SGADVANCE +PLUS
Users Manual

SGADVANCE   Ver. 2.2.1

Technology Center

Introduction

This user's manual describes the specifications and operations of SGADVANCE.

Please read this manual thoroughly to understand the specifications and fully employ the functions.

Precautions for Use

These precautions must be observed when using this manual and the software introduced herein:

♦   Sigma Koki Co., Ltd. retains all rights to this guide and the software introduced in the manual.

♦   Unauthorized reproduction or duplication of this manual, whether in whole or in part, is strictly prohibited.

♦   Due to improvements or other reasons, the specifications of software and hardware introduced in this manual are subject to change without prior notice.

♦   Sigma Koki Co., Ltd. assumes no responsibility for the results obtained when operating the software introduced in this manual.

♦   While Sigma Koki Co., Ltd. has thoroughly inspected the contents of this manual and the software introduced herein, unforeseen problems may still arise. Please contact us if there are any concerns.

Applicable Software and hardware

The following software and hardware are referred to in this manual:

♦   Software

- Operating System: Windows 8/8.1/10/11(64bit)

- Excel 2010 or later (must be a version that supports Excel macros)

♦   Hardware

- Measurement equipment and controller (compatible with RS-232C or GPIB* interface)

     * GPIB is only supported for interface board/card from National Instruments.

Stage controller (Stage-Controller, or Driver by Sigma Koki)

     * USB is only supported for stage controller from Sigma Koki.

Table of Contents

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1. Overview

SGADVANCE is an application program which can communicate with devices such as automatic positioning device, measuring instruments or control devices to collect data and conduct measurement.

SGADVANCE has high affinity with Microsoft Excel. You can use Excel to edit/save collected or measured data with SGADVANCE, or, specify commands on Excel to operate SGADVANCE. With SGADVANCE, you can easily configure a measurement/controlling system matching to your environments.

In addition, you can use luminance meters[*1] when you start software with the mode including the function of conventional "SGLCES". You can easily configure a liquid crystal evaluation system matching to your environments.

*1 Luminance meter : In this book, a luminance meter, a spectrum radiometer, a spectrum colorimeter, etc. are pointed out.
  Luminance meter with the results that we measured :
    BM-5A, BM-7, SR-3(TOPCON), CS-1000(KONICA MINOLTA), PR-705(PHOTO RESEARCH), etc.
  Please consult in advance about the correspondence propriety of a luminance meter.

- Data collection
- Auto measurement
- Measurement instruction

Personal Computer

Controller

Instrument

Linkage with Excel

Excel

Stage-Controller
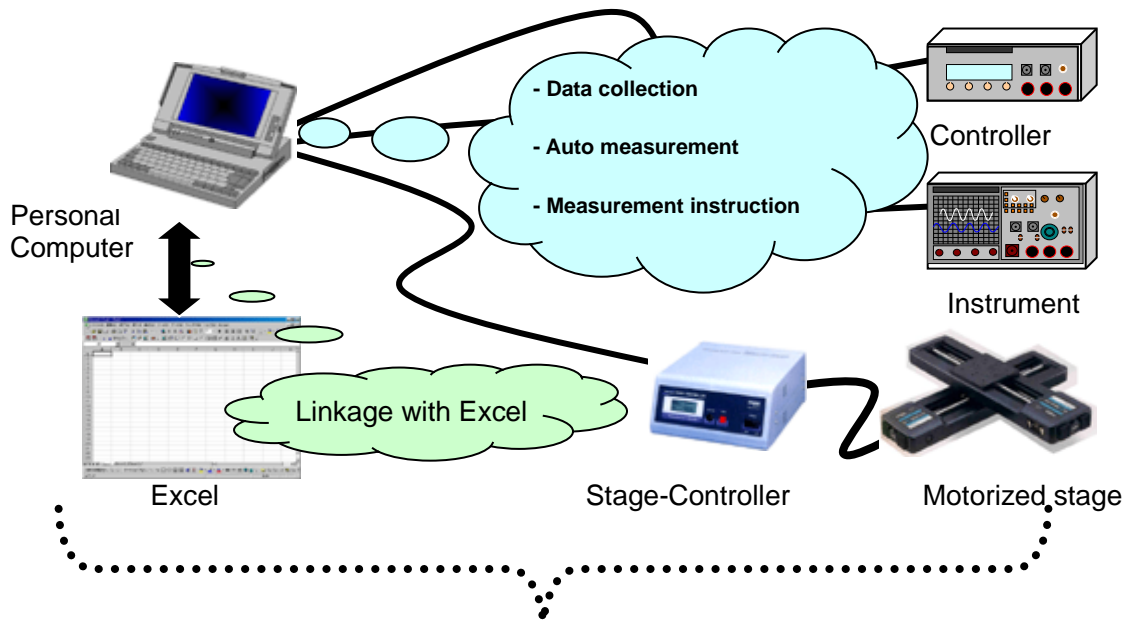
Motorized stage

Allows users to configure measurement/controlling systems matching to specific environments
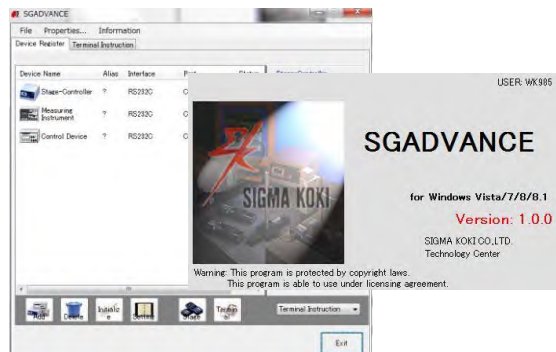
1.1 Main Features

♦ Simple auto-measurement with motorized stages, instruments, controllers, etc.

♦ Allows multiple connections. Supports RS-232C[*1], GPIB[*2], USB[*3] and LAN interfaces.

♦ SGADVANCE facilitates data editing by saving controlling/measurement results as text or Excel formats.

♦ Three selectable measurement modes, "Program Instruction", in which measurement is designated from SGADVANCE, and "Excel Instruction", in which measurement is easily ordered by Excel file, and "Terminal Instruction" , in which measurement is ordered from an Excel file directly, allow users to choose a variety of measurement settings from the simplest to highly sophisticated measurement matching to purposes and conditions.

♦ Program Instruction mode features manual operations, time-series measurement, counter presetting, and other useful measurement functions.

♦ In Terminal Instruction mode, since simple control scripts, "If", "Jump", "Loop", etc. are supported on an Excel worksheet, you can set parameters and operation counts, or movement corresponding to measurement results without knowledge of Excel macros (if combined with Excel macros, controls and instructions of higher level are available.)
And supports five specification modes, Row, Column, Range, Sheet and Cell, for controlling devices. You can communicate with devices about specified contents.

♦ You can save communications and other conditions in SGA files, which allows you to repeat the same process without difficulty.

♦ SGADVANCE allows you to send/receive commands through interfaces directly with open terminal windows. This enables you to check operational status during command entries.

*1: For RS-232C interface, use COM 1 to 8 ports.

*2: Only National Instruments' card/board can support the GPIB interface.

If you want to use GPIB, be sure to install driver software (supplied with GPIB board/card) in advance.

*3: Only Sigma Koki's stage controller can support USB I/F.

If you want to use USB interface, be sure to install the driver software in advance.

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2. Installation

To use SGADVANCE, SGADVANCE needs to be installed.

The Installation procedure is described below.

To install SGADVANCE, follow the steps (1) to (8) described below:

* There are an object for 32 bit and an object for 64 bit in an installation file. Please use it according to the environment of the personal computer to install.

The installation files are in the Setup folder.

The installation file for 32 bit is contained into a "32-bit" folder, and the installation file for 64 bit is contained in the "64-bit" folder. Please perform "setup.exe" in each folder.

Please install by "administrator authority."

If a user do not have an administrator authority, right-click setup.exe with a mouse. Then a pop up menu is displayed, click "performing as an administrator" and install.

2.1 Installing SGADVANCE

(1) Running Setup.exe

Choose installation file (setup.exe) depending on the environment of the PC to install from Setup folder of the CD-ROM and double click Setup.exe.

(2) Starting Setup Process

On starting Setup.exe, the SGADVANCE installation dialog appears.

To continue the installation, click the Next button. To cancel, click the Cancel button.
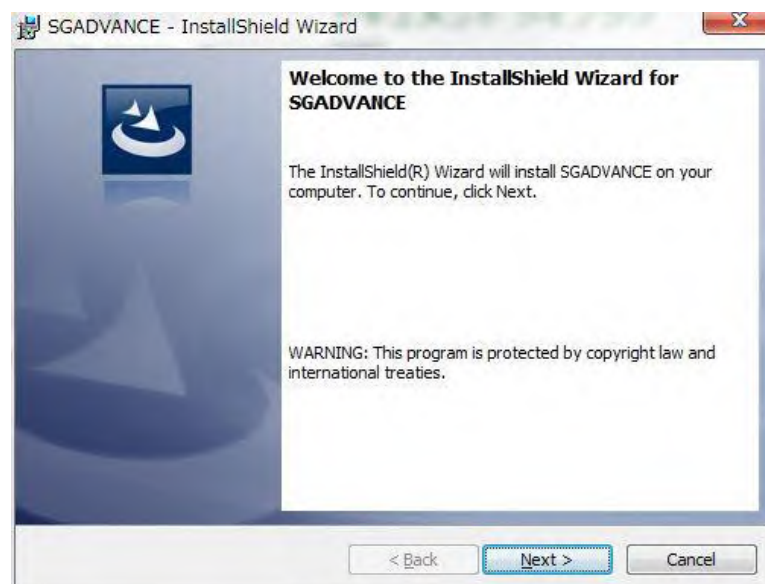
Fig. 2-1 Installation wizard

3

(3)   License Agreement

License agreement is displayed. To agree and continue the setup, click the Install button. To
cancel, click the Cancel button.

Fig. 2-2 License Agreement dialog

(4)   Readme Information

Information such as the movement environment is displayed. Confirm it. To continue the setup,
click the Next button. To cancel, click the Cancel button.
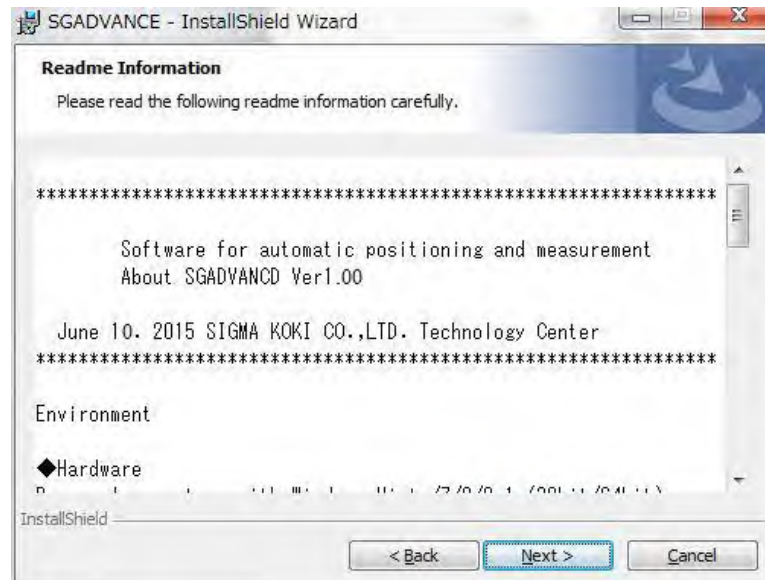
Fig. 2-3 Readme Information dialog

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(5)   Input Customer Information

Type in your name, organization and the serial number of the product. To continue the setup,

click the Next button. To cancel, click the Cancel button.
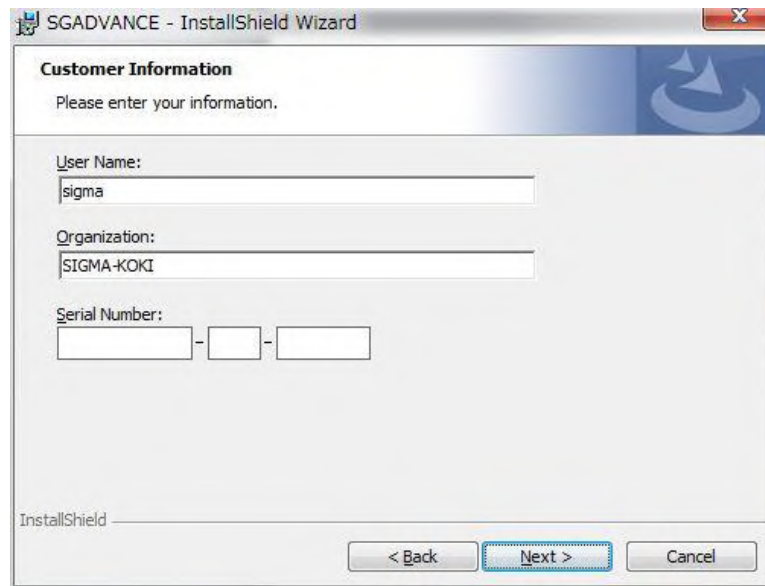
Fig. 2-4 Customer Information dialog

(6)   Selecting Destination Folder

Select the installation folder. To install to the default folder, click the Next button. To install

to a different folder, click the Change button and select a desired destination on the

displayed dialog.
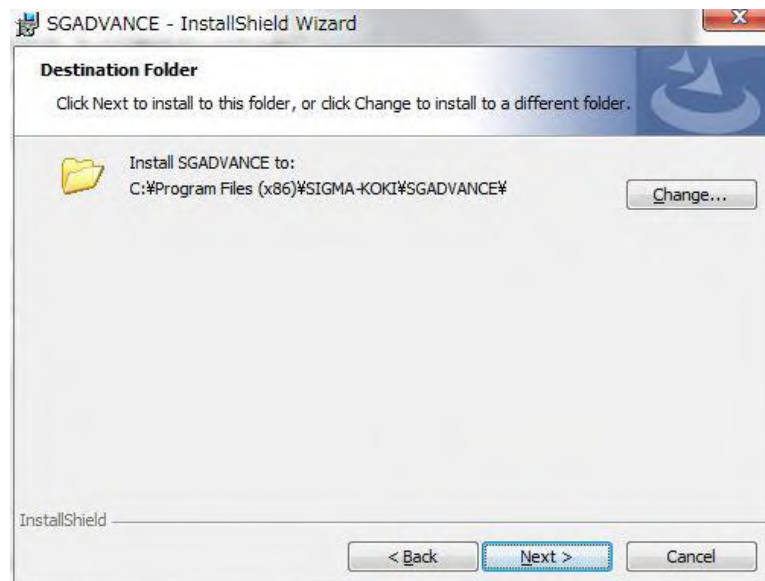
Fig. 2-5 Destination Folder dialog

(7)   Start Copying Files

Check the summary of installation information. To continue installation, click the Install button.

To cancel, click the Cancel button.

Clicking the Install button begins the installation of SGADVANCE.
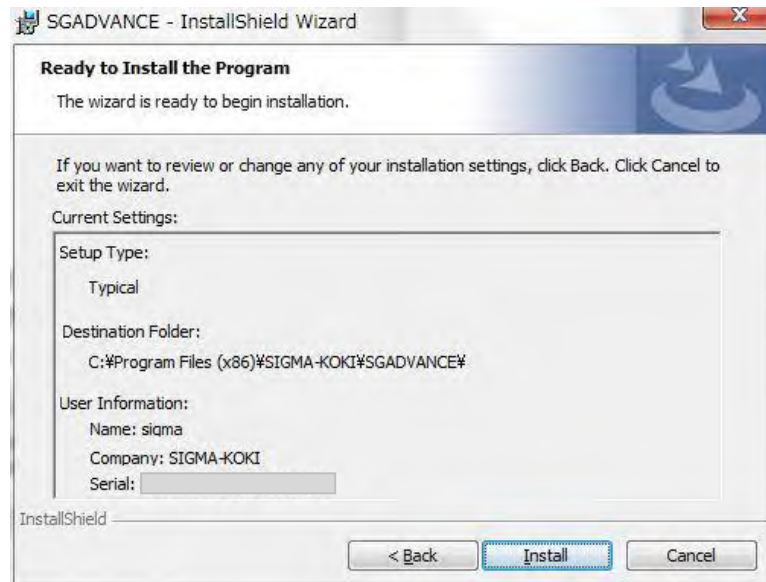
Fig. 2-6 Ready to Install the Program dialog

(8)   Completion of Installation

Click the Finish button after the installation is completed.

Now SGADVANCE has been installed on your PC successfully!
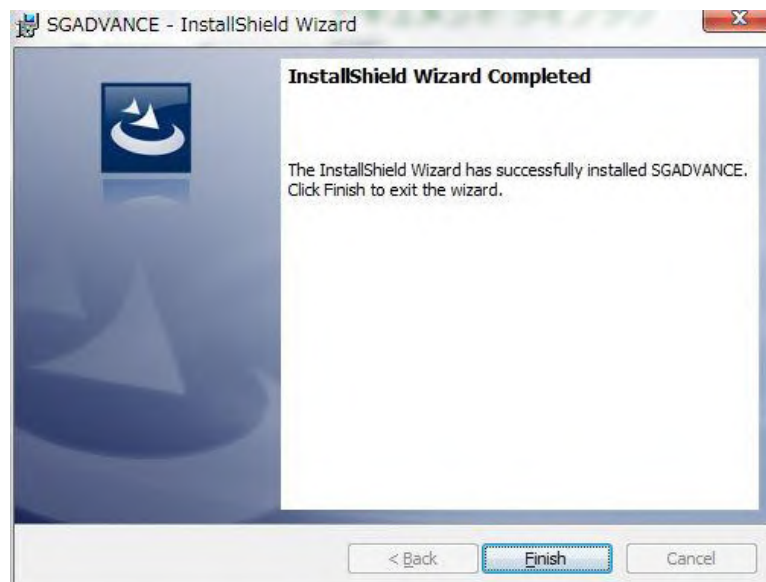
Fig. 2-7 Completion of Installation

* Sample files of SGADVANCE are copied to C:¥SIGMA-KOKI¥SGADVANCE¥Sample folder. Please refer as needed.

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2.2　　　Uninstalling SGADVANCE

Select Control Panel and then Programs and Features.

Programs Property dialog appears. Select SGADVANCE and click Uninstall button.

Programs and Features
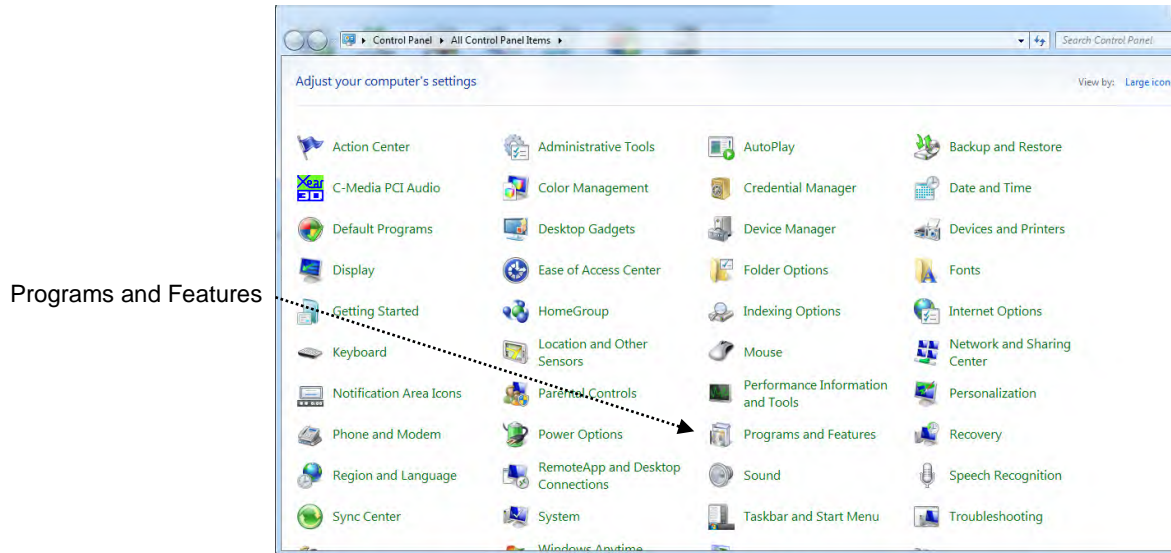
Fig. 2-8 Control Panel

2.3　　　Start mode of the software

With after version 2.0.0. of SGADVANCE, there are "SGADVANCE" mode and "SGADVANCE +PLUS" mode in the start mode of the software. The "SGADVANCE" mode is similar to before version 2.0.0 of SGADVANCE. The "SGADVANCE +PLUS" mode, it is the mode which a function of SGLCES which is the other software was added to.

When having installed after version 2.0.0 for the first time, it starts with "SGADVANCE" mode. You switch to a mode depending on the software which you purchased, and start from the next time.

When you change a start mode, perform it with the "registration" screen that is displayed when you click "registration" of the "information" menu of the "Device Register" screen.

Fig. 2-9 Registration screen

Choose SGADVANCE or SGADVANCE +PLUS in software type, and click an "OK" button. Then you finish software and reboot, it starts with the mode which you chose. (The software is not replaced by the mode which you chose until it is rebooted.)

* Until you register the key (password) to open the lock of the software, When it starts with SGADVANCE mode, you can use a function same as SGADVANCE +PLUS mode. After you register the key (password), it can start only with a mode depending on the license which you registered.

8

3. Operation

This section describes the operations of SGADVANCE.

SGADVANCE has four main dialogs; Device Register, Program Instruction, Excel Instruction and Terminal Instruction.

3.1　　　Device Register Dialog

You can register devices or make settings for them in this dialog.
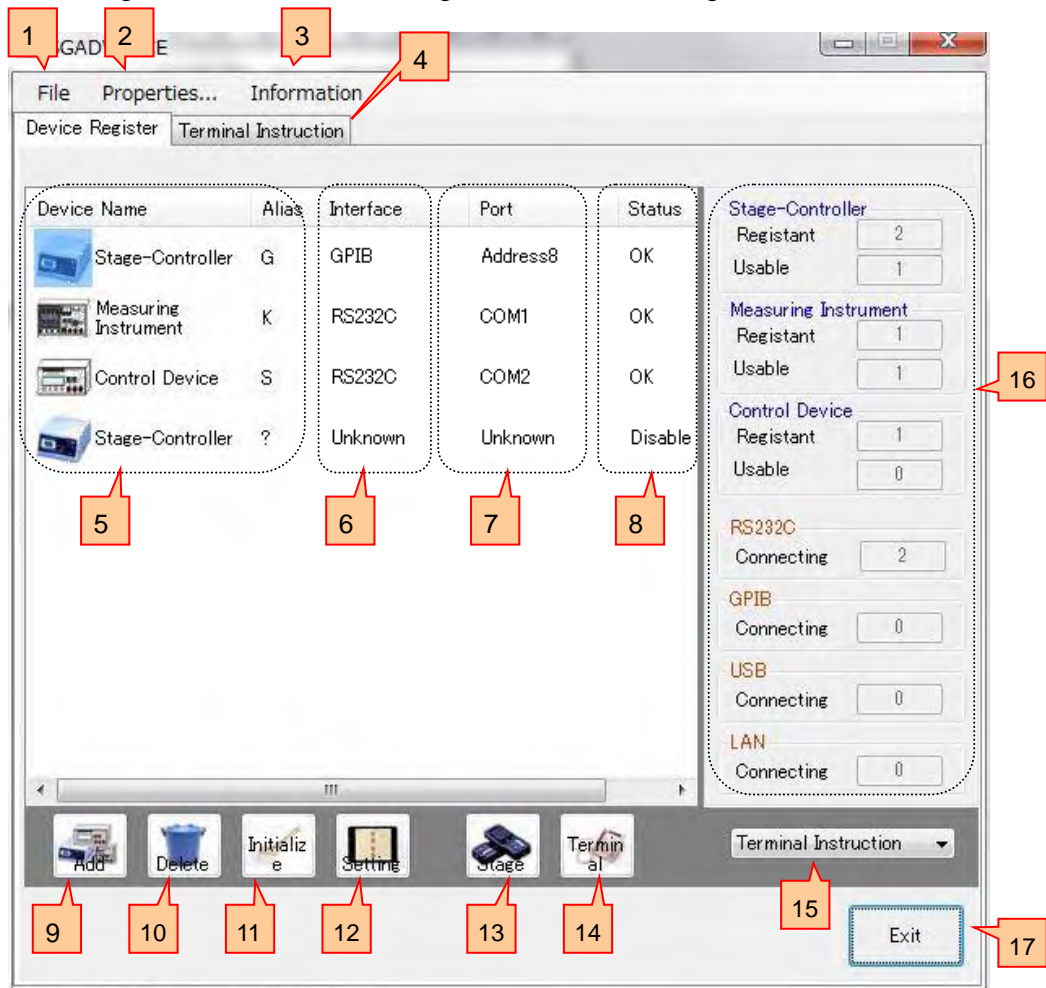
Fig. 3.1 Device Register dialog

1 **File Menu**

Click File to display the File menu.

A Settings file (with extension SGA) contains conditions and contents set with SGADVANCE, and save them. Loading a Settings file can restore the saved environments. Moreover, preservation and restoration of the contents of a setting in a device unit can also be performed.

A "file" menu performs preservation and restoration of a settings file.
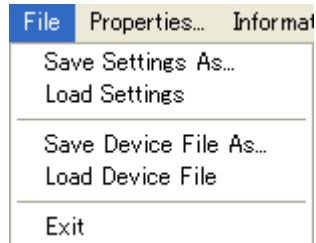
Fig. 3-2 File menu

・ **"Save / Load Settings" menu**

If "Save Settings As" menu is clicked, each conditions and the contents which were set up by "SGADVANCE" can be saved as a settings file (an extension is .SGA.

Moreover, if "Load Settings" menu is clicked, a settings file is read and the saved environment can be restored.

・ **"Save / Load Device File" menu**

When the Device Register tab is being displayed, you can click "Save / Load Device File" menu.

A setup (the contents of the communication setup, the contents of the setup of operation) of the controller under selection, device in the Device Register tab can be saved as a device file (an extension is .SGV). Moreover, if a device file is read, the saved device of the contents will be added to the Device Register tab.

2 **Properties Menu**

Clicking the Properties button will display the Properties menu.
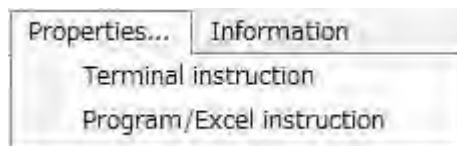
Fig. 3-3 Properties menu

・**"Terminal instruction" menu**

Clicking the "Terminal instruction" menu will display the Properties dialog for the terminal instruction.

Click on the OK button to affect operations.
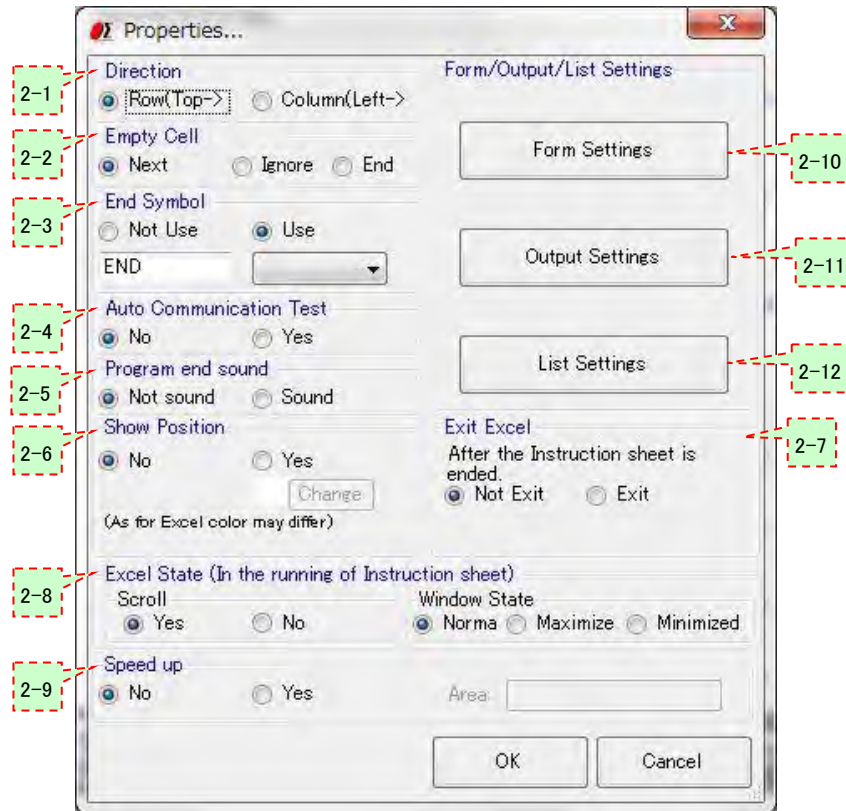
Fig. 3-4 Properties dialog for "Terminal instruction"

2-1 **Direction**

Specify an operation direction run on the Excel sheet.

Though SGADVANCE processes as written in specified instruction sheets, you can choose processing direction from vertical and horizontal.
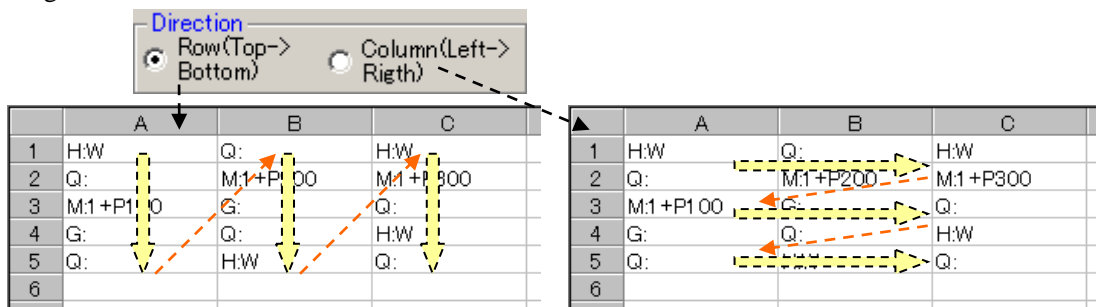
Fig. 3-5 Direction

If you select Row, the process takes place in the order of column A, column B and column C in a sheet.

(A1=>A2=>A3.....B1=>B2=>B3.....C1=>C2=>C3.....)

If you select column, the process takes place in the order of row 1, row 2 and row 3 in the sheet.

(A1=>B1=>C1....A2=>B2=>C2.....A3=>B3=>C3.....)

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2-2 Empty Cell

Specify a processing method when there are blank cells in an Excel sheet.

Select Next to end the current process at current location, and move it to the next row/column.

Select Ignore to ignore empty cells and move to the next cell.

Select End to finish processing in a sheet (If there are two or more instruction sheets, the process moves to the next sheet.)
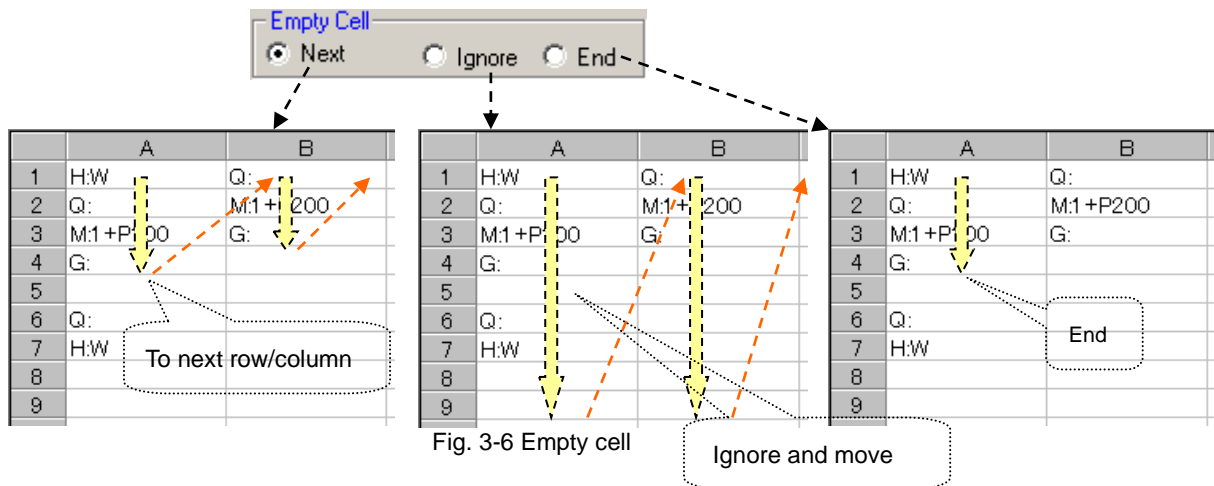
Fig. 3-6 Empty cell

2-3 End Symbol

Use an End symbol to finish the process in the middle of the instruction sheet.

As the symbol, maximum eight (8) optional alphanumeric characters can be used (case-sensitive).

For timing to end up, Sheet or All is selectable.

(Though the operation seems identically by selecting End in Empty Cell and selecting End Sheet in the End Symbol, when selecting End in Empty Cell, a blank is only allowed for the purpose of ending in the middle of the sheet. If the end symbol is used, an empty cell can exist in the middle of the sheet.)

When selecting Not Use, the end symbol does not function.

Normally the END command finishes a sheet in process. If you have more than one instruction sheet, selecting All finishes all the instruction sheets.

End processing instruction sheet here

Fig. 3-7 End symbol

12

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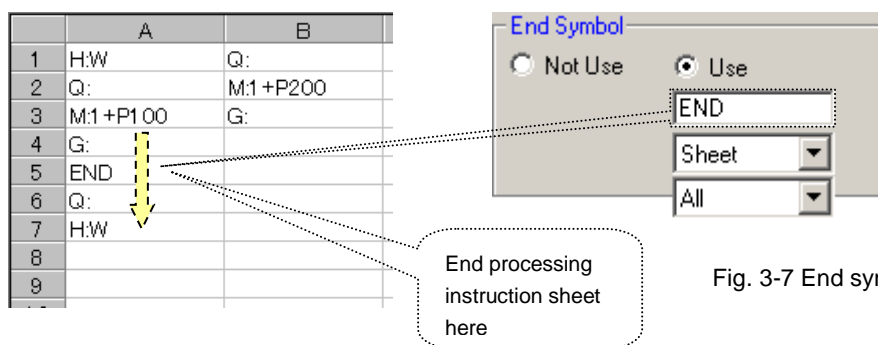
2-4 Auto Communication Test

Before running an instruction sheet, examine communications with all the destinations set for the sheet. If you select (check Yes) Auto Communication Test, the test can run automatically. Otherwise, run the manual test.

Fig. 3-8 Auto communication test

By specifying Auto Communication Test, communication can be tested automatically when the Excel sheet is executed.

The details of auto communication test are as described below depending on mode:

♦ Sheet, row, column, or range

When Yes is selected, all communications with destination devices set in Terminal instruction tab are tested automatically prior to running an Excel sheet.

When a test returns NG, the process ends before running the sheet.

♦ Cell

When selecting Yes, the program starts processing in Excel, and checks the test result if it encounters communication process. When a communication test has not been performed, the program begins it automatically.

When a test returns NG, the process ends during the Excel sheet execution.

2-5 Program end sound

You can select whether you sound a sound when the instruction sheet execution finishes.

Fig. 3-9 Program end sound

2-6 Show Position

A cell in process can be indicated by a designated color while processing an instruction sheet.
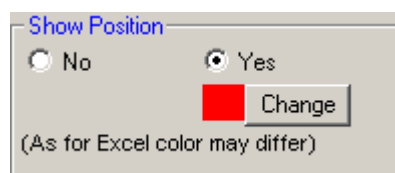
Fig. 3-10 Show position

When selecting Yes, a cell in process is indicated in a designated color.

(currently processed cell can be identified by the color.)

Click the Change button to change color specifications.

13

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2-7 Exit Excel

Whether the Excel is kept running or exited can be selected when the instruction sheet execution finishes.
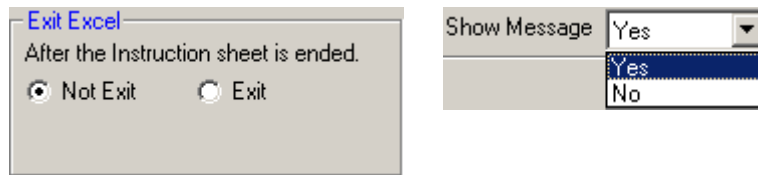
Fig. 3-11 Exit Excel

♦**When Not Exit is selected:**

Excel remains active even the process in the sheet ends.

♦**When Exit is selected:**

Excel closes when the process in the sheet ends. You can select whether the confirmation message is indicated or not when the sheet contents are changed.

♦**When No is selected:**

Data is updated when Excel closes.

♦**When Yes is selected:**

A confirmation message appears to ask you whether to save the data.

2-8 Excel State (in the running of instruction sheet)

Auto scrolling of Excel can be specified so that a cell in process always appears on the screen during the instruction sheet run.

In the Window State box, you can select an Excel window size displayed after running SGADVANCE.
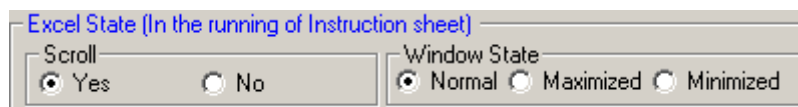
Fig. 3-12 Excel state

2-9 Speed up

You can select whether you read the designated range of the instructions sheet in the memory of the PC before program practice and perform program practice at high speed, or you perform it while reading it from instructions seat for program run time without reading it.

When the contents of the instructions sheet are huge, you can expect an effect of the speedup. (but if the designated range of the instructions sheet is wide, you use a large quantity of memory)

When you choose "Yes", you appoint the range of the instructions sheet to read.

Fig. 3-13 Speed up

Form Settings

The form used to describe in a cell is defined for cell mode.

A form for wait is also defined to specify latency time during processing in other modes.

Click on the Form Settings button to display the setting window.

Fig. 3-14 Form Settings

(1) Time Waiting

Specify a Symbol used to stop processing for a preset time while processing an instruction sheet. (Default is "W". An optional character can be defined. A symbol character is case-sensitive. A blank space cannot be defined. Avoid confusion with other control characters in selecting a symbol character.)

The Time Waiting form is mode-independent, or can be used in all designation modes.

Define one optional alphanumeric character as symbol

Example of wait form appears

Fig. 3-15 Time waiting

15

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By describing the designated form in an instruction sheet, the process enters wait state.

	A	B	C
1	H:W		
2	W:5		
3	Q:		
4			
5			
6			
7			

After sending H:W, wait for five seconds by W:5 and then send Q:

Fig. 3-16 Example of wait form

(2) Setting Form for Communication

Designate a form for a cell to perform communication in an instruction sheet under cell mode. (Default is "F". An optional character can be specified. Symbol is case-sensitive. A blank is not available. Avoid confusion with any other control character in selecting a character.)

The Communication form can be used for cell mode only.

Specify one alphanumeric character as communication symbol

Communication

Symbol: F

Form: F:Device Type TableNo. :Send String
Device :Alias Symbol
Type :W->Send R->Receive A->Send & Receive
TableNo :1-128

Example: FXA1:Send String

Form and example appear

Fig. 3-17 Form for communication

Define Symbol in one alphanumeric character. After it, by following the form, describe Alias Symbol of a device name, Sending/Receiving Type, Table No. for outputting results and a string for Sending/Receiving.

For the Table No., see 2-11 "Setting Output of Result."

Alias Symbol of a device name is to specify a device in communication. Use one specified in "Devise Setting."

Use these aliases

Device Name	Alias	Interface	Port	Status
SHOT-304GS	M	RS232C	COM1	OK
MEASURE	K	RS232C	COM2	OK

Fig. 3-18 Device list

When an instruction sheet is in Cell mode, describe "FMA1:abcd" in a desired cell. When the control moves to that cell, the string "abcd" is sent to the device of which alias is M (device name is SHOT-304GS and Port is COM1 for RS-232), and the result is received from the device.

If you describe "FKA1:efgh" in a cell, the string "efgh" is sent to the device of which alias is K (Device name is Measure and Port is COM2 for RS-232). The result is received from the device.

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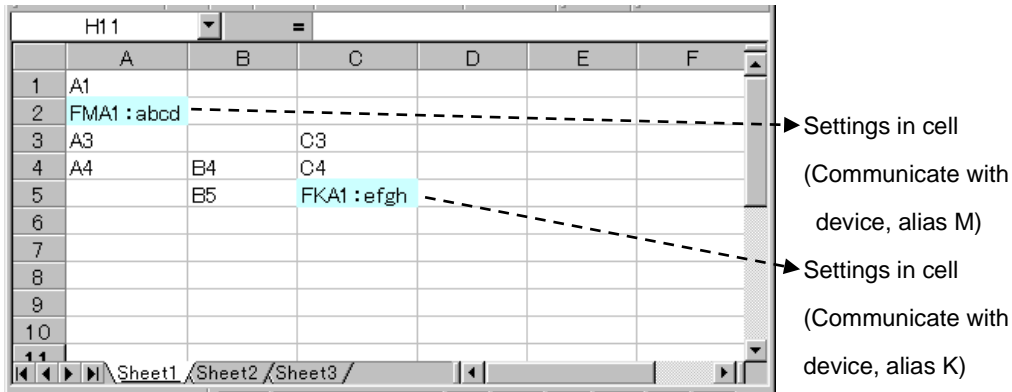
Fig. 3-19 Cell settings

For cell mode, only cells for which communication symbols are described are subject to cell mode and any other cells are not subject to cell mode.

In cell mode, characters used as communication symbols are identified for cell designations. Describing the symbol in a not-designated cell generates an error during a run.

(3) Setting Form for Receive Waiting

To process an instruction sheet responding to the reception result from a device, specify a Receive Waiting Symbol (Default is "V". You can choose one of other characters. This symbol is case-sensitive. A blank is not available. Avoid confusing with other control characters in selecting a character.)

Receive Waiting is mode-independent, or can be used in all designation mode. (In cell mode, a communication symbol needs to be described for the process to identify cell mode before Receive Waiting form.)
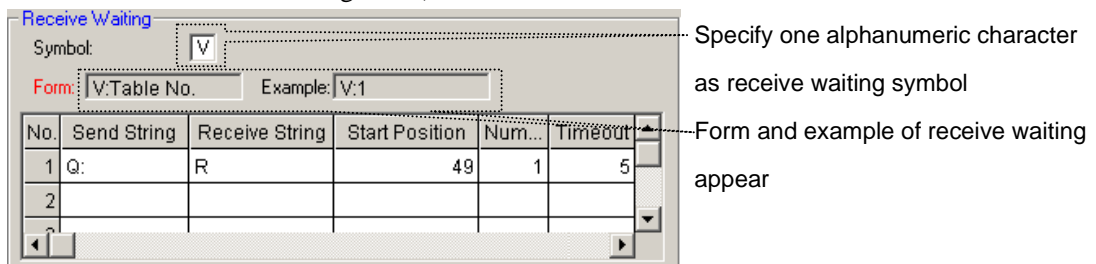
Fig. 3-20 Form for receive waiting

On a table, write a string to be sent in Send String, and of the string to be returned, write characters to be confirmed in Receive String.

Of the Receive String, define the position and number to be confirmed in Start Position and Num respectively.

Then define the timeout for receiving in TimeOut.

When the designated string cannot be received during the timeout, the "Designated String Reception Error" occurs and SGADVANCE ends the processing of the sheet.

17

(If there are any other sheets to be processed, the process moves to the next sheet.)

In Receive Waiting, specify a table No. to which conditions for receive waiting is described after the designated Receive Waiting Symbol.

For example, if "12345678990, 1234567890, K, K, R" is returned responding to the transmission of Q, in order to repeat checking for ten seconds until the 27th character of the returned string becomes "R", fill the table as shown in fig. 3-48. The contents of the table are used as Table No.1.

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	27	1	10

Table No: Fig. 3-21 Example of receive wait entry

The registered table No. can be used when it is specified as a form for receive waiting.

	A	B
1	H:W	
2	V:1	
3	Q:	
4		

In sheet mode, column (row) mode, or range mode, after sending H:W, wait by V:1 until the conditions registered to the table No.1 is satisfied, then send Q:

	A	B
1	FMA1:H:W	
2	FMA1:V:1	
3	FMA1:Q:	
4		

In cell mode, description of communication symbol (F~:) is necessary before V:1

Fig. 3-22 Example of receive waiting form

2-11 Setting Output of Result (setting in cell mode)

For cell mode, register the output destination of the results from processing an instruction sheet. When a destination is not specified, a Result sheet is newly created in the same book as the instruction sheet at default, and processing results are written to it.

(When the Result sheet already exists, it is overwritten with new results.)

	A
1	H:W
2	Q:
3	W:3
4	M:1+P100
5	W:1
6	G:
7	Q:
8	END
9	

Sheet1

Instruction sheet

Run

	A	B	C	D
1	OK			
2	-286,	-386,	0,	0,K,C,B
3				
4	OK			
5				
6	OK			
7	100,	0,	0,	0,K,C,R
8				

Sheet1 Result

Fig. 3-23 Output of result

Result sheet

Click on the Output Settings button to display the Output Settings window.

Table No.

Set name of workbook and sheet
to save results

Clears registered contents
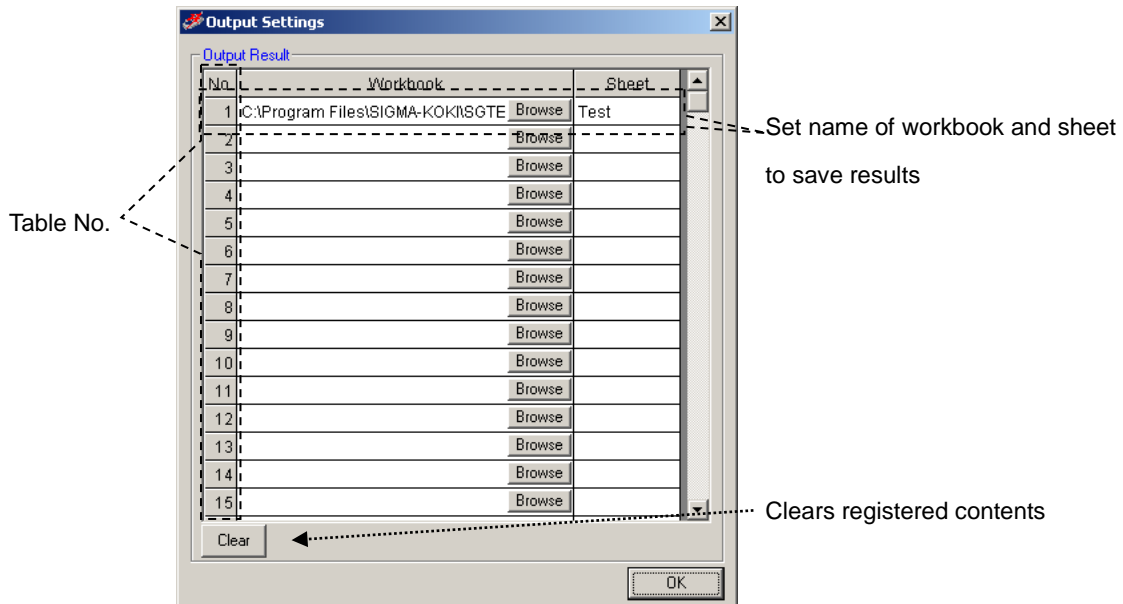
A registered output destination of results can be used by specifying the table No.

Use table No.

Register names
of workbook and
sheet for output
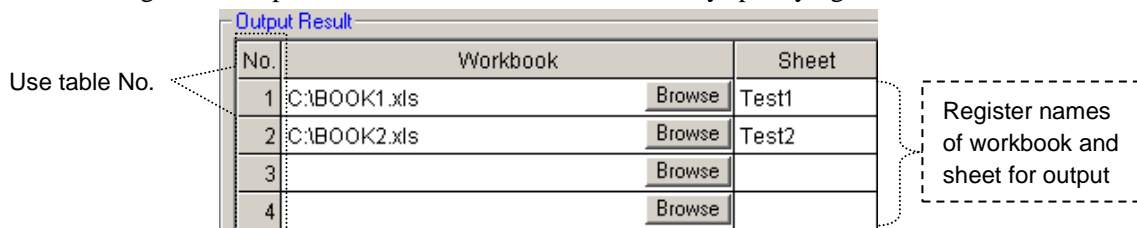
Fig. 3-24 Registration in output result

Specify the table No. of an output destination registered in the fig. 3-24 in a form so that the results are saved to a destination defined for the table No.

When the table No. of the form is omitted, the results are saved to the Result sheet in the same book as the instruction sheet. When the table No. is specified but it is not registered in Output Settings, the results are also saved to the Result sheet.

Table No.: Output destination
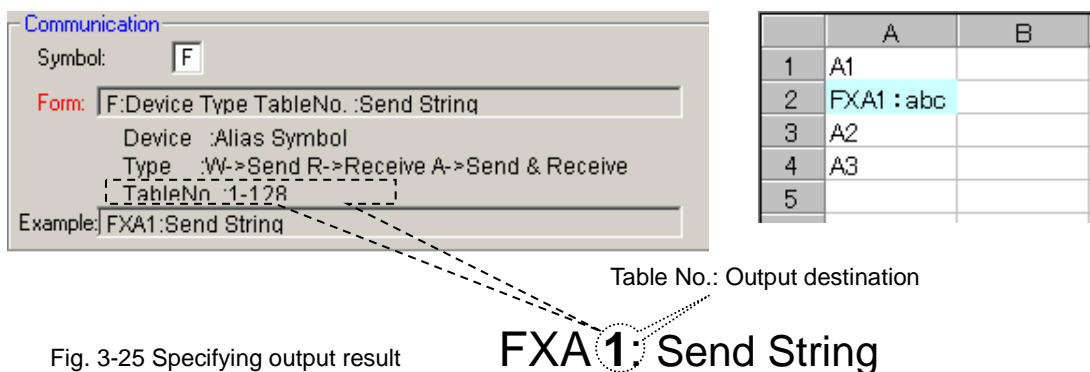
Fig. 3-25 Specifying output result

FXA**1**: Send String

List Settings

Register saved SGA files sequentially (list run).

Click on the List Settings button to display the List Settings window.

Set SGA files to register

Clear registered contents
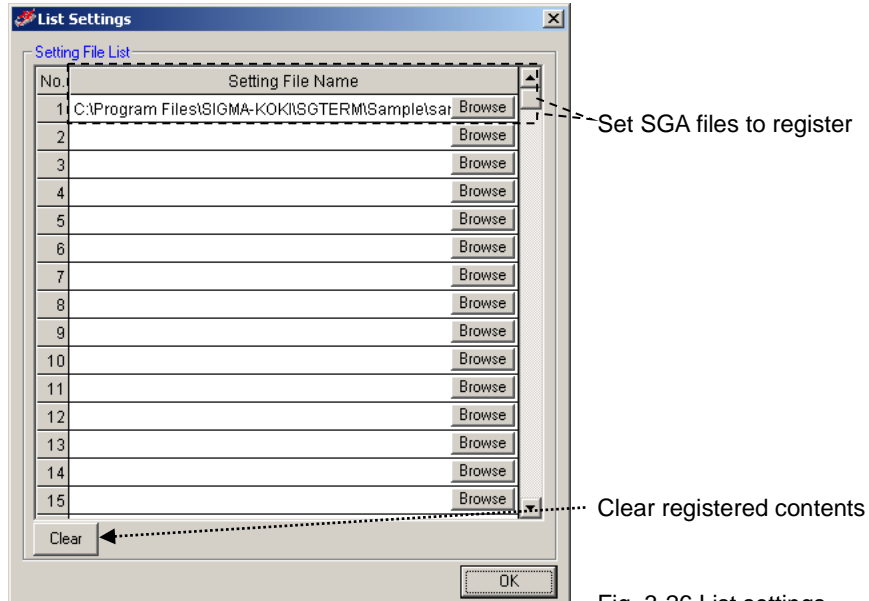
Fig. 3-26 List settings

If you want to run several Excel workbooks (including several sheets) sequentially, register SGA files to be run in this table and run the list so that the SGA files are run automatically according to their contents.

For the details, see 7 "List Run" in "3.4 Terminal instruction".

・**"Program/Excel instruction" menu**

Clicking the "Program/Excel instruction" menu will display the Properties dialog for the program/Excel instruction.

Click on the OK button to affect operations.
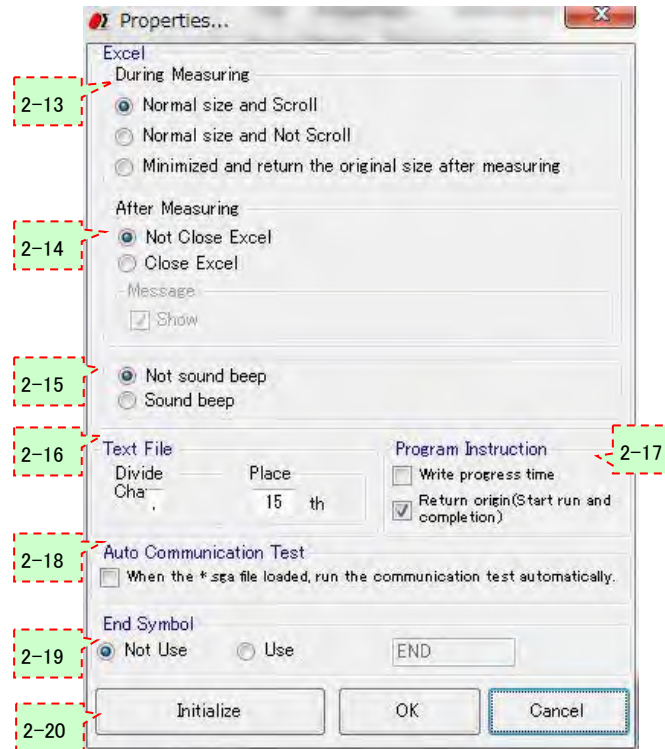
Fig. 3-27 Properties dialog

2-13 **During Measurement**

Select a desired operation mode to use Excel in measurement.

♦ Normal size and Scroll

Excel scrolls the display responding to the update of measurement results.

♦ Normal size and Not Scroll

Excel does not scroll the display even measurement results are updated.

♦ Minimize and return the original size after measuring

Minimizes Excel and does not display the contents during measurement.

2-14 **After Measuring**

Select a desired Excel operation mode after measurement.

♦ Not Close Excel

Excel will still be open after measurement.

♦ Close Excel

Excel will be closed automatically after measurement.

You can choose the display of a confirmation message before closing Excel if you select this mode.

21

Sound beep

Select whether you sound a Beep sound at the time of end of measurement.

Text File

Define the text file format.

♦ Divide Cha... (Character)

Specify a delimiter.

♦ Place

Specify a number of characters in text formats.

Example: 15-characters alignment: ABCDEFG,   HIJKLMN,   OPQRSTU,....

Fill with blanks to add up to 15-character.

Program Instruction

Make settings in Program Instruction mode.

♦ Write progress time

Outputs progress time to measurement result files (Excel/Text).

	A	B
1	Progress time (s)	SHOT-204
2	0	0
3	0.8	1000
4	1.6	2000
5	3.1	0
6	3.9	1000
7	4.7	2000

Note: Progress time varies depending on performance and environments of PC used. So do not expect progress time shows exactly as you calculated. It is merely an approximation.

Fig. 3-28 Progress time

♦Return Origin [Start run and completion]

When the Run Position of a stage controller is set to Prepare or After Measure, specify if the devices are homed.

Device Name	Interface	Port	Run Position	Interval	
SHOT-304GS	RS232C	COM2	Prepare	0	Start after homing
SHOT-304GS	RS232C	COM2	Measure	0	
Measuring Instrument	RS232C	COM1	Measure	0	
SHOT-304GS	RS232C	COM2	After Mesasure	0	Start after homing

Fig. 3-29 Homing on Start/After Measure

Auto Communication Test

Enable/disable automatic communication tests with registered devices when loading setting files (.SGA files).

If disabled, manually verify communication with the devices.

2-19 **End Symbol**

Set the end method of the instructions contents of the instructions sheet at Excel instruction measurement.

♦Not Use

Not use the end symbol indicating the end of instructions content.

When the left edge row of instructions sheets includes a blank cell, process finish there.

♦ Use

As a symbol to terminate instructions contents, the symbol, maximum eight (8) optional alphanumeric characters can be used. (A capital letter, the small letter are distinguished)

2-20 **Initialize**

To Default the settings in the Properties dialog.

3 **Information Menu**

Click the Information button to open the Information menu.

You can display version of SGADVANCE in the version menu.

You can register the key (password) to open the lock of license in the Registration menu.

For the registration of the key (password) to unlock of the license, please refer to "About the license of software" attached to CD-ROM.

And With the "registration" screen, you choose the start mode of the software. Please refer to "2.3 Start mode of the software" for the details.

Fig. 3-30 Information menu

4 **Display Selection Tabs**

Switches Device Register and Measurement (Terminal Instruction, Program Instruction and Excel Instruction).

5 **Device Name**

Displays registered devices (Stage-Controller/Measuring Instrument/Control Device).

Double click to display the setting dialog.

6 **Interface**

Shows interfaces (RS-232C/GPIB/USB/LAN) for registered devices.

Shows "Unknown" if no interface is specified.

7 **Port**

Displays a connection (COM1 to 8, Address0 to 30, ID1 to 8 or LAN1) for each registered device.

Shows "Unknown" if no connection is specified.

8 **Status**

Shows status (connected/error) for registered devices.

Shows "Disable" if a device is not connected.

9 **Add button**

Click to register additional devices.

Click to show the Add Device dialog. Select a device you want to add on the dialog.

 Up to 32 devices are acceptable.

Fig. 3-31 Add Device dialog

♦ Stage ...

Stage-Controller or Intelligent Driver of Sigma Koki.

♦ Measure ...

Measuring Instrument which will return measured results for measurement commands.

♦ Control...

Control device (not reading data) to change temperatures or brightness.

10 **Delete button**

Click to delete registered devices.

To delete a device, select the device and then click the Delete button.

A device cannot be deleted if currently being used in Program Instruction or Excel Instruction mode.

11 **Initialize button**

Delete all the registrations and initialize the settings.

You cannot initialize settings if any devices are currently being used in Program Instruction or Excel Instruction mode.

12 **Setting button**

Click to set a registered device.

To set a device, select a desired device and then click the Setting button.

The Device Settings dialog will appear.

Click on the OK button to update with the settings.

24
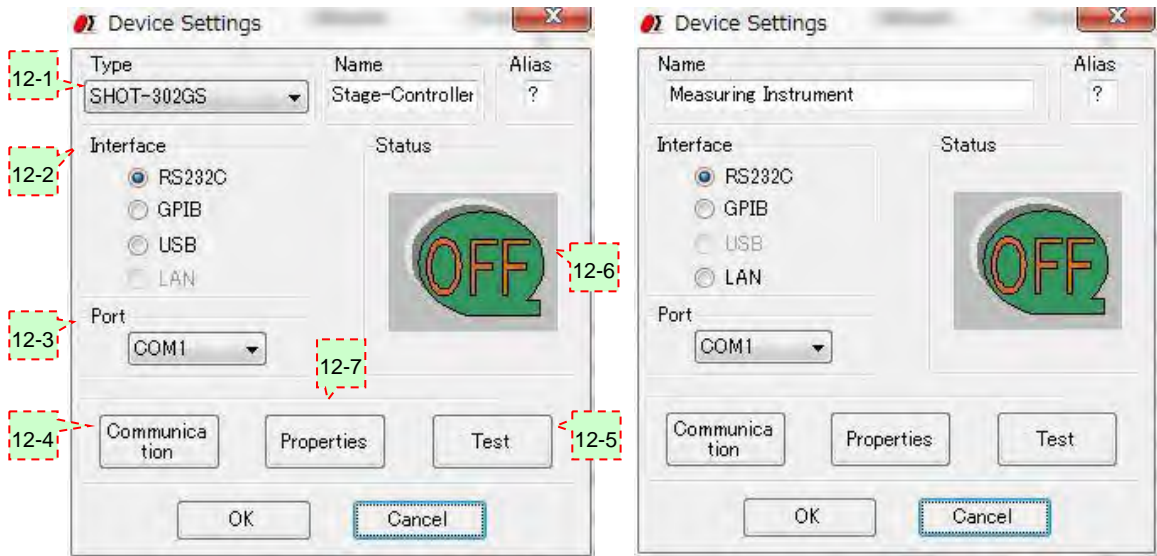
In the case of a stage-controller

In the case of a measuring Instrument and a control device

Fig 3-32 Device Settings dialog

12-1 Name

Select/Input a model of a device you want to register.

For Stage-Controllers, select a model from the list.

If you want to change the name of a device model, alter it by typing directly in the name box.

For Measuring Instruments or Control Devices, default names are displayed.

To change the name of a model, alter it by typing directly in the box.

Input one character as the abbreviation name of the device.
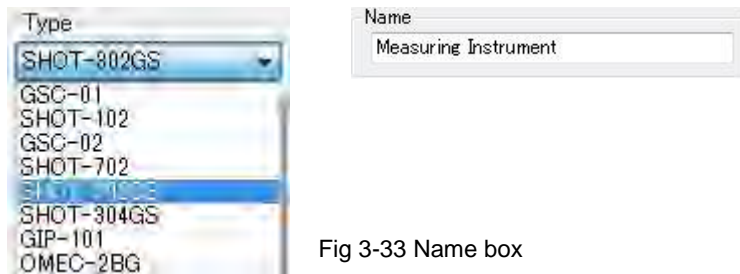
Fig 3-33 Name box

12-2 Interface

Select an interface for the device you want to register.

Selectable interfaces may vary depending on the devices.

♦ Stage-Controller: RS-232C, GPIB, USB or LAN (dependent on models)

♦ Measuring Instrument:　　RS-232C, GPIB or LAN

♦ Control Device:　　　　　RS-232C, GPIB or LAN

Port

Select a connection for the device you want to register.

Selectable connections may vary depending on interfaces for the devices.

- ♦ RS-232C: COM1 to COM8
- ♦ GPIB: Address0 to Address30
- ♦ USB: ID1 to ID8
- ♦ LAN: LAN1

12-4 **Communication button**

Click to set communication conditions for a registered device.

Click on the Communication button to display the setting dialog.

The dialog type is dependent on selected interfaces.

- ♦ RS-232C: A communication setting dialog for RS-232C is displayed.

                        Make settings according to a device to be used.
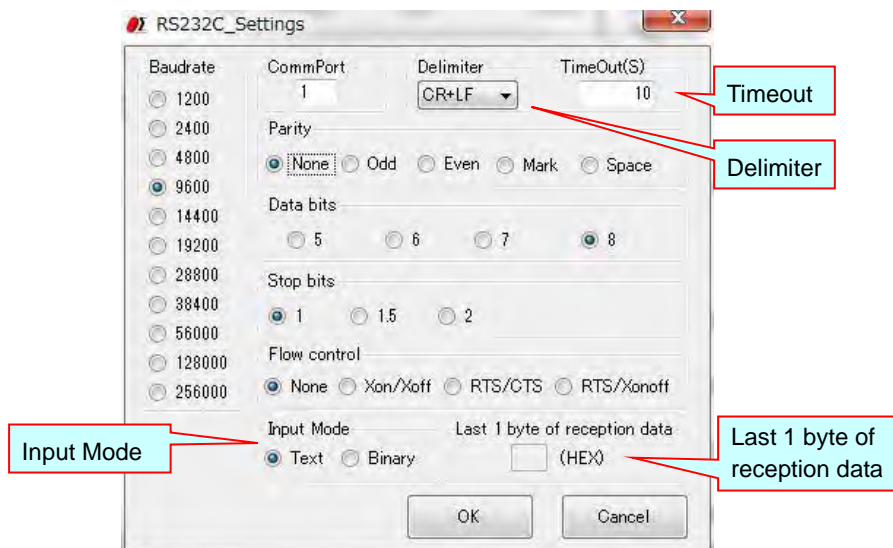
Fig. 3-34 RS232C Settings dialog

■ Input Mode

  Choose the communicate mode.

  Text   : Communicate in a text mode.

  Binary : Communicate in a Binary mode.

■ Delimiter

  In sending, the string specified as Delimiter is added to the end of strings to be sent.

  Receive data should in turn include the delimiter at the end.

  It cannot specify, when Binary is chosen by Input Mode.

■ TimeOut

  TimeOut restricts passing time after starting reception. When the preset time specified for

  TimeOut has passed, receiving process ends.

26

0 - 600 seconds can be specified as TimeOut.

In communication of a text mode, if it does not finish receiving data within the setup time, it becomes an error.

In communication of a binary mode, there are the following two kinds of cases according to the contents of a setting of the "Last 1 byte of reception data".

・ When "Last 1 byte of reception data" is specified

If it does not finish receiving data within the setup time (if reception of the character specified as "Last 1 byte of reception data" is not completed within the setup time), it becomes an error like communication of a text mode.

・ When "Last 1 byte of reception data" is made into a blank

Reception is continued till the time specified as the timeout.

If time passes, reception will be ended and the data received by then will be acquired.

Reception processing takes the time always specified as the timeout. However, it does not become an error even if the setup time passes.

* When "Last 1 byte of reception data" is made into a blank, be sure to set a timeout as 1 seconds or more. Reception processing cannot be ended if it is set as 0 second.

■ Last 1 byte of reception data

Specify 1 byte of the last of received data in hexadecimals (two characters). However, when 1 byte of last is unfixed, make it a blank.

・ At the time of specification

Reception is supervised till the time specified as the timeout at the time of reception. If specified 1 byte is received, reception processing will be ended and receiving data will be acquired. It becomes an error if 1 byte of the last reception is not completed by the time specified as the timeout.

・ At the time of a blank

Reception is continued till the time specified as the timeout. If time passes, reception processing will be ended, and the data received by then is acquired. Reception processing takes the time always specified as the timeout. However, it does not become an error even if the setup time passes.

● About the notation of transmitting receiving data

When communicating by a binary mode, write transmitting receiving data by a hexadecimal number. That is, write 1 byte of data by the alphanumeric character (0~9, A~F) of two characters.

For example, when transmitting data is "2 3 35 10 26" (hexadecimal), write it as "0203351026". Moreover, receiving data is "2 A 0 84 E5" (hexadecimal), it is written as "020A0084E5"

* When you specify transmitting data, be sure to write 1 byte of data by two characters.

♦ GPIB: When GPIB is selected as the interface, the GPIB Settings dialog is displayed. Make settings according to a device to be used.

Fig. 3-35 GPIB Settings dialog

In sending, the string specified as Delimiter is added to the end of strings to be sent.

Receive data should in turn include the delimiter at the end.

TimeOut restricts passing time after starting reception. When the preset time specified for TimeOut has passed, receiving process ends.

* Timeout setting for GPIB affects wait time in the GPIB driver. Therefore, setting longer time in TimeOut freezes SGADVANCE until the TimeOut ends, since GPIB has the control during that time span.

* If you want to use the GPIB Interface, install the driver supplied with GPIB boards or cards by National Instruments, and check the software works properly before the use.

♦ USB: For the USB interface, the USB settings dialog is displayed.

* Only Sigma Koki's Stage-Controller can support USB I/F.
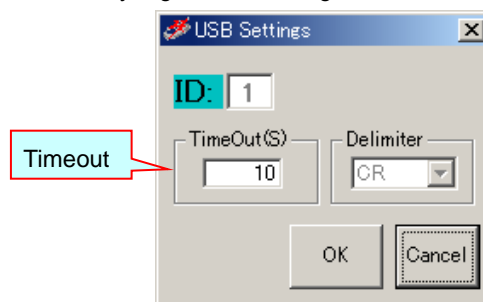
Fig. 3-36 USB Settings dialog

IDs are automatically assigned in the order of connection with Stage-Controllers.

In sending, the string specified as Delimiter is added to the end of strings to be sent.

Receive data should in turn include the delimiter at the end.

Delimiter for the SHOT series is fixed to "CR," not changeable.

TimeOut restricts passing time after starting reception. When the preset time specified for TimeOut has passed, receiving process ends.

* When you want to use the USB interface, install the USB driver of Sigma Koki and confirm that it works properly in advance.

♦ LAN: For the LAN interface, the LAN settings dialog is displayed.
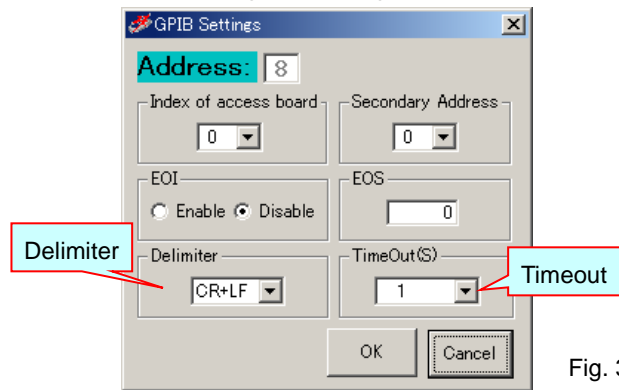
Make settings according to a device to be used.
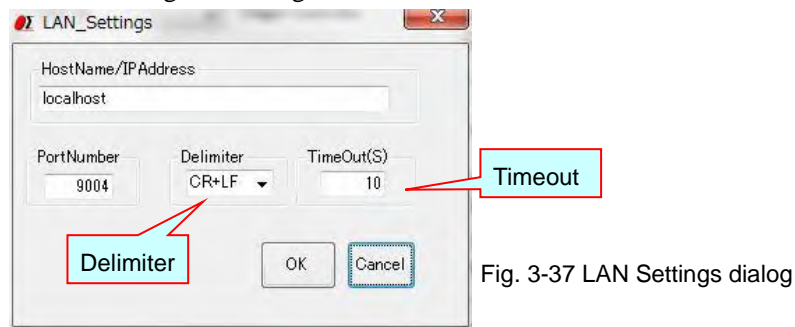
Fig. 3-37 LAN Settings dialog

In sending, the string specified as Delimiter is added to the end of strings to be sent.

Receive data should in turn include the delimiter at the end.

TimeOut restricts passing time after starting reception. When the preset time specified for TimeOut has passed, receiving process ends.

12-5 Test Button

Click to test communication with a registered device.

Click on the Test button to display the Communication Test dialog.
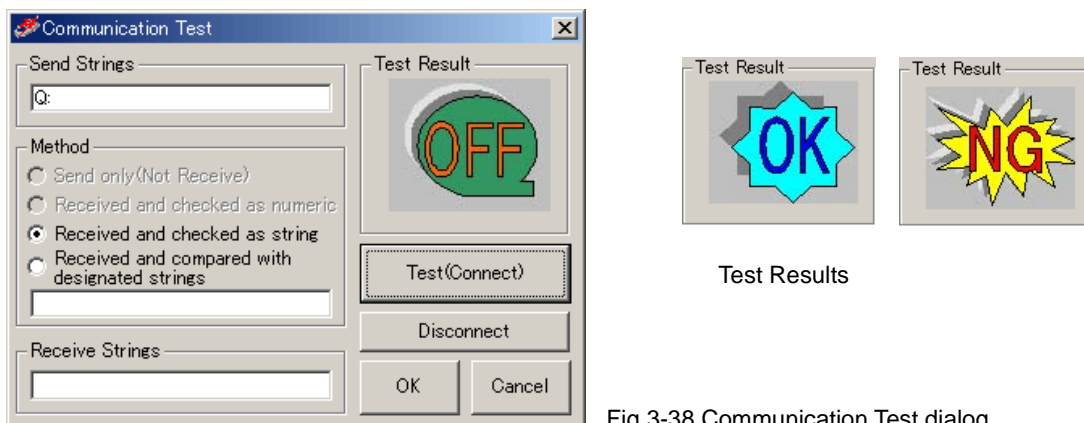
Test Results

Fig 3-38 Communication Test dialog

Type in strings to be transferred to the device in the Send Strings box for communication test. Click the Test (Connect) button to transfer the strings to the specified device, and then the results returned are checked against the sent strings.

The testing mode varies depending on the choice in the Method box:

♦ Send only (Not Receive)

Only sends strings, and does not compare receive results (Strings are not received).

♦ Received and checked as numeric

Checks if the received results are numeric values.

When the strings include characters other than numeric values, the communication test returns NG.

◆ Received and checked as string

　　　Checks if the received results are strings.

　　　Confirms the return of any strings including numeric values.

◆ Received and compared with designated strings

　　　Checks if the returned strings match the designated strings.

　　　When they do not match exactly, the communication test returns NG.

Communication test results are indicated in the Test Result display.

When the communication test returns NG, check again the sent/received strings for testing, communication settings, connection status with the devices (cables), etc. Also check installation status of driver software for GPIB or USB.

By conducting a communication test (and if the result is satisfactory), SGADVANCE is connected with the device.

Click on the Disconnect button to terminate the communication.

12-6 Status

Displays a communication test result.

12-7 Properties button

Click to specify operational settings for a registered device.

Click on the Properties button to display the setting dialog.

Dialogs shown depend on the types of devices or Stage-Controllers.

(1) Measuring Instrument: For an instrument, the Measuring Instrument Settings dialog is displayed.
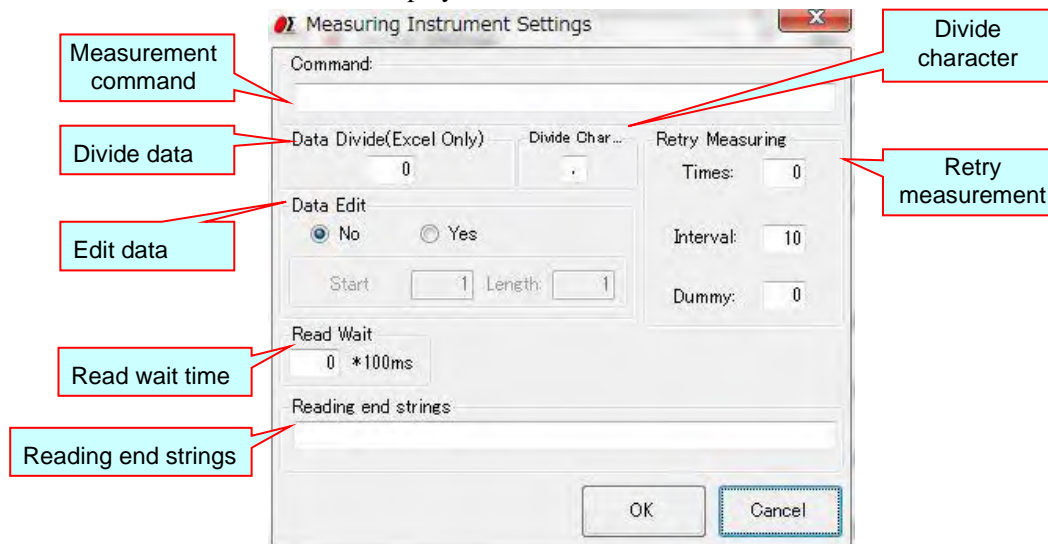
Fig. 3-39 Measurement Instrument Settings dialog

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♦ Command

Input a measurement command to send to the instrument.

Instruments must respond to the measurement commands.

(If a device does not respond to a measurement command, SGADVANCE cannot recognize it as an instrument).

♦ Divide character

If you want to receive response data from a Measuring Instrument <u>by an Excel file</u>, specify a divide character to divide the data to fill as many number of Excel cells.

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to ",", Dividing number to 3:

	A	B	C
1	X=123	Y=456 Z=789	A=ABC B=DEF

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to " " (space), Dividing number to 3:

	A	B	C
1	X=123, Y=456	Z=789, A=ABC	B=DEF

♦ Data Divide (Excel Only)

If you want to receive response data from a Measuring Instrument <u>by an Excel file</u>, specify a number to divide the data to fill as many number of Excel cells.

Data is divided by the character specified in the "Divide character".

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 0:

	A	B	C
1	123,456,789		

All the data in a cell.

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 2:

	A	B	C
1	123	456	

First two comma-separated strings fill two Excel cells.

Third and after are discarded.

♦ Data Edit

To output a response from a Measuring Instrument, edit the return strings with a start position and length specified.

- Example: If a response is "123, 456, 789" with Start Position set to 2, Length to 2:

	A	B	C
1	23		

You can combine the editing and dividing features.

- Example: If a response is "123, 456, 789" with Start Position and Length set to 2 and 2 in Data Edit, and Data Divide to 2:

	A	B	C
1	23	56	

♦ Retry Measuring

Set retry conditions in communication with Measuring Instruments.

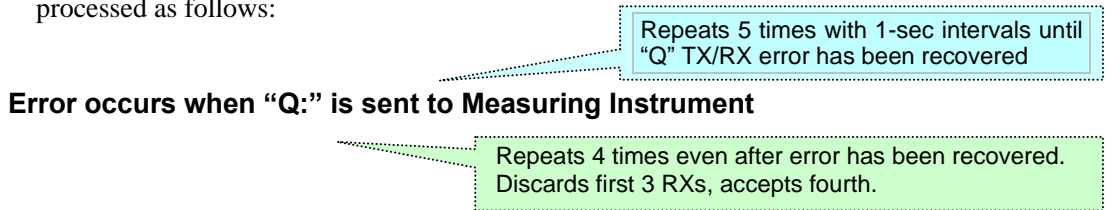When retry counts are specified in the Times box, communication process is repeated as many

times as specified against communication failure before issuing an error.

Interval specifies an interval (in second) between retries.

In the Dummy box, specify the number of dummy communications repeated until reading

valid data. This feature is to help receive unstable data.

Assume that Times is set to five, Interval to one, and Dummy to three. The communication is

processed as follows:

> Repeats 5 times with 1-sec intervals until "Q" TX/RX error has been recovered

Error occurs when "Q:" is sent to Measuring Instrument

> Repeats 4 times even after error has been recovered. Discards first 3 RXs, accepts fourth.

♦ Read wait time

Specifies the interval (in second) of sending of the measurement command to a measuring

instrument, and a reception start.

- Example: If a measurement command is "ST" and Read wait time is three:
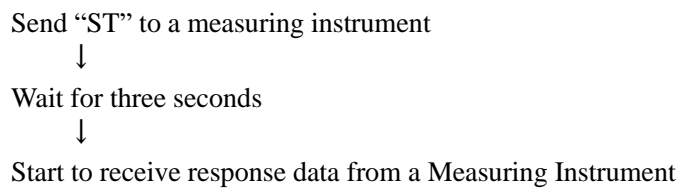
> Send "ST" to a measuring instrument
> ↓
> Wait for three seconds
> ↓
> Start to receive response data from a Measuring Instrument

*In the usual measuring instrument, although 0 is set as Read wait time, set up a required value

according to device or use environment.

♦ Reading end strings

Usually, the receipt of letter from an instrument will be ended if the delimiter specified

beforehand is received. (When transmission and a receipt of letter are 1 to 1.) However, there

is also an instrument which transmits continuously the data divided by the delimiter, and

transmits finally the specific character string which expresses the end of data. (When

receiving two or more times to one transmission) To receive data from such an instrument, it

is necessary to repeat a receipt of letter several times until it receives a specific character

string.

Example:

PC		Instrument
"MES, 1" are transmitted.	------▶	Reception
Reception	◀------	"123" + delimiter are transmitted.
Reception	◀------	"456" + delimiter are transmitted.
	⋮	
Reception	◀------	"END" + delimiter are transmitted.
Since "END" was received, processing ends.		
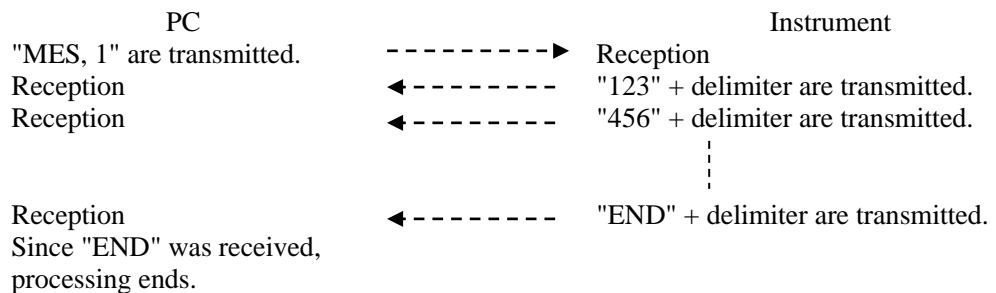
In repeating a receipt of letter until it receives a specific character string, specify the character string to be the reading end strings. When the reading end strings is blank, it receives only once (to a delimiter).

(2) Control Device: For a Control Device, Control Device Settings dialog is displayed.

Fig. 3-40 Control Device Settings dialog

♦ Command

Input a control command sent to a Control Device.

It is used in Program Instruction mode.

It is not used in Excel Instruction mode and Terminal Instruction mode.

Describe a control command in Excel instructions file in these mode.

♦ Answer

Input strings to be returned from the Control Device.

The Answer field should be specified only when the Control Device can respond to a control command (otherwise, DO NOT input the strings).

If the strings are specified, SGADVANCE compares Answer with returned strings. If they do not match, a communication error will occur.

♦ Wait Time (Use with Excel Instruction)

Input wait time, if it is used for controlling purposes in Excel Instruction mode.

Unavailable to Program Instruction mode.

(3) Stage-Controller: For a Stage-Controller, a dialog for the Stage-Controller model is displayed.
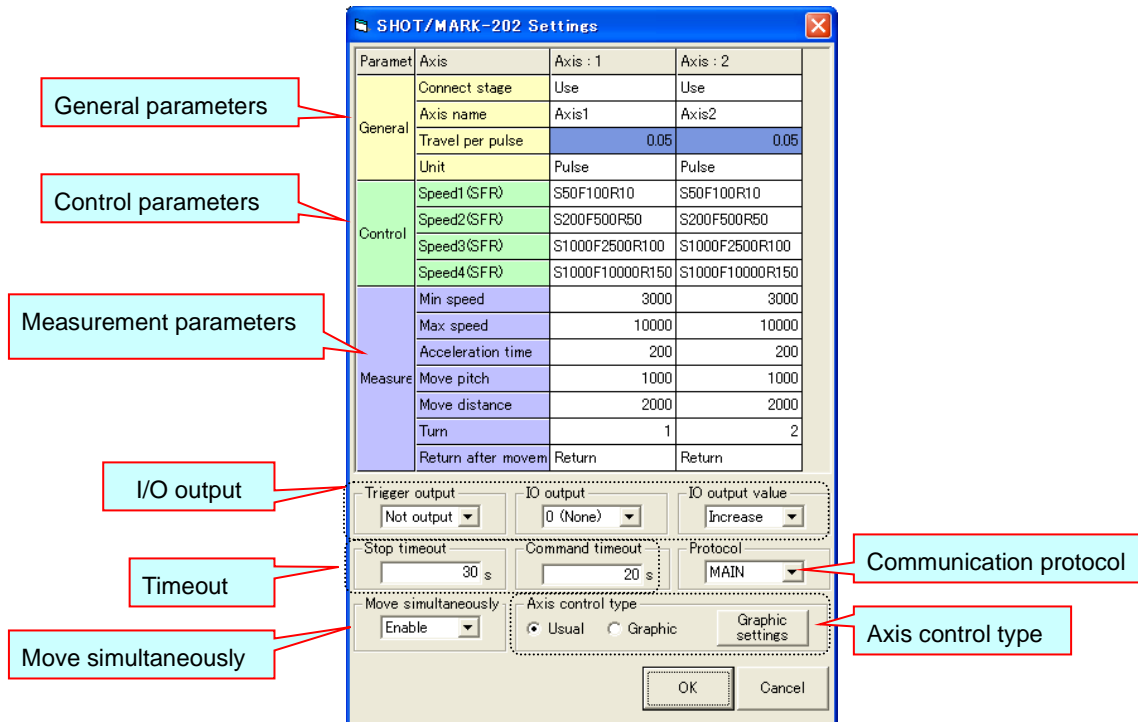
Fig. 3-41 Dialog for Stage-Controller settings

♦ General

Set unique parameters of the Stage-Controller.

Displayed/specified contents vary depending on the models of Stage-Controllers.

Fig. 3-42 General parameters

Connect stage: Enable/disable an axis.

   (Disabled axes are not operated in Program Instruction mode).

Axis name: Give a name to the axis.

Open/Close: Select a control mode (Open/Close).

   (Applicable only to models that support closed loop).

Travel per pulse: Specify a moving amount per pulse.

   (Set this parameter matching to the stage specifications).

Unit: Specify a unit of moving amounts (pulse/micro m/degree).

   * When you specified a unit in micro m or degree at HIT-M, PGC-04 or HSC-103, the travel per pulse is set automatically. It is not necessary to change it.

When you specified a unit in pulse at PGC-04 or HSC-103, specify the travel per pulse (micro m).

Origin select: Specify a direction of the home position.

(Applicable only for a device that can flip the home position).

♦ Control parameters

Set speed parameters used in the control dialog of the Stage-Controller.

You can specify up to four speed modes.

Displayed/specified contents vary depending on the models of Stage-Controllers.

The speed selected here will affect the movement speed in the control dialog.

Control	Speed1 (SFR)	S50F100R10
	Speed2 (SFR)	S200F500R50
	Speed3 (SFR)	S1000F2500R100
	Speed4 (SFR)	S1000F10000R150

Fig. 3-43 Control parameters

Fig. 3-44 Speed selection box in control dialog

♦ Measurement parameters

Set measurement parameters used in Program Instruction mode.

Specify a moving speed of a stage in Excel Instruction mode.

Displayed/specified contents vary depending on the models of Stage-Controllers.

Parameter	Axis	Axis : 1
Measure	Min speed	3000
	Max speed	10000
	Acceleration time	200
	Range	
	Move pitch	1000
	Move distance	2000
	Turn	1
	Return after movement	Return

Fig. 3-45 Measurement parameters

Min speed/Max speed Acceleration time/range:

Specify a moving speed of a stage during measurement.

Move pitch: Specify a moving pitch of a stage during measurement.

In measurement, the stage will move by the pitch.

Move distance: Specify a moving distance of a stage during measurement.

In measurement, the stage will move to the specified distance.

Turn: Specify the moving order of a stage during measurement.

In measurement, the stage will move in the specified order.

Return after movement: Select the moving mode of a stage during measurement.
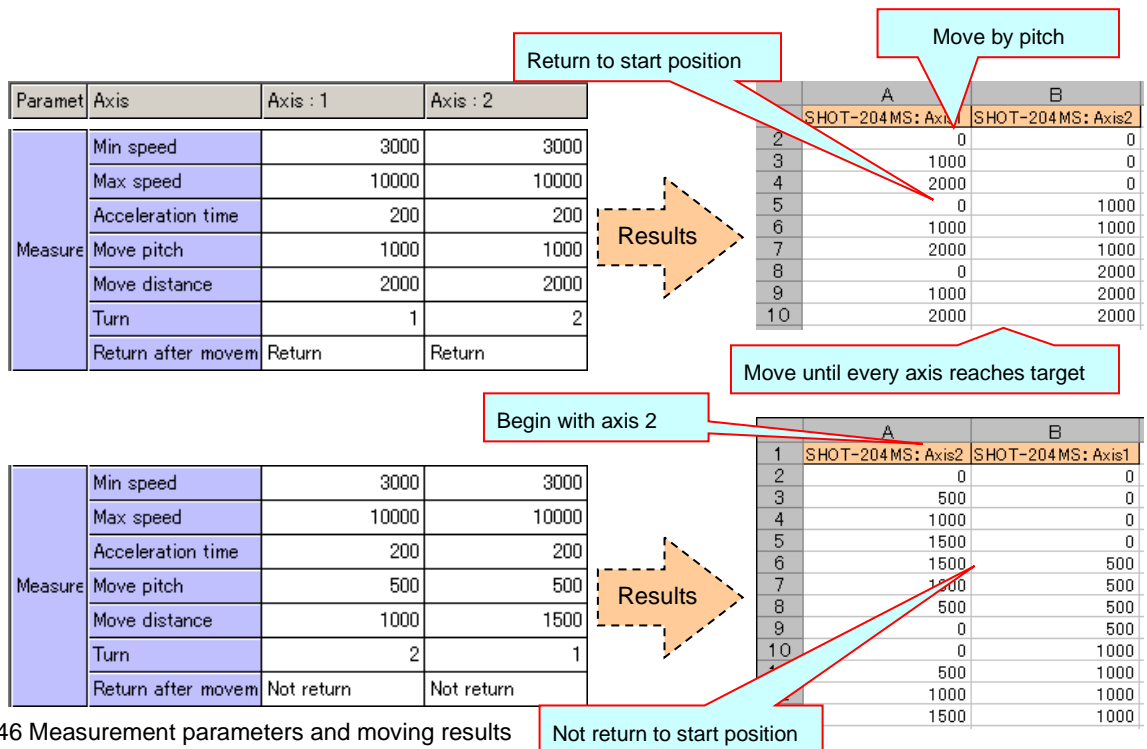
Fig. 3-46 Measurement parameters and moving results

♦ I/O output

Specify I/O signal outputs during measurement in Program Instruction mode.

Available only to Stage-Controllers supporting I/O outputs.
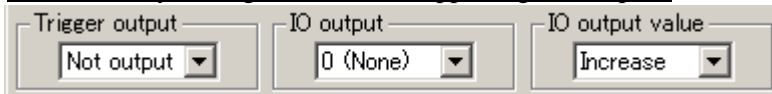
Fig. 3-47 Settings in I/O output

Trigger output: If enabled, a trigger signal is output every time a stage makes a pitch move (after the move) during measurement.

I/O output: If NOT DISABLED (not 0), an I/O signal of a specified bit value is output every time a stage makes a pitch move (after the move) during measurement. (Select a bit value from 1 to 15).

I/O output value: If you enabled I/O output, specify the type of bit value output.

For **Fixed**, a specified bit value is output every time a stage makes a pitch move (after the move).

For **Increase**, the value is incremented from 1 to a specified value every time a stage controller makes a pitch move (after the move).

* No signal output at (0, 0) because of the absence of a pitch move.
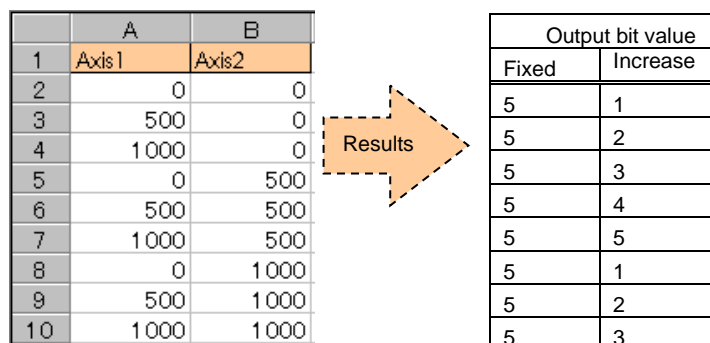
Fig 3-48 Output results of I/O output of 5

36

♦ Timeout

Specifies communication timeouts during measurement.

Fig. 3-49 Timeout settings

Stop timeout:　　Specifies maximum allowable time for a stage to stop completely (or, became ready). If a stage fails to stop within this time, an error occurs.

Command timeout: Specifies maximum allowable time from sending a command to a stage to receiving the response. If no response is returned within the specified time, an error occurs.

♦ Protocol

Specifies a communication protocol with the Stage-Controller.

Set a Protocol matching to the communication specifications of the Stage-Controller. (The setting is unnecessary with some Stage-Controller models).
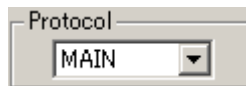
Fig. 3-50 Setting of Communication Protocol

MAIN: Receives a response returned for a command sent to a Stage-Controller.

SUB: Except for some specific commands, SGADVANCE does not receive a response returned for a command sent to a Stage-Controller.

♦ Move simultaneously

Specify the move method in program instruction measurement and Excel instruction measurement.

・Case of program instruction measurement

Enable: Choose, when you perform simultaneous movements of two or more axes.

Disable: Choose, when you move in the shape of a matrix.

・Matrix-like movement

37

・Simultaneous movement of two or more axes

	Axis : 1	Axis : 2
Move pitch	1000	1000
Move distance	2000	2000

	A	B
1	Axis1	Axis2
2	0	0
3	1000	1000
4	2000	2000
5		
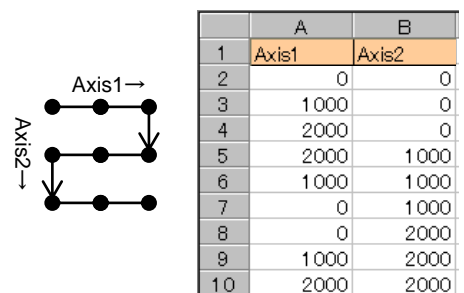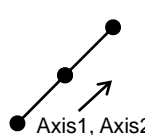
Axis1, Axis2

Fig. 3-51 Matrix-like movement and simultaneous movement of two or more axes

・Case of Excel instruction measurement

Enable: Choose, when you move a coordinate value written to the Excel sheet at the same time.

Disable: Choose, when by 1 axis moves.

・Enable sample

Instructions column	Axis1	Axis2	Axis3	Axis4	Measure
▶ Correspondence devices	SHOT-304GS_…	SHOT-304GS…	SHOT-304GS…	SHOT-304GS…	Measuring

	A	B	C	D	E
1	Axis1	Axis2	Axis3	Axis4	Measure
2	1000	1500	100	20	
3	2000	2500	200	40	
4	3000	3500	300	60	
5	4000	4500	400	80	
6	5000	5500	500	100	
7					
8					

Move 4 axes at the same time.

Fig. 3-52 Simultaneous movement of two or more axes in Excel instruction measurement
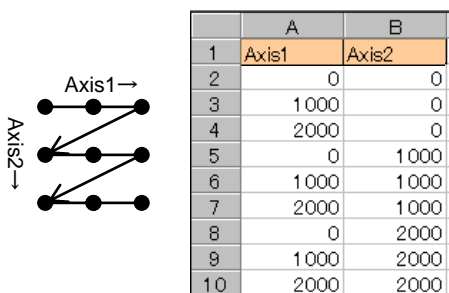
SGADVANCE moves axis1 1000, axis2 1500, axis3 100, axis4 20 at the same time in the second line of the Excel sheet.

♦ Axis control type

Specify the type of an axis control dialog and a setup required in case a graphic type control dialog is used.

Usual: Choose, when you use the usual type dialog.

Graphic: Choose, when you use the graphic type dialog.

Graphic settings button: Click to display the graphic axis control settings dialog.

When you use a graphic type control dialog, set up various required setup on the displayed dialog.

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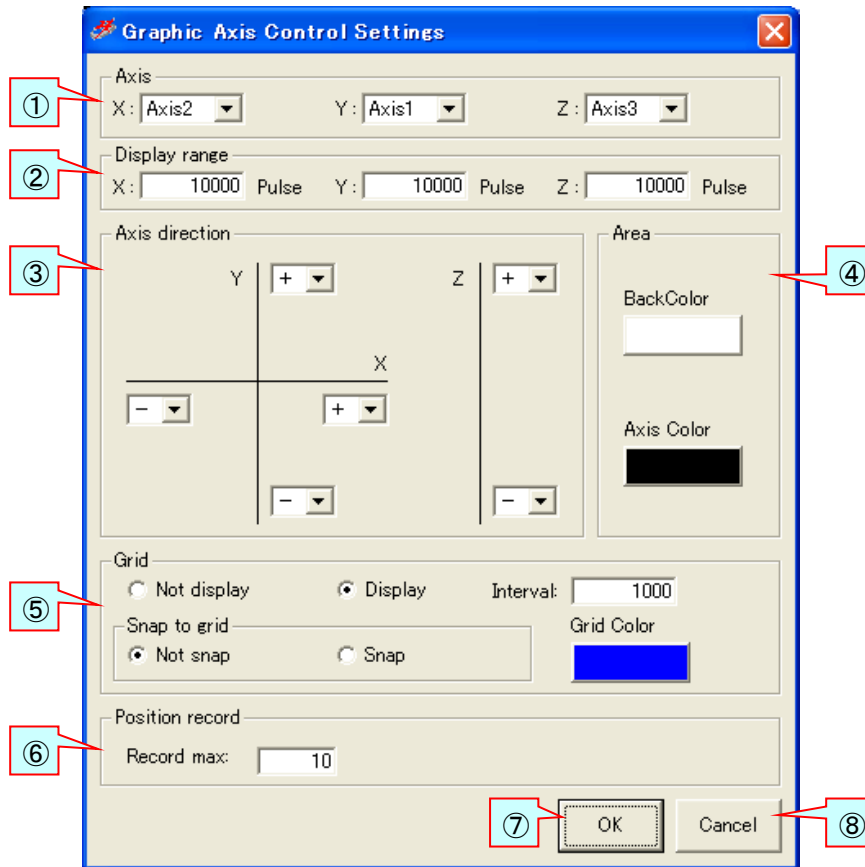
Fig. 3-53 Graphic Axis Control Settings dialog

---

① **Axis**

Specify the actual axis of a stage assigned to each axis of a graphic control dialog.

Since the axis specified "Use" on the dialog for stage-controller settings is displayed on a list, specify the axis of a stage to assign.

Specify "None", when you do not assign the axis of an axis control dialog.

② **Display range**

Specify the display range of stage operation area.

A unit is a unit specified on the dialog for stage-controller settings.

A value larger than 0 and smaller than 100000000 can be specified.

(It is not the movable range of a stage. When a stage moves out of the display range, the button for moving the display range can be clicked and the display range can be moved to the current position of a stage.)

③ **Axis direction**

Specify the direction of each axis of coordinates of stage operation area.

Please specify according to the move direction of an actual stage.

39

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④ **Area**

Specify the background color of operation area, and the color of an axis of coordinates.

If you click each button, the setting dialog of a color will be displayed.

Choose a color to specify and click the "OK" button.

⑤ **Grid**

■Not display ・・・A grid line is not displayed on operation area.

■Display ・・・・・・A grid line is displayed on operation area.

■Interval ・・・・・・When you display a grid line, specify the interval of a grid line.

You can specify the value from 1/10 of the minimum of the display ranges X, Y, and Z specified by ② to the minimum.

■Not snap to grid ・・・

When a grid line is displayed, operation area is clicked and a stage movement position is specified, it moves by making a click position into a movement position on a stage.

■Snap to grid ・・・

When a grid line is displayed, operation area is clicked and a stage movement position is specified, it moves on a stage by making the position on the nearby grid line of a click position into a movement position.

■Grid color ・・ When displaying a grid line, specify the color of a grid line.

If a button is clicked, the setting dialog of a color will be displayed.

Choose a color to specify and click the "OK" button.

⑥ **Position record max**

Specify to how many the movement place coordinates of a stage are recordable.

The table for the number specified here is prepared for a graphic operation dialog.

The values from 10 to 1000 can be specified.

⑦ **"OK" button**

If it clicks, the specified contents will be set up and it will return to the dialog for stage-controller settings.

⑧ **"Cancel" button**

If it clicks, the specified contents will be canceled and it will return to the dialog for stage-controller settings.

13 **Stage button**

Click to operate a stage using a registered Stage-Controller.

To operate a stage, select a Stage-Controller and then click the Stage button. Click to display the Axis Control dialog.

Displayed/specified contents vary depending on the models of Stage-Controllers.

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Manual control is available in the same dialog.

There are usually a type and a graphic type of "Axis Control" dialogs.

・Usual type Axis Control dialog
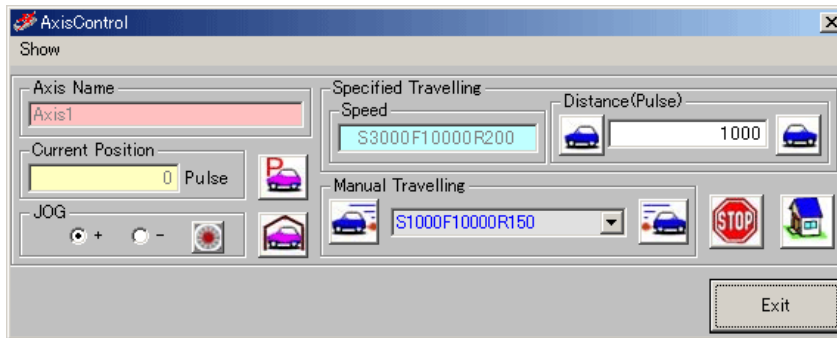
Fig. 3-54 Axis Control dialog
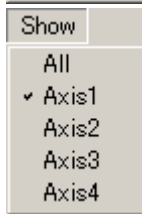
Select an axis to operate in the Show menu.

The axis name of an operation ·········► target is displayed.

Current position of the operated ······► axis is shown.

Set current position to 0 ········ (logical origin).

Moves axis back to the ········ logical origin.

Clicking JOG button starts jogging.
Selection between + and – sets the direction of movement.
To stop jogging, click STOP button.

Type in pulses of travel.

The speed of the specified traveling is displayed.
Specify the speed at Min speed/Max speed
Acceleration time/range of measurement
parameters in the setting dialog for the
Stage-Controller. (Refer to 34 pages)

Click to move the axis by as many
pulses as specified above.

Click to stop the stage.

Move axis back to the
machine origin.

The speed of the manual traveling is displayed.
Specify the speed at Speed1 to Speed4 of control
parameters in the setting dialog for the
Stage-Controller. (Refer to 34 pages)

Click and hold to keep the
axis moving until the button
is released.

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・Graphic type Axis Control dialog(May not be available depending on the Controller model)

On a graphic type axis control dialog, the current position of a stage is graphically displayed in stage operation area, the arbitrary points in operation area are clicked, and a movement place can be specified.

③ ②
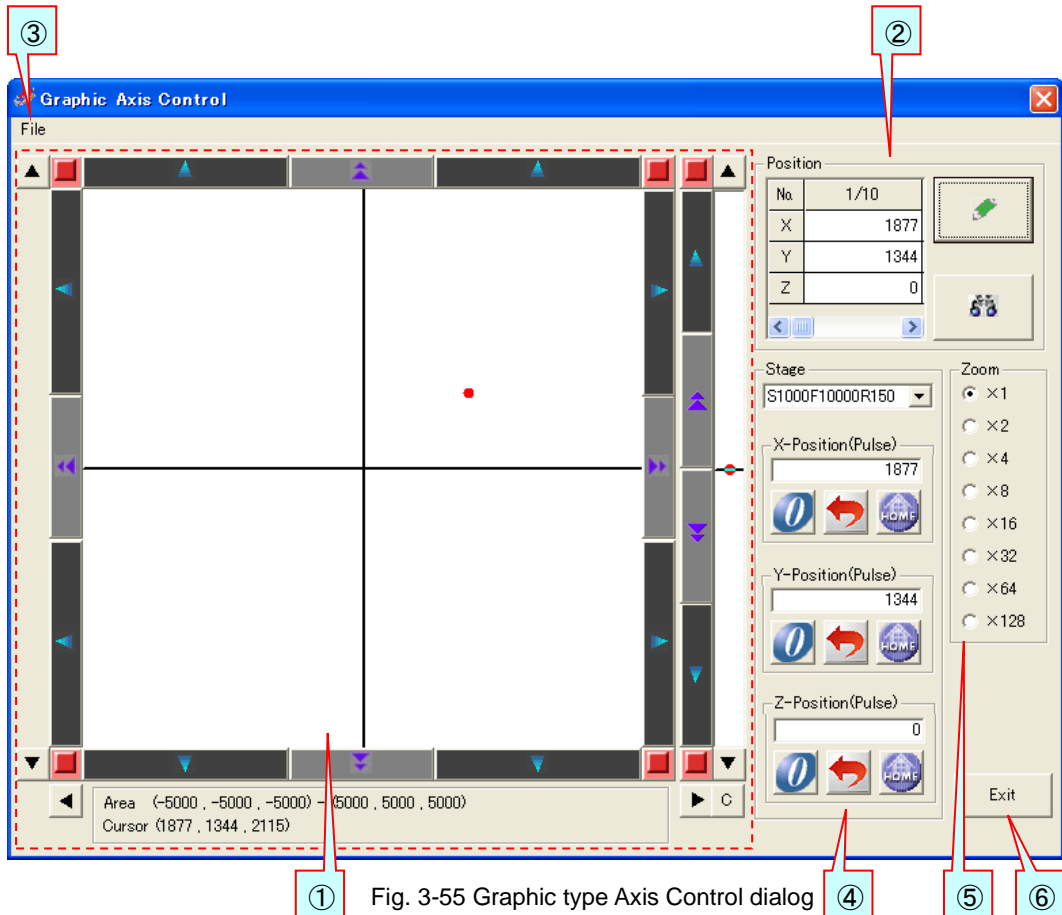
① Fig. 3-55 Graphic type Axis Control dialog ④ ⑤ ⑥

① **Stage operation area**

The current position of a stage is displayed by ●.

If the inside of operation area is clicked, the position will be displayed by ● and a stage will be moved to the position.

(The color of ● which shows a position changes in the background color of operation area.)

Moreover, the button of the circumference of operation area can be clicked and it can move on the stage of each axis. The button for moving the display range can be clicked and the range which operation area shows can be changed.
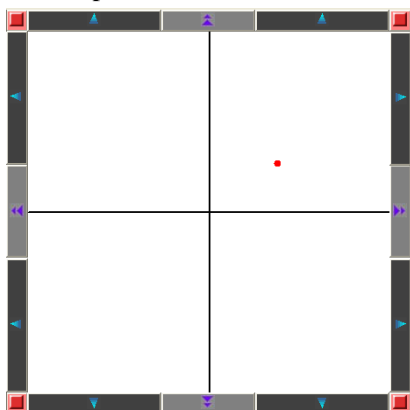
Stage operation area for X-axis and Y-axis.
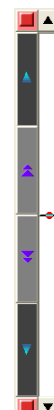
Stage operation area for Z-axis.

42

When it sets up for displaying a grid line, a grid line is displayed as shown in the following figure.
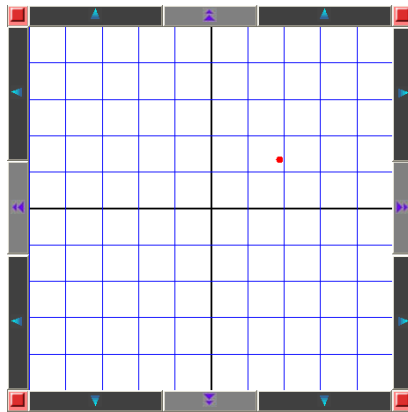
■**JOG button**

JOG operation will be started if it clicks. Click a stop button, when you stop JOG operation.

■**Manual move button**

While clicking, it moves on a stage.

■**Stop button**

A stage will be stopped if it clicks.

■**Button for moving the display range**

If it clicks, the range which stage operation area shows will be moved.

When the stage current position is outside operation area, the display range can be changed with this button and the stage current position can be displayed.
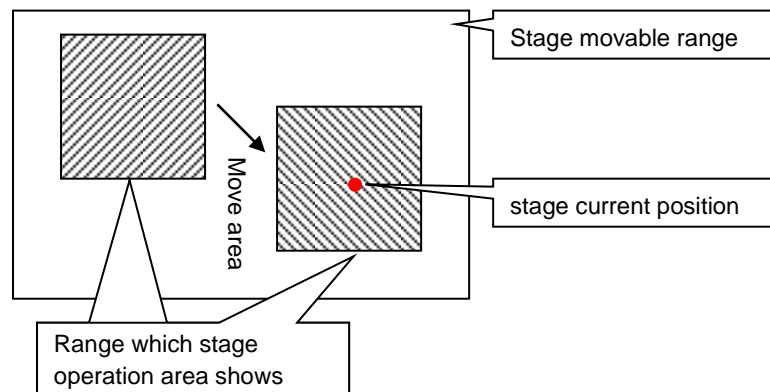
■**Button which displays the origin in the center**

If it clicks, the origin will be displayed in the center of operation area.

■**The display of the display range and the cursor position**

The display range of operation area and the position of a mouse cursor are displayed.

```
Area  (-5000 , -5000 , -5000) - (5000 , 5000 , 5000)
Cursor (1877 , 1344 , 2115)
```
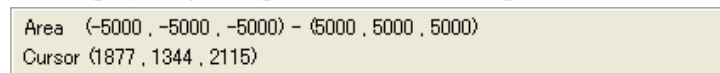
② **Position record**

It is used, when recording the stage current position on a table and moving a stage to the recorded position.
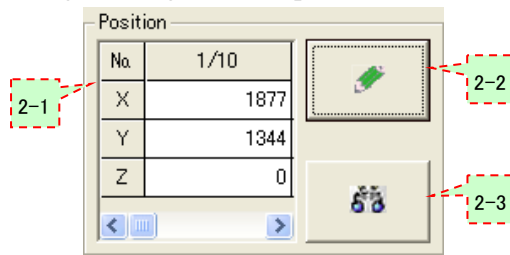
2-1 **Table**

It displays the recorded stage position.

Moreover, you can click the cell of a table and can also do the direct entry of the stage position.

The columns of a table is prepared in the number of the position record maximum numbers specified on the graphic axis control settings dialog.

You move a scroll bar and can display other columns.

2-2 **Record button**

If it clicks, the stage current position will be recorded on a table at a column present on display.

2-3 **Move button**

If it clicks, a stage will be moved to the position of the column of a table present on display.

③ **"File" menu**

If it clicks, the "File" menu will be displayed.

The contents of the table which recorded the position can be saved with the "File" menu. And the saved file can be read and it can restore to a table.

④ **Stage control**

Speed setting, return to origin, etc. of a stage are operated.

The speed of the traveling is displayed. Specify the speed at Speed1 to Speed4 of control parameters in the setting dialog for the Stage-Controller.

Current position of the axis is shown.

Move axis back to the machine origin.

Set current position to 0. (logical origin).

Move axis back to the logical origin.

⑤ **Zoom**

Operation area is zoomed in.

If "x1" is chosen, it will return to a standard.

X1　　　　　　　　　　　　　　　　　　　X2
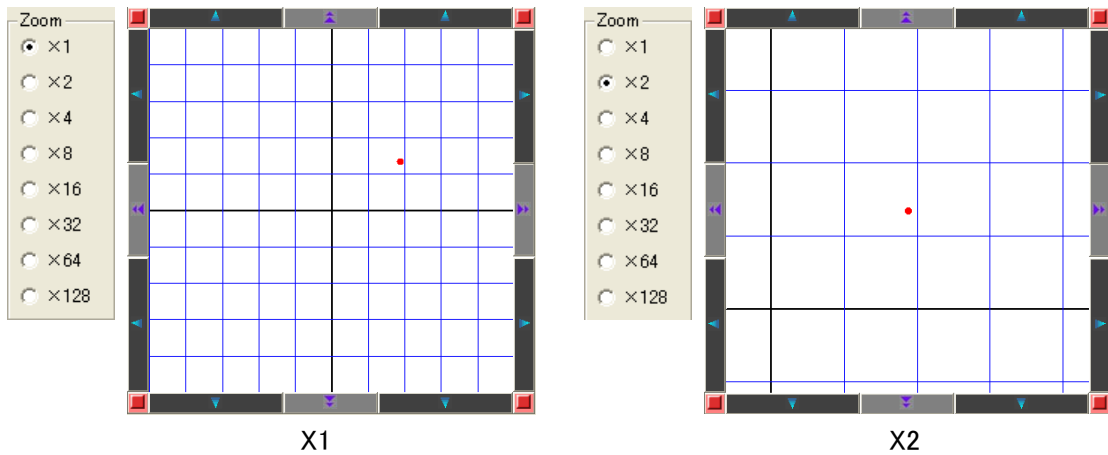
⑥ **"Exit" button**

If it clicks, a graphic axis control dialog will be closed and it will return to a main window.

14 **Terminal button**

Click to open the Terminal dialog to communicate with a registered device.

In the Terminal dialog, you can communicate with a registered (set) device by directly inputting commands.

To start the Terminal dialog, select a device and then click the Terminal button. The dialog is displayed.
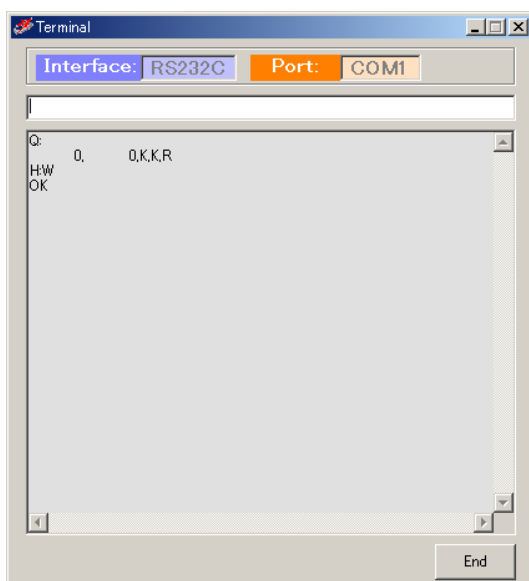
Input strings and press the Enter key to send the strings to the destination device.

Received strings from the device are displayed in the dialog.

If a destination device is not connected, communication by the Terminal feature is not available.

A timeout does not suspend communication.

Click End to finish

Fig. 3-56 Terminal dialog

15   Measurement mode selection box

Specify a measurement mode with this box.

If you change the measurement mode, the mode tab changes accordingly.

Fig 3-57 Measurement mode selection box and mode tabs

- ♦ Terminal Instruction: Select to run in Terminal Instruction mode
- ♦ Excel Instruction: Select to run in Excel Instruction mode
- ♦ Program Instruction: Select to run in Program Instruction mode.

16   Connection status display

Shows connection status of registered devices.

Device type information and interface information are available.
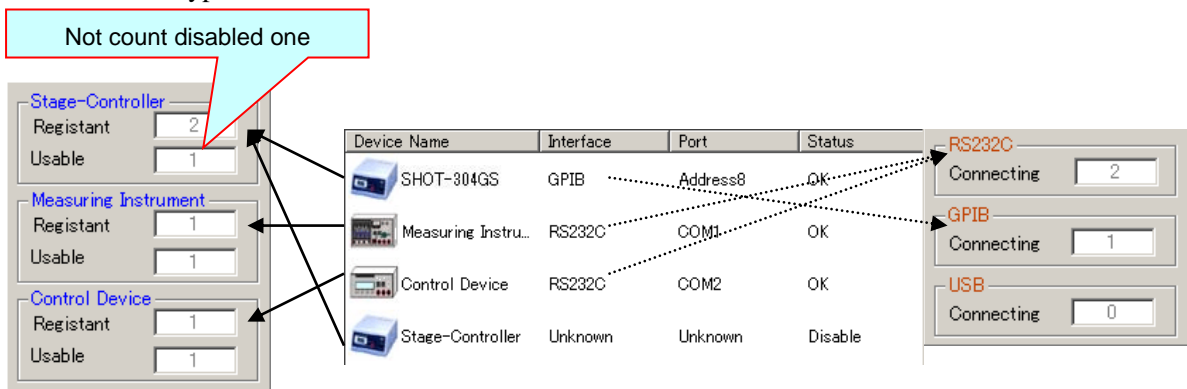
Fig. 3-58 Connection status display

17   Exit button

Click to exit SGADVANCE.

This button can function identically as the exit button in the File menu.

3.2 Program Instruction Dialog

The dialog to register devices or set conditions for operations in Program Instruction mode.
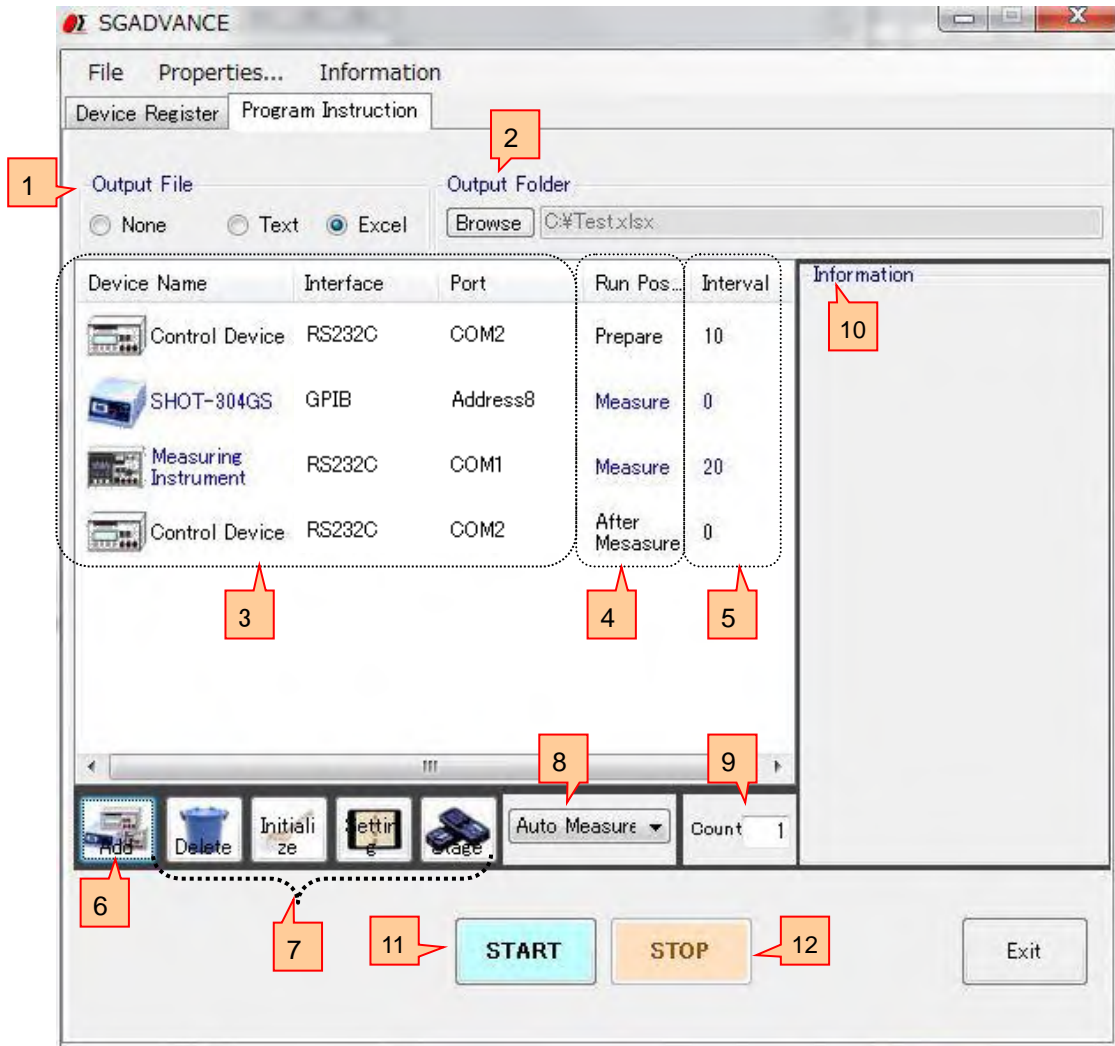
Fig. 3-59 Program Instruction dialog

1 **Output File**

Select a format to save results.

♦ None

Does not output measurement results.

♦ Text

Saves measurement results to text files.

♦ Excel

Save measurement results to Excel files.

Select Output Folder

Specify a destination to save measurement results.

Click Browse to show a file list. Select a file for saving the results.

If not specified, a new file is created to save the results.

If you selected text format for saving, a new file named SGdata.txt is created under the current directory.

For Excel, it is named Book*.xls.

(The Excel program decides file names and destinations).

Registered Device List Display

Devices used in Program Instruction mode are displayed in the order of operations.

Run Position

Shows the run position (operation timing) for each device in Program Instruction mode.

♦ Prepare

Devices operated only at the start of measurement. (Not operated in measurement).

♦ Measure

Devices operated during measurement.

♦ After Measurement

Devices operated only after measurement finishes. (Not operated in measurement).

Interval

Shows an interval (in 100 ms) from the end of operations in a device to starting of the next device.

Add button

Click to register additional devices in Program Instruction mode.

Click to show the Add Device dialog. Select a device you want to add.
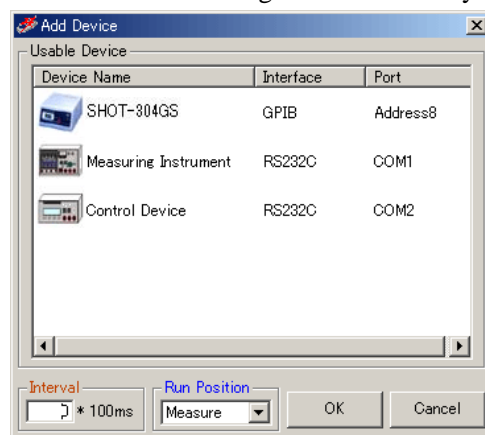
Fig. 3-60 Add Device dialog

In the Add Device dialog, only devices registered and able to communicate are displayed.

(Devices without communication settings are not displayed).

You can specify Interval and Run Position for adding devices.

If you choose Run Position, selection in Run Position must precede the device selection.

7 Delete, Setting, Initialize and Stage buttons

Click to delete, set, initialize or control a device.

Select a device for a desired process, and then click one of the buttons.

(Device specification is not necessary for initialization).

8 Measurement mode selection box

Select a measurement mode in Program Instruction mode.

Fig. 3-61 Measurement mode selection box

- ♦ Auto Measure: Select to perform auto-measurement.
- ♦ Auto Measure-M: Select to perform auto-measurement-Multi.
- ♦ Manual Measure: Select to perform manual measurement.

9 Count

Specify a count to repeat measurement in Program Instruction mode.

Set a count from 1 to 999.

10 Information display

Displays setting status of registered devices.

Select a device to show information on the device.
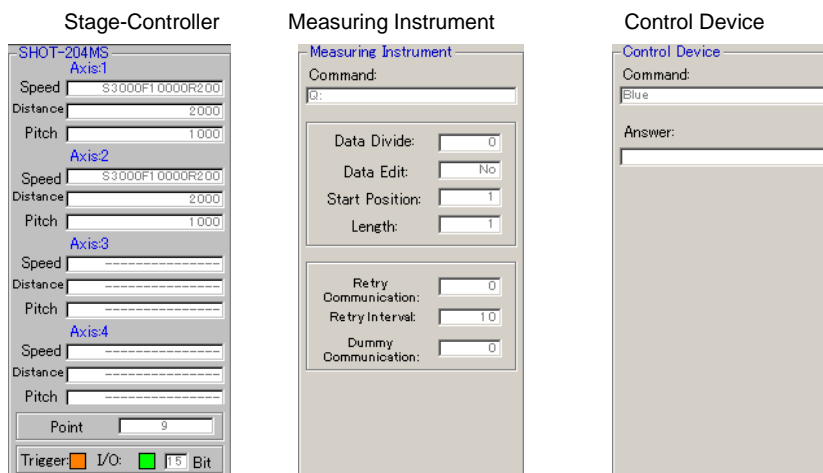
Fig. 3-62 Information displays

11   **START Button**

Click to start measurement.

* If an error occurs during operations, terminate communication in the setting dialog and check the

    conditions such as connection status. Then test communication status to confirm that SGADVANCE is

    communicating with the device successfully.

* If an output file (Text/Excel) is operated during measurement, an error may occur. Don't operate a file

    during measurement.

12   **STOP Button**

Click to stop measurement.

Clicking STOP will abort measurement.

(Measurement did not stop immediately. It will stop when a step of processes are completed).

3.3   Excel Instruction Dialog

Register devices or set conditions for operations in Excel Instruction mode.
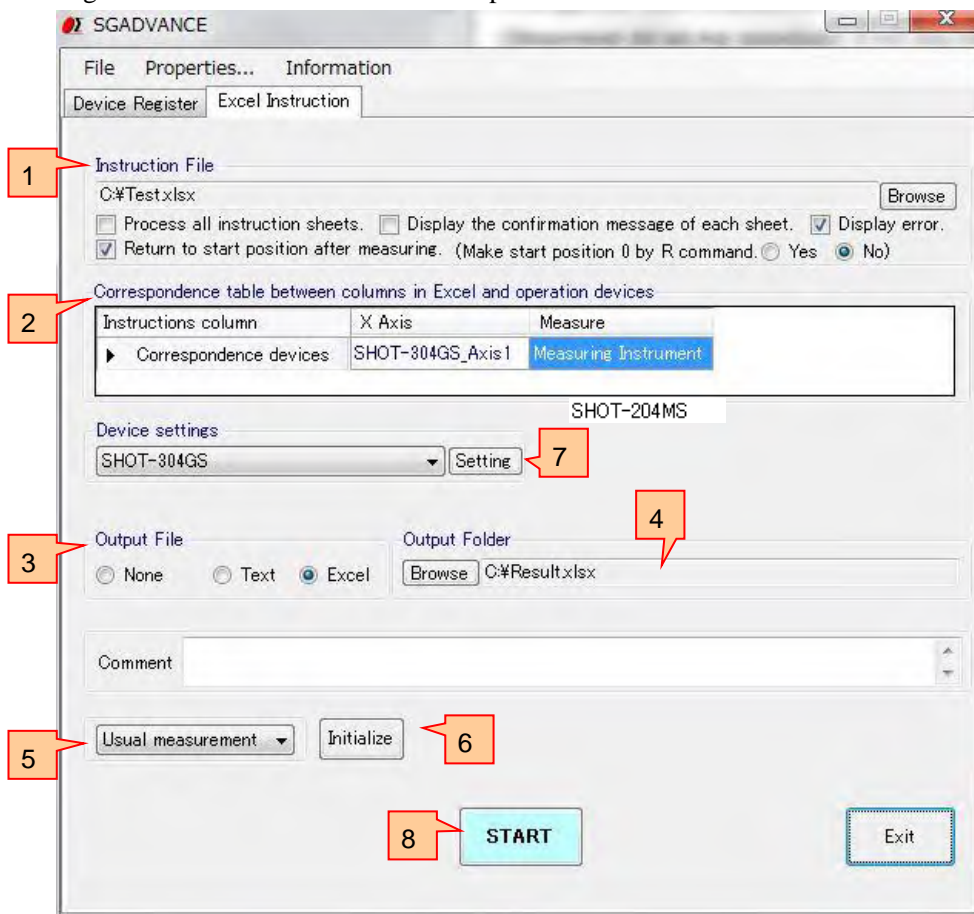
Fig. 3-63 Excel Instruction dialog

50

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Instruction File

Specify an instruction file used in Excel Instruction mode.

Click Browse to show the file list display. Select an instruction file in the list.

♦ Process All Instruction Sheets

If an instruction file (book) contains two or more sheets of which the names begins with

"Instruction," all applicable sheets will be selected for processing.

If not selected, only the first Instruction sheet is to be processed.

♦ Display the confirmation message of each sheet

When "Process All Instruction Sheets (a name starts in Instruction)" is chosen, set

up whether a confirmation message is displayed before the measurement start of

the sheet after the 2nd sheet.

A measurement will be in a stop state during the display of a confirmation message.
Select, if a confirmation message is displayed. When not selected, a confirmation
message does not display and a measurement of the following sheet is started
continuously.
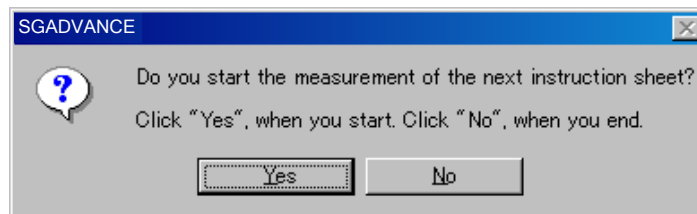
Fig. 3-64 Confirmation message

Buttons of a confirmation message

♦ Yes : Start a measurement of the following sheet.

♦ No : Stop a measurement.

♦ Display error

Select to display an error message and to halt a measurement, when an error

occurs during a measurement.

If not selected, an error message does not display but continues a measurement

even if an error occurs.
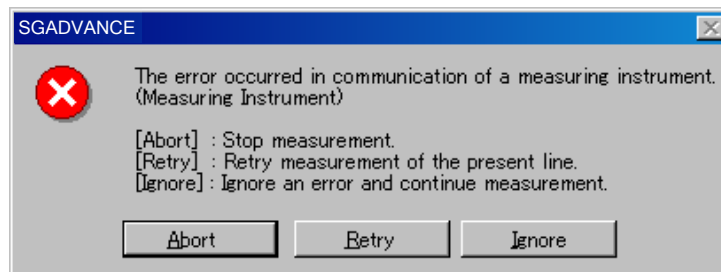
Fig. 3-65 Error message

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Buttons of an error message

♦ Abort : A measurement is interrupted and it returns to an "Excel
instruction" dialog.

♦ Retry : A measurement of the line of an instruction file which was being
performed now is retried.

♦ Ignore : An error is disregarded and a measurement is continued.

♦ Return to start position after measuring

Select to return a stage to measurement start position after measurement.

If not selected, a stage will stay at the place where the measurement finishes.

* The measurement start position to which a stage returns after measurement is a location computed

from the origin at the time of measurement termination (criteria origin).

If it moves to a machine origin or a logical origin is set up during a measurement, since a home

position is changed, with the time of measurement initiation, a stage may return to a different

location from a actual measurement starting position.

♦ Make start position 0 by R command

Yes : When the R command (logic starting point setup) is executed during a
measurement, the measurement start coordinates of the axis are
changed into 0. After a measurement end, a stage returns to the origin
(criteria origin).

No : Even if it executes the R command (logic starting point setup) during a
measurement, the measurement start coordinates of the axis are not
changed. After a measurement end, a stage returns to a measurement
starting position (position computed from the criteria origin).

* 'Make start position 0 by R command' can be set up only when 'Return to start position after
measuring' is chosen.

Example 1 : When YES is chosen by Make start position 0 by R command

	The contents of an Excel instruction sheet	A motion of a stage	The coordinate value displayed on a controller	The coordinate value on the basis of the origin at the time of a measurement start
①		The coordinates at the time of a measurement start are set to 500.	500	500
②	1000	It moves to 1000.	1000	1000
③	R	It is set as the logic origin. *Measurement start coordinates are changed into 0.	0	1000
④	2000	It moves to 2000	2000	3000
⑤		A measurement is ended and it moves to the measurement start coordinates 0.	0	1000

The coordinate value on the basis of the origin at the time of a measurement start

0   500 1000 1500 2000   3000   4000

A motion of a stage   ①➤ ②
                        ③————————➤ ④
                        ⑤←————

52

Example 2 : When NO is chosen by Make start position 0 by R command

	The contents of an Excel instruction sheet	A motion of a stage	The coordinate value displayed on a controller	The coordinate value on the basis of the origin at the time of a measurement start
①		The coordinates at the time of a measurement start are set to 500.	500	500
②	1000	It moves to 1000.	1000	1000
③	R	It is set as the logic origin. * Measurement start coordinates are with 500 without being changed.	0	1000
④	2000	It moves to 2000	2000	3000
⑤		A measurement is ended and it moves to the measurement start coordinates 500.	500	1500

The coordinate value on the basis of the origin at the time of a measurement start

0   500 1000 1500 2000   3000   4000

A motion of a stage

①➤ ②
③ ──────────────► ④
⑤ ◄──────

2 Correspondence table between columns in Excel and operation devices

The table to relate an instruction column in the Excel instruction file and the device to be operated.

Shows titles in the Excel instruction file (except rightmost columns) as Instruction columns.

Select related devices to columns.

Fig. 3-66 Relate Excel Instruction column and device

3 Output File

Select a format to save results.

♦ None

Does not output measurement results.

♦ Text

Saves measurement results to text files.

♦ Excel

Save measurement results to Excel files.

53

4 **Select Output File**

Specify a destination to which measurement results are saved in Excel Instruction mode.

Click Browse to show a file list. Select a file for saving the results.

If the destination is an Excel file, a new Excel book is created and the results are saved there when the output file name is "New Book" in the list.

Comments written in the Comment box are written to the destination file as the comments.

* Output of the measurement data to an Excel file

 ♦ Usual measurement

  The line (a measurement cell is space or W (numeric value)) indicating measuring by an instruction file is displayed on an output Excel file.

  When an error occurs with a measuring instrument, space is displayed on a measurement result cell.

 ♦ Step measurement

  All lines of an instruction file are displayed on an output Excel file.

  When an error occurs with a measuring instrument, space is displayed on a measurement result cell.

5 **Measurement mode selection box**

Select a measurement mode in Excel Instruction mode.

Usual measurement ▼
Usual measurement
Step measurement
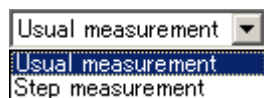
Fig. 3-67 Measurement mode selection box

 ♦ Usual measurement   Select to run in usual measurement mode.

 ♦ Step measurement   Select to run in step measurement mode.

6 **Initialize Button**

Click to clear the settings.

7 **Device settings**

Set/change operational conditions of a device.

Select a device of which conditions you want to set/change, and then click the Setting button to display the Device Settings dialog.

8 **START Button**

Click to begin measurement.

* If an error occurs during operations, terminate communication in the setting dialog and check the conditions such as connection status. Then test communication status to confirm that SGADVANCE is communicating with the device successfully.

* If an output file (Text/Excel) or Excel instruction file is operated during measurement, an error may occur. Don't operate a file during measurement.

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3.4　　　　Terminal Instruction Dialog

Set the following items on this terminal instruction window:

(1) Specify a worksheet in a workbook as the Excel instruction sheet.

(2) Specify an area in the Excel instruction sheet for communication.

The method and devices for the communication.

(3) Specify a place outputting the result that it received.
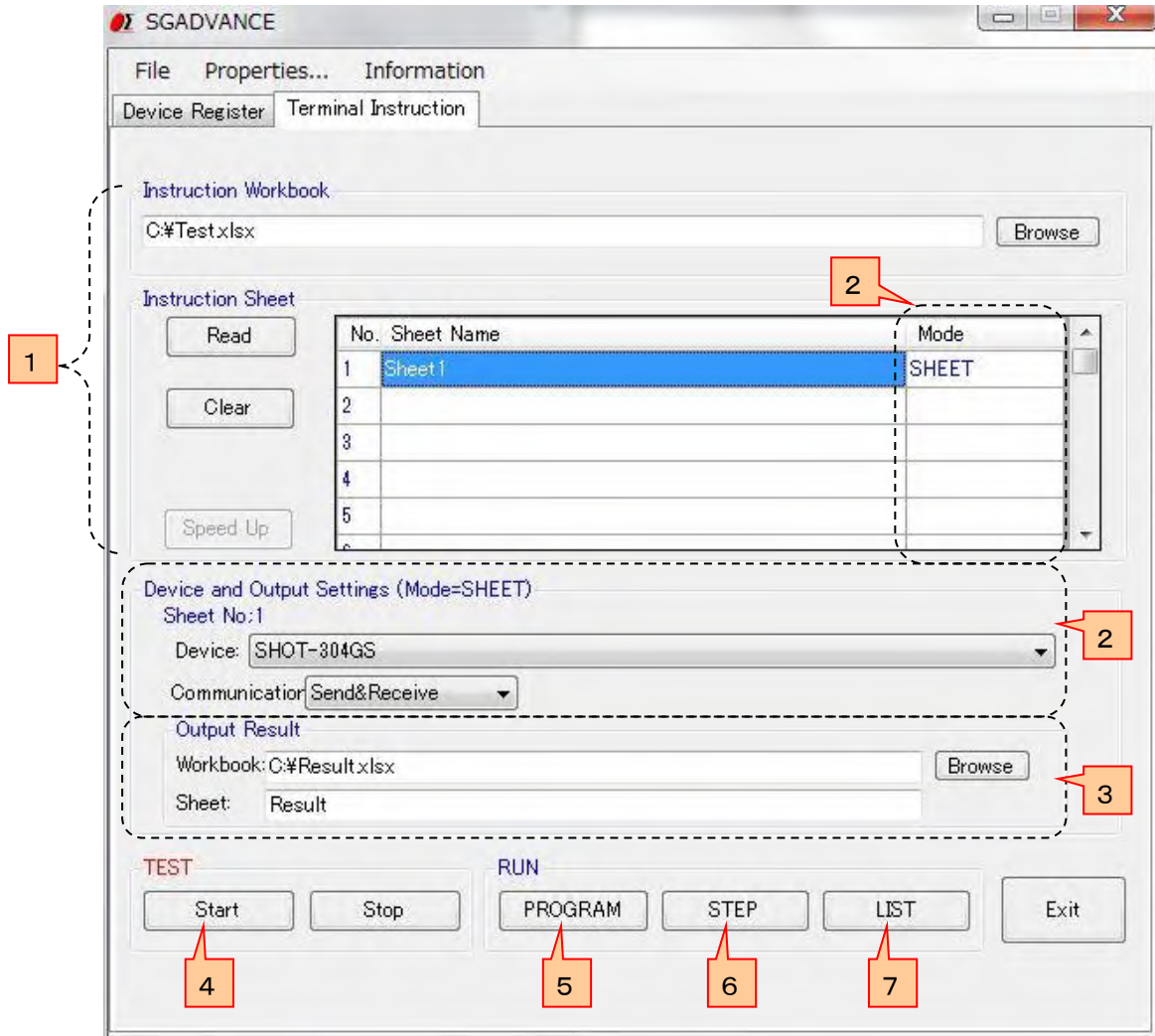

Fig. 3-68 Terminal Instruction dialog

1 **Instruction sheet settings**

Determine an Excel book and an instruction sheet.

First, specify an Excel book used as the Excel Instruction workbook.

Click the Browse button to display a file list screen. Select a book from the list.

"BOOK1.xls" is selected as a book for instruction sheet　　Fig. 3-69 Instruction workbook

Type the name of the sheet to be used in the Sheet Name box.

Click the Read button to read the sheet name automatically from the designated book (If you want to delete a sheet name, click the Clear button.)
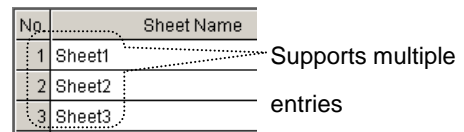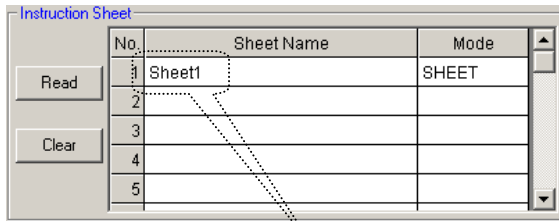

"Sheet1" is used as Instruction sheet

Fig. 3-70 Select instruction sheet

By this setting, the Sheet 1 of the BOOK1.xls is used as the instruction sheet.

More than one instruction sheets can be set as Fig 3-70. describes.

You can use more than one instruction books. Set them in the List Settings.

For the List settings, see 2-12 "List Settings" of "Properties dialog for Terminal instruction" of 2 "Properties Menu" in "3.1 Device Register Dialog."

2 Instruction Range

You have to specify a description area in a designated instruction sheet for communication.

There are five (5) modes; whole sheet, row, column, range and cell.

I. When using whole sheet for communication (all descriptions in a sheet)

Specify whole sheet
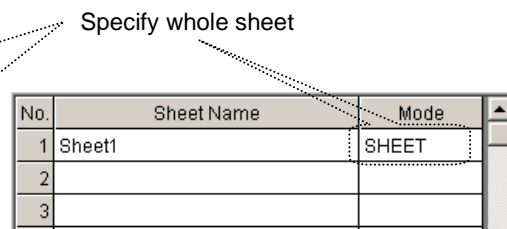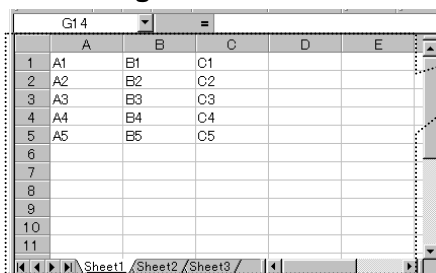
Fig. 3-71 Sheet setting

To use whole sheet (all descriptions in a sheet) for communication, select SHEET in Mode box. Clicking the Sheet Name or Mode displays the Device and Output Settings window. Set necessary items in the window such as devices, modes, and destinations of the resulted data in communication.

In the Device box, select the device to be used in communication among the devices added in the Device list (Fig. 3-1).

In the Communication box, select a communication mode from Send&Receive, Send, and Receive.

When Send&Receive is selected, SGADVANCE will send/receive all the contents described in the instruction sheet.

For Send, SGADVANCE only sends the contents of the instruction sheet without receiving; for Receive, only receives the response to the contents of the instruction sheet.

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For Output Result, the Result sheet is prepared in the same instruction workbook at default. The Result sheet is automatically created and results are written there.

To change the destination of the results, change the settings.

When there are more than one instruction sheets, each sheet needs to be set separately.
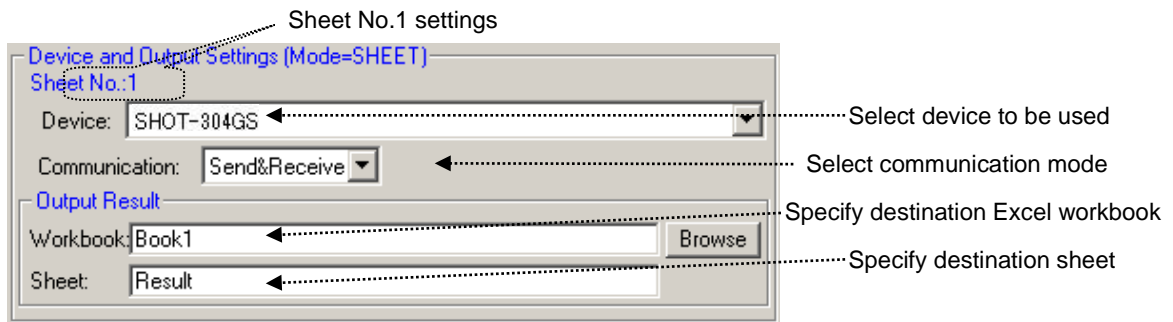
Fig. 3-72 Device and output settings

II. When using designated row for communication (only designated rows in a sheet)

Fig. 3-73 Row settings

When using only designated rows in communication, select ROW in the Mode box.

Clicking the Sheet Name box or Mode box displays the Device and Output Settings window. Set necessary items in the window; ranges, devices, modes, and destinations of the resulted data in communication.

Choose desired rows for communication in the Selected Range on the instruction sheet.

More than one row can be registered in a table for communication.

In the Device box, select the device to be used in communication among the devices added in the Device list (Fig. 3-1). You can specify a different device for each row.

For Output Result, the Result sheet is prepared in the same instruction workbook at default. The Result sheet is automatically created and results are written there.

Click on the Browse button to change the destination of resulted data.

In the Communication box, select a communication mode from Send&Receive, Send, and Receive.

When Send&Receive is selected, SGADVANCE will send/receive all the contents described in the designated rows.

For Send, SGADVANCE only sends the contents of the designated rows without receiving; for Receive, only receives the response to the contents of the designated rows.

When there are more than one instruction sheets, each sheet needs to be set separately.

57

Sheet No. 1 settings

Clears contents

Select communication mode

Fig. 3-74 Device and output settings

Specify row for communication

Select device to be used

Specify Excel book and sheet for output

Change color of designated row in Excel

When using more than one row under the same conditions, enter all rows in the Selected Range field (comma-separated).

Fig. 3-75 Adding selected range

III. When using designated columns for communication (only designated columns in a sheet)

Select column (column B only) for communication

Fig. 3-76 Column settings
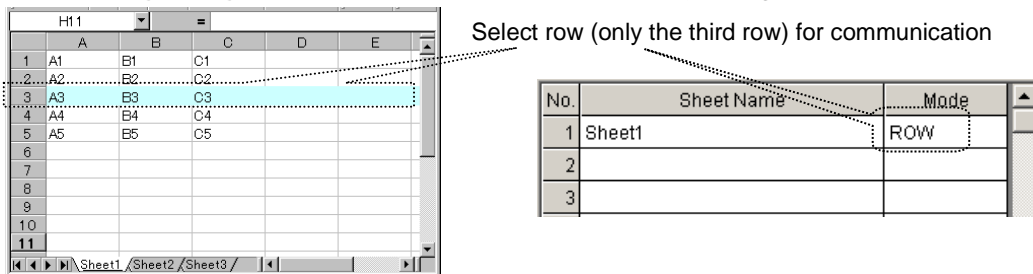
When using only designated columns in communication, select the COLUMN in the Mode box. Clicking the Sheet Name box or Mode box displays the Device and Output Settings window. Set necessary items in the window; ranges, devices, modes, and destinations of the resulted data in communication.

Choose desired columns for communication in the Selected Range on the instruction sheet. More than one column can be registered in a table for communication.

In the Device box, select the device to be used in communication among the devices added in the Device list (Fig. 3-1). You can specify a different device for each column.

For Output Result, the Result sheet is prepared in the same instruction workbook at default. The Result sheet is automatically created and results are written there.

Click on the Browse button to change the destination of resulted data.

In the Communication box, select a communication mode from Send&Receive, Send, and Receive.

When Send&Receive is selected, SGADVANCE will send/receive all the contents described in the designated columns.

For Send, SGADVANCE only sends the contents of the designated columns without receiving; for Receive, only receives the response to the contents of the designated columns.

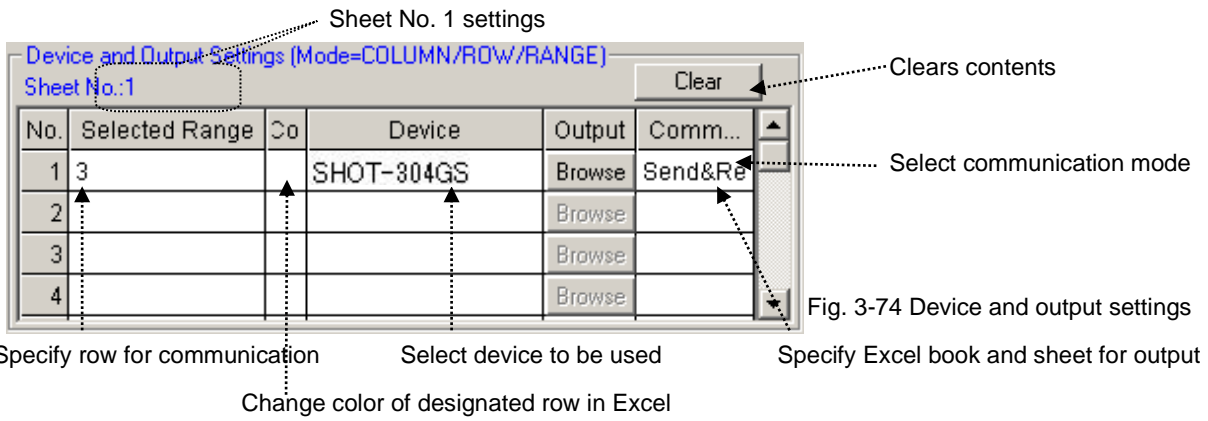When there are more than one instruction sheets, each sheet needs to be set separately.

Fig.3-77 Device and output settings
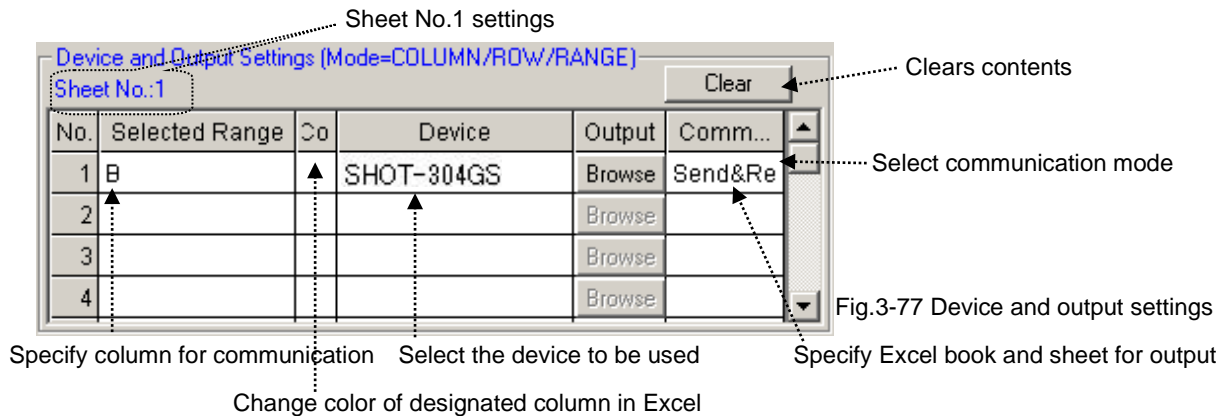
When more than one column is used under the same conditions, several columns are described in Selected Range (comma-separated).

Fig. 3-78 Adding selected range

IV. When using designated range for communication

(only designated range in a sheet)
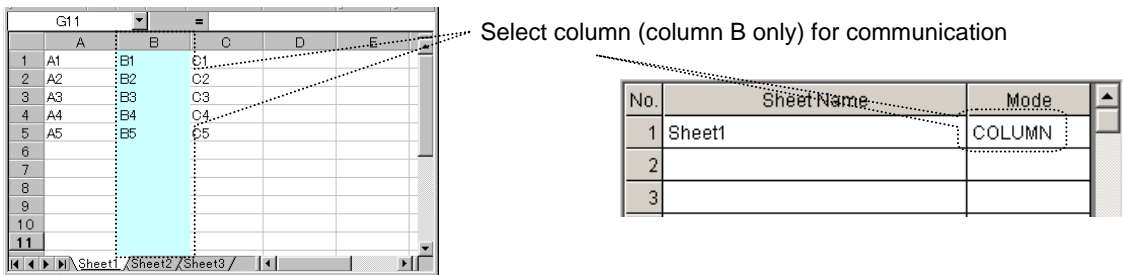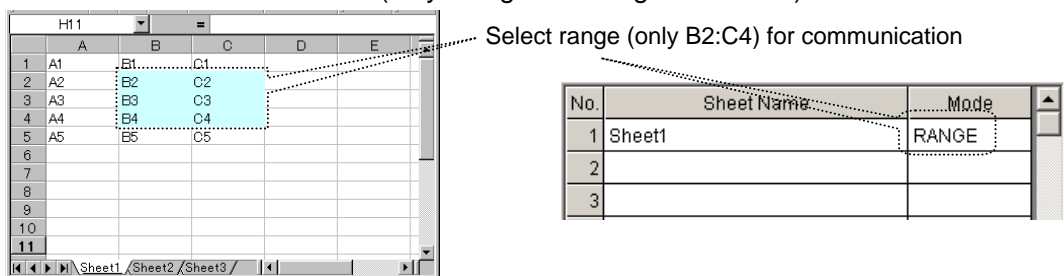

Fig. 3-79 Range settings

When using designated ranges for communication, select the RANGE in the Mode box.

Clicking the Sheet Name box or Mode box displays the Device and Output Settings window. Set necessary items in the window; ranges, devices, modes, and destinations of the resulted data in communication.

Choose desired ranges for communication in the Selected Range on the instruction sheet.

More than one range can be registered in a table for communication.

In the Device box, select the devices to be used for communication among the devices added in the Device List (Fig. 3-1). You can specify a different device for each range.

For Output Result, the Result sheet is prepared in the same instruction workbook at default. The Result sheet is automatically created and results are written there.

Click on the Browse button to change the destination of resulted data.

In the Communication box, select a communication mode from Send&Receive, Send, and Receive.

When Send&Receive is selected, SGADVANCE will send/receive all the contents described in the designated ranges.

For Send, SGADVANCE only sends the contents of the designated ranges without receiving; for Receive, only receives the response to the contents of the designated ranges.

When there are more than one instruction sheets, each sheet needs to be set separately.

Sheet No.1 settings
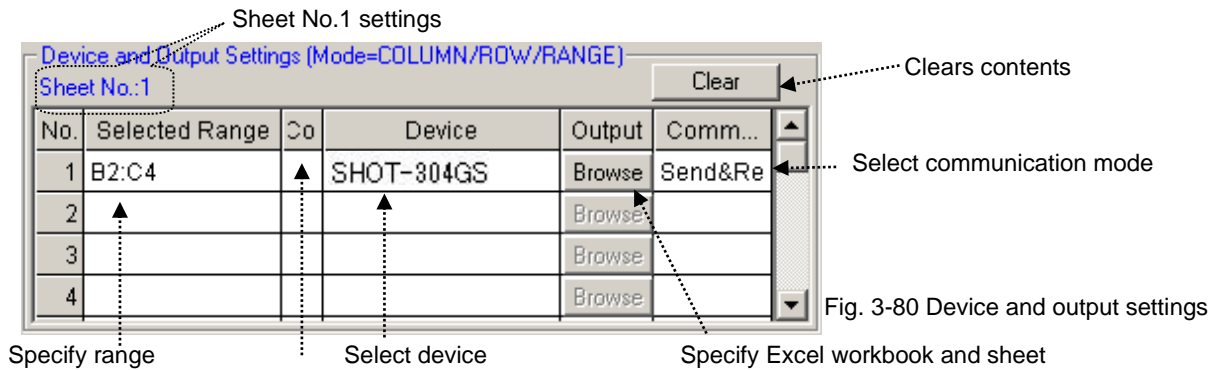
Fig. 3-80 Device and output settings

Clears contents

Select communication mode

Specify range   Select device   Specify Excel workbook and sheet

Change color of selected range in Excel

When using more than one range under the same conditions, enter all ranges in the Selected Range field (comma-separated).

Fig. 3-81 Adding selected range

V. When using designated cells for communication (Use designated cells in a sheet)

Select cells for communication
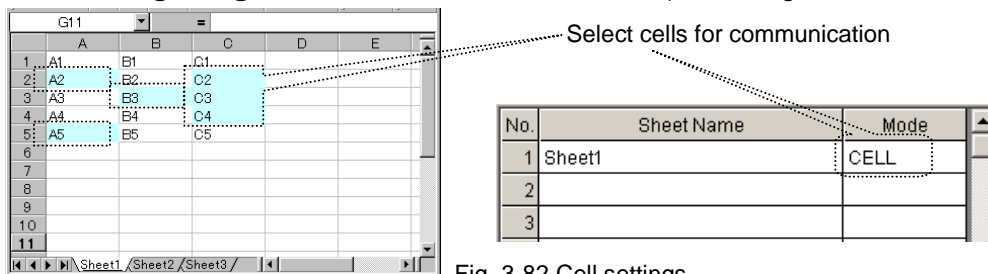
Fig. 3-82 Cell settings

When using designated cells for communication, select CELL in the Mode box.

In Cell mode, specify the device, mode and output destination for each cell separately. To specify the above items, you need to define a form for each cell.

Fig. 3-83 Cell mode form

For forms for cell mode, see 2-10 "Form settings" of "Properties dialog for Terminal instruction" of 2 "Properties Menu" in "3.1 Device Register Dialog."

For the details of setting output destination in cell mode, see 2-11 "Output Result settings."

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3 **Output of Result**

Received data is output to a result sheet.

Results are output to a sheet designated in Output for each mode.

For cell mode, specify output destination (table No.) in a form for each cell.

When no destination is specified, or nothing is specified in the table with the designated No. in cell mode, results are written to the following locations:

♦ **When no book name is specified:** Written to the same book.

♦ **When no sheet name is specified:** A result sheet is created, to which results are written.

The location in the sheet is the same as in the instruction sheet.

Instruction sheet   Fig. 3-84 Writing results   Result sheet
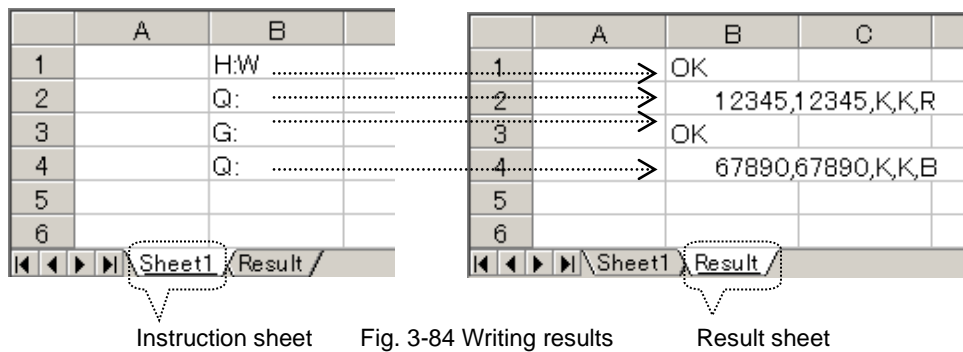
4 **Run Test**

Checks if there is a need to run communication tests with destinations used in an Excel instruction sheet.

Click the Start button to start testing. Click the Stop button to suspend the test.

Run test checks if communication has already been tested with all destinations. (Actual communication test is not started. Only test results are checked.)

When an instruction sheet is run, communication tests should be performed in advance with all the destination devices to be used in the instruction sheet (except auto communication test is specified.)

To carry out communication tests automatically when running an Excel instruction sheet, set as described in **2-4** "Auto Communication Test" of "Properties dialog for Terminal instruction" of **2** "Properties Menu" in "3.1 Device Register Dialog."

If there are any destinations with which communications have not been tested, contents in Excel is not performed. A run test can show the status.

Test results are shown below the main screen. Information on each connection appears in Connection State of the Information menu.
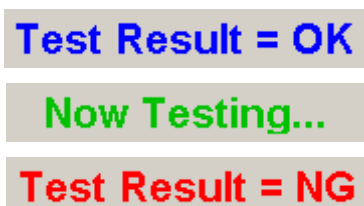
Fig. 3-85 Test result

When a run test resulted in NG, a communication test should be carried out with NG connections shown in Connection State.

When "NG" is shown in Connection State, possible causes are; there are destinations to which a communication tests returned NG, or communication tests have not been carried out with destinations in the instruction sheet.

In the former case, repeat communication tests to have satisfactory results.

In the latter case, conduct communication tests also for them, or remove NG destinations from the instruction sheet.

5 Running

Processes an Excel instruction sheet based on the contents.

The Excel instruction sheet processed is designated in the Instruction Sheet setting (see 1 Instruction sheet settings in "3.4 Terminal Instruction Dialog" for the details).

The message, "Now communicating..." appears during the process. Click the Stop button to stop the process.

Fig. 3-86 Message "Now communicating"

6 Step Run

Runs cell by cell with checking operations.

During step run, a confirmation message is shown for each cell. Select one from among Run, Skip, and Exit.
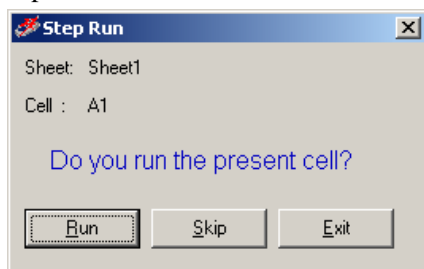
Fig. 3-87 Step run confirmation message

On the confirmation messages, the sheet name in process and current cell position (cell to be processed) appears. You can select one from among Run, Skip and Exit for the cell.

Select Run to run the contents of the cell.

Select Skip to skip the cell (without processing) and move the process to the next cell.

Select Exit to end the process.

When there are several instruction sheets, selecting Exit ends the current sheet processing, moves the process to the next sheet, and displays the confirmation message again.

7 **List Run**

Runs Excel books (sheets) in the registered order of the SGA files.

The SGA files registered in 2-12 "List Setting" of "Properties dialog for Terminal instruction" of **2** "Properties Menu" in "3.1 Device Register Dialog" are read sequentially and automatically. Processes are performed according to the contents of the SGA files.

No.	Setting File Name	
1	C:\Program Files\SIGMA-KOKI\SGTERM.sge	Browse
2		Browse
3		Browse
4		Browse
5		Browse
6		Browse
7		Browse
8		Browse
9		Browse
10		Browse
11		Browse
12		Browse
13		Browse
14		Browse
15		Browse

Fig. 3-88 Setting file list

To run several Excel workbooks (including several sheets) continuously, register SGA files in this table and perform a list run to run sequentially and automatically.

The contents of the list are read automatically by starting up SGADVANCE, and saved automatically when the SGADVANCE closes.

4. Functions

This section is dedicated to describe various functions which SGADVANCE can offer. SGADVANCE supports Program Instruction, Excel Instruction and Terminal Instruction measuring modes.

♦ Program Instruction

  Run measurement by using the Program Instruction dialog.

  There are two modes in the Program Instruction.

  ・Auto measure   : Normal measurement

  ・Auto measure-Multi   : The measurement which two or more controllers are interlocked and controls them

♦ Excel Instruction

  Run measurement by following descriptions in an Excel instruction sheet.

♦ Terminal Instruction

  Communicate with various devices by following descriptions in an Excel instruction sheet.

4.1   Measurement in Program Instruction Mode

In Program Instruction mode, automatic or manual measurement is available by operating/setting in relating dialogs.

Device Name	Interface	Port	Run Pos...	Interval
Control Device	GPIB	Address8	Prepare	10
SHOT-304GS	RS232C	COM2	Measure	0
Measuring Inst...	RS232C	COM1	Measure	20
Control Device	GPIB	Address8	After M...	0

Fig 4.1 Program Instruction dialog

To begin measurement in Program Instruction mode, first register all the applicable devices to enable them.

For the details of device registrations, see "3 Operation."

In Program Instruction mode, devices registered in the Program Instruction dialog are operated sequentially in the order of registration, following the settings for the devices.

Note that processing is affected by the settings in the Run Position column and the order of registration. Therefore, when you register devices in the Program Instruction dialog, consider what to be processed with the devices.

Also note that each registered device operates as specified in the settings, so also consider target processes in making settings for a device.

♦ Parameters affecting operations in Program Instruction mode

The following parameters can affect operations in Program Instruction mode.

(1) Run Position

Select one of Prepare, Measure and After Measure in the Run Position list when you register/change the settings of a device in Program Instruction mode.
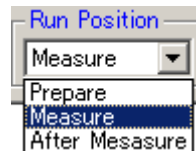
 Fig. 4-2 Run Position list

Prepare: Operates a registered device only once before measurement in the order of registration.

Typical purpose of "Prepare" is to initialize a device before measurement.
The operation results are not saved to a file (in text or Excel format).
If the device is a Stage-Controller, each applicable axis is moved by a pitch.
If the device is Measuring Instrument, the measurement command is performed once.
If the device is a Control Device, the control command is performed once.

Measure: Perform measurement processes with the registered device.

Measuring as many times as specified.
The results can be saved to a file (in text or Excel format).
If a Stage-Controller is registered, measurement count is calculated as follows:
Let (moving distance/pitch + 1) be multiplied by itself as many times as the number of axes.
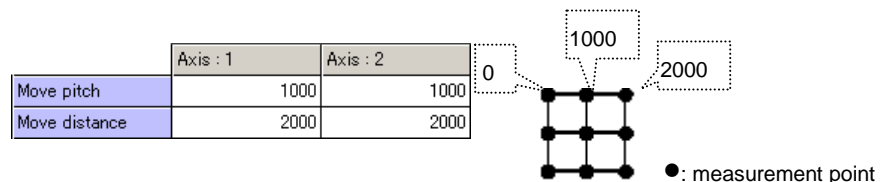
Measurement count: (2000/1000 + 1) x (2000/1000 + 1) = 9 (times)

Fig. 4-3 Measurement count

If a Measuring Instrument is registered, the measurement command is executed in each measurement point.
If a Control Device is registered, the control command is executed in each measurement point.
    * If no Stage-Controllers are registered, measurement/control is performed only once.
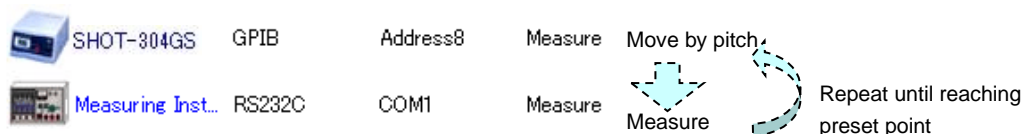
After Measure: Controls registered devices once in the order of registration after the measurement.
            Typical purpose of "After Measure" is to set devices after measurement.
            The operation results are not saved to a file (in text or Excel format).
            The contents of device operation are the same as in the Prepare mode.

(2) Execution Order of Devices

In Program Instruction mode, devices are run sequentially in the order of registration.
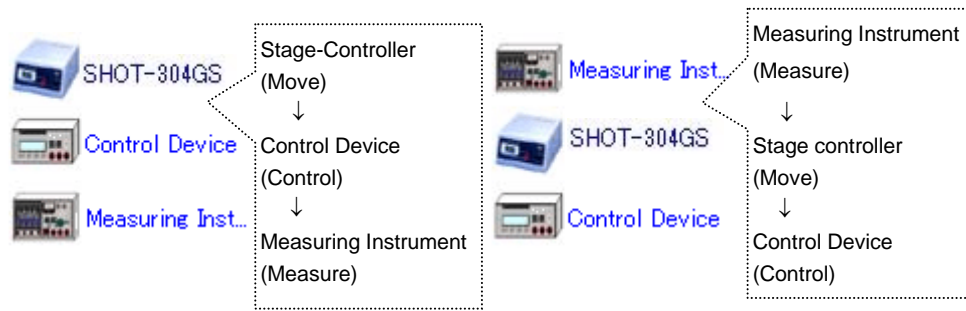
Fig. 4-4 Execution order of devices

(3) Interval

In Program Instruction mode, you can set intervals between the runs of sequentially operated devices.
If an interval is specified, a device starts to run after the previous device has finished and the specified interval has elapsed.
Set intervals in 100 ms.

* Actual time spans of intervals are not an exact time you specified. It may vary depending on environments of PC, etc.

Device Name	Interface	Port	Run Pos…	Interval
SHOT-304GS	GPIB	Address8	Measure	0
Control Device	RS232C	COM2	Measure	10
Measuring Inst…	RS232C	COM1	Measure	20

Operation flow: SHOT-304GS operates => No wait => Control Device operate => Wait 1-sec => Measuring Instrument operates => Wait 2-sec

Fig. 4-5 Setting Intervals

(4) Set operations

In Program Instruction mode, specify operations of each registered device in the Device Settings dialog.
The settings determine the controlling features like communication commands.
For the details of the settings, see the descriptions of the Device Settings button in "3. Operation."
Settings for Stage-Controller operations are described below:

♦ Stage Speed

Speed parameters specify the moving speeds of each axis of a stage.

	Axis : 1	Axis : 2
Min speed	3000	3000
Max speed	10000	10000
Acceleration time	200	200

Fig. 4-6 Speed parameters

♦ Moving Pitch and Distance

Operations of a stage of each axis are decided by moving pitches and distances.

	Axis : 1	Axis : 2
Move pitch	1000	1000
Move distance	3000	1500

Fig. 4-7 Movement parameters

A stage moves along rows and columns in a matrix. The moving amount and range are dependent on values specified in Move pitch and Move distance boxes.
The matrix is 2-D with two axes (X and Y) or 3-D with three axes (X, Y and Z).
A measurement count with a stage is calculated as follows:
Let (moving distance/pitch + 1) be multiplied by itself as many times as the number of axes.
For figure 4-7, the number of times the stage operated (moving point) equals to the measurement count calculated as follows:

Measurement count: (3000/1000 + 1) x (1500/1000 +1) = 8 times (points)

* A reminder in a division is rounded down.

Fig. 4-8 Operation point
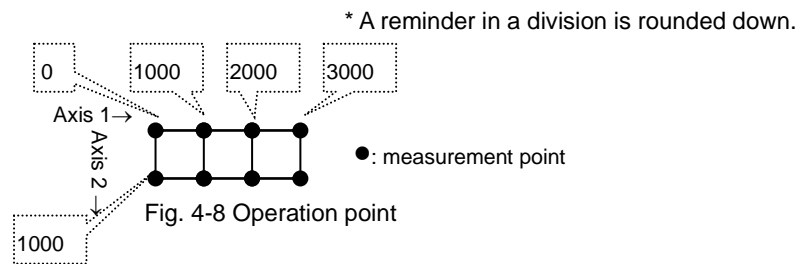
♦ Moving Order of Stages

Specify the order of stage movement if you use two or more stages.

	Axis : 1	Axis : 2	Axis : 3	Axis : 4
Turn	1	2	3	4

Operate Axis 1, then Axis 2, Axis 3, Axis 4

	Axis : 1	Axis : 2	Axis : 3	Axis : 4
Turn	3	1	4	2

Operate Axis 2, then Axis 4, Axis 1, Axis 2

Fig. 4-9 Moving order

♦ Operations After Stage Movement

Specifies operation method of a stage for the moving range decided by the moving pitch and distance.

If a return after movement is chosen ("Return" is selected), a stage will return to the start position after moving a preset distance, and then repeat the move to the positions incremented by the pitch.

If disabled ("Not return" is selected), a stage will not return to the start position after moving a preset distance. It will continue move to decremented (or, incremented) positions by the pitch.

* If selecting "Return," a stage will return to the starting position after every movement has finished. If selecting "Not return," a stage will not return.

<table>
	Axis : 1		Axis : 2	
Return after movem	Return		Return	
</table>

	A	B
1	Axis1	Axis2
2	0	0
3	1000	0
4	2000	0
5	0	1000
6	1000	1000
7	2000	1000
8	0	2000
9	1000	2000
10	2000	2000

Axis 1→
Axis 2→

	Axis : 1		Axis : 2	
Return after movem	Not return		Not return	

	A	B
1	Axis1	Axis2
2	0	0
3	1000	0
4	2000	0
5	2000	1000
6	1000	1000
7	0	1000
8	0	2000
9	1000	2000
10	2000	2000

Axis 1→
Axis 2→
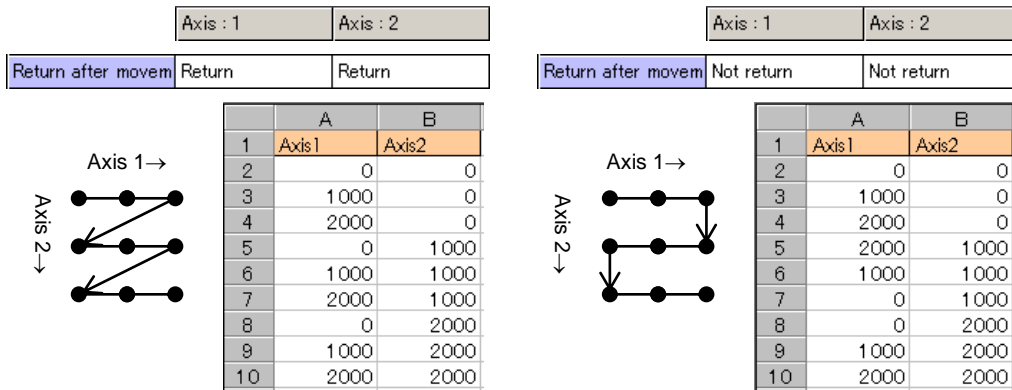
Fig. 4-10 Operations: Return/Not return after movement

♦ Move simultaneously

Specify whether two or more axes are simultaneously moved for whether it moves in the shape of a matrix in the moving range of the stage determined by a move pitch and distance.

・Matrix-like movement (Choose "Disable" in Move simultaneously)

	Axis : 1		Axis : 2	
Move pitch		1000		1000
Move distance		2000		2000
Return after movem	Return		Return	

	A	B
1	Axis1	Axis2
2	0	0
3	1000	0
4	2000	0
5	0	1000
6	1000	1000
7	2000	1000
8	0	2000
9	1000	2000
10	2000	2000

Axis1→
Axis2→

or

	Axis : 1		Axis : 2	
Move pitch		1000		1000
Move distance		2000		2000
Return after movem	Not return		Not return	

	A	B
1	Axis1	Axis2
2	0	0
3	1000	0
4	2000	0
5	2000	1000
6	1000	1000
7	0	1000
8	0	2000
9	1000	2000
10	2000	2000

Axis1→
Axis2→

・Simultaneous movement of two or more axes

	Axis : 1		Axis : 2	
Move pitch		1000		1000
Move distance		2000		2000

	A	B
1	Axis1	Axis2
2	0	0
3	1000	1000
4	2000	2000
5		

Axis1, Axis2

Fig. 4-11 Matrix-like movement and simultaneous movement of two or more axes

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※　Simultaneous movements of two or more axes move by all the axis simultaneous move command of a controller.

Example: In movement with two axes, when a move pitch is the same and movement speed is the same, it moves in the shape of 1 straight line. However when the move pitch of both axes is different, or when movement speed differs, movement of an actual stage does not become 1 straight line-like.

	Axis : 1	Axis : 2
Move pitch	2000	1000
Move distance	4000	2000

When the speed of both axes is the same and move pitches differ

Axis1,Axis2

	A	B
1	Axis1	Axis2
2	0	0
3	2000	1000
4	4000	2000
5		

Fig. 4-12 Simultaneous movement of two or more axes

※　By an OMEC series controller, when the groups of the axis which moves differ, one axis moves at a time. All axes simultaneous movement is not performed.

4.2   Measurement Example in Program Instruction Mode

Measurement in Program Instruction mode is described with examples as follows:

♦ Automatic Measurement by Specifying Range and Pitch

Devices used: Stage-Controller SHOT-304GS, two motorized stages (X- and Y-axis) and
                    Measuring Instrument.

Measurement: Measure at moving points (measurement points) by moving X and Y stages by the
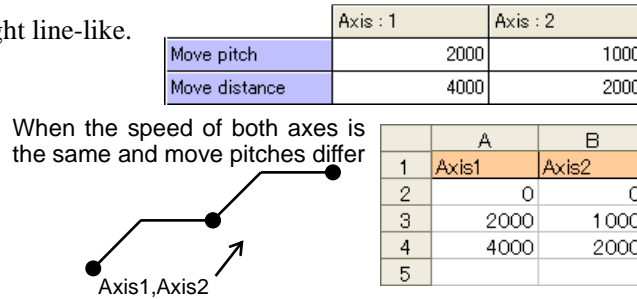   specified distance.

Conditions: Use COM1 (RS-232C) for SHOT-304GS, COM2 (RS-232C) for Measuring
                    Instrument

                    The X-axis of the stage moves in 100-pulse until it reaches 300-pulse.

                    The Y-axis of the stages move in 200-pulse until it reaches 400-pulse.

                    The measurement command for a Measuring Instrument is "M." If "M" is

                    transmitted, the instrument will return measurement results.

PC   SHOT-304GS   Motorized stage (X, Y)

Measuring Instrument

Fig 4-13 Devices for measurement
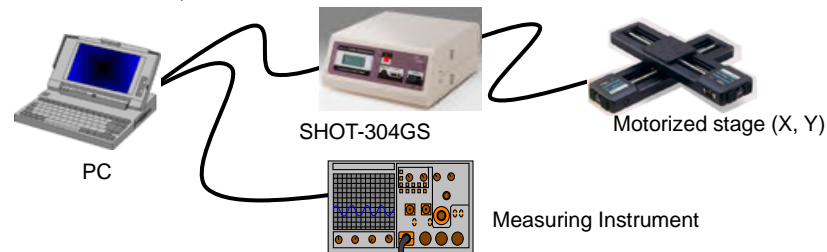
(1) Register Devices

Add the Stage-Controller and Measuring Instrument in the Device Register dialog.

    (See "3.1 Device Register Dialog" for the details of the registration).

Device Name	Interface	Port	Status
Stage-Controller	Unknown	Unknown	Disable
Measuring Instru…	Unknown	Unknown	Disable

Fig. 4-14 Adding device
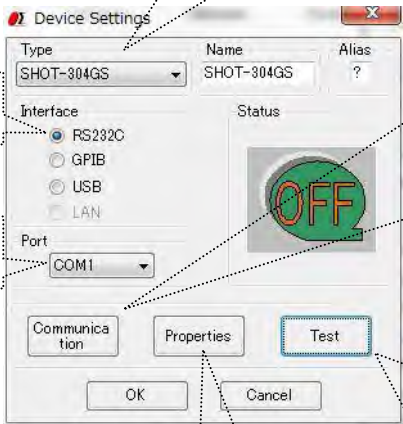
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(2) Set Conditions for Devices

Enable the added devices by setting communication and operation conditions, and verify the communication with the devices. (See "3.1 Device Register Dialog" for the details of the settings).

Set SHOT-304GS

Select SHOT-304GS

Select RS-232C
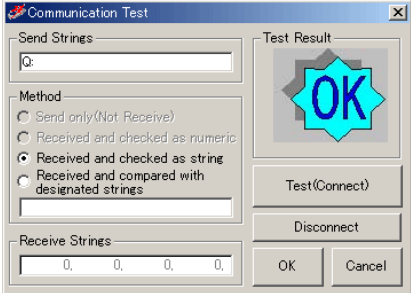
Select COM1

Set communication conditions

Verify communication

Disable axis-3 and axis-4

Axis	Axis : 3	Axis : 4
Connect stage	Not use	Not use

Set pitch and distance for axis-1 and axis-2

	Axis : 1	Axis : 2
Move pitch	100	200
Move distance	300	400

Fig. 4-15 Settings for SHOT-304GS

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Set Measuring Instrument

Select RS-232C

Select COM2

Set communication conditions

Verify communication

Input measurement command "M"

Command "M" and Send Strings "M" are examples. Actually follow the specification of the measuring instrument used.

Fig. 4-16 Settings for Measuring Instrument

When the settings finish, check if the device is connected in the Device Register dialog.

Device Name	Interface	Port	Status
SHOT-304GS	RS232C	COM1	OK
Measuring Instru...	RS232C	COM2	OK

Check communication status

Fig. 4-17 Device status

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(3) Register Devices in Program Instruction Dialog

In the Program Instruction dialog, add SHOT-304GS and Measuring Instrument in this order.

(See "3.2 Program Instruction Dialog" for the details of the registration).

Fig. 4-18 Adding device
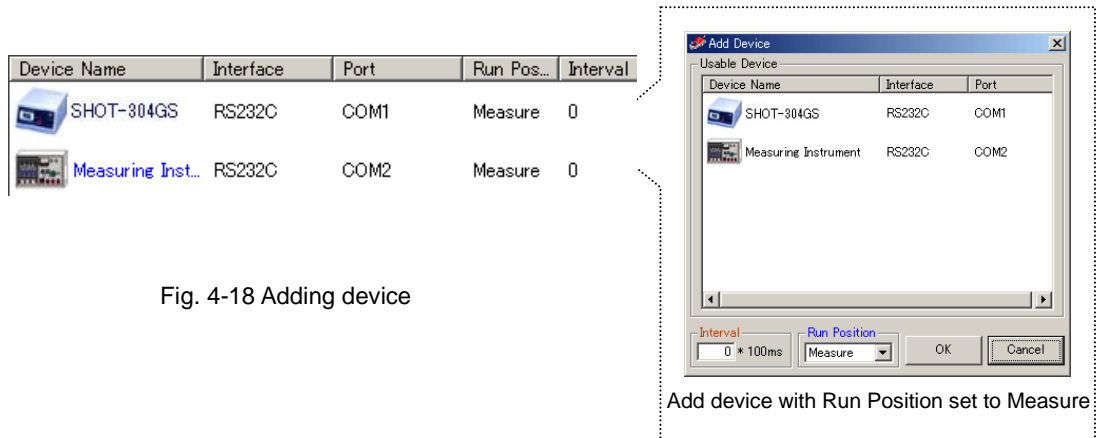
Add device with Run Position set to Measure

(4) Set Measurement Conditions

Specify the destination to save the results, select Auto Measure mode, and set the count to one.

(See "3.2 Program Instruction Dialog" for the details of the settings).

Specify destination

Specify mode and count
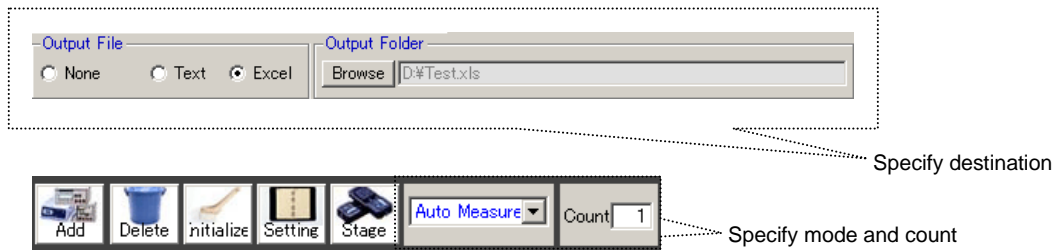
Fig. 4-19 Setting measurement conditions

(5) Start Measurement

Click on the START button to start measurement.

During measurement, click on the STOP button to suspend the measurement.

Fig. 4-20 START and STOP buttons

If measurement finishes, a completion message is displayed.
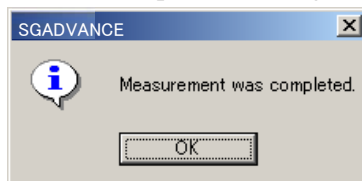
Fig 4-21 Completion message

73

(6) Result Output

The measurement results are output to the specified destination.

| Move pitch | 100 | 200 |
| Move distance | 300 | 400 |

	A	B	C
1	SHOT-304GS:Axis1	SHOT-304GS:Axis2	Measuring Inst
2	0	0	0.287
3	100	0	1.829
4	200	0	2.491
5	300	0	3.089
6	0	200	4.275
7	100	200	5.692
8	200	200	6.481
9	300	200	7.902
10	0	400	8.963
11	100	400	9.472
12	200	400	10.583
13	300	400	11.892

Fig. 4-22 Measurement results

♦ Specify Count to Repeat Measurement

You can repeat measurement by specifying the count.

If you set the count to two while other conditions are set to the same as in "Automatic Measurement by Specifying Range and Pitch," the same measurement runs twice successively.

Add   Delete   Initialize   Setting   Stage   Auto Measure ▼   Count 2   ······ Specify count

	A	B	C
1	SHOT-304GS:Axis1	SHOT-304GS:Axis2	Measuring Instr
2	0	0	0.287
3	100	0	1.829
4	200	0	2.491
5	300	0	3.089
6	0	200	4.275
7	100	200	5.692
8	200	200	6.481
9	300	200	7.902
10	0	400	8.963
11	100	400	9.472
12	200	400	10.583
13	300	400	11.892
14	0	0	0.653
15	100	0	1.005
16	200	0	2.341
17	300	0	3.852
18	0	200	4.297
19	100	200	5.023
20	200	200	6.374
21	300	200	7.854
22	0	400	8.987
23	100	400	9.015
24	200	400	10.465
25	300	400	11.925

Results of first run ······ (rows 2–13)

Results of second run ······ (rows 14–25)

Fig. 4-23 Run by count

♦ Set Start/End Stage Positions (Set Offsets)

For a stage, you can specify a start/end position before/after measurement.

Operation definitions: The X-axis of the stage starts measurement at 150-pulse point, and to be

positioned at the 200-pulse point when the measurement finishes.

The Y-axis of the stage begins measurement at 200-pulse point, and to be

positioned at 100-pulse point when the measurement finishes.

* Except the above, run under the same conditions as in "Automatic

Measurement by Specifying Range and Pitch."

(1) Add Devices

Select the Device Register tab. Add Stage-Controllers for the start and finish. Specify the same
conditions as for the Stage-Controller used for measurement (rename both new devices for
identification), and add both devices in the Program Instruction dialog with Run Position set to
Prepare and After Measure for each. (See "3.1 Device Register Dialog" and "3.2 Program
Instruction Dialog" for the details of the registrations).

* If you register a controller and used it for the both purposes, the movement of the controller becomes

unpredictable. Be sure to add a controller for each purpose.

Fig. 4-24 Add devices for Prepare and After Measure

(2) Set Conditions

Set moving pitches matching to the conditions, and select "Return origin" in the Properties
dialog.

Fig. 4-25 Settings of Prepare and After Measure

(3) Operation and Measurement Result

The stages move in accordance with the settings and outputs measurement results.

* Devices for which Run Position is set to Prepare or After Measure are not subject to measurement.

Stage Movement		Measurement Results

After homing, moves to specified position

Move pitch	150	200

Measure with preset pitch and distance

Move pitch	100	200
Move distance	300	400

	A	B	C
1	SHOT-304GS:Axis1	SHOT-304GS:Axis2	Measuring Inst
2	150	200	0.287
3	250	200	1.829
4	350	200	2.491
5	450	200	3.089
6	150	400	4.275
7	250	400	5.692
8	350	400	6.481
9	450	400	7.902
10	150	600	8.963
11	250	600	9.472
12	350	600	10.583
13	450	600	11.892

Distance = 300   Distance = 400

Homes after measurement, then moves to specified position

Move pitch	200	100

Move to this position (X = 200, Y = 100) after measurement

Fig. 4-26 Stage operation and measurement result

♦ I/O Signal Output in Measurement

A stage controller featuring I/O signal output can send out I/O and trigger signals during measurement.

If you set trigger output and I/O output with other conditions set as in "Automatic Measurement by Specifying Range and Pitch," each signal is output every time a stage makes a move (after the move).

Trigger output	IO output	IO output value
Output	8	Increase

Settings for output signals

	A	B	C	D	E	F
1	SHOT-304GS:Axis1	SHOT-304GS:Axis2	Measuring Inst		IO output Bit	Trigger
2	0	0	0.287	→	–	–
3	100	0	1.829	→	1	Output
4	200	0	2.491	→	2	Output
5	300	0	3.089	→	3	Output
6	0	200	4.275	→	4	Output
7	100	200	5.692	→	5	Output
8	200	200	6.481	→	6	Output
9	300	200	7.902	→	7	Output
10	0	400	8.963	→	8	Output
11	100	400	9.472	→	1	Output
12	200	400	10.583	→	2	Output
13	300	400	11.892	→	3	Output

Signal output

Fig. 4-27 Setting and output result of I/O and trigger signal (1)

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* Results of such output signals shown in Fig. 4-25 or 4-26 are NOT output to the destinations (text or Excel files).

* The signal is not output for the first point (X = 0, Y = 0) since it is output after a stage move.

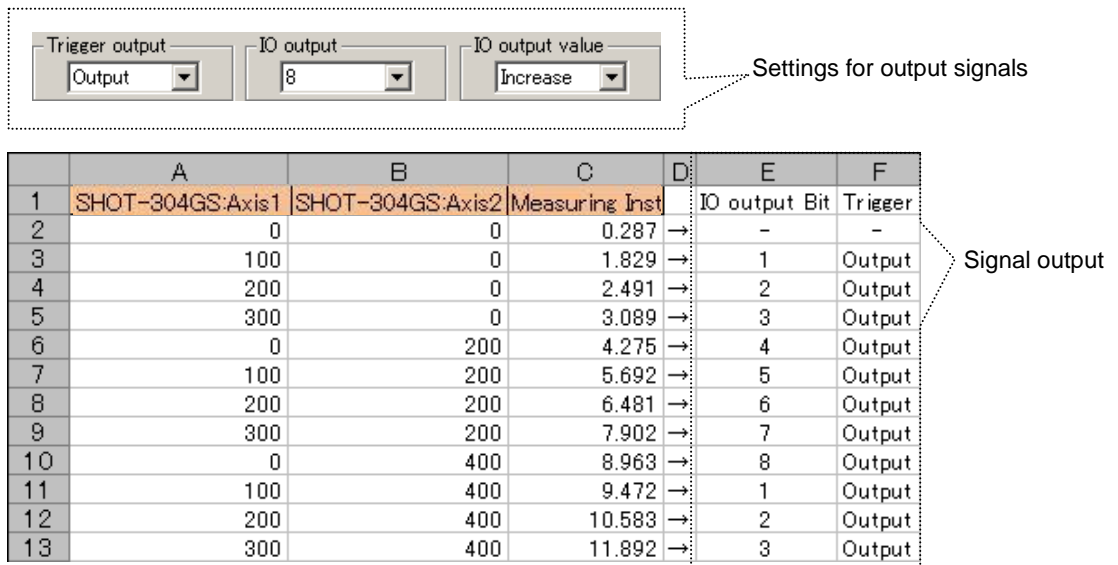* Set signal logics (voltage levels) or pulse width of trigger signals on the Stage-Controller.

* For I/O signal, 0-bit is output immediately before a stage move, and a specified bit value immediately after the move.

* An I/O signal output is held until the next output.

Settings for output signals

	A	B	C	D	E	F
1	SHOT-304GS:Axis1	SHOT-304GS:Axis2	Measuring Inst		IO output Bit	Trigger
2	0	0	0.287	→	–	–
3	100	0	1.829	→	3	–
4	200	0	2.491	→	3	–
5	300	0	3.089	→	3	–
6	0	200	4.275	→	3	–
7	100	200	5.692	→	3	–
8	200	200	6.481	→	3	–
9	300	200	7.902	→	3	–
10	0	400	8.963	→	3	–
11	100	400	9.472	→	3	–
12	200	400	10.583	→	3	–
13	300	400	11.892	→	3	–
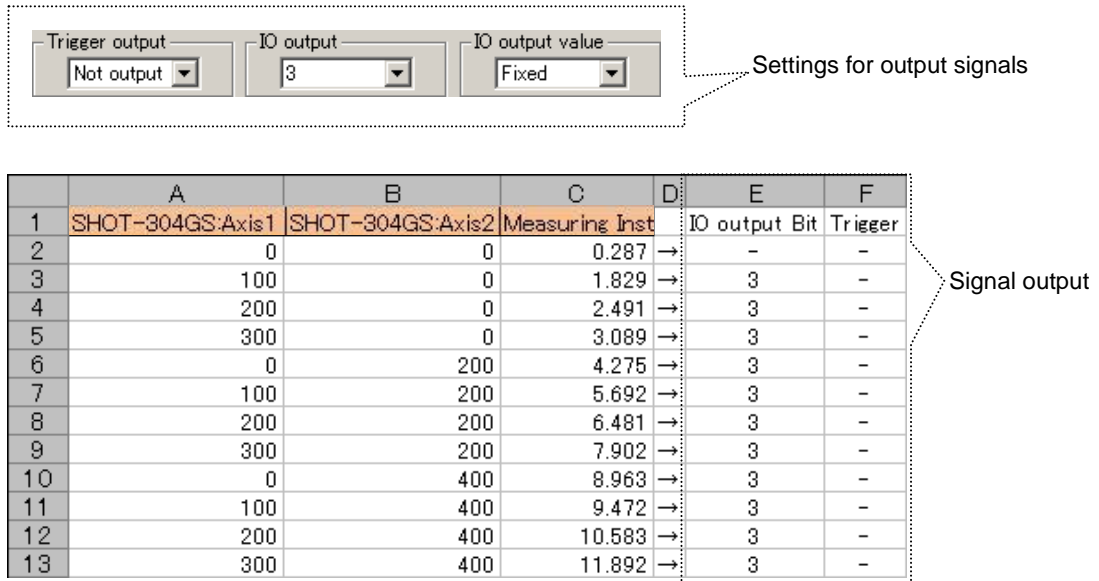
Signal output

Fig. 4-28 Setting and output result of I/O and trigger signal (2)

0-bit output ⇒ Stage move (by the pitch) ⇒ Trigger output ⇒ Output designated bit value
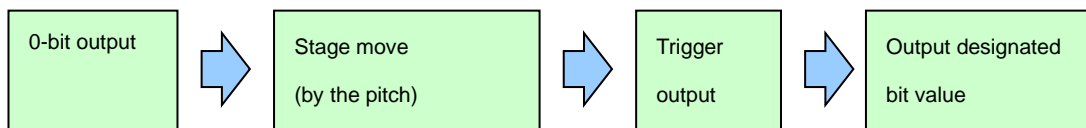
Fig. 4-29 Output flow of I/O and Trigger signals

♦ Auto measure and Auto measure-Multi

There are two kinds of automatic measurement of a program instruction measurement, Auto measure and Auto measure-Multi.

When using one controller for a measurement, a difference is not in both. However, when two or more controllers are used for a measurement, the methods of moving of stages differ.

Devices used : Stage-Controller SHOT-302GS (X-axis) --- one motorized stage (X-axis) is connected.
Stage-Controller SHOT-302GS (Y-axis) --- one motorized stage (Y-axis) is connected.
Measuring Instrument.
Measurement : Measure at moving points (measurement points) by moving X and Y stages by the specified distance.
Conditions : Use COM1 (RS-232C) for SHOT-302GS (X-axis), COM2 (RS-232C) for SHOT-302GS (Y-axis), Address1 (GPIB) for Measuring Instrument.
The X-axis of the stage moves in 100-pulse until it reaches 300-pulse.
The Y-axis of the stage moves in 200-pulse until it reaches 400-pulse.
The measurement command for a Measuring Instrument is "M." If "M" is transmitted, the instrument will return measurement results.
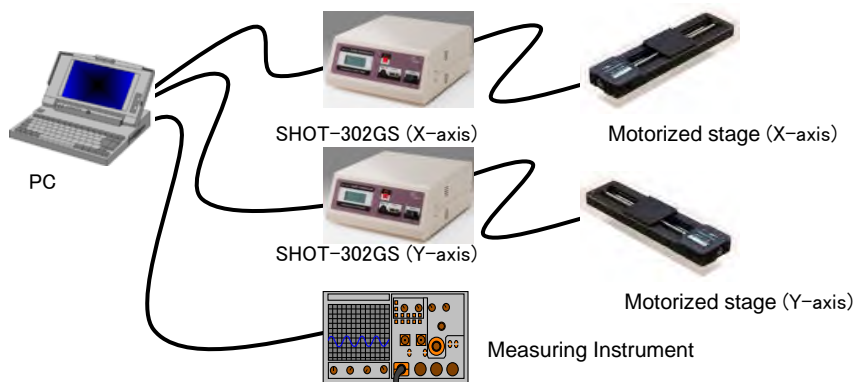

Fig. 4-30 Devices for measurement

(1) Register Devices

Add the Stage-Controller and Measuring Instrument in the Device Register dialog. And add SHOT-302GS (X-axis), SHOT-302GS (Y-axis) and Measuring Instrument in this order in the Program Instruction dialog.

(See "3.1 Device Register Dialog" and "3.2 Program Instruction Dialog" for the details of the registration).

Device Name	Interface	Port	Run Pos…	Interval
SHOT-302GS(X-axis)	RS232C	COM1	Measure	0
SHOT-302GS(Y-axis)	RS232C	COM2	Measure	0
Measuring Instrument	GPIB	Address1	Measure	0

Fig. 4-31 Adding device

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(2) Set Conditions

Set moving pitches and distance matching to the conditions in the Properties dialog.

Axis	Axis : 1	Axis : 2
Connect stage	Use	Not use
Axis name	X-axis	Axis2
Move pitch	100	1000
Move distance	300	2000

Axis	Axis : 1	Axis : 2
Connect stage	Use	Not use
Axis name	Y-axis	Axis2
Move pitch	200	1000
Move distance	400	2000

Setting of SHOT-302GS (X-axis).   Setting of SHOT-302GS (Y-axis).

Fig. 4-32 Move parameters

(3) Operation and Measurement Result

♦ Auto measure

The stage X-axis and the stage Y-axis do not carry out the action which interlocked. It does not become the two dimension matrix of X and Y.
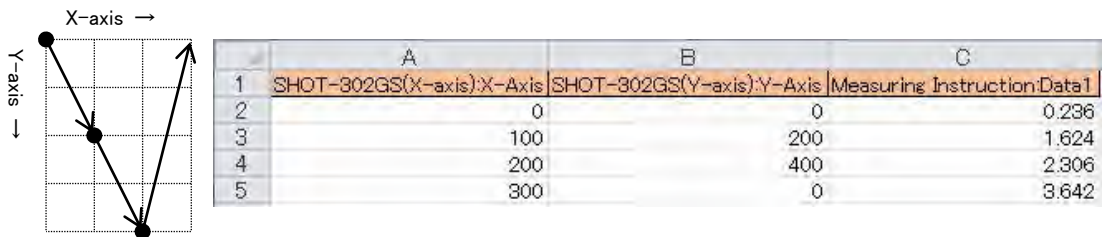

	A	B	C
1	SHOT-302GS(X-axis):X-Axis	SHOT-302GS(Y-axis):Y-Axis	Measuring Instruction:Data1
2	0	0	0.236
3	100	200	1.624
4	200	400	2.306
5	300	0	3.642

Fig. 4-33 Measurement result

♦ Auto measure-Multi

The stage X-axis and the stage Y-axis carry out the action which interlocked. It become the two dimension matrix of X and Y.

It operates the same with two sets, the stage X-axis and the stage Y-axis, having been connected to one controller.
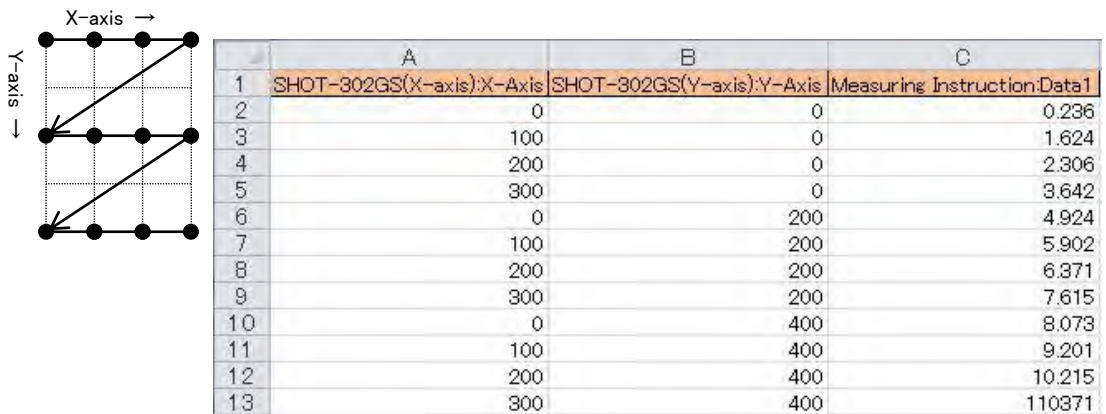

	A	B	C
1	SHOT-302GS(X-axis):X-Axis	SHOT-302GS(Y-axis):Y-Axis	Measuring Instruction:Data1
2	0	0	0.236
3	100	0	1.624
4	200	0	2.306
5	300	0	3.642
6	0	200	4.924
7	100	200	5.902
8	200	200	6.371
9	300	200	7.615
10	0	400	8.073
11	100	400	9.201
12	200	400	10.215
13	300	400	110371

Fig. 4-34 Measurement result

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♦ Manual Measurement

In Program Instruction mode, manual measurement is available as well as the automatic.

Typically, use manual mode to measure and check on a step-by-step basis.

(1) Operation Settings

Select Manual Measurement mode with operation conditions set to the same as in

"Automatic Measurement by Specifying Range and Pitch."

(See "3.1 Device Register Dialog" and "3.2 Program Instruction Dialog" for the details of

the settings).

Fig. 4-35 Adding device

Fig 4-36 Select measurement mode

Select Manual Measurement

(2) Start Up Axis Control Dialog

Select the registered SHOT-304GS in the Program Instruction dialog, and then click the

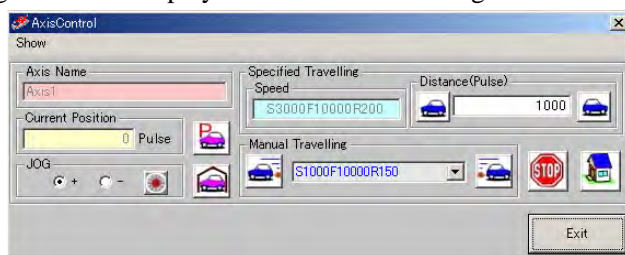Stage button to display the Axis Control dialog.

Fig. 4-37 Axis Control dialog

(3) Stage Operation and Measurement

Move the stage to a desired measurement point in the control dialog, and click the START button.

Measurement begins on the instant.

Measured data and the current stage position are output to the destination.

In the Axis Control dialog, you can repeat measurement by operating the stage and clicking the

START button at desired positions until clicking the STOP button.

* In manual measurement mode, you CANNOT operate a Stage-Controller registered in the Program
Instruction dialog by clicking Start (You can operate Stage-Controllers only in the Axis Control dialog).
* Manual measurement continues until the STOP button is clicked.
* Be sure to click the STOP button to exit the manual measurement mode.
* Do not access the destination files (text or Excel) while manual measurement continues, or an error
will be generated.

Fig. 4-38 START and STOP buttons

♦ Time Series Measurement

Performs measurement with specified measuring time (intervals).

* An actual time span in time series measurement is not an exact time you specified. It may vary depending on PC environments, etc.
* Finish continuous operations within 24 hours from the start. When exceeding the limit, the timer will reset.

Devices: Two Measuring Instruments

Measurement: Measure every time a specified time has elapsed.

Conditions: Use COM1 (RS-232C) for Measuring Instrument A, COM2 (RS-232C) for Instrument B.

Measure with Instrument A, then wait for one second to begin measurement with Instrument B.

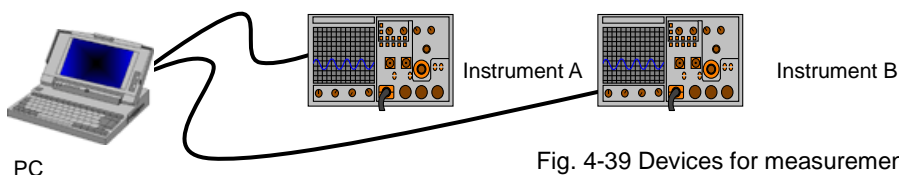Wait two seconds after measuring with B. Repeat the procedure ten times.

PC   Instrument A   Instrument B

Fig. 4-39 Devices for measurement

(1) Device Registration and Operation Setting

Add Instruments A and B, and then set measurement conditions.

(See "3.1 Device Register Dialog" and "3.2 Program Instruction Dialog" for the details of the registration and settings).

Specify intervals for each device.

Device Name	Interface	Port	Run Position	Interval
Measuring Instrument A	RS232C	COM1	Measure	10
Measuring Instrument B	RS232C	COM2	Measure	20

Specify

Fig. 4-40 Specify intervals

Select "Write progress time" in the Properties menu. Set measurement mode to Automatic Measurement and the count to ten.

Program Instruction
☑ Write progress time

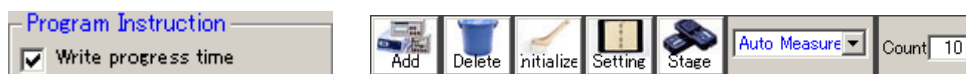Add Delete Initialize Setting Stage Auto Measure ▼ Count 10

Fig. 4-41 Set Write progress time, Auto measurement, and count

(2) Operation and Measurement Result

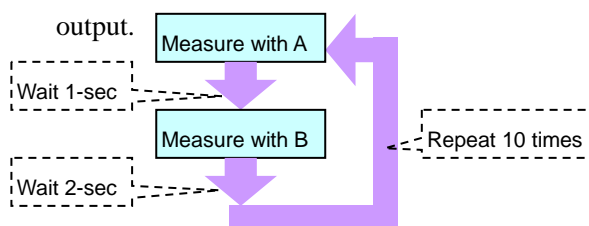Measurement is performed with preset intervals according to the settings, and the results are output.

Measure with A
Wait 1-sec
Measure with B
Wait 2-sec
Repeat 10 times

	A	B	C
1	Progress time (s)	Measuring Inst	Measuring Inst
2	0	0.265	0.034
3	3.2	1.364	1.025
4	6.4	2.371	2.302
5	9.6	3.397	3.901
6	12.7	4.032	4.271
7	15.9	5.397	5.312
8	19.1	6.293	6.734
9	22.3	7.211	7.351
10	25.5	8.925	8.716
11	28.7	9.465	9.901

Fig. 4-42 Operation and measurement result

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4.3　　　Measurement in Excel Instruction Mode

In Excel Instruction mode, you can run automatic/manual measurement. Stage positions and operations of a Control Device are designated by an Excel instruction file.
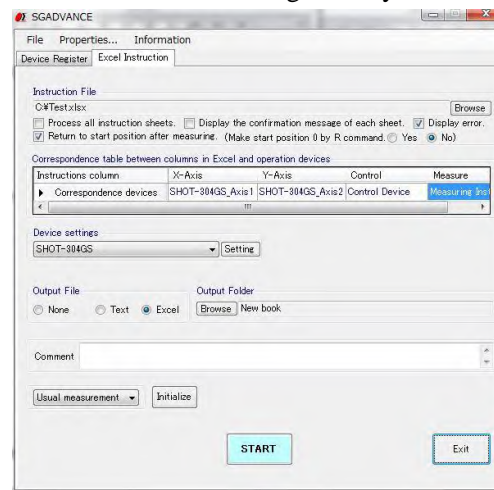

Fig 4-43 Excel Instruction dialog

To begin measurement in Excel Instruction mode, first register all the applicable devices to enable them.

For the details of device registrations, see "3. Operation."

The move speed of the stage of each axis at the time of a measurement is set up with "the measurement parameters" of the setting dialog of a controller.

(See "3 Operation" for the details of the settings of the speed).

♦ Usual Measurement and Step Measurement

In Excel Instruction mode, two measurement modes are available:

Usual Measurement:　　Auto-measurement by following the contents of instruction files.

　　　　　　　　　　　Supports sequential running of two or more instruction sheets.

Step Measurement:　　 Manually run the contents in an instruction sheet on a row-by-row

　　　　　　　　　　　 basis.

　　　　　　　　　　　 SGADVANCE can run only one (the first) instruction sheet in step
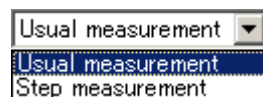
　　　　　　　mode.

Fig. 4-44 Measurement mode selection box

♦ Instruction File

You need to create an instruction file in advance in order to designate operations.

Create an instruction file by following the rules below:

● The first row is a title row. Fill in the axis name of the stage to be used, a control device name, a measuring instrument name, etc. Be sure to enter.

- A title row is filled in from column A one by one to the right in order of operation of a stage, control device or a measuring instrument. Blank out a column at the right of a last column.

  * Do not insert a blank column on the way in a title row. The column on the right of a blank column is disregarded.
  * In figure 4-45, cells on the first row are assigned to X-axis, Y-axis and measurement. Enter any of characters, symbols or numeric values, but be sure to begin with the first row.

- Only as for the stage controller and the control device (use nothing of the measuring instrument), or only as for the measuring instrument (use nothing of the stage controller and the control device), even can work.

- Fill in the control commands to a stage or a control device from the 2nd row.

- The measurement process goes down from the 2nd row. A blank cell on column A finishes the process.

- When you set an end symbol in "not use" with the Properties dialog for the program/Excel instruction, the processing is finished there when the cell of the blank is found in the A row. (See the Properties dialog for the program/Excel instruction of ⒉ Properties Menu in 3.1 Device Register Dialog)

- Coordinate designation commands for stages must be numeric values or H, R, RH, STOP, HA, RA, RHA in single-byte upper case.

  H   : Return the axis to home position.
  R   : Designate the position as the origin in logical coordinate system, and assign the coordinate (0).
  RH   : Move to the logical origin.
  STOP: Stop Excel instruction measurement. The following dialog is displayed during a stop.
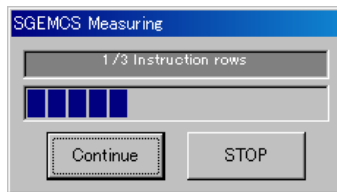
Click on the Continue button to continue the measurement. (Measurement is continued from the right-hand cell of the cell which specified STOP.)
Click on the STOP button to stop the measurement. (Measurement did not stop immediately. It will stop when a step of processes are completed).

  HA : When you set move simultaneously in "Enable" with the stage controller properties dialog, return the axles which the stage controller uses to home position at the same time.
  RA : When you set move simultaneously in "Enable" with the stage controller properties dialog, designate the position as the origin in logical coordinate system, and assign the coordinate (0) at the same time.
  RHA: When you set move simultaneously in "Enable" with the stage controller properties dialog, move the axles which the stage controller uses to the logical origin at the same time.

  (About the stage controller properties, see (3) Stage-Controller of 12–7 Properties button in 3.1 Device Register Dialog)

- The moving coordinate values for stages shall be absolute values.

  * The values should be distances from the origin, not relative positions from the current position.

- When a measurement column is blank, or when only assignment of wait time is filled in, SGADVANCE measures.

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- "W" followed by a numeric value (like W10) in a measurement column will specify wait time. Use single byte characters to write "W" and the numeric values.

  A wait time can be specified in the range for 1 - 3600 seconds.

- If you enter contents other than "W" followed by a numeric value in a cell on a measurement column, SGADVANCE can move stages, or operate control devices, but cannot designate measurement.

- A sheet name of an instruction sheet must begin with "**Instruction**" in single byte characters. After it, no restraints are imposed on the names.
  Valid naming examples: Instruction test, Instruction-01, InstructionSample.

- SGADVANCE can sequentially run auto-measurement for two or more instruction sheets. In such cases, you must specify the same stages and control devices for all sheets.
  Example: If you write X-axis in column A and measurement in column B in the Instruction01 sheet, and write X-axis in column A, Y-axis in column B and measurement in column C, the difference breaks the formatting rules.
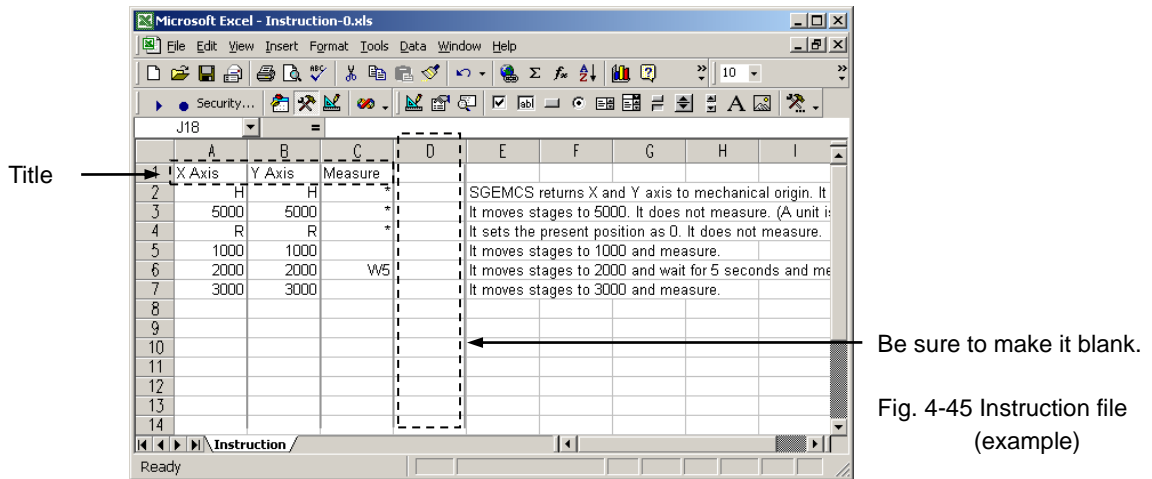

Title

Be sure to make it blank.

Fig. 4-45 Instruction file (example)

4.4 Measurement Example in Excel Instruction Mode

The following descriptions are dedicated to measurement examples in Excel Instruction mode.

♦ Usual Measurement

Devices: A Stage-Controller SHOT-304GS, two motorized stages (X and Y-axis), a Control Device and Measuring Instrument

Measurement: Move X and Y-stage in specified amounts. Send a control command to the Control Device, then conduct measurement at each moving points (measurement points).

Conditions: Assign COM1 (RS-232C) to SHOT-304GS, Address1 (GPIB) to the Control Device, and COM2 (RS-232C) to the Measuring Instrument.
The Control Device begins to operate on receiving a control command from PC. The device does not send any verification strings. When the device received the command from PC, it waits one second before the measurement. The measurement command for a Measuring Instrument is "M." If transmitting "M," the instrument will return measurement results.

SHOT-304GS　　Motorized stage (X,Y)

PC

Control Device

4-46 Devices for measurement

Measuring Instrument
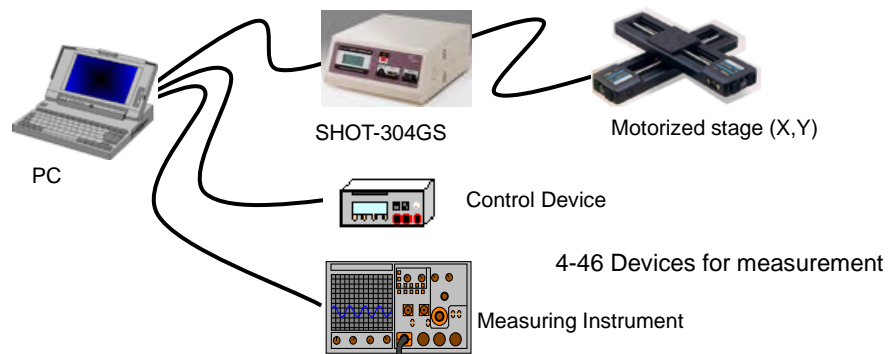
(1) Register Devices

Add the Stage-Controllers, Control Device and Measuring Instrument in the Device Register dialog (See "3.1 Device Register Dialog" for the details of the registration).

Device Name	Interface	Port	Status
Stage-Controller	Unknown	Unknown	Disable
Control Device	Unknown	Unknown	Disable
Measuring Instru...	Unknown	Unknown	Disable

Fig. 4-47 Adding device

(2) Set Conditions for Devices

Enable the added devices by setting communication and operation conditions, and verify the communication with the devices. (See "3.1 Device Register Dialog" for the details of the settings).
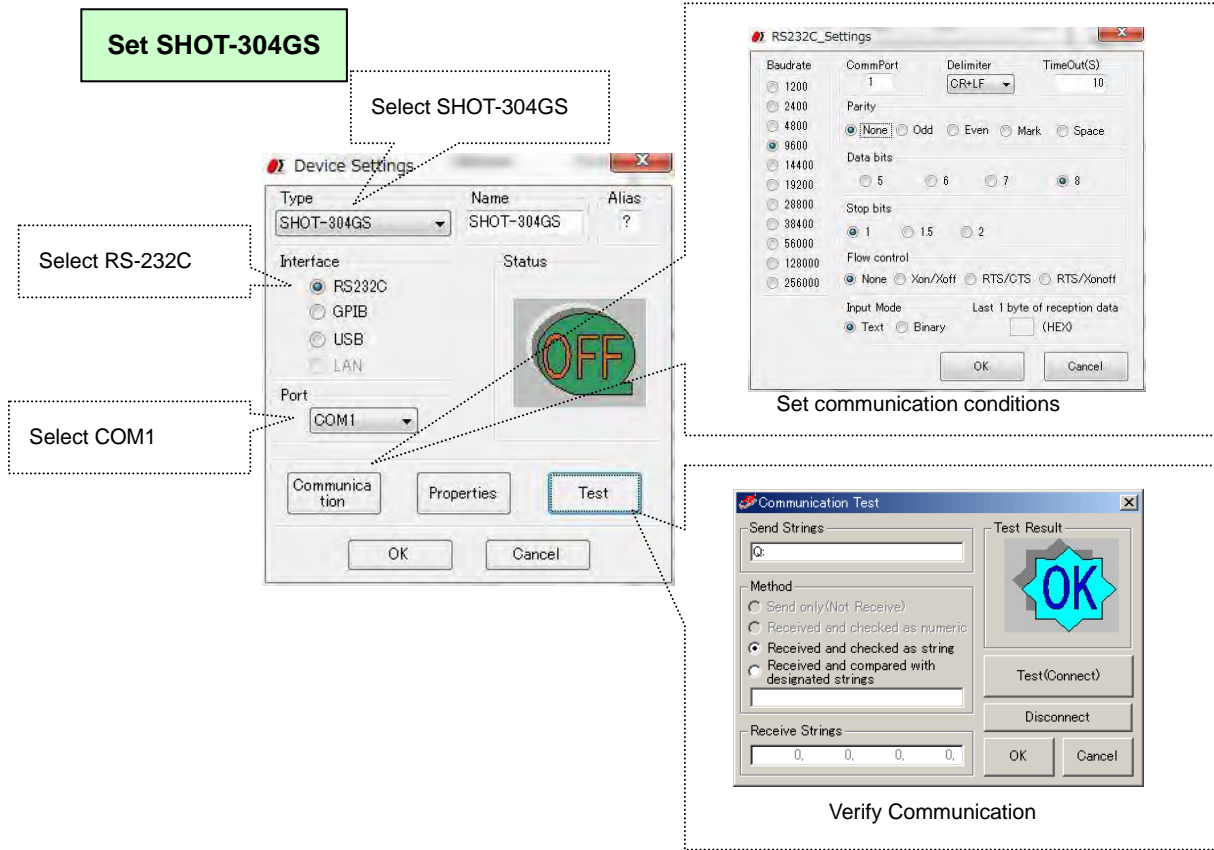
Fig. 4-48 Settings for SHOT-304GS

Set Control Device

Select GPIB

Select Address1

Set communication conditions

Verify communication

Send Strings "RED" is example.
Actually follow the specification of the control device used.

Set 1-sec wait time.
Control command input is not essential since it is specified in instruction file.
(If destination device will respond with verification strings, input strings in Answer box).
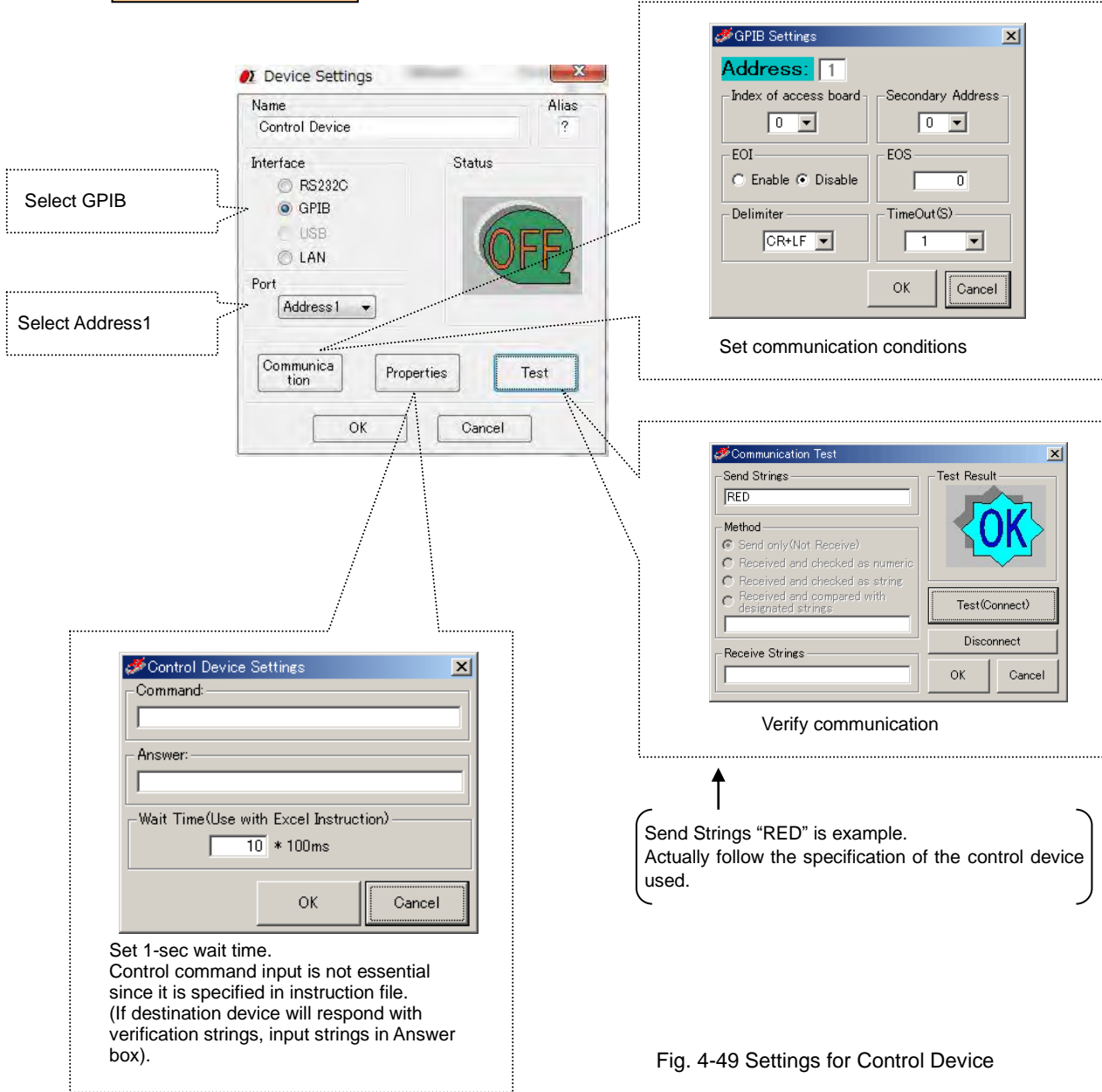
Fig. 4-49 Settings for Control Device

Set Measuring Instrument

Select RS-232C

Select COM2

Set communication conditions

Verify communication

Input measurement command "M"

Command "M" and Send Strings "M" are examples. Actually follow the specification of the measuring instrument used.

Fig. 4-50 Settings for Measuring Instrument

When the settings finish, check if the device is connected in the Device Register dialog.

Check status

Fig. 4-51 Device status

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(3) Create Instruction Files

Create an instruction file as described in figure 4-52.

This instruction file is to send a control command (RED, GREEN or BLUE) to a control device at every measuring position.

Fig. 4-52 Instruction file-1.xls

If you want to fix the control command in order to give priority to stage movement, create an instruction file exampled in figure 4-53.

Fig. 4-53 Instruction file-2.xls

(4) Settings in Excel Instruction Dialog

Set the Excel Instruction dialog as shown in figure 4-54.

(See "3.3 Excel Instruction Dialog" for the details of the settings).
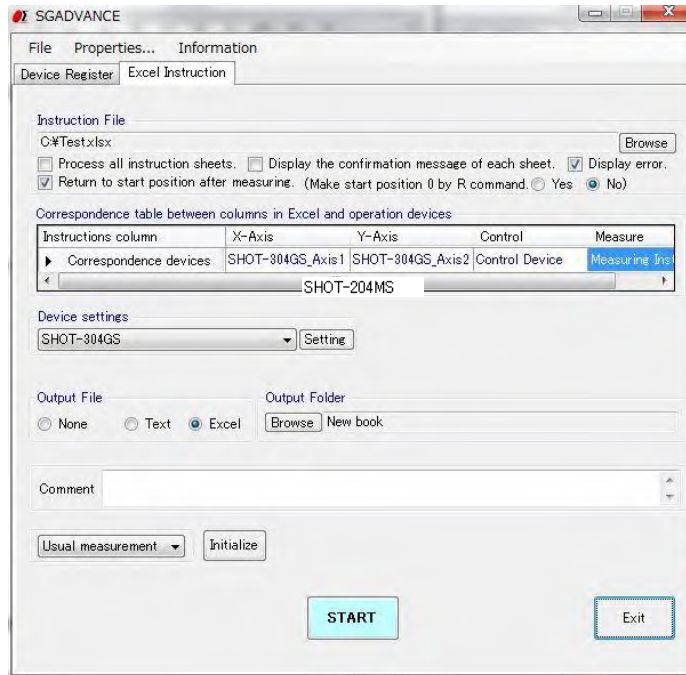
Fig. 4-54 Excel Instruction dialog

(5) Start Measurement

Click on the START button to start measurement.

During measurement, click on the Pause button on the progress display to halt the measurement. Click on the Continue button to continue the measurement. Click on the STOP button to stop the measurement. (Measurement did not stop immediately. It will stop when a step of processes are completed).
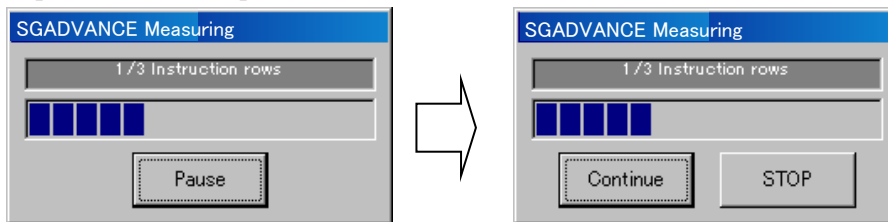
Fig. 4-55 Measurement progress display

(6) Result Output

The measurement results are output to the destination.
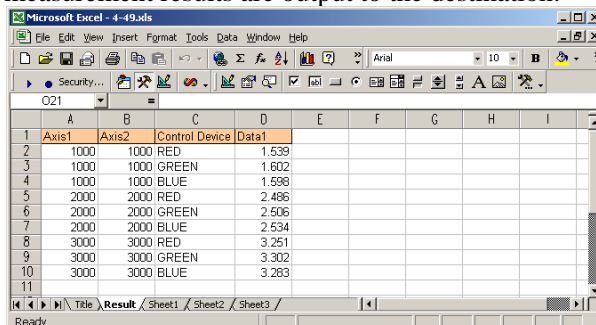
Fig. 4-56 Measurement results

90

♦ Step Measurement

In step measurement mode, manually run the contents in an instruction file on a row-by-row basis.

As a step control, SGADVANCE can send control characters to specified control devices every time measurement defined in a row has finished.

* When there are two or more instruction sheets, only a measurement of the first sheet is performed.

(1) Register devices, (2) set conditions for devices and (3) create instruction files as described for the Usual Measurement mode above.

(4) Settings in Excel Instruction Dialog

Set the Excel Instruction dialog as shown in figure 4-57.

(See "3.3 Excel Instruction Dialog" for the details of the settings).
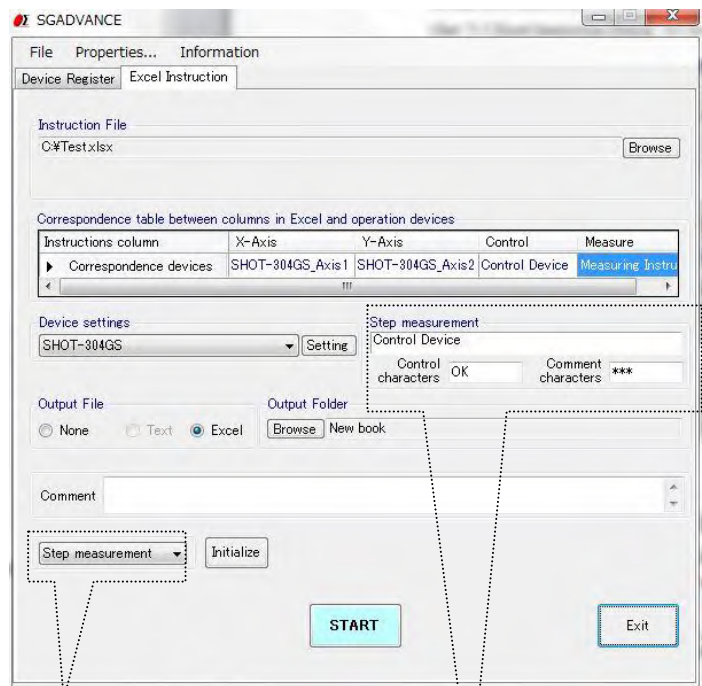
Select step mode in measurement mode selection box

Displayed if selecting Step measurement

Specify destination device if SGADVANCE sends control characters, as step control, to Control Device every time measurement defined in a one row finishes
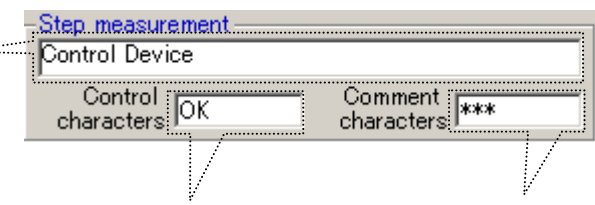
Specify characters to send to Control Device for step control

Specify characters to write to mark column in destination file every time measurement in a row finishes

Fig. 4-57 Excel Instruction dialog (step measurement)

(5) Start Measurement

Click START to show the Step measurement dialog.
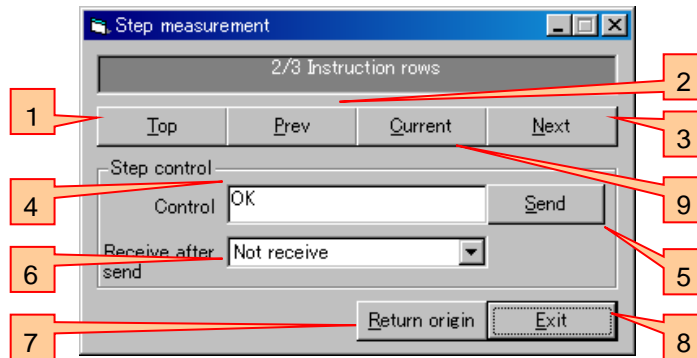
Fig. 4-58 Stem measurement dialog

1	Click TOP to run as described in the first row of an instruction file.
2	Click "Prev" to run the previous row.
3	Click Next to run the next row (run the first row immediately after starting measurement).
4	Displays the control characters specified in the Excel Instruction dialog (Fig. 4-50). Or, you can change the characters in this box.
5	If you select a control device to which the control characters are sent, click Send to transmit the characters to the device. In addition, comment strings described in Fig. 4-57 are displayed in the mark column of the destination file.
6	Select the reception of a response from the step control device after sending the control characters. Note that SGADVANCE does not check received characters.
7	Click to return to the measurement start coordinates.
8	Click to terminate measurement.
9	Click to rerun the current line. The measurement result of the current line is overwritten.

(6) Result Output

The measurement results are output to the specified destination.

Fig. 4-59 Measurement results

92

4.5　　　　Measurement in Terminal Instruction Mode

In Terminal Instruction, Sheet Mode, Row Mode, Column Mode, Range Mode and Cell Mode are available. As for control, Script Control is provided.

* For operations of each mode, refer to section 3.

4.5.1　　　　Instruction by Sheet Mode

This is for communication between one whole sheet in an Excel workbook and one device.

This is one-to-one communication between a sheet and a device.

Excel sheet
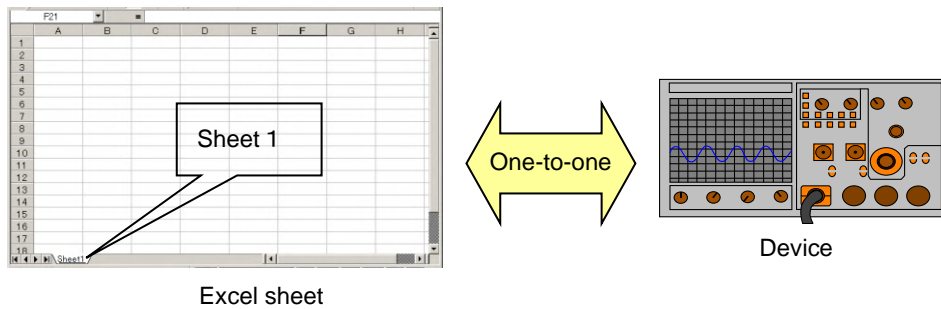
For sheet mode, define communication mode (send/receive/send&receive), a device to be connected and a sheet (sheet name).

Set necessary conditions in the Terminal Instruction tab.

Fig. 4-60 Instruction workbook setting

Specify an Excel workbook

Fig. 4-61 Sheet name and mode settings

Select Sheet as Mode

Specify a sheet name

Fig. 4-62 Device and output settings
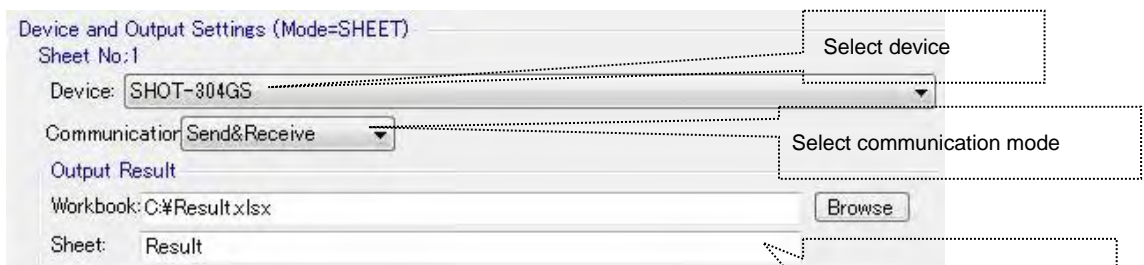
Select device

Select communication mode

Specify Excel workbook and sheet for output

In the examples of the Fig. 4-61 and 4-62, all the contents described in the Sheet 1 are sent to SHOT-304GS and the results are returned. The received results are written to the sheet specified in the Output Result.

	A	B	C	D
1	H:W	H:1	Q:	
2	Q:	M:2+P200	H:2	
3	M:1+P100	G:	Q:	
4	G:	Q:	H:W	
5	Q:			
6				
7				

All the contents are sent to SHOT-304GS and results are returned
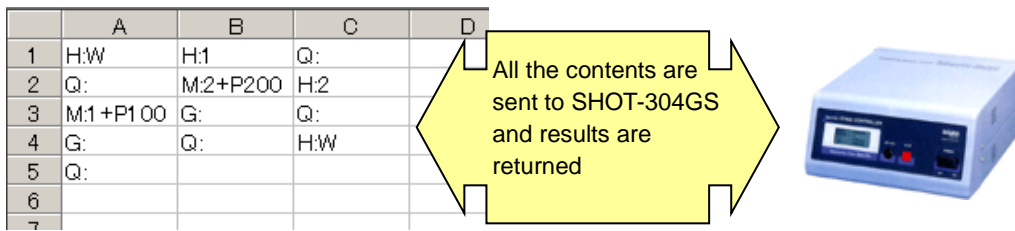
4.5.2   Instruction by Row Mode and Column Mode

In Row mode or Column mode, communication is performed between a specified row /column and a device. Rows/columns are designated in one sheet of Excel workbook.

More than one row/column can be designated in one sheet.

A device can be specified separately to each designated row or column.

Communicate with device 1

Specify row/column

Communicate with device 2

Excel sheet
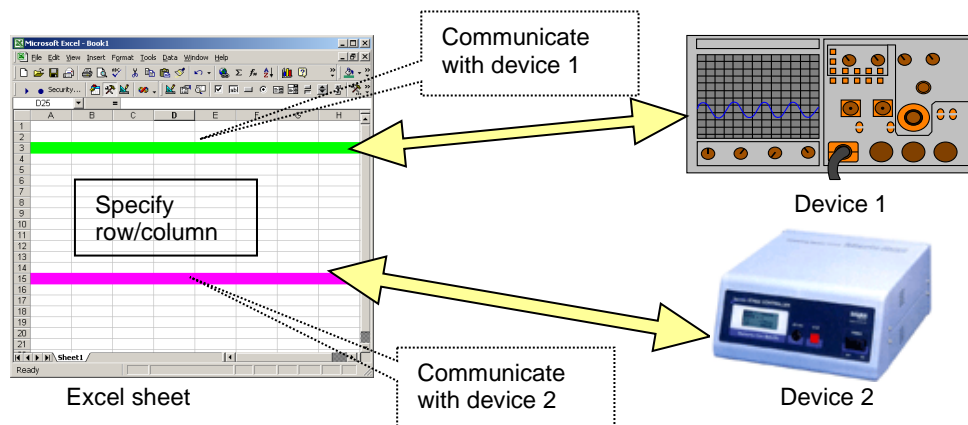
Device 1

Device 2

For row or column mode, define communication mode (send/receive/send&receive), a sheet (sheet name), a row (row number) or a column (column name) and a device.

Set necessary conditions in the Excel Settings tab.

The workbook to be used is set in the way shown in the Fig. 4-60 "Instruction workbook setting."

No.	Sheet Name	Mode	
1	Sheet1	ROW	▲
2			
3			

Select Row or Column as Mode
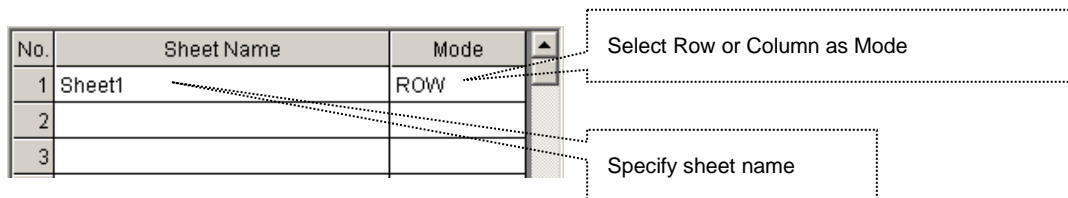
Specify sheet name

Fig. 4-63 Sheet name and mode settings

94

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Fig. 4-64 Device and output settings

Select communication mode

Specify destination for result

Specify row or column to be used

Select device to be used

In the examples of the Fig. 4-63 and 4-64, the contents written in the cells in the first row is sent to SHOT-304GS, and the contents in the cells in the third row to the measurement device, and the results are received. The received results are written to the sheet specified in Output Result.

(During execution, the color of each row changes as specified.)

Only specified rows/columns are communicated

Each specified row/column communicates with each specified device.
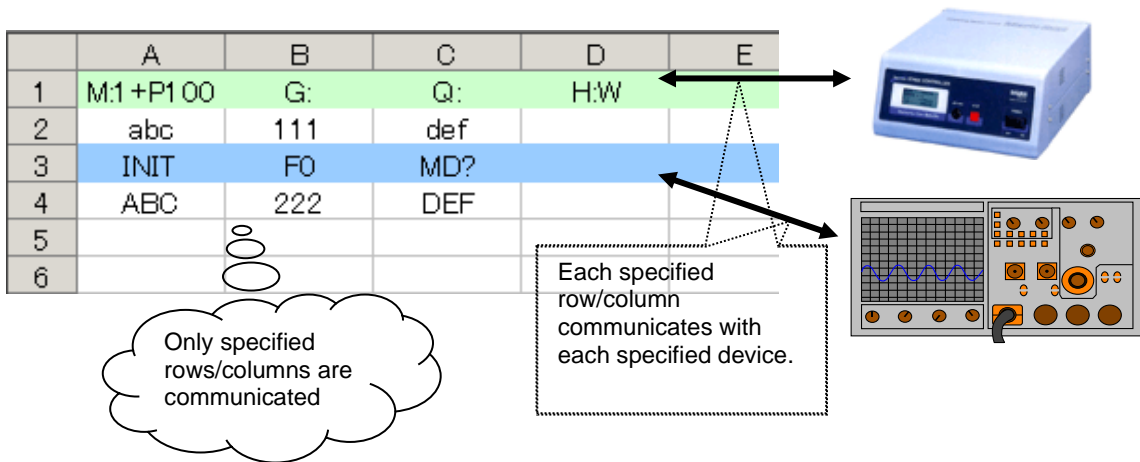
4.5.3 Instruction by Range Mode

This is for communication between the range specified in a sheet of Excel workbook and one device.

More than one range can be specified in one sheet.

Different devices can be specified for each specific range.

Communicate with device 1

Communicate with device 2

Specify range
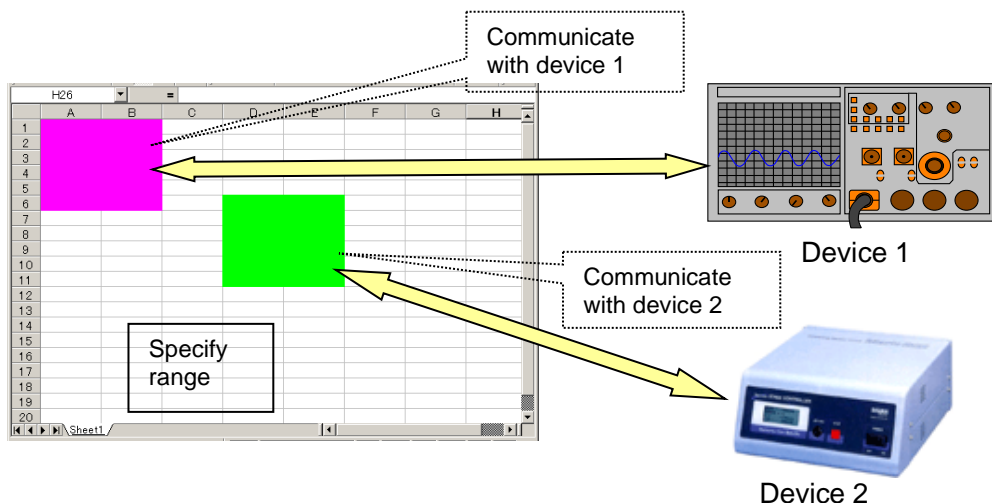
Device 1

Device 2

For range mode, define a sheet (sheet name), range, a device and communication mode (send/receive/send&receive).

Set necessary conditions in the Excel Settings tab.

Specify the workbook to be used in the way shown in "Fig. 4-1 Instruction workbook setting."

Fig. 4-65 Sheet name and mode settings

Fig. 4-66 Device and output settings

In the examples of the Fig. 4-65 and 4-66, the contents written in the range A1:B4 in a sheet is sent to SHOT-304GS and the contents in C6:D9 is sent to the measurement device. The results are returned. The received results are written to the sheet specified in the Output Result. (During execution, the color of each row changes as specified.)
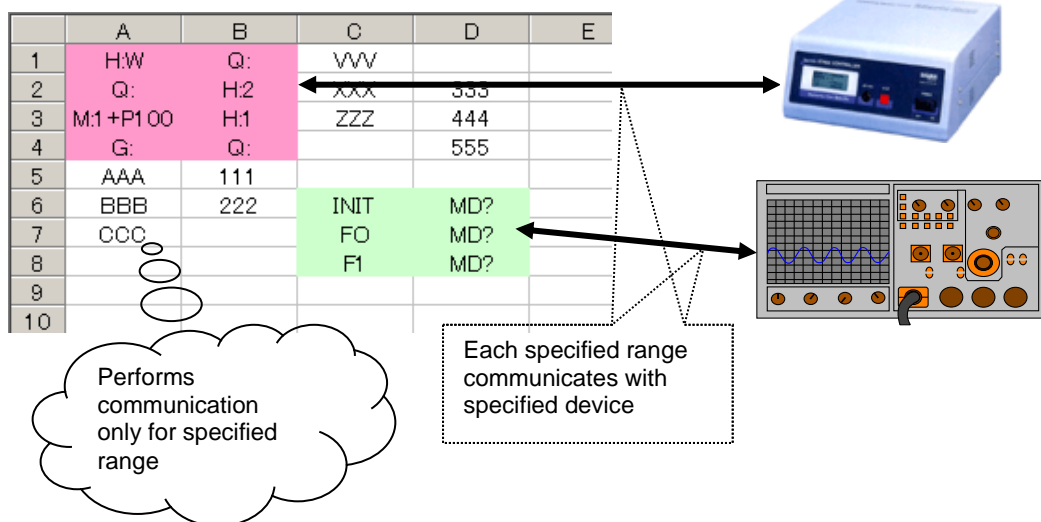
4.5.4 Instruction by Cell Mode

This is for communication between each cell and a device in a sheet of Excel workbook.

Different devices can be specified for each cell.
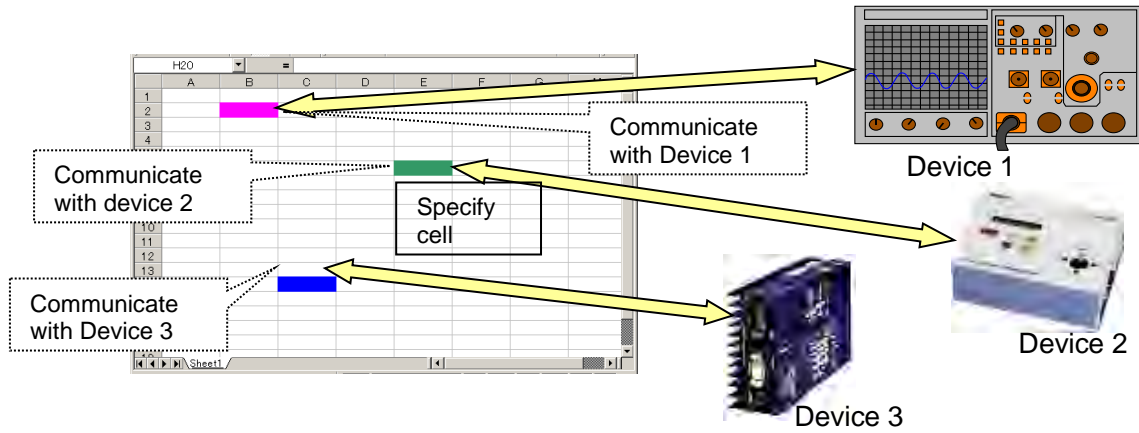
When specifying a sheet (sheet name) in the cell mode, the whole sheet becomes cell mode.

Specify communication settings by cell

Select Settings and then Device and Output Settings in the menu and specify the sheet name and mode.

Set the workbook to be used in the way shown in the "Fig. 4-60 Instruction book setting."

Fig. 4-67 Sheet name and mode settings

Specify the devices used in the Cell mode form using Alias preset in Device Settings.

Fig. 4-68 Device aliases

In cell mode, write the forms for communication directly to cells. The program uses described cells for communication. Any applicable cells in a sheet can be used for communication.

Communicate with SHOT-304GS, of which alias is M

Form for communication only

Communicate with measurement device of which alias is K
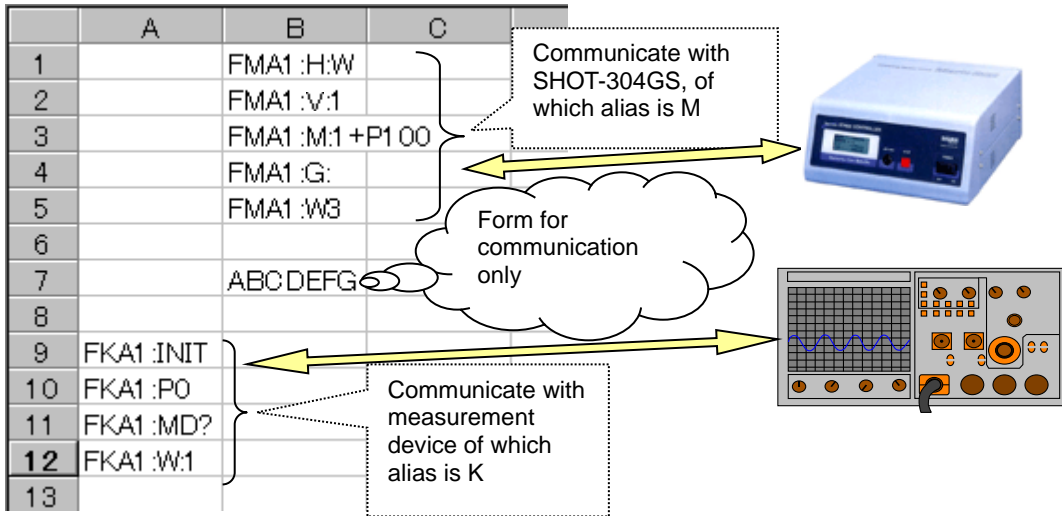
4.5.5 Controls by Script

You can control conditions, branches and/or rules by scripts in a sheet of an Excel workbook (available in every mode.).

Jump, If, Loop, Print and PrintSet are available as scripts.

(1) Jump

Jumps (moves a process) to the specified cell.

    Form: Jump Cell name

(Characters in Jump are case-sensitive.)

Example: Jump C5 (Jump from the current cell to C5.)
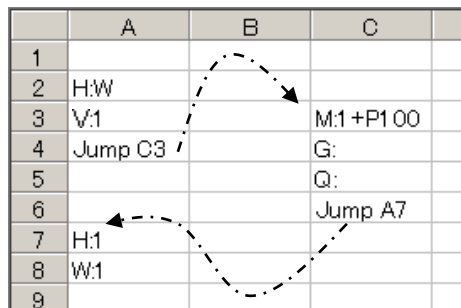
Fig. 4-69 Jump

(2)   If

Compare the contents following an If script and the contents following an inequality sign, and jumps to the cell following Then if the condition is satisfied. It jumps to the cell following Else if not satisfied.

Form: If Cell name = { <, >, <=, >=, <> } Cell name Then Cell name Else Cell name

---

(Characters in If, Then and Else are case-sensitive. The characters following Else can be omitted. If they are omitted, the process moves to the next cell.)

 Example 1: If A2 = A3 Then B5 Else C6

(Check if the contents of A2 match that of A3 and jump to B5 if they match, or C6 if they do not.)

Fig. 4-70 If

Example 2: If A4 >= B8 Then C9

(Compare the contents of A4 with B8 and jump to C9 if the contents of A4 are equal or larger than that of B8, or to the next cell if smaller.)

Example 3: If A5 <> B7 Then C3 Else D2

(Compare the contents of A5 with B7 and jump to C3 if the contents of A5 are not equal to B7, or to the next cell if identical.)

(3)   Loop

Repeats to move between the designated cells as many times as specified.

Form: Loop Cell name Cell name Number of times

(Characters in Loop are case-sensitive. The name of the first cell should be smaller than that of the second cell. Otherwise, a process cannot loop.)

 Example: Loop B3 B6 3

(The process loops from B3 to B6 three times.)

Loops three times

* When a cell moves beyond a loop in Jump sentences, it may not do the later loop well. Please be careful.

Fig. 4-71 Loop

99

(4)　　Print

Copy the value of a copy source cell to a copy destination cell.

When the same Print sentence is repeatedly performed by the Loop sentence etc., it can also copy to the cell which separated a specified amount from the copy destination cell every one by one.

Form: Print Source cell name Destination cell name Offset amount Offset direction

---

Offset amount :

When the same Print sentence is repeatedly performed by the Loop sentence etc., specify how many it copies to the cell which separated every from a copy destination cell.

Specify a positive or negative relative value.

It is omissible. When it omits, it is always copied to a copy destination cell. (It is overwritten.)

Offset direction :

Specify the direction to offset, when an offset amount is specified.

In the case of a vertical direction … Specify "Row".

In the case of a horizontal direction … Specify "Col".

It is omissible. When it omits, it follows setting out of Direction in the Properties tab.

(Characters in Print, Row and Col are case-sensitive.)

※　When an offset amount is specified, a copy destination cell changes one by one and a copy destination cell exceeds the range of a sheet, it is copied to the cell of a vertical end or a horizontal end.

※　One sheet can describe a Print sentence to 256 pieces.

※　The book and sheet of Excel of a copy source and a copy destination are the book and sheet which were specified in the last PrintSet sentence. If there is no assignment by a PrintSet sentence, both book and seat are registered into <u>table №1</u> of the output settings window. (When nothing is registered into table № 1, it is <u>the "Result" sheet of an instruction book</u>.)

For the output settings window, see "3.7 Setting Output of Result."

Example 1 : Print B3 C3

(The value of B3 cell is copied to C3 cell.)

Example 2 : Print B2 D2 2 Row

(The value of B2 cell is copied to D2 cell at first. The value of B2 cell is copied to the 2nd cell down from the cell copied last time from next time.)

Instruction sheet　　　　　　　　　　　Output result sheet
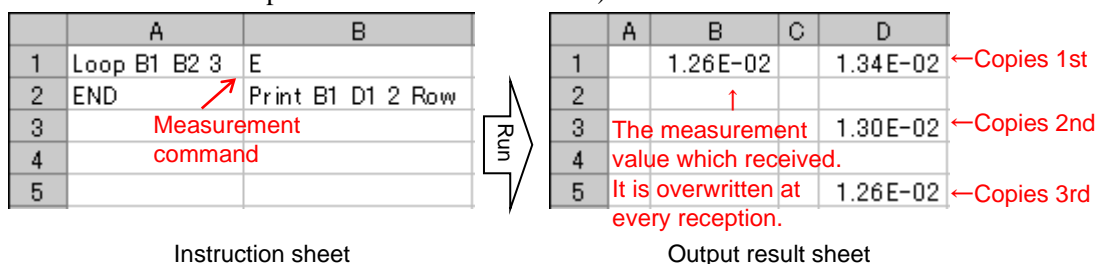
Fig. 4-72 Print

(5)　　PrintSet

Specify the book and sheet of the copy source cell and copy destination cell of a Print sentence. Specify assignment of a book and sheet by table number of the output settings window. For the output settings window, see "3.7 Setting Output of Result."

```
Form: Printset Table number of source cell Table number of destination cell
```

(Characters in Printset are case-sensitive.)

※　When the book and sheet are not set as specified table №, it is set as <u>the "Result" sheet of an instruction book</u>.

※　When only one table № is specified, the table № is set up for a copy source and a copy destination.

※　When both of table № are omitted, table № 1 is set up for a copy source and a copy destination.

Example 1 : Instruction book … C:¥BookA.xls , Instruction sheet … Instruction
　　　　　 Output result book … C:¥BookB.xls , Sheet … Result1
　　　　　 Output settings window →
　　　　　 In the case of the
　　　　　 above-mentioned conditions

No.	Workbook		Sheet
1	C:¥BookB.xls	Browse	Result1
2	C:¥BookC.xls	Browse	Result2
3		Browse	
4		Browse	

← Table №

	Example	Book and sheet of a copy source	Book and sheet of a copy destination
(1)	PrintSet 1 2	C:¥BookB.xls Result1	C:¥BookC.xls Result2
(2)	PrintSet 2	C:¥BookC.xls Result2	C:¥BookC.xls Result2
(3)	PrintSet	C:¥BookB.xls Result1	C:¥BookB.xls Result1
(4)	PrintSet 3 1	C:¥BookA.xls Result	C:¥BookB.xls Result1

Example 2 : In the case of the same setting out as Example 1
　　　　　 PrintSet 1 2
　　　　　 (In the Print sentence after this, it copies to the book and sheet of table № 2 from the book and sheet of table № 1.)

	A	B	
1	PrintSet 1 2	E	←Measurement command
2	Loop B1 B2 3	Print B1 D1 2 Row	
3	END		
4			
5			

Instruction Book, Sheet→
(C:¥BookA.xls, Instruction)

Fig. 4-73 PrintSet

Run
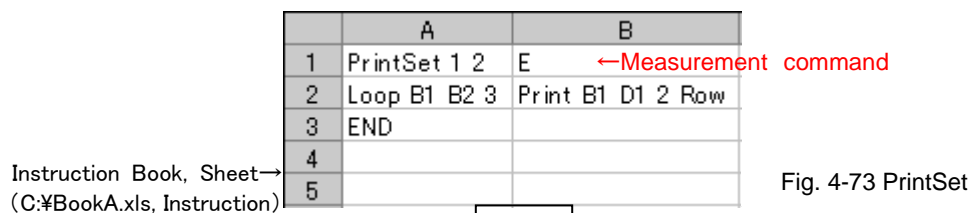
	A	B	C	D
1		1.26E-02		
2		↑		
3		The measurement value which		
4		received.		
5		It is overwritten at every reception.		

Output result book/sheet and book/sheet of table № 1 of the output settings window
(C:¥BookB.xls, Result1)

	A	B	C	D
1		By "Print", Copies 1st→		1.34E-02
2				
3		Copies 2nd→		1.30E-02
4				
5		Copies 3rd→		1.26E-02

Book/sheet of table № 2 of the output settings window
(C:¥BookC.xls, Result2)

4.6　　　Measurement Example in Terminal Instruction Mode

4.6.1　　　Samples for Sheet Mode

The followings are descriptions on samples for communication in sheet mode.

Use sheet mode when one sheet gives instructions to one device.

Either Send or Send&Receive can be selected depending on the communication contents.

When Send is selected, the sheet only sends the contents to a device. When "Send&Receive" is

selected, the sheet receives the output from the device responding to the sent contents. Random

communication with Send and Send&Receive is not available (* V command, described in

(3) Setting Form for Receive Waiting in　2-10　Form Settings in 3.1 Device Register Dialog can

be used even when Send mode is selected.)

(1)　　　Sheet Mode Sample 1

Send the contents in a sheet to the stage driver (GSC-02) to move the stage.

Personal computer　　　　　　　　　GSC-02　　　　　　　Motorized stage

Home the stage, then move it 1000-pulse, then home again.

	A	B
1	H:W	
2	V:1	
3	M:1 +P1 000	
4	G:	
5	V:1	
6	H:W	
7	V:1	
8		
9		
10		

Describe contents in Excel sheet as shown in

left figure.

Description should begin in A column on first line.

Use Sheet1

Fig. 4-74 Sample 1

[Operation conditions]

GSC-02 moves the stage by following the received command, but does not return any

information. However, it returns the information on the stage's current status or position only

when it is inquired. GSC-02 is connected through RS-232C interface.

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[Setting conditions]

- Communication settings

Set the communication to be used as shown in 12-2 Interface, 12-3 port and 12-4 "Communication" button in "3.1 Device Register Dialog" and select the interface and port to run communication test. When the communication test result is satisfactory, communication setup finishes.

- Device and output settings

Specify the Excel workbook and sheet name to be used as shown in "4.5.1 Instruction by Sheet Mode." Select Sheet Mode and select Send as communication mode since the command to GSC-02 is only for sending (When Send&Receive is selected, receiving responses is essential.)
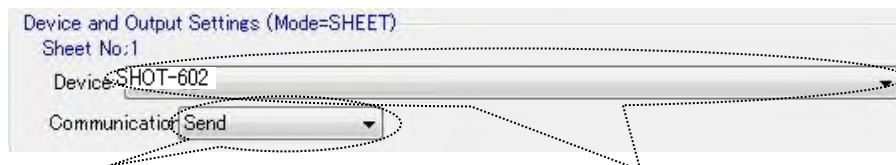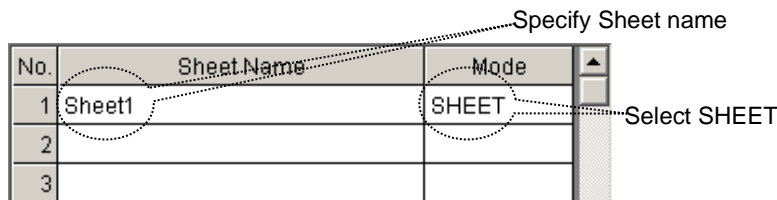
Select Send (Only send is available in Sheet mode.)   Select a destination device

- Operation settings

Specify operations as described in "Properties dialog for the terminal instruction" in 2 Properties Menu in 3.1 Device Register Dialog.

For this sample, the following settings are specified (keep default except the followings.)
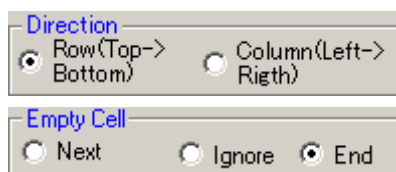
- Form settings

GSC-02 does not return to normal command transmission, while it returns the information in a standard format only when it receives a command for inquiry.

When Send is selected in Device and Output Settings, the sheet can only send information.

In such cases, use (3) Setting Form for Receive Waiting in 2-10 Form Settings in 3.1 Device Register Dialog to enable Send&Receive based on the registered contents.

Set the following contents in a table.

[Run]

Execute Program Run to run the contents in an Excel sheet.

	Cell A	
1	H:W	Send H:W (homing)
2	V:1	Wait for ready (use receive waiting command)
3	M:1+P1 000	Send M:1+P1000 (instruct move pulse)
4	G:	Send G: (instruct movement)
5	V:1	Wait for ready (use receive waiting command)
6	H:W	Send H:W (homing)
7	V:1	Wait for ready (use receive waiting command)

Fig. 4-75 Contents of sample 1

(2)   Sheet Mode Sample 2

This sample is to send the contents in a sheet to the stage controller (SHOT-304GS) to move the
stage.

The contents are the same as the sample 1, while the communication specification of the device
to be used is different.

Personal computer   SHOT-304GS   Motorized stage

Home the stage, then move it 1000-pulse, then home again.

Describe contents in Excel sheet as shown in
left figure.
Description should begin in A column on first line.

Use Sheet1

Fig. 4-76 Sample 2

[Operation conditions]

SHOT-304GS moves the stage based on the received command and sends the results (always responding to the received command.)

SHOT-304GS is connected through USB.

[Setting conditions]

- Communication settings

Set the communication conditions and run communication tests as shown in the sample 1.

(USB is used for this sample.)

- Device and output settings

Set in the same way as the sample 1 shown in "4.5.1 Instruction by Sheet Mode."

Select Send&Receive as the command to SHOT-304GS are always responded.
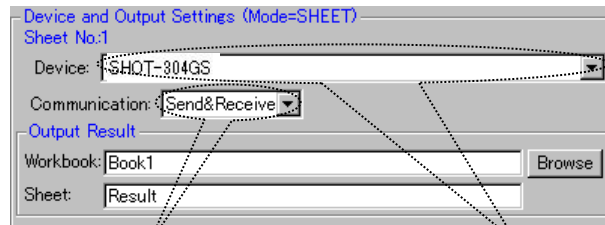
Select Send&Receive   Select device to be used in sheet

- Operation settings

Set operation as the same way for the sample 1 by referring to "Properties dialog for the terminal instruction" in 2 Properties Menu in 3.1 Device Register Dialog.

- Form settings

Set in the same way as described for the sample 1. Start position of R needs to be changed since the device returns information on four axes responding to the Q command.

Change to 49

[Run]

Execute Program Run, and then the contents of an Excel sheet are run in the same way as described for the sample 1.

When either Send&Receive or Receive is selected in Device and Output Settings, the received results are written to a Result Sheet (The result of command for receive waiting (V command) is not written to.)

Other sheets than the Result can be specified as an output sheet in Output Result Settings.

Fig. 4-77 Results of sample 2

4.6.2 Sample of Row/Column/Range Mode

See how the sample works for communication in Row, Column and Range modes.

In those modes, different destination is specified in each row, column or range in one sheet.

Either Send or Send&Receive can be selected depending on the contents of communication.

When Send is selected, a specified row, column or range only sends the contents to a device.

When Send&Receive is selected, SGADVANCE always receives the output from a device responding to transmission.

Send and Send&Receive cannot be performed randomly in one row, column or range.

(* V command, described in (3) Setting Form for Receive Waiting in 2-10 Form Settings in 3.1 Device Register Dialog can be used even in Send only mode.)

(1) Sample of Column Mode (Same in row mode)

This is for sending the contents in a specified column in a sheet to the stage driver (GSC-02) to move the stage.

Personal computer   GSC-02   Motorized stage

Home the stage, then move it 5000-pulse. On the way, stop the stage when 500-pulse are exceeded.

Whether the stage passes through 500-pulse point is determined by monitoring the position information responding to the Q command.

In this sample, use the Loop script for repeating process to monitor information, If for result determination, and Jump in designating destinations for process.

For script specifications, see "4.5.5 Control by Script."

* The position where the stage stops after passing 500-pulse varies depending on stage speeds.

Describe the following contents in an Excel sheet.

	A	B	C	D
1	H:W			
2	V:1		Q:	
3	M:1+P5000		If D2 > D3 Then B8	500
4	G:			
5	Loop C2 C3 10			
6	H:W			
7	END			
8		L:E		
9		Jump:A7		
10				

⊢ ◄ ► ► Sheet1 / Result /

Use Sheet 1

(Create New sheet when there is no

Result sheet)

Fig 4-78 Sample 3

Select Tools menu and then Macro in Excel to open Visual Basic Editor. Select the Sheet 2 (Result) project and describe the macro in Change in a Worksheet.
(If there is not a Result sheet, create.)
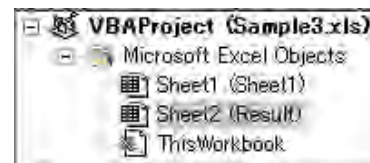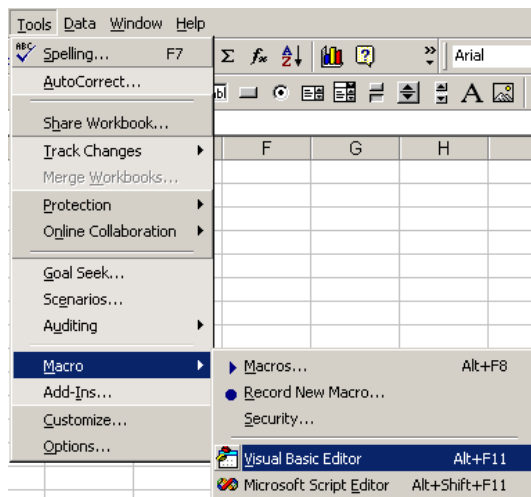
Fig. 4-79 Start-up Visual Basic Editor

Fig. 4-80 Project screen

Worksheet | Change

```
Private Sub Worksheet_Change(ByVal Target As Range)
    Dim r As Integer

    With Target
        If .Row = 2 And .Column = 3 Then
            Sheet1.Range("D2") = Mid(Sheet2.Range("C2").Value, 1, 10)
        End If
    End With

End Sub
```

Describe macro

Fig. 4-81 Change event in Worksheet

[Operation conditions]

The Operation conditions for GSC-02 are the same as that for the sample 1 ("1. Sheet Mode Sample 1").

GSC-02 is connected through RS-232C interface.

[Setting conditions]

- Communication settings

The communication is set as described for the sample 1 ("1. Sheet Mode Sample 1").

- Device and output settings

Specify an Excel workbook and sheet name to be used referring to "4.5.1 Sheet Mode."

Select COLUMN mode.

No.	Sheet Name	Mode
1	Sheet1	COLUMN
2		
3		

Enter sheet name

Select COLUMN mode

(Or select ROW mode)

In the sample, communication is performed for three columns; Column A, B and C. Set the columns to be communicated and register the communication contents for each column. (Such control scripts as Loop, If or Jump are not communicated even if they are in the range subject to communication.)

	A	B	C	D
1	H:W			
2	V:1		Q:	
3	M:1 +P5000		If D2 > D3 Then B8	500
4	G:			
5	Loop C2 C3 10			
6	H:W			
7	END			
8		L:E		
9		Jump A7		
10				

Sheet1 / Result /

Select Send&Receive since Column C receives response to Q:. Device is GSC-02

Select Send since column B is for send only. Device is GSC-02

Select Send since column A is for send only. Device is GSC-02

Register above contents in Device and Output Settings
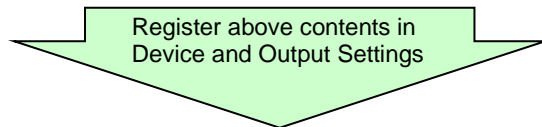
No.	Selected Range	Co	Device	Output	Comm...
1	A		GSC-02	Browse	Send
2	B		GSC-02	Browse	Send
3	C		GSC-02	Browse	Sendℜ

Register columns for communication

Specify device for each column

Specify communication mode

Result sheet is default output destination

108

- Operation Settings

Set operations by referring to "Properties dialog for the terminal instruction" in `2` Properties Menu in 3.1 Device Register Dialog.

In this sample, set as shown below (keep default for other items than the followings)

```
┌ Direction ─────────────────────────────┐
│  ⦿ Row(Top->      ◯ Column(Left->       │
│     Bottom)          Rigth)             │
└─────────────────────────────────────────┘
┌ Empty Cell ─────────────────────────────┐
│  ◯ Next      ⦿ Ignore   ◯ End           │
└─────────────────────────────────────────┘
```
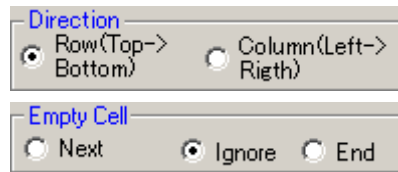
- Form Settings

Set the same conditions as described for the sample 1 in (3) Setting Form for Receive Waiting in `2-10` Form Settings in 3.1 Device Register Dialog ("1. Sheet Mode Sample 1").

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	27	1	5
2					

[Run]

"Program Run" runs the contents of an Excel sheet.

When the sheet is run, A1 and A2 cells moves the stage to home position and A3 to A5 cells issue the order of 5000-pulse move to move the stage. After that, A5 cell runs Loop command and Q command in C2 cell is sent out. The response to Q command is written to C2 cell in the Result sheet. When the contents in the C2 cell change, the macro in the Fig. 4-81 Change event in the Worksheet is called to copy the current coordinate to the D2 cell. Then in C3 cell, the contents of D2 and D3 are compared and jumps to B8 cell if the contents of the D2 cell exceed 500. B8 cell stops the stage and jumps to the A7 cell to end the process.
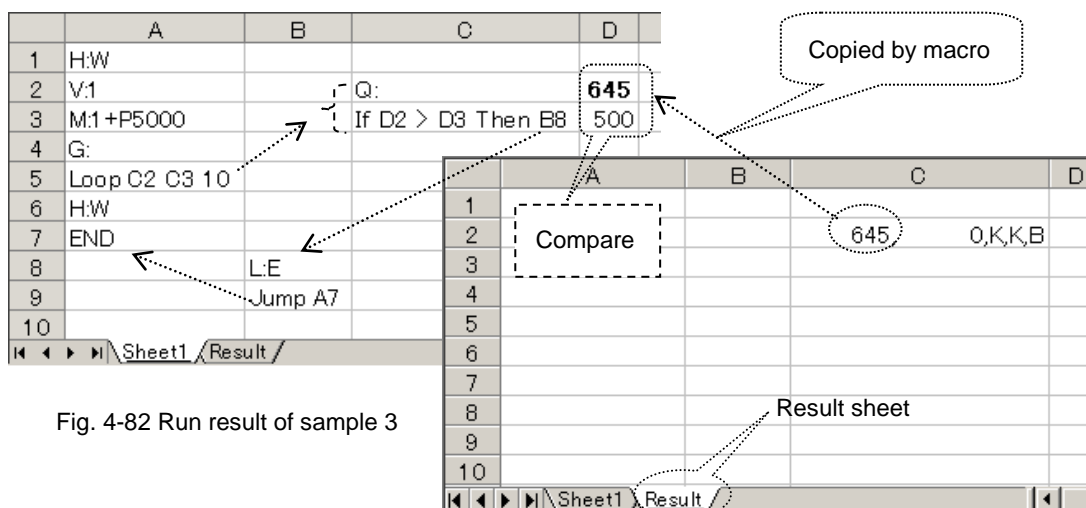
Fig. 4-82 Run result of sample 3

(2)　　　Range Mode Sample

Collect data from a measurement device while positioning a stage.

SHOT-304GS   Motorized stage

Personal computer

Measurement device

(ADVANTEST R6552 Multimeter)
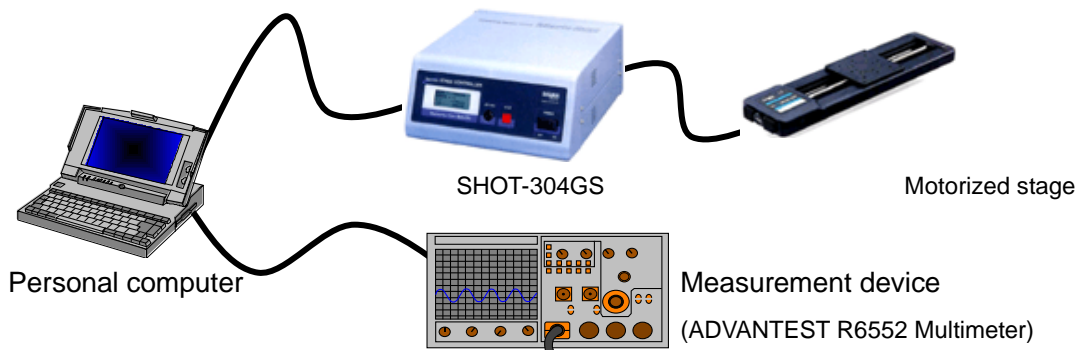
Home the stage and set initial conditions to a measurement device.

Then, measure 10 times every time the stage moves 500-pulse.

As the measurement result, write the movement amounts of the stage and the corresponding measured values.

In this sample, control takes place by scripts in the same way as described in 1. Column Mode Sample.

For script specifications, see "4.5.5 Control by Script."

Write the following contents in an Excel sheet.

	A	B	C	D
1	H:W			
2	V:1	Loop C4 D8 10		
3		END		
4	F1		Q:	E
5	R0		M:1 +P500	
6	W:1		G:	
7			V:1	
8	Jump B2		Jump D4	
9				
10				
11				

Sheet1 / Result /

Use Sheet 1

(When there is no Result sheet, create new one)

Fig. 4-83 Sample 4

Start up Visual Basic Editor in the same way as described in the Fig. 4-79.

In Visual Basic Editor, select Insert, then select Module to add a standard module.

Add
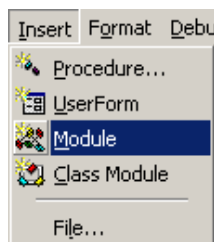
Fig. 4-84 Adding standard module
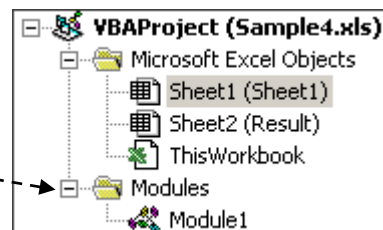
Fig. 4-85 Project screen

110

Describe macros in modules:
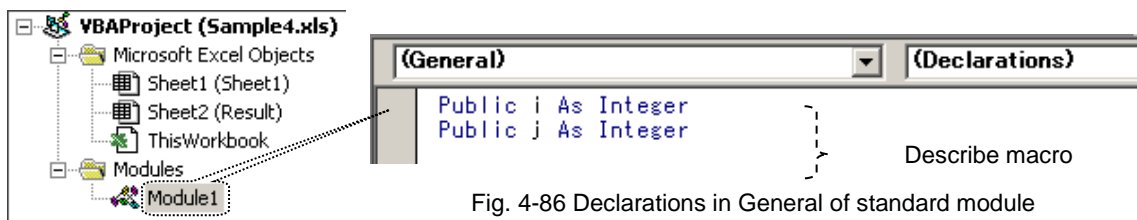
Fig. 4-86 Declarations in General of standard module
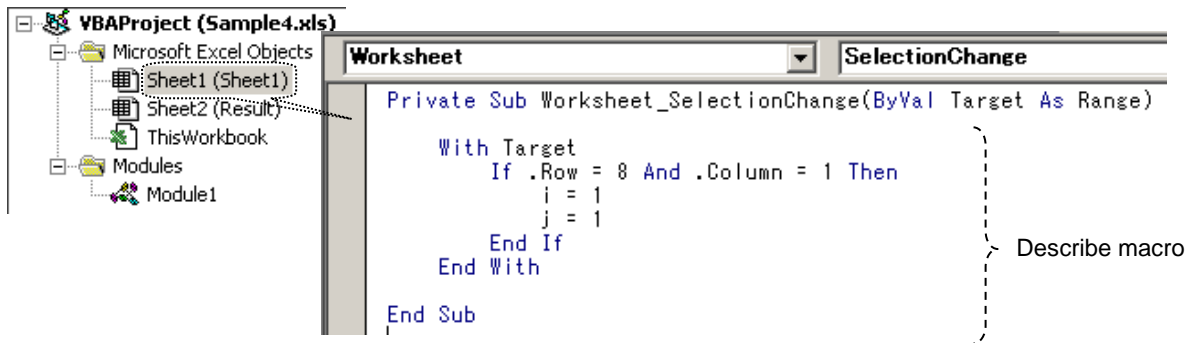
Fig. 4-87 Selection Change event in Worksheet of Sheet 1 module
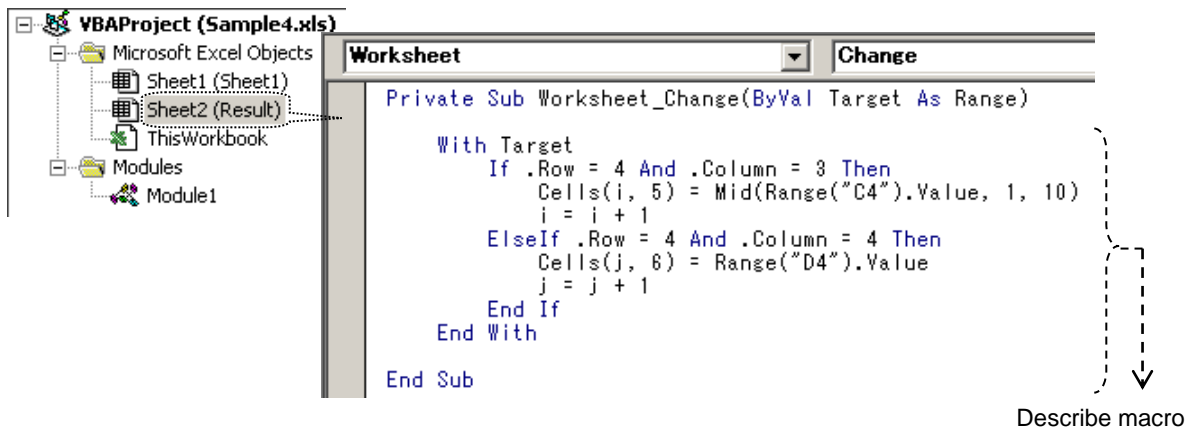
Fig. 4-88 Change event in Worksheet of Sheet 2 module

[Operation conditions]

SHOT-304GS moves the stage according to received commands.

SHOT-304GS always responds to received commands.

The measurement device (ADVANTEST R6552 Multimeter) collects data on receiving a measuring command.

Measurement should follow the initialization. No response is returned to the initialization command.

Connect SHOT-304GS through USB (ID1). Connect the measurement device (ADVANTEST R6552 Multimeter) through GPIB (Address1).

[Setting conditions]

- Communication settings

 Set communication settings. Select interface and port, and then run communication test. When the test results are satisfactory, the communication settings are completed.

- Device and output settings

 Specify an Excel workbook and sheet name to be used as described in "4.5.1 Instruction by Sheet Mode."

 Select the RANGE mode.

Specify Sheet name

Select RANGE.

In this sample, the communication is performed with the designated range. Specify the range for communication and register the communication settings for each range.

(Control scripts such as Loop, If or Jump are not subject to communication even in the communication range.)

A1:A2 sends/receives data to/from SHOT-304GS (USB, ID=1)

D4:D5 sends/receives data to/from a measurement device (GPIB, Address=1)

C4:C8 sends/receives data to/from SHOT-304GS (USB, ID=1)

A4:A6 sends data to measurement device (GPIB, Address=1)
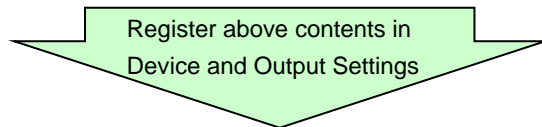
Register above contents in Device and Output Settings

Register ranges for communication   Specify device for each range   Specify communication mode

Result sheet is default destination

- Operation settings

   Set operations by referring to "Properties dialog for the terminal instruction" in `2` Properties Menu in 3.1 Device Register Dialog

   Set in the same way as described for the sample 3 ("1. Column Mode Sample").

- Form settings

   Set the same conditions as described for the sample 3 in (3) Setting Form for Receive Waiting in `2-10` Form Settings in 3.1 Device Register Dialog

   Start position of R needs to be changed since the device returns information on four axes responding to the Q command.

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	49	1	5
2					

Change to 49

[Run]

   Program Run runs the contents of an Excel sheet.

   When sheet is run, the range of A1:A2 homes the stage and the range of A4:A6 initializes the measurement device (A6 cell waits one second for completion of initialization.)

   A8 cell instructs Jump to B2. At the same time, the macro, described in Selection Change event in Worksheet of Sheet 1 module, is executed (See Fig. 4-87).

   B2 cell instructs to repeat the range of C4:D8 ten times. When Loop finishes, the program ends at B3 cell.

   By jumping to the C4 cell, the Q command is sent and the response is written to C4 cell in the Result sheet. When the contents of the C4 cell change, the macro, described in Change event in Worksheet of Sheet 2 module, is called and the current coordinate is copied to the Dx cell. See Fig. 4-88 for the Macro.

   Then the range of C5:C7 moves the stage by 500-pulse.

   By jumping from C8 cell to D4 cell, E command is sent to the measurement device and then measurement starts. The measurement results are written to D4 cell of the Result sheet.

   Like in the Q command, when the contents of the D4 cell change, the macro is called and the measurement value is copied to the Fx cell.

   The cells to which the current coordinates and measurement values are copied are incremented by one row.

   The above processing of C4:D8 is repeated ten times.

   Finally, ten current coordinates fill Column E and ten measurement values fill Column F.

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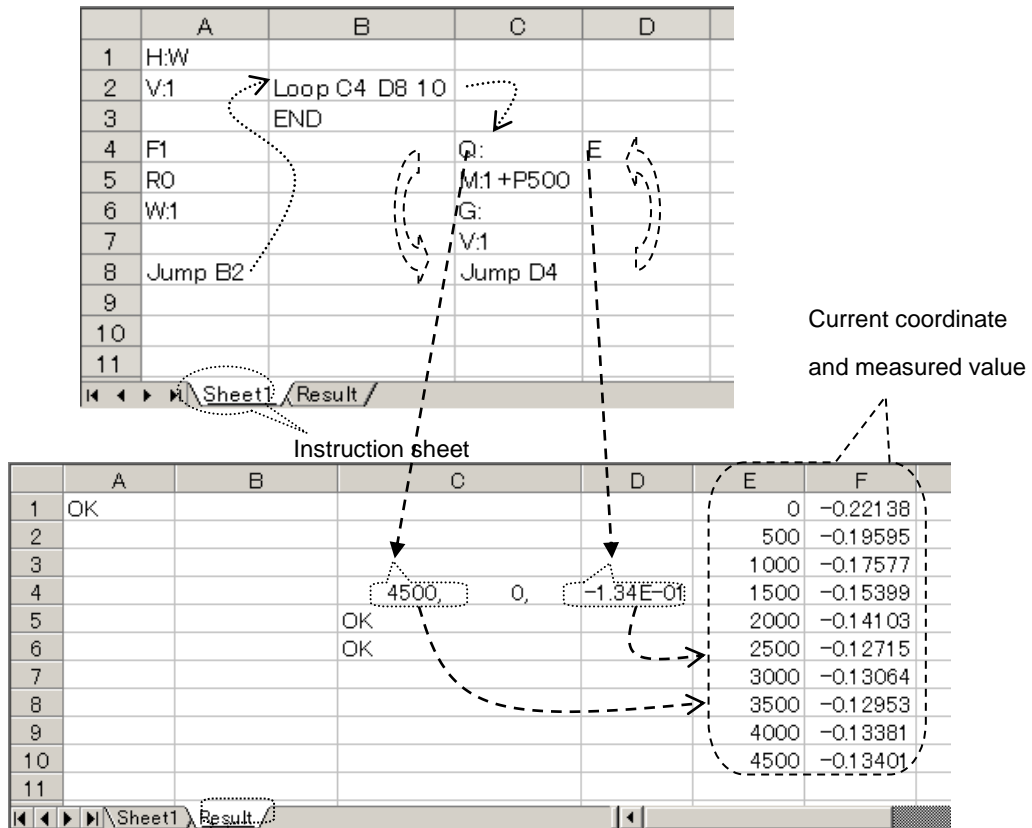
Fig. 4-89 Run result of sample 4

4.6.3　　Cell Mode Sample

The following describes the sample for communication in cell mode.

This mode is used when different destination is specified for each cell to give instruction.

The devices and communication mode, etc. are specified for each cell with the forms.

For the form, see (2) Setting Form for Communication in 2-10 Form Settings in 3.1 Device Register Dialog.

(1)　　Cell Mode Sample

Collect data from a measurement device while positioning a stage.

Personal computer

GSC-02　Motorized stage

Measurement device
(ADVANTEST R6552 Multimeter)
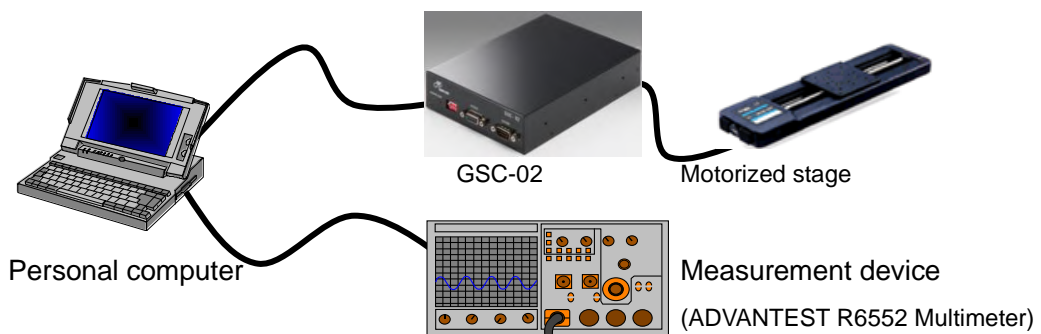
Run the same contents in cell mode as described in "2. Range Mode Sample."

However, use GSC-02 instead of SHOT-304GS.

The operation settings are the same as described in "2. Range Mode Sample."

Describe the following contents in an Excel sheet.

	A	B	C	D
1	FCW1 :H:W			
2	FCW1 :V:1	Loop C4 D8 10		
3		END		
4	FSW1 :F1		FCA1 :Q:	FSA1 :E
5	FSW1 :R0		FCW1 :M:1 +P500	
6	W:1		FCW1 :G	
7			FCW1 :V:1	
8	Jump B2		Jump D4	
9				
10				
11				

Use Sheet 1

(When there is no Result sheet,

create)

Fig. 4-90 Sample 5

Start up Visual Basic Editor to describe the same macro as described in "2. Range Mode Sample" (For the details, see Fig. 4-86 Declarations in general of standard module, Fig. 4-87 Selection Change event in Worksheet of Sheet 1 module, and Fig. 4-88 Change event in Worksheet of Sheet 2 module.)

[Operation conditions]

GSC-02 moves the stage according to the received command.

Normally, it does not respond to the received command, however, it responds to the status request command.

The measurement device (ADVANTEST R6552 Multimeter) collects data on receiving the measurement command.

Measurement follows the initialization. No response is returned to the initialization command.

GSC-02 is connected through RS-232C (COM2) and the measurement device (ADVANTEST R6552 Multimeter) is connected through GPIB (Address 1).

The alias of GSC-02 is "C", the measurement device (ADVANTEST R6552 Multimeter) is "S."

[Setting conditions]

- Communication settings

Set communication settings. Select interface and port and run communication test. When the results are satisfactory, the communication settings are completed.

115

- Device and output settings

Specify an Excel workbook and sheet name to be used as described in "4.5.1 Instruction by Sheet Mode."

Select the CELL mode.

No.	Sheet Name	Mode
1	Sheet1	CELL
2		
3		

Specify Sheet name

Select CELL

- Operation settings

Set operations by referring to "Properties dialog for the terminal instruction" in 2 Properties Menu in 3.1 Device Register Dialog

Set in the same way as described for the sample 4 ("2. Range Mode Sample").

- Form settings

Set the same conditions as described for the sample 3 in (3) Setting Form for Receive Waiting in 2-10 Form Settings in 3.1 Device Register Dialog.

Start position of R needs to be changed since the device returns information on two axes responding to the Q command.

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	27	1	5
2					

Change to 27

[Run]

"Program Run" runs the contents of an Excel sheet.

When the sheet is run, the form is analyzed and run cell by cell.

A1 and A2 cells send "H:V" and "V:1" for the stage's zero return.

The device is GSC-02 since specified as "C" for its alias in the Form, and the communication direction is Send only since specified as "W" in the Form.

A4 and A5 cells send the command to initialize the measurement device. The device is the measurement device as specified as "S" by its alias in the Form, and the communication direction is Send only since specified as "W" in the Form.

A8 cell instructs Jump to B2 cell. At the same time, the macro described in Selection Change event in Worksheet of Sheet 1 module is executed (see Fig. 4-87).

B2 cell issues an order to repeat the range of C4:D8 ten times. When the Loop finishes, the program ends at B3 cell.

By jumping to C4, the Q command is sent by format analysis in the same way, while

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Send&Receive takes place by the form "A." The result of the Q command transmission is written to C4 cell. When the contents of the C4 cell change, the macro described in Change event in Worksheet of Sheet 2 module (cf. Fig. 4-88) is called and the current coordinates are copied to Dx cell.

Then the cells from C5 to C7 moves the stage by 500-pulse.

(Only Send takes place as the command is specified as "W" in the Form.)

By jumping from C8 cell to D4 cell, the E command is sent to the measurement device and then measurement starts. (Send&Receive takes place as the command is specified as "A" in the Form.)

The measurement results are written to D4 of the Result sheet.

Like Q command, when the contents of D4 change, the macro is called and the measurement values are copied to the Fx cell.

The cells to which the current coordinates and measurement values are copied are incremented by one row.

The above processing from C4 to D8 is repeated ten times.

Finally, ten current coordinates fill Column E and ten measurement values fill Column F in the Result sheet.

Instruction sheet

Current coordinate and measured value
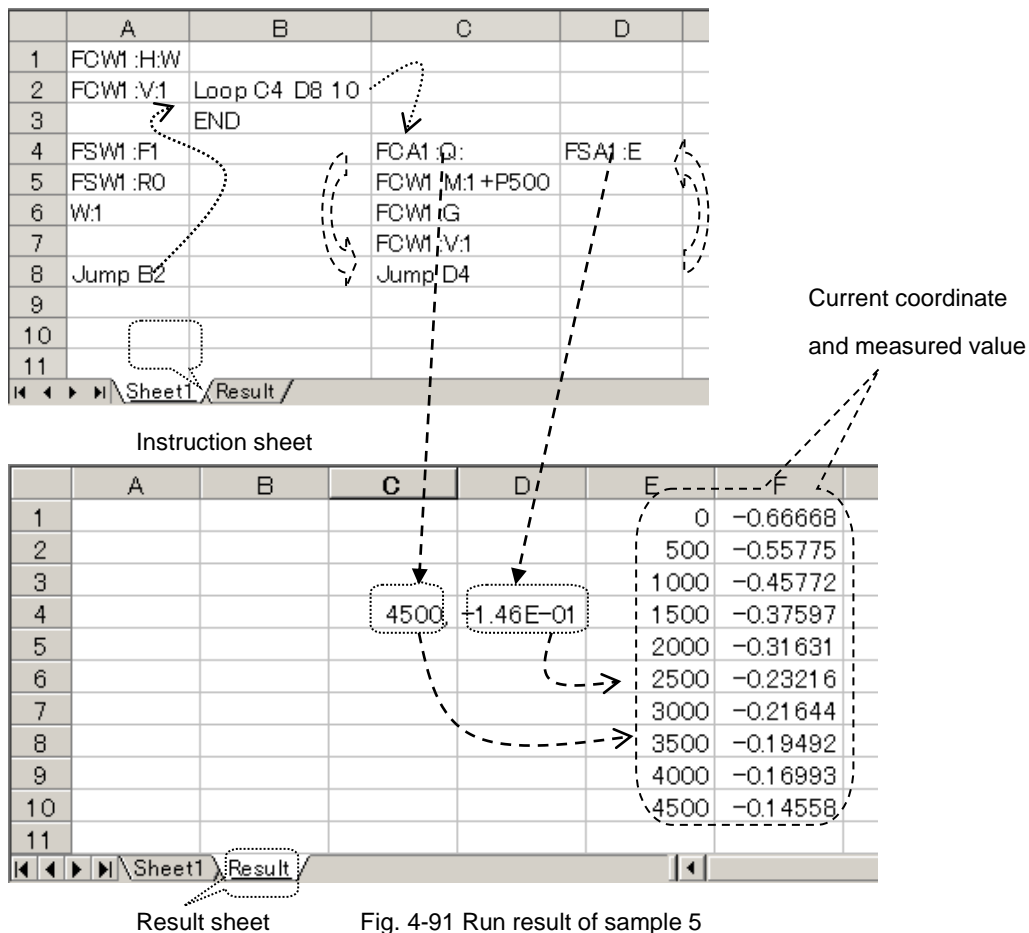
Result sheet   Fig. 4-91 Run result of sample 5

5. Operation
(SGADVANCE +PLUS mode)

This section describes the operations in the "SGADVANCE +PLUS" mode.

It is similar to "SGADVANCE" mode in the whole, but there is a different part partly.

In the "SGADVANCE +PLUS" mode, it has four main dialogs; Device Register, Program

Instruction, Excel Instruction and Terminal Instruction.

5.1　　　　Device Register Dialog

You can register devices or make settings for them in this dialog.
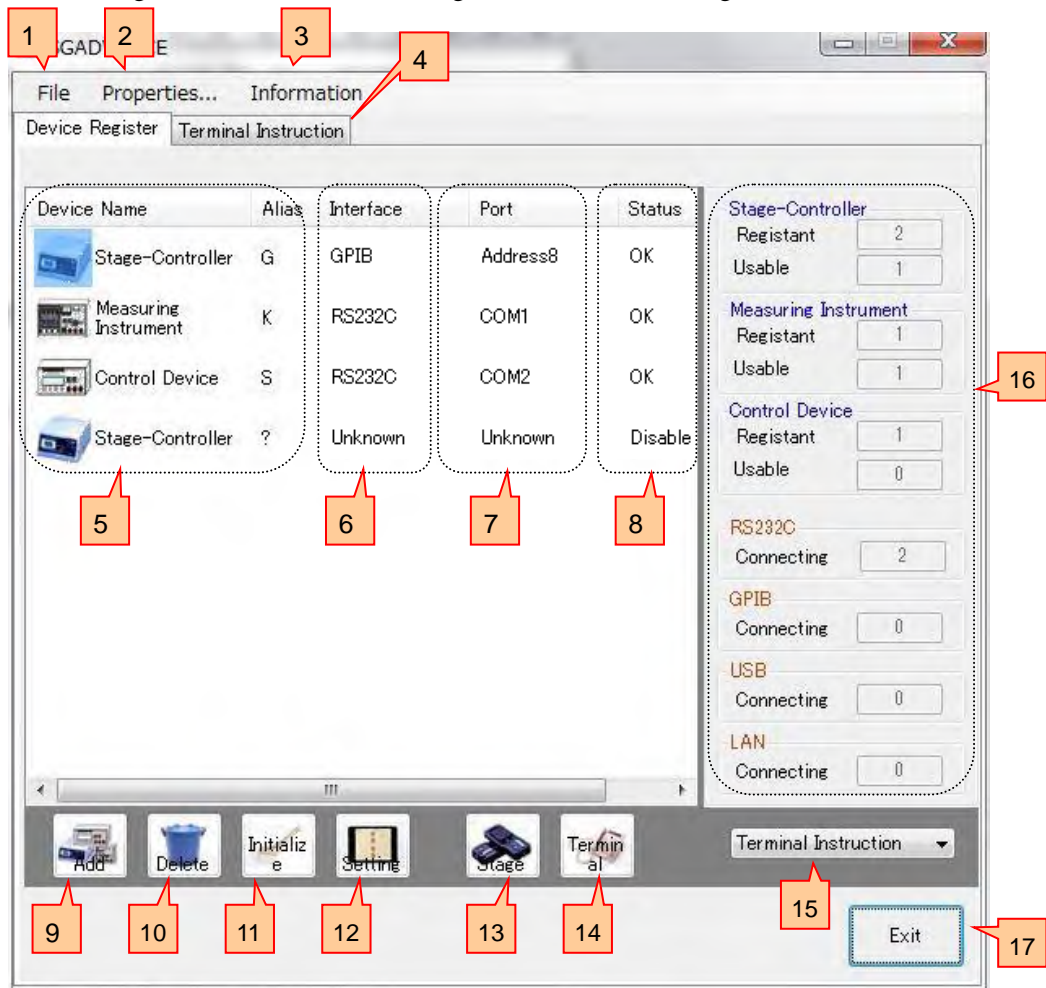
Fig. 5.1 Device Register dialog

[1] - [4]

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

[5] **Device Name**

Displays registered devices (Stage-Controller/Measuring Instrument/Control Device/Luminance

Meter/External Device). Double click to display the setting dialog.

118

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

`9` Add button

Click to register additional devices.

Click to show the Add Device dialog. Select a device you want to add on the dialog.
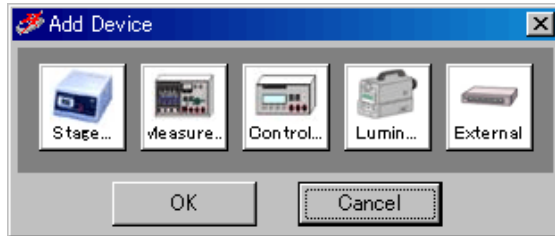
Up to 32 devices are acceptable.

Fig. 5-2 Add Device dialog

♦ Stage ...

Stage-Controller or Intelligent Driver of Sigma Koki.

♦ Measure ...

Measuring Instrument which will return measured results for measurement commands.

♦ Control...

Control device (not reading data) to change temperatures or brightness.

♦ Lumin...

Luminance Meter which will return measured results for measurement commands.

(See ※1 of "1. Overview" about a luminance meter.)

♦ External

Control device (not reading data) which creates the control method to DLL (dynamic link library).

This can be used only by Excel instruction measurement.

(See "6.8 Excel instruction measurement which uses external device" about a detail.)

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

`12` Setting button

Click to set a registered device.

To set a device, select a desired device and then click the Setting button.

The Device Settings dialog will appear.

Click on the OK button to update with the settings.

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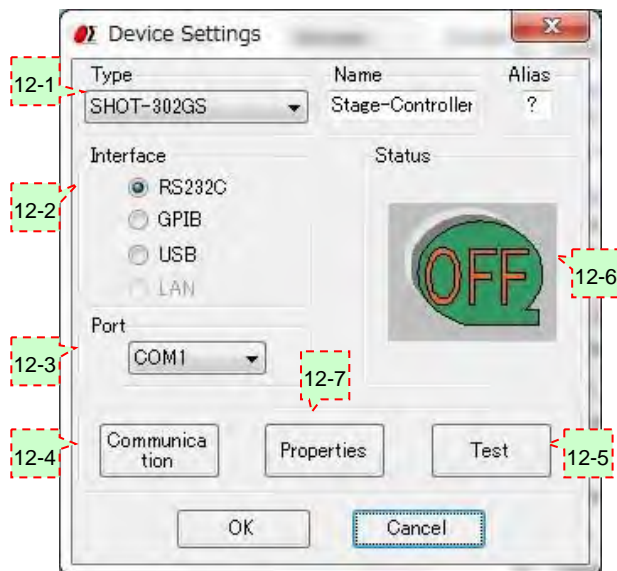
In the case of a stage-controller

In the case of a measuring instrument
and a control device
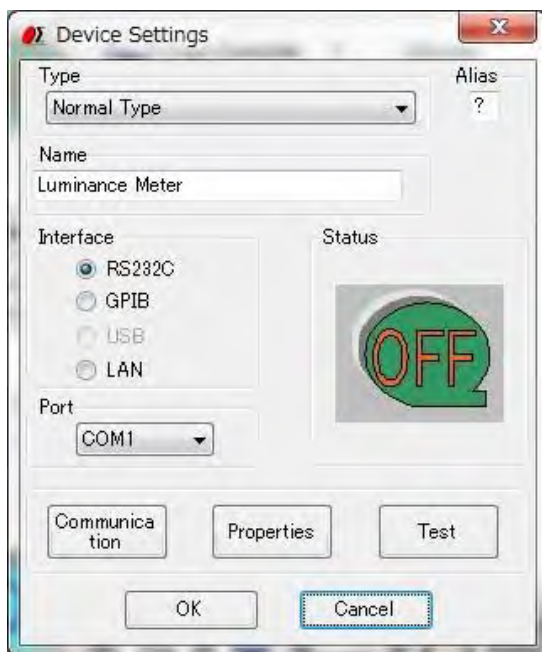
In the case of a luminance Meter

In the case of an external device
Communication, Properties, and Test
button are not used.

Fig 5-3 Device Settings dialog

120

12-1 Name

Select/Input a model of a device you want to register.

For Stage-Controllers, select a model from the list.

If you want to change the name of a device model, alter it by typing directly in the name box.

For Measuring Instruments or Control Devices or External Devices, default names are displayed.

To change the name of a model, alter it by typing directly in the box.
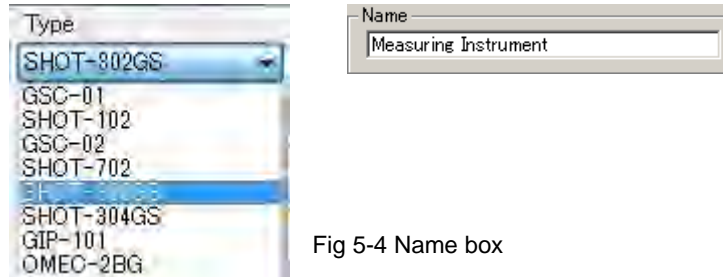
Fig 5-4 Name box

For Luminance Meter, select a type from the list.
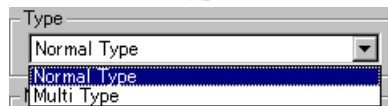
♦ Normal Type : The luminance meter of the type which will send a reply data only once
if a measurement command is transmitted once
(TOPCON BM-5A, BM-7, etc.)

Example   PC   Luminance Meter
          Transmit a measurement command.
          "M1" + Delimiter   ⟶

                                              ⟵   Send a reply data.
                                                    "123.45" + Delimiter
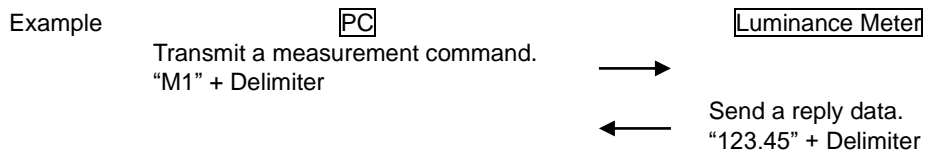
♦ Multi Type   : The luminance meter of the type which will send a reply reply data two
or more times if a measurement command is transmitted once
(TOPCON SR-3, Konica Minolta CS-1000, etc.)

Example   PC   Luminance Meter
          Transmit a measurement command.
          "M5" + Delimiter   ⟶

                                              ⟵   Send a reply data.
                                                    "123.45" + Delimiter
                                              ⟵   "678.90" + Delimiter
                                              ⟵   "987.65" + Delimiter
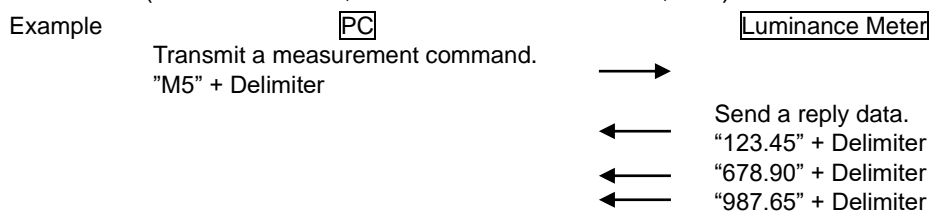
A default name is displayed on the name box.

To change the name of a model, alter it by typing directly in the box.

12-2 Interface

Select an interface for the device you want to register.

Selectable interfaces may vary depending on the devices.

- ♦ Stage-Controller: RS-232C, GPIB, USB or LAN (dependent on models)
- ♦ Measuring Instrument: RS-232C, GPIB or LAN
- ♦ Control Device: RS-232C, GPIB or LAN
- ♦ Luminance Meter: RS-232C, GPIB or LAN
- ♦ External: Cannot choose. (Displayed as External)

12-3 Port

Select a connection for the device you want to register.

Selectable connections may vary depending on interfaces for the devices.

- ♦ RS-232C: COM1 to COM8
- ♦ GPIB: Address0 to Address30
- ♦ USB: ID1 to ID8
- ♦ LAN: LAN1

12-4 - 12-6

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

12-7 Properties button

Click to specify operational settings for a registered device.

Click on the Properties button to display the setting dialog.

Dialogs shown depend on the types of devices or Stage-Controllers.

(1) Measuring Instrument: For an instrument, the Measuring Instrument Settings dialog is
displayed.
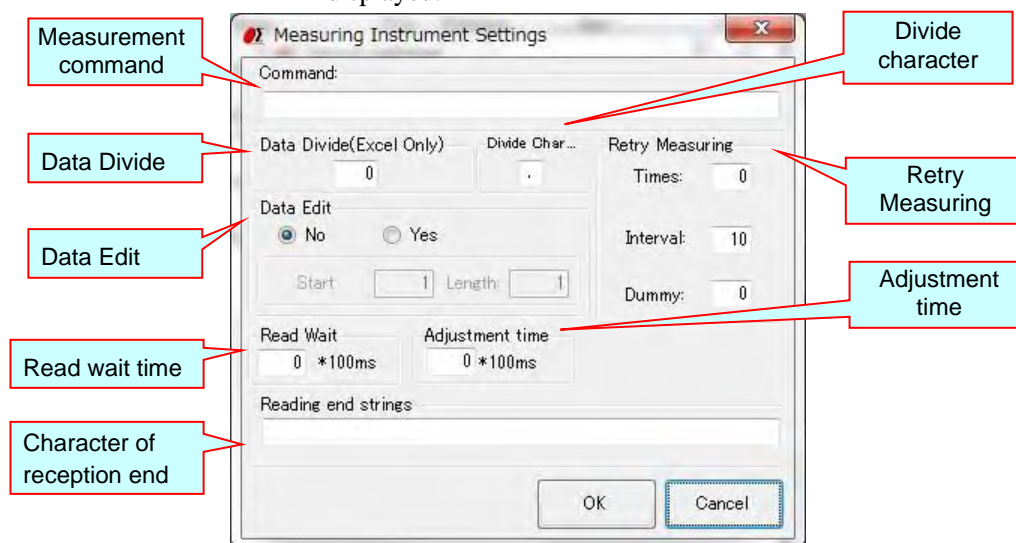
Fig. 5-5 Measurement Instrument Settings dialog

♦ Command

Input a measurement command to send to the instrument.

Instruments must respond to the measurement commands.

(If a device does not respond to a measurement command, SGLCES cannot recognize it as an instrument).

♦ Divide character

If you want to receive response data from a measuring instrument by an Excel file, specify a divide character to divide the data to fill as many number of Excel cells.

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to ",", Dividing number to 3:

	A	B	C
1	X=123	Y=456 Z=789	A=ABC B=DEF

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to " " (space), Dividing number to 3:

	A	B	C
1	X=123, Y=456	Z=789, A=ABC	B=DEF

♦ Data Divide (Excel Only)

If you want to receive response data from a measuring instrument by an Excel file, specify a number to divide the data to fill as many number of Excel cells.

Data is divided by the character specified in the "Divide character".

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 0:

	A	B	C
1	123,456,789		

All the data in a cell.

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 2:

	A	B	C
1	123	456	

First two comma-separated strings fill two Excel cells.

Third and after are discarded.

♦ Data Edit

To output a response from a measuring instrument, edit the return strings with a start position and length specified.

- Example: If a response is "123, 456, 789" with Start Position set to 2, Length to 2:

	A	B	C
1	23		

You can combine the editing and dividing features.

- Example: If a response is "123, 456, 789" with Start Position and Length set to 2 and 2 in Data Edit, and Data Divide to 2:

	A	B	C
1	23	56	

♦ Retry Measuring

Set retry conditions in communication with measuring instruments.

When retry counts are specified in the Times box, communication process is repeated as many times as specified against communication failure before issuing an error.

Interval specifies an interval (in second) between retries.

In the Dummy box, specify the number of dummy communications repeated until reading valid data. This feature is to help receive unstable data.

Assume that Times is set to five, Interval to one, and Dummy to three. The communication is processed as follows:

Repeats 5 times with 1-sec intervals until "Q" TX/RX error has been recovered

Error occurs when "Q:" is sent to Measuring Instrument

Repeats 4 times even after error has been recovered. Discards first 3 RXs, accepts fourth.

♦ Read wait time

Specifies the interval (in 100 milliseconds) of sending of the measurement command to a measuring instrument, and a reception start.

- Example: If a measurement command is "ST" and Read wait time is 30:

Send "ST" to a measuring instrument
↓
Wait for three seconds
↓
Start to receive response data from a Measuring Instrument

* In the usual measuring instrument, although 0 is set as Read wait time, set up a required value according to device or use environment.
* A unit was a second in conventional SGLCES. Please be careful.

♦ Read Character of reception end

When "#READONLY" is specified as the measurement command of a measuring instrument, specify the character string which completes reception.

When it is described as "#READONLY" to a measurement command, the measuring instrument does not perform transmitting processing, but it performs reception processing until it receives the character string specified as the Read Character of reception end.

When the Read Character of reception end is blank, it receives only once (to a delimiter).

- Example: When the reply data returned to a measurement command "MES, 1" is as follows

Transmit "MES, 1" to a   ──────────▶   ・・・・・・・・・・・・・・・・・・・・・・・・・・・①
measuring instrument

           ◀────────── Reply data 1 "OK,123・・"   ・・・・②
           ◀────────── Reply data 2 "OK"   ・・・・③

In the case so that ② and ③ may be returned as a reply of a result to measurement command ①, in processing of the usual measuring instrument, only ② is receivable as a result of ①. However, if the measuring instrument for reception is registered, the measurement command is set up with "#READONLY" and the reply data 2 is set as the Read Character of reception end, ③ can be processed after processing of ① and ②.

Device Name	Interface	Port	Status	
Measuring[MES,1]	RS232C	COM1	OK	← For ①②
Measuring[READ]	RS232C	COM1	OK	← For ③

Measuring Instrument Settings (left)

Command: MES,1

Data.Divide(Excel Only): 0   Divide Char...: ,
Retry Measuring — Times: 0

Data Edit: ● No ○ Yes   Interval: 10
Start Position: 1   Length: 1   Dummy: 0

Character of reception end (only when command is #READONLY)

Read Wait: 0 s   Adjustment time: 0 s   OK   Cancel

Measuring Instrument Settings (right)

Command: #READONLY

Data.Divide(Excel Only): 0   Divide Char...: ,
Retry Measuring — Times: 0

Data Edit: ● No ○ Yes   Interval: 10
Start Position: 1   Length: 1   Dummy: 0

Character of reception end (only when command is #READONLY): OK

Read Wait: 0 s   Adjustment time: 0 s   OK   Cancel

* "#READONLY" is not used in the usual measurement (processing which returns one result to one measurement command. In transmission and reception, 1 to 1 processes.). When you perform measurement like processing which returns two or more results to one measurement command, please set it up if needed.

♦ Adjustment time

Specify the waiting time (in 100 milliseconds) before transmitting a measurement command to a measuring instrument.

- Example: If a measurement command is "ST" and Adjustment time is 30:
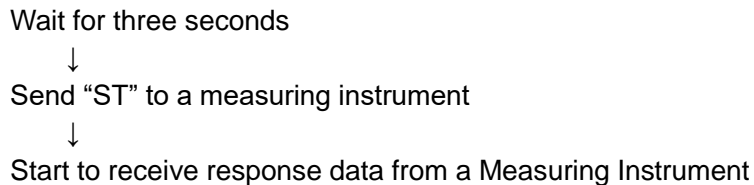
Wait for three seconds
    ↓
Send "ST" to a measuring instrument
    ↓
Start to receive response data from a Measuring Instrument

* In the usual measuring instrument, although 0 is set as Adjustment time, set up a required value according to device or use environment.
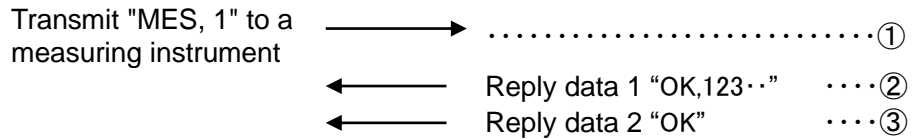* A unit was a second in conventional SGLCES. Please be careful.

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(2) Control Device: For a Control Device, Control Device Settings dialog is displayed.
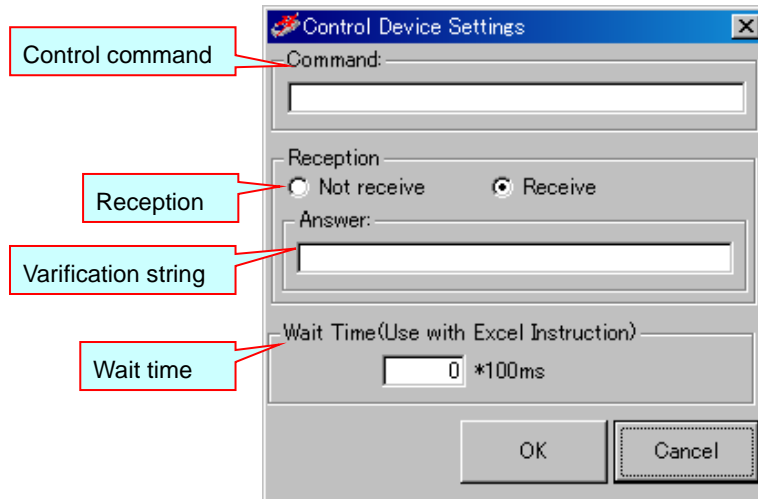
Fig. 5-6 Control Device Settings dialog

♦ Command

    Input the control command which transmits to a control device by program instruction measurement.

    A setup here is unnecessary in order to describe control command to an instruction file in Excel instruction measurement.

♦ Reception

    Choose whether it receives or not after transmitting control command to a control device.

♦ Answer

    When you check whether it is equal to the character strings specified by the Answer which performed reception and received from the control device, input strings.

    SGLCES compares the Answer with returned strings. If they do not match, a communication error will occur.

    Do not input, when you do not check the character string which received.

♦ Wait Time (Use with Excel Instruction)

    Input wait time, if it is used for controlling purposes in Excel Instruction mode. Unavailable to Program Instruction mode.

    Control instruction is transmitted to a control device, when performing reception processing, it receives, and it stands by between the specified wait times after that.

(3) Stage-Controller

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

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(4) Luminance Meter: For a Luminance Meter , the Luminance Meter Settings dialog is displayed.

① Normal Type
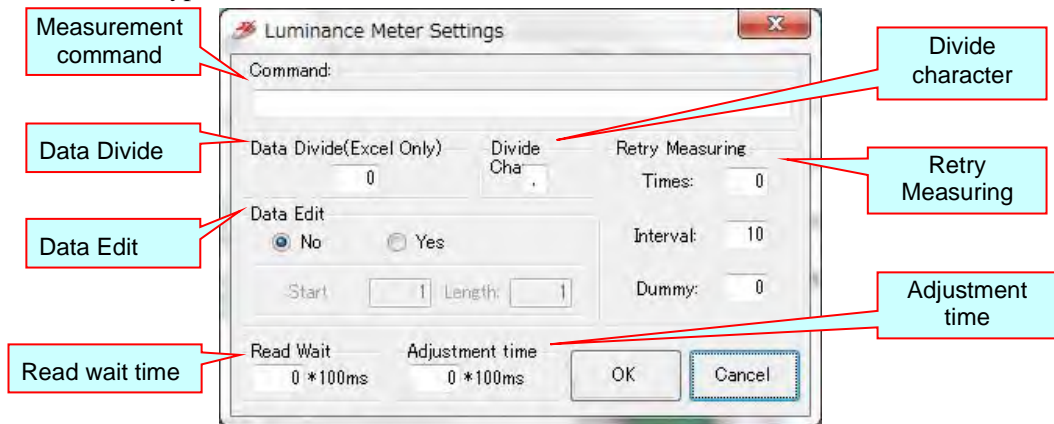
Fig. 5-7 Dialog for Luminance Meter settings (Normal Type)

♦ Command

Input a measurement command to send to the luminance meter.

The luminance meter must respond to the measurement commands.

(If a device does not respond to a measurement command, software cannot recognize it as a luminance meter).

♦ Divide character

If you want to receive response data from a luminance meter by an Excel file, specify a divide character to divide the data to fill as many number of Excel cells.

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to ",", Dividing number to 3:

	A	B	C
1	X=123	Y=456 Z=789	A=ABC B=DEF

- Example: If a response is "X=123,Y=456 Z=789,A=ABC B=DEF" with Divide character set to " " (space), Dividing number to 3:

	A	B	C
1	X=123, Y=456	Z=789, A=ABC	B=DEF

127

♦ Data Divide (Excel Only)

If you want to receive response data from a luminance meter <u>by an Excel file</u>, specify a number to divide the data to fill as many number of Excel cells.

Data is divided by the character specified in the "Divide character".

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 0:

	A	B	C
1	123,456,789		

All the data in a cell.

- Example: If a response is "123,456,789" with Divide character set to ",", Dividing number to 2:

	A	B	C
1	123	456	

First two comma-separated strings fill two Excel cells.

Third and after are discarded.

♦ Data Edit

To output a response from a luminance meter, edit the return strings with a start position and length specified.

- Example: If a response is "123, 456, 789" with Start Position set to 2, Length to 2:

	A	B	C
1	23		

You can combine the editing and dividing features.

- Example: If a response is "123, 456, 789" with Start Position and Length set to 2 and 2 in Data Edit, and Data Divide to 2:

	A	B	C
1	23	56	

♦ Retry Measuring

Set retry conditions in communication with luminance meters.

When retry counts are specified in the Times box, communication process is repeated as many times as specified against communication failure before issuing an error.

Interval specifies an interval (in second) between retries.

In the Dummy box, specify the number of dummy communications repeated until reading valid data. This feature is to help receive unstable data.

Assume that Times is set to five, Interval to one, and Dummy to three. The communication is processed as follows:

Repeats 5 times with 1-sec intervals until "Q" TX/RX error has been recovered

Error occurs when "Q:" is sent to Measuring Instrument

Repeats 4 times even after error has been recovered. Discards first 3 RXs, accepts fourth.

♦ Read wait time

Specifies the interval (in 100 milliseconds) of sending of the measurement command to a luminance meter, and a reception start.

- Example: If a measurement command is "ST" and Read wait time is 30:

Send "ST" to a luminance meter

↓

Wait for three seconds

↓

Start to receive response data from a luminance meter

* In the usual luminance meter, although 0 is set as Read wait time, set up a required value according to device or use environment.
* A unit was a second in conventional SGLCES. Please be careful.

♦ Adjustment time

Specify the waiting time (in 100 milliseconds) before transmitting a measurement command to a luminance meter.

- Example: If a measurement command is "ST" and Adjustment time is 30:

Wait for three seconds

↓

Send "ST" to a luminance meter

↓

Start to receive response data from a luminance meter

* In the usual luminance meter, although 0 is set as Adjustment time, set up a required value according to device or use environment.
* A unit was a second in conventional SGLCES. Please be careful.
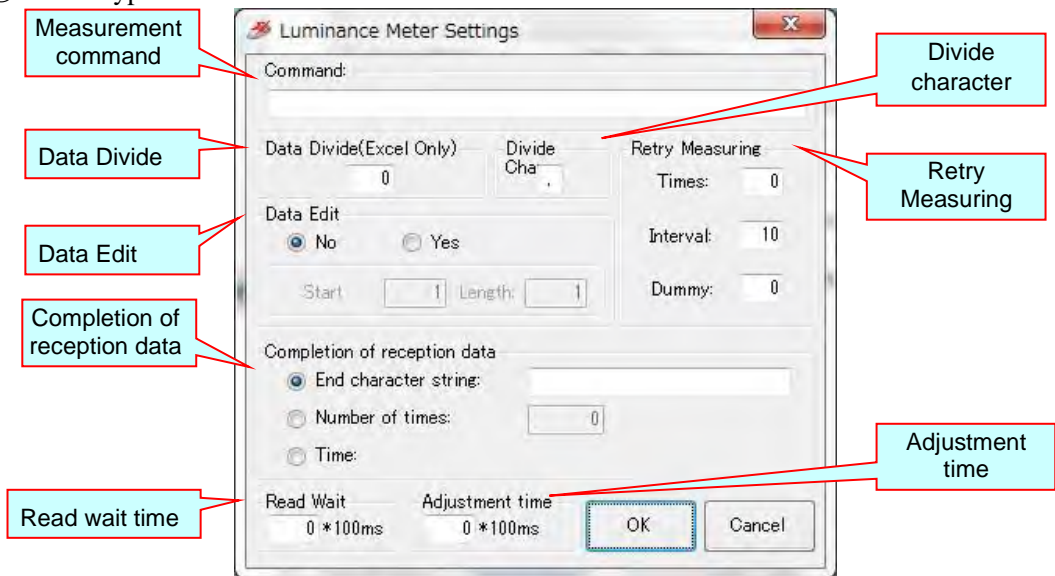
② Multi Type

Fig. 5-8 Dialog for Luminance Meter settings (Multi Type)

♦ Command

♦ Divide character

♦ Data Divide (Excel Only)

♦ Data Edit   Same as ① Normal Type

♦ Retry Measuring

♦ Read wait time

♦ Adjustment time

♦ Completion of reception data

Since the luminance meter of Multi Type will send a reply data two or more times if a measurement command is transmitted, specify the method for receiving the whole of the reply data.

There are 3 types of the receiving method. Choose the type suitable for the luminance meter to be used.

・End character string

Reception processing is repeated until it receives the specified character string.

Input into the right-hand side character string input column the character string answered by the last from a luminance meter.

Example:

PC   Luminance Meter
Measurement
command
transmission
"ST" +Delimiter

Data reply
"123.45" +Delimiter
"678.90" + Delimiter
"987.65" + Delimiter
"END" + Delimiter
↑
End of data

In the case of such a luminance meter,
as shown in the right figure, set up.

Luminance Meter Settings

Command:
ST

Data Divide(Excel Only)   Divide Cha-   Retry Measuring
0   .   Times: 0

Data Edit
◉ No   ○ Yes   Interval: 10

Start   1 Length: 1   Dummy: 0

Completion of reception data
◉ End character string: END
○ Number of times: 0
○ Time:

Read Wait   Adjustment time
0 *100ms   0 *100ms   OK   Cancel
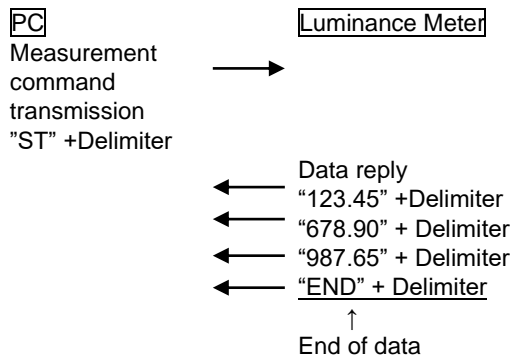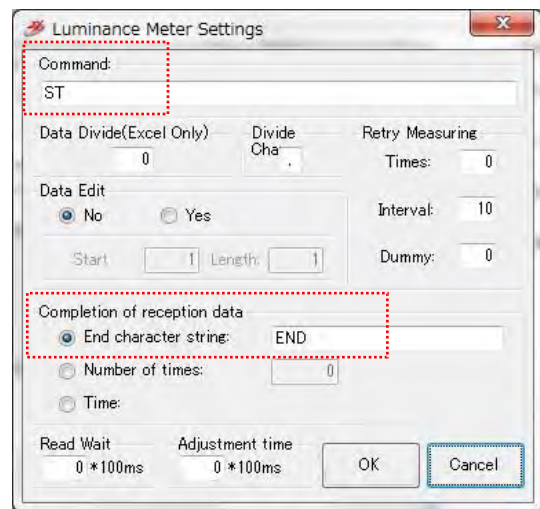
・Number of times

The specified number-of-times part reception processing is repeated.

Input into the right-hand side number-of-times input column the number of times which repeats reception.

Specify this, when it is known how many times reply data will be sent from a luminance meter.

Example:

PC	Luminance Meter
Measurement command transmission "M8" +Delimiter	→

Data reply
"0000," + Delimiter
"678.90" + Delimiter
⋮
"987.65" + Delimiter
} 257 times

In the case of such a luminance meter, as shown in the right figure, set up.
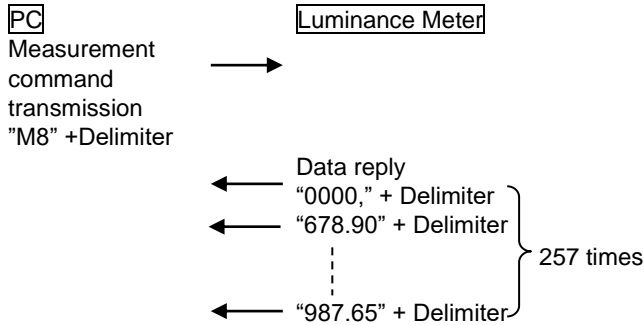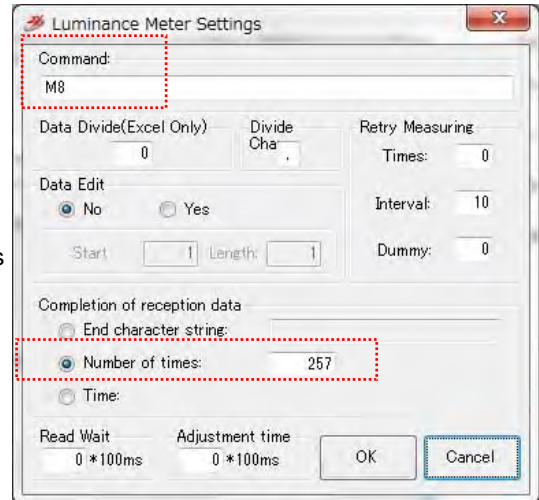
Luminance Meter Settings

Command:
M8

Data Divide(Excel Only)   Divide Cha .   Retry Measuring
0   Times: 0

Data Edit
● No   ○ Yes   Interval: 10

Start   1   Length: 1   Dummy: 0

Completion of reception data
○ End character string:
● Number of times: 257
○ Time:

Read Wait   Adjustment time
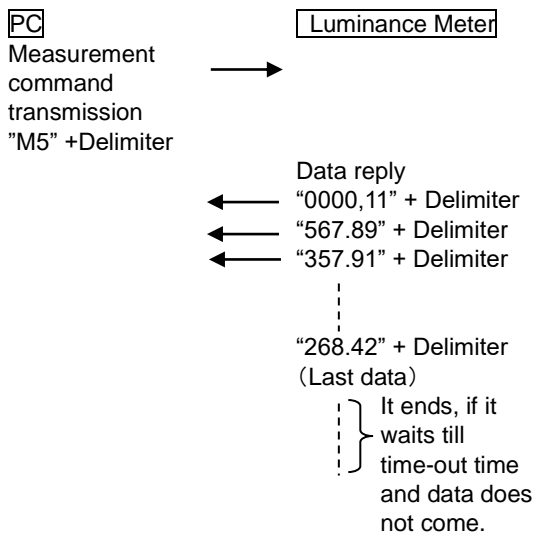0 *100ms   0 *100ms   OK   Cancel

---

・Time

Reception processing is repeated until the reply data from a luminance meter is no longer answered and it becomes a communication time-out by reception processing.

Time-out time is specified on a "communication setting" dialog.

Specify this, when not knowing how many times reply data will be sent from a luminance meter, or when there is no trailing character.

Example:

PC	Luminance Meter
Measurement command transmission "M5" +Delimiter	→

Data reply
"0000,11" + Delimiter
"567.89" + Delimiter
"357.91" + Delimiter
⋮
"268.42" + Delimiter
（Last data）
} It ends, if it waits till time-out time and data does not come.

In the case of such a luminance meter, as shown in the right figure, set up.

Luminance Meter Settings

Command:
M5

Data Divide(Excel Only)   Divide Cha .   Retry Measuring
0   Times: 0

Data Edit
● No   ○ Yes   Interval: 10

Start   1   Length: 1   Dummy: 0

Completion of reception data
○ End character string:
○ Number of times: 0
● Time:

Read Wait   Adjustment time
0 *100ms   0 *100ms   OK   Cancel

<u>※About "Read Wait" and "Communication time-out"</u>
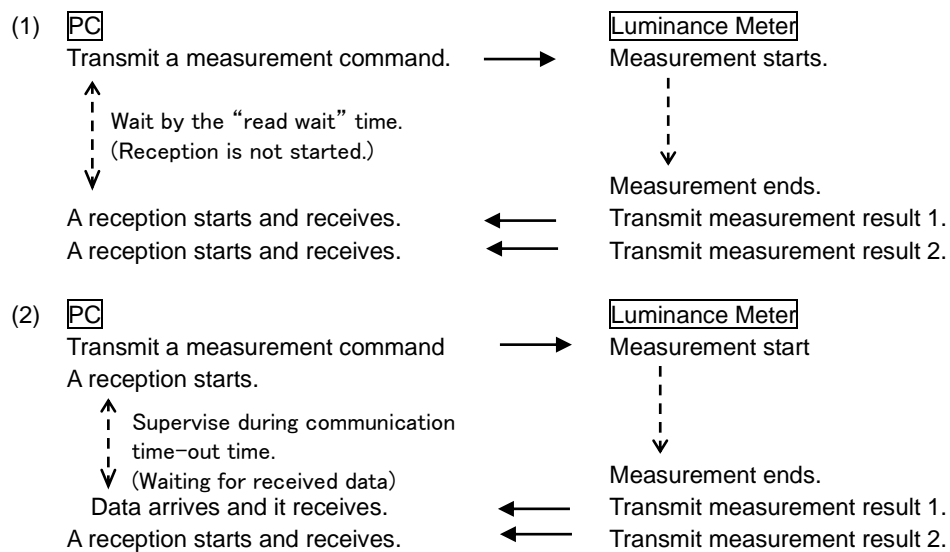
If time is taken after transmitting a measurement command to a luminance meter before the first reply data is answered, it is necessary to set the "read wait" time or "communication time-out" time as sufficient length. Adjust these setup according to the specification and the measurement conditions of a luminance meter.

(1) When the "read wait" time is set up for a long time

After certainly waiting for the set-up time after transmitting a measurement command, reception of the first reply data is started. Even if the first reply data arrives earlier than the "read wait" time, reception is not started until the "read wait" time passes.

(2) When the "read wait" time was set as 0 second and "communication time-out" time is set up for a long time

Reception of the first reply data is started immediately after transmitting a measurement command. Reception is supervised during "communication time-out" time, and if reply data reaches within a time, it will receive immediately. When "Time" is chosen by a "Completion of reception data", since it waits for reception until it becomes a communication time-out, the reception after receiving the last reply data requires the time set as communication time-out time.

(1) PC   Luminance Meter
    Transmit a measurement command.   ⟶   Measurement starts.

        ↑   Wait by the "read wait" time.
        ┊   (Reception is not started.)
        ↓   Measurement ends.

    A reception starts and receives.   ⟵   Transmit measurement result 1.
    A reception starts and receives.   ⟵   Transmit measurement result 2.

(2) PC   Luminance Meter
    Transmit a measurement command   ⟶   Measurement start
    A reception starts.

        ↑   Supervise during communication
        ┊   time-out time.
        ↓   (Waiting for received data)   Measurement ends.
    Data arrives and it receives.   ⟵   Transmit measurement result 1.
    A reception starts and receives.   ⟵   Transmit measurement result 2.

13 - **17**

It is similar to "SGADVANCE" mode time. Please refer to a 3.1 "Device Register Dialog ".

5.2   Program Instruction Dialog

It is similar to "SGADVANCE" mode time. Please refer to a 3.2 "Program Instruction Dialog".

5.3   Excel Instruction Dialog

It is similar to "SGADVANCE" mode time. Please refer to a 3.3 "Excel Instruction Dialog".

5.4   Terminal Instruction Dialog

It is similar to "SGADVANCE" mode time. Please refer to a 3.4 "Terminal Instruction Dialog".

6. Functions (SGADVANCE +PLUS mode)

This section describes the functions in the "SGADVANCE +PLUS" mode.

It is similar to "SGADVANCE" mode in the whole, but there is a different part partly.

In the "SGADVANCE +PLUS" mode, it supports Program Instruction and Excel Instruction measuring and Terminal Instruction measuring modes.

♦ Program Instruction

Run measurement by using the Program Instruction dialog.

There are two modes in the Program Instruction.

・Auto measure : Normal measurement

・Auto measure-Multi : The measurement which two or more controllers are interlocked and controls them

♦ Excel Instruction

Run measurement by following descriptions in an Excel instruction sheet.

♦ Terminal Instruction

Communicate with various devices by following descriptions in an Excel instruction sheet.

6.1　　　　Measurement in Program Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.1 "Measurement in Program Instruction Mode".

* You cannot use the external device in a program instructions measurement.

6.2　　　　Measurement Example in Program Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.2 "Measurement Example in Program Instruction Mode".

6.3　　　　Measurement in Excel Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.3 "Measurement in Excel Instruction Mode".

* For the description method of the control order to external device, Please refer to a 6.8 "Excel instruction measurement which uses external device".

6.4　　　　Measurement Example in Excel Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.4 "Measurement Example in Excel Instruction Mode".

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6.5　　　　Measurement in Terminal Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.5 "Measurement in Terminal Instruction Mode".

6.6　　　　Measurement Example in Terminal Instruction Mode

It is similar to "SGADVANCE" mode time. Please refer to a 4.6 "Measurement Example in Terminal Instruction Mode".

6.7　　　　Measurement Example in Excel Instruction Mode at the time of binary mode communication

The following descriptions are dedicated to measurement examples in Excel Instruction mode at the time of binary mode communication.

Devices:	A Stage-Controller SHOT-304GS, two motorized stages (X and Y-axis) and Measuring Instrument
Measurement:	Move X and Y-stage in specified amounts then conduct measurement at each moving points (measurement points).
Conditions:	Assign COM1 (RS-232C) to SHOT-304GS and COM2 (RS-232C) to the Measuring Instrument. The Measuring Instrument communicates by a binary mode.
	The measurement command of The Measuring Instrument is "02 03 35 10 26" (hexadecimal). If transmitting it, the instrument will return measurement results. 1 byte of the last of a measurement result is unfixed.

PC　　　　　　SHOT-304GS　　　　Motorized stage (X,Y)
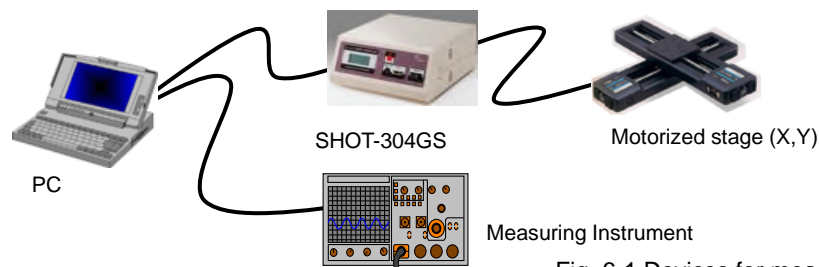
Measuring Instrument

Fig. 6-1 Devices for measurement

(1) Register Devices

Add the Stage-Controllers and Measuring Instrument in the Device Register dialog (See "3.1 Device Register Dialog" for the details of the registration).

Device Name	Interface	Port	Status
Stage-Controller	Unknown	Unknown	Disable
Measuring Instrument	Unknown	Unknown	Disable

Fig. 6-2 Adding device

(2) Set Conditions for Devices

 Enable the added devices by setting communication and operation conditions, and verify the communication with the devices. (See "3.1 Device Register Dialog" for the details of the settings).
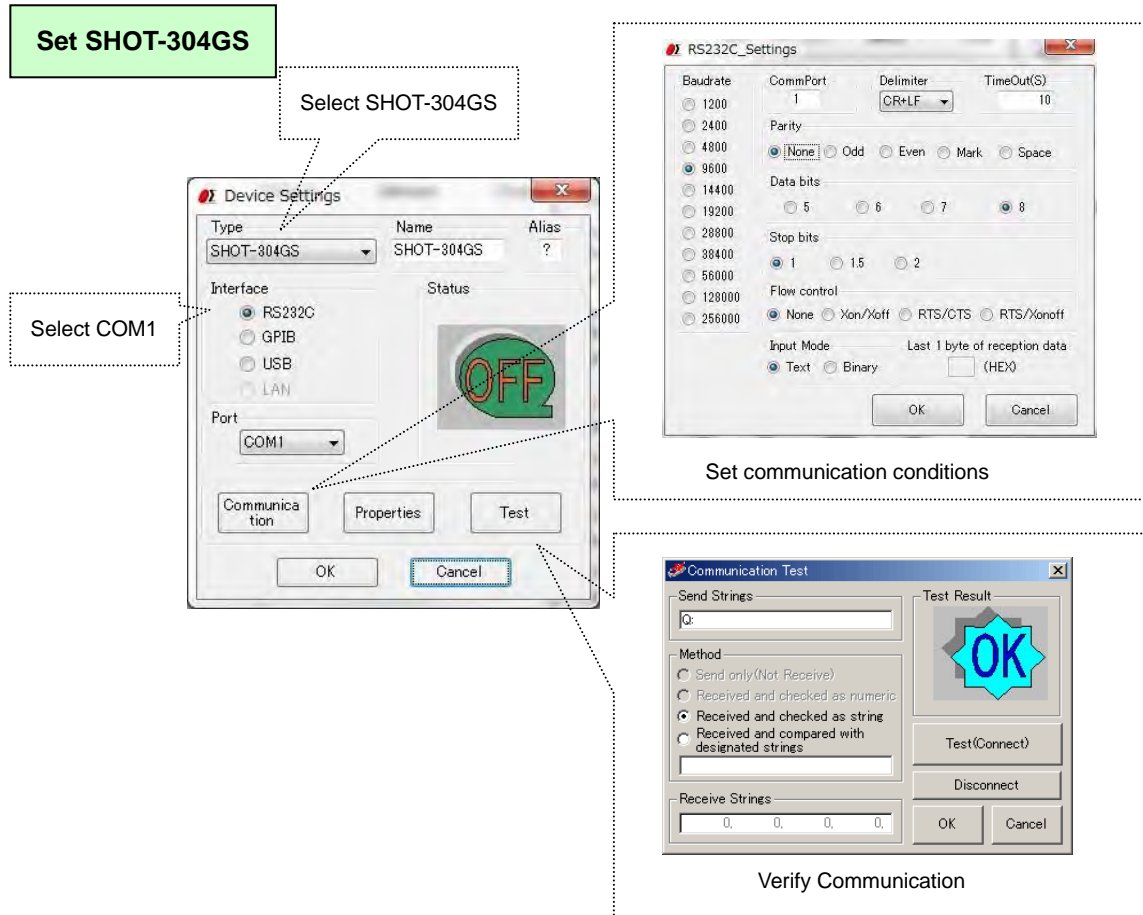

Set communication conditions

Verify Communication

Fig. 6-3 Settings for Mark-204

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Set communication conditions

Select

Select COM2

Since it is unfixed, make it a blank.

Verify communication
(Make Send Strings into a blank and check only opening of a port.)

Input a measurement command in hexadecimals.

Command "0203351026" is an example.
Actually follow the specification of the measuring instrument used.

Fig. 6-4 Settings for Measuring Instrument

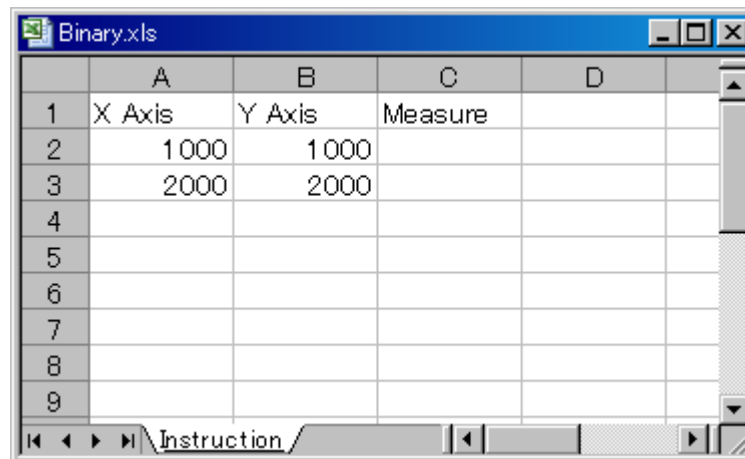When the settings finish, check if the device is connected in the Device Register dialog.

Fig. 6-5 Device status

(3) Create Instruction Files

Create an instruction file as described in figure 6-6.
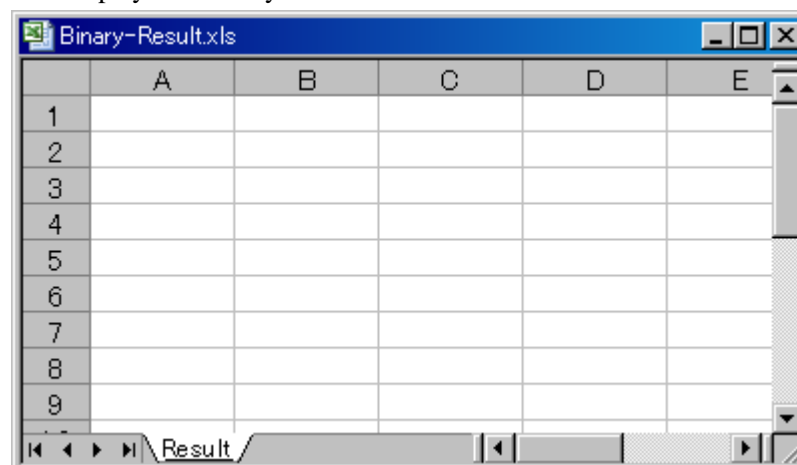
Fig. 6-6 Binary.xls

Moreover, also create the output file by Excel.

Since measurement data will be outputted to the sheet of the name of "Result" if it measures, the sheet of the name of "Result" is prepared for this file. Moreover, a display format is set as a "Text" by "Format Cells" of this sheet. This is for displaying correctly the measurement data written in hexadecimals on the cell of Excel. When the display format of a cell is not a "Text", it may not be displayed correctly.

Fig. 6-7 Binary-Result.xls

(4) Settings in Excel Instruction Dialog

Set the Excel Instruction dialog as shown in figure 6-8.

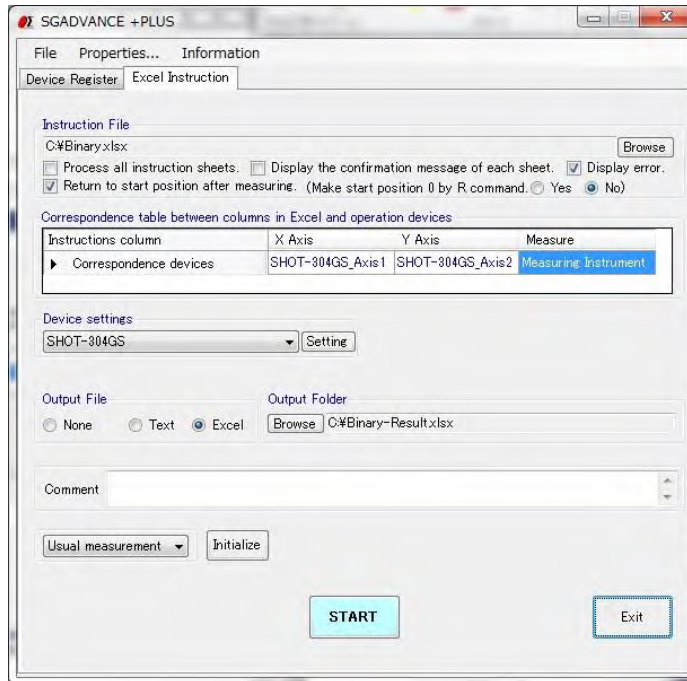(See "3.3 Excel Instruction Dialog" for the details of the settings).

Fig. 6-8 Excel Instruction dialog

(5) Start Measurement

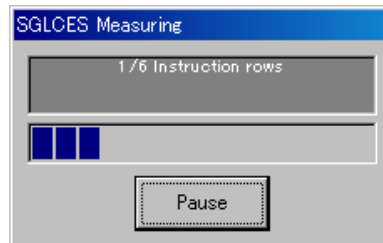Click on the START button to start measurement.

Fig. 6-9 Measurement progress display

(6) Result Output

The measurement results are output to the destination.

Fig. 6-10 Measurement results

6.8　Excel instruction measurement which uses external device

External device is device for control by which the user of SGLCES[*1] creates the control method of device to DLL (dynamic link library) beforehand. (This is device which does not read data.)

DLL is a file separate from a SGLCES main part program.

By the user's creating DLL according to the control method of the external device to be used, and describing the function call command in DLL to an Excel instruction file, the function in DLL can be called at the time of Excel instruction measurement execution, and device can be controlled.

For example, when controlling an I/O signal from a personal computer to the exterior, the control methods of an I/O signal differ for every board maker. However, it can respond freely on a user side, without converting a main part program (SGLCES) by including these processings in DLL.

The DLL name for external device control used by SGLCES (Ver.2.0.0 or later) is **SGOUT.DLL**. This DLL is distributed to the system folder of Windows at the time of installation of SGLCES. In addition, SGOUT.DLL distributed is a form and the contents of control of concrete device are not contained. When the external device to be used was changed or the contents of processing are changed also the same device, if a user changes SGOUT.DLL and redistributes to a system folder, it can respond without changing a SGLCES main part program.

In addition, VisualBasic.NET of Microsoft is required for creation of SGOUT.DLL.

*1: We call SGADVANCE+PLUS (start mode of SGADVANCE) as SGLCE.
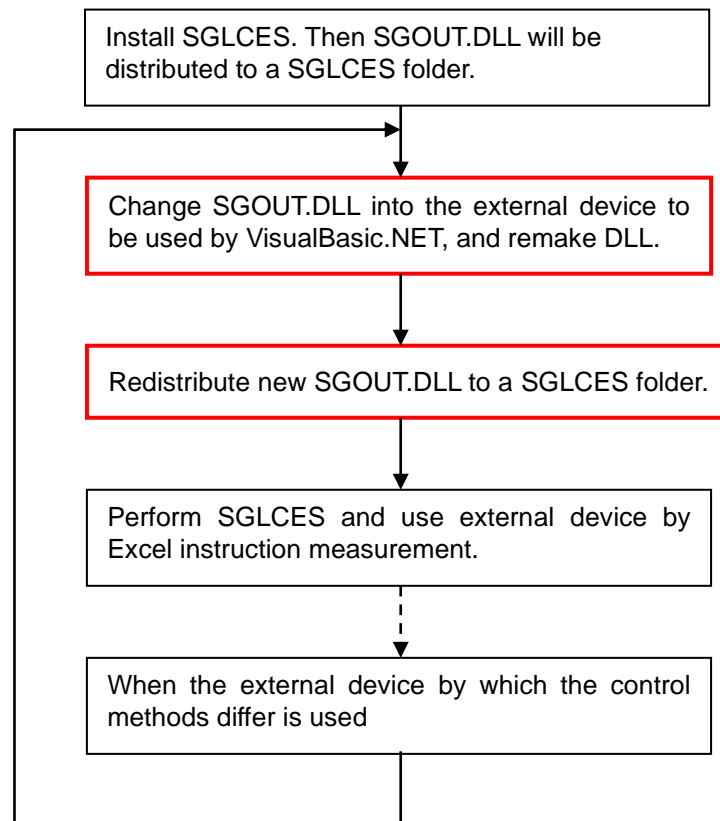
1.　Work Flow

Fig. 6-11 Work Flow

2. SGOUT.DLL

SGOUT.DLL is DLL for performing control processing according to the external device to be used. User can change it freely.

However, the function called from a SGLCES is decided. The other function cannot be called from SGLCES.

The function called from SGLCES is 100 of SGOUT_001() - SGOUT_100 ().

In Excel instruction measurement of SGLCES, the function of SGOUT_001() - SGOUT_100 () can be called by describing a DLL call command to an instruction file.

Please refer to "5. DLL call method in Excel instruction measurement" about a DLL call command.

Excel instruction file

External device	Measure
DLL001,10,1000	

The function in SGOUT.DLL is called and performed by the DLL call command described by the Excel instruction file.

SGOUT.DLL
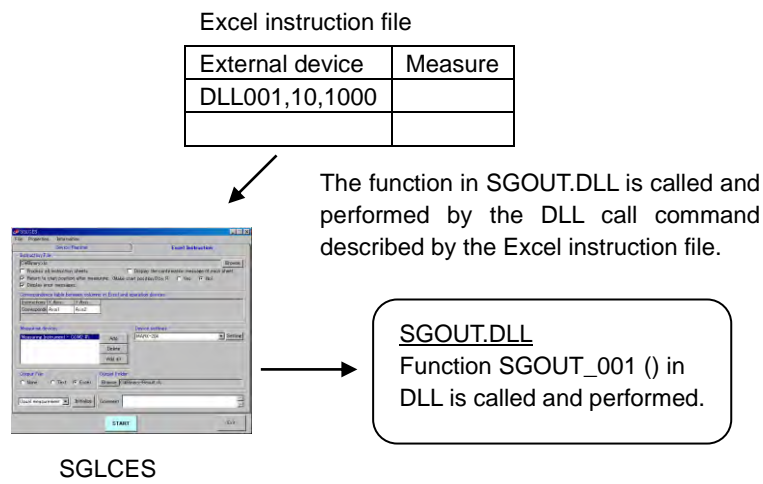Function SGOUT_001 () in DLL is called and performed.

SGLCES

Fig. 6-12 Call of SGOUT.DLL

The number of the argument and data type of these functions, and the data type of a return value are common.

[Form of a function]

        SGOUT_***(var01 As Variant, Optional var02 As Variant,
                Optional var03 As Variant, Optional var04 As Variant,
                Optional var05 As Variant, Optional var06 As Variant,
                Optional var07 As Variant, Optional var08 As Variant,
                Optional var09 As Variant , Optional var10 As Variant) As Boolean

    Argument   var01 - var10   Variant type（var02 - var10 are omissible.）

    Return value   Boolean type   True: Normal   False: Abnormal

                    When a return value is False, it considers that the SGLCES had abnormalities

                    in the function call, and an error occurs in Excel instruction measurement.

        The number of 001-100 goes into the *** portion of function name SGOUT_***().

The Private function used inside DLL in addition to these functions can be created freely.

These functions can be used from the function of SGOUT_001() - SGOUT_100 ().

3. Change Method of SGOUT.DLL

(1) Copy the file for SGOUT.DLL creation to the arbitrary folders of a personal computer which does the change work of SGOUT.DLL.

The file for SGOUT.DLL creation is contained in ¥Sample¥DLL¥SGOUT¥program folder in the folder which installed SGLCES.

(Usually, C:¥Program Files¥ SIGMA-KOKI¥SGLCES¥Sample¥DLL¥SGOUT¥program folder)

(2) Double-click SGOUT.sln in a Program folder and open it by VisualBasic.NET.

bin	2012/07/30 14:53
My Project	2012/07/30 14:53
obj	2012/07/30 14:53
ClassSGOUT.vb	2012/07/02 14:38
SGOUT.sln	2012/07/02 14:37
SGOUT.suo	2012/07/19 13:44
SGOUT.vbproj	2012/07/02 14:38
SGOUT.vbproj.user	2012/07/02 14:37

Fig. 6-13 SGOUT.sin

(3) Open ClassSGOUT.vb and edit the contents.

(4) Build and end VisualBasic.NET.

(5) Copy new SGOUT.dll in a ¥Program¥bin¥Release folder to the folder which installed SGLCES.
(Usually, C:¥Program Files¥ SIGMA-KOKI¥SGLCES folder)

4. Notes at the time of SGOUT.DLL creation

(1) Create SGOUT.DLL by VisualBasic.NET

(2) At the time of edit of ClassSGOUT.vb, when the existing function needs change of a function name and to be deleted, the original function name is kept left behind and please empty the contents of processing of a function.

5. DLL call method in Excel instruction measurement

In order to call DLL and to control external device at the time of Excel instruction measurement execution, the DLL call command described in the column for external device of an Excel instruction file was added. By describing this command to an Excel instruction file, the external device by DLL call is controllable.

(1) DLL call command

Command	Explanation	
DLL001 ～ DLL100	[Function]	The call of DLL for external device control
	[Form]	DLLnnn, Parameter1, Parameter2, ・・・ Parameter10 ┗━━ Specify the number of 001-100 as nnn of a command name, and specify the function in SGOUT.DLL to call. If a number is 001, function SGOUT_001 () will be called. If a number becomes 100, function SGOUT_100 () will be called. Parameter1～10・・・The argument passed to the function to call (Specification is possible to ten pieces. It is omissible after a parameter 2.)
	[Example]	DLL001, 1, 258048 ・・・The SGOUT_001 () function of SGOUT.DLL is called, 1 is passed to the 1st argument and 258048 is passed to the 2nd argument.

(2) The example of an Excel instruction file

Fig. 6-14 The example of an Excel instruction file

Explanation of the example of a directions file

	Controller Axis1	External Device	Measure
①	Return to mechanical origin	Since it is blank, nothing is performed.	Not measure
②	Move to 1000.	Function SGOUT_001 () in SGOUT.DLL is called, 500 is passed to the 1st argument and aaa is passed to the 2nd argument.	Measure
③	Move to 2000.	Function SGOUT_005 () in SGOUT.DLL is called, 200 is passed to the 1st argument and 300 is passed to the 2nd argument and 400 is passed to the 3rd argument.	Measure