

User's Guide



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CN3800 Series Protocol Manual for RS232C / RS422A



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[1] Introduction

The operating instructions in this copy describe the communication interface which is an optional function prepared for the Program Controller CN3800 Series. For the functions and features of the controller unit itself, refer to the Operating Instructions of the controller unit.

Two types of communication interfaces, RS232C and RS422A, are available. By using the types of signals conforming to the specifications of EIA RS232C or RS422A, various types of data can be set or read from the CN3800 Series by personal computer, etc.

(Note: With the initial data screens, data can only be read but cannot be set or changed.

Data setting and changing are to be done by the LOC mode (front key).)

RS232C and RS422A are data communication standards specified by the U.S. Electronic Industries Association (EIA). The Japanese standard corresponding to these standards is JIS X5101 (Old JIS C6361). This standard covers the electrical and mechanical points; in other words, it refers to only the hardware. It does not touch upon the software aspect of data transmission

procedures. Therefore, communication cannot be carried out unconditionally by a device equipped with this interface. Users are required to be fully informed, in advance, of the specifications and transmission procedures.

The use of RS422A allows parallel connection of multiple CN3800 Series Controllers (including the Digital Controller SR25 Series). At present, only a few personal computers can support this interface. However, the use of a line converter for FS232C/PS422A conversion solves the problem.

[2] Specifications

Signal level:	Conforming to EIA RS232C/RS422A
Communication mode:	RS232C 3-wire half duplex RS422A 4—wire half duplex multidrop
Synchronization system:	Start—stop synchronization
Communication distance:	RS232C 15m RS422A 1.2km
Transmission speed:	1200, 2400, 4800 bps
Transmission procedure:	Non-procedural
Data format:	Data length 7 bits, even parity, stop bit 1 or data length 8 bits, no parity, stop bit 1.

BOC: Checksum 1 byte

Communication codes: ASCII codes

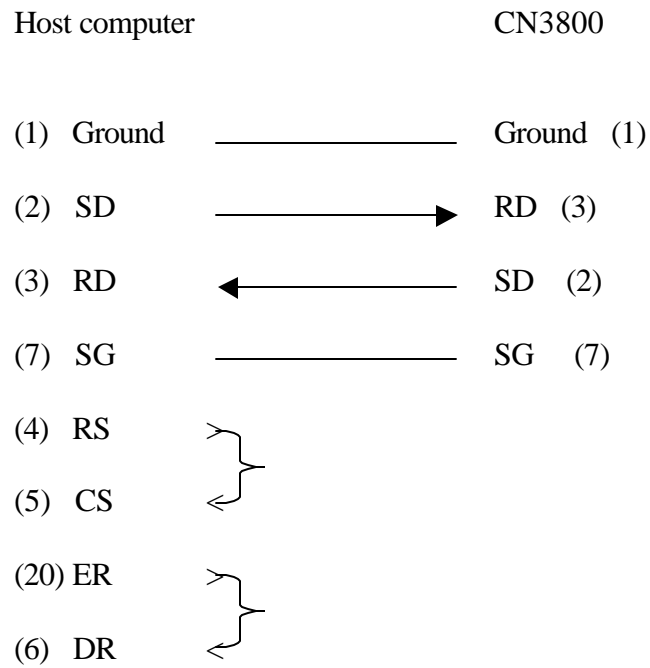
Control codes: Not used.

Number of connectable units: RS232C 1 unit
RS422A 10 units

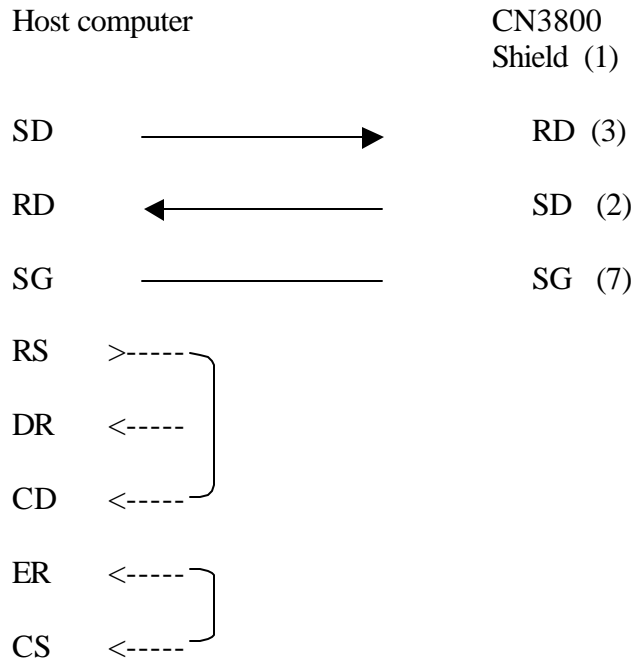
[3] Connection

1. RS232C

Example 1

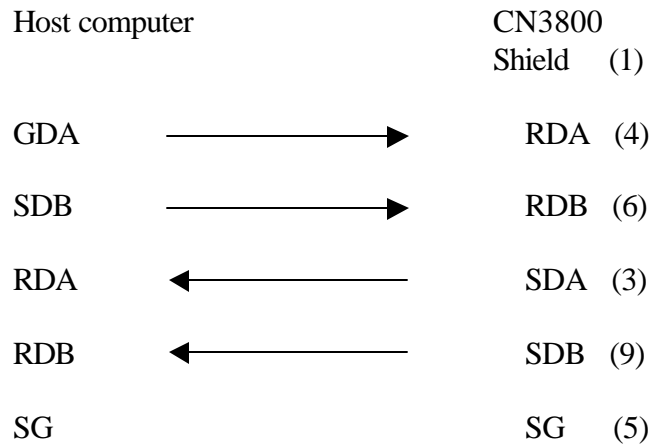


Example 2



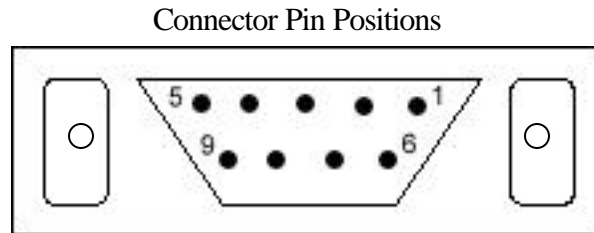
2. RS422A

Example 1



Note: The figures in () are Pin Nos.

* Return of the control signals shall be executed in accordance with the respective host computer specifications.



[4] Setting Requirements for Communication

1. Communication Parameter Setting

The following communication parameters shall be set by displaying the Communication Option Screen of the initial data screen. (Parameter setup or parameter alteration is not possible, though monitoring is possible, unless the operation mode is set at “LOC” and the action mode is at “RST” or “MAN” at the same time.)

(1) ADDR (Address <Machine No.>) Setting

Designate any number from 0 to 31. If multiple units are used, designate different addresses for the various units. Be sure not to designate the same number to more than one unit.

(2) BPS (transmission speed) setting

Designate any level from 1200, 2400, and 4800 bps to meet the transmission speed of the host computer. If multiple units are used, set them all at the same speed.

(3) DATA (Data bit length, parity) setting

Select the data bit length, parity, stop bit length from the following, to be set in conformity with the host computer.

- 0: Data 7 bits, even parity, stop bit 1
- 1: Data 8 bits, no parity, stop bit 1

If multiple units are used, set them all with the same values.

2. Operation Mode Setting

Three types of CN3800 operation modes, as shown below, are available. Each mode has a different communication condition.

1. LOC mode (Data setting is executed by operating front keys.)
2. EXT mode (Data setting is executed by external control input "DI".)

3. COM mode (Data setting is executed through communication system.)

[COM-EXT mode (Data setting is executed by external control input during COM mode)]

- (1) During LOC or EXT mode, a data link can be established. However, [D1 ~ D4] READ commands only are valid during COM mode and the error message “ERO” + NAK is returned when any other command is delivered.
- (2) During COM (COM-EXT) mode, all READ and WRITE commands are valid.
- (3) To alter the operation mode, display the LCD operation mode screen and select/set LOC, EXT or COM as required. Select for the operation of CN3800 by means of the communication system.

*Refer to the Operating Instructions of the CN 3800 unit.

- (4) If the input type, range, unit, or scaling is changed, or memory initialization (1,2) is executed on any of the initial data screens during LOC mode, the CN3800 controller automatically suspends the communication and abandons the data link, to enter Link-OFF status. Carry out data link establishment again after a lapse of 500 msec.

[5] Communication Check

1. Preparation

(1) Connection

Referring to section [3] above, connect CN3800 to the host computer or the line converter.

(2) CN3800 side preparation

ADDR (Address): 0

BPS (speed): 1200 bps

DATA (Data bit length): 7 bits, even parity

In addition to the above, change the operation mode from LOC to COM mode.

(3) Host computer side preparation

The setting contents shall be the same as the CN3800 side.

2. Circuit Check

Install the sample program presented at the end of these instructions in the host computer, and run the program. This program is a sample prepared for NEC PC-9801 Disk Basic N88-BASIC (86). If using another model, OS, or language, the user must prepare an equivalent program.

When the program is run and the following display is given, the circuit connection can be judged as correctly arranged. The values represent PV value, SV value, PTN no., STP no., as in the sequence.

00

DI 23.5, -- ,1,1

OK

The PV value above changes with measuring range, measuring temperature, or other condition.

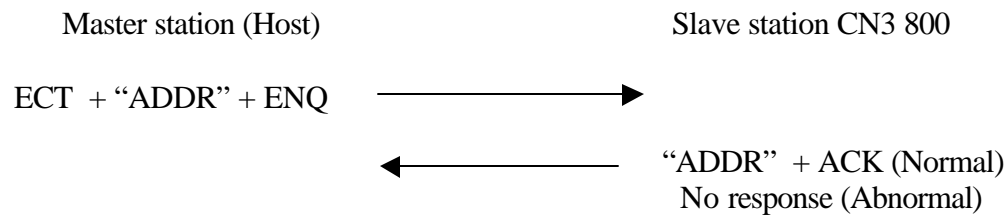
3. Poor Connection

If the above circuit check does not operate normally, check again for poor connection with the host computer, faulty setup, or the program itself. In particular, it should be noted that the wiring specification for the return line of the control signal wire on the host computer side differs from one type of host computer to another.

[6] Establishment and Abandonment of Data Link

If a data link is not yet established CN3800 does not process or return the data even if receiving a READ command or WRITE command. Never fail to send out command(s) after establishing the data link.

1. Establishment of Data Link



In the case of “ADDR (Address) No. = 10”, four bytes of

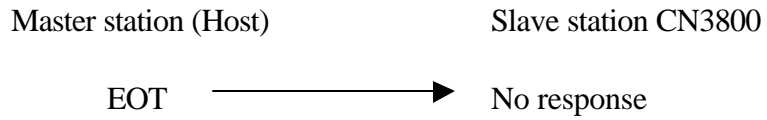
04H + 31H + 30H + 05H are transmitted.

(EOT) (1) (0) (ENQ)

- (1) CN3800 with the data link established by ECT is linked off.
- (2) With a normal response given, reading or changing of the CN 3800 data by the READ command and WRITE command can be executed.
- (3) The two-digit no. 0031 set on CN3800 side shall be designated to the address no. (“ADDR”).

(4) There is no response from CN3800 if there exists no CN3800 with the specified address no. or if no normal receive operation is performed.

2. Abandonment of Data Link

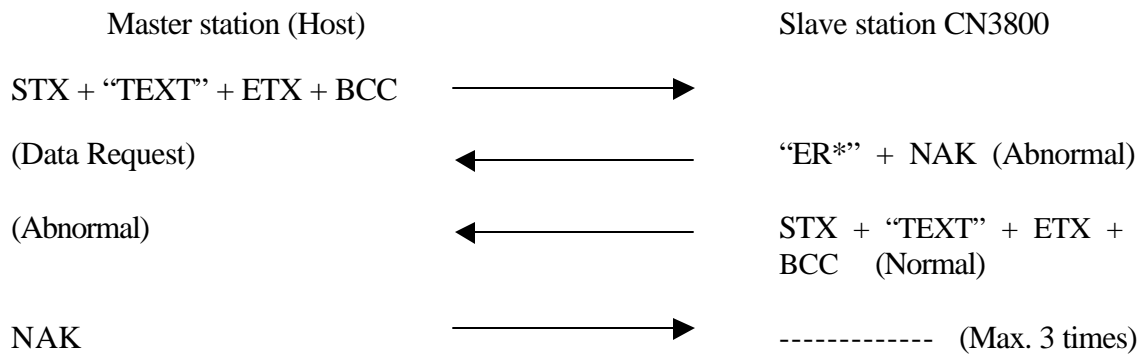


(1) Transmission of ECT links off the CN3800 with data link established.

[7] Communication Format

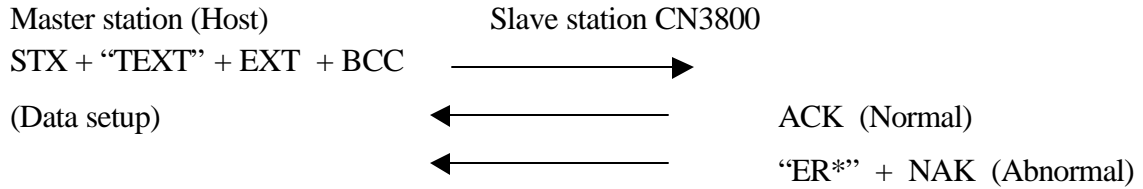
1. READ Command Format

The READ command reads the data, status, etc., of CN3800



2. WRITE Command Format

The WRITE command sets up (or alters) the data, execution keys, etc., of CN3800



3. Control Codes

The following control codes are used.

STX : 02H	ETX : 03H
ECT : 04H	ENQ : 05H
ACK : 06H	NAK : 15H

4. Check code

- (1) Checksum is employed as a check code (BCC).
- (2) The BCC range is from immediately after STX to ETX. In other words, all the data placed after ETX are considered BCC data.

- (3) Addition of the various ASCII data within the above mentioned valid range is made ignoring the carry at the most significant bit.

Example: In case of READ command for the monitor screens

STX + "M1" + ETX + BCC

(02H) (4DH) (31H) (03H) (81H)

4DH + 31H + 03H = 81H (8 bits)

(81H & 7FH = 01H (7 bits))

5. Positive Acknowledgment and Negative Acknowledgment

- (1) ACK is returned at a positive acknowledgement (when data is normally received).
- (2) Error message ("ER*") added before NAK is returned as a negative acknowledgement (when data is abnormally received). (* : 0 ~ 6) A detailed description of the error message is given in [8] – 1, - (4) Details of Communication Commands (Text Format) -- Common Specifications".

Example: When returning the command error (“ER2”), four bytes of

45H + 52H + 32H + 15H are transmitted.
(E) (R) (2) (NAK)

6. Time Out, Etc.

- (1) If data receive (until ETX, BCC) is not completed within approximately 3 seconds after the CN3800 receives STX, it is considered “Time Out”. And the CN3800 waits for another command (a new STX). If time out is set on the host computer side, allocate 4 seconds or longer as the time out length.
- (2) Receiving NAK more than twice consecutively means NAK Time Out, which sets CN3800 to wait for another command (a new STX). In this case, send a command again.
- (3) Data link is cancelled automatically when a command is not transmitted within 5 minutes after the delivery of the last data, which is regarded as time out. In this case, establish the data link again.
- (4) If CR or LF is provided in the text, it is subjected to BCC. However, it is not regarded as a data portion.

- (5) If the input type, range, unit, or scaling is changed or memory initialization (1, 2) is executed on any of the initial data screens during LOC mode, the CN3800 controller automatically suspends the communication and abandons the data link, to enter Link—OFF status. Carry out data link establishment again after a lapse of 500 msec.

[8] Details of Communication Commands (Text Format)

1. Common Specifications

- (1) The following characters can be used in commands and data

- | | |
|---------------|--|
| (a) Alphabets | (Only upper-case characters are used.) |
| (b) Figures | (0 ~ 9) |
| (c) + | (Sign) |
| (d) - | (Sign and also for READ command) |
| (e) . | (Decimal point) |
| (f) _ | (Space : Delimiter between command and data) |
| (g) , | (Comma : Delimiter between data) |
| (h) ; | (Semicolon : Data omission during WRITE command) |
| (i) % | (Percent : Unit symbol) |

(2) Data Format

(a) As a mark-off command and data, “-“ (space) is used. But for marking off between the command and the pattern no., step no., or control no. during READ command, “-“ (minus) is used.

(b) As a mark-off between data, “,” (comma) is used. “,” is also used continuously for the number of data to be omitted in order to omit data during WRITE command.

However, if all the data after a particular data are to be omitted, “;“ (semicolon) is used.

Following are examples of Execution Parameter Screen Related Command 5 WRITE commands.

Example 1: “E5_200.0, 3, 6”

```
FIX SV <--- 200.0 , PID_ No. <--- 3, ALARM _ No. <--- 6
```

Example 2: “E5_,8”

```
FIX SV , PID _ No. <--- Omit, ALARM _ No. <--- 8
```

Example 3: “E-200.0;”

```
FIX SV <--- 200.0, PID_ No., ALARM No. <--- Omit
```

Example 4: “E5_.,,5”

This format is considered an “Error” due to an excessive number of data (number of commas).

Example 5: “E5_4,”

This format is considered an “Error” since “,” is placed at the end.

Example 6: “E5_,”

This format is considered an “Error” since no data is provided.

(c) A single datum consists of a maximum of six characters including “+”, “-”, “.”. In the case of data in figures, the maximum number of significant digits is four.

However, the data of LINK FORMAT consists of a maximum of nine characters, nine digits.

(Depending on the measuring range, 0.000 ~ 10.999 may be returned against 0 ~ 10999 as PV value as the returned data for “DI” command.)

Correct examples:	10	+0010	-10	-0010
	200.0	+200.0	-200.0	
	0.1	+000.1	-0.1	-000.1

Incorrect examples:	+123456	-123456	1234.5
	0200.0	+0200.0	-0200.0
	0000.1	+0000.1	-0000.1

(d) If the number of digits lower than the decimal point in numeric data differs from the specified digit number, it is considered an “Error”.

(In case of 99)

Correct examples:	99	099	0099
Incorrect examples:	99.	99.0	99.00

(In case of 10.0)

Correct examples:	10.0	010.0		
Incorrect examples:	10	10.	10.00	10.000

(In case of 0.01)

Correct examples:	0.01	.01	00.01
Incorrect examples:	0.010		

(3) Commands are classified on the basis of LCD screen group unit, as shown below.

(Common classification for both READ and WRITE commands)

Each command consists of two characters, a single upper-case letter and a single figure.

O*	: Operation Related Command	[O1]
D*	: LED Display Related Command	[D1 ~ D4]
M*	: Monitor Screen Related Commands	[M1 ~ M3]
E*	: Execution Parameter Screen Related Commands	[E1 ~ E5]
P*	: Program Data Screen Pattern Data Related Command	[P1]
S*	: Program Data Screen Step Data Related Commands	[S1 ~ S6]
C*	: Control Data Screen Related Commands	[C1 ~ C3]
K*	: KEY Lock Screen Related Commands	[K1 ~ K3]
I*	: Initial Data Screen Related Commands	[I1 ~ I9]

Note: * = Numeric data 1 ~ 9 (No. for each command type)

Though “D1 ~ D4” commands are valid in LOC or EXT mode, other commands are invalid and the error message “ER0” is returned against them.

“D*”, “M*”, and ‘I*’ are used as READ commands only. Their use as WRITE commands is prohibited. (As an exception, “M1_*”, WRITE command is possible if action mode is set at “MAN”.)

The READ commands sent from the host computer consist of the above two characters. However, it should be noted that the following commands are entered with pattern no. or step no. added.

(a) Pattern data related command

P1 - (P)

(P) : Pattern no. (1 ~ 9)

(b) Step data related command

S1 - (P), (S)

(P) : Pattern no. (1 ~ 9)

(S) : Step no. (01 ~ 09 or 01 ~ 81)

(c) Control data related command

C1 - (C)

(C) : Control data no. (PID_ , ALARM_No.)

In principle, the formats of returned data for both READ command and WRITE command are the same as described in detail in the following section.

Example 1 : Execution parameter screen related READ command format

READ command : ES
Data returned from CN 3800 : E5_(1), (2), (3)

WRITE command : ES (1), (2), (3)

(1): FIX SV value
(2): FIX PID_ No. value
(3): FIX ALARM_ No. value

Example 2: Program data screen related READ and WRITE command formats

READ command : S2 - (P), (S)
Data returned from CN3800 : S2 _ (P), (S), (1), (2)
WRITE command : S2 - (P), (S), (1), (2)

(P): PTN no.
(S): STP no.
(1): PID_ value
(2): ALARM_ value

Example 3: Control data screen related READ and WRITE command formats

READ command : C3 - (C)
Data returned from CN3800 : C3 _ (C) (1), (2)
WRITE command : C3 _ (C), (1), (2)

(C): Control data no.
(1): AL1 value
(2): AL2 value

(4) CN3800 sends back the following error messages upon command receiving if normal data receive is not executed due to hardware failure or use of the wrong command.

“ER*” + NAK (*: 0~6 Error message return format)

ERO (Operation mode error) --- Any command other than “D1 ~ D4” is delivered during COM or EXT mode.

ER1 (Format error) --- Text file configuration is abnormal, including such a case as buffer over.

ER2 (Data error) --- Invalid command is delivered.

ER3 (Data error) --- Invalid data (irrelevant data or out-of-range data) is delivered.

ER4 (Framing error) --- An error such as parity, framing, or break is generated.

ER5 (WRITE command execution error) --- WRITE command is delivered during WRITE- command-receive invalid.

ER6 (EXEC. KEY execution error) ---

EXEC. KEY command is delivered during EXEC.

KEY-command-receive invalid.

In addition to the above cases, the message “ER7” added after the READ command data is returned upon receiving “D*”, “M*”, or “EI” READ command, when the data content is not finalized in such a case of alteration by operating the action mode alteration key.

If this message is returned, transmit the READ command again after a lapse of 250 msec or longer.

Example:

READ command: STX + “DI” + ETX + BCC

Data returned: STX + “D1_ER7” + ETX + BCC

- (5) For the data formats of the various parameters, decimal point, setting range, refer to the Operating Instructions of the CN3800 unit, since the applicable contents are the same (including those displayed on the LCD screen).
- (6) Data alteration of various parameters via the communication system is made as described below, though it depends upon the operation mode (COM, COM-EXT) or the action mode.

- (a) All READ commands can be used regardless of the action mode (RUN, FIX, MAN, CFM, etc.) when the operation mode is set at communication mode (COM or COM-EXT).

- (b) Any WRITE command other than the operation mode related WRITE command “OI_*” cannot be used when the operation mode is set at COM-EXT (External control mode in communication mode).

- (c) “E2”, “E3”, program data screen related commands, and control data screen related commands cannot alter the data in RUN or CFM action mode.

When data is required to be changed during RUN action mode, “RUN-HLD” status must be established.

- (d) The WRITE command limitation in each action mode is the same as the data alteration by key operation during LOC mode. When the limitation is applied to WRITE command, the error message “ER5” is returned, to allow for check on the limitation of the various parameters.

- (e) The execution key (“EI_*” WRITE command) limitation in each action mode is the same as that in LOC mode. When the limitation is applied to the execution key, the error message “ER6” is returned, to allow for check on the various keys.

When the action mode is altered by the execution key, for more secure operation, verify the status output by sending “D2” or “E1” READ command after a lapse of 250 msec or longer.

(7) Time data

Time data is returned/set as shown below, minute or second being the minimum unit.

00H30M	----->	30 (00 * 60 + 30 = 30)
01H10M	----->	70 (01 * 60 + 10 = 70)
99H59M	----->	5999 (99 * 60 + 59 = 5999)
00M59S	----->	59 (00 * 60 + 59 = 59)
10M20S	----->	620 (10 * 60 + 20 = 620)
99M59S	----->	5999 (99 * 60 + 59 = 5999)

2. Operation Mode Related Command [O1]

(1) READ command	: O1
Data returned from CN3800	: O1_(1)
Write command	: O1_(1)
(1)	: OPERATION MODE [COM, EXT]
COM	: TO COM (Action mode can be changed by “E1_*” command.)

EXT : TO COM-EXT (Action mode can be changed by external control input.)

3. Display (LED) Related Commands [D1 ~ D4]

Display related commands mean READ commands only. If the data to be returned is not finalized, “ER7” may be returned at (1).

(These commands can be used in LOC or EXT mode.)

(1) READ command	:	DI
Data returned from CN3800	:	DI_(1), (2), (3), (4)
(1)	:	PV value
(2)	:	SV value
(3)	:	PTN No.
(4)	:	STP No.

* “HH” or “LL” is returned as PV value during SO.

* “---“ is returned as SV value during RST or MAN.

* Execution no. is returned as PTN no. and STP no. during RUN or CFM mode.
However, each start no. is returned as PTN no. and STP no. during other modes.

(2) READ command : D2

Data returned from CN3800 : D2_(1), (2), (3), (4), (5), (6), (7), (8), (9)

(1) : RST [OFF, ON]

(2) : GUA [OFF, ON]

(3) : ADV [OFF, ON]

(4) : HLD [OFF, ON]

(5) : RUN [OFF, ON]

(6) : FIX [OFF, ON]

(7) : MAN [OFF, ON]

(8) : AT [OFF, ON, WAI]

(9) : CFM [OFF, ON]

* Action mode (Status output) display related command

* OFF: Not executed ON: Executed WAI: AT Standby

(3) READ command : D3

Data returned from CN3800 : D3_(1), (2), (3), (4)

(1) : TS1 [OFF, ON]

(2) : TS2 [OFF, ON]

(3) : TS3 [OFF, ON]

(4) : TS4 [OFF, ON]

* Time signal output display related command

(4) READ command	:	D4
Data returned from CN3800	:	D4_(1), (2), (3)
	(1) :	AL1 [OFF, ON]
	(2) :	AL2 [OFF, ON]
	(3) :	SO [OFF, ON]

*Alarm output display related command

4. Monitor Screen Related Commands [M1 ~ M3]

Monitor screen related commands mean READ commands only.

However, WRITE command is available only as M1 command during MAN activation.

When the data to be returned are not finalized, “ER7” may in some cases be returned at (1).

(1) READ Command	:	M1
Data returned from CN3800	:	M1_(1), (2), (3)
WRITE command	:	M1_(1)
	(1) :	OUT value
	(2) :	DEV value
	(3) :	TIME value

* With WRITE command being valid during MAN mode, OUT value only can be designated.

* For the DEV value during SO or during any mode other than RUN or FIX, "--" is returned.

* For the TIME value during MAN or RST mode, "--" is returned.

(2) READ command	:	M2
Data returned from CN3800	:	M2_(1), (2), (3), (4), (5), (6)
(1)	:	LINK FORMAT
(2)	:	LINK POINTER
(3)	:	LINK EXEC (Execution value)
(4)	:	LINK EXEC (Set value)
(5)	:	PTN RPT (Execution value)
(6)	:	PTN RPT (Set value)

* LINK POINTER shows the point (location) in the LINK FORMAT of the presently executed pattern no. The data include "1" as the left end of LINK FORMAT and "9" as the right end.

* "--" is returned for each if not during RUN or CFM mode.

* Even during RUN or CFM mode, if LINK FORMAT is not set up or LINK operation is not executed, "--" is returned at LINK FORMAT, LINK POINTER and LINK EXEC (execution value).

(3) READ command	:	M1
Data returned from CN3800	:	M3_(1), (2), (3), (4)
	(1) :	Execution PID_No. value
	(2) :	Execution ALARM_No. value
	(3) :	SET SV value
	(4) :	SET TIME value

* "--" is returned for each during RST or MAN mode.

5. Execution Parameter Screen Related Commands [E1 ~ E5]

(1) READ command	:	E1
Data returned from CN3800	:	E1_(1), (2), (3), (4), (5), (6), (7), (8), (9)
	(1) :	RST [OFF, ON]
	(2) :	GUA [OFF, ON]
	(3) :	ADV [OFF, ON]
	(4) :	HLD [OFF, ON]
	(5) :	RUN [OFF, ON]
	(6) :	FIX [OFF, ON]
	(7) :	MAN [OFF, ON]
	(8) :	AT [OFF, ON, WAI]
	(9) :	CFM [OFF, ON]
WRITE command	:	E1_(1)
	(1) :	RST, GUA, ADV, HLD, RUN, FIX, MAN, AT, CFM]

* Execution key (Action mode selection execution) command

* When - the data to be returned is not finalized, “ER7” may be returned at (1).

* The validity of the execution key remains the same as in LOC mode. Refer to the Operating Instructions of the CN3800 unit.

* OFF: Not executed ON: Executed WAI: AT Standby

(2) READ command	:	E2
Data returned from CN3800	:	E2_(1), (2)
WRITE command	:	E2_(1), (2)
	(1) :	START PIN No. value
	(2) :	START STP No. value
(3) READ command	:	E3
Data returned from CN3800	:	E3_(1), (2), (3)
WRITE command	:	E2_(1), (2), (3)
	(1) :	LINK FORMAT value
	(2) :	LINK EXEC value
	(3) :	PV START [NO, YES]

* If “0” is designated at the top data of the LINK FORMAT, “--” is returned at the LINK FORMAT data, meaning “no link”.

* NO: Function is not used. YES: Function is used.

(4) READ command : E4
 Data returned from CN3800 : E4_(1), (2)
 WRITE command : E4_(1), (2)
 (1) : ADV MODE [STP, TIME]
 (2) : ADV TIME value

(5) READ command : E5
 Data returned from CN3800 : E5_(1), (2), (3)
 WRITE command : E5_(1), (2), (3)
 (1) : FIX SV value
 (2) : FIX PID_No. value
 (3) : FIX ALARM No. value

6. Program Data Screen Related Commands [P1, S1 ~ S6]

(1) READ command : P1-(1)
 Data returned from CN380 : P1_(1), (2), (3), (4), (5), (6)
 (1) : PIN No. value (1 ~ 9)
 (2) : START SV value
 (3) : GUA ZONE value
 (4) : GUA TIME value
 (5) : PTN END value
 (6) : PTN RPT value

(2) READ command	:	S1-(1), (2)
Data returned from CN3800	:	S1_(1), (2), (3), (4)
WRITE command	:	S1_(1), (2), (3), (4)
	(1) :	PTN No. value (1 ~ 9)
	(2) :	STP No, value (01 ~ 09 or 01 ~ 81)
	(3) :	SV value
	(4) :	TIME value
(3) READ command	:	S2-(1), (2)
Data returned from CN3800	:	S2_(1), (2), (3), (4)
WRITE command	:	S2_(1), (2), (3), (4)
	(1) :	PTN No. value (1 ~ 9)
	(2) :	STP No. value (01 - 09 or 01 ~ 81)
	(3) :	PID No. value
	(4) :	ALARM_No. value
(4) READ command	:	S3-(1), (2)
Data returned from CN3800	:	S3_(1), (2), (3), (4), (5)
WRITE command	:	S3_(1), (2), (3), (4), (5)
	(1) :	PTN No. value (1 ~ 9)
	(2) :	STP No. value (01 ~ 09 or 01 ~ 81)
	(3) :	TS1 [NO, YES]
	(4) :	TS1 ON TIME value
	(5) :	TS1 OFF TIME value

* NO: TS1 is not used. YES: TS1 is used

(5) READ command : S4-(1), (2)
 Data returned from CN3800 : S4_(1), (2), (3), (4), (5)
 WRITE command : S4_(1), (2), (3), (4), (5)

(1) : PTN No. value (1 ~ 9)
 (2) : STP No. value (01 ~ 09 or 01 ~ 81)
 (3) : TS2 [NO, YES]
 (4) : TS2 ON TIME value
 (5) : TS2 OFF TIME value

* NO: TS2 is not used. YES: TS2 is used.

(6) READ command : S5-(1), (2)
 Data returned from CN3800 : S5_(1), (2), (3), (4), (5)
 WRITE command : S5_(1), (2), (3), (4), (5)

(1) : PTN No. value (1 ~ 9)
 (2) : STP No. value (01 ~ 09 or 01 ~ 81)
 (3) : TS3 [NO, YES]
 (4) : TS3 ON TIME value
 (5) : TS3 OFF TIME value

* NO: TS3 is not used. YES: TS3 is used.

(7) READ command : S6-(1), (2)
 Data returned from CN3800 : S6_(1), (2), (3), (4), (5)
 WRITE command : S6_(1), (2), (3), (4), (5)

(1) : PTN No. value (1 ~ 9)

- (2) : STP No. value (01 ~ 09 or 01 ~ 81)
- (3) : TS4 [NO, YES]
- (4) : TS4 ON TIME value
- (5) : TS4 OFF TIME value

7. Control Data Screen Related Commands [C1 ~ C3]

- (1) READ command : C1-(1)
- Data returned from CN3800 : C1_(1), (2), (3), (4)
- WRITE command : C1_(1), (2), (3), (4)

- (1) : CONTROL NO. (PID_, ALARM_) value (1 ~ 9)
- (2) : P (Proportional) value
- (3) : I (Integral) value
- (4) : D (Derivative) value

- (2) READ command : C2-(1)
- Data returned from CN3800 : C2_(1), (2), (3)
- WRITE command : C2_(1), (2), (3)

- (1) : CONTROL No. (PID_, ALARM_) value (1 ~ 9)
- (2) : OH value (Output limiter H value)
- (3) : OL value (Output limiter L value)

* OL value can be set when satisfying the condition of “OH>OL”
(OH is the base value) (OH must be designated in advance.)

(3) READ command	:	C3-(1)
Data returned from CN3800	:	C3_(1), (2), (3)
WRITE command	:	C3_(1), (2), (3)
	(1) :	CONTROL No. (PID_, ALARM_) value (1 ~9)
	(2) :	AL1 (ALARM 1) value
	(3) :	AL2 (ALARM 2) value

* The setting ranges of AL1 and AL2 differ in accordance with the types of AL1 mode and AL2 mode (which are set on the initial data screens).

8. KEY Lock Screen Related Commands [K1 ~ K3]

(1) READ command	:	K1
Data returned from CN3800	:	K1_(1), (2)
WRITE command	:	K1_(1), (2)
	(1) :	SVHL value (Setting limiter H value)
	(2) :	SVLL value (Setting limiter L value)

* SVLL value can be set when satisfying the condition of “SVHL>SVLL”
(SVHL is the base value). SVHL must be designated in advance.

(2) READ command	:	K2
Data returned from CN3800	:	K2_(1), (2)
WRITE command	:	K2_(1), (2)
	(1) :	LIMIT MODE PTN [NO, YES]
	(2) :	LIMIT MODE RPT [NO, YES]

* NO: The function is not used.

YES: The function is used.

(3) READ command	:	K3
Data returned from CN3800	:	K3_(1), (2)
WRITE command	:	K3_(1), (2)
	(1) :	CFM MODE [PTN, LINK]
	(2) :	CFM TIME value

9. Initial Data Screen Related Commands [I1 ~ I9]

Initial data screen commands mean the READ commands only. The WRITE commands are invalid.

When altering the data on the initial data screens, change the operation mode to LOC mode and change the data contents by operating the FP21 front keys.

(1) READ command : I1
 Data returned from CN3800 : I1_(1), (2), (3), (4)

(1) : PV FILTER value
 (2) : PV BIAS value
 (3) : R/D ACTION [R, D]
 (4) : CYC TIME value

* R: Reverse (Heat-up operation)

D: Direct (Cool-down operation)

* "--" is returned as CYC TIME value if the output type is Voltage or Current.

(2) READ command : I2
 Data returned from CN3800 : I2_(1), (2), (3), (4), (5), (6)

(1) : TMT1 MODE [PV, SV]
 (2) : TMT2 MODE [PV, SV]
 (3) : TMT1 HL value
 (4) : TMT1 LL value
 (5) : TMT2 HL value
 (6) : TMT2 LL value

* "--" is returned to all the above if there is no option of TMT1/TMT2.

(3) READ command : I3
 Data returned from CN3800 : I3_(1), (2), (3), (4), (5), (6)

- (1) : ALT MODE [HL1, HL2, LL1, LL2, HD1, HD2, LD1, LD2, AD1, AD2]
- (2) : AL2, MODE [HL1, HL2, LL1, LL2, HD1, HD2, LD1, LD2, AD1, AD2]
- (3) : AL1 SENS. value
- (4) : AL1 STBY [NO, YES]
- (5) : AL2 SENS. value
- (6) : AL2 STBY [NO, YES]

* NO: The function is not used.

YES: The function is used.

- (4) READ command : I4
- Data returned from CN3800 : I4_(1), (2), (3), (4), (5), (6), (7), (8)
- (1) : DI_1 MODE [PTN, STP]
- (2) : DI_15 MODE [AT, SEL]
- (3) : DO21 [TS1, TS2, TS3, TS4, SO, RUN, END, EXT]
- (4) : DO22 {TS1, TS2, TS3, TS4, SO, RUN, END, EXT}
- (5) : DO23 [TS1, TS2, TS3, TS4, SO, RUN, END, EXT]
- (6) : DO31 [TS1, TS2, TS3, TS4, SO, RUN, END, EXT]

- (7) : DO32 [TS1, TS2, TS3, TS4,
SO, RUN, END, EXT]
- (8) : DO33 [TS1, TS2, TS3, TS4,
SO, RUN, END, EXT]

- (5) READ command : I5
Data returned from CN3800 : I5_(1), (2), (3), (4)
- (1) : OUT [MA, V, CNT, SSR]
(Adjustment output type)
- (2) : T1 [NON, MA, MV, V]
(Transmission output type 1)
- (3) : T2 [NON, MA, MV, V]
(Transmission output type 2)
- (4) : COM [232C, 422A]
(Communication option type)

*MA: Current output V: Voltage output
 CNT: Connection output SSR: SSR output
 *NON: No output MA: 4~20mA MV: 0~10mV V: 0~10V
 *232C: RS-232C 422A: RS-422A

- (6) READ command : I6
Data returned from CN3800 : I6_(1), (2)
- (1) : UNIT [C, F, N, %]
(Unit indication)
- (2) : RTD TYPE [PT, JPT]
(PT input type)

- (2) : SCALE H value
- (3) : D. POINT value

* "--" is returned to all of the above in case of TC, RTD input

*D. POINT 0: **** 1: *.*.* 2: *.*.* 3: *.*.*

- (9) READ command : I9
- Data returned from CN3800 : I9_(1), (2), (3), (4), (5)
- (1) : SO MODE [RST, HLD]
- (2) : SO OUT value
- (3) : POWER ON MODE [NML, RST, AUT, GUA, AUG]
- (4) : TIME UNIT [MIN, SEC]
- (5) : PID FORME [SER, PAR, DPA]

* NML:	NORMAL	RST:	ALL RST	AUT:	AUTO RUN
GUA:	GUA RUN	AUG:	AUTO & GUA		
* MIN:	Minute	SEC:	Second		
* SER:	SERIES	PAR:	PARA	DPA:	D_PARA

[9] Appendices

1. ASCII Code Table

	b7b6b5	000	001	010	011	100	101	110	111
b4~b1		0	1	2	3	4	5	6	7
0000	0	NUL	TC7(DLE)	SP	0	@	P	^	p
0001	1	TC1(SOH)	DC1	!	1	A	Q	a	q
0010	2	TC2(STX)	DC2	“	2	B	R	b	r
0011	3	TC3(ETX)	DC3	#	3	C	S	c	s
0100	4	TC4(EOT)	DC4	\$	4	D	T	d	t
0101	5	TC5(ENQ)	TC8(NAK)	%	5	E	U	e	u
0110	6	TC6(ACK)	TC9(SYN)	&	6	F	V	f	v
0111	7	BEL	TC10(ETB)	‘	7	G	W	g	w
1000	8	FE0(BS)	CAN	(	8	H	X	h	x
1001	9	FE1(HT)	EM	)	9	I	Y	i	y
1010	A	FE2(LF)	SUB	*	:	J	Z	j	z
1011	B	FE3(VT)	ESC	+	;	K	[	k	{
1100	C	FE4(FF)	IS4(FS)	,	<	L	\	l	|
1101	D	FE5(CR)	IS3(GS)	/-	=	M	]	m	}
1110	E	SO	IS2(RS)	.	>	N	^	n	~
1111	F	SI	IS1(US)	/	?	O	_	o	DEL

2. Circuit Check Sample Program

```
100 '*****
110 ' **CN3800 COMMUNICATION TEST PROGRAM **
120 ' *****
130 CLOSE : CLS 3
140 STX$=CHR$(2) : ETX$=CHR$(3) : EOT$=CHR$(4) : ENQ$=CHR$(5)
150 ACK$=CHR$(6)
160 '
170 MN$='00' : CMND$='D1' : BCC$=CHR$(&H78)
180 DEF SEG=&HA000
190 OUT &H68, &HD : POKE &H3FE6, &H5 : OUT &H68, &HC
200 '
210 OPEN "COM:E71NN" AS #1
220 ON COM GOSUB *RX
230 COM ON
240 PRINT #1, EOT$ + MN$ + ENQ$;
250 FOR I=1 TO 10000 : NEXT
260 EF = 0
270 PRINT #1, STX$ + CMND$ + ETX$ + BCC$;
280 FOR I=1 TO 5000: NEXT
290 CLOSE
300 END
310 '
320 *RX
330 RXD$ = INPUT$ (LOC(1), #1)
340 IF EF=1 THEN 390
350 IF RXD$=ACK$ THEN PRINT : GOTO 390
360 IF RXD$=ETX$ THEN EF=1
370 IF ASC(RXD$) < 31 THEN 390
380 PRINT RXD$;
390 RETURN
```



```

100 *****
110 ' **CN3800 COMMUNICATION TEST PROGRAM / COM 1**
120 ' *****
130 CLOSE : CLS 3
140 STX$=CHR$(2) : ETX$=CHR$(3) : EOT$=CHR$(4) : ENQ$=CHR$(5)
150 ACK$=CHR$(6)
160 '
170 MN$='00' : CMND$='D1' : BCC$=CHR$(&H78)
180 DEF SEG=&HA000
190 OUT &H68, &HD : POKE &H3FE6, &H5 : OUT &H68, &HC
200 '
210 OPEN "COM1: 2400, E, 7, 1" FOR RANDOM AS #1
220 ON COM(1) GOSUB 320
230 COM(1) ON
240 PRINT #1, EOT$ + MN$ + ENQ$;
250 FOR I=1 TO 10000 : NEXT
260 EF = 0
270 PRINT #1, STX$ + CMND$ + ETX$ + BCC$;
280 FOR I=1 TO 5000: NEXT
290 CLOSE
300 END
310 '
320 '
330 RXD$ = INPUT$ (LOC(1), #1)
340 IF EF=1 THEN 390
350 IF RXD$=ACK$ THEN PRINT : GOTO 390
360 IF RXD$=ETX$ THEN EF=1
370 IF ASC(RXD$) < 31 THEN 390
380 PRINT RXD$;
390 RETURN

```

```

100 '*****
110 ' **CN3800 COMMUNICATION TEST PROGRAM / COM 2**
120 ' *****
130 CLOSE : CLS 3
140 STX$=CHR$(2) : ETX$=CHR$(3) : EOT$=CHR$(4) : ENQ$=CHR$(5)
150 ACK$=CHR$(6)
160 '
170 MN$='00' : CMND$='D1' : BCC$=CHR>(&H78)
180 DEF SEG=&HA000
190 OUT &H68, &HD : POKE &H3FE6, &H5 : OUT &H68, &HC
200 '
210 OPEN "COM2: 2400, E, 7, 1" FOR RANDOM AS #1
220 ON COM(2) GOSUB 320
230 COM(2) ON
240 PRINT #1, EOT$ + MN$ + ENQ$;
250 FOR I=1 TO 10000 : NEXT
260 EF = 0
270 PRINT #1, STX$ + CMND$ + ETX$ + BCC$;
280 FOR I=1 TO 5000: NEXT
290 CLOSE
300 END
310 '
320 '
330 RXD$ = INPUT$ (LOC(1), #1)
340 IF EF=1 THEN 390
350 IF RXD$=ACK$ THEN PRINT : GOTO 390
360 IF RXD$=ETX$ THEN EF=1
370 IF ASC(RXD$) < 31 THEN 390
380 PRINT RXD$;
390 RETURN

```