



Instruction Manual

**PAPERLESS RECORDER
COMMUNICATION
FUNCTION
(Ethernet)**

TYPE: PHF

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— NOTICE —

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1. COMMUNICATION FUNCTIONS

1.1 General

- This equipment provides a communication function (optional) using an Ethernet interface.
- The following functions are available as Ethernet communication functions.
 - (1) FTP server function
Permits take-out of files from the compact flash of the paperless recorder, using personal computer's browser (Internet Explorer) or DOS prompt.
 - (2) Web server function
Permits check of measured values and event information recorded in the paperless recorder, using personal computer's browser (Internet Explorer).
 - (3) E-mail send function
Permits E-mail transmission in a fixed period and also on occurrence of an alarm.
 - (4) MODBUS TCP/IP function
Permits exchange of data with host computer, programmable controller, graphic display panel, etc. by MODBUS TCP/IP communication.

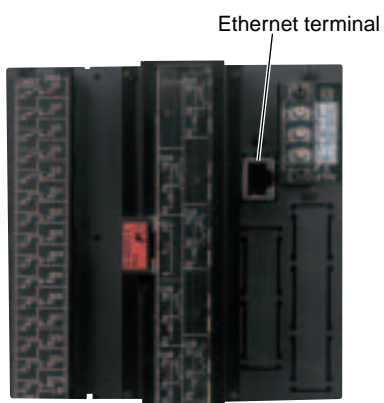
2. ETHERNET COMMUNICATION FUNCTIONS

- Setting of IP address, etc. is essential for connection of a paperless recorder to Ethernet. Be sure to consult with the system manager of your company.

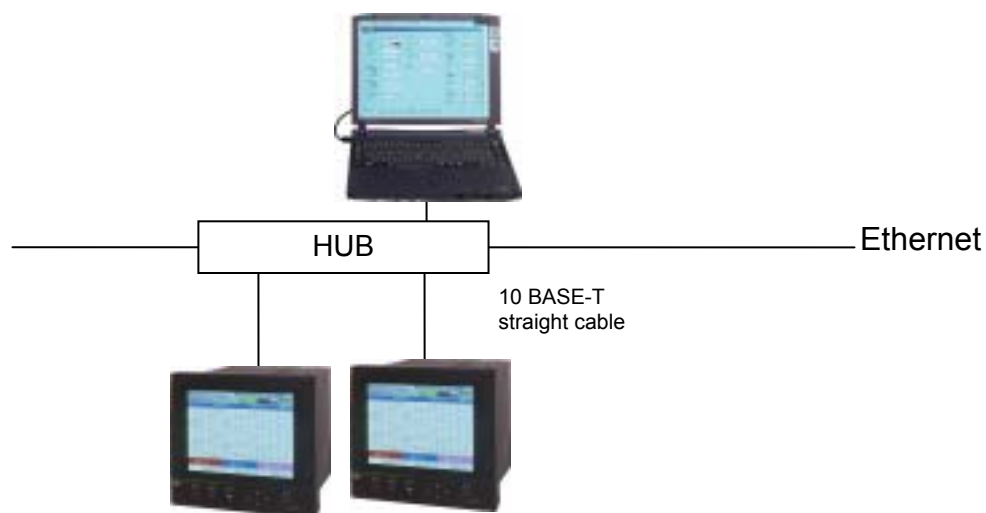
2.1 LAN port specification

Item	Specification 10BASE-T
Transmission rate	10 Mbps
Transmission method	Base band
Maximum network length or maximum node interval	500 m (cascade in 4 stages)
Maximum segment length	100 m (between node and hub)
Cable for connection	UTP (twisted-pair cable without shield) 22-26 AWG
Protocol	TCP/IP

2.2 Connection to the terminal



2.3 Connection



Node to hub distance: Up to 100 m
 Maximum number of nodes per network: 100 nodes
 Recommended cable: 10 BASE-T twisted-pair cable, Category 5

2.4 Setting Ethernet communicating conditions

- Set IP address, subnet mask and default gateway for connection of the paperless recorder to Ethernet. (Consult with the system manager of your company for the values to be set.)
- Communicating conditions setting items

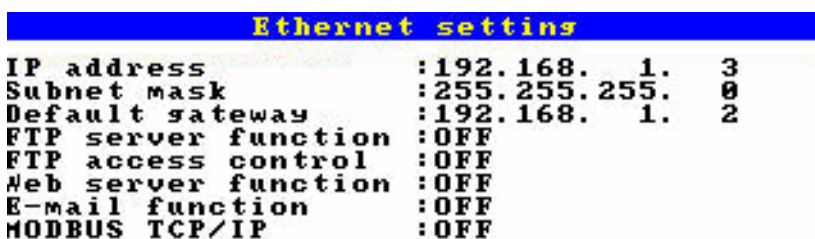
Item	Value at delivery	Setting range	Remarks
IP address	192.168. 1. 1	0 to 255 for each digit	Turn ON the power again after setting change.
Subnet mask	255.255.255. 0	0 to 255 for each digit	
Default gateway	0. 0. 0. 0	0 to 255 for each digit	

2.5 Ethernet communicating conditions setting operation

- (1) Select “Ethernet setting” from the “Parameter setting” menu screen, and press the [ENT] key.



- (2) Move the cursor to “IP address”, and set an IP address.



- (3) Move the cursor to “Subnet mask”, and set a subnet mask.
 (4) Move the cursor to “Default gateway”, and set a default gateway.

3. FTP SERVER FUNCTION

3.1 Description of FTP server function

- This function permits take-out of record files from the compact flash of the recorder, using browser or DOS prompt.
- This function permits deletion of record files from the compact flash of the recorder, using browser or DOS prompt. (This function is available only to a user of administration level.)
- This function permits changing names of record files recorded on the compact flash of the recorder, using browser or DOS prompt. (This function is available only to a user of administration level.)
- Use Internet Explorer made by Microsoft as the personal computer's browser.
- Up to eight (8) user names and passwords may be set for those who are permitted to log in the FTP server.
- If the FTP server access verify function is OFF, log-in to the FTP server is permitted with common user name "ftp" (without password).
- When log-in or log-off to/from the FTP server is executed, the subject information is displayed on the Ethernet communication log screen.
- The FTP server permits log-in by one user only at a time.

[Caution]

- The communication automatically disconnects, if no FTP communication request is made for 10 minutes.
- The display motion of the paperless recorder may slow down when taking out a file of large size.
- While the compact flash of the paperless recorder is accessed by FTP communication, do not take out the compact flash.

Furthermore, when the FTP server function is used, inhibit access to the compact flash in the "Memory card abstract" screen, before taking out the compact flash.

- Do not delete or change the name of a file while the file is being recorded.
- Attributes of all files in the FTP server are displayed as read-only as hidden files.
- Log-in to the FTP server is not permitted, if no compact flash is located in the recorder or if access to the compact flash is inhibited.

In that case, the recorder stays in log-in status and log-in is not permitted until ten (10) minutes elapses.

- If the Ethernet communication is shut down while the FTP server is in log-in status, log-in is not permitted until the communication is automatically disconnected ten (10) minutes later.

3.2 Setting FTP server function

- Execute setting of FTP server function and of access verification, for using the FTP server function. Furthermore, set names and passwords of those who use the FTP server function.
- FTP server function setting items

Item	Value at delivery	Setting range	Remarks
FTP server function	OFF	ON, OFF	Turn ON the power again after setting is changed.
FTP access control	OFF	ON, OFF	

- User name setting items

Item	Value at delivery	Setting range	Remarks
User 1 to 8 name	(Blank)	Up to 16 letters may be set.	
User 1 to 8 password	(Blank)	Up to 8 letters may be set.	
User 1 to 8 level	Administrator	Administrator, guest	

3.3 FTP server function setting operation

- FTP server function setting**

- Execute setting of the FTP server function first of all. Select “Ethernet setting” from the “Parameter setting” menu screen, and press the [ENT] key.

```

Ethernet setting
IP address           :192.168.  1.  3
Subnet mask          :255.255.255.  0
Default gateway      :192.168.  1.  2
FTP server function  :OFF
FTP access control   :OFF
Web server function  :OFF
E-mail function      :OFF
MODBUS TCP/IP        :OFF
  
```

- Move the cursor to “FTP server function”, and select FTP server function ON/OFF. The FTP server function can be used, if ON is set.
- Move the cursor to “FTP access control”, and select FTP server verify function ON/OFF. No password is required at the time of log-in to the FTP server, if OFF is set.

- **User name setting**

(1) Set user names and passwords. Select “User account setting” from the “Parameter setting” menu screen, and press the [ENT] key.

```

User account settings
User 1 name :USER01
User 2 name :
User 3 name :
User 4 name :
User 5 name :
User 6 name :
User 7 name :
User 8 name :
  
```

(2) Move the cursor to the user to be set, and press the [ENT] key.

```

User 1 account settings
User name :USER01
Password :U01
User level :administrator
  
```

(3) Set a user name using up to 16 letters.

(4) Set a password using up to 8 letters.

(5) Select a user access level out of “administrator” and “guest”.

If “guest” was selected, file deletion is not permitted, although log-in to the FTP server is permitted.

3.4 FTP server operation

- Connect the FTP server to the paperless recorder from the browser, by performing operation in the sequence indicated below.

(1) Start Internet Explorer from a personal computer on Ethernet.

(2) Enter the IP address of the paperless recorder in the address column in the following manner.

FTP: //(recorder's IP address)

Enter FTP: //192.168.1.2 in case the IP address of the paperless recorder is 192.168.1.2.

(3) The screen that requests entry of user name and password appears. Enter a user name and password.

(4) Record files contained on the compact flash are displayed on the browser.

(5) Select a file to be taken out, and copy it to an arbitrary folder in the personal computer.

(6) Select a file to be deleted, and delete the selected file.

4. WEB SERVER FUNCTION

4.1 Description of web server function

- The web server function permits monitoring of measured values and event log in the paperless recorder using personal computer's browser.
- Use Internet Explorer made by Microsoft as the personal computer's browser.

[Caution] • Monitoring from cell phone's browser is not permitted. If connection to recorder's web server is made from a cell phone, the recorder may halt in the worst case. Do not attempt to monitor data in the paperless recorder from a cell phone.

- An error may arise depending on the circumstances of the communication, as the period of update of the browser is 10 seconds.

The screen of the PC is displayed again, if the update button of the browser is pressed in such a case.

- The characters may not be displayed normally depending on the setting of the browser.

4.2 Setting web server function

- Set the web server function for permitting its use.
- Set items

Item	Value at delivery	Setting range	Remarks
Web server function	OFF	ON, OFF	Turn ON the power again after setting is changed.

4.3 Web server function setting operation

(1) Select "Ethernet setting" from the "Parameter setting" menu screen, and press the [ENT] key.

```
Ethernet setting
IP address          :192.168.  1.  3
Subnet mask         :255.255.255.  0
Default gateway     :192.168.  1.  2
FTP server function :OFF
FTP access control  :OFF
Web server function :OFF
E-mail function     :OFF
MODBUS TCP/IP      :OFF
```

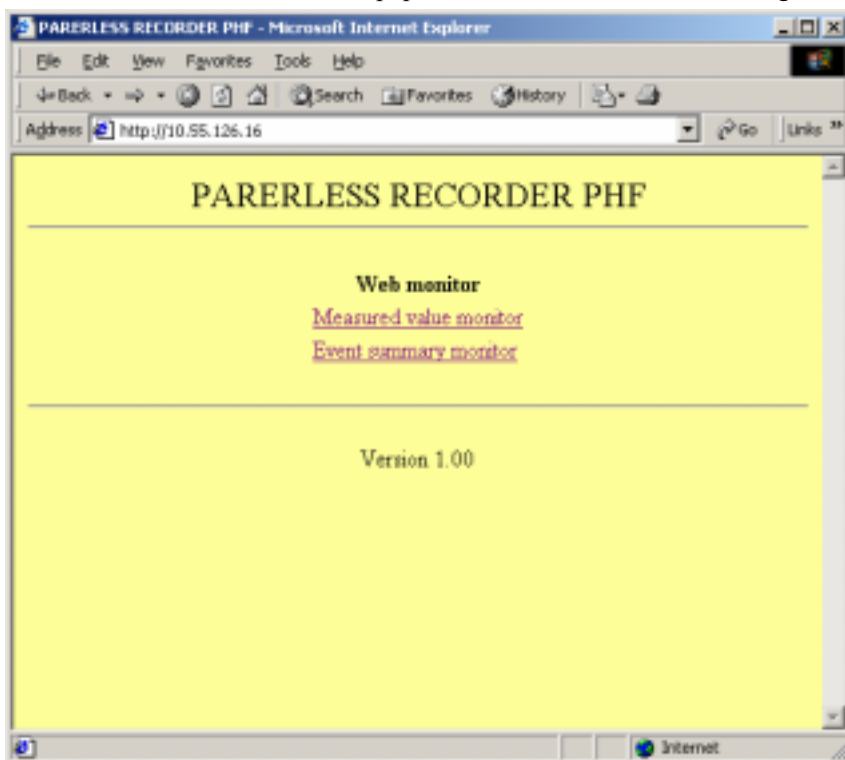
(2) Move the cursor to "Web server function", and select web server function ON/OFF. Use of the web server function is permitted if ON is set.

4.4 Web server operation

- Connect the web server to the paperless recorder from the personal computer's browser, by performing operation in the sequence indicated below.
 - (1) Start Internet Explorer from a personal computer on Ethernet.
 - (2) Enter the IP address of the paperless recorder in the address column in the following manner.
http: //(recorder's IP address)
Enter http: //192.168.1.2 in case the IP address of the paperless recorder is 192.168.1.2.
 - (3) The paperless recorder monitor screen is displayed on the browser.

4.5 Web monitor screen

- (1) **Web monitor menu screen**
 - Connect to the web server of the paperless recorder, and the following screen appears.



(2) PV display screen

PV display

DATE 2007/ 1/ 6 13:32:45 Record status Stop
 PILC PHF61B11-E10EY
 SNO. A6L0890T Data capacity 0%
 Main status None

		Value	Alarm 1234
CH 1	TAG 01 TAG2 01	160.8 °C	1 2 3 4
CH 2	TAG 02 TAG2 02	64.8 mV	1 2 3 4
CH 3	TAG 03 TAG2 03	154.3 mV	1 2 3 4
CH 4	TAG 04 TAG2 04	214.2 mV	1 2 3 4
CH 5	TAG 05 TAG2 05	263.5 mV	1 2 3 4
CH 6	TAG 06 TAG2 06	360.4 mV	1 2 3 4

(3) Event Summary display screen

Event Summary

TIME	DATA
2007/ 1/ 6 13:30:42	ALM ON CH6 -2H
2007/ 1/ 6 13:30:40	ALM ON CH6 -4H
2007/ 1/ 6 13:30:37	ALM ON CH5 -3H
2007/ 1/ 6 13:30:35	ALM ON CH5 -1H
2007/ 1/ 6 13:30:31	ALM ON CH4 -4H
2007/ 1/ 6 13:30:28	ALM ON CH3 -3H
2007/ 1/ 6 13:30:26	ALM ON CH2 -2H
2007/ 1/ 6 13:30:22	ALM ON CH1 -1H
2007/ 1/ 6 13:29:18	ALM ON CH6 -4H
2007/ 1/ 6 13:29:16	ALM ON CH6 -3H
2007/ 1/ 6 13:29:13	ALM ON CH5 -2H
2007/ 1/ 6 13:29:09	ALM ON CH5 -1H
2007/ 1/ 6 13:28:58	ALM ON CH4 -4H
2007/ 1/ 6 13:28:55	ALM ON CH3 -3H

5. E-MAIL SEND FUNCTION

5.1 Description of E-mail send function

- E-mails can be transmitted from the paperless recorder. (Receipt of E-mails is not permitted.)
- E-mails can be transmitted in any of the states indicated below.
 - (1) An alarm arose or was cancelled.
 - (2) An external input (DI) was ON or OFF.
 - (3) Any error occurred to the main unit. (Battery end or compact flash full occurred, if an alarm of an arbitrary channel arose.)
 - (4) Once every fixed period (The period may be selected out of 1 hour, 2 hours, 3 hours, 4 hours, 6 hours, 12 hours and 24 hours.)
- Up to eight (8) addresses can be registered for transmission of E-mails.
- Measured values of each channel can be attached to each E-mail.
- E-mail transmission test can be conducted in the E-mail trigger setting screen.

[Caution]

- Up to sixteen (16) E-mail send requests can be transmitted continuously, but not more than 16. No transmission will be implemented if the number of E-mail send requests exceeds 16. Therefore, make setting so that E-mail send requests will not occur continuously.
- For sending E-mails, it is necessary to register the paperless recorder in the mail server. Consult with the system manager of your company, for registration to the mail server.
- If E-mail send fails, the E-mail send requests are cancelled.
- Even if E-mail is sent, there is a possibility where the E-mail does not reach the destination because of incorrect address, etc.
- If two or more E-mail addresses are set as send destinations in the E-mail trigger setting, the error message is not recorded on the communication log unless all the attempts to send E-mails fail.

5.2 Setting E-mail function

- Set E-mail send/receive addresses and E-mail send trigger, for permitting use of the E-mail function. (Consult with the system manager of your company, for the values to be set.)

- E-mail function set items

Item	Value at delivery	Setting range	Remarks
E-mail function	OFF	ON, OFF	Turn ON the power again after setting change.

- E-mail send/receive address set items

Item	Value at delivery	Setting range	Remarks
SMTP IP address	0. 0. 0. 0	0 to 255 for each digit	
Sender's mail address	(Blank)	Up to 64 letters may be set.	
Sender's mail name	(Blank)	Up to 32 letters may be set.	
Receiver's mail address 1 to 8	(Blank)	Up to 64 letters may be set.	

- E-mail send trigger set items

Item	Value at delivery	Setting range	Remarks
Trigger timing	None	None, DI ON, DI OFF, Alarm ON, Alarm OFF, Warning, Timer cycle	
DI No.	DI 1	DI 1 to 5	Trigger timing = DI ON, DI OFF
Alarm Channel	Channel 1	Channel 1 to 6	Trigger timing = Alarm ON, OFF
Alarm No.	1	1 to 4	
Warning type	Alarm ON (All ch)	Alarm ON (All ch), All warning, No battery, CF full	Trigger timing = Warning
Time cycle	1 hour	1, 2, 3, 4, 6, 12 hour, 1 day	Trigger timing = Timer cycle
Time base (hour)	0	0 to 23	
Title	(Blank)	Up to 32 letters may be set.	
Text 1	(Blank)	Up to 32 letters may be set.	
Text 2	(Blank)	Up to 32 letters may be set.	
PV value affixation	OFF	ON, OFF	
Receiver's add No.	None	Receiver's address No. 1, 2, 3, 4, 5, 6, 7, 8	

5.3 E-mail function setting operation

- Setting E-mail function

(1) Set the E-mail function first of all. Select "Ethernet setting" from the "Parameter setting" menu screen, and press the [ENT] key.

```

Ethernet settings
IP address          :192.168.  1.  3
Subnet mask         :255.255.255.  0
Default gateway     :192.168.  1.  2
FTP server function :OFF
FTP access control  :OFF
Web server function :OFF
E-mail function     :OFF
MODBUS TCP/IP      :OFF

```

(2) Move the cursor to "E-mail function", and select E-mail function ON/OFF. The E-mail send function can be used, if ON is set.

- **Setting E-mail send/receive addresses**

(1) Select “E-mail setting” from the “Parameter setting” menu screen, and press the [ENT] key.

```
E-mail settings
SMTP IP address      :192.168.  1.  2
Sender's mail
  Add   :ttest@bjd.ne.jp
  Name  :ttest
Receiver's mail
  Add 1 :m-test@bjd.ne.jp
  Add 2 :
  Add 3 :
  Add 4 :
  Add 5 :
  Add 6 :
  Add 7 :
  Add 8 :
```

- (2) Move the cursor to “SMTP IP address”, and set the IP address of the mail server.
- (3) Move the cursor to “Sender’s mail Add”, and set the sender's mail address.
- (4) Move the cursor to “Sender’s mail Name”, and set the sender's name.
- (5) Move the cursor to “Receiver’s mail Add”, and set up to eight (8) receivers' mail addresses.

- **Setting E-mail send trigger**

(1) Select “E-mail trigger setting” from the “Parameter setting” menu screen, and press the [ENT] key.

```
E-Mail trigger settings
E-Mail trigger 1 settings
E-Mail trigger 2 settings
E-Mail trigger 3 settings
E-Mail trigger 4 settings
E-Mail trigger 5 settings
E-Mail trigger 6 settings
E-Mail trigger 7 settings
E-Mail trigger 8 settings
E-Mail trigger 9 settings
E-Mail trigger 10 settings
```


- (2) Up to ten (10) patterns of E-mail send timing may be set.
 Select a send timing to be selected, and press the [ENT] key.

```

E-Mail trigger 1 settings
Trisster timings :Alarm ON
Alarm Channel   :Channel 1
Alarm No.       : 1
Title           :ALARM ON
Text 1          :
Text 2          :
PU value affixation :ON
Receiver's add No. : 1      4      6      8
Mail send test  :Hit [ENT] key
  
```

- (3) Move the cursor to “Trigger timing”, and select an E-mail send timing.

```

E-Mail trigger 1 settings
Trisster timings
Title :
Text 1 :
Text 2 :
PU value affixation
Receiver's add No.
Mail send test
None
DI ON
DI OFF
Alarm ON
Alarm OFF
Warning
Timer cycle
  
```

Select one of the followings as an E-mail send timing.

When a timing is selected, particulars set items are displayed for each timing type. Set these items also.

- 1) DI ON, DI OFF
 E-mails can be sent by DI ON/OFF.
 When DI ON/OFF timing is selected, set items for the DI No. to be used are displayed. Set the DI No. to be used for judgment.
- 2) Alarm ON, Alarm OFF
 E-mails can be sent by the alarm occur/cancel information.
 When alarm ON/OFF timing is selected, set items for the channel No. and alarm No. to be used are displayed. Set the channel No. and alarm No. to be used for judgment.
- 3) Warning
 E-mails can be sent by warning occur information.
 When warning is selected, set items for the warning information to be used are displayed. Set the warning information to be used for judgment.

4) Timer cycle

E-mails can be sent in a fixed period.

When timer cycle is selected, set items for the send period and reference time are displayed. Set the E-mail send period and reference time.

(4) Move the cursor to "Title", and set the E-mail title.

(5) Move the cursor to "Text 1", "Text 2", and set a comment of two (2) lines to be described in the E-mail.

(6) Move the cursor to "PV value affixation", and set whether to indicate measured values of all the channels in the E-mail. All the channels can be indicated, ON is set.

(7) Move the cursor to "Receiver's add No.", and select an address No. to receive the E-mail.

The E-mail is sent to each address No. for which ON was set.

(8) An E-mail send test can be conducted by moving the cursor to "Mail send test" and by then pressing the [ENT] key.

5.4 E-mail send test operation

- Conduct an E-mail send test with the paperless recorder, by performing operation in the sequence indicated below.

(1) Select "E-mail trigger setting" from the "Parameter setting" menu screen, and press the [ENT] key.

(2) Select an E-mail trigger setting No. to conduct a send test, and then press the [ENT] key.

(3) Move the cursor to "Mail send test", and then press the [ENT] key.

5.5 E-mail send contents

- The paperless recorder sends an E-mail with following contents.

From: LY-E04	←	Sender's mail name
Date: Wednesday, April 03, 2002 8:00 PM		
To: m-test2 ; m-test8		
Subject: Timer cycle	←	Mail title

2002/ 4/ 3 20:00:00 Operational report ← Mail trigger timing & time

1hour ← Mail text 1

PVON ← Mail text 2

CH1 = 862.6mH ← PV value

CH2 = 862.5mm/s

CH3 = 862.5mV

CH4 = 862.5mV

CH5 = 6.270V

CH6 = 6.270V

6. MODBUS TCP/IP FUNCTION

6.1 Description of MODBUS TCP/IP function

- The MODBUS TCP/IP protocol permits use of MODBUS protocol (MODBUS RTU), on an Ethernet interface.
- MODBUS TCP/IP communication is executed through port 502.
- The MODBUS TCP/IP function permits read/write of set values from/to the paperless recorder.

6.2 Setting MODBUS TCP/IP function

- Make MODBUS TCP/IP function setting to permit the use of MODBUS TCP/IP function.
- Specify station No. to evaluate the device with which communication is to be carried out.
- Set items

Item	Factory default	Setting range	Remarks
MODBUS TCP/IP	OFF	ON, OFF	Turn on the power after the setting is changed.
MODBUS Station NO.	1	0 to 255	Communication is not carried out if 0 is selected.

6.3 MODBUS TCP/IP function setting operation

- (1) Select “Ethernet setting” from the “Parameter setting” menu screen, and press the [ENT] key.

Ethernet setting			
IP address	:192.168.	1.	3
Subnet mask	:255.255.255.	0	
Default gateway	:192.168.	1.	2
FTP server function	:OFF		
FTP access control	:OFF		
Web server function	:OFF		
E-mail function	:OFF		
MODBUS TCP/IP	:OFF		

- (2) Move the cursor to “MODBUS TCP/IP”, and select MODBUS TCP/IP function ON/OFF. The MODBUS TCP/IP function can be used, if ON is set.
- (3) Select “Basic setting” on the “Parameter setting” menu screen, and press the [ENT] key.
- (4) Move the cursor to “MODBUS Station No.” and select a desired station No.

7. MODBUS TCP/IP COMMUNICATION PROTOCOL

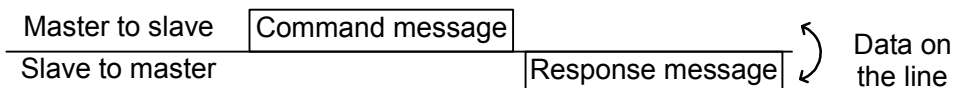
7.1 General

The communication system by the MODBUS TCP/IP protocol is that the communication is always started from the master station and a slave station responds to the received message.

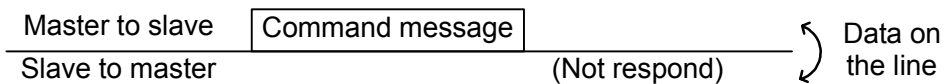
Transmission procedures is as shown below.

- 1) The master station sends a command message to a slave station.
- 2) The slave station checks that the station No. in the received message matches with the own station No. or not.
- 3) If matched, the slave station executes the command and sends back the response message.
- 4) If mismatched, the slave station leaves the command message and wait for the next command message.

- a) In case when the station No. in the received command message matches with the own slave station No.



- b) In case when the station No. in the received command message mismatches with the own slave station No.



- 5) To assure safety, provide a structure where the response message is checked and retry is made three (3) times or more if no response is made or an error occurs.

The master station can individually communicate with any one of slave stations connected on the same line upon setting the station No. in the command message.

7.2 Composition of Message

Command message and response message consist of 6 fields ; Transaction Identifier, Protocol Identifier, Length Unit Identifier, Station No., Function code and Data code. And these are send in this order.

Transaction Identifier (2 bytes)
Protocol Identifier (2 bytes)
Length Unit Identifier (2 bytes)
Station No. (1 byte)
Function code (1 byte)
Data (2 to 133 bytes)

Fig.7-1 Composition of message

In the following, each field is explained.

(1) Transaction Identifier

Identification of a MODBUS Request / Response transaction.

(2) Protocol Identifier

Set 0 for MODBUS TCP/IP.

(3) Length Unit Identifier

Number of bytes of data part.

(4) Station No.

Station No. is the number specifying a slave station. The command message is received and operated only by the slave station whose station No. matches with the No. set in the parameter “MODBUS Station No.”

For details of setting the parameter “MODBUS Station No.”, refer to chapter 6.

(5) Function code

This is a code to designate the function executed at a slave station.

For details, refer to section 7.4.

(6) Data

Data are the data required for executing function codes. The composition of data varies with function codes.

For details, refer to chapter 8.

A register number is assigned to each data in the recorder. For reading/writing the data by communication, designate the register number.

Note that the register number transmitted on message is expressed as its relative address.

The relative address is calculated by the following expression.

$$\boxed{\text{Relative address}} = \left(\text{The lower 4 digits of the } \boxed{\text{register number}} \right) - 1$$

For example, when the register number designated by a function code is 40003,

$$\begin{aligned} \text{Relative address} &= (\text{lower 4 digits of } 40003) - 1 \\ &= 0002 \end{aligned}$$

is used on the message.

7.3 Response of Slave Station

(1) Response for normal command

To a relevant message, the slave station creates and sends back a response message which corresponds to the command message. The composition of message in this case is the same as in section 7.2.

Contents of the data field depend on the function code. For details, refer to Chapter 8.

(2) Response for abnormal command

If contents of a command message have an abnormality (for example, non-actual function code is designated) other than transmission error, the slave station does not execute that command but creates and sends back a response message at error detection.

The composition of response message at error detection is as shown in Fig.7-2. The value used for function code field is function code of command message plus 80H.

Table 7-1 gives error codes.

Transaction Identifier
Protocol Identifier
Length Unit Identifier
Station No.
Function code + 80H
Error code

Fig.7-2 Response message at error detection

Table 7-1 Error Code

Error code	Contents	Description
01H	Illegal function code	Non-actual function code is designated. Check for the function code.
02H	Illegal data address	A relative address of a register number to which the designated function code can not be used.
03H	Illegal data number	Because the designation of number is too much, the area where register number do not exist is designated.
04H	Device error	Communication with slave equipment failed. Check the communication specification for the slave equipment.

(3) No response

Under any of the following items, the slave station takes no action of the command message and sends back no response.

- A station number transmitted in the command message differs from the station number specified to the slave station.
- A transmission error is detected.
- Station No. of a slave station is set to 0.

7.4 Function Code

According to MODBUS protocol, register numbers are assigned by function codes.

Each function code acts on specific register number.

This correspondence is shown in Table 7-2, and the message length by function is shown in Table 7-3.

Table 7-2 Correspondence between function codes and objective address

Function code			Register No.		
No.	Function	Object	No.	Contents	
03 _H	Read-out (continuously)	Holding register	4xxxx	Read-out/write-in	word data
04 _H	Read-out (continuously)	Input register	3xxxx	Read-out	word data
10 _H	Write-in (continuously)	Holding register	4xxxx	Read-out/write-in	word data

Table 7-3 Function code and message length

[Unit: byte]

Function code	Contents	Number of designatable data	Command message		Response message	
			Minimum	Maximum	Minimum	Maximum
03 _H	Read-out of word data	64 words	12	12	11	137
04 _H	Read-out of word data (read-out only)	64 words	12	12	11	137
10 _H	Write-in of continuous word data	64 words	15	141	12	12

7.5 FIX Processing (Cautions in data write)

The instrument is provided inside with a non-volatile memory (F-ROM) for holding the setting parameters.

Data written in the non-volatile memory is not lost even if turning off the power.

To hold parameters that were written in the internal memory via communication after turning off the power, the FIX process is effective. It allows parameters to be written in nonvolatile memory.

Fig.7-3 shows the FIX procedure.

Cautions:

- Write in the non-volatile memory takes approximately 2 seconds.
- While writing, do not turn off the power of the PHF. Otherwise, the data in the non-volatile memory will be destroyed, whereby the PHF could not be used any longer.
- Don't change parameters on the front panel when performing the FIX procedure, or memory error may result.
- The non-volatile memory (F-ROM) is a device where the number of write-in times is limited. The guaranteed number of write-in times of the non-volatile memory used on the instrument is 100,000 minimum. Therefore, limit the times of change of parameter setting to absolute minimum. Refrain from carrying out the FIX processing periodically for example or while such is not absolutely required.

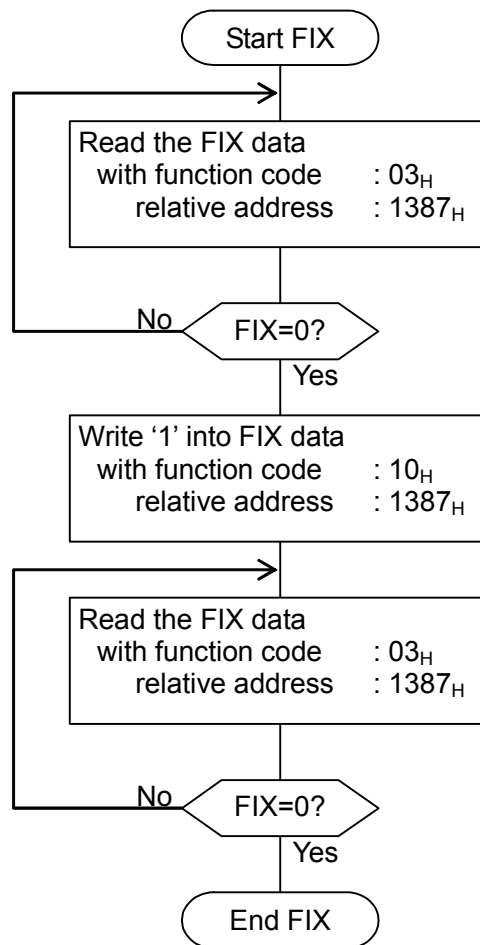


Fig.7-3 FIX procedure

8. DETAILS OF MESSAGE

8.1 Read-out of Word Data [Function code : 03_H]

Function code	Max. word number read-out in one message	Relative data address	Register No.	Kind of data
03 _H	64 words	0000 _H to 1386 _H	40001 to 44999	Storage enable data
		1387 _H to 157B _H	45000 to 45500	Storage enable data
		157C _H to 1B57 _H	45501 to 47000	Storage enable data

(1) Message composition

Command message composition(byte)

Transaction Identifier	Upper	} 1 to 64
	Lower	
Protocol Identifier	Upper	
	Lower	
Length Unit Identifier	Upper	
	Lower	
Station No.		
Function code		
Read-out start No. (relative address)	Upper	
	Lower	
Read-out word number	Upper	
	Lower	

Response message composition(byte)

Transaction Identifier	Upper	} Read-out word number×2
	Lower	
Protocol Identifier	Upper	
	Lower	
Length Unit Identifier	Upper	
	Lower	
Station No.		
Function code		
Read-out byte number		
Contents of the first word data	Upper	
	Lower	
Contents of the next word data	Upper	
	Lower	
~		
Contents of the last word data	Upper	
	Lower	

* Arrangement of read-out word data

MSB	LSB
Upper byte of contents of the first word data	
Lower byte of contents of the first word data	
Upper byte of contents of the next word data	
Lower byte of contents of the next word data	
~	
Upper byte of contents of the last word data	
Lower byte of contents of the last word data	

(2) Function explanations

Word data of continuous word numbers from the read-out start No. can be read. Read-out word data are transmitted from the slave station in the order of upper and lower bytes.

(3) Message transmission (example)

Reading range start and range end in Channel 1 from No. 2 station is shown below.

Relative address of range start in Channel 1: 001B_H (Register No.40028), Data number: 02_H

Command message composition (byte)			Response message composition (byte)		
Transaction Identifier	Upper	00 _H	Transaction Identifier	Upper	00 _H
	Lower	00 _H		Lower	00 _H
Protocol Identifier	Upper	00 _H	Protocol Identifier	Upper	00 _H
	Lower	00 _H		Lower	00 _H
Length Unit Identifier	Upper	00 _H	Length Unit Identifier	Upper	00 _H
	Lower	06 _H		Lower	07 _H
Station No.		02 _H	Station No.		02 _H
Function code		03 _H	Function code		03 _H
Read-out start No. (relative address)	Upper	00 _H	Read-out byte number		04 _H
	Lower	1B _H	Contents of the first word data	Upper	00 _H
Read-out word number	Upper	00 _H		Lower	00 _H
	Lower	02 _H	Contents of the next word data	Upper	0F _H
		Lower		A0 _H	

* Meaning of data to be read

Channel 1 Range start 00 00_H = 0
 (contents of the first word data)

Channel 1 Range end 0F A0_H = 4000
 (contents of the next word data)

Where the unit is °C with decimal point position set at 1,

Channel 1 Range start = 0.0°C

Channel 1 Range end = 400.0°C

Point For “Point” decimal point, refer to Section 9.1.

8.2 Read-out of Read-out Only Word Data [Function code : 04_H]

Function code	Max. word number readout in one message	Relative data address	Register No.
04 _H	64 words	0000 _H to 07CF _H	30001 to 32000

(1) Message composition

Command message composition(byte)

Transaction Identifier	Upper	} 1 to 64
	Lower	
Protocol Identifier	Upper	
	Lower	
Length Unit Identifier	Upper	
	Lower	
Station No.		
Function code		
Read-out start No. (relative address)	Upper	
	Lower	
Read-out word number	Upper	
	Lower	

Response message composition(byte)

Transaction Identifier	Upper	} Read-out word number×2
	Lower	
Protocol Identifier	Upper	
	Lower	
Length Unit Identifier	Upper	
	Lower	
Station No.		
Function code		
Read-out byte number		
Contents of the first word data	Upper	
	Lower	
Contents of the next word data	Upper	
	Lower	
~		
Contents of the last word data	Upper	
	Lower	

* Arrangement of read-out word data

MSB	LSB
Upper byte of contents of the first word data	
Lower byte of contents of the first word data	
Upper byte of contents of the next word data	
Lower byte of contents of the next word data	
~	
Upper byte of contents of the last word data	
Lower byte of contents of the last word data	

(2) Function explanations

Word data of continuous word numbers from the read-out start No. can be read. Read-out word data are transmitted from the slave station in the order of upper and lower bytes.

(3) Message transmission (example)

Reading range start and range end in Channel 2 from No. 1 station is shown below.

Relative address of range start in Channel 2: 0065_H (Register No.30102), Data number: 01_H

Command message composition (byte)

Transaction Identifier	Upper	00 _H
	Lower	00 _H
Protocol Identifier	Upper	00 _H
	Lower	00 _H
Length Unit Identifier	Upper	00 _H
	Lower	06 _H
Station No.		01 _H
Function code		04 _H
Read-out start No. (relative address)	Upper	00 _H
	Lower	65 _H
Read-out word number	Upper	00 _H
	Lower	01 _H

Response message composition (byte)

Transaction Identifier	Upper	00 _H
	Lower	00 _H
Protocol Identifier	Upper	00 _H
	Lower	00 _H
Length Unit Identifier	Upper	00 _H
	Lower	05 _H
Station No.		01 _H
Function code		04 _H
Read-out byte number		02 _H
Contents of the first word data	Upper	01 _H
	Lower	4F _H

* Meaning of data to be read

Channel 1 Range start 01 4F_H = 335
(contents of the first word data)

Where the unit is °C with decimal point position set at 1,

Channel 2 Measured value = 33.5°C

➤ **Point** ➤ For "Point" decimal point, refer to Section 9.1.

8.3 Write-in of Continuous Word Data [Function code : 10_H]

Function code	Max. word number read-out in one message	Relative data address	Register No.	Kind of data
10 _H	64 words	0000 _H to 1386 _H	40001 to 44999	Storage enable data
		1387 _H to 157B _H	45000 to 45500	Storage diable data
		157C _H to 1B57 _H	45501 to 47000	Storage enable data

(1) Message composition

Command message composition(byte)		Response message composition(byte)	
Transaction Identifier	Upper	Transaction Identifier	Upper
	Lower		Lower
Protocol Identifier	Upper	Protocol Identifier	Upper
	Lower		Lower
Length Unit Identifier	Upper	Length Unit Identifier	Upper
	Lower		Lower
Station No.		Station No.	
Function code		Function code	
Write-in start No. (relative address)	Upper	Write-in start No. (relative address)	Upper
	Lower		Lower
Write-in word number	Upper	Write-in word number	Upper
	Lower		Lower
Write-in byte number			
First write-in word data	Upper		
	Lower		
Next write-in word data	Upper		
	Lower		
} 1 to 64			
Write-in word number×2			
Last write-in word data	Upper		
	Lower		

* Arrangement of read-out word data

MSB	LSB
Upper byte of contents of the first word data	
Lower byte of contents of the first word data	
Upper byte of contents of the next word data	
Lower byte of contents of the next word data	
}	
Upper byte of contents of the last word data	
Lower byte of contents of the last word data	

(2) Function explanations

Word data of continuous word number is written from write-in start address. Write-in word data are transmitted from master station in the order of upper and lower bytes.

(3) Message transmission (example)

Writing Subtract channel = channel 2, PV shift = 20.0°C, and PV gain = 110.0% in

Channel 1 of No. 1 station is shown below.

Subtract channel = 0002_H (= 2D : channel 2)

PV shift = 00C8_H (= 200D)

Input filter = 044C_H (= 1100D)

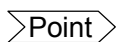
Relative address of Subtract channel in Channel 1: 0014_H(Register No.40021), Data number: 03_H

Command message composition (byte)

Transaction Identifier	Upper	00 _H
	Lower	00 _H
Protocol Identifier	Upper	00 _H
	Lower	00 _H
Length Unit Identifier	Upper	00 _H
	Lower	0D _H
Station No.		01 _H
Function code		10 _H
Write-in start No. (relative address)	Upper	00 _H
	Lower	14 _H
Write-in word number	Upper	00 _H
	Lower	03 _H
Write-in byte number		06 _H
First write-in word data	Upper	00 _H
	Lower	02 _H
Next write-in word data	Upper	00 _H
	Lower	C8 _H
Last write-in word data	Upper	04 _H
	Lower	4C _H

Response message composition (byte)

Transaction Identifier	Upper	00 _H
	Lower	00 _H
Protocol Identifier	Upper	00 _H
	Lower	00 _H
Length Unit Identifier	Upper	00 _H
	Lower	06 _H
Station No.		01 _H
Function code		10 _H
Write-in start No. (relative address)	Upper	00 _H
	Lower	14 _H
Write-in word number	Upper	00 _H
	Lower	03 _H



Since the transmission data can not include a decimal point, data of 110.0 is transmitted as "1100".

For transmission format of each data, refer to the address map(Chapter 9).



If the write-in command message is sent to any slave station during the FIX process, response is not returned from it.

9. ADDRESS MAP AND DATA FORMAT

9.1 Data Format

9.1.1 Transmission data format

Transmitted data is “numeric value” and not “ASCII code”.

9.1.2 Control of decimal point

A decimal point is not included on the transmission data.

Align decimal point for data that have decimal point (decimal point is eliminated in transmission, and added in receiving).

9.1.3 Data with input error

When input error (Over, Under, Burnout or Error) occurs in display data, read data from measured values are as follows.

Display data	Read data
Over	32767
Under	-32767
Bunout	-32768
Error	-32768

Detection of input error during communication can be performed at address 30131 = Channel status.

9.1.4 Range of write-in data

When data is written in each parameter, the write-in data should be kept within the setting range. PHF accepts the write-in data beyond the range. However, be careful since the PHF performance will not be guaranteed.

9.2 Address Map

For detailed contents about individual parameter function or setting range, refer to the operation manual.

Data type Long: long data The data of this address is manipulated in unit of word. 1 data/2 address
 Word: word data The data of this address is manipulated in unit of word. 1 data/1 address
 Byte: byte data The data of this address is manipulated in unit of byte. A maximum of 2 data/1 address
 Bit: Bit data The data of this address is manipulated in unit of bit. A maximum of 16 data/1 address

Word data [read-out / write-in] : Function code [03H, 10H]

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks	
4XXXX					
40001	Byte	Tag 1	1st, 2nd characters	Set Tag 1 (8 characters) by the ASCII code.	
40002	Byte		3rd, 4th characters		
40003	Byte		5th, 6th characters		
40004	Byte		7th, 8th characters		
40005	Byte		Tag 2	1st, 2nd characters	Set Tag 2 (8 characters) by the ASCII code.
40006	Byte			3rd, 4th characters	
40007	Byte			5th, 6th characters	
40008	Byte			7th, 8th characters	
40009	Word			Reserve	
40010	Word	Input type	0 to 33 (Please refer to Table 9-1)		
40011	Word	Input filter	0 to 900 (0 to 900 sec)		
40012	Word	Unit	0 to 167 (Please refer to Table 9-2)		
40013	Word	Scaling	0: OFF, 1: ON		
40014	Word	Masuring start	-1000 to 5500 (Please refer to Table 9-3)		
40015	Word	Masuring end	-1000 to 5500 (Please refer to Table 9-3)		
40016	Word	Engineering start	-32767 to 32767		
40017	Word	Engineering end	-32767 to 32767		
40018	Word	Decimal point	0 to 4 (Please refer to Table 9-4)		
40019	Word	Square rooter	0: OFF, 1: ON		
40020	Word			Reserve	
40021	Word	Subtract channel	0 to 6 (0: Subtract OFF, 1 to 6: channel 1 to 6)		
40022	Word	PV shift	-32767 to 32767		
40023	Word	PV gain	0 to 32767 (0.00 to 327.67%)		
40024	Word			Reserve	
40025	Word			Reserve	
40026	Word	Recording mode	0: Display only, 1: With record		
40027	Word	Recording type	0: Min-Max rec., 1: Point record, 2: Average rec.		
40028	Word	Range start	-32767 to 32767 (Please refer to Table 9-5)		
40029	Word	Range end	-32767 to 32767 (Please refer to Table 9-5)		
40030	Word			Reserve	
to				Reserve	
40065	Word	Channel 2 setting	Same allocation as in Channel 1		
to					
40129	Word	Channel 3 setting	Same allocation as in Channel 1		
to					
40193	Word	Channel 4 setting	Same allocation as in Channel 1		
to					
40257	Word	Channel 5 setting	Same allocation as in Channel 1		
to					
40321	Word	Channel 6 setting	Same allocation as in Channel 1		
to					
40385	Word			Reserve	
to					
41921	Word	Channel 1 alarm setting (16 words)	Alarm No.1	Alarm type	0: OFF, 1: H alarm, 2: L alarm
41922	Word			Set point	-32767 to 32767 (Please refer to Table 9-5)
41923	Word				Reserve
41924	Word			DO relay No.	0 to 10 (0: None, 1 to 10: DO1 to 10)
41925	Word		Alarm No.2	Alarm type	0: OFF, 1: H alarm, 2: L alarm
41926	Word			Set point	-32767 to 32767 (Please refer to Table 9-5)

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks	
41927	Word			Reserve	
41928	Word		DO relay No.	0 to 10 (0: None, 1 to 10: DO1 to 10)	
41929	Word		Alarm No.3	Alarm type	0: OFF, 1: H alarm, 2: L alarm
41930	Word			Set point	-32767 to 32767 (Please refer to Table 9-5)
41931	Word				Reserve
41932	Word			DO relay No.	0 to 10 (0: None, 1 to 10: DO1 to 10)
41933	Word		Alarm No.4	Alarm type	0: OFF, 1: H alarm, 2: L alarm
41934	Word			Set point	-32767 to 32767 (Please refer to Table 9-5)
41935	Word				
41936	Word			DO relay No.	0 to 10 (0: None, 1 to 10: DO1 to 10)
41937	Word	Channel 2 alarm setting		Same allocation as in Channel 1	
to					
41953	Word	Channel 3 alarm setting		Same allocation as in Channel 1	
to					
41969	Word	Channel 4 alarm setting		Same allocation as in Channel 1	
to					
41985	Word	Channel 5 alarm setting		Same allocation as in Channel 1	
to					
42001	Word	Channel 6 alarm setting		Same allocation as in Channel 1	
to					
42017	Word			Reserve	
to				Reserve	
42425	Byte	Display setting	Display name	1st, 2nd characters	Set Display name (16 characters) by the ASCII code.
42426	Byte			3rd, 4th characters	
42427	Byte			5th, 6th characters	
42428	Byte			7th, 8th characters	
42429	Byte			9th, 10th characters	
42430	Byte			11th, 12th characters	
42431	Byte			13th, 14th characters	
42432	Byte			15th, 16th characters	
42433	Word		Display No.1	0: None, 1 to 6: ch1 to 6	
42434	Word		Display No.2	0: None, 1 to 6: ch1 to 6	
42435	Word	Display No.3	0: None, 1 to 6: ch1 to 6		
42436	Word	Display No.4	0: None, 1 to 6: ch1 to 6		
42437	Word	Display No.5	0: None, 1 to 6: ch1 to 6		
42438	Word	Display No.6	0: None, 1 to 6: ch1 to 6		
to				Reserve	
42497	Word			Reserve	
42498	Word	Display setting2	Trend direction	0: Vertical, 1: Horizontal	
42499	Word		Channel index	0: CH No.disp., 1: Tag No.disp., 2: Unit Disp.	
42500	Word		Scale display	0: OFF, 1: ON	
42501	Word				Reserve
42502	Word		Display divided	1 to 20	
to				Reserve	
43032	Word	Time setting	Time set request	1: Time set request.(Automatically clear)	
43033	Word		Year	1 to 99 (2001 to 2099year)	
43034	Word		Month	1 to 12 (1 to 12month)	
43035	Word		Day	1 to 31 (1 to 31day)	
43036	Word		Hour	0 to 23 (0 to 23hour)	
43037	Word		Minute	0 to 59 (0 to 59minute)	
43038	Word			Reserve	
43039	Word			Reserve	
43040	Word	Refreshment cycle		0 to 19 (Please refer to Table 9-6)	
43041	Word			Reserve	
43042	Word	LCD lights-out time		0 to 60 (0: ON all the time, 1 to 60: 1 to 60min)	
43043	Word	File division cycle		0 to 4 (Please refer to Table 9-7)	
43044	Word	Memory full alarm		0 to 10 (0: None, 1 to 10: DO1 to 10)	
43045	Word	Record data format		0: Ascii, 1: Binary	
43046	Word			Reserve	
43047	Word			Reserve	
43048	Word			Reserve	
43049	Word			Reserve	
43050	Word			Reserve	
43051	Word	Battery alarm		0 to 10 (0: None, 1 to 10: DO1 to 10)	

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks
43052	Word	Data format	0 to 4 (Please refer to Table 9-8)	
43053	Word			Reserve
43054	Word			Reserve
43055	Word			Reserve
43056	Word	Alarm hysteresis	0 to 10000 (0.00 to 100.00%)	
43057	Word	Alarm latch	0: OFF, 1: ON	
43058	Word	MODBUS Station No.	0 to 255 (0: Communication OFF)	
43059	Word			Reserve
43060	Word			Reserve
43061	Word	Configuration password	0 to 9999	
43062	Word	CF manager password	0 to 9999	
43063	Word	Record password	0 to 9999	
to				Reserve
43301	Byte	Original unit 1 setting	1st, 2nd characters	Set original unit (7 characters) by the ASCII code.
43302	Byte		3rd, 4th characters	
43303	Byte		5th, 6th characters	
43304	Byte		7th, characters	
43305	Byte			
43306	Byte			Reserve
43307	Byte			Reserve
43308	Byte	Original unit 2 setting	Same allocation as Original unit 1	
to				
43315	Byte	Original unit 3 setting	Same allocation as Original unit 1	
to				
43322	Byte	Original unit 4 setting	Same allocation as Original unit 1	
to				
43329	Byte	Original unit 5 setting	Same allocation as Original unit 1	
to				
43336	Byte	Original unit 6 setting	Same allocation as Original unit 1	
to				
43343	Byte	Original unit 7 setting	Same allocation as Original unit 1	
to				
43350	Byte	Original unit 8 setting	Same allocation as Original unit 1	
to				
43357	Byte	Original unit 9 setting	Same allocation as Original unit 1	
to				
43364	Byte	Original unit 10 setting	Same allocation as Original unit 1	
to				
43371	Byte	Original unit 11 setting	Same allocation as Original unit 1	
to				
43378	Byte	Original unit 12 setting	Same allocation as Original unit 1	
to				
43385	Word			Reserve
to				Reserve
43496	Word	DI 1 function	0 to 5 (Please refer to Table 9-9)	
43497	Word	DI 2 function	0 to 5	
43498	Word	DI 3 function	0 to 5	
43499	Word	DI 4 function	0 to 5	
43500	Word	DI 5 function	0 to 5	
43501	Word			Reserve
43502	Word			Reserve
43503	Word			Reserve
43504	Word			Reserve
43505	Word			Reserve
43506	Word	RCJ ON/OFF	0: OFF, 1: ON	
43507	Word			Reserve
43508	Word			Reserve
43509	Word			Reserve
43510	Word	Front communication	0: OFF, 1: ON	
43511	Word	Rec.start adjust OFF	0: OFF, 1: ON	

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks
43512	Word			Do not write
to				Do not write
44001	Byte	PILC data	1st, 2nd characters	Do not write
44002	Byte		3rd, 4th characters	Do not write
44003	Byte		5th, 6th characters	Do not write
44004	Byte		7th, 8th characters	Do not write
44005	Byte		9th, 10th characters	Do not write
44006	Byte		11th, 12th characters	Do not write
44007	Byte		13th, 14th characters	Do not write
44008	Byte		15th, 16th characters	Do not write
44009	Byte		17th, 18th characters	Do not write
44010	Byte		19th, 20th characters	Do not write
44011	Byte		21th, 22th characters	Do not write
44012	Byte		23th, 24th characters	Do not write
44013	Byte		25th, 26th characters	Do not write
44014	Byte		27th, 28th characters	Do not write
44015	Byte		29th, 30th characters	Do not write
44016	Byte		31th, 32th characters	Do not write
44017	Byte	Serial number	1st, 2nd characters	Do not write
44018	Byte		3rd, 4th characters	Do not write
44019	Byte		5th, 6th characters	Do not write
44020	Byte		7th, 8th characters	Do not write
44021	Byte		9th, 10th characters	Do not write
44022	Byte		11th, 12th characters	Do not write
44023	Byte		13th, 14th characters	Do not write
44024	Byte		15th, 16th characters	Do not write
44025	Word			Do not write
to				Do not write
Following register No. 45000 to 45500 will not be recorded in the main unit.				
45000	Word	Register data request	1: Register data (Automatically clear)	
45001	Word			Reserve
45002	Word			Reserve
45003	Word	Prohibiting the writing to the memory card	0: Writing permission, 1: Writing prohibition	
45004	Bit	Recorder control	(Please refer to Table 9-10)	
45005	Word			Reserve
45006	Word			Reserve
45007	Word	Alarm latch clear request	1: Alarm latch clear (Automatically clear)	
45008	Word			Do not write
to				Do not write
The following addresses are recorded in the main unit.				
45501	Word			Reserve
45502	Word	E-mail function	0: OFF, 1: ON	
45503	Word	FTP server function	0: OFF, 1: ON	
45504	Word	FTP access control	0: OFF, 1: ON	
45505	Word	Web server function	0: OFF, 1: ON	
45506	Word			Reserve
45507	Word			Reserve
45508	Word	MODBUS TCP/IP function	0: OFF, 1: ON	
45509	Word	IP address	1st number	0 to 255
45510	Word		2nd number	0 to 255
45511	Word		3rd number	0 to 255
45512	Word		4th number	0 to 255
45513	Word	Subnet mask	1st number	0 to 255
45514	Word		2nd number	0 to 255
45515	Word		3rd number	0 to 255
45516	Word		4th number	0 to 255
45517	Word	Default gateway	1st number	0 to 255
45518	Word		2nd number	0 to 255
45519	Word		3rd number	0 to 255
45520	Word		4th number	0 to 255
45521	Word	SMTP IP address	1st number	0 to 255
45522	Word		2nd number	0 to 255
45523	Word		3rd number	0 to 255
45524	Word		4th number	0 to 255

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks
45525	Byte	Sender's mail address	1st, 2nd characters	Set address (64 characters) by the ASCII code.
45526	Byte		3rd, 4th characters	
45527	Byte		5th, 6th characters	
45528	Byte		7th, 8th characters	
45529	Byte		9th, 10th characters	
45530	Byte		11th, 12th characters	
45531	Byte		13th, 14th characters	
45532	Byte		15th, 16th characters	
45533	Byte		17th, 18th characters	
45534	Byte		19th, 20th characters	
45535	Byte		21th, 22th characters	
45536	Byte		23th, 24th characters	
45537	Byte		25th, 26th characters	
45538	Byte		27th, 28th characters	
45539	Byte		29th, 30th characters	
45540	Byte		31th, 32th characters	
45541	Byte		33th, 34th characters	
45542	Byte		35th, 36th characters	
45543	Byte		37th, 38th characters	
45544	Byte		39th, 40th characters	
45545	Byte		41th, 42th characters	
45546	Byte		43th, 44th characters	
45547	Byte		45th, 46th characters	
45548	Byte		47th, 48th characters	
45549	Byte		49th, 50th characters	
45550	Byte		51th, 52th characters	
45551	Byte		53th, 54th characters	
45552	Byte		55th, 56th characters	
45553	Byte	57th, 58th characters		
45554	Byte	59th, 60th characters		
45555	Byte	61th, 62th characters		
45556	Byte	63th, 64th characters		
45557	Byte	Sender's mail name	1st, 2nd characters	Set name (32 characters) by the ASCII code.
45558	Byte		3rd, 4th characters	
45559	Byte		5th, 6th characters	
45560	Byte		7th, 8th characters	
45561	Byte		9th, 10th characters	
45562	Byte		11th, 12th characters	
45563	Byte		13th, 14th characters	
45564	Byte		15th, 16th characters	
45565	Byte		17th, 18th characters	
45566	Byte		19th, 20th characters	
45567	Byte		21th, 22th characters	
45568	Byte		23th, 24th characters	
45569	Byte		25th, 26th characters	
45570	Byte	27th, 28th characters		
45571	Byte	29th, 30th characters		
45572	Byte	31th, 32th characters		
45573	Byte	Receiver's mail address 1	1st, 2nd characters	Set address (64 characters) by the ASCII code.
45574	Byte		3rd, 4th characters	
45575	Byte		5th, 6th characters	
45576	Byte		7th, 8th characters	
45577	Byte		9th, 10th characters	
45578	Byte		11th, 12th characters	
45579	Byte		13th, 14th characters	
45580	Byte		15th, 16th characters	
45581	Byte		17th, 18th characters	
45582	Byte		19th, 20th characters	
45583	Byte		21th, 22th characters	
45584	Byte		23th, 24th characters	
45585	Byte		25th, 26th characters	
45586	Byte		27th, 28th characters	
45587	Byte		29th, 30th characters	
45588	Byte		31th, 32th characters	

Register No.	Data type	Memory contents		Read-out data / Write-in data setting range	Remarks		
45589	Byte		33th, 34th characters				
45590	Byte		35th, 36th characters				
45591	Byte		37th, 38th characters				
45592	Byte		39th, 40th characters				
45593	Byte		41th, 42th characters				
45594	Byte		43th, 44th characters				
45595	Byte		45th, 46th characters				
45596	Byte		47th, 48th characters				
45597	Byte		49th, 50th characters				
45598	Byte		51th, 52th characters				
45599	Byte		53th, 54th characters				
45600	Byte		55th, 56th characters				
45601	Byte		57th, 58th characters				
45602	Byte		59th, 60th characters				
45603	Byte	61th, 62th characters					
45604	Byte	63th, 64th characters					
45605	Byte	Receiver's mail address 2		Same allocation as Receiver's mail address 1			
to							
45637	Byte	Receiver's mail address 3		Same allocation as Receiver's mail address 1			
to							
45669	Byte	Receiver's mail address 4		Same allocation as Receiver's mail address 1			
to							
45701	Byte	Receiver's mail address 5		Same allocation as Receiver's mail address 1			
to							
45733	Byte	Receiver's mail address 6		Same allocation as Receiver's mail address 1			
to							
45765	Byte	Receiver's mail address 7		Same allocation as Receiver's mail address 1			
to							
45797	Byte	Receiver's mail address 8		Same allocation as Receiver's mail address 1			
to							
45829	Word				Reserve		
to					Reserve		
45901	Byte	User 1 setting	User name	1st, 2nd characters	Set name (16 characters) by the ASCII code.		
45902	Byte		3rd, 4th characters				
45903	Byte		5th, 6th characters				
45904	Byte		7th, 8th characters				
45905	Byte		9th, 10th characters				
45906	Byte		11th, 12th characters				
45907	Byte		13th, 14th characters				
45908	Byte		15th, 16th characters				
45909	Byte		Password	1st, 2nd characters		Set name (8 characters) by the ASCII code.	
45910	Byte			3rd, 4th characters			
45911	Byte			5th, 6th characters			
45912	Byte			7th, 8th characters			
45913	Word		User level			0: guest, 1: administrator	
45914	Word						Reserve
45915	Byte	User 2 setting		Same allocation as User 1			
to							
45929	Byte	User 3 setting		Same allocation as User 1			
to							
45943	Byte	User 4 setting		Same allocation as User 1			
to							
45957	Byte	User 5 setting		Same allocation as User 1			
to							
45971	Byte	User 6 setting		Same allocation as User 1			
to							
45985	Byte	User 7 setting		Same allocation as User 1			
to							
45999	Byte	User 8 setting		Same allocation as User 1			
to							
46013	Word				Reserve		
to					Reserve		

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks		
46101	Byte	E-mail trigger 1 setting	Title	1st, 2nd characters	Set title (32 characters) by the ASCII code.	
46102	Byte			3rd, 4th characters		
46103	Byte			5th, 6th characters		
46104	Byte			7th, 8th characters		
46105	Byte			9th, 10th characters		
46106	Byte			11th, 12th characters		
46107	Byte			13th, 14th characters		
46108	Byte			15th, 16th characters		
46109	Byte			17th, 18th characters		
46110	Byte			19th, 20th characters		
46111	Byte			21th, 22th characters		
46112	Byte			23th, 24th characters		
46113	Byte			25th, 26th characters		
46114	Byte			27th, 28th characters		
46115	Byte			29th, 30th characters		
46116	Byte			31th, 32th characters		
46117	Byte		Text 1	1st, 2nd characters	Set text 1 (32 characters) by the ASCII code.	
46118	Byte			3rd, 4th characters		
46119	Byte			5th, 6th characters		
46120	Byte			7th, 8th characters		
46121	Byte			9th, 10th characters		
46122	Byte			11th, 12th characters		
46123	Byte			13th, 14th characters		
46124	Byte			15th, 16th characters		
46125	Byte			17th, 18th characters		
46126	Byte			19th, 20th characters		
46127	Byte			21th, 22th characters		
46128	Byte			23th, 24th characters		
46129	Byte			25th, 26th characters		
46130	Byte			27th, 28th characters		
46131	Byte			29th, 30th characters		
46132	Byte			31th, 32th characters		
46133	Byte	Text 2	1st, 2nd characters	Set text 2 (32 characters) by the ASCII code.		
46134	Byte		3rd, 4th characters			
46135	Byte		5th, 6th characters			
46136	Byte		7th, 8th characters			
46137	Byte		9th, 10th characters			
46138	Byte		11th, 12th characters			
46139	Byte		13th, 14th characters			
46140	Byte		15th, 16th characters			
46141	Byte		17th, 18th characters			
46142	Byte		19th, 20th characters			
46143	Byte		21th, 22th characters			
46144	Byte		23th, 24th characters			
46145	Byte		25th, 26th characters			
46146	Byte		27th, 28th characters			
46147	Byte		29th, 30th characters			
46148	Byte		31th, 32th characters			
46149	Word	Trigger timing	(Please refer to Table 9-11)			
46150	Word	Trigger timing argument 1				
46151	Word	Trigger timing argument 2				
46152	Word	PV value affixation	0: OFF, 1: ON			
46153	Word	Receiver's mail address No.	(Please refer to Table 9-12)			
46154	Word			Reserve		
46155	Byte	E-mail trigger 2 setting	Same allocation as E-mail trigger 1			
to						
46209	Byte	E-mail trigger 3 setting	Same allocation as E-mail trigger 1			
to						
46263	Byte	E-mail trigger 4 setting	Same allocation as E-mail trigger 1			
to						
46317	Byte	E-mail trigger 5 setting	Same allocation as E-mail trigger 1			
to						
46371	Byte	E-mail trigger 6 setting	Same allocation as E-mail trigger 1			
to						

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks
46425	Byte	E-mail trigger 7 setting	Same allocation as E-mail trigger 1	
to				
46479	Byte	E-mail trigger 8 setting	Same allocation as E-mail trigger 1	
to				
46533	Byte	E-mail trigger 9 setting	Same allocation as E-mail trigger 1	
to				
46587	Byte	E-mail trigger 10 setting	Same allocation as E-mail trigger 1	
to				
46641	Word			Reserve
to				Reserve
47000	Word	Final address		Reserve

Word data [read-out only] : Function code [04H]

Register No.	Data type	Memory contents	Read-out data / Write-in data setting range	Remarks
3XXXX				
30001	Bit	System information	(Please refer to Table 9-13)	
30002	Bit			Reserve
30003	Bit	DO information	DO1 to 10	(Please refer to Table 9-14)
30004	Word			Reserve
30005	Word			Reserve
30006	Bit	DI information		(Please refer to Table 9-15)
to				Reserve
30086	Word	Memory cord utilization	0 to 1000 (0.00 to 100.0% , 100.0%=Memory FULL)	
to				Reserve
30093	Bit	Channel Alarm information	Channel 1 to 4	(Please refer to Table 9-16)
30094	Bit		Channel 5 to 6	
30095	Word			Reserve
30096	Word			Reserve
30097	Word			Reserve
30098	Word			Reserve
30099	Word			Reserve
30100	Word			Reserve
30101	Word	Measured value	Channel 1	-32767 to 32767 (No decimal point)
30102	Word		Channel 2	-32767 to 32767 (No decimal point)
30103	Word		Channel 3	-32767 to 32767 (No decimal point)
30104	Word		Channel 4	-32767 to 32767 (No decimal point)
30105	Word		Channel 5	-32767 to 32767 (No decimal point)
30106	Word		Channel 6	-32767 to 32767 (No decimal point)
to				Reserve
30130	Word			Reserve
30131	Word	Channel status	Channel 1	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
30132	Word		Channel 2	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
30133	Word		Channel 3	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
30134	Word		Channel 4	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
30135	Word		Channel 5	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
30136	Word		Channel 6	0:Normal, 1:Burnout, 2:Over, 3:Under, 4:Error
to				Reserve
32000	Word	Final address		Reserve

Notes) • The area marked (Do not use) is a reserve area. Do not write in there.

9.3 Additional Explanation of Address Map

Table 9-1 Input type code

Data	Input type		Initial decimal point
0	Skip	Skip	0
1	K-Type TC	Thermocouple	1
2	E-Type TC		
3	J-Type TC		
4	T-Type TC		
5	R-Type TC		
6	S-Type TC		
7	B-Type TC		
8	N-Type TC		
9	W-Type TC		
10	L-Type TC		
11	U-Type TC		
12	PN-Type TC		
20	Pt100		
21	JPt100		
22	Ni100		
23	Pt50		
24	Cu50		
30	50mV	DC voltage	2
31	500mV		1
32	1-5V		3
33	0-5V		

*When position of decimal point varies with input type, initialize it.

Table 9-2 Unit code

Data	Unit	Data	Unit	Data	Unit	Data	Unit	Data	Unit
0	°C	18	t/min	36	mPa	54	mm ²	72	ppm
1	°F	19	kg/min	37	Pa	55	cm ²	73	ppmNH ₃
2	%RH	20	g/min	38	kPa	56	m ²	74	ppmSO ₂
3	vol%	21	m ³ /min	39	MPa	57	g	75	ppmH ₂ S
4		22	l/min	40		58	kg	76	ppmCO
5		23		41		59	t	77	ppmO ₂
6	t/d	24	t/s	42	mm	60	g/cm ³	78	ppmNO _x
7	kg/d	25	kg/s	43	cm	61	kg/cm ³	79	ppb
8	g/d	26	g/s	44	m	62	g/m ³	80	pH
9	m ³ /d	27	m ³ /s	45		63	kg/m ³	81	mol
10	l/d	28	l/s	46		64		82	%
11		29		47		65		83	%H ₂
12	t/h	30	mbar	48	ml	66	g/l	84	%CO ₂
13	kg/h	31	bar	49	L	67	kg/l	85	%He
14	g/h	32	N/mm ²	50	kl	68	g/ml	86	%Ar
15	m ³ /h	33	N/m ²	51	mm ³	69		87	%O ₂
16	l/h	34		52	cm ³	70		88	%NaCl
17		35		53	m ³	71		89	%CO

Data	Unit	Data	Unit	Data	Unit	Data	Unit	Data	Unit
90	mN	108	us	126	Var	144	uSv/h	162	*Unit 7
91	N	109	ms	127	kVar	145	mSv/h	163	*Unit 8
92	N·m	110	s	128	uS/cm	146	nGy/h	164	*Unit 9
93	J	111	min	129	uF	147	uGy/h	165	*Unit 10
94	kJ	112	h	130	F	148	um	166	*Unit 11
95		113	day	131	C	149		167	*Unit 12
96	mm/s	114	mV	132	mH	150	Pa·s		
97	mm/min	115	V	133	H	151	mPa·s		
98	mm/h	116	kV	134	m ohm	152			
99	m/s	117	uA	135	ohm	153			
100	m/min	118	mA	136	k ohm	154			
101	m/h	119	A	137	M ohm	155			
102	rps	120	Hz	138	lx	156	*Unit 1		
103	rpm	121	dB	139	cd	157	*Unit 2		
104	rph	122	W	140	lm	158	*Unit 3		
105	m/s2	123	kW	141	cd/m2	159	*Unit 4		
106	rad/s	124	VA	142		160	*Unit 5		
107	km/h	125	kVA	143		161	*Unit 6		

*The unit that was made in Unit 1 to 12: Original unit definition is selected.

Table 9-3 Masuring start, Masuring end setting limit

Input type	Masuring start, Masuring end limit
50mV	-1000 to 5500 (-10.00 to 55.00mV)
500mV	-100 to 5500 (-10.0 to 550.0mV)
1-5V	500 to 5500 (0.500 to 5.500V)
0-5V	-100 to 5500 (-0.100 to 5.500V)

Table 9-4 Decimal point code

Decimal point data	Setting data
0	-32767 to 32767
1	-3276.7 to 3276.7
2	-327.67 to 327.67
3	-32.767 to 32.767
4	-3.2767 to 3.2767

Table 9-5 Data setting limit

Input type TC,Pt

Input type	°C (Centigrade)	°F (Fahrenheit)
	Range start, Range end Alarm No.1 to 4 set point	Range start, Range end Alarm No.1 to 4 set point
K-Type TC	-2300 to 14000 (-230.0 to 1400.0 °C)	-3820 to 25520 (-382.0 to 2552.0 °F)
E-Type TC	-2300 to 8300 (-230.0 to 830.0 °C)	-3820 to 15260 (-382.0 to 1526.0 °F)
J-Type TC	-2300 to 11300 (-230.0 to 1130.0 °C)	-3820 to 20660 (-382.0 to 2066.0 °F)
T-Type TC	-2300 to 4300 (-230.0 to 430.0 °C)	-3820 to 8060 (-382.0 to 806.0 °F)
R-Type TC	-300 to 17900 (-30.0 to 1790.0 °C)	-220 to 32540 (-22.0 to 3254.0 °F)
S-Type TC	-300 to 17900 (-30.0 to 1790.0 °C)	-220 to 32540 (-22.0 to 3254.0 °F)
B-Type TC	3700 to 17900 (370.0 to 1790.0 °C)	6980 to 32540 (698.0 to 3254.0 °F)
N-Type TC	-300 to 13300 (-30.0 to 1330.0 °C)	-220 to 24260 (-22.0 to 2426.0 °F)
W-Type TC	-300 to 17900 (-30.0 to 1790.0 °C)	-220 to 32540 (-22.0 to 3254.0 °F)
L-Type TC	-2300 to 9300 (-230.0 to 930.0 °C)	-3820 to 17060 (-382.0 to 1706.0 °F)
U-Type TC	-2300 to 4300 (-230.0 to 430.0 °C)	-3820 to 8060 (-382.0 to 806.0 °F)
PN-Type TC	-300 to 13300 (-30.0 to 1330.0 °C)	-220 to 24260 (-22.0 to 2426.0 °F)
Pt100	-2300 to 6300 (-230.0 to 630.0 °C)	-3820 to 11660 (-382.0 to 1166.0 °F)
JPt100	-2300 to 6300 (-230.0 to 630.0 °C)	-3820 to 11660 (-382.0 to 1166.0 °F)
Ni100	-900 to 2100 (-90.0 to 210.0 °C)	-1300 to 4100 (-130.0 to 410.0 °F)
Pt50	-2300 to 6300 (-230.0 to 630.0 °C)	-3820 to 11660 (-382.0 to 1166.0 °F)
Cu50	-800 to 2300 (-80.0 to 230.0 °C)	-3820 to 11660 (-382.0 to 1166.0 °F)

Input type Volt

Input type	Scaling OFF	Scaling ON
	Range start, Range end Alarm No.1 to 4 set point	Range start, Range end Alarm No.1 to 4 set point
50mV	-1000 to 5500 (-10.00 to 55.00mV)	-32767 to 32767 (Please refer to Table 9-4)
500mV	-100 to 5500 (-10.0 to 550.0mV)	
1-5V	500 to 5500 (0.500 to 5.500V)	
0-5V	-100 to 5500 (-0.100 to 5.500V)	

Table 9-6 Refreshment cycle code

Data	Refreshment cycle
0	1sec
1	2sec
2	3sec
3	5sec
4	10sec
5	20sec
6	30sec
7	1min
8	2min
9	3min
10	5min
11	10min
12	20min
13	30min
14	1hour
15	2hour
16	3hour
17	4hour
18	6hour
19	12hour

Table 9-7 File division cycle code

Data	File division cycle
0	No division
1	1 hour
2	1 day
3	1 week
4	1 month

Table 9-8 Date format code

Data	Data format
0	2005/10/28
1	28/10/2005
2	28- Oct-05
3	10/28/2005
4	Oct-28-05

Table 9-9 DI function code

Data	DI function
0	Function invalid
1	Rec start/Rec stop
2	Function invalid
3	Function invalid
4	Function invalid
5	LCD ON

Table 9-10 Recorder control

Bit	Contents	Write data
0	Record start/stop	0:Record stop, 1:Record start
1	Reserve	
2	Reserve	
3	LCD Lighting	0: No change, 1:LCD Lighting
4	Reserve	
5	Reserve	
6	Reserve	
7	Reserve	
8	Reserve	
9	Reserve	
10	Reserve	
11	Reserve	
12	Reserve	
13	Reserve	
14	Reserve	
15	Reserve	

Table 9-11 Trigger timing data

Trigger timing argument 1 and 2 have a significant difference according to the contents of Trigger timing.

Data	Trigger timing	Argument 1	Argument 2
0	None	None	None
1	DI ON	0 to 4 (DI1 to 5)	None
2	DI OFF	0 to 4 (DI1 to 5)	None
3	Alarm ON	0 to 5 (channel 1 to 6)	0 to 3 (Alarm No.1 to 4)
4	Alarm OFF	0 to 5 (channel 1 to 6)	0 to 3 (Alarm No.1 to 4)
5	Warning	0 to 3 0: Alarm ON (All ch) 1: All warning 2: No battery 3: CF full	None
6	Timer cycle	0 to 6 0: 1hour 1: 2hour 2: 3hour 3: 4hour 4: 6hour 5: 12hour 6: 1day	0 to 23 (Base time 0:00 to 23:00)

Table 9-12 Receiver's mail address No.

Bit	Contents	Data
0	E-mail address No.1	0: No receive, 1: Address to receive
1	E-mail address No.2	0: No receive, 1: Address to receive
2	E-mail address No.3	0: No receive, 1: Address to receive
3	E-mail address No.4	0: No receive, 1: Address to receive
4	E-mail address No.5	0: No receive, 1: Address to receive
5	E-mail address No.6	0: No receive, 1: Address to receive
6	E-mail address No.7	0: No receive, 1: Address to receive
7	E-mail address No.8	0: No receive, 1: Address to receive
8	Reserve	
9	Reserve	
10	Reserve	
11	Reserve	
12	Reserve	
13	Reserve	
14	Reserve	
15	Reserve	

Table 9-13 System information

Bit	Contents	Data
0	Recording status	0: Stop, 1: Recording
1	CF capacity status	0: capacity available, 1: No capacity
2	Channel alarming status	0: No, 1: Yes
3	Reserve	
4	Reserve	
5	LCD state	0: ON, 1: OFF
6	Reserve	
7	Reserve	
8	Battery condition	0: Provided, 1: Not provided
9	Reserve	
10	CF information	0: No, 1: Yes
11	Reserve	
12	Reserve	
13	Reserve	
14	Reserve	
15	Reserve	

Table 9-14 DO information

Bit	Contents	Data
0	DO 1 information	0: ON, 1: OFF
1	DO 2 information	0: ON, 1: OFF
2	DO 3 information	0: ON, 1: OFF
3	DO 4 information	0: ON, 1: OFF
4	DO 5 information	0: ON, 1: OFF
5	DO 6 information	0: ON, 1: OFF
6	DO 7 information	0: ON, 1: OFF
7	DO 8 information	0: ON, 1: OFF
8	DO 9 information	0: ON, 1: OFF
9	DO 10 information	0: ON, 1: OFF
10	Reserve	
11	Reserve	
12	Reserve	
13	Reserve	
14	Reserve	
15	Reserve	

Table 9-15 DI information

Bit	Contents	Data
0	DI 1 information	0: ON, 1: OFF
1	DI 2 information	0: ON, 1: OFF
2	DI 3 information	0: ON, 1: OFF
3	DI 4 information	0: ON, 1: OFF
4	DI 5 information	0: ON, 1: OFF
5	Reserve	
6	Reserve	
7	Reserve	
8	Reserve	
9	Reserve	
10	Reserve	
11	Reserve	
12	Reserve	
13	Reserve	
14	Reserve	
15	Reserve	

Table 9-16 Channel Alarm information

Bit	Address 30093		Address 30094	
0	Channel 1	Alarm No. 1	Channel 5	Alarm No. 1
1		Alarm No. 2		Alarm No. 2
2		Alarm No. 3		Alarm No. 3
3		Alarm No. 4		Alarm No. 4
4	Channel 2	Alarm No. 1	Channel 6	Alarm No. 1
5		Alarm No. 2		Alarm No. 2
6		Alarm No. 3		Alarm No. 3
7		Alarm No. 4		Alarm No. 4
8	Channel 3	Alarm No. 1	Reserve	
9		Alarm No. 2	Reserve	
10		Alarm No. 3	Reserve	
11		Alarm No. 4	Reserve	
12	Channel 4	Alarm No. 1	Reserve	
13		Alarm No. 2	Reserve	
14		Alarm No. 3	Reserve	
15		Alarm No. 4	Reserve	

10. TROUBLESHOOTING

If the communication is unavailable, check the following items.

Case of Ethernet communication (common to FTP, web, E-mail and MODBUS TCP/IP)

- Whether the power is turned ON again after communication setup change.
- Whether all devices related to communication are turned ON.
- Whether connections are correct.
- Whether the number of connected instruments and connection distance are as specified.
- Whether conditions for communication are correct.
 - IP address
 - Subnet mask
 - Default gateway
- Whether the 12th digit of type code of this Recorder is E?
(PHF □□□□□-□□□E□-□)

Case of FTP server function

- Whether the user name, the password, and the user level are correct?
- Whether a compact flash has been inserted to the main unit.

Case of E-mail send function

- Whether conditions for communication are correct.
 - SMTP address
 - Sender's mail address
 - Receiver's mail address
- Whether E-mail send conditions are correct.

Case of MODBUS TCP/IP communication function

- Whether the station No. designated as send destination by the master station coincides with the station No. of this Recorder been connected.
- Whether the station No. of this Recorder is set other than 0.
If it is 0, the communication function does not work.

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