

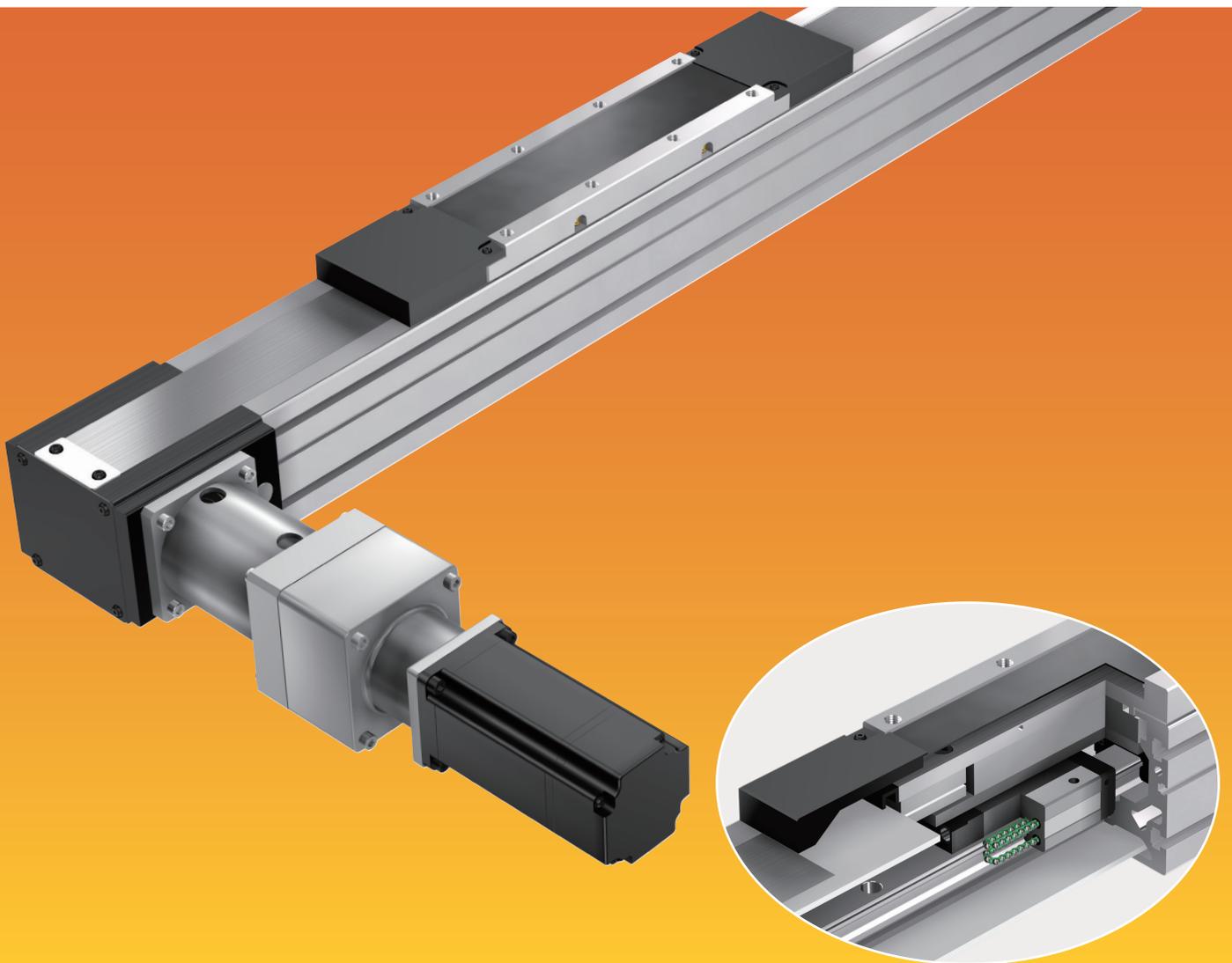


**NEW**

# LM Actuator

Optimal for high speed and long stroke  
Long term maintenance-free operation is actualized  
Lightweight, compact structure

# TY



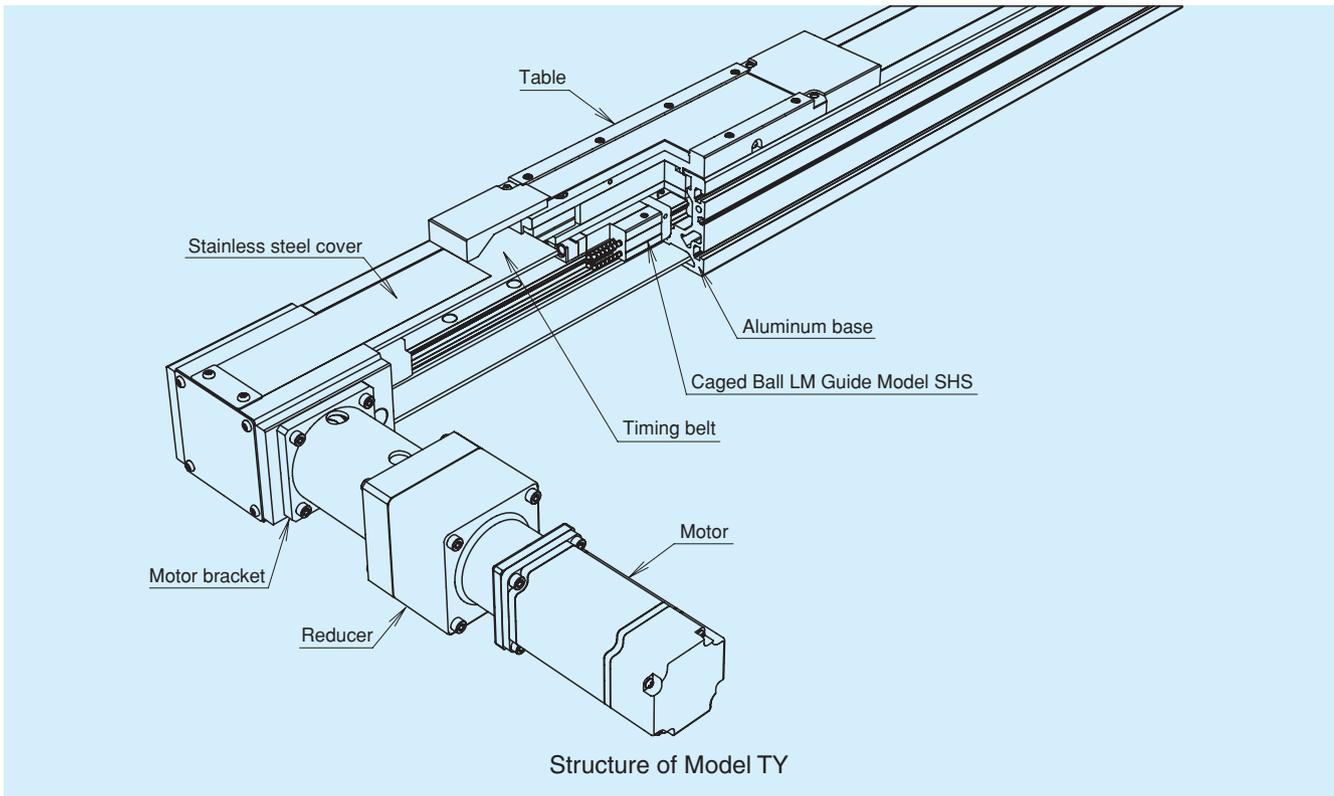
For details, visit THK at [www.thk.com](http://www.thk.com)  
\*Product information is updated regularly on the THK website.

**THK CO., LTD.**  
TOKYO. JAPAN

CATALOG No.352-1E

## Structure of Model TY

This belt drive actuator has a caged ball LM Guide combined with a lightweight and compact aluminum base. Options such as a stainless steel cover, a motor bracket or a sensor make it useful for a variety of applications.



## Features of Model TY

### 1. Optimal for long stroke high speed conveyance

A maximum stroke of 4749 mm\* is possible due to the belt drive method.

A maximum travel speed of 3400 mm/s is possible when an AC servomotor (rated rotational speed 3000 min.<sup>-1</sup>).

\* Stroke between the mechanical stoppers

Maximum Travel Speed

Unit: mm/s

Model no.	TY20		
Reduction ratio	1/3	1/5	1/9
Maximum travel speed	3400	2000	1100

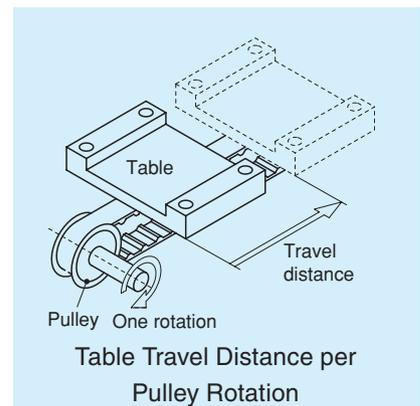
Note 1) Please note that when the stroke is short, it may not reach the maximum travel speed.

Note 2) The maximum travel speed for actuators with a stainless steel cover is 2500 mm/s.

Table Travel Distance per Pulley Rotation

Pitch circle diameter of the pulley [mm]	Table travel distance per pulley rotation [mm]	Table travel distance [mm] per motor rotation		
		Reduction ratio: 1/3	Reduction ratio: 1/5	Reduction ratio: 1/9
65.25	205	68.3	41	22.8

Note) The timing pulley has a large pitch circle diameter, so THK recommends the use of a reducer.



## 2. Long service life and long term maintenance-free operation

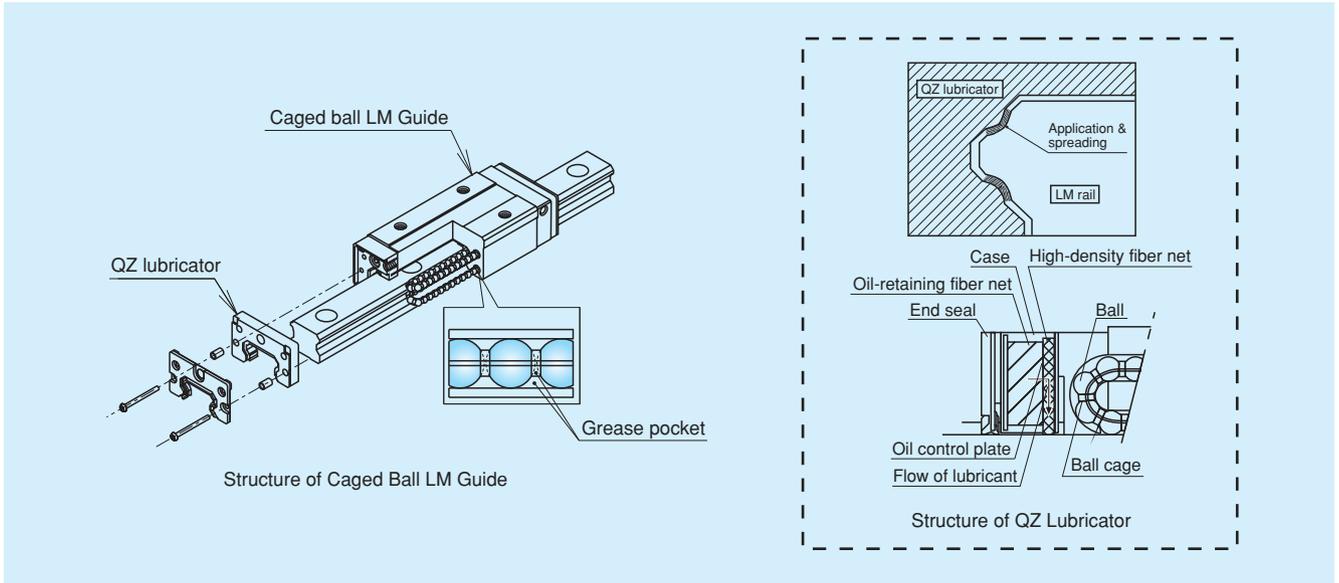
Built-in Caged Ball LM Guide model SHS.

Long service life and long term maintenance-free operation are possible because there is no mutual friction between the balls and grease retention is improved due to the effect of the caged ball.

QZ Lubricator is equipped as standard\*.

The QZ Lubricator supplies an optimal amount of lubricant to the raceway of the LM rail, substantially extending maintenance intervals.

\* For Model TY, the QZ Lubricator is equipped on a single side only for each LM block.

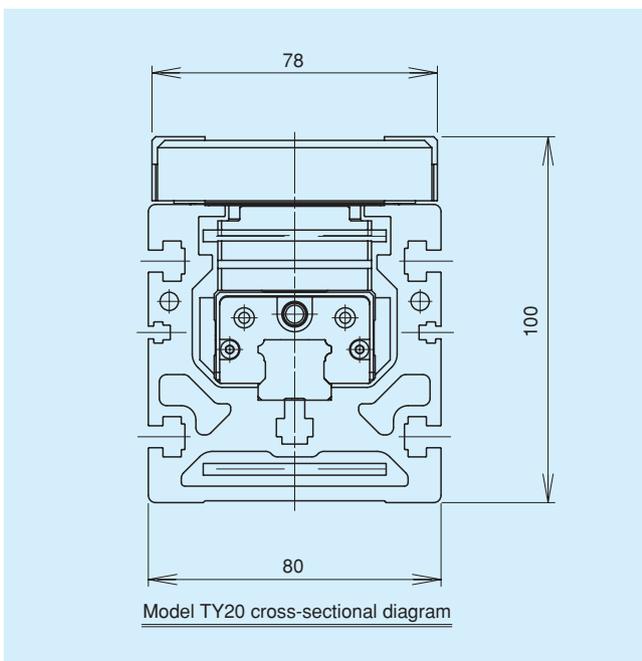


## 3. Quality dustproof cover optional\*

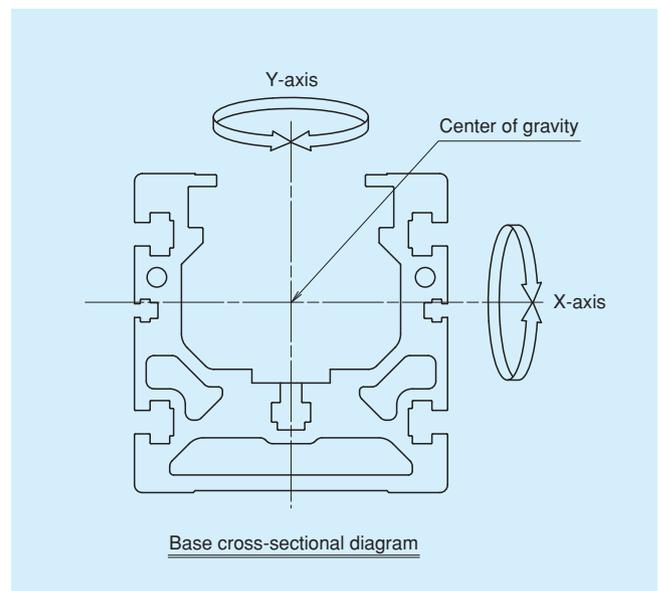
A tightly sealing stainless steel cover prevents foreign matter from entering the actuator.

\* Please note that, with a stainless steel cover, maximum base length and maximum travel speed will be restricted.  
(Maximum base length: 3540 mm; maximum travel speed: 2500 mm/s)

## 4. Lightweight, compact structure



Lightweight and compact structure using narrow-width aluminum extrusion for base material.



Base geometrical moment of inertia	$I_x$ [mm <sup>4</sup> ]	$1.49 \times 10^6$
	$I_y$ [mm <sup>4</sup> ]	$1.94 \times 10^6$
Mass [kg/m]		6.65

## Specifications

Model no.		TY20	
Drive method		Timing belt drive	
Pitch circle diameter of the pulley [mm]		65.25	
Positioning repeatability <sup>Note 1)</sup> [mm]		±0.1	
Mechanical Stroke <sup>Note 2)</sup> [mm]		549 to 4749 (specifications without a stainless steel cover)	
Model no. for LM Guide use		SHS20V (Two blocks)	
LM Guide unit	Basic dynamic load rating C [N]	22300	
	Basic static load rating C <sub>0</sub> [N]	38400	
Static Permissible Load <sup>Note 3)</sup> [N]	Reverse radial direction	28700	
	Lateral direction	9000	
	Axial direction	1100 (when using a concentric type reducer)	
		450 (when using a orthogonal axis type reducer [symbol: D1])	
Static Permissible Moment <sup>Note 4)</sup> [N-m]	M <sub>A</sub>	2000	
	M <sub>B</sub>	600	
	M <sub>C</sub>	500	
Maximum load capacity guideline <sup>Note 5)</sup> [kg] (horizontal mount)	Reduction ratio 1/3	Motor ouput 750 W	15
	Reduction ratio 1/5	Motor ouput 750 W	30
	Reduction ratio 1/9	Motor ouput 400 W	55

Note 1) Positioning repeatability is standardized at an ambient temperature of 20°C.

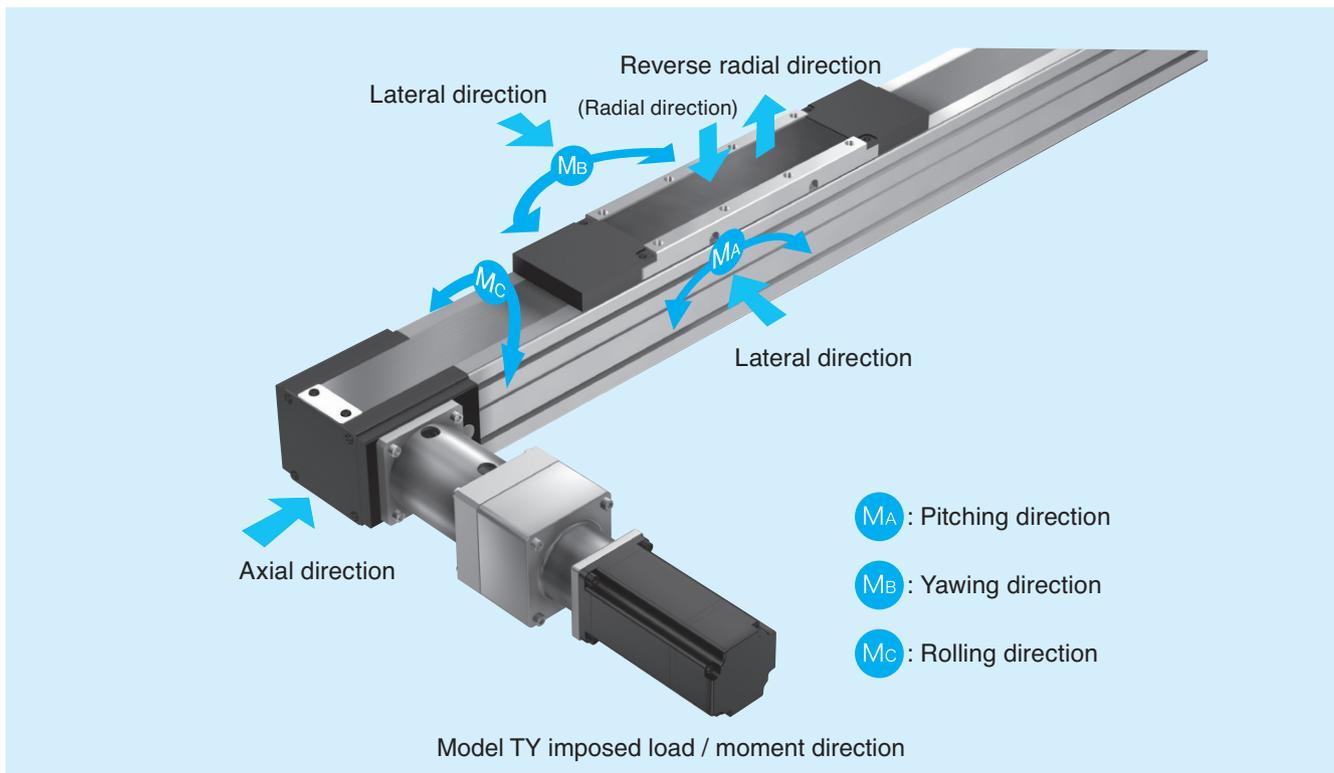
Note 2) Effective stroke is less than mechanical stroke for stainless steel cover option.

Please refer to the dimensions tables for details (page 6).

Note 3) The static permissible load is determined by either the bolt tightening strength or static rated load of the LM Guide unit. For the axial direction, it is determined by the torsional strength of pulley shaft.

Note 4) Static permissible moment is the maximum value of the moment that can load on each direction.

Note 5) Maximum load capacity guideline is the load during rated speed of the motor at the acceleration/deceleration of 0.5G. Also, the travel life of the LM Guide unit must be evaluated separately. For details, see the appendix on page 13.



## Model Number Chart

**TY20 - 084 - B1 - C - B**

①

②

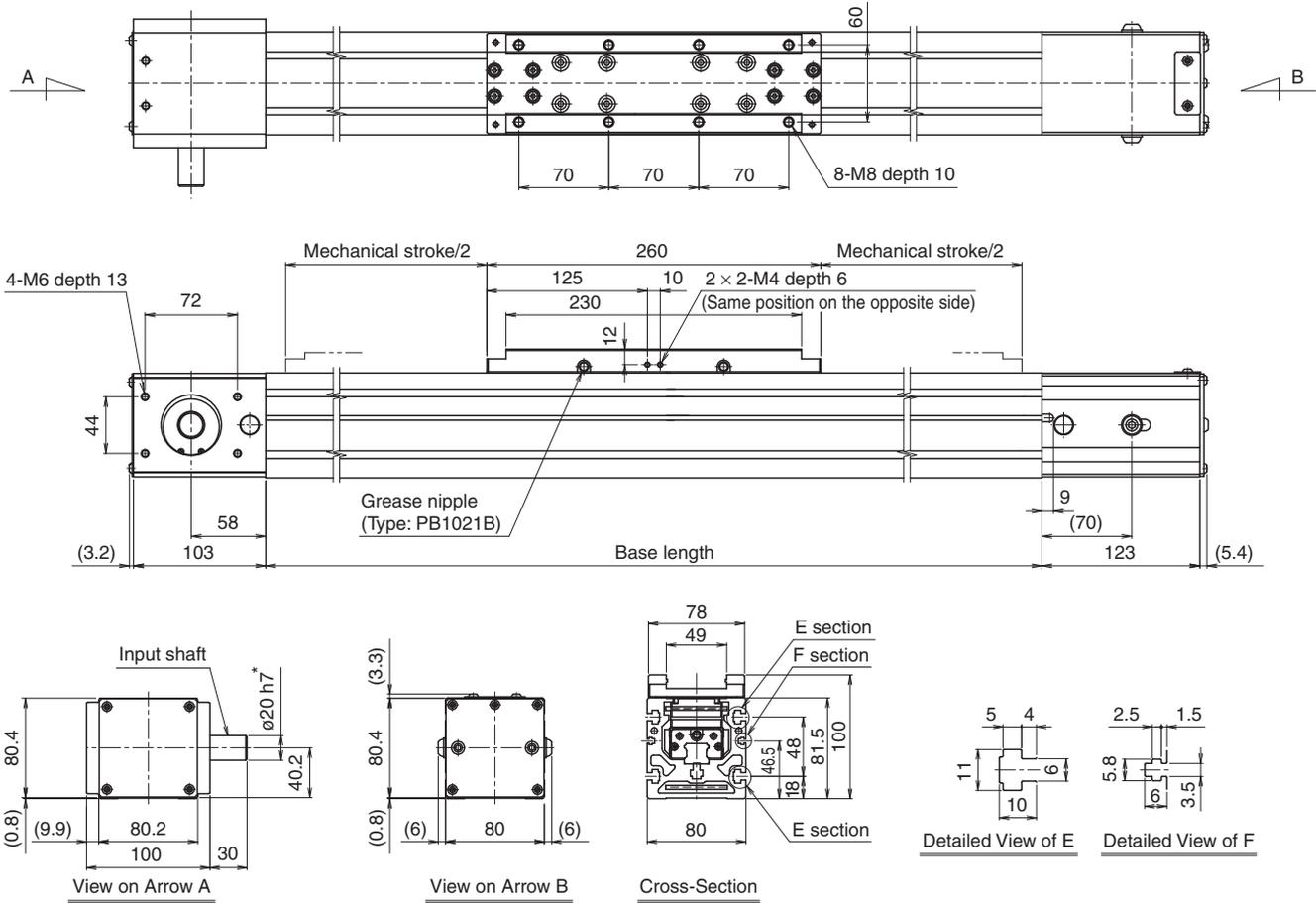
③

④

⑤

① Model no.	TY20
② Base length	e.g.: if it is 840 mm: 084 if it is 1020 mm: 102
③ Motor bracket	N: No motor bracket <b>For concentric type reducer</b> B1: Pilot diameter $\varnothing$ 50H7, $\varnothing$ 5.5, PCD60 B2: Pilot diameter $\varnothing$ 70H7, $\varnothing$ 6.6, PCD90 <b>For orthogonal axis type reducer</b> D1: Pilot diameter $\varnothing$ 70H7, M6, PCD90 D2: Pilot diameter $\varnothing$ 80H7, M6, PCD100
④ Cover	N: No cover C: With a stainless steel cover
⑤ Sensor	N: None B: Photo Sensor EE-SX674 (3 pcs.) D1: Proximity Sensor GL-N12F (3 pcs.) D2: Proximity Sensor GL-N12F (1 pc.), GL-N12FB (2 pcs.)

# Model TY20 (No cover)



\* When installing an orthogonal axis type reducer, please note that the input shaft will differ (see page 8).

Base length [mm]	840	1020	1320	1620	1920	2220	2520	2820	3120
Mechanical stroke [mm]	549	729	1029	1329	1629	1929	2229	2529	2829
Main unit weight [kg]	13.4	15.1	17.9	20.7	23.5	26.3	29.1	31.9	34.7

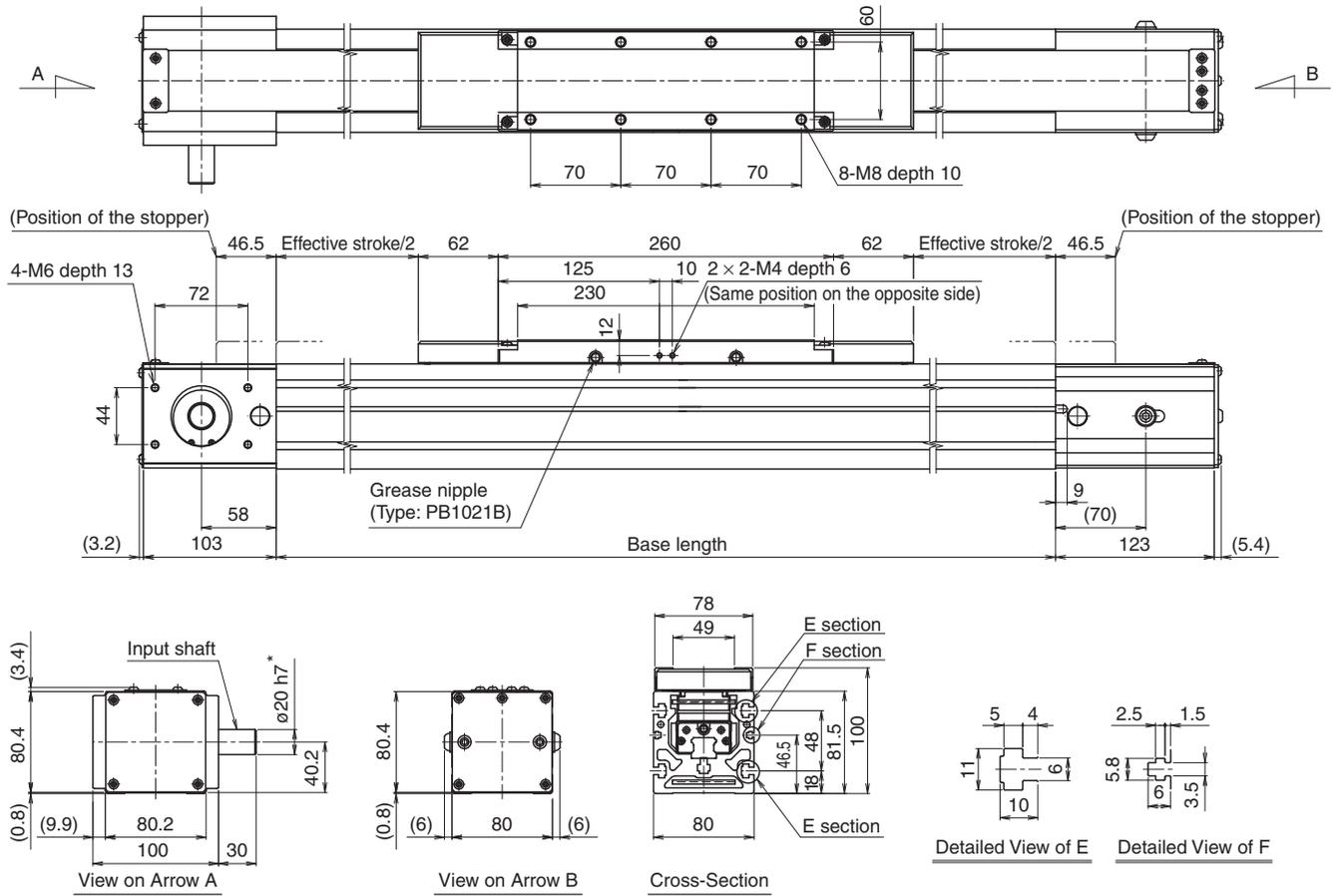
Base length [mm]	3420	3720	4020	4320	4620	5040
Mechanical stroke [mm]	3129	3429	3729	4029	4329	4749
Main unit weight [kg]	37.5	40.3	43.1	45.9	48.7	52.6

Note 1) Above figure shows the slider in mid-stroke.

Note 2) Please contact THK for strokes other than those listed above.

Note 3) Please install the unit using the T-slot (E section) on the side (see page 12).

## Model TY20 (With stainless steel cover)



\* When installing an orthogonal axis type reducer, please note that the input shaft will differ (see page 8).

Base length [mm]	840	1020	1320	1620	1920	2220	2520	2820	3120
Mechanical stroke [mm]	549	729	1029	1329	1629	1929	2229	2529	2829
Effective stroke [mm]	456	636	936	1236	1536	1836	2136	2436	2736
Main unit weight [kg]	13.8	15.5	18.3	21.2	24.0	26.8	29.6	32.4	35.2

Base length [mm]	3420
Mechanical stroke [mm]	3129
Effective stroke [mm]	3036
Main unit weight [kg]	38.1

Note 1) Above figure shows the slider in mid-stroke.

Note 2) Please use the actuator within effective strokes. Contact THK for strokes other than those listed above.

Note 3) Please install the unit using the T-slot (E section) on the side (see page 12).

Note 4) The maximum manufacturable base length is 3540 mm for stainless steel cover specifications. Please contact THK for details.

## Motor bracket

Motor brackets for various reducers are available.

Table of Supported Motor Bracket for Concentric Type Reducer

Reducer (concentric)				Symbol
Manufacturer	Model no.	Reduction ratio	Rated output [W]	
Shimpo Drives	VR*F-3B-100	1/3	100	B1
	VR*F-3B-200	1/3	200	
	VR*F-3B-400	1/3	400	
	VR*F-5B-100	1/5	100	
	VR*F-5B-200	1/5	200	
	VR*F-S9B-100	1/9	100	
	VR*F-3C-750	1/3	750	B2
	VR*F-5C-400	1/5	400	
	VR*F-5C-750	1/5	750	
	VR*F-S9C-200	1/9	200	
	VR*F-S9C-400	1/9	400	

Table of Supported Motor Bracket for Orthogonal Axis Type Reducer

Reducer (orthogonal axis)				Symbol
Manufacturer	Model no.	Reduction ratio	Rated output [W]	
Shimpo Drives	NEVSH-3B-100-TH1	1/3	100	D1
	NEVSH-3B-200-TH1	1/3	200	
	NEVSH-3B-400-TH1	1/3	400	
	NEVSH-5B-100-TH1	1/5	100	
	NEVSH-5B-200-TH1	1/5	200	
	NEVSH-9B-100-TH1	1/9	100	
	NEVSH-3C-750-TH1	1/3	750	D2
	NEVSH-5C-400-TH1	1/5	400	
	NEVSH-9C-200-TH1	1/9	200	

Note 1) The load inertial moment is bigger because this product uses the belt drive method. Using a reducer is recommended.

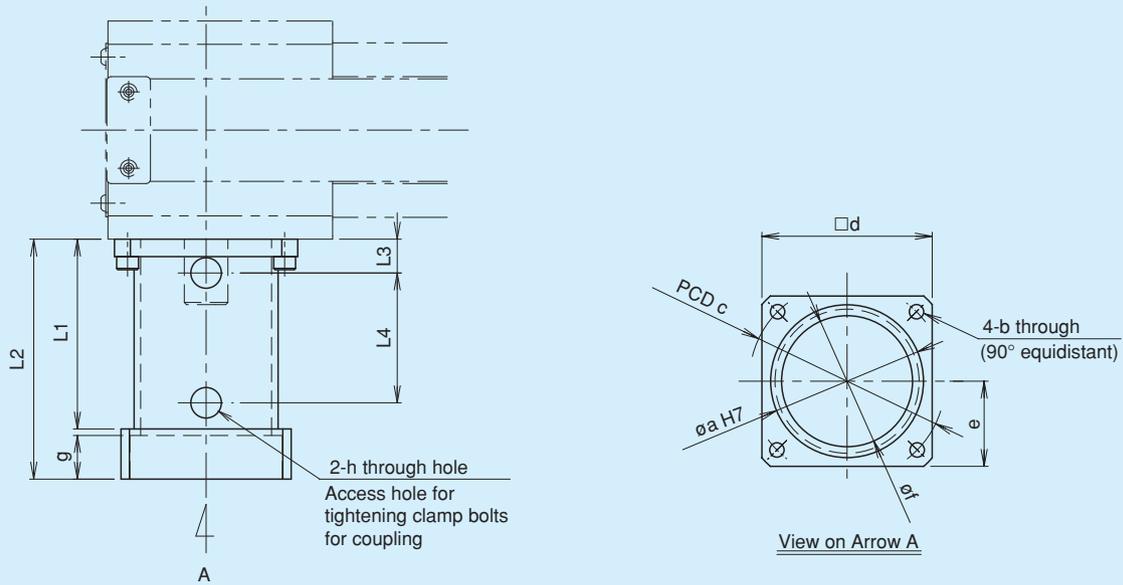
Note 2) Please see Shimpo Drives, Inc.'s catalog for detailed reducer specifications.

Note 3) The orthogonal axis type reducer is a special specification. Please contact THK for details.

Note 4) If a reducer is installed by THK, please provide the motor manufacturer and model number of the motor.

## Motor bracket dimensions

### Motor bracket for concentric type reducer

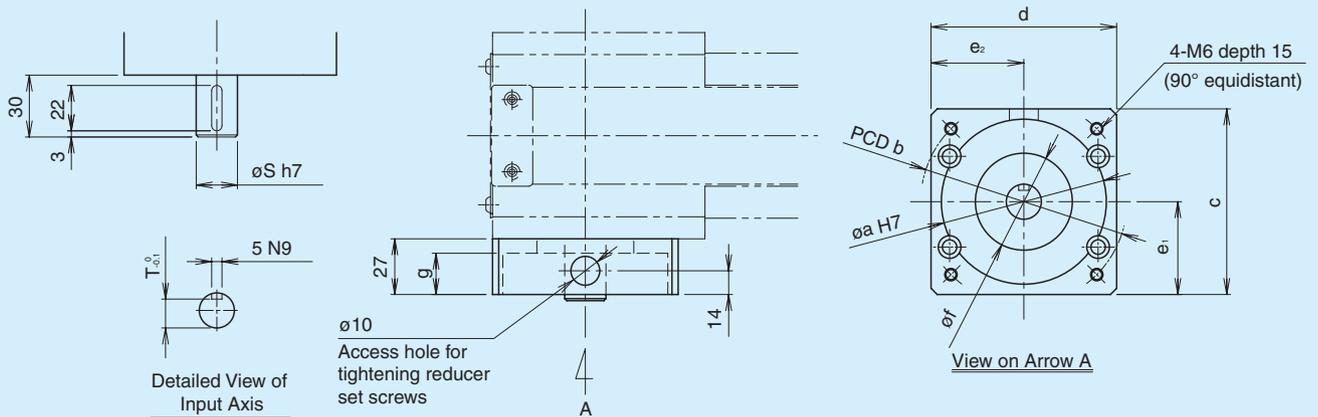


Dimensions of Motor Bracket for Concentric Type Reducer

Unit: mm

Motor bracket code	Motor bracket dimensions											
	a	b	c	d	e	f	g	h	L1	L2	L3	L4
B1	50	5.5	60	56	28	45	14	12	73	87	20	40
B2	70	6.6	90	78	39	60	20	14	90	110	15.5	59.5

### Motor bracket for orthogonal axis type reducer



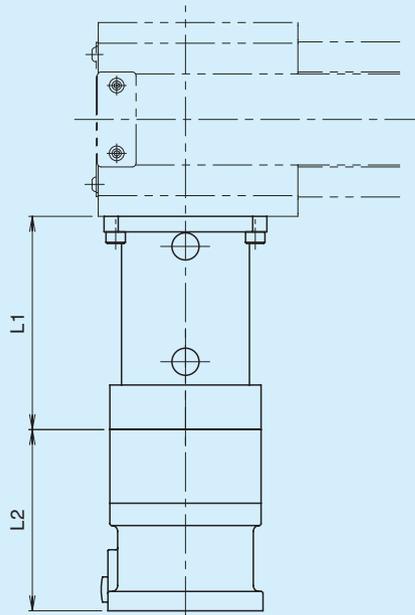
Dimensions of Motor Bracket for Orthogonal Axis Type Reducer

Unit: mm

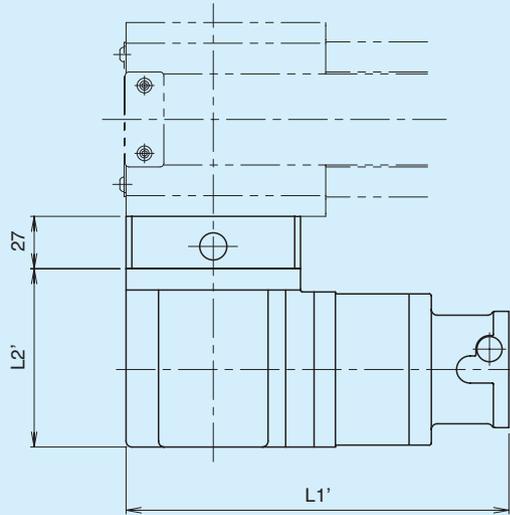
Motor bracket code	Motor bracket dimensions										
	a	b	c	d	e <sub>1</sub>	e <sub>2</sub>	f	g	S	T	
D1	70	90	78	86	39	43	—	—	13	10	
D2	80	100	90	90	45	45	47	20	17	14	

Note) Keys are not included in the reducer. Please have keys ready when installing the reducer.

## Concentric type reducer



## Orthogonal axis type reducer

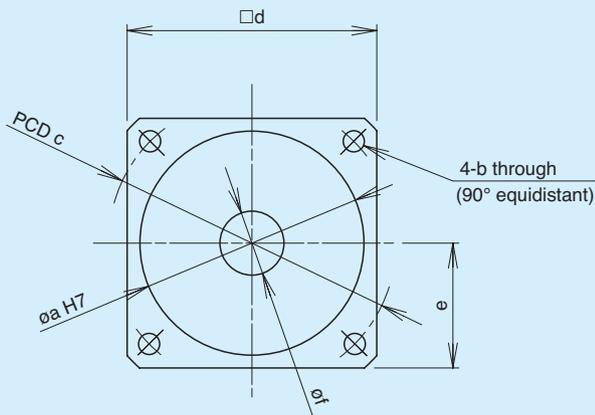


### Dimensions When Mounting the Reducer

Reducer (concentric)				External dimensions of reducer [mm]	
Manufacturer	Model no.	Reduction ratio	Rated output [W]	L1	L2
Shimpo Drives	VR*F-3B-100	1/3	100	87	67.5
	VR*F-3B-200	1/3	200		72.5
	VR*F-3B-400	1/3	400		72.5
	VR*F-5B-100	1/5	100		67.5
	VR*F-5B-200	1/5	200		72.5
	VR*F-S9B-100	1/9	100		67.5
	VR*F-3C-750	1/3	750	110	93.5
	VR*F-5C-400	1/5	400		89.5
	VR*F-5C-750	1/5	750		93.5
	VR*F-S9C-200	1/9	200		89.5
VR*F-S9C-400	1/9	400		89.5	

Reducer (orthogonal axis)				External dimensions of reducer [mm]	
Manufacturer	Model no.	Reduction ratio	Rated output [W]	L1'	L2'
Shimpo Drives	NEVSH-3B-100-TH1	1/3	100	144.5	89
	NEVSH-3B-200-TH1	1/3	200	149.5	
	NEVSH-3B-400-TH1	1/3	400	149.5	
	NEVSH-5B-100-TH1	1/5	100	163.5	
	NEVSH-5B-200-TH1	1/5	200	168.5	
	NEVSH-9B-100-TH1	1/9	100	163.5	
	NEVSH-3C-750-TH1	1/3	750	171.5	92
	NEVSH-5C-400-TH1	1/5	400	197.5	
	NEVSH-9C-200-TH1	1/9	200	197.5	

## Dimensions of the reducer mounting section



Dimensions of the Reducer Mounting Section

Unit: mm

Reducer model no.	Mounting section dimensions					
	a	b*	c*	d*	e*	f*
VR*F-3B-100, VR*F-5B-100, VR*F-S9B-100 NEVSH-3B-100-TH1, NEVSH-5B-100-TH1 NEVSH-9B-100-TH1	30	M4	46	40	20	8
	30	M3	45	38	19	8
VR*F-3B-200, VR*F-5B-200, VR*F-S9C-200 NEVSH-3B-200-TH1, NEVSH-5B-200-TH1 NEVSH-9C-200-TH1	50	M5	70	60	30	14
	50	M4	70	60	30	11
VR*F-3B-400, VR*F-5C-400, VR*F-S9C-400 NEVSH-3B-400-TH1, NEVSH-5C-400-TH1	50	M5	70	60	30	14
	50	M4	70	60	30	14
VR*F-3C-750, VR*F-5C-750, NEVSH-3C-750-TH1	70	M5	90	80	40	19
	70	M6	90	80	40	16
	70	M6	90	80	40	19

\* Please select the dimensions according to the motor.

## Sensor

Model TY can equip various sensors to the T-groove at the side of the base.

When selecting a sensor, please specify using the corresponding code from the table below.

Tables of Various Sensors

Type	Output operation	Sensor model number	No. of units	Manufacturer	Symbol
Photo Sensor	N.O. / N.C. (selectable)	EE-SX674	3	OMRON	B
Proximity Sensor	N.O. (Normally Open)	GL-N12F	3	SUNX	D1
	N.O. (Normally Open)	GL-N12F	1		D2
	N.C. (Normally Closed)	GL-N12FB	2		

Note 1) All sensor outputs are NPN outputs.

Note 2) N.O. contact point is a normally-open type; N.C. contact point is a normally-closed type.

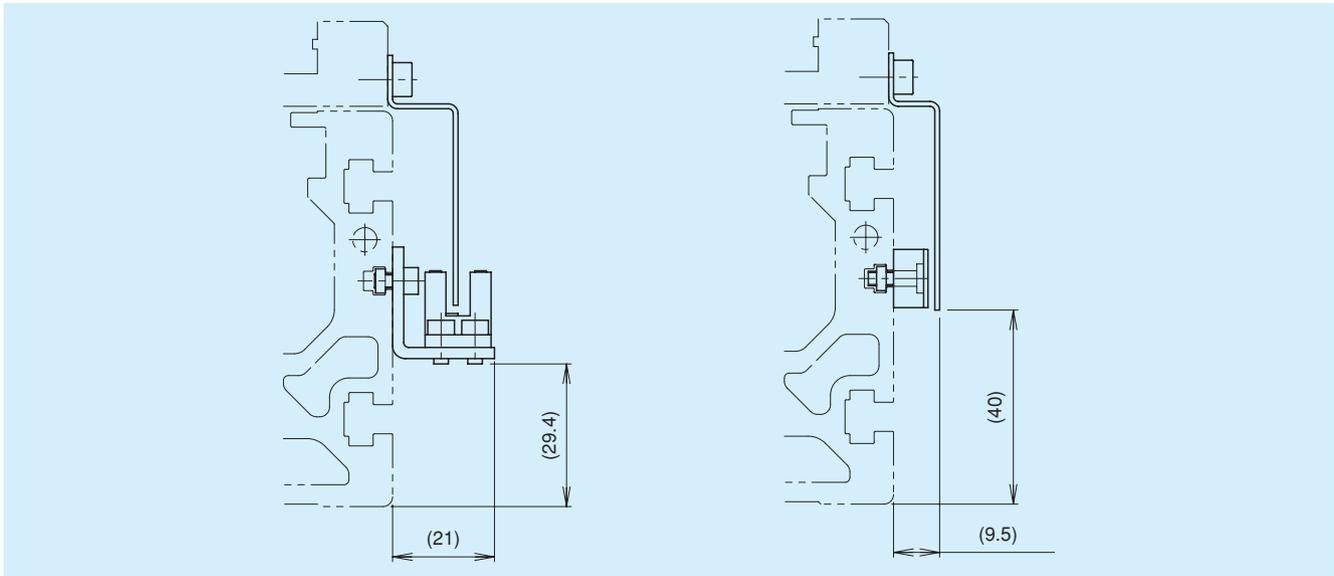
Note 3) Sensors are mounted on the product before being shipped. Please note that a photosensor connector is not included.

## Sensor mounting dimensions

B : EE-SX674 (3 pcs.) [OMRON]

D1 : GL-N12F (3 pcs.) [SUNX]

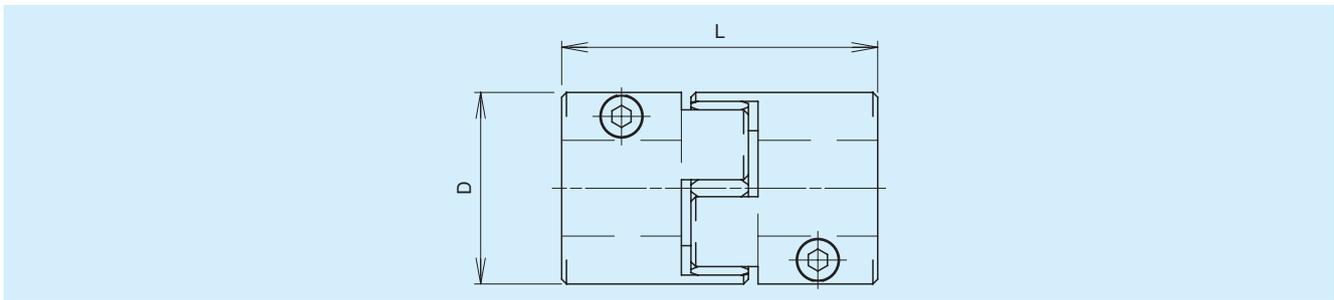
D2 : GL-N12F (1 pc.) [SUNX]  
GL-N12FB (2 pcs.) [SUNX]



\* The direction of the sensor is changeable. The sensor can be removed by sliding the sensor mounting nut from the opposite side of the motor.

## Coupling

A coupling is not necessary because the orthogonal axis type reducer has coupling-less specifications. When selecting a concentric type reducer, please select a coupling from the table below.



Coupling Model no.	Manufacturer	External dimensions		Applicable Reducers
		L [mm]	D [mm]	
ALS-040-R-12B-20B	Miki Pulley	66	40	VR*F-*B
ALS-055-R-19B-20B		78	55	VR*F-*C

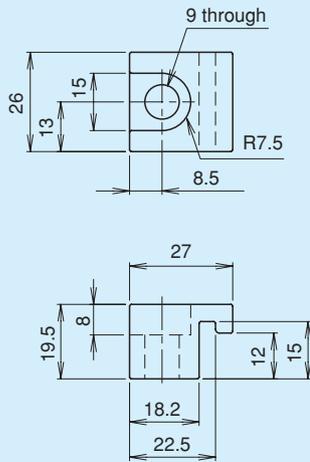
\* Please see the catalog of the coupling manufacturers (Miki Pulley Co., Ltd.) for details.

## Base mounting bracket

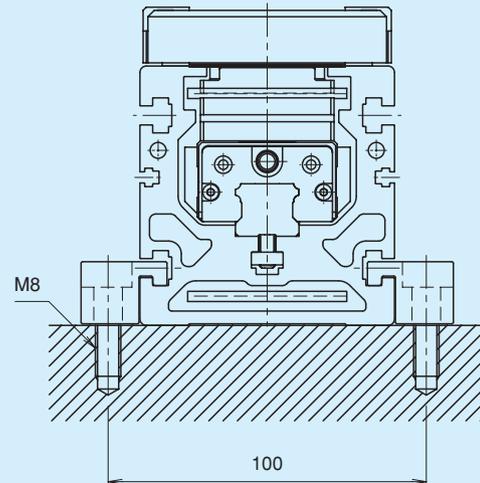
The mounting brackets for mounting the base are available.

Note) this is not a standard attachment, so please specify the number of pieces required.

### Base fixing bracket dimensions



### Example of base fixing bracket use (horizontal mount)



Note 1) Mounting position must be horizontal. If a wall mounting position is used, please contact THK.

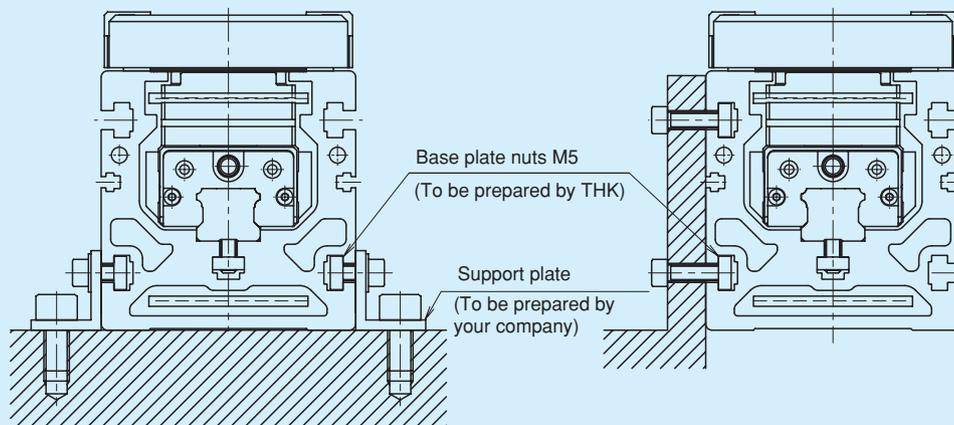
Note 2) Mounting intervals of the base fixing brackets should be approximately 250 to 300 mm.

\* Mount the base fixing bracket by sliding it from the opposite side of the motor.

## Example of mounting the base (horizontal mount)

The diagram below shows a base mounting example without using the base fixing brackets.

Note) Mounting position must be horizontal. If a wall mounting position is used, please contact THK.

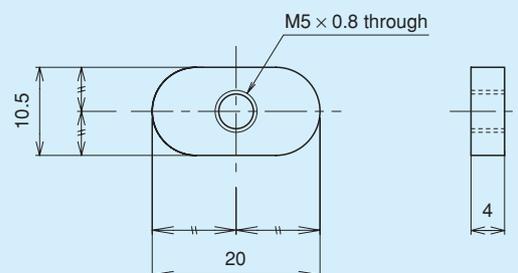


## Dimensions of the nuts for mounting the base

The nuts are available for mounting the base that are used for the above mounting example. This is not a standard attachment, so please specify the number of pieces required.

Note) Mounting intervals of the base mounting nut should be approximately 250 to 300 mm.

\* Mount the base mounting nut by sliding it from the opposite side of the motor.



## Appendix

### Selecting a Model TY

- ① Calculate the service life of the LM Guide from load conditions in order to check that it is sufficiently safe and satisfies the desired service life.
- ↓
- ② Select the motor and check that the output torque of the reducer is the same as permissible input torque of the actuator or less.
- ↓
- ③ Select the options (motor bracket, sensor, cover) as necessary.

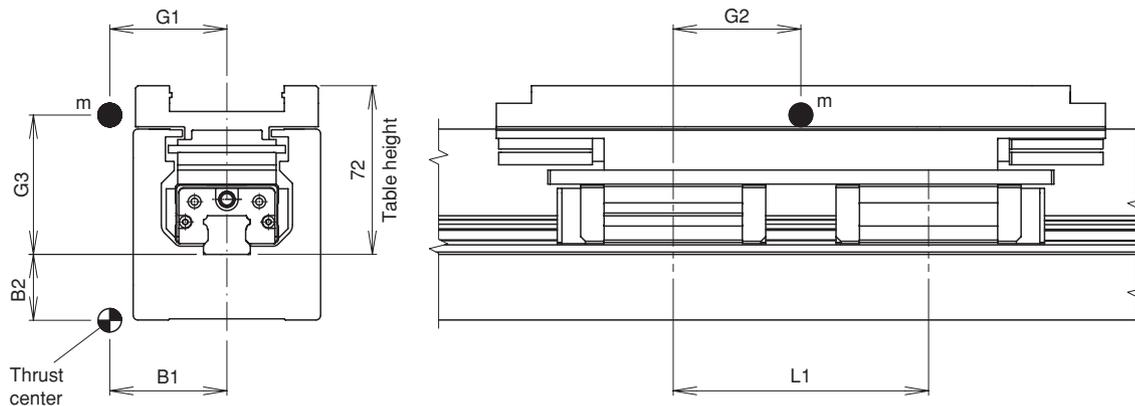
### Service life / static safety factor

For information about the service life and static safety factor of the TY model LM Guide, see the LM Guide section in the General Catalog. Also, rated life of the LM Guide can be calculated in the THK's technical support site (<https://tech.thk.com/>), or using the technical calculation software that is recorded in the CD catalog. See the data in the table below when calculating rated life.

Note) Please note that the calculation of the service life is a theoretical calculation. Under actual operation, life may vary depending on the operating conditions including operating environment, lubricating condition, mounting accuracy, rigidity, etc.

### LM Guide unit

Model no. for LM Guide use	Thrust position		Block span	Movable unit			
	B1 [mm]	B2 [mm]		Mass	Center of gravity position		
			m [kg]	G1 [mm]	G2 [mm]	G3 [mm]	
SHS20V	0	-45	109	1.2	0	54.5	52.2



## Selecting the motor

When selecting the motor for mounting on Model TY, please select by referring to the data in the table below. Please contact each motor manufacturer for information on motor selection and motor specifications.

Timing belt model no.	Timing pulley		
	Model no.	Pitch diameter [mm]	Inertia (total of two pieces) [kg-cm <sup>2</sup> ]
050-MA5	41-MA5-050	65.25	5.8

\* Belt mass: 0.192 kg/m

Belt length = base length × 2 + 280 mm

### [Reference]

Coupling Model no.	Manufacturer	Inertia [kg-cm <sup>2</sup> ]
ALS-040-R-12B-20B	Miki Pulley	0.4
ALS-055-R-19B-20B		1.63

\* Please see the catalog of the coupling manufacturers (Miki Pulley Co., Ltd.) for details.

Concentric type reducer model no.	Inertia [kg-cm <sup>2</sup> ]	Manufacturer
VR*F-3B-100	0.0575	Shimpo Drives
VR*F-5B-100	0.04	
VR*F-S9B-100	0.035	
VR*F-3B-200	0.135	
VR*F-5B-200	0.118	
VR*F-S9C-200	0.275	
VR*F-3B-400	0.145	
VR*F-5C-400	0.363	
VR*F-S9C-400	0.275	
VR*F-3C-750	0.913	
VR*F-5C-750	0.713	

\* Please see the catalog for the reducer manufacturer (Shimpo Drives, Inc.) for details.

Orthogonal axis type reducer model no.	Inertia [kg-cm <sup>2</sup> ]	Manufacturer
NEVSH-3B-100-TH1	0.33	Shimpo Drives
NEVSH-3B-200-TH1	0.338	
NEVSH-3B-400-TH1	0.338	
NEVSH-5B-100-TH1	0.16	
NEVSH-5B-200-TH1	0.271	
NEVSH-9B-100-TH1	0.109	
NEVSH-3C-750-TH1	1.31	
NEVSH-5C-400-TH1	0.727	
NEVSH-9C-200-TH1	0.655	

\* Please see the catalog for the reducer manufacturer (Shimpo Drives, Inc.) for details.

Reducer specifications	Bracket code	Permissible input torque [N-m]
Concentric type reducer	B1, B2	37.3
Orthogonal axis type reducer	D1	15.6
	D2	29.5

## Precautions on Use

### ● Operation

- Unnecessarily disassembling this product may allow foreign objects to enter reduce functionality.
- Do not drop or knock this product. Doing so may cause injury or damage the unit. If the product is dropped or impacted, functionality may be reduced even if there is no surface damage.
- Do not allow foreign matter such as dust and cutting powder to enter. This may damage the ball recirculation part or reduce functionality.
- When the product is in motion or about to be in motion, do not touch any moving parts. Do not go near the actuator when it is in motion.
- 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.
- Anti-rust oil is applied to the input axis for coupling installation. Please wipe the anti-rust oil off completely when installing couplings.
- Mounting position must be horizontal. If a wall mounting position is used, please contact THK.

### ● Environment

The wrong environment can cause poor production failure. The best places to use the device are as follows:

- An environment with an ambient temperature from 0 to 40°C and humidity of no more than 80% RH that will not expose the product to freezing or condensation.
  - \* Contact THK if you are considering using the product in an environment with an operating temperature outside of the specified range.
- A place free from corrosive gas or flammable gas.
- A place free from dust, salt or metal powder.
- A place where water, oil and chemicals will not get on the product.
- Places where vibration or impact are not transmitted to the unit.
- Contact THK if the product will be used in a special environment, such as one with constant vibration, a clean room, a vacuum, or a low-/high-temperature environment.

### ● Lubrication

- Please use this product after sealing lubricant.
- In order to effectively use this product, lubrication is required. Insufficient lubrication may increase abrasion on the rolling part and shorten service life. THK AFB-LF grease, the standard grease for this product, is enclosed.
- Do not use a mix of lubricants with different physical properties.
- Please contact THK if using special lubricants.
- Please contact THK if using this product with oil lubrication.
- The greasing interval is usually 100 km; however, this may vary depending on the operating conditions, so THK recommends determining a greasing interval during the initial inspection.
- Regular lubricants may not be used when this product is operated in a special environment such as one with constant vibration, a clean room, a vacuum, or low-/ high-temperature environment. In such cases, please contact THK.

### ● Storage

- When storing the product, enclose it in a package designated by THK and store it in a horizontal orientation while avoiding locations subject to high temperature, low temperature and high humidity.

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