

(5) Reading for Control output manipulating value

Command code: R O (52H, 4FH)

STX (02H)	No.	R	O	Checksum	ETX (03H)
--------------	-----	---	---	----------	--------------

Response with data

STX (02H)	@	D	O	Sign	Control output manipulating value	Checksum	ETX (03H)
--------------	---	---	---	------	--------------------------------------	----------	--------------

Negative acknowledgement (When the communication is abnormally performed.)

NAK	(15H)
-----	-------

● Command example

When reading the Control output manipulating value. (Instrument number: 0)

STX (02H)		R	O	3	F	ETX (03H)
	(20H)	(52H)	(4FH)	(33H)	(46H)	

● Response example

When the Control output manipulating value is 100%.

STX	@	D	O		0	1	0	0	4	C	ETX
(02H)	(40H)	(44H)	(4FH)	(20H)	(30H)	(31H)	(30H)	(30H)	(34H)	(43H)	(03H)

100%

(6) Reading for Alarm output status

Command code: R Q (52H, 51H)

STX (02H)	No.	R	Q	Checksum	ETX (03H)
--------------	-----	---	---	----------	--------------

Response with data

STX (02H)	@	D	Q	Sign	Alarm output status	Checksum	ETX (03H)
--------------	---	---	---	------	---------------------	----------	--------------

When the output is ON, the digit will be "1" respectively.

- 1st digit: Temperature alarm, Low limit output status *1
- 2nd digit: Temperature alarm, High limit output status *2
- 3rd digit: Heater burnout alarm output status *3
- 4th digit: Sensor burnout alarm output status

*1: In case of Low limit alarm, Low limit of High/Low limits alarm and High/Low limit range alarm.

*2: In case of High limit alarm, High limit of High/Low limits alarm and Process value alarm.

*3: With the MCD-150, MCD-550, MCR-100 and MCR-200 series, the 3rd digit is always 0 (OFF status) since the item to set the Heater burnout alarm output is not applicable to the instruments.

Negative acknowledgement (When the communication is abnormally performed.)

NAK	(15H)
-----	-------

● Command example

When reading the Alarm output status. (Instrument number: 0)

STX (02H)	(20H)	R (52H)	Q (51H)	3 (33H)	D (44H)	ETX (03H)
--------------	-------	------------	------------	------------	------------	--------------

● Response example

When the Temperature alarm High limit output is ON.

STX (02H)	@ (40H)	D (44H)	Q (51H)		0 (30H)	0 (30H)	1 (31H)	0 (30H)	4 (34H)	A (41H)	ETX (03H)
--------------	------------	------------	------------	--	------------	------------	------------	------------	------------	------------	--------------

The 2nd digit: Temperature alarm, High limit output is ON.

(7) Reading for Input value from the sensor

Command code: R T (52H, 54H)

STX (02H)	No.	R	T	Checksum	ETX (03H)
--------------	-----	---	---	----------	--------------

Response with data

STX (02H)	@	D	T	Sign	Input value from the sensor	Checksum	ETX (03H)
--------------	---	---	---	------	--------------------------------	----------	--------------

Negative acknowledgement (When the communication is abnormally performed.)

NAK	(15H)
-----	-------

● Command example

When reading the Input value from the sensor. (Instrument number: 0)

STX (02H)	(20H)	R (52H)	T (54H)	3 (33H)	A (41H)	ETX (03H)
--------------	-------	------------	------------	------------	------------	--------------

● Response examples

When the Input value from the sensor is 1200°C.

STX (02H)	@ (40H)	D (44H)	T (54H)	 (20H)	1 (31H)	2 (32H)	0 (30H)	0 (30H)	4 (34H)	5 (35H)	ETX (03H)
--------------	------------	------------	------------	-----------	------------	------------	------------	------------	------------	------------	--------------

1200°C

When the Input value from the sensor is -199.9°C.

STX (02H)	@ (40H)	D (44H)	T (54H)	- (2DH)	1 (31H)	9 (39H)	9 (39H)	9 (39H)	1 (31H)	F (46H)	ETX (03H)
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-199.9°C

6. Command table

● Setting command

Command		Contents	Page
Code	Character		
53H, 53H	S, S	Main setting value	17
53H, 41H	S, A	Temperature alarm [A1] setting value	18
53H, 61H	S, a	Temperature alarm [A2] setting value	19
53H, 50H	S, P	Proportional band setting value	20
53H, 49H	S, I	Integral time setting value	20
53H, 44H	S, D	Derivative time setting value	21
53H, 57H	S, W	Anti-reset windup setting value	21
53H, 48H	S, H	Heater burnout alarm setting value	22
53H, 4DH	S, M	Manual operation output setting value	22
53H, 43H	S, C	Main control output proportional cycle setting value	23
53H, 63H	S, c	Sub control output proportional cycle setting value	23
53H, 70H	S, p	Sub control output proportional band setting value	24
53H, 46H	S, F	Main control output differential setting value	25
53H, 66H	S, f	Sub control output differential setting value	25
53H, 55H	S, U	Output high limit setting value	26
53H, 4CH	S, L	Output low limit setting value	26

● Changing command

Command		Contents	Page
Code	Character		
53H, 4EH	S, K	Setting value Lock/Unlock	27
53H, 4BH	S, N	Auto/Manual control	28
53H, 52H	S, R	Remote/Local Status	29
53H, 59H	S, Y	Auto-tuning Performance/Cancellation	30

● Reading command

Command		Contents	Page
Code	Character		
52H, 53H	R, S	Main setting value	31
52H, 41H	R, A	Temperature alarm [A1] setting value	32
52H, 61H	R, a	Temperature alarm [A2] setting value	33
52H, 50H	R, P	Proportional band setting value	34
52H, 49H	R, I	Integral time setting value	35
52H, 44H	R, D	Derivative time setting value	36
52H, 57H	R, W	Anti-reset windup setting value	37
52H, 48H	R, H	Heater burnout alarm setting value	38
52H, 4DH	R, M	Manual operation output setting value	39
52H, 43H	R, C	Main control output proportional cycle setting value	40
52H, 63H	R, c	Sub control output proportional cycle setting value	41
52H, 70H	R, p	Sub control output proportional band setting value	42
52H, 46H	R, F	Main control output differential setting value	43
52H, 66H	R, f	Sub control output differential setting value	44
52H, 55H	R, U	Output high limit setting value	45
52H, 4CH	R, L	Output low limit setting value	46

● Status reading command

Command		Contents	Page
Code	Character		
52H, 4BH	R, K	Setting value Lock/Unlock changing status	47
52H, 4EH	R, N	Auto/Manual control changing status	48
52H, 52H	R, R	Remote/Local setting changing status	49
52H, 59H	R, Y	Auto-tuning Performance/Cancellation changing status	50
52H, 4FH	R, O	Control output manipulation value	51
52H, 51H	R, Q	Alarm output status	52
52H, 54H	R, T	Input value from the sensor	53

7. Sample program
7.1 Sample program list

```

1000 '-----
1010 '<SAMPLE1A,BAS>
1020 '* This Program is communication example for MCD-100, MCR-100, HCD-100,
1030 ' MPC-200, PC-600, PC-700 and PC-800.
1040 '* It runs on the IBM PC and compatible PC with GW-BASIC.
1050 '
1060 '                      Dec. 24, 1993  SHINKO TECHNOS CO.,LTD.
1070 '-----
1080 '
1090 '*****
1100 '*          Initial          *
1110 '*****
1120 CRPMAX=25:  'maximum row line number (vertical)
1130 CMAX=80:   'maximum column number
1140 CRP=1:    'row line pointer
1150 CCP=1:    'column pointer
1160 DIM KD$(200): 'key input buffer
1170 CLS: GOSUB 1690
1180 OPEN "COM1:2400,E,7,1" AS #1 : '2400bps,even,data 7 bits data,1 stop bit
1190 ON COM(1) GOSUB 1420
1200 COM(1) ON
1210 '*****
1220 '*          Main          *
1230 '*****
1240 B=1
1250  KD$(B)=" "
1260  WHILE KD$(B)=" ": KD$(B)=INKEY$: WEND
1270  IF KD$(B)=CHR$(2) THEN KD$(1)=KD$(B):B=1
1280  IF KD$(B)=CHR$(8) THEN GOSUB 1340 ELSE GOSUB 1360: GOTO 1250
1290  FOR B=1 TO BMAX
1300    PRINT#1,KD$(B);
1310  NEXT B
1320 GOTO 1240
1330 '
1340 GOSUB 1750: KD$(B)=CHR$(3): BMAX=B:GOSUB 1620
1350 RETURN
1360 GOSUB 1620
1370 IF B<200 THEN B=B+1 ELSE PRINT "Over flow ... Key input buffer": STOP
1380 RETURN
1390 '*****
1400 '*          Receiver          *
1410 '*****
1420 N=LOC(1):IF N=0 THEN RETURN
1430 D$=INPUT$(N,#1):CRPB=2
1440 FOR L=1 TO N
1450  RD$=MID$(D$,L,1)
1460  IF RD$ < " " THEN GOSUB 1520 ELSE GOSUB 1540
1470 NEXT L
1480 RETURN
1490 '*****
1500 '*          Display          *
1510 '*****
1520 GOSUB 1560:PRINT " ^ ";:GOSUB 1560:PRINT CHR$(ASC(RD$)+ASC("@"));
1530 RETURN

```

```
1540 GOSUB 1560:PRINT RD$;
1550 RETURN
1560 CCP=CCP+1:IF CCP=CMAX THEN CCP=1:GOSUB 1590
1570 LOCATE CRP+CRPB, CCP
1580 RETURN
1590 CRP=CRP+4:IF CRP=CRPMAX THEN CRP=1:CLS
1600 GOSUB 1690
1610 RETURN
1620 CRPB=0
1630 IF KD$(B) < " " THEN GOSUB 1650 ELSE GOSUB 1670
1640 RETURN
1650 GOSUB 1560:PRINT " ^";:GOSUB 1560:PRINT CHR$(ASC(KD$(B))+ASC("@"));
1660 RETURN
1670 GOSUB 1560:PRINT KD$(B);
1680 RETURN
1690 LOCATE CRP+1, CCP:PRINT STRING$(CMAX, "-");
1700 LOCATE CRP+CRPB, CCP
1710 RETURN
1720 '*****
1730 '*           Make SUM           *
1740 '*****
1750 SUM=0
1760 FOR LS=2 TO B-1
1770   SUM=SUM+ASC(KD$(LS))
1780 NEXT LS
1790 SUMC$=RIGHT$("0"+HEX$(((NOT SUM)+1) AND &HFF), 2)
1800 KD$(B)=LEFT$(SUMC$, 1):GOSUB 1620:B=B+1
1810 KD$(B)=RIGHT$(SUMC$, 1):GOSUB 1620:B=B+1
1820 RETURN
1830 END
```

8.2 Operation method of the Communication sample program

(1) Before executing the sample program, confirm the following matters.

- Whether the settings such as Transfer rate, Instrument number (In case of RS-485, option C5) are correct or not. (See page 11 and 12)
- Whether the wiring connections are correct or not.
When the confirmation is completed, turn the power on.

(2) Start the GW-BASIC.

Prepare the GW-BASIC and input as BASIC by key operation, and then press the (Enter) key.

(3) Input the sample program (Page 56 and 57) and preserve the program as "SAMPLE1A. BAS".

```

OK
1000 '-----
1010 '<SAMPLE1A.BAS>
1020 '* This Program is communication example for MCD-100, MCR-100, HCD-100,
1030 ' MPC-200, PC-600, PC-700 and PC-800.
:
:
:
1800 KD$(B)=LEFT$(SUMC$,1):GOSUB 1620:B=B+1
1810 KD$(B)=RIGHT$(SUMC$,1):GOSUB 1620:B=B+1
1820 RETURN
1830 END
SAVE "SAMPLE1A.BAS",A
OK

```

(4) Load the sample program.

Input as underlined by key, and press the (Enter) key.

```

OK
load "SAMPLE1A.BAS"

```

When the load is completed, the display will be as follows.

```

load "SAMPLE1A.BAS"
OK

```

(5) Execute the sample program.

Input as underlined by key, and press the (Enter) key.

```

OK
RUN 

```

When executed, the display turns as follows, it is the command input preparation status. The transmitting data is displayed up side of the line [-----], and the receiving data is displayed down side of the line,


```

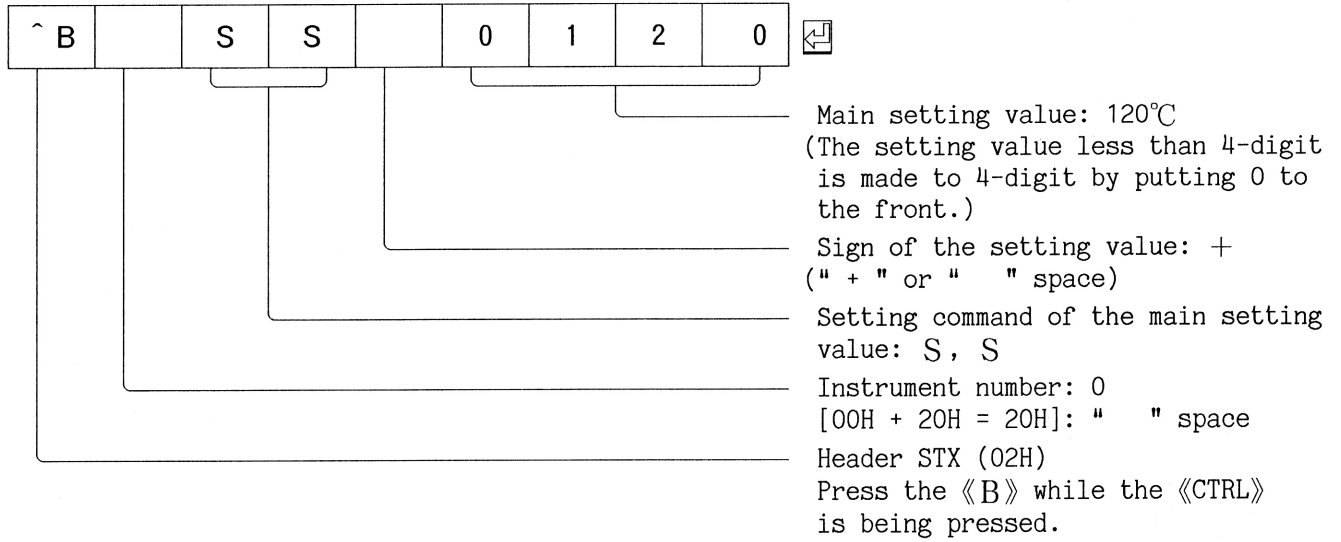
-----

```

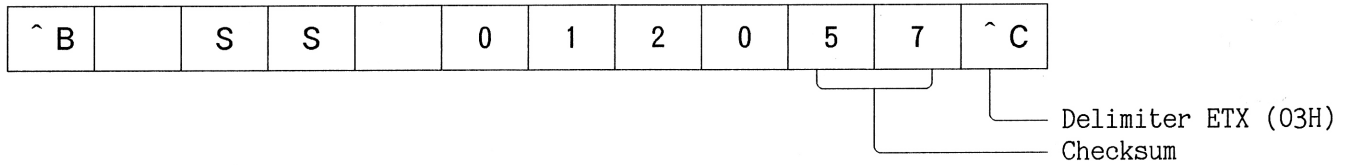

(6) As an example, try to execute the setting command of the main setting value.

(When setting the temperature 120°C, Instrument number: 0)

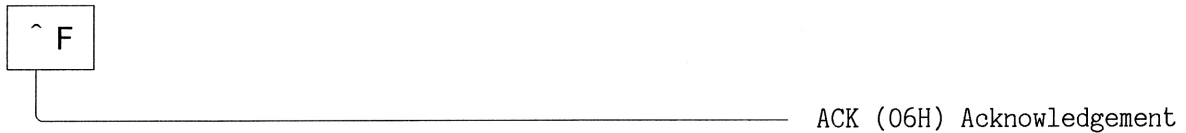
To execute the command, input it from header (STX) " ^ B " to data by key operations, and press the  (Enter) key.



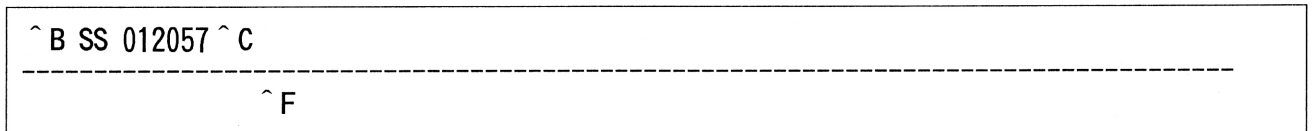
The checksum is automatically calculated, and it is sent with the delimiter (ETX).



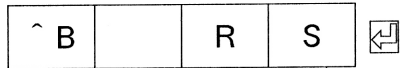
When the command is normally finished, it responds as follows.



Confirm the display if it is as follows:

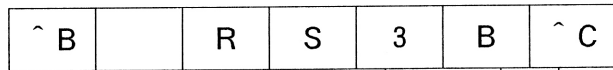


(7) Try to read the main setting value set at item (6) by reading command.



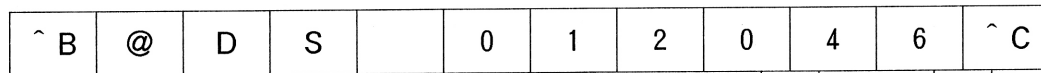
Reading command of the Main setting value: R, S
 Instrument number: 0
 [00H + 20H = 20H]: " " space
 Header STX (02H)
 Press the «B» key while the «CTRL» key is being pressed.

The checksum is automatically calculated, and it is sent with the delimiter (ETX).



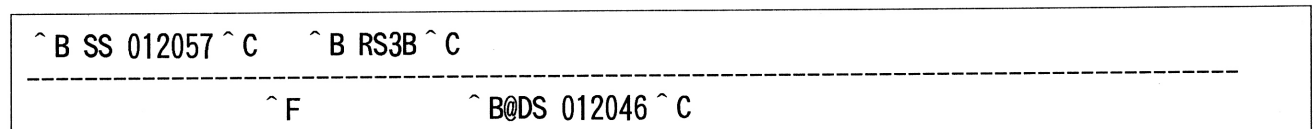
Delimiter ETX (03H)
 Checksum

When the command is normally finished, it responds as follows.



Delimiter ETX (03H)
 Checksum
 Main setting value (120°C)
 Sign of the setting value: +
 (" + " or " " space)
 Responding command to Main setting value
 reading command: D, S
 Instrument number: 40H
 Header STX (02H)

Confirm the display if it is as follows.



(8) The communication test can be executed for other command by the same way.

8.3 Notices when inputting the command.

● Control code

The control code is indicated with the letters " ^ " and the control code added 40H of bias because the code cannot be indicated on CRT display.

Control code	CRT display	Key operation
STX (02H)	^ B (" ^ " and 02H + 40H")	Press the B key while the CTRL key is pressed.
ETX (03H)	^ C (" ^ " and 03H + 40H")	Press the C key while the CTRL key is pressed.
ACK (06H)	^ F (" ^ " and 06H + 40H")	Press the F key while the CTRL key is pressed.
NAK (15H)	^ U (" ^ " and 15H + 40H")	Press the U key while the CTRL key is pressed.

9. When troubled

When the communication cannot be executed, refer to the following items after confirmed the power supplied to the host computer and the MC series controller.

Cause and Remedy	See page
Connection of the communication connector is not firm.	—
Wiring of the communication connector is not correct.	8 to 10
Communication cable is broken.	—
The transfer rate (Baud rate) for the MC series controller is not accord with the host computer.	11
The communication system (Data length, Parity and Stop bit) of the host computer is not accord with the MC series controller.	—
The instrument number of the command is not accord with the number of the MC series controller.	12
The same instrument number is set to the plural MC series controller.	12
The program of the host computer side is made by mistake. ⇒ Execute the communication test by applying the sample program. If the communication test is executed normally, confirm the program of the host computer.	56 to 60
In case the communication converter (IF-100-C5) is not used for the RS-485 (Option C5), the program is not processed about the transmission timing.	13 56 to 60

◆ In case the NAK is returned during communication.

Cause and Remedy	See page
The host computer sends the command not existent.	—
The host computer sends the value beyond settable range.	—

9. ASCII code

b7	0	0	0	0	1	1	1	1
b6	0	0	1	1	0	0	1	1
b5	0	1	0	1	0	1	0	1

b4	b3	b2	b1
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	1	1	1

	0	1	2	3	4	5	6	7
0	NUL (TC7)	DLE (TC7)	SP	0	@	P	\	p
1	SOH (TC1)	DC1	!	1	A	Q	a	q
2	STX (TC2)	DC2	"	2	B	R	b	r
3	ETX (TC3)	DC3	#	3	C	S	c	s
4	EOT (TC4)	DC4	\$	4	D	T	d	t
5	ENQ (TC5)	NAK (TC8)	%	5	E	U	e	u
6	ACK (TC6)	SYN (TC9)	&	6	F	V	f	v
7	BEL	ETB (TC10)	'	7	G	W	g	w
8	BS (FE0)	CAN	(	8	H	X	h	x
9	HT (FE1)	EM	)	9	I	Y	i	y
A	LF (FE2)	SUB	*	:	J	Z	j	z
B	VT (FE3)	ESC	+	;	K	[	k	{
C	FF (FE4)	FS (IS4)	,	<	L	\	l	|
D	CR (FE5)	GS (IS4)	-	=	M	]	m	}
E	SO	RS (IS4)	.	>	N	^	n	~
F	SI	US (IS4)	/	?	O	-	o	DEL

MEMO

• • • Inquiry • • •

For any inquiry of this controller, after checking the following as to the controller, please contact your shop where purchased, or our agency.

- [Example]
- Model MCD-130-R/E, C5
 - Rated scale 0 to 1200°C
 - Type of input K
 - Supply voltage 100/200Vac

In addition to the above, let us know the details of malfunction, if any, and the operating conditions specifically on job site.

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