



THK Electrical Actuator Compact Series

SKR/KR

INSTRUCTION MANUAL

No.2060-2(0) E

Table of Contents

1. Introduction	1-1
1-1 Acknowledgment	1-1
1-2 About this manual	1-1
1-3 How to use this product	1-2
1-4 About product support	1-2
1-5 About related instruction manuals	1-2
1-6 Product and company information	1-3
2. Safety precautions	2-1
2-1 Warning indications on safety	2-1
2-2 Safety precautions	2-1
2-3 Checking warning labels	2-4
3. Specifications	3-1
3-1 Basic specification	3-1
4. Structure and Model Numbers	4-1
4-1 Structure and part names	4-1
4-2 Model configuration	4-2
5. Storage and Transportation	5-1
5-1 Precautions to be observed for safe use	5-1
5-2 Precautions to be observed for prevention of product fault or fracture	5-2
6. Installation and Operation	6-1
6-1 Precautions to be observed for safe use	6-1
6-2 Precautions to be observed for prevention of product fault or fracture	6-2
6-3 Other precautions	6-4
6-4 Motor mounting method	6-5
6-5 Outer rail mounting method	6-32
7. Maintenance	7-1
7-1 Precautions to be observed for safe use	7-1
7-2 Precautions to be observed for prevention of product fault or fracture	7-1
7-3 Daily inspection	7-2
7-4 Periodical inspection	7-2
7-5 Lubrication	7-3
7-6 Method for supplying grease	7-4
7-7 Belt replacement method for motor wrap type	7-5
7-8 Free warranty period	7-9

Table of Contents

7-9	Usage conditions (range)	7-9
7-10	Warranty scope	7-9
7-11	Exclusion of warranty liability	7-10
7-12	Delivery conditions	7-10

8. Appendix **8-1**

8-1	Permissible input torque	8-1
8-2	Permissible rotational speed	8-2
8-3	Introduction of the grease	8-4
8-4	Introduction of the grease gun unit	8-7

1. Introduction

1-1

Acknowledgment

Thank you for purchasing the Compact Series SKR/KR.

This product is a compact, rigid and high accuracy actuator with an inner block made with an integrated LM block and ball screw nut structure (SKR55/65 only - ball screw nut embedded into LM block) on the inner surface of the outer rail with U-shaped cross-section.

This product is designed and manufactured to be incorporated in devices with a wide range of applications including conveyance systems, implementing equipment, automated assemblers, positioning equipment and more.

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 custom products. However, the descriptions provided in the delivery specification drawings or delivery specification documents of those custom products take precedence over this manual.

* Custom products 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 driver controller to be used is one of HS-LXM, TLC or THC. Please note that driver controllers other than the above cannot be used. This excludes installations of the motor specified by the customer.

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 our Sales Division, and Customer Support, or IMT Operation Division.

For the following information, please contact THK.

- Technical support for this product

1-5 About related instruction manuals

- When you use the actuator SKR/KR, read the following instruction manuals as necessary.

When using driver controller TLC/THC

· 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

When using controller HS-LXM

- Controller series Controller HS-LXM
- Controller series Operating BOX OP-20
- Controller series Controller HS-LXM
- Controller series Software for PC LXR-PC
- Controller series Servo Amp DJB3
- Technical materials for MELSERVO-J3 SSCNET III (by Mitsubishi Electric Corporation)
compliant MR-J3-□B servo amps

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. 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, leading to injury.
- **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.
- **Motor wrap types do not have a safety device in case of timing belt breakage. Install a safety device to the equipment for greater safety.**
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****■ 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.

**■ 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 cause abnormal operation that could lead to injury. Refer to the appendix of the general catalog of electric actuators for details about rated load and permissible moments. Refer to the appendix of the general catalog of linear motion systems for details about permissible input torque. (Permissible moments are for LM guides only and do not consider fastening bolt strength.)



- **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 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 of the product.
- **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.
 - * The packaging also contains a successful inspection certificate that guarantees product quality. Please verify the contents.
 - * 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 parts, the cover or the bellows.**
Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture of the product.
- **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 of the product.





- **When carrying this product, hold the bottom face of the product. SKR55/65 and KR55/65 are heavy articles (20 kg or heavier). Two or more people should hold the product as necessary.**

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

* For more information on the weight of the product, see the general catalog of electric actuators or general catalog of linear motion systems.



■ 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 cause abnormal operation that could lead to injury.

For your reference, see the specification (→ P.3-1), 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 warning labels

This product is affixed with warning labels. Identify them when unpacking the product. Fig.1 shows the affixing position.

Applicable model number	Warning label	
	Affixed to rail surface	Affixed to housing B
KR15, KR20 KR26, KR30H KR33, KR45H KR46 SKR20, SKR26 SKR33, SKR46		
KR55 KR65 SKR55 SKR65		

Affixed to rail surface (example)	Affixed to housing B (example)	
	Without a cover	With a cover

Fig. 1 SKR/KR warning label position

4. Structure and Model Numbers

4. Structure and Model Numbers

4-1 Structure and part names

The name of each part of this product is shown in Fig. 2.

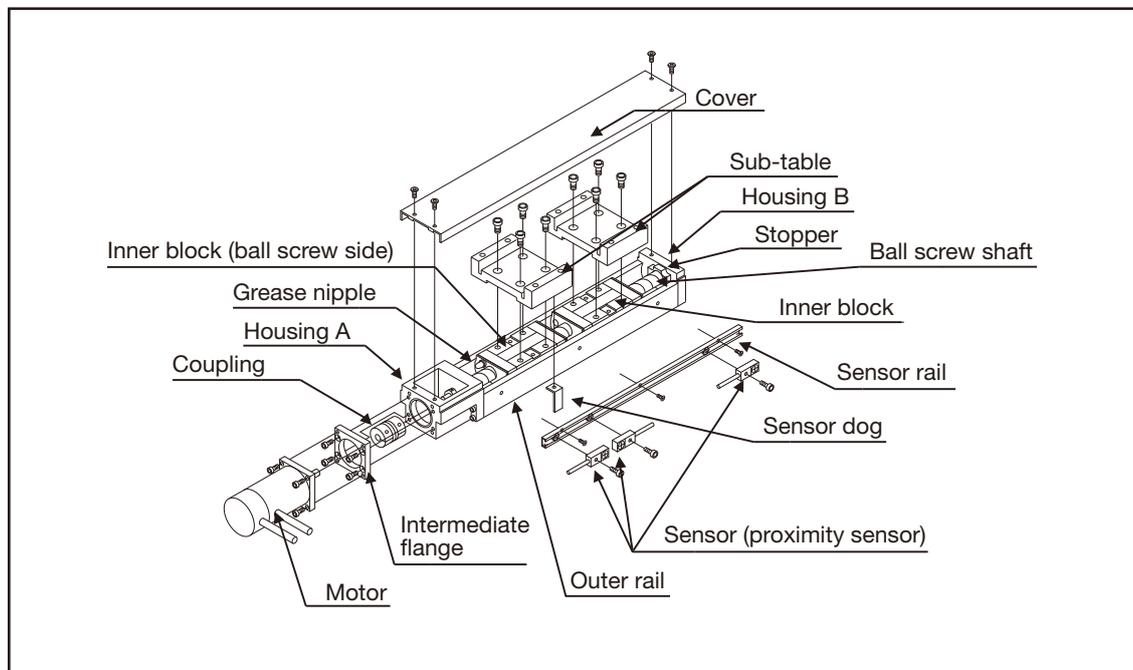


Fig. 2 The structure and part names of SKR/KR

* For details such as the dimensions and accuracy, see the delivery specification drawings or general catalog of linear motion systems.
If you have any question, contact THK.

4. Structure and Model Numbers

4-2

Model configuration

The following is an example of model number coding.

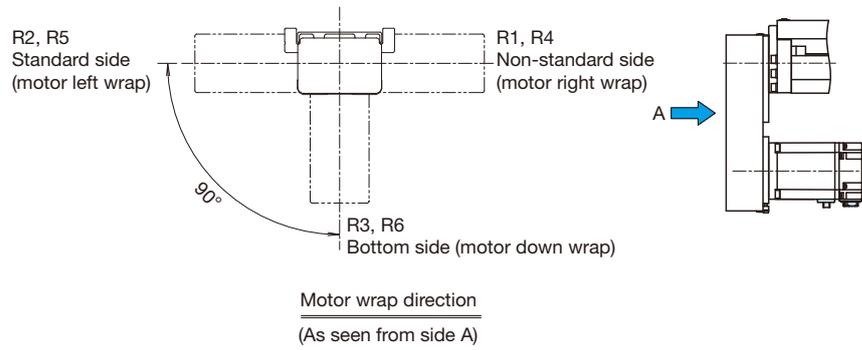
SKR46 20 A - 0490 - P H - 1 E WV - 14 M / M40B R L S02 D2 HA 2
 (1) (2) (3) (4) (5)(6) (7)(8) (9) (10) (11) (12) (13)(14) (15) (16) (17) (18)

(1) Model number	SKR20, SKR26, SKR33, SKR46, SKR55, SKR65 KR15, KR20, KR26, KR30H, KR33, KR45H, KR46, KR55, KR65
(2) Ball screw lead	1 : (SKR20, KR15, KR20) 2 : (SKR26, KR15, KR26) 6 : (SKR20, SKR26, SKR33, KR20, KR26, KR30H, KR33) 10 : (SKR33, SKR46, KR30H, KR33, KR45H, KR46) 20 : (SKR33, SKR46, SKR55, SKR65, KR45H, KR46, KR55) 25 : (SKR65, KR65) 30 : (SKR55, SKR65) 40 : (SKR55) 50 : (SKR65)
(3) Slider type	A : 1 long block B : 2 long blocks C : 1 short block D : 2 short blocks
(4) Stroke	0015 : 15mm (50 to 1490mm)
(5) Accuracy	No symbol : Normal grade H : High accuracy grade P : Precision grade
(6) With or without a motor/control device type	0 : Direct connecting (without motor) R1 : Non-standard side motor wrap* ¹ (without motor) R2 : Standard side motor wrap* ¹ (without motor) R3 : Bottom side motor wrap* ¹ (without motor) 1 : Direct connecting (Customer specified motor purchased/mounted by THK) R4 : Non-standard side motor wrap* ¹ (Customer specified motor purchased/mounted by THK) R5 : Standard side motor wrap* ¹ (Customer specified motor purchased/mounted by THK) R6 : Bottom side motor wrap* ¹ (Customer specified motor purchased/mounted by THK) H : Controller HS-LXM TL : Driver controller TLC TH : Driver controller THC
(7) Cover	0 : Without cover 1 : With cover 2 : With bellows

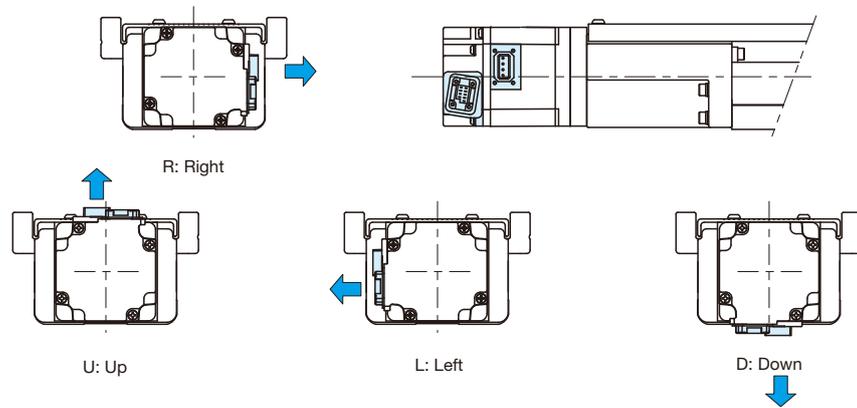
(8) Sensor	0	: Not included	
	1	: With sensor rail	
	2	: Photo sensor [3 pcs] (EE-SX671) (OMRON Co., Ltd.)	
	6	: Photo sensor [3 pcs] (EE-SX674) (OMRON Co., Ltd.)	
	7	: Proximity sensor - N.O. contact [3 pcs] (APM-D3A1-001) (Azbil Corporation)	
	B	: Proximity sensor - N.C. contact [3 pcs] (APM-D3B1-003) (Azbil Corporation)	
	E	: Proximity sensor - N.O. contact [1 pcs], N.C. contact [2 pcs] (APM-D3A1-001, APM-D3B1-003) (Azbil Corporation)	
	H	: Proximity sensor - N.O. contact [3 pcs] (GX-F12A) (Panasonic Industrial Devices SUNX Co., Ltd.)	
	L	: Proximity sensor - N.C. contact [3 pcs] (GX-F12B) (Panasonic Industrial Devices SUNX Co., Ltd.)	
	J	: Proximity sensor - N.O. contact [1 pcs], N.C. contact [2 pcs] (GX-F12A, GX-F12B) (Panasonic Industrial Devices SUNX Co., Ltd.)	
	M	: Proximity sensor (PNP output) - N.O. contact [1 pcs], N.C. contact [2 pcs] (GX-F12A-P, GX-F12B-P) (Panasonic Industrial Devices SUNX Co., Ltd.)	
	(9) Housing A/ intermediate flange	10	
		20	
30			
40			
50			
60			
A0			
A5			
A6			
AM			
AN			
AP			
AQ			
AR			
AS			
AT			
AU			
AV			
AY			
AZ			
W5			
WN			
WP			
WQ			
WV			
WY			
WZ			
(10) Motor shaft diameter	No symbol	: To be selected when directly coupled	
	05	: 5 mm	
	08	: 8 mm	
	11	: 11 mm	
	14	: 14 mm	
	16	: 16 mm	
	19	: 19 mm	
(11) Method of fixing motor shaft	No symbol	: To be selected when directly coupled	
	D	: Shaft flat (D-cut)	
	K	: Key way	
	M	: Friction bushing	

(12) Motor rated output	M05 : 50 W M10 : 100 W M20 : 200 W M40 : 450 W M75 : 750 W M05B : 50 W with brake M10B : 100 W with brake M20B : 200 W with brake M40B : 400 W with brake M75B : 750 W with brake
(13) Motor mounting method	S : Direct coupling R : Motor right wrap ^{*1} L : Motor left wrap ^{*1} D : Motor down-turn wrap ^{*1}
(14) Motor cable orientation ^{*2}	R : Right U : Up L : Left D : Down
(15) Origin system ^{*3}	S02 : Motor side (sensor right side) S12 : Motor side (sensor right side) S20 : Motor side (sensor left side) S21 : Motor side (sensor left side) S03 : Reverse motor side (sensor right side) S13 : Reverse motor side (sensor right side) S30 : Reverse motor side (sensor left side) S31 : Reverse motor side (sensor left side) D00 : Motor side (stopper) D01 : Motor side (stopper) D10 : Motor side (stopper) D11 : Motor side (stopper) R00 : Reverse motor side (stopper) R01 : Reverse motor side (stopper) R10 : Reverse motor side (stopper) R11 : Reverse motor side (stopper)
(16) Power supply voltage	No symbol D1 : 100 V D2 : 200 V
(17) Cable type and length	S3 : 3 m standard S5 : 5 m standard SA : 10 m standard F3 : 3 m for securing F5 : 5 m for securing FA : 10 m for securing H3 : 3 m high flex H5 : 5 m high flex HA : 10 m high flex
(18) Axis number	1 : 1st axis 2 : 2nd axis 3 : 3rd axis 4 : 4th axis 5 : 5th axis 6 : 6th axis 7 : 7th axis 8 : 8th axis

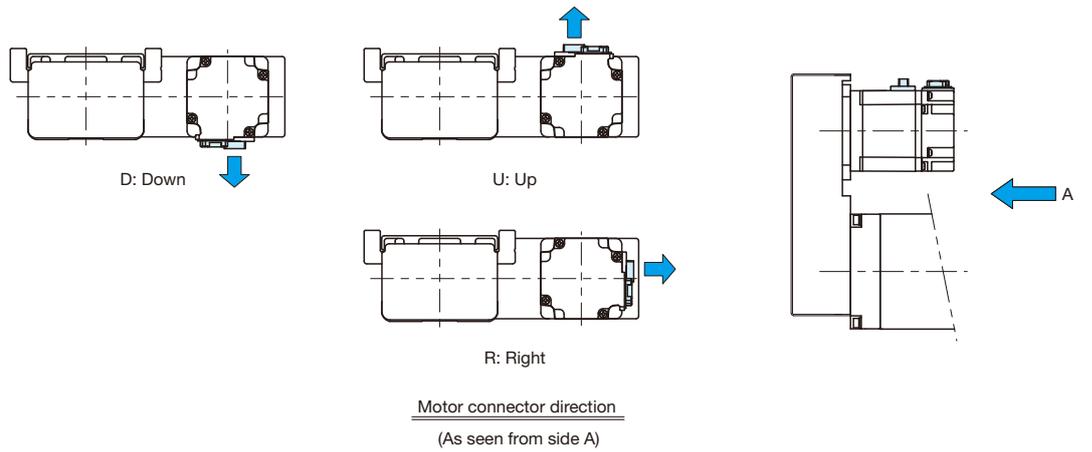
*1 Motor wrap direction



*2 Motor cable orientation
For direct motor coupling



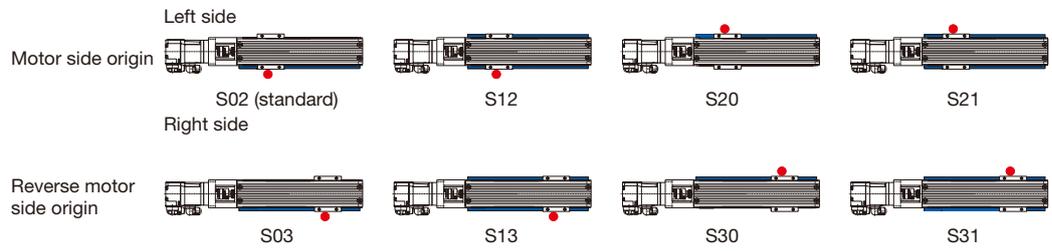
For motor wrap coupling



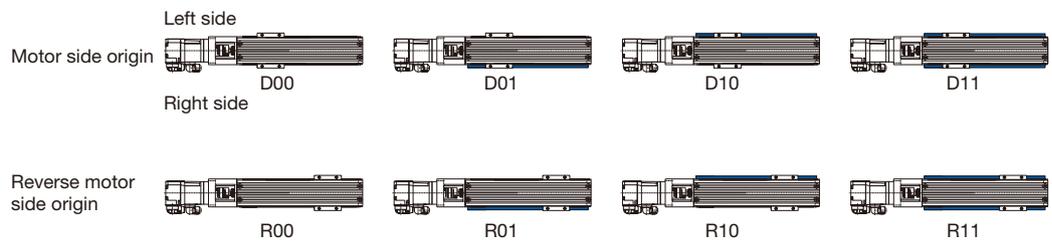
*3 Origin system

Origin sensor type

(— : sensor rail, ● : external origin sensor)



Pressed origin type



5. Storage and Transportation

5-1

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 parts, the cover or the bellows.**

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



- **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 of the product.



- **When carrying this product, hold beneath the outer rail. SKR55/65 and KR55/65 are heavy articles (20 kg or heavier). Two or more people should hold the product as necessary. Otherwise, it may cause the product to fall, leading to injury, or cause fault or fracture of the product.**

* For more information on the weight of the product, see the general catalog of electric actuators or general catalog of linear motion systems.

5. Storage and Transportation

5. Storage and Transportation

5-2

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:**
 - A place at ambient temperature within the following storage temperature range
Storage temperature: -20°C to 80°C (no freezing or condensation, SKR/KR body only)
* For SKR20/26: -10°C to 50°C (no freezing or condensation, SKR body only)
* With the packaging unopened
 - Place where the product is not exposed to water
 - Place where no flammable substance exists in the vicinity
 - Place where a vibration or shock does not transmit to the product
 - Place where liquid containing impurities such as conductive iron dust, powder such as solid abrasive, dust, oil mist, cutting oil, water content, salt content, organic solvent, or corrosive/flammable gas is not generated or does not float
 - A place where no direct sunlight nor radiation heat reaches
 - Place where no strong electric field nor strong magnetic field develops
 - Place where inspections and cleanings can be easily performed
- **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.**

6. Installation and Operation

6-1

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.

- **Motor wrap types do not have a safety device in case of timing belt breakage. Install a safety device to the equipment for greater safety.**

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 maximum speed when using the product.**

Otherwise, it may cause fault or damage, or cause abnormal operation that could lead to injury.

For your reference, see the specification (→ P.3-1), 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.

6. Installation and Operation

6-2

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.**
 - Place where the ambient temperature range is 0 to 40°C indoors (no freezing)
 - Place where the ambient humidity range is 20% to 80% RH indoors (no condensation)
 - Place where the product is not exposed to water
 - Place where no flammable substance exists in the vicinity
 - Place where a vibration or shock does not transmit to the product
 - Place where liquid containing impurities such as conductive iron dust, powder such as solid abrasive, dust, oil mist, cutting oil, water content, salt content, organic solvent, or corrosive/flammable gas is not generated or does not float
 - A place where no direct sunlight nor radiation heat reaches
 - Place where no strong electric field nor strong magnetic field develops
 - Place where inspections and cleanings can be easily performed
- **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.**
Take care as the stroke is shorter, particularly for types with bellows.
 - * For more information on the stroke, see the general catalog of electric actuators or general catalog of linear motion systems.
- **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.**

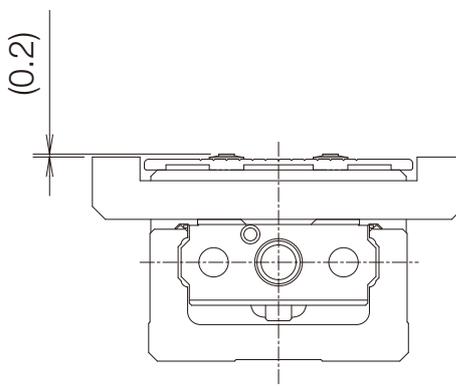


Fig. 3 Cross-section of KR33 with cover

Note) The cover mounting bolts of KR33 types with covers are higher up on the sub-table surface. Be careful when designing parts to be mounted on the sub-table. See Fig. 3.

6. Installation and Operation

- **SKR55/65, KR55/65 types with standard bellows should be used in a horizontal position. Please contact THK if using in other positions.**

The bellows may fall off if used wall-mounted or upside-down.

- **Take care if types with covers are used in any other position that horizontal (upside-down or wall-mounted), the deflection of the cover may cause it to come in contact with components mounted on the sub-table.**

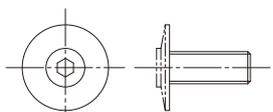
* For details, please contact THK.

- **Use thin head screws for cover installation if using a type with a cover. Take care when mounting or dismantling the cover as the heads of the screws may become scratched.**

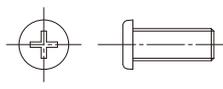
Note) Depending on the model number, cross recessed head screws (No. 0 type 1 pan-head screws) for precision device or hexagonal-socket-head type button bolts may be used.

· KR15: Cross recessed head screws for precision devices (No. 0 type 1 pan-head screws)

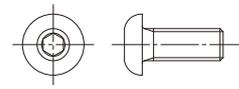
· KR30H/45H, SKR33/46: Hexagonal-socket-head type button bolts



Thin head screw appearance



No. 0 type 1 pan-head screw appearance



Hexagonal-socket-head type button bolt appearance

- **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.

- **Anti-rust oil is applied on the product. Thoroughly wipe off the oil before operating the product. In addition, supply grease after the trial run and before using the product.**



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

· KR15 : THK AFF grease

· SKR20/26, KR20/26 : THK AFA grease

· SKR33 to 65, KR30H to 65 : THK AFB-LF grease



- **The photo 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-SX671, EE-SX674 : OMRON Corp.

6. Installation and Operation

6. Installation and Operation

6-3

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.

Sensors rails can also be mounted on each end of the outer rail.

Note) Sensor rails are positions at each end of the outer rail as standard for types with a stroke of 70 mm or less.

- **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 dogs are made of stainless steel for SKR20/26 and KR15/20/26 models.

* Standard sensors

· APM-D3A1-001, APM-D3B1-003: Azbil Corporation

· GX-F12A, GX-F12B, GX-F12A-P, GX-F12B-P: 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 general catalog of the electric actuators.

If you have any question, contact THK.

- **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.

6. Installation and Operation

6-4 Motor mounting method

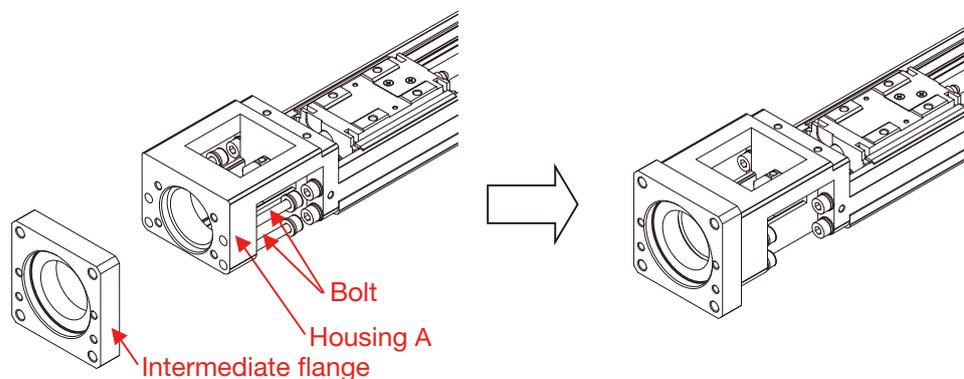
We have an intermediate flange to mount various motors in SKR/KR.

For SKR20/26 and KR20/26

For through-hole motor mounting holes

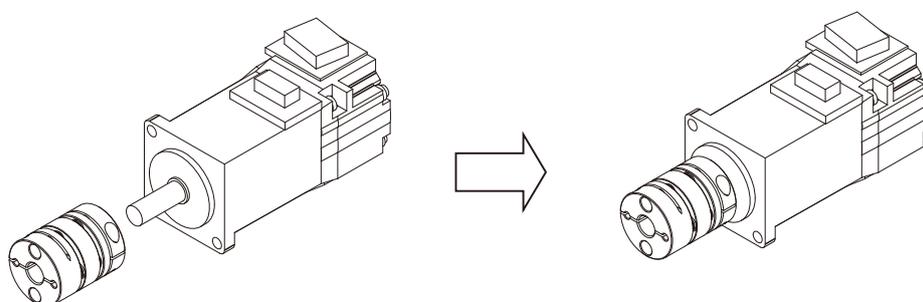
Model	Applicable intermediate flange
SKR20/26 KR20/26	P, Q

1. Mount the included intermediate flange onto the housing A.



Model	Intermediate flange fixing bolt size	Tightening torque [N·cm]
SKR20/26 KR20/26	Hexagonal-socket-head type bolts with integrated washer M3×18L 4 pcs	99

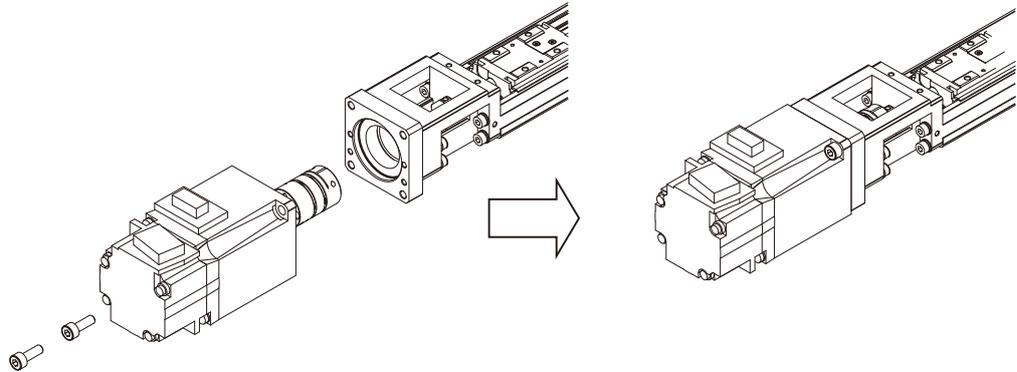
2. Tighten the coupling to the motor shaft.



6. Installation and Operation

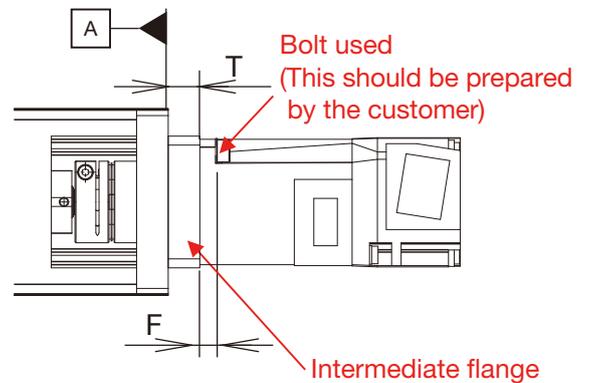
6. Installation and Operation

3. Mount the motor to the actuator.
Make sure that the bolts used are not so long as to protrude from surface A.



$$F + 1D \leq \text{Bolt Length} < T + F$$

- T: Intermediate flange length
(See table below)
F: Motor flange length
(Check for each motor mounted)
D: Screw nominal diameter



Model	Intermediate flange length T [mm]
SKR20/26 KR20/26	8.5

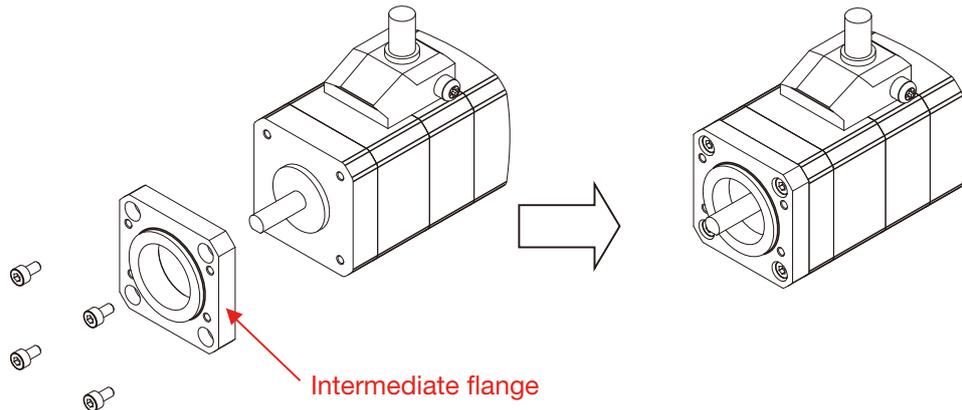
4. Tighten the coupling to the ball screw shaft.

6. Installation and Operation

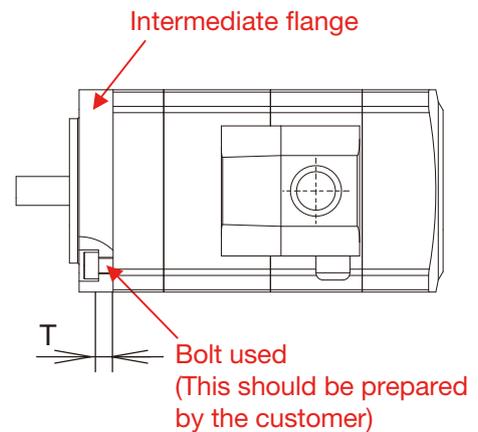
For tapped motor mounting holes

Model	Applicable intermediate flange
KR15	N, S
SKR20/26 KR20/26	N, R, S

1. Mount the intermediate flange to the motor. Use the bolt with the most appropriate length.



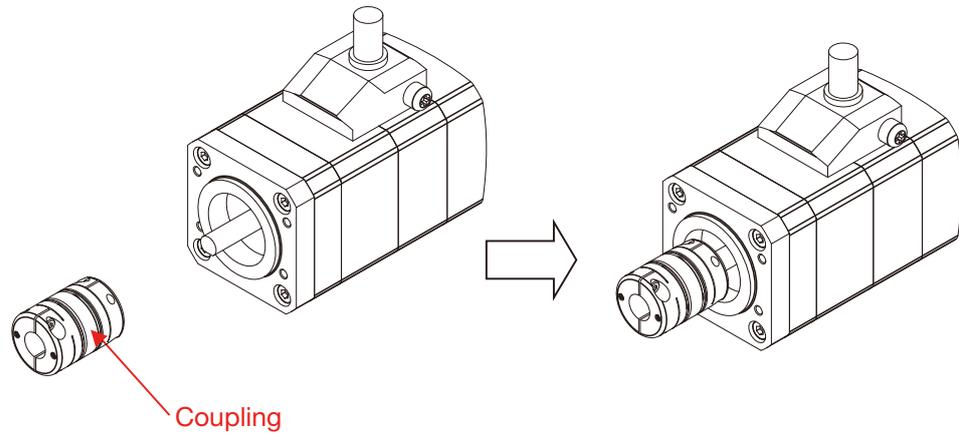
Model	Intermediate flange seat surface T [mm]
KR15	Intermediate flange N: 1.5 Intermediate flange S: 3
SKR20 KR20	1.5
SKR20/26 KR20/26	Intermediate flange N: 1.5 Intermediate flange R: 3 Intermediate flange S: 2



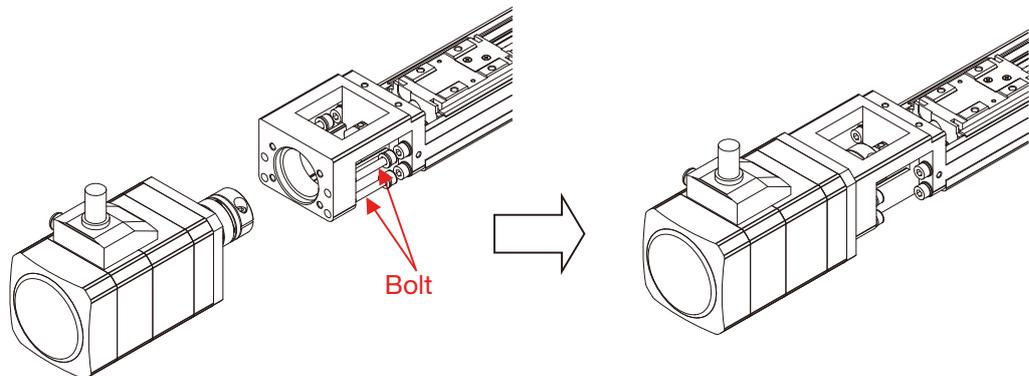
6. Installation and Operation

6. Installation and Operation

2. Tighten the coupling to the motor shaft.



3. Mount the motor to the actuator.



Model	Intermediate flange fixing bolt size	Tightening torque [N·cm]
KR15	Hexagonal-socket-head type bolts M2.5 x 10L 2 pcs	56
SKR20/26 KR20/26	Hexagonal-socket-head type bolts with integrated washer M3 x 18L 4 pcs	99

4. The ball screw directly connects to the coupling.

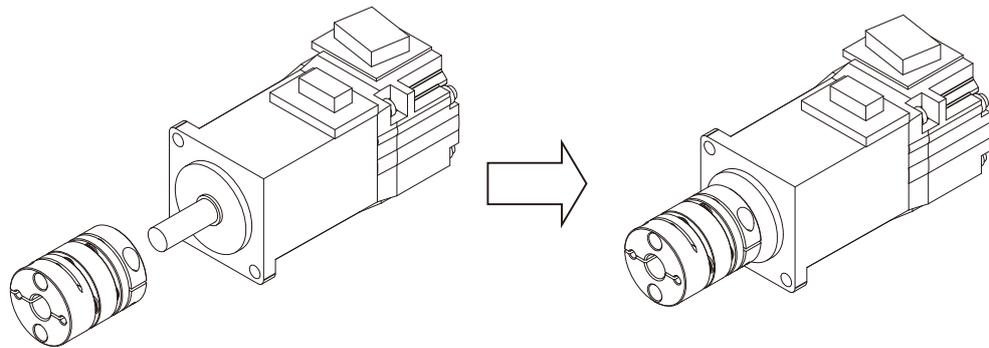
6. Installation and Operation

For SKR33/46/55/65 and KR30H/33/45H/46/55/65

For through-hole motor mounting holes

Model	Applicable intermediate flange
SKR33 KR30H/33	P,Q,T,U
SKR46	U,V,Y
KR45H	U,Y
SKR55 KR55	Z,5,6
SKR65 KR65	V,Z,5,6

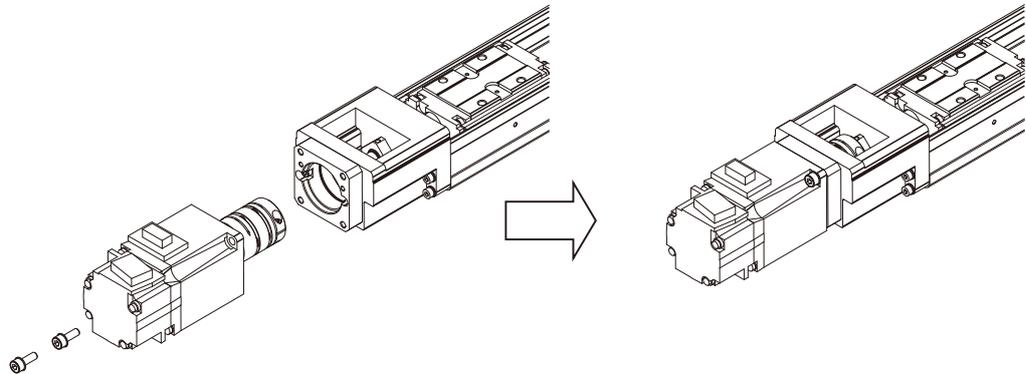
1. Tighten the coupling to the motor shaft.



6. Installation and Operation

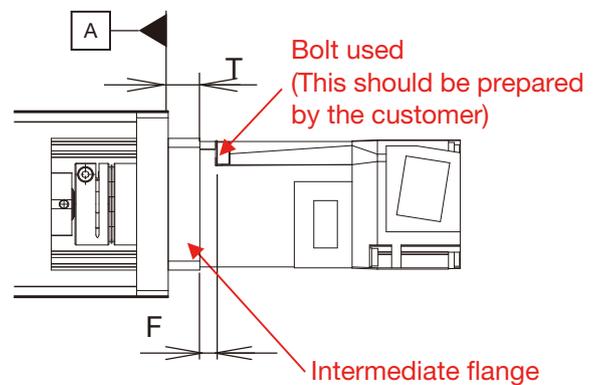
6. Installation and Operation

2. Mount the motor to the actuator.
Make sure that the bolts used are not so long as to protrude from surface A.



$$F + 1D \leq \text{Bolt Length} < T + F$$

- T: Intermediate flange length
(See table below)
- F: Motor flange length
(Check for each motor mounted)
- D: Screw nominal diameter



Model	Intermediate flange length T [mm]
SKR33 KR30H/33	10
SKR46 KR45H/46	10
SKR55/65 KR55/65	12

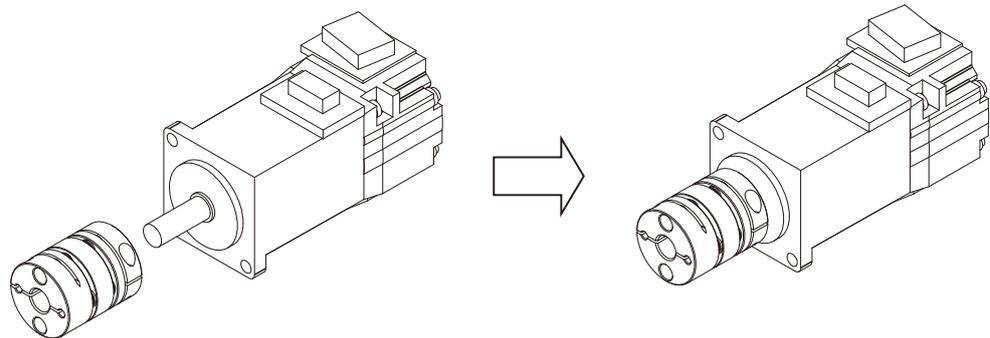
3. Tighten the coupling to the ball screw shaft.

6. Installation and Operation

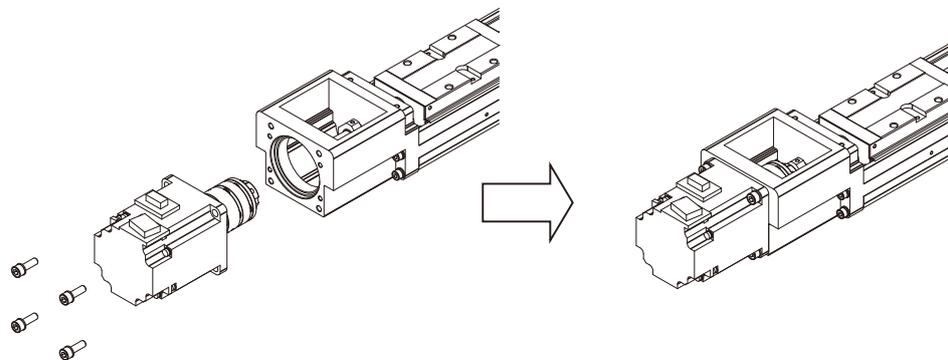
When not using an intermediate flange

Model	Applicable housing A
KR45H	A0
KR46	10, 30, 40
SKR55 KR55	A0

1. Tighten the coupling to the motor shaft.



2. Mount the motor to the actuator.



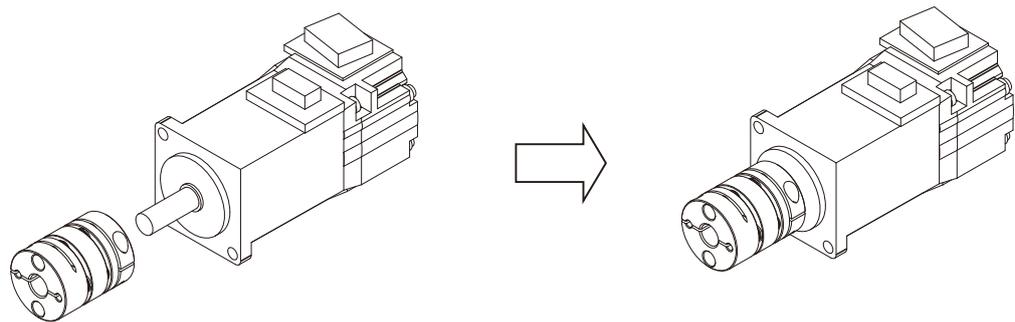
3. Tighten the coupling to the ball screw shaft.

6. Installation and Operation

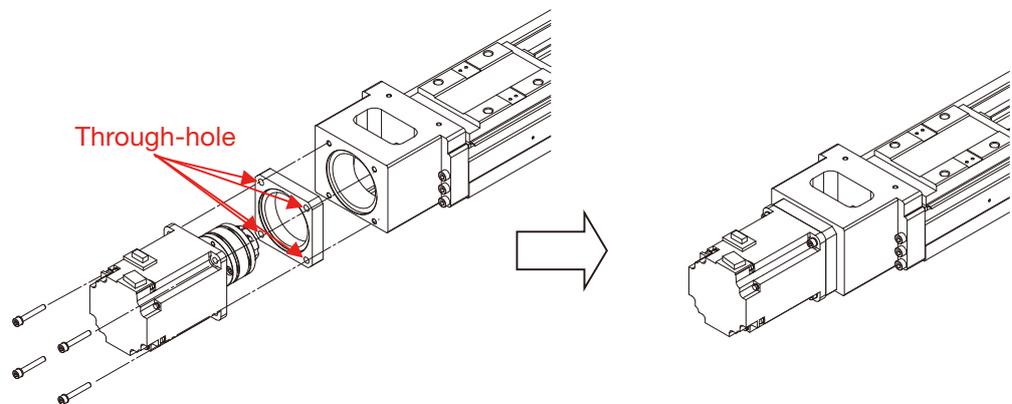
When tightening both the motor and intermediate flange

Model	Applicable housing A, intermediate flange
SKR65 KR65	AZ

1. Tighten the coupling to the motor shaft.



2. Mount the motor to the actuator.



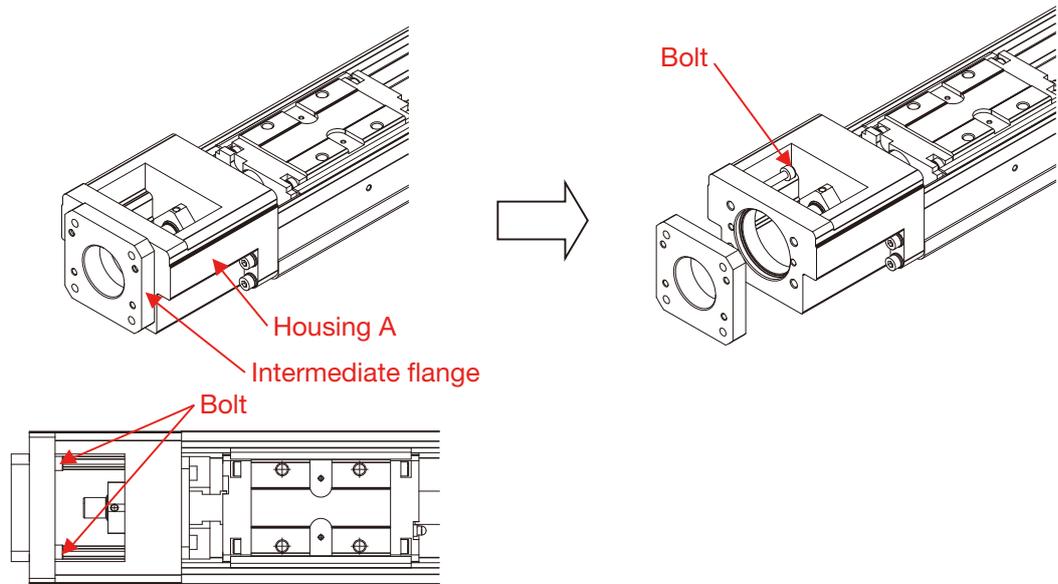
3. Tighten the coupling to the ball screw shaft.

6. Installation and Operation

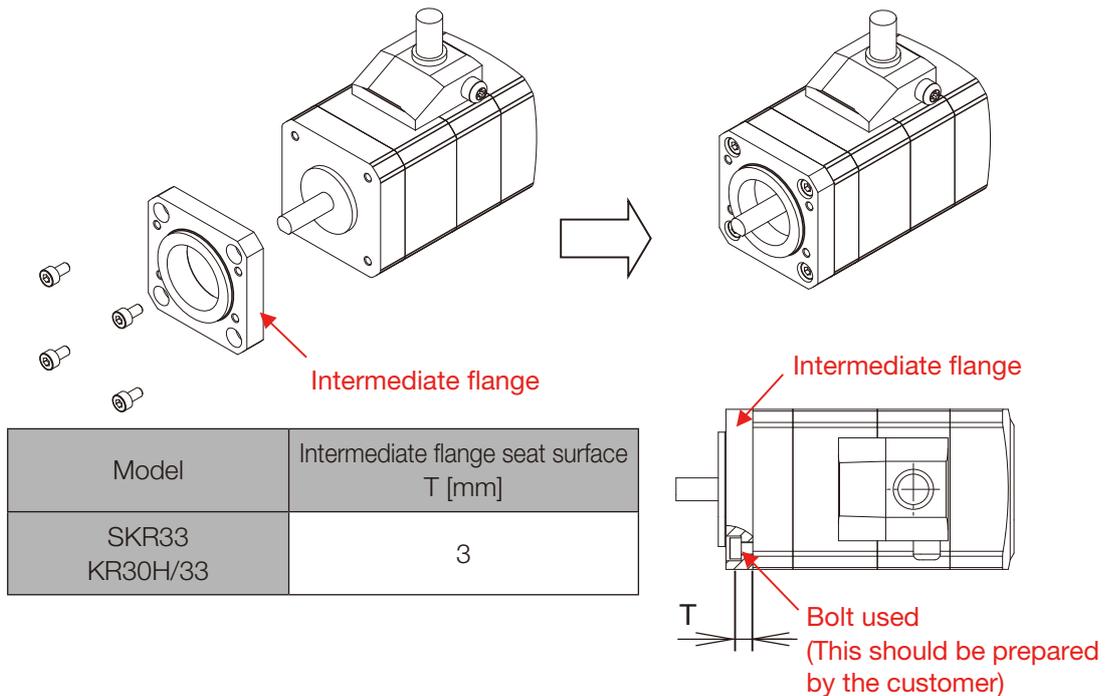
For tapped motor mounting holes

Model	Applicable intermediate flange
SKR33 KR30H/33	R

1. Loosen the bolts and remove the intermediate flange temporarily installed in housing A.



2. Mount the intermediate flange to the motor. Use the bolt with the most appropriate length.

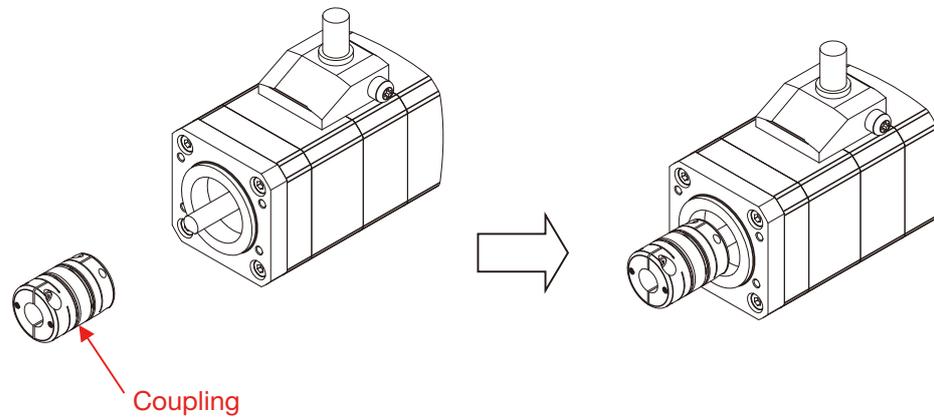


Model	Intermediate flange seat surface T [mm]
SKR33 KR30H/33	3

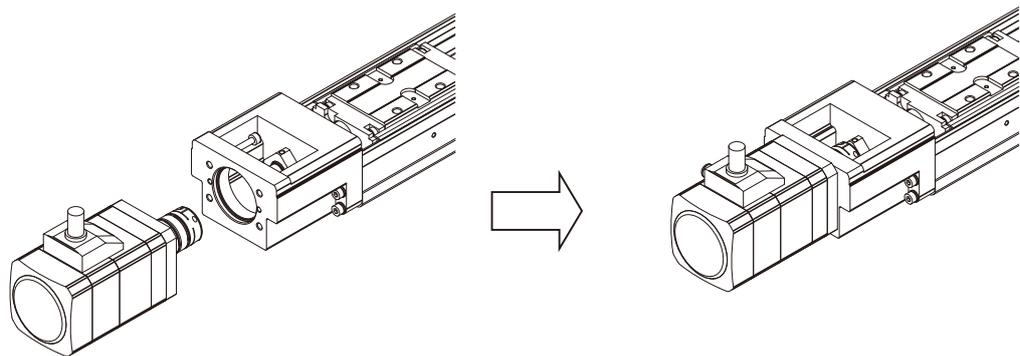
6. Installation and Operation

6. Installation and Operation

3. Tighten the coupling onto the motor shaft.



4. Mount the motor to the actuator.



Model	Hexagonal-socket-head type bolts for securing intermediate flange	Tightening torque [N·cm]
SKR33 KR30H/33	M3 x 16L 2 pcs	131

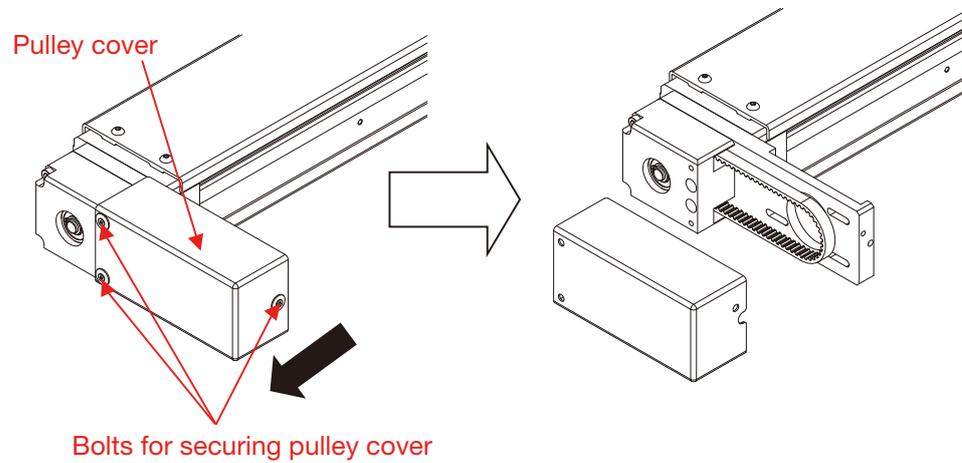
5. Tighten the coupling to the ball screw shaft.

6. Installation and Operation

6. Installation and Operation

For SKR20/26 and KR15/20/26

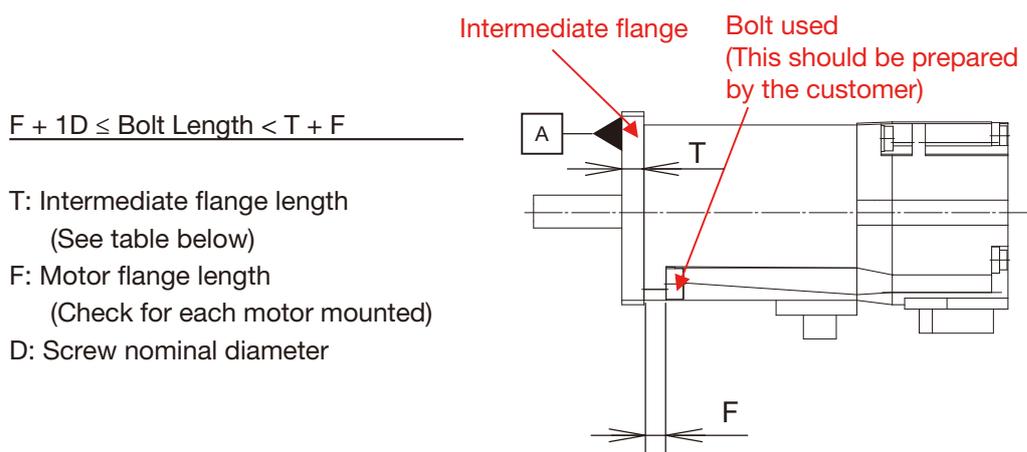
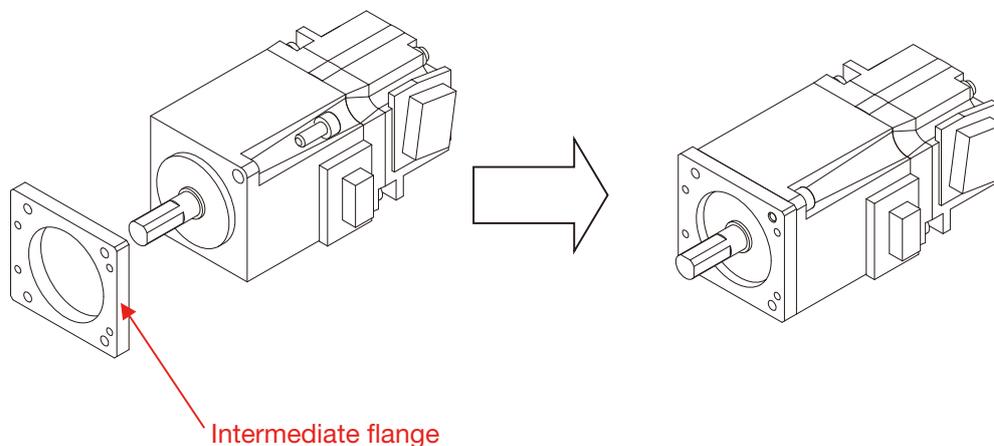
1. Remove the bolts for securing the pulley cover and pull off in the ← direction.



Model	Small hexagonal-socket-head thin head screws for securing pulley cover
SKR20/26 KR15/20/26	M2.6 x 5L 3 pcs

6. Installation and Operation

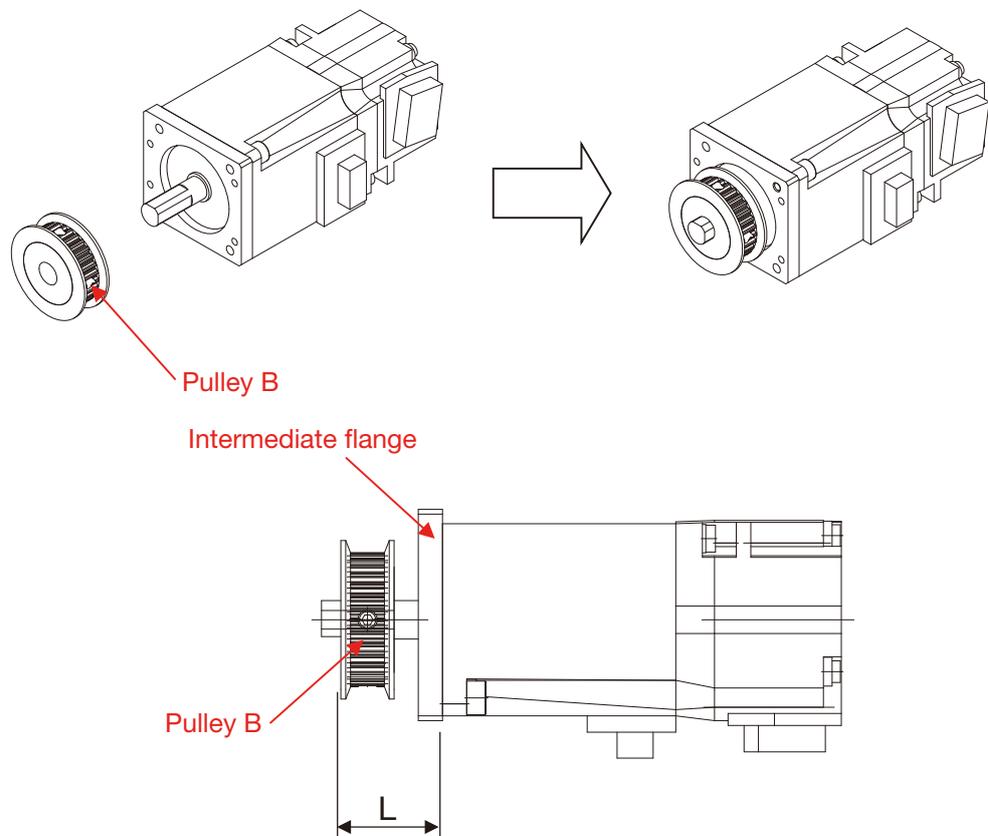
- Install the servo motor to the included intermediate flange. Pay attention to which way the motor connector faces. Make sure that the bolts used are not so long as to protrude from surface A.



Model	Intermediate flange thickness T [mm]
KR15	5
SKR20/26 KR20/26	Intermediate flange M: 5 Intermediate flange P, Q: 8.5

6. Installation and Operation

3. Adjust the position of pulley B to the L dimension and mount the servo motor.



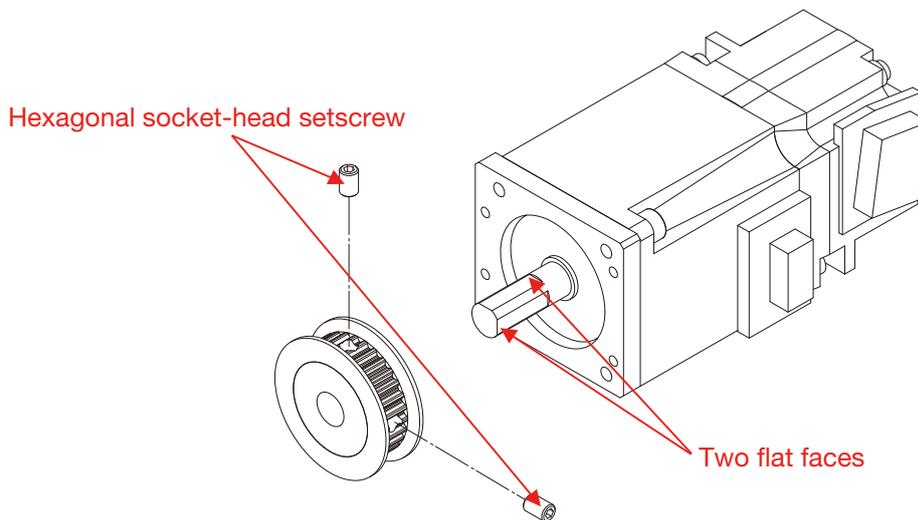
Adjust the position of pulley B such that the ends of pulley A and pulley B are the same. Use the dimensions in the following table as a guide for the ends of pulley B from the motor mounting surface.

Pulley B mounting position	
Model	L dimensions
KR15	(20.5)
SKR20/26 KR20/26	Intermediate flange M: (23.5) Intermediate flange P, Q: (27)

6. Installation and Operation

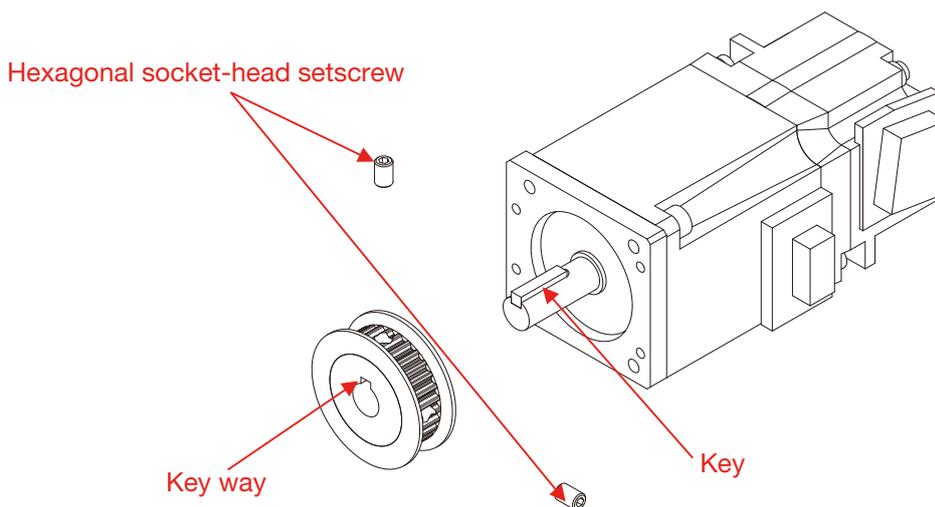
6. Installation and Operation

- For tightening type D
 When mounting, take care to align the position of the flat face of the motor shaft with the hex-socket set screw such that the point of contact of the two objects is as close to perpendicular as possible.
 When fastening to a shaft with two flat surfaces, fasten the hexagonal socket-head set screws alternately a little at a time.



Model	Hexagonal socket-head setscrew	Tightening torque [N·cm]
SKR20/26 KR15/20/26	M2.6 x 3L 2 pcs	49

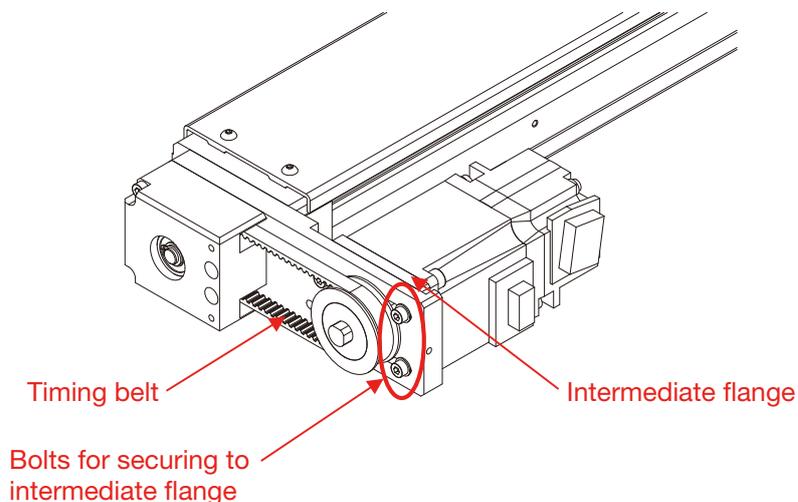
- For tightening type K
 Be sure to align the key portion of the pulley with the key way of the motor shaft.



Model	Hexagonal socket-head setscrew	Tightening torque [N·cm]
SKR20/26 KR20/26	M2.6 x 3L 2 pcs	49

6. Installation and Operation

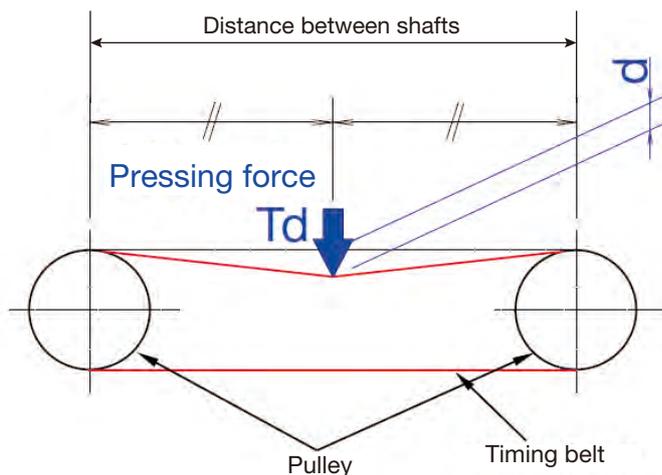
- Temporarily tighten the bolts for fixing the intermediate flange and adjust the tension of the timing belt.



Model	Hexagonal-socket-head type bolts and washers for securing to intermediate flange
KR15	M2.5 x 10L 2 pcs Flat washer / small washer 2.6
SKR20/26 KR20/26	M3 x 10L 4 pcs Flat washer / small washer 3

- Simple measurement method

Mount the motor so that the deflection of the belt is d by pressing the center of the belt by pressing force Td .



Model	Pressing force Td [N]	Amount of deflection d [mm]	Distance between shafts [mm]
KR15	0.6 to 0.7	0.7	(45)
SKR20 KR20	0.9 to 1.1	1.0	(61)
SKR26 KR26	0.9 to 1.1	1.1	(68)

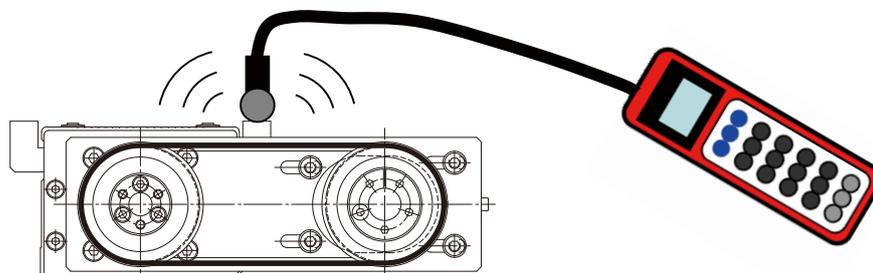
6. Installation and Operation

6. Installation and Operation

(2) How to use a sonic belt tensimeter

Use a belt tensimeter for the measurement. Flip the belt at the measurement position by your finger and the like, measure the frequency (of vibration), and check that the tension is correct.

Note) For how to use the belt tensimeter, see the instruction manual of each manufacturer.



Model	Initial tension [N]	Unit mass [kg/(10 mm (width) x 1 m (length))]	Span length (Distance between shafts) [mm]	Belt width [mm]
KR15	5.88 to 7.85	0.013	(45)	4
SKR20 KR20	9.81 to 12.7	0.013	(61)	6
SKR26 KR26	9.81 to 12.7	0.013	(68)	6

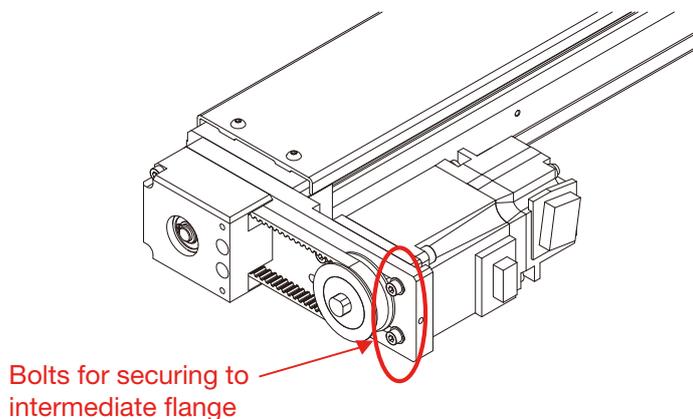
Reference: Belt models for the standard wrapped motor specification are shown in the table below.

Model	Belt type (Mitsuboshi Belting Ltd.)
KR15	B40S2M130
SKR20 KR20	B60S2M186
SKR26 KR26	B60S2M200

6. Installation and Operation

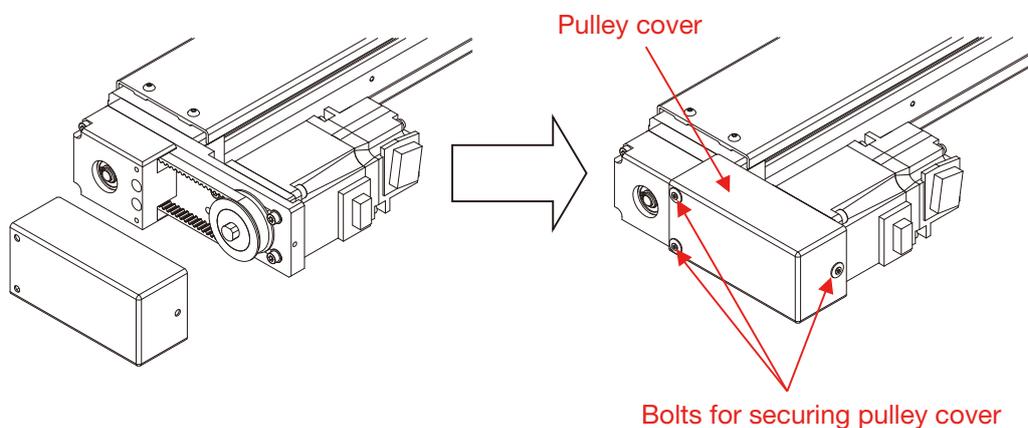
6. Installation and Operation

- After adjusting the tension, conduct final tightening of the bolts for securing the intermediate flange. Check the tension after final tightening and verify it is within (1) or (2).



Model	Hexagonal-socket-head type bolts and washers for securing to intermediate flange	Tightening torque [N·cm]
KR15	M2.5 x 10L 2 pcs Flat washer / small washer 2.6	56
SKR20/26 KR20/26	M3 x 10L 4 pcs Flat washer / small washer 3	99

- Use pulley cover fixing bolts to secure the pulley cover.



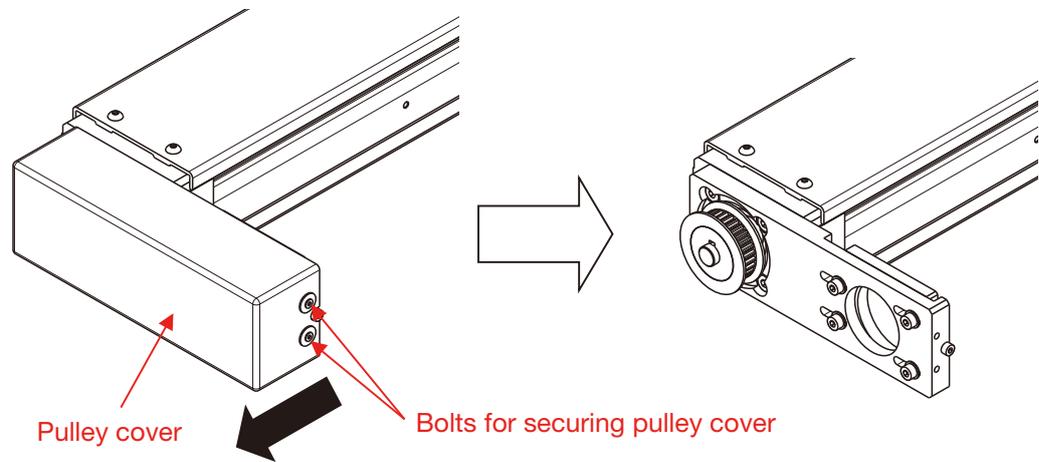
Model	Small hexagonal-socket-head thin head screws for securing pulley cover	Tightening torque [N·cm]
SKR20/26 KR15/20/26	M2.6 x 5L 3 pcs	29

6. Installation and Operation

6. Installation and Operation

For SKR33 to 65 and KR30H to 65

1. Remove the bolts for securing the pulley cover and pull off in the ← direction.



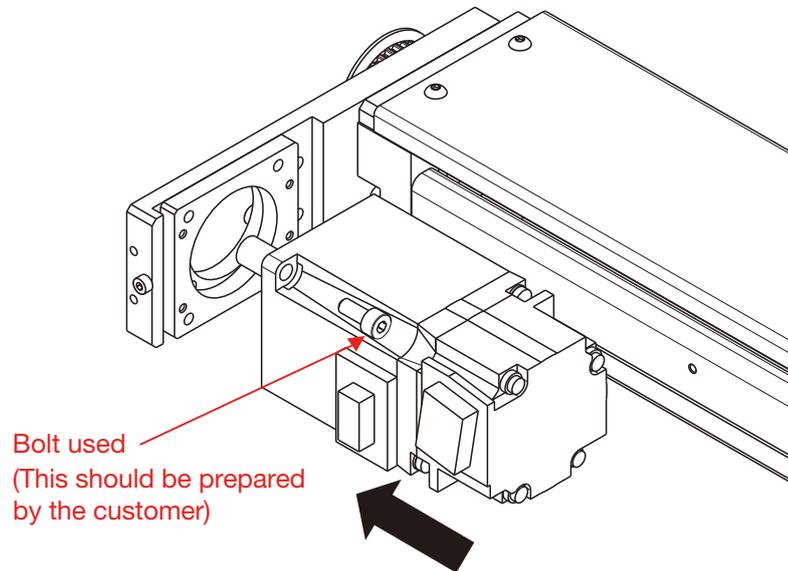
Model	Small hexagonal-socket-head thin head screws for securing pulley cover
SKR33,46 KR30H/33/45H/46	M3 x 6L 3 pcs
SKR55/65 KR55/65	M3 x 6L 4 pcs

6. Installation and Operation

2. Mount the servo motor.

Pay attention to which way the motor connector faces.

Make sure that the bolts used are not so long as to protrude from surface A.

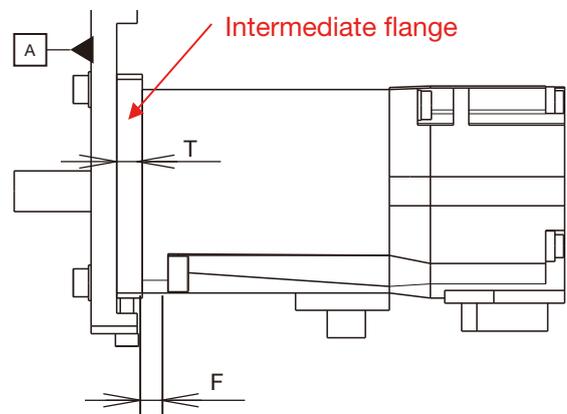


$$F + 1D \leq \text{Bolt Length} < T + F$$

T: Intermediate flange length
(See table below)

F: Motor flange length
(Check for each motor mounted)

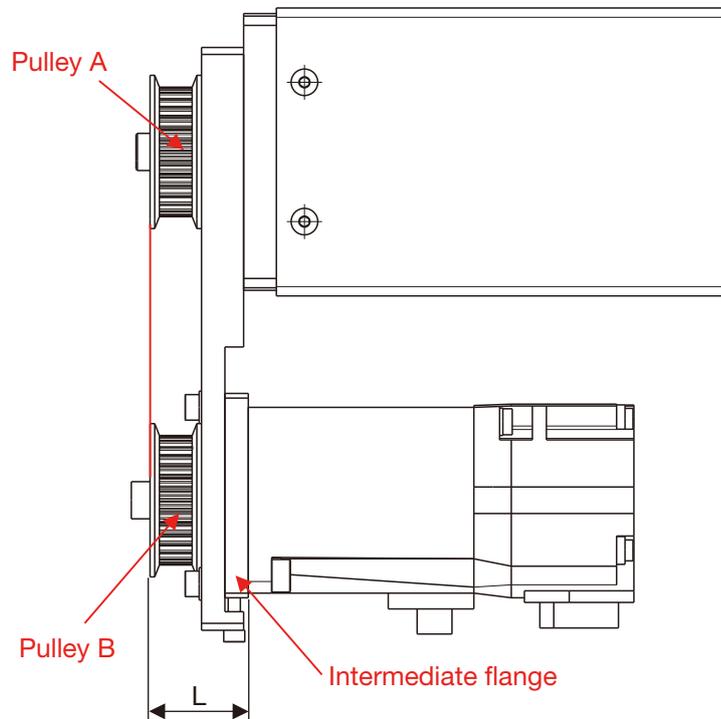
D: Screw nominal diameter



Model	Intermediate flange length T [mm]
SKR33 KR30H/33	5
SKR46 KR45H/46	6
SKR55/65 KR55/65	6

6. Installation and Operation

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



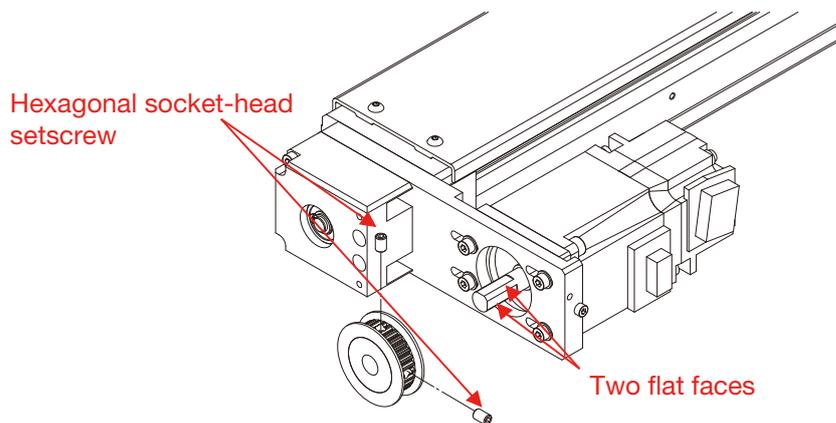
Adjust the position of pulley B such that the ends of pulley A and pulley B are the same.
Use the dimensions in the following table as a guide for the ends of pulley B from the motor mounting surface.

Pulley B mounting position	
Model	L dimensions
SKR33 KR30H/33	(22)
SKR46 KR45H/46	(35)
SKR55/65 KR55/65	(35)

6. Installation and Operation

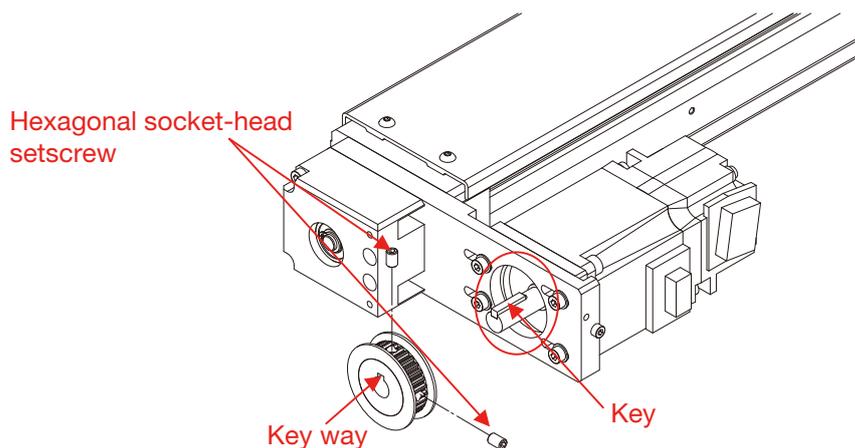
6. Installation and Operation

- For tightening type D
 When mounting, take care to align the position of the flat face of the motor shaft with the hex-socket set screw such that the point of contact of the two objects is as close to perpendicular as possible.
 When fastening to a shaft with two flat surfaces, fasten the hexagonal socket-head set screws alternately a little at a time.



Model	Hexagonal socket-head setscrew	Tightening torque [N·cm]
SKR33 KR30H/33	M4 x 6L 2 pcs	112

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

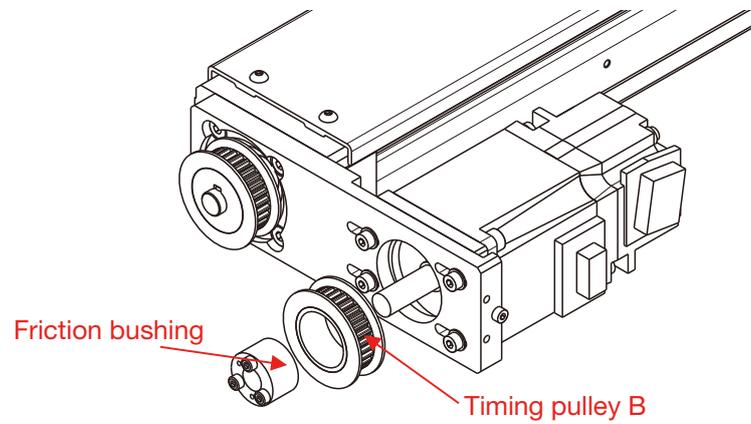


Model	Hexagonal socket-head setscrew	Tightening torque [N·cm]
SKR33 KR30H/33	M4 x 6L 2 pcs	112

6. Installation and Operation

6. Installation and Operation

- For tightening type M
Mount the timing pulley and friction bushing that come with the product.



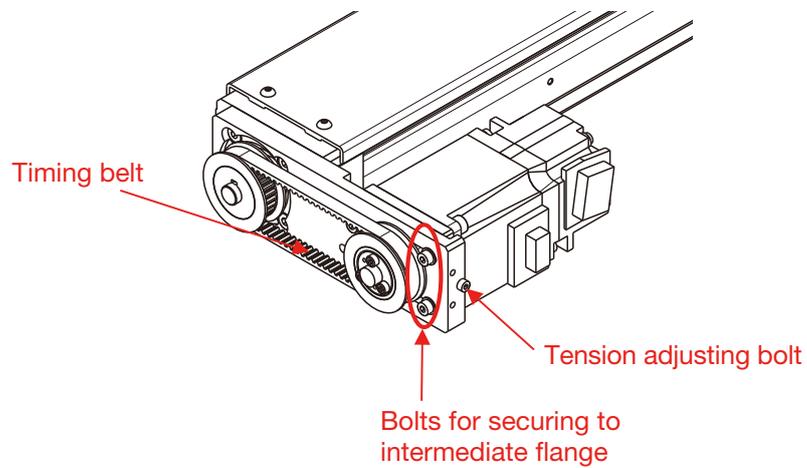
Friction bushing			
Model	Motor shaft diameter [mm]	Hexagonal-socket-head type bolt size, pcs	Tightening torque [N·cm]
SKR33 KR30H/33	φ6, 8	M2.5 x 10L 3 pcs	100
SKR46 KR45H/46	φ11	M4 x 12L 3 pcs	480
	φ14	M4 x 14L 5 pcs	
SKR55/65 KR55/65	φ11	M4 x 12L 3 pcs	480
	φ14	M4 x 14L 5 pcs	
	φ19	M4 x 14L 6 pcs	

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 friction bushing unit.

6. Installation and Operation

6. Installation and Operation

4. Loosen the bolts securing the intermediate flange and adjust the timing belt tension with the tension adjusting bolt.



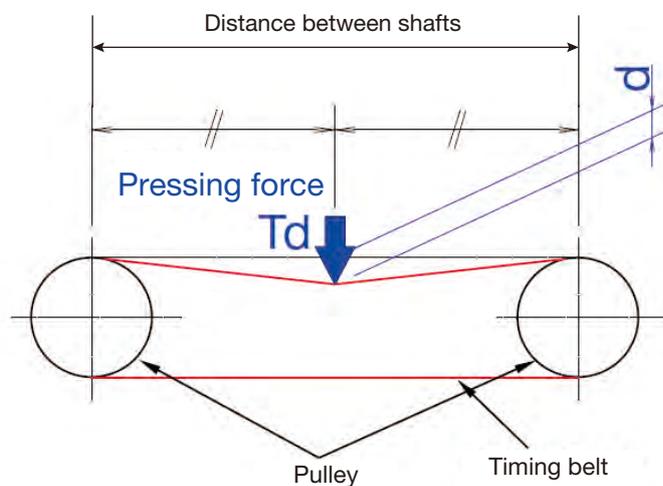
Model	Hexagonal-socket-head type bolts and washers for securing to intermediate flange	Tension adjusting hexagonal-socket-head type bolt
SKR33 KR30H/33	M3 x 10L 4 pcs Flat washer / regular type 3	M2.6 x 10L
SKR46 KR45H/46	M5 x 12L 4 pcs Flat washer / regular type 3	M3 x 10L
SKR55 KR55	M5 x 12L 4 pcs Flat washer / regular type 5	M3 x 10L
SKR65 KR65	M5 x 12L 4 pcs Flat washer / regular type 5	M3 x 12L

6. Installation and Operation

6. Installation and Operation

(1) Simple measurement method

Mount the motor so that the deflection of the belt is d by pressing the center of the belt by pressing force T_d .



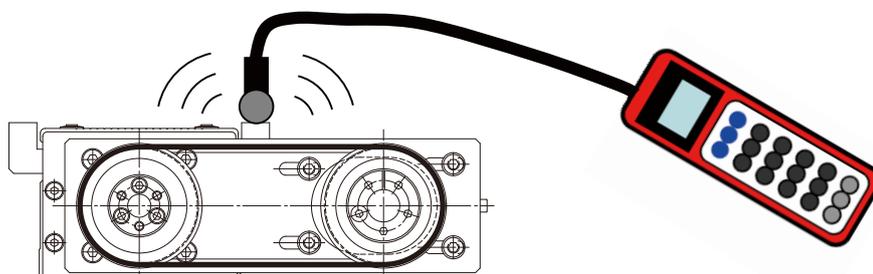
Model	Pressing force T_d [N]	Amount of deflection d [mm]	Distance between shafts [mm]
SKR33 KR30H/33	1.7 to 2.2	1.2	(75)
SKR46 KR45H/46	7.4 to 9.3	1.7	(105)
SKR55/KR55 (400W)	7.4 to 9.3	1.8	(115)
SKR65/KR65 (750W)	7.4 to 9.4	1.9	(120)
SKR65/KR65 (Motor left-right wrap)	7.6 to 9.5	2.3	(145)
SKR65/KR65 (Motor up wrap)	7.6 to 9.5	2.4	(150)
SKR65/KR65 (Motor down wrap)	7.5 to 9.4	2.2	(137.5)

6. Installation and Operation

6. Installation and Operation

(2) How to use a sonic belt tensimeter

Use a belt tensimeter for the measurement. Flip the belt at the measurement position by your finger and the like, measure the frequency (of vibration), and check that the tension is correct.
 Note) For how to use the belt tensimeter, see the instruction manual of each manufacturer.



Model	Initial tension [N]	Unit mass [kg/(10 mm (width) x 1 m (length))]	Span length (Distance between shafts) [mm]	Belt width [mm]
SKR33 KR30H/33	19.6 to 26.5	0.019	75	6
SKR46 KR45H/46	93.4 to 124	0.034	105	15
SKR55/KR55 (400W)	93.4 to 124	0.034	115	15
SKR65/KR65 (750W)	93.4 to 124	0.034	120	15
SKR65/KR65 (Motor left-right wrap)	93.4 to 124	0.034	145	15
SKR65/KR65 (Motor up wrap)	93.4 to 124	0.034	150	15
SKR65/KR65 (Motor down wrap)	93.4 to 124	0.034	137.5	15

Reference: Belt models for the standard wrapped motor specification are shown in the table below.

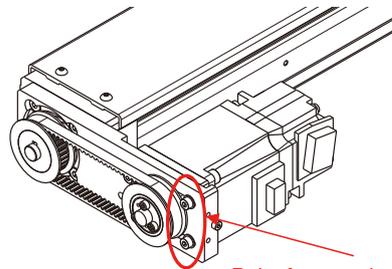
Model	Belt type (Mitsuboshi Belting Ltd.)
SKR33 KR30H/33	B60S3M240
SKR46 KR45H/46	B150S5M370
SKR55/KR55 (400W)	B150S5M390
SKR65/KR65 (750W)	B150S5M400
SKR65/KR65 (Motor left-right wrap)	B150S5M450
SKR65/KR65 (Motor up wrap)	B150S5M460
SKR65/KR65 (Motor down wrap)	B150S5M435

6. Installation and Operation

6. Installation and Operation

5. After adjusting the tension, conduct final tightening of the bolts for securing the intermediate flange.

Check the tension after final tightening and verify it is within (1) or (2).



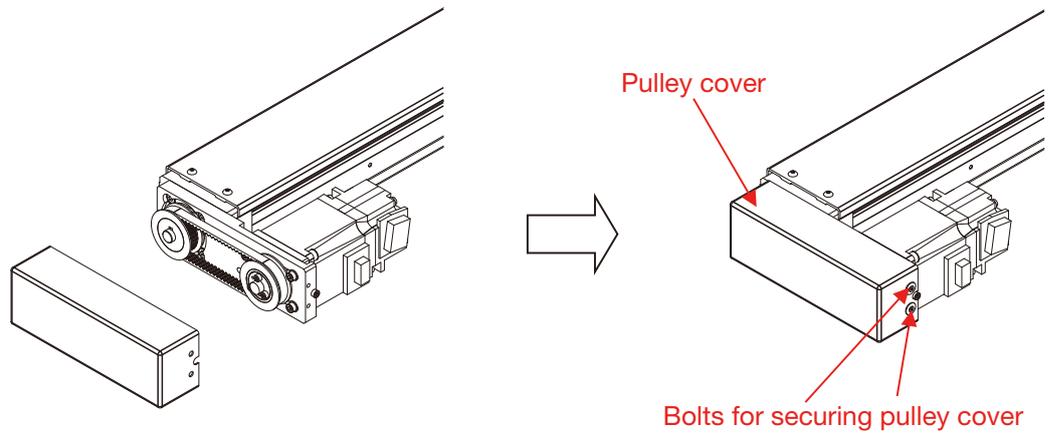
Bolts for securing to intermediate flange

Model	Hexagonal-socket-head type bolts and washers for securing to intermediate flange	Tightening torque [N·cm]
SKR33 KR30H/33	M3 x 10L 4 pcs Flat washer / regular type 3	244
SKR46 KR45H/46	M5 x 12L 4 pcs Flat washer / regular type 5	795
SKR55/65 KR55/65	M5 x 12L 4 pcs Flat washer / regular type 5	795

6. Installation and Operation

6. Installation and Operation

6. Use pulley cover fixing bolts to secure the pulley cover.



Model	Small hexagonal-socket-head thin head screws for securing pulley cover	Tightening torque [N·cm]
SKR33/46 KR30H/33/45H/46	M3 x 6L 3 pcs	39
SKR55/65 KR55/65	M3 x 6L 4 pcs	

6. Installation and Operation

6. Installation and Operation

6-5

Outer rail mounting method

Use the countersunk holes in the outer rail and hexagonal-socket-head type bolts to secure to the mounting surface. See Fig. 4.

Note) Use M3 hexagonal-socket-head type button bolts when securing to KR15 outer rails.

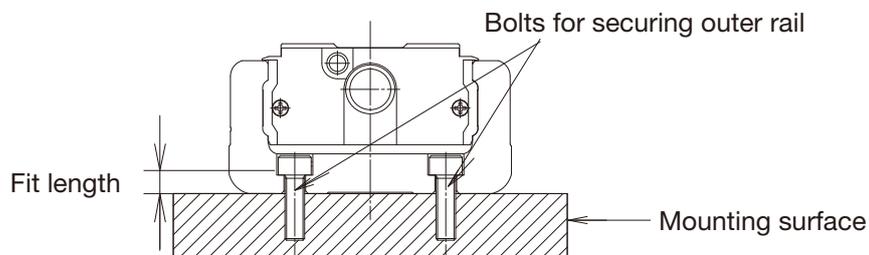


Fig. 4 SKR/KR mounting diagram

Note) Mount the outer rail so that the bolts for securing base do not interfere with the inner block.

7. Maintenance

7. Maintenance

7-1

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 "Safety Data Sheets" for THK original greases. Contact THK for details.

7-2

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.

7. Maintenance

7. Maintenance

7-3 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.

7-4 Periodical inspection

- **For the motor wrap 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.

7. Maintenance

7. Maintenance

7-5

Lubrication

- The standard models are supplied with the following grease before shipment.

- KR15: THK AFF grease
- SKR20/26 KR20/26: THK AFA grease
- SKR33 to 65 KR30H to 65: THK AFB-LF 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 retainer effect of SKR allows it to be long-term maintenance free. However, we recommend determining the greasing interval through an initial inspection.

- The inner block has a grease nipple mounted as standard for lubrication.

* KR15 has a $\phi 2$ mm lubricant hole.

Table 1 shows the model numbers of the grease nipples and applicable nozzle types of the grease gun. As well, Fig. 5 shows the shape of the grease nipples.

Model	Grease nipple model number	Applicable nozzle type
KR15	None ($\phi 2$ mm lubricant hole)	Dedicated nozzle U type P type attachment
KR20 to 33 SKR20 to 33	PB107	Dedicated nozzle U type N type attachment
KR45H to 65 SKR46 to SKR65	A-M6F	H type nozzle

Note) Directly apply grease to the rolling surface of the LM guide and ball screw for products without a grease nipple installed.

Table 1 Grease nipple model number and applicable nozzle type

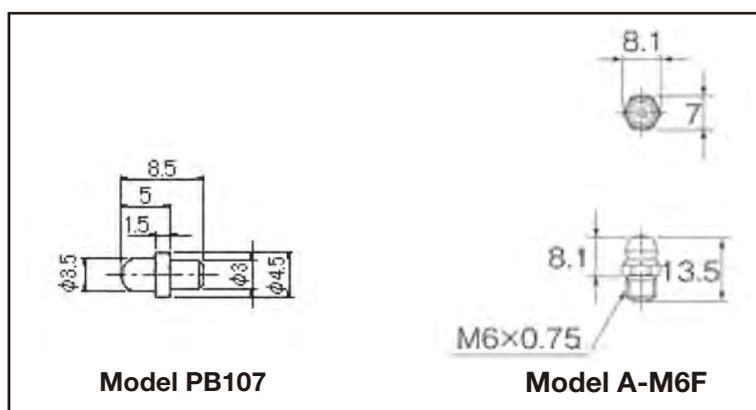


Fig. 5 Shapes of the grease nipples

- The appendix introduces the grease gun unit for lubrication for your reference.

7. Maintenance

7. Maintenance

7-6

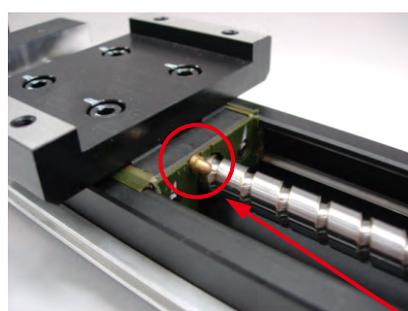
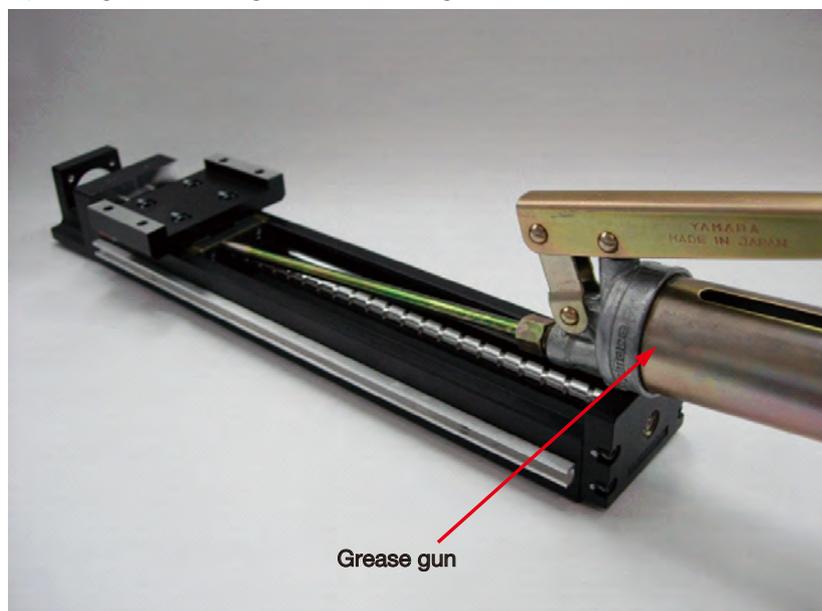
Method for supplying grease

[SKR/KR]

The following figure shows a SKR/KR representative greasing method for your reference.

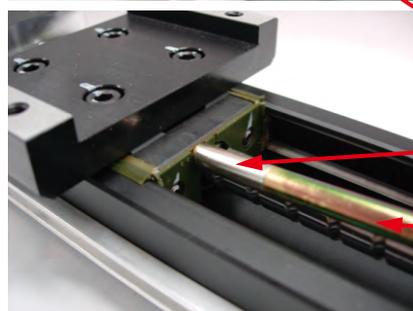
Procedure

1. Wipe off the old grease or stains using a clean waste cloth.
2. Supply grease using a grease gun as indicated in the figure below: (Move the inner block or ball screw by hand to permeate the grease throughout.)
3. Carry out pre-conditioning operation to apply the grease throughout.
4. Wipe off grease leaking or accumulating in the corner.



Supply grease from the grease nipple attached on the end face of the inner block.

Mount the nozzle and attachment (nozzle only for some models) on the grease gun, insert it into the nipple, and inject the grease.



Grease nipple

Attachment

Nozzle

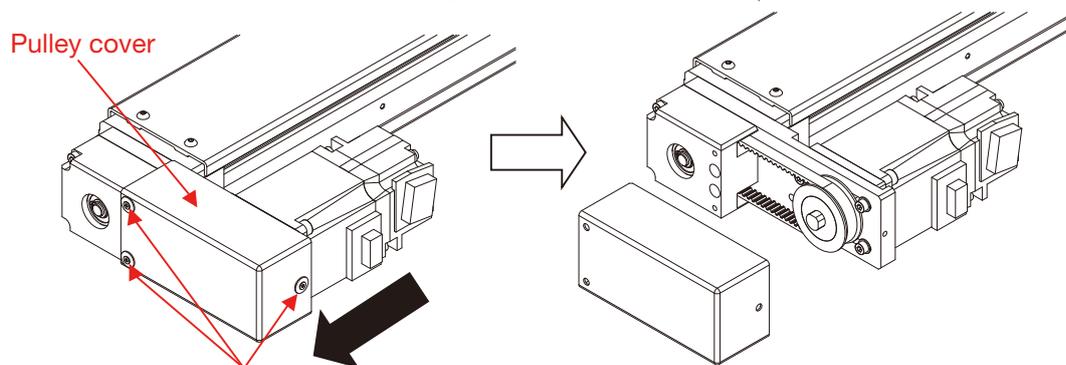
7. Maintenance

7. Maintenance

7-7 Belt replacement method for motor wrap type

The following figure shows the belt replacement method for SKR20 to 33 and KR15 to 33 for your reference.

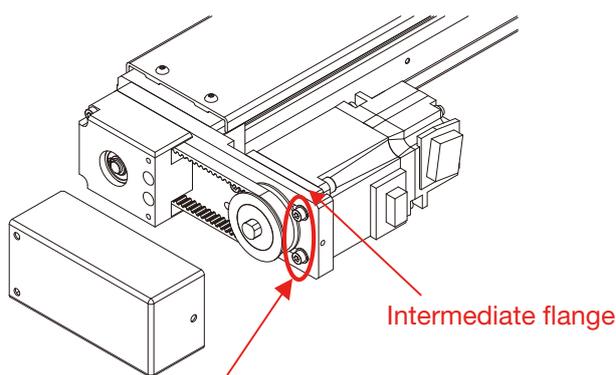
1. Remove the bolts for securing the pulley cover and pull off in the ← direction.



Bolts for securing pulley cover

Model	Small hexagonal-socket-head thin head screws for securing pulley cover
SKR20/26 KR15/20/26	M2.6 x 5L 3 pcs
SKR33 KR30H/33	M3 x 6L 4 pcs

2. Loosen the bolts for securing intermediate flange.
For SKR33/KR30H/KR33, loosen the tension plate (hexagon socket head cap screw: M2.6) and loosen the timing belt.



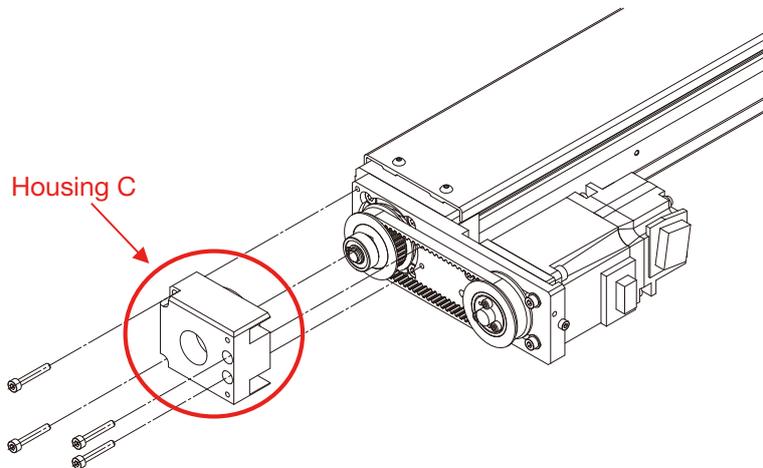
Bolts for securing intermediate flange

Model	Hexagonal-socket-head type bolts for securing intermediate flange
KR15	M2.5 x 10L 2 pcs
SKR20/26 KR20/26	M3 x 10L 4 pcs
SKR33 KR30H/33	M3 x 10L 4 pcs

7. Maintenance

7. Maintenance

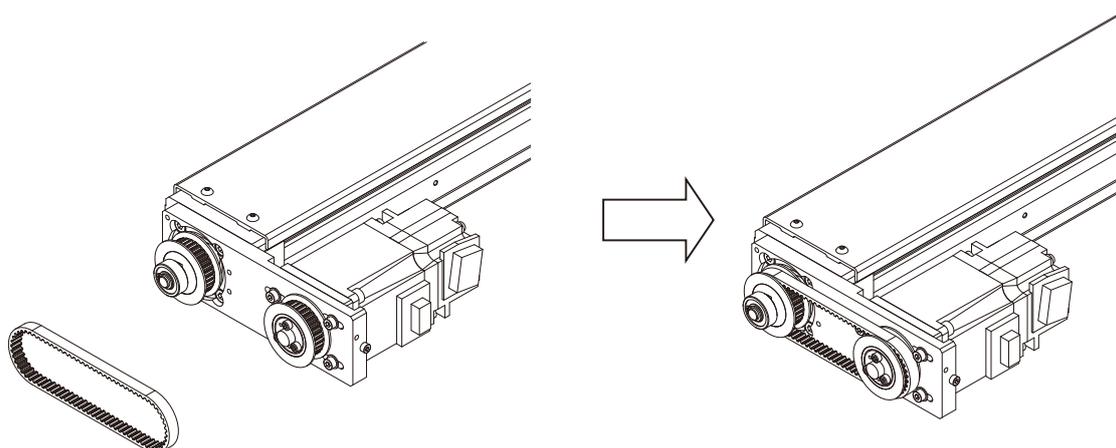
3. Remove housing C and remove the old timing belt.



Model	Hexagonal-socket-head type bolts for securing housing C	Tightening torque [N·cm]
KR15	M2.5 x 10L 4 pcs	56 (SUS)
SKR20/26 KR20/26	M3 x 20L 4 pcs	99 (SUS)
SKR33 KR30H/33	M3 x 20L 4 pcs	131

4. Replace with a new timing belt.

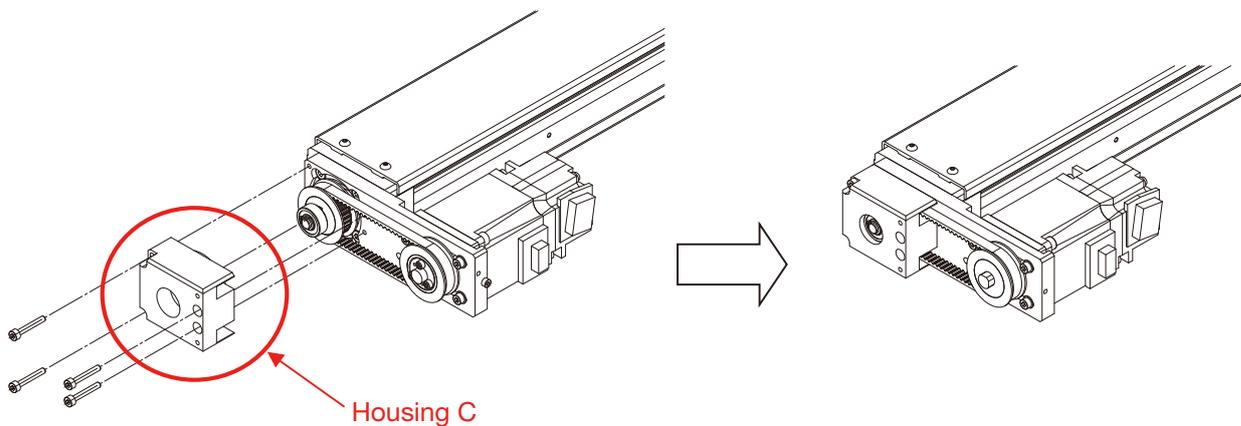
* See "Motor mounting method" for the belt model number.



7. Maintenance

7. Maintenance

5. Mount housing C.

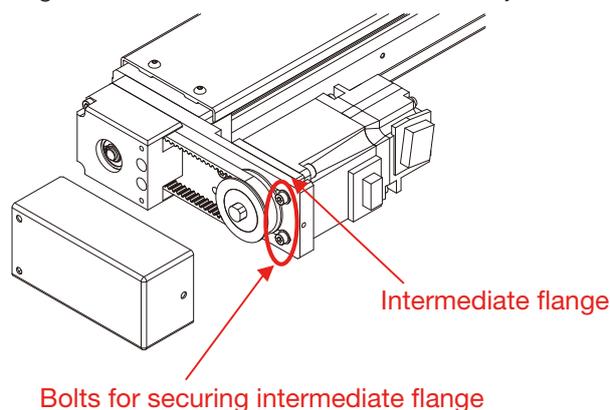


6. Adjust the tension of the belt.

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

7. Temporarily tighten the bolts for securing intermediate flange and adjust the tension. After adjusting the tension, conduct final tightening of the bolts for securing the intermediate flange.

* See "Motor mounting method" for details on how to make adjustments.

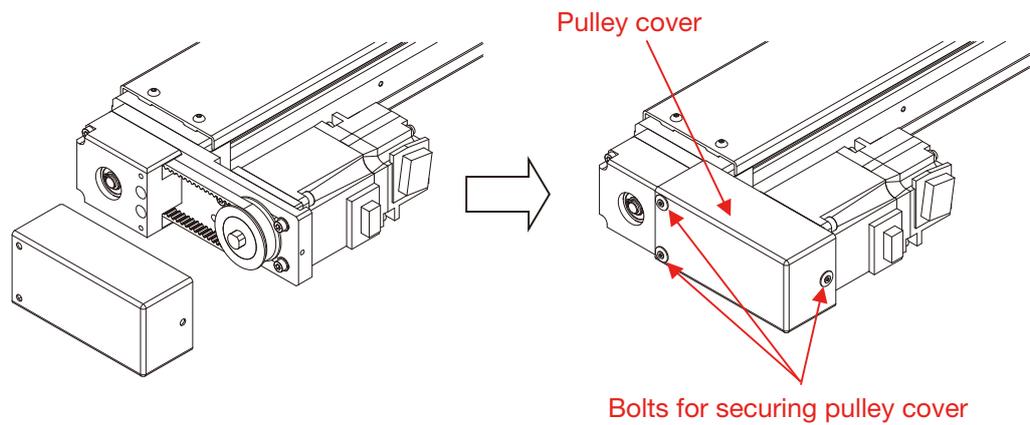


Model	Hexagonal-socket-head type bolts and washers for securing to intermediate flange	Tightening torque [N·cm]
KR15	M2.5 x 10L 2 pcs Flat washer / small washer 2.6	56 (SUS)
SKR20/26 KR20/26	M3 x 10L 4 pcs Flat washer / small washer 3	99 (SUS)
SKR33 KR30H/33	M3 x 10L 4 pcs Flat washer / regular type 3	244

7. Maintenance

7. Maintenance

8. Use pulley cover fixing bolts to secure the pulley cover.



Model	Small hexagonal-socket-head thin head screws for securing pulley cover	Tightening torque [N·cm]
SKR20/26 KR15/20/26	M2.6 x 5L 3 pcs	29 (SUS)
SKR33 KR30H/33	M3 x 6L 3 pcs	39

7. Maintenance

7. Maintenance

7-8 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.

7-9 Usage conditions (range)

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

7-10 Warranty scope

7-10-1 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.

7-10-2 Consumables and spare parts

- Cables and timing belts are consumables.

7. Maintenance

7. Maintenance

7-10-3 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 7-9 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 and timing belts.
- 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 7-8, 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.

7-10-4 Repair period

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

7-11 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.

7-12 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.

8. Appendix

8. Appendix

8-1 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	Ball screw lead [mm]	Diameter of ball screw shaft end [mm]	Permissible input torque [N·m]	
			Direct motor coupled specification	Wrapped motor specification
SKR20	1	4	0.13	0.13
	6		0.422	0.422
SKR26	2	5	0.435	0.435
	6		0.802	0.802
SKR33	6	8	2.865	2.865
	10,20		3.22	3.22
SKR46	10,20	10	5.498	4.41
SKR55	20,30,40	12	8.57	7.28
SKR65	20,25,30,50	15	18.14	16.1
KR15	1	3	0.051	0.051
	2		0.103	0.103
KR20	1	4	0.207	0.207
	6		0.422	0.422
KR26	2	5	0.622	0.622
	6		0.802	0.802
KR30H	6,10	6	1.244	1.244
KR33	6,10	6	1.244	1.244
KR45H	10,20	10	5.498	4.41
KR46	10,20	8	2.707	
		10		4.41
KR55	20	12	8.57	7.28
KR65	25	15	18.14	16.1

* The permissible input torque values above are each calculated from the torsion strength of the ball screw shaft end (excluding some models).

- Models whose permissible input torques are limited by the static permissible load (axial direction) of the bearing section:

⇒ SKR20 (lead 1 mm), SKR26 (lead 2 mm), SKR33 (lead 6 mm)

KR15, KR26 (lead 2 mm)

- Models whose permissible input torques are limited by the static rated load of the ball screw:

⇒ KR20 (lead 1 mm)

Note) For KR46, note that the ball screw shaft end diameter differs between the direct motor coupled and wrapped motor specifications.

⇒ Direct motor coupled specification: 8 mm, wrapped motor specification: 10 mm

Additionally, for the direct motor coupled specification, a 10 mm ball screw shaft end diameter is also available.

For details, please contact THK.

8. Appendix

8. Appendix

8-2

Permissible rotational speed

KR permissible rotational speed

Model	Ball screw lead [mm]	Stroke [mm]		Permissible rotational speed [min^{-1}]			
		Block A type	Block C type	Block A type		Block C type	
				Precision grade	Normal grade, and high accuracy grade	Precision grade	Normal grade, and high accuracy grade
KR15	1,2	150 or less	-	4500	4500	-	-
KR20	1,6	130 or less	-	6000	6000	-	-
KR26	2	210 or less	-	6000	6000	-	-
	6	210 or less	-	6000	5950	-	-
KR30H	6,10	300 or less	320 or less	6000	4760	6000	4760
		400	420	5930	4760	5300	4760
		500	520	3950	3950	3610	3610
KR33	6,10	300 or less	325 or less	6000	4760	6000	4760
		400	425	5930	4760	5300	4760
		500	525	3950	3950	3600	3600
		600	625	2820	2820	2610	2610
KR45H	10	500 or less	530 or less	4440	3170	4440	3170
		600	630	4390	3170	3860	3170
		700	730	-	3170	-	2950
		800	830	-	2580	-	2330
	20	500 or less	530 or less	4440	3170	4440	3170
		600	630	4290	3170	3860	3170
		700	730	-	3170	-	2950
		800	830	-	2530	-	2330
KR46	10	490 or less	520 or less	4440	3170	4440	3170
		590	620	4440	3170	3900	3170
		690	720	-	3170	-	2980
		790	820	-	2600	-	2350
	20	490 or less	520 or less	4440	3170	4440	3170
		590	620	4340	3170	3900	3170
		690	720	-	3170	-	2980
		790	820	-	2550	-	2350
KR55	20	800	-	3370	2400	-	-
		900	-	2720	2400	-	-
		1000	-	2240	2240	-	-
		1100	-	-	1880	-	-
		1200	-	-	1600	-	-
KR65	25	990 or less	-	2690	1920	-	-
		1190	-	2030	1920	-	-
		1490	-	-	1330	-	-

Note) The upper limit of the permissible rotation speed is set at 6000 min^{-1} .

6000 min^{-1} : The maximum rotation speed of the AC servomotor that is assumed to be used in SKR/KR.

Note) If using the product at rotation speed exceeding the permissible value in the table above, contact THK.

8. Appendix

8. Appendix

SKR permissible rotational speed

Model	Ball screw lead [mm]	Stroke [mm]		Permissible rotational speed [min ⁻¹]			
		Block A type	Block C type	Block A type	Block C type		
SKR20	1,6	130 or less	-	6000	-		
SKR26	2,6	210 or less	-	6000	-		
SKR33	6,10	395 or less	420 or less	6000	6000		
		495	520	5520	5030		
		595	620	3930	3640		
	20	395 or less	-	6000	-		
		495	-	5340	-		
		595	-	3830	-		
SKR46	10	390 or less	420 or less	6000	6000		
		490	520	6000	5480		
		590	620	4410	4000		
		690	720	3320	3050		
		790	820	2590	2400		
	20	390 or less	420 or less	6000	6000		
		490	520	5960	5320		
		590	620	4300	3900		
		690	720	3240	2980		
		790	820	2530	2350		
		SKR55	20	800	-	3300	-
				900	-	2660	-
1000	-			2190	-		
1100	-			1840	-		
1200	-			1560	-		
30	800		-	3310	-		
	900		-	2670	-		
	1000		-	2200	-		
	1100		-	1840	-		
	1200		-	1570	-		
40	800	-	3250	-			
	900	-	2630	-			
	1000	-	2160	-			
	1100	-	1820	-			
	1200	-	1540	-			
SKR65	20	790	-	4410	-		
		990	-	2910	-		
		1190	-	2070	-		
		1490	-	1350	-		
	25	790	-	4340	-		
		990	-	2880	-		
		1190	-	2040	-		
		1490	-	1340	-		
	30	790	-	4420	-		
		990	-	2920	-		
		1190	-	2070	-		
		1490	-	1350	-		
	50	790	-	3600	-		
		990	-	2820	-		
		1190	-	2010	-		
		1490	-	1320	-		

Note) The upper limit of the permissible rotation speed is set at 6000 min⁻¹.

6000 min⁻¹: The maximum rotation speed of the AC servomotor that is assumed to be used in SKR/KR.

Note) If using the product at rotation speed exceeding the permissible value in the table above, contact THK.

Note) The permissible rotational speed for SKR does not vary with precision grade.

8. Appendix

8. Appendix

8-3

Introduction of the grease

THK original grease

AFA Grease

It is high-class grease with a long service life using a urea-based consistency enhancer with high-class synthetic oil as the base oil.

● Characteristics

- Unlike ordinary metal soap based grease, it excels in antioxidation stability and can be used for a long period.
- Grease unsusceptible to entrance of water.
- Grease that does not easily soften even if used for a long period.

● Representative properties

Test items	Representative property values	
Consistency enhancer	Urea-based	
Base oil	High-class synthetic oil	
Base oil kinetic viscosity: mm ² /s (40°C)	25	
Worked penetration (25°C, 60 W)	258	
Mixing stability (100,000 W)	329	
Dropping point: °C	261	
Evaporation: mass% (99°C, 22 h)	0.2	
Oil separation rate: mass% (100°C, 24 h)	0.5	
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	
Low temperature torque: mN·m (-20°C)	Startup	170
	Rotation	70
4-ball test (fusion load): N	3089	
Operating temperature range (°C)	-45 to 160	
Appearance color	Brown	



Fig. 6 Appearance of the grease tube and the product box

8. Appendix

8. Appendix

AFB-LF Grease

It is universal grease using a lithium-based consistency enhancer with refined mineral oil as the base oil.

● **Characteristics**

- Excels in abrasion resistance and extreme pressure resistance in comparison to off-the-shelf universal lithium-based grease due to the action of a special additive.
- Not easily softens and excels in mechanical stability even if used for a long period.
- Unsusceptible to influences of water such as softening in case of water entrance and decrease in extreme pressure resistance.

● **Representative properties**

Test items	Representative property values	
Consistency enhancer	Lithium-based grease	
Base oil	Refined mineral oil	
Base oil kinetic viscosity: mm ² /s (40°C)	170	
Worked penetration (25°C, 60 W)	275	
Mixing stability (100,000 W)	345	
Dropping point: °C	193	
Evaporation: mass% (99°C, 22 h)	0.4	
Oil separation rate: mass% (100°C, 24 h)	0.6	
Copper plate corrosion (B method, 100°C, 24 h)	Accepted	
Low temperature torque: mN·m (-20°C)	Startup	130
	Rotation	51
4-ball test (fusion load): N	3089	
Operating temperature range (°C)	-15 to 100	
Appearance color	Brownish yellow	



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

8. Appendix

8. Appendix

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 dust-generation 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 dust-generation 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
Operating temperature range (°C)		-40 to 120
Appearance color		Reddish brown



Fig. 8 Appearance of the grease tube and the product box

8. Appendix

8. Appendix

8-4

Introduction of the grease gun unit

Grease Gun Unit MG70



The grease gun unit MG70 is capable of supplying grease for SKR/KR 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 2 shows the specifications of the grease gun while Fig.9 shows its appearance.

Discharge pressure	19.6 MPa max
Discharge rate	0.6 cc/stroke
Grease	70 g bellows cartridge
Overall length	235 mm (excluding nozzle)
Weight	480 g (with nozzle, excluding grease)

Table 2 Specifications of the grease gun

8. Appendix

8. Appendix

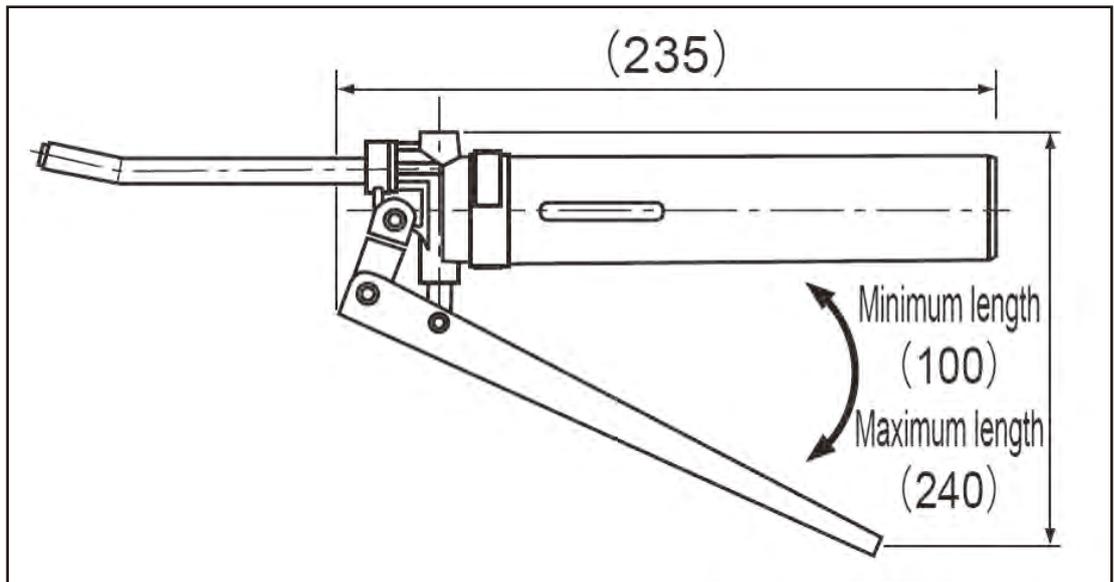


Fig. 9 Appearance of the grease gun

Fig. 10 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.

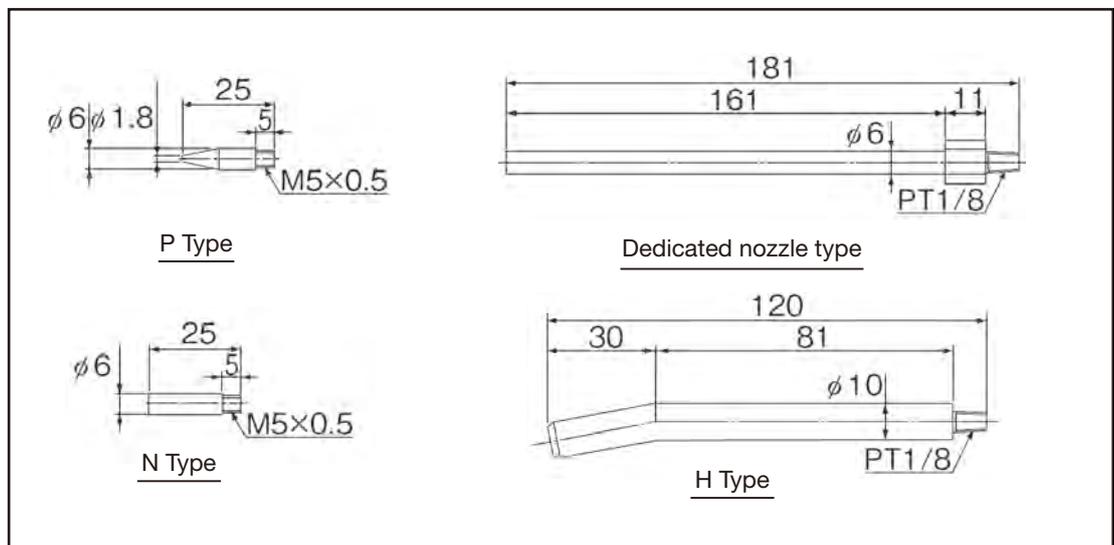


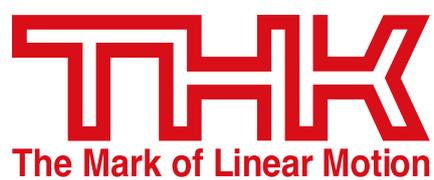
Fig. 10 Shapes of the nozzles and the attachments for the grease gun

Appendix

Revision history

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

Date of issue	Instruction manual No.	Details
May 2016	No.2060-1(0) E	First edition
November 2017	No.2060-2(0) E	<ul style="list-style-type: none">· Errata corrected (permissible input torque, etc.)· Text deleted concerning the LXA and LXA-S controllers due to production stop· Images updated for the grease tube and decorative box (new appearance)



THK Electric Actuator Compact Series

SKR/KR

INSTRUCTION MANUAL