RA3100

Omniace
Communication command

Instruction Manual

1WMPD4004790B

A&D Company, Ltd.

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Introduction

We thank you for your purchase of our data acquisition product OMNIACE RA3100 (hereinafter "the RA3100" or "this product").
This instruction manual explains how to use the communication interface and the communication commands when controlling communication using the LAN interface or the RS-232C interface.
Please read this manual carefully to use this product correctly before using this product.
Please read this instruction manual, which is provided on the included CD, as it gives details of the functions and operations of the input module and the RA3100. Read the corresponding manuals of the PC (controller) connected to the interface to ensure correct use.
If you have questions or are unsure of the instructions given in this manual, please contact us.

<Instruction manual>

Name	Descriptions
RA3100 instruction manual	Operations and settings of parameters for RA3100 are described.

Symbols in This Manual

Terms and symbols used in this manual denote as follows.

⚠ WARNING	This indicates a condition or practice that could result in personal injury or loss of life, or may result in light injury or physical damage if this equipment is misused due to neglect of a Warning.
⚠ CAUTION	This indicates a condition or practice that could result in light injury or damage to the equipment or other property if this equipment is misused due to neglect of a Caution.
Note	This indicates a condition or practice that could result in incorrect operation or damage to data if this equipment is misused due to neglect of a Note.
Tips	This indicates configuration limitations and additional explanations.
☞	Reference page
	A tap is the act of lightly touching an item such as a key displayed on the screen with a finger. Example: Used for selecting or setting screen keys.
☐ key	Enclosed characters represent a key name on the operation panel. Example: START key
【 】key	Text enclosed in 【 】 indicates touch panel keys displayed on the screen. Example: 【CH】 key
[ ] screen	Text enclosed in [ ] indicates the text of items on the screen. Example: [Module 1]
k (lower case) K (upper case)	Example: 1 kg = 1000 g 1 KB = 1024 bytes

The meaning of the notation and symbols used for messages is indicated below.

< >	Defined value
[ ]	May be omitted
{ } |	Select one of the items in the curly brackets

Contents

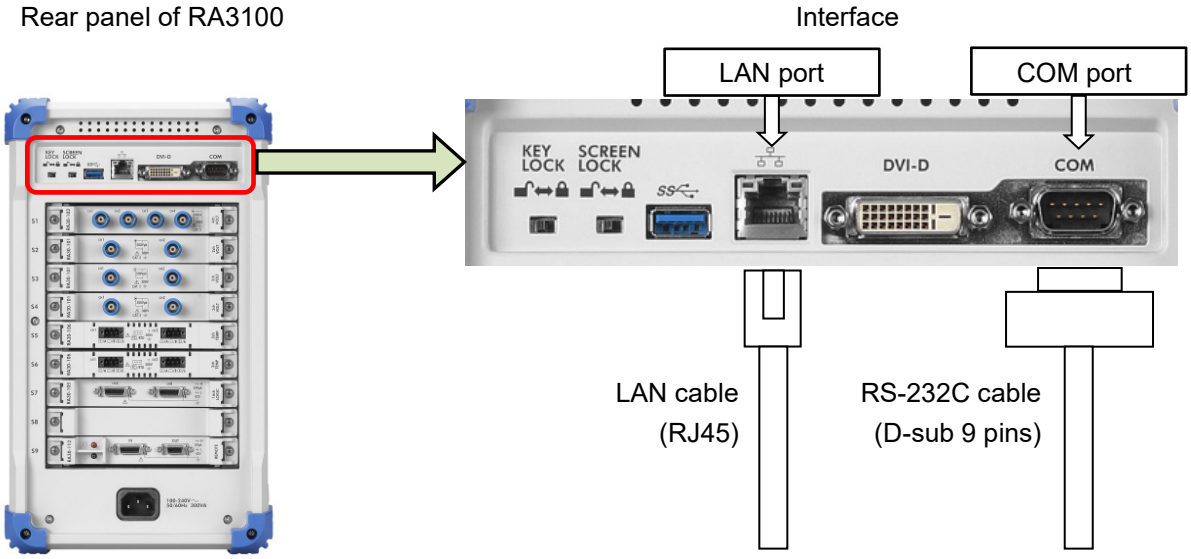
1. Communication settings

The RA3100 is equipped with an interface with a LAN port and a COM port (RS-232C), which are used to connect to peripherals.
LAN port is 1000BASE-T, 100BASE-TX and 10BASE-T in accordance with IEEE802.3.
Cables conforming to the relevant standards of the connections should be used.
Use crossover cables when directly connecting to a computer using RS-232C.

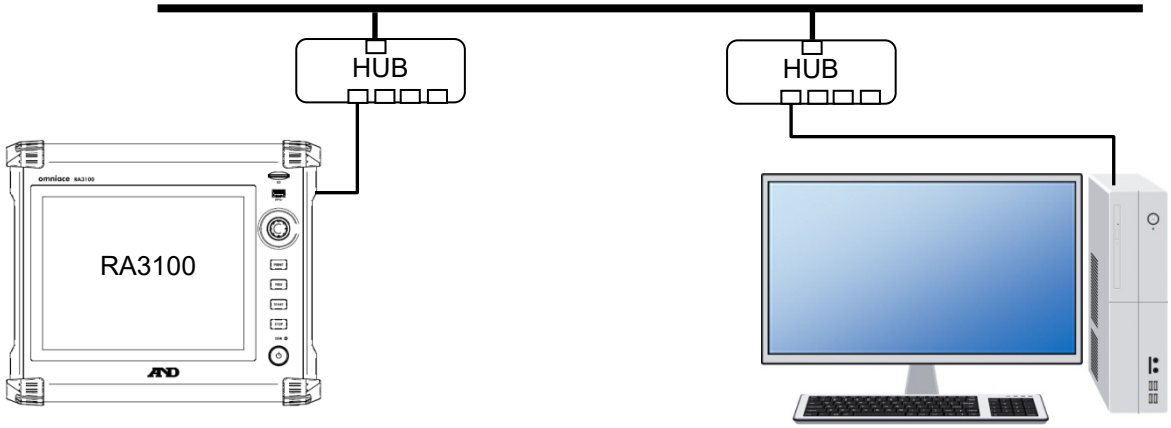
1.1. Preparing the product

1.1.1. Connections of communication ports

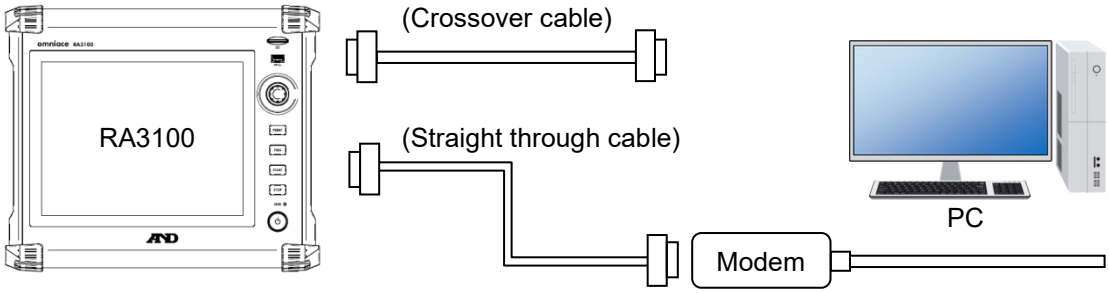
The interface is mounted on the rear panel of the RA3100. Connect a cable to the LAN port when using ethernet. Connect a cable to the RS-232C when using COM port.



Connection using LAN cable



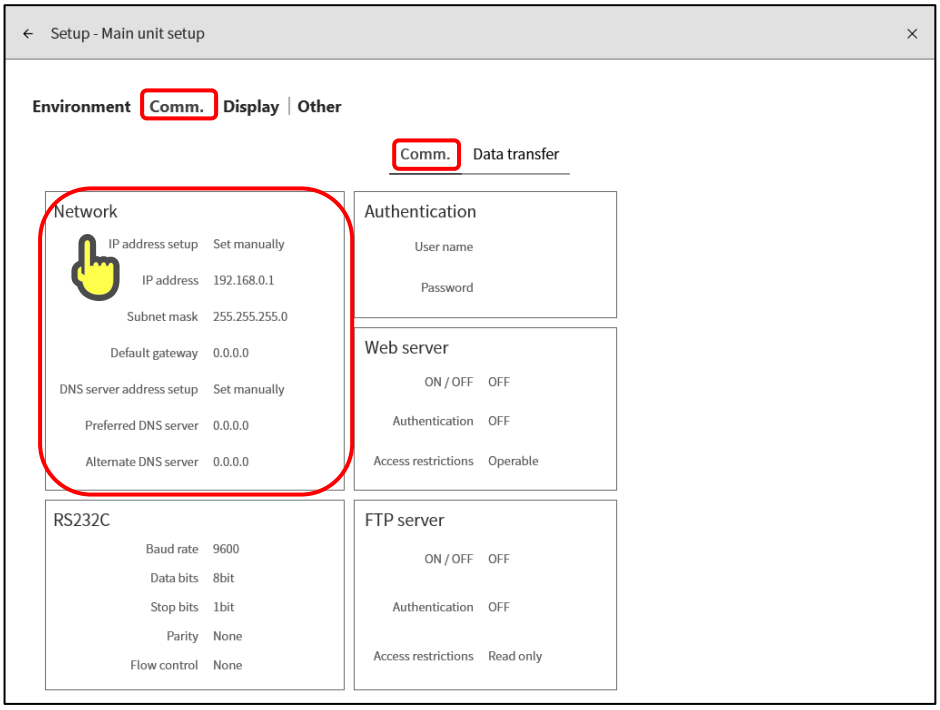
Connection using RS-232C cable



Use crossover cable when connecting to computer, DTE device and others using RS-232C.
Use straight through cable when connecting to DCE device.

1.1.2. Network setup for LAN port

This section describes for setup of LAN port.
The current settings are displayed by the following procedure.
Step 1 Tap【Setup】 key of the "**side menu**" on the display block.
Step 2 Tap【Comm.】 on the [Main unit setup] screen to display the [Comm.] settings screen, which indicates the current setting values.



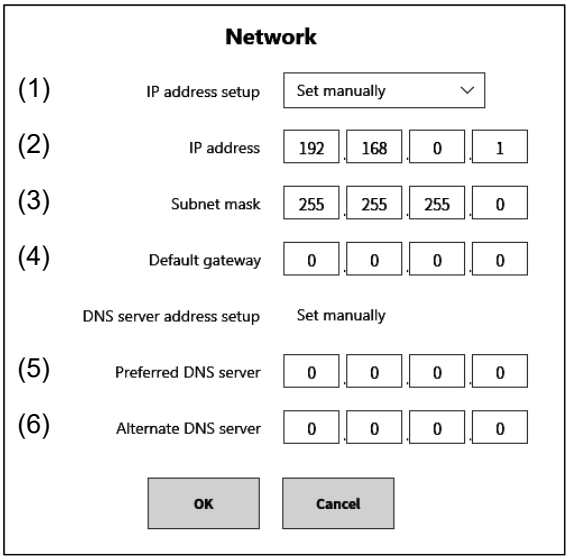
Tap the Network box to display the network settings screen.
Consult a network manager for the settings when connecting to an ethernet network.

(1) IP address setup:
Select whether to "obtain automatically" or "set manually".

When "obtain automatically" is selected, IP address is set automatically by the DHCP server on the network. Then, the address of the DNS server is set automatically because automatic setup of the DNS server is enabled.

When "set manually" is selected, IP address, subnet mask, gateway and DNS server address needs to be set manually.

Network setup dialog box



(2) IP address:
Specify an IP address that is a unique number on the network and consists of a network address + device address if "obtain automatically" is selected.
Example:
IP address of the RA3100 is set to "192.168.0.1". IP address of computer is set to "192.168.0.10".

(3) Subnet mask:
The value that defines the IP address range (subnet).
In the case of "192.168.0.1", the subnet mask should be set to "255.255.255.0".

(4) Default gateway:
Sets the IP address of the gateway device for connecting the network that the product is connected to with external networks.

(5) Preferred DNS server:
Sets the IP address of the preferred DNS server on the network. The DNS server converts automatically domain name to IP address.

(6) Alternate DNS server:
Sets the IP address of the alternate DNS server on the network.

Tips

Specify port number "3000" when using the LAN port to communicate with an external device.

1.1.3. Communication parameters of RS-232C (COM port)

The current settings are displayed by the following procedure.

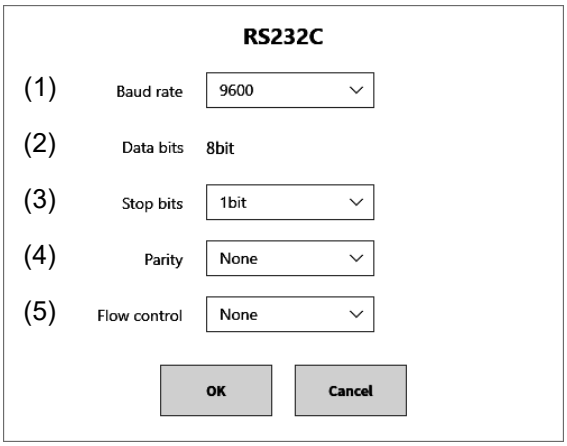
Step 1 Tap【 Setup】 key of the "**side menu**" on the display block.

Step 2 Tap【 Environment】key of "**Main unit setup**" item of the [Setup] screen.

Step 3 Tap the RS-232C box to display the RS-232C settings screen.

When using the RS-232C port of this product to communicate with an external device, match the RS-232C settings with those of the PC.

RS-232C setup dialog box



(1) Baud rate:
Sets the RS-232C data transmission speed.
300 / 600 / 1200 / 2400 / 4800 / 9600 / 14400 / 19200 / 38400 / 57600 / 115200 / 230400 / 460800 bps

(2) Data bits:
The number of bits in one byte of data. Fixed to 8 bits.

(3) Stop bits:
The stop bits in one byte of data. Select 1 or 2 bits.

(4) Parity:
The parity bit for one byte of data.
None, Odd, Even, Mark, or Space

(5) Flow control:
The flow control of communication using CTS/RTS.
None, Xon/Xoff, or Hardware

2. Overview of communication commands

When this product is connected to a PC via LAN or RS-232C and receives a command from the PC, it executes the process according to the command. LAN is TCP/IP socket communication, and RA3100 communicates as a server.

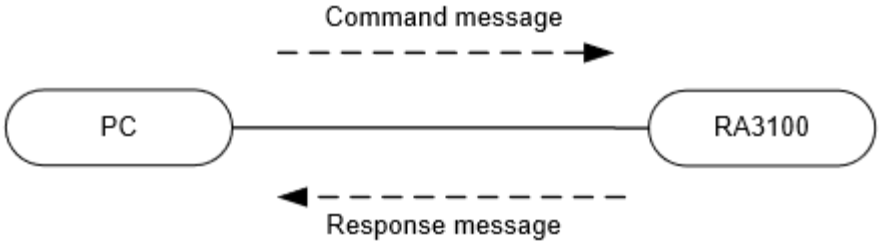
Note

- When communicating, there is no particular distinction between LAN or RS-232C communication ports, and processing is performed when a command is received. However, if commands are received from both ports at the same time, it may cause malfunctions to occur, so only one of the communication ports should be used.
- Use ASCII and UTF-8 codes for communication of the RA3100.
  Characters of JIS, SJIS, EUC codes and others become a garbled text.

2.1. Communication format

2.1.1. Message format

In order to control the RA3100 from a PC, messages are used for communication between the PC and RA3100.
Messages sent from the PC to the RA3100 are command messages and messages sent from the RA3100 to the PC are response messages. Response messages include ACK messages and NAK messages.
One response message is always returned for one command message.



A message consists of a frame and terminator (delimiter).
The terminator is <CR><LF> [0x0D0A].

Format:

Message	
Frame	Terminator
<FRAME>	<CR><LF>

Command message

The frame of a command message includes a command and its parameters, and enables configuration, readout, or execution to be processed.
You can add a question mark (?) to a command to submit a query regarding the current parameter setting information.
If parameters are included, they are separated with a separator (single-byte space).

Format:

Command	Question mark	Separator	Parameter
<CMD>	[?]	<SP>	<PARAMS>

(Example) I00
S03 1,12,,0
S03?
S30? 1,1

<CMD>
Three characters expressing the type of command. For details, refer to "2.2 Command List".

<SP>
A single-byte space [0x20].

<PARAMS>
Multiple parameters are separated with comma "," [0x2C].
Enclose the string parameter of a signal name etc. with <STX> [0x02] and <ETX> [0x03].
Use ASCII and UTF-8 codes for the string parameter.
Exponential, decimal and integer notation can use when exponential notation is used in a parameter description.
It is not necessary to specify a value for a parameter unless the setting is to be changed.

Response message

When a command message is recognized and processed successfully, an ACK message (normal response) is returned.
If an error such as a format error or execution error occurs for the command message, an NAK message (error response) is returned.

ACK message (normal response)

There are two types of ACK message: standard ACK and ACK with data.

Standard ACK
The frame consists of a confirmation response and reception command.
The confirmation response and reception command are separated with a separator (single-byte space).
Format:

Confirmation response	Separator	Reception command
ACK	<SP>	<CMD>

(Example) ACK S01

ACK with data
The frame consists of a confirmation response, reception command, and data.
The confirmation response and reception command are separated with a separator (single-byte space).
The confirmation response and data are separated with a comma (,).
Format:

Confirmation response	Separator	Reception command	Comma	Data
ACK	<SP>	<CMD>[?]	,	<DATA>

(Example) ACK I05,1
ACK S03?,1,12,,0

<DATA>

Multiple parameters are separated with comma "**,**" [0x2C].

Enclose the string parameter of a signal name etc. with <STX> [0x02] and <ETX> [0x03].

Use ASCII and UTF-8 codes for the string parameter.

NAK message (error response)

There are three types of NAK message: execution error NAK, frame error NAK, and busy error NAK.

Execution error NAK

The response message when an error occurs with the received command.

The frame consists of a confirmation response, reception command, error number, and parameter number.

The confirmation response and reception command are separated with a separator (single-byte space).

The reception command, error number, and parameter number are separated with a comma (,).

Format:

Confirmation response	Separator	Reception command	Comma	Error number	Comma	Parameter number
NAK	<SP>	<CMD>[?]	,	<ERR>	,	<PARAMNUM>

(Example) NAK S01,4,1
NAK M01?,7,-1

Frame error NAK

The response message when a command message cannot be recognized.

The frame consists of a confirmation response and type.

The confirmation response and type are separated with a separator (single-byte space).

Format:

Confirmation response	Separator	Type
NAK	<SP>	<TYPE>

(Example) NAK HAD

Busy error NAK

The response message when another command is being processed.

The frame consists of a confirmation response and type.

The confirmation response and type are separated with a separator (single-byte space).

Format:

Confirmation response	Separator	Type
NAK	<SP>	BSY

(Example) NAK BSY

<ERR>

Error number and descriptions are as follows:

When an error occurs, the following error numbers are replied as a parameter of NAK.

( ) means system error inside of the RA3100.

Error number	Descriptions
1	Command busy.
2	Settings cannot be changed because recording is continued.
3	Unknown command.
4	Parameter is out of range.
5	Number of parameters is incorrect.
6	Time out.
7	(Unknown device)
8	(Common memory error)
9	Deficiency of required parameter.
10	Storage device has been filled.
11	Full memory.
12	(Internal bus error)
13	Execution failure.

<PARAMNUM>

Parameter number shows which parameter in receiving command has failed.

Negative value is replied to parameter number if it cannot be identified.

<TYPE>

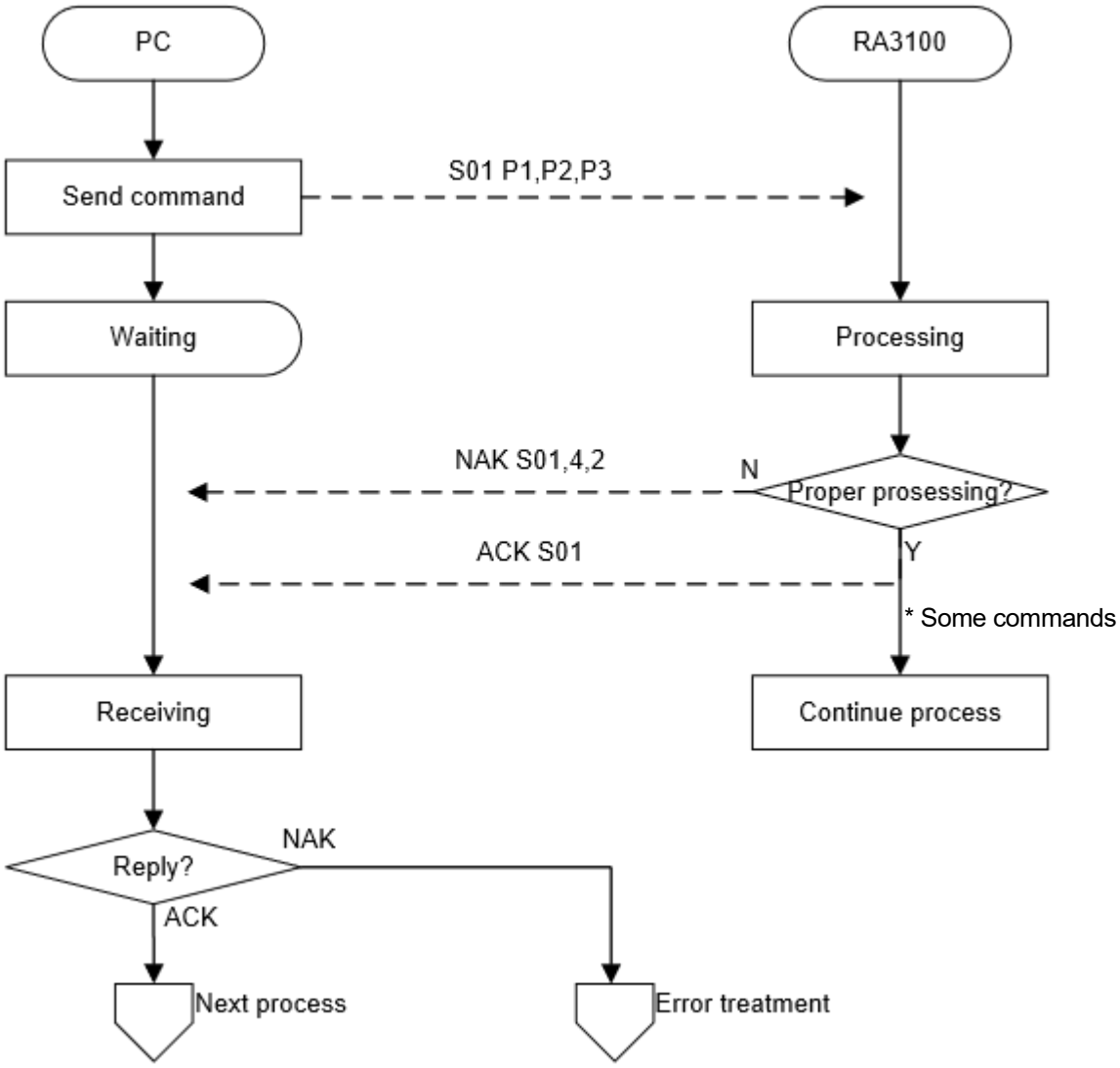
The types of frame errors are indicated in the table below.

Type	Descriptions
HAD	3-character command could not be recognized.
DEL	A terminator could not be recognized in the command message.
FMT	Syntax error.

2.1.2. Communication protocol

When a command is issued from a PC, this product always responds with an ACK or NAK message once the process is complete after reception. The PC should execute the next process after confirming this response.

* The ACK message for some commands is sent before the process is complete.
Refer to the remarks in each command.



*Dotted lines indicate communication

2.2. Command List

First character of 3-character command shows type of command. Other characters show content of command.

Example : S04 S : S command 04 : Settings of recording printer

2.2.1. Command groups

Types of command are as follows:

First character	Descriptions	Details
S	S command : Settings of main unit	3.1. Settings of main unit
M	M command : Module setting	3.2. Module setting
I	I command : Reading information	3.3. Reading information
E	E command : Execution process	3.4. Execution process

2.2.2. Command List

Settings of main unit (S commands)

Command	Descriptions	Details
S01	Common recording configuration and querying	S01
S02	Memory recording configuration and querying	S02
S03	SSD recording configuration and querying	S03
S04	Printer recording configuration and querying	S04
S21	Start-trigger configuration and querying (analog input signal)	S21
S22	Start-trigger configuration and querying (logical input signal)	S22
S24	Memory-trigger configuration and querying (analog input signal)	S24
S25	Memory-trigger configuration and querying (logical input signal)	S25
S26	Memory-trigger mode configuration and querying	S26
S30	Channel format configuration and querying	S30
S31	Logical input display signal configuration and querying	S31
S32	Scale conversion configuration and querying	S32
S33	Unit list configuration and querying	S33
S34	Recording name configuration and querying	S34
S35	Thumbnail configuration and querying	S35
S36	Print parameter configuration and querying	S36
S37	Header, footer, and annotation configuration and querying	S37
S39	Y-T waveform format configuration and querying	S39
S40	X-Y waveform configuration and querying	S40
S41	X-Y waveform channel configuration and querying	S41
S42	FFT analysis configuration and querying	S42
S43	Waveform area division configuration and querying	S43
S44	Feed length configuration and querying	S44
S45	Recording information XML file output configuration and querying	S45
S46	Division count configuration and querying	S46
S48	Measurement mode configuration and querying	S48
S49	TRIG key function configuration and querying	S49
S50	Data transfer configuration and querying	S50
S51	Date and time configuration and querying	S51
S52	CSV format configuration and querying	S52

Module setting (M commands)

Command	Descriptions	Details
M01	RA30-101 (2ch voltage module) configuration and querying	M01
M02	RA30-102 (4ch voltage module) configuration and querying	M02
M03	RA30-103 (2ch high speed voltage module) configuration and querying	M03
M04	RA30-104 (2ch AC strain module) configuration and querying	M04
M05	RA30-105 (16ch logic module) configuration and querying	M05
M06	RA30-106 (2ch temperature module) configuration and querying	M06
M07	RA30-107 (2ch high voltage module) configuration and querying	M07
M08	RA30-108 (2ch frequency module) configuration and querying	M08
M09	RA30-109 (2ch acceleration module) configuration and querying	M09
M12	RA30-112 (remote control module) configuration and querying	M12
M13	RA30-113 (4ch voltage module) configuration and querying	M13

Reading information (I commands)

Command	Descriptions	Details
I00	Reading information of main unit, type, serial No.	I00
I04	Reading board information of input module	I04
I05	Reading the status of main unit	I05
I07	Recording setting error readout	I07
I09	Physical quantity calculation coefficient readout	I09
I10	Recording data count readout	I10
I11	Data transfer status readout	I11
I12	Used block count readout	I12

Executions process (E commands)

Command	Descriptions	Details
E01	Execute canceling the input offset (zero-cancel)	E01
E07	Execute start and end recording	E07
E15	Feed execution	E15
E16	Execute print header, footer and annotation	E16
E17	TRIG execution	E17
E18	MARK execution	E18
E19	PRINT control	E19
E22	BAL execution	E22
E23	Bridge check	E23
E24	TEDS readout	E24
E25	Count reset	E25
E27	Recorded data deletion	E27
E29	Data transfer manual control	E29
E32	Saved data deletion	E32

3. Details of command

3.1. Settings of main unit (S commands)

3.1.1. S01: Common recording configuration and querying

Command	S01	
Command message	Setting:	S01 <P1>,<P2>, • • • ,<P13>
	Query:	S01?
Response message	Setting:	ACK S01
	Query:	ACK S01?,<P1>,<P2>, • • • ,<P13>
Remarks	Configures or submits a query on the common settings regarding main unit recording. Refer to "**Setup Details**" – "**Recording**" in the instruction manual of the RA3100.	

Parameters

P1	Recording mode	
Data range	0 to 8	
	0 : Basic	1 : Start time
	2 : START trigger	3 : Interval time
	4 : Start time + START trigger	5 : START trigger + Interval time
	6 : Start time + Interval time	7 : Start time + START trigger + Interval time
	8 : Window record	

P2	Record number of interval time mode
Data range	1 to 10000
Remarks	Available number of settings is different due to recording time, type of recording media and remaining capacity of SSD.

P3	Maximum recording time		
Data range	0 or 1	0 : Invalid	1 : Effective
Remarks	If effective, recording time is maximum time that can be used remaining capacity of SSD at starting time. In this case, maximum time is calculated with remaining capacity, "sampling rate" and "number of recordings". If invalid, value of recording time is used.		

P4	Recording time
Data range	1 to 8640000000 Specify each recording time in unit of millisecond.
Remarks	Range of recording time varies by remaining capacity, "sampling rate" and "number of recordings". Maximum recording time is 100 days. If recording time beyond the maximum time is specified, it becomes error.

P5	Point number of recording using external sampling
Data range	0 to 16 0 : 2 k　1 : 5 k　2 : 10 k　3 : 20 k　4 : 50 k 5 : 100 k　6 : 200 k　7 : 500 k　8 : 1 M　9 : 2 M 10 : 5 M　11 : 10 M　12 : 20 M　13 : 50 M　14 : 100 M 15 : 200 M　16 : 500 M　Unit is number of points
Remarks	When EXT (external sampling) is used to SSD recording, recording time is used this number of points.

P6	Interval time
Data range	1 to 86400　Specify interval time in unit of seconds.
Remarks	1 day = 86400 sec　1 hour = 3600 sec　1 minute = 60 sec

P7	(Internal reservation)
Data range	Omit always

P8	Start time: Year
Data range	0 to 99
Remarks	Year from 2000 to 2099

P9	Start time: Month
Data range	Month from 1 to 12

P10	Start time: day
Data range	Days from 1 to 31

P11	Start time: Hour
Data range	Hours from 0 to 23

P12	Start time: Minute
Data range	Minutes from 0 to 59

P13	Start time: Second
Data range	Seconds from 0 to 59

3.1.2. S02: **Memory recording configuration and querying**

Command	S02	
Command message	Setting:	S02 <P1>,<P2>, • • • ,<P8>
	Query:	S02?
Response message	Setting:	ACK S02
	Query:	ACK S02?,<P1>,<P2>, • • • ,<P8>
Remarks	Configures settings or submits a query regarding memory recording. Refer to "**Setup Details**" – "**Recording**" in the instruction manual of the RA3100.	

Parameters

P1	Management of memory recording
Data range	0 to 2 0 : Memory recording OFF 1 : Memory recording ON Overwrite mode OFF 2 : Memory recording ON Overwrite mode ON

P2	Sampling speed of memory recording
Data range	0 to 25
Remarks	Refer to "Table of sampling speed" concerning of relationship between parameter number and sampling speed.

P3	(Internal reservation)
Data range	Omit always

P4	Number of recorded blocks (number of memory divisions)
Data range	1 to 200

P5	Block size of memory recording (number of points)
Data range	0 to 18 0 : 2 k 1 : 5 k 2 : 10 k 3 : 20 k 4 : 50 k 5 : 100 k 6 : 200 k 7 : 500 k 8 : 1 M 9 : 2 M 10 : 5 M 11 : 10 M 12 : 20 M 13 : 50 M 14 : 100 M 15 : 200 M 16 : 500 M 17 : 1 G 18 : 2 G Unit is number of points
Remarks	Block size is number of recording data for each channel.

P6	Pre-trigger
Data range	0 to 99

P7	(Internal reservation)
Data range	Omit always

P8	Synchronization control trigger for monitor
Data range	0 or 1 0 : Disabled 1 : Enabled

Table of sampling speed for memory recording

P2	Sampling
0	6 s
1	3 s
2	1.2 s
3	1 s
4	500 ms
5	200 ms
6	100 ms

P2	Sampling
7	50 ms
8	20 ms
9	10 ms
10	5 ms
11	2 ms
12	1 ms
13	500 µs

P2	Sampling
14	200 µs
15	100 µs
16	50 µs
17	20 µs
18	10 µs
19	5 µs
20	2 µs

P2	Sampling
21	1 µs
22	500 ns
23	200 ns
24	100 ns
25	50 ns

3.1.3. S03: SSD recording configuration and querying

Command	S03
Command message	Setting: S03 <P1>,<P2>,<P3>,<P4> Query: S03?
Response message	Setting: ACK S03 Query: ACK S03?,<P1>,<P2>,<P3>,<P4>
Remarks	Configures settings or submits a query regarding SSD recording. Refer to "**Setup Details**" - "**Recording**" in the instruction manual of the RA3100.

Parameters

P1	Management of SSD recording
Data range	0 or 1 0 : OFF 1 : ON
Remarks	When SSD recording is used, settings of trigger window of recording mode can use.

P2	Sampling speed of SSD recording
Data range	0 to 21, 63
Remarks	Range of sampling speed depends on Normal / P-P of data format. Refer to "**Table of sampling speed for SSD recording**" concerning of sampling speed.

P3	(Internal reservation)
Data range	Omit always

P4	Data format
Data range	0 or 1 0 : NORMAL data fromat 1 : P-P data format

Table of sampling speed for SSD recording

P2	Sampling	Data format	
		NORMAL	P-P
0	6 s	○	○
1	3 s	○	○
2	1.2 s	○	○
3	1 s	○	○
4	500 ms	○	○
5	200 ms	○	○
6	100 ms	○	○
7	50 ms	○	○
8	20 ms	○	○
9	10 ms	○	○
10	5 ms	○	○

P2	Sampling	Data format	
		NORMAL	P-P
11	2 ms	○	○
12	1 ms	○	○
13	500 µs	○	○
14	200 µs	○	○
15	100 µs	○	○
16	50 µs	○	○
17	20 µs	○	○
18	10 µs	○	○
19	5 µs	○	○
20	2 µs	○	○
21	1 µs	○	×
63	EXT	○	○

3.1.4. S04: Printer recording configuration and querying

Command	S04
Command message	Setting: S04 <P1>,<P2>, • • • ,<P5> Query: S04?
Response message	Setting: ACK S04 Query: ACK S04?,<P1>,<P2>, • • • ,<P5>
Remarks	Configures settings or submits a query regarding printer recording. Refer to "**Setup Details**" - "**Recording**" in the instruction manual of the RA3100.

Parameters

P1	Management of printer recording
Data range	0 or 1 0 : OFF 1 : ON

P2	Paper feed speed
Data range	0 to 12, 63
Remarks	Refer to "**Table of paper feed speed**" concerning relationship between parameter number and paper feed speed. When paper feed speed is set to EXT (external synchronization), SSD recording memory and recording become OFF.

P3	(Internal reservation)
Data range	Omit always

P4	Real time printing of waveform
Data range	0 or 1 0 : OFF 1 : ON
Remarks	When real time printing is used, waveform is printed at the same time as printer recording (SSD recording).

P5	Sheet number of printing
Data range	1 to 3 Sheet number of real time waveform printing

Table of paper feed speed

P2	Paper feed speed
0	1 mm/min
1	2 mm/min
2	5 mm/min
3	6 mm/min
4	12 mm/min
5	30 mm/min

P2	Paper feed speed
6	1 mm/s
7	2 mm/s
8	5 mm/s
9	10 mm/s
10	20 mm/s
11	50 mm/s
12	100 mm/s

P2	Paper feed speed
63	EXT

3.1.5. S21: Start-trigger configuration and querying (analog input signal)

Command	S21
Command message	Setting: S21 <P1>,<P2>, • • • ,<P7> Query: S21?
Response message	Setting: ACK S21 Query: ACK S21?,<P1>,<P2>, • • • ,<P7>
Remarks	Configures settings or submits a query regarding the start-trigger when the trigger source is analog input. Refer to "**Trigger Setup**" - "**Start Trigger**" in the instruction manual of the RA3100.

Parameters

P1	Management of start trigger (Analog input channel)
Data range	0 or 1 0 : Invalid 1 : Effective

P2	Slot number
Data range	1 to 9
Remarks	Input slot number of channel to set as start-trigger source

P3	Channel number
Data range	1 to 4
Remarks	Channel number of channel to set as trigger source

P4	Threshold value (upper threshold value) of window trigger
Data range	−32000 to 32000
Remarks	The parameter value is expressed as an AD count value. For information on the AD count value, refer to "**Appendix**" - "**Relationship between AD Count Value and Measured Value**" in the instruction manual of the RA3100. Trigger source has exceeded upper threshold value when using WINDOW (IN/OUT). Specify value more than lower threshold value when using WINDOW (IN/OUT). Specify the same threshold value when using UP and DOWN. For cautions when the scale conversion function and wave inversion function are enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P5	Threshold value (lower threshold value) of window trigger
Data range	−32000 to 32000
Remarks	The parameter value is expressed as an AD count value. For information on the AD count value, refer to "**Appendix**" - "**Relationship between AD Count Value and Measured Value**" in the instruction manual of the RA3100. Trigger source has been below threshold value when using UP and DOWN. Trigger source has been below lower threshold value when using WINDOW (IN/OUT). Specify value less than upper threshold value when using WINDOW (IN/OUT). For cautions when the scale conversion function and wave inversion function are enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P6	Detection type of trigger
Data range	0 to 3 0 :UP (rising edge) 1:DOWN(falling edge) 2:WINDOW IN 3:WINDOW OUT

P7	Filter time
Data range	1 to 10000000 (10 s) Specify in unit of μs.
Remarks	Filter time is the same as filter time of logic start trigger.

3.1.6. S22: Start-trigger configuration and querying (logical input signal)

Command	S22
Command message	Setting: S22 <P1>,<P2>, • • • ,<P7> Query: S22?
Response message	Setting: ACK S22 Query: ACK S22?,<P1>,<P2>, • • • ,<P7>
Remarks	Configures settings or submits a query regarding the start-trigger when the trigger source is logical input. Refer to "**Trigger Setup**" - "**Start Trigger**" in the instruction manual of the RA3100.

Parameters

P1	Management of start trigger (Logical input channel)
Data range	0 or 1 0 : Invalid 1 : Effective

P2	Slot number
Data range	1 to 9
Remarks	Input slot number of channel to set as trigger source

P3	Channel number
Data range	A, B A : CHA B : CHB
Remarks	Channel number of channel to set as trigger source

P4	Logic channel for trigger detection
Data range	0 to 255
Remarks	Channel to use for trigger detection A parameter value is summed up values of CHn to be used trigger input. CH1 : 1 CH2 : 2 CH3 : 4 CH4 : 8 CH5 : 16 CH6 : 32 CH7 : 64 CH8 : 128

P5	Bit pattern
Data range	0 to 255
Remarks	H/L trigger detection for each channel A parameter value is summed up values of CHn that detects trigger at H level. CH1 : 1 CH2 : 2 CH3 : 4 CH4 : 8 CH5 : 16 CH6 : 32 CH7 : 64 CH8 : 128

P6	Trigger detection
Data range	0 to 1 0 : OR 1 : AND

P7	Filter time
Data range	1 to 10000000 (10 s) Specify it in unit of μs
Remarks	Filter time is the same as filter time of analog start trigger.

3.1.7. S24: Memory-trigger configuration and querying (analog input signal)

Command	S24
Command message	Setting: S24 <P1>,<P2>, • • • ,<P8> Query: S24? <P1>
Response message	Setting: ACK S24 Query: ACK S24?,<P1>,<P2>, • • • ,<P8>
Remarks	Configures settings or submits a query regarding the trigger when the trigger source is analog input. Refer to "**Trigger Setup**" - "**Memory trigger**" in the instruction manual of the RA3100.

Parameters

P1	Trigger source
Data range	1 to 18 1 :T1 2 : T2 • • • 18 : T18 Selection of source
Remarks	Specifies the target trigger source.

P2	Management of trigger source
Data range	0 or 1 0 : Disabled 1 : Enabled

P3	Slot number
Data range	1 to 9
Remarks	Input slot number of channel to set as trigger source

P4	Channel number
Data range	1 to 4
Remarks	Channel number of channel to set as trigger source

P5	WINDOW trigger threshold value (Upper limit value)
Data range	−32000 to 32000
Remarks	The parameter value is expressed as an AD count value. For information on the AD count value, refer to "**Appendix**" - "**Relationship between AD Count Value and Measured Value**" in the instruction manual of the RA3100. When detection is WINDOW (IN / OUT), specify upper limit value that is larger than lower limit value. When detection is UP / DOWN, specify the same value as lower limit value. For cautions when the scale conversion function and wave inversion function are enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P6	Trigger threshold value (WINDOW Lower limit value)
Data range	−32000 to 32000
Remarks	The parameter value is expressed as an AD count value. For information on the AD count value, refer to "**Appendix**" - "**Relationship between AD Count Value and Measured Value**" in the instruction manual of the RA3100. When detection is UP / DOWN, specify threshold value of UP / DOWN. When detection is WINDOW (IN / OUT), specify WINDOW lower limit value that is smaller than upper limit value. For cautions when the scale conversion function and wave inversion function are enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P7	Trigger detection
Data range	0 to 3 0 : UP (Rising edge)　1 : DOWN (Falling edge)　2 : WINDOW IN　3 : WINDOW OUT

P8	Filter time
Data range	1 to 10000000 (10 s)　Specify in unit of μs.
Remarks	Filter time is the same as filter time of logic start trigger.

3.1.8. S25: Memory-trigger configuration and querying (logical input signal)

Command	S25
Command message	Setting: S25 <P1>,<P2>, • • • ,<P8> Query: S25? <P1>
Response message	Setting: ACK S25 Query: ACK S25?,<P1>,<P2>, • • • ,<P8>
Remarks	Configures settings or submits a query regarding the trigger when the trigger source is logical input. Refer to "**Trigger Setup**" - "**Memory trigger**" in the instruction manual of the RA3100.

Parameters

P1	Trigger source
Data range	1 to 18 1 :T1 2 : T2 • • • 18 : T18 Selection of source
Remarks	Specifies the target trigger source.

P2	Management of trigger source
Data range	0 or 1 0 : Invalid 1 : Effective

P3	Slot number
Data range	1 to 9
Remarks	Input slot number of channel to set as trigger source

P4	Channel number
Data range	A, B A : CHA B : CHB
Remarks	Channel number of channel to set as trigger source

P5	Logic channel
Data range	0 to 255
Remarks	Channel to use for trigger detection A parameter value is summed up values of CHn to be used trigger input. CH1 : 1 CH2 : 2 CH3 : 4 CH4 : 8 CH5 : 16 CH6 : 32 CH7 : 64 CH8 : 128

P6	Bit pattern
Data range	0 to 255
Remarks	H/L trigger detection for each channel A parameter value is summed up values of CHn that detects trigger at H level. CH1 : 1 CH2 : 2 CH3 : 4 CH4 : 8 CH5 : 16 CH6 : 32 CH7 : 64 CH8 : 128

P7	Trigger detection
Data range	0 to 1 0 : OR 1 : AND
Remarks	Specify trigger detection either OR or AND for each channel of CH1 to CH8.

P8	Filter time
Data range	1 to 10000000 (10 s) Specify it in unit of s
Remarks	Filter time is the same as filter time of analog start trigger.

3.1.9. S26: Memory-trigger mode configuration and querying

Command	S26
Command message	Setting: S26 <P1> Query: S26?
Response message	Setting: ACK S26 Query: ACK S26?,<P1>

Parameters

P1	Trigger mode
Data range	0 to 2 0 : OFF 1 : OR 2 : AND
Remarks	OFF : Memory-trigger mode is disabled. OR : In the case of OR, it acts as a trigger when one of the valid trigger sources is detected. AND : In the case of AND, it acts as a trigger when all valid trigger sources are detected. Refer to "**Trigger Setup**" – "**Memory trigger**" in the instruction manual of the RA3100.

3.1.10. S30: Channel format configuration and querying

Command	S30
Command message	Setting: S30 <P1>,<P2>, • • • ,<P12> Query: S30? <P1>,<P2>
Response message	Setting: ACK S30 Query: ACK S30?,<P1>,<P2>, • • • ,<P12>
Remarks	Refer to "**Using Optional Modules**" – "**2ch Voltage Module (RA30-101)**" in the instruction manual of the RA3100.

Parameters

P1	Slot selection
Data range	1 to 9, F
Remarks	Specify slot number that the target module is installed. If F is specified, all modules are target.

P2	Channel selection
Data range	1 to 9, F 16 Channel Logic Module (RA30-105)　1 : CHA　2 : CHB, F
Remarks	Specify target channel. If F is specified, all channels of modules specified with P1 are target.

P3	Signal name
Data range	Enter a string. Maximum 40 characters, encoded in UTF-8.
Remarks	Insert strings between <STX> [0x02] and <ETX> [0x03].

P4	Color
Data range	1 to 18 1 : Light blue　2 : Pink　3 : Yellow　4 : White 5 : Light green　6 : Purple　7 : Blue　8 : Light yellow-green 9 : Red　10 : Dark gray　11 : Reddish purple　12 : Bright blue 13 : Olive green　14 : Pale yellow-green　15 : Orange　16 : Pale purple 17 : Pale pink　18 : Green
Remarks	When logic module is used, 8 CH of CHA and CAB become the same color.

P5	Display position
Data range	0.0 to 100.0

P6	Display range
Data range	1.0 to 100.0

P7	Display minimum
Data range	–RANGE to RANGE
Remarks	A display error may occur due to resolution between settings and input value. Example : S30 1,1,,,,,-100,30,1,,,

P8	Display maximum
Data range	–RANGE to RANGE
Remarks	A display error may occur due to resolution between settings and input value. （Input example）S30 1,1,,,,,-100,30,1,,,

P9	Sheet number
Data range	1 to 3
Remarks	The operation when this is set is as follows. * When specified channel is OFF, NAK is responded. * When specified sheets exceed 48 CH or more, NAK is responded. * When slot or channel is F, even if channel is OFF or sheets exceed 48 CH or more, ACK is responded. (Settings are not reflected.)

P10	Graph number
Data range	1 to 18
Remarks	(When RA30-105 is used, signal unit is graph number of 8 CH.) The operation when this is set is as follows. * When specified channel is OFF, NAK is responded. * When slot or channel is F, even if channel is OFF, ACK is responded. (Settings are not reflected.)

P11	Waveform monitor
Data range	0 to 1 0 : OFF 1 : ON
Remarks	The operation when this is set is as follows. * When specified channel is OFF, NAK is responded. * When slot or channel is F, even if channel is OFF, ACK is responded. (Settings are not reflected.)

P12	Wave inversion
Data range	0 to 1 0 : OFF 1 : ON
Remarks	The operation when this is set is as follows. * If the specified slot has a module that does not support wave inversion, an ACK message is returned. (Settings are not reflected.)

3.1.11. S31: Logical input display signal configuration and querying

Command	S31
Command message	Setting: S31 <P1>,<P2>, • • • ,<P20> Query: S31? <P1>,<P2>
Response message	Setting: ACK S31 Query: ACK S31?, <P1>,<P2>, • • • ,<P20>
Remarks	Refer to "**Using Optional Modules**" - "**16ch Logic Module (RA30-105)**" in the instruction manual of the RA3100.

Parameters

P1	Slot selection
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. If F is specified, all modules are target.

P2	Channel selection
Data range	Setting: A, B, F A : CHA B : CHB F : All channels Query: A, B A : CHA B : CHB
Remarks	Specify target channel.

P3	Signal amplitude
Data range	0.0 to 100.0
Remarks	Unit is percentage. Round off at second decimal place.

P4	Signal unit
Data range	0 to 1 0 : 8CH 1 : 1CH

P5	Graph number CH1
Data range	1 to 18
Remarks	The operation when this is set is as follows. * When specified channel is OFF, NAK is responded. * When slot or channel is F, even if channel is OFF, ACK is responded. (Settings are not reflected.)

P6	Display signal CH1
Data range	0 to 1 0 : OFF 1 : ON
Remarks	The operation when this is set is as follows. * When specified channel is OFF, NAK is responded. * When slot or channel is F, even if channel is OFF, ACK is responded. (Settings are not reflected.)

P7 ～ P20	Graph number and display signal from CH2 to CH8.
Data range & Remarks	Refer to data range and remarks of graph number and display signal for CH 1. Graph number for each channel and parameters of display signal are as follows:

	CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8
Graph number	P5	P7	P9	P11	P13	P15	P17	P19
Display signal	P6	P8	P10	P12	P14	P16	P18	P20

3.1.12. S32: Scale conversion configuration and querying

Command	S32
Command message	Setting: S32 <P1>,<P2>, • • • ,<P10> Query: S32? <P1>,<P2>
Response message	Setting: ACK S32 Query: ACK S32?, <P1>,<P2>, • • • ,<P10>
Remarks	Refer to "**Setup Details**" - "**Conversion (Physical Quantity Conversion)**" in the instruction manual of the RA3100.

Parameters

P1	Slot selection
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. If F is specified, all modules are target.

P2	Channel selection
Data range	Setting: 1 to 4, F Query: 1 to 4
Remarks	Specify channel of module specified with P1. If F is specified, all channels of modules specified with P1 are target.

P3	Conversion method
Data range	0 to 2 0 : Not used 1 : compensation 2 : 2 points
Remarks	Refer to the instruction manual of the RA3100.

P4	Compensation : Gain
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Gain when "1: Compensation" is selected for conversion method in P3

P5	Compensation : Offset
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Offset when "1: Compensation" is selected for conversion method in P3

P6	2 points : Pre-conversion 1
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Value of pre-conversion 1 when "2: 2 points" is selected for conversion method in P3

P7	2 points : Post-conversion 1
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Value of post-conversion 1 when "2: 2 points" is selected for conversion method in P3

P8	2 points : Pre-conversion 2
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Value of pre-conversion 2 when "2: 2 points" is selected for conversion method in P3

P9	2 points : Post-conversion 2
Data range	−7.922816E+10 to 7.922816E+10
Remarks	Value of post-conversion 2 when "2: 2 points" is selected for conversion method in P3

P10	Unit
Data range	0 to 11
Remarks	Specify unit from unit list. 0 is default unit of module.

3.1.13. S33: Unit list configuration and querying

Command	S33	
Command message	Setting: Query:	S33 <P1>,<P2>, • • •,<P11> S33?
Response message	Setting: Query:	ACK S33 ACK S33?, <P1>,<P2>, • • •,<P11>
Remarks	Insert strings between <STX> [0x02] and <ETX> [0x03]. Refer to "**Setup Details**" - "**Conversion (Physical Quantity Conversion)**" in the instruction manual of the RA3100.	

Parameters

P1	Unit 1
Data range	Enter a string. Maximum 10 characters, encoded in UTF-8.

P2	Unit 2
Data range	Enter a string. Maximum 10 characters, encoded in UTF-8.

– Abbreviation –

P11	Unit 11
Data range	Enter a string. Maximum 10 characters, encoded in UTF-8.

3.1.14. S34: Recording name configuration and querying

Command	S34
Command message	Setting: S34 <P1>,<P2>,<P3> Query: S34?
Response message	Setting: ACK S34 Query: ACK S34?, <P1>,<P2>,<P3>
Remarks	Configures settings or submits a query regarding the recording name. Refer to "**Setup Details**" - "**Recording**" in the instruction manual of the RA3100.

Parameters

P1	Recoding name
Data range	Enter a string. Maximum 40 characters, encoded in UTF-8.
Remarks	Insert strings between (STX) [0x02] and (ETX) [0x03].

P2	Automatic serial number
Data range	0 to 1 0 : OFF 1 : ON

P3	Start number of P2
Data range	1 to 9999

3.1.15. S35: Thumbnail configuration and querying

Command	S35
Command message	Setting: S35 <P1>,<P2>,<P3> Query: S35?
Response message	Setting: ACK S35 Query: ACK S35?,<P1>,<P2>,<P3>
Remarks	Performs configuration or querying regarding the thumbnail waveform. Refer to "**Setup Details**" - "**Recording**" in the instruction manual of the RA3100.

Parameters

P1	Slot selection
Data range	1 to 9
Remarks	Slot of target module to display thumbnail waveform for.

P2	Channel selection
Data range	1 to 4
Remarks	Channel of module specified in P1.

P3	Ratio of display scale
Data range	0 to 3 0：1/10 1：1/20 2：1/50 3：1/100
Remarks	Display magnification of thumbnail waveform.

3.1.16. S36: Print parameter configuration and querying

Command	S36
Command message	Setting: S36 <P1>,<P2>, • • • ,<P12> Query: S36?
Response message	Setting: ACK S36 Query: ACK S36?, <P1>,<P2>, • • • ,<P12>
Remarks	Configures settings or submits a query to the printer regarding the print parameters. Refer to "**Setup Details**" - "**Printer**" in the instruction manual of the RA3100.

Parameters

P1	Header
Data range	0 to 3 0 : OFF 1 : Text 2 : Signal name 3 : Text & signal name

P2	Annotation
Data range	0 to 1 0 : OFF 1 : Text

P3	Footer
Data range	0 to 3 0 : OFF 1 : Text 2 : Scale value 3 : Text & scale value

P4	Grid
Data range	0 to 4 0 : OFF 1 : 10 mm STD 2 : 10 mm 3 : 5 mm STD 4 : 5 mm

P5	Date / data name
Data range	0 to 3 0 : OFF 1 : Date 2 : Recording name 3 : Date & recording name

P6	Line number of date / data name
Data range	1 to 86

P7	Trigger / mark
Data range	0 to 1 0 : OFF 1 : ON

P8	Line number of trigger / mark
Data range	1 to 86

P9	Time axis
Data range	0 to 1 0 : OFF 1 : ON

P10	Line number of time axis
Data range	1 to 86

P11	Recording speed
Data range	0 to 2 0 : OFF 1 : Sampling speed 2 : Chart speed

P12	Line number of recording speed
Data range	1 to 86

3.1.17. S37: **Header, footer, and annotation configuration and querying**

Command	S37
Command message	Setting: S37 <P1>,<P2>,<P3> Query: S37? <P1>,<P2>
Response message	Setting: ACK S37 Query: ACK S37?,<P1>,<P2>,<P3>
Remarks	Configures settings or submits a query regarding the printed text. Refer to "**Setup Details**" - "**Printer**" in the instruction manual of the RA3100. Header, footer and annotation can print using command of "**3.4.4. E16: Execute print header, footer and annotation**".

Parameters

P1	Type of this text
Data range	0 to 2 0 : Header 1 : Annotation 2 : Footer
Remarks	Specifies the target.

P2	Line number
Data range	1 to 86
Remarks	Specifies the target line number.

P3	Text
Data range	Enter a string. Maximum 60 characters, encoded in UTF-8.
Remarks	Insert strings between <STX> [0x02] and <ETX> [0x03]. Use characters of UTF-8 code.

Example of command input : Annotation text is printed at 10th line.

S37 1,10,<STX>Title:<ETX>

3.1.18. S39: Y-T waveform format configuration and querying

Command	S39
Command message	Setting: S39 <P1>,<P2>,<P3>, • • • ,<P7> Query: S39?
Response message	Setting: ACK S39 Query: ACK S39?, <P1>,<P2>,<P3>, • • • ,<P7>
Remarks	Configures settings or submits a query regarding the Y-T waveform displayed on the monitor. Refer to "**Setup Details**" - "**Display Setup**" in the instruction manual of the RA3100.

Parameters

P1	Grid			
Data range	0 to 2	0 : OFF	1 : Dark	2 : Bright

P2	Trigger		
Data range	0 to 1	0 : OFF	1 : ON

P3	Mark		
Data range	0 to 1	0 : OFF	1 : ON

P4	Interlocked waveform to cursor position		
Data range	0 to 1	0 : OFF	1 : ON

P5	Search result line		
Data range	0 to 1	0 : OFF	1 : ON

P6	Notation of X axis			
Data range	0 to 2	0 : OFF	1 : date	2 : Point

P7	TSP/BSP		
Data range	0 to 1	0 : OFF	1 : ON

3.1.19. S40: X-Y waveform configuration and querying

Command	S40
Command message	Setting: S40 <P1>,<P2>,<P3> Query: S40?
Response message	Setting: ACK S40 Query: ACK S40?, <P1>,<P2>,<P3>
Remarks	Configures settings or submits a query regarding X-Y waveform display. Refer to "**Playback Recorded Data**" - "**X-Y Waveform**" in the instruction manual of the RA3100.

Parameters

P1	Dot/Line switching				
Data range	0 to 1	0 : Dot	1 : Line		

P2	Grid display				
Data range	0 to 1	0 : OFF	1 : ON		

P3	Display scale				
Data range	1 to 4	1 : X-Y1	2 : X-Y2	3 : X-Y3	4 : X-Y4

3.1.20. S41: X-Y waveform channel configuration and querying

Syntax	S41
Command message	Setting: S41 <P1>,<P2>, • • • ,<P5> Query: S41? <P1>
Response message	Setting: ACK S41 Query: ACK S41?, <P1>,<P2>, • • • ,<P5>
Remarks	Configures settings or submits a query regarding the input channels for the X axis and Y axis of the X-Y waveform. Refer to "**Playback Recorded Data**" - "**X-Y Waveform**" in the instruction manual of the RA3100.

Parameters

P1	X-Y channel
Data range	1 to 4
Remarks	Specify target X-Y channel.

P2	Slot number of Z axis channel
Data range	1 to 9

P3	Input channel of X axis
Data range	1 to 4
Remarks	Same channel as Y axis cannot be selected.

P4	Slot number of channel of Y axis
Data range	1 to 4

P5	Input channel of Y axis
Data range	1 to 4
Remarks	Same channel as X axis cannot be selected.

3.1.21. S42: FFT analysis configuration and querying

Command	S42	
Command message	Setting:	S42 <P1>,<P2>, • • • ,<P27>
	Query:	S42?
Response message	Setting:	ACK S42
	Query:	ACK S42?, <P1>,<P2>, • • • ,<P27>
Remarks	Performs configuration regarding FFT analysis. For details on FFT analysis, refer to each "**FFT Analysis**" section in the instruction manual of the RA3100.	

Parameters

P1	Graph display		
Data range	0 to 1	0 : 1 window	1 : 2 window

P2	Number of sampling points				
Data range	0 to 3	0 : 1000	1 : 2000	2 : 5000	3 : 10000
Remarks	Common setting for analysis 1 and analysis 2.				

P3	Window function			
Data range	0 to 2	0 : Hanning	1 : Hamming	2 : Rectangular
Remarks	Common settings for analysis 1 and analysis 2.			

P4	AVG processing
Data range	0 to 4 0 : None 1 : Time simple averaging 2 : Frequency simple averaging 3 : Frequency exponential weight averaging 4 : Frequency axis peak hold
Remarks	Common settings for analysis 1 and analysis 2.

P5	Number of times to be added
Data range	1 to 10
Remarks	Common settings for analysis 1 and analysis 2.

P6	Analysis 1 : Analysis function		
Data range	0 to 9	0 : Time scale waveform	1 : Linear spectrum
		2 : RMS spectrum	3 : Power spectrum
		4 : Power spectrum density	5 : 1/1 octave analysis
		6 : 1/3 octave analysis	7 : Cross power spectrum
		8 : Transfer function	9 : Coherence function

P7	Analysis 1 : X axis				
Data range	0 to 4	0 : Time	1 : Linear Hz	2 : Log Hz	3 : 1/1 Oct	4 : 1/3 Oct

P8	Analysis 1 : Y axis		
Data range	0 to 5	0 : Linear	1 : Lin-Rel
		2 : Lin-Img	3 : Lin-Amp
		4 : Log-Amp	5 : Phase

P9	Analysis 1 : Manual scale		
Data range	0 to 1	0 : OFF	1 : ON

P10	Analysis 1 : Maximum value of manual scale
Data range	-7.922816E+28 ～ 7.922816E+28

P11	Analysis 1 : Minimum value of manual scale
Data range	-7.922816E+28 ～ 7.922816E+28

P12	Analysis 1 : Slot number of signal analysis CH1
Data range	0 to 9

P13	Analysis 1 : Channel of signal analysis CH1
Data range	0 to 4

P14	Analysis 1 : Slot number of signal analysis CH2
Data range	0 to 9

P15	Analysis 1 : Channel of signal analysis CH2
Data range	0 to 4

P16	Analysis 1 : Peak value		
Data range	0 to 1	0 : Maximum value	1 : Local maximum value

P17	Analysis 2 : Analysis function		
Data range	0 to 9	0 : Time scale waveform	1 : Linear spectrum
		2 : RMS spectrum	3 : Power spectrum
		4 : Power spectrum density	5 : 1/1 octave analysis
		6 : 1/3 octave analysis	7 : Cross power spectrum
		8 : Transfer function	9 : Coherence function

P18	Analysis 2 : X axis
Data range	0 to 4　　0 : Time　　1 : Linear Hz　　2 : Log Hz　　3 : 1/1 Oct　　4 : 1/3 Oct

P19	Analysis 2 : Y axis		
Data range	0 to 5	0 : Linear	1 : Lin-Rel
		2 : Lin-Img	3 : Lin-Amp
		4 : Log-Amp	5 : Phase

P20	Analysis 2 : Manual scale		
Data range	0 to 1	0 : OFF	1 : ON

P21	Analysis 2 : Maximum value of manual scale
Data range	−7.922816E+28 to 7.922816E+28

P22	Analysis 2 : Minimum value of manual scale
Data range	−7.922816E+28 to 7.922816E+28

P23	Analysis 2 : Slot number of signal analysis CH1
Data range	0 to 9

P24	Analysis 2 : Channel of signal analysis CH1
Data range	0 to 4

P25	Analysis 2 : Slot number of signal analysis CH2
Data range	0 to 9

P26	Analysis 2 : Channel of signal analysis CH2
Data range	0 to 4

P27	Analysis 2 : Peak value		
Data range	0 to 1	0 : Maximum value	1 : Local maximum value

3.1.22. S43: Waveform area division configuration and querying

Command	S43		
Command message	Setting:	S43 <P1>,<P2>,<P3>,<P4> to S43 <P1>,<P2>, • • • ,<P55>	Division 1 Division 18
	Query:	S43? <P1>	
Response message	Setting:	ACK S43	
	Query:	ACK S43?,<P1>,<P2>,<P3>,<P4> to ACK S43 <P1>,<P2>, • • • ,<P55>	Division 1 Division 18
Remarks	Configures settings or submits a query regarding the graph position and size of the waveform area. Perform "3.1.25. S46: Division count configuration and querying" to use these settings. Refer to "**Setup Details**" - "**Sheet Setup**" in the instruction manual of the RA3100.		

Parameters

P1	Number of graph division
Data range	1 to 18
Remarks	Specify number of graph division. * Number of parameters changes according to the settings of graph division.

P2	Number of TSP lines
Data range	0 to 86
Remarks	Number of lines (each line has a height of 2.5 mm) on TSP (space above waveform display area) * When number of TSP+G#+SP# exceeds 86, NAK is responded. Refer to "**Setup Details**" - "**Sheet Setup**" in the instruction manual of the RA3100.

P3	Number of lines of G1 (Graph 1)
Data range	0 to 86
Remarks	Number of lines for G1 (Graph 1) (each line has a height of 2.5 mm) * When number of TSP+G#+SP# exceeds 86, NAK is responded.

P4	Grid display of G1 (Graph 1)
Data range	0 to 1 0 : OFF 1 : ON

P5	Number of lines of SP1 (space 1)
Data range	0 to 86
Remarks	Number of lines for SP1 (Space 1) (each line has a height of 2.5 mm) * When number of TSP+G#+SP# exceeds 86, NAK is responded.

P6 to P55	Number of lines of graph from 2 to 18. Grid display. Number of space lines.
Data range and Remarks	Refer to number of lines and grid display of graph 1, range of number of space 1 lines and remarks. Parameter number of graph and space number is fallows:

Number	1	2	3	4	5	6	7	8	9
Number of lines of graph	P3	P6	P9	P12	P15	P18	P21	P24	P27
Grid display	P4	P7	P10	P13	P16	P19	P22	P25	P28
Number of space lines	P5	P8	P11	P14	P17	P20	P23	P26	P29

Number	10	11	12	13	14	15	16	17	18
Number of lines of graph	P30	P33	P36	P39	P42	P45	P48	P51	P54
Grid display	P31	P34	P37	P40	P43	P46	P49	P52	P55
Number of space lines	P32	P35	P38	P41	P44	P47	P50	P53	

3.1.23. S44: Feed length configuration and querying

Command	S44	
Command message	Setting:	S44 <P1>
	Query:	S44?
Response message	Setting:	ACK S44
	Query:	ACK S44?,<P1>
Remarks	Configures settings or submits a query regarding the feed length. Refer to "**Setup Details**" – "**Printer**" in the instruction manual of the RA3100.	

Parameter

P1	Feed length
Data range	0 to 100
Remarks	Feed length after printing (mm)

3.1.24. S45: Recording information XML file output configuration and querying

Command	S45
Command message	Setting: S45 <P1> Query: S45?
Response message	Setting: ACK S45 Query: ACK S45?,<P1>
Remarks	Configures settings or submits a query regarding recording information XML file output. The settings to read XML file of recording information using your application. Refer to "**Setup Details**" - "**Recording Setup**" - "Other" in the instruction manual of the RA3100.

Parameter

P1	The output settings of XML file of recording information
Data range	0 to 1 0 : OFF 1 : ON

3.1.25. S46: Division count configuration and querying

Command	S46
Command message	Setting: S46 <P1> Query: S46?
Response message	Setting: ACK S46 Query: ACK S46?,<P1>
Remarks	Configures settings or submits a query regarding the division count of the waveform area. The definition of graph division is specified at "**3.1.22. S43: Waveform area division configuration and querying**". Refer to "**Setup Details**" - "**Sheet Setup**" in the instruction manual of the RA3100.

Parameter

P1	Number of graph division
Data range	1 to 18

3.1.26. S48: Measurement mode configuration and querying

Command	S48
Command message	Setting: S48 <P1> Query: S48?
Response message	Setting: ACK S48 Query: ACK S48?,<P1>
Remarks	Configures settings or submits a query regarding the measurement mode. Refer to "**Measurement Setup**" – "**Selecting the Measurement Mode**" in the instruction manual of the RA3100.

Parameter

P1	Measurement mode
Data range	0 to 1 0: R&D mode 1: MFG mode

3.1.27. S49: TRIG key function configuration and querying

Command	S49
Command message	Setting: S49 <P1> Query: S49?
Response message	Setting: ACK S49 Query: ACK S49?,<P1>
Remarks	Performs assignment or submits a query regarding the operation panel TRIG key. Refer to "**Setup Details**" – "**Other (Main Unit Setup)**" in the instruction manual of the RA3100.

Parameter

P1	TRIG key assignment function
Data range	0 to 1 0: TRIG 1: FEED

3.1.28. S50: Data transfer configuration and querying

Command	S50
Command message	Setting: S50 <P1>,<P2>, • • • ,<P9> Query: S50?
Response message	Setting: ACK S50 Query: ACK S50?,<P1>,<P2>, • • • ,<P9>
Remarks	Configures settings or submits a query regarding data transfer. Refer to "**Setup Details**" – "**Data Transfer**" in the instruction manual of the RA3100.

Parameters

P1	Data transfer ON/OFF
Data range	0 to 1 0: OFF 1: ON

P2	Transfer mode
Data range	0 to 2 0: Always 1: When recording 2: Manual
Remarks	Can only be changed when data transfer (P1) is set to OFF

P3	Data type
Data range	0 to 1 0: PRINTER 1: SSD
Remarks	Can only be changed when data transfer (P1) is set to OFF

P4	Protocol
Data range	0 to 1 0: TCP 1: UDP
Remarks	Can only be changed when data transfer (P1) is set to OFF

P5	UDP destination IP address
Data range	IP address (four numbers separated by dots) (Example) 192.168.0.2
Remarks	Can only be changed when data transfer (P1) is set to OFF

P6	UDP destination port
Data range	0 to 65535
Remarks	Can only be changed when data transfer (P1) is set to OFF

P7	Transfer data
Data range	0 to 1 0: One-shot 1: Continuous
Remarks	Can only be changed when data transfer (P1) is set to OFF

P8	Decimation
Data range	1 to 1000
Remarks	Can only be changed when data transfer (P1) is set to OFF

P9	Time stamp
Data range	0 to 1 0: OFF 1: ON
Remarks	Can only be changed when data transfer (P1) is set to OFF

3.1.29. S51: Date and time configuration and querying

Command	S51	
Command message	Setting:	S51 <P1>,<P2>,···,<P6>
	Query:	S51?
Response message	Setting:	ACK S51
	Query:	ACK S51?,<P1>,<P2>,···,<P6>
Remarks	Configures or submits a query on the date and time of the main unit. P1, P2, and P3 (for the date) or P4, P5, and P6 (for the time) must be set together. To set the date or time only, abbreviate using commas. Example of setting the date only: S51 2024,1,1,,,	

Parameters

P1	Year of date
Data range	2000 to 2099

P2	Month of date
Data range	1 to 12

P3	Day of date
Data range	1 to 31

P4	Hour of time
Data range	0 to 23

P5	Minute of time
Data range	0 to 59

P6	Second of time
Data range	0 to 59

3.1.30. S52 : CSV format configuration and querying

Command	S52
Command message	Setting: S52 <P1>,<P2>,・・・,<P7> Query: S52?
Response message	Setting: ACK S52 Query: ACK S52?,<P1>,<P2>,・・・,<P7>
Remarks	Configures whether to output header information to the CSV data. Refer to "**Main Unit Setup**" - "**Other**" - "**CSV Format**" in the instruction manual of the RA3100.

Parameters

P1	Header information
Data range	0 to 1 0: OFF 1: ON
Remarks	Configures whether to output header information to the CSV data.

P2	Maximum data output per file
Data range	0 to 1 0: 60k 1: 1M
Remarks	Set the maximum sample count to output per file.

P3	Separator symbol
Data range	0 to 3 0: comma 1: semicolon 2: space 3: tab
Remarks	Set the symbol to use for separating the items of the CSV data.

P4	Decimal point symbol
Data range	0 to 1 0: period 1: comma
Remarks	Set the symbol to use for decimal points in the numeric values of the CSV data.

P5	External sampling X axis unit conversion
Data range	0 to 1 0: OFF 1: ON
Remarks	Set whether to perform X axis unit conversion for external sampling.

P6	External sampling ΔX
Data range	1E-12 to 7.922816E+10
Remarks	Set the amount of change in the X axis for external sampling when P5 is set to "1".

P7	External sampling X axis unit
Data range	Enter a string. Maximum 10 characters, encoded in UTF-8.
Remarks	Set the unit of the X axis for external sampling when P5 is set to "1". Enclose the string between <STX> [0x02] and <ETX> [0x03]. Example: <STX>V<ETX>

3.2. Module setting (M commands)

3.2.1. M01: RA30-101 (2ch voltage module) configuration and querying

Command	M01
Command message	Setting: M01 <P1>,<P2>, • • • ,<P7> Query: M01? <P1>,<P2>
Response message	Setting: ACK M01 Query: ACK M01?,<P1>,<P2>, • • • ,<P7>
Remarks	Configures settings or submits a query regarding the RA30-101. Refer to "**Using Optional Modules**" – "**2ch Voltage Module (RA30-101)**" in the instruction manual of the RA3100.

Parameters

P1	Slot number
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.

P2	Channel
Data range	Setting: 1 to 2, F Query: 1 to 2
Remarks	Specify channel of target module. When F is selected, all channels are target.

P3	Measurement ON/OFF		
Data range	0 to 1	0 : OFF	1 : ON

P4	Measurement range			
Data range	0 to 11	0 : 500 V	1 : 200 V	2 : 100 V
		3 : 50 V	4 : 20 V	5 : 10 V
		6 : 5 V	7 : 2 V	8 : 1 V
		9 : 500 mV	10 : 200 mV	11 : 100 mV

P5	Input coupling			
Data range	0 to 2	0 : GND	1 : DC	2 : AC

P6	Low pass filter					
Data range	0 to 4	0 : OFF	1 : 3 Hz	2 : 30 Hz	3 : 300 Hz	4 : 3 kHz

P7	Anti-aliasing filter		
Data range	0 to 1	0 : OFF	1 : ON
Remarks	When ON is selected, it synchronizes with sampling speed of SSD.		

3.2.2. M02: RA30-102 (4ch voltage module) configuration and querying

Command	M02
Command message	Setting: M02 <P1>,<P2>, • • • ,<P6> Query: M02? <P1>,<P2>
Response message	Setting: ACK M02 Query: ACK M02?, <P1>,<P2>, • • • ,<P6>
Remarks	Configures settings or submits a query regarding the RA30-102. Refer to "**Using Optional Modules**" - "**4ch Voltage Module (RA30-102)**" in the instruction manual of the RA3100.

Parameters

P1	Slot number
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.

P2	Channel
Data range	Setting: 1 to 4, F Query: 1 to 4
Remarks	Specify channel of target module. When F is selected, all channels are target.

P3	Measurement ON/OFF		
Data range	0 to 1	0 : OFF	1 : ON

P4	Measurement range			
Data range	0 to 7	0 : 200 V	1 : 100 V	2 : 50 V
		3 : 20 V	4 : 10 V	5 : 5 V
		6 : 2 V	7 : 1 V	

P5	Input coupling		
Data range	0 to 1	0 : GND	1 : DC

P6	Low pass filter					
Data range	0 to 4	0 : OFF	1 : 3 Hz	2 : 30 Hz	3 : 300 Hz	4 : 3 kHz

3.2.3. M03: RA30-103 (2ch high speed voltage module) configuration and querying

Command	M03
Command message	Setting: M03 <P1>,<P2>, • • • ,<P6> Query: M03? <P1>,<P2>
Response message	Setting: ACK M03 Query: ACK M03?, <P1>,<P2>, • • • ,<P6>
Remarks	Configures settings or submits a query regarding the RA30-103. Refer to "**Using Optional Modules**" - "**2ch High-Speed Voltage Module (RA30-103)**" in the instruction manual of the RA3100.

Parameters

P1	Slot number
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.

P2	Channel
Data range	Setting: 1 to 2, F Query: 1 to 2
Remarks	Specify channel of target module. When F is selected, all channels are target.

P3	Measurement ON/OFF	
Data range	0 to 1	0 : OFF 1 : ON

P4	Measurement range			
Data range	0 to 11	0 : 500 V	1 : 200 V	2 : 100 V
		3 : 50 V	4 : 20 V	5 : 10 V
		6 : 5 V	7 : 2 V	8 : 1 V
		9 : 500 mV	10 : 200 mV	11 : 100 mV

P5	Input coupling			
Data range	0 to 2	0 : GND	1 : DC	2 : AC

P6	Low pass filter				
Data range	0 to 3	0 : OFF	1 : 5 Hz	2 : 50 Hz	3 : 500 Hz

3.2.4. M04: RA30-104 (2ch AC strain module) configuration and querying

Command	M04
Command message	Setting: M04 <P1>,<P2>, • • • ,<P10> Query: M04? <P1>,<P2>
Response message	Setting: ACK M04 Query: ACK M04?, <P1>,<P2>, • • • ,<P10>
Remarks	Configures settings or submits a query regarding the RA30-104. Refer to "**Using Optional Modules**" – "**2ch AC Strain Module (RA30-104)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specifies the slot where the target module is installed. When "F" is specified, all modules of the same type are targeted.

P2	Channel
Data range	Setting: 1 to 2, F Query: 1 to 2
Remarks	Specifies the channel of the target module. When "F" is specified, all channels are targeted.

P3	Measurement ON/OFF
Data range	0 to 1 0: OFF 1: ON

P4	Measurement range			
Data range	B.V. 0.5Vrms	0 to 5	0: 2000 × 10^{-6} strain 2: 8000 × 10^{-6} strain 4: 40000 × 10^{-6} strain	1: 4000 × 10^{-6} strain 3: 20000 × 10^{-6} strain 5: 80000 × 10^{-6} strain
	B.V. 2Vrms	0 to 5	0: 500 × 10^{-6} strain 2: 2000 × 10^{-6} strain 4: 10000 × 10^{-6} strain	1: 1000 × 10^{-6} strain 3: 5000 × 10^{-6} strain 5: 20000 × 10^{-6} strain
Remarks	The items vary according to the B.V. setting in P10.			

P5	Coupling
Data range	0 to 1 0: GND 1: STRAIN

P6	Low-pass filter
Data range	0 to 4 0: OFF 1: 10 Hz 2: 30 Hz 3: 100 Hz 4: 300 Hz

P7	CAL
Data range	0 to 2 0: OFF 1: + 2: –
Remarks	For cautions when the wave inversion function is enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P8	CAL value
Data range	1 to 9999
Remarks	The unit of the parameter value is 10^{-6} strain. For cautions when the scale conversion function is enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P9	R-FINE
Data range	−8000.0 to 8000.0
Remarks	The unit of the parameter value is 10^{-6} strain. For cautions when the scale conversion function and wave inversion function are enabled, refer to "**5.2. Cautions when using the scale conversion function and wave inversion function**".

P10	B.V.
Data range	0 to 1 0: 0.5 Vrms 1: 2 Vrms

3.2.5. M05: RA30-105 (16ch logic module) configuration and querying

Command	M05	
Command message	Setting:	M05 <P1>,<P2>, • • • ,<P6>
	Query:	M05? <P1>,<P2>
Response message	Setting:	ACK M05
	Query:	ACK M05?, <P1>,<P2>, • • • ,<P6>
Remarks	Configures settings or submits a query regarding the RA30-105. Refer to "**Using Optional Modules**" - "**16ch Logic Module (RA30-105)**" in the instruction manual of the RA3100.	

Parameters

P1	Slot number	
Data range	Setting:	1 to 9, F
	Query:	1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.	

P2	Channel	
Data range	Setting:	A, B, F
	Query:	A, B
Remarks	Specify channel of target module. When F is selected, all channels are target. When A is selected, CHA (1 to 8 CH) are target. When B is selected, CHB (9 to 16 CH) are target.	

P3	Measurement ON/OFF		
Data range	0 to 1	0 : OFF	1 : ON

P4	Input signal		
Data range	0 to 1	0 : Voltage	1 : Contact

P5	Voltage threshold value			
Data range	0 to 2	0 : 1.4 V	1 : 2.5 V	2 : 4.0 V

P6	Resistance threshold value			
Data range	0 to 2	0 : 2 kΩ	1 : 5 kΩ	2 : 9 kΩ

3.2.6. M06: RA30-106 (2ch temperature module) configuration and querying

Command	M06
Command message	Setting: M06 <P1>,<P2>, • • • ,<P11> Query: M06? <P1>,<P2>
Response message	Setting: ACK M06 Query: ACK M06?, <P1>,<P2>, • • • ,<P11>
Remarks	Configures settings or submits a query regarding the RA30-106. Refer to "**Using Optional Modules**" - "**2ch Temperature Module (RA30-106)**" in the instruction manual of the RA3100.

Parameters

P1	Slot number
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.

P2	Channel
Data range	Setting: 1 to 2, F Query: 1 to 2
Remarks	Specify channel of target module. When F is selected, all channels are target.

P3	Measurement ON/OFF
Data range	0 to 1 0 : OFF 1 : ON

P4	Data refresh rate
Data range	0 to 2 0 : Slow 1 : Normal 2 : Fast

P5	Sensor
Data range	0 to 1 0 : Thermocouple (TC) 1 : Resistance temperature detector (RTD)

P6	TC : Measurement range
Data range	0 to 2 0 : High resolution 1 : Middle resolution 2 : Low resolution
Remarks	Refer to "**Table of sensor type and measurement range**" concerning the relationship between the TC sensor type (P7) and measurement range.

P7	TC : Sensor type
Data range	0 to 8 0 : K 1 : J 2 : E 3 : T 4 : N 5 : R 6 : S 7 : B 8 : C

P8	TC : Reference junction
Data range	0 to 1 0 : External 1 : Internal
Remarks	Reference junction (cooling point) for temperature compensation of thermocouple

P9	TC : Detection of broken wire
Data range	0 to 1　　0 : OFF　　1 : ON

P10	RTD : Measurement range
Data range	0 to 2　　0 : High resolution　　1 : Middle resolution　　2 : Low resolution
Remarks	Refer to "**Table of sensor type and measurement range**" concerning the relationship between the RTD sensor type (P11) and measurement range.

P11	RTD : Sensor type
Data range	0 to 2　　0 : Pt100/0.5 mA　　1 : Pt100/1 mA　　2 : Pt1000/0.1 mA

Table of sensor type and measurement range

Sensor type	High resolution	Middle resolution	Low resolution
TC : K	200 °C	600 °C	1370 °C
TC : J	200 °C	400 °C	1100 °C
TC : E	200°C	600 °C	1000 °C
TC : T	100 °C	200 °C	400 °C
TC : N	200 °C	600 °C	1300 °C
TC : R	200 °C	1000 °C	1760 °C
TC : S	200 °C	1000 °C	1700 °C
TC : B	600 °C	1000 °C	1800 °C
TC : C	600 °C	1200 °C	2300 °C
RTD : Pt100	200 °C	400 °C	850 °C
RTD : Pt1000	200 °C	400 °C	850 °C

3.2.7. M07: RA30-107 (2ch high voltage module) configuration and querying

Command	M07
Command message	Setting: M07 <P1>,<P2>, • • • ,<P7> Query: M07? <P1>,<P2>
Response message	Setting: ACK M07 Query: ACK M07?, <P1>,<P2>, • • • ,<P7>
Remarks	Configures settings or submits a query regarding the RA30-107. Refer to "**Using Optional Modules**" – "**2ch High Voltage Module (RA30-107)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specifies the slot where the target module is installed. When "F" is specified, all modules of the same type are targeted.

P2	Channel
Data range	Setting: 1 to 2, F Query: 1 to 2
Remarks	Specifies the channel of the target module. When "F" is specified, all channels are targeted.

P3	Measurement ON/OFF
Data range	0 to 1 0: OFF 1: ON

P4	Measurement range				
Data range	Measurement mode DC	0 to 8	0 : 1000 V 3 : 100 V 6 : 10 V	1 : 500 V 4 : 50 V 7 : 5 V	2 : 200 V 5 : 20 V 8 : 2 V
	Measurement mode RMS	0 to 8	0 : 1000 Vrms 3 : 100 Vrms 6 : 10 Vrms	1 : 500 Vrms 4 : 50 Vrms 7 : 5 Vrms	2 : 200 Vrms 5 : 20 Vrms 8 : 2 Vrms
Remarks	The items vary according to the measurement mode setting in P7.				

P5	Coupling
Data range	0 to 2 0: GND 1: DC 2: AC

P6	Low-pass filter
Data range	0 to 5 0: OFF 1: 3 Hz 2: 30 Hz 3: 300 Hz 4: 3 kHz 5: 30 kHz

P7	Measurement mode
Data range	0 to 3 0: DC 1: RMS(Fast) 2: RMS(Mid) 3: RMS(Slow)
Remarks	Must be specified together with the measurement range in P4. An NAK message is returned if it is not specified.

3.2.8. M08: RA30-108 (2ch frequency module) configuration and querying

Command	M08
Command message	Setting: M08 <P1>,<P2>, • • • ,<P11> * The parameters vary according to the measurement mode. Query: M08? <P1>,<P2>
Response message	Setting: ACK M08 Query: ACK M08?,<P1>,<P2>, • • • ,<P11> * The parameters vary according to the measurement mode.
Remarks	Configures settings or submits a query regarding the RA30-108. Refer to "**Using Optional Modules**" – "**2ch Frequency Module (RA30-108)**" in the instruction manual of the RA3100. For information on the relationship between the measurement mode and parameters, refer to "**Table of parameters for each measurement mode**".

Table of parameters for each measurement mode

Channel	CH1 / CH2						CH3 / CH4
Measurement mode	Period/ Frequency/ Power freq.	Rotation speed	Pulse width/ Duty cycle	Freq. deviation	Pulse count	Pulse integ.	Input voltage
P1	Slot						
P2	Channel						
P3	Measurement						
P4	Measurement range						
P5	Measurement mode						Coupling
P6	Response speed						L.P.F.
P7	Smoothing process				Pulse polarity		Threshold
P8	Smoothing count				Gate time	Auto reset	Hysteresis
P9	Pulse average process						
P10	Pulse average count						
P11		Pulses per revolution	Pulse polarity	Center frequency			

CH1/CH2 parameters

P1	Slot
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specifies the slot where the target module is installed. When "F" is specified, all modules of the same type are targeted.

P2	Channel
Data range	1 to 2
Remarks	Specifies the channel of the target module.

P3	Measurement ON/OFF

Data range	0 to 1	0 : OFF 1 : ON

P4	Measurement range				
Data range	Measurement mode Period/pulse width	0 to 15	0 : 1 ms 3 : 10 ms 6 : 100 ms 9 : 1 s 12 : 10 s 15 : 100 s	1 : 2 ms 4 : 20 ms 7 : 200 ms 10 : 2 s 13 : 20 s	2 : 5 ms 5 : 50 ms 8 : 500 ms 11 : 5 ms 14 : 50 s
	Measurement mode Frequency	0 to 15	0 : 2 Hz 3 : 20 Hz 6 : 200 Hz 9 : 2 kHz 12 : 20 kHz 15 : 200 kHz	1 : 5 Hz 4 : 50 Hz 7 : 500 Hz 10 : 5 kHz 13 : 50 kHz	2 : 10 Hz 5 : 100 Hz 8 : 1 kHz 11 : 10 kHz 14 : 100 kHz
	Measurement mode Rotation speed	0 to 15	0 : 10 rpm 3 : 100 rpm 6 : 1000 rpm 9 : 10000 rpm 12 : 100 krpm 15 : 1000 krpm	1 : 20 rpm 4 : 200 rpm 7 : 2000 rpm 10 : 20000 rpm 13 : 200 krpm	2 : 50 rpm 5 : 500 rpm 8 : 5000 rpm 11 : 50000 rpm 14 : 500 krpm
	Measurement mode Duty cycle	0 to 3	0 : 100 %(20 Hz) 2 : 100 %(2 kHz)	1 : 100 %(200 Hz) 3 : 100 %(20 kHz)	
	Measurement mode Power freq.	0 to 2	0 : 50 Hz	1 : 60 Hz	2 : 400 Hz
	Measurement mode Freq. deviation	Fixed to 0	0: ±50%		
	Measurement mode Pulse count	Fixed to 0	0: 40000		
	Measurement mode Pulse integ.	0 to 14	0 : 50 k 3 : 500 k 6 : 5 M 9 : 50 M 12 : 500 M	1 : 100 k 4 : 1 M 7 : 10 M 10 : 100 M 13 : 1000 M	2 : 200 k 5 : 2 M 8 : 20 M 11 : 200 M 14 : 2000 M
Remarks	The data ranges and items vary according to the measurement mode setting in P5.				

P5	Measurement mode			
Data range	0 to 8	0: Period	1: Frequency	2: Rotation speed
		3: Pulse width	4: Duty cycle	5: Power freq.
		6: Freq. deviation	7: Pulse count	8: Pulse integ.

P6	Response speed

Data range	0 to 1000

P7	Smoothing process, pulse polarity		
Data range	Smoothing process	0 to 1	0 : OFF 1 : ON
	Pulse polarity	0 to 1	0 : Positive 1 : Negative

P8	Smoothing count, gate time, auto reset				
Data range	Smoothing count	2 to 100			
	Gate time	0 to 8	0 : 200 ms 3 : 2 s 6 : 20 s	1 : 500 ms 4 : 5 s 7 : 30 s	2 : 1 s 5 : 10 s 8 : 60 s
	Auto reset	0 to 3	0 : OFF 3 : Start & Over	1 : Start	2 : Over

P9	Pulse average process		
Data range	0 to 1	0 : OFF	1 : ON

P10	Pulse average count
Data range	2 to 4096

P11	Pulses per revolution, pulse polarity, center frequency	
Data range	Pulses per revolution	1 to 100
	Pulse polarity	0 to 1 0 : Positive 1 : Negative
	Center frequency	6.6 to 13000.0

CH3/CH4 parameters

P1	Slot
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	Specifies the slot where the target module is installed. When "F" is specified, all modules of the same type are targeted.

P2	Channel
Data range	3 to 4
Remarks	Specifies the channel of the target module.

P3	Measurement ON/OFF		
Data range	0 to 1	0 : OFF	1 : ON

P4	Range					
Data range	0 to 8	0 : 500 V 5 : 10 V	1 : 200 V 6 : 5 V	2 : 100 V 7 : 2 V	3 : 50 V 8 : 1 V	4 : 20 V

P5	Coupling
Data range	0 to 2　　0 : GND　1 : DC　2 : AC

P6	Low-pass filter （CH3/CH4）
Data range	0 to 3　　0 : OFF　1 : 300 Hz　2 : 3 kHz　3 : 30 kHz

P7	Threshold
Data range	−40 to 40
Remarks	The parameter value is the ratio (%) to the measurement range in P4. (Example) Set this parameter to 10 to have a threshold voltage of 20 V with a measurement range of 200 V.

P8	Hysteresis
Data range	1 to 10

3.2.9. M09: RA30-109 (2ch acceleration module) configuration and querying

Command	M09	
Command message	Setting:	M09 <P1>,<P2>, • • • ,<P11>
	Query:	M09?
Response message	Setting:	ACK M09
	Query:	ACK M09?, <P1>,<P2>, • • • ,<P11>
Remarks	Configures settings or submits a query regarding the RA30-109. Refer to "**Using Optional Modules**" – "**2ch Acceleration Module (RA30-109)**" in the instruction manual of the RA3100.	

Parameter

P1	Slot	
Data range	Setting:	1 to 9, F
	Query:	1 to 9
Remarks	Specifies the slot where the target module is installed. When "F" is specified, all modules of the same type are targeted.	

P2	Channel	
Data range	Setting:	1 to 2, F
	Query:	1 to 2
Remarks	Specifies the channel of the target module. When "F" is specified, all channels are targeted.	

P3	Measurement ON/OFF
Data range	0 to 1　　0 : OFF　1 : ON

P4	Measurement range
Data range	0 to 19
Remarks	The items vary according to the measurement mode setting in P5. The data ranges vary according to the sensor sensitivity setting in P10. For information on the relationship between the measurement mode and items and the relationship between the sensor sensitivity and data ranges of each measurement range, refer to "**Table of data ranges for each measurement range**".

P5	Measurement mode
Data range	0 to 3 0: OFF 1: Acceleration 2: Velocity 3: Displacement

P6	Low-pass filter
Data range	0 to 4 0 : OFF 1 : 20 Hz 2 : 200 Hz 3 : 2 kHz 4 : 20 kHz

P7	Anti-aliasing filter
Data range	0 to 1 0 : OFF 1 : ON
Remarks	When set to ON, the filter is set according to the sampling speed of the SSD.

P8	Sensor
Data range	0 to 1 0: Preamp 1: Charge Conv.
Remarks	Must be specified together with the measurement range in P4 and the sensor sensitivity in P10. An NAK message is returned if it is not specified.

P9	Gain
Data range	0 to 2 0 : 0.1 mV/pC 1 : 1.0 mV/pC 2 : 10 mV/pC
Remarks	Must be specified together with the measurement range in P4 and the sensor sensitivity in P10. An NAK message is returned if it is not specified.

P10	Sensor sensitivity
Data range	0.100 to 100.000 (Preamp) 1.00 to 1000.00 (Charge Conv., 0.1 mV/pC) 0.100 to 100.000 (Charge Conv., 1.0 mV/pC) 0.0100 to 10.0000 (Charge Conv., 10 mV/pC)
Remarks	The data ranges vary according to the sensor in P8 and gain in P9. Must be specified together with the measurement range in P4. An NAK message is returned if it is not specified.

P11	Calculation mode
Data range	0 to 4 0 : OFF 1 : Envelope 2 : RMS(Fast) 3 : RMS(Mid) 4 : RMS(Slow)

Table of data ranges for each measurement range

P4: Measurement range				P10: Sensor sensitivity									P8: Sensor	P9: Gain
	P5: Measurement mode			0.100 ~ 0.250	0.251 ~ 0.500	0.501 ~ 1.000	1.001 ~ 2.500	2.501 ~ 5.000	5.001 ~ 10.000	10.001 ~ 25.000	25.001 ~ 50.000	50.001 ~ 100.000	Preamp	
				1.00 ~ 2.50	2.51 ~ 5.00	5.01 ~ 10.00	10.01 ~ 25.00	25.01 ~ 50.00	50.01 ~ 100.00	100.01 ~ 250.00	250.01 ~ 500.00	500.01 ~ 1000.00	Charge Conv.	0.1 mV/pC
				0.100 ~ 0.250	0.251 ~ 0.500	0.501 ~ 1.000	1.001 ~ 2.500	2.501 ~ 5.000	5.001 ~ 10.000	10.001 ~ 25.000	25.001 ~ 50.000	50.001 ~ 100.000		1.0 mV/pC
				0.0100 ~ 0.0250	0.0251 ~ 0.0500	0.0501 ~ 0.1000	0.1001 ~ 0.2500	0.2501 ~ 0.5000	0.5001 ~ 1.0000	1.0001 ~ 2.5000	2.5001 ~ 5.0000	5.0001 ~ 10.0000		10 mV/pC
	Acceleration	Velocity	Displacement											
0	1 m/s^2	10 mm/s	100 µm									○		
1	2 m/s^2	20 mm/s	200 µm								○	○		
2	3.16 m/s^2	31.6 mm/s	316 µm								○	○		
3	5 m/s^2	50 mm/s	500 µm							○	○	○		
4	10 m/s^2	100 mm/s	1 mm						○	○	○	○		
5	20 m/s^2	200 mm/s	2 mm					○	○	○	○	○		
6	31.6 m/s^2	316 mm/s	3.16 mm					○	○	○	○	○		
7	50 m/s^2	500 mm/s	5 mm				○	○	○	○	○	○		
8	100 m/s^2	1 m/s	10 mm			○	○	○	○	○	○	○		
9	200 m/s^2	2 m/s	20 mm		○	○	○	○	○	○	○			
10	316 m/s^2	3.16 m/s	31.6 mm		○	○	○	○	○	○				
11	500 m/s^2	5 m/s	50 mm	○	○	○	○	○	○	○				
12	1 km/s^2	10 m/s	100 mm	○	○	○	○	○	○					
13	2 km/s^2	20 m/s	200 mm	○	○	○	○	○						
14	3.16 km/s^2	31.6 m/s	316 mm	○	○	○	○							
15	5 km/s^2	50 m/s	500 mm	○	○	○	○							
16	10 km/s^2	100 m/s	1 m	○	○	○								
17	20 km/s^2	200 m/s	2 m	○	○									
18	31.6 km/s^2	316 m/s	3.16 m	○										
19	50 km/s^2	500 m/s	5 m	○										

3.2.10. M12: RA30-112 (remote control module) configuration and querying

Command	M12
Command message	Setting: M12 <P1>,<P2>, • • • ,<P8> Query: M12? <P1>
Response message	Setting: ACK M12 Query: ACK M12?,<P1>,<P2>, • • • ,<P8>
Remarks	Configures settings or submits a query regarding the RA30-112. Refer to "**Using Optional Modules**" - "**Remote Control Module (RA30-112)**" in the instruction manual of the RA3100.

Parameters

P1	Slot number
Data range	Setting: 1 to 9, F Query: 1 to 9
Remarks	The RA30-112 can only install slot 9. This parameter is shown the same P1 of other modules because of unified parameters.

P2	Response speed (filter time)
Data range	0 to 2 0 : Slow 1 : Normal 2 : Fast

P3	TRIG/EXT.1
Data range	0 to 1 0 : TRIG 1 : EXT.1
Remarks	When 1 : EXT.1 is used, the setting of P5 needs.

P4	Type of trigger signal
Data range	0 to 2 0 : OFF 1 : Start trigger 2 : Memory trigger

P5	EXT.1 output condition
Data range	0 to 7 [b0111] The calculation formula of the parameter is as follows: Parameter of bit 2 x 2^2 + Parameter of bit 1 x 2^1 + Parameter of bit 0 x 2^0 bit 0 : System error bit 1 : Printer error bit 2 : Out of range When setting parameter to enable, set bit to 1. When setting parameter to invalid, set bit to 0.
Remarks	Example: How to output signal from TRIG/EXT.1 OUT terminal of RA30-112 : When outputting system error and printer error, set 3. When outputting printer error only, set 2. When the recorder is set only, even if system error occurs, it isn't outputted. Specify P3 to 1 : EXT.1.

P6	OSC/EXT.2
Data range	0 to 1 0 : OSC 1 : EXT.2
Remarks	When 1 : EXT.2 is used, the setting of P8 needs.

P7	Carrier signal source (OSC) for the AC strain module
Data range	0 to 1　　0 : Internal clock　　1 : External clock

P8	EXT.2 output condition
Data range	0 to 7 [b0111] The calculation formula of the parameter is as follows: Parameter of bit 2 x 2^2 + Parameter of bit 1 x 2^1 + Parameter of bit 0 x 2^0 bit 0 : System error　　bit 1 : Printer error　　bit 2 : Out of range When setting parameter to enable, set bit to 1. When setting parameter to invalid, set bit to 0.
Remarks	Example: How to output signal from TRIG/EXT.2 OUT terminal of RA30-112 : When outputting system error and printer error, set 3. When outputting printer error only, set 2. When the recorder is set only, even if system error occurs, it isn't outputted. Specify P5 to 1 : EXT.2.

3.2.11. M13: RA30-113 (4ch voltage module) configuration and querying

Command	M13	
Command message	Setting:	M13 <P1>,<P2>, • • • ,<P6>
	Query:	M13? <P1>,<P2>
Response message	Setting:	ACK M13
	Query:	ACK M13?, <P1>,<P2>, • • • ,<P6>
Remarks	Configures settings or submits a query regarding the RA30-113. Refer to "**Using Optional Modules**" - "**4ch Voltage Module (RA30-113)**" in the instruction manual of the RA3100.	

Parameters

P1	Slot number	
Data range	Setting:	1 to 9, F
	Query:	1 to 9
Remarks	Specify slot number that the target module is installed. When F is selected, all modules of the same type are target.	

P2	Channel	
Data range	Setting:	1 to 4, F
	Query:	1 to 4
Remarks	Specify channel of target module. When F is selected, all channels are target.	

P3	Measurement ON/OFF
Data range	0 to 1　　0 : OFF　　1 : ON

P4	Measurement range			
Data range	0 to 7	0 : 500 V	1 : 200 V	2 : 100 V
		3 : 50 V	4 : 20 V	5 : 10 V
		6 : 5 V	7 : 2 V	

P5	Input coupling		
Data range	0 to 1	0 : GND	1 : DC

P6	Low pass filter					
Data range	0 to 4	0 : OFF	1 : 3 Hz	2 : 30 Hz	3 : 300 Hz	4 : 3 kHz

3.3. Reading information (I commands)

3.3.1. I00: Reading information of main unit, type, serial No.

Command	I00
Command message	I00
Response message	ACK I00,<A1>
Remarks	The recorder information is outputted by ACK response. Refer to "**Setup Details**" - "**Version Management**" in the instruction manual of the RA3100.

ACK response

A1	Recorder information
Content of response	Format : Product name (SP) Model (SP) Recorder version (SP) Serial number (Example of ACK response) omniace RA3100 VerAA.BB.CC S/N36XXXXXX
Remarks	AA = Major Version BB = Minor Version CC = Revision XXXXXX = Serial number

3.3.2. I04: Reading board information of input module

Command	I04
Command message	I04
Response message	ACK I04,<A1>,<A2>,・・・,<A9>
Remarks	The board information of input module installed in slot is read. Refer to "**Setup Details**" – "**Version Management**" in the instruction manual of the RA3100.

ACK response

A1 to A9	Module information installed in slot 1 to slot 9
Content of response Data range	A1 : Information of slot 1, A2 : Information of slot 2, • • • A9 : Information of slot 9 0, 1 0: Not installed [bit 31 to 24]: Major Version [bit 23 to 16]: Minor Version [bit 15 to 8]: Revision [bit 7 to 0]: ID
Remarks	Version and ID of module installed in slot are outputted. 32 bit data in decimal number is responded. The module can identify using ID. ID 1 = RA30-101 2 = RA30-102 3 = RA30-103 4 = RA30-104 5 = RA30-105 6 = RA30-106 7 = RA30-107 8 = RA30-108 9 = RA30-109 12 = RA30-112

3.3.3. I05: Reading the status of main unit

Command	I05
Command message	I05
Response message	ACK I05,<A1>
Remarks	The status of recorder is read.

ACK response

A1	Status			
Content of response	0 to 5	0 : Preparing	1 : Measuring	2 : Recording
		3 : Stopping recording	4 : Printing	5 : Stopping printing

3.3.4. I07: Recording setting error readout

Command	I07
Command message	I07
Response message	ACK I07,<A1>
Remarks	Reads whether there is an error in the recording settings.

ACK response

A1	Status
Content of response	0 - bit 0 : System error bit 1 : Insufficient SSD capacity bit 2 : Recording time bit 3 : Recording sample count bit 4 : Interval recording count bit 5 : Interval time bit 6 : Memory recording active bit 7 : Memory recording sampling speed bit 8 : Memory block count bit 9 : Memory block sample count bit 10 : SSD recording active bit 11 : SSD recording sampling speed bit 12 : Printer recording active bit 13 : Printer recording sampling speed bit 14 : Module channel measurement OFF bit 15 : Recording start time bit 16 : Remote module not inserted bit 17 : Recording folder count upper limit bit 18 : Recording mode
Remarks	If "0", there is no error. If other than "0", there is an error. A decimal number is output with the bits corresponding to the content of the error on. (Example ACK response) ACK I07,131088(CR)(LF) 131088 (decimal) = 010 0000 0000 0001 0000 (binary) bit 4 : Interval recording count bit 17 : Recording folder count upper limit

3.3.5. I09: Physical quantity calculation coefficient readout

Command	I09
Command message	I09 <P1>,<P2>
Response message	ACK I09,<A1>,<A2>,<A3>
Remarks	Reads the information required for conversion from the AC count value to the physical quantity. (example) When AD count value = 32000, <A1> = 3.125E-03, <A2> = 0E+00, and <A3> =<STX>V<ETX> Physical value = 32000 × 3.125E-03 + 0E+00 = 100 [V]

Parameter

P1	Slot
Data range	1 to 9
Remarks	The slot number where the target module is installed.

P2	Channel
Data range	1 to 4
Remarks	The target channel number.

ACK response

A1	Gain
Content of response	Numeric value (range: double type)
Remarks	The value to multiply with the AD count value.

A2	Offset
Content of response	Numeric value (range: double type)
Remarks	The value to add to the AD count value.

A3	Unit
Content of response	String
Remarks	Maximum 10 characters. Enclosed between <STX> [0x02] and <ETX> [0x03]. (Example) <STX>V<ETX>

3.3.6. I10: Recording data count readout

Command	I10
Command message	I10
Response message	ACK I10,<A1>
Remarks	Reads the number of items for the recording data saved in the main unit.

ACK response

A1	Recording data count
Content of response	0 to 1000

3.3.7. I11: Data transfer status readout

Command	I11
Command message	I11
Response message	ACK I11,<A1>
Remarks	Reads the data transfer status.

ACK response

A1	Status
Content of response	-1 to 3 -1 : Error 0 : OFF 1 : Disconnected 2 : Stanby 3 : Transferring

3.3.8. I12: Used block count readout

Command	I12
Command message	I12
Response message	ACK I12,<A1>,<A2>
Remarks	Reads the number of blocks for memory recording.

ACK response

A1	Number of used blocks
Content of response	0 to 200
Remarks	The number of blocks for which capture is complete within the number of recorded blocks (number of memory divisions). The response is "0" if memory recording is not used or the main unit is in a state other than recording.

A2	Number of recorded blocks (number of memory divisions)
Content of response	0 to 200
Remarks	The response is "0" if memory recording is not used or the main unit is in a state other than recording.

3.4. Execution process (E commands)

3.4.1. E01: Execute canceling the input offset (zero-cancel)

Command	E01
Command message	E01 <P1>,<P2>
Response message	ACK E01
Remarks	The E01 performs zero-cancel of target channel. Refer to "**Using Optional Modules**" – "**2ch Voltage Module (RA30-101)**" in the instruction manual of the RA3100. Other module that equips zero-cancel function is same, too.

Parameters

P1	Slot number
Data range	1 to 9, F
Remarks	Specify slot number that the target module is installed. When F is selected, all modules are target.

P2	Channel
Data range	1 to 4, F
Remarks	Specify channel of module selected at P1. When F is selected, all channels are target.

3.4.2. E07: Execute start and end recording

Command	E07
Command message	E07 <P1>
Response message	ACK E07
Remarks	The E07 performs starting and ending of recording. When starting command is received during recording, error occurs. Refer to "**Measuring Input Signals**" – "**Starting and Ending Recording**" in the instruction manual of the RA3100.

Parameters

P1	Starting and ending of recording
Data range	0 to 1 0 : End 1 : Start
Remarks	For "0: End", the post-process (save process and print end process) for stopping recording has not completed when the ACK message is returned. An NAK message is returned if the next command is received before the post-process is complete. For information on the method for waiting for the post-process to complete, refer to "5.1.2 Start or stop recording".

3.4.3. E15: Feed execution

Command	E15
Command message	E15 <P1>
Response message	ACK E15
Remarks	Specify the length of paper feeding.

Parameters

P1	Length of paper feeding [mm]
Data range	0 to 100
Remarks	The specified length is fed. If P1 isn't specified, field length of S44 is used.

3.4.4. E16: Execute print header, footer and annotation

Command	E16
Command message	E16 <P1>
Response message	ACK E16
Remarks	Header, annotation, footer are printed. Refer to "**Setup Details**" – "**Printer**" in the instruction manual of the RA3100.

Parameters

P1	Printing target
Data range	0 to 2 0 : Header 1 : Annotation 2 : Footer
Remarks	Selected item is printed. Printing item is selected at "**3.1.17. S37: Header, footer, and annotation configuration and querying**".

3.4.5. E17: TRIG execution

Command	E17
Command message	E17
Response message	ACK E17
Remarks	Generates a trigger. The trigger is output from the TRIG OUT signal of the RA30-112 (remote control module).

3.4.6. E18: MARK execution

Command	E18
Command message	E18
Response message	ACK E18
Remarks	Generates a mark. The mark is not output from the TRIG OUT signal of the RA30-112 (remote control module).

3.4.7. E19: PRINT control

Command	E19
Command message	E19 <P1>
Response message	ACK E19
Remarks	Starts or stops pen recording.

Parameter

P1	Start or stop pen recording
Data range	0 to 1 0: Stop pen recording 1: Start pen recording
Remarks	

3.4.8. E22: BAL execution

Command	E22
Command message	E22 <P1>,<P2>
Response message	ACK E22
Remarks	Executes BAL for the specified channel of the RA30-104 (2ch AC strain module). Refer to "**Using Optional Modules**" – "**2ch AC Strain Module (RA30-104)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	1 to 9, F
Remarks	Specifies the slot where the RA30-104 (2ch AC strain module) is installed. When "F" is specified, all RA30-104 (2ch AC strain modules) are targeted.

P2	Channel
Data range	1 to 2, F
Remarks	Specifies the channel of the module specified in P1. When "F" is specified, all channels are targeted.

3.4.9. E23: Bridge check

Command	E23
Command message	E23 <P1>,<P2>
Response message	ACK E23
Remarks	Executes a bridge check for the specified channel of the RA30-104 (2ch AC strain module). Refer to "**Using Optional Modules**" - "**2ch AC Strain Module (RA30-104)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	1 to 9, F
Remarks	Specifies the slot where the RA30-104 (2ch AC strain module) is installed. When "F" is specified, all RA30-104 (2ch AC strain modules) are targeted.

P2	Channel
Data range	1 to 2, F
Remarks	Specifies the channel of the module specified in P1. When "F" is specified, all channels are targeted.

3.4.10. E24: TEDS readout

Command	E24
Command message	E24 <P1>,<P2>
Response message	ACK E24
Remarks	Executes TEDS reading for the specified channel of the RA30-109 (2ch acceleration module). Refer to "**Using Optional Modules**" - "**2ch Acceleration Module (RA30-109)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	1 to 9, F
Remarks	Specifies the slot where the RA30-109 (2ch acceleration module) is installed. When "F" is specified, all RA30-109 (2ch acceleration modules) are targeted.

P2	Channel
Data range	1 to 2, F
Remarks	Specifies the channel of the module specified in P1. When "F" is specified, all channels are targeted.

3.4.11. E25: Count reset

Command	E25
Command message	E25 <P1>,<P2>
Response message	ACK E25
Remarks	Resets the pulse integration value of the RA30-108 (2ch frequency module). Refer to "**Using Optional Modules**" – "**2ch Frequency Module (RA30-108)**" in the instruction manual of the RA3100.

Parameter

P1	Slot
Data range	1 to 9, F
Remarks	Specifies the slot where the RA30-108 (2ch frequency module) is installed. When "F" is specified, all RA30-108 (2ch frequency modules) are targeted.

P2	Channel
Data range	1 to 2, F
Remarks	The measurement mode of the module specified in P1 specifies the channel of pulse integration. When "F" is specified, all channels are targeted.

3.4.12. E27: Recorded data deletion

Command	E27
Command message	E27 <P1>
Response message	ACK E27
Remarks	Deletes the recorded data saved on the internal SSD.

Parameter

P1	Target for deletion
Data range	F: Delete all Name of recorded data folder (18 digit number): Delete specified folder.
Remarks	The deletion process starts after the ACK response is received. The status of the deletion process can be checked using the "3.3.3. I05: **Reading the status of main unit**" command. "0" (preparing) is returned if the deletion process is ongoing or "1" (measuring) is returned if the deletion process is complete.

3.4.13. E29: Data transfer manual control

Command	E29
Command message	E29 <P1>
Response message	ACK E29
Remarks	Performs manual transfer control for data transfer. Can only be executed when data transfer is enabled and set to the manual transfer mode.

Parameter

P1	Manual control		
Data range	0 to 1	0 : Stop	1 : Start

3.4.14. E32: Saved data deletion

Command	E32
Command message	E32 <P1>,<P2>,<P3>
Response message	ACK E32
Remarks	Deletes the data saved in the main unit. Refer to "File Management" in the instruction manual of the RA3100. The deletion process starts after the ACK response. The status of the deletion process can be retrieved using the "3.3.3 I05: **Reading the status of main unit**" command. If the deletion process is ongoing, the response is "0: Preparing". If the deletion process is complete, the response is "1: Measuring"

Parameters

P1	Saved data		
Data range	0 to 1	0: Recorded data	1: CSV data
Remarks	Select the saved data to delete.		

P2	Deletion type		
Data range	0 to 1	0: Batch deletion	1: Individual deletion
Remarks			

P3	Name
Data range	Enter a string. Encoded in UTF-8.
Remarks	Specify the folder name of the recorded data or CSV data. This is required when P2 is set to "1: Individual deletion". Enclose the string between <STX> [0x02] and <ETX> [0x03]. Retrieve the folder name from the FTP client. Refer to "**Downloading the Data of this Product via FTP**" in the instruction manual of the RA3100.

4. Specifications of hardware

4.1. LAN port

Items	Specifications
Adaptable standards	IEEE802.3 complied with standards (1000BASE-T, 100BASE-TX, 10BASE-T)
Connector	RJ-45
Port	1

4.2. COM port

Items	Specifications
Adaptable standards	EIA-574 complied with standards
Communication speed	300 to 460800 bps
Data length	8 bit fixed
Stop bit	1 bit, 2 bit selection
Parity bit	None, odd, even, mark, space selection
Flow control	None, Xon/Xoff, Hardware (CTS/RTS) selection
Connector	D-sub 9 pin
Port	1

Pin assignment :

Pin No.	Name	IN/OUT	Functions
1	N.C.	-	
2	RxDATA	IN	Receive data
3	TxDATA	OUT	Transmit data
4	N.C.	-	
5	GND		GND
6	N.C.	-	
7	RTS	OUT	Request to send
8	CTS	IN	Clear to send
9	N.C.	-	

5. Appendix

5.1. Command operation procedure

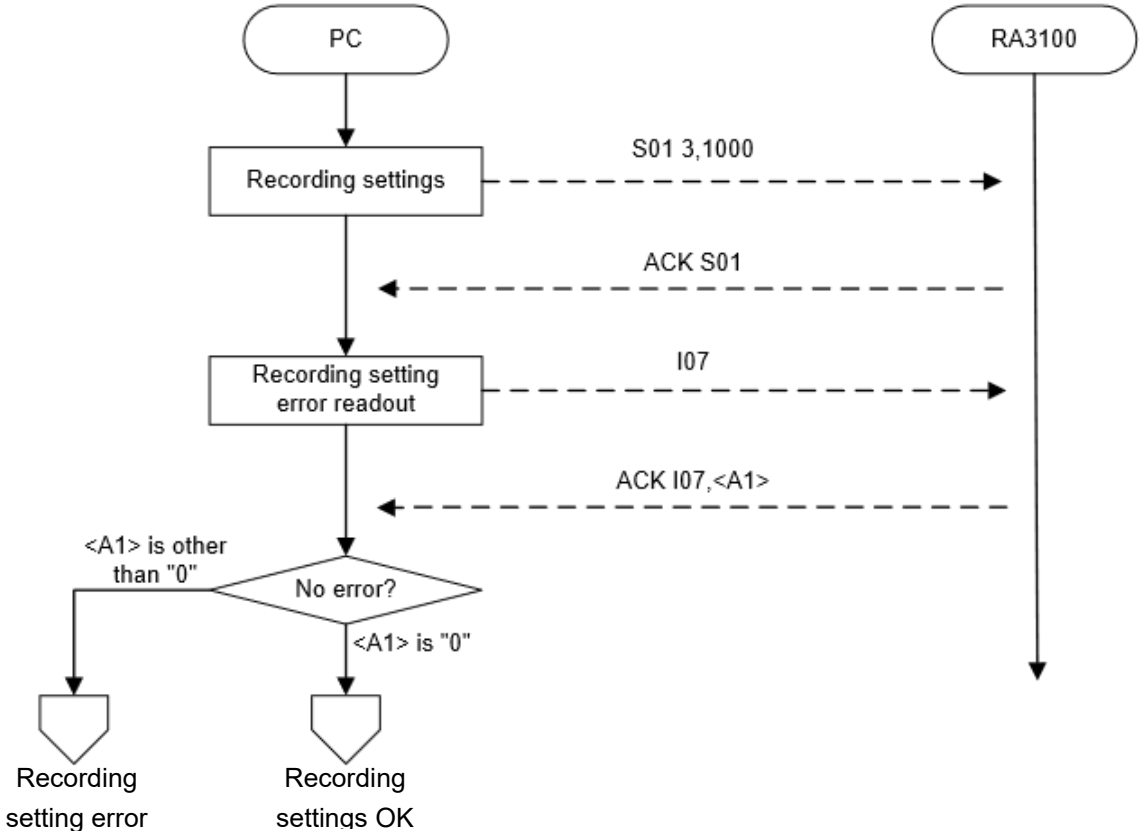
5.1.1. Recording settings

Example command for configuring and checking recording settings

Even if an ACK response is successfully received for the following commands regarding recording settings, recording may not be able to be started in some cases, due to reasons such as insufficient SSD capacity.

- S01 Common recording configuration command
- S02 Memory recording configuration command
- S03 SSD recording configuration command
- S04 Printer recording configuration command

Use I07 (recording setting error readout command) to check whether a recording setting error occurred after issuing a command regarding recording configuration.



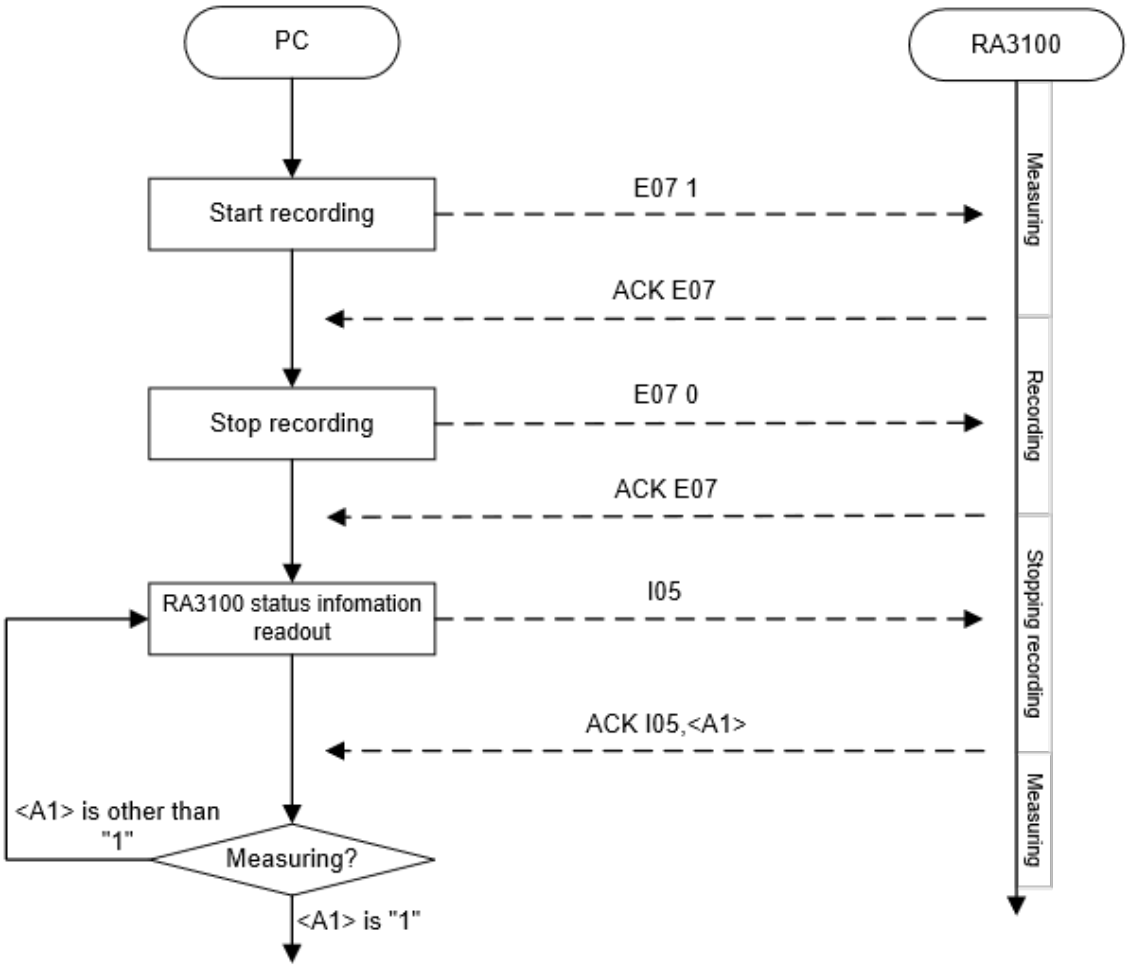
*Dotted lines indicate communication

5.1.2. Start or stop recording

Example command to start and stop recording

Issue E07 1 (recording start command) to start recording.
To stop recording, issue E07 0 (recording stop command).

When the ACK message for stopping recording is returned, the response is "stopping recording" because the post-process for stopping recording (such as the save process and print end process) has not completed. A NAK message is returned if a command other than an I command is received while stopping recording. Issue the next command after the post-process for stopping recording is complete and the response for I05 (RA3100 status information readout command) is "measuring".



*Dotted lines indicate communication

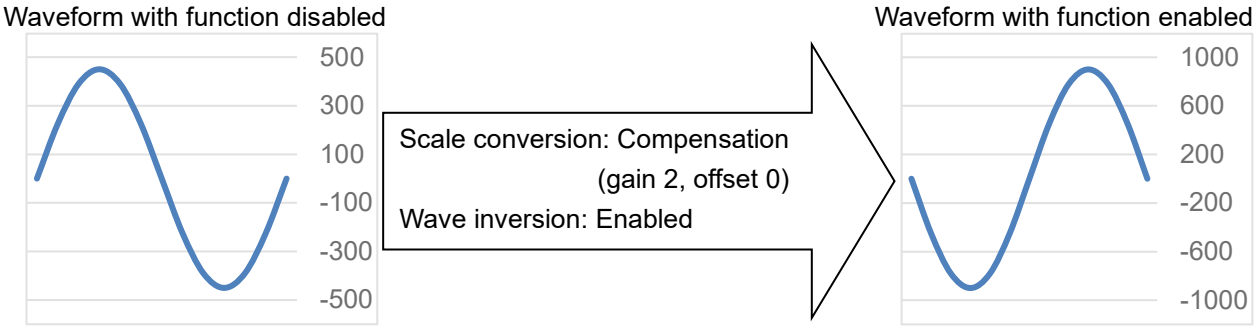
5.2. Cautions when using the scale conversion function and wave inversion function

For the following command parameters, the scale conversion (physical quantity conversion) function and wave inversion function are automatically reflected.
Therefore, even if the function is enabled, it is necessary to specify values and settings for the waveform with the function disabled.

Command	Parameters		
S21: Start-trigger configuration (analog input signal)	P4: Trigger threshold upper limit value	P5: Trigger threshold lower limit value	P6: Trigger type
S24: Memory-trigger configuration (analog input signal)	P5: Trigger threshold upper limit value	P6: Trigger threshold lower limit value	P7: Trigger type
M04: RA30-104 settings	P7: CAL	P8: CAL value	P9: R-FINE

Example of issuing command with function enabled

An example of execution by issuing a command with scale conversion and wave inversion performed.

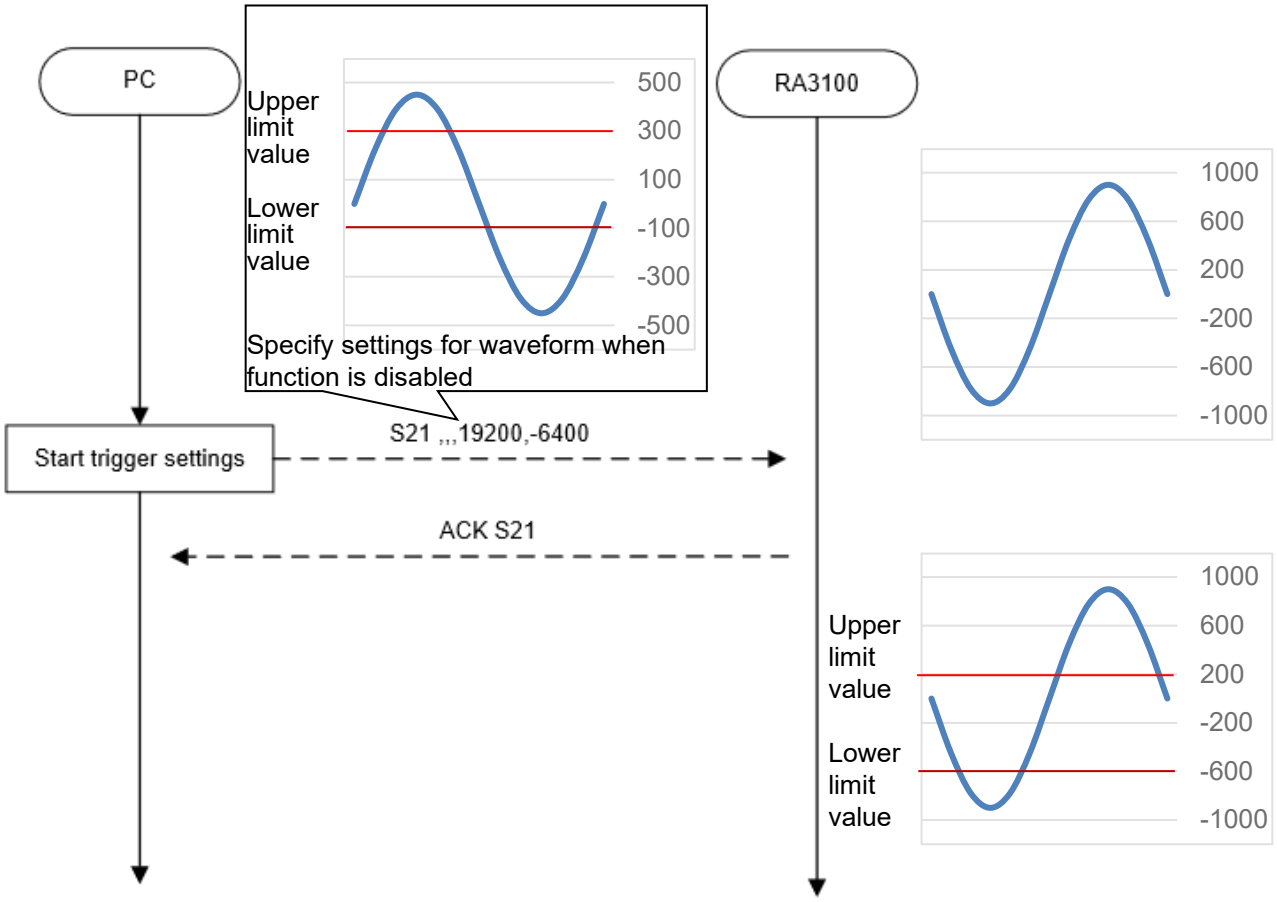


S21: Start-trigger configuration
To set the upper limit value to 200 V and lower limit value to -600 V for the waveform with the function enabled, it is necessary to consider the waveform with the function disabled and issue the commands in P4 and P5.

P4: Specify 300 V (19200) as the trigger threshold upper limit value.

P5: Specify -100 V (-6400) as the trigger threshold lower limit value.

The settings displayed as a result are upper limit 200 V and lower limit value -600 V, with scale conversion and wave inversion reflected.


PC
RA3100
Upper limit value
Lower limit value
500
300
100
-100
-300
-500
Specify settings for waveform when function is disabled
1000
600
200
-200
-600
-1000
Start trigger settings
S21 ,,,19200,-6400
ACK S21
Upper limit value
Lower limit value
1000
600
200
-200
-600
-1000

Omniace
RA3100

Communication command 1WMPD4004790B 3rd Edition

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