

User's Manual

**1axis SFS (Sigma Fine Stage)
Controller
FINE-01 γ**



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For Your Safety

Before using this product, thoroughly read this manual and all warnings or cautions in the documentation provided in order to prevent any damage or property losses, or personal injury that may cause to user or others. After reading this manual, keep it in a safe place for future reference.

The Symbols Used in This Manual

Symbols below are used to indicate the exact nature of the warning or caution in order to prevent any damage or property loss, or personal injury that may cause to user or others.

 WARNING	 CAUTION
This symbol marks warnings that should be read and used to prevent serious injury or death.	This symbol indicates where caution should be used to avoid possible injury to yourself or others, or damage to property.

Power cord that can be used

Please use the power cord that comes in the package.

Disclaimer of Liability

1. SIGMAKOKI CO., LTD does not accept liability for damages resulting from the use of this product or the inability to use this product.
2. SIGMAKOKI CO., LTD does not accept liability for damages resulting from the use of this product that deviates from what is not described in the manual.
3. SIGMAKOKI CO., LTD does not accept liability for damages resulting from the use of this product in extraordinary conditions, including fire, earthquakes, and action by any third party, other accidents, and deliberate or accidental misuse.

WARNING

- * Do not use this product in the presence of flammable gas, explosives, or corrosive substances, in areas exposed to high levels of moisture or humidity, in poorly ventilated areas, or near flammable materials.
- * Do not connect or check the product while the power is on.
- * Installation and connection should be performed only by a qualified technician.
- * Do not bend, pull, damage, or modify the power, motor or connecting cables.
- * Do not touch the internal parts of the products.
- * Connect the earth terminal to ground.
- * Should the product overheat, or should you notice an unusual smell, heat, or unusual noises coming from the product, turn off the power immediately.
- * Do not turn on the power in the event that it has received a strong physical shock as the result of a fall or other accident.
- * Use dry cloth only for cleaning the equipment.
- * Do not leave the product in an enclosed area or in areas in which it would be exposed to direct sunlight or vibration.
- * Do not touch the product when your hands are wet.

CAUTION

- * When unplugging the product, pull on the plug rather than the cord.
- * Because some electrical charge remains after the power has been cut, do not touch the input or output terminals for approx. ten seconds after the product has been turned off.
- * Before connecting peripherals to the product, adjust the product' s initial setting (parameter settings) to suit the peripheral.
- * Turn off the power before connecting the product to other devices. Connection should be performed following the connection diagram.
- * Before turning the equipment on (or when beginning operations), be sure that you can turn the power off immediately in the event that an abnormality occurs.
- * Do not obstruct the product' s air vents or other openings.

Chapter 1 Before Using

1. Contents

Purchasers of this product are advised to find that the package contains the items listed below. Check the package contents using the following checklist. Contact our International Sales Division as soon as possible in the event that you find that any items are missing or damaged.

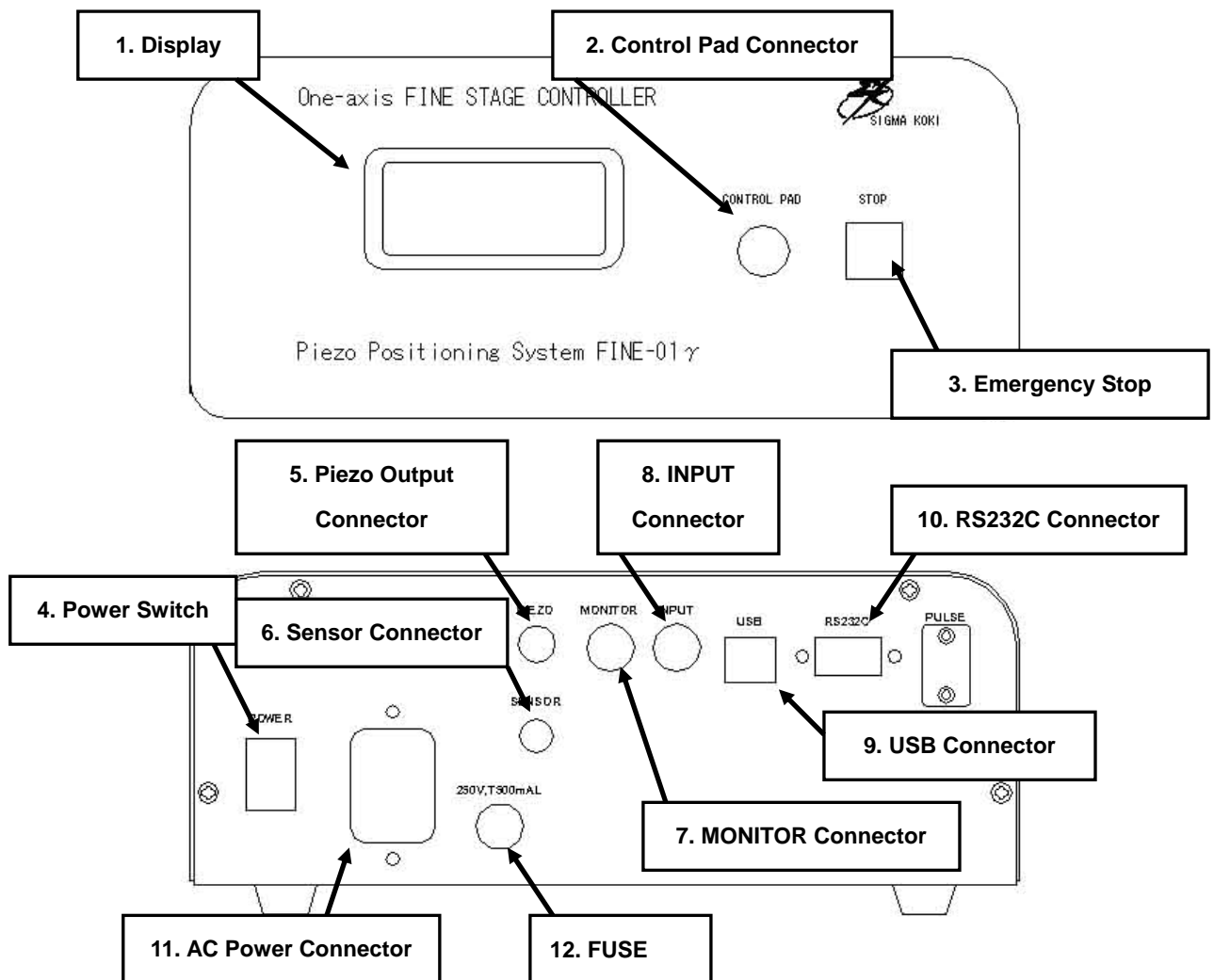
- FINE-01 γ Stage Controller
- This Manual
- AC power cable (2.3m)

2. Overview

1 Piezo driver is embedded in the FINE-01 γ Stage Controller. This unit equips a digital sensor input and it corrects hysteresis curve to Piezo, which enables closed loop control. Fine stage can be controlled by simple command from PC connected to this controller using RS232C or USB interface. ANALOG mode embedded allows control by external input of analog signal.

3. Function and the Name of Each Part

3-1. Name of Each Part



3-2. Function of Each Part

1. **Display** Display operation mode and coordinate of each axis of Fine Stage.
2. **Control Pad Connector** Connect Control Pad (CJ-200A).
3. **Emergency Stop Button** Stop the Fine Stage immediately, then move to the 0V point in case of open loop control or 0nm point in case of closed loop control.
4. **Power Switch** Electric power is supplied when it is turned 'ON'. Power is cut off when it is turned 'OFF'.
5. **PIEZO Output Connector** Connect to the Fine Stage being used.
6. **Sensor Connector** Connect to the digital sensor of Fine Stage being used.
7. **MONITOR Connector** This connector is for ANALOG signal monitor. (Output voltage is the same as input voltage to **INPUT connector**.)
8. **INPUT Connector** This connector is for ANALOG signal input. (30 times higher voltage than what has been input from **INPUT connector** is output from **PIEZO output connector**.) Input range : -10 ~ +10V
9. **USB Connector** Connect to PC through USB.
(Note) Please use Sigma Koki Software for USB communication.
10. **RS232C Connector** Connect to PC through RS232C.
11. **AC Power Connector** Connect using power supply cable (2.3m) attached.
12. **FUSE** AC 250V, 0.5A, T
(Use same type fuse when replacing.)



For your safety, make sure the switch is OFF before connecting connectors.

Chapter 2 Basic Operation Methods

In order to understand the functions of this controller, an outline and details of basic operation are described below.

4. Connect Fine Stage.



5. Turn on the power of controller.



6. Operate by Control Pad



7. Operate in ANALOG mode.



8. Change memory switch.



Connect Fine Stage (SFS/SFS-H series) using the exclusive connecting cable.

- [Reference]
- 4-1. Connect Fine Stage.
 - 4-2. Connect control pad and power cable.

Turn on the power switch on the rear panel.

Initial screen is displayed in LCD after the software version information.

Set up the memory switch according to the stage operation.

- [Reference]
- 5-1. Display
 - 5-2. Operation mode at power-on
 - 5-3. Changing operation mode at power-on.
 - 5-4. Check memory switch settings

When MODE button on the Control Pad is pressed, operation mode changes

HOST→MANUAL→STAND ALONE→EDIT→HOST ...

Fine Stage can be moved to each direction by cross button on Control Pad in MANUAL mode

- [Reference]
- 6-1. Control Pad
 - 6-2. Operation Modes & Buttons
 - 6-3. Operate Fine Stage by Control Pad

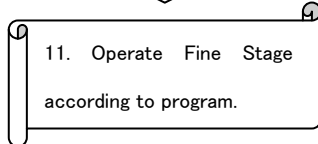
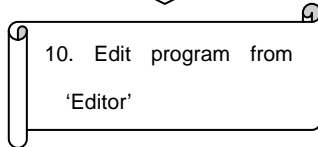
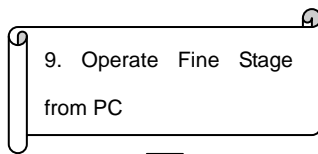
MANUAL mode will be turned into ANALOG mode when ENTER+SET buttons are pressed. Operate Fine Stage by ANALOG signal input to INPUT connector in ANALOG mode.

- [Reference]
- 7-1. Connect FINE-01 γ to external device
 - 7-2. Input signal
 - 7-3. MONITOR connector

In memory switch, parameter settings including communication settings are saved.

Contents of memory switch can be checked and set by pressing Ctrl + SET buttons on Control Pad in MANUAL mode.

- [Reference]
- 8-1. Setup the contents of memory switch
 - 8-2. Contents list of memory switch
 - 8-3. Details of memory switch



Fine Stage can be operated by simple command from PC.

- [Reference]
- 9-1. Command list
 - 9-2. Command format
 - 9-3. Command details

Edit program in EDIT mode.

- [Reference]
- 10-1. Controlling option and data entry
 - 10-2. Editing programs
 - 10-3. Explanation of program data

Fine Stage can be operated (such as program selection, activation, stop, etc) from Control Pad and PC.

- [Reference]
- 11-1. Starting programmed operations from a control pad
 - 11-2. Starting programmed operations from a computer

4. Connect Fine Stage

This controller can control SFS/SFS-H series stage by connecting with exclusive cables.

4-1. Connect Fine Stage

Connect controller to each Fine Stage.

Connect Piezo cable (FINE-CA-3) to PIEZO connector of Fine Stage and PIEZO output connector of FINE-01 γ.

Connect sensor cable (DS1-CA-3) to sensor connector of Fine Stage and sensor connector for FINE-01 γ.

Note) Sensor cable should be connected for closed loop operation.



Turn off Power Switch before connecting the cables.

4-2. Connect control pad and power cable

When using Control Pad (CJ-200A) as a stage controller, connect to 'CONTROL PAD' section on the right of the front panel and make sure that the arrow mark of the connector faces upwards.

(Note) Be sure the power is turned off before connecting Control Pad in order to avoid malfunction.

Connect the attached power cable to AC power connector on rear panel of controller, and plug the power cord in.

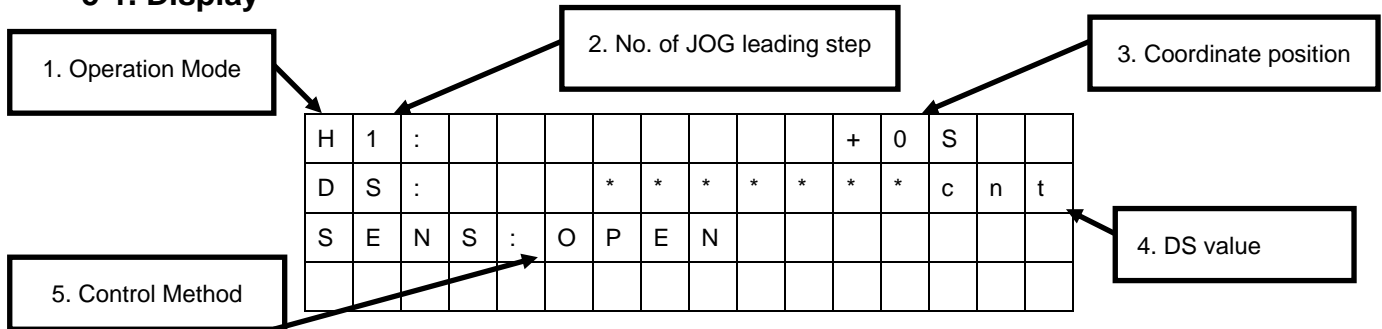


For your safety, be sure that FG cord of power cable is connected to earth ground.

5. Turn on the Power of Controller

When power switch of the controller is turned ON, the equipment name and the version information are shown first. Then the present operation mode, No. of JOG leading step, control method, and the coordinate position will be displayed.

5-1. Display



1. Operation Mode

H:HOST mode, M:MANUAL mode, S:STAND ALONE mode, E:EDIT mode, A:ANALOG mode

2. No. of JOG leading step

1: Step No.1, 2:Step No.2, 3:Step No.3, 4:Step No.4

Refer to [8-3. Details of memory switch], regarding the details of No of step.

3. Coordinate position


Unit is according to display settings. S: No. of step, nm: nm, mV: mV

4. DS value

Account value of digital sensor will be displayed. (No-display when shipped)

5. Control Method

OPEN: Open loop, CLOSE: Closed loop



At the time of the warming-up of a stage, and the acquisition of hysteresis data in closed loop, voltage is displaced by 1 cycle from 0 to 150V to stabilize Piezo-electric element and acquire hysteresis data, which moves the stage.

5-2. Operation mode at power-on

The operation mode at power-on changes according to “MOD SEL”, the setting item of memory switch.
(Refer to [8-2. Contents list of memory switch].)

The default value is set to HOST mode.

The operation mode at power-on can be selected between HOST / MANUAL/ANALOG.

(Refer to [6-2. Operation Modes and Buttons].)

5-3. Changing the operation mode at power-on

Please follow the directions below when changing the operation mode at power-on. All operations are done with Control Pad (CJ-200A).

1. Turn on the power of controller.
2. Press the “MODE” button on the Control Pad and change the mode to MANUAL.
3. Press “Ctrl” + ”SET” buttons simultaneously.

Then the memory switch setup screen will be shown.
(Figure 5-1)

M	E	M	R	Y		S	W	I	T	C	H			0	1
S	P	D		S	E	L	:								1

Memory switch setup screen (Figure 5-1)

4. Press “-2(4)” button at the bottom of the cross button until “MODE SEL” is displayed like Figure 5-2.
5. Select the mode you want to change to and by pressing “SET” or “SPD” button.

Display changes in the following order : HOST→
MANUAL→ANALOG→ ...

M	E	M	R	Y		S	W	I	T	C	H			0	5	
M	O	D		S	E	L							H	O	S	T

Operation mode select screen (Figure 5-2)

6. Press “MODE” button when you finished setup. Configuration screen will appear as shown in Figure 5-3.

7. Press “SET” button.

Display returns to the initial screen of MANUAL mode.

(Press “MODE” button to re-do setup. Press “SPD” button to cancel settings.)

M	E	M	R	Y		S	W	I	T	C	H		S	E	T	
O	K	(S	E	T)	,	N	G	(S	P	D)		

Setup configuration screen (Figure 5-3)

5-4. Check the memory switch settings

Setup inner memory settings of controller according to the each Fine Stage connected.

Set the memory switch according to the operating environment.

(Communication settings and control methods should be set in accordance with using conditions.)

Refer to [Chapter 8.Change the memory switch] for details.

Memory switch setup screen will be shown when both 'Ctrl' and 'SET' buttons are pressed simultaneously in MANUAL mode.

「Functions of buttons in memory switch settings」

Buttons	Functions
Up	Change the setting items.
Down	Change the setting items.
Right	When the contents are numerical values, blinking cursor is moved to right digit.
Left	When the contents are numerical values, blinking cursor is moved to left digit.
SET	1. Change the settings contents. (It increases in case of digit value indication.)
	2. Save the changed data in the settings configuration screen and exits.
SPD	1. Change the settings contents. (It decreases in case of digit value indication.)
	2. Cancel the changed data in the settings configuration screen and exits.
MODE	1. Press when settings are completed. (It turns to confirmation screen.)
	2. Return to memory switch screen after canceling the setup completion in the settings configuration screen.
Ctrl+ORG+ZERO (Three buttons are pressed simultaneously.)	Reset the memory switch to factory defaults.

(Note) After memory switch settings have been completed, you should return to the coordinate screen and reboot the power. Otherwise, the changed items may not operate correctly.

6. Operate Fine Stage by Control Pad

Control Pad (CJ-200A) is for smooth operation of each mode in stage controller FINE-01 γ . Since it is connected to a stage controller using a cable, it is possible to remote-control. Therefore, even when the stage controller and the Fine Stage are placed at a distance, you can check the operation of the Fine Stage near by using the Control Pad.

6-1. Control Pad

CJ-200A is designed as Control Pad for the stage controller FINE-01 γ .



Be sure that the arrow mark on the connector (male) faces upwards and inserted into the "CONTROL PAD" section on the right of front panel when using Control Pad as a stage controller. Be sure to turn off the power of the controller before connecting Control Pad. If the Control Pad is connected while the controller is powered ON, the Control Pad may not work properly.

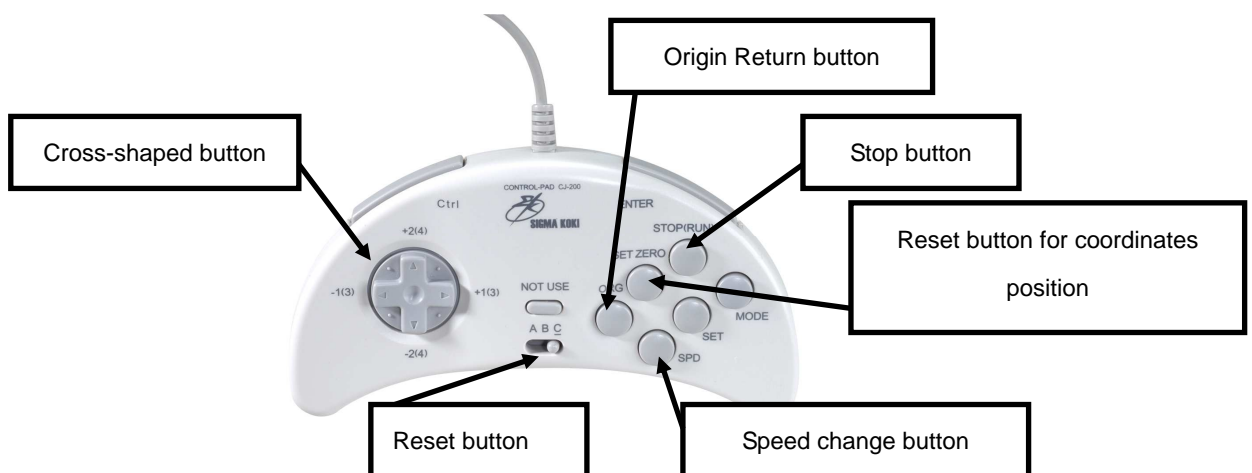
(Note 1) There is no Reset button for CJ-200A.

(Note 2) There is no 「Button reset」 function for CJ-200A.

「Button reset」

Change Reset button setting from 'C' to 'A' while pressing 'ORG' button. Then, release 'ORG' button and set the Reset button back to 'C'.

Control Pad CJ-200A



Refer to [6-3. Operate Fine Stage by Control Pad] about the function of each button of Control Pad CJ-200A.

6-2. Operation Modes and Buttons

There are 5 kinds of operation modes (HOST mode, MANUAL mode, STAND ALONE mode, EDIT mode and ANALOG mode) in this controller. The operation mode changes by pressing 'MODE' button or 'Ctrl' + 'MODE' buttons. However, MANUAL mode will turn to ANALOG mode by pressing 'ENTER' and 'SET' buttons simultaneously only.

* HOST mode

Fine Stage can be operated from PC.

Either of RS232C or USB interface can be used to connect to PC. They cannot be connected at the same time.

* MANUAL mode

Fine Stage can be operated by each button of Control Pad.

Memory switch settings screen can also be displayed.

* STAND ALONE mode

Program can be operated by Control Pad or PC.

Refer to [11. Move FINE Stages according to the program] for details.

* EDIT mode

Program data can be edited.

Refer to [10.Editing programs by EDIT mode] for details.

* ANALOG mode

Fine Stage can be operated by inputting ANALOG signal.

Refer to [7. Operate Fine Stage in ANALOG mode] for details.

6-3. Operate Fine Stage by Control Pad

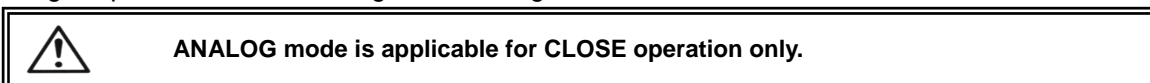
Fine Stage can be operated by Control Pad in MANUAL mode. See below functions of each button.

Functions	Button	Operation
(1) Cross-shaped button	Right	It moves to the positive direction (+voltage direction).
	Left	It moves to the negative direction (-voltage direction).
	Up	N/A
	Down	N/A
(2) Speed change button	SPD	Change the STEP NO. in JOG operation mode by cross-shaped button. (1→2→3→4→1)
(3) Reset button for coordinates position	ZERO	It resets coordinates position as "0" and it will be regarded as logical origin.
(4) Logical Origin Return button	Ctrl + ZERO	It moves to logical origin.
(5) Origin Return button	ORG	It moves to Origin Points (0mV and 0nm).
(6) Stop button	STOP	It stops the stage in operation and moves to Origin Point.
(7) Memory switch settings button	Ctrl + SET	It sets memory switch.

7. Operate Fine Stage in ANALOG mode

FINE-01 γ can be operated by ANALOG signal to INPUT connector externally.

Stage is positioned after loading ANALOG signal from INPUT connector.



ANALOG signal can be checked since the same voltage that has been input from INPUT connector will be displayed on MONITOR connector.

7-1. Connect FINE-01 γ to external device

Connect INPUT connector of FINE-01 γ and external device (signal source) using BNC co-axial cable.



7-2. Input signal

-Analog signal from -10V to +10V can be input.

-10V and 10V will be regarded as 0nm and 100000nm respectively. Hence, when 0V has been input, 50000nm will be its position. ($1\text{mV} \cong 5\text{nm}$)



When INPUT connector is 'OPEN', output from Piezo output connector is not stabilized. When operating in Analog mode, be sure to connect signal source to INPUT connector.

7-3. MONITOR connector

ANALOG signal can be monitored since the same voltage that has been input from INPUT connector will be output.

(When ANALOG signal is +5V, output will be +5V.)

Use BNC connector when connecting.

Note) When INPUT connector is 'OPEN', output from MONITOR connector is not stabilized.

8. Change the Memory Switch

Setup of memory switch is necessary to operate the Fine Stage optimally.

8-1. Setup the contents of memory switch

The memory switch screen will be displayed by pressing “Ctrl” + “SET” button simultaneously in MANUAL mode.

The settings of memory switch can be changed by each button on the Control Pad.

*) Please check button operation of memory switch settings in [5-4. Check the settings of memory switch] in order to use each button.

8-2 Contents list of memory switch

The contents of memory switch is set to factory defaults when “Ctrl” + “ORG” + “ZERO” button is pressed simultaneously on the memory switch setting screen

No.	Memory switch contents (Displayed)	Setting Ranges/Options	Default value
01	SPD SEL	1 - 4	1
02	INTFACE	RS232C/USB	RS232C
03	BAURATE	4800/9600/19200/38400	38400
04	DELMTER	CR/LF/CRLF	CRLF
05	MOD SEL	HOST/MANUAL/ANALOG	HOST
06	COM/ACK	MAIN/SUB	MAIN
07	SENSMOD	CLOSE/OPEN	OPEN
08	DISP	VOLT/OTHER/SENSOR	OTHER
09	COUNT	OFF/ON	OFF
10	LCD_BLT	ON/OFF	ON

Note1) Be sure to return to the coordinate screen and reboot the power after changing the memory switch setup.

It may not operate correctly according to set condition even though right setting if the controller was not rebooted.

8-3 Details of memory switch

The number in front of each row stands for the memory switch number.

01) SPD SEL Select the speed number

Specifies the initial-setting speed number at power - on.

The minimum output power for this controller is at 1step about 2.3mV (MAX: 65535 steps, 150V), which means when chose setting 4, the output power is 1000steps about 2.3V.

* Setting range1 - 4

1	:	1 step
2	:	10 steps
3	:	100 steps
4	:	1000 steps

02) INTFACE Communication Interface Selection

Set the communication system with host (PC).

* Setting options	RS232C	:	RS232C Interface
	USB	:	USB Interface

03) BAURATE Baud rate settings

Set the data communication speed when RS232C is selected

* Setting options	4800	:	4800bps
	9600	:	9600bps
	19200	:	19200bps
	38400	:	38400bps

04) DELMTER Delimiter setting

Set the delimiter of block in a communication data.

* Setting options	CR	:	CR (Fixed to CR when USB is selected)
	LF	:	LF
	CRLF	:	CR+LF

05) MOD SEL Set the initial operation mode at power-on.

Select the initial operation mode at power-on.

* Setting options	HOST	:	HOST mode
	MANUAL:	:	MANUAL mode
	ANALOG:	:	ANALOG mode

06) COM/ACK Set the communication protocol with a PC.

When command is sent in HOST mode from PC, it select whether 'OK/NG' ageist request is send or not replied.

* Setting options	MAIN	:	Reply OK/NG
	SUB	:	No reply OK/NG

07) SENSMOD Set control mode.

Set up control mode.

* Setting options	CLOSE	:	Closed loop control
	OPEN	:	Open loop control

08) DISP Select the display.

Select the display form of each axis.

* Setting options	VOLT	:	Display supplied voltage value.
	OTHER	:	(when CLOSE) Display nm (when OPEN) Display output steps
	SENSOR:		Display nm

09) COUNT Select the ON/OFF of count value display.

Select the ON/OFF of inside of stage digital sensor count value display.

* Setting options	OFF	:	Count value display OFF
	ON	:	Count value display ON

10) LCD_BLT Select the ON/OFF of display back light.

Select the ON/OFF of display back light for LCD.

* Setting options	ON	:	Back light ON.
	OFF	:	Back light OFF

9. Operate Fine stage from PC

RS232C or USB interface is used to connect to PC.

The controller controls the Fine Stage by sending the command (string) from PC.

The controller is initially set to HOST mode when the power is turned on just after purchase.



When connect to PC, please confirm the settings of PC and FINE-01 γ are right.

In case these are wrong, the stage can not do normal operation.

9-1 Command list

Types of command are shown as bellow.

Command	Command letter	Meanings
Absolute movement command	A	Specifies absolute coordinate
Relative movement command	M	Specifies relative coordinate
Move command	G	Start moving A or M command
Mechanical origin command	H	Return to the mechanical origin(0mV point, 0nm point)
Logical origin command	N	Return to the logical origin.
Stop command	L	Stop
Logical origin setting	R	Reset the coordinate value, that will be the logic mechanical origin
Status confirmation command	Q	Reply the status. (Ex. coordinate value)
ACK3 confirmation command	!	Reply B(busy) /R(ready)
Internal information acquisition command	?	Reply internal information
Execution of internal program Changing operational mode command	P	Execute or stop internal controller programmed operation. Also change the operational mode.

9-2 Command format

The communication protocol used between the controller and the PC depend on the memory switch (COM/ACK) setting.

1. Setup COM/ACK = MAIN

A communication protocol forms one response for each command.

Command string Receive Reply string Send

A response string is "OK" when command is received normally and "NG" when command is not received.

However, in some cases, for example in response to confirmation commands, data will be returned instead of "OK".

2. Setup COM/ACK = SUB

A communication protocol does not respond "OK/NG" as command.

However, the data will be returned in respond to some command, such as confirmation command.

Command except "Q" or "!" command should only be sent after checking the internal status "Ready".

9-3 Command details

A Command Absolute movement command

It is a command to make an absolute coordinate movement. This command configures the movement of axis, the direction of movement, and the amount of absolute movement. Move command "G" is needed after "A" command is executed. The amount of absolute movement is specified in nm unit or the number of steps according to the control method.

Open loop control : Number of step Closed loop control: nm

(Values) Open loop control : ± 65535 steps

 Closed loop control : ± 999999 nm

(However, it only moves within the range of acquisition data in hysteresis characteristic.)

EX) **A:1+P100** Move to the +100 steps position (in open loop), move to the +100nm position in closed loop

G:

M Command Relative movement command

This command configures the movement of axis, the direction of movement, and the amount of relative movement. Move command "G" is needed after "M" command is executed. The amount of relative movement is specified in nm unit or the number of steps according to the control method.

Open loop control : Number of step Closed loop control : nm

(Values) Open loop control : ± 65535 steps

 Closed loop control : ± 999999 nm

(However, it only moves within the range of acquisition data in hysteresis characteristic.)

EX) **A:1+P100** Move to the +100 steps position (at open loop), move to the +100nm position at closed loop

G:

G Command Move command

It is a command to start moving.

This command is required to use after "A" or "M" command. G command does not operate if there is no "A" or "M" command before using G command, or G command has already been executed.

G: Move command

H Command Return to the mechanical origin command

It is a command to return the stage to the mechanical origin point. Return to 0step point (0mVoutup point) in open loop control, and 0nm point in closed loop control.

H:1 Return to the mechanical origin

N Command Logical origin command

It is a command to return the stage to the logical origin point.

N:1 Return to the logical origin

L Command Stop command

It is a command to stop the stage.

L:E Stop the stage immediately and return to the origin(0mV point) same as an emergency stop button

R Command Setting the logical origin command

This is a command to regard current coordinate value as 0 and logical origin.

R:1 Reset the coordinate value, that will be the logical origin

Q Command Status confirmation command

This command will reply the stage's operating conditions and coordinate value of each axis from controller.

The controller sends coordinate data in 10 figures, and then replies the all data in 16 figures long.

Q:

Reply Ex)

0, ACK1, ACK2, ACK3

0 : Coordinate value is 0 step (in open loop)
Coordinate value is 0nm (in closed loop)

ACK1(Command received status) K : Command received normally
X : Command error

ACK2(Stopping Cause) K : Stopped normally
W : Stopped by an error

ACK3(Possible to receipt a command) R : Possible to receipt all command
B : Busy condition, it is impossible to move or receipt any command.

! command ACK3 configuration command

Replies the status of ACK3 only from "Q" command reply's data.

!:

Reply Ex)

R

? Command Internal information acquisition command

Return the internal information data to the stage according to the parameter.

? : [Parameter Letter]

Parameter Letter	Meanings	Reply Ex.
N	Reply model name	FINE-01r
V	Reply version number	V1.01

P Command Execution of internal program, Changing operational mode command

According to the message sending from the Host side (PC side), It is possible to change the operation mode of internal program as execute or stop.

- P:R** Move to STAND ALONE mode.
- P:H** Move to HOST mode.
- P:A** Move to ANALOG mode.
- P:M** Move to MANUAL mode
- P:P□** Set program number(□ = 1 - 8)
- P:S** Start solo program behavior.
- P:E** Stop solo program behavior.
- P:U0** Suspend solo program behavior.
- P:U1** Cancellation of suspend solo program behavior.

10. Editing Programs by EDIT Mode

In EDIT mode, it is possible to edit programs which stored inside of the controller.

There are 8 kind of stored programs from No.1 to No.8. Each program can be edited up to 1000 lines.

10-1 Controlling option and data entry

Programs can be edited by using each buttons on the control pad.

Option-entry buttons

- * **Cross-shaped button: Up, Down** Switching the program No.
(Switching Order : No.1→2→3→...)
- * **SET button** : 1 On the EDIT mode start-up screen, press "SET" to begin editing
 : 2 On the confirmation screen, press "SET" to exit also saving changes.
- * **SPD button** : On the confirmation screen, press "SPD" to exit without saving changes
- * **MODE button** : 1 When editing is done, press "MODE". (The screen will shift to confirmation screen)
 : 2 On the confirmation screen, cancel will return to the editing screen again.

Data-entry buttons

- * **Cross-shaped button** : Up : Moving program line No.(Line number).
(Order : No.5→4→3→...)
- * **Cross-shaped button** : Down : Moving program line No.(Line number).
(Order : No.1→2→3→...)
- * **Cross-shaped button** : Right : Moving cursor to the right for editing.
- * **Cross-shaped button** : Left : Moving cursor to the left for editing.
- * **SET button** : Changing data content (increasing if it is numerical data)
- * **SPD button** : Changing data content (decreasing if it is numerical data)

10-3 Explanation of Program Data

Example for registered data entered in Program No.1

Line number	Operating Pattern	Travel Distance	Wait Time
1	F	255	-
2	0	1000	2
3	30	-	0
4	N	-	-
5	99	-	-
1000			

* **Line number** Programs can consist of from one to thousand lines.

* **Operating Pattern**

0: Normal operation (move to a specified coordinate and stop at the point.)

30: Return to Mechanical origin Return to the Mechanical origin point.

F : Repeating Actuation Repeating actuation for specified number of time. The specified number will be input in one axis. (1 - 65535)

N : End of Repeating Ending the Repeating actuation

99: End of Data Must input in the last line of the program (no operation is performed)

* **Travel Distance** Enter the relative travel distance.

(Setting value) At the open loop : ± 65535 steps

At the close loop : ± 65535 nm

*) When the operating pattern is at 30/F/N/99, "-" will be input.

* **Waiting Time** Input the waiting time. (0 to 9999 in units of 0.01second)

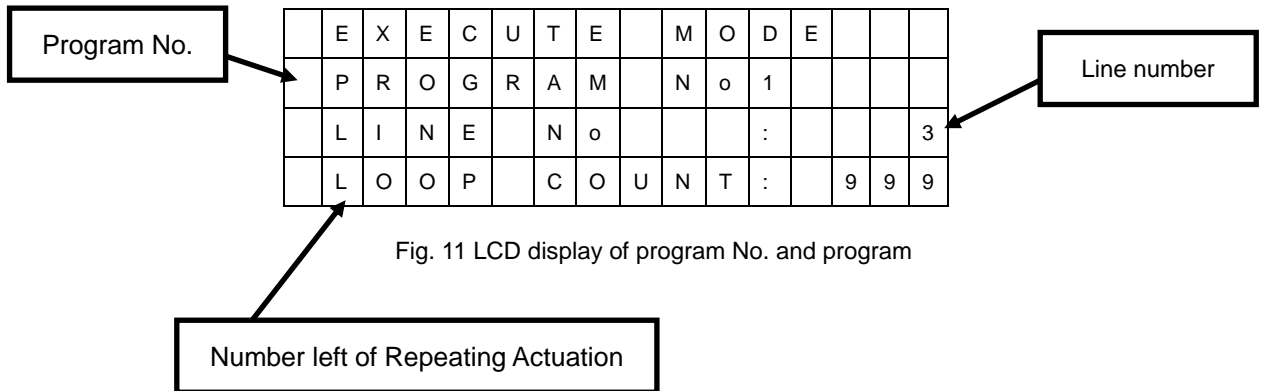
*) When the operating pattern is at 99/N/F, "-" will be input.

11. Move FINE Stages acceding to the program.

Program data edit in EDIT mode can be used to operate FINE stages by commands received from the computer or signals from Control Pad.

During program operation, program No. and program data is showing on the liquid crystal display.

Please see the following Fig. 11



11-1 Starting Programmed Operations from a Control Pad

It is possible to start the program without connecting to PC, if you follow the steps showing below.

Set up operation mode at STAND ALONE mode.

Push the “SET” button of Control Pat

It will become Program Data No.1 - 8 Choice screen. Use the “top and bottom” button to selected program No.

Program will start with pushing “Ctrl” button and “STOP (RUN)” button at the same time

Also, stop the program with push “STOP (RUN)” button.

11-2. Starting Programmed Operations from a Computer

When starting program data operations from a computer, you can perform motorized operations (positioning) following the instructions in the program by sending remote commands from host mode (computer).

The commands are shown below.

- P:R** Move to STAND ALONE mode
- P:H** Move to HOST mode.
- P:P[No.]** Set up program number (1 - 8).
- P:S** Start solo program operation.
- P:E** Stop solo program operation.
- P:U0** Suspend solo program operation.
- P:U1** Cancellation of suspend solo program operation.

Chapter 3 Specifications

12. Specifications

(1) General Specifications

Power source	AC100V \pm 10%	50/60Hz
Rated current	0.5A	
Operating temperature	10 to 30°C	
Storage temperature	-20 to 60°C	
Ambient temperature	20 to 80%RH	(No condensation)
Altitude	up to 2000m	
Indoor use only		
Installation category	II	
Pollution degree	2	
External dimensions	225W*250D*85H (Excluding objections)	
Weight	3.5kg	

(2) Performance

Controlling axis	1 axis	
D/A converter	16 bits	
Maximum output voltage	0 to +150V (0 to 65535 step) 1 step \approx 2.3mV	
INPUT connector input voltage	-10 to +10V	
Coordinate display	\pm 999999 step	(For OPEN LOOP control)
	\pm 999999 nm	(For CLOSED LOOP control)
	0 to +150000mV (For OPEN / CLOSED LOOP control)	
Control methods	OPEN LOOP / CLOSED LOOP	
Interface	RS232C Interface	
	* Baud Rate	38400/19200/9600/4800
	* Data bit	8 bits
	* Parity	None
	* Stop bit	1 bit
	* Delimiter	CR, LF, CR+LF
	* Flow control	Hardware (RTS/CTS)

USB Interface

* Transfer Speed Full speed mode 12Mbps

(3) Fast Transient/Burst Noise

EN61000-4-4(2004) Level 2

(4) Dielectric Strength Voltage

When AC1kV 60Hz is applied between the supply terminal and the case for one minute, no abnormality shall occur.

(5) Surge Noise

EN61000-4-5(2006) Level 2

(6) Electrostatic Noise

EN61000-4-2(1995)+A1(1998)+A2(2001) Level 2

13. Connector**13-1 RS232C Connector**

Number	Name	Number	Name
1	-	6	DTR
2	TXD	7	CTS
3	RXD	8	RTS
4	DSR	9	-
5	SG		

Part Number : XM3B-0922-132 (manufactured by Omron) Female type

Sigma Koki cable Part Number : RS232C/STR

13-2 USB Connector

Number	Name	Number	Name
1	-	3	+DATA
2	-DATA	4	GND

Part Number : XM7B-0422 (manufactured by Omron)

13-3 PIEZO Connector

Part Number : HRM-305 (manufactured by Hirose)

Sigma Koki cable Part Number : FINE-CA-3

13-4 SENSOR connector

Number	Name	Number	Name
1	IN	4	GND
2	VDD	5	SOUT
3	CLK	6	GND

Part Number : HR10G-7R-6S (manufactured by Hirose)

Sigma Koki cable Part Number : DS1-CA-3

13-5 CONTROL PAD

Number	Name	Number	Name
1	DATA	4	+5V
2	-	5	CLK
3	GND	6	-

Part Number : TC7668-01-201 (manufactured by Hosiden)

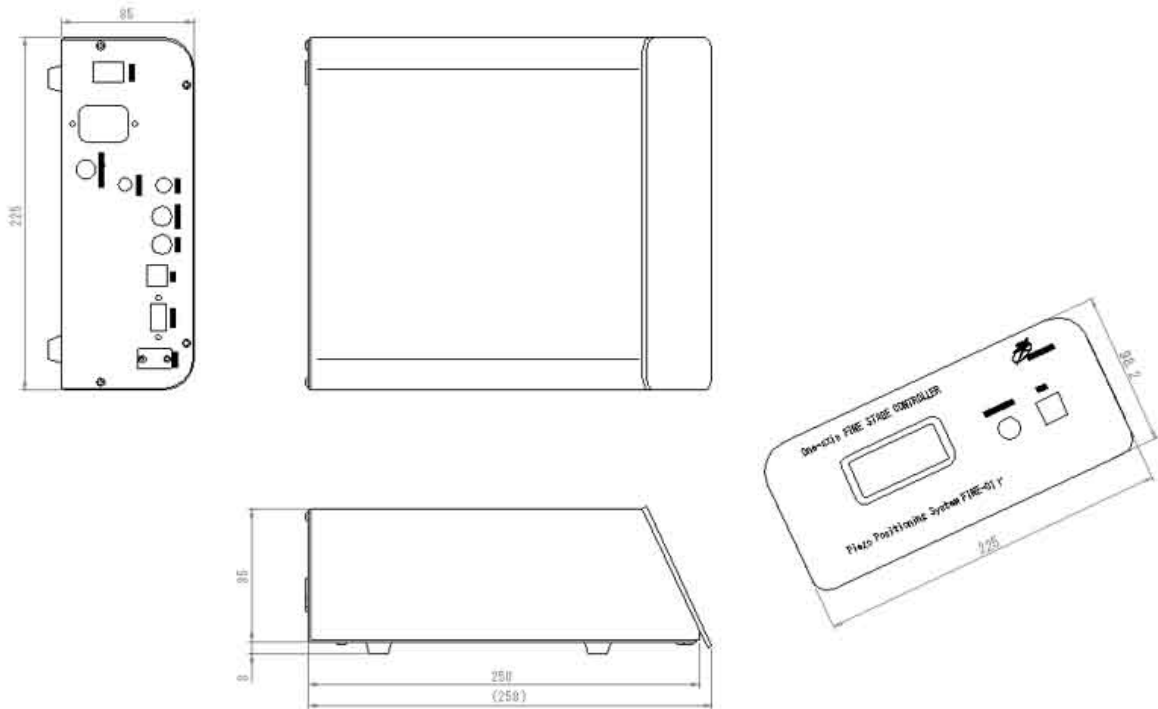
13-6 INPUT Connector

Part Number : 5226990-1 (manufactured by TE Connectivity)

13-7 MONITOR Connector

Part Number : 5226990-1 (manufactured by TE Connectivity)

14. External Dimensions



15. When there seems to be a problem ...

Please refer to the followings when the controller does not work properly or there seems to be a problem in communication. When it still does not work properly after checking the following items, please contact our International Sales Department.

- | | |
|--|--|
| 1. Power cannot be turned ON. | <ul style="list-style-type: none"> † Check if power cable is connected correctly. -> Refer to [4-2] † Check if using voltage is within usable voltage range. |
| 2. Stage does not work properly. | <ul style="list-style-type: none"> † Check if cable is connected correctly. ->Refer to [4-1] † Check memory switch contents that have been set and if those are correct. <ul style="list-style-type: none"> -> Refer to [8-3] Check No.07 of memory switch in particular. 07) Control methods setup : Set control methods. Select 'Open Loop control' or 'Closed Loop control' according to using environment. † After setting memory switch, make sure to switch ON again. |
| 3. Memory switch contents have not been saved. | <ul style="list-style-type: none"> † Check if Control Pad is connected correctly. -> Refer to [4-2] † Make sure the power is switched OFF before connecting Control Pad. It may not work correctly when the cable is connected while power is ON. † Press [Button Reset] on Control Pad. -> Refer to[6-1] |
| 4. Control Pad does not work properly. | <ul style="list-style-type: none"> † Check each cable is connected correctly. † Check memory switch contents that have been set and if those are correct. <ul style="list-style-type: none"> ->Refer to [8-3] Check No.02~4 of memory switch in particular. Select 02) communication interface : Set communication method according to the interface used between RS232C and USB. 03)Baud rate setup : Set data communication speed when selecting RS232C, according to the data communication speed on PC. 04) Delimiter setup : Set delimiter sign for block for communication data according to communication settings on PC. (It should be set to CR when USB is selected.) |
| 5. Communication problems with PC | <ul style="list-style-type: none"> † Check each cable is connected correctly. † Check memory switch contents that have been set and if those are correct. <ul style="list-style-type: none"> ->Refer to [8-3] Check No.02~4 of memory switch in particular. Select 02) communication interface : Set communication method according to the interface used between RS232C and USB. 03)Baud rate setup : Set data communication speed when selecting RS232C, according to the data communication speed on PC. 04) Delimiter setup : Set delimiter sign for block for communication data according to communication settings on PC. (It should be set to CR when USB is selected.) |

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