A7000 Series
Instruction Manual for Communication Functions
~RS-232C/RS-485~

1 Before Using the Unit

This Operation Manual corresponds to the communication function of the A7000 Series. When using the instrument, please read through this manual in combination with the Operation Manual of the main unit.

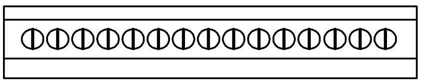
2 Specifications

	RS-232C	RS-485
Synchronous System	Start-stop transmission system	
Communication System	Full duplex	Two-line semi-duplex (polling selecting system)
Transmission Rate	38400bps/19200bps/9600bps/4800bps/2400bps	
Start Bit	1bit	
Data Length	7 bits/8 bits	
Error Detection	Even parity/odd parity/none	
		BCC (block check character) checksum
Stop Bit	1 bit/2 bits	
Character Code	ASCII codes	
Data Communication Control Procedure	Non-procedural	
Signal Name in Use	TXD, RXD, SG	Non-inverse (+), inverse (-)
Number of Units Connected	1	A maximum of 31 meters
Line Length	15 m	500 m maximum
Delimiter	CR+LF/CR	

3 Terminals and Connections

3.1 Explanation of Terminals

3.1.1 RS-232C

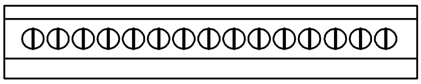


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Terminal No.	Name	Description
1	RXD	Receive data terminal
2	TXD	Transmit data terminal
3	SG	Common terminal for the communication functions
4	NC	Connect nothing to this terminal.
5	NC	Connect nothing to this terminal.
6	S/H	Start/Hold terminal. Enabled when it has the same potential as, or is shorted with, terminal COM.
7	PH	Peak Hold terminal. Enabled when it has the same potential as, or is shorted with, terminal COM.
8	NC	Connect nothing to this terminal.
9	COM	Common terminal for external control. (It has the same potential as input LO.)
10	HH c	Collector output terminal of HH output photocoupler
11	HI c	Collector output terminal of HI output photocoupler
12	GO c	Collector output terminal of GO output photocoupler
13	LO c	Collector output terminal of LO output photocoupler
14	LL c	Collector output terminal of LL output photocoupler
15	eCOM	Photocoupler's common emitter terminal

* For models A7X1X-9, terminals 10 to 15 are NC. Connect nothing to these terminals.

3.1.2 RS-485

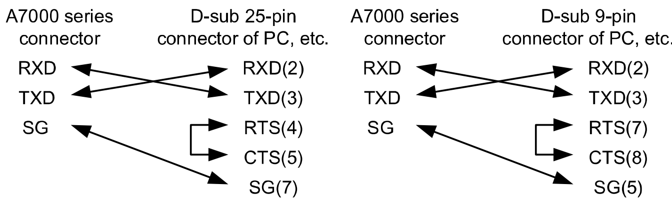


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

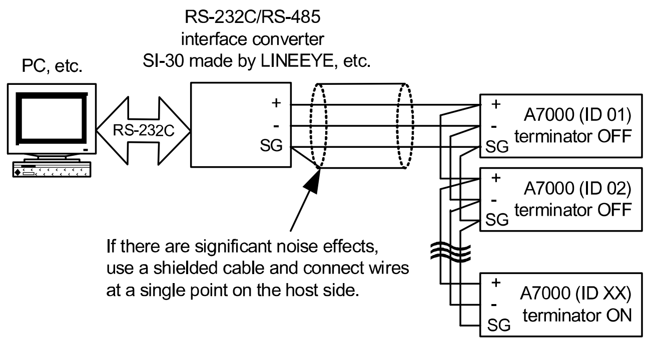
Terminal No.	Name	Description
1	(+)	Non-inverting output
2	(-)	Inverting output
3	SG	Common terminal for the communication functions
4	TERM	Terminating resistor terminal (200Ω). To turn it ON, short it with terminal 5.
5	TERM	Terminating resistor terminal (200Ω). To turn it ON, short it with terminal 4.
6	S/H	Start/Hold terminal. Enabled when it has the same potential as, or is shorted with, terminal COM.
7	PH	Peak Hold terminal. Enabled when it has the same potential as, or is shorted with, terminal COM.
8	NC	Connect nothing to this terminal.
9	COM	Common terminal for external control. (It has the same potential as input LO.)
10	HH c	Collector output terminal of HH output photocoupler
11	HI c	Collector output terminal of HI output photocoupler
12	GO c	Collector output terminal of GO output photocoupler
13	LO c	Collector output terminal of LO output photocoupler
14	LL c	Collector output terminal of LL output photocoupler
15	eCOM	Photocoupler's common emitter terminal

* For models A7X1X-A, terminals 10 to 15 are NC. Connect nothing to these terminals.

3.2 Connecting the RS-232C Interface



3.3 Connecting the RS-485 Interface



*If loop wiring is carried out with a RS-485 connection, use a commercially available Y-type split connector or the like.

*To turn ON an RS-485 I/O unit's terminator (200 Ω), short-circuit the two TERM terminals.

4 RS-485 Transmission/Reception Formats

4.1 Establishing and Releasing the Communication Link

	Function	1	2	3	4	5	6	7	Char. Length	1	2	3	4	5	6	7	8	9	10	Char. Length
	Establishing communication	ENQ	0	1	CR	LF			3	ACK	0	1	CR	LF						3
		*Device ID is specified in 2 digits (00 is invalid).								(Normal response) * Response time: 40 ms maximum (No response is made if the device ID is different.)										
	Canceling communication	EOT	CR	LF					1											
		*If another device ID is specified without canceling communication, communication is still possible.								(No response is made to cancellation of communication.) * Response time: 20 ms maximum										

4.2 Available Control Codes

Control Code	Hexadecimal	Name
STX	02H	Start of Text
ETX	03H	End of Text
EOT	04H	End of Transmission
ENQ	05H	Enquiry
ACK	06H	Acknow ledge

4.3 BCC Checksum

As a means of error detection, a block check character (BCC) checksum is added to the RS-485 communication function of the A7000 unitmeter. See the following illustrations for details on the transmission and reception formats.

(which are as illustrated in the table of communication commands in the RS-232C communication function.)

Example of BCC Checksum for Transmission

Character	STX	D	S	P	ETX	A	E	CR	LF
Hexadecimal	02H	44H	53H	50H	03H	41H	45H	0DH	0AH
		[1]	[2]	[3]	[4]	↑	↑		

BCC H = Higher-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [4]
44H+53H+50H+03H=EAH

BCC L = Lower-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [4]
44H+53H+50H+03H=EAH

Example of BCC Checksum for Reception

Character	STX				5	0	0	0		H	I	ETX	9	D	CR	LF
	02H	20H	20H	20H	35H	30H	30H	30H	20H	48H	49H	03H	39H	44H	0DH	0AH
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	↑	↑		

BCC L = Lower-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [11]
20H+20H+20H+35H+30H+30H+30H+20H+48H+49H+03H=1D9H

BCC H = Higher-order 4 bits among the lower-order 8 bits of the sum of the hexadecimal values numbered from [1] to [11]
20H+20H+20H+35H+30H+30H+30H+20H+48H+49H+03H=1D9H

5 Communication Commands

Function	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Char. Length	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Char. Length
Common response																	Y	E	S			CR	LF												5
																	(Normal response)																		
																	N	O		?		CR	LF												5
																	(Response to an undefined command, etc.) (Response made if data not meeting the number of digits is input)																		
																	E	R	R	O	R		A	CR	LF										7
																	(Response to data out of the setting range or data not meeting the setting conditions) (Response made if there is a communication parameter error) *Generally, a response is made only once. * There are ERROR B to ERROR F as an equivalent response command. * If there is a response of the ERROR X command, perform the same steps again. If this does not solve the problem, turn the meter supply OFF and then ON again.																		
Response made if internal memory data is abnormal * Generally, a response is made only once.																	D	A	T	A		L	O	S	T		C	O	N	D	CR	LF			14
																	(Response made if condition data is abnormal) * Set condition data again.																		
																	D	A	T	A		L	O	S	T		C	O	M	CR	LF				13
																	(Response made if comparator data is abnormal) * Set comparator data again.																		
																	D	A	T	A		L	O	S	T		M	E	T	CR	LF				13
																	(Response made if scaling data is abnormal) * Set scaling data again.																		

Function	Command (1–15)	Char. Length	Response (1–18)	Char. Length
Measured value and comparison result responses	D S P CR LF	3	5 0 0 0 H I CR LF ("+" indication without decimal point)	10
			- 5 0 0 0 H I CR LF ("+" indication without decimal point)	10
			5 0 0 . 0 H I CR LF ("+" indication with a decimal point)	11
			< = 9 8 0 0 H I CR LF ("+" side excess indication without decimal point)	10
			< = - 9 8 0 . 0 H I CR LF ("-" side excess indication with a decimal point)	11
			P H 5 0 0 0 H I CR LF (Peak hold indication without decimal point)	10
			5 0 0 0 A L 1 CR LF ("+" indication without decimal point)	11
			- 5 0 0 0 A L 2 CR LF ("-" indication without decimal point)	11
			5 0 0 . 0 A L 3 CR LF ("+" indication with a decimal point)	12
Measured value response A measurement condition such as peak hold, etc. or compression is not responded.	M E S CR LF	3	0 CR LF ("0" indication without decimal point)	12
			0 . 0 1 CR LF ("0.01" indication with a decimal point)	12
			- 1 CR LF ("-1" indication without decimal point)	12
			- 0 . 0 0 5 CR LF ("-0.005" indication with a decimal point)	12
			< = 9 8 0 . 5 CR LF (Excess indication with a decimal point)	12
			< = - 9 8 0 . 5 CR LF ("-" side excess indication with a decimal point) * All responses have a fixed length of 12 characters.	12
Judgment result response * A measurement condition is not responded.	J G M CR LF	3	H H CR LF (Response of a state in which the judgment result is HH)	15
			H I CR LF (Response of a state in which the judgment result is HI)	15
			G O CR LF (Response of a state in which the judgment result is GO)	15
			L O CR LF (Response of a state in which the judgment result is LO)	15
			L L CR LF (Response of a state in which the judgment result is LL)	15
			O F F CR LF (Response of a state in which the judgment results are all OFF)	15
			N O ? CR LF (Response made if there is no comparison output) * All responses have a fixed length of 15 characters with the exception of an error.	5
Response of the maximum value, minimum value, or maximum and minimum values	M A X CR LF	3	M A X 5 0 0 . 0 CR LF (Response of maximum value)	10
			M I N - 1 0 0 . 0 CR LF (Response of minimum value)	10
			M - M 6 0 0 . 0 CR LF (Response of maximum and minimum values) * These values are simultaneously responded by dividing them with a delimiter.	10
Clear of the maximum value, minimum value, or maximum and minimum values	M C L M A CR LF (Clears the maximum value.)	6	Y E S CR LF	5
	M C L M I CR LF (Clears the minimum value.)	6	Y E S CR LF	5
	M C L M M CR LF (Clears the maximum and minimum values.)	6	Y E S CR LF	5
Key operation inhibition response	K E Y CR LF	3	O F F CR LF (Response of a state in which the key operation inhibition function is OFF)	3
			O N CR LF (Response of a state in which the key operation inhibition function is ON)	2
Key operation inhibition setting	K E Y O F F CR LF (Deactivates the key operation inhibition function.)	7	Y E S CR LF	5
	K E Y O N CR LF (Activates the key operation inhibition function.)	6	Y E S CR LF	5
Response of remote-controlled hold	S T H CR LF	3	S T A R T CR LF (Response of a state in which hold is deactivated by remote control)	5
			H O L D CR LF (Response of a state in which hold is activated by remote control)	4
			L O C CR LF (Response of a state in which hold is not remote controlled)	3
Hold remote control	S T H S CR LF (Deactivates the hold function.)	5	Y E S CR LF	5
	S T H H CR LF (Activates the hold function.)	5	Y E S CR LF	5
Trigger input	T CR LF	1	5 0 0 . 0 H I CR LF ("+" indication with a decimal point) * The response format is the same as the DSP command.	11
Cancellation of hold remote control	E S M CR LF	3	Y E S CR LF	5

Function	Command (characters 1–15)	Char. Length	Response (characters 1–18)	Char. Length
Response of remote-controlled peak hold	PVH CR LF	3	PH-OFF CR LF (Response of a state in which peak hold is deactivated by remote control)	6
			VH-OFF CR LF (Response of a state in which valley hold is deactivated by remote control)	6
			PV-OFF CR LF (Response of a state in which peak & valley hold is deactivated by remote control)	6
			PH-ON CR LF (Response of a state in which peak hold is activated by remote control)	5
			VH-ON CR LF (Response of a state in which valley hold is activated by remote control)	5
			PV-ON CR LF (Response of a state in which peak & valley hold is activated by remote control)	5
			LOC CR LF (Response of a state in which peak hold is not remote controlled)	3
Peak hold selection setting	PVH PH CR LF (Sets up peak hold.)	6	YES CR LF	5
	PVH VH CR LF (Sets up valley hold.)	6	YES CR LF	5
	PVH PV CR LF (Sets up peak and valley hold.)	6	YES CR LF	5
Peak hold remote control	PVH ON CR LF (Activates the peak hold function.)	6	YES CR LF	5
	PVH OFF CR LF (Deactivates the peak hold function.)	7	YES CR LF	5
Peak-held value response	PVD CR LF	3	PH 500.0 CR LF (Response of peak-held value)	10
			VH -100.0 CR LF (Response of valley-held value)	10
			PVH 600.0 CR LF (Response of peak- and valley-held values)	10
Clear of peak-held value	PCL PH CR LF (Clears a peak-held value.)	6	YES CR LF	5
	PCL VH CR LF (Clears a valley-held value.)	6	YES CR LF	5
	PCL PV CR LF (Clears peak- and valley-held values.)	6	YES CR LF	5
Cancellation of peak hold remote control	EPM CR LF	3	YES CR LF	5
Response of remote-controlled digital zero	DZR CR LF	3	OFF CR LF (Response of a state in which digital zero is deactivated by remote control)	3
			1000 CR LF (Response of a state in which digital zero is activated at 1000 by remote control)	5
			-1000 CR LF (Response of a state in which digital zero is activated at -1000 by remote control) * The value indicated when digital zero is activated is responded.	5
			LOC CR LF (Response of a state in which digital zero is not remote controlled)	3
Digital zero remote control	DZR ON CR LF (Activates digital zero.)	6	YES CR LF	5
	DZR OFF CR LF (Deactivates digital zero.)	7	YES CR LF	5
	DZR 1000 CR LF (Activates digital zero at 1000.)	8	YES CR LF	5
Cancellation of digital zero remote control	EZM CR LF	3	YES CR LF	5
Response of remote-controlled comparison output	RLY CR LF	3	OFF CR LF (Response of a state in which all outputs are turned OFF by remote control)	3
			HH CR LF (Response of a state in which HH is turned ON by remote control)	2
			HI CR LF (Response of a state in which HI is turned ON by remote control)	2
			GO CR LF (Response of a state in which GO is turned ON by remote control)	2
			LO CR LF (Response of a state in which LO is turned ON by remote control)	2
			LL CR LF (Response of a state in which LL is turned ON by remote control) * If multiple outputs are ON, response is made in the above order.	2
			LOC CR LF (Response of a state in which output is not remote controlled)	3
			NO ? CR LF (Response made if there is no comparison output)	5
Comparison output remote control	RLY HH CR LF (Turns ON HH.)	6	YES CR LF	5
	RLY HI CR LF (Turns ON HI.)	6	YES CR LF	5
	RLY GO CR LF (Turns ON GO.)	6	YES CR LF	5
	RLY LO CR LF (Turns ON LO.)	6	YES CR LF	5
	RLY LL CR LF (Turns ON LL.)	6	YES CR LF	5
	RLY OFF CR LF (Turns OFF all comparison outputs.)	7	YES CR LF	5
			NO ? CR LF (Response made if there is no comparison output)	5
Cancellation of comparison output remote control	RCM CR LF	3	YES CR LF	5
			NO ? CR LF (Response made if there is no comparison output)	5

Function	Command (characters 1–15)	Char. Length	Response (characters 1–18)	Char. Length
Response of remote-controlled pattern select	P S L CR LF	3	1 CR LF (Response of a state in which the pattern used by remote control is "1")	1
			8 CR LF (Response of a state in which the pattern used by remote control is "8")	1
			L O C CR LF (Response of a state in which the pattern select is not remote controlled)	3
Pattern select remote control	P S L 1 CR LF (Sets pattern in use to "1.")	5	Y E S CR LF	5
	P S L 8 CR LF (Sets pattern in use to "8.")	5	Y E S CR LF	5
Cancellation of pattern select remote control	P S M CR LF	3	Y E S CR LF	5
Remote control response	R E A CR LF	3	N O ? CR LF (Response in a state in which no function is remote controlled)	5
			S T H CR LF (Response of a state in which the hold function is remote controlled)	3
			P V H CR LF (Response of a state in which the peak hold function is remote controlled)	3
			D Z R CR LF (Response of a state in which the digital zero function is remote controlled)	3
			R L Y CR LF (Response of a state in which the comparison output function is remote controlled)	3
			P S L CR LF (Response of a state in which the pattern select function is remote controlled)	3
			* If multiple functions have been remote controlled, response is made with data divided by delimiters.	
Cancellation of pattern select remote control	L O C CR LF	3	Y E S CR LF	5
Condition data parameter response	A L 1 CR LF	3	A V G 1 CR LF (Response of a state in which the number of averaging times is "1")	5
			M A V O F F CR LF (Response of a state in which the moving averaging function is OFF)	7
			S W D 1 CR LF (Response of a state in which step wide is "1")	5
			C L R R E D CR LF (Response of a state in which the display color is red)	7
			C L T M A N U A L CR LF (Response of a state in which the display color type is Manual)	10
			C H H R E D CR LF (Response of a state in which the HH display color is red)	7
			C H I R E D CR LF (Response of a state in which the HI display color is red)	7
			C G O R E D CR LF (Response of a state in which the GO display color is red)	7
			C L O R E D CR LF (Response of a state in which the LO display color is red)	7
			C L L R E D CR LF (Response of a state in which the LL display color is red)	7
			B L K O F F CR LF (Response of a state in which display blank is OFF)	7
			P V H P H CR LF (Response of a state in which peak hold select is at PH)	6
			B D Z O N CR LF (Response of a state in which digital zero backup is ON)	6
			P S N 1 CR LF (Response of a state in which pattern select is "1")	5
			L I N O F F CR LF (Response of a state in which linearize is OFF)	7
			T R K O F F CR LF (Response of a state in which tracking zero is OFF)	7
			P O N 0 CR LF (Response of a state in which the delay time is "0")	5
			P R O L V 0 CR LF (Response of a state in which the protect level is at LV0)	7
			U N O O F F CR LF (Response of a state in which unit number indication is OFF)	7
			S T T A CR LF (Response of a state in which the start hold type is A)	5
			S T D 0 CR LF (Response of a state in which the start hold delay time is "0")	5
			P V T A CR LF (Response of a state in which the peak hold type is A)	5
			B A U 9 6 0 0 CR LF (Response of a state in which the baud rate is 9600 bps)	8
			D A T 7 CR LF (Response of a state in which the data length is 7 bits)	5
			P B T E V E N CR LF (Response of a state in which a parity bit is even parity)	8
			S B T 2 CR LF (Response of a state in which a stop bit is 2 bits)	5
			D L M C R + L F CR LF (Response of a state in which a delimiter is CR + LF)	9
			A D R 1 CR LF (Response of a state in which the device ID is 01)	5
Response of the number of averaging times	A V G CR LF	3	1 CR LF (Response of a state in which the number of averaging times is "1")	1
			5 0 0 0 CR LF (Response of a state in which the number of averaging times is "5000")	4
Setting of the number of averaging times	A V G 1 CR LF (Sets the number of averaging times to "1.")	5	Y E S CR LF	5
	A V G 5 0 0 0 CR LF (Sets the number of averaging times to "5000.")	8	Y E S CR LF	5
			* The number of averaging times is switched immediately after setting.	
			N O ? CR LF (Response made if an unsettable number of averaging times is set)	5

Function	Command (1–15)	Char. Length	Response (1–18)	Char. Length
Response of the number of moving averaging times	M A V CR LF	3	O F F CR LF	3
			(Response of a state in which moving averaging is OFF)	
			O N = 4 CR LF	4
			(Response of a state in which the number of moving averaging times is 4)	
			O N = 1 6 CR LF	5
			(Response of a state in which the number of moving averaging times is 16)	
Setting of the number of moving averaging times	M A V 4 CR LF	5	Y E S CR LF	5
	(Sets the number of moving averaging times to "4".)			
	M A V 1 6 CR LF	6	Y E S CR LF	5
	(Sets the number of moving averaging times to "16".)			
	M A V 0 CR LF	5	Y E S CR LF	5
	(Cancels (deactivates) the moving averaging function.)		* The number of moving averaging times is switched or moving averaging is deactivated immediately after setting.	
Step wide response	S W D CR LF	3	1 CR LF	1
			(Response of a state in which step wide is "1")	
			1 0 CR LF	2
			(Response of a state in which step wide is "10")	
Step wide setting	S W D 1 CR LF	5	Y E S CR LF	5
	(Sets step wide to "1.")			
	S W D 1 0 CR LF	6	Y E S CR LF	5
	(Sets step wide to "10.")		* Step wide is switched immediately after setting.	
Display color response	C L R CR LF	3	R E D CR LF	3
			(Response of a state in which the display color is red)	
			G R E E N CR LF	5
			(Response of a state in which the display color is green)	
			N O ? CR LF	5
			(Response made if there is comparison output)	
Display color setting	C L R R CR LF	5	Y E S CR LF	5
	(Sets display color to red.)			
	C L R G CR LF	5	Y E S CR LF	5
	(Sets display color to green.)			
			N O ? CR LF	5
			(Response made if there is comparison output)	
Display color type response	C L T CR LF	5	A U T O CR LF	4
			(Response of a state in which the display color type is Auto)	
			M A N U A L CR LF	6
			(Response of a state in which the display color type is Manual)	
			N O ? CR LF	5
			(Response made if there is comparison output)	
Display color type setting	C L T A CR LF	5	Y E S CR LF	5
	(Sets the display color type to Auto.)			
	C L R M CR LF	5	Y E S CR LF	5
	(Sets the display color type to Manual.)		* The display color type is switched immediately after setting.	
			N O ? CR LF	5
			(Response made if there is no comparison output)	
HH display color response	C H H CR LF	3	R E D CR LF	3
			(Response of a state in which the HH display color is red)	
			G R E E N CR LF	5
			(Response of a state in which the HH display color is green)	
			A U T O CR LF	4
			(Response of a state in which the display color type is Auto)	
			N O ? CR LF	5
			(Response made if the comparison output unit is not installed)	
HH display color setting	C H H R CR LF	5	Y E S CR LF	5
	(Sets HI display color to red.)			
	C H H G CR LF	5	Y E S CR LF	5
	(Sets HI display color to green.)		* HI display color is switched immediately after setting.	
			A U T O CR LF	4
			(Response of a state in which the display color type is Auto)	
			N O ? CR LF	5
			(Response made if there is no comparison output)	
HI display color response	C H I CR LF	3	R E D CR LF	3
			(Response of a state in which the HI display color is red)	
			G R E E N CR LF	5
			(Response of a state in which the HI display color is green)	
			A U T O CR LF	4
			(Response of a state in which the display color type is Auto)	
			N O ? CR LF	5
			(Response made if there is no comparison output)	
HI display color setting	C H I R CR LF	5	Y E S CR LF	5
	(Sets HI display color to red.)			
	C H I G CR LF	5	Y E S CR LF	5
	(Sets HI display color to green.)		* HI display color is switched immediately after setting.	
			A U T O CR LF	4
			(Response of a state in which the display color type is Auto)	
			N O ? CR LF	5
			(Response made if there is no comparison output)	

Function	Command (1–15)	Char. Length	Response (1–18)	Char. Length
LO display color response	CLO CR LF	3	RED CR LF (Response of a state in which the LO display color is red)	3
			GREEN CR LF (Response of a state in which the LO display color is green)	5
			AUTO CR LF (Response of a state in which the display color type is Auto)	4
			NO ? CR LF (Response made if there is no comparison output)	5
LO display color setting	CLO R CR LF (Sets LO display color to red.)	5	YES CR LF	5
	CLO G CR LF (Sets LO display color to green.)	5	YES CR LF * LO display color is switched immediately after setting.	5
			AUTO CR LF (Response of a state in which the display color type is Auto)	4
			NO ? CR LF (Response made if there is no comparison output)	5
LL display color response	CLL CR LF	3	RED CR LF (Response of a state in which the LL display color is red)	3
			GREEN CR LF (Response of a state in which the LL display color is green)	5
			AUTO CR LF (Response of a state in which the display color type is Auto)	4
			NO ? CR LF (Response made if there is no comparison output)	5
LL display color setting	CLL R CR LF (Sets LL display color to red.)	5	YES CR LF	5
	CLL G CR LF (Sets LL display color to green.)	5	YES CR LF * LO display color is switched immediately after setting.	5
			AUTO CR LF (Response of a state in which the display color type is Auto)	4
			NO ? CR LF (Response made if there is no comparison output)	5
Display blank response	BLK CR LF	3	OFF CR LF (Response of a state in which blank setting is OFF)	7
			LV1 CR LF (Response of a state in which blank setting is at LV1)	7
			LV2 CR LF (Response of a state in which blank setting is at LV2)	7
			LV3 CR LF (Response of a state in which blank setting is at LV3)	7
			ON CR LF (Response of a state in which blank setting is ON)	6
Display blank setting	BLK OFF CR LF (Deactivates blank setting.)	7	YES CR LF	5
	BLK LV1 CR LF (Sets blank setting to LV1.)	7	YES CR LF	5
	BLK LV2 CR LF (Sets blank setting to LV2.)	7	YES CR LF	5
	BLK LV3 CR LF (Sets blank setting to LV3.)	7	YES CR LF	5
	BLK ON CR LF (Activates blank setting.)	6	YES CR LF	5
Digital zero backup response	BDZ CR LF	3	ON CR LF (Response of a state in which digital zero backup is ON)	2
			OFF CR LF (Response of a state in which digital zero backup is OFF)	3
Digital zero backup control	BDZ ON CR LF (Activates digital zero backup.)	6	YES CR LF	5
	BDZ OFF CR LF (Deactivates digital zero backup.)	7	YES CR LF	5
Digital zero data save command	SAV CR LF	3	YES CR LF	5
			NO ? CR LF (Response made if the relevant unit is not installed)	5
Response of the number of patterns for pattern select	PSN CR LF	3	1 CR LF (Response of a state in which the number of patterns for pattern select is "1")	1
			8 CR LF (Response of a state in which the number of patterns for pattern select is "8")	1
Control over the number of patterns for pattern select	PSN 1 CR LF (Sets the number of patterns for pattern select to "1.")	6	YES CR LF	5
	PSN 8 CR LF (Sets the number of patterns for pattern select to "8.")	7	YES CR LF	5
Linearize function status response	LIN CR LF	3	OFF CR LF (Response of a state in which the linearize function is OFF)	3
			2 CR LF (Response of a state in which the linearize correction point is "2")	2
			16 CR LF (Response of a state in which the linearize correction point is "16")	2
Linearize function status setting	LIN OFF CR LF (Deactivates the linearize function.)	7	YES CR LF	5
	LIN 2 CR LF (Sets linearize correction point to "2.")	5	YES CR LF	5
	LIN 16 CR LF (Sets linearize correction point to "16.")	6	YES CR LF	5

Function	Command (1 2 3 4 5 6 7 8 9 10 11 12 13 14 15)	Char. Length	Response (1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18)	Char. Length
Tracking zero response	T R K CR LF	3	O N T = 1 W = 1 CR LF (Response of a state in which the tracking zero time is "1" and tracking zero width is "1")	10
			O N T = 9 9 W = 9 9 CR LF (Response of a state in which the tracking zero time is "99" and tracking zero width is "99")	12
			O F F CR LF (Response of a state in which the tracking zero function is OFF)	3
Tracking zero setting	T R K T = 1 CR LF (Sets tracking zero time to "1.")	7	Y E S CR LF	5
	T R K T = 9 9 CR LF (Sets tracking zero time to "99.")	8	Y E S CR LF	5
	T R K W = 1 CR LF (Sets tracking zero width to 1 digit.)	7	Y E S CR LF	5
	T R K W = 9 9 CR LF (Sets tracking zero width to 99 digits.)	8	Y E S CR LF	5
	T R K T = 0 CR LF (Deactivates the tracking zero function.)	7	Y E S CR LF	5
* In order to validate a tracking zero setup, please perform a number of times setup of an average continuously after carrying out a tracking zero setup.				
Power-on delay time response	P O N CR LF	3	0 CR LF (Response of a state in which the power-on delay function is OFF)	1
			1 CR LF (Response of a state in which the power-on delay time is 1 second)	1
			9 CR LF (Response of a state in which the power-on delay time is 9 seconds)	1
Power-on delay time setting	P O N 1 CR LF (Sets power-on delay time to 1 second.)	5	Y E S CR LF	5
	P O N 9 CR LF (Sets power-on delay time to 9 seconds.)	6	Y E S CR LF	5
	P O N 0 CR CR LF (Deactivates the power-on delay function.)	5	Y E S CR LF	5
Protect level response	P R O CR LF	3	L V 0 CR LF (Response of a state in which the protect level is at LV0)	3
			L V 1 CR LF (Response of a state in which the protect level is at LV1)	3
			L V 2 CR LF (Response of a state in which the protect level is at LV2)	3
			L V 3 CR LF (Response of a state in which the protect level is at LV3)	3
Protect level setting	P R O L V 0 CR LF (Sets protect level to LV0.)	7	Y E S CR LF	5
	P R O L V 1 CR LF (Sets protect level to LV1.)	7	Y E S CR LF	5
	P R O L V 2 CR LF (Sets protect level to LV2.)	7	Y E S CR LF	5
	P R O L V 3 CR LF (Sets protect level to LV3.)	7	Y E S CR LF	5
Start hold type response	S T T CR LF	3	A CR LF (Response of a state in which the start hold type is A)	1
			B CR LF (Response of a state in which the start hold type is B)	1
Start hold type setting	S T T A CR LF (Sets start hold type to A.)	5	Y E S CR LF	5
	S T T B CR LF (Sets start hold type to B.)	5	Y E S CR LF	5
Start hold deray time response	S T D CR LF	3	0 CR LF (Response made when start hold deray time is 0 ms)	1
			9 9 9 9 CR LF (Response made when start hold deray time is 9.999 ms)	1
Start hold deray time setting	S T D 0 CR LF (Sets start hold deray time to 0 ms.)	5	Y E S CR LF	5
	S T D 9 9 9 9 CR LF (Sets start hold deray time to 9.999 ms.)	5	Y E S CR LF	5
Peak hold type response	P V T CR LF	3	A CR LF (Response of a state in which the peak hold type is A)	1
			B CR LF (Response of a state in which the peak hold type is B)	1
Peak hold type setting	P V T A CR LF (Sets peak hold type to A.)	5	Y E S CR LF	5
	P V T B CR LF (Sets peak hold type to B.)	5	Y E S CR LF	5
Baud rate response	B A U CR LF	3	2 4 0 0 CR LF (Response of a state in which the baud rate is 2400 bps)	4
			4 8 0 0 CR LF (Response of a state in which the baud rate is 4800 bps)	4
			9 6 0 0 CR LF (Response of a state in which the baud rate is 9600 bps)	4
			1 9 2 0 0 CR LF (Response of a state in which the baud rate is 19200 bps)	5
			3 8 4 0 0 CR LF (Response of a state in which the baud rate is 38400 bps)	5
	B A U 2 4 0 0 CR LF (Sets the baud rate to 2400 bps.)	8	Y E S CR LF	5
	B A U 4 8 0 0 CR LF (Sets the baud rate to 4800 bps.)	8	Y E S CR LF	5
	B A U 9 6 0 0 CR LF (Sets the baud rate to 9600 bps.)	8	Y E S CR LF	5
	B A U 1 9 2 0 0 CR LF (Sets the baud rate to 19200 bps.)	9	Y E S CR LF	5
	B A U 3 8 4 0 0 CR LF (Sets the baud rate to 38400 bps.)	9	Y E S CR LF * The baud rate is switched upon next power-up.	5

Function	Command (1–15)	Char. Length	Response (1–18)	Char. Length
Data length response	D A T CR LF	3	7 CR LF (Response of a state in which the data length is 7 bits)	1
			8 CR LF (Response of a state in which the data length is 8 bits)	1
	D A T 7 CR LF (Sets data length to 7 bits.)	5	Y E S CR LF	5
	D A T 8 CR LF (Sets data length to 8 bits.)	5	Y E S CR LF * The data length is switched upon next power-up.	5
Parity bit response	P B T CR LF	3	E V E N CR LF (Response of a state in which a parity bit is even parity)	4
			O D D CR LF (Response of a state in which a parity bit is odd parity)	3
			N O CR LF (Response of a state in which a parity bit is none)	2
	P B T E CR LF (Sets a parity bit to even parity.)	5	Y E S CR LF	5
	P B T O CR LF (Sets a parity bit to odd parity.)	5	Y E S CR LF	5
	P B T N CR LF (Sets a parity bit to none.)	5	Y E S CR LF * A parity bit is switched upon next power-up.	5
Stop bit response	S B T CR LF	3	1 CR LF (Response of a state in which a stop bit is 1 bit)	1
			2 CR LF (Response of a state in which a stop bit is 2 bits)	1
	S B T 1 CR LF (Sets a stop bit to 1 bit.)	5	Y E S CR LF	5
	S B T 2 CR LF (Sets a stop bit to 2 bits.)	5	Y E S CR LF * A stop bit is switched upon next power-up.	5
Delimiter response	D L M CR LF	3	C R + L F CR LF (Response of a state in which a delimiter is CR + LF)	5
			C R CR LF (Response of a state in which a delimiter is CR)	2
	D L M C L CR LF (Sets a delimiter to CR + LF.)	6	Y E S CR LF	5
	D L M C CR LF (Sets a delimiter to CR.)	5	Y E S CR LF * A delimiter is switched upon next power-up.	5
Device ID response	A D R CR LF	3	1 CR LF (Response of a state in which the device ID is "01")	1
			9 9 CR LF (Response of a state in which the device ID is "99")	2
Device ID setting	A D R 1 CR LF (Sets device ID to "01".)	5	Y E S CR LF	5
	A D R 9 9 CR LF (Sets device ID to "99".)	6	Y E S CR LF * Device ID is switched upon next power-up.	5
Scaling data parameter response	A L 2 CR LF	3	P - 1 CR LF (The pattern used previously is responded.)	3
			R A N G 2 A CR LF (Response of a state in which the measurement range is 2 A)	7
			I S E L O . C CR LF (Response of a state in which the input type is open collector)	8
			F S C 9 9 9 9 CR LF (Response of a state in which the full-scale indicated value is "9999")	10
			F I N 9 9 9 9 CR LF (Response of a state in which the full-scale input value is "9999")	10
			O F S 0 CR LF (Response of a state in which the offset indicated value is "0")	10
			O I N 0 CR LF (Response of a state in which the offset input value is "0")	5
			P S 1 . 0 0 CR LF (Response of a state in which the pre-scale value is "1.00")	7
			P P R 1 CR LF (Response of a state in which the frequency division value is "1")	5
			D L H I 9 9 9 9 CR LF (Response of a state in which the digital limiter HI value is "9999")	10
			D L L O - 9 9 9 9 CR LF (Response of a state in which the digital limiter LO value is "-9999")	10
			A O U T 0 - 1 CR LF (Response of a state in which the analog output type is 0 to 1 V)	8
			A O H I 9 9 9 9 CR LF (Response of a state in which the analog output HI indicated value is "9999")	10
			A O L O 0 CR LF (Response of a state in which the analog output LO indicated value is "0")	10
			U N I T C CR LF (Response of a state in which the temperature indication unit is °C)	6
			D E P O F F CR LF (Response of a state in which there is no decimal point)	7

Function	Command (1–15)	Char.Length	Response (1–18)	Char.Length
Scaling data setting *When range is set to 1 V, FSC to "8000" and OFS to "20" in P-2	M E T CR LF * Indication becomes "MET" at the instant the MET command has been received.	3	P - 1 CR LF (The pattern used previously is responded.)	3
	2 CR LF (Sets data-setting pattern to "2.")	1	P - 2 CR LF	3
	M CR LF	1	R A N G 2 A CR LF	7
	1 V CR LF (Sets the measurement range to 1 V.)	2	R A N G 1 V CR LF	7
	M CR LF	1	F S C 9 9 9 9 CR LF	10
	8 0 0 0 CR LF (Sets the full-scale indicated value to "8000.")	4	F S C 8 0 0 0 CR LF	10
	M CR LF	1	O F S 0 CR LF	10
	2 0 CR LF (Sets the offset indicated value to "20.")	2	O F S 2 0 CR LF	10
	E CR LF * Setting necessary data and then sending the E command causes data acquired up to that point to be return to measurement operation.	1	Y E S CR LF	5
			N O ? CR LF (Response made if a value out of the setting range is input)	6
Comparator data parameter response *If comparison output type is high and low limit setting.	A L 3 CR LF	3	P - 1 CR LF (The pattern used previously is responded.)	3
			C O M T O / U CR LF (Response of a state in which the comparison output type is of high- and low-limit setting)	8
			H H - S 5 0 0 0 CR LF (Response of a state in which the HH judgment value is "5000")	10
			H I - S 1 0 0 0 CR LF (Response of a state in which the HI judgment value is "1000")	10
			L O - S 5 0 0 CR LF (Response of a state in which the LO judgment value is "500")	10
			L L - S 0 CR LF (Response of a state in which the LL judgment value is "0")	10
			H H - H 0 CR LF (Response of a state in which the HH hysteresis is "0")	10
			H I - H 0 CR LF (Response of a state in which the HI hysteresis is "0")	10
			L O - H 0 CR LF (Response of a state in which the LO hysteresis is "0")	10
			L L - H 0 CR LF (Response of a state in which the LL hysteresis is "0")	10
			H H - H N O CR LF (Response of a state in which HH logic is normally open)	7
			H I - I N O CR LF (Response of a state in which HI logic is normally open)	7
			G O - O N O CR LF (Response of a state in which GO logic is normally open)	7
			L O - O N O CR LF (Response of a state in which LO logic is normally open)	7
			L L - L N O CR LF (Response of a state in which LL logic is normally open)	7
			N O ? CR LF (Response made if there is no comparison output)	5
*If comparison output type is tolerance judgment	A L 3 CR LF	3	P - 1 CR LF (The pattern used previously is responded.)	3
			C O M T E R R CR LF (Response of a state in which the comparison output type is of tolerance judgment)	8
			N V A L 5 0 0 0 CR LF (Response of a state in which the nominal value is "5000")	10
			E R R 1 5 . 0 0 CR LF (Response of a state in which tolerance 1 is "5.00")	11
			E R R 2 1 0 . 0 0 CR LF (Response of a state in which tolerance 2 is "10.00")	11
			E R 1 H 0 CR LF (Response of a state in which the tolerance-1 hysteresis is "0")	10
			E R 2 H 0 CR LF (Response of a state in which the tolerance-2 hysteresis is "0")	10
			H H - H N O CR LF (Response of a state in which HH logic is normally open)	7
			H I - I N O CR LF (Response of a state in which HI logic is normally open)	7
			G O - O N O CR LF (Response of a state in which GO logic is normally open)	7
			L O - O N O CR LF (Response of a state in which LO logic is normally open)	7
			L L - L N O CR LF (Response of a state in which LL logic is normally open)	7
			N O ? CR LF (Response made if there is no comparison output)	5

Function	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	Char. Length	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	Char. Length
Comparator data setting *If comparison output type is higt and low limit setting and HH is set to "8000", LL is set to "-5000", and HH and LL logics are set in P-2 to normally closed.	C O M CR LF * The main unit's indication becomes "COM" at the instant the COM command has been received.	3	P - 1 CR LF (The pattern used previously is responded.)	3
	2 CR LF (Sets data-setting pattern to "2.")	1	P - 2 CR LF	3
	M CR LF	1	C O M T O / U CR LF	8
	M CR LF	1	H H - S 5 0 0 0 CR LF	10
	8 0 0 0 CR LF (Sets the HH setting value to "8000.")	4	H H - S 8 0 0 0 CR LF	10
	M CR LF	1	H I - S 1 0 0 0 CR LF	10
	M CR LF	1	L O - S 5 0 0 CR LF	10
	M CR LF	1	L L - S 0 CR LF	10
	- 5 0 0 0 CR LF (Sets the LL setting value to "-5000.")	5	L L - S - 5 0 0 0 CR LF	10
	M CR LF	1	H H - H 0 CR LF	10
	M CR LF	1	H I - H 0 CR LF	10
	M CR LF	1	L O - H 0 CR LF	10
	M CR LF	1	L L - H 0 CR LF	10
	M CR LF	1	H H - L N O CR LF	7
	N C CR LF (Sets HH logic to normally closed.)	2	H H - L N C CR LF	7
	M CR LF	1	H I - L N O CR LF	7
	M CR LF	1	G O - L N O CR LF	7
	M CR LF	1	L O - L N O CR LF	7
	M CR LF	1	L L - L N O CR LF	7
	N C CR LF (Sets LL logic to normally closed.)	2	L L - L N C CR LF	7
	E CR LF * A return to measurement operation using the E command (If the M command is sent, a return to side judgment value is made.)	1	Y E S CR LF	5
			E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input)	7
			N O ? CR LF (Response made if there is no comparison output)	5
*If comparison output type is tolerance iudgment, the nominal value is set to "8000", and tolerance 2 is set to "20.00".	C O M CR LF * The main unit's indication becomes "COM" at the instant the COM command has been received.	3	P - 1 CR LF (The pattern used previously is responded.)	3
	M CR LF	1	C O M T O / U CR LF	8
	E R R CR LF (Sets the comparator output type to tolerance judgment.)	3	C O M T E R R CR LF	8
	M CR LF	1	N V A L 5 0 0 0 CR LF	10
	8 0 0 0 CR LF (Sets the nominal value to "8000.")	4	N V A L 8 0 0 0 CR LF	10
	M CR LF	1	E R R 1 5 . 0 0 CR LF	11
	M CR LF	1	E R R 2 1 0 . 0 0 CR LF	11
	2 0 0 0 CR LF (Sets tolerance-2 to "20.00.")	4	E R R 2 2 0 . 0 0 CR LF	11
	M CR LF	1	E R 1 H 0 CR LF	10
	E CR LF * A return to measurement operation using the E command (If the M command is sent, a return to nominal value setting is made.)	1	Y E S CR LF	5
			E R R O R 0 CR LF (Response made if a value not meeting the setting conditions is input)	7
			N O ? CR LF (Response made if there is no conaprison output)	5
Calibration data response	A L 4 CR LF	3	P - 1 CR LF (The pattern used previously is responded.)	3
			S N S R 5 CR LF (Response of a state in which the sensor power is 5 V)	6
			Z R I N 0 . 0 0 0 CR LF (Response of a state in which the zero input value is "0.000")	10
			Z E R O 0 CR LF (Response of a state in which the zero indicated value is "0")	6
			S P I N 2 . 0 0 0 CR LF (Response of a state in which the span input value is "2.000")	10
			S P A N 9 9 9 9 CR LF (Response of a state in which the span indicated value is "9999")	9
			N O ? CR LF (Response made if the relevant input unit is not installed)	5

Function	Command (characters 1–15)	Char. Length	Response (characters 1–18)	Char. Length
Calibration data setting	C A L CR LF	3	P - 1 CR LF	3
	*The reading of the main unit changes to CAL the moment it receives an CAL command.			
	M CR LF	1	S N S R 1 0 CR LF	7
	5 CR LF	1	S N S R 5 CR LF	6
	(Sets sensor power to 10 V.)			
	M CR LF	1	Z R I N 0 . 0 0 0 0 CR LF	11
	S CR LF	1	Z R I N 0 . 9 1 4 4 CR LF	11
	*The current measured value is regarded as a setpoint.			
	0 5 0 0 0 CR LF	5	Z R I N 0 . 5 0 0 0 CR LF	11
	(Sets the zero input value to +0.5000.)			
	- 0 5 0 0 0 CR LF	6	Z R I N - 0 . 5 0 0 0 CR LF	12
	(Sets the zero input value to +0.5000.)			
	M CR LF	1	Z E R O 0 CR LF	6
	1 0 0 CR LF	3	Z E R O 1 0 0 CR LF	8
	(Sets the zero reading to 100.)			
	M CR LF	1	S P I N 2 . 0 0 0 0 CR LF	11
	S CR LF	1	S P I N 2 . 1 0 8 8 CR LF	11
	*The current measured value is regarded as a setpoint.			
	3 0 0 0 0 CR LF	5	S P I N 3 . 0 0 0 0 CR LF	11
	(Sets the span input value to +3.0000.)			
	M CR LF	1	S P A N 9 9 9 9 CR LF	9
	5 0 0 0 CR LF	4	S P A N 5 0 0 0 CR LF	9
	(Sets the span reading to 5000.)			
	E CR LF	1	Y E S CR LF	5
	*A return to measurement operation using the E commands.		E R R O R X CR LF	7
			(Response made if a value not meeting the setting conditions is input)	
			N O ? CR LF	5
			(Response made if the relevant input unit is not installed)	
Linearize data response	A L 5 CR LF	3	0 1 I = 0 CR LF	6
			(Response of a state in which the linearize data N-01 input value is "0")	
			0 1 O = 0 CR LF	6
			(Response of a state in which the linearize data N-01 output value is "0")	
			0 2 I = 1 0 0 CR LF	8
			(Response of a state in which the linearize data N-02 input value is "100")	
			0 2 O = 1 1 0 CR LF	8
			(Response of a state in which the linearize data N-02 output value is "110")	
			0 2 I = 5 0 0 CR LF	8
			· · · ·	
			1 6 I = 9 0 0 0 CR LF	9
			(Response of a state in which the linearize data N-16 input value is "9000")	
			1 6 O = 9 2 0 0 CR LF	9
			(Response of a state in which the linearize data N-16 output value is "9200")	
			N O ? CR LF	5
			(Response of a state in which the linearize function is OFF)	
Linearize data setting	L N D 1 CR LF	5	0 1 I = 0 CR LF	6
	*Setting can be made from any of the data items 01 to 16.			
	*The reading of the main unit changes to LINE the moment it receives an LND XX command.			
	- 1 0 0 0 CR LF	5	0 1 I = - 1 0 0 0 CR LF	10
	(Sets the input value of linearize data N-01 to -1000.)			
	M CR LF	1	0 1 O = 0 CR LF	6
	- 9 0 0 CR LF	4	0 1 O = - 9 0 0 CR LF	9
	(Sets the output value of linearize data N-01 to -900.)			
	M CR LF	1	0 2 I = 5 0 0 CR LF	8
	- 5 0 0 CR LF	4	0 2 I = - 5 0 0 CR LF	9
	(Sets the input value of linearize data N-02 to -500.)			
	M CR LF	1	0 2 O = 5 0 0 CR LF	8
	- 6 0 0 CR LF	4	0 2 O = - 6 0 0 CR LF	9
	(Sets the output value of linearize data N-02 to -600.)			
	· ·			
	E CR LF	1	Y E S CR LF	5
	*If an R command is sent after setting required dara, the main unit saves data provided up to that point and then returns to measurement operation.		E R R O R 7 CR LF	7
			(Response when a value outside the setpoint range is input.)	
			N O ? CR LF	5
			(Response of a state in which the linearize function is OFF)	

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