

THK Electrical Actuator Compact Series

KRF

INSTRUCTION MANUAL

No.2040-2 (0) E

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1-1 Acknowledgment

Thank you for purchasing the Compact Series KRF.

This product is a medium speed, medium load capacity and long service life actuator.

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 KRF, 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/>

2-1 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.

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.

2-3 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.

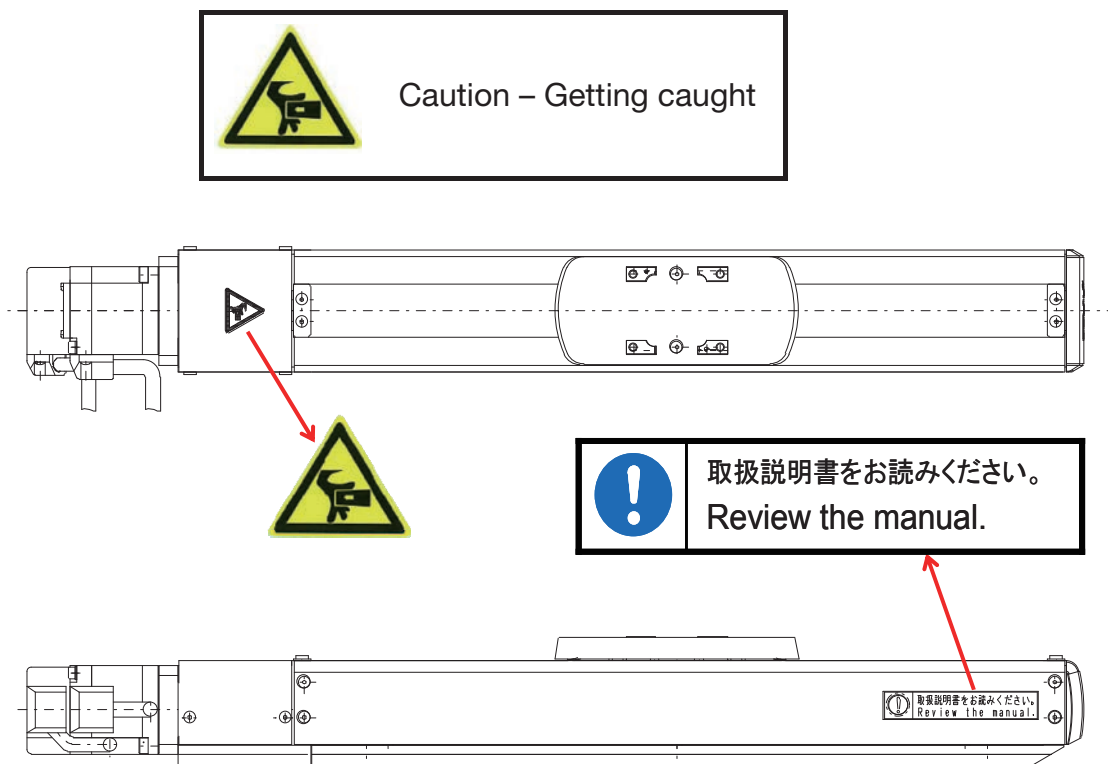


Fig. 1 KRF Precautions/instruction labels affixing positions

3-1

Nameplates display and serial number

Fig. 2 shows the nameplate format of the Compact Series KRF.

TYPE No. : Actuator model

SERIAL No.: Serial number

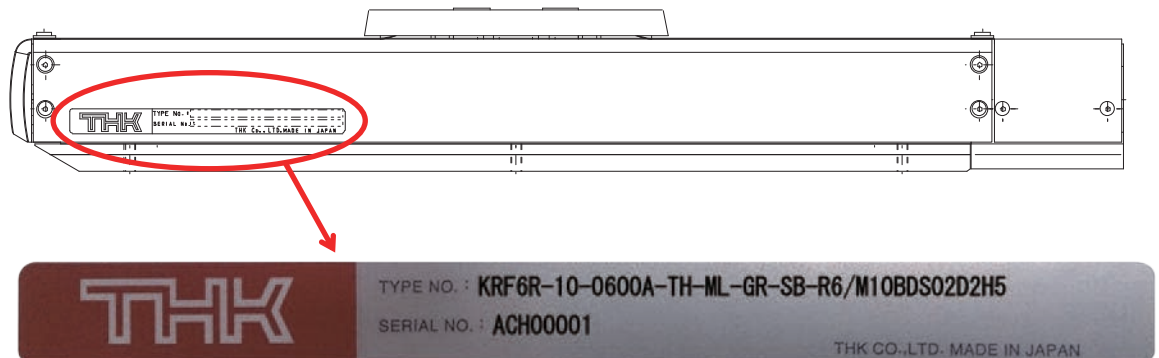


Fig. 2 KRF Nameplate details

4-1

Basic specification

The basic specification of KRF 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 servo driver controller TLC/THC

Model number	Ball screw lead [mm]	Stroke [mm]	Motor rated output [W]	Maximum load capacity ² [kg]			Maximum speed at each stroke ³ [mm/s]														
				Horizontal mount	Wall mount	Vertical mount	Stroke														
							to 300	350	400	450	500	550	600	650	700	750	800				
KRF4	6	50 to 300	50	6	5.5	4	300														
KRF5	6	50 to 550	50	19	14	6	300				250										
	10	50 to 550		15	12.5	3.5	500				430										
KRF6	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⁻¹).

*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⁻¹) or by the permissible rotational speed of the ball screw.

When using stepper driver controller TSC

Model number	Ball screw lead [mm]	Stroke [mm]	Maximum load capacity ¹ [kg]			Maximum speed at each stroke ¹ [mm/s]															
			Horizontal mount	Wall mount	Vertical mount	Stroke															
						to 300	350	400	450	500	550	600	650	700	750	800					
KRF3	6	50 to 300	3	3	1.5	300															
KRF4	6	50 to 300	6.5	6	4	300															
KRF5	6	50 to 550	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.

4-2

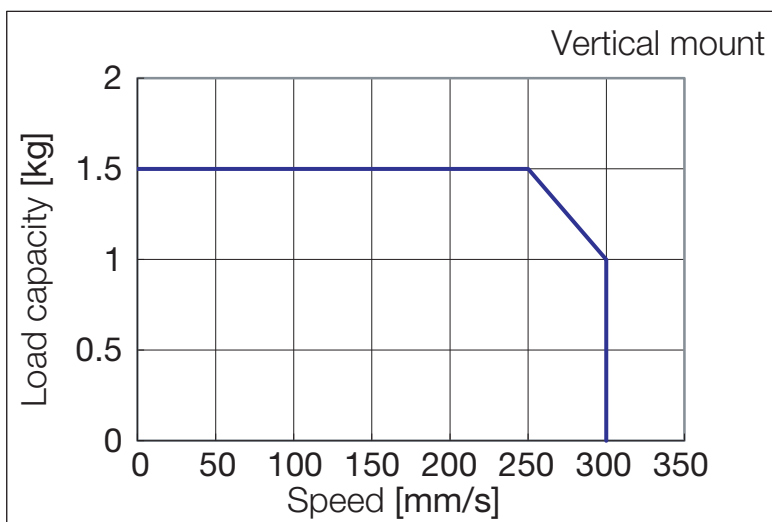
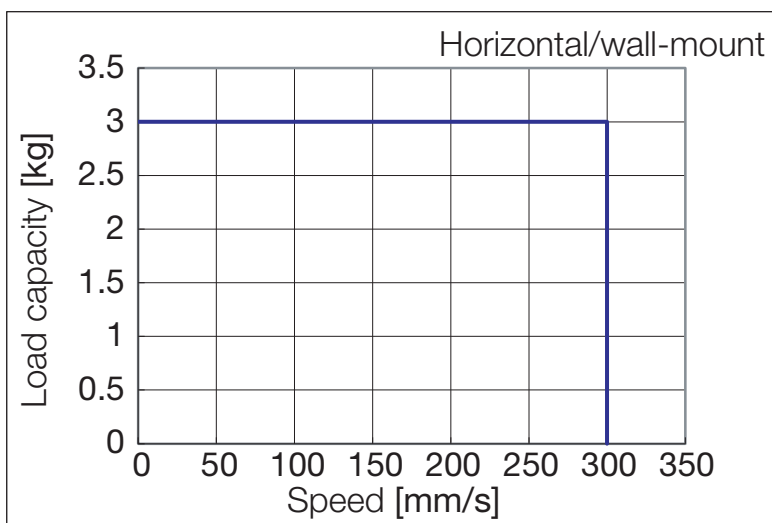
Speed and load capacity characteristic diagram

Load capacity and maximum speed vary with usage conditions.

Use the product within the range of following characteristic diagram.

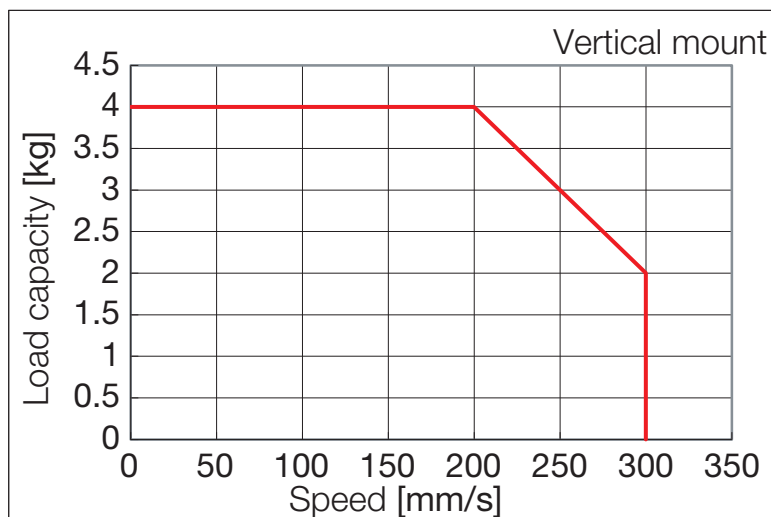
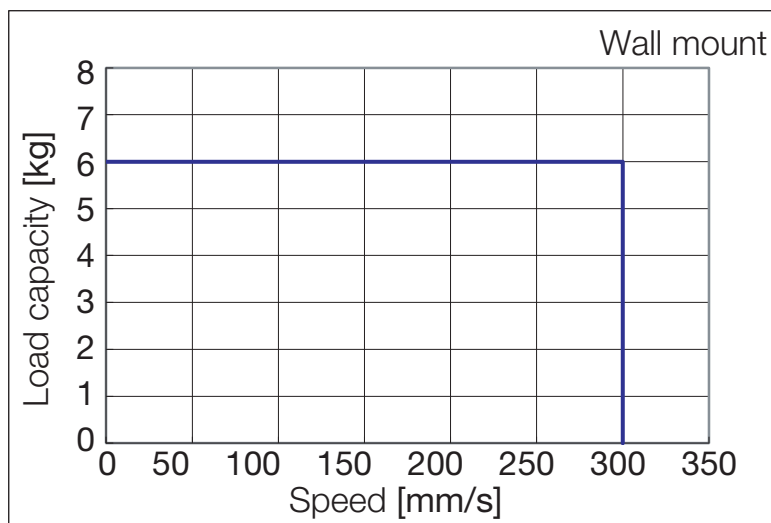
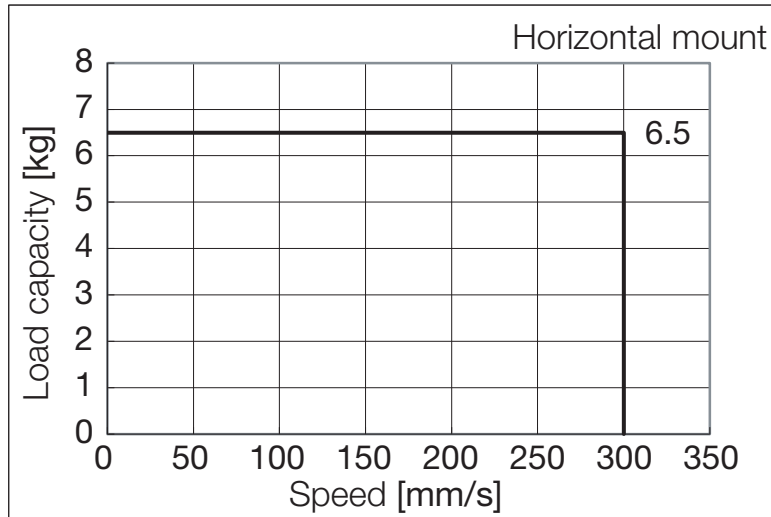
KRF3 (28P)....Stepper driver controller TSC

○ Lead 6 mm



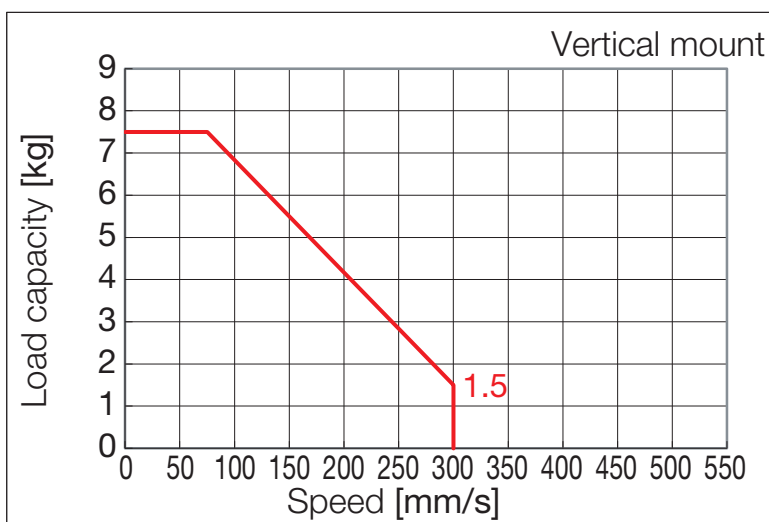
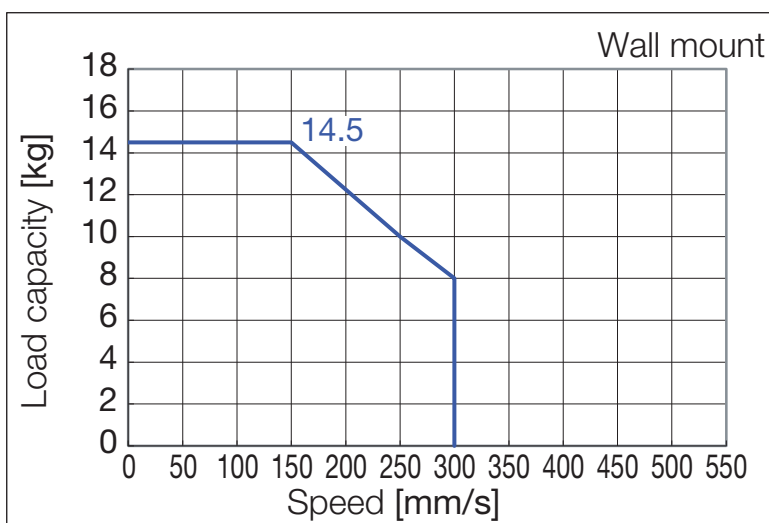
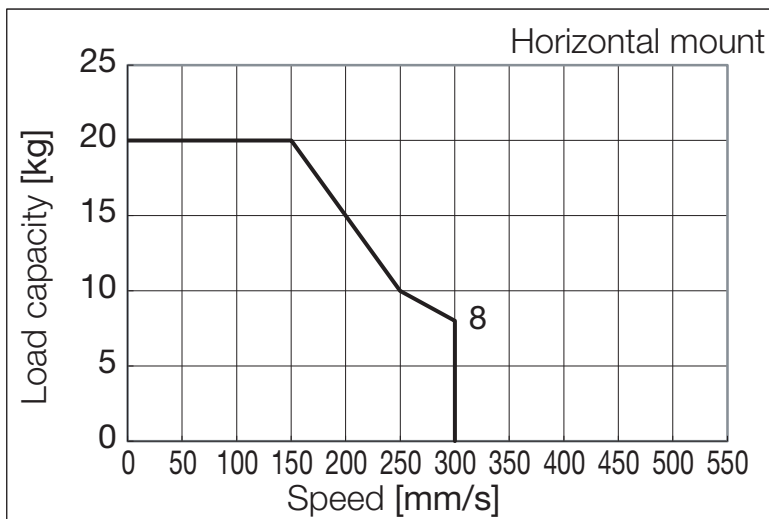
KRF4 (35P)....Stepper driver controller TSC

○ Lead 6 mm

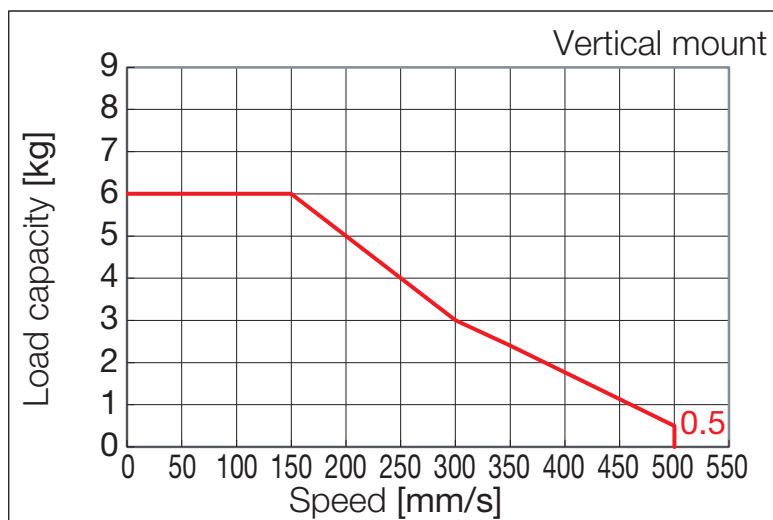
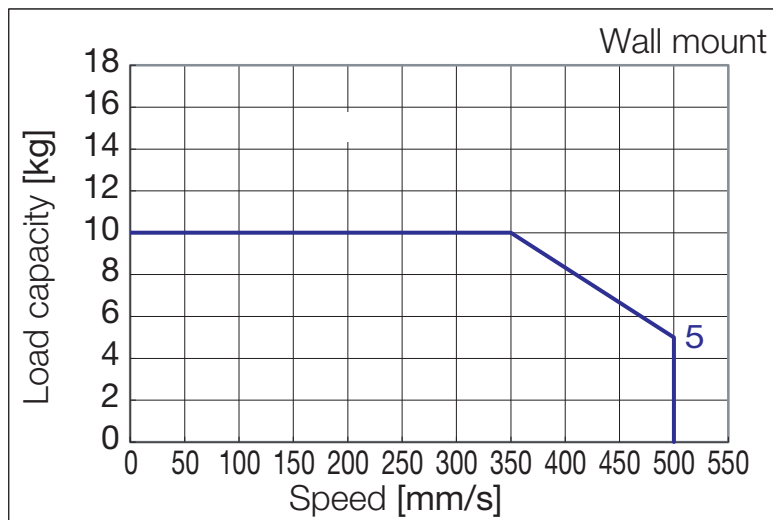
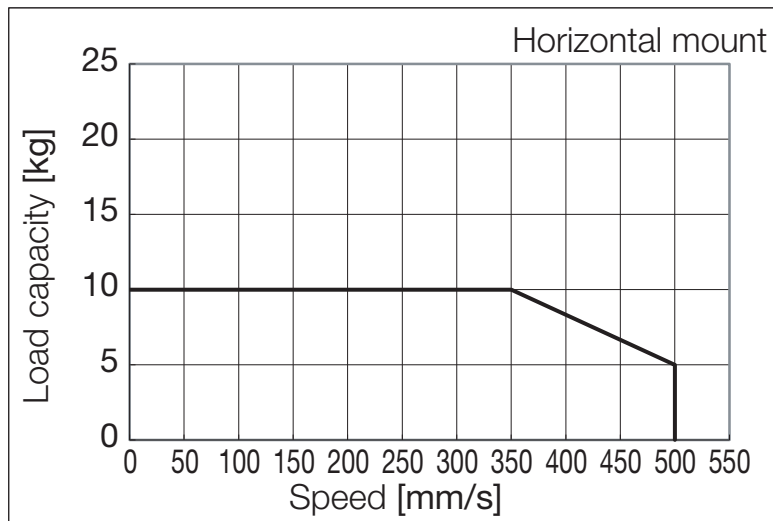


KRF5 (42P)....Stepper driver controller TSC

○ Lead 6 mm

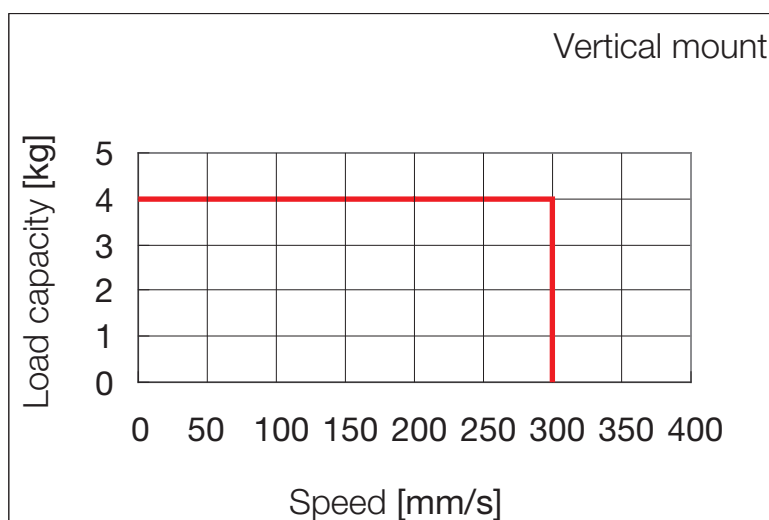
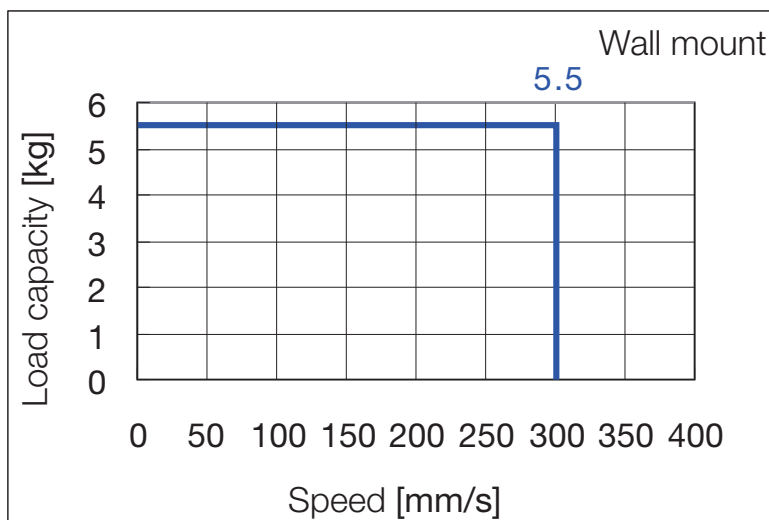
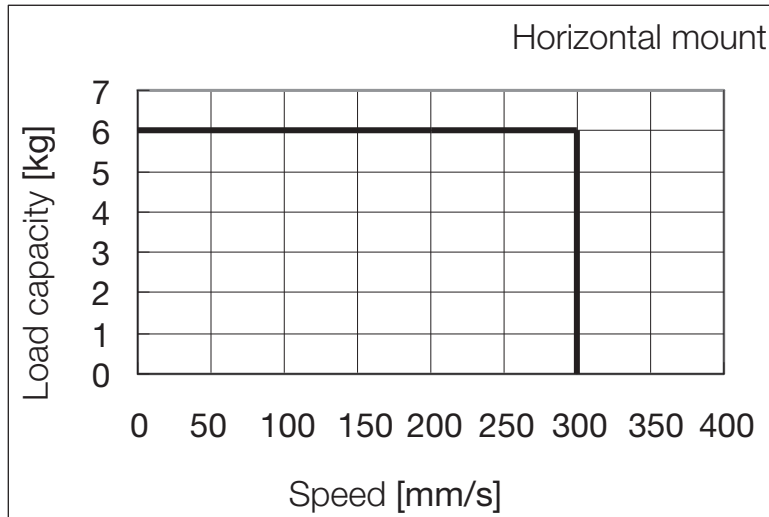


○ Lead 10 mm



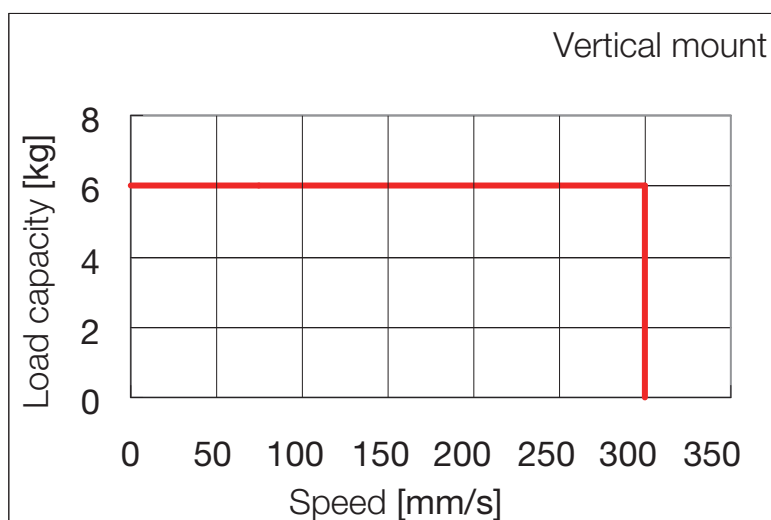
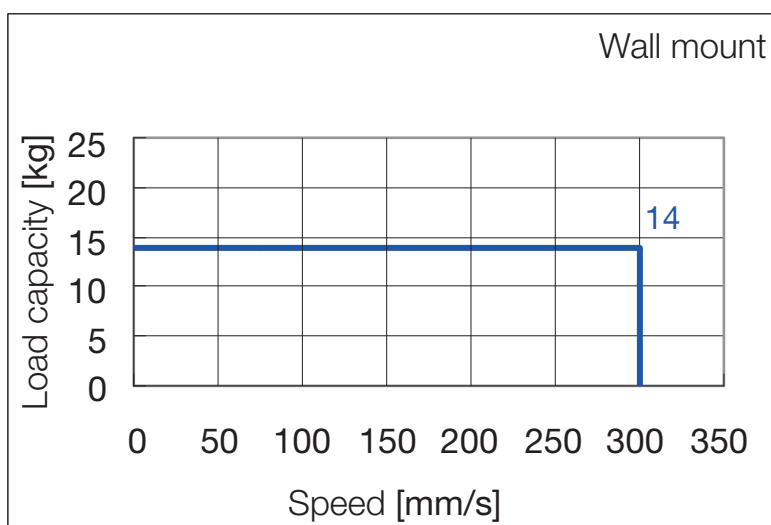
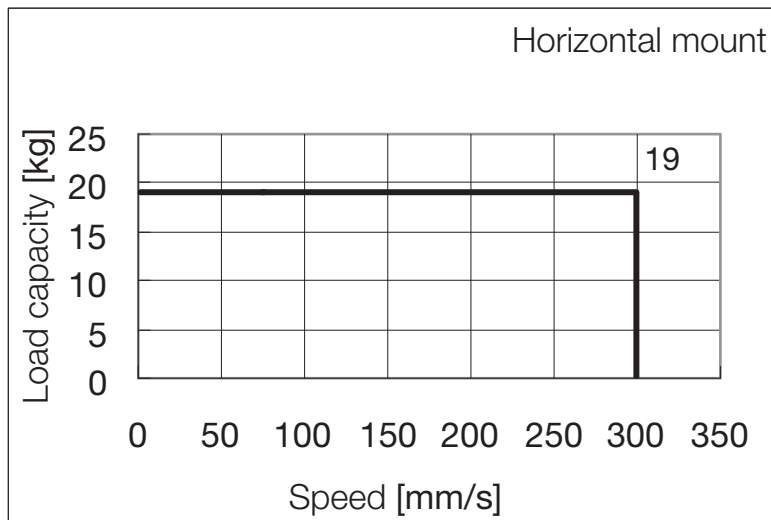
KRF4 (50W)....Servo driver controller TLC

○ Lead 6 mm

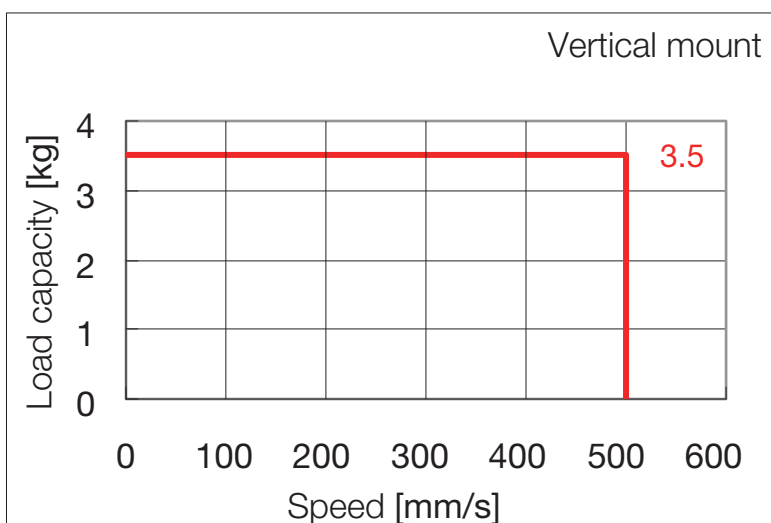
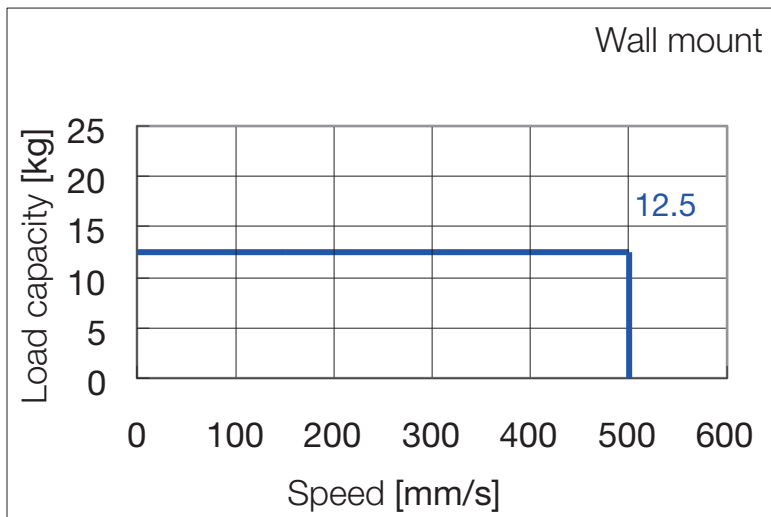
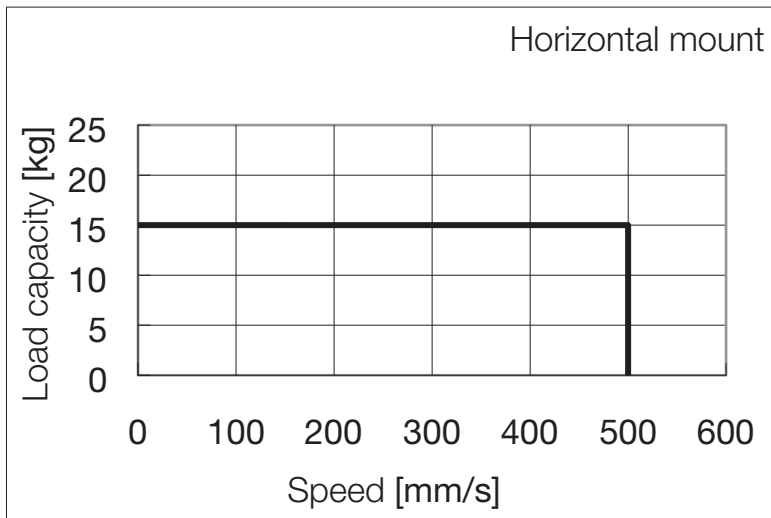


KRF5 (50 W)....Servo driver controller TLC

○ Lead 6 mm

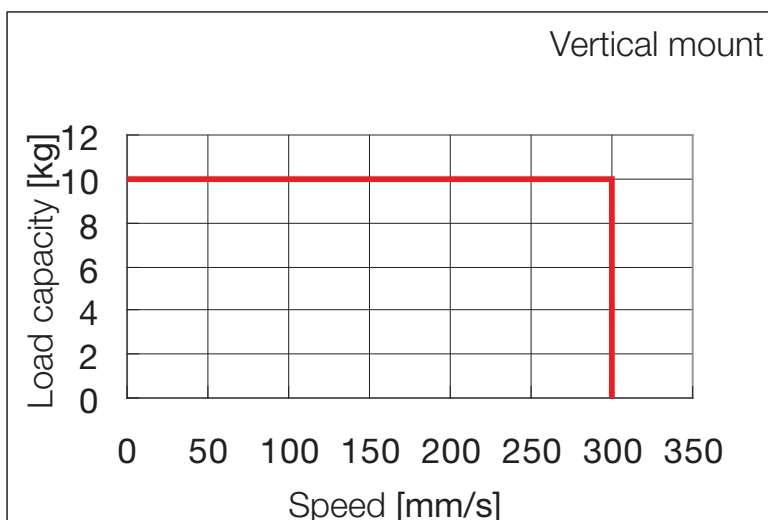
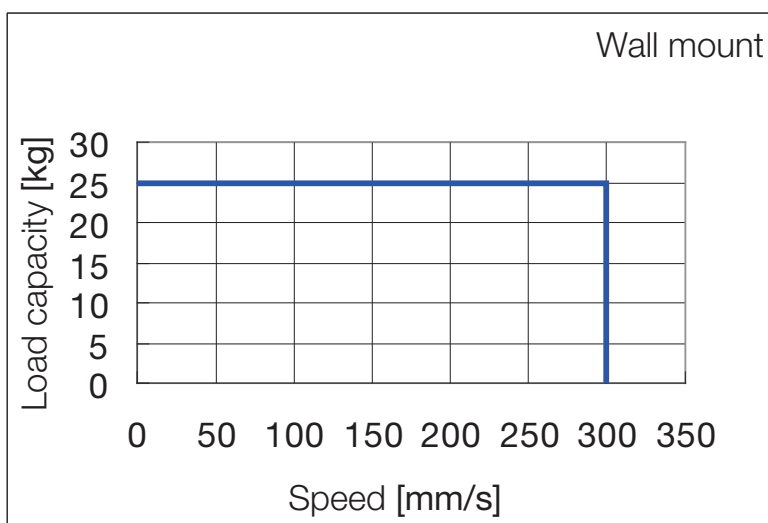
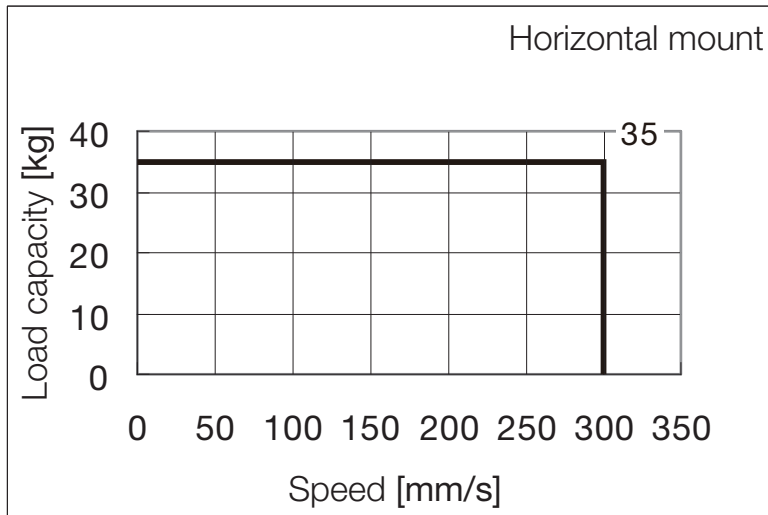


○ Lead 10 mm

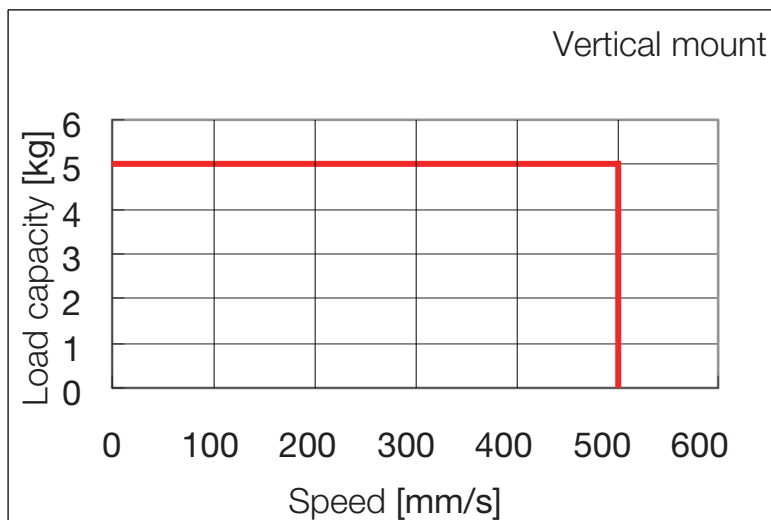
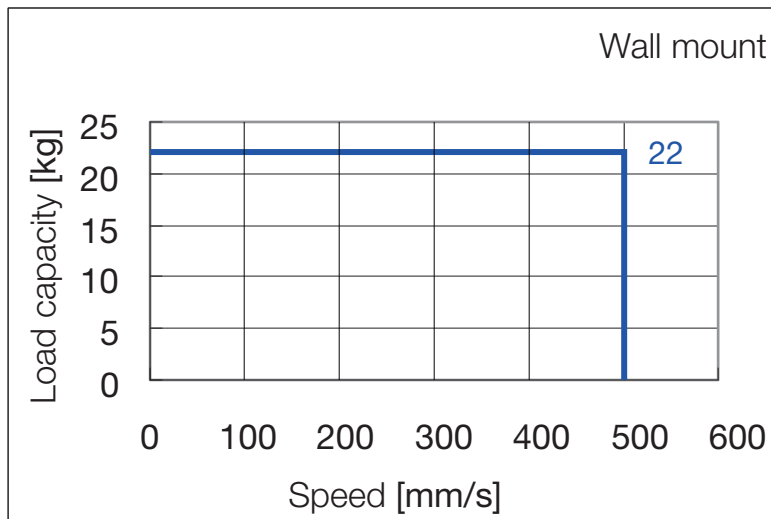
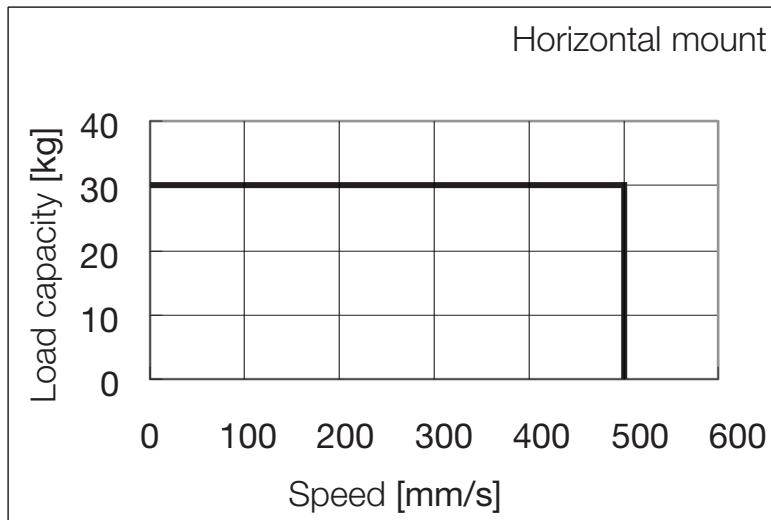


KRF6 (100 W)....Servo driver controller THC

○ Lead 6 mm



○ Lead 10 mm



5-1 Structure and part names

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

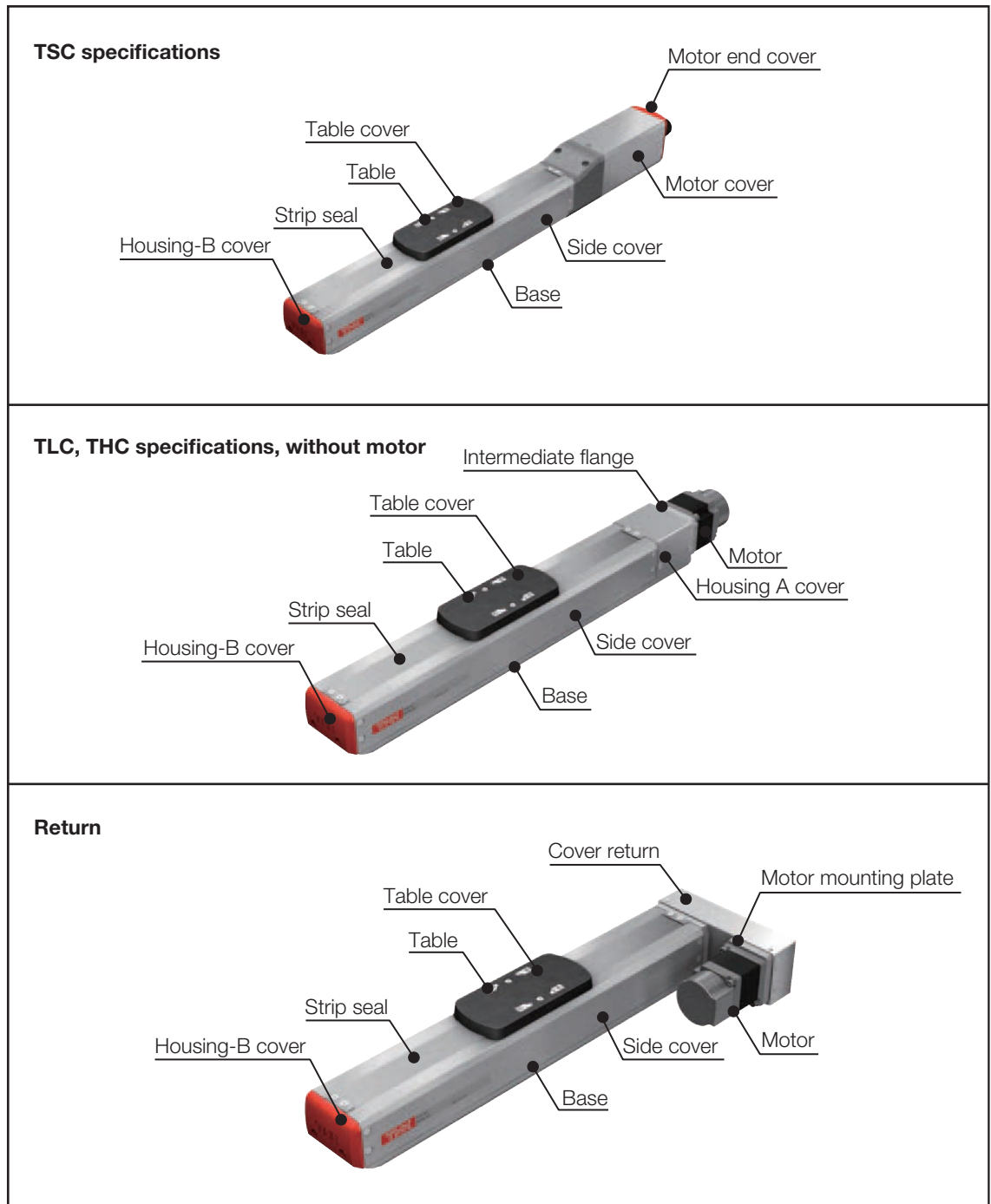


Fig. 3 Structure and part names of KRF (* KRF6 has no base.)

* For details such as the dimensions and accuracy, see the delivery specification drawings or the catalog of Compact Series KRF.

If you have any question, contact THK.

5-2

Model configuration

The following is an example of model number coding.

■ KRF (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

KRF5R - 06 - 0150 A - 0 - WQ - D - MR-SB

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Model number	KRF3, KRF4, KRF5, KRF6, KRF4R, KRF5R, KRF6R (R represents motor return.)						
(2) Ball screw lead	06 : 6 mm 10 : 10 mm (For KRF3, 4, and 4R, only ball screw lead 6 is applicable.)						
(3) Stroke	0150 : 150 mm (50 to 800 mm, 50 mm pitch) The maximum stroke = KRF3: 300, KRF4: 300, KRF5: 550, KRF6: 800						
(4) Design symbol	A						
(5) With/without motor	0 : Without motor When selecting "0", a coupling is not provided. For return configuration, timing pulley and timing belt are provided. 1 : With motor When selecting "1", the motor you specify will be installed. (Prepared by THK) * Specify the motor cable orientation separately.						
(6) Intermediate flange	A0 AN AQ AM AP AS AR AU AT WM WN WP WQ						
(7) Method of fixing motor shaft	No symbol : To be selected when directly coupled D : Flat side K : Key M : Friction tightening Methods of fixing motor shaft you can select differ depending on the model number. KRF4R: "D", "K", KRF5R: "D", "K", KRF6R: "D", "K", "M"						
(8) Options	No symbol : None MR : Motor right return* ML : Motor left return* MD : Motor down return* GR : Change the cover color to gray SB : With slider base □₁□₂ : Sensor Add "-" from left in the order of the optional symbol. * This is valid only when KRF□R is selected for model number (1).						

5. Structure and Model Numbers

■ KRF (type with motor)

When combining with dedicated controller

<Model configuration> Specification of TSC/TLC/THC with motor

KRF6R - 06 - 0150 A - TH - MR-GR/M10 L D00 D1 H3
 (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)

(1) Model number	KRF3, KRF4, KRF5, KRF6, KRF4R, KRF5R, KRF6R (R represents motor return.)										
(2) Ball screw lead	06 : 6 mm 10 : 10 mm (KRF3, KRF4, and KRF4R, only ball screw lead 6 is applicable.)										
(3) Stroke	0150 : 150 mm (50 to 800 mm, 50 mm pitch) The maximum stroke = KRF3: 300, KRF4: 300, KRF5: 550, KRF6: 800										
(4) Design symbol	A										
(5) Control device	TS : Driver controller TSC TL : Driver controller TLC TH : Driver controller THC Control device you can select differ depending on models. KRF3: TSC, KRF4: TSC/TLC, KRF5: TSC/TLC, KRF6: THC KRF4R: TLC, KRF5R: TLC, KRF6R: THC										
(6) Option	No symbol : None MR : Motor right return* ML : Motor left return* MD : Motor down return* GR : Change the cover color to gray SB : With slider base □₁□₂ : Sensor Add "-" from left in the order of the optional symbol. * This is valid only when KRF□R is selected for model number (1).										
(7) Motors used	28P : Stepper motor□28 28PB : Stepper motor□28 (with brake) 35P : Stepper motor□35 35PB : Stepper motor□35 (with brake) 42P : Stepper motor□42 42PB : Stepper motor□42 (with brake) Motors you can select differ depending on models. KRF3: "28P", "28PB" KRF4R: "M05", "M05B" KRF4: "35P", "35PB", "M05", "M05B" KRF5R: "M05", "M05B" KRF5: "42P", "42PB", "M05", "M05B" KRF6R: "M10", "M10B" KRF6: "M10", "M10B"										
(8) Motor cable direction	No symbol : None (TSC) R : Right U : Up L : Left D : Down When "MR" is selected as an option, "R" cannot be selected. When "ML" is selected, "L" cannot be selected. When "MD" is selected, "U" cannot be selected.										
(9) Home position	D00 : Motor side R00 : Reverse motor side S02 : Motor side S03 : Reverse motor side D00 and R00 are of stopper type home position method. You can only select THC for S0 * (external sensor type.)										
(10) Power supply voltage	No symbol : None (TSC, TLC) D1 : 100 V (THC) D2 : 200V (THC)										
(11) Cable length	No symbol : None S3 : 3 m standard S5 : 5 m standard SA : 10 m standard F3 : 3 m standard F5 : 5 m standard FA : 10 m standard H3 : 3 m high flex H5 : 5 m high flex HA : 10 m high flex										

Indicates the type and length of attached cables.
Cables you can select differ depending on controllers.
TSC: "S*", TLC: "F*", "H*", THC: "F*", "H*"

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, 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 Compact Series KRF.

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.**



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

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.

7-2

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
Operating temperature: 0°C to 40°C (ambient humidity 80% RH or less, no freezing or condensation)
 - * 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
- **Certain types of coolants may cause trouble to the function of the product. If using the product in an environment where the coolant may enter into the product, contact THK.**
- **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.

7-3

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

KRF3: $\phi 17$

KRF4: $\phi 20$

KRF5: $\phi 20$

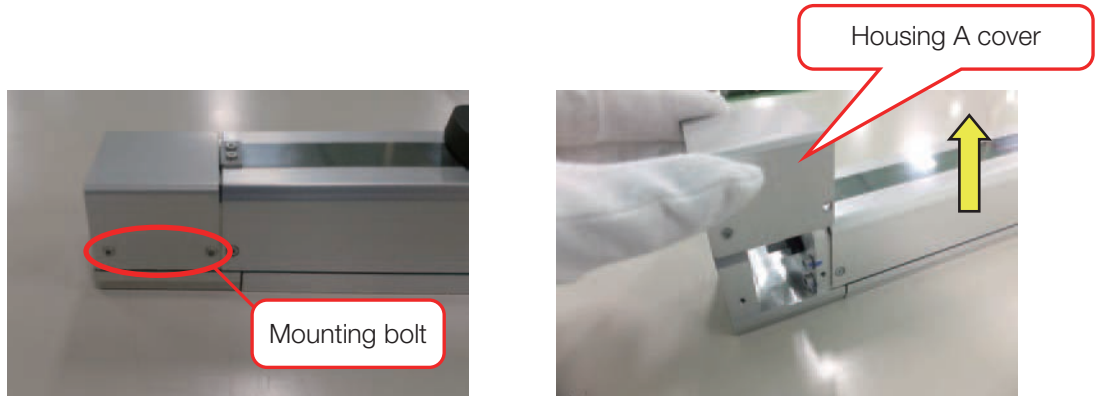
KRF6: $\phi 22$

7-4 Motor mounting method

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

[Direct coupled specification]

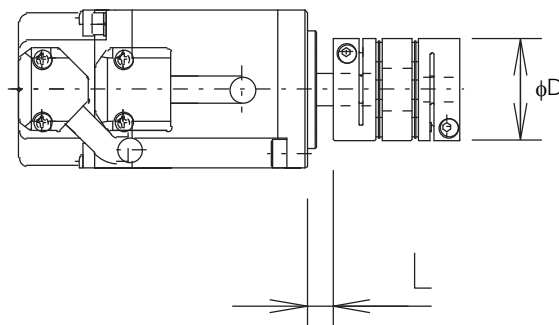
1. Remove the bolt and remove the housing A cover toward the direction of arrow.



Model number	Bolt size
KRF3	M2.6 × 4L
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M2.6 × 5L

Bolt type: Thin head (FH type) head screws

2. Tighten the coupling onto the motor shaft.

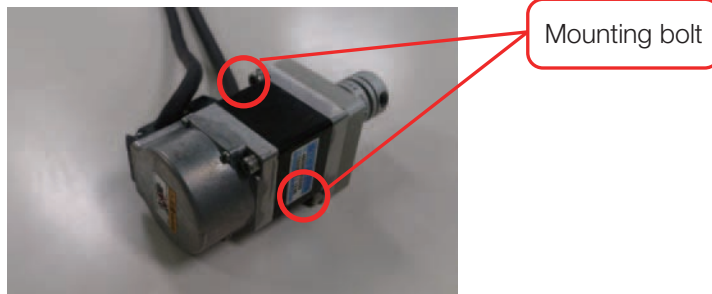


Model number	Motor models	Coupling models	L dimensions [mm]	φD [mm]	Clamping bolt	Tightening torque [N·mm]
KRF3	SGMMV-A2A (Yaskawa Electric Corporation)	SFC-005DA2-3B x 5B (Miki Pulley Co., Ltd.)	8	16	M2	40 to 50
KRF4	TS4602 (Tamagawa Seiki Co., Ltd.)	SFC-010DA2-4B-8B (Miki Pulley Co., Ltd.)	13	19	M2.5	100 to 110
KRF5	TS4602 (Tamagawa Seiki Co., Ltd.)	SFC-010DA2-5B-8B-T013 (Miki Pulley Co., Ltd.)	15.2	19	M2.5	100 to 110
KRF6	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.

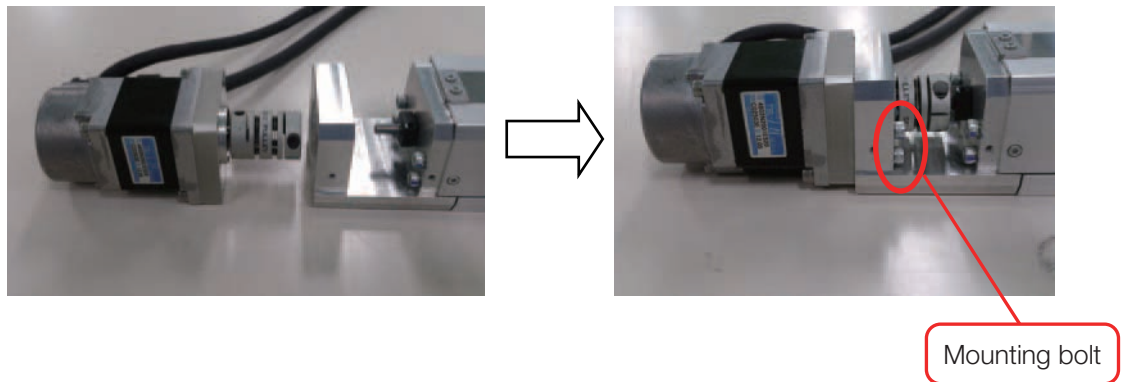
- When mounting the intermediate flange to housing A after mounting the motor onto the intermediate flange
Mount the motor onto the intermediate flange.
Motors for mounting and bolt sizes are shown in the following table.



Model number	Motor models	Bolt size	Tightening torque [N·cm]
KRF3	SGMMV-A2A (Yaskawa Electric Corporation)	M2.6 × 8L	68
KRF4	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 × 12L	329
KRF5	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 × 12L	329
KRF6	TS4603 (Tamagawa Seiki Co., Ltd.)	M4 × 10L	329

Bolt type: Hexagonal-socket-head type bolt

- Mount the part assembled in procedure 3 onto the housing A.
Intermediate flange types and bolt sizes are shown in the following table.

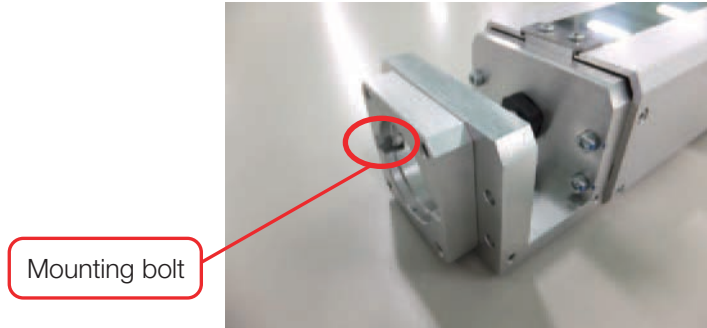


Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
KRF3	M,N,S	M2.5 × 10L	30
KRF4	P,Q,R,S,M,N	M3 × 15L	125
KRF5	P,Q,R,S,M,N	M3 × 16L	125
KRF6	R	M3 × 16L	125

Bolt type: Hexagonal-socket-head type bolt

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

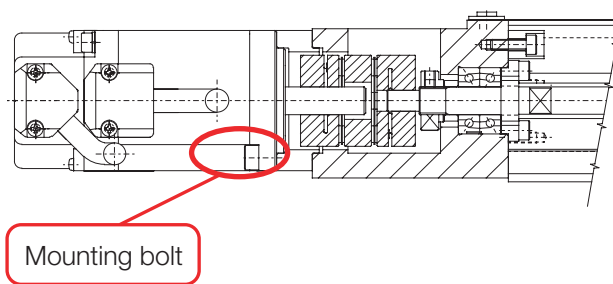
Intermediate flange types and the bolts used are shown in the following table.



Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
KRF6	P,Q,T,U	M3 × 8L	125

Bolt type: Hexagonal-socket-head type bolt

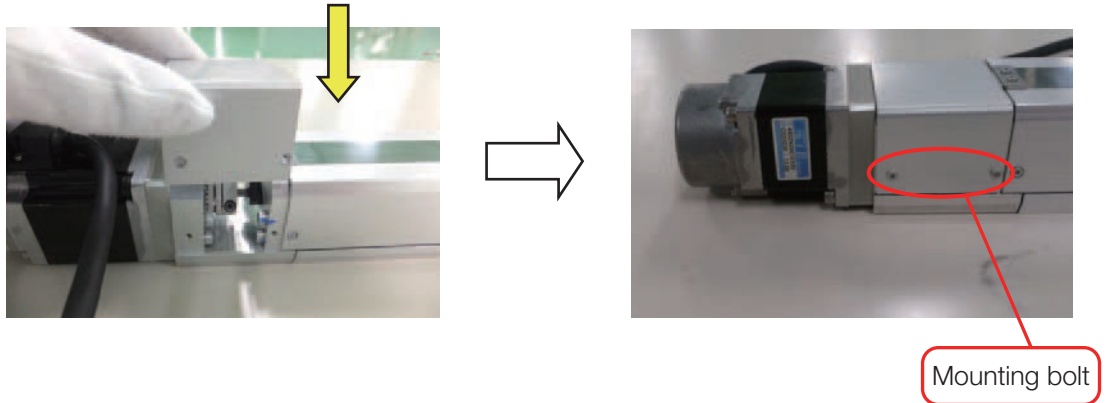
And then, mount the motor and coupling assembled in procedure 2 onto the intermediate flange.



Model number	Motor models	Bolt size	Tightening torque [N·cm]
KRF6	TS4603 (Tamagawa Seiki Co., Ltd.)	M4 × 10L	329

- Secure the coupling and ball screw shaft.

7. Mount the housing A cover.



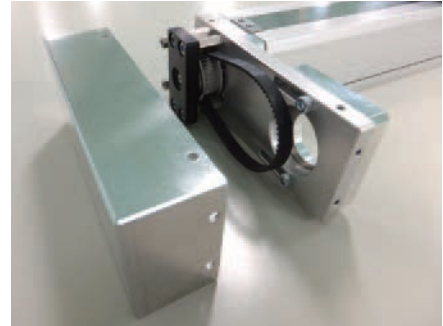
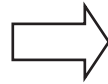
Model number	Bolt size	Tightening torque [N·cm]
KRF3	M2.6 × 4L	30
KRF4	M2.6 × 4L	30
KRF5	M3 × 5L	76
KRF6	M2.6 × 5L	30

Bolt type: Thin head (FH type) head screws

[Return type specification]

1. Remove the mounting bolt, and remove the return cover.

OKRF4R/5R



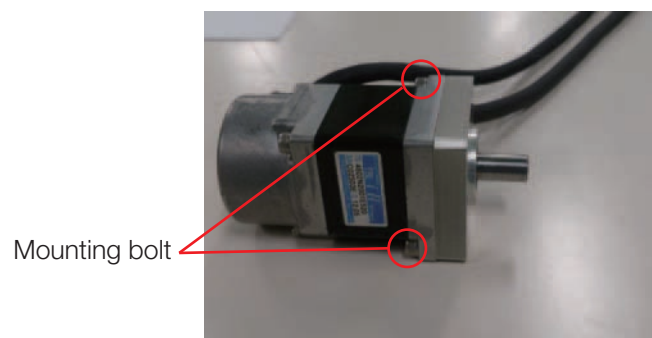
OKRF6R



Model number	Bolt size
KRF4R	M2.6×4L
KRF5R	M2.6×4L
KRF6R	M3 x 5L

Bolt type: Thin head (FH type) head screws

2. Mount the motor mounting plate on the motor.
Mount the motor paying attention to the orientation of the motor mounting plate.
Check that the mounting bolt is not protruded beyond the motor mounting plate.

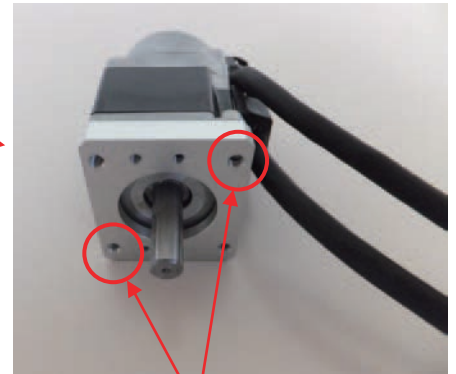
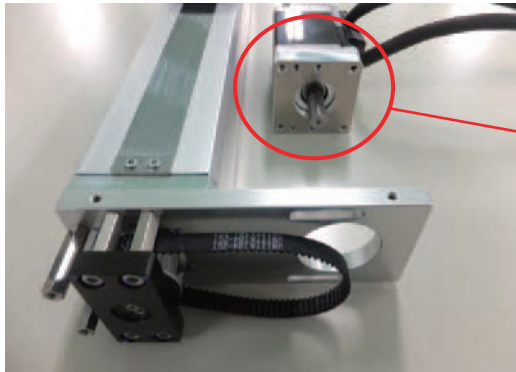


7. Installation and Operation

Model number	Motor models	Bolt size	Tightening torque [N·cm]
KRF4R	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 x 10L	329
KRF5R	TS4602 (Tamagawa Seiki Co., Ltd.)	M4 x 10L	329
KRF6R	TS4603 (Tamagawa Seiki Co., Ltd.)	M4 x 10L	329

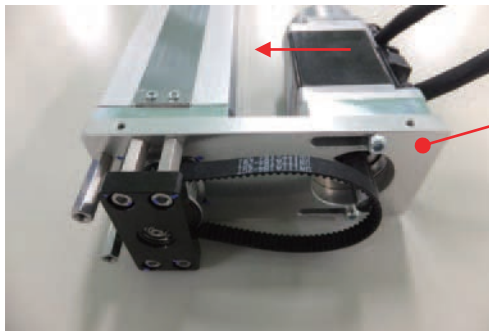
Bolt type: Hexagonal-socket-head type bolt

Note: The motor mounting plate orientation



Check that the mounting bolt is not protruded beyond the motor mounting plate.

3. Temporarily fasten the motor mounting plate onto the pulley bracket.



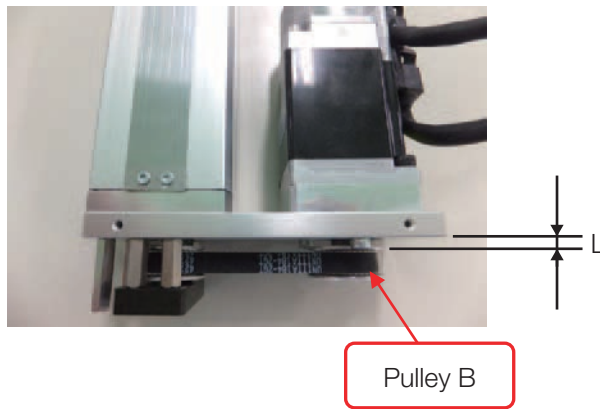
Pulley bracket

Press the plate toward the main unit side and temporarily fasten.

Model number	Intermediate flange type	Bolt size
KRF4R	WM, WN, WP, WQ	M3×6L
KRF5R	WM, WN, WP, WQ	M3×6L
KRF6R	WP, WQ	M3×6L

Bolt type: Hexagonal-socket-head type bolt

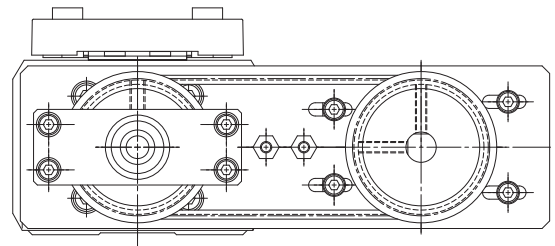
4. Mount the pulley onto the motor.
Adjust the position of pulley B to the L dimension to mount pulley B.



Model number	L dimensions
KRF4R	1.5
KRF5R	1.5
KRF6R	2

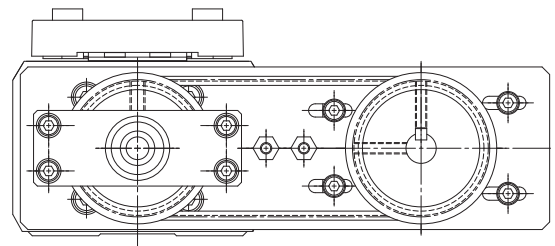
- For tightening type D
Be sure to set a hexagonal socket-head setscrew to the D cut face of motor shaft.

Model number	Hexagonal socket-head setscrew	Tightening torque [N·cm]
KRF4R	M3 × 3L	50
KRF5R	M3 × 3L	50
KRF6R	M4 × 4L	120



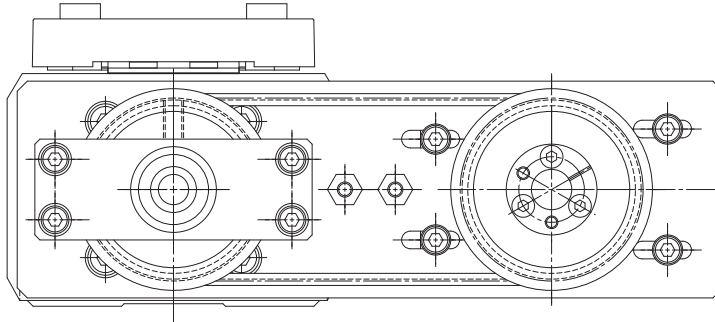
- For tightening type K
Be sure to align the key portion of the pulley with the key way of the motor shaft.

Model number	Hexagonal socket-head setscrew	Tightening torque [N·cm]
KRF4R	M3 × 3L	50
KRF5R	M3 × 3L	50
KRF6R	M4 × 4L	120



- For tightening type M

Mount the timing pulley and mecha lock that come with the product.



Mecha lock: PSL-D-8 (Miki Pulley Co., LTD.)

Model number	Number - Nominal x Length	Tightening torque [N·cm]	Screw hole for removing
KRF6R	3-M2.5 x 10	100	2-M2.5

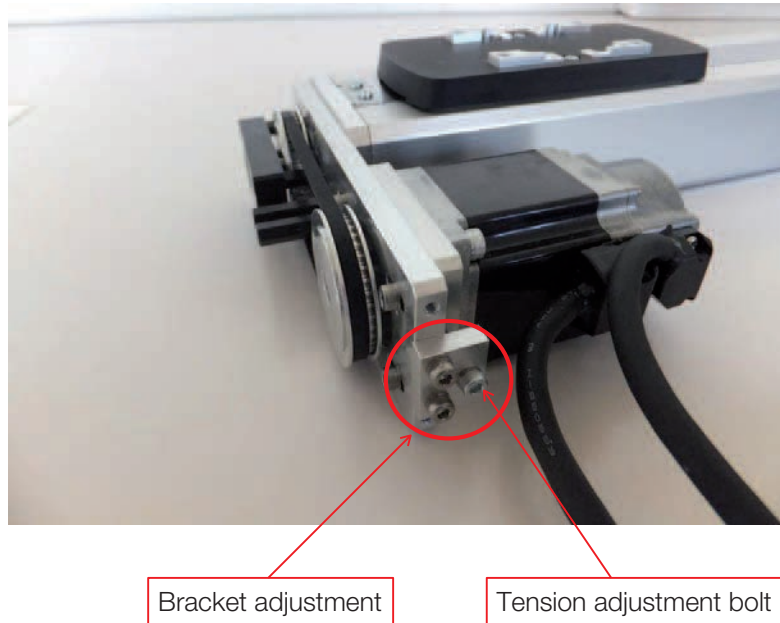
Retighten the mounting bolts evenly in diagonal order. And then, tighten all the bolts evenly using a torque wrench according to the recommended tightening torque until it comes to a stop. Do not use any bolts other than the ones attached to the mecha lock unit.

- Mount the timing belt.

The table below specifies timing belts corresponding to each model.

Model number	Belt manufacturer	Belt model
KRF4R	Gates Unitta Asia Company	184-2GT-6
KRF5R	Gates Unitta Asia Company	204-2GT-6
KRF6R	Gates Unitta Asia Company	264-3GT-4

6. Adjust the timing belt tension.
 KRF6R makes a tension adjustment using the attached bracket adjuster.

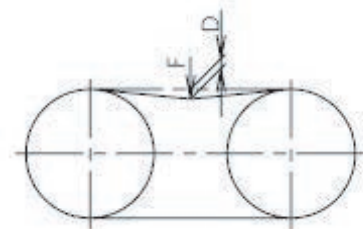
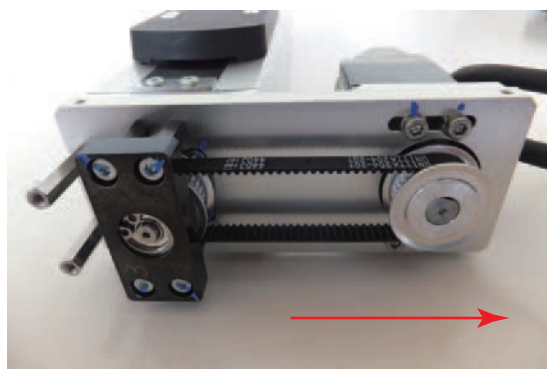


Model number	Bolt size	Tightening torque [N-cm]
KRF6R	M3 × 10L	125

Bolt type: Hexagon socket head cap screw

Pull it toward the arrow direction to adjust the tension. Adjust the belt tension to meet the values as shown in the table below using the sonic tensimeter U-507 by Gates Unitta Asia Company. The table also shows the pressing force and amount of impression for your reference, but we recommend you adjust them by the tensimeter.

Model number	Mounting tension [N]	Pressing force [N]	Amount of impression D [mm]
KRF4R	11 to 20	0.7 to 1.3	0.9
KRF5R	11 to 20	0.7 to 1.3	1.1
KRF6R	14 to 26	0.9 to 1.7	1.2



7. Installation and Operation

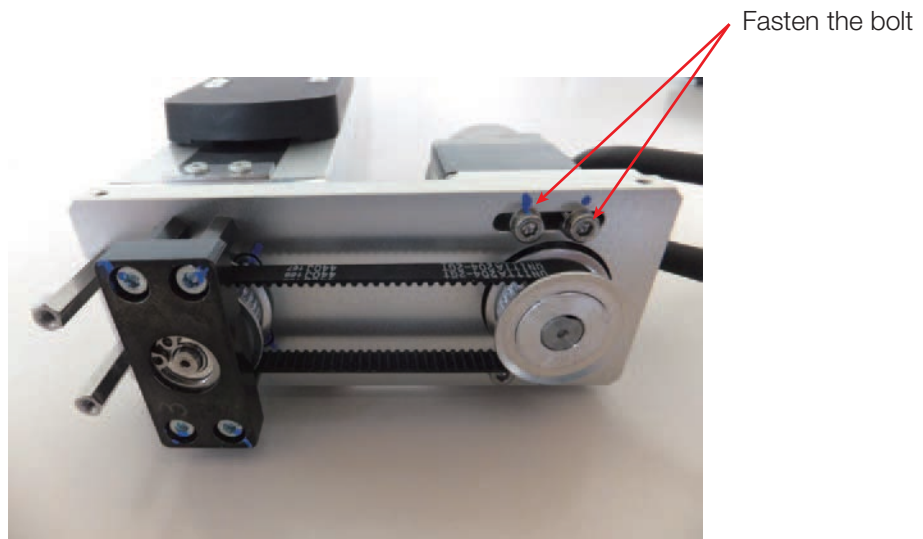
7. Fasten the bolts.

Fasten hexagon socket head cap screw using the specified tightening torque. (plain washer, 4 holes)

Please measure it by the tensimeter once again after fastening the bolt.

Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
KRF4R	WM, WN, WP, WQ	M3 × 6L	125
KRF5R	WM, WN, WP, WQ	M3 × 6L	125
KRF6R	WP, WQ	M3 × 6L	125

Bolt type: Hexagonal-socket-head type bolt

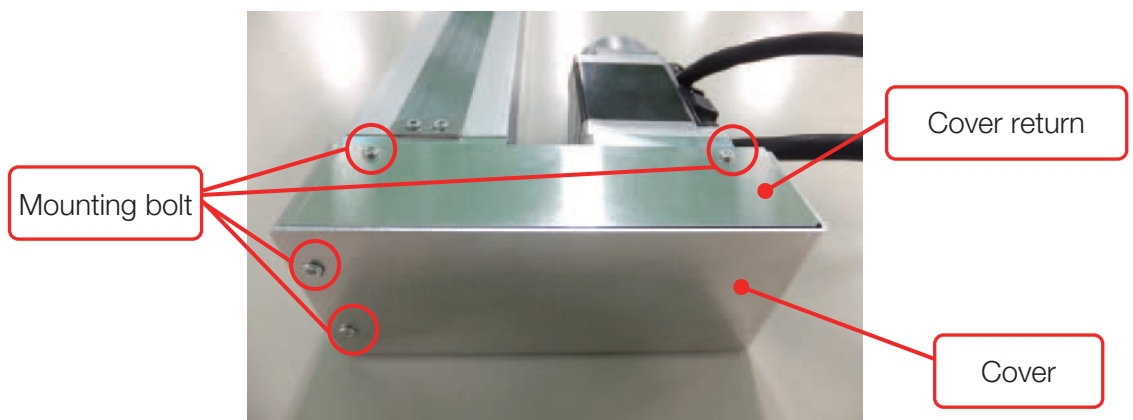


8. Mount cover return and cover
Fasten the bolt by the designated tightening torque.

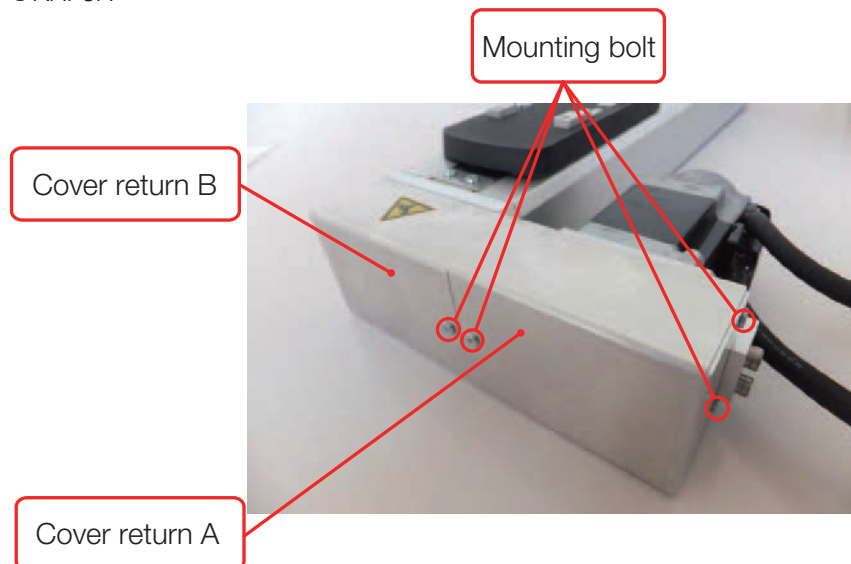
Model number	Bolt size	Tightening torque [N·cm]	Number of bolts
KRF4R	M2.6 × 4L	30	8
KRF5R	M2.6 × 4L	30	8
KRF6R	M3 × 5L	76	6

Bolt type: Thin head (FH type) head screws

OKRF4R/5R



OKRF6R



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.

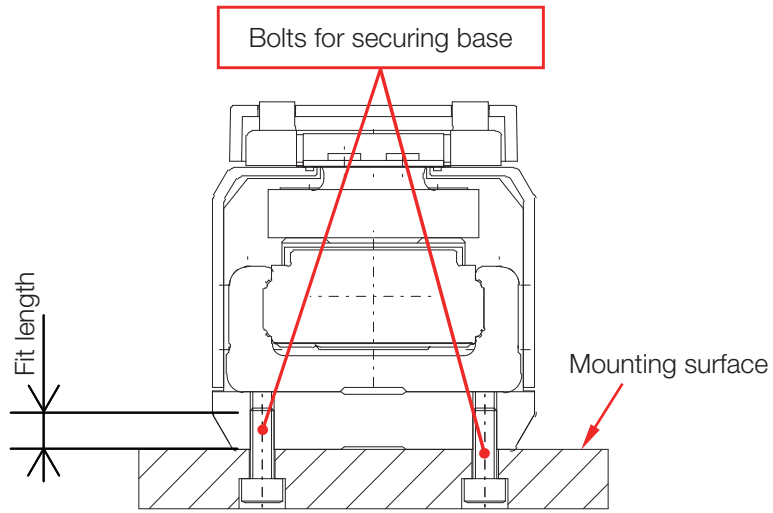


Fig. 4 Drawing for mounting KRF3/4/5 tap specification

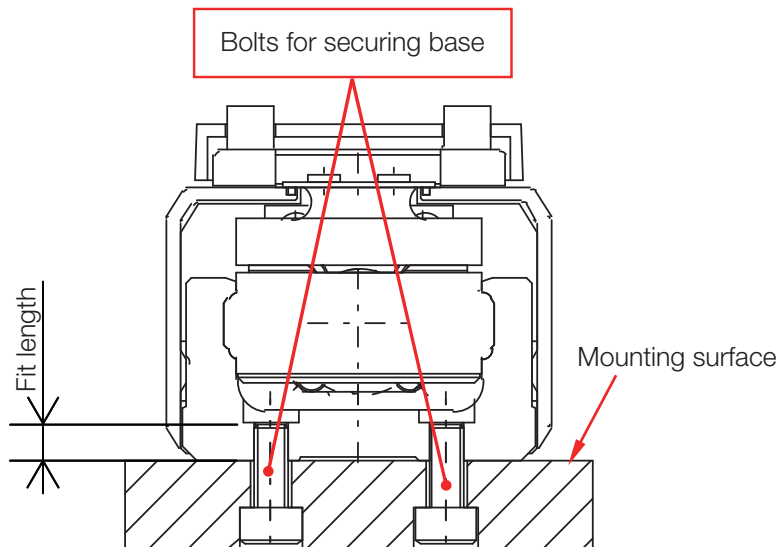
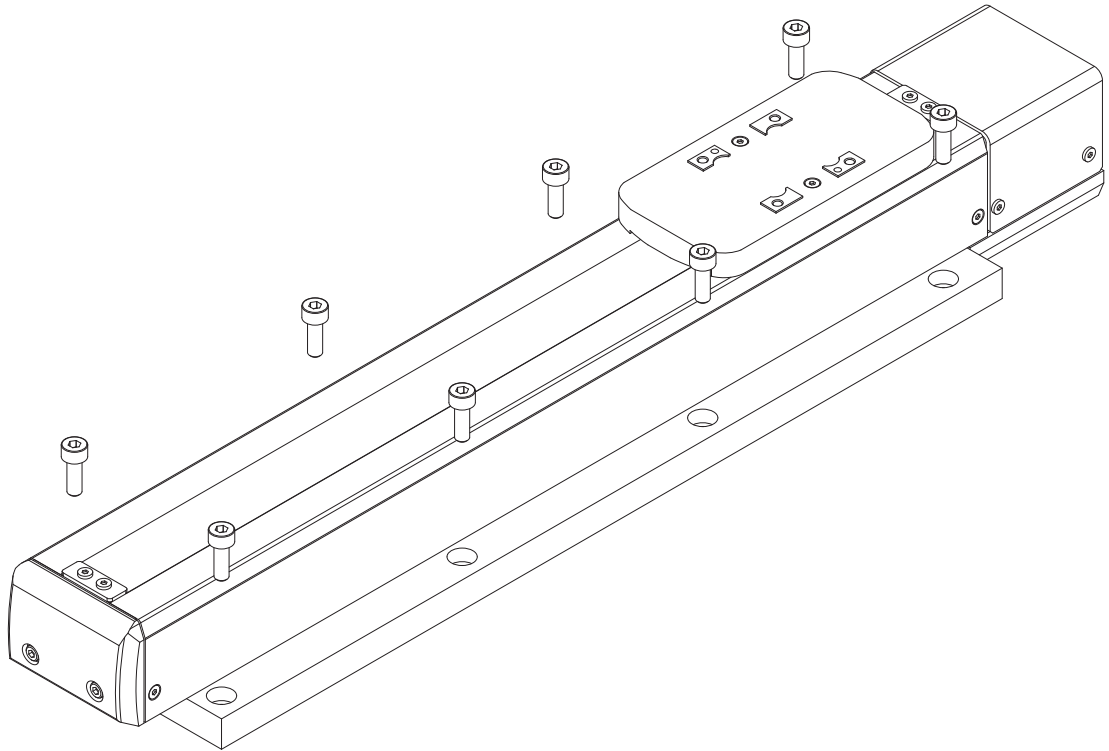


Fig. 5 Drawing for mounting KRF6 Tap specification

Model number		KRF3		KRF4		KRF5		KRF6		
Screw size		M3		M3		M4		M6		
Material of screw		Steel	SUS	Steel	SUS	Steel	SUS	Steel	SUS	
Tensile strength rank		10.9	A2-70	10.9	A2-70	10.9	A2-70	10.9	A2-70	
Fit length of screw [mm]		4.5		4.5		6		6		
Tightening torque [N·cm]	Material of mounting surface	Iron	130	100	130	100	310	230	860	770
		Aluminum	125	100	125	100	250	230	660	660

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

[Slider base (Mounting hole specification)]

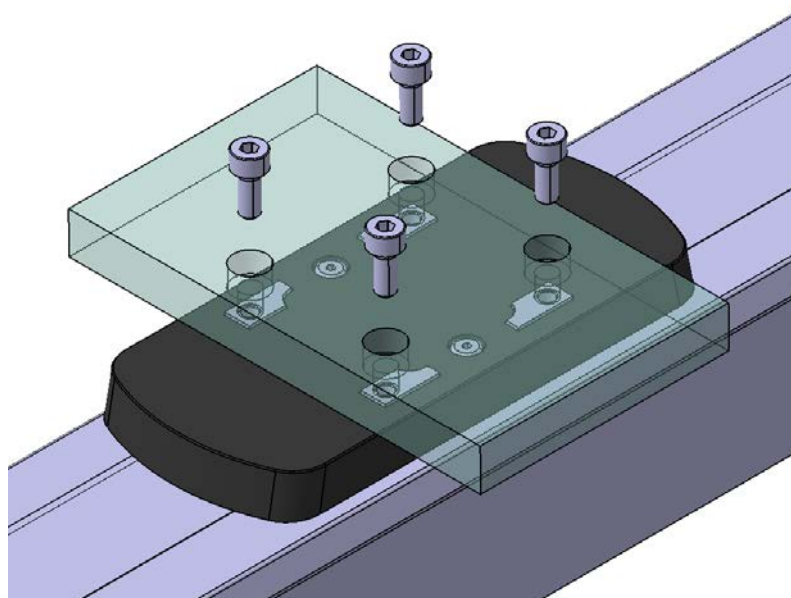


Model number		KRF3		KRF4		KRF5		KRF6		
Screw size		M4		M4		M4		M5		
Material of screw		Steel	SUS	Steel	SUS	Steel	SUS	Steel	SUS	
Tensile strength rank		10.9	A2-70	10.9	A2-70	10.9	A2-70	10.9	A2-70	
Slider base thickness [mm]		6		6		6		7.5		
Tightening torque [N·cm]	Material of the other side	Iron	250	230	250	230	250	230	450	450
		Aluminum	250	230	250	230	250	230	450	450

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

7-6 Mounting method for objects to be mounted

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

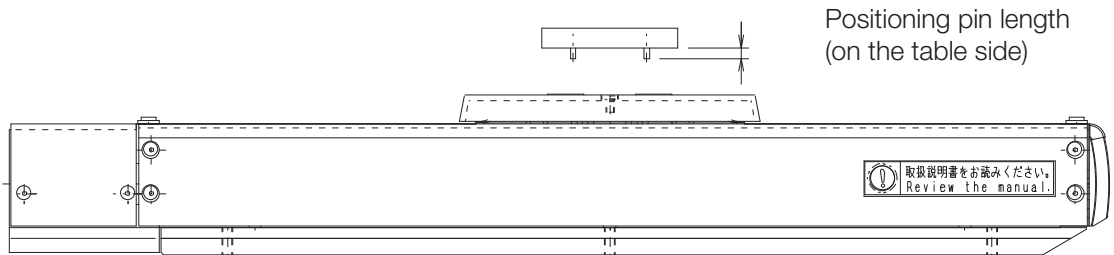


Model number			KRF3		KRF4		KRF5		KRF6	
Screw size			M3		M3		M4		M5	
Material of screw			Steel	SUS	Steel	SUS	Steel	SUS	Steel	SUS
Tensile strength rank			10.9	A2-70	10.9	A2-70	10.9	A2-70	10.9	A2-70
Table tap depth [mm]			4.5		4.5		6		7.5	
Tightening torque [N·cm]	Material of mounting surface	Iron	130	100	130	100	310	230	585	450
		Aluminum	125	100	125	100	250	230	450	450

Table 3 Tightening torque for mounting table

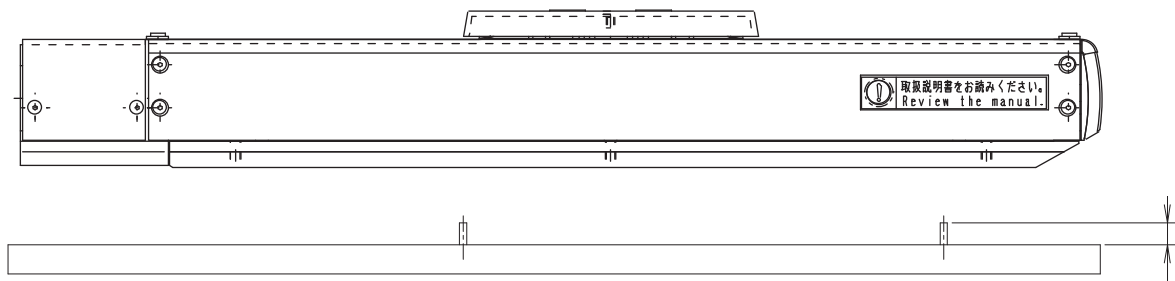
7-7 Positioning pin length

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	KRF3	KRF4	KRF5	KRF6
Table hole diameter	$\phi 2H7$	$\phi 2H7$	$\phi 2H7$	$\phi 3H7$
Table hole depth [mm]	5	5	5	5
Positioning pin length [mm]	4	4	4	4

Table 4 Table positioning pin hole details



Positioning pin length
(on the main unit side)

Model number	KRF3	KRF4	KRF5	KRF6
Main unit hole diameter	$\phi 3H7$	$\phi 3H7$	$\phi 3H7$	$\phi 3H7$
Main unit hole depth [mm]	5	5	5	5
Positioning pin length [mm]	4	4	4	4

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

Table 5 Main unit positioning pin hole details

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.

8-3 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

- **For the motor return type, we recommend you to adjust the belt tension after between about two weeks and one month of operation.**
 - Initial elongation of the belt may lower the belt tension.
- **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.
- **Inspection of timing belt (for the products using timing belts)**
 - Adjust the belt tension. (See installation of motor)
 - * If you use the product with the belt tension low, it may adversely affect the performance.
 - Check whether the timing belt contacts the flange part of the pulley.
If it contacts, adjust the alignment of the pulley.
 - * If you continue to use the product with the timing belt contacting the flange part, it may cause a fracture of the flange or abnormal wear of the belt.
 - Visually check an abnormal wear, scratch, or crack on the teeth or side of the timing belt.

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.
- **For the normal use of the grease, replenish it approximately every 100 km travel distance. However, note that the greasing interval varies with the service conditions or the service environment. We recommend determining the greasing interval through the initial inspection.**
 - * Note that the greasing interval becomes shorter than usual in case of high-load use or under the environment where oil content decreases.
 - * The long-term maintenance-free operation of the LM guide and ball screw part can be realized by the effect of Lubricator QZ. However, We recommend determining the greasing interval through inspections.
- **KRF 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.**

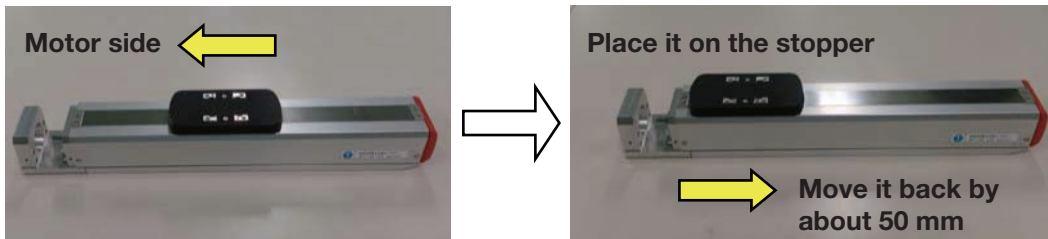
8-6 Method for supplying grease

[KRF3]

The following figure shows a KRF representative greasing method for your reference.

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.



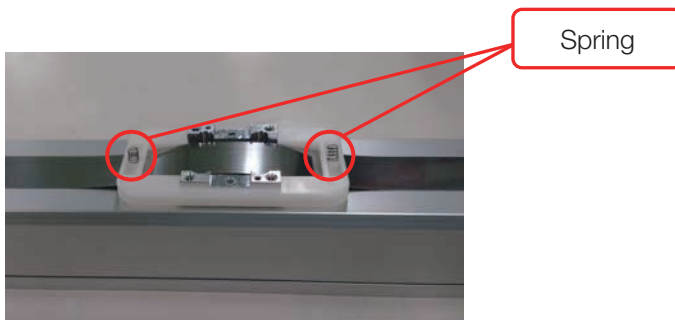
2. Remove the table cover.



Model number	Bolt size
KRF3	M2.6 × 4L

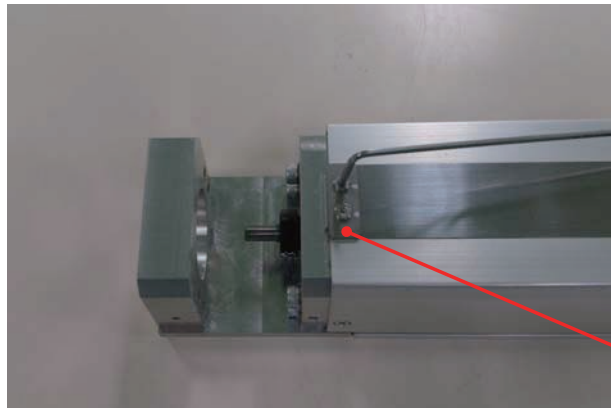
Thin head FH type head screws

3. Remove the springs (2 pcs.).



* Be careful not to lose the springs.

4. Remove the strip seal holder (on the motor side).



Strip seal holder

Model number	Bolt size
KRF3	M2.6 × 4L

Thin head FH type head screws

5. Remove the strip seal holder (on the reverse motor side).



Strip seal holder

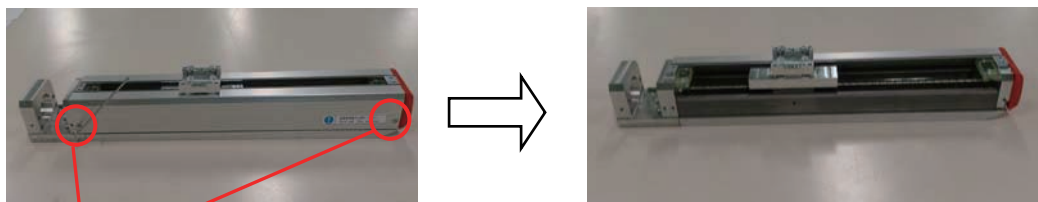
Model number	Bolt size
KRF3	M2.6 × 4L

Thin head FH type head screws

- Remove the strip seal and the strip seal guide from the main unit.



- Remove the side cover.



Mounting bolt

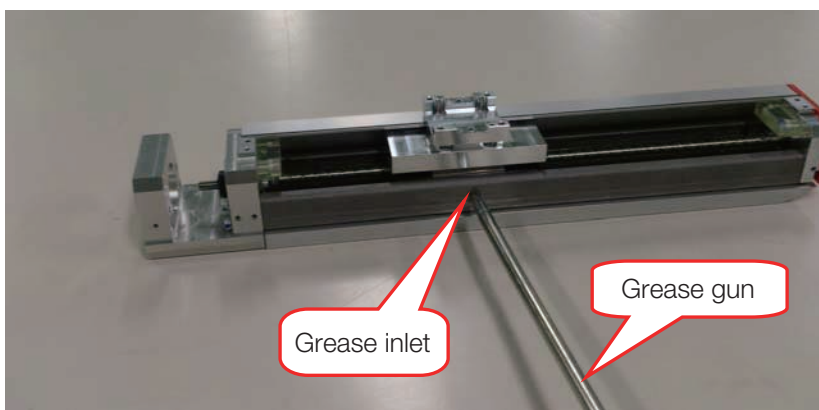
Model number	Bolt size
KRF3	M2.6 × 4L

Thin head FH type head screws

* Remove them on the both side.

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

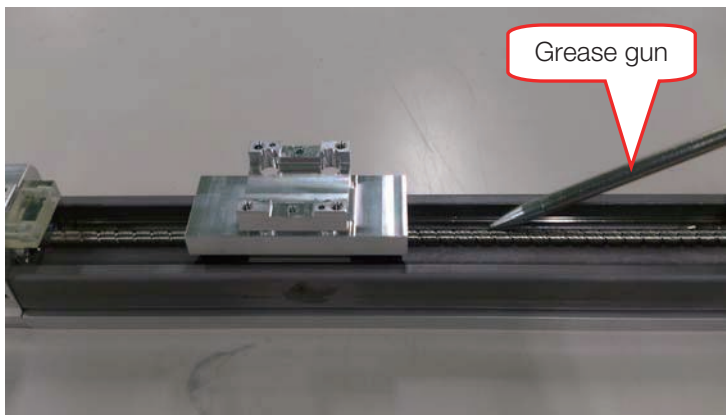
Lubrication of LM Guide



- (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 ³]	Number of grease gun strokes	Amount of application [cm ³]/100 mm	Number of grease gun strokes / 100 mm
KRF3	0.2	0.33	0.07	0.12

Table 6 Amount of greasing

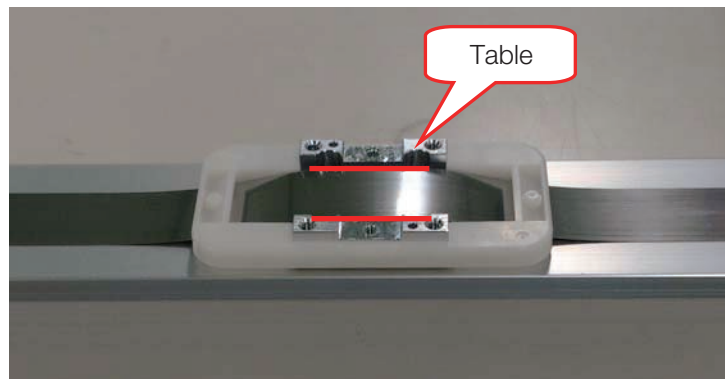
9. Put the side covers back in place.



Model number	Bolt size	Tightening torque [N·cm]
KRF3	M2.6 × 4L	30

Thin head FH type head screws

10. Place the strip seal guide and strip seal on the table.



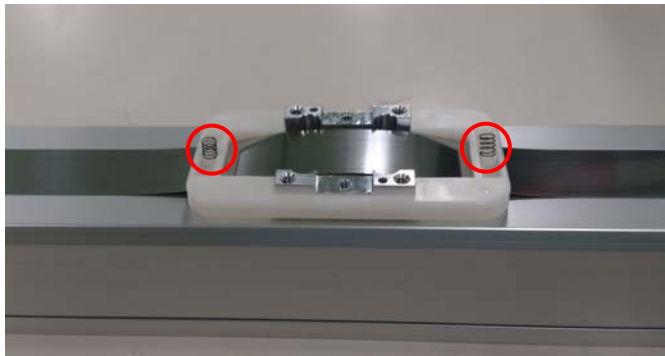
* Mount the strip seal holder, adjusting the table and strip seal so that they do not touch over the entire stroke, and so that the strip seal does not lift.



Model number	Bolt size	Tightening torque [N·cm]
KRF3	M2.6 × 4L	30

Thin head FH type head screws

11. Attach the springs (2 pcs.).



12. Mount the table cover.

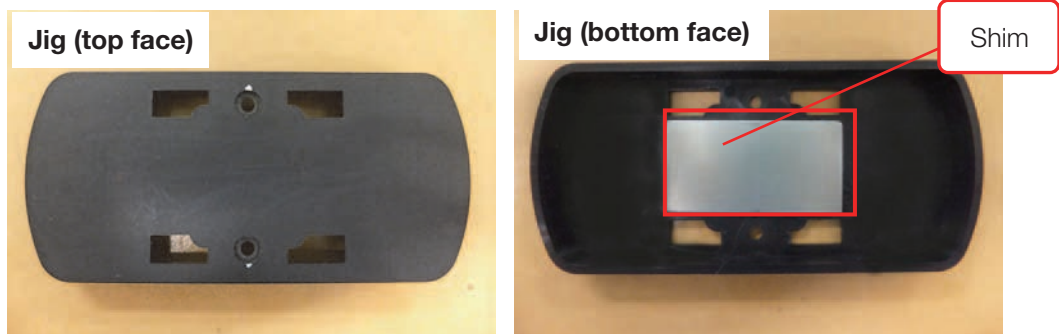


Model number	Bolt size	Tightening torque [N-cm]
KRF3	M2.6 × 4L	9

Thin head FH type head screws

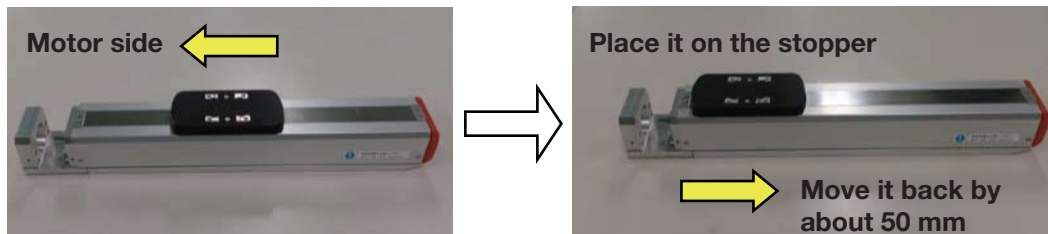
[KRF4, 5, 6]

The following figure shows a KRF 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.



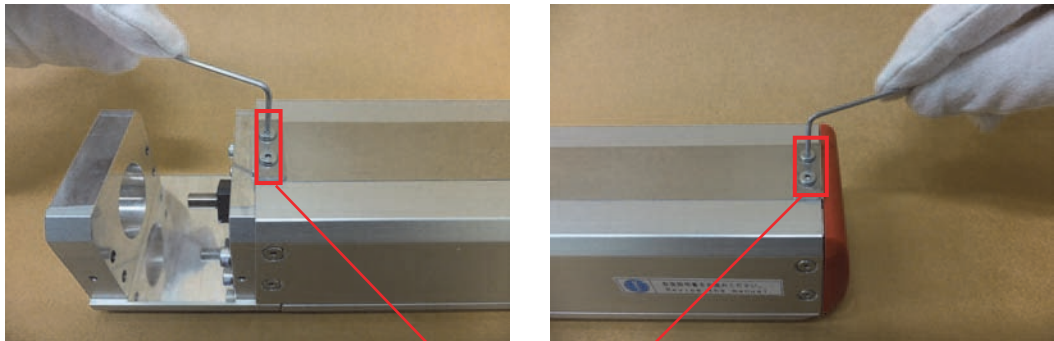
2. Remove the table cover.



Model number	Bolt size
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M3 × 5L

Thin head FH type head screws

3. Remove the strip seal holder.

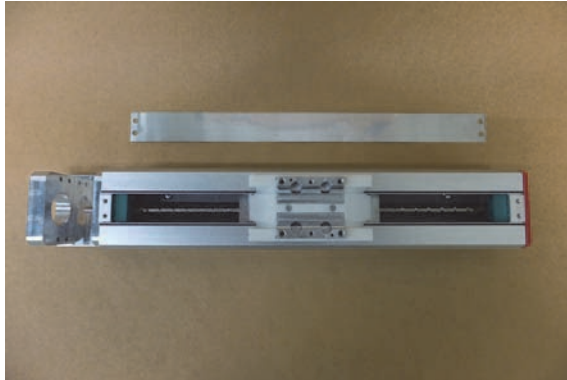


Strip seal holder

Model number	Bolt size
KRF3	M2.6 × 4L
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M3 × 5L

Thin head FH type head screws

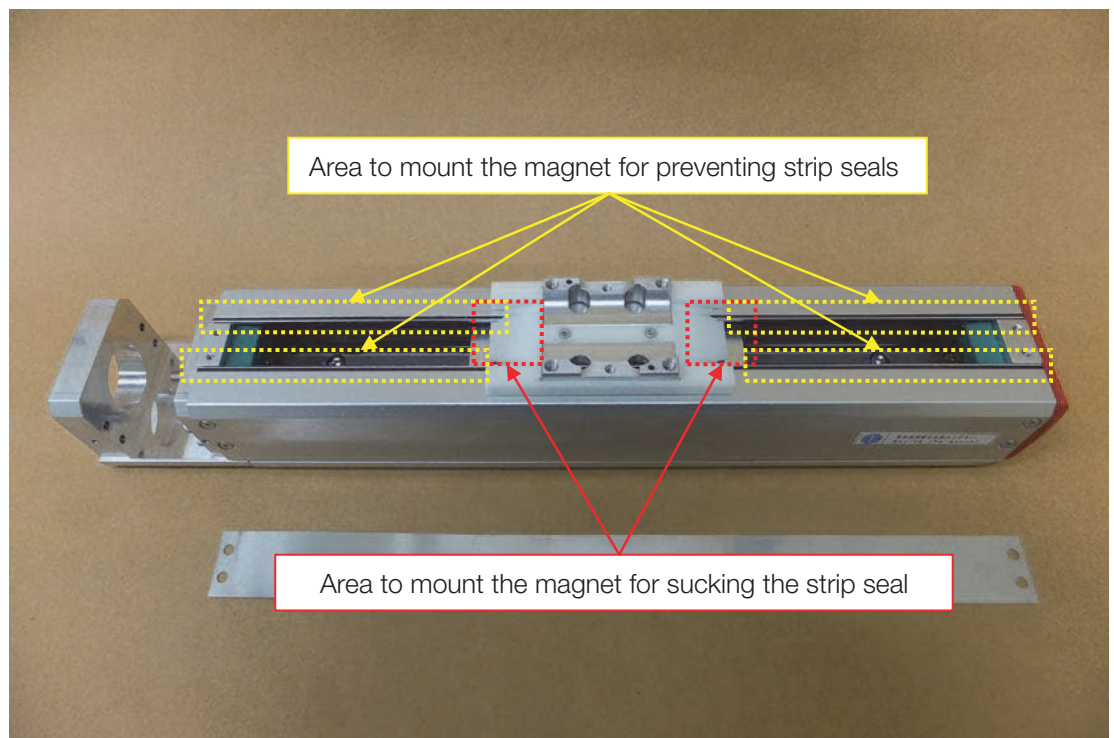
4. Remove the strip seal from the main unit.



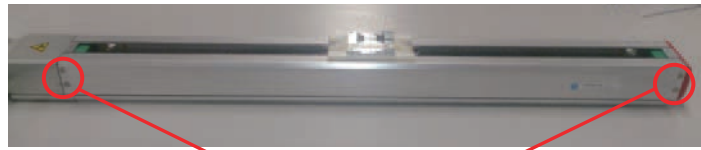
Precautions

The KRF 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.

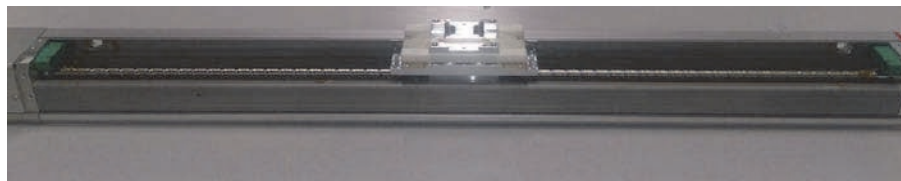
It also has a belt-like magnet mounted to prevent the strip seal from lifting.



5. Remove the side cover.



Mounting bolt



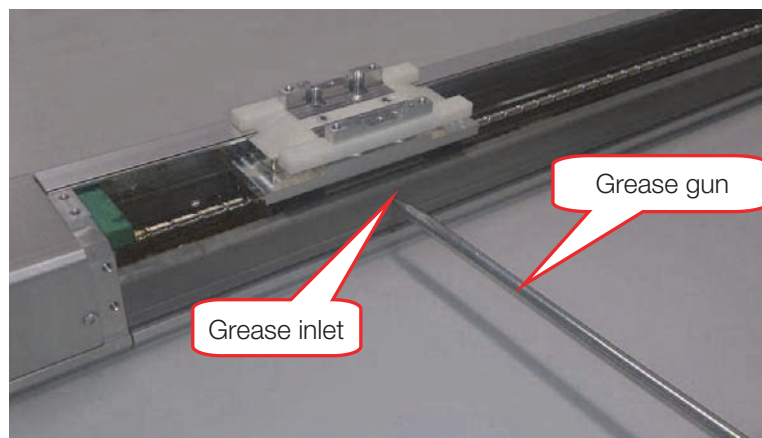
Model number	Bolt size
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M2.6 × 5L

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



- (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 7.

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



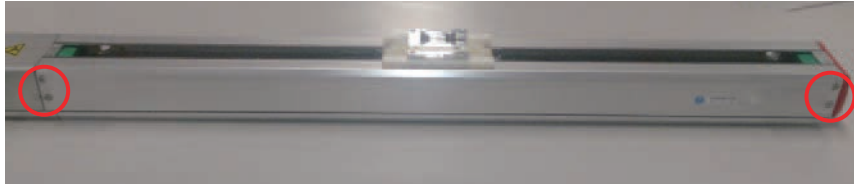
- (1) Mount the P type nozzle to the grease gun.
- (2) Supply grease directly to the raceway of the ball screw.
- (3) Stroke the table to apply the grease.
- (4) Repeat this process several times until the amount of grease reaches the specified level. For the amount of grease, see Table 7.

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 ³]	Grease gun Number of strokes	Amount of application [cm ³]/100 mm	Grease gun Number of strokes/ 100 mm
KRF4	0.4	0.67	0.30	0.49
KRF5	1	1.67	0.16	0.27
KRF6	1.34	2.23	0.93	1.54

Table 7 Amount of greasing

7. Put the side covers back in place.



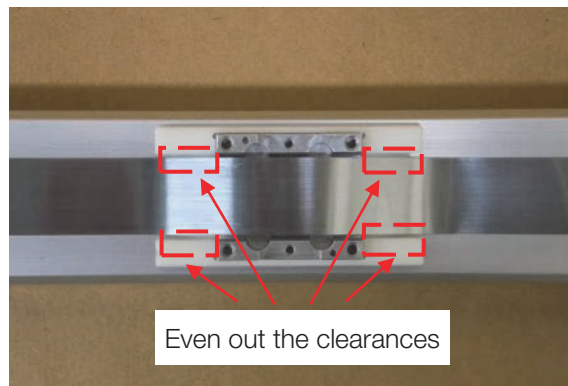
Model number	Bolt size	Tightening torque [N·cm]
KRF4	M2.6 × 4L	30
KRF5	M3 × 5L	76
KRF6	M2.6 × 5L	30

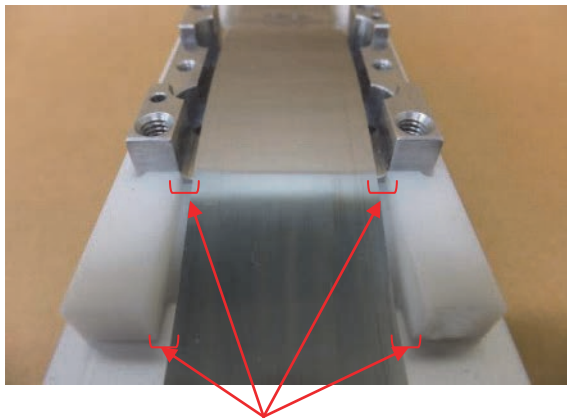
Thin head FH type head screws

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.





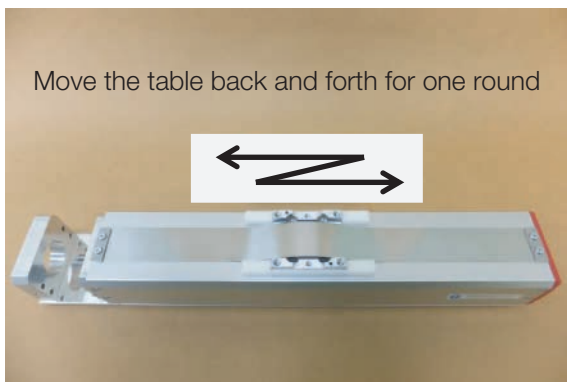
Even out the clearance

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

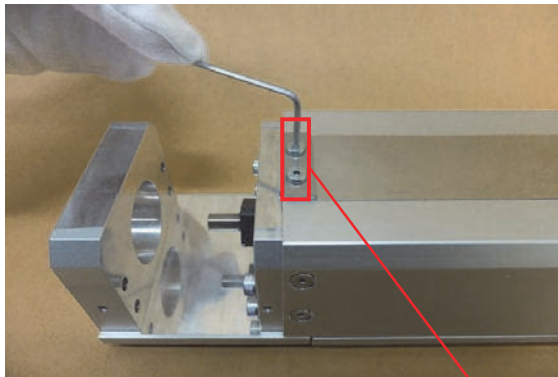


Strip seal holder

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.



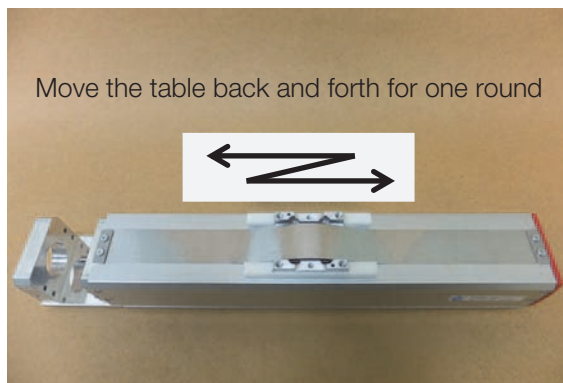
12. Tighten it until the strip seal holder on the housing A side will not slide.



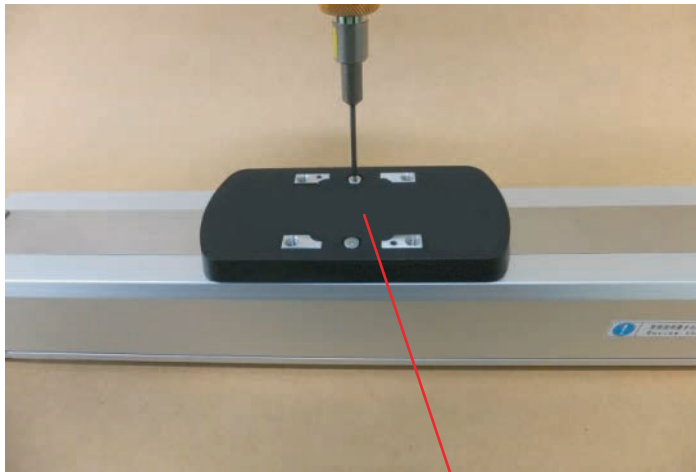
Strip seal holder

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.



14. Mount the strip seal adjustment jig.

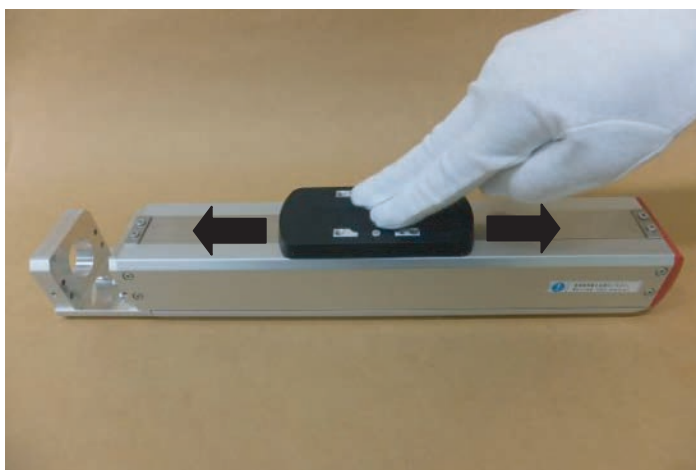


Strip seal adjustment jig

Model number	Bolt size	Tightening torque [N·cm]
KRF4	M2.6 × 4L	9
KRF5	M3 × 5L	17
KRF6	M3 × 5L	17

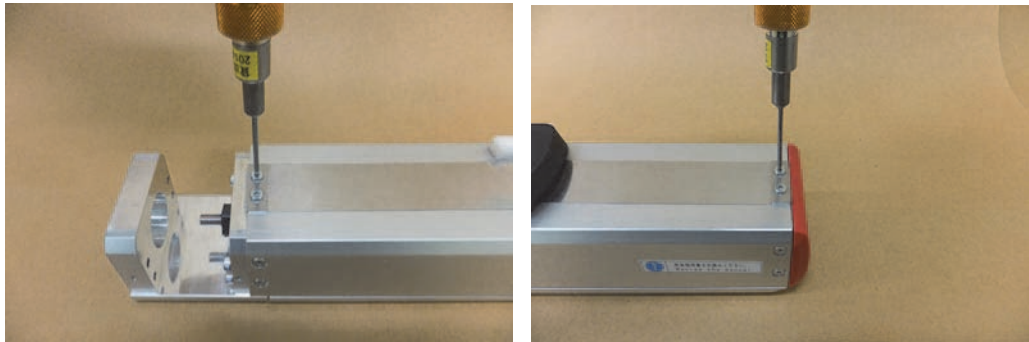
Thin head FH type head screws

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

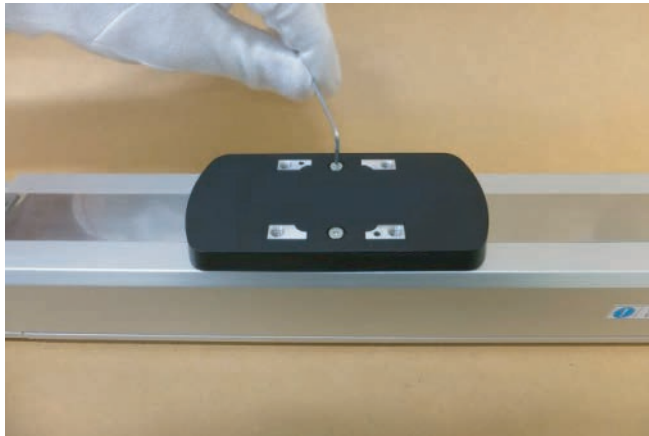


16. Fully fasten the strip seal.

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



17. Remove the strip seal adjustment jig.



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.

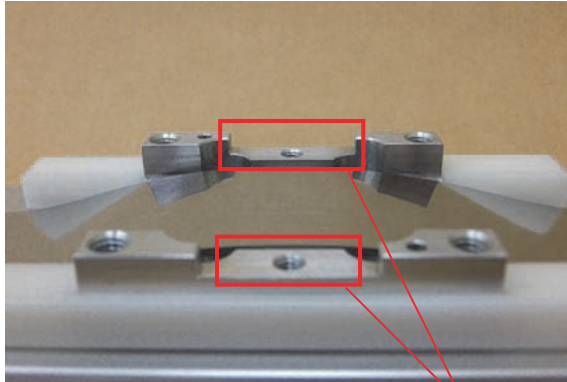
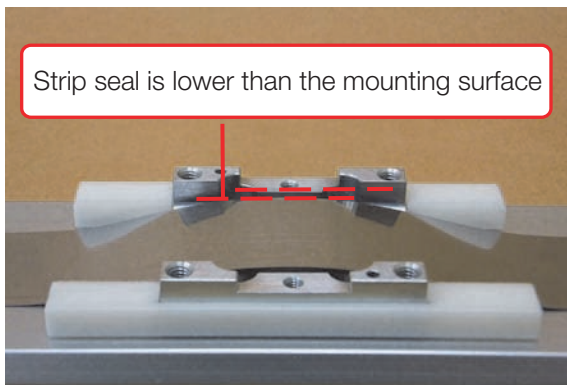
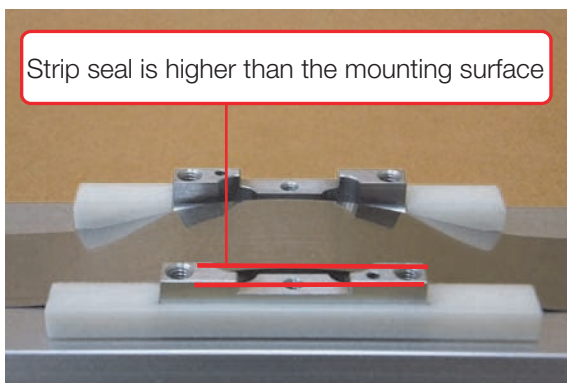


Table cover mounting surface



Strip seal is lower than the mounting surface

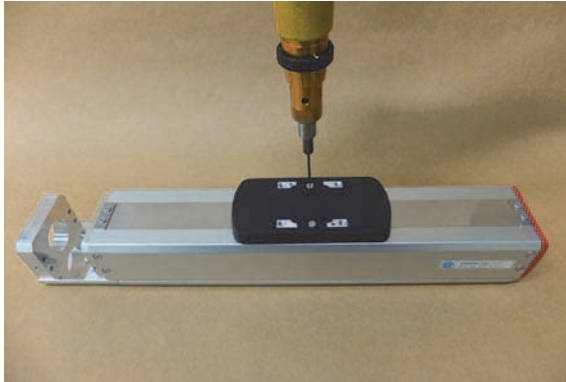
Example of appropriate mounting state



Strip seal is higher than the mounting surface

Example of inappropriate mounting state

19. Mount the table cover.



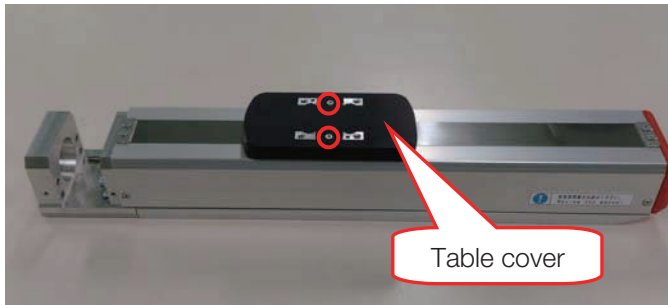
Model number	Bolt size	Tightening torque [N·cm]
KRF4	M2.6 × 4L	9
KRF5	M3 × 5L	17
KRF6	M3 × 5L	17

Thin head FH type head screws

8-7 How to replace the strip seal

[KRF3]

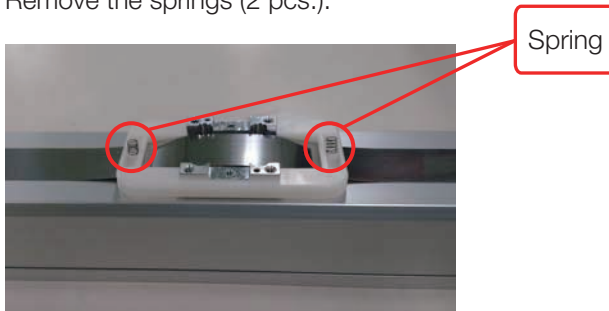
1. Remove the table cover.



Model number	Bolt size
KRF3	M2.6 × 4L

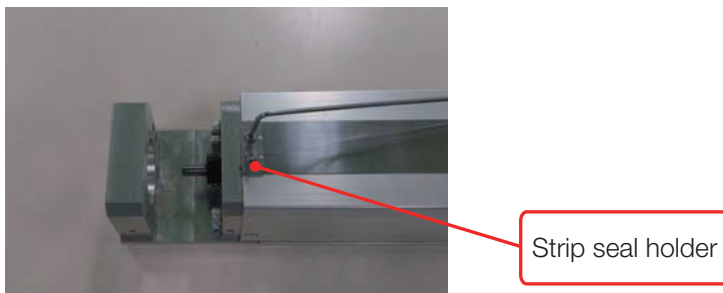
Thin head FH type head screws

2. Remove the springs (2 pcs.).



* Be careful not to lose the springs.

3. Remove the strip seal holder (on the motor side).



Model number	Bolt size
KRF3	M2.6 × 4L

Thin head FH type head screws

4. Remove the strip seal holder (on the reverse motor side).



Strip seal holder

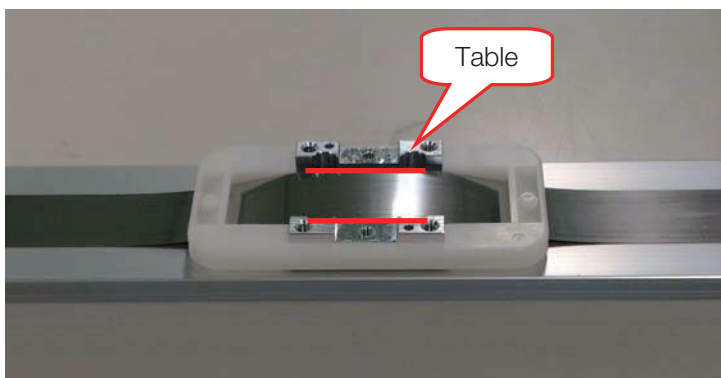
Model number	Bolt size
KRF3	M2.6 × 4L

Thin head FH type head screws

5. Remove the strip seal and the strip seal guide from the main unit, and replace it with the new one.



6. Place the strip seal guide and strip seal on the table.



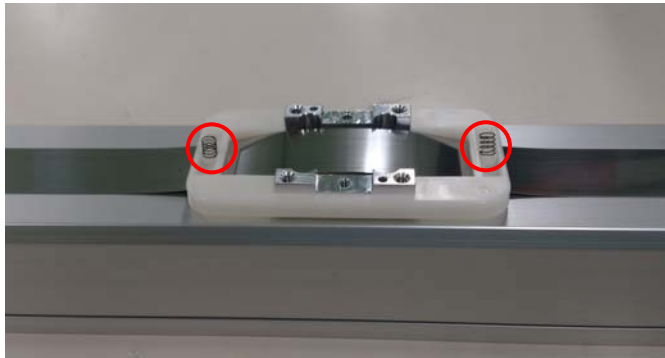
* Mount the strip seal holder, adjusting the table and strip seal so that they do not touch over the entire stroke, and so that the strip seal does not lift.



Model number	Bolt size	Tightening torque [N·cm]
KRF3	M2.6 × 4L	30

Thin head FH type head screws

7. Attach the springs (2 pcs.).



8. Mount the table cover.

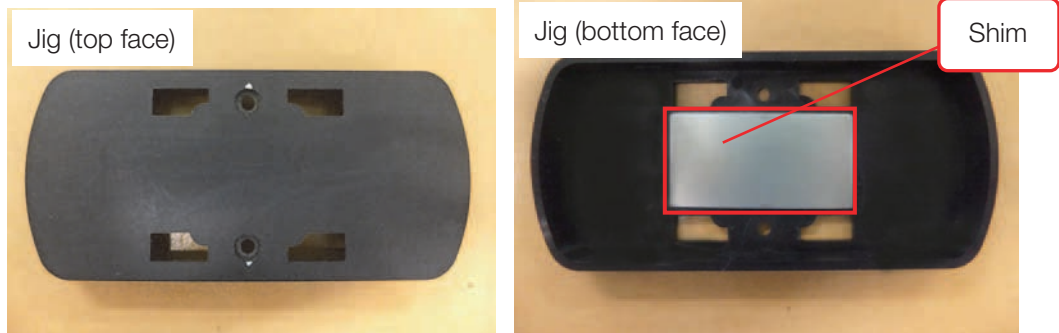


Model number	Bolt size	Tightening torque [N·cm]
KRF3	M2.6 × 4L	9

Thin head FH type head screws

[KRF4, 5, 6]

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.



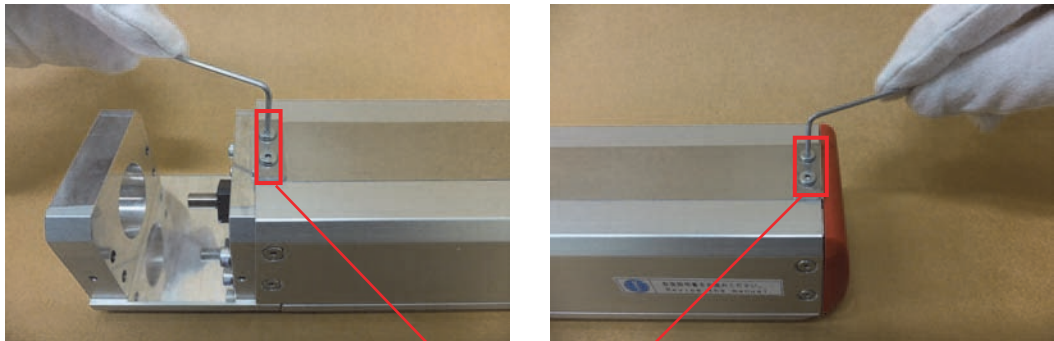
1. Remove the table cover.



Model number	Bolt size
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M3 × 5L

Thin head FH type head screws

2. Remove the strip seal holder.



Strip seal holder

Model number	Bolt size
KRF4	M2.6 × 4L
KRF5	M3 × 5L
KRF6	M3 × 5L

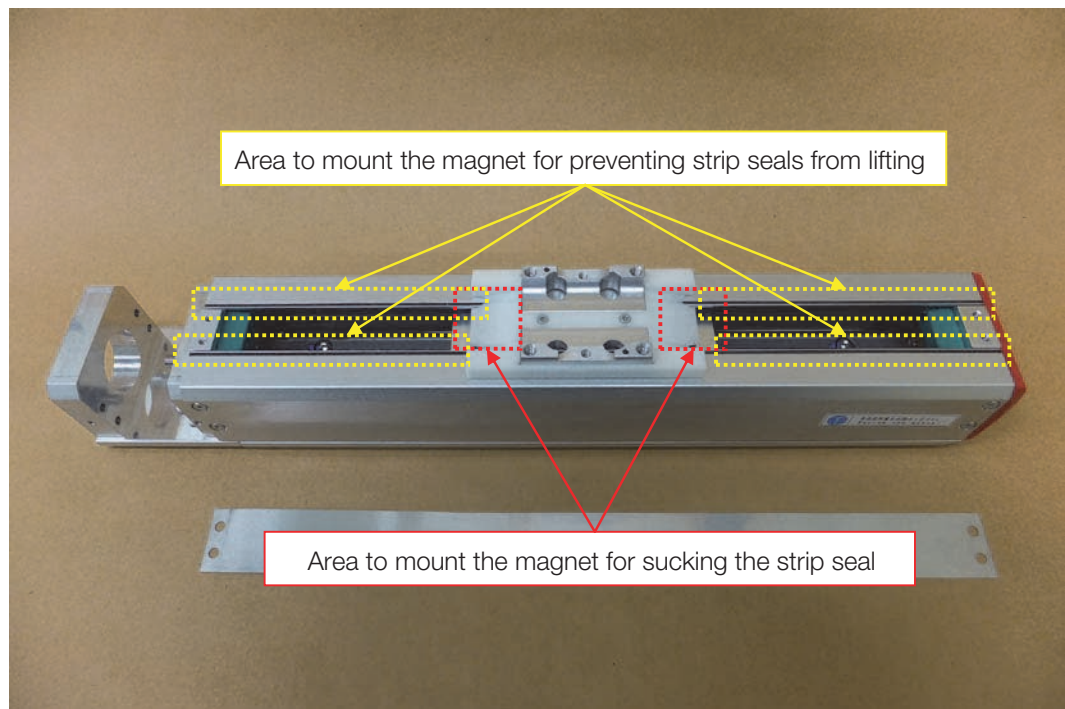
Thin head FH type head screws

3. Remove the strip seal from the main unit.

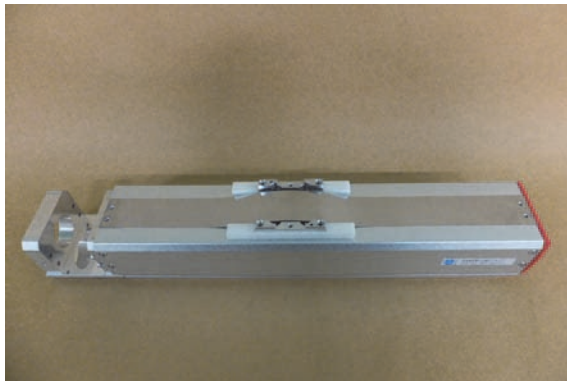


Precautions

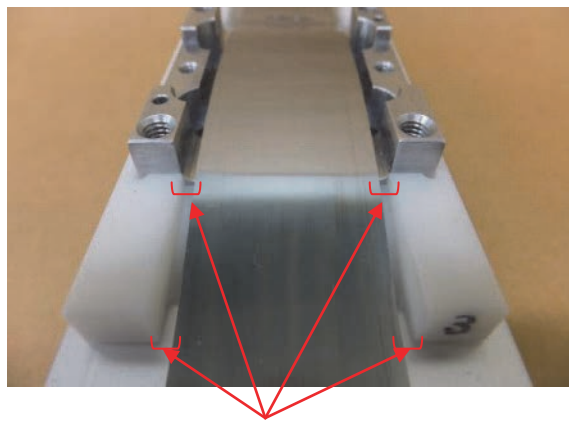
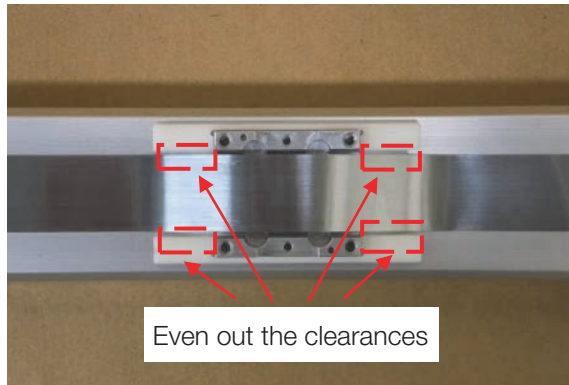
The KRF table has magnets with strong magnetic fields attached at the two areas for sucking up the strip seal. Be careful handling it because magnetic bodies may stick to the magnets. It also has a belt-like magnet mounted to prevent the strip seal from lifting.



4. Temporary mount a new strip seal and adjust the strip seal position.



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



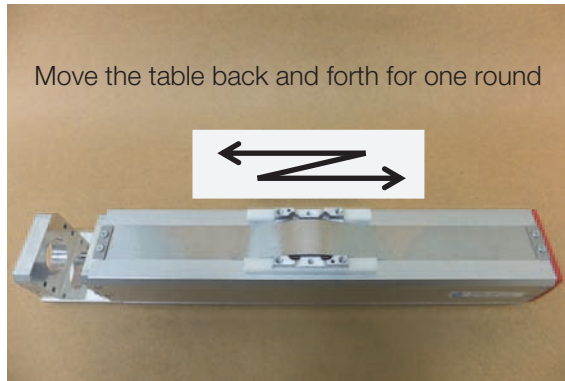
6. Tighten it until the strip seal holder stays in place. Loosen the thin head screw by one turn.



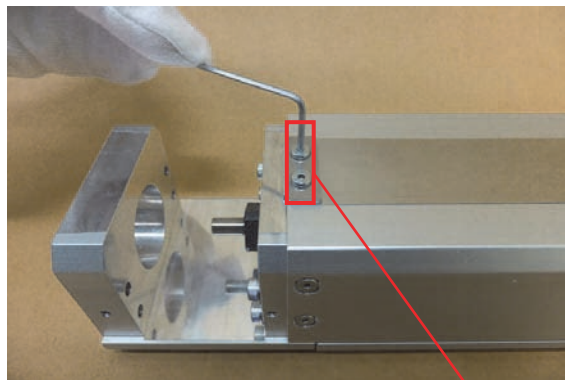
Strip seal holder

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



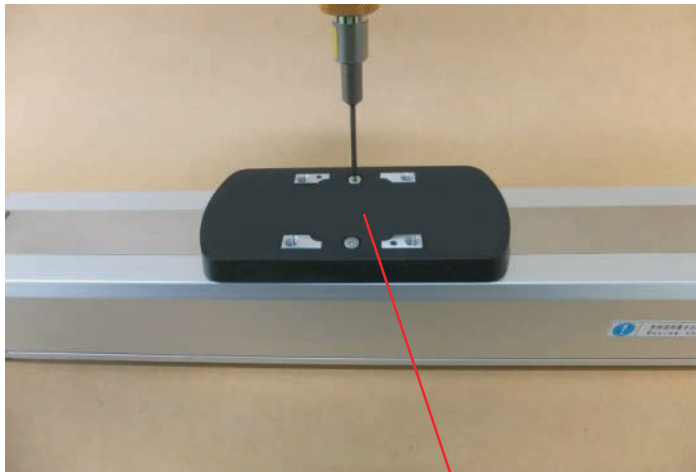
Strip seal holder

9. 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.



10. Mount the strip seal adjustment jig.

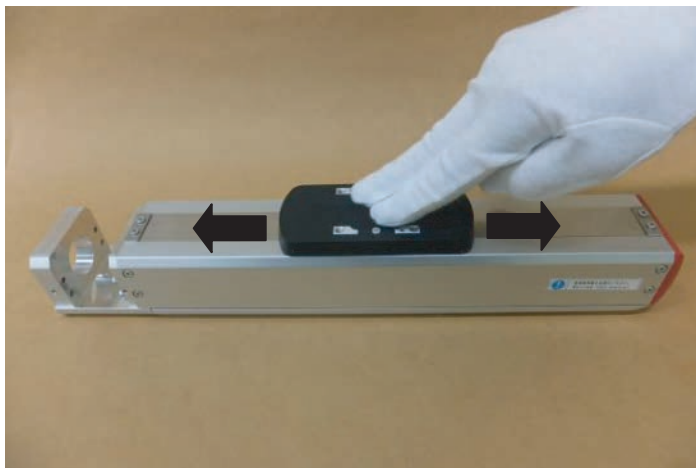


Strip seal adjustment jig

Model number	Bolt size	Tightening torque [N·cm]
KRF4	M2.6 × 4L	9
KRF5	M3 × 5L	17
KRF6	M3 × 5L	17

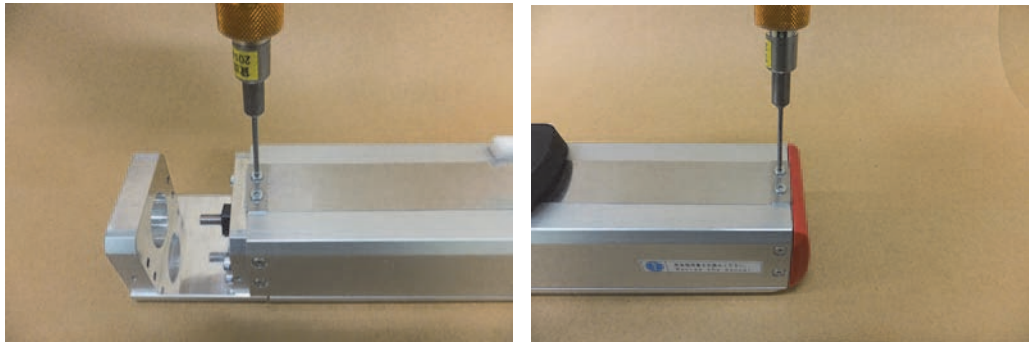
Thin head FH type head screws

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

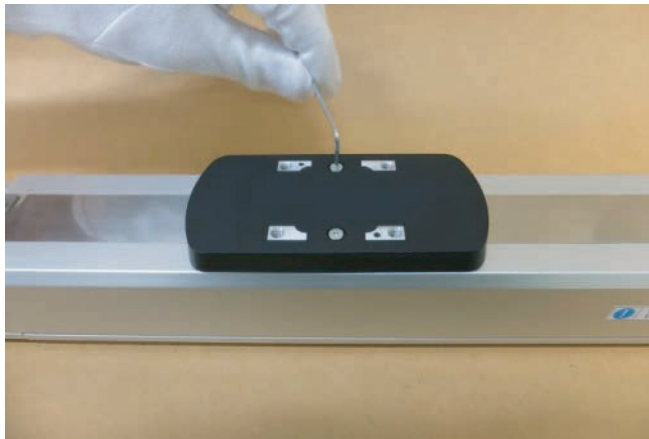


12. Fully fasten the strip seal.

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



13. Remove the strip seal adjustment jig.



14. 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.

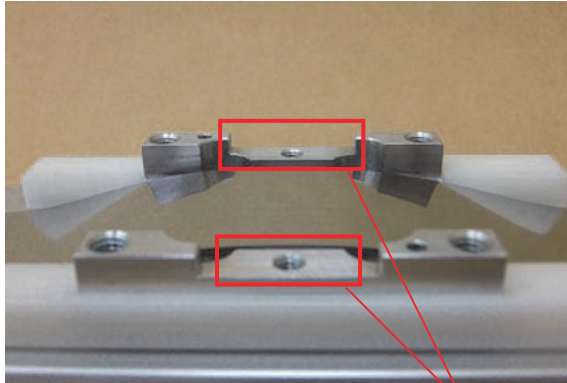
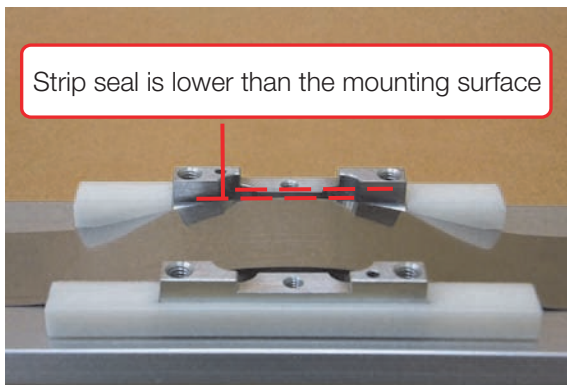
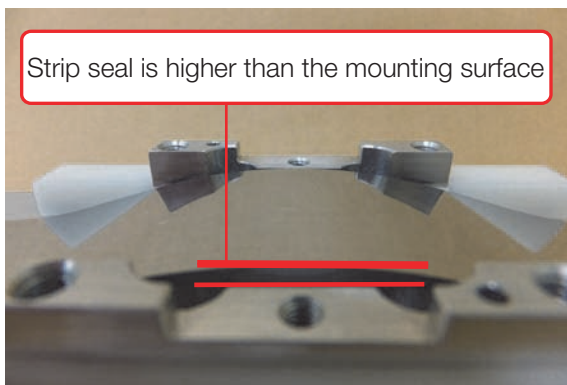


Table cover mounting surface



Strip seal is lower than the mounting surface

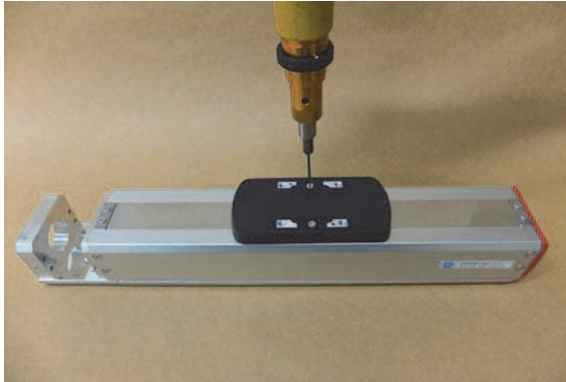
Example of appropriate mounting state



Strip seal is higher than the mounting surface

Example of inappropriate mounting state

15. Mount the table cover.



Model number	Bolt size	Tightening torque [N·cm]
KRF4	M2.6 × 4L	9
KRF5	M3 × 5L	17
KRF6	M3 × 5L	17

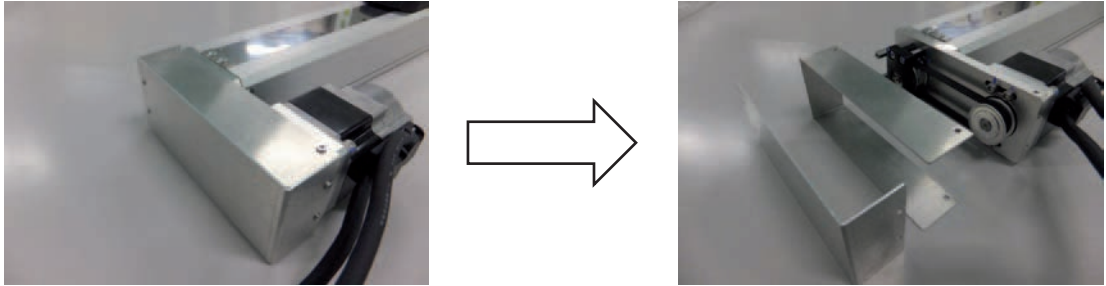
Thin head FH type head screws

8-8 Belt replacement method for motor return type

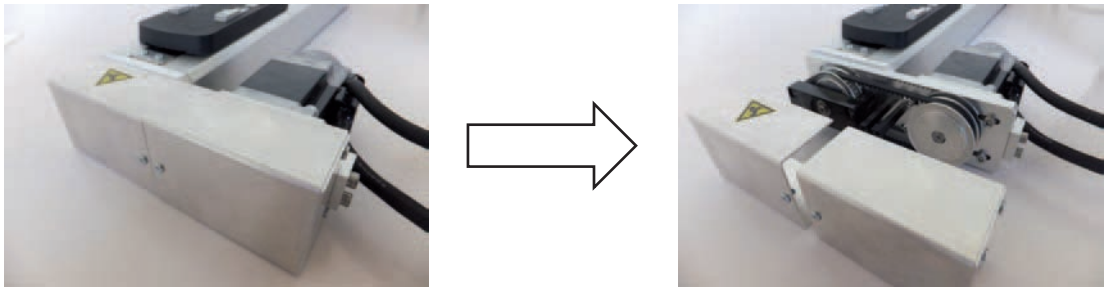
The following figure shows the belt replacement method for KRF for your reference.

1. Remove the mounting bolt, and remove the return cover.

OKRF4R/5R



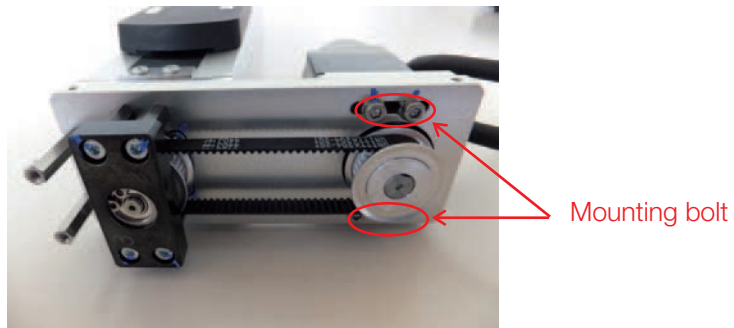
OKRF6R



Model number	Bolt size
KRF4R	M2.6 × 4L
KRF5R	M2.6 × 4L
KRF6R	M3 × 5L

Bolt type: Thin head (FH type) head screws

2. Loosen the mounting bolt of the motor mounting plate.



Model number	Intermediate flange type	Bolt size
KRF4R	WM, WN, WP, WQ	M3 × 6L
KRF5R	WM, WN, WP, WQ	M3 × 6L
KRF6R	WP, WQ	M3 × 6L

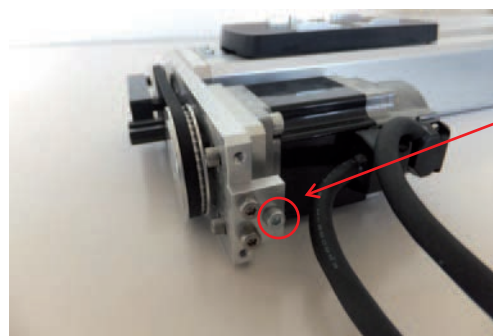
Bolt type: Hexagonal-socket-head type bolt

- Remove the housing C to remove the old timing belt.
For KRF6R, loosen the bolt for adjusting the tension of tension plate (hexagon socket head cap screw: M3) and remove the timing belt. Belt to be used……(Gates Unitta Asia)

Housing C



OKRF6R

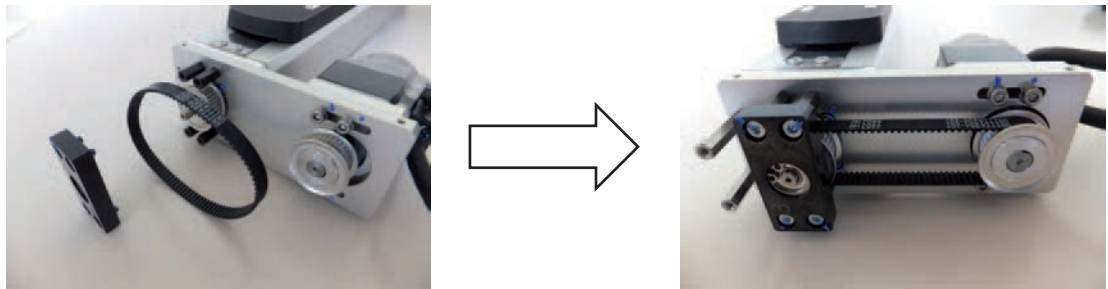


Model number	Bolt used
KRF4R	M3 × 8
KRF5R	M3 × 8
KRF6R	M3 × 10

Bolt type: Hexagonal-socket-head type bolt

Model number	Belt manufacturer	Belt model
KRF4R	Gates Unitta Asia Company	184-2GT-6
KRF5R	Gates Unitta Asia Company	204-2GT-6
KRF6R	Gates Unitta Asia Company	264-3GT-4

4. Replace with the new timing belt, and mount the housing C.



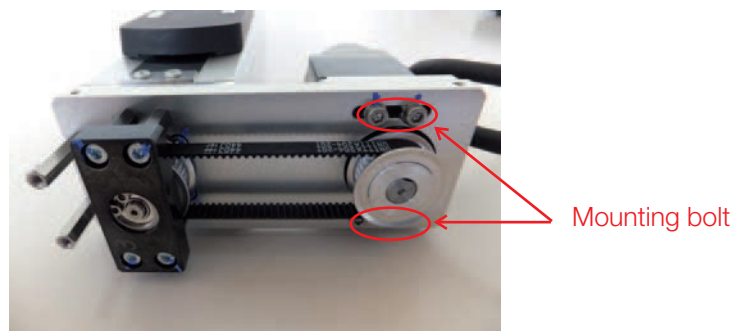
Model number	Bolt used	Tightening torque [N·cm]
KRF4R	M3×8	162
KRF5R	M3×8	162
KRF6R	M3×10	162

Bolt type: Hexagonal-socket-head type bolt

5. Adjust the belt tension.

* For the method to adjust the belt, see "Motor mounting method".

6. Tighten the mounting bolt of the motor mounting plate. After tightening, measure the tension again.

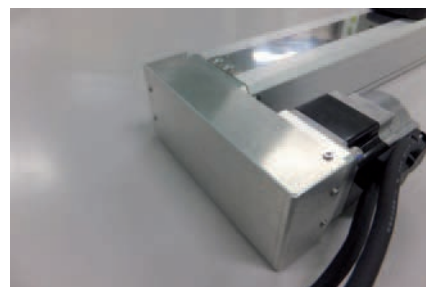
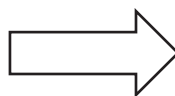
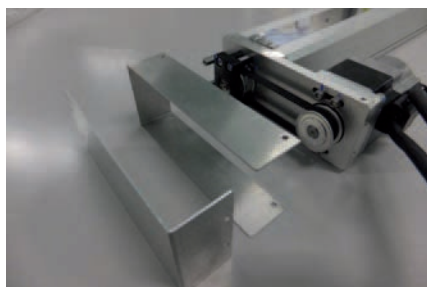


Model number	Intermediate flange type	Bolt size	Tightening torque [N·cm]
KRF4R	WM, WN, WP, WQ	M3×6L	125
KRF5R	WM, WN, WP, WQ	M3×6L	125
KRF6R	WP, WQ	M3×6L	125

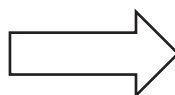
Bolt type: Hexagonal-socket-head type bolt

7. Mount the pulley cover.

○KRF4R/5R



○KRF6R



Model number	Bolt size	Tightening torque [N·cm]	Number of bolts
KRF4R	M2.6 × 4L	30	8
KRF5R	M2.6 × 4L	30	8
KRF6R	M3 × 5L	76	6

Bolt type: Thin head (FH type) head screws

8-9 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.

8-10 Usage conditions (range)

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

8-11 Warranty scope

8-11-1 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**)

8-11-2 Consumables and spare parts

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

8-11-3 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 8-10 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 8-9, 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.

8-11-4 Repair period

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

8-12 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.

8-13 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.

9-1 Table weight

Model number	Inner block weight [kg]	Table weight [kg]	Total weight [kg]
KRF3	0.04	0.05	0.08
KRF4	0.08	0.07	0.14
KRF5	0.20	0.12	0.31
KRF6	0.29	0.17	0.46

Table 8 Table weight

9-2 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]
KRF3	0.154
KRF4	0.355
KRF5	0.671
KRF6	1.035

Table 9 Permissible input torque

9-3 Static permissible moment

- Static permissible moment is shown in Table 10. 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
KRF3	12.1	12.1	32.3
KRF4	31	21.2	52.7
KRF5	84	48.4	105.8
KRF6	166	103.8	179.5

Table 10 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.

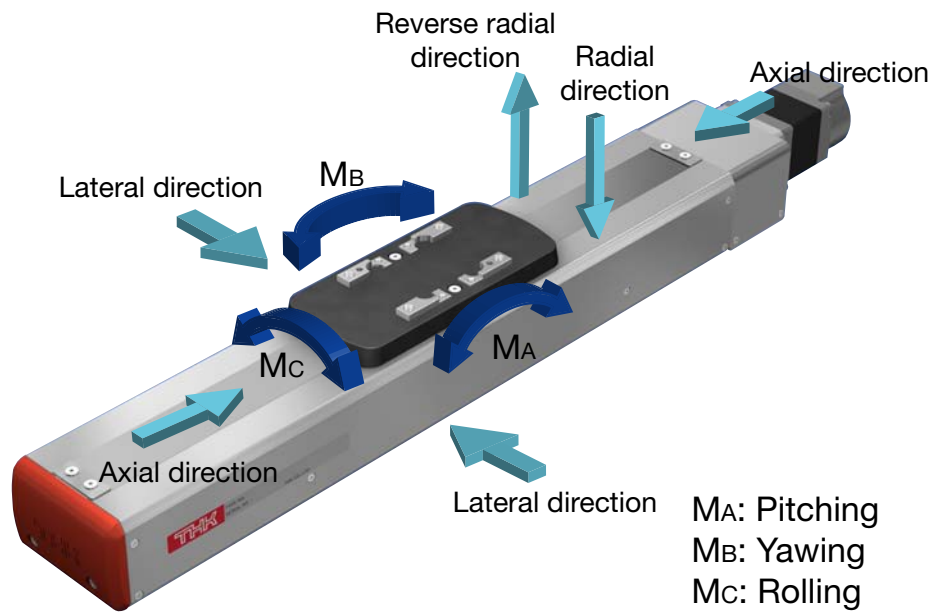


Fig. 6 Imposed load ratio and moment direction

9-4 Static permissible load

- Static permissible load is shown in Table 11. 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		KRF3	KRF4	KRF5	KRF6
Static permissible load [N]	Axial direction	290	955	1465	2023
	Radial direction	3450	6300	12150	20200
	Reverse radial direction	3450	4048	6472	12380
	Lateral direction	1095	1095	1899	3095

Table 11 Static permissible load

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

9-5 Permissible rotational speed

Model number	Lead [mm]	Permissible rotation speed at each stroke [min ⁻¹]*							
		Stroke							
		to 300	350 to 500	550	600	650	700	750	800
KRF3	6	3000	-	-	-	-	-	-	-
KRF4	6	3000	-	-	-	-	-	-	-
KRF5	6	3000	2500	-	-	-	-	-	-
	10	3000	2400	-	-	-	-	-	-
KRF6	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⁻¹), or by the permissible rotational speed of the ball screw.

Table 12 Permissible rotation speed

9-6 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 ² /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

9-7 Introduction of the grease gun unit

Grease Gun Unit MG70



The grease gun unit MG70 is capable of supplying grease for KRF 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, and Fig. 8 shows its appearance.

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

Table 13 Specifications of the grease gun

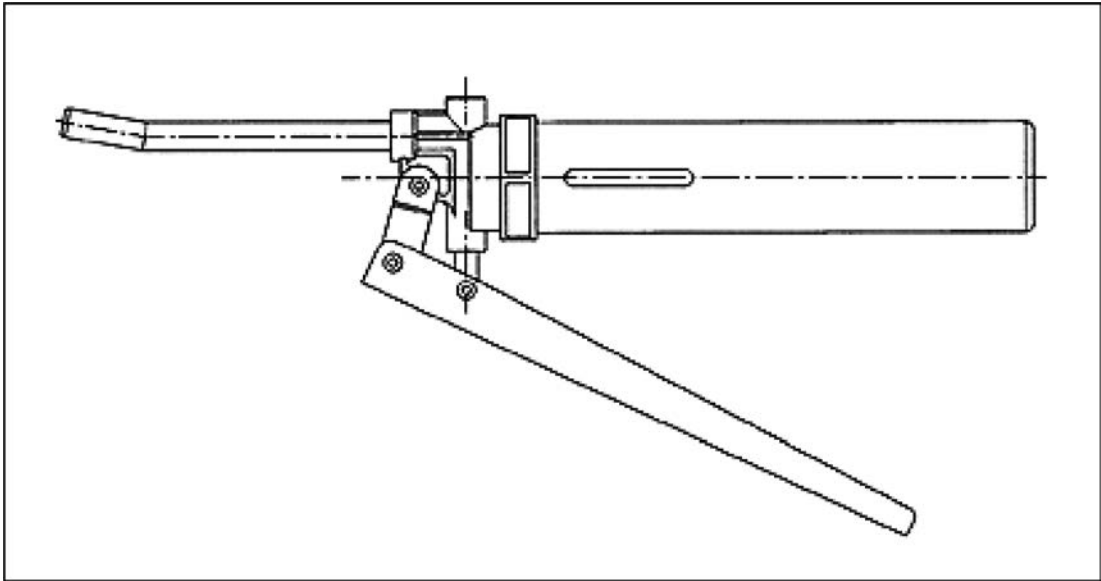


Fig. 8 Appearance of the grease gun

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.

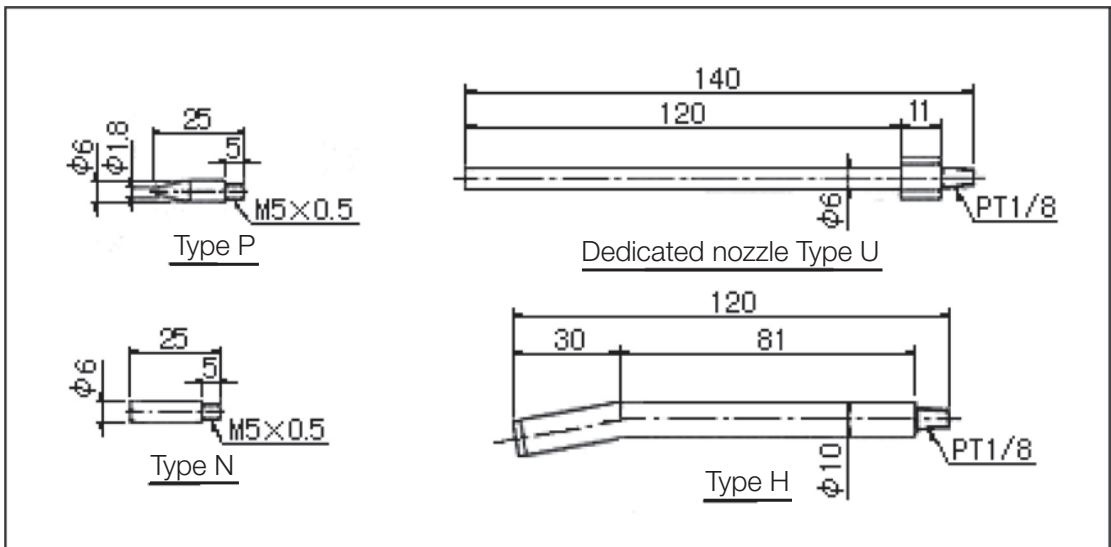


Fig. 9 Shapes of the nozzle and attachment for the grease gun

Appendix

Revision history

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

Date of issue	Instruction manual No.	Details
November 2014	No.2040-2(0)E	First edition



THK Electric Actuator Compact Series

KRF

INSTRUCTION MANUAL