Auto-Alignment Application

SGALIGN

Software User Manual

HOURS
www.hours-shop.com

Table of Contents

Introduction

This is the user manual for the SGALIGN control software shipped with the auto-alignment system.

1 . Overview

The SGALIGN software is used for operating the alignment system. By use of the auto run program (sequence program) based on various commends and indicators, the multi-axis motorized stages can be automatically operated, and the measurement can be automatically achieved.

1 - 1 . Operating Environment

OS	:	Windows 10 64bit / Windows 11
CPU	:	8th Generation Intel® Core™ i7 Processor 2.0GHz or more (Recommended)
Memory	:	16GB or more (Recommended)
Storage	:	SSD or HDD, 500GB or more
Platform	:	.NET 6.0

1 - 2 . Compatible PCI Board

Motion Control Board	:	MC8082P (NOVA electronics, INC.) https://www.novaelec.co.jp/MC8082P.html	2 pcs
A/D Board	:	PEX-321316 (Interface Corporation) http://www.interface.co.jp/catalog/prdc.asp?name=pex-321316	
GPIB Board	:	PCI-4304 (Interface Corporation) http://www.interface.co.jp/catalog/prdc.asp?name=pci-4304	

1 - 3 . File

Executable program is saved in the following folder.

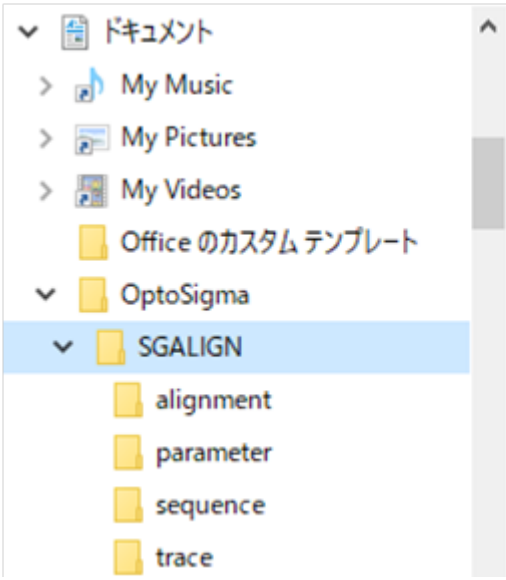
C:¥SIGMAKOKI64

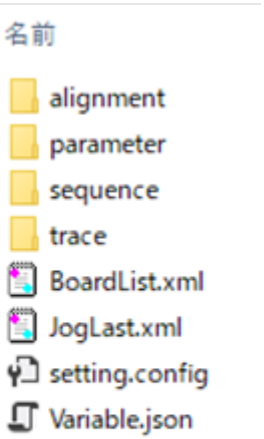
C:¥SIGMAKOKI64

SGALIGN.exe	Main program
:	Others such as system file

Setting filer is saved in the following folder.

C:¥Users¥[USER NAME]¥Documents¥SGALIGN



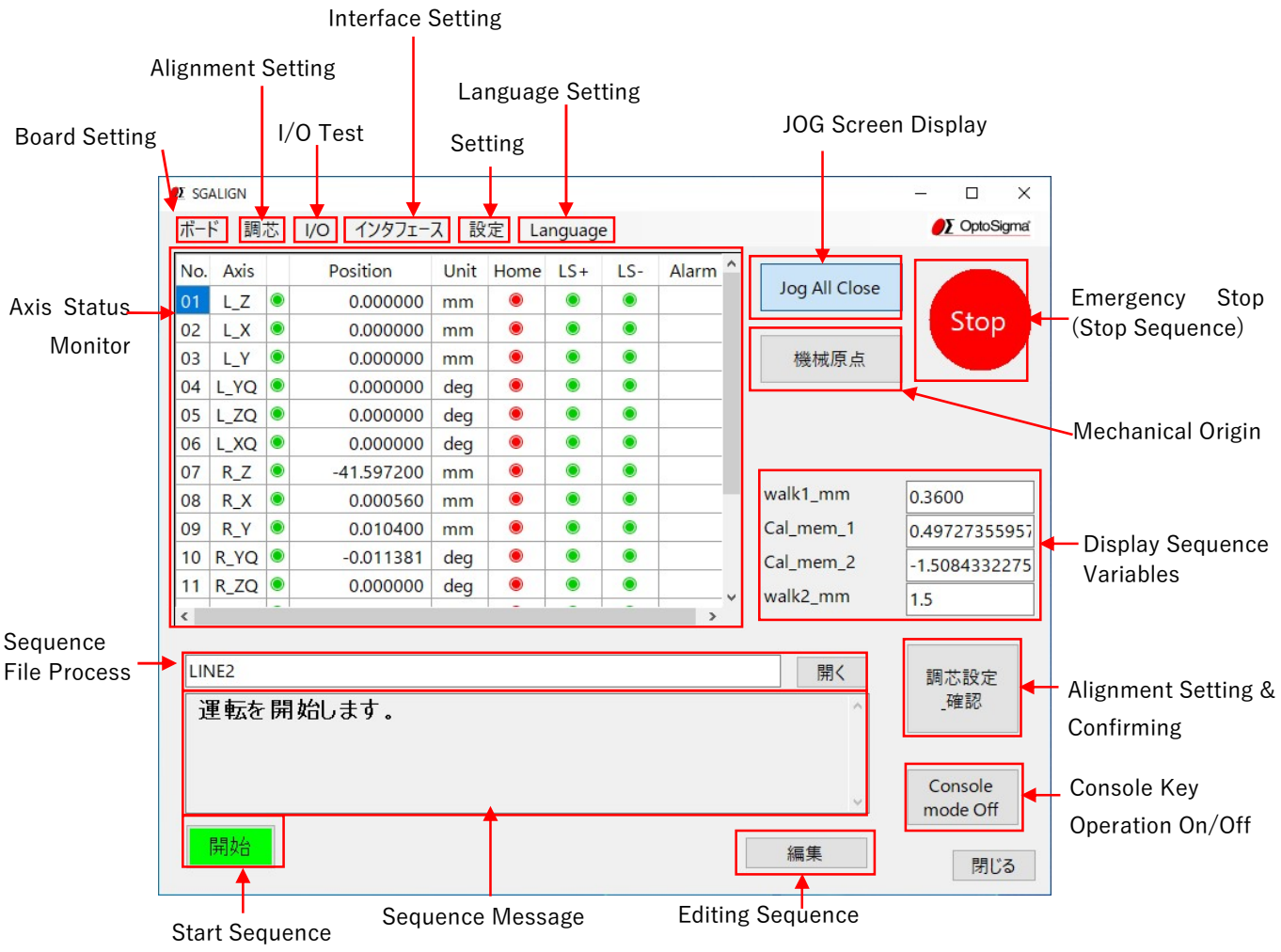


…Folder contains alignment result files
…Folder contains setting files
…Folder contains sequence files
…Folder contains trace log files
…Setting file for NOVA board list
…Saved status of the JOG interface
…①
…File contains sequence variables

① The final status of each interface, and the full path of the various setting file are saved in this file.

2 . Main Screen

2 - 1 . Menu and Buttons



・<Board> Board setting menu

Display setting screen for NOVA electronics, INC. board

(See P.11 for details)

・<Alignment> Alignment setting menu

Display setting screen for alignment (Same function as clicking <Alignment Setting & Confirming> button)

(See P.28 for details)

・<I/O> I/O test menu

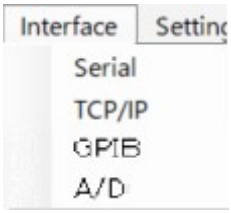
Display I/O test screens

(See P.16 for details)

・<Interface> Interface setting menu

Display submenu of various interface setting.

Set various interface.



・<Serial> Display setting screen for serial communication
(See P.20 for details)

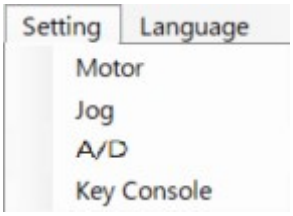
・<TCP/IP> Display setting screen for LAN communication
(See P.22 for details)

・<GPIB> Display setting screen for GP-IB communication
(See P.24 for details)

・<A/D> Display setting screen for A/D
(See P.26 for details)

・<Setting> Various setting menu

Display submenu of various setting



[Motor] : Display setting screen for axis parameters
(See P.12 for details)

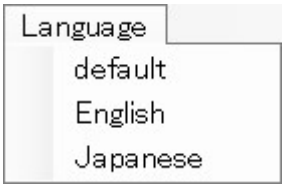
[Jog] : Display screen for JOG operation
(See P.18 for details)

[A/D] : Display screen for A/D setting
(See P.26 for details)

[Key Console] : Display screen for key console setting
(See P.45 for details)

・<Language> Language setting menu

Display submenu of language setting



[default] : in default language

[English] : in English

[Japanese] : in Japanese

・<JOG> Display JOG screen

Display screen for JOG operation

(See P.18 for details)

・<Mechanical Origin> Button for mechanical origin

Run mechanical origin operation set in axis setting screen.

* WARNIN: Please be careful to prevent from possible mechanical interference!

・<Stop> Emergency stop button & sequence stop button

Immediately stop absolute movement, relative movement, all axis motion in JOG operation.

Immediately stop all axis motion and sequence itself in sequence operation.

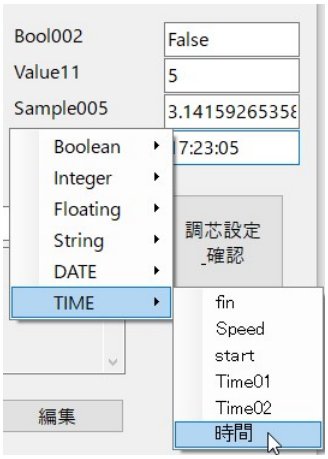
Please restart the software after emergency stop operation.

・<Display Sequence Variables>

Up to 4 variables defined by sequence can be displayed.

Double-click name of the variables to select.

Variables can be specified from Type-Variables.



・< Alignment Setting & Confirming> Button

Display alignment setting screen (Same to <Alignment Setting> menu)

(See P.28 for details)

・<Axis Status Monitor>

Display status of all axis in real time.

(See P.9 for details)

・<Sequence File Process>

[Open] Button

Select the sequence file (*.json) to edit or run.

・<Start> Sequence start button

Start sequence.

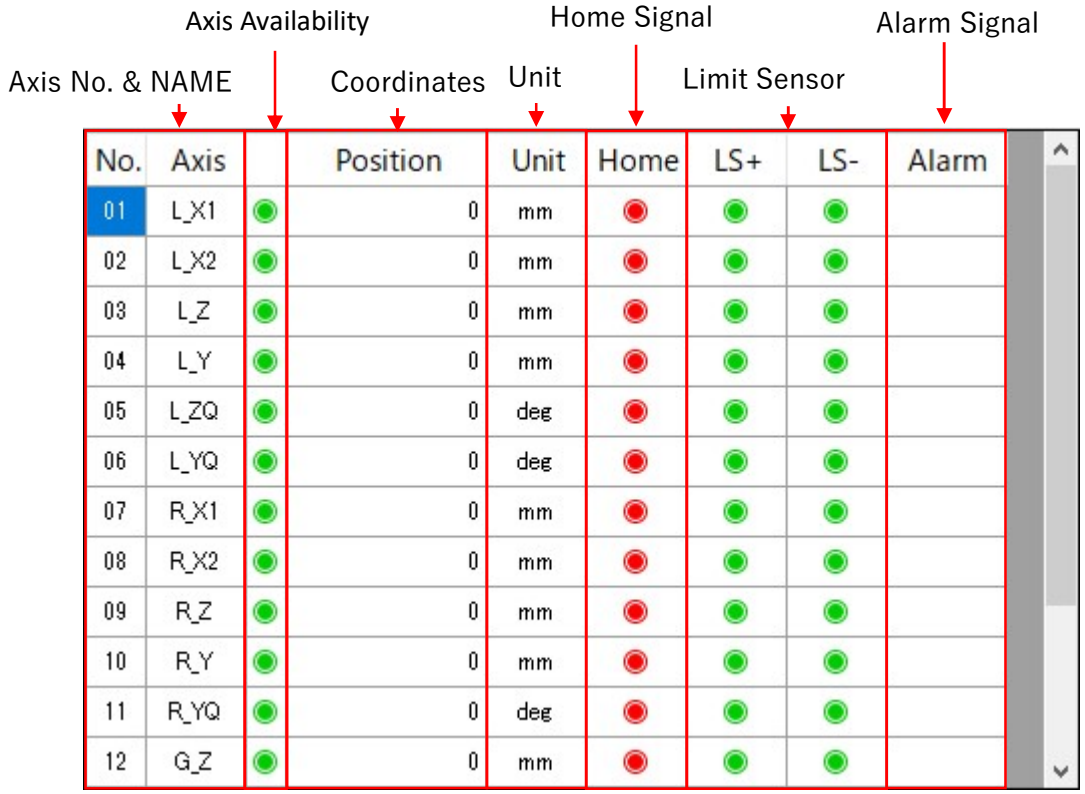
・<Edit> Button for sequence creation and edit

Display the sequence creation and edit screen.

(See P.36 for details)

2 - 2 . Axis Status Monitor

Display the current status of all axis in real time.



No.	Axis		Position	Unit	Home	LS+	LS-	Alarm
01	L_X1		0	mm				
02	L_X2		0	mm				
03	L_Z		0	mm				
04	L_Y		0	mm				
05	L_ZQ		0	deg				
06	L_YQ		0	deg				
07	R_X1		0	mm				
08	R_X2		0	mm				
09	R_Z		0	mm				
10	R_Y		0	mm				
11	R_YQ		0	deg				
12	G_Z		0	mm				

・<Axis No. & Name>

Display the axis number and the axis name set in the axis parameter setting screen (Section 4, Page 12).

・<Axis Availability>

In red if the axis set in the axis parameter setting screen (Section 4, Page 12) does not exist or the axis cannot be recognized. In green when the axis is recognized.

・<Coordinates>

Display the coordinates based on the information set in the axis parameter setting screen (Section 4, Page 12). The coordinate "0" expresses the position at software startup or the position after homing. When the motor is running, the coordinates are highlighted in green.

・<Unit>

Display the unit (in mm or deg) of the coordinates set in the axis parameter setting screen (Section 4, Page 12)

・<Home Signal>

Indicates whether home operation has been completed or not. When homing is performed by clicking HOME button or in the sequence program, the light turns green after finishing the home operation.

・<Limit Sensor>

Display the status of the limit sensor in the stages.

In red once the sensor detects the signal.

[LM+] : Limit sensor at “+” side

[LM-] : Limit sensor at “-” side

*Both [LM+] and [LM-] light in red when driver is powered off.

・<Alarm Signal>

Display when alarm occurs.

Display nothing if no alarm.

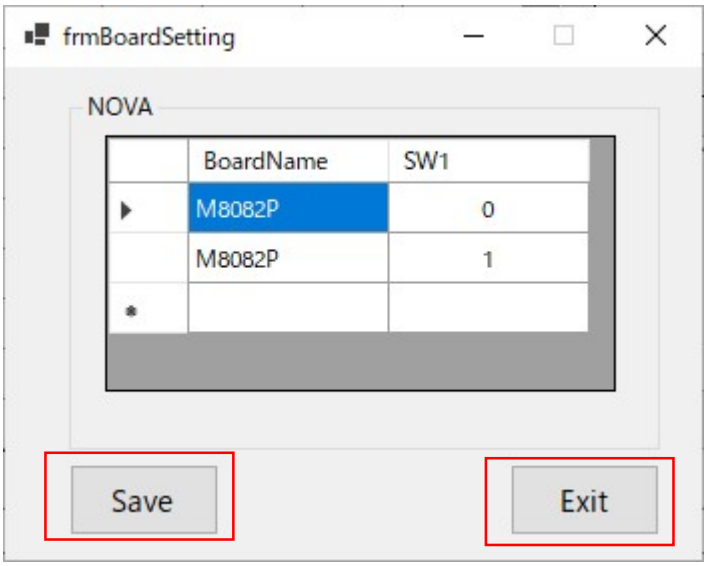
3 . Board Setting Screen

Set the number of the NOVA electronics' board.

If the number of input line is not 2, input "M8082P" into the "BoardName" column of the last "*" line.
Input rotary switch number specified on the NOVA board into "SW1" column.
"SW1" is the board number used by the program.

*Example

BoardName	SW1
M8082P	0
M8082P	1



・<Save> button

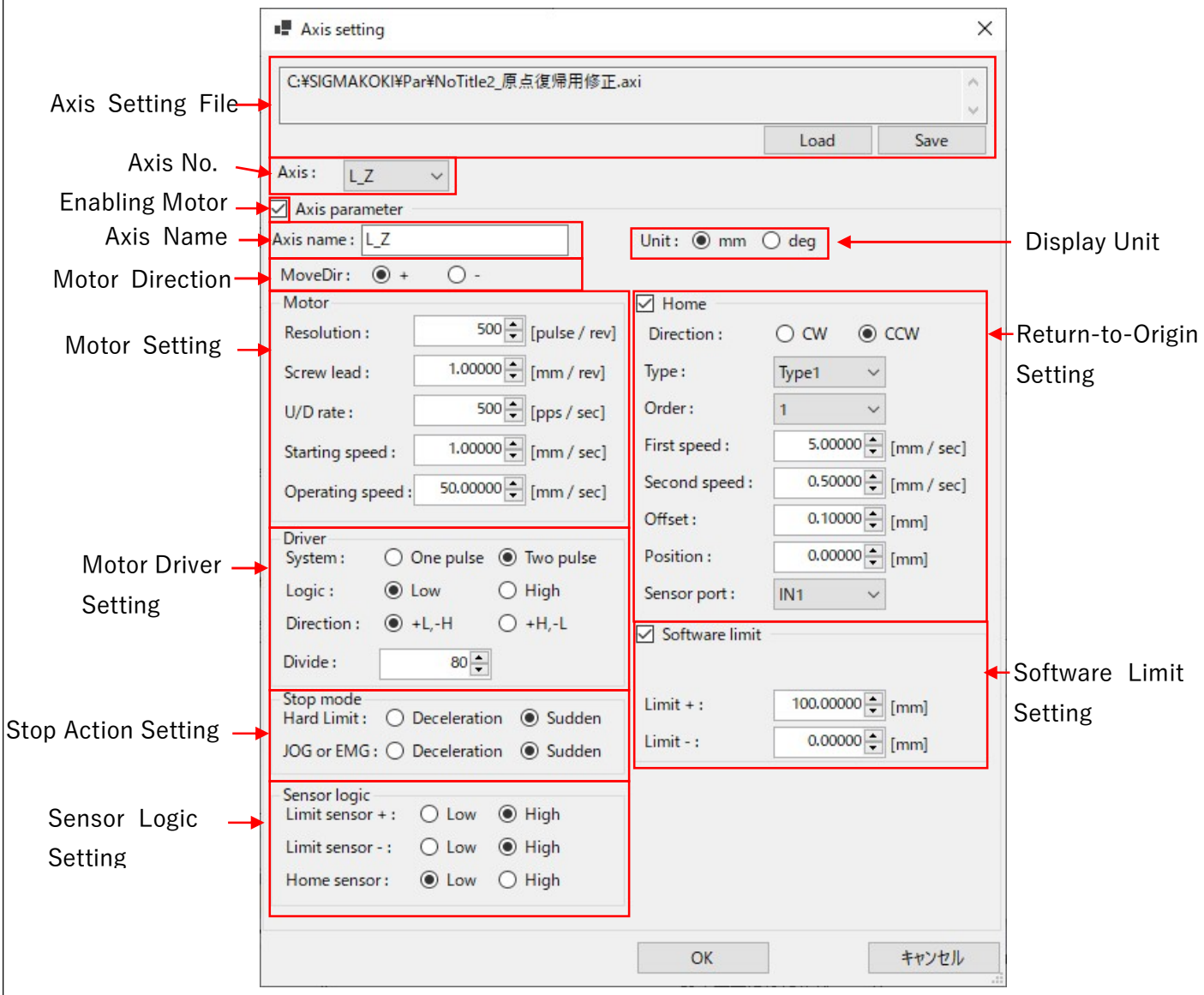
Click the "Save" button to save the setting after the input.
The setting is always saved in the following folder.
C:¥Users¥[User Name]¥Documents¥OPTOSIGMA¥SGALIGN¥BoardList.xml

・<Exit> button

Click to close the board setting screen.

4 . Axis Parameter Setting Screen

[!] IMPORTANT SETTING FILE RELATED TO THE OPERATION OF THE STAGE. [!]
[!] BASICALLY, PLEASE DO NOT EDIT. [!]



・[Axis Setting File]

Display the name of the file which contains axis setting values.

LOAD : Load the axis setting file.

SAVE : Save the axis setting file.

・[Axis Number]

Select the axis number on the motion control board.

Axis 1 to 8 can be selected.

Display the axis name if the “Axis Name” is saved.

・[Enabling Motor]

Enable or disable the selected axis.

Even the axis is disabled, some settings such as axis name and sensor signal are reflected in the axis variable monitor (Page. 8).

Check to enable the axis and setting changes.

・[Axis Name]

Set a name for the currently selected axis.

・[Display Unit]

Select the type of the enabled stage.

- ・[mm] Select for linear stage
- ・[deg] Select for rotating or gonio stage

・[Motor Direction] “MoveDir”

Specify CW or CCW of the controller. Also reflected in the direction of the software limit.

Increasing/decreasing the scale in the same direction : +

Increasing/decreasing the scale in the opposite direction : -

・[Motor Setting]

Set motor and stage

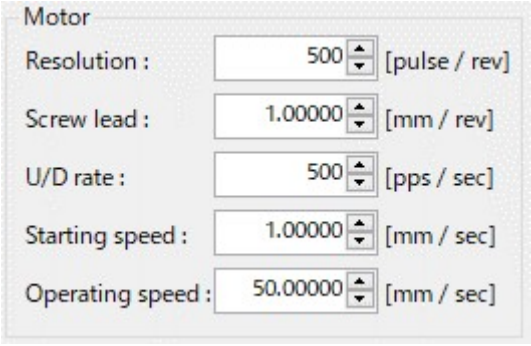
Resolution : Set the required pulse numbers/revolution

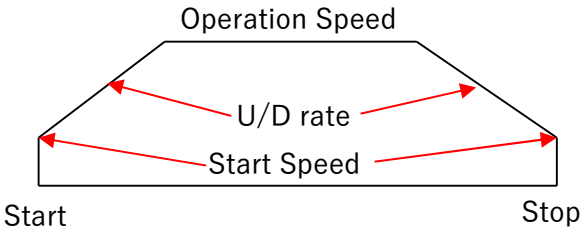
Screw lead : Set the travel/revolution

U/D rate : Set the acceleration time for motor acceleration/deceleration (Unit: pulse (1 - 8000))

Start speed : Set the motor starting speed

Operating speed : Set the motor operating speed





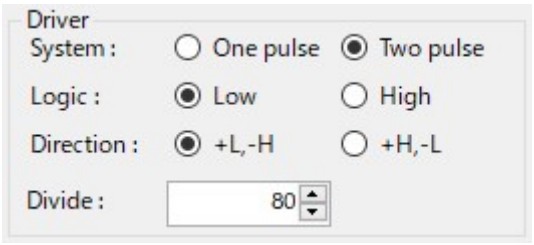
・[Motor Driver Setting]

System : Select the mode of the command pulse that the driver can receive (one-pulse mode or two-pulse mode).

Logic : Select the command pulse logic.

Direction : Select the direction logic for the one-pulse mode.
Select the command pulse logic for two-pulse mode.

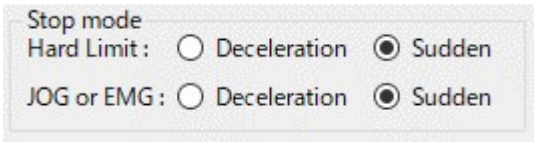
Divide : Set micro-step resolution (Must be linked to the driver settings)



・[Stop Action Setting]

Hard Limit : Select the mode for stopping due to hardware limit.

JOG or EMG : Select the mode for stopping when using JOG or emergency stop button.



Deceleration : Deceleration stop

Sudden : Immediate stop

・[Sensor Logic Setting]

Select the logic of the sensor signal

Limit Sensor + : "+" side of the hardware limit

Limit Sensor - : "-" side of the hardware limit

Home Sensor : Home sensor (valid only for the stage equipped with such sensor)

*Changes depending on the type of the used sensor.

・[Return-to-Origin Setting]

Home : Check when performing return-to-origin operation.
If checked, the following items can be edited.

Direction : Set return-to-origin direction

Type : Set return-to-origin method (option for other than Type1)
*Operation of Type1: moves until reaching the limit sensor at specified direction, and then moves to the specified offset position.

Order : Set return-to-origin order (performed in the order of the small number)

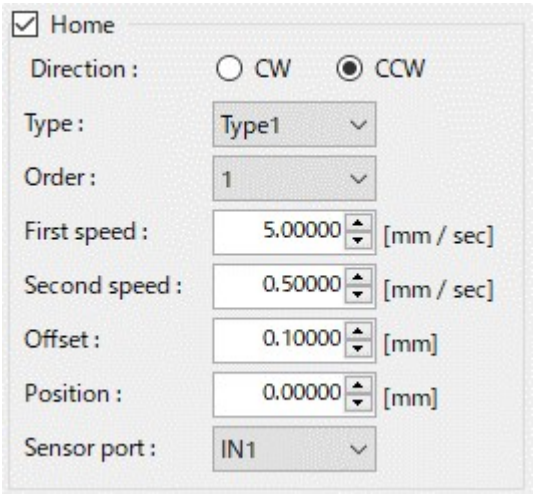
First speed : Set the first return-to-origin speed

Second speed : Set the second return-to-origin speed

Offset : Set the offset position after homing

Position : Se the initial position. This position is reflected in coordination after homing.
*Value display only. The stage does not really move/

Sensor port : Select the board with the return-to-origin sensor connected.



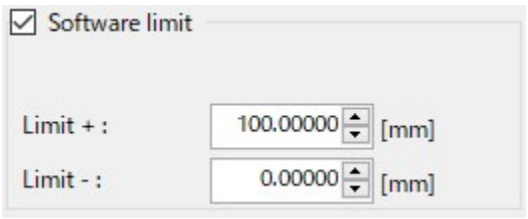
・[Software Limit Setting]

Software limit : Check to enable software limit and its setting
If checked, the following items can be edited.

Limit+ : Set “+” side limit position in given unit

Limit- : Set “-” side limit position in given unit

*”+” and “-” directions reflect the direction specified in [Motor Direction] “MoveDir”.



5 . I/O Test Screen

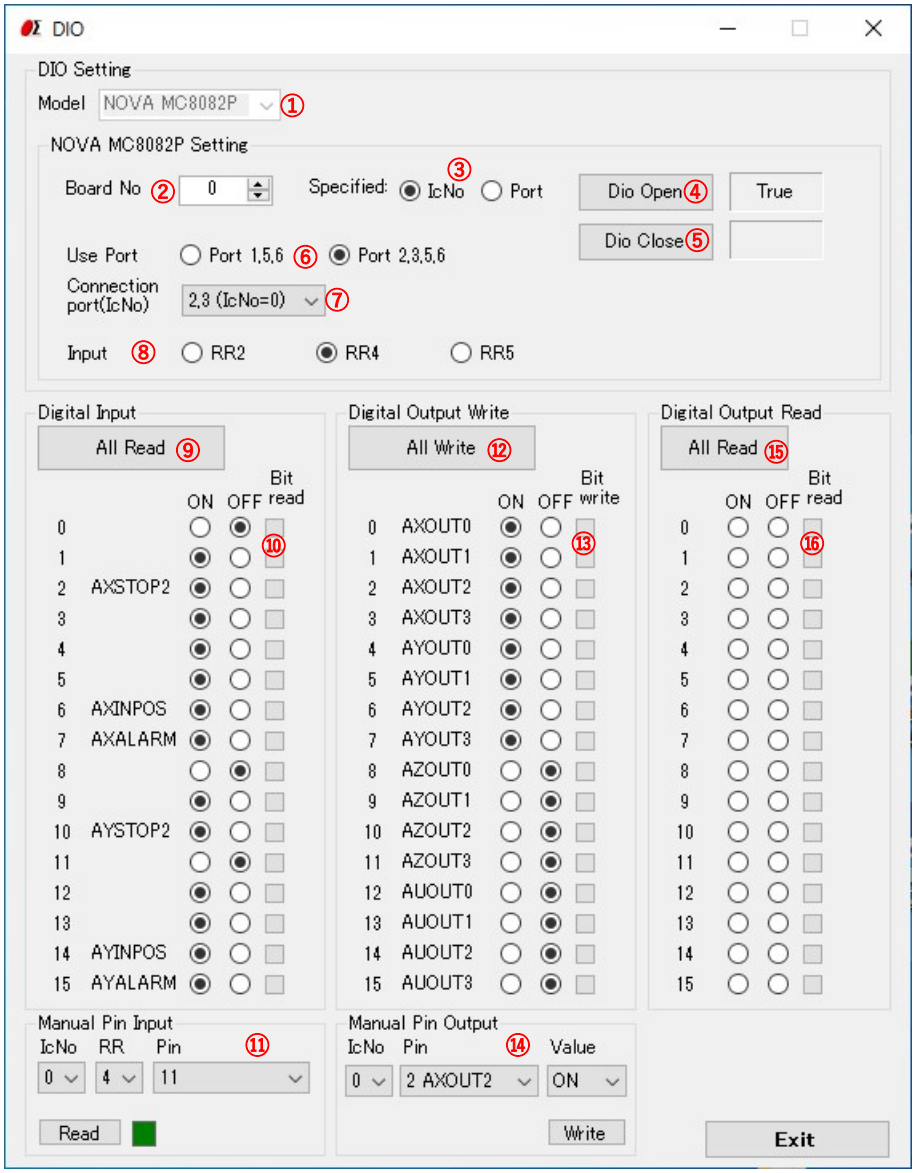
Used to perform ON/OFF communication test for each PIN of I/O.

The digital I/O function of the motion control board “MC8082P” manufactured by Nova Electronics Corporation is used to control the 8-axis driver box “SDB-08” manufactured by us.

For details of each product, please refer to the following companies' websites and manuals.

MC8082P ：https://www.novaelec.co.jp/down/file/mc8000p.pdf

SDB-08 ：https://jp.optosigma.com/en_jp/sdb-08.html



・① [Model]

The model number of the board to be used is displayed. It is fixed to “NOVA MC8082P”.

・② [Board No]

Specify the number of the board to be used. Specify the board number by counting up from “0”.

When specifying the first board ：0

When specifying the second board ：1

・③ [Specified]

Selects the mode of I/O designation. Depending on the mode selected, the buttons, etc. displayed on the screen will change. Details are explained on P.29 5-1.

IcNo ：This mode allows a list of all output ports to be displayed.

Port ：This mode allows operation by specifying the I/O port of SDB-08.

・④ [Dio Open]

Accesses the board and puts it into standby based on the specified configuration.

When this button is pressed, each I/O button becomes active and operational.

・⑤ [Dio Close]

Releases a board in standby mode.

If you need switch to a different configuration, use this function.

・⑥ [Use Port] or [Port IcNo]

The display switches according to the status of [Specified].

Use Port ：Displayed when [Specified] is “IcNo”.
Specify the group of SDB-08 I/O ports to be used.

Port IcNo ：Displayed when [Specified] is “Port”.
Specify the I/O port and IC number of the SDB-08 to be used.

・⑦ [Connection port（IcNo）]

Displayed when [Specified] is “IcNo”.

Specify the number of the IC to be used by “0” or “1”.

・⑧ [Input]

Specifies the group of input signals.

In the “NOVA MC8082P,” RR (read register) 2, 4, and 5 exist.

For details, refer to the instruction manual of the “MC8082P” motion control board.

The port displayed in the “Digital Input” frame switches according to the selected setting.

・⑨ [All Read]

Each signal of “Digital Input” is acquired at once and the result is reflected on the screen.

・⑩ [ON/OFF/Bit read]

The signal status of the input port read immediately before “ON/OFF” is shown.

By pressing “Bit read”, the signal of the specified port is acquired and the result is reflected on the screen.

・⑪ [Manual Pin Input]

Check the input signals specified manually without being bound by settings such as [Use Port] or [Port IcNo]. For details of the combination, refer to the instruction manual of the motion control board “MC8082P”.

IcNo or Port : The display switches depending on the status of [Specified].
IcNo … Displayed when [Specified] is “IcNo”.
Specify the IC number of the board.
Port … Displayed when [Specified] is “Port”. Specify the port.

RR : Specify the input signal group from “2”, “4”, or “5”.

Pin : Specify the pin number.

Read : Indicates the signal status of the port.
When ON … Lit green
When OFF … Lit gray

・⑫ [All Write]

Switches the signal state of each output port based on the ON/OFF state set in “Digital Output Write”.
All ports are immediately reflected at the moment the button is pressed,
so please be careful of malfunctions.

・⑬ [ON/OFF/Bit write]

After specifying the signal state of the output port with ON/OFF, press Bit write to switch the signal state of the specified port.

If only ON/OFF is changed, the signal state of the port does not change.

・⑭ [Manual Pin Output]

It controls output signals specified manually without being bound by settings such as [Use Port] or [Port IcNo]. For details of the combination, please refer to the instruction manual of the motion control board “MC8082P”.

IcNo or Port : The display switches depending on the status of [Specified].
IcNo … Displayed when [Specified] is “IcNo”.
Specify the IC number of the board.
Port … Displayed when [Specified] is “Port”. Specify the port.

Pin : Specify the pin number.

Value : Specify the output status as “ON” or “OFF”.

Write : Switches the signal of the specified port based on the setting.

・⑮ [All Read]

Displays the assumed current output signal status of each port with reference to the last output signal status.

・⑯ [ON/OFF/Bit read]

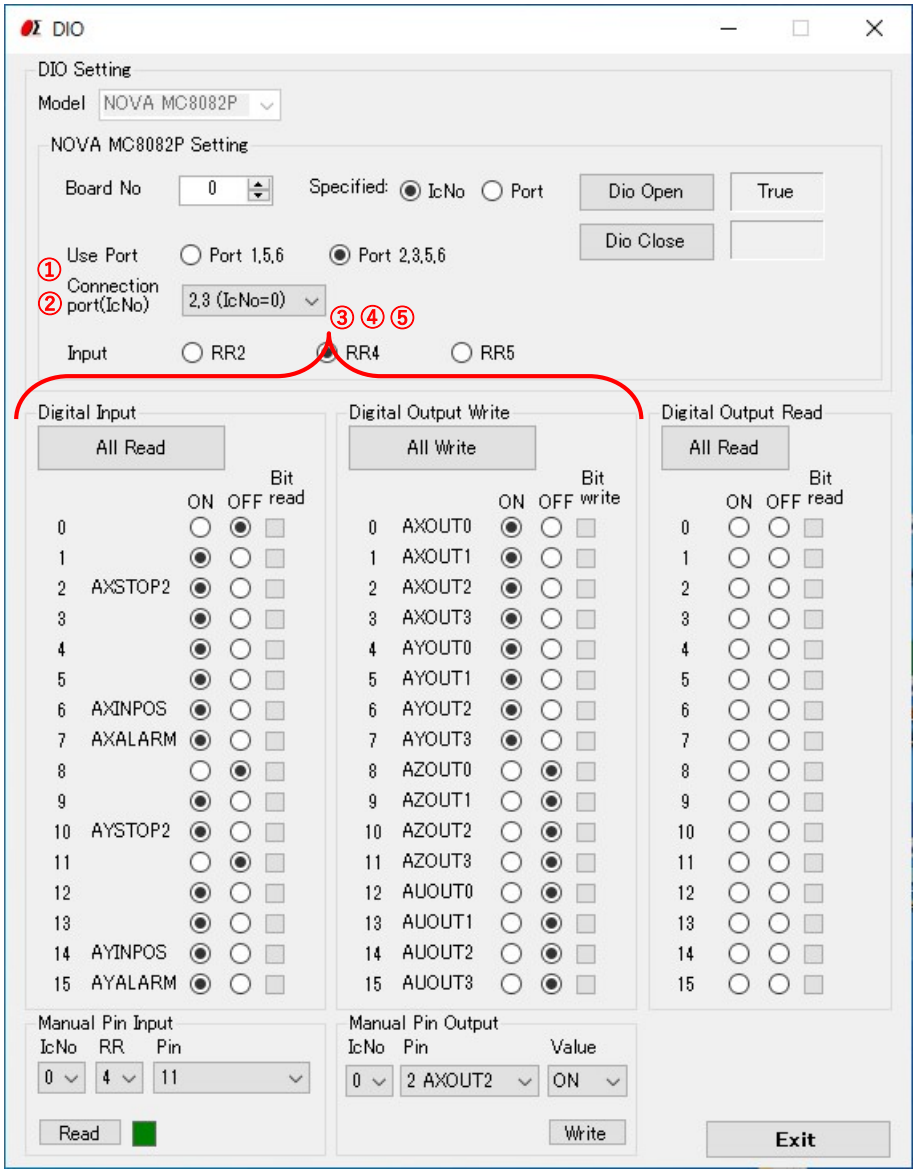
ON/OFF is the signal status of the assumed output port.

By pressing Bit read, the signal of the specified port is acquired and the result is reflected on the screen.

5 - 1 . Differences due to the [Specified] setting

The I/O test screen switches between modes depending on the value of the [Specified] setting.
The differences between the modes are described in detail below.

■ In case of “IcNo”.



① [Use Port] and [Connection port (IcNo)] are displayed, and [Port IcNo] is not displayed.

② The Port selected in [Use Port] is further divided and selected by IC number.
When “Port 1,5,6” is selected, select either “1 (IcNo=0)” or “5,6 (IcNo=1)”.
When “Port 2,3,5,6” is selected, select either “2,3 (IcNo=0)” or “5,6 (IcNo=1)”.
When “1 (IcNo=0)” is selected, only 8Pin is displayed for Digital Output Write.

③ After selecting “Use Port,” the pin names in “Digital Input” and “Digital Output Write” will change to the corresponding ones.
Simultaneous reading and writing of up to 16 pins for 2 ports (2 connectors) at a time becomes possible.

④ The following items read/write input and output signals to/from the port specified by [Connection Port].

- Input

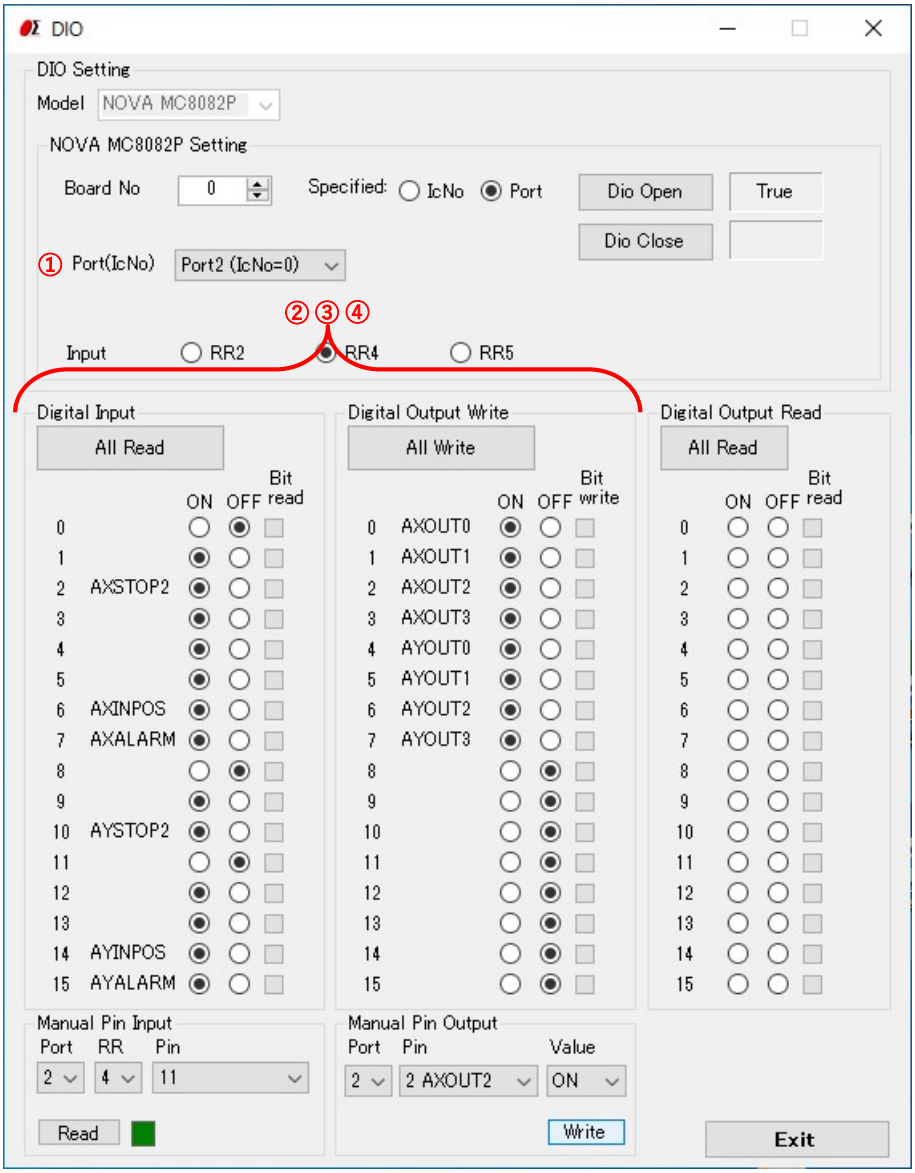
[All Read] and [Bit read]

- Output

[All Write] and [Bit write]

⑤ For [Manual Pin Input] and [Manual Pin Output], specify “IcNo”.

■ In case of “Port”.



① “Port IcNo” is displayed, and “Use Port” and “Connection port (IcNo)” are not displayed.

② After selecting [Port IcNo], the pin name in [Digital Input] and [Digital Output Write] will change to the corresponding one. Simultaneous reading and writing of up to 8 pins for 1 port (1 connector) at a time becomes possible.

③ The following items read/write input and output signals to/from the port specified by [Port IcNo].

- Input

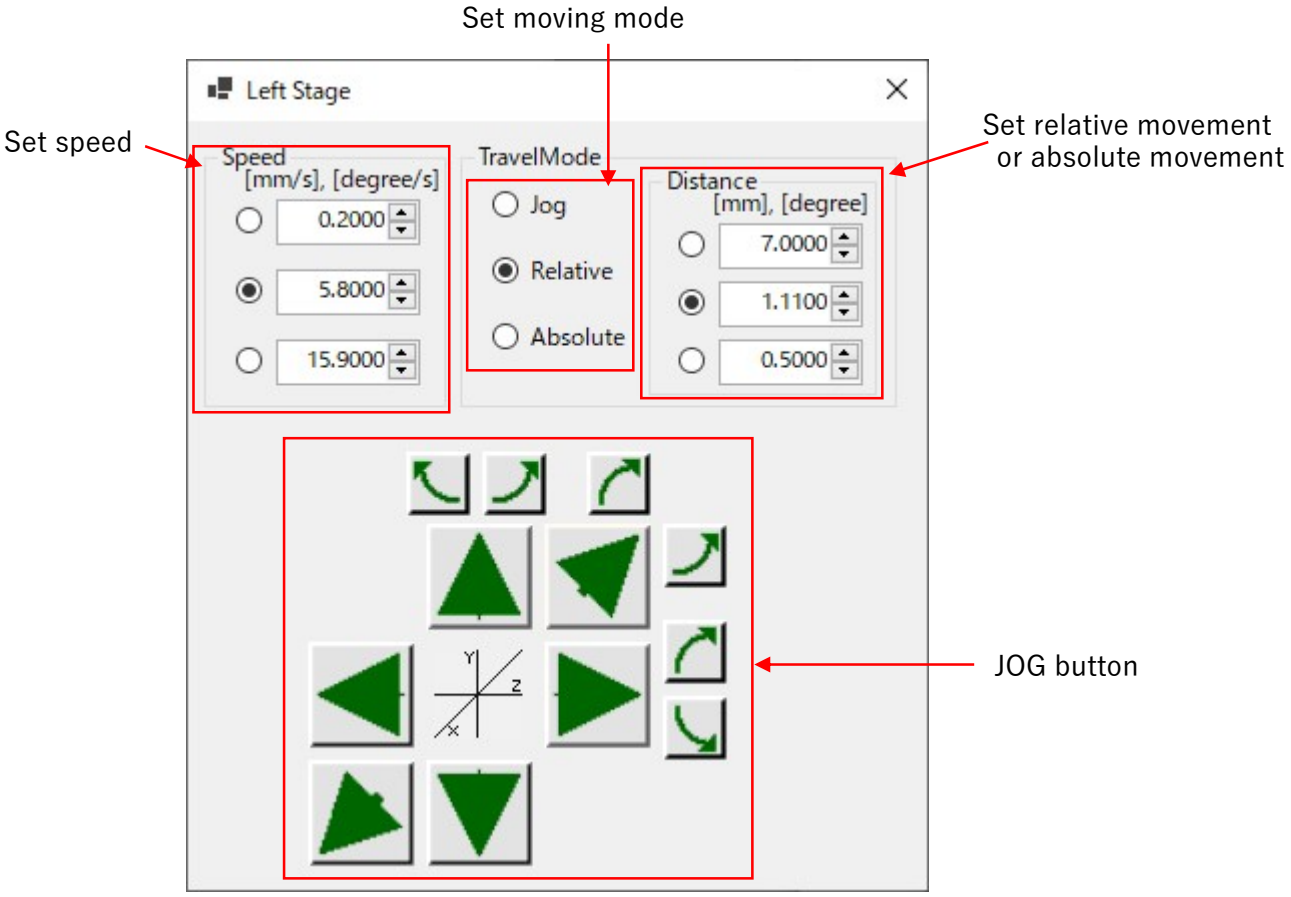
[All Read] and [Bit read]

- Output

[All Write] and [Bit write]

④ For [Manual Pin Input] and [Manual Pin Output], specify “Port”.

6 . JOG Operation Screen



・[Set Speed]

Set speed for JOG movement, relative movement and absolute movement. (Unit: mm/sec or deg/sec)

The input value is the speed. Check left to enable the setting.

3 patterns of speed can be set.

*Calculated by use of the value set in “Axis Parameter setting screen” (Page 12). Please note that If the parameter is not set correctly, the real speed might be different from the setting speed.

・[Set Moving Mode]

Set JOG movement, relative movement and absolute movement.

Check left to enable the setting.

・[Set relative movement or absolute movement]

In the case of selecting “Relative” in [Set Moving Mode]:

Set relative movement. (Unit: mm or deg)

The input value is movement.

Clicking JOG button to move input distance/angle from the current position.

In the case of selecting “Absolute” in [Set Moving Mode]:

Set absolute movement. (Unit: mm or deg)

Clicking JOG button to move to input position.

・[JOG button]

In the case of selecting “JOG” in [Set Moving Mode]:

When push the JOG button continually, the corresponding axis moves continually (JOG operation).

In the case of selecting “Relative” in [Set Moving Mode]:

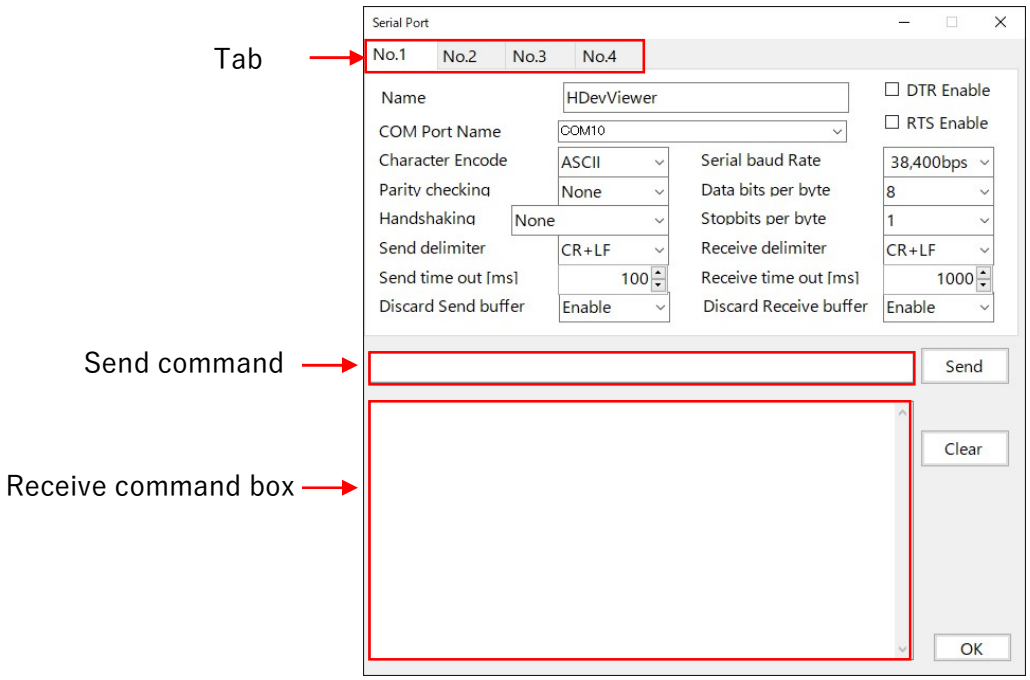
When push the JOG button, the corresponding axis moves given distance/angle in given direction.

In the case of selecting “Absolute” in [Set Moving Mode]:

When push the JOG button, the corresponding axis moves to given position independent of direction.

7 . Serial Communication Setting Screen

This setting is necessary when serial communication such as RS-232C is used for alignment operation or sequence programs.



・[Tab]

Up to 30 settings can be saved.

Right-clicking on the index of a tab opens a contextual menu.

Click “Add” to add a tab.

Click “Delete” to delete a tab.

●Tips: Settings cannot be changed within the sequence program.

Make the subsequent settings while referring to the manual on how to connect the destination device.

・[Name]

Set the name of the device to be connected.

・[Port Name]

Click the combo box to display a list of recognized serial ports.

Specify the serial port to connect to from the list.

・[Character Encoding]

Select character code from the combo box.

・[Baud Rate]

Select baud rate from the combo box.

・[Data Bits]

Select bit length of the communication data from the combo box.

・[Parity]
Select parity (communication data error monitoring) from the combo box.

・[Stop Bits]
Select the bit length that indicates the end of data from the combo box.

・[Handshake]
Select a handshake from the combo box.

・[Send Delimiter]
Select send data delimiter from the combo box.

・[Receive Delimiter]
Select receive data delimiter from the combo box.

・[Send Timeout Period [ms]]
Input send timeout period in [ms].

・[Receive Timeout Period [ms]]
Input receive timeout period in [ms].

・[Send Buffer Clear]
Select enable/disable of send buffer clear from the combo box.

・[Clear Receive Buffer]
Select enable/disable of receive buffer clear from the combo box.

・[DTR Enable]
Check to enable DTR (Data Terminal Ready) signaling.

・[RTS Enable]
Check to enable RTS (Request to Send) signaling.

・[Send]
Enter text in the “Send command” section and click the “Send” button to send and receive commands according to the settings in the tab displayed. The sent content will be displayed in the “Receive command box”. If there is a reply from the device you are connecting to, the reply will be displayed in the “Receive command box”.

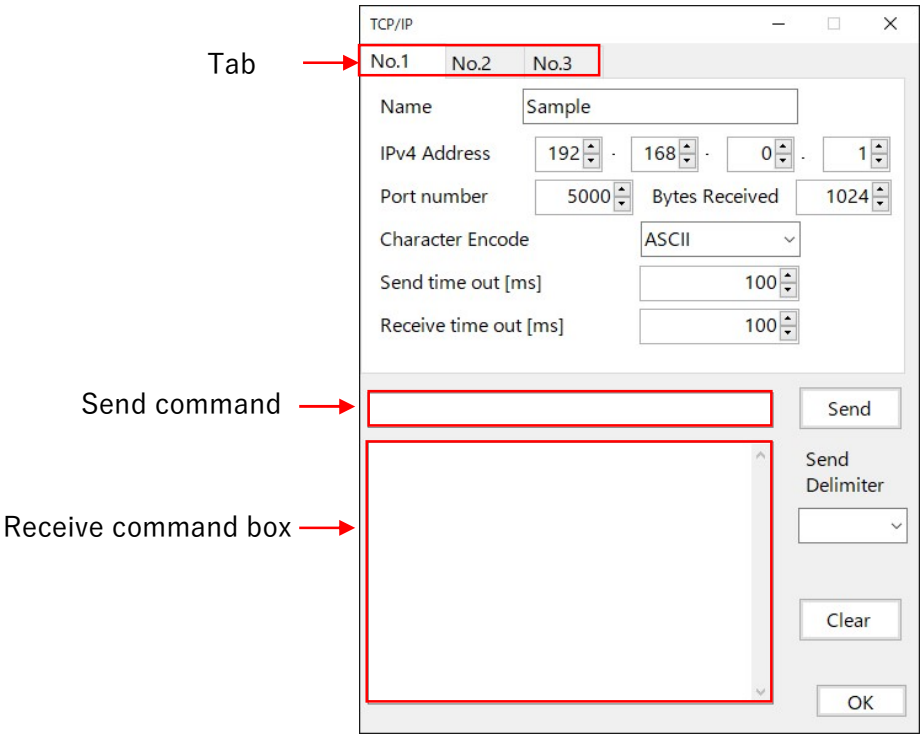
・[Clear]
Deletes the contents of the “Receive command box”.

*Please refer the RS-232C communication standard for detail.

8. TCP/IP Setting Screen

This setting is necessary for TCP/IP communication such as Ethernet in the alignment operation and sequence program.

The sequence program refers to the settings in tab No. 1, but the “IPv4 address”, “port number”, and “Send data delimiter” settings are made in the sequence program.



・[Tab]

Up to 30 settings can be saved.

Right-clicking on the index of a tab opens a contextual menu.

Click “Add” to add a tab.

Click “Delete” to delete a tab.

・[Name]

Set the name of the device to be connected.

・[IPv4 Address]

Set IP address of the connection device.

However, the IP address of the LAN adapter of the control PC should be fixed but not DHCP. The subnet mask and the IP address should be set properly.

・[Port Number]

Set proper port number of the connected device.

Please refer device manual for detail.

・[Bytes Received]

Sets the maximum number of bytes of data to be received. If a value smaller than the number of bytes received is set, the system will not operate properly. Set as large a value as possible.

The recommended value is “1024”.

・[Character Encoding]

Select character code from the combo box.

・[Send Timeout [ms]]

Input send timeout period in [ms].

・[Receive Timeout [ms]]

Input receive timeout period in [ms].

・[Send]

Enter text in the “Send command” section and click the “Send” button to send and receive commands according to the settings in the tab displayed. The sent content will be displayed in the “Receive command box”. If there is a reply from the device you are connecting to, the reply will be displayed in the “Receive command box”.

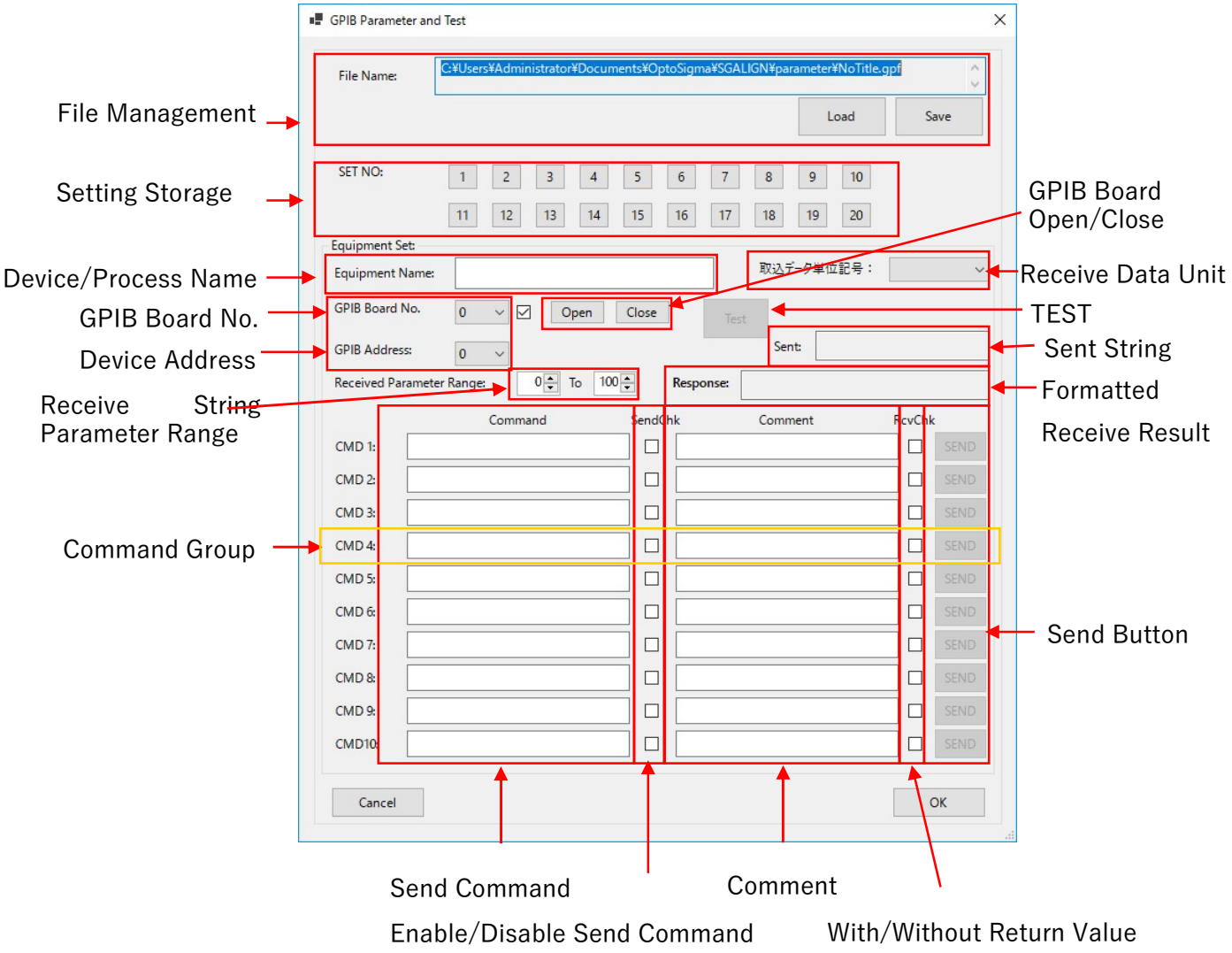
・[Send Delimiter]

Select send data delimiter from the combo box.

・[Clear]

Deletes the contents of the “Receive command box”.

9 . GP-IB Setting Screen



・[File Management]

File Name : Full path of the GPIB setting file

Load : Load GPIB setting

Save : Save GPIB setting

・[Setting Storage]

Memorize 20 types of settings in “Device Setting” frame.

・[Device/Process Name]

Device or process name that the setting will be sent to.

・[Receive Data Unit]

Set unit of the received data. The setting cannot be saved to the setting file.

・[GPIB Board No.]

Select GPIB board.

・[Device Address]
Select GPIB device address.

・[GPIB Board Open/Close]
Click “Open” to open the GPIB board with the specified GPIB board number.
If the GPIB board is successfully opened, the “Send” button is enabled.
Click “Close” to close the GPIB board. The “Send” button is disabled.

・[Receive String Parameter Range]
The string at the specified position is extracted from the received string and displayed in the [Formatted Receive Result].
The start position of the string to be extracted is given before “To”. The first character position is considered to be 0.
After "To" is the number of strings to be extracted from the start position of the string.

・[Command Group]
A group of send line, enable/disable send command, enable/disable receive data.

・[Send Command]
Input the command which will be sent to the device specified by GPIB board number and device address.

・[Enable/Disable Send Command]
Check or uncheck to enable or disable sending the input command to the device.

・[With/Without Return Value]
Check when there is returned value corresponding to the send command.

・[Comment]
Show the meaning of command. (The comment is not sent to the device)

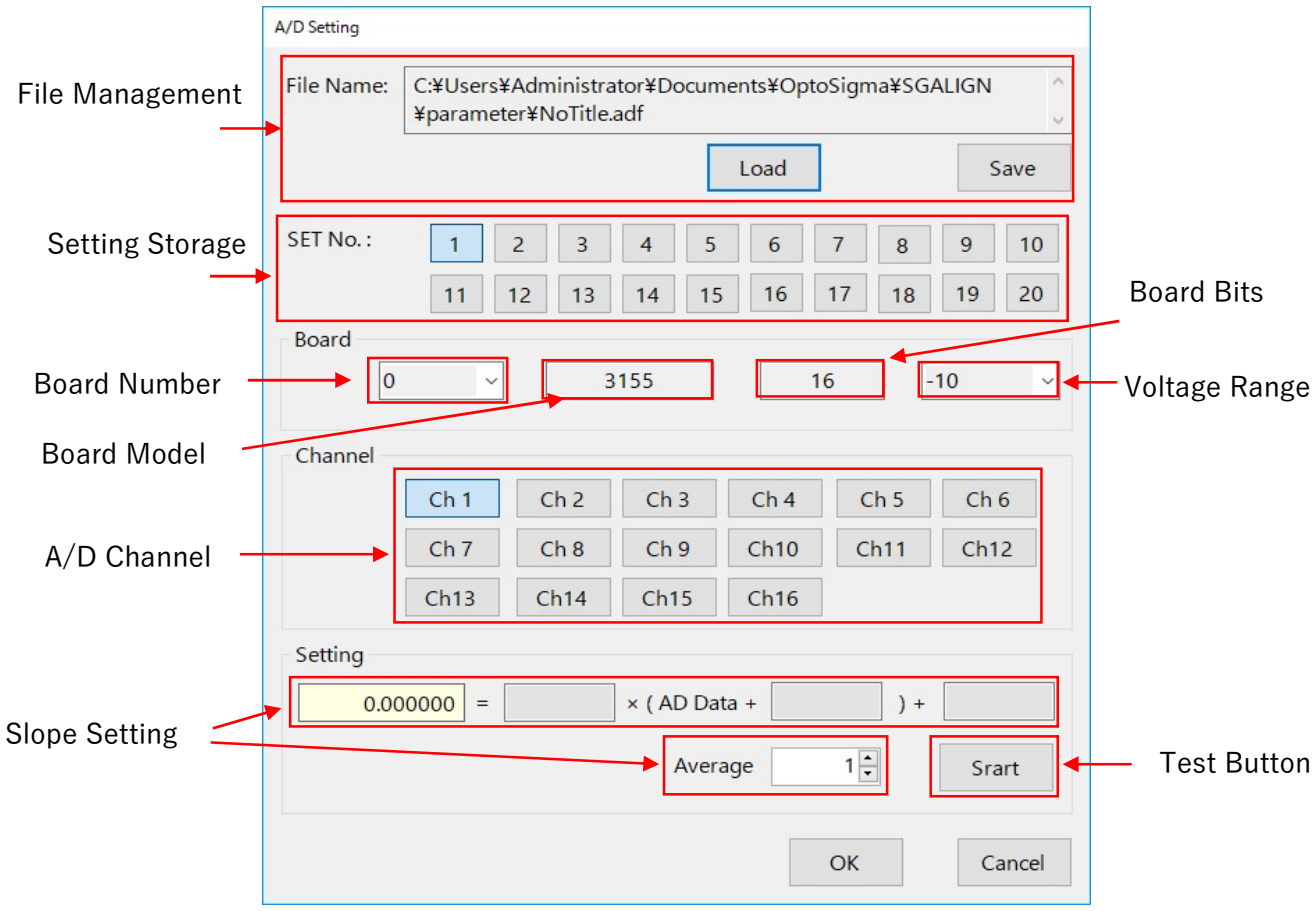
・[Send Button]
Performing test for sending and receiving line by line.

・[Test]
Send and receive a group of all 10 lines at once. (It is performed in order from the top)

・[Sent String]
Display the most recently sent command string.

・[Formatted Receive Result]
Display the string extracted from the received string according to the conditions in [Receive String Parameter Range].

1 0 . A/D Setting Screen



・[File Management]

File Name : Full path of the A/D setting file

Load : Load A/D setting

Import : Load A/D setting using current file name

Save : Save A/D setting

・[Setting Storage]

Memorize 20 types of settings in board frame.

・[Board Number]

Select board number of the A/D board.

・[Board Model]

Display the A/D board name corresponding to the selected board number.

・[Board Bits]

Display the input and output bit numbers of the A/D board selected in [Board Number].

・[Voltage Range]

Select the input voltage range of the A.D board.

・[A/D Channel]

Select the channel in A/D board.

・[Slope Setting]

The slope of the data input from the A/D board can be corrected.

Slope Correction Result = Slope × (AD_DATA + Digital Offset Value) + Offset Value

The analog values are acquired and averaged over the number of runs specified in "Average".

・[Test Button]

Start or stop the analog value acquisition test.

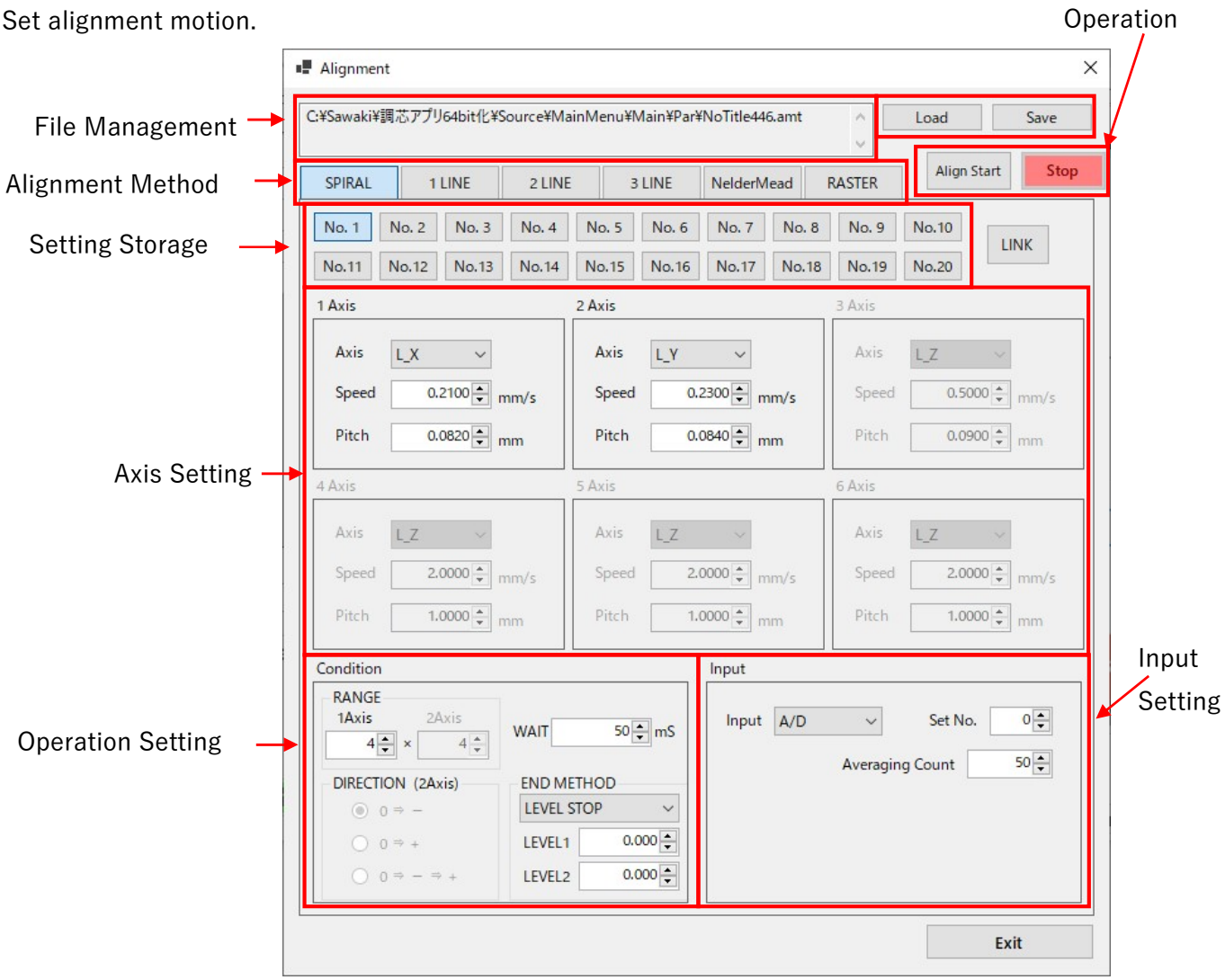
Once the "Start" button is pressed, the analog value acquisition is started and the button name becomes "Stop".

Once the "Stop" button is pressed, the analog value acquisition is stopped and the button name becomes "Start".

The acquired values are displayed in real time on the left side of the slope expression.

1 1 . Alignment Setting Screen

Set alignment motion.



・[File Management]

File Name : Full path of the alignment setting file

Load : Load alignment setting

Save : Save alignment setting

・[Alignment Method]

SPIRAL : Detect by moving in a spiral outward from the current position.

1LINE : Detect along one specified axis.

2LINE : Detect along specified 1st axis and then specified 2nd axis.

3LINE : Detect along specified 1st axis, 2nd axis and 3rd axis in turn.

NelderMead : Using the NelderMead method, detect by moving to the predicted next peak position.

RASTER : Detect in serpentine motion.

・[Setting Storage] No.1～No.20

Memorize 20 types of settings for each alignment method.

・[Axis Setting] 1Axis, 2Axis, 3Axis

Set axis for alignment.

[Axis] : Select the axis

[Speed] : Set moving speed

[Pitch] : Set moving interval

・[Operation Setting] Condition

Set Detecting range, Detecting Method, Detecting WAIT and End position.

[RANGE] : Detecting range (Valid for SPIRAL, RASTER and LINE alignment only)

Detecting points are (Range * 2 + 1)^2 for SPIRAL.

For example: When inputting “5”, detecting points are (5 * 2 + 1)^2 = 121.

Detecting points are input value for RASTER, 1LINE, 2LINE and 3LINE.

For example: When inputting “5 * 3”, detecting points are 5 * 3 = 15.

[DIRECTION] : Detecting direction (With exception of SPIRAL and NelderMead)

0 -> - Detect from starting position to minus direction.

0 -> + Detect from starting position to plus direction.

0 -> - -> + Move to half of the detection range from staring position to minus direction, and then detect along plus direction. *In case of RASTER, valid for 1st axis.

[WAIT] : Detecting WAIT

Set the waiting time for starting power measurement after moving to measurement point. (Unit: msec)

[END METHOD] : End condition

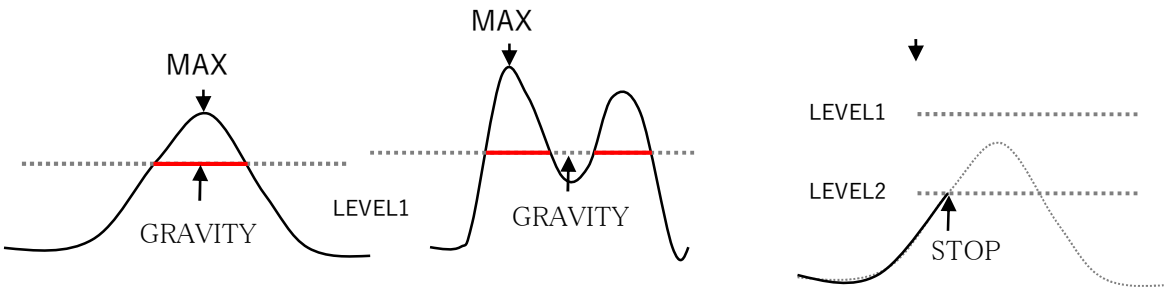
MAX POWER Move to peak position after detection

LEVEL STOP Stop once the detected data is within the range between LEVEL1 and LEVEL2.

PEAK SEARCH *Optional function. Not available for standard product.

GRAVITY Set peak to be 100% after detection and move to the center of gravity cut off by the value (%) of LEVEL1.

CENTER Return to the starting position after detection.



[LEVEL1] Comparison value for LEVEL STOP and GRAVITY.

[LEVEL2] Comparison value for LEVEL STOP.

*Unit changes depending on the measurement data.

GRAVITY: %

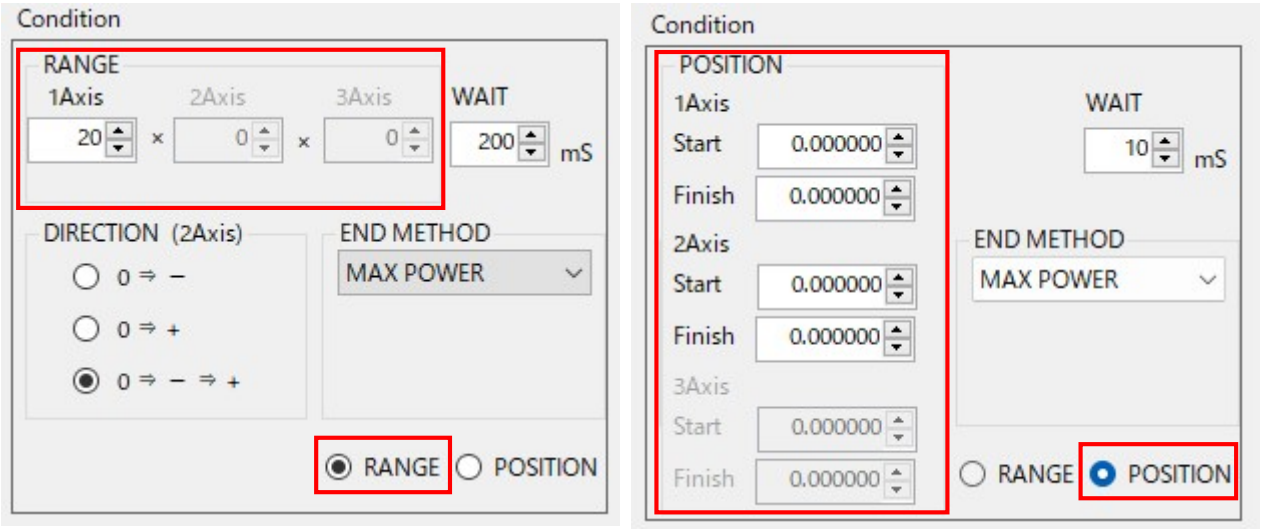
LEVEL STOP: Analog voltage, or unit specified by connected device.

・[Operation Setting] Condition (For 1LINE , 2LINE and 3LINE)

The measurement range, measurement method, measurement WAIT, and end position can be set.

[POSITION] mode can be selected as a method for specifying the operating range.

For details on [RANGE] mode, see P. 32.



[POSITION] ：Measuring range (mode that can be specified only in LINE alignment)

Specifies the measurement range in terms of relative position from the current coordinates.

START is the start position and Finish is the end position.

Example: If “Start” is “0.01”, “Finish” is “-0.015”, and “Pitch” is “0.002”.

(-0.015 - 0.01) / 0.002 = -12　*Decimal places are rounded down.

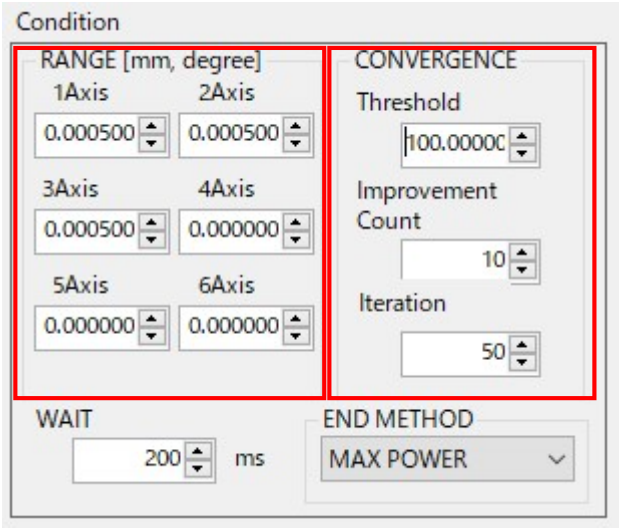
Measure in the minus direction from the start position.

The measurement points are 13 points, including 1 point at the start position.

Other items are the same as for Spiral and Raster alignment.

・[Operation Setting] Condition (For NelderMead only)

Set Detecting range, Detecting Method, Detecting WAIT and End position.



[RANGE [mm, degree]]

Set the amplitude of each axis for NelderMead method.

[CONVERGENCE]

Sets the condition for termination of alignment.

NelderMead alignment ends the alignment operation in the following way.

・When all axes used for alignment have been moved within 2 pulses of the previous movement value.。

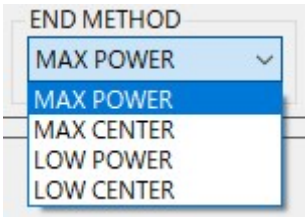
・When the non-improvement count by “Threshold” reaches the number of times set by “Improvement Count”.

・When the number of times set by “Iteration” has been reached.

Threshold ：Unit is %.
The following formula is used to determine the increase or decrease in the non-improvement count.
・Last measured power < Maximum power to date * Threshold Value
⇒Increase non-improvement counts.
・Maximum power to date * Threshold Value < Last measured power
⇒Clear the non-improvement count and restart from 0.

Improvement Count：When the non-improvement count reaches the value set in this item, the alignment stops.

Iteration ：Specify the maximum number of alignment times.



[END METHOD]

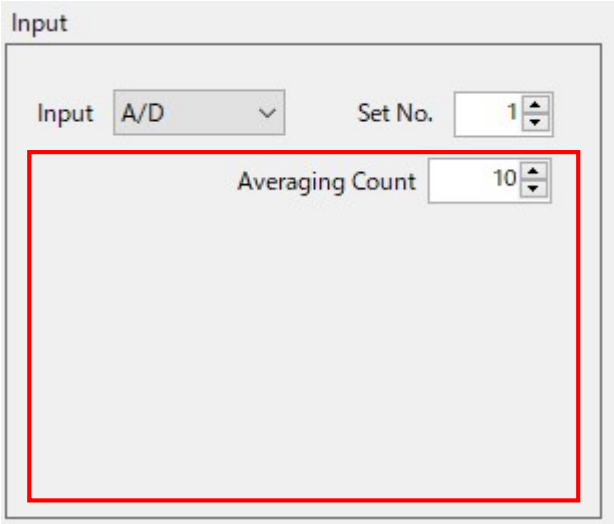
MAX POWER	Stop after measuring to be the maximum value.
MAX CENTER	After measuring to be the maximum value, it returns to the start position.
LOW POWER	Stop after measuring to be the minimum value.
LOW CENTER	After measuring to be the minimum value, it returns to the start position.

Other items are the same as for Spiral, Raster, and Line alignment.

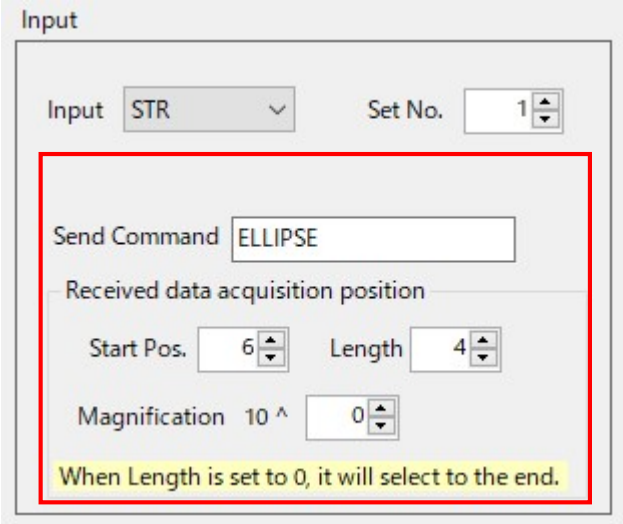
・[Input Setting] input

Set the interface for acquiring the measurement data.

Input items of [Input Setting] for Analog.



Input items of [Input Setting] for GPIB, STR (serial), and TCP/IP.



[input]

Select the interface (A/D, GPIB, STR (serial), TCP/IP) for acquiring the measurement data.

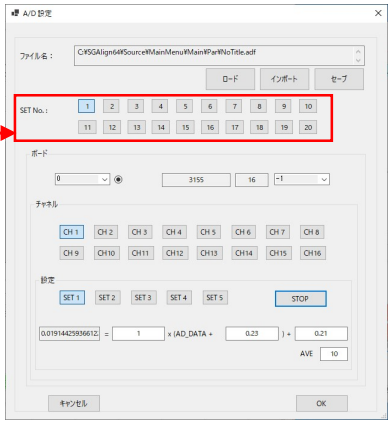
[Set No.]

Select the setting number for each interface.

Example: In the case of A/D

Subtract 1 from the “SET No.” shown on the “A/D Set” screen to get the value of 1-20.

Example: A/D set screen



Example: In the case of GPIB

Subtract 1 from the “SET No.” shown on the “GPIB Parameter” screen to get the value of 1-20.

Example: In the case of STR (serial)

Specify the “Tab No.” set in the “Serial Communication Setup Screen”.

Example: In the case of TCP/IP

Specify the “Tab No.” set in the “TCP/IP Setting Screen”.

[Averaging Count] (*Available for A/D only)

Set the number of measurements for averaging.

When the number is set to be 0, averaging is not performed.

*Depending on the device, it may not work due to the communication response.

[Send Command](*GPIB, STR(Serial), TCP/IP only)

Command for acquiring the power.

The command is sent to the destination using the device setting specified in “Set No.” on each communication device setting screen.

[Start Pos.] (*GPIB, STR(Serial), TCP/IP only)

Sets the start position of the string, which is the received numeric data, in the received string.

The position of the first character in the received string is 0.

[Length] (*GPIB, STR(Serial), TCP/IP only)

Sets the length of the received numerical data started from the [Start Pos.] in the received string.

[Magnification] (*GPIB, STR(Serial), TCP/IP only)

Set the multiplier to be multiplied by the numerical data.

The setting value “0” is 10 to the power of 0, meaning 1x.

Example : If Magnification is “6” and the received data is “3.246E-5”

0.00003246 * 100,000 = 32.46

・[Operation]

[Align Start] Start the selected alignment detection

At the same time, the measurement data is saved in the following folder.

Folder "C:¥Users¥[User Name]¥Documents¥SGALIGN¥data"

Format ".csv"

* The file will be overwritten each time when a new detection is started.
Please rename if necessary.

・Saved Format

① In the case of two dimensional detection (SPIRAL, RASTER)

Save name: Alignment detection name

(e.g. Spiral.csv for SPIRAL alignment detection)

*Below shows when opening the file in Excel.

The numerical data is actually separated by ",".

1st Axis Detection Pitch (mm)

Axis_1	0.001	Axis_2	0.001	← 2nd Axis Detection Pitch (mm)	
	−37.4632	−37.4622	−37.4612	−37.4602	−37.4592
−14.5019	157.6912	159.4794	167.9617	179.1794	191.0831
−14.5029	168.0654	183.4354	185.4151	193.8938	204.7416
−14.5039	178.5884	194.1817	208.9962	211.1971	218.815
−14.5049	189.0577	204.3704	218.9572	231.4823	233.2227
−14.5059	198.9388	214.4277	228.4801	240.3424	250.5826

← 2nd Axis Coordinate (mm)

1st Axis Coordinate (mm) →

← Detected Data (Analog Value, etc.)

② In the case of one dimensional detection (1-3 Line)

Save name: "Axis_1.csv" for 1LINE

"Axis_1.csv" (1st axis) and for "Axis_2.csv" (2nd axis) 2LINE

*Below shows when opening the file in Excel.

The numerical data is actually separated by ",".

Axis_1	0.001	← Detection Pitch (mm)
−43.7553	−0.00259	*Axis_2 for 2nd axis
−43.7543	−0.00283	
−43.7533	−0.00273	
−43.7523	−0.00252	← Detected Data (Analog value, etc.)
−43.7513	−0.0024	

Coordinate (mm) →

[STOP] Stop the detection.

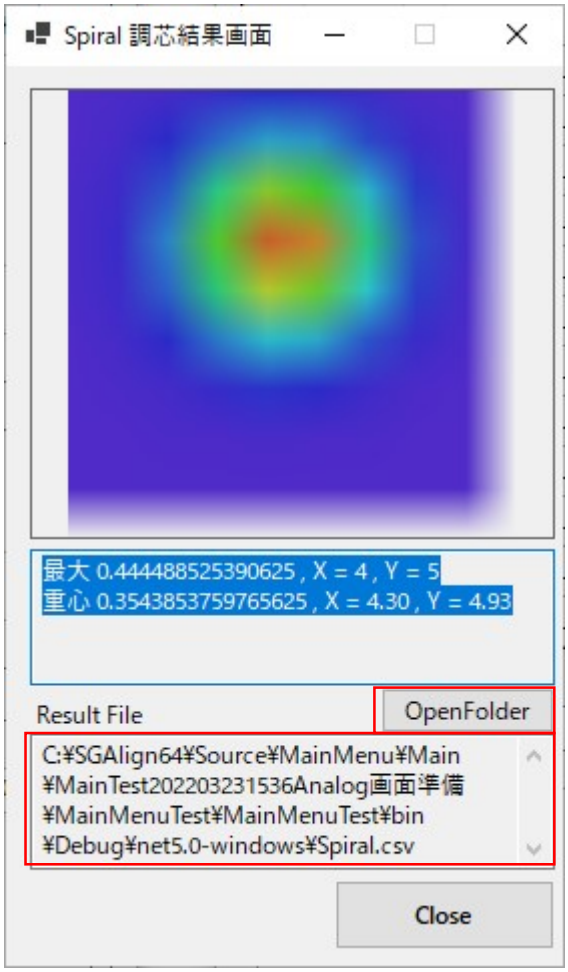
*In the case of SPIRAL or PASTER, the operation does not stop until the detection along the currently operating side is completed.

*The measurement results from the start of the measurement to the time when STOP is pressed are saved.

1 2 . Alignment Result Screen

Display the alignment result for various alignment method.

・[Alignment Result for Spiral]

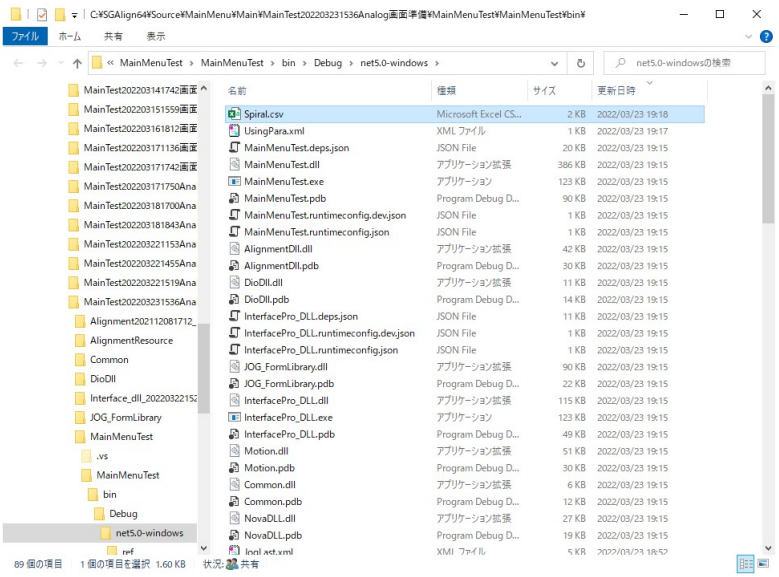


・[Result File]

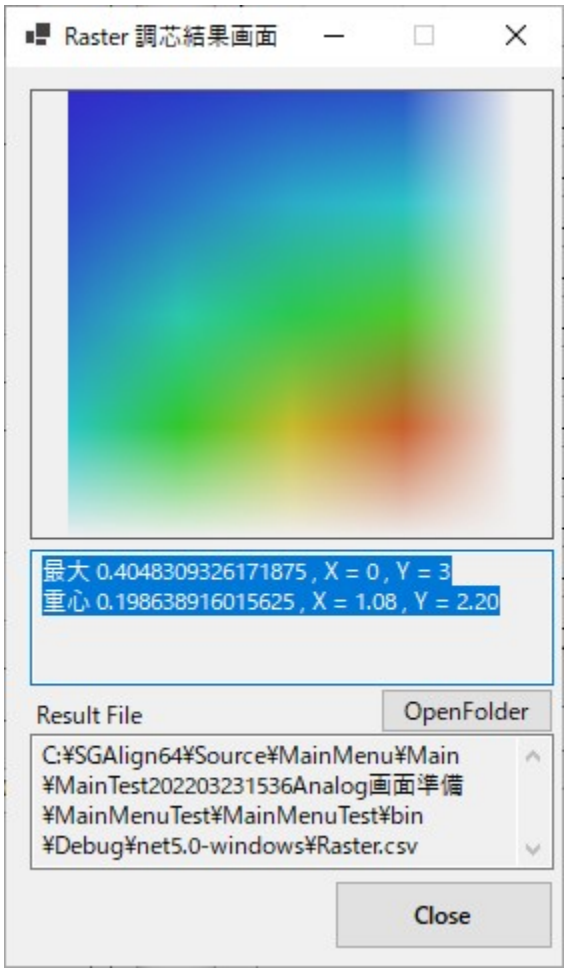
Display the saved .csv file name.

・[OpenFolder]Button

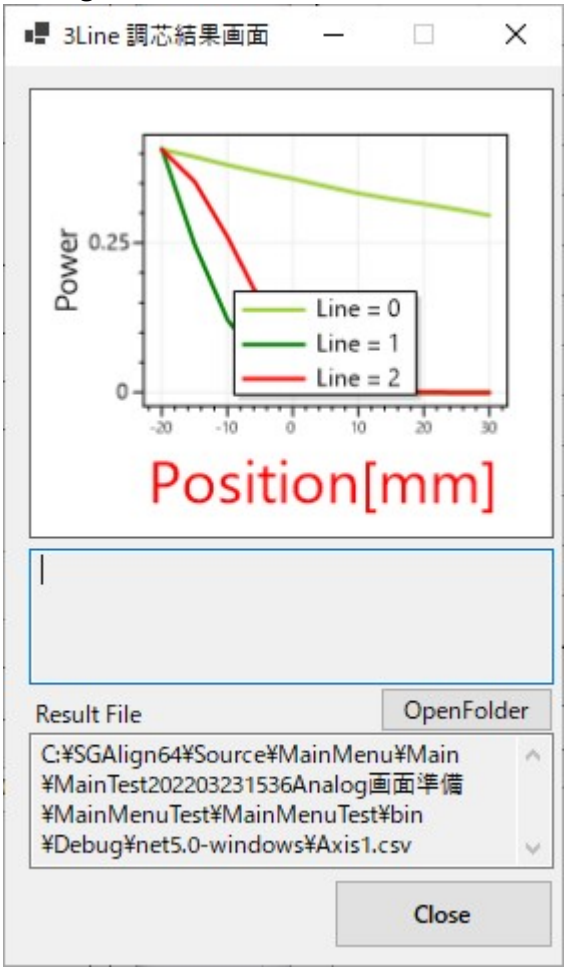
Click [OpenFolder] button to explore the folder which contains .csv alignment result file.



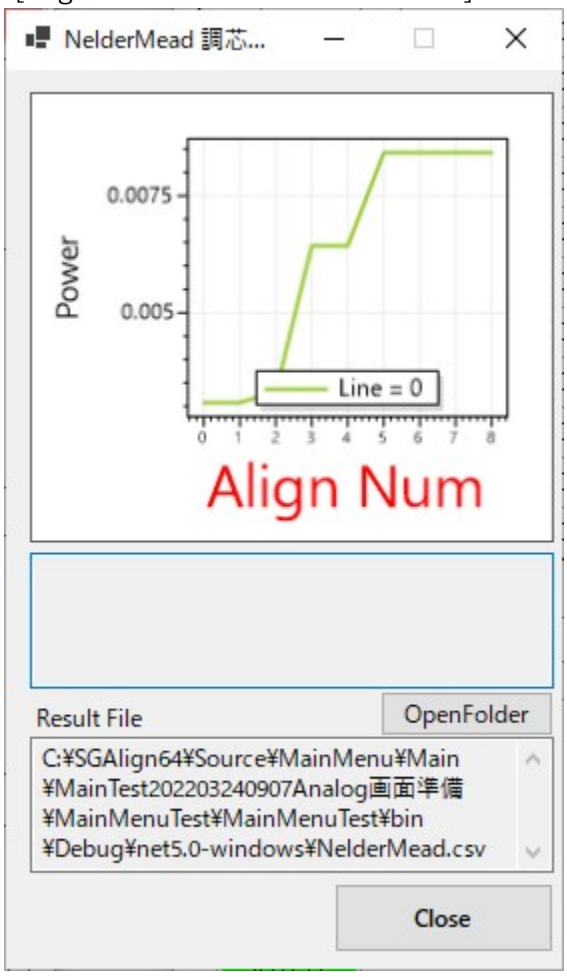
・[Alignment Result for Raster]



・[Alignment Result for 3Line]

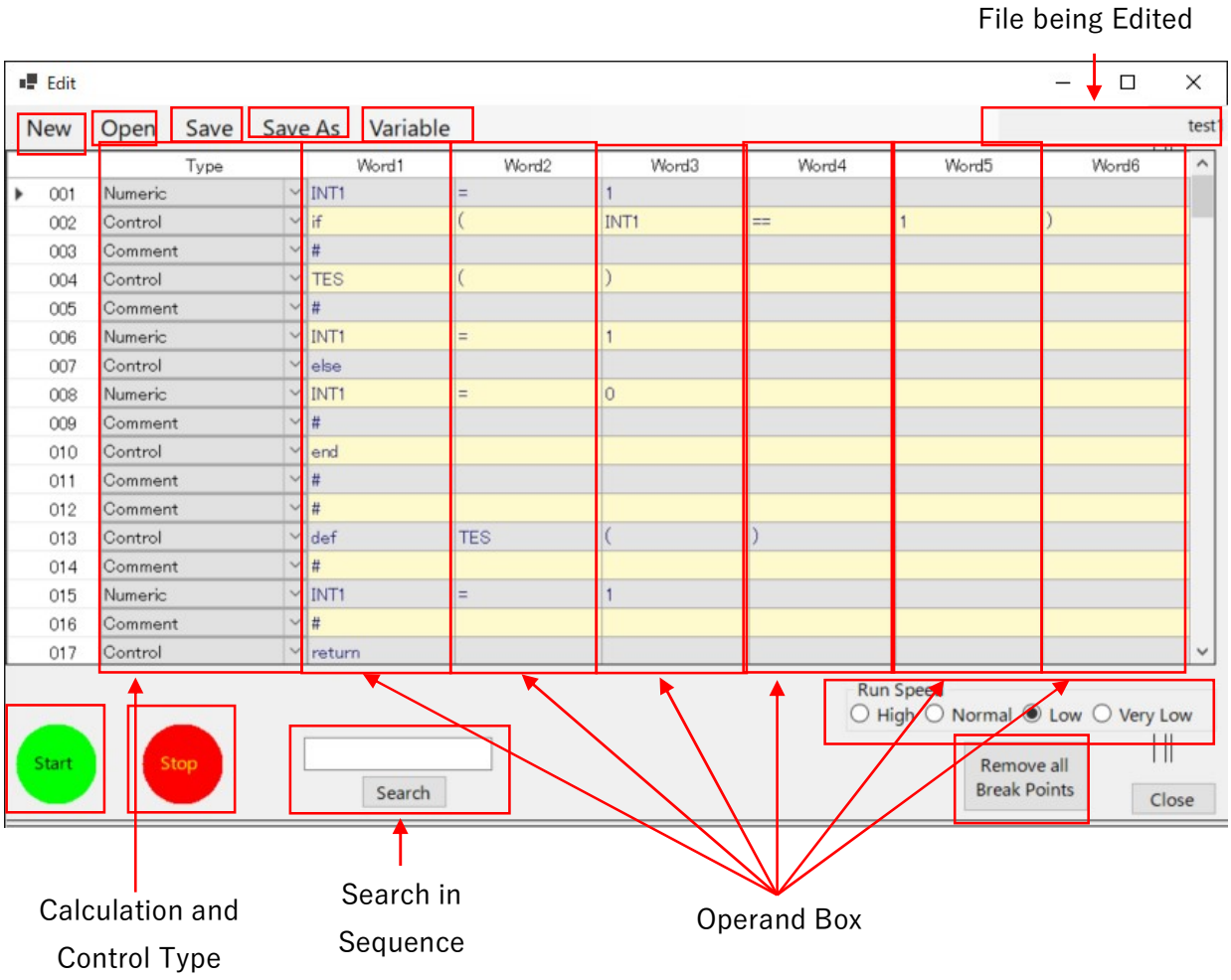


[Alignment Result for NelderMead]



1 3 . Sequence

1 3 - 1 . Sequence Editing Screen



・[New]

Completely clear the current sequence screen to create a new sequence.

(File is not saved in this time)

・[Open]

Open and display a sequence file.

・[Save]

Overwrite the selected sequence file with the contents shown in the current sequence screen.

・[Save as]

Save the contents shown in the current sequence screen to a new file.

・[Variable List]

Display the variable editing screen

-> 3-2

・[File being Edited]

The file name of the currently edited/displayed sequence.

・[Calculation and Control Type]

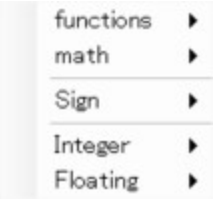
Select the process from the combo box.

・[Operand Box]

Enter commands, operators, variables, values, etc.

C# or Python syntax.

Right-click to display input candidates.



・[Start] Button

Start the sequence in the order from the top.

・[Stop] Button

Stop the currently running sequence.

・[Search in Sequence]

Search the string entered into the search box in columns from Word1 to Word6 in the current sequence screen. Display the matched string or value in cell in red.

・[Run Speed]

Change the execution speed of the sequence shown in the current screen.

[High] : High speed

[Normal] : Normal speed

[Low] : Low speed

[Very Low] : Very low speed

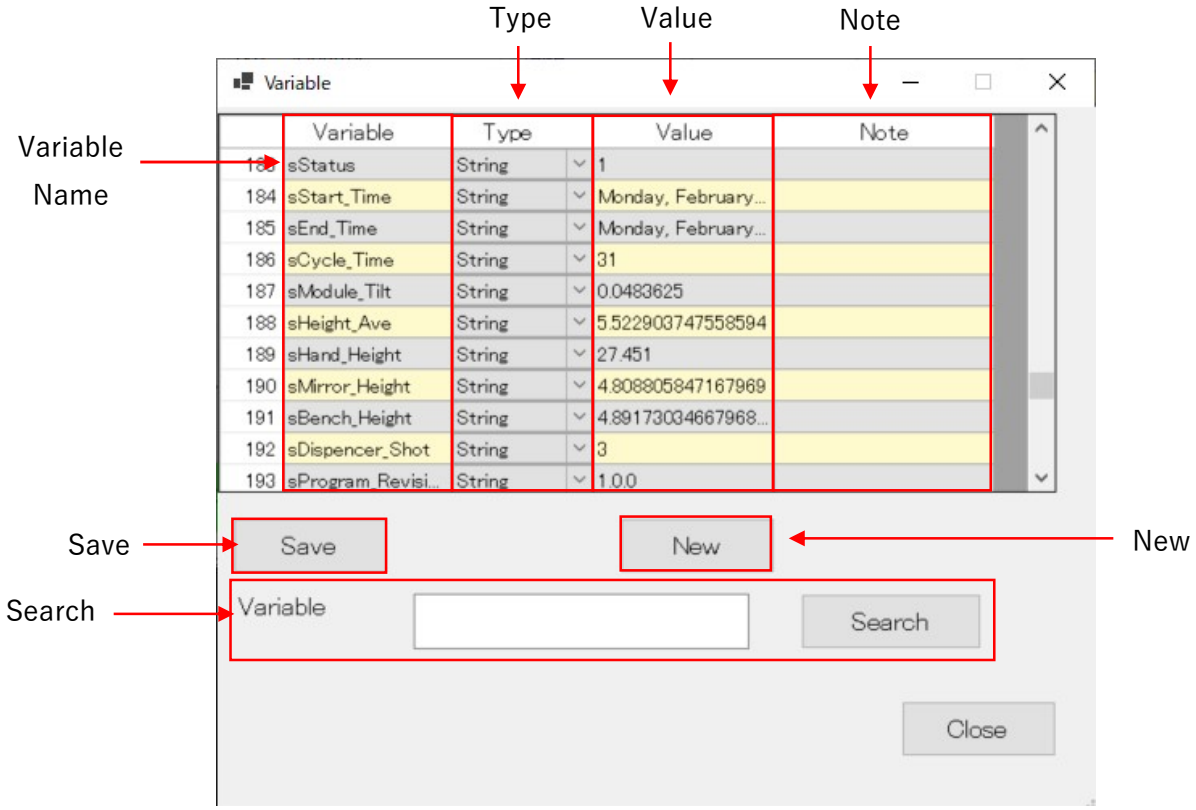
*When executing the sequence by click [Start] button in main screen,
the execution speed is faster than the [High] speed in sequence screen.

・[Remove all Break Point] Button

Remove all break points in the sequence screen.

1 3 - 2 . Variable List Screen

Input the variables used in the sequence.



・[Variable Name]

Input or modify the variable name.

Input in the last line to add new variable.

・[Type]

Select the type of the variable from the combo box.

・[Value]

Display the current value of the variable.

Change the current value when editing.

・[Note]

Input note about the variable. This does not affect the sequence.

・[Save] Button

Overwrite the variable list file with the current variable list.

Saved file path and name:

C:¥Users¥[User Name]¥Documents¥OptoSigma¥SGALIGN¥Variable.json

・[New] Button

Clear the variable list for creating new one.

・[Search]

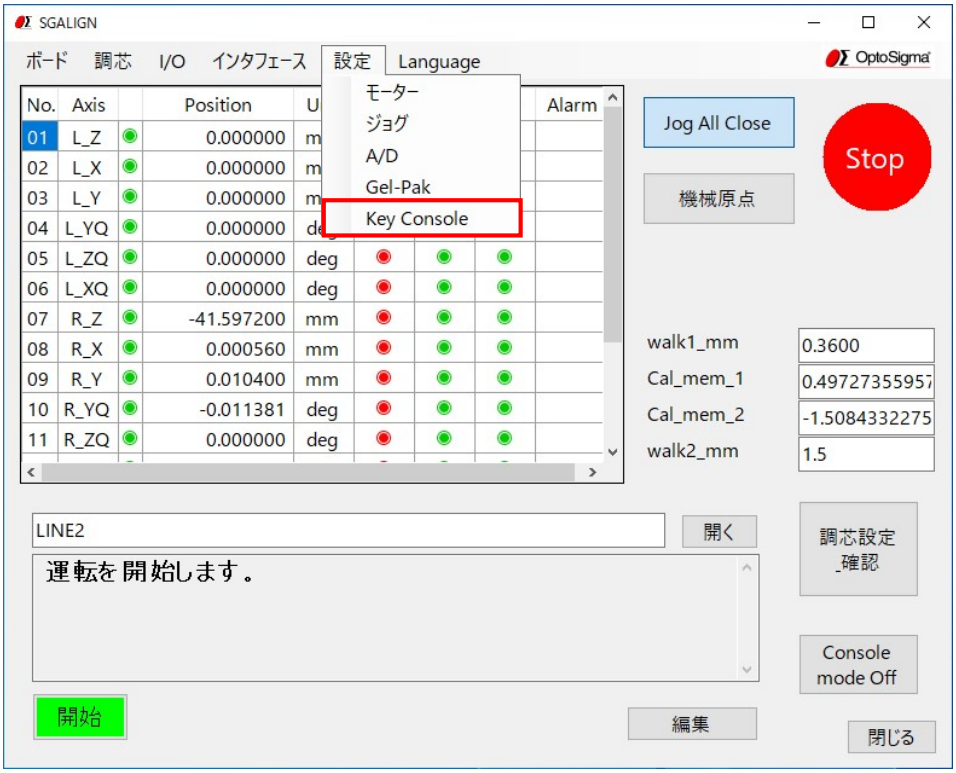
Enter the variable name in the textbox and click [Search] button.

If the variable exists in the current variable list, the list is scrolled, and the searched variable becomes highlighted in blue.

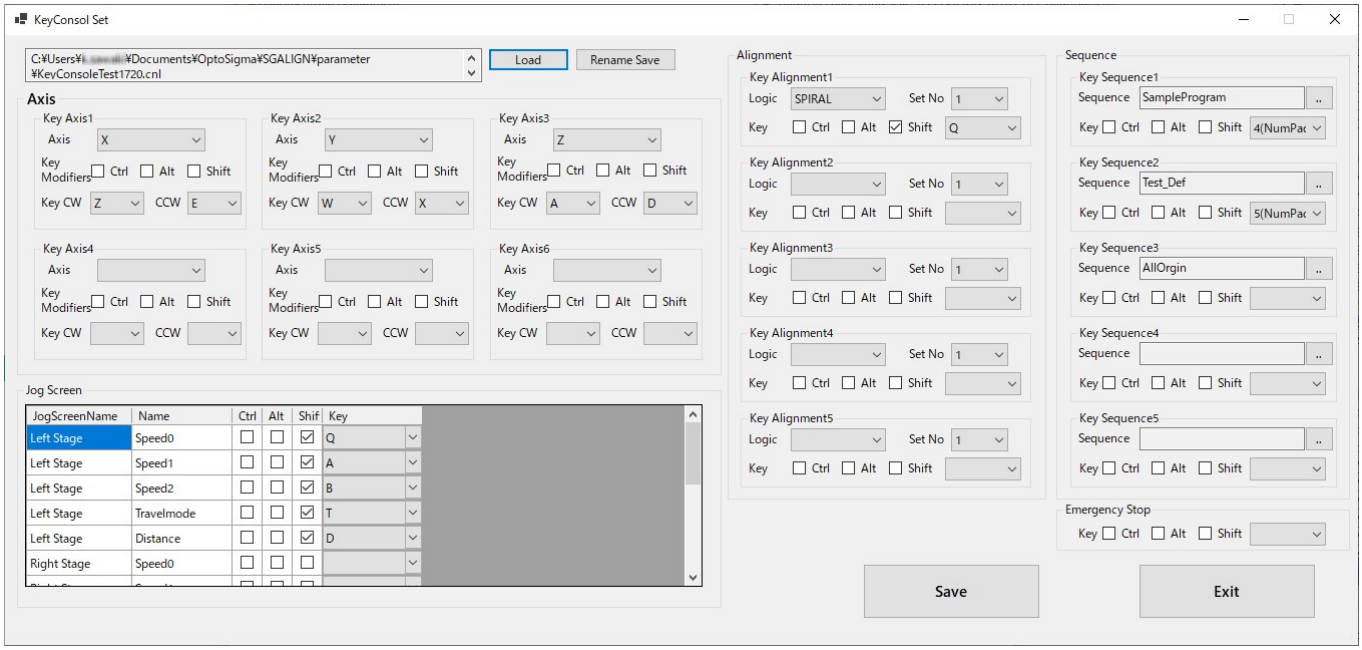
The search is the exact match search.

1 4 . Key Console

1 4 - 1 . Display the key console setting screen



Click [Setting] - [Key Console] on main screen to display the key console screen.



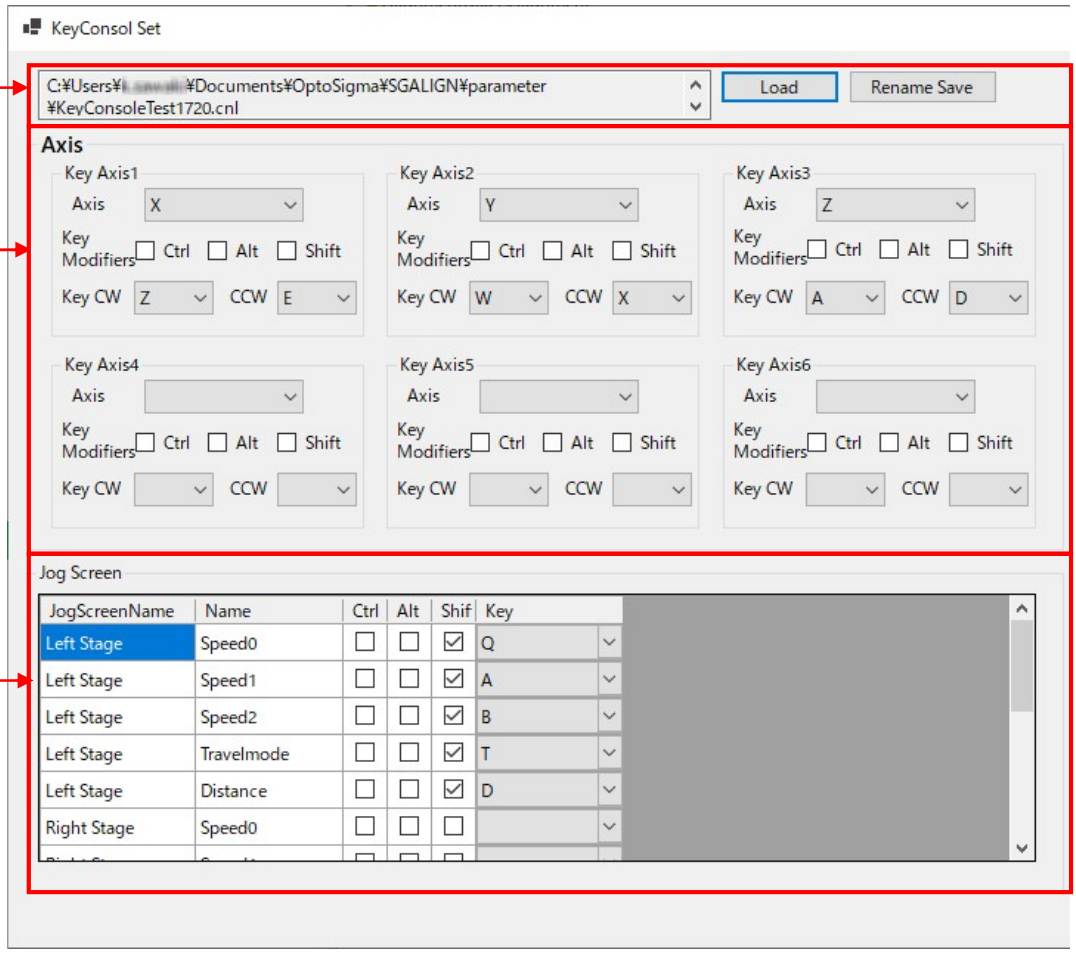
1 4 - 2 . Key Console Setting Screen

・[Left side of the key console setting screen]

File Management

Axis Operation Key Setting

Set speed, operation mode, moving distance key in Jog Screen



・[Right side of the key console setting screen]

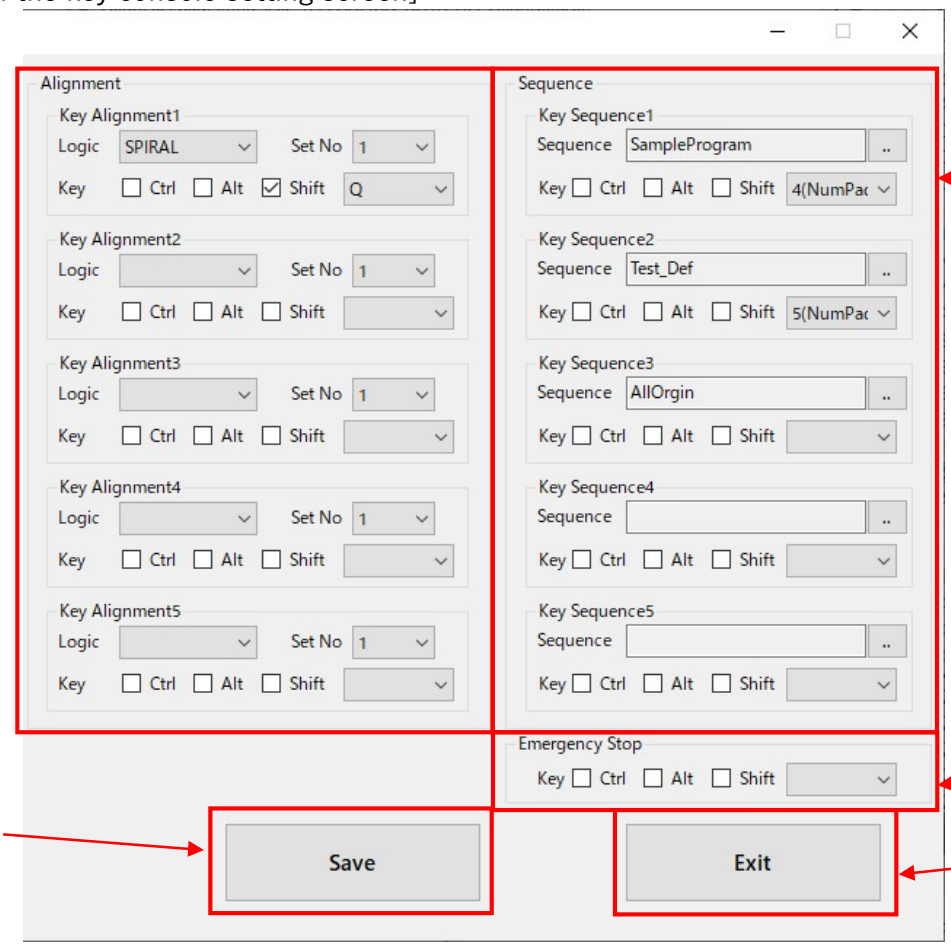
Alignment Setting Key

Sequence Key

Save Button

Exit Button

Emergency Stop Key



・[File Management]

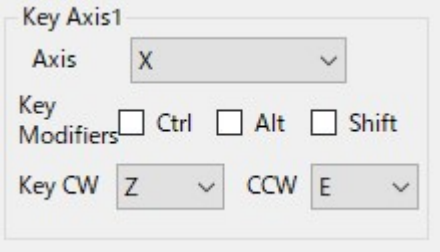
File name (.cnl) for saving the key console setting value.

Load : Load the key console setting file (.cnl file)

Rename Save : Save the key console setting to different file (.cnl file)

・[Axis Operation Key Setting]

Specify the key for moving the axis in each direction. Up to 6 axes can be specified.



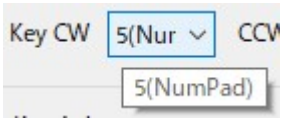
Axis : Select the axis which is operated by using the key. Only the existing axes are listed.

Key Modifiers: Check to allow in combination with Control, Alt, and Shift.

Key CW : Specify the CW direction key of the axis shown in [Axis]. Required for key operation.

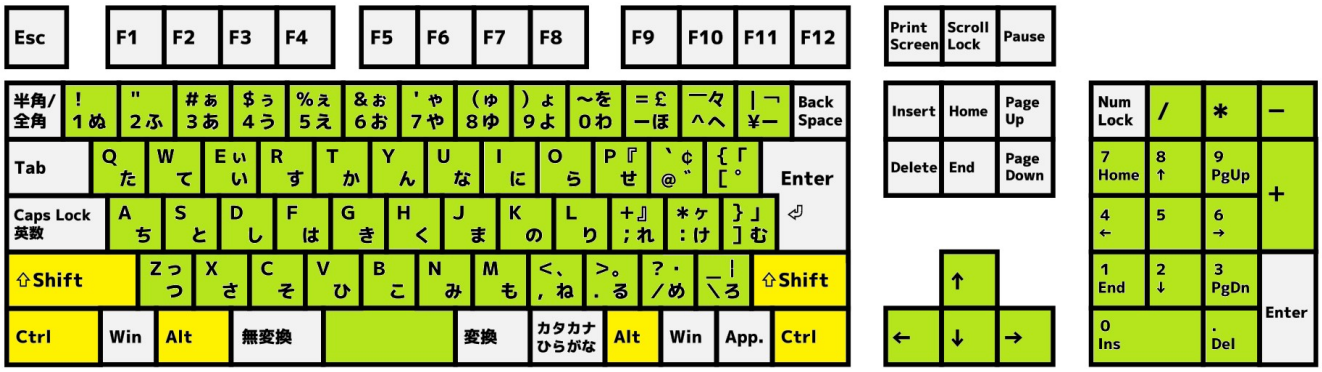
Key CCW : Specify the CCW direction key of the axis shown in [Axis]. Required for key operation.

When pointing Key CW and Key CCW with mouse, tooltip appears.



Keys in green can be specified for Key, Key CW, and Key CCW.

Keys in yellow can be specified for Key Modifiers.



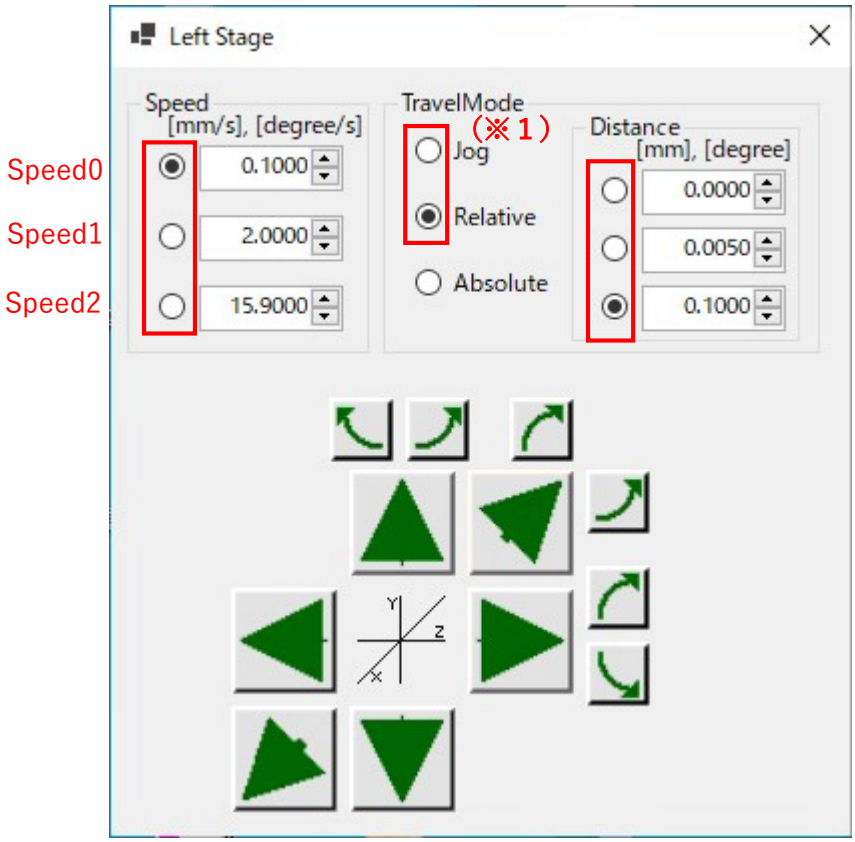
*Please note that the keys in yellow can only be used in combination with that in green and cannot be used alone.

・[Set speed, operation mode, moving distance key in Jog Screen]
Using the 3-step speed and 3-step movement distance set in the JOG operation screen,
to specify keys for 3-step speed, key for movement distance switching, and key for movement mode switching.

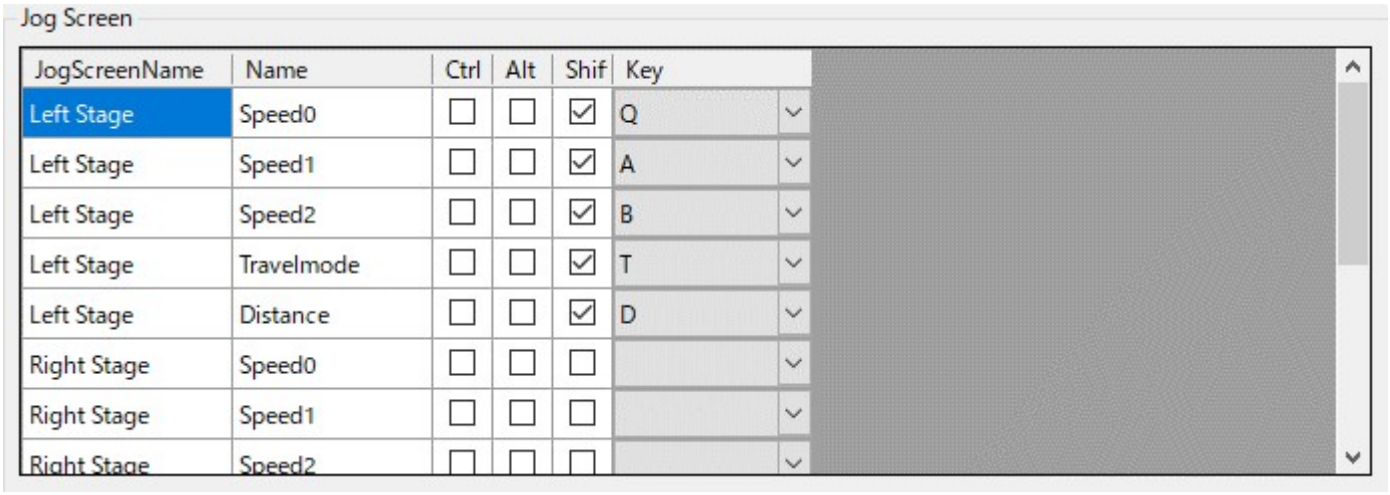
Jog Screen

JogScreenName	Name	Ctrl	Alt	Shif	Key
Left Stage	Speed0	☐	☐	☑	Q
Left Stage	Speed1	☐	☐	☑	A
Left Stage	Speed2	☐	☐	☑	B
Left Stage	Travelmode(※1)	☐	☐	☑	T
Left Stage	Distance	☐	☐	☑	D
Right Stage	Speed0	☐	☐	☐	
Right Stage	Speed1	☐	☐	☐	
Right Stage	Speed2	☐	☐	☐	

Items that can be assigned to keys in each JOG screen are Speed0, Speed1, Speed2, TravelMode switching, and Distance switching .
(For example) Left Stage



※ 1: With key operation, Travelmode switches between Jog and Relative. Absolute cannot be switched to.



JogScreenName : Display the JOG screen name and it cannot be changed.

Name : Display the name of the key operation and it cannot be changed.

Ctrl : Check to use "Control" key.

Alt : Check to use "Alt" key.

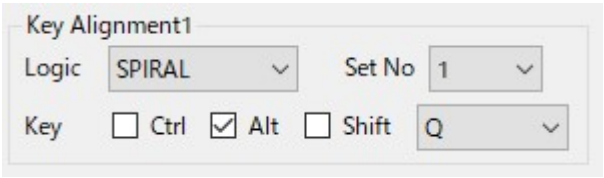
Shift : Check to use "Shift" key.

Key : Specify the key. It is necessary when using key operation.

When pointing the Key using mouse, the full key name appears in a tooltip.

・[Alignment Setting Key]

[Alignment Method] and [Setting Storage] No.1~No.20 set on the [Alignment Setting Screen] can be specified as key operations. Up to 5 alignment settings can be specified.



Logic : Select the [Alignment type] for key operation

Set No : Specify [Setting Storage] No.1~No.20 for selected [Logic]

Ctrl : Check to use "Control" key.

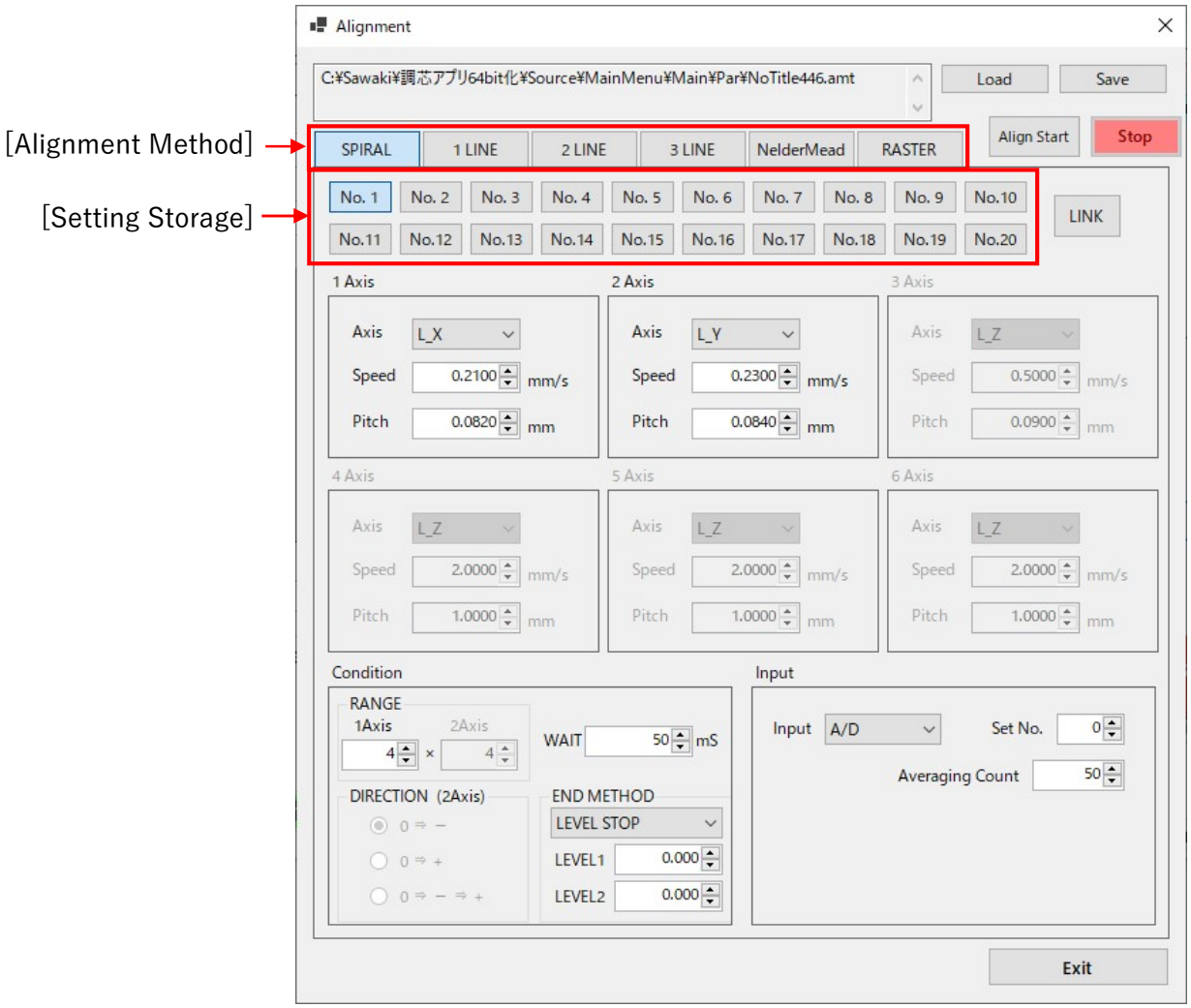
Alt : Check to use "Alt" key.

Shift : Check to use "Shift" key.

Key : Specify the key. It is necessary when using key operation.

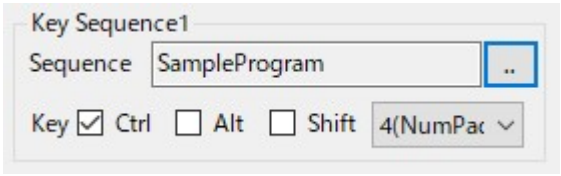
When pointing the Key using mouse, the full key name appears in a tooltip.

(Example: Alignment Setting Screen)



・[Sequence Key]

A sequence file that describes sequence actions can be specified as a key operation. Up to 5 can be specified.



Sequence : Display *.json sequence file for key operation.
It cannot be directly input.

.. Button : Click to display *.json sequence files in the folder
C:¥Users¥[User Name]¥Documents¥OPTOSIGMA¥SGALIGN¥sequence
Select *.json sequence file from here.
*Only the sequence file in the following folder can be selected.
C:¥Users¥[User Name]¥Documents¥OPTOSIGMA¥SGALIGN¥sequence

Ctrl : Check to use "Control" key.

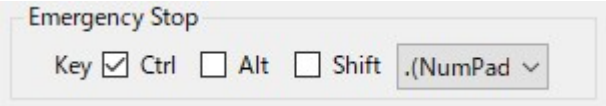
Alt : Check to use "Alt" key.

Shift : Check to use "Shift" key.

Key : Specify the key. It is necessary when using key operation.
When pointing the Key using mouse, the full key name appears in a tooltip.

・[Emergency Stop Key]

Set key for emergency stop.
Immediately stop all axis motion, all alignment and all sequence.



Ctrl : Check to use "Control" key.

Alt : Check to use "Alt" key.

Shift : Check to use "Shift" key.

Key : Specify the key. It is necessary when using key operation.
When pointing the Key using mouse, the full key name appears in a tooltip.

・[Save Button]

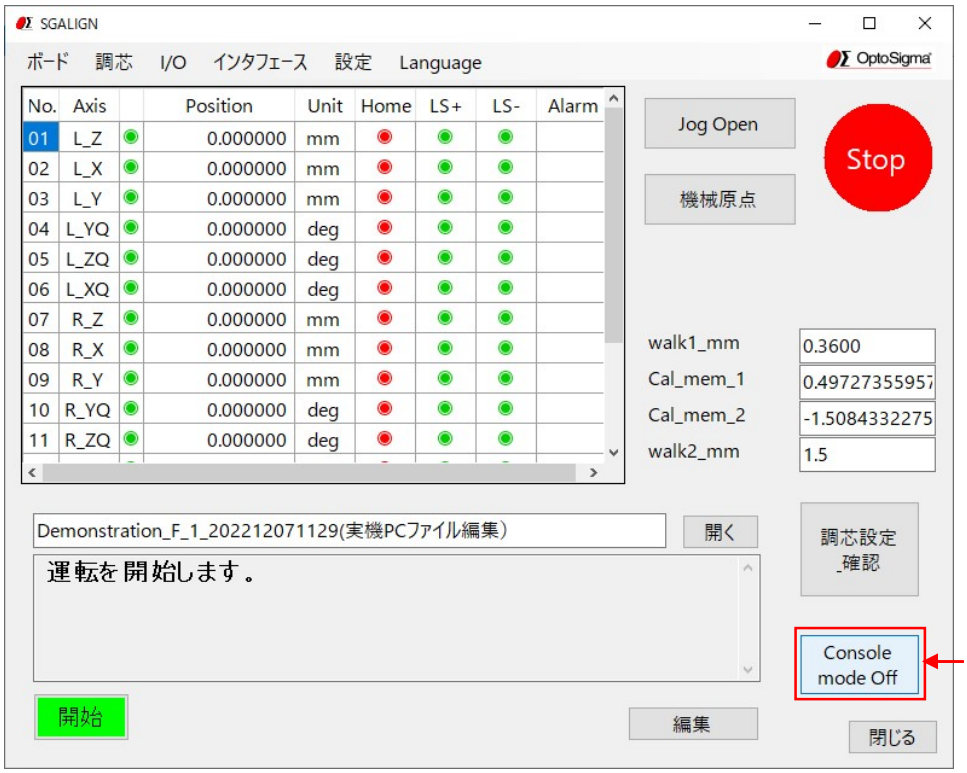
Click to save key console setting to the ".cnl" file shown in [File Management].

・[Exit Button]

Close the key console setting screen.

1 4 - 3 . Switching to console key operation mode

Key operations are possible only when the main screen is active.



ON/OFF switching button for console key operation

Above shows status when console key operation mode is OFF.

Click [ON/OFF switching button for console key operation].

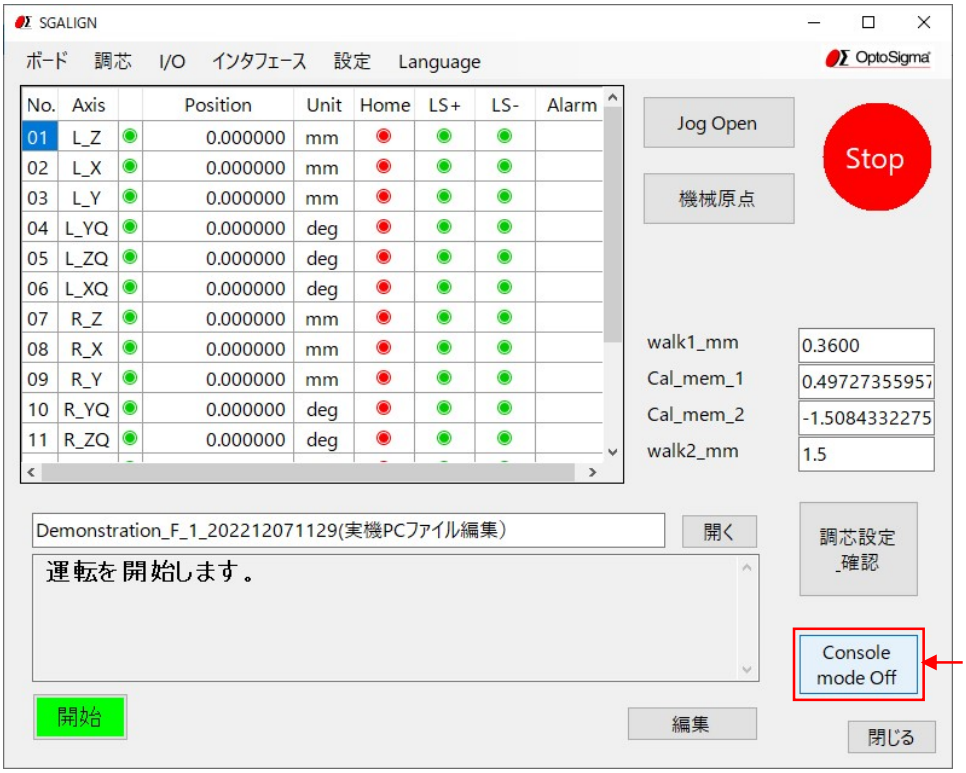
ON/OFF switching button for console key operation

console key operation mode becomes ON.

When the console key operation mode is ON, screen in pink is for attention.

The text of [ON/OFF switching button for console key operation] becomes [Console mode On].

Click [ON/OFF switching button for console key operation] again to return to console key operation mode OFF status.



ON/OFF switching button for console key operation

1 4 - 4 . Operation example using console keys

[Movement mode switching]

As an example, change movement mode of the Left Stage to relative movement.

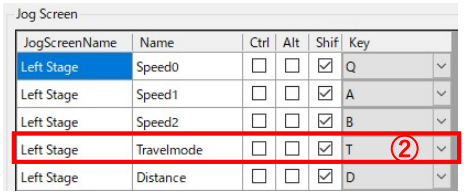
① Switch console mode to be On and display the pink screen.

② The Travelmode of the Left Stage on the setting screen is confirmed to be [Shift + T].

③ Active the main screen in pink by clicking it or using other method, and press [Shift + T].

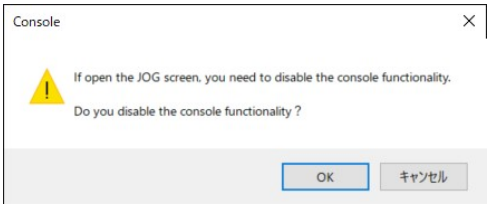
Main Screen

Console key setting screen



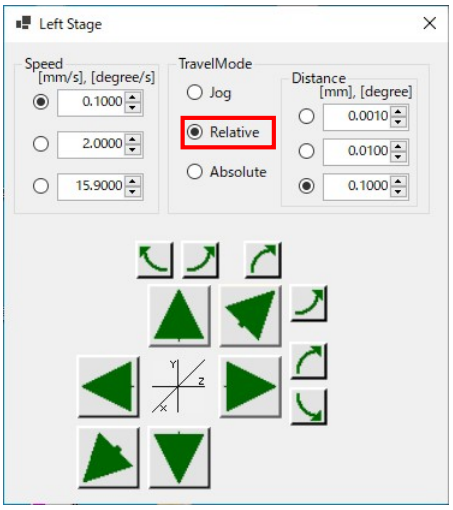
ON/OFF switching button for console key operation

To confirm, press the Jog Open button to try to display the JOG screen.



The message box shows that to open the JOG screen, Console function must be disabled. Then click OK.
(Explanation will be omitted from the next time)

Left Stage JOG Screen



Travelmode on the JOG screen of the Left Stage can be confirmed to be Relative.

With console key specification, each time after specified key is pressed, Travelmode changes from JOG → Relative → JOG → ⋯ repeatedly.

It cannot be changed to Absolutemode.

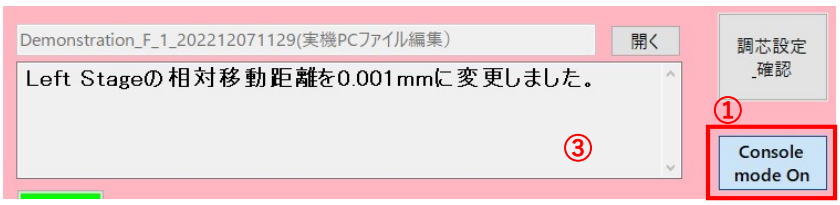
[Relative moving distance switching]

① Switch console mode to be On and display the pink screen.

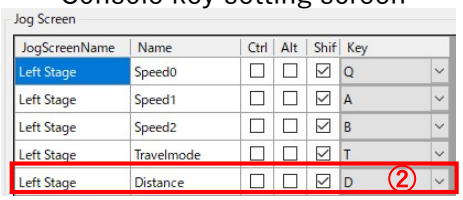
② The Distance switching of the Left Stage on the setting screen is confirmed to be [Shift + D].

③ Active the main screen in pink by clicking it or using other method, and press [Shift + T].

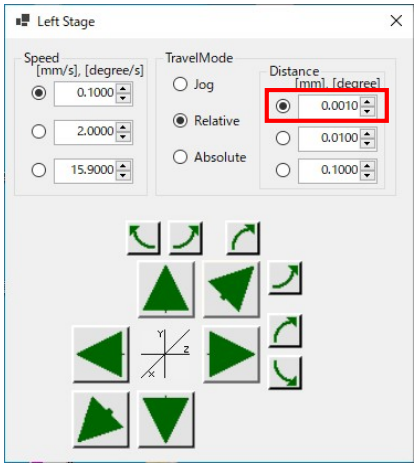
Main Screen



Console key setting screen



Left Stage JOG Screen



Relative distance on JOG screen of left stage can be confirmed to be 0.001mm.

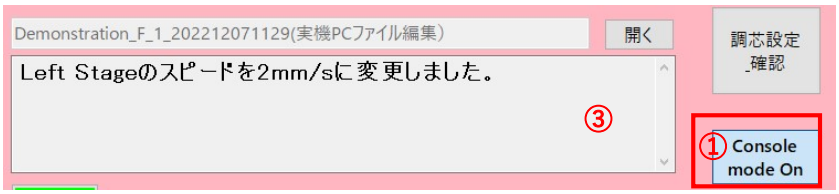
[Speed Setting]

① Switch console mode to be On and display the pink screen.

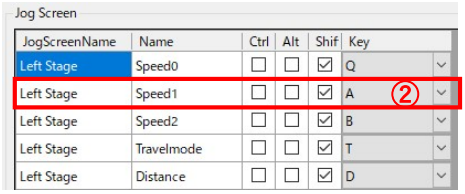
② The Speed1 specification of the Left Stage on the setting screen is confirmed to be [Shift + A].

③ Active the main screen in pink by clicking it or using other method, and press [Shift + A].

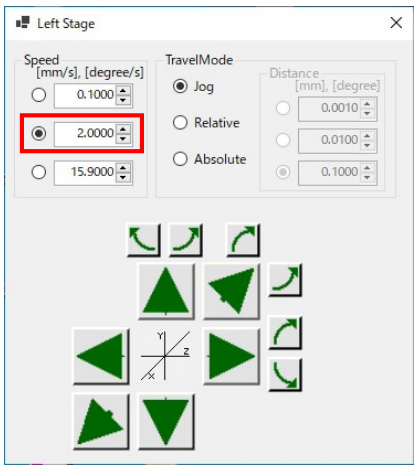
Main Screen



Console key setting screen



Left Stage JOG Screen



Speed on left stage JOG screen can be confirmed to be 2mm/s.

Above the operation is also valid for Speed0 key and Speed2 key setting.

[Axis Movement]

① Switch console mode to be On and display the pink screen.

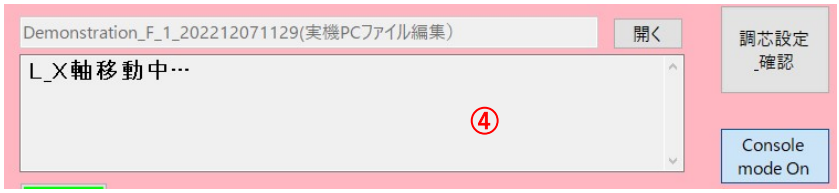
② Set Travelmode to the desired status (Relative or JOG). (See previous page)

③ On the setting screen, [Z] is used to move L_X axis in the + direction.

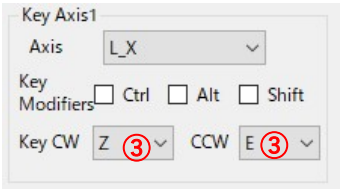
④ Active the main screen in pink by clicking it or using other method, and press [Z].

⑤ Once the movement is completed, the message "Completed" will be displayed after "...".

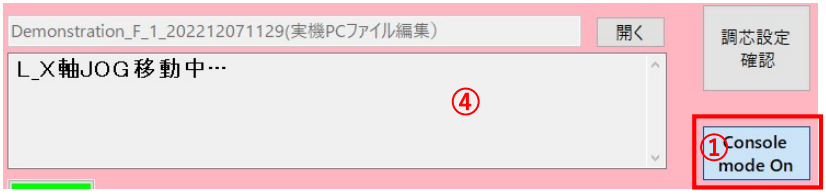
Main screen when executing relative movement



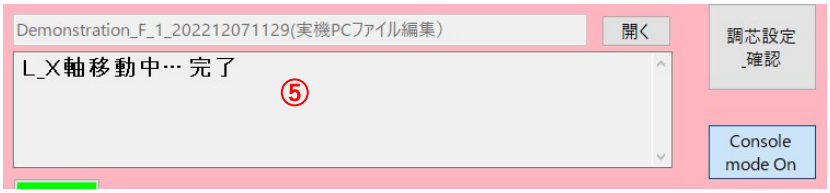
Console key setting screen



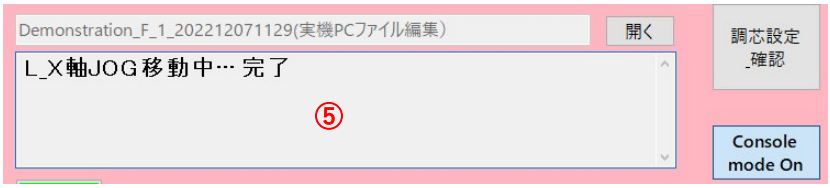
Main screen when executing JOG movement



Main screen after completing relative movement



Main screen after completing JOG movement



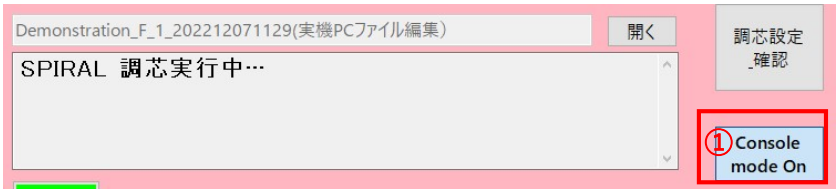
[Alignment Operation]

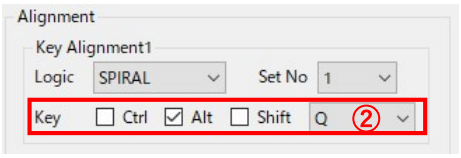
① Switch console mode to be On and display the pink screen.

② On the setting screen, Key Alignment1 is SPIRAL alignment No.1. The console key is [Alt + Q].

③ Active the main screen in pink by clicking it or using other method, and press [Alt + Q].

④ Executing the alignment. To stop during the alignment, click STOP button on the screen, or press Emergency Stop key specified on the console key setting screen.





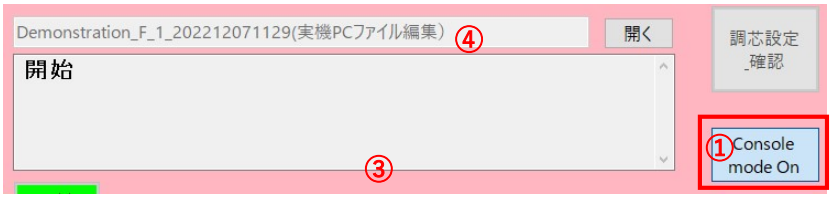
[Sequence Operation]

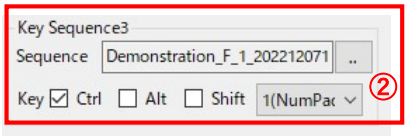
① Switch console mode to be On and display the pink screen.

② On the setting screen, the sequence file of Key Sequence3 is "Demonstration_F_1202212071129～～". The console key is [Ctrl + 1(NumPad)].

③ Active the main screen in pink by clicking it or using other method, and press [Ctrl + 1(NumPad)].

④ The sequence name is changed to the specified sequence file name and the sequence is executed. To stop during the execution, click STOP button on the screen, or press Emergency Stop key specified on the console key setting screen.





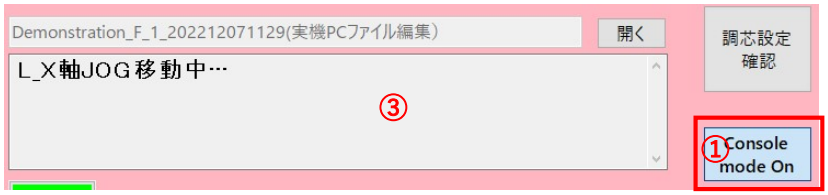
[Emergency Stop]

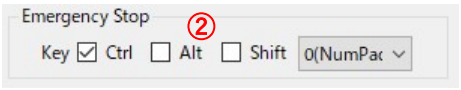
① Switch console mode to be On and display the pink screen.

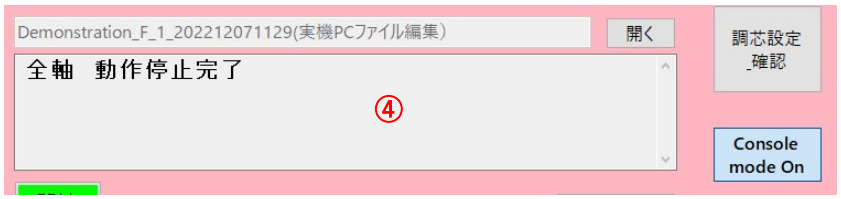
② On the setting screen, the console key of Emergency Stop is [Ctrl + 0(NumPad)].

③ Active the main screen in pink by clicking it or using other method, and press [Ctrl + 0(NumPad)].

④ "All axes are stopped" is displayed. Pressing stop key can stop axis, alignment and sequence.

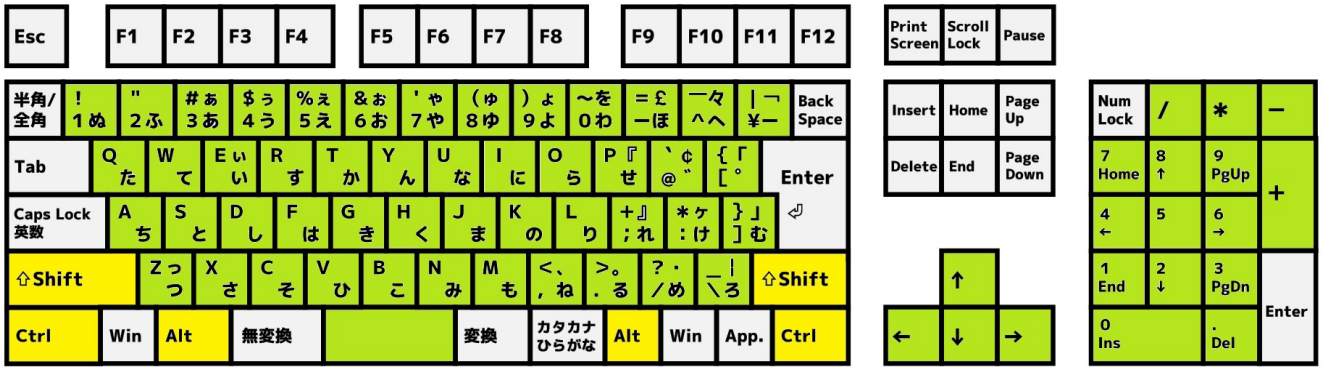






1 4 - 5 . Usable keys for console key operation

For console key operation, the keys in green can be used individually or in combination with keys in yellow.



*Yhe key in yellow can only be used in combination with the keys in green. They cannot be used individually.

(NumPad) key is the numeric keypad on the right side of the keyboard shown in the above.

When selecting a key, [Numeric key] is the main key on the left, and [Number(NumPad)] key is the numeric key on the right. They are different.

[Number(NumPad)] key cannot be used for some PCs such as laptops without the numeric keypad.

The recommended keyboard layout.、

- Japanese 106 keyboard
- Japanese 108/109 keyboard
- Japanese 112 keyboard

1 5 . How to start (From power on to sequence start)

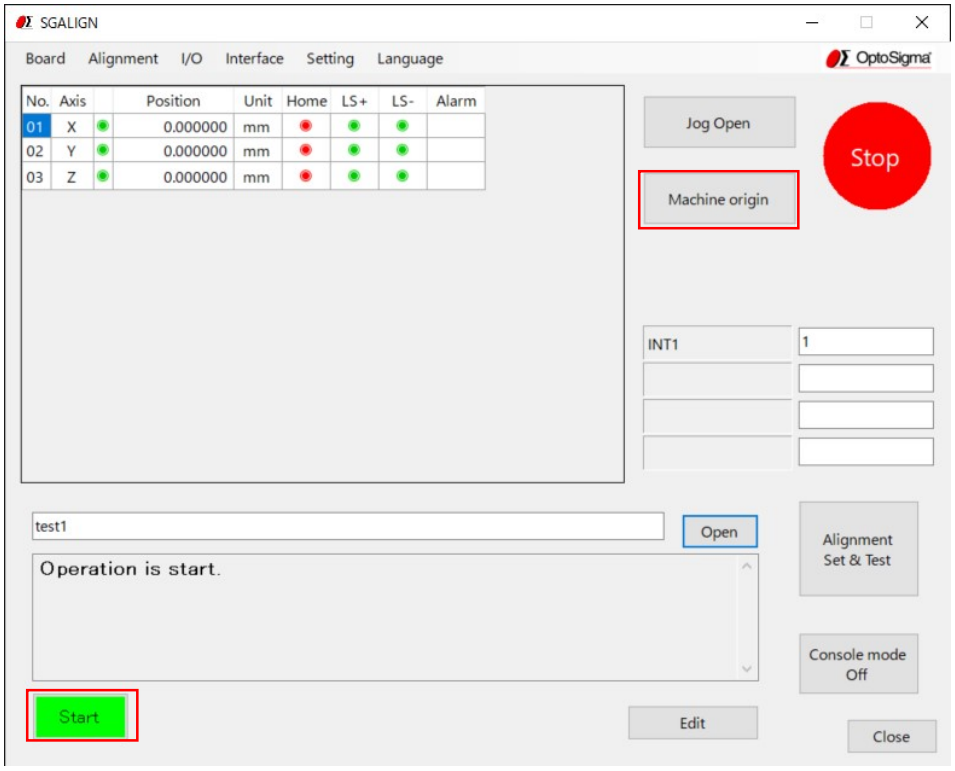
① Power on the PC and then the 8-axis driver box.

② Double click the following icon to start the alignment software.

SGALIGN

③ Once the main screen appeared, click [Machine Origin].

*Please always do mechanical origin after restarting driver box and alignment software. Otherwise, repeatability cannot be achieved, and mechanical interference may happen to damage the setup.



④ Once the machine origin is finished, please press [Start] button.

⑤ Once the operation is finished, please double check that the sequence program has been stopped. Then please click [Close] button.

*It might take time until the end screen appears because the data needs to be saved.

⑥ One the software is finished, please power off all devices.

It is recommended to power off the devices in the reverse sequence of startup.