

Intelligent Driver

Two-Axis Stage Controller

**GSC-02A**

*For Your  
Safety*

**User's Manual**



**HOURS**  
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## For your safety

Before using this product, read this manual and all warnings or cautions in the documentation provided. Only Factory Authorized Personnel should be changes and/or adjust the parts of controller.

### The symbols used in this manual


 <b>WARNING</b>	 <b>CAUTION</b>
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.

The above indications are used together with the following symbols to indicate the exact nature of the warning or caution.

<b>Examples of Symbols Accompanying Warnings and Cautions</b>	
	△ Symbols enclosed in a triangle indicate warnings and cautions. The exact nature of the warning or caution is indicated by the symbol inside (the symbol at left indicates risk of electrocution).
	○ Symbols enclosed in a circle mark indicate prohibitions (actions that must not be performed). The exact nature of the prohibition is indicated by the symbol inside or next to the circle mark (the symbol at left indicates that the product must not be disassembled).
	● Symbols inside a black circle mark actions that must be performed to ensure safety. The exact nature of the action that must be performed is indicated by the symbol inside (the symbol at left is used in cases in which the AC adapter must be unplugged to ensure safety).

## Symbols on the product

The symbol mark on the product calls your attention. Please refer to the manual, in the case that you operate the part of the symbol mark on the product.

	This symbol labeled on the portion calls your attention.
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- ④ If the equipment is used in a manner not specified by the SIGMAKOKI CO., LTD., the protection provided by the equipment may be impaired.

### **WARNING**

- Don't 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.
- Don't connect or check the product while the power is on.
- Installation and connection should be performed only by a qualified technician.
- Don't bend, pull, damage, or modify the power or connecting cables.
- Don't touch the products internal parts.
- 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.
- Don't turn on the power in the event that it has received a strong physical shock as the result of a fall or other accident.
- Don't touch the stage while operation.
- Use dry clothes only for cleaning the equipment.

## Chapter 1: Before you begin

### 1. Package Contents

Purchasers of the Stage Controller should find that the package contains the items listed below. Check the package contents using the following checklist. Contact your retailer as soon as possible in the event that you should find that any item is missing or damaged.

- |   |    |
|---|----|
| <input type="checkbox"/> GSC-02A Stage Controller     | :1 |
| <input type="checkbox"/> User' s Manual (This Manual) | :1 |
| <input type="checkbox"/> SJT-02 Terminal Cap          | :1 |

You can download sample software from our web page.

WEB [https://jp.optosigma.com/en\\_jp/software\\_sample](https://jp.optosigma.com/en_jp/software_sample)

## 2. Overview

This controller is two axes stage controller featuring stepping motor drivers.

When the GSC-02A is connected to an ordinary personal computer via an RS232C interface, the stage can be accurately moved to the desired position by simple commands sent from the PC.

In addition, manual operation is possible by connecting SJT-02 (an optional product).

## 3. The GSC-02A System

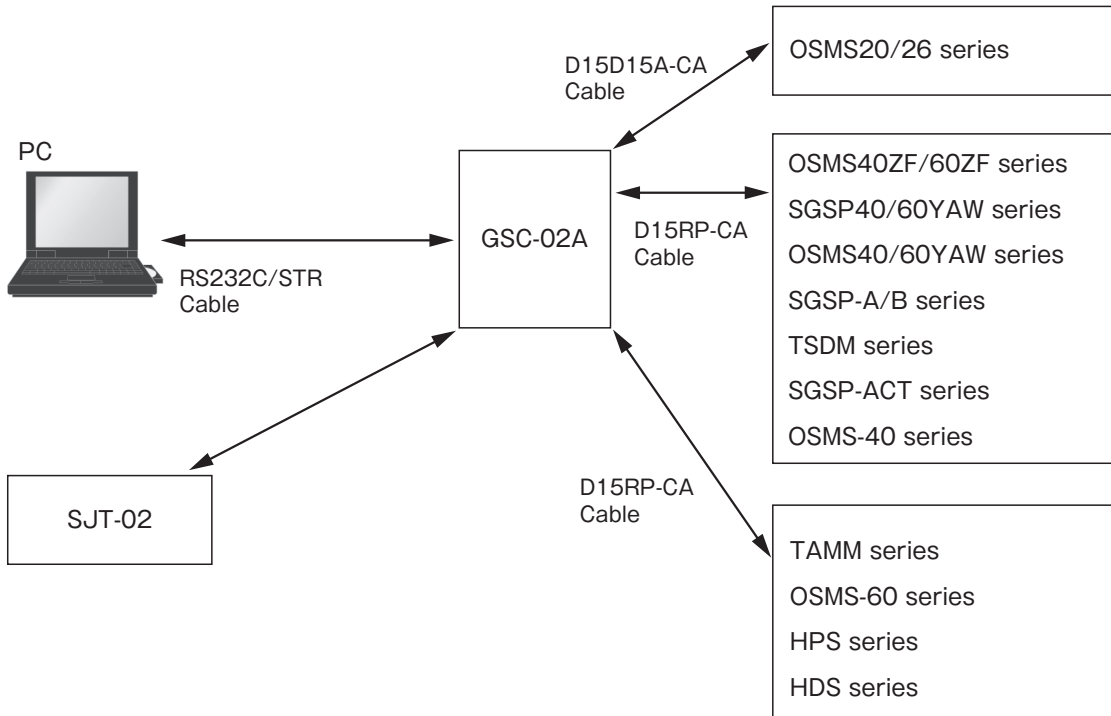


Figure3-1: The GSC-02A system



Note that applicable cables and drive current values are depending on the specifications of stages used. Check if your controller can adequately control desired devices before forming a system.

## 4. Parts of the GSC-02A

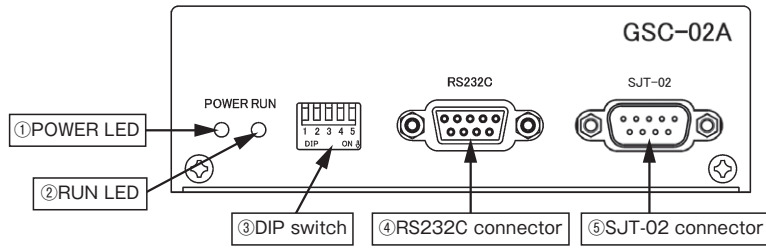


Figure4-1: GSC-02A front panel

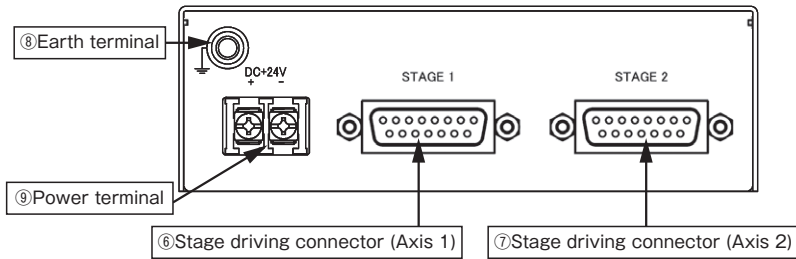


Figure4-2: GSC-02A rear panel

### Functions:

- ① POWER LED : Lights up in green when powered.
- ② RUN LED : Lights up in red while driving stages.
- ③ DIP switch : Makes basic settings for GSC-02A.
- ④ RS232C connector: : This connector is used when the device is controlled from the computer via an RS232C interface.
- ⑤ SJT-02 connector : This connector is used when controlling with the SJT-02.
- ⑥, ⑦ Stage driving connector : Connect to the motorized stage of your choice. Supports up to two axes.
- ⑧ Earth terminal : Should be grounded properly in your environment.
- ⑨ Power terminal : Connect to the power source (+24 [V], 2 [A]).



Turn off a power supply in the case of the connector connection for security.



Make sure to set up and wire the cable supplying DC+24 [V] and GND to the GSC-02A so that the maximum length of cable isn't longer than 2 [m].

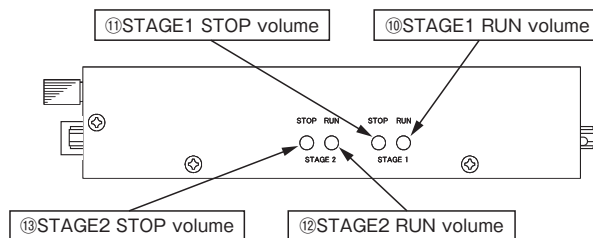


Figure4-3: GSC-02A side panel

- ⑩ STAGE1 RUN volume : Volume control adjusting the RUN current output through the stage drive connector. (Axis 1)
- ⑪ STAGE1 STOP volume : Volume control adjusting the STOP current output through the stage drive connector. (Axis 1)
- ⑫ STAGE2 RUN volume : Volume control adjusting the RUN current output through the stage drive connector. (Axis 2)
- ⑬ STAGE2 STOP volume : Volume control adjusting the STOP current output through the stage drive connector. (Axis 2)

## Chapter 2 Basic Operations

### 5. GSC-02 Connection procedure

#### 5-1. Connecting to Motorized Stages

First, connect GSC-02A to the motorized stages.

- ① Please confirm the power source is turning off.
- ② Connect a standard cable (D15RP-CA / D15D15A-CA) to the connector of the motorized stage.
- ③ Connect the stage to be controlled as the first axis to the STAGE1 connector of the GSC-02A controller. Also connect the stage controlled as the second axis to the STAGE2 connector.

#### 5-2. Connecting to PC and peripheral device

Connect GSC-02A to PC and peripherals (SJT-02).

RS232C interface is used for the connection between the PC and GSC-02A.

The following descriptions premise the RS232C interface.

- ① Please confirm the power source is turning off.
- ② Use a genuine cable RS232C/STR, or 9-pin, D-SUB straight cable with male/female ends using inch screw threads.
- ③ Insert the male connector of communications cable into the RS232C connector on the GSC-02A. Insert the female end into the serial port on your PC.

Connect to the peripheral device (SJT-02) using the SJT-02 dedicated accessory cable.

- ① Please confirm the power source is turning off.
- ② Connect the attached cable for SJT-02 to the SJT-02 connector on GSC-02A. Connect the female side to the SJT-02.
- ③ Set the baud rate of the GSC-02A by adjustment on the DIP switch. **SJT-02 can't use on the baud rate set to 2400 [bps].**

Note) For more information about SJT-02, refer to the instruction manual attached to SJT-02.



## 6. GSC-02A Setting

Initialize your GSC-02A to match to the target stages and host environment (your PC, etc.). The initialization includes DIP Switch settings and current adjustments (RUN/STOP) for each axis motor.

### 6-1. Set parameters with DIP Switch

Initialize your GSC-02A by setting each switch to ON/OFF as follows:

Parameter Assignment in the DIP Switch:

Table6-1-1: DIP switch setting items

DIP Switch No.	Items	Parameters
1,2	Baud rate	2400 / 4800 / 9600 / 19200
3	Detecting the mechanical origin	MARK method / MINI method
4	Input logic for the limit sensor	Normal open/ Normal close
5	Specify whether to return mechanical origin for each axis	First axis only/ Both axis

Switch settings and Corresponding Parameters (Set to ON by turning to the downside)

Table6-1-2: DIP switch setting list

Items	Dip Switch No.		Descriptions
	SW No.1	SW No.2	
Baud rate	ON	ON	2400 [bps]
	OFF	ON	4800 [bps]
	ON	OFF	9600 [bps]
	OFF	OFF	19200 [bps]
Detecting the mechanical origin	SW No.3		
	ON		MARK method*
	OFF		MINI method*
Input logic for the limit sensor	SW No.4		
	ON		Normal open
	OFF		Normal close
Specify whether to return mechanical origin for each axis	SW No.5		
	ON		First axis only
	OFF		Both axis

Note) Shaded areas in the list show our factory settings. Take care to handle the very small DIP Switch so as to avoid giving damage to them during the settings. Use appropriate tools such as sharp tweezers for setting switches on the DIP Switch. For our OSMS series stages, select MINI method and Normal close.

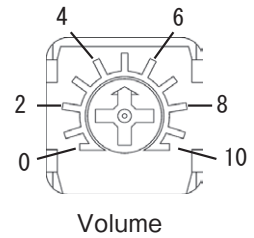
\*) For details on the method of return to origin, see page 20.

## 6-2. Setting the drive current

Set current values supplied from GSC-02A to stages. Turn a RUN current volume, provided on the side of the unit, to adjust RUN current corresponding to the stages to use. Use a STOP current volume to set a ratio to RUN current according to your conditions for the case where the current down function works. You can make each current adjustment for Axis 1 or Axis 2 independently.

Note that for the STOP current, adjustment is available not for current values, but for a ratio [%] to the RUN current.

Note) Generally the ratio of the STOP current to the RUN current is approx. 50 [%].



### Driving current settings (RUN)

Factory-set to 0.35 [A/Phase]

Table6-2-1: Driving current settings

Volume No.	0	1	2	3	4	5	6	7	8	9	10
RUN current [A/phase]	0.25	0.26	0.3	0.34	0.44	0.53	0.6	0.67	0.75	0.78	0.8

### Stop current settings (STOP current setting to 50 [%] for RUN current)

Factory-set to volume No.0

Table6-2-2: STOP current settings

RUN No.	0	1	2	3	4	5	6	7	8	9	10
STOP No.	0	0	0	0	1	2	2	3	3	3	3

Note) Each value cited in the above table is a guide to adjust the current without instrument, and may fluctuate within an allowable range.

### 6-3. Power ON

When you have completed procedures above, connect the power source. GSC-02A is power ON and the green power LED lights up.

Now the setup has been done, and your GSC-02A is ready to use. For the details of commands applicable to GSC-02A, see Chapter 3.

## Chapter3: Using GSC-02A to position Motorized Stages

### 7. Using Computer to position Motorized Stages

The controller can be connected to a computer using an RS232C interface.

Motorized stages can then be precisely controlled by commands (strings) transmitted from the computer.

The RS232C interface communication parameter of the GSC-02A is described below. Please set the configurations of the PC side according to the following Table7-1.

Table7-1: RS232C communication settings

Items	Descriptions
Baud rate	Baud rate set with DIP Switch
Delimit	CR+LF
Parity	none
Data bit	8 [bit]
Stop bit	1 [bit]
Flow control	Hardware (RTS/CTS)

#### 7-1. List of Commands

The following is a list of available commands:

Table7-1-1: Command list

Command	String	Details
Return to mechanical origin	H :	Detect mechanical origin
Set number of pulses for relative movement	M :	Axis of movement, direction, number of pulses
Set number of pulses for absolute movement	A :	Absolute coordinates
Jog command	J :	Move at minimum speed (S)
Drive command	G :	Start
Stop command	L :	Stop
Set electronic (logical) origin	R :	Set the electronic (logical) origin to the current position
Speed settings	D :	Set S, F and R
Free motor	C :	Excitation ON/OFF
Status1	Q :	Return current position etc.
Status2	! :	Return B(busy)/R(ready)
Internal information	? :	Check internal information
System switching	SYS :	Switching between System Types A and B

The following commands are available only when System Type B is set.  
 (The settings are retained even when the power is turned off.)

Table7-1-2: Command list (System Type B)

Direction of travel	DR :	Select the + direction
Input logic for the limit sensor	LSL :	Select the detection logic for the limit sensor
Input logic for the ORG sensor	OSL :	Select the detection logic for the ORG sensor
Input logic for the NEAR sensor	NSL :	Select the detection logic for the NEAR sensor
Method of return to origin	ORG :	Select the method of return to origin
Switch number of steps	S :	Switch number of steps
Communication protocol	ACK :	Select the communication protocol
ORG speed settings	B :	Set S, F and R of ORG

Note) When stage operating status is Busy, if you send other command of L:, Q:, !:, ?:, command status is NG.

**7-2. Command Format**

Except for some status check commands (Q:, !:, ?:), no response will be returned to a command input. To determine whether or not a command was received normally, use the Q command to check status.

System Type B can select use ACK or not use ACK, when send command for computer to controller. If select use ACK, then OK will return when accept command. NG will return when can't accept command.

All commands are in single-byte characters.

**1. When COMM/ACK is set to MAIN:**

Response string of OK or NG will send when receive for each command.

Command string ..... receive  
 Response string ..... send

The response string when a command is received normally is OK, that when the command wasn't correct, NG. In some cases, for example in response to confirmation commands, data will be returned instead of OK. Commands should only be sent after checking the internal status of the controller.

**2. When COMM/ACK is set to SUB:**

A protocol is used in which the controller does not respond to each command. you can't get response OK or NG. Data will however be returned in response to some commands, such as confirmation commands. To determine whether or not a command was received normally, use the Q command to check status.

7-3. Command in detail

(1) H command: Return to mechanical origin

**Features:** This command is used to detect the mechanical origin for a stage and set that position as the origin. Once the mechanical origin has been detected, the value displayed will be 0. In System Type A, each axis moves at the following constant conditions: Minimum speed (S):500 [pps], Maximum speed (F): 5000 [pps], Acceleration/ Deceleration time (R): 200 [ms].Method of return to origin is depending on the DIP Switch settings. In System Type B, when after power on, the stage will move at the speed (S, F, R) specified in the B command. And it'll move with the method of return origin specified in the ORG command.

· Command format

H : nm

· parameter

n: 1 or 2 or W                                   1: first-axis, 2: second-axis, W: both first-axis and second-axis

m: + or -   +: + direction, -: - direction

(If n is set to W, m needs to be set for two)

Ex1) H : 1+                                       Detects mechanical origin for Axis 1 in the positive direction.

Ex2) H : 2-                                       Detects mechanical origin for Axis 2 in the negative direction.

Ex3) H : W+-                                     Detects mechanical origin for Axis 1 in the positive direction, and Axis 2 in the negative direction.

Ex4) H : W                                       Detects mechanical origin for Axis 1 in the negative direction, and Axis 2 in the negative direction.

Note) If there is no parameter: m, the operation is determined as - and is executed.

Note) During stage operating status is Busy, the command status is NG.

Note) During motor excitation off by C command, motorized stages can't move, and the command status is NG.

(2) M command: Set number of pulses for relative travel

**Features:**This command is to specify the axis of travel, direction, and the travel (number of pulses).

This command must always be followed by a drive (G) command.

Travel is by means of acceleration/deceleration driving. The distance traveled is specified in pulses.

· Command format

M : nmPx

· parameter

n: 1 or 2 or W                                   1: first-axis, 2: second-axis, W: both first-axis and second-axis

m: + or -   +: + direction, -: - direction

(If n is set to W, m needs to be set for two)

x: moving pulse count                       0-16777214.

Ex) M : W+P500 - P200   Travel 500 [pulse] in the + direction on the first axis and 200 [pulse] in the - direction on the second axis

G :   Drive

Note) During stage operating status is Busy, the command status is NG.

Note) During motor excitation off by C command, motorized stages can't move, and the command status is NG.

**(3) A command: Set number of pulses for absolute travel**

**Features:** This command is to specify the-axis of travel, direction, and the travel (number of pulses).

This command must always be followed by a drive G command.

Travel is by means of acceleration /deceleration driving.

· **Command format**

A : nmPx

· **parameter**

n: 1 or 2 or W                      1: first-axis, 2: second-axis, W: both first-axis and second-axis

m: + or -                              +: + direction, -: - direction

(If n is set to W, m needs to be set for two)

x: moving pulse count              0-16777214.

Ex1) A : 1+p10000                      Travel to the 10000 [pulse] position in the + direction on the first-axis

G :    Drive

Ex2) A : W+P1000-P100                Travel to the 1000 [pulse] position in the + direction on the first-axis and the 100 [pulse] position in the - direction on the second-axis

G :    Drive

Note) During stage operating status is Busy, the command status is NG.

Note) During motor excitation off by C command, motorized stages can't move, and the command status is NG.

**(4) J command: JOG**

This command drives stages continuously (at a constant speed) at the starting speed(S). This command must always be followed by a drive G command. The stage will stop by an L command.

When nothing L command, until get limit sensor signal continue this moving.

· **Command format**

J : nm

· **parameter**

n: 1 or 2 or W                      1: first-axis, 2: second-axis, W: both first-axis and second-axis

m: + or -                              +: + direction, -: - direction

(If n is set to W, m needs to be set for two)

Ex) J : W-+                                move in the - direction on the first-axis and in the + direction on the second-axis

G :    Drive

Note) During stage operating status is Busy, the command status is NG.

Note) During motor excitation off by C command, motorized stages can't move, and the command status is NG.

**(5) G command: Drive**

**Features:** When a drive command is issued, the stage starts moving, moves the specified number of pulses, and then stops. The G command is used after M, A, and J commands.

· **Command format**

G : Drive

G Drive (It works with just G without the colon)

Note) During stage operating status is Busy, the command status is NG.

Note) During motor excitation off by C command, motorized stages can't move, and the command status is NG.

**(6) L command: Decelerate and stop**

**Features:** When this command is executed, the stage decelerates and stops.

· **Command format**

L : n

· **parameter**

n: 1 or 2 or W 1: first-axis, 2: second-axis, W: both first-axis and second-axis

Ex1) L : 1 First-axis decelerates and stops

Ex2) L : W First- and second-axis decelerate and stop

**(7) L: E command: Emergency stop**

**Features:** This command stops all stages immediately, whatever the conditions.

· **Command format**

L : E Stop first and second-axis immediately

**(8) R command: Set electronic (logical) origin**

**Features:** This command is used to set electronic (logical) origin to the current position of each-axis.

· **Command format**

R : n

· **parameter**

1: first-axis, 2: second-axis, W: both first-axis and second-axis

Ex) R : 1 Set the electronic (logical) origin for the first-axis

Note) During stage operating status is Busy, the command status is NG.

**(9) D command: Speed settings1**

**Features:** The minimum speed (S), maximum speed (F), and acceleration/deceleration time (R) are set according to the initialize settings when the power is turned on. This command allows you to change these default settings. The default settings are (S): 500 [pps], (F): 5000 [ps], (R): 200 [ms].

· **Command format**

D : nSpdsFspdfRspdr

· **parameter**

n: 1 or 2 or W                      1: first-axis, 2: second-axis, W: both first-axis and second-axis

spds: Minimum speed (S)                      1 to 30000 [pps]

spdf: Maximum speed (F)                      1 to 30000 [pps]

spdr: Acceleration/deceleration time (R)                      1 to 1000 [ms]

(If n is set to W, two spds, two spdfs, and two spdrs are needed each.)

Note) The maximum speed(F) setting should be equal or greater than the minimum speed. If the minimum speed is set to equals to the maximum or the acceleration/ deceleration time is set to zero, stages will move at a constant speed without performing acceleration/ deceleration logically.

Ex1) D : 1S200F2000R100

Adjust speed settings for the first-axis (S=200 [pps] / F=2000 [pps] / R=100 [ms])

Ex2) D : WS100F1000R10S300F3000R20

Adjust speed settings for the first-axis (S=100 [pps] / F=1000 [pps] / R=10 [ms])

and second-axis (S=300 [pps] / F=3000 [pps] / R=20 [ms])

Note) During stage operating status is Busy, the command status is NG.

**(10) D command: Speed settings2**

**Features:**The minimum speed (S), maximum speed (F), and acceleration/deceleration time (R) are set according to the initialize settings when the power is turned on. This command allows you to change these default settings. The default settings are (S): 500 [pps], (F): 5000 [pps], (R): 200 [ms].

· **Command format**

D : rSspds1Fspdf1Rspdr1Sspds2Fspdf2Rspdr2

· **parameter**

r : Speed range    1: Low speed range, 2: High speed range

spds1,2 : Minimum speed (S)                      1-200 [pps](Low Range) 50-30000 [pps](High Range)

spdf1,2 : Maximum speed (F)                      1-200 [pps](Low Range) 50-30000 [pps](High Range)

Spdr1,2 : Acceleration/ Deceleration time (R)                      0-1000 [ms] (for both High/Low range)

Note) The maximum speed(F) setting should be equal or greater than the minimum speed. If the minimum speed is set to equals to the maximum or the acceleration/ deceleration time is set to zero, stages will move at a constant speed without performing acceleration/ deceleration logically.

Ex) D : 2S100F1000R200S100F1000R200

Adjust speed settings for the first-axis (S=100 [pps] / F=1000 [pps] / R=200 [ms])

and second-axis (S=100 [pps] / F=1000 [pps] / R=200 [ms])

Note) During stage operating status is Busy, the command status is NG.



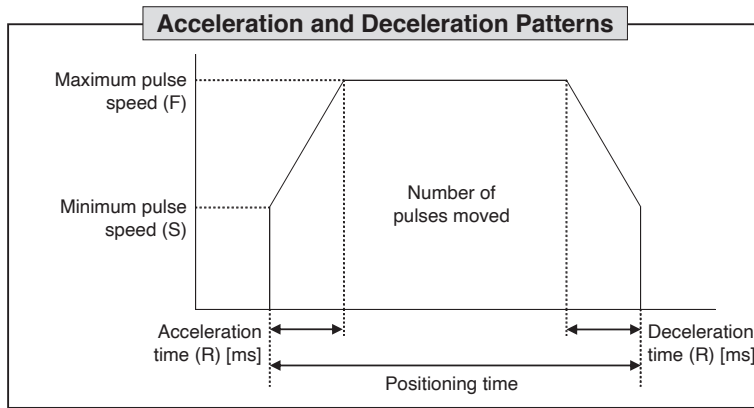


Figure7-3-1: Acceleration and Deceleration Patterns

**(11) C command: Free/ hold motor (Excitation ON/OFF)**

**Features:** This command is used to excite the motor or to turn excitation off, making it possible to move (rotate) stages manually.

• **Command format**

C : nm

• **parameter**

n: 1 or 2 or W

1: first-axis, 2: second-axis, W: both first-axis and second-axis

m: 0 or 1

0: electromagnetic current off, 1: electromagnetic current on  
(If n is set to W, m needs to be set for two)

Ex1) C : 10

Free first-axis motor

Ex2) C : W01

Free first-axis motor, and Hold second-axis motor.

Note) During stage operating status is Busy, the command status is NG.

Note) During all of electromagnetic current off by C command, motorized stages can't move and the command status is NG.

**(12) Q command: Status 1**

**Features:** On receipt of this command, the controller returns the coordinates for each-axis and the current state of each stage.

• **Command format**

Q : Return data:

— 1000, — 20000, ACK1, ACK2, ACK3

First-axis coordinates    Second-axis coordinates    Three-character string data

ACK1 :                    X : Command or parameter errors.  
                                  K : Command received normally.

ACK2 :                    L : First-axis stopped at LS  
                                  M : Second-axis stopped at LS  
                                  W : First and second axes stopped at LS  
                                  K : Normal stop

ACK3 :                    B : (BUSY) L, Q, !, and ?, commands can be received  
                                  R : (READY) all commands can be received

Note) Coordinate values for each-axis have a fixed length of ten digits, including symbols (Symbols are left-aligned, coordinates values right-aligned).

**(13) ! command: Status 2**

Features: On receipt of this command, the controller returns the stage operating status.

· Command format

! : Return data:                    B                    B : (BUSY) L, Q, !, and ?, commands can be received  
    R                    R : (READY) all commands can be received

**(14) ? command: Request for internal information**

Features: This command returns controller settings.

· Command format

? : pn

· parameter

p : Parameter                    watch below the table  
 n: 1 or 2 or W                    1: first-axis, 2: second-axis, W: both first-axis and second-axis  
 When you use (V,-,N,ACK) parameter, n don't need.

Parameter	Data returned	Examples
V	Version numbers	Ex)?:V → V1.00
—	Sub version numbers	Ex)?:— → 001
N	Device name	Ex)?:N → GSC-02A (System Type A) GSC-02B (System Type B)
DR	Direction of travel	0 or 1 Ex)?:DRW → 0,0 Ex)?:DR2 → 0 0: POS, 1 : NEG
LSL	Input logic for the limit sensor	0 or 1 Ex)?:LSLW → 0,0 Ex)?:LSL2 → 0 0: Normal Close, 1: Normal Open
OSL	Input logic for the ORG sensor	0 or 1 Ex)?:OSLW → 0,0 Ex)?:OSL2 → 0 0: Normal Close, 1: Normal Open
NSL	Input logic for the NEAR sensor	0 or 1 Ex)?:NSLW → 1,1 Ex)?:NSL2 → 1 0: Normal Close, 1: Normal Open
ORG	Method of return to origin	0,1,2,3,4 or 5 Ex)?:ORGW → 1,1 Ex)?:ORG2 → 1 0: Not return origin, 1: MINI method 2: CENTER method, 3: ORGS method 4: NORM method, 5: MARK method
S	Division	Ex)?:SW → 2,2 Ex)?:S2 → 2 1: Full step, 2: Half step
ACK	Communications protocol	0 or 1 Ex) ? :ACK → 0 0: SUB (No response), 1: MAIN (Response)
D	Travel speed [pps]	? :D1 → S100F1000R200
B	ORG speed [pps]	? :B2 → S500F5000R200

**(15) SYS command: Switching systems**

**Features:** This command is used to set the System Type A or B. The default setting is 0.

System Type A : Set method of return to origin, input logic for the limit sensor, specify whether to return mechanical origin for each axis with DIP switches.

System Type B : Set method of return to origin, input logic for the limit sensor, specify whether to return mechanical origin for each axis with the commands.  
(These items can't be set from the DIP switches.)

· Command format

SYS : a

· parameter

a: 0 or 1                                    0: System Type A (? :N Device name: GSC-02A)

1: System Type B (? :N Device name: GSC-02B)

Ex) SYS : 1                                Set to System Type B

Note) The power must be turned on again to reflect the system type change settings.

Note) When changing the System Type, the settings made in System Type B will be initialized.

Note) During stage operating status is Busy, the command status is NG.

**(16) DR command: Select the direction of travel Enabled only for System Type B**

**Features:** This command sets the direction of travel for each axis of the stage to the + side.  
The default setting is 0.

· Command format

DR : na

· parameter

n: 1 or 2 or W                            1: first-axis, 2: second-axis, W: both first-axis and second-axis

a: 0 or 1                                    0: POS (Set the motor direction to the + direction.)

1: NEG (Set the reverse direction of the motor to the + direction.)

Ex1) DR : 11                                Set the direction of travel for Axis 1 to NEG.

Ex2) DR : W01                              Set the direction of travel for first-axis to POS, and set the direction of travel for second-axis to NEG.

Note) During stage operating status is Busy, the command status is NG.

**(17) LSL command: Detection logic for the limit sensor (Enabled only for System Type B)**

**Features:** Select the conditions (input logic) for the limit sensor for each-axis. The default setting is 0.

· Command format

LSL : na

· parameter

n: 1 or 2 or W                    1: first-axis, 2: second-axis, W: both first-axis and second-axis  
a: 0 or 1                            0: Normal close (switches OFF from the default value of ON when limit sensor is detected)  
    1: (switches ON from default value of OFF when limit sensor is detected)

(If n is set to W, m needs to be set for two)

Ex1) LSL : 11                    Set the limit sensor input logic of first-axis to Normal Open.  
Ex2) LSL : W01                 Set the limit sensor input logic of first-axis to Normal Close, and set the limit sensor input logic of second-axis to Normal Open.

Note) During stage operating status is Busy, the command status is NG.

**(18) OSL command: Detection logic for the ORG sensor (Enabled only for System Type B)**

**Features:** Select the conditions (input logic) for the ORG sensor for each-axis. The default setting is 0.

· Command format

OSL : na

· parameter

n: 1 or 2 or W                    1: first-axis, 2: second-axis, W: both first-axis and second-axis  
a: 0 or 1                            0: Normal close (switches OFF from the default value of ON when limit sensor is detected)  
    1: (switches ON from default value of OFF when limit sensor is detected)

(If n is set to W, m needs to be set for two)

Ex1) OSL : 11                    Set the ORG sensor input logic of first-axis to Normal Open.  
Ex2) OSL : W01                 Set the ORG sensor input logic of first-axis to Normal Close, and set the ORG sensor input logic of second-axis to Normal Open.

Note) During stage operating status is Busy, the command status is NG.

**(19) NSL command: Detection logic for the NEAR sensor (Enabled only for System Type B)**

Features: Select the conditions (input logic) for the NEAR sensor for each-axis. The default setting is 0.

· Command format

NSL : na

· parameter

n: 1 or 2 or W                    1: first-axis, 2: second-axis, W: both first-axis and second-axis  
a: 0 or 1                            0: Normal close (switches OFF from the default value of ON when limit sensor is detected)  
    1: (switches ON from default value of OFF when limit sensor is detected)

(If n is set to W, m needs to be set for two)

Ex1) NSL : 11                    Set the NEAR sensor input logic of first-axis to Normal Open.  
Ex2) NSL : W01                 Set the NEAR sensor input logic of first-axis to Normal Close, and set the NEAR sensor input logic of second-axis to Normal Open.

Note) During stage operating status is Busy, the command status is NG.

**(20) ORG command: Method of return to origin**

Features: Select the method of return to origin. The default setting is 1.

· Command format

ORG : na

· parameter

n: 1 or 2 or W                    1: first-axis, 2: second-axis, W: both first-axis and second-axis  
a : 0,1,2,3,4 or 5                0: Not return origin  
    1: MINI method  
    2: CENTER method  
    3: ORGS method  
    4: NORM method  
    5: MARK method

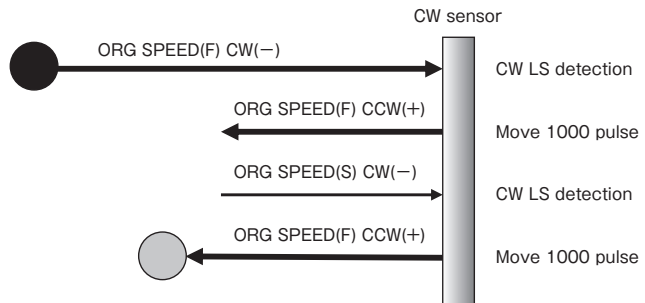
(If n is set to W, m needs to be set for two)

Ex1) ORG : 12                    Set the method of return origin for first-axis to the CENTER method.  
Ex2) ORG : W01                 Set first-axis not to return origin, and set the method of return origin for second-axis to the MINI method.

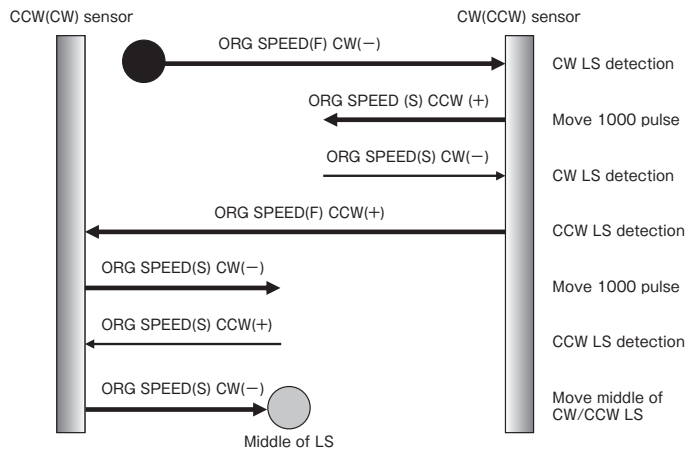
Note) During stage operating status is Busy, the command status is NG.

## Detecting the Mechanical Origin:

### MINI method

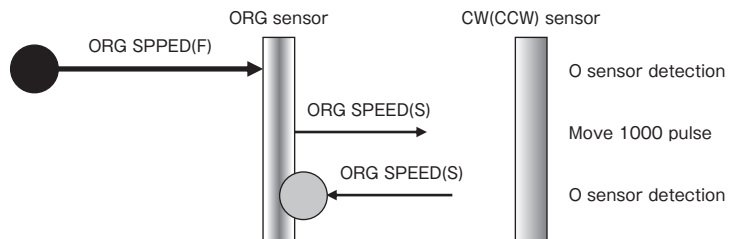


### CENTER method

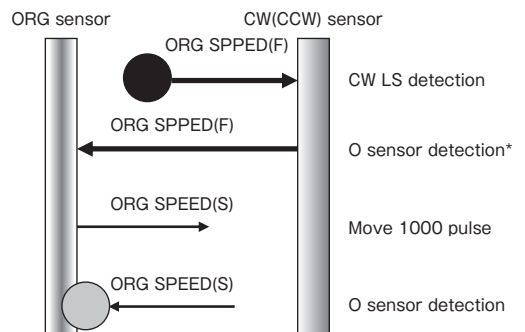


### ORGS method

1. In case the current position is in front of the ORG sensor

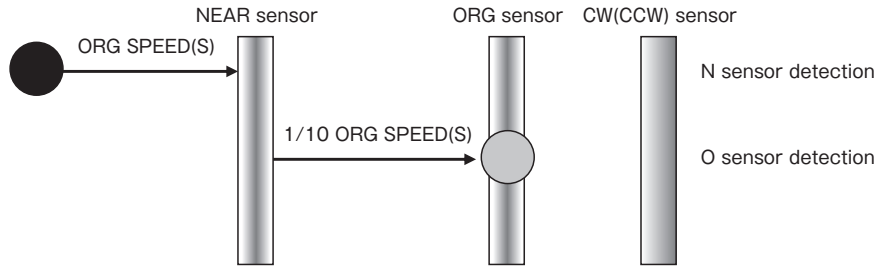


2. In case the current position is beyond the ORG sensor



\*) If the stage can't detect ORG sensor, stage will stop at the opposite side CCW(CW) sensor.

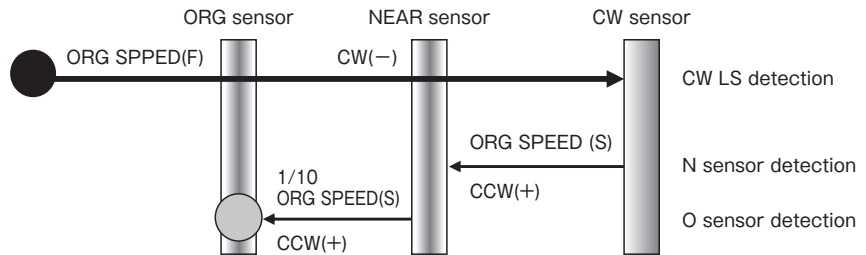
**NORM method**



Note) If the stage moves in the CW direction and the NEAR sensor can't detect it (no NEAR sensor), the stage will stop at the CW sensor.

Note) If the stage moves in the CW direction after detecting the ORG sensor and the ORG sensor can't be detected (no ORG sensor), it'll stop at the CW (CCW) sensor.

**MARK method**



**(21) S command: Switch number of steps (Enabled only for System Type B)**

Features: This command is used to set the number of motor divisions. The default setting is 2.

· Command format

S : nd

· parameter

n: 1 or 2 or W

1: first-axis, 2: second-axis, W: both first-axis and second-axis

d: 1 or 2

1: Full step

2: Half step

(If n is set to W, m needs to be set for two)

Ex1) S : 12

Set the number of divisions for first-axis to Half step.

Ex2) S : W21

Set the number of divisions for first-axis to Half step, and set the number of divisions for second-axis to Full step

Note) During stage operating status is Busy, the command status is NG.





## Chapter 4: Specification

### 8. Specification

#### (1) General specifications

Power source	DC+24 [V]
Rating current	2 [A]
Operating temperature	5 ~ 40 [°C ]
Storage temperature	-20 ~ 60 [°C ]
Ambient humidity	20 ~ 80 [%RH] (no condensation)
Altitude	up to 2000 [m]
Indoor use only	
Installation category	II
Pollution degree	2
External dimensions	180W × 125D × 40H (excluding projections) [mm]
Weight	0.75 [kg]

#### (2) Performance

Controlling axis	2 axis
Maximum driving speed (F)	1 to 30 [kpps]
Minimum driving speed (S)	1 to 30 [kpps]
Acceleration/deceleration time (R)	0 to 1000 [ms]
Sensor input	Origin sensor/proximity sensor/CW (–) limit/CCW (+) limit System Type A : Only limit sensor logic can be changed with the settings of switch 4 on the DIP Switch System Type B : All sensor logic can be changed by sending a command.
Method of return to origin	MINI method / MARK method / CENTER method / ORGS method / NORMAL method System Type A : MINI method / MARK method Set with switch 3 on the DIP Switch. System Type B : All method of return to origin can be changed by sending a command.
Axes to Home	Axis1/ both axis (1 axis and 2axis) System Type A : Set with switch 5 on the DIP Switch. System Type B : Axes to Home can be changed by sending a command.
Interface	RS232C interface Communication Parameters - Baud rate 2400/4800/9600/19200 [bps] (Set with switches 1/2 on the DIP Switch.) - Data bits 8 [bit] - Parity none - Stop bit 1 [bit] - Flow control Hardware (RTS/CTS) - Delimiters CR+LF

**(3) Driver Specifications**

Driver Mode	Half step/Full step driving
Driving (RUN) current	0.25 [A/phase] to 0.8 [A/phase]
Current down function	Automatic current down

**(4) Electrical fast transmit/burst immunity**      EN61000-4-4 (2012) Level2

**(5) Electrostatic discharge**      EN61000-4-2 (2009) Level2.

## 9. Connector Pin Numbers and Signals

### 9-1. STAGE1,2 connector

No.	Name	No.	Name
1	Blue: motor wiring	9	GND: for Brake
2	Red: motor wiring	10	+24 [V]: for Brake
3	Orange: motor wiring	11	LS (+): limit detection on +
4	Green: motor wiring	12	LS (-): limit detection on -
5	Black: motor wiring	13	GND: common sensor
6	GND: common sensor	14	NEAR: proximity detection
7	ORG: mechanical origin detection	15	+24 [V]: sensor power supply
8	+24 [V]: sensor power supply		

Connector Type D-sub 15pin female connector (mm screw threads)

### 9-2. RS232C connector

No.	Name	No.	Name
1	—	6	DTR
2	TxD (OUT)	7	CTS (IN)
3	RxD (IN)	8	RTS (OUT)
4	DSR	9	—
5	GND		

Connector Type D-sub 9pin female connector (inch screw threads)

### 9-3. SJT-02 connector

No.	Name	No.	Name
1	+24 [V]	6	DTR
2	TxD (OUT)	7	CTS (IN)
3	RxD (IN)	8	RTS (OUT)
4	DSR	9	STOP
5	GND		

Connector Type D-sub 9pin male connector (mm screw threads)



Don't connect any other devices to the SJT-02 connector to avoid possible damage.

## 10. Exterior Dimensions

