



**THK Electrical Actuator Clean Series**

# CKRF

**INSTRUCTION MANUAL**

No.5040-1 (0) E

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# 1. Introduction

## 1-1 Acknowledgment

Thank you for purchasing the Clean Series CKRF.

This product is an actuator suitable for using in a clean environment.

This product is designed and manufactured to be incorporated in devices with wide range of application including conveyance system, implementing equipment, automated assemblers, and positioning equipment, etc.

We hope our creative inventions and unique technologies contribute to your further prosperity.

## 1-2 About this manual

### 1-2-1 Intended audience

The person in charge of designing embedded systems of the product and installing, wiring, and maintaining the product, and the person who actually uses the product.

### 1-2-2 Using This Manual

This manual describes correct handling methods and precautions for the product.

For the maximum performance and long life of the product, carefully read and understand this manual to safely and correctly use the product.

If you use the printed version of this manual, be sure to keep it in the place that the audience can refer to it when needed.

### 1-2-3 Notice and attention

- Do not use or handle the product in the ways that are not described in this manual.
- Do not reproduce, reprint, or lend the whole contents or a part of this manual without permission.
- Please note that the description in this manual is subject to change without prior notice in the future, due to improvements of the product or other reasons.
- We have made all possible efforts to make the content of this manual accurate. However, if you find any mistake or uncertainty in this manual, please contact THK.
- Drawings throughout this manual are only intended as typical examples, and may differ from your product.
- Note that THK shall not be liable for any result incurred by applying this manual, regardless of the reason.
- This manual is also applied to special types of product. However, the descriptions provided in the delivery specification drawings or delivery specification documents of those special types take precedence over this manual.

\* Special types represent the products that have different materials and specifications from those of the standard products on catalogs.

### 1-2-4 Notation of this manual

**Important**

- Notes that can lead to unsatisfactory functions, errors, or damages of the product if not observed while using the product.

**Supplement**

- Supplementary information for the description.

**Reference**

- Reference information for the description.

## 1-3 How to use this product

- This product must not be used for the devices or systems that are used under the situations that may be fatal to human life.
- If you consider using this product for special applications such as passenger movement vehicle, medical, aerospace, nuclear power, and electric power devices or systems, be sure to consult with THK in advance.
- This product is manufactured under the strict quality control, however, that does not mean that the product is free from failure. For applications to the equipment that may suffer serious accidents or loss from the failure of this product, install safety devices or backup devices that prevent such serious accidents or loss.

### Important

- If you purchase this product with a motor, the applicable driver controller is TSC, TLC, or THC. Please note that driver controllers other than the above cannot be used.

## 1-4 About product support

We have made all possible efforts to make the content of this manual accurate. However, if you find any mistake or uncertainty in this manual, please contact THK.

For the following information, please contact THK.

- Technical support for this product

## 1-5 About related instruction manuals

- When you use the actuator CKRF, read the following instruction manuals as necessary.

· Controller series	Driver controller TSC
· Controller series	Driver controller TLC
· Controller series	Driver controller THC
· Controller series	Network unit TNU
· Controller series	Setup tool D-STEP
· Controller series	Digital operator TDO

## 1-6 Product and company information

To find the latest product and company information, we recommend you to periodically access our website.

- Website URL: <https://www.thk.com/>
- Technical support website URL: <http://www.tech.thk.com/>

## 2. Safety precautions

### 2-1

### Warning indications on safety

This manual uses the following warning indications according to safety matters. The descriptions next to warning indications on safety are important messages. Be sure to observe those descriptions.



**Warning** "Erroneous handling may cause death or serious injury to a person"



**Caution** "Erroneous handling may cause injury to a person or property damage only"



"Prohibitions (don't)"



"Obligations (do)"

### 2-2

### Safety precautions

This section describes important precautions that you must observe.



### Warning



#### ■ General

- **While this product is operating or operable, do not enter the working area of any moving part.**  
Otherwise, it may cause you to touch the moving part and injure you.
- **While the motor or sensor is energized, do not move or install this product.**  
Otherwise, it may cause electric shocks, or cause malfunction that could lead to injury.



#### ■ Installation and operation

- **If any moving part may fall by its own weight in vertical application or the like, provide a safeguard for preventing the part from falling.**  
If any moving part falls, it may cause injury or damage.



- **While this product is operating, do not touch any moving part or rotating part.**  
Otherwise, it may cause your hand to be caught and injured.



#### ■ Maintenance

- **Turn off the machine (turning power off) before conducting any maintenance.**  
Otherwise, it may cause electric shocks, or cause malfunction that could lead to injury.
- **If two or more people are involved in the operation, confirm the procedures such as sequences, signs, and abnormalities in advance, and appoint another person for monitoring the operation.**  
Failure to do so may cause an unexpected accident.

## 2. Safety precautions

### Caution



#### ■ General

- **Do not stand on this product or the packaging box.**  
Otherwise, it may cause fault or damage, or cause falling that could lead to injury.
- **Do not impact this product.**  
Otherwise, it may cause fault or damage, or injure you.
- **Do not apply a load that exceeds the permissible level.**  
Otherwise, it may cause fault or damage, or may cause abnormal operation that could lead to injury.  
\* For your reference, see the Appendix, which contains the static permissible moment and permissible input torque for each model number.



- **Do not disassemble or alter this product.**  
Otherwise, it may cause foreign material to enter the product, which could result in fault or adversely affect the performance or service life. Or may cause abnormal operation that could lead to injury.



#### ■ Unpacking

- **Be careful not to hit your hands or body against protruded parts.**  
Otherwise, it may cause injury, or cause fault or fracture.
- **Check whether the delivered product is the product you ordered.**  
Using a wrong product may cause malfunction that could lead to injury or fault.
- **Check whether the product has any fractured parts.**  
Using a fractured product may cause injury or fault.  
\* If you find any defect, contact our Sales Division.



#### ■ Transportation

- **Do not drop or hit this product.**  
Otherwise, it may cause injury or fracture, or a functional loss.
- **When transporting this product, do not hold any moving part or the cover.**  
Also, do not hold the side cover from the both sides.  
Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture.
- **When transporting this product, do not hold the motor, the sensor or the cable.**  
Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture.



- **When carrying this product, hold the bottom face of the product.**  
Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture.  
\* See the appendix for the weight of the product.

#### ■ Installation and operation



- **Firmly secure this product before operating it.**  
Failure to do so may cause abnormal operation that could cause injury, fault or fracture.
- **If anomaly occurs, immediately stop the machine.**  
Failure to do so may cause abnormal operation that could cause injury, fault or fracture.
- **Do not exceed the maximum speed when using the product.**  
Otherwise, it may cause fault or damage, or may cause abnormal operation that could lead to injury. For your reference, see the specification (→ P.4-1), which contains the maximum speed for each model number at each stroke.
- **Do not use the failed and broken product.**  
Otherwise, it may cause injury or machine failure.

## 2. Safety precautions

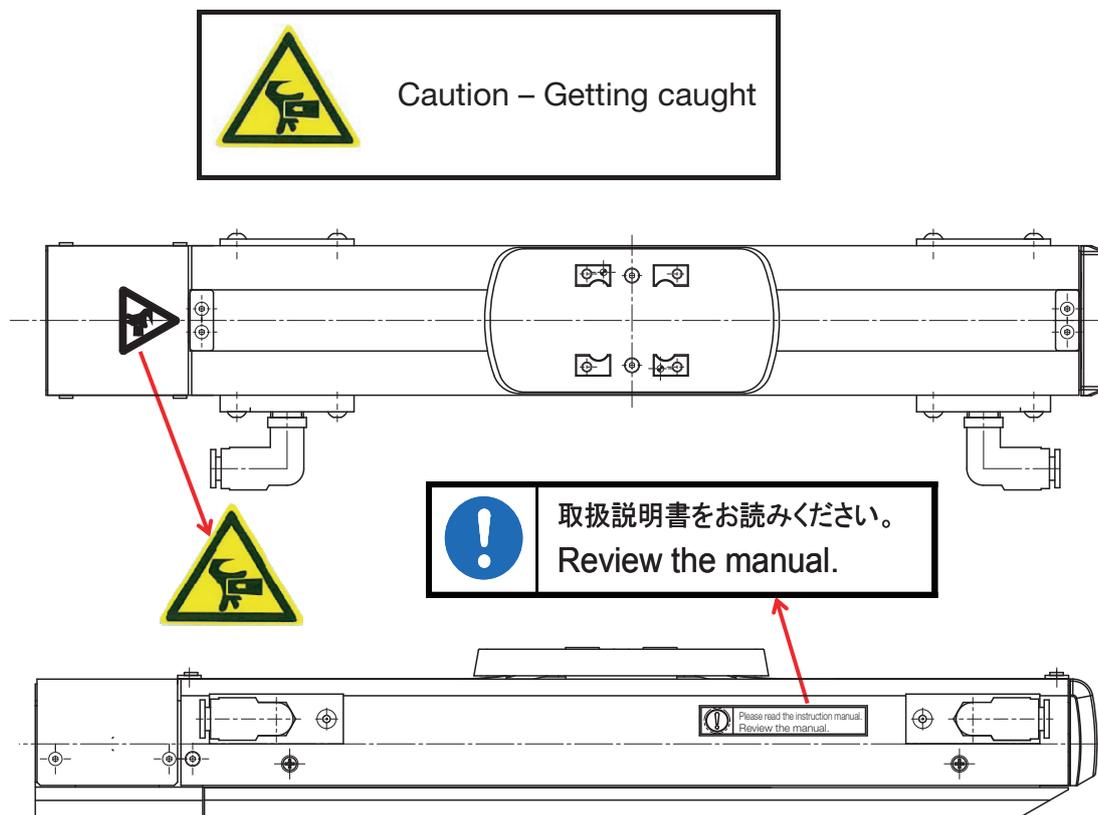
## 2. Safety Precautions

### 2-3

### Checking the precautions/instruction labels

This product is affixed with precautions/instruction labels. Identify them when unpacking the product.

Fig.1 shows the affixing position.



**Fig. 1 CKRF Precautions/instruction labels affixing positions**

## 3. Nameplates Display

### 3. Nameplates Display

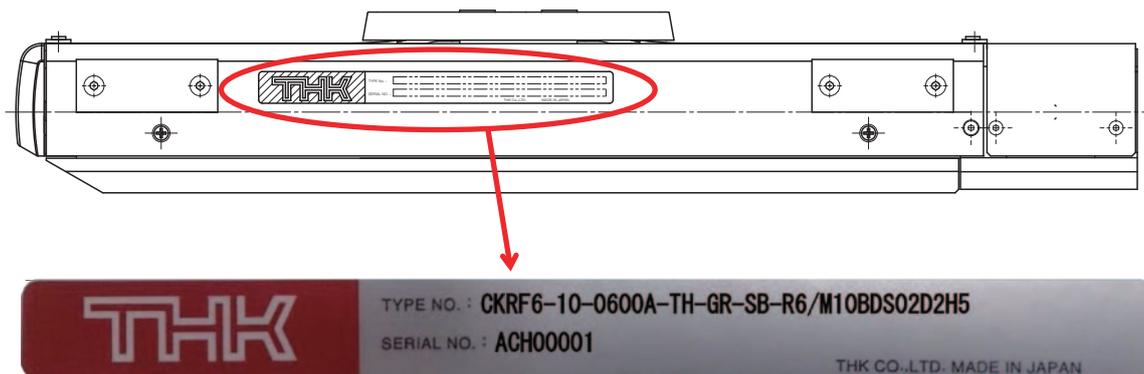
#### 3-1

#### Nameplates display and serial number

Fig. 2 shows the nameplate format of the Clean Series CKRF.

TYPE No. : Actuator model

SERIAL No.: Serial number



**Fig. 2 CKRF Nameplate details**

## 4. Specifications

### 4. Specifications

#### 4-1

#### Basic specification

The basic specification of CKRF is shown as follows. Do not exceed the following basic specification when using the product. Otherwise, it may cause fault or damage, or may cause abnormal operation that could lead to injury.

##### When using stepper driver controller TSC

Model number	Ball screw lead [mm]	Stroke [mm]	Motor size	Maximum load capacity <sup>1</sup> [kg]			Maximum speed at each stroke <sup>1</sup> [mm/s]														
				Horizontal mount	Wall mount	Vertical mount	Stroke														
							to 300	350	400	450	500	550	600	650	700	750	800				
CKRF4	6	50 to 300	Stepper motor □35	6.5	6	4	300														
CKRF5	6	50 to 550	Stepper motor □42	20	14.5	7.5	300			250											
	10	50 to 550		10	10	6	500			430											

\* 1 The maximum load capacity and the maximum speed vary with usage conditions. For details, see "Basic specification" and "Speed and Load Capacity Relationship Diagram" for each model number.

##### When using servo driver controller TLC/THC

Model number	Ball screw lead [mm]	Stroke [mm]	Motor rated output [W]	Maximum load capacity <sup>2</sup> [kg]			Maximum speed at each stroke <sup>3</sup> [mm/s]														
				Horizontal mount	Wall mount	Vertical mount	Stroke														
							to 300	350	400	450	500	550	600	650	700	750	800				
CKRF4	6	50 to 300	50	6	5.5	4	300														
CKRF5	6	50 to 550	50	19	14	6	300			250											
	10	50 to 550		15	12.5	3.5	500			430											
CKRF6	6	50 to 800	100	35	24	10	300			260	220	200	170	150							
	10	50 to 800		30	22	5	500			440	380	330	290	260							

\* 1 This assumes a speed at the rated motor revolution (3,000min<sup>-1</sup>).

\* 2 The maximum load capacity assumes the capacity at the rated speed under 0.5 G for horizontal and wall mounts, and 0.3 G for vertical mount.

\* 3 The maximum speed is the value restricted by the motor rotational speed (at 3000 min<sup>-1</sup>) or by the permissible rotational speed of the ball screw.

## 4. Specifications

### 4. Specifications

#### 4-2

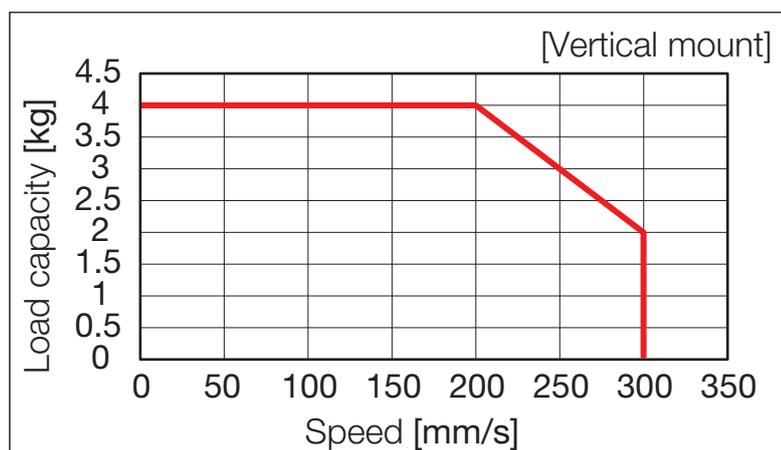
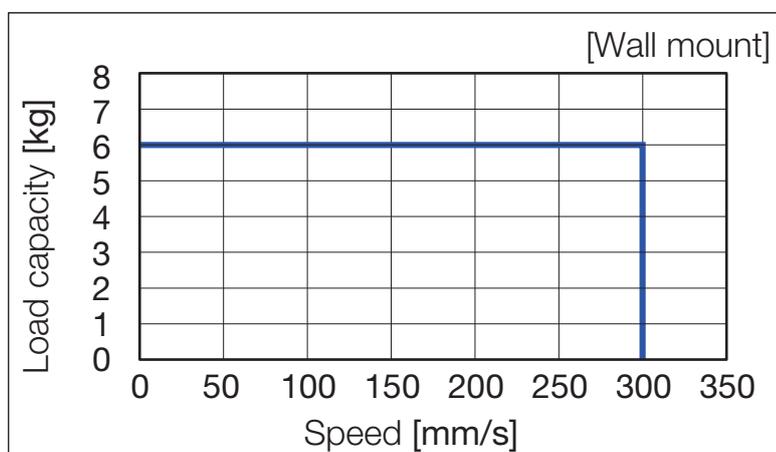
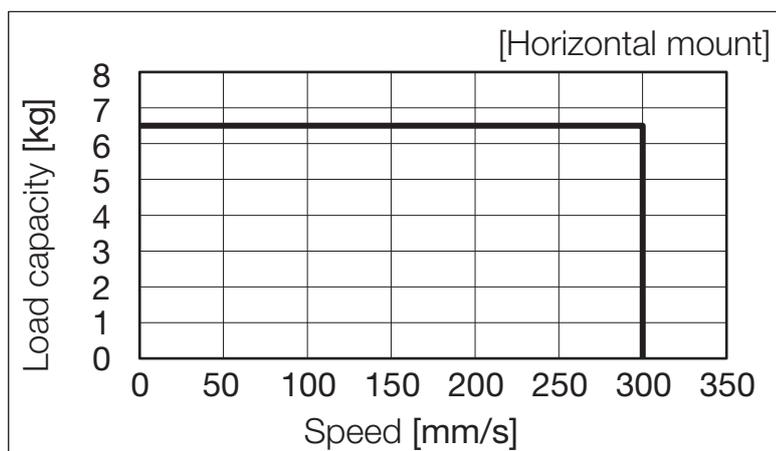
### Speed and load capacity characteristic diagram

Load capacity and maximum speed vary with usage conditions.

Use the product within the range of following characteristic diagram.

#### CKRF4...Stepper driver controller TSC

##### ○ Lead 6 mm

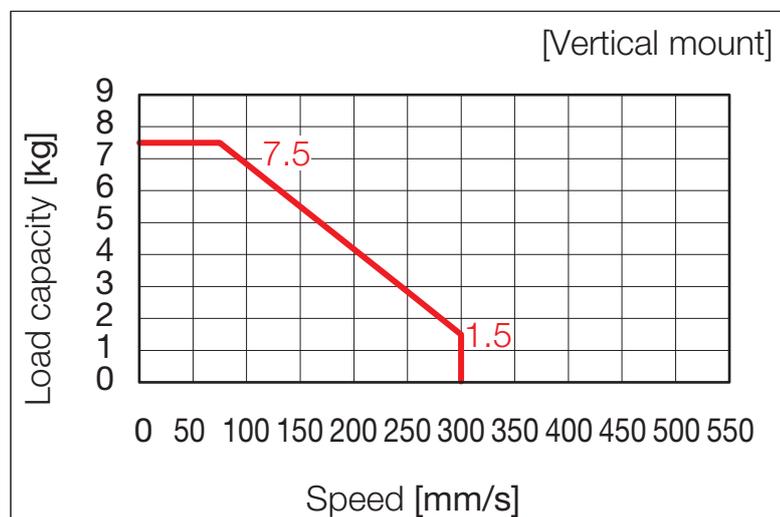
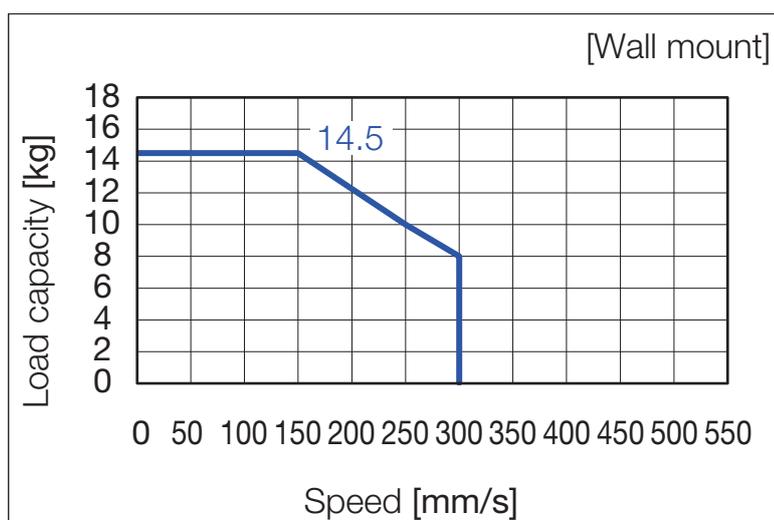
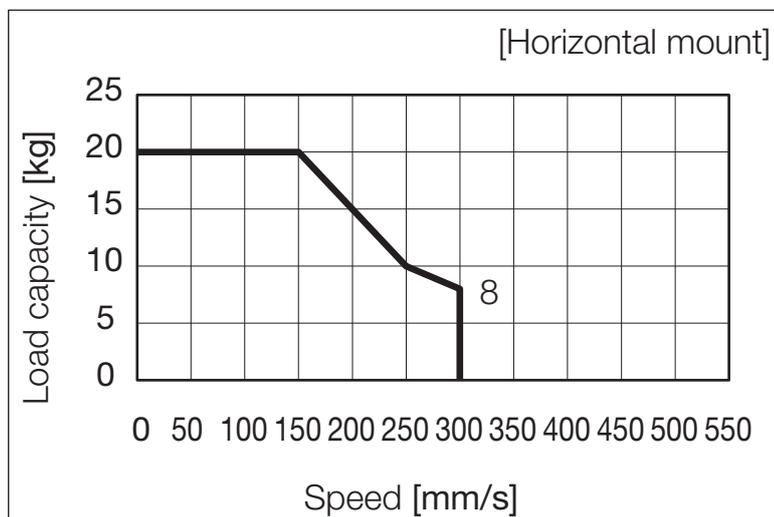


# 4. Specifications

## 4. Specifications

### CKRF5....Stepper driver controller TSC

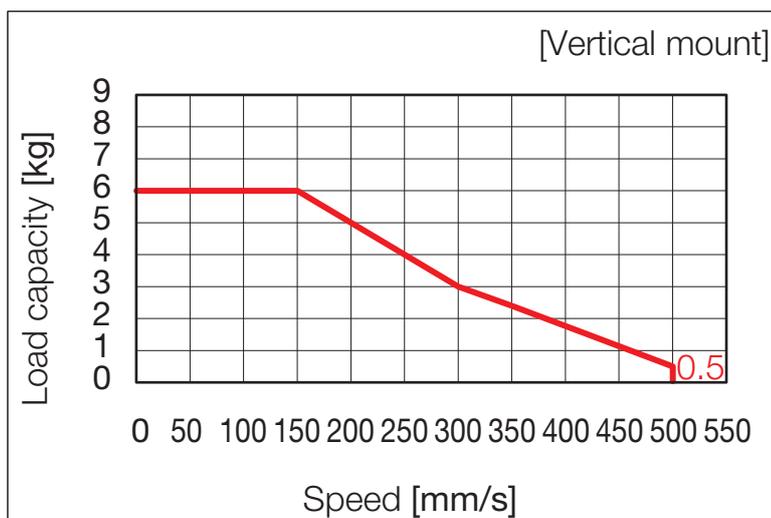
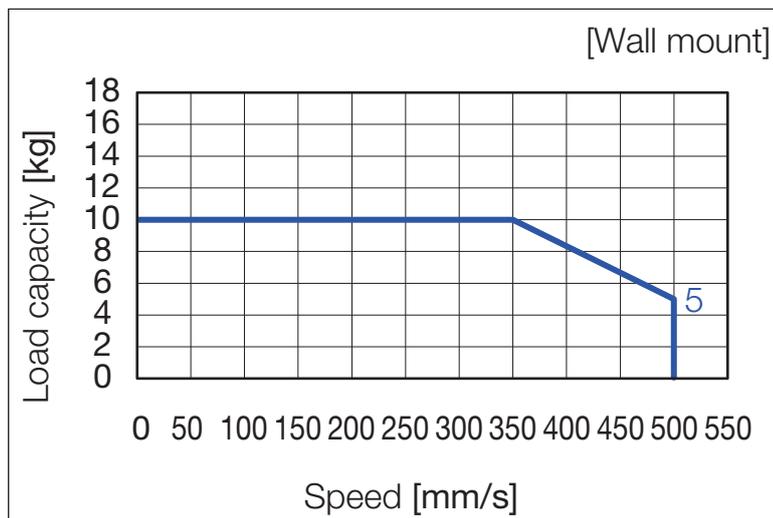
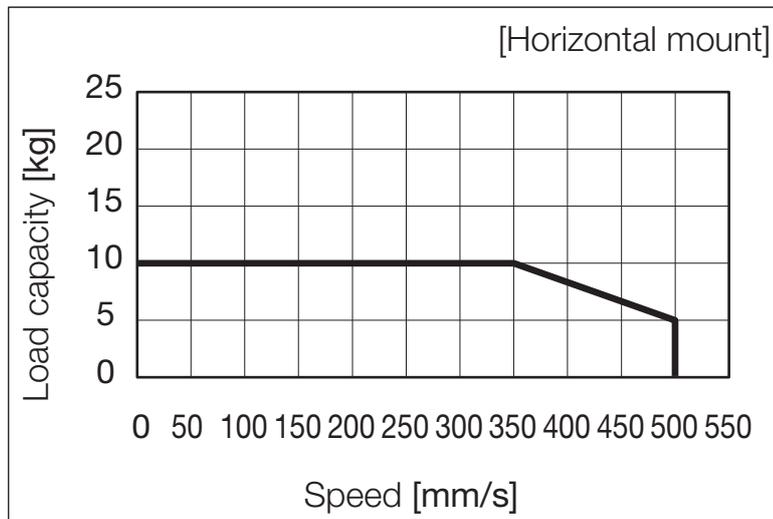
○ Lead 6 mm



# 4. Specifications

## 4. Specifications

○ Lead 10 mm

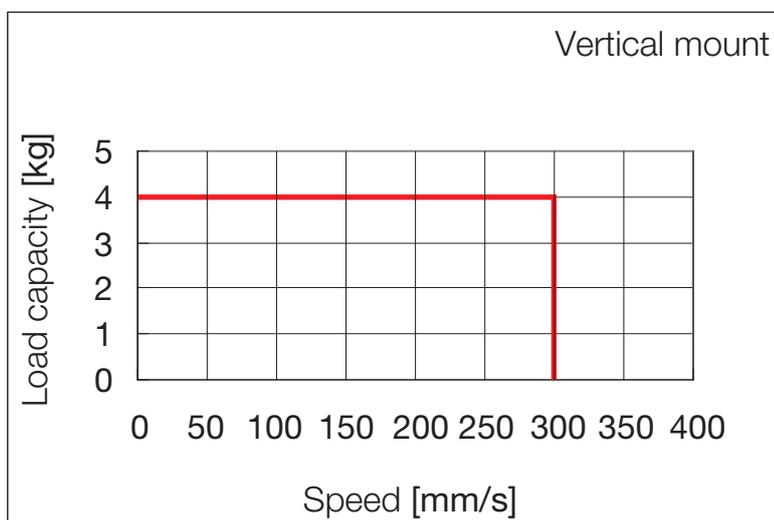
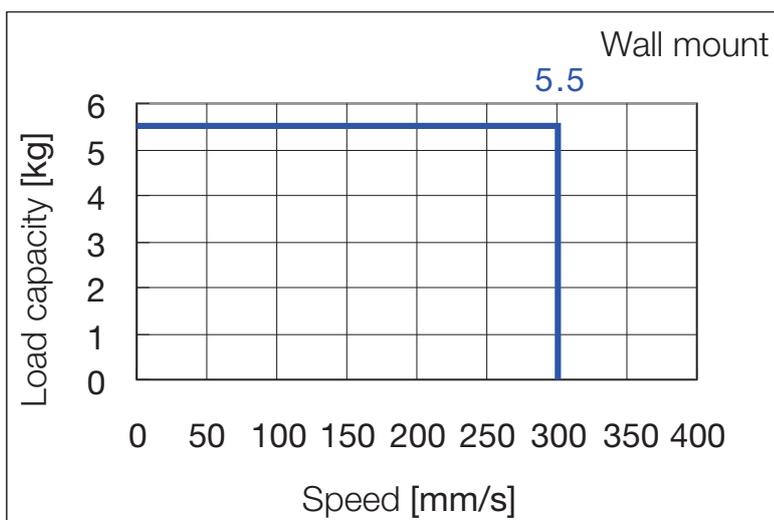
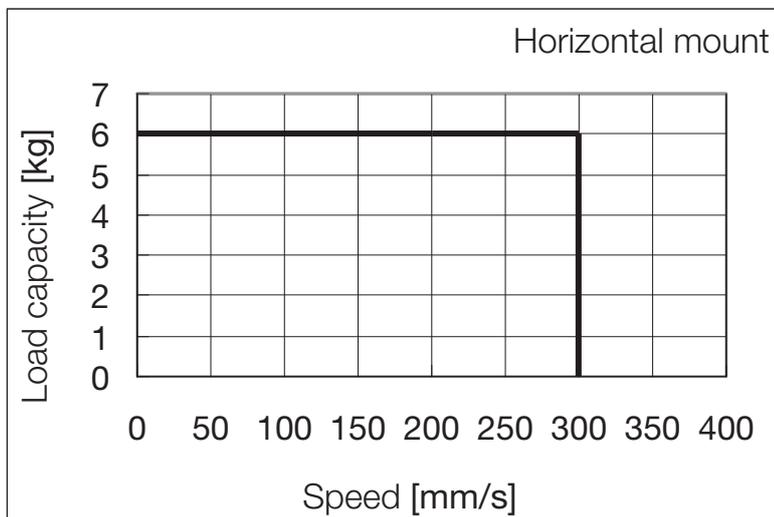


# 4. Specifications

## 4. Specifications

### CKRF4 (50 W)....Servo driver controller TLC

○ Lead 6 mm

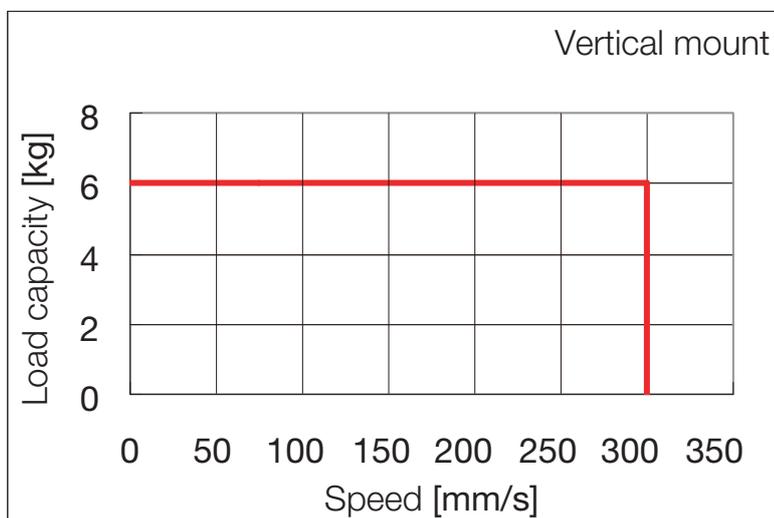
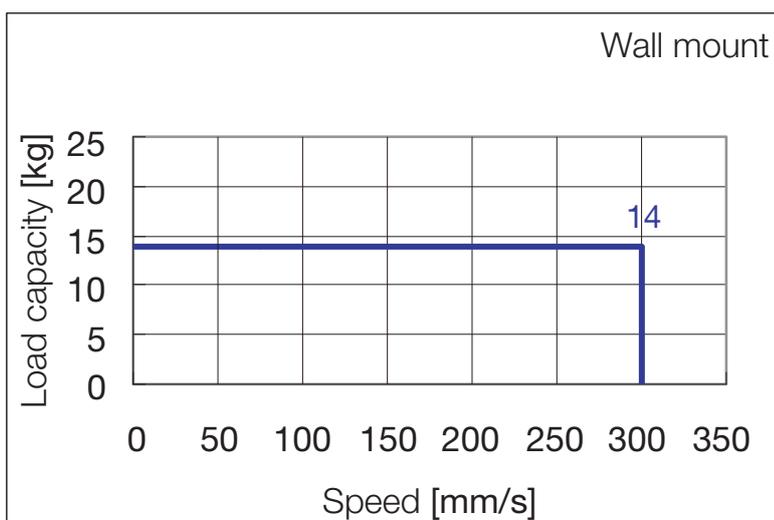
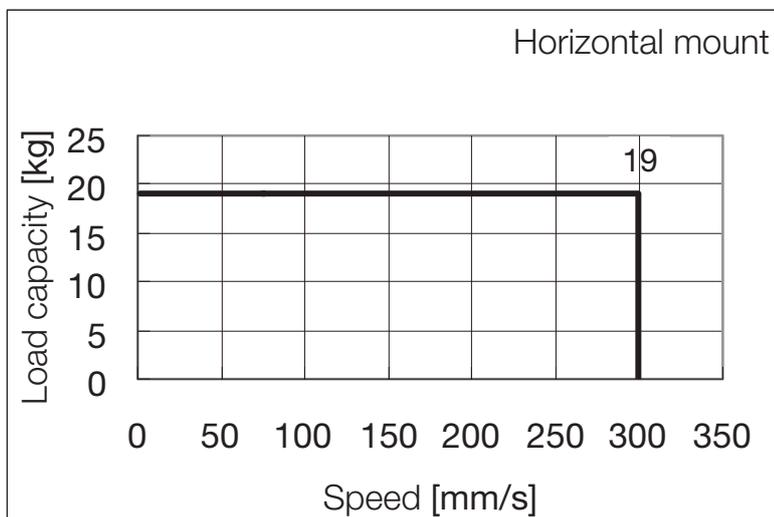


# 4. Specifications

## 4. Specifications

### CKRF5 (50 W)....Servo driver controller TLC

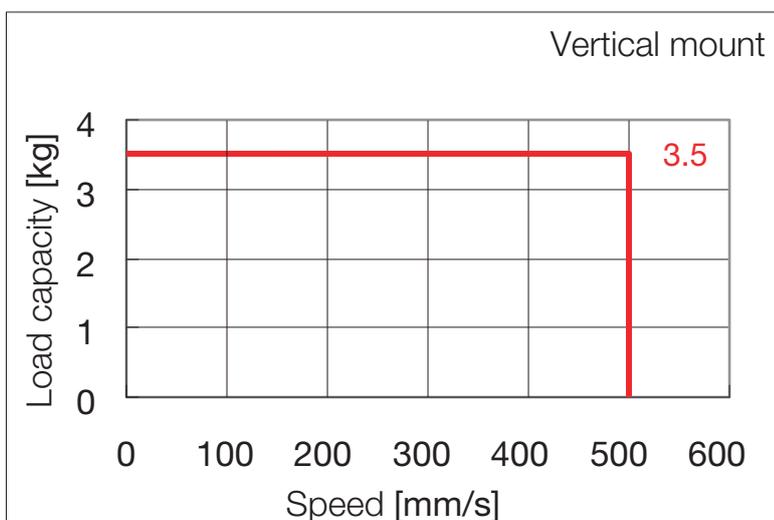
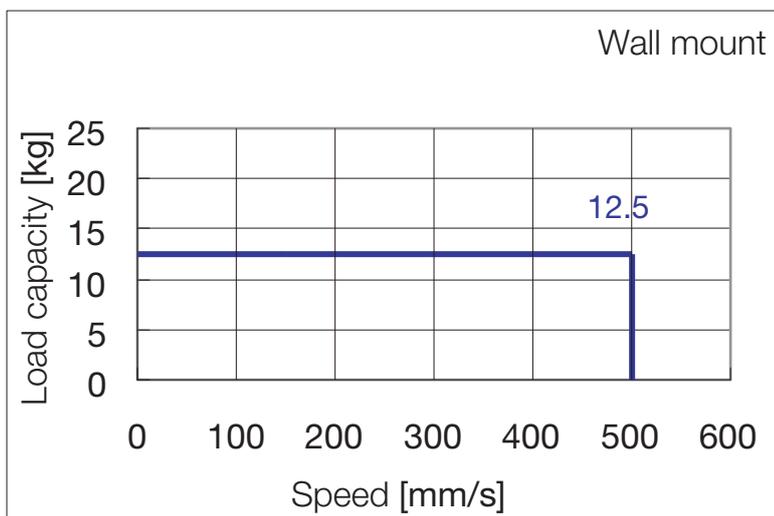
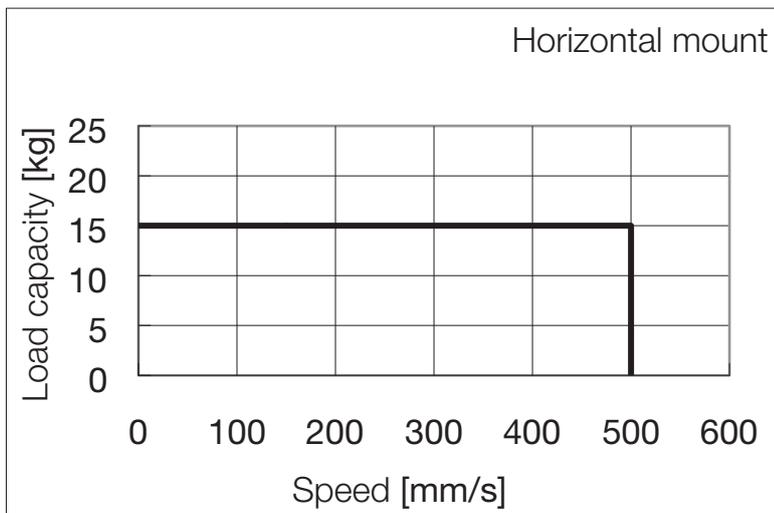
○ Lead 6 mm



## 4. Specifications

### 4. Specifications

#### ○ Lead 10 mm

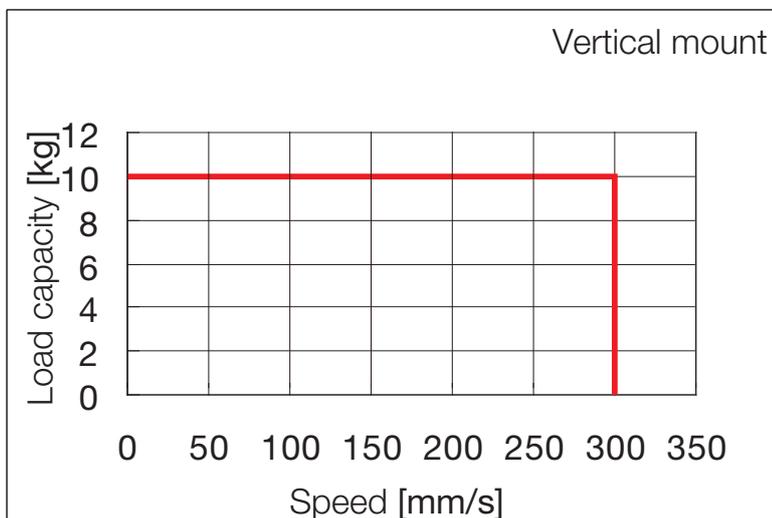
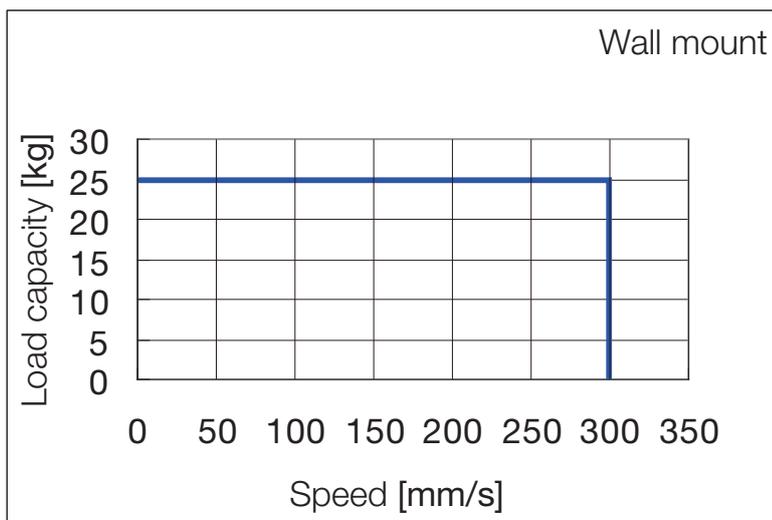
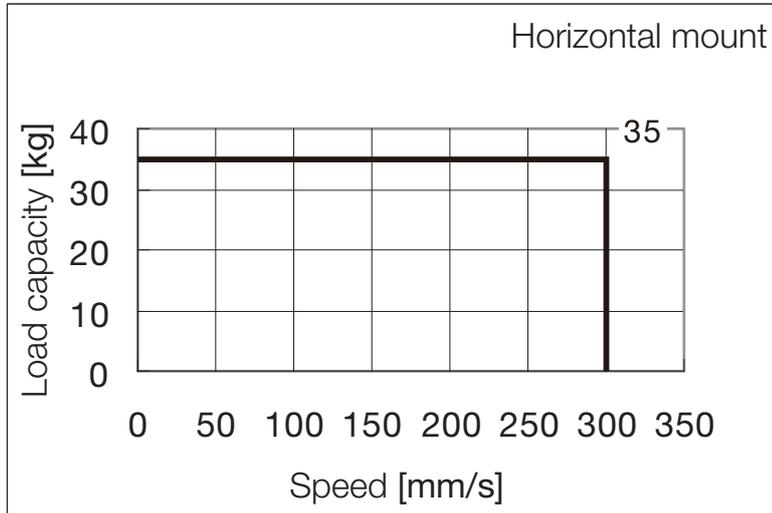


# 4. Specifications

## 4. Specifications

### CKRF6 (100 W)....Servo driver controller THC

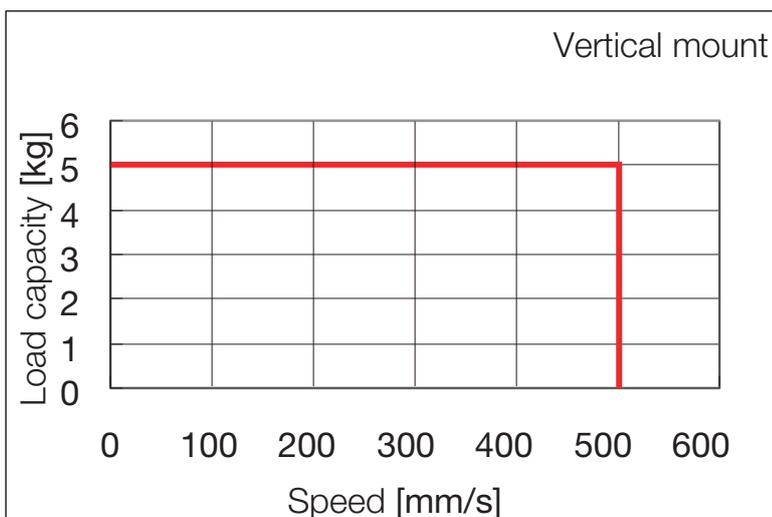
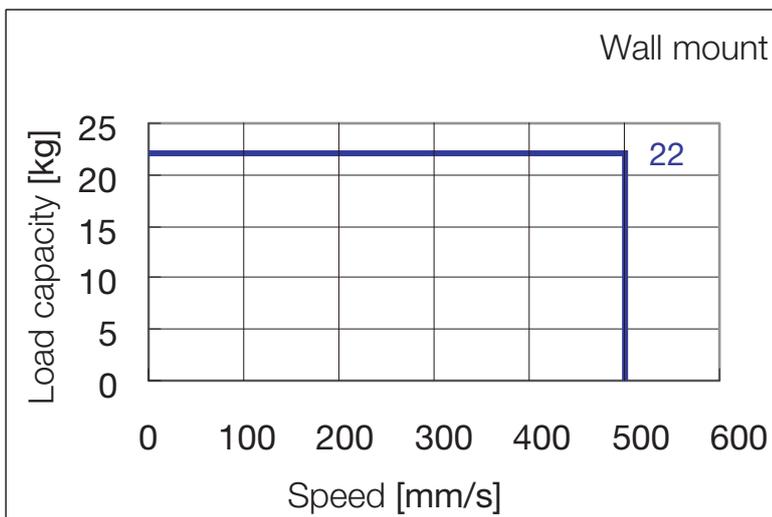
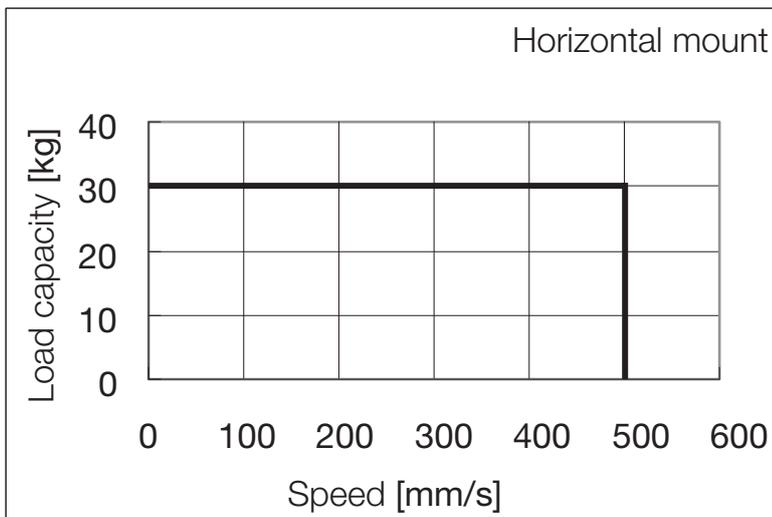
○ Lead 6 mm



# 4. Specifications

## 4. Specifications

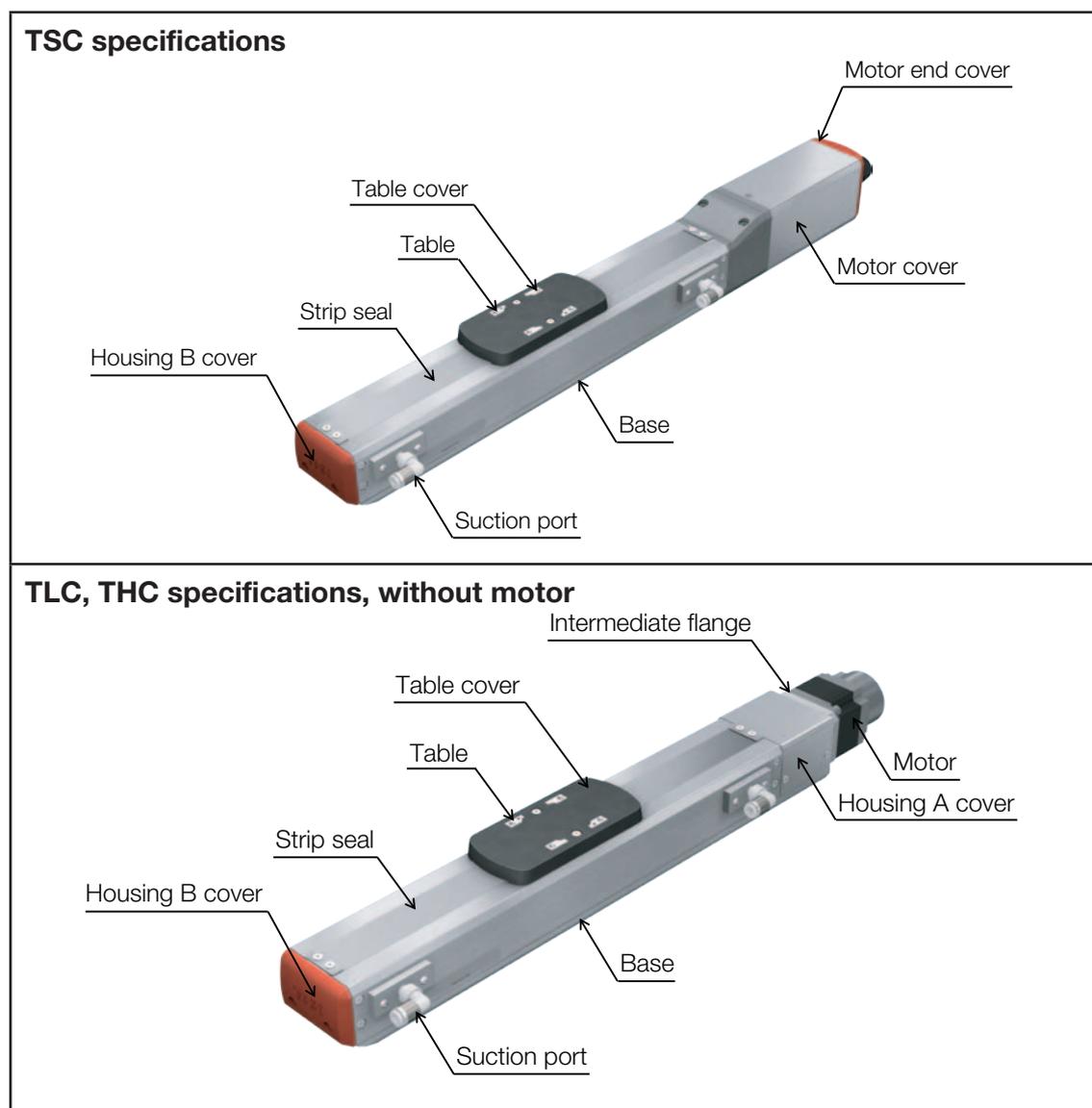
○ Lead 10 mm



## 5. Structure and Model Numbers

### 5-1 Structure and part names

The name of each part of this product is shown in Fig. 3.



**Fig. 3 Structure and part names of CKRF (\* CKRF6 has no base.)**

\* For details such as the dimensions and accuracy, see the delivery specification drawings or catalog of Clean Series CKRF.

If you have any question, contact THK.

## 5. Structure and Model Numbers

### 5-2

### Model configuration

The following is an example of model number coding.

#### ■ CKRF (type without motor)

In the case of actuator main unit only or when the motor specified by the customer is installed

#### <Model configuration> Without motor type

### **CKRF4 - 06 - 0150 A - 0 - AQ - GR-SB-R6**

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Model number	<b>CKRF4, CKRF5, CKRF6</b>					
(2) Ball screw lead	<b>06</b> : 6 mm <b>10</b> : 10 mm (For CKRF4, only ball screw lead 6 is applicable.)					
(3) Stroke	<b>0150</b> : 150 mm (50 to 800 mm, 50 mm pitch) The maximum stroke = CKRF4:300, CKRF5:550, CKRF6:800					
(4) Design symbol	<b>A</b>					
(5) With/without motor	<b>0</b> : Without motor    When selecting "0", a coupling is not provided. <b>1</b> : With motor        When selecting "1", the motor you specify will be installed. * Specify the motor cable orientation separately.					
(6) Intermediate flange	<b>A0</b> <b>AN</b> <b>AQ</b> <b>AM</b> <b>AP</b> <b>AS</b> <b>AR</b> <b>AU</b> <b>AT</b>					
(7) Option	<b>No symbol</b> : None <b>GR</b> : Change the cover color to gray <b>SB</b> : With slider base <b>□<sub>1</sub>□<sub>2</sub></b> : Sensor Add "-" from left in the order of the optional symbol.					



## 6. Storage and Transportation

### 6-1

### Precautions to be observed for safe use

#### **Caution**



- **Do not drop or hit this product.**

Otherwise, it may cause injury or fracture, or a functional loss.

- **When transporting this product, do not hold any moving part or the cover.**

Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture.



- **When transporting this product, do not hold the motor, the sensor or the cable.**

Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture.

- **When hoisting this product, use the base, and avoid applying load to any other parts (side cover, suction port, housing B cover, motor, etc.).**



- **When carrying this product, hold the bottom face of the product.**

\* For more information on the weight of the product, see the catalog of the Clean Series CKRF.

## 6. Storage and Transportation

### 6-2

### Precautions to be observed for prevention of product fault or fracture



- **Since using an adverse storage environment may cause fault, store the product in the environment described below:**
  - Place at ambient temperature within the following storage temperature range  
Storage temperature: 0°C to 50°C  
(Ambient humidity 80% RH or less, no freezing or condensation)  
\* With the product unpacked
  - A place with non-corrosive gas nor flammable gas
  - A place with little dust, salt or metallic powder
  - A place with no exposure to water, oil or chemicals
  - A Place where a vibration or shock does not transmit to the main unit
- **This product is provided with antirust treatment and sealed before being packed. When storing the product, enclose it in a package designated by THK and store it in a horizontal orientation while avoiding high temperature, low temperature and high humidity.**
- **When you remove the suction port, be sure to turn off the power supply and stop the supply voltage first, and check that fluid in the piping has come out.**
- **After mounting, wiring, and pipework, pass fluid or connect power supply, and perform an appropriate function test and leak test. If you find any leaks or the devices not functioning properly, do not use the product and make sure that the parts are mounted correctly.  
It may lose the cleaning performance.**



- **Do not apply an excessive load on the package, otherwise, it may cause fault or fracture.**

## 7. Installation and Operation

### 7-1

### Precautions to be observed for safe use

#### **Warning**



- **If any moving part may fall by its own weight in vertical application or the like, provide a safeguard for preventing the part from falling.**

If any moving part falls, it may cause injury or damage.



- **While this product is operating, do not touch any moving part or rotating part.**

Otherwise, it may cause your hand to be caught and injured.

#### **Caution**



- **Firmly secure this product before operating it.**

Failure to do so may cause abnormal operation that could cause injury, fault or fracture.

- **If anomaly occurs, immediately stop the machine.**

Failure to do so may cause abnormal operation that could cause injury, fault or fracture.



- **Do not exceed the permissible rotation speed when using the product.**

Otherwise, it may cause fault or damage, or may cause abnormal operation that could lead to injury. Also see the appendix, which contains the permissible rotation speed for each model number.

- **Do not use the failed and broken product.**

Otherwise, it may cause injury or machine failure.

## 7. Installation and Operation

### 7-2

### Precautions to be observed for prevention of product fault or fracture



- **Since using an adverse service environment may cause fault, use the product in the environment described below.**
  - A place within the following operating temperature range  
If air cleanliness class 4 performance is required, operating temperature: +16°C to +24°C (no condensation at the humidity of 50% RH or less)  
When used in the normal environment (under the usual atmosphere), operating temperature: +10°C to +40°C (no condensation at the humidity of 80% RH or less)
  - \* If you desire to use the product outside of the service temperature range, contact THK.
  - A place with non-corrosive gas nor flammable gas
  - A place with little dust, salt or metallic powder
  - A place with no exposure to water, oil or chemicals
  - A place where a vibration or shock does not transmit to the main unit
- **Prevent foreign materials such as dust or metallic powder from entering into the product since it may cause abnormal wear or shorten the service life.**  
If foreign material enter the product, take a dustproof measure that matches the service atmosphere.
- **The mounting surface for this product must be a machined plane or have the accuracy equivalent to the machined plane. If the surface is insufficiently accurate, it may adversely affect the performance or the service life. In addition, be sure to mount the product on a sufficiently rigid base.**
- **When installing the product, provide a space sufficient to perform the maintenance.**
- **Use the product within the stroke range.**
- **Be careful not to let the parts to be mounted on the table of this product interfere with any other parts near the stroke end.**
- **Check that there is no tool or bolt in the product before operating it.**



- **The stoppers attached to both stroke ends are not for positioning. Do not use them for positioning.**



- **Do not let the table collide with the stopper.**  
Collision may cause fault or fracture.



- **The standard models contain the following grease.**  
THK AFF grease



- **The photomicro sensors do not have the water-proof or dust-proof structure. Do not use it in a place where much dust or oil mist is present, or where water, oil or chemical directly or indirectly flies. For other detail information, see the catalog issued by the sensor manufacturer.**

- \* Sensor
  - EE-SX674: OMRON Corp.

## 7. Installation and Operation

### 7-3

### Other precautions

- **If you use proximity sensors close to each other, they may interfere with each other. To avoid such mutual interference, consider taking an appropriate measure such as keeping a sufficient distance between the sensors and using sensors of different frequencies.**

For details, see the catalog issued by the sensor manufacturer.

- **If a stainless steel sensor dog is used when a proximity sensor is used, note that the detection distance is shorter than that of an iron dog.**

For details, see the catalog issued by the sensor manufacturer.

\* Sensor

· GX-F12A, GX-F12B: Panasonic Industrial Devices SUNX Co., Ltd.

- **For selection and handling of a motor, see the respective catalog and instruction manual issued by the motor manufacturer.**

For data required to select a motor, see the appendix for your reference.

- **For selection, handling and mounting of a coupling, see the respective catalog issued by the coupling manufacturer.**

Check necessary data such as permissible torque, eccentricity, deflection angle and tightening torque of the assembly bolt.

\* The maximum outer diameter of usable couplings

CKRF4:  $\phi 20$

CKRF5:  $\phi 20$

CKRF6:  $\phi 22$

- **For handling and mounting of a suction port, see the respective catalog issued by the port manufacturer.**

- **For selection and mounting of a tube, see the respective catalog issued by the port manufacturer.**

# 7. Installation and Operation

## 7-4 Motor mounting method

We have an intermediate flange to mount various motors in CKRF.

The example below is the case of mounting a coupling by Miki Pulley Co., Ltd. and a servo motor by Tamagawa Seiki Co., Ltd. onto CKRF.

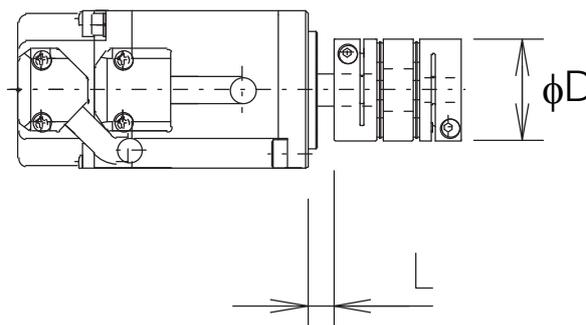
1. Remove the bolt and remove the housing A cover toward the direction of arrow.



Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M2.6 × 5L

Bolt type: Thin head (FH type) head screws

2. Tighten the coupling onto the motor shaft.



Model number	Motor models	Coupling models	L dimensions [mm]	φD [mm]	Clamping bolt	Tightening torque [N·mm]
CKRF4	TS4602 (Tamagawa Seiki Co., Ltd.)	SFC-010DA2-4B-8B (Miki Pulley Co., Ltd.)	13	19	M2.5	100 to 110
CKRF5	TS4602 (Tamagawa Seiki Co., Ltd.)	SFC-010DA2-5B-8B-T013 (Miki Pulley Co., Ltd.)	15.2	19	M2.5	100 to 110
CKRF6	TS4603 (Tamagawa Seiki Co., Ltd.)	SFC-020DA2-6B-8B (Miki Pulley Co., Ltd.)	6.7	26	M2.5	100 to 110

\* For selection, handling and mounting of a coupling, see the respective catalog issued by the coupling manufacturer.

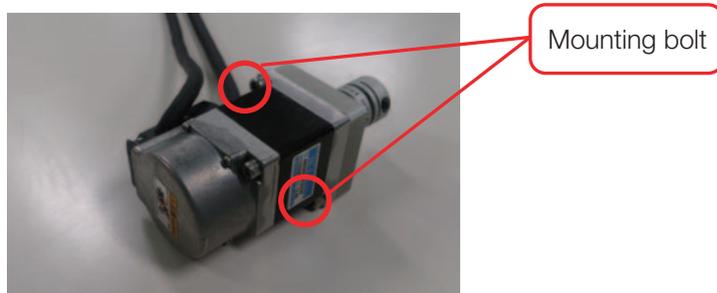
\* Check necessary data such as permissible torque, eccentricity, deflection angle and tightening torque of the assembly bolt.

## 7. Installation and Operation

3. When mounting the intermediate flange to housing A after mounting the motor onto the intermediate flange.

Mount the motor onto the intermediate flange.

Motors for mounting and bolt sizes are shown in the following table.

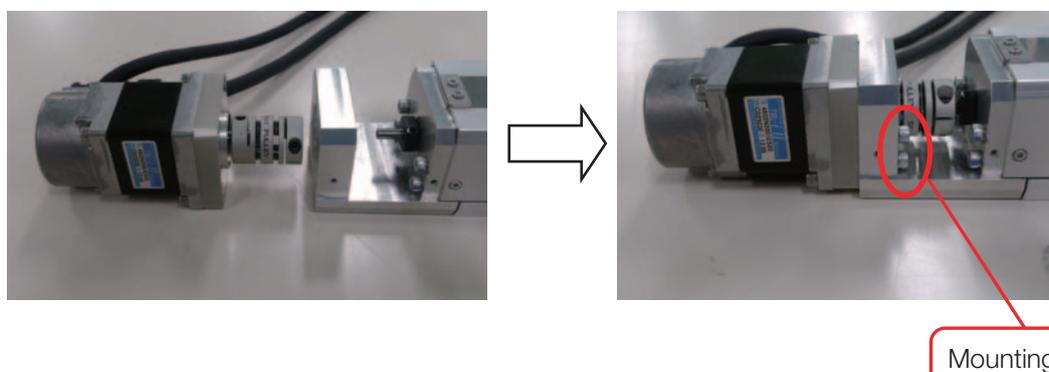


Model number	Motor models	Bolt size	Tightening torque [N·cm]
CKRF4	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 × 12L	329
CKRF5	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 × 12L	329
CKRF6	TS4603 (Tamagawa Seiki Co., Ltd.)	M4 × 10L	329

Bolt type: Hexagonal-socket-head type bolt

4. Mount the part assembled in procedure 3 onto the housing A.

Intermediate flange types and bolt sizes are shown in the following table.

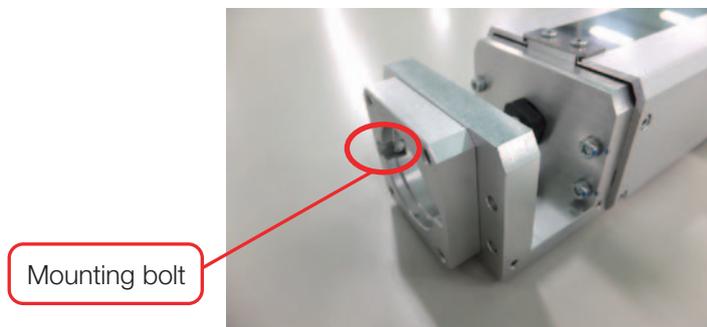


Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
CKRF4	P,Q,R,S,M,N	M3 × 15L	125
CKRF5	P,Q,R,S,M,N	M3 × 16L	125
CKRF6	R	M3 × 16L	125

Bolt type: Hexagonal-socket-head type bolt

## 7. Installation and Operation

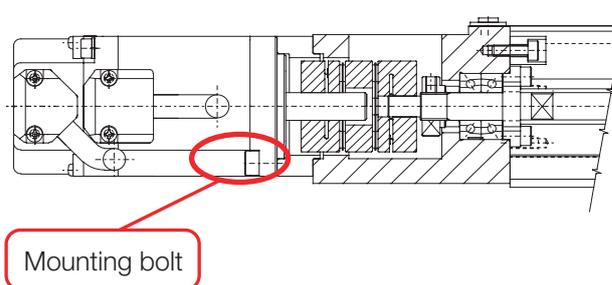
5. When mounting the motor after mounting the intermediate flange to housing A.  
Mount the intermediate flange onto the housing A.  
Intermediate flange types and the bolts used are shown in the following table.



Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
CKRF6	P,Q,T,U	M3 × 8L	125

Bolt type: Hexagonal-socket-head type bolt

And then, mount the motor and coupling assembled in procedure 2 onto the intermediate flange.



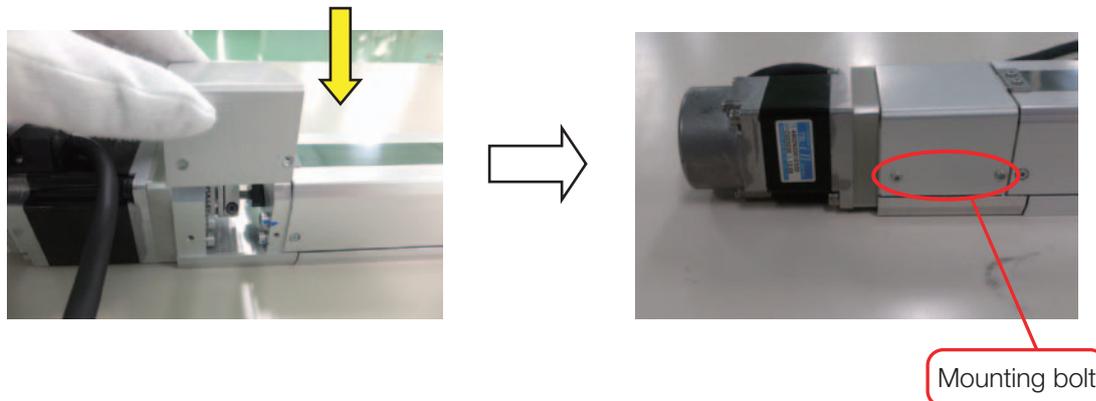
Model number	Motor models	Bolt size	Tightening torque [N·cm]
CKRF6	TS4603 (Tamagawa Seiki Co., Ltd.)	M4 × 10L	329

6. Secure the coupling and ball screw shaft.

# 7. Installation and Operation

## 7. Installation and Operation

7. Mount the housing A cover.



Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	30
CKRF5	M3 × 5L	76
CKRF6	M2.6 × 5L	30

Bolt type: Thin head (FH type) head screws

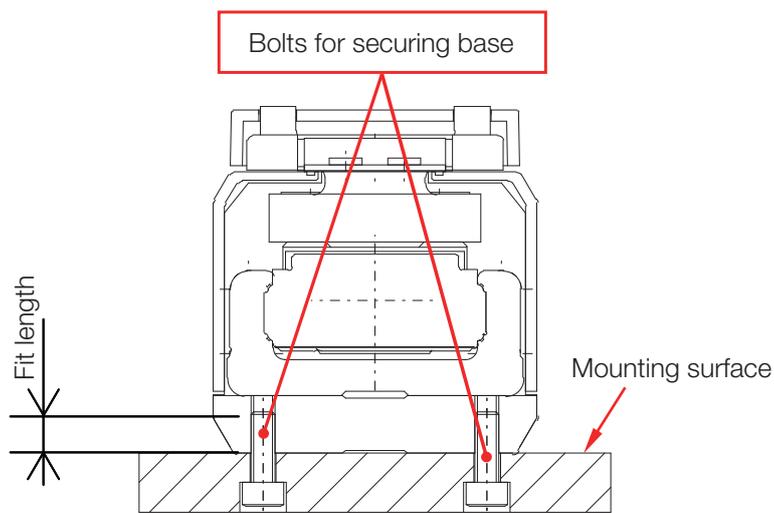
### 7-5

## Base mounting method

### [Standard base (Tap hole specification)]

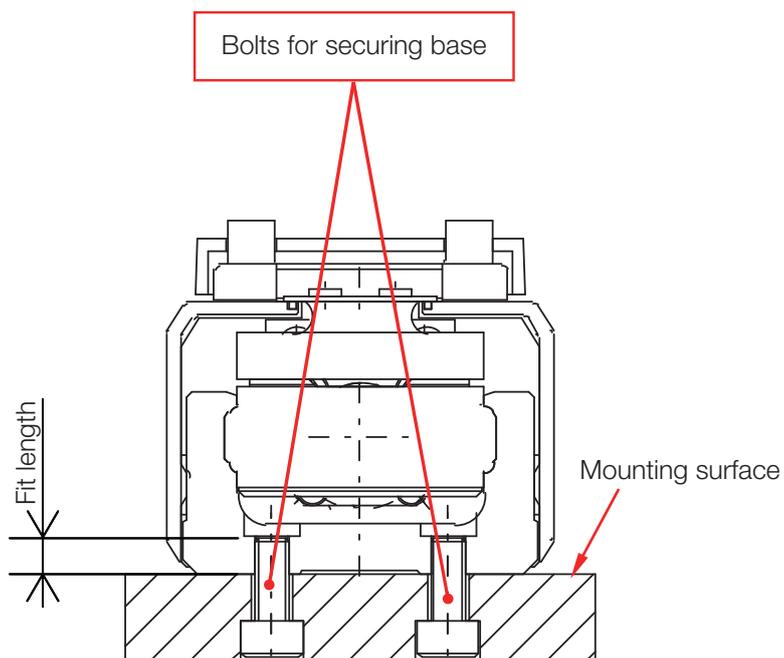
**Note)** Secure the actuator using all the mounting holes.

**Note)** Use the bolt with the most appropriate length. See Table 1 for details.



**Fig. 4 Drawing for mounting CKRF4/5 tap specification**

# 7. Installation and Operation



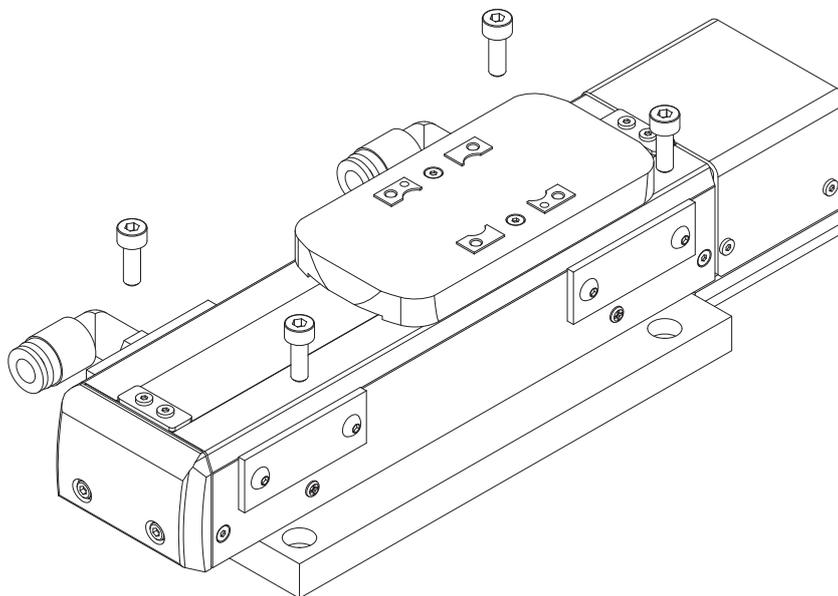
**Fig. 5 Drawing for mounting CKRF6 Tap specification**

Model number		CKRF4		CKRF5		CKRF6		
Screw size		M3		M4		M6		
Material of screw		Steel	SUS	Steel	SUS	Steel	SUS	
Tensile strength rank		10.9	A2-70	10.9	A2-70	10.9	A2-70	
Fit length of screw [mm]		4.5		6		6		
Tightening torque [N·cm]	Material of mounting surface	Iron	130	100	310	230	860	770
		Aluminum	125	100	250	230	660	660

**Table 1 Tightening torque for mounting base (when using bottom surface tap)**

# 7. Installation and Operation

## [Slider base (Mounting hole specification)]



Model number		CKRF4		CKRF5		CKRF6		
Screw size		M4		M4		M5		
Material of screw		Steel	SUS	Steel	SUS	Steel	SUS	
Tensile strength rank		10.9	A2-70	10.9	A2-70	10.9	A2-70	
Slider base thickness [mm]		6		6		7.5		
Tightening torque [N·cm]	Material of the other side	Iron	250	230	250	230	450	450
		Aluminum	250	230	250	230	450	450

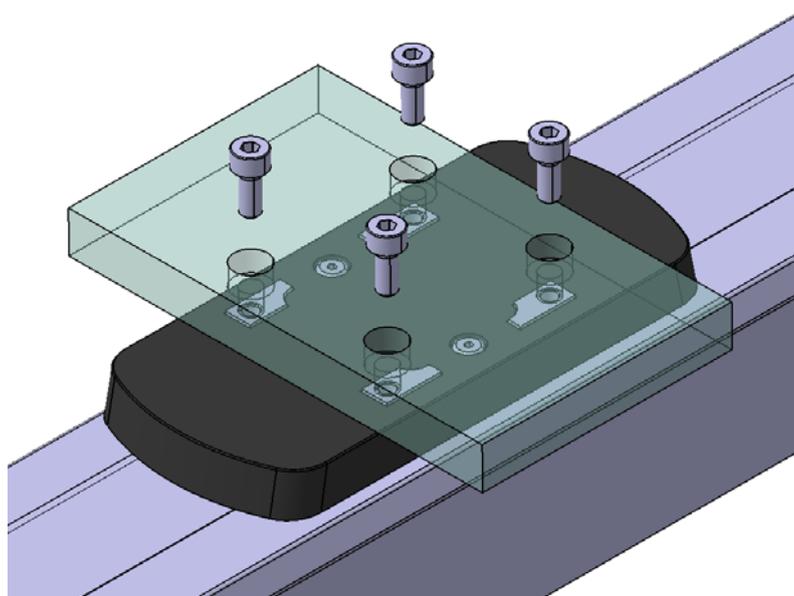
**Table 2 Tightening torque for mounting slider base (when using mounting hole)**

# 7. Installation and Operation

## 7-6

### Mounting method for objects to be mounted

Secure objects to be conveyed using the taps provided on the table.



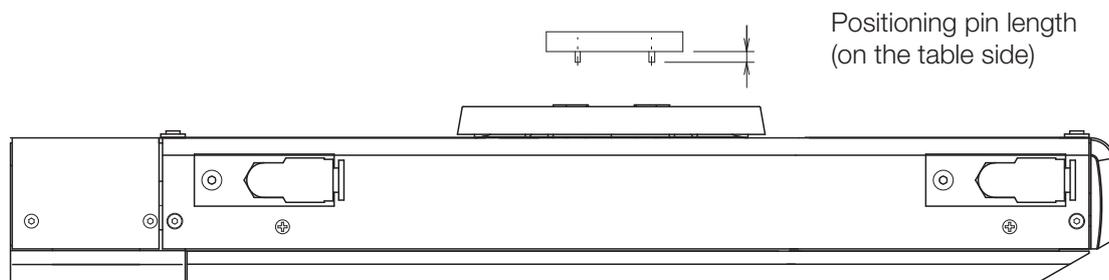
Model number			CKRF4		CKRF5		CKRF6	
Screw size			M3		M4		M5	
Material of screw			Steel	SUS	Steel	SUS	Steel	SUS
Tensile strength rank			10.9	A2-70	10.9	A2-70	10.9	A2-70
Table tap depth [mm]			4.5		6		7.5	
Tightening torque [N·cm]	Material of mounting surface	Iron	130	100	310	230	585	450
		Aluminum	125	100	250	230	450	450

**Table 3 Tightening torque for mounting table**

## 7. Installation and Operation

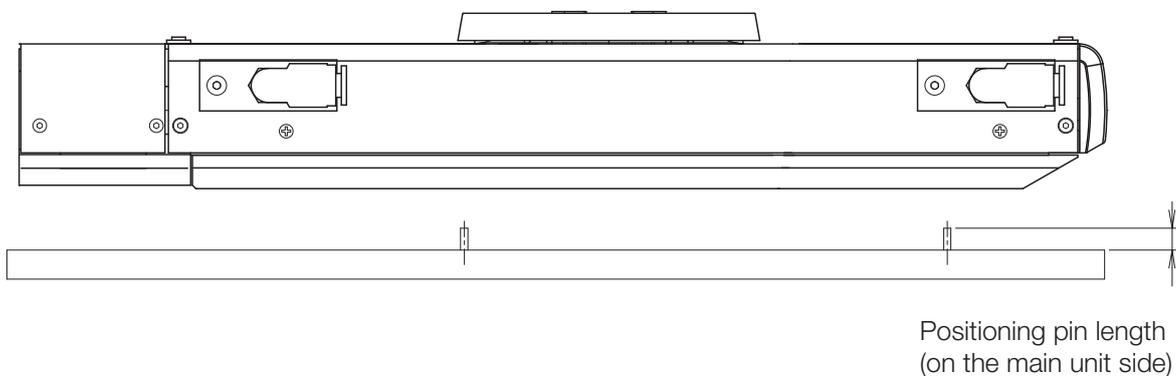
### 7-7 Positioning pin length

If you use the hole for positioning pins in securing the objects to be mounted, assemble the table so that the length of the positioning pin is as shown in the table below or less.



Model number	CKRF4	CKRF5	CKRF6
Table hole diameter	$\phi 2H7$	$\phi 2H7$	$\phi 3H7$
Table hole depth [mm]	5	5	5
Positioning pin length [mm]	4	4	4

**Table 4 Table positioning pin hole details**



Model number	CKRF4	CKRF5	CKRF6
Main unit hole diameter	$\phi 3H7$	$\phi 3H7$	$\phi 3H7$
Main unit hole depth [mm]	5	5	5
Positioning pin length [mm]	4	4	4

\* This also applies to the case of mounting a slider base.

**Table 5 Main unit positioning pin hole details**

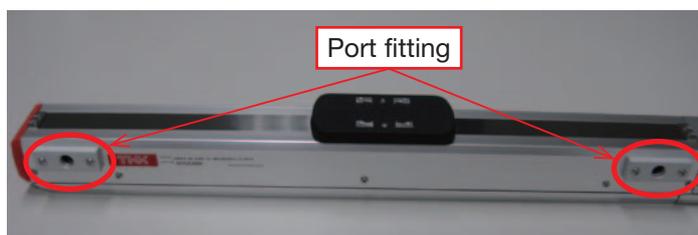
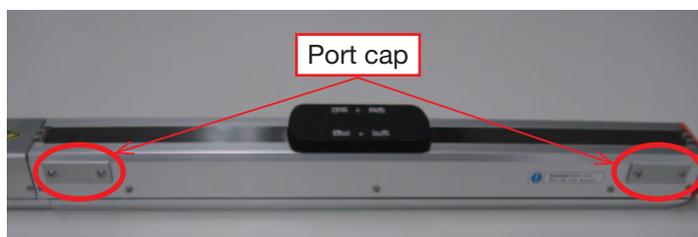
# 7. Installation and Operation

## 7. Installation and Operation

### 7-8

### How to change port positions

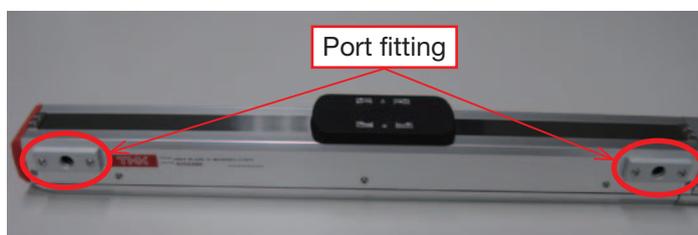
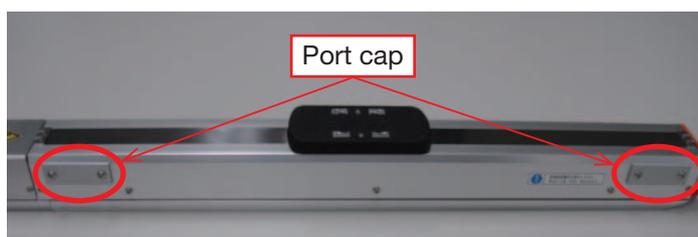
1. Remove port fittings and port caps.



Model number	Bolt size
CKRF4	M3 × 8L
CKRF5	M3 × 8L
CKRF6	M3 × 8L

Hexagonal-socket-head type button bolt

2. Secure the port fittings and port caps.



Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M3 × 8L	88
CKRF5	M3 × 8L	88
CKRF6	M3 × 8L	88

Hexagonal-socket-head type button bolt

## 8. Maintenance

### 8. Maintenance

#### 8-1

#### Precautions to be observed for safe use

##### Warning



- **Turn off the machine (turning power off) before conducting any maintenance.**  
Otherwise, it may cause electric shocks, or cause malfunction that could lead to injury.
- **If two or more people are involved in the operation, confirm the procedures such as sequences, signs, and abnormalities in advance, and appoint another person for monitoring the operation.**  
Failure to do so may cause an unexpected accident.

##### Caution



- **When handling grease, wear a protective glasses and protective gloves.**  
If grease gets into eyes or touch the skin, it may affect your body such as causing inflammation.



- **Do not expose grease to a flame, spark or high-temperature object.**  
Otherwise, it may ignite the grease, which could cause fire.

\* For other information on handling grease, see the precautions indicated on the grease package or catalog. We have "Material Safety Data Sheets" for THK original greases. Contact THK for details.

#### 8-2

#### Precautions to be observed for prevention of product fault or fracture



- **To have this product fully exert its functions, it is essential to lubricate the product. Be sure to supply grease on a regular basis.**

Using the product with insufficient lubrication may shorten the service life.

- **Do not let foreign materials enter into the LM guide or the ball screw.**  
Otherwise, it may cause fault, or could adversely affect the performance or service life.



- **Do not mix different types of grease.**  
Otherwise, it may affect the performance.

## 8. Maintenance

## 8. Maintenance

### 8-3 Daily inspection

- **Before operating the product, visually check any exterior damage or stain.**
- **Check the grease state (stain, etc.). If the grease is significantly stained, wipe off the grease, and then supply new grease. (Supply the new grease until it comes out from the inner block, and exhaust the stained grease. )**
- **Check whether abnormal noise or vibration occurs during operation. If abnormal noise or vibration occurs, immediately stop the machine and inspect the state of the product.**  
Insufficient lubrication or loosening of a mounting bolt can be a cause of abnormal noise or vibration. Check for insufficient lubrication or loosening of a mounting bolt.

### 8-4 Periodical inspection

- **Perform more detailed inspection approximately once every 3 to 6 months.**
  - Check the lubrication state, and then clean the product and replenish the grease.
  - Inspect whether each mounting bolt has loosened, and if any of them has loosened, retighten it.
- **For the suction port, check the following and replace it as needed:**
  - 1) Scratch, dent, wear, and corrosion
  - 2) Air leaks
  - 3) Twist, crush, or distortion of a tube
  - 4) Hardening, deterioration, or softness of a tube

Visually check abnormal wear, scratches, or cracks on the surface of the strip seal.

If you find any abnormalities, replace the strip seal.

For the replacement procedure, see "Replacement of the strip seal procedure".

### 8-5 Lubrication

- **The standard models are supplied with the following grease before shipment.**  
THK AFF grease  
**See the appendix for details of the greases.**
- **Basically, this is the long-term maintenance-free product not requiring greasing, but depending on your operating conditions and service environment, greasing may be needed. We recommend you set up a greasing interval at the initial inspection. In addition, if you use the product exceeding the travel distance of 10,000 km (horizontal and wall mount), or 5,000 km (vertical mount), replenish grease approximately every six months or 100 km travel distance, whichever comes first.**
  - \* Note that the greasing interval becomes shorter than usual in case of high-load use or under the environment where oil content decreases.
- **CKRF does not have a grease nipple for lubrication, but apply grease to the inner block from the grease inlet on the side face of the outer rail and directly to the ball screw shaft.**

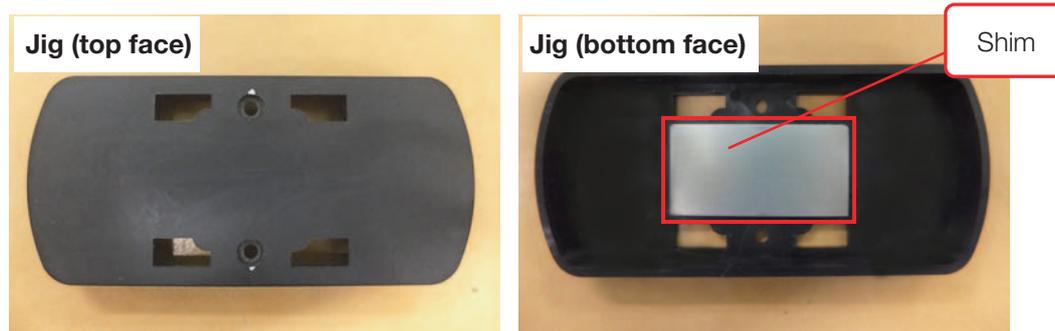
## 8. Maintenance

### 8. Maintenance

#### 8-6

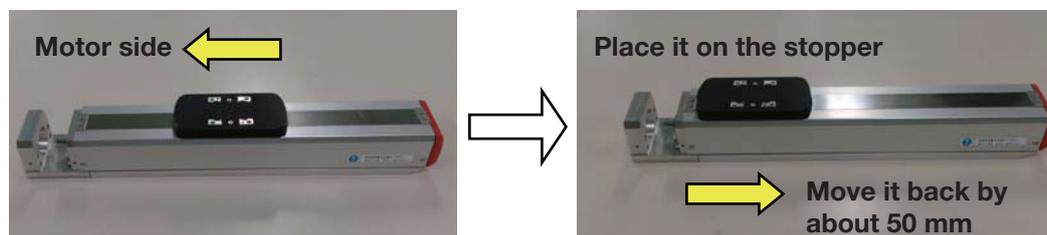
#### Method for supplying grease

The following figure shows a CKRF representative greasing method for your reference. When you adjust the strip seal, you will need the strip seal adjustment jig with the 1 mm shim pasted on the back of the table cover. Please contact THK for details.

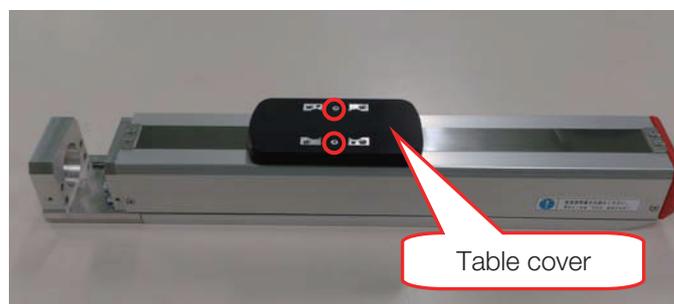


#### Procedure

1. Move the table to the motor mounting side, place it on the stopper, and then move it back by 50 mm to the reverse motor side.



2. Remove the table cover.



Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M3 × 5L

Thin head FH type head screws

## 8. Maintenance

### 8. Maintenance

3. Remove the strip seal holder.



Strip seal holder

Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M3 × 5L

Thin head FH type head screws

## 8. Maintenance

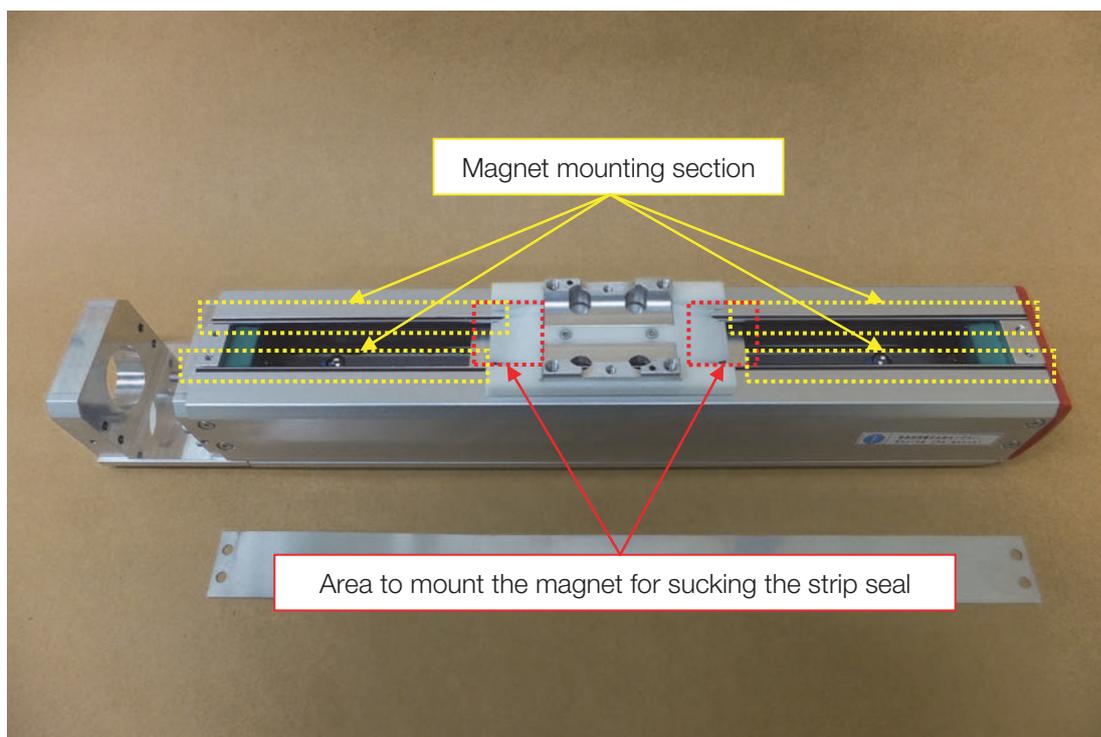
### 8. Maintenance

4. Remove the strip seal from the main unit.



#### Precautions

The CKRF table has magnets with strong magnetic fields attached at the two areas for sucking up the strip seal. Be careful handling it because magnetic bodies may stick to the magnets. It also has a belt-like magnet mounted to prevent the strip seal from lifting.



# 8. Maintenance

## 8. Maintenance

5. Remove the side cover.



Mounting bolt



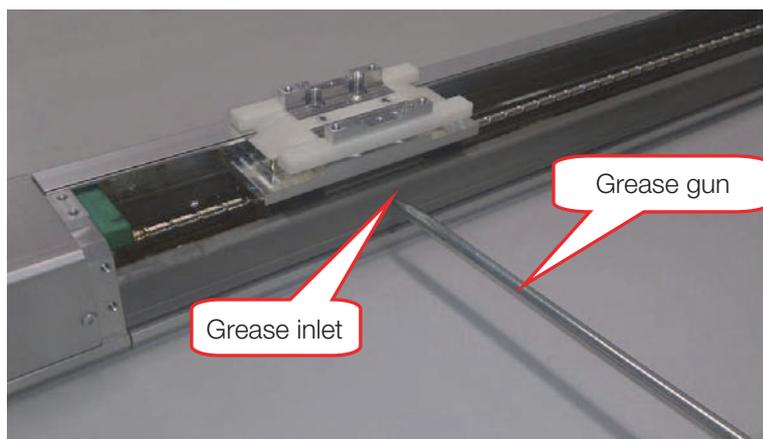
Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M2.6 × 5L

Thin head FH type head screws

\* Remove them from both side.

6. Supply grease using a grease gun as indicated in the figure below.

### Lubrication of LM Guide



## 8. Maintenance

## 8. Maintenance

- (1) Mount the P type nozzle to the grease gun.
- (2) Make sure the center of the inner block are fitted to the grease hole position.
- (3) Supply grease from the grease holes provided on the side face of the outer rail (on the right and left sides).
- (4) Stroke the table to apply the grease.
- (5) Repeat this process several times until the amount of grease reaches the specified level. For the amount of grease, see Table 6.

**Note)** Make sure that you supply the grease several times. If you supply the specified amount of grease at once, the grease may not go around all the corners.

### Ball screw lubrication



- (1) Mount the P type nozzle to the grease gun.
- (2) Supply grease directly to the raceway of the ball screw.
- (3) Stroke the table to apply the grease.
- (4) Repeat this process several times until the amount of grease reaches the specified level. For the amount of grease, see Table 6.

**Note)** Make sure that you supply the grease several times. If you supply the specified amount of grease at once, the grease may not go around all the corners.

Model number	LM guide part		Screw shaft	
	Amount of application [cm <sup>3</sup> ]	Number of grease gun strokes	Amount of application [cm <sup>3</sup> ]/100 mm	Number of grease gun strokes /100 mm
CKRF4	0.4	0.67	0.30	0.49
CKRF5	1	1.67	0.16	0.27
CKRF6	1.34	2.23	0.93	1.54

**Table 6 Amount of greasing**

## 8. Maintenance

### 8. Maintenance

7. Put the side covers back in place.



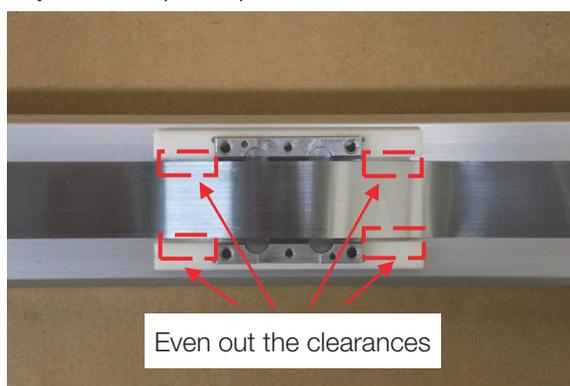
Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	30
CKRF5	M3 × 5L	76
CKRF6	M2.6 × 5L	30

Thin head FH type head screws

8. Temporary mount a strip seal and adjust the strip seal position.

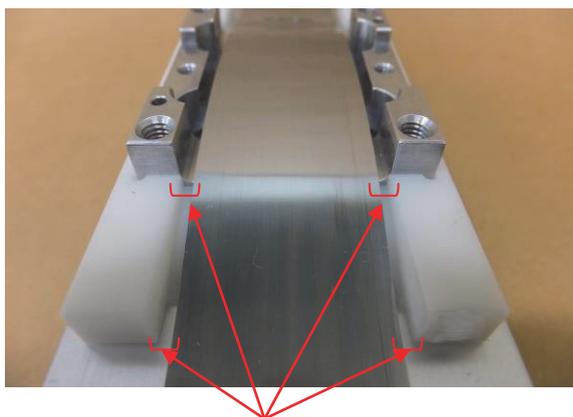


9. Adjust the strip seal position at the center of the strip seal guide and even out the clearances.



# 8. Maintenance

## 8. Maintenance



Even out the clearances

10. Tighten it until the strip seal holder stays in place. Loosen the thin head screw by one turn.



Strip seal holder

11. Move the table back and forth for one round to make sure that the strip seal will not contact the strip seal guide in the entire stroke.

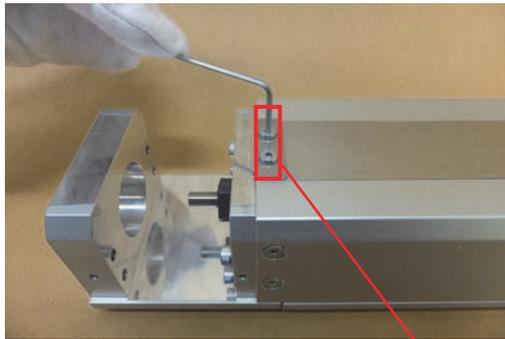
If they contact, adjust the strip seal position once again.



## 8. Maintenance

### 8. Maintenance

12. Tighten it until the strip seal holder on the housing A side will not slide.



Strip seal guide

13. Move the table back and forth for one round to make sure that the strip seal will not contact the strip seal guide in the entire stroke.

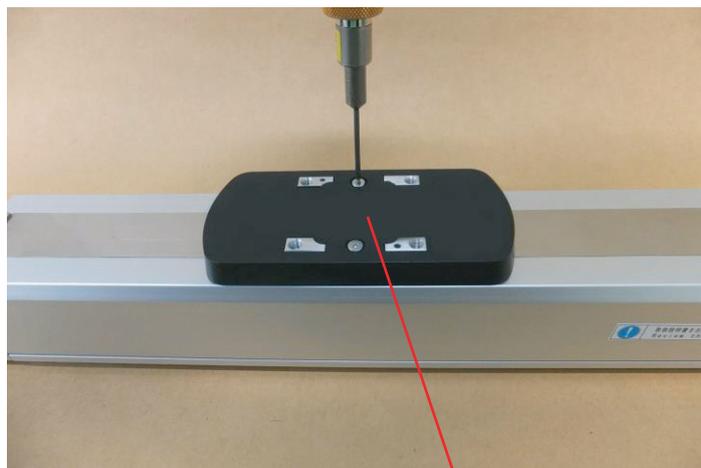
If they contact, adjust the strip seal position once again.



## 8. Maintenance

### 8. Maintenance

14. Mount the strip seal adjustment jig.

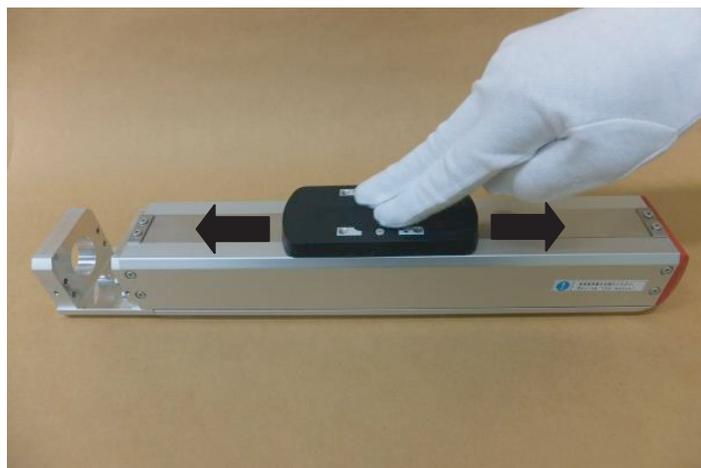


Strip seal adjustment jig

Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	9
CKRF5	M3 × 5L	17
CKRF6	M3 × 5L	17

Thin head FH type head screws

15. Move the table back and forth for three rounds covering the entire stroke. Stop the table around the stroke center.



## 8. Maintenance

### 8. Maintenance

16. Fully fasten the strip seal.

**Note)** Never pull the strip seal toward the stroke direction when you fully fasten the strip seal.



17. Remove the strip seal adjustment jig.



## 8. Maintenance

### 8. Maintenance

18. Check the clearance of the strip seal. Verify the height of the strip seal and table cover mounting surface to make sure that the strip seal is located lower than the table cover mounting surface. If the strip seal is higher than the table cover mounting surface, re-adjust the strip seal from the temporary assembly process.

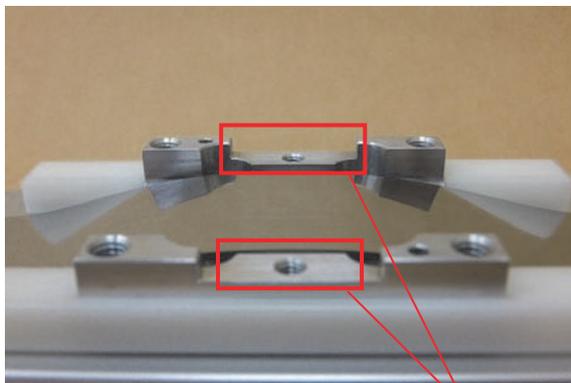
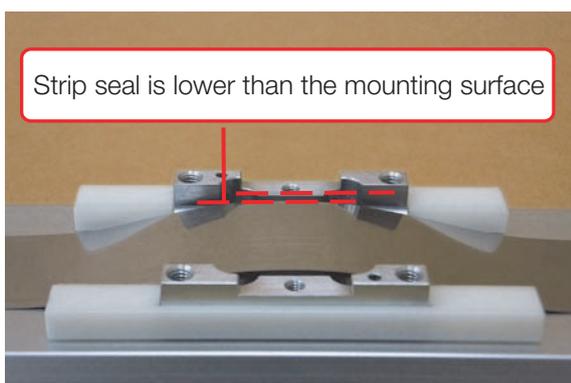
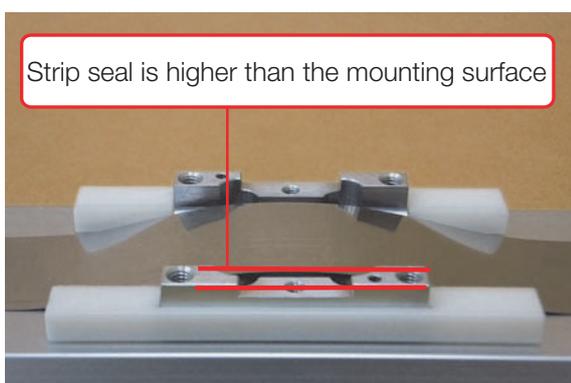


Table cover mounting surface



Strip seal is lower than the mounting surface

Example of appropriate mounting state



Strip seal is higher than the mounting surface

Example of inappropriate mounting state

## 8. Maintenance

### 8. Maintenance

19. Mount the table cover.



Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	9
CKRF5	M3 × 5L	17
CKRF6	M3 × 5L	17

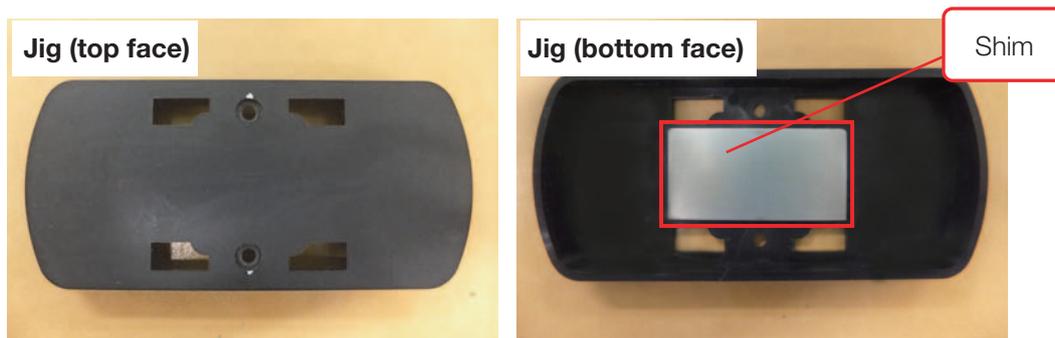
Thin head FH type head screws

# 8. Maintenance

## 8. Maintenance

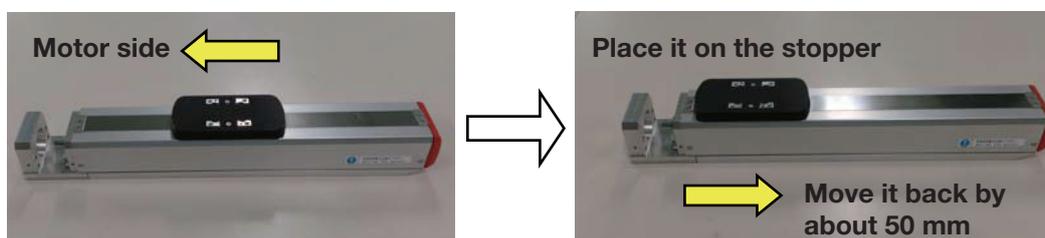
### 8-7 How to replace the strip seal

When you adjust the strip seal, you will need the strip seal adjustment jig with the 1 mm shim pasted on the back of the table cover. Please contact THK for details.

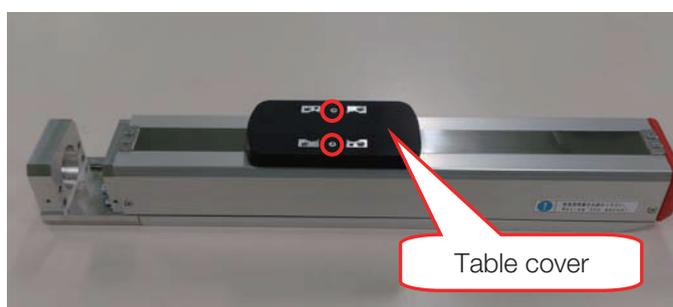


#### Procedure

1. Move the table to the motor mounting side, place it on the stopper, and then move it back by 50 mm to the reverse motor side.



2. Remove the table cover.



Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M3 × 5L

Thin head FH type head screws

## 8. Maintenance

### 8. Maintenance

3. Remove the strip seal holder.



Strip seal holder

Model number	Bolt size
CKRF4	M2.6 × 4L
CKRF5	M3 × 5L
CKRF6	M3 × 5L

Thin head FH type head screws

## 8. Maintenance

### 8. Maintenance

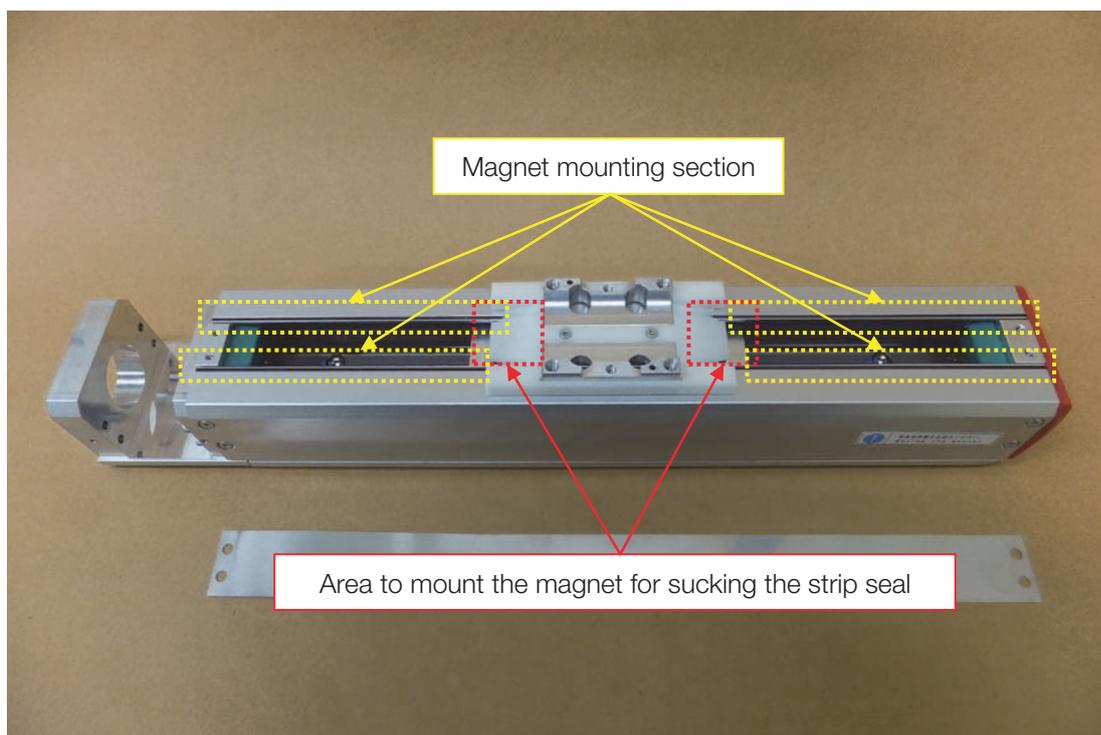
4. Remove the strip seal from the main unit.



#### Precautions

The CKRF table has magnets with strong magnetic fields attached at the two areas for sucking up the strip seal. Be careful handling it because magnetic bodies may stick to the magnets.

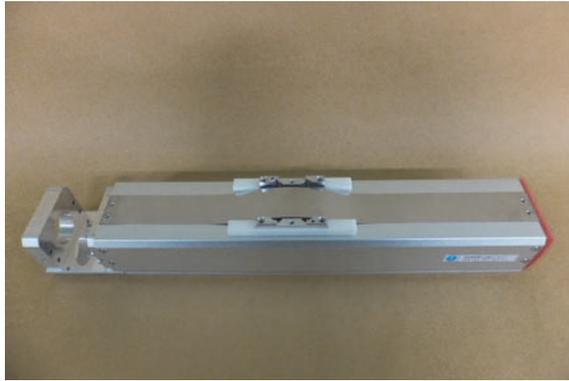
It also has a belt-like magnet mounted to prevent the strip seal from lifting.



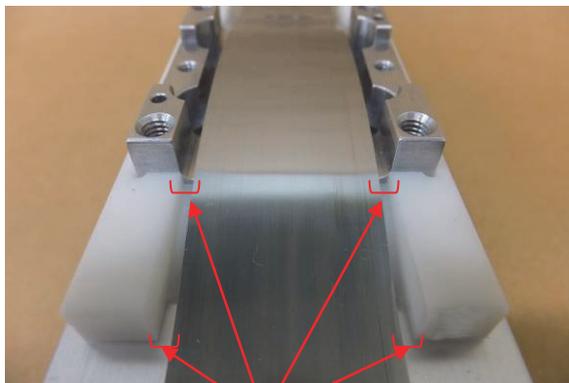
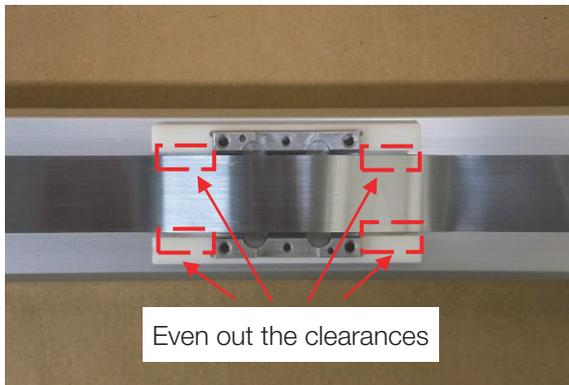
# 8. Maintenance

## 8. Maintenance

- 5. Temporary mount a new strip seal and adjust the strip seal position.



- 6. Adjust the strip seal position at the center of the strip seal guide and even out the clearances.



# 8. Maintenance

## 8. Maintenance

7. Tighten it until the strip seal holder stays in place. Loosen the thin head screw by one turn.

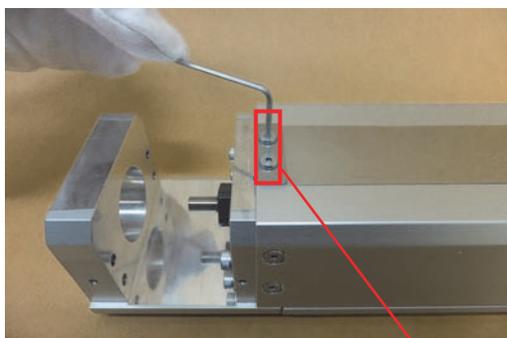


Strip seal holder

8. Move the table back and forth for one round to make sure that the strip seal will not contact the strip seal guide in the entire stroke.  
If they contact, adjust the strip seal position once again.



9. Tighten it until the strip seal holder on the housing A side will not slide.



Strip seal guide

## 8. Maintenance

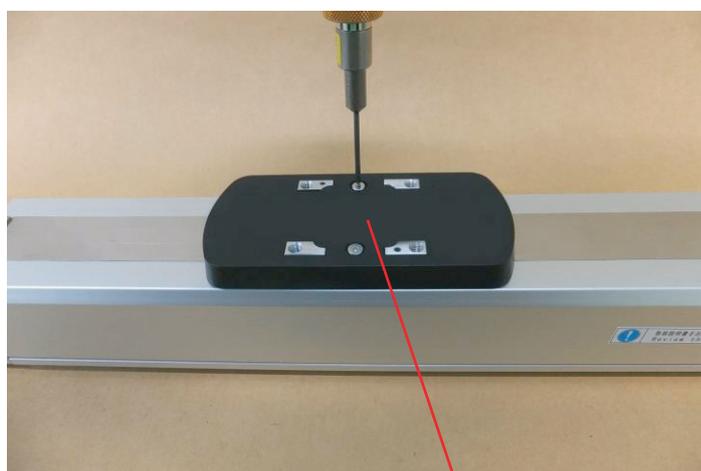
### 8. Maintenance

10. Move the table back and forth for one round to make sure that the strip seal will not contact the strip seal guide in the entire stroke.

If they contact, adjust the strip seal position once again.



11. Mount the strip seal adjustment jig.



Strip seal adjustment jig

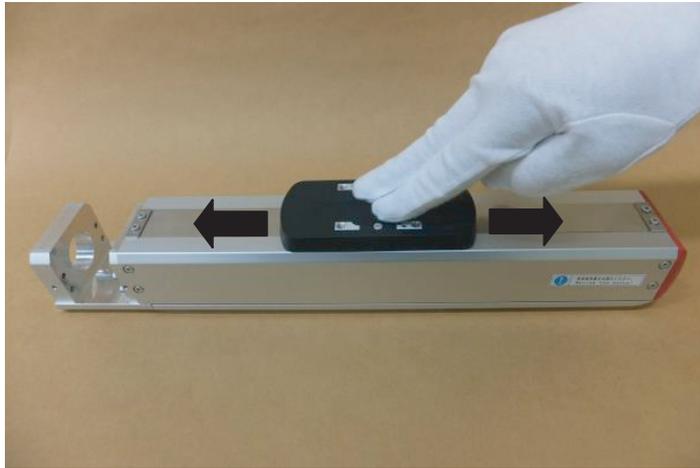
Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	9
CKRF5	M3 × 5L	17
CKRF6	M3 × 5L	17

Thin head FH type head screws

## 8. Maintenance

## 8. Maintenance

12. Move the table back and forth for three rounds covering the entire stroke. Stop the table around the stroke center.



13. Fully fasten the strip seal.

**Note)** Never pull the strip seal toward the stroke direction when you fully fasten the strip seal.



14. Remove the strip seal adjustment jig.



## 8. Maintenance

### 8. Maintenance

15. Check the clearance of the strip seal. Verify the height of the strip seal and table cover mounting surface to make sure that the strip seal is located lower than the table cover mounting surface. If the strip seal is higher than the table cover mounting surface, re-adjust the strip seal from the temporary assembly process.

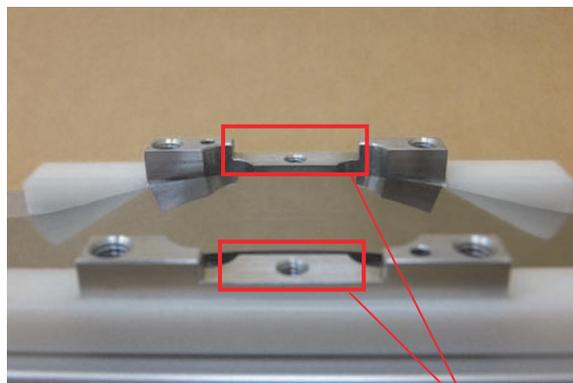
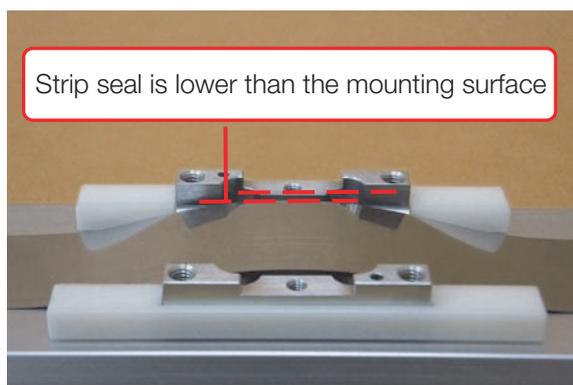
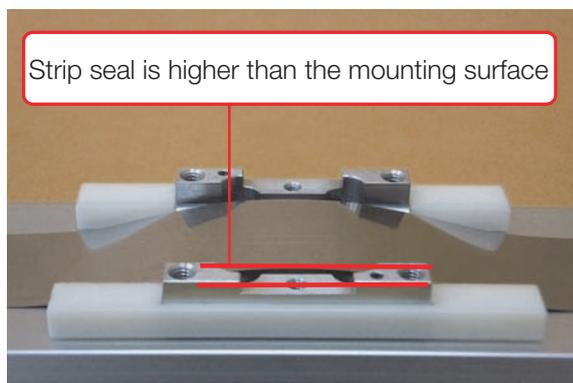


Table cover mounting surface



Strip seal is lower than the mounting surface

Example of appropriate mounting state



Strip seal is higher than the mounting surface

Example of inappropriate mounting state

## 8. Maintenance

### 8. Maintenance

16. Mount the table cover.



Model number	Bolt size	Tightening torque [N·cm]
CKRF4	M2.6 × 4L	9
CKRF5	M3 × 5L	17
CKRF6	M3 × 5L	17

Thin head FH type head screws

## 8. Maintenance

### 8. Maintenance

#### 8-8 Free warranty period

The warranty period shall be 12 months from the product delivery date or 18 months from the date of shipping (based on the manufacture date), whichever is earlier.

If the free warranty period has been expired at the time of receiving notice of any defect, repair works will be charged.

#### 8-9 Usage conditions (range)

The normal usage conditions (range) specified in our catalogs and/or instruction manuals shall apply.

#### 8-10 Warranty scope

##### 8-10-1 Failure diagnosis

Please inform THK of the trouble description, content, and model and serial number indicated on the product label. Then we will perform the initial diagnosis of the product failure.

When we recognize that the failure occurred within the free warranty period set forth above and the responsibility of the cause rests on us, the warranty is applied without charge. Otherwise any repair or replacement will be charged.

The final judgment of the warranty qualification is determined when we check the product in our site.

Location of the product label: **3-1 Nameplates display and serial number (→ P.3-1)**

##### 8-10-2 Consumables and spare parts

- Cables, strip seals, a strip seal guide, and timing belt are the consumables.

## 8. Maintenance

### 8-10-3 Repair

We will perform free repair works or replacement for any failure occurred within the free warranty period set forth above.

However, it is our discretion whether we provide repair or replacement.

Free warranty is not applicable even within the warranty period for any of the following cases:

- Failure arising out of improper storage or handling by the customer, or software and/or hardware installed by the customer.
- Failure arising out of any alteration of our products by the customer.
- Failure arising out of any use of our products out of the usage conditions set forth in section 8-9 of this manual.
- Failure arising out of any use of the product without taking appropriate water-, oil-, and dust-proof measures.
- Lack of maintenance works specified in our instruction manual.
- Wearing caused by usage conditions.
- Wearing of consumables including cables, strip seals, a strip seal guide, and timing belt, etc.
- Failure arising out of any convulsion of nature, such as earthquake, lightning, flood and wind damage.
- Failure arising out of any factor that is not recognized as our responsibility.

\*In case of any free repair work within the free warranty period, the warranty period of the pertinent product shall still be the period set forth in section 8-8, not the period originating from the time of free repair work.

\*In case of any paid repair work, the warranty period of the repaired section shall be six months from the repair work regardless of the warranty period of the product itself.

\*Repair work is performed at our Japanese site. Whether free or paid repair work, cost of returning the product to our site shall be customer's responsibility.

\*The cost of delivering the repaired or replacing product to customer's site is our responsibility in case of free warranty, or included in the repair charge in case of a paid repair service. However, the destination must be in Japan.

### 8-10-4 Repair period

The warranty period of actuator CKRF shall be seven years from the date of purchase or five years from the product discontinuation date, whichever comes first.

### 8-11 Exclusion of warranty liability

- Regardless of whether it is within the free warranty period or not, any damage to the equipment other than our products and opportunity loss incurred by the customer due to the failure of the products are not covered by the warranty.
- We hold no responsibility for removal of the product for repair work, reinstallation after repair work, and other costs caused thereby.
- We hold no responsibility for any damage arising out of any use of the product without taking appropriate water-, oil-, and dust-proof measures.

### 8-12 Delivery conditions

Delivery products will be shipped by mixed cargo and passed on the car.

Unpacking, transportation, installation, on-site adjustment and trial run after delivery are not our responsibility.

## 9. Appendix

### 9. Appendix

#### 9-1 Permissible input torque

- If you use a motor that exceeds the permissible input torque, consider taking a necessary measure such as limiting the motor torque.

Model number	Permissible input torque [N·m]
CKRF4	0.355
CKRF5	0.671
CKRF6	1.035

**Table 7 Permissible input torque**

#### 9-2 Static permissible moment

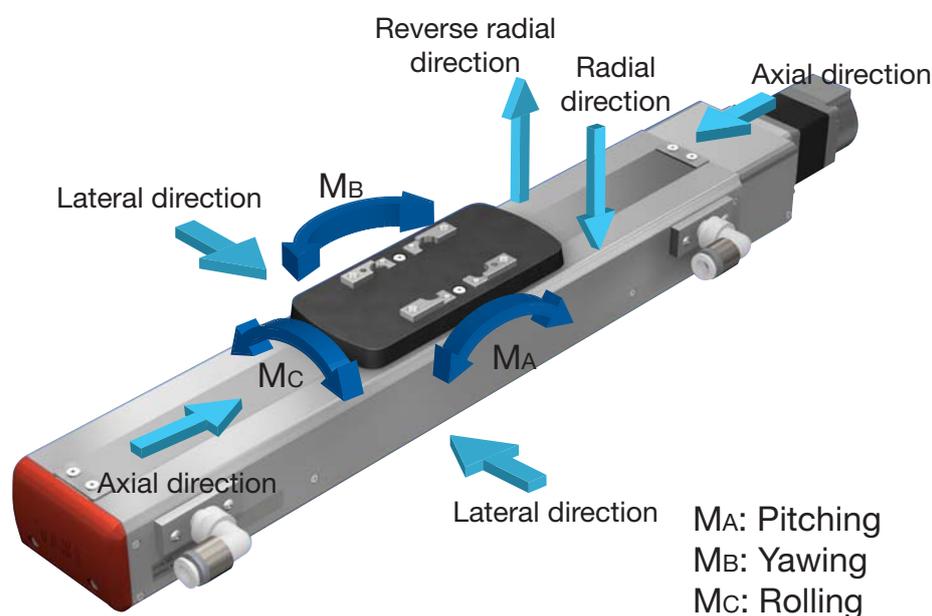
- Static permissible moment is shown in Table 8. For the direction of the moment, see Fig. 6. (The static moment is the value when a load is applied only to one direction.)

Model number	Ma	Mb	Mc
CKRF4	31	21.2	52.7
CKRF5	84	48.4	105.8
CKRF6	166	103.8	179.5

**Table 8 Static permissible moment**

Note) The static permissible moment is the value when all of the mounting holes of the table are used.

Note) The static permissible moment is the maximum moment permissible under the static condition.



**Fig. 6 Imposed load ratio and moment direction**

## 9. Appendix

### 9. Appendix

#### 9-3 Static permissible load

- Static permissible load is shown in Table 9. For the direction of the load, see Fig. 6.  
(The static permissible load is the value when a load is applied only to one direction.)

Model number		CKRF4	CKRF5	CKRF6
Static permissible load [N]	Axial direction	955	1465	2023
	Radial direction	6300	12150	20200
	Reverse radial direction	4048	6472	12380
	Lateral direction	1095	1899	3095

**Table 9 Static permissible load**

Note) The static permissible load is the maximum load permissible under the static condition.

#### 9-4 Permissible rotational speed

Model number	Lead [mm]	Permissible rotation speed at each stroke [min <sup>-1</sup> ]*							
		Stroke							
		to 300	350 to 500	550	600	650	700	750	800
CKRF4	6	3000	-	-	-	-	-	-	-
CKRF5	6	3000	2500	-	-	-	-	-	-
	10	3000	2400	-	-	-	-	-	-
CKRF6	6	3000	2750	2500	2000	1750	1500		
	10	3000	2700	2400	2100	1800	1650	1500	

\* The permissible rotational speed is the value restricted by the motor rotational speed (at 3,000 min<sup>-1</sup>), or by the permissible rotational speed of the ball screw.

**Table 10 Permissible rotation speed**

## 9. Appendix

### 9. Appendix

#### 9-5 Introduction of the grease

##### THK original grease

##### AFF Grease

Using high-class synthetic oil and lithium-based consistency enhancer and additive, this grease has a stable rolling resistance that has not been achieved with conventional vacuum grease or low particle-generative grease.

##### ● Characteristics

- Excels in conformability at low speed operation with a small fluctuation in rolling resistance due to a low viscose resistance.
- Optimal for use in a clean room due to excellently low particle-generative characteristics.
- Allows the greasing interval to be extended due to excellent wear resistance in micro vibrations.

##### ● Representative properties

Test items	Representative property values	
Consistency enhancer	Lithium-based grease	
Base oil	High-class synthetic oil	
Base oil kinetic viscosity: mm <sup>2</sup> /s (40°C)	100	
Worked penetration (25°C, 60 W)	315	
Mixing stability (100,000 W)	345	
Dropping point: °C	220	
Evaporation: mass% (99°C, 22 h)	0.7	
Oil separation rate: mass% (100°C, 24 h)	2.6	
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	
Low temperature torque: mN·m (-20°C)	Startup	220
	Rotation	60
4-ball test (fusion load): N	1236	
Service temperature range (°C)	-40 to 120	
Appearance color	Reddish brown	



**Fig. 7 Appearance of the grease tube and the product box**

## 9. Appendix

### 9. Appendix

#### 9-6

### Introduction of the grease gun unit

#### Grease Gun Unit MG70



The grease gun unit MG70 is capable of supplying grease for CKRF by replacing the dedicated nozzle. The grease gun has a slit window that allows you to visually check the remaining amount of grease. Since grease is contained in a 70 g bellows cartridge, you can replace the nozzle without soiling your hand.

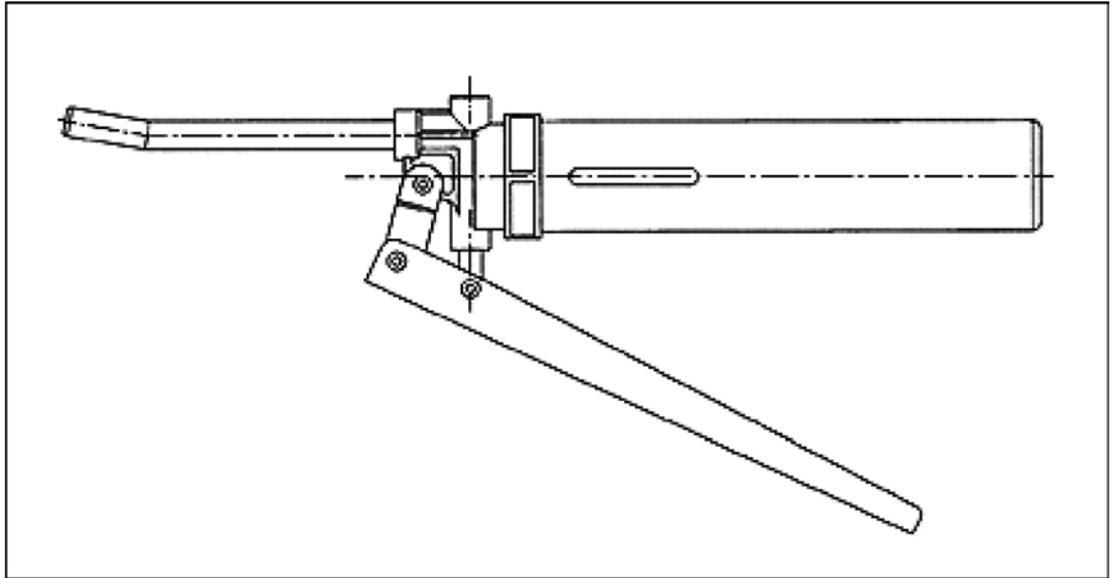
Table 11 shows the specifications of the grease gun while Fig. 8 shows its appearance.

Discharge pressure	20 MPa max
Discharge rate	0.6 cm <sup>3</sup> /stroke
Grease	70 g bellows cartridge
Overall length	235 mm (excluding nozzle)
Weight	480 g (with nozzle, excluding grease)

**Table 11 Specifications of the grease gun**

## 9. Appendix

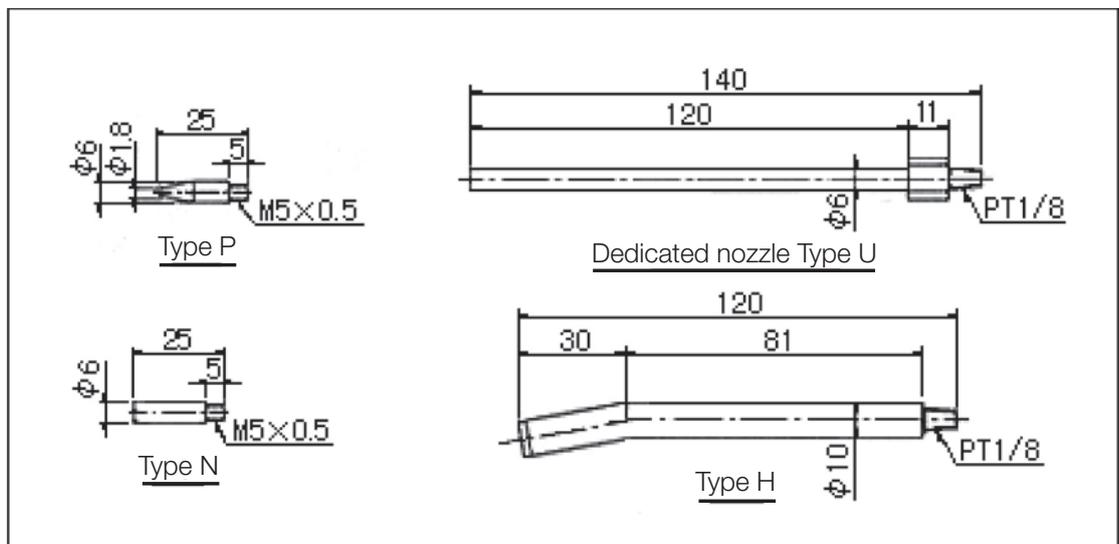
### 9. Appendix



**Fig. 8 Appearance of the grease gun**

Fig. 9 shows the shapes of the nozzles and attachment for the grease gun used for lubrication.

\* It allows you to supply grease to a part difficult to lubricate (by dropping grease onto the raceway) by using the P type attachment.



**Fig. 9 Shapes of the nozzle and attachment for the grease gun**

## 9. Appendix

### 9. Appendix

#### 9-7

#### Suction

The table below shows the vacuum rate for your reference.

Model number	Vacuum rate (l/min)
CKRF4	10
CKRF5	12
CKRF6	15

Note) The vacuum rate does not include the effect of piping resistance. Piping resistance is dependent on the piping length and piping diameter, and can reduce the flow amount.

#### 9-8

#### Suction port

The suction port has adopted the one-touch system, which makes it easier to connect using a off-the-shelf air tube.

Model number	Connection screw size	Applicable tube outer diameter (mm)
CKRF4	R1/8	φ6
CKRF5	R1/8	φ6
CKRF6	R1/8	φ8

# Appendix

## Revision history

The instruction manual No. is described on the back cover.

Date of issue	Instruction manual No.	Details
November 2014	No.5040-1(0)E	First edition



**THK Electric Actuator Clean Series**

**CKRF**

**INSTRUCTION MANUAL**