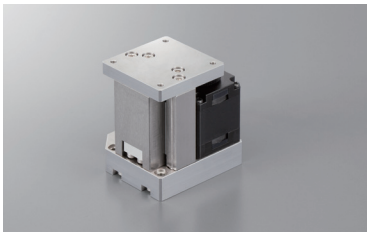
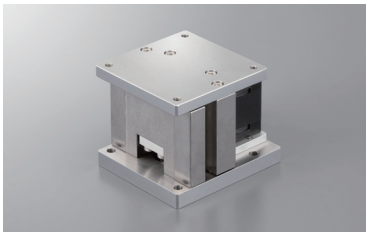
# Horizonal Z-axis Stage: KHE04006-C/KHE06008-C(Linear ball guide)

KHE04006-C



KHE06008-C



RoHS

* All image is for illustrative purposes only.



## KHE04006-C□

1 2 3

Calbes P.1-287～
Electrical specification P.1-163～

### 1 Table size

| | |
|---|---|
| 04 | □40mm |
| 06 | □60mm |

### 2 Travel distance

| | |
|---|---|
| 006 | 6mm |
| 008 | 8mm |

### 3 Cable option

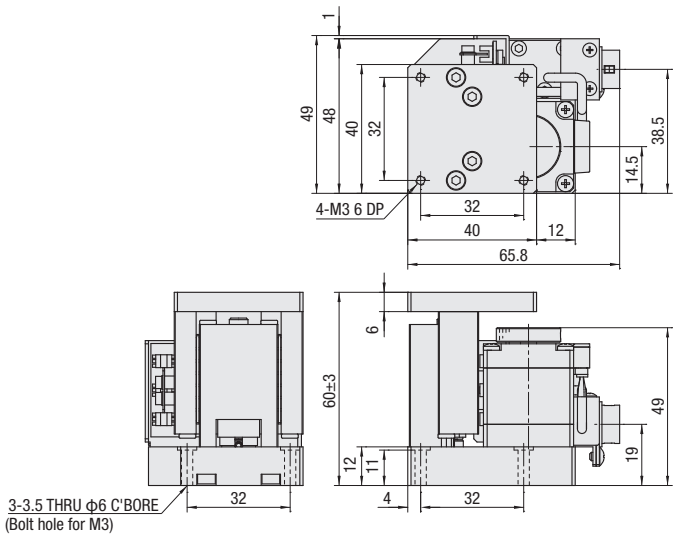
| Code | Specification | Cable type |
|---|---|---|
| Blank | Cable is not included (Standard) | — |
| F | Robot cable 2m | D214-2-2R |
| G | Robot cable 2m one end loose | D214-2-2RK |
| H | Robot cable 4m | D214-2-4R |
| J | Robot cable 4m one end loose | D214-2-4RK |

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

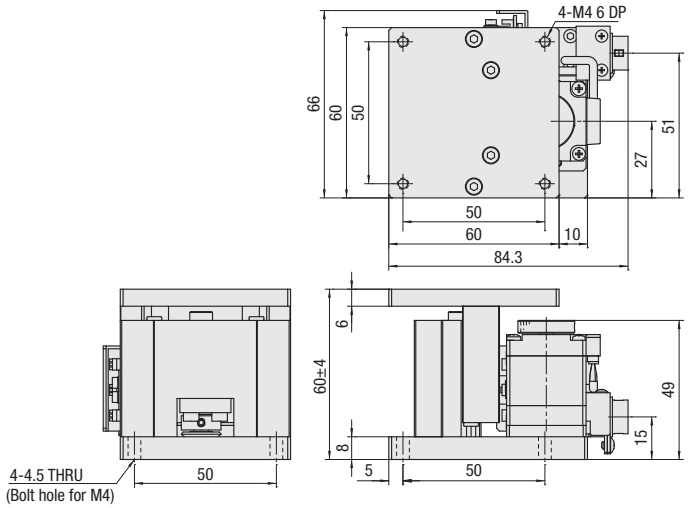
| SPEC | | | |
|---|---|---|---|
| Model | | KHE04006-C | KHE06008-C |
| Mechanical specification | Travel length | 6mm | 8mm |
| | Table size | 40×40mm | 60×60mm |
| | Feed screw (Ball screw) | ϕ6 lead 1 | ϕ8 lead 1 |
| | Guide | Linear ball guide | |
| | Main materials-Finishing | Steel–Opposite side of the end face finishing | |
| | Weight | 0.5kg | 0.92kg |
| Accuracy specification | Resolution (Pulse) | 2μm (Full)/1μm (Half) | |
| | MAX speed | 10mm/sec | |
| | Positioning accuracy | – | |
| | Repeatability positioning accuracy | ±5μm | |
| | Load capacity | 3kgf [29N] | 4kgf [39N] |
| | Lost motion | 5μm | |
| | Parallelism | 80μm | |
| Sensor | Limit sensor | Installed | |
| | Origin sensor | Installed | |
| Provided screw (Hexagon-headed bolt) | | 3 of M3—16 | 4 of M4—14 |

Dimensions

## KHE04006-C




## KHE06008-C



# Electrical Specification: KHE04006/KHE06008

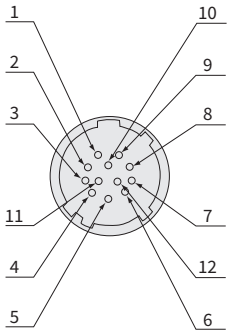


## Electrical specification

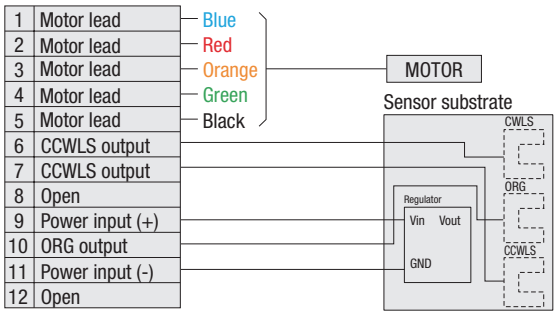
| Models | | KHE04006-C | KHE06008-C |
|---|---|---|---|
| Motor (*1) | Type | 5 phase stepping motor 0.75A/Phase | |
| | Maker | Oriental Motor Co., Ltd. | |
| | Model (*2) | PK523HPB-C17 | |
| | Step angle | 0.72° | |
| Connector | Model | HR10A-10R-12PC (71) (Hirose Electric Co., Ltd.) | |
| | Receiving connector | HR10A-10P-12S (73) (Hirose Electric Co., Ltd.) | |
| Sensor | Limit sensor | Installed | |
| | Origin sensor | Installed | |
| | Model | Photo microsensor EE-SX4320 (Omron Co., Ltd.) | |
| | Power voltage | DC5～24V ±10% | |
| | Consumption current | Total 60mA or less | |
| | Control output | NPN open collector output DC5~24V 8mA or less<br>Residual voltage 0.3V or less when the load current is 2mA | |
| | Limit output logic | On detection (light shield condition): Output transistor OFF (Non-continuity) | |
| | Origin output logic | Detection (Light): Output transistor ON (Continuity) | |

*1 See page P.1-297~ for details of single motor specification
*2 The model numbers are Suruga Seiki's proprietary management codes.

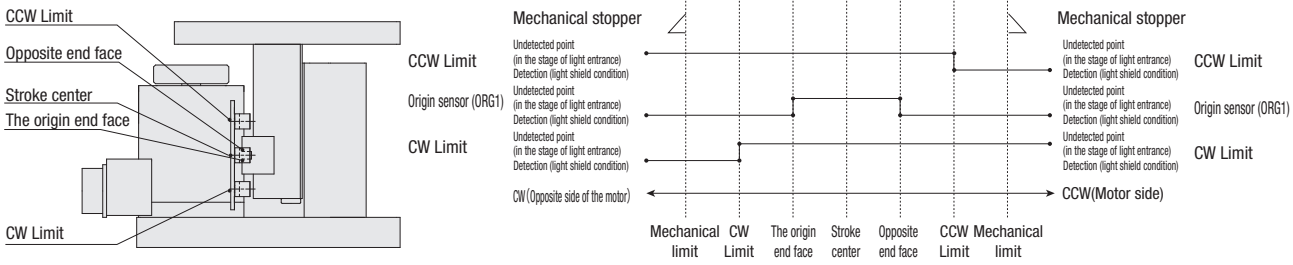
## Pin allocation




## Connection diagram




## Timing chart




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

| | Reference coordinate | Mechanical limit | CW Limit | Origin | Stroke center | Opposite end face | CCW Limit | Mechanical limit |
|---|---|---|---|---|---|---|---|---|
| KHE04006 | Return to origin | 3 | 2.2 | 0 | 1 | 2 | 4.2 | 5 |
| | Stroke center | 4 | 3.2 | 1 | 0 | 1 | 3.2 | 4 |
| KHE06008 | Return to origin | 4 | 3.2 | 0 | 1 | 2 | 5.2 | 6 |
| | Stroke center | 5 | 4.2 | 1 | 0 | 1 | 4.2 | 5 |

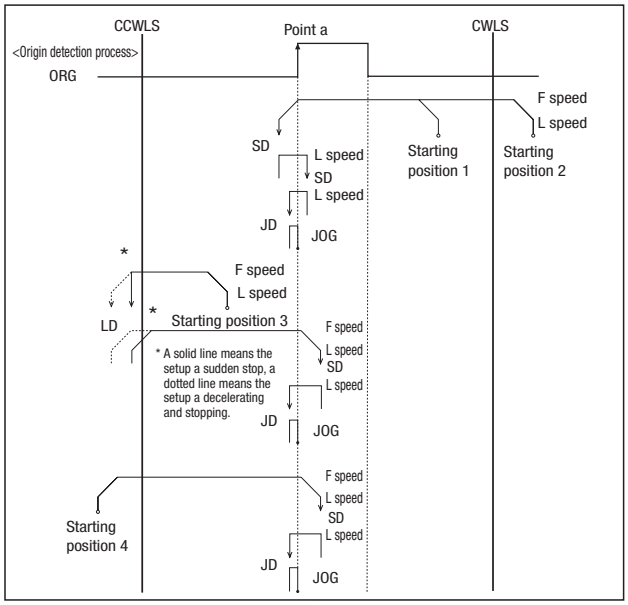
* Return to origin means that is performed return to origin type 4 using DS102/DS112 series.
* The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 mm.

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.

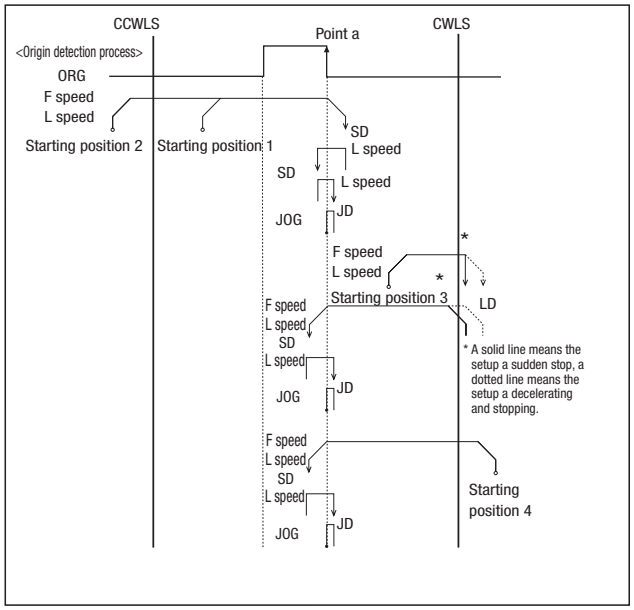
## KHE series recommendation return to origin method

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.

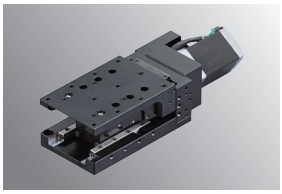
[Type10] After finished Type4, perform detected process for CW edge of TIMING signal.

**Return to origin sequence** P.1-281～

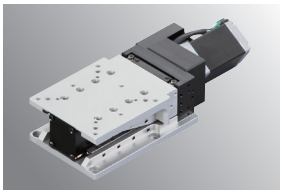
# Horizontal Z-axis Cross Roller Guide: KHC06004F/KHC07004F/KS332



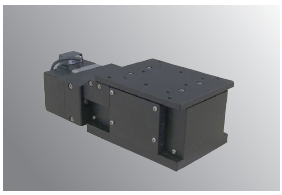
KHC06004F



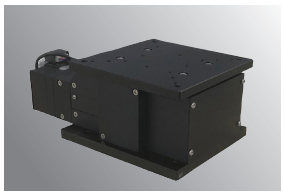
KHC07004F



KS332-8NC



KS332-12C



RoHS

Freely customize the motor

* Can be used for KHC

Calbes P.1-287～
Electrical specification P.1-167～

**KHC06004F-5**

**KS332-8NC-5**

### 1 Table size

| | |
|---|---|
| 06 | 60mm |
| 07 | 70mm |

### 2 Travel distance

| | |
|---|---|
| 004 | 4mm |

### 3 Travel distance

| | |
|---|---|
| 8N | 8mm |
| 12 | 12mm |

### 4 Cable option

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

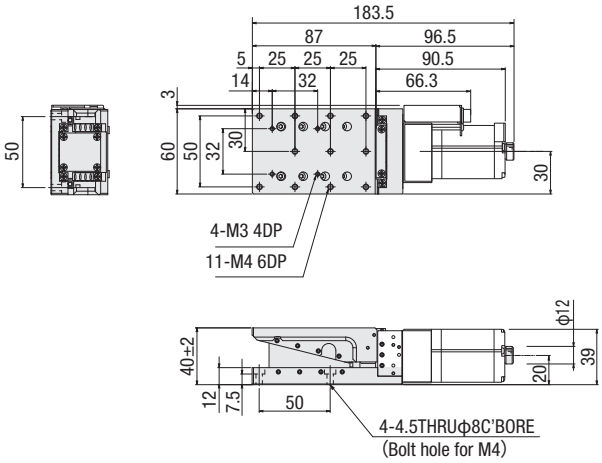
* One end loose position to only stage opposite side.
* Please select "blank, 2, 6 and 7" when connect with stepping motor controller(DS102/112).

**SPEC**

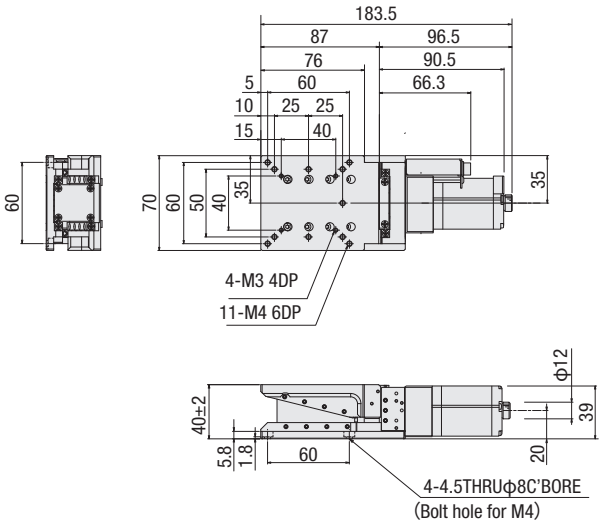
| Model | | KHC06004F-5 | KHC07004F-5 | KS332-8NC-5 | KS332-12C-5 |
|---|---|---|---|---|---|
| Mechanical specification | Travel length | 4mm | | 8mm | 12mm |
| | Table size | 60×60mm | 70×70mm | 80×100mm | 120×120mm |
| | Feed screw | Ball screwφ8 lead 1 | | Ball screwφ6 lead 1 | Ball screwφ8 lead 1 |
| | Guide | Wedge type Crossed roller guide | | | |
| | Main materials-Finishing | Aluminum–Black almite finishing | Aluminum–White almite finish | Aluminum–Black almite finishing | |
| | Weight | 1.14 kg | 1.18 kg | 2.0 kg | 3.6 kg |
| Accuracy specification | Resolution (Pulse) | 0.25 μm (Full)/0.125μm (Half) | | ≒0.73 μm (Full)/0.365μm (Half) | |
| | MAX speed | 2.5 mm/sec | | ≒3.7 mm/sec | |
| | Uni-directional positioning accuracy | 7μm | | – | |
| | Repeatability positioning accuracy | ±0.5 μm | | | |
| | Load capacity | 7kgf [68.6N] | | 20kgf [196N] | |
| | Moment stiffness | Pitch 0.2/yaw 0.04/ roll 0.14 ["/N・cm] | | Pitch 0.24/yaw 0.12/ roll 0.03 ["/N・cm] | Pitch 0.20/yaw 0.11/ roll 0.01 ["/N・cm] |
| | Lost motion | 1 μm | | | |
| | Parallelism | 50 μm | | | |
| Sensor | Limit sensor | Installed | | | |
| | Origin sensor | Installed | | | |
| | Slit origin sensor | – | | | |
| Provided screw (Hexagon-headed bolt) | | 4 of M4—12 | 4 of M4—6 | 4 of M4—16 | 4 of M6—16 |

Dimensions

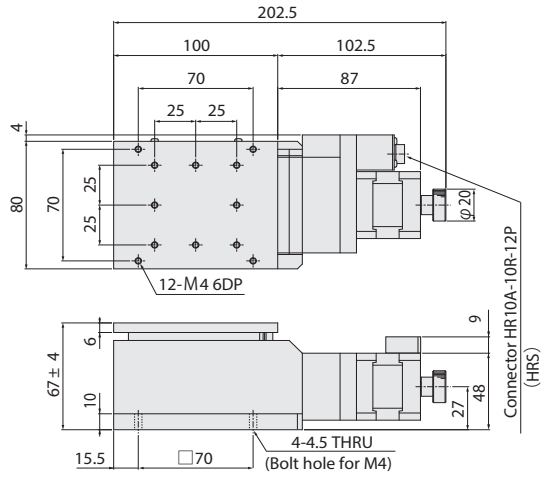
## KHC06004F



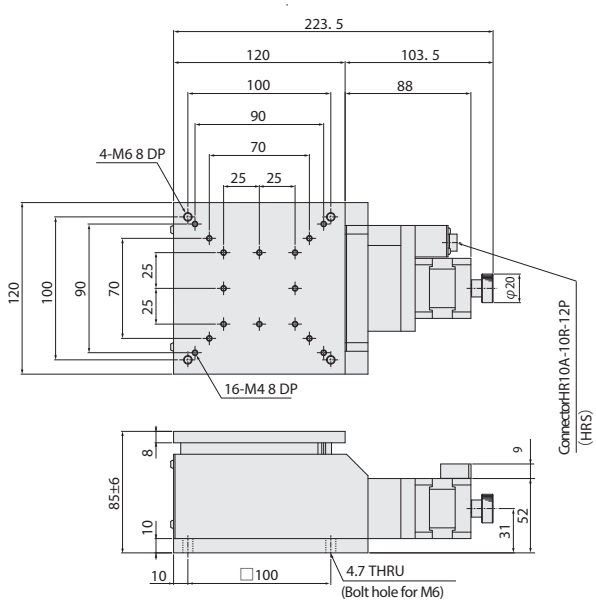

## KHC07004F




## KS332-8NC




## KS332-12C



# Electrical Specification: KHC06004F/KHC07004F/KS332



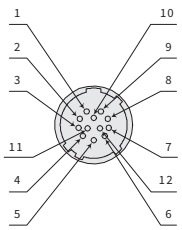
## Electrical specification

| Models | | KHC06004F | KHC07004F | KS332-8NC | KS332-12C |
|---|---|---|---|---|---|
| Motor (*1) | Type | 5 phase stepping motor 0.75A/Phase (Oriental Motor Co., Ltd.) | | | |
| | Model | PK525HPB-C1 (□28mm) | | PK544PB-C18 | |
| | Step angle | 0.72° | | 0.72° | |
| Connector | Model(*2) | 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 | | | |
| | Origin sensor (ORG1) | Installed | | | |
| | Slit origin sensor (ORG2) | — | | | |
| | Model | Micro photosensor EE-SX4320(Omron Co., Ltd.) | | Switches AV4044 (Panasonic) 0.1A 30V DC<br>Photo microsensor EE-SX671 (Omron Co., Ltd.) | |
| | Power voltage | DC5～24V ±10% | | | |
| | Consumption current | Total 60mA or less | | Total 35mA or less | |
| | Control output | NPN open collector output DC5～24V 8mA or less<br>Residual voltage 0.3V or less when the load current is 2mA | | NPN open collector output DC5～24V100mA or less<br>Residual voltage 0.8V or less when the load current is 100mA<br>Residual voltage 0.4V or less when the load current is 40mA | |
| | Output logic(*) | On detection (light shield condition) : Output transistor 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 The model numbers are Suruga Seiki's proprietary management codes.

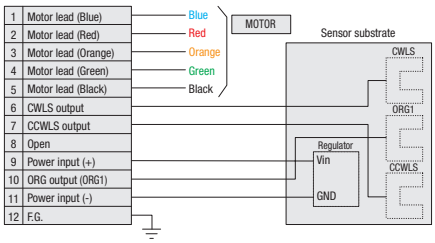
## Pin allocation

**KHC06004F/KHC07004F**



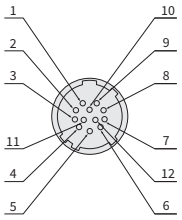

## Connection diagram

**KHC06004F/KHC07004F**



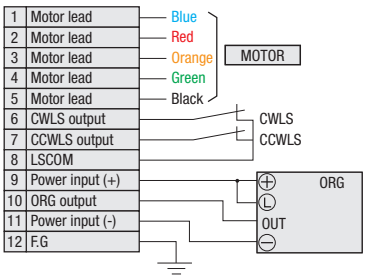

## Pin allocation

KS332-8NC/KS332-12C



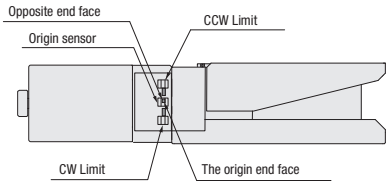

## Connection diagram

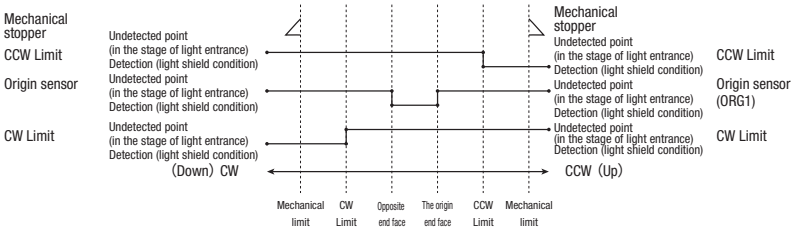
KS332-8NC/KS332-12C




## Timing chart (KHC06004/KHC07004)

**KHC06004/KHC07004**



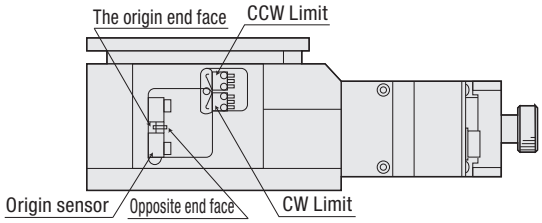

Unit [mm] Direction of CW ◀——▶ Direction of CCW

| | Reference coordinate | Mechanical limit | CW Limit | Opposite end face | The origin end face stroke center | CCW Limit | Mechanical limit |
|---|---|---|---|---|---|---|---|
| **KHC06004F** | Return to origin | 2.5 | 2.2 | 1.5 | 0 | 2.2 | 2.5 |
| **KHC07004F** | Return to origin | 2.5 | 2.2 | 1.5 | 0 | 2.2 | 2.5 |

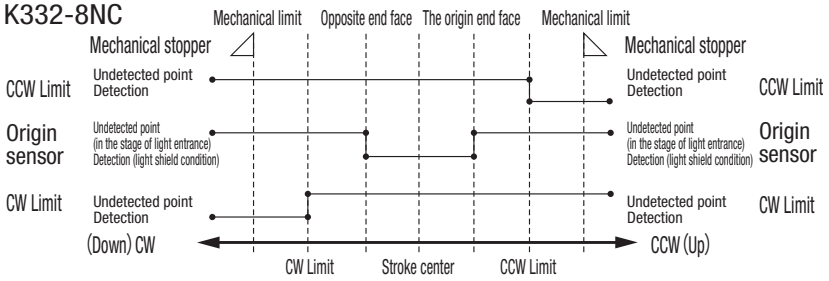
*Return to origin means that is performed return to origin type 3 using DS102/DS112 controller.
* The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 mm.

## Timing chart ( KS332-8NC/KS332-12C )

**KS332-8NC/KS332-12C**



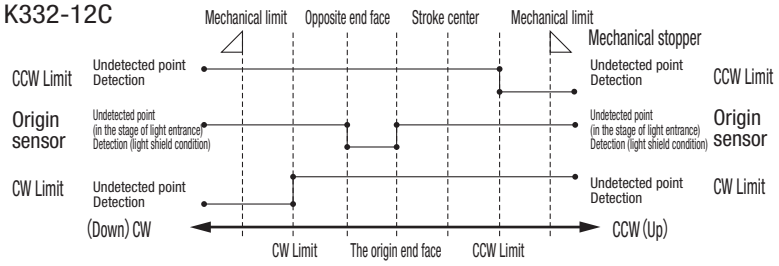

K332-8NC




Unit [mm] Direction of CW ◄——► Direction of CCW

| | Reference coordinate | Mechanical limit | CW Limit | Opposite end face | Stroke center | The origin end face | CCW Limit | Mechanical limit |
|---|---|---|---|---|---|---|---|---|
| KS332-8NC | Return to origin | — | 4.9 | 2.2 | 0.4 | 0 | 4.1 | — |
| | Stroke center | — | 4.5 | 1.8 | 0 | 0.4 | 4.5 | — |

K332-12C




Unit [mm] Direction of CW ◄——► Direction of CCW

| | Reference coordinate | Mechanical limit | CW Limit | Opposite end face | Stroke center | The origin end face | CCW Limit | Mechanical limit |
|---|---|---|---|---|---|---|---|---|
| KS332-12C | Return to origin | — | 7.6 | 2.2 | 1.1 | 0 | 5.4 | — |
| | Stroke center | — | 6.5 | 1.1 | 0 | 1.1 | 6.5 | — |

*Return to origin means that is performed return to origin type 3 using DS102/DS112 controller.
* The coordinate value should be on the design. Dimension error may occur about plus or minus 0.5 mm.

## Method for return to origin

Suruga's motorized stages is different from the sensor specifications depends on models. As return to origin operation is devided into types, it is necessary to choose the correct type.Selected wrong type may be operated uncorrectly.Choose your best one whatever you need according to be recommended as below.

### ■KHC06004F/KHC07004F/KS332-8NC/KS332-12C recommended return to origin

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.