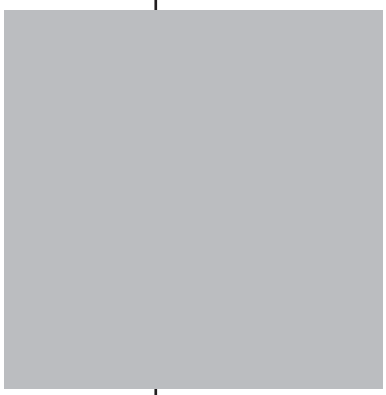
YAMATAKE

No. CP-SP-1066E

DIGITRONIK CPL Communications DCP31/32

User's Manual



Thank you for the choice of the DIGITRONIK Digital Program Controller DCP31/32.
This instruction manual not only outlines the communication functions of the DCP31/32, but also describes its wiring methods, communication procedure, communication data table, trouble-shooting, and communication specifications.
The items required for the DCP 31/32 communication functions to be properly used are given in this manual.
Persons in charge of design or maintenance of operation panels or equipment using the DCP31/32 communication functions should read this manual without fail.

Yamatake Corporation

RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment.
Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

REQUEST

Ensure that this User's Manual is handed over to the user before the product is used.

Copying or duplicating this User's Manual in part or in whole is forbidden. The information and specifications in this User's Manual are subject to change without notice.

Considerable effort has been made to ensure that this User's Manual is free from inaccuracies and omissions.
If you should find any inaccuracies or omissions, please contact Yamatake Corporation.

In no event is Yamatake Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SAFETY PRECAUTIONS

■ About Icons

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. The safety precautions described in this manual are indicated by various icons.
As the following describes the icons and their meanings, be sure to read and understand the descriptions before reading this manual:

⚠**WARNING**	Warnings are indicated when mishandling this product might result in death or serious injury to the user.
⚠**CAUTION**	Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

■ Examples

	Triangles warn the user of a possible danger that may be caused by wrongful operation or misuse of this product. These icons graphically represent the actual danger. (The example on the left warns the user of the danger of electrical shock.)
	White circles with a diagonal bar notify the user that specific actions are prohibited to prevent possible danger. These icons graphically represent the actual prohibited action. (The example on the left notifies the user that disassembly is prohibited.)
	Black filled-in circles instruct the user to carry out a specific obligatory action to prevent possible danger. These icons graphically represent the actual action to be carried out. (The example on the left instructs the user to remove the plug from the outlet.)

⚠WARNING

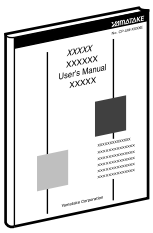
	**Before connecting the DCP31/32 to the measurement target or external control circuits, make sure that the FG terminal is properly grounded (100Ω max.).** **Failure to do so might cause electric shock or fire.**
	**Turn the DCP31/32 OFF before starting wiring.** **Failure to do so might cause electric shock.**
	**Do not touch electrically charged parts such as the power terminals.** **Doing so might cause electric shock.**
	**Do not disassemble the DCP31/32.** **Doing so might cause electric shock or faulty operation.**

⚠CAUTION

	**Wire the DCP31/32 properly according to predetermined standards. Also wire the DCP31/32 using designed power leads according to recognized installation methods.** **Failure to do so might cause electric shock, fire or faulty operation.**
	**Do not allow lead clippings, chips or water to enter the DCP31/32 case.** **Doing so might cause fire or faulty operation.**
	**Firmly tighten the terminal screws at the torque listed in the specifications.** **Insufficient tightening of terminal screws might cause electric shock or fire.**
	**Do not use unused terminals on the DCP31/32 as relay terminals.** **Doing so might cause electric shock, fire or faulty operation.**
	**We recommend attaching the terminal cover (sold separately) after wiring the DCP31/32.** **Failure to do so might cause electric shock.**

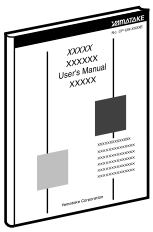
The Role of This Manual

In all, three manuals have been prepared for the DCP31/32. Read the manual according to your specific requirements. The following lists all the manuals that accompany the DCP31/32 and gives a brief outline of the manual. If you do not have the required manual, contact Yamatake Corporation or your dealer.



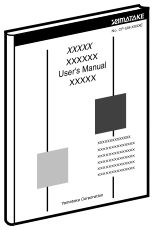
DIGITRONIK Digital Program Controller DCP31 User's Manual
No.CP-UM-1757E

This manual is provided with the DCP31 (single-loop model).
It is required reading for those in charge of designing, producing and maintaining control systems incorporating the DCP31, and for those using the DCP31 in other applications.
It describes mounting onto control panels, wiring, parameter setup, program setup, operation methods, maintenance and inspection, troubleshooting and specifications.



DIGITRONIK Digital Program Controller DCP32 User's Manual
No.CP-SP-1042E

This manual is provided with the DCP32 (dual-loop model).
It is required reading for those in charge of designing, producing and maintaining control systems incorporating the DCP32, and for those using the DCP32 in other applications.
It describes mounting onto control panels, wiring, parameter setup, program setup, operation methods, maintenance and inspection, troubleshooting and specifications.



DIGITRONIK CPL Communications DCP31/32 User's Manual
No.CP-SP-1066E

This manual.

This manual is required reading for those using the CPL communications functions of the DCP31/32.
This manual describes an outline of CPL communications, wiring, communications procedures and DCP31/32 communications data, how to remedy trouble, and communications specifications.

Organization of This Manual

This manual is organized as follows.

Chapter 1. COMMUNICATION FUNCTIONS

Communication functions and model numbers of the DIGITRONIK instruments.

Chapter 2. WIRING

RS-232C and RS-485 wiring methods to make communication between the DIGITRONIK instuments and other equipment.

Chapter 3. SETTING

Setting for communication of DIGITRONIK instruments.

Chapter 4. COMMUNICATION PROCEDURE

Communication procedure, message configuration, data read/write and signal timing.

Chapter 5. COMMUNICATION DATA TABLE

Table of various data addresses used for communication of DIGITRONIK instruments.

Chapter 6. TROUBLESHOOTING

Check points required if the DIGITRONIK instrument communication should not operate normally.

Chapter 7. SPECIFICATIONS

Communication specifications for the DIGITRONIK instruments.

Appendix

Code table and network configuration using the RS-232C/RS-485 converter CMC10L.

Contents

Conventions Used in This Manual

The following conventions are used in this manual:

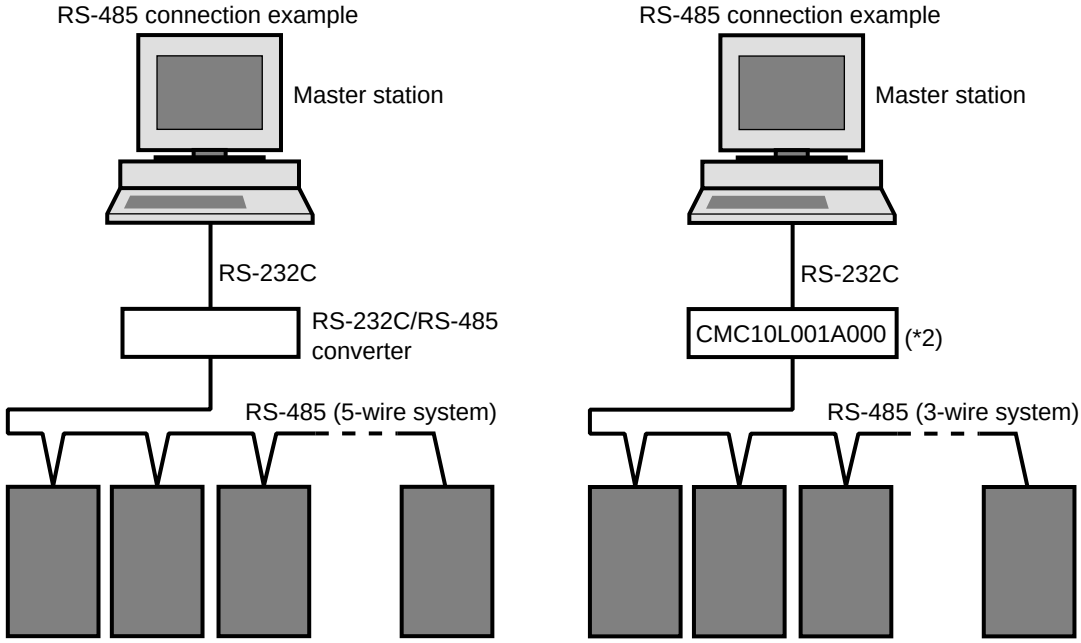
Handling Precautions : Handling Precautions indicate items that the user should pay attention to when handling the DCP31/32.

Note : Notes indicate useful information that the user might benefit by knowing.

(1),(2),(3) : The numbers with the parenthesis indicate steps in a sequence or indicate corresponding parts in an explanation.

Chapter 1. COMMUNICATION FUNCTIONS

- In the RS-485 system, up to 31 instruments can be connected with one master station. The “instrument addresses” are then used to identify mate stations for communication.
- The communication procedure and format are in common to the RS-232C and RS-485 systems.
- When the following procedure is completed during communication, various data for the instrument can be read or written.
  (1) The master station (host computer) transmits an instruction message to a slave station (instrument)
  (2) The master station receives a response message from the slave station.
- Instructions from master station to slave station are classified into two types; “read” and “write”.
- The type of ready/write data can be optionally selected by “data address”.
- CPL(Control Peripheral Link) communications network is the Yamatake Corporation's host-communications system.



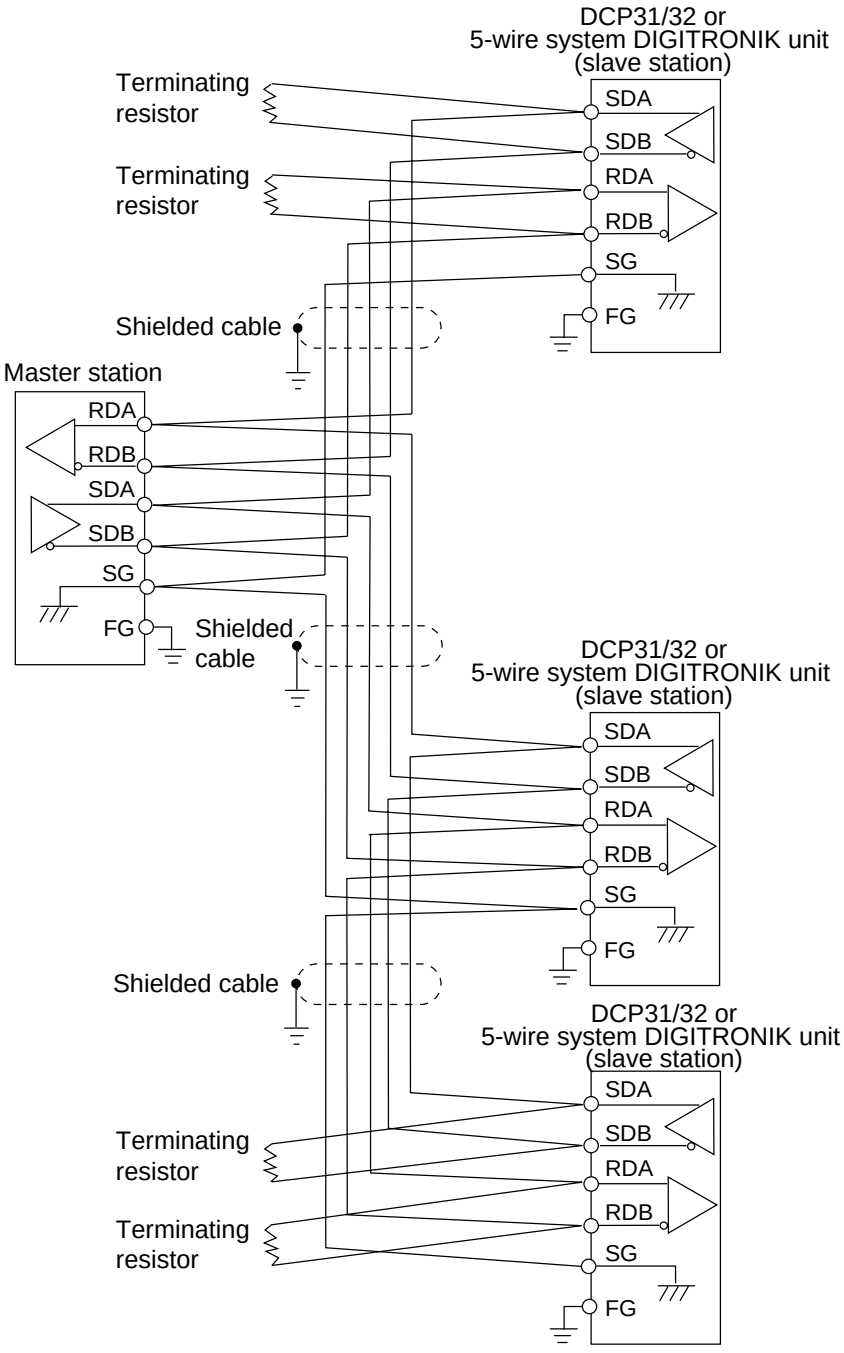
Note

- The high-performance communication controller CMC410A102 is available for conversion between the RS-232C and RS-485 interfaces.
- When the master station is an MA500 DIM or CMC410, it can be connected to up to 16 slave stations.
- The CMC10L001A000 communication controller is an RS-232C/RS-485 (3-wire type) converter available from Yamatake Corporation.

Chapter 2. WIRING

2 - 1 RS-485 Connection

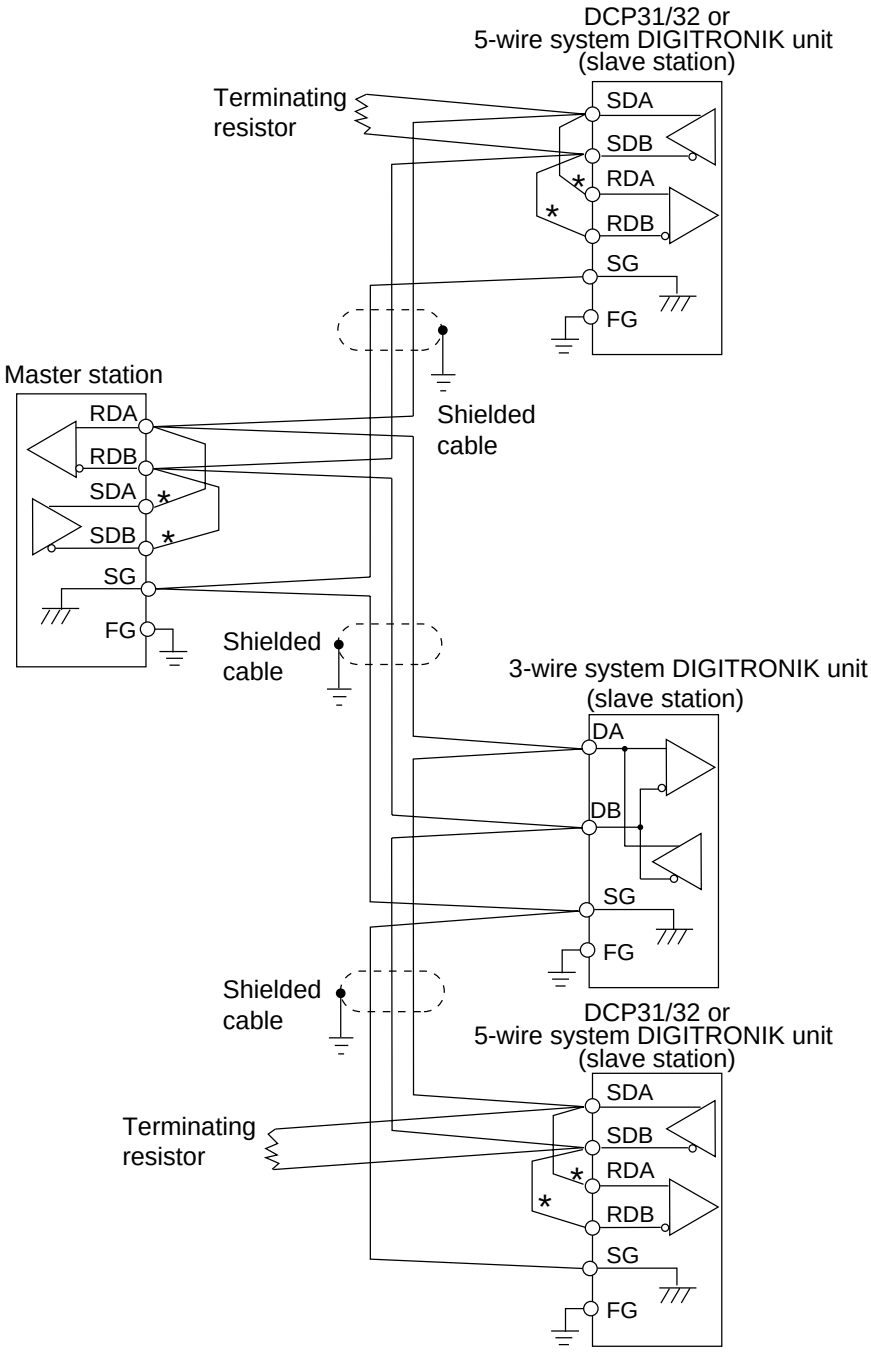
■ 5-wire RS-485 mutual connection



Connect four terminating resistors of 150Ω±5%, 1/2W min. at each end of the transmission line. Connect only one end of the shielded wire to the frame ground. Other 3-wire system DIGITRONIK units of Yamatake Corporation can be used on the same communication line. Conduct the wiring shown at the item **"3-wire RS-485 mutual connection" on page 2-2**.

■ 3-wire RS-485 mutual connection

An example of DCP31/32 wiring with a 3-wire system unit supporting the RS-485 is shown below.



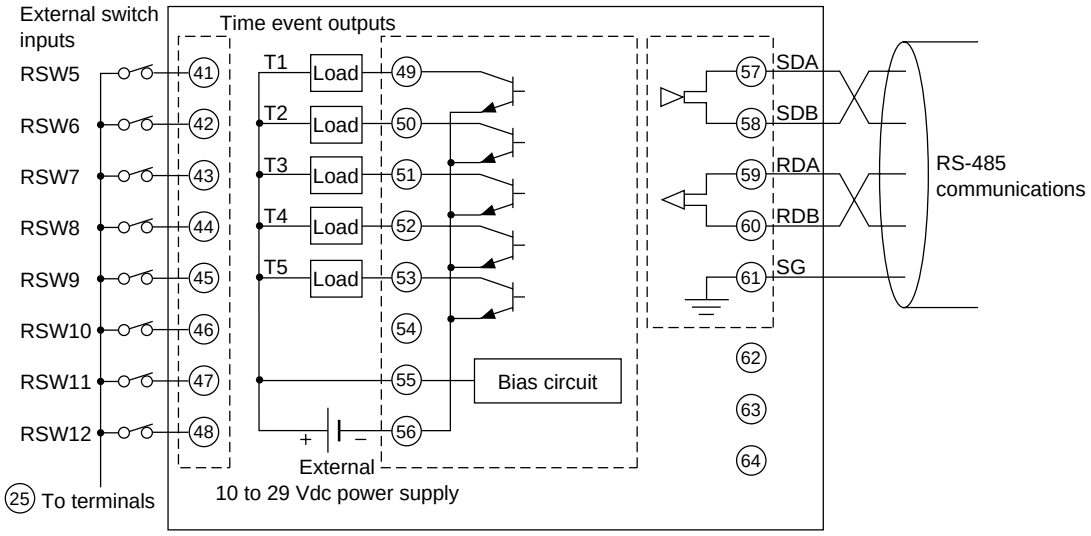
Connect two terminating resistors of 150Ω±5% 1/2W min. at each end of the transmission line. Connect only one end of the shielded cable to the FG ground. Externally conduct the wiring for the wires marked with an asterisk.

On 3-wire system, the CMC10L001A000 of Yamatake Corporation can be used as a converter for master station.

For the details, refer to the item **"Connection with CMC10L" on page Appendix-2**.

2 - 2 Terminal Array of DCP31/32

The terminal array of the DCP31/32 with the communication function is as follows.

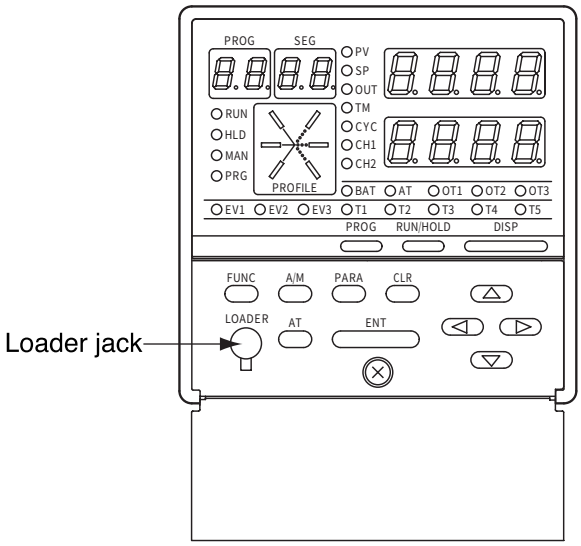


! Handling Precautions

- Connect the shield wires to FG at one place.
- The recommended tightening torque for the terminal screws is 0.78 to 0.98 N·m.
- Maintain a distance of at least 50 cm between I/O leads or communications lead and the power lead. Also, do not pass these leads through the same piping or wiring duct.
- When installing the DCP31/32 in locations subject to vibration or impact, be sure to use round crimped terminals to prevent the lead from coming loose from the terminal.
- When wiring with crimped terminals, take care to prevent contact with adjacent terminals.

2 - 3 Loader Jack Connection

The loader jack located on the console of DCP31/32 can be connected to a serial communication part of personal computer by the special cable for DCP31/32.



! Handling Precautions

- Use the special cable for DCP31/32 in case of loader jack connection.
- Connect the special cable to a serial communication port of personal computer.
- When connecting a ground type thermocouple to the input 2 of DCP32, a PV value may be drifted by loader jack connection. In this case, do not ground the personal computer. For example, exchange a 3-pole plug for power supply for a 2-pole plug.

Chapter 3. SETTING

3 - 1 SETUP Items of DCP31/32

Code	Item	Setting at delivery from factory	Setting range
C84	Station address	0	0 to 127
C85	Transmission rate / Character format	0	0: 9600 bps/even parity, 1 stop bit 1: 9600 bps/no parity, 2 stop bits 2: 4800 bps/even parity, 1 stop bit 3: 4800 bps/no parity, 2 stop bits
C93	CPL communications port selection	0	0: Add-on terminal 1 to 15: Loader jack (Station address)

- When set to 0, CPL communications from the loader jack is not possible. In this case, CPL communications is possible from the add-on terminal (㊼, ㊽, ㊾, ㊿, (61)) under setup *C84* and *C85* communications conditions.
- When set to 1 to 15, CPL communications from the loader jack is possible, and the *C93* setting becomes the station address.
  Transmission rate and character format are 4800 bps, even parity and 1 stop bit.

3 - 2 Initialize

Before starting communication, initialize the communication conditions for the DCP31/32 and master station.

■ CPL communications port selection

Set one of 0 to 15 to the SETUP item *C93* of the DCP31/32.
When set to 0, CPL communications is possible from the add on terminal. In this case, set the station address and transmission rate/character format to the SETUP items *C84*, *C85*.
When set to 1 to 15, CPL communications is possible from the loader jack. In this case, the *C93* setting becomes the station address.
Transmission rate/character format are 4800 bps, even parity and 1 stop bit.
0 is set at delivery from the factory.

■ Station address

Set a decimal number within 1 to 127 to the SETUP item *C84* of the DCP31/32.
Set a different address value from the addresses of the other slave stations connected in multi-drop on the same transmission line.
Address 0 is set as an station address at delivery from the factory. Since the communication function is not activated at address 0, be sure to set a value other than 0 to execute communication.

■ Transmission rate/Character format

Set one of 0 to 3 to the SETUP item *C85* of the DCP31/32. At this time, set the same transmission rate and character format as in the master station.

0: 9600 bps / even parity 1 stop bit (at delivery from the factory)
1: 9600 bps / no parity 2 stop bits
2: 4800 bps / even parity 1 stop bit
3: 4800 bps / no parity 2 stop bits

Chapter 4. COMMUNICATION PROCEDURE

4 - 1 Outline of Communication Procedure and Messages

The outline of communication procedure, and the concept of message configuration are given in this paragraph.

■ Communication procedure

The communication procedure used is given below in simple expression

(1) The master station transmits an request message to a slave station to designate the mate instrument for communication.

(2) The slave station processes the request message and executes read and write.

(3) Further, the slave station transmits a response message according to the contents of processing.

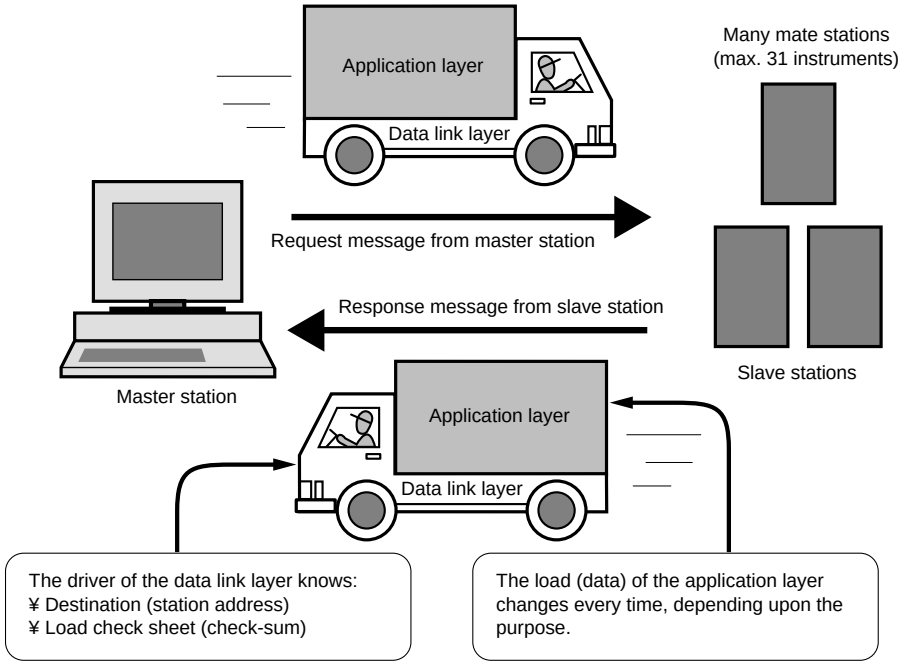
(4) The master station receives the response message and executes processing.

■ Configuration of message

One message consists of two layers as shown below. This is common to the request message from the master station and response message from a slave station.

- Data link layer
  - · This layer has the basic information required for communication.
  - · This layer has the destination of communication message and message check information.
- Application layer
  - · A layer for data read and write
  - · The contents change, depending upon the purpose.

The individual layers are detailed in the following items.



■ Definite examples

Definitely, the messages are as shown below.

● In case of message

¥ Request message

STX	0	1	0	0	X	R	S	,	1	0	0	1	W	,	2	ETX	9	A	CR	LF

Data link layer — Application layer — Data link layer

¥ Response message

STX	0	1	0	0	X	0	0	,	0	,	4	2	ETX	9	4	CR	LF

Data link layer — Application layer — Data link layer

● In case of write request

¥ Request message

STX	0	1	0	0	X	W	S	,	1	0	0	1	W	,	5	8	ETX	5	A	CR	LF

Data link layer — Application layer — Data link layer

¥ Response message

STX	0	1	0	0	X	0	0	ETX	8	2	CR	LF

Data link layer — Application layer — Data link layer

The data link layer and application layer are detailed in and after the next paragraph.

■ Concept of data address

This instrument uses the concept of data address to facilitate reading or writing each intended data by addressing.

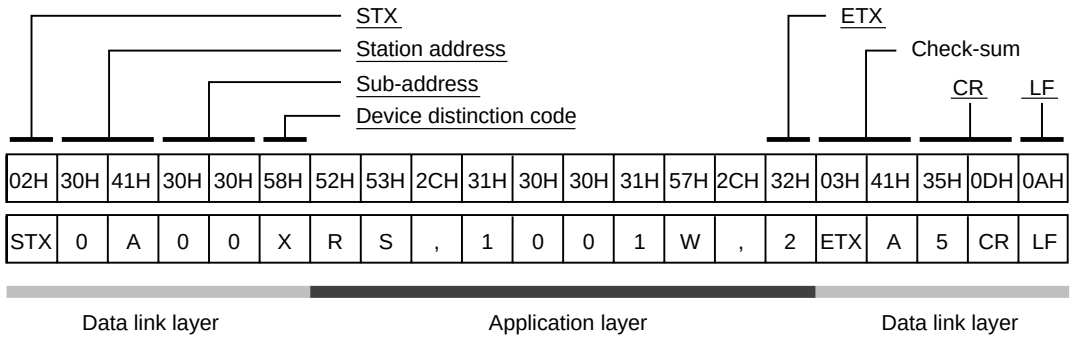
For the actual correspondence between data and address, see the "Communication Data Table".

Data A	501W
Data B	502W
Data C	503W
:	:

4 - 2 Data Link Layer

■ Description of data link layer

- The data link layer includes eight basic information for transmitting a message.
- The data link layers of an request message and response message have the same structure.



The underlined characters ( ) are always constant when used by this instrument.

● STX (Start of TeXt)

◆ Role : Indicates the head of a message.

❁Description · Fixed at 02H.

· When the instrument receives "STX", it is identified as the first character of a new request message even on the course of any message.

● Station address

◆Role : Designates the destination instrument. Communication with one instrument designated is permitted.

❁Description · If 0 is set as an station address, the communication function is stopped.
Therefore to make communication be sure to set an address value of 1 or more.

· 2 hexadecimal characters. For details, see the example.

· For the details of setting of the station address, see the "SETTING".

❑ Example : When the station address of the mate is 10:

(1) 10 (decimal) = 0AH (hexadecimal)

(2) When converted into character codes:
0 = 30H, A = 41H

(3) "0A" (30H, 41H) found in (2) is used as the station address.

⚠ Handling Precaution

Note that the function of the station address differs absolutely from that of the data address of the application layer.

● **Sub-address**

❁ Description : The sub-address is meaningless in this instrument. Be sure to set "00" (30H, 30H) as the sub-address in the same format as in the station address.

● **Device ID code**

❁ Description : The character code "X" (58H) or "x" (78H) only can be designated in this instrument.

● **ETX (End of TeXt)**

◆Role : Indicates that the application layer existed up to immediately before.

❁ Description : Fixed at 03H.

● **Check-sum**

◆Role : A value to be used to check whether or not the message has been changed due to any error (such as noise) on the course of communication.

❁ Description · Two hexadecimal characters

· The preparing method for the check-sum is as follows;

(1) The character codes of the message from STX to ETX are added byte by byte.

(2) The two's complement of the result of addition is taken.

(3) The above value is converted into character codes.

❑ Example : Description is given below, citing the example of the above request message on the preceding page.

(1) The character codes from STX to ETX are added byte by bytes. The one lower byte of the result of calculation is 76H.

(2) The two's complement of the result of addition is taken. the result is 8AH.

(3) The 8AH is converted into character codes. This value is used as the check-sum. The result is "8A"; (38H) and (41H).

For the conversion into character codes, see the example of the station address (on the preceding page).

! Handling Precaution

The check-sum in the request message can be omitted, but no check-sum is then included in the response message. The check-sum should not be omitted to assure the proper reception of a message.

● **CR and LF (Carriage Return/Line Feed)**

◆Role : Indicates the end of a message.

❁Description : "CR" is (0DH), and "LF" is (0AH).

· Be sure to use CR and LF in pair.

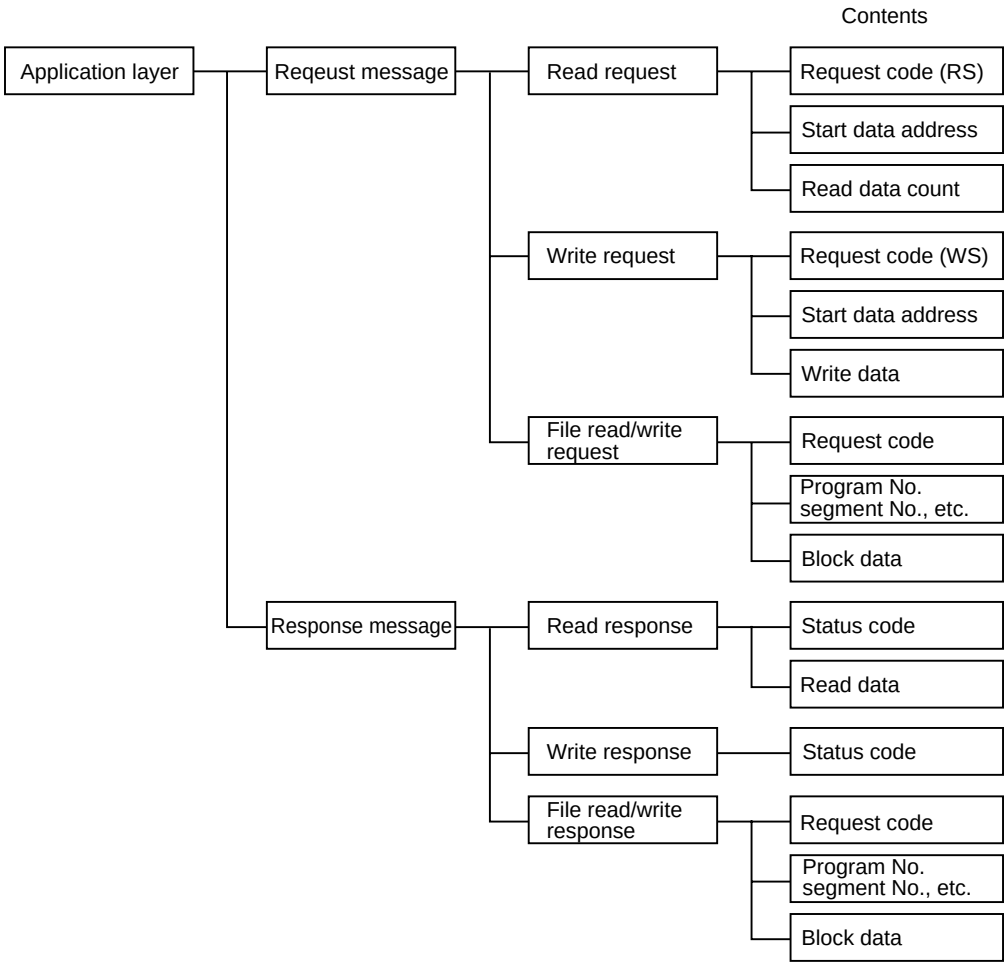
! Handling Precautions

- If any of the following errors has occurred in the contents of the data link layer, the instrument does not respond to them.
  - · The communication conditions for both stations do not meet each other (such as different transmission speeds, or parity error occurrence).
  - · The transmitted station address differs from the station address of the object instrument.
  - · The station address is "00".
  - · STX, ETX, CR and LF are not placed at the specified positions.
  - · The device distinction code is neither "X" nor "x".
  - · The station address, sub-address, or check-sum is not two characters long.
  - · The calculation result of the check-sum does not meet the check-sum of the message.
  - · Non-designated characters are included in the message.
- As for the contents of the data link layer, the same message as the request message of an instrument is set as a response message, except for the check-sum.
- Use the upper-case characters "A" to "F" in the hexadecimal numeric part to be used for the station address and check-sum.

4 - 3 Application Layer

■ Outline of application layer

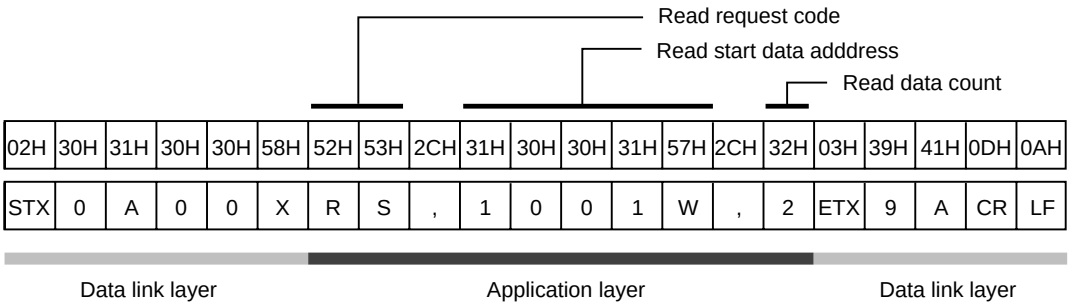
- The application layer includes an request, data, data count, and message decision information (and code).
- The application layers of the request message and response message differ in structure from each other.
- There are three types of request messages; "a read request", "a write request", and "a file read request/file write request".
  The response message includes a response corresponding to each request.
- It can be identified by an status code how the request message has been processed.



4 - 4 Data Read

■ Description of read request

- This request permits the contents of continuous data addresses starting with the read start data address designated to be read in one message.
- The application layer of a read request consists of the following three types of data:



- Individual data are partitioned by a comma "," (character code *2CH*), respectively.
- An upper-case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" or a space cannot be added to each data.
  - ❏ Example : The underlined part of "RS, 01001W, 2" is wrong.
  - ❏ Example : The underlined parts of "RS, 1001W, 02" are wrong.
  - ❏ Example : The above figure indicates an example that two-data information is read from 1001W in one message.

● Read request code (RS)

◆Role : A command which indicates read.
❁Description : Two characters "RS" (52H, 53H).

● Read start data address

◆Role : Designates the start data address from which data is to be read.
❁Description : The correspondence between data address and read data is shown in the "Communication Data Table".
· Be sure to add "W" (75H) immediately after the numeric of the data address.

● Read data count

◆Role : It is designated how many data are read continuously, starting with the designated data address.

! Handling Precaution

For the high limit of the read data count, see the "Communication Data Table".

■ Read response

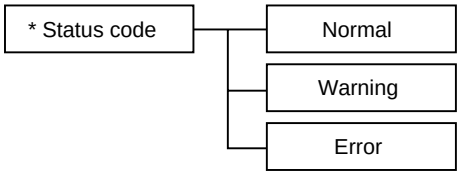
◆Role : When the message in the data link layer is proper, a response message is sent back according to the contents of the request message.

❁Description : All the data in the application layer are expressed in decimal character codes.

● Status code

◆Role : A numeric by which it can be identified how the request message has been processed on the instrument side. Different value is set according to the result of processing.

❁Description : The response message includes an "status code" without fail. The status codes are classified as follows;



* The status code is two decimal digits.

● Normal response/warning response

◆Role : Sends back the read data.

❁Description : Information in the application layer

· Status code : For the details of the status code, see the "Status code Table".

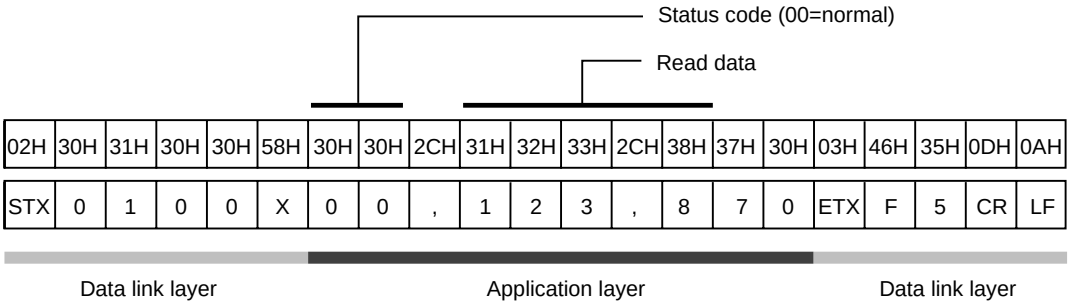
· Read data : The decimal point is removed from a numeric to be put in.

❑ Example : "55.6" is converted into "556" when it is put in.

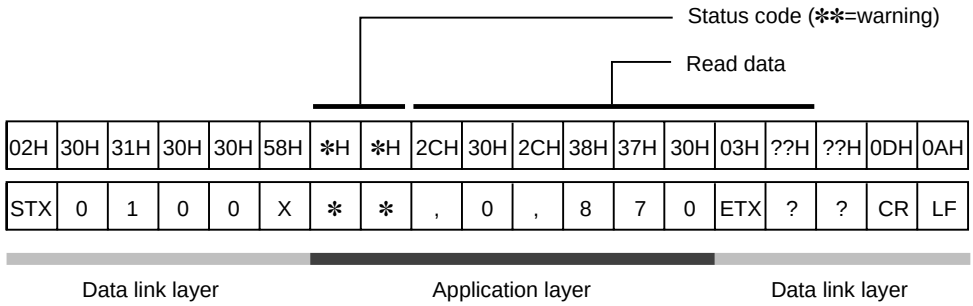
: Individual data are partitioned with a comma (*2CH*), respectively.

: The range and number of digits of each data depend upon the read data.

❑ Example : In case of normal response (when there are two read data, and all the data are read properly)



❑ Example : In case of warning response (numeric corresponding to the warning code is put in ✻✻.)



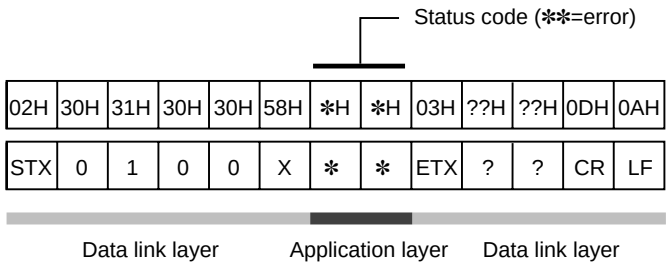
● **Error response**

◆Role : Indicates that there is an error in the request message, and it cannot be normally read. Therefore, there is no data herein.

❁Description : Information in the application layer.

· Status code : Indicates an error type.
For details, see the "Status code Table".

❑ Example : In case of error response:



■ Expression of decimal numeric (numeric data)

◆Role : All the numeric part, read count, write value (described in WS command), and read data at the data address follow the rules given below.

(1) When a numeric is negative, add a minus sign "–" (*2DH*) before the numeric.
❑ Example: "-123" (2DH, 31H, 32H, 33H)

(2) When a numeric is 0, use one 0.
❑ Example: "0" (30H)
❑ Example: "00" (30H, 30H) is wrong.

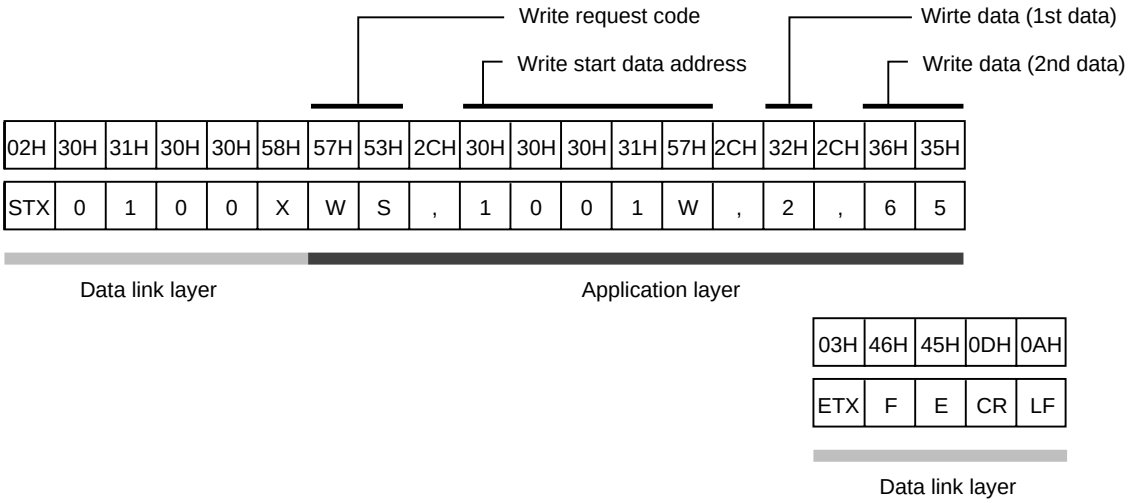
(3) When a numeric is positive, never add a plus sign "≠" before the numeric.
❑ Example: "+123"+ (2BH, 31H, 32H 33H) is wrong.

(4) Never add unnecessary 0 or a space before a numeric.
❑ Example: "0123" (30H, 31H, 32H, 33H) is wrong.
❑ Example: "123" (20H, 31H, 32H, 33H)

4 - 5 Data Write

■ Description of write request

- This request permits the contents of continuous data addresses, starting with the designated write start data address to be simultaneously written in one message.
- The application layer of a write request consists of the following three types of data:



- Individual data are partitioned with a comma "," (character code *2CH*), respectively.
- The write data count need not be designated.
- An upper case character code is used for each numeric or character in the application layer.
- Decimal number is used for each numeric.
- Unnecessary "0" (*30H*) or a space cannot be added to each data.
  - ❏ Example : The underlined part of "WS, 01001W, 2" is wrong.
  - ❏ Example : The underlined parts of "WS, 1001W, 02" are wrong.
  - ❏ Example : The above figure shows an example that 2 and 65 are written at addresses 1001W and 1002W, respectively, in one message.

● Write request code (WS)

◆Role : A command which indicates write.
❁Description : Two characters "WS" (*57H*, *53H*)

● Write start data address

◆Role : Designates the start data address for write.
· For the correspondence between the data address and write data, see the "Communication Data Table".
· Be sure to add "W" (*57H*) after the numeric representing the data address.

● **Write data**

◆Role : Data to be written at continuous addresses starting with the designated data address.

❁Description : The range of a numeric to be written differs, depending upon each data address.

· Individual data are partitioned with a comma (*2CH*), respectively.

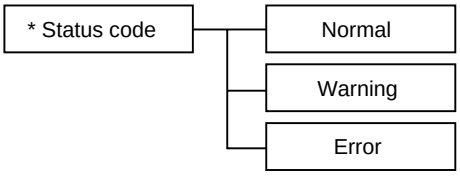
· The data address at which the corresponding data is written is incremented by 1 sequentially, starting with the start data address (see the example given on the preceding page).

· The number of data which can be written in one message is limited. For details, see the "Communication Data Table".

■ Write response

◆Role : When the message in the data link layer is proper, the status code only is sent back.

❁Description : The status codes are classified as follows;



* The status code is expressed in two decimal digits.

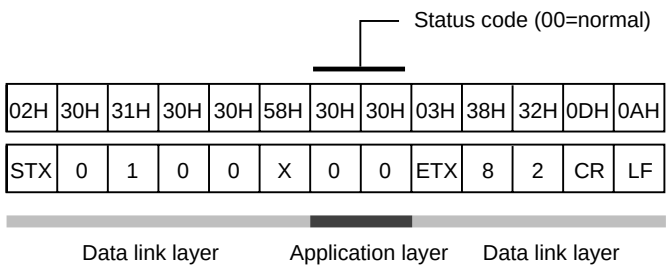
● **Normal response/warning response**

◆Role : Information concerning the result of processing the write request message is sent back.
Only the normal status code or warning status code is sent back.

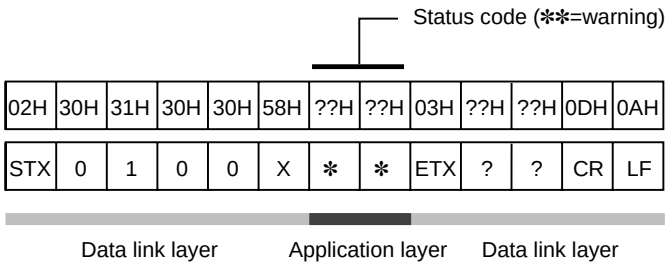
❁Description : Information in the application layer

· Status code : A numeric by which it can be identified how the request message has been processed on the instrument side.

❑ Example : An example of normal response (when all data are properly written)



❑ Example : In case of warning response (numeric corresponding to the warning code is put in ✻✻).



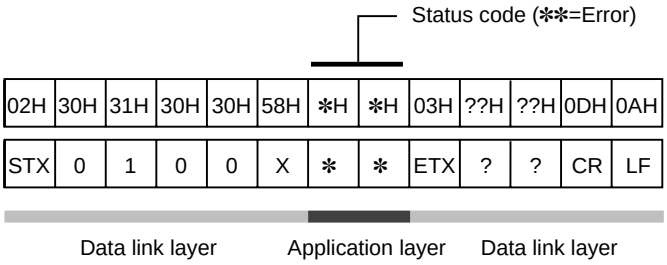
● Error response

◆Role : Only the error status code is sent back.

❁Description : Information in the application layer

· Status code : Indicates that there is an error in the request message, and write processing cannot be done.

❑ Example : In case of error response (numeric corresponding to the error code is put in ✻✻).

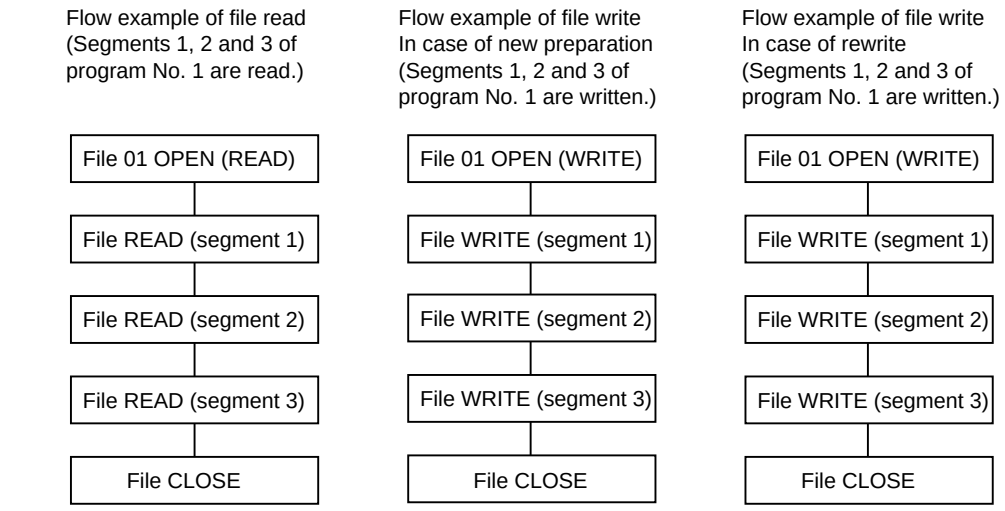


4 - 6 File READ/WRITE (program pattern)

Description is given below on the program pattern, citing an example of request/response.
In this example, it is assumed that the slave station address is 01, and there is no check-sum.
The program pattern can be processed by the file operation of the CPL communications.
More than one file cannot be opened simultaneously.

The file operations of the DCP31/32 are classified into the following types:

1. File OPEN
2. File CLOSE
3. File Block READ
4. File Block WRITE
5. File DELETE



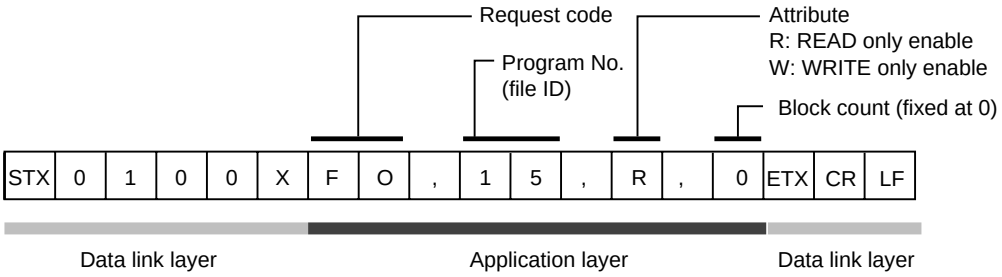
(File DELETE can be used independently.)

Handling Precautions

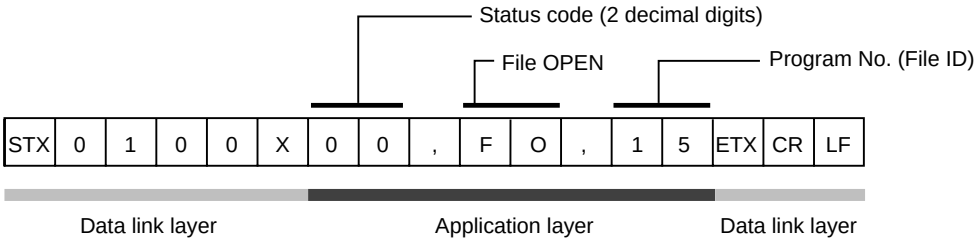
- When an operator operates a program pattern from the console, the OPEN request causes an error end.
- An operator can't make a program pattern operation from the console during file OPEN.

■ File OPEN

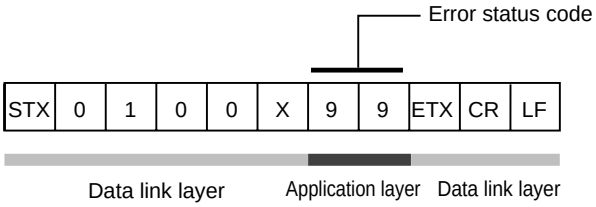
● OPEN request (FO command)



● Normal response



● Error response



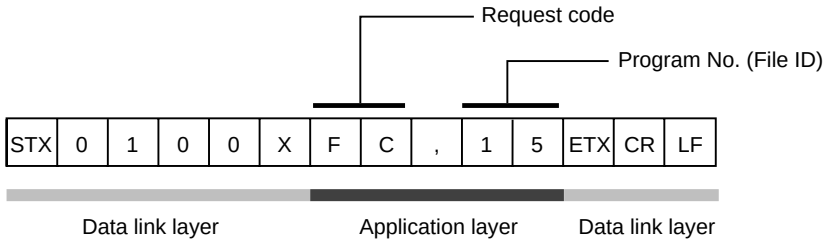
- When set to 1 to the variable parameter settings *PrtC*, an OPEN request setting W for the attribute causes an error end.

! Handling Precaution

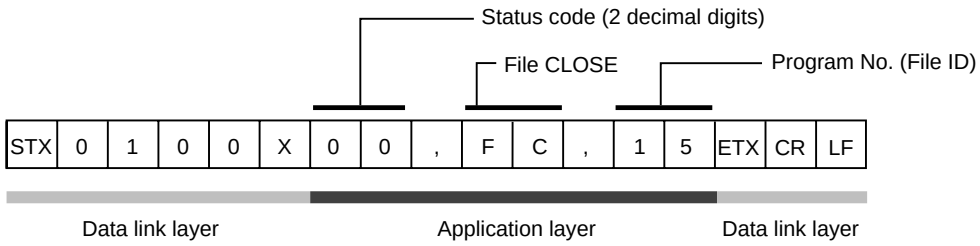
If the next command is transmitted within 10s after the file is opened, the OPEN status continues. However, the time elapses for 10s without transmitting the command, the file is automatically closed.

■ File CLOSE

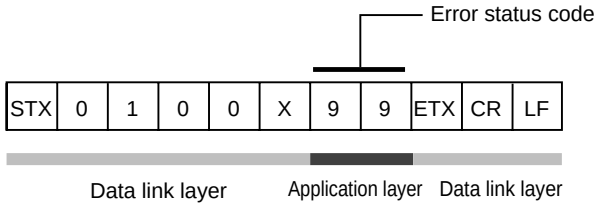
● CLOSE request (FC command)



● Normal response

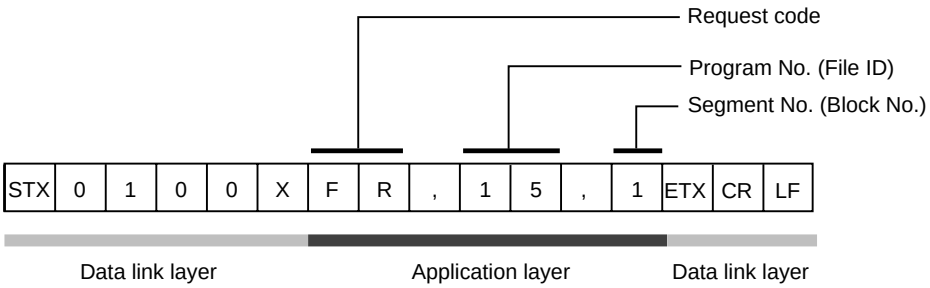


● Error response

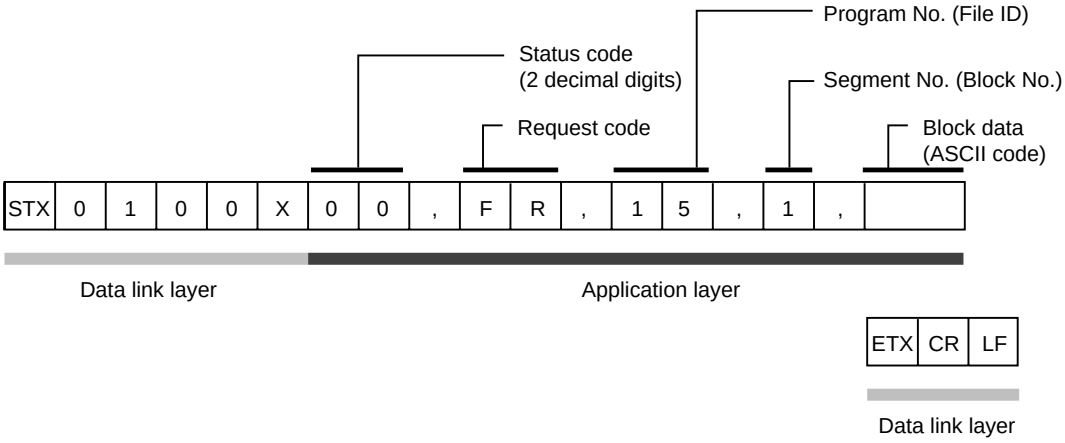


■ File block READ

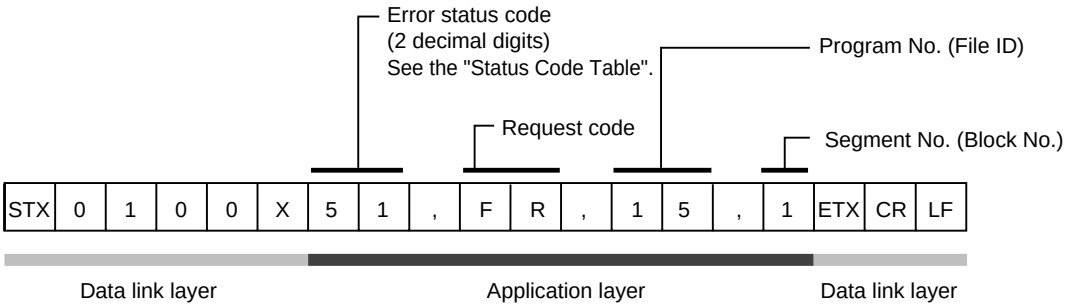
● Block READ request (FR command)



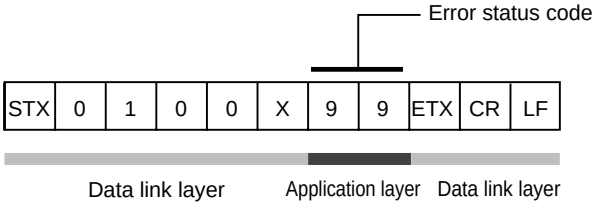
● Normal response



● Error response (1)

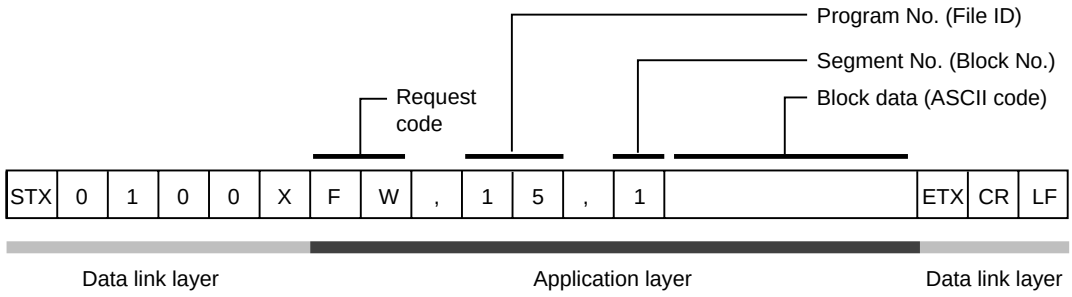


● Error response (2)

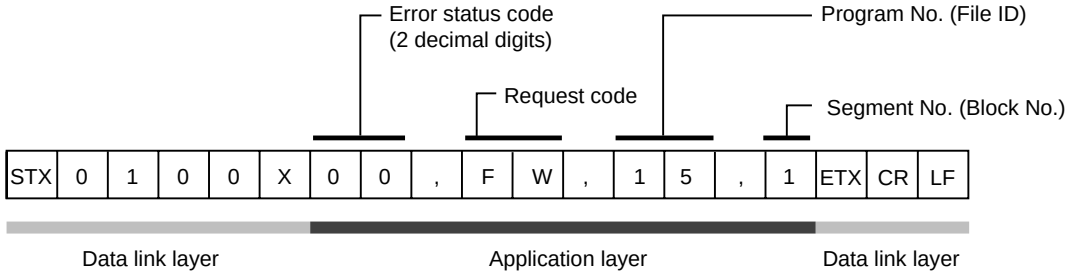


■ File block WRITE

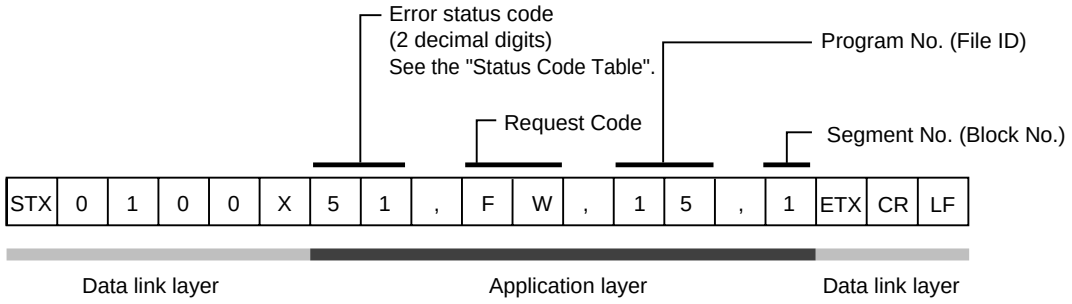
● Block WRITE request (FW command)



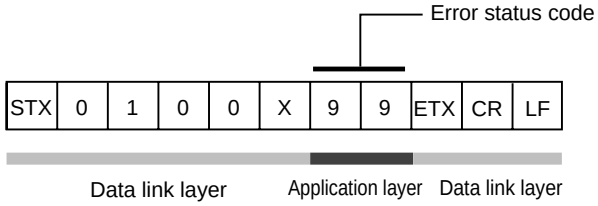
● Normal response



● Error response (1)



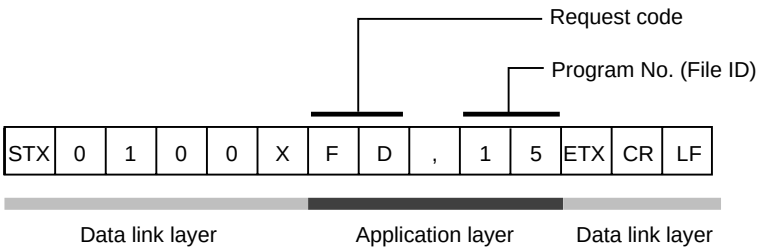
● Error response (2)



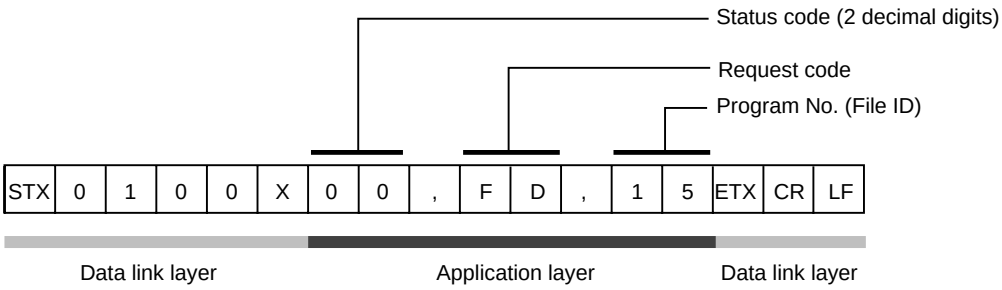
- When set to 1 to the variable parameter settings *PrtC*, a Block WRITE request causes an error end.

■ File DELETE (deletion)

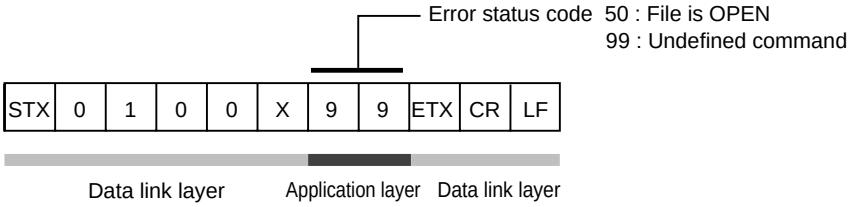
● File DELETE request (FD command)



● Normal response (indicates that the deletion operation ends)



● Error response



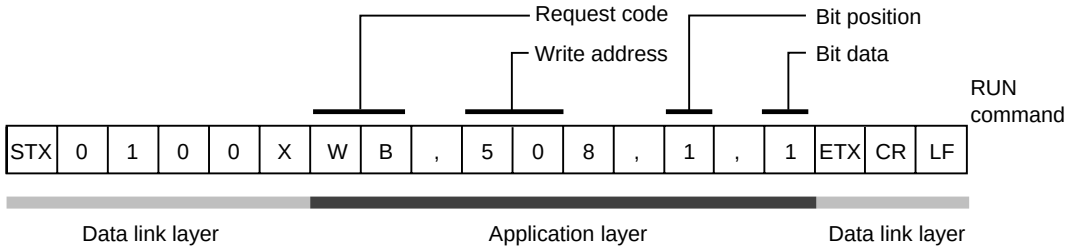
- Execute the file DELETE in a CLOSE status.
- It takes 0.2s max. to delete a file.
- After the file DELETE is completed, the normal response is sent back.
- When a file has been already deleted, the normal response is sent back.
- The program being run currently cannot be deleted (except for the constant value mode).
- When set to 1 to the variable parameter settings *PrtC*, a File DELETE request causes an error end.

4 - 7 Run Operation

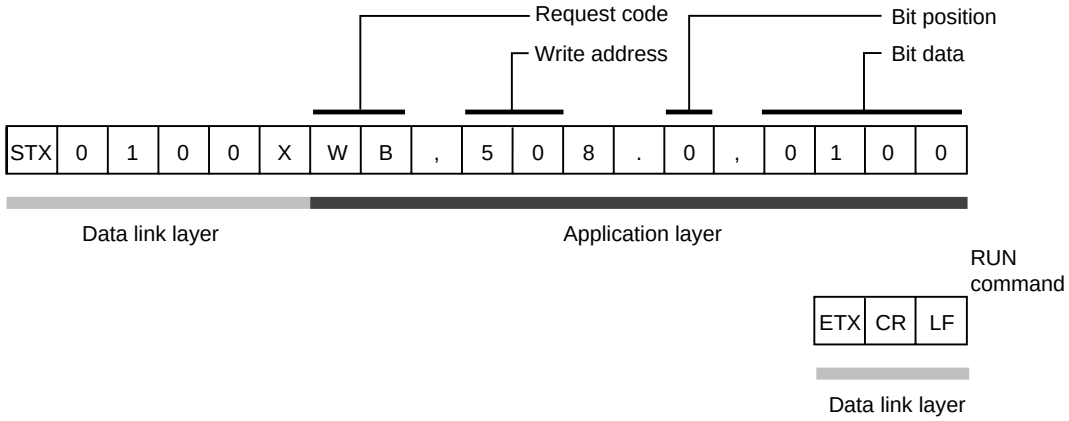
The run operation is executed by the bit write request or write request.
In the run operation, more than one write operation are ineffective, and only the extreme LSB side operation is processed effectively. The run operation cannot also be executed over two or more words.

● **Bit write request (WB command)**

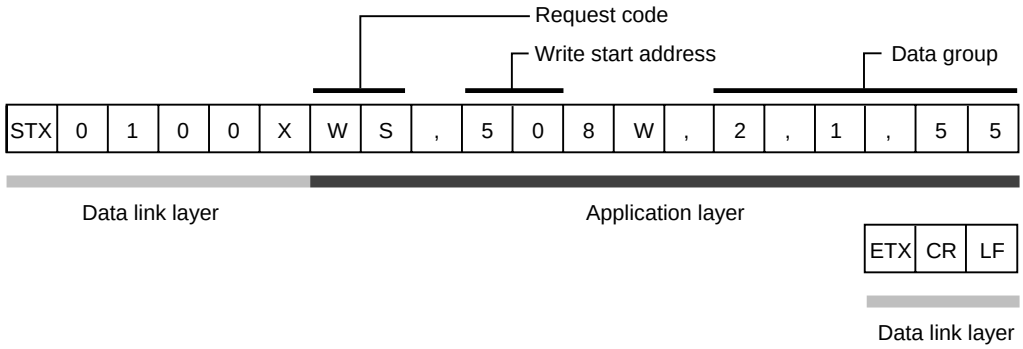
Only the bit write of the run operation is effective under the WB command.



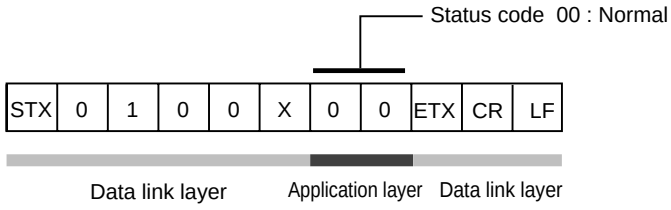
or



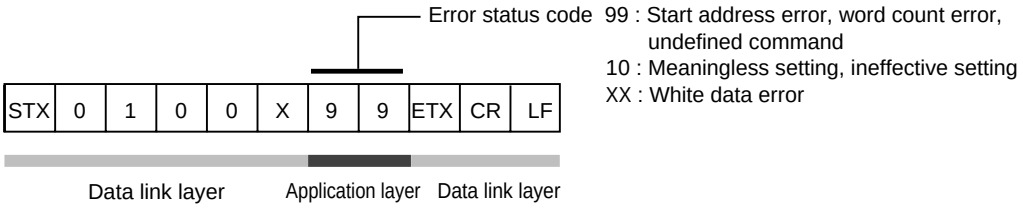
● **Write request (WS command)**



● **Normal response**



● **Error response**



Handling Precautions

•It takes 0.2s max. before the RUN mode starts after the DCP31/32 receives the RUN command in the READY status and sends back a normal response. This time changes, depending upon the internal processing status of the DCP31/32.

Status 1 to MV can be obtained by reading the same address. (See Chapter 5 "Communication Data Table".)

Address	Data item	Data (decimal)	Read data
508W	Run operation 1		Status 1
509W	Run start segment No.	1 to 30	Segment No.
510W	Run start program No.	1 to 19	Program No.
511W	Manual MV1	–100 to +1100	MV1
512W	Manual MV2	–100 to +1100	MV2

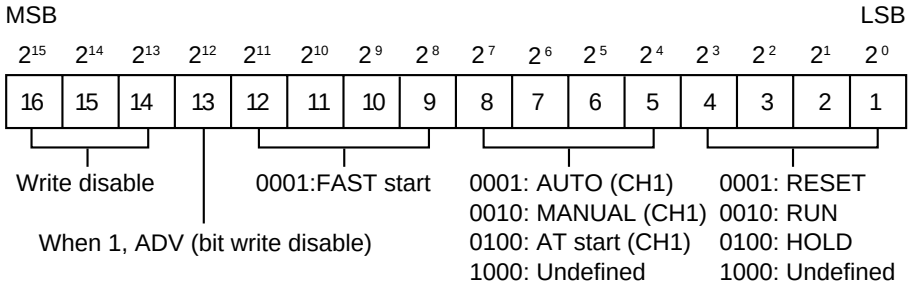
The 1st word is a request flag of 16 bits. The run operation can be done by writing at this address. This is achieved by the usual write request or bit write request.
The run operation can be checked by reading the status 1.
A response is sent back after checking if the run operation is accepted, and the time required for it is 100 to 200ms.
When the segment No. data and program No. data corresponding to the 2nd and 3rd words, respectively, are designated independently in the READY status, the run start program No. and run start segment No. are changed.
These data indicated on the LED indicators on the console are then also changed.
These data may be used in combination with RUN or advance request.

The function in such cases are shown on the table given on the next page.
In any other cases, these data are ignored.
The data in and after the 4th word are ignored.
When only the program No. is designated, the segment is set to 1.

As for the MV1 of the 4th word, MV in the MANUAL mode on CH1 side should be designated or it should be used in combination with MANUAL request.
In any other cases, this data is ignored.
The data in and after the 5th word are also ignored.
As for the MV2 of the 5th word, MV in the MANUAL mode on CH2 side should be designated. In any other cases, this data is ignored.

■ Run operation bit definition (command)

● Run operation 1



However, this is operated when the D1 input is turned OFF since the D1 input has priority.

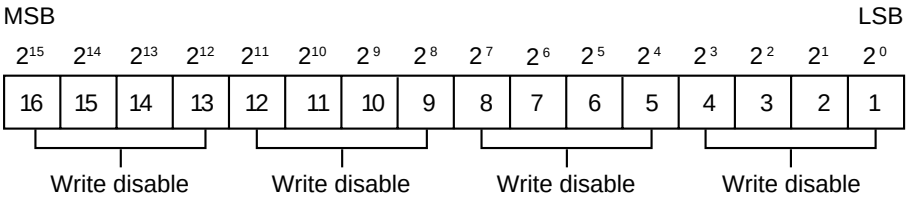
Run operation	SEG No.	PRG No.	MAN MV	Operation of DCP31/32
RESET	Ignore	Ignore	Ignore	READY status is set.
RUN (Note 1)	Necessary	necessary	Ignore	In READY status, RUN starts with PRG No. and SEG No. given to the left.
	None	None	None	In READY status, RUN starts with PRG No. and SEG No. already selected.
RUN	Ignore	Ignore	Ignore	In HOLD or FAST status, RUN starts.
HOLD	Ignore	Ignore	Ignore	In RUN or FAST status, HOLD is set.
ADV (Note 3)	Necessary	None	None	In RUN, HOLD or FAST status, SEG No. given to the left becomes a start point.
	Necessary	Necessary	Ignore	In RUN, HOLD or FAST status, PROG No. and SEG No. given to the left become a start point.
MANUAL (CH1)	Ignore	Ignore	None	In AUTO on CH1 side status, it is changed over to MANUAL status.
	Ignore	Ignore	None	In AUTO on CH1 side status, it is changed over to MANUAL status, and MV given to the left is set. In MANUAL status, MV given to the left is set. During AT execution, AT is interrupted.
AUTO (CH1)	Ignore	Ignore	Ignore	In MANUAL on CH1 side status, it is changed over to AUTO status. During AT execution, AT is interrupted.
FAST	Ignore	Ignore	Ignore	In RUN or HOLD status, FAST starts.
AT START	Ignore	Ignore	Ignore	AT starts. (Note 2)

Note 1) (1) When PRG No and SEG No. are not set to the program, the READY status cannot be changed over to RUN.
(2) The READY status cannot be changed over to RUN during key operation.

Note 2) When the following conditions are all satisfied, AT starts on CH1 side.
(1) Controller function is set on CH1 side.
(2) Output is not heat/cool type on CH1 side.
(3) One of RUN, HOLD, FAST or END status is set.
(4) AUTO mode is selected on CH1 side.
(5) 0 is not set to the variable parameter setting *At*.

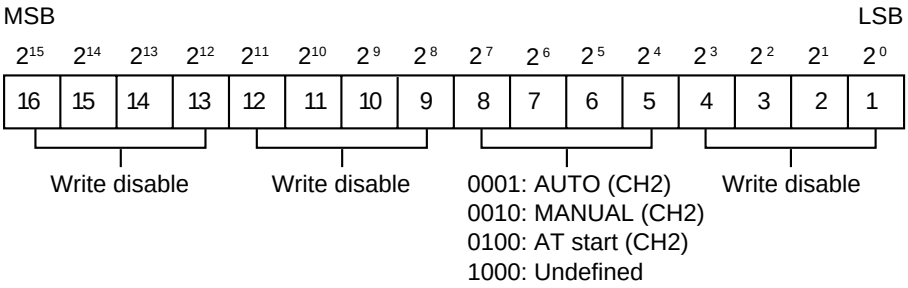
Note 3) ADV is accepted only as shown in the following examples.
WS, 508W, 4096, 20 (ADV to segment 20).
WS, 508W, 4096, 20, 2 (ADV to segment 20 of program 2).

● **Run operation 2**



Data cannot be written for the DCP31.
Though write data is disable for the DCP32, plural data can be written to the MV2 (512W) to the Run operation (3) simultaneously because data can be written to the Run operation (2).

● **Run operation 3**



Data cannot be written for the DCP31.
When the following conditions are all satisfied, AT starts on CH2 side.
(1) Controller function is set on CH1 side.
(2) Output is not heat/cool type on CH2 side.
(3) One of RUN, HOLD, FAST, END status is set.
(4) Auto mode is selected on CH2 side.
(5) 0 is not set to the variable parameter 2 setting *At.2*.

4 - 8 Status Code Table

■ Normal and error ends

Status code	Type	Name	Contents.
00	Normal	Command normal	Request message is ended normally
01	Normal	Command normal	Request message is ended normally regarding the last block.
40	Error	Former error	Request message is in error.
41	Error	Data number error	The number of data is over 16. (Including read data count of RS request)
42	Error	Data address error	The data address is not defined. All of message has been cancelled.
43	Error	Data error	The value of write data is in error. All of message has been cancelled.
44	Error	Data limit error	The value of write data is out of the limit. Processing is continued except for the relevant data address.
45	Error	Write error	The data cannot be written according to the status of DCP31/32. (Settings can be changed only READY mode regarding all of setup items and some of event configuration data) Write is attempted to the write inhibit data address.
47	Error	Impossible mode change	Mode can not be changed.
48	Error	Console operating	Operation keys of console are operated by an operator. Send the request message after key operation.
50	Error	Double open	File is already open.
51	Error	File closed	File is not open yet.
52	Error	Program number/ Segment number error	Program number or segment number is in error. No program in the segment.
54	Error	Read/Write violation	Attribute of File OPEN is violated.
57	Error	Block data error	Block data of File block WRITE is in error.
58	Error	Running program delete	The program being run cannot be deleted.
59	Error	Program protect	File OPEN, File block WRITE and File DELETE are inhibited.
99	Error	Command error	The command is undefined.

4 - 9 Timing Specifications

■ Timing specifications for request message and response message

When a slave station is connected with the master station directly, the following precautions should be observed concerning the transmit timings of an request message from the master station and a response message from the slave station.

● Response monitor time

The maximum response time required from the end of transmitting an request message from the master station to the start of receiving a response message from the salve station is 2s (section (1)). Therefore, the response monitor time should be set to 2s.

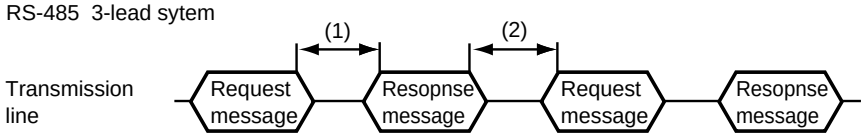
Generally, when the response monitor time reaches time up, the request message is retransmitted.

For details, see the "Communication Program for Master station".

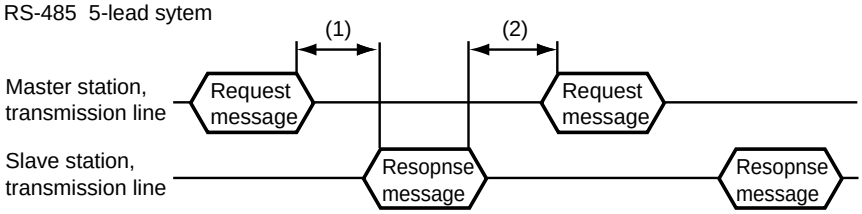
● Transmit start time

A wait time of 10ms or more is required before the master station starts to transmit the next request message (to the same slave station or a different slave station) after the end of receiving a response message (section (2)).

• RS-485 3-lead sytem



• RS-485 5-lead sytem

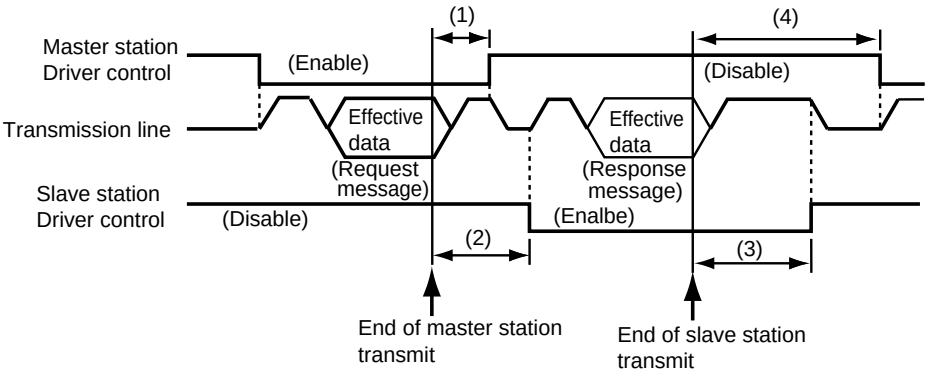


(1) End of master station transmit — Request interval time of slave station = 2000ms max

(2) End of slave station transmit — Request interval time of master station = 10ms min.

■ RS-485 driver control timing specification

When the transmit/receive of the RS-485 3-lead system is directly controlled by the master station, utmost care should be exercised about the following timing.



(1) Transmit end of master station — Driver disable time = 500 s max.
(2) Receive end of slave station — Drive enable time = 1ms min.
(3) Transmit end of slave station — Drive disable time = 10ms max.
(4) Receive end of aster station — Drive enalbe time = 10ms max.

Chapter 5. COMMUNICATION DATA TABLE

5 - 1 Preliminary Knowledge of Communication Data Handling

■ Types and formats of communication data

● Types of communication data

The communication data are classified into the following types:

- Run status : Data indicating the run status of the DCP31/32 (PV, alarm, etc.)
- Variable parameter : Data to be changed during running.
- Variable parameter 2 : Data to be changed during running for CH2.
- Event configuration data
  : Data for setting an event type and other event outputs.
- PID parameter : Data for setting PID constants, output limiter, etc. for CH1.
- PID parameter 2 : Data for setting PID constants, output limiter, etc. for CH2.
- Setup data : Data for setting the status of the DCP31/32 before running. (setting of input range, etc.)
- Table data : Data for setting input linearization table approximation.
- Constant-value operation data
  : Data for setting SP, PID constants, etc. to be used in the constant value control mode.
- Program pattern (block data)
  : Data for setting the run pattern such as SP, and TIME.

These data are communication every data type.

● Format of communication data

The communication data are classified into the following formats:

- Numeric data : Data indicating numerics (PV, SP, etc.)
- Bit data : Data, each bit of which is given meaning (alarm, etc.). The bit data must be composed during transmit, and be decomposed during receive.

■ Data address

The data addresses are allocated as shown in the table below.

Communication data	Offset	Address DCP31	Address DCP32
Run status	500	501 to 526	501 to 526
Variable parameter	2500	2501 to 2533	2501 to 2533
Variable parameter 2	3000	—	3001 to 3022
Event configuration data	3500	3501 to 3513	3501 to 3513
PID parameter	1500	1501 to 1580	1501 to 1580
PID parameter 2	2000	—	2001 to 2080
Setup data	4500	4501 to 4600	4501 to 4600
Table data	4000	4001 to 4022	4001 to 4044
Constant-value operation data	1000	1001 to 1026	1001 to 1046

■ Data read/write count

The data count which can be continuously read/written by once communication is predetermined as shown in the table below.

Category	Data count
Read	1 to 16
Write	1 to 16

Among the continuous data, any data which do not exist due to difference in model number are handled as shown below.

- Read : 0 is read as a dummy data (warning end).
- Write : Not written (warning end).

■ Data unit and decimal point position

A decimal point is not added to read/write data.
The unit or decimal point position is predetermined every data.
For the unit and decimal point position of each data, see the request manual for the main unit of instrument.

Example: When data to be read/written is numeric value 105, its unit or decimal point position is automatically determined by the data address, the SETUP item of the instrument and the others.
Therefore, the numeric data 105 is expressed as 10.5%, 105˚C, or the like according to the data address of data to be read/written.

■ Notes

- Cautions on instrument console display
  When data is written by communication with respect to a parameter indicated in the input ready status of the instrument, the display is not changed into the value set by communication, but the preceding value is kept as it is. This is because the display data to LED is not updated irrespective of change in the internal data. When the currently indicated parameter is transferred once to another parameter, and it is recalled, the value changed by communication is indicated correctly.
  When the instrument is placed in the basic display status (SP/PV/MV display status), the display is always updated according to the internal data. Therefore, even when an SP is rewritten by communication, the changed value is indicated immediately.

- Keylock
  Even when the instrument is set to the keylock status, data can be written by communication.

- Restrictions on read
  Any parameters which cannot be called by key operation on the instrument can be all called by communication.
  If an address out of the range (non-designated address) is accessed, the end code "*42*" is returned.

- Restrictions on write
  Any parameters which cannot be input by key operation on the instrument can be written by communication. The restrictions on write (the high and low limits, etc.) are the same as in the usual input by a console.
  Even a parameter which can be input by key operation may not be able to be set by communication under an inapropriate condition.

- In case more than one data including error data are to be written in once message.
  For example, assume that the proportional band, integral time, and derivative time are written like WS, 1501W, 300, 6001, 20. Since I then exceeds the effective range, the response "*44*" (error response) is returned.

At this time, beware of the following points:
(1) Data is written until a set disable data appears.
(2) No data is written at a word address where a set disable data exists, but the next data is processed.
In the case of this example, therefore 300 and 20 are written normally, but 6001 is not written, and the value before the message is received remains.

- Status write
  The status write command makes the LSB side of bit information effective.
  For example, when WS, 508W, 3 (both AUTO and MANUAL are designated) is written, this is interpreted as AUTO command, and MANUAL is ignored.

5 - 2 Communication Data Table

The address and read/write (R/W) enable status of each data are determined as shown in the table below.

● **Meaning of symbols in R/W column**

R : READ
W : WRITE
❍ : Enable
× : Disable
▲ : Enable, however, fixed value depending upon the instrument
❑ : Enable, however, a blank area

■ Run status

No.	Format	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	Bit	Alarm status (1)	501W	❍	×	❍	×	
2	Bit	Alarm status (2)	502W	❍	×	❍	×	
3	Bit	Event output status	503W	❍	×	❍	×	
4	Numeric	PV1	504W	❍	×	❍	×	
5	Numeric	SP1	505W	❍	❍	❍	❍	*1
6	Numeric	PV2	506W	❑	×	❍	×	
7	Numeric	SP2	507W	❑	×	❍	❍	*2
8	Bit	Status (1)/Run operation (1)	508W	❍	❍	❍	❍	*3
9	Numeric	Segment No.	509W	❍	❍	❍	❍	*4
10	Numeric	Program No.	510W	❍	❍	❍	❍	*4
11	Numeric	MV1	511W	❍	❍	❍	❍	*5
12	Numeric	MV2	512W	❑	×	❍	❍	*6
13	Bit	Status (2)/Run operation (2)	513W	❍	×	❍	❍	
14	Bit	Status (3)/Run operation (3)	514W	❑	×	❍	❍	
15	Numeric	Segment progress time	515W	❍	×	❍	×	*7
16	Numeric	Run progress time	516W	❍	×	❍	×	*7
17	Numeric	Using PID group No. (CH1)	517W	○	×	○	×	*8
18	Numeric	Using PID group No. (CH2)	518W	❑	×	❍	×	*9
19	Numeric	Cycle execution count	519W	❍	×	❍	×	*10
20	Numeric	PVd	520W	❑	×	❍	×	
21	Numeric	PVw	521W	❑	×	❍	×	
22	Numeric	SPw	522W	❑	×	❍	❍	
23	Numeric	Heat MV	523W	❍	×	❍	×	*11
24	Numeric	Cool MV	524W	❍	×	❍	×	*11
25	Numeric	Motor feedback value	525W	❍	×	❍	×	*12
26	Bit	External switch input status	526W	❍	×	❍	×	

● **Explanation of remarks column**

*1 WRITE is enable when the programmer function is set, and MANUAL mode is selected on the side of CH1.

*2 WRITE is enable when the programmer function is set, and MANUAL mode is selected on the side CH2.

*3 The data functions as the item of status (1) in case of READ. The data functions as the item of run operation 1 in case of WRITE. Bit assignment is different between status (1) and run operation (1).

*4 WRITE is enable in READY mode. WRITE is enable when RUN operation is done in READY mode. WRITE is enable when the ADV operation is done.

*5 –100 to +1100 can be written when the programmer function is set, and the MANUAL mode is selected on the side of CH1.

*6 –100 to +1100 can be written when the programmer function is set, and the MANUAL mode is selected on the side of CH2.

*7 0 to 5999 minute can be read when set to 0 for the set up item *C64* (program time unit). 0 to 5999s can be read when set to 1.

*8 1 to 8 can be read except for the heat/cool output on the side of CH1.

*9 1 to 8 can be read except for the heat/cool output on the side of CH2. 1 to 4 can be read in case of the heat/cool output on the side of CH2.

*10 0 to 9999 can be read.

*11 –100 to +1100 can be read in case of the heat/cool output.

*12 –500 to +1500 can be read in case of the position proportion output (2G).

● **Alarm status 1**

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Each bit 0 : OFF, 1 : ON
1 : AL01 Input 1 over-range
2 : AL02 Input 1 under-range
3 : AL03 Input 2 over-range [DCP32 only]
4 : AL04 Input 2 under-range [DCP32 only]
5 : Undefined
6 : Undefined
7 : AL07 Input 1 RTD disconnection A
8 : AL08 Input 1 RTD disconnection B
9 : AL09 Input 1 RTD disconnection C
10 : AL10 MFB disconnection
11 : AL11 MFB short-circuit
12 : AL12 MFB adjustment impossible
13 : AL13 Input 2 RTD disconnection A [DCP32 only]
14 : AL14 Input 2 RTD disconnection B [DCP32 only]
15 : AL15 Input 2 RTD disconnection C [DCP32 only]
16 : AL16 Humidity calculation error [DCP32 only]

● **Alarm status 2**

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Each bit 0 : OFF, 1 : ON
1 : AL70 A/DT malfunction
2 : AL71 A/D2 malfunction [DCP32 only]
3 : Undefined
4 : Undefined
5 : Undefined
6 : Low battery voltage
7 : Undefined
8 : AL81 Board configuration error
9 : Undefined
10 : AL83 Input 2 Cold junction compensation impossible
11 : Undefined
12 : Undefined
13 : AL96 Program error
14 : AL97 Parameter error
15 : AL98 Adjustment value error
16 : AL99 PROM error

● **Event output status**

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Each bit 0 : OFF, 1 : ON
1 : Event 1 (EV1)
2 : Event 2 (EV2)
3 : Event 3 (EV3)
4 : Time event 1 (T1)
5 : Time event 2 (T2)
6 : Time event 3 (T3)
7 : Time event 4 (T4)
8 : Time event 5 (T5)
9 : Undefined
10 : Undefined
11 : Undefined
12 : Undefined
13 : Undefined
14 : Undefined
15 : Undefined
16 : Undefined

● **Status 1 (READ)**

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Undefined (fixed at 0)
0000: FAST stop
0001: FAST
0001: AUTO (CH1)
0010: MANUAL (CH1)
0100: During AT (CH1)
0000: END
0001: READY
0010: RUN
0100: HOLD

● **Run operation 1 (WRITE)**

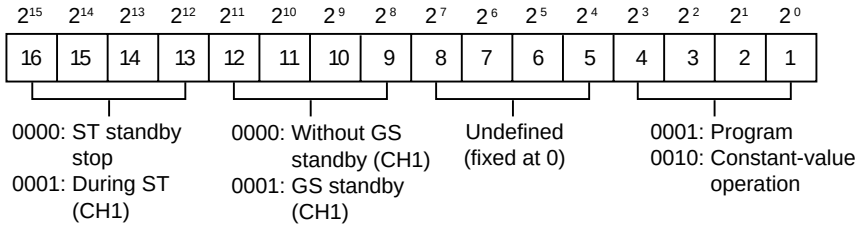
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Write disable
ADV when going to 1
(bit write disabled)
0001: FAST start
0001: AUTO (CH1)
0010: MANUAL (CH1)
0100: AT start (CH1)
0001: RESET
0010: RUN
0100: HOLD

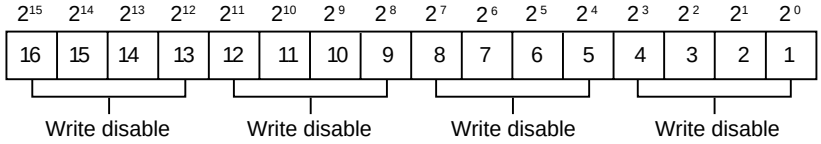
Note

See 4-7 Run operation (page 4-19) for details.

● **Status 2 (READ)**



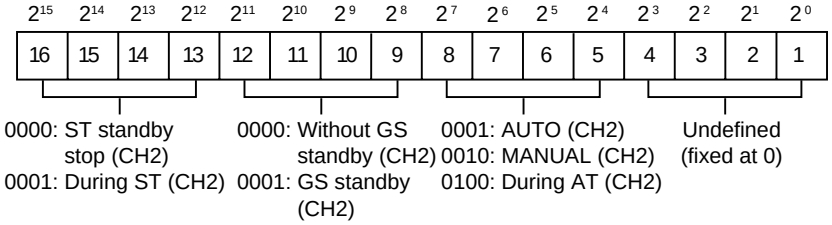
● **Run operation 2 (WRITE)**



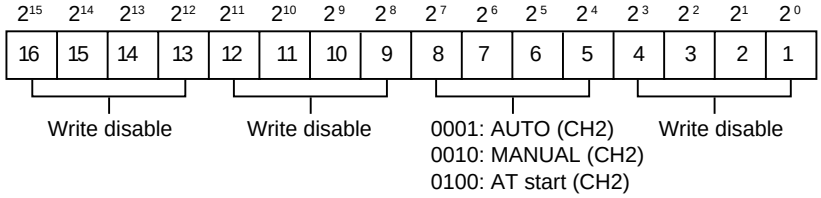
Note

See 4-7 Run operation (page 4-19) for details.

● **Status 3 (READ)**



● **Run operation 3 (WRITE)**



Note

See 4-7 Run operation (page 4-19) for details.

● **External switch input status**

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Each bit 0 : OFF, 1 : ON
1 : RSW1 (RUN)
2 : RSW2 (HOLD)
3 : RSW3 (RESET)
4 : RSW4 (ADV)
5 : RSW5
6 : RSW6
7 : RSW7
8 : RSW8 (Program selection weighting 1)
9 : RSW9 (Program selection weighting 2)
10 : RSW10 (Program selection weighting 4)
11 : RSW11 (Program selection weighting 8)
12 : RSW12 (Program selection weighting 10)
13 : Undefined
14 : Undefined
15 : Undefined
16 : Undefined

■ Variable parameter settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*LoC*	Key lock	2501W	○	○	○	○	
2	*PrtC*	Program protect	2502W	○	○	○	○	
3	*FL*	Input 1 digital filter	2503W	○	○	○	○	
4	*Pb1*	Input 1 bias	2504W	○	○	○	○	
5	*Sb1*	SP1 bias	2505W	○	○	○	○	
6	*otL*	MV change limitter (CH1)	2506W	○	○	○	○	
7	*IoUt*	PID operation initial MV (CH1)	2507W	○	○	○	○	
8	*rPid*	Pid operation initializ ation	2508W	○	○	○	○	
9	*Rt*	Auto-tuning method selection (CH1)	2509W	○	○	○	○	
10	*St*	Smart-tuning method selection (CH1)	2510W	○	○	○	○	
11	*2PId*	Advanced PID selection (CH1)	2511W	○	○	○	○	
12	*gS.t*	G.Soak time (CH1)	2512W	○	○	○	○	
13	*CP.11*	PID auto-switching point 1-1	2513W	○	○	○	○	
14	*CP.12*	PID auto-switching point 1-2	2514W	○	○	○	○	
15	*CP.13*	PID auto-switching point 1-3	2515W	○	○	○	○	
16	*CP.14*	PID auto-switching point 1-4	2516W	○	○	○	○	
17	*CP.15*	PID auto-switching point 1-5	2517W	○	○	○	○	
18	*CP.16*	PID auto-switching point 1-6	2518W	○	○	○	○	
19	*CP.17*	PID auto-switching point 1-7	2519W	○	○	○	○	
20	*FRSt*	FAST factor	2520W	○	○	○	○	
21	*dIFF*	ON-OFF control differential Position-proportional dead z one Heat/cool control dead z one	2521W	○	○	○	○	
22	*CY.1*	Output 1 time-proportional output cycle	2522W	○	○	○	○	
23	*CY.2*	Output 2 time-proportional output cycle	2523W	○	○	○	○	
24	*CY.3*	Output 3 time-proportional output cycle	2524W	○	○	○	○	*
25	*du-L*	3-position control deviation lower limit	2525W	○	○	○	○	
26	*du-K*	3-position control deviation upper limit	2526W	○	○	○	○	
27	*HY-L*	3-position control lower limit hysteresis	2527W	○	○	○	○	
28	*HY-H*	3-position control upper limit hysteresis	2528W	○	○	○	○	
29	*N.-C*	Motor control method selection	2529W	○	○	○	○	
30	*N.-At*	Motor valve opening automatic adjustment	2530W	○	○	○	○	
31	*N.-CL*	Motor valve opening adjustment fully closed position	2531W	○	○	○	○	
32	*N.-oP*	Motor valve opening adjustment fully open position	2532W	○	○	○	○	
33	*N.-t*	Motor valve opening adjustment fully open/closed time	2533W	○	○	○	○	

● **Explanation of remarks column**

* 1 to 60 can be written but this item is not available for the DCP31.

■ Variable parameter 2 settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*FL.2*	Input 2 digital filter	3001W	○	○	○	○	
2	*Pb1.2*	Input 2 bias	3002W	○	○	○	○	
3	*Sb1.2*	SP2 bias	3003W	○	○	○	○	
4	*PrSS*	Pressure offset	3004W	○	○	○	○	
5	*vEL*	Velocity offset	3005W	○	○	○	○	
6	*t-b1*	Unused	3006W	○	○	○	○	
7	*9ASS*	Unused	3007W	○	○	○	○	
8	*otL.2*	MV change limitter (CH2)	3008W	○	○	○	○	
9	*Iot.2*	PID operation initial MV (CH2)	3009W	○	○	○	○	
10	*rPI.2*	PID operation initializ ation (CH2)	3010W	○	○	○	○	
11	*At.2*	Auto-tuning method selection (CH2)	3011W	○	○	○	○	
12	*St.2*	Smart-tuning method selection (CH2)	3012W	○	○	○	○	
13	*2PI.2*	Advanced PID selection (CH2)	3013W	○	○	○	○	
14	*gSt.2*	G.Sock time (CH2)	3014W	○	○	○	○	
15	*CH.2*	Add basic display item (CH2)	3015W	○	○	○	○	
16	*CP.21*	PID auto-switching point 2-1	3016W	○	○	○	○	
17	*CP.22*	PID auto-switching point 2-2	3017W	○	○	○	○	
18	*CP.23*	PID auto-switching point 2-3	3018W	○	○	○	○	
19	*CP.24*	PID auto-switching point 2-4	3019W	○	○	○	○	
20	*CP.25*	PID auto-switching point 2-5	3020W	○	○	○	○	
21	*CP.26*	PID auto-switching point 2-6	3021W	○	○	○	○	
22	*CP.27*	PID auto-switching point 2-7	3022W	○	○	○	○	

■ Event configuration data setting

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*Et1*	Event 1 type	3501W	○	○	○	○	*
2	*Ed1*	Event 1 standby	3502W	○	○	○	○	
3	*HYS1*	Event 1 hysteresis	3503W	○	○	○	○	
4	*dLt*	Event 1 ON delay time	3504W	○	○	○	○	
5	*Et2*	Event 2 type	3505W	○	○	○	○	*
6	*Ed2*	Event 2 standby	3506W	○	○	○	○	
7	*HYS2*	Event 2 hysteresis	3507W	○	○	○	○	
8	*dL2*	Event 2 ON delay time	3508W	○	○	○	○	
9	*Et3*	Event 3 type	3509W	○	○	○	○	*
10	*Ed3*	Event 3 standby	3510W	○	○	○	○	
11	*HYS3*	Event 3 hysteresis	511W	○	○	○	○	
12	*dL3*	Event 3 ON delay time	3512W	○	○	○	○	
13	*tt*	Time event type	3513W	○	○	○	○	*

● **Explanation of remarks column**

* WRITE is enable in READY mode only.

■ PID parameter settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*P - 1*	Proportional band (PID set 1-1)	1501W	○	○	○	○	
2	*I - 1*	Reset time (PID set 1-1)	1502W	○	○	○	○	
3	*d - 1*	Rate time (PID set 1-1)	1503W	○	○	○	○	
4	*oL - 1*	MV lower limit (PID set 1-1)	1504W	○	○	○	○	
5	*oH - 1*	MV upper limit (PID set 1-1)	1505W	○	○	○	○	
6	*rE - 1*	Manual reset (PID set 1-1)	1506W	○	○	○	○	
7	*br - 1*	Brake (PID set 1-1)	1507W	○	○	○	○	
8	*dP - 1*	Disturbance inhibit proportional band (PID set 1-1)	1508W	○	○	○	○	
9	*dI - 1*	Disturbance inhibit reset time (PID set 1-1)	1509W	○	○	○	○	
10	*dd - 1*	Disturbance inhibit rate time (PID set 1-1)	1510W	○	○	○	○	
11	*P - 2*	Proportional band (PID set 1-2)	1511W	○	○	○	○	
12	*I - 2*	Reset time (PID set 1-2)	1512W	○	○	○	○	
13	*d - 2*	Rate time (PID set 1-2)	1513W	○	○	○	○	
14	*oL - 2*	MV lower limit (PID set 1-2)	1514W	○	○	○	○	
15	*oH - 2*	Mv upper limit (PID set 1-2)	1515W	○	○	○	○	
16	*rE - 2*	Manual reset (PID set 1-2)	1516W	○	○	○	○	
17	*br - 2*	Brake (PID set 1-2)	1517W	○	○	○	○	
18	*dP - 2*	Disturbance inhibit proportional band (PID set 1-2)	1518W	○	○	○	○	
19	*dI - 2*	Disturbance inhibit reset time (PID set 1-2)	1519W	○	○	○	○	
20	*dd - 2*	Disturbance inhibit rate time (PID set 1-2)	1520W	○	○	○	○	
21	*P - 3*	Proportional band (PID set 1-3)	1521W	○	○	○	○	
22	*I - 3*	Reset time (PID set 1-3)	1522W	○	○	○	○	
23	*d - 3*	Rate time (PID set 1-3)	1523W	○	○	○	○	
24	*oL - 3*	MV lower limit (PID set 1-3)	1524W	○	○	○	○	
25	*oH - 3*	MV upper limit (PID set 1-3)	1525W	○	○	○	○	
26	*rE - 3*	Manual reset (PID set 1-3)	1526W	○	○	○	○	
27	*br - 3*	Brake (PID set 1-3)	1527W	○	○	○	○	
28	*dP - 3*	Disturbance inhibit proportional band (PID set 1-3)	1528W	○	○	○	○	
29	*dI - 3*	Disturbance inhibit reset time (PID set 1-3)	1529W	○	○	○	○	
30	*dd - 3*	Disturbance inhibit rate time (PID set 1-3)	1530W	○	○	○	○	
31	*P - 4*	Proportional band (PID set 1-4)	1531W	○	○	○	○	
32	*I - 4*	Reset time (PID set 1-4)	1532W	○	○	○	○	
33	*d - 4*	Rate time (PID set 1-4)	1533W	○	○	○	○	
34	*oL - 4*	MV lower limit (PID set 1-4)	1534W	○	○	○	○	
35	*oH - 4*	MV upper limit (PID set 1-4)	1535W	○	○	○	○	
36	*rE - 4*	Manual reset (PID set 1-4)	1536W	○	○	○	○	
37	*br - 4*	Brake (PID set 1-4)	1537W	○	○	○	○	
38	*dP - 4*	Disturbance inhibit proportional band (PID set 1-4)	1538W	○	○	○	○	
39	*dI - 4*	Disturbance inhibit reset time (PID set 1-4)	1539W	○	○	○	○	
40	*dd - 4*	Disturbance inhibit rate time (PID set 1-4)	1540W	○	○	○	○	

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
41	*P - 5*	Proportional band (PID set 1-5)	1541W	○	○	○	○	
42	*I - 5*	Reset time (PID set 1-5)	1542W	○	○	○	○	
43	*d - 5*	Rate time (PID set 1-5)	1543W	○	○	○	○	
44	*oL - 5*	MV lower limit (PID set 1-5)	1544W	○	○	○	○	
45	*oH - 5*	MV upper limit (PID set 1-5)	1545W	○	○	○	○	
46	*rE - 5*	Manual reset (PID set 1-5)	1546W	○	○	○	○	
47	*br - 5*	Brake (PID set 1-5)	1547W	○	○	○	○	
48	*dP - 5*	Disturbance inhibit proportional band (PID set 1-5)	1548W	○	○	○	○	
49	*dI - 5*	disturbance inhibit reset time (PID set 1-5)	1549W	○	○	○	○	
50	*dd - 5*	Disturbance inhibit rate time (PID set 1-5)	1550W	○	○	○	○	
51	*P - 6*	Proportional band (PID set 1-6)	1551W	○	○	○	○	
52	*I - 6*	reset time (PID set 1-6)	1552W	○	○	○	○	
53	*d - 6*	Rate time (PID set 1-6)	1553W	○	○	○	○	
54	*oL - 6*	MV lower limit (PID set 1-6)	1554W	○	○	○	○	
55	*oH - 6*	Mv upper limit (PID set 1-6)	1555W	○	○	○	○	
56	*rE - 6*	Manual reset (PID set 1-6)	1556W	○	○	○	○	
57	*br - 6*	Brake (PID set 1-6)	1557W	○	○	○	○	
58	*dP - 6*	Disturbance inhibit proportional band (PID set 1-6)	1558W	○	○	○	○	
59	*dI - 6*	Disturbance inhibit reset time (PID set 1-6)	1559W	○	○	○	○	
60	*dd - 6*	Disturbance inhibit rate time (PID set 1-6)	1560W	○	○	○	○	
61	*P - 7*	Proportional band (PID set 1-7)	1561W	○	○	○	○	
62	*I - 7*	Reset time (PID set 1-7)	1562W	○	○	○	○	
63	*d - 7*	Rate time (PID set 1-7)	1563W	○	○	○	○	
64	*oL - 7*	MV lower limit (PID set 1-7)	1564W	○	○	○	○	
65	*oH - 7*	MV upper limit (PID set 1-7)	1565W	○	○	○	○	
66	*rE - 7*	Manual reset (PID set 1-7)	1566W	○	○	○	○	
67	*br - 7*	Brake (PID set 1-7)	1567W	○	○	○	○	
68	*dP - 7*	Disturbance inhibit proportional band (PID set 1-7)	1568W	○	○	○	○	
69	*dI - 7*	Disturbance inhibit reset time (PID set 1-7)	1569W	○	○	○	○	
70	*dd - 7*	Disturbance inhibit rate time (PID set 1-7)	1570W	○	○	○	○	
71	*P - 8*	Proportional band (PID set 1-8)	1571W	○	○	○	○	
72	*I - 8*	Reset time (PID set 1-8)	1572W	○	○	○	○	
73	*d - 8*	Rate time (PID set 1-8)	1573W	○	○	○	○	
74	*oL - 8*	MV lower limit (PID set 1-8)	1574W	○	○	○	○	
75	*oH - 8*	MV upper limit (PID set 1-8)	1575W	○	○	○	○	
76	*rE - 8*	Manual reset (PID set 1-8)	1576W	○	○	○	○	
77	*br - 8*	Brake (PID set 1-8)	1577W	○	○	○	○	
78	*dP - 8*	Disturbance inhibit proportional band (PID set 1-8)	1578W	○	○	○	○	
79	*dI - 8*	Disturbance inhibit reset time (PID set 1-8)	1579W	○	○	○	○	
80	*dd - 8*	Disturbance inhibit rate time (PID set 1-8)	1580W	○	○	○	○	

■ PID parameter 2 settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*P - 21*	Proportional band (PID set 2-1)	2001W	○	○	○	○	
2	*I - 21*	Reset time (PID set 2-1)	2002W	○	○	○	○	
3	*d - 21*	Rate time (PID set 2-1)	2003W	○	○	○	○	
4	*oL - 21*	MV lower limit (PID set 2-1)	2004W	○	○	○	○	
5	*oH - 21*	MV upper limit (PID set 2-1)	2005W	○	○	○	○	
6	*rE - 21*	Manual reset (PID set 2-1)	2006W	○	○	○	○	
7	*br - 21*	Brake (PID set 2-1)	2007W	○	○	○	○	
8	*dP - 21*	Disturbance inhibit proportional band (PID set 2-1)	2008W	○	○	○	○	
9	*dI - 21*	Disturbance inhibit reset time (PID set 2-1)	2009W	○	○	○	○	
10	*dd - 21*	Disturbance inhibit rate time (PID set 2-1)	2010W	○	○	○	○	
11	*P - 22*	Proportional band (PID set 2-2)	2011W	○	○	○	○	
12	*I - 22*	Reset time (PID set 2-2)	2012W	○	○	○	○	
13	*d - 22*	Rate time (PID set 2-2)	2013W	○	○	○	○	
14	*oL - 22*	MV lower limit (PID set 2-2)	2014W	○	○	○	○	
15	*oH - 22*	MV upper limit (PID set 2-2)	2015W	○	○	○	○	
16	*rE - 22*	Manual reset (PID set 2-2)	2016W	○	○	○	○	
17	*br - 22*	Brake (PID set 2-2)	2017W	○	○	○	○	
18	*dP - 22*	Disturbance inhibit proportional band (PID set 2-2)	2018W	○	○	○	○	
19	*dI - 22*	Disturbance inhibit reset time (PID set 2-2)	2019W	○	○	○	○	
20	*dd - 22*	Disturbance inhibit rate time (PID set 2-2)	2020W	○	○	○	○	
21	*P - 23*	Proportional band (PID set 2-3)	2021W	○	○	○	○	
22	*I - 23*	Reset time (PID set 2-3)	2022W	○	○	○	○	
23	*d - 23*	Rate time (PID set 2-3)	2023W	○	○	○	○	
24	*oL - 23*	MV lower limit (PID set 2-3)	2024W	○	○	○	○	
25	*oH - 23*	MV upper limit (PID set 2-3)	2025W	○	○	○	○	
26	*rE - 23*	Manual reset (PID set 2-3)	2026W	○	○	○	○	
27	*br - 23*	Brake (PID set 2-3)	2027W	○	○	○	○	
28	*dP - 23*	Disturbance inhibit proportional band (PID set 2-3)	2028W	○	○	○	○	
29	*dI - 23*	Disturbance inhibit reset time (PID set 2-3)	2029W	○	○	○	○	
30	*dd - 23*	Disturbance inhibit rate time (PID set 2-3)	2030W	○	○	○	○	
31	*P - 24*	Proportional band (PID set 2-4)	2031W	○	○	○	○	
32	*I - 24*	Reset time (PID set 2-4)	2032W	○	○	○	○	
33	*d - 24*	Rate time (PID set 2-4)	2033W	○	○	○	○	
34	*oL - 24*	MV lower limit (PID set 2-4)	2034W	○	○	○	○	
35	*oH - 24*	MV upper limit (PID set 2-4)	2035W	○	○	○	○	
36	*rE - 24*	Manual reset (PID set 2-4)	2036W	○	○	○	○	
37	*br - 24*	Brake (PID set 2-4)	2037W	○	○	○	○	
38	*dP - 24*	Disturbance inhibit proportional band (PID set 2-4)	2038W	○	○	○	○	
39	*dI - 24*	Disturbance inhibit reset time (PID set 2-4)	2039W	○	○	○	○	
40	*dd - 24*	Disturbance inhibit rate time (PID set 2-4)	2040W	○	○	○	○	

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
41	*P - 25*	Proportional band (PID set 2-5)	2041W	○	○	○	○	
42	*I - 25*	Reset time (PID set 2-5)	2042W	○	○	○	○	
43	*d - 25*	Rate time (PID set 2-5)	2043W	○	○	○	○	
44	*oL - 25*	MV lower limit (PID set 2-5)	2044W	○	○	○	○	
45	*oH - 25*	MV upper limit (PID set 2-5)	2045W	○	○	○	○	
46	*rE - 25*	Manual reset (PID set 2-5)	2046W	○	○	○	○	
47	*br - 25*	Brake (PID set 2-5)	2047W	○	○	○	○	
48	*dP - 25*	Disturbance inhibit proportional band (PID set 2-5)	2048W	○	○	○	○	
49	*dI - 25*	Disturbance inhibit reset time (PID set 2-5)	2049W	○	○	○	○	
50	*dd - 25*	Disturbance inhibit rate time (PID set 2-5)	2050W	○	○	○	○	
51	*P - 26*	Proportional band (PID set 2-6)	2051W	○	○	○	○	
52	*I - 26*	Reset time (PID set 2-6)	2052W	○	○	○	○	
53	*d - 26*	Rate time (PID set 2-6)	2053W	○	○	○	○	
54	*oL - 26*	MV lower limit (PID set 2-6)	2054W	○	○	○	○	
55	*oH - 26*	Mv upper limit (PID set 2-6)	2055W	○	○	○	○	
56	*rE - 26*	Manual reset (PID set 2-6)	2056W	○	○	○	○	
57	*br - 26*	Brake (PID set 2-6)	2057W	○	○	○	○	
58	*dP - 26*	Disturbance inhibit proportional band (PID set 2-6)	2058W	○	○	○	○	
59	*dI - 26*	Disturbance inhibit reset time (PID set 2-6)	2059W	○	○	○	○	
60	*dd - 26*	Disturbance inhibit rate time (PID set 2-6)	2060W	○	○	○	○	
61	*P - 27*	Proportional band (PID set 2-7)	2061W	○	○	○	○	
62	*I - 27*	Reset time (PID set 2-7)	2062W	○	○	○	○	
63	*d - 27*	Rate time (PID set 2-7)	2063W	○	○	○	○	
64	*oL - 27*	MV lower limit (PID set 2-7)	2064W	○	○	○	○	
65	*oH - 27*	MV upper limit (PID set 2-7)	2065W	○	○	○	○	
66	*rE - 27*	Manual reset (PID set 2-7)	2066W	○	○	○	○	
67	*br - 27*	Brake (PID set 2-7)	2067W	○	○	○	○	
68	*dP - 27*	Disturbance inhibit proportional band (PID set 2-7)	2068W	○	○	○	○	
69	*dI - 27*	Disturbance inhibit reset time (PID set 2-7)	2069W	○	○	○	○	
70	*dd - 27*	Disturbance inhibit rate time (PID set 2-7)	2070W	○	○	○	○	
71	*P - 28*	Proportional band (PID set 2-8)	2071W	○	○	○	○	
72	*I - 28*	Reset time (PID set 2-8)	2072W	○	○	○	○	
73	*d - 28*	Rate time (PID set 2-8)	2073W	○	○	○	○	
74	*oL - 28*	MV lower limit (PID set 2-8)	2074W	○	○	○	○	
75	*oH - 28*	MV upper limit (PID set 2-8)	2075W	○	○	○	○	
76	*rE - 28*	Manual reset (PID set 2-8)	2076W	○	○	○	○	
77	*br - 28*	Brake (PID set 2-8)	2077W	○	○	○	○	
78	*dP - 28*	Disturbance inhibit proportional band (PID set 2-8)	2078W	○	○	○	○	
79	*dI - 28*	Disturbance inhibit reset time (PID set 2-8)	2079W	○	○	○	○	
80	*dd - 28*	Disturbance inhibit rate time (PID set 2-8)	2080W	○	○	○	○	

■ Setup data settings

Setup data can be written only in READY mode.

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*C01*	Control action (CH1)	4501W	○	○	○	○	
2	*C02*	Input 1 temperature unit	4502W	○	○	○	○	
3	*C03*	Input 1 range type	4503W	○	○	○	○	
4	*C04*	Input 1 range decimal point position	4504W	○	○	○	○	
5	*C05*	Input 1 range lower limit (0%)	4505W	○	○	○	○	
6	*C06*	Input 1 range upper limit (100%)	4506W	○	○	○	○	
7	*C07*	Input 1 root extraction dropout	4507W	○	○	○	○	
8	*C08*	Input 1 lineariz ation table approximation	4508W	○	○	○	○	
9	*C09*	SP1 lower limit	4509W	○	○	○	○	
10	*C10*	SP1 upper limit	4510W	○	○	○	○	
11	*C11*	PID set auto-switching (CH1)	4511W	○	○	○	○	
12	*C12*	MV setting at input 1 over-range (MV1)	4512W	○	○	○	○	
13	*C13*	Preset manual value (MV1)	4513W	○	○	○	○	
14	*C14*	Manual change mode (MV1)	4514W	○	○	○	○	
15	*C15*	Preset manual value (MV1)	4515W	○	○	○	○	
16	*C16*	MV in READY mode (MV1, MV1 heat output)	4516W	○	○	○	○	
17	*C17*	MV (cool) in READY mode (MV1 cool output)	4517W	○	○	○	○	
18	*C18*	Main output type (CH1)	4518W	○	○	○	○	
19	*C19*	SP1 main output lower limit (4mA setting)	4519W	○	○	○	○	
20	*C20*	SP1 main output upper limit (20mA setting)	4520W	○	○	○	○	
21	*C21*	Control action (CH2)	4521W	□	□	○	○	*1
22	*C22*	Input 2 temperature unit	4522W	□	□	○	○	*1
23	*C23*	Input 2 range type	4523W	□	□	○	○	*2
24	*C24*	Input 2 range decimal point position	4524W	□	□	○	○	*3
25	*C25*	Input 2 range lower limit (0%)	4525W	□	□	○	○	*4
26	*C26*	Input 2 range upper limit (100%)	4526W	□	□	○	○	*4
27	*C27*	Input 2 root extraction dropout	4527W	□	□	○	○	*5
28	*C28*	Input 2 lineariz ation table approximation	4528W	□	□	○	○	*1
29	*C29*	Unused	4529W	□	□	□	□	*12
30	*C30*	Unused	4530W	□	□	□	□	*6
31	*C31*	Unused	4531W	□	□	□	□	*7
32	*C32*	SP2 lower limit	4532W	□	□	○	○	*8
33	*C33*	SP2 upper limit	4533W	□	□	○	○	*9
34	*C34*	PID set auto-switching (CH2)	4534W	□	□	○	○	*1
35	*C35*	PV2 MV setting in over-range mode (MV2)	4535W	□	□	○	○	*1
36	*C36*	PV2 MV in over-range mode (MV2)	4536W	□	□	○	○	*10
37	*C37*	Manual change mode (MV2)	4537W	□	□	○	○	*1
38	*C38*	Preset manual value (MV2)	4538W	□	□	○	○	*10
39	*C39*	MV in READY mode (MV2, MV2 heat output)	4539W	□	□	○	○	*10
40	*C40*	MV (cool) in READY mode (MV2 cool output)	4540W	□	□	○	○	*10

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
41	*C41*	Main output type (CH2)	4541W	□	□	○	○	*1
42	*C42*	SP2 main output lower limit (4mA setting)	4542W	□	□	○	○	*4
43	*C43*	SP2 main output upper limit (20mA setting)	4543W	□	□	○	○	*4
44	*C44*	MV1/MV2 exchange	4544W	□	□	○	○	*1
45	*C45*	With/without 3-position control	4545W	○	○	○	○	
46	*C46*	Auxiliary output 1 type	4546W	○	○	□	□	*13
47	*C47*	Auxiliary output 1 lower limit (4mA)	4547W	○	○	□	□	*14
48	*C48*	Auxiliary output 1 upper limit (20mA)	4548W	○	○	□	□	*14
49	*C49*	Auxiliary output 2 type	4549W	○	○	○	○	
50	*C50*	Auxiliary output 2 lower limit (4mA)	4550W	○	○	○	○	
51	*C51*	Auxiliary output 2 upper limit (20mA)	4551W	○	○	○	○	
52	*C52*	External switch input RSW5 assignment	4552W	○	○	○	○	
53	*C53*	External switch input RSW6 assignment	4553W	○	○	○	○	
54	*C54*	External switch input RSW7 assignment	4554W	○	○	○	○	
55	*C55*	Para key assignment item 1	4555W	○	○	○	○	
56	*C56*	Para key assignment item 2	4556W	○	○	○	○	
57	*C57*	Para key assignment item 3	4557W	○	○	○	○	
58	*C58*	Para key assignment item 4	4558W	○	○	○	○	
59	*C59*	Para key assignment item 5	4559W	○	○	○	○	
60	*C60*	Para key assignment item 6	4560W	○	○	○	○	
61	*C61*	Para key assignment item 7	4561W	○	○	○	○	
62	*C62*	Para key assignment item 8	4562W	○	○	○	○	
63	*C63*	Operation completion state	4563W	○	○	○	○	
64	*C64*	Program time unit	4564W	○	○	○	○	
65	*C65*	Time display	4565W	○	○	○	○	
66	*C66*	PV display	4566W	○	○	○	○	
67	*C67*	Alarm display	4567W	○	○	○	○	
68	*C68*	Programming item: Events 1 to 3	4568W	○	○	○	○	
69	*C69*	Programming item: Time events 1 to 5	4569W	○	○	○	○	
70	*C70*	Programming item: PID set, G.SOAK	4570W	○	○	○	○	
71	*C71*	Programming item: PV start, cycle, pattern link	4571W	○	○	○	○	
72	*C72*	Cold junction compensation	4572W	○	○	○	○	
73	*C73*	Input operation at input 1 disconnection	4573W	○	○	○	○	
74	*C74*	Voltage time-proportional output system	4574W	○	○	○	○	
75	*C75*	Output 1 selection	4575W	○	○	○	○	
76	*C76*	Output 2 selection	4576W	○	○	○	○	
77	*C77*	Output 3 selection	4577W	□	□	○	○	*1
78	*C78*	Voltage output 1 adjustment	4578W	○	○	○	○	
79	*C79*	Voltage output 2 adjustment	4579W	○	○	○	○	
80	*C80*	Voltage output 3 adjustment	4580W	□	□	○	○	*11

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
81	*C81*	Input 1 burnout current (expansion setting 1)	4581W	○	○	○	○	
82	*C82*	Expansion setting 2	4582W	○	○	○	○	
83	*C83*	Unused	4583W	□	×	□	×	
84	*C84*	CPL communication address	4584W	○	×	○	×	
85	*C85*	CPL communication speed/code	4585W	○	×	○	×	
86	*C86*	Unused	4586W	□	×	□	×	
87	*C87*	Unused	4587W	□	×	□	×	
88	*C88*	Unused	4588W	□	×	□	×	
89	*C89*	Unused	4589W	□	×	□	×	
90	*C90*	Special function	4590W	○	×	○	×	
91	*C91*	Input 1 z ener barrier adjustment	4591W	○	×	○	×	
92	*C92*	Input 2 z ener barrier adjustment	4592W	○	×	○	×	
93	*C93*	CPL communication port selection	4593W	○	×	○	×	
94	*C94*	PID type	4594W	○	○	○	○	*15
95	*C95*	Unused	4595W	□	×	□	×	
96	*C96*	Hardware type 1	4596W	○	×	○	×	
97	C97	Hardware type 2	4597W	▲	×	▲	×	
98	*C98*	ROM ID	4598W	▲	×	▲	×	
99	*C99*	ROM item	4599W	▲	×	▲	×	
100	*C00*	ROM revision	4600W	▲	×	▲	×	

● **Explanation of remarks column**

*1 0 to 1 can be written but this item is unused in the DCP31.

*2 128 to 193 can be written but this item is unused in the DCP31.

*3 0 to 3 can be written but this item is unused in the DCP31.

*4 –1999 to +9999 can be written but this item is unused in the DCP31.

*5 0 to 100 can be written but this item is unused in the DCP31.

*6 0 to *C31* set value can be written.

*7 *C30* set value to 4000 can be written.

*8 –1999 to *C33* set value can be written but this item is unused in the DCP31.

*9 *C32* set value to 9999 can be written but this item is unused in the DCP31.

*10 –10 to 110 can be written but this item is unused in the DCP31.

*11 2 to 22 can be written but this item is unused in the DCP31.

*12 0 to 1 can be written but this item is unused.

*13 0 to 11 can be written but this item is unused in the DCP32.

*14 –1999 to +9999 can be written but this item is unused in the DCP32.

*15 Read/write is possible in the DCP31/32 with ROM revision No.10 or higher number. This item was unused in the past. The data could be only read (in a space area), but could not be written.

■ Table data settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*t - A. 1*	Input lineariz ation table approximation A1	4001W	○	○	○	○	
2	*t - A. 2*	Input lineariz ation table approximation A2	4002W	○	○	○	○	
3	*t - A. 3*	Input lineariz ation table approximation A3	4003W	○	○	○	○	
4	*t - A. 4*	Input lineariz ation table approximation A4	4004W	○	○	○	○	
5	*t - A. 5*	Input lineariz ation table approximation A5	4005W	○	○	○	○	
6	*t - A. 6*	Input lineariz ation table approximation A6	4006W	○	○	○	○	
7	*t - A. 7*	Input lineariz ation table approximation A7	4007W	○	○	○	○	
8	*t - A. 8*	Input lineariz ation table approximation A8	4008W	○	○	○	○	
9	*t - A. 9*	Input lineariz ation table approximation A9	4009W	○	○	○	○	
10	*t - A. A*	Input lineariz ation table approximation A10	4010W	○	○	○	○	
11	*t - A. b*	Input lineariz ation table approximation A11	4011W	○	○	○	○	
12	*t - b. 1*	Input lineariz ation table approximation B1	4012W	○	○	○	○	
13	*t - b. 2*	Input lineariz ation table approximation B2	4013W	○	○	○	○	
14	*t - b. 3*	Input lineariz ation table approximation B3	4014W	○	○	○	○	
15	*t - b. 4*	Input lineariz ation table approximation B4	4015W	○	○	○	○	
16	*t - b. 5*	Input lineariz ation table approximation B5	4016W	○	○	○	○	
17	*t - b. 6*	Input lineariz ation table approximation B6	4017W	○	○	○	○	
18	*t - b. 7*	Input lineariz ation table approximation B7	4018W	○	○	○	○	
19	*t - b. 8*	Input lineariz ation table approximation B8	4019W	○	○	○	○	
20	*t - b. 9*	Input lineariz ation table approximation B9	4020W	○	○	○	○	
21	*t - b. A*	Input lineariz ation table approximation B10	4021W	○	○	○	○	
22	*t - b. b*	Input lineariz ation table approximation B11	4022W	○	○	○	○	
23	*t - C. 1*	Input lineariz ation table approximation C1	4023W	□	□	○	○	
24	*t - C. 2*	Input lineariz ation table approximation C2	4024W	□	□	○	○	
25	*t - C. 3*	Input lineariz ation table approximation C3	4025W	□	□	○	○	
26	*t - C. 4*	Input lineariz ation table approximation C4	4026W	□	□	○	○	
27	*t - C. 5*	Input lineariz ation table approximation C5	4027W	□	□	○	○	
28	*t - C. 6*	Input lineariz ation table approximation C6	4028W	□	□	○	○	
29	*t - C. 7*	Input lineariz ation table approximation C7	4029W	□	□	○	○	
30	*t - C. 8*	Input lineariz ation table approximation C8	4030W	□	□	○	○	
31	*t - C. 9*	Input lineariz ation table approximation C9	4031W	□	□	○	○	
32	*t - C. A*	Input lineariz ation table approximation C10	4032W	□	□	○	○	
33	*t - C. b*	Input lineariz ation table approximation C11	4033W	□	□	○	○	
34	*t - d. 1*	Input lineariz ation table approximation D1	4034W	□	□	○	○	
35	*t - d. 2*	Input lineariz ation table approximation D2	4035W	□	□	○	○	
36	*t - d. 3*	Input lineariz ation table approximation D3	4036W	□	□	○	○	
37	*t - d. 4*	Input lineariz ation table approximation D4	4037W	□	□	○	○	
38	*t - d. 5*	Input lineariz ation table approximation D5	4038W	□	□	○	○	
39	*t - d. 6*	Input lineariz ation table approximation D6	4039W	□	□	○	○	
40	*t - d. 7*	Input lineariz ation table approximation D7	4040W	□	□	○	○	
41	*t - d. 8*	Input lineariz ation table approximation D8	4041W	□	□	○	○	
42	*t - d. 9*	Input lineariz ation table approximation D9	4042W	□	□	○	○	
43	*t - d. A*	Input lineariz ation table approximation D10	4043W	□	□	○	○	
44	*t - d. b*	Input lineariz ation table approximation D11	4044W	□	□	○	○	

■ Constant-value operation data settings

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
1	*N. odE*	Operation mode	1001W	○	○	○	○	
2	*SP*	SP1	1002W	○	○	○	○	
3	*SP2*	SP2	1003W	□	□	○	○	*
4	*Ev1*	Event 1 setting value	1004W	○	○	○	○	
5	*Ev2*	Event 2 setting value	1005W	○	○	○	○	
6	*Ev3*	Event 3 setting value	1006W	○	○	○	○	
7	----	Unused	1007W	□	×	□	×	
8	----	Unused	1008W	□	×	□	×	
9	----	Unused	1009W	□	×	□	×	
10	----	Unused	1010W	□	×	□	×	
11	*P.*	Proportional band (CH1)	1011W	○	○	○	○	
12	*I.*	Reset time (CH1)	1012W	○	○	○	○	
13	*d.*	Rate time (CH1)	1013W	○	○	○	○	
14	*oL.*	MV lower limit (CH1)	1014W	○	○	○	○	
15	*oH.*	MV upper limit (CH1)	1015W	○	○	○	○	
16	*rE.*	Manual reset (CH1)	1016W	○	○	○	○	
17	br.	Brake (CH1)	1017W	○	○	○	○	
18	*dP.*	Disturbance inhibit proportional band (CH1)	1018W	○	○	○	○	
19	*dI.*	Disturbance inhibit reset time (CH1)	1019W	○	○	○	○	
20	*dd.*	Disturbance inhibit rate time (CH1)	1020W	○	○	○	○	
21	*P. - C*	Proportional band (for CH1 cool control)	1021W	○	○	○	○	
22	*I. - C*	Reset time (for CH1 cool control)	1022W	○	○	○	○	
23	*d. - C*	Rate time (for CH1 cool control)	1023W	○	○	○	○	
24	*oL. - C*	MV lower limit (for CH1 cool control)	1024W	○	○	○	○	
25	*oH. - C*	MV upper limit (for CH1 cool control)	1025W	○	○	○	○	
26	*rE. - C*	Manual reset (for CH1 cool control)	1026W	○	○	○	○	
27	----	Unused	1027W	□	×	□	×	
28	----	Unused	1028W	□	×	□	×	
29	----	Unused	1029W	□	×	□	×	
30	----	Unused	1030W	□	×	□	×	

No.	Item code	Item	Address	DCP31		DCP32		Remarks
				R	W	R	W	
31	*P. - 2*	Proportional band (CH2)	1031W	□	□	○	○	
32	*I. - 2*	Reset time (CH2)	1032W	□	□	○	○	
33	*d. - 2*	Rate time (CH2)	1033W	□	□	○	○	
34	*oL. - 2*	MV lower limit (CH2)	1034W	□	□	○	○	
35	*oH. - 2*	MV upper limit (CH2)	1035W	□	□	○	○	
36	*rE. - 2*	Manual reset (CH2)	1036W	□	□	○	○	
37	*br. - 2*	Brake (CH2)	1037W	□	□	○	○	
38	*dP. - 2*	Disturbance inhibit proportional band (CH2)	1038W	□	□	○	○	
39	*dI. - 2*	Disturbance inhibit reset time (CH2)	1039W	□	□	○	○	
40	*dd. - 2*	Disturbance inhibit rate time (CH2)	1040W	□	□	○	○	
41	*P. - 2C*	Proportional band (for CH2 cool control)	1041W	□	□	○	○	
42	*I. - 2C*	Reset time (for CH2 cool control)	1042W	□	□	○	○	
43	*d. - 2C*	Rate time (for CH2 cool control)	1043W	□	□	○	○	
44	*oL. - 2C*	MV lower limit (for CH2 cool control)	1044W	□	□	○	○	
45	*oH. - 2C*	MV upper limit (for CH2 cool control)	1045W	□	□	○	○	
46	*rE. - 2C*	Manual reset (for CH2 cool control)	1046W	□	□	○	○	

● **Explanation of remarks column**

* *C32* set value to *C33* can be written but this item is unused in the DCP31.

■ Details of block data

The block data is such that the program data corresponding to the one segment designated by segment No. is converted into two ASCII bytes, each of which is expressed in hexadecimal notation, and these bytes are combined together.
These bytes are not partitioned.
One item of DCP31/32 program pattern consists of 2 bytes, which are aligned in the order of the upper byte and lower byte.
The segment No. 1 differs in the byte count of one block data and item configuration from the segment Nos. 2 to 30.

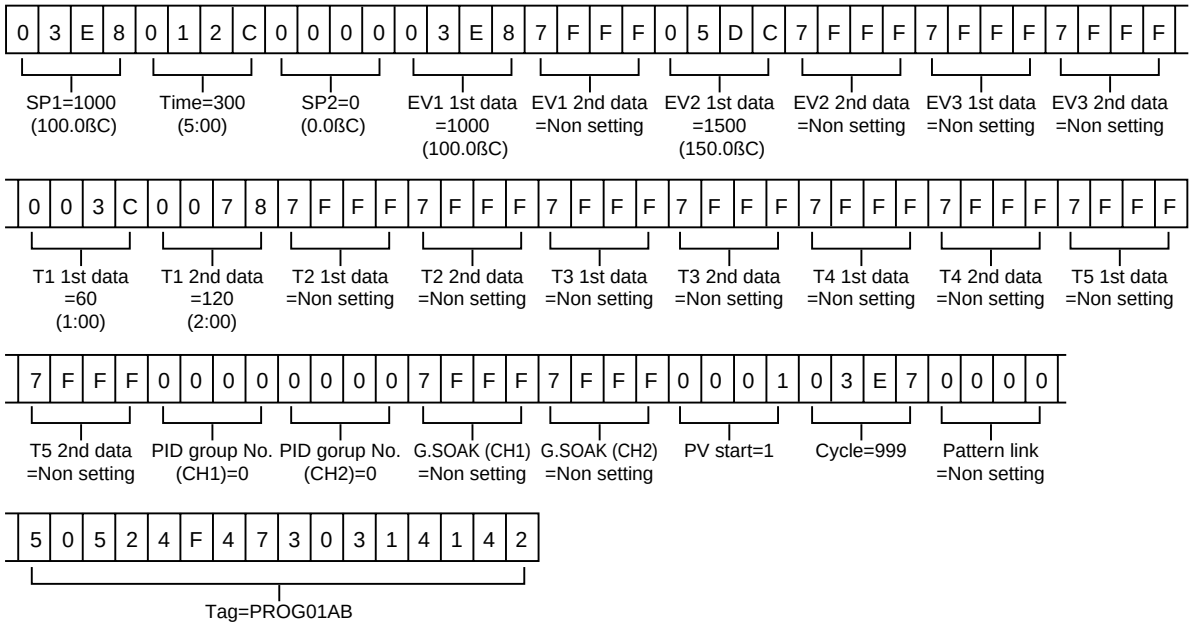
● Segment 1

Order in block (byte order)	Programming item
1 to 2	SP1
3 to 4	Time
5 to 6	SP2
7 to 8	EV1 1st data
9 to 10	EV1 2nd data
11 to 12	EV2 1st data
13 to 14	EV2 2nd data
15 to 16	EV3 1st data
17 to 18	EV3 2nd data
19 to 20	T1 1st data
21 to 22	T1 2nd data
23 to 24	T2 1st data
25 to 26	T2 2nd data
27 to 28	T3 1st data
29 to 30	T3 2nd data
31 to 32	T4 1st data
33 to 34	T4 2nd data
35 to 36	T5 1st data
37 to 38	T5 2nd data
39 to 40	PID group No. (CH1)
41 to 42	PID group No. (CH2)
43 to 44	G. SOAK (CH1)
45 to 46	G. SOAK (CH2)
47 to 48	PV start
49 to 50	Cycle
51 to 52	Pattern link
53 to 60	Tag (8 bytes)

- SP1
  The data can be written within *C09* set value to *C10*.
- Time
  The data can be written within 0 to 5999.
- SP2
  The data can be written within *C32* set value to *C33*.
  This item is not available for the DCP31.

- Event (EV1 to EV3, T1 to T5) 1st data
  In case of time event; th data can be written within 0 to 5999 for the ON time setting.
  In case of PV type event, the data can be written within –1999 to 9999 for the operating point. But in case of absolute value deviation event within 0 to 9999,
  In case of MV/MFB event within –100 to 1100.
  7FFF (H) when no data is set.
- Event (EV1 to EV3, T1 to T5) 2nd data
  In case of time event, the data can be written within ON time setting +1 to 5999 for the OFF time setting. 7FFF (H) when the ON time setting is 5999.
  7FFF (H) in case of PV type event.
  7FFF (H) when no data is set.
- PID group No. (CH1)
  0: No. of the previous segment is continued.
  1 to 8: PID group No. (1 to 4 for the heat/cool output on the side of CH1)
- PID group No. (CH2)
  0: No. of the previous segment is continued.
  1 to 8: PID group No. (1 to 4 for the heat/cool output on the side of CH2)
- G.SOAK (CH1)
  The data can be written within 0 to 1000.
  7FFF (H) when no data is set.
- G.SOAK (CH2)
  The data can be written within 0 to 1000.
  7FFF (H) when no data is set.
  This item is not available for the DCP 31.
- PV start
  0: Non PV start
  1: PV start on the side of CH1.
  2: PV start on the side of CH2. (2 can not be written for the DCP31.)
- Cycle
  0: Non cycle run.
  1 to 9999: Cycle run count
- Pattern link
  0: Non link
  1 to 19: Program No. of link destination
- Tag (8 bytes)
  The value of each byte is limited within 20 to 5FH (Numerics, Capital letters and Symbols).
  Ex.
  "PROG01AB" are 16 byte given below.
  50524F4730314142.

● **An example of segment 1 block data**



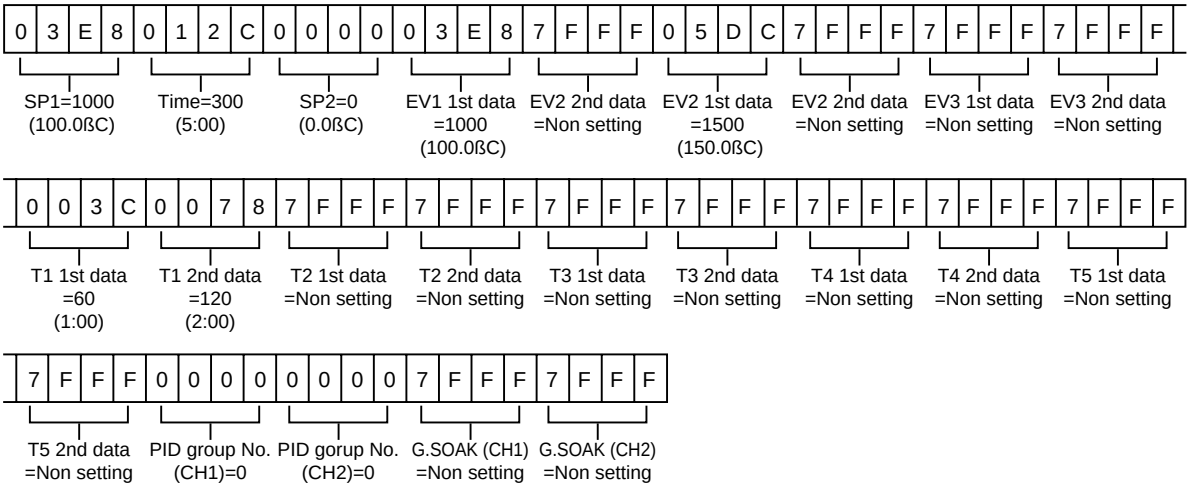
● **Segment 2 to 30**

Order in block (byte order)	Programming item
1 to 2	SP1
3 to 4	Time
5 to 6	SP2
7 to 8	EV1 1st data
9 to 10	EV1 2nd data
11 to 12	EV2 1st data
13 to 14	EV2 2nd data
15 to 16	EV3 1st data
17 to 18	EV3 2nd data
19 to 20	T1 1st data
21 to 22	T1 2nd data
23 to 24	T2 1st data
25 to 26	T2 2nd data
27 to 28	T3 1st data
29 to 30	T3 2nd data
31 to 32	T4 1st data
33 to 34	T4 2nd data
35 to 36	T5 1st data
37 to 38	T5 2 nd data
39 to 40	PID group No. (CH1)
41 to 42	PID group No. (CH2)
43 to 44	G. SOAK (CH1)
45 to 46	G. SOAK (CH2)

This is the same format as deleted 4 items (PV start, Cycle, Pattern link and Tag) from the segment 1 block data.

Each item is the same as each one of segment 1 block data.

● An example of segment 2 to 30 block data



Chapter 6. TROUBLESHOOTING

■ Check items in case communication is disabled

(1) Check whether or not the RS-485 wiring is wrong.

(2) Check if the communication conditions for the DCP31/32 meet those for the host computer

If any one of the following setting items is different between both stations, communication is disabled.

The underlined items mean that they can be set on the DCP31/32 side.

Baud rate : 1200, 2400, 4800, 9600bps
Data length : 7, 8 bits
Parity : No parity, odd parity, even parity
Stop bit : 1 stop bit, 2 stop bits

(3) Check if the destination address of the command frame transmitted from the host computer meets the address set to the DCP31/32.

The address of the DCP31/32 set to 0 at delivery from the factory. Even when the destination address of the command frame is set to 00 (30H, 30H), the DCP31/32 does not respond to such a message.

(4) Use the upper-case character codes for all the character codes other than the device ID code ("X" or "x" in this instrument).

Chapter 7. SPECIFICATIONS

■ RS-485 Specifications

Name	Remarks
Transmission mode	Balanced type
Transmission line	5-lead system/3-lead system
Signal level	Input data 0 –0.2V max. Input data 1 +1V min. Output data 0 –0.2V max. Output data 1 +2V min.
Baud rate (bps)	4800, 9600
Transmission distance	500m max. (300m when connected with the MA500 DigitroniK interface module)
Communication system	Half duplex
Character synchroniz ation method	Start/stop transmission
Data format	8 data bits, 1 stop bit, even parity 8 data bits, 2 stop bits, no parity
Error detection	Parity check, check-sum
Communication address	0 to 127 (Communication functions are disabled when set to 0.)
Network type	1:N (up to 31 units, or up to 16 units when connected with MA500 DIM or CMC410)

Appendix

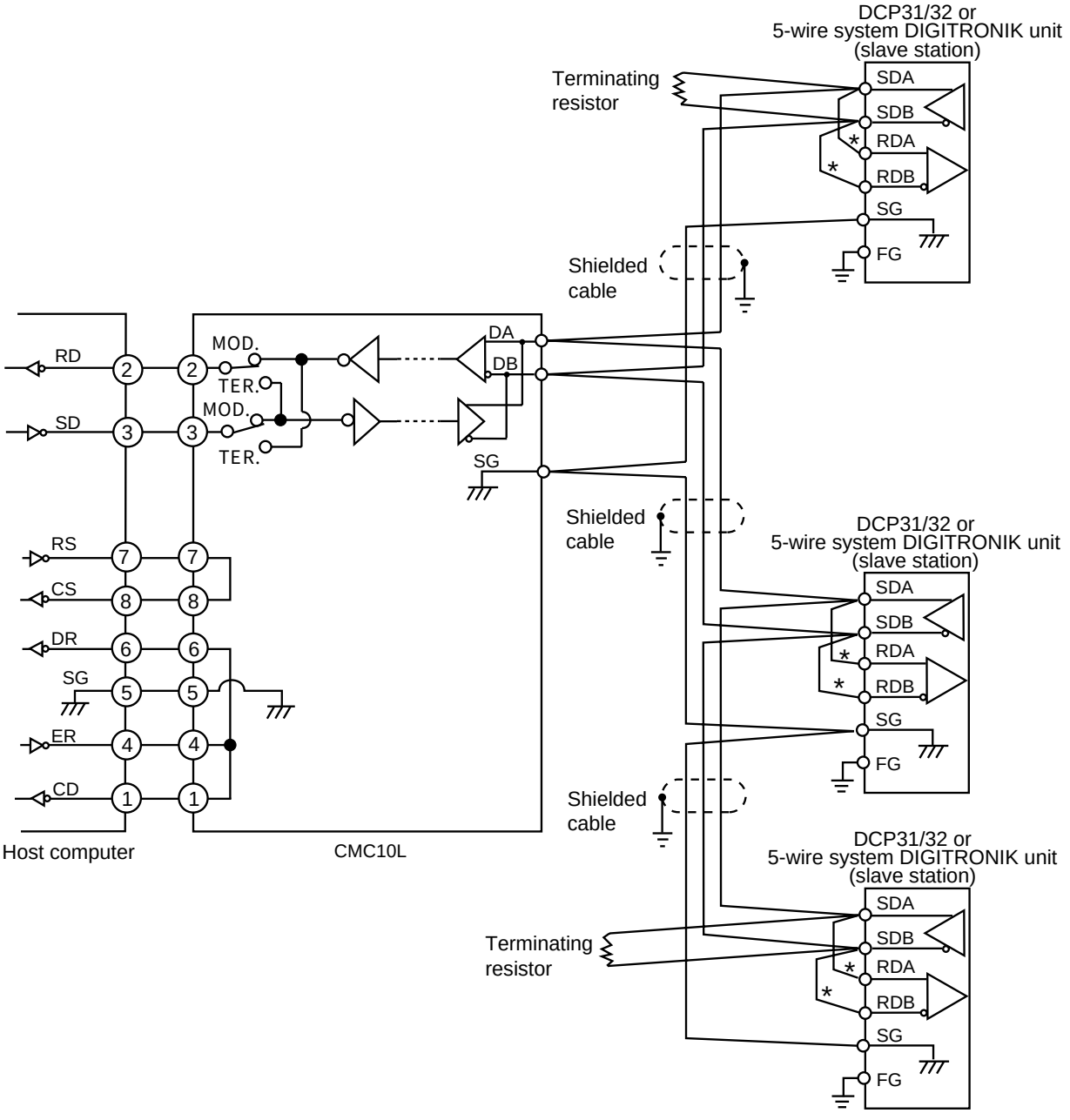
■ Code table

UPPER / LOWER	0	1	2	3	4	5	6	7
0			SPACE	0	@	P	`	p
1			!	1	A	Q	a	q
2	STX		"	2	B	R	b	r
3	ETX		#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
A	LF		*	:	J	Z	j	z
B			+	;	K	[	k	{
C			,	<	L	\	l	|
D	CR		-	=	M	]	m	}
E			.	>	N	^	n	~
F			/	?	O	_	o	

The shaded part ( ) is not used for this communication system. (The codes to be used change every instrument.)

■ Connection with CMC10L

The CMC10L001A000 is available as an RS-232C/RS-485 (3-wire system) converter from Yamatake Corporation. The following diagram shows an example of wiring using a straight cable for a host computer in the terminal mode:



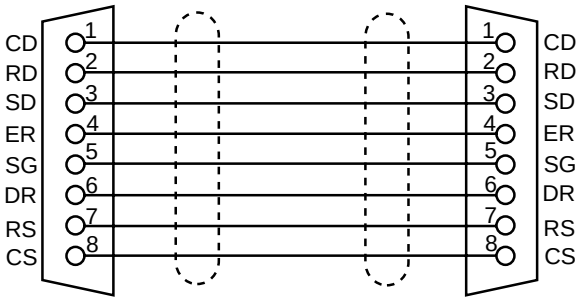
Connect two terminating resistors of 150Ω±5%, 1/2W min. at each end of the transmission line.
Conduct the wiring externally for the wires marked with an asterisk.

Connect the master station SD to the slave station RD, and the master station RD to the slave station SD.
To execute this connection, set the MODE switch provided in the CMC10L as shown in the following table in accordance with the host computer side RS-232C connector pin arrangement (modem/terminal) and the type of cable (cross/straight) used:

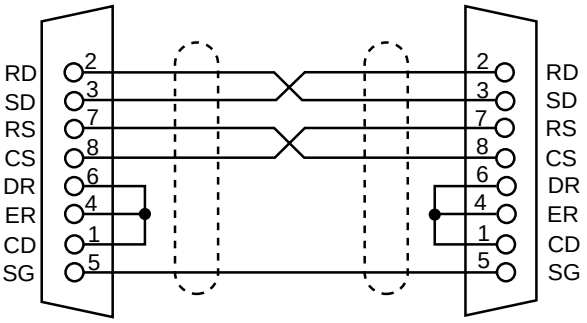
RS-232C	Cable type	MODE switch
TERMINAL	Straight	MODEM
TERMINAL	Cross	TERMINAL
MODEM	Straight	TERMINAL
MODEM	Cross	MODEM

- **RS-232C cable**

Straight: An RS-232C cable with a D-Sub (9-pin) connector at each end where pins with the same number are mutually connected (for example, pin 2 to pin 2, and pin 3 to 3)

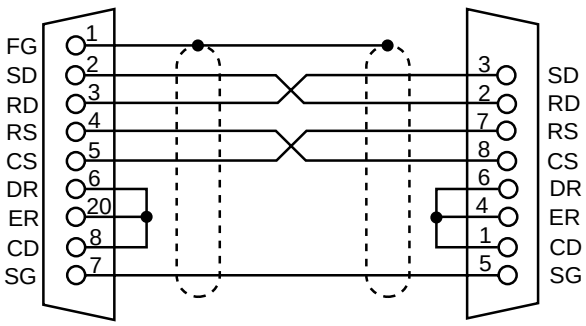


Cross: An RS-232C cable with a D-Sub (9-pin) connector at each end where different number pins are connected (for example, pin 2 to pin 3, and pin 3 to pin 2)



D-Sub (25-pin) – D-Sub (9-pin) conversion cable:

An RS-232C cable for conversion between D-Sub (25-pin) and D-Sub (9-pin)



Specifications are subject to change without notice.

YAMATAKE

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Printed in J apan.
1st Edition: Issued in J uly, 1999(W)
3rd Edition: Issued in Mar., 2003(W)

This has been printed on recycled paper.