TOHO ELECTRONICS INC.

Operation Manual (Communication Edition)

(TOHO Protocol, MODBUS)

Model: TRM-00J
Name: Paperless Recorder

DWG.No. 4B-6829-B

Thank you very much for purchasing TRM-00J.
Kindly read this operation manual for proper usage.

Table of Contents

Section 1 Before Using the Product ····· 1 -
1．1． About the Operation Manual ····· 1 -
1．2． Requirements for Communication ····· 1 -
1．3． Things Communication Function Can Do ····· 1 -
1．4． Position (Priority) of Communication ····· 1 -
1．5． Settings to Be Made Prior to the Communication ····· 1 -
Section 2 Communication Settings ····· 2 -
2．1． Outline ····· 2 -
2．2． Setting of Communication Protocol ····· 3 -
2．3． Setting of Format ····· 3 -
2．4． Setting of Device Address ····· 3 -
2．5． Setting of Communication Speed, Data Length, Stop Bit, and Parity ····· 3 -
2．6． Setting of BCC ····· 3 -
2．7． Setting of Response Delay Time ····· 3 -
Section 3 Communication Outline ····· 4 -
3．1． Communication Procedures ····· 4 -
3．2． Kinds of Message ····· 4 -
Section 4 Explanation about TOHO Protocol Communication ····· 5 -
4．1． About the Format ····· 5 -
4．2． Structure of Request Message (Data Transmission from Upper Computer to This Product) ····· 5 -
4．2．1． Structure of Read Request Message ····· 5 -
4．2．2． Structure of Write Request Message ····· 5 -
4．2．3． Structure of Save Request Message ····· 5 -
4．3． Structure of Response Message (Data Transmission from This Product to Upper Computer) ····· 6 -
4．3．1． Response Message for Read Request Message ····· 6 -
4．3．2． Response Message for Write/Save Request Message ····· 6 -
4．3．3． Response Message for the Error ····· 6 -
4．4． Explanation about Codes ····· 7 -
4．5． Things to Be Noted during the Communication ····· - 10 -
4．5．1． Timing of Transmission ····· - 10 -
4．5．2． Request Interval ····· - 10 -
4．5．3． Conditions for Response ····· - 10 -
4．5．4． Address Specification Error ····· - 10 -
4．5．5． Number of Digits of Data and Position of Decimal Point ····· - 10 -
4．5．6． Operation after Receiving a Save Request Message ····· - 10 -
4．5．7． Saving Data Other than Save Request Message ····· - 10 -
4．6． Sample TOHO Communications ····· - 11 -
4．6．1． Sample Communication for Reading ····· - 11 -
4．6．2． Sample Communication for Writing ····· - 12 -
Section 5 Explanation about MODBUS Protocol Communication ····· - 13 -
5．1． MODBUS RTU ····· - 13 -
5．1．1． Structure of Request Message (Data Transmission from Upper Computer to This Product) ····· - 13 -
5．1．2． Structure of Response Message (Data Transmission from This Product to Upper Computer) ····· - 14 -

５．１．３．　Explanation about Codes ····· - 15 -
５．１．４．　Things to Be Noted during the Communication ····· - 17 -
５．２．　MODBUS ASCII ····· - 18 -
５．２．１．　Structure of Request Message (Data Transmission from Upper Computer to This Product) ····· - 18 -
５．２．２．　Structure of Response Message (Data Transmission from This product to Upper Computer) ····· - 19 -
５．２．３．　Explanation About Codes ····· - 20 -
５．２．４．　Things to Be Noted during the Communication ····· - 22 -
Section ６　List of Identifiers ····· - 23 -
６．１．　Other Commands ····· - 23 -
６．２．　Input ····· - 25 -
６．３．　Scaling ····· - 26 -
６．４．　Display ····· - 28 -
６．５．　Scale ····· - 29 -
６．６．　Alarm ····· - 30 -
６．７．　REC/CALC ····· - 35 -
６．８．　Group name ····· - 36 -
６．９．　Group channel ····· - 36 -
６．１０．　Graph Display ····· - 38 -
６．１１．　Auto switching ····· - 39 -
６．１２．　Record Operation ····· - 39 -
６．１３．　Schedule ····· - 40 -
６．１４．　Message ····· - 40 -
６．１５．　DI ····· - 43 -
６．１６．　Progress time ····· - 43 -
６．１７．　LCD backlight ····· - 44 -
６．１８．　Key function ····· - 44 -
６．１９．　Comm. Settings ····· - 45 -
６．２０．　Clock ····· - 45 -
６．２１．　Language ····· - 45 -
Section ７　List of ASCII Codes ····· - 46 -

Section 1 Before Using the Product

1. 1. About the Operation Manual

This manual explains the communication function of TRM-00J.

1. 2. Requirements for Communication

As a standard feature for communication, this product is equipped with RS-485 and USB communication function.

1. 3. Things Communication Function Can Do

Allows user to write and read to items of this product that are described in "Section 6 List of Identifiers" such as "To change, start, or stop items that can be operated through front keys" and "To read the information that can be displayed on the display section."
Provided, however, that since the RAM of this product is used during the reading/writing of data through ordinary command, the data that was written will be replaced by the previous data (data that is saved in EEPROM) if the power is turned OFF and then turned ON.
To save the written data into the EEPROM of this product, execute the save request message.
(See "4. 5. ","5. 1. 4. " and "5. 2. 4. " Things to Be Noted during the Communication.)

1. 4. Position (Priority) of Communication

This product allows the user to change parameters through the key (including touch operation, hereinafter referred to as "key operation") even during the communication. Although the same setting can be changed simultaneously through key operation and communication, do not change the setting through communication while the setting is being edited through key operation since there is no priority between key operation and communication.

1. 5. Settings to Be Made Prior to the Communication

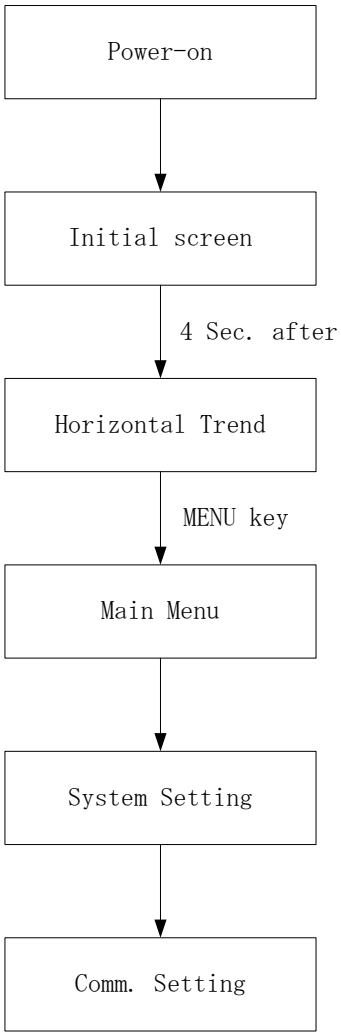
Several settings need to be made to this product in order for it to perform a communication function. See "Section 2 Communication Settings"

Section 2 Communication Settings

2. 1. Outline

Initial settings need to be made to this product in order for it to perform a communication function. Settings shall be made through key operation.

Follow the procedure shown below to navigate between setting screens. See User's Manual for details.



2. 2. Setting of Communication Protocol

Select the communication protocol.

2. 3. Setting of Format

Sets the format for each protocol. See "Section 4 Explanation about TOHO Protocol Communication" and "Section 5 Explanation about MODBUS Protocol Communication" for details.

2. 4. Setting of Device Address

Setting must be made in accordance with format setting specifications.

2. 5. Setting of Communication Speed, Data Length, Stop Bit, and Parity

Setting must be made in accordance with the settings of upper computer that shall be connected.
During the setting of MODBUS RTU, data length will be fixed to 8 bits (data length setting will be ignored).

2. 6. Setting of BCC

In case of TOHO Protocol, set "With or Without BCC Check (Turn BCC Check ON/OFF)."

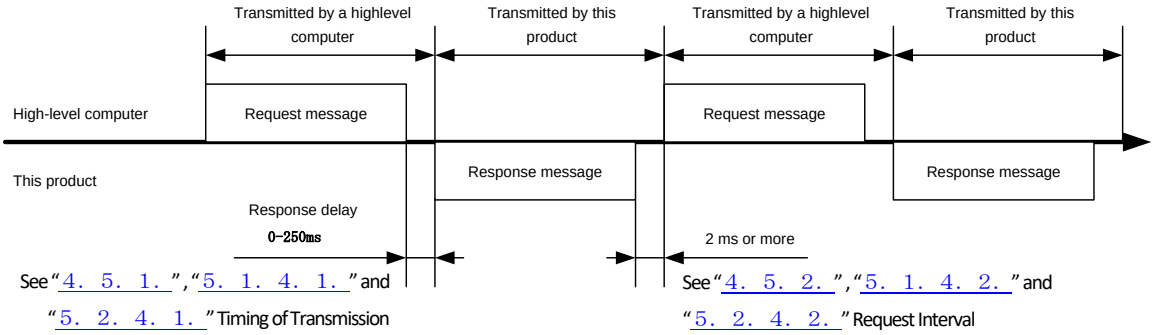
2. 7. Setting of Response Delay Time

Set the time to take for the upper computer to complete the receiving of "request message," open the line, and get ready for the next input.

Section 3 Communication Outline

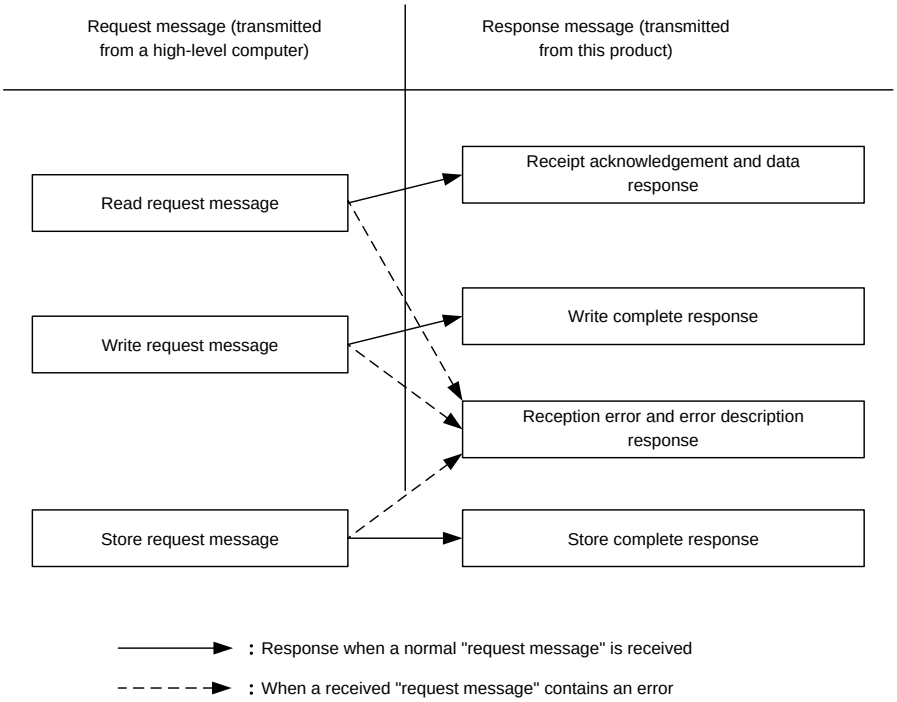
3．1． Communication Procedures

This product returns the “response message” as a reply to the “request message” that will be sent by the upper computer. Therefore, the transmission will never be initiated by this product.



3．2． Kinds of Message

■ Kinds of message can briefly be classified into the following:



■ In case of TOHO Protocol, all codes (except for BCC) will be expressed in ASCII code.
■ In case of MODBUS RTU, all codes will be expressed in binary code.
■ In case of MODBUS ASCII, all codes will be expressed in ASCII code.
■ To code the program for the upper computer, see “Section 6 List of Identifiers” and “Section 7 List of ASCII Codes”

Section 4 Explanation about TOHO Protocol Communication

4．1． About the Format

There are two types of format for TOHO Protocol—namely, Type 1 and Type 2—with the difference in the specification of address and second identifier.

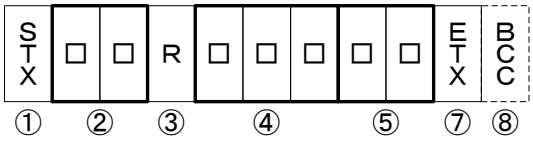
See "4．4． Explanation about Codes" for details.

4．2． Structure of Request Message (Data Transmission from Upper Computer to This Product)

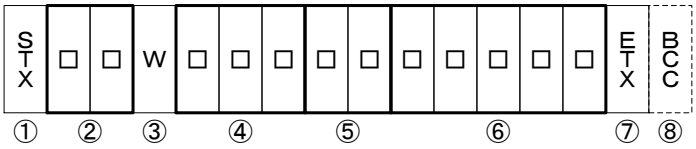
■ See "4．4． Explanation about Codes" for codes from ① to ⑪.

■ See "4．6．1． Sample Communication for Reading" and "4．6．2． Sample Communication for Writing" for concrete samples of the request message.

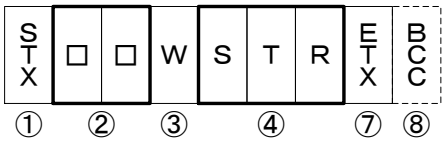
4．2．1． Structure of Read Request Message



4．2．2． Structure of Write Request Message



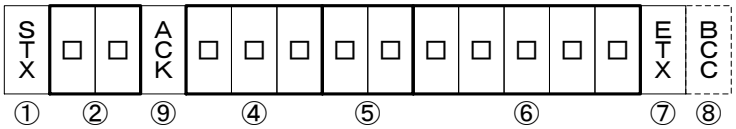
4．2．3． Structure of Save Request Message



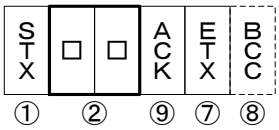
4．3． Structure of Response Message (Data Transmission from This Product to Upper Computer)

■ See "4．4． Explanation about Codes" for codes from ① to ⑪.
■ See "4．6．1． Sample Communication for Reading" and "4．6．2． Sample Communication for Writing" for concrete samples of the response message.

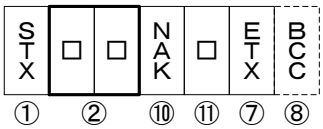
4．3．1． Response Message for Read Request Message



4．3．2． Response Message for Write/Save Request Message



4．3．3． Response Message for the Error



4．4． Explanation about Codes

■ The following codes other than ⑧BCC will be expressed in ASCII code.
■ See "Section 7 List of ASCII Codes" for the detail about ASCII codes.
■ To convert into ASCII code, see "4．6． Sample TOHO Communications"

①STX

It is a code that is necessary for the receiving side to detect the start of the message. It shall be attached to the start of the character string to be sent.

② Address

Format = Type 1

Specifies the device that will be communicated by the upper computer. Address setting value shall serve as the address of this product.

Format = Type 2

Specifies the channel of the device that will be communicated by the upper computer. Address of the subjected channel shall be computed by the following formula:

Address = {(Address Setting Value - 1) x 6} + Subjected Channel

Example) Address of channel 4 where address setting value = 5

Address = {(5 - 1) x 6} + 4 = 28

③ Contents of Request

Set the symbol R or W.

R: If the data is to be read from this product
W: If the data is to be written or saved into this product

④ First Identifier

It is a classification symbol (identifier) of the data to be read or written that will be expressed by the 3-digit alphanumeric ASCII code. See "10. List of Identifiers (Codes)."

⑤ Second Identifier

Format = Type 1

It is used to specify the channel for the data to be specified by the firstidentifier that has been allocated to each channel.
This is not necessary for the data that is not allocated per channel. Do not include it in the request message.
See "Section 6 List of Identifiers" to check if the second identifier is required or not.

Format = Type 2

This will not be used. Do not include it in the request message.

⑥ Numerical Data

Upon writing, 5-digit or 6-digit numerical data can be written. Upon reading, numerical data will be converted into 5-digit or 6-digit numerical data in accordance with the configuration of this product.

Negative data: The symbol "-" is considered one digit to be displayed at the largest digit.
Position of decimal point: Decimal point will not be included in the data.

Example: 5-digit numerical data "00010" means the following:

Example	Meaning of Numerical Value
If the display unit of the data is without decimal point	→ 10
If the display unit of the data is up to the first decimal place	→ 1.0
If the display unit of the data is up to the second decimal place	→ 0.10

⑦ ETX

It is a code that is necessary for the receiving side to detect the end of the message. It shall be attached to the end of the character string to be sent (except for BCC).

⑧ BCC

Get Ex-OR of all characters from STX to ETX with the check code for the detection of error.
This code shall not be included in the response message if BCC Check is turned OFF at the communication setting of this product.
See "2. 6. Setting of BCC"

⑨ ACK

It is an acknowledge code that will be included in the "response message" to be replied by this product if no error is found in the received message.

⑩ NAK

It is a reject code that will be included in the "response message" to be replied by this product if error is found in the received message.
If there is an error in the received "request message," content of error (⑪ Error Code) will also be attached (next to NAK) to the "response message" that will be returned by this product.

⑪ Error Code

If there is an error in the “request message” that was received by this product, the description of the said error (number in the table shown below) will be attached (next to “⑩ NAK”) to the “response message” that will be returned by this product.
Since error number “0” indicates the breakdown of measuring equipment (memory error or A/D conversion error), it will be included in the “response message” whether or not there is an error in the “request message.”
For multiple errors, the largest error number will be included.

Contents and classification of error are the following:

Error Number	Description of errors in “Request Message” that was received by this product
0	Malfunction of measuring equipment (memory error or A/D conversion error)
1	Numerical value data is out of the “setting range that is specified individually by the setting item”
2	Changing of the requested item is prohibited or no item to read
3	ASCII code that is other than numeric value has been set to the portion for the numeric value ASCII code that is other than “0” or “-” has been set to the position for the symbol
4	Format Error
5	BCC Error
6	Overrun Error
7	Framing Error
8	Parity Error

4. 5. Things to Be Noted during the Communication

4. 5. 1. Timing of Transmission

Upon using the communication function, set enough response delay time to ensure the communication (sending/receiving) with the host computer.

See "2. 7. Setting of Response Delay Time"

4. 5. 2. Request Interval

If "request message" is to be sent continuously by the upper computer, wait for at least 2msecs from the arrival of the "response message" from this product before sending the next request message.

4. 5. 3. Conditions for Response

This product will not return the "response message" if STX and ETX (BCC) are not included in the "request message."

Therefore, although there is an error in the "request message,""response message" with NAK and error code will not be returned unless the above condition is met.

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

Once STX is received, this product clears all codes that were received prior to the said STX.

4. 5. 4. Address Specification Error

This product will not respond to any "request message" that specifies the address that is other than the one that has been set to itself.

Therefore, if there is an error in the address section of the "request message," none of the slave stations will return the "response message."

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

Once STX is received, this product clears all codes that were received prior to the said STX.

4. 5. 5. Number of Digits of Data and Position of Decimal Point

See "4.4. Explanation About Codes ⑥ Numerical Data."

4. 5. 6. Operation after Receiving a Save Request Message

This product starts the saving of data once it receives the save request message correctly from the upper computer.

Only the data that is different from the one stored in EEPROM (changed data) shall be saved. Data will be saved within 6 seconds.

This product will send the response (ACK) when the save request message is received. Some data may be lost if the product is turned OFF while the saving process is in progress. Do not turn the power of this product OFF for at least 6 seconds after sending a save request message.

4. 5. 7. Saving Data Other than Save Request Message

This product saves the parameter into EEPROM even without receiving the save request message in this case:

- If the parameter is changed through key operation, it writes only changed parameter and other related parameters.

4. 6. Sample TOHO Communications

4. 6. 1. Sample Communication for Reading

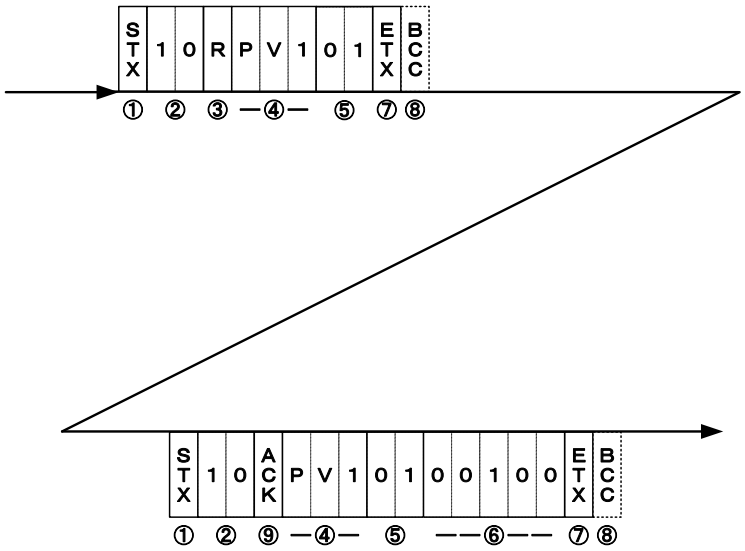
Example:

Request message: Request this productin which address is set as "10," to read "Channel 1 Measuring Temperature."
(If format = Type 1)
(Upper computer)

For the above request,

Response message: Returns the data of "Channel 1 Measuring Temperature" (00100).
(This product)

Read Request Message (to be sent by the upper computer)



Code	symbol and Data	ASCII code ※2
① Start Code	STX	02H
② Address	10	31H, 30H
③ Contents of Request	R	52H
④ First Identifier ※1	PV1	50H, 56H, 31H
⑤ Second Identifier ※1	01	30H, 31H
⑥ Numerical Data	00100	30H, 30H, 31H, 30H, 30H
⑦ End Code	ETX	03H
⑧ BCC Data		64H
Request		
Response		01H
⑨ Acknowledgment Code	ACK	06H

※1: See "Section 6 List of Identifiers" for the detail about identifiers.
※2: See "Section 7 List of ASCII Codes" for the detail about ASCII codes.

4. 6. 2. Sample Communication for Writing

Example:

Request message: To change “Channel 3 Input Type” to “Pt100 (13)” and write it into this product.

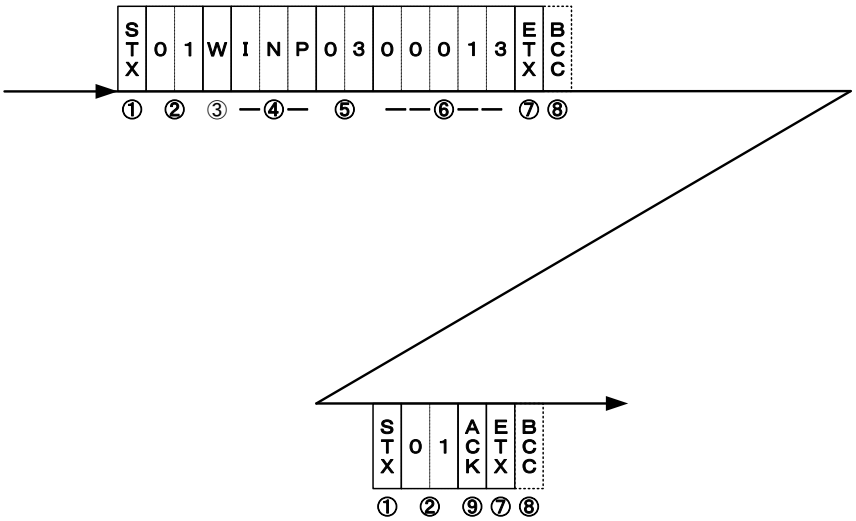
(Upper computer)

For the above request,

Response message: Return the message to tell that the request message has been received.

(This product) ※ Read the data separately to check if the data is written correctly.

Write Request Message (to be sent by the upper computer)



Code	symbol and Data	ASCII code ※2
① Start Code	STX	02H
② Address	01	30H, 31H
③ Contents of Request	W	57H
④ First Identifier ※1	INP	49H, 4EH, 50H
④ Second Identifier ※1	03	30H, 33H
⑤ Numerical Data	00013	30H, 30H, 30H, 31H, 33H
⑥ End Code	ETX	03H
⑦ BCC Data		31H
Request		06H
Response		
⑧ Acknowledgment Code	ACK	06H

※1: See “Section 6 List of Identifiers” for the detail about identifiers.

※2: See “Section 7 List of ASCII Codes” for the detail about ASCII codes.

Section 5 Explanation about MODBUS Protocol Communication

5. 1. MODBUS RTU

5. 1. 1. Structure of Request Message (Data Transmission from Upper Computer to This Product)

5. 1. 1. 1. Structure of Read Request Message

a)	Slave Address		**01H**	
b)	Function Code		**03H**	
c)	Register Address	Upper	**00H**	First register address
		Lower	**00H**	
d)	Number of Registers	Upper	**00H**	2 (fixed)
		Lower	**02H**	
e)	CRC-16	Lower	**C4H**	
		Upper	**0BH**	

5. 1. 1. 2. Structure of Write Request Message

a)	Slave Address		**01H**	
b)	Function Code		**10H**	
c)	Register Address	Upper	**01H**	First register address
		Lower	**00H**	
d)	Number of Registers	Upper	**00H**	2 (fixed)
		Lower	**02H**	
f)	Number of Bytes		**04H**	Number of Registers x 2
g)	Data for the first register (Lower word)	Upper	**00H**	③
		Lower	**0DH**	④ Data structure is ①②③④H.
	Data for the first register (Upper word)	Upper	**00H**	① (① represents 1 byte)
		Lower	**00H**	②
e)	CRC-16	Lower	**6FH**	
		Upper	**FCH**	

5. 1. 1. 3. Structure of Save Request Message

a)	Slave Address		**01H**	
b)	Function Code		**10H**	
c)	Register Address	Upper	**20H**	First register address
		Lower	**0EH**	
d)	Number of Registers	Upper	**00H**	2 (fixed)
		Lower	**02H**	
f)	Number of Bytes		**04H**	Number of Registers x 2
g)	Data for the first register (Lower word)	Upper	**00H**	Data for the saving of setting is optional.
		Lower	**00H**	
	Data for the first register (Upper word)	Upper	**00H**	
		Lower	**00H**	
e)	CRC-16	Lower	**EBH**	
		Upper	**E2H**	

5. 1. 2. Structure of Response Message (Data Transmission from This Product to Upper Computer)

5. 1. 2. 1. Response Message for Read Request Message

a)	Slave Address		**01H**	
b)	Function Code		**03H**	
f)	Number of Bytes		**04H**	Number of Registers x 2
g)	Data for the first register (Lower word)	Upper	**00H**	③
		Lower	**64H**	④ Data structure is ①②③④H.
	Data for the first register (Upper word)	Upper	**00H**	① (① represents 1 byte)
		Lower	**00H**	②
e)	CRC-16	Lower	**BBH**	
		Upper	**ECH**	

5. 1. 2. 2. Response Message for Write/Save Request Message

a)	Slave Address		**01H**	
b)	Function Code		**10H**	
c)	Register Address	Upper	**01H**	First register address
		Lower	**00H**	
d)	Number of Registers	Upper	**00H**	2 (fixed)
		Lower	**02H**	
e)	CRC-16	Lower	**40H**	
		Upper	**34H**	

5. 1. 2. 3. Response Message for the Error

a)	Slave Address		**01H**	
b)	Function Code		**83H**	← In case of error, the value that is consist
h)	Error Number		**03H**	of function code of request message
e)	CRC-16	Lower	**01H**	+ 80H will be set.
		Upper	**31H**	

5. 1. 3. Explanation about Codes

■ The following codes from (a) Slave Address, (b) Function Code up to (h) Error Number will beexpressed in 8-bit binary code:

(a) Slave Address

It is an address of the device that will be communicated by the upper computer (this product).
Address in the response message form this product indicates the source of response message.

(b) Function Code

Enter the code 03H or 10H.

- 03H: If the data is to be read from this product
- 10H: If the data is to be written or saved into this product

(c) Register Address

Specifies the position of data to be read or written with 2bytes.
See "Section 6 List of Identifiers" for the address of each command.

(d) Number of Registers

Specifies the number of registers that writes.
Since the number of registers of this product is fixed to 2, set it to "0002H."

(e) CRC-16

It is an error-checking code for the detection of a possible error in the message. It sends CRC-16 (Cyclic Redundancy Code).
Generating polyomical of CRC-16 that is used in this product is X16 + X15 + X2 + 1.
If it is to be attached at the end of the message as an error number, attach the lower byte of CRC before the upper byte.

(f) Number of Bytes

Specifies the number of registers that reads and writes x 2.
Since the number of registers of this product is 2 (fixed), set "04H."

(g) Data Section

Specifies the data to be written into the register. Data is 4 bytes (fixed).
If the data contains a decimal point, set the numeric value that ignores the decimal point.
Data that is enclosed inparentheses is the value that will be used in the actual message to be sent. See "5. 1. 1. Structure of Request Message (Data Transmission from Upper Computer to This Product)" for details.

Contents of Communication	HEX Data
PV = 1200.0 (℃)	**00002EE0h (2EE00000)**
PV = -10.00 (℃)	**FFFFFC18h (FC18FFFF)**

(h) Error Number

If there is an error in the message that was sent by the upper computer, the error number will be included in the "response message" of this product for the reply.

For multiple errors, the largest error number will be included.

Contents and classification of error are the following:

Error Number	Description of errors in "Request Message" that was received by this product
01	Received an unsupported function code
02	Received an unspecified address
03	Numerical value data is out of the "setting range that is specified individually by the setting item"
04	Malfunction of measuring equipment (memory error or A/D conversion error)

5．1．4． Things to Be Noted during the Communication

5．1．4．1． Timing of Transmission

Upon using the communication function, set enough response delay time to ensure the communication (sending/receiving) with the host computer.

See "2． 7． Setting of Response Delay Time"

5．1．4．2． Request Interval

If "request message" is to be sent continuously by the upper computer, wait for at least 2msecs from the arrival of the "response message" from this product before sending the next request message.

5．1．4．3． Conditions for Response

This product will not return the "response message" if there is a time interval of more than 3.5 characters between data that consist of the "request message" since it cannot identify these data as one whole "request message."

Therefore, although there is an error in the "request message,""response message" with the error number (response for the error) will not be returned unless the above condition is met.

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

At a time interval of more than 3.5 characters, this product clears all characters that were received prior to the said interval.

5．1．4．4． Address Specification Error

This product will not respond to any "request message" that specifies the address that is other than the one that has been set to itself.

Therefore, if there is an error in the address section of the "request message," none of the slave stations will return the "response message."

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

At a time interval of more than 3.5 characters, this product clears all characters that were received prior to the said interval.

5．1．4．5． Number of Digits of Data and Position of Decimal Point

See "5． 1． 3． Explanation about Codes (g) Data Section."

5．1．4．6． Operation after the Receiving of Save Request Message

This product starts the saving of data once it receives the save request message correctly from the upper computer.

Only the data that is different from the one stored in EEPROM (changed data) shall be saved. Data will be saved within 6 seconds.

This product will send the response (ACK) when the save request message is received. Some data may be lost if the product is turned OFF while the saving process is in progress. Do not turn the power of this product OFF for at least 6 seconds after the sending of save request message.

5．1．4．7． Saving Data Other than Save Request Message

This product saves the parameter into EEPROM even without receiving the save request message in this case:

- If the parameter is changed through key operation, it writes only changed parameter and other related parameters.

5. 2. MODBUS ASCII

5. 2. 1. Structure of Request Message (Data Transmission from Upper Computer to This Product)

5. 2. 1. 1. Structure of Read Request Message

a)	Start Code		**':'**	
b)	Slave Address		**'0','1'**	
c)	Function Code		**'0','3'**	
d)	Register Address	Upper	**'0','0'**	First register address
		Lower	**'0','0'**	
e)	Number of Registers	Upper	**'0','0'**	2 (fixed)
		Lower	**'0','2'**	
f)	LRC		**'F','A'**	
g)	End Code		**CR,LF**	

5. 2. 1. 2. Structure of Write Request Message

a)	Start Code		**':'**	
b)	Slave Address		**'0','1'**	
c)	Function Code		**'1','0'**	
d)	Register Address	Upper	**'0','1'**	First register address
		Lower	**'0','0'**	
e)	Number of Registers	Upper	**'0','0'**	2 (fixed)
		Lower	**'0','2'**	
h)	Number of Bytes		**'0','4'**	Number of Registers x 2
i)	Data for the first register (Lower word)	Upper	**'0','0'**	③
		Lower	**'0','D'**	④ Data structure is ①②③④H.
	Data for the first register (Upper word)	Upper	**'0','0'**	① (① represents 1 byte)
		Lower	**'0','0'**	②
f)	LRC		**'D','B'**	
g)	End Code		**CR,LF**	

5. 2. 1. 3. Structure of Save Request Message

a)	Start Code		**':'**	
b)	Slave Address		**'0','1'**	
c)	Function Code		**'1','0'**	
d)	Register Address	Upper	**'2','0'**	First register address
		Lower	**'0','E'**	
e)	Number of Registers	Upper	**'0','0'**	2 (fixed)
		Lower	**'0','2'**	
h)	Number of Bytes		**'0','4'**	Number of Registers x 2
i)	Data for the first register (Lower word)	Upper	**'0','0'**	Data for the saving of setting is optional.
		Lower	**'0','0'**	
	Data for the first register (Upper word)	Upper	**'0','0'**	
		Lower	**'0','0'**	
f)	LRC		**'B','B'**	
g)	End Code		**CR,LF**	

5．2．2．Structure of Response Message (Data Transmission from This product to Upper Computer)

5．2．2．1．Response Message for Read Request Message

a)	Start Code		**':'**	
b)	Slave Address		**'0','1'**	
c)	Function Code		**'0','3'**	
h)	Number of Bytes		**'0','4'**	Number of Registers x 2
i)	Data for the first register (Lower word)	Upper	**'0','0'**	③
		Lower	**'6','4'**	④ Data structure is ①②③④H.
	Data for the first register (Upper word)	Upper	**'0','0'**	① (① represents 1 byte)
		Lower	**'0','0'**	②
f)	LRC		**'9','4'**	
g)	End Code		**CR,LF**	

5．2．2．2．Response Message for Write/Save Request Message

a)	Start Code		**':'**	
b)	Slave Address		**'0','1'**	
c)	Function Code		**'1','0'**	
d)	Register Address	Upper	**'0','1'**	First register address
		Lower	**'0','0'**	
e)	Number of Registers	Upper	**'0','0'**	2 (fixed)
		Lower	**'0','2'**	
f)	LRC		**'E','C'**	
g)	End Code		**CR,LF**	

5．2．2．3．Response message for the error

a)	Start Code	**':'**	
b)	Slave Address	**'0','1'**	
c)	Function Code	**'8','3'**	← In case of error, the value that is consist of function code of request message + 80H will be set.
j)	Error Number	**'0','3'**	
f)	LRC	**'7','9'**	
g)	End Code	**CR,LF**	

5. 2. 3. Explanation About Codes

■ The following codes from (a) Start Code, (b) Slave Address up to (j) Error Number will be expressed in ASCII code:
■ See "Section 7 List of ASCII Codes" or the detail about ASCII codes.
■ For the conversion into ASCII code,
See "5. 2. 1. Structure of Request Message (Data Transmission from Upper Computer to This Product)" for details.

(a) Start Code
It is a code that is necessary for the receiving side to detect the start of the message. It shall be attached to the start of the character string to be sent.

(b) Slave Address
It is an address of the device that will be communicated by the upper computer (this product).
Address in the response message form this product indicates the source of response message.

(c) Function Code
Enter the code 03H or 10H.
- 03H: If the data is to be read from this product
- 10H: If the data is to be written or saved into this product

(d) Register Address
Specifies the position of data to be read or written with 2bytes.
See "Section 6 List of Identifiers" for the address of each command.

(e) Number of Registers
Specifies the number of registers that writes.
Since the number of registers of this product is fixed to 2, set it to "0002H."

(f) LRC
It is an error-checking code for the detection of a possible error in the message. It sends LRC.
LRC that is used in this product is a value where all data in the message, except for start code and end code, are summed upwithout performing a carry over and treated the sum total as the complement of 2.
Any portion that is expressed as "1" and "B" shall be considered as "1BH."
If 12H was computed as an error number, attach "1" and "2" at the end of the message.

(g) End Code
It is a code that is necessary for the receiving side to detect the end of the message.
CR(0DH) and LF(0AH) shall be attached at the end of the character string to be sent.

(h) Number of Bytes
Specifies the number of registers that reads and writes x 2.
Since the number of registers of this product is 2 (fixed), set "04H."

(i) Data Section

Specifies the data to be written into the register. Data is 4 bytes (fixed).

If the data contains a decimal point, set the numeric value that ignores the decimal point.

Data that is enclosed in parentheses is the value that will be used in the actual message to be sent. See "5. 2. 1. Structure of Request Message (Data Transmission from Upper Computer to This Product)" for details.

Contents of Communication	HEX Data
PV = 1200.0 (℃)	**00002EE0h (2EE00000)**
PV = -10.00 (℃)	**FFFFFC18h (FC18FFFF)**

(j) Error Number

If there is an error in the message that was sent by the upper computer, the error number will be included in the "response message" of this product for the reply.

For multiple errors, the largest error number will be included.

Contents and classification of error are the following:

Error Number	Description of errors in "Request Message" that was received by this product
01	Received an unsupported function code
02	Received an unspecified address
03	Numerical value data is out of the "setting range that is specified individually by the setting item"
04	Malfunction of measuring equipment (memory error or A/D conversion error)

5．2．4． Things to Be Noted during the Communication

5．2．4．1． Timing of Transmission

Upon using the communication function, set enough response delay time to ensure the communication (sending/receiving) with the host computer.

See "2．7．Setting of Response Delay Time"

5．2．4．2． Request Interval

If "request message" is to be sent continuously by the upper computer, wait for at least 2msecs from the arrival of the "response message" from this product before sending the next request message.

5．2．4．3． Conditions for Response

This product will not return the "response message" if start code and end code are not included in the "request message."

Therefore, although there is an error in the "request message,""response message" with the error number (response for the error) will not be returned unless the above condition is met.

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

Once the start code is received, this product clears all codes that were received prior to the said start code.

5．2．4．4． Address Specification Error

This product will not respond to any "request message" that specifies the address that is other than the one that has been set to itself.

Therefore, if there is an error in the address section of the "request message," none of the slave stations will return the "response message."

Therefore, the upper computer should resend the necessary "request message" if the "response message" is not returned within areasonable time.

Once the start code is received, this product clears all codes that were received prior to the said start code.

5．2．4．5． Number of Digits of Data and Position of Decimal Point

See "5.1.3 Explanation About Codes (i) Data Section."

5．2．4．6． Operation after the Receiving of Save Request Message

This product starts the saving of data once it receives the save request message correctly from the upper computer.

Only the data that is different from the one stored in EEPROM (changed data) shall be saved. Data will be saved within 6 seconds.

This product will send the response (ACK) when the save request message is received. Some data may be lost if the product is turned OFF while the saving process is in progress. Do not turn the power of this product OFF for at least 6 seconds after the sending of save request message.

5．2．4．7． Saving Data Other than Save Request Message

This product saves the parameter into EEPROM even without receiving the save request message in this case:

- If the parameter is changed through key operation, it writes changed parameter and other related parameters.

Section 6 List of Identifiers

■ See User's Manual of this product for setting range, selection items, initial value, and other related information.
Note:"□" in the frame of identifier means space (ASCII code: 20H).

6．1． Other Commands

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
PV1	01	40001	0000	CH1 PV	R	Temperature input：0.0 ℃ unit Analog input：1 digit unit TOHO When "-H-" or "B.OUT" is displayed：HHHHH When "-L-" is displayed：LLLLL MODBUS When "-H-" or "B.OUT" is displayed：48484848h When "-L-" is displayed：4C4C4C4Ch
PV1	02	40003	0002	CH2 PV	R	
PV1	03	40005	0004	CH3 PV	R	
PV1	04	40007	0006	CH4 PV	R	
PV1	05	40009	0008	CH5 PV	R	
PV1	06	40011	000A	CH6 PV	R	
MD□		40025	0018	Record operation	RW	0：Stop 1：Start
OM1		48195	2002	DO Monitor 1	R	④③②① ①～④ 0：OFF 1：ON ①：DO1 ②：DO2 ③：DO3 ④：DO4
OM2		48197	2004	DO Monitor 2	R	④③②① ①～④ 0：OFF 1：ON ①：DO5 ②：DO6 ③：DO7 ④：DO8
OM3		48199	2006	DO Monitor 3	R	④③②① ①～④ 0：OFF 1：ON ①：DO9 ②：DO10 ③：DO11 ④：DO12

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
EM1		48201	2008	DI1 Monitor	R	④③②① ①～④ 0：DI OFF 1：DI ON ①：DI1 ②：DI2 ③：DI3 ④：DI4
EM2		48203	200A	DI2 Monitor	R	④③②① ①～④ 0：DI OFF 1：DI ON ①：DI5 ②：DI6 ③：DI7 ④：DI8
EM3		48205	200C	DI3 Monitor	R	④③②① ①～④ 0：DI OFF 1：DI ON ①：DI9 ②：DI10 ③：DI11 ④：DI12
STR		48207	200E	Store instruction	W	
INI				Initialize the setting	W	1：Parameter setting 2：Input 3：Display 4：Record 5：Others 11：System setting 12：Device/Other 99：All setting

6. 2. Input

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
INP	01	40257	0100	CH1 Input Type	RW	0 : K 1 : J 2 : T 3 : E 4 : R 5 : S 6 : B 7 : N 8 : U 9 : L 10 : WRe5-26 11 : PR40-20 12 : PL2 13 : Pt100 14 : JPt100 15 : -10~10(mV) 16 : 0~20(mV) 17 : 0~50(mV) 18 : -1~1(V) 19 : -10~10(V) 20 : 0~10(V) 21 : 4~20(mA)
INP	02	40259	0102	CH2 Input Type	RW	
INP	03	40261	0104	CH3 Input Type	RW	
INP	04	40263	0106	CH4 Input Type	RW	
INP	05	40265	0108	CH5 Input Type	RW	
INP	06	40267	010A	CH6 Input Type	RW	
BAO	01	40269	010C	CH1 Burnout	RW	0 : OFF 1 : ON
BAO	02	40271	010E	CH2 Burnout	RW	
BAO	03	40273	0110	CH3 Burnout	RW	
BAO	04	40275	0112	CH4 Burnout	RW	
BAO	05	40277	0114	CH5 Burnout	RW	
BAO	06	40279	0116	CH6 Burnout	RW	
RJF	01	40281	0118	CH1 RJC	RW	0 : Internal 1 : Specified Channel 2 : OFF
RJF	02	40283	011A	CH2 RJC	RW	
RJF	03	40285	011C	CH3 RJC	RW	
RJF	04	40287	011E	CH4 RJC	RW	
RJF	05	40289	0120	CH5 RJC	RW	
RJF	06	40291	0122	CH6 RJC	RW	
RJC	01	40293	0124	CH1 RJC Channel	RW	0 : CH01 1 : CH02 2 : CH03 3 : CH04 4 : CH05 5 : CH06
RJC	02	40295	0126	CH2 RJC Channel	RW	
RJC	03	40297	0128	CH3 RJC Channel	RW	
RJC	04	40299	012A	CH4 RJC Channel	RW	
RJC	05	40301	012C	CH5 RJC Channel	RW	
RJC	06	40303	012E	CH6 RJC Channel	RW	

6．3．Scaling

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
SQL	01	40513	0200	CH1 Square root	RW	0：OFF 1：ON
SQL	02	40515	0202	CH2 Square root	RW	
SQL	03	40517	0204	CH3 Square root	RW	
SQL	04	40519	0206	CH4 Square root	RW	
SQL	05	40521	0208	CH5 Square root	RW	
SQL	06	40523	020A	CH6 Square root	RW	
SIH	01	40525	020C	CH1 Meas. upr lim	RW	
SIH	02	40527	020E	CH2 Meas. upr lim	RW	
SIH	03	40529	0210	CH3 Meas. upr lim	RW	
SIH	04	40531	0212	CH4 Meas. upr lim	RW	
SIH	05	40533	0214	CH5 Meas. upr lim	RW	
SIH	06	40535	0216	CH6 Meas. upr lim	RW	
SIL	01	40537	0218	CH1 Meas. lwr lim	RW	
SIL	02	40539	021A	CH2 Meas. lwr lim	RW	
SIL	03	40541	021C	CH3 Meas. lwr lim	RW	
SIL	04	40543	021E	CH4 Meas. lwr lim	RW	
SIL	05	40545	0220	CH5 Meas. lwr lim	RW	
SIL	06	40547	0222	CH6 Meas. lwr lim	RW	
SOH	01	40549	0224	CH1 Scale upr lim	RW	
SOH	02	40551	0226	CH2 Scale upr lim	RW	
SOH	03	40553	0228	CH3 Scale upr lim	RW	
SOH	04	40555	022A	CH4 Scale upr lim	RW	
SOH	05	40557	022C	CH5 Scale upr lim	RW	
SOH	06	40559	022E	CH6 Scale upr lim	RW	
SOL	01	40561	0230	CH1 Scale lwr lim	RW	
SOL	02	40563	0232	CH2 Scale lwr lim	RW	
SOL	03	40565	0234	CH3 Scale lwr lim	RW	
SOL	04	40567	0236	CH4 Scale lwr lim	RW	
SOL	05	40569	0238	CH5 Scale lwr lim	RW	
SOL	06	40571	023A	CH6 Scale lwr lim	RW	
DP□	01	40573	023C	CH1 Decimal Point	RW	0：0 1：0.0 2：0.00 3：0.000 4：0.0000
DP□	02	40575	023E	CH2 Decimal Point	RW	
DP□	03	40577	0240	CH3 Decimal Point	RW	
DP□	04	40579	0242	CH4 Decimal Point	RW	
DP□	05	40581	0244	CH5 Decimal Point	RW	
DP□	06	40583	0246	CH6 Decimal Point	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
UNI	01	40585	0248	CH1 Unit	RW	0 : ℃ 1 : ° F 2 : K 3 : mV 4 : V 5 : mA 6 : A 7 : mW 8 : W 9 : % 10 : %RH 11 : ppc 12 : ppm 13 : ppb 14 : $\%O_2$ 15 : µS/cm 16 : mbar 17 : bar 18 : Pa 19 : kPa 20 : MPa 21 : kgf/cm^2 22 : kg/h 23 : L/s 24 : L/min 25 : L/h 26 : m^3/min 27 : m^3/h 28 : Nm^3/min 29 : Nm^3/h 30 : mm/s 31 : m/s 32 : m/min 33 : m/h 34 : m/s^2 35 : rpm 36 : mm 37 : cm 38 : m 39 : mm^3 40 : cm^3 41 : m^3 42 : g 43 : kg 44 : t 45 : L 46 : pH 47 : (No Unit)
UNI	02	40587	024A	CH2 Unit	RW	
UNI	03	40589	024C	CH3 Unit	RW	
UNI	04	40591	024E	CH4 Unit	RW	
UNI	05	40593	0250	CH5 Unit	RW	
UNI	06	40595	0252	CH6 Unit	RW	

6．4． Display

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
TAG	01			CH1 Tag	RW	Up to 29 alphanumeric characters
TAG	02			CH2 Tag	RW	
TAG	03			CH3 Tag	RW	
TAG	04			CH4 Tag	RW	
TAG	05			CH5 Tag	RW	
TAG	06			CH6 Tag	RW	
EXP	01			CH1 Description	RW	Up to 29 alphanumeric characters
EXP	02			CH2 Description	RW	
EXP	03			CH3 Description	RW	
EXP	04			CH4 Description	RW	
EXP	05			CH5 Description	RW	
EXP	06			CH6 Description	RW	
COL	01	40769	0300	CH1 Display Color	RW	0：Red 1：Green 2：Blue 3：Purple 4：Yellow 5：Aqua 6：Dark Red 7：Lime 8：Dark Blue 9：Bright Purple 10：Blue Green 11：Olive 12：Gray 13：Khaki 14：Brown 15：Orange
COL	02	40771	0302	CH2 Display Color	RW	
COL	03	40773	0304	CH3 Display Color	RW	
COL	04	40775	0306	CH4 Display Color	RW	
COL	05	40777	0308	CH5 Display Color	RW	
COL	06	40779	030A	CH6 Display Color	RW	

6. 5. Scale

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
SCH	01	41057	0420	CH1 Rng of ScaleU	RW	Temperature input : 0.0 ℃ unit Analog input : 1 digit unit
SCH	02	41059	0422	CH2 Rng of ScaleU	RW	
SCH	03	41061	0424	CH3 Rng of ScaleU	RW	
SCH	04	41063	0426	CH4 Rng of ScaleU	RW	
SCH	05	41065	0428	CH5 Rng of ScaleU	RW	
SCH	06	41067	042A	CH6 Rng of ScaleU	RW	
SCL	01	41069	042C	CH1 Rng of ScaleL	RW	Temperature input : 0.0 ℃ unit Analog input : 1 digit unit
SCL	02	41071	042E	CH2 Rng of ScaleL	RW	
SCL	03	41073	0430	CH3 Rng of ScaleL	RW	
SCL	04	41075	0432	CH4 Rng of ScaleL	RW	
SCL	05	41077	0434	CH5 Rng of ScaleL	RW	
SCL	06	41079	0436	CH6 Rng of ScaleL	RW	
SCN	01	41081	0438	CH1 Scale No.	RW	0 : No.1 1 : No.2 2 : No.3
SCN	02	41083	043A	CH2 Scale No.	RW	
SCN	03	41085	043C	CH3 Scale No.	RW	
SCN	04	41087	043E	CH4 Scale No.	RW	
SCN	05	41089	0440	CH5 Scale No.	RW	
SCN	06	41091	0442	CH6 Scale No.	RW	
SCS	01	41093	0444	CH1 Partitions	RW	
SCS	02	41095	0446	CH2 Partitions	RW	
SCS	03	41097	0448	CH3 Partitions	RW	
SCS	04	41099	044A	CH4 Partitions	RW	
SCS	05	41101	044C	CH5 Partitions	RW	
SCS	06	41103	044E	CH6 Partitions	RW	

6．6． Alarm

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
SF1	01	41281	0500	CH1 Alarm1 Alarm Type	RW	
SF1	02	41283	0502	CH2 Alarm1 Alarm Type	RW	
SF1	03	41285	0504	CH3 Alarm1 Alarm Type	RW	
SF1	04	41287	0506	CH4 Alarm1 Alarm Type	RW	
SF1	05	41289	0508	CH5 Alarm1 Alarm Type	RW	
SF1	06	41291	050A	CH6 Alarm1 Alarm Type	RW	
SF2	01	41293	050C	CH1 Alarm2 Alarm Type	RW	
SF2	02	41295	050E	CH2 Alarm2 Alarm Type	RW	
SF2	03	41297	0510	CH3 Alarm2 Alarm Type	RW	
SF2	04	41299	0512	CH4 Alarm2 Alarm Type	RW	
SF2	05	41301	0514	CH5 Alarm2 Alarm Type	RW	0：OFF
SF2	06	41303	0516	CH6 Alarm2 Alarm Type	RW	1：Alim Up Lim
SF3	01	41305	0518	CH1 Alarm3 Alarm Type	RW	2：Alm Lw Lim
SF3	02	41307	051A	CH2 Alarm3 Alarm Type	RW	3：Abnl Alarm
SF3	03	41309	051C	CH3 Alarm3 Alarm Type	RW	
SF3	04	41311	051E	CH4 Alarm3 Alarm Type	RW	
SF3	05	41313	0520	CH5 Alarm3 Alarm Type	RW	
SF3	06	41315	0522	CH6 Alarm3 Alarm Type	RW	
SF4	01	41317	0524	CH1 Alarm4 Alarm Type	RW	
SF4	02	41319	0526	CH2 Alarm4 Alarm Type	RW	
SF4	03	41321	0528	CH3 Alarm4 Alarm Type	RW	
SF4	04	41323	052A	CH4 Alarm4 Alarm Type	RW	
SF4	05	41325	052C	CH5 Alarm4 Alarm Type	RW	
SF4	06	41327	052E	CH6 Alarm4 Alarm Type	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
AO1	01	41329	0530	CH1 Alarm1 Alm Tgt Conn	RW	0：OFF 1：ALM 2：DO01 3：DO02 4：DO03 5：DO04 6：DO05 7：DO06 8：DO07 9：DO08 10：DO09 11：DO10 12：DO11 13：DO12
AO1	02	41331	0532	CH2 Alarm1 Alm Tgt Conn	RW	
AO1	03	41333	0534	CH3 Alarm1 Alm Tgt Conn	RW	
AO1	04	41335	0536	CH4 Alarm1 Alm Tgt Conn	RW	
AO1	05	41337	0538	CH5 Alarm1 Alm Tgt Conn	RW	
AO1	06	41339	053A	CH6 Alarm1 Alm Tgt Conn	RW	
AO2	01	41341	053C	CH1 Alarm2 Alm Tgt Conn	RW	
AO2	02	41343	053E	CH2 Alarm2 Alm Tgt Conn	RW	
AO2	03	41345	0540	CH3 Alarm2 Alm Tgt Conn	RW	
AO2	04	41347	0542	CH4 Alarm2 Alm Tgt Conn	RW	
AO2	05	41349	0544	CH5 Alarm2 Alm Tgt Conn	RW	
AO2	06	41351	0546	CH6 Alarm2 Alm Tgt Conn	RW	
AO3	01	41353	0548	CH1 Alarm3 Alm Tgt Conn	RW	
AO3	02	41355	054A	CH2 Alarm3 Alm Tgt Conn	RW	
AO3	03	41357	054C	CH3 Alarm3 Alm Tgt Conn	RW	
AO3	04	41359	054E	CH4 Alarm3 Alm Tgt Conn	RW	
AO3	05	41361	0550	CH5 Alarm3 Alm Tgt Conn	RW	
AO3	06	41363	0552	CH6 Alarm3 Alm Tgt Conn	RW	
AO4	01	41365	0554	CH1 Alarm4 Alm Tgt Conn	RW	
AO4	02	41367	0556	CH2 Alarm4 Alm Tgt Conn	RW	
AO4	03	41369	0558	CH3 Alarm4 Alm Tgt Conn	RW	
AO4	04	41371	055A	CH4 Alarm4 Alm Tgt Conn	RW	
AO4	05	41373	055C	CH5 Alarm4 Alm Tgt Conn	RW	
AO4	06	41375	055E	CH6 Alarm4 Alm Tgt Conn	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
AS1	01	41377	0560	CH1 Alarm1 Alarm Value	RW	
AS1	02	41379	0562	CH2 Alarm1 Alarm Value	RW	
AS1	03	41381	0564	CH3 Alarm1 Alarm Value	RW	
AS1	04	41383	0566	CH4 Alarm1 Alarm Value	RW	
AS1	05	41385	0568	CH5 Alarm1 Alarm Value	RW	
AS1	06	41387	056A	CH6 Alarm1 Alarm Value	RW	
AS2	01	41389	056C	CH1 Alarm2 Alarm Value	RW	
AS2	02	41391	056E	CH2 Alarm2 Alarm Value	RW	
AS2	03	41393	0570	CH3 Alarm2 Alarm Value	RW	
AS2	04	41395	0572	CH4 Alarm2 Alarm Value	RW	
AS2	05	41397	0574	CH5 Alarm2 Alarm Value	RW	
AS2	06	41399	0576	CH6 Alarm2 Alarm Value	RW	Temperature input：0.0 ℃ unit Analog input：1 digit unit
AS3	01	41401	0578	CH1 Alarm3 Alarm Value	RW	
AS3	02	41403	057A	CH2 Alarm3 Alarm Value	RW	
AS3	03	41405	057C	CH3 Alarm3 Alarm Value	RW	
AS3	04	41407	057E	CH4 Alarm3 Alarm Value	RW	
AS3	05	41409	0580	CH5 Alarm3 Alarm Value	RW	
AS3	06	41411	0582	CH6 Alarm3 Alarm Value	RW	
AS4	01	41413	0584	CH1 Alarm4 Alarm Value	RW	
AS4	02	41415	0586	CH2 Alarm4 Alarm Value	RW	
AS4	03	41417	0588	CH3 Alarm4 Alarm Value	RW	
AS4	04	41419	058A	CH4 Alarm4 Alarm Value	RW	
AS4	05	41421	058C	CH5 Alarm4 Alarm Value	RW	
AS4	06	41423	058E	CH6 Alarm4 Alarm Value	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
AH1	01	41425	0590	CH1 Alarm1 Hysteresis	RW	
AH1	02	41427	0592	CH2 Alarm1 Hysteresis	RW	
AH1	03	41429	0594	CH3 Alarm1 Hysteresis	RW	
AH1	04	41431	0596	CH4 Alarm1 Hysteresis	RW	
AH1	05	41433	0598	CH5 Alarm1 Hysteresis	RW	
AH1	06	41435	059A	CH6 Alarm1 Hysteresis	RW	
AH2	01	41437	059C	CH1 Alarm2 Hysteresis	RW	
AH2	02	41439	059E	CH2 Alarm2 Hysteresis	RW	
AH2	03	41441	05A0	CH3 Alarm2 Hysteresis	RW	
AH2	04	41443	05A2	CH4 Alarm2 Hysteresis	RW	
AH2	05	41445	05A4	CH5 Alarm2 Hysteresis	RW	
AH2	06	41447	05A6	CH6 Alarm2 Hysteresis	RW	Temperature input : 0.0 ℃ unit Analog input : 1 digit unit
AH3	01	41449	05A8	CH1 Alarm3 Hysteresis	RW	
AH3	02	41451	05AA	CH2 Alarm3 Hysteresis	RW	
AH3	03	41453	05AC	CH3 Alarm3 Hysteresis	RW	
AH3	04	41455	05AE	CH4 Alarm3 Hysteresis	RW	
AH3	05	41457	05B0	CH5 Alarm3 Hysteresis	RW	
AH3	06	41459	05B2	CH6 Alarm3 Hysteresis	RW	
AH4	01	41461	05B4	CH1 Alarm4 Hysteresis	RW	
AH4	02	41463	05B6	CH2 Alarm4 Hysteresis	RW	
AH4	03	41465	05B8	CH3 Alarm4 Hysteresis	RW	
AH4	04	41467	05BA	CH4 Alarm4 Hysteresis	RW	
AH4	05	41469	05BC	CH5 Alarm4 Hysteresis	RW	
AH4	06	41471	05BE	CH6 Alarm4 Hysteresis	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
AD1	01	41473	05C0	CH1 Alarm1 Alm Dly (sec)	RW	
AD1	02	41475	05C2	CH2 Alarm1 Alm Dly (sec)	RW	
AD1	03	41477	05C4	CH3 Alarm1 Alm Dly (sec)	RW	
AD1	04	41479	05C6	CH4 Alarm1 Alm Dly (sec)	RW	
AD1	05	41481	05C8	CH5 Alarm1 Alm Dly (sec)	RW	
AD1	06	41483	05CA	CH6 Alarm1 Alm Dly (sec)	RW	
AD2	01	41485	05CC	CH1 Alarm2 Alm Dly (sec)	RW	
AD2	02	41487	05CE	CH2 Alarm2 Alm Dly (sec)	RW	
AD2	03	41489	05D0	CH3 Alarm2 Alm Dly (sec)	RW	
AD2	04	41491	05D2	CH4 Alarm2 Alm Dly (sec)	RW	
AD2	05	41493	05D4	CH5 Alarm2 Alm Dly (sec)	RW	
AD2	06	41495	05D6	CH6 Alarm2 Alm Dly (sec)	RW	
AD3	01	41497	05D8	CH1 Alarm3 Alm Dly (sec)	RW	
AD3	02	41499	05DA	CH2 Alarm3 Alm Dly (sec)	RW	
AD3	03	41501	05DC	CH3 Alarm3 Alm Dly (sec)	RW	
AD3	04	41503	05DE	CH4 Alarm3 Alm Dly (sec)	RW	
AD3	05	41505	05E0	CH5 Alarm3 Alm Dly (sec)	RW	
AD3	06	41507	05E2	CH6 Alarm3 Alm Dly (sec)	RW	
AD4	01	41509	05E4	CH1 Alarm4 Alm Dly (sec)	RW	
AD4	02	41511	05E6	CH2 Alarm4 Alm Dly (sec)	RW	
AD4	03	41513	05E8	CH3 Alarm4 Alm Dly (sec)	RW	
AD4	04	41515	05EA	CH4 Alarm4 Alm Dly (sec)	RW	
AD4	05	41517	05EC	CH5 Alarm4 Alm Dly (sec)	RW	
AD4	06	41519	05EE	CH6 Alarm4 Alm Dly (sec)	RW	

6．7． REC/CALC

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
PDF	01	41537	0600	CH1 Inp Fltr (sec)	RW	
PDF	02	41539	0602	CH2 Inp Fltr (sec)	RW	
PDF	03	41541	0604	CH3 Inp Fltr (sec)	RW	
PDF	04	41543	0606	CH4 Inp Fltr (sec)	RW	
PDF	05	41545	0608	CH5 Inp Fltr (sec)	RW	
PDF	06	41547	060A	CH6 Inp Fltr (sec)	RW	
REC	01	41549	060C	CH1 Record Type	RW	0：OFF 1：Inst. val 2：Average 3：Max/Min
REC	02	41551	060E	CH2 Record Type	RW	
REC	03	41553	0610	CH3 Record Type	RW	
REC	04	41555	0612	CH4 Record Type	RW	
REC	05	41557	0614	CH5 Record Type	RW	
REC	06	41559	0616	CH6 Record Type	RW	
PVS	01	41561	0618	CH1 Offset	RW	Temperature input：0.0 ℃ unit Analog input：1 digit unit
PVS	02	41563	061A	CH2 Offset	RW	
PVS	03	41565	061C	CH3 Offset	RW	
PVS	04	41567	061E	CH4 Offset	RW	
PVS	05	41569	0620	CH5 Offset	RW	
PVS	06	41571	0622	CH6 Offset	RW	
PVG	01	41573	0624	CH1 Gain	RW	
PVG	02	41575	0626	CH2 Gain	RW	
PVG	03	41577	0628	CH3 Gain	RW	
PVG	04	41579	062A	CH4 Gain	RW	
PVG	05	41581	062C	CH5 Gain	RW	
PVG	06	41583	062E	CH6 Gain	RW	

6．8． Group name

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
GN1				Group1 Group Name	RW	Up to 29 alphanumeric characters
GN2				Group2 Group Name	RW	
GN3				Group3 Group Name	RW	
GN4				Group4 Group Name	RW	
GN5				Group5 Group Name	RW	
GN6				Group6 Group Name	RW	
GN7				Group7 Group Name	RW	
GN8				Group8 Group Name	RW	
GF1		41809	0710	Group1 Group Display	RW	0：OFF 1：ON
GF2		41811	0712	Group2 Group Display	RW	
GF3		41813	0714	Group3 Group Display	RW	
GF4		41815	0716	Group4 Group Display	RW	
GF5		41817	0718	Group5 Group Display	RW	
GF6		41819	071A	Group6 Group Display	RW	
GF7		41821	071C	Group7 Group Display	RW	
GF8		41823	071E	Group8 Group Display	RW	
TF1		41793	0700	Group1 Label Display	RW	0：Channel No. 1：Tag
TF2		41795	0702	Group2 Label Display	RW	
TF3		41797	0704	Group3 Label Display	RW	
TF4		41799	0706	Group4 Label Display	RW	
TF5		41801	0708	Group5 Label Display	RW	
TF6		41803	070A	Group6 Label Display	RW	
TF7		41805	070C	Group7 Label Display	RW	
TF8		41807	070E	Group8 Label Display	RW	

6．9． Group channel

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
G11		42049	0800	Group01 CH01	RW	0：Non-select 1：Select
G12		42051	0802	Group01 CH02	RW	
G13		42053	0804	Group01 CH03	RW	
G14		42055	0806	Group01 CH04	RW	
G15		42057	0808	Group01 CH05	RW	
G16		42059	080A	Group01 CH06	RW	
G21		42061	080C	Group02 CH01	RW	
G22		42063	080E	Group02 CH02	RW	
G23		42065	0810	Group02 CH03	RW	
G24		42067	0812	Group02 CH04	RW	
G25		42069	0814	Group02 CH05	RW	
G26		42071	0816	Group02 CH06	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
G31		42073	0818	Group03 CH01	RW	
G32		42075	081A	Group03 CH02	RW	
G33		42077	081C	Group03 CH03	RW	
G34		42079	081E	Group03 CH04	RW	
G35		42081	0820	Group03 CH05	RW	
G36		42083	0822	Group03 CH06	RW	
G41		42085	0824	Group04 CH01	RW	
G42		42087	0826	Group04 CH02	RW	
G43		42089	0828	Group04 CH03	RW	
G44		42091	082A	Group04 CH04	RW	
G45		42093	082C	Group04 CH05	RW	
G46		42095	082E	Group04 CH06	RW	
G51		42097	0830	Group05 CH01	RW	
G52		42099	0832	Group05 CH02	RW	
G53		42101	0834	Group05 CH03	RW	
G54		42103	0836	Group05 CH04	RW	
G55		42105	0838	Group05 CH05	RW	
G56		42107	083A	Group05 CH06	RW	0 : Non-select 1 : Select
G61		42109	083C	Group06 CH01	RW	
G62		42111	083E	Group06 CH02	RW	
G63		42113	0840	Group06 CH03	RW	
G64		42115	0842	Group06 CH04	RW	
G65		42117	0844	Group06 CH05	RW	
G66		42119	0846	Group06 CH06	RW	
G71		42121	0848	Group07 CH01	RW	
G72		42123	084A	Group07 CH02	RW	
G73		42125	084C	Group07 CH03	RW	
G74		42127	084E	Group07 CH04	RW	
G75		42129	0850	Group07 CH05	RW	
G76		42131	0852	Group07 CH06	RW	
G81		42133	0854	Group08 CH01	RW	
G82		42135	0856	Group08 CH02	RW	
G83		42137	0858	Group08 CH03	RW	
G84		42139	085A	Group08 CH04	RW	
G85		42141	085C	Group08 CH05	RW	
G86		42143	085E	Group08 CH06	RW	

6．10． Graph Display

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
TW1		42305	0900	Group1 Horz trend	RW	
TW2		42307	0902	Group2 Horz trend	RW	
TW3		42309	0904	Group3 Horz trend	RW	
TW4		42311	0906	Group4 Horz trend	RW	0：OFF
TW5		42313	0908	Group5 Horz trend	RW	1：ON
TW6		42315	090A	Group6 Horz trend	RW	
TW7		42317	090C	Group7 Horz trend	RW	
TW8		42319	090E	Group8 Horz trend	RW	
TL1		42321	0910	Group1 Vert trend	RW	
TL2		42323	0912	Group2 Vert trend	RW	
TL3		42325	0914	Group3 Vert trend	RW	
TL4		42327	0916	Group4 Vert trend	RW	0：OFF
TL5		42329	0918	Group5 Vert trend	RW	1：ON
TL6		42331	091A	Group6 Vert trend	RW	
TL7		42333	091C	Group7 Vert trend	RW	
TL8		42335	091E	Group8 Vert trend	RW	
BD1		42337	0920	Group1 Bar graph	RW	
BD2		42339	0922	Group2 Bar graph	RW	
BD3		42341	0924	Group3 Bar graph	RW	
BD4		42343	0926	Group4 Bar graph	RW	0：OFF
BD5		42345	0928	Group5 Bar graph	RW	1：ON
BD6		42347	092A	Group6 Bar graph	RW	
BD7		42349	092C	Group7 Bar graph	RW	
BD8		42351	092E	Group8 Bar graph	RW	
DD1		42353	0930	Group1 Digital disp.	RW	
DD2		42355	0932	Group2 Digital disp.	RW	
DD3		42357	0934	Group3 Digital disp.	RW	
DD4		42359	0936	Group4 Digital disp.	RW	0：OFF
DD5		42361	0938	Group5 Digital disp.	RW	1：ON
DD6		42363	093A	Group6 Digital disp.	RW	
DD7		42365	093C	Group7 Digital disp.	RW	
DD8		42367	093E	Group8 Digital disp.	RW	

6．11． Auto switching

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
DCA		42561	0A00	Auto display	RW	0：OFF 1：ON
DCT		42563	0A02	Change cycle	RW	0：5 sec 1：10 sec 2：15 sec 3：30 sec 4：60 sec

6．12． Record Operation

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
DRT		42817	0B00	Record Cycle	RW	0：0.1 sec 1：1 sec 2：2 sec 3：3 sec 4：5 sec 5：10 sec 6：15 sec 7：20 sec 8：30 sec 9：1 min 10：2 min 11：3 min 12：5 min 13：10 min 14：15 min 15：20 min 16：30 min 17：60 min
FRT		42819	0B02	File rec. cy	RW	0：10Minute 1：1 Hour 2：1 Day 3：1 Week 4：1 Month 5：1 Year
FOW		42821	0B04	File overwrite	RW	0：Disable 1：Enable

6．13．Schedule

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
SCD		43073	0C00	Schedule	RW	0：OFF 1：Week Day 2：Every Day
STH		43075	0C02	Start Time hour	RW	
STM				Start Time min	RW	
STS				Start Time sec	RW	
ENH		43077	0C04	End Time hour	RW	
ENM				End Time min	RW	
ENS				End Time sec	RW	
WE1		43079	0C06	Sun	RW	0：Non-select 1：Select
WE2		43081	0C08	Mon	RW	
WE3		43083	0C0A	Tue	RW	
WE4		43085	0C0C	Wed	RW	
WE5		43087	0C0E	Thu	RW	
WE6		43089	0C10	Fri	RW	
WE7		43091	0C12	Sat	RW	

6．14．Message

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
ME1				Message01 Message	RW	Up to 29 alphanumeric characters
ME2				Message02 Message	RW	
ME3				Message03 Message	RW	
ME4				Message04 Message	RW	
ME5				Message05 Message	RW	
ME6				Message06 Message	RW	
ME7				Message07 Message	RW	
ME8				Message08 Message	RW	
ME9				Message09 Message	RW	
MEA				Message10 Message	RW	
MEB				Message11 Message	RW	
MEC				Message12 Message	RW	
MED				Message13 Message	RW	
MEE				Message14 Message	RW	
MEF				Message15 Message	RW	
MEG				Message16 Message	RW	
MEH				Message17 Message	RW	
MEI				Message18 Message	RW	
MEJ				Message19 Message	RW	
MEK				Message20 Message	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
MT1		43329	0D00	Message01 Timing	RW	
MT2		43331	0D02	Message02 Timing	RW	
MT3		43333	0D04	Message03 Timing	RW	
MT4		43335	0D06	Message04 Timing	RW	
MT5		43337	0D08	Message05 Timing	RW	
MT6		43339	0D0A	Message06 Timing	RW	
MT7		43341	0D0C	Message07 Timing	RW	
MT8		43343	0D0E	Message08 Timing	RW	0 : OFF
MT9		43345	0D10	Message09 Timing	RW	1 : Func Key
MTA		43347	0D12	Message10 Timing	RW	2 : Alarm On
MTB		43349	0D14	Message11 Timing	RW	3 : Alarm Off
MTC		43351	0D16	Message12 Timing	RW	4 : DI ON
MTD		43353	0D18	Message13 Timing	RW	5 : DI OFF
MTE		43355	0D1A	Message14 Timing	RW	
MTF		43357	0D1C	Message15 Timing	RW	
MTG		43359	0D1E	Message16 Timing	RW	
MTH		43361	0D20	Message17 Timing	RW	
MTI		43363	0D22	Message18 Timing	RW	
MTJ		43365	0D24	Message19 Timing	RW	
MTK		43367	0D26	Message20 Timing	RW	
MC1		43369	0D28	Message01 Channel No.	RW	
MC2		43371	0D2A	Message02 Channel No.	RW	
MC3		43373	0D2C	Message03 Channel No.	RW	
MC4		43375	0D2E	Message04 Channel No.	RW	
MC5		43377	0D30	Message05 Channel No.	RW	
MC6		43379	0D32	Message06 Channel No.	RW	
MC7		43381	0D34	Message07 Channel No.	RW	
MC8		43383	0D36	Message08 Channel No.	RW	0 : CH01
MC9		43385	0D38	Message09 Channel No.	RW	1 : CH02
MCA		43387	0D3A	Message10 Channel No.	RW	2 : CH03
MCB		43389	0D3C	Message11 Channel No.	RW	3 : CH04
MCC		43391	0D3E	Message12 Channel No.	RW	4 : CH05
MCD		43393	0D40	Message13 Channel No.	RW	5 : CH06
MCE		43395	0D42	Message14 Channel No.	RW	
MCF		43397	0D44	Message15 Channel No.	RW	
MCG		43399	0D46	Message16 Channel No.	RW	
MCH		43401	0D48	Message17 Channel No.	RW	
MCI		43403	0D4A	Message18 Channel No.	RW	
MCJ		43405	0D4C	Message19 Channel No.	RW	
MCK		43407	0D4E	Message20 Channel No.	RW	

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
MA1		43409	0D50	Message01 Alarm No.	RW	
MA2		43411	0D52	Message02 Alarm No.	RW	
MA3		43413	0D54	Message03 Alarm No.	RW	
MA4		43415	0D56	Message04 Alarm No.	RW	
MA5		43417	0D58	Message05 Alarm No.	RW	
MA6		43419	0D5A	Message06 Alarm No.	RW	
MA7		43421	0D5C	Message07 Alarm No.	RW	
MA8		43423	0D5E	Message08 Alarm No.	RW	
MA9		43425	0D60	Message09 Alarm No.	RW	0 : Alarm 01
MAA		43427	0D62	Message10 Alarm No.	RW	1 : Alarm 02
MAB		43429	0D64	Message11 Alarm No.	RW	2 : Alarm 03
MAC		43431	0D66	Message12 Alarm No.	RW	3 : Alarm 04
MAD		43433	0D68	Message13 Alarm No.	RW	
MAE		43435	0D6A	Message14 Alarm No.	RW	
MAF		43437	0D6C	Message15 Alarm No.	RW	
MAG		43439	0D6E	Message16 Alarm No.	RW	
MAH		43441	0D70	Message17 Alarm No.	RW	
MAI		43443	0D72	Message18 Alarm No.	RW	
MAJ		43445	0D74	Message19 Alarm No.	RW	
MAK		43447	0D76	Message20 Alarm No.	RW	
MD1		43449	0D78	Message01 DI No.	RW	
MD2		43451	0D7A	Message02 DI No.	RW	
MD3		43453	0D7C	Message03 DI No.	RW	
MD4		43455	0D7E	Message04 DI No.	RW	
MD5		43457	0D80	Message05 DI No.	RW	
MD6		43459	0D82	Message06 DI No.	RW	
MD7		43461	0D84	Message07 DI No.	RW	0 : DI01
MD8		43463	0D86	Message08 DI No.	RW	1 : DI02
MD9		43465	0D88	Message09 DI No.	RW	2 : DI03
MDA		43467	0D8A	Message10 DI No.	RW	3 : DI04
MDB		43469	0D8C	Message11 DI No.	RW	4 : DI05
MDC		43471	0D8E	Message12 DI No.	RW	5 : DI06
MDD		43473	0D90	Message13 DI No.	RW	6 : DI07
MDE		43475	0D92	Message14 DI No.	RW	7 : DI08
MDF		43477	0D94	Message15 DI No.	RW	8 : DI09
MDG		43479	0D96	Message16 DI No.	RW	
MDH		43481	0D98	Message17 DI No.	RW	
MDI		43483	0D9A	Message18 DI No.	RW	
MDJ		43485	0D9C	Message19 DI No.	RW	
MDK		43487	0D9E	Message20 DI No.	RW	

6．15．DI

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
DI1		43585	0E00	DI1 Function	RW	0：OFF 1：Rec. ON/OFF 2：LCD ON/OFF
DI2		43587	0E02	DI2 Function	RW	
DI3		43589	0E04	DI3 Function	RW	
DI4		43591	0E06	DI4 Function	RW	
DI5		43593	0E08	DI5 Function	RW	
DI6		43595	0E0A	DI6 Function	RW	
DI7		43597	0E0C	DI7 Function	RW	
DI8		43599	0E0E	DI8 Function	RW	
DI9		43601	0E10	DI9 Function	RW	

6．16．Progress time

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
ET□		43841	0F00	Progress time	RW	0：OFF 1：ON
ETF		43843	0F02	Condition	RW	0：Record 1：Alm ocrd 2：DI
ETC		43845	0F04	Channel No.	RW	0：CH01 1：CH02 2：CH03 3：CH04 4：CH05 5：CH06
ETA		43847	0F06	Alarm No.	RW	0：Alarm 01 1：Alarm 02 2：Alarm 03 3：Alarm 04 4：All
ETD		43849	0F08	DI No.	RW	0：DI01 1：DI02 2：DI03 3：DI04 4：DI05 5：DI06 6：DI07 7：DI08 8：DI09

6．17． LCD backlight

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
SPT		44097	1000	Slp t (min)	RW	
LAC		44099	1002	Actv. brt.	RW	
LSC		44101	1004	Slp brt.	RW	
ABK		44103	1006	Alm rcvy	RW	0：OFF 1：ON

6．18． Key function

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
FU□		44609	1200	FUNC Key	RW	0：OFF 1：Switching of Screen 2：Message
KLF		44611	1202	Key Lock	RW	0：OFF 1：ON
MKF		44613	1204	Menu Lock	RW	0：Free 1：Parameter 2：System 3：All
HKF		44615	1206	Hard Key Lock	RW	0：Free 1：REC 2：FUNC 3：REC+FUNC

6．19． Comm. Settings

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
PRT		44865	1300	Protocol	RW	0：TOHO 1：MODBUS
MFO		44867	1302	Format	RW	0：Type 1/RTU 1：Type 2/ASCII
ADR		44869	1304	Comm. Address	RW	
BPS		44871	1306	Comm. Speed	RW	0：2400bps 1：4800bps 2：9600bps 3：19200bps 4：38400bps
DAT		44873	1308	Data Length	RW	0：7bit 1：8bit
STB		44875	130A	Stop bit	RW	0：1bit 1：2bit
PAL		44877	130C	Parity check	RW	0：OFF 1：EVEN 2：ODD
BCC		44879	130E	BCC check	RW	0：OFF 1：ON
AWT		44881	1310	Resp delay	RW	

6．20． Clock

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
TYE		44353	1100	Year	RW	
TMO		44355	1102	Month	RW	
TDA		44357	1104	Day	RW	
THO		44359	1106	Hour	RW	
TMI		44361	1108	Minute	RW	
TSE		44363	110A	Second	RW	

6．21． Language

TOHO		MODBUS		Name	Command	Remark
First Identifier	Second Identifier	Absolute (DEC)	Relative (hex)			
LNG		40027	001A	Language	RW	0：English 1：Japanese

Section 7 List of ASCII Codes

Upper / Lower	00h	10h	20h	30h	40h	50h	60h	70h
00h	**NUL**	**DLE**	**Space**	**0**	**@**	**P**	**`**	**p**
01h	**SOH**	**DC1**	**!**	**1**	**A**	**Q**	**a**	**q**
02h	**STX**	**DC2**	**"**	**2**	**B**	**R**	**b**	**r**
03h	**ETX**	**DC3**	**#**	**3**	**C**	**S**	**c**	**s**
04h	**EOT**	**DC4**	**$**	**4**	**D**	**T**	**d**	**t**
05h	**ENQ**	**NAK**	**%**	**5**	**E**	**U**	**e**	**u**
06h	**ACK**	**SYN**	**&**	**6**	**F**	**V**	**f**	**v**
07h	**BEL**	**ETB**	**'**	**7**	**G**	**W**	**g**	**w**
08h	**BS**	**CAN**	**(**	**8**	**H**	**X**	**h**	**x**
09h	**HT**	**EM**	**)**	**9**	**I**	**Y**	**i**	**y**
0Ah	**LF**	**SUB**	*****	**:**	**J**	**Z**	**j**	**z**
0Bh	**VT**	**ESC**	**+**	**;**	**K**	**[**	**k**	**{**
0Ch	**FF**	**FS**	**,**	**<**	**L**	**¥**	**l**	**|**
0Dh	**CR**	**GS**	**-**	**=**	**M**	**]**	**m**	**}**
0Eh	**SO**	**RS**	**.**	**>**	**N**	**^**	**n**	**~**
0Fh	**SI**	**US**	**/**	**?**	**O**	**_**	**o**	**DEL**

※How to Use ASCII Code Table:
(ASCII Code) = (Upper) + (Lower)

Example 1: If "A": (41h) = (40h) + (01h)
Example 2: If "m": (6Dh) = (60h) + (0Dh)