

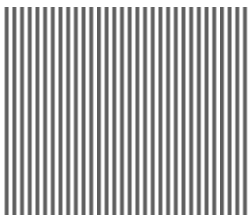
**CHINO**

---

Digital Program Controller

KP1000

**COMMUNICATIONS  
INTERFACES**



# INSTRUCTIONS

Retain this manual apart from the instrument  
and in an easily accessible place.

Please make sure that this manual is handed to the final user of the instrument.

**CHINO**

# Table of Contents

<p><b>1. Introduction</b> ..... - 1 -</p> <p><b>2. For safe use of the product</b>..... - 2 -</p> <p style="padding-left: 20px;">2-1 Prerequisites for use..... - 2 -</p> <p style="padding-left: 20px;">2-2. Symbol mark..... - 2 -</p> <p><b>3. Overview</b> ..... - 3 -</p> <p style="padding-left: 20px;">3-1. RS-232C communication interface ..... - 3 -</p> <p style="padding-left: 20px;">3-2. RS-422A/485 communication interface ..... - 3 -</p> <p><b>4. Communication Protocol</b> ..... - 4 -</p> <p style="padding-left: 20px;">4-1.MODBUS Protocol..... - 4 -</p> <p style="padding-left: 20px;">4-2. PRIVATE Protocol ..... - 4 -</p> <p><b>5. Communication Specifications</b> ..... - 5 -</p> <p style="padding-left: 20px;">5-1.MODBUS ..... - 5 -</p> <p style="padding-left: 20px;">5-2.PRIVATE..... - 5 -</p> <p><b>6. Setting the parameters for PC communication</b> ..... - 6 -</p> <p style="padding-left: 20px;">6-1. Communication speed (COM BIT RATE). - 7 -</p> <p style="padding-left: 20px;">6-2. Set device number (COM NUMBER)..... - 7 -</p> <p style="padding-left: 20px;">6-3. Set the communication function (COM KIND)..... - 7 -</p> <p style="padding-left: 20px;">6-4. Setting communication transmission kind (COM TRANS KIND) ..... - 8 -</p> <p style="padding-left: 20px;">6-5. Setting communication protocol (COM PROTOCOL) ..... - 8 -</p> <p style="padding-left: 20px;">6-6. Setting communication character (COM CHARACTER)..... - 8 -</p> <p><b>7. Wiring</b>..... - 10 -</p> <p style="padding-left: 20px;">7-1. Precautions while wiring ..... - 10 -</p> <p style="padding-left: 20px;">7-2. Cable for communication ..... - 11 -</p> <p style="padding-left: 20px;">7-3. RS-232C connection ..... - 14 -</p> <p style="padding-left: 20px;">7-4. Wiring of RS-422A/485 ..... - 15 -</p> <p><b>8. MODBUS protocol</b>..... - 16 -</p> <p style="padding-left: 20px;">8-1. Message transmission mode ..... - 17 -</p> <p style="padding-left: 20px;">8-2. Data time interval ..... - 18 -</p> <p style="padding-left: 20px;">8-3. Message configuration..... - 18 -</p> <p style="padding-left: 20px;">8-4. Method of creating a message ..... - 25 -</p> <p style="padding-left: 20px;">8-5. Function code ..... - 26 -</p> <p style="padding-left: 20px;">8-6. Process during abnormality ..... - 32 -</p> <p style="padding-left: 20px;">8-7. KP relative number table ..... - 34 -</p> <p style="padding-left: 20px;">8-8. MODBUS protocol support reference table. - 75 -</p> <p style="padding-left: 20px;">8-9. Measurement range and decimal point position . - 81 -</p>	<p><b>9. PRIVATE protocol</b> ..... - 83 -</p> <p style="padding-left: 20px;">9-1. Difference between RS—232C and RS-422A/485 ..... - 83 -</p> <p style="padding-left: 20px;">9-2. Basic procedure of communication ..... - 85 -</p> <p style="padding-left: 20px;">9-3. Communication format ..... - 87 -</p> <p style="padding-left: 20px;">9-4. Positive response and negative response. - 98 -</p> <p style="padding-left: 20px;">9-5.Communication time chart ..... - 100 -</p> <p><b>10. Communication (Digital) transmission- 102 -</b></p> <p style="padding-left: 20px;">10-1. Overview ..... - 102 -</p> <p style="padding-left: 20px;">10-2. Specifications of communication division... - 103 -</p> <p style="padding-left: 20px;">10-3. Communication transmission setting..... - 104 -</p> <p style="padding-left: 20px;">10-4. Wiring..... - 105 -</p> <p style="padding-left: 20px;">10-5. Example of combination ..... - 106 -</p> <p><b>11. Appendix</b> ..... - 108 -</p> <p style="padding-left: 20px;">11-1. Communication format list ..... - 108 -</p> <p style="padding-left: 20px;">11-2. Input type No.-Input type support table.... - 115 -</p>
--	--

---

---

# 1. Introduction

---

---

Thank you for purchasing Digital Program Controller 'KP1000 series'.

KP 1000 series is Digital Program Controller with indicator accuracy of (0.1%, control cycle of approximately 0.1 seconds and front size of 96X96mm.

Multi-range input and up to 19 types of program patterns etc. are various functionalities that are provided as standard provisions. Besides a digital indicator with large easy to view LED display, various settings have an interactive system with high resolution dot matrix LCD display and handling is also easy with precise control.

Understand the controller properly and read this instruction manual beforehand in order to avoid any trouble.

This is a 'Communication' instruction manual. For general specifications, read 'General' instruction manual along with this manual.

## A Request

**- For the persons doing instrumentation, installation and sales -**

Be sure to handover this instruction manual to the persons using the controller.

**- For the users of the controller -**

Preserve this instruction manual until you scrap the controller.

## Notice

1. You should not copy or forward fully or partially this document without prior notice.
2. The contents of this document may be changed without notice.
3. We have taken enough care regarding the contents of this document however if at all you notice a mistake or an omission contact our nearest office.
4. Please understand that regarding the result of the operation, whatever is the result the company will not be responsible.

---

---

## 2. For safe use of the product

---

---

In order to use the controller safely, read the following precautions and understand them.

### 2-1 Prerequisites for use




The controller is a general product of component type that is to be used by mounting it in a panel for instrumentation inside a room. Do not use it in any other condition.

When using, design a fail safe on the final product side and review regularly and use the controller after confirming the safety of the system. For the wiring, adjustment and operation of the controller, contact a professional having knowledge of instrumentation.

It is necessary that the people actually using this controller read this instruction manual, and have enough understanding of various precautions and the basic operations of the controller.

### 2-2. Symbol mark

The following symbol marks are used in the product itself and in this instruction manual hence understand the meaning of these symbol marks properly.

Symbol mark	Meaning
 <b>Warning</b>	If there is a possibility of death or severe injuries then explain the precautions to avoid that possibility.
 <b>Precaution</b>	If there is a possibility of small injuries or a possibility of the controller or its nearby devices getting damaged then explain the precautions to avoid those possibilities.
	It is a symbol for ground terminal. Always connect the ground terminal to protective grounding.

---

---

## 3. Overview

---

---

RS-232C, RS-422A, RS-485 are available in communication interface of KP and are used for communication with personal computer (hereinafter referred to as PC).

PC can receive measurement data from KP, various parameters can be set and operation commands can be issued. Number of KP connections is 1 for RS-232 and maximum 31 for RS-422A, RS-485.

### 3-1. RS-232C communication interface

RS-232C is the data communication standard set and executed by Electronic India Alliance (EIA) and Japanese equivalent for that is JIS C 6361.

This standard is basically an interface with modem and data terminal device connected to it and only electrical and mechanical specifications are given.

Presently RS-232C communication interface that is used in industrial instruments like PC and DB series, only some of them completely conform to the above standards, and signal wire count and connectors for connection etc. may sometimes differ from the standards.

As nothing is specified about the software part or what we call 'data transmission procedure' it does not mean that the devices that RS-232C communication interface can be connected unconditionally.

Hence it is necessary that the designer investigates and confirms the specifications and transmission procedure of the mutual device. However if the connection partner is able to program those specifications optionally like the PC, the designer, by creating the appropriate program, can combine it with almost all the devices.

When investigating the RS-232C standards, the method of referring to JIS C 6361 is the simplest method.

### 3-2. RS-422A/485 communication interface

RS-422A/485 communication interface can communicate by connecting in parallel the KP series of a number of machines (maximum 31) through the signal that conforms to RS-422A/485.

PCs that have RS-422A/485 communication interface are less however as it is a serial communication, connection can be easily done by using RS-232C → RS-422A/485 signal converter.

Line converter (Our company model: SC8-10) for RS-232C ↔ RS-422A/485 signal conversion is available with our company. You may order it from us.

Difference between RS-422A and RS-485 is that RS-422A uses 4 signal wires whereas RS-485 uses 2 signal wires.

---

---

## 4. Communication Protocol

---

---

KP has the following two protocols and switching can be done by front key settings.

### 4-1. MODBUS Protocol

MODBUS is a registered trademark of SCHNEIDER company. MODBUS protocol has two modes namely RTU mode and ASCII mode and switching can be done using front key settings. It has the transmission function of measurement data and settings, operation function.

### 4-2. PRIVATE Protocol

PRIVATE is usual CHINO protocol. Switching is done by setting the front key. It has the transmission function of measurement data and settings, operation function.

Old instrument of CHINO products is compatible with new instrument, however the parameter which can not be set by PRIVATE can be set by MODBUS. We recommended to use MODBUS protocol if communication is set newly.

---

## 5. Communication Specifications

---

### 5-1.MODBUS

- Communication system : Half duplex asynchronous system (Polling selecting system)
- Protocol : MODBUS protocol
- Communication speed : 38400,19200,9600,4800,2400bps switching
- Start bit : 1 bit
- Data length : 7 bits (ASCII mode)  
8 bits (RTU mode/ASCII mode)
- Parity bit : None/even/odd
- Stop bit : 1 bit/2 bits
- Transmission code : ASCII (ASCII mode)  
Binary (RTU mode)
- Error check : LRC (ASCII mode)  
(Error detection) CRC-16 (RTU mode)
- Data transmission procedure : No procedure
- Usage signal name : Sending and receiving data only(Without using the control signal)

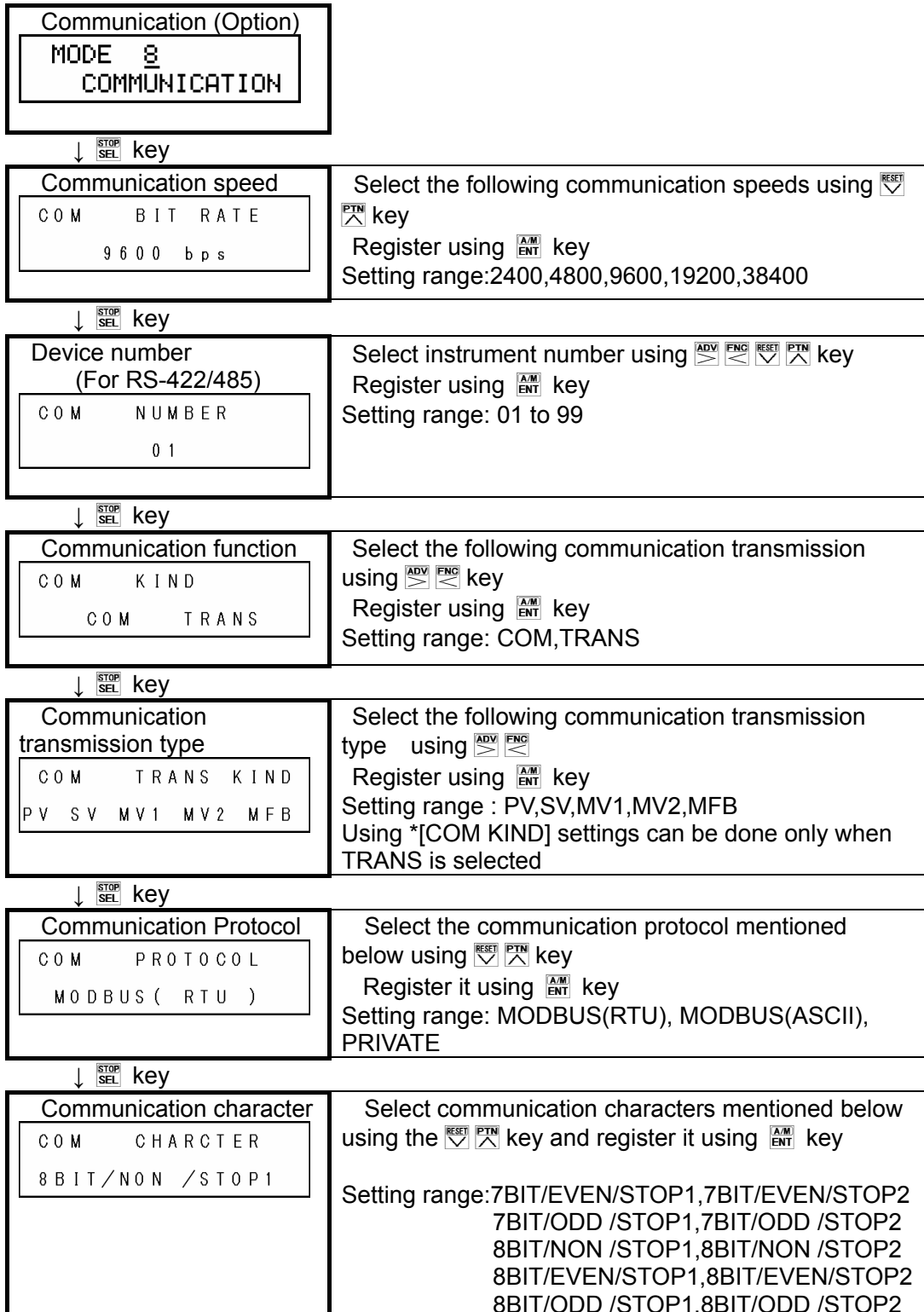
### 5-2.PRIVATE

- Communication system : Half duplex asynchronous system (Polling selecting system)
- Protocol : PRIVATE protocol
- Communication speed : 38400,19200,9600,4800,2400bps switching
- Start bit : 1 bit
- Data length : 7 bits
- Parity bit : Even
- Stop bit : 1 bit
- Transmission code : ASCII code
- Error check : BCC (Block check character)      Check sum  
(Error detection)
- Data transmission procedure : No procedure
- Usage signal name : Sending and receiving data only (Without using the control signal)

## 6. Setting the parameters for PC communication

According to the flow chart, set these 6 parameters 'Communication speed', 'Device number', 'Communication function', 'Communication transmission type', 'Communication protocol' and 'Communication character'.

1. Click **RUN MODE** key from the operation screen.
2. Select MODE 8 from 'Select MODE screen' using **RESET** **PTN** key.
3. Set the following fields of Communication settings screen (MODE8).







In case of PRIVATE, the setting is 7BIT/EVEN/STOP1.



## 6-1. Communication speed (COM BIT RATE)

Use KP and PC in same communication speed. (Usually initial value can be 9600 bps.)

- ① Display 'COMBITRATE' using  key.
- ② Select communication speed using   key and register it using  key.

Communication speed: 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, (Initial value is 9600bps)

## 6-2. Set device number (COM NUMBER)

Set the device number of KP at the time of RS-422A/485.

In single to multiple KPs that communicate with the PC, always do the settings such that one KP does not overlap with the other KPs.

- ① 'COM NUMBER' is displayed using the  key.
- ② Set device number (1 to 99) using     key, select it and register it using  key.







### Precautions

- ① Device number should be in a range from 1 to 99 and it should not overlap with the other KPs. (Initial value 1)
- ② In case of RS-232C, KP is connected to 1 machine but set the device number. Usually initial value can be 1.

## 6-3. Set the communication function (COM KIND)





Set the communication function.

- ① Display 'COM KIND' using  key.
- ② Select communication function using   key and register it using  key.
- ③ If 'COM' is selected, it becomes a high order communication function.
- ④ If 'TRANS' is selected, it becomes communication transmission function.

Communication function: COM, TRANS

## 6-4. Setting communication transmission kind (COM TRANS KIND)

Set communication transmission kind.

- ① Display 'COM TRANSKIND' using  key.
- ② Select transmission kind using   key and register it using  key.
- ③ If 'PV' is selected, measurement value (PV) is transmitted.
- ④ If 'SV' is selected, setting value (SV) is transmitted.
- ⑤ If 'MV' is selected output value (MV) is transmitted.
- ⑥ If 'MFB' is selected, operation terminal feedback value (MFB) is transmitted.  
However, it can be selected only when output format is ON OFF servo type.
- ⑧ In case of output 2 specifications, output 1 side 'MV1' and output 2 side 'MV2' can be selected individually.

Transmission type: PV,SV,MV1,MV2,MFB





## 6-5. Setting communication protocol (COM PROTOCOL)

- ① 'COM PROTOCOL' is displayed using  key.
- ② Select communication protocol using   key and register it using  key.

Selection	Communication Protocol	Initial value
RTU	MODBUS RTU	RTU
ASCII	MODBUS ASCII	
PRIVATE	PRIVATE	

※ If communication protocol is changed, communication function changes to initial value.

## 6-6. Setting communication character (COM CHARACTER)

- ① 'COM CHARACTER' is displayed using  key.
- ② Select communication character using   key and register it using  key.

【MODBUS RTU】

Selection	Bit length	Parity	Stop bit	Initial value
8N1	8bit	None	1	8N1
8N2			2	
8E1		Even	1	
8E2			2	
8O1		Odd	1	
8O2			2	

【MODBUS ASCII】

Selection	Bit length	Parity	Stop bit	Initial value
7E1	7bit	Even	1	7E1
7E2			2	
7O1		Odd	1	
7O2			2	
8N1	8bit	None	1	
8N2			2	
8E1		Even	1	
8E2			2	
8O1		Odd	1	
8O2			2	

【PRIVATE】

Selection	Bit length	Parity	Stop bit	Initial value
7E1	7bit	Even	1	7E1

# 7. Wiring

## 7-1. Precautions while wiring

### 1. Communication terminal

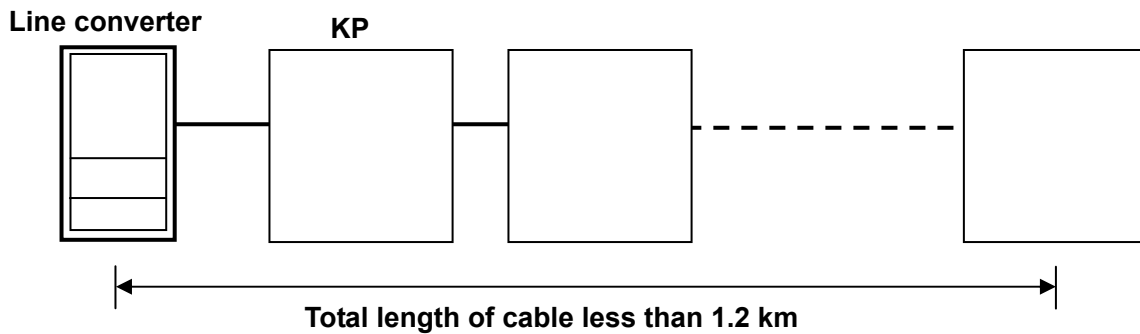
Depending on the communication interfaces that are specified, terminal arrangement differs.

No.	RS-232C	RS-422A	RS-485
⑫	RD	RDA	SA
⑬	SD	RDB	SB
⑭	SG	SDA	SG
⑮		SDB	
⑯		SG	

### 2. Total length of RS-422/485 communication cable is less than 1.2 km

Wiring space between each device can be anything but the total cable length distance is less than 1.2km.

(Line converter  $\longleftrightarrow$  Last terminal KP)



### 3. Take action to avoid intermixing of noise.

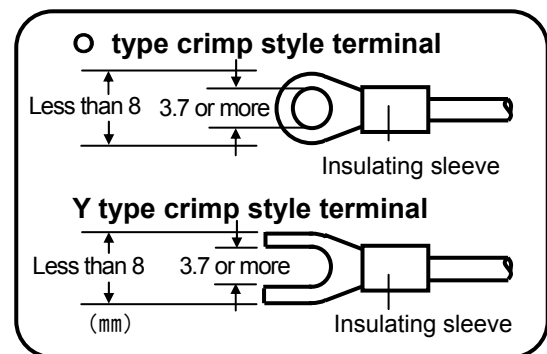
To avoid effect of noise place the power cable and other communication cables away from each other by at least 50 cm or more.

### 4. Always perform the crimp-style terminal process.

One of the causes of communication defect is loss of connection.

Always process the communication cable terminal using O type or Y type crimp style terminal with insulation sleeve.

(Terminal screw of KP, line converter is M3.5mm.)



### 5. Apply last terminal resistance.

When using RS-422A/485 communication, apply a resistance of 100Ω to the KP place in the last terminal. (For details see clause 7.4)

(Generally metal coating resistance is okay. It is available with our company and you may order it.)

### 6. Number of machines of DB connections

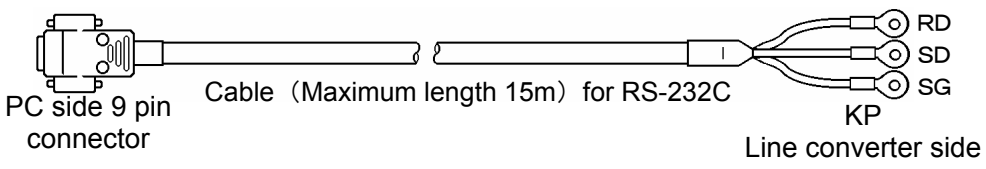
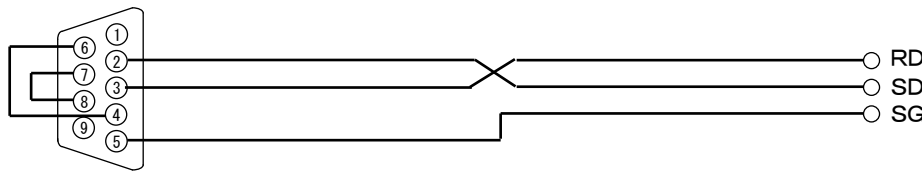
For RS-232C : 1  
 For RS-422A/485 : Maximum 31

## 7-2. Cable for communication

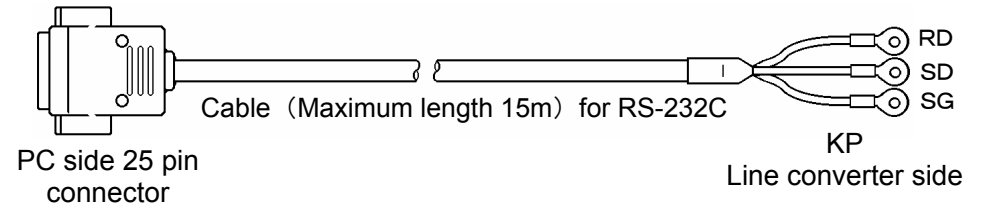
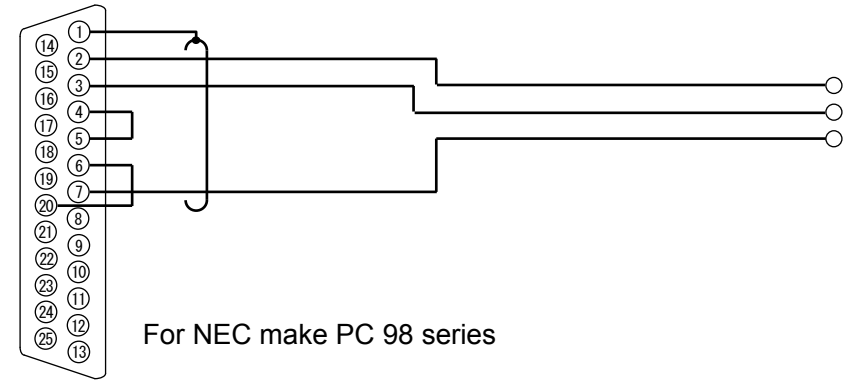
Before connecting get the exclusive communication cables ready. They are available with our company also and you can order them.

### 7-2-1. Communication cable for RS-232C (Between PC/Line converter)

① Connection between PC (9 pin) and KP, PC (9 pin) and line converter

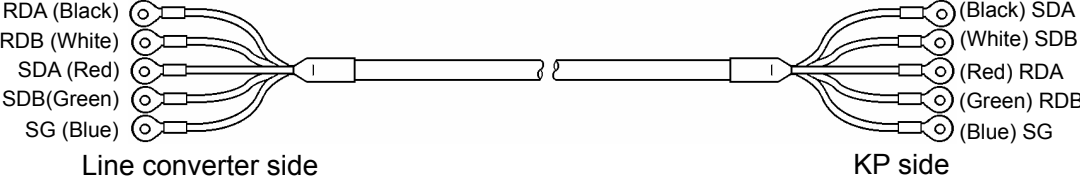
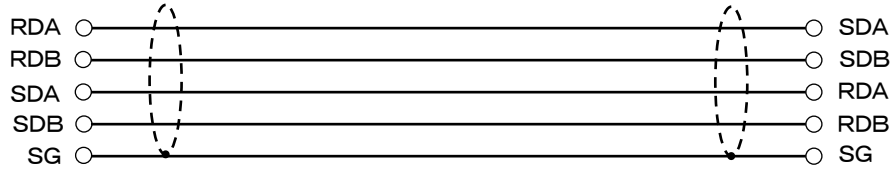

Cable	9 pin connector ↔ 0 type crimp-style terminal ↔ RS-232 cable
Format	 <p>PC side 9 pin connector</p> <p>Cable (Maximum length 15m) for RS-232C</p> <p>Line converter side</p>
Internal wiring	 <p>RD</p> <p>SD</p> <p>SG</p>
Model code	<b>RZ-CRS6</b> □□ Cable length is 1 to 15m (Specified)

② Connection between PC (25 pin) and KP, PC (25 pin) and line converter

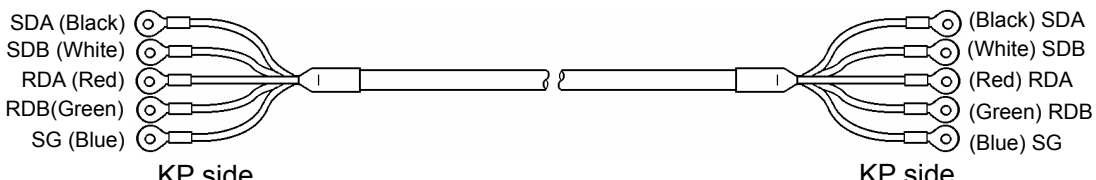
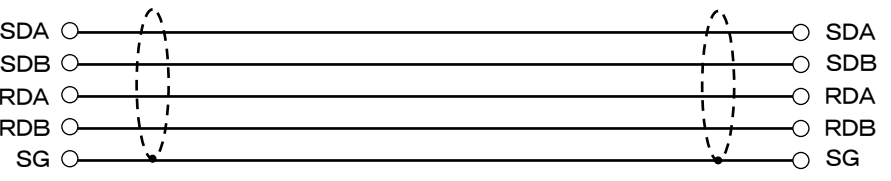

Cable	25 pin connector ↔ 0 type crimp-style terminal RS-232C cable
Format	 <p>PC side 25 pin connector</p> <p>Cable (Maximum length 15m) for RS-232C</p> <p>Line converter side</p>
Internal wiring	 <p>For NEC make PC 98 series</p>
Model code	<b>RZ-CRS2</b> □□ Cable length is 1 to 15m (Specify)

## 7-2-2. Communication cable for RS-422A

### ① Connection between line converter and KP

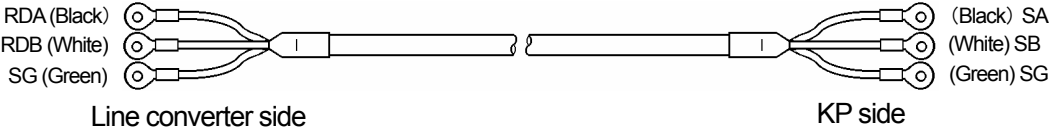
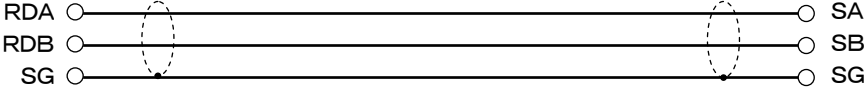
Cable	0 type crimp style terminal ↔ 0 type crimp style terminal RS-422A cable (For line converter)
<b>Format</b>	 <p>Line converter side</p> <p>KP side</p> <p>SG (Signal grand) wiring is available on both sides using 2 wick VCTF wire which is further twisted to 4 wicks. It is disconnected and used as there is no SG terminal on the line converter side.</p>
<b>Internal wiring</b>	
<b>Model code</b>	<b>RZ-CRA2□□</b>  Cable length is 01 to 99m (Specified)

### ② Connection between KPs

Cable	0 type crimp style wire ↔ 0 type crimp style RS-422A cable (For serial connection)
<b>Format</b>	 <p>KP side</p> <p>KP side</p> <p>SG (Signal grand) wiring is available on both sides using 2 wick VCTF wire which is further twisted to 4 wicks.</p>
<b>Internal wiring</b>	
<b>Model code</b>	<b>RZ-CRA1□□</b>  Cable length is 01 to 99m (Specified)

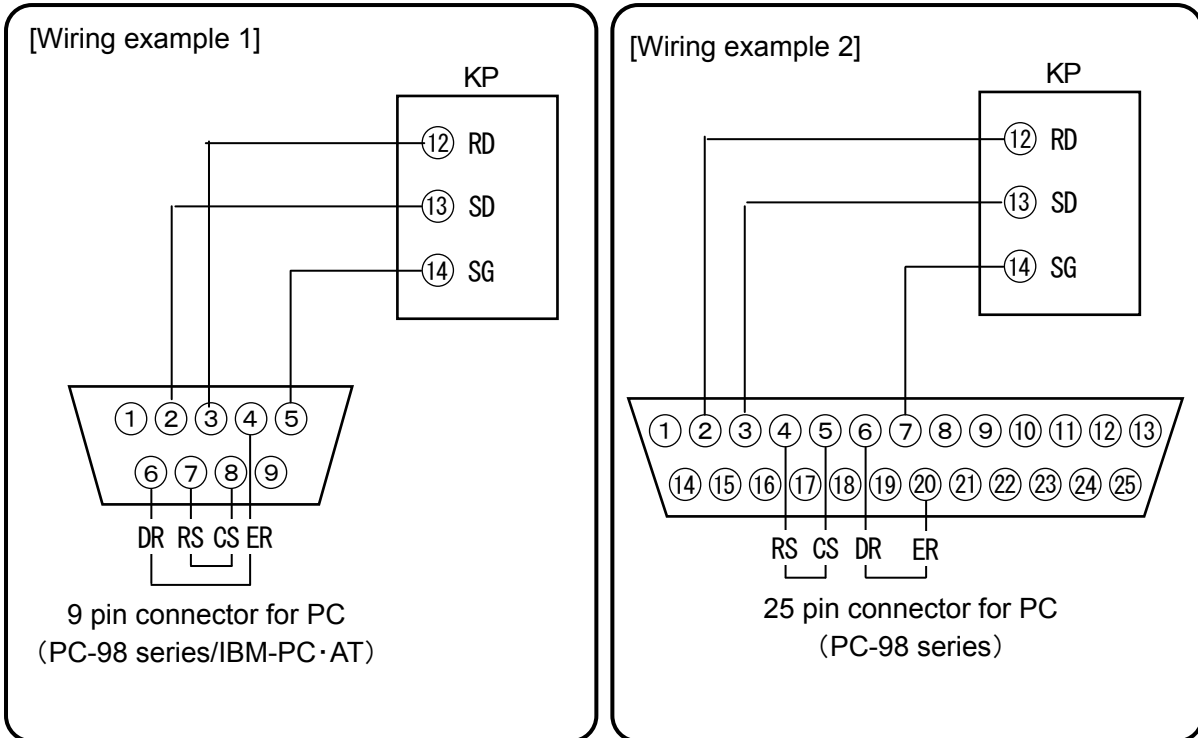
**7-2-3. Communication cable for RS-485**

① Connection between line converter and KP; and between KPs

Cable	0 type crimp style terminal ↔ 0 type crimp style terminal RS-485 cable
<p><b>Format</b></p>	 <p>Line converter side</p> <p>KP side</p> <p>SG (Signal Grand) wire is available in both the terminals using 2 wick cable made by twisting CVVS wire. It is disconnected and used as there is no SG terminal on the line converter side.</p>
<p><b>Internal wiring</b></p>	 <p>RDA ○ SA RDB ○ SB SG ○ SG</p>
<p><b>Model code</b></p>	<p><b>RZ-LEC□□□</b></p> <p>└─ Cable length is 001 to 200m (Specified)</p>

### 7-3. RS-232C connection

KP uses sending, receiving and Signal Grand (SG) only and does not use any other control signal. In general PC as controlling is done by control signal, it does not operate just by connecting 3 signal wires. As the wiring process in the connector, differs on how the PC controls the control signal, see the instruction manual of the PC that is being used.



### Precautions

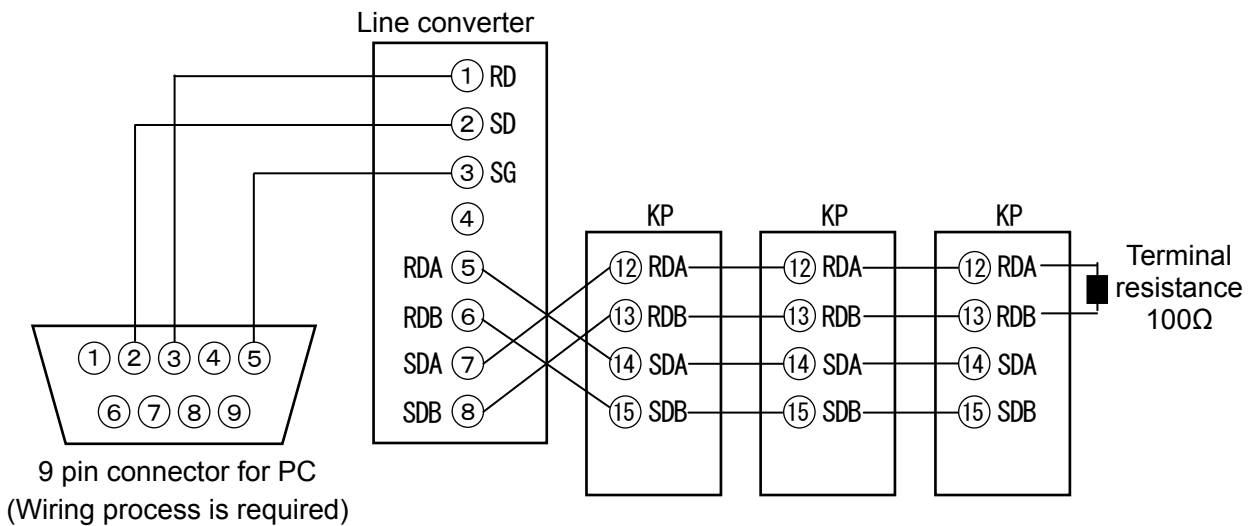
RS-232C cable length is maximum 15m. NEC make PC98 series 9 bit connector is 'Wiring example 1' and 25 pin connector is connected as shown in 'Wiring example 2'.



## 7-4. Wiring of RS-422A/485

Connect RS-422A/485 communication interface to the PC using line converter (Our company model:SC8-10). Line converter and PC use only three signals namely send, receive and signal grand and do not use any other control signal. Hence wiring process in the connector similar to that in RS-232C connection, is necessary. (For details see the instruction manual of the line converter.)

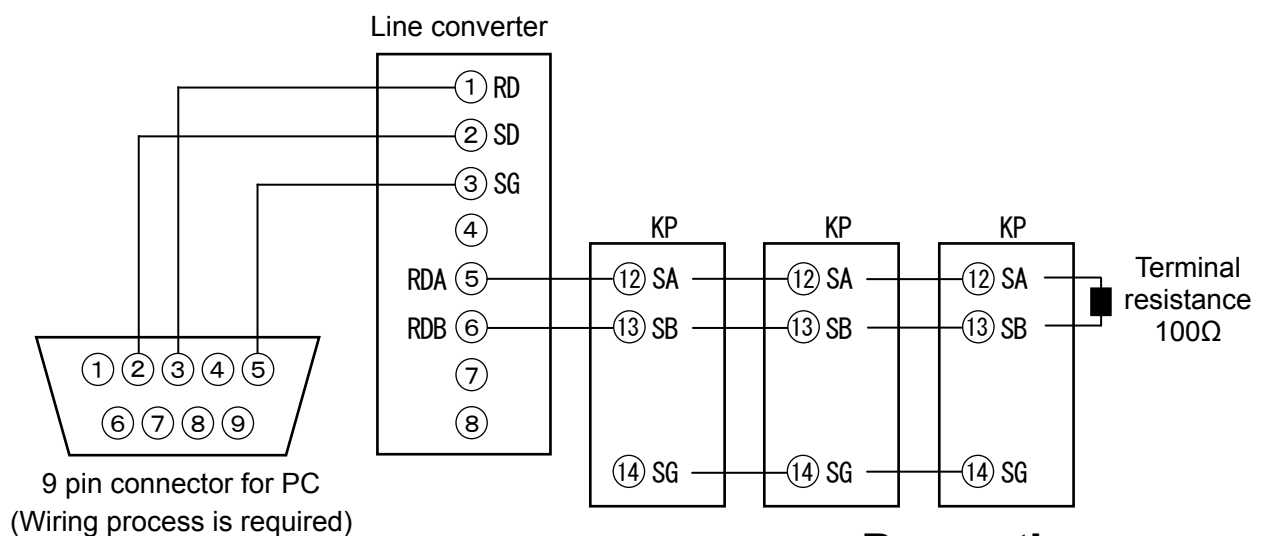
### Wiring of RS-422A



#### ⚠ Precautions

Do not connect the SG wire to FG terminal or grounding terminal of the device.

### Wiring of RS-485



#### ⚠ Precautions

Do not connect the SG wire to FG terminal or grounding terminal of the device.

---

---

## 8. MODBUS protocol

---

---

### Basic procedure and precautions regarding communication



#### Precautions

In order to avoid accidents always read the contents and understand them.

**1. When setting (Right) the parameters, setting is controlled using key operations.**

Communication is possible any time in KP. Response is received against the data request from the PC at any time.

**2. Device number is necessary in RS-232C also.**

In RS-232C, PC and KP are connected on one to one basis. Device is set and communication for this device number is performed.

**3. As control signal wire is not used, consider resending the command.**

Serial interface of KP communicates without using the control wire. As a result, sometimes reception defect may occur due to KP status hence consider resending the command.

**4. Do not remove the communication cable or a device and do not switch ON-OFF the power supply during communication.**

If cable or device that makes up the serial interface is removed or power supply is switched ON-OFF, operation is stopped and error may occur. If this is the status, it is necessary to reset all the devices that make up the serial interface and redo everything from the beginning.

**5. Send the next command only after confirming that the communication drive is OFF.**

In RS-422A/485, multiple devices are connected to the same communication line and only one machine whose device number is specified by the PC drives the communication line. At that time in order that the PC receives all the characters for sure, let some time elapse after the last character is sent and then switch OFF the drive of communication line. If command for the next device is sent by the PC before it gets switched OFF, signals conflict and normal communication is not performed, hence take care when using high speed PCs. This interval is approximately 5ms.

## 8-1. Message transmission mode

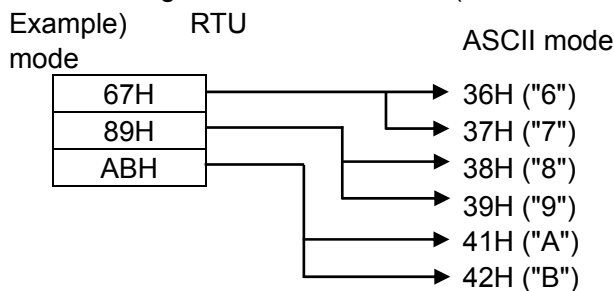
There are two types of modes namely RTU(Remote Terminal Unit) mode and ASCII mode and they are selected using the front key setting.

<Table 1 Comparison between RTU mode and ASCII mode>

Item		RTU mode	ASCII mode
Interface		RS-232C, RS-422A, RS-485	
Communication system		Half duplex asynchronous system	
Communication speed		2400,4800,9600,19200,38400bps	
Transmission code		Binary	ASCII
Error check (Error detection)	Vertical direction	Parity	
	Horizontal direction	CRC-16	LRC
Character configuration	Start bit	1 bit	
	Data length	7 bit/8 bits	
	Parity bit	None/even/odd	
	Stop bit	1 bit/2 bits	
Message start code		None	: (Colon)
Message end code		None	CR, LF
Data time interval		Less than 28 bit time	Less than 1 second

### 8-1-1. Transmission data

RTU mode is binary forwarding. ASCII mode splits the RTU 8 bit binary into high order and low order 4 bits and garbles each character (0 to 9, A to F).

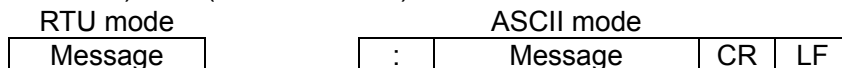


As the length of message in RTU mode is half that of ASCII mode and hence effective transmission is done.

### 8-1-2. Configuration of the message frame

RTU mode is made up of message part only.

ASCII mode is made up of start character ":" (Colon, 3AH)", message and end character "CR (Carriage return, 0DH) + LF (Line feed, 0AH)".



ASCII mode has a strong point that, as the start character is ":" it facilitates troubleshooting.

## 8-2. Data time interval

During RTU mode: Less than 9600bps:20msec, 9600bps or more:5msec

During ASCII mode: Less than 1 second

When sending a message, do not let the time interval of data that makes up one message exceed the time span mentioned above. If it exceeds the time interval mentioned above, the receiving side (this device), in order to judge the end of transmission from the transmission side, processes it as an abnormal message reception.

In RTU mode message characters should be sent continuously whereas in ASCII mode as character gap is maximum 1 second, master (PC) processing speed is comparatively slow but it can be used.

## 8-3. Message configuration

MODBUS message is made up of the following, in case of both the RTU and ASCII mode.

Slave address
Function code
Data
Error check

### 8-3-1. Slave address

Set the slave address beforehand in a range of 1 to 99 using front key setting. Master usually does the transmission with one slave. All the connected devices receive in common the message sent from the master. However, the slave whose slave address matches with the slave address in the command message only responds to that message.

Slave address '0' is used in message (broadcast) for all the slaves from the master. In this case the slave does not return a response.

### 8-3-2. Function code

Function code is a code that is to be executed in the slave and each data is roughly categorized as follows. For details see the reference table.

- ① Digital setting value : AT1 start
- ② Digital input data : Event status etc.
- ③ Analog setting value : Various setting information. Numeric value range is a numeric value within the range of 16 bits.  
-32768 to 32767 (For details see reference table).
- ④ Analog input data : Measurement data, status etc. Numeric value range is a numeric value within a range of 16 bits.

<Table 2. Function code table>

Code	Function	Unit	MODBUS original function (Reference)
01	Read digital (ON/OFF) setting value	1 bit	Read coil status
02	Read digital input data	1 bit	Read input relay status
03	Read analog setting value	16 bits	Read the contents of maintenance register
04	Read analog input data	16 bits	Read the contents of input register
05	Write the digital setting value	1 bit	Change the status of single coil
06	Write the analog setting value	16 bits	Write to single maintenance register
08	Loop back test (Send the received data)		Loop back test
15	Write multiple digital setting values		Change the status of multiple coils
16	Write multiple analog setting values		Write to multiple maintenance registers

### 8-3-3. Data division

Function of data differs depending on the function code. During the request from the master, it consists of code number (relative number calculated from reference number mentioned hereinafter) of the data that is to be read and written and the data unit count etc. Response from the slave is made up of data etc. that is requested.

Basic data of MODBUS is 16 bit integer on a whole and presence or absence of tag is specified for each data. Thus by putting the decimal point after another number make it as an integer value or by fixing the decimal point position make it standard by upper and lower limit of the scale and express it. In KP a system of putting the decimal point in a different position is fetched.

## Precautions

In the data division, specific numeric value can be assigned as error data, like input data. When using such data, first judge the error of the data and then combine it with decimal point data. If it is combined with decimal data earlier, then error data is mistook as normal data.

### 8-3-4. Reference number

In the KP there is a number called 'Reference number' that is allotted and it is required when reading and writing the data. The data in the KP is categorized depending on its type into, 'Digital setting value', 'Digital input data', 'analog input data' and 'analog settings value'. (8-7. KP relative number table)

When reference number of MODBUS original is to be specified, see section 8.8 Reference table for MODBUS protocol.

<Table 3. Reference number and relative number>

Data kind	Reference number	Relative number	MODBUS original (Reference)
Digital setting value	1 to 10000	Reference number-1	Coil
Digital input data	10001 to 20000	Reference number-10001	Input relay
Analog input data	30001 to 40000	Reference number-30001	Input register
Analog setting value	40001 to 50000	Reference number-40001	Maintenance register

Example) Relative number of measurement value (PV) of 'Reference number 30101' is '100'.

<Table 4. KP reference number chart table>

Data kind	Parameter	Reference number	Relative number	Code	Reference table
Digital setting value	AT1 start FB tuning	101 111	100 110	01 05 15	Section 8-7-3
Digital input Data	Error status Event status	10002 to 10124	1 to 123	02	Section 8-7-4
Analog setting value	Setup parameter 1 Setup parameter 2 1 type parameter Execution parameter & specific parameter 8 type parameter No.1 8 type parameter No.2 8 type parameter No.3 8 type parameter No.4 8 type parameter No.5 8 type parameter No.6 8 type parameter No.7 8 type parameter No.8 No.9 parameter	40001 to 40047 40051 to 40079 40101 to 40148 40151 to 40187 40206 to 40237 40256 to 40287 40306 to 40337 40356 to 40387 40406 to 40437 40456 to 40487 40506 to 40537 40556 to 40587 40601 to 40650	0 to 46 50 to 78 100 to 147 150 to 186 205 to 236 255 to 286 305 to 337 355 to 386 405 to 436 455 to 486 505 to 536 555 to 586 600 to 649	03 06 16	Section 8-7-1
Pattern setting	Pattern information	49003 to 49534	9002 to 9533	03 06 16	Section 8-7-1
Analog input data	Real data parameter	30101 to 30144	100 to 143	04	Section 8-7-2

### 8-3-5. Error check

Error check of transmission frame differs depending on the mode.

RTU mode: CRC-16

ASCII mode: LRC

#### ① Calculation of CRC-16

CRC system assigns the information that is to be sent, by generating polynomials, and sends the rest of the information by appending it at the end. Generating polynomial is as follows.

$$1 + X^2 + X^{15} + X^{16}$$

Target extends from slave address to the end of the data and calculation is done by the following procedure.

- 1) Initialization (=FFFFH) of CRC-16 data (Consider it as X)
- 2) Exclusive-OR (EX-OR) of data 1 and X→X
- 3) Shift X one bit to the right→X
- 4) If carry appears get A001H and EX-OR. If it does not appear go to 5).→X
- 5) Repeat 3) and 4) until shifting is done for 8 times.
- 6) Net data and EX-OR of X.→X
- 7) Same as 3) to 5).
- 8) Repeat till the end of the data.
- 9) Create messages in low order and high order of 16 bit data (X) that is calculated.

Example) When data is [02H] [07H], CRC-16 becomes 1241H hence the error check data becomes [41H] [12H].

## Reference: CRC-16 calculation program

```
/***** CRC-16 calculation program (C language) *****/
#include <stdio.h>
#include <conio.h>

void main(void)
{
    /** Internal change declaration ***/
    unsigned int      iLoopCnt;          /* Loop counter          */
    unsigned short    usData;           /* Input data            */
    unsigned short    usCrcData;        /* CRC-16 data          */
    unsigned short    usErrChkData;     /* Error check data     */
    int               iDummy;          /* Dummy variable       */

    /* Initialize the output result of CRC-16 data */
    usCrcData = 0xffff;

    printf("Enter hexadecimal data.(End using [q]) >¥n");
    while( scanf("%x",&usData) != 0 )
    {
        /* Get the exclusion of CRC output result and the data that is input */
        usCrcData = usData ^ usCrcData;

        /** Do the CRC calculation ***/
        /* Repeat till shifting up to 8 bits is done */
        for( iLoopCnt = 0 ; iLoopCnt < 8 ; iLoopCnt++ )
        {
            /* Check the existence of carry */
            if( usCrcData & 0x0001 )
            {
                /* When carry occurs */
                /* Shift CRC output result 1 bit to the right */
                usCrcData = usCrcData >> 1;

                /* Get the exclusion with A001H */
                usCrcData = usCrcData ^ 0xa001;
            }
            else
            {
                /* When carry does not occur */
                /* Shift CRC output result 1 bit to the right */
                usCrcData = usCrcData >> 1;
            }
        } /* for */
    } /* while */

    printf("CRC-16 data is %xH.¥n", usCrcData );

    /* Create error check data */
    usErrChkData = ( usCrcData >> 8 ) | ( usCrcData << 8 );
    printf( "Data for error check is %xH.", usErrChkData );

    iDummy = getch();
}
```



## ② LRC calculation method

Target extends from slave address to the end of the data and calculation is done by the following procedure.

- 1) Create message in RTU mode.
- 2) Add from the beginning (Slave address) to the end of data.→X
- 3) Get the complement (bit inversion) of X.→X
- 4) Add 1.(X=X+1)
- 5) Add X as LRC at the end of the message.
- 6) Convert everything to ASCII character.

Example) When data is [02H][07H], LRC becomes [F7H] hence

Binary message becomes [02H] [07H] [F7H]

ASCII message becomes [30H] [32H] [30H] [37H] [46H] [37H]

## Reference: LRC calculation program

```
/* LRC calculation program (C language) */
#include <stdio.h>
#include <conio.h>

void main(void)
{
    /** Internal change declaration **/
    unsigned short usData;           /* Input data */
    unsigned short usLrcData;       /* LRC data */
    int iDummy;                    /* Dummy variable */

    /* Initialize the output result of LRC data*/
    usLrcData = 0;

    printf(" Enter hexadecimal data.(End using [q]) >¥n");
    while( scanf("%x",&usData) != 0 )
    {
        /* Add from the beginning to the end of the data */
        usLrcData += usData;
        /* Cancel high order 1 byte */
        usLrcData = usLrcData & 0xff;
    } /* while */

    /* Get the exclusion with FFH */
    usLrcData = usLrcData ^ 0xff;

    /* Add 1 */
    usLrcData = usLrcData++;
    /* Cancel high order 1 byte */
    usLrcData = usLrcData & 0xff;

    /* LRC error check */
    printf("LRC-16 data is %xH.¥n", usLrcData );

    iDummy = getch();
}
```

### **8-3-6. Precautions while processing the data**

- ① Decimal point position of each data is clearly mentioned in the reference table. There are various points like fixing the decimal point position, points to be decided for every measurement range (See section 8.9), items as per linear decimal point setting. Take care about the decimal point position when data is regenerated.
- ② As every data can be accessed (changed), it is necessary to take care at the time of setting the related data. For example, there exists data initialization process etc. depending on the change in the measurement range. Process contents are mentioned in reference number table.
- ③ Read and write the data in the range of the numbers, specified by reference number. If data is read and written for the reference numbers that are not specified, device operation may get affected.
- ④ Many reference numbers that are not continuous can be read and written, however, if the reference number that is not specified is the starting number than it is an error (Error-02H).
- ⑤ When reading a number of reference numbers, the data of the number that is not specified by the reference number becomes '0'.
- ⑥ When writing multiple reference numbers, if an error occurs all the settings become disabled.

## 8-4. Method of creating a message

Message is made up of ① Slave address, ② Function code, ③ Data division, ④ Error check code. (See section 8-3.)

Message that can be read and written once is within the following range.

Function code	Number of data units	
	ASCII mode	RTU mode
01	64	64
02	64	64
03	32	64
04	32	64
15	64	64
16	32	64

Note) Number of units of data is the request from high order

Method of creating a message is explained in the following example.

Example) Reading the measurement value of 'Slave address 02' KP

### 8-4-1. Message in RTU mode

① Slave address: 02 [02H]

② Function code: 04 [04H]

Becomes 'Reading analog input data (Reading contents of input register)'. When action code is '04' specify 'Relative number of data 2 bytes' and 'number of units of data' that is to be read in data division. (See section 8-5. For 'function code:04', see section 8-5-4.)

※ It is necessary to confirm the number of bytes of data.

③ Data division: Starting relative number 100 ([00H][64H]), Number of units 2 ([00H][02H])

Measurement value (Analog input data) is stored in reference number '30032 to 30144' (See section 8-3-4. table 3). From the table it is understood that measurement value (PV) is stored in '30101' and PV status is stored in '30102'. (See section 8-7. For details on reading the measurement value see sections 8-7-2.) Relative number of the beginning 'Reference number 30101' is 30101-30001=100 and if displayed in 2 bytes it becomes '[00H] [64H]' (See section 8-3-4 table 3).

Number of units of data to be read is '2 units' of measurement value and PV status, hence when displayed in 2 bytes, it becomes [00H] [02H].

④ Error check: Calculate using CRC-16 2730H ([30H] [27H])

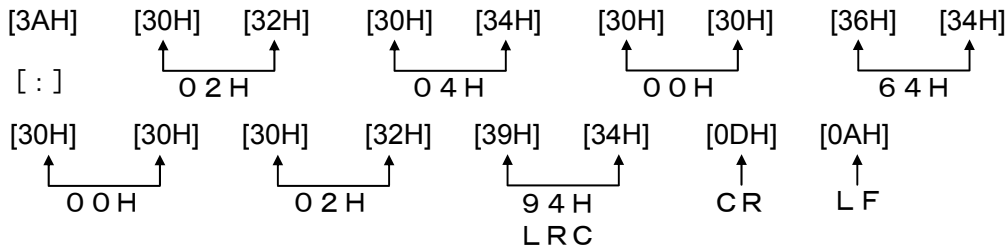
Error check in RTU mode is calculated using CRC-16. (See section 8-3-5.①) Data of message basic division becomes [02H] [04H] [00H] [64H] [00H] [02H] according to ① to ③ and CRC-16 becomes 2730H. Thus error check data becomes [30H] [27H].

⑤ Message: [02H] [04H] [00H] [64H] [00H] [02H] [30H] [27H]

Create message according to the message configuration. (See 8-3.)

### 8-4-2. ASCII mode message

Calculate error check LRC from message basic division. LRC becomes 94H (See section 8-3-5.②). Convert each data of basic division to ASCII code and also convert LRC to ASCII code and add it to basic division. Starting character of message is ":" and add "CR", "LF" at the end.



### 8-5. Function code

Function code wise response is shown below. (See section 8-3-2 <Table 2. Function code table>)

Note) See section 8-6 for response in case of abnormality

#### 8-5-1. Reading digital setting value (Reading the coil status)

[Function code : 01 (01H)]

Read only from specified number to specified units 'Continuous (ON/OFF) digital setting value of the number' is read. ON/OFF data is made up of data (1 byte) that contains 8 units in numeric order and the response message data. LSB (DO side) of each data becomes a digital data of the smallest number. If the units that are to be read are not in multiples of 8, then the bits that are not required become 0.

Example) Reading the digital settings value reference number 101 of slave 2

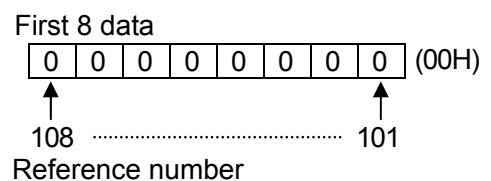
Reference number	101
Data	OFF

AT stop

<RTU mode>

Master → Device	
Slave address	02H
Function code	01H
Starting number (H)	00H
Starting number (L)	64H
Number of units (H)	00H
Number of units (L)	01H
CRC(L)	BCH
CRC(H)	26H

Device → Master (Normal)	
Slave address	02H
Function code	01H
Data count	01H
Initial 8 data	00H
CRC(L)	51H
CRC(H)	CCH



<ASCII mode error check>

Error check CRC (L), CRC (H) part is as follows.

LRC	98H	LRC	FCH
-----	-----	-----	-----

Note) Starting number (Relative number) is 'Reference number-1'. (Decimal 100(=101-1)→Hexadecimal 64H)

Note) Data count is the number of bytes of data.

(It differs from request units. For example request unit is 1 unit, data count is 1 unit).

### 8-5-2. Reading digital input data (Reading the status of input relay)

[Function code : 02 (02H)]

Read only from specified number to specified units 'Digital (ON/OFF) input data with continuous numbers'. ON/OFF data is made up of data (1 byte) that contains 8 units in numeric order and the response message data. LSB (DO side) of each data becomes a digital data of the smallest number. If the units that are to be read are not in multiples of 8, then the bits that are not required become 0. Example of response is same as that of 'Function code 01'. However starting number (Relative number) is 'Reference number-10001'.

### 8-5-3. Reading analog setting value (Reading the contents of maintenance register)

[Function code : 03 (03H)]

From the specified number, only the number of units of the continuation of number 'Analog setting value (2 bytes:16 bytes) data' that are specified are read. Data is split into high order 8 bits to low order 8 bits and is arranged in numeric order and consists of the data of response message.

Example) Reading pattern No., step No., and step repeat of slave 1.

(Reading 3 units of analog setting value reference number from 49003 to 49005 of slave 1.)

Reference number (Relative number)	49003 (232AH)	49004 (232BH)	49005 (232CH)
Data	1 (0001H)	2 (0002H)	10 (000AH)

← Example of  
Pattern No.= 1,  
Step No.= 2,  
Step repeat = 10

<RTU mode>

Master → Device		Device → Master (Normal)	
Slave address	01H	Slave address	01H
Function code	03H	Function code	03H
Starting number (H)	23H	Data count	06H
Starting number (L)	2AH	Pattern No. (H)	00H
Number of units (H)	00H	Pattern No. (L)	01H
Number of units (L)	03H	Step No. (H)	00H
CRC (L)	2FH	Step No. (L)	02H
CRC (H)	87H	Step repeat (H)	00H
		Step repeat (L)	0AH
		CRC (L)	3DH
		CRC (H)	72H

<ASCII mode error check>

LRC	ACH	LRC	E9H
-----	-----	-----	-----

Note) Starting number(Relative number)is 'Reference number-40001'.

Note) Data count is the number of bytes of data.

(It differs from request units. In the example request unit count is 3 units, data count is 6 unit).

Note) There is a limitation on the number of data units of the message (This device can be sent) that can be received once.

(See section 8-4.)

### 8-5-4. Reading analog input data (Reading the contents of input register)

[Function code : 04 (04H)]

From the specified number, only the number of units 'Analog input (2 bytes:16 bytes) data of the continuation number' that are specified are read. Data is split into high order 8 bits to low order 8 bits and is arranged in numeric order and consists of the data of response message. Response example is similar to that of 'Function code 03'. However starting number (Reference number) is 'Reference number-30001'.

### 8-5-5. Writing the digital setting value (Changing the status of single coil)

[Function code : 05 (05H)]

Consider the digital setting value of the specified number as the status (ON/OFF) that is specified.

Example) Execute AT1 of slave 2. (Switch ON the digital setting value reference number 101 of slave 2.)

<RTU mode>

Master → Device		Device → Master (Normal)	
Slave address	02H	Slave address	02H
Function code	05H	Function code	05H
Setting value number (H)	00H	Setting value number (H)	00H
Setting value number (L)	64H	Setting value number (L)	64H
Setting status (H)	FFH	Setting status (H)	FFH
Setting status (L)	00H	Setting status (L)	00H
CRC(L)	CDH	CRC(L)	CDH
CRC(H)	D6H	CRC(H)	D6H

<ASCII mode error check>

LRC	96H	LRC	96H
-----	-----	-----	-----

Note) During normal response the response is same as command message.

Note) Setting value number (Relative number) is 'Reference number-1'. (Decimal 100(=101-1)→Hexadecimal 64H)

Note) At the time of executing, set 'FF00H'. Set '0000H' at the time of stopping AT.

Note) If slave address is considered as 0, all the slave machines execute that command. However no slave machine responds.

### 8-5-6. Writing analog setting value (Writing to single maintenance register)

[Function code : 06 (06H)]

Consider the analog setting value of the specified number as the set value.

Example) Set input type number of slave 1 as 5 (K1).

<RTU mode>

Master → Device		Device → Master (Normal)	
Slave address	01H	Slave address	01H
Function code	06H	Function code	06H
Setting value number (H)	00H	Setting value number (H)	00H
Setting value number (L)	00H	Setting value number (L)	00H
Set data (H)	00H	Set data (H)	00H
Set data (L)	05H	Set data (L)	05H
CRC(L)	49H	CRC(L)	49H
CRC(H)	C9H	CRC(H)	C9H

<ASCII mode error check>

LRC	F4H	LRC	F4H
-----	-----	-----	-----

Note) Starting number(Relative number) is 'Reference number-40001'.

Note) During normal response the response is same as command message.

Note) If slave address is considered as 0, all the slave machines execute that command. However no slave machine responds.

### 8-5-7. Loop back test

[Function code : 08 (08H)]

Perform transmission check between master slaves. Respond for the diagnosis code that is specified. In this device perform 'return check to send the received data as it is' and diagnosis code is fixed as '0000H'.

Example) Implement 'Loop back test' to slave 2.

<RTU mode>

Master → Device

Slave address		02H
Function code		08H
Diagnosis code (H)	Fixed	00H
Diagnosis code (L)		00H
Option data		*
Option data		*
CRC(L)		*
CRC(H)		*

Device → Master (Normal)

Slave address		02H
Function code		08H
Diagnosis code (H)	Fixed	00H
Diagnosis code (L)		00H
Received data		*
Received data		*
CRC(L)		*
CRC(H)		*

### 8-5-8. Writing multiple digital setting value (Change is status of multiple coils)

[Function code : 15 (0H)]

From the specified number consider the digital setting value of the specified number of units as the specified status (ON/OFF).

ON/OFF specification becomes, one data of 8 units in numeric order. LSB (DO side) of each data becomes the digital data of smallest number. If the units to be written are not in multiples of 8, ignore the bits that are not required.

Example) Set AT1 of slave 2 to start.

(Change the digital setting value reference number 101 of slave 2 to the following status.)

Reference number	101
Data	ON

AT start

<RTU mode>

Master → Device

Slave address	02H
Function code	0FH
Starting number (H)	00H
Starting number (L)	64H
Number of units (H)	00H
Number of units (L)	01H
Data count	01H
Initial 8 data	01H
CRC(L)	DEH
CRC(H)	8AH

Device → Master (Normal)

Slave address	02H
Function code	0FH
Starting number (H)	00H
Starting number (L)	64H
Number of units (H)	00H
Number of units (L)	01H
CRC(L)	D5H
CRC(H)	E7H

<ASCII mode error check>

Error check CRC(L),CRC(H)part is as follows.

LRC	88H
-----	-----

LRC	8AH
-----	-----

Note) Starting number(Relative number)is 'Reference number-1'. (Decimal 100(=101-1)→Hexadecimal 64H)

Note) If slave address is changed to 0, all the slave machines execute that command. However no slave machine responds.

Note) There is a restriction on the number of data units of message that can be sent once (That this device can receive). (See section 8-4.)



### 8-5-9. Writing multiple analog setting values (Writing to multiple maintenance register)

[Function code : 16 (10H)]

From the specified number, change the analog setting value of specified number of units to the specified value. Data is split into high order 8 bits and low order 8 bits, is arranged in numeric order and then sent.

Example) Set parameter 1 PID of slave 1 as P=12.0%, I=90 seconds, D=25 seconds.

(Set 3 units of analog setting value reference number from 40206 to 40208 of slave 1.)

Reference number (Relative number)	205 (00CDH)	206 (00CEH)	207 (00CFH)
Data	120 (0078H)	90 005AH	25 (0019H)

<RTU mode>

Master → Device		Device → Master(Normal)	
Slave address	01H	Slave address	01H
Function code	10H	Function code	10H
Starting number (H)	00H	Starting number (H)	00H
Starting number (L)	CDH	Starting number (L)	CDH
Number of units (H)	00H	Number of units (H)	00H
Number of units (L)	03H	Number of units (L)	03H
Data count	06H	CRC(L)	11H
Initial data (H)	00H	CRC(H)	C4H
Initial data (L)	78H		
Second data (H)	00H		
Second data (L)	5AH		
Third data (H)	00H		
Third data (L)	19H		
CRC(L)	33H		
CRC(H)	95H		

<ASCII mode error check>

LRC	2EH	LRC	1EH
-----	-----	-----	-----

Note) Starting number (Relative number) is 'Reference number-40001'.

Note) If slave address is considered as 0, all the slave machines execute that command.  
However no slave machine responds.

Note) There is a restriction on the number of data units of message that can be sent once (That this device can receive). (See section 8-4.)

## 8-6. Process during abnormality

If there is an error in the contents of the message from the master, respond as follows.

### 8-6-1. In case of no response

In the following cases the messages are ignored and no response is given.

- ① When transmission error (over run, framing, parity, CRC or LRC) is detected in the message.
- ② When the slave address during the message is not the self address.
- ③ When the data interval of the message is long.
  - RTU mode...When less than 9600bps:20msec or more
  - When 9600bps or more:5msec or more
  - ASCII mode...1 second or more
- ④ When transmission parameters do not match.
- ⑤ When received message exceeds the number of bytes that can be received (Sometimes no response is given when the number of messages that can be received are received.)

Note) When slave address is '0' by write function, it there is no error in the message, message is executed but there is no response. If the error mentioned above occurs in the message then also there is no response, hence when slave address is '0' the normality/abnormality cannot be judged.

## 8-6-2. Response of error message

In the contents of the message from the master if the errors mentioned in section 8-6-1 do not occur instead if the following error is detected, then display (respond) as 'error message' the code that shows error contents.

Format of error message is as follows.

Slave address	Function code	Function code+80H
Function code+80H	01	81H
Error code	02	82H
CRC(L)	03	83H
CRC(H)	04	84H
	05	85H
	06	86H
	08	88H
	15	8FH
	16	90H

Error codes are as follows.

Error code	Contents
01H	Function code defect When function code that is not specified is received
02H	Relative number (reference number) defect When received starting number or setting value number is other than what is specified
03H	Defect of number of units of data ·When the number of units of data to be sent in response to the received message exceeds the specified number of units ·When requested number of data units is 0 ·When received specified data count and actual data count do not match
11H	Other than setting value range When numeric value that is out of setting range is mentioned in the reference table
12H	Cannot be set ·When linear decimal point is written during TC/Pt input ·When linear scale is written during TC/Pt input ·When control format writes SV at the time of stationary operation, during program operation ·When AT is started during AT ·When AT1 is executed during the program operation at the time of resetting ·When AT2, AT3 is executed except during the program operation at the time of resetting ·When operation screen and drive pattern no. are set at the time other than that of resetting ·When FB tuning is executed during AT, FB tuning ·When FB tuning is executed during program operation ·When pattern selection system sets operation screen and pattern no. except during COM ·When ADV, STOP is set during RESET ·When RUN, STOP, ADV is set during END ·When RUN, STOP, ADV, RESET is set during CONST ·When MANUAL output is set when it is not a manual operation ·When program drive system sets operation screen and program drive except in case of MASTER COM ·When program operation sets time unit except during RESET ·When program operation sets control algorithm except during RESET ·When pattern copy trigger is set when pattern of copy source is not set or pattern of copy destination is not deleted ·When program operation sets pattern clear trigger except during RESET ·When program operation sets step addition trigger except during RESET ·When program operation sets step deletion trigger except during RESET

## 8-7. KP relative number table

### 8-7-1. Analog setting value

① Setup parameter 1

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC Code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
40001	03 06 16	R W W	Input type number	<p>[Standard input]</p> <p>1/2/3/4/5/6/7/8/9/ 10/11/12/13/14/15/1 6/17/18/19/20/ 21/22/23/24/25/26/2 7/28/31/32/33/ 34/35/36/37/41/42/4 4/45/46/47/49/ 50/51/53/54/56/57 (1/2/3/4/5/6/7/8/9/10/ 11/12/13/14/15/16/1 7/18/19/20/ 21/22/23/24/25/26/2 7/28/31/32/33/ 34/35/36/37/41/42/4 4/45/46/47/49/ 50/51/53/54/56/57)</p> <p>[4-wire type input]</p> <p>41/42/44/45/46/47/4 9/50/51/52/53/ 54/56/57 (41/42/44/45/46/ 47/49/50/51/52/53/5 4/56/57)</p>	<p>[Standard input]</p> <p>5 (K1)</p> <p>[4-wire type input]</p> <p>53 (Pt100Ω1)</p>	<p>[Standard input]</p> <p>1= B 2= R1 3= R2 4= S 5= K1 6= K2 7= K3 8= E1 9= E2 10= E3 11= E4 12= J1 13= J2 14= J3 15= J4 16= T1 17= T2 18= WRe5-26 19= W-WRe26 20= NiMo-Ni 21= CR-AuFe 22= N 23= PR5-20 24= PtRh40-20 25= Plati II 1 26= Plati II 2 27= U 28= L 31= ±10mV 32= ±20mV 33= ±50mV 34= ±100mV 35= ±5V 36= 0-20mA 37= ±10V 41= JPt100Ω1 42= JPt100Ω2 44= JPt100Ω4 45= JPt100Ω5 46= QPt100Ω1 47= QPt100Ω2 49= QPt100Ω4 50= QPt100Ω5 51= Pt50Ω 53= Pt100Ω1 54= Pt100Ω2 56= Pt100Ω4 57= Pt100Ω5</p>

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC Code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
						[4-wire type input] 41= JPt100Ω1 42= JPt100Ω2 44= JPt100Ω4 45= JPt100Ω5 46= QPt100Ω1 47= QPt100Ω2 49= QPt100Ω4 50= QPt100Ω5 51= Pt50Ω 52= Pt-Co 53= Pt100Ω1 54= Pt100Ω2 56= Pt100Ω4 57= Pt100Ω5  See range list. (Section 8-9)
40002	03 06 16	R W W	Unit number	0/2 (0/2)	0 (°C)	0= Celsius temperature (°C) 2=Absolute temperature (K)  When input type is 21:CR-AuFe, 52: Pt-Co setting,0:°C cannot be written. 1 means 'Do not set'.
40003	03 06 16	R W W	RJ	0/1 (0/1)	0	0=RJ_INT (internal) 1=RJ_EXT (external)
40004	03 06 16	R W W	Range 'Zero'	Within input range, Range in which 5 digits can be displayed (-19999 to 30000)	Auto develop- ment	Always set zero<span. Range is within the input range and WRITE is performed. (See section 8-9 measurement range and decimal point position)
40005	03 06 16	R W W	Range 'span'	Within input range, Range in which 5 digits can be displayed (-19999 to 30000)	Auto develop- ment	Always set zero<span. Range is within the input range and WRITE is performed. (See section 8-9 measurement range and decimal point position)
40006 40007	03 06 16	R W W	Linear scale 'MIN' Linear scale 'MAX'	-19999 to 30000 (-19999 to 30000) -19999 to 30000 (-19999 to 30000)	0 2000.0	Input whose range is set... Decimal point position depends on linear decimal point settings. In TC/Pt input status is READ only and writing is not possible.

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC Code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
40008	03 06 16	R W W	SV decimal point	0 to 4 digits (0 to 4)	1	Set decimal point position of linear scale In TC/Pt input, fixed value for each range can be READ. Writing is not possible.
40011	03 06 16	R W W	PV decimal point	0 to 4 digits (0 to 4)	1	
40012	03 06 16	R W W	Digital filter	0.0 to 99.9 (0 to 999)	0.1seconds	0.0=OFF
40020	03 06 16	R W W	SV decimal point for display	0 to 4 digits (0 to 4)	1	SV decimal point position of the first display part
40021	03 06 16	R W W	Direct/Reverse of control action	0/1 (0/1)	1 (REVERSE)	0= Direct (DIRECT: Direct operation) 1= Reverse (REVERSE: Reverse operation)
40022	03 06 16	R W W	Pulse cycle	1 to 180 (1 to 180)	30 seconds	Control output 1 can WRITE only ON OFF pulse/SSR drive pulse
40023	03 06 16	R W W	FB zero	0.0 to 99.9 (0 to 999)	0.0	Always set by zero<span. Control output 1 can write ON OFF servo type only.
40024			FB span	0.1 to 100.0 (1 to 1000)	100.0	
40025			FB dead band	0.5 to 5.0 (5 to 50)	1.0	
40026	03 06 16	R W W	Direct/reverse of control action of output 2	0/1 (0/1)	1 (REVERSE)	0= Direct (DIRECT: Direct operation) 1= Reverse (REVERSE: Reverse operation)
40027	03 06 16	R W W	Pulse 2 cycle	1 to 180 (1 to 180)	30 seconds	Control output 2 can WRITE only ON OFF pulse/SSR drive pulse.
40030	03 06 16	R W W	Cancel report output	0/1 (0/1)	0 (Usual alarm)	0= (Usual alarm) 1= Cancel alarm

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC Code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks				
40031	03 06 16	R W W	Alarm format 'AL1'	[Alarm format] 0/1 (0/1)  [Alarm assistance] 0/1/4/5 (0/1/4/5)	[Format] 1 (Deviation)  [Assistance] 0 (Higher limit)	Alarm format 0=A (Absolute value) 1=D (Deviation)  · Alarm assistance 0= H__(Higher limit, No wait, No maintenance) 1= HW_( High limit, Wait exists, No maintenance) 4= L__(Low limit, No Wait, No maintenance) 5= LW_(Low limit, Wait exists, No maintenance)  * Low order 8 bits is the alarm format setting, high order 8 bit does alarm assistance function setting.  High order 8 bit    low order 8 bit <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px;">Alarm support</td> <td style="width: 50px;">Alarm format</td> </tr> <tr> <td colspan="2" style="text-align: center;">Setting value</td> </tr> </table>	Alarm support	Alarm format	Setting value	
Alarm support	Alarm format									
Setting value										
40032	03 06 16	R W W	Alarm dead band 'AL1'	0.00 to 200.00 (0 to 20000)	2.00	Decimal point position when alarm format is absolute value/deviation: When SV DOT=0 it is→1 When SV DOT=1 it is→2 When SV DOT=2 it is→3 When SV DOT=3 it is→4 When SV DOT=4 it is→4				
40034	03 06 16	R W W	Alarm delay	0.0 to 2000.0 (0 to 20000)	0.0 seconds					
40036	03 06 16	R W W	Alarm format 'AL2'	Same as alarm format 'AL1'	[Format] 1 (Deviation)  [Assistance] 4 (Lower limit)	Same as alarm format 'AL1'				
40037	03 06 16	R W W	Alarm dead band 'AL2'	Same as alarm dead band 'AL1'	2.00	Same as alarm dead band 'AL1'				

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC Code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
40041	03 06 16	R W W	Alarm dead band 'AL3'	Same as alarm dead band 'AL1'	[Format] 1 (Deviation) [Assistance] 0 (Higher limit)	Same as alarm dead band 'AL1'
40042	03 06 16	R W W	Alarm dead band 'AL3'	Same as alarm dead band 'AL1'	2.00	Same as alarm dead band 'AL1'
40046	03 06 16	R W W	Alarm format 'AL4'	Same as alarm format 'AL1'	[Format] 1 (Deviation) [Assistance] 4 (Lower limit)	Same as alarm format 'AL1'
40047	03 06 16	R W W	Alarm dead band 'AL4'	Same as alarm dead band 'AL1'	2.00	Same as alarm dead band 'AL1'



② Setup parameter 2

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
40051	03 06 16	R W W	Transmission (H) analog type	0/1/2/3/4 (0/1/2/3/4)	1 (PV)	0=TRS_SV 1=TRS_PV 2=TRS_MV1 3=TRS_MV2 4=TRS_MFB  WRITE is not possible when there is no transmission signal output MV2 writing is not possible when there is no control output 2.  MFB cannot be written when control output 1 is other than ON/OFF servo.
40052 40053	03 06 16	R W W	Transmission (H) and transmission scale 'zero' Transmission (H) transmission scale (span)	[In case of PV/SV] -19999 to 30000 (-19999 to 30000) [In case of MV1/MV2/MFB] -1999.9 to 3000.0 (-19999 to 30000)	Measurement range	Writing is not possible when there is no transmission signal output.  [In case of PV/SV/RSV] Decimal point position: SV decimal point position
40079	03 06 16	R W W	Digital transmission type 1	0/1/2/3/4/5 (0/1/2/3/4/5)	1 (PV)	0=TRS_SV 1=TRS_PV 2=TRS_MV1 3=TRS_MV2 4=TRS_MFB  Writing is not possible when it is not a function with communication. MV2 writing is not possible when there is no control output 2. MFB cannot be written when control output 1 is other than ON/OFF servo.

③ 1 type parameter

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Communication range)	Initial value	Remarks
40101	03 06 16	R W W	Output 2 gap	-100.0 to 100.0 (-1000 to 1000)	0.0%	
40102	03 06 16	R W W	Output 2 PID 'P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999)	5.0%	
40103	03 06 16	R W W	Output 2 PID 'I'	0( $\infty$ ) 1 to 9999 (0: Infinity 1 to 9999)	60 seconds	
40104	03 06 16	R W W	Output 2 PID 'D'	0 to 9999 (0 to 9999)	30 seconds	
40105	03 06 16	R W W	Output 2 limit (Output 2 scale) 'Lower limit value'	-5.0 to 100.0 (-50 to 1000)	0.0%	Always set output 2 limit as lower limit<higher limit.
40106	03 06 16	R W W	Output 2 limit (Output 2 scale) 'Higher limit value'	0.0 to 105.0 % (0 to 1050)	100.0%	Always set output 2 limit as lower limit<higher limit.
40108	03 06 16	R W W	Dead band of output 2	0.1 to 9.9 (1 to 99)	0.5%	
40111	03 06 16	R W W	Output dead band	0.1 to 9.9 (1 to 99)	0.5%	
40112	03 06 16	R W W	Output during PV abnormality 'Lower limit'	-5.0 to 105.0 (-50 to 1050)	0.0%	
40113	03 06 16	R W W	Output during PV abnormality 'Higher limit'	-5.0 to 105.0 (-50 to 1050)	0.0%	
40148	03 06 16	R W W	Control algorithm	0/1 (0/1)	0	0=Position type PID 1=Speed type PID * When program operation is other than RESET, writing is not possible.

④ Execution parameter, Specific parameter

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40151	03	R	'SV (target) value' that is being used	Within the range of range scale	-	
40156	03 06 16	R W W	PID 'P' that is being executed	0:2 position control 0.1 to 999.9 (0 to 9999)	-	
40157	03 06 16	R W W	PID 'I' that is being executed	0( $\infty$ ) 1 to 9999 (0 to 9999)	-	
40158	03 06 16	R W W	PID 'D' that is being executed	0 to 9999 (0 to 9999)	-	
40159	03 06 16	R W W	Output limit (Output scale) 'Lower limit value'	-5.0 to 100.0 (-50 to 1000)	-	Always set output limit as lower limit<higher limit.
40160	03 06 16	R W W	Output limit (Output scale) 'Higher limit value'	0.0 to 105.0 (0 to 1050)	-	Always set output limit as lower limit<higher limit.
40161	03 06 16	R W W	Descending output variation limit during execution	-100.0 to -0.1 (-1000 to -1)	-	
40162	03 06 16	R W W	Ascending output variation limit during execution	0.1 to 100.0 (1 to 1000)	-	
40163	03 06 16	R W W	Sensor correction during execution	-19999 to 20000 (-19999 to 20000)_	-	Decimal point position:0.1 time resolution of PV decimal point position
40181	03 06 16	R W W	Alarm value 1 that is being executed	-19999 to 30000 (-19999 to 30000)	-	Decimal point position: SV decimal point position
40183	03 06 16	R W W	Alarm value 2 that is being executed	-19999 to 30000 (-19999 to 30000)	-	Decimal point position: SV decimal point position

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40185	03 06 16	R W W	Alarm value 3 that is being executed	-19999 to 30000 (-19999 to 30000)	-	Decimal point position: SV decimal point position
40187	03 06 16	R W W	Alarm value 4 that is being executed	-19999 to 30000 (-19999 to 30000)	-	Decimal point position: SV decimal point position

⑤ 8 type parameter no. 1

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40206	03 06 16	R W W	PID 16 type 'Parameter 1 of P'	0:2position control 0.1 to 999.9 (0:2position control 1 to 9999:P value)	5.0%	
40207	03 06 16	R W W	PID 16 type 'Parameter 1 of I'	0( $\infty$ ) 1 to 9999 (0: Infinity 1 to 9999:Ivalue)	60 seconds	
40208	03 06 16	R W W	PID 16 type 'Parameter 1 of D'	0 to 9999 (0 to 9999)	30 seconds	
40209 40210	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Parameter 1 of lower limit value' Output limit 8 types (Output scale 8 types) 'Parameter 1 of higher limit value'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40211	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 1'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40212	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 1'	0.1 to 100.0 (1 to 1000)	100.0%	
40213	03 06 16	R W W	Sensor correction 'Parameter 1'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40214	03 06 16	R W W	A.R.W 'Parameter of lower limit value'	-100.0 to 0.0 (-1000 to 0)	-50.0%	
40215	03 06 16	R W W	A.R.W 'Parameter of higher limit value'	0.0 to 100.0 (0 to 1000)	50.0%	
40216	03 06 16	R W W	Output preset	-100.0 to 100.0 (-1000 to 1000)	50.0%	
40218	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 1'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40219	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 1 of hours or minutes'	0 to 999 Hours or minutes (0 to 999)	000	
40220	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 1 of minutes and seconds'	0 to 59 minutes or seconds (0 to 59)	00	

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40221	03 06 16	R W W	Time signal 8 types 'Parameter 1 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40222	03 06 16	R W W	Time signal 8 types 'Parameter 1 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40223	03 06 16	R W W	Time signal 8 types 'Parameter 1 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40224	03 06 16	R W W	Time signal 8 types 'Parameter 1 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40231	03 06 16	R W W	Alarm value 1 8 types 'Parameter 1'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40233	03 06 16	R W W	Alarm value 2 8 types 'Parameter 1'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40235	03 06 16	R W W	Alarm value 3 8 types 'Parameter 1'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40237	03 06 16	R W W	Alarm value 4 8 types 'Parameter 1'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position

⑥ 8 type parameter no. 2

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40256	03 06 16	R W W	PID 16 type 'Parameter 2 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40257	03 06 16	R W W	PID 16 type 'Parameter 2 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:Ivalue)	60 seconds	
40258	03 06 16	R W W	PID 16 type 'Parameter 2 of D'	0 to 9999 (0 to 9999)	30 seconds	
40259 40260	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower limit value of parameter 2' Output limit 8 types (Output scale 8 types) 'Higher limit value of parameter 2'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40261	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 2'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40262	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 2'	0.1 to 100.0 (1 to 1000)	100.0%	
40263	03 06 16	R W W	Sensor correction 'Parameter 2'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40268	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 2'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40269	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 2 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40270	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 2 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40271	03 06 16	R W W	Time signal 8 types 'Parameter 2 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40272	03 06 16	R W W	Time signal 8 types 'Parameter 2 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40273	03 06 16	R W W	Time signal 8 types 'Parameter 2 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40274	03 06 16	R W W	Time signal 8 types 'Parameter 2 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40281	03 06 16	R W W	Alarm value 1 8 types 'Parameter 2'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40283	03 06 16	R W W	Alarm value 2 8 types 'Parameter 2'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40285	03 06 16	R W W	Alarm value 3 8 types 'Parameter 2'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40287	03 06 16	R W W	Alarm value 4 8 types 'Parameter 2'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position



⑦ 8 types parameter No.3

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40306	03 06 16	R W W	PID·16 types 'Parameter 3 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40307	03 06 16	R W W	PID·16 types 'Parameter 3 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40308	03 06 16	R W W	PID·16 types 'Parameter 3 of D'	0 to 9999 (0 to 9999)	30 seconds	
40309 40310	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Parameter 3 of lower limit value' Output limit 8 types (Output scale 8 types) 'Parameter 3 of upper limit value'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40311	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 3'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40312	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 3'	0.1 to 100.0 (1 to 1000)	100.0%	
40313	03 06 16	R W W	Sensor correction 'Parameter 3'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40318	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 3'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40319	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 3 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40320	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 3 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40321	03 06 16	R W W	Time signal 8 types 'Parameter 3 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40322	03 06 16	R W W	Time signal 8 types 'Parameter 3 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40323	03 06 16	R W W	Time signal 8 types 'Parameter 3 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40324	03 06 16	R W W	Time signal 8 types 'Parameter 3 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40331	03 06 16	R W W	Alarm value 1 8 types 'Parameter 3'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40333	03 06 16	R W W	Alarm value 2 8 types 'Parameter 3'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40335	03 06 16	R W W	Alarm value 3 8 types 'Parameter 3'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40337	03 06 16	R W W	Alarm value 4 8 types 'Parameter 3'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position

⑧ 8 type parameter No.4

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40356	03 06 16	R W W	PID 16 type 'Parameter 4 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P VALUE)	5.0%	
40357	03 06 16	R W W	PID 16 type 'Parameter 4 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I VALUE)	60 seconds	
40358	03 06 16	R W W	PID 16 type 'Parameter 4 of D'	0 to 9999 (0 to 9999)	30 seconds	
40359 40360	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower order value of parameter 4' Output limit 8 types (Output scale 8 types) 'Higher order value of parameter 4'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40361	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 4'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40362	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 4'	0.1 to 100.0 (1 to 1000)	100.0%	
40363	03 06 16	R W W	Sensor correction 'Parameter 4'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40368	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 4'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40369	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 4 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40370	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 4 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40371	03 06 16	R W W	Time signal 8 types 'Parameter 4 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40372	03 06 16	R W W	Time signal 8 types 'Parameter 4 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40373	03 06 16	R W W	Time signal 8 types 'Parameter 4 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40374	03 06 16	R W W	Time signal 8 types 'Parameter 4 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40381	03 06 16	R W W	Alarm value 1 8 types 'Parameter 4'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40383	03 06 16	R W W	Alarm value 2 8 types 'Parameter 4'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40385	03 06 16	R W W	Alarm value 3 8 types 'Parameter 4'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40387	03 06 16	R W W	Alarm value 4 8 types 'Parameter 4'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position

⑨ 8 type paramter no.5

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40406	03 06 16	R W W	PID 16 type 'Parameter 5 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P VALUE)	5.0%	
40407	03 06 16	R W W	PID 16 type 'Parameter 5 of I'	0(∞) 1 to 9999 (0:Infinity 1 to 9999:I VALUE)	60 seconds	
40408	03 06 16	R W W	PID 16 type 'Parameter 5 of D'	0 to 9999 (0 to 9999)	30 seconds	
40409 40410	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower order value of parameter 5' Output limit 8 types (Output scale 8 types) 'Higher order value of parameter 5'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40411	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 5'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40412	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 5'	0.1 to 100.0 (1 to 1000)	100.0%	
40413	03 06 16	R W W	Sensor correction 'Parameter 5'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40418	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 5'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40419	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 5 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40420	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 5 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40421	03 06 16	R W W	Time signal 8 types 'Parameter 5 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40422	03 06 16	R W W	Time signal 8 types 'Parameter 5 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40423	03 06 16	R W W	Time signal 8 types 'Parameter 5 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40424	03 06 16	R W W	Time signal 8 types 'Parameter 5 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40431	03 06 16	R W W	Alarm value 1 8 types 'Parameter 5'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40433	03 06 16	R W W	Alarm value 2 8 types 'Parameter 5'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40435	03 06 16	R W W	Alarm value 3 8 types 'Parameter 5'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40437	03 06 16	R W W	Alarm value 4 8 types 'Parameter 5'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position

⑩ 8 type paramter no. 6

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40456	03 06 16	R W W	PID 16 types 'Parameter 6 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P VALUE)	5.0%	
40457	03 06 16	R W W	PID 16 types 'Parameter 6 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40458	03 06 16	R W W	PID 16 types 'Parameter 6 of D'	0 to 9999 (0 to 9999)	30 seconds	
40459 40460	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower order value of parameter 6' Output limit 8 types (Output scale 8 types) 'Higher order value of parameter 6'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40461	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 6'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40462	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 6'	0.1 to 100.0 (1 to 1000)	100.0%	
40463	03 06 16	R W W	Sensor correction 'Parameter 6'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40469	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 6'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40470	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 6 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40471	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 6 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40472	03 06 16	R W W	Time signal 8 types 'Parameter 6 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40473	03 06 16	R W W	Time signal 8 types 'Parameter 6 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40474	03 06 16	R W W	Time signal 8 types 'Parameter 6 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40475	03 06 16	R W W	Time signal 8 types 'Parameter 6 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40481	03 06 16	R W W	Alarm value 1 8 types 'Parameter 6'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40483	03 06 16	R W W	Alarm value 2 8 types 'Parameter 6'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40485	03 06 16	R W W	Alarm value 3 8 types 'Parameter 6'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40487	03 06 16	R W W	Alarm value 4 8 types 'Parameter 6'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position



① 8 type parameter No.7

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40506	03 06 16	R W W	PID 16 types 'Parameter 7 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P VALUE)	5.0%	
40507	03 06 16	R W W	PID 16 types 'Parameter 7 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40508	03 06 16	R W W	PID·16 types 'Parameter 7 of D'	0 to 9999 (0 to 9999)	30 seconds	
40509 40510	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower order value of parameter 7' Output limit 8 types (Output scale 8 types) 'Higher order value of parameter 7'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40511	03 06 16	R W W	Output variation limit· 8 types 'Descending parameter 7'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40512	03 06 16	R W W	Output variation limit· 8 types 'Ascending parameter 7'	0.1 to 100.0 (1 to 1000)	100.0%	
40513	03 06 16	R W W	Sensor correction 'Parameter 7'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40518	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 7'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40519	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 7 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40520	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 7 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40521	03 06 16	R W W	Time signal 8 types 'Parameter 7 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40522	03 06 16	R W W	Time signal 8 types 'Parameter 7 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40523	03 06 16	R W W	Time signal 8 types 'Parameter 7 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40524	03 06 16	R W W	Time signal 8 types 'Parameter 7 of OFF time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40531	03 06 16	R W W	Alarm value 1 8 types 'Parameter 7'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40533	03 06 16	R W W	Alarm value 2 8 types 'Parameter 7'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
40535	03 06 16	R W W	Alarm value 3 8 types 'Parameter 7'	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
40537	03 06 16	R W W	Alarm value 4 8 types 'Parameter 7'	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position

⑫ 8 type paramter no.8

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40556	03 06 16	R W W	PID 16 types 'Parameter 8 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40557	03 06 16	R W W	PID 16 types 'Parameter 8 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40558	03 06 16	R W W	PID 16 types 'Parameter 8 of D'	0 to 9999 (0 to 9999)	30 seconds	
40559 40560	03 06 16	R W W	Output limit 8 types (Output scale 8 types) 'Lower order value of parameter 8' Output limit 8 types (Output scale 8 types) 'Higher order value of parameter 8'	-5.0 to 100.0 (-50 to 1000) 0.0 to 105.0 (0 to 1050)	0.0% 100.0%	Always set output limit as lower limit<higher limit.
40561	03 06 16	R W W	Output variation limit 8 types 'Descending parameter 8'	-100.0 to -0.1 (-1000 to -1)	-100.0%	
40562	03 06 16	R W W	Output variation limit 8 types 'Ascending parameter 8'	0.1 to 100.0 (1 to 1000)	100.0%	
40563	03 06 16	R W W	Sensor correction 'Parameter 8'	-19999 to 20000 (-19999 to 20000)	0.0%	Decimal point position: 0.1 times resolution of PV decimal point position
40568	03 06 16	R W W	Real temperature compensation 8 types 'Parameter 8'	1 to 20000 (1 to 20000)	2000.0	Decimal point position: SV decimal point position
40569	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 8 of hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	
40570	03 06 16	R W W	Waiting time alarm 8 types 'Parameter 8 of minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	
40571	03 06 16	R W W	Time signal 8 types 'Parameter 8 of ON time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists
40572	03 06 16	R W W	Time signal 8 types 'Parameter 8 of ON time minutes or seconds'	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
40573	03 06 16	R W W	Time signal 8 types 'Parameter 8 of OFF time hours or minutes'	0 to 999 hours or minutes (0 to 999)	000	Writing is possible only when time signal exists

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40574	03	R	Time signal 8 types	0 to 59 minutes or seconds (0 to 59)	00	Writing is possible only when time signal exists
	06	W	'Parameter 8 of OFF time			
	16	W	minutes or seconds'			
40581	03	R	Alarm value 1	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
	06	W	8 types			
	16	W	'Parameter 8'			
40583	03	R	Alarm value 2	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
	06	W	8 types			
	16	W	'Parameter 8'			
40585	03	R	Alarm value 3	-19999 to 30000 (-19999 to 30000)	3000.0	Decimal point position: SV decimal point position
	06	W	8 types			
	16	W	'Parameter 8'			
40587	03	R	Alarm value 4	-19999 to 30000 (-19999 to 30000)	-1999.9	Decimal point position: SV decimal point position
	06	W	8 types			
	16	W	'Parameter 8'			

⑬ No.9 parameter

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40601	03 06 16	R W W	PID 16 types 'Parameter 9-1 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40602	03 06 16	R W W	PID 16 types 'Parameter 9-1 of I'	0 (∞) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40603	03 06 16	R W W	PID 16 types 'Parameter 9-1 of D'	0 to 9999 (0 to 9999)	30 seconds	
40604	03 06 16	R W W	PID 16 types 'Parameter 9-2 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40605	03 06 16	R W W	PID 16 types 'Parameter 9-2 of I'	0 (∞) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40606	03 06 16	R W W	PID 16 types 'Parameter 9-2 of D'	0 to 9999 (0 to 9999)	30 seconds	
40607	03 06 16	R W W	PID 16 types 'Parameter 9-3 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40608	03 06 16	R W W	PID 16 types 'Parameter 9-3 of I'	0 (∞) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40609	03 06 16	R W W	PID 16 types 'Parameter 9-3 of D'	0 to 9999 (0 to 9999)	30 seconds	
40610	03 06 16	R W W	PID 16 types 'Parameter 9-4 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40611	03 06 16	R W W	PID 16 types 'Parameter 9-4 of I'	0 (∞) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40612	03 06 16	R W W	PID 16 types 'Parameter 9-4 of D'	0 to 9999 (0 to 9999)	30 seconds	
40613	03 06 16	R W W	PID 16 types 'Parameter 9-5 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40614	03 06 16	R W W	PID 16 types 'Parameter 9-5 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40615	03 06 16	R W W	PID 16 types 'Parameter 9-5 of D'	0 to 9999 (0 to 9999)	30 seconds	
40616	03 06 16	R W W	PID 16 types 'Parameter 9-6 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40617	03 06 16	R W W	PID 16 types 'Parameter 9-6 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40618	03 06 16	R W W	PID 16 types 'Parameter 9-6 of D'	0 to 9999 (0 to 9999)	30 seconds	
40619	03 06 16	R W W	PID 16 types 'Parameter 9-7 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40620	03 06 16	R W W	PID 16 types 'Parameter 9-7 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40621	03 06 16	R W W	PID 16 types 'Parameter 9-7 of D'	0 to 9999 (0 to 9999)	30 seconds	
40622	03 06 16	R W W	PID 16 types 'Parameter 9-8 of P'	0:2 position control 0.1 to 999.9 (0:2 position control 1 to 9999:P value)	5.0%	
40623	03 06 16	R W W	PID 16 types 'Parameter 9-8 of I'	0( $\infty$ ) 1 to 9999 (0:Infinity 1 to 9999:I value)	60 seconds	
40624	03 06 16	R W W	PID 16 types 'Parameter 9-8 of D'	0 to 9999 (0 to 9999)	30 seconds	
40625	03 06 16	R W W	SV 8 type of AT2 'Parameter 1'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40626	03 06 16	R W W	SV 8 type of AT2 'Parameter 2'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40627	03 06 16	R W W	SV 8 type of AT2 'Parameter 3'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40628	03 06 16	R W W	SV 8 type of AT2 'Parameter 4'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40629	03 06 16	R W W	SV 8 type of AT2 'Parameter 5'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40630	03 06 16	R W W	SV 8 type of AT2 'Parameter 6'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40631	03 06 16	R W W	SV 8 type of AT2 'Parameter 7'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40632	03 06 16	R W W	SV 8 type of AT2 'Parameter 8'	-19999 to 30000 (-19999 to 30000)	Automatic development	Decimal point position: SV decimal point position
40633	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 1'	Within the range of SV limit (Within the range of SV limit)	Automatic development	Decimal point position: SV decimal point position
40634	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 2'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position
40635	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 3'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position
40636	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 4'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position
40637	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 5'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position
40638	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 6'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position
40639	03 06 16	R W W	SV 8 section of PID No.9 'Parameter 7'	Prior section Max value to SV limit higher limit value (Prior section Max value to SV limit higher limit value)	Automatic development	Decimal point position: SV decimal point position

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks																
40640	03 06 16	R W W	SV 8 type of AT3 'Parameter 1'	Within the range of SV section No. 9-1 (Within the range of SV section No. 9-1)	Automatic development	Decimal point position: SV decimal point position																
40641	03 06 16	R W W	SV 8 type of AT3 'Parameter 2'	Within the range of SV section No. 9-2 (Within the range of SV section No. 9-2)	Automatic development	Decimal point position: SV decimal point position																
40642	03 06 16	R W W	SV 8 type of AT3 'Parameter 3'	Within the range of SV section No. 9-3 (Within the range of SV section No. 9-3)	Automatic development	Decimal point position: SV decimal point position																
40643	03 06 16	R W W	SV 8 type of AT3 'Parameter 4'	Within the range of SV section No. 9-4 (Within the range of SV section No. 9-4)	Automatic development	Decimal point position: SV decimal point position																
40644	03 06 16	R W W	SV 8 type of AT3 'Parameter 5'	Within the range of SV section No. 9-5 (Within the range of SV section No. 9-5)	Automatic development	Decimal point position: SV decimal point position																
40645	03 06 16	R W W	SV 8 type of AT3 'Parameter 6'	Within the range of SV section No. 9-6 (Within the range of SV section No. 9-6)	Automatic development	Decimal point position: SV decimal point position																
40646	03 06 16	R W W	SV 8 type of AT3 'Parameter 7'	Within the range of SV section No. 9-7 (Within the range of SV section No. 9-7)	Automatic development	Decimal point position: SV decimal point position																
40647	03 06 16	R W W	SV 8 type of AT3 'Parameter 8'	Within the range of SV section No. 9-8 (Within the range of SV section No. 9-8)	Automatic development	Decimal point position: SV decimal point position																
40648	03 06 16	R W W	'Start direction' of AT2, 3	0/1 (0/1)	0 (UP)	0= UP 1= DOWN																
40649	03 06 16	R W W	'ON/OFF flag' of AT2	0/1 (0/1)	0 (OFF)	0=OFF 1=ON  *Consider bit 0 to bit 8 of lower 8 bits as ON/OFF flag of SV1 to SV8.  Lower 8 bits <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <tr> <td colspan="4" style="text-align: center;">SV8</td> <td colspan="4" style="text-align: center;">SV1</td> </tr> </table>	7	6	5	4	3	2	1	0	SV8				SV1			
7	6	5	4	3	2	1	0															
SV8				SV1																		
40650	03 06 16	R W W	'ON/OFF flag' of AT3	0/1 (0/1)	0 (OFF)	0=OFF 1=ON *Same as that of reference 40649																



FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
40701	03 06 16	R W W	Output 2 Descending output variation limiter	-100.0 to -0.1 % (-1000 to -1)	-100.0%	Writing is possible only in case of output 2 specifications
40702	03 06 16	R W W	Output 2 Ascending output variation limiter	0.1 to 100.0 % (1 to 1000)	100.0%	Writing is possible only in case of output 2 specifications
40703	03 06 16	R W W	Output 2 Output during PV lower limit abnormality	-5.0 to 105.0 % (-50 to 1050)	0.0%	Writing is possible only in case of output 2 specifications
40704	03 06 16	R W W	Output 2 Output during PV higher limit abnormality	-5.0 to 105.0 % (-50 to 1050)	0.0%	Writing is possible only in case of output 2 specifications
40707	03 06 16	R W W	Preset manual	-5.0 to 105.0 % (-50 to 1050)	0.0%	
40708	03 06 16	R W W	Output 2 Preset manual	-5.0 to 105.0 % (-50 to 1050)	0.0%	Writing is possible only in case of output 2 specifications

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
48001	03 06 16	R W W	Display back light	0/1/2 (0/1/2)	2 (AUTO)	0= Green 1= Orange 2=AUTO (Green/orange automatic switching)
48002	03 06 16	R W W	Display contrast	0 to 100 % (0 to 100)	50%	
48003	03 06 16	R W W	Key backlight	0/1/2 (0/1/2)	0 (AUTO)	0=AUTO (Automatic ON/OFF) 1=OFF (Does not glow normally) 2=ON (Glows normally)

⑭ Pattern information

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
49003	03 06 16	R W W	'Pattern No.'	Pattern 1 to 19 (1 to 19)	1	Initial value:1( = Pattern No. 1) Set before reading or writing the pattern information.
49004	03 06 16	R W W	'Step No.'	Step 01 to 18 or Final step No. (0 to 19)	0	Initial value:0( = Step No. 0) Set before reading or writing the pattern information.
49005	03 06 16	R W W	Repeat step	0:Start repeat step 1 to 99:End repeat step 255: Blank display (Other than repeat step section) (0 to 99/255)	255 (Blank display)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step.
49006	03 06 16	R W W	Program pattern 'SV'	[Step 0] Within the range of SV limit (Within the range of SV limit) [Step 01 to 19] Within the range of SV limit (Within the range of SV limit)	[Step 0] 0 SV value before [Step 01 to 19]	Writing is not possible when, reference 49004 'step No.' is later to END step. Decimal point position: SV decimal point position
49007	03 06 16	R W W	Program pattern 'Time hours or minutes'	000 to 999 (0 to 999)	0	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step No. other than step No.0.
49008	03 06 16	R W W	Program pattern 'Time minutes or seconds'	00 to 59 (0 to 59)	0	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step no. other than step No.0.
49010	03 06 16	R W W	PID No.	0: Previous step continuation 1 to 9: Parameter No. 1 to 9 (0 to 9)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step No. other than step No.0.
49012	03 06 16	R W W	Alarm No.	0: Previous step continuation 1 to 8: Parameter No. 1 to 8 (0 to 8)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step no. other than step No.0.
49013	03 06 16	R W W	Output limit No.	0: Previous step continuation 1 to 8: Parameter No. 1 to 8 (0 to 8)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step No. other than step No.0.
49014	03 06 16	R W W	Output variation limit No.	0: Previous step continuation 1 to 8: Parameter No. 1 to 8 (0 to 8)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step No. other than step No.0.
49016	03 06 16	R W W	Sensor correction No.	0: Previous step continuation 1 to 8: Parameter No. 1 to 8 (0 to 8)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step No.' is 0 or later to END step. Write, after setting a step No. other than step No.0.

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
49018	03 06 16	R W W	Real temperature compensation No.	0:OFF(No real temperature compensation operation) 1 to 8: Parameter No. 1 to 8 (0 to 8)	0	Writing is not possible when, reference 49004 'step no.' is 0 or later to END step. Write, after setting a step no. other than step no.0.
49019	03 06 16	R W W	Waiting alarm No.	0: Previous step continuation 1 to 8: Parameter No. 1 to 8 (0 to 8)	1 (STEP1) 0 (from STEP2)	Writing is not possible when, reference 49004 'step no.' is 0 or later to END step. Write, after setting a step no. other than step no.0.
49020	03 06 16	R W W	Time signal No. No.1	0: Invalid 1 to 8: Parameter No. 1 to 8 11 to 18:Repeat of parameter No. 1 to Repeat of parameter No. 8 20:ON during section (0,1 to 8,11 to 18,20)	0	Writing is not possible when, reference 49004 'step no.' is 0 or later to END step. Write, after setting a step no. other than step no.0.
49021	03 06 16	R W W	Time signal No. No.2	Same as reference no. 49020	0	Same as reference no. 49020
49022	03 06 16	R W W	Time signal No. No.3	Same as reference no. 49020	0	Same as reference no. 49020
49023	03 06 16	R W W	Time signal No. No.4	Same as reference no. 49020	0	Same as reference no. 49020
49024	03 06 16	R W W	Time signal No. No.5	Same as reference no. 49020	0	Same as reference no. 49020
49040	03	R	Existing step count	0 to 19 (0 to 19)	0	
49041	03 06 16	R W W	Program pattern Start SV 'Step 0'	Within the range of SV limit (Within the range of SV limit)	0	Decimal point position: SV decimal point position
49042	03 06 16	R W W	Program pattern PV/SV start 'Step 0'	0/1 (0/1)	0	0= SV start 1= PV start
49043	03 06 16	R W W	Program pattern Link to 'END step'	Pattern 1 to 19 (1 to 19)	0	
49044	03 06 16	R W W	END output1 'END step'	-5.0 to 105.0 (-50 to 1050 or 32767)	32767 (CONTROL)	「CONTROL」=32767
49045	03 06 16	R W W	END output 2 'END step'	-5.0 to 105.0 (-50 to 1050 or 32767)	32767 (CONTROL)	「CONTROL」=32767

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
49048	03 06 16	R W W	Time unit hours minutes/minutes seconds (Mode 2)	0/1 (0/1)	0 (Hours/minutes)	0= Hours/minutes 1= Minutes/seconds * When program operation is other than RESET, writing is not possible.
49049	03 06 16	R W W	SV during reset	Within the range of SV limit (Within the range of SV limit)	0	In case of no transmission signal output and no communication function or with communication function, writing is not possible during high order communication selection.
49055	03 06 16	R W W	Repeat pattern	0 to 9999 (0 to 9999)	0	
49056	03 06 16	R W W	Executing SV (Mode 0)	Within the range of SV limit (Within the range of SV limit)	0	
49057	03 06 16	R W W	Executing time Hours or minutes (Mode 0)	0 to 999 hours or minutes (0 to 999)	000	
49058	03 06 16	R W W	Executing time Minutes or seconds (Mode 0)	0 to 59 minutes or seconds (0 to 59)	00	
49066	03 06 16	R W W	Operation screen Drive pattern No.	Pattern 1 to 19 (1 to 19)	1	Writing is not possible in the following cases ·When operation status is other than RESET ·When pattern selection system is other than COM in the case of 'with pattern selection input option'.
49067	03 06 16	R W W	Operation screen Program drive	[Read] 1/2/3/4/5/6 (1/2/3/4/5/6)  [Write] 1/2/4/6 (1/2/4/6)	1	[Read] 1= RESET 2= RUN 3= FAST 4= STOP 5= END 6= ADV  [Write] 1= RESET 2= RUN 4= STOP 6= ADV  Writing is not possible in the following cases ·When ADV,STOP is set in RESET status ·When RUN, STOP, ADV is set in END status ·When RUN,STOP,ADV, RESET is set in CONST status ·In case with external drive input, program drive system is other than MASTER COM

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks						
49093	03 06 16	R W W	Copy pattern trigger	<p>[Read] 0/1/2/3/4/5 (0/1/2/3/4/5)</p> <p>[Write] Source pattern No.1 to 19 (1 to 19) Destination pattern No.1 to 19 (1 to 19)</p>	-	<p>[Read] Reads edit pattern status. 0=No edition 1=Add step 2=Delete step 3=Copy pattern 4=Clear pattern (1 pattern) 5= Clear all patterns</p> <p>[Write] High order 8 bits become the copy source pattern no. and low order 8 bit set the copy destination pattern no.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">High order 8 bit</td> <td style="width: 50%; text-align: center;">Low order 8 bit</td> </tr> <tr> <td style="text-align: center;">Source pattern no.</td> <td style="text-align: center;">Destination pattern no.</td> </tr> <tr> <td colspan="2" style="text-align: center;">Set value</td> </tr> </table> <p>* When copy source pattern is not set or copy destination pattern is not eliminated, writing is not possible..</p>	High order 8 bit	Low order 8 bit	Source pattern no.	Destination pattern no.	Set value	
High order 8 bit	Low order 8 bit											
Source pattern no.	Destination pattern no.											
Set value												
49094	03 06 16	R W W	Pattern clear trigger	<p>[Read] 0/1/2/3/4/5 (0/1/2/3/4/5)</p> <p>[Write] 0=Pattern all clear Pattern No.1 to 19 (0 to 19)</p>	-	<p>[Read] Read edit pattern status. 0=No edition 1=Add step 2= Delete step 3= Copy pattern 4= Clear pattern (1 pattern) 5= Clear all patterns</p> <p>[Write] When pattern of specified set value is cleared and set value 0 is set, execute pattern all clear.</p> <p>* When program operation is other than RESET, writing is not possible.</p>						
49095	03 06 16	R W W	Add step trigger*	<p>[Read] 0/1/2/3/4/5 (0/1/2/3/4/5)</p> <p>[Write] Pattern No.1 to 19 Step No.1 to 18 or Final step No. (1 to 18 or Final step No.)</p>	-	<p>[Read] Read edit pattern status. 0=No edition 1=Add step 2= Delete step 3= Copy pattern 4= Clear pattern (1 pattern) 5= Clear all patterns</p> <p>[Write] High order 8 bits becomes the pattern No. and low order 8 bits sets the step no.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">Higher 8 bit</td> <td style="width: 50%; text-align: center;">Lower 8 bit</td> </tr> <tr> <td style="text-align: center;">Pattern No.</td> <td style="text-align: center;">Step No.</td> </tr> <tr> <td colspan="2" style="text-align: center;">Set value</td> </tr> </table> <p>* When program operation is other than RESET, writing is not possible.</p>	Higher 8 bit	Lower 8 bit	Pattern No.	Step No.	Set value	
Higher 8 bit	Lower 8 bit											
Pattern No.	Step No.											
Set value												

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks																																
49096	03 06 16	R W W	Delete step trigger	[Read] 0/1/2/3/4/5 (0/1/2/3/4/5)  [Write] Pattern No.1 to 19 Step No.1 to 19 or Final step No. (1 to 19 or Final step No.)	-	[Read] Read edit pattern status. No edition 1=Add step 2= Delete step 3= Copy pattern 3= Clear pattern (1 pattern) 5= Clear all patterns [Write] High order 8 bits becomes the pattern No. and low order 8 bits sets the step no.  Higher 8 bit    Lower 8 bit <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 50px;">Pattern No.</td> <td style="width: 50px;">Step No.</td> </tr> <tr> <td colspan="2" style="text-align: center;">Set value</td> </tr> </table> * When program operation is other than RESET, writing is not possible.	Pattern No.	Step No.	Set value																													
Pattern No.	Step No.																																					
Set value																																						
49501	03 06 16	R W W	Setting screen mode lock (bit support)	(0 to 65535)	-	0= Setting screen normal display 1= Setting screen lock status 1= Setting screen no display  * Bit 0 to Bit 7 of low order 8 bits are set as mode 0 to mode 7 sequentially, bit 3 and 4 of high order 8 bit are set as mode 11, mode 12.  Low order 8 bit <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <tr> <td colspan="4" style="text-align: center;">Mode 7</td> <td colspan="4" style="text-align: center;">Mode 0</td> </tr> </table> High order 8 bit <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <tr> <td colspan="2" style="text-align: center;">Mode12</td> <td colspan="2" style="text-align: center;">Mode11</td> <td colspan="2" style="text-align: center;">Mode8</td> <td colspan="2"></td> </tr> </table>	7	6	5	4	3	2	1	0	Mode 7				Mode 0				7	6	5	4	3	2	1	0	Mode12		Mode11		Mode8			
7	6	5	4	3	2	1	0																															
Mode 7				Mode 0																																		
7	6	5	4	3	2	1	0																															
Mode12		Mode11		Mode8																																		
49502	03 06 16	R W W	AT start/stop	0/1/2/3 (0/1/2/3)	0 (END)	0=END 1=AT1 2=AT2 3=AT3  At the time of setting AT1 to 3, writing is not possible during auto tuning execution. [For AT1] · Writing is not possible in program operation that is being reset. [For AT2] · Writing is not possible in operation other than program operation that is being reset.																																

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
						[For AT3] · Writing is not possible in operation other than program operation that is being reset.
49503	03 06 16	R W W	Operation screen 'A/M switching 1'	0/1 (0/1)	1	0=AUTO 1=MANUAL
49504	03 06 16	R W W	Operation screen 'MANUAL output 1'	-5.0 to 105.0 % (-50 to 1050)	0.0%	Writing is possible during manual operation only
49505	03 06 16	R W W	Operation screen 'A/M switching 2'	0/1 (0/1)	1	0=AUTO 1=MANUAL
49506	03 06 16	R W W	Operation screen 'MANUAL output 2'	-5.0 to 105.0 % (-50 to 1050)	0.0%	Writing is possible during manual operation only
49516	03 06 16	R W W	Program drive system	0/1/2/3 (0/1/2/3)	0 (MASTER KEY)	0=MASTER KEY 1=MASTER EXT 2=SLAVE EXT 3=MASTER COM  Writing is possible in case of 'with external drive input'
49517	03 06 16	R W W	Select pattern system	0/1/2 (0/1/2)	0 (KEY)	0=KEY 1=EXT 2=COM  Writing is possible only in case of 'With pattern selection input'
49521	03 06 16	R W W	Control format	0/1 (0/1)	0 (Program operation)	0= Program operation 1= Stationary operation
49522	03 06 16	R W W	Operation screen 'SV at the time of stationary operation'	Within the range of SV limit (Within the range of SV limit)	0	Control format cannot be written during program operation. Decimal point position: SV decimal point position
49533	03 06 16	R W W	Key lock of driving operation	0/1 (0/1)	0	0= Unlock 1= Lock
49534	03 06 16	R W W	Time display system	0/1/2/3 (0/1/2/3)	0 (Elapsed step)	0=Elapsed step 1=Elapsed pattern 2=Remaining step 3=Remaining pattern



## 8-7-2. Analog input data (READ only)

### ① Real data, parameter information

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Detailed explanation
30101	04	R	Measurement value (PV)	Decimal point position: Depends on PV decimal point setting 32767 when PV is + over range -32768 when PV is - over range
30102	04	R	PV status	0= Normal 1= + Over range 2= - Over range
30103	04	R	Setting value (SV)	SV that is being used currently Decimal point position: TC/Pt input = Fixed for each range Depends on Linear input = Linear decimal point settings
30105	04	R	Control output value 1	-50 to 1050 = - 5.0 to 105.0%
30106	04	R	MV1 status	0=AUTO 1=MAN 2=AT 3=PRG.END OUT 4=P.V ERR OUT 5=FB AT 6=RESET
30107	04	R	Control output value 2	-50 to 1050=-5.0 to 105.0%
30108	04	R	MV2 status	0=AUTO 1=MAN 2=AT 3=PRG.END OUT 4=P.V ERR OUT 5=FB AT 6=RESET
30109 30110 30111 30112 30113	04	R	Execution SV Execution alarm value 1 Execution alarm value 2 Execution alarm value 3 Execution alarm value 4	Execution SV setting value (Decimal point position is same in 40008) Execution alarm 1 setting value (Decimal point position is same in 40231) Execution alarm 2 setting value (Decimal point position is same in 40233) Execution alarm 3 setting value (Decimal point position is same in 40235) Execution alarm 4 setting value (Decimal point position is same in 40237)
30114 30115 30116	04	R	Execution P Execution I Execution D	Execution P setting value (0 to 9999=0.0 to 999.9%) Execution I setting value (0 to 9999=0 to 9999 seconds) Execution D setting value (0 to 9999=0 to 9999 seconds)
30117	04	R	Execution output limit lower limit value	Execution output limit lower limit value (Decimal point is same in 40209)
30118	04	R	Execution output limit higher limit value	Execution output limit higher limit value (Decimal point is same in 40210)
30119	04	R	Execution output variation limit descending	Execution output variation limit descending value (Decimal point is same in 40211)
30120	04	R	Execution output variation limit ascending	Execution output variation limit ascending value (Decimal point is same in 40212)
30121	04	R	Execution sensor correction	Execution sensor correction value (Decimal point position is same in 40213)

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Detailed explanation																																	
30126	04	R	Execution pattern number	Upper display pattern No.																																	
30127	04	R	Execution step no.	Upper display step no.																																	
30128	04	R	Execution time hours or minutes	Elapsed/remaining time hours or minutes value of operation screen 2																																	
30129	04	R	Execution time minutes or seconds	Elapsed/remaining time minutes or seconds value of operation screen 2																																	
30130	04	R	Display time system	0= Step elapsed time 1= Pattern elapsed time 2= Step remaining time 3= Pattern remaining time																																	
30131	04	R	Display time unit	Time unit of operation screen 2 0=Day : Time 1=Hours : Minutes 2=Minutes : Seconds																																	
30134	04	R	FB value	FB value of operation screen 2																																	
30141	04	R	Lock status	0= Setting screen normal display 1= Setting screen lock status 0= Hide setting screen  * Bit 0 to Bit 7 of low order 8 bits are set as mode 0 to mode 7 sequentially, bit 3 and 4 high order 8 bit are set as mode 11, mode 12.  Low order 8 bits <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> </table> <p style="text-align: center;">Mode 7 <span style="margin-left: 100px;">Mode 0</span></p> High order 8 bits <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> </table> <p style="text-align: center;">Mode 12 <span style="margin-left: 20px;">Mode 11</span> <span style="margin-left: 20px;">Mode 8</span></p>	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0																	
7	6	5	4	3	2	1	0																														
7	6	5	4	3	2	1	0																														
30142	04	R	Alarm status	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> <tr> <td colspan="4" style="text-align: center;">Alarm 4</td> <td colspan="4" style="text-align: center;">Alarm 3</td> <td colspan="4" style="text-align: center;">Alarm 2</td> <td colspan="4" style="text-align: center;">Alarm 1</td> </tr> </table> <p style="text-align: center;">Alarm OFF → 0 0    0 0 Alarm ON → 0 1    0 1 Alarm OFF during wait operation → 1 0    1 0</p>	1	1	1	1	1	1	1	9	8	7	6	5	4	3	2	1	0	Alarm 4				Alarm 3				Alarm 2				Alarm 1			
1	1	1	1	1	1	1	9	8	7	6	5	4	3	2	1	0																					
Alarm 4				Alarm 3				Alarm 2				Alarm 1																									
30143	04	R	Error other status	0= No error 1= Error occurrence																																	
30144	04	R	Time signal status	0=ON 1=OFF  *Time signal 1 to 5 is set for bit 0 to bit 4 of lower order 8 bits sequentially.  Low order 8 bits <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td> </tr> </table> <p style="text-align: center;">TS5 <span style="margin-left: 100px;">TS1</span></p>	7	6	5	4	3	2	1	0																									
7	6	5	4	3	2	1	0																														

### 8-7-3. Digital setting value

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Setting range (Range during communication)	Initial value	Remarks
101	01 05 15	R W W	AT1 start	0/1 [0000h/FF00h] (End/start) In the bracket [ ] In case of FNC code 05	0 (End)	0=AT1 end (End) 1=Start AT1 or executing AT Cannot be executed during 2 position 2 control. Cannot be executed during FB tuning.  When executing AT other than AT1, execute using reference 49502 of function 03, 06, 16.
111	01 05 15	R W W	FB tuning	0/1 [0000h/FF00h] (End/start) In the bracket [ ] In case of FNC code 05	0 (End)	0=FB tuning end (End) 1=FB tuning start or FB tuning executing Execution is not possible during program operation. Execution is not possible during AT tuning or FB tuning.

### 8-7-4. Digital input data (READ only)

FNC code.....Application function code, R/W.....R: READ (Read), W: WRITE (Write)

Reference number	FNC code	R/W	Data name	Detailed explanation		
10002	02	R	A/D error	0= Normal 1= During A/D error occurrence		
10005	02	R	Correction data error	0= Normal 1= During correction data error occurrence		
10117	02	R	Alarm 1 status	0= Alarm OFF 1= Alarm ON		
10118			0	0	1	0= Alarm OFF during WAIT operation
10119			0= Alarm OFF	1= Alarm ON	0= Alarm OFF during WAIT operation	
10120			0	0	1	0= Alarm OFF during WAIT operation
10121			0= Alarm OFF	1= Alarm ON	0= Alarm OFF during WAIT operation	
10122			0	0	1	0= Alarm OFF during WAIT operation
10123			0= Alarm OFF	1= Alarm ON	0= Alarm OFF during WAIT operation	
10124			0	0	1	0= Alarm OFF during WAIT operation

## 8-8.MODBUS protocol support reference table

Analog setting value (40001 to 49999)							
Setup parameter 1		Setup parameter 2		1 type parameter		Execution parameters and specific parameters	
No.	Contents	No.	Contents	No.	Contents	No.	Contents
40001	Input type number	40051	Transmission (H) Analog type	40101	Output 2·gap	40151	SV (R) being used
40002	Unit number	40052	Transmission (H) Scale MIN	40102	Output 2·P	40152	
40003	RJ	40053	Transmission (H) Scale·MAX	40103	Output 2·I	40153	
40004	Range ZERO	40054		40104	Output 2·D	40154	
40005	Range SPAN	40055		40105	Output 2 limit L	40155	
40006	Linear scale MIN	40056		40106	Output 2 limit H	40156	P
40007	Linear scale MAX	40057		40107		40157	I
40008	SV decimal point position	40058		40108	Output 2·2 position DB	40158	D
40009		40059		40109		40159	Output limit L
40010		40060		40110		40160	Output limit H
40011	PV decimal point position	40061		40111	Position 2 dead band	40161	Output variation limitDW
40012	Digital filter	40062		40112	Lower limit output during PV abnormality	40162	Output variation limit UP
40013		40063		40113	Upper limit output during PV abnormality	40163	Execution sensor correction
40014		40064		40114		40164	
40015		40065		40115		40165	
40016		40066		40116		40166	
40017		40067		40117		40167	
40018		40068		40118		40168	
40019		40069		40119		40169	
40020	Display SV decimal point	40070		40120		40170	
40021	Control action direct/reverse	40071		40121	Split Dir	40171	
40022	Pulse cycle	40072		40122	Split Rev	40172	
40023	FB ZERO	40073		40123		40173	
40024	FB SPAN	40074		40124		40174	
40025	FB Gain	40075		40125		40175	
40026	Output 2 Direct/Reverse	40076		40126		40176	
40027	Pulse 2 cycle	40077		40127		40177	
40028	Output 2 control system	40078		40128		40178	
40029		40079	Digital transmission type 1	40129		40179	
40030	Reset alarm	40080		40130		40180	
40031	Alarm format 1	40081		40131		40181	Alarm value 1 setting
40032	Alarm dead band 1	40082		40132		40182	
40033		40083		40133		40183	Alarm value 2 settings
40034	Alarm delay	40084		40134		40184	
40035		40085		40135		40185	Alarm value 3 settings
40036	Alarm format 2	40086		40136		40186	
40037	Alarm dead band 2	40087		40137		40187	Alarm value 4 settings
40038		40088		40138		40188	
40039		40089		40139		40189	
40040		40090		40140		40190	
40041	Alarm format 3	40091		40141		40191	
40042	Alarm dead band 3	40092		40142		40192	
40043		40093		40143		40193	
40044		40094		40144		40194	
40045		40095		40145		40195	
40046	Alarm format 4	40096		40146		40196	
40047	Alarm dead band 4	40097		40147		40197	
40048		40098		40148	Control algorithm	40198	
40049		40099		40149		40199	
40050		40100		40150		40200	

Analog setting value (40001 to 49999)							
8 type parameter 1		8 type parameter No.2		8 type parameter No.3		8 type parameter No.4	
No.	Contents	No.	Contents	No.	Contents	No.	Contents
40201		40251		40301		40351	
40202		40252		40302		40352	
40203		40253		40303		40353	
40204		40254		40304		40354	
40205		40255		40305		40355	
40206	P	40256	P	40306	P	40356	P
40207	I	40257	I	40307	I	40357	I
40208	D	40258	D	40308	D	40358	D
40209	Output limit L	40259	Output limit L	40309	Output limit L	40359	Output limit L
40210	Output limit H	40260	Output limit H	40310	Output limit H	40360	Output limit H
40211	Output variation limitDW	40261	Output variation limitDW	40311	Output variation limitDW	40361	Output variation limitDW
40212	Output variation limitUP	40262	Output variation limitUP	40312	Output variation limitUP	40362	Output variation limitUP
40213	Sensor correction	40263	Sensor correction	40313	Sensor correction	40363	Sensor correction
40214	A.R.W. lower limit value	40264		40314		40364	
40215	A.R.W. higher limit value	40265		40315		40365	
40216	Output preset	40266		40316		40366	
40217	PID dead band	40267		40317		40367	
40218	Real temperature compensation	40268	Real temperature compensation	40318	Real temperature compensation	40368	Real temperature compensation
40219	Wait time alarm hours or minutes	40269	Wait time alarm hours or minutes	40319	Wait time alarm hours or minutes	40369	Wait time alarm hours or minutes
40220	Wait time alarm minutes or seconds	40270	Wait time alarm minutes or seconds	40320	Wait time alarm minutes or seconds	40370	Wait time alarm minutes or seconds
40221	TS ON hours or minutes	40271	TS ON hours or minutes	40321	TS ON hours or minutes	40371	TS ON hours or minutes
40222	TS ON minutes or seconds	40272	TS ON minutes or seconds	40322	TS ON minutes or seconds	40372	TS ON minutes or seconds
40223	TS OFF hours or minutes	40273	TS OFF hours or minutes	40323	TS OFF hours or minutes	40373	TS OFF hours or minutes
40224	TS OFF minutes or seconds	40274	TS OFF minutes or seconds	40324	TS OFF minutes or seconds	40374	TS OFF minutes or seconds
40225		40275		40325		40375	
40226		40276		40326		40376	
40227		40277		40327		40377	
40228		40278		40328		40378	
40229		40279		40329		40379	
40230		40280		40330		40380	
40231	Alarm value 1 setting	40281	Alarm value 1 setting	40331	Alarm value 1 setting	40381	Alarm value 1 setting
40232		40282		40332		40382	
40233	Alarm value 2 settings	40283	Alarm value 2 settings	40333	Alarm value 2 settings	40383	Alarm value 2 settings
40234		40284		40334		40384	
40235	Alarm value 3 settings	40285	Alarm value 3 settings	40335	Alarm value 3 settings	40385	Alarm value 3 settings
40236		40286		40336		40386	
40237	Alarm value 4 settings	40287	Alarm value 4 settings	40337	Alarm value 4 settings	40387	Alarm value 4 settings
40238		40288		40338		40388	
40239		40289		40339		40389	
40240		40290		40340		40390	
40241		40291		40341		40391	
40242		40292		40342		40392	
40243		40293		40343		40393	
40244		40294		40344		40394	
40245		40295		40345		40395	
40246		40296		40346		40396	
40247		40297		40347		40397	
40248		40298		40348		40398	
40249		40299		40349		40399	
40250		40300		40350		40400	

<b>Analog setting value (40001 to 49999)</b>							
<b>8 types parameter No. 5</b>		<b>8 types parameter No. 6</b>		<b>8 types parameter No. 7</b>		<b>8 types parameter No. 8</b>	
<b>No.</b>	<b>Contents</b>	<b>No.</b>	<b>Contents</b>	<b>No.</b>	<b>Contents</b>	<b>No.</b>	<b>Contents</b>
40401		40451		40501		40551	
40402		40452		40502		40552	
40403		40453		40503		40553	
40404		40454		40504		40554	
40405		40455		40505		40555	
40406	P	40456	P	40506	P	40556	P
40407	I	40457	I	40507	I	40557	I
40408	D	40458	D	40508	D	40558	D
40409	Output limit L	40459	Output limit L	40509	Output limit L	40559	Output limit L
40410	Output limit H	40460	Output limit H	40510	Output limit H	40560	Output limit H
40411	Output variation limitDW	40461	Output variation limitDW	40511	Output variation limitDW	40561	Output variation limitDW
40412	Output variation limitUP	40462	Output variation limitUP	40512	Output variation limitUP	40562	Output variation limitUP
40413	Sensor correction	40463	Sensor correction	40513	Sensor correction	40563	Sensor correction
40414		40464		40514		40564	
40415		40465		40515		40565	
40416		40466		40516		40566	
40417		40467		40517		40567	
40418	Real temperature compensation	40468	Real temperature compensation	40518	Real temperature compensation	40568	Real temperature compensation
40419	Wait time alarm hours or minutes	40469	Wait time alarm hours or minutes	40519	Wait time alarm hours or minutes	40569	Wait time alarm hours or minutes
40420	Wait time alarm minutes or seconds	40470	Wait time alarm minutes or seconds	40520	Wait time alarm minutes or seconds	40570	Wait time alarm minutes or seconds
40421	TS ON hours or minutes	40471	TS ON hours or minutes	40521	TS ON hours or minutes	40571	TS ON hours or minutes
40422	TS ON minutes or seconds	40472	TS ON minutes or seconds	40522	TS ON minutes or seconds	40572	TS ON minutes or seconds
40423	TS OFF hours or minutes	40473	TS OFF hours or minutes	40523	TS OFF hours or minutes	40573	TS OFF hours or minutes
40424	TS OFF minutes or seconds	40474	TS OFF minutes or seconds	40524	TS OFF minutes or seconds	40574	TS OFF minutes or seconds
40425		40475		40525		40575	
40426		40476		40526		40576	
40427		40477		40527		40577	
40428		40478		40528		40578	
40429		40479		40529		40579	
40430		40480		40530		40580	
40431	Alarm value 1 setting	40481	Alarm value 1 setting	40531	Alarm value 1 setting	40581	Alarm value 1 setting
40432		40482		40532		40582	
40433	Alarm value 2 settings	40483	Alarm value 2 settings	40533	Alarm value 2 settings	40583	Alarm value 2 settings
40434		40484		40534		40584	
40435	Alarm value 3 settings	40485	Alarm value 3 settings	40535	Alarm value 3 settings	40585	Alarm value 3 settings
40436		40486		40536		40586	
40437	Alarm value 4 settings	40487	Alarm value 4 settings	40537	Alarm value 4 settings	40587	Alarm value 4 settings
40438		40488		40538		40588	
40439		40489		40539		40589	
40440		40490		40540		40590	
40441		40491		40541		40591	
40442		40492		40542		40592	
40443		40493		40543		40593	
40444		40494		40544		40594	
40445		40495		40545		40595	
40446		40496		40546		40596	
40447		40497		40547		40597	
40448		40498		40548		40598	
40449		40499		40549		40599	
40450		40500		40550		40600	

**Analog setting value (40001 to 49999)**

No.9 Parameter				DI/DO function allotment		Pattern information	
No.	Contents	No.	Contents	No.	Contents	No.	Contents
40601	Parameter 9-1·P	40701	Descending variation limit 2	48001	Display back light	49001	
40602	Parameter 9-1·I	40702	Descending variation limit 2	48002	Display contrast	49002	
40603	Parameter 9-1·D	40703	PV 2 abnormality output lower limit	48003	Key backlight	49003	Pattern No.
40604	Parameter 9-2·P	40704	PV 2 abnormality output lower limit	48004		49004	Step No.
40605	Parameter 9-2·I	40705		48005		49005	Repeat step
40606	Parameter 9-2·D	40706		48006		49006	SV
40607	Parameter 9-3·P	40707	Preset manual	48007		49007	Time hours or minutes
40608	Parameter 9-3·I	40708	Preset manual 2	48008		49008	Time minutes or seconds
40609	Parameter 9-3·D	40709		48009		49009	
40610	Parameter 9-4·P	40710		48010		49010	PID No.
40611	Parameter 9-4·I	40711		48011		49011	
40612	Parameter 9-4·D	40712		48012		49012	Alarm No.
40613	Parameter 9-5·P	40713		48013		49013	Output limit/Scale No.
40614	Parameter 9-5·I	40714		48014		49014	Output variation limit No.
40615	Parameter 9-5·D	40715		48015		49015	
40616	Parameter 9-6·P	40716		48016		49016	Sensor correction No.
40617	Parameter 9-6·I	40717		48017		49017	
40618	Parameter 9-6·D	40718		48018		49018	Real temperature compensation No.
40619	Parameter 9-7·P	40719		48019		49019	Waiting time alarm No.
40620	Parameter 9-7·I	40720		48020		49020	Time signal 1 No.
40621	Parameter 9-7·D	40721		48021		49021	Time signal 2 No.
40622	Parameter 9-8·P	40722		48022		49022	Time signal 3 No.
40623	Parameter 9-8·I	40723		48023		49023	Time signal 4 No.
40624	Parameter 9-8·D	40724		48024		49024	Time signal 5 No.
40625	AT2·SV1	40725		48025		49025	Time signal 6 No.
40626	AT2·SV2	40726		48026		49026	Time signal 7 No.
40627	AT2·SV3	40727		48027		49027	Time signal 8 No.
40628	AT2·SV4	40728		48028		49028	
40629	AT2·SV5	40729		48029		49029	
40630	AT2·SV6	40730		48030		49030	
40631	AT2·SV7	40731		48031		49031	
40632	AT2·SV8	40732		48032		49032	
40633	SV section 1	40733		48033		49033	
40634	SV section 2	40734		48034		49034	
40635	SV section 3	40735		48035		49035	
40636	SV section 4	40736		48036		49036	
40637	SV section 5	40737		48037		49037	
40638	SV section 6	40738		48038		49038	
40639	SV section 7	40739		48039		49039	
40640	AT3·SV1	40740		48040		49040	Existing set step count (R)
40641	AT3·SV2	40741		48041		49041	Start SV
40642	AT3·SV3	40742		48042		49042	PV/SV start
40643	AT3·SV4	40743		48043		49043	Link to
40644	AT3·SV5	40744		48044		49044	END output 1
40645	AT3·SV6	40745		48045		49045	END output 2
40646	AT3·SV7	40746		48046		49046	
40647	AT3·SV8	40747		48047		49047	
40648	AT2/AT3 start	40748		48048		49048	Time unit (Mode 2)
40649	AT2·ON/OFF flag	40749		48049		49049	Reset time SV
40650	AT3·ON/OFF flag	40750		48050		49050	



Analog setting value (40001 to 49999)							
Pattern information		Pattern information					
No.	Contents	No.	Contents	No.	Contents	No.	Contents
49051		49501	Mode lock (bit support)	49551			
49052		49502	AT start/stop	49552			
49053		49503	A/M switching 1	49553			
49054		49504	MAN output 1 value	49554			
49055	Repeat pattern	49505	A/M switching 2	49555			
49056	SV (Mode 0)	49506	MAN output 2 value	49556			
49057	Time H (Mode 0)	49507		49557			
49058	Time L (Mode 0)	49508		49558			
49059		49509		49559			
49060		49510		49560			
49061		49511		49561			
49062		49512		49562			
49063		49513		49563			
49064		49514		49564			
49065		49515		49565			
49066	Drive pattern No.	49516	Program drive system	49566			
49067	Program drive	49517	Select pattern system	49567			
49068		49518		49568			
49069		49519		49569			
49070		49520		49570			
49071		49521	CONST/PRG switching	49571			
49072		49522	CONST-SV value	49572			
49073		49523		49573			
49074		49524		49574			
49075		49525		49575			
49076		49526		49576			
49077		49527		49577			
49078		49528		49578			
49079		49529		49579			
49080		49530		49580			
49081		49531		49581			
49082		49532		49582			
49083		49533	FNC key lock	49583			
49084		49534	Display time	49584			
49085		49535		49585			
49086		49536		49586			
49087		49537		49587			
49088		49538		49588			
49089		49539		49589			
49090		49540		49590			
49091		49541		49591			
49092		49542		49592			
49093	Copy pattern trigger	49543		49593			
49094	Clear pattern trigger(W)	49544		49594			
49095	Add step trigger	49545		49595			
49096	Delete step trigger	49546		49596			
49097		49547		49597			
49098		49548		49598			
49099		49549		49599			
49100		49550		49600			

Analog input data (30001 to 39999)							
Type information		Real data & parameter					
No.	Contents	No.	Contents	No.	Contents	No.	Contents
30001		30101	PV data				
30002		30102	PV status				
30003		30103	SV being used				
30004		30104					
30005		30105	MV1				
30006		30106	MV1 status				
30007		30107	MV2				
30008		30108	MV2 status				
30009		30109	Execution SV (Mode 0)				
30010		30110	Execution alarm 1(Mode 0)				
30011		30111	Execution alarm 2(Mode 0)				
30012		30112	Execution alarm 3(Mode 0)				
30013		30113	Execution alarm 4(Mode 0)				
30014		30114	Execution P(Mode 0)				
30015		30115	Execution I(Mode 0)				
30016		30116	Execution D(Mode 0)				
30017		30117	Execution output limit L				
30018		30118	Execution output limit H				
30019		30119	Execution output variation DW				
30020		30120	Execution output variation UP				
30021		30121	Execution sensor correction				
30022		30122					
30023		30123					
30024		30124					
30025		30125					
30026		30126	Execution pattern number				
30027		30127	Execution step number				
30028		30128	Execution time hours or minutes				
30029		30129	Execution time minutes or seconds				
30030		30130	Display time system				
30031		30131	Display time unit				
30032	Time unit (Mode 2)	30132					
30033		30133					
30034		30134	FB value				
30035		30135					
30036		30136					
30037		30137					
30038		30138					
30039		30139					
30040		30140					
30041		30141	Lock status				
30042		30142	Alarm status				
30043		30143	Status other than error				
30044		30144	Time signal status				
30045		30145					
30046		30146					
30047		30147					
30048		30148					
30049		30149					
30050		30150					

## 8-9. Measurement range and decimal point position

<Measurement range list table>

Input type	Range	SV DOT	Range	SV DOT	
Thermocouple (TC)	SV(°C) Setting, display range		SV(K) Setting, display range		
	B	0.0 to 1820.0	1	273.0 to 2093.0	1
	R1	0.0 to 1760.0	1	273.0 to 2033.0	1
	R2	0.0 to 1200.0	1	273.0 to 1473.0	1
	S	0.0 to 1760.0	1	273.0 to 2033.0	1
	K1	-200.0 to 1370.0	1	73.0 to 1643.0	1
	K2	0.0 to 600.0	1	273.0 to 873.0	1
	K3	-200.0 to 300.0	1	73.0 to 573.0	1
	E1	-270.0 to 1000.0	1	3.0 to 1273.0	1
	E2	0.0 to 700.0	1	273.0 to 973.0	1
	E3	-270.0 to 300.0	1	3.0 to 573.0	1
	E4	-270.0 to 150.0	1	3.0 to 423.0	1
	J1	-200.0 to 1200.0	1	73.0 to 1473.0	1
	J2	-200.0 to 900.0	1	73.0 to 1173.0	1
	J3	-200.0 to 400.0	1	73.0 to 673.0	1
	J4	-100.0 to 200.0	1	173.0 to 473.0	1
	T1	-270.0 to 400.0	1	3.0 to 673.0	1
	T2	-200.0 to 200.0	1	73.0 to 473.0	1
	W5-26	0.0 to 2310.0	1	273.0 to 2583.0	1
	W0-26	0.0 to 2310.0	1	273.0 to 2583.0	1
	NiMO	-50.0 to 1410.0	1	223.0 to 1683.0	1
	AuFe	0.0 to 280.0 (K)	1	0.0 to 280.0	1
	N	0.0 to 1300.0	1	273.0 to 1573.0	1
PR5-20	0.0 to 1800.0	1	273.0 to 2073.0	1	
PR20-40	0.0 to 1880.0	1	273.0 to 2153.0	1	
Plati1	0.0 to 1390.0	1	273.0 to 1663.0	1	
Plati2	0.0 to 600.0	1	273.0 to 873.0	1	
U	-200.0 to 400.0	1	73.0 to 673.0	1	
L	-200.0 to 900.0	1	73.0 to 1173.0	1	
DC voltage and current	Range setting scope				
	10mV	-10 to 10 (mV)	0 to 4	to	
	20mV	-20 to 20 (mV)	0 to 4	to	
	50mV	-50 to 50 (mV)	0 to 4	to	
	100mV	-100 to 100 (mV)	0 to 4	to	
	5V	-5 to 5 (V)	0 to 4	to	
	mA	-20 to 20 (mV)	0 to 4	to	

Thermometer resistance		SV(°C) Setting, display range				SV(K) Setting, display range			
	JPt100Ω1	-200.0	to	649.0	1	73.0	to	922.0	1
	JPt100Ω2	-200.0	to	400.0	1	73.0	to	673.0	1
	JPt100Ω4	-200.0	to	200.0	1	73.0	to	473.0	1
	JPt100Ω5	-100.0	to	100.0	1	173.0	to	373.0	1
	QPt100Ω1	-200.0	to	649.0	1	73.0	to	922.0	1
	QPt100Ω2	-200.0	to	400.0	1	73.0	to	673.0	1
	QPt100Ω4	-200.0	to	200.0	1	73.0	to	473.0	1
	QPt100Ω5	-100.0	to	100.0	1	173.0	to	373.0	1
	Pt50Ω	-200.0	to	649.0	1	73.0	to	922.0	1
	Pt100Ω1	-200.0	to	850.0	1	73.0	to	1123.0	1
	Pt100Ω2	-200.0	to	400.0	1	73.0	to	673.0	1
	Pt100Ω4	-200.0	to	200.0	1	73.0	to	473.0	1
	Pt100Ω5	-100.0	to	100.0	1	173.0	to	373.0	1
	Pt-Co (Exclusive 4-wire system)	4.0	to	374.0 (K)	1	4.0	to	374.0	1

# 9.PRIVATE protocol

## 9-1.Difference between RS—232C and RS-422A/485

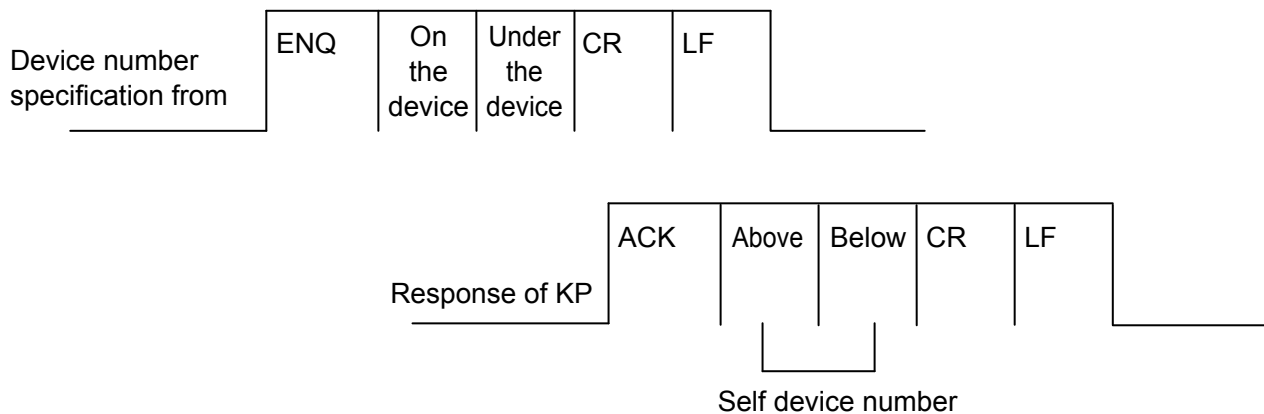
Only the level of RS-232C and RS-422A/RS-485 differs electrically, the communication procedure is the same.

However RS-422A/RS-485, by connecting a number of devices in series, from 1 amongst that.

This is called establishing the data link. For that each device sets its own device number beforehand such that it does not overlap with the other device number.(See 'setting parameters for communication') After the data link is established, communication procedure of RS-232C and RS-422A/RS-485 is exactly the same.

### 9-1-1. Establishing the data link

From the PC if you want to communicate by using the following procedure, send the device numbers before hand and establish data link with that device and communicate. After establishing the data link communicate with that device according to the procedure explained in 'Communication format'.



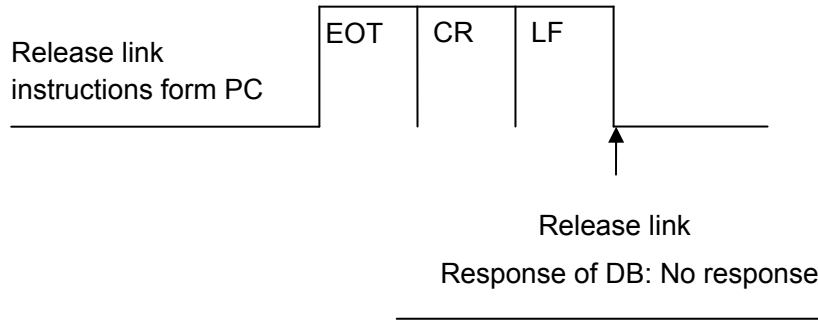
### Precautions

To avoid accidents always read these contents and understand them.

1. Always send the device numbers in 2 digits from 01 to 99.
2. Do not use the device number 00.
3. Only the specified device responds within 1 second.
4. When the device of the specified device number does not exist, then there is no response.
5. If there is a device whose data link is already established the data link of that device is automatically released because data link with some other device is established.
6. If there is a power failure, a back up of the data link status of the data link before power failure is taken.
7. ENQ, ACK are control codes and they are expressed as hexadecimals as follows.  
ENQ:05H  
ACK:06H
8. When device number 1 is sent response of KP is as follows.  
ACK 30 31 CR LF  
When device number 99 is sent response of KP is as follows.  
ACK 39 39 CR LF

## 9-1-2. Releasing the data link

When communicating with the device other than the device that is presently communicating, release the data link with the following procedure from the Pc and then establish the data link with the next device by the procedure mentioned earlier.



### Precautions

To avoid accidents always read these contents and understand them.

1. By using this command, the data link of all the devices that are connected is released and following data link is established.
2. Data link of each device which is connected is released within 10msec from when this command given, hence for sending it further from the PC a time of 10msec or more is necessary.
3. EOT is control code and it is expressed as hexadecimal as follows.  
EOT:04H

## 9-2. Basic procedure of communication

### 9-2-1. Text format at the time of sending and receiving

STX	TEXT	ETX	BCC L	BCC H	CR	LF
-----	------	-----	-------	-------	----	----

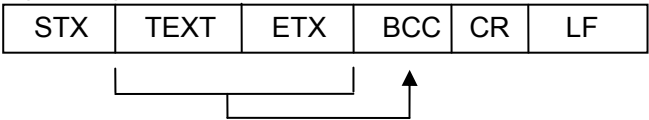
- ① Character received before STX is not received.
- ② Always add CR(0DH), LF(0AH) as end code. (For both sending and receiving).

### 9-2-2. Check sum

This device adds check sum data as BCC (Block Check Code).

Check sum means, seeing each text data as binary and sending low order 8 bits of that total sum as hexadecimal character.

- ① Target range of BCC



- ② BCC (Check sum)

The low order 8 bit data of the pure binary total sum of target range data is split into high and low order 4 bits and are converted to characters(30 to 39, 41 to 46H) 0 to F, and is kept in high order and low order sequence. (2 characters)

STX	TEXT	ETX	BCC L	BCC H	CR	LF
-----	------	-----	-------	-------	----	----

- ③ When adding parity to BCC, the parity of BCC itself is considered.
- ④ BCC is not added in positive and negative response.
- ⑤ Nor it is added to ENQ, ACK, EOT.
- ⑥ BCC is added and checked for both sending and receiving.

STX	1	2	,	0	ETX	BCC L	BCC H	CR	LF
	31	32	2C	30	03	32	43		
						(2)	(C)		

When the data to be sent and received is changed due to noise etc, by comparing with that value calculated on the receiving side, that occurrence may be detected.

### 9-2-3. Basic procedure of communication

- ① In case of KP with communication option, communication is possible at any point of time.
- ② In RS—422A/RS-485, first of all data link is established and then communication with KP is performed according to the communication format. In the end the data link is released and made available for next communication.
- ③ In RS-232C, communication with KP is done according to the communication format from the beginning.
- ④ If a command is sent for KP from high order PC or if parameter setting and pattern setting is done KP does not accept it and a negative response is sent if FNC key or the corresponding mode is not locked.

In this case please lock the FNC key or the corresponding mode.

- ⑤ In case of data request command from high order PC, KP outputs the data regardless of lock/no lock status. (However, pattern setting data is output in case of RESET only)
- ⑥ If KP receives a data request from high order PC, if the request is correct the data is sent. If the request is incorrect or if data sending is not possible, a negative response is sent.
- ⑦ When KP receives parameter setting, command from high order PC, if the command and the settings are correct a positive response is sent after internal processing.  
If there is a mistake in the setting, command or if setting, command cannot be received, a negative response is sent.

### 9-2-4. Control code

Following code is used during communication.

STX(Text start signal)	: 02H
ETX(Text end signal)	: 03H
ACK(Positive response)	: 06H
NAK(Negative response)	: 15H
[RS-422A/485]	
ENQ(Enquiry signal)	: 05H
EOT(Transmission end signal)	: 04H



### 9-3. Communication format



#### Precautions

When transfer the parameter from old instrument to this instrument, check the setting range of each parameter because some parameters of setting range (for example, SV (setting value), alarm value etc.) is different from old instrument.

#### 9-3-1. Data request command (PC → KP)

Command name	Command format	Status
① Real data request	STX Δ1, Δ1, ETX BCC CR LF (DF)	Current data request
② Execution parameter request	STX Δ1, Δ2, ETX BCC CR LF (EF)	Mode 0 execution parameter request
③ Setting program pattern data request [In case of resetting only]	STX Δ1, Δ3, □□, □□, ETX BCC CR LF  <div style="margin-left: 100px;">           □□ — Step No.            □□ — Pattern No.            Repeat pattern in case of 00            Request data         </div>	Program pattern data request Data request for each step
④ Individual setting parameter request	STX Δ1, Δ4, □□, □□, ETX BCC CR LF  <div style="margin-left: 100px;">           □□ — 1 to 8=Parameter No.                      When parameter is 8 types            □□ — When 91 to 98=PID9                      When 1=Parameter is 1 type                      Parameter type No.*1            * 1 parameter type No. is a number given to setting parameter and is indicated in section 9-5-3.         </div>	Data request by specifying 1 setting parameter
⑤ Program pattern setting status request	STX Δ1, Δ5, □□, ETX BCC CR LF  <div style="margin-left: 100px;">           □□ — Pattern No.(1 to 19)         </div>	Pattern setting status request
⑥ Device status request	STX Δ1, Δ6, ETX BCC CR LF (20)	Request configuration status of the device
⑦ Mode lock status request	STX Δ1, Δ7, ETX BCC CR LF (30)	Request each mode lock status
⑧ Status 1 request	STX Δ1, Δ8, ETX BCC CR LF (40)	Request the status of alarm, error, time signal
⑨ Status 2 request	STX Δ1, Δ9, ETX BCC CR LF (50)	Request the status of program operation

(Note)Δ=Space

### 9-3-2. Response output of KP to the data request command (KP→PC)

Function	Output format
<p>① Real data output</p>	<p>STX Δ1, □□, □□, □, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Pattern No.    Step No.    PV(Measurement value)    SV(Set value) All 9 digits in case of ±OR</p> <p>0 in case of resetting    PV status: 0=Normal, 1=+OR 2=-OR 4=Hardware error</p> <p>□, □, □□□, □□ □, □□□□□□□□, □, □□□□□□□□</p> <p>Time unit    Time    MV1 (Output value)    MV2(Output 2) 1=Minute    1=Minute    0=AUTO    In case of output 2 format 2=Hours    2=Hours    1=MAN    Data in output 1 becomes a 3=Days    3=Days    2=AT    dummy data</p> <p>Time display system    0=PRG, END OUT    0=AUTO 1=Elapsed step    4=PV ERR OUT    1=MAN 2=Elapsed pattern    5=FB AT    2=AT 3=Remaining step    6=RESET    3=PRG, END OUT 4=Remaining pattern    All 9 digits in case of over range    4=PV ERR OUT 5=FB AT 6=RESET</p> <p>ETX BCC CR LF</p> <p>(Note) PV, SV data up to 4 position after the decimal point can be sent and if it exceeds 6 digits including the decimal point, the digit in the lowest position is truncated.</p>
<p>② Mode 0 Execution parameter output</p>	<p>STX Δ2, □□□□□□□□, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Execution target SV    Execution P    Execution I</p> <p>□□□□□□□□, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Execution D    Execution AL1    Execution AL2</p> <p>□□□□□□□□, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Execution AL3    Execution AL4    Execution OL</p> <p>□□□□□□□□, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Execution OH    Execution variation limit    Execution sensor correction</p> <p>□□□□□□□□, □□□□□□□□, □□□□□□□□, □□□□□□□□</p> <p>Second P    Second I    Second D</p> <p>In case of output 2 format, the data becomes dummy data in output 1.</p> <p>ETX BCC CR LF</p> <p>(Note) Output variation reads the ascending value.</p>
<p>③ Setting program pattern data output [In case of reset only]</p>	<p>(i) Step 0 output STX Δ3, Δ1, □□, Δ0, □□□□□□□□, □, ETX BCC CR LF</p> <p>Pattern No. Step No. Start SV    0= Start SV 1= Start PV</p> <p>(ii) Step n output STX Δ3, Δ2, □□, □□, □□□□□□□□, □□□, □□, □□, □□</p> <p>Pattern No. Step No. SV    Time.</p> <p>Repeat count Δ0= Repeat start step ΔΔ= Un-set step</p> <p>□, □, □, □, □, □, □, □□, □□, □□, □□, □□</p> <p>PID ALM OPL OSL    TS1 TS2 TS3 TS4 TS5 No. No. No. No.    Waiting time No.    0=ALL OFF Real temperature compensation No.    1=No.1 Sensor correction No.    2= Repeat No.1 ⚡ 99=ALL ON</p> <p>ETX BCC CR LF</p>

Function	Output format
	<p>(iii) END step output  STX Δ3, Δ3, □□, □□, □□, □□□□□□, ETX BCC CR LF  <div style="display: flex; justify-content: space-around; font-size: small;"> <span>Pattern No.</span> <span>Step No.</span> <span>Output in case of END</span> </div> <div style="display: flex; justify-content: space-around; font-size: x-small;"> <span>Link destination</span> <span>Pattern No.</span> </div> <div style="display: flex; justify-content: space-around; font-size: x-small;"> <span>0= Output 0</span> <span>200= Fixed control</span> </div> <span>0=No link</span> </p> <p>(Note) When output is read in case of END, output in case of END of output 1 is read.</p> <p>(iv) Repeat pattern output  STX Δ3, Δ6, □□□□□□□□, ETX BCC CR LF  Repeat count</p>
④ Individual setting parameter output	KP sends the requested setting parameter. Sending format is the same as individual parameter setting format in case of setting from PC in KP. (See 9-5-3) However as the number of digits of the data differ, see Appendix 1 Communication format list for the details.
⑤ Program pattern setting status output	STX Δ5, □□, □□, ETX BCC CR LF <div style="display: flex; justify-content: space-around; font-size: small;"> <span>Setting step count</span> </div> <div style="display: flex; justify-content: space-around; font-size: x-small;"> <span>0= Not set</span> </div> <span>Pattern No.</span>
⑥ Device status output	STX Δ6, □, □, □, □, □, □, □, □, □, □, ETX BCC CR LF <div style="display: flex; justify-content: space-between; font-size: small;"> <div style="width: 45%;"> <span>1=Controller</span>  <span>2=Setter</span>  <span>0=Setter</span>  <span>1=Full multi-input</span>  <span>2=4-wire type Input</span>  <span>Output 1</span>  <span>1=61, 65</span>  <span>2=62</span>  <span>3=63</span> </div> <div style="width: 45%;"> <span>Time unit</span>  <span>0=Hours/minutes</span>  <span>1=Minute/seconds</span>  <span>Select pattern</span>  <span>External drive</span>  <span>Time signal</span>  <span>Transmission</span>  <span>0=Does not exist</span>  <span>1=Exists</span>  <span>Output 2</span>  <span>0=None</span>  <span>1=61, 65</span>  <span>3=63</span> </div> </div>

Function	Output format
⑦ Mode lock status output	STX Δ7, □, □, □, □, □, □, □, □, □, □, ETX BCC CR LF <div style="display: flex; justify-content: center; margin-top: 5px;"> <span style="margin-right: 20px;"> </span><span style="margin-right: 20px;"> </span> <span style="margin-right: 20px;">1</span><span style="margin-right: 20px;">2</span><span style="margin-right: 20px;">3</span><span style="margin-right: 20px;">4</span><span style="margin-right: 20px;">5</span><span style="margin-right: 20px;">6</span><span style="margin-right: 20px;">7</span><span style="margin-right: 20px;">8</span> </div> <p style="margin-left: 80px; margin-top: 5px;">Mode 0</p> <p style="margin-left: 40px; margin-top: 5px;">FNC key</p> <div style="margin-left: 80px; margin-top: 5px;">       0= Non lock        1=Lock        2=NoDisp     </div>
⑧ Status 1 Output	STX Δ8, □□, □□, □□, □□, □, □, □, □, □, □, □, <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="margin-left: 20px;">           AL1 AL2 AL3 AL4            00=Alarm OFF            01=Alarm ON            10=Waiting Alarm OFF         </div> <div style="margin-right: 20px;">           TS1 TS2 TS3 TS4 TS5            Time signal            0=OFF            1=ON         </div> </div> <div style="margin-left: 100px; margin-top: 15px;">       Waiting time alarm        0=OFF        1=ON     </div> <div style="margin-left: 200px; margin-top: 15px;">       Error        0=Normal        1=+OR        2=-OR        4=Hardware error     </div> <p style="margin-top: 10px;">ETX BCC CR LF</p>
⑨ Status 2 Output	STX Δ9, □, □, □, □, □, □, □, □, □, □, □, <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="margin-left: 20px;">           RUN [ 0=                 1=RUN            STOP [ 0=                  1=STOP            RESET [ 0=                   1=RESET            END [ 0=                 1=END            ADV [ 0=                  1=ADV            CONST [ 0=PRG                   1=CONST         </div> <div style="margin-left: 300px;">           M/S [ 0=Master                 1=Slave            FNC key [ 0=Non lock                      1=Lock            AT [ 0=Normal                 1=AT in process            WAIT [ 0=Normal                   1=Real temperature compensation            MAN2 [ 0=AUTO                   1=MAN                   In case of output 2 format                   Data in output 1 becomes                   the dummy data.         </div> <div style="margin-left: 300px;">           MAN1 [ 0=AUTO                   1=MAN         </div> </div> <p style="margin-top: 10px;">ETX BCC CR LF</p>

### 9-3-3.Command that moves the KP status (PC→KP)

Command function	Command format
<p>① Program drive</p> <p>[FNC lock]</p>	<p>STX Δ2, Δ1, □, □□, ETX BCC CR LF</p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">Pattern No.</span> </span> </p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;">           1=RUN            2=STOP            3=ADV            4=RESET            5= Select pattern         </span> </p> <p>(Note) When external drive input, select pattern input are attached, it is necessary to set the program drive system, select pattern system in COM. (communication), in mode 1.</p>
<p>② Execution parameter setting</p> <p>[Mode 0 lock]</p>	<p>STX Δ2, Δ2, □□□□, □□□□, □□□□, □□□□□□,</p> <p style="margin-left: 100px;">P I D AL1</p> <p>□□□□□□, □□□□□□, □□□□□□, □□□□□□, □□□□□□,</p> <p style="margin-left: 100px;">AL2 AL3 AL4 OL OH</p> <p>□□□□□□, □□□□□□, ETX BCC CR LF</p> <p style="margin-left: 100px;">OSL Sensor correction</p> <p>(Note) OSL sets the ascending/descending absolute value. In other cases alarm format AL becomes the dummy data.</p>
<p>③ AUTO/MAN switching</p> <p>[FNC lock]</p>	<p>STX Δ2, Δ3, □, □□□, □, □□□, ETX BCC CR LF</p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">MV1</span> </span> <span style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">MV2</span> </span> </span> </p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;">Set manual output value</span> <span style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">In case of output format 2</span> </span> </span> </p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">0=MV1 AUTO, at that time MV1 is space setting</span> </span> <span style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">Space setting in output 1 format</span> </span> </span> </p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">1=MV1 MAN</span> </span> <span style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">0=MV2 AUTO, at that time MV1 is space setting</span> </span> </span> </p> <p style="margin-left: 100px;"> <span style="border-left: 1px solid black; border-bottom: 1px solid black; padding-left: 5px;"> <span style="border-bottom: 1px solid black; padding-bottom: 2px;">1=MV1 MAN</span> </span> </p>

<p>④ Fixed control (CONST)</p> <p>[Mode 1 lock]</p>	<p>STX Δ2, Δ4, □, □□□□□□, ETX BCC CR LF</p> <p style="margin-left: 100px;">  SV</p> <p style="margin-left: 100px;">└─ 0=PRG, at that time SV is space setting</p> <p style="margin-left: 100px;">└─ 1=CONST</p>
<p>⑤ Alarm Cancel output</p> <p>[Mode 1 lock]</p>	<p>STX Δ2, Δ5, ETX BCC CR LF (20)</p>
<p>⑥ Auto tuning Start/stop</p> <p>[Mode 1 lock]</p>	<p>STX Δ2, Δ6, □ ETX BCC CR LF</p> <p style="margin-left: 100px;">└─ 0=AT stop</p> <p style="margin-left: 100px;">└─ 1=AT1 start</p> <p style="margin-left: 100px;">└─ 2=AT2 start</p> <p style="margin-left: 100px;">└─ 3=AT3 start</p>
<p>⑦ Mode Lock/release lock</p>	<p>STX Δ2, Δ7, □, □, □, □, □, □, □, □, □, □, ETX BCC CR LF</p> <p style="margin-left: 100px;">  Mode 0</p> <p style="margin-left: 100px;">  1 2 3 4 5 6 7 8</p> <p style="margin-left: 100px;">FNC key</p> <p style="margin-left: 150px;">└─ 0=Non lock</p> <p style="margin-left: 150px;">└─ 1=Lock</p>
<p>⑧ Time display system</p> <p>[Mode 1 lock]</p>	<p>STX Δ2, Δ8, □, ETX BCC CR LF</p> <p style="margin-left: 100px;">└─ 1=Elapsed step</p> <p style="margin-left: 100px;">└─ 2=Elapsed pattern</p> <p style="margin-left: 100px;">└─ 3=Remaining steps</p> <p style="margin-left: 100px;">└─ 4=Remaining pattern</p>

**9-3-4. Program pattern setting (PC→KP)** [At the time of resetting only] [Mode 2 lock]

Set field	Set format
① Step 0	STX Δ3, Δ1, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> 0 0, <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> , ETX BCC CR LF Pattern Step Start SV 0= Start SV No. No. 1=Start PV
② Step n	STX Δ3, Δ2, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , Pattern Step SV Time No. No. ETX BCC CR LF When setting the relevant step for the first time, if time is set as "0" (000 hours/00 minutes, or 000 minutes/00 seconds) error code 41 may occur. When setting the time as "0", set the time as <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> and after the pattern setting is done, change the setting to <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> . (Note) Delimiter of time hours/minutes, minutes/seconds is period.
③ END step	STX Δ3, Δ3, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> , ETX BCC CR LF Pattern Step   Output in case of END No. No.   0= Output 0   200= Fixed control   Link destination pattern No. 00=No link
[Mode 2 lock] [Mode 4 lock]	(Note) When output is written at the time of END, output is set at the time of END of output 1, output 2.
④ Parameter No. setting	STX Δ3, Δ4, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , Pattern Step PID ALM OPL OSL     Waiting time number No. No. No. No. No. No.     Real temperature     compensation No. (0=OFF)     Sensor correction No.
<input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , ETX BCC CR LF TS1 TS2 TS3 TS4 TS5 00=ALL OFF *Set 00 in case of no TS. 01=No.1 02=Repeat No.1 16=Repeat No.8 99=ALL ON	
⑤ Repeat step	STX Δ3, Δ5, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , ETX BCC CR LF Pattern   End step   Repeat count No.   Starting step   1 to 99=Count   Starting < End, always   00=Cancel repeat
⑥ Repeat pattern	STX Δ3, Δ6, <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> , ETX BCC CR LF Repeat count
⑦ Copy pattern	STX Δ3, Δ7, <input type="text"/> <input type="text"/> , <input type="text"/> <input type="text"/> , ETX BCC CR LF   Copy destination pattern No. Copy and Pattern
⑧ Clear pattern	STX Δ3, Δ8, <input type="text"/> <input type="text"/> , ETX BCC CR LF     00=Clear ALL   1 to 19=Clear pattern unit

### 9-3-5.Individual parameter setting (PC→KP)

Parameter type	No.	Format
Alarm (1 to 8)  [Mode 3 lock]	12	STX 12, □, □□□□□□, □□□□□□, □□□□□□, <div style="margin-left: 40px;"> <span style="margin-left: 100px;">AL1</span> <span style="margin-left: 100px;">AL2</span> <span style="margin-left: 100px;">AL3</span> </div> □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">AL4</span> </div> Do not change the setting when all digits are space. 1 to 8=PID No. 0=Copy to No. 1 to 8 (Note) When alarm format is something else AL becomes the dummy data.
PID (1 to 8) (91 to 98)  [Mode 3 lock]	13	STX 13, □□, □□□□□□, □□□□□□, □□□□□□, <div style="margin-left: 40px;"> <span style="margin-left: 100px;">P</span> <span style="margin-left: 100px;">I</span> <span style="margin-left: 100px;">D</span> </div> ETX BCC CR LF Do not change the setting when all digits are space. 1 to 8=PID No. 91 to 98=PID No. 0=No.1 to 8, 90=Copy to No.91 to 98
Output variation limit (1 to 8)  [Mode 4 lock]	14	STX 14, □, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">1 to 8=PID No.</span>  <span style="margin-left: 100px;">0=Copy to No. 1 to 8</span> </div> (Note) When output variation limit is read, ascending value is read and when it is written ascending/descending absolute value is set.
Output higher and lower limit (1 to 8)  [Mode 4 lock]	15	STX 15, □, □□□□□□, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">OL-L</span> <span style="margin-left: 100px;">OL-H</span> </div> Do not change the setting when all digits are space. 1 to 8=PID No. 0=Copy to No. 1 to 8
Sensor correction (1 to 8)  [Mode 5 lock]	16	STX 16, □, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">1 to 8=PID No.</span>  <span style="margin-left: 100px;">0=Copy to No. 1 to 8</span> </div>
Real temperature compensation (1 to 8)  [Mode 6 lock]	17	STX 17, □, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">1 to 8=PID No.</span>  <span style="margin-left: 100px;">0=Copy to No. 1 to 8</span> </div>
Waiting time alarm (1 to 8)  [Mode 6 lock]	18	STX 18, □, □□□.□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 100px;">1 to 8=PID No.</span>  <span style="margin-left: 100px;">0=Copy to No. 1 to 8</span> </div> (Note) Delimiter for time hours/minute, minutes/seconds is a period.



Parameter type	No.	Format
Time signal (1 to 8)  [Mode 6 lock]	19	STX 19, □, □□□.□□, □□□.□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 20px;">ON Time</span> <span style="margin-left: 40px;">OFF Time</span> </div> Do not change the setting in case of 6 digits space. 1 to 8=PID No. 0=Copy to No. 1 to 8  (Note) Delimiter for time hours/minute, minutes/seconds is a period.
Digital filter [Mode 5 lock]	20	STX 20, □□□□, ETX BCC CR LF
Transmission type Transmission scale  [Mode 7 lock]	21	STX 21, □, □□□□□□, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 20px;">Scale Min</span> <span style="margin-left: 40px;">Scale MAX</span> </div> Do not change the setting when all digits are space. Transmission type <ul style="list-style-type: none"> <li>0=SV</li> <li>1=PV</li> <li>2=MV1</li> <li>4=MV2</li> <li>5=Others</li> </ul> (Note) Transmission type:5=Others cannot be written.
Output 2 gap [Mode 3 lock]	22	STX 22, □□□□□□, ETX BCC CR LF
Output 2 PID  [Mode 3 lock]	23	STX 23, □□□□□□, □□□□, □□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 20px;">Second P</span> <span style="margin-left: 40px;">Second I</span> <span style="margin-left: 40px;">Second D</span> </div>
Output 2 variation limit [Mode 4 lock]	24	STX 24, □□□□□□, ETX BCC CR LF (Note) When output 2 variation limit is read, ascending value is read and when it is written ascending/descending absolute value is set.
Output 2 higher and lower limit [Mode 4 lock]	25	STX 25, □□□□□□, □□□□□□, ETX BCC CR LF <div style="margin-left: 40px;"> <span style="margin-left: 20px;">Second OL</span> <span style="margin-left: 40px;">Second OH</span> </div> Do not change the setting when all digits are space.
Second position 2 dead band [Mode 3 lock]	26	STX 26, □□□, ETX BCC CR LF
Output in case of PV 2 abnormality [Mode 4 lock]	27	STX 27, □□□□□□, ETX BCC CR LF (Note) When output is read during PV 2 abnormality, higher limit value is read and when it is written higher limit/lower limit value is set.
Output 2 Direct/reverse  [Mode 4 lock]	28	STX 28, □, ETX BCC CR LF <ul style="list-style-type: none"> <li>0=DIRECT</li> <li>1=REV.</li> </ul>

Parameter type	No.	Format
Measurement input unit [Mode 5 lock]	30	STX 30, □□, □, ETX BCC CR LF Unit:0=°C, 2=K Input unit No.
RJ INT/EXT [Mode 5 lock]	31	STX 31, □, ETX BCC CR LF 0=INT 1=EXT
SV decimal point [Mode 5 lock]	32	STX 32, □, ETX BCC CR LF (Note) Differs from display SV decimal point.
PV decimal point [Mode 5 lock]	33	STX 33, □, ETX BCC CR LF
Alarm delay [Mode 3 lock]	34	STX 34, □□□□□, ETX BCC CR LF
Alarm format Alarm dead band [Mode 3 lock]	35	STX 35, □, □, □□□□□, ETX BCC CR LF Dead band Alarm format: 0=DH, 1=DHW, 2=DL, 3=DLW, 4=AH, 5=AL, 6=Other 1 to 4=Alarm No. 0=Copy to No.1 to 4 (Note)Alarm format:6=Other than that cannot be written.
Position 2 dead band [Mode 3 lock]	36	STX 36, □□□, ETX BCC CR LF
Pulse cycle [Mode 4 lock]	37	STX 37, □□□, ETX BCC CR LF (Note) When pulse cycle is read, pulse cycle of output 1 is read and when it is written, pulse cycle of output 1 and output 2 is set.
FB zero Span Gain [Mode 4 lock]	38	STX 38, □□□□□, □□□□□, □□□, ETX BCC CR LF Zero Span Gain Do not change the setting when all digits are space.
Output preset [Mode 4 lock]	39	STX 39, □□□□□□, ETX BCC CR LF
Output at the time of PV abnormality [Mode 4 lock]	40	STX 40, □□□□□, ETX BCC CR LF (Note) When output is read in case of PV abnormality, higher limit value is read and when it is written, higher limit/lower limit value is set.
Output Direct/reverse [Mode 4 lock]	41	STX 41, □, ETX BCC CR LF 0=DIRECT 1=REV.

Parameter type	No.	Format
Linear range [Mode 5 lock]	42	STX 42, <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="text-align: center;"> <span style="margin-right: 100px;">ZERO</span> <span>SPAN</span> </div> Do not change the setting when all digits are space.
Linear scale [Mode 5 lock]	43	STX 43, <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="text-align: center;"> <span style="margin-right: 100px;">MIN</span> <span>MAX</span> </div> Do not change the setting when all digits are space.
ARW [Mode 3 lock]	44	STX 44, <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="text-align: center;"> <span style="margin-right: 50px;">Lower limit</span> <span>Higher limit</span> </div> Do not change the setting when all digits are space.
AT2 SV (1 to 8) [Mode 3 lock]	45	STX 45, <input type="checkbox"/> , <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="margin-left: 100px;">           AT2SV  <input type="checkbox"/> 0=OFF  <input type="checkbox"/> 1=ON  <input type="checkbox"/> 1 to 8=Parameter No.  <input type="checkbox"/> 0=Copy to No.1 to 8         </div>
SV section (AT3) (1 to 7) [Mode 3 lock]	46	STX 46 <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="margin-left: 100px;">           Delimiter SV  <input type="checkbox"/> 1 to 7=Parameter No.         </div>
AT3 SV (1 to 8) [Mode 3 lock]	47	STX 47, <input type="checkbox"/> , <input type="checkbox"/> , <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF <div style="margin-left: 100px;">           AT3SV  <input type="checkbox"/> 0=OFF  <input type="checkbox"/> 1=ON  <input type="checkbox"/> 1 to 8=Parameter No.         </div>
AT start direction [Mode 3 lock]	48	STX 48, <input type="checkbox"/> , ETX BCC CR LF <div style="margin-left: 100px;"> <input type="checkbox"/> 0=UP  <input type="checkbox"/> 1=Down         </div>
SV during reset [Mode 2 lock]	49	STX 49, <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> , ETX BCC CR LF

## 9-4. Positive response and negative response

### 9-4-1. Positive response

ACK	CR	LF
-----	----	----

ACK=06H

### 9-4-2. Negative response

NAK	Error	Code	CR	LF
-----	-------	------	----	----

NAK=15H

\* Do not apply STX, ETX, BCC to ACK/NAK.

### 9-4-3. Error code

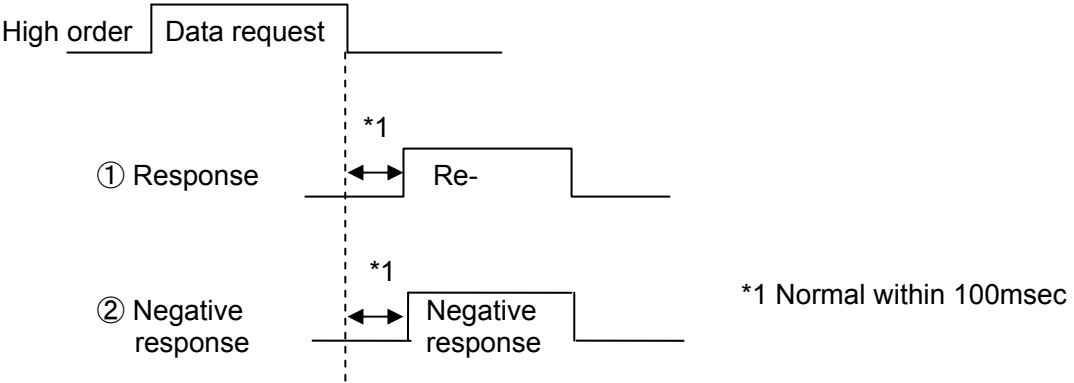
Code	Error type	Contents
△1	Framing	
△2	Over run	
△3	Parity	
△4	Check sum	
△5	Lock/non lock	· During non lock, high order was confirmed and command was sent.
10	Format	· Fast communication code error
11	"	· Second communication code error
12	"	· Third onwards communication code error
14	"	· ETX error (No ETX)
15	"	· Excess reception buffer
16	Numeric value	· Cannot recognize as numerals.
20	Data	· Undefined numeric value is received. (Numeric value is out of range)
21	"	· L/H error (Greater and smaller relation is reversed)
22	"	· SV RANG error (It is set out of SV RANG)
23	"	· SV scope error
24	"	· Z/S error (Greater and smaller relation is reversed)
25	"	· Linear range error
30	Program drive	· ADV, STOP was done during reset.
31	"	· Pattern was selected during STOP.
32	"	· Pattern was selected during RUN.
33	"	· RUN, STOP, ADV, Pattern were selected during END.
34	"	· RUN, STOP, ADV, RESET was done during CONST.
35	External drive OP	· Program drive was RUN, STOP, ADV, RESET during KEY or EXT

(Note) △=Space

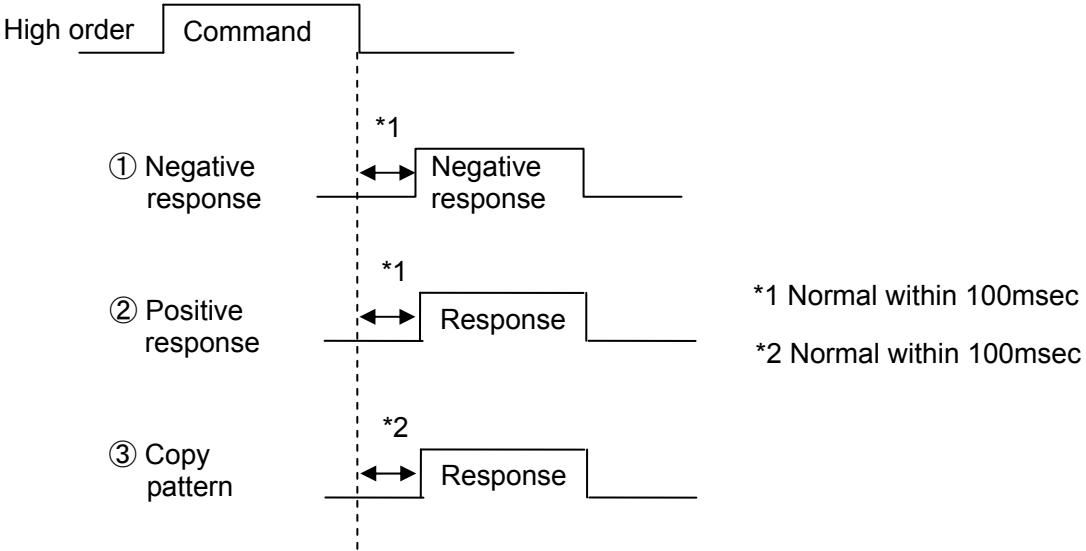
Code	Error type	Contents
36	Select pattern OP	·Select pattern selected the pattern in case of KEY or ETX
40	Set pattern	·Set the pattern except for RESET.
41	"	·Continued 2 steps and set Time=0.
43	"	·Set parameter No. in unset step (END step).
44	"	·Did repeat setting in unset step.
45	"	·Set after END step. (Add)
46	"	·Set END after unset step.
50	Copy pattern	·Copy pattern except in case of RESET.
51	"	·Copy destination is not cleared.
52	"	·Copy and pattern are not set.
53	Clear pattern	·Clear pattern except during RESET.
54	Read pattern	·Read requested the pattern data except during RESET.
55	"	·Read requested the unset step.
60	RUN; PTN No.	·Unset pattern is RUN. (Link destination includes the unset pattern)
61	RUN; Repeat step	·Repeat step setting of the pattern that was RUN is an error
65	AT start	·Started AT1 during RESET, PRG.
66	"	·Started AT2 except for RESET, PRG.
67	"	·Started AT3 except for RESET, PRG.
99	Others	·At the time of other error

## 9-5.Communication time chart

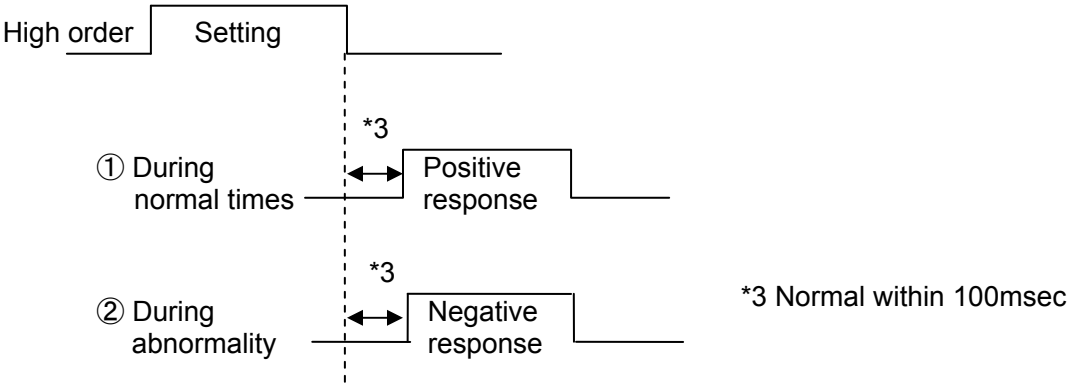
### 9-5-1.Response to data request



### 9-5-2.Response to command

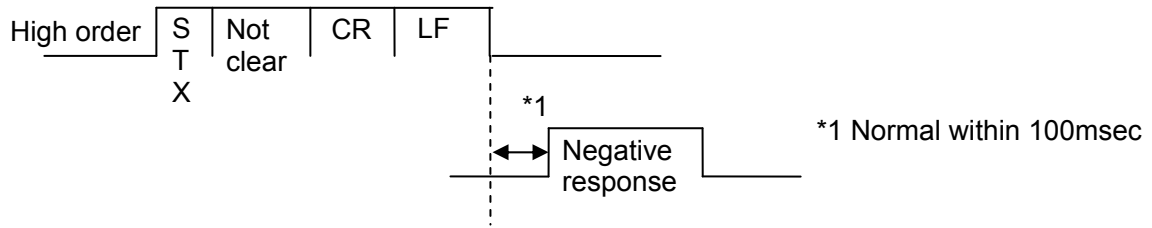


### 9-5-3.Response to pattern setting, parameter setting

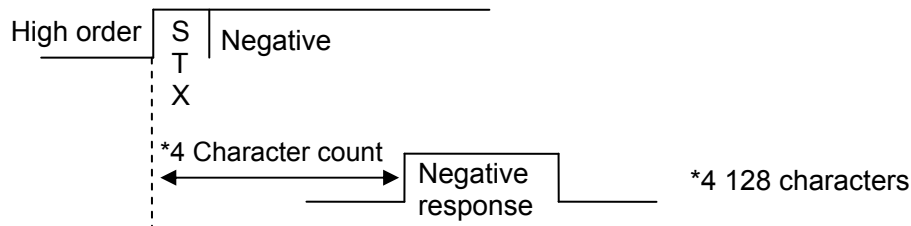


### 9-5-4. During other abnormalities

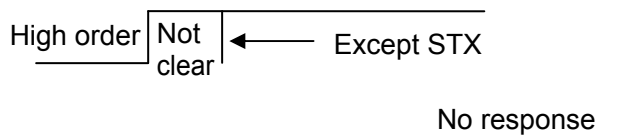
① Contents unclear



② Exceeding character count(Excess buffer)



③ When beginning with other than STX



### 9-5-5. Response of PC

Response of KP, to the request, setting from PC is carried out after a certain time. In other words if there is no response from KP after a fixed time, it is necessary send a request and settings from the PC again. For timer time when it is resend, see the time chart.

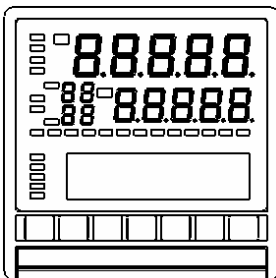
<b>Precautions</b>	<p>* When the front key operation 1 to 3 is to be repeated, it takes some seconds.</p>
--------------------	--

# 10.Communication (Digital) transmission

## 10-1. Overview

KP can, not only communicate with the PC but also can digitally communicate with KP→DB device (Between our company's controller-DB). It is called "Communication transmission" "Communication remote".

If this function is used, DBs on multiple machines operate with the same condition, consider KP as master device which is set in communication transmission and DB as slave device which is set in communication remote. Maximum 31 slave device SVs can be set using communication. It can be change to KP (master device) doing communication transmission or to communication remote DB (slave device) receiving it, by key settings of device itself.



If communication function of mode 8 is set as 'TRANS', it becomes a communication transmission (Master device) function.

### (Communication function settings and transmission data contents)

Mode 8, communication function settings (Master device)→(Slave device)	Transmission data contents
Protocol=PRIVATE (Transmission)→(Remote) [KP, DB]	<ul style="list-style-type: none"> <li>• Master device transmits the remote SV data and slave device receives it</li> <li>• PRIVATE protocol</li> <li>• Transmission when decimal point exists</li> </ul>
Protocol=MODBUS (Transmission)→(Remote) [KP, DB]	<ul style="list-style-type: none"> <li>• Master device transmits Run/Ready, execution no. selection, remote SV and slave device receives it.</li> <li>• MODBUS protocol</li> <li>• Transmission when decimal point does not exist</li> </ul>

※ In order that slave device does the reception it is necessary to switch it to remote mode.

※ Master device sends the following data.

• PRIVATE protocol

Remote SV data = Data selected in communication transmission type

• MODBUS protocol

① Run/Ready = Run status

② Select execution No. = Executing PID No.

③ Remote SV = Data selected in communication transmission type



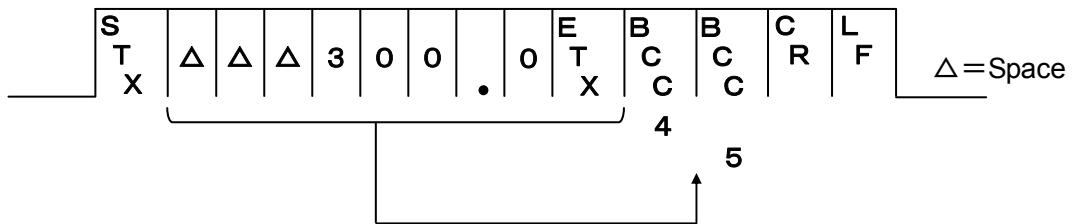
## 10-2. Specifications of communication division

- Communication system :Asynchronous method
- Communication speed :38400,19200,9600,4800,2400bps switching communication speed
- Start bit :1 bit
- Data length :7 bit (ASCII mode/PRIVATE mode) or 8 bits (RTU mode/ASCII mode)
- Parity bit :None (RTU mode/ASCII mode), Even (RTU mode/ASCII mode/PRIVATE mode), Odd (RTU mode/ASCII mode)
- Stop bit :1 bit (RTU mode/ASCII mode/PRIVATE mode), 2 bits (RTU mode/ASCII mode)
- Transmission code :ASCII (ASCII mode/PRIVATE mode) or Binary (RTU mode)
- Error check :Check sum ※1...For PRIVATE mode  
:CRC-16 ...For RTU mode  
:LRC ...For ASCII mode
- Usage signal name : Send or receive data only, without using control signal

### ※1 Check sum (BCC)

Check sum means, total sum of characters after STX up to ETX is calculated, lower order 8 bits are split into high and low order 4 bits and are converted to characters from 0 to F and are sent and received sequentially in high order and low order.

(Example)



Character	Δ	Δ	Δ	3	0	0	.	0	ETX	Total sum=BCC
ASCII code	20h	20h	20h	33h	30h	30h	2Eh	30h	03h	154h=45

### 10-3. Communication transmission setting

Set the following parameters in communication transmission KP.

- 1) Setting the communication speed (COM BIT RATE). (See 6-1)
- 2) Setting the communication function (COM KIND). (See 6-3)
- 3) Setting communication transmission type (COM TRANS KIND).(See 6-4)
- 4) Setting communication protocol(COM PROTOCOL).(See 6-5)
- 5) Setting communication character (COM CHARACTER). (See 6-6)

**Reference** In case of 'PRIVATE mode' communication transmission, KP outputs the data in the following format.



Data output: PV (measurement value), SV (Control setting value), MV1 (Output 1 value), MV2 (Output 2 value), MFB (Feedback value), RSV (Remote SV)

※ In case of 'RTU/ASCII mode' communication transmission, output the data by slave address '0' in MODBUS format mentioned earlier.



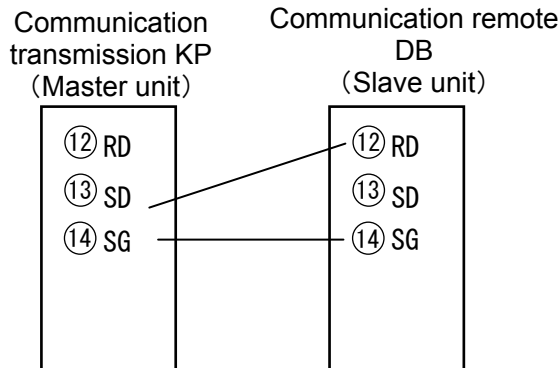
#### Precautions

- ① When connecting KP using communication transmission and DB using communication remote, make the communication protocol and communication speed of the device same.
- ② If analog remote and communication remote are used simultaneously analog remote takes precedence.
- ③ Analog transmission type and communication transmission type can be set separately.
- ④ If analog transmission option and communication transmission option are used simultaneously, transmission output is done from both.

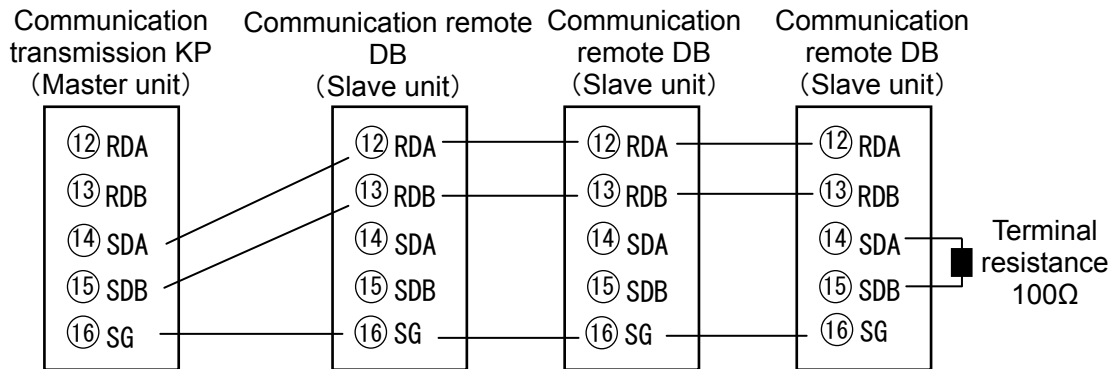
'Transmission scale lower limit' 'Transmission scale higher limit' 'remote scale lower limit' 'remote scale higher limit' of the parameter is set at the time of analog transmission/remote. Thus when using communication transmission one need not set them.

## 10-4. Wiring

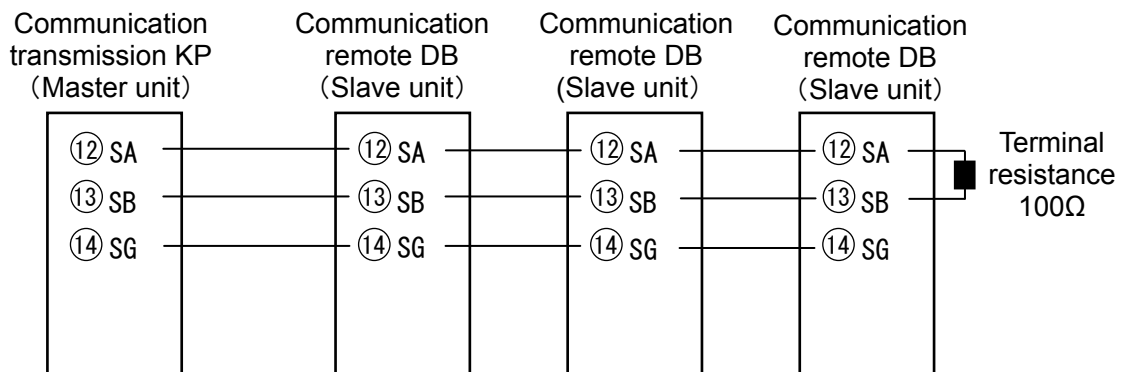
### 10-4-1. For RS-232C



### 10-4-2. For RS-422A



### 10-4-3. For RS-485

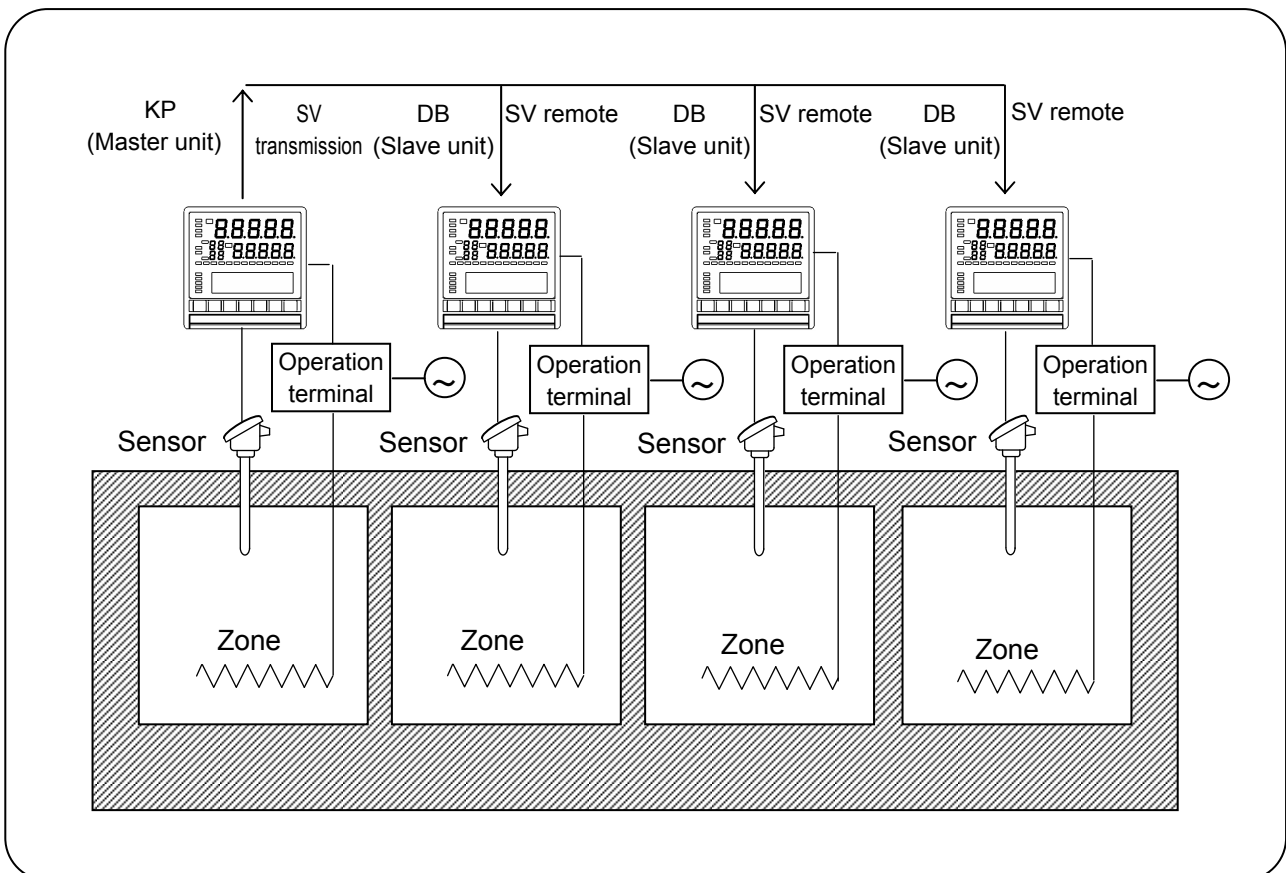


## 10-5. Example of combination

### 10-5-1. Multizone temperature control

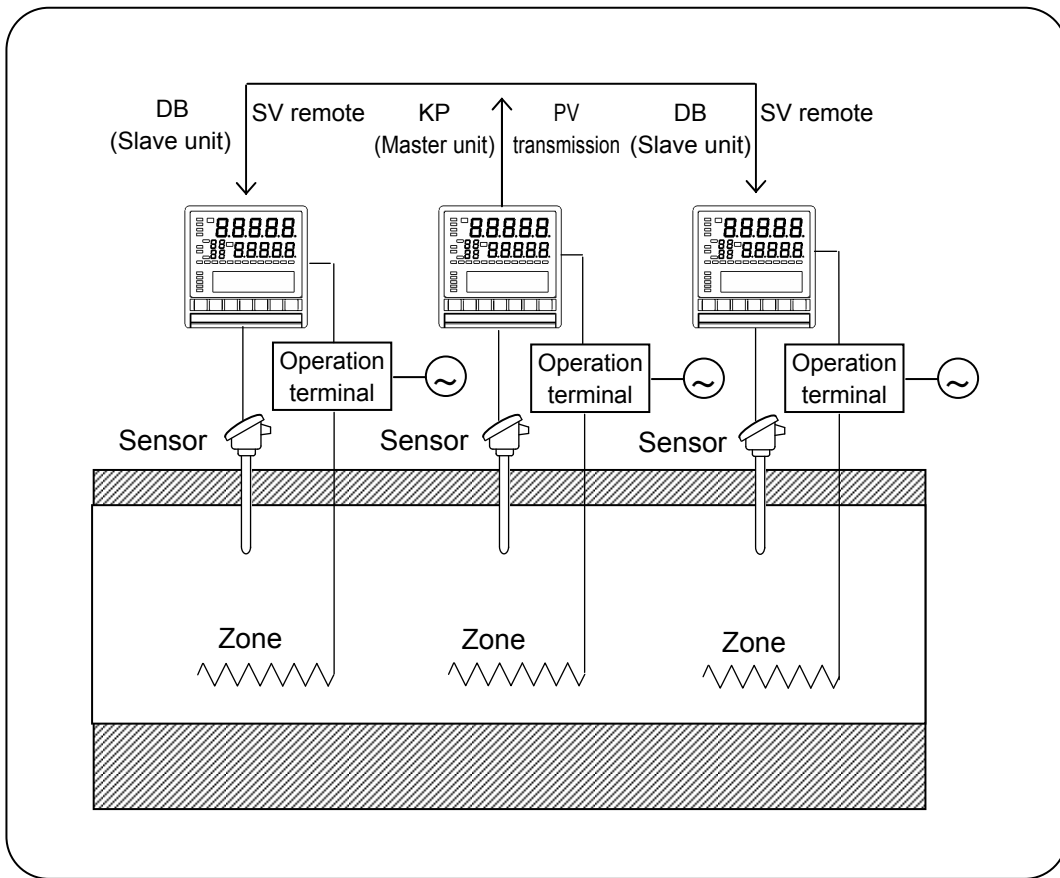
Perform communication transmission for SV using KP of base unit, and slave unit DB receives using communication remote.

As there is no error in analog division remote control with good precision is possible. If remote shift of DB is used, temperature slope can be held in multizone,



### 10-5-2. Controlling burning furnace zone

Communication transmission for PV is done using base unit in the center and both the cordless handsets receive SV as PV using communication remote and soakability can be controlled properly.



# 11. Appendix

## 11-1. Communication format list

As mentioned below Δ=Space(20H),X=Code data and numeric value data at the time of setting,○=Code data and numeric value data at the time of sending DB,SX=STX(02H),EX=ETX(03H),BCBC=BCC,CR=CR(0DH),LF=LF(0AH).

Communication Item	Format																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Real data request	SX	Δ	1	,	Δ	1	,	EX	BC D	BC F	CR	LF																			
Response output	SX	Δ	1	,	○	○	,	○	○	,	○	,	○	○	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	,
	○	,	○	,	○	○	○	,	○	○	,	○	,	○	○	○	○	○	○	○	,	○	,	○	,	○	○	○	○	○	○
	○	○	,	EX	BC	BC	CR	LF																							
Execution parameter request	SX	Δ	1	,	Δ	2	,	EX	BC E	BC F	CR	LF																			
Response output	SX	Δ	2	,	○	○	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	,	○	○	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	○	○	○	,	○	○	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
	,	○	○	○	○	○	○	○	○	,	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

Communication Item	Format																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Setting Program Pattern Data Request	SX	Δ	1	,	Δ	3	,	x	x	,	x	x	,	EX	BC	BC	CR	LF												
Step 0 Output	SX	Δ	3	,	Δ	1	,	o	o	,	Δ	0	,	o	o	o	o	o	o	o	o	,	o	,	EX	BC	BC	CR	LF	
Step n output	SX	Δ	3	,	Δ	2	,	o	o	,	o	o	,	o	o	o	o	o	o	o	o	,	o	o	o	,	o	o	,	o
END Step Output Pattern Repeat output	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	,	o	o
Individual settings Parameter request	,	EX	BC	BC	CR	LF																								
Program pattern Setting status Request	SX	Δ	3	,	Δ	3	,	o	o	,	o	o	,	o	o	,	o	o	o	o	o	o	,	EX	BC	BC	CR	LF		
Response output	SX	Δ	3	,	Δ	6	,	o	o	o	o	o	o	o	o	,	EX	BC	BC	CR	LF									
Device Status Request	SX	Δ	1	,	Δ	4	,	x	x	,	x	x	,	EX	BC	BC	CR	LF												
Response output	SX	Δ	5	,	o	o	,	o	o	,	EX	BC	BC	CR	LF															
Mode lock Status Request	SX	Δ	1	,	Δ	5	,	x	x	,	EX	BC	BC	CR	LF															
Response output	SX	Δ	6	,	o	o	,	o	o	,	o	o	,	o	o	,	o	o	o	o	o	,	EX	BC	BC	CR	LF			
Status 1 Request	SX	Δ	1	,	Δ	7	,	EX	BC	BC	CR	LF																		
Response output	SX	Δ	7	,	o	o	,	o	o	,	o	o	,	o	o	,	o	o	o	o	o	,	EX	BC	BC	CR	LF			
Status 2 Request	SX	Δ	1	,	Δ	8	,	EX	BC	BC	CR	LF																		
Response output	SX	Δ	8	,	o	o	,	o	o	,	o	o	,	o	o	,	o	o	o	o	o	,	EX	BC	BC	CR	LF			
	EX	BC	BC	CR	LF																									
Status 2 Request	SX	Δ	1	,	Δ	9	,	EX	BC	BC	CR	LF																		
Response output	SX	Δ	9	,	o	o	,	o	o	,	o	o	,	o	o	,	o	o	o	o	o	,	EX	BC	BC	CR	LF			
	BC	CR	LF																											

Communication item	Format																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Program drive	SX	Δ	2	,	Δ	1	,	x	,	x	x	,	EX	BC	BC	CR	LF													
Execution parameter Setting	SX	Δ	2	,	Δ	2	,	x	x	x	x	x	,	x	x	x	x	,	x	x	x	x	,	x	x	x	x	x	x	,
	x	x	x	x	x	x	,	x	x	x	x	x	,	x	x	x	x	x	x	x	x	x	,	x	x	x	x	x	x	x
	x	x																												
AUTO/MAN Switching	SX	Δ	2	,	Δ	3	,	x	,	x	x	x	,	x	,	x	x	x	,	EX	BC	BC	CR	LF						
Fixed control (CONST)	SX	Δ	2	,	Δ	4	,	x	,	x	x	x	x	x	,	EX	BC	BC	CR	LF										
Cancel alarm output	SX	Δ	2	,	Δ	5	,	EX	BC 2	BC 0	CR	LF																		
Auto tuning	SX	Δ	2	,	Δ	6	,	x	,	EX	BC	BC	CR	LF																
Mode Lock/Release lock	SX	Δ	2	,	Δ	7	,	x	,	x	x	x	x	x	,	x	,	x	,	x	,	x	,	x	,	x	,	EX	BC	BC
	CR	LF																												
Time display System	SX	Δ	2	,	Δ	8	,	x	,	EX	BC	BC	CR	LF																
Step 0 Setting	SX	Δ	3	,	Δ	1	,	x	x	,	0	0	,	x	x	x	x	x	x	,	x	,	EX	BC	BC	CR	LF			
Step n Setting	SX	Δ	3	,	Δ	2	,	x	x	,	x	x	,	x	x	x	x	x	x	x	,	x	x	x	,	x	x	,	EX	BC
	BC	CR	LF																											
END Step Setting	SX	Δ	3	,	Δ	3	,	x	x	,	x	x	,	x	x	,	x	x	x	,	EX	BC	BC	CR	LF					
Parameter No. Setting	SX	Δ	3	,	Δ	4	,	x	x	,	x	x	,	x	,	x	,	x	,	x	,	x	,	x	,	x	,	x	x	,
	x	x																												
Repeat Step Setting	SX	Δ	3	,	Δ	5	,	x	x	,	x	x	,	x	x	,	x	x	,	EX	BC	BC	CR	LF						
Repeat Pattern Setting	SX	Δ	3	,	Δ	6	,	x	x	x	x	,	EX	BC	BC	CR	LF													
Copy Pattern	SX	Δ	3	,	Δ	7	,	x	x	,	x	x	,	EX	BC	BC	CR	LF												
Clear pattern	SX	Δ	3	,	Δ	8	,	x	x	,	EX	BC	BC	CR	LF															



Communication item	Format																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Alarm	SX SX	1 1	2 2	,	x O	,	x O	x O	x O	x O	x O	x O	,	x O	x O	,	x O	x O	,	x O	x O	,	x O	x O	,	x O	x O	,	x O	x O	
	x O	x O	x O	,	EX O	BC O	BC O	CR O	LF O				,	EX	BC	BC	CR	LF													
PID	SX SX	1 1	3 3	,	x O	x O	,	x O	x O	x O	x O	x O	,	x O	x O	x O	x O	,	x O	x O	x O	x O	,	EX O	BC O	BC O	CR O	LF O	O D	O	
	O	O	O	,	EX	BC	BC	CR	LF																						
Variation Limit	SX SX	1 1	4 4	,	x O	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC EX	CR BC	LF BC	CR	LF												
				,	No.																										
Output Higher lower limit	SX SX	1 1	5 5	,	x O	,	x O	x O	x O	x O	x O	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC O	CR O	LF O	,	EX	BC	BC	CR	LF		
				,	No.																										
Sensor correction	SX SX	1 1	6 6	,	x O	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC EX	CR BC	LF BC	CR	LF												
				,	No.																										
Real temperature compensation	SX SX	1 1	7 7	,	x O	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC O	CR EX	LF BC	BC	CR	LF											
				,	No.																										
Waiting time alarm	SX SX	1 1	8 8	,	x O	,	x O	x O	x O	x O	x O	,	EX O	BC EX	BC BC	CR BC	LF CR	LF													
				,	No.																										

Communication Item	Format																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
Time signal	SX SX	1 1	9 9	,	x O	,	x O	x O	x O	,	x O	x O	,	x O	x O	x O	,	x O	x O	,	EX EX	BC BC	BC BC	CR CR	LF LF							
					No.						ON-Time										OFF-Time											
Digital filter	SX SX	2 2	0 0	,	x O	x O	x O	x O	,	EX O	BC O	BC O	CR ,	LF EX	BC	BC	CR	LF														
Transmission type	SX SX	2 2	1 1	,	x O	,	x O	x O	x O	x O	x O	x O	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC O	CR ,	LF EX	BC	BC	CR	LF				
Transmission scale					Type						Scale MIN										Scale MAX											
Output 2 Gap	SX SX	2 2	2 2	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC ,	CR EX	LF BC	BC	CR	LF														
Output 2 PID	SX SX	2 2	3 3	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC ,	CR EX	LF BC	BC	CR	LF														
											Second P										Second I											
Output 2 variation limit	SX SX	2 2	4 4	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC ,	CR EX	LF BC	BC	CR	LF														
Output 2 Higher and lower limit	SX SX	2 2	5 5	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC ,	CR EX	LF BC	BC	CR	LF														
											Second OL										Second OH											
Second Position 2 dead band	SX SX	2 2	6 6	,	x O	x O	x O	x O	,	EX O	BC O	BC O	CR O	LF ,	EX	BC	BC	CR	LF													
Output at the time of second PV abnormality	SX SX	2 2	7 7	,	x O	x O	x O	x O	x O	,	EX O	BC O	BC ,	CR EX	LF BC	BC	CR	LF														
Output 2 direct/reverse	SX SX	2 2	8 8	,	x O	,	EX EX	BC BC	BC BC	CR CR	LF LF																					
Measurement input unit	SX SX	3 3	0 0	,	x O	x O	,	EX EX	BC BC	BC BC	CR CR	LF LF																				
					Input						Unit																					
SV Decimal point	SX SX	3 3	2 2	,	x O	,	EX EX	BC BC	BC BC	CR CR	LF LF																					
PV Decimal point	SX SX	3 3	3 3	,	x O	,	EX EX	BC BC	BC BC	CR CR	LF LF																					
Alarm delay	SX SX	3 3	4 4	,	x O	x O	x O	x O	x O	,	EX O	BC ,	BC EX	CR BC	LF BC	BC	CR	LF														

Communication Item	Format																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Alarm format																															
Alarm	SX	3	5	,	x	,	x	,	x	x	x	x	,	EX	BC	BC	CR	LF	BC	CR	LF										
Dead band	SX	3	5	,	No.		Mode					Dead band																			
Position 2 dead band	SX	3	6	,	x	x	x	,	EX	BC	BC	CR	LF																		
2 dead band	SX	3	6	,	x	x	x	,	EX	BC	BC	CR	LF	EX	BC	BC	CR	LF													
Pulse cycle	SX	3	7	,	x	x	x	,	EX	BC	BC	CR	LF																		
cycle	SX	3	7	,	x	x	x	,	EX	BC	BC	CR	LF																		
FB zero	SX	3	8	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Span	SX	3	8	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
Gain									ZERO																						
		EX	BC	BC	CR	LF																									
Output preset	SX	3	9	,	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF												
	SX	3	9	,	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF												
Output during PV abnormality	SX	4	0	,	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF													
	SX	4	0	,	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF													
Output Direct/reverse	SX	4	1	,	x	EX	BC	BC	CR	LF																					
	SX	4	1	,	x	EX	BC	BC	CR	LF																					
Linear range	SX	4	2	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	SX	4	2	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
									ZERO																						
Linear scale	SX	4	3	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	SX	4	3	,	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
									Scale MIN																						
ARW	SX	4	4	,	x	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF							
	SX	4	4	,	x	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF							
									Lower limit																						
AT2 SV	SX	4	5	,	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF								
	SX	4	5	,	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF								
					No.																										
									AT2 SV																						
SV section	SX	4	6	,	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF										
	SX	4	6	,	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF										
					No.																										
									Delimiter SV																						
AT3 SV	SX	4	7	,	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF								
	SX	4	7	,	x	x	x	x	x	x	x	x	x	x	x	EX	BC	BC	CR	LF	BC	CR	LF								
					No.																										
									AT3 SV																						
AT start direction	SX	4	8	,	x	EX	BC	BC	CR	LF																					
	SX	4	8	,	x	EX	BC	BC	CR	LF																					

Communication item	Format																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
SV during Reset	SX	4	9	,	x	x	x	x	x	x	,	EX	BC	BC	CR	LF														
	SX	4	9	,	O	O	O	O	O	O	O			EX	BC	BC	CR	LF												
Thermocouple type Unit [Measurement device]	SX	5	1	,	x	x	,	x	,	EX	BC	BC	CR	LF																
	SX	5	1	,	O	O	,	O	,	EX	BC	BC	CR	LF																
SV scale [Measurement device]	SX	5	2	,	x	x	x	x	x	x	,	x	x	x	x	x	x	,	EX	BC	BC	CR	LF	BC	BC	CR	LF			
	SX	5	2	,	O	O	O	O	O	O	O																			

## 11-2. Input type No.-Input type support table

### Thermocouple scale

No.	Input type	No.	Input type	No.	Input type	No.	Input type
1	B	8	E1	15	J4	22	N
2	R1	9	E2	16	T1	23	PR5-20
3	R2	10	E3	17	T2	24	PR20-40
4	S	11	E4	18	WRe5-26	25	Plati1
5	K1	12	J1	19	WRe0-26	26	Plati2
6	K2	13	J2	20	NiMo	27	U
7	K3	14	J3	21	AuFe	28	L

### Thermocouple type (Setting device)

No.	Thermocouple	No.	Thermocouple	No.	Thermocouple
1	B	8	WRe5-26	15	Plati
2	R	9	WRe0-26	16	U
3	S	10	NiMo	17	L
4	K	11	AuFe		
5	E	12	NiCr		
6	J	13	PR5-20		
7	T	14	PR20-40		

### DC voltage and current scale

No.	Input type	No.	Input type	No.	Input type
31	10mV	34	100mV	37	10V
32	20mV	35	5V		
33	50mV	36	20mA		

### Resistance scale

No.	Input type	No.	Input type	No.	Input type	No.	Input type
41	JPt100Ω1 (Pt100Ω1)	44	JPt100Ω4 (Pt100Ω4)	47	QPt100Ω2 (DIN Pt100Ω2)	50	QPt100Ω5 (DIN Pt100Ω5)
-		45	JPt100Ω5 (Pt100Ω5)			51	Pt50Ω
42	JPt100Ω2 (Pt100Ω2)	46	QPt100Ω1 (DIN Pt100Ω1)	49	QPt100Ω4 (DIN Pt100Ω4)	52	Pt-Co

# CHINO

---

## CHINO CORPORATION

32-8,KUMANO-CHO,ITABASHI-KU,TOKYO 173-8632

Telephone:81-3-3956-2171

Facsimile:81-3-3956-0915

E-mail: [inter@chino.co.jp](mailto:inter@chino.co.jp)

---

