

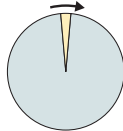
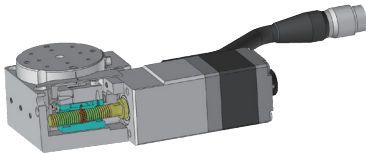
Motorized Rotary Stage Guidance



Impressive lineup of attractive products including the newest model.
Can be found the optimum stages.

Choosing an appropriate stage

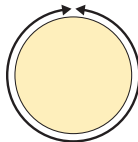
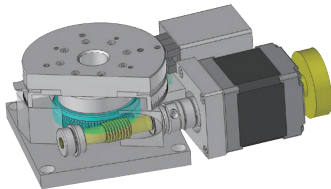
Original



Make sure it is driven repeatedly within plus or minus 10 degree.
▶ P.1-169~

Sinemotor rotary stage: KRB04/KRB06
High durability and high speed driving with ball screws.
The optimum repeatability driving of the minute angle.

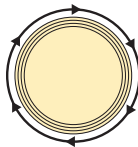
Table size	φ40mm	φ60mm
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Make sure to use 360 degree rotated. ▶ P.1-177~

Worm gear type rotary stage: KRW04360C/KRW06360C-Z/KS402/KRE
The optimum positioning on the wide angle accuracy or continuous operation in 360 degree.
Transmission type would be suitable for rotating polarizing elements and organization cables.
KRE series: Thin type • Light weight • Low price ▶ P.1-025~

Table size	φ40mm	φ60mm	φ75mm	φ100mm	φ180mm
------------	-------	-------	-------	--------	--------



Make sure to use 360 degree high speed rotated.:KS451 ▶ P.1-189~

Direct drive type

Table size	φ39mm
------------	-------

The optimum rotation stages for use to rotate 360 degree with high speed.

High speed



Worm gear type
(~40°/sec)

Direct drive
(72°/sec)

Ball bearing type
(102°/sec)

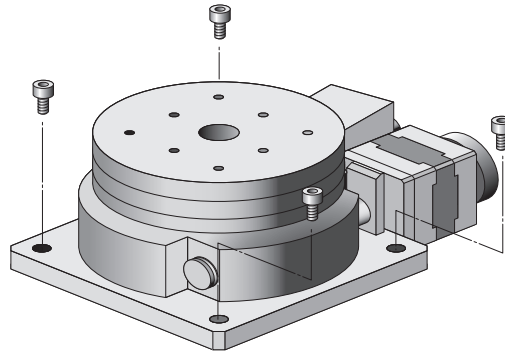
How to use correctly

▽Mounting

Fix corner position with supplied screw.

* KRBO4、KRBO6、KRW04360、KRW06360

KRE04360、KRE06360 are fixed in 3 position



▽About the object that mounted on upper/bottom of stage

When a stage is mounted on uneven or an object that is uneven, the stage table may deformed, and may also affected the accuracy. [Approximate flatness: up to 10 μ m]

▽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.

Load capacity or accuracy might be changed due to the mount position. Please check below table for using.

Please feel free to ask us how to best use.

▼Each positioning characteristics

Products series	Inverted and reversed	Side horizontal	Side vertical use
Sinmotion rotation stage	○	○	○
Worm gear type rotation stage	○	○	○
Direct drive type	×	×	×
KRE04360、KRE06360	×	×	×

○ : Available under limit of load or moment

× : Not available

Center of rotation

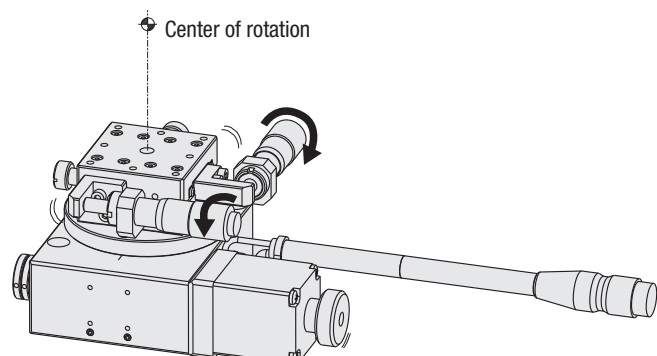
▽How to align the center of rotation

Use the full power of stages by aligned each center when mount to the other equipments.

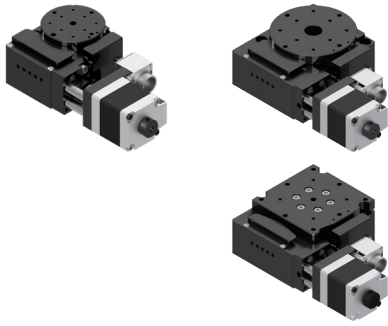
Align the center as belows.:

- Position the minimum point of eccentricity rotating the stage by using dial gauge, and then fix the work.
- Can be issued to fine tune the center with XY stages.

* There is no surface based on mounting.



Rotation Ball Screw Guidance



High-precision rotating stage using ball screws
Ideal for use in repeatability motion with good operation.

Usage

- For posture controlled
- For lens or LD panel bonding

Sine motion rotary stage guidance

High durability type

Backlash by the abrasion was concerned about by the worm gear type when continued being driven at a microangle repeatedly.

We have succeeded in making travel mechanism a ball screw from a worm gear. High durability has been achieved by adopting a sliding worm gear to a rolling ball screw for the moving mechanism.

Improved acceleration and deceleration performance

Compared to worm gears, it has less sliding resistance, enabling smooth rise and acceleration

Reduce the backlash

Reduce the backlash with preload mechanism.

Travel distance and constant speed

The linear movement of a ball screw is converted into rotational movement by bearings in the stage. (The travel distance of ball screw is not the same as the travel angle of the stage because linear movement is converted into rotational movement).

As a result, the resolution per pulse is different between the stroke center and the end. The rotation speed is not stable even when sending pulse signals at a constant speed.

Equipment for calculating the travel distance

*An equation on the basis of the stroke center.

- (1) $\text{Travel angle} = \text{Arcsin}((\text{Input pulse} \times X) / P)$
- (2) $\text{Input pulse} = P \times \sin(\text{travel distance}) / X$

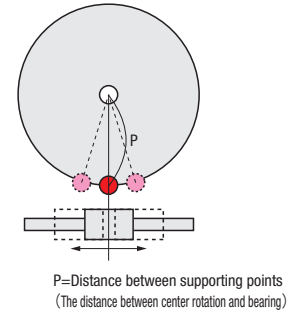
Definition

Definition	Value	Unit
Distance between supporting points P	17	mm
Ball screw lead	1	mm
Motor basic step angle	0.72	Degree
Ball screw travel length per pulse X	0.002	mm

* Distance between supporting points are different from the stage.

Basic specification

Model	Motor basic step angle	Distance between supporting points P
KRB04017M-□C	0.72°	17mm
KRB06011M-□C	0.72°	27mm



Contact us for details of the equation.

For proper operation

Mounting

KRB04017M/KRB06011MS : Fix 3 position with supplied screw.

KRB06011: Fix with supplied screws to 3 position of lower plate.

About the object that mounted on upper/bottom of stage.

When a stage is mounted on uneven or an object that is uneven, the stage table may be deformed, and may also affect the accuracy.

[Approximate flatness: up to 10μm]

Position of stage mounting

All products SPEC shows must be shown flat setting condition.

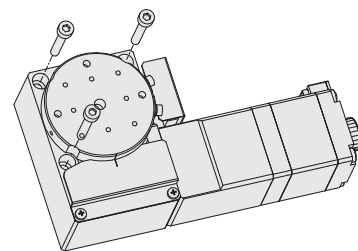
Pay attention to mount such as up side down, vertical on the side and horizontal on the side.

Load capacity and accuracy might be changed by the positioning.

Please refer to the posture characteristics table by product on page 1-168 to determine whether or not a product can be used.

Please feel free to ask us for more information.

- KRB04017M/KRB06011MS:
Fit the hole of the upper table with the installation hole.



Sinemotion Rotary Stage $\phi 40/\phi 60$: KRB04/KRB06

High-precision rotating stage using ball screws
 Ideal for use in repeatability motion with good operation.



KRB 04017 M -LC

1 2 3 3 4 4

Cables P. 1-207 ~
 Electrical specification P.1- KRB-005~

1 Stage table size

Code	size	Travel distance
04017	$\phi 40\text{mm}$	$\pm 8.5^\circ$
06011	$\phi 60\text{mm}$ 60×60mm	$\pm 5.5^\circ$

2 Table shape

Blank	Circular
S	Square

Note: Only KRB06 is available

3 Motor option

Code	Specification
C	Standard(5 Phase stepping motor)
T	2 Phase stepping motor

3 Motor option

Code	Specification
ZA	α STEP (AZ Series)

4 Cable option(for motorless)

Code	Specification	Cable Model	2 phase Cable type
Blank	Cable is not included (Standard)	—	—
A	2m	D214-2-2E	—
B	2m One end loose	D214-2-2EK	DS1-2C-2-2EK
C	4m	D214-2-4E	—
D	4m One end loose	D214-2-4EK	DS1-2C-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	DS1-2C-2-2RK
H	Robot cable 4m	D214-2-4R	—
J	Robot cable 4m one end loose	D214-2-4RK	DS1-2C-2-4RK

* One end loose position to only stage opposite side.
 Note:For T-phase stepping, only one end rose (B, D, G, J) is supported.

4 Cable option(Motor option:ZA)

Code	Specification
Blank	Sensor cable 2m One end loose wire
3	Sensor cable 3m One end loose wire
5	Sensor cable 5m One end loose wire
3A	3A:Screwdriver (3m cable set)
5A	3A:Screwdriver (5m cable set)

* One end loose position to only stage opposite side.
 *3A/5A does not include sensor cable, motor cable, and motor driver.

Motor option: Accessories when ZA is selected.

Cable option code	Sensor cable model	Motor Cable model	Driver model
Blank	HR10AP-S-SB-6-2	—	—
3	HR10AP-S-SB-6-3	—	—
5	HR10AP-S-SB-6-5	—	—
3A	HR10AP-S-SB-6-3	CC030VZ2R2	AZD-K
5A	HR10AP-S-SB-6-5	CC050VZ2R2	AZD-K

Specification

		SPEC		
Model		KRB04017M-LC	KRB06011M-LC	KRB06011MS-LC
Mechanical specification	Travel distance	$\pm 8.5^\circ$	$\pm 5.5^\circ$	
	Stage surface size	$\phi 40\text{mm}$	$\phi 60\text{mm}$	60×60mm
	Travel mechanism (Reduction ratio)	Ball screw $\phi 6$ lead 1		
	Guide	Combination angular ball bearing		
Accuracy specification	Main materials-Finishing	Aluminum-Black alumite processing		
	Weight	0.40kg	0.62kg	0.63kg
	Resolution※ (Pulse) Full	$\approx 0.0068^\circ$	$\approx 0.0043^\circ$	
	MAX speed	101.5°/sec [15kHz]	63.8°/sec [15kHz]	
Sensor	Repeatability positioning accuracy	0.003°		
	Load capacity	4.0kgf [39.2N]	6.0kgf [58.8N]	
	Moment stiffness	0.52°/N · cm	0.25°/N · cm	
	Lost motion	0.003°		
	Backlash	0.01°		
	Parallelism	50 μm		
Sensor	Limit sensor	Available		
	Origin sensor	Available		
	Slit origin sensor	—		
Provided screw (Hexagon-headed bolt)		3 of M3-25	3 of M4-25	

* The SPEC varies depending on the motor.
 *See page P.1-169 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.

Resolution · MAX speed · Weight

Motor code	C	T	ZA
Type	Standard	2 Phase stepping motor	α STEP (AZ)
Motor model* 1	C005C-90215P-1	SJA28N32-0674B-01	AZM24AK
Step angle	0.72°	1.8°	0.36°※2
Resolution(Full)	KRB04017M	$\approx 0.0169^\circ$	$\approx 0.0034^\circ$ ※2
	KRB06011M	$\approx 0.0106^\circ$	$\approx 0.0021^\circ$ ※2
	KRB06011MS	$\approx 0.0106^\circ$	$\approx 0.0021^\circ$ ※2
MAX speed	KRB04017M	76.1°/sec [4.5kHz]	101.5°/sec [30kHz]
	KRB06011M	47.8°/sec [4.5kHz]	63.8°/sec [30kHz]
	KRB06011MS	47.8°/sec [4.5kHz]	63.8°/sec [30kHz]
Weight	KRB04017M	0.40kg	0.44kg
	KRB06011M	0.62kg	0.66kg
	KRB06011MS	0.63kg	0.67kg

*1 Model is our own management model.
 ※2 1000P/R setting

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60/\square 60$

$\phi 75$

$\phi 100$

$\phi 180$

Other

1-KRB
002

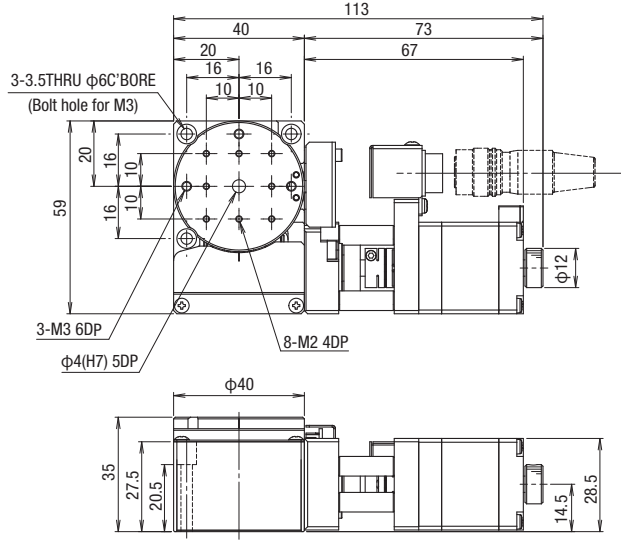
Motorized Stage

Sinemotion Rotary Stage $\phi 40/\phi 60$: KRB04/KRB06

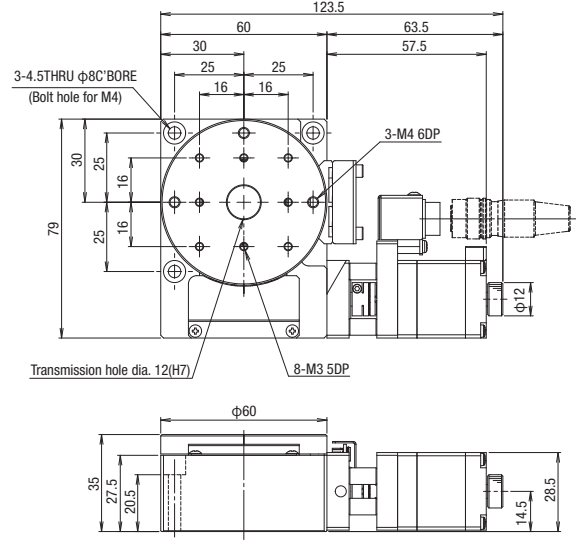


Dimensions

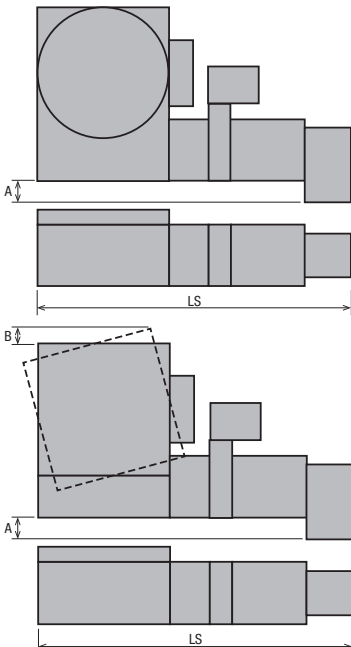
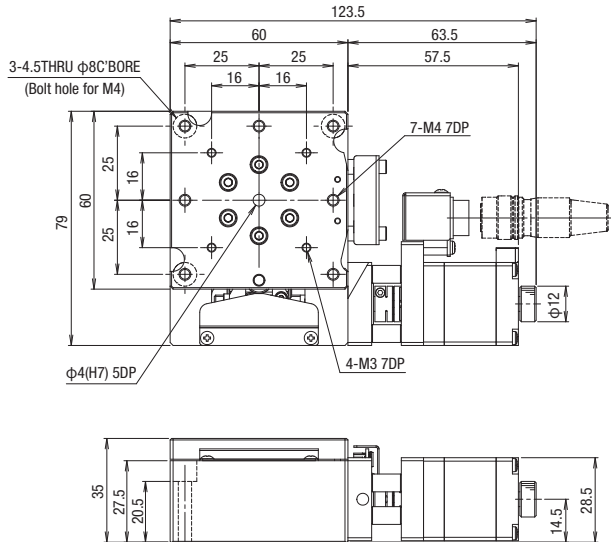
KRB04017M-LC



KRB06011M-LC



KRB06011MS-LC



C Standard motor

Motor model C005C-90215P-1

T 2 Phase stepping motor

Motor model SJA28N32-0674B-01

Model	Stage table size	Motor	Motor size	A(mm)	B(mm)	LS(mm)
KRB04017M-LC	$\phi 40$	C	$\square 28$	—	—	113
KRB06011M-LC	$\phi 60$			—	—	123.5
KRB06011MS-LC	$\square 60$			—	5.5	123.5
KRB04017M-LT	$\phi 40$	T	$\square 28$	—	—	113
KRB06011M-LT	$\phi 60$			—	—	123.5
KRB06011MS-LT	$\square 60$			—	5.5	123.5

ZA α STEP (AZ Series)

Motor model AZM24AK

Model	Stage table size	Motor	Motor size	A(mm)	B(mm)	LS(mm)
KRB04017M-LZA	$\phi 40$	ZA	$\square 28$	10	—	135.5
KRB06011M-LZA	$\phi 60$			10	—	146
KRB06011MS-LZA	$\square 60$			10	5.5	146

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60/\square 60$

$\phi 75$

$\phi 100$

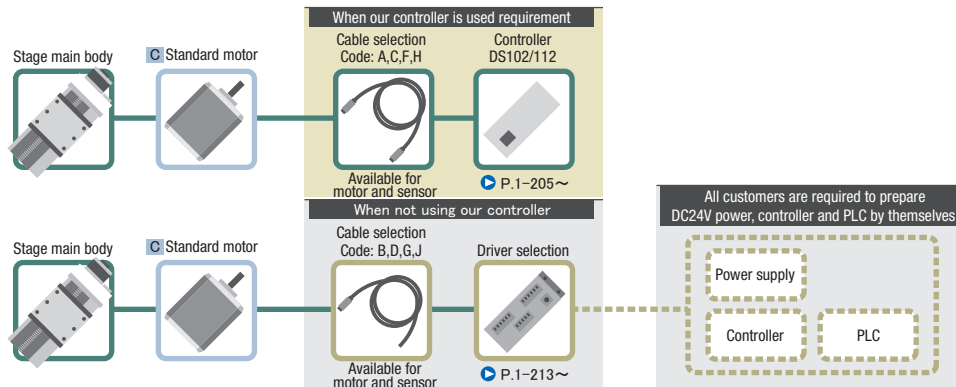
$\phi 180$

Other

1-KRB
003

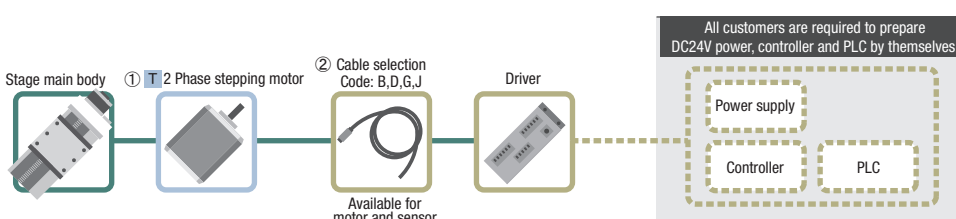
Motor option

C Standard motor
 Motor model
 C005C-90215P-1



Motor option

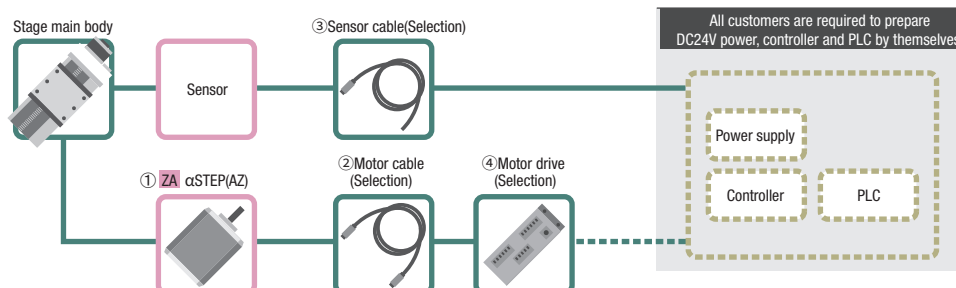
T 2 Phase stepping motor
 Motor model
 SJA28N32-0674B-01



Code	Motor model	Motor • Sensor cable selection
T	SJA28N32-0674B-01	B • D : DS1-2C-2-□EK G • J : DS1-2C-2-□RK

Motor option

ZA αSTEP (AZ Series)
 Motor model
 AZM24AK



Code	① Motor model	② Motor cable selection	③ Sensor cable selection	④ Driver selection
ZA	AZM24AK	3A : CC030VZ2R2 5A : CC050VZ2R2 Blank • 3 • 5 : None	3A • 3 : HR10AP-S-SB-6-3 5A • 5 : HR10AP-S-SB-6-5 Blank : HR10AP-S-SB-6-2	3A • 5A : AZD-K Blank • 3 • 5 : None

Motorized Rotary Stage

X
 XY
 Z
 Horizontal Z
 XYZ
 Goniometer

Rotary

Unit
 Controller

Ball Screw

Worm Gear

Direct Drive

φ39
 φ40
 φ59
 φ60/□60
 φ75
 φ100
 φ180
 Other

1-KRB
 004

Motorized Stage

Electrical Specification: KRB Series

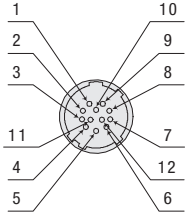
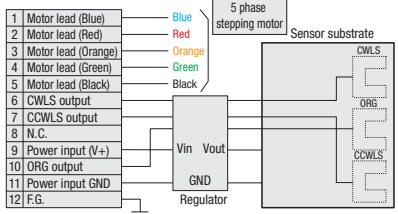
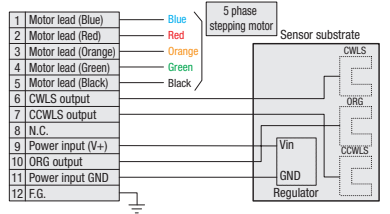
Motor · Electrical specification(5/2 Phase stepping motor)

Motor code		C	T	
Stage model		KRB04/KRB06		
Motor Specification (*1)	Type	5 phase stepping motor (0.75A/Phase)	2 phase stepping motor (0.67A/Phase)	
	Feature	Standard	—	
	Model*1	C005C-90215P-1	SJA28N32-0674B-01	
	With electromagnetic brake	—	—	
	Manufacturer	Oriental Motor Co., Ltd.	SURUGA SEIKI	
	Step angle	0.72°	1.8°	
	mass		0.11kg	
	Motor size	□ size		□28mm
		L size		37mm
	Maximum static torque	0.048N · m		0.059N · m
Driver model	CVD507-K-A9(Oriental Motor Co., Ltd.)		—	
Driver power input	DC24V±10% 1.4A(MAX)		—	
Brake power input	—		—	
Connector	Panel mount	HR10A-10R-12P(73) (HRS)	HR10A-10R-10P(73) (HRS)	
	Receiving connector	HR10A-10P-12S(73) (HRS)	HR10A-10P-10S(73) (HRS)	
	Limit sensor		Available	
Sensor board	Origin sensor		Available	
	Slit origin sensor		—	
	Sensor	Photo microsensor EE-SX4320 (Omron Co., Ltd.)		
	Power-supply voltage	DC5~24V±5%		
	Current consumption	Total 60mA or less		
	Control output	NPN open collector output DC30V 10mA or less		
	Output logic	On detection (light shield condition): Output transistor OFF (Non-continuity)		

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

*2 Model is our own management model.

Pin allocation · Connection diagram

Unit	Controller	Pin allocation Connector model HR10A-10R-12P(73)(HRS)	φ40	φ60/□60
			Connection diagram	Connection diagram
Ball Screw	Available for motor and sensor			
			Worm Gear	Available for motor and sensor

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

φ39

φ40

φ59

φ60/□60

φ75

φ100

φ180

Other

Motor • Electrical specification(αSTEP)

Motor code		ZA		
Stage model		KRB04/KRB06		
Motor Specification (*1)	Type	αSTEP (AZ Series)		
	Feature	Small step-out ,absolute		
	Model*1	AZM24AK		
	With electromagnetic brake	-		
	Manufacturer	Oriental Motor Co., Ltd.		
	Step angle	0.36°(Set to 1000P/R)		
	mass	0.15kg		
	Motor size	□ size	28mm	
		L size	45mm	
	Maximum static torque	0.095N · m		
Driver model	AZD-K(Oriental Motor Co., Ltd.)			
Driver power input	DC24V±5%			
Brake power input	-			
Connector	Panel mount	Motor: DF62B-13EP-2.2C (Hirose Electric Co., Ltd.) Sensor: HR10A-7R-6P(73) (Hirose Electric Co., Ltd.)		
	Receiving connector	Motor: DF62C-13S-2.2C (Hirose Electric Co., Ltd.) Sensor: HR10A-7P-6S(73) (Hirose Electric Co., Ltd.)		
Sensor board	Limit sensor	Available		
	Origin sensor	Available		
	Slit origin sensor	-		
	Sensor	Photo microsensor EE-SX4320 (Omron Co., Ltd.)		
	Power-supply voltage	DC5~24V±5%		
	Current consumption	Total 60mA or less		
	Control output	NPN open collector output DC30V 10mA or less		
Output logic	On detection (light shield condition): Output transistor OFF (Non-continuity)			

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

*2 Model is our own management model.

Pin allocation • Connection diagram

ZA	Motor	<p>[Receiver cable] Model : CC030VZ2R2(3m)/CC050VZ2R2(5m) * Flexible cable</p>															
	Sensor	<p>[Receiver cable] Model : HR10AP-S-SB-6-□ ※□ : 2(2m)/3(3m)/5(5m) * Fixed</p> <p>Sensor side Connector (Female): HR10A-7P-6S (73) (HRS) ULAWM20276 AWG28 3P Black</p>	<p>[Pin allocation] Connector model : HR10A-7R-6P(73)(HRS)</p>														
		<p>*The shields are connected with the connector shell.</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Signals</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>CWLS</td> </tr> <tr> <td>2</td> <td>CCWLS</td> </tr> <tr> <td>3</td> <td>ORG</td> </tr> <tr> <td>4</td> <td>NORG</td> </tr> <tr> <td>5</td> <td>V+</td> </tr> <tr> <td>6</td> <td>V-</td> </tr> </tbody> </table>	Pin	Signals	1	CWLS	2	CCWLS	3	ORG	4	NORG	5	V+	6	V-	<p>[Pin allocation] Connector model : HR10A-7R-6P(73)(HRS)</p>
Pin	Signals																
1	CWLS																
2	CCWLS																
3	ORG																
4	NORG																
5	V+																
6	V-																

Motorized Stage

Electrical specification KRB04/ KRB06

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

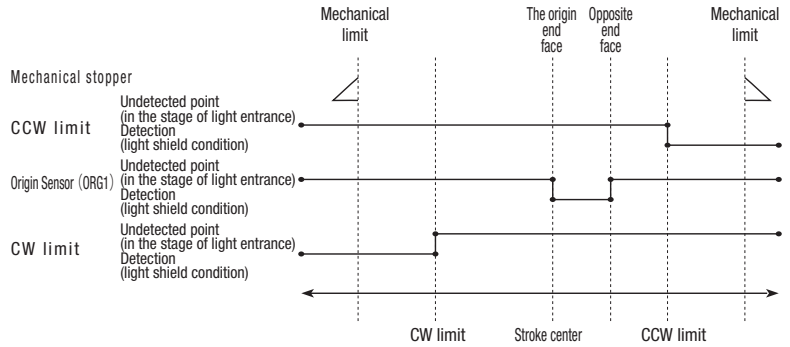
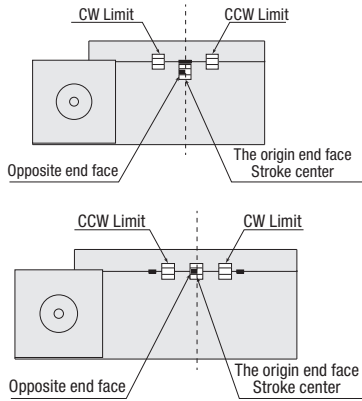
Goniometer

Rotary

Unit

Controller

Timing chart



Unit [deg] Direction of CW ← → Direction of CCW

	Reference coordinate	CW Limit	The origin end face Stroke center	Opposite end face	CCW Limit
KRB04017M-L	Return to origin	9.0	0	4.5	9.0
KRB06011M-L	Return to origin	6.0	0	2.5	6.0

* Return to origin means that is performed return to origin type 4 using DS102/DS112 series.(DS102/DS112 are dedicated to 5-phase motors)
 * 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.
 Output signal logic will be different depends on your controller.

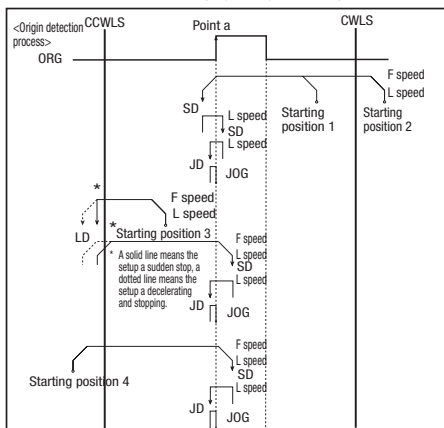
Return to origin

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.

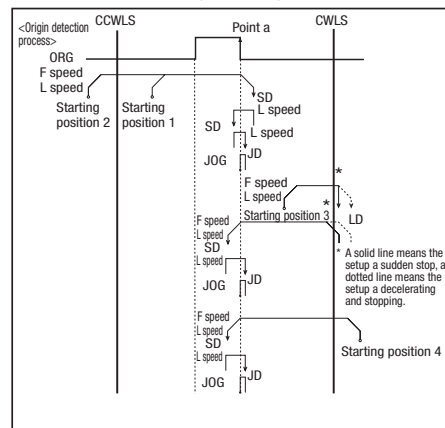
KRB04017/KRB06011 recommended return to origin Return to origin sequence P.1-201~

- Type 3: Detect in the direction of CCW and perform detected process for CCW edge 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.



Ball Screw

Worm Gear

Direct Drive

φ39

φ40

φ59

φ60/□60

φ75

φ100

φ180

Other

X
XY
Z
Horizontal Z
XYZ
Goniometer

Rotary
Unit
Controller

Ball Screw

Worm Gear

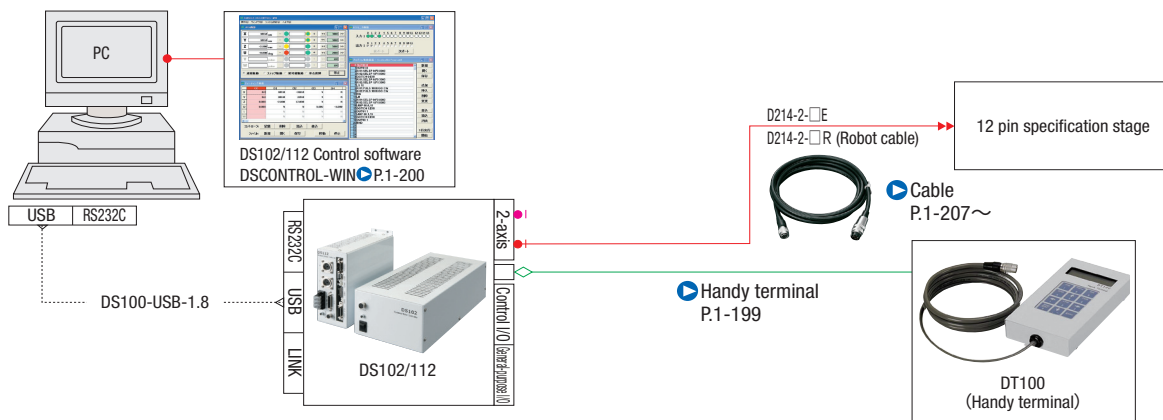
Direct Drive

φ39
φ40
φ59
φ60/φ60
φ75
φ100
φ180
Other

Connectin example

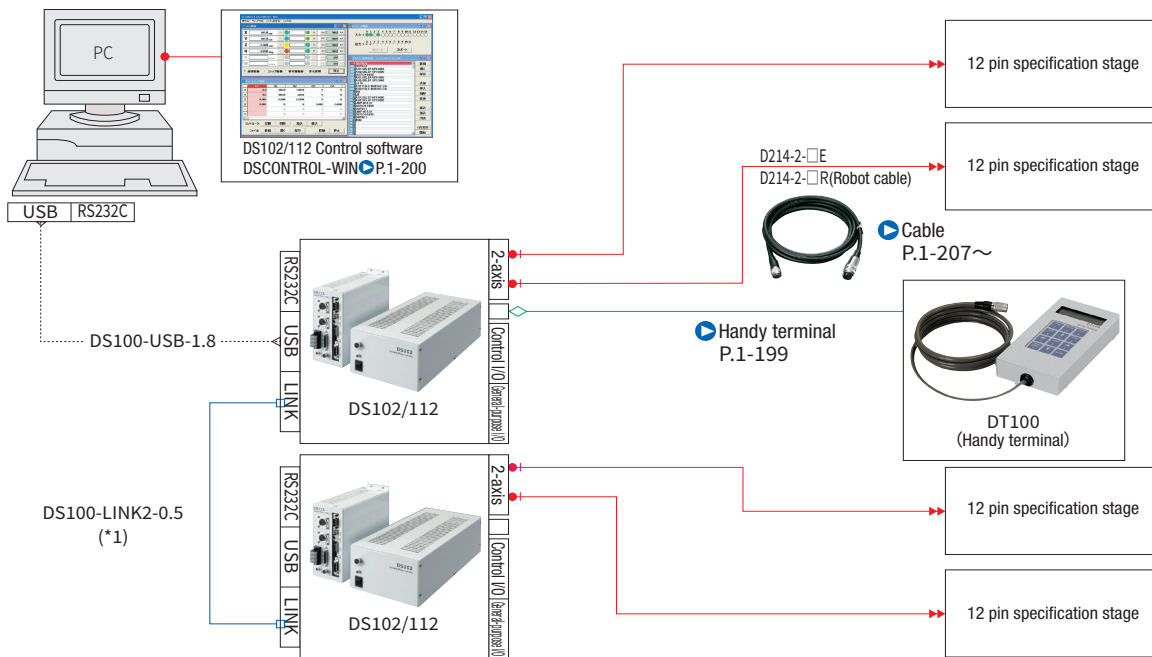
Connection example 1 Motorized Stage 1axis: When holding a terminal device (using control software)

*USB cable connection between PC and controller.



Connection example 2 Motorized Stage 4axis: When holding a terminal device (using control software)

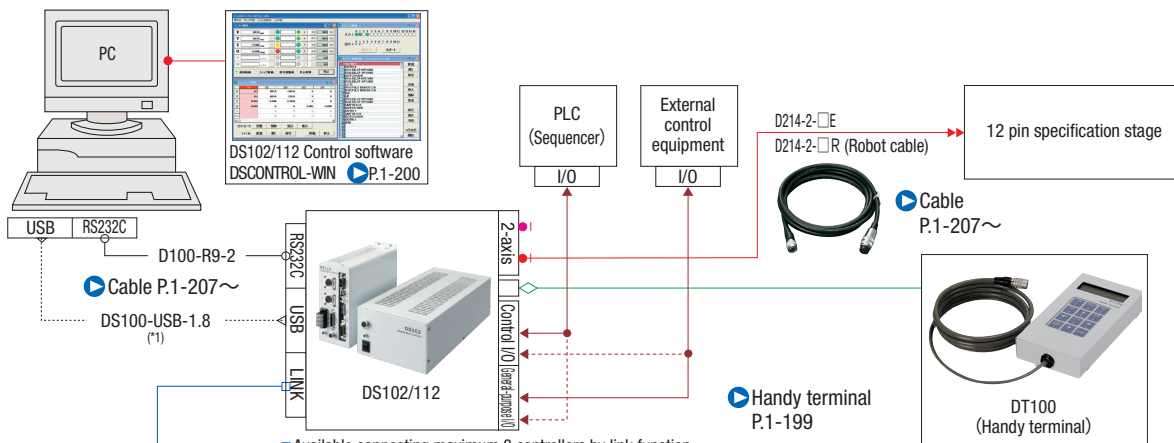
*USB cable connection between PC and controller.



(*1) It is possible to control up to 3 controllers (for a maximum of 6-axis control) with link function.

Connection example 3 When controlling from the PLC I/O Unit.

*USB cable connection between PC and controller.



(*1) Using the USB hub, it is controllable in a single PC up to four link networks (24-axis).

Motorized Stage

Rotary Stage $\phi 39/\phi 59/\square 40/\square 60$: KRW04/KRW06

KRW04360T-LC

KRW04360M-LC

KRW06360T-LC

KRW06360M-LC

KRW06360T-LC-Z

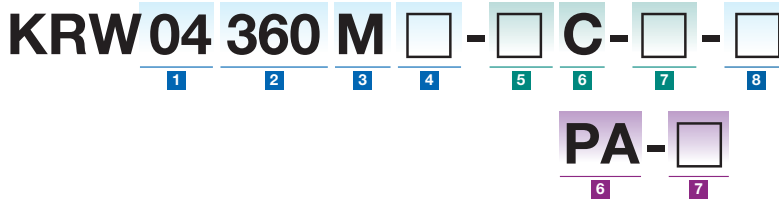
RoHS



Freely customize the motor

Vertical specifications(Z) are not included.

*All image is for illustrative purposes only.



CCable P.1-207~
EElectrical specification P.C-055~

1 Stage size

04	$\phi 39\text{mm}(\square 40\text{mm})$
06	$\phi 59\text{mm}(\square 60\text{mm})$

*Square specification size (stage surface shape) in parentheses

2 Travel distance

360	360°
-----	------

3 Connector specifications

T	Pig tail	
M	Panel mount	

4 Stage surface shape

Code	Specification
Blank	Circular
S	Square

5 Motor location specification

Code	Specification
L	L position
R	Opposite hand

6 Motor option

Code	Specification
C	Standard
G	High resolution

8 Mounting

Code	Specification
Blank	Horizon
Z	Vertical

*Z : $\phi 59\text{mm}$ /Compatible only with Standard Motor specification

6 Motor option

Code	Specification
PA	α STEP (AR Series)
ZA	α STEP (AZ Series)
EA	for EtherCAT
UG	Servo motor (MINAS A6)
UA	Servo motor (J4)

7 Cable option (Motor:C · G)

Code	Specification	Cable type
Blank	Cable is not included (Standard)	—
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

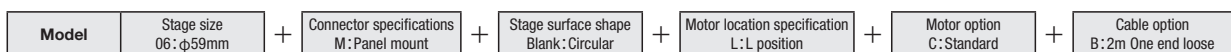
7 Cable option (Motor:PA · ZA · EA · UG · UA)

Code	Specification
Blank	Sensor cable 2m One end loose wire
3	Sensor cable 3m One end loose wire
5	Sensor cable 5m One end loose wire
3A	Driver (Amplifier)/Cable set 3m
5A	Driver (Amplifier)/Cable set 5m

Driver (Amplifier) · Cable option combination

Code	Driver (Amplifier) · Cable	Blank		3	5	3A		5A	
		PA/ZA/EA/UG/UA	PA/ZA/EA/UG/UA	PA/ZA	EA/UG/UA	PA/ZA	EA/UG/UA		
Cable	Sensor	2m	3m	5m	3m	5m	3m	5m	
	Motor	Not included				3m	5m		
	Encoder					—	3m	—	5m
Driver (Amplifier)	Not included				Included				

Selection Example



▷ KRW06360M-LC-B

New Motorized Rotary Stage

- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller
- Ball Screw
- Worm Gear
- Direct Drive
- $\phi 39$
- $\phi 40$
- $\phi 59$
- $\phi 60$
- $\phi 75$
- $\phi 100$
- $\phi 180$
- Other

Specification

SPEC							
Model	KRW04360T-LC	KRW04360M-LC	KRW06360T-LC	KRW06360M-LC	KRW06360T-LC-Z	KRW06360M-LC-Z	
Opposite hand	KRW04360T-RC	KRW04360M-RC	KRW06360T-RC	KRW06360M-RC	KRW06360T-RC-Z	KRW06360M-RC-Z	
Mechanical specification	Travel distance	360°					
	Stage size(*1)	φ39mm (40×40mm)		φ59mm (60×60mm)			
	Connector type	Pig tail	Panel mount	Pig tail	Panel mount	Pig tail	Panel mount
	Travel mechanism (Reduction ratio)	Worm gear(1/120)		Worm gear(1/180)			
	Guide	Deep groove ball bearing					
	Main materials-Finishing	Aluminum—Black almite finishing					
Accuracy specification	Weight	0.42kg	0.39kg	0.62kg	0.59kg	0.72kg	0.69kg
	Resolution/Pulse	0.006°		0.004°			
	MAX speed	30°/sec		20°/sec			
	Positioning accuracy	0.05°					
	Repeatability positioning accuracy	±0.01°					
	Load capacity	3kgf [29.4N]			1kgf [9.8N]		
	Moment stiffness	0.74"/N · cm		0.2"/N · cm			
	Lost motion	0.05°					
	Backlash	0.1°		0.05°			
	Sensor	Parallelism	50μm				
Eccentricity		5μm					
Runout		30μm					
Limit sensor		—					
Origin sensor		有					
Slit origin sensor	—						
Provided screw (Hexagon-headed bolt)	3 of M3—30		3 of M4—30		4 of M4—6		

* Might be changed specification due to motors.

*1 The figure in parenthesis is the stage surface size when the Stage surface shape option: square (S) is selected.

Resolution · MAX speed · Weight

Motor code	C		G	
Specification	Standard		High resolution	
Motor model *1	C005C-90215P-1		PK523HPMB-C1	
Step angle	0.72°		0.36°	
Resolution/Pulse	KRW04	0.006°	0.003°	
	KRW06	0.004°	0.002°	
MAX speed	KRW04	30°/sec		
	KRW06	20°/sec		
Weight	KRW04360T (Pig tail)	0.42kg		
	KRW04360M (Panel mount)	0.39kg		
	KRW06360T (Pig tail)	0.62kg		
	KRW06360M (Panel mount)	0.59kg		
	KRW06360T-Z (Pig tail)	0.72kg	—	
	KRW06360M-Z (Panel mount)	0.69kg	—	

Motor code	PA	ZA	EA	UG	UA	
Specification	αSTEP (AR)	αSTEP (AZ)	for EtherCAT	MINAS A6	J4	
Motor model ※1	ARM24SAK	AZM24AK	STM28W100A	MSMF5AZL1A2	HG-KR053	
Resolution/Pulse	KRW04	0.003° (1000P/R setting)		23 Bit encoder (8388608P/R) ※2	22 Bit encoder (4194304P/R) ※3	
	KRW06	0.002° (1000P/R setting)				
MAX speed	KRW04	30°/sec				
	KRW06	20°/sec				
Weight	KRW04360T (Pig tail)	0.46kg	0.46kg	0.43kg	0.63kg	0.65kg
	KRW04360M (Panel mount)	0.43kg	0.43kg	0.40kg	0.60kg	0.62kg
	KRW06360T (Pig tail)	0.66kg	0.66kg	0.63kg	0.83kg	0.85kg
	KRW06360M (Panel mount)	0.63kg	0.63kg	0.60kg	0.80kg	0.82kg

*1 Model is our own management model.

*2 Optional encoder cable is for incremental system.

*3 When constructing an absolute system, it is necessary to install a battery in the amplifier.

- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer

- Rotary
- Unit
- Controller

- Ball Screw

- Worm Gear

- Direct Drive

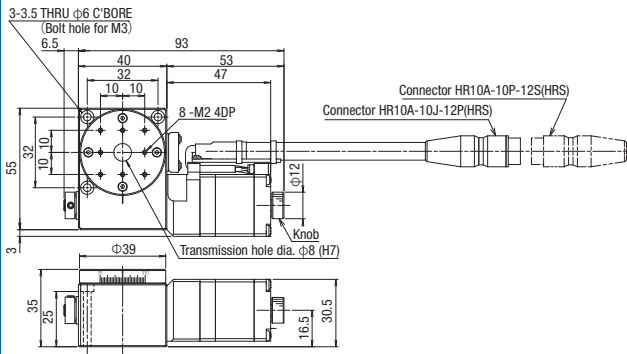
- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Motorized Stage

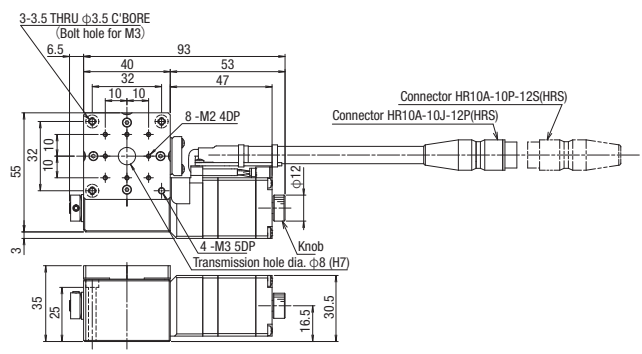
Rotary Stage $\phi 39/\phi 59/\square 40/\square 60$: KRW04/KRW06

Dimensions

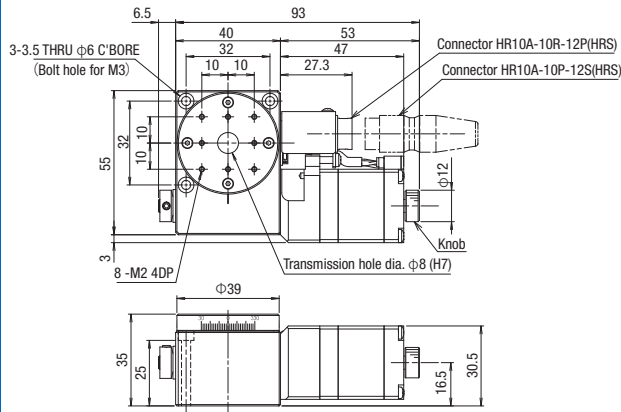
KRW04360T-LC



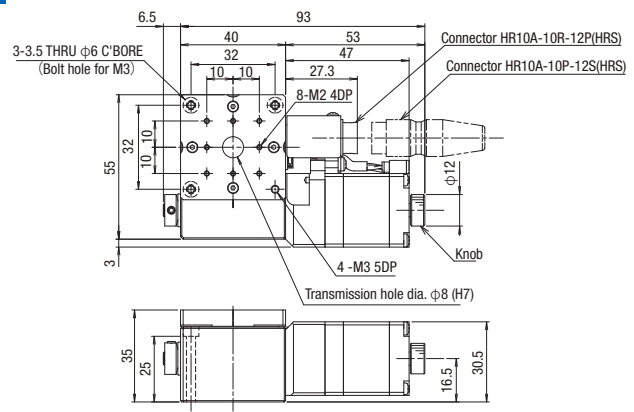
KRW04360TS-LC



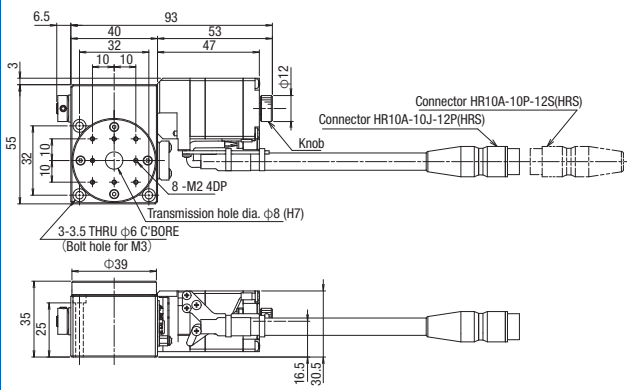
KRW04360M-LC



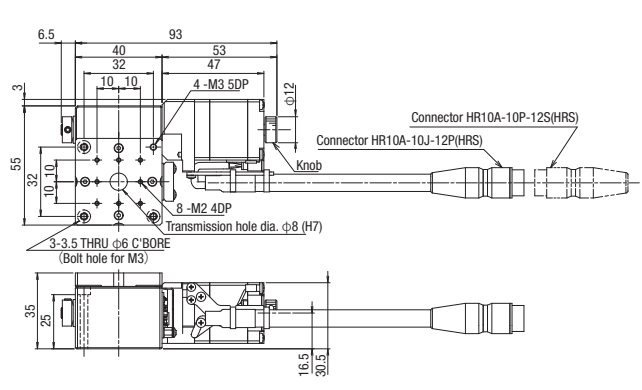
KRW04360MS-LC



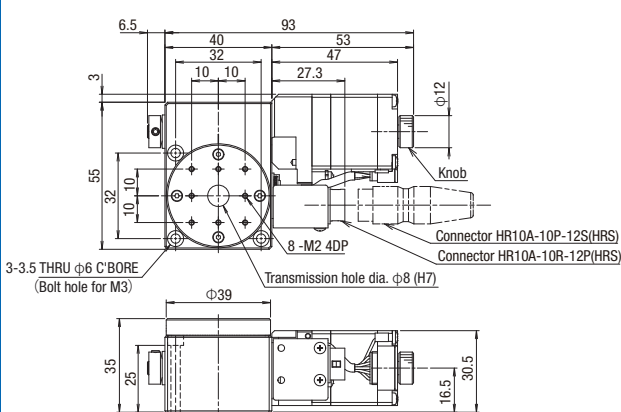
KRW04360T-RC



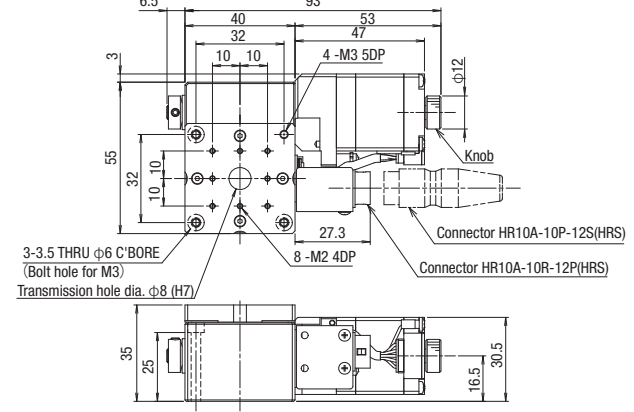
KRW04360TS-RC



KRW04360M-RC



KRW04360MS-RC



Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60$

$\phi 75$

$\phi 100$

$\phi 180$

Other

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

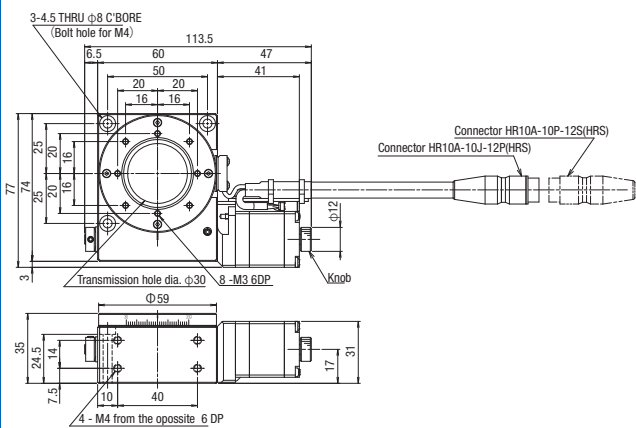
- Ball Screw
- Worm Gear

- Direct Drive

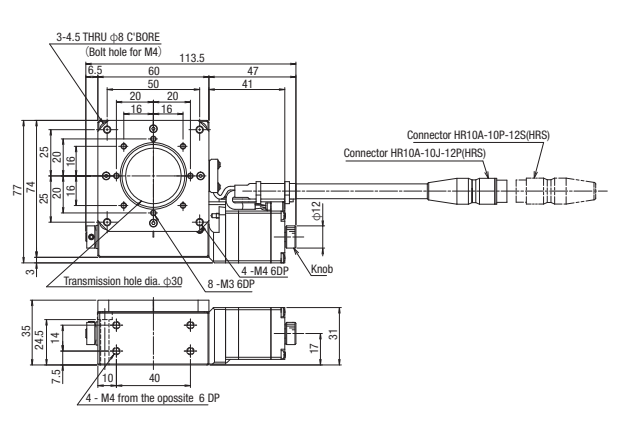
- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Dimensions

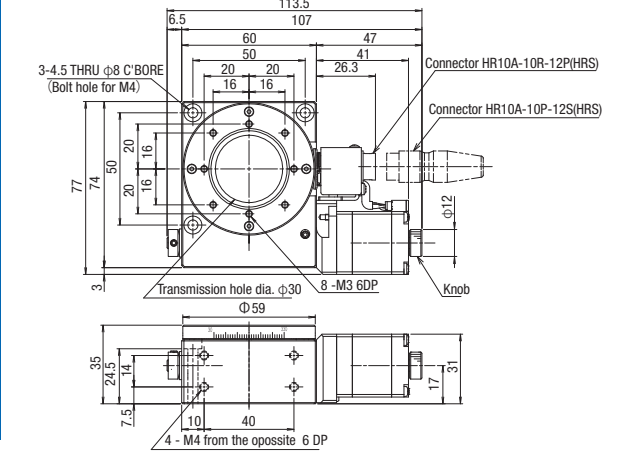
KRW06360T-LC



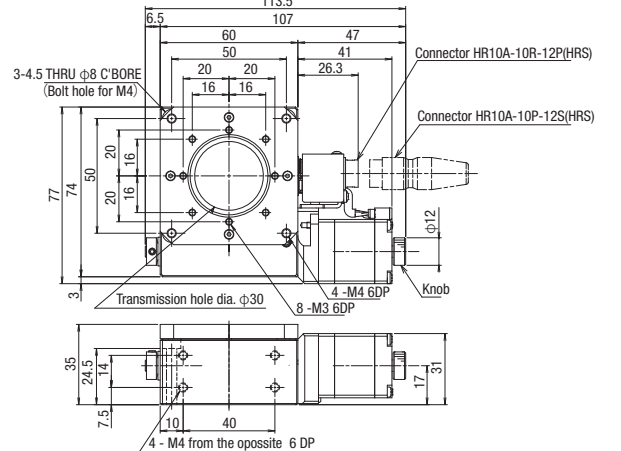
KRW06360TS-LC



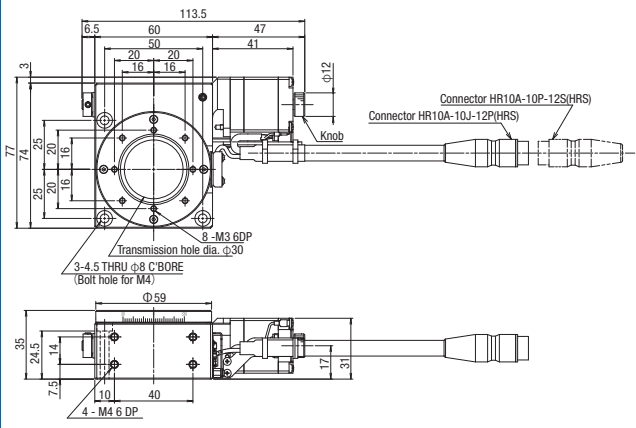
KRW06360M-LC



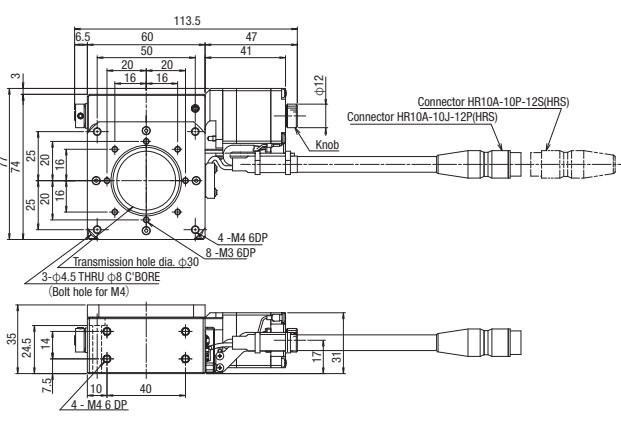
KRW06360MS-LC



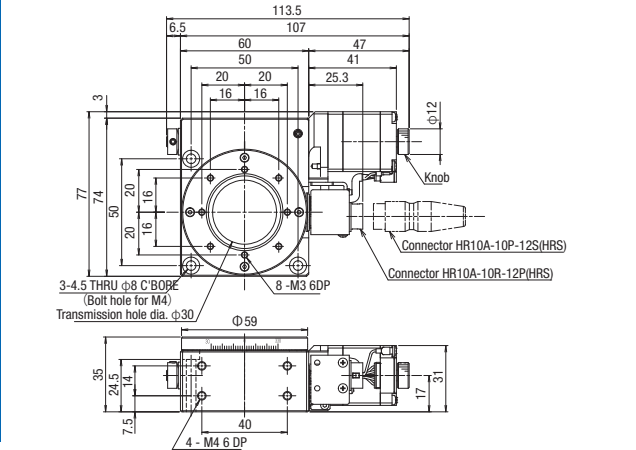
KRW06360T-RC



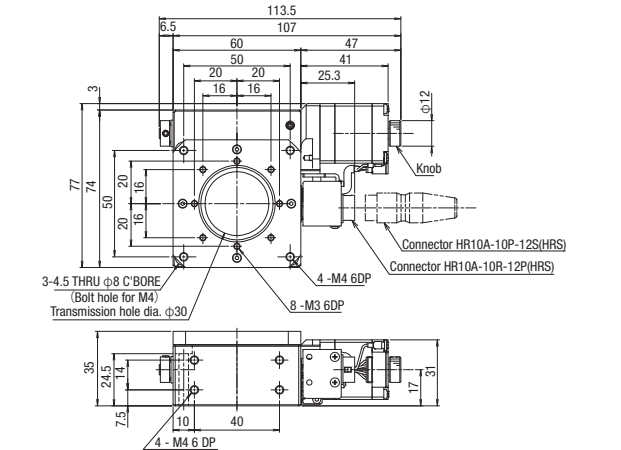
KRW06360TS-RC



KRW06360M-RC



KRW06360MS-RC

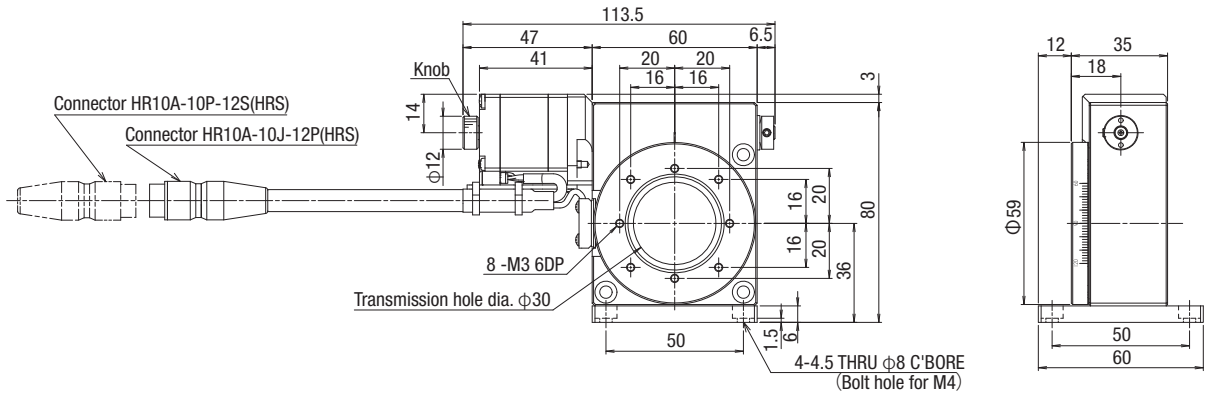


Motorized Stage

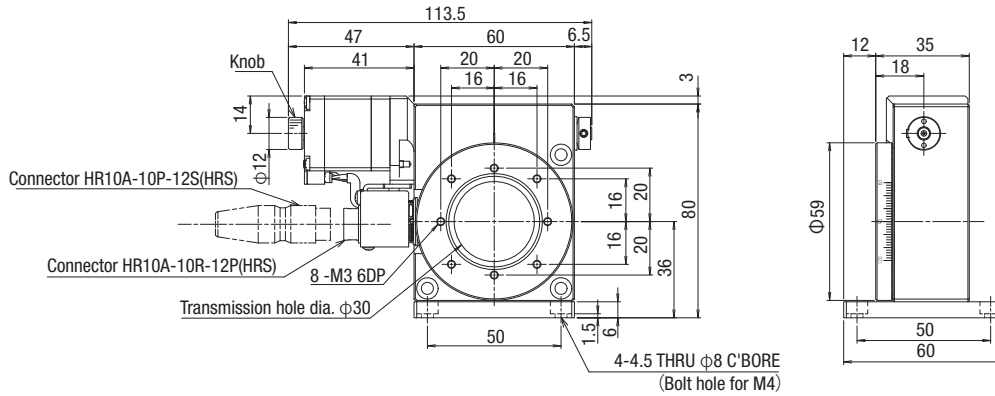
Rotary Stage $\phi 39/\phi 59/\square 40/\square 60$: KRW04/KRW06

Dimensions

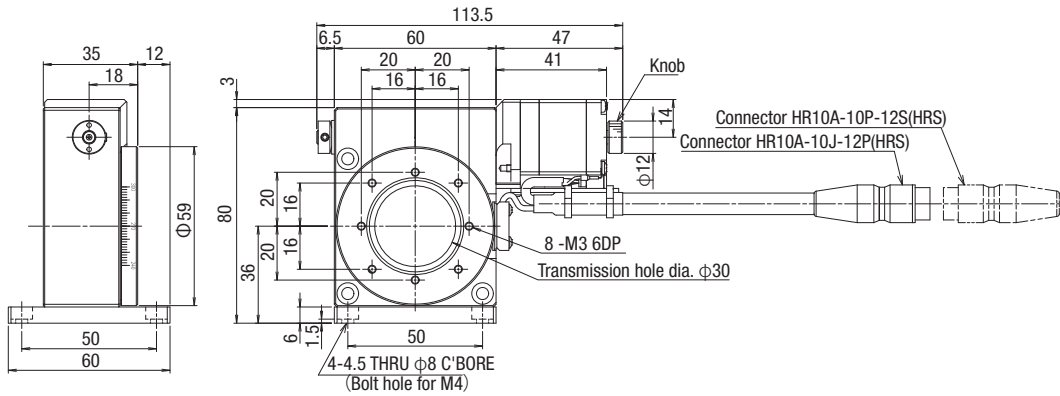
KRW06360T-LC-Z



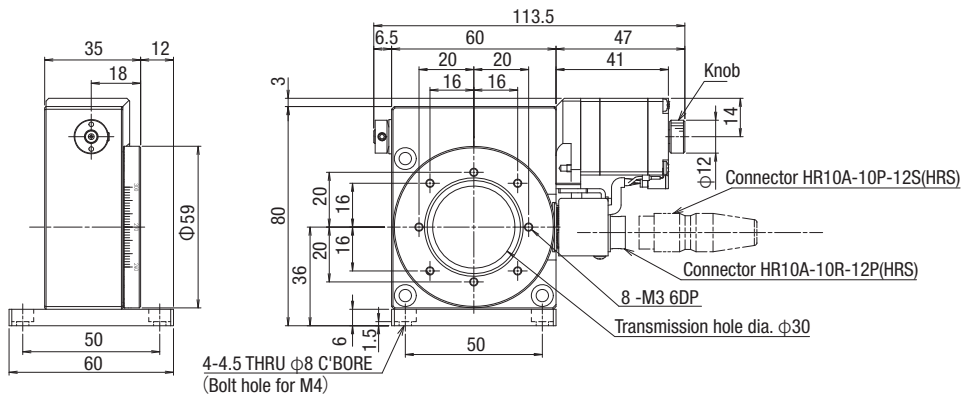
KRW06360M-LC-Z



KRW06360T-RC-Z



KRW06360M-RC-Z



Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60$

$\phi 75$

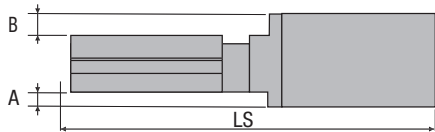
$\phi 100$

$\phi 180$

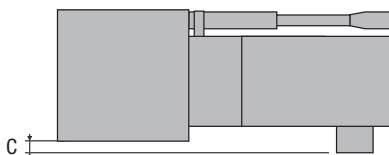
Other

Dimensions

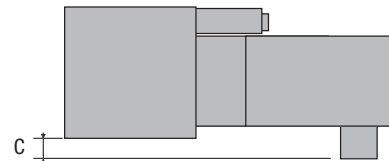
Side view



Top view :Connector :T(Pigtail)



Top view :Connector :M(Panel Mount)



C Standard motor

Motor model C005C-90215P-1

G High resolution

Motor model PK523HPMB-C1

Model	Stage size	Motor	Motor size	A(mm)	B(mm)	C(mm)	LS(mm)
KRW04360*-C	φ39/□40	C	□28	-	-	3	99.5
KRW04360*-G		G					
KRW06360*-C	φ59/□60	C	□28	-	-	3	113.5
KRW06360*-G		G					

PA αSTEP(AR Series)

Motor model ARM24SAK

ZA αSTEP(AZ Series)

Motor model AZM24AK

Model	Stage size	Motor	Motor size	A(mm)	B(mm)	C(mm)	LS(mm)
KRW04360*-PA	φ39/□40	PA	□28	-	-	8.5	112.5
KRW04360*-ZA		ZA				13	122
KRW06360*-PA	φ59/□60	PA	□28	-	-	8.5	126.5
KRW06360*-ZA		ZA				13	136

EA Motor for EtherCAT

Motor model STM28W100A

Model	Stage size	Motor	Motor size	A(mm)	B(mm)	C(mm)	LS(mm)
KRW04360*-EA	φ39/□40	EA	□28	-	-	8.9	127.8
KRW06360*-EA	φ59/□60						141.8

UG Servo motor MINAS A6 (Panasonic)

Motor model MSMF5AZL1A2

UA Servo motor J4 (Mitsubishi Electric corporation)

Motor model HG-KR053

Model	Stage size	Motor	Motor size	A(mm)	B(mm)	C(mm)	LS(mm)
KRW04360*-UG	φ39/□40	UG	□38	2.5	0.5	21	154.5
KRW04360*-UA		UA	□40	4.2	2	17.8	148.9
KRW06360*-UG	φ59/□60	UG	□38	2	1	21	169
KRW06360*-UA		UA	□40	3.7	2.5	17.8	163.4

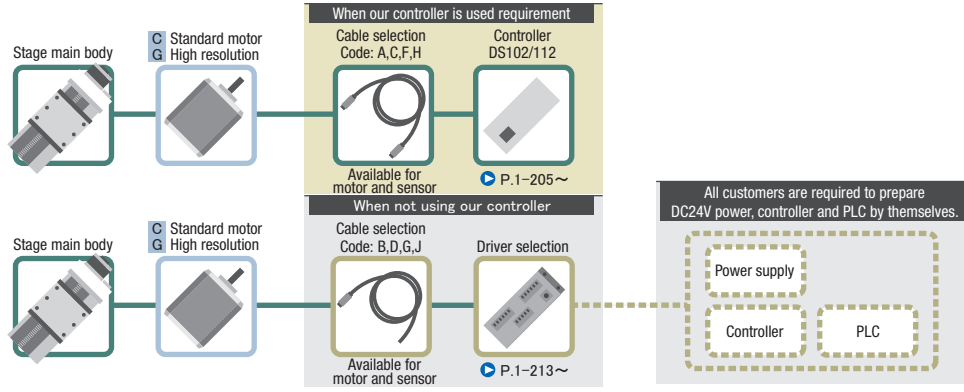
Motorized Stage

Rotary Stage $\phi 39/\phi 59/\square 40/\square 60$:KRW04/KRW06

Motor option

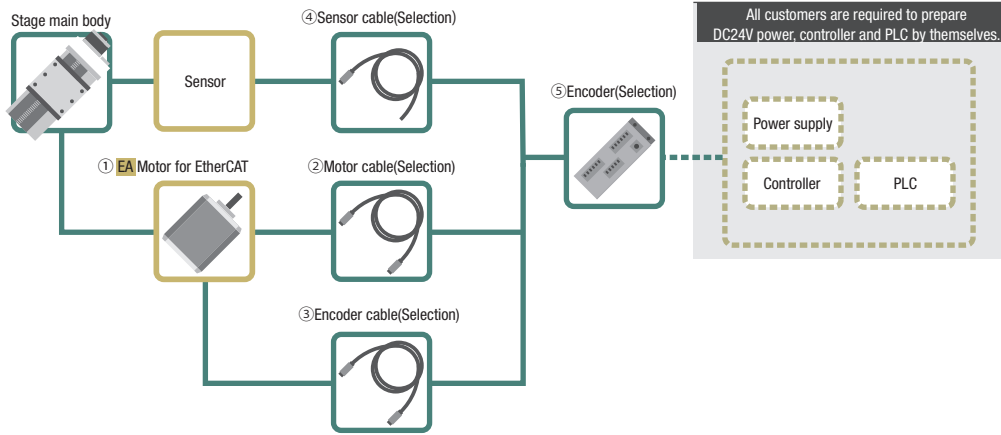
C Standard motor
 Motor model
 C005C-90215P-1

G High resolution
 Motor model
 PK523HPMB-C1



Motor option

EA Motor for EtherCAT
 Motor model
 STM28W100A



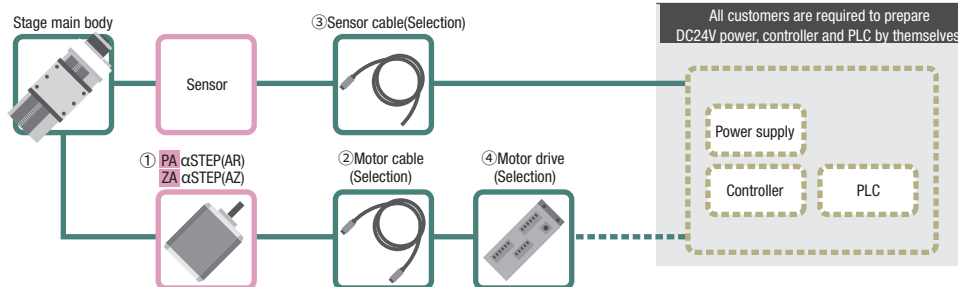
Code	① Motor model	② Motor cable selection	③ Encoder cable selection	④ Sensor cable selection	⑤ Driver selection
EA	STM28W100A	3A : D214-3-3R2 5A : D214-3-5R2 Blank · 3 · 5 : Not included	3A : D214-3-3RE2 5A : D214-3-5RE2 Blank · 3 · 5 : Not included	3A · 3 : HR10AP-S-SB-6-3 5A · 5 : HR10AP-S-SB-6-5 Blank : HR10AP-S-SB-6-2	3A · 5A : DS1000A-EC-28 Blank · 3 · 5 : Not included

- New
- Motorized Rotary Stage
- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller
- Ball Screw
- Worm Gear
- Direct Drive
- $\phi 39$
- $\phi 40$
- $\phi 59$
- $\phi 60$
- $\phi 75$
- $\phi 100$
- $\phi 180$
- Other

Motor option

PA αSTEP (AR Series)
 Motor model
 ARM24SAK

ZA αSTEP (AZ Series)
 Motor model
 AZM24AK

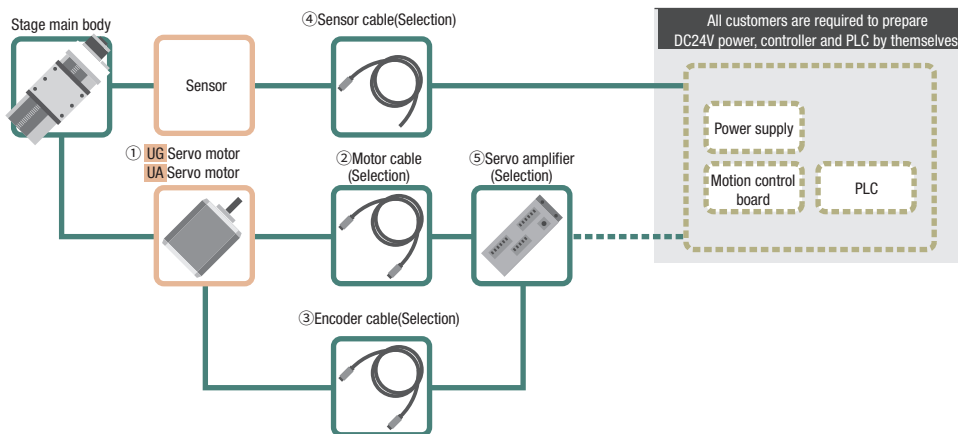


Code	① Motor model	② Motor cable selection	③ Sensor cable selection	④ Driver selection
PA	ARM24SAK	3A : CC030VA2R2 5A : CC050VA2R2 Blank • 3 • 5 : Not included	3A • 3 : HR10AP-S-SB-6-3 5A • 5 : HR10AP-S-SB-6-5 Blank : HR10AP-S-SB-6-2	3A • 5A : ARD-K Blank • 3 • 5 : Not included
ZA	AZM24AK	3A : CC030VZ2R2 5A : CC050VZ2R2 Blank • 3 • 5 : Not included		3A • 5A : AZD-K Blank • 3 • 5 : Not included

Motor option

UG Servo motor
 Motor model
 MSMF5AZL1A2

UA Servo motor
 Motor model
 HG-KR053



Code	① Motor model	② Motor cable selection	③ Encoder cable selection	④ Sensor cable selection	⑤ AC servo amplifier selection
UG	MSMF5AZL1A2	3A : MFMC A0030EED 5A : MFMC A0050EED Blank • 3 • 5 : Not included	3A : MFEC A0030EAD 5A : MFEC A0050EAD Blank • 3 • 5 : Not included	3A • 3 : HR10AP-S-SB-6-3 5A • 5 : HR10AP-S-SB-6-5 Blank : HR10AP-S-SB-6-2	3A • 5A : MADLT05SF Blank • 3 • 5 : Not included
UA	HG-KR053	3A : SVPM-J3HF1-B-3-02S 5A : SVPM-J3HF1-B-5-02S Blank • 3 • 5 : Not included	3A : SVEM-J3HF1-B-3 5A : SVEM-J3HF1-B-5 Blank • 3 • 5 : Not included		3A • 5A : MR-J4-10A Blank • 3 • 5 : Not included

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

Ball Screw

Worm Gear

Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Motorized Stage

Electrical specification : KRW04/KRW06

Motor · Electrical specification (5 phase stepping motor/αSTEP)

Motor code	C	G	PA	ZA	
Model	KRW04/KRW06				
Motor Specification (*1)	Type	5 phase stepping motor (0.75A/Phase)		αSTEP (AR Series)	
	Feature	Standard	High resolution	Small step-out, incremental	
	Model (*2)	C005C-90215P-1	PK523HPMB-C1	ARM24SAK	
	Manufacturer	Oriental Motor Co., Ltd.			
	Step angle	0.72°	0.36°	0.36°(1000P/R時)	
	Mass	0.11kg	0.11kg	0.15kg	0.15kg
	Motor size	□size 37mm		□28mm	
		L size		45mm	54.5mm
	Max. Holding Torque	0.048N · m	0.038N · m	0.055N · m	0.095N · m
	Driver model	CVD507-K-A9		ARD-K	AZD-K
Input power (Voltage · frequency)	DC24V±10% 1.4A(MAX)		DC24V±10%	DC24V±5%	
Connector	Pigtail	HR10A-10J-12P(73) (Hirose Electric Co., Ltd.)	Motor:43025-1000 (MOLEX) or 1-794617-0(TE Connectivity) Sensor:HR10A-7J-6P(73)(HRS)	Motor:DF62B-13EP-2.2C(HRS) Sensor:HR10A-7J-6P(73)(HRS)	
	Panel Mount	HR10A-10R-12P(73) (Hirose Electric Co., Ltd.)	Motor:43025-1000 (MOLEX) or 1-794617-0(TE Connectivity) Sensor:HR10A-7R-6P(73)(HRS)	Motor:DF62B-13EP-2.2C(HRS) Sensor:HR10A-7R-6P(73)(HRS)	
	Receiving connector	HR10A-10P-12S(73) (Hirose Electric Co., Ltd.)	Motor:43020-1000 (MOLEX) or 1-794615-0(TE Connectivity) Sensor:HR10A-7P-6S(73) (HRS)	Motor:DF62C-13S-2.2C(HRS) Sensor:HR10A-7P-6S(73)(HRS)	
Sensor board	Limit sensor	—			
	Origin sensor	Available			
	Slit origin sensor	—			
	Sensor model	Photo microsensor EE-SX4320 (Omron Co., Ltd.)			
	Power-supply voltage	DC5~24V±5%			
	Current consumption	Total 35mA or less			
	Control output	NPN open collector output DC30V 10mA or less			
	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

C · G	Available for motor and sensor	<p>[Pin allocation (common)] Pigtail : HR10A-10J-12P(73) (HRS) Panel Mount : HR10A-10R-12P(73) (HRS)</p>	<p>[Pin allocation (common)]</p> <table border="1"> <tr><td>1</td><td>Motor lead (Blue)</td><td>Blue</td></tr> <tr><td>2</td><td>Motor lead (Red)</td><td>Red</td></tr> <tr><td>3</td><td>Motor lead (Orange)</td><td>Orange</td></tr> <tr><td>4</td><td>Motor lead (Green)</td><td>Green</td></tr> <tr><td>5</td><td>Motor lead (Black)</td><td>Black</td></tr> <tr><td>6</td><td>Not used (or CWLS)</td><td></td></tr> <tr><td>7</td><td>Not used (or CCWLS)</td><td></td></tr> <tr><td>8</td><td>N.C.</td><td></td></tr> <tr><td>9</td><td>Power input V+</td><td></td></tr> <tr><td>10</td><td>ORG output</td><td></td></tr> <tr><td>11</td><td>Power input GND</td><td></td></tr> <tr><td>12</td><td>F.G.</td><td></td></tr> </table> <p>6pin,7pin are connected to GND inside the sensor board. If 6pin,7pin are not used, it is recommended to insulate them or connect them to GND.</p>	1	Motor lead (Blue)	Blue	2	Motor lead (Red)	Red	3	Motor lead (Orange)	Orange	4	Motor lead (Green)	Green	5	Motor lead (Black)	Black	6	Not used (or CWLS)		7	Not used (or CCWLS)		8	N.C.		9	Power input V+		10	ORG output		11	Power input GND		12	F.G.	
		1	Motor lead (Blue)	Blue																																			
2	Motor lead (Red)	Red																																					
3	Motor lead (Orange)	Orange																																					
4	Motor lead (Green)	Green																																					
5	Motor lead (Black)	Black																																					
6	Not used (or CWLS)																																						
7	Not used (or CCWLS)																																						
8	N.C.																																						
9	Power input V+																																						
10	ORG output																																						
11	Power input GND																																						
12	F.G.																																						

Motor Code	Motor · Encoder	Sensor (common)																				
PA	<p>[Receiver cable] Model:CC030VA2R2(3m)/CC050VA2R2(5m) *Flexible cable</p> <p>Driver side Connector:43025-1000(Molex) or 1-794617-0(TE Connectivity) Motor side Connector:43020-1000(Molex) or 1-794615-0(TE Connectivity)</p> <p>3m, 5m</p>	<p>[Receiver cable] Model:HR10AP-S-SB-6-□ (□ is the length) *for fixing Sensor side Connector (Female): HR10A-7P-6S (73) (HRS) ULAWM20276 AWG28 3P Black</p> <p>2m⁺⁵⁰₋₀mm, 3m⁺⁵⁰₋₀mm, 5m⁺¹⁵⁰₋₀mm</p> <table border="1"> <tr><td>1</td><td>Orange/Red</td><td>2</td><td>CCWLS</td></tr> <tr><td>3</td><td>Gray/Black</td><td>3</td><td>ORG</td></tr> <tr><td>4</td><td>Gray/Red</td><td>4</td><td>NORG</td></tr> <tr><td>5</td><td>White/Black</td><td>5</td><td>V+</td></tr> <tr><td>6</td><td>White/Red</td><td>6</td><td>V-</td></tr> </table> <p>*The shields are connected with the connector shell.</p>	1	Orange/Red	2	CCWLS	3	Gray/Black	3	ORG	4	Gray/Red	4	NORG	5	White/Black	5	V+	6	White/Red	6	V-
1	Orange/Red	2	CCWLS																			
3	Gray/Black	3	ORG																			
4	Gray/Red	4	NORG																			
5	White/Black	5	V+																			
6	White/Red	6	V-																			
ZA	<p>[Receiver cable] Model:CC030VZ2R2(3m)/CC050VZ2R2(5m) *Flexible cable</p> <p>Driver side Connector:55100-0670(Molex) Motor side Connector:DF62C-13S-2.2C(HRS)</p> <p>Driver side Connector:J11DF-06V-KX (J.S.T.MFG.)</p> <p>3m, 5m</p>	<p>[Pin allocation (common)] Pigtail:HR10A-7J-6P(73) (HRS) Panel Mount:HR10A-7R-6P(73) (HRS)</p> <p>[結線図]</p> <table border="1"> <tr><td>1</td><td>Not used (or CWLS)</td></tr> <tr><td>2</td><td>Not used (or CCWLS)</td></tr> <tr><td>3</td><td>ORG output</td></tr> <tr><td>4</td><td>N.C.</td></tr> <tr><td>5</td><td>Power input V+</td></tr> <tr><td>6</td><td>Power input GND</td></tr> </table> <p>1pin,2pin are connected to GND inside the sensor board. If 1pin,2pin are not used, it is recommended to insulate them or connect them to GND.</p>	1	Not used (or CWLS)	2	Not used (or CCWLS)	3	ORG output	4	N.C.	5	Power input V+	6	Power input GND								
1	Not used (or CWLS)																					
2	Not used (or CCWLS)																					
3	ORG output																					
4	N.C.																					
5	Power input V+																					
6	Power input GND																					

- New
- Motorized Rotary Stage
- X
- XY
- Z
- Horizontal Z
- XYZ
- Goniometer
- Rotary
- Unit
- Controller
- Ball Screw
- Worm Gear
- Direct Drive
- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other
- C
- 055

Motor • Electrical specification(Motor for EtherCAT/Servo motor)		EA	UG	UA	
Motor code			KRW04/KRW06		
Model					
Motor Specification (※1)	Type	2 phase closed Loop stepping motor	Servo motor	Servo motor	
	Feature	Small step-out ,incremental,EtherCAT	High speed	High speed	
	Model (*2)	STM28W100A	MSMFAZL1A2	HG-KR053	
	Manufacturer	SURUGA SEIKI	Panasonic	Mitsubishi Electric corporation	
	Step angle	0.36°(1000P/R時)	Both absolute and incremental 23 bits encoder (8388608P/R) (*3)	Both absolute and incremental 22 bits encoder (4194304P/R) (*4)	
	Mass	0.12kg	0.32kg	0.34kg	
	Motor size	□size	□28mm	□38mm	□40mm
		L size	59.3mm	72mm	66.4mm
	Max. Holding Torque	0.085N • m	—	—	
	Maximum torque	—	0.48N • m	0.56N • m	
Driver model	DS1000A-EC-28	MADLT05SF	MR-J4-10A		
Input power (Voltage • frequency)	DC24V±10%	Three and Single phase AC200-240V 50/60Hz	Three and Single phase AC200-240V 50/60Hz		
Connector	Pigtail	Motor:B06B-ZESK-D (JST) Encoder:SM08B-GHS-TB (JST) Sensor:HR10A-7J-6P(73)(HRS) Driver I/O Connector Housing:PUDP-24V-S Driver I/O Contact:SPUD-002T-P0.5:SPUD-002T-P0.5	Motor: 172167-1(TE Connectivity) Encoder: 172169-1(TE Connectivity) Sensor:HR10A-7J-6P(73)(HRS)	Motor: Manufacturer standard Encoder: Manufacturer standard Sensor:HR10A-7J-6P(73) (HRS)	
	Panel Mount	Motor:B06B-ZESK-D (JST) Encoder:SM08B-GHS-TB (JST) Sensor:HR10A-7R-6P(73)(HRS) Driver I/O Connector Housing:PUDP-24V-S Driver I/O Contact:SPUD-002T-P0.5	Motor: 172167-1 (TE Connectivity) Encoder: 172169-1 (TE Connectivity) Sensor:HR10A-7R-6P(73)(HRS)	Motor: Manufacturer standard Encoder: Manufacturer standard Sensor:HR10A-7R-6P(73)(HRS)	
	Receiving connector	Motor:ZER-06V-S (JST) Encoder:GHR-08V-S (JST) Sensor:HR10A-7P-6S(73)(HRS)	Motor: 172159-1 (TE Connectivity) Encoder: 172161-1 (TE Connectivity) Sensor:HR10A-7P-6S(73)(HRS)	Motor:JN4FT04SJ1-R (JST) Encoder: 1674320-1 (TE Connectivity) Sensor:HR10A-7P-6S(73)(HRS)	
Sensor board	Limit sensor	—			
	Origin sensor	Available			
	Slit origin sensor	—			
	Sensor model	Photo microsensor EE-SX4320 (Omron Co., Ltd.)			
	Power-supply voltage	DC5~24V±5%			
	Current consumption	Total 35mA or less			
	Control output	NPN open collector output DC30V 10mA or less			
	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.
 *3 Optional encoder cable is for incremental system.
 *4 When constructing an absolute system, it is necessary to install a battery in the amplifier.

Pin allocation • Connection diagram

Motor Code	Motor • Encoder	Sensor (common)															
EA	Motor [Receiver cable] Model:D214-3-3R2(3m)/D214-3-5R2(5m) *Flexible cable Driver side Connector:PAP-04V-S(J.S.T.MFG.) Contact:SPHD-002T-P0.5(J.S.T.MFG.) Motor side Connector:ZER-06V-S(J.S.T.MFG.) Contact:SZE-002T-P0.3(J.S.T.MFG.) 	Encoder [Receiver cable] Model:D214-3-3RE2(3m)/D214-3-5RE2(5m) *Flexible cable Driver side Connector:PUDP-10V-S(J.S.T.MFG.) Contact:SPUD-002T-P0.5(J.S.T.MFG.) Motor side Connector:GHR-08V-S(J.S.T.MFG.) Contact:SSHL-002T-P0.2(J.S.T.MFG.) 															
	Motor [Receiver cable] Model:MFCA0030EED(3m)/MFCA0050EED(5m) *Flexible cable 																
UG	Encoder [Receiver cable] Model:MFCA0030EAD(3m)/MFCA0050EAD(5m) *for fixing 	Motor Sensor side Connector (Female): HR10A-7P-6S (73) (HRS) ULAWM20276 AWG28 3P Black <table border="1"> <tr><td>Orange/Red</td><td>2</td><td>CCWLS</td></tr> <tr><td>Gray/Black</td><td>3</td><td>ORG</td></tr> <tr><td>Gray/Red</td><td>4</td><td>NORG</td></tr> <tr><td>White/Black</td><td>5</td><td>V+</td></tr> <tr><td>White/Red</td><td>6</td><td>V-</td></tr> </table> <p>*The shields are connected with the connector shell.</p>	Orange/Red	2	CCWLS	Gray/Black	3	ORG	Gray/Red	4	NORG	White/Black	5	V+	White/Red	6	V-
	Orange/Red		2	CCWLS													
Gray/Black	3	ORG															
Gray/Red	4	NORG															
White/Black	5	V+															
White/Red	6	V-															
UA	Motor [Receiver cable] Model:SVPM-J3HF1-B-□-02S *Flexible cable Loose wire on the servo amplifier side Motor side Connector: JN4FT04SJ1-R (JAE) NA3CTR-18-4(MISUMI) ULAWM2517 AWG18 	Encoder [Receiver cable] Model:SVEM-J3HF1-B-□ *Flexible cable Motor (encoder)side Connector:1674320-1 (TE Connectivity) Servo amplifier side Receptacle: 36210-0100FD (3M) ShellKit : 36310-3200-008 (3M) NAMFSB-23-3P (MISUMI) ULAWM2576 AWG23 <p>* The load drawer</p>															
	Motor [Pin allocation (common)] Pigtail:HR10A-7J-6P(73) (HRS) Panel Mount:HR10A-7R-6P(73) (HRS) 																
Encoder [Connection diagram] 		Encoder 1 Not used (or CWLS) 2 Not used (or CCWLS) 3 ORG output 4 N.C. 5 Power input V+ 6 Power input GND 															

1pin,2pin are connected to GND inside the sensor board. If 1pin,2pin are not used, it is recommended to insulate them or connect them to GND.

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

Ball Screw

Worm Gear

Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Timing chart

	Origin detected scale position [deg.]
KRW04360T(M)-L	0 (The end face of the origin: CCW side edge of shield plate) 8 (Opposite end face : CW side edge of shield plate)
KRW06360T(M)-L	0 (The end face of the origin: CCW side edge of shield plate) 8 (Opposite end face : CW side edge of shield plate)

*Return to origin means that is performed return to origin type 4 using DS102/DS112 series. (DS102/DS112 are dedicated products for 5-phase motors.)

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

	Origin detected scale position [deg.]
KRW04360T(M)-R	0 (The end face of the origin: CW side edge of shield plate) 8 (Opposite end face : CCW side edge of shield plate)
KRW06360T(M)-R	0 (The end face of the origin: CW side edge of shield plate) 8 (Opposite end face : CCW side edge of shield plate)

*Return to origin means that is performed return to origin type 3 using DS102/DS112 series. (DS102/DS112 are dedicated products for 5-phase motors.)

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

Return to origin method

Suruga's motorized stages is different from the wire connection as the number of sensors depending on models. It is necessary to choose type to suit correctly as return to origin operation is divided into same types. Selected wrong type may be operated incorrectly. Choose your best one whatever you need according to be recommended as below.

■ KRW04360/KRW06360 recommended return to origin Return to origin sequence P.1-201~

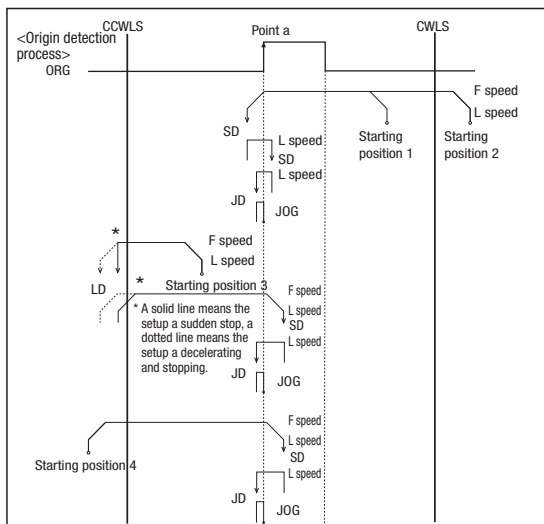
Type 3: Detect in the direction of CCW and perform detected process for CCW edge of ORG signal.

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

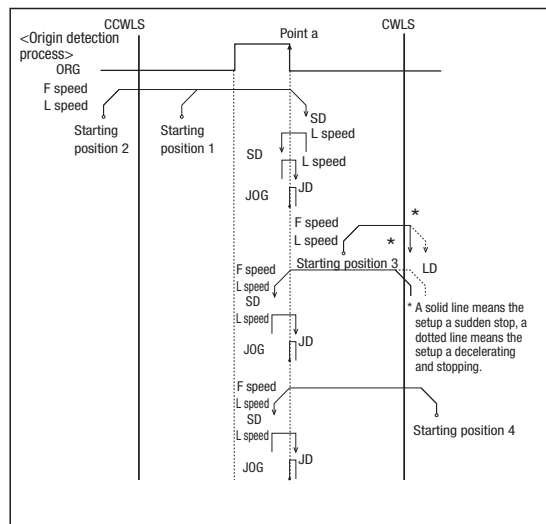
Type 9: After finished Type3, perform detected process for CCW edge of TIMING signal.

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

[Type3]



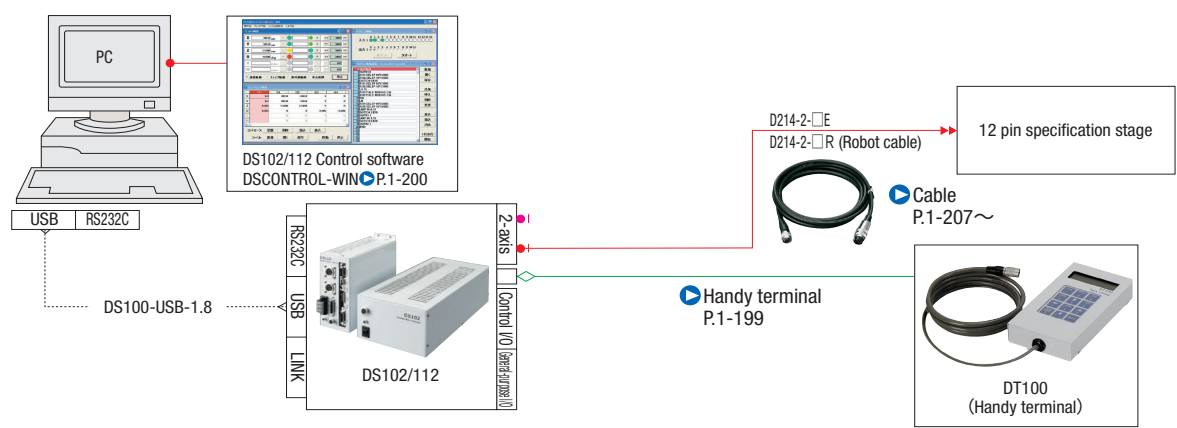
[Type4]



Connectin example

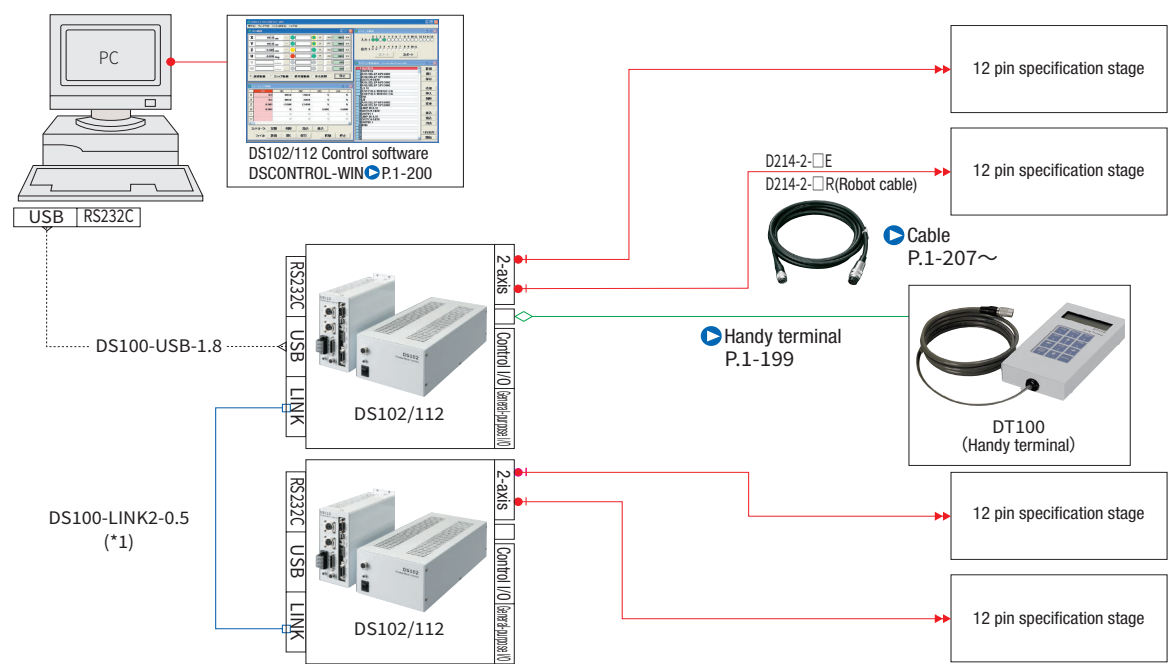
■ Connection example 1 Motorized Stage 1axis: When holding a terminal device (using control software)

*USB cable connection between PC and controller.



■ Connection example 2 Motorized Stage 4axis: When holding a terminal device (using control software)

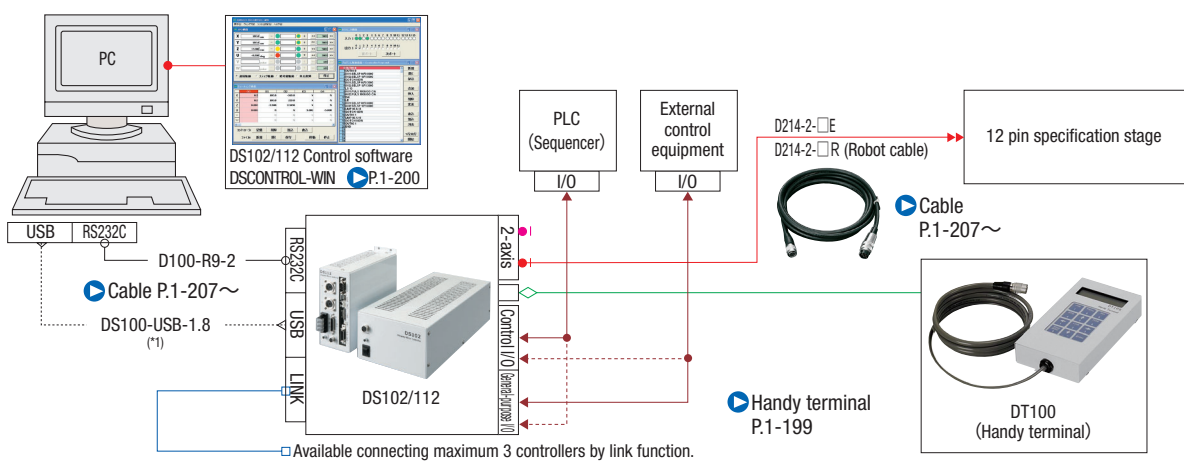
*USB cable connection between PC and controller.



(*1) It is possible to control up to 3 controllers (for a maximum of 6-axis control) with link function.

■ Connection example 3 When controlling from the PLC I/O Unit.

*USB cable connection between PC and controller.



*1) Available connecting maximum 3 controllers by link function.

(*1) Using the USB hub, it is controllable in a single PC up to four link networks (24-axis).

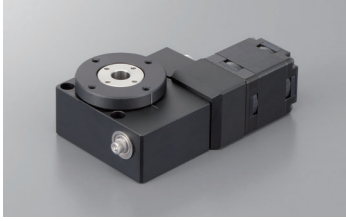
Motorized Stage

Rotary Stage: KRE04360/KRE06360

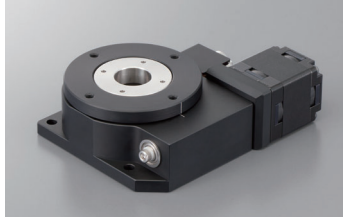
Motorized Rotary Stage

RoHS

KRE04360

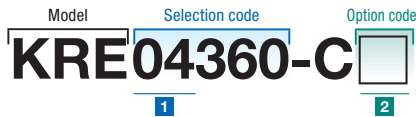


KRE06360



* The photo shows an image.
The holes and the shape may differ in certain respects from the actual product.

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



🔗 Cable P.1-207~
🔗 Electrical specification P.1-179~

1 Table size

04	φ39mm
06	φ60mm

2 Cable option

Code	Specification	Cable type
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)	—

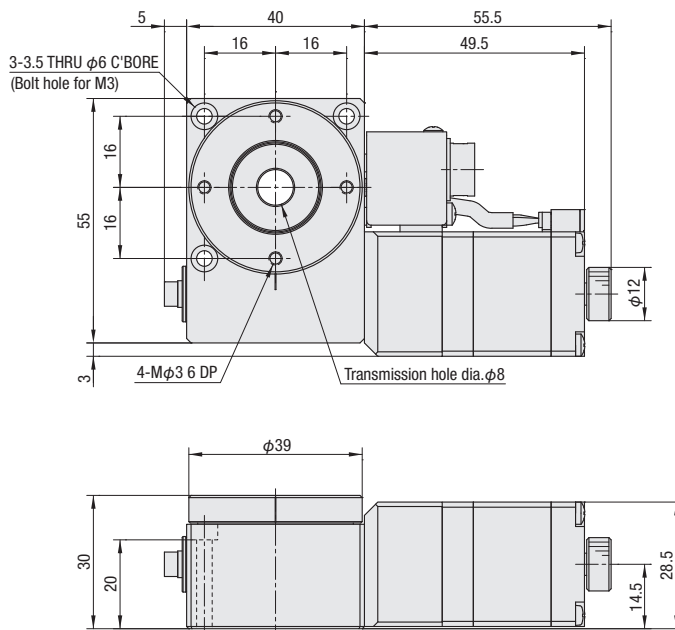
* If you choose the option specification, please add the difference to standard price.
 Electrical specification 🔗 P.1-179~
 * See page 🔗 P.1-207, 209~ for details of cable.
 * Please select "Code F or H" when connect with stepping motor controller(DS102/112).

- Ball Screw
- Worm Gear
- Direct Drive

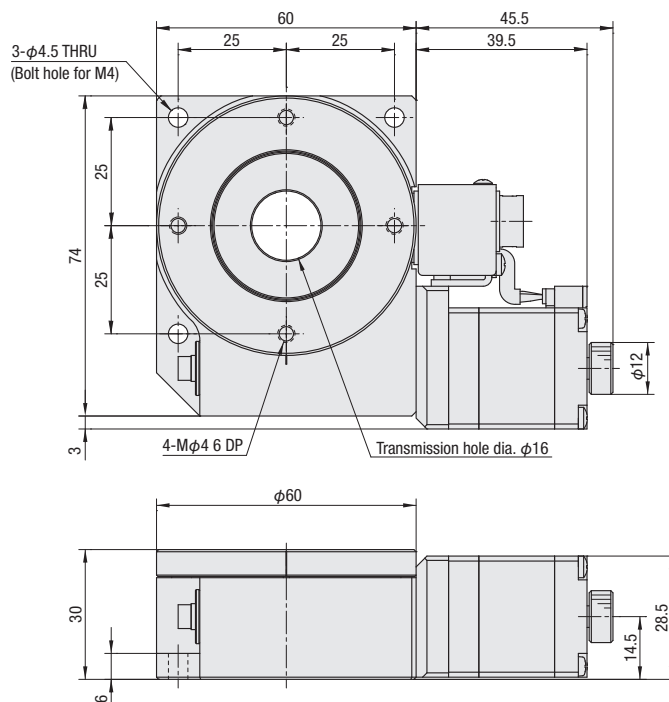
SPEC		
Model	KRE04360-C	KRE06360-C
Mechanical specification	360°	
Travel length	360°	
Table size	φ39mm	φ60mm
Travel mechanism (Reduction ratio)	Worm gear (Reduction ratio 1/90)	Worm gear (Reduction ratio 1/120)
Guide	Deep groove ball bearing	
Main materials-Finishing	Aluminum—Black almite finishing	
Weight	0.36kg	0.50kg
Accuracy specification	Within 0.1 degree	
Resolution (Pulse)	0.008°(Full)	0.006°(Full)
MAX speed	40°/sec	30°/sec
Positioning accuracy	Within ±0.05°	
Repeatability positioning accuracy	Within 0.1 degree	
Load capacity	3kgf [29.4N]	
Lost motion	Within 0.1 degree	
Parallelism	Within 50μm	
Sensor	—	
Limit sensor	—	
Origin sensor	Installed	
Other	3 of M3—25	3 of M4—12
Provided screw (Hexagon-headed bolt)	3 of M3—25	3 of M4—12

Dimensional outline drawings

KRE04360



KRE06360



Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60$

$\phi 75$

$\phi 100$

$\phi 180$

Other

1

178

Electrical Specification: KRE04360/KRE06360

Electrical specification

Models		KRE04360-C	KRE06360-C
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase	
	Maker	Oriental Motor Co., Ltd.	
	Model (*2)	C005C-90215P-1	
	Step angle	0.72°	
Connector	Model	HR10A-10R-12PC (71) (Hirose Electric Co., Ltd.)	
	Receiving connector	HR10A-10P-12S (73) (Hirose Electric Co., Ltd.)	
Sensor	Origin sensor	Installed	
	Model	Photo microsensor EE-SX4320 (Omron Co., Ltd.)	
	Power voltage	DC5~24V ±10%	
	Consumption current	Total 35mA 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.

X

XY

Z

Horizontal
Z

XYZ

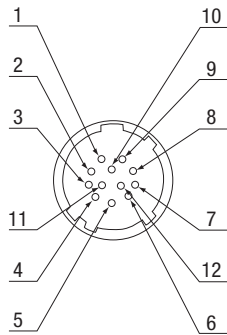
Goniometer

Rotary

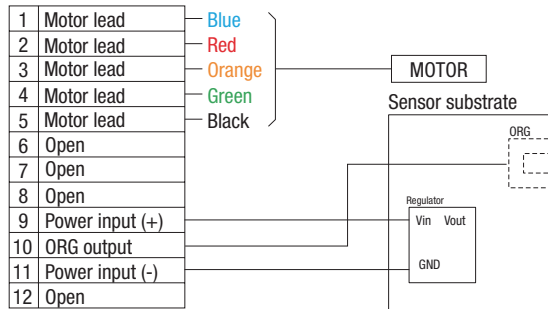
Unit

Controller

Pin allocation



Connection diagram



* When use DS102/DS112 controller, setup the sensor logic as below.

- Limit sensor logic: A (N.O.)
- Origin sensor logic: B (N.C.)

Timing chart

Unit [°]

	Origin detected scale position [°]
KRE04360	0 (The end face of the origin: CCW side edge of the douser.) 6 (Opposite side of the end face: CW side edge of the douser.)
KRE06360	0 (The end face of the origin: CCW side edge of the douser.) 4 (Opposite side of the end face: CW side edge of the douser.)

* 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.

Ball
Screw

Worm
Gear

Direct
Drive

φ39

φ40

φ59

φ60

φ75

φ100

φ180

Other

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

Ball Screw

Worm Gear

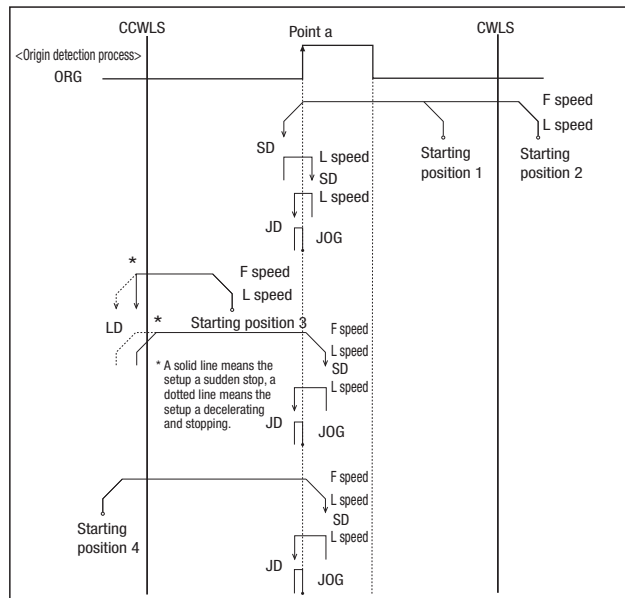
Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

KRE series recommendation return to origin method

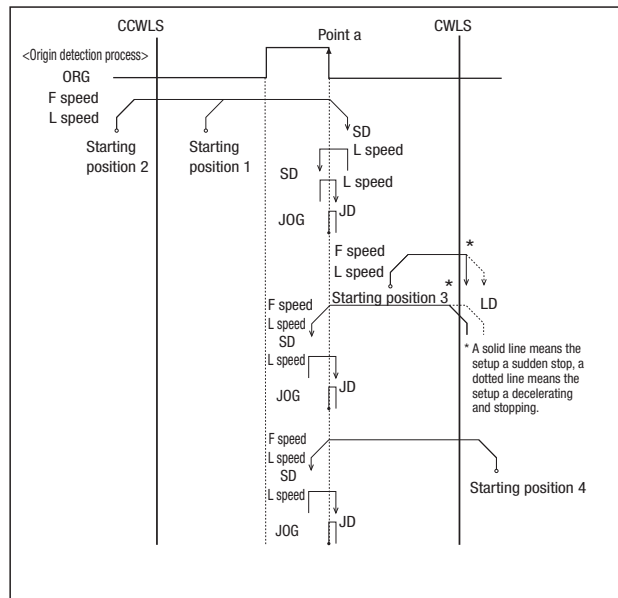
Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not be work correctly. Set to the way of recommendation return origin when using our controller.

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



[Type9] After finished Type3, perform detected process for CCW edge of TIMING signal.

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



[Typ10] After finished Type4, perform detected process for CW edge of TIMING signal.

Return to origin sequence P.1-201~

Adaptive driver

■ Driver P.1-205~

DC24V type input

Model	CVD507-K-A9	CRD5107P
Divisions	1~1/250 (16 steps)	1~1/250 (16 steps)

Adaptive stepping motor controller

■ Controller P.1-197~

Input power	General-purpose input/output port	Driver type (Divisions)	
		Normal (Full/Half)	Micro step (1~1/250 [16 steps])
AC100-240V	Without	DS102ANR	DS102AMS
	With	DS102ANR-IO	DS102AMS-IO
DC24V	Without	DS112ANR	DS112AMS
	With	DS112ANR-IO	DS112AMS-IO



Motorized Stage

Rotary Stage $\phi 75/\phi 100/\phi 180$: KS402

RoHS



■ Good for accuracy positioning at wide angle and 360° continuously rotation.

■ Transmission type would be suitable for rotating polarizing elements and organization cables.

Model Selection code Option code
KS402-75G-5

● Cable P.1-207~
 ● Electrical specification P.1-183~

1 Table size

75G	$\phi 75\text{mm}$
100C	$\phi 100\text{mm}$
180C	$\phi 180\text{mm}$

2 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

* 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



		SPEC		
Model		KS402-75G-5	KS402-100C-5	KS402-180C-5
Mechanical specification	Travel length	360°		360°
	Table size	$\phi 75\text{mm}$	$\phi 100\text{mm}$	$\phi 180\text{mm}$
	Travel mechanism (Reduction ratio)	Worm gear (1/144)	Worm gear (1/180)	Worm gear (1/180)
	Guide	Receiving cross roller axis	Combination angular ball bearing	Combination angular ball bearing
	Main materials-Finishing	Aluminum-Black almite finishing		
Accuracy specification	Weight	1.1kg	2.5kg	9.7kg
	Resolution	0.0025°/Pulse (Full)	0.004°/Pulse (Full)	0.004°/Pulse (Full)
	MAX speed	25°/sec [10kHz]	20°/sec [5kHz]	20°/sec [5kHz]
	Positioning accuracy	Within 0.03°		
	Repeatability positioning accuracy	Within $\pm 0.005^\circ$		
	Load capacity	10kgf [98N]	15kgf [147N]	30kgf [294N]
	Moment stiffness	0.15°/N · cm	0.07°/N · cm	0.02°/N · cm
	Lost motion	Within 0.005°	Within 0.004°	Within 0.01°
	Backlash	Within 0.005°	Within 0.004°	Within 0.01°
	Parallelism	Within 120 μm		
Eccentricity	Within 5 μm			
Runout	Within 20 μm		Within 60 μm	
Sensor	Limit sensor	Installed (Switch)		Installed (Switch)
	Origin sensor	Installed		
	Proximity origin sensor	—		
Provided screw (Hexagon-headed bolt)		4 of M4-12	4 of M6-16	4 of M6-12

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60$

$\phi 75$

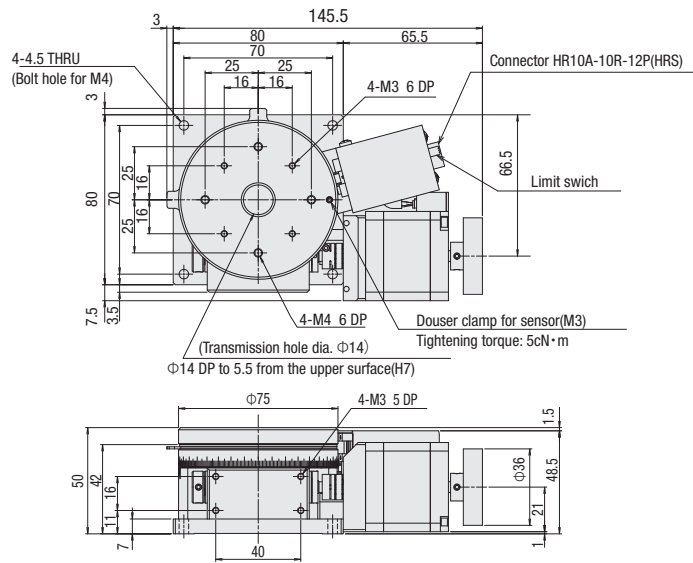
$\phi 100$

$\phi 180$

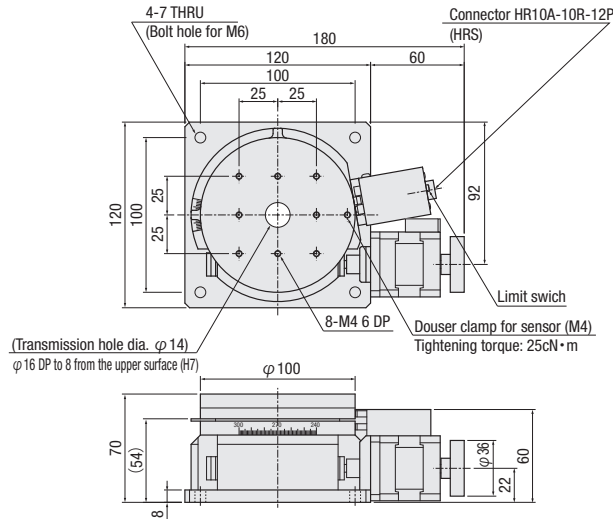
Other

Dimensional outline drawings

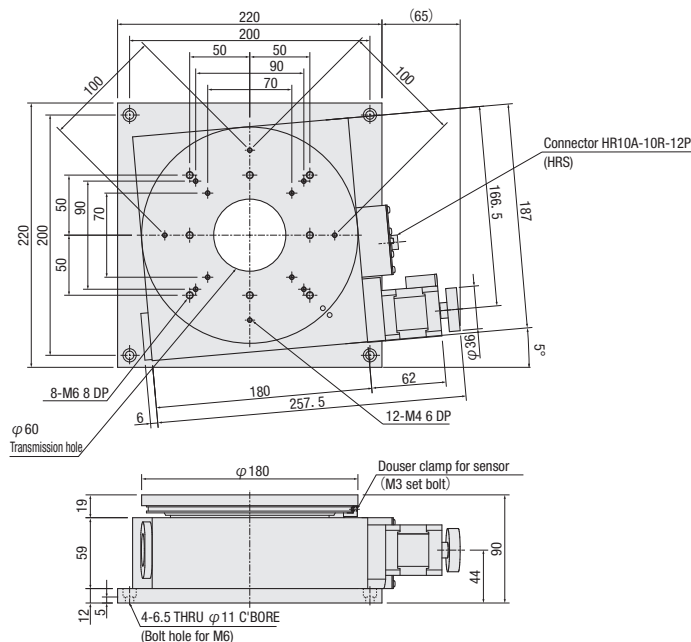
KS402-75G



KS402-100C



KS402-180C



Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

φ39

φ40

φ59

φ60

φ75

φ100

φ180

Other

1

182

Electrical Specification • Option: KS402

Electrical specification

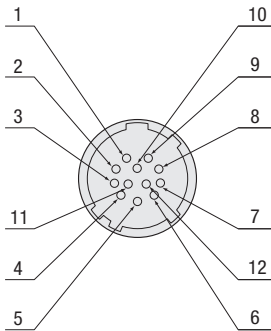
Models		KS402-75G	KS402-100C	KS402-180C
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co., Ltd.)		
	Model (*2)	PK544-PMB-C18(□42mm)	PK544PB-C18(□42mm)	PK544PB(□42mm)
	Step angle	0.36°		
Connector	Model	HR10A-10R-12P (73) (Hirose Electric Co., Ltd.)		
	applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co., Ltd.)		
Sensor	Limit sensor	Installed (PM-F25)		Installed (PM-F25,R25)
	Origin sensor	Installed (PM-F25)		Installed (PM-L25)
	Slit origin sensor	-		
	Model	Micro Photoelectric sensor PM-□25 (Panasonic Industrial Devices SUNX)		
	Power voltage	DC5~24V ±10%		
	Consumption current	Total 45mA or less (Per 1 sensor 15mA)		
	Control output	NPN open collector output DC30V or less 50mA or less Residual voltage 2V or less when the load current is 50mA Residual voltage 1V or less when the load current is 16mA		
Output logic	CWLS,CCWLS On detection (light shield condition): Output transistor OFF (Non-continuity) ORG Light on: Output transistor becomes OFF (Non-continuity)		On detection (light shield condition): Output transistor OFF (Non-continuity)	

*1 See page P.1-215~ for details of single motor specification.

*2 Model is our own management model.

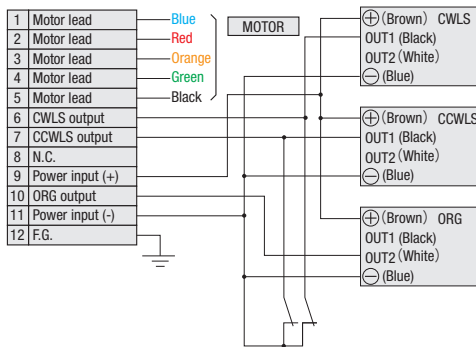
- Can be reset the limit function in KS402-75G, 100C, 180C by the switch.
- Can be set any traveling angle because of changeable shield plate position

Pin allocation

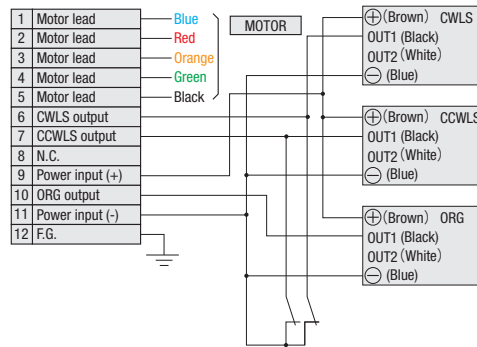


Connection diagram

KS402-75G/KS402-100C



KS402-180C



Timing chart

KS402-75G, KS402-100C, KS402-180C (Detect only KS402-180C (dark))

Origin • • • Detect in scale 0 (Lighth on)

(Return to origin is performed type 4 of returning origin by use of DS102/DS112 controller)

CW and CCW limit • • • Any changeable position

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

- Ball Screw
- Worm Gear

- Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

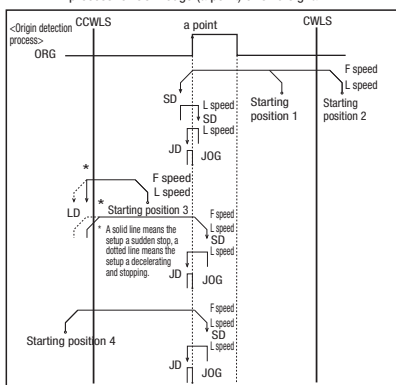
Method for return to origin

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

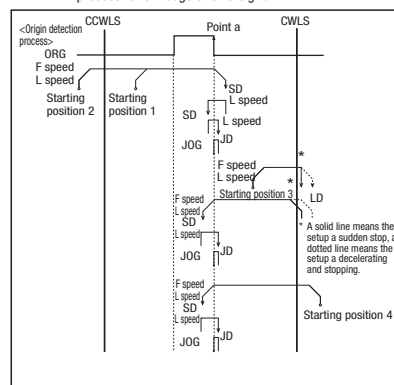
KS402 series recommended return to origin Return to origin sequence P.1-201~

- 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

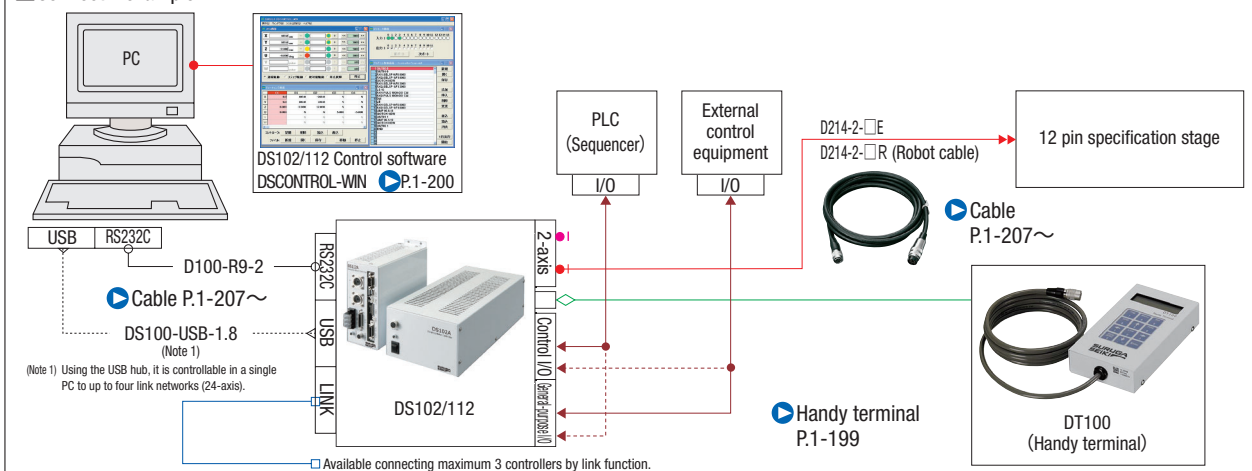
Model	CVD507-K-A9	CRD5107P
Divisions	1~1/250 (16 steps)	1~1/250 (16 steps)

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	DS102ANR	DS102AMS
	With	DS102ANR-IO	DS102AMS-IO
DC24V	Without	DS112ANR	DS112AMS
	With	DS112ANR-IO	DS112AMS-IO

Connectin example



(Note 1) Using the USB hub, it is controllable in a single PC to up to four link networks (24-axis).

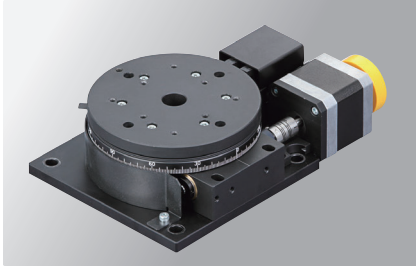
Available connecting maximum 3 controllers by link function.

Motorized Stage

New
Motorized Rotary Stage

Motorized Rotary Stage: KRE10360

KRE10360



RoHS

* This photos shows a cover psition is an image. The holes and the shape may differ in certain respects from the actual product.

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

Model Selection code Option code

KRE10360-

1 2

Cable P.1-207~
Electrical specification P.1-179~

1 Table size

10	φ100mm
----	--------

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	Cable is not included (Standard)	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)	—

* The one end loose side might be on an opposite side of stage.

* If you choose the option specification, please add the difference to standard price.
See page Page P.1-207, 209~ for more cable details.

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

- Ball Screw
- Worm Gear

- Direct Drive
- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

SPEC

Model		KRE10360
Mechanical specification	Travel length	360°
	Table size	φ100mm
	Travel mechanism (Reduction ratio)	Worm gear(1/90)
	Guide	Deep groove ball bearing
	Material of stage	Aluminum—Al-Bronze
Accuracy specification	Mass	1.8kg
	Resolution	0.008°/Pulse(Full)
	MAX speed	40°/sec[5kHz]
	Positioning accuracy	Within 0.05°
	Repeatability positioning accuracy	Within ±0.01°
	Load capacity	15kgf [147N]
	Moment stiffness	0.08°/N · cm
	Lost motion	Within 0.02°
	Back Rush	Within 0.02°
	Paralleism	Within 120μm
	Eccentricity	Within 5μm
Runout	Within 35μm	
Provided screw (Hexagon-headed bolt)		4 of M6—16
Sensor	Limit sensor	Installed (Switch)
	Origin sensor	Installed

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

Ball Screw

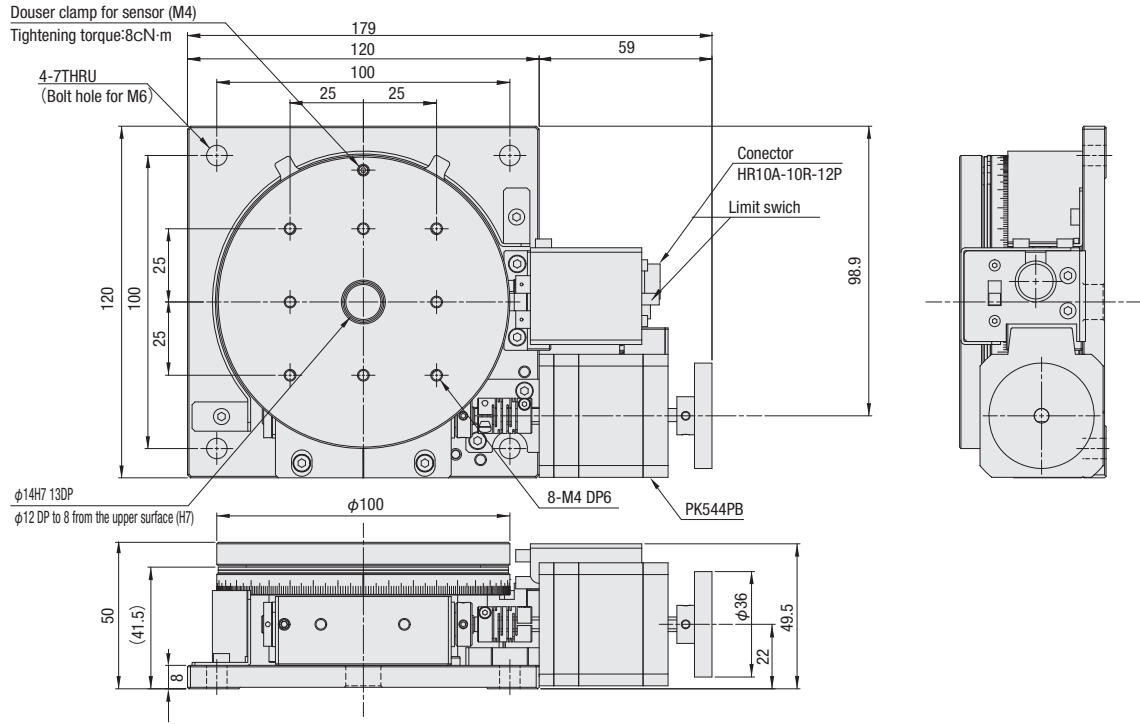
Worm Gear

Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100**
- φ180
- Other

Dimensional outline awings

KRE10360



Electrical Specification • Option : KRE10360

Electrical specification

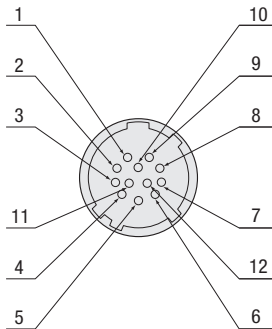
Model		KRE10360
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase (Oriental Motor Co., Ltd.)
	Model (*2)	PK544PB
	Step angle	0.72°
Connector	Model	HR10A-10R-12P (73) (Hirose Electric Co., Ltd.)
	Applicable connector on acceptance side	HR10A-10P-12S (73) (Hirose Electric Co., Ltd.)
Sensor	Limit sensor	Installed (PM-R25)
	Origin sensor	Installed (PM-F25)
	Slit origin sensor	—
	Model	Micro Photoelectric Sensor PM-□25 (Panasonic Industrial Devices SUNX)
	Power voltage	DC5~24V ±10%
	Consumption current	Total 45mA or less (Per 1 sensor 15mA)
	Control output	NPN open collector output DC30V or less 50mA or less Residual voltage 2V or less when the load current is 50mA Residual voltage 1V or less when the load current is 16mA
Output logic	CWLS, CCWLS	On detection (light shield condition): Output transistor OFF (Non-continuity)
	ORG	Light on: Output transistor becomes OFF (Non-continuity)

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

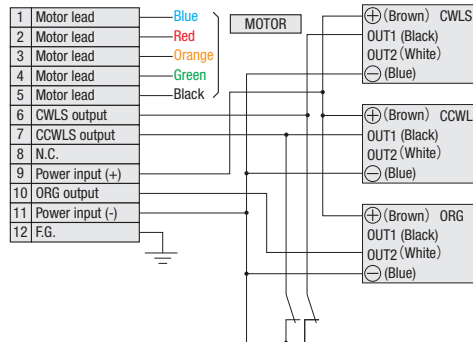
*2 Model is our own management model.

○ Can be set any traveling angle because of changeable shield plate position

Pin allocation



Connection diagram



Timing chart

Origin . . . Detect in scale 0 (Light)

(Return to origin is performed type 4 of returning origin by use of DS102/DS112 controller)

CW and CCW limit . . . Any changeable position

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

Ball Screw

Worm Gear

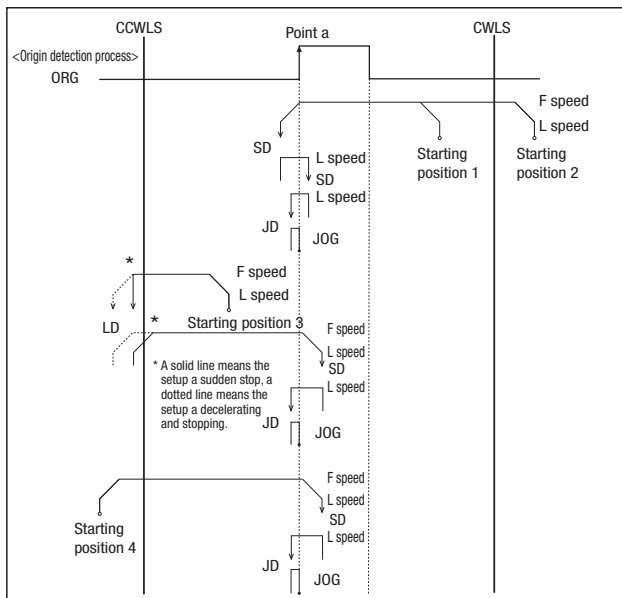
Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Method for return to origin

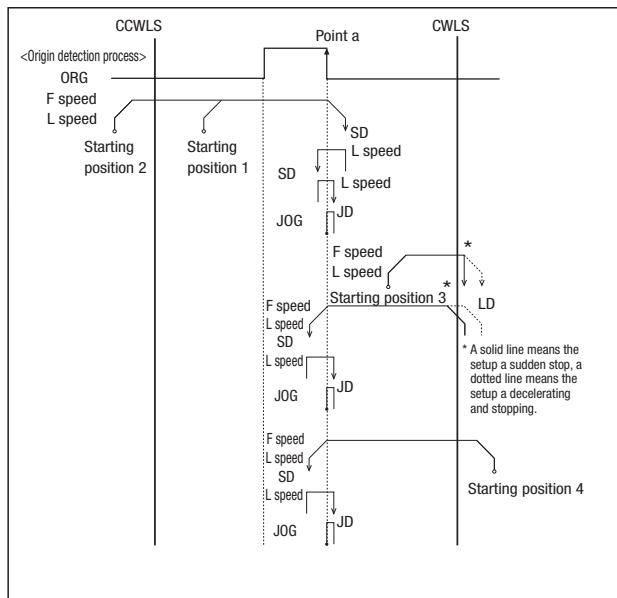
Suruga's motorized stages are different from the specification depending on the models. Therefore return to origin method other than recommendation may not work correctly. Set to the way of recommendation return origin when using our controller.

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



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

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



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

Adaptive driver

■ Driver P.1-205~

DC24V type input

Model	CVD507-K-A9	CRD5107P
Divisions	1~1/250 (16 steps)	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	DS102ANR	DS102AMS
	With	DS102ANR-IO	DS102AMS-IO
DC24V	Without	DS112ANR	DS112AMS
	With	DS112ANR-IO	DS112AMS-IO



DS112/102

Rotary Stage $\phi 39$: KS451

KS451-40



RoHS

■ Good for accuracy positioning
360° continuously rotation.

Model **KS451-40-** Option code **5**

1 2

▶ Cable P.1-207~
▶ Electrical specification P.1-191~

1 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

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

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

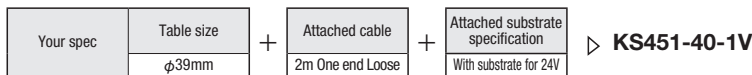
* Please select "blank, 2, 6 and 7" when connect with stepping motor controller(DS102/112).

2 Attached substrate specification

Code	Specification
Blank	Not available 24V supported substrate
V	Substrate for 24V Included K-PCBA24

※KS451: Sensor voltage 5V
Consider to use sensor amplifier substrate when you control without our controller.

Selection Example



SPEC

Model		KS451-40-5
Mechanical specification	Travel length	360°
	Table size	$\phi 39\text{mm}$
	Travel mechanism	Direct drive motor
	Guide	Ball bearing (Deep groove ball bearing)
	Main materials-Finishing	Aluminum-Black almite finishing, stainless steel
	Weight	0.3kg
Accuracy specification	Resolution	0.72°/Pulse (Full) 0.36°/Pulse (Half)
	MAX speed	72°/sec [100Hz]
	Positioning accuracy	—
	Repeatability positioning accuracy	—
	Load capacity	1.0kgf [9.8N]
	Moment stiffness	2.50°/N · cm
	Lost motion	Within 0.05°
	Backlash	—
Sensor	Parallelism	Within 100 μm
	Runout	Within 50 μm
	Limit sensor	—
	Origin sensor	Installed
	Proximity origin sensor	—
Provided screw (Hexagon-headed bolt)		3 of M3-28

X

XY

Z

Horizontal
Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball
Screw

Worm
Gear

Direct
Drive

$\phi 39$

$\phi 40$

$\phi 59$

$\phi 60$

$\phi 75$

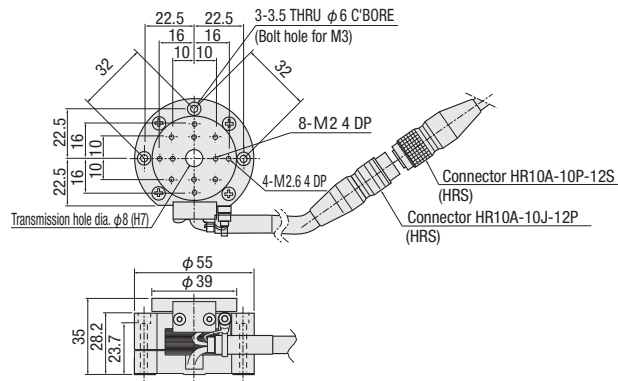
$\phi 100$

$\phi 180$

Other

Dimensional outline drawings

KS451-40

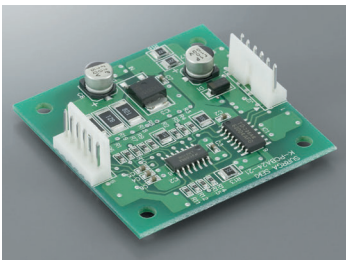


Sensor amplifier substrate for 24V: K-PCBA24

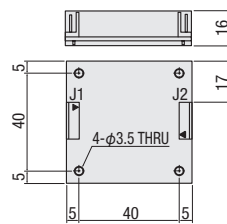
Instruction Manual R o H S

K-PCBA is needed to drive a motorized stage with EE-SX1101 sensor when using PC or sequencer's motion control module and not using our controller. EE-SX11 sensor is operated with 5V input voltage and there is only about 1mA of output current. When using controlling equipment such as PC and sequencer, it is common to use photo coupler for sensor input-terminal and often needs about 10mA of terminal current. Therefore a motorized stage with EE-SX1101 sensor cannot be directly connected. In this case, K-PCBA is effective in being assembled as sensor amplifier so that input voltage becomes 24V and max. Output current is available up to 500mA.

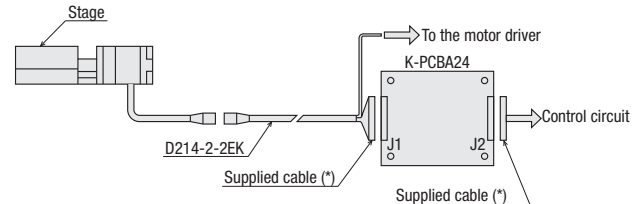
K-PCBA24



Dimensional outline drawings

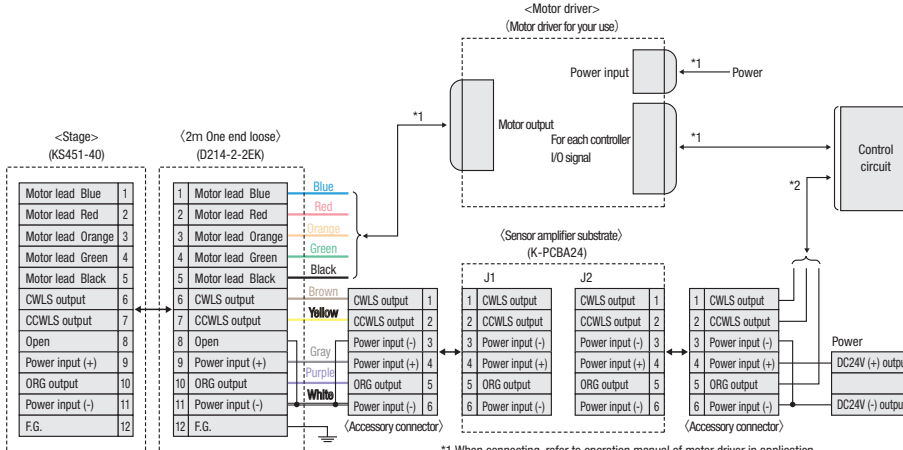


Full diagram



* Crimping connection of accessory connector needs to be done by a customer

Connection sensor amplifier and driver example



Note that sensor damage

*See sensor specification for the exclude and include this substrate.
 *There are stages that no need this substrate.

*1. When connecting, refer to operation manual of motor driver in application.
 *2. When connecting, follow the control circuit in application.

SPEC	
Model	K-PCBA24
Dimension	50 (W) × 50 (D) × 16 (H) mm
Connector type	171825-6 (Tyco Electronics Japan G.K.)
Compatible connector	171822-6 (Accessories)
Power voltage	DC24V±10%
Consumption current	30mA or less
Control output	NPN open collector output DC24V 500mA or less
Specification environment	0~40°C, 20~80%RH (non-dew)
Accessories	2 of connector 171822-6 (Tyco Electronics Japan G.K.) 12 of contact terminal 170204-1 (Tyco Electronics Japan G.K.)

*Connector processing needs to be done by customer. Please use electric wire of which diameter is more than 0.2mm for wire arrangement.

Motorized Rotary Stage

X

XY

Z

Horizontal Z

XYZ

Goniometer

Rotary

Unit

Controller

Ball Screw

Worm Gear

Direct Drive

φ39

φ40

φ59

φ60

φ75

φ100

φ180

Other

Electrical Specification•Option: KS451

Electrical specification

Model		KS451-40
Motor	Type	5 phase stepping motor 0.75A/Phase
	Model	Special specification
	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	—
	Origin sensor	Installed
	Slit origin sensor	—
	Model	Photo microsensor EE-SX1103 (Omron Co., Ltd.)
	Power voltage	DC5V
	Consumption current	Total 25mA or less
	Control output	NPN open collector output DC5V or less 1.2mA or less Residual voltage 0.4V or less when the load current is 0.3mA
	Output logic	On detection (light shield condition): Output transistor OFF (Non-continuity)

* Please use microstep when reduce the vibration or return to origin. (Driver: CVD507-K-A9/CRD5107P ▶ P.1-205~)

X

XY

Z

Horizontal Z

XYZ

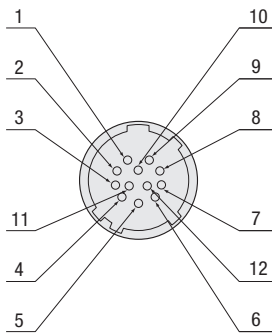
Goniometer

Rotary

Unit

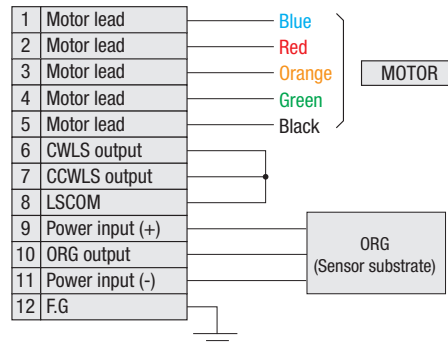
Controller

Pin allocation



Connection diagram

KS451-40



Timing chart

KS451-40

	Range of origin detection [°]
KS451-40	0~11°

Note: The direction of CW/CCW in timing chart shows motor rotation.
Upper plate rotation in CW as below.
KS451-40: CW

Ball Screw

Worm Gear

Direct Drive

φ39

φ40

φ59

φ60

φ75

φ100

φ180

Other

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

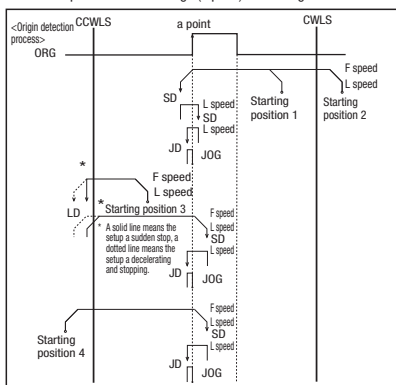
Method for return to origin

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

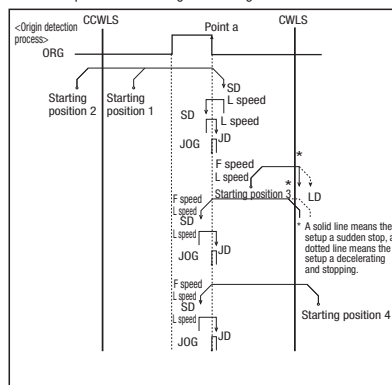
KS451 recommended return to origin Return to origin sequence P.1-201~

- 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~

DC24V type input

Model	CVD507-K-A9	CRD5107P
Divisions	1~1/250 (16 steps)	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	DS102ANR	DS102AMS
	With	DS102ANR-IO	DS102AMS-IO
DC24V	Without	DS112ANR	DS112AMS
	With	DS112ANR-IO	DS112AMS-IO

- Ball Screw
- Worm Gear

Direct Drive

- φ39
- φ40
- φ59
- φ60
- φ75
- φ100
- φ180
- Other

Connectin example

