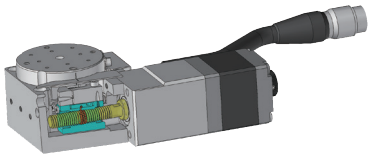
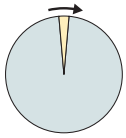
Motorized Rotary Stage Guidance

Original





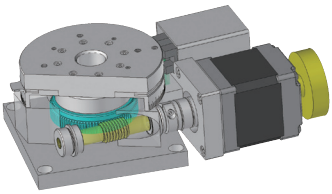
Make sure it is driven repeatedly within plus or minus 10 degree. P.1-237～

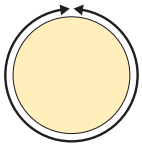
Sinemotion rotary stage: KRB04/KRB06

High durability and high speed driving with ball screws.

The optimum repeatability driving of the minute angle.

Table size	ϕ40mm	ϕ60mm	□60mm





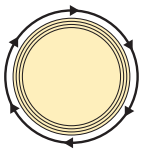
Make sure to use 360 degree rotated. P.1-245～

Worm gear type rotary stage: KRW04360C/KRW06360C-Z/KS402/KRE

The optimum positiong on the wide angle accuracy or continuous operation in 360 degree.

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

Table size	ϕ39mm	ϕ40mm	ϕ59mm	ϕ60mm	ϕ75mm
	ϕ100mm	ϕ180mm			



3Make sure to use 360 degree high speed rotated.:KS451 P.1-269～

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)

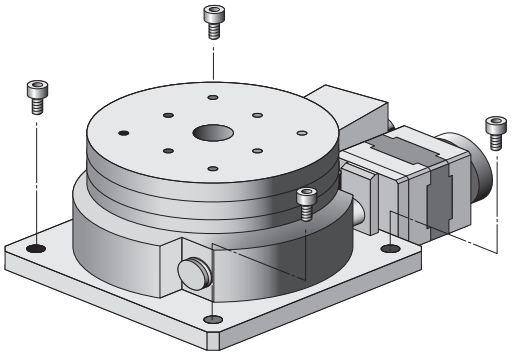
Ball bearing type (102°/sec)

How to use correetly

▽Mounting

Fix corner position with supplied screw.

* KRB04、KRB06、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 affeted 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 posioning.

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
Sine-motion rotation stage	○	○	○
Worm gear type rotation stage	○	○	○
Direct drive type	×	×	×
KRE04360、KRE06360	×	×	×

○：Available under limit of load or moment
×：Not available

Center of rotation

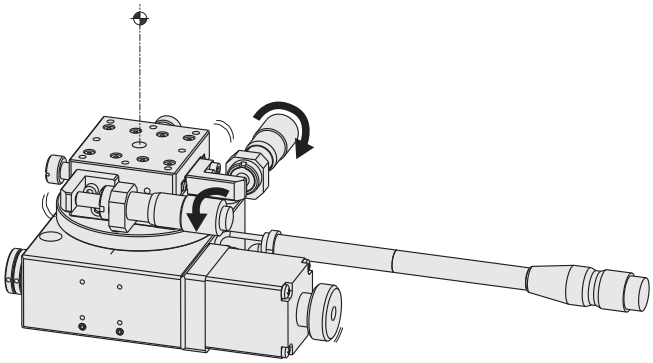
▽How to align the center of rotation

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

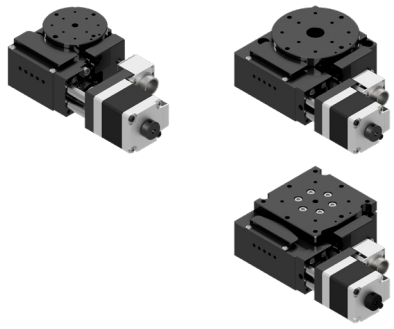
Align the center as belows.:

- 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.



Sinemotion Rotary Stage (Ball-screw-driven) 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 forthe moving mechanism.

Improved acceleration and deceleration performance

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

■Reduce the backlash

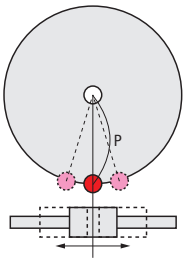
Reduce the backlash with preload mechanism.

■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 ovement).
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) Travel angle=Arcsin((Input pulse*X)/P)
(2) Input pulse=P*sin(travel distance)/X



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

■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.

KRB06011M: Fix with supplied screws to 3 position of lower plate.

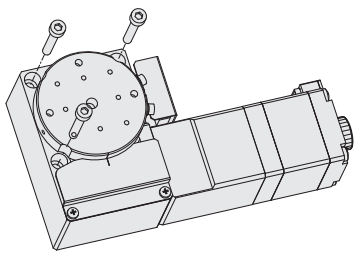
▽About the object that mounted on upper/bottom of stage.

When a stage is mounted on uneven or an object that is uneven,
the stage table may deformed, and may also affeted 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 posioning.
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.



Sine motion Rotary Stage ϕ40/ϕ60: KRB04/KRB06

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

Original RoHS Freely customize the motor

KRB 04017 M □-L C -□
1 2 3 3 4 4

Calbes P.1-287～
Electrical specification P.1-241～

1 Table size

Code	size		Travel distance
04017	ϕ40mm		±8.5°
06011	ϕ60mm	60×60mm	±5.5°

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	αSTEP (AZ Series)

4 Cable opiton (Motor: C/T)

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: 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	±8.5°	±5.5°	
	Stage surface size	ϕ40mm	ϕ60mm	60×60mm
	Travel mechanism (Reduction ratio)	Ball screw ϕ6 lead 1		
	Guide	Combination angular ball bearing		
	Main materials-Finishing	Aluminum–Black alumite processing		
	Weight	0.40kg	0.62kg	0.63kg
Accuracy specification	Resolution※ (Pulse) Full	≒0.0068°	≒0.0043°	
	MAX speed	101.5°/sec [15kHz]	63.8°/sec [15kHz]	
	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	50μm		
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.1-237 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

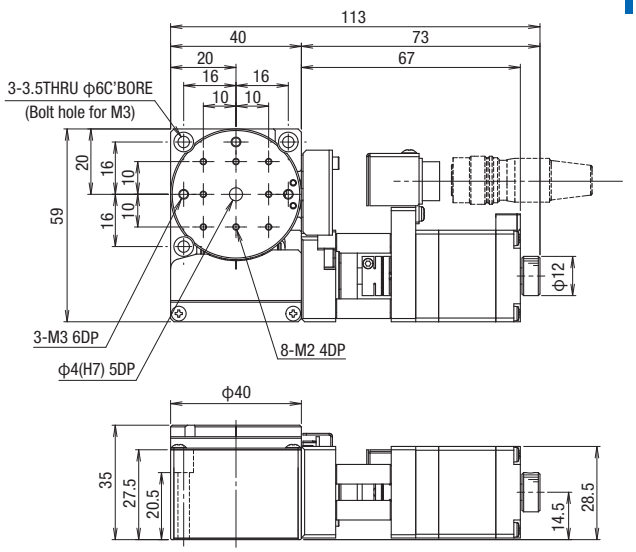
Motor code		**C**	**T**	**ZA**
Type		Standard	2 Phase stepping motor	αSTEP (AZ)
Motor model* 1		C005C-90215P-1	SJA28N32-0674B-01	AZM24AK
Step angle		0.72°	1.8°	0.36°※2
Resolution(Full)	KRB04017M	≒0.0068°	≒0.0169°	≒0.0034°※2
	KRB06011M	≒0.0043°	≒0.0106°	≒0.0021°※2
	KRB06011MS	≒0.0043°	≒0.0106°	≒0.0021°※2
MAX speed	KRB04017M	101.5°/sec [15kHz]	76.1°/sec [4.5kHz]	101.5°/sec [30kHz]
	KRB06011M	63.8°/sec [15kHz]	47.8°/sec [4.5kHz]	63.8°/sec [30kHz]
	KRB06011MS	63.8°/sec [15kHz]	47.8°/sec [4.5kHz]	63.8°/sec [30kHz]
Weight	KRB04017M	0.40kg	0.40kg	0.44kg
	KRB06011M	0.62kg	0.62kg	0.66kg
	KRB06011MS	0.63kg	0.63kg	0.67kg

*1 Model numbers include Suruga Seiki's proprietary management codes.
※2 1000P/R setting

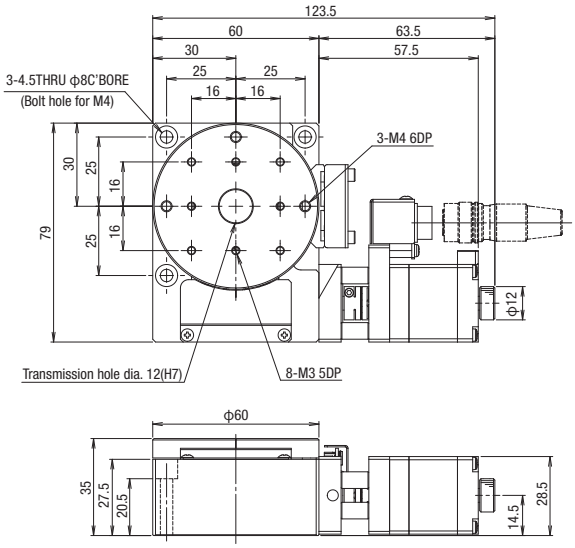
Sine motion Rotary Stage ϕ40/ϕ60/□60: KRB04/KRB06

Dimensions

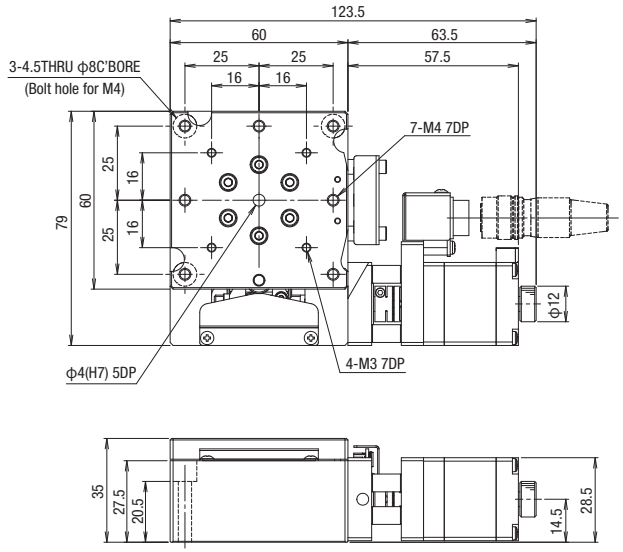
KRB04017M-LC

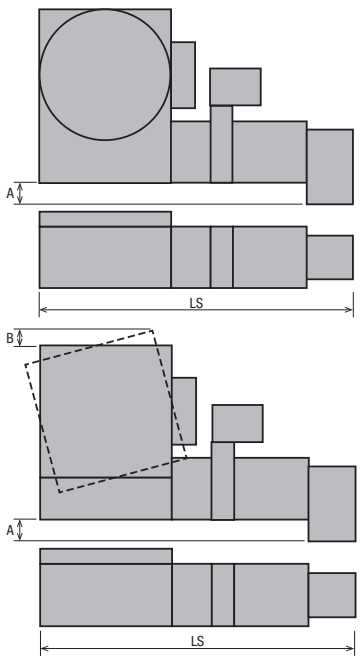


KRB06011M-LC



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	ϕ40	C	□ 28	—	—	113
KRB06011M-LC	ϕ60			—	—	123.5
KRB06011MS-LC	□60			—	5.5	123.5
KRB04017M-LT	ϕ40	T	□ 28	—	—	113
KRB06011M-LT	ϕ60			—	—	123.5
KRB06011MS-LT	□60			—	5.5	123.5

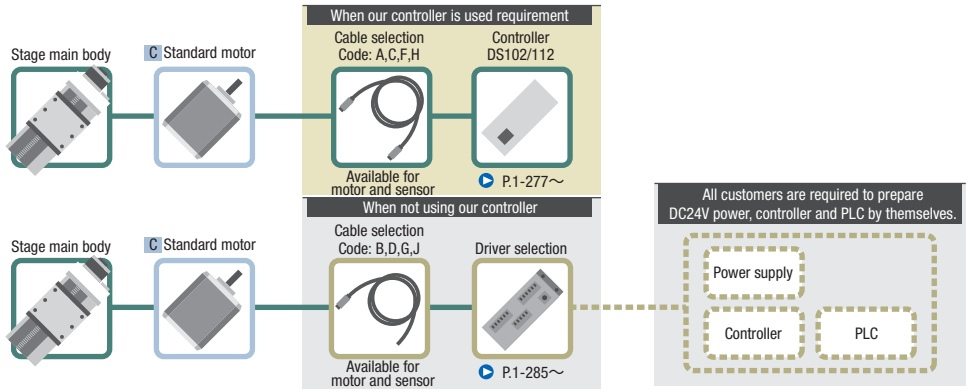
ZA αSTEP (AZ Series)

Motor model AZM24AK

Model	Stage table size	Motor	Motor size	A(mm)	B(mm)	LS(mm)
KRB04017M-LZA	ϕ40	ZA	□ 28	10	—	135.5
KRB06011M-LZA	ϕ60			10	—	146
KRB06011MS-LZA	□60			10	5.5	146

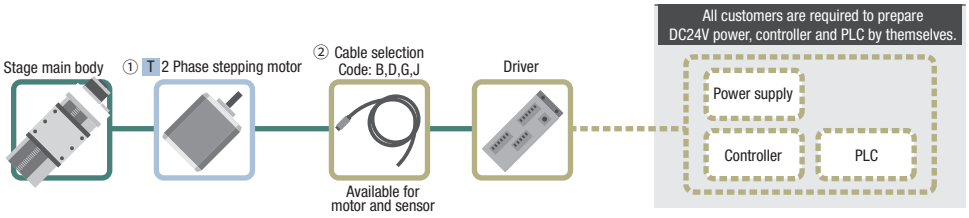
Motor option

C Standard motor
Motor model
C005C-90215P-1



Motor option

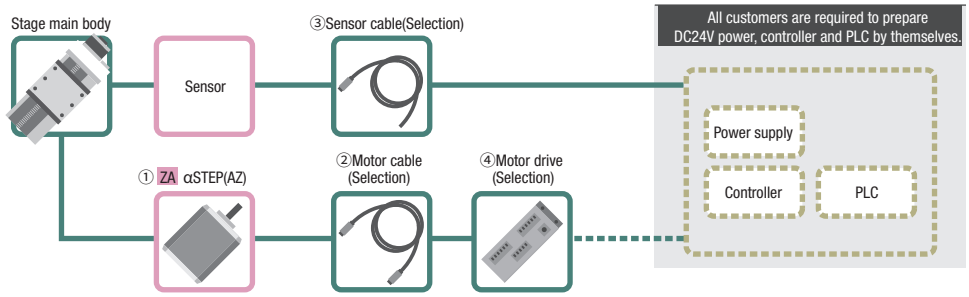
T 2 Phase stepping motor
Motor model
SJA28N32-0674B-01



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	①Motor model	②Motor cable selection	③Sensor cable selection	④Driver 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

Electrical Specification: KRB Series

Electrical specification(5 Phase/2 Phase stepping motor)

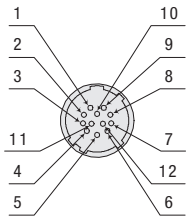
Motor code			C	T
Stage model			KRB04/KRB06	
Motor Specification (*1)	Type		5 phase stepping motor (0.75A/Phase)	2 phase stepping motor (0.67A/Phase)
	Feature		Standard	—
	Model*1		C005C-90215P-1	SJA28N32-0674B-01
	With electromagnetic brake		—	—
	Manufacturer		Oriental Motor Co., Ltd.	SURUGA SEIKI
	Step 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)
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.1-297～ for details of single motor specification.
*2 Model numbers include Suruga Seiki's proprietary management codes.

Pin allocation・Connection diagram

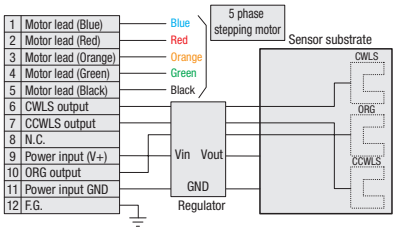
C — Available for motor and sensor

Pin allocation
Connector model
HR10A-10R-12P(73)(HRS)



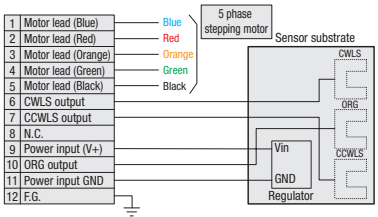
ϕ40

Connection diagram



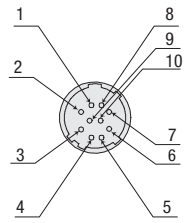
ϕ60/□60

Connection diagram



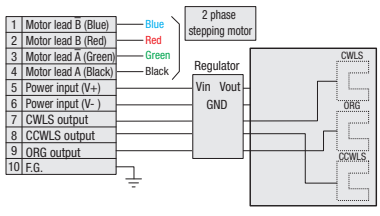
T — Available for motor and sensor

Pin allocation
Connector model
HR10A-10R-10P(73)(HRS)



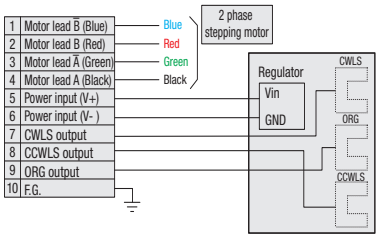
ϕ40

Connection diagram



ϕ60/□60

Connection diagram



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)

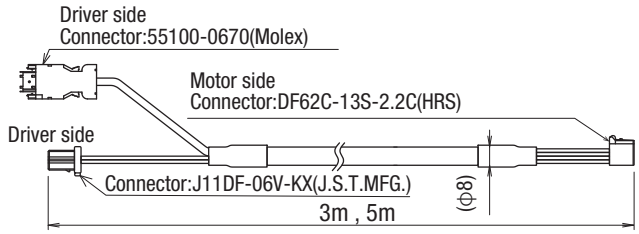
*1 P.1-297～ for details of single motor specification.

Pin allocation・Connection diagram

ZA

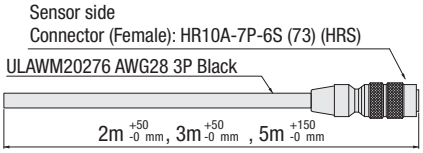
Motor

【Receiver cable】Model：CC030VZ2R2(3m)/CC050VZ2R2(5m) * Flexible cable



Sensor

【Receiver cable】Model：HR10AP-S-SB-6-□
※□：2(2m)/3(3m)/5(5m)
* Fixed

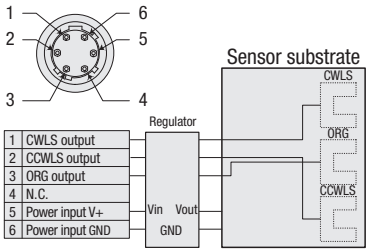


*The shields are connected with the connector shell.

Pin	Signals
1	CWLS
2	CCWLS
3	ORG
4	NORG
5	V+
6	V–

φ40

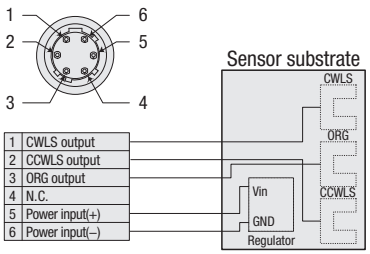
【Pin allocation】Connector model：HR10A-7R-6P(73)(HRS)



1	CWLS output
2	CCWLS output
3	ORG output
4	N.C.
5	Power input V+
6	Power input GND

φ60・□60

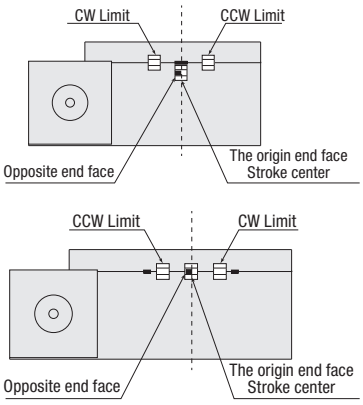
【Pin allocation】Connector model：HR10A-7R-6P(73)(HRS)

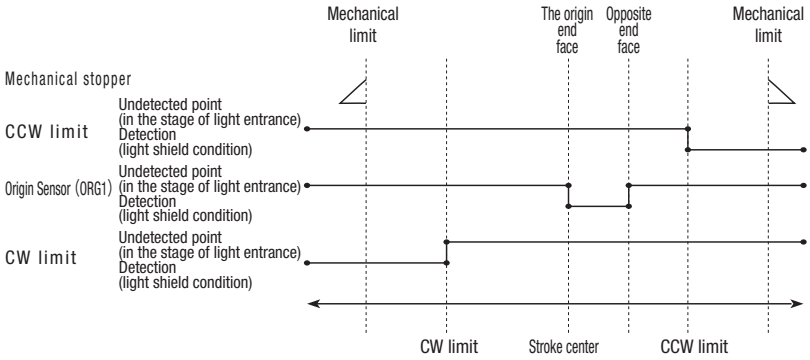


1	CWLS output
2	CCWLS output
3	ORG output
4	N.C.
5	Power input(+)
6	Power input(–)

Electrical specification KRB04/ KRB06

Timing chart





Unit [deg] Direction of CW ◀——▶ Direction of CCW

	Reference coordinate	CW Limit	The origin end face Storke 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.

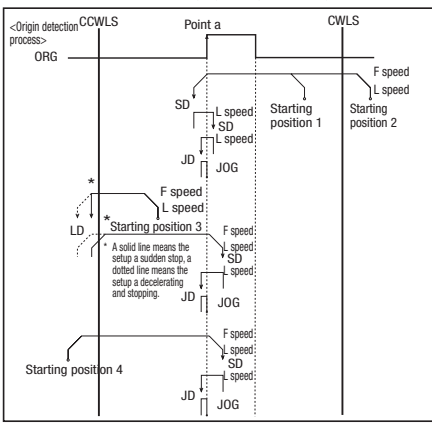
Return to origin

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.

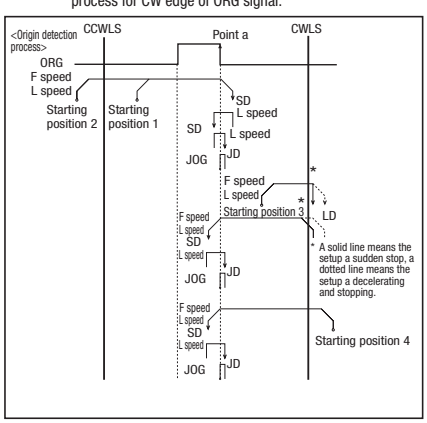
■KRB04017/KRB06011 recommended return to origin　Return to origin sequence ▶P.1-281～

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.



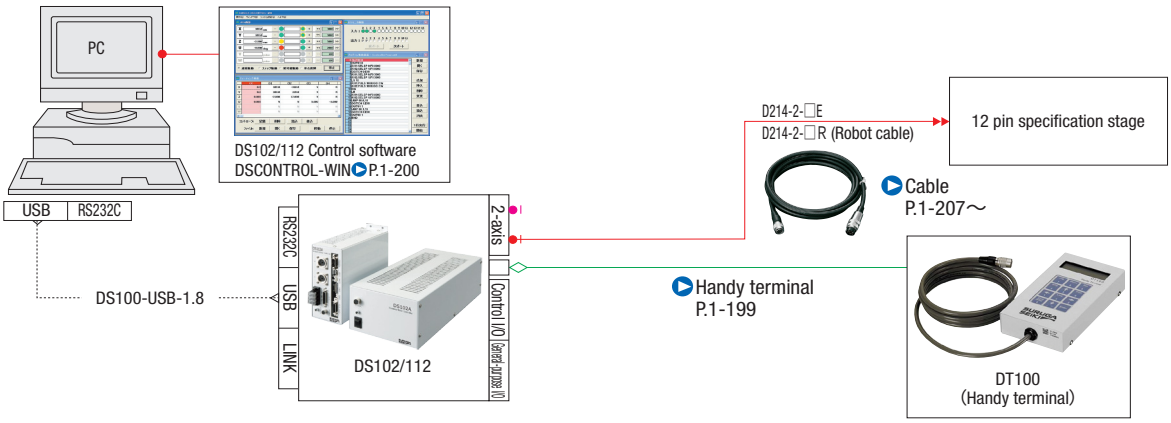
[Type4] Detect in the direction of CW and perform detected process for CW edge of ORG signal.



Connectin example

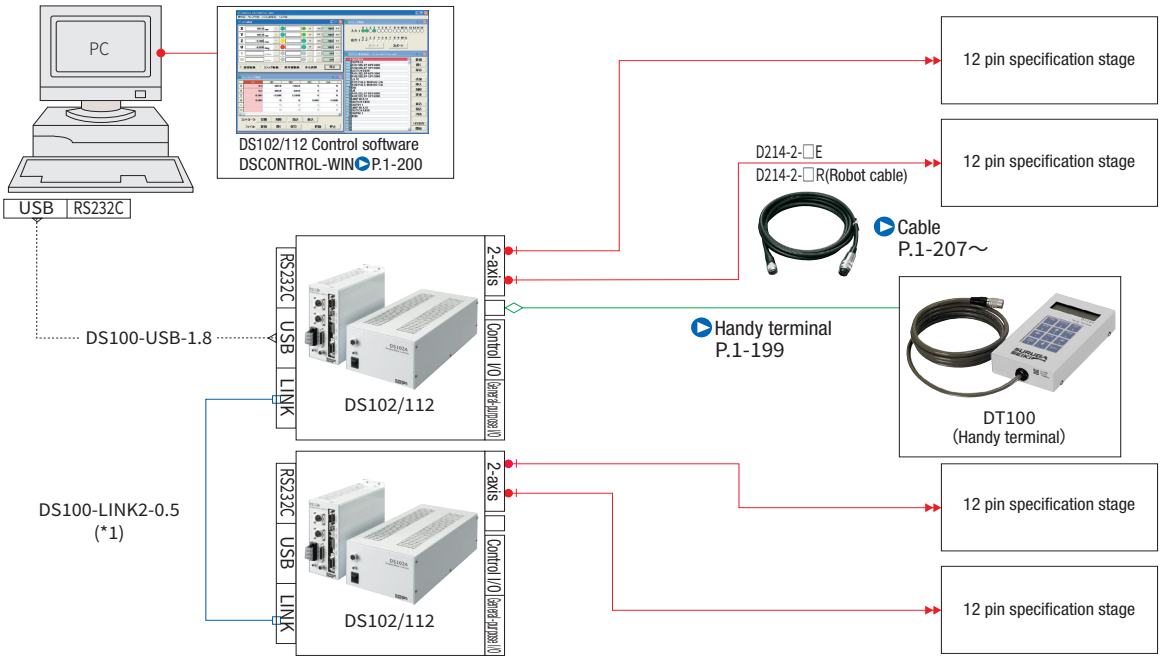
■ Connection example 1　Motorized Stage 1axis: When holding a terminal device (using control software)

*USB cable connection between PC and controller.



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

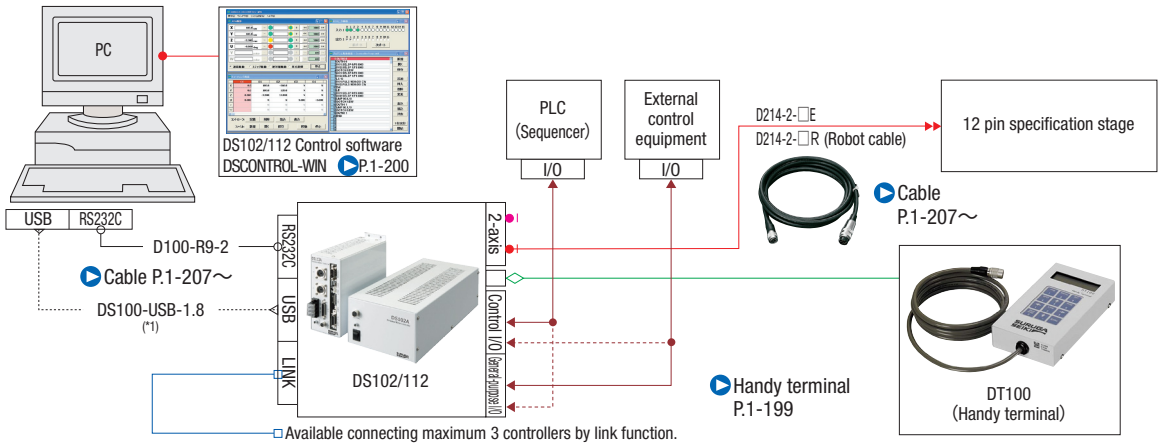
*USB cable connection between PC and controller.



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

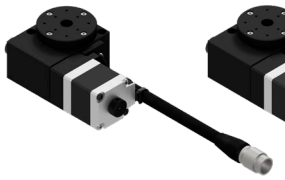
■Connection example 3　When controlling from the PLC I/O Unit.

*USB cable connection between PC and controller.



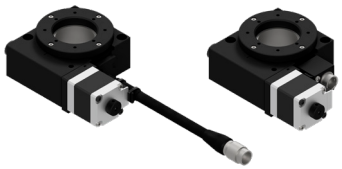
Rotary Stage ϕ39/ϕ59/□40/□60：KRW04/KRW06

KRW04360T-LC



KRW04360M-LC

KRW06360T-LC



KRW06360M-LC

KRW06360T-LC-Z

RoHS

Freely customize the motor

* All image is for illustrative purposes only.

KRW 04 360 M - □ - LC - □ - □

1 2 3 4 5 6 7 8

ZA - □

6 7

Calbes P.1-287～
Electrical specification P.1-253～

1 Table size

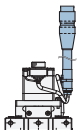
04	ϕ39mm(□40mm)
06	ϕ59mm(□60mm)

* Square specification size (stage surface shape) in parentheses

2 Travel distance

360	360°

3 Connector specifications

T	Pig tail	
M	Panel mount	

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：ϕ 59mm/Compatible only with Standard Motor specification

7 Cable option (Motor:C・G)

Code	Specification	Cable type
Blank	Calbe 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

6 Motor option

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

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

Selection Example

Model	Stage size 06：ϕ59mm	+	Connector specifications M：Panel mount	+	Stage surface shape Blank：Circular	+	Motor location specification L：L position	+	Motor option C：Standard	+	Cable option B：2m One end loose

▷ KRW06360M-LC-B

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					
	Weight	0.42kg	0.39kg	0.62kg	0.59kg	0.72kg	0.69kg
Accuracy specification	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°			
	Parallelism	50μm					
	Eccentricity	5μm					
	Runout	30μm					
Sensor	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	—

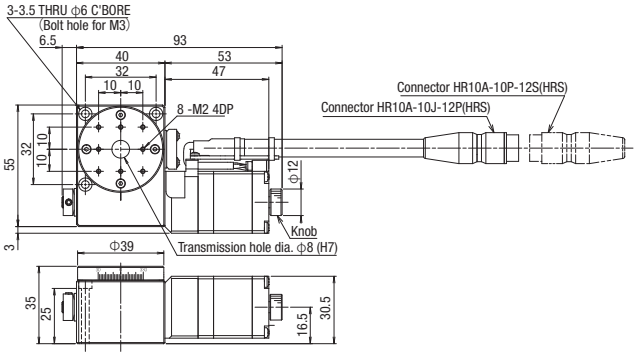
Motor code		PA	ZA	EA	UG	UA
Specification		αSTEP (AR)	αSTEP (AZ)	for EtherCAT	MINAS A6	J4
Motor model ※1		ARM24SAK	AZM24AK	STM28W100A	MSMF5AZL1A2	HG-KR053
Resolution/Pulse	KRW04	0.003° (1000P/R setting)			23 Bit encoder (8388608P/R) ※2	22 Bit encoder (4194304P/R) ※3
	KRW06	0.002° (1000P/R setting)				
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 numbers include Suruga Seiki's proprietary management codes.
*2 Optional encoder cable is for incremental system.
*3 When constructing an absolute system, it is necessary to install a battery in the amplifier.

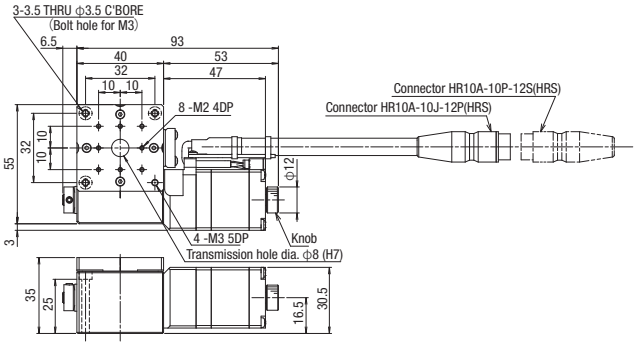
Rotary Stage ϕ39/ϕ59/□40/□60：KRW04/KRW06

Dimensions

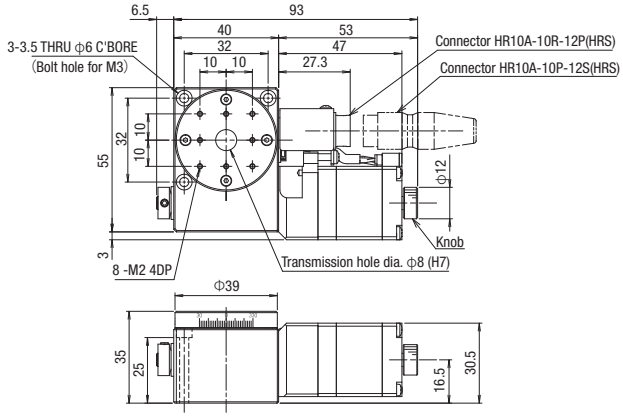
KRW04360T-LC



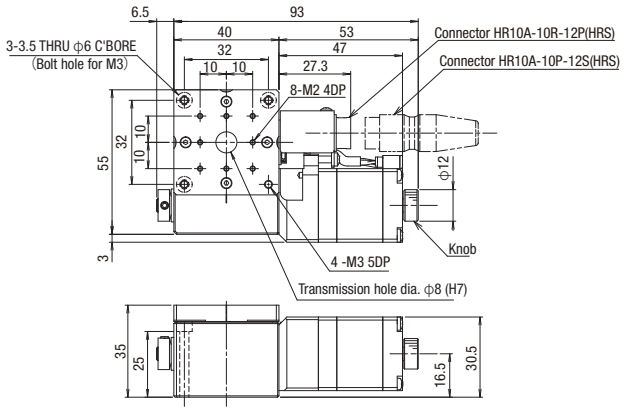
KRW04360TS-LC



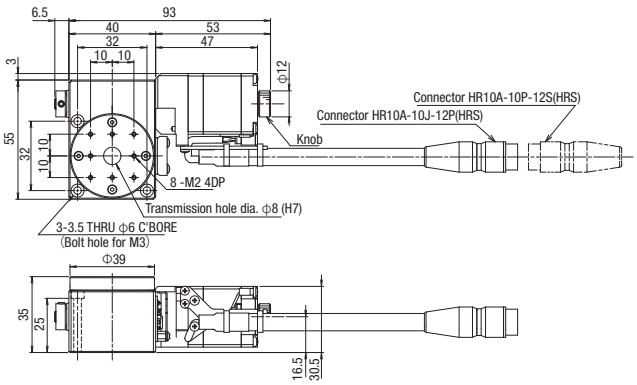
KRW04360M-LC



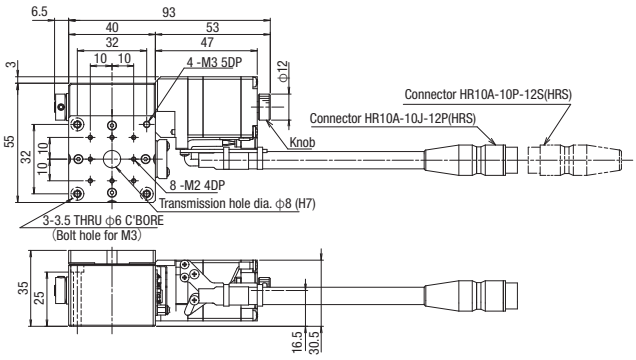
KRW04360MS-LC



KRW04360T-RC



KRW04360TS-RC



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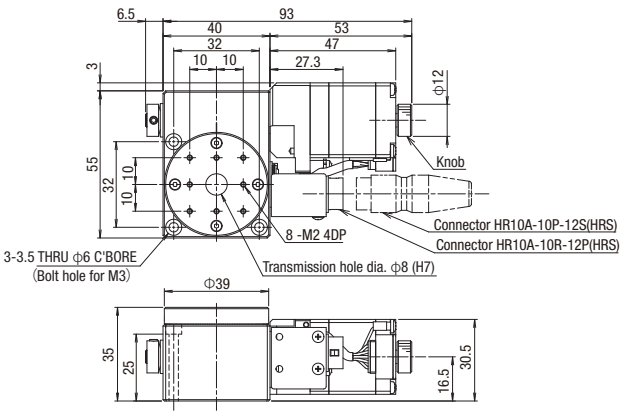

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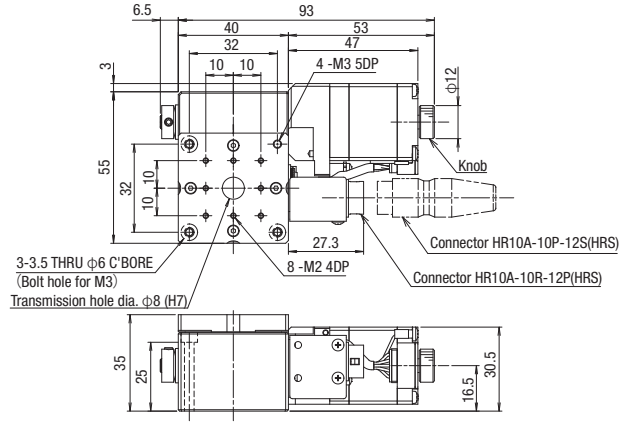
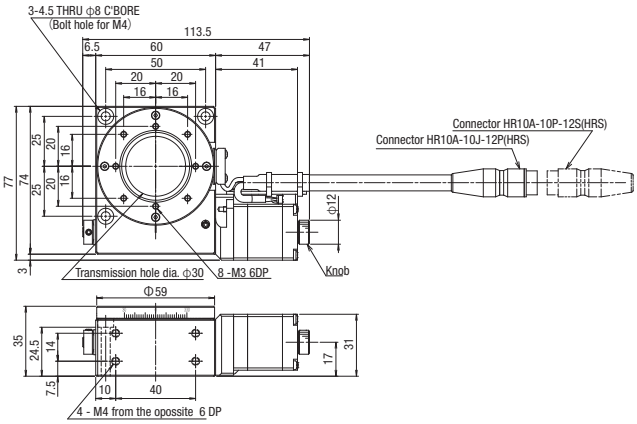
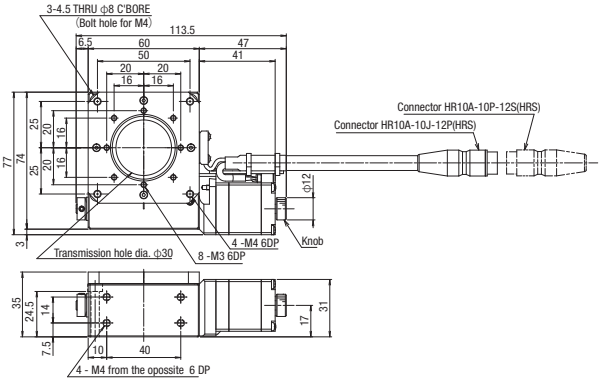


Dimensions

KRW06360T-LC



KRW06360TS-LC



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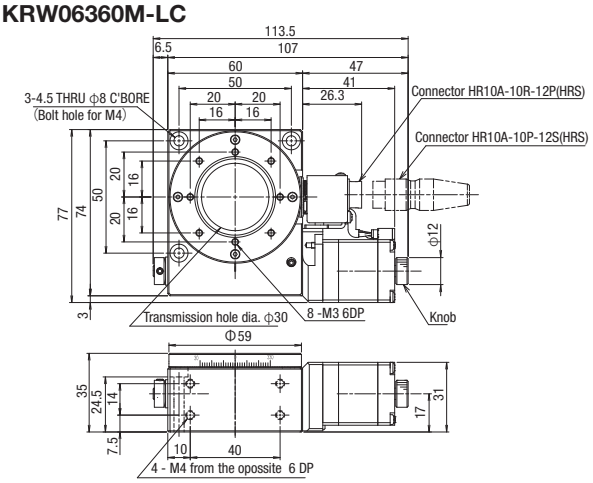
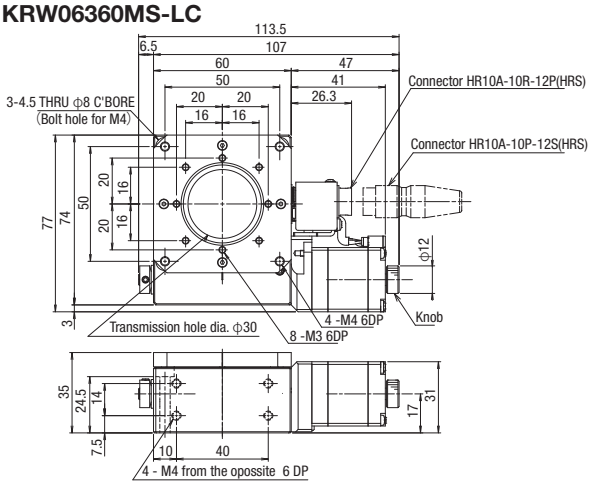


KRW06360MS-LC



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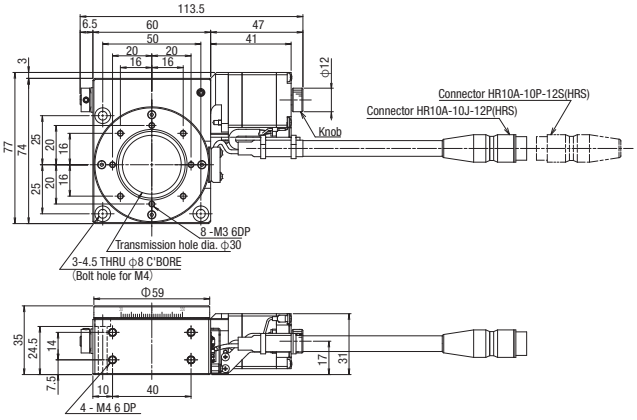

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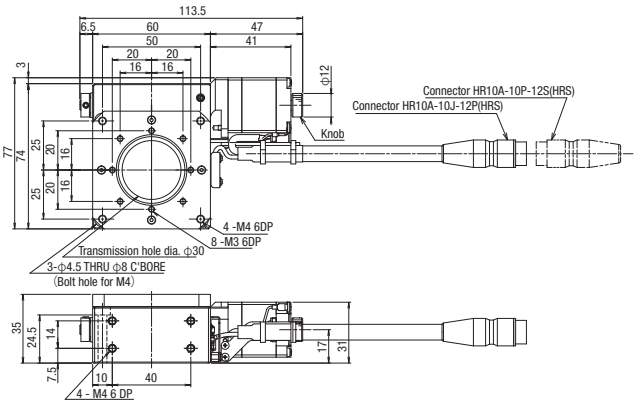

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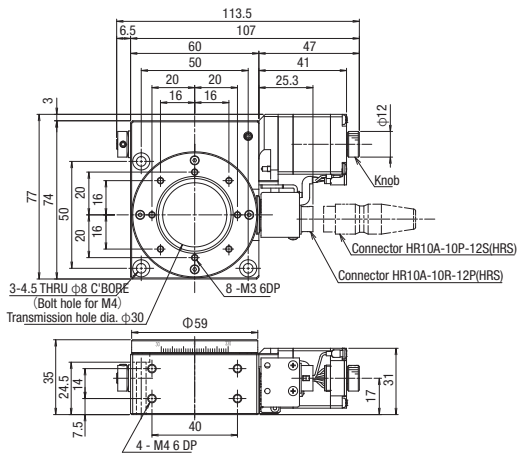

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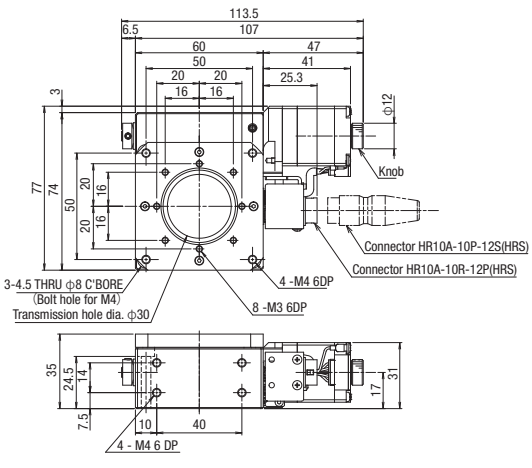
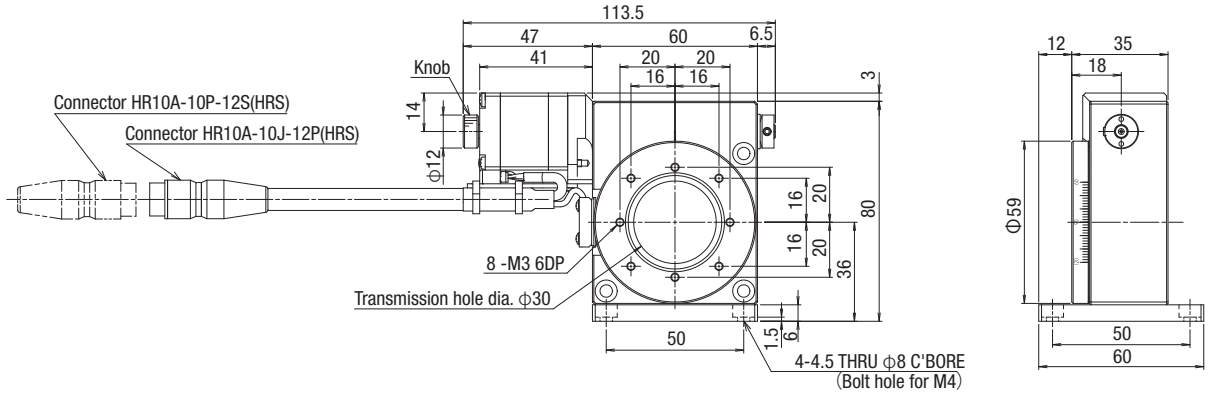


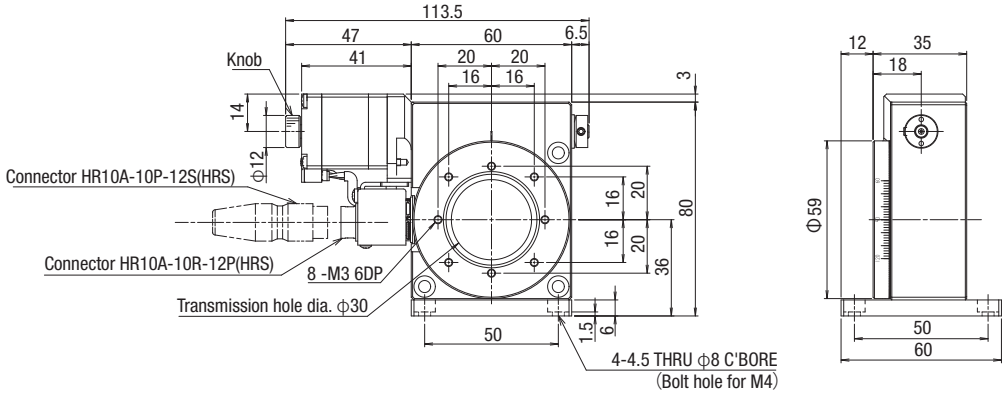
Rotary Stage ϕ39/ϕ59/□40/□60：KRW04/KRW06

Dimensions

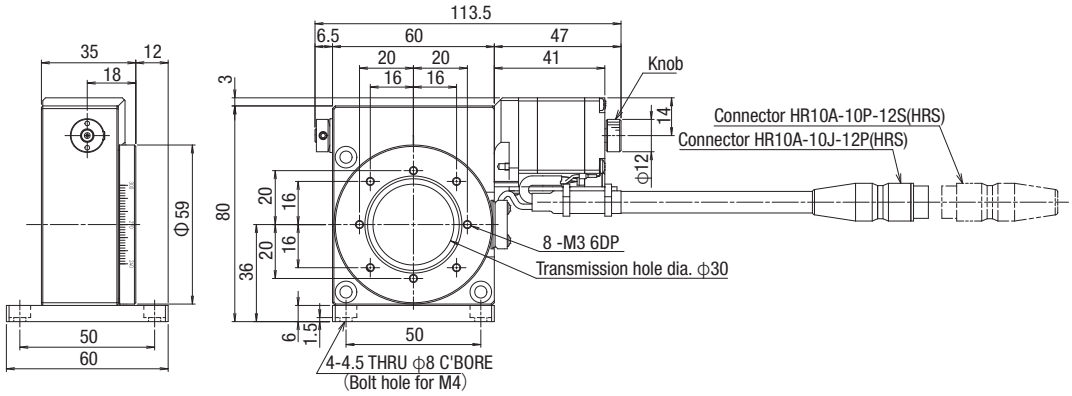
KRW06360T-LC-Z



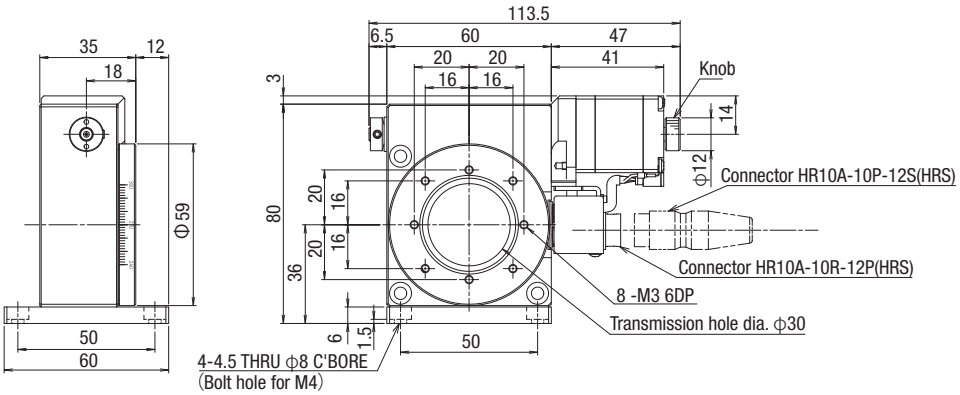
KRW06360M-LC-Z



KRW06360T-RC-Z

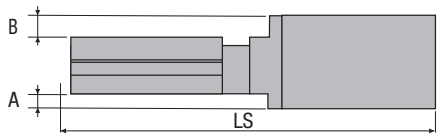


KRW06360M-RC-Z

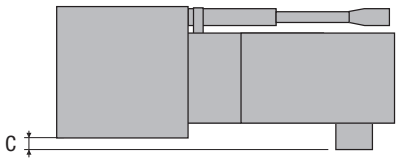


Dimensions

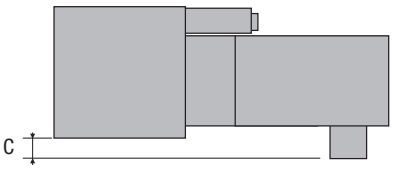
Side view



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

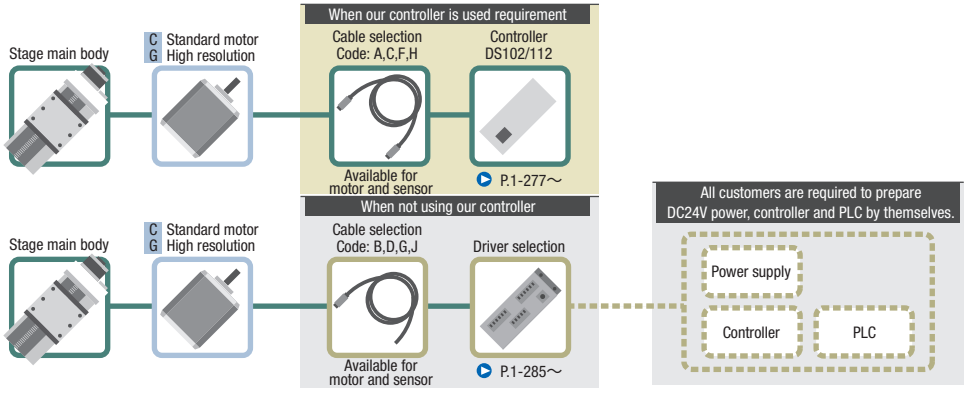
Model	Stage size	Motor	Motor size	A(mm)	B(mm)	C(mm)	LS(mm)
KRW04360*-*UG	ϕ39/□40	UG	□38	2.5	0.5	21	154.5
KRW04360*-*UA		UA	□40	4.2	2	17.8	148.9
KRW06360*-*UG	ϕ59/□60	UG	□38	2	1	21	169
KRW06360*-*UA		UA	□40	3.7	2.5	17.8	163.4

Rotary Stage ϕ39/ϕ59/□40/□60：KRW04/KRW06

Motor option

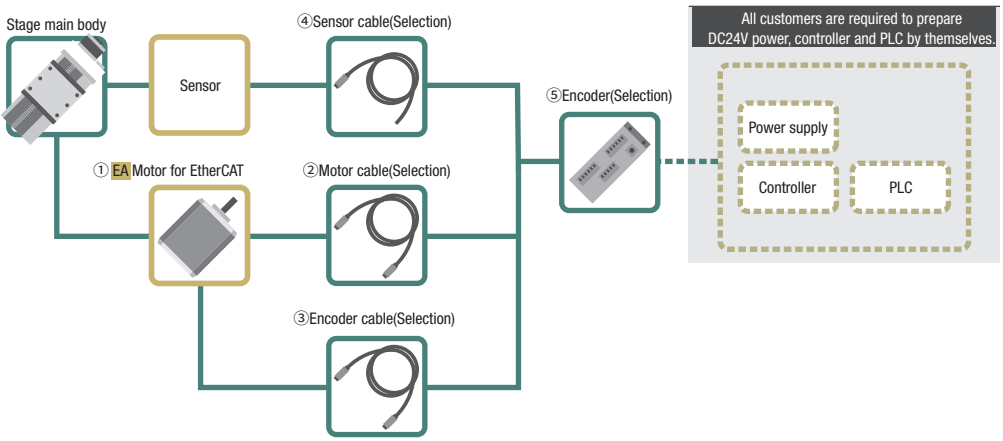
C Standard motor
Motor model
C005C-90215P-1

G High resolution
Motor model
PK523HPMB-C1



Motor option

EA Motor for EtherCAT
Motor model
STM28W100A

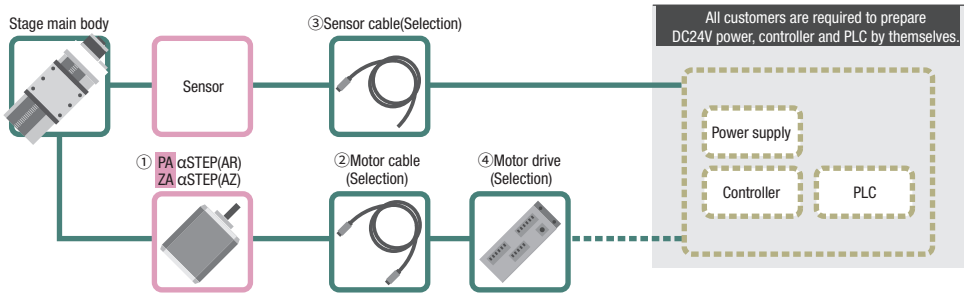


Code	①Motor model	②Motor cable selection	③Encoder cable selection	④Sensor cable selection	⑤Driver selection
EA	STM28W100A	3A：D214-3-3R2 5A：D214-3-5R2 Blank・3・5：Not included	3A：D214-3-3RE2 5A：D214-3-5RE2 Blank・3・5：Not included	3A・3：HR10AP-S-SB-6-3 5A・5：HR10AP-S-SB-6-5 Blank：HR10AP-S-SB-6-2	3A・5A：DS1000A-EC-28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

Motor option

PA αSTEP (AR Series)
Motor model
ARM24SAK

ZA αSTEP (AZ Series)
Motor model
AZM24AK

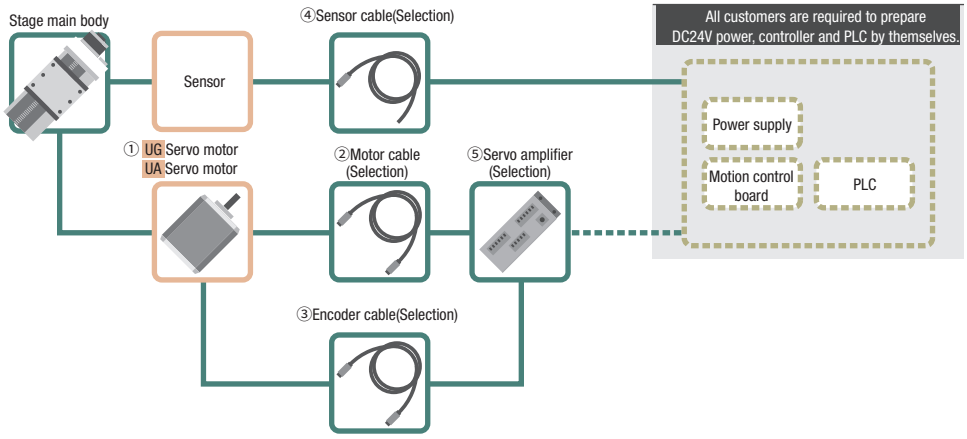


Code	①Motor model	②Motor cable selection	③Sensor cable selection	④Driver selection
PA	ARM24SAK	3A：CC030VA2R2 5A：CC050VA2R2 Blank・3・5：Not included	3A・3：HR10AP-S-SB-6-3 5A・5：HR10AP-S-SB-6-5 Blank：HR10AP-S-SB-6-2	3A・5A：ARD-K Blank・3・5：Not included
ZA	AZM24AK	3A：CC030VZ2R2 5A：CC050VZ2R2 Blank・3・5：Not included		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	①Motor model	②Motor cable selection	③Encoder cable selection	④Sensor cable selection	⑤AC servo amplifier selection
UG	MSMF5AZL1A2	3A：MFMCA0030EED 5A：MFMCA0050EED Blank・3・5：Not included	3A：MFECA0030EAD 5A：MFECA0050EAD 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

Electrical specification：KRW04/KRW06

Electrical specification(5 phase stepping motor/αSTEP)

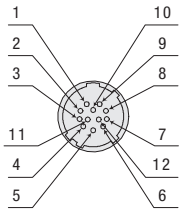
Motor code			C	G	PA	ZA
Model			KRW04/KRW06			
Motor Specification (*1)	Type		5 phase stepping motor (0.75A/Phase)		αSTEP (AR Series)	αSTEP (AZ Series)
	Feature		Standard	High resolution	Small step-out ,incremental	Small step-out ,absolute
	Model (*2)		C005C-90215P-1	PK523HPMB-C1	ARM24SAK	AZM24AK
	Manufacturer		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	□28mm			
		L size	37mm	37mm	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.1-297～ for details of single motor specification.
*2 Model numbers include Suruga Seiki's proprietary management codes.

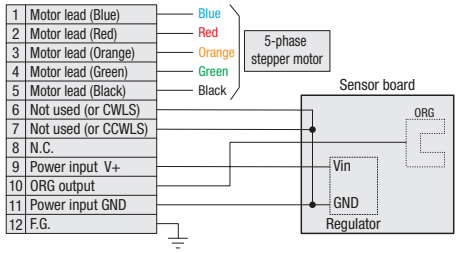
Pin allocation・Connection diagram

C・G — Available for motor and sensor

【Pin allocation (common)】
Pigtail ：HR10A-10J-12P(73) (HRS)
Panel Mount：HR10A-10R-12P(73) (HRS)

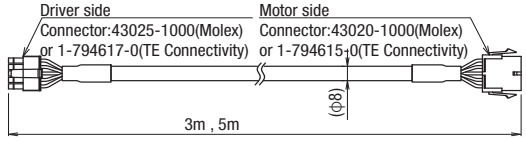


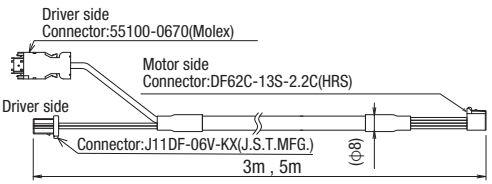
【Pin allocation (common)】



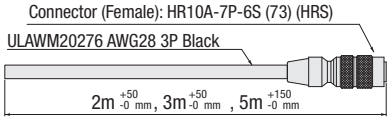
6pin,7pin are connected to GND inside the sensor board. If 6pin,7pin are not used, it is recommended to insulate them or connect them to GND.

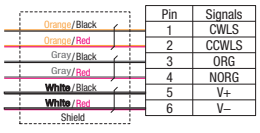
Motor Code		Motor・Encoder	Sensor (common)
PA	Motor	【Receiver cable】Model:CC030VA2R2(3m)/CC050VA2R2(5m) *Flexible cable	【Receiver cable】Model:HR10AP-S-SB-6-□ (□ is the length) *for fixing
ZA	Motor	【Receiver cable】Model:CC030VZ2R2(3m)/CC050VZ2R2(5m) *Flexible cable	【Pin allocation (common)】 Pigtail:HR10A-7J-6P(73) (HRS) Panel Mount:HR10A-7R-6P(73) (HRS)





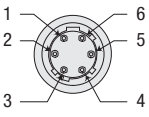
Sensor side
Connector (Female): HR10A-7P-6S (73) (HRS)



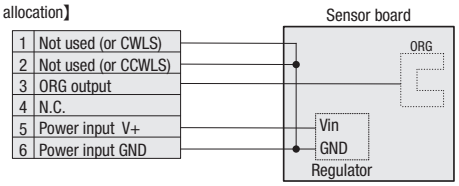


Pin	Signals
1	CWLS
2	CCWLS
3	ORG
4	NORG
5	V+
6	V–

*The shields are connected with the connector shell.



【Pin allocation】



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.

Electrical specification(Motor for EtherCAT/Servo motor)

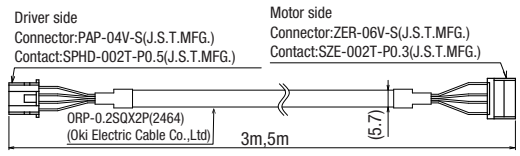
Motor code			EA	UG	UA
Model			KRW04/KRW06		
Motor Specification (※1)	Type		2 phase closed Loop stepping motor	Servo motor	Servo motor
	Feature		Small step-out ,incremental,EtherCAT	High speed	High speed
	Model (*2)		STM28W100A	MSMF5AZL1A2	HG-KR053
	Manufacturer		SURUGA SEIKI	Panasonic	Mitsubishi Electric 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.1-297～ for details of single motor specification.
*2 Model numbers include Suruga Seiki's proprietary management codes.
*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

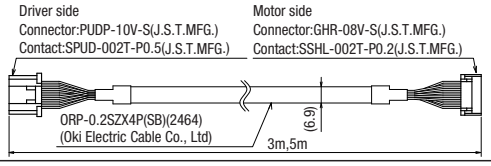
Motor Code: EA — Motor

【Receiver cable】Model:D214-3-3R2(3m)/D214-3-5R2(5m) *Flexible cable



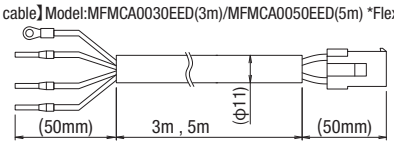
Motor Code: EA — Encoder

【Receiver cable】Model:D214-3-3RE2(3m)/D214-3-5RE2(5m) *Flexible cable



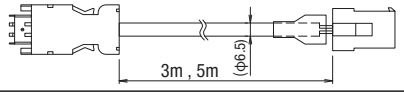
Motor Code: UG — Motor

【Receiver cable】Model:MFMCA0030EED(3m)/MFMCA0050EED(5m) *Flexible cable



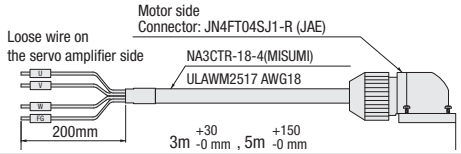
Motor Code: UG — Encoder

【Receiver cable】Model:MFECA0030EAD(3m)/MFECA0050EAD(5m) *for fixing



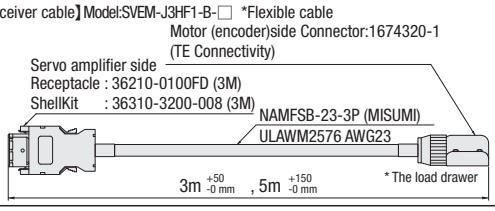
Motor Code: UA — Motor

【Receiver cable】Model:SVPM-J3HF1-B-□-02S *Flexible cable



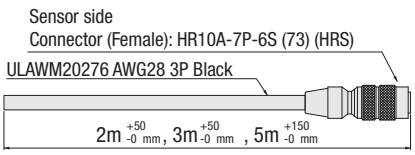
Motor Code: UA — Encoder

【Receiver cable】Model:SVEM-J3HF1-B-□ *Flexible cable



Sensor (common)

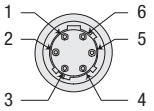
【Receiver cable】Model:HR10AP-S-SB-6-□ (□ is the length) *for fixing



*The shields are connected with the connector shell.

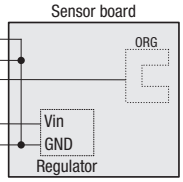
Pin	Signals
1	CWLS
2	CCWLS
3	ORG
4	NORG
5	V+
6	V–

【Pin allocation (common)】
Pigtail:HR10A-7J-6P(73) (HRS)
Panel Mount:HR10A-7R-6P(73) (HRS)



【Connection diagram】

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.

Electrical specification：KRW04/KRW06

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.

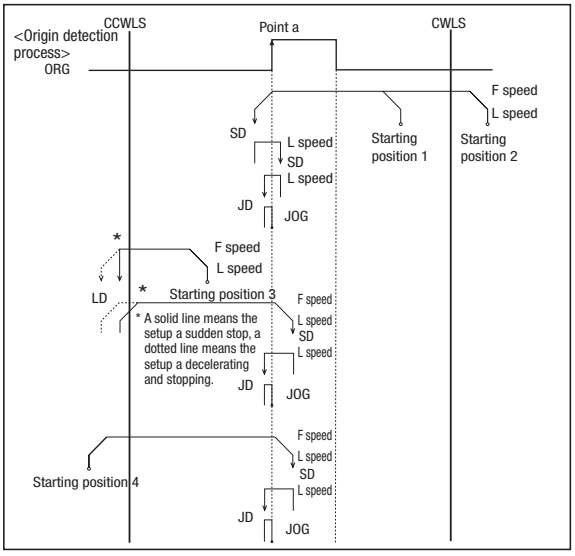
Return to origin method

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 devided into same types. Selected wrong type may be operated incorrectly. Choose your best one whatever you need according to be recommended as below.

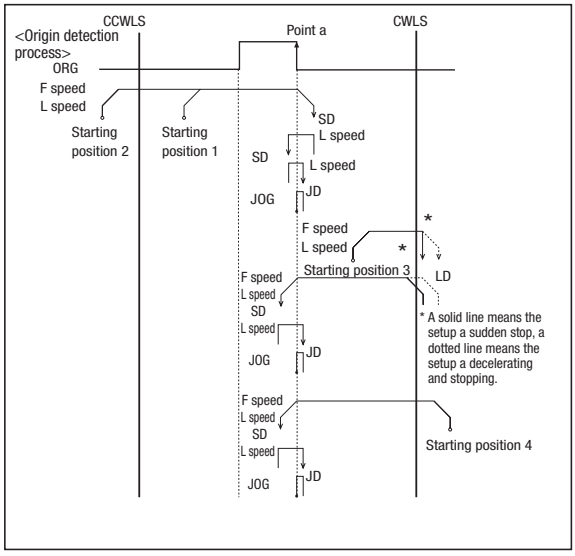
■KRW04360/KRW06360 recommended return to origin　Return to origin sequence ▶P.1-281～

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]



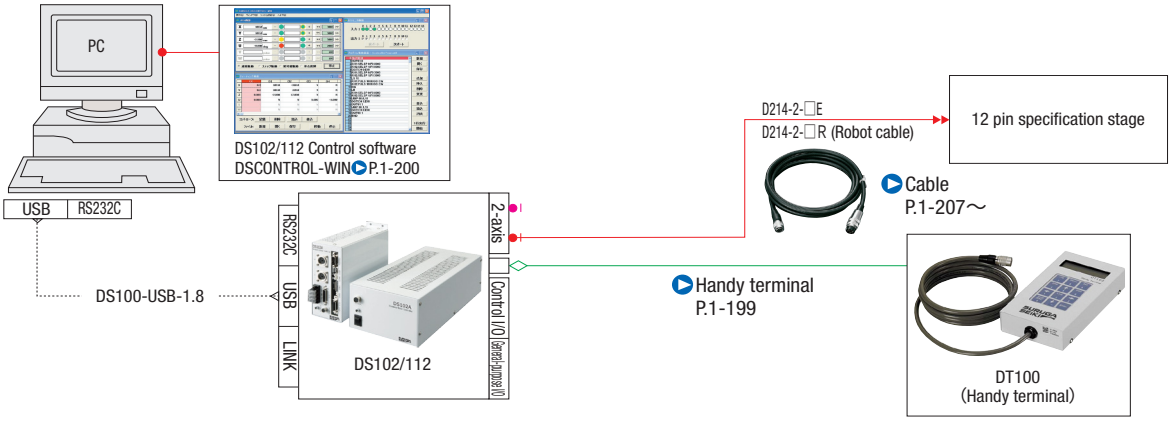
[Type4]



Connectin example

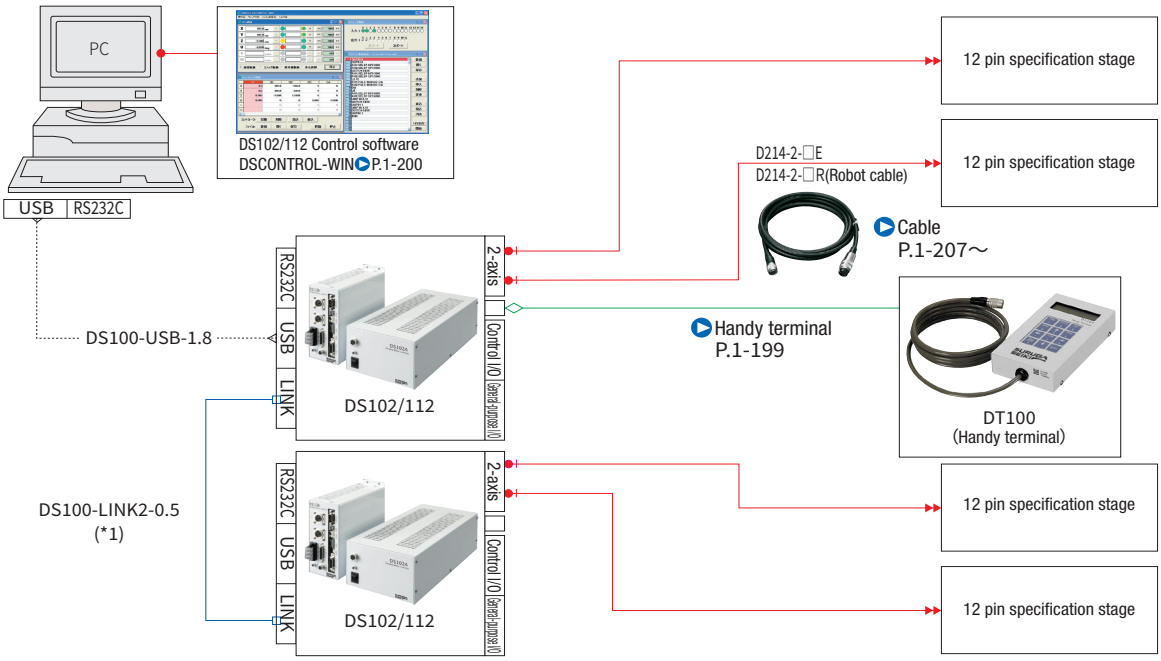
■ Connection example 1　Motorized Stage 1axis: When holding a terminal device (using control software)

*USB cable connection between PC and controller.



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

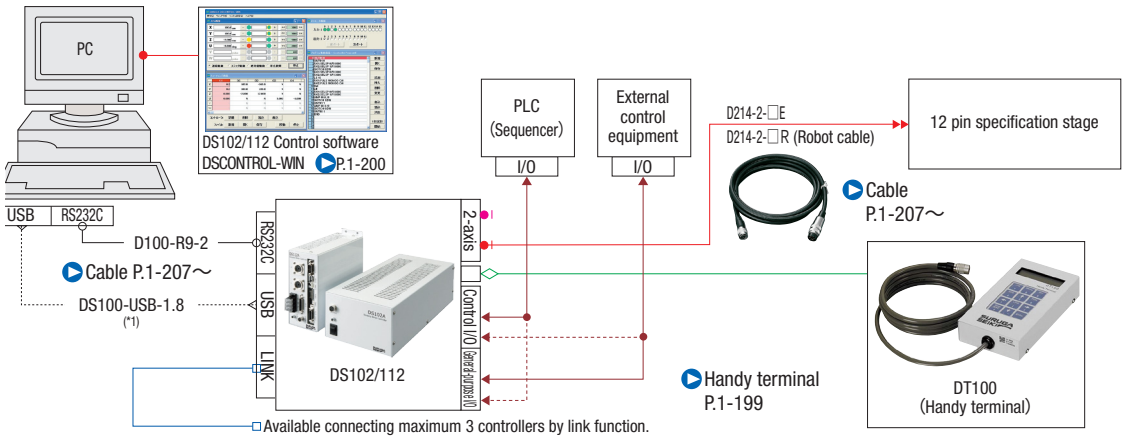
*USB cable connection between PC and controller.



(*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.

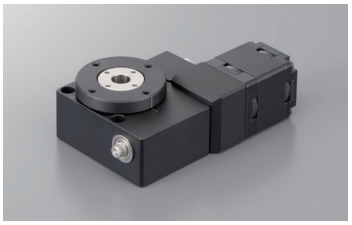
*USB cable connection between PC and controller.



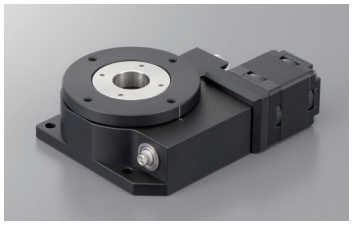
(*1) Using the USB hub, it is controllable in a single PC to up to four link networks (24-axis).

Rotary Stage: KRE04360/KRE06360

KRE04360



KRE06360



RoHS

* All image is for illustrative purposes only.

KRE04360-C□

1 2

Calbes P.1-287～
Electrical specification P.1-259～

1 Table size

04	ϕ39mm
06	ϕ60mm

2 Cable option

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

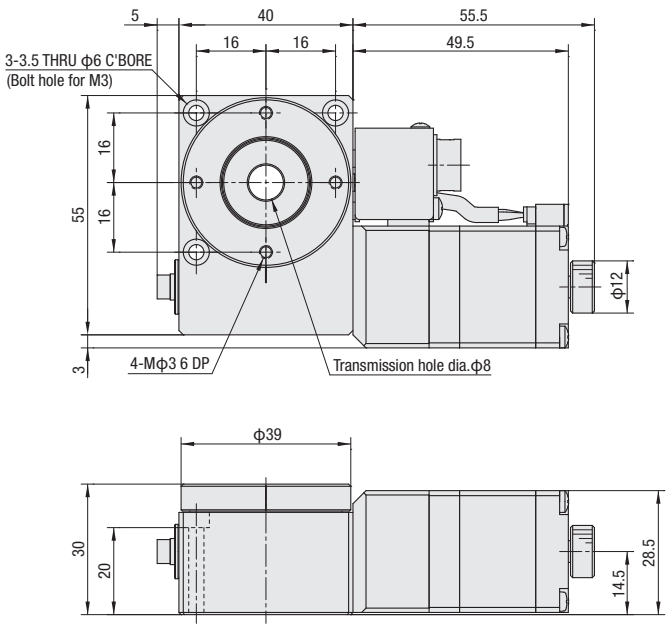
* Please select "Code F or H" when connect with stepping motor controller(DS102/112).

SPEC

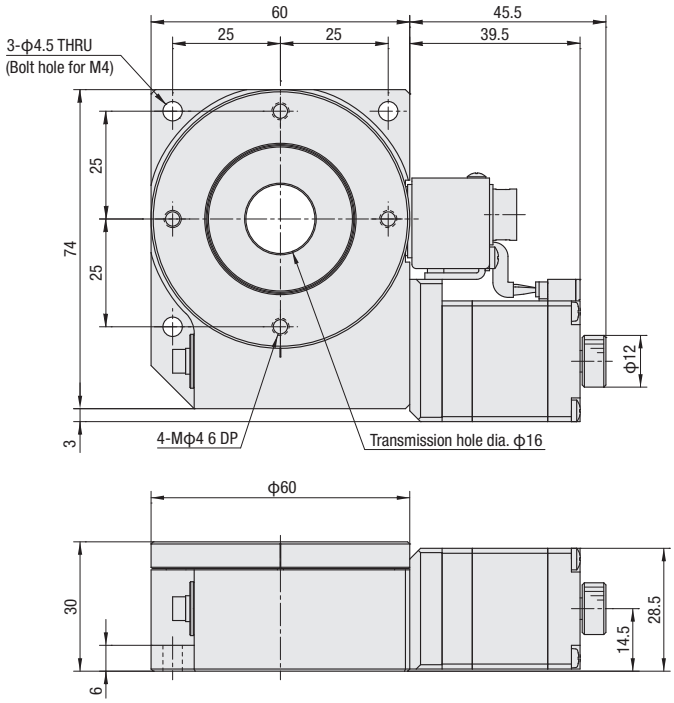
Model		KRE04360-C	KRE06360-C
Mechanical specification	Travel length	360°	
	Table size	ϕ39mm	ϕ60mm
	Travel mechanism (Reduction ratio)	Worm gear (Reduction ratio 1/90)	Worm gear (Reduction ratio 1/120)
	Guide	Deep groove ball bearing	
	Main materials-Finishing	Aluminum—Black almite finishing	
	Weight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

Dimensions

KRE04360



KRE06360



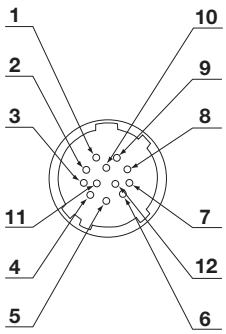
Electrical Specification: KRE04360/KRE06360

Electrical specification

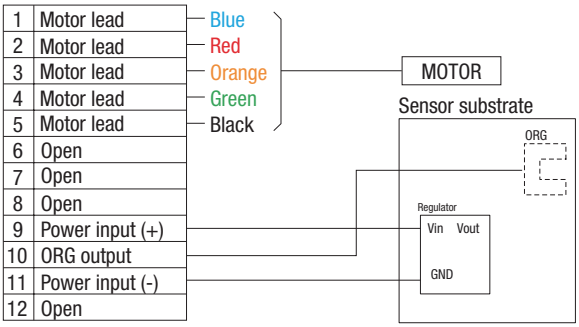
Models		KRE04360-C	KRE06360-C
Motor (*1)	Type	5 phase stepping motor 0.75A/Phase	
	Maker	Oriental Motor Co., Ltd.	
	Model (*2)	C005C-90215P-1	
	Step angle	0.72°	
Connector	Model	HR10A-10R-12PC (71) (Hirose Electric Co., Ltd.)	
	Receiving connector	HR10A-10P-12S (73) (Hirose Electric Co., Ltd.)	
Sensor	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.1-297~ for details of single motor specification.
*2 The model numbers are Suruga Seiki's proprietary management codes.

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 [°]

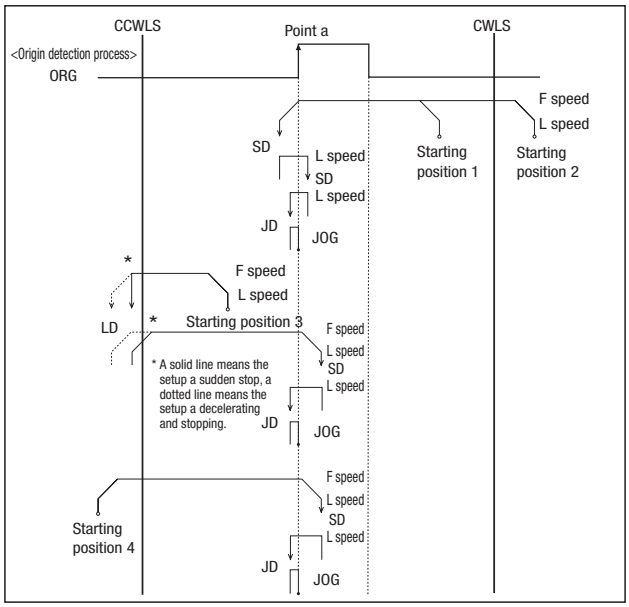
	Origin detected scale position [°]
KRE04360	0 (The end face of the origin: CCW side edge of the douser.) 6 (Opposite side of the end face: CW side edge of the douser.)
KRE06360	0 (The end face of the origin: CCW side edge of the douser.) 4 (Opposite side of the end face: CW side edge of the douser.)

* 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.

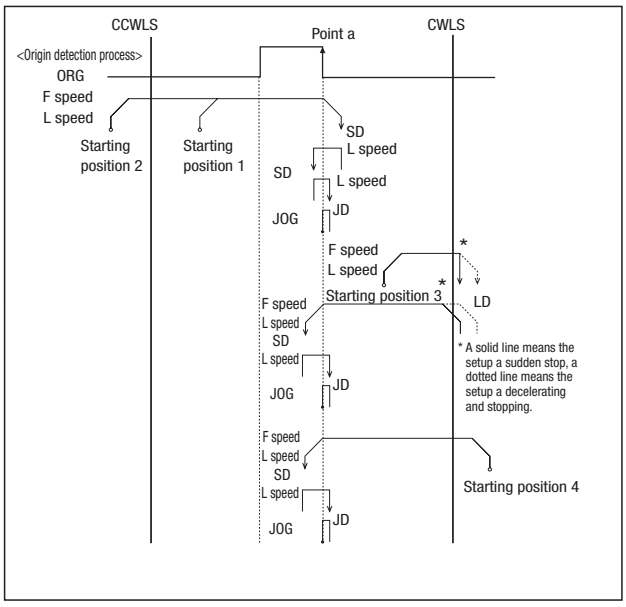
KRE series recommendation return to origin method

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.



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

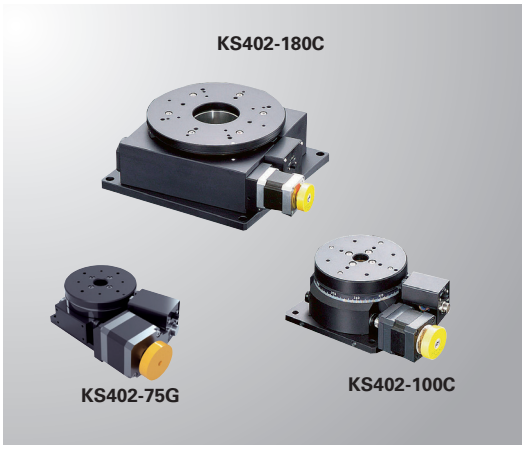


[Type9] After finished Type3, perform detected process for CCW edge of TIMING signal.

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

Return to origin sequence P.1-281～

Rotary Stage ϕ75/ϕ100/ϕ180: KS402



* All image is for illustrative purposes only.

RoHS

KS402-75G-5

1 2

Calbes P.1-287～
Electrical specification P.1-263～

1 Table size

75G	ϕ75mm
100C	ϕ100mm
180C	ϕ180mm

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

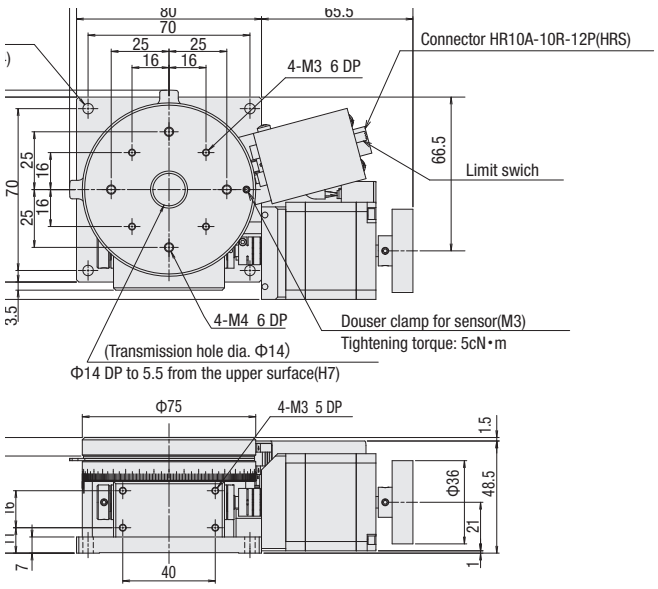
* Please select "blank, 2, 6 and 7" when connect with stepping motor controller(DS102/112).

SPEC

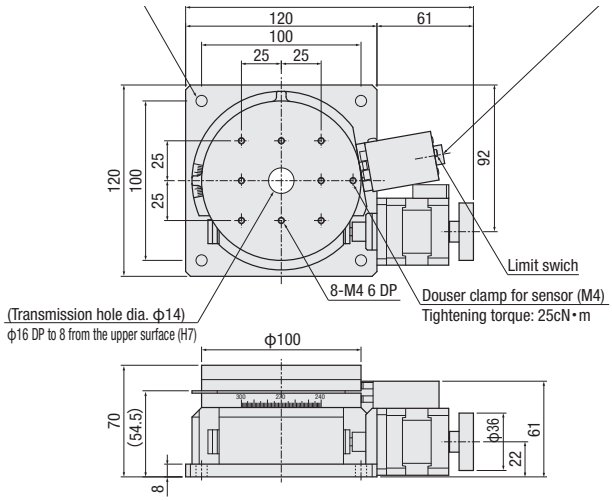
Model		KS402-75G-5	KS402-100C-5	KS402-180C-5
Mechanical specification	Travel length	360°		360°
	Table size	ϕ75mm	ϕ100mm	ϕ180mm
	Travel mechanism (Reduction ratio)	Worm gear (1/144)	Worm gear (1/180)	Worm gear (1/180)
	Guide	Receiving cross roller axis	Combination angular ball bearing	Combination angular ball bearing
	Main materials-Finishing	Aluminum–Black almite finishing		
	Weight	1.16kg	2.5kg	9.7kg
Accuracy specification	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	0.03°		0.05°
	Repeatability positioning accuracy	±0.005°		±0.005°
	Load capacity	10kgf [98N]	15kgf [147N]	30kgf [294N]
	Moment stiffness	0.15″/N・cm	0.07″/N・cm	0.02″/N・cm
	Lost motion	0.005°	0.004°	0.01°
	Backlash	0.005°	0.004°	0.01°
	Parallelism	120μm		100μm
	Eccentricity	5μm		
	Runout	20μm		60μm
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

Dimensions

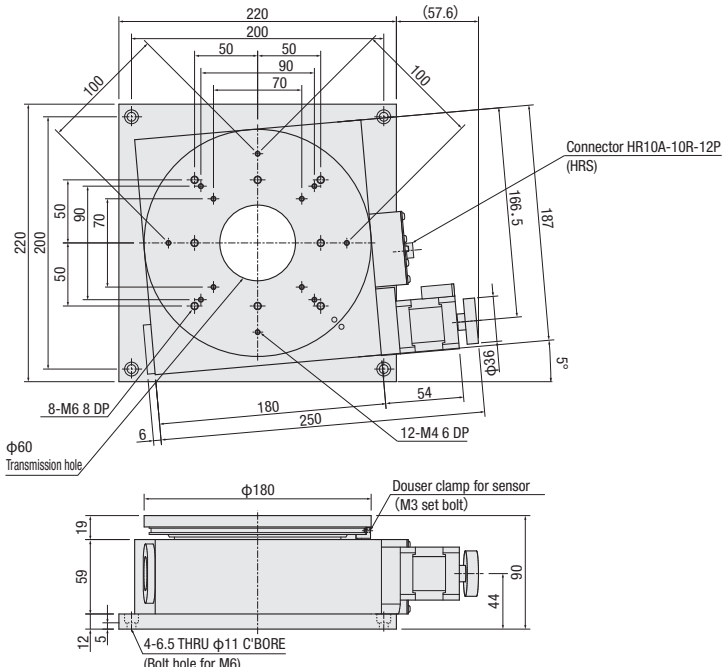
KS402-75G



KS402-100C



KS402-180C



Electrical Specification: KS402

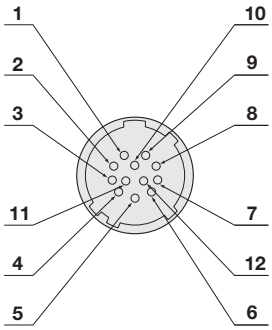
Electrical specification

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°	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-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.1-297～ for details of single motor specification.
*2 Model numbers include Suruga Seiki's proprietary management codes.

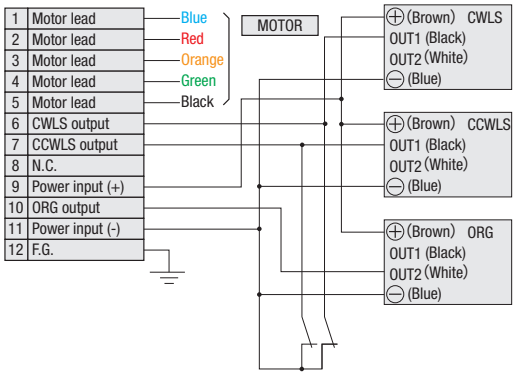
◯Can be reset the limit function in KS402-75G, 100C, 180C by the switch.
◯Can be set any traveling angle because of changeable shield plate position

Pin allocation

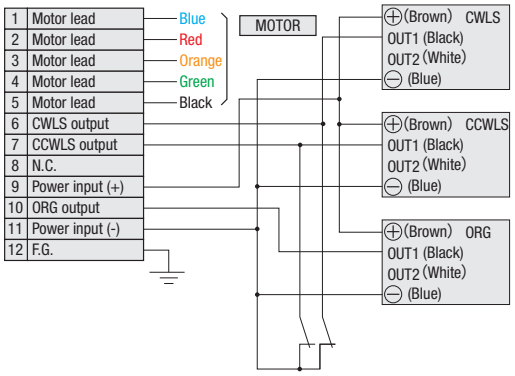


Connection diagram

KS402-75G/KS402-100C



KS402-180C



Timing chart

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

Origin • • • Detect in scale 0 (Ligth on)
(Return to origin is performed type 4 of returning origin by use of DS102/DS112 controller)
CW and CCW limit • • • Any changeable position

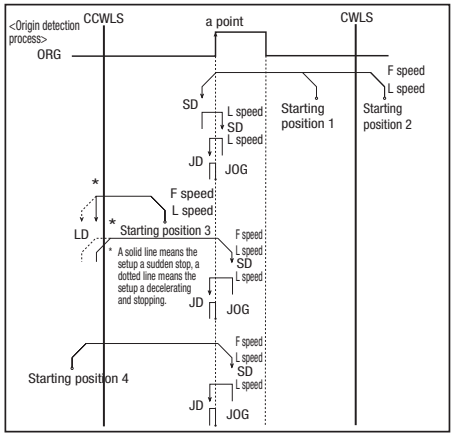
Method for return to origin

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.

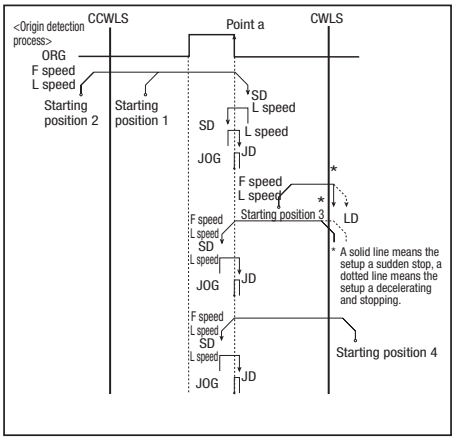
■KS402 series recommended return to origin　Return to origin sequence P.1-281～

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

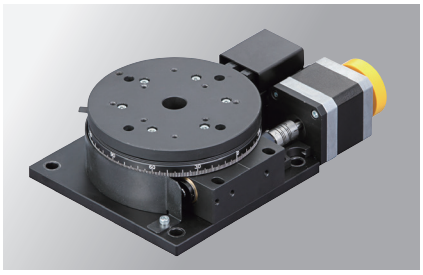
[Type3] Detect in the direction of CCW and perform detected process for CCW edge (a point) of ORG signal.



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



Motorized Rotary Stage：KRE10360



* All image is for illustrative purposes only.

RoHS

KRE10360-□

1 2

Calbes P.1-287～
Electrical specification P.1-267～

1 Table size

10	ϕ100mm

2 Cable option

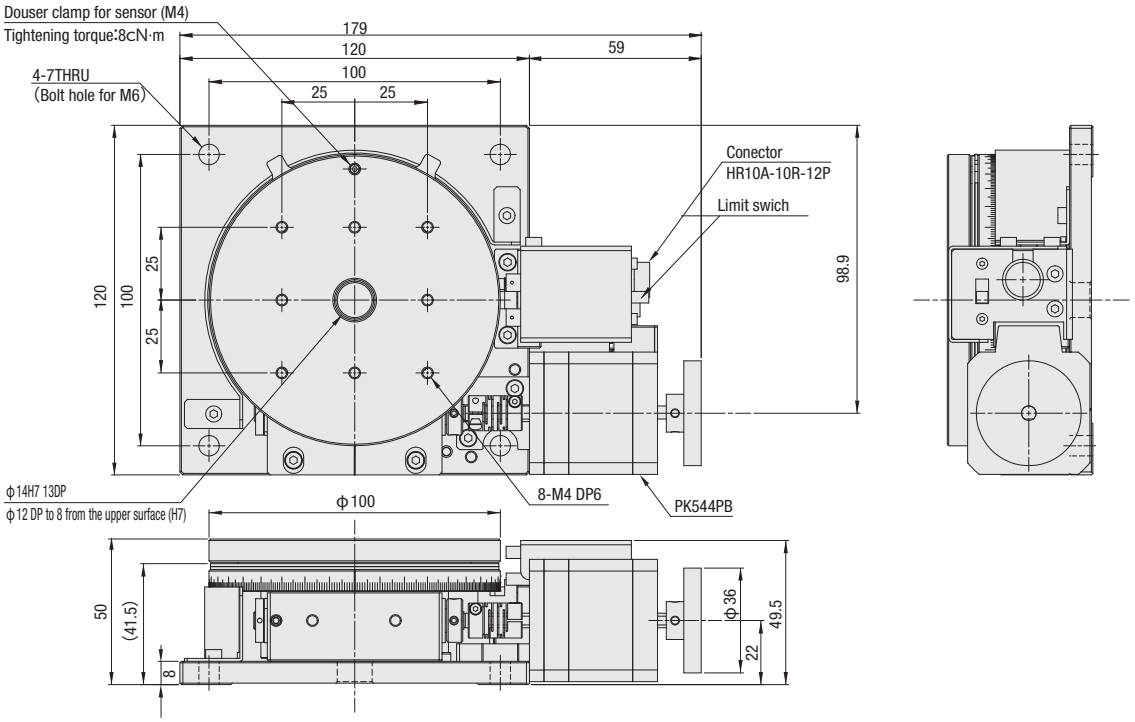
Code	Specification	Cable type
Blank	Cable is not included (Standard)	—
A	2m	D214-2-2E
B	2m One end loose	D214-2-2EK
C	4m	D214-2-4E
D	4m One end loose	D214-2-4EK
E	Only connector (Cable is not included)	—
F	Cable is not included (Standard)	D214-2-2R
G	Robot cable 2m one end loose	D214-2-2RK
H	Robot cable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

* The one end loose side might be on an opposite side of stage.
* Please select "blank, A, C , F, H" when connect with stepping motor controller(DS102/112).

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

Dimensions

KRE10360



Electrical Specification : KRE10360

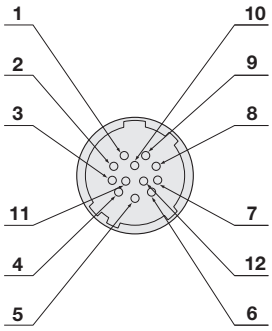
Electrical specification

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 less50mA 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)

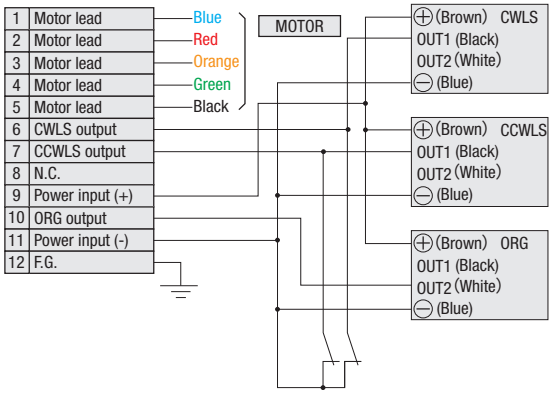
*1 See page 1-297~ for details of single motor specification

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

Pin allocation



Connection diagram



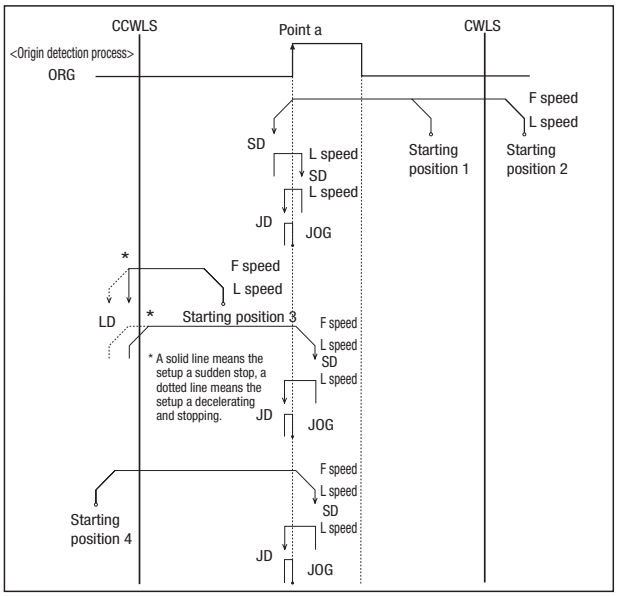
Timing chart

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

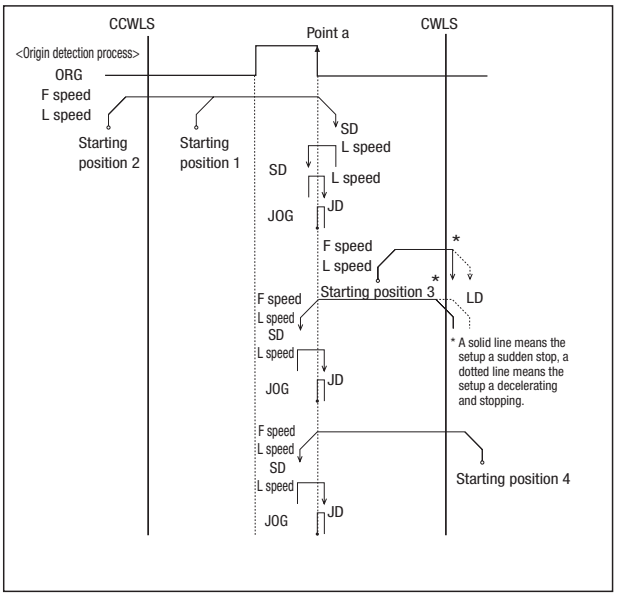
Method for return to origin

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.

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



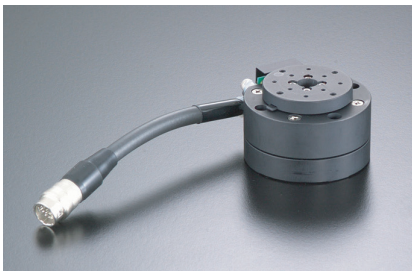
【Type 4】 Detect in the direction of CW and perform detected process for CW edge of ORG signal.



【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.

Rotary Stage ϕ39: KS451



* All image is for illustrative purposes only.

RoHS

KS451-40-5□

1 2

■Good for accuracy possitioning 360°continuously rotation.

Calbes P.1-287～
Electrical specification P.1-271～

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

* 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 amprifier substrate when you control without our controller.

Selection Example

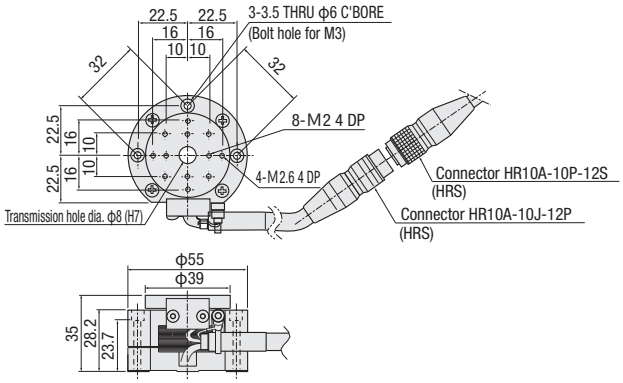
Your spec	Table size	+	Attached cable	+	Attached substrate specification	▷
	ϕ39mm		2m One end Loose		With substrate for 24V	**KS451-40-1V**

SPEC

Model		KS451-40-5
Mechanical specification	Travel length	360°
	Table size	ϕ39mm
	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	0.05°
	Backlash	—
	Parallelism	100μm
	Runout	50μm
Sensor	Limit sensor	—
	Origin sensor	Installed
	Proximity origin sensor	—
Provided screw (Hexagon-headed bolt)		3 of M3—28

Dimensions

KS451-40

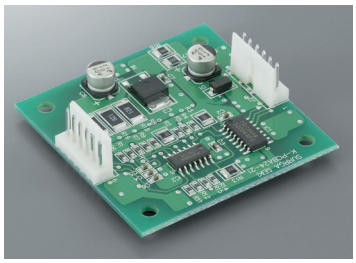


Sensor amplifier substrate for 24V: K-PCBA24

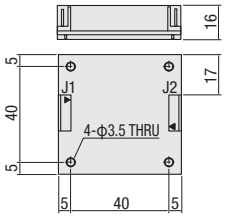
RoHS

K-PCBA is needed to drive a motorized stage with EE-SX1103 sensor when using PC or sequencer's motion control module and not using our controller. EE-SX1103 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-SX1103 sensor cannot be direvtly 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

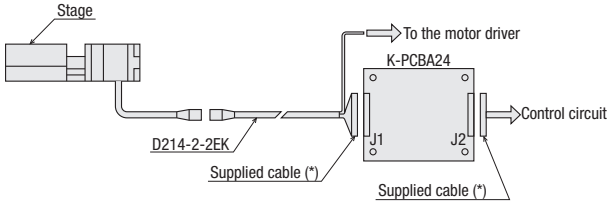


Dimensional outline drawings



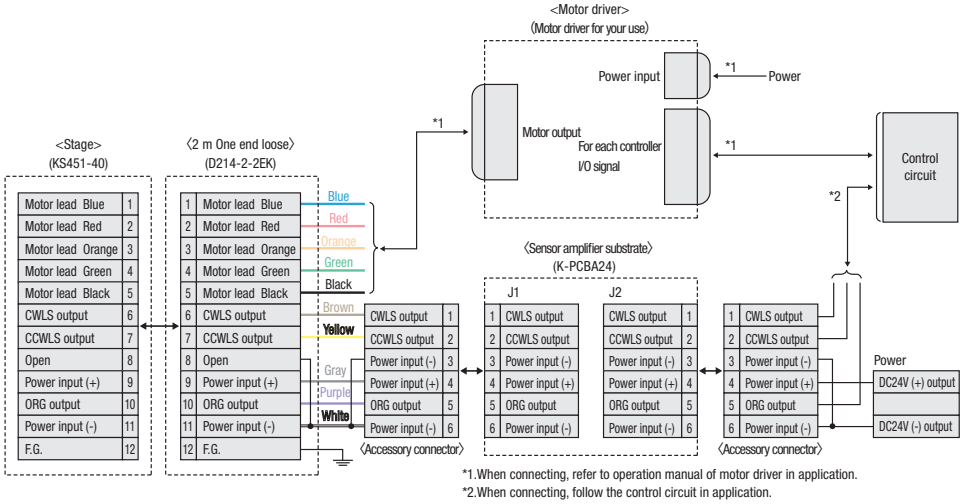
▼mark indicates the position of connector 1 pin.

■Full diagram



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

■Connection sensor amplifier and driver example



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

●Note that sensor damage

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

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.

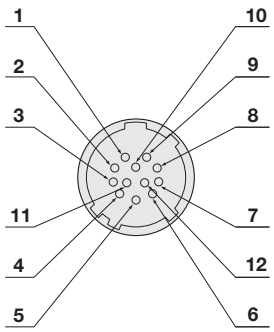
Electrical Specification: KS451

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 less1.2mA 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)

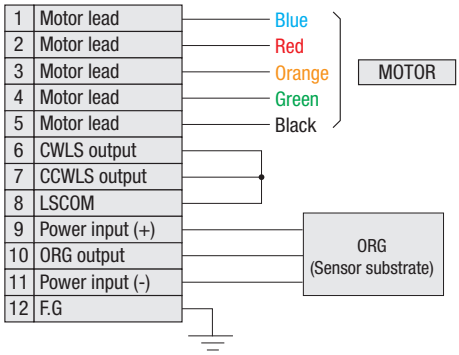
* Please use microstep when reduce the vibration or return to origin. (Driver: CVD507-K-A9/CRD5107P P.1-285〜)

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

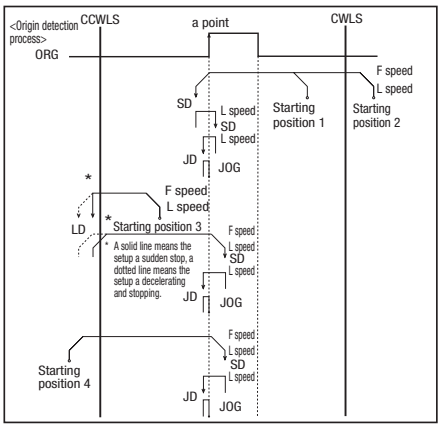
Method for return to origin

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.

■KS451 recommended return to origin　Return to origin sequence ▶P.1-281～

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.