MITSUBISHI ELECTRIC

Multi-circuit energy measuring Unit
Energy Measuring Unit(EcoMonitorPro)

Programming Manual

(for CC-Link communication)

Applicable Unit Types

Model EMU-C7P4-6
EMU2-RD3-C
EMU2-RD5-C
EMU2-RD7-C
EMU2-RD2-C-4W
EMU2-RD4-C-4W

IB63380

Introduction

Thank you for purchasing our energy measuring unit (hereinafter referred to as the measuring unit). Please carefully read this manual prior to use to fully understand the functions and performance of the measuring unit, and correctly use the unit.

Contents

1. General

This manual explains the sequence program to be prepared by the user to monitor measurements on the energy measuring unit (hereinafter referred to as the measuring unit) using the sequencer through Control & Communication Link (hereinafter referred to as CC-Link) or to set the parameters of the measuring unit from the sequencer.
When actually programming, read not only this manual, but also the following related manuals.

Table 1.1 Related Manuals

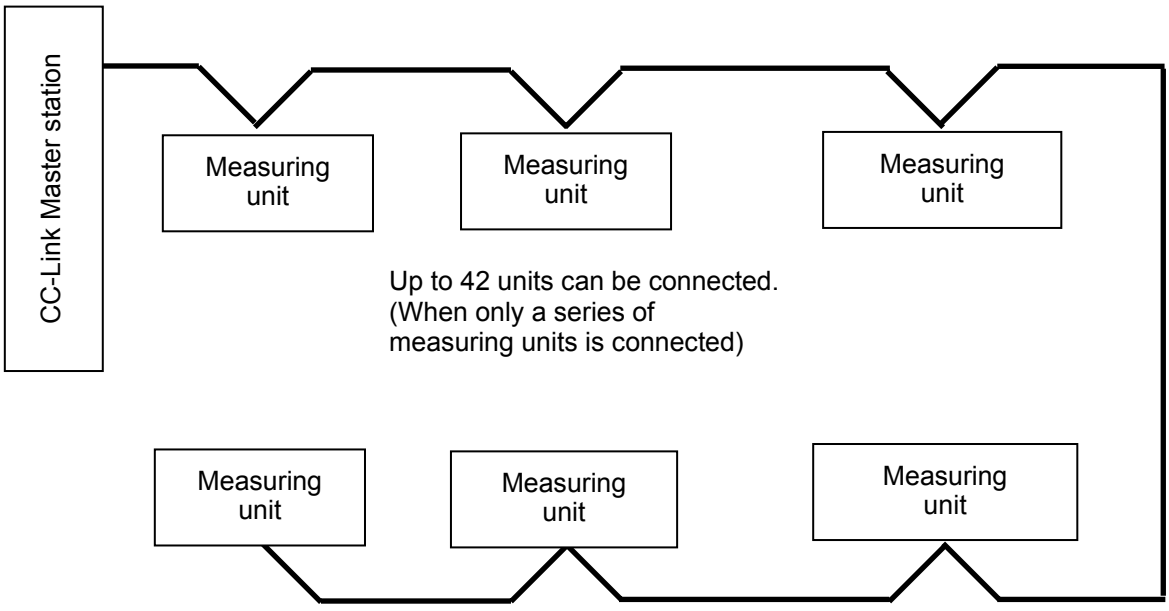
Manual Name	Manual No. (Type code)
Instruction Manual for Energy Measuring Unit	Supplied with product

2. Product Specifications

Table 2.1 shows the CC-Link specifications for the measuring unit.

Table 2.1 CC-Link Specifications for Measuring Unit

Item	Description
Unit type	Remote device station
Number of occupied stations	1 station
Number of connectable units	Up to 42 units (when only remote device stations occupying one station each are connected)
Transmission rate	To be selected from 156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps and 10 Mbps
Number of remote input/ output points	32 points each
Number of remote register points	4 points each



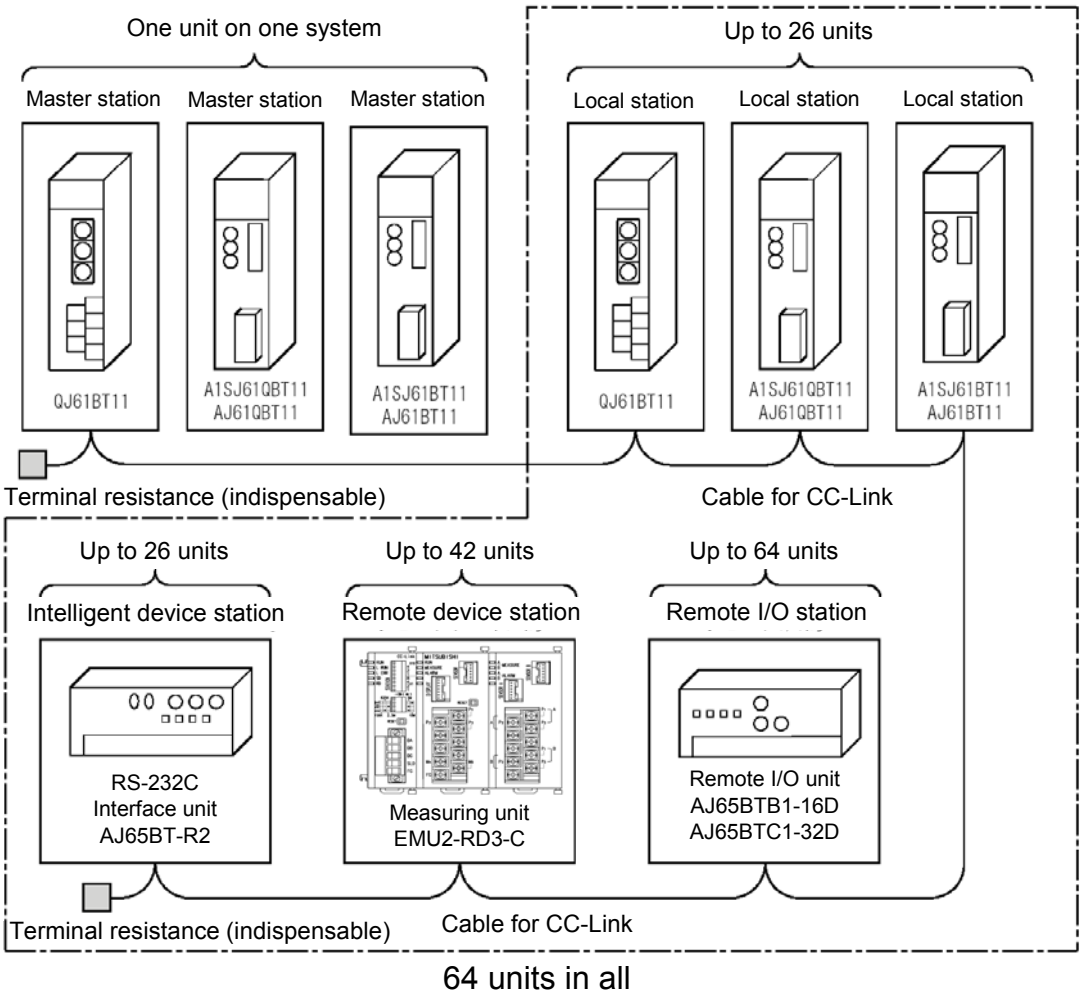
Example of system configuration (CC-Link)

3 General System Configuration

CC-Link System devices include remote I/O stations, remote device stations, local stations and intelligent device stations. One master station can cover up to 64 remote I/O stations, remote device stations and local stations in all.
However, the following conditions of connection must be met.

(1) {(1×a)+(2×b)+(3×c)+(4×d)} ≤ 64
- a : Number of units occupying 1 station (The measuring units are included in these units.)
- b : Number of units occupying 2 stations
- c : Number of units occupying 3 stations
- d : Number of units occupying 4 stations

(2) {(16×A) + (54×B) + (88×C)} ≤ 2304
- A : Number of remote I/O stations ≤64 units
- B : Number of remote device stations (The measuring units are included in these units.) ≤42 units
- C : Number of local stations and intelligent device stations ≤26 units



4. Master Station Parameter Setting

4.1 Procedures for setting parameters and starting data link

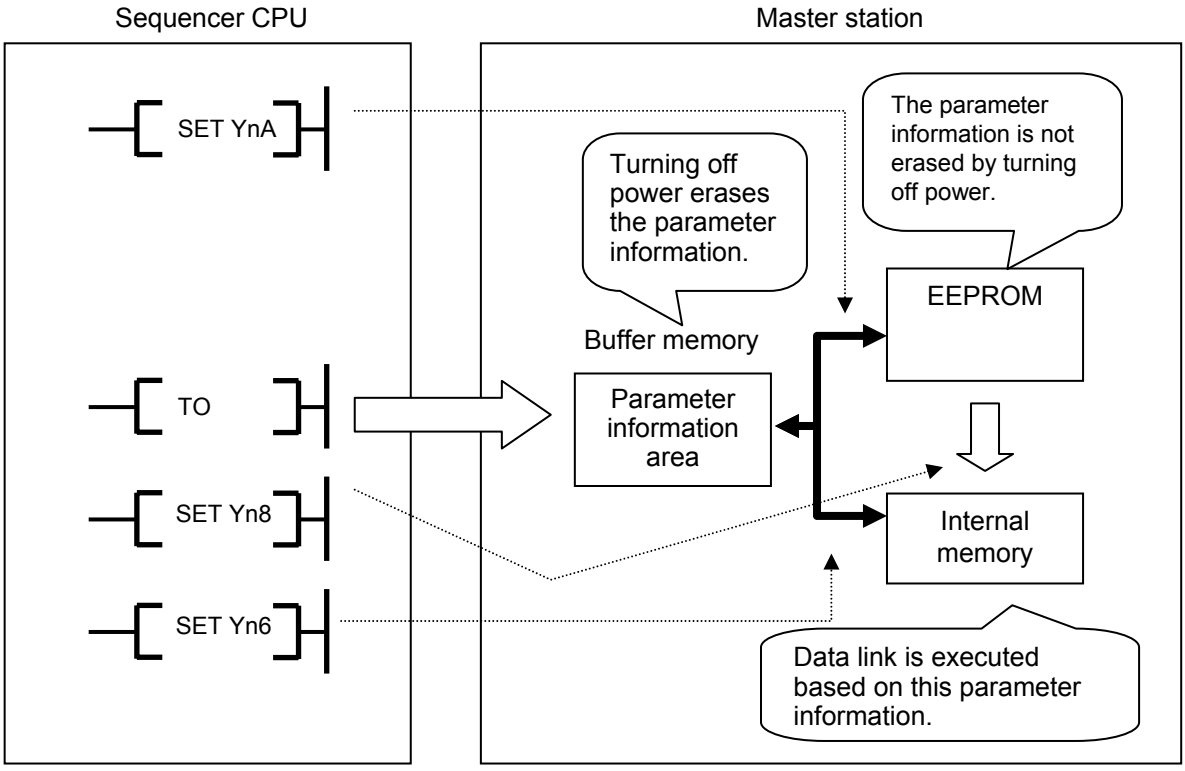
The procedures for setting the parameters necessary to start data link are explained below.

4.1.1 Relationship among buffer memory, EEPROM and internal memory

(1) Buffer memory
Temporary storage area to write parameter information in the EEPROM or internal memory. When the unit power is turned off, the parameter information is erased.

(2) EEPROM
Data link can be started based on the parameters in the EEPROM only by turning on the data link start request (Yn8). It is unnecessary to write the parameters in the buffer memory every time the master station is started up. It is necessary to enter the parameters in the EEPROM in advance through the parameter entry request (YnA) to the EEPROM.

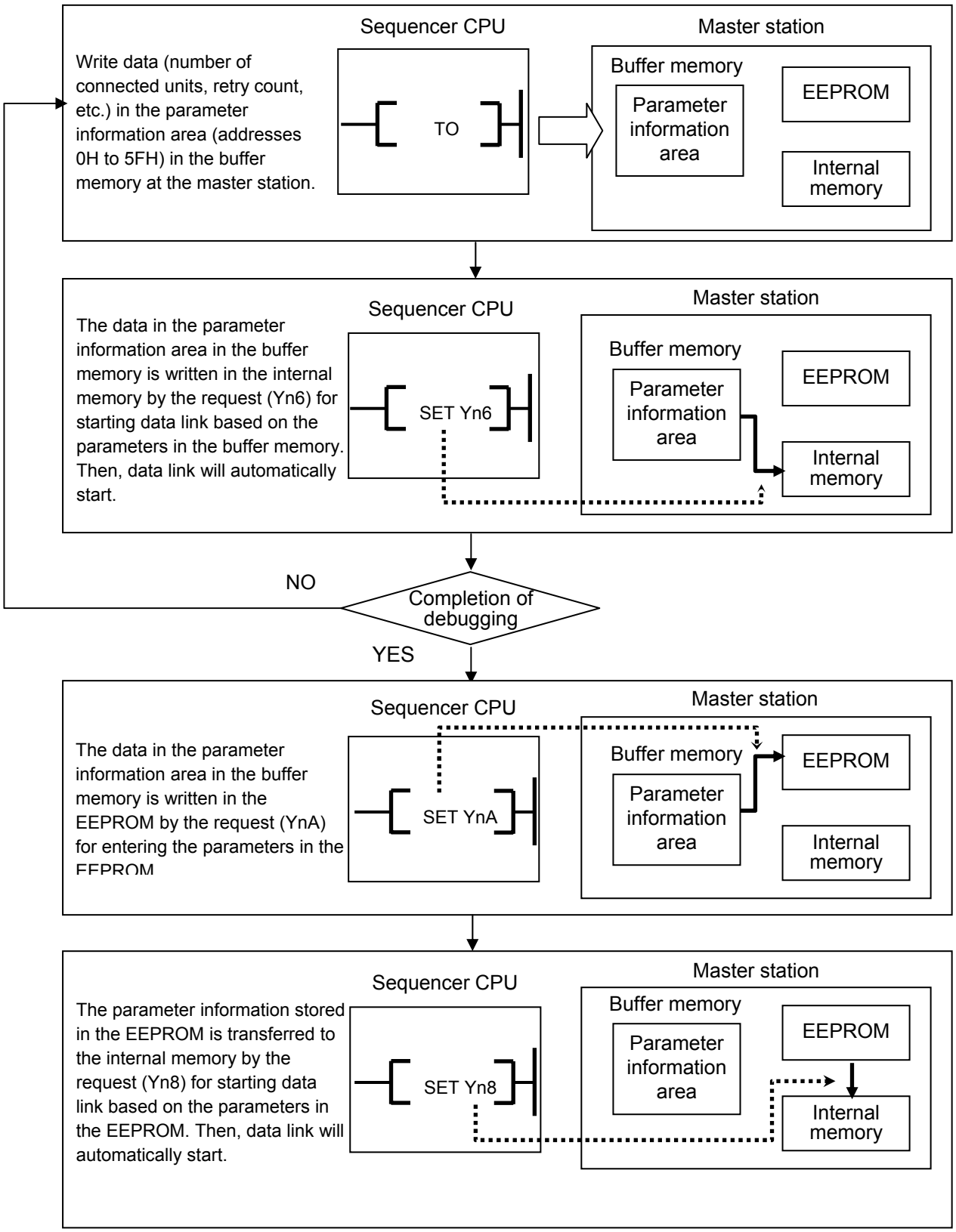
(3) Internal memory
Data link is executed based on the parameter information stored in the internal memory. When the unit power is turned off, the parameter information is erased.



It is recommended to execute data link based on the parameters in the buffer memory when debugging (starting up) the system and to execute data link based on the parameters in the EEPROM during operation after the completion of debugging. This reduces the number of steps in the program (the scanning time) during operation.

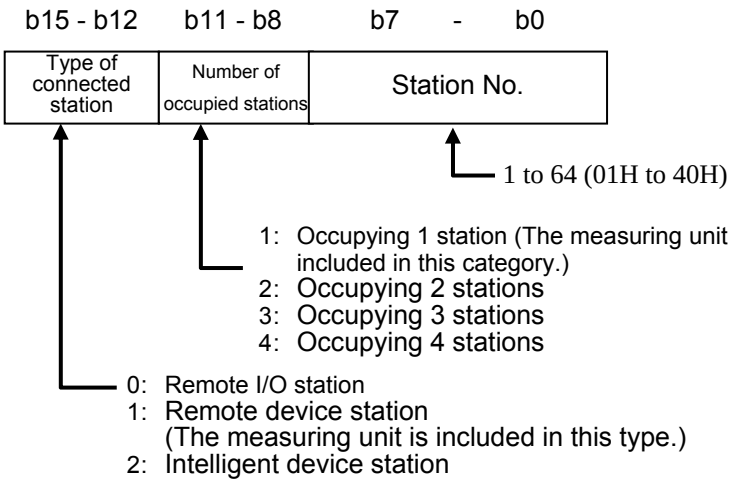
4.1.2 Procedures for setting parameters and starting data link

Perform the following procedures.



4.2 Parameters to be set

The following tables shows the items to be set in the parameter information area (addresses 00H to 5FH) in the buffer memory at the master station.

Setting item	Description	Buffer memory address
Number of connected units	Set the number of stations connected to the master station (including reserved stations). Default : 64 units Setting range : 1 to 64 units	1H
Retry count	Set the retry count upon occurrence of communication error. Default : 3 times Setting range : 1 to 7 times	2H
Number of stations to be automatically restored	Set the number of stations that can be restored by one link scan. Default : 1 unit Setting range : 1 to 10 units	3H
Specification of operation to be performed when CPU goes down	Specify the data link status to be caused upon occurrence of sequencer CPU error at the master station. Default : 0 (stopped) Setting range : 0 (stopped) 1 (continued)	6H
Specification of reserved station	Specify the reserved station. Default : 0 (no setting) Setting range : Turn on the bit corresponding to the station number.	10H - 13H
Specification of invalid station	Specify the invalid station. Default : 0 (no setting) Setting range : Turn on the bit corresponding to the station number.	14H - 17H
Station information	Set the types of the connected stations. Setting range :  (Note) Since the measuring unit is a remote device station occupying one station, its type is “11□□H” (□□ is the station number).	20H (1st unit) | 5FH (64th unit)

5. Communication between Master Station and Measuring Unit

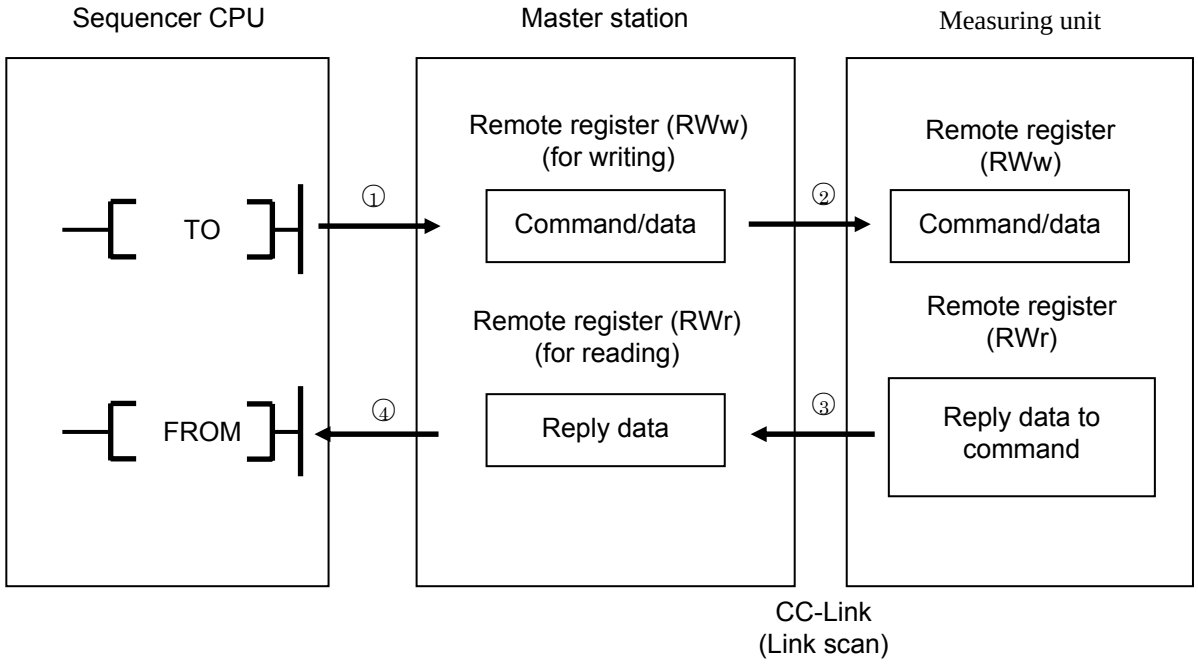
5.1 Outline of communication

The communication between the master station and the measuring unit is made in one of the initial, normal and error modes. In the normal communication mode, the following operations can be executed.

- Monitoring of measurements (word data), such as current, voltage and electric energy
- Setting of items (word data), such as demand time limit

For the measuring unit, a command is provided for each measuring or setting item. To monitor the measurement or set the item, write the command assigned to the item to be monitored or set and incidental data to the remote register RWw at the master station from the sequence program.

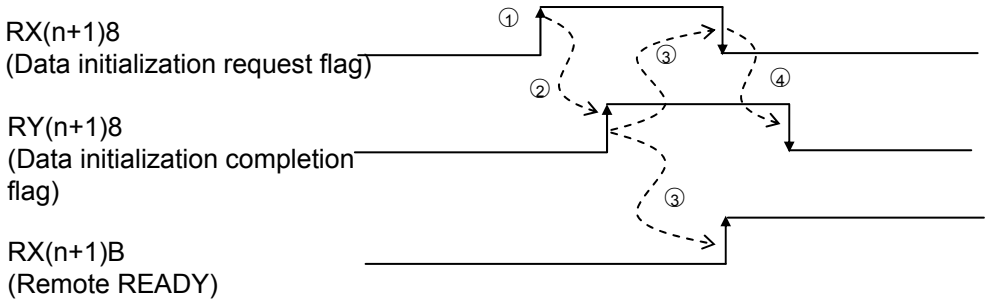
Outline of transfer of command to and from CC-Link master



① The command and incidental data are stored in the remote register (RWw) by TO command.
② The command and incidental data are transmitted to the remote register of the measuring unit by CC-Link scan.
③ The replay data is transmitted to the remote register (RWr) at the master station by link scan.
④ The reply data to be stored in the remote register (RWr) is read by FROM command.

5.2 Initial communication

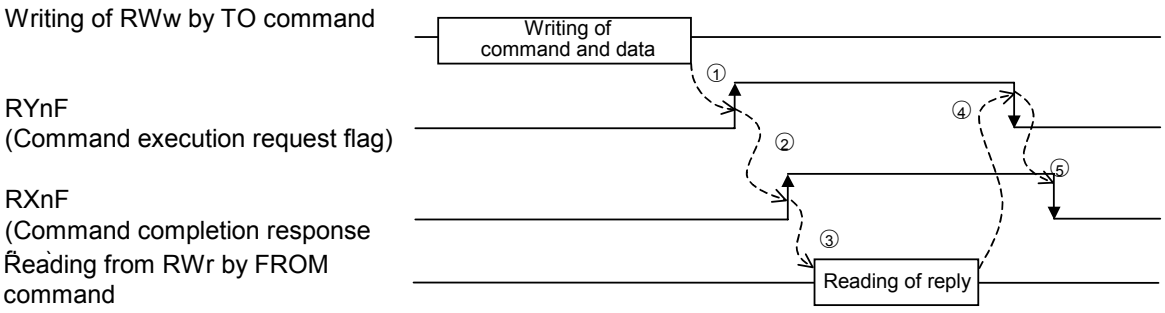
The initial communication is made first of all after the measuring unit control power in the off state is turned on or the unit is reset.



① After the measuring unit control power in the off state is turned on, a power interruption occurs or the reset switch is turned on, the data initialization request flag in the off state is turned on.
② After the data initialization request flag in the off state is turned on, turn on the data initialization completion flag in the off state.
③ After the data initialization completion flag in the off state is turned on, the data initialization request flag is turned off, and the remote READY in the off state is turned on.
④ After the data initialization request flag is turned off, turn off the data initialization completion flag.

5.3 Normal communication

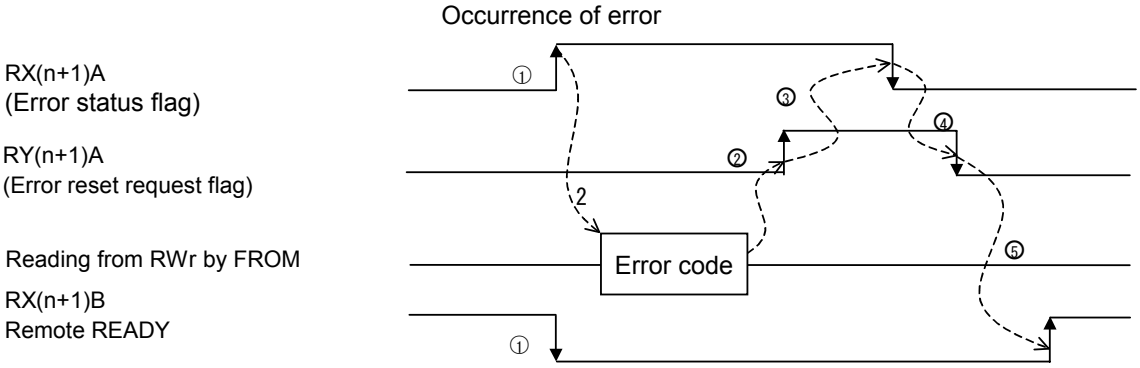
After the completion of the initial communication, the communication mode changes to the normal communication mode (remote READY is turned on), where commands for monitoring measurements and setting items can be transferred. The command transferring procedures are shown below.



① After writing the command assigned to the item to be monitored or set and incidental data to the remote register RWw, turn on the command execution request flag in the off state.
② After the reply data corresponding to the transmitted command is received, the command completion response flag in the off state is turned on.
③ After the command completion response flag in the off state is turned on, read the reply data from the remote register RWr.
④ After the completion of reading of the reply data, turn off the command execution request flag to Canceled the command execution request.
⑤ The command execution request flag is turned off to turn off the command completion response flag.

Note 1: To transmit another command continuously, repeat the above steps ① to ⑤.
Note 2: Commands can be transferred only when RX(n+1)B (remote READY) is 1 (ON).

5.4 Error communication



① When an error occurs in the measuring unit, the error status flag in the off state is turned on, and remote READY in the on state is turned off.
② When the error status flag in the off state is turned on, read the error code from the remote register RWr. Remove the cause of the error according to the read error code, and turn on the error reset request flag in the off state when restarting the communication with the measuring unit.
③ The error reset request flag in the off state is turned on to turn off the error status flag in the on state.
④ After the error status flag is turned off, turn off the error reset request flag in the on state.
⑤ After the error reset request flag is turned off, remote READY in the off state is turned on, and normal communication is restarted.

Note: For the error codes, see 6.2.4 “Occurrence of error.”

6. Remote Input/Output and Remote Register

6.1 Remote input/output (RX, RY)

Remote input (RX) and remote output (RY) signals are used to transfer data in bit units between the master station and the measuring unit.

6.1.1 Remote input (RX)

The following table shows the allocation of the remote input (RX) signals of the measuring unit.

Device No.	Signal name	Description		EcoMonitor*1	EcoMonitor Pro*2	Remarks
		0	1			
RXn0	Unusable	-	-	-	-	
RXn1	Unusable	-	-	-	-	
RXn2	Current demand upper/ lower limit alarm	Canceled	Active	-	✓	Note 2
RXn3	Power demand upper/ lower limit alarm	Canceled	Active	-	✓	Note 2
RXn4	Unusable	-	-	-	-	
RXn5	Collective upper/lower limit alarm	Canceled	Active	-	✓	Note 2
RXn6	Unusable	-	-	-	-	
RXn7	Unusable	-	-	-	-	
RXn8	Voltage upper/lower limit alarm	Canceled	Active	-	✓	Note 2
RXn9	Unusable	-	-	-	-	
RXnA	Unusable	-	-	-	-	
RXnB	Unusable	-	-	-	-	
RXnC	Unusable	-	-	-	-	
RXnD	Power factor upper/ lower limit alarm	Canceled	Active	-	✓	Note 2
RXnE	Unusable	-	-	-	-	
RXnF	Command completion response flag	No reply data received	Reply data received	✓	✓	Note 1
RX(n+1)0	Unusable	-	-	-	-	
RX(n+1)1	Unusable	-	-	-	-	
RX(n+1)2	Unusable	-	-	-	-	
RX(n+1)3	Unusable	-	-	-	-	
RX(n+1)4	Unusable	-	-	-	-	
RX(n+1)5	Unusable	-	-	-	-	
RX(n+1)6	Unusable	-	-	-	-	
RX(n+1)7	Unusable	-	-	-	-	
RX(n+1)8	Data initialization completion flag	When power is turned off, remote READY is turned on or error status flag is turned on	When power in off state is turned on or unit is reset	✓	✓	Note 1
RX(n+1)9	Unusable	-	-	-	-	
RX(n+1)A	Error status flag	No error has occurred.	Error has occurred.	✓	✓	Note 1
RX(n+1)B	Remote READY	Commands cannot be transmitted.	In normal communication mode (Commands can be transmitted.)	✓	✓	Note 1
RX(n+1)C	Unusable	-	-	-	-	
RX(n+1)D	Unusable	-	-	-	-	
RX(n+1)E	Unusable	-	-	-	-	
RX(n+1)F	Unusable	-	-	-	-	

n: Address allocated according to the station number setting

Note 1: For the details, see Section 5 “Communication between Master Station and Measuring Unit.”
Note 2: The alarms on EcoMonitorPro*3 are output only when “execution of monitoring” has been specified on the main unit.
Note 3: The models applicable to *1and *2 are shown below.

	Applicable models
*1	EMU-C7P4-6
*2	EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

6.1.2 Remote output (RY)

The following table shows the remote output (RY) signals of the measuring unit.

Device No.	Signal name	Contents		Remarks
		ON (1)→OFF (0)	OFF (0)→ON (1)	
RYn0	Unusable	-	-	
RYn1	Unusable	-	-	
RYn2	Unusable	-	-	
RYn3	Unusable	-	-	
RYn4	Unusable	-	-	
RYn5	Unusable	-	-	
RYn6	Unusable	-	-	
RYn7	Unusable	-	-	
RYn8	Unusable	-	-	
RYn9	Unusable	-	-	
RYnA	Unusable	-	-	
RYnB	Unusable	-	-	
RYnC	Unusable	-	-	
RYnD	Unusable	-	-	
RYnE	Unusable	-	-	
RYnF	Command execution request flag	When command execution request is canceled	When command execution request is given	Note 1
RY(n+1)0	Unusable	-	-	
RY(n+1)1	Unusable	-	-	
RY(n+1)2	Unusable	-	-	
RY(n+1)3	Unusable	-	-	
RY(n+1)4	Unusable	-	-	
RY(n+1)5	Unusable	-	-	
RY(n+1)6	Unusable	-	-	
RY(n+1)7	Unusable	-	-	
RY(n+1)8	Data initialization completion flag	When remote READY request is canceled	When remote READY request is given	Note 1
RY(n+1)9	Unusable	-	-	
RY(n+1)A	Error reset status flag	When error status reset request is canceled	When error status reset request is given	Note 1
RY(n+1)B	Unusable	-	-	
RY(n+1)C	Unusable	-	-	
RY(n+1)D	Unusable	-	-	
RY(n+1)E	Unusable	-	-	
RY(n+1)F	Unusable	-	-	

n: Address allocated according to the station number setting

Note 1: For the details, see Section 5 “Communication between Master Station and Measuring Unit.”

Points

If any unusable device is turned on or off in the sequence program, the functions of the measuring unit cannot be guaranteed.

6.2 Remote registers RWr and RWw

The remote registers RWr and RWw are used to transfer word data between the master station and the measuring unit. Since the measuring unit occupies one station, four words are allocated to each of the remote registers RWr and RWw.
The measuring unit has a command for each measuring or setting item. The item can be monitored or set by writing the command assigned to the item to be monitored or set and incidental data to the remote register RWw at the master station through the sequence program.

6.2.1 Command List

The following list shows the commands, data group numbers and data channel numbers supported by the measuring unit. For the details of each item, see 6.2.2 “Details of commands.”

(1) Command
A command indicates a request to the measuring unit from the sequencer. The following commands are available.

Command		Name	Description	Remarks	Page	Command support	
						Eco Monitor*2	Eco MonitorPro*3
Standard commands common to unit types	1H	Data monitor	Monitoring of various data (measuring data, status data, setting data, etc.)		16	-	✓
	2H	Data setting	Setting of various data (rated voltage and current, phase and wire system, demand time limit, etc.) (Note) Except clock data		36	-	✓
	3H	Clock data setting	Setting of date data and time data		39	-	✓
Digital command	9EH	Bit setting/resetting	Resetting of max. values and electric energy to 0 and resetting of alarms	Bit data setting command	40	✓	✓
Analog commands	C0H	Analog data setting	Setting of rated voltage and current, phase and wire system, demand time limit, etc.	Byte data setting command	42	✓	✓
	C1H	Analog data request (Note 3)	Monitoring of measurements (current, voltage, electric power, etc.)	Byte data monitoring command	45	✓	✓
	CCH	Collective monitor (Note 3)	Collective monitoring of four measurements	Command for collectively monitoring four items specified by C1H command (items to be monitored are set by C0H command)	63	✓	-
	CDH	Optional collective monitor (Note 3)	Collective monitoring of four measurements	Command for collectively monitoring four items specified by C1H command (items to be monitored are transmitted together with the command)	64	✓	✓
Pulse commands	E1H	Counter specification latch	Saving in latch memory	Latch command for storing specified item in latch memory in EMU	65	✓	✓
	E3H	Counter specification latch and clear	Saving in latch memory and clearing of current value	Latch command for storing specified item in latch memory in EMU and clearing current value	66	✓	✓
	E4H	Counter data request	Monitoring of measurements (electric energy, current time, hourly electric energy, etc.)	Command for monitoring counter data (related to electric energy and clock)	67	✓	✓
	E5H	Counter latch data request	Monitoring of data in latch memory	Command for monitoring measurements stored in latch memory by E1H or E3H command	76	✓	✓
	E6H	Counter data setting	Setting of electric energy value and initialization of clock	Command for setting counter data (related to electric energy and clock)	77	✓	✓

(2) Data group number and data channel number

These numbers are allocated to various data of the measuring unit to identify the data. The number to be allocated is a matrix consisting of a data group number and a data channel number.

For the details of the number, see the group and channel list.

	Content
Data group No.	Number allocated to each measuring element (current, voltage, alarm status, etc.)
Data channel No.	Number allocated to each detail (R-phase current, S-phase current, etc.) of each measuring element

* These numbers are used mainly in standard commands common to unit types.

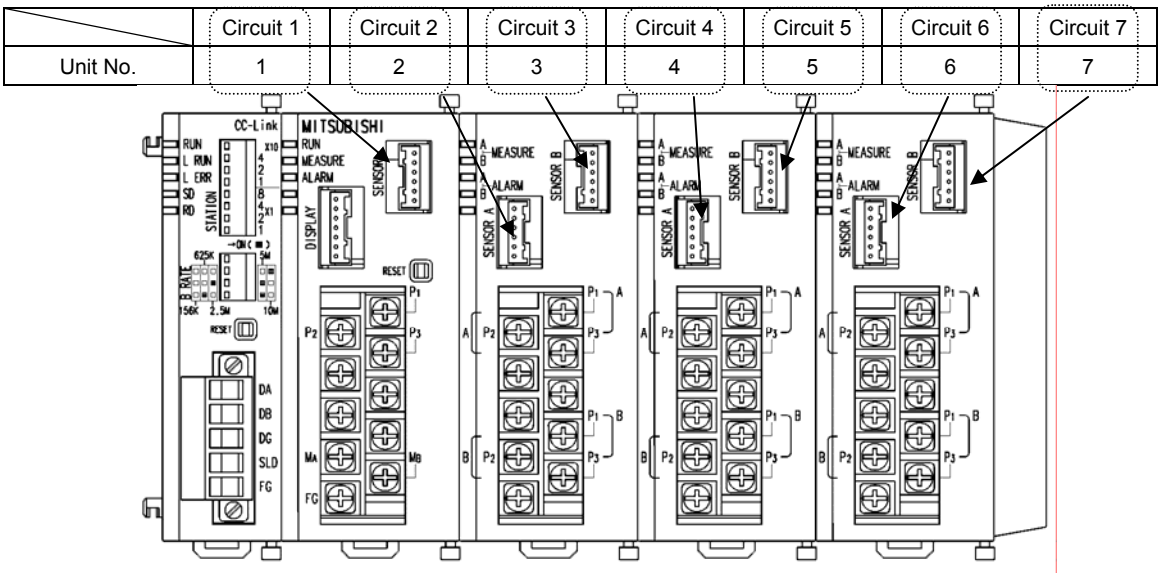
(3) Unit number

When a terminal has some circuits (some channels) for one function, each of the circuits (channels) is identified by this number.

For each measuring unit, the unit number is allocated as shown below.

	Multi-circuit energy measuring unit EcoMonitor	Energy measuring unit EcoMonitorPro
	EMU-C7CP4-6	EMU2-RD3-C EMU2-RD5-C EMU2-RD7-C EMU2-RD2-C-4W EMU2-RD4-C-4W
Unit No.	Input circuit number (channel No.) is used as unit No.	Input circuit number (channel number) is used as unit number.

(Example) For energy measuring unit (EMU2-RD7-C)



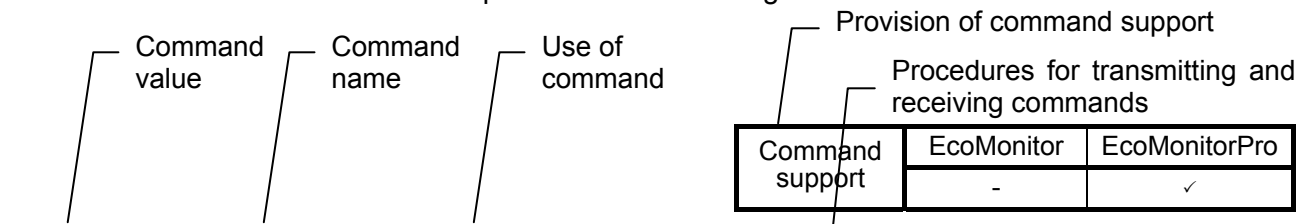
Note 1: Commands can be transmitted only when RX(n+1)B (remote READY) is 1 (ON).

Note 2: To transmit a command and receive reply data, RYnF (command execution request flag) and RXnF (command completion response flag) are used. For the details, see 5.3 “Normal communication.”

Note 3: When the current values and maximum values are monitored collectively or continuously, the monitored maximum value may be less than the current value depending on the timing of updating of data in the measuring unit.

6.2.2 Details of commands

This section explains the details of the commands and reply data supported by the measuring unit. The details of each command are explained in the following format.



Command support	EcoMonitor	EcoMonitorPro
	-	✓

1H	Data monitor	Monitoring of current, voltage, electric power and reactive power data

- Data group numbers and data channel numbers have been allocated to measuring data. (See Table 6.1.)
- Set and write the data group number and data channel number of the data to be monitored in the relevant memory.
- The structure of the data returned from the measuring unit varies depending on the data channel number (measuring data). (See Table 6.2.)
- The structure and significant digits of data vary depending on the settings (phase and wire system, primary voltage and primary current) of the measuring unit. (See Tables 6.2 and 6.3 to determine the measuring data structure, significant digits and exponent.)
- Stored measuring data vary depending on the unit type (model name) and setting (phase and wire system) of the measuring unit. If data not stored in the unit is requested, an out-of-range channel error occurs. Take care not to request such data. (See Table 6.1.)

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b4	b3 – b0
m	Group No.	Unit No.	1H *1
m + 1	00H	Channel No.	
m + 2	00H	00H	
m + 3	00H	00H	

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	Channel No.	Group No.
n + 1	Exponent part	00H
n + 2	Medium low-order data	Low-order data
n + 3	High-order data	Medium high-order data

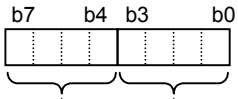
m and n: Addresses allocated according to the station number setting

Command

Contents of the register to be transmitted from the master station to the remote device station (measuring unit)
The command value must be stored in the first byte of the register to be transmitted.
Since the transmitted data length is fixed at 4 words, store 00H in an area without data.

Contents of the register to be received by the master station from the remote device station (measuring unit)
Since the received data length is fixed at 4 words, 00H is stored in an area without reply data.

*1: Standard commands common to unit types are expressed as 8-bit data consisting of a unit number (high-order 4 bits) and a command (low-order 4 bits).



Command :Data range ・・・ 0H to 8H
Unit No. :Data range ・・・ 0H to 8H

For example, when the unit number is 2H and the command is 1H, the command value is “21H.”

(1) Data monitor (1H) command
(Other than clock data and time data)

Command support	EcoMonitor	EcoMonitorPro
	-	✓

1H	Data monitor	Monitoring of current, voltage, electric power and reactive power data

- Data group numbers and data channel numbers have been allocated to measuring data. (See Table 6.1.)
- Set and write the data group number and data channel number of the data to be monitored in the relevant memory.
- The structure of the data returned from the measuring unit varies depending on the data channel number (measuring data). (See Table 6.2.)
- The structure and significant digits of data vary depending on the settings (phase and wire system, primary voltage and primary current) of the measuring unit. (See Tables 6.2 and 6.3 to determine the measuring data structure, significant digits and exponent.)
- Stored measuring data vary depending on the unit type (model name) and setting (phase and wire system) of the measuring unit. If data not stored in the unit is requested, an out-of-range channel error occurs. Take care not to request such data. (See Table 6.1.)

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b4	b3 – b0
m	Group No.	Unit No.	1H
m + 1	00H	Channel No.	
m + 2	00H	00H	
m + 3	00H	00H	

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	Channel No.	Group No.
n + 1	Exponent part	00H
n + 2	Medium low-order data	Low-order data
n + 3	High-order data	Medium high-order data

When a measurement error has occurred, a hardware error is returned.

(2) Data monitor (1H) command
(Clock data and time data)

Command support	EcoMonitor	EcoMonitorPro
	-	✓

1H	Data monitor	Monitoring of current, voltage, electric power and reactive power data

- Data group numbers and data channel numbers have been allocated to measuring data. (See Table 6.1.)
- Set and write the data group number and data channel number of the data to be monitored in the relevant memory.
- The structure of the data returned from the measuring unit varies depending on the data channel number. (See Table 6.2.)
- If data not stored in the measuring unit is requested, an out-of-range channel error occurs. Take care not to request such data. (See Table 6.1.)

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b4	b3 – b0
m	Group No.	Unit No.	1H
m + 1	00H	Channel No.	
m + 2	00H	00H	
m + 3	00H	00H	

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	Channel No.	Group No.
n + 1	Year	Month
n + 2	Date	Time
n + 3	Minute	Second

When a measurement error has occurred, a hardware error is returned.

Table 6.1 Allocation of Group Numbers and Channel Numbers

(1) Numbers related to measuring and gauging data (1/6)

Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
01	21		Measurement data	Current value of phase 1 current	(A)	✓	
01	41	*1		Current value of phase 2 current	(A)	✓	
01	61	*1		Current value of phase 3 current	(A)	✓	
01	81	*2		Current value of phase 0 current	(A)	✓	
05	21			Current value of voltage between phases 1 and 2	(V)	✓	
05	41	*1		Current value of voltage between phases 2 and 3	(V)	✓	①
05	61	*1		Current value of voltage between phases 3 and 1	(V)	✓	
02	A2			Maximum current demand	(A)	✓	
07	01	*3	Measurement data	Current value of electric power	(kW)	✓	
08	01	*3		Power demand	(kW)	✓	
08	02	*3		Maximum power demand	(kW)	✓	
0D	01			Power factor	(%)	✓	
F0	02		Setting data	Unit type setting	-	✓	⑤
E0	11			Primary current setting	(A)	✓	④
E0	13			Phase and wire system setting	-	✓	⑤
E0	15			Demand time limit: Current and electric power (min)	(min.)	✓	
E0	12			Primary voltage setting	(V)	✓	④
09	01	*3	Measurement data	Current value of instantaneous reactive power	(kvar)	✓	
0D	02			Max. power factor	(%)	✓	
0D	05			Min. power factor	(%)	✓	
01	01			Current value of total current	(A)	✓	
02	21			Phase 1 current demand	(A)	✓	
02	41	*1		Phase 2 current demand	(A)	✓	①
02	61	*1		Phase 3 current demand	(A)	✓	
02	81	*2		Phase 0 current demand	(A)	✓	
02	A1			Max. current demand	(A)	✓	
02	C5			Min. current demand	(A)	✓	
0F	01			Current value of frequency	(Hz)	✓	
02	E0		Measurement data	Demand time limit: Current	(sec)	✓	
08	E0			Demand time limit: Electric power	(sec)	✓	⑤
E0	91			5A/direct setting	-	✓	
03	21	*2	Measurement data	Current value of voltage between phases 1 and 0	(V)	✓	
03	41	*2		Current value of voltage between phases 2 and 0	(V)	✓	
03	61	*2		Current value of voltage between phases 3 and 0	(V)	✓	
05	01			Current value of total voltage	(V)	✓	
05	A2			Max. voltage	(V)	✓	①
05	C5			Min. voltage	(V)	✓	
08	05	*3		Min. power demand	(kW)	✓	

(1) Numbers related to measuring and gauging data (2/6)

Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
4D	21		Measurement data	High-frequency voltage fundamental effective value (between 1 and 2)	(V)	✓	①
4D	41	*1		High-frequency voltage fundamental effective value (between 2 and 3)	(V)	✓	
4D	61	*2		High-frequency voltage fundamental effective value (between 3 and 1)	(V)	✓	
55	21			High-frequency voltage 9th effective value (between 1 and 2)	(V)	✓	
57	21			High-frequency voltage 11th effective value (between 1 and 2)	(V)	✓	
59	21			High-frequency voltage 13th effective value (between 1 and 2)	(V)	✓	
55	41	*1		High-frequency voltage 9th effective value (between 2 and 3)	(V)	✓	
57	41	*1		High-frequency voltage 11th effective value (between 2 and 3)	(V)	✓	
59	41	*1		High-frequency voltage 13th effective value (between 2 and 3)	(V)	✓	
55	61	*2		High-frequency voltage 9th effective value (between 3 and 1)	(V)	✓	
57	61	*2		High-frequency voltage 11th effective value (between 3 and 1)	(V)	✓	
59	61	*2		High-frequency voltage 13th effective value (between 3 and 1)	(V)	✓	
76	79			High-frequency voltage 9th content (between 1 and 2)	(%)	✓	
76	7B			High-frequency voltage 11th content (between 1 and 2)	(%)	✓	
76	7D			High-frequency voltage 13th content (between 1 and 2)	(%)	✓	
76	8F	*1		High-frequency voltage 9th content (between 2 and 3)	(%)	✓	
76	91	*1		High-frequency voltage 11th content (between 2 and 3)	(%)	✓	
76	93	*1		High-frequency voltage 13th content (between 2 and 3)	(%)	✓	
76	A5	*2		High-frequency voltage 9th content (between 3 and 1)	(%)	✓	
76	A7	*2		High-frequency voltage 11th content (between 3 and 1)	(%)	✓	
76	A9	*2		High-frequency voltage 13th content (between 3 and 1)	(%)	✓	

(1) Numbers related to measuring and gauging data (3/6)

Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
1D	21		Measurement data	High-frequency current fundamental effective value (on side 1)	(A)	✓	
1D	41	*2		High-frequency current fundamental effective value (on side 2)	(A)	✓	
1D	61	*1		High-frequency current fundamental effective value (on side 3)	(A)	✓	
25	21			High-frequency current 9th effective value (on side 1)	(A)	✓	
27	41	*2		High-frequency current 11th effective value (on side 2)	(A)	✓	
29	41	*2		High-frequency current 13th effective value (on side 2)	(A)	✓	
25	61	*1		High-frequency current 9th effective value (on side 3)	(A)	✓	
27	61	*1		High-frequency current 11th effective value (on side 3)	(A)	✓	
29	61	*1		High-frequency current 13th effective value (on side 3)	(A)	✓	
75	79			High-frequency current 9th content (on side 1)	(%)	✓	
75	7B			High-frequency current 11th content (on side 1)	(%)	✓	①
75	7D			High-frequency current 13th content (on side 1)	(%)	✓	
75	8F	*2		High-frequency current 9th content (on side 2)	(%)	✓	
75	91	*2		High-frequency current 11th content (on side 2)	(%)	✓	
75	93	*2		High-frequency current 13th content (on side 2)	(%)	✓	
75	A5	*1		High-frequency current 9th content (on side 3)	(%)	✓	
75	A7	*1		High-frequency current 11th content (on side 3)	(%)	✓	
75	A9	*1		High-frequency current 13th content (on side 3)	(%)	✓	

(1) Numbers related to measuring and gauging data (4/6)

Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
75	86		Measurement data	High-frequency current total distortion factor (on side 1)	(%)	✓	
75	9C	*2		High-frequency current total distortion factor (on side 2)	(%)	✓	
75	B2	*1		High-frequency current total distortion factor (on side 3)	(%)	✓	
75	73			High-frequency current 3rd content (on side 1)	(%)	✓	
75	75			High-frequency current 5th content (on side 1)	(%)	✓	
75	77			High-frequency current 7th content (on side 1)	(%)	✓	
75	89	*2		High-frequency current 3rd content (on side 2)	(%)	✓	
75	8B	*2		High-frequency current 5th content (on side 2)	(%)	✓	
75	8D	*2		High-frequency current 7th content (on side 2)	(%)	✓	
75	9F	*1		High-frequency current 3rd content (on side 3)	(%)	✓	
75	A1	*1		High-frequency current 5th content (on side 3)	(%)	✓	
75	A3	*1		High-frequency current 7th content (on side 3)	(%)	✓	
76	86		Measurement data	High-frequency voltage total distortion factor (between 1 and 2)	(%)	✓	
76	9C	*1		High-frequency voltage total distortion factor (between 2 and 3)	(%)	✓	①
76	B2	*2		High-frequency voltage total distortion factor (between 3 and 1)	(%)	✓	
76	73			High-frequency voltage 3rd content (between 1 and 2)	(%)	✓	
76	75			High-frequency voltage 5th content (between 1 and 2)	(%)	✓	
76	77			High-frequency voltage 7th content (between 1 and 2)	(%)	✓	
76	89	*1		High-frequency voltage 3rd content (between 2 and 3)	(%)	✓	
76	8B	*1		High-frequency voltage 5th content (between 2 and 3)	(%)	✓	
76	8D	*1		High-frequency voltage 7th content (between 2 and 3)	(%)	✓	
76	9F	*2		High-frequency voltage 3rd content (between 3 and 1)	(%)	✓	
76	A1	*2		High-frequency voltage 5th content (between 3 and 1)	(%)	✓	
76	A3	*2		High-frequency voltage 7th content (between 3 and 1)	(%)	✓	
33	21		Measurement data	High-frequency current total effective value (on side 1)	(A)	✓	
33	41	*2		High-frequency current total effective value (on side 2)	(A)	✓	
33	61	*1		High-frequency current total effective value (on side 3)	(A)	✓	

(1) Numbers related to measuring and gauging data (5/6)

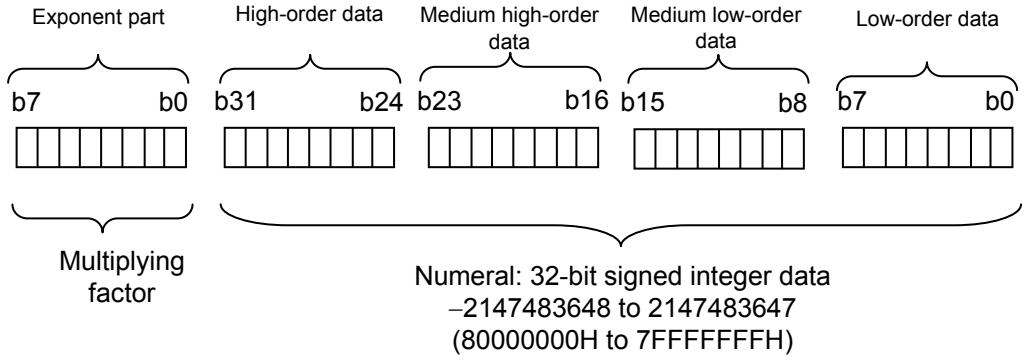
Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
33	21		Measurement data	High-frequency current total effective value (on side 1)	(A)	✓	
33	41	*2		High-frequency current total effective value (on side 2)	(A)	✓	
33	61	*1		High-frequency current total effective value (on side 3)	(A)	✓	
1F	21			High-frequency current 3rd effective value (on side 1)	(A)	✓	
21	21			High-frequency current 5th effective value (on side 1)	(A)	✓	
23	21			High-frequency current 7th effective value (on side 1)	(A)	✓	
1F	41	*2		High-frequency current 3rd effective value (on side 2)	(A)	✓	
21	41	*2		High-frequency current 5th effective value (on side 2)	(A)	✓	
23	41	*2		High-frequency current 7th effective value (on side 2)	(A)	✓	
1F	61	*1		High-frequency current 3rd effective value (on side 3)	(A)	✓	
21	61	*1		High-frequency current 5th effective value (on side 3)	(A)	✓	
23	61	*1		High-frequency current 7th effective value (on side 3)	(A)	✓	
63	21		Measurement data	High-frequency voltage total effective value (between 1 and 2)	(V)	✓	
63	41	*1		High-frequency voltage total effective value (between 2 and 3)	(V)	✓	
63	61	*2		High-frequency voltage total effective value (between 3 and 1)	(V)	✓	①
4F	21			High-frequency voltage 3rd effective value (between 1 and 2)	(V)	✓	
51	21			High-frequency voltage 5th effective value (between 1 and 2)	(V)	✓	
53	21			High-frequency voltage 7th effective value (between 2 and 3)	(V)	✓	
4F	41	*1		High-frequency voltage 3rd effective value (between 2 and 3)	(V)	✓	
51	41	*1		High-frequency voltage 5th effective value (between 2 and 3)	(V)	✓	
53	41	*1		High-frequency voltage 7th effective value (between 2 and 3)	(V)	✓	
4F	61	*2		High-frequency voltage 3rd effective value (between 3 and 1)	(V)	✓	
51	61	*2		High-frequency voltage 5th effective value (between 3 and 1)	(V)	✓	
53	61	*2		High-frequency voltage 7th effective value (between 3 and 1)	(V)	✓	

(1) Numbers related to measuring and gauging data (6/6)

Group No. (h)	Channel No. (h)	Note	Data type	Data name	Unit	EMU2-RD*4	Data format
80	01		Measurement data	Electric energy (integrated value)	(kWh)	✓	②
81	01			Reactive power energy (delay)	(kvar)	✓	
80	64			Electric energy (integrated value), increased number of significant figures	(kWh)	✓	
81	66			Reactive power energy (delay), increased number of significant figures	(kvar)	✓	
E0	03			Year, month, day, hour, minute, second	-	✓	⑥
A0	31		Alarm status data	Alarm status monitoring	-	✓	③

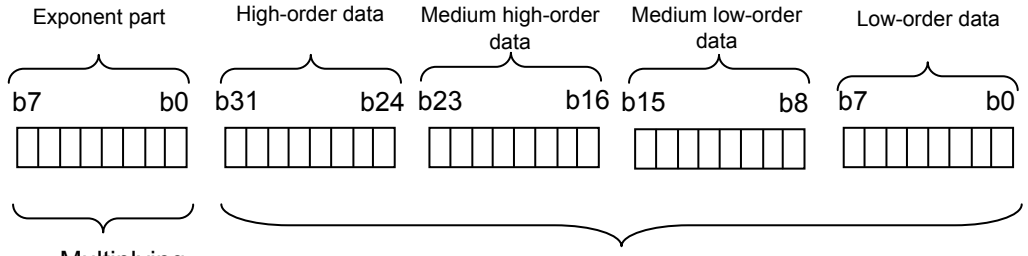
*1: When the phase and wire system is set to single-phase 2-wire (1P2W), data is not stored, and an out-of-range channel error occurs.
*2: Data is stored only when the phase and wire system is set to 3-phase 4-wire (3P4W). When another system is specified, an out-of-range channel error occurs.
*3: The number of significant digits of data and the multiplying factor change according to the phase and wire system, primary current and primary voltage settings, and also the channel number to be monitored changes. For the data structure, see Table 6.2. For the significant digits of data and multiplying factor, see Table 6.3.
*4: Applicable models:
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Table 6.2 Data Structure ①

Data type	Data Structure
Measurement data Data on voltage, current, electric power, reactive power, power factor and frequency Format ①	 <Details of multiplying factor> The multiplying factor has been determined for each channel item according to the primary current setting, primary voltage setting and phase and wire system. **See Table 6.3.** Exponent part = 03H: Indicates that the multiplying factor is 1000. (The numeral multiplied by 1000 is the actual value.) Exponent part = 02H: Indicates that the multiplying factor is 100. (The numeral multiplied by 100 is the actual value.) Exponent part = 01H: Indicates that the multiplying factor is 10. (The numeral multiplied by 10 is the actual value.) Exponent part = 00H: Indicates that the multiplying factor is 1. (The numeral multiplied by 1 is the actual value.) Exponent part = FFH: Indicates that the multiplying factor is 0.1. (The numeral multiplied by 0.1 is the actual value.) Exponent part = FEH: Indicates that the multiplying factor is 0.01. (The numeral multiplied by 0.01 is the actual value.) Exponent part = FDH: Indicates that the multiplying factor is 0.001. (The numeral multiplied by 0.001 is the actual value.) (Note) It is necessary to multiply the numeral by the multiplying factor on the high-order side. <Examples of numeral: Current value of voltage>

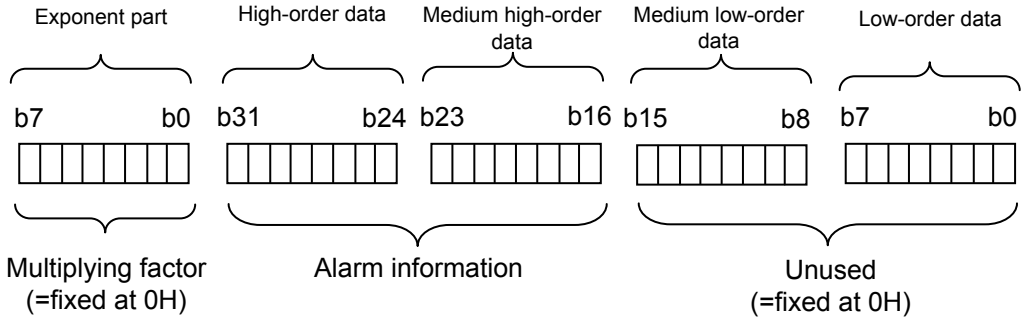
Data	Multiplying factor	Numeral	Actual value
FF000000FFH	FFH→0.1 time	000000FFH→255	255x0.1 time = 25.5 [kW]
00000000FF	00H→1 time	000000FFH→255	255x1 time = 255 [kW]
FFFFFFFF01	FFH→0.1 time	FFFFFF01H→-255	−255x0.1 time = −25.5 [kW]
00FFFFFF01	00H→1 time	FFFFFF01H→-255	−255x1 time =−255 [kW]

Table 6.2 Data Structure ②

Data type	Data Structure
Measurement data Data on electric energy and reactive power energy Format ②	 Numeral: 32-bit signed integer data −2147483648 to 2147483647 (80000000H to 7FFFFFFFH) Range of effective values: 0 to 999999 (0 to F423FH) <Details of multiplying factor> The multiplying factor has been determined for each channel item according to the primary current setting, primary voltage setting and phase and wire system. **See Table 6.3.** Exponent part = 03H: Indicates that the multiplying factor is 1000. (The numeral multiplied by 1000 is the actual value.) Exponent part = 02H: Indicates that the multiplying factor is 100. (The numeral multiplied by 100 is the actual value.) Exponent part = 01H: Indicates that the multiplying factor is 10. (The numeral multiplied by 10 is the actual value.) Exponent part = 00H: Indicates that the multiplying factor is 1. (The numeral multiplied by 1 is the actual value.) Exponent part = FFH: Indicates that the multiplying factor is 0.1. (The numeral multiplied by 0.1 is the actual value.) Exponent part = FEH: Indicates that the multiplying factor is 0.01. (The numeral multiplied by 0.01 is the actual value.) Exponent part = FDH: Indicates that the multiplying factor is 0.001. (The numeral multiplied by 0.001 is the actual value.) Exponent part = FCH: Indicates that the multiplying factor is 0.0001. (The numeral multiplied by 0.0001 is the actual value.) Exponent part = FBH: Indicates that the multiplying factor is 0.00001. (The numeral multiplied by 0.00001 is the actual value.) (Note) It is necessary to multiply the numeral by the multiplying factor on the high-order side. <Examples of numeral: Current value of voltage>

Data	Multiplying factor	Numeral	Actual value
FF000000FFH	FFH→0.1 time	000000FFH→255	255x0.1 time = 25.5 [kW]
00000000FF	00H→1 time	000000FFH→255	255x1 time = 255 [kW]

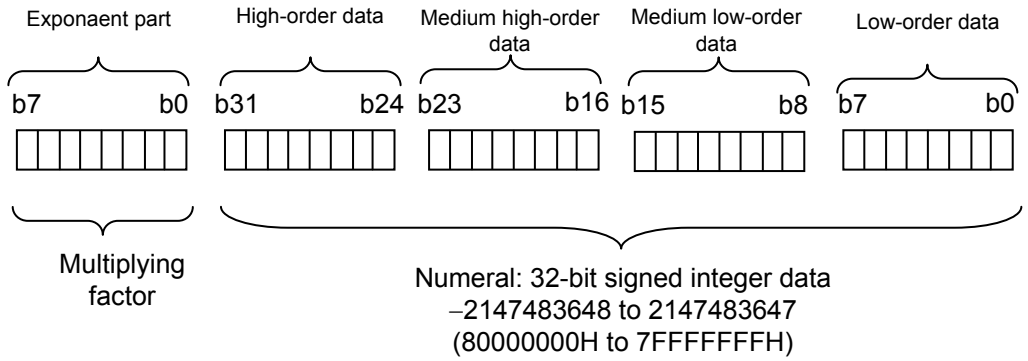
Table 6.2 Data Structure ③

Data type	Data Structure
Alarm information Format ③	

<Alarm information bit allocation>

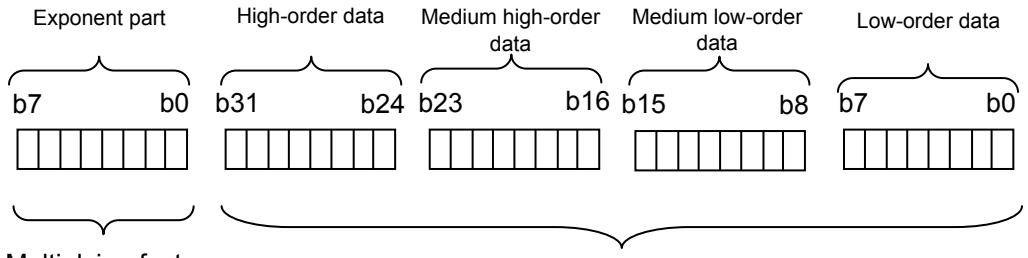
	Bit	Set data		
		Details	When the bit is 1	When the bit is 0
Medium high-order data	b16	Unused	-	-
	b17	Unused	-	-
	b18	Current demand upper/lower limit alarm	Active	Cancel
	b19	Power demand upper/lower limit alarm	Active	Cancel
	b20	Unused	-	-
	b21	Upper/lower limit alarm (collective)	Active	Cancel
	b22	Unused	-	-
	b23	Unused	-	-
High-order data	b24	Voltage upper/lower limit alarm	Active	Cancel
	b25	Unused	-	-
	b26	Unused	-	-
	b27	Unused	-	-
	b28	Unused	-	-
	b29	Power factor upper/lower limit alarm	Active	Cancel
	b30	Unused	-	-
	b31	Unused	-	-

Table 6.2 Data Structure ④

Data type	Data Structure
Setting data Primary current setting Primary voltage setting Format ④	 <Details of multiplying factor> The primary current setting and primary voltage setting are set in the numeral part (b0 to b31). The number of significant digits of each setting has been determined (Table 6.3). Process the value to be set according to the number of significant digits, and change the setting in the exponent part. When the least significant digit is the first decimal place: Set FFH in the exponent part, and specify an integral value. When the least significant digit is the unit's place: Set 00H in the exponent part, and specify an integral value. When the least significant digit is the tens place: Set 01H in the exponent part, and specify an integral value. <Examples of numeral: Primary current setting and primary voltage setting>

Setting	Multiplying factor	Numeral	Data
Setting = 100.0A (Significant digit = First decimal place)	0.1 time→FFH	1000→03E8H	FF000003E8H
Setting =400A (Significant digit = Unit's place)	1 time→00H	400→0190H	0000000190H
Setting =110.0 V (Significant digit = First decimal place)	0.1 time→FFH	1100→044CH	FF0000044CH
Setting =3300 V (Significant digit = Tens place)	10 time→01H	330→014A	010000014A

Table 6.2 Data Structure ⑤

Data type	Data Structure
Setting data (Phase and wire system Demand time limit (current/electric power/common) Byte monitor Attribute monitor Unit type code 16-point (output) selection) Format ⑤	 Multiplying factor (=fixed at 0H) Numeral: 32-bit signed integer data −2147483648 to 2147483647 (80000000H to 7FFFFFFFH) <Details of data (numeric part)> Phase and wire system (1PW): = 1 (01H) Single-phase 2-wire : Single-phase 3-wire (1P3W) = 2 (02H) : 3-phase 3-wire (3P3W) = 3 (03H) : 3-phase 4-wire (3P4W) = 4 (04H) * b31 to 8: Fixed at 0 Demand time limit: The data range varies depending on the group number and channel number to be read. Byte monitor : C4H 10H 05H (Fixed data) Reported byte count Transferred byte count Type code } Data not related to CC-Link transmission * b31 to 24: Fixed at 0 Attribute code : C4H 05H 05H (Fixed data) DO point count DI point count Type code } Data not related to CC-Link transmission * b31 to 24: Fixed at 0 Unit type code: EMU2-RD3-C = 33H EMU2-RD5-C = 35H EMU2-RD7-C = 37H EMU2-RD2-C-4W = 52H EMU2-RD4-C-4W = 54H * b31 to 8: Fixed at 0 16-point (output) selection b17: Resetting all memory b18: Resetting data except the electric energy (integrated value) b22: Resetting the max. power demand b26: Resetting the max. power factor b27: Resetting the max. current demand b28: Resetting the max. voltage b30: Resetting the electric energy (integrated value) Other bits are invalid.

Group No. (h)	Channel No. (h)	Data range
E0	15	0 minute (=0H) to 15 minutes (=FH) in 1-min steps Supplement: For [E0:15], the value of [02:E0] converted to the equivalent in minutes is set. If 10, 20, 30, 40, 50, 1200, 1500 or 1800 seconds has been specified for [02:E0], the value is read as 0.
02	E0	0 second (=0H) to 1800 seconds (=708H) in second units
08	E0	

Table 6.2 Data Structure ⑥

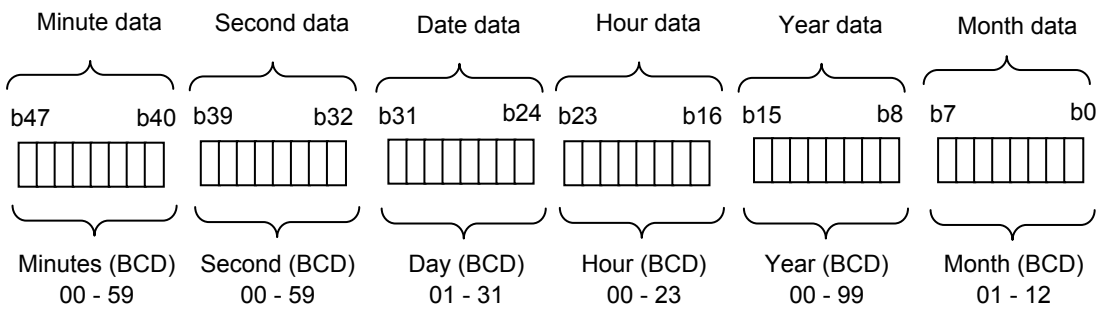
Data type	Data Structure
Time data (Date data Time data) Format ⑥	 <Date data> Year data : Last two digits of year (05H indicates 2005.) Month data : Data on month (11H indicates November.) Day data : Data on day (16H indicates the 16th.) <Time data> Hour data : Data on hour (17H indicates 17 o'clock.) Minute data : Data on minute (15H indicates 15 minutes.) Second data : Data on second (28H indicates 28 seconds.)

Table 6.3 Significant Digits of Data and Multiplying Factor

(1) Data format for electric power and reactive power

① Energy measuring unit

<Model EMU2-RD*1>

Vertical axis :Primary current setting

Horizontal axis :Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W					1P3W	3P3W							
V / A	110	220	440	3300	6600	110	110	220	440	3300	6600	11000	22000	33000
5	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits	1 digit	1 digit
6	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits	1 digit	1 digit
7.5	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
8	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
10	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
12	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit
15	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit
20	3 digits	3 digits	3 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit
25	3 digits	3 digits	3 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit	x1
30	3 digits	3 digits	2 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit	x1
40	3 digits	3 digits	2 digits	1 digit	1 digit	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
50	3 digits	3 digits	2 digits	1 digit	1 digit	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
60	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
75	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
80	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
100	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
120	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
150	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
200	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x1
250	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
300	2 digits	2 digits	1 digit	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
400	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
500	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
600	2 digits	1 digit	1 digit	x1	x1	1 digit	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
750	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
800	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1000	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1200	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1500	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
1600	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
2000	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
2500	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
3000	1 digit	1 digit	x1	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	—
4000	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	—
5000	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	—	—
6000	1 digit	x1	x1	x10	x10	x1	1 digit	x1	x1	x10	x10	x10	—	—
7500	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	—	—
8000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	—	—
10000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	—	—	—
12000	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	—	—	—
20000	x1	x1	x1	x10	—	x1	x1	x1	x10	x10	—	—	—	—
25000	x1	x1	x1	x10	—	x1	x1	x1	x10	x100	—	—	—	—
30000	x1	x1	x10	—	—	x1	x1	x1	x10	—	—	—	—	—

Phase and wire system	3P4W					
V / A	63.5/110	110/190	120/208	220/380	240/415	254/440
5	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
6	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
7.5	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
8	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
10	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
12	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
15	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
20	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
25	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
30	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
40	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
50	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
60	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
75	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
80	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
100	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
120	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
150	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
200	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
250	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
300	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
400	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
500	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
600	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
750	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
800	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1000	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1200	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1500	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1600	1 digit	1 digit	1 digit	1 digit	1 digit	x1
2000	1 digit	1 digit	1 digit	x1	x1	x1
2500	1 digit	1 digit	1 digit	x1	x1	x1
3000	1 digit	1 digit	1 digit	x1	x1	x1
4000	1 digit	x1	x1	x1	x1	x1
5000	1 digit	x1	x1	x1	x1	x1
6000	1 digit	x1	x1	x1	x1	x1
7500	x1	x1	x1	x1	x1	x1
8000	x1	x1	x1	x1	x1	x1
10000	x1	x1	x1	x1	x1	x1
12000	x1	x1	x1	x1	x1	x1
20000	x1	x1	x1	x10	x10	x10
25000	x1	x1	x1	x10	x10	x10
30000	x1	x1	x1	x10	x10	x10

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Note: “3 digits” indicates three decimal places (x 0.001), and “2 digits” indicates two decimal places (x 0.01).
Note: “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.
Note: “x10” indicates an integer x 10. “x100” indicates an integer x 100.
Note: “− “ indicates an area out of the setting range.
Note: If a channel other than the channels (3 decimal places, 2 decimal places, 1 decimal place, integer x 1 and integer x 10) determined by the primary voltage, primary current and phase and wire system settings according to the above table is received, an out-of-range channel error is returned.

(2) Data format for current and high-frequency current

Vertical axis: Primary current setting

Primary current (A)	Energy measuring unit
	EMU2-RD*1
5	2 digits
6	2 digits
7.5	2 digits
8	2 digits
10	2 digits
12	2 digits
15	2 digits
20	2 digits
25	2 digits
30	2 digits
40	1 digit
50	1 digit
60	1 digit
75	1 digit
80	1 digit
100	1 digit
120	1 digit
150	1 digit
200	1 digit
250	1 digit
300	1 digit
400	x1
500	x1
600	x1
750	x1
800	x1
1000	x1
1200	x1
1500	x1
1600	x1
2000	x1
2500	x1
3000	x1
4000	x10
5000	x10
6000	x10
7500	x10
8000	x10
10000	x10
12000	x10
20000	x10
25000	x10
30000	x10

Note: “2 digits” indicates two decimal places (x 0.01), and “1 digit” indicates one decimal place (x 0.1).
Note: “x1” indicates an integer x 1, and “x10” indicates an integer x 10.

(3) Data format for voltage and high-frequency voltage

Vertical axis: Primary voltage setting

Phase and wire system	Primary voltage (V)	Energy measuring unit	
		EMU2-RD3-C EMU2-RD5-C EMU2-RD7-C	EMU2-RD2-C-4W EMU2-RD4-C-4W
1P2W 1P3W 3P3W	110	1 digit	—
	220	1 digit	—
	440	x1	—
	690	x1	—
	1100	x1	—
	2200	x1	—
	3300	x10	—
	6600	x10	—
	11000	x10	—
	13200	x10	—
	13800	x10	—
	15000	x10	—
	16500	x10	—
	22000	x10	—
	24000	x10	—
	33000	x10	—
	66000	x10	—
	77000	x10	—
	110000	x10	—
3P4W	63.5/110	—	1 digit
	110/190	—	1 digit
	120/208	—	1 digit
	220/380	—	1 digit
	240/415	—	1 digit
	254/440	—	x1

Note: “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.
Note: “x10” indicates an integer x 10, and “x100” indicates an integer x 100.

(4) Data format for electric energy and reactive power energy

① Energy measuring unit

<Model EMU2-RD[*1]>

Vertical axis :Primary current setting

Horizontal axis :Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W					1P3W	3P3W							
V / A	110	220	440	3300	6600	110	110	220	440	3300	6600	11000	22000	33000
5	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
6	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
7.5	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
8	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
10	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
12	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
15	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
20	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x1
25	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
30	2 digits	2 digits	1 digit	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
40	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
50	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
60	2 digits	1 digit	1 digit	x1	x1	1 digit	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
75	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
80	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
100	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
120	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
150	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
200	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
250	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
300	1 digit	1 digit	x1	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
400	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	x100
500	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	x100
600	1 digit	x1	x1	x10	x10	x1	1 digit	x1	x1	x10	x10	x10	x100	x100
750	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
800	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
1000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
1200	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	x100	x100	x100
1500	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	x100	x100	x100
1600	x1	x1	x1	x10	x10	x1	x1	x1	x10	x10	x100	x100	x100	x100
2000	x1	x1	x1	x10	x100	x1	x1	x1	x10	x10	x100	x100	x100	x100
2500	x1	x1	x1	x10	x100	x1	x1	x1	x10	x100	x100	x100	x100	x1000
3000	x1	x1	x10	x10	x100	x1	x1	x1	x10	x100	x100	x100	x100	—
4000	x1	x1	x10	x100	x100	x1	x1	x10	x10	x100	x100	x100	x1000	—
5000	x1	x1	x10	x100	x100	x1	x1	x10	x10	x100	x100	x100	—	—
6000	x1	x10	x10	x100	x100	x10	x1	x10	x10	x100	x100	x100	—	—
7500	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	x1000	—	—
8000	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	x1000	—	—
10000	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	—	—	—
12000	x10	x10	x10	x100	x100	x10	x10	x10	x10	x100	x1000	—	—	—
20000	x10	x10	x10	x100	—	x10	x10	x10	x100	x100	—	—	—	—
25000	x10	x10	x10	x100	—	x10	x10	x10	x100	x1000	—	—	—	—
30000	x10	x10	x100	—	—	x10	x10	x10	x100	—	—	—	—	—

Phase and wire system	3P4W					
V / A	63.5/110	110/190	120/208	220/380	240/415	254/440
5	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
6	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
7.5	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
8	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
10	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
12	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
15	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
20	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
25	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
30	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
40	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
50	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
60	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
75	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
80	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
100	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
120	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
150	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
200	1 digit	1 digit	1 digit	x1	x1	x1
250	1 digit	1 digit	1 digit	x1	x1	x1
300	1 digit	1 digit	1 digit	x1	x1	x1
400	1 digit	x1	x1	x1	x1	x1
500	1 digit	x1	x1	x1	x1	x1
600	1 digit	x1	x1	x1	x1	x1
750	x1	x1	x1	x1	x1	x1
800	x1	x1	x1	x1	x1	x1
1000	x1	x1	x1	x1	x1	x1
1200	x1	x1	x1	x1	x1	x1
1500	x1	x1	x1	x1	x1	x1
1600	x1	x1	x1	x1	x1	x10
2000	x1	x1	x1	x10	x10	x10
2500	x1	x1	x1	x10	x10	x10
3000	x1	x1	x1	x10	x10	x10
4000	x1	x10	x10	x10	x10	x10
5000	x1	x10	x10	x10	x10	x10
6000	x1	x10	x10	x10	x10	x10
7500	x10	x10	x10	x10	x10	x10
8000	x10	x10	x10	x10	x10	x10
10000	x10	x10	x10	x10	x10	x10
12000	x10	x10	x10	x10	x10	x10
20000	x10	x10	x10	x100	x100	x100
25000	x10	x10	x10	x100	x100	x100
30000	x10	x10	x10	x100	x100	x100

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Note: “3 digits” indicates three decimal places (x 0.001), and “2 digits” indicates two decimal places (x 0.01).

Note: “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.

Note: “x10” indicates an integer x 10. “x100” indicates an integer x 100.

Note: “− “ indicates an area out of the setting range.

Hint

For the energy measuring unit, the numbers of significant digits and the multiplying factors of the electric energy and reactive power energy can be determined through the following calculation.
Calculate the full-load power, and determine the multiplying factor.

$$\text{Full-load power [kW]} = \frac{\alpha \times (\text{Primary voltage}) \times (\text{Primary current})}{1000}$$

α: 1 Single-phase 2-wire
2 Single-phase 3-wire (Calculation with primary voltage of 110 V)
$\sqrt{3}$ 3-phase 3-wire
3 3-phase 4-wire (Primary voltage: Phase voltage)

Full-load power [kW]	Multiplying factor	Number of digits of data
Less than 12	2 digits	0 to 9999.99 kWh
12 to less than 120	1 digit	0 to 99999.9 kWh
120 to less than 1200	×1	0 to 999999 kWh
1200 to less than 12000	×10	0 to 9999990 kWh
12000 to less than 120000	×100	0 to 99999900 kWh
120000 or more	×1000	0 to 999999000 kWh

Note: The primary voltage setting multiplied by the primary current setting must not exceed 88,665 kW. (The allowable setting range is limited based on the value of the full-load power.)
For example, when the primary voltage setting is 110000 V, if the primary current is set to 30000 A, the primary voltage setting is automatically initialized to 220 V.
When the primary current setting is 30000 A, if the primary voltage is set to 110000 V, the primary current setting is automatically initialized to 100 A.

(3) Data setting (2H) command

Command support	EcoMonitor	EcoMonitorPro
	-	✓

2H	Data setting	Setting of data, such as rated (primary) current, phase and wire system and rated (primary) voltage

- Settings of the measuring unit can be changed from the sequencer.
- Set and write the data group number and data channel number of the data to be set in the relevant memory.
- For the data group number and data channel number of the data to be set, see Table 6.4.
- For the data structure, see Table 6.2. For the significant digits and multiplying factor, see Table 6.3.

* After ratings are set or settings are changed on this unit, it takes some seconds until the operation of the unit stabilizes. The unit does not perform measuring operation for this period.

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b4	b3 – b0
m	Group No.	Unit No.	2H
m + 1	Exponent part	Channel No.	
m + 2	Medium low-order data	Low-order data	
m + 3	High-order data	Medium high-order data	

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	Channel No.	Group No.
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Table 6.4 Allocation of Group Numbers and Channel Numbers

Hexadecimal		Channel name	Setting range	Setting step	Data format
Group	Channel				
E0	11	Rated (primary) current setting	(Note 1)		④
E0	12	Rated (primary) voltage setting	(Note 2)	—	④
E0	13	Phase and wire system setting	1:1P2W, 2:1P3W, 3:3P3W, 4:3P4W	—	⑤
E0	15	Demand time limit setting (current/voltage/common)	(Note 3) (0 is an instantaneous value.)	—	⑤
02	E0	Current demand time limit setting	(Note 3) (0 is an instantaneous value.)	(Note 3) Default: 2 min	⑤
08	E0	Power demand time limit setting	(Note 3) (0 is an instantaneous value.)	(Note 3) Default: 2 min	⑤
E0	92	5A input switching setting	0: Direct sensor 2: 5A split-type sensor	—	⑤
80	01	Electric energy (integrated value)	0-999999×Multiplying factor (Note 4)	In steps of 1 × Multiplying factor	②
81	01	Reactive power energy (delay)	0 - 999999×Multiplying factor (Note 4)	In steps of 1 × Multiplying factor	②
A1	3A	16-point (output) selection ON-OFF output	b17 : Resetting all memory b18 : Resetting data except the electric energy (integrated value) b22 : Resetting the max. power demand b26 : Resetting the max. power factor b27 : Resetting the max. current demand b28 : Resetting the max. voltage b30 : Resetting the electric energy (integrated value)	—	⑤

If a channel other than the above channels is specified, an out-of-range channel error is returned.
If data out of the setting range is set, a data error is returned, and the setting is not changed.
If a setting command is received during setting operation on the unit, the “unit in setting mode” error is returned.

Note 1: The range varies depending on the primary voltage and phase and wire system settings.

	Energy measuring unit
	EMU2-RD*1
Primary current setting when 5A input switching is 0 (other).	50A, 100A, 250A, 400A, 600A
Primary current setting when 5A input switching is 1 (5A through type) or 2 (5A split-type sensor).	5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A

Note 2: The range varies depending on the primary current and phase and wire system settings.

	Energy measuring unit
	EMU2-RD*1
1P2W/3P3W	110V, 220V, 440V, 690V, 1100V, 2200V, 3300V, 6600V, 11000V, 13200V, 13800V, 15000V, 16500V, 22000V, 24000V, 33000V, 66000V, 77000V, 110000V
1P3W	110V
3P4W (setting based on line-to-line voltage)	63.5V/110V, 110/190V, 120V/208V, 220V/380V, 240V/415V, 254V/440V (EMU2-RD*-C-4W only)

Note 3: Demand time limit setting range

	Setting range and setting step	Unit	Supplement
[E0:15]	0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15	Min.	When any of the values shown left is set in [E0h:15h], the same value is set in [02h:E0h] and [08h:E0h]. Reading with [E0h:15h] reads the setting in [02h:E0h]. When 15 is set in [E0h:15h], 900 is set in [02h:E0h] and [08h:E0h]. If a value not included in the setting range of [E0h:15h] has been set in [02h:E0h], the value is read as a fixed value, 0.
[02:E0] [08:E0]	0, 10, 20, 30, 40, 50, 60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720, 780, 840, 900, 1200,1500, 1800	Sec.	

Note 4: The multiplying factor varies depending on the primary voltage, primary current and phase and wire system settings.

Examples:

- When the primary voltage is 200 V, the primary current is 300 A and the phase and wire system is 1P3W, the multiplying factor is ×1.
- When the primary voltage is 6600 V, the primary current is 200 A and the phase and wire system is 3P3W, the multiplying factor is ×10.

*1: Applicable models:
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(4) Clock data setting (3H) command

Command support	EcoMonitor	EcoMonitorPro
	-	✓

3H	Clock data setting	Setting of clock data and time data

- The clock data and time data in the measuring unit can be changed from the sequencer.
- Set and write the unit number whose data to be set in the relevant memory.
- For the data structure, see Table 6.2. For the significant digits and multiplying factor, see Table 6.3.

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b4	b3 – b0
m	00H	Unit No.	3H
m + 1	Year	Month	
m + 2	Day	Hour	
m + 3	Minute	Second	

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	00H	13H (Unit No., command)
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

(5) Bit setting/resetting (9EH) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

9EH	Bit setting/resetting	Resetting of maximum values and electric energy (integrated value)

- The maximum values and electric energy (integrated value) in the measuring unit are reset.
- Each value can be reset, or all values can be reset collectively.
- Set and write the bit information to be reset in the relevant memory.

Note: Resetting a maximum value resets the data on the date and time (year, month, day, hour, minute and second) of occurrence of the maximum value.

Remote register RWw (sequencer → measuring unit)

	b15 b8	b7 b0
m	00H	9EH (command)
m + 1	High-order data	Low-order data
m + 2	00H	Unit No.
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	00H	00H
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

m and n: Addresses allocated according to the station number setting

Table 6.5 Details of Data Structure

	Bit	Description	"1" → "0"	"0" → "1"	Eco Monitor*1	Eco Monitor Pro*2	Remarks
Low-order data	b0	Impossible to use	−	−	−	−	
	b1	Clearing of all memory	−	To reset	✓	✓	Note 1, Note 2
	b2	Resetting data other than electric energy (integrated value)	−	To reset	✓	✓	Note 2, Note 3
	b3	Impossible to use	−	−	−	−	
	b4	Impossible to use	−	−	−	−	
	b5	Resetting of max. leakage current demand	−	To reset	−	−	
	b6	Resetting of max. power demand	−	To reset	✓	✓	Note 2
	b7	Impossible to use	−	−	−	−	
High-order data	b8	Impossible to use	−	−	−	−	
	b9	Impossible to use	−	−	−	−	
	b10	Resetting of max. power factor	−	−	−	✓	Note 2
	b11	Resetting of max. current demand	−	To reset	✓	✓	Note 2
	b12	Resetting of max. voltage	−	To reset	✓	✓	Note 2
	b13	Impossible to use	−	−	−	−	
	b14	Resetting of electric energy (integrated value)	−	To reset	✓	✓	Note 2
	b15	Resetting of max. hourly electric energy	−	To reset	✓	−	Note 2

Note 1 : All maximum value data are reset (from the maximum values to the current values), and the electric energy (integrated value) is cleared to 0 kWh.

Note 2 : Resetting a maximum value or all data in the memory resets the data on the time of occurrence.

Note 3 : All maximum value data are reset (from the maximum values to the current values), and the electric energy (integrated value) is not cleared to 0 kWh.

Note 4 : The models applicable to *1 and *2 are shown below.

	Applicable model
*1	EMU-C7P4-6
*2	EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Points
If any unusable device is turned on or off in the sequence program, the functions of the measuring unit cannot be guaranteed.

(6) Analog data setting (C0H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

C0H	Analog data setting	Changing of settings of the measuring unit

- Settings of the measuring unit can be changed from the sequencer.
- For the settings that can be changed and the channel numbers allocated to the setting data, see Table 6.6.
- Set and write the channel number of the data to be changed in the relevant memory.
  For the structure of the data to be transmitted to the measuring unit, see Table 6.8.
  The data structure varies depending on the settings (phase and wire system, primary voltage and primary current).

* After ratings are set or settings are changed on this unit, it takes some seconds until the operation of the unit stabilizes. The unit does not perform measuring operation for this period.

Remote register RWw (sequencer → measuring unit)

	b15 b8	b7 b0
m	Channel No.	C0H (command)
m + 1	High-order data	Low-order data
m + 2	00H	Unit No.
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	00H	00H
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Table 6.6 Channel Number Allocation

Channel		Channel name	Multi-circuit energy measuring unit EMU-C7P4-6		Energy measuring unit EMU2-RD*1	
Decimal No.	Hexa-decimal		Setting range	Setting step	Setting range	Setting step
029	1D	Rated (primary) current setting	(Note 1)	—	(Note 1)	
030	1E	Phase and wire system setting	1: 1P2W 3: 3P3W 2: 1P3W 4: 3P4W		1: 1P2W 3: 3P3W 2: 1P3W 4: 3P4W	
032	20	Demand time limit setting	0 to 15 min. (0 is an instantaneous value.)	In 1-min units Default: 2 min.	(Note 4) (0 is an instantaneous value.)	(Note 4) Default: 2 min.
033	21	Rated (primary) voltage setting	(Note 2)	—	(Note 2)	—
034	22	Analog channel setting 1	According to the channel of the analog monitor command	The channel number is stored in 8-bit units.	—	—
035	23	Analog channel setting 2	According to the channel of the analog monitor command	The channel number is stored in 8-bit units.	—	—
072	48	Current demand time limit setting	—	—	(Note 4) (0 is an instantaneous value.)	(Note 4) Default: 2 min.
073	49	Power demand time limit setting	—	—	(Note 4) (0 is an instantaneous value.)	(Note 4) Default: 2 min.
074	4A	CT/pulse switching setting	0: CT input 1: Pulse input	—	—	—
075	4B	5A input switching setting	0: Other 1: 5A product	—	0: Direct sensor 2: 5A split-type sensor	—

If a channel other than the above channels is specified, an out-of-range channel error is returned.
If the channel for time limit or primary voltage is specified for a measuring circuit that has been set to the pulse input type, an out-of-range channel error is returned.
When data out of any setting range is set, a data error is returned, and the setting is not changed.
If a setting command is received during setting operation on the unit, the “unit in setting mode” error is returned.

Note 1: The ranges vary depending on the primary voltage and phase and wire system settings.

	Multi-circuit energy measuring unit	Energy measuring unit
	EMU-C7P4-6	EMU2-RD*1
Primary current setting when 5A input switching is 0 (other).	50A, 100A, 250A, 400A, 600A	50A, 100A, 250A, 400A, 600A
Primary current setting when 5A input switching is 1 (5A through type) or 2 (5A split-type sensor).	5A, 7.5A, 10A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 2000A	5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A

Note 2: The ranges vary depending on the primary voltage and phase and wire system settings.

	Multi-circuit energy measuring unit	Energy measuring unit
	EMU-C7P4-6 EMU-C7P4-6-A	EMU2-RD*1
1P2W/3P3W	110V, 220V, 440V	110V, 220V, 440V, 690V, 1100V, 2200V, 3300V, 6600V, 11000V, 13200V, 13800V, 15000V, 16500V, 22000V, 24000V, 33000V, 66000V, 77000V, 110000V
1P3W	110V, 220V, 440V	110V
3P4W (setting based on line-to-line voltage)	63.5V/110, 110V/190V 415V/440V, 254V/440V	63.5V/110V, 110/190V, 120V/208V, 220V/380V, 240V/415V, 254V/440V (EMU2-RD*-C-4W only)

Note 3: The decision on whether the channel is within the supported range is made in the same manner as in the case of analog monitor command.
It is allowed to set the same channel several times.
If a channel out of the range is included, a data error is returned, the data H and L are discarded, and the setting is not changed.
The default values are shown below.

Phase and wire system setting	Analog channel setting 1 (Hexadecimal data)		Analog channel setting 2 (Hexadecimal data)	
1P2W	02	02	02	11
1P3W	02	03	04	11
3P3W				
3P4W				

Note 4: Demand time limit setting range

	Setting range and setting step	Unit	Supplement
20	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	Min.	When any of the values shown left is set in 20h, the same value is collectively set in 48h and 49h. Reading with 20h reads the setting in 48h. When 15 has been set in 20h, 900 is set in 48h and 49h. If a value not included in the setting range of 20h has been set for 48h, the value is read as a fixed value, 0.
48	0, 10, 20, 30, 40, 50, 60, 120, 180, 240, 300, 360, 420, 480, 540, 600, 660, 720, 780, 840, 900, 1200, 1500, 1800	Sec.	
49			

*1: Applicable models:
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(7) Analog data request (C1H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

C1H	Analog data request	Monitoring of data on current, voltage, electric power, leakage current and time of occurrence of maximum value

- Channel numbers have been allocated to the measuring data. (See Table 6.7.)
- Set and write the channel number of the data to be monitored in the relevant memory.
- The structure of the data returned from the measuring unit varies depending on the data channel number (measuring data). (See Table 6.8.)
- The structure and significant digits of data vary depending on the settings (phase and wire system, primary voltage and primary current) of the measuring unit. (Determine the structure, significant digits and multiplying factor of the measuring data referring to Tables 6.8 and 6.9.)
- Stored measuring data vary depending on the measuring unit type (model name). If data not stored in the unit is requested, an out-of-range channel error occurs. (See Table 6.7.)
- Stored measuring data vary depending on the setting (phase and wire system) of the measuring unit. If data not stored in the unit is requested, an out-of-range channel error occurs. (See Table 6.7.)

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b0
m	Channel No.	C1H (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	High-order data	Low-order data
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Note: If a measuring error occurs, a hardware error is returned.

Table 6.7 Data Channel Allocation

① Multi-circuit energy measuring unit: EcoMonitor

Data channel No.		Note	Data type	Data name	Unit	EMU-C7P4-6	Data format
Decimal No.	Hexa-decimal						
002	02		Measurement data	Current value of phase 1 current	(A)	✓	②
003	03	*1		Current value of phase 2 current	(A)	✓	
004	04	*1		Current value of phase 3 current	(A)	✓	
005	05	*2		Current value of phase 0 current	(A)	✓	
006	06			Current value of voltage between phases 1 and 2	(V)	✓	①
007	07	*1		Current value of voltage between phases 2 and 3	(V)	✓	
008	08	*1		Current value of voltage between phases 3 and 1	(V)	✓	
017	11			Maximum current demand	(A)	✓	
018	12		Data on time of occurrence of maximum value	Year of occurrence of above max. value	(year)	✓	⑥
019	13			Month and day of occurrence of above max. value	(mo./day)	✓	
020	14			Hour and minute of occurrence of above max. value	(hr/min)	✓	
021	15	*3	Measurement data	Current value of electric power	(kW)	✓	③
022	16	*3		Electric power demand	(kW)	✓	
023	17	*3		Maximum electric power demand	(kW)	✓	
024	18		Data on time of occurrence of maximum value	Year of occurrence of above max. value	(year)	✓	⑥
025	19			Year and month of occurrence of above max. value	(mo./day)	✓	
026	1A			Hour and minute of occurrence of above max. value	(hr/min)	✓	
028	1C		Setting data	Unit type setting		✓	⑨
029	1D			Primary current setting	(A)	✓	⑧
030	1E			Phase and wire system setting		✓	⑨
032	20			Demand time limit setting	(min)	✓	
033	21			Primary voltage setting	(V)	✓	⑦
057	39		Measurement data	Current value of total current	(A)	✓	②
058	3A			Current value of max. phase current	(A)	✓	
059	3B			Phase 1 current demand	(A)	✓	
060	3C			Phase 2 current demand	(A)	✓	
061	3D			Phase 3 current demand	(A)	✓	
062	3E	*2		Phase 0 current demand	(A)	✓	
063	3F			Max. phase current demand	(A)	✓	
066	42		Data on time of occurrence of maximum value	Year of occurrence of voltage max. value	(year)	✓	⑥
067	43			Month and day of occurrence of voltage max. value	(mo./day)	✓	
068	44			Hour and minute of occurrence of voltage max. value	(hr/min)	✓	
074	4A		Setting data	CT input/pulse input setting	-	✓	⑨
075	4B			5A/direct setting	-	✓	
086	56	*2	Measurement data	Current value of voltage between phases 1 and 0	(V)	✓	①
087	57	*2		Current value of voltage between phases 2 and 0	(V)	✓	
088	58	*2		Current value of voltage between phases 3 and 0	(V)	✓	
089	59			Current value of total voltage	(V)	✓	
090	5A			Max. voltage	(V)	✓	
247	F7	*3		Current value of electric power	(kW)	✓	③
248	F8	*3		Electric power demand	(kW)	✓	
249	F9	*3		Maximum electric power demand	(kW)	✓	

*1: When the phase and wire system is set to single-phase 2-wire (1P2W), an out-of-range channel error occurs because the unit does not have such data.

*2: Only when the phase and wire system is set to 3-phase 4-wire (3P4W), the unit has such data. When it is set to any other system, an out-of-range channel error occurs.

*3: The data form and the channel number to be monitored change according to the phase and wire system, primary current and primary voltage settings. For the data structure, see Tables 6.8 and 6.9.

Table 6.7 Data Channel Allocation

② Energy measuring unit (1/4): EcoMonitorPro

Data channel No.		Note	Data type	Data name	Unit	EMU2-RD*4	Data format
Decimal No.	Hexa-decimal						
002	02		Measurement data	Current value of phase 1 current	(A)	✓	②
003	03	*1		Current value of phase 2 current	(A)	✓	
004	04	*1		Current value of phase 3 current	(A)	✓	
005	05	*2		Current value of phase 0 current	(A)	✓	
006	06			Current value of voltage between phases 1 and 2	(V)	✓	①
007	07	*1		Current value of voltage between phases 2 and 3	(V)	✓	
008	08	*1		Current value of voltage between phases 3 and 1	(V)	✓	
017	11			Maximum current demand	(A)	✓	②
021	15	*3	Measurement data	Current value of electric power	(kW)	✓	③
022	16	*3		Electric power demand	(kW)	✓	
023	17	*3		Maximum electric power demand	(kW)	✓	
027	1B			Power factor	(%)	✓	
028	1C		Setting data	Unit type setting	-	✓	⑨
029	1D			Primary current setting	(A)	✓	⑧
030	1E			Phase and wire system setting	-	✓	⑨
032	20			Demand time limit setting	(min)	✓	
033	21			Primary voltage setting	(V)	✓	⑦
052	34	*3	Measurement data	Current value of instantaneous reactive power (x1,x0.1)	(kvar)	✓	③
055	37			Max. power factor	(%)	✓	
056	38			Min. power factor	(%)	✓	
057	39			Current value of total current	(A)	✓	②
059	3B			Phase 1 current demand	(A)	✓	
060	3C	*1		Phase 2 current demand	(A)	✓	
061	3D	*1		Phase 3 current demand	(A)	✓	
062	3E	*2		Phase 0 current demand	(A)	✓	
063	3F			Max. current demand	(A)	✓	
064	40			Min. current demand	(A)	✓	
069	45			Current value of frequency	(Hz)	✓	③
072	48		Setting data	Demand time limit: Current	(sec)	✓	⑨
073	49			Demand time limit: Electric power	(sec)	✓	
075	4B			5A/direct setting	-	✓	
086	56	*2	Measurement data	Current value of voltage between phases 1 and 0	(V)	✓	①
087	57	*2		Current value of voltage between phases 2 and 0	(V)	✓	
088	58	*2		Current value of voltage between phases 3 and 0	(V)	✓	
089	59			Current value of total voltage	(V)	✓	
090	5A			Max. voltage	(V)	✓	
094	5E			Min. voltage	(V)	✓	
108	6C	*3		Min. demand power (x1, x0.1)	(kW)	✓	③
109	6D	*3		Min. demand power (x10, x100)	(kW)	✓	
110	6E	*3		Min. demand power (x0.01, x0.001)	(kW)	✓	

Table 6.7 Data Channel Allocation

② Energy measuring unit (2/4): EcoMonitorPro

Data channel No.		Note	Data type	Data name	Unit	EMU2-RD*4	Data format
Decimal No.	Hexa-decimal						
120	78		Measurement data	High-frequency voltage fundamental effective value (between 1 and 2)	(V)	✓	
121	79	*1		High-frequency voltage fundamental effective value (between 2 and 3)	(V)	✓	
122	7A	*2		High-frequency voltage fundamental effective value (between 3 and 1)	(V)	✓	
123	7B			High-frequency voltage 9th effective value (between 1 and 2)	(V)	✓	
124	7C			High-frequency voltage 11th effective value (between 1 and 2)	(V)	✓	①
125	7D			High-frequency voltage 13th effective value (between 1 and 2)	(V)	✓	
126	7E	*1		High-frequency voltage 9th effective value (between 2 and 3)	(V)	✓	
127	7F	*1		High-frequency voltage 11th effective value (between 2 and 3)	(V)	✓	
128	80	*1		High-frequency voltage 13th effective value (between 2 and 3)	(V)	✓	
129	81	*2		High-frequency voltage 9th effective value (between 3 and 1)	(V)	✓	
130	82	*2		High-frequency voltage 11th effective value (between 3 and 1)	(V)	✓	
131	83	*2		High-frequency voltage 13th effective value (between 3 and 1)	(V)	✓	
132	84			High-frequency voltage 9th content (between 1 and 2)	(%)	✓	
133	85			High-frequency voltage 11th content (between 1 and 2)	(%)	✓	
134	86			High-frequency voltage 13th content (between 1 and 2)	(%)	✓	
135	87	*1		High-frequency voltage 9th content (between 2 and 3)	(%)	✓	
136	88	*1		High-frequency voltage 11th content (between 2 and 3)	(%)	✓	③
137	89	*1		High-frequency voltage 13th content (between 2 and 3)	(%)	✓	
138	8A	*2		High-frequency voltage 9th content (between 3 and 1)	(%)	✓	
139	8B	*2		High-frequency voltage 11th content (between 3 and 1)	(%)	✓	
140	8C	*2		High-frequency voltage 13th content (between 3 and 1)	(%)	✓	
141	8D		Measurement data	High-frequency current fundamental effective value (on side 1)	(A)	✓	
142	8E	*2		High-frequency current fundamental effective value (on side 2)	(A)	✓	
143	8F	*1		High-frequency current fundamental effective value (on side 3)	(A)	✓	
144	90			High-frequency current 9th effective value (on side 1)	(A)	✓	
145	91			High-frequency current 11th effective value (on side 1)	(A)	✓	
146	92			High-frequency current 13th effective value (on side 1)	(A)	✓	
147	93	*2		High-frequency current 9th effective value (on side 2)	(A)	✓	②
148	94	*2		High-frequency current 11th effective value (on side 2)	(A)	✓	
149	95	*2		High-frequency current 13th effective value (on side 2)	(A)	✓	
150	96	*1		High-frequency current 9th effective value (on side 3)	(A)	✓	
151	97	*1		High-frequency current 11th effective value (on side 3)	(A)	✓	
152	98	*1		High-frequency current 13th effective value (on side 3)	(A)	✓	
153	99			High-frequency current 9th content (on side 1)	(%)	✓	
154	9A			High-frequency current 11th content (on side 1)	(%)	✓	
155	9B			High-frequency current 13th content (on side 1)	(%)	✓	
156	9C	*2		High-frequency current 9th content (on side 2)	(%)	✓	
157	9D	*2		High-frequency current 11th content (on side 2)	(%)	✓	③
158	9E	*2		High-frequency current 13th content (on side 2)	(%)	✓	
159	9F	*1		High-frequency current 9th content (on side 3)	(%)	✓	
160	A0	*1		High-frequency current 11th content (on side 3)	(%)	✓	
161	A1	*1		High-frequency current 13th content (on side 3)	(%)	✓	

Table 6.7 Data Channel Allocation

② Energy measuring unit (3/4): EcoMonitorPro

Data channel No.		Note	Data type	Data name	Unit	EMU2-RD*4	Data format
Decimal No.	Hexa-decimal						
174	AE		Measurement data	High-frequency current total distortion factor (on side 1)	(%)	✓	③
175	AF	*2		High-frequency current total distortion factor (on side 2)	(%)	✓	
176	B0	*1		High-frequency current total distortion factor (on side 3)	(%)	✓	
177	B1			High-frequency current 3rd content (on side 1)	(%)	✓	
178	B2			High-frequency current 5th content (on side 1)	(%)	✓	
179	B3			High-frequency current 7th content (on side 1)	(%)	✓	
180	B4	*2		High-frequency current 3rd content (on side 2)	(%)	✓	
181	B5	*2		High-frequency current 5th content (on side 2)	(%)	✓	
182	B6	*2		High-frequency current 7th content (on side 2)	(%)	✓	
183	B7	*1		High-frequency current 3rd content (on side 3)	(%)	✓	
184	B8	*1		High-frequency current 5th content (on side 3)	(%)	✓	
185	B9	*1		High-frequency current 7th content (on side 3)	(%)	✓	
186	BA		Measurement data	High-frequency voltage total distortion factor (between 1 and 2)	(%)	✓	③
187	BB	*1		High-frequency voltage total distortion factor (between 2 and 3)	(%)	✓	
188	BC	*2		High-frequency voltage total distortion factor (between 3 and 1)	(%)	✓	
189	BD			High-frequency voltage 3rd content (between 1 and 2)	(%)	✓	
190	BE			High-frequency voltage 5th content (between 1 and 2)	(%)	✓	
191	BF			High-frequency voltage 7th content (between 1 and 2)	(%)	✓	
192	C0	*1		High-frequency voltage 3rd content (between 2 and 3)	(%)	✓	
193	C1	*1		High-frequency voltage 5th content (between 2 and 3)	(%)	✓	
194	C2	*1		High-frequency voltage 7th content (between 2 and 3)	(%)	✓	
195	C3	*2		High-frequency voltage 3rd content (between 3 and 1)	(%)	✓	
196	C4	*2		High-frequency voltage 5th content (between 3 and 1)	(%)	✓	
197	C5	*2		High-frequency voltage 7th content (between 3 and 1)	(%)	✓	
198	C6		Measurement data	High-frequency current total effective value (on side 1)	(A)	✓	②
199	C7	*2		High-frequency current total effective value (on side 2)	(A)	✓	
200	C8	*1		High-frequency current total effective value (on side 3)	(A)	✓	
202	CA			High-frequency current 3rd effective value (on side 1)	(A)	✓	
203	CB			High-frequency current 5th effective value (on side 1)	(A)	✓	
204	CC			High-frequency current 7th effective value (on side 1)	(A)	✓	
205	CD	*2		High-frequency current 3rd effective value (on side 2)	(A)	✓	
206	CE	*2		High-frequency current 5th effective value (on side 2)	(A)	✓	
207	CF	*2		High-frequency current 7th effective value (on side 2)	(A)	✓	
208	D0	*1		High-frequency current 3rd effective value (on side 3)	(A)	✓	
209	D1	*1		High-frequency current 5th effective value (on side 3)	(A)	✓	
210	D2	*1		High-frequency current 7th effective value (on side 3)	(A)	✓	
228	E4		Measurement data	High-frequency voltage total effective value (between 1 and 2)	(V)	✓	①
229	E5	*1		High-frequency voltage total effective value (between 2 and 3)	(V)	✓	
230	E6	*2		High-frequency voltage total effective value (between 3 and 1)	(V)	✓	
231	E7			High-frequency voltage 3rd effective value (between 1 and 2)	(V)	✓	
232	E8			High-frequency voltage 5th effective value (between 1 and 2)	(V)	✓	
233	E9			High-frequency voltage 7th effective value (between 1 and 2)	(V)	✓	
234	EA	*1		High-frequency voltage 3rd effective value (between 2 and 3)	(V)	✓	
235	EB	*1		High-frequency voltage 5th effective value (between 2 and 3)	(V)	✓	
236	EC	*1		High-frequency voltage 7th effective value (between 2 and 3)	(V)	✓	
237	ED	*2		High-frequency voltage 3rd effective value (between 3 and 1)	(V)	✓	
238	EE	*2		High-frequency voltage 5th effective value (between 3 and 1)	(V)	✓	
239	EF	*2		High-frequency voltage 7th effective value (between 3 and 1)	(V)	✓	

Table 6.7 Data Channel Allocation

② Energy measuring unit (4/4): EcoMonitorPro

Data channel No.		Note	Data type	Data name		EMU2-RD*4	Data format
Decimal No.	Hexa-decimal						
240	F0	*3	Measurement data	Current value of power (x10, x100)	(kW)	✓	⑤
241	F1	*3		Current value of demand power (x10, x100)	(kW)	✓	
242	F2	*3		Maximum demand power (x10, x100)	(kW)	✓	
244	F4	*3		Current value of reactive power (x10, x100)	(kvar)	✓	
247	F7	*3	Measurement data	Current value of power (x0.01, x0.001)	(kW)	✓	④
248	F8	*3		Current value of demand power (x0.01, x0.001)	(kW)	✓	
249	F9	*3		Minimum demand power (x0.01, x0.001)	(kW)	✓	
251	FB	*3		Current value of reactive power (x0.01, x0.001)	(kvar)	✓	

*1: When the phase and wire system is set to single-phase 2-wire (1P2W), data is not stored, and an out-of-range channel error occurs.

*2: Data is stored only when the phase and wire system is set to 3-phase 4-wire (3P4W). When another system is specified, an out-of-range channel error occurs.

*3: The number of significant digits of data and the multiplying factor change according to the phase and wire system, primary current and primary voltage settings, and also the channel number to be monitored changes. For the data structure, see Table 6.8. For the significant digits of data and multiplying factor, see Table 6.9.

*4: Applicable models:
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Table 6.8 Data Structure (1/5)

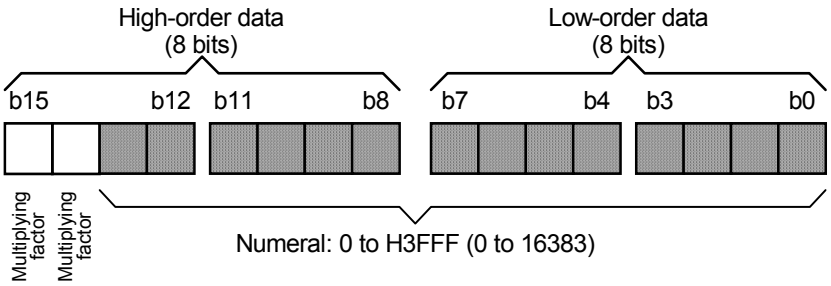
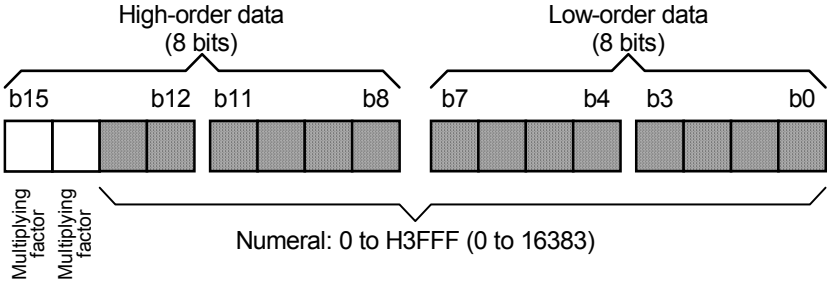
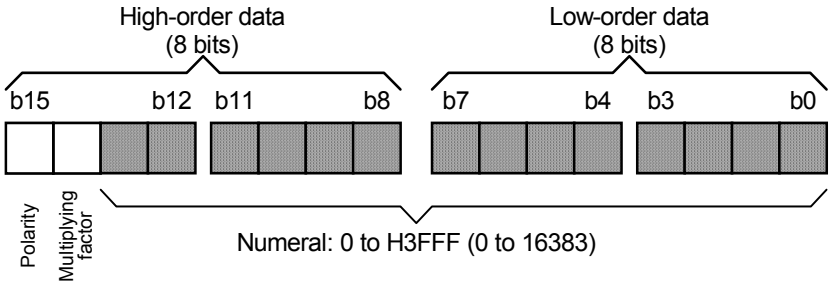
Data type	Data Structure
Measurement data Voltage data High-frequency voltage (effective value) Format ①	 <Details of multiplying factor> The multiplying factor has been determined based on the primary voltage setting. **See Table 4.** b15=0, b14=0: A numeral multiplied by 10 is indicated. (The actual value is 1/10 of the numeral.) b15=0, b14=1: A numeral multiplied by 1 is indicated. b15=1, b14=0: A value multiplied by 1/10 is indicated. (The actual value is 10 times the numeral.) b15=1, b14=1: A numeral multiplied by 1/100 is indicated. (The actual value is 100 times the numeral.) **When b15=0 and b14=0, processing to multiply the numeral by 1/10 is necessary on the high-order side.** **When b15=1 and b14=0, processing to multiply the numeral by 10 is necessary on the high-order side.** **When b15=1 and b14=1, processing to multiply the numeral by 100 is necessary on the high-order side.** <Examples of numeral: Current value of voltage> Data = H00FF (b15=0, b14=0, numeral=H00FF) · 25.5 [V] Data = H40FF (b15=0, b14=1, numeral=H00FF) · 255 [V] Data = H80FF (b15=1, b14=0, numeral=H00FF) · 2550 [V] Data = HC0FF (b15=1, b14=1, numeral=H00FF) · 25500 [V]
Measurement data Current data High-frequency current (effective value) Format ②	 <Details of multiplying factor> The multiplying factor has been determined based on the primary current setting. **See Table 4.** b15=0, b14=0: A numeral multiplied by 10 is indicated. (The actual value is 1/10 of the numeral.) b15=0, b14=1: A numeral multiplied by 1 is indicated. b15=1, b14=0: A value multiplied by 1/10 is indicated. (The actual value is 10 times the numeral.) b15=1, b14=1: A numeral multiplied by 1/100 is indicated. (The actual value is 100 times the numeral.) **When b15=0 and b14=0, processing to multiply the numeral by 1/10 is necessary on the high-order side.** **When b15=1 and b14=0, processing to multiply the numeral by 10 is necessary on the high-order side.** **When b15=1 and b14=1, processing to multiply the numeral by 100 is necessary on the high-order side.** <Examples of numeral: Current value of current> Data = H00FF (b15=0, b14=0, numeral=H00FF) · 25.5 [A] Data = H40FF (b15=0, b14=1, numeral=H00FF) · 255 [A] Data = H80FF (b15=1, b14=0, numeral=H00FF) · 2550 [A] Data = HC0FF (b15=1, b14=1, numeral=H00FF) · 2.55 [A]

Table 6.8 Data Structure (2/5)

<table>
<tr><th>Data type</th><th>Data Structure</th></tr>
<tr><td>Measurement data

(Data on electric power and reactive power One decimal place, integer) Power factor, frequency, high-frequency voltage, high-frequency current, content, distortion factor

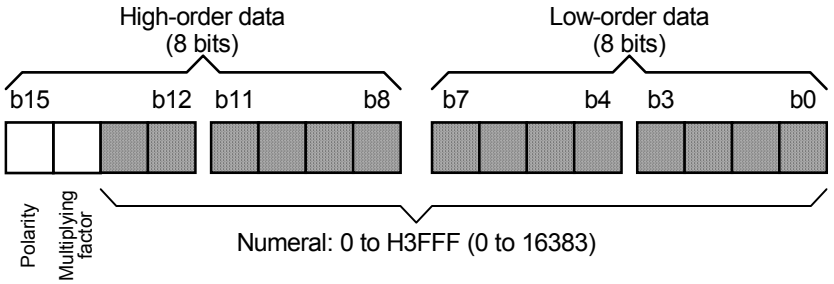
Format ③</td><td>


<Details of multiplying factor>
The multiplying factor has been determined based on the primary current setting, primary voltage setting and phase and wire system setting.
See Table 4.
b14=0: A numeral multiplied by 10 is indicated. (The actual value is 1/10 of the numeral.)
b14=1: A numeral multiplied by 1 is indicated.
When b14=0, processing to multiply the numeral by 1/10 is necessary on the high-order side.

<Details of polarity>
b15=0: The numeral is a positive value.
b15=1: The numeral is a negative value.
When b15=1, processing to prefix the minus symbol is necessary on the high-order side.

<Examples of numeral: Current value of power>
Data = H00FF (b15=0, b14=0, numeral=H00FF) · 25.5 [kW]
Data = H40FF (b15=0, b14=1, numeral=H00FF) · 255 [kW]
Data = H80FF (b15=1, b14=0, numeral=H00FF) · 25.5 [kW]
Data = HC0FF (b15=1, b14=1, numeral=H00FF) · –255 [kW]
</td></tr>
<tr><td>Measurement data

(Data on electric power and reactive power (two and three decimal places)

Format ④</td><td>


<Details of multiplying factor>
The multiplying factor has been determined based on the primary current setting, primary voltage setting and phase and wire system setting.
See Table 4.
b14=0: A numeral multiplied by 1000 is indicated. (The actual value is 1/1000 of the numeral.)
b14=1: A numeral multiplied by 100 is indicated. (The actual value is 1/100 of the numeral.)
When b14=0, processing to multiply the numeral by 1/1000 is necessary on the high-order side.
When b14=1, processing to multiply the numeral by 1/100 is necessary on the high-order side.

<Details of polarity>
b15=0: The numeral is a positive value.
b15=1: The numeral is a negative value.
When b15=1, processing to prefix the minus symbol is necessary on the high-order side.

<Examples of numeral: Current value of power>
Data = H00FF (b15=0, b14=0, numeral=H00FF) · 0.255 [kW]
Data = H40FF (b15=0, b14=1, numeral=H00FF) · 2.55 [kW]
Data = H80FF (b15=1, b14=0, numeral=H00FF) · –0.255 [kW]
Data = HC0FF (b15=1, b14=1, numeral=H00FF) · –2.55 [kW]
</td></tr>
</table>

Table 6.8 Data Structure (3/5)

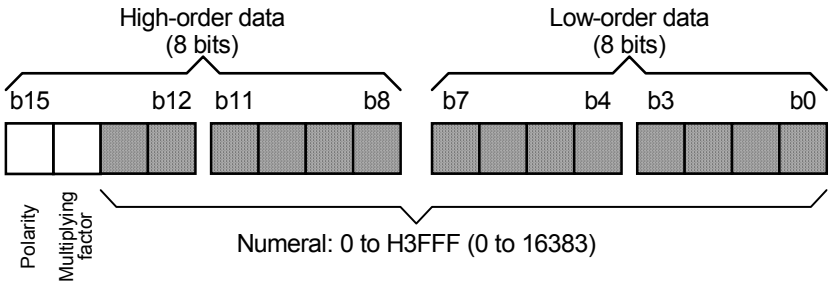
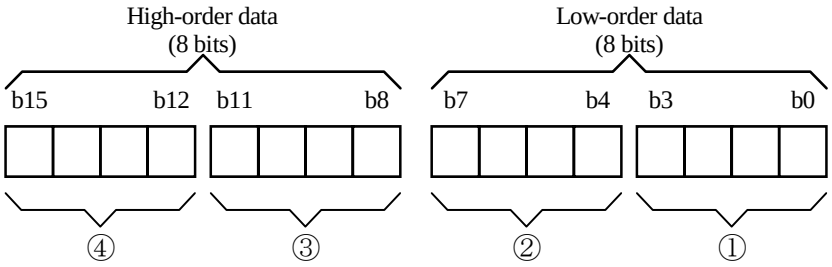
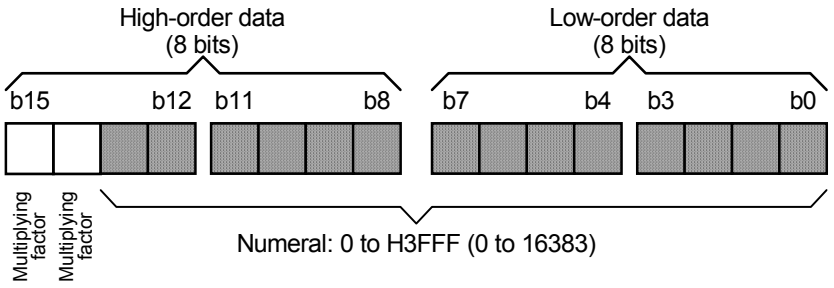
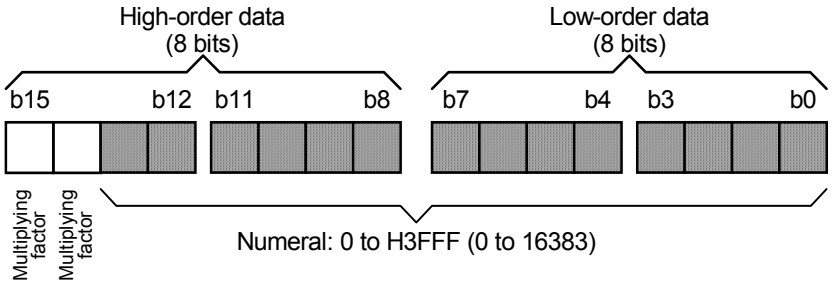
Data type	Data Structure
Measurement data (Data on electric power and reactive power (integer×10, ×100)) Format ⑤	 <Details of multiplying factor> The multiplying factor has been determined based on the primary current setting, primary voltage setting and phase and wire system setting. **See Table 4.** b14=0: A value multiplied by 1/10 is indicated. (The actual value is 10 times the numeral.) b14=1: A numeral multiplied by 1/100 is indicated. (The actual value is 100 times the numeral.) **When b14=0, processing to multiply the numeral by 10 is necessary on the high-order side.** **When b14=1, processing to multiply the numeral by 100 is necessary on the high-order side.** <Details of polarity> b15=0: The numeral is a positive value. b15=1: The numeral is a negative value. **When b15=1, processing to prefix the minus symbol is necessary on the high-order side.** <Examples of numeral: Current value of power> Data = H00FF (b15=0, b14=0, numeral=H00FF) · 2550 [kW] Data = H40FF (b15=0, b14=1, numeral=H00FF) · 25500 [kW] Data = H80FF (b15=1, b14=0, numeral=H00FF) · –2550 [kW] Data = HC0FF (b15=1, b14=1, numeral=H00FF) · –25500 [kW]
Data on time of occurrence of maximum value Format ⑥	 <Details> Year : ④ Fourth digit of year, ③ Third digit of year, ② Second digit of year ① First digit of year. Month and day : ④ Second digit of month (0 for January to September), ③ First digit of month, ② Second digit of day (0 for 1st to 9th), ① First digit of day. Hour and minute : ④ Second digit of hour (0 for 1 to 9 o'clock), ③ First digit of hour, ② Second digit of minute (0 for 1 to 9 min), ① First digit of minute. <Examples: Time of occurrence of maximum current demand> Year of occurrence of maximum current demand: Data = H1997 · 1997 Month and day of occurrence of maximum current demand: Data = H0602 · June 2 Hour and minute of occurrence of maximum current demand: Data = H1715 · 17:15

Table 6.8 Data Structure (4/5)

<table>
<tr><th>Data type</th><th>Data Structure</th></tr>
<tr><td>Measurement data
(Primary voltage setting)

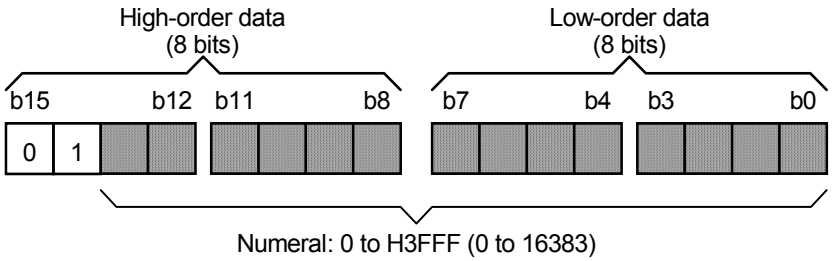
Format ⑦</td><td>


<Details of multiplying factor>
The primary voltage is set in b0 to b13. The number of significant digits for the setting has been determined (see Table 3). Therefore, process the value to be set according to the number of significant digits, and change the settings in b15 and b14 (multiplying factor).
When the least significant digit is the first decimal place: Multiply the setting by 10, and set 0 in b15 and b14.
When the least significant digit is the unit’s place: Set the value directly, and set 0 in b15 and 1 in b14.
When the least significant digit is the tens place: Multiply the setting by 1/10, and set 1 in b15 and 0 in b14.
When the least significant digit is the hundreds place: Multiply the setting by 1/100, and set 1 in b15 and b14.
<Examples of numeral: Primary voltage setting>
Setting = 110.0 V (least significant digit: first decimal place)
→ Data = H044C (b15=0, b14=0, numeral=H044C)
Setting = 220 V (least significant digit: unit’s place) → Data = H40DC (b15=0, b14=1, numeral=H00DC)
Setting = 3300 V (least significant digit: tens place) → Data = H814A (b15=1, b14=0, numeral=H014A)
</td></tr>
<tr><td>Measurement data
(Primary current setting)

Format ⑧</td><td>


<Details of multiplying factor>
The primary current is set in b0 to b13. The number of significant digits for the setting has been determined (see Table 3). Therefore, process the value to be set according to the number of significant digits, and change the settings in b15 and b14 (multiplying factor).
When the least significant digit is the first decimal place: Multiply the setting by 10, and set 0 in b15 and b14.
When the least significant digit is the unit’s place: Set the value directly, and set 0 in b15 and 1 in b14.
When the least significant digit is the tens place: Multiply the setting by 1/10, and set 1 in b15 and 0 in b14.
When the least significant digit is the second decimal place: Multiply the setting by 100, and set 1 in b15 and b14.
<Examples of numeral: Primary current setting>
Setting = 100.0 A (least significant digit: first decimal place)
→ Data = H03E8 (b15=0, b14=0, numeral=H03E8)
Setting = 400 A (least significant digit: unit’s place) → Data = H4190 (b15=0, b14=1, numeral=H0190)
Setting = 4000 A (least significant digit: tens place) → Data = H8190 (b15=1, b14=0, numeral=H0190)
Setting = 5.00 A (least significant digit: second decimal place)
→ Data = HC1F4 (b15=1, b14=1, numeral=H01F4)
</td></tr>
</table>

Table 6.8 Data Structure (5/5)

Data type	Data Structure
Measurement data (Phase and wire system setting) (Current demand time limit setting) (Power demand time limit setting) (Unit type setting) (B/NET connection setting) Format ⑨	 Numeral: 0 to H3FFF (0 to 16383) <Details of data (numeric part)> Phase and wire system: Single-phase 2-wire (1P2W) = H4001 Single-phase 3-wire (1P3W) = H4002 3-phase 3-wire (3P3W) = H4003 3-phase 4-wire (3P4W) = H4004 Demand time limit: The data range varies depending on the data channel number to be read. Unit type: CT input/pulse input setting: CT input= H4000 Pulse input = H4001 5A/direct setting: Direct setting = H4000 5A setting = H4001

Data channel No.	Data range
H20	In 1-min. steps in range from 0 min (H0000) to 15 min (H400F)
H48	In second units in range from 0 sec (H4000) to 1800 sec (H4708)
H49	

Model name	Data
EMU2-RD3-C	H4033
EMU2-RD5-C	H4035
EMU2-RD7-C	H4037
EMU2-RD2-C-4W	H4052
EMU2-RD4-C-4W	H4054

Table 6.9 Significant Digits of Data and Multiplying Factor

(1) Data format for electric power and reactive power

① Multi-circuit energy measuring unit: EcoMonitor

<Model EMU-C7P4-6>

Vertical axis : Primary current setting

Horizontal axis : Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W			1P3W	3P3W		3P4W			
V / A	110	220	440	220	220	440	63.5/110	110/190	240/415	254/440
5.0A	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
7.5A	2 digits	2 digits	2 digits	2 digits	2 digits	1 digit	2 digits	2 digits	1 digit	1 digit
10.0A	2 digits	2 digits	2 digits	2 digits	2 digits	1 digit	2 digits	2 digits	1 digit	1 digit
15.0A	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit	2 digits	2 digits	1 digit	1 digit
20.0A	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit	2 digits	1 digit	1 digit	1 digit
25.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	2 digits	1 digit	1 digit	1 digit
30.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
40.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
50.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
60.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
75.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
80.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
100.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
120.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
150.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
200A	1 digit	1 digit	1 digit	1 digit	1 digit	x1	1 digit	1 digit	x1	x1
250A	1 digit	1 digit	1 digit	1 digit	1 digit	x1	1 digit	1 digit	x1	x1
300A	1 digit	1 digit	x1	x1	1 digit	x1	1 digit	1 digit	x1	x1
400A	1 digit	1 digit	x1	x1	x1	x1	1 digit	x1	x1	x1
500A	1 digit	1 digit	x1	x1	x1	x1	1 digit	x1	x1	x1
600A	1 digit	x1	x1	x1	x1	x1	1 digit	x1	x1	x1
750A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
800A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
1000A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
1200A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
1500A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
2000A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1

Note: “2 digits” indicates two decimal places (x 0.01), and “1 digit” indicates one decimal place (x 0.1).
Note: “x1” indicates an integer x 1.

② Energy measuring unit: EcoMonitorPro
<Model EMU2-RD[*1]>

Vertical axis : Primary current setting
Horizontal axis : Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W					1P3W	3P3W							
V / A	110	220	440	3300	6600	110	110	220	440	3300	6600	11000	22000	33000
5	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits	1 digit	1 digit
6	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits	1 digit	1 digit
7.5	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
8	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
10	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit
12	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit
15	3 digits	3 digits	3 digits	2 digits	2 digits	3 digits	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit
20	3 digits	3 digits	3 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit
25	3 digits	3 digits	3 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit	x1
30	3 digits	3 digits	2 digits	2 digits	1 digit	3 digits	3 digits	3 digits	2 digits	1 digit	1 digit	1 digit	1 digit	x1
40	3 digits	3 digits	2 digits	1 digit	1 digit	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
50	3 digits	3 digits	2 digits	1 digit	1 digit	3 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
60	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	3 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
75	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
80	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
100	3 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
120	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
150	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
200	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x1
250	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
300	2 digits	2 digits	1 digit	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
400	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
500	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
600	2 digits	1 digit	1 digit	x1	x1	1 digit	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
750	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
800	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1000	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1200	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
1500	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
1600	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
2000	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
2500	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
3000	1 digit	1 digit	x1	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	—
4000	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	—
5000	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	—	—
6000	1 digit	x1	x1	x10	x10	x1	1 digit	x1	x1	x10	x10	x10	—	—
7500	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	—	—
8000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	—	—
10000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	—	—	—
12000	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	—	—	—
20000	x1	x1	x1	x10	—	x1	x1	x1	x10	x10	—	—	—	—
25000	x1	x1	x1	x10	—	x1	x1	x1	x10	x100	—	—	—	—
30000	x1	x1	x10	—	—	x1	x1	x1	x10	—	—	—	—	—

Phase and wire system	3P4W					
V / A	63.5 / 110	110 / 190	120 / 208	220 / 380	240 / 415	254 / 440
5	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
6	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
7.5	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
8	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
10	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
12	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
15	3 digits	3 digits	3 digits	3 digits	3 digits	3 digits
20	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
25	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
30	3 digits	3 digits	3 digits	2 digits	2 digits	2 digits
40	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
50	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
60	3 digits	2 digits	2 digits	2 digits	2 digits	2 digits
75	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
80	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
100	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
120	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
150	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
200	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
250	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
300	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
400	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
500	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
600	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
750	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
800	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1000	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1200	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1500	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
1600	1 digit	1 digit	1 digit	1 digit	1 digit	x1
2000	1 digit	1 digit	1 digit	x1	x1	x1
2500	1 digit	1 digit	1 digit	x1	x1	x1
3000	1 digit	1 digit	1 digit	x1	x1	x1
4000	1 digit	x1	x1	x1	x1	x1
5000	1 digit	x1	x1	x1	x1	x1
6000	1 digit	x1	x1	x1	x1	x1
7500	x1	x1	x1	x1	x1	x1
8000	x1	x1	x1	x1	x1	x1
10000	x1	x1	x1	x1	x1	x1
12000	x1	x1	x1	x1	x1	x1
20000	x1	x1	x1	x10	x10	x10
25000	x1	x1	x1	x10	x10	x10
30000	x1	x1	x1	x10	x10	x10

Note: “3 digits” indicates three decimal places (x 0.001), and “2 digits” indicates two decimal places (x 0.01).
Note “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.
Note: “x10” indicates an integer x 10. “x100” indicates an integer x 100.
Note: “−“ indicates an area out of the setting range.
Note: If a channel other than the channels (3 decimal places, 2 decimal places, 1 decimal place, integer x 1 and integer x 10) determined by the primary voltage, primary current and phase and wire system settings according to the above table is received, an out-of-range channel error is returned.

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(2) Data format for current and high-frequency current

Vertical axis: Primary current setting

Primary current (A)	Multi-circuit energy measuring unit EcoMonitor	Energy measuring unit EcoMonitorPro
	EMU-C7P4-6	EMU2-RD[*1]
5	1 digit	2 digits
6	—	2 digits
7.5	1 digit	2 digits
8	—	2 digits
10	1 digit	2 digits
12	—	2 digits
15	1 digit	2 digits
20	1 digit	2 digits
25	1 digit	2 digits
30	1 digit	2 digits
40	1 digit	1 digit
50	1 digit	1 digit
60	1 digit	1 digit
75	1 digit	1 digit
80	1 digit	1 digit
100	1 digit	1 digit
120	x1	1 digit
150	x1	1 digit
200	x1	1 digit
250	x1	1 digit
300	x1	1 digit
400	x1	x1
500	x1	x1
600	x1	x1
750	x1	x1
800	x1	x1
1000	x1	x1
1200	x1	x1
1500	x1	x1
1600	—	x1
2000	x1	x1
2500	—	x1
3000	—	x1
4000	—	x10
5000	—	x10
6000	—	x10
7500	—	x10
8000	—	x10
10000	—	x10
12000	—	x10
20000	—	x10
25000	—	x10
30000	—	x10

Note: “2 digits” indicates two decimal places (x 0.01), and “1 digit” indicates one decimal place (x 0.1).
Note: “x1” indicates an integer x 1, and “x10” indicates an integer x 10.

(3) Data format for voltage and high-frequency voltage

Vertical axis: Primary voltage setting

Phase and wire system	Primary voltage (V)	Multi-circuit energy measuring unit EcoMonitor	Energy measuring unit EcoMonitorPro	
		EMU-C7P4-6	EMU2-RD3-C EMU2-RD5-C EMU2-RD7-C	EMU2-RD2-C-4W EMU2-RD4-C-4W
1P2W 1P3W 3P3W	110	1 digit	1 digit	—
	220	x1	1 digit	—
	440	x1	x1	—
	690	—	x1	—
	1100	—	x1	—
	2200	—	x1	—
	3300	—	x10	—
	6600	—	x10	—
	11000	—	x10	—
	13200	—	x10	—
	13800	—	x10	—
	15000	—	x10	—
	16500	—	x10	—
	22000	—	x10	—
	24000	—	x10	—
	33000	—	x10	—
	66000	—	x10	—
	77000	—	x10	—
	110000	—	x10	—
3P4W	63.5/110	1 digit	—	1 digit
	110/190	x1	—	1 digit
	120/208	—	—	1 digit
	220/380	—	—	1 digit
	240/415	x1	—	1 digit
	254/440	x1	—	x1

Note: “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.

Note: "x10" indicates an integer x 10.

(8) Collective monitor (CCH) command

Command support	EcoMonitor	EcoMonitorPro
	✓	-

CCH	Collective monitor	Collective monitoring of data of the four channels set in the analog channel settings 1 and 2

- The data of the four channels requested by the analog data request (C1H) command can be collectively monitored according to the analog channel settings 1 (for 1ch and 2ch) and 2 (for 3ch and 4ch) in the analog data setting (CCH) command.
  The data on year, month, day, hour, minute and second cannot be monitored. To monitor the data on the date and time, use the analog data request command (C1H).
- For the data structure, see Table 6.8.

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b
m	00H	CCH (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	High-order data (1ch)	Low-order data (1ch)
n + 1	High-order data (2ch)	Low-order data (2ch)
n + 2	High-order data (3ch)	Low-order data (3ch)
n + 3	High-order data (4ch)	Low-order data (4ch)

Note: If a channel out of the channel specification range is specified in the analog data setting (C0H) command, the data of the default channel are returned.

(9) Optional collective monitor (CDH) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

CDH	Optional collective monitor	Collective monitoring of data on four items among current, voltage, electric power, leakage current and time of occurrence of maximum value

- Specify four channels to be monitored from the allocated data channel numbers stated in the data collection (C1H) command, and the data of the specified channels can be collectively monitored.
  If any of the specified channels is improper, an error is returned.
- The data format is the same as that used for the analog data request (C1H) command.
  The data on year, month, day, hour, minute and second cannot be monitored. To monitor the data on the date and time, use the analog data request command (C1H).
- **Set all four channel numbers of data** to be monitored.

Remote register RWw (sequencer → measuring unit)

	b15 … b8	b7 … b0
m	Channel No. A	CDH (command)
m + 1	Channel No. C	Channel No. B
m + 2	00H	Channel No. D
m + 3	00H	Unit No.

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 … b8	b7 … b0	
n	High-order data	Low-order data	… Channel No. A
n + 1	High-order data	Low-order data	… Channel No. B
n + 2	High-order data	Low-order data	… Channel No. C
n + 3	High-order data	Low-order data	… Channel No. D

Note: When a measuring error occurs, a hardware error is returned.

Note: If a channel other than the allocated data channels stated in the analog monitor (C1H) command is specified, an out-of-range channel error is returned.

(10) Counter specification latch (E1H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

E1H	Counter specification latch	Saving of data on integrated electric energy, etc. in the latch memory

- The current data of the specified channel is saved in the latch memory in the measuring unit.
- The data of the channel on which measurement data is currently being summed up is not cleared, and the measurement is continued.
- For the channel numbers, see Table 6.10.

Remote register RWw (sequencer → measuring unit)

	b15 b8	b7 b0
m	Channel No.	E1H (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	00H	00H
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Note: When a channel disabled from measuring is specified, a hardware error is returned.

Table 6.10 Channel Number Allocation

Data channel No.		Note	Data type	Data name	Unit	Remarks	Multi-circuit energy measuring unit EcoMonitor		Energy measuring unit EcoMonitorPro	Data format
							EMU-C7P4-6		EMU2-RD*1	
Decimal No.	Hexa-decimal						CT circuit	Pulse		
001	01		Measurement data	Pulse count			–	✓	–	②
063	3F			Integrated electric energy	(kWh)		✓	–	✓	①
068	44			Reactive power	(Kvarh)		–	–	✓	

Note: If a channel not listed above is specified, an out-of-range channel error is returned.
Note: If the data to be set is out of the above range, a data error is returned.

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(11) Counter specification latch & clear (E3H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

E3H	Counter specification latch & clear	Saving of data on integrated electric energy, etc. in the latch memory and clearing of current values

- The current data of the specified channel is saved in the latch memory in the measuring unit, and the current values are cleared (reset to 0).
- For the channel numbers, see Table 6.11.

Note 1: When the counter specification latch & clear command is executed, the operation for retaining the memory of integrated electric energy (writing to E^2PROM) is not performed. If the reset switch is pressed after the command is executed, since the operation for retaining the memory of the data is not performed, the clear instruction may be made invalid. When the control power of the measuring unit is turned off, the operation for retaining the memory is performed. To reset the measuring unit, it is recommended to turn off and on the control power.

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b0
m	Channel No.	E3H (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	00H	00H
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Note: When a channel disabled from measuring is specified, a hardware error is returned.

Table 6.11 Channel Number Allocation

Data channel No.		Note	Data type	Data name	Unit	Remarks	Multi-circuit energy measuring unit EcoMonitor		Energy measuring unit EcoMonitorPro	Data format
							EMU-C7P4-6		EMU2-RD*1	
Decimal No.	Hexa-decimal						CT circuit	Pulse		
001	01		Measurement data	Pulse count			–	✓	–	②
063	3F			Integrated electric energy	(kWh)		✓	–	✓	①
068	44			Reactive power	(Kvarh)		—	–	✓	

Note: If a channel not listed above is specified, an out-of-range channel error is returned.
Note: If the data to be set is out of the above range, a data error is returned.

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(12) Counter data request (E4H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

E4H	Counter data request	Monitoring of data on electric energy (integrated value, hourly electric energy, maximum hourly electric energy) and current time

- Channel numbers have been allocated to measuring data. (See Table 6.12.)
- Set and write the channel number of the data to be monitored in the relevant memory.
- The structure of the 24-bit (3-byte) data (high-order + medium-order + low-order) returned from the measuring unit varies depending on the contents of the data (data channel number). See Table 6.13.
- The data structure varies depending on the settings (phase and wire system, primary voltage and primary current) of the measuring unit.
  (Determine the measuring data structure referring to Tables 6.13 and 6.14.)
- The stored measuring data vary depending on the measuring unit type (model name). If data not stored in the unit is requested, an out-of-range channel error occurs. (See Table 6.12.)

Remote register RWw (sequencer → measuring unit)

	b15 b8	b7 b0
m	Channel No.	E4H (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWw (measuring unit → sequencer)

	b15 b8	b7 b0
n	Medium-order data	Low-order data
n + 1	00H	High-order data
n + 2	00H	00H
n + 3	00H	00H

Note: When a measuring error occurs, a hardware error is returned.

Table 6.12 Data Channel Number Allocation

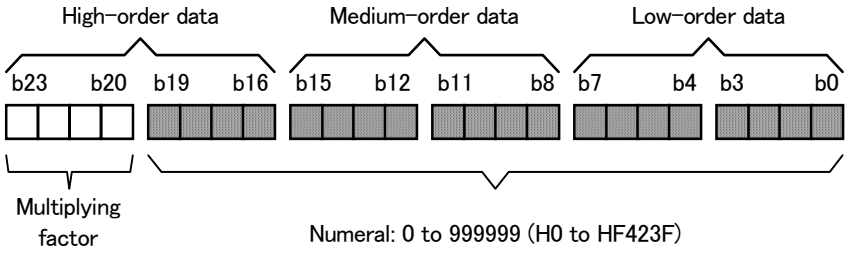
Data channel No.		Data type	Data name	Unit	Multi-circuit energy measuring unit EcoMonitor	Energy measuring unit EcoMonitorPro	Data format
Decimal No.	Hexa-decimal				EMU-C7P4-6	EMU2-RD*1	
001	01	Measurement data	Pulse count	–	✓	–	②
063	3F		Electric energy (integrated value)	(kWh)	✓	✓	①
068	44		Reactive power (delay)	(kvarh)	–	✓	
072	48		Electric energy (integrated value), increased number of significant figures	(kWh)	–	✓	
074	4A		Reactive power (delay), increased number of significant figures	(kvarh)	–	✓	
093	5D		Max. hourly electric energy	(kWh)	✓	–	
094	5E	Data on time of occurrence of maximum value	Year of occurrence of above max. value	(year)	✓	–	④
095	5F		Month and day of occurrence of above max. value	(mo./day)	✓	–	
096	60		Hour and minute of occurrence of above max. value	(hr/min)	✓	–	
113	71	Measurement data	Data on hourly electric energy at 1 o'clock (0 to 1)	(kWh)	✓	–	①
114	72		Data on hourly electric energy at 2 o'clock (1 to 2)	(kWh)	✓	–	
115	73		Data on hourly electric energy at 3 o'clock (2 to 3)	(kWh)	✓	–	
116	74		Data on hourly electric energy at 4 o'clock (3 to 4)	(kWh)	✓	–	
117	75		Data on hourly electric energy at 5 o'clock (4 to 5)	(kWh)	✓	–	
118	76		Data on hourly electric energy at 6 o'clock (5 to 6)	(kWh)	✓	–	
119	77		Data on hourly electric energy at 7 o'clock (6 to 7)	(kWh)	✓	–	
120	78		Data on hourly electric energy at 8 o'clock (7 to 8)	(kWh)	✓	–	
121	79		Data on hourly electric energy at 9 o'clock (8 to 9)	(kWh)	✓	–	
122	7A		Data on hourly electric energy at 10 o'clock (9 to 10)	(kWh)	✓	–	
123	7B		Data on hourly electric energy at 11 o'clock (10 to 11)	(kWh)	✓	–	
124	7C		Data on hourly electric energy at 12 o'clock (11 to 12)	(kWh)	✓	–	
125	7D		Data on hourly electric energy at 13 o'clock (12 to 13)	(kWh)	✓	–	
126	7E		Data on hourly electric energy at 14 o'clock (13 to 14)	(kWh)	✓	–	
127	7F		Data on hourly electric energy at 15 o'clock (14 to 15)	(kWh)	✓	–	
128	80		Data on hourly electric energy at 16 o'clock (15 to 16)	(kWh)	✓	–	
129	81		Data on hourly electric energy at 17 o'clock (16 to 17)	(kWh)	✓	–	
130	82		Data on hourly electric energy at 18 o'clock (17 to 18)	(kWh)	✓	–	
131	83		Data on hourly electric energy at 19 o'clock (18 to 19)	(kWh)	✓	–	
132	84		Data on hourly electric energy at 20 o'clock (19 to 20)	(kWh)	✓	–	
133	85		Data on hourly electric energy at 21 o'clock (20 to 21)	(kWh)	✓	–	
134	86		Data on hourly electric energy at 22 o'clock (21 to 22)	(kWh)	✓	–	
135	87		Data on hourly electric energy at 23 o'clock (22 to 23)	(kWh)	✓	–	
136	88		Data on hourly electric energy at 24 o'clock (23 to 24)	(kWh)	✓	–	
252	FC	Setting value	Pulse multiplier	–	✓	–	③
253	FD	Current time data	Date data	–	✓	✓	⑤
254	FE		Time data	–	✓	✓	

If a channel not listed above is specified, an out-of-range channel error is returned.

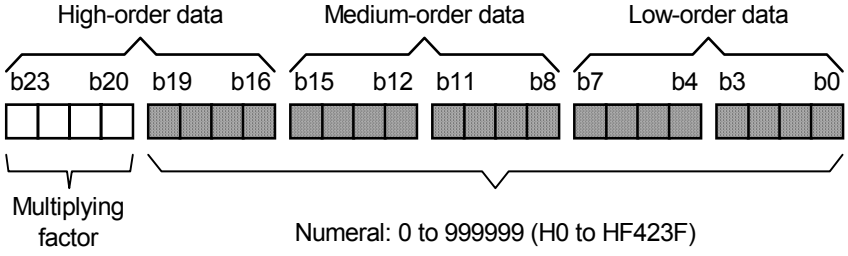
*1: Applicable models:
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Table 6.13 Data Structure (1/2)

<table>
<tr><th>Data type</th><th>Data Structure</th></tr>
<tr><td>Measurement data

Format ①</td><td>


<Details of multiplying factor>
The multiplying factor has been determined according to the primary current, primary voltage and phase and wire system settings.
See Table 6.
b20 to 23 = 1110 : A numeral multiplied by 100 is indicated (the actual value is 1/100 of the numeral).
b20 to 23 = 1111 : A numeral multiplied by 10 is indicated (the actual value is 1/10 of the numeral).
b20 to 23 = 0000: A value multiplied by 1 is indicated.
b20 to 23 = 0001: A numeral multiplied by 1/10 is indicated (the actual value is 10 times the numeral).
b20 to 23 = 0010: A numeral multiplied by 1/100 is indicated (the actual value is 100 times the numeral).
b20 to 23 = 0011 : A numeral multiplied by 1/1000 is indicated (the actual value is 1000 times the numeral).
When b20 to 23 = 1110, processing to multiply the numeral by 1/100 is necessary on the high-order side.
When b20 to 23 = 1111, processing to multiply the numeral by 1/10 is necessary on the high-order side.
When b20 to 23 = 0001, processing to multiply the numeral by 10 is necessary on the high-order side.
When b20 to 23 = 0010, processing to multiply the numeral by 100 is necessary on the high-order side.
When b20 to 23 = 0011, processing to multiply the numeral by 1000 is necessary on the high-order side.
<Examples of numeral: Electric energy>
Data = HEF423F (b20 to 23: 1110, numeral: HF423F) · 0 to 9999.99 kWh
Data = HFF423F (b20 to 23: 1111, numeral: HF423F) · 0 to 99999.9 kWh
Data = H0F423F (b20 to 23: 0000, numeral: HF423F) · 0 to 999999 kWh
Data = H1F423F (b20 to 23: 0001, numeral: HF423F) · 0 to 9999990 kWh
Data = H2F423F (b20 to 23: 0010, numeral: HF423F) · 0 to 99999900 kWh
Data = H3F423F (b20 to 23: 0011, numeral: HF423F) · 0 to 999999000 kWh
</td></tr>
<tr><td>Measurement data

Format ②</td><td>


<Details of multiplying factor>
b20 to 23 = 0000, fixed
<Examples of numeral>
Data = H0186A0 (b20 - 23: 0000, numeral H186A0) · 100000 counter
</td></tr>
</table>

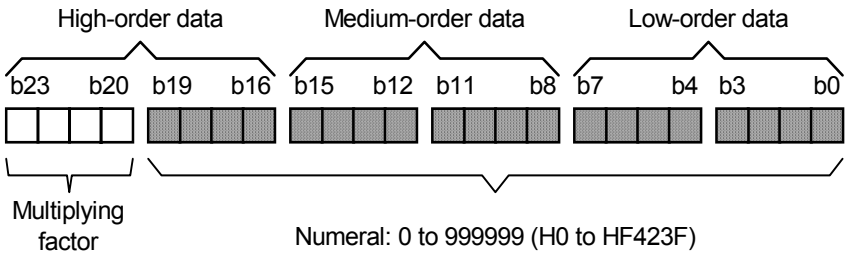
Measurement data (Pulse multiplier) Format ③	 <Details of multiplying factor> b20 to 23 = 1110, fixed; A numeral multiplied by 100 is indicated (the actual value is 1/100 of the numeral). **When b20 to 23 = 1110, processing to multiply the numeral by 1/100 is necessary on the high-order side.** <Examples of numeral> 0 to 9999.99

Table 6.13 Data Structure (2/2)

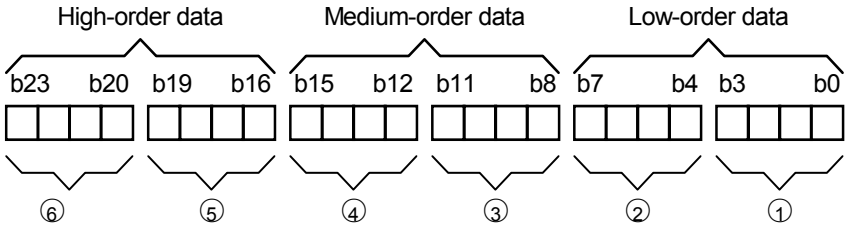
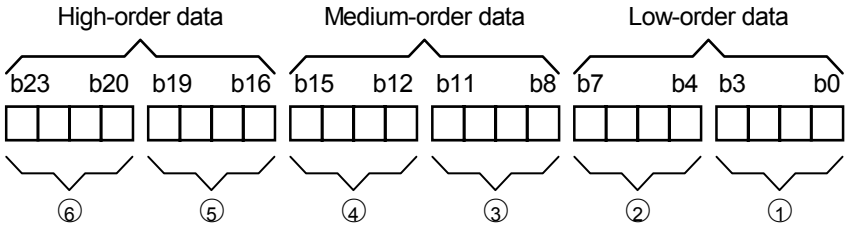
Data type	Data Structure
Data on time of occurrence of maximum value Format ④	 <Details> Year : ⑥ and ⑤ are fixed at 0 and are not used. ④ Fourth digit of year, ③ Third digit of year, ② Second digit of year, ① First digit of year. Month and day : ⑥ and ⑤ are fixed at 0 and are not used. ④ Second digit of month (0 for January to September), ③ First digit of month, ② Second digit of day (0 for 1st to 9th), ① First digit of day. Hour and minute :⑥ and ⑤ are fixed at 0 and are not used. ④ Second digit of hour (0 for 1 to 9 o'clock), ③ First digit of hour, ② Second digit of minute (0 for 1 to 9 min), ① First digit of minute. <Examples: Time of occurrence of maximum hourly electric energy> Year of occurrence of maximum hourly electric energy : Data = H001997· 1997 Month and day of occurrence of maximum hourly electric energy : Data = H000602· June 2 Hour and minute of occurrence of maximum hourly electric energy: Data = H001715· 17:15
Data on current time Format ⑤	 <Details> Date : ⑥ Second digit of year (0 for year 2000 to 2009), ⑤ First digit of year, ④ Second digit of month (0 for January to September), ③ First digit of month, ② Second digit of day (0 for 1st to 9th), ① First digit of day. Hour : ⑥ Second digit of hour (0 for 1 to 9 o'clock), ⑤ First digit of hour, ④ Second digit of minute (0 for 1 to 9 min), ③ First digit of minute, ② Second digit of second (0 for 1 to 9 sec), ① First digit of second. <Examples: Time of occurrence of maximum hourly electric energy> Date : Data=H970602 · June 2, 1997 Data =H051116 · November 16, 2005 Hour : Data =H171528 · 17:15:28 Data =H084500 · 08:45:00

Table 6.14 Significant Digits of Data and Multiplying Factor

<Multiplying factor for electric energy data (integrated value and hourly electric energy)>

① Multi-circuit energy measuring unit: EcoMonitor
<Model EMU-C7P4-6>
Vertical axis : Primary current setting
Horizontal axis : Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W			1P3W	3P3W		3P4W			
V / A	110	220	440	220	220	440	63.5/110	110/190	240/415	254/440
5.0A	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
7.5A	2 digits	2 digits	2 digits	2 digits	2 digits	1 digit	2 digits	2 digits	1 digit	1 digit
10.0A	2 digits	2 digits	2 digits	2 digits	2 digits	1 digit	2 digits	2 digits	1 digit	1 digit
15.0A	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit	2 digits	2 digits	1 digit	1 digit
20.0A	2 digits	2 digits	1 digit	1 digit	1 digit	1 digit	2 digits	1 digit	1 digit	1 digit
25.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	2 digits	1 digit	1 digit	1 digit
30.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
40.0A	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
50.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
60.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
75.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
80.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
100.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
120.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
150.0A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
200A	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit	x1	x1
250A	1 digit	1 digit	1 digit	1 digit	1 digit	x1	1 digit	1 digit	x1	x1
300A	1 digit	1 digit	x1	x1	1 digit	x1	1 digit	1 digit	x1	x1
400A	1 digit	1 digit	x1	x1	x1	x1	1 digit	x1	x1	x1
500A	1 digit	1 digit	x1	x1	x1	x1	1 digit	x1	x1	x1
600A	1 digit	x1	x1	x1	x1	x1	1 digit	x1	x1	x1
750A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
800A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
1000A	1 digit	x1	x1	x1	x1	x1	x1	x1	x1	x1
1200A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
1500A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1
2000A	x1	x1	x1	x1	x1	x1	x1	x1	x1	x1

Note: “2 digits” indicates two decimal places (x 0.01), and “1 digit” indicates one decimal place (x 0.1).
Note: “x1” indicates an integer x 1.

② Energy measuring unit: EcoMonitorPro

<Model EMU2-RD[*1]>

Vertical axis : Primary current setting

Horizontal axis : Primary voltage setting and phase and wire system setting

Phase and wire system	1P2W					1P3W	3P3W							
V / A	110	220	440	3300	6600	110	110	220	440	3300	6600	11000	22000	33000
5	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
6	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit	x1	x1
7.5	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
8	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
10	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1
12	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
15	2 digits	2 digits	2 digits	1 digit	1 digit	2 digits	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1
20	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x1
25	2 digits	2 digits	2 digits	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
30	2 digits	2 digits	1 digit	1 digit	x1	2 digits	2 digits	2 digits	1 digit	x1	x1	x1	x1	x10
40	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
50	2 digits	2 digits	1 digit	x1	x1	2 digits	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
60	2 digits	1 digit	1 digit	x1	x1	1 digit	2 digits	1 digit	1 digit	x1	x1	x1	x10	x10
75	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
80	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
100	2 digits	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10
120	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
150	1 digit	1 digit	1 digit	x1	x1	1 digit	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10
200	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x1	x10	x10	x10	x10
250	1 digit	1 digit	1 digit	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
300	1 digit	1 digit	x1	x1	x10	1 digit	1 digit	1 digit	x1	x10	x10	x10	x10	x100
400	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	x100
500	1 digit	1 digit	x1	x10	x10	1 digit	1 digit	x1	x1	x10	x10	x10	x100	x100
600	1 digit	x1	x1	x10	x10	x1	1 digit	x1	x1	x10	x10	x10	x100	x100
750	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
800	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
1000	1 digit	x1	x1	x10	x10	x1	x1	x1	x1	x10	x10	x100	x100	x100
1200	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	x100	x100	x100
1500	x1	x1	x1	x10	x10	x1	x1	x1	x1	x10	x100	x100	x100	x100
1600	x1	x1	x1	x10	x10	x1	x1	x1	x10	x10	x100	x100	x100	x100
2000	x1	x1	x1	x10	x100	x1	x1	x1	x10	x10	x100	x100	x100	x100
2500	x1	x1	x1	x10	x100	x1	x1	x1	x10	x100	x100	x100	x100	x1000
3000	x1	x1	x10	x10	x100	x1	x1	x1	x10	x100	x100	x100	x100	—
4000	x1	x1	x10	x100	x100	x1	x1	x10	x10	x100	x100	x100	x1000	—
5000	x1	x1	x10	x100	x100	x1	x1	x10	x10	x100	x100	x100	—	—
6000	x1	x10	x10	x100	x100	x10	x1	x10	x10	x100	x100	x100	—	—
7500	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	x1000	—	—
8000	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	x1000	—	—
10000	x1	x10	x10	x100	x100	x10	x10	x10	x10	x100	x100	—	—	—
12000	x10	x10	x10	x100	x100	x10	x10	x10	x10	x100	x1000	—	—	—
20000	x10	x10	x10	x100	—	x10	x10	x10	x100	x100	—	—	—	—
25000	x10	x10	x10	x100	—	x10	x10	x10	x100	x1000	—	—	—	—
30000	x10	x10	x100	—	—	x10	x10	x10	x100	—	—	—	—	—

Phase and wire system	3P4W					
V / A	63.5 / 110	110 / 190	120 / 208	220 / 380	240 / 415	254 / 440
5	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
6	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
7.5	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
8	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
10	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
12	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
15	2 digits	2 digits	2 digits	2 digits	2 digits	2 digits
20	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
25	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
30	2 digits	2 digits	2 digits	1 digit	1 digit	1 digit
40	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
50	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
60	2 digits	1 digit	1 digit	1 digit	1 digit	1 digit
75	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
80	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
100	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
120	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
150	1 digit	1 digit	1 digit	1 digit	1 digit	1 digit
200	1 digit	1 digit	1 digit	x1	x1	x1
250	1 digit	1 digit	1 digit	x1	x1	x1
300	1 digit	1 digit	1 digit	x1	x1	x1
400	1 digit	x1	x1	x1	x1	x1
500	1 digit	x1	x1	x1	x1	x1
600	1 digit	x1	x1	x1	x1	x1
750	x1	x1	x1	x1	x1	x1
800	x1	x1	x1	x1	x1	x1
1000	x1	x1	x1	x1	x1	x1
1200	x1	x1	x1	x1	x1	x1
1500	x1	x1	x1	x1	x1	x1
1600	x1	x1	x1	x1	x1	x10
2000	x1	x1	x1	x10	x10	x10
2500	x1	x1	x1	x10	x10	x10
3000	x1	x1	x1	x10	x10	x10
4000	x1	x10	x10	x10	x10	x10
5000	x1	x10	x10	x10	x10	x10
6000	x1	x10	x10	x10	x10	x10
7500	x10	x10	x10	x10	x10	x10
8000	x10	x10	x10	x10	x10	x10
10000	x10	x10	x10	x10	x10	x10
12000	x10	x10	x10	x10	x10	x10
20000	x10	x10	x10	x100	x100	x100
25000	x10	x10	x10	x100	x100	x100
30000	x10	x10	x10	x100	x100	x100

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

Note: “3 digits” indicates three decimal places (x 0.001), and “2 digits” indicates two decimal places (x 0.01).
Note: “1 digit” indicates one decimal place (x 0.1), and “x1” indicates an integer x 1.
Note: “x10” indicates an integer x 10. “x100” indicates an integer x 100.
Note: “—“ indicates an area out of the setting range.

Hint

For the energy measuring unit, the numbers of significant digits and the multiplying factors of the electric energy and reactive power energy can be determined through the following calculation.
Calculate the full-load power, and determine the multiplying factor.

$$\text{Full-load power [kW]} = \frac{\alpha \times (\text{Primary voltage}) \times (\text{Primary current})}{1000}$$

α: 1 Single-phase 2-wire
2 Single-phase 3-wire (Calculation with primary voltage of 110 V)
$\sqrt{3}$ 3-phase 3-wire
3 3-phase 4-wire (Primary voltage: Phase voltage)

Full-load power [kW]	Multiplying factor	Number of digits of data
Less than 12	2 digits	0 to 9999.99 kWh
12 to less than 120	1 digit	0 to 99999.9 kWh
120 to less than 1200	×1	0 to 999999 kWh
1200 to less than 12000	×10	0 to 9999990 kWh
12000 to less than 120000	×100	0 to 99999900 kWh
120000 or more	×1000	0 to 999999000 kWh

Note: The primary voltage setting multiplied by the primary current setting must not exceed 88,665 kW. (The allowable setting range is limited based on the value of the full-load power.)
For example, when the primary voltage setting is 110000 V, if the primary current is set to 30000 A, the primary voltage setting is automatically initialized to 220 V.
When the primary current setting is 30000 A, if the primary voltage is set to 110000 V, the primary current setting is automatically initialized to 100 A.

(13) Latch data monitor (E5H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

E5H	Latch data monitor	Monitoring of data on integrated electric energy, etc. in the latch memory

- The values on the specified channel number saved in the latch data memory in the measuring unit are monitored.
- For the channel numbers, see Table 6.15.
- The data structure varies depending on the settings (phase and wire system, primary voltage and primary current) of the measuring unit.
- For the data structure, see Table 6.13. For the significant digits and multiplying factor, see Table 6.14.

Note 1: The latch data is erased by pressing the reset switch or turning off power.

Remote register RWw (sequencer → measuring unit)

	b15 b8	b7 b0
m	Channel No.	E5H (command)
m + 1	00H	Unit No.
m + 2	00H	00H
m + 3	00H	00H

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	Medium-order data	Low-order data
n + 1	00H	High-order data
n + 2	00H	00H
n + 3	00H	00H

Note: When a measuring error occurs, a hardware error is returned.

Table 6.15 Channel Number Allocation

Data channel No.		Note	Data type	Data name	Unit	Remarks	Multi-circuit power measuring unit EcoMonitor		Energy measuring unit EcoMonitorPro	Data format
							EMU-C7P4-6		EMU2-RD*1	
Decimal No.	Hexa-decimal						CT circuit	Pulse		
001	01		Measurement data	Pulse count			−	✓	−	②
063	3F			Integrated electric energy	(kWh)		✓	−	✓	①
068	44			Reactive power	(Kvarh)		−	−	✓	

Note: If a channel not listed above is specified, an out-of-range channel error is returned.
Note: If the data to be set is out of the above range, a data error is returned.

*1: Applicable models
EMU2-RD1-C, EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

(14) Counter data setting (E6H) command

Command support	EcoMonitor	EcoMonitorPro
	✓	✓

E6H	Counter data setting	Coordinating of calendar and clock and setting of electric energy (integrated value)

- Use this command to coordinate the clock in the measuring unit and set the electric energy (integrated value).
- For the channel number of the data to be set, see Table 6.16.
- For the data structure, see Table 6.13. For the significant digits and multiplying factor, see Table 6.14.

Remote register RWw (sequencer → measuring unit)

	b15 – b8	b7 – b0
m	Channel No.	E6H (command)
m + 1	Medium-order data	High-order data
m + 2	00H	Low-order data
m + 3	00H	Unit No.

(*) Specify a unit number from 0H to 8H.

Remote register RWr (measuring unit → sequencer)

	b15 – b8	b7 – b0
n	00H	00H
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

Table 6.16 Channel Number Allocation

Data channel No.		Note	Data type	Data name	Unit	Range	Multi-circuit energy measuring unit EcoMonitor		Energy measuring unit EcoMonitorPro	Data format
							EMU-C7P4-6		EMU2-RD*1	
Decimal No.	Hexa-decimal						CT circuit	Pulse		
001	01		Measurement data	Pulse count		0 to 999999	–	✓	–	②
063	3F			Integrated electric energy	(kWh)	0 to 999999 ($\times 10^n$)	✓	–	✓	①
068	44			Reactive power	(Kvarh)	0 to 999999 ($\times 10^n$)	–	–	✓	
252	FC			Pulse multiplier		0 to 9999.99	–	✓	–	③
253	FD			Date data		Jan. 1, 1898 to Dec. 31, 2097	–	–	–	⑤
						Jan. 1, 2000 to Dec. 31, 2099	✓	–	✓	
254	FE			Time data		00:00:00 to 23:59:59	✓	–	✓	

Note: If a channel not listed above is specified, an out-of-range channel error is returned.
Note: If the data to be set is out of the above range, a data error is returned.

*1: Applicable models
EMU2-RD3-C, EMU2-RD5-C, EMU2-RD7-C, EMU2-RD2-C-4W, EMU2-RD4-C-4W

6.2.3 Details of transmission data form

(1) Data form for commands common to unit types

Multiplier								High-order data								Medium high-order data								Medium low-order data								Low-order data							
39	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

	Details of data form	EcoMonitor	EcoMonitor Pro	Item
Multiplier 10 to the –8th power : F8h 10 to the –7th power : F9h 10 to the –6th power : FAh 10 to the –5th power : FBh 10 to the –4th power : FCh 10 to the –3rd power : FDh 10 to the –2nd power : FEh 10 to the –1st power : FFh 10 to the –1st power : 01h 10 to the –2nd power : 02h 10 to the –3rd power : 03h 10 to the –4th power : 04h 10 to the –5th power : 05h 10 to the –6th power : 06h 10 to the –7th power : 07h	• Measurement data: Signed 32 bit data (Ex.)255 · 000000FFh -255 · FFFFFF01h	–	✓	Voltage data Rated (primary) voltage setting Current data Rated (primary) current setting Electric power data Reactive power data
Fixed at FFh	• Signed 32 bit data (Ex.) Power factor: 100.0% · 000003E8h	–	✓	Power factor (%) Frequency (Hz) Content (%), distortion factor (%)
Fixed at 00h	• Signed 32 bit data (Ex.) Demand time limit: 1800 seconds · 00000708h	–	✓	Demand time limit (sec) Phase and wire system Byte monitor Attribute monitor Unit type setting
Fixed at 00h	16 bit alarm input/reset output information • High-order data • Medium high-order data Fixed at 00h • Medium low-order data • Low-order data	–	✓	Alarm information 16 point (output) selection

(2) Data form for analog commands

High-order								Low-order							
b15	b14	b13	b12	b11	b10	b9	b8	b7	b6	b5	b4	b3	b2	b1	b0

↓ ↓

		Details of data form				Eco Monitor	Eco Monitor Pro	Item
		+/–	Form	Data range	Example of setting			
0	0	+	1 decimal place	0.0 to 999.9	110.0	✓	✓	Voltage data (V), Rated (primary) voltage setting
0	1	+	Integer	0 to 9999	220	✓	✓	
1	0	+	Integer(x10)	0 to 99990	45000	✓	✓	
1	1	+	Integer(x100)	0 to 999900	220000	–	✓	
0	0	+	1 decimal place	0 to 999.9	50.0, 100.0	✓	✓	Current data (A), Rated (primary) current setting
0	1	+	Integer	0 to 9999	250	✓	✓	
1	0	+	Integer(x10)	0 to 99990	30000	✓	✓	
1	1	+	2 decimal place	0 to 99.99	5.00	✓	✓	
0	0	+	1 decimal place	+0.0 to +1600.0		✓	✓	Electric power, reactive power data (kW) 1 decimal place, integer
0	1	+	Integer	+0 to +16000		✓	✓	
1	0	–	1 decimal place	–0.0 to –1600.0		✓	✓	
1	1	–	Integer	–0 to –16000		✓	✓	
0	0	+	3 decimal place	+0.000 to +16.000		✓	✓	Electric power, reactive power data (kW) 2 and 3 decimal place
0	1	+	2 decimal place	+0.00 to +160.00		✓	✓	
1	0	–	3 decimal place	–0.000 to –16.000		✓	✓	
1	1	–	2 decimal place	–0.00 to –160.00		✓	✓	
0	0	+	Integer (x10)	+0 to +160000		–	✓	Electric power, reactive power data (kW) Integer x10, x100
0	1	+	Integer (x100)	+0 to +1600000		–	✓	
1	0	–	Integer (x10)	–0 to –160000		–	✓	
1	1	–	Integer (x100)	–0 to –1600000		–	✓	
0	0	+	1 decimal place	+0.0 to +100.0		–	✓	Power factor(%)
1	0	–	1 decimal place	–0.0 to –99.9		–	✓	
0	1	–	Integer	0 to 9999		–	–	Leakage current (mA)
0	0	–	1 decimal place	+0.0 to +100.0		–	✓	Content (%), distortion factor (%)
0	1	–	–	0 to 15		✓	✓	Demand time (min)
0	1	–	–	0 to 1800	(The first digit is 0.)	–	✓	Demand time (sec)
0	1	–	–	–	1: 1P2W 2: 1P3W 3: 3P3W 4: 3P4W	✓	✓	Phase and wire system

		Details of data form					Eco Monitor	Eco Monitor Pro	Item
		+/–	Form	Data range	Example of setting				
0	1	–	–	–	H01	EMU-C7P4-6	✓	✓	Unit type setting
					H33	EMU2-RD3-C			
					H35	EMU2-RD5-C			
					H37	EMU2-RD7-C			
					H52	EMU2-RD2-C-4W			
					H54	EMU2-RD4-C-4W			
–	–	–	–	–	0 to 255 (Channel No.)		✓	–	Analog channel setting value

While settings are being changed on the setting screen or on the upper/lower limit setting screen, the error message “no B/NET connection” is returned.

(3) Data form for pulse commands

High-order								Medium-order								Low-order							
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

↓ ↓ ↓ ↓

				Details of data form		Item
Multiplying factor The exponential in decimal is indicated by 4 bits. −8 to 0 and 0 to 7				+	10 to the −8th power : 1000b 10 to the −7th power : 1001b 10 to the −6th power : 1010b 10 to the −5th power : 1011b 10 to the −4th power : 1100b 10 to the −3rd power : 1101b 10 to the −2nd power : 1110b 10 to the −1st power : 1111b 10 to the 0 power : 0000b 10 to the 1st power : 0001b 10 to the 2nd power: 0010b 10 to the 3rd power : 0011b 10 to the 4th power : 0100b 10 to the 5th power : 0101b 10 to the 6th power : 0110b 10 to the 7th power : 0111b	0 - 0.00999999 0 - 0.0999999 0 - 0.999999 0 - 9.99999 0 - 99.9999 0 - 999.999 0 - 9999.99 0 - 99999.9 0 - 999999 0 - 9999990 0 - 99999900 0 - 999999000 0 - 9999990000 0 - 99999900000 0 - 999999000000 0 - 9999990000000	Electric energy (kWh) Reactive power (kvarh) (Integrated electric energy and monitored electric energy)

The multiplying factor varies depending on the primary voltage and current settings.

b24 High-order Medium-order Low-order b0

Data range			Item
Year (BCD)* 0 - 99	Month (BCD) 1 - 12	Day (BCD) 1 - 31	Year/month/day
Time (BCD) 0 - 23	Minute (BCD) 0 - 59	Second (BCD) 0 - 59	Hour/minute/second

* Year: Last two digits of year

6.2.4 Occurrence of error

When a command transmitted to the measuring unit or data incidental to the command contains an error or a hardware error occurs in the measuring unit, RX(n+1)A (error status flag) is set to 1 (ON), and an error code shown in Table 6.17 is returned as response data.

Table 6.17 Error Codes

Details of error	Error code (Hexadecimal)	EcoMonitor	EcoMonitorPro
Undefined command The message length code is not appropriate to the command.	01h	✓	−
When the frequency, high-frequency voltage and high-frequency current are out of the measuring ranges, their current values are monitored.	17h	−	✓
Undefined command The message length code is not appropriate to the command.	40 h	−	✓
The group number is out of the specified range.	41 h	−	✓
The channel number is out of the specified range.	42h	−	✓
A setting command is received while the unit is in the setting mode.	44 h	−	✓
The unit number is out of the specified range.	45h	−	✓
The setting is out of the specified range.	51h	−	✓
Hardware trouble	C0h	✓	−
The channel number is out of the specified range.	C1h	✓	−
The setting is out of the specified range.	C2h	✓	−

When an error occurs, the error code is written in the remote register RWrn as shown below, and RX(n+1)A (error status flag) is set to 1 (error status), and RX(n+1)B (remote READY) is set to 0 (normal communication stopped).
For the procedures for clearing the error status, see 5.4 “Error communication.”

(1) When a command common to unit types is used

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	Channel No.	Group No.
n + 1	00H	00H
n + 2	00H	Error code
n + 3	00H	00H

n: Address allocated based on station number setting

(Note) When a value in a command common to unit types is out of the specified range, the response data is generated in the format shown in (2).

(2) When a digital command, analog command or pulse command is used.

Remote register RWr (measuring unit → sequencer)

	b15 b8	b7 b0
n	00H	Error code
n + 1	00H	00H
n + 2	00H	00H
n + 3	00H	00H

n: Address allocated based on station number setting

7. Abbreviations and terms used in this manual

The abbreviations and terms used in this manual are explained below.

Abbreviation or term	Description
Master station	Station controlling remote stations and local stations One master station is required on one system.
Local station	Station that has a CPU and can communicate with the master station and other local stations
Remote I/O station	Remote station that handles only bit information
Remote device station	Remote station that handles bit information and word information
Remote station	Generic name of remote I/O stations and remote device stations These stations are controlled by the master station.
Intelligent device station	Station capable of transient transmission (Local stations are included.)
RX	Remote input
RY	Remote output
RWw	Remote register (writing area)
RWr	Remote register (reading area)
Demand value	The demand value refers to an approximate mean value in the demand time limit. When the demand time limit is set to 0 min., each demand current value is equal to the current value.
Command	Identification code allocated to each item to be monitored or set On the measuring unit, a measurement is monitored or a parameter is set by transmitting the dedicated command.

Attached Table 1 List of Analog Monitor Command Data Channels

* "—" means that the channel is out of the range.

Data channel No.	Note	Data name	Unit	Multi-circuit energy measuring unit	Energy measuring unit		Commands common to unit types	
				EMU-C7P4-6	EMU2-RD*-C	EMU2-RD * -C-4W	Group No.	Channel No.
H02		Current value of phase 1 current	(A)	✓	✓	✓	01H	21H
H03	*1	Current value of phase 2 current	(A)	✓	✓	✓	01H	41H
H04	*1	Current value of phase 3 current	(A)	✓	✓	✓	01H	61H
H05	*2	Current value of phase 0 current	(A)	✓	–	✓	01H	81H
H06		Current value of voltage between phases 1 and 2	(V)	✓	✓	✓	05H	21H
H07	*1	Current value of voltage between phases 2 and 3	(V)	✓	✓	✓	05H	41H
H08	*1	Current value of voltage between phases 3 and 1	(V)	✓	✓	✓	05H	61H
H0B		Current value of leakage current	(mA)	–	–	–		
H0C		Leakage current demand	(mA)	–	–	–		
H0D		Maximum leakage current demand	(mA)	–	–	–		
H0E		Year of occurrence of above max. value	(year)	–	–	–		
H0F		Month and day of occurrence of above max. value	(mo./day)	–	–	–		
H10		Hour and minute of occurrence of above max. value	(hr/min)	–	–	–		
H11		Maximum current demand	(A)	✓	✓	✓	02H	A2H
H12		Year of occurrence of above max. value	(year)	✓	–	–		
H13		Month and day of occurrence of above max. value	(mo./day)	✓	–	–		
H14		Hour and minute of occurrence of above max. value	(hr/min)	✓	–	–		
H15	*3	Current value of electric power (x1, x0.1)	(kW)	✓	✓	✓	07H	01H
H16	*3	Electric power demand (x1, x0.1)	(kW)	✓	✓	✓	08H	01H
H17	*3	Maximum electric power demand (x1, x0.1)	(kW)	✓	✓	✓	08H	02H
H18		Year of occurrence of above max. value	(year)	✓	–	–		
H19		Year and month of occurrence of above max. value	(mo./day)	✓	–	–		
H1A		Hour and minute of occurrence of above max. value	(hr/min)	✓	–	–		
H1B		Power factor		–	✓	✓	0DH	01H
H1C		Unit type setting		✓	✓	✓	F0H	02H
H1D		Primary current setting	(A)	✓	✓	✓	E0H	11H
H1E		Phase and wire system setting		✓	✓	✓	E0H	13H
H20		Demand time limit setting	(min)	✓	✓	✓	E0H	15H
H21		Primary voltage setting	(V)	✓	✓	✓	E0H	12H
H34	*3	Current value of instantaneous reactive power (x1, x0.1)		–	✓	✓	09H	01H
H37		Max. power factor		–	✓	✓	0DH	02H
H38		Min. power factor		–	✓	✓	0DH	05H
H39		Current value of total current	(A)	✓	✓	✓	01H	01H
H3A		Current maximum value of current	(A)	✓	–	–		
H3B		Phase 1 current demand	(A)	✓	✓	✓	02H	21H
H3C	*1	Phase 2 current demand	(A)	✓	✓	✓	02H	41H
H3D	*1	Phase 3 current demand	(A)	✓	✓	✓	02H	61H
H3E	*2	Phase 0 current demand	(A)	✓	–	✓	02H	81H
H3F		Max. phase current demand	(A)	✓	✓	✓	02H	A1H
H40		Min. current demand	(A)	–	✓	✓	02H	C5H
H41		Max. voltage	(V)	–	–	–		

Data channel No.	Note	Data name	Unit	Multi-circuit energy measuring unit	Energy measuring unit		Commands common to unit types	
				EMU-C7P4-6	EMU2-RD*-C	EMU2-RD*-C-4W	Group No.	Channel No.
H42		Year of occurrence of above max. value	(year)	✓	–	–		
H43		Month and day of occurrence of above max. value	(mo./day)	✓	–	–		
H44		Hour and minute of occurrence of above max. value	(hr/min)	✓	–	–		
H45		Current value of frequency		–	✓	✓	0FH	01H
H48		Demand time limit: Current		–	✓	✓	02H	E0H
H49		Demand time limit: Electric power		–	✓	✓	08H	E0H
H4A		CT input/pulse input setting	–	✓	–	–		
H4B		5A/direct setting	–	✓	✓	✓	E0H	91H
H56	*2	Current value of voltage between phases 1 and 0	(V)	✓	–	✓	03H	21H
H57	*2	Current value of voltage between phases 2 and 0	(V)	✓	–	✓	03H	41H
H58	*2	Current value of voltage between phases 3 and 0	(V)	✓	–	✓	03H	61H
H59		Current value of total voltage	(V)	✓	✓	✓	05H	01H
H5A		Max. voltage	(V)	✓	✓	✓	05H	A2H
H5E		Min. voltage	(V)	–	✓	✓	05H	C5H
H6C	*3	Minimum demand power (x1, x0.1)		–	✓	✓	08H	05H
H6D	*3	Minimum demand power (x10, x100)		–	✓	✓	08H	05H
H6E	*3	Minimum demand power (x0.01, x0.001)		–	✓	✓	08H	05H
H78		High-frequency voltage fundamental effective value (between 1 and 2)		–	✓	✓	4DH	21H
H79	*1	High-frequency voltage fundamental effective value (between 2 and 3)		–	✓	✓	4DH	41H
H7A	*2	High-frequency voltage fundamental effective value (between 3 and 1)		–	–	✓	4DH	61H
H7B		High-frequency voltage 9th effective value (between 1 and 2)		–	✓	✓	55H	21H
H7C		High-frequency voltage 11th effective value (between 1 and 2)		–	✓	✓	57H	21H
H7D		High-frequency voltage 13th effective value (between 1 and 2)		–	✓	✓	59H	21H
H7E	*1	High-frequency voltage 9th effective value (between 2 and 3)		–	✓	✓	55H	41H
H7F	*1	High-frequency voltage 11th effective value (between 2 and 3)		–	✓	✓	57H	41H
H80	*1	High-frequency voltage 13th effective value (between 2 and 3)		–	✓	✓	59H	41H
H81	*2	High-frequency voltage 9th effective value (between 3 and 1)		–	–	✓	55H	61H
H82	*2	High-frequency voltage 11th effective value (between 3 and 1)		–	–	✓	57H	61H
H83	*2	High-frequency voltage 13th effective value (between 3 and 1)		–	–	✓	59H	61H
H84		High-frequency voltage 9th content (between 1 and 2)		–	✓	✓	76H	79H
H85		High-frequency voltage 11th content (between 1 and 2)		–	✓	✓	76H	7BH
H86		High-frequency voltage 13th content (between 1 and 2)		–	✓	✓	76H	7DH
H87	*1	High-frequency voltage 9th content (between 2 and 3)		–	✓	✓	76H	8FH
H88	*1	High-frequency voltage 11th content (between 2 and 3)		–	✓	✓	76H	91H
H89	*1	High-frequency voltage 13th content (between 2 and 3)		–	✓	✓	76H	93H
H8A	*2	High-frequency voltage 9th content (between 3 and 1)		–	–	✓	76H	A5H
H8B	*2	High-frequency voltage 11th content (between 3 and 1)		–	–	✓	76H	A7H
H8C	*2	High-frequency voltage 13th content (between 3 and 1)		–	–	✓	76H	A9H

Data channel No.	Note	Data name Unit	Multi-circuit energy measuring unit	Energy measuring unit		Commands common to unit types	
			EMU-C7P4-6	EMU2-RD*-C	EMU2-RD *-C-4W	Group No.	Channel No.
H8D		High-frequency current fundamental effective value (on side 1)	–	✓	✓	1DH	21H
H8E	*2	High-frequency current fundamental effective value (on side 2)	–	–	✓	1DH	41H
H8F	*1	High-frequency current fundamental effective value (on side 3)	–	✓	✓	1DH	61H
H90		High-frequency current 9th effective value (on side 1)	–	✓	✓	25H	21H
H91		High-frequency current 11th effective value (on side 1)	–	✓	✓	27H	21H
H92		High-frequency current 13th effective value (on side 1)	–	✓	✓	29H	21H
H93	*2	High-frequency current 9th effective value (on side 2)	–	–	✓	25H	41H
H94	*2	High-frequency current 11th effective value (on side 2)	–	–	✓	27H	41H
H95	*2	High-frequency current 13th effective value (on side 2)	–	–	✓	29H	41H
H96	*1	High-frequency current 9th effective value (on side 3)	–	✓	✓	25H	61H
H97	*1	High-frequency current 11th effective value (on side 3)	–	✓	✓	27H	61H
H98	*1	High-frequency current 13th effective value (on side 3)	–	✓	✓	29H	61H
H99		High-frequency current 9th content (on side 1)	–	✓	✓	75H	79H
H9A		High-frequency current 11th content (on side 1)	–	✓	✓	75H	7BH
H9B		High-frequency current 13th content (on side 1)	–	✓	✓	75H	7DH
H9C	*2	High-frequency current 9th content (on side 2)	–	–	✓	75H	8FH
H9D	*2	High-frequency current 11th content (on side 2)	–	–	✓	75H	91H
H9E	*2	High-frequency current 13th content (on side 2)	–	–	✓	75H	93H
H9F	*1	High-frequency current 9th content (on side 3)	–	✓	✓	75H	A5H
HA0	*1	High-frequency current 11th content (on side 3)	–	✓	✓	75H	A7H
HA1	*1	High-frequency current 13th content (on side 3)	–	✓	✓	75H	A9H
HAE		High-frequency current total distortion factor (on side 1)	–	✓	✓	75H	86H
HAF	*2	High-frequency current total distortion factor (on side 2)	–	–	✓	75H	9CH
HB0	*1	High-frequency current total distortion factor (on side 3)	–	✓	✓	75H	B2H
HB1		High-frequency current 3rd content (on side 1)	–	✓	✓	75H	73H
HB2		High-frequency current 5th content (on side 1)	–	✓	✓	75H	75H
HB3		High-frequency current 7th content (on side 1)	–	✓	✓	75H	77H
HB4	*2	High-frequency current 3rd content (on side 2)	–	–	✓	75H	89H
HB5	*2	High-frequency current 5th content (on side 2)	–	–	✓	75H	8BH
HB6	*2	High-frequency current 7th content (on side 2)	–	–	✓	75H	8DH
HB7	*1	High-frequency current 3rd content (on side 3)	–	✓	✓	75H	9FH
HB8	*1	High-frequency current 5th content (on side 3)	–	✓	✓	75H	A1H
HB9	*1	High-frequency current 7th content (on side 3)	–	✓	✓	75H	A3H

Data channel No.	Note	Data name Unit	Multi-circuit energy measuring unit	Energy measuring unit		Commands common to unit types	
			EMU-C7P4-6	EMU2-RD*-C	EMU2-RD *-C-4W	Group No.	Channel No.
HBA		High-frequency voltage total distortion factor (between 1 and 2)	–	✓	✓	76H	86H
HBB	*1	High-frequency voltage total distortion factor (between 2 and 3)	–	✓	✓	76H	9CH
HBC	*2	High-frequency voltage total distortion factor (between 3 and 1)	–	–	✓	76H	B2H
HBD		High-frequency voltage 3rd content (between 1 and 2)	–	✓	✓	76H	73H
HBE		High-frequency voltage 5th content (between 1 and 2)	–	✓	✓	76H	75H
HBF		High-frequency voltage 7th content (between 1 and 2)	–	✓	✓	76H	77H
HC0	*1	High-frequency voltage 3rd content (between 2 and 3)	–	✓	✓	76H	89H
HC1	*1	High-frequency voltage 5th content (between 2 and 3)	–	✓	✓	76H	8BH
HC2	*1	High-frequency voltage 7th content (between 2 and 3)	–	✓	✓	76H	8DH
HC3	*2	High-frequency voltage 3rd content (between 3 and 1)	–	–	✓	76H	9FH
HC4	*2	High-frequency voltage 5th content (between 3 and 1)	–	–	✓	76H	A1H
HC5	*2	High-frequency voltage 7th content (between 3 and 1)	–	–	✓	76H	A3H
HC6		High-frequency current total effective value (on side 1)	–	✓	✓	33H	21H
HC7	*2	High-frequency current total effective value (on side 2)	–	–	✓	33H	41H
HC8	*1	High-frequency current total effective value (on side 3)	–	✓	✓	33H	61H
HCA		High-frequency current 3rd effective value (on side 1)	–	✓	✓	1FH	21H
HCB		High-frequency current 5th effective value (on side 1)	–	✓	✓	21H	21H
HCC		High-frequency current 7th effective value (on side 1)	–	✓	✓	23H	21H
HCD	*2	High-frequency current 3rd effective value (on side 2)	–	–	✓	1FH	41H
HCE	*2	High-frequency current 5th effective value (on side 2)	–	–	✓	21H	41H
HCF	*2	High-frequency current 7th effective value (on side 2)	–	–	✓	23H	41H
HD0	*1	High-frequency current 3rd effective value (on side 3)	–	✓	✓	1FH	61H
HD1	*1	High-frequency current 5th effective value (on side 3)	–	✓	✓	21H	61H
HD2	*1	High-frequency current 7th effective value (on side 3)	–	✓	✓	23H	61H
HE4		High-frequency voltage total effective value (between 1 and 2)	–	✓	✓	63H	21H
HE5	*1	High-frequency voltage total effective value (between 2 and 3)	–	✓	✓	63H	41H
HE6	*2	High-frequency voltage total effective value (between 3 and 1)	–	–	✓	63H	61H
HE7		High-frequency voltage 3rd effective value (between 1 and 2)	–	✓	✓	4FH	21H
HE8		High-frequency voltage 5th effective value (between 1 and 2)	–	✓	✓	51H	21H
HE9		High-frequency voltage 7th effective value (between 1 and 2)	–	✓	✓	53H	21H
HEA	*1	High-frequency voltage 3rd effective value (between 2 and 3)	–	✓	✓	4FH	41H
HEB	*1	High-frequency voltage 5th effective value (between 2 and 3)	–	✓	✓	51H	41H
HEC	*1	High-frequency voltage 7th effective value (between 2 and 3)	–	✓	✓	53H	41H

Data channel No.	Note	Data name	Unit	Multi-circuit energy measuring unit	Energy measuring unit		Commands common to unit types	
				EMU-C7P4-6	EMU2-RD*-C	EMU2-RD *-C-4W	Group No.	Channel No.
HED	*2	High-frequency voltage 3rd effective value (between 3 and 1)		–	–	✓	4FH	61H
HEE	*2	High-frequency voltage 5th effective value (between 3 and 1)		–	–	✓	51H	61H
HEF	*2	High-frequency voltage 7th effective value (between 3 and 1)		–	–	✓	53H	61H
HF0	*3	Current value of power (x10, x100)		–	✓	✓	07H	01H
HF1	*3	Current demand power (x10, x100)		–	✓	✓	08H	01H
HF2	*3	Max. current demand power (x10, x100)		–	✓	✓	08H	02H
HF4	*3	Current value of reactive power (x10, x100)		–	✓	✓	09H	01H
HF7	*3	Current value of power (x0.01, x0.001)	(kW)	✓	✓	✓	07H	01H
HF8	*3	Current demand power (x0.01, x0.001)	(kW)	✓	✓	✓	08H	01H
HF9	*3	Max. current demand power (x0.01, x0.001)	(kW)	✓	✓	✓	08H	02H
HFB	*3	Current value of reactive power (x0.01, x0.001)		–	✓	✓	09H	01H

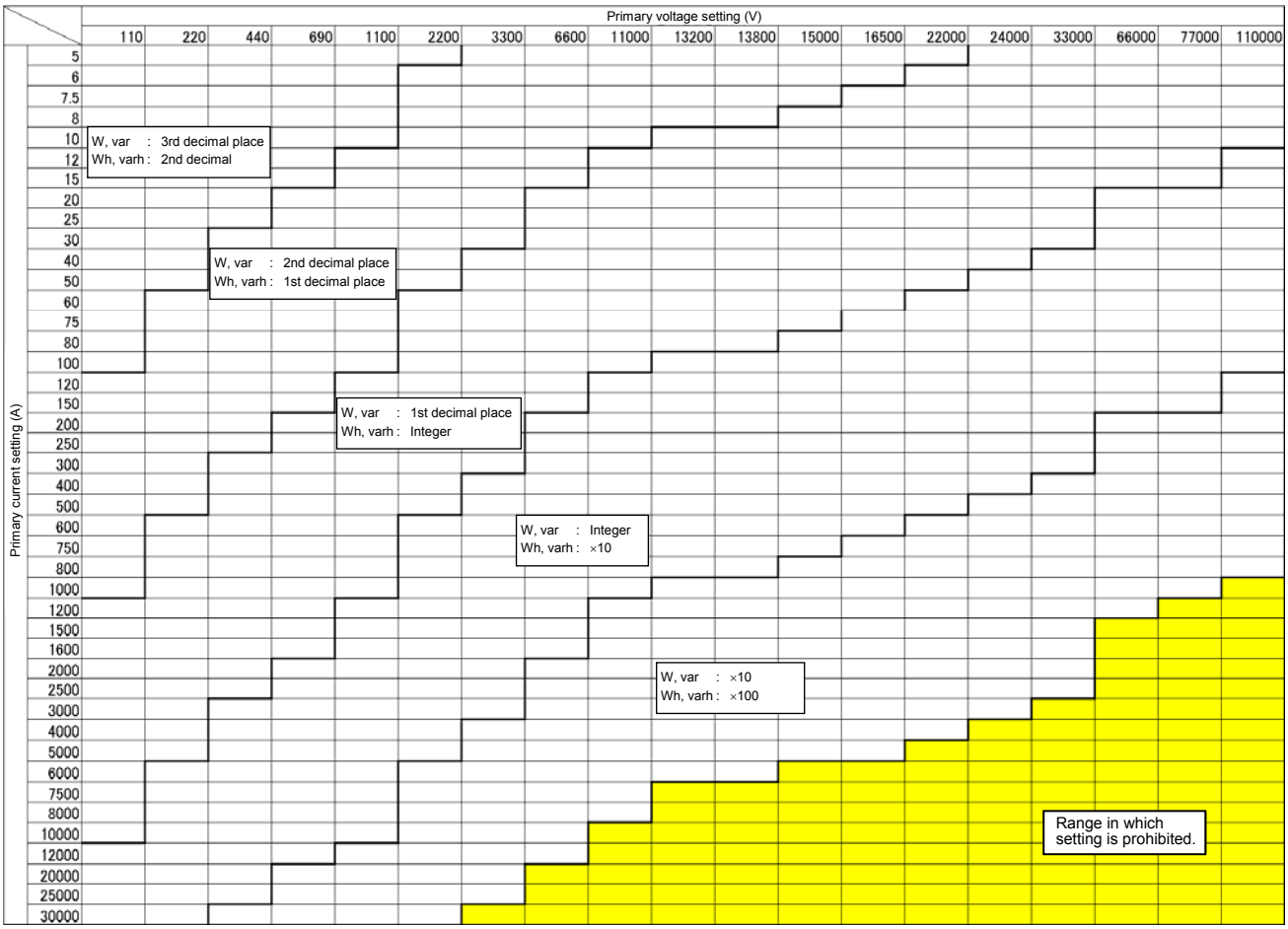
*1: When the phase and wire system is set to single-phase 2-wire (1P2W), data is not stored, and an out-of-range channel error occurs.

*2: Data is stored only when the phase and wire system is set to 3-phase 4-wire (3P4W). When another system is specified, an out-of-range channel error occurs.

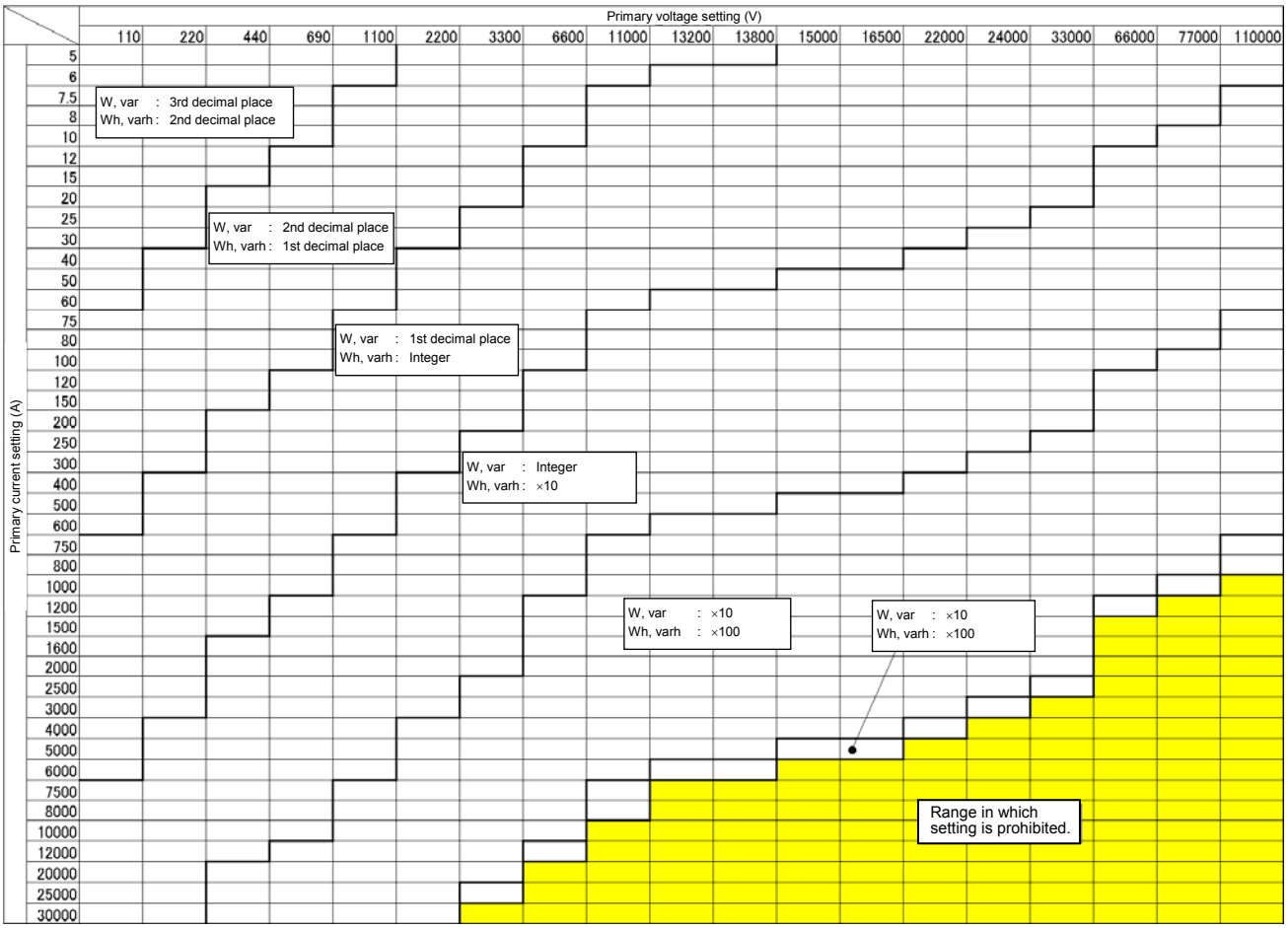
*3: The data form and the channel number to be monitored change according to the phase and wire system, primary current and primary voltage settings.

Attached Table 2 List of Multiplying Factors in Electric Power/Reactive Power Data Format for Energy Measuring Unit

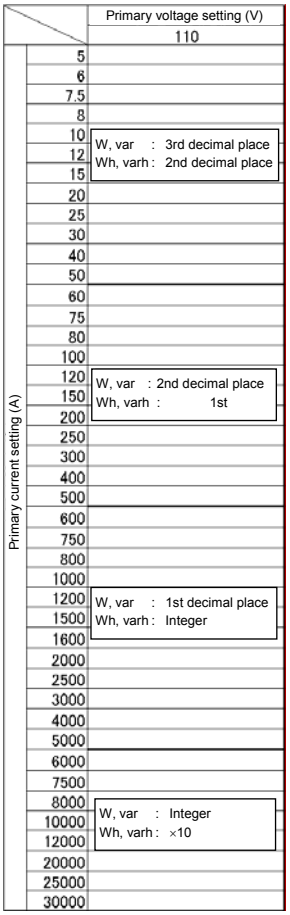
① 1P2W



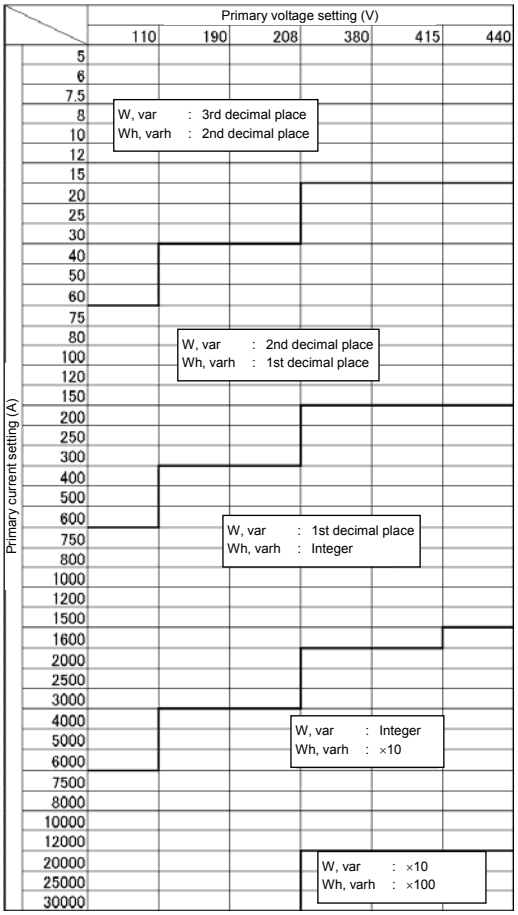
② 3P3W


Primary voltage setting (V)
110
220
440
690
1100
2200
3300
6600
11000
13200
13800
15000
16500
22000
24000
33000
66000
77000
110000
Primary current setting (A)
5
6
7.5
8
10
12
15
20
25
30
40
50
60
75
80
100
120
150
200
250
300
400
500
600
750
800
1000
1200
1500
1600
2000
2500
3000
4000
5000
6000
7500
8000
10000
12000
20000
25000
30000
W, var : 3rd decimal place
Wh, varh : 2nd decimal place
W, var : 2nd decimal place
Wh, varh : 1st decimal place
W, var : 1st decimal place
Wh, varh : Integer
W, var : Integer
Wh, varh : ×10
W, var : ×10
Wh, varh : ×100
W, var : ×10
Wh, varh : ×100
Range in which setting is prohibited.

③ 1P3W


Primary voltage setting (V)
110
Primary current setting (A)
5
6
7.5
8
10
12
15
20
25
30
40
50
60
75
80
100
120
150
200
250
300
400
500
600
750
800
1000
1200
1500
1600
2000
2500
3000
4000
5000
6000
7500
8000
10000
12000
20000
25000
30000
W, var : 3rd decimal place
Wh, varh : 2nd decimal place
W, var : 2nd decimal place
Wh, varh : 1st
W, var : 1st decimal place
Wh, varh : Integer
W, var : Integer
Wh, varh : ×10

④ 3P4W


Primary voltage setting (V)
110
190
208
380
415
440
Primary current setting (A)
5
6
7.5
8
10
12
15
20
25
30
40
50
60
75
80
100
120
150
200
250
300
400
500
600
750
800
1000
1200
1500
1600
2000
2500
3000
4000
5000
6000
7500
8000
10000
12000
20000
25000
30000
W, var : 3rd decimal place
Wh, varh : 2nd decimal place
W, var : 2nd decimal place
Wh, varh : 1st decimal place
W, var : 1st decimal place
Wh, varh : Integer
W, var : Integer
Wh, varh : ×10
W, var : ×10
Wh, varh : ×100