJ61BT11N.
All connect count	Set the total number of connected stations in the CC-Link system including reserved stations	1	
Remote input (RX)	Set the remote input (RX) refresh device.	X100	Device name - Select from X, M, L, B, D, W, R or ZR. Device number - Within the range of the device points that the CPU has.
Remote output (RY)	Set the remote output (RY) refresh device.	Y100	Device name - Select from Y, M, L, B, T, C, ST, D, W, R or ZR. Device number - Within the range of the device points that the CPU has.
Remote register (RWr)	Set the remote register (RWr) refresh device.	W300	Device name - Select from M, L, B, D, W, R, or ZR. Device number - Within the range of the device points that the CPU has.
Remote register (RWw)	Set the remote register (RWw) refresh device.	W400	Device name - Select from M, L, B, T, C, ST, D, W, R, or ZR. Device number - Within the range of the device points that the CPU has.
Special relay (SB)	Set the link special relay (SB) refresh device.	SB0	Device name - Select from M, L, B, D, W, R, SB or ZR. Device number - Within the range of the device points that the CPU has.
Special register (SW)	Set the link special register (SW) refresh device.	SW0	Device name - Select from M, L, B, D, W, R, SW or ZR. Device number - Within the range of the device points that the CPU has.
Retry count	Set the number of retries for "Retry count", when a communication error occurs.	3	
Automatic reconnection station count	Set the number of modules that can return to system operation by a single link scan.	1	
Standby master station No.	Set the station number for the standby master station	Blank	Blank: No standby master station specified.
PLC down select	Set the data link status for "PLC down select", when a master station programmable controller CPU error occurs	Stop	
Scan mode setting	Set whether the link scan for the sequence scan is synchronous or asynchronous	Asynchronous	
Delay information setting	Set for the link scan delay time.	0	50μs

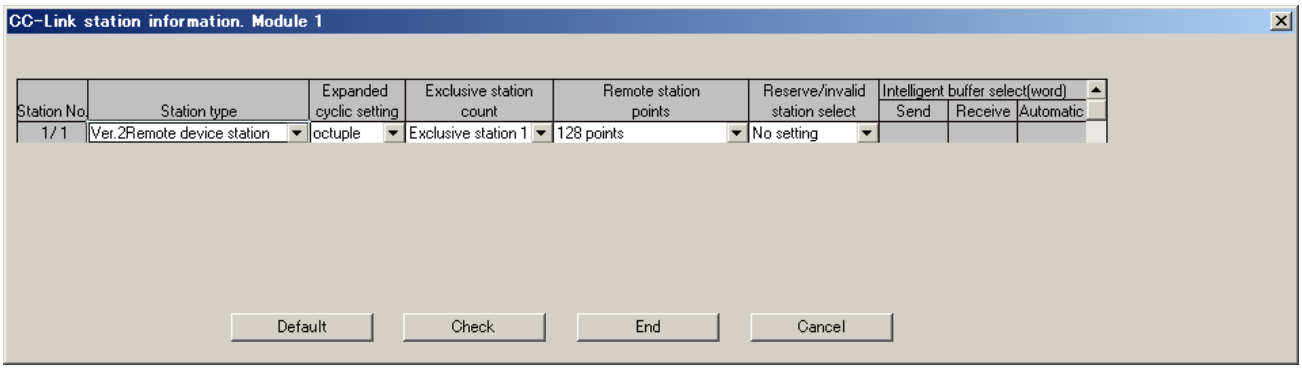
9.1.2 Operational Settings

Operational settings are as follows.



9.1.3 Station Information Settings

Station information settings are as follows.



(4) Parameter Settings

(a) Initial communication sample program

Sample program measuring unit turn ON or initial processing after reset.

Measuring unit data link status

Initial communication

1)Check data link status in each station.

2)Initial data setting completion flag (Y1078) turns to ON after Initial data processing request (X1078) turns to ON.

3)Initial data processing request (X1078) turns to OFF after Initial data setting completion flag (Y1078) turns to ON.

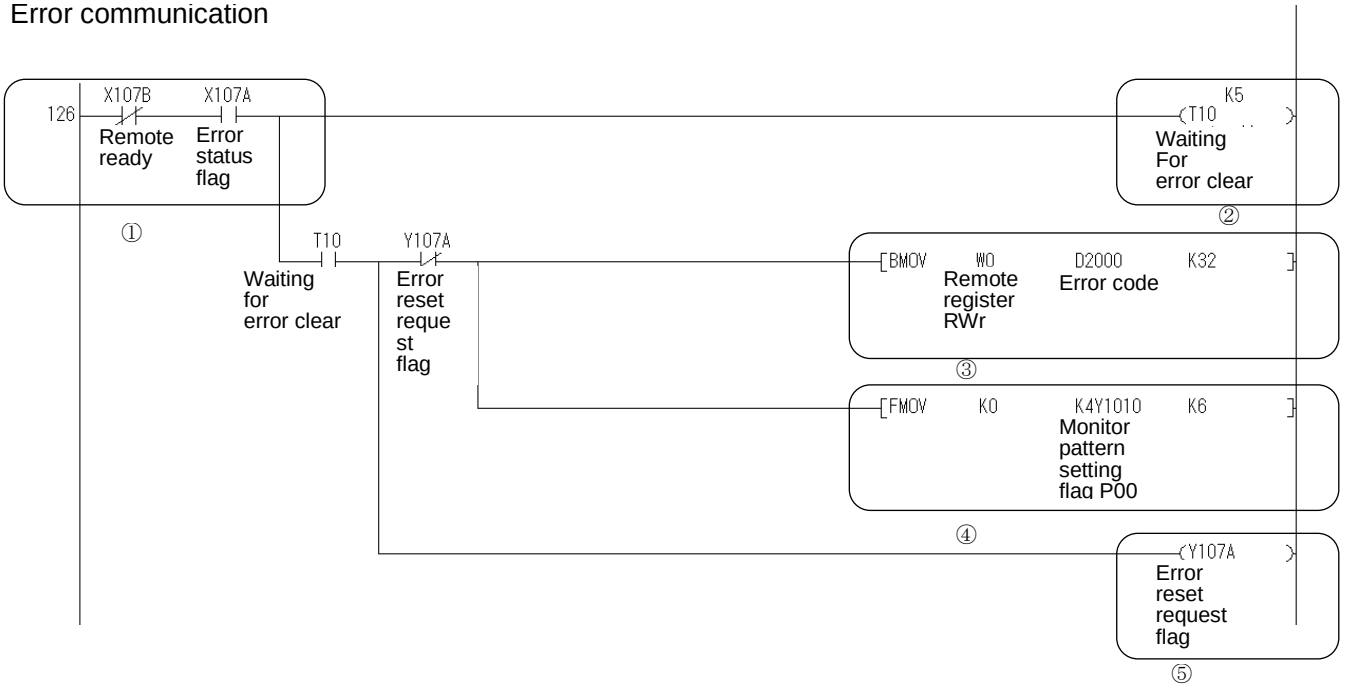
Device allocation

Device No.	Contents	Note
X0	Status of CC-Link master station OFF: Unit normal ON: Unit error	Device No. is changed by the input number of CC-Link master unit. <Example> When Input No. is "X/Y30"Of CC-Link master unit. X0 → X30, X1 → X31, XF → X3F
X1	Data status of CC-Link master station OFF: Data link stop ON: Data link	
X0F	Unit ready of CC-Link master station OFF: 1) Error in setting of SW in Unit. 2) When the Unit error signal (Xn0) turns to ON. ON: It is turns to ON automatically when unit is moveable.	
X1078	Remote input: RX(n+7)8 Initial data setting completion flag	It is changed by the setting of the remote input (RX) refresh device (CC-Link parameter setting) and station No. of leak current monitoring device. Please refer to 7.1.1 for more details.
Y1078	Remote output: RY(n+7)8 Initial data processing completion flag	It is changed by the setting of the remote output (RY) refresh device (CC-Link parameter setting) and station No. of leak current monitoring device. Please refer to 7.1.2 for more details.
SW80 to SW83	Data link status 0: normal 1: data link error	It is changed by the setting of link relay (SW) refresh device (CC-Link parameter setting). Please refer to manual of each CC-Link system.
M0 to M63	Data link error in each station OFF: normal ON: data link error	Device

	b15	b14	~	b1	b0
SW80	16	15	~	2	1
SW81	32	31	~	18	17
SW82	48	47	~	34	33
SW83	64	63	~	50	49

(b) Error communication sample program

Error communication



① Confirming remote ready (X107B) turns to OFF and Error status flag (X107A) turns to ON when error occurred in measuring unit.

② Waiting time from error occurred to error reset.

③ Error code is received to remote register (RWr) W000 to W001F. Read received error code to device D2000 to D2031.

④ Monitor pattern setting flag (Y1010 to Y106F) after error occurred.

⑤ Turn ON the error reset flag (Y107A) after reset.

⑥ Error status flag turns to OFF after error reset. Error reset flag (Y107A) turns to OFF.
Restart communication to measuring unit after error reset flag (Y107A) turns to OFF and remote ready (X107B) turns to ON.

Device allocation

Device No.	Contents	Note
X107A	Remote input of measuring unit: RX(n+7)A Error status flag	It is changed by the setting of the remote input (RX) refresh device (CC-Link parameter setting) and station No. of measuring unit. Please refer to 7.1.1 for more details.
X107B	Remote input of measuring unit: RX(n+7)B Remote READY	
Y107A	Remote output: RY(n+7)A Error reset status flag	It is changed by the setting of the remote output (RY) refresh device (CC-Link parameter setting) and station No.measuring unit. Please refer to 7.1.2 for more details.
W0000 to W001F	Remote register: RWr Data for reading	It is changed by the setting of the remote register (RWr) refresh device (CC-Link parameter setting) and station No.measuring unit. Please refer to 7.1.2 for more details.
D2000 to D2032	Error code for receiving	Device (Selectable) Refer to table 7.2 error code for more details.

(c) Normal communication sample program

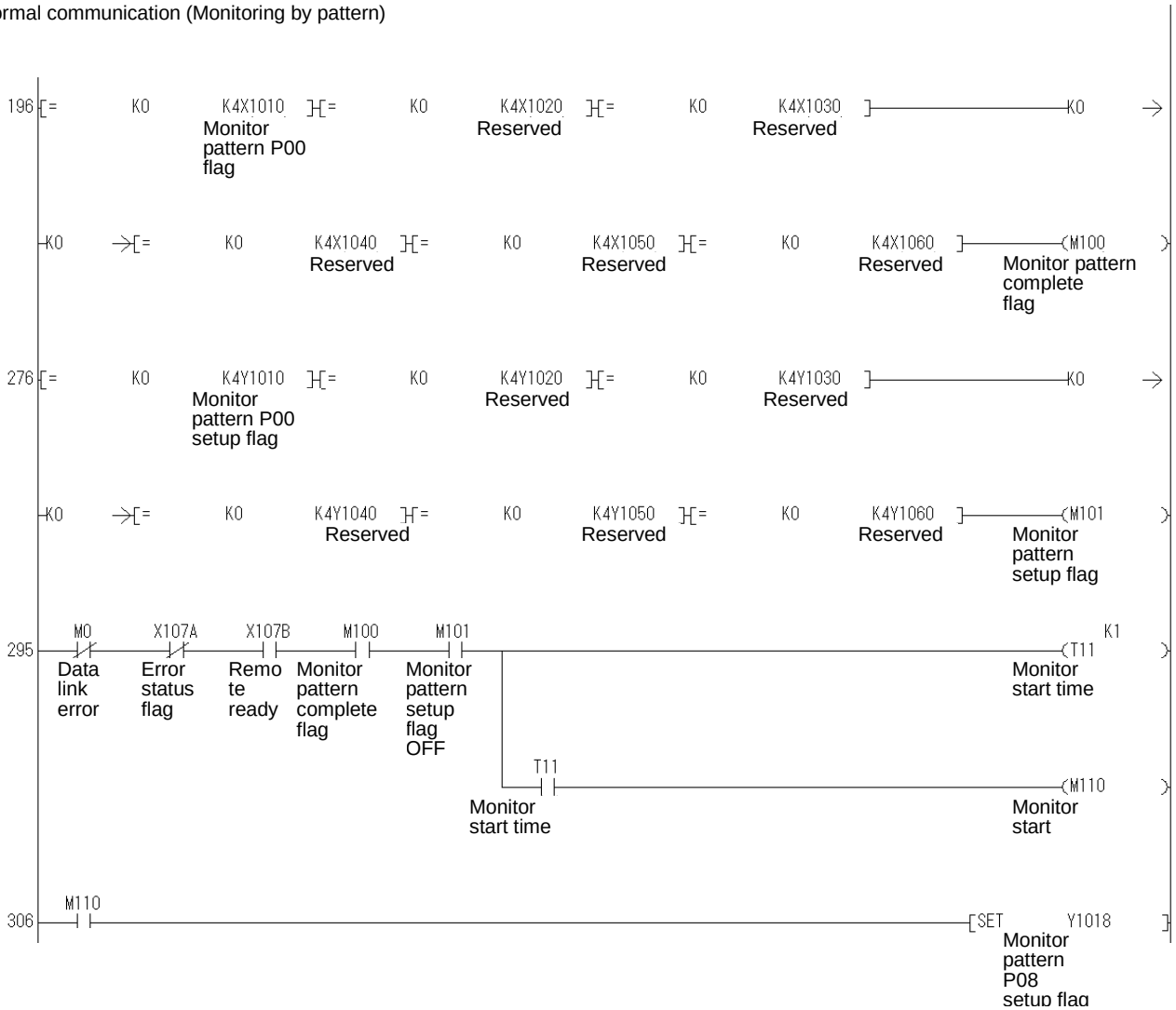
After initial communication, you can monitor the measured value and setup the setting value when normal communication status is normal (Remote ready is ON)

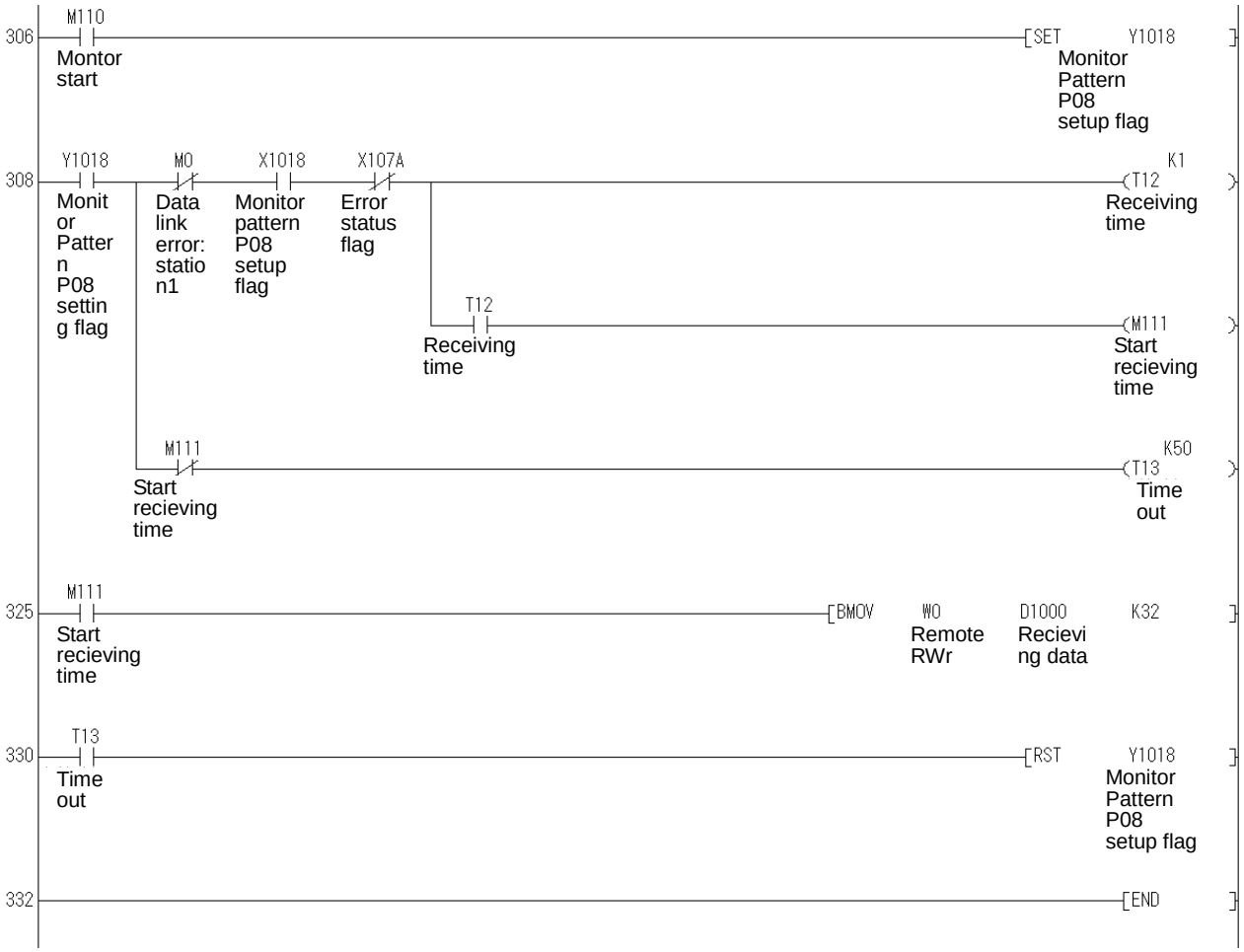
Describing following 3 programs as a sample program.

	Note	Measuring items	Page
Monitoring example by pattern	Sample program reading measuring items to programmable controller devices using monitor pattern P08 setting flag (RY (n+1)8) Measured value is stored in programable controller device	Phase 1 current Phase 2 current Phase 3 current 1-2 voltage 2-3 voltage 3-1 voltage Active power Active energy(import)	61
Monitoring example by command (1H)	Sample program reading measuring items to programmable controller devices using monitor pattern P00 setting flag (RY(n+1)0) writing command (channel group) to remote register RWw. Measured value is stored in programable controller device	Phase 1 current 1-2 voltage Active power Reactive power Power factor Frequency Active energy(import) Reactive energy(import lag)	65
Monitoring example by command (2H)	Sample program reset all alarms using monitor pattern P00 setting flag (RY(n+1)0)	Alarm all reset	70

(1) Monitoring sample using pattern

Normal communication (Monitoring by pattern)





① Confirming monitor pattern setting completion flag (X1010 to X106F) is OFF.

② Confirming monitor pattern setting flag (Y1010 to Y106F) is OFF.

③ Start monitor communication (M110) after confirming monitorable condition (M0 OFF), X107A is OFF, X101B is ON (remote ready), M100 is ON and M101 is ON.

④ Monitor pattern P08 setting flag (Y1018) turns to ON when Starting monitor communication (M110).

⑤ Monitor pattern P08 setting completion flag (X1018) turns to ON after monitor pattern P08 setting flag (Y1018) turns to ON and replay the data.

⑥ Measured data is transmitting to receiving data (D1000 to D1031) from remoter register RWr (W1000 to W101F) after monitor communication starting (M110) is ON

* While monitor pattern P08 setting flag (Y1018) is ON, measured data in remote register RWr (W0000 to W001F) is update.

⑦ Monitor pattern setting completion flag (X1018) turns to OFF when time out (TI3) turns to ON.

Device allocation

Device	Contents	Note
X1010	Monitor pattern P00 completion flag	Using monitor pattern P08 in sample program. Please change X1018 when using other monitor pattern. Setup Remote input (RX) refresh device. Please refer to Remote input RX.
X1011 to X1017	Reserved	
X1018	Monitor pattern P08 completion flag	
X1019	Monitor pattern P09 completion flag	
X101A	Monitor pattern P10 completion flag	
X101B	Monitor pattern P11 completion flag	
X101C	Monitor pattern P12 completion flag	
X101D to X1077	Reserved	
X107A	Error status flag	
X107B	Remote ready	
M100	Confirming the monitor pattern completion flag turns to OFF Confirming X1010 to X106F turns to OFF.	Devices in a CPU module.(User selectable) . Use as interrock in monitor start.
Y1010	Monitor pattern P00 completion flag	Using monitor pattern P08 in sample program. Please change Y1018 when using other monitor pattern. Setup Remote input (RY) refresh device. Please refer to Remote output RY.
Y1011 to Y1017	Reserved	
Y1018	Monitor pattern P08 completion flag	
Y1019	Monitor pattern P09 completion flag	
Y101A	Monitor pattern P10 completion flag	
Y101B	Monitor pattern P11 completion flag	
Y101C	Monitor pattern P12 completion flag	
Y101D to Y1077	Reserved	
M101	Confirming the monitor pattern flag turns to OFF Confirming X1010 to X106F turns to OFF.	Devices in a CPU module.(User selectable). Use as interrock in monitor start.
M0	Data link error : station1	Devices in a CPU module.(User selectable). Please setup same device in (a) Initial program
T11	Monitor pattern receiving time	Devices in a CPU module.(User selectable).
M111	Start data receiving	Devices in a CPU module.(User selectable).
T12	Monitor pattern receiving time	Devices in a CPU module.(User selectable).
M112	Start data receiving	Devices in a CPU module.(User selectable).
T13	Time out	Devices in a CPU module.(User selectable).
W0000 to W0001F	Remote register RWr Storing reply data	Remote register changed according to setup of remote register refresh device and station No. of measuring unit.
D1000 to D1031	Receiving data	Devices in a CPU module.(User selectable).

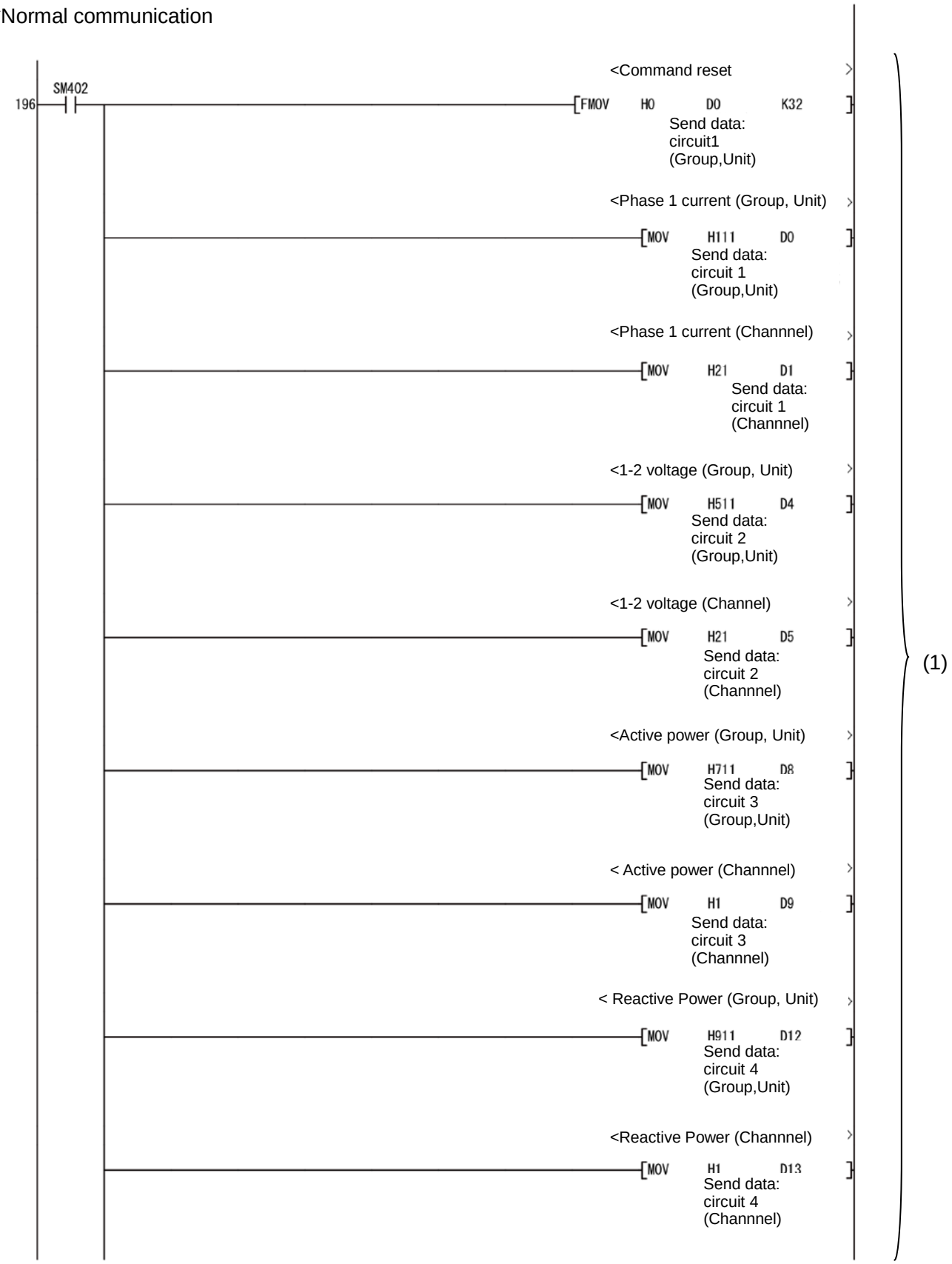
Device	Contents	Note

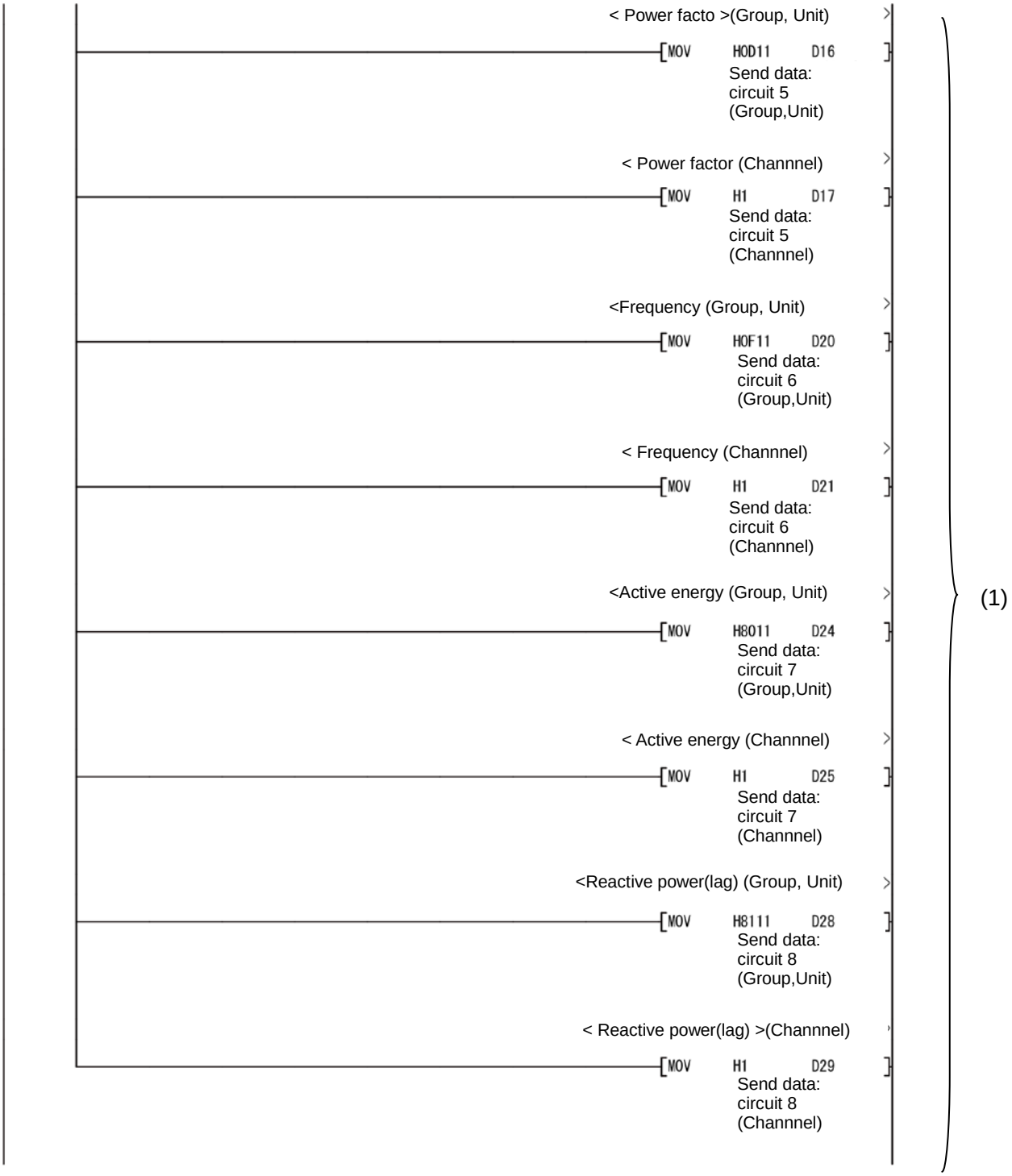
Content of receive data depends on monitor pattern.
Data details of monitor pattern P08 showed in below table.

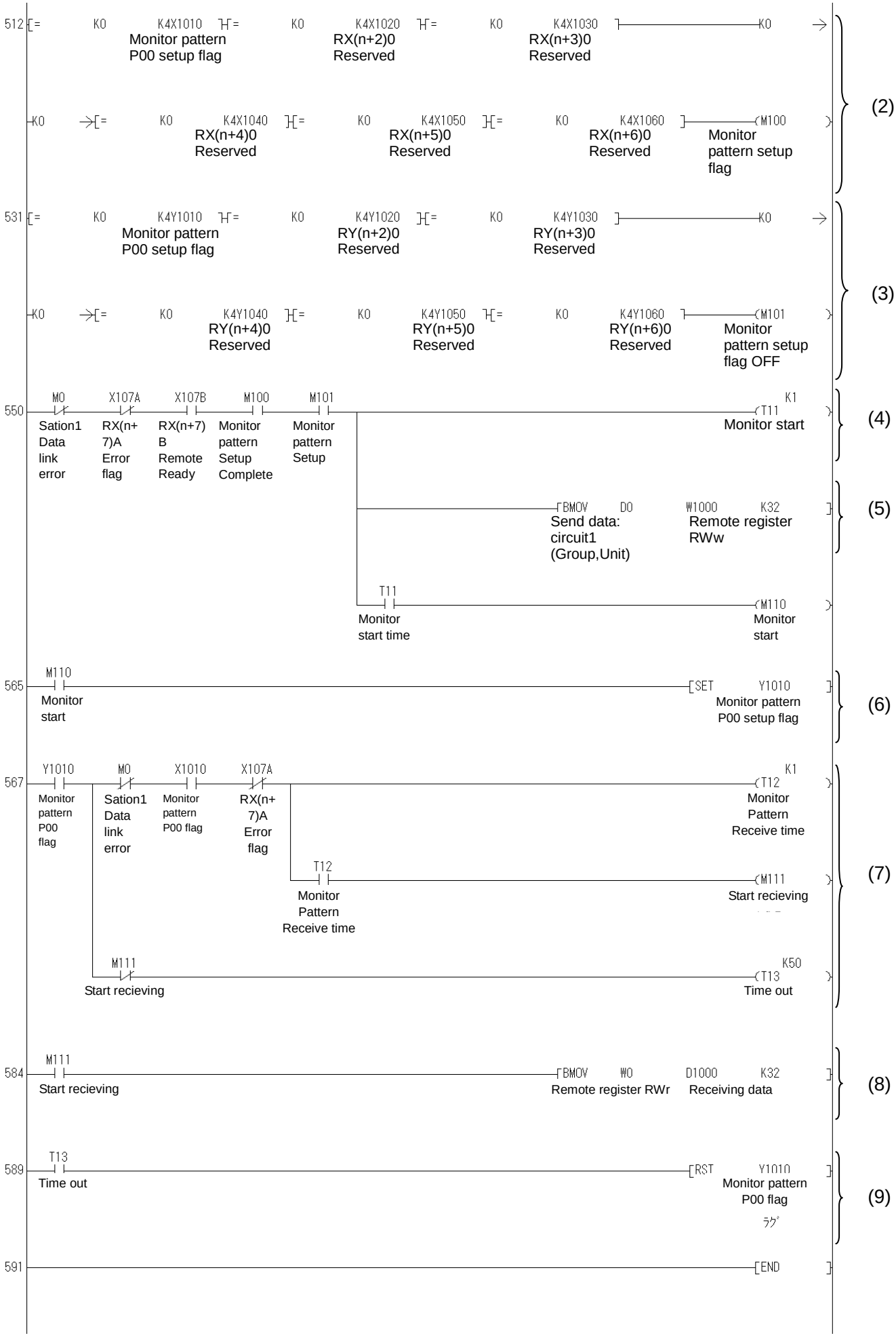
Device	Contents		Note
D1000	Phase 1 current	H2101	Channnel（H21）, Group（01）
D1001		Multiplying factor	Measured value＝Data×Multiplying factor
D1002,D1003		Data	
D1004	Phase 1 current	H4101	Channnel（H41）, Group（01）
D1005		Multiplying factor	Measured value＝Data×Multiplying factor
D1006,D1007		Data	
D1008	Phase 1 current	H6101	Channnel（H61）, Group（01）
D1009		Multiplying factor	Measured value＝Data×Multiplying factor
D1010, D1011		Data	
D1012	1-2 voltage	H2105	Channnel（H21）, Group（05）
D1013		Multiplying factor	Measured value＝Data×Multiplying factor
D1014, D1015		Data	
D1016	2-3 voltage	H4105	Channnel（H41）, Group（05）
D1017		Multiplying factor	Measured value＝Data×Multiplying factor
D1018, D1019		Data	
D1020	3-1 voltage	H6105	Channnel（H61）, Group（05）
D1021		Multiplying factor	Measured value＝Data×Multiplying factor
D1022, D1023		Data	
D1024	Electric power	H0107	Channnel（H01）, Group（07）
D1025		Multiplying factor	Measured value＝Data×Multiplying factor
D1026, D1027		Data	
D1028	Electric Energy	H0180	Channnel（H01）, Group（80）
D1029		Multiplying factor	Measured value＝Data×Multiplying factor
D1030, D1031		Data	

(2) Monitoring sample using command (1H)

*Normal communication




< Power facto >(Group, Unit)
MOV H0D11 D16
Send data: circuit 5 (Group,Unit)
< Power factor (Channnel)
MOV H1 D17
Send data: circuit 5 (Channnel)
<Frequency (Group, Unit)
MOV H0F11 D20
Send data: circuit 6 (Group,Unit)
< Frequency (Channnel)
MOV H1 D21
Send data: circuit 6 (Channnel)
<Active energy (Group, Unit)
MOV H8011 D24
Send data: circuit 7 (Group,Unit)
< Active energy (Channnel)
MOV H1 D25
Send data: circuit 7 (Channnel)
<Reactive power(lag) (Group, Unit)
MOV H8111 D28
Send data: circuit 8 (Group,Unit)
< Reactive power(lag) >(Channnel)
MOV H1 D29
Send data: circuit 8 (Channnel)
(1)


512
[= K0 K4X1010
Monitor pattern P00 setup flag
[= K0 K4X1020
RX(n+2)0 Reserved
[= K0 K4X1030
RX(n+3)0 Reserved
K0
K0
[= K0 K4X1040
RX(n+4)0 Reserved
[= K0 K4X1050
RX(n+5)0 Reserved
[= K0 K4X1060
RX(n+6)0 Reserved
M100
Monitor pattern setup flag
(2)
531
[= K0 K4Y1010
Monitor pattern P00 setup flag
[= K0 K4Y1020
RY(n+2)0 Reserved
[= K0 K4Y1030
RY(n+3)0 Reserved
K0
K0
[= K0 K4Y1040
RY(n+4)0 Reserved
[= K0 K4Y1050
RY(n+5)0 Reserved
[= K0 K4Y1060
RY(n+6)0 Reserved
M101
Monitor pattern setup flag OFF
(3)
550
M0
Sation1 Data link error
X107A
RX(n+7)A Error flag
X107B
RX(n+7)B Remote Ready
M100
Monitor pattern Setup Complete
M101
Monitor pattern Setup
K1
T11
Monitor start
(4)
BMOV D0 W1000 K32
Send data: circuit1 (Group,Unit)
Remote register RWw
(5)
T11
Monitor start time
M110
Monitor start
565
M110
Monitor start
SET Y1010
Monitor pattern P00 setup flag
(6)
567
Y1010
Monitor pattern P00 flag
M0
Sation1 Data link error
X1010
Monitor pattern P00 flag
X107A
RX(n+7)A Error flag
K1
T12
Monitor Pattern Receive time
T12
Monitor Pattern Receive time
M111
Start recieving
M111
Start recieving
K50
T13
Time out
(7)
584
M111
Start recieving
BMOV W0 D1000 K32
Remote register RWr
Receiving data
(8)
589
T13
Time out
RST Y1010
Monitor pattern P00 flag
(9)
591
END

(1) Write command send to measuring unit in device.
(2) Confirm the monitor pattern setup complete flag (X1010-X106F) is OFF.
(3) Confirm the monitor pattern setup flag (Y1010-Y106F) is OFF.
(4) Monitoring start after confirm X107A is OFF, X101B is ON, M100 is ON, M101 is ON.
(5) Write send command at (1) in remote register RWw (W1000-W101F).
(6) Monitor pattern P00 setup flag turn to ON in monitor start (M110).
(7) After Monitor pattern P00 setup flag (Y1010) turns to ON and reply data according to monitor pattern, Monitor pattern P00 setup complete flag (X1010) turns ON.
After confirming monitor pattern P00 setup complete flag (X1010), Error flag (X107A) is not ON, time out is conducted.
(8) Transfer the measured data to receive data (D1000-D1031) when monitor start (M110)is ON.
(9) After Time out (T13) is ON, Monitor pattern P00 setup flag (Y1010) turns to OFF.

Device allocation

Device	Contents	Note
X1010	Monitor pattern P00 completion flag	Using monitor pattern P00 in sample program. Please change X1010 when using other monitor pattern. Setup Remote input (RX) refresh device. Please refer to Remote input RX.
X1011 to X1017	Reserved	
X1018	Monitor pattern P08 completion flag	
X1019	Monitor pattern P09 completion flag	
X101A	Monitor pattern P10 completion flag	
X101B	Monitor pattern P11 completion flag	
X101C	Monitor pattern P12 completion flag	
X101C to X106F	Reserved	
X107A	Error status flag	
X107B	Remote ready	
M100	Confirming the monitor pattern completion flag turns to OFF Confirming X1010 to X106F turns to OFF.	Devices in a CPU module.(User selectable) . Use as interrock in monitor start.
Y1010	Monitor pattern P00 completion flag	Using monitor pattern P08 in sample program. Please change Y1018 when using other monitor pattern. Setup Remote input (RY) refresh device. Please refer to Remote output RY.
Y1011 to Y1017	Reserved	
Y1018	Monitor pattern P08 completion flag	
Y1019	Monitor pattern P09 completion flag	
Y101A	Monitor pattern P10 completion flag	
Y101B	Monitor pattern P11 completion flag	
Y101C	Monitor pattern P12 completion flag	
Y101C to Y106F	Reserved	
M101	Confirming the monitor pattern flag turns to OFF Confirming X1010 to X106F turns to OFF.	Devices in a CPU module.(User selectable). Use as interrock in monitor start.
M0	Data link error : station1	Devices in a CPU module.(User selectable). Please setup same device in (a) Initial program
T11	Monitor pattern receiving time	Devices in a CPU module.(User selectable).
M111	Start data receiving	Devices in a CPU module.(User selectable).
T12	Monitor pattern receiving time	Devices in a CPU module.(User selectable).
M112	Start data receiving	Devices in a CPU module.(User selectable).
T13	Time out	Devices in a CPU module.(User selectable).
W1000 to W1001F	Remote register RWr Storing reply data	Remote register changed according to setup of remote register refresh device and station No. of measuring unit.
W0000 to W001F	Remote register RWr Storing reply data	Remote register changed according to setup of remote register refresh device and station No. of measuring unit.

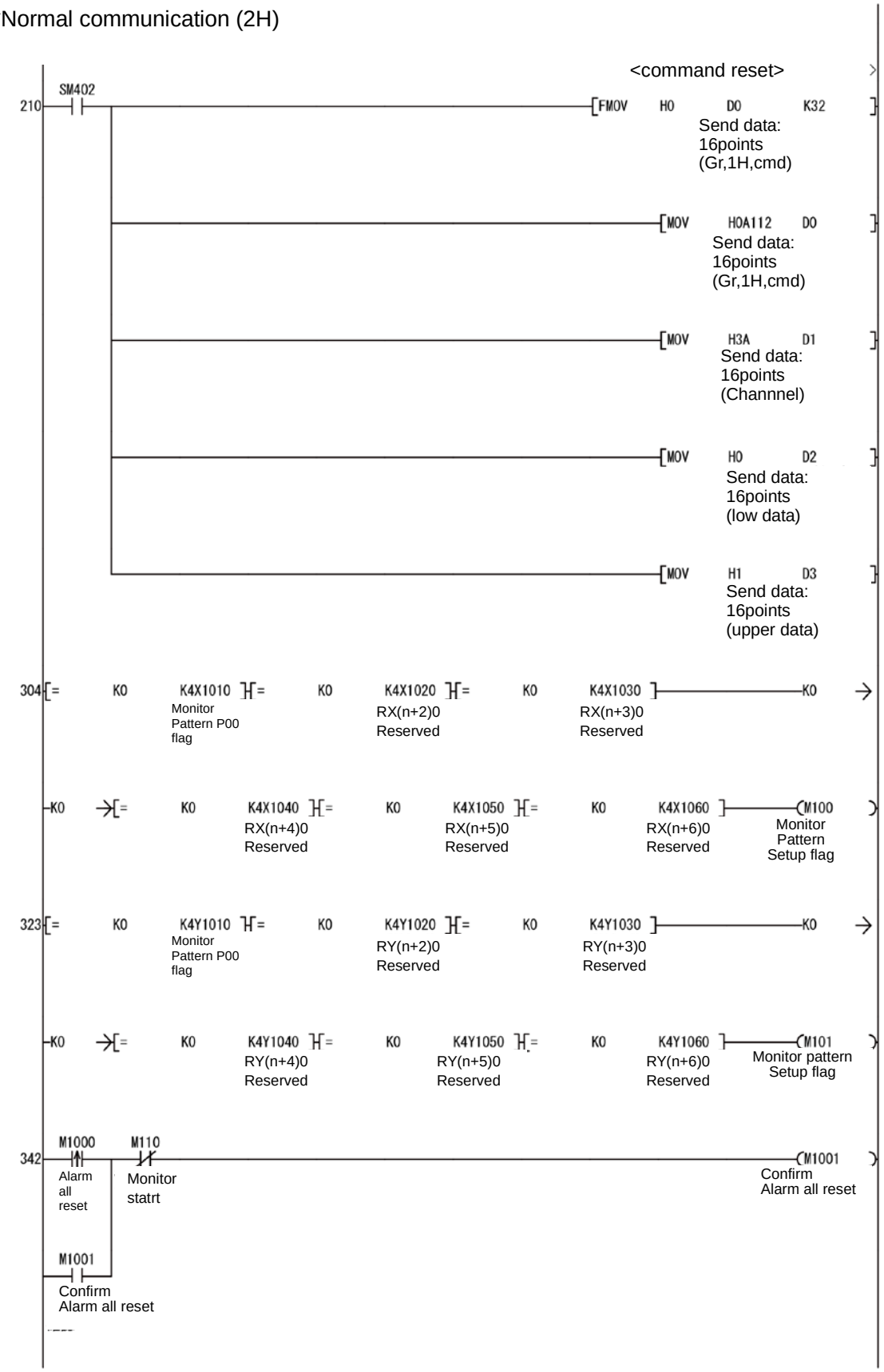
<table>
<tr><th>Device</th><th colspan="3">Contents</th><th>Note</th></tr>
<tr><td rowspan="2">D0 to D31</td><td colspan="4">Send data Internal device</td></tr>
<tr><td colspan="4">Write Group No., Channel No., command that monitored in receiving data

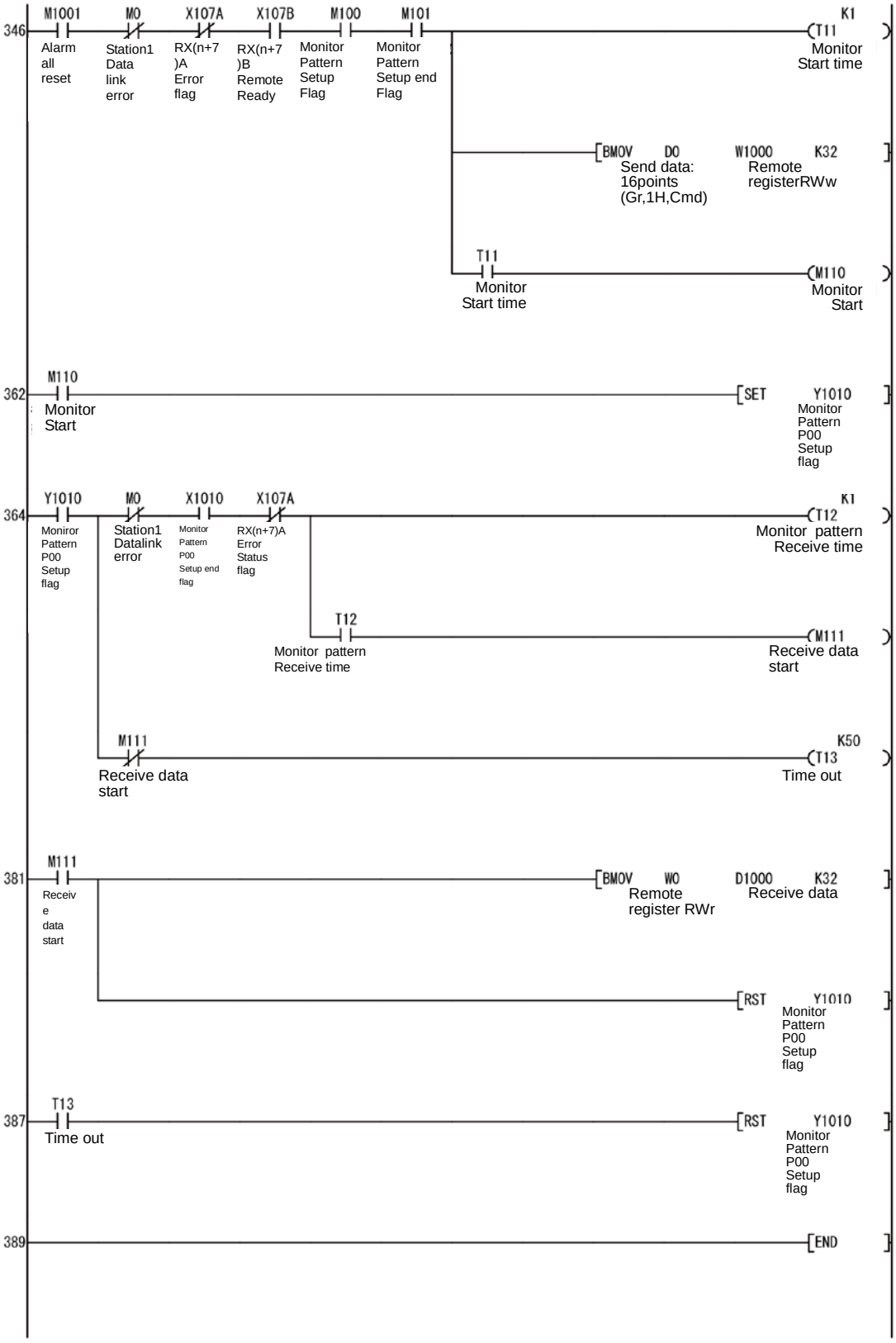
<table>
<tr><th>Device</th><th colspan="2">Content</th><th>Note</th></tr>
<tr><td>D0</td><td rowspan="3">Phase 1 current</td><td>H0111</td><td></td></tr>
<tr><td>D1</td><td>H0021</td><td></td></tr>
<tr><td>D2, D3</td><td>H0000</td><td></td></tr>
<tr><td>D4</td><td rowspan="3">1-2 voltage</td><td>H0511</td><td></td></tr>
<tr><td>D5</td><td>H0021</td><td></td></tr>
<tr><td>D6, D7</td><td>H0000</td><td></td></tr>
<tr><td>D8</td><td rowspan="3">Active power</td><td>H0711</td><td></td></tr>
<tr><td>D9</td><td>H0021</td><td></td></tr>
<tr><td>D10, D11</td><td>H0000</td><td></td></tr>
<tr><td>D12</td><td rowspan="3">Reactive power</td><td>H0911</td><td></td></tr>
<tr><td>D13</td><td>H0021</td><td></td></tr>
<tr><td>D14, D15</td><td>H0000</td><td></td></tr>
<tr><td>D16</td><td rowspan="3">Power factor</td><td>H0D11</td><td></td></tr>
<tr><td>D17</td><td>H0021</td><td></td></tr>
<tr><td>D18, D19</td><td>H0000</td><td></td></tr>
<tr><td>D20</td><td rowspan="3">Frequency</td><td>H0F11</td><td></td></tr>
<tr><td>D21</td><td>H0021</td><td></td></tr>
<tr><td>D22, D23</td><td>H0000</td><td></td></tr>
<tr><td>D24</td><td rowspan="3">Active energy</td><td>H8011</td><td></td></tr>
<tr><td>D25</td><td>H0001</td><td></td></tr>
<tr><td>D26, D27</td><td>H0000</td><td></td></tr>
<tr><td>D28</td><td rowspan="3">Reactive energy</td><td>H8111</td><td></td></tr>
<tr><td>D29</td><td>H0001</td><td></td></tr>
<tr><td>D30, D31</td><td>H0000</td><td></td></tr>
</table>
</td></tr>
<tr><td rowspan="2">D1000 to D1031</td><td colspan="4">Receive data Internal device</td></tr>
<tr><td colspan="4">Receive data is different by monitor pattern.

<table>
<tr><th>Device</th><th colspan="2">Content</th><th>Note</th></tr>
<tr><td>D1000</td><td rowspan="3">Phase 1 current</td><td>H2101</td><td></td></tr>
<tr><td>D1001</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1002, D1003</td><td>Data</td><td></td></tr>
<tr><td>D1004</td><td rowspan="3">1-2 voltage</td><td>H2105</td><td></td></tr>
<tr><td>D1005</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1006, D1007</td><td>Data</td><td></td></tr>
<tr><td>D1008</td><td rowspan="3">Active power</td><td>H0107</td><td></td></tr>
<tr><td>D1009</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1010, 10D11</td><td>Data</td><td></td></tr>
<tr><td>D1012</td><td rowspan="3">Reactive power</td><td>H0109</td><td></td></tr>
<tr><td>D1013</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1014, D1015</td><td>Data</td><td></td></tr>
<tr><td>D1016</td><td rowspan="3">Power factor</td><td>H01D1</td><td></td></tr>
<tr><td>D1017</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1018, D1019</td><td>Data</td><td></td></tr>
<tr><td>D1020</td><td rowspan="3">Frequency</td><td>H01F1</td><td></td></tr>
<tr><td>D1021</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1022, D1023</td><td>Data</td><td></td></tr>
<tr><td>D1024</td><td rowspan="3">Active energy</td><td>H0180</td><td></td></tr>
<tr><td>D1025</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1026, 10D27</td><td>Data</td><td></td></tr>
<tr><td>D1028</td><td rowspan="3">Reactive energy</td><td>H0181</td><td></td></tr>
<tr><td>D1029</td><td>Multiple factor</td><td></td></tr>
<tr><td>D1030, D1031</td><td>Data</td><td></td></tr>
</table>
</td></tr>
</table>

(3) Monitoring sample using command (2H)

*Normal communication (2H)




346
M1001
Alarm all reset
M0
Station1 Data link error
X107A
RX(n+7)A Error flag
X107B
RX(n+7)B Remote Ready
M100
Monitor Pattern Setup Flag
M101
Monitor Pattern Setup end Flag
K1
T11
Monitor Start time
BMOV D0 W1000 K32
Send data: 16points (Gr,1H,Cmd)
Remote registerRWw
T11
Monitor Start time
M110
Monitor Start
362
M110
Monitor Start
SET Y1010
Monitor Pattern P00 Setup flag
364
Y1010
Moniror Pattern P00 Setup flag
M0
Station1 Datalink error
X1010
Monitor Pattern P00 Setup end flag
X107A
RX(n+7)A Error Status flag
K1
T12
Monitor pattern Receive time
T12
Monitor pattern Receive time
M111
Receive data start
M111
Receive data start
K50
T13
Time out
381
M111
Receive data start
BMOV W0 D1000 K32
Remote register RWr
Receive data
RST Y1010
Monitor Pattern P00 Setup flag
387
T13
Time out
RST Y1010
Monitor Pattern P00 Setup flag
389
END

(1) Write command send to measuring unit in device.

(2) Confirm the monitor pattern setup complete flag (X1010-X106F) is OFF.

(3) Confirm the monitor pattern setup flag (Y1010-Y106F) is OFF.

(4) Confirm the alarm all reset M1001 is ON when M1000 is ON.
M1001 turns to OFF when X101B is ON in (6)

(5) Command is written to remote register RWw (W000 to W001F) after M1001 is ON, M0 is OFF, CX107A is OFF, X101B is ON.

(6) M110 turns to ON after (5).

(7) Y1010 turns to ON in M110.

(8) After Monitor pattern P00 setup flag (Y1010) turns to ON and reply data according to monitor pattern, Monitor pattern P00 setup complete flag (X1010) turns ON.
After confirming monitor pattern P00 setup complete flag (X1010), Error flag (X107A) is not ON, time out is conducted.

(9) Transfer the measured data to receive data (D1000-D1031) when monitor start (M110) is ON.

(10) After Time out (T13) is ON, Monitor pattern P00 setup flag (Y1010) turns to OFF.

Device allocation

Device	Contents	Note
X1010	Monitor pattern P00 completion flag	
X1011 to X1017	Reserved	
X1018	Monitor pattern P08 completion flag	
X1019	Monitor pattern P09 completion flag	
X101A	Monitor pattern P10 completion flag	
X101B	Monitor pattern P11 completion flag	
X101C	Monitor pattern P12 completion flag	
X101C to X106F	Reserved	
X107A	Error status flag	
X107B	Remote ready	
M100	Confirming the monitor pattern completion flag turns to OFF Confirming X1010 to X106F turns to OFF.	
Y1010	Monitor pattern P00 completion flag	
Y1011 to Y1017	Resereved	
Y1018	Monitor pattern P08 completion flag	
Y1019	Monitor pattern P09 completion flag	
Y101A	Monitor pattern P10 completion flag	
Y101B	Monitor pattern P11 completion flag	
Y101C	Monitor pattern P12 completion flag	
Y101C to Y106F	Reserved	
M101	Confirming the monitor pattern flag turns to OFF Confirming X1010 to X106F turns to OFF.	
M0	Data link error : station1	
T11	Monitor pattern receiving time	
M111	Start data receiving	
T12	Monitor pattern receiving time	
M112	Start data receiving	
T13	Time out	

<table>
<tr><td>Device</td><td>Contents</td><td>Note</td></tr>
<tr><td>W1000 to W1001F</td><td>Remote register RWr
Storing reply data</td><td></td></tr>
<tr><td>W0000 to W001F</td><td>Remote register RWr
Storing reply data</td><td></td></tr>
<tr><td>D0 to D31</td><td>Send data Internal device
Write Group No., Channel No., command that monitored in receiving data
<table><tr><td>Device</td><td colspan="2">Content</td><td>Note</td></tr><tr><td>D0</td><td rowspan="4">Alarm all reset</td><td>HA112</td><td></td></tr><tr><td>D1</td><td>H003A</td><td></td></tr><tr><td>D2</td><td>H0000</td><td></td></tr><tr><td>D3</td><td>H0001</td><td></td></tr><tr><td>D4 to D31</td><td></td><td>H0000</td><td></td></tr></table></td></tr>
<tr><td>D1000 to D1031</td><td>Receive data Internal device
Receive data is different by monitor pattern.
<table><tr><td>Device</td><td colspan="2">Content</td><td>Note</td></tr><tr><td>D1000</td><td rowspan="2">Alarm all reset</td><td>H3AA1</td><td></td></tr><tr><td>D1001 to D1003</td><td>H0000</td><td></td></tr><tr><td>D1004 to D1031</td><td></td><td>H0000</td><td></td></tr></table></td></tr>
</table>

9.2 Sample program 2

(1) Program Content

This program example is assumed the system configuration in below.

・CC-Link master unit: Mounting in Slot No.0.

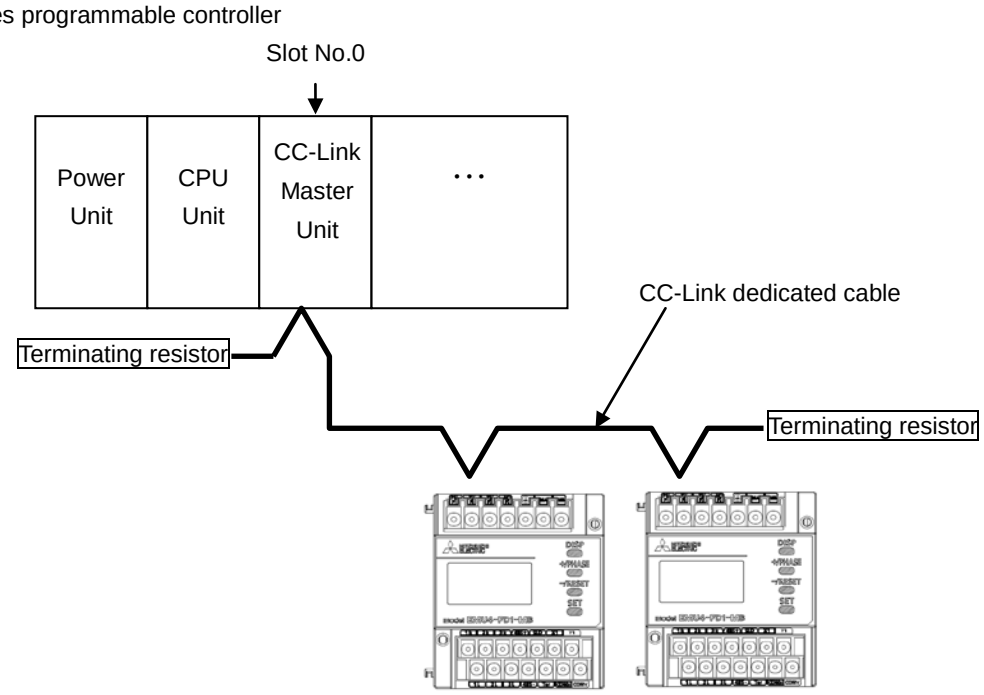
・CC-Link master unit: First XY: 0000.

・Station No. of Measuring unit (EMU4-FD1-MB): 1

・Station No. of Measuring unit (EMU4-FD1-MB): 2

Note: The refresh set with the automatic refresh parameters and the refresh executed with the FROM/TO instructions cannot be performed simultaneously.

(2) System Configuration



*Read data

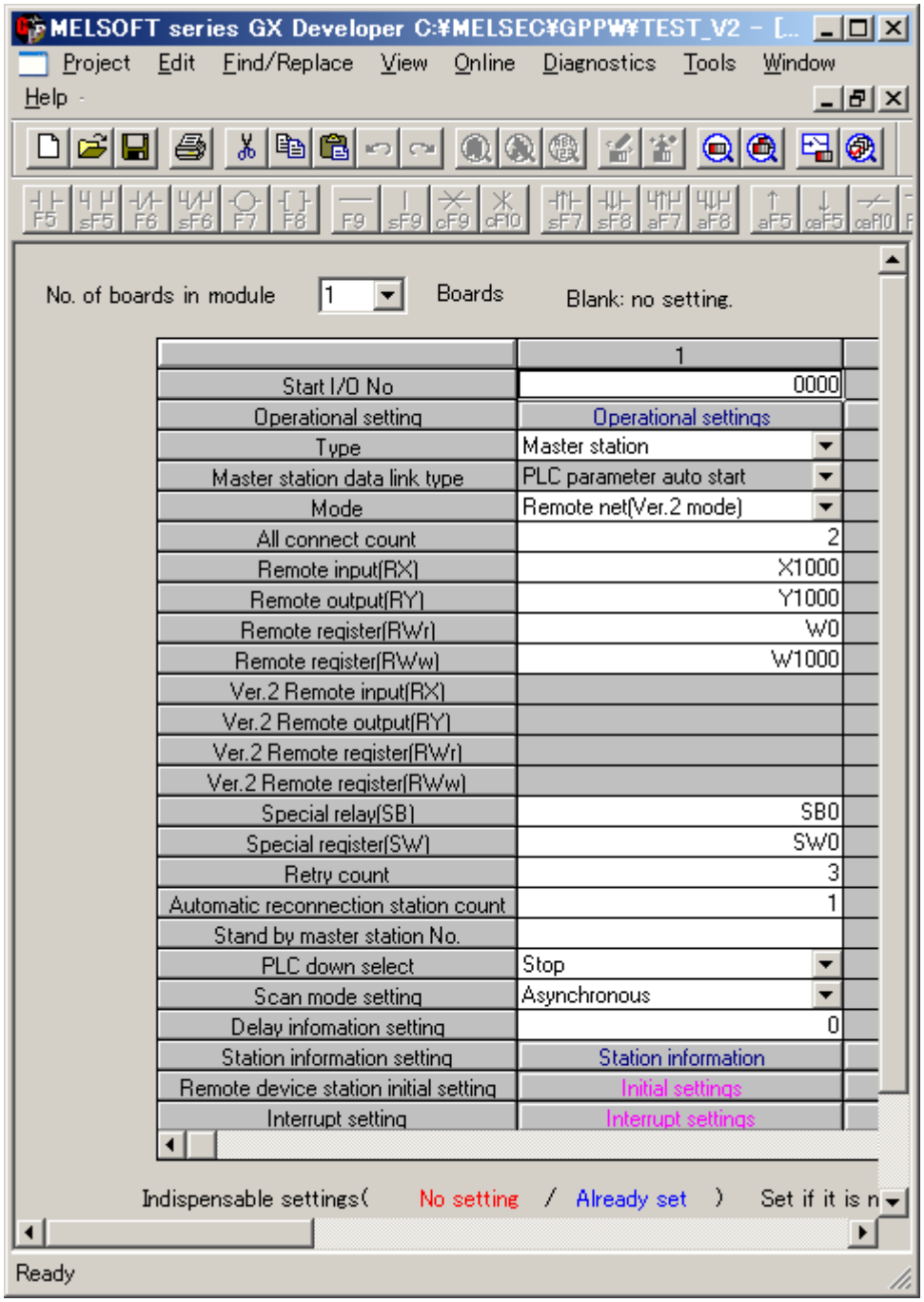
Station	Model	Data
Station1	EMU4-FD1-MB	Total reactive power, Total power factor, Reactive energy (import lag) Phase 1 current, Phase 2 current, Phase 3 current 1-2 voltage, 2-3 voltage, 3-1 voltage, Total active power,Active energy(import)
Station2	EMU4-FD1-MB	Total reactive power, Total power factor, Reactive energy (import lag) Phase 1 current, Phase 2 current, Phase 3 current 1-2 voltage, 2-3 voltage, 3-1 voltage, Total active power,Active energy(import)

(3) Parameter Settings

Parameter settings are set as following with GX Developer.

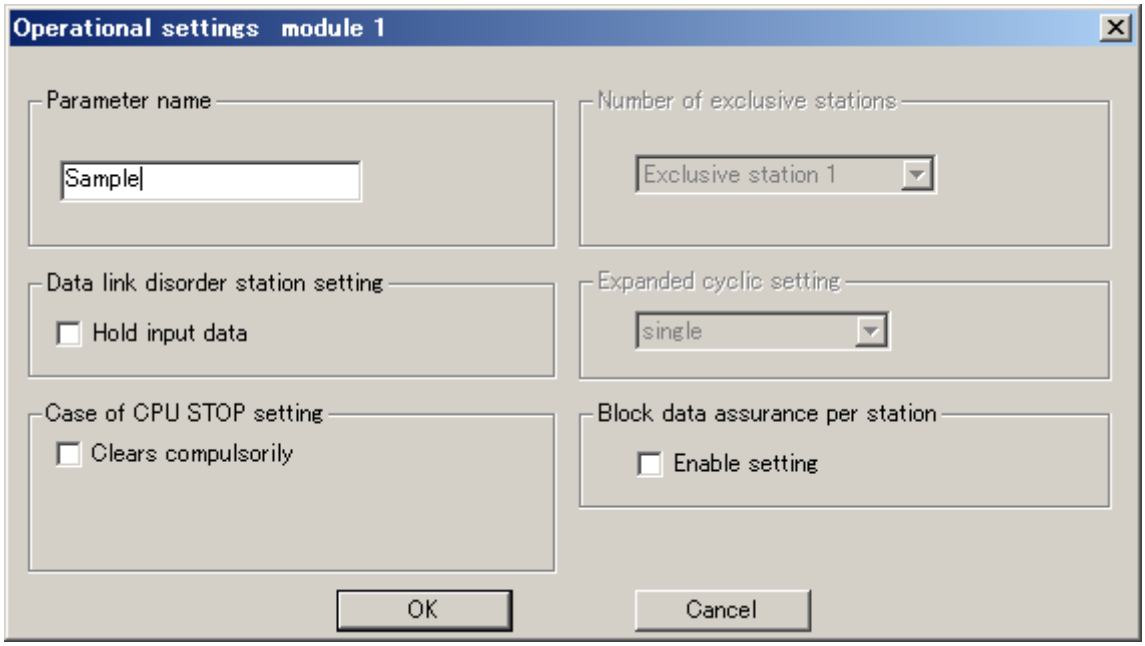
9.2.1 Network Parameter Settings and Auto Refresh Parameter Settings

The following is shown CC-Link network parameter settings and auto refresh parameter settings.



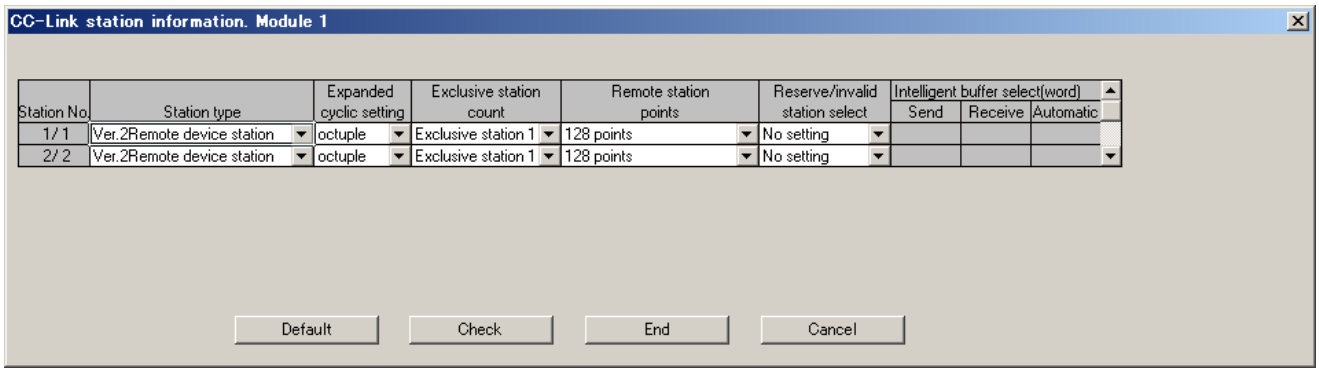
9.2.2 Operational Settings

Operational settings are as follows.



9.2.3 Station Information Settings

Station information settings are as follows.



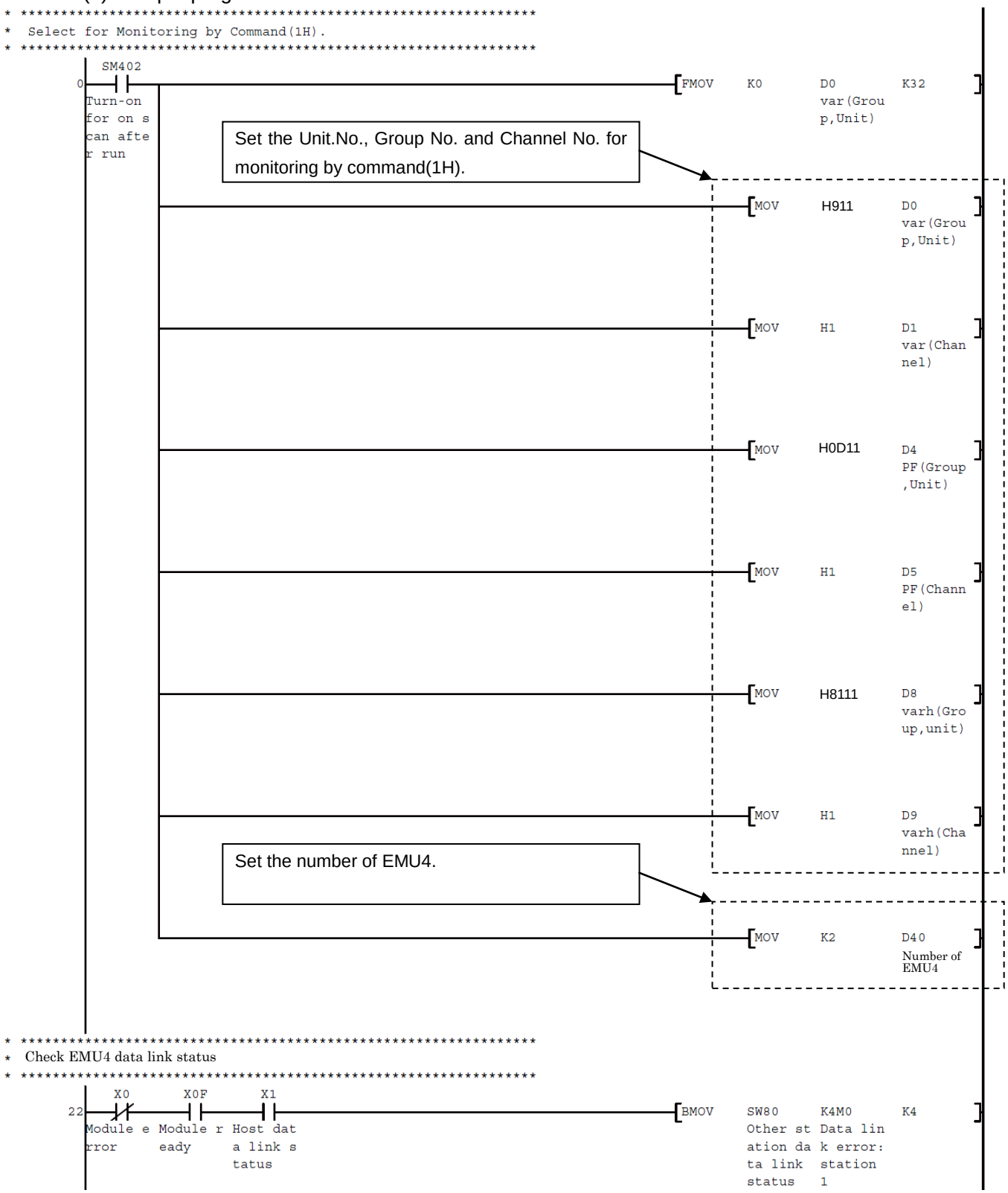
(4) Device Allocation

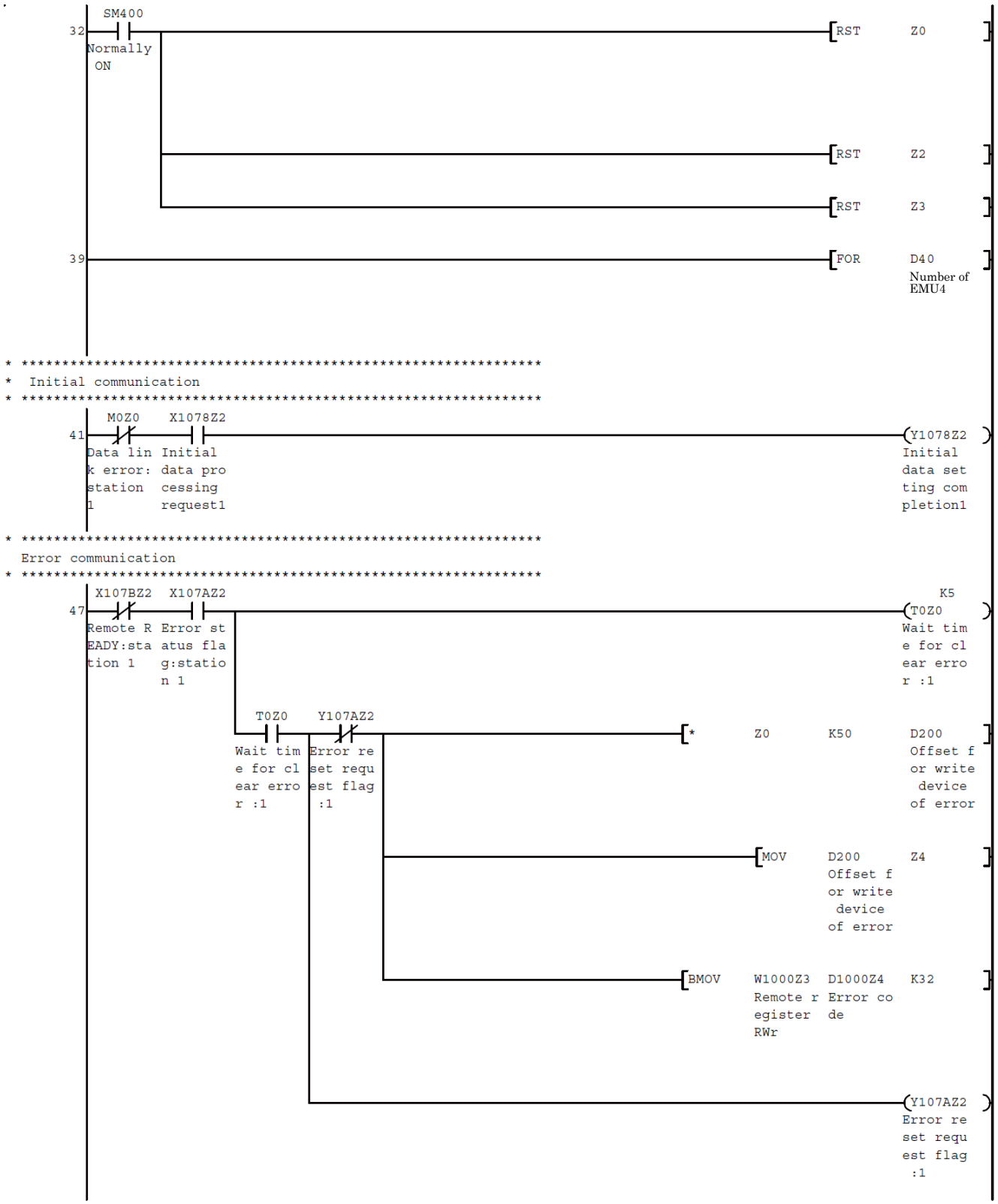
Allocation of transmitted device

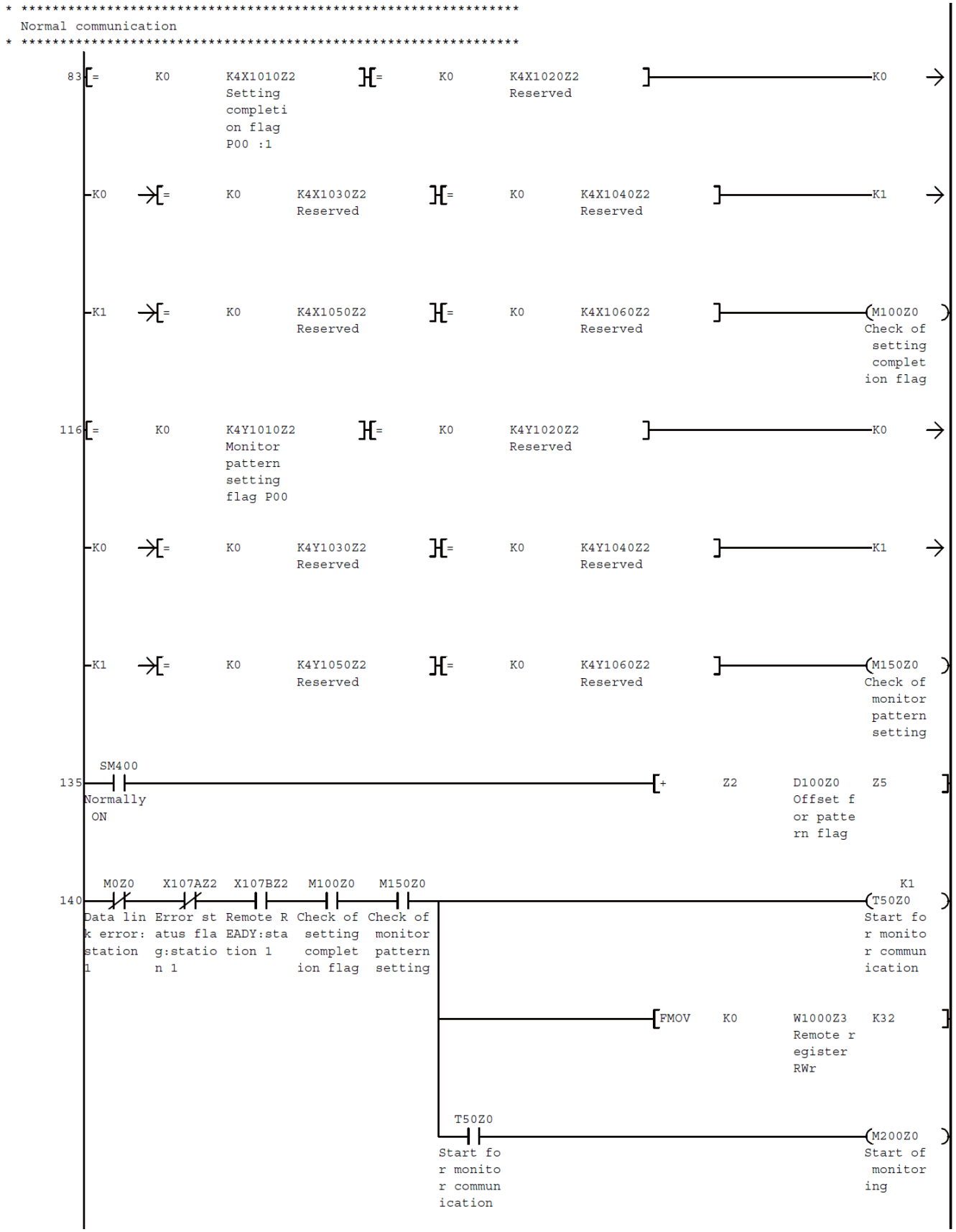
Items	Contents	Device No.	Note
Remote input (RX)	Station number 1: Remote input (RX00 to RX7F)	X1000 to X107F	Set X1000 to remote input(RX) refresh device.
	Station number 2: Remote input (RX00 to RX7F)	X1080 to X10FF	
Remote output (RY)	Station number 1: Remote output (RY00 to RY7F)	Y1000 to Y107F	Set Y1000 to remote output(RY) refresh device.
	Station number 2: Remote output (RY00 to RY7F)	Y1080 to Y10FF	
Remote register (RWr)	Station number 1: Remote register(RWr0 to RWr3)	W0000 to W001F	Set W0000 to remote register(RWr) refresh device.
	Station number 2: Remote register (RWr0 to RWr3)	W0020 to W003F	
Remote register (RWw)	Station number 1: Remote register (RWw0 to RWw3)	W1000 to W101F	Set W1000 to remote register(RWw) refresh device.
	Station number 2: Remote register (RWw0 to RWw3)	W1020 to W103F	
Link special relay (SB)	Link special relay of master station (SB0 to SB01FF)	SB0 to SB01FF	Set SB0 to link special relay(SB) refresh device.
Link special register (SW)	Link special register of master station (SW0 to SW01FF)	SW0 to SW01FF	Set SW0 to link special register(SW) refresh device.
Items of sending data	Sending data for monitoring by command(1H).	D0 to D31	Number of items are mentioned in section 9.1(2).
Error code	For station number 1:	D1000 to D1031	
	For station number 2:	D1050 to D1081	
Station error	For station number 1:	M0	0: Normal 1: Data link error occurred
	For station number 2:	M1	
Check of setting completion flag	For station number 1:	M100	To check the OFF.
	For station number 2:	M101	
Check of monitor pattern setting flag	For station number 1:	M150	To check the OFF.
	For station number 2:	M151	
Start of monitoring	For station number 1:	M200	
	For station number 2:	M201	
Start of received data	For station number 1:	M250	
	For station number 2:	M251	
Reception of error for monitoring by pattern	For station number 1:	M300	
	For station number 2:	M301	
Wait time for clear error	For station number 1:	T0	
	For station number 2:	T1	
Start time for monitor communication	For station number 1:	T50	
	For station number 2:	T51	
Reception time for monitoring by pattern	For station number 1:	T100	
	For station number 2:	T101	
Time out	For station number 1:	T150	
	For station number 2:	T151	
Index modification	For the select of station number	Z0	Uses Z0 or Z1. (To be Indexed the timer)
	For the flag of remote I/O	Z2	
	For the remote register	Z3	
	For the write device of received data	Z4	
	For the flag of monitoring by pattern	Z5	

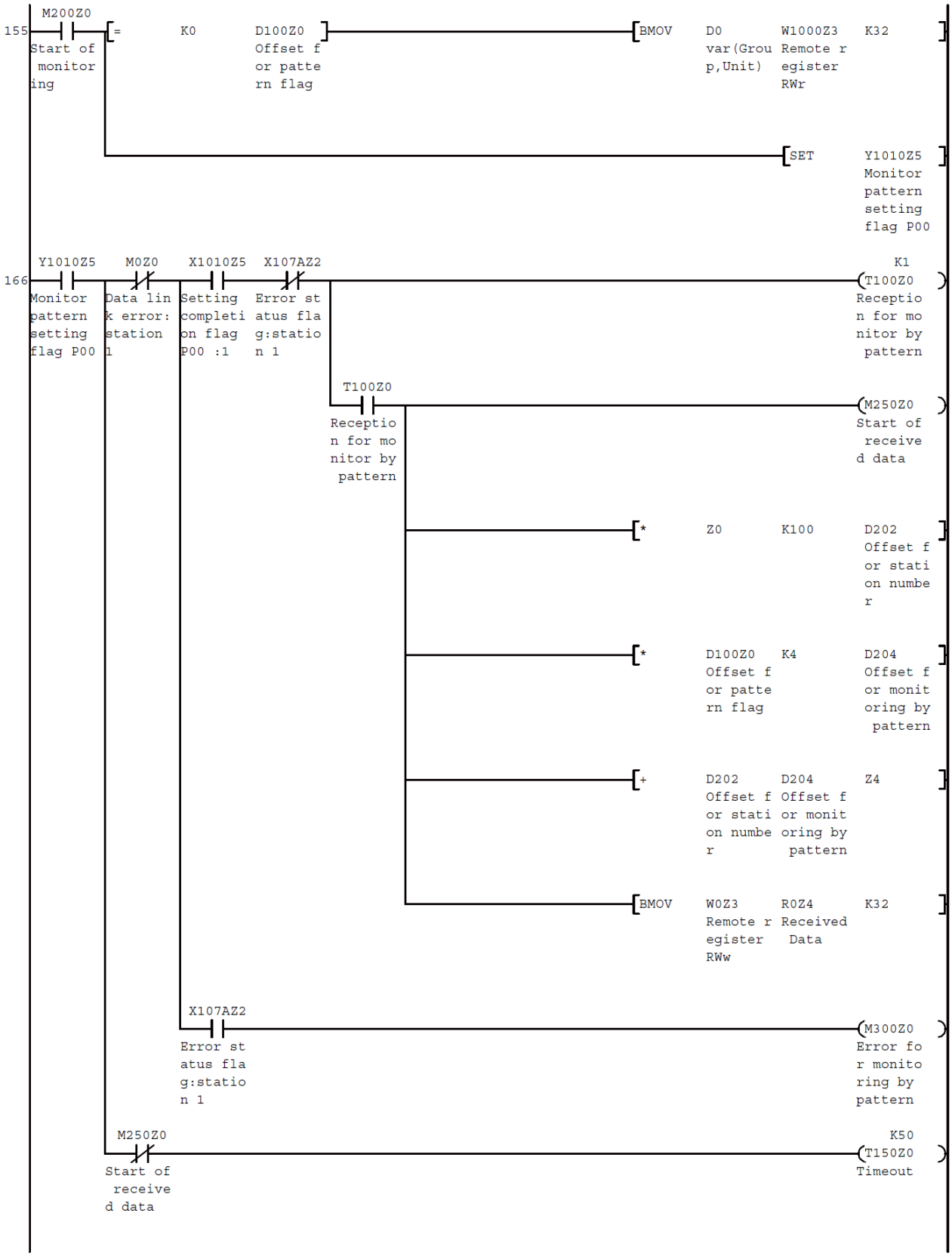
Items	Contents			Device No.	Note
Received data	Station number 1	Total reactive power	Multiplying factor, 00h	R1	Active value = Numerical value × Multiplying factor
			Numerical value	R2, R3	
		Total power factor	Multiplying factor, 00h	R5	
			Numerical value	R6, R7	
		Reactive energy (import lag)	Multiplying factor, 00h	R9	
			Numerical value	R10, R11	
		Phase 1 current	Multiplying factor, 00h	R33	
			Numerical value	R34, R35	
		Phase 2 current	Multiplying factor, 00h	R37	
			Numerical value	R38, R39	
		Phase 3 current	Multiplying factor, 00h	R41	
			Numerical value	R42, R43	
		1-2 voltage	Multiplying factor, 00h	R45	
			Numerical value	R46, R47	
		2-3 voltage	Multiplying factor, 00h	R49	
			Numerical value	R50, R51	
		3-1 voltage	Multiplying factor, 00h	R53	
			Numerical value	R54, R55	
		Total active power	Multiplying factor, 00h	R57	
			Numerical value	R58, R59	
		Active energy (import)	Multiplying factor, 00h	R61	
			Numerical value	R62, R63	
	Station number 2	Total reactive power	Multiplying factor, 00h	R101	Active value = Numerical value × Multiplying factor
			Numerical value	R102, R103	
		Total power factor	Multiplying factor, 00h	R105	
			Numerical value	R106, R107	
		Reactive energy (import lag)	Multiplying factor, 00h	R109	
			Numerical value	R110, R111	
		Phase 1 current	Multiplying factor, 00h	R133	
			Numerical value	R134, R135	
		Phase 2 current	Multiplying factor, 00h	R137	
			Numerical value	R138, R139	
		Phase 3 current	Multiplying factor, 00h	R141	
			Numerical value	R142, R143	
		1-2 voltage	Multiplying factor, 00h	R145	
			Numerical value	R146, R147	
		2-3 voltage	Multiplying factor, 00h	R149	
			Numerical value	R150, R151	
		3-1 voltage	Multiplying factor, 00h	R153	
			Numerical value	R154, R155	
		Total active power	Multiplying factor, 00h	R157	
			Numerical value	R158, R159	
		Active energy (import)	Multiplying factor, 00h	R161	
			Numerical value	R162, R163	

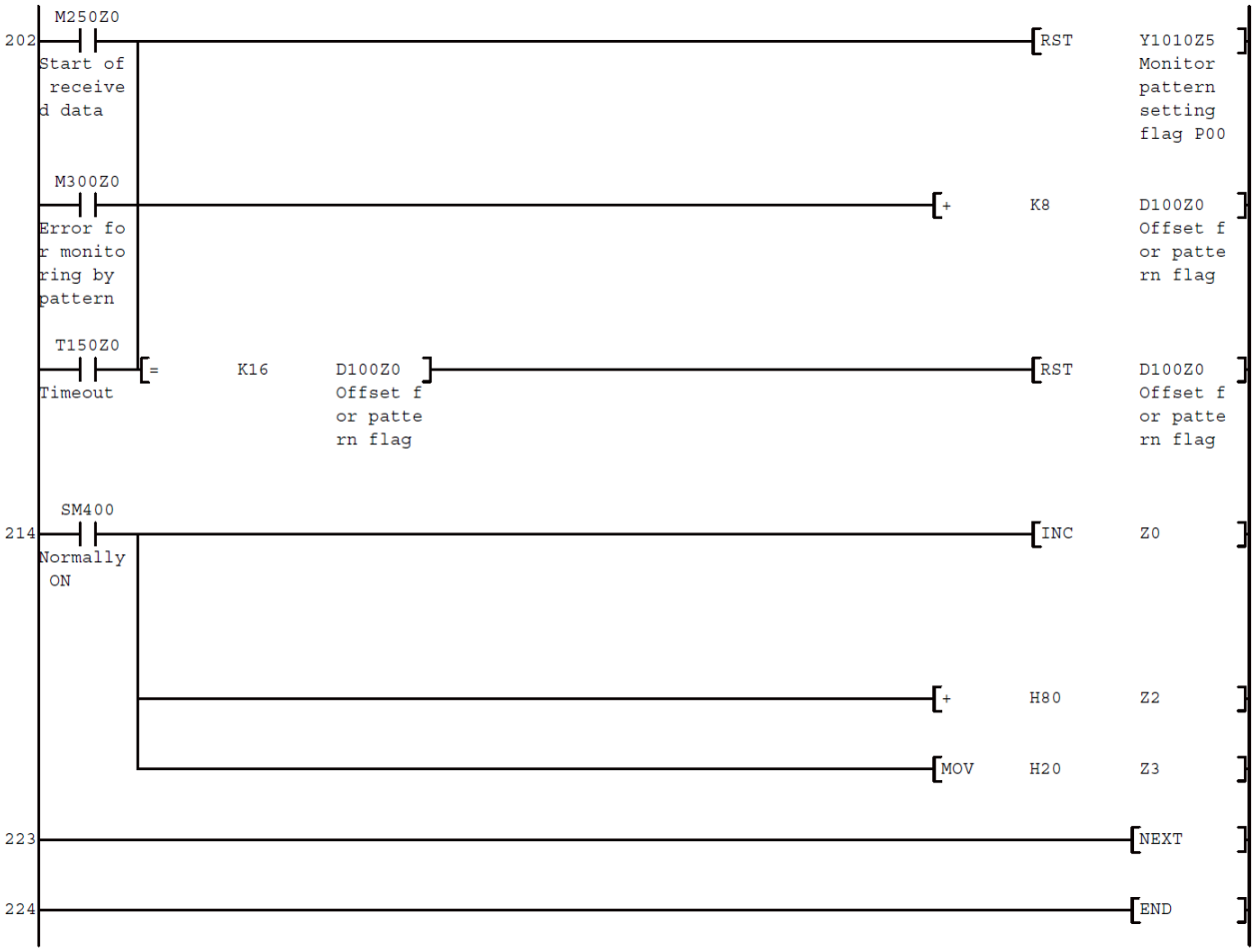
(5) Sample program




SM400
32
Normally ON
RST Z0
RST Z2
RST Z3
39
FOR D40
Number of EMU4
* **
* Initial communication
* **
M0Z0
X1078Z2
41
Data lin k error: station 1
Initial data pro cessing request1
Y1078Z2
Initial data set ting com pletion1
* **
Error communication
* **
X107BZ2
X107AZ2
47
Remote R EADY:sta tion 1
Error st atus fla g:statio n 1
K5
T0Z0
Wait tim e for cl ear erro r :1
T0Z0
Y107AZ2
Wait tim e for cl ear erro r :1
Error re set requ est flag :1
* Z0 K50 D200
Offset f or write device of error
MOV D200 Offset f or write device of error Z4
BMOV W1000Z3 Remote r egister RWr D1000Z4 Error co de K32
Y107AZ2
Error re set requ est flag :1


* **
Normal communication
* **
83
=
K0
K4X1010Z2
Setting completion flag P00 :1
=
K0
K4X1020Z2
Reserved
K0
K0
=
K0
K4X1030Z2
Reserved
=
K0
K4X1040Z2
Reserved
K1
K1
=
K0
K4X1050Z2
Reserved
=
K0
K4X1060Z2
Reserved
M100Z0
Check of setting completion flag
116
=
K0
K4Y1010Z2
Monitor pattern setting flag P00
=
K0
K4Y1020Z2
Reserved
K0
K0
=
K0
K4Y1030Z2
Reserved
=
K0
K4Y1040Z2
Reserved
K1
K1
=
K0
K4Y1050Z2
Reserved
=
K0
K4Y1060Z2
Reserved
M150Z0
Check of monitor pattern setting
135
SM400
Normally ON
+
Z2
D100Z0
Offset for pattern flag
Z5
140
M0Z0
Data link error: station 1
X107AZ2
Error status flag:station 1
X107BZ2
Remote READY:station 1
M100Z0
Check of setting completion flag
M150Z0
Check of monitor pattern setting
K1
T50Z0
Start for monitor communication
FMOV
K0
W1000Z3
Remote register RWr
K32
T50Z0
Start for monitor communication
M200Z0
Start of monitoring


155
M200Z0
Start of monitoring
=
K0
D100Z0
Offset for pattern flag
BMOV
D0
var(Group,Unit)
W1000Z3
Remote register RWr
K32
SET
Y1010Z5
Monitor pattern setting flag P00
166
Y1010Z5
Monitor pattern setting flag P00
M0Z0
Data link error: station 1
X1010Z5
Setting completion flag P00 :1
X107AZ2
Error status flag:station 1
K1
T100Z0
Reception for monitor by pattern
T100Z0
Reception for monitor by pattern
M250Z0
Start of received data
*
Z0
K100
D202
Offset for station number
*
D100Z0
Offset for pattern flag
K4
D204
Offset for monitoring by pattern
+
D202
Offset for station number
D204
Offset for monitoring by pattern
Z4
BMOV
W0Z3
Remote register RWw
R0Z4
Received Data
K32
X107AZ2
Error status flag:station 1
M300Z0
Error for monitoring by pattern
M250Z0
Start of received data
K50
T150Z0
Timeout


202
M250Z0
Start of receive d data
RST
Y1010Z5
Monitor pattern setting flag P00
M300Z0
Error fo r monito ring by pattern
+
K8
D100Z0
Offset f or patte rn flag
T150Z0
Timeout
=
K16
D100Z0
Offset f or patte rn flag
RST
D100Z0
Offset f or patte rn flag
214
SM400
Normally ON
INC
Z0
+
H80
Z2
MOV
H20
Z3
223
NEXT
224
END

10. Test Mode

Measuring Unit (EMU4-FD1-MB,) has the test mode which the fixed values are replied even if the voltage and current are not input. It can be used to check the communication to programmable controller.

10.1 How to Test

To do the test, it is necessary to operate the Measuring Unit.
About how to use the test mode, refer to the each instrument manual of Measuring Unit.