SGTERM Users Manual

SGTERM　Ver. 6.07

SIGMA KOKI Co., Ltd.

Technology Center

• Introduction

This user's manual describes the specifications and operations of SGTERM.
Please read this guide 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 manual 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 XP/Vista
- Excel 97 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.

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

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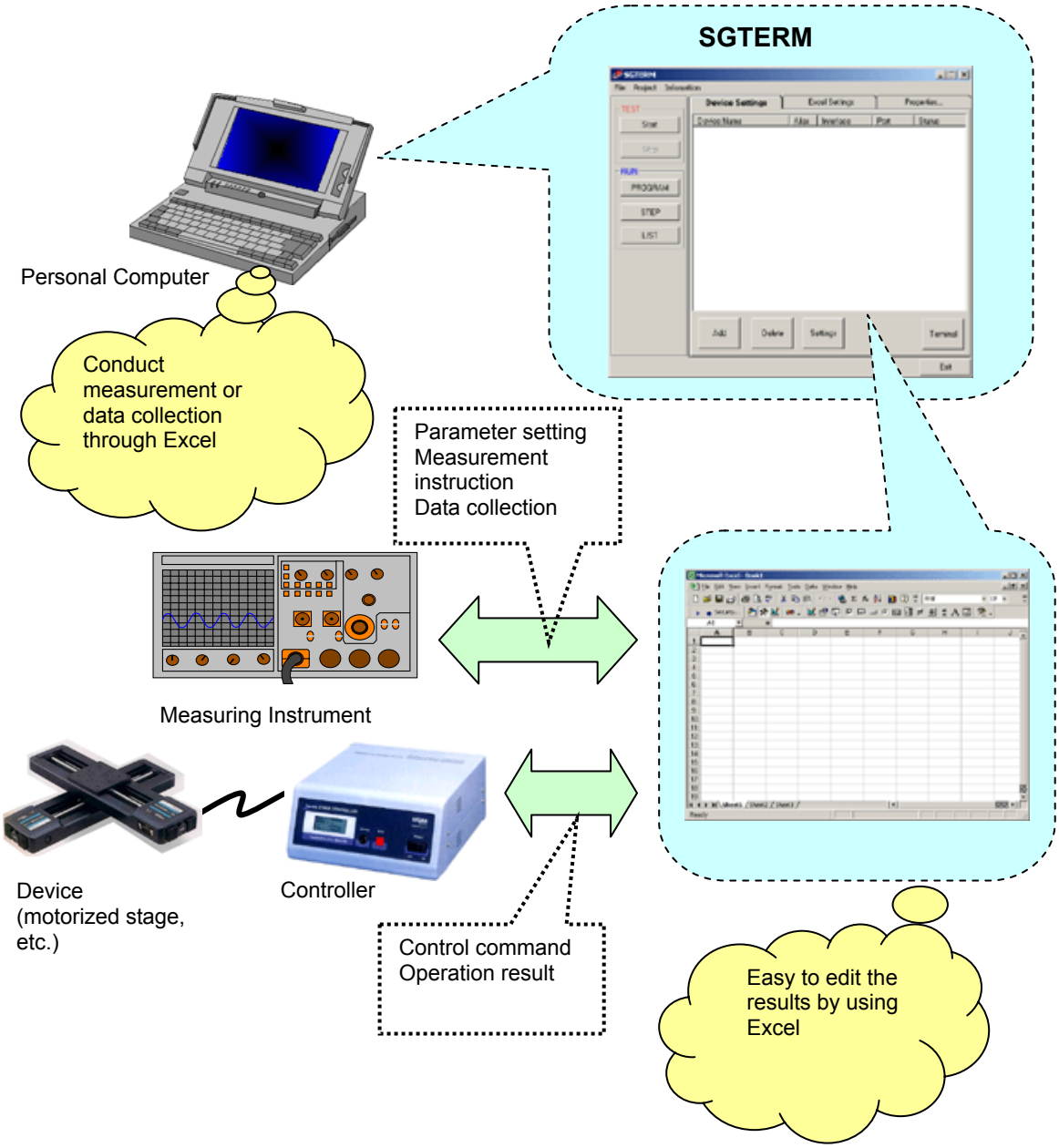
1. Overview

SGTERM is the software for measurement and control using Microsoft Excel, and able to collect data from machine controllers and measurement devices through the application.



By transmitting/receiving the contents of the specified Excel worksheet to/from devices connected to PC through various interfaces, SGTERM can control device movement commands and collect device data from Excel worksheets. Since the results of operations are saved to Excel files, you can use them for a variety of measurement and control purposes with features offered by the Excel program.

1. 1 Main Features

- As most functions can be designated on Excel worksheets, even if you have only basic knowledge on Excel, you can control devices connected through RS232C, GPIB or USB, or conduct measurement through the same interfaces.

- Saving control/measurement results to an independent Excel worksheet/workbook realizes easy processing of the data.

- 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.)

- 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 and Excel format file names in SGE files, which allows you to repeat the same process without difficulty. Moreover, you can list multiple SGE files and run them continuously in the order of listing.

- Step Run, which enables you to run or skip each cell on an Excel sheet, is supported as well as the normal operations.

- SGTERM allows you to send/receive commands through interfaces directly with open terminal windows. This let you check operational status during command entries. In addition, SGTERM supports multiple opening of windows, allowing the simultaneous running of several devices easily without restarting the application.

2. Installation

To use SGTERM in applications, SGTERM needs to be installed.

The Installation procedure is described below.

When actually installing SGTERM, follow the steps (1) to (7) described below:

2.1 Installing SGTERM

(1) Running Setup.exe

Insert the CD-ROM into the CD-ROM drive. The installer runs automatically.

If it does not automatically run, double click Setup.exe in the CD-ROM to start.

(2) Starting setup process

After starting Setup.exe, the SGTERM installation screen appears.

To continue the installation, click the Next button. To cancel, click the Cancel button.

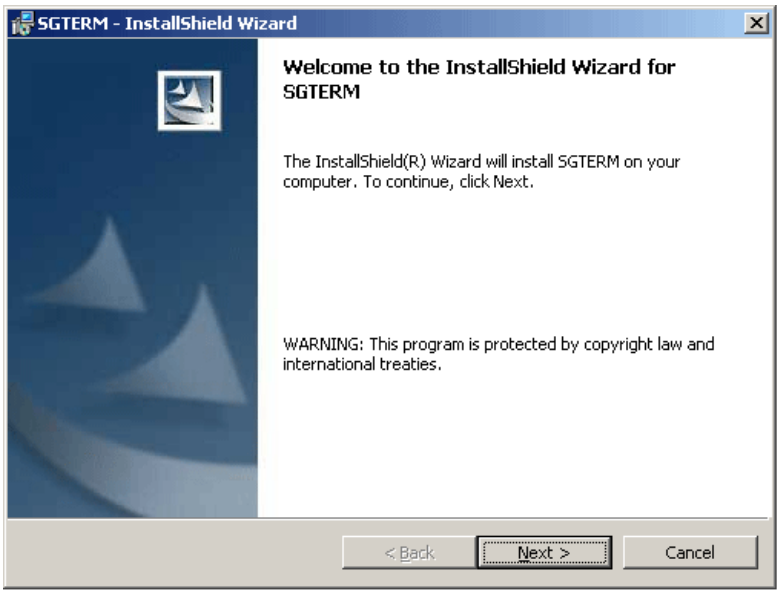


Fig. 2-1 Installation wizard

(3) Setting 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.

(This window may not appear depending on the type of installation.)

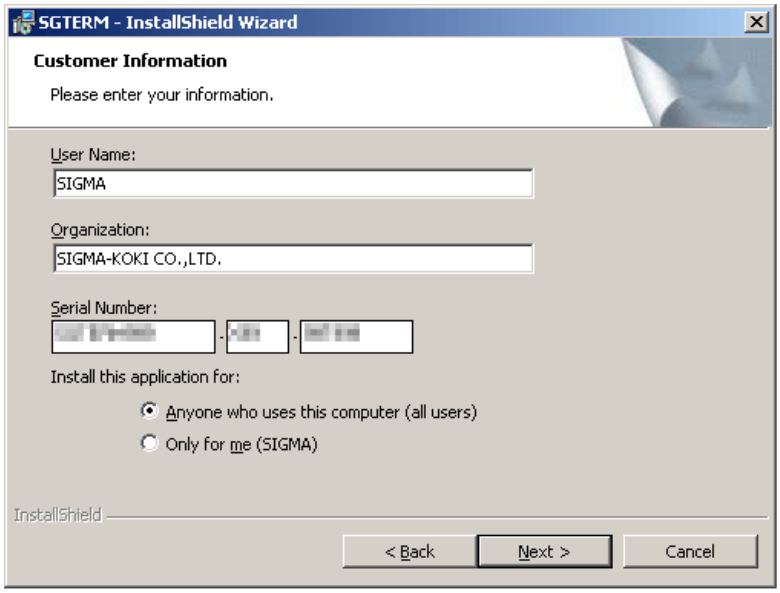


Fig. 2-2 Customer information window

(4) Selecting destination folder

Select the destination folder. To install to the default folder, click the Next button. To install a different folder, click the Change button and select a desired destination on the displayed dialog.

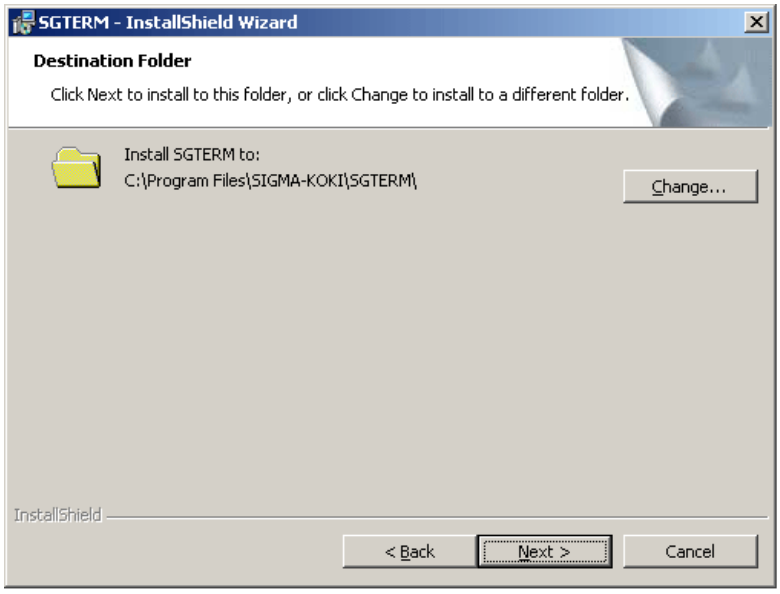


Fig. 2-3 Selecting destination folder

(5) Selecting setup type

Choose a setup type. To continue, click the Next button. To cancel, click the Cancel button ("Typical" is recommended for normal use.)

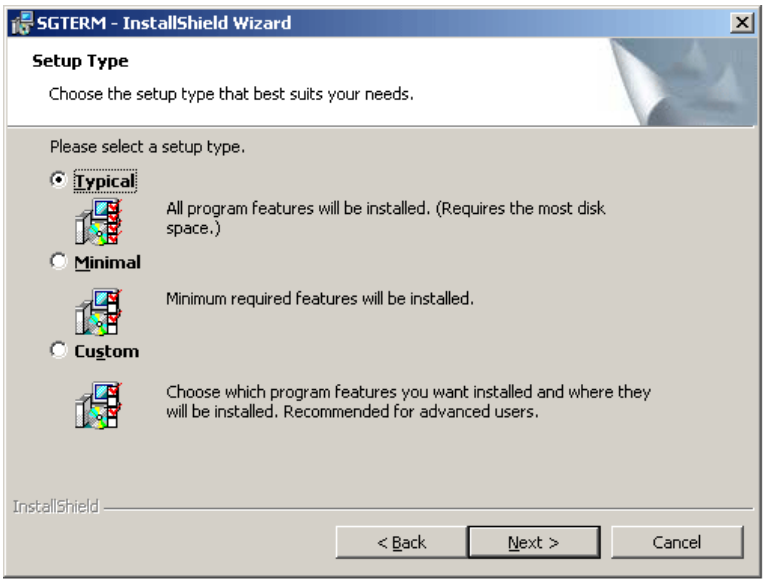


Fig. 2-4 Setup type window

(6) Start copying files

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

Clicking the Installation button begins the installation of SGTERM.

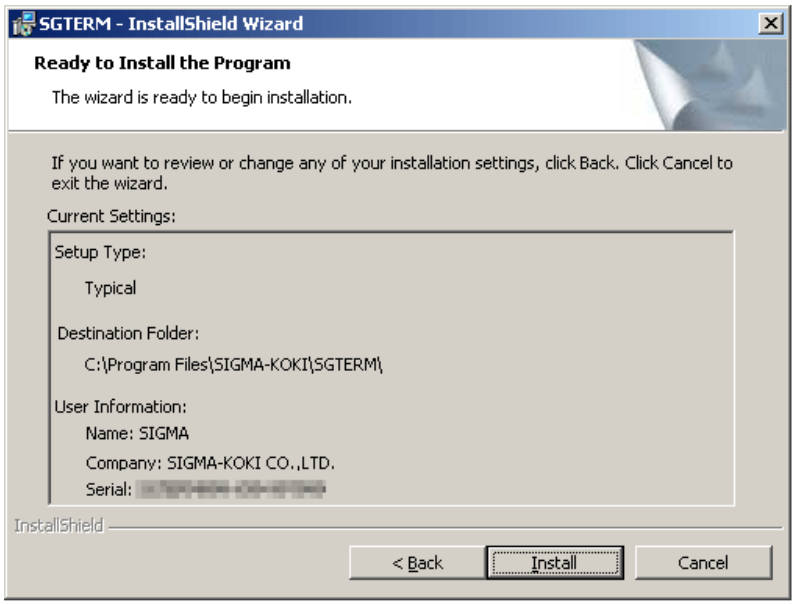


Fig. 2-5 Ready to install the program

(7) Completion of installation

Click the Finish button after the installation is completed.

Now SGTERM has been installed on your PC successfully!

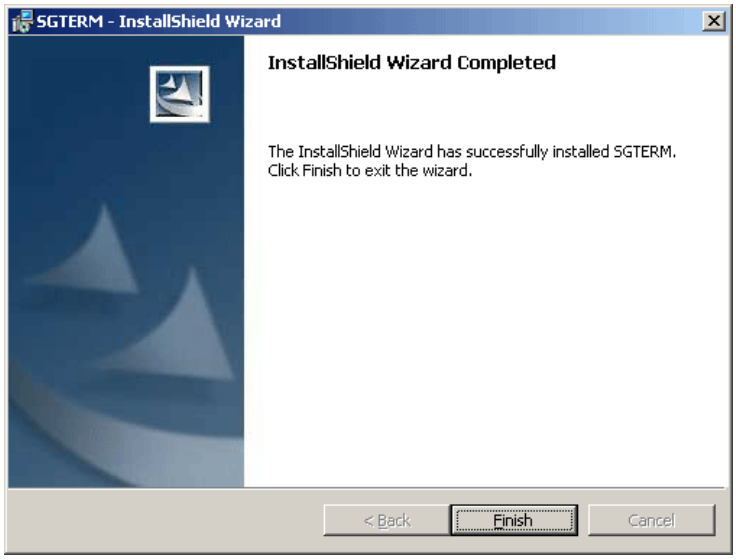


Fig. 2-6 Completion of installation

2.2 Uninstalling SGTERM

Select Control Panel and then Add/Remove Programs.

Programs Property window appears. Select SGTERM and click Add/Remove button.

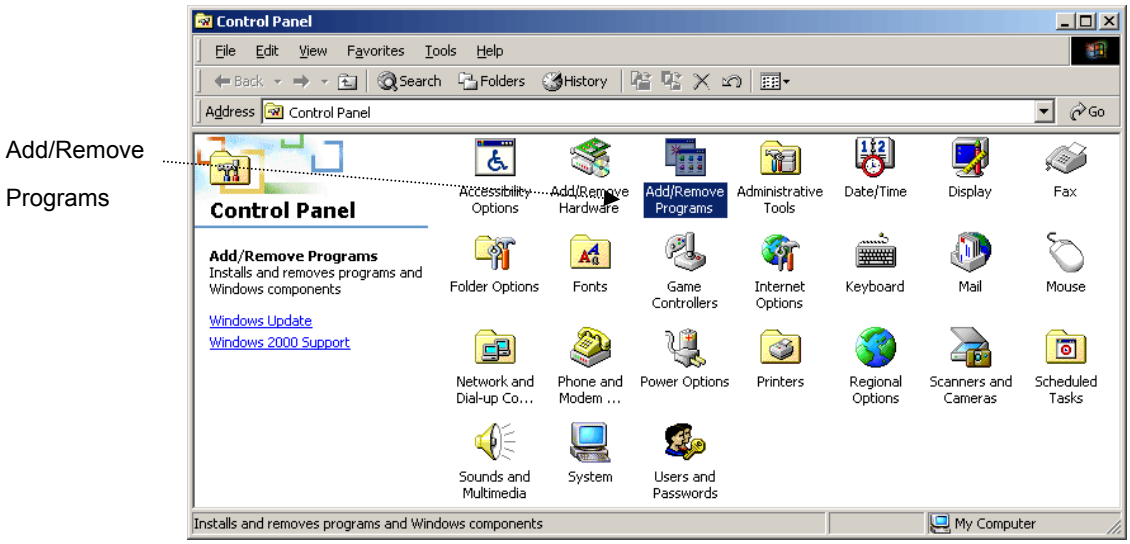


Fig. 2-7 Control Panel

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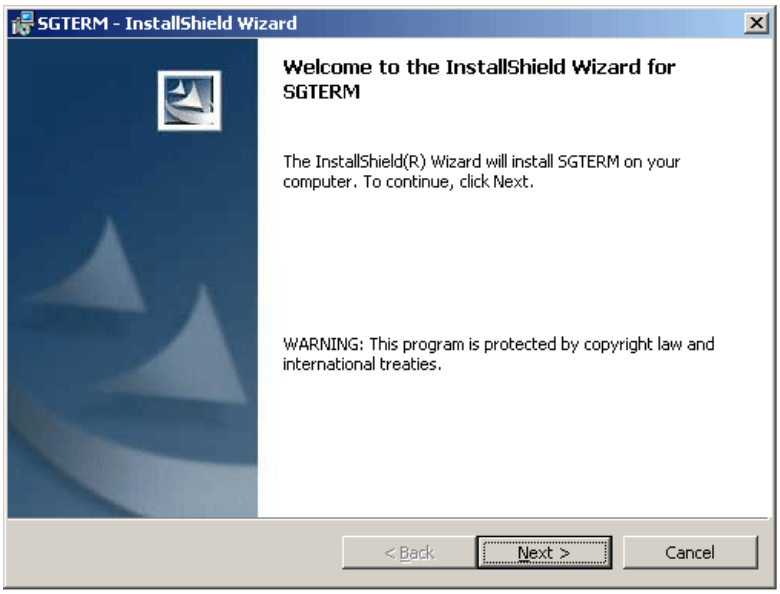

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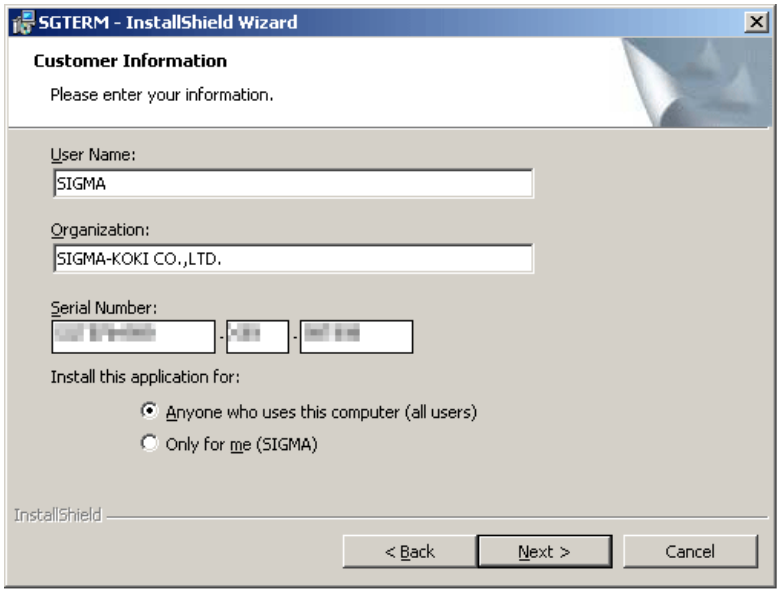

Fig. 2-2 Customer information window

(4) Selecting destination folder

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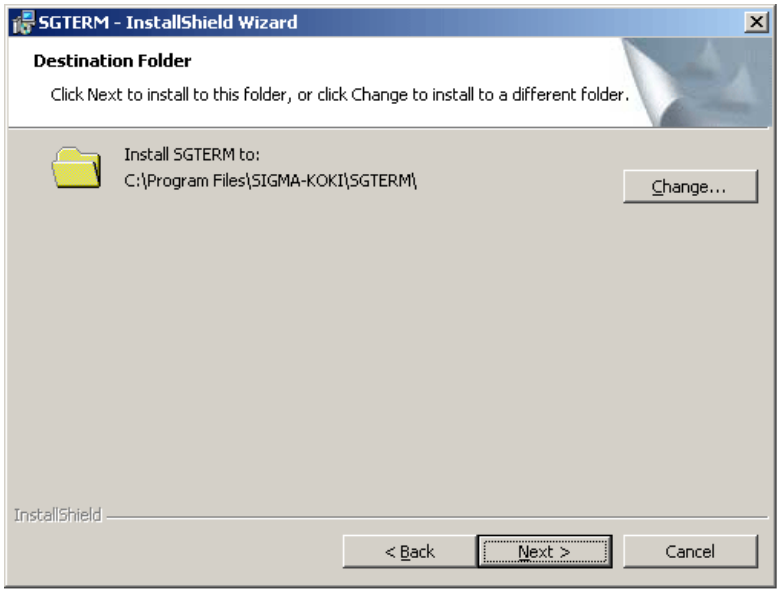

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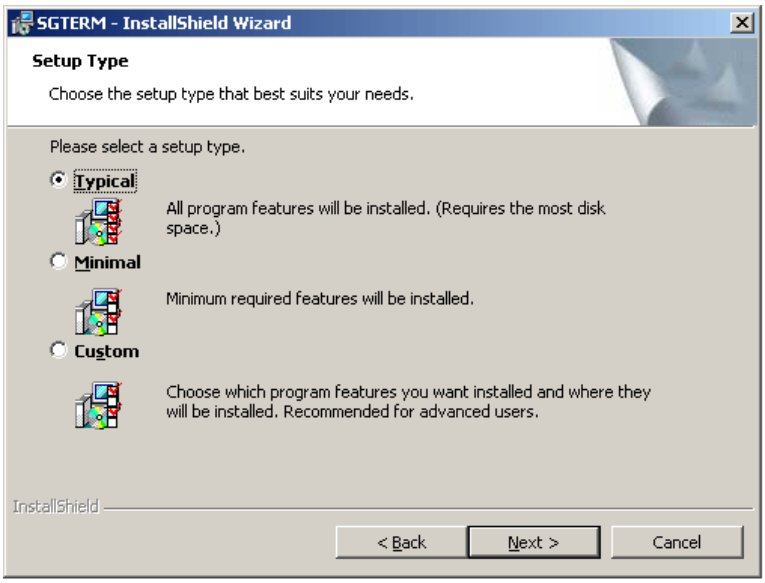

Fig. 2-4 Setup type window

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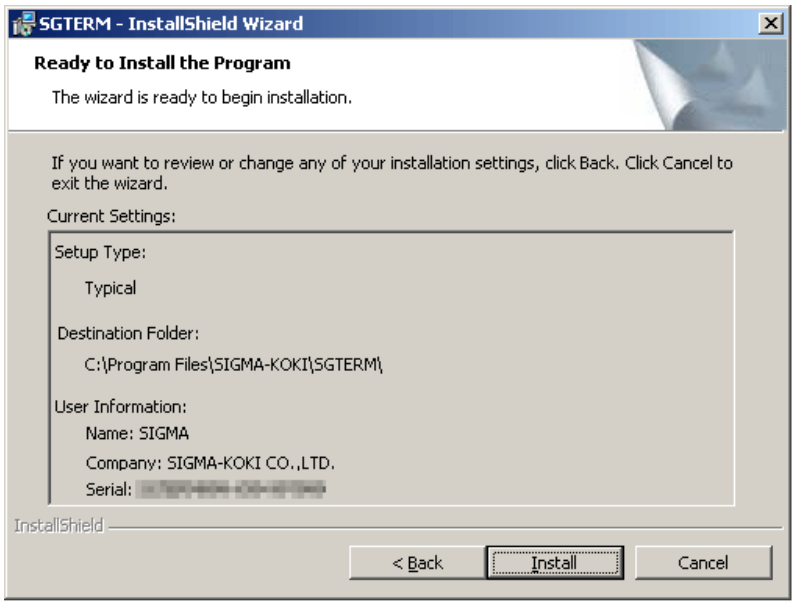

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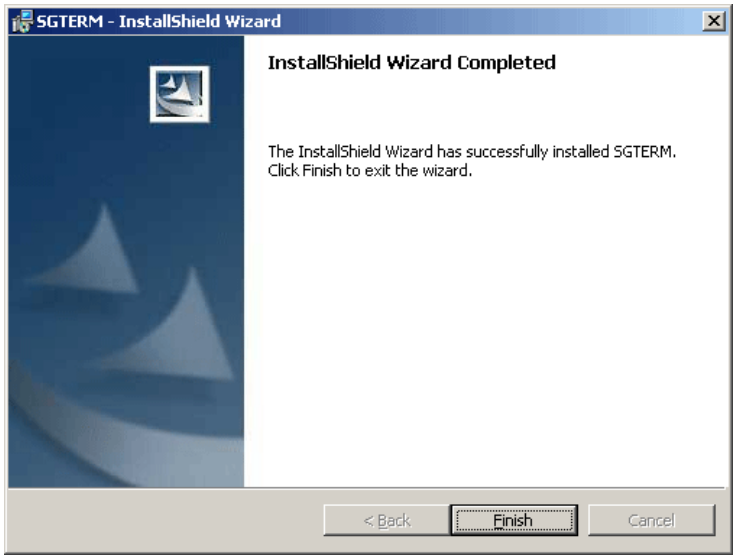

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2.2 Uninstalling SGTERM

Select Control Panel and then Add/Remove Programs.

Programs Property window appears. Select SGTERM and click Add/Remove button.

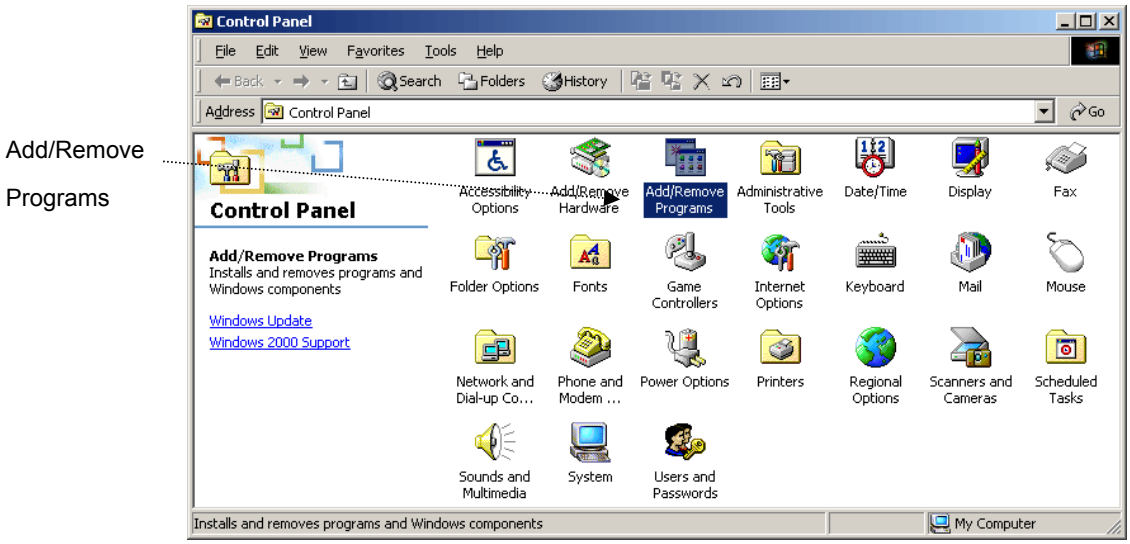


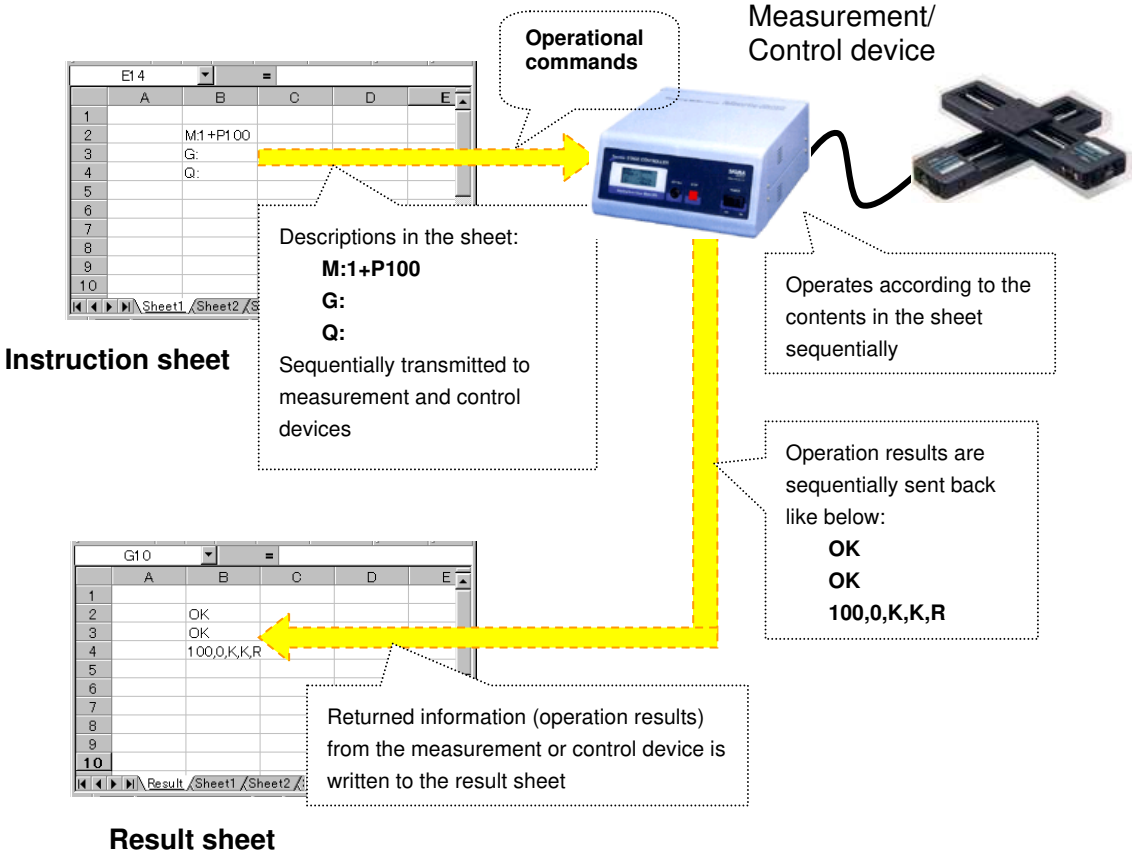
Fig. 2-7 Control Panel

3. Operation

This section describes the operations of SGTERM.

3.1 Setup Flow

SGTERM basically transmits the contents described in an Excel "**Instruction Sheet**" to **measurement or control devices** to control them, and writes the received measurement data to the **Result Sheet**.



The following descriptions deal with the setting with SGTERM.

3.2 Main Screen

Starting up SGTERM displays the Main screen (Device settings tab). The screen is provided for necessary settings for the operations.

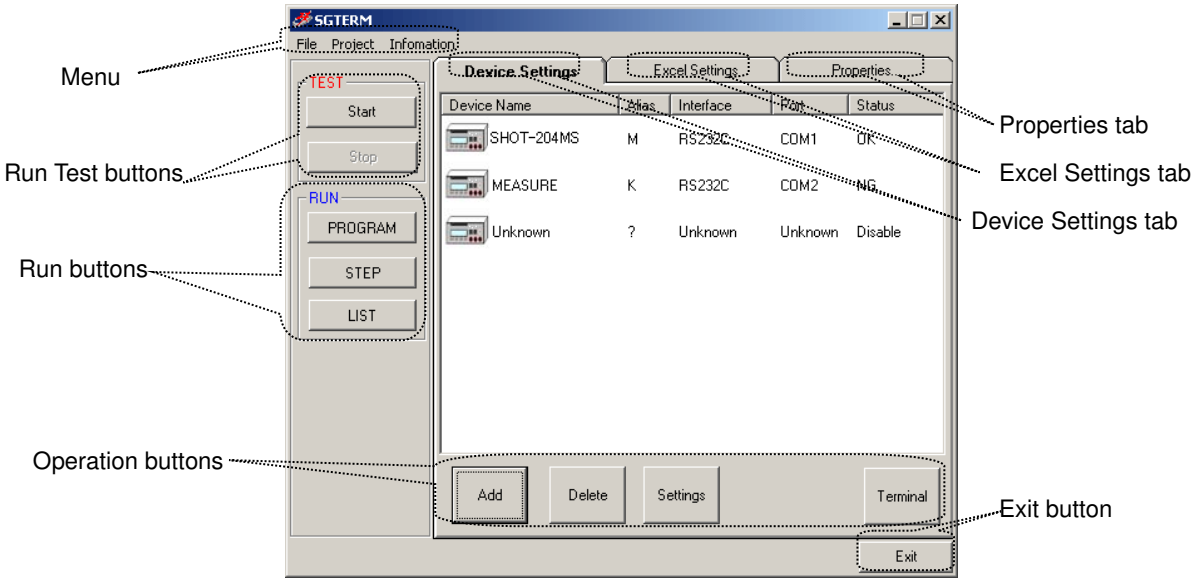


Fig. 3-1 Main screen

3.3 Device Settings

First, add devices to be used, and set the relating information.

Click the Add button to add a device on the screen.

Fig. 3-2 Add button

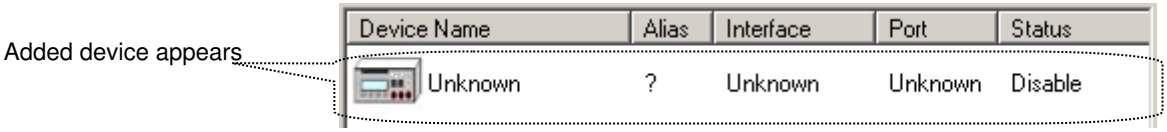


Fig. 3-3 Adding device

The name, interface, port, etc. of the device are indicated as Unknown. Click the Settings button to enter the device information.

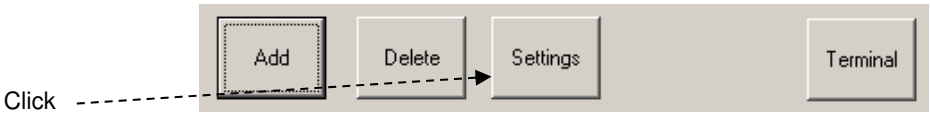


Fig. 3-4 Settings button

Clicking the Settings button displays the Device Settings dialog.

Specify the device name, alias, interface and port on the dialog.

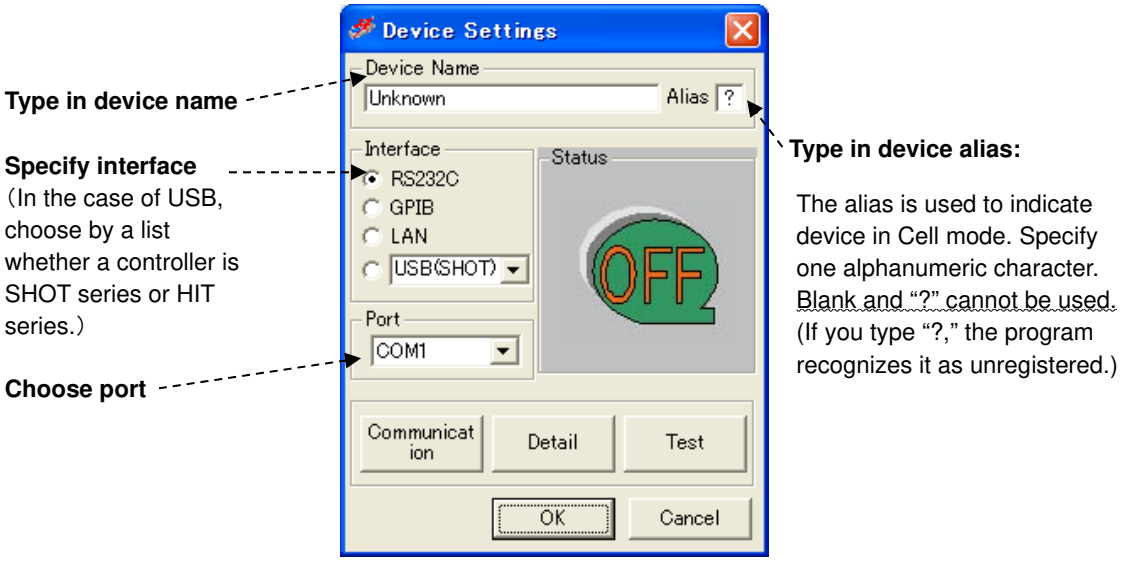


Fig. 3-5 Device settings dialog

3.3.1 Communication Settings

Click the Communication button on the Device Settings window shown in Fig. 3-5 to display the communication settings screen for the specified interface.

The Table 3-1 shows the communication interfaces available for SGTERM.

Table 3-1 Communication interface available for SGTERM

Interface	Conditions
RS-232C	Use COM 1 to 8. Eight ports can be used simultaneously. Transfer rates should be 110 to 256000 bps.
GPIB	Addresses 0 to 30 are available. Max. 15 devices can be used simultaneously. Note that only National Instruments' card/board can support GPIB I/F (be sure to install driver software in advance).
USB	IDs 1 to 8 are available. Max. eight devices can be connected in parallel. Note that only Sigma Koki's stage controller can support USB I/F (be sure to install driver software in advance).
LAN	One device can be used.

(1) RS-232C

When RS-232C is specified as the interface on the Device Settings window of Fig. 3-5, the RS-232C settings window appears, and you can set necessary communication conditions.

Set the conditions matching to the specifications of the device to be used.

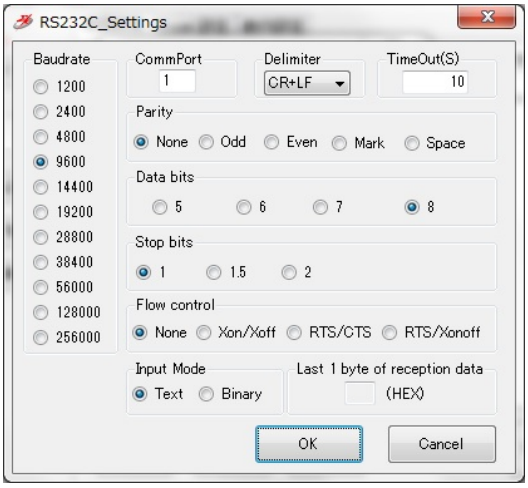


Fig. 3-6 RS-232C settings

■ Input Mode

Choose the communicate mode.

Text : Communicate in a text mode.

Binary : Communicate in a Bunary mode.

■ Delimiter

Specify a delimiter, when you choose Text by Input Mode.

It cannot specify, when Binary is chosen by Input Mode. In communication of a binary mode, since a delimiter is not used, it is automatically set as None and cannot change.

■ TimeOut

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

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" of a "RS232C Binary Settings" dialog.

・ 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.**

(2) GPIB

When GPIB is selected as the interface on the Device Settings window of Fig. 3-5, the GPIB Settings window appears, and you can set necessary communication conditions.

Set the conditions matching to the specifications of the device to be used.

Fig. 3-8 GPIB settings

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.

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

Receiving data also includes the specified delimiter at the end.

The Index of access board, Secondary Address, EOI, EOS and TimeOut are used as parameters to be transferred to IBDEV function (to open and initialize GPIB) of National Instruments.

∗ For the details of parameters, see the instruction manual for GPIB board/card of National instruments.

TimeOut is used as a timeout span for READ function (IBRD function) or WRITE function (IBWRT function) in GPIB, that is, GPIB is to wait for the specified time.

(When RS-232C or USB are selected, SGTERM is to wait.)

Therefore, setting longer time in TimeOut freezes SGTERM until the TimeOut ends, since GPIB has the control unless data reception occurs.

(3) USB

When USB is selected as the interface on the Device Settings window of Fig. 3-5, the USB Settings window appears, and you can set necessary communication conditions.

Set the conditions matching to the specifications of the device to be used.

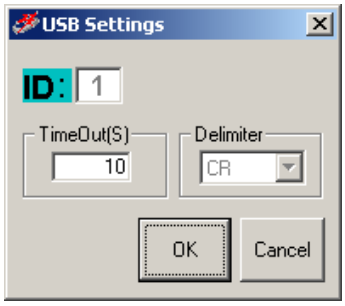


Fig 3-9 USB settings

USB is only supported for the stage controller of Sigma Koki.

If you want to use the USB Interface, install the USB driver of Sigma Koki, and check the software works properly before the use.

* USB driver can be downloaded from https://jp.optosigma.com/en_jp/software__usb free of charge.

IDs are automatically assigned to the stage controllers in the order of connection.

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

Receiving data also includes the specified delimiter at the end.

Delimiter for the SHOT/Mark series is fixed to “CR”, not changeable.

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

(4) LAN

When LAN is selected as the interface on the Device Settings window of Fig. 3-5, the LAN Settings window appears, and you can set necessary communication conditions.

Set the conditions matching to the specifications of the device to be used.

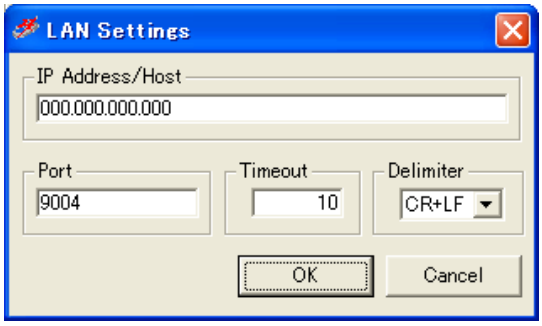


Fig 3-10 LAN settings

■ IP Address/Host

Specify the IP address or host name of device to be used.

■ Port

Specify the port number of device to be used.

■ Timeout

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

0 - 600 seconds can be specified as TimeOut.

■ Delimiter

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

Receiving data also includes the specified delimiter at the end.

3.3.2 Detail Settings

Click the Detail button on the Device Settings window of Fig 3-5 to display the Detail Settings window. Specify necessary retrying conditions for communication, communication mode and reading end strings.

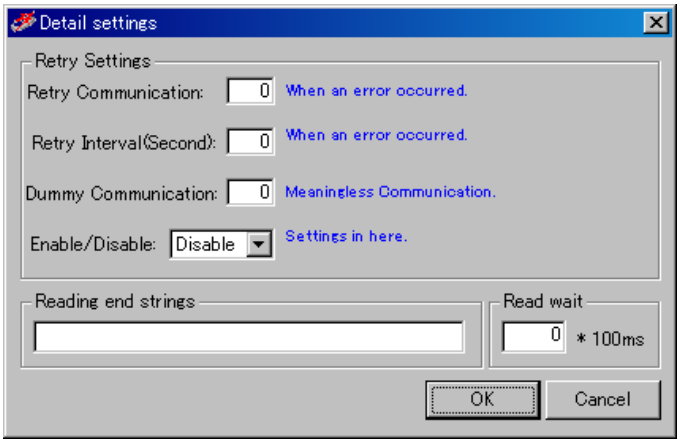
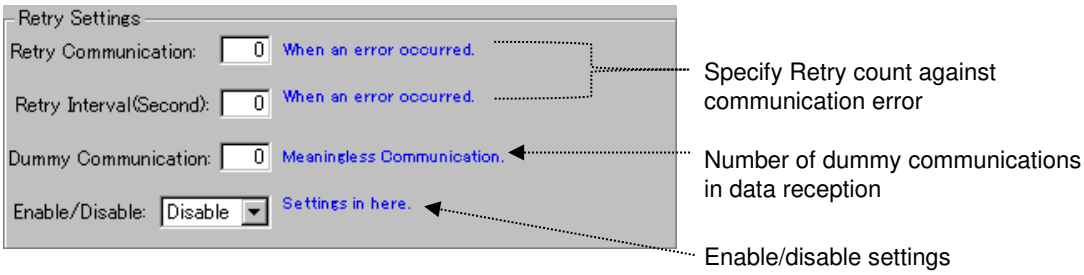


Fig. 3-11 Detail settings

(1) Specify retrying conditions for communication

Specify the retry in the event of a communication error, and the number of dummy communications, etc. in receiving data.



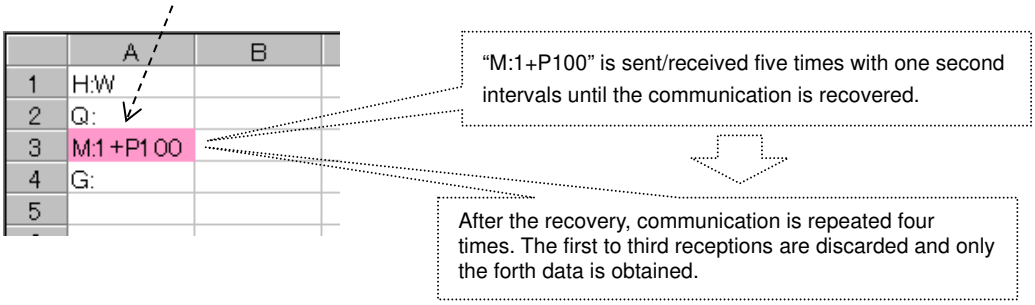
When retry counts are specified, communication process is repeated as many times as specified against communication failure before issuing an error. Retry interval specifies an interval (in second) between retries.

Dummy communication specifies number of dummy communications repeated until valid data is obtained. This feature is to help receive unstable data.

Assume that Retry Communication is set to five, Retry Interval to one, and Dummy to three.

The actual process is performed as follows:

A communication error occurs in the A3 cell on the sheet during running an instruction sheet.



(2) Specify 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).

(3) Specify Read wait

Specifies the interval before starting reception. (Unit: 100 msec)

- Example: If communication type of device is “Send & Receive” and Read wait time is three:

Send the character string specified as the Excel instruction sheet to the device.

↓

Wait for 300 msec.

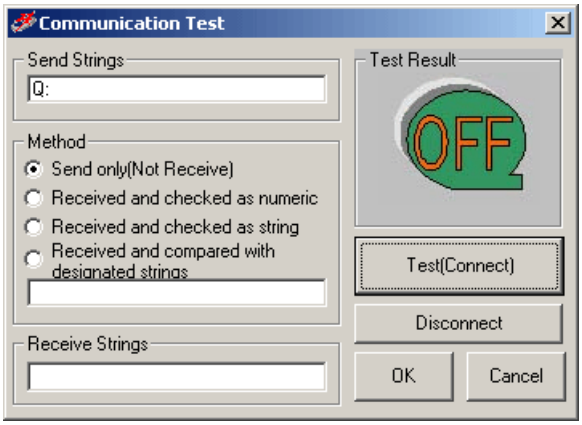
↓

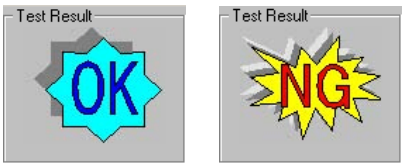
Start to receive response data from the device.

*In the usual device, although 0 is set as Read wait, set up a required value according to device or use environment.

3.3.3 Communication Test

Click the Test button on the Device Settings window of Fig. 3-5 to display the Communication Test window for testing communication under the preset conditions.





Test result

Fig. 3-12 Communication test

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 string to the specified device, and then the receiving conditions are checked against the sent strings.

There provided various check methods as follows:

- **Send only (Not Received)**

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

- **Received and checked as numeric**

  Checks if the received result is numeric value.

  When the strings include characters other than numeric values, the communication result becomes NG.

- **Received and checked as string**

  Checks if the received result is a string.

  Confirms the return of any strings including numeric values.

- **Received and compared with designated strings**

  Checks if the received result of the send string matches the designated string.

  When they do not match completely, the communication result becomes 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), installation status of driver software if GPIB or USB is used, etc.

By conducting a communication test (and if the result is satisfactory), the communication is established.

If you click on the Disconnect button, the communication finished.

Device settings/status is displayed on the main screen after finishing with Device Settings:

Device Name	Alias	Interface	Port	Status
SHOT-204MS	M	RS232C	COM1	OK

Fig 3-13 Device status

Add all the devices to be used on this Device Settings window by repeating the above steps:

Device Name	Alias	Interface	Port	Status
SHOT-204MS	M	RS232C	COM1	OK
MEASURE	K	RS232C	COM2	OK

Fig 3-14 Device list

3.4 Excel Settings

Set operations related to Excel.

Click the Excel Settings tab on the Main screen to display the settings window:

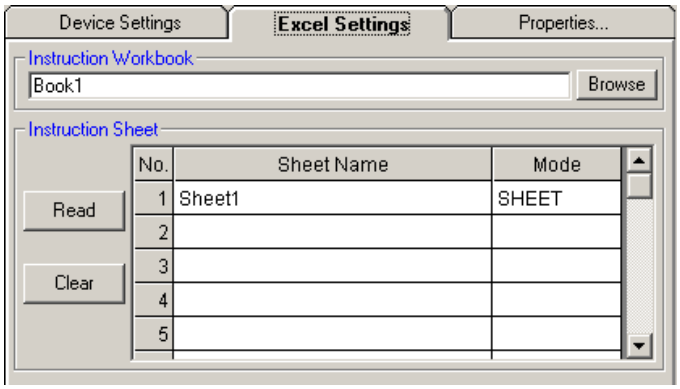


Fig 3-15 Excel settings

Set the following items on this Excel settings window:

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

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

(3) The method and devices for the communication.

3.4.1 Instruction Sheet

Determine an Excel book and an instruction sheet.

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

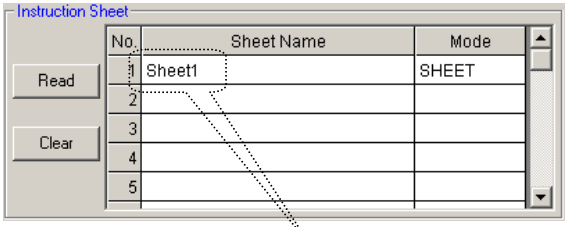
Click the Browse button to display a file list screen. Select a book from the list.

"BOOK1.xls" is selected as a book for instruction sheet

Fig. 3-16 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

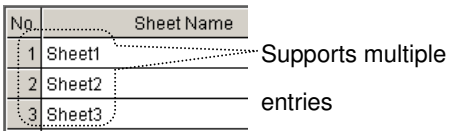


Fig. 3-17 Select instruction sheet

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 3-17. describes.

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

For the List settings, see “3.8 List Settings.”

3.4.2 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)

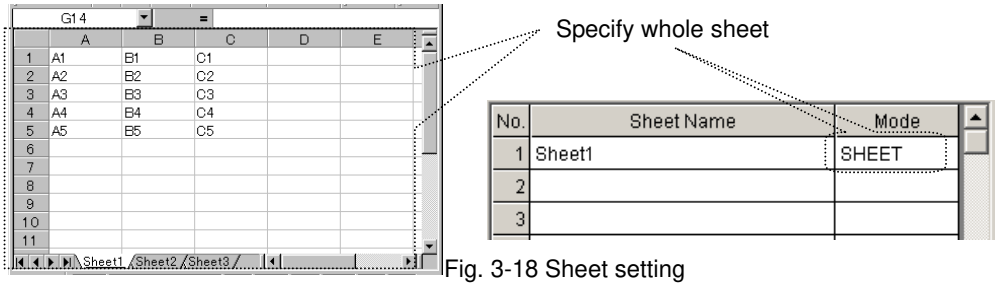


Fig. 3-18 Sheet setting

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. 3-14).

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

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

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

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.

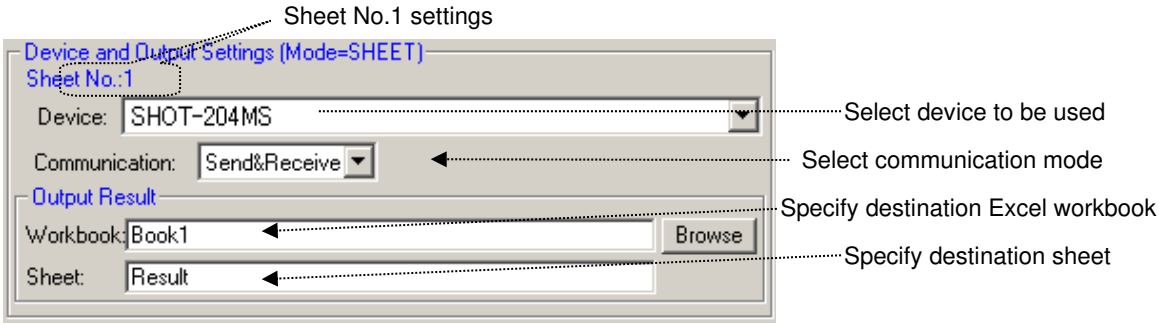


Fig. 3-19 Device and output settings

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

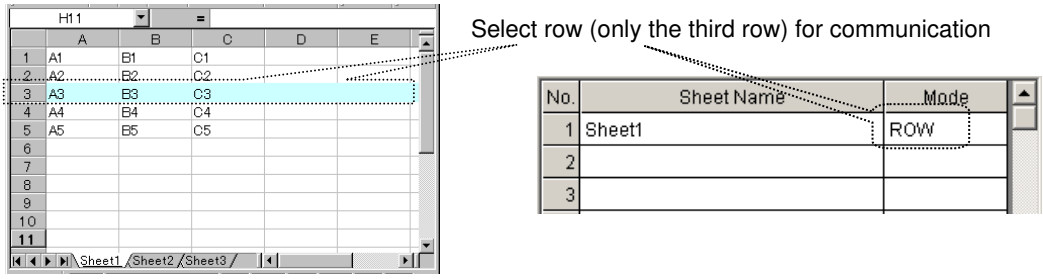


Fig. 3-20 Row settings

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. 3-14). 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, SGTERM will send/receive all the contents described in the designated rows.

For Send, SGTERM 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.

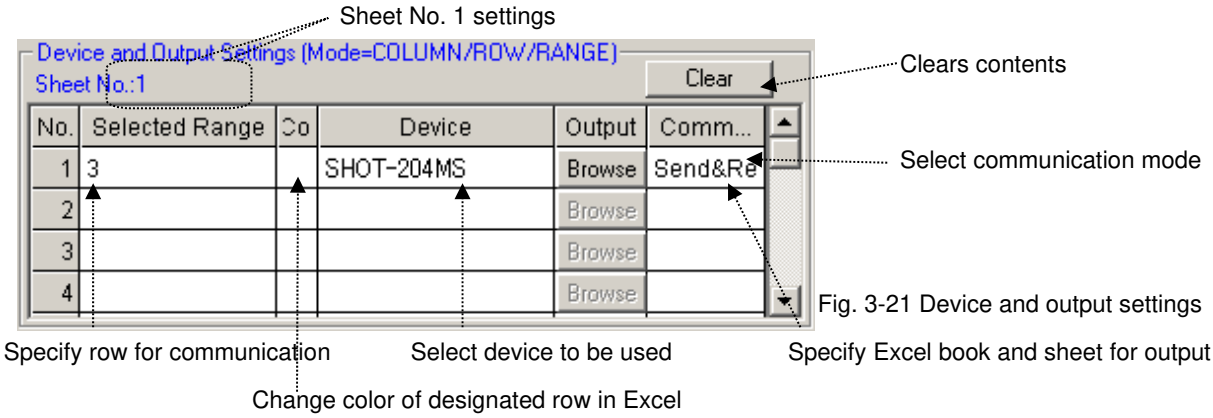


Fig. 3-21 Device and output settings

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

No.	Selected Range
1	1,2,5

Fig. 3-22 Adding selected range

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

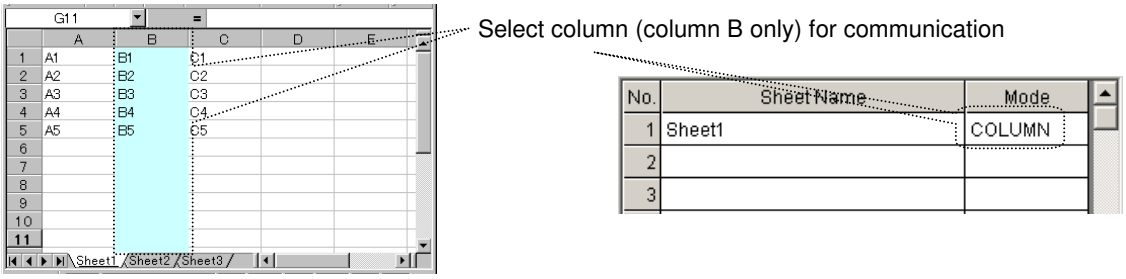


Fig. 3-23 Column settings

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. 3-14). 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, SGTERM will send/receive all the contents described in the designated columns.

For Send, SGTERM 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.

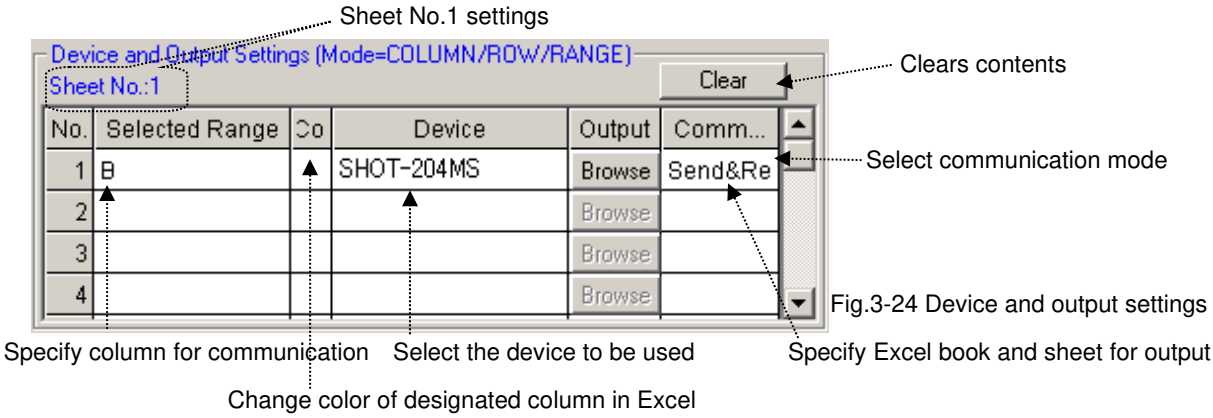


Fig.3-24 Device and output settings

When more than one column is used under the same conditions, several columns are described in Selected Range (comma-separated).

No.	Selected Range
1	A,B,C

Fig. 3-25 Adding selected range

IV. When using designated range for communication

(only designated range in a sheet)

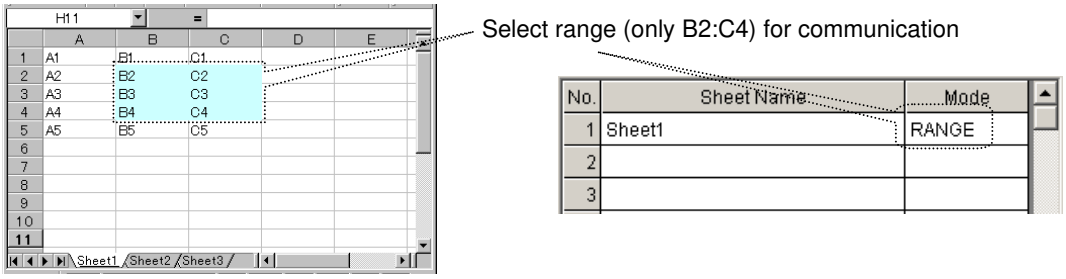


Fig. 3-26 Range settings

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. 3-14). 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, SGTERM will send/receive all the contents described in the designated ranges.

For Send, SGTERM 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.

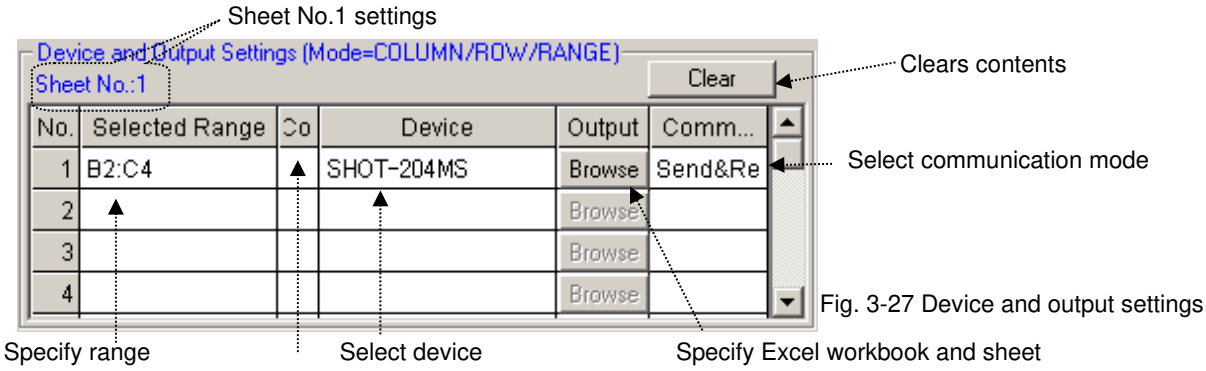


Fig. 3-27 Device and output settings

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).

No.	Selected Range
1	A1:B2,C5:D7

Fig. 3-28 Adding selected range

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

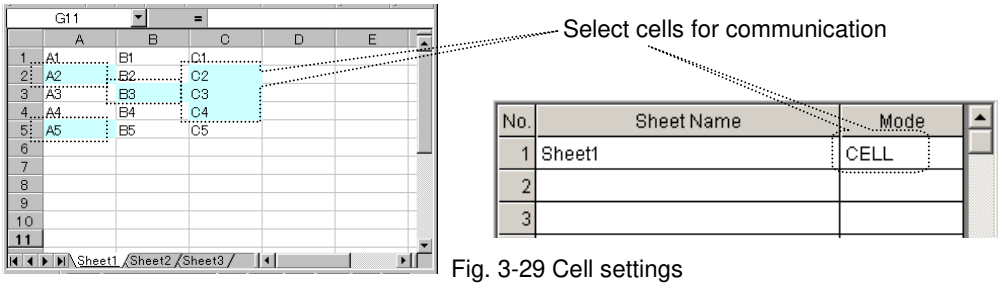


Fig. 3-29 Cell settings

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.

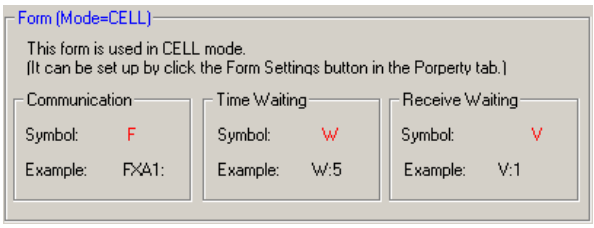


Fig. 3-30 Cell mode form

For forms for cell mode, see “3.6 Form settings.” For the details of setting output destination in cell mode, see “3.7 Output Result settings.”

3.4.3 Output of Result

Received data is output to a result sheet.

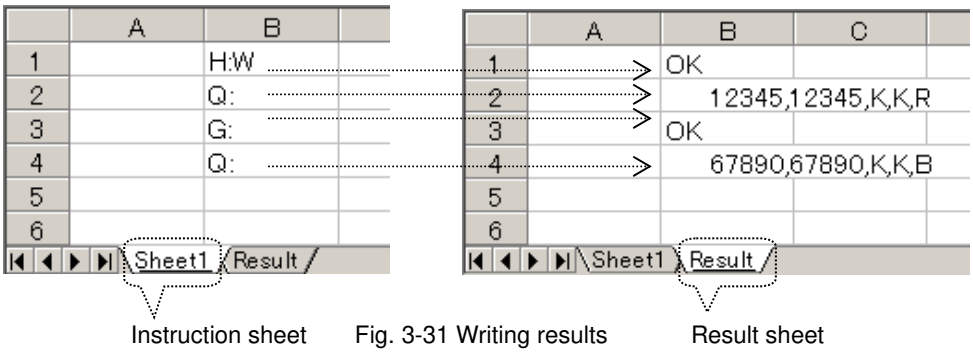
Results are output to a sheet designated in Output for each mode.

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. 3-31 Writing results Result sheet

3.5 Properties Settings

Set operational conditions for SGTERM.

Click on the Properties tab in the Main screen to display the setting screen.

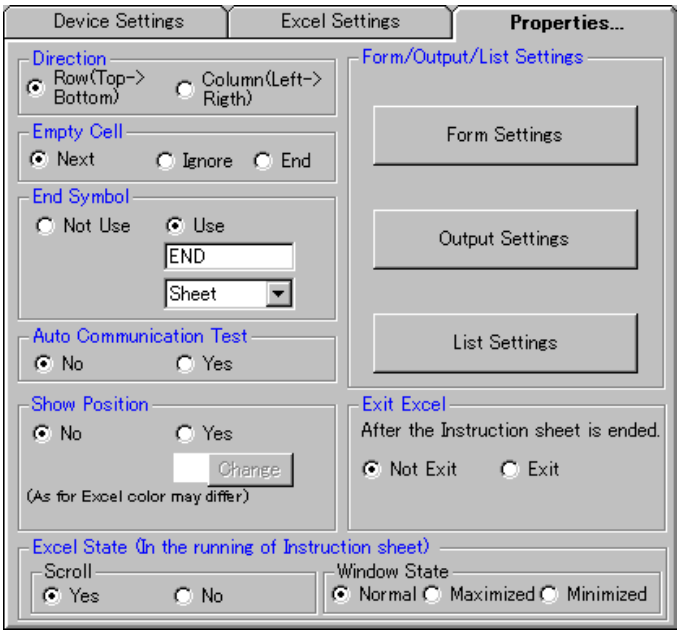


Fig. 3-32 Properties setting

(1) Direction

Specify an operation direction run on the Excel sheet.

Though SGTERM processes as written in specified instruction sheets, you can choose processing direction from vertical and horizontal.

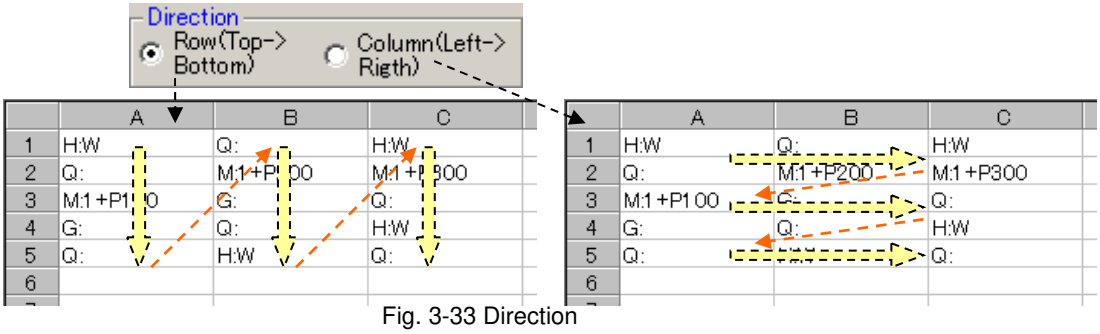


Fig. 3-33 Direction

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.....)

(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.)

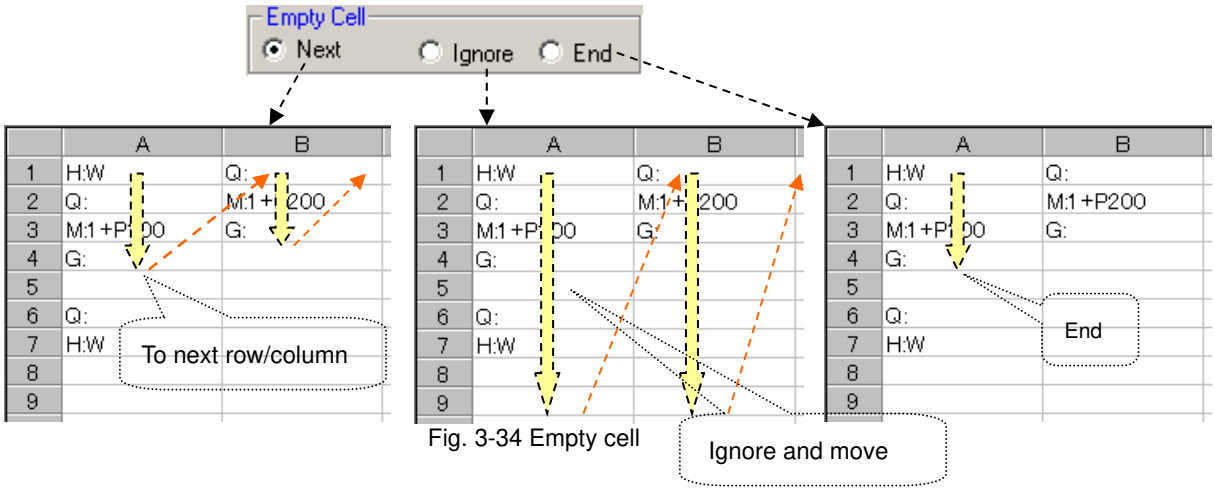


Fig. 3-34 Empty cell

(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.

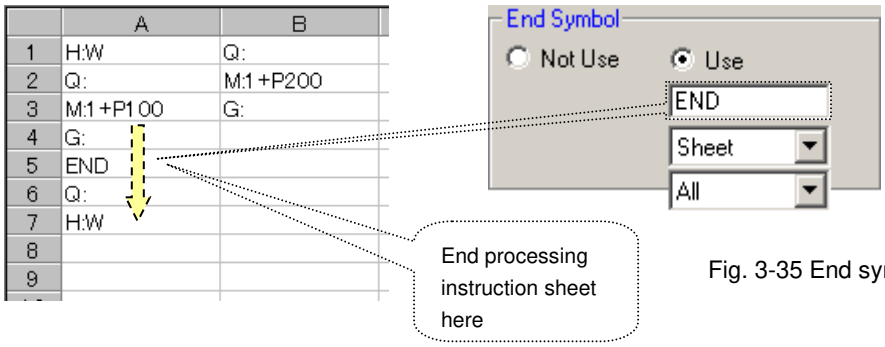


Fig. 3-35 End symbol

(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. 3-36 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 Excel Settings 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.

(5) Show Position

A cell in process can be indicated by a designated color while processing an instruction sheet.

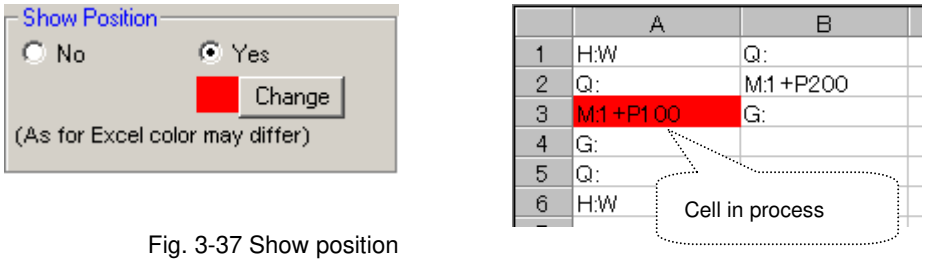


Fig. 3-37 Show position

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.

(6) Exit Excel

Whether the Excel is kept running or exited can be selected when the instruction sheet execution finishes.

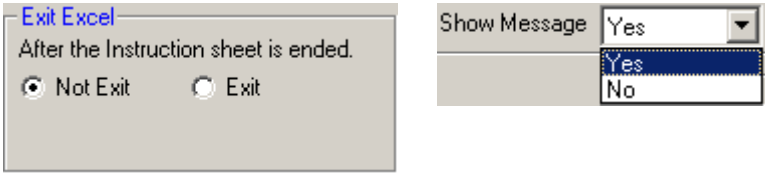


Fig. 3-38 Exit Excel

- **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.

(7) 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 SGTERM.

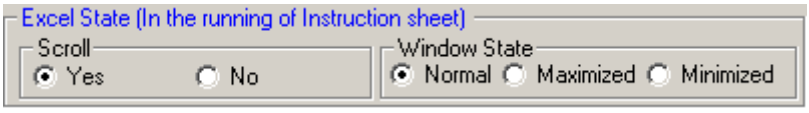


Fig. 3-39 Excel state

(8) Form/Output/List Settings

Click one of the Form Settings/Output Settings/List Settings buttons for setting a desired item. For the details of each setting, see “3.6 Form Settings,” “3.7 Output Settings” or “3.8 List Settings.”

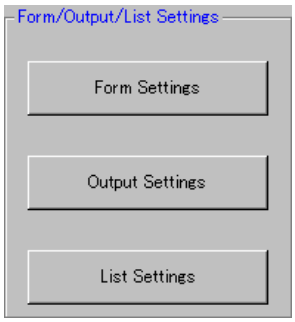


Fig. 3-40 Form/Output/List settings

3.6 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 in the Properties Setting tab to display the setting window.

Fig. 3-41 Form settings button

Setting instructions for a cell in an instruction sheet is available in cell mode. Actual instructions need to be specified for each cell.

This is for specifying an instruction position, destination device, communication mode, etc. for a cell.

Therefore, specify a form for cell mode and describe the form to a cell. The described cells can be designated in cell mode.

(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.

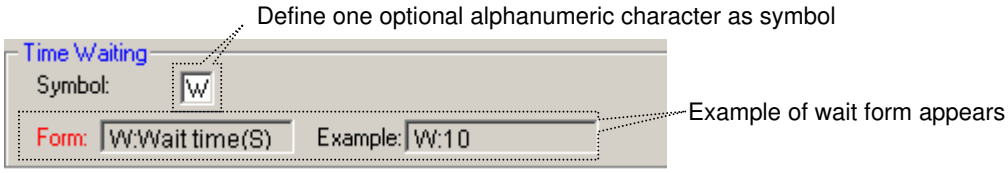


Fig. 3-42 Time waiting

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

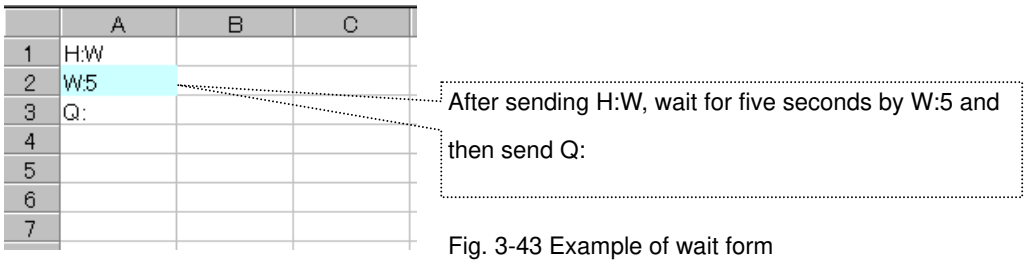


Fig. 3-43 Example of wait form

(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.

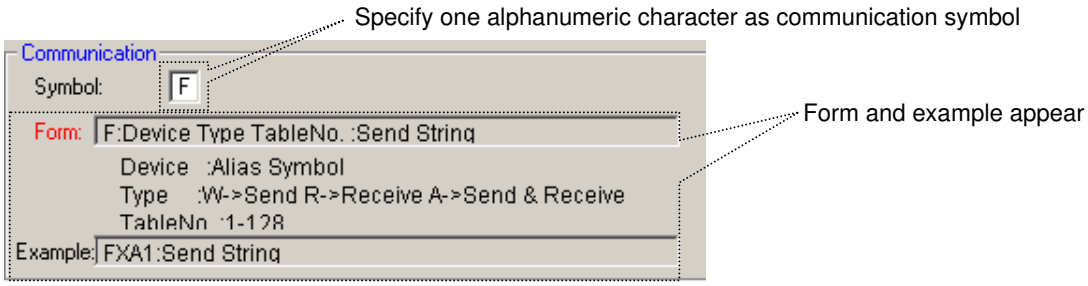


Fig. 3-44 Form for communication

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 "3.7 Setting Output of Result."

Alias Symbol of a device name is to specify a device in communication. Use one specified in "3.3 "Devise Setting."

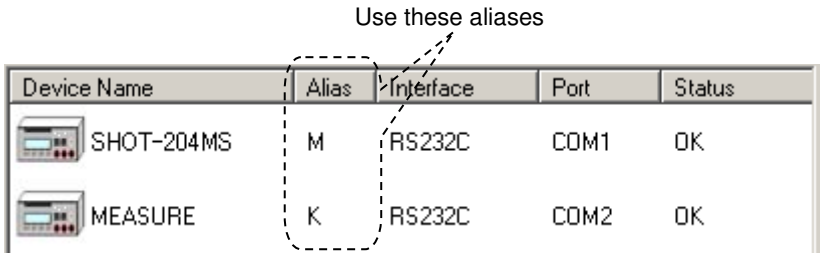


Fig. 3-45 Device list

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-204MS 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.

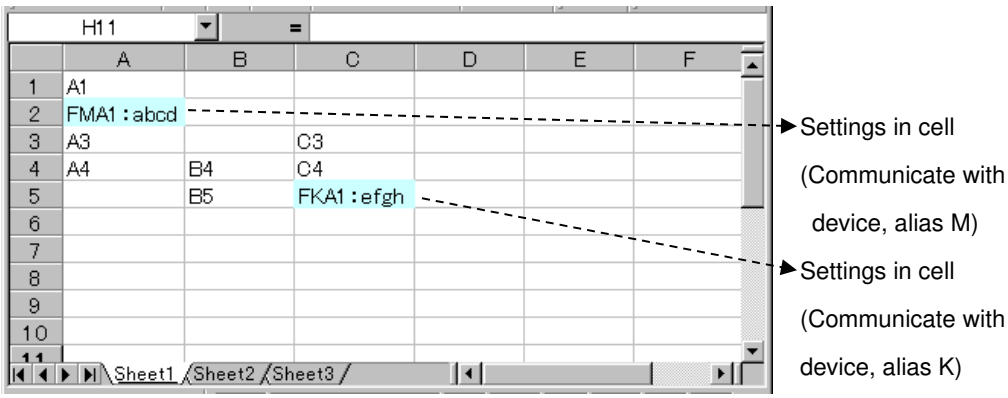


Fig. 3-46 Cell settings

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.)

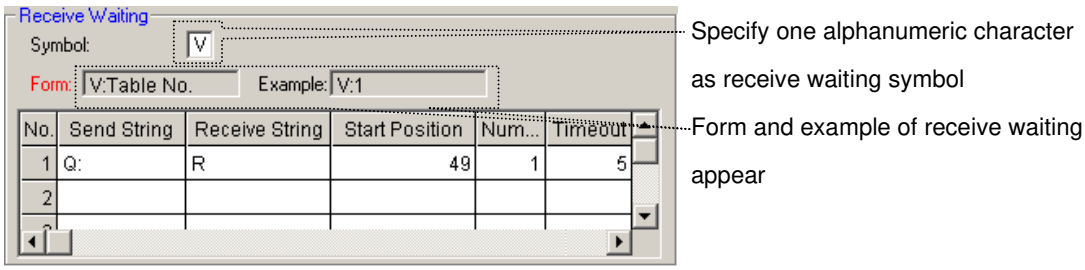


Fig. 3-47 Form for receive waiting

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 SGTERM ends the processing of the sheet.
(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. 3-48 Example of receive wait entry

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

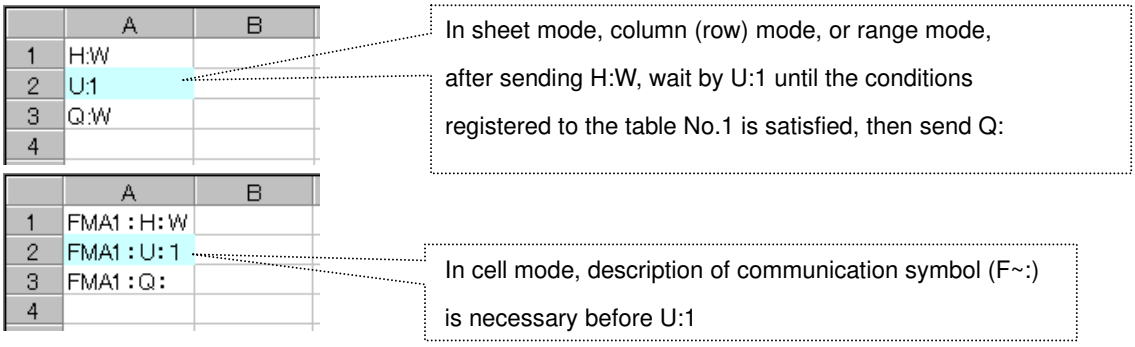


Fig. 3-49 Example of receive waiting form

3.7 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.)

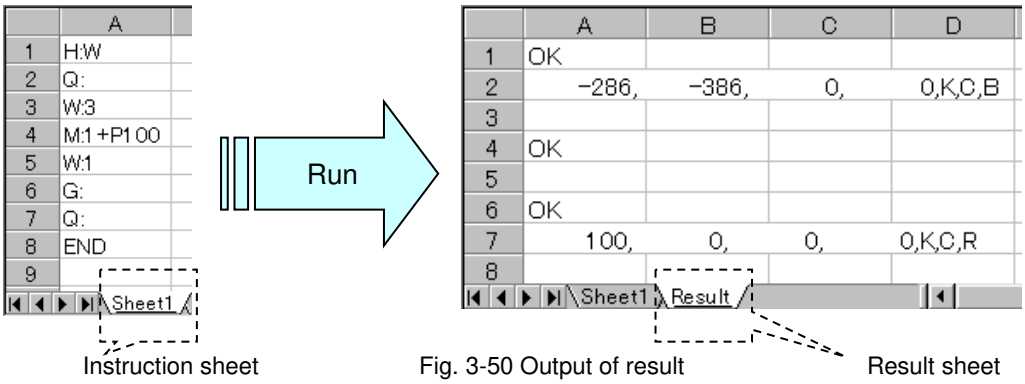


Fig. 3-50 Output of result

Click on the Output Settings button in the Properties tab to display the Output Settings window.

Fig. 3-51 Output settings button

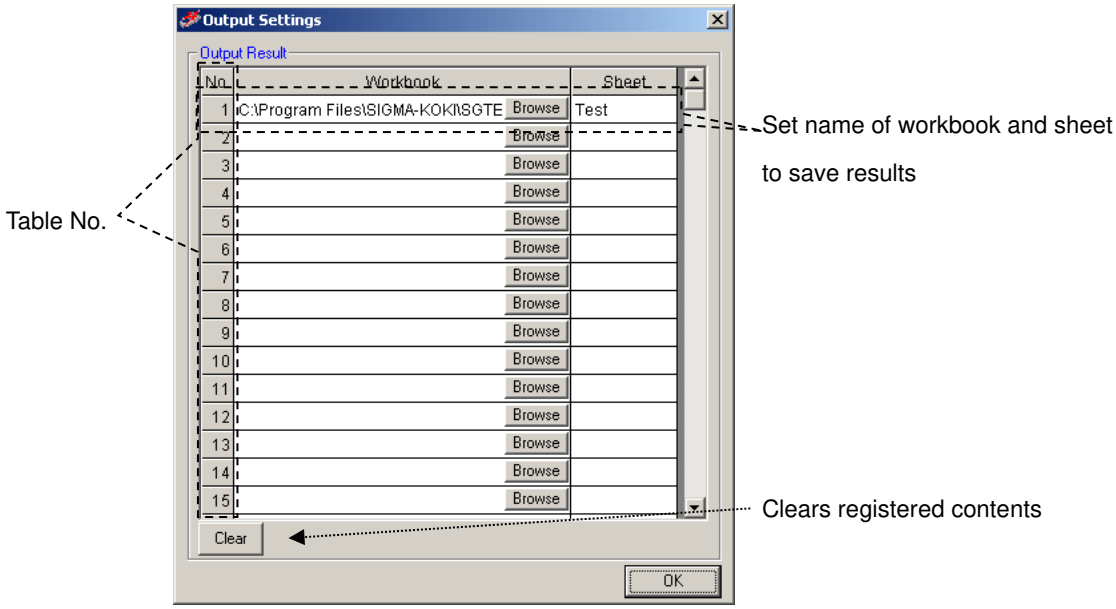


Fig. 3-52 Output settings

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

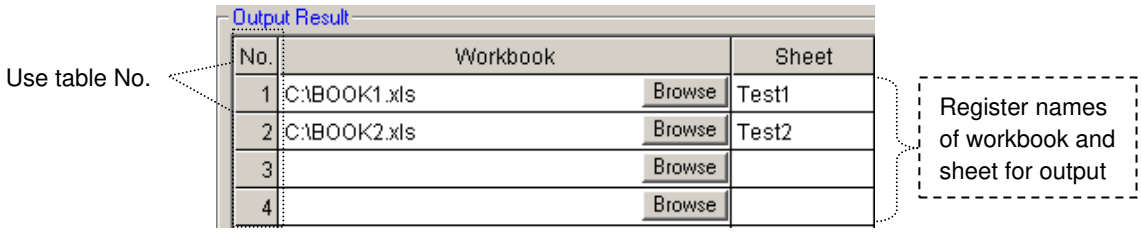


Fig. 3-53 Registration in output result

Specify the table No. of an output destination registered in the fig. 3-52 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.

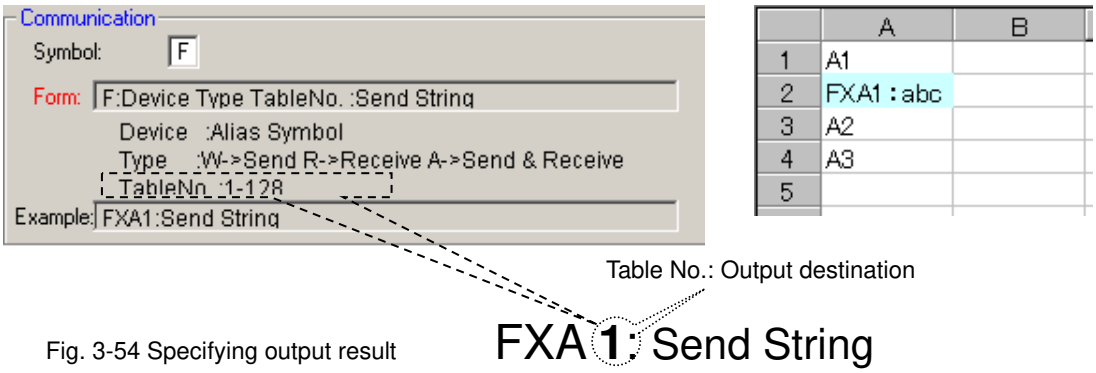


Fig. 3-54 Specifying output result

3.8 List Settings

Register saved SGE files sequentially (list run).

Click on the List Settings button in the Properties tab to display the List Settings window.

Fig. 3-55 List settings button

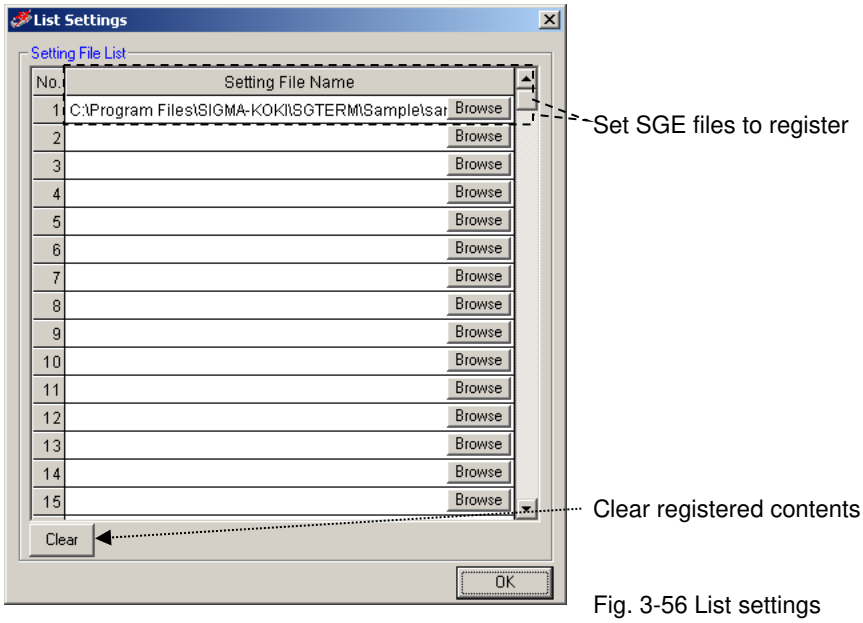


Fig. 3-56 List settings

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

For the details, see “(3) List Run” in “3.9.2 Running.”

3.9 Running Excel Instruction Sheet

The contents in an Excel instruction sheet are run based on the preset contents.

There are three types of running; Program run, Step run and List run.

In addition, there is a Run Test to check the operation before running.

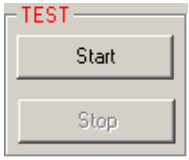


Fig. 3-57 Run and run test button

3.9.1 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 “(4) Auto Communication Test” in “3.5 Properties Settings.”

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.

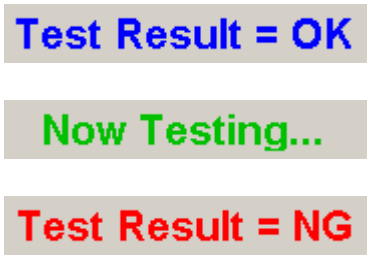


Fig. 3-58 Test result

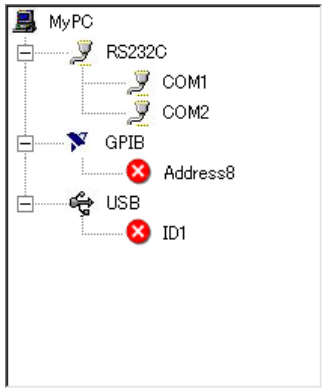


Fig. 3-59 Connection state

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.

3.9.2 Running

Run the contents of an Excel instruction sheet.

There are three choices; Program run, Step run and List run.

You need to carry out communication tests in advance with destinations to be used, or enable Auto Communication Test.

(1) Program Run

Processes an Excel instruction sheet based on the contents.

The Excel instruction sheet processed is designated in the Instruction Sheet setting (see 3.4.1 for the details).

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

Fig. 3-60 Message “Now communicating”

(2) 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.

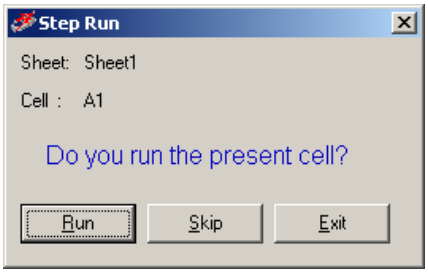


Fig. 3-61 Step run confirmation message

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.

(3) List Run

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

The SGE files registered in “3.8 List Setting” are read sequentially and automatically. Processes are performed according to the contents of the SGE files.

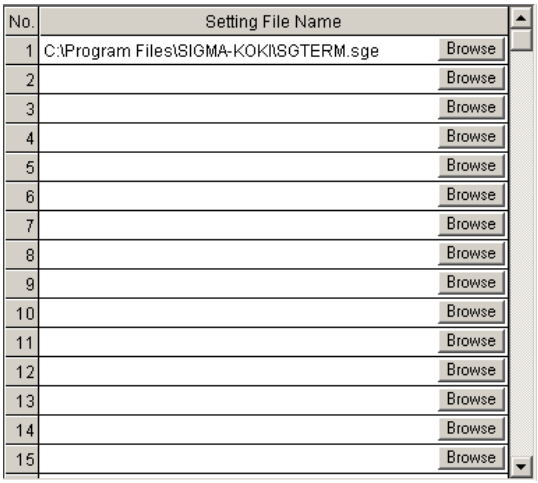


Fig. 3-62 Setting file list

To run several Excel workbooks (including several sheets) continuously, register SGE 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 SGTERM, and saved automatically when the SGTERM closes.

3.10 Saving Settings

The set contents can be saved as a file with file extension of SGE.

SGE files can be saved or loaded in the File menu.

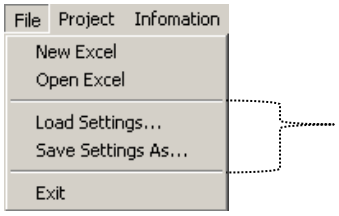


Fig. 3-63 SGE file menu

Normally, the conditions set for one Excel workbook can be saved as one SGE file and restored by loading it.

Since SGE files save the Excel instruction files and result destinations, you can run the program without opening Excel by reading SGE files.

3.11 Loading and Creation of Excel

The commands to open the existing Excel files used as instruction sheets, or create new files.

Excel files can be opened or created in the File menu.

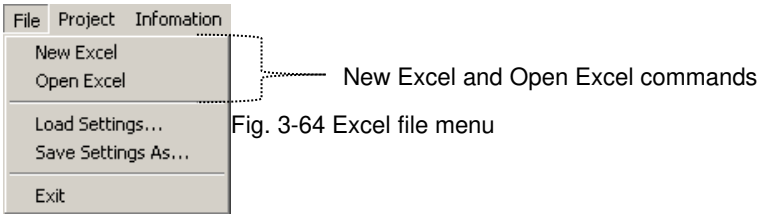


Fig. 3-64 Excel file menu

Use these commands to open Excel files and edit sheets.

When opening or creating Excel files, the instruction workbook of Excel Settings is updated automatically.

For designating an Excel instruction workbook, see “3.4.1 Instruction Sheet.”

When running an Excel instruction sheet, opening the Excel file is not necessary.

3.12 Initialization of Set Contents

Use the command to initialize (default) set contents.

Click Initialize in the Project menu for initialization.

Fig. 3-65 Initialization menu

The process clears all the set contents.

3.13 Information

Various information on SGTERM can be referred to.

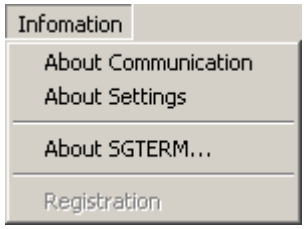


Fig. 3-66 Information menu

(1) Version information

The version of SGTERM in current use appears.

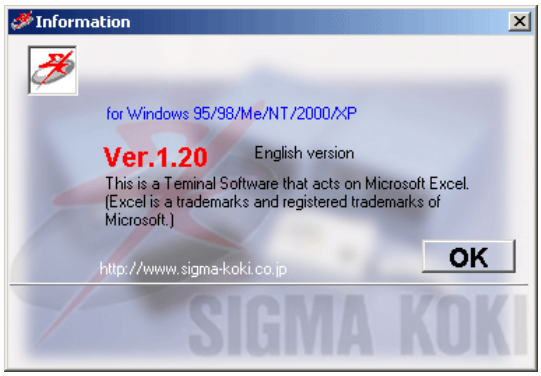


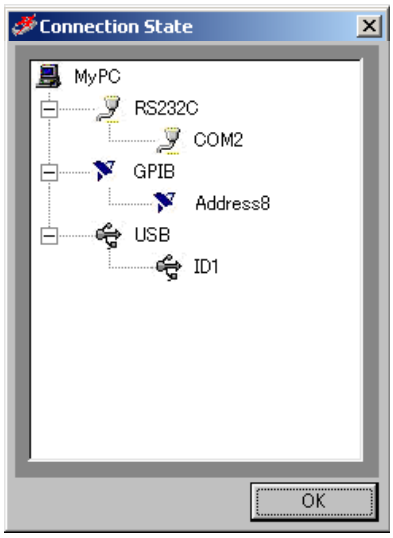
Fig. 3-67 Version information

(2) Connection State

The connection state of communication is displayed.

Connection State can display only connections for which communication tests have been carried out with satisfying results.

Connections for which communication tests have not been performed are not displayed.



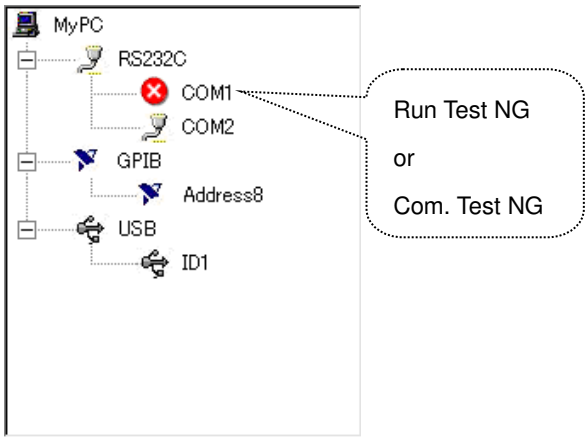


Fig. 3-68 Connection state

When opening Connection State window after carrying out a run test, connections for which the run tests end in NG are shown with “X” mark. Connections for which the communication tests end in NG are also marked with “X.”

To release NG state, repeat the connection test to have satisfying result, disconnect NG connections, or disable NG connections in running a sheet.

(3) Setting Contents

Shows setting contents.

The setting information is represented in tree structure. Click on a particular node to go to the next node.

Click on a desired item in a lowest node to display the settings.

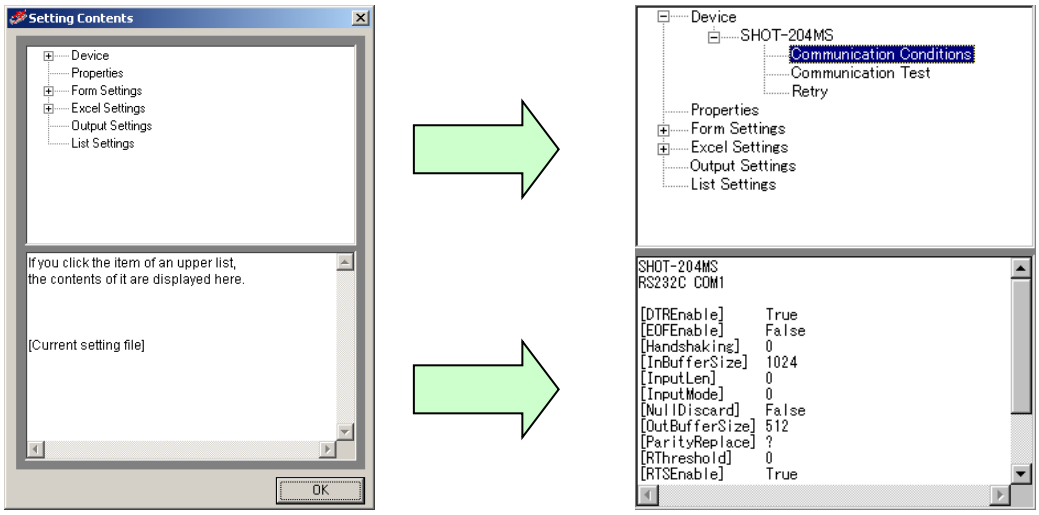


Fig. 3-69 Setting contents

3.14 Terminal Function

Terminal is a capability to send/receive by inputting commands directly.

Click the Terminal button in the Main screen to start up.

Fig. 3-70 Terminal start up

Specifying a connection on Interface & Port window to communicate.

The destination should be connected, and the communication state with the destination should be tested beforehand.

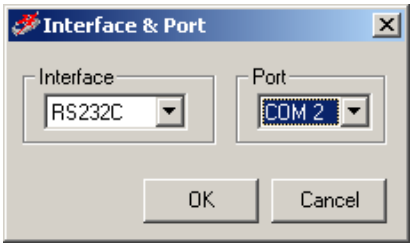
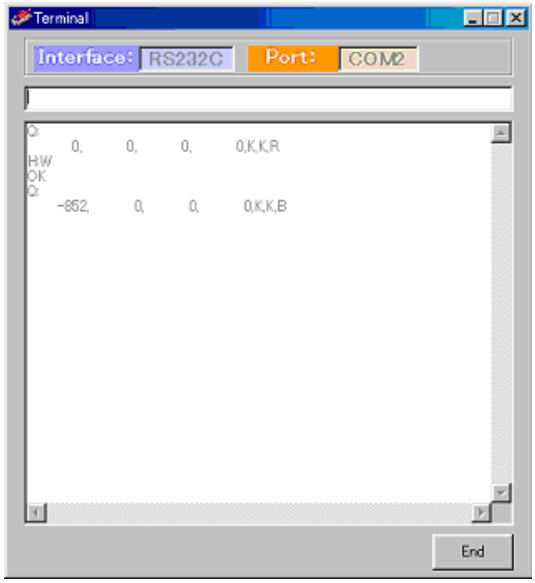


Fig. 3-71 Interface & Port

The communication conditions reflect the contents described in “3.3.1 Communication Settings.”



Type in sending strings and press the Enter key to transfer the input strings to a destination.
Received strings from the destination are displayed on the screen.
Terminal cannot be used unless the destination is not connected.
Click the End button to end.

Fig. 3-72 Terminal window

The process is not paused by timeout. Click the End button to close.
For two or more connections, start up as many terminals.

3.15 Exiting SGTERM

Ends SGTERM.
Click Exit in the File menu, or click the Exit button in the Main screen to close the SGTERM.

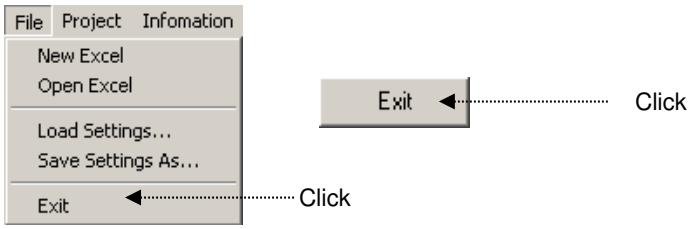


Fig. 3-73 Exit menu and button

4. Function

This section explains modes and control available by SGTEM

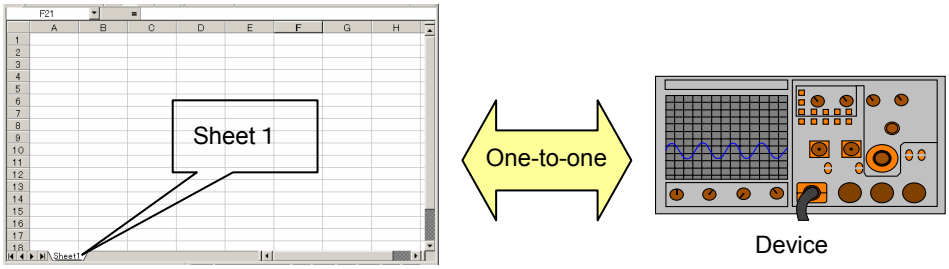
In SGTERM, Sheet Mode, Row Mode, Column Mode, Range Mode and Cell Mode are available. As for control, Script Control is provided.

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

4.1 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 Excel Settings tab.

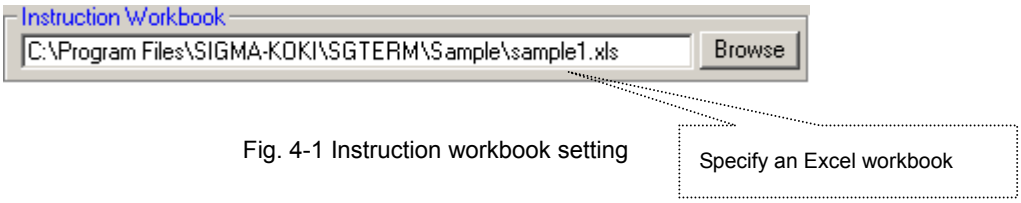


Fig. 4-1 Instruction workbook setting

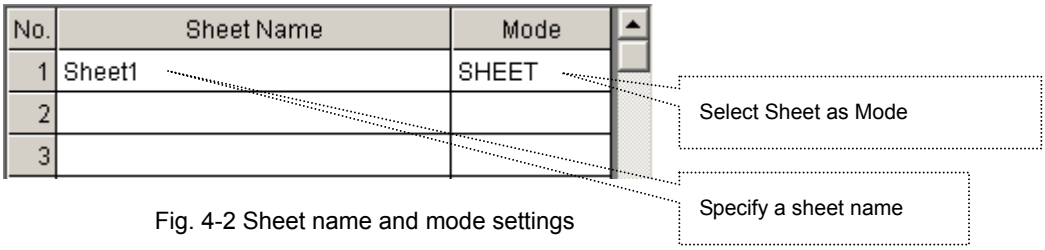


Fig. 4-2 Sheet name and mode settings

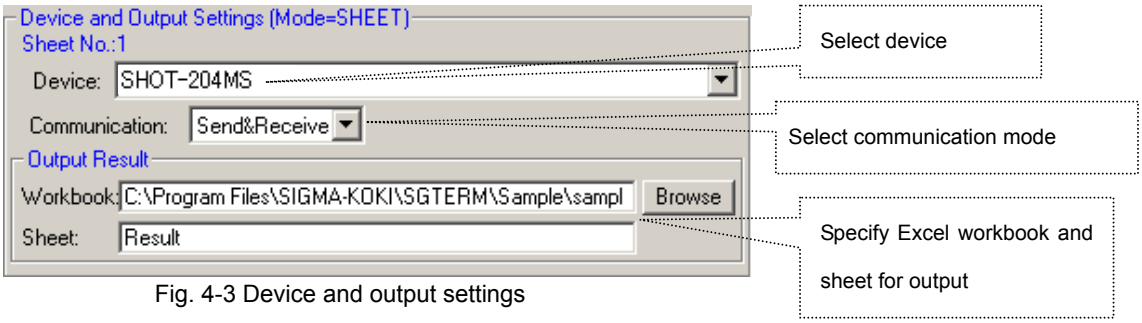
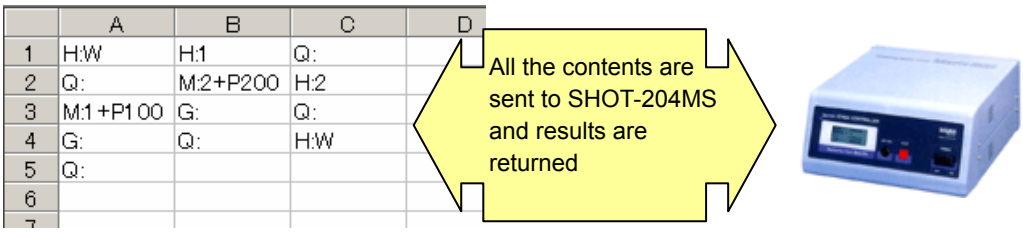


Fig. 4-3 Device and output settings

In the examples of the Fig. 4-2 and 4.3, all the contents described in the Sheet 1 are sent to SHOT-204MS and the results are returned. The received results are written to the sheet specified in the Output Result.

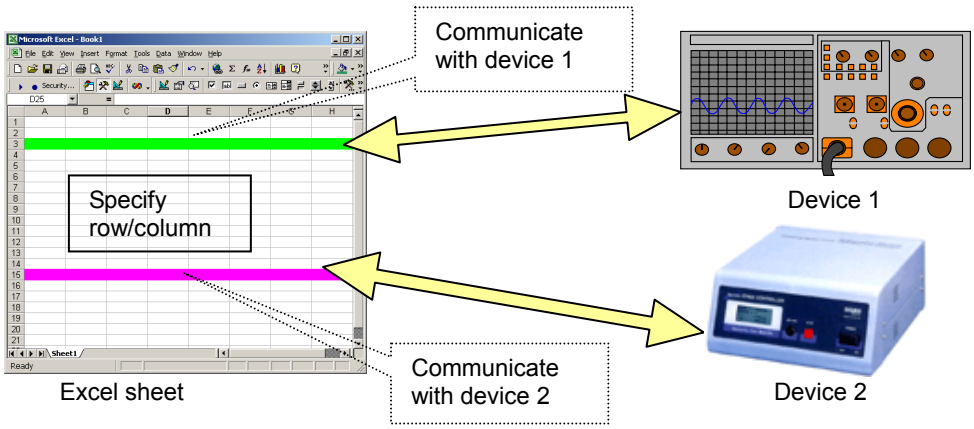


4.2 Instruction by Row Mode and Column Mode

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.



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. 4-1 “Instruction workbook setting.”

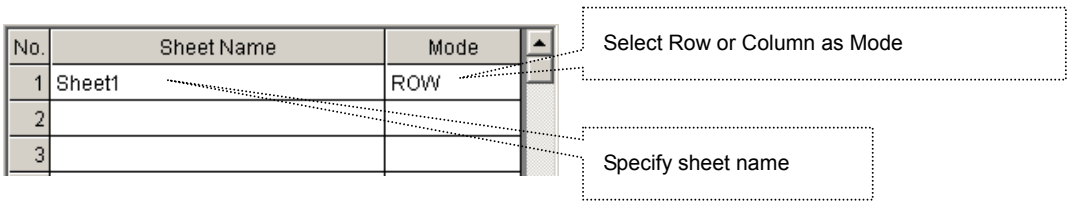


Fig. 4-4 Sheet name and mode settings

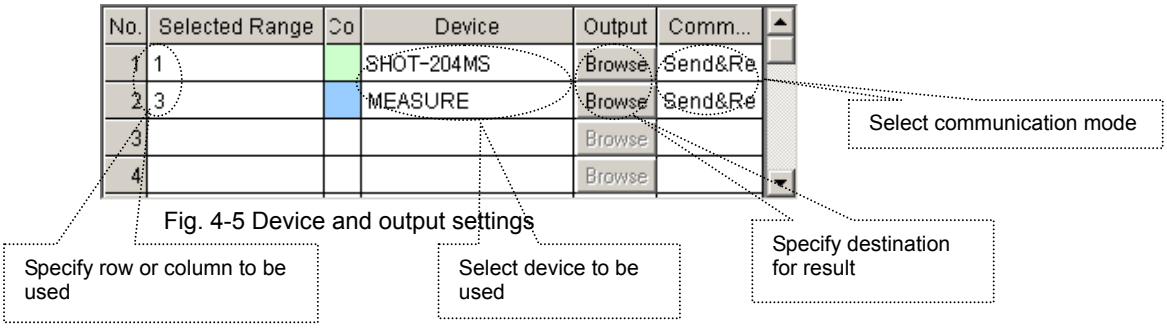
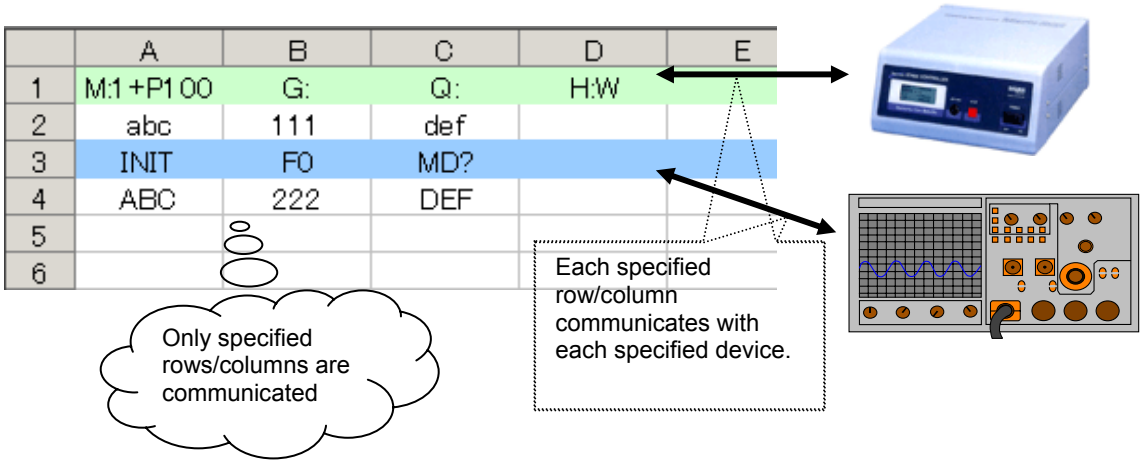


Fig. 4-5 Device and output settings

In the examples of the Fig. 4-4 and 4-5, the contents written in the cells in the first row is sent to SHOT-204MS, 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.)

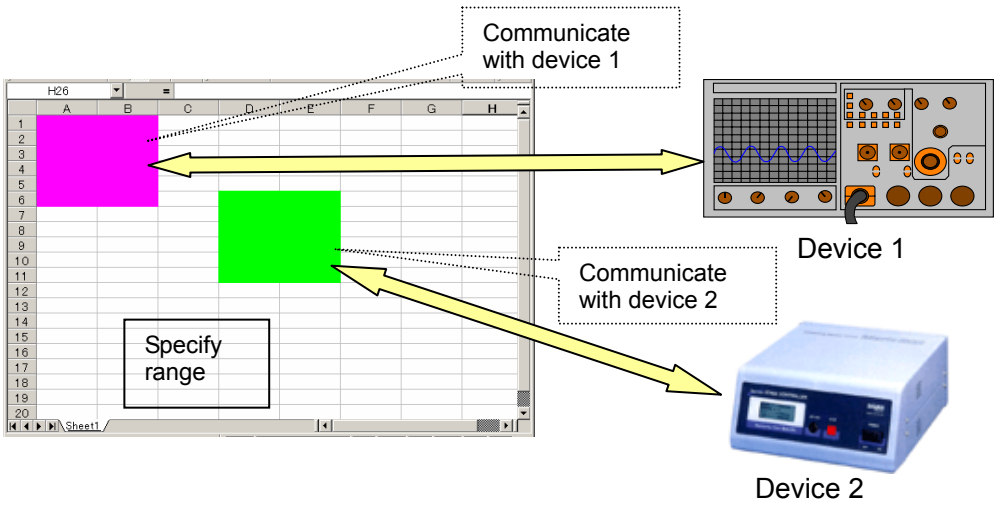


4.3 Instruction by Range Mode

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.



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.”

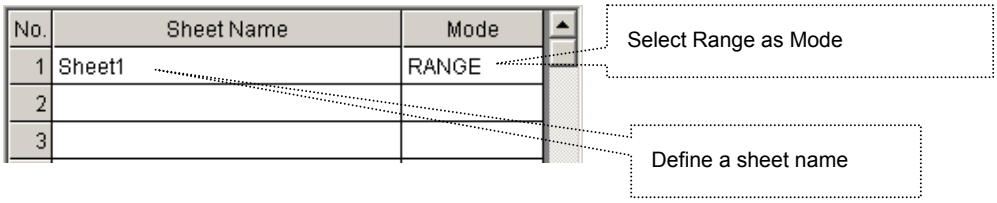


Fig. 4-6 Sheet name and mode settings

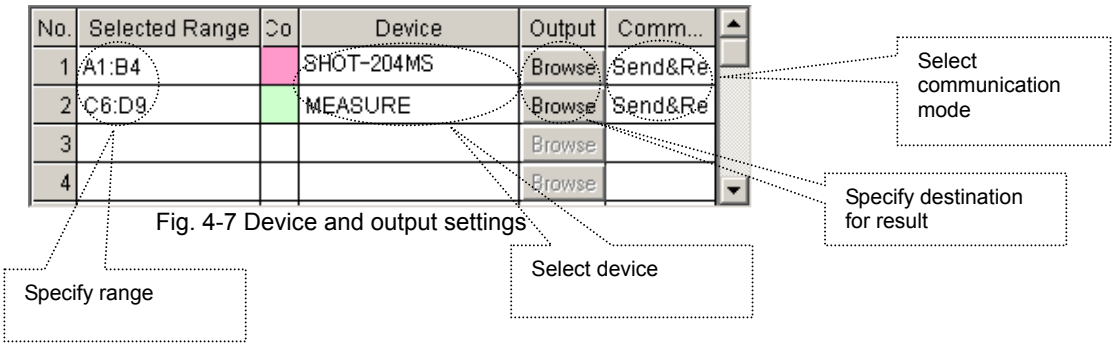
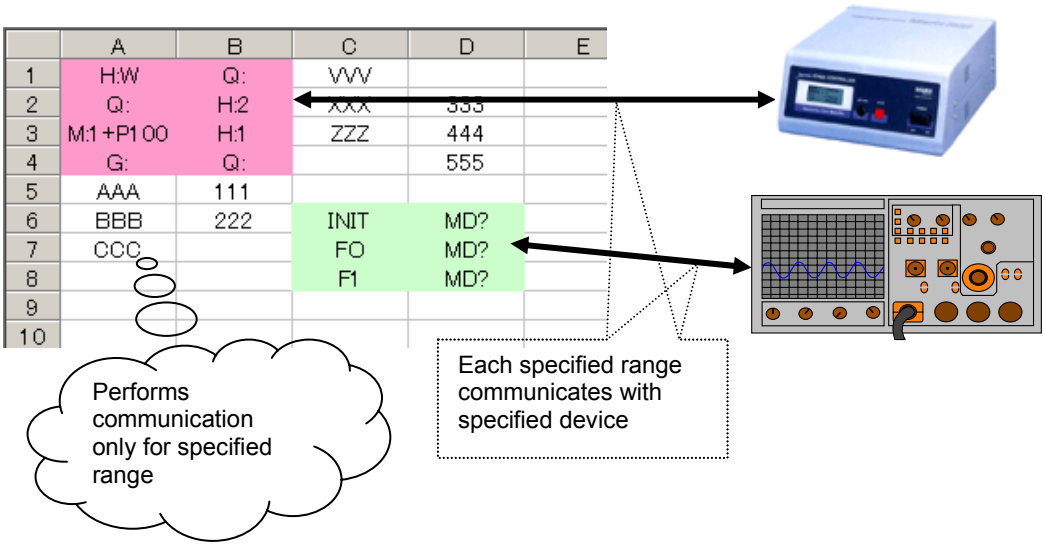


Fig. 4-7 Device and output settings

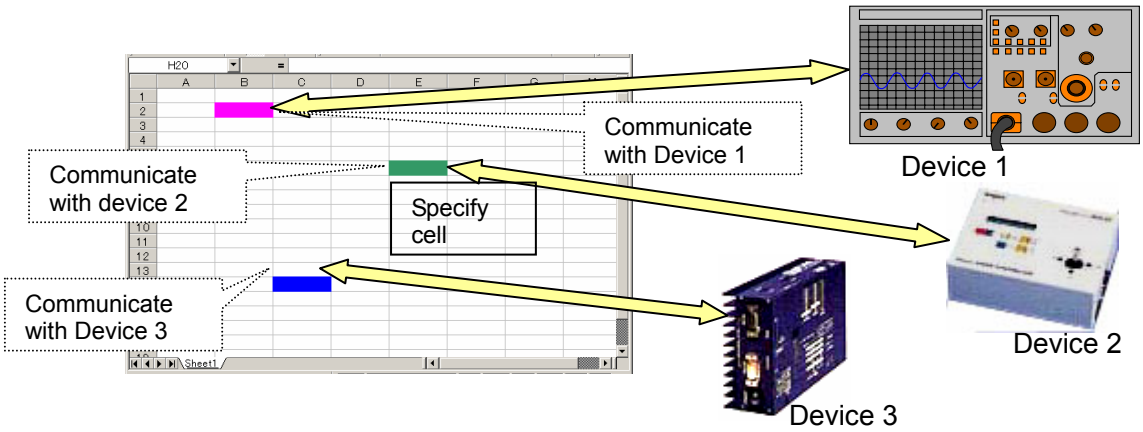
In the examples of the Fig. 4-6 and 4-7, the contents written in the range A1:B4 in a sheet is sent to SHOT-204MS and the contents in C6:D9 is sent to the measurement device. The results are returned. The received results are written to the sheet specified in the Output Result. (During execution, the color of each row changes as specified.)



4.4 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. 4-1 Instruction book setting."

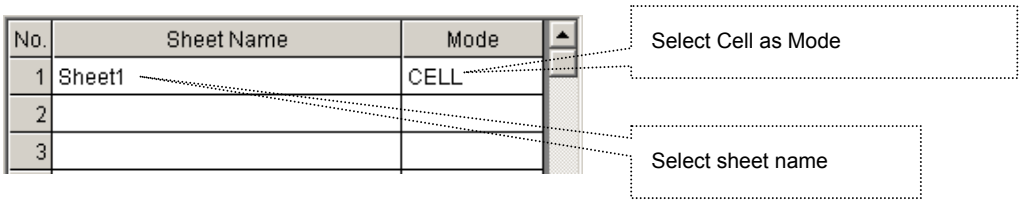


Fig. 4-8 Sheet name and mode settings

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

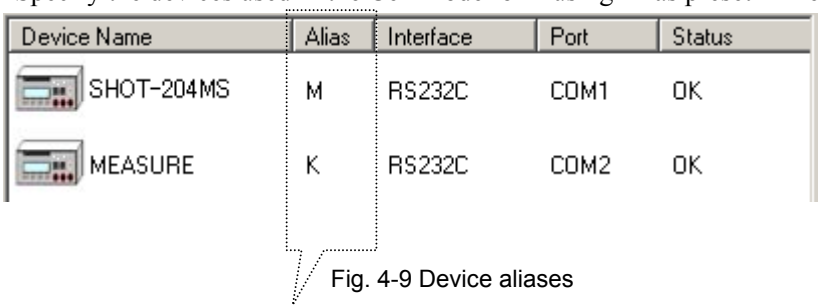
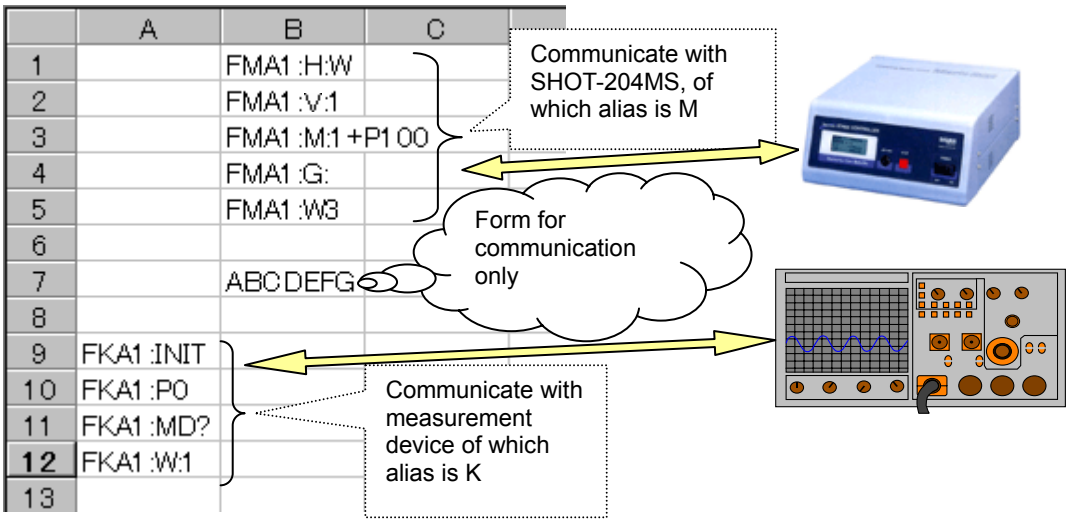


Fig. 4-9 Device aliases

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.



4.5 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.)

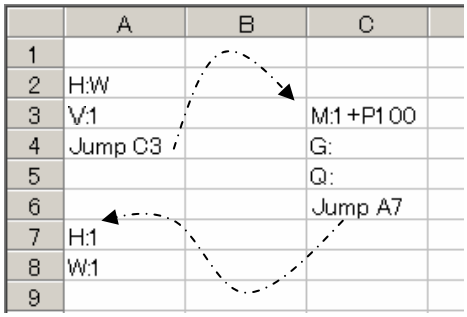


Fig. 4-10 Jump

(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.)

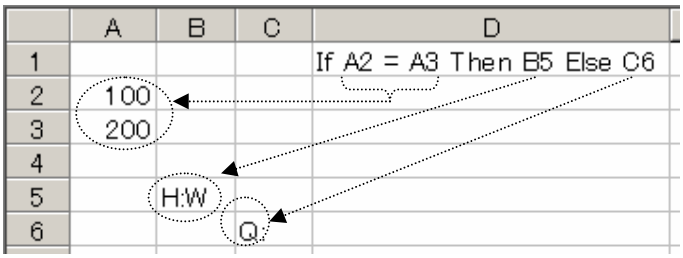


Fig. 4-11 If

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.)

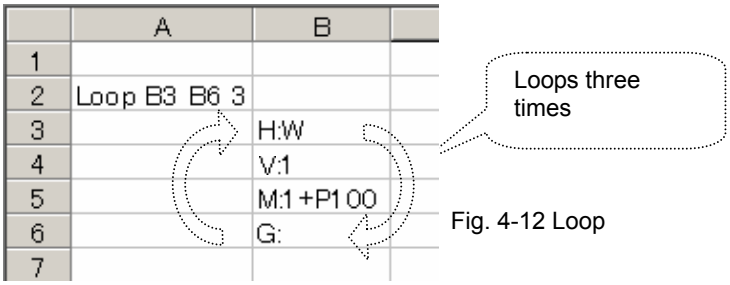


Fig. 4-12 Loop

(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 table №1 of the output settings window. (When nothing is registered into table № 1, it is the "Result" sheet of an instruction book.)

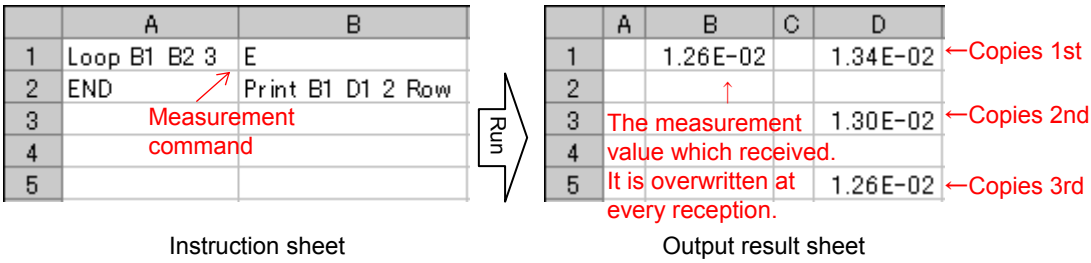
For the output settings window, see “3.7 Setting Output of Result.”

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. 4-13 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 the "Result" sheet of an instruction book.

※ 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	← Table №	Browse	

	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.)

Instruction Book, Sheet→ (C:¥BookA.xls, Instruction)

	A	B
1	PrintSet 1 2	E ←Measurement command
2	Loop B1 B2 3	Print B1 D1 2 Row
3	END	
4		
5		

Run

	A	B	C	D
1		1.26E-02		
2		↑		
3	The measurement value which received.			
4				
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)

Fig. 4-14 PrintSet

5. Sample

This section is dedicated to describe some examples of SGTERM.

5.1 Samples for Sheet Mode

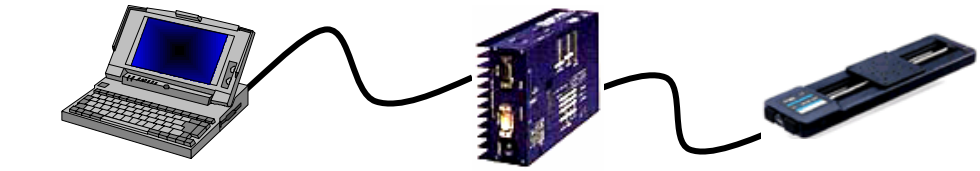
The followings are descriptions on samples for communication in sheet mode.

Use sheet mode when one sheet gives instructions to one device.

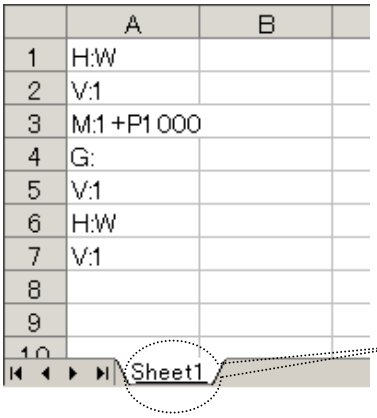
Either Send or Send&Receive can be selected depending on the communication contents. When Send is selected, the sheet only sends the contents to a device. When "Send&Receive" is selected, the sheet receives the output from the device responding to the sent contents. Random communication with Send and Send&Receive is not available (* V command, the form for receive waiting described in "4.5.1 Form Settings" can be used even when Send mode is selected.)

(1) Sheet Mode Sample 1

Send the contents in a sheet to the stage driver (SHOT-602) to move the 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		

Sheet1

Describe contents in Excel sheet as shown in left figure.

Description should begin in A column on first line.

Use Sheet1

Fig. 5-1 Sample 1

[Operation conditions]

SHOT-602 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. SHOT-602 is connected through RS-232C interface.

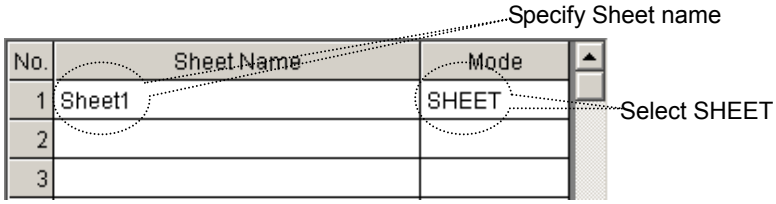
[Setting conditions]

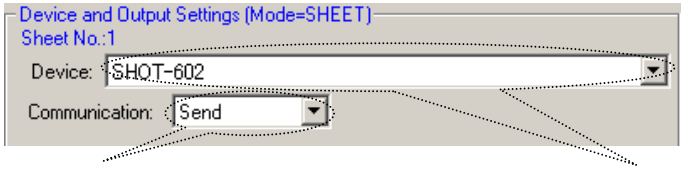
- Communication settings

Set the communication to be used as shown in “3.3.1 Communication Settings” 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 “4.1 Instruction by Sheet Mode.” Select Sheet Mode and select Send as communication mode since the command to SHOT-602 is only for sending (When Send&Receive is selected, receiving responses is essential.)



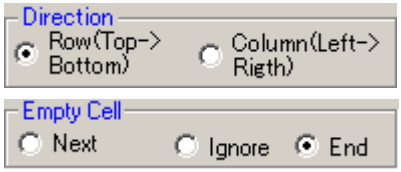


Select Send (Only send is available in Sheet mode.) Select a destination device

- Operation settings

Specify operations as described in “3.5 Operation Instruction.”

For this sample, the following settings are specified (keep default except the followings.)



- Form settings

SHOT-602 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 (2) Form for receive waiting in “4.5.1 Form Settings” to enable Send&Receive based on the registered contents.

Set the following contents in a table.

Symbol:

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	27	1	5
2					

[Run]

Execute Program Run to run the contents in an Excel sheet.

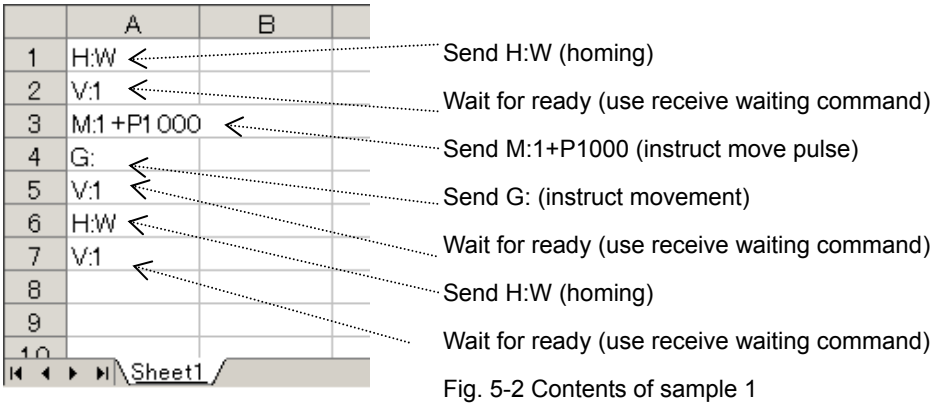


Fig. 5-2 Contents of sample 1

(2) Sheet Mode Sample 2

This sample is to send the contents in a sheet to the stage controller (SHOT-204MS) 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.

Home the stage, then move it 1000-pulse, then home again.

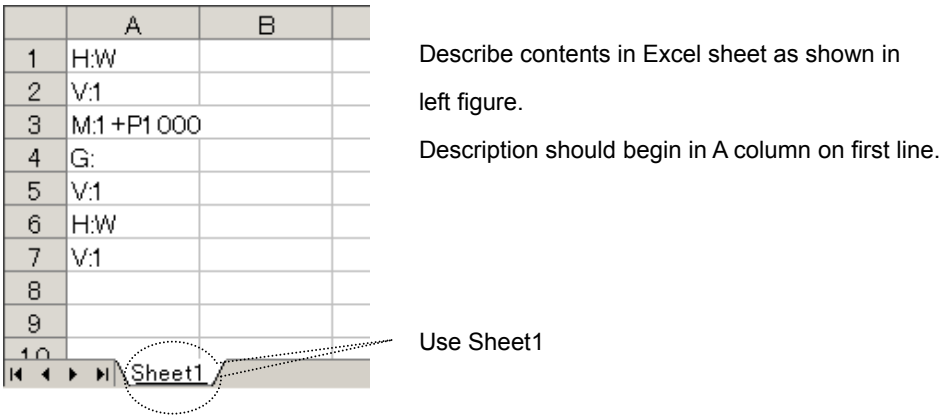


Fig. 5-3 Sample 2

[Operation conditions]

SHOT-204MS moves the stage based on the received command and sends the results (always responding to the received command.)

SHOT-204MS is connected through USB.

[Setting conditions]

- Communication settings

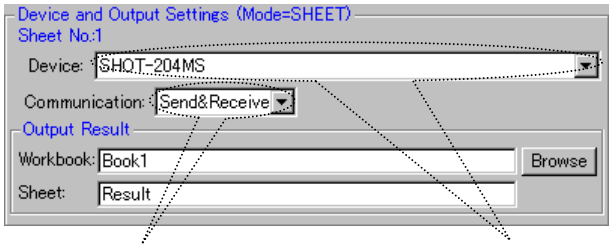
Set the communication conditions and run communication tests as shown in “4.4.1 Communication Settings” for the sample 1.

(USB is used for this sample.)

- Device and output settings

Set in the same way as the sample 1 shown in “4.2 Instruction by Sheet Mode.”

Select Send&Receive as the command to SHOT-204MS 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 “4.7 Operation Settings.”

- 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.

No.	Send String	Receive String	Start Position	Num...	Timeout
1	Q:	R	49	1	5
2					

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.

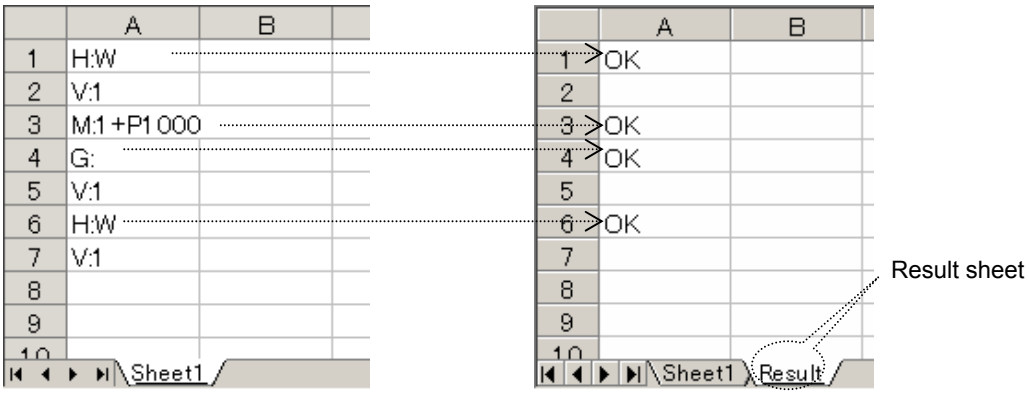


Fig. 5-4 Results of sample 2

5.2 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.

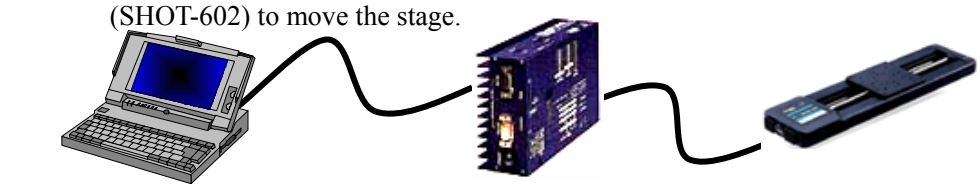
When Send&Receive is selected, SGTERM always receives the output from a device responding to transmission.

Send and Send&Receive cannot be performed randomly in one row, column or range.

(* V command, the form for receive waiting described in “4.5.1 Form Settings” 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 (SHOT-602) to move the stage.



Personal computer SHOT-602 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 “4.6 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 5-5 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.)

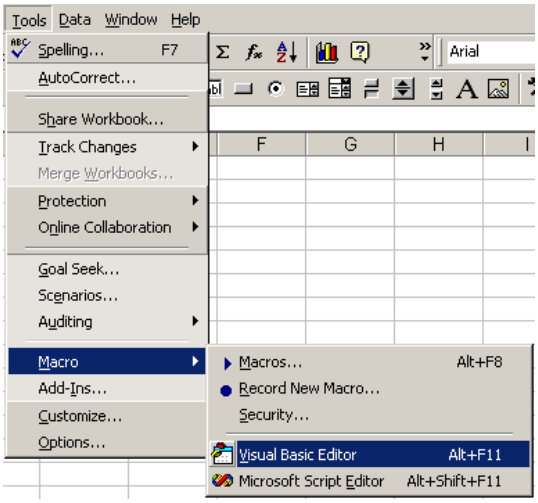


Fig. 5-6 Start-up Visual Basic Editor

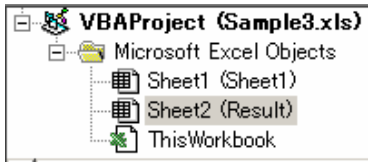


Fig. 5-7 Project screen

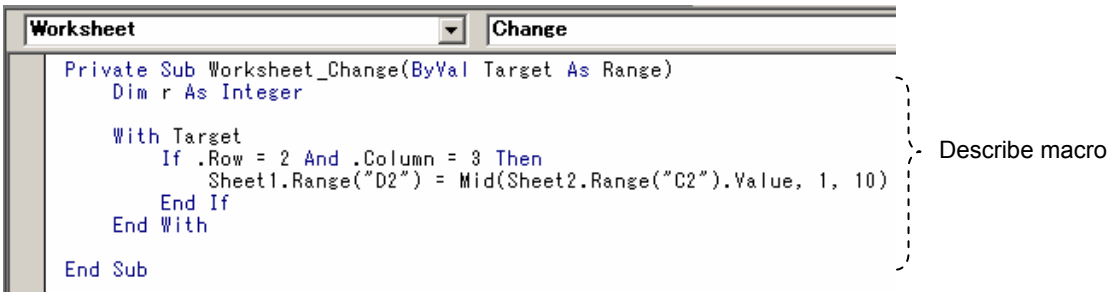


Fig. 5-8 Change event in Worksheet

[Operation conditions]

The Operation conditions for SHOT-602 are the same as that for the sample 1 (“1. Sheet Mode Sample 1”).

SHOT-602 is connected through RS-232C interface.

[Setting conditions]

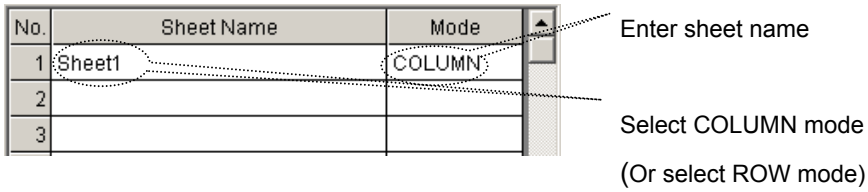
- Communication settings

The communication is set as described for the sample 1 (“1. Sheet Mode Sample 1”).

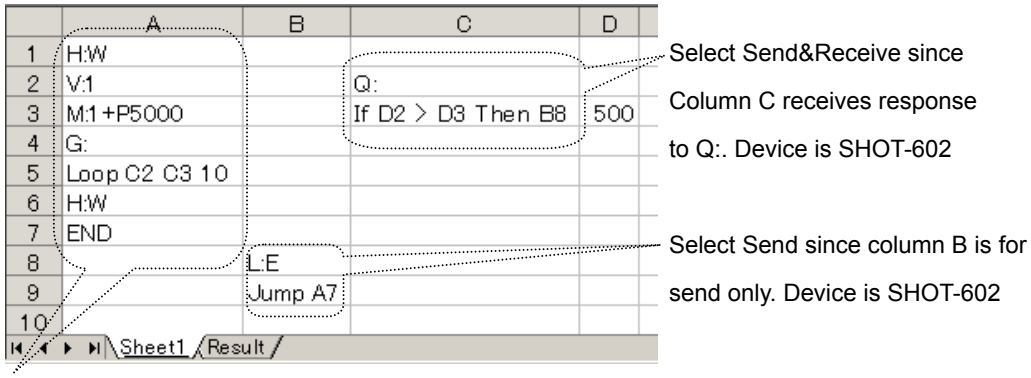
- Device and output settings

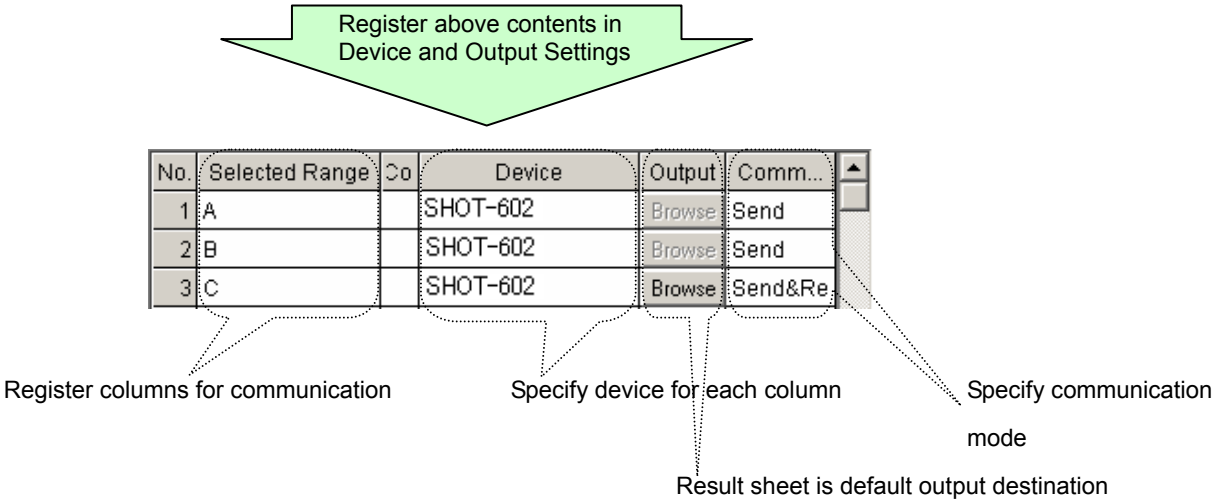
Specify an Excel workbook and sheet name to be used referring to “4.2 Sheet Mode.”

Select COLUMN 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.)

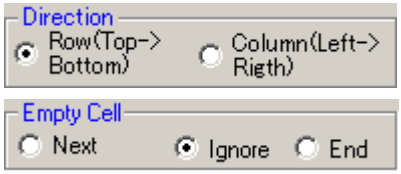




- Operation Settings

Set operations by referring to “4.7 Operation Settings.”

In this sample, set as shown below (keep default for other items than the followings)



- Form Settings

Set the same conditions as described for the sample 1 in 2. Form settings for receive waiting in “4.5.1 Form Settings” (“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. 5-8 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.

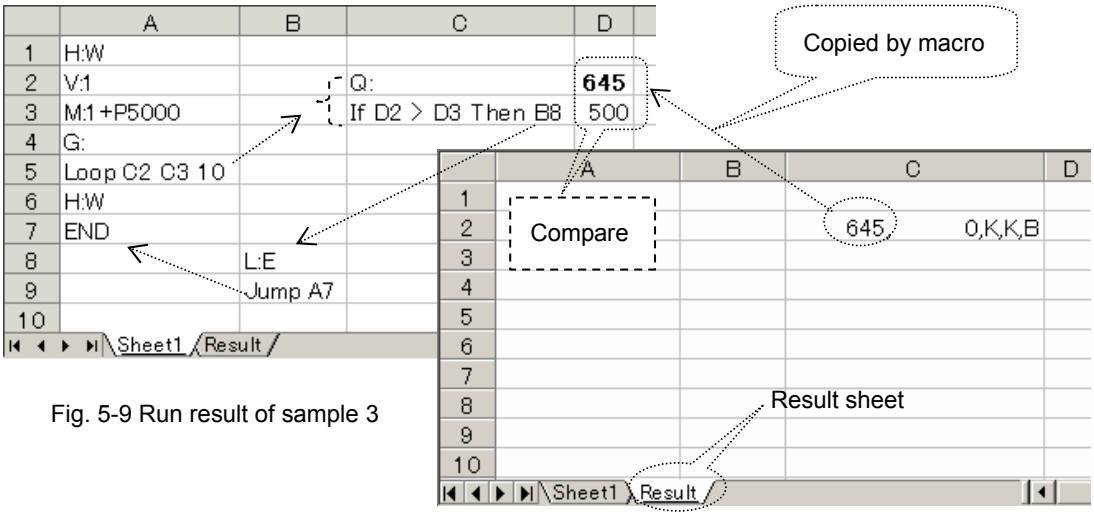
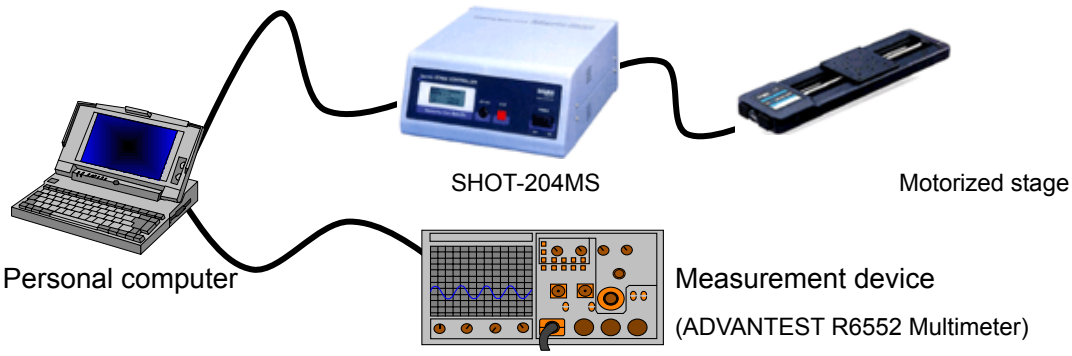


Fig. 5-9 Run result of sample 3

(2) Range Mode Sample

Collect data from a measurement device while positioning a stage.



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 “4.6 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

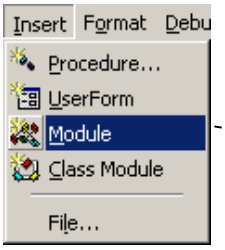
Use Sheet 1

(When there is no Result sheet, create new one)

Fig. 5-10 Sample 4

Start up Visual Basic Editor in the same way as described in the Fig. 5-6.

In Visual Basic Editor, select Insert, then select Module to add a standard module.



Add

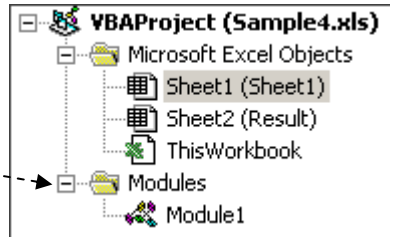


Fig. 5-11 Adding standard module

Fig. 5-12 Project screen

Describe macros in modules:

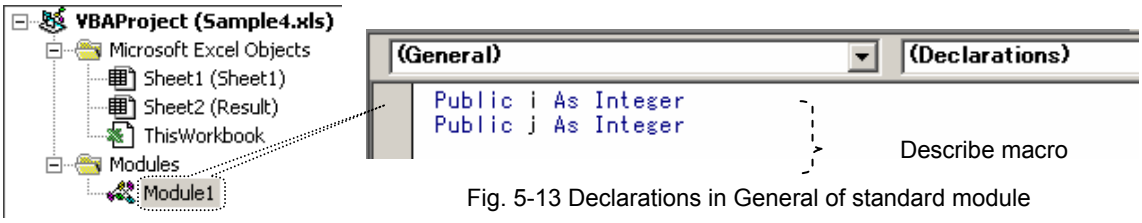


Fig. 5-13 Declarations in General of standard module

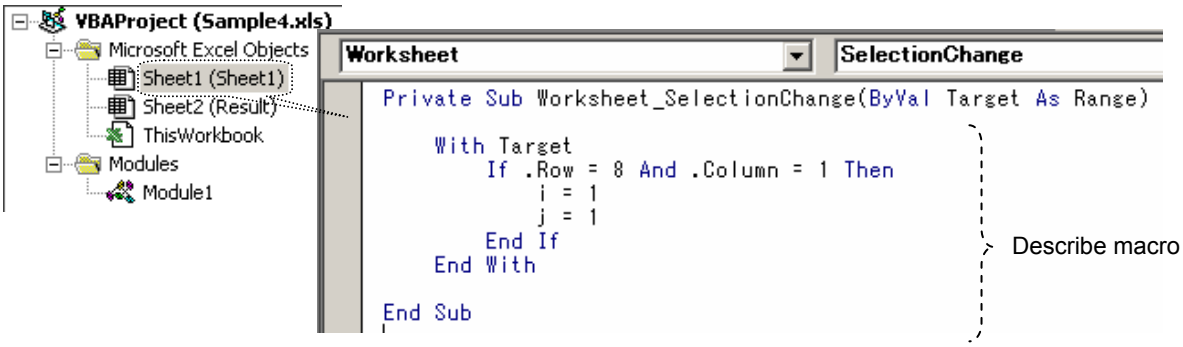


Fig. 5-14 Selection Change event in Worksheet of Sheet 1 module

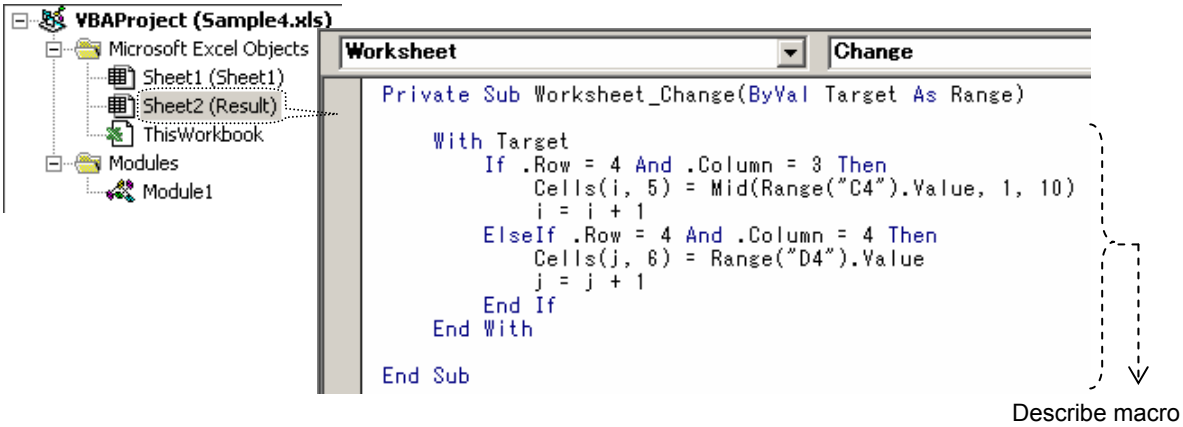


Fig. 5-15 Change event in Worksheet of Sheet 2 module

[Operation conditions]

SHOT-204MS moves the stage according to received commands.

SHOT-204MS 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-204MS through USB (ID1). Connect the measurement device (ADVANTEST R6552 Multimeter) through GPIB (Address1).

[Setting conditions]

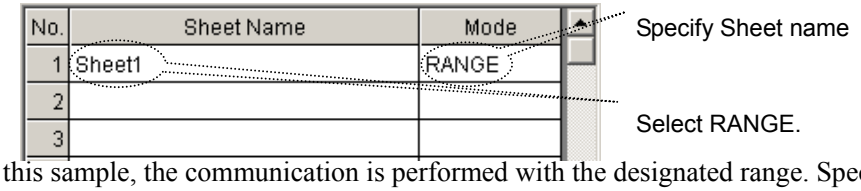
- Communication settings

Set communication to be used as described in “4.1.1 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

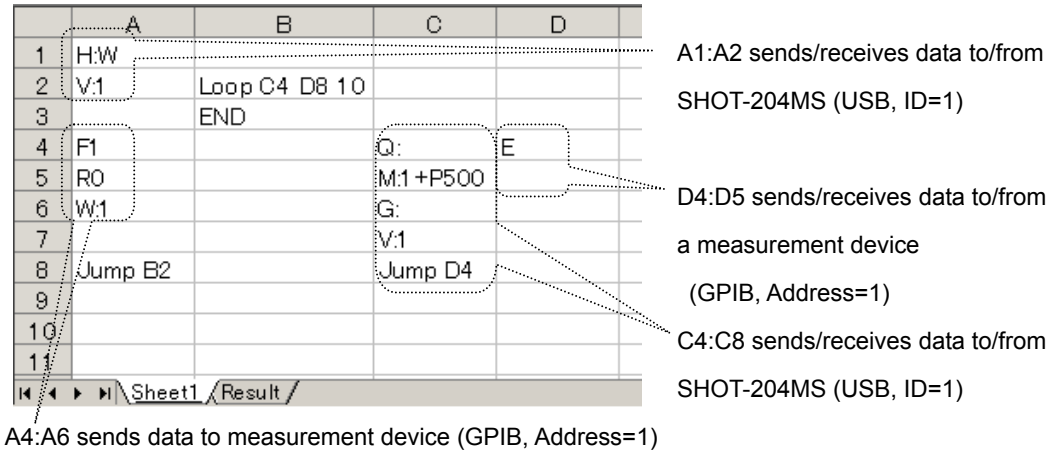
Specify an Excel workbook and sheet name to be used as described in “4.2 Instruction by Sheet Mode.”

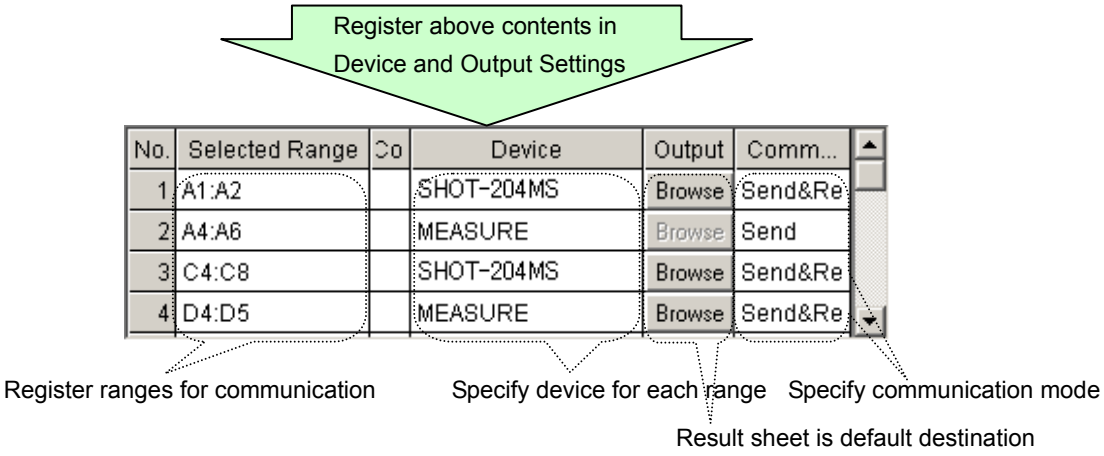
Select the RANGE mode.



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.)





- Operation settings

Set operations by referring to “4.7 Operation Settings.”

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 2. Form settings for receive waiting in “4.5.1 Form Settings.”

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. 5-14).

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. 5-15 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.

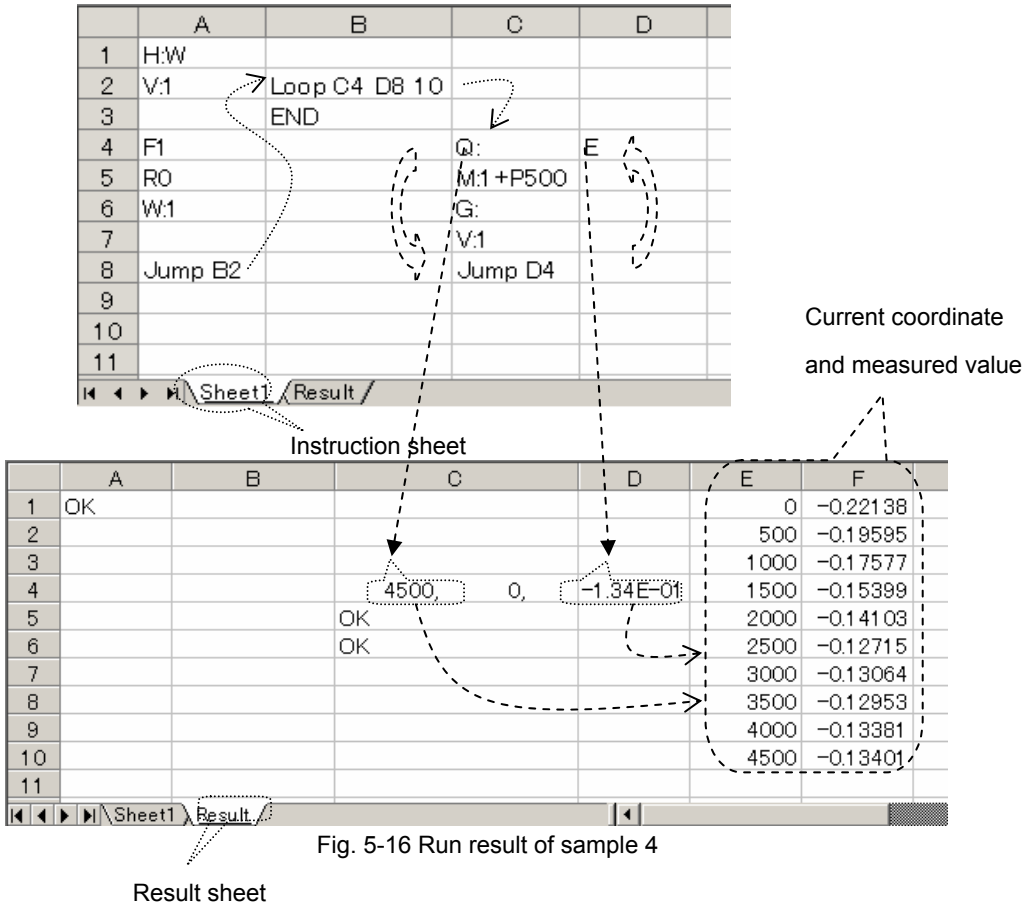


Fig. 5-16 Run result of sample 4

5.3 Cell Mode Sample

The following describes the sample for communication in cell mode.

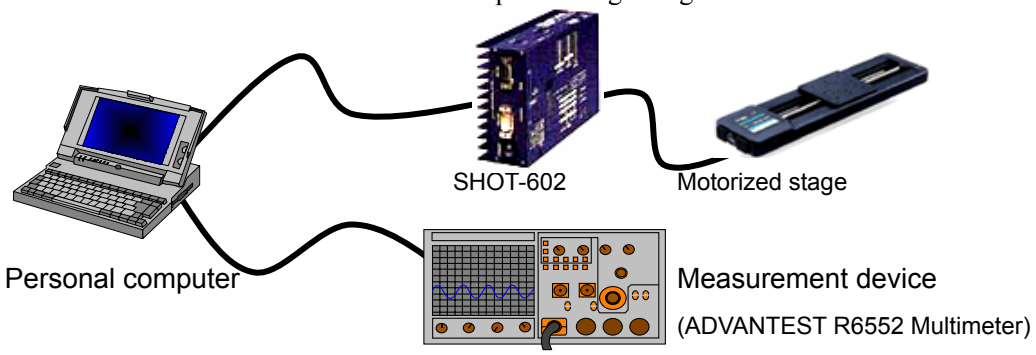
This mode is used when different destination is specified for each cell to give instruction.

The devices and communication mode, etc. are specified for each cell with the forms.

For the form, see “1. Form setting for communication” in “4.5.1 Form Settings.”

(1) Cell Mode Sample

Collect data from a measurement device while positioning a stage.



Run the same contents in cell mode as described in “2. Range Mode Sample.”
However, use SHOT-602 instead of SHOT-204MS.
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				

Sheet1 Result

Use Sheet 1
(When there is no Result sheet, create)

Fig. 5-17 Sample 5

Start up Visual Basic Editor to describe the same macro as described in “2. Range Mode Sample” (For the details, see Fig. 5-13 Declarations in general of standard module, Fig. 5-14 Selection Change event in Worksheet of Sheet 1 module, and Fig. 5-15 Change event in Worksheet of Sheet 2 module.)

[Operation conditions]

SHOT-602 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.
SHOT-602 is connected through RS-232C (COM2) and the measurement device (ADVANTEST R6552 Multimeter) is connected through GPIB (Address 1).
The alias of SHOT-602 is “C”, the measurement device (ADVANTEST R6552 Multimeter) is “S.”

[Setting conditions]

- Communication settings

Set communication to be used as described in “4.1.1 Communication Settings.” Select interface and port and run communication test. When the 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 “4.2 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 “4.7 Operation Settings.”

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 “2. Form settings for receive waiting” in “4.5.1 Form Settings.”

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 SHOT-602 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. 5-14).

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

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. 5-15) 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.

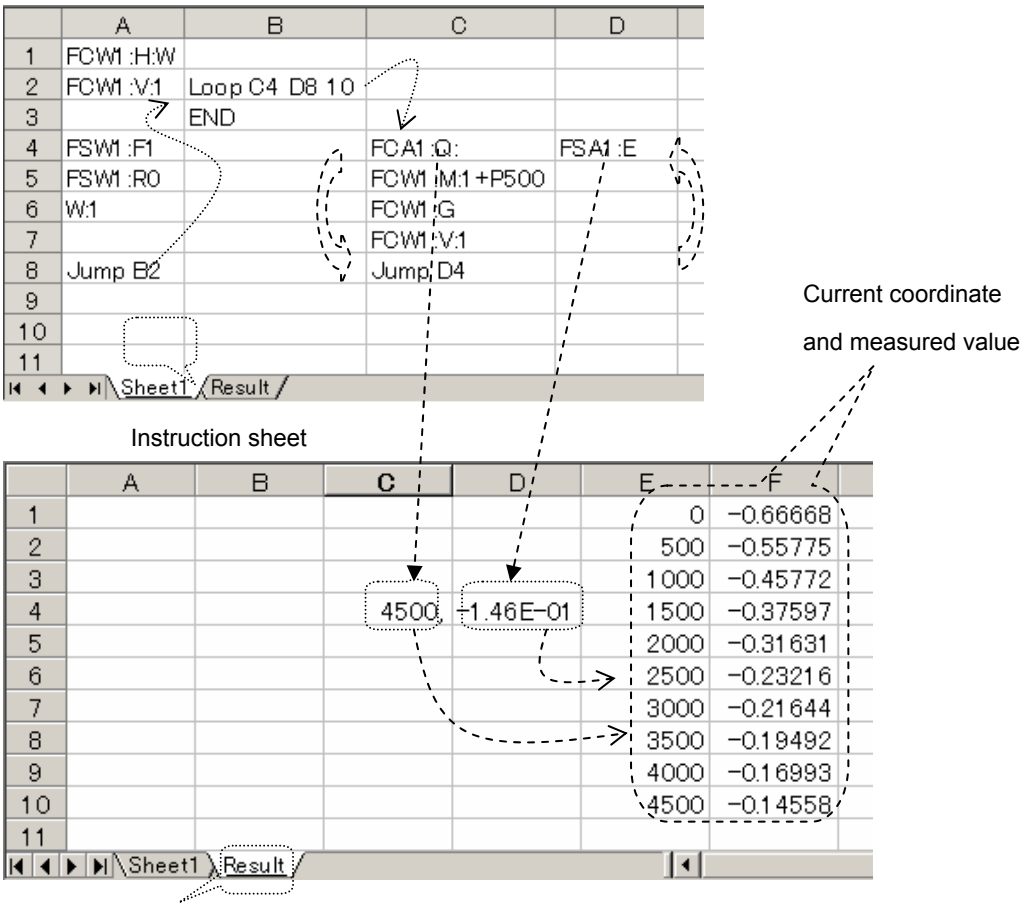


Fig. 5-18 Run result of sample 5