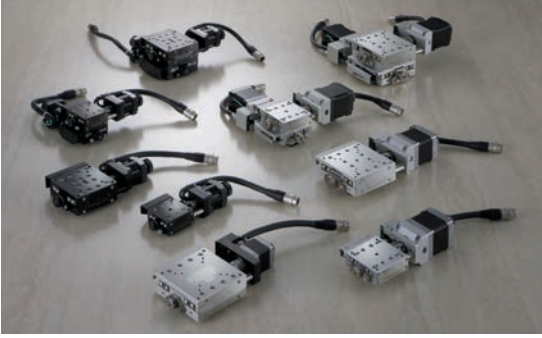


Motorized Goniometer Stage Guidance



This is the arc driving stage which has center of rotation on the vertical centroid of the stage surface.

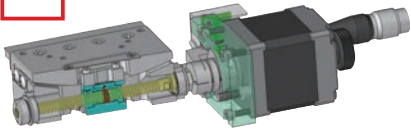
Usage

- Repeat positioning of minute angle in the optical pickup adjustment and inspection equipment.
- Parts posture adjusting for assembly process and mounting line.
- Available bonding camera lens and LCD panel together in production and inspection.

The focus of setting

Ball screw type

Original



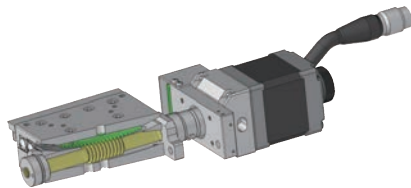
KGB/KAB Sinmotion Stage

▶P.1-145~

High precision goniometer stage for driving minute angle repeatability. Ball screw type is improved durability even continuing repeatability driving.

Table size	60×60mm	70×70mm

Worm type



KG/KA/KGW/KAW

▶P.1-149~

Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism. Selectable from various sizes and work distance type.

Table size	40×40mm	50×50mm	60×60mm	70×70mm

■ Sensor improvements

KGW and KAW series correspond to a voltage level of DC5V through 24V.

■ List of rotation centroid height

- Shows rotation centroid height for each stage surface.
- Mark of blue centroid can be integrated 2-axis.

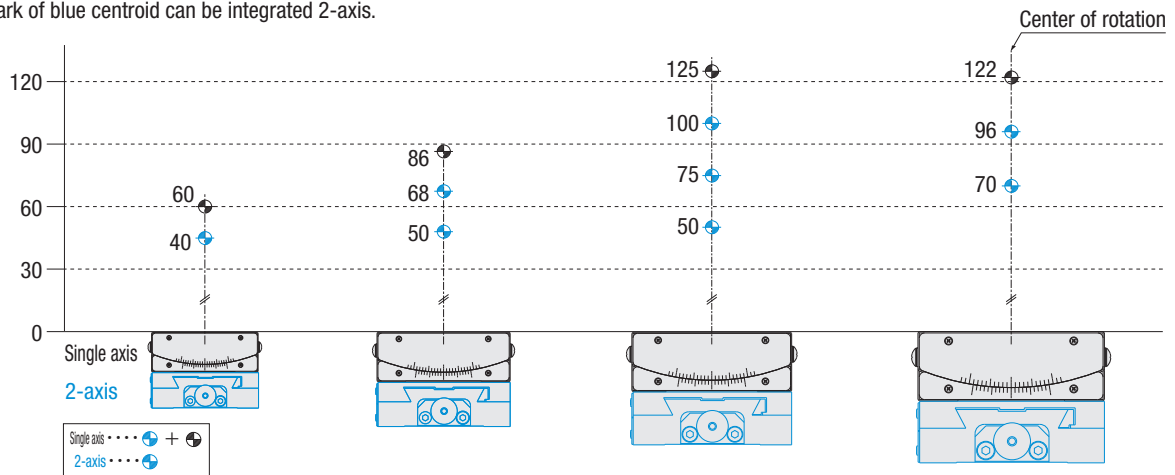


Table size	40 × 40	50 × 50	60 × 60	70 × 70
Ball screw type	—	—	—	○
Worm type	○	○	○	○

Ball bearing type sinemotion goniometer stages

High precision goniometer stages with ball bearings. This is ideal for driving a minute angle repeatability.

Features



High endurance

Backlash by the abrasion was concerned about by the worm gear type when continued being driven at a microangle repeatedly.
Ball screw mechanism makes evaluation high durability.

Improvement acceleration and deceleration

Smooth start-up and acceleration with small friction.

Reduction backlash

Using the preload parts may reduced backlash.

Travel length and isokinetic

The linear-driven will be changed to rotation-moving by using the internal bearing.
Ball screw traveling length will not be the same as stage travel angle due to linear-moving converts to rotation-moving.
It is different resolution per pulse at the center and end.
Rotation speed will not be constant even with the send of pulse signal at the constant speed.

Travel range calculation fomula

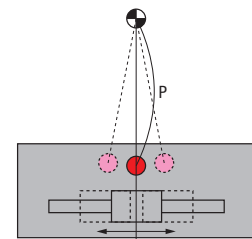
* The fomula based on the stroke center.

(1) Travel angle = $\text{Arcsin}(\text{Input pulse} \cdot X) / P$ (2) Input pulse = $P \cdot \sin(\text{Traveling angle}) / X$

Terms

Definition	Value	Unit
Distance between supporting points P*	76	mm
Ball screw lead	1	mm
Motor basic step angle	0.72	°
Ball screw travel length per pulse X	0.002	mm

*Distance between supporting points depending on the stage.



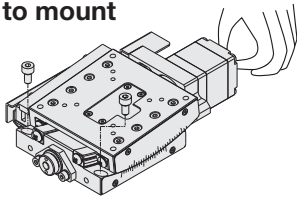
P=Distance between supporting points
(The distance between center rotation and bearing)

Basic Specification

Model	Motor basic step angle	Distance between supporting points P
KGB06050	0.72°	55mm
KGB06075	0.72°	80mm
KGB06100	0.72°	105mm
KGB06125	0.72°	130mm
KGB07070	0.72°	76mm
KGB07096	0.72°	102mm
KGB07122	0.72°	128mm

For use correctly

How to mount



Stroke the upper plate to CW or CCW.
Screw on bolt holes for each 2. (Total 4 screws)
Tighten the screws by manual.

About object on the upper or lower stage.

Stage surface might be deformed and Mounting unflat object and set to the unflat place can affect to be deformed stage surface and decreasing accuracy.
Pay attention. [Approximate flatness: 10μm Within]

Position of stage mounting

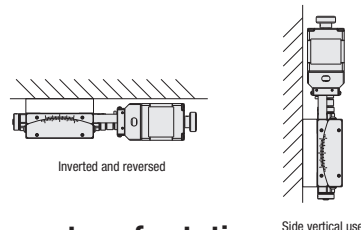
All products SPEC shows must be shown flat setting condition.
Pay attention to mount such as up side down, vertical on the side and horizontal on the side.
Load capacity and accuracy might be changed by the positioning.
Please feel free to ask us for more information.

Each positioning characteristics

Travel guide [Feeding method]	Inverted and reversed	Side horizontal	Side vertical use
Crossed roller [Ball screw]	○	○	△
Crossed roller [Worm gear]	○	○	△

○ means usable, however load and moment is limited.

△ Load and moment is limited, it may not lose characteristics in some usage or models.



Run-out accuracy of the center of rotation/Height of the center of rotation

Our cross roller goniometer stages are providing high-precision machining.

Run-out accuracy of the center of rotation

Put the true sphere on the level of the center of rotation, and define the true sphere run-out as run-out accuracy of the center of rotation.

Height of the center of rotation

Height of the center of rotation is between upper side of stage and center of roundness.

Ball Screw Type Sinemotion Goniometer Stages □60:KGB06/KAB06

1-axis
KGB06075AL (KGB06 series)



2-axis
KAB06075AL (KAB06 series)



Freely
customize
the motor

Original RoHS

※Can be used for KGB
☑See page P.009

■High precision goniometer stages with ball bearings. This is ideal for driving a minute angle repeatability.

■Configuration 2-axis
Combination of 1-axis stage that is different center of rotation.



☑Cable P.1-207~
☑Electrical specification P.1-143~

1 Axis

G	1-axis
A	2-axis

2 Height of center rotation (W.D)

050	50mm
075	75mm
100	100mm
125	125mm

3 Sensor logic

Code	Specification
L	L position
R	Opposite hand

4 Cable option

Code	Specification	Cable type
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Robot cable 2m	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable 4m	D214-2-4R
J	Robot cable 4m one end loose	D214-2-4RK
Blank	Cable is not included (Standard)	—

* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

See page 1-207, 209~ for details of cable.

*Please select "Code A, C, F, or H" when connect with stepping motor controller (DS102/112).

SPEC

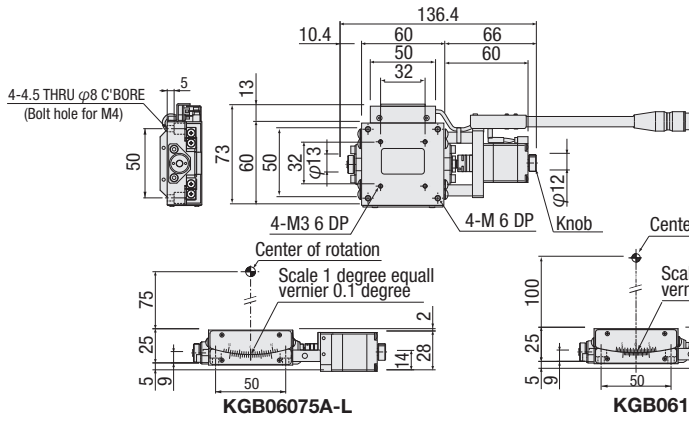
	SPEC							
	1-axis				2-axis			
Number of axes	1-axis				2-axis			
Model	KGB06050-L	KGB06075-L	KGB06100-L	KGB06125-L	KAB06050-L	KAB06075-L	KAB06100-L	
(Opposite hand)	KGB06050-R	KGB06075-R	KGB06100-R	KGB06125-R	KAB06050-R	KAB06075-R	KAB06100-R	
Mechanical specification	Travel length Upper/Lower axis	±8.5°	±5.5°	±5°	±4°	±8.5°/±5.5°	±5.5°/±5°	±5°/±4°
	Table size	60×60mm						
	Travel mechanism	Ball screw φ6 lead 1						
	Guide	Crossed roller guide						
Universal Machine	Main materials-Finishing	Aluminum—Black almite finishing						
	Weight	0.5kg				1.0kg		
	Height of stage	25±0.2mm				50±0.4mm		
Accuracy specification	Height of center rotation	50±0.2mm	75±0.2mm	100±0.2mm	125±0.2mm	50±0.4mm	75±0.4mm	100±0.4mm
	Runout accuracy of center rotation	Within 0.01mm						
	Resolution (Pulse)*	Upper at the full Lower at the full	≒0.0021° ≒0.0014°	≒0.0014° ≒0.0011°	≒0.0011° ≒0.0009°	≒0.0021° ≒0.0014°	≒0.0014° ≒0.0011°	≒0.0011° ≒0.0009°
	MAX speed**	Upper Lower	31.5°/sec [15kHz] 21°/sec [15kHz]	21°/sec [15kHz] 16.5°/sec [15kHz]	16.5°/sec [15kHz] 13.5°/sec [15kHz]	31.5°/sec 21°/sec	21°/sec 16.5°/sec	16.5°/sec 13.5°/sec
Sensor	Repeatability positioning accuracy	±0.001°						
	Load capacity	5kgf [49N]				4.5Kg [44.1N]		
	Moment stiffness	Pitch 0.30/yaw 0.10/roll 0.11 ["/N·cm]				Pitch 0.41/yaw 0.2/roll 0.41 ["/N·cm]		
	Lost motion	Within 0.003°				Within 0.003°		
Provided screw (Hexagon-headed bolt)	Limit sensor	Installed				Installed		—
	Origin sensor	Installed				Installed		—
	Slit origin sensor	—				—		—
Provided screw (Hexagon-headed bolt)	4 of M4—10							

* See page 1-169 if you require exact calculations. ☑1-140 if you require exact calculations.

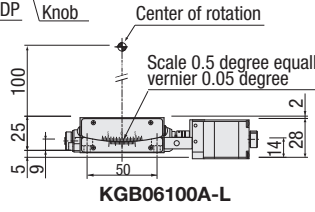
**The MAX speed becomes the theory speed at the time of the 15kHz drive for the traveling pulse of the full stroke.

Dimensional outline awings(1-axis)

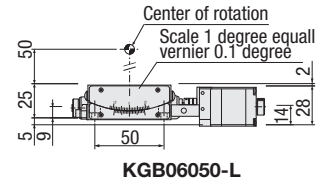
KGB06-L series



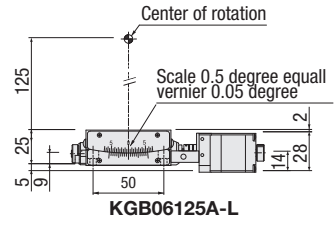
KGB06075A-L



KGB06100A-L

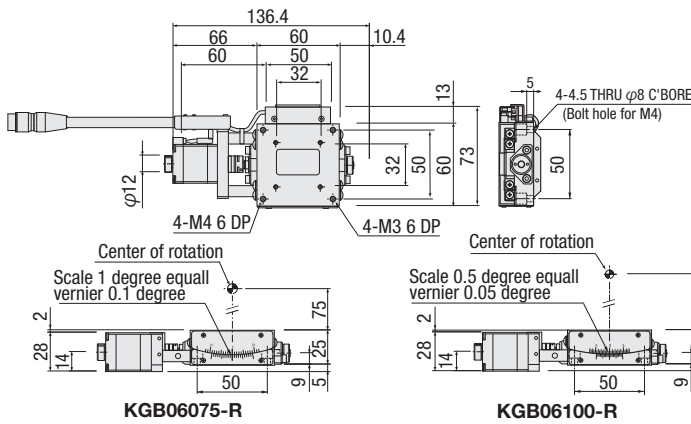


KGB06050-L

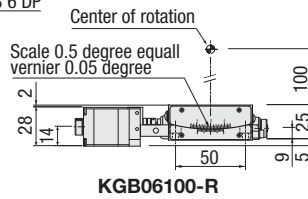


KGB06125A-L

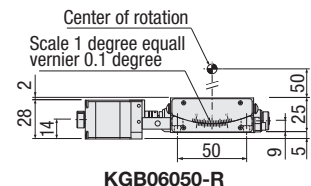
KGB06-R series (Opposite hand)



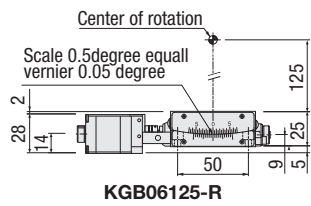
KGB06075-R



KGB06100-R

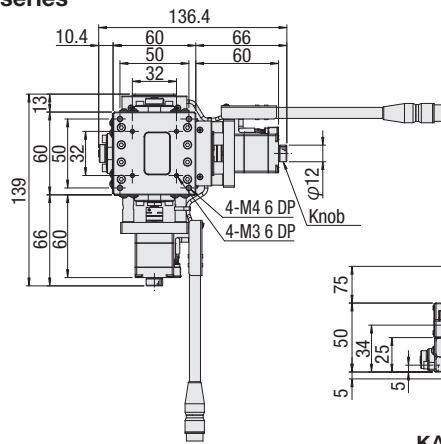


KGB06050-R

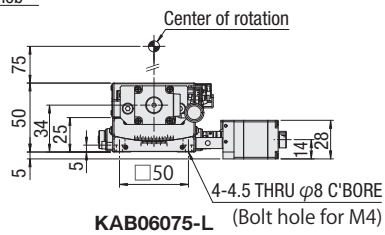


KGB06125-R

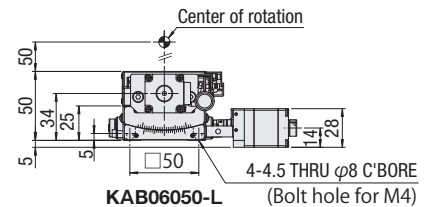
KAB06-L series



KAB06075-L (Bolt hole for M4)

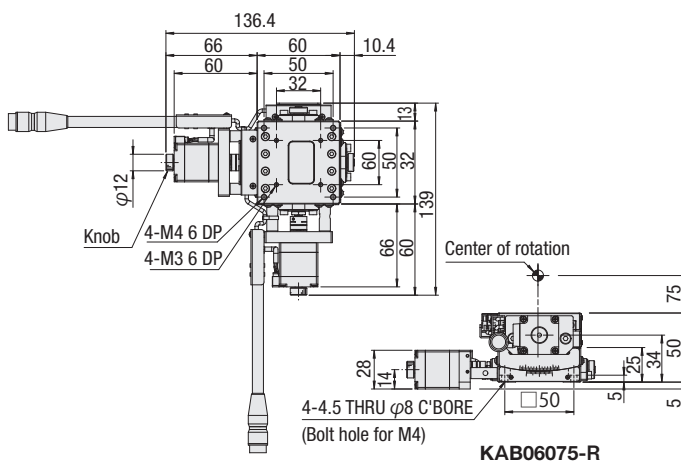


KAB06100-L (Bolt hole for M4)

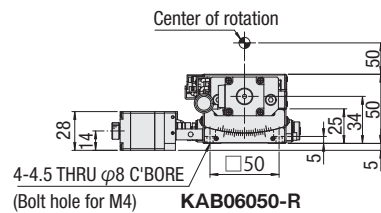


KAB06050-L (Bolt hole for M4)

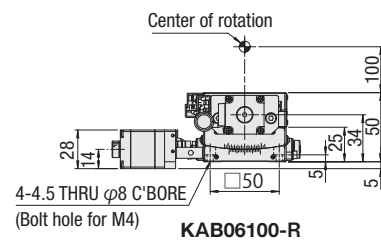
KAB06-R series (Opposite hand)



KAB06075-R



KAB06050-R



KAB06100-R

New

Motorized goniometer Stage

- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

Ball Screw

Worm Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

New Motorized Stage

X
XY
Z
Horizontal Z
XYZ

Goniometer
Rotary
Unit
Controller

Ball Screw

Worm Gear

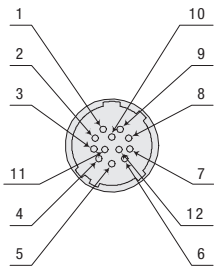
φ40
φ50
φ60
φ70
φ80
φ100
φ120
Other

Electrical specification

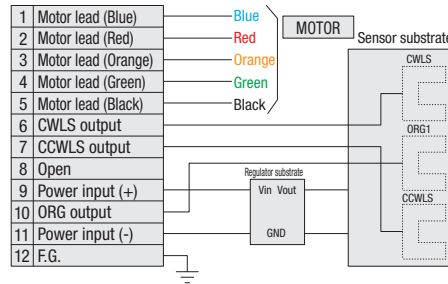
Model		KGB06050-L	KGB06075-L	KGB06100-L	KGB06125-L	KAB06050-L	KAB06075-L	KAB06100-L
Opposite hand		KGB06050-R	KGB06075-R	KGB06100-R	KGB06125-R	KAB06050-R	KAB06075-R	KAB06100-R
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co.,Ltd.)						
	Model (*2)	C005C-90215P						
	Step angle	0.72°						
Connector	Model	HR10A-10J-12P (73) (Hirose Electric Co.,Ltd.)						
	Applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co.,Ltd.)						
Sensor	Limit sensor	Installed						
	Origin sensor	Installed						
	Slit origin sensor	-						
	Model	Photo microsensor EE-SX4320 (Omron Co.,Ltd.)						
	Power voltage	DC5~24V ±10%						
	Consumption current	Total 60mA or less						
	Control output	NPN open collector output DC5~24V 8mA or less Residual voltage 0.3V or less when the load current is 2mA						
Output logic	On detection (light shield condition): Output transistor OFF (Non-continuity)							

*1 See page P.1-213~ for details of single motor specification.
*2 Model is our own management model.

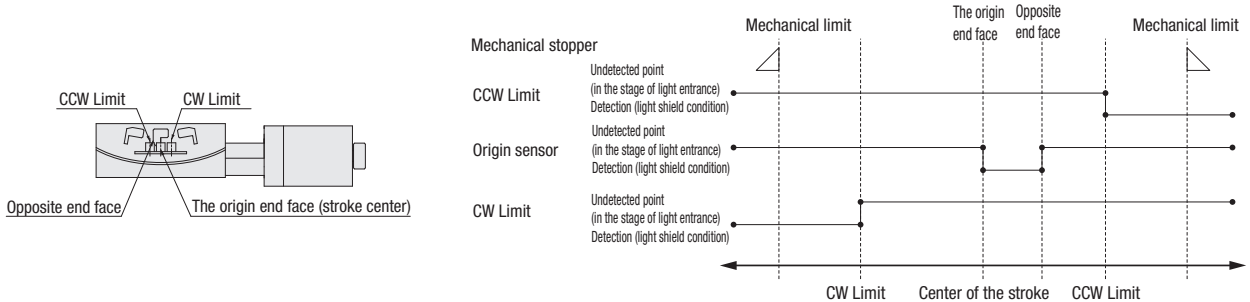
Pin allocation



Connection diagram



Timing chart



Unit [deg.]	Reference coordinate	Direction of CW ← → Direction of CCW			
		CW Limit	The origin end face Stroke center	Opposite end face	CCW Limit
KGB06050	Return to origin	8.7	0	2.5	8.7
KGB06075	Return to origin	5.7	0	1.8	5.7
KGB06100	Return to origin	5.2	0	1.4	5.2
KGB06125	Return to origin	4.2	0	1.1	4.2

* Return to origin means that is performed return to origin type 4 using DS102/DS112 series.
* The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 deg.

Note: The timing chart shows only timing of sensor, it is not for output signal logic.
Refer to ON/OF display of output transistor that shows on electrical specifications-sensor-output logic for output signal logic.

Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly.

Set to the way of recommendation return origin when using our controller.

KGB06/KAB06 recommended return to origin Return to origin sequence P.1-201~

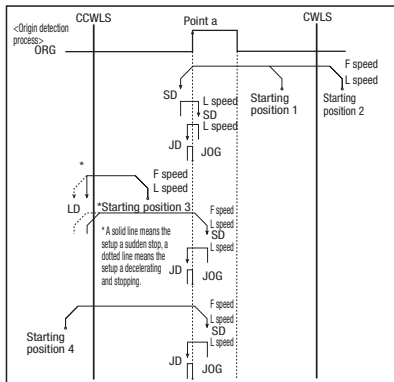
Type 3: Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.

Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.

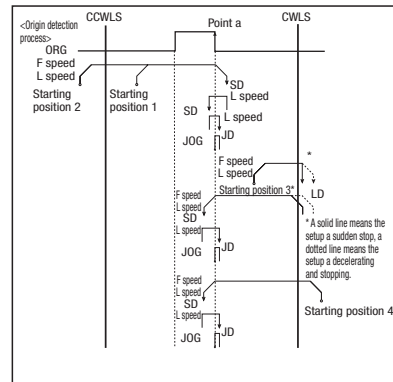
Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.

Type 10: After finished Type4, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

Driver P.1-205~

DC24 type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

Controller P.1-197~

Input power	General-purpose input/ output port	Driver type	
		Full/Half	1~1/250[16 steps]
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO



DS112/102

Ball Screw Type Sinemotion Goniometer Stage □70: KGB07/KAB07

■ 1-axis
KGB07070AL (KGB07 series)



■ 2-axis
KAB07070AL (AB07 series)



High precision goniometer stages with ball bearings.
This is ideal for driving a minute angle repeatability

■ Configuration 2-axis
Combination of 1-axis stage that is different center of each rotation.

Model Selection code Option code

K **GB07070** □ □ - □ □

1 2 3 4 5

▶ Cable P.1-207~
▶ Electrical specification P.1-147~

1 Axis

G	1-axis
A	2-axis

2 Height of center rotation (W.D)

070	70mm
096	96mm
122	122mm

* KAB07 is available only for W.D70, 90mm.

3 Sensor logic

Type	CWLS	ORG1	CCWLS	ORG2
A	NC	NC	NC	NO
B	NO	NO	NO	
C	NC	NO	NC	

4 Sensor cover location specification

Code	Specification
L	L position
R	Opposite hand

5 Cable option

Code	Specification	Cable type
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Robot cable 2m	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable 4m	D214-2-4R
J	Robot cable 4m one end loose	D214-2-4RK
Blank	Cable is not included (Standard)	—

* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page ▶ P.1-207, 209~ for details of cable.

* Please select "Code A, C, F or H" when connect with stepping motor controller(DS102/112).

SPEC

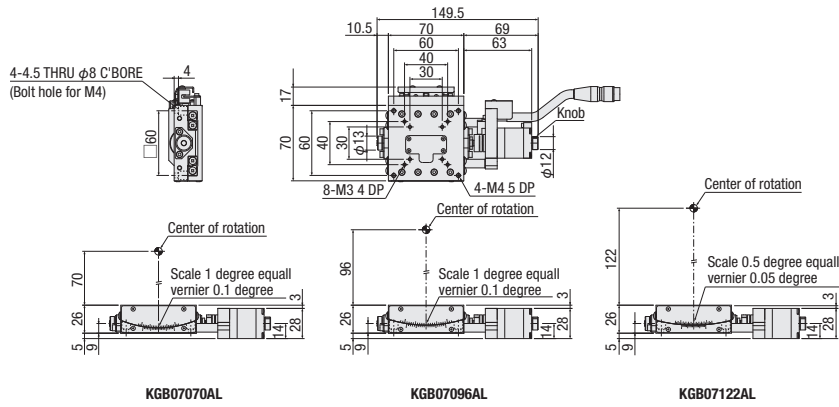
Number of axis		1-axis			2-axis		
Model		KGB07070AL	KGB07096AL	KGB07122AL	KAB07070AL	KAB07096AL	
(Opposite hand)		KGB07070AR	KGB07096AR	KGB07122AR	KAB07070AR	KAB07096AR	
Mechanical specification	Travel length Upper/Lower axis	±5°	±4°	±3°	±5°/±4°	±4°/±3°	
	Table size	70×70mm					
	Travel mechanism	Ball screw φ6 lead 1					
	Guide	Crossed roller guide					
Universal items	Main materials-Finishing	Aluminum—White almite finish					
	Weight	0.7kg			1.4kg		
	Height of stage	26±0.2mm			52±0.4mm		
Accuracy specification	Height of center rotation	70±0.2mm	96±0.2mm	122±0.2mm	70±0.4mm	96±0.4mm	
	Runout accuracy of center rotation	Within 0.01mm					
	Resolution (Pulse)	Upper at the full	≒0.0015°	≒0.0011°	≒0.0009°	≒0.0015°	≒0.0011°
		Lower at the full				≒0.0011°	≒0.0009°
	MAX speed	Upper	23°/sec [15kHz]	17°/sec [15kHz]	13°/sec [15kHz]	23°/sec [15kHz]	17°/sec [15kHz]
Lower					17°/sec [15kHz]	13°/sec [15kHz]	
Repeatability positioning accuracy	Within ±0.003°						
Sensor	Load capacity	5kgf [49N]			4kgf [39.2N]		
	Moment stiffness	Pitch 0.28/yaw 0.06/roll 0.06 ["/N·cm]			Pitch 0.34/yaw 0.12/roll 0.34 ["/N·cm]		
	Lost motion	Within 0.003°					
Provided screw (Hexagon-headed bolt)	Limit sensor	Installed					
	Origin sensor	Installed					
	Slit origin sensor	Installed					
Provided screw (Hexagon-headed bolt)		4 of M4—8					

* See page ▶ P.1-140 if you require exact calculations.

* The MAX speed becomes the theory speed at the time of the 15kHz drive for the traveling pulse of the full stroke.

Dimensional outline drawings

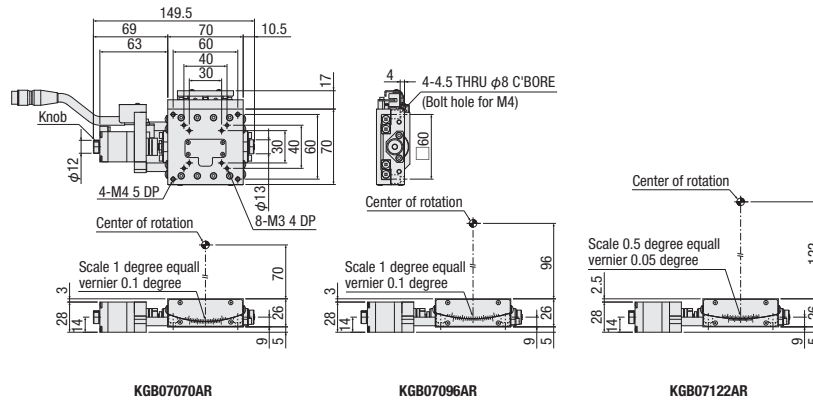
KGB07-L series



Motorized goniometer
Stage

- X
- XY
- Z
- Horizontal Z
- XYZ

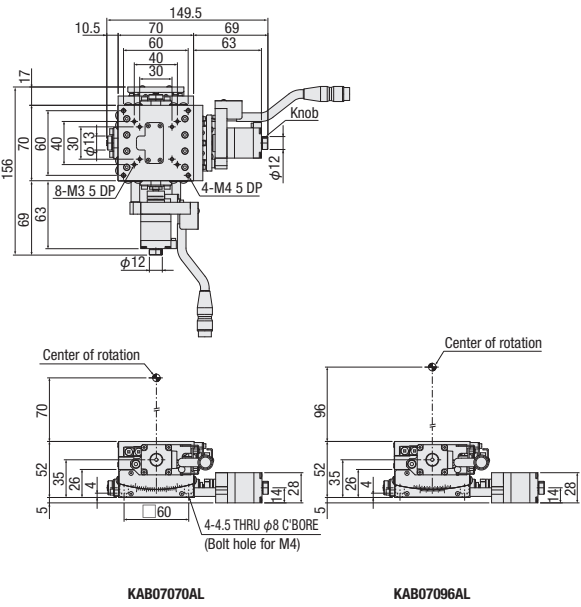
KGB07-R series



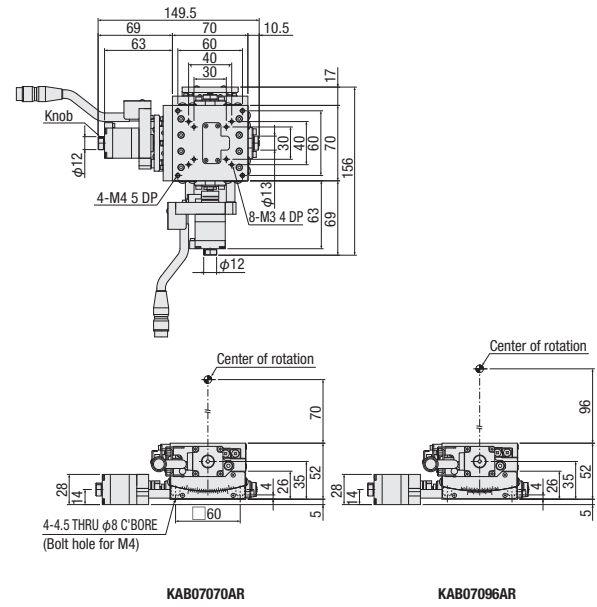
- Goniometer
- Rotary
- Unit
- Controller

Dimensional outline drawings

KAB07-L series



KAB07-R series



Ball Screw

Worm Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Electrical Specification • Option: KGB07/KAB07

Motorized goniometer
Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

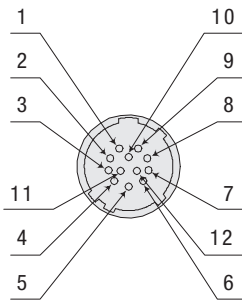
Electrical specification

Model	KGB07070AL KGB07070AR	KGB07096AL KGB07096AR	KGB07122AL KGB07122AR
Opposite hand			
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co.,Ltd.)	
	Model (*2)	C005C-90215P	
	Step angle	0.72°	
Connector	Model	HR10A-10J-12P (73) (Hirose Electric Co.,Ltd.)	
	Applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co.,Ltd.)	
Sensor	Limit sensor	Installed	
	Origin sensor (ORG1)	Installed	
	Slit origin sensor (ORG2)	Installed	
	Model	Photo microsensor: EE-SX398 (Omron Co.,Ltd.)、EE-SX498 (Omron Co.,Ltd.) : Limit • Origin sensor Photo microsensor: PM-F25 (Opposite hand PM-R25) (Panasonic Industrial Devices SUNX) : Slit origin sensor	
	Power voltage	DC5~24V ±10%	
	Consumption current	100mA or less	
	Control output	EE-SX398、EE-SX498: NPN open collector output DC5~24V 16mA or less Residual voltage 0.4V or less when the load current is 16mA PM-F25 (Opposite hand PM-R25) : NPN open collector output DC30V or less 50mA or less Residual voltage 1V or less when the load current is 16mA Residual voltage 2V or less when the load current is 50mA	
Output logic	EE-SX398: On detection (light shield condition): Output transistor ON (Continuity) EE-SX498: On detection (light shield condition): Output transistor OFF (Non-continuity) PM-F25 (R25) : On detection (light shield condition) : Output transistor ON (Continuity)		

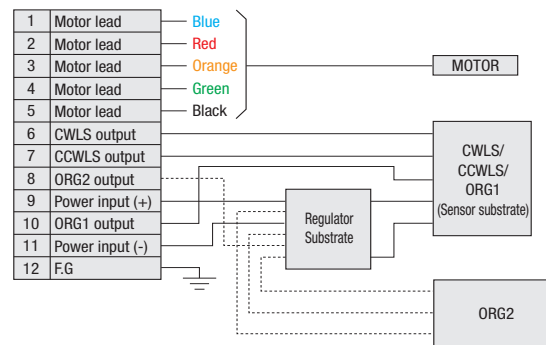
*1 See page P.1-213~ for details of single motor specification.

*2 Model is our own management model.

Pin allocation



Connection diagram



70 goniometer sensor logic

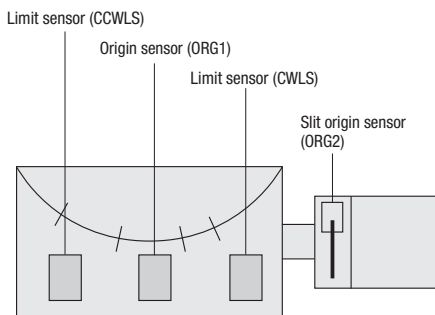
Type	CWLS	ORG1	CCWLS	ORG2
A	NC EE-SX498	NC EE-SX498	NC EE-SX498	NO PM-F25 (Opposite hand PM-R25)
B	NO EE-SX398	NO EE-SX398	NO EE-SX398	
C	NC EE-SX498	NO EE-SX398	NC EE-SX498	

*Upper: Sensor logic
Lower: Using sensor

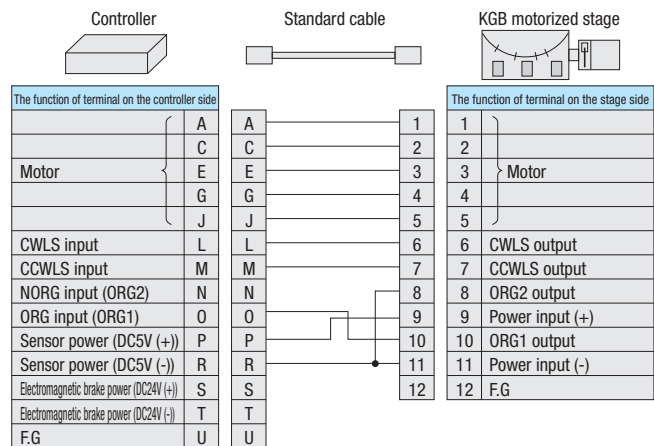
*Broken line area does not work when use standard cable

Built-in sensor

■ KGB series has built-in sensors such as below.



■ The connecting diagram that connected to our controller using standard attached cable is shown as below.



The CWLS (pin#6) and CCWLS (pin#7) on the motorized stage side are connected to CWLS (Lpin) and CCWLS (Mpin) of controller as usual. However ORG2 output (Pin#8) is connected to DC5V (-) and ORG1 output (pin#10) will be connected to ORG. In other words, the sensor of ORG2 does not work on this wire connection, only ORG1 sensor is recognized by the controller as origin signal. As a result, return to origin should be done without the slit origin sensor as same as function of motorized stages that have only three sensors (CWLS, CCWLS and ORG).

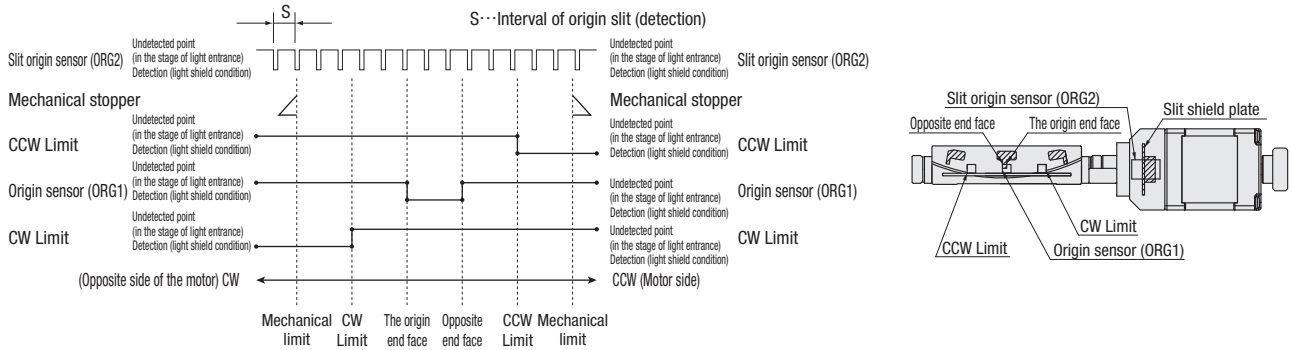
● Available the correspondence cable for a slit origin sensor (ORG2)! *See page P.1-207 for details.

This series are included four sensors as standard. In case of using four sensors with slit origin sensor (ORG2), you need the cable for four sensors.

Also please note that the type is different from recommendation return to origin.

When use all of 4 sensors, please select the cable for 4 sensors from page P.1-207~.

Timing chart



Unit [deg]	Direction of CW ← → Direction of CCW					
	Detection clearance of slit origin S	Reference coordinate	CW Limit	Origin	Opposite end face	CCW Limit
KGB07070A	0.8	Return to origin	5.3	0	2.1	5.3
KGB07096A	0.6	Return to origin	4.2	0	1.5	4.2
KGB07122A	0.5	Return to origin	3.2	0	1.3	3.2

* Return to origin means that is performed return to origin Type 4 using DS102/DS112 series. * The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 deg.

Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly. Set to the way of recommendation return origin when using our controller.

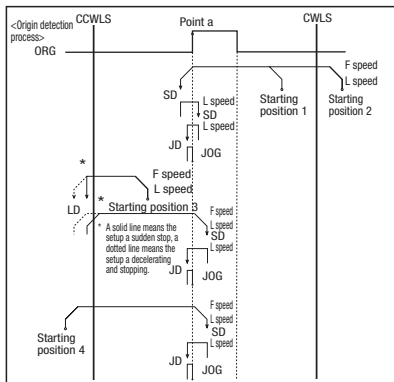
KGB07/KAB07 recommended return to origin Return to origin sequence P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.
- Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.
- Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.
- Type 10: After finished Type4, perform detected process for CW edge of TIMING signal.

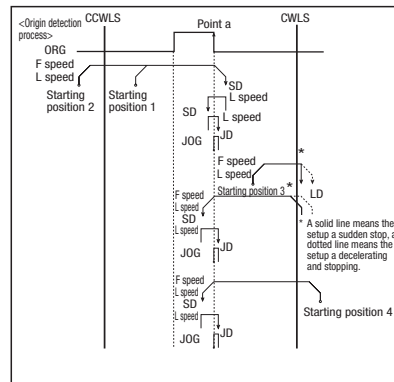
Select return to origin type from the followings when use the slit origin sensor (ORG2).

- Type 1: Detect in the direction of CCW and perform detected process for CW edge (point a) of NORG signal. Next detect an edge of CCW side (point b) of ORG signal.
- Type 2: Detect in the direction of CW and perform detected process for CCW edge of NORG signal. Next detect on edge of CW side (point b) of ORG signal.
- Type 7: After finished type1, perform detected process for CCW edge of TIMING signal.
- Type 8: After finished type2, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

Driver P.1-205~

DC24 type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

Controller P.1-197~

Input power	General-purpose input/output port	Driver type	
		Full/Half	1~1/250 (16 steps)
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO



- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

- Ball Screw
- Worm Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Goniometer Stage □40: KGW04/KAW04

■ 1-axis
KGW04040 (KGW04 series)



■ 2-axis
KAW04040 (KAW04 series)



RoHS

Can be used for KGW
See page P.009

- Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism.
- Configuration 2-axis
Combination of 1-axis stage that is different center of rotation.



☉ Cable P.1-207~
☉ Electrical specification P.1-151~

1 Axis

G	1-axis
A	2-axis

2 Table size

04	□40mm
----	-------

3 Height of center rotation (W.D)

040	40mm
060	60mm

* 2-axis [A] is available for only 040.

4 Sensor cover location specification

Code	Specification
L	L position
R	Opposite hand

5 Cable option

Code	Specification	Cable type
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Robot cable 2m	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable 4m	D214-2-4R
J	Robot cable 4m one end loose	D214-2-4RK
Blank	Cable is not included (Standard)	—

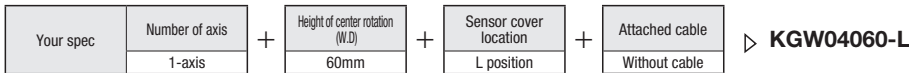
* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page ☉ P.1-207, 209~ for details of cable.

* Please select "Code A, C, F or H" when connect with stepping motor controller(DS102/112).

Selection Example



		SPEC		
Number of axis		1-axis		2-axis
Model		KGW04040-L	KGW04060-L	KAW04040-L
(Opposite hand)		KGW04040-R	KGW04060-R	KAW04040-R
Mechanical specification	Travel length Upper/Lower axis	±8°		±8°/±6°
	Table size	40×40mm		
	Travel mechanism	Worm gear (1/240)		
	Guide	Crossed roller guide		
Main materials-Finishing	Aluminum—Black almite finishing, Brass black coating			
Weight	0.4kg		0.8kg	
Dimensional tolerance	Height of stage	20±0.2mm		40±0.4mm
	Height of center rotation	40±0.2mm	60±0.2mm	40±0.4mm
	Runout accuracy of center rotation	Within 0.01mm		—
Accuracy specification	Resolution/Pulse	0.003° (Full)		
	MAX speed	15°/sec [5kHz]		
	Repeatability positioning accuracy	Within ±0.005°		
	Load capacity	3kgf [29.4N]		2.5kgf [24.5N]
	Moment stiffness	Pitch 1.30/yaw 1.16/roll 0.27 ["/N · cm]		Pitch 1.57/yaw 2.32/roll 1.57 ["/N · cm]
Sensor	Lost motion	Within 0.01°		
	Limit sensor	Installed		
	Origin sensor	Installed		
	Slit origin sensor	—		
Provided screw (Hexagon-headed bolt)	4 of M3—6			

Motorized goniometer Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

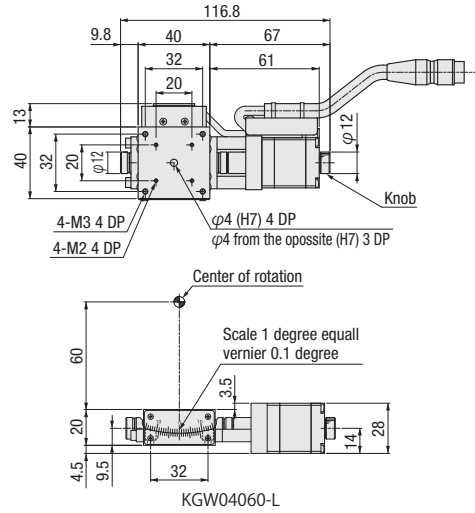
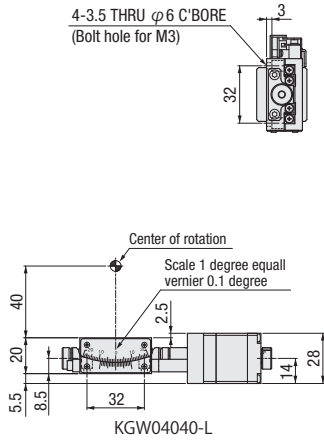
φ100

φ120

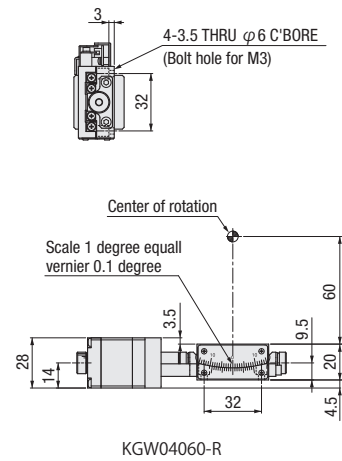
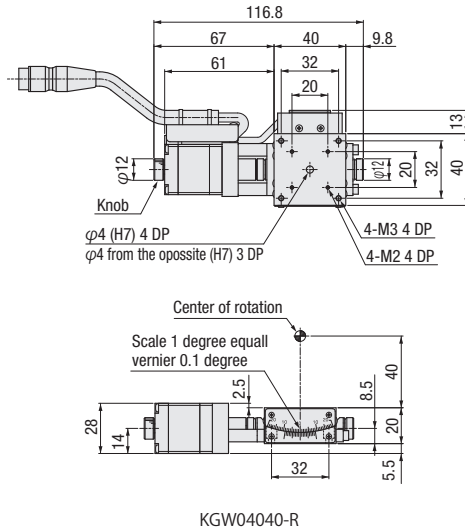
Other

Dimensional outline drawings

KGW04-L series

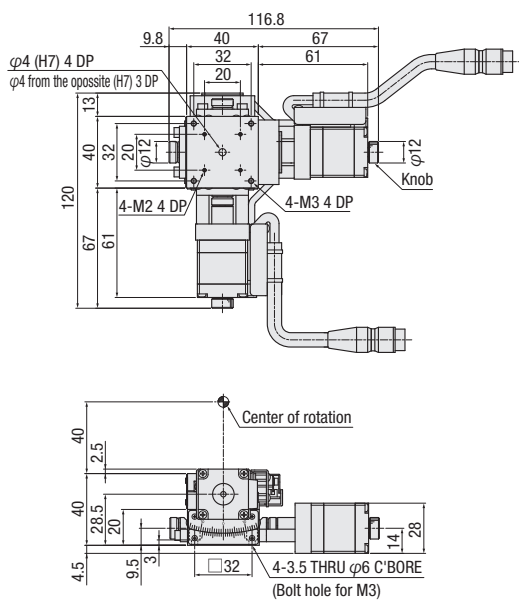


KGW04-R series

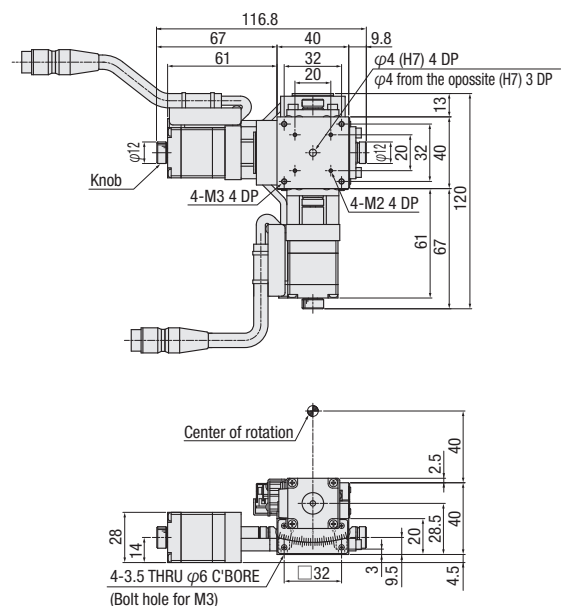


Dimensional outline drawings

KAW04040-L



KAW04040-R



Motorized goniometer
Stage

X

XY

Z

Horizontal
Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball
Screw

Worm
Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

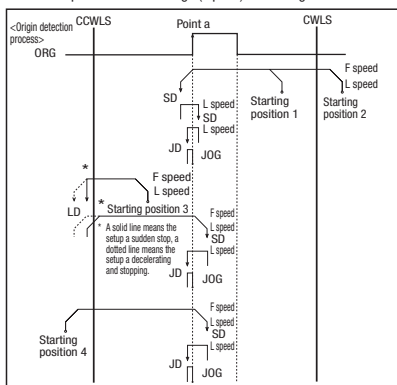
Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly.
 Set to the way of recommendation return origin when using our controller.

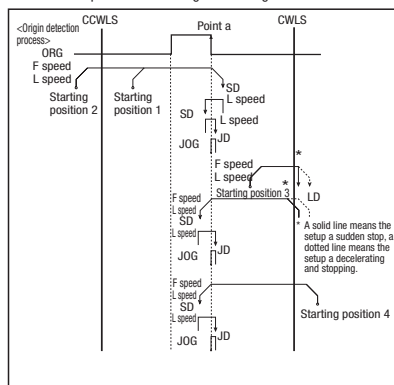
■ KGW04/KAW04 recommended return to origin Return to origin sequence ▶P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.
- Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.
- Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.
- Type 10: After finished Type4, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

■ Driver ▶P.1-205~

DC24 type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

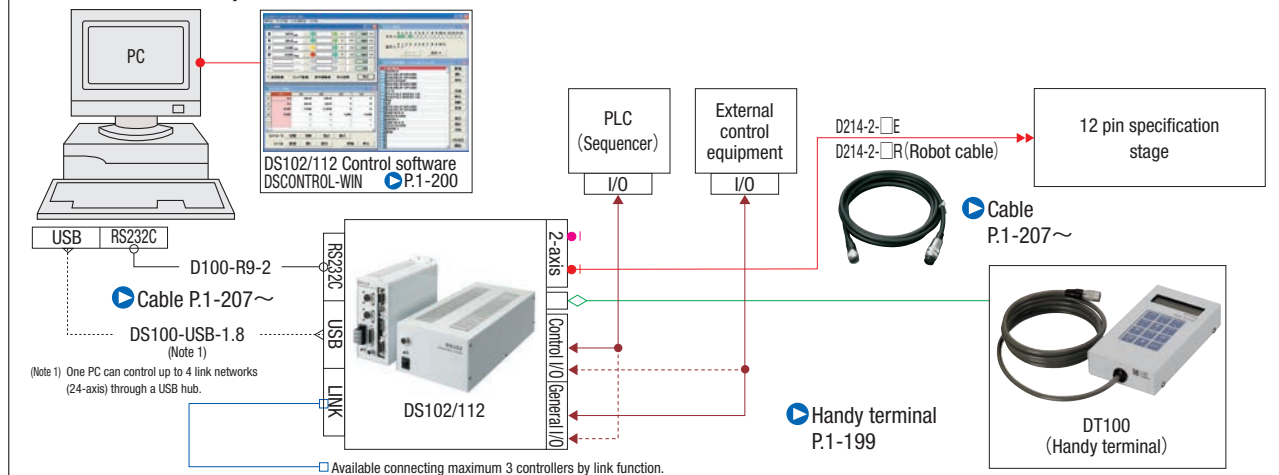
Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

■ Controller ▶P.1-197~

Input power	General-purpose input/output port	Driver type	
		Full/Half	1~1/250 (16 steps)
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO

■ Connection example



- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

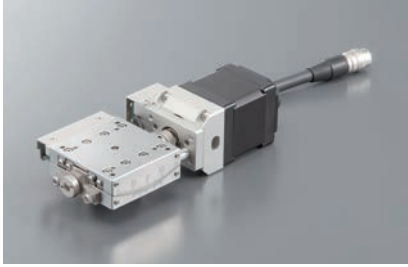
Ball
Screw

Worm
Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Goniometer Stage □50: KG05/KA05

1-axis
KG05-W050A (KG05-W series)



2-axis
KA05-W068A (KA05-W series)



RoHS

Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism.

Configuration 2-axis
Combination of 1-axis stage that is different center of rotation.

Model Selection code Option code

K **G05-W050A** **□** **-5**

1 2 3 4

☑ Cable P.1-207~
☑ Electrical specification P.1-155~

1 Axis

G	1-axis
A	2-axis

2 Height of center rotation (W.D)

050	50mm
068	68mm
086	86mm

*2 Unselectable 086 for 2-axis

3 Sensor cover location specification

Code	Specification
Blank	L position
R	Opposite hand

4 Cable option

Code	Specification	Cable type
Blank	2m	D214-2-2E
1	2m One end loose	D214-2-2EK
2	4m	D214-2-4E
3	4m One end loose	D214-2-4EK
4	Only connector (Cable is not included)	—
5	Cable is not included (Standard)	—
6	Robot cable 2m	D214-2-2R
7	Robot cable 4m	D214-2-4R
8	Robot cable 4m one end loose	D214-2-4RK
9	Robot cable 2m one end loose	D214-2-2RK

* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page P.1-207, 209~ for details of cable.

* Please select "blank, 2, 6 and 7" when connect with stepping motor controller(DS102/112).

Selection Example

Your spec

Number of axis	2-axis
----------------	--------

+

Height of center rotation (W.D)	86mm
---------------------------------	------

+

Sensor cover location	Opposite hand
-----------------------	---------------

+

Attached cable	2m
----------------	----

▷ **KA05-W068AR**

		SPEC					
		1-axis		2-axis			
Number of axis							
Model		KG05-W050A-5	KG05-W068A-5	KG05-W086A-5	KA05-W050A-5	KA05-W068A-5	
(Opposite hand)		KG05-W050AR-5	KG05-W068AR-5	KG05-W086AR-5	KA05-W050AR-5	KA05-W068AR-5	
Mechanical specification	Travel length Upper/Lower axis	±10°	±8°	±6°	±10°/±8°	±8°/±6°	
	Table size	50×50mm					
	Travel mechanism (Reduction ratio)	Upper	Worm gear (1/231)	Worm gear (1/300)	Worm gear (1/375)	Worm gear (1/231)	Worm gear (1/300)
		Lower				Worm gear (1/300)	Worm gear (1/375)
Guide		Crossed roller guide					
Main materials-Finishing		Aluminum—White almite finish、Brass—Nickel chrome plating					
Weight		0.75kg			1.5kg		
Dimensional tolerance	Height of stage	18±0.2mm		36±0.4mm			
	Height of center rotation	50±0.2mm	68±0.2mm	86±0.2mm	50±0.4mm	68±0.4mm	
	Runout accuracy of center rotation	Within 0.01mm					
Accuracy specification	Resolution/Pulse	Upper at the full	0.001559°	0.0012°	0.00096°	0.001559°	0.0012°
		Lower at the full				0.0012°	0.00096°
	MAX speed	Upper	7.8°/sec [5kHz]	6°/sec [5kHz]	4.8°/sec [5kHz]	7.8°/sec [5kHz]	6°/sec [5kHz]
		Lower				6°/sec [5kHz]	4.8°/sec [5kHz]
	Repeatability positioning accuracy	Within ±0.005°					
Load capacity	3kgf [29.4N]			2.3kgf [22.5N]			
Moment stiffness	Pitch 0.42°/yaw 0.16°/roll 0.23 ["/N · cm]				Pitch 0.65°/yaw 0.32°/roll 0.65 ["/N · cm]		
Lost motion	Within 0.01°						
Sensor	Limit sensor	Installed					
	Origin sensor	Installed					
	Slit origin sensor	Installed					
	Provided screw (Hexagon-headed bolt)	4 of M3-6					

Motorized goniometer stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

1

153

Electrical Specification: KG05/KA05

Motorized goniometer
Stage

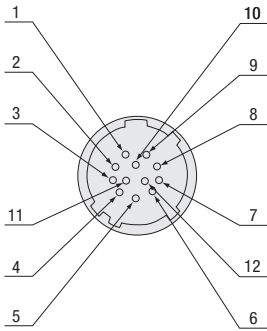
Electrical specification

Model		KG05-W050A	KG05-W068A	KG05-W086A
Opposite hand		KG05-W050AR	KG05-W068AR	KG05-W086AR
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co.,Ltd.)		
	Model (*2)	C9582-9015-1		
	Step angle	0.36°		
Connector	Model	HR10A-10J-12P (73) (Hirose Electric Co.,Ltd.)		
	Applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co.,Ltd.)		
Sensor	Limit sensor	Installed		
	Origin sensor (ORG1)	Installed		
	Slit origin sensor (ORG2)	Installed		
	Model	Photo microsensor: EE-SX4320 (Omuron Co.,Ltd.) : Limit • Origin sensor (ORG1) Photo microsensor: PM-L25 (Panasonic Industrial Devices SUNX) : Slit origin sensor (ORG2)		
	Power voltage	DC5~24V ±10%		
	Consumption current	100mA or less		
	Control output	EE-SX4134: NPN open collector output DC5~24V 8mA or less Residual voltage 0.4V or less when the load current is 8mA PM-L25: NPN open collector output DC30V or less 50mA or less Residual voltage 1V or less when the load current is 16mA Residual voltage 2V or less when the load current is 50mA		
Output logic	EE-SX4134: On detection (light shield condition): Output transistor OFF (Non-continuity) PM-L25: On detection (light shield condition) : Output transistor ON (Continuity)			

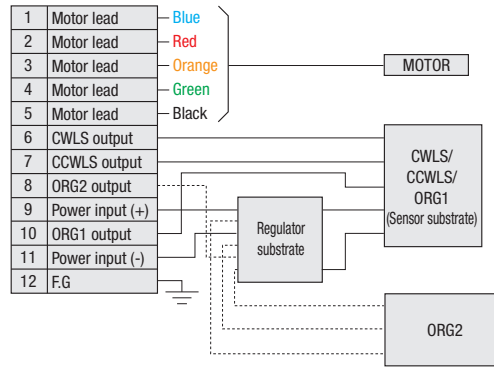
*1 See page P.1-213~ for details of single motor specification.

*2 Model is our own management model.

Pin allocation



Connection diagram



50 goniometer sensor logic

Type	CWLS	ORG1	CCWLS	ORG2
A	NC EE-SX4134	NC EE-SX4134	NC EE-SX4134	NO PM-L25

* Upper: Sensor logic

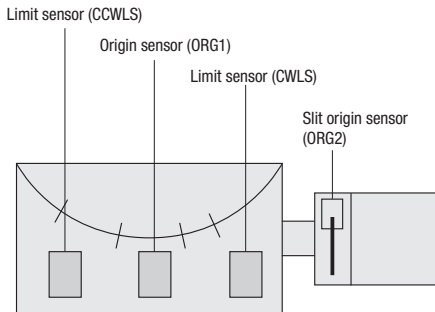
Lower: Using sensor

Note: Only 50 goniometer stage sensor logic

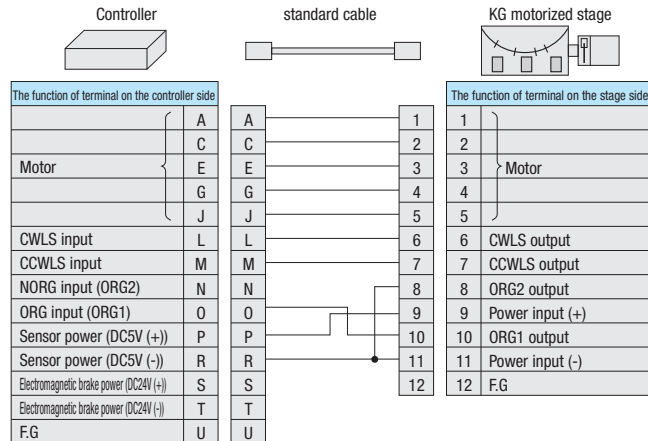
* Broken line area does not work when use standard cable.
It works with slit origin sensor cable.

Built-in sensor

KG series has built-in sensors such as below.



The connecting diagram that connected to our controller using standard attached cable is shown as below.



The CWLS (pin#6) and CCWLS (pin#7) on the motorized stage side are connected to CWLS (Lpin) and CCWLS (Mpin) of controller as usual. However ORG2 output (Pin#8) is connected to DC5V (-) and ORG1 output (pin#10) will be connected to ORG. In other words, the sensor of ORG2 does not work on this wire connection, only ORG1 sensor is recognized by the controller as origin signal. As a result, return to origin should be done without the slit origin sensor as same as function of motorized stages that have only three sensors (CWLS, CCWLS and ORG).

Available the correspondence cable for a slit origin sensor (ORG2)! See page P.1-207 for details.

This series are included four sensors as standard. In case of using four sensors with slit origin sensor (ORG2), you need the cable for four sensors. Also please note that the type is different from recommendation return to origin.

When use all of 4 sensors, please select the cable for 4 sensors from page P.1-207~.

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

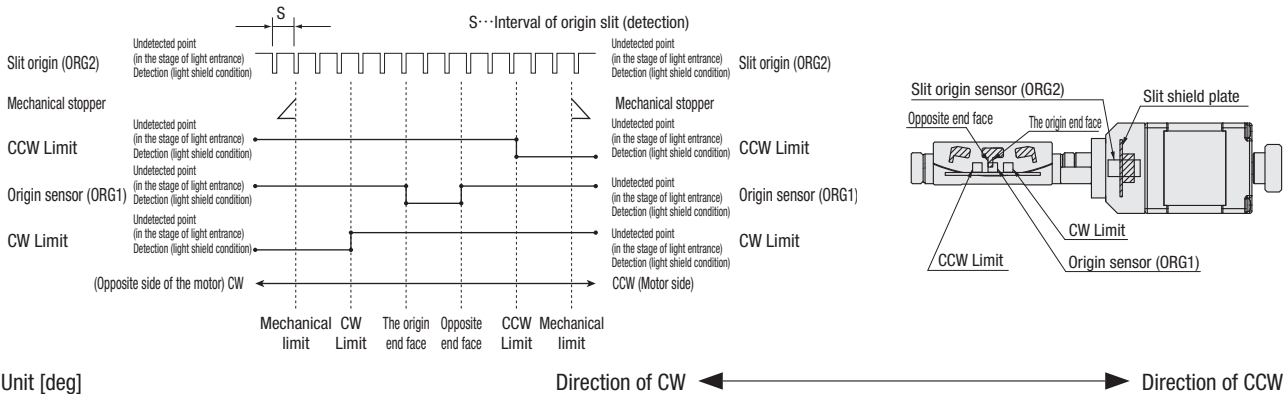
φ80

φ100

φ120

Other

Timing chart



Unit [deg]	Detection clearance of slit origin S	Reference coordinate	CW Limit	Origin	Opposite end face	CCW Limit
KG05-W050A	1.6	Return to origin	10.3	0	1.9	10.3
KG05-W068A	1.2	Return to origin	8.3	0	1.5	8.3
KG05-W086A	1.0	Return to origin	6.3	0	1.2	6.3

* Return to origin means that is performed return to origin Type 4 using DS102/DS112 series.
 * The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 deg.

Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly. Set to the way of recommendation return origin when using our controller.

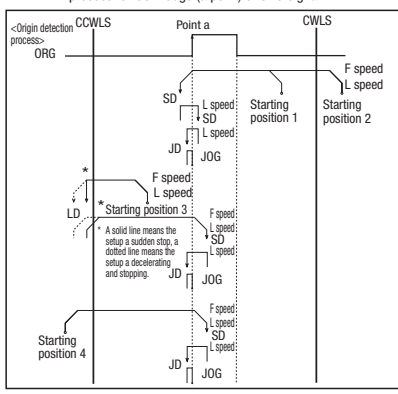
KG05/KA05 recommended return to origin Return to origin sequence P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.
- Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.
- Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.
- Type 10: After finished Type4, perform detected process for CW edge of TIMING signal.

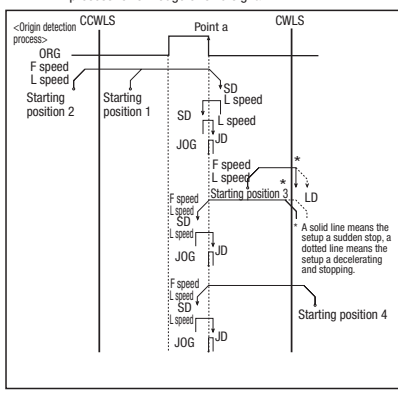
Available the correspondence cable for a slit origin sensor (ORG2)! * Select return origin method as below

- Type 1: Detect in the direction of CCW and perform detected process for CW edge (point a) of NORG signal. Next detect an edge of CCW side (point b) of ORG signal.
- Type 2: Detect in the direction of CW and perform detected process for CCW edge of NORG signal. Next detect on edge of CW side (point b) of ORG signal.
- Type 7: After finished type1, perform detected process for CCW edge of TIMING signal.
- Type 8: After finished type2, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

Driver P.1-205~

DC24V type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

Controller P.1-197~

Input power	General-purpose input/output port	Driver type	
		Full/Half	1~1/250 (16 steps)
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO



DS112/102

Motorized Stage

Goniometer Stage □60: KGW06 (1-axis)

1-axis
KGW06050 (KGW06 series)



Freely
customize
the motor

RoHS

See page P.009

Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism.

Model Selection code Option code
KGW06050-
1 2 3 4

Cable P.1-207~

Electrical specification P.1-161~

1 Table size

06	□60mm
----	-------

2 Height of center rotation (W.D)

050	50mm
075	75mm
100	100mm
125	125mm

3 Sensor cover location specification

Code	Specification
L	L position
R	Opposite hand

4 Cable option

Code	Specification	Cable type
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Robot cable 2m	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable 4m	D214-2-4R
J	Robot cable 4m one end loose	D214-2-4RK
Blank	Cable is not included (Standard)	—

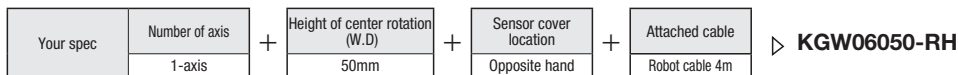
* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page P.1-207, 209~ for details of cable.

* Please select "Code A, C, F or H" when connect with stepping motor controller(DS102/112).

Selection Example



SPEC

	1-axis			
	KGW06050-L	KGW06075-L	KGW06100-L	KGW06125-L
Number of axis				
Model	KGW06050-L	KGW06075-L	KGW06100-L	KGW06125-L
(Opposite hand)	KGW06050-R	KGW06075-R	KGW06100-R	KGW06125-R
Mechanical specification				
Travel length	±10°	±8°	±6°	±5°
Table size	60×60mm			
Travel mechanism (Reduction ratio)	Worm gear (1/160)	Worm gear (1/225)	Worm gear (1/292)	Worm gear (1/360)
Guide	Crossed roller guide			
Main materials-Finishing	Aluminum—Black almite finishing			
Weight	0.5kg			
Dimensional specification				
Height of stage	25±0.2mm			
Height of center rotation	50±0.2mm	75±0.2mm	100±0.2mm	125±0.2mm
Runout accuracy of center rotation	Within 0.01mm			
Accuracy specification				
Resolution/Pulse	0.0045° (Full)	0.0032° (Full)	0.002466° (Full)	0.002° (Full)
MAX speed	22.5°/sec [5kHz]	16°/sec [5kHz]	12.5°/sec [5kHz]	10°/sec [5kHz]
Repeatability positioning accuracy	Within ±0.003°			
Load capacity	5kgf [49N]			
Moment stiffness	Pitch 0.30/yaw 0.10/roll 0.11 ["/N · cm]			
Lost motion	Within 0.01°			
Sensor				
Limit sensor	Installed			
Origin sensor	Installed			
Slit origin sensor	—			
Provided screw (Hexagon-headed bolt)	4 of M4—10			

Motorized goniometer

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

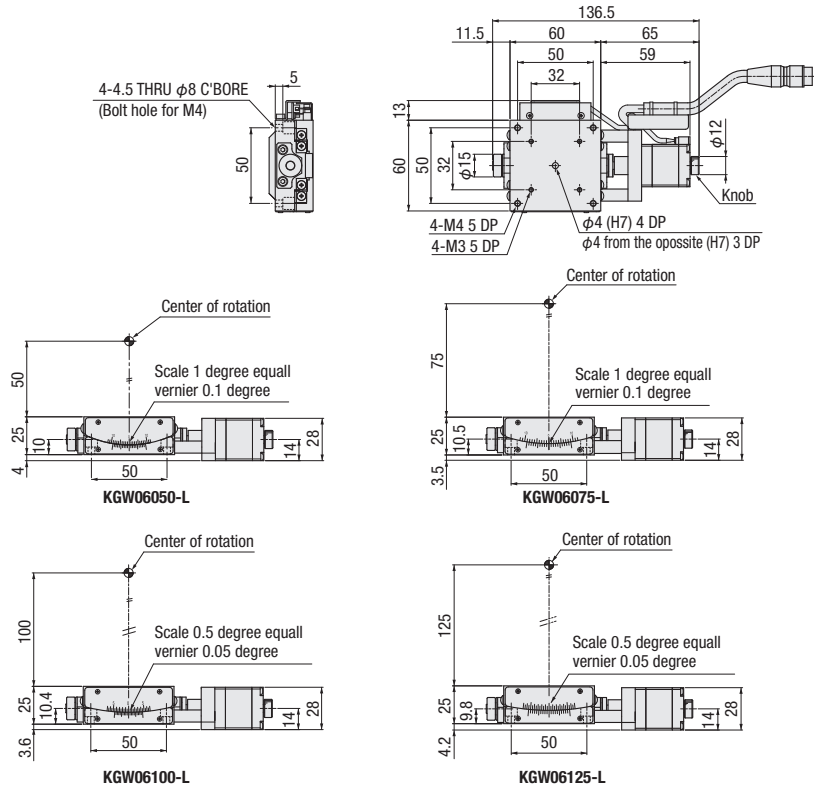
Ball Screw

Worm Gear

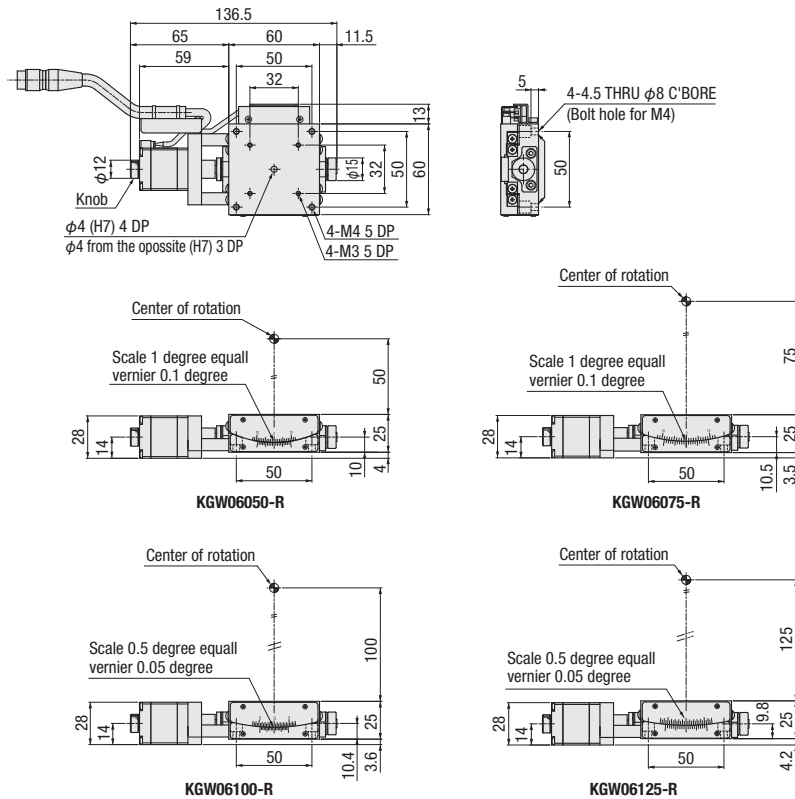
- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Dimensional outline drawings (1-axis)

KGW06-L series



KGW06-R series (Opposite hand)



Motorized Stage

Goniometer Stage □60: KAW06 (2-axis)

2-axis
KAW06075 (KAW06 series)



RoHS

- Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism.
- Configuration 2-axis Combination of 1-axis stage that is different center of rotation.

Model Selection code Option code
KAW06050-

1 2 3 4

ⓘ Cable P.1-207~
ⓘ Electrical specification P.1-161~

1 Table size

06	□60mm
----	-------

2 Height of center rotation (W.D)

050	50mm
075	75mm
100	100mm

3 Sensor cover location specification

Code	Specification
L	L position
R	Opposite hand

4 Cable option

Code	Specification	Cable type
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Robot cable 2m	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable 4m	D214-2-4R
J	Robot cable 4m one end loose	D214-2-4RK
Blank	Cable is not included (Standard)	—

* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page P.1-207, 209~ for details of cable.

* Please select "Code A, C, F or H" when connect with stepping motor controller(DS102/112).

Selection Example



SPEC

Number of axis		2-axis		
Model		KAW06050-L	KAW06075-L	KAW06100-L
(Opposite hand)		KAW06050-R	KAW06075-R	KAW06100-R
Mechanical specification	Travel length Upper/Lower axis	±10°/±8°	±8°/±6°	±6°/±5°
	Table size	60×60mm		
	Travel mechanism (Reduction ratio) Upper	Worm gear (1/160)	Worm gear (1/225)	Worm gear (1/292)
	Lower	Worm gear (1/225)	Worm gear (1/292)	Worm gear (1/360)
Guide		Crossed roller guide		
Main materials-Finishing		Aluminum—Black almite finishing		
Weight		1.0kg		
Dimensional tolerance	Height of stage	50±0.4mm		
	Height of center rotation	50±0.4mm	75±0.4mm	100±0.4mm
	Runout accuracy of center rotation	—		
Accuracy specification	Resolution/Pulse Upper at the full	0.0045°	0.0032°	0.002466°
	Lower at the full	0.0032°	0.002466°	0.002°
	MAX speed Upper	22.5°/sec [5kHz]	16°/sec [5kHz]	12.5°/sec [5kHz]
	Lower	16°/sec [5kHz]	12.5°/sec [5kHz]	10°/sec [5kHz]
	Repeatability positioning accuracy	Within ±0.005°		
	Load capacity	4.5kgf [44.1N]		
Moment stiffness		Pitch 0.41/yaw 0.2/roll 0.41 ["/N · cm]		
Lost motion		Within 0.01°		
Sensor	Limit sensor	Installed		
	Origin sensor	Installed		
	Slit origin sensor	—		
	Provided screw (Hexagon-headed bolt)	4 of M4—10		

Motorized goniometer Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

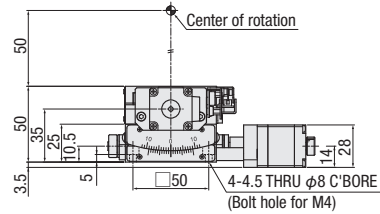
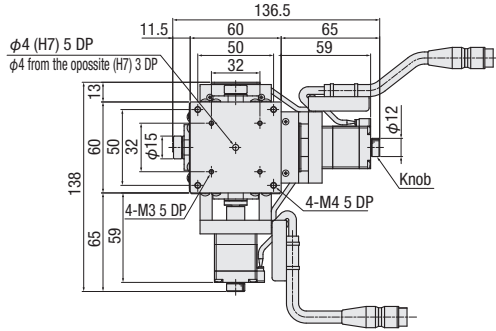
- Ball Screw

- Worm Gear

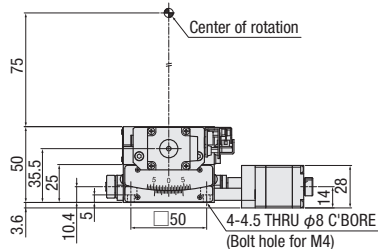
- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Dimensional outline drawings (2-axis)

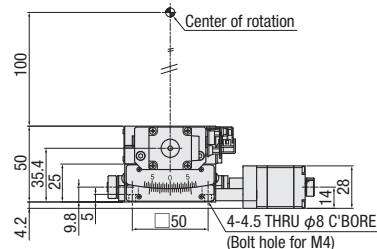
KAW06-L series



KAW06050-L

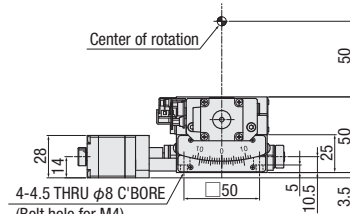
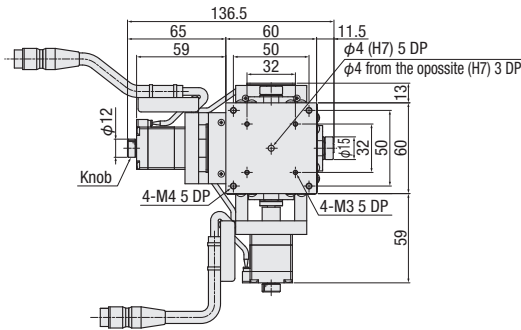


KAW06075-L

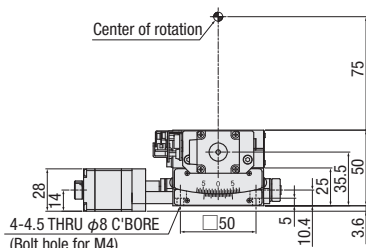


KAW06100-L

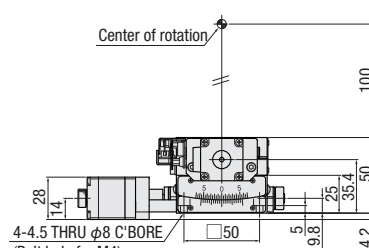
KAW06-R series(Opposite hand)



KAW06050-R



KAW06075-R



KAW06100-R

Motorized Stage

Electrical Specification: KGW06/KAW06

Motorized goniometer
Stage

Electrical specification

Model	KGW06050-L	KGW06075-L	KGW06100-L	KGW06125-L
Opposite hand	KGW06050-R	KGW06075-R	KGW06100-R	KGW06125-R
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co.,Ltd.)		
	Model (*2)	C005C-90215P		
	Step angle	0.72°		
Connector	Model	HR10A-10J-12P (73) (Hirose Electric Co.,Ltd.)		
	applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co.,Ltd.)		
Sensor	Limit sensor	Installed		
	Origin sensor	Installed		
	Slit origin sensor	-		
	Model	Photo microsensor EE-SX4320 (Omuron Co.,Ltd.)		
	Power voltage	DC5~24V ±10%		
	Consumption current	Total 60mA or less		
	Control output	NPN open collector output DC5~24V 8mA or less Residual voltage 0.3V or less when the load current is 2mA		
	Output logic	On detection (light shield condition): Output transistor OFF (Non-continuity)		

*1 See page P.1-213~ for details of single motor specification.

*2 Model is our own management model.

Available sensor DC5V~24V.

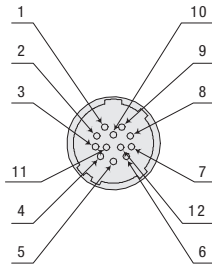
This stages have DC5V~24V correspondence sensor. 24V correspondence sensor amplifier substrate K-PCBA24 is not necessary.

It used to require the K-PCBA24 when the former products are driven by use of a motion control board or programmable logic controller (PLC) without our controller.

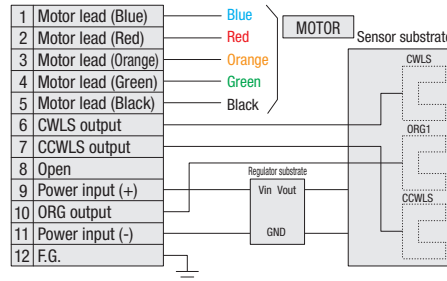
Note

Must be wired without sensor amplifier substrate when our customer who uses the former stages KS501-40, -60 and amplifier substrates will be replaced with KGW04 and 06 stages.
We have a variety of harness that can be jumped between input and output connector of sensor amplifier substrate for taking advantage of existing cables that using sensor amplifier substrate.

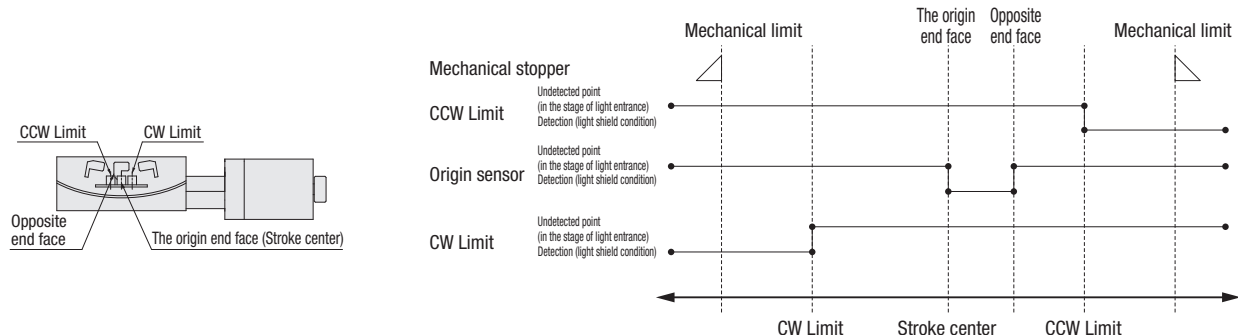
Pin allocation



Connection diagram



Timing chart



Unit [deg.]	Direction of CW	Reference coordinate	CW Limit	The origin end face Stroke center	Opposite end face	CCW Limit
φ40		Return to origin	10.5	0	2.5	10.5
φ50		Return to origin	8.3	0	1.8	8.3
φ60		Return to origin	6.3	0	1.4	6.3
φ70		Return to origin	5.2	0	1.1	5.2
φ80						
φ100						
φ120						
Other						

* Return to origin means that is performed return to origin type 4 using DS102/DS112 series.

* The coordinate is a basis of design value. Dimension error may occur about plus or minus 0.5 deg.

Note: The timing chart shows only timing of sensor, it is not for output signal logic.

Refer to ON/OFF display of output transistor that shows on electrical specifications-sensor-output logic for output signal logic.

X

XY

Z

Horizontal
Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball
Screw

Worm
Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

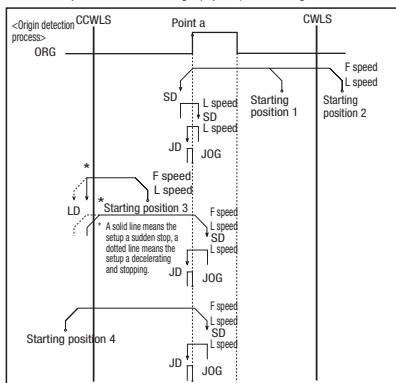
Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly. Set to the way of recommendation return origin when using our controller.

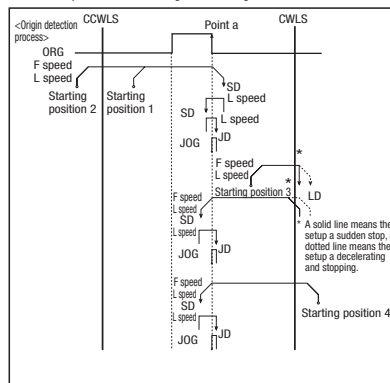
■ KGW06/KAW06 recommended return to origin Return to origin sequence ▶ P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge(a point) of ORG signal.
- Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.
- Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.
- Type10: After finished Type4, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

■ Driver ▶ P.1-205~

DC24 type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

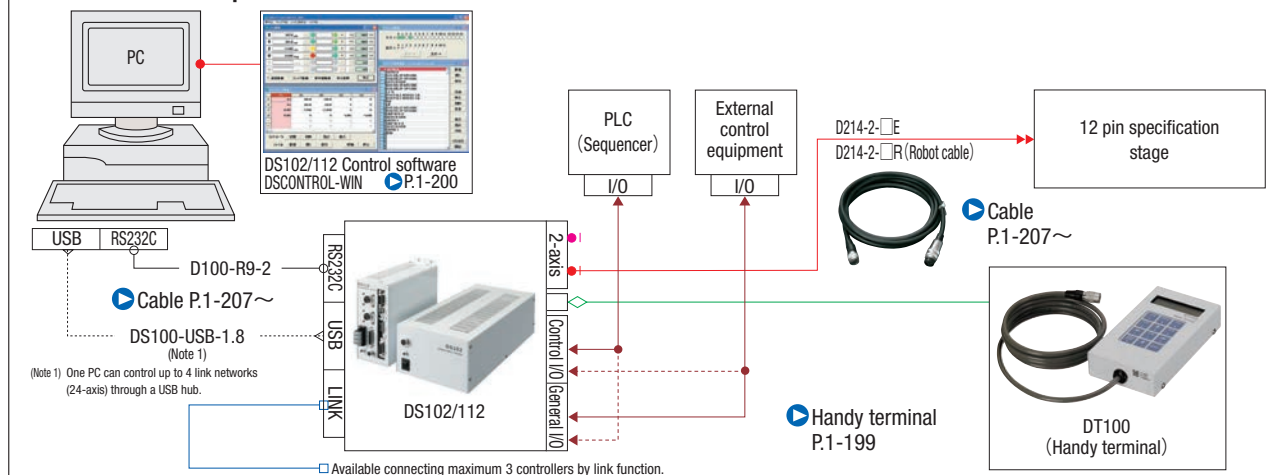
Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

■ Controller ▶ P.1-197~

Input power	General-purpose input/output port	Driver type	
		Full/Half	1~1/250 (16 steps)
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO

■ Connection example



- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

Ball
Screw

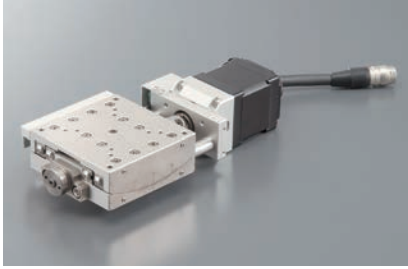
Worm
Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other

Motorized Stage

Goniometer Stage □70: KG07/KA07

1-axis
KG07-W070A (KG07-W series)



2-axis
KA07-W070A (KA07-W series)



RoHS

- Our high precision goniometer stages based on cross roller guide for travel guide and worm gear mechanism.
- 70°70mm has an additional sensor logic system.
- Configuration 2-axis
- Combination of 1-axis stage that is different center of rotation.

Model Selection code Option code

K **G07-W070** **-5**

1 2 3 4 5

☉ Cable P.1-207~
☉ Electrical specification P.1-161~

1 Axis

G	1-axis
A	2-axis

2 Height of center rotation (W.D)

070	70mm
096	96mm
122	122mm

* KA07 is only W.D70 and 90mm

3 Sensor logic

Type	CWLS	ORG1	CCWLS	ORG2
A	NC	NC	NC	NO
B	NO	NO	NO	
C	NC	NO	NC	

4 Sensor cover location specification

Code	Specification
Blank	L position
R	Opposite hand

5 Cable option

Code	Specification	Cable type
Blank	2m	D214-2-2E
1	2m One end loose	D214-2-2EK
2	4m	D214-2-4E
3	4m One end loose	D214-2-4EK
4	Only connector (Cable is not included)	—
5	Cable is not included (Standard)	—
6	Robot cable 2m	D214-2-2R
7	Robot cable 4m	D214-2-4R
8	Robot cable 4m one end loose	D214-2-4RK
9	Robot cable 2m one end loose	D214-2-2RK

* One end loose position to only stage opposite side.

* If you choose the option specification, please add the difference to standard price.

* See page P.1-207, 209~ for details of cable.

* Please select "blank, 2, 6 and 7" when connect with stepping motor controller(DS102/112).

Selection Example

Your spec

Number of axis	2-axis
----------------	--------

+

Height of center rotation (W.D)	96mm
---------------------------------	------

+

Sensor cover location	Opposite hand
-----------------------	---------------

+

Sensor logic	Absolutely NO
--------------	---------------

+

Attached cable	2m
----------------	----

▷ **KA07-W096BR**

		SPEC				
Number of axis		1-axis		2-axis		
Model		KG07-W070A-5	KG07-W096A-5	KG07-W122A-5	KA07-W070A-5	KA07-W096A-5
(Opposite hand)		KG07-W070AR-5	KG07-W096AR-5	KG07-W122AR-5	KA07-W070AR-5	KA07-W096AR-5
Mechanical specification	Travel length Upper/Lower axis	±9°	±7°	±5°	±9°/±7°	±7°/±5°
	Table size	70×70mm				
	Travel mechanism (Reduction ratio) Upper/Lower	Worm gear (1/235)	Worm gear (1/301)	Worm gear (1/375)	Worm gear (1/235)	Worm gear (1/301)
Dimensional tolerance	Guide	Crossed roller guide				
	Main materials-Finishing	Aluminum—White almite finish				
	Weight	1.0kg		2.0kg		
Accuracy specification	Height of stage	26±0.2mm		52±0.4mm		
	Height of center rotation	70±0.2mm	96±0.2mm	122±0.2mm	70±0.4mm	96±0.4mm
	Runout accuracy of center rotation	Within 0.01mm				
Sensor	Resolution (Pulse) Upper at the full/Lower at the full	0.001532°	0.001196°	0.00096°	0.001532°	0.001196°
	MAX speed Upper/Lower	7.6°/sec [5kHz]	6°/sec [5kHz]	4.8°/sec [5kHz]	7.6°/sec [5kHz]	6°/sec [5kHz]
	Repeatability positioning accuracy	Within ±0.003°				
Other	Load capacity	5kgf [49N]		4kgf [39.2N]		
	Moment stiffness	Pitch 0.17°/yaw 0.06°/roll 0.06 ["/N · cm]		Pitch 0.23°/yaw 0.12°/roll 0.23 ["/N · cm]		
	Lost motion	Within 0.006°				
Provided screw (Hexagon-headed bolt)	Limit sensor	Installed				
	Origin sensor	Installed				
	Slit origin sensor	Installed				

Motorized goniometer

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

1

163

Electrical Specification: KG07/KA07

Motorized goniometer

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

φ40

φ50

φ60

φ70

φ80

φ100

φ120

Other

1

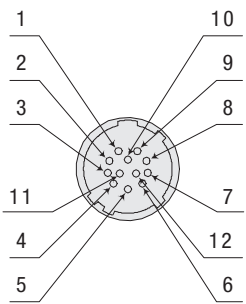
165

Electrical specification

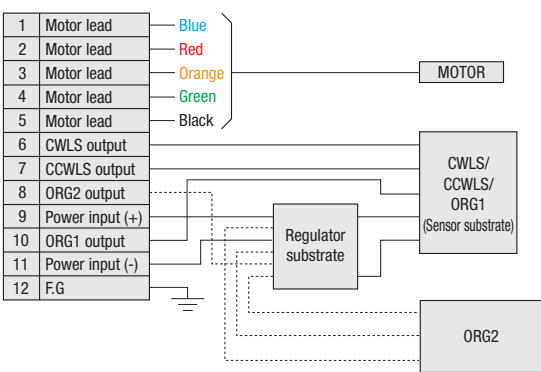
Model		KG07-W070A	KG07-W096A	KG07-122A
Opposite hand		KG07-W070AR	KG07-W096AR	KG07-122AR
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co.,Ltd.)		
	Model (*2)	C9582-9015-1		
	Step angle	0.36°		
Connector	Model	HR10A-10J-12P (73) (Hirose Electric Co.,Ltd.)		
	applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co.,Ltd.)		
Sensor	Limit sensor	Installed		
	Origin sensor (ORG1)	Installed		
	Slit origin sensor (ORG2)	Installed		
	Model	Photo microsensor: EE-SX398 (Omuron Co.,Ltd.)、EE-SX498 (Omuron Co.,Ltd.) : Limit・Origin sensor (ORG1) Photo microsensor: PM-L25 (Panasonic Industrial Devices SUNX) : Slit origin sensor (ORG2)		
	Power voltage	DC5~24V ±10%		
	Consumption current	100mA or less		
	Control output	EE-SX398、EE-SX498: NPN open collector output DC5V~24V 16mA or less Residual voltage 0.4V or less when the load current is 16mA PM-L25: NPN open collector output DC30V or less 50mA or less Residual voltage 1V or less when the load current is 16mA Residual voltage 2V or less when the load current is 50mA		
	Output logic	EE-SX398: On detection (light shield condition): Output transistor ON (Continuity) EE-SX498: On detection (light shield condition): Output transistor OFF (Non-continuity) PM-L25: On detection (light shield condition) : Output transistor ON (Continuity)		

*1 See page P.1-213~ for details of single motor specification. *2 Model is our own management model.

Pin allocation



Connection diagram



70 goniometer sensor logic

Type	CWLS	ORG1	CCWLS	ORG2
A	NC EE-SX498	NC EE-SX498	NC EE-SX498	NO PM-L25
B	NO EE-SX398	NO EE-SX398	NO EE-SX398	
C	NC EE-SX498	NO EE-SX398	NC EE-SX498	

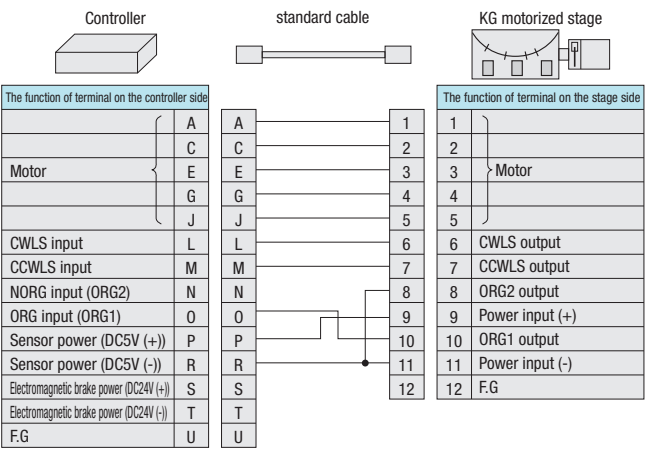
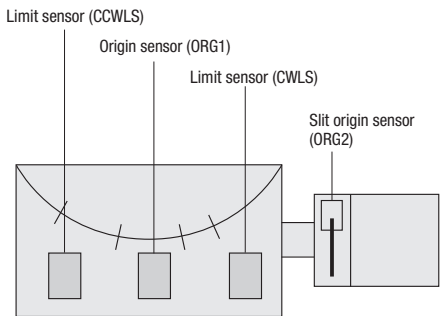
* Upper: Sensor logic
Lower: Using sensor

* Broken line area does not work when use standard cable

Built-in sensor

KG series have built-in sensors as below.

The connecting diagram that connected to our controller using standard attached cable is shown as below.

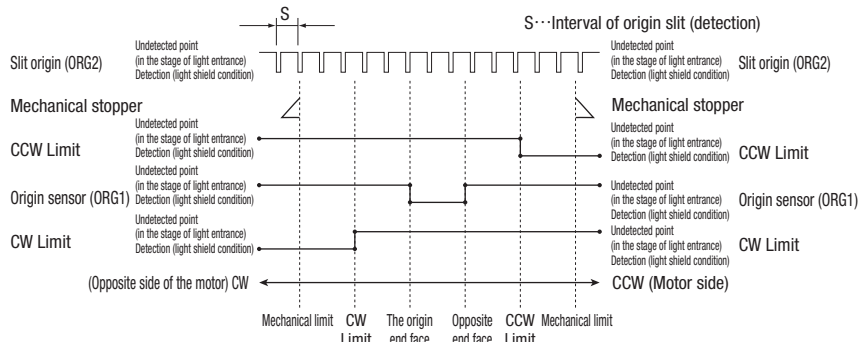


The CWLS (pin#6) and CCWLS (pin#7) on the motorized stage side are connected to CWLS (Lpin) and CCWLS (Mpin) of controller as usual. However ORG2 output (Pin#8) is connected to DC5V (-) and ORG1 output (pin#10) will be connected to ORG. In other words, the sensor of ORG2 does not work on this wire connection, only ORG1 sensor is recognized by the controller as origin signal. As a result, return to origin should be done without the slit origin sensor as same as function of motorized stages that have only three sensors (CWLS, CCWLS and ORG).

Available the correspondence cable for a slit origin sensor (ORG2)! See page P.1-207 for details.

This series are included four sensors as standard. In case of using four sensors with slit origin sensor (ORG2), you need the cable for four sensors. Also please note that the type is different from recommendation return to origin. When use all of 4 sensors, please select the cable for 4 sensors from P.1-207~.

Timing chart



Unit [deg]	Direction of CW			Direction of CCW		
	Detection clearance of slit origin S	Reference coordinate	CW Limit	Origin	Opposite end face	CCW Limit
KG07-W070A	1.5	Return to origin	9.3	0	2.1	9.3
KG07-W096A	1.2	Return to origin	7.3	0	1.6	7.3
KG07-W122A	1.0	Return to origin	5.3	0	1.3	5.3

* Return to origin means that is performed return to origin type 4 using DS102/DS112/D200 controller.
 * The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 deg.

Method for return to origin

Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly. Set to the way of recommendation return origin when using our controller.

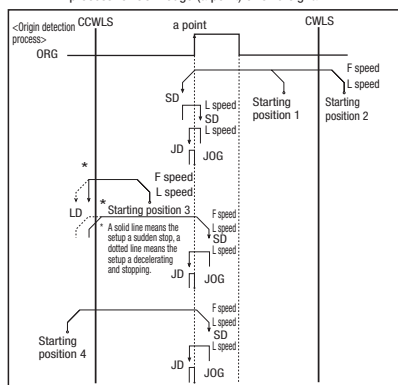
KG07/KA07 recommended return to origin Return to origin sequence P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge(a point) of ORG signal.
- Type 4: Detect in the direction of CW and perform detected process for CW edge of ORG signal.
- Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.
- Type 10: After finished Type4, perform detected process for CW edge of TIMING signal.

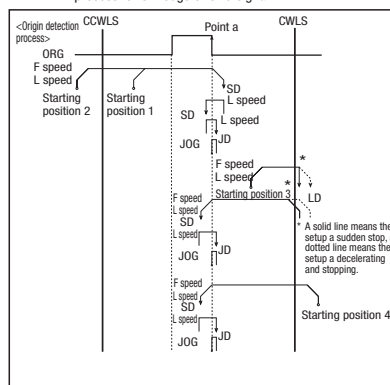
Select return to origin type from the followings when use the slit origin sensor (ORG2).

- Type 1: Detect in the direction of CCW and perform detected process for CW edge(point a) of NORG signal.Next detect an edge of CCW side(point b) of ORG signal.
- Type 2: Detect in the direction of CW and perform detected process for CCW edge of NORG signal.Next detect on edge of CW side (point b) of ORG signal.
- Type 7: After finished type1, perform detected process for CCW edge of TIMING signal.
- Type 8: After finished type2, perform detected process for CW edge of TIMING signal.

[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Adaptive driver

Driver P.1-205~

DC24 type input

Model	CRD5107P	SD5107P3-A22
Divisions	1~1/250 (16 steps)	Full/Half

AC100V input

Model	RKD507-A
Divisions	1~1/250 (16 steps)

Adaptive stepping motor controller

Controller P.1-197~

Input power	General-purpose input/output port	Driver type	
		Full/Half	1~1/250 (16 steps)
AC100-240V	Without	DS102NR	DS102MS
	With	DS102NR-IO	DS102MS-IO
DC24V	Without	DS112NR	DS112MS
	With	DS112NR-IO	DS112MS-IO



- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller

- Ball Screw
- Worm Gear

- φ40
- φ50
- φ60
- φ70
- φ80
- φ100
- φ120
- Other