ORIENTAL MOTOR

HP-2108-11

Operating Manual

Data Memory Type Controller
SG8030S-D, SG8030S-U

Thank you for purchasing an Oriental Motor product. To obtain the best performance from your equipment, please read this manual thoroughly before use.

This manual is common in **SG8030S-D** (DIN rail mounting model), **SG8030S-U** (recessed mounting model). The operation of the main body (**SG8030S**) is common.

■Safety Precautions

This product is designed to be incorporated into general industrial machinery, and must not be used for other purposes. It should be noted that we are not responsible for any damages caused by ignoring this warning.
Only qualified personnel should handle the product.
The cautions described below are intended to ensure correct use of the product and to prevent the customer and other people from being injured.

⚠Warning If this Warning is ignored, death or serious injury may be caused by fire or electric shock.

- Do not use the product in an explosive or flammable atmosphere. Otherwise, fire and injury may occur.
- Qualified installers should be assigned to the work of installation, connection, running, operation and inspection. This is intended to prevent fire and injury.
- The controller power supply to be used should be a DC power supply where the primary and secondary sides are provided with reinforced insulation. Otherwise, electric shock may occur.
- Electrical connections must be made in strict accordance with the connection diagram. Otherwise, fire may occur.
- Turn off controller power in the event of power interruption. When the power is restored, the motor may start up suddenly and cause injuries or damage to the equipment.
- Do not disassemble, or modify the controller. Otherwise, fire may occur. When internal inspection or repair must be made, contact your local sales office.

⚠Caution If this Caution is ignored, injury or physical damage may be caused by electric shock or other accidents.

- Do not use the controller in excess of its ratings. Otherwise, the equipment may be damaged.
- Install the controller inside a cabinet. Otherwise, fire may occur or the equipment may be damaged.
- Do not place combustibles around the controller. Otherwise, fire may occur.
- Provide an emergency-stop device or emergency-stop circuit external to the equipment so that the entire equipment will operate safely in the event of a system failure or malfunction. Failure to do so may result in injury.
- Immediately when trouble has occurred, stop running and turn off the controller power. Failure to do so may result in fire or injury.
- When scrapping the controller, scrap it as industrial waste.

■Overview

The **SG8030S** controller comes in a compact DIN size and allows 4-step control of positioning merely through the output of start commands from a programmable controller.
In this product, the input circuit with an external controller is current source type input, and the output circuit is current sink type output. Use the external controller of current source type input, current sink type output.

■Before Use

Check to make sure that all parts are included before use.

SG8030S-D DIN Rail Mounting Model

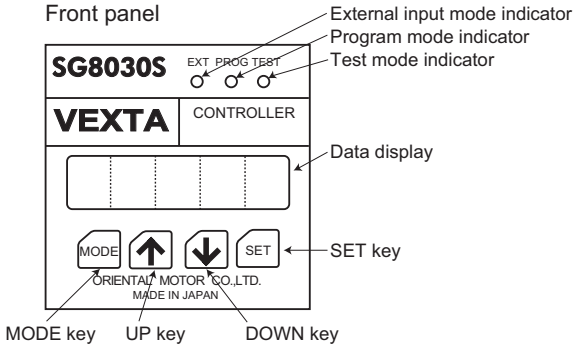
SG8030S Unit	
Flush Connection Socket	1
Operating Manual	1

SG8030S-U Recessed Mounting Model

SG8030S Unit	
Connection Socket	1
Recessed Mounting Adapter	1
Operating Manual	1

■Explanation of Control Panel

Front panel



Note: The front panel is coated with a transparent protective film.

■Explanation of the Controller's Modes

The **SG8030S** has three control modes. Pressing the **MODE** key causes the mode to change, from external to program to test mode, as indicated by the mode indicators.

< The Three Control Modes >

• External (EXT) Mode

This mode is automatically selected when the **SG8030S** is turned on. When required operating data has already been recorded, motor operation is controlled by a programmable controller.

• Program (PROG) Mode

This mode is used to set operating parameters. See p.10 “Setting Operating Data”

• Test (TEST) Mode

This mode is used for manual checks of operation and the like. See p.12 “Confirmation of Operation Manually.”

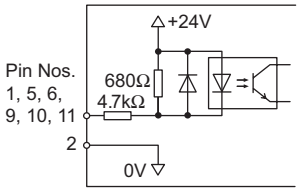
■Connection Socket Signal Table

Pin no.	Signal name	Direction	Function
1	Operation mode input	Input	When power is not supplied (H level) →Positioning When power is supplied (L level) →Return to mechanical home
2	GND	Input	24VDC ground
3	+24V	Input	24VDC input terminal
4	Busy	Output	Output during pulse oscillation
5	HOMELS	Input	Mechanical home sensor input
6	Start	Input	Start signal
7	CW-pulse/Pulse	Output	CW-pulse/Pulse output terminal
8	CCW-pulse/ Rotation direction	Output	CCW-pulse/Rotation direction output terminal
9	External stop	Input	When power is not supplied →Stops all operation When power is supplied →Restores ready-for-operation status
10	CW-scan	Input	Continuous CW operation when input
11	CCW-scan	Input	Continuous CCW operation when input

H level: When terminal is open.
L level: When terminal is short-circuited to the GND terminal.

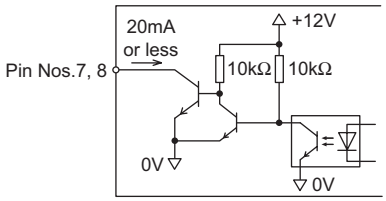
■Internal Input Circuit (Current sourcing input)

This circuit is used for signals input from an external controller or sensor.
Signal names: Operation mode input, HOMELS, Start, External stop, CW scan, CCW scan.

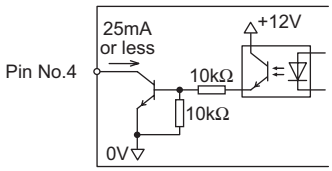


■Internal Output Circuit (Current sinking output)

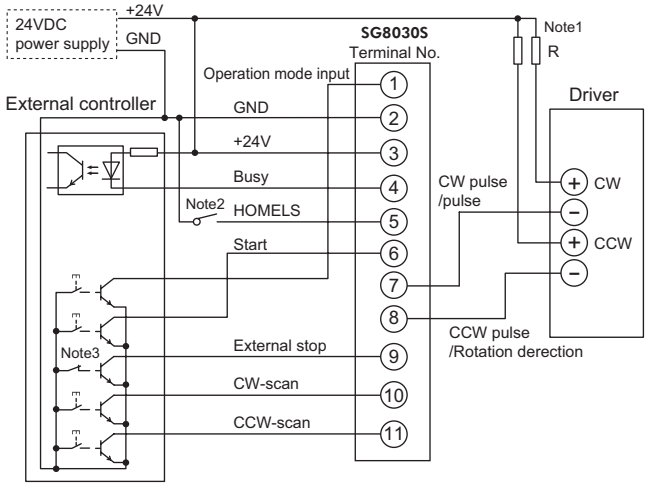
This circuit is used for signals output to a driver.
Signal names: CW pulse/Pulse, CCW pulse/Rotation direction



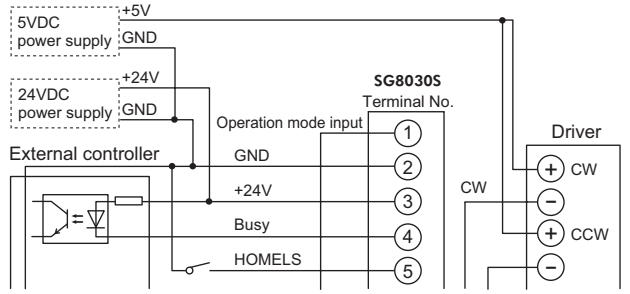
This circuit is used for signals output to an external controller.
Signal name: Busy



■Sample Connection Diagram



Note 1: Use an external resistor (R) of 1.5k- 2.2kΩ (1/4W or more). This resistor is not required when connecting the unit to a 5VDC power supply. In this case, connect as shown below.



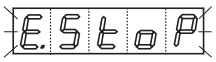
Note 2: Use normal open (NO) limit for control of the mechanical home sensor.

Note 3: Power for the external stop input signal must always be on during normal operation. When not using the external stop input signal, always connect to the ground terminal.

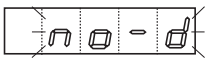
Use power input of 24VDC±5%, consumption corrent of 0.1A. Use of a power supply with more than sufficient capacity is recommended.

■Messages

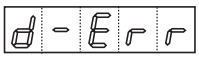
1.“E.StoP” message ..... The “E.StoP” message is displayed after input of an external stop signal when the power supply goes off.
When the “E.StoP” message is displayed, the unit will not accept input from the control panel switches. To cancel this status, short circuit the external stop signal to GND.



2.“no-d” message ..... The “no-d” message flashes on the display when the number of operating pulses for the four positioning steps has not been set.



3.“d-Err” message ..... The “d-Err” message is displayed when data has not been recorded correctly. After resetting, record the program data again.



Resetting
Turn off power momentarily, then turn back on while pressing the **SET** key on the front panel. All data will be reset.

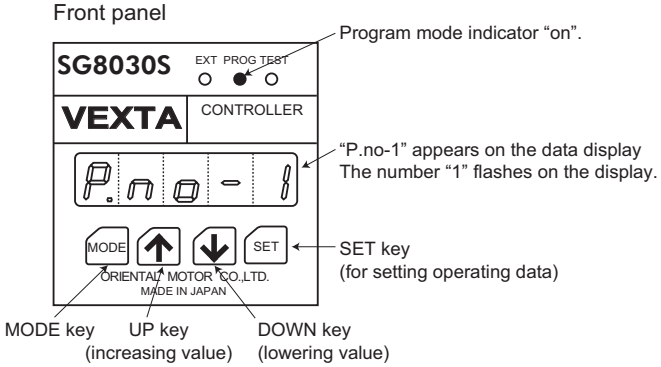
■Setting Operating Data

Operating data is set in program mode using the control panel keys (**UP**, **DOWN**, and **SET** keys)

• Selecting Program Mode

Select program mode by pressing the **MODE** key.

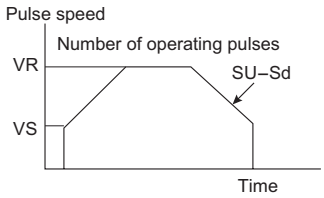
Front panel



1.Setting Positioning Data

The **SG8030S** can be set for up to the following 4 steps, or operation patterns. Set the data of the positioning feed distance, operating pulses, and the direction of the rotation.

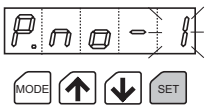
Stepping motor operating pattern



VS: Starting pulse speed
SU-Sd: The acceleration/deceleration rate
VR: Operating pulse speed
Number of operating pulses: Positioning feed distance

Note: The settings for VS and SU-Sd are the same for all four operation patterns.

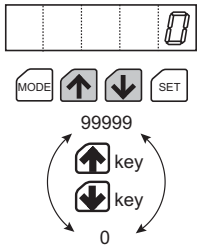
(1) Data Display during Step 1



After program mode has been selected, “P. no-1” will be displayed and the “1” will flash on and off.

- Press the **SET** key to set the positioning data for Step 1.

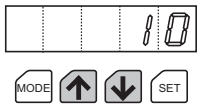
(2) Setting the Number of Operating Pulses



Pressing and holding the **UP** or **DOWN** key causes the number to increase or decrease consecutively. Factory setting is 0 pulses. The number of pulses can be set in increments of one. Pressing the **UP** key at 99999 brings the setting back to 0; pressing the **DOWN** key at 0 takes the setting to 99999.

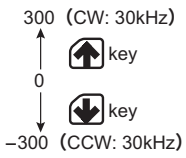
- Pressing the **SET** key sets the number of pulses displayed. Following this, the setting for the operating pulse speed is displayed, at which point the operating pulse speed can be set.

(3) Setting the Operating Pulse Speed (VR) and the Direction of Rotation



Pressing and holding the **UP** or **DOWN** key causes the number to increase or decrease consecutively.
Factory setting is 10; i.e. 1000Hz in CW direction.

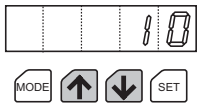
< Setting the Operating Pulse Speed >



The operating pulse speed can be set in 100Hz increments.
The settings are input at 1/100 of actual speed.
Thus, the setting for 100Hz is 1.

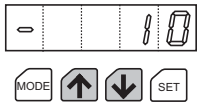
< Setting the Direction of Rotation >

• Setting rotation in CW direction



When nothing is displayed in the furthest left position, this indicates CW direction.

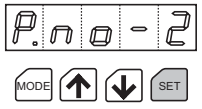
• Setting Rotation in CCW Direction



When a minus sign is displayed in the furthest left position, this indicates CCW direction.

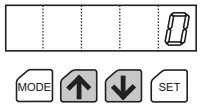
- Pressing the **SET** key sets the value displayed and advances the setting operation to the second step setting of the positioning data. ("P. no-2" is displayed.)

(4) Data Settings for the Second and Subsequent Steps



Setting procedures for the second and subsequent steps are the same as those for the first step. Procedures (1) through (3) are repeated for the second step and beyond as required.

< When no setting is to be made for the positioning data >



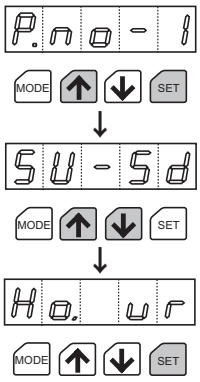
For steps where data settings are not going to be made, set the number of operating pulses to 0.

See p.11 Section 4 "Setting the Acceleration/Deceleration Rate and the Starting Pulse Speed" for instructions concerning the setting of SU-Sd (acceleration/deceleration rate) and VS (starting pulse speed).

2.Setting Pulse Speed Data for Return to Mechanical Home

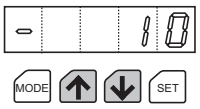
Select program mode by pressing the **MODE** key.
Set the pulse speed data and the starting direction.

(1) Display of Pulse Speed Data for Return to Mechanical Home



Press the **UP** and **SET** keys together for over one second.
↓
"SU-Sd" will be displayed. Press the **DOWN** key once or the **UP** key twice.
↓
"Ho. vr" will be displayed. Once the **SET** key is pressed, the pulse speed data for return to mechanical home can be set.

(2) Setting the Pulse Speed and the Starting Direction for Return to Mechanical Home



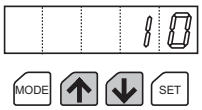
Pressing and holding the **UP** or **DOWN** key causes the number to increase or decrease consecutively.
Factory setting is -10; i.e. 1000Hz in CCW direction.

< Setting the Pulse Speed for Return to Mechanical Home >

- The setting is the same as the operation pulse speed setting, when the positioning data is set.
- The operation speed can be set in 100Hz increments. The setting is input at 1/100 of actual speed. Thus, the setting for 100Hz is 1.

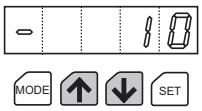
< Setting the Starting Direction >

• Starting in CW Direction



When nothing is displayed in the furthest left position, this indicates CW direction.

• Starting in CCW Direction



When a minus sign is displayed in the furthest left position, this indicates CCW direction.

- Pressing the **SET** key sets the value displayed. ("P. no-1" is displayed.)

3.Setting the Data of the Continuous Operating Speed

- The continuous operating pulse speed is the value set for the pulse speed for return to mechanical home.
  Continuous operating pulse speed
  = Pulse speed for return to mechanical home

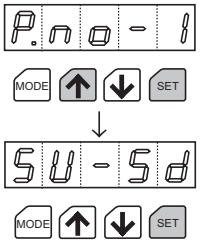
See Section 4. "Setting the Acceleration/Deceleration Rate and the Starting Pulse Speed" below for instructions concerning the setting of SU-Sd (acceleration/deceleration rate) and VS (starting pulse speed).

4.Setting the Acceleration/Deceleration Rate and the Starting Pulse Speed

- The acceleration/deceleration rate and starting pulse speed are the same for all operating modes.

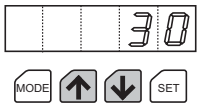
Select program mode by pressing the **MODE** key.

(1) Display of Acceleration/Deceleration Rate Data

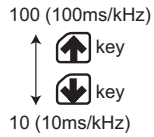


Press the **UP** and **SET** keys together for over one second.
↓
"SU-Sd" will be displayed. Pressing the **SET** key causes the current setting for the acceleration/deceleration rate to be displayed. At this point a new data setting can be made.

(2) Setting the Acceleration/Deceleration Rate



Press the **UP** or **DOWN** key to change the number.
(Factory setting is 30ms/kHz.)

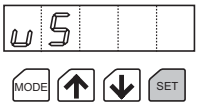


The acceleration/deceleration rate can be set in increments of 10ms/kHz.
(Settings are input at actual rates.)

Note: Holding down these keys does not cause the number displayed to continue to change.

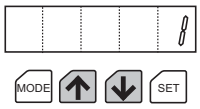
- Pressing the **SET** key sets the value displayed. The unit then proceeds to the setting of starting pulse speed.
("vS" is displayed.)

(3) Display of Starting Pulse Speed Data

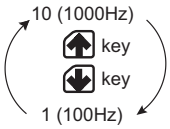


"vS" is displayed. Pressing the **SET** key causes the current setting for the starting pulse speed to be displayed. At this point a new data setting can be made.

(4) Setting the Starting Pulse Speed



Press the **UP** or **DOWN** key to change the number.
Factory setting is 100Hz.
The starting pulse speed can be set in increments of 100Hz.
Settings are input at 1/100 of actual speed.
(Thus, the setting for 100Hz is 1.)



Pressing the **UP** key at 10 brings the setting back to 1; pressing the **DOWN** key at 1; takes the setting to 10.

Note: Holding down these keys does not cause the number displayed to continue to change.

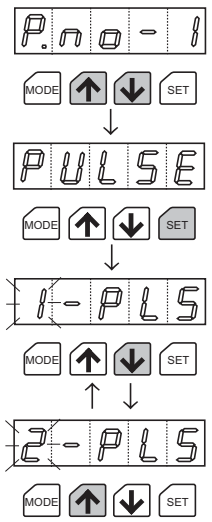
- Pressing the **SET** key sets the value displayed. The following data setting is then displayed: "Ho.vr"

If VS (starting pulse speed) is set higher than VR (operating pulse speed), the motor operates uniformly at the VS speed, without accelerating or decelerating.

5.Setting Pulse Output System

Select Program mode by pressing the **Mode** key.

(1) Display of Pulse Output System



Press the **UP** and **DOWN** keys together for over one second.

↓

"PULSE" will be displayed. Pressing the **SET** key causes the current setting for the pulse output system to be displayed.

↓

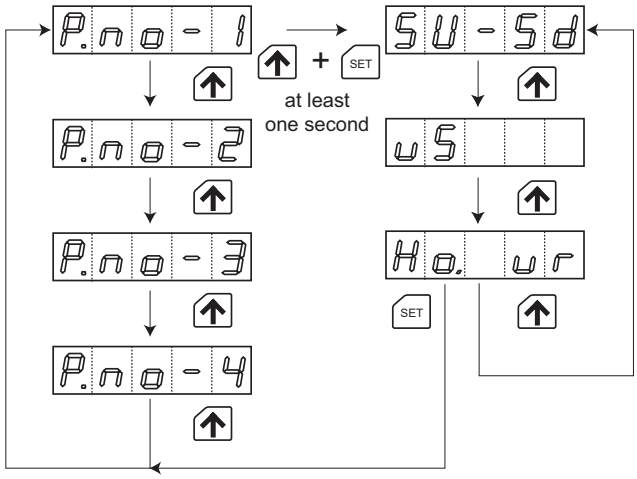
Press the **UP** or **DOWN** key to change the 1-pulse system or the 2-pulse system.
Factory setting is "2-PLS" (2-pulse system).

- Pressing the **SET** key sets the value displayed. The unit then proceeds to display of "P.no-1".

Note: If the unit is reset, the pulse mode setting will not change to the 2-pulse mode (default setting).
In this case, the unit remains in the 1-pulse mode.

< Selecting Operating Parameters >

- When any item of operating data is being displayed, a different item can be selected for setting by pressing the **UP** or **DOWN** key.



< At Completion of Data Setting >

When all of the required operating data have been input, press the **MODE** key.
Pressing the **MODE** key changes the control mode.

6.Resetting

Turning on power while pressing the **SET** key erases data settings and resets the factory settings except the pulse output system.

Data setting item	Data display	Value
Number of operating pulses	0	0 pulse
Operating pulse speed (VR)	10	1000Hz
Starting direction for return to mechanical home	–	CCW direction
Operating speed for return to mechanical home	10	1000Hz
Acceleration/deceleration rate (SU-Sd)	30	30ms/kHz
Starting pulse speed (VS)	1	100Hz
Continuous operating speed	Same as speed for return to mechanical home	
Pulse output system	Does not effect. (Factory setting is 2-pulse system.)	

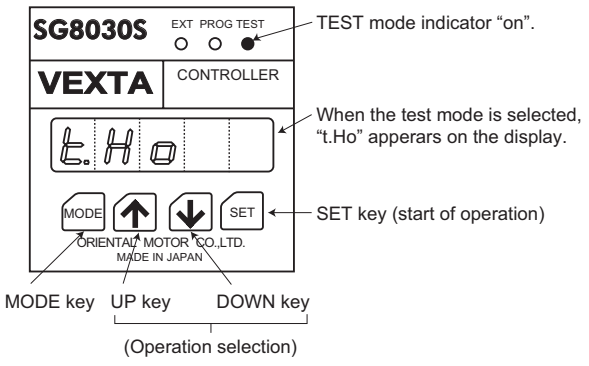
■Confirmation of Operation Manually

Operation can be confirmed manually by using the control panel keys (**UP**, **DOWN**, and **SET** keys) in test mode.
In the test mode, the motor executes continuous operation, return to mechanical home and positioning according to the data set in the program mode. (The test mode can also be used to check driver and sensor connections.)

• Selecting Test Mode

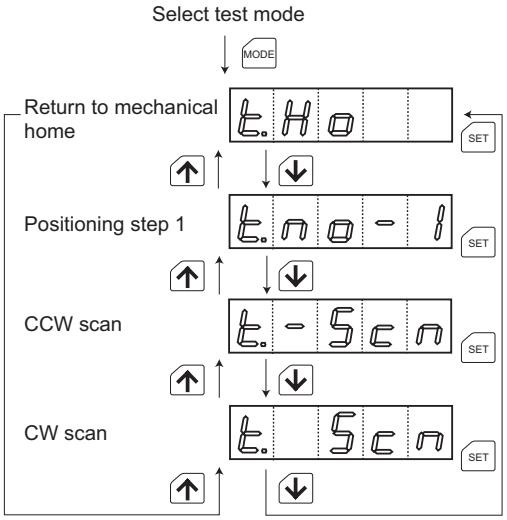
Select test mode by pressing the **MODE** key.

Front panel



• Selecting Operation

The operating mode is selected using the **UP** and **DOWN** keys.



● Pressing the **SET** key executes the operation displayed.

1.Return to Mechanical Home

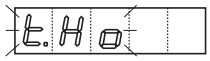
Test the return to mechanical home after connecting the motor and the sensor, etc.

Select "t.Ho": Press the **UP** or **DOWN** key to display "t.Ho".

↓

Start of Operation: Press the **SET** key.

Message



↓ ● During operation "t.Ho" flashes on the display.

End of Operation: When mechanical home is detected, the motor stops and "t.Ho" appears on the display.

2.Continuous Operation

< Executing continuous operation in CW direction >

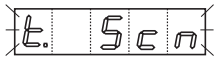
Select "t. Scn": Press the **UP** or **DOWN** key to display "t. Scn".

↓

Start of Operation: Press the **SET** key for at least one second.

Note: The motor operates continuously in the clockwise direction only for the duration that the **SET** key is pressed.

Message



↓ ● During operation, "t. Scn" flashes on the display.

End of Operation: When the **SET** key is released, the motor decelerates to a stop and "t. Scn" appears on the display.

< Executing continuous operation in CCW direction >

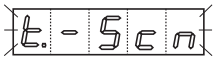
Select "t.-Scn": Press the **UP** or **DOWN** key to display "t.-Scn".

↓

Start of Operation: Press the **SET** key for at least one second.

Note: The motor operates continuously in the counterclockwise direction only for the duration that the **SET** key is pressed.

Message



↓ ● During operation, "t.-Scn" flashes on the display.

End of Operation: When the **SET** key is released, the motor decelerates to a stop and "t.-Scn" is displayed.

< Executing Single-pulse (jog) Operation in CW or CCW Directions >
Select "t. Scn" or "t.-Scn", and then briefly (in less than one second) press and release the **SET** key. One pulse will be output.

3.Positioning

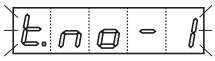
Executing sequential feed positioning.

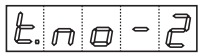
Select "t.no-1": Press the **UP** or **DOWN** key to display "t.no-1".

↓

Start of Operation: Press the **SET** key.

Message





↓ ● During operation, "t.no-1" flashes on the display.

End of Operation: When the set number of pulses have been output, the motor stops and the next step "t.no-2" appears on the display.

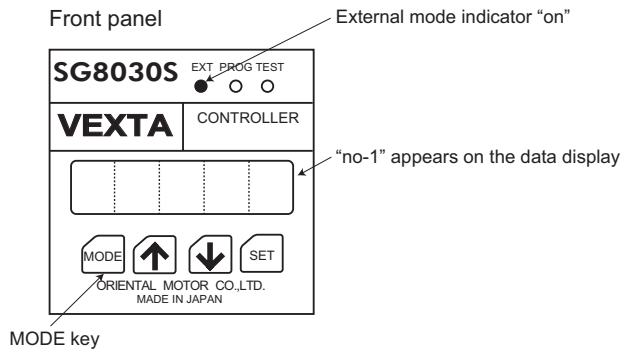
Note: The unit returns to operation standby status.

Note: Steps for which the number of operating pulses have not been set are not displayed. The next step to be executed will be one for which the number of operating pulses has been set.

■Operation by Programmable Controller

• Selecting External Input Mode

Select external input mode by pressing the **MODE** key.



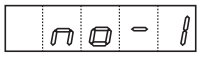
(Operation cannot be controlled with the control panel keys.)

∗ When the power is turned on - automatically the unit enters external input mode.

1.Positioning

Operating Procedure

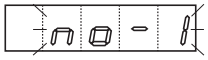
(1) Select Operating Mode (Positioning):
Input the operation mode input signal (pin 1) at H level.



"no-1" appears on the display.

↓

(2) Start Input: Input the START signal (pin 6) at L level.

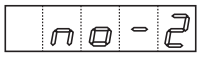


During operation the step number "no-1" flashes on the display.

↓

(3) End of Operation: The unit returns to START signal input standby status.

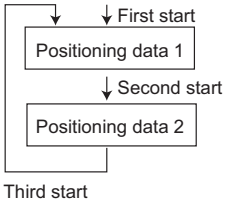
Example: When the data for Step 2 have been input.



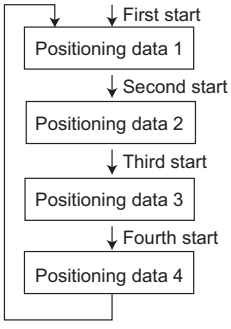
When operation is completed, the next step number appears on the display. ("no-2" appears on the display.)

< Operation Example >

• When two sets of positioning data have been input



• When four sets of positioning data have been input



2.Continuous Operation

< Operating Procedures >

Continuous Operation in CW Direction

(1) Select Operating Mode and Start of Operation:
Input the CW scan signal (pin 10) at L level.

Pulse for CW rotation is output.
During operation "ScAn" flashes on the display.

↓

(2) Stop: Cancel the CW scan signal by swiching to H level.

When the signal is cancelled, the motor decelerates at the acceleration/deceleration rate (SU-Sd) set, and signal generation stops when the motor speed reaches to the starting pulse speed (VS).

Continuous operation in CCW direction

(1) Select Operating Mode and Start of Operation:
Input the CCW scan signal (pin 11) at L level.

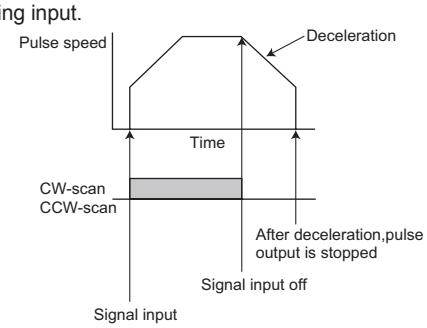
Pulse for CCW rotation is output.
During operation "-ScAn" flashes on the display.

↓

(2) Stop: Cancel the CCW scan signal by switching to H level.

< Continuous Operation Pattern >

Pulse is output only while CW-scan signal or CCW-scan signal is being input.



3.Return to Mechanical Home

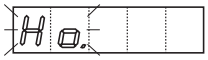
< Operating Procedure >

(1) Select Operating Mode (Return to Mechanical Home):
Input the operation mode input signal (pin 1) at L level.

"Ho." appears on the display.

↓

(2) Start of Operation: Input the START signal (pin 6) at L level.



During operation "Ho." flashes on the display.

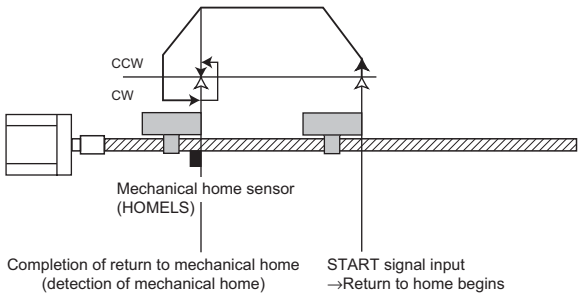
↓

(3) Upon return to the mechanical home, operation is completed.

Upon return to mechanical home, "Ho.End" appears on the display.

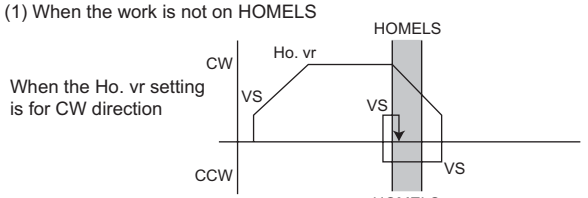
< Return to Home Operation Pattern >

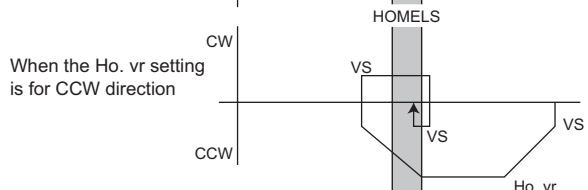
Example: When starting direction is CCW



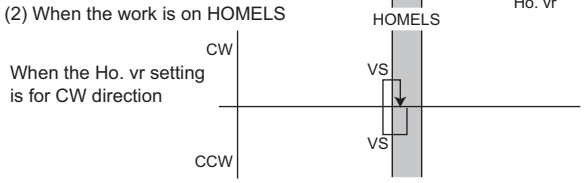
Return to home operation pattern

(1) When the work is not on HOMELS



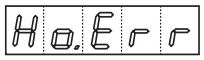


(2) When the work is on HOMELS



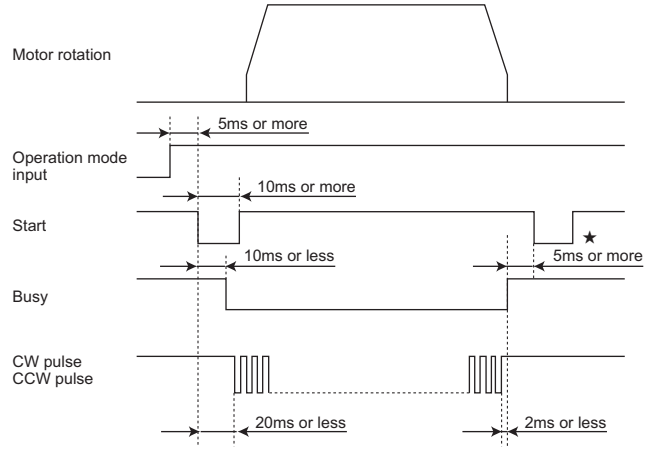
< Error Messages >

"Ho.Err" message ..... The indicator shows the signal during themechanical home operation, in cases when the mechanical home limit sensor does not normally detect the home position, due to chattering and/or vibration. Adjust the sensor to recover the normal detecting function.

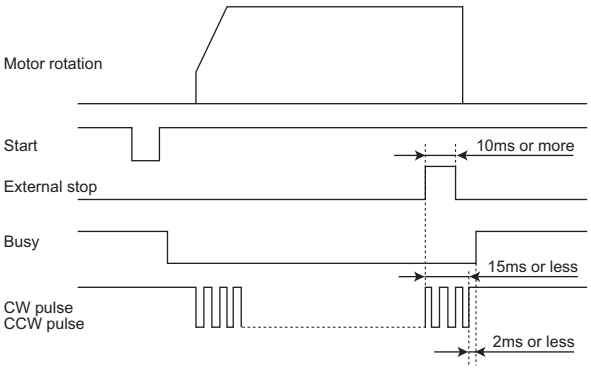


■Timing Chart

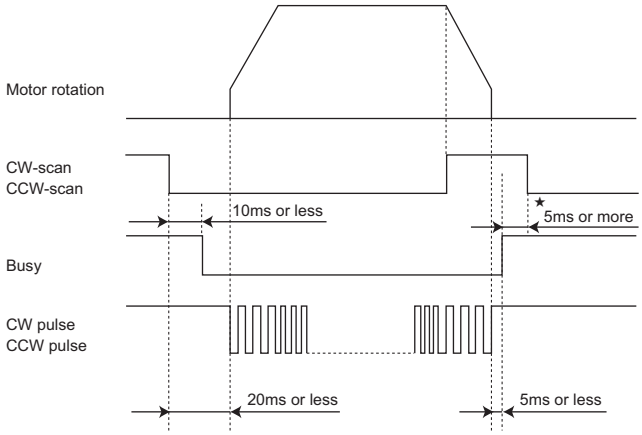
1.Positioning



< At Time of Exrernal Stop Input >



2.Continuous Operation

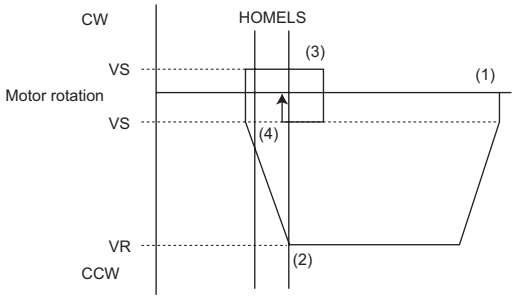


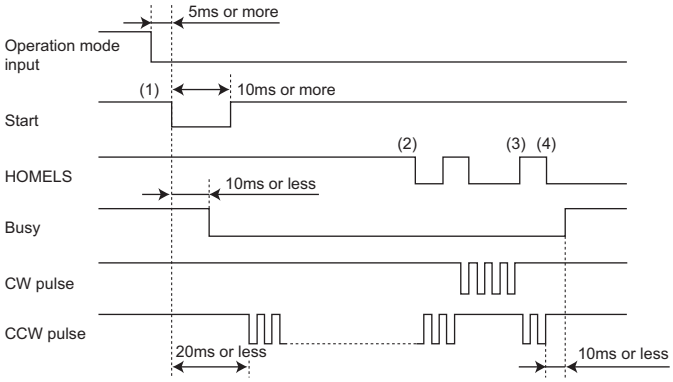
★Note Concerning Timing Charts:

At the completion of operation, wait at least 5ms after the busy output goes off before inputting the next START signal.

3.Return to Mechanical Home

(When starting direction is CCW)





(1) After switching operating modes, input of the start signal causes the motor to begin operating in CCW direction.

↓

(2) When HOMELS is detected, the motor decelerates and rotation is reversed, then the motor operates at VS speed in CW direction.

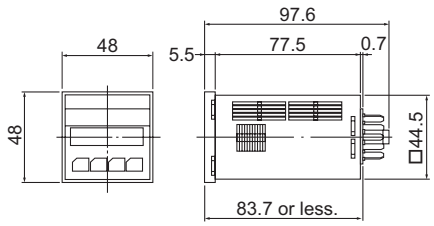
↓

(3) When HOMELS is detected and passed over, the motor again changes direction and operates at VS speed in CCW direction.

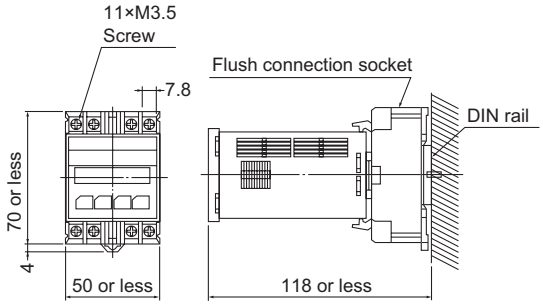
↓

(4) When HOMELS is detected once more, the motor stops.

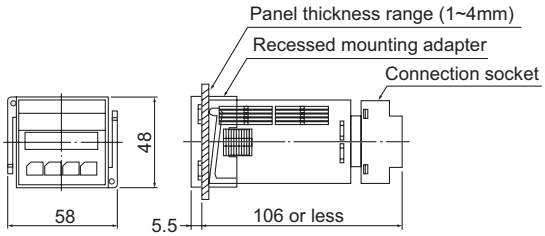
■Dimensions (unit: mm)



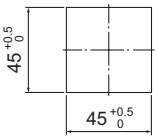
SG8030S-D



SG8030S-U



Mounting Hole Dimensions



■Specifications

SG8030S-D, SG8030S-U

Positioning data	4 steps Memory: EEP-ROM
Positioning control	Sequential oepration in response to start signal No. of pulses per step 1-99,999 Operation pulse speed 100-30,000Hz (100Hz increments) Starting pulse speed 100-1,000Hz (100Hz increments) Acceleration/deceleration rate 10-100ms/kHz (10ms/kHz increments)
Control modes	External (EXT) mode Program (PROG) mode Test (TEST) mode
Operating modes	Positioning (index) Return to mechanical home (home) Continuous operation (scan) Single pulse (jog) : Used only in test mode
Return to mechanical home capability	HOMELS detection of home through designation of mechanical home detection direction or rotation
Input signal	24VDC Photocoupler; input resistance 4.7kΩ Current sourcing input
Output signal	NPN Transistor output linked to photocoupler; 24VDC or less, 25mA or less Current sinking output
Power supply input	24VDC±5%, Consumption current: 0.1A
Mass	0.1kg
Ambient temperature	0~40°C
Ambient humidity	20~85% (non-condensing)

ORIENTAL MOTOR U.S.A. CORP.
Technical Support Line Tel:(800)468-3982
Available from 7:30 AM to 5:00 PM, P.S.T.
E-mail: techsupport@orientalmotor.com
www.orientalmotor.com

ORIENTAL MOTOR (EUROPA) GmbH
Headquarters and Düsseldorf Office Tel:0211-5206700 Fax:0211-52067099
Munich Office Tel:08131-59880 Fax:08131-598888
Hamburg Office Tel:040-76910443 Fax:040-76910445

ORIENTAL MOTOR (UK) LTD.
Tel:01256-347090 Fax:01256-347099

ORIENTAL MOTOR (FRANCE) SARL
Tel:01 47 86 97 50 Fax:01 47 82 45 16

ORIENTAL MOTOR ITALIA s.r.l.
Tel:02-93906346 Fax:02-93906348

TAIWAN ORIENTAL MOTOR CO., LTD.
Tel:(02)8228-0707 Fax:(02)8228-0708

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Tel:(6745)7344 Fax:(6745)9405

ORIENTAL MOTOR (MALAYSIA) SDN. BHD.
Tel:(03)79545778 Fax:(03)79541528

INA ORIENTAL MOTOR CO., LTD.
KOREA
Tel:(032)822-2042~3 Fax:(032)819-8745

ORIENTAL MOTOR CO., LTD.
Headquarters Tokyo, Japan
Tel:(03)3835-0684 Fax:(03)3835-1890

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