Instruction Manual

DIGITAL CONTROLLER COMMUNICATION FUNCTIONS (MODBUS)

TYPE: PXH

Fuji Electric Systems Co., Ltd.

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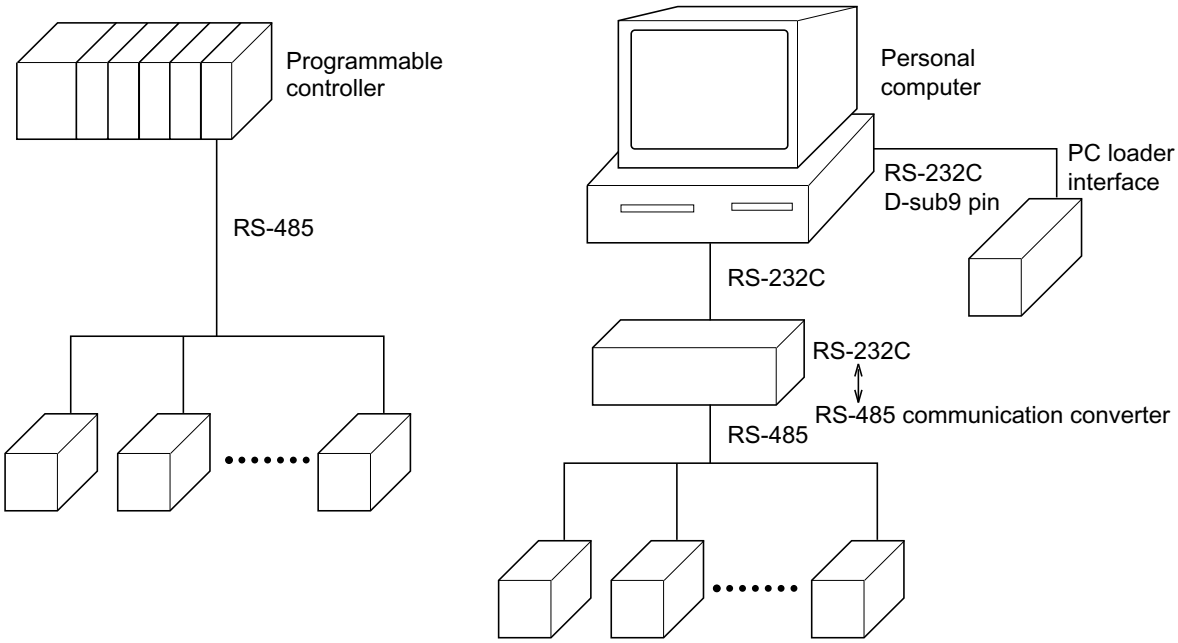
1. COMMUNICATION FUNCTIONS

1.1 Outline

- Via RS-485 interface and PC loader interface, PXH provides communication functions of transmitting and receiving data to and from host computer, programmable controller, graphic panel, etc.
- The communication system consists of master station and slave stations. For RS-485 communication, up to 31 slave stations (PXHs) can be connected per master station.
  Note that, because the master station can communicate with only one slave station at a time, a party to communicate with must be specified by the "Station No." set at each slave station.
  For loader communication, one slave station (PXH) can be connected per master station.
- In order that the master station and slave station can communicate, the format of the transmit/receive data must coincide. For the PXH, the format of the communication data is determined by the MODBUS protocol.
- Please use an RS-232C ⇔ RS-485 converter in case of designating a personal computer or other devices which have an RS-232C interface as a master station.
  ［RS-232C ⇔ RS-485 converter］ (recommended article)
  Type: RC-77 (isolated type)/ RA SYSTEMS make http://www.ras.co.jp
  Type: K3SC-10 (isolated type)/ OMRON make http://www.omron.co.jp

RS-232C communication with PC is available upon connecting Type: ZZPPXH1*TK4H4563 to PC loader interface where PXH is provided in standard.



Caution:

When using the RS-232C ⇔ RS-485 converter, pay attention to cable connection between the converter and master station. If the cable is not connected correctly, the master station and slave station cannot communicate. In addition, be careful about communication settings such as baud rate and parity set for the converter.

2. SPECIFICATIONS

2.1 Communication Specifications

■ **RS-485**

Item	Specification	
Electrical specification	Based on EIA RS-485	
Transmission method	2-wire, half duplex	
Synchronous system	Start-stop synchronous system	
Connection format	1 : N	
Number connectable units	Up to 31 units	
Transmission distance	500m max. (total extension distance)	
Transmission speed	9600bps, 19200bps, 38400bps	
Data format	Data length	8 bits
	Stop bit	1 bit
	Parity	none, even, odd (selectable)
Transmission code	HEX value (MODBUS RTU mode)	
Error detection	CRC-16	
Isolation	Functional isolation between transmission circuit and others (withstand voltage : 500V AC)	

■ **PC loader interface**

Item	Specification	
Electrical specification	EIA RS232C	
Transmission method	3-wire, half duplex, bit-sereal	
Synchronous system	Start-stop synchronous system	
Connection format	1 : 1	
Transmission speed	9600bps, 19200bps, 38400bps	
Data format	Data length	8 bits
	Stop bit	1 bit
	Parity	none, even, odd (selectable)
Transmission code	HEX value (MODBUS RTU mode)	
Error detection	CRC-16	
Isolation	Non-isolated from internal circuit	

3. CONNECTION

⚠ **WARNING**

For avoiding electric shock and malfunctions, do not turn on the power supply until all wiring is completed.

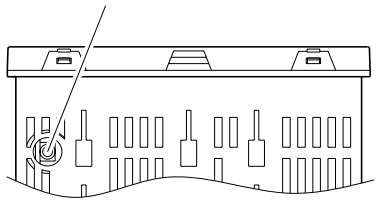
3.1 Communication Terminal Allocation

■ PXH9 (RS-485)

Terminal number	(14)	(15)	(16)
Signal name	RS485 ⊕	SG	RS485 ⊖

■ PXH9 (PC loader interface)

PC loader interface

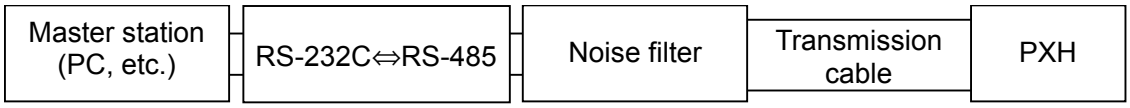


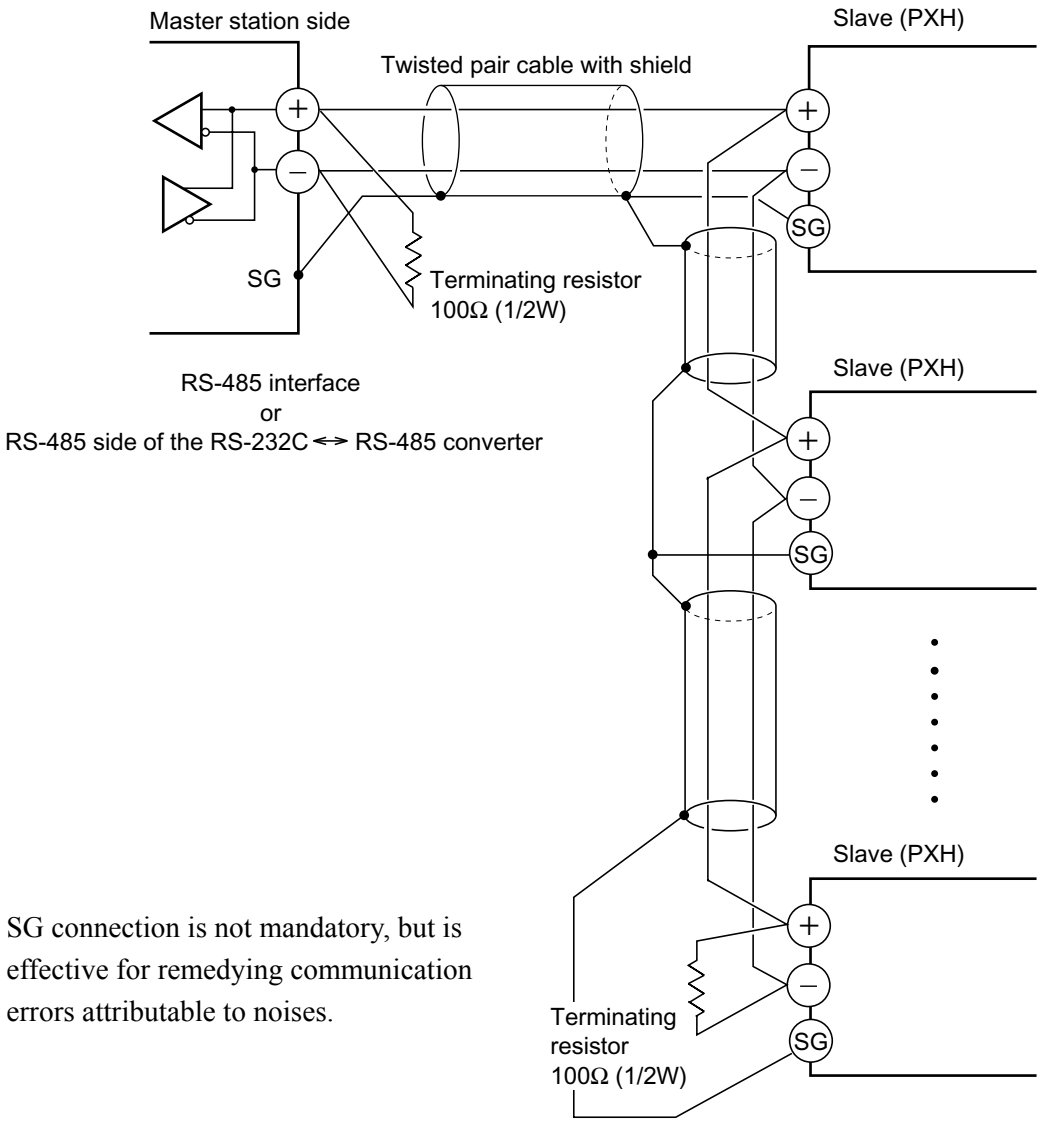
Φ2.5, 3-pole miniature jack

3.2 Wiring

■ **RS-485**

- Use twisted pair cables with shield. Recommended: KPEV-SB (Furukawa Electric make)
- The total extension length of the cable is up to 500 m. A master station and up to 31 units of the PXH can be connected per line.
- Both ends of the cable should be terminated with terminating resistors 100Ω (1/2W or more).
- If the PXH is to be installed where the level of noise applied to the PXH may exceed 1000 V, it is recommended to install a noise filter in the master station side as below.
  Recommended noise filter: ZRAC2203-11 (TDK make)
- If problematic in EMC at communication, loading the communication cable with ferrite can lower the noise level.
  Recommended ferrite core: ZCAT series (TDK make)
  MSFC series (Morimiya Electric make)

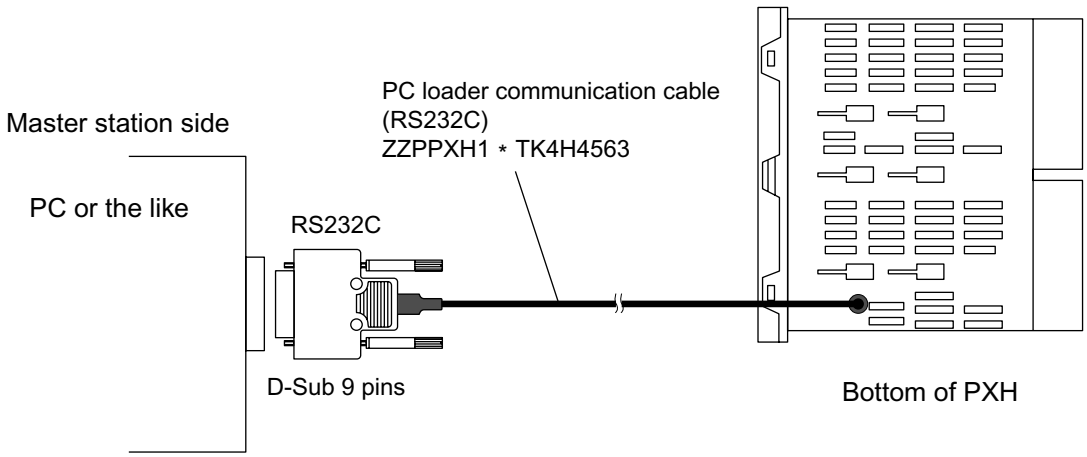




- SG connection is not mandatory, but is effective for remedying communication errors attributable to noises.

■ **PC loader communication**

- Use an optional PC loader communication cable (RS-232C).



4. SETTING OF COMMUNICATION CONDITION

In order that the master station and instrument (PXH) can correctly communicate, following settings are required.

- All communication condition settings of the master station and those of instruments (PXH) are indentical.
- For RS-485 communication, different "station numbers (STN4)" are assigned to all PXHs which are connected to a common line. (Any "Station No." is not shared by more than one instrument.)
- For PC loader communication, the station No. is fixed at "1".
  Both for PC loader communication and RS-485 communication, same station No. "1" may be assigned.

4.1 Setting items

The parameters to be set are shown in the following table. Set them by operating the front panel keys.

■ RS-485

CH B COM Parameter symbol	Item	Value at delivery	Setting range	Remarks
SPD4	Transmission speed	38400bps	96 : 9600bps 192 : 19200bps 384 : 38400bps	Set the same communication condition to the master station and all slave stations.
———	Data length	8 bits	Fixed (can not be changed)	
———	Stop bit	1 bit	Fixed (can not be changed)	
BIT4	Parity setting	odd	8n : none parity 8o : odd parity 8E : even parity	
STN4	Station No.	1	0 to 255 (0: communication function stop)	Set a different number to each station.

■ PC loader communication

CH B COM Parameter symbol	Item	Value at delivery	Setting range	Remarks
SPD2	Transmission speed	38400bps	96 : 9600bps 192 : 19200bps 384 : 38400bps	Set the same conditions as the master station.
———	Data length	8 bits	Fixed (can not be changed)	
———	Stop bit	1 bit	Fixed (can not be changed)	
BIT2	Parity setting	odd	8n : none parity 8o : odd parity 8E : even parity	
———	Station No.	1	Fixed (can not be changed)	

4.2 Setting Operation Method

The following example shows how to set the communication conditions.

Example: For RS-485, set BIT4 parity at even and STN4 at 18.

Key operation	Indication	Description
	200 LP 01 SV 200	Operation status (PV/SV indication) or (PV/MV indication)
SEL	PS1 0000	Press the SEL key to display PS1.
∨	b COM Ch	Press the ∨ key repeatedly until b.COM channel appears. (If past over, press the ∧ key to return.)
SEL	b. STN4 02 1	Press the SEL key to display STN4 parameter.
SEL	b. STN4 02 00001	Press the SEL key. The numeric value on the lower indicator blinks and the setting mode is selected.
>∧∨	b. STN4 02 00018	Press the >, ∧, or ∨ key to change the numeric value to 18.
SEL	b. STN4 02 18	Press the SEL key again. The numeric value stops blinking and the setting is registered.
∨	b. BIT4 04 8o	Press the ∨ key to display the BIT4 parameter.
SEL	b. BIT4 04 8o	Press the SEL key. The numeric value on the lower indicator blinks and the setting mode is selected.
∧∨	b. BIT4 04 8E	Press the ∧ or ∨ key until the numeric value changes to 8E (even parity).
SEL	b. BIT4 04 8E	Press the SEL key again. The numeric value stops blinking and the setting is registered.
DISP	b COM Ch	Press the DISP key to resume b.COM channel indication.
DISP	200 LP 01 SV 200	Press the DISP key to resume the operation status (PV/SV indication).

* Be sure to turn off and on power so that the communication condition settings will affect the control.

5. MODBUS COMMUNICATION PROTOCOL

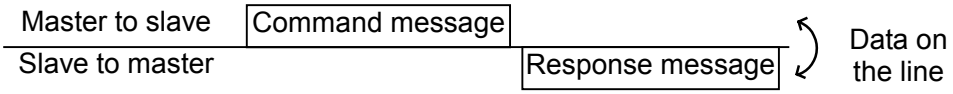
5.1 Outline

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

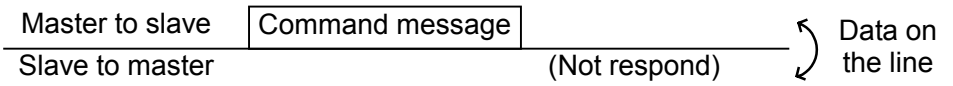
Transmission procedures is as shown below.

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.



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.

5.2 Composition of Message

Command message and response message consist of 4 fields; Station No., Function code, Data and Error check code. And these are sent in the following order.

Station No. (1 byte)
Function code (1 byte)
Data (2 to 69 bytes)
Error check code (CRC-16) (2 bytes)

Fig. 5-1 Composition of message

In the following, each field is explained.

(1) Station No

Station No. is the number specifying a slave station. For RS-485 communication, the command is processed only by the slave station whose station No. matches with the No. set in the parameter "STN4".

For details of setting the parameter "STN4", refer to chapter 4.

For PC loader communication, the station No. is fixed at "1".

(2) Function code

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

For details, refer to section 5.4.

(3) Data

Data are the data required for executing function codes. The composition of data varies with function codes. For details, refer to chapter 6.

A register number is assigned to each data in the indicating controller. For using 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.

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

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

Relative address = (lower 4 digits of 40003) – 1

= 0002

is used on the message.

(4) Error check code

This is the code to detect message errors (change in bit) in the signal transmission.
On the MODBUS protocol (RTU mode), CRC-16 (Cycric Redundancy Check) is applied.
For CRC calculation method, refer to section 5.5.

5.3 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 5.2.

Contents of the data field depend on the function code. For details, refer to Chapter 6.

(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. 5-2. The value used for function code field is function code of command message plus 80_H.

Table 5-1 gives error codes.

Station No.
Function code + 80_H
Error code
Error check（CRC-16）

Fig. 5-2 Response message at error detection

Table 5-1 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 resister number to which the designated function code can not be used.
03H	Illegal data value	Because the designation of number is too much, the area where resister numbers do not exist is designated.

(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 error check code is not matched, or a transmission error (parity error, etc.) is detected.
- The time interval between the composition data of the message becomes longer than the time corresponding to 24 bits. (Refer to section 5.6 Transmission Control Procedure.)
- Station No. of a slave station is set as 0.
- A write-in command is sent while executing FIX.

5.4 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 5-2, and the message length by function is shown in Table 5-3.

Table 5-2 Correspondence between function codes and objective address

Function code			⟷	Resister 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
06_H	Write-in	Holding register		4xxxx	Read-out/write-in word data
10_H	Write-in (continuously)	Holding register		4xxxx	Read-out/write-in word data

Table 5-3 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	32 words	8	8	7	69
04_H	Read-out of word data (read-out only)	15 words	8	8	7	35
*1 06_H	Write-in of word data	1 word	8	8	8	8
10_H	Write-in of continuous word data	32 words	11	73	8	8

*1) For PXH, all data is designated by 2 words.
If 06_H (write-in of word data) is used, only 1 lower word can be written in, and only 1 upper word cannot.

5.5 Calculation of Error Check Code (CRC-16)

CRC-16 is the 2-byte (16-bits) error check code. From the top of the message (station No.) to the end of the data field are calculated.

The slave station calculates the CRC of the received message, and does not respond if the calculated CRC is different from the contents of the received CRC code.

Fig. 5-3 shows the flow of the CRC-16 calculation system.

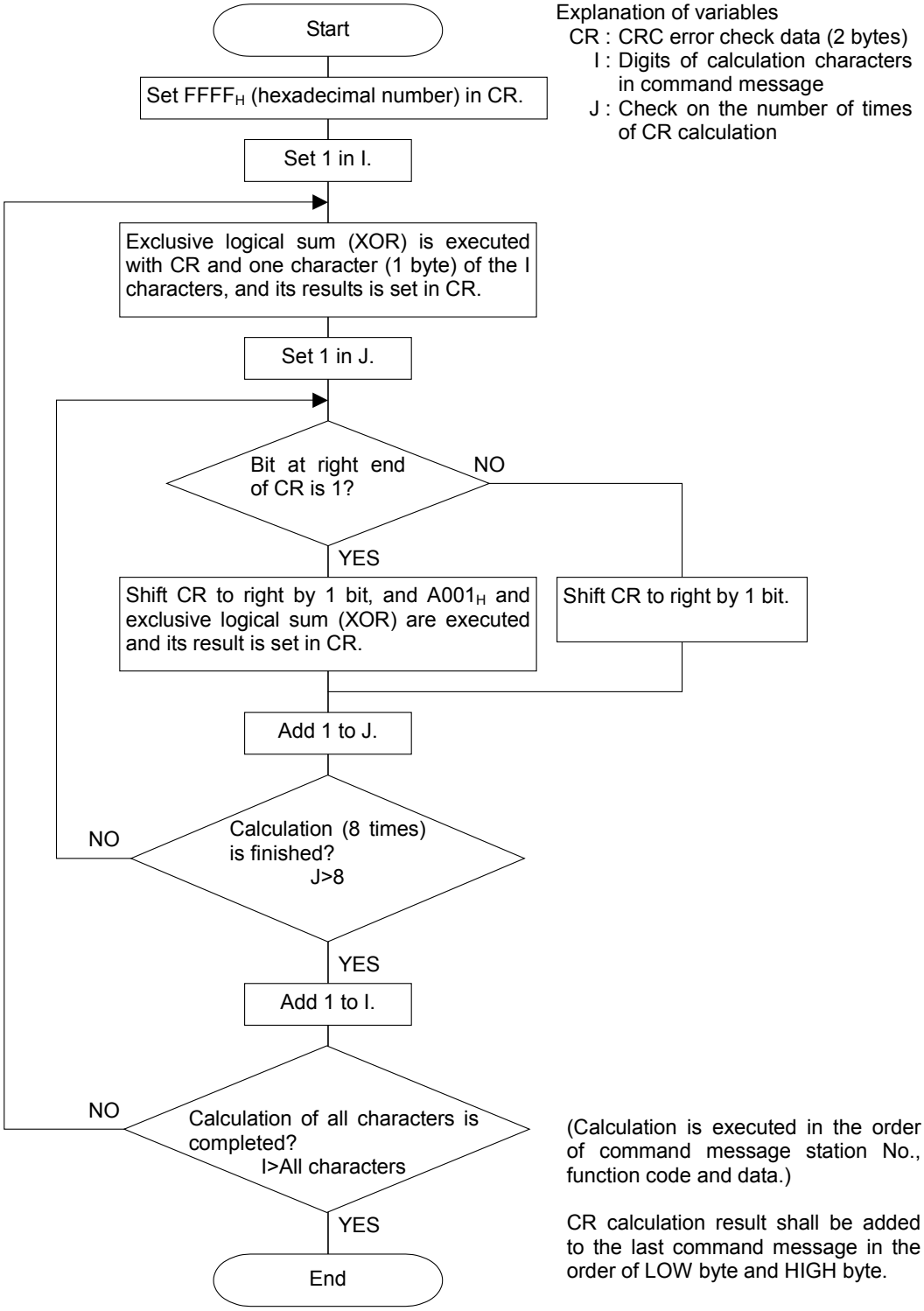


Fig. 5-3 Flow of CRC-16 calculation

5.6 Transmission Control Procedure

(1) Transmission procedure of master station

The master station must proceed to a communication upon conforming to the following items.

(1-1) Before sending a command message, provide 48 bits time or more vacant status.

(1-2) For 1 command message, each field part should be sent below 24 bits time interval.

(1-3) Within 24 bits time after sending a command message, receiving stand-by status starts.

(1-4) Provide 48 bits time or more vacant status between the end of response message reception and beginning of next command message sending [same as in (1-1)].

(1-5) For ensuring the safety, make a confirmation of the response message and make an arrangement so as to provide 3 or more retries in case of no response, error occurrence, etc.

Note) The above definition is minimum requirement. For ensuring the safety, it's recommended the program for the master should be developed with 2 to 3 times margins. Concretely, it is advised to arrange the program for 9600 bps with 10 ms or more for vacant status (1-1), and within 1 ms for byte interval (1-2) and changeover from sending to receiving (1-3).

(2) Description

1) Detection of the message frame

Since the communication system uses the 2-wire RS-485 interface, there may be 2 statuses on a line below. (The same goes with PC loader communication.)

(a) Vacant status (no data on line)

(b) Communication status (data is existing)

Instruments connected on the line are initially at a receiving status and monitoring the line. When 24 bits time or more vacant status has appeared on the line, the end of preceding frame is assumed and, within following 24 bits time, a stand-by status is posted. When data appears on the line, the instruments enter on receiving, and when 24 bits time or more vacant status is detected again, and the end of that frame is assumed. I.e., data which appeared on the line from the first 24 bits time or more vacant status to the next 24 bits time or more vacant status is fetched as one frame.

Therefore, one frame (command message) must be sent upon confirming the following.

(1-1) 48 bits time or more vacant status precedes the command message sending.

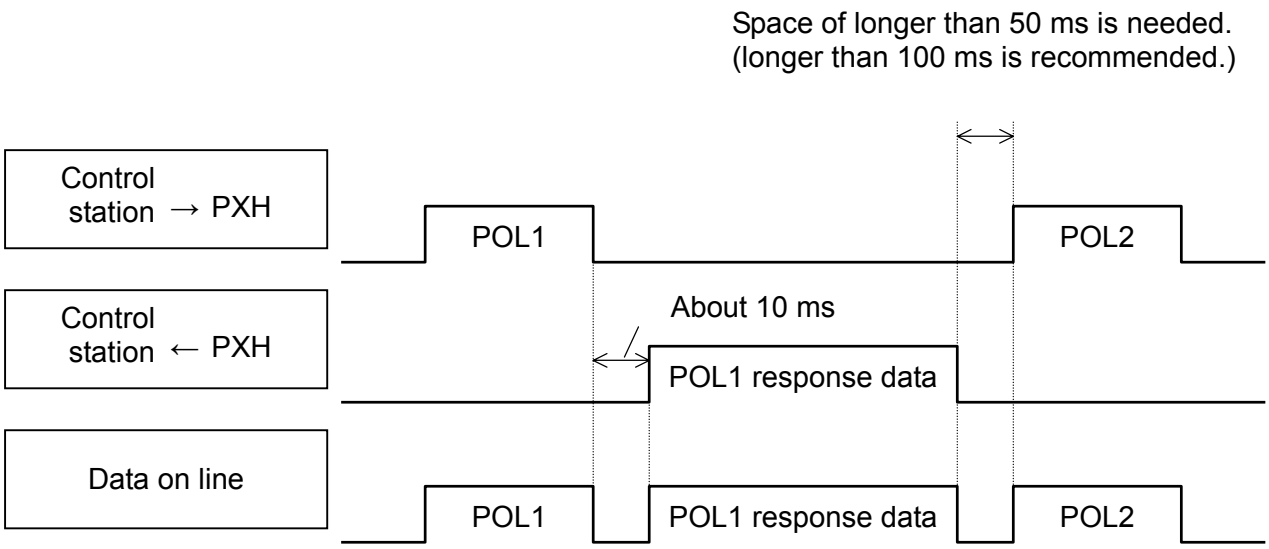
(1-2) For 1 command message, each byte should be sent below 24 bits time interval.

2) Response of this instrument (PXH)

After a frame detection (24 bits time or more vacant status is detected), this instrument carries out processing with that frame as a command message. If the command message is addressed to the own station, a response message is returned. Its processing time is about 10 ms (depends on contents of command message).

After sending a command message, therefore, the master station must observe the following

(1-3) Stand-by status is posted within 24 bits time after sending a command message.


Space of longer than 50 ms is needed.
(longer than 100 ms is recommended.)
Control station → PXH
Control station ← PXH
Data on line
POL1
POL2
About 10 ms
POL1 response data
POL1
POL1 response data
POL2

5.7 FIX Processing (Cautions in data write)

The instrument is provided inside with a non-volatile memory (EEPROM) 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. 5-4 shows the FIX procedure.

Cautions:

- FIX processing takes approximately 5 seconds to 3 minutes (depending on how many parameters were changed).
- While writing, do not turn off the power of the PXH. Otherwise, the data in the non-volatile memory will be destroyed, whereby the PXH 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 (EEPROM) 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 FIX processing to bare minimum, like when setting parameters are changed. Refrain from carrying out the FIX processing periodically for example or while such is not absolutely required.

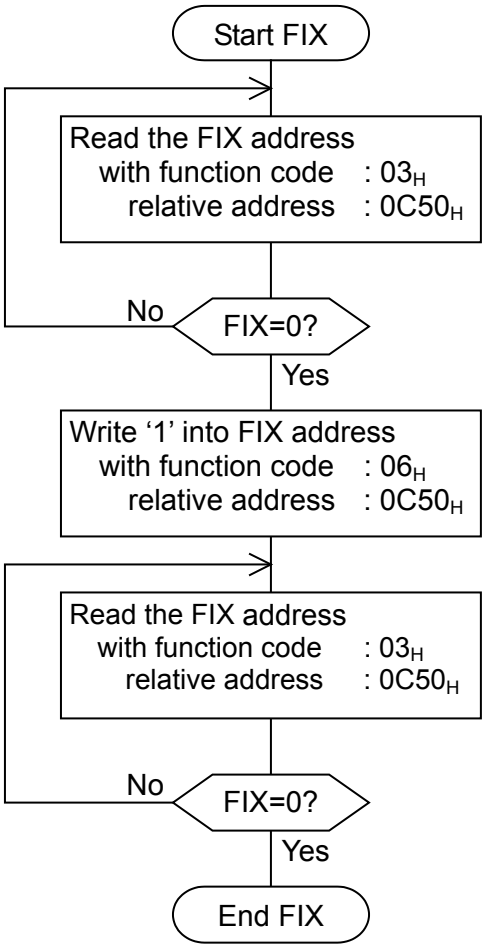


Fig. 5-4 FIX procedure

6. DETAILS OF MESSAGE

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

Function code	Max. word number read-out in one message	Relative data address	Register No.
03_H	32 words	0000_H – 01388_H	40001-45001

(1) Message composition

Command message composition (byte)

Station No.		
Function code		
Read-out start No. (relative address)	Upper	
	Lower	
Read-out word number	Upper	1 to 32
	Lower	
CRC data	Upper	
	Lower	

Response message composition (byte)

Station No.		
Function code		
Read-out byte number		Read-out word number × 2
State of the first word data	Upper	
	Lower	
State of the next word data	Upper	
	Lower	
~	~	
State of the last word data	Upper	
	Lower	
CRC 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 explanation

Words data are read-out, starting from read-out start No. until read-out word number. The slave station transmits the read-out word data in the order of upper and lower bytes.

For PXH for which all data consists of 2 word units, data should be read out by units of 2 words.

Example: Suppose data is 99999 (00 01 86 $9F_H$)

(1) (2) (3) (4)

(3)	86	LH（Low word High byte）
(4)	9F	LL（Low word Low byte）
(1)	00	HH（High word High byte）
(2)	01	HL（High word Low byte）

Suppose data is 1

00	LH
01	LL
00	HH
00	HL

(3) Message transmission

The following shows an example of reading out PV1F (PV1 full scale) from No. 1 station.

Relative address of PV1F (PV1 full scale): 0830_H

Number of data words: 02_H (2 words per data)

Command message composition (byte)

Station No.		01_H
Function code		03_H
Read-out start No. (relative address)	Upper	08_H
	Lower	30_H
Read-out word number	Upper	00_H
	Lower	02_H
CRC data	Upper	$C6_H$
	Lower	64_H

Response message composition (byte)

Station No.		01_H
Function code		03_H
Read-out byte number		04_H
PV1F lower data	Upper	$0F_H$
	Lower	$A0_H$
PV1F upper data	Upper	00_H
	Lower	00_H
CRC data	Upper	$F9_H$
	Lower	05_H

* Meaning of read-out word data

PV1F (PV1 full scale) $\overbrace{00 \quad 00}^{\text{Upper data}} \quad \overbrace{0F \quad A0_H}^{\text{Lower data}} = 4000$

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

Function code	Max. word number read-out in one message	Relative data address	Register No.
04_H	15 words	0000_H – $057E_H$	30001-31407

(1) Message composition

Command message composition (byte)

Station No.	
Function code	
Read-out start No. (relative address)	Upper
	Lower
Read-out word number	Upper
	Lower
CRC data	Upper
	Lower

} 1 to 15

Response message composition (byte)

Station No.		
Function code		
Read-out byte number		Read-out word number × 2
State of the first word data	Upper	
	Lower	
State of the next word data	Upper	
	Lower	
~	~	
State of the last word data	Upper	
	Lower	
CRC 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 explanation

Words data are read-out, starting from read-out start No. until read-out word number. The slave station transmits the read-out word data in the order of upper and lower bytes.

For PXH for which all data consists of 2 word units, data is read out by units of 2 words.

(1) (2) (3) (4)

Example: Suppose data is –2 (FF FF FF FE_H)

(3)	FF	LH
(4)	FE	LL
(1)	FF	HH
(2)	FF	HL

(3) Message transmission

The following shows an example of reading out PV value from No. 1 station.

Relative address of PV value: 0102_H

Data number: 02_H (2 words per data)

Command message composition (byte)

Station No.		01_H
Function code		04_H
Read-out start No. (relative address)	Upper	01_H
	Lower	02_H
Read-out word number	Upper	00_H
	Lower	02_H
CRC data	Upper	$D1_H$
	Lower	$F7_H$

Response message composition (byte)

Station No.		01_H
Function code		04_H
Read-out byte number		04_H
PV1 lower data	Upper	38_H
	Lower	80_H
PV1 upper data	Upper	00_H
	Lower	01_H
CRC data	Upper	36_H
	Lower	CC_H

* Meaning of read-out word data

PV1 measurement data 00 01 38 80_H = 80000

If

decimal point position PV1D = 2
unit PV1U = °C
} 800.00°C

6.3 Write-in of Word Data (1 word) [Function code: 06_H]

Function code	Max. word number write-in in one message	Relative data address	Register No.
06_H	1 word	0000_H－01388_H	40001－45001

(1) Message composition

Command message composition (byte)

Station No.		
Function code		
Write-in designate No. (relative address)	Upper	
	Lower	
Write-in word data	Upper	
	Lower	
CRC data	Upper	
	Lower	

Response message composition (byte)

Station No.		
Function code		
Write-in designate No. (relative address)	Upper	
	Lower	
Write-in word data	Upper	
	Lower	
CRC data	Upper	
	Lower	

(2) Function explanation

Designated data is written in word data of write-in designate No. Write-in data are transmitted from master station in the order of upper and lower bytes.

For PXH, all data consist of 2 word units. If 06H (write-in of word data) is used, only 1 lower word of 2 word data can be written in, and only 1 upper word of 2 word data cannot.

(3) Message transmission (example)

The following shows an example of setting 100.0 (1000_D=$03E8_H$) to the parameter "P1" of No.1 slave station.

Parameter "P1" Relative address: 0282_H

Command message composition (byte)

Station No.		01_H
Function code		06_H
Write-in designate No. (relative address)	Upper	02_H
	Lower	82_H
State of write-in designation	Upper	03_H
	Lower	$E8_H$
CRC data	Upper	28_H
	Lower	$E4_H$

Response message composition (byte)

Station No.		01_H
Function code		06_H
Write-in designate No. (relative address)	Upper	02_H
	Lower	82_H
State of write-in designation	Upper	03_H
	Lower	$E8_H$
CRC data	Upper	28_H
	Lower	$E4_H$

Note When setting is being locked, response is returned normally, but the command is not executed. Make sure that setting is not locked to send the write-in command.
The setting lock parameter can be written in even if communication setting is invalidated.
If the write-in command message is sent to any slave station during the FIX process, response is not returned from it.

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

Function code	Max. word number write-in in one message	Relative data address	Register No.
10_H	32 words	0000_H－01388_H	40001－45001

(1) Message composition

Command message composition (byte)

Station No.		
Function code		
Write-in start No. (relative address)	Upper	
	Lower	
Write-in word number	Upper	1 to 32
	Lower	
Write-in byte number		Write-in word number × 2
First write-in word data	Upper	
	Lower	
Next write-in word data	Upper	
	Lower	
~	~	
Last write-in word data	Upper	
	Lower	
CRC data	Upper	
	Lower	

Response message composition (byte)

Station No.	
Function code	
Write-in start No. (relative address)	Upper
	Lower
Write-in word number	Upper
	Lower
CRC data	Upper
	Lower

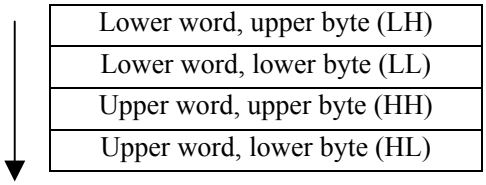
* Arrangement of write-in word data

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 explanation

Words data are written in, starting from write-in start No. until write-in word number. Write-in word data are transmitted from master station in the order of upper and lower bytes.

For PXH for which all data consists of 2 word units, write in data by units of 2 words in the order illustrated below.



(3) Message transmission (example)

The following shows an example of writing-in P1 = 100.0, I1 = 10, and D1 = 5.0 to No. 1 slave station.

P1 = $03E8_H$ (= 1000_D)

I1 = 0064_H (= 100_D)

D1 = 0032_H (= 50_D)

Parameter "P1" Relative address:0282_H Data number:06_H (2 words per data)

Command message composition (byte)

Station No.		01_H
Function code		10_H
Write-in start No.	Upper	02_H
	Lower	82_H
Write-in word number	Upper	00_H
	Lower	06_H
Write-in byte number		$0C_H$
P1 lower data	Upper	03_H
	Lower	$E8_H$
P1 upper data	Upper	00_H
	Lower	00_H
I1 lower data	Upper	00_H
	Lower	64_H
I1 upper data	Upper	00_H
	Lower	00_H
D1 lower data	Upper	00_H
	Lower	32_H
D1 upper data	Upper	00_H
	Lower	00_H
CRC data	Upper	$B6_H$
	Lower	$D8_H$

Response message composition (byte)

Station No.		01_H
Function code		10_H
Write-in start No.	Upper	02_H
	Lower	82_H
Write-in word number	Upper	00_H
	Lower	06_H
CRC data	Upper	$E1_H$
	Lower	$9B_H$

Point

Since the transmission data can not include a decimal point, data of 100.0 is transmitted as "1000".
For transmission format of each data, refer to the address map (Chapter 7).

Caution

When setting is being locked, response is returned normally. However, the command is not executed. If the write-in command message is sent to any slave station during the FIX process, response is not returned from it.

7. ADDRESS MAP AND DATA FORMAT

7.1 Data Format

7.1.1 Transmission data format

The MODBUS protocol used in this instrument (PXH) is RTU (Remote Terminal Unit) mode.
Transmitted data is "numeric value" and not "ASCII code".

7.1.2 Engineering unit

This instrument can handle set value data or other data which are affected by input range as follows.
Engineering unit: Subjected to scaling to match the actual value according to input range

[Example] The value of "PV = 150" (input range: 0º to 400ºC)

	Register No.	Data (HEX)	→	Data (decimal)
Engineering unit	0102	00000096_H		150

● How to change the input range setting via communication

The input range setting is for full scale, base scale and decimal point position setting.
In order that the change of input range setting will affect the control, power must be turned off and on, or the reset command must be executed.
Changing the decimal point position automatically changes the full scale and base scale settings.
Example: Changing the input range from 0 to 400, to 0.0 to 400.0

(1) PV1D = 0 → 1 (automatically changes as PV1F = 400 → 400.0, PV1B = 0 → 0.0)

↓

(2) FIX command (see 5.7)

↓

(3) Power OFF-ON or execute reset command (write 1 at relative address 0060H)

● Input range dependent data (see communication address map)

Input range dependent data must be reset after turning off and on power or after transmitting a reset command subsequent to a change of input range.

(1) Input range setting change

↓

(2) FIX command (see 5.7)

↓

(3) Power off and on or execute reset (write 1 at relative address 0060H)

↓

(4) Reset all data depending upon by input range

7.1.3 Handling of decimal point

No decimal point is added to transmission data.

For data given in the following table, carry out an alignment of decimal point. (Decimal point should be removed in transmission, and should be added in receiving data.)

Word data [read-out/write-in]

Digits below decimal point	Kind	Register No.	Digits below decimal point	Kind	Register No.
Designate by UCD1 if TPLT = 10, 11, 30, 31, 50, 51 (0 to 3) Designate by PV1D if TPLT = 13, 14, 33, 34, 53, 54 (0 to 3)	AL1	40257	Designate by UCD1 if TPLT = 10, 11, 30, 31, 50, 51 (0 to 3) Designate by PV1D if TPLT = 13, 14, 33, 34, 53, 54 (0 to 3)	HYS3	41103
	A1-L	40257		REF3	41111
	A1-H	40259		SV4	41121
	AL2	40273		ARH4	41131
	A2-L	40273		ARL4	41133
	A2-H	40275		HYS4	41135
	AL3	40289		REF4	41143
	A3-L	40289		SV5	41153
	A3-H	40291		ARH5	41163
	AL4	40305		ARL5	41165
	A4-L	40305		HYS5	41167
	A4-H	40307		REF5	41175
	AL5	40321		SV6	41185
	A5-L	40321		ARH6	41195
	A5-H	40323		ARL6	41197
	AL6	40337		HYS6	41199
	A6-L	40337		REF6	41207
	A6-H	40339		SV7	41217
	AL7	40353		ARH7	41227
	A7-L	40353		ARL7	41229
	A7-H	40355		HYS7	41231
	AL8	40369		REF7	41239
	A8-L	40369	Designate by PV1D (0 to 3)	PV1F	42097
	A8-H	40371		PV1B	42099
	1HYS	40265		PV1Z	42107
	2HYS	40281		PV1S	42109
	3HYS	40297	Designate by PV2D (0 to 3)	PV2F	42129
	4HYS	40313		PV2B	42131
	5HYS	40329		PV2Z	42139
	6HYS	40345		PV2S	42141
	7HYS	40361	Designate by AI1D (0 to 3)	AI1F	42193
	8HYS	40377		AI1B	42195
	SV_L1	40641		AI1Z	42203
	ARH1	40651		AI1S	42205
	ARL1	40653	Designate by UCD1 (0 to 3)	UCF1	42081
	SH1	40655		UCB1	42083
	SL1	40657	1 digit below decimal point	P1	40643
	HS1	40671		I1	40645
	SV1	41025		D1	40647
	ARH1	41035		MVH1	40659
	ARL1	41037		MVL1	40661
	HYS1	41039		DMV1	40667
	REF1	41047		BAL1	40677
	SV2	41057		PMV1	40685
	ARH2	41067		ALP1	40833
	ARL2	41069		BET1	40841
	HYS2	41071		P-1	41027
	REF2	41079		I-1	41029
	SV3	41089		D-1	41031
	ARH3	41099		BL-1	41045
	ARL3	41101		P-2	41059

Digits below decimal point	Kind	Register No.
1 digit below decimal point	I-2	41061
	D-2	41063
	BL-2	41077
	P-3	41091
	I-3	41093
	D-3	41095
	BL-3	41109
	P-4	41123
	I-4	41125
	D-4	41127
	BL-4	41141
	P-5	41155
	I-5	41157
	D-5	41159
	BL-5	41173
	P-6	41187
	I-6	41189
	D-6	41191
	BL-6	41205
	P-7	41219
	I-7	41221
	D-7	41223
	BL-7	41237
	P1CU	42117
	P1TF	42119
	P2CU	42149
	P2TF	42151
	A1CU	42211
	A1TF	42213
	AO1L	42435
	AO1H	42437
	A1LL	42439
	A1LH	42441
	AO2L	42451
	AO2H	42453
	A2LL	42455
	A2LH	42457
	KF1	40849
	B1F1	40851
	B2F1	40853
	TrVL	42597
	PGP	42599
Designate by PV1D (0 to 3)	P1X0	43201
	P1X1	43203
	P1X2	43205
	P1X3	43207
	P1X4	43209
	P1X5	43211
	P1X6	43213
	P1X7	43215
	P1X8	43217
	P1X9	43219

Digits below decimal point	Kind	Register No.
Designate by PV1D (0 to 3)	P1XA	43221
	P1XB	43223
	P1XC	43225
	P1XD	43227
	P1XE	43229
	P1XF	43231
	P1Y0	43233
	P1Y1	43235
	P1Y2	43237
	P1Y3	43239
	P1Y4	43241
	P1Y5	43243
	P1Y6	43245
	P1Y7	43247
	P1Y8	43249
	P1Y9	43251
	P1YA	43253
	P1YB	43255
	P1YC	43257
	P1YD	43259
	P1YE	43261
	P1YF	43263
Designate by PV2D (0 to 3)	P2X0	43265
	P2X1	43267
	P2X2	43269
	P2X3	43271
	P2X4	43273
	P2X5	43275
	P2X6	43277
	P2X7	43279
	P2X8	43281
	P2X9	43283
	P2XA	43285
	P2XB	43287
	P2XC	43289
	P2XD	43291
	P2XE	43293
	P2XF	43295
	P2Y0	43297
	P2Y1	43299
	P2Y2	43301
	P2Y3	43303
	P2Y4	43305
	P2Y5	43307
	P2Y6	43309
	P2Y7	43311
	P2Y8	43313
	P2Y9	43315
	P2YA	43317
	P2YB	43319
	P2YC	43321
	P2YD	43323
	P2YE	43325
	P2YF	43327

Digits below decimal point	Kind	Register No.	Digits below decimal point	Kind	Register No.
Designate by AI1D (0 to 3)	A1X0	43393	Designate by AI1D (0 to 3)	A1Y0	43425
	A1X1	43395		A1Y1	43427
	A1X2	43397		A1Y2	43429
	A1X3	43399		A1Y3	43431
	A1X4	43401		A1Y4	43433
	A1X5	43403		A1Y5	43435
	A1X6	43405		A1Y6	43437
	A1X7	43407		A1Y7	43439
	A1X8	43409		A1Y8	43441
	A1X9	43411		A1Y9	43443
	A1XA	43413		A1YA	43445
	A1XB	43415		A1YB	43447
	A1XC	43417		A1YC	43449
	A1XD	43419		A1YD	43451
	A1XE	43421		A1YE	43453
	A1XF	43423		A1YF	43455

Word data [read-out only]

Digits below decimal point	Kind	Register No.	Digits below decimal point	Kind	Register No.
Designate by UCD1 if TPLT = 10, 11, 30, 31, 50, 51 (0 to 3) Designate by PV1D if TPLT = 13, 14, 33, 34, 53, 54 (0 to 3)	PV1	30259	Designate by PV1D (0 to 3)	PV1	31025
	SV1	30261			
	DV1	30263	Designate by PV2D (0 to 3)	PV2	31027
			Designate by AI1D (0 to 3)	AI1	31031
			Designate by UCD1 (0 to 3)	AIM	31345
			1 digit below decimal point	MV1	30265
				AO1	31105
				AO2	31107
				AMV1	31381
				FFV1	31389
				MVrb	31397
			2 digits below decimal point	RCJ1	31057
				RCJ2	31059

7.1.4 Data when input is abnormal

When "UUUU" or "LLLL" is displayed on the face panel on account of over-range, under-range or input burnout for example, PV read-out value (register No. 30259) is 105% or –5% of input range.

Presence of any input abnormality via communication can be detected by:

"Register No. 30269: Input abnormal status"

7.1.5 Range of write-in data

When data is written in each parameter, the write-in data should be kept within the setting range. PXH can accept the write-in data beyond the range, however, be careful since the PXH performance will not be guaranteed.

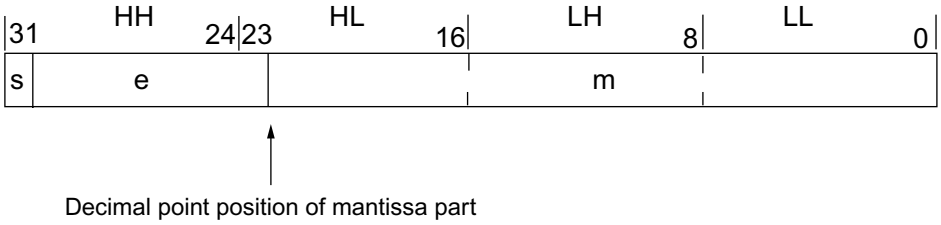
7.1.6 Floating decimal point type

The mathematical calculation constant uses the floating decimal point type at communication.

Type name	Sign	Bits
Floating decimal point type	Yes	32 (2 words)

(1) Floating decimal point type data format

Floating decimal point (float) data of a binary number is expressed by the data format shown in [Fig. 7-1].



s : Sign of mantissa part (1 bit)
e : Exponent part (8 bits)
m : Mantissa part (23 bits)

Fig. 7-1 Floating decimal point type data format

7.1.7 Setting parameter numbers

Use the following method to change the settings for the parameter number with communication.

CH – No.

↓ ↓

(Base-32 x 10) + Decimal

[Ex.] To set 2 – 13 with communication, the value becomes:

733 = 36 x 2 x 10 + 13

7.2 Communication Address Map

Caution: Never write data into addresses which are not disclosed to users.
Otherwise a failure may be caused.

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

Word data [read-out/write-in] : Function code [03_H, 06_H, 10_H]

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0000H	40001	REM1	Remote mode	0: Auto 1: Remote			
0010H	40017	STBY	Standby command	0: OFF 1: ON			
0014H	40021	AT	Auto tuning command	0: AT Not activated 1: AT Activated	0: AT Stop 1: AT Execute		
0020H	40033	LACH	Alarm unlatch command	0: Latched 1: Unlatched	0: No effect 1: Unlatch		
0030H	40049	PLTN	Palette signal selection	0 to 7			
0040H	40065	LOC	Key lock	0 to 5			
0060H	40097	RES	Reset command	0: Operating normally 1: Being reset	0: No effect 1: Execute resetting		
0100H	40257	AL1	Alarm 1 setting	▪ Engineering unit setting		*	
0100H	40257	A1-L	Alarm 1 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0102H	40259	A1-H	Alarm 1 high limit setting	Deviation alarm: –100 to 100%FS		*	
0104H	40261	1 TP	Alarm 1 type	0 to 11, 16 to 32, 35 to 38			
0106H	40263	1 OP	Alarm 1 option	0 to 15 (0000B to 1111B)			
0108H	40265	1HYS	Alarm 1 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
010AH	40267	1DLY	Alarm 1 delay time	0 to 9999 (sec or min)			
0110H	40273	AL2	Alarm 2 setting	▪ Engineering unit setting		*	
0110H	40273	A2-L	Alarm 2 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0112H	40275	A2-H	Alarm 2 high limit setting	Deviation alarm: –100 to 100%FS		*	
0114H	40277	2 TP	Alarm 2 type	0 to 11, 16 to 32, 35 to 38			
0116H	40279	2 OP	Alarm 2 option	0 to 15 (0000B to 1111B)			
0118H	40281	2HYS	Alarm 2 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
011AH	40283	2DLY	Alarm 2 delay time	0 to 9999 (sec or min)			
0120H	40289	AL3	Alarm 3 setting	▪ Engineering unit setting		*	
0120H	40289	A3-L	Alarm 3 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0122H	40291	A3-H	Alarm 3 high limit setting	Deviation alarm: –100 to 100%FS		*	
0124H	40293	3 TP	Alarm 3 type	0 to 11, 16 to 32, 35 to 38			
0126H	40295	3 OP	Alarm 3 option	0 to 15 (0000B to 1111B)			
0128H	40297	3HYS	Alarm 3 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
012AH	40299	3DLY	Alarm 3 delay time	0 to 9999 (sec or min)			
0130H	40305	AL4	Alarm 4 setting	▪ Engineering unit setting		*	
0130H	40305	A4-L	Alarm 4 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0132H	40307	A4-H	Alarm 4 high limit setting	Deviation alarm: –100 to 100%FS		*	
0134H	40309	4 TP	Alarm 4 type	0 to 11, 16 to 32, 35 to 38			
0136H	40311	4 OP	Alarm 4 option	0 to 15 (0000B to 1111B)			
0138H	40313	4HYS	Alarm 4 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
013AH	40315	4DLY	Alarm 4 delay time	0 to 9999 (sec or min)			
0140H	40321	AL5	Alarm 5 setting	▪ Engineering unit setting		*	
0140H	40321	A5-L	Alarm 5 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0142H	40323	A5-H	Alarm 5 high limit setting	Deviation alarm: –100 to 100%FS		*	
0144H	40325	5 TP	Alarm 5 type	0 to 11, 16 to 32, 35 to 38			
0146H	40327	5 OP	Alarm 5 option	0 to 15 (0000B to 1111B)			
0148H	40329	5HYS	Alarm 5 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
014AH	40331	5DLY	Alarm 5 delay time	0 to 9999 (sec or min)			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0150H	40337	AL6	Alarm 6 setting	▪ Engineering unit setting		*	
0150H	40337	A6-L	Alarm 6 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0152H	40339	A6-H	Alarm 6 high limit setting	Deviation alarm: –100 to 100%FS		*	
0154H	40341	6 TP	Alarm 6 type	0 to 11, 16 to 32, 35 to 38			
0156H	40343	6 OP	Alarm 6 option	0 to 15 (0000B to 1111B)			
0158H	40345	6HYS	Alarm 6 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
015AH	40347	6DLY	Alarm 6 delay time	0 to 9999 (sec or min)			
0160H	40353	AL7	Alarm 7 setting	▪ Engineering unit setting		*	
0160H	40353	A7-L	Alarm 7 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0162H	40355	A7-H	Alarm 7 high limit setting	Deviation alarm: –100 to 100%FS		*	
0164H	40357	7 TP	Alarm 7 type	0 to 11, 16 to 32, 35 to 38			
0166H	40359	7 OP	Alarm 7 option	0 to 15 (0000B to 1111B)			
0168H	40361	7HYS	Alarm 7 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
016AH	40363	7DLY	Alarm 7 delay time	0 to 9999 (sec or min)			
0170H	40369	AL8	Alarm 8 setting	▪ Engineering unit setting		*	
0170H	40369	A8-L	Alarm 8 low limit setting	Absolute value alarm: 0 to 100%FS		*	
0172H	40371	A8-H	Alarm 8 high limit setting	Deviation alarm: –100 to 100%FS		*	
0174H	40373	8 TP	Alarm 8 type	0 to 11, 16 to 32, 35 to 38			
0176H	40375	8 OP	Alarm 8 option	0 to 15 (0000B to 1111B)			
0178H	40377	8HYS	Alarm 8 hysteresis	▪ Engineering unit setting (0 to 50%FS)		*	
017AH	40379	8DLY	Alarm 8 delay time	0 to 9999 (sec or min)			
0210H	40529	EXM1	External manipulation variable setting	–250 to 1250 (–25.0 to 125.0%)			
0250H	40593	COM-RSV	Communication via remote setting	▪ Engineering unit setting (0 to 100%FS)			
0280H	40641	SV_L1	Local SV	▪ Engineering unit setting (–25 to 125%FS)		*	
0282H	40643	P1	Proportional band	0 to 9999 (0.0 to 999.9%)			
0284H	40645	I1	Integral time	0 to 32000 (0.0 to 3200.0sec)			
0286H	40647	D1	Derivative time	0 to 9999 (0.0 to 999.9sec)			
028AH	40651	ARH1	Anti-reset windup high limit setting	▪ Engineering unit setting (0 to 100%FS)		*	
028CH	40653	ARL1	Anti-reset windup low limit setting			*	
028EH	40655	SH1	SV high limit	▪ Engineering unit setting (–25 to 125%FS)		*	
0290H	40657	SL1	SV low limit			*	
0292H	40659	MVH1	MV high limit setting	–250 to 1250 (–25.0 to 125.0%)			
0294H	40661	MVL1	MV low limit setting				
0296H	40663	hC1	MV high limit setting (cool)	–25.0 to 125.0%			
0298H	40665	LC1	MV low limit setting (cool)				
029AH	40667	DMV1	MV change ratio limit setting	0 to 1500 (0.0 to 150.0%)			
029CH	40669	DT1	Sampling rate	5 to 1000 (50 to 10000msec)			
029EH	40671	HS1	Hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
02A4H	40677	BAL1	Manipulating output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
02A6H	40679	TC1	Control output (MV1) proportional period	1 to 150sec			
02A8H	40681	REV1	Control action setting	0: NRML 1: REV			Turn off and on power
02ACH	40685	PMV1	Manipulating output preset value	–250 to 1250 (–25.0 to 125.0%)			
02C6H	40711	hC2	MV high limit setting (cool)	–25.0 to 125.0%			
02C8H	40713	LC2	MV low limit setting (cool)				
0340H	40833	ALP1	2 degrees of freedom coefficient α	–3000 to 3000 (–300.0 to 300.0%)			
0348H	40841	BET1	2 degrees of freedom coefficient β	0 to 9999 (0.0 to 999.9%)			
0350H	40849	KF1	Sets Feed Forward Gain and bias 1, bias 2. [FF=KF1 × (Input – B1F) + B2F]	–10000 to 10000			
0352H	40851	B1F1					
0354H	40853	B2F1					
0368H	40873	Manual MV1		0.0 to 100.0%			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0400H	41025	SV1	Set value 1	▪ Engineering unit setting (–25 to 125%FS)		*	
0402H	41027	P-1	Pallet 1 proportional band	0 to 9999 (0.0 to 999.9%)			
0404H	41029	I-1	Pallet 1 integral time	0 to 32000 (0.0 to 3200.0sec)			
0406H	41031	D-1	Pallet 1 derivative time	0 to 9999 (0.0 to 999.9sec)			
040AH	41035	ARH1	Pallet 1 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
040CH	41037	ARL1	Pallet 1 anti-reset windup low limit			*	
040EH	41039	HYS1	Pallet 1 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
0414H	41045	BL-1	Pallet 1 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
0416H	41047	REF1	Pallet 1 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
0418H	41049	PC-1	Cooling proportional band	0.0 to 999.9%			
041AH	41051	iC-1	Cooling integral time	0.0 to 3200.0 sec			
041CH	41053	dC-1	Cooling derivative time	0.0 to 999.9 sec			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0420H	41057	SV2	Set value 2	▪ Engineering unit setting (–25 to 125%FS)		*	
0422H	41059	P-2	Pallet 2 proportional band	0 to 9999 (0.0 to 999.9%)			
0424H	41061	I-2	Pallet 2 integral time	0 to 32000 (0.0 to 3200.0sec)			
0426H	41063	D-2	Pallet 2 derivative time	0 to 9999 (0.0 to 999.9sec)			
042AH	41067	ARH2	Pallet 2 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
042CH	41069	ARL2	Pallet 2 anti-reset windup low limit			*	
042EH	41071	HYS2	Pallet 2 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
0434H	41077	BL-2	Pallet 2 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
0436H	41079	REF2	Pallet 2 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
0438H	41081	PC-2	Cooling proportional band	0.0 to 999.9%			
043AH	41083	iC-2	Cooling integral time	0.0 to 3200.0 sec			
043CH	41085	dC-2	Cooling derivative time	0.0 to 999.9 sec			
0440H	41089	SV3	Set value 3	▪ Engineering unit setting (–25 to 125%FS)		*	
0442H	41091	P-3	Pallet 3 proportional band	0 to 9999 (0.0 to 999.9%)			
0444H	41093	I-3	Pallet 3 integral time	0 to 32000 (0.0 to 3200.0sec)			
0446H	41095	D-3	Pallet 3 derivative time	0 to 9999 (0.0 to 999.9sec)			
044AH	41099	ARH3	Pallet 3 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
044CH	41101	ARL3	Pallet 3 anti-reset windup low limit			*	
044EH	41103	HYS3	Pallet 3 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
0454H	41109	BL-3	Pallet 3 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
0456H	41111	REF3	Pallet 3 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
0458H	41113	PC-3	Cooling proportional band	0.0 to 999.9%			
045AH	41115	iC-3	Cooling integral time	0.0 to 3200.0 sec			
045CH	41117	dC-3	Cooling derivative time	0.0 to 999.9 sec			
0460H	41121	SV4	Set value 4	▪ Engineering unit setting (–25 to 125%FS)		*	
0462H	41123	P-4	Pallet 4 proportional band	0 to 9999 (0.0 to 999.9%)			
0464H	41125	I-4	Pallet 4 integral time	0 to 32000 (0.0 to 3200.0sec)			
0466H	41127	D-4	Pallet 4 derivative time	0 to 9999 (0.0 to 999.9sec)			
046AH	41131	ARH4	Pallet 4 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
046CH	41133	ARL4	Pallet 4 anti-reset windup low limit			*	
046EH	41135	HYS4	Pallet 4 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
0474H	41141	BL-4	Pallet 4 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
0476H	41143	REF4	Pallet 4 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
0478H	41145	PC-4	Cooling proportional band	0.0 to 999.9%			
047AH	41147	iC-4	Cooling integral time	0.0 to 3200.0 sec			
047CH	41149	dC-4	Cooling derivative time	0.0 to 999.9 sec			
0480H	41153	SV5	Set value 5	▪ Engineering unit setting (–25 to 125%FS)		*	
0482H	41155	P-5	Pallet 5 proportional band	0 to 9999 (0.0 to 999.9%)			
0484H	41157	I-5	Pallet 5 integral time	0 to 32000 (0.0 to 3200.0sec)			
0486H	41159	D-5	Pallet 5 derivative time	0 to 9999 (0.0 to 999.9sec)			
048AH	41163	ARH5	Pallet 5 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
048CH	41165	ARL5	Pallet 5 anti-reset windup low limit			*	
048EH	41167	HYS5	Pallet 5 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
0494H	41173	BL-5	Pallet 5 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
0496H	41175	REF5	Pallet 5 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
0498H	41177	PC-5	Cooling proportional band	0.0 to 999.9%			
049AH	41179	iC-5	Cooling integral time	0.0 to 3200.0 sec			
049CH	41181	dC-5	Cooling derivative time	0.0 to 999.9 sec			
04A0H	41185	SV6	Set value 6	▪ Engineering unit setting (–25 to 125%FS)		*	
04A2H	41187	P-6	Pallet 6 proportional band	0 to 9999 (0.0 to 999.9%)			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
04A4H	41189	I-6	Pallet 6 integral time	0 to 32000 (0.0 to 3200.0sec)			
04A6H	41191	D-6	Pallet 6 derivative time	0 to 9999 (0.0 to 999.9sec)			
04AAH	41195	ARH6	Pallet 6 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
04ACH	41197	ARL6	Pallet 6 anti-reset windup low limit			*	
04AEH	41199	HYS6	Pallet 6 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
04B4H	41205	BL-6	Pallet 6 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
04B6H	41207	REF6	Pallet 6 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
04B8H	41209	PC-6	Cooling proportional band	0.0 to 999.9%			
04BAH	41211	iC-6	Cooling integral time	0.0 to 3200.0 sec			
04BCH	41213	dC-6	Cooling derivative time	0.0 to 999.9 sec			
04C0H	41217	SV7	Set value 7	▪ Engineering unit setting (–25 to 125%FS)		*	
04C2H	41219	P-7	Pallet 7 proportional band	0 to 9999 (0.0 to 999.9%)			
04C4H	41221	I-7	Pallet 7 integral time	0 to 32000 (0.0 to 3200.0sec)			
04C6H	41223	D-7	Pallet 7 derivative time	0 to 9999 (0.0 to 999.9sec)			
04CAH	41227	ARH7	Pallet 7 anti-reset windup high limit	▪ Engineering unit setting (0 to 100%FS)		*	
04CCH	41229	ARL7	Pallet 7 anti-reset windup low limit			*	
04CEH	41231	HYS7	Pallet 7 hysteresis setting	▪ Engineering unit setting (0 to 50%FS)		*	
04D4H	41237	BL-7	Pallet 7 output convergence value	–1000 to 1000 (–100.0 to 100.0%)			
04D6H	41239	REF7	Pallet 7 PID change point	▪ Engineering unit setting (–25 to 125%FS)		*	
04D8H	41241	PC-7	Cooling proportional band	0.0 to 999.9%			
04DAH	41243	iC-7	Cooling integral time	0.0 to 3200.0 sec			
04DCH	41245	dC-7	Cooling derivative time	0.0 to 999.9 sec			
04E0H	41249	Mh-1	MV high limit setting	-25.0 to 125.0%			
04E2H	41251	ML-1	MV low limit setting				
04E4H	41253	hC-1	MV high limit setting (cool)				
04E6H	41255	LC-1	MV low limit setting (cool)				
04E8H	41257	Mh-2	MV high limit setting				
04EAH	41259	ML-2	MV low limit setting				
04ECH	41261	hC-2	MV high limit setting (cool)				
04EEH	41263	LC-2	MV low limit setting (cool)				
04F0H	41265	Mh-3	MV high limit setting				
04F2H	41267	ML-3	MV low limit setting				
04F4H	41269	hC-3	MV high limit setting (cool)				
04F6H	41271	LC-3	MV low limit setting (cool)				
04F8H	41273	Mh-4	MV high limit setting				
04FAH	41275	ML-4	MV low limit setting				
04FCH	41277	hC-4	MV high limit setting (cool)				
04FEH	41279	LC-4	MV low limit setting (cool)				
0500H	41281	Mh-5	MV high limit setting				
0502H	41283	ML-5	MV low limit setting				
0504H	41285	hC-5	MV high limit setting (cool)				
0506H	41287	LC-5	MV low limit setting (cool)				
0508H	41289	Mh-6	MV high limit setting				
050AH	41291	ML-6	MV low limit setting				
050CH	41293	hC-6	MV high limit setting (cool)				
050EH	41295	LC-6	MV low limit setting (cool)				
0510H	41297	Mh-7	MV high limit setting				
0512H	41299	ML-7	MV low limit setting				
0514H	41301	hC-7	MV high limit setting (cool)				
0516H	41303	LC-7	MV low limit setting (cool)				
0518H	41305	hh-1	MV high limit setting (heat)				
051AH	41307	Lh-1	MV low limit setting (heat)				
051CH	41309	hh-2	MV high limit setting (heat)				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
051EH	41311	Lh-2	MV low limit setting (heat)	-25.0 to 125.0%			
0520H	41313	hh-3	MV high limit setting (heat)				
0522H	41315	Lh-3	MV low limit setting (heat)				
0524H	41317	hh-4	MV high limit setting (heat)				
0526H	41319	Lh-4	MV low limit setting (heat)				
0528H	41321	hh-5	MV high limit setting (heat)				
052AH	41323	Lh-5	MV low limit setting (heat)				
052CH	41325	hh-6	MV high limit setting (heat)				
052EH	41327	Lh-6	MV low limit setting (heat)				
0530H	41329	hh-7	MV high limit setting (heat)				
0532H	41331	Lh-7	MV low limit setting (heat)				
0700H	41793	PC1	Cooling proportional band	0.0 to 999.9%			
0702H	41795	iC1	Cooling integral time	0.0 to 3200.0 sec			
0704H	41797	dC1	Cooling derivative time	0.0 to 999.9 sec			
0706H	41799	TCC1	Control output (cool) proportional period	1 to 150 sec			
0708H	41801	rVC1	Control operation method (cool)	NRML: Normal operation REV: Reverse operation			
070AH	41803	MKC1	MV output method (cool)	LNR SSR-d			
070CH	41805	PMC1	Manipulating output value (cool)	-25.0 to 125.0%			
070EH	41807	hh1	MV high limit setting (heat)				
0710H	41809	Lh1	MV low limit setting (heat)				
0712H	41811	Ld1	Output limiter type setting	0 to 3			
0714H	41813	LdC1	Cooling output limiter type setting				
0720H	41825	PC2	Cooling proportional band	0.0 to 999.9%			
0722H	41827	iC2	Cooling integral time	0.0 to 3200.0 sec			
0724H	41829	dC2	Cooling derivative time	0.0 to 999.9 sec			
0726H	41831	TCC2	Control output (cool) proportional period	1 to 150 sec			
0728H	41833	rVC2	Control operation method (cool)	NRML: Normal operation REV: Reverse operation			
072AH	41835	MKC2	MV output method (cool)	LNR SSR-d			
072CH	41837	PMC2	Manipulating output value (cool)	-25.0 to 125.0%			
072EH	41839	hh2	MV high limit setting (heat)				
0730H	41841	Lh2	MV low limit setting (heat)				
0732H	41843	Ld2	Output limiter type setting	0 to 3			
0734H	41845	LdC2	Cooling output limiter type setting				
0820H	42081	UCF1	Mathematical calculation full scale	–19999 to 99999			Turn off and on power
0822H	42083	UCB1	Mathematical calculation base scale				
0824H	42085	UCD1	Mathematical calculation decimal point position	0 to 3			
0830H	42097	PV1F	PV1 full scale	–19999 to 99999			Turn off and on power
0832H	42099	PV1B	PV1 base scale				
0834H	42101	PV1D	PV1 decimal point position	0 to 3			
0836H	42103	PV1T	PV1 input type	0 to 9, 12 to 14, 16 to 20, 26, 27			
0838H	42105	PV1U	PV1 input unit	0: °C 1: °F 2: non			
083AH	42107	PV1Z	PV1 zero adjustment	▪ Engineering unit setting (–50 to 50%FS)		*	
083CH	42109	PV1S	PV1 span adjustment			*	
0844H	42117	P1CU	PV1 input router cut point	–1 to 1250 (–0.1 to 125.0%) (–1: OFF)			
0846H	42119	P1TF	PV1 input filter time constant	0 to 9000 (0.0 to 900.0sec)			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0848H	42121	P1Ln	PV1 linearize setting	(0) OFF (1) nrML (2) hi-C (3) Lo-C			
0850H	42129	PV2F	PV2 full scale	–19999 to 99999			Turn off and on power
0852H	42131	PV2B	PV2 base scale				
0854H	42133	PV2D	PV2 decimal point position	0 to 3			
0856H	42135	PV2T	PV2 input type	0 to 9, 12 to 14, 16 to 20, 26, 27			
0858H	42137	PV2U	PV2 input unit	0: °C 1: °F 2: non			
085AH	42139	PV2Z	PV2 zero adjustment	▪ Engineering unit setting (–50 to 50%FS)		*	
085CH	42141	PV2S	PV2 span adjustment			*	
0864H	42149	P2CU	PV2 input router cut point	–1 to 1250 (–0.1 to 125.0%) (–1: OFF)			
0866H	42151	P2TF	PV2 input filter time constant	0 to 9000 (0.0 to 900.0sec)			
0868H	42153	P2Ln	PV2 linearize setting	(0) OFF (1) nrML (2) hi-C (3) Lo-C			
0890H	42193	AI1F	AI1 full scale	–19999 to 99999			Turn off and on power
0892H	42195	AI1B	AI1 base scale				
0894H	42197	AI1D	AI1 decimal point position	0 to 3			
0896H	42199	AI1T	AI1 input unit	16 to 18			
089AH	42203	AI1Z	AI1 zero adjustment	▪ Engineering unit setting (–50 to 50%FS)		*	
089CH	42205	AI1S	AI1 span adjustment			*	
08A2H	42211	A1CU	AI1 input router cut point	–1 to 1250 (–0.1 to 125.0%) (–1: OFF)			
08A4H	42213	A1TF	AI1 input filter time constant	0 to 9000 (0.0 to 900.0sec)			
08A6H	42215	A1Ln	Ai1 linearize setting	(0) OFF (1) nrML (2) hi-C (3) Lo-C			
0970H	42417	AO1T	AO1 output type	1: PV 5: AiM 2: SV 6: S1 3: MV 7: S2 4: DV 8: S3			
0972H	42419	AO2T	AO2 output type				
0982H	42435	AO1L	AO1 output base scale	–1300 to 1300 (–130.0 to 130.0%)			
0984H	42437	AO1H	AO1 output full scale	–1300 to 1300 (–130.0 to 130.0%)			
0986H	42439	A1LL	AO1 output low limit	–250 to 1050 (–25.0 to 105.0%)			
0988H	42441	A1LH	AO1 output high limit				
0992H	42451	AO2L	AO2 output base scale	–1300 to 1300 (–130.0 to 130.0%)			
0994H	42453	AO2H	AO2 output full scale				
0996H	42455	A2LL	AO2 output low limit	–250 to 1050 (–25.0 to 105.0%)			
0998H	42457	A2LH	AO2 output high limit				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0A00H	42561	CALC	Calculation	0 to 40			
0A02H	42563	TPLT	Template number	10, 11, 13, 14, 16, 30, 31, 33, 34, 50, 51, 53, 54			Turn off and on power
0A04H	42565	OTYP	Output type number	10 to 13, 30, 31, 50 to 55			
0A22H	42595	VTYP	Valve type	FB (0): PFB control FB-Sr (1): PFB + estimated control Sr1 (2): Estimated control 1 Sr2 (3): Estimated control 2 (Valve fully open when power is turned on)			
0A24H	42597	TrVL	Travel time	50 to 3000 (5.0 to 300.0 sec)			
0A26H	42599	PGP	Valve dead zone	50 to 1000 (0.5 to 100.0%)			
0A2CH	42605	AdPC	Valve close adjustment value	0 to 1048575 (00000H to FFFFFH)			
0A2EH	42607	AdPO	Valve open adjustment value	0 to 1048575 (00000H to FFFFFH)			
0A30H	42609	RIH1	Remote setting inhibition	0: OFF 1: ON			
0A40H	42625	RAC1	Whether to use R-ACK or not	0: inhibit 1: enable			
0A50H	42641	A-M1	A/M mode	0: A–M 1: A			
0A60H	42657	CND1	Power-ON starting mode setting	0: Auto 1: Remote 2: Manual			
0A74H	42677	STBO	Standby action setting	0, 1			
0A80H	42689	TRK1	Whether to select tracking or not	0: OFF 1: ON			
0A90H	42705	PLTS	Palette change method selection	0: PLTn 1: SV 2: PV			
0A92H	42707	F1	User assign key 1 (F1)	0 to 27			
0A94H	42709	F2	User assign key 2 (F2)				
0A96H	42711	F3	User assign key 3 (F3)				
0A98H	42713	JP1	Parameter jump setting 1	1-01 to Z-Z9			Refer to parameter no. setting
0A9AH	42715	JP2	Parameter jump setting 2				
0A9CH	42717	JP3	Parameter jump setting 3				
0AA0H	42721	BRD1	Burnout direction designation (MV1)	0: HOLD 1: LO 2: UP 3: EXMV			
0AE0H	42785	DI01	DI1 function selection	0 to 255			
0AE2H	42787	DI02	DI2 function selection				
0AE4H	42789	DI03	DI3 function selection				
0AE6H	42791	DI04	DI4 function selection				
0AE8H	42793	DI11	DI11 function selection				
0AEAH	42795	DI12	DI12 function selection				
0AECH	42797	DI13	DI13 function selection				
0AEEH	42799	DI14	DI14 function selection				
0AF0H	42801	DI15	DI15 function selection				
0B00H	42817	Ci01	Communication Di1 function setting	0 to 255			
0B02H	42819	Ci02	Communication Di2 function setting				
0B04H	42821	Ci03	Communication Di3 function setting				
0B06H	42823	Ci04	Communication Di4 function setting				
0B08H	42825	Ci05	Communication Di5 function setting				
0B0AH	42827	Ci06	Communication Di6 function setting				
0B0CH	42829	Ci07	Communication Di7 function setting				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0B0EH	42831	Ci08	Communication Di8 function setting				
0B24H	42853	dSPT	Operation display type	0: Control output (MV) 1: Valve aperture feedback value (MVRB)			
0B26H	42855	odSP	Operation display setting	000 to 111 1: Show, 0: Hide 0-bit: PV/totalized value 1-bit: Value during totalizer/totalized value 2-bit: PV/AiM			
0B30H	42865	brG1	Bar graph display type	NON (0): No display MV (1): Control output MVRB (2): Valve aperture feedback value			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0B50H	42897	DS00	Parameter mask 00	0 to 65535 (0000H to FFFFH)			
0B52H	42899	DS01	Parameter mask 01				
0B54H	42901	DS02	Parameter mask 02				
0B56H	42903	DS03	Parameter mask 03				
0B58H	42905	DS04	Parameter mask 04				
0B5AH	42907	DS05	Parameter mask 05				
0B5CH	42909	DS06	Parameter mask 06				
0B5EH	42911	DS07	Parameter mask 07				
0B60H	42913	DS08	Parameter mask 08				
0B62H	42915	DS09	Parameter mask 09				
0B64H	42917	DS10	Parameter mask 10				
0B66H	42919	DS11	Parameter mask 11				
0B68H	42921	DS12	Parameter mask 12				
0B6AH	42923	DS13	Parameter mask 13				
0B6CH	42925	DS14	Parameter mask 14				
0B6EH	42927	DS15	Parameter mask 15				
0B70H	42929	DS16	Parameter mask 16				
0B72H	42931	DS17	Parameter mask 17				
0B74H	42933	DS18	Parameter mask 18				
0B76H	42935	DS19	Parameter mask 19				
0B78H	42937	DS20	Parameter mask 20				
0B7AH	42939	DS21	Parameter mask 21				
0B7CH	42941	DS22	Parameter mask 22				
0B7EH	42943	DS23	Parameter mask 23				
0B80H	42945	DS24	Parameter mask 24				
0B82H	42947	DS25	Parameter mask 25				
0B84H	42949	DS26	Parameter mask 26				
0B86H	42951	DS27	Parameter mask 27				
0B88H	42953	DS28	Parameter mask 28				
0B8AH	42955	DS29	Parameter mask 29				
0B8CH	42957	DS30	Parameter mask 30				
0B8EH	42959	DS31	Parameter mask 31				
0B90H	42961	DS32	Parameter mask 32				
0B92H	42963	DS33	Parameter mask 33				
0B94H	42965	DS34	Parameter mask 34				
0B96H	42967	DS35	Parameter mask 35				
0B98H	42969	DS36	Parameter mask 36				
0B9AH	42971	DS37	Parameter mask 37				
0B9CH	42973	DS38	Parameter mask 38				
0B9EH	42975	DS39	Parameter mask 39				
0BA0H	42977	DS40	Parameter mask 40				
0BA2H	42979	DS41	Parameter mask 41				
0BA4H	42981	DS42	Parameter mask 42				
0BA6H	42983	DS43	Parameter mask 43				
0BA8H	42985	DS44	Parameter mask 44				
0C00H	43073	PAS1	Security setting 1				
0C02H	43075	PAS2	Security setting 2				
0C04H	43077	PAS3	Security setting 3				
0C22H	43107	STN4	RS-485 station No.	0 to 255			Turn off and on power
0C24H	43109	SPD4	RS-485 communication speed	0: 9.6k 1: 19.2k 2: 38.4k			
0C26H	43111	BIT4	RS-485 bit format	0: 8N 1: 8O 2: 8E			
0C30H	43121	SPD2	RS-232C communication speed	0: 9.6k 1: 19.2k 2: 38.4k			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0C32H	43123	BIT2	RS-232C bit format	0: 8N 1: 8O 2: 8E			
0C50H	43153	-	FIX command	0: Not writing in 1: Now writing in memory	0: No effect 1: Write-in request		
0C80H	43201	P1X0	Linearize table P1X0	-25% to 125% FS (Engineering value of PV1 scale)			
0C82H	43203	P1X1	Linearize table P1X1				
0C84H	43205	P1X2	Linearize table P1X2				
0C86H	43207	P1X3	Linearize table P1X3				
0C88H	43209	P1X4	Linearize table P1X4				
0C8AH	43211	P1X5	Linearize table P1X5				
0C8CH	43213	P1X6	Linearize table P1X6				
0C8EH	43215	P1X7	Linearize table P1X7				
0C90H	43217	P1X8	Linearize table P1X8				
0C92H	43219	P1X9	Linearize table P1X9				
0C94H	43221	P1XA	Linearize table P1XA				
0C96H	43223	P1XB	Linearize table P1XB				
0C98H	43225	P1XC	Linearize table P1XC				
0C9AH	43227	P1XD	Linearize table P1XD				
0C9CH	43229	P1XE	Linearize table P1XE				
0C9EH	43231	P1XF	Linearize table P1XF				
0CA0H	43233	P1Y0	Linearize table P1Y0				
0CA2H	43235	P1Y1	Linearize table P1Y1				
0CA4H	43237	P1Y2	Linearize table P1Y2				
0CA6H	43239	P1Y3	Linearize table P1Y3				
0CA8H	43241	P1Y4	Linearize table P1Y4				
0CAAH	43243	P1Y5	Linearize table P1Y5				
0CACH	43245	P1Y6	Linearize table P1Y6				
0CAEH	43247	P1Y7	Linearize table P1Y7				
0CB0H	43249	P1Y8	Linearize table P1Y8				
0CB2H	43251	P1Y9	Linearize table P1Y9				
0CB4H	43253	P1YA	Linearize table P1YA				
0CB6H	43255	P1YB	Linearize table P1YB				
0CB8H	43257	P1YC	Linearize table P1YC				
0CBAH	43259	P1YD	Linearize table P1YD				
0CBCH	43261	P1YE	Linearize table P1YE				
0CBEH	43263	P1YF	Linearize table P1YF				
0CC0H	43265	P2X0	Linearize table P2X0	-25% to 125% FS (Engineering value of PV2 scale)			
0CC2H	43267	P2X1	Linearize table P2X1				
0CC4H	43269	P2X2	Linearize table P2X2				
0CC6H	43271	P2X3	Linearize table P2X3				
0CC8H	43273	P2X4	Linearize table P2X4				
0CCAH	43275	P2X5	Linearize table P2X5				
0CCCH	43277	P2X6	Linearize table P2X6				
0CCEH	43279	P2X7	Linearize table P2X7				
0CD0H	43281	P2X8	Linearize table P2X8				
0CD2H	43283	P2X9	Linearize table P2X9				
0CD4H	43285	P2XA	Linearize table P2XA				
0CD6H	43287	P2XB	Linearize table P2XB				
0CD8H	43289	P2XC	Linearize table P2XC				
0CDAH	43291	P2XD	Linearize table P2XD				
0CDCH	43293	P2XE	Linearize table P2XE				
0CDEH	43295	P2XF	Linearize table P2XF				
0CE0H	43297	P2Y0	Linearize table P2Y0				
0CE2H	43299	P2Y1	Linearize table P2Y1				
0CE4H	43301	P2Y2	Linearize table P2Y2				
0CE6H	43303	P2Y3	Linearize table P2Y3				
0CE8H	43305	P2Y4	Linearize table P2Y4				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0CEAH	43307	P2Y5	Linearize table P2Y5	-25% to 125% FS (Engineering value of PV2 scale)			
0CECH	43309	P2Y6	Linearize table P2Y6				
0CEEH	43311	P2Y7	Linearize table P2Y7				
0CF0H	43313	P2Y8	Linearize table P2Y8				
0CF2H	43315	P2Y9	Linearize table P2Y9				
0CF4H	43317	P2YA	Linearize table P2YA				
0CF6H	43319	P2YB	Linearize table P2YB				
0CF8H	43321	P2YC	Linearize table P2YC				
0CFAH	43323	P2YD	Linearize table P2YD				
0CFCH	43325	P2YE	Linearize table P2YE				
0CFEH	43327	P2YF	Linearize table P2YF				
0D40H	43393	A1X0	Linearize table A1X0	-25% to 125% FS (Engineering value of Ai1 scale)			
0D42H	43395	A1X1	Linearize table A1X1				
0D44H	43397	A1X2	Linearize table A1X2				
0D46H	43399	A1X3	Linearize table A1X3				
0D48H	43401	A1X4	Linearize table A1X4				
0D4AH	43403	A1X5	Linearize table A1X5				
0D4CH	43405	A1X6	Linearize table A1X6				
0D4EH	43407	A1X7	Linearize table A1X7				
0D50H	43409	A1X8	Linearize table A1X8				
0D52H	43411	A1X9	Linearize table A1X9				
0D54H	43413	A1XA	Linearize table A1XA				
0D56H	43415	A1XB	Linearize table A1XB				
0D58H	43417	A1XC	Linearize table A1XC				
0D5AH	43419	A1XD	Linearize table A1XD				
0D5CH	43421	A1XE	Linearize table A1XE				
0D5EH	43423	A1XF	Linearize table A1XF				
0D60H	43425	A1Y0	Linearize table A1Y0				
0D62H	43427	A1Y1	Linearize table A1Y1				
0D64H	43429	A1Y2	Linearize table A1Y2				
0D66H	43431	A1Y3	Linearize table A1Y3				
0D68H	43433	A1Y4	Linearize table A1Y4				
0D6AH	43435	A1Y5	Linearize table A1Y5				
0D6CH	43437	A1Y6	Linearize table A1Y6				
0D6EH	43439	A1Y7	Linearize table A1Y7				
0D70H	43441	A1Y8	Linearize table A1Y8				
0D72H	43443	A1Y9	Linearize table A1Y9				
0D74H	43445	A1YA	Linearize table A1YA				
0D76H	43447	A1YB	Linearize table A1YB				
0D78H	43449	A1YC	Linearize table A1YC				
0D7AH	43451	A1YD	Linearize table A1YD				
0D7CH	43453	A1YE	Linearize table A1YE				
0D7EH	43455	A1YF	Linearize table A1YF				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0DC0H	43521	K01	Mathematical calculation constant 1	▪ Floating decimal point type 99999 to 0.0000 –0.001 to –9999			
0DC2H	43523	K02	Mathematical calculation constant 2				
0DC4H	43525	K03	Mathematical calculation constant 3				
0DC6H	43527	K04	Mathematical calculation constant 4				
0DC8H	43529	K05	Mathematical calculation constant 5				
0DCAH	43531	K06	Mathematical calculation constant 6				
0DCCH	43533	K07	Mathematical calculation constant 7				
0DCEH	43535	K08	Mathematical calculation constant 8				
0DD0H	43537	K09	Mathematical calculation constant 9				
0DD2H	43539	K10	Mathematical calculation constant 10				
0DD4H	43541	K11	Mathematical calculation constant 11				
0DD6H	43543	K12	Mathematical calculation constant 12				
0DD8H	43545	K13	Mathematical calculation constant 13				
0DDAH	43547	K14	Mathematical calculation constant 14				
0DDCH	43549	K15	Mathematical calculation constant 15				
0DDEH	43551	K16	Mathematical calculation constant 16				
0E00H	43585	ATP1	Auto tuning type	0: NRML 1: LPV			
0E20H	43617	DO1	DO1 output designation	0 to 255			Turn off and on power
0E22H	43619	DO2	DO2 output designation				
0E24H	43621	DO3	DO3 output designation				
0E26H	43623	DO4	DO4 output designation				
0E30H	43633	DO11	DO11 output designation				
0E32H	43635	DO12	DO12 output designation				
0E34H	43637	DO13	DO13 output designation				
0E36H	43639	DO14	DO14 output designation				
0E38H	43641	DO15	DO15 output designation				
0E70H	43697	C1	LED C1 assign	0 to 255			Turn off and on power
0E72H	43699	C2	LED C2 assign				
0E74H	43701	LDO1	LED DO1 assign				
0E76H	43703	LDO2	LED DO2 assign				
0E78H	43705	LDO3	LED DO3 assign				
0E7AH	43707	LDO4	LED DO4 assign				
0E7CH	43709	LDO5	LED DO5 assign				
0E7EH	43711	LALM	LED ALM assign				
0EA0H	43745	CN01	Constant 1 used for template	–19999 to 99999			
0EA2H	43747	CN02	Constant 2 used for template				
0EA4H	43749	CN03	Constant 3 used for template				
0EA6H	43751	CN04	Constant 4 used for template				
0EA8H	43753	CN05	Constant 5 used for template				
0EAAH	43755	CN06	Constant 6 used for template				
0EACH	43757	CN07	Constant 7 used for template				
0EAEH	43759	CN08	Constant 8 used for template				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0EB0H	43761	CN09	Constant 9 used for template				
0EB2H	43763	CN10	Constant 10 used for template				
0EB4H	43765	CN11	Constant 11 used for template				
0EB6H	43767	CN12	Constant 12 used for template				
0EB8H	43769	CN13	Constant 13 used for template				
0EBAH	43771	CN14	Constant 14 used for template				
0EBCH	43773	CN15	Constant 15 used for template				
0EBEH	43775	CN16	Constant 16 used for template				
0F00H	43841	TrUn	Totalizer command/status	hoLd/rUn/LATCh			
0F02H	43843	TrES	Totalizer reset command	on/oFF			
0F04H	43845	Toin	Totalizer input selection	(0) Pv1 (1) Pv2 (2) Ai1 (3) AiM * When "(3) AiM" is selected, set the mathematical calculation scale to (Ch 8-89, 90, 91).			
0F06H	43847	TdP	Totalizer value display decimal point position	0 to 4			
0F08H	43849	TCUT	Totalizer cut point	0% to 100%FS (Engineering value setting) Decimal point position for the input scale set in Toin depends on decimal point setting for input range.			
0F0AH	43851	A1TP	Totalizer alarm 1 type	0: No alarm 1: Totalizer value alarm 2: Totalizer batch output 3: Totalizer batch output (with auto-reset)			
0F0CH	43853	A1on	Totalizer alarm 1 ON pulse width	0: Continuous 1: 100 ms 2: 200 ms 3: 500 ms 4: 1 sec			
0F0EH	43855	A1oP	Totalizer alarm 1 Excitation/non-excitation setting	0: Excitation 1: Non-excitation			
0F10H	43857	A2TP	Totalizer alarm 2 type	0: No alarm 1: Totalizer value alarm 2: Totalizer batch output 3: Totalizer batch output (with auto-reset)			
0F12H	43859	A2on	Totalizer alarm 2 ON pulse width	0: Continuous 1: 100 ms 2: 200 ms 3: 500 ms 4: 1 sec			
0F14H	43861	A2oP	Totalizer alarm 2 Excitation/non-excitation setting	0: Excitation 1: Non-excitation			
0F16H	43863	TMod	Operation mode	(0) JPn: Japanese mode (1) EnG: English mode			
0F18H	43865	ToPT	Totalizer option setting	0000 to 1111			
0F1AH	43867	Tb	Totalizer standard time	(0) SEC (1) Min (2) hoUr (3) dAY			
0F1CH	43869	SCL	Totalizer divisor	0 to ±1000000			
0F1EH	43871	MUL	Totalizer multiplier				
0F20H	43873	TCF	Totalizer constant	20 to 9999999 Uses decimal point set in TdP			
0F22H	43875	TinT	Totalizer initial value	-1999999 to 9999999 Uses decimal point set in TdP			
0F24H	43877	A1SP	Totalizer alarm 1 setting				

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0F26H	43879	A2SP	Totalizer alarm 2 setting	-1999999 to 9999999 Uses decimal point set in TdP			
0F28H	43881	rTSc	Transfer output source scale	-1999999 to 9999999			
0F30H	43889	rCP0	Recipe assignment 1	0-00 to R-Z9			Refer to parameter no. setting
0F32H	43891	rCP1	Recipe assignment 2				
0F34H	43893	rCP2	Recipe assignment 3				
0F36H	43895	rCP3	Recipe assignment 4				
0F38H	43897	rCP4	Recipe assignment 5				
0F3AH	43899	rCP5	Recipe assignment 6				
0F3CH	43901	rCP6	Recipe assignment 7				
0F3EH	43903	rCP7	Recipe assignment 8				
0F40H	43905	rCP8	Recipe assignment 9				
0F42H	43907	rCP9	Recipe assignment 10				
0F44H	43909	d00	Recipe setting 0	Dependent on rCP0 setting			
0F46H	43911	d01	Recipe setting 1	Dependent on rCP1 setting			
0F48H	43913	d02	Recipe setting 2	Dependent on rCP2 setting			
0F4AH	43915	d03	Recipe setting 3	Dependent on rCP3 setting			
0F4CH	43917	d04	Recipe setting 4	Dependent on rCP4 setting			
0F4EH	43919	d05	Recipe setting 5	Dependent on rCP5 setting			
0F50H	43921	d06	Recipe setting 6	Dependent on rCP6 setting			
0F52H	43923	d07	Recipe setting 7	Dependent on rCP7 setting			
0F54H	43925	d08	Recipe setting 8	Dependent on rCP8 setting			
0F56H	43927	d09	Recipe setting 9	Dependent on rCP9 setting			
0F58H	43929	d10	Recipe setting 10	Dependent on rCP0 setting			
0F5AH	43931	d11	Recipe setting 11	Dependent on rCP1 setting			
0F5CH	43933	d12	Recipe setting 12	Dependent on rCP2 setting			
0F5EH	43935	d13	Recipe setting 13	Dependent on rCP3 setting			
0F60H	43937	d14	Recipe setting 14	Dependent on rCP4 setting			
0F62H	43939	d15	Recipe setting 15	Dependent on rCP5 setting			
0F64H	43941	d16	Recipe setting 16	Dependent on rCP6 setting			
0F66H	43943	d17	Recipe setting 17	Dependent on rCP7 setting			
0F68H	43945	d18	Recipe setting 18	Dependent on rCP8 setting			
0F6AH	43947	d19	Recipe setting 19	Dependent on rCP9 setting			
0F6CH	43949	d20	Recipe setting 20	Dependent on rCP0 setting			
0F6EH	43951	d21	Recipe setting 21	Dependent on rCP1 setting			
0F70H	43953	d22	Recipe setting 22	Dependent on rCP2 setting			
0F72H	43955	d23	Recipe setting 23	Dependent on rCP3 setting			
0F74H	43957	d24	Recipe setting 24	Dependent on rCP4 setting			
0F76H	43959	d25	Recipe setting 25	Dependent on rCP5 setting			
0F78H	43961	d26	Recipe setting 26	Dependent on rCP6 setting			
0F7AH	43963	d27	Recipe setting 27	Dependent on rCP7 setting			
0F7CH	43965	d28	Recipe setting 28	Dependent on rCP8 setting			
0F7EH	43967	d29	Recipe setting 29	Dependent on rCP9 setting			
0F80H	43969	d30	Recipe setting 30	Dependent on rCP0 setting			
0F82H	43971	d31	Recipe setting 31	Dependent on rCP1 setting			
0F84H	43973	d32	Recipe setting 32	Dependent on rCP2 setting			
0F86H	43975	d33	Recipe setting 33	Dependent on rCP3 setting			
0F88H	43977	d34	Recipe setting 34	Dependent on rCP4 setting			
0F8AH	43979	d35	Recipe setting 35	Dependent on rCP5 setting			
0F8CH	43981	d36	Recipe setting 36	Dependent on rCP6 setting			
0F8EH	43983	d37	Recipe setting 37	Dependent on rCP7 setting			
0F90H	43985	d38	Recipe setting 38	Dependent on rCP8 setting			
0F92H	43987	d39	Recipe setting 39	Dependent on rCP9 setting			
0F94H	43989	d40	Recipe setting 40	Dependent on rCP0 setting			
0F96H	43991	d41	Recipe setting 41	Dependent on rCP1 setting			
0F98H	43993	d42	Recipe setting 42	Dependent on rCP2 setting			
0F9AH	43995	d43	Recipe setting 43	Dependent on rCP3 setting			
0F9CH	43997	d44	Recipe setting 44	Dependent on rCP4 setting			
0F9EH	43999	d45	Recipe setting 45	Dependent on rCP5 setting			
0FA0H	44001	d46	Recipe setting 46	Dependent on rCP6 setting			
0FA2H	44003	d47	Recipe setting 47	Dependent on rCP7 setting			
0FA4H	44005	d48	Recipe setting 48	Dependent on rCP8 setting			
0FA6H	44007	d49	Recipe setting 49	Dependent on rCP9 setting			
0FA8H	44009	d50	Recipe setting 50	Dependent on rCP0 setting			
0FAAH	44011	d51	Recipe setting 51	Dependent on rCP1 setting			
0FACH	44013	d52	Recipe setting 52	Dependent on rCP2 setting			
0FAEH	44015	d53	Recipe setting 53	Dependent on rCP3 setting			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Write-in data setting range	Affected by input range	Remarks or corresponding parameter
0FB0H	44017	d54	Recipe setting 54	Dependent on rCP4 setting			
0FB2H	44019	d55	Recipe setting 55	Dependent on rCP5 setting			
0FB4H	44021	d56	Recipe setting 56	Dependent on rCP6 setting			
0FB6H	44023	d57	Recipe setting 57	Dependent on rCP7 setting			
0FB8H	44025	d58	Recipe setting 58	Dependent on rCP8 setting			
0FBAH	44027	d59	Recipe setting 59	Dependent on rCP9 setting			
0FBCH	44029	d60	Recipe setting 60	Dependent on rCP0 setting			
0FBEH	44031	d61	Recipe setting 61	Dependent on rCP1 setting			
0FC0H	44033	d62	Recipe setting 62	Dependent on rCP2 setting			
0FC2H	44035	d63	Recipe setting 63	Dependent on rCP3 setting			
0FC4H	44037	d64	Recipe setting 64	Dependent on rCP4 setting			
0FC6H	44039	d65	Recipe setting 65	Dependent on rCP5 setting			
0FC8H	44041	d66	Recipe setting 66	Dependent on rCP6 setting			
0FCAH	44043	d67	Recipe setting 67	Dependent on rCP7 setting			
0FCCH	44045	d68	Recipe setting 68	Dependent on rCP8 setting			
0FCEH	44047	d69	Recipe setting 69	Dependent on rCP9 setting			
0FD0H	44049	d70	Recipe setting 70	Dependent on rCP0 setting			
0FD2H	44051	d71	Recipe setting 71	Dependent on rCP1 setting			
0FD4H	44053	d72	Recipe setting 72	Dependent on rCP2 setting			
0FD6H	44055	d73	Recipe setting 73	Dependent on rCP3 setting			
0FD8H	44057	d74	Recipe setting 74	Dependent on rCP4 setting			
0FDAH	44059	d75	Recipe setting 75	Dependent on rCP5 setting			
0FDCH	44061	d76	Recipe setting 76	Dependent on rCP6 setting			
0FDEH	44063	d77	Recipe setting 77	Dependent on rCP7 setting			
0FE0H	44065	d78	Recipe setting 78	Dependent on rCP8 setting			
0FE2H	44067	d79	Recipe setting 79	Dependent on rCP9 setting			
01388H	45001		Communication Di terminal	00000000 to 11111111 (8-bit)			

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

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Affected by input range	Remarks or corresponding parameter
0100H	30257	PID MODE1	Current control mode	0001H: Fault status 0002H: Standby status 0004H: Remote Ack 0008H: Other than auto mode 0010H: Auto mode request 0020H: Remote mode request 0040H: Auto tuning status 0080H: Normal operation status 0100H: PV tracking status 0200H: Local SV status 0400H: Remote SV status 0800H: Local + PV tracking status 1000H: Forced manual mode status 2000H: EX-MV mode status 4000H: Manual mode status		Corresponding bit to relevant status is "1".
0102H	30259	PV1	Process variable (PV) used for control currently	–25999 to 105999 (Input scale: –5 to 105% FS)	*	
0104H	30261	SV1	Currently used setpoint (SV)	–19999 to 99999 (within settable range)	*	
0106H	30263	DV1	Currently used deviation (DV)	–125998 to 125998 (Input scale: –105 to 105% FS)	*	
0108H	30265	MV1	Currently used manipulating value (MV)	–250 to 1250 (–25.0 to 125.0%)		
010CH	30269	FAULT1	Currently used input error status information	Normal: 0 Over: 1 Under: 2		
0270H	30625	HMV1	Heating MV	—		
0272H	30627	HMV2		—		
0280H	30641	CMV1	Cooling MV	—		
0282H	30643	CMV2		—		
0310H	30785	ALM1 (RELAY)	Alarm 1 status (relay status)	Excitation: 1, Non-excitation: 0		
0312H	30787	ALM2 (RELAY)	Alarm 2 status (relay status)			
0314H	30789	ALM3 (RELAY)	Alarm 3 status (relay status)			
0316H	30791	ALM4 (RELAY)	Alarm 4 status (relay status)			
0318H	30793	ALM5 (RELAY)	Alarm 5 status (relay status)			
031AH	30795	ALM6 (RELAY)	Alarm 6 status (relay status)			
031CH	30797	ALM7 (RELAY)	Alarm 7 status (relay status)			
031EH	30799	ALM8 (RELAY)	Alarm 8 status (relay status)			
0340H	30833	ALM1	Alarm 1 status	ON: 1, OFF: 0		
0342H	30835	ALM2	Alarm 2 status			
0344H	30837	ALM3	Alarm 3 status			
0346H	30839	ALM4	Alarm 4 status			
0348H	30841	ALM5	Alarm 5 status			
034AH	30843	ALM6	Alarm 6 status			
034CH	30845	ALM7	Alarm 7 status			
034EH	30847	ALM8	Alarm 8 status			
0400H	31025	PV1	PV1 measurement value	–214783647 to 214783648	*	
0402H	31027	PV2	PV2 measurement value		*	
0406H	31031	AI1	Ai1 measurement value		*	
0420H	31057	RCJ1	PV1 RCJ measurement value			
0422H	31059	RCJ2	PV2 RCJ measurement value			
0450H	31105	AO1	AO1 output value	–250 to 1250 (–25.0 to 125.0%)		
0452H	31107	AO2	AO2 output value			

Relative address	Register No.	Parameter name	Parameter contents	Read-out data	Affected by input range	Remarks or corresponding parameter
0470H	31137	DI01	DI1 to 4 input status	DI1: 8000H DI2: 4000H DI3: 2000H DI4: 1000H		Corresponding bit to ON is "1".
0472H	31139	DI11	DI11 to 15 input status	DI11: 8000H DI12: 4000H DI13: 2000H DI14: 1000H DI15: 0800H		Corresponding bit to ON is "1".
0476H	31143	diC1	Communication Di monitor (1-5)	—		
0478H	31145	diC2	Communication Di monitor (6-8)	—		
04D0H	31233	DO01	DO1 to 4 output status	DO1: 1 DO2: 2 DO3: 4 DO4: 8		Corresponding bit to ON is "1".
04D2H	31235	DO11	DO11 to 15 output status	DO11: 1 DO12: 2 DO13: 4 DO14: 8 DO15: 16		Corresponding bit to ON is "1".
0540H	31345	AIM	Mathematical calculation result	–214783647 to 214783648	*	Mathematical calculation scale
0550H	31361	ALM DLY 1	Alarm 1 delay timer remaining time monitor	0 to 9999		
0552H	31363	ALM DLY 2	Alarm 2 delay timer remaining time monitor			
0554H	31365	ALM DLY 3	Alarm 3 delay timer remaining time monitor			
0556H	31367	ALM DLY 4	Alarm 4 delay timer remaining time monitor			
0558H	31369	ALM DLY 5	Alarm 5 delay timer remaining time monitor			
055AH	31371	ALM DLY 6	Alarm 6 delay timer remaining time monitor			
055CH	31373	ALM DLY 7	Alarm 7 delay timer remaining time monitor			
055EH	31375	ALM DLY 8	Alarm 8 delay timer remaining time monitor			
0564H	31381	AMV1	EXMV value (External analog value)	–214783647 to 214783648		
056CH	31389	FFV1	Feed Forward value	–214783647 to 214783648		
0574H	31397	MVrb	Valve aperture monitor	-50 to 1050 (-5.0% to 105.0%)		
0576H	31399	Int Val	Front integration display			
0578H	31401		Totalizer alarm 1 status (relay state)	Excitation: 1, Non-excitation: 0		
057AH	31403		Totalizer alarm 2 status (relay state)			
057CH	31405		Totalizer alarm 1 status	ON: 1, OFF: 0		
057EH	31407		Totalizer alarm 2 status			

8. SAMPLE PROGRAM

This section concerns data read-out/write-in sample program by Microsoft Visual Basic 6.0 (SP6) (enclosed to CD-ROM).

Note that the program shown here is for reference for you to create a program and not for guaranteeing all actions.

Before executing the program, make sure of the communication conditions in the following procedure.

- Parity, communication speed: Must be set in this program to match the instrument.

Precautions for some RS-232C ⇔ RS-485 converter

The transmission data itself may precede the answer data from the slave station. In such a case, discard as many data as transmission bytes found there, and then process it as answer data.

Applicable OS

Windows 2000 Professional

Windows XP Professional Edition

Fuji Electric Systems Co., Ltd. will not be responsible for damages attributable to use of the sample program nor infringement of rights owned by third parties.

Use the program upon admitting the above.

(a) Example of data read-out

Operation: 2 word data of a designated address is read-out and displayed at a time.

Used function code: 03_H , 04_H

Read-out word number: 2

```
' Variable declaration ************************************************************************************************
    Dim idx As Integer
    Dim Ansdat() As Byte                    ' For storing answer data
    Dim Rxbuff As Variant                   ' Receive data buffer
    Dim PauseTime                           ' Sets the communication wait time
                                            ' Required wait time depends on transmission speed and transmission frame length
    Dim Stno As Byte                        ' Communication station number

Private Sub Form_Load()

' Initializing the variable ********************************************************************************************
    Stno = 1
    Main.Visible = True

End Sub

'-----------------------------------------
'Read continuous words sample program
'Function code : 03H, 04H
'Number of words : 2
'-----------------------------------------

Private Sub TX1_Click()

    TX1.Enabled = False

' Communication port setting *******************************************************************************************
    If Com5.Value = True Then
        Comm_port = 5                       ' COM5
    ElseIf Com4.Value = True Then
        Comm_port = 4                       ' COM4
    ElseIf Com3.Value = True Then
        Comm_port = 3                       ' COM3
    ElseIf Com2.Value = True Then
        Comm_port = 2                       ' COM2
    Else
        Comm_port = 1                       ' COM1
    End If

    If SPD192.Value = True Then
        Comm_speed = "19200,"               ' 19200bps
    ElseIf SPD96.Value = True Then
        Comm_speed = "9600,"                ' 9600bps
    Else
        Comm_speed = "38400,"               ' 38400bps
    End If

    If Even1.Value = True Then
        Comm_parity = "E,"                  ' Even parity
    ElseIf Odd1.Value = True Then
        Comm_parity = "O,"                  ' Odd parity
    Else
        Comm_parity = "N,"                  ' No parity
    End If

    PauseTime = 0.2                         ' Sets the wait time (0.2 sec)

    idx = 0

' Opening the communication port ***************************************************************************************
    MSComm1.CommPort = Comm_port            ' COM port setting
    MSComm1.Settings = Comm_speed & Comm_parity & "8,1"     ' Speed / Party / 8bit_Data / Stop_1bit
    MSComm1.PortOpen = True                 ' Opens a port

' Setting the opposite station number for communication ****************************************************************
    St = Val(Stno1(idx).Text)
    Stno = St Mod 256
    Stno1(idx).Text = Str(Stno)

' Address processing ***************************************************************************************************
    AD$ = Str(Val(Address(idx).Text) - 1)
    AD$ = Right$(("00000" & AD$), 5)
    Area = Val(Left$(AD$, 1))
    Adrsh = Int(Val(Right$(AD$, 4)) / 256)
    Adrsl = Val(Right$(AD$, 4)) Mod 256
```

```
' Transmission command generation ************************************************************************************************
    Select Case Area
    Case 3
        ReDim Txdat(7) As Byte                  ' Secures 8 byte array
        Txdat(0) = Stno                         ' Station No.
        Txdat(1) = &H4                          ' Command
        Txdat(2) = Adrsh                        ' High address
        Txdat(3) = Adrsl                        ' Low address
        Txdat(4) = &H0                          ' Number of read-in words (High)
        Txdat(5) = &H2                          ' Number of read-in words (Low)
        Txsu = 5                                ' Number of transmission data

    Case 4
        ReDim Txdat(7) As Byte                  ' Secures 8 byte array
        Txdat(0) = Stno                         ' Station No.
        Txdat(1) = &H3                          ' Command
        Txdat(2) = Adrsh                        ' High address
        Txdat(3) = Adrsl                        ' Low address
        Txdat(4) = &H0                          ' Number of read-in words (High)
        Txdat(5) = &H2                          ' Number of read-in words (Lo)
        Txsu = 5                                ' Number of transmission data

    Case Else                                   ' For other value
        MSComm1.PortOpen = False                ' Closes COM port
        TX1.Enabled = True
        Exit Sub
    End Select

' Transmitting a command ***********************************************************************************************************

' Generation of CRC for transmission data
        GoSub 10000                             ' CRC calculation
        Txdat(Txsu + 1) = CRC1                  '
        Txdat(Txsu + 2) = CRC2                  '

' Transmitting a generated command
        MSComm1.Output = Txdat                  ' Transmits 1 byte

' Waiting until all answer data is received
    Start = Timer                               ' Saves the waiting start time
    Do While Timer < Start + PauseTime          ' Whether time setting elapsed
        DoEvents                                ' Transfers the control to another process
        If ((Start + PauseTime) - Timer) > PauseTime Then
           Start = Timer
        End If
    Loop

' Fetching the answer data into byte array
    MSComm1.InputMode = comInputModeBinary      ' Designates binary mode
    length = MSComm1.InBufferCount              ' Acquires required number of receive data bytes
    MSComm1.InputLen = 0                        ' Designates acquisition of all data
    Rxbuff = MSComm1.Input                      ' Fetches receive data into receive buffer
    Ansdat = Rxbuff                             ' Assigns byte array to receive data

' CRC calculation for receive data
    Ansu = length – 3                           ' Receive data length
    GoSub 20000                                 ' CRC calculation

' Error check
    If (length = 0) Then                                                    ' No anser
        Noans = Noans + 1: Rx_data.Caption = "Noans": GoTo 150
    ElseIf ((Ansdat(length - 2) <> CRC1) + (Ansdat(length - 1) <> CRC2)) Then   ' CRC error
        CRCErr = CRCErr + 1: Rx_data.Caption = "CRCErr": GoTo 150
    ElseIf Ansdat(1) >= &H80 Then                                           ' Command error
        CMDErr = CMDErr + 1: Rx_data.Caption = "CMDErr": GoTo 150
    End If

' Processing of normal receive data
        wrk1 = Ansdat(3)
        wrk2 = Ansdat(4)
        wrk3 = Ansdat(5)
        wrk4 = Ansdat(6)
    If Ansdat(5) > 128 Then                     ' If receive data is negative
        Rx_data.Caption = Str(((wrk3 * (2 ^ 24)) + (wrk4 * (2 ^ 16)) + (wrk1 * (2 ^ 8)) + wrk2) - (2 ^ 32))
    Else
        Rx_data.Caption = Str(((wrk3 * (2 ^ 24)) + (wrk4 * (2 ^ 16)) + (wrk1 * (2 ^ 8)) + wrk2))
    End If
150
    MSComm1.PortOpen = False                    ' Closes COM port

    TX1.Enabled = True

    Exit Sub
```

```
' ************************************************************************************************************************

10000       ' CRC calculation subroutine IN:Txdat(Txsu) / OUT CRC1,CRC2    ************************************************************
      CRC = &HFFFF
      For i = 0 To Txsu Step 1
            CRC = CRC Xor Txdat(i)
            For J = 1 To 8 Step 1
                  CT = CRC And &H1
                  If CRC < 0 Then CH = 1 Else: CH = 0: GoTo 11000
                  CRC = CRC And &H7FFF
11000             CRC = Int(CRC / 2)
                  If CH = 1 Then CRC = CRC Or &H4000
                  If CT = 1 Then CRC = CRC Xor &HA001
            Next J
      Next i
      CRC1 = CRC And &HFF
      CRC2 = ((CRC And &HFF00) / 256 And &HFF)
      Return


20000       ' CRC calculation subroutine IN:Ansdat(Ansu) / OUT CRC1,CRC2    ************************************************************
      CRC = &HFFFF
      For i = 0 To Ansu Step 1
            CRC = CRC Xor Ansdat(i)
            For J = 1 To 8 Step 1
                  CT = CRC And &H1
                  If CRC < 0 Then CH = 1 Else: CH = 0: GoTo 21000
                  CRC = CRC And &H7FFF
21000             CRC = Int(CRC / 2)
                  If CH = 1 Then CRC = CRC Or &H4000
                  If CT = 1 Then CRC = CRC Xor &HA001
            Next J
      Next i
      CRC1 = CRC And &HFF
      CRC2 = ((CRC And &HFF00) / 256 And &HFF)
      Return

End Sub
```

(b) Example of data write-in

Operation: Writes 2 word data into a designated address

Used function code: 10_H

Number of write-in words: 2

```
'-----------------------------------
'Write 2 words sample program
'Function code : 10H
'Number of words : 2
'-----------------------------------

Private Sub Write_command_Click()
    Write_command.Enabled = False

    ' Communication port setting ************************************************************************************************
    If Com5.Value = True Then
        Comm_port = 5                           ' COM5
    ElseIf Com4.Value = True Then
        Comm_port = 4                           ' COM4
    ElseIf Com3.Value = True Then
        Comm_port = 3                           ' COM3
    ElseIf Com2.Value = True Then
        Comm_port = 2                           ' COM2
    Else
        Comm_port = 1                           ' COM1
    End If

    If SPD192.Value = True Then
        Comm_speed = "19200,"                   ' 19200bps
    ElseIf SPD96.Value = True Then
        Comm_speed = "9600,"                    ' 9600bps
    Else
        Comm_speed = "38400,"                   ' 38400bps
    End If

    If Even1.Value = True Then
        Comm_parity = "E,"                      ' Even parity
    ElseIf Odd1.Value = True Then
        Comm_parity = "O,"                      ' Odd parity
    Else
        Comm_parity = "N,"                      ' No parity
    End If

    PauseTime = 0.2                             ' Sets the wait time (0.2 sec)
    idx = 1

    ' Opening the communication port ********************************************************************************************
    MSComm1.CommPort = Comm_port                ' Com port
    MSComm1.Settings = Comm_speed & Comm_parity & "8,1"     ' Speed / Party / 8bit_Data / Stop_1bit
    MSComm1.PortOpen = True                     ' Open com port

    ' Setting the opposite station number for communication ****************************************************************************
    St = Val(Stno1(idx).Text)
    Stno = St Mod 256
    Stno1(idx).Text = Str(Stno)

    ' Address processing ********************************************************************************************************
    AD$ = Str(Val(Address(idx).Text) - 1)
    AD$ = Right$(("00000" & AD$), 5)
    Area = Val(Left$(AD$, 1))
    Adrsh = Int(Val(Right$(AD$, 4)) / 256)
    Adrsl = Val(Right$(AD$, 4)) Mod 256

    ' Transmission command generation ********************************************************************************************

    Select Case Area
    Case 4

    'Normal sending data is processed.
        Dim byteData(3) As Byte
        Dim sHex     As String

        sHex = Right("00000000" & Hex(Val(Write_data.Text)), 8) ' Decimal → hexadecimal
        byteData(0) = CByte("&H" & Mid(sHex, 1, 2))             'hh byte
        byteData(1) = CByte("&H" & Mid(sHex, 3, 2))             'hl byte
        byteData(2) = CByte("&H" & Mid(sHex, 5, 2))             'lh byte
        byteData(3) = CByte("&H" & Mid(sHex, 7, 2))             'll byte
```

```
            ReDim Txdat(12) As Byte                 ' 13 bytes
                Txdat(0) = Stno                     ' Station No.
                Txdat(1) = &H10                     ' Command
                Txdat(2) = Adrsh                    ' High address
                Txdat(3) = Adrsl                    ' Low address
                Txdat(4) = &H0                      ' Number of write-in words (High)
                Txdat(5) = &H2                      ' Number of write -in words (Lo)
                Txdat(6) = &H4                      ' Number of write -in bytes
                Txdat(7) = byteData(2)              ' Write-in data (Lo high)
                Txdat(8) = byteData(3)              ' Write-in data (Lo lo)
                Txdat(9) = byteData(0)              ' Write-in data (High high)
                Txdat(10) = byteData(1)             ' Write-in data (HIgh lo)
                Txsu = 10                           ' Number of transmission data

        Case Else                                   ' For other
                MSComm1.PortOpen = False            ' Closes COM port
                Write_command.Enabled = True
                Exit Sub
        End Select

        ' Transmitting a command ***********************************************************************************************

        ' Generation of CRC for transmission data
        GoSub 10000                                 ' CRC calculation
        Txdat(Txsu + 1) = CRC1                      '
        Txdat(Txsu + 2) = CRC2                      '

        ' Transmitting a generated command
        MSComm1.Output = Txdat                      ' Transmits 1 byte

        ' Waiting until all answer data is received
        Start = Timer                               ' Saves the waiting start time
        Do While Timer < Start + PauseTime          ' Whether time setting elapsed
            DoEvents                                ' Transfers the control to another process
            If ((Start + PauseTime) - Timer) > PauseTime Then
                Start = Timer
            End If
        Loop

        MSComm1.PortOpen = False                     ' Closes COM port

        Write_command.Enabled = True

        Exit Sub

' ***********************************************************************************************************************

10000       ' CRC calculation subroutine IN:Txdat(Txsu) / OUT CRC1,CRC2    ***************************************************************
        CRC = &HFFFF
        For i = 0 To Txsu Step 1
            CRC = CRC Xor Txdat(i)
            For J = 1 To 8 Step 1
                CT = CRC And &H1
                If CRC < 0 Then CH = 1 Else: CH = 0: GoTo 11000
                CRC = CRC And &H7FFF
11000           CRC = Int(CRC / 2)
                If CH = 1 Then CRC = CRC Or &H4000
                If CT = 1 Then CRC = CRC Xor &HA001
            Next J
        Next i
        CRC1 = CRC And &HFF
        CRC2 = ((CRC And &HFF00) / 256 And &HFF)
        Return

End Sub
```

9. TROUBLESHOOTING

If the communication is unavailable, check the following items.

□ Whether all devices related to communication are turned on.

□ Whether wirings are correct. (Whether polarities are correct.)

□ Whether the number of connected instruments and connection distance are as specified.

□ Whether communication conditions coincide between the master station (host computer) and slave stations (PXH).

□ Transmission speed	:	9600bps, 19200bps, 38400bps
□ Data length	:	8 bits
□ Stop bit	:	1 bit
□ Parity	:	□ odd
		□ even
		□ none

□ Whether send/receive signal timing conforms to Section 5.4 in this manual.

□ Whether the station No. designated as send destination by the master station coincides with the station No. of the connected PXH. (For PC loader communication, the station No. is fixed at "1".)

□ Whether, at RS-485 communication, more than one instrument connected on the same transmission line does not share the same station No.

□ Whether, at RS-485 communication, the station No. of instruments is not set at 0.
If it is 0, the communication function does not work.

□ Whether, at RS-485 communication, the 11th digit of type code of this controller is R.
(PXH9□□□□ – □□R□□ – □)

□ Whether, at RS-485 communication, settings of communication conditions for RS-232C ⇔ RS-485 converter are correct.

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