



LJ-V7000 Series LabVIEW measuring instrument drivers

Reference Manual

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2. Introduction

The LJ-V7000 Series LabVIEW measuring instrument drivers provides a communication interface for controlling the LJ-V7000

The drivers have been created based on the LabVIEW standard plug-and-play measuring instrument driver template, which allows selection of VI from the LabVIEW function pallet (instrument I/O), in a similar way to many other plug-and-play measuring instrument drivers.

3. Operating Environment

The following operating environment and National Instruments LabVIEW 8.6 or later (32 bit) are required to use the LJ-V7000 Series LabVIEW measuring instrument drivers. In addition, LJ-Navigator2 needs to be installed.

OS	Windows 7 (Home Premium/Professional/Ultimate) Windows Vista (Home Basic/Home Premium/Business/Ultimate) Windows XP (SP2 or later) (Home Edition/Professional Edition)
CPU	Core i3 2.3 GHz or faster (Core2 Duo 2.8 GHz or faster)
Memory	2 GB or more
Secondary cache memory	2 MB or more
Free drive space	10 GB or more
Interface	A PC equipped with either of the interfaces below. USB 2.0/1.1 *1, Ethernet 1000BASE-T/100BASE-TX *2

*1 Operation is not guaranteed with connections via a USB hub

*2 Operation is not guaranteed with connections to a LAN or via a router

4. Installation Steps

Follow the installation steps described below to install the LJ-V7000 Series LabVIEW measuring instrument driver.

- (1) Copy the entire folder containing "Keyence LJ-V7000" to the instr.lib folder of LabVIEW.

Location of the instr.lib folder Example: C:\Program Files(x86)\National Instruments\LabVIEW 2012\instr.lib

- (2) Click Tools > Advanced > Mass Compile in LabView.

- (3) Select the "Keyence LJ-V7000" folder copied to instr.lib in "Select a directory to be compiled" and click the "Current folder".

- (4) Click "Mass compile".

* Bad VI: When the warning message "Keyence LJ-V7000.lvlib: VI Tree.vi" occurs, click "Done".

- (5) Copy the error code file (Keyence_LJ-V7000-errors.txt) to the errors folder in the LabVIEW user.lib folder.

Location of the errors folder

Example: C:\Program Files\National Instruments\LabVIEW 2012\user.lib

* If there is no errors folder, create an errors folder within the above-mentioned user.lib folder and copy the error code file into it.

This completes the installation. However, you need to restart LabVIEW in order to use it.

* To uninstall LabVIEW, delete the file copied to the instr.lib folder in step (2) and the file copied to the user.lib folder in step (5) above.

5. How to Use Instrument Drivers

Select View > Functions Palette > Instrument I/O > Instr Drivers > "Keyence LJV7000" to select driver VI or sample VI. For specific ways to use the communication library, refer to the sample VI.

<Overvier of sample VI>

A : Read Measurement Data



→ Obtain the measurement results in Advanced mode

B : Read Profiles(for High-Speed Mode)



→ Read profiles in High speed mode with batch turned OFF

C : Read Batch Profiles(for High-Speed Mode)



→Read profiles in High speed mode with batch turned ON

D : Read Profiles(for High-Speed Data Communication)



→Read profiles in High speed mode via high speed communication

E : Configure



→Send/receive settings

* For more information on sample VI, refer to Chapter 8.














6. Instrument Drivers Package

This section provides a brief description of each of the VI instrument drivers. For more information, refer to Context Help in the VI file.

Items used in Sample VI A – E are marked with a circle in the right hand boxes.

Icon	VI name	Description of VI	Sample VI				
			A	B	C	D	E
	VI tree	Display all the user-callable VIs of the instrument driver in an organized table.					
	Initialize	Communication with the controller is established.	○	○	○	○	○
	Close	Communication with the controller is terminated.	○	○	○	○	○
	Reboot Controller	This function reboots the controller and connected devices.					
	Return to Factory State	This function returns all of the controller's settings to the factory state.					
	Get System Error	This function gets the controller's system error information.					
	Clear System Error	This function clears the system error occurring on the controller.					
	Trigger	This function issues a trigger.					

	Start Batch Measurements	This function starts batch measurements.			○		
	Stop Batch Measurements	This function stops batch measurements.			○		
	Auto Zero	This function issues an auto zero request.					
	Timing	This function issues a timing request.					
	Reset	This function issues a reset request.					
	Set Setting	This function sends the setting for the specified item to the controller.					○
	Get Setting	This function gets the setting for the specified item by Target Setting from the controller.					○
	Initialize Setting	This function initializes the setting specified by Target as the initialization target.					
	Reflect Setting	This function reflects the settings stored in the write settings area to the running settings area.					○
	Update Write Settings Area	This function updates the contents of the write settings area with either the settings in the running settings area or the settings saved in the save area.					○
	Check Status of Saving to Save Area	This function checks whether or not the controller is accessing the save area with an operation such as that to save settings.					○
	Set Time	This function sets the date/time for the controller.					
	Get Time	This function gets the date/time from the controller.					
	Change Program	This function changes the active program number.					
	Get Active Program Number	This function gets the date/time from the controller.					
	Read Measurement Data	This function gets the newest measurement results (measurement values and judgment results).	○				
	Read Profiles(for High-Speed Mode)	This function gets profile data when the operation mode is "high-speed" *1, *2		○			
	Read Batch Profiles(for High-Speed Mode)	This function gets profile data when the operation mode is "high-speed" and Batch measurement: on. *If Compression (time axis) is ON, use Read Profiles (for High-Speed Mode) VI. *1, *2			○		
	Read Profiles(for Advanced Mode)	This function gets profile data when the operation mode is "Advanced(with OUT measurement)" *1					

	Read Batch Profiles(for Advanced Mode)	This function gets profile data when the operation mode is "Advanced (with OUT measurement)" and Batch measurement: on. *If Compression (time axis) is ON, use Read Profiles(for Advanced Mode) VI. *1					
	Extract-Header-Data-Array	Only various data composing headers will be extracted to output in one dimensional array from profile data acquired with Read Profiles VI.					
	Extract-Profile-Array	Only height data of profiles without a header and footer will be extracted to output in two-dimensional array from profile data acquired with Read Profiles VI.		○	○	○	
	Start Storage	When the storage condition setting is terminal/command, this function requests the start of storage.					
	Stop Storage	When the storage condition setting is terminal/command, this function requests the stop (cancellation) of storage.					
	Read Storage Status	When the storage target setting is not off, this function gets the storage status. *2					
	Read Data Storage Data	Storage data will be acquired if "storage target" is set to "OUT value". *2, *3					
	Clear Memory	When the operation mode is "high-speed (profile only)", this function clears the profile data accumulated in internal memory.					
		When the operation mode is "advanced (with OUT measurement)", the accumulated storage data is cleared.					
	Read Profile Storage Data	When the storage target setting is profile, this function gets the stored profile data. (Batch setting: off) *1, *2, *3					
	Read Batch Profile Storage Data	When the storage target setting is profile, this function gets the stored profile data. (Batch setting: on) *If Compression (time axis) is ON, use Read ProfileStorage Data VI. *1, *2, *3					
	Start High-Speed Data Communication	High-speed communication with the controller is established to start.				○	
	Stop High-Speed Data Communication	High-speed data communication will be terminated.				○	
	Read Profiles(for High-Speed Data Communication)	Profile data will be acquired by high-speed communication. *1				○	

*1 Refer to sections 10.2 Profile DataAmount Calculation Method and 10.3 Profile Data Storage Order and Specific Examples for use.

*2 Refer to sections 10.1 Internal Memory of Controller for use.

*3 Refer to sections 10.3 - 10.5 Profile Data Storage Order and Specific Examples for use.

7. Error code

The error codes below show a table of error codes and source text that each driver VI outputs to the **error out** output terminal.

These error codes are output according to the judgment of driver VI.

Code	Description of error
5000	Failed to open the communication path.
5001	The communication path was not established.
5002	Failed to send the command.
5003	Failed to receive a response.
5004	A timeout occurred while waiting for the response.
5005	Failed to allocate memory.
5006	An invalid parameter was passed.
5007	The received response data was invalid.
5009	High-speed communication initialization could not be performed.
5010	High-speed communication was initialized.
5011	Error already occurred during high-speed communication (for high-speed communication)
5012	The buffer size passed as an input of the VI is insufficient.

Error codes returned from the controller and output by driver VI. These errors are output if the controller failed to process even though communication with the controller was successful.

Code	Description of error
6000	Status error (when a system error has occurred, etc.)
6001	Parameter error (when an invalid parameter was set, etc.)

Other individual VI error codes.

Code	Description of error
6500	The trigger mode is <u>not</u> "external trigger"
6501	Batch measurements are off
6502	The change program setting is "terminal"
6503	The operation mode is "high-speed (profile only)"
6504	The operation mode is "advanced (with OUT measurement)"
6505	"Batch measurements on and profile compression (time axis) off"
6506	<u>Not</u> "batch measurements on and profile compression (time axis) off"
6507	Storage target setting is "OFF" (no storage)
6508	The storage condition setting is <u>not</u> "terminal/command"
6509	The storage target setting is <u>not</u> "OUT value"
6510	The storage target setting is <u>not</u> profile, or "batch measurements on and profile compression (time axis) off"
6511	The storage target setting is <u>not</u> profile, or <u>not</u> "batch measurements on and profile compression (time axis) off"
6512	The data specified as the send start position does not exist
6700	Accessing the save area
6701	Batch measurement start/stop processing could not be performed because the REMOTE terminal is off or the LASER_OFF terminal is on
6702	No profile data
6703	No batch data (batch measurements not run even once)
6704	The batch data specified by the batch number to read (Read Batch No) in Read Req has not been accumulated yet
6705	Already performing high-speed data communication
6800	The VI has never received the profile data in the high-speed communication within a specified time out frame.
6801	The buffer size passed as an input is insufficient.
6802	High-speed communication has never been started.
6803	Parameter error
6815	System error

<Table listing individual error codes and VIs>

VI name	6500	6501	6502	6503	6504	6505	6506	6507	6508	6509	6510	6511	6512
Trigger	○												
Start Batch Measurements		○											
Stop Batch Measurements		○											
Auto Zero				○									
Timing				○									
Reset				○									
Change Program			○										
Read Measurement Data				○									
Read Profiles(for High-Speed Mode)					○	○							
Read Batch Profiles(for High-Speed Mode)					○		○						
Read Profiles(for Advanced Mode)				○		○							
Read Batch Profiles(for Advanced Mode)				○			○						
Start Storage				○				○	○				
Stop Storage				○				○	○				
Read Storage Status				○									
Read Data Storage Data				○						○			
Read Profile Storage Data				○							○		
Read Batch Profile Storage Data				○								○	
Start High-Speed Data Communication					○								○
Read Profiles(for High-Speed Data Communication)					○								

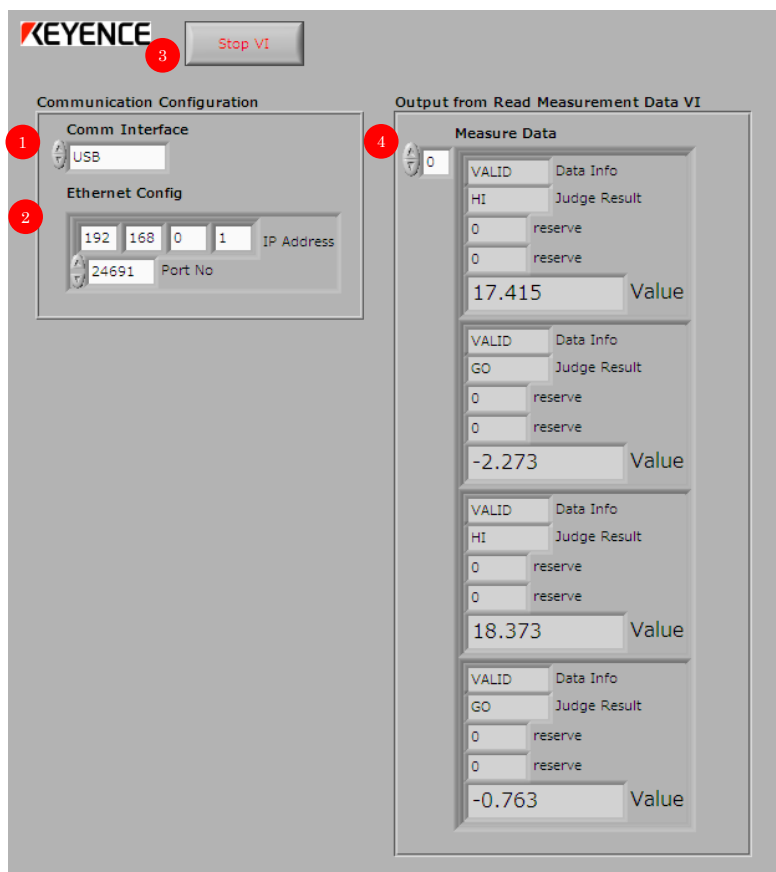
VI name	6700	6701	6702	6703	6704	6705	6800	6801	6802	6803	6815
Reboot Controller	○										
Start Batch Measurements		○									
Stop Batch Measurements		○									
Read Profiles(for High-Speed Mode)			○								
Read Batch Profiles(for High-Speed Mode)				○							
Read Profiles(for Advanced Mode)			○								
Read Batch Profiles(for Advanced Mode)				○							
Read Batch Profile Storage Data					○						
Start High-Speed Data Communication						○					
Read Profiles(for High-Speed Data Communication)							○	○	○	○	○

8.Sample VII

This section describes each Sample VI.

A : Read Measurement Data

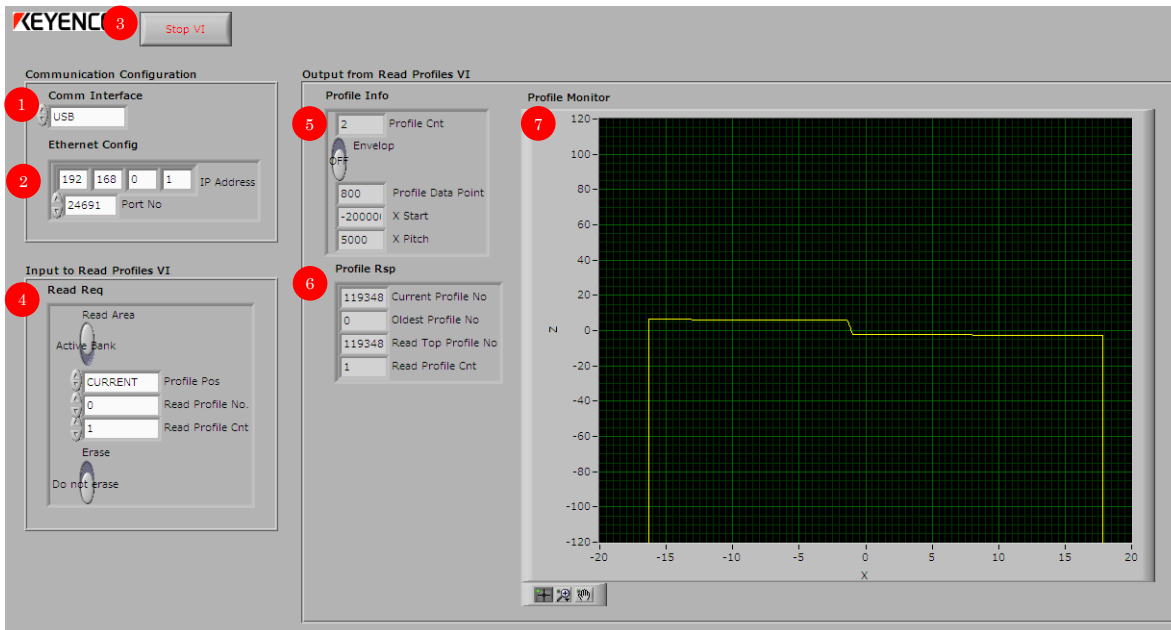
→Read the measurements in Advanced mode. When Sample VI is run, real time measurements are displayed.



①	Select communication path	Select either USB or Ethernet.
②	Ethernet communication setting	Specify the IP address and port number.
③	VI Stop button	Stops VI.
④	Select Display OUT	Displays measurements and evaluation results (HI, GO, LO). Measure Data output array of the Read Measurement Data VI is displayed unchanged as an indicator. To change the range of OUT to be displayed, change the value of the index number within the range 0 to 15.

B : Read Profiles(for High-Speed Mode)

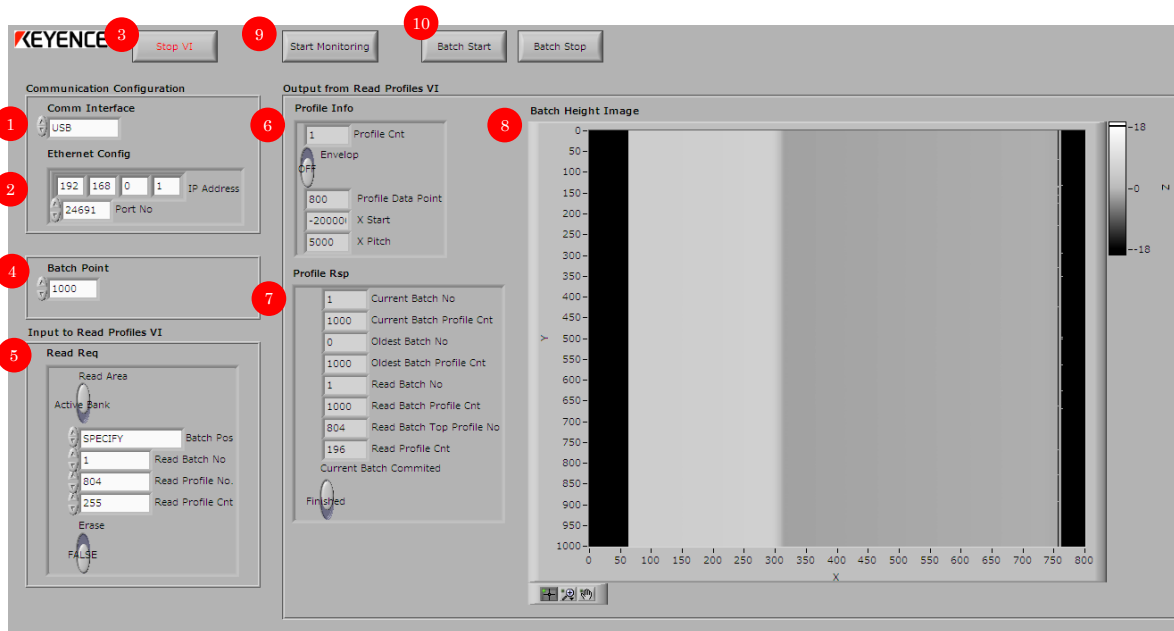
→Read profiles in High speed mode with batch turned OFF.



①	Select communication path	Select either USB or Ethernet.
②	Ethernet communication setting	Specify the IP address and port number.
③	VI Stop button	Stops VI.
④	Input to Read Profile Request	Specify conditions for reading profiles. Read Req input to be connected to Read Profiles (for High-Speed Mode) VI input terminal is displayed as a control. (By default, the latest profile is read from the active surface, and the profile read is set so that it is not cleared from the controller.)
⑤	Profile Information Display	Profile Info output of Read Profiles (for High-Speed Mode) VI is displayed unchanged as a indicator.
⑥	Profile Response Display	Profile Rsp output of Read Profiles (for High-Speed Mode) is displayed unchanged as a indicator.
⑦	Profile Monitor (XY graph)	Profiles are presented in a graph display. Vertical and horizontal axes are expressed in mm units.

C : Read Batch Profiles(for High-Speed Mode)

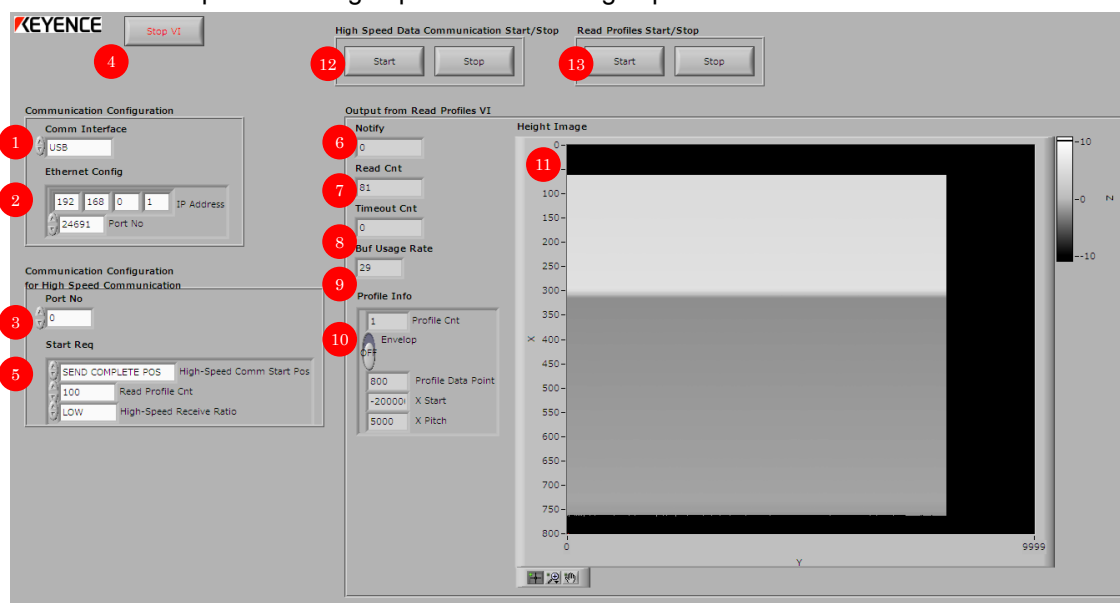
→Read profiles in High speed mode with batch ON.



①	Select communication path	Select either USB or Ethernet.
②	Ethernet communication setting	Specify the IP address and port number.
③	VI Stop button	Stops VI.
④	Batch Point	Specify the number of batch points to be read.
⑤	Input to Read Profile Request	Specify conditions for reading profiles. Read Req input to be connected to Read Batch Profiles (for High-Speed Mode) VI input terminal is displayed as a control.
⑥	Profile Information Display	Profile Info output of Read Profiles (for High-Speed Mode) VI is displayed unchanged as an indicator.
⑦	Profile Response Display	Profile Rsp of Read Profiles (for High-Speed Mode) VI is displayed unchanged as an indicator.
⑧	Height Image Monitor Display	The batch profile read by batch profile reading is displayed as the height image. The horizontal axis represents the X-coordinate. (It is expressed in the unit data quantity, not mm.) The vertical axis represents the batch point orientation. The Z-axis (height direction of LVJ) is shown on a gray scale. (Example: It indicates that the white area is high while the black area is low.)
⑨	Monitor Start button	Reads batch data from the controller. (When reading batch data finishes, VI stops.)
⑩	Batch Start/Stop button	Starts/stops batch measurement.

D : Read Profiles(for High-Speed Data Communication)

→Reads profiles in High speed mode via high speed communication.

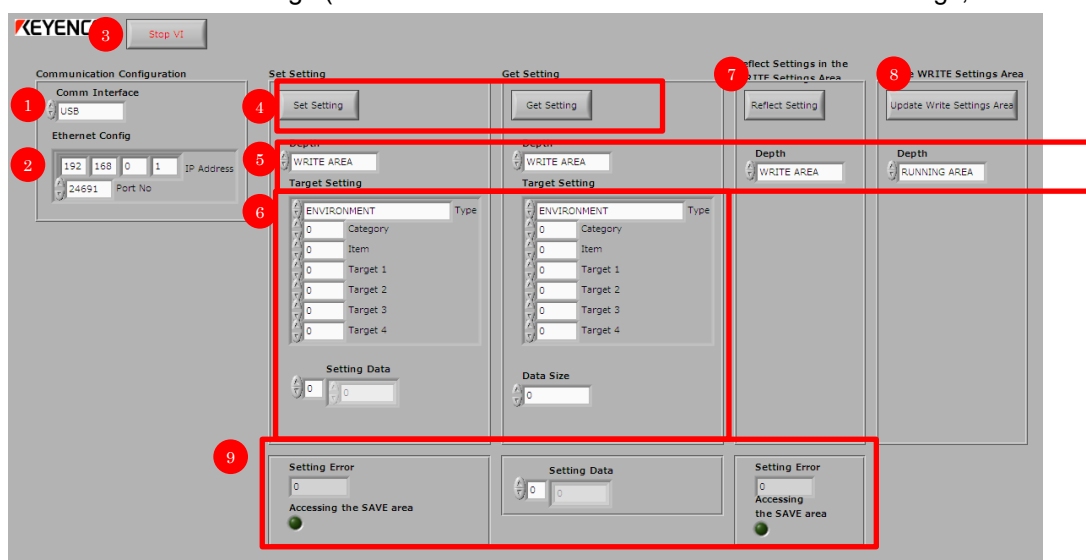


①	Select communication path	Select either USB or Ethernet.
②	Ethernet communication setting	Specify the IP address and port number.
③	Port number for high speed communication	When communications are carried out over Ethernet, specify a port number for high-speed communication set for the controller. * Specify a port number that is different from the one specified in (2).
④	VI Stop button	Stops VI.
⑤	Input to High Speed Communication Request	Specify conditions for high-speed communications. Start Req input connected to the input terminal of Start High-Speed Data Communication VI is displayed unchanged as a control.
⑥	Notify Output	Notify output of Start High-Speed Data Communication VI is displayed unchanged as a control.
⑦	Number of Profiles Read	Indicates how many profiles have been read after profile reading is started in (13). The number of profiles specified in Rsp Profile Cnt in (5) x the number of profiles read in (7) equals the number of profiles that were actually read.
⑧	Total Timeout Count Output	When a request for reading profiles is made in (13) and the number of profiles specified in Read Profile Cnt in (5) cannot be read in one second, a timeout error occurs. This number is counted. Example: When profiles are read in (13), but high-speed communications in (12) are not carried out, or when high-speed communications in (12) are carried out but the specified number of profiles are not updated (no trigger input or slow sampling frequency), a time error occurs.
⑨	Buffer usage	The Buf Usage Rate output of Read Profiles (for High-Speed Data Communication) VI is displayed. Profiles are stored by (12) in the buffer provided on your computer. The buffer usage rate is displayed in %. Once a profile is read by (13), the read profile is cleared from within the buffer. If the buffer usage rate is 100%, the number of profiles stored in (12) exceeds the number of profiles read in (13), indicating that profiles are not stored at each sampling frequency.

⑩	Profile Information Display	Profile Info output of Read Profiles (for High-Speed Data Communication) VI is displayed unchanged as a indicator.
⑪	Height Image Monitor Display	Displays a profile as a height image. The horizontal axis represents the number of profiles. The vertical axis represents the X-coordinate of LJ.V. (It is expressed in the unit data quantity, not mm.) Indicates the Z-axis (height direction of LJ.V) on a gray scale. (Example: It indicates that the white area is high while the black area is low.)
⑫	High Speed Data Communication Start/Stop Button	Starts/stops high-speed communication between LJ.V and PC. (Profiles are stored in the buffer provided on a PC/storage stops.)
⑬	Profile Read Stop/Start Button	Reads profiles stored in the PC in (12), and stops/starts the height image display.

E : Configure

→Sends/receives settings (For more information on how to send/receive settings, refer to Chapter 9.)



①	Select communication path	Select either USB or Ethernet.
②	Ethernet communication setting	Specify the IP address and port number.
③	VI Stop Button	Stops VI.
④	Send/Receive Settings Button	Sends/receives the set items.
⑤	Area for Sending/Receiving Settings	Specify an area for sending/receiving settings. For more information, refer to 9.3 "Writing Processing for Settings".
⑥	Setting Items	Inputs/outputs setting items. For more information, refer to 9.1 "Sending/Receiving Settings".
⑦	Update Writing Area	Settings in the Writing Area are reflected in the RUNNING AREA or SAVE AREA. For more information, refer to 9.3 "Writing Processing for Settings".
⑧	Updating the WRITE AREA	Used to return settings in the WRITE AREA that are not consistent with the settings within the controller. For more information, refer to 9.3 "Writing Processing for Settings".
⑨	Saving Operation & Error Check	Displays errors that occurred during sending/receiving of settings. While writing settings to the SAVE AREA, Accessing the SAVE area lights green.

9. How to Send/Receive Settings

9.1. Sending/Receiving Settings

The LJ-V7000 Series can send/receive settings for each item using **Set Setting VI** and **Get Setting VI**. This section explains **Target Setting** and **Setting Data** that are input to Set Setting and Get Setting VIs.(For information on **Setting Depth**, refer to 9.3 "Write Processing for Settings".)

Target Setting: Specify items for sending/receiving settings. Members are as shown below. For detailed parameters of each member, refer to 9.2 Details of Items for Sending/Receiving Settings.

Type	Specify which settings of the Environmental settings, Common measurement settings or Program 0 - Program 15 should be sent/received.
Category	When sending or receiving settings for Program 0 - Program 15, specify which settings should be sent/received as Trigger settings and Imaging settings. When sending or receiving Environment settings or Measurement common settings, specify 0.
Item	Specify which settings of the items specified in Category should be sent/received.
Target1	It is necessary to specify these items according to the send/receive settings. If settings are not required, specify 0.
Target2	
Target3	
Target4	

Setting Data: Specify the setting data to send/receive settings. For more information, refer to 9.2 "Details of Items for Sending/Receiving Settings".

9.2 Details of Items for Sending/Receiving Settings

9.2.1 Changing Environmental Settings

<Device name>

Type:01h, Category:00h, Item:00h

Target1~4:00h

byte	Setting Data
0	Device name, byte 1
1	Device name, byte 2
2	Device name, byte 3
to	to
31	Device name, byte 32

*32 characters max. 0 is not appended to the end.

<Operation at next power on>

Type:01h, Category:00h, Item:01h

Target1~4:00h

byte	Setting Data
0	Operation at next power on 0:BOOT→IP addresses fixed, 1:IP address fixed, 2:BOOTP
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<High-speed communication band restriction>

Type:01h, Category:00h, Item:02h

Target1~4:00h

byte	Setting Data
0	High-speed communication bandrestriction 0: OFF, 1:500Mbps, 2:200Mbps, 3:100Mbps
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<MTU during high-speed communication>

Type:01h, Category:00h, Item:03h

Target1~4:00h

byte	Setting Data
0	MTU setting: 1500~9216
1	
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<IP address/Subnet mask/Gateway>

Type:01h, Category:00h

Item:04h (IP address)/05h (Subnet mask)

/06h (Gateway)

Target1~4:00h

byte	Setting Data
0	IP address, 1 st byte
1	IP address, 2 nd byte
2	IP address, 3 rd byte
3	IP address, 4 th byte

The following IP addresses are treated as invalid IP addresses:

0.0.0.0/224.0.0.0~255.255.255.255

The following addresses are treated as invalid subnet masks:

0.0.0.0/255.255.255.255/ There are no consecutive[1]bits from the

beginning(Example:255.255.255.64=11111111.11111111.11111111.11111111.01000000 is an error)

The following addresses are treated as invalid gateway:

224.0.0.0~255.255.255.255

<TCP command port number/TCP high-speed port number >

Type:01h, Category:00h

Item:07h (TCP command port number)/08h (TCP high-speed port)

Target1~4:00h

byte	Setting Data
0	Port number (1~65535)
1	
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

Do not set TCP command ports number same as TCP high-speed port number.

<Baud rate>

Type:01h, Category:00h, Item:0Ah

Target1~4:00h

byte	Setting Data
0	Baud rate: 0:9600, 1:19200, 2:38400, 3:57600, 4:115200
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Parity>

Type:01h, Category:00h, Item:0Bh

Target1~4:00h

byte	Setting Data
0	Parity: 0: NONE, 1: EVEN, 2: ODD
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

9.2.2 Common measurement settings

<Operation mode>

Type:02h, Category:00h, Item:00h

Target1~4:00h

byte	Setting Data
0	Operation mode: 0: High-speed, 1: Advanced
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Memory allocation>

Type:02h, Category:00h, Item:01h

Target1~4:00h

byte	Setting Data
0	Memory allocation setting: 0: Double buffer, 1: Entire area(overwrite), 2: Entire area(do not overwrite)
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Operation when memory full>

Type:02h, Category:00h, Item:02h

Target1~4:00h

byte	Setting Data
0	Operation when memory full: 0: Overwrite, 1: Stop
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Parallel imaging>

Type:02h, Category:00h, Item:03h

Target1~4:00h

byte	Setting Data
0	Parallel imaging: 0: Disabled, 1: Enabled
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Strobe output time>

Type:02h, Category:00h, Item:04h

Target1~4:00h

byte	Setting Data
0	Strobe output time: 0: 10 μ s, 1: 20 μ s, 2: 50 μ s, 3: 100 μ s, 4: 200 μ s, 5: 500 μ s, 6: 1ms, 7: 2ms, 8: 5ms, 9: 10ms, 10: 20ms
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<TRG minimum input time>

Type:02h, Category:00h, Item:06h

Target1~4:00h

Byte	Setting Data
0	Constant when TRG input terminal: 0: 7 μ s, 1: 10 μ s, 2: 20 μ s, 3: 50 μ s, 4: 100 μ s, 5: 200 μ s, 6: 500 μ s, 7: 1ms
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<ENCODER minimum input time>

Type:02h, Category:00h, Item:07h

Target1~4:00h

byte	Setting Data
0	Constant when ENCODER input terminal: 0: 120ns, 1: 150ns, 2: 250ns, 3: 500ns, 4: 1 μ s, 5: 2 μ s, 6: 5 μ s, 7: 10 μ s, 8: 20 μ s
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Control terminal minimum input time>

Type:02h, Category:00h, Item:08h

Target1~4:00h

byte	Setting Data
0	Control terminal minimum input time: 0: 250 μ s, 1: 1ms
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Change program>

Type:02h、Category:00h、Item:09h

Target1~4:00h

byte	Setting Data
0	Change program: 0: Terminal、1: Command
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

9.2.3Change Program setting

●9.2.3.1Trigger settings

<Trigger mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:01h

Target1~4:00h

byte	Setting Data
0	Trigger mode: 0:Continuous trigger、1:External trigger、2:Encoder trigger
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Sampling frequency>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:02h

Target1~4:00h

byte	Setting Data
0	Sampling frequency: 0:10Hz、1:20Hz、2:50Hz、3:100Hz、4:200Hz、5:500Hz、6:1KHz、7:2KHz、8:4KHz、9:4.13KHz、10:8KHz、11:16KHz、12:32KHz、13:64KHz
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Batch measurement>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:03h

Target1~4:00h

byte	Setting Data
0	Batch measurement: 0:Batch OFF、1:Batch ON
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Inter-trigger pitch>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:04h

Target1~4:00h

byte	Setting Data
0	Inter-trigger pitch: 0:Pitch OFF、1:Pitch ON
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Inter-trigger pitch count>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:05h

Target1~4:00h

byte	Setting Data
0	Pitch count: 1~50000(0.001mm unit、0.001~50.000mm)
1	
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Mutual interference prevention>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:06h

Target1~4:00h

byte	Setting Data
0	Mutual interference prevention: 0:OFF、1:ON
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Input mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:00h、Item:07h

Target1~4:00h

byte	Setting Data
0	Encoder trigger input mode: 0: 1-phase 1TM(no dir_)、1:2-phase 1times、2:2-phase 2times、3:2-phase 4 times 倍
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Skipping>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:00h, Item:08h
Target1~4:00h

byte	Setting Data
0	Encoder trigger skipping: 0: Skipping OFF, 1: Skipping ON
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Points to skip>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:00h, Item:09h
Target1~4:00h

byte	Setting Data
0	Encoder trigger skipping count: 2~1000
1	
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Batch count>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:00h, Item:0Ah
Target1~4:00h

byte	Setting Data
0	Batch count: 50~15000
1	
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

●9.2.3.2 Imaging settings

<Binning>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:01h, Item:01h
Target1:00h(headA/wide), 01h(headB), Target2~4:00h

byte	Setting Data
0	Binning: 0: OFF, 1: ON
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<X direction>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:01h, Item:02h
Target1:00h(headA/wide), 01h(headB), Target2~4:00h

byte	Setting Data
0	Measurement range X direction: 0:FULL, 1:MIDDLE, 2: SMALL
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Z direction>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:01h, Item:03h
Target1:00h(headA/wide), 01h(headB), Target2~4:00h

byte	Setting Data
0	Measurement range Z direction: 0:FULL, 1:MIDDLE, 2: SMALL
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<CMOS sensitivity>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:01h, Item:05h
Target1:00h(headA/wide), 01h(headB), Target2~4:00h

byte	Setting Data
0	CMOS sensitivity characteristics: 0:High precision, 1:High dynamic range1, 2:High dynamic range2, 3:High dynamic range3
1	Reserved (fixed as 0)
2	Reserved (fixed as 0)
3	Reserved (fixed as 0)

<Exposure time>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)
Category:01h, Item:06h
Target1:00h(headA/wide), 01h(headB), Target2~4:00h

byte	Setting Data
0	Exposure time: 0:15μs, 1:30μs, 2:60μs, 3:120μs, 4:240μs, 5:480μs, 6:960μs, 7:1920μs, 8:5ms, 9:10ms
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Imaging mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:07h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Imaging mode: 0:standard、1:multi emission(synthesis)、2:multi emission(optimized light intensity)
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Multi emission(optimized light intensity) detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:08h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Emission times: 0:2 times、1:4 times
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Multi emission(synthesis) detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:09h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Emission times: 0:3 times、1:5 times
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Mask setting>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:0Ah

Target1:00h(headA/wide)、01h(headB)

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Enabled/disabled: 0:Mask disabled、1:Rectangle、2:Triangle
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	X coordinate1: 2~640
5	
6	Z coordinate1: 2~480
7	
8	X coordinate2: 2~640
9	
10	Z coordinate2: 2~480
11	
12	X coordinate3: 2~640 (invalid when Rectangle)
13	
14	Z coordinate3: 2~480 (invalid when Rectangle)
15	

<Control mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:0Bh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Control mode: 0:AUTO、1:MANUAL
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Upper limit value/Lower limit value>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:01h、Item:0Ch(upper limit value)、0Dh(lower limit value)

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	FB upper/lower limit value: 1~99
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<FB target area>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:01h、Item:0Eh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	FB target area start: 0~639
1	
2	FB target area end: 0~639
3	

<Peak width filter>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:01h、Item:12h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Peak width filter: 0:OFF、1:ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Peak detection level>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:01h、Item:0Fh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Peak detection level: 1~5
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Invalid data interpolation count>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:01h、Item:10h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Invalid data interpolation count: 0~255
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Peak selection>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:01h、Item:11h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Peak selection: 0:Standard、1:NEAR、2:FAR、3:Remove X multi reflection、4:Remove Y multi reflection、5:Make invalid data
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

●9.2.3.3 Profile

<Combine(wide)>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:01h

Target1~4:00h

byte	Setting Data
0	Wide setting: 0:OFF、1:ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

Note: This setting is not used when one sensor head.

<Compression (X axis)>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:02h

Target1~4:00h

byte	Setting Data
0	Compression (X-axis): 0:OFF、1:2、2:4
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Compression (time axis)>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:03h

Target1~4:00h

byte	Setting Data
0	Compression (time axis): 0:OFF、1:ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Time axis compression count>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:04h

Target1~4:00h

byte	Setting Data
0	Time axis compression count: 2~1000
1	
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Dead zone process valid/invalid>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:05h

Target1~4:00h

byte	Setting Data
0	Dead zone processing enabled/disabled: 0: disabled、1: enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Reverse (X)/Reverse (Z) >

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:06h (ReverseX)、07h (ReverseZ)

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Reverse: 0: OFF、1: ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

Note: This setting is not used when one sensor head

<Shift (X)/Shift (Z) >

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:08h (Shift X)、09h (Shift Z)

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Shift amount: any value in measurement range (0.001μm unit, Sined 32-bit integer example: 1mm=100000、2mm=200000)
1	
2	
3	

Note: This setting is not used when one sensor head

<Median(X axis)/Median (time axis) >

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:0Ah (Median(x axis))、0Ch (Median (time axis))

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Median count: 0: OFF、1:3points、2:5 points、3:7 points、4:9 points
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Smoothing>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:0Bh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Smoothing: 0:1、1:2、2:4、3:8、4:16、5:32、6:64
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Averaging>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:0Dh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Averaging count: 0:1、1:2、2:4、3:8、4:16、5:32、6:64、7:128、8:256
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Invalid data processing (time axis) >

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:0Eh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Processing times: 0~255
1	Resume times: 0~255
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Tilt correction>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:0Fh

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	ON/OFF: 0: Correction disabled、1: Correction enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Linear calculation area count: 0: Area2 disabled、1: Area2 enabled
5	Reserved(fixed as 0)
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Area start position1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	
12	Area end position1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Area start position2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Area end position2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
21	
22	
23	
24	Post-correction angle(-45.00~+45.00deg) : -4500~
25	
26	Correction angle(-45.00~+45.00deg) : -4500~+
27	

<Height correction>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:02h、Item:10h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	ON/OFF: 0: Correction disabled、1: Correction enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Area start position1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
5	
6	
7	
8	Area end position1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	
12	Area start position2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Area end position2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Post-correction height 0~999.99mm: 0~99999
21	
22	
23	
24	Correction span: 1~131071 *The correction span is the value divided by 65536. (Condition: 0<Correction span<2) example: if 98304 is set, (98304÷65536=1.5) correction span is 1.5.
25	
26	
27	

●9.2.3.4 Master regist

<Master profile>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:03h、Item:01h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	valid/invalid: 0:Master invalid、1:Master valid
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Profile data amount (*1):
5	50,75,100,150,200,300,400,600,800,1200,1600
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Xcoordinate data start position (*2) (0.01um unit Sined 32-bit integer)
9	
10	
11	X direction pitch (*2) (0.01um unit、Sined 32-bit integer)
12	
13	
14	
15	Profile (0.01um unit Sined 32-bit integer)
16	
17	
18	
19	~
~	
~	
~	
3212	Profile (0.01um unit Sined 32-bit integer)
3213	
3214	
3215	

*1 Profile data amount depend on the setting. Refer to 10.2 "Profile data amount calculation method" or receive "MasterProfile" and confirm it.

*2 It depends on the type of sensor head and settings. Please confirm by receiving "MasterProfile"

*3 This example is in case of 800points(It depends on Profile data amount.)

●9.2.3.5 Position correction settings

<Dual head mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:04h、Item:01h

Target1~4:00h

byte	Setting Data
0	Dual head mode: 0: OFF、1: ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

Note: This setting is not used when one sensor head.

<Dual head mode target head>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:04h、Item:02h

Target1~4:00h

byte	Setting Data
0	Correction target head: 0: headA、1: headB
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

Note: This setting is not used when one sensor head.

<Dual head mode X/Z correction amount>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:04h、Item:03h(X correction amount)、04h(Z correctionamount)

Target1~4:00h

byte	Setting Data
0	Correction amount: -10000.0~+10000.0mm (0.001μm unit、Sined 32-bit integer example: 1mm=100000、2mm=200000)
1	
2	
3	

Note: This setting is not used when one sensor head.

<θcorrection ON/OFF><Backup correction ON/OFF>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:04h、Item:05h(θ correctionON/OFF)、07h (preliminary correctionON/OFF)

Target1:00h(headA/wide)、01h(headB)

Target2:00h(Position correction1)、01h(Position correction2)、Target3~4:00h

byte	Setting Data
0	ON/OFF: 0: OFF、1: ON
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<θcorrection detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:04h、Item:06h(θcorrectionON/OFF)

Target1:00h(headA/wide)、01h(headB)

Target2:00h(position correction1)、01h(position correction2)、Target3~4:00h

byte	Setting Data
0	Linear calculation area: 0: Area 2 disabled、1: Area2 enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Linear calculation area1 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
5	
6	
7	Linear calculation area1 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
8	
9	
10	Linear calculation area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
11	
12	
13	Linear calculation area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
14	
15	
16	Correction standard: 0: Horizontal、1: MasterProfile
17	
18	
19	Reserved(fixed as 0)
20	
21	
22	Reserved(fixed as 0)
23	Reserved(fixed as 0)

<preliminary correction detail><Xcorrection detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:04h、Item:08h(preliminary correctiondetail)、0Bh (Xcorrectiondetail)

Target1:00h(headA/wide)、01h(headB)

Target2:00h(position correction1)、01h(position correction2)、Target3~4:00h

byte	Setting Data
0	Edge measuring area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Edge measuring area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	Edge direction: 0: Rising、1: Falling
7	
8	
9	Detection direction: 0: +direction、1: -direction
10	
11	
12	Detection No: 1~10
13	
14	
15	Reserved(fixed as 0)
16	
17	
18	Edge level: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
19	
20	

<XZcorrection selection>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、···、1F:Program NO.15)

Category:04h、Item:09h

Target1:00h(headA/wide)、01h(headB)

Target2:00h(position correction1)、01h(position correction2)、Target3~4:00h

byte	Setting Data
0	XYcorrection selection: 0: OFF、1: Xcorrection、2: Zcorrection、3: X→Zcorrection、4: Z→Xcorrection、5: Feature point correction
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Z correction Height measurement detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program

NO.1、...、1F:Program NO.15)

Category:04h、Item:0Ch

Target1:00h(headA/wide)、01h(headB)

Target2:00h(position correction1)、01h(position correction2)、Target3~4:00h

byte	Setting Data
0	Height measuring area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Height measuring area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	Height type: 0: Peak, 1: bottom, 6: Average
7	
8	
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)

<Featurepoint correction detail>

Type:10h~1Fh(10h:Program NO.0、11h:Program

NO.1、...、1F:Program NO.15)

Category:04h、Item:0Dh

Target1:00h(headA/wide)、01h(headB)

Target2:00h(position correction1)、01h(position correction2)、Target3~4:00h

byte	Setting Data
0	Correction target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc)
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

*From 4byte, unique parameters are assigned to each correction target. For details on the unique parameters, see 9.2.3.11"Measurement Area"(page-41).

●9.2.3.6Profilemask settings

<Profile mask area settings group>

Type:10h~1Fh(10h:Program NO.0、11h:Program

NO.1、...、1F:Program NO.15)

Category:05h、Item:01h

Target1:00h(headA/wide)、01h(headB)、Target2~4:00h

byte	Setting Data
0	Area selection: 0: Disabled, 1: Rectangle, 2: Triangle
1	position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Xcoordinate1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
5	
6	
7	Zcoordinate1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
8	
9	
10	Xcoordinate2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
11	
12	
13	Zcoordinate2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
14	
15	
16	Xcoordinate3: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	Zcoordinate3: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
20	
21	
22	
23	
24	
25	
26	
27	
~	
139	

*When Rectangle is selected, upper left(Xcoordinate1, Zcoordinate1) and bottom right(Xcoordinate2, Zcoordinate2) should be set. Xcoordinate3, Zcoordinate3 is no effect.

*When Triangle is selected, (Xcoordinate1, Zcoordinate1), (Xcoordinate2, Zcoordinate2) and (Xcoordinate3, Zcoordinate3) are used.

*1 the number of profile mask area (x5) is continuing.(Total140byte is used.)

<Profile Mask area settings individual>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:05h, Item:02h

Target1:00h(headA/wide), 01h(headB)

Target2:00h~04h(Profile mask area1~5) Target3~4:00h

byte	Setting Data
0	Area selection: 0: Disabled, 1: Rectangle, 2: Triangle
1	position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Xcoordinate1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
5	
6	
7	
8	Zcoordinate1: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	
12	Xcoordinate2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Zcoordinate2: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Xcoordinate3: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
21	
22	
23	
24	Zcoordinate3: any value in measurement range (0.01um unit Sined 32-bit integer example: 5mm=500000)
25	
26	
27	

*When Rectangle is selected, upper left(Xcoordinate1, Zcoordinate1) and bottom right(Xcoordinate2, Zcoordinate2) should be set. Xcoordinate3, Zcoordinate3 is no effect.

*When Triangle is selected, (Xcoordinate1, Zcoordinate1), (Xcoordinate2, Zcoordinate2) and (Xcoordinate3, Zcoordinate3) are used.

●9.2.3.7 OUT settings

<OUT name>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:01h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

Byte	Setting Data
0	OUT name, byte1
1	OUT name, byte2
2	OUT name, byte3
~	~
19	OUT name, byte20

*20 Characters max. 0 is not appended to the end.

<Minimum display unit>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:02h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Minimum display unit
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

*The unit changes according to the measurement mode assigned to the OUT.

Length system, 0:1mm, 1:0.1mm, 2:0.01mm, 3:0.001mm, 4:1μm, 5:0.1μm

Area system, 0:1mm², 1:0.1mm², 2:0.01mm², 3:0.001mm², 4:0.0001mm², 5:0.00001mm²

Angle system, 0:1deg, 1:0.1deg, 2:0.01deg

<Measurement mode>

Type:10h~1Fh(10h:Program NO.0, 11h:Program

NO.1, ..., 1F:Program NO.15)

Category:06h, Item:03h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Minimum display unit (from①)
1	Measurement mode (from②)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	From 4byte, unique parameters are assigned to each measurement mode. For details on the unique parameters, see [Unique parameters of measurement mode from 4byte]
~	
N	

①

Length system ... 0:1mm, 1:0.1mm, 2:0.01mm, 3:

0.001mm, 4:1μm, 5:0.1μm

Area system ... 0:1mm², 1:0.1mm², 2:0.01mm², 3:0.001mm², 4:0.0001mm², 5:0.00001mm²

Angle system ... 0:1deg, 1:0.1deg, 2:0.01deg

②

0:OFF, 1:Height, 2:Step, 3:Position, 4:Center position, 5:Width, 6:Thickness, 7:Angle, 8:R measurement, 9:Area, 10:Master comparison(Z), 11:Distance(point-point), 12:Distance(point-line), 13:Height(Profile compression (time axis) on), 14:Position(Profile compression(time axis) on), 15:Deflection width(Profile compression(time axis) on), 16:Height(simple 3D), 17:Step(simple 3D), 18:Position(simple 3D), 19:Calculation

[Unique parameters of measurement mode from 4byte]

Measurement mode 0:OFF

byte	Setting Data
4	Reserved(fixed as 0)
~	
91	

1:Height (when profile compression(time axis) is off)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Intsect(lin-arc), 5: Center of circle, 6: Average
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

2:Step

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Intsect(lin-arc), 5: Center of circle, 6: Average
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	
M+1	Reserved(fixed as 0)
~	
47	
48	Reference target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
49	Reference target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle, 6: Average
50	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
51	Reserved(fixed as 0)
52	Unique parameters are assigned to each Reference target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

3: Position (when profile compression(time axis) is off)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle, 7: Edge
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

4: Center position, 5: Width

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle, 7: Edge
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	
M+1	Reserved(fixed as 0)
~	
47	
48	Reference target selection: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
49	Reference target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle, 7: Edge
50	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
51	Reserved(fixed as 0)
52	Unique parameters are assigned to each Reference target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

6: Thickness

byte	Setting Data
4	Measurement target selection: 8: Max thickness, 9: Min thickness, 10: Ave thickness, 11: Max thickness position, 12: Min thickness position
5	Position correction selection (HeadA): 0: No position correction, 1: Position correction1, 2: Position correction2
6	Position correction selection (HeadB): 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

7: Angle

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement reference selection: 0: Angle from X-axis, 1: Angle between lines
6	Angle range: 0: 0~180deg, 1: -90~90deg
7	Measurement target position correction: 0: No position correction, 1: Position correction1, 2: Position correction2
8	Reference target position correction: 0: No position correction, 1: Position correction1, 2: Position correction2
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)
12	Measurement target Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
13	Reserved(fixed as 0)
14	Reserved(fixed as 0)
15	Reserved(fixed as 0)
16	Measurement target Linear calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Measurement target Linear calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
21	
22	
23	
24	Measurement target Linear calculation area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
25	
26	
27	
28	Measurement target Linear calculation area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
29	
30	
31	
32	Reference target Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
33	Reserved(fixed as 0)
34	Reserved(fixed as 0)
35	Reserved(fixed as 0)
36	Reference target Linear calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
37	
38	
39	

40	Reference target Linear calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
41	
42	
43	
44	Reference target Linear calculation area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
45	
46	
47	
48	Reference target Linear calculation area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
49	
50	
51	
52	Reserved(fixed as 0)
~	
91	

8: R measurement

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Arc calculation area: 0: Area2 disabled, 1: Area2 enabled
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)
12	Arc calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Arc calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Arc calculation area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
21	
22	
23	
24	Arc calculation area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
25	
26	
27	
28	Reserved(fixed as 0)
~	
91	

9: Area

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement reference selection: 0: Reference for 1 line, 1: Reference for 2 lines, 2: Master reference
6	Measurement target position correction: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Measurement target1 position correction: 0: No position correction, 1: Position correction1, 2: Position correction2
8	Measurement target2 position correction: 0: No position correction, 1: Position correction1, 2: Position correction2
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)
12	Measurement area Area calculation area Left: any value in measurement range(0.01μm unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Measurement area Area calculation area Right: any value in measurement range(0.01μm unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	
20	Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
21	Reserved(fixed as 0)
22	Reserved(fixed as 0)
23	Reserved(fixed as 0)
24	Reference straight line1 Linear calculation area Left: any value in measurement range(0.01μm unit Sined 32-bit integer example: 5mm=500000)
25	
26	
27	
28	Reference straight line1 Linear calculation area Right: any value in measurement range(0.01μm unit Sined 32-bit integer example: 5mm=500000)
29	
30	
31	
32	Reference straight line1 Area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
33	
34	
35	
36	Reference straight line1 Area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
37	
38	
39	
40	Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
41	Reserved(fixed as 0)
42	Reserved(fixed as 0)

43	Reserved(fixed as 0)
44	Reference straight line2 Linear calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
45	
46	
47	
48	Reference straight line2 Linear calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
49	
50	
51	
52	Reference straight line2 area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
53	
54	
55	
56	Reference straight line2 area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
57	
58	
59	
60	Reserved(fixed as 0)
~	
91	

*Reference straight line2's settings are not needed when
Reference for 1 line is selected.

*Reference straight line1, 2's settings are not needed
when Master Reference is selected.

10: Master comparison(Z)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Area setting Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	
12	Area setting Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Reserved(fixed as 0)
~	
91	

11: Distance(point-point)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).。
~	
M	
M+1	Reserved(fixed as 0)
~	
47	
48	Reference target selection: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
49	Reference target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle
50	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
51	Reserved(fixed as 0)
52	Unique parameters are assigned to each Reference target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).。
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

12: Distance(point-line)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Contact(lin-arc), 5: Center of circle
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11
~	
M	"Measurement Area"(page-41).
M+1	Reserved(fixed as 0)
~	
47	
48	Reference target selection: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
49	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
50	Reserved(fixed as 0)
51	Reserved(fixed as 0)
52	Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
53	Reserved(fixed as 0)
54	Reserved(fixed as 0)
55	Reserved(fixed as 0)
56	Linear calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
57	
58	
59	Linear calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
60	
61	
62	Area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
63	
64	
65	Area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
66	
67	
68	Reserved(fixed as 0)
69	
70	
71	Reserved(fixed as 0)
72	
~	
91	

13: Height (when profile compression(time axis) is on)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: bottom, 13: Middle value
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11
~	
N	"Measurement Area"(page-41).
N+1	Reserved(fixed as 0)
~	
91	

14: Position(when profile compression(time axis) is on)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: bottom, 7: Edge
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11
~	
N	"Measurement Area"(page-41).
N+1	Reserved(fixed as 0)
~	
91	

15: Deflection width(when profile compression(time axis) is on)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 14: P-P(Z), 15: P-P(X)
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

16: Height (simple 3D)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection:0:Peak, 1:bottom, 6: Average, 16:P-P
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	
M+1	Reserved(fixed as 0)
~	
15	
16	Ycoordinate start position: value withinBatch point
17	
18	Ycoordinate endposition:value withinBatch point
19	
20	Reserved(fixed as 0)
~	
91	

17: Step (simple 3D)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: bottom, 6: Average
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	
M+1	Reserved(fixed as 0)
~	
15	
16	Measurement target Ycoordinate start position: value withinBatch point
17	
18	Measurement target Ycoordinate end position: value withinBatch point
19	
20	Reference target selection: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
21	Reference target selection: 0: Peak, 1: bottom, 6: Average
22	Reserved(fixed as 0)
23	Reserved(fixed as 0)
24	Unique parameters are assigned to each reference target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	

M+1	Reserved(fixed as 0)
~	
31	
32	Reference target Ycoordinate start position: value withinBatch point
33	
34	Reference target Ycoordinate end position: value withinBatch point
35	
36	Reserved(fixed as 0)
~	
91	

18: Position (simple 3D)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Output coordinate: 0: Xcoordinate, 1: Ycoordinate
6	Measurement target selection: 0: Peak, 1: bottom
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
M	
M+1	Reserved(fixed as 0)
~	
15	
16	Ycoordinatestart position: value withinBatch point
17	
18	Ycoordinate end position: value withinBatch point
19	
20	Reserved(fixed as 0)
~	
91	

19: Calculation

byte	Setting Data
4	Calculation mode: 0: Addition, 1: Subtraction. 2: Absolute value, 3: AVE, 4: P-P, 5: MAX, 6: MIN
5	Reserved(fixed as 0)
6	Reserved(fixed as 0)
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each calculation mode. The unique parameters are described below.
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

[Unique parameter of calculation from 8byte]

0:Addition 1:Subtraction

byte	Setting Data
8	Calculation target A: OUT number (example: OUT1:00h, OUT12:0Bh)
9	Calculation target B: OUT number (example: OUT1:00h, OUT12:0Bh)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)

2:Absolute value

byte	Setting Data
8	Target OUT: OUT number (example: OUT1:00h, OUT12:0Bh)
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)

3:AVE/ 4:P-P/ 5:MAX/ 6:MIN

byte	Setting Data
8	OUT1: 0: Do not use as calculation target, 1: Use as calculation target
~	OUT2~15: 0: Do not use as calculation target, 1: Use as calculation target
23	OUT16: 0: Do not use as calculation target, 1: Use as calculation target

<Measurement value hold count>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:04h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Measurement value hold count: 0~999
1	
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Measurement value filter>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:05h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Measurement value filter: 0: OFF, 1: Moving Average, 2: Low-pass filter, 3: High-pass filter
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Measurement valuefilter detail>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:06h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

Unique parameters are assigned to each measurement value filter.

1:Moving average

byte	Setting Data
0	Averagecount: 0: 4 times, 1: 16 times, 2: 64 times, 3: 256 times, 4: 1024 times, 5: 4096 times
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

2:Low-pass filter

3:High-pass filter

Byte	Setting Data
0	Cutoff frequency: 0: 0.1Hz, 1: 0.3Hz, 2: 1Hz, 3: 3Hz, 4: 10Hz, 5: 30Hz, 6: 100Hz, 7: 300Hz, 8: 1000Hz
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Scaling measurement value1>

<Scaling display value1>

<Scaling measurement value2>

<Scaling display value2>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:07h(Scaling measurement value1), 08h

(Scaling display value1), 09h(Scaling measurement value2), 0Ah

(Scaling display value2)

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Measurement value/Display value: 0.01μm unit Sined 32-bit integer.
1	
2	
3	*Display range lower limit for the minimum display unit ≤ Measurement value/Display value ≤ Display range upper limit for the minimum display unit.

<Measuring mode>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、…、1F:Program NO.15)

Category:06h、Item:0Bh

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Measuring mode: 0:Normal, 1:Peak hold, 2:bottom hold, 3:Peak to Peak hold, 4:Average hold, 5:Sample hold, 6:Peak, 7:bottom, 8:Peak to Peak, 9:Average
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Measuring period>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、…、1F:Program NO.15)

Category:06h、Item:0Ch

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Measuring period: 0:Terminal/command, 1: Measurement area 2 :OUT reference, 3: Threshold(level), 4:Threshold(Edge)
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Unique parameters are assigned to each measuring period. The unique parameters are described below.
~	
15	

[Unique parameters of Measuring period from 4byte]

1: Measurement area

byte	Setting Data
4	Measure start position: value withinBatch point
5	
6	Measure end position: value withinBatch point
7	
8	Reserved(fixed as 0)
~	
15	

2: OUT reference

byte	Setting Data
4	Reference OUT: 0:OUT1、1:OUT2…15:OUT16
5	Reserved(fixed as 0)
~	
15	

3: Threshold (level)

byte	Setting Data
4	Upper limit: 0.01μm unit. Sined 32-bit integer。
5	*Display range lower limit for the minimum display unit ≤Upper limit ≤display range upper limit for the minimum display unit
6	
7	
8	Lower limit: 0.01μm unit. Sined 32-bit integer。
9	*Display range lower limit for the minimum display unit ≤Lower limit ≤display range upper limit for the minimum display unit
10	
11	
12	Reserved(fixed as 0)
~	
15	

4: Threshold (Edge)

byte	Setting Data
4	Edge threshold: 0.01μm unit. Sined 32-bit integer。
5	
6	*Display range lower limit for the minimum display unit ≤Edge threshold ≤display range upper limit for the minimum display unit
7	
8	Edge direction: 0:Rising, 1:Falling
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)
12	Measurement count: when batch off: Integer from 1 to 999,999 when batch on: Integer from 1 to Batch point
13	
14	
15	

<Offset>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、…、1F:Program NO.15)

Category:06h、Item:0Dh

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Offset: 0.01μm unit. Sined 32-bit integer。
1	*Display range lower limit for the minimum display unit ≤Offset ≤display range upper limit for the minimum display unit
2	
3	

<Tolerance upper/lower limit>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:0Eh(upper limit), 0Fh(lower limit)

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Tolerance upper/lower limit value: 0.01 μ m unit. Sined
1	32-bit integer.
2	*Display range lower limit for the minimum display unit
3	\leq Tolerance upper/lower limit value \leq display range upper limit for the minimum display unit

<Zero reference value>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:13h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Zero reference value: 0.01 μ m unit. Sined 32-bit
1	integer.
2	*Display range lower limit for the minimum display unit
3	\leq Zero reference value \leq display range upper limit for the minimum display unit

<Hysteresis>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:10h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Hysteresis: 0.01 μ m unit. Sined 32-bit integer.
1	*0 \leq Hysteresis \leq display range upper limit for the
2	minimum display unit
3	

<ZERO>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:11h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	ZERO: 0:None, 1:ZERO1, 2:ZERO2
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<TIMING/RESET>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:06h, Item:12h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	TIMING/RESET: 0:None, 1:TIMING1/RESET1, 2:TIMING2/RESET2
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

●9.2.3.8 Terminal settings

<Judgment output setting>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:07h, Item:01h

Target1:00h~0Bh(OUT_PIN1~12) Target2~4:00h

byte	Setting Data
0	Setting method: 0:No setting, 1:AND, 2:OR
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	OUT1 judgment result: 0:Not specified, 2:HI, 4:GO, 8:LO
5	OUT2 judgment result: 0:Not specified, 2:HI, 4:GO, 8:LO
~	~
21	OUT16 judgment result: 0:Not specified, 2:HI, 4:GO, 8:LO

*The judgment result can be specified by bits with logical OR .
When HI and GO are both specified, the measurement result value is "6".

<Analog output target OUT>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:07h, Item:02h

Target1:00h(CH1), 01h(CH2) Target2~4:00h

byte	Setting Data
0	Target OUT: 0:OUT1, 1:OUT2...15:OUT16, 255:none
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Analog output scaling>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:07h, Item:03h

Target1:00h(CH1), 01h(CH2) Target2~4:00h

byte	Setting Data
0	OUT display value1: Sined 32-bit integer *1
1	
2	
3	
4	Output voltage1: Sined 32-bit integer -10.5V~10.5V (1mVunit)
5	
6	
7	
8	OUT display value2: Sined 32-bit integer *1
9	
10	
11	
12	Output voltage2: Sined 32-bit integer -10.5V~10.5V (1mVunit)
13	
14	
15	

*1 setting range

Length(mm) ...-999.999mm~999.999mm (0.01μm unit)

Area(mm^2) ...-9999.99mm^2~9999.99mm^2

(0.00001mm^2unit)

Angle(deg) ...-9999.99deg~9999.99deg (0.001degunit)

●9.2.3.9 Storage settings

<Storage target>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:08h, Item:01h

Target1~4:00h

byte	Setting Data
0	Storage target: 0: OFF, 1: OUT value, 2: Profile
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Storage condition>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:08h, Item:02h

Target1~4:00h

byte	Setting Data
0	Storage condition: 0: Terminal/Command, 1: OUT update, 2: OUT data(edge), 3: OUT data(level)
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)

<Storage data amount(Terminal/Command)>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:08h, Item:03h

Target1~4:00h

byte	Setting Data
0	Storage data amount: 0 to buffer size upper limit. *Upper limit value is the max points can be set by LJ-Navigator2.
1	
2	
3	

<Storage data amount(OUT data(Edge))>

Type:10h~1Fh(10h:Program NO.0, 11h:Program NO.1, ..., 1F:Program NO.15)

Category:08h, Item:04h

Target1~4:00h

byte	Setting Data
0	Storage data amount: 0 to buffer size upper limit. *Upper limit value is the max points can be set by LJ-Navigator2.
1	
2	
3	
4	Threshold: The range that can be input in the OUT minimum display unit. (0.01μm unit.Sined 32-bit integer)
5	
6	
7	
8	Hysteresis: $0 \leq \text{Hysteresis} \leq$ display range upper limit for the minimum display unit.(0.01μm unit.Sined 32-bit integer)
9	
10	
11	
12	Target OUT: 0: OUT1, 1: OUT2, 2: OUT3...15: OUT16
13	Edgedirection: 0: Rising, 1: Falling
14	Reserved(fixed as 0)
15	Reserved(fixed as 0)

<Storage data amount (OUT data(level))>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:08h、Item:05h

Target1~4:00h

byte	Setting Data
0	Upper limit value: The range that can be input in the OUT minimum display unit. (0.01μm unit. Signed 32-bit integer)
1	
2	
3	
4	Lower limit value: The range that can be input in the OUT minimum display unit. (0.01μm unit. Signed 32-bit integer)
5	
6	
7	
8	Target OUT: 0:OUT1、1:OUT2...15:OUT16
9	Reserved(fixed as 0)
10	Reserved(fixed as 0)
11	Reserved(fixed as 0)

●9.2.3.10 Program name

<Program name>

Type:10h~1Fh(10h:Program NO.0、11h:Program NO.1、...、1F:Program NO.15)

Category:09h、Item:00h

Target1~4:00h

byte	Setting Data
0	Program name, byte0
1	Program name, byte1
2	Program name, byte2
~	~
23	Program name, byte23

*24 characters max. 0 is not appended to the end.

●9.2.3.11 Measurement area details

The correction target selection of feature point correction of position correction and the unique parameters of the measurement target of the measurement mode are shown below. The byte numbers shown here indicate the byte numbers from the start of the corresponding data block. (see the example at 9.2.3.12)

0:Peak, 1:bottom, 6:Average, 8:Maximum thickness, 9:Minimum thickness, 10:Average thickness, 11:Maximum thickness position, 12:Minimum thickness position, 13:Middle value, 14:P-P(Z) (only when profile compression(time axis) is on), 16:P-P (only for Height (simple 3D))

byte	Setting Data
0	Area Left: any value in measurement range (0.01μm unit Signed 32-bit integer example: 5mm=500000)
1	
2	
3	
4	Area Right: any value in measurement range (0.01μm unit Signed 32-bit integer example: 5mm=500000)
5	
6	
7	

2:Knee

byte	Setting Data
0	Area Left: any value in measurement range (0.01μm unit Signed 32-bit integer example: 5mm=500000)
1	
2	
3	
4	Area Right: any value in measurement range (0.01μm unit Signed 32-bit integer example: 5mm=500000)
5	
6	
7	
8	Knee shape: 0:Valley, 1:Peak
9	Detection direction: 0: + direction, 1: - direction
10	Detection No: 1~10
11	Sensitivity: 0~100

3: Intersection(lines)

byte	Setting Data
0	Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Line calculation area Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
5	
6	
7	
8	Line calculation area Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
9	
10	
11	
12	Area2 Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
13	
14	
15	
16	Area2 Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
17	
18	
19	
20	Linear calculation area count: 0: Area2 disabled, 1: Area2 enabled
21	Reserved(fixed as 0)
22	Reserved(fixed as 0)
23	Reserved(fixed as 0)
24	Line calculation area Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
25	
26	
27	
28	Line calculation area Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
29	
30	
31	
32	Area2 Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
33	
34	
35	
36	Area2 Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
37	
38	
39	

Line1

Line2

4: Contact (line-arc)

byte	Setting Data
0	Linear calculation area: 0: Area2 disabled, 1: Area2 enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Line calculation area Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
5	
6	
7	
8	Line calculation area Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
9	
10	
11	
12	Area2 Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
13	
14	
15	
16	Area2 Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
17	
18	
19	
20	Arc calculation area: 0: Area2 disabled, 1: Area2 enabled
21	Reserved(fixed as 0)
22	Reserved(fixed as 0)
23	Reserved(fixed as 0)
24	Arc calculation area Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
25	
26	
27	
28	Arc calculation area Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
29	
30	
31	
32	Area2 Left: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
33	
34	
35	
36	Area2 Right: Any value in measurement range (0.01μm unit Sined 32-bit integer. example: 5mm=500000)
37	
38	
39	

Line

Arc

5: Center of circle

byte	Setting Data
0	Arc calculation area count: 0: Area2 disabled, 1: Area2 enabled
1	Reserved(fixed as 0)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Arc calculation area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
5	
6	
7	
8	Arc calculation area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	
12	Area2 Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
13	
14	
15	
16	Area2 Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
17	
18	
19	

7: Edge (when profile compression(time axis) is off)

byte	Setting Data
0	Edge measuring area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Edge measuring area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	
7	Edge direction: 0: Rising, 1: Falling
8	
9	
10	Detect direction: 0: +direction, 1: -direction
11	Detect No: 1~10
12	Reserved(fixed as 0)
13	
14	
15	

7: Edge (when profile compression(time axis) is on)

byte	Setting Data
0	Edge measuring area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Edge measuring area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	
7	Detection target: 0: Upper profile, 1: Lower profile
8	
9	
10	Edge direction: 0: Rising, 1: Falling
11	Detect direction: 0: +direction, 1: -direction
12	Detect No: 1~10
13	Edge level: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
14	
15	

15: P-P(X) (only for when profile compression (time axis) is on)

byte	Setting Data
0	Edge measuring area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Edge measuring area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	
7	Edge direction: 0: Rising, 1: Falling
8	
9	
10	Detect direction: 0: +direction, 1: -direction
11	Detect No: 1~10
12	Reserved(fixed as 0)
13	
14	
15	

●9.2.3.12 Examples of sending/receiving measurement mode settings

Example: When "Height (profile compression (time axis): OFF" is selected and "Average" height is measured.

<Measurement mode>

Type:10h~1Fh(10h:Program NO.0, 11h:Program

NO.1, ..., 1F:Program NO.15)

Category:06h, Item:03h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Minimum display unit (from①)
1	Measurement mode (from②)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	From 4byte, unique parameters are assigned to each measurement mode. For details on the unique parameters, see [Unique parameters of measurement mode from 4byte]
~	
N	

1:Height (when profile compression(time axis) is off)

byte	Setting Data
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Intsect(lin-arc), 5: Center of circle, 6: Average
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Unique parameters are assigned to each measurement target. For details on the unique parameters, see 9.2.3.11 "Measurement Area"(page-41).
~	
N	
N+1	Reserved(fixed as 0)
~	
91	

6:Average

byte	Setting Data
0	Area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
1	
2	
3	Area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
4	
5	
6	
7	

These can be summarized as follows:

<Measurement mode>

Type:10h~1Fh(10h:Program NO.0, 11h:Program

NO.1, ..., 1F:Program NO.15)

Category:06h, Item:03h

Target1:00h~0Fh(OUT1~16) Target2~4:00h

byte	Setting Data
0	Minimum display unit (from①)
1	Measurement mode (from②)
2	Reserved(fixed as 0)
3	Reserved(fixed as 0)
4	Measurement target head: 0: HeadA, 1: HeadB, 2: Combined profile(only when profile combine(wide) is on)
5	Measurement target selection: 0: Peak, 1: Bottom, 2: Knee, 3: Intsect(lines), 4: Intsect(lin-arc), 5: Center of circle, 6: Average
6	Position correction selection: 0: No position correction, 1: Position correction1, 2: Position correction2
7	Reserved(fixed as 0)
8	Area Left: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
9	
10	
11	Area Right: any value in measurement range (0.01μm unit Sined 32-bit integer example: 5mm=500000)
12	
13	
14	
15	
16	Reserved(fixed as 0)
~	
91	

Measurement mode
1:Height

Measurement target
6:Average

9.3 Writeing processing for settings

The following four VIs are used when a write operation is carried out for settings.

- **Set Setting**
- **Reflect Setting**
- **Update Write Settings Area**
- **Check Status of Saving to Save Area**

To send settings, it is necessary to specify the **Setting Depth** using **Set Setting** VI. Details on the **Setting Depth** option and its role are as follows:

Setting Depth	Role
WRITE AREA	Settings written into this area will not be reflected in the controller. Setting written into this area will be reflected in RUNNING AREA or SAVE AREA by Reflect Setting VI.
RUNNING AREA	Settings written into this area will be reflected in the controller, but the settings will not be saved when the power is turned off. (When it is restarted, settings will be reflected in SAVE AREA.)
SAVE AREA	Settings written into this area will be reflected in the controller. Even when the power is turned off, the settings are saved in the controller. However, it takes time to write into this area. (Check whether writing into this area is in progress using Check Status of Saving to Save Area VI. Verify that writing is finished from Saving to Save Area VI before turning off the power.)

<Usage example (1)> ... When changing multiple settings in a batch

```
1  : Set Setting  VI (WRITE AREA)
2  : Set Setting  VI (WRITE AREA)
   :
Final : Set Setting  VI (WRITE AREA)
       Reflect Setting VI (RUNNING AREA)
```

Consistency of settings is checked when writing into the RUNNING AREA or SAVE AREA. An error message is returned if any inconsistencies are found. (Errors can be checked by Context help.) If multiple settings are changed, therefore, when each setting is written into the RUNNING AREA (SAVE AREA), inconsistencies may occur due to the setting items, and the settings will not be reflected in the controller. Write multiple settings into the WRITE AREA, create consistent settings, and finally reflect them collectively in the controller.

To return inconsistent settings in the WRITE AREA to the settings within the controller, use **Update Write Settings Area** VI.

Note

- Measurement is suspended when settings are written into RUNNING AREA (SAVE AREA).
- Do not turn off the power to the controller while settings are being written into SAVE AREA. You can check whether settings are being written using **Check Status of Saving to Save Area** VI.
- If the last **Set Setting** VI (WRITE AREA) is used as **Set Setting** VI (RUNNING), the same results can be obtained. (It is then not necessary to update WRITE AREA.)

<Usage example (2)>... When only one setting is changed

- | |
|-------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• When settings are not saved to the controller |
|-------------------------------------------------------------------------------------------------|

Set Setting VI (RUNNING AREA)

- | |
|---------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• When settings are saved to the controller |
|---------------------------------------------------------------------------------------------|

Set Setting VI (SAVE AREA)

Note

- Measurement is suspended when settings are written into RUNNING AREA (SAVE AREA).
- Do not turn off the power to the controller while settings are being written into SAVE AREA. You can check whether settings are being written using **Check Status of Saving to Save Area** VI.

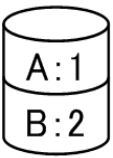
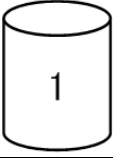
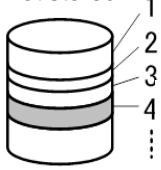
10. Appendix

10.1 Internal memory of controller

When using the following VIs, it is necessary to specify a memory area within the controller that reads data. To specify the memory area, use **Read Area** of **Read Req** input. When data is read only from the internal memory where data is currently being stored, specify **Read Area**: 0.

- **Read Profiles (for High-Speed Mode)**
- **Read Batch Profiles (for High-Speed Mode)**
- **Read Storage Status**
- **Read Data Storage Data**
- **Read Profile Storage Data**
- **Read Batch Profile Storage Data**

When an internal memory within the controller is used by allocating to a double buffer, etc., the method for specifying **Read Area** varies depending on "Memory Allocation" and "Operating Mode". (For information on allocation of the internal memory, refer to 9-5 in the LJ-V7000 Series User's Manual.)

Memory Allocation		Operating Mode	Read Area
Double Buffer	Divides an internal memory into two surfaces - Surface A and Surface B. Alternates between using Surface A and Surface B every time a program is changed. The surface on which data is currently being stored is called the active surface. 	High speed	Active surface: TRUE, Inactive surface: FALSE
		Advanced	Active surface: 0, Surface A: 1, Surface B: 2
Entire area (Overwrite)	Uses the entire area of the internal memory. 	High speed	Specify TRUE.
		Advanced	Specify 1.
Entire area (No overwrite)	The area within the entire internal memory area where data is not stored. 	Advanced	Every time a program is changed, the Read Area counts up 1→2→3···. Enter 1 - 1000 depending on the area you want to read. To read the area that is currently being used for storage, enter 0.(*1) * No additional data can be stored when the program change number exceeds 1000.

- * 1 For the **Read Area** where data is being stored, call **Read Storage Status** VI and check the **Active Surface of Storage Status Rsp** output.

Note

- When reading a profile, if the profile is read by specifying **TRUE** for **Erase** of the **Read Req** input (the read profile is erased), the read profile (batch) and other profiles older than this (batch) will be deleted from memory.
- When the controller sends the read profile during high speed data communication, the sent profile will be deleted from memory.
- When profiles are continuously read from the controller, if the PC reads and deletes the profiles at a speed slower than the speed at which data is saved to the controller, the memory will become full. Data to be read after the current profile or data read before the current profile will be deleted as dictated in the settings for operations when the memory is FULL. (For more information, refer to 9-5 in the LJ-V7000 Series User's Manual.)

10.2 Profile data amount calculation method

The amount of profile data to get is a value multiplied by a correction factor determined from the settings below with 800 as the base.

Setting			Correction factor	Comment
Category	Item	Setting value		
Imaging settings	Measurement range X direction	FULL	1.00	Initial value
		MIDDLE	0.75	
		SMALL	0.50	
	Binning	OFF	1.00	Initial value
		ON	0.50	
Profile settings	Combine (wide)	OFF	1.00	Initial value
		ON	2.00	
	Compression (X axis)	OFF	1.00	Initial value
		2	0.50	
		4	0.25	

For example, the amount of profile data with the settings below is 300 (= $800 \times 0.75 \times 1.00 \times 1.00 \times 0.50$) items of data.

Measurement range X direction: Middle, Binning: Off, Combine (wide): Off, Compression (X axis): 2

However, when the amount of profile data found as a result of the equation above is less than 200, the profile compression (X axis) setting is adjusted so that the amount of profile data is 200 or higher. For example, in a situation like that below, the amount of profile data is 300.

Measurement range X direction: Middle, Binning: Off, Combine (wide): Off, Compression (X axis): 4

The specific calculation is described below.

1. $800 \times 0.75 \times 1.00 \times 1.00 \times 0.25 = 150$
2. The result is less than 200, so the profile compression (X axis) setting is adjust to 2 instead of 4
3. $800 \times 0.75 \times 1.00 \times 1.00 \times 0.5 = 300$
4. The result is 200 or higher, so the amount of profile data above is confirmed

10.3 Profile data storage order and Specific examples

In functions that get profile data, such as **Read Profiles(for High-Speed Data Communication)** VI, the profile data stored in the area between header and footer is 1 unit of profile data found with 10.2 "Profile data amount calculation method", and the data is stored in the order below.

- Storage order

1. 1st head profiles (when compression (time axis) is on, MAX profiles)
2. 1st head MIN profiles
3. 2nd head profiles (when compression (time axis) is on, MAX profiles)
4. 2nd head MIN profiles

- Notes

3 and 4 only exist when the number of heads is 2 and wide is off.

2 and 4 only exist when compression (time axis) is on.

- Specific examples

- (i) For configuration 1 (initial settings)

Heads: 2, Measurement range X direction: Full, Binning: Off, Wide: Off, Compression (X axis): Off, Compression (time axis): Off

The amount of profile data is 800

The profile data storage order is as follows. (See profile data storage order for 1)

1. Head A profiles (800)
3. Head B profiles (800)

When getting 10 profiles with **Read Profiles** VI, the data below is stored in **ProfileData**.

Profile1	header*1	32bitx6
	1. Head A profiles (800)	32bitx800
	3. Head B profiles (800)	32bitx800
	footer	32bitx1
⋮		
Profile10	header*1	32bitx6
	1. Head A profiles (800)	32bitx800
	3. Head B profiles (800)	32bitx800
	footer	32bitx1

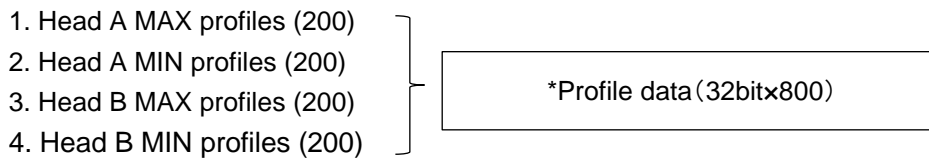
* For header details, refer to 10.4.

(ii) For configuration 2

Heads: 2, Measurement range X direction: Full, Binning: on, Wide: off, Compression (X axis): 2, Compression (time axis): On

The amount of profile data is 200

The profile data storage order is as follows. (See profile data storage order for 1)



When getting 10 profiles with **Read Profiles VI**, the data below is stored in **ProfileData**.

Profile1	header*1	32bit×6
	*Profile data	32bit×800
	footer	32bit×1
⋮		
Profile10	header*1	32bit×6
	*Profile data	32bit×800
	footer	32bit×1

*see the detail of header at 10.4.

10.4 Header Details (Encoder Counter/Z-phase Flag/Trigger Counter)

The section below contains details of 32 bit x 6 headers.

header	7th bit: Indicates whether the encoder's Z phase has been entered. (*) <div><div>MSB</div><div><div><div></div><div></div><div><div>↓</div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>LSB</div></div><table><tr><td>31</td><td>...</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr></table></div>	31	...	7	6	5	4	3	2	1	0	32bit
	31	...	7	6	5	4	3	2	1	0		
	Indicates which number trigger from the start of measurements this profile is. (Trigger counter)	32bit										
	The encoder count when the trigger was issued. (Encoder counter)	32bit										
reserve	32bitx3											

Other than when settings are modified or the program is switched, the trigger counter and the encoder counter are reset at the following times.

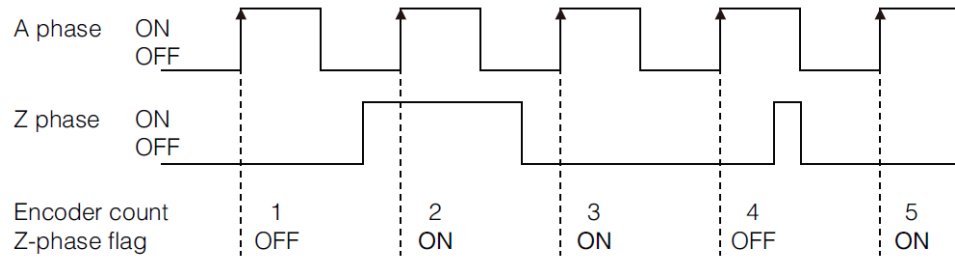
- When the memory is cleared in high-speed mode (profile only)
- When laser emission stops and is restarted with the LASER_OFF terminal
- When laser emission is allowed after it was prohibited with the REMOTE terminal

* About the Z-phase flag

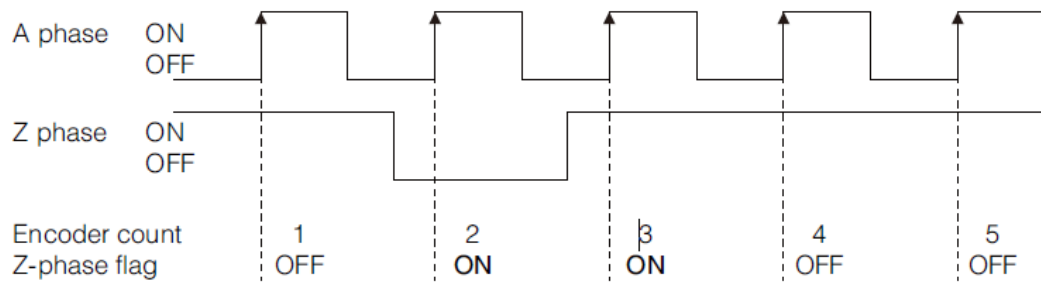
This flag can be used when the controller is version 3.0 or later.

This flag is turned ON when Z-phase ON input is received during the period between the previous trigger input (or the start of measurement if there was no previous trigger input) and the current trigger input.

Example: Single phase 1x multiplier encoder trigger with no skipping



Note: When the Z-phase input uses a negative logic encoder, set the TRG minimum input time, which is a common measurement setting, to 7 μ s. With negative logic, the Z-phase flag turns ON as shown in the following figure.

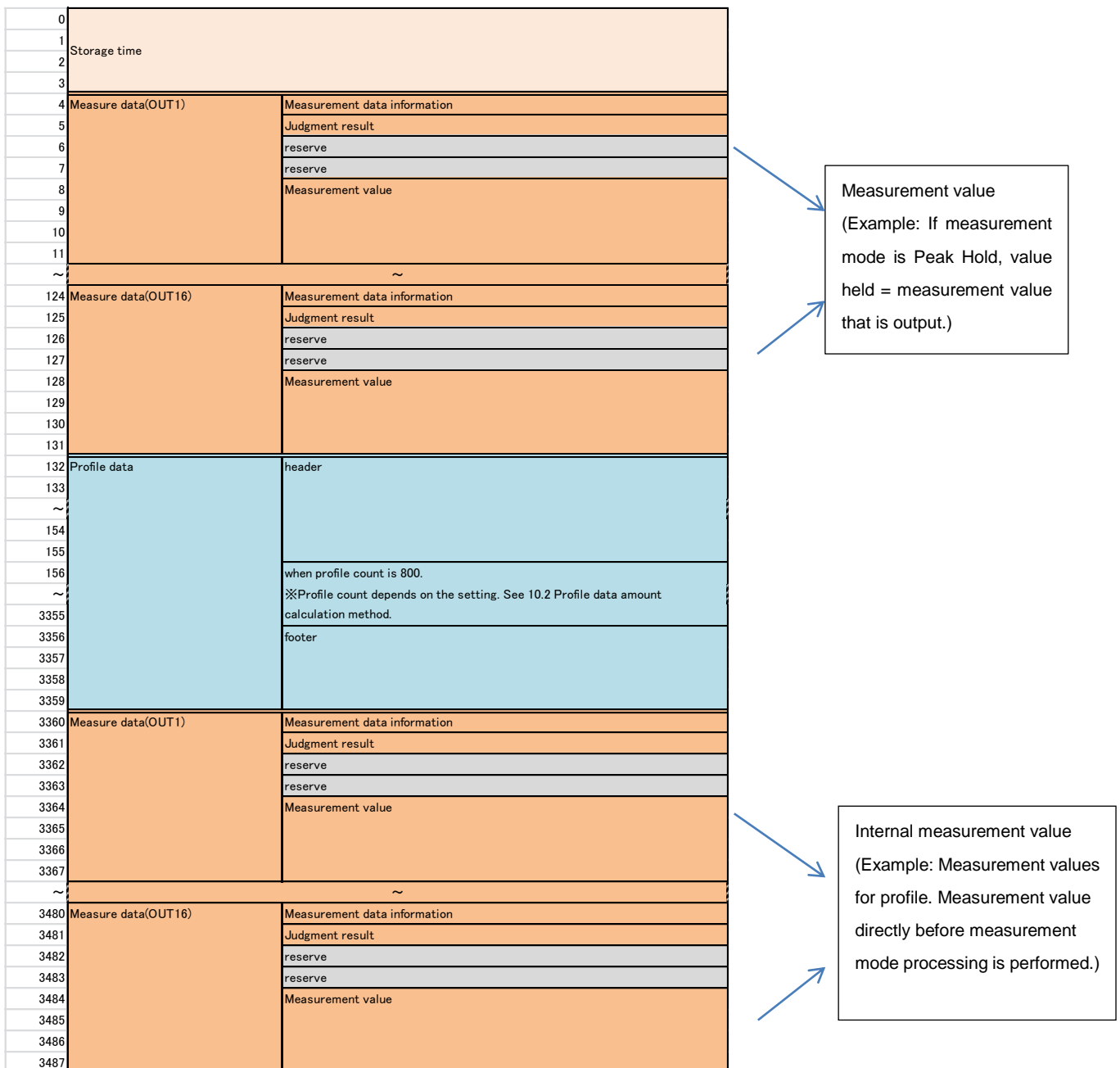


10.5 Storage Order of Profile Storage Data and Specific Examples

Read Profile Storage Data VI allows you to read stored profile data, measurement values and internal measurement values (*1). Data to be read has the following structure when 1 line = 1 byte settings are configured.

*1 "Internal measurement value" means the measurement value immediately before the measurement mode processing of the OUT measurement setting is performed. There is one internal measurement value of each OUT for each piece of profile data.

Structure of one piece of profile storage data



* Result of determining tolerance of internal measurement values is always 0.

10.6 Storage Order of Batch Profile Storage Data and Specific Examples

Read Profile Storage Data VI allows you to read stored profile data and measurement values. Data to be read has the following structure. Data to be read has the following structure when 1 line = 1 byte settings are configured.

Structure of one piece of batch profile storage data

0	Profile data	header
1		
~		
22		
23		
24		when profile count is 800.
~		※Profile count depends on the setting. See 10.2 Profile data amount calculation method.
3223		
3224		footer
3225		
3226		
3227		
3228	Measure data(OUT1)	Measurement data information
3229		Judgment result
3230		reserve
3231		reserve
3232		Measurement value
3233		
3234		
3235		
~		~
3348	Measure data(OUT16)	Measurement data information
3349		Judgment result
3350		reserve
3351		reserve
3352		Measurement value
3353		
3354		
3355		

Internal measurement value
(Example: Measurement values for profile. Measurement value directly before measurement mode processing is performed.)

* Result of determining tolerance of internal measurement values is always 0.

10.7 Storage Order of Data Storage Data and Specific Examples

Read Data Storage Data VI allows you to read stores measurement values. Data to be read has the following structure.

Structure of one piece of data storage data

0	Storage time	
1		
2		
3		
4	Measure data(OUT1)	Measurement data information
5		Judgment result
6		reserve
7		reserve
8		Measurement value
9		
10		
11		
~		~
124	Measure data(OUT16)	Measurement data information
125		Judgment result
126		reserve
127		reserve
128		Measurement value
129		
130		
131		