

TSUBAKI MITER GEAR BOX ARA GEAR BOX



With more than **half a century** of
Tsubaki Miter Gear Boxes are used for



Tsubaki Miter Gear Boxes have been preferred by customers for a wide range of applications and specifications ever since their launch in 1966. Both Miter Gear Boxes and ARA Gear Boxes are available in standard and special specifications to best meet your needs.

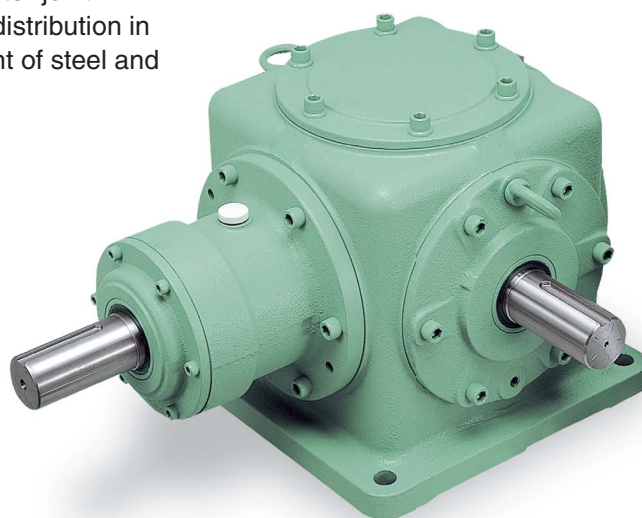
rich experience,

varieties of applications around the world.

Miter Gear Box

The Miter Gear Box takes its name after the spiral gear's miter-joint. Leading the industry, Tsubaki commenced production and distribution in 1966 and has been steadily increasing with the development of steel and other heavy industries.

Reduction ratio	1:1, 1.5:1, 2:1, 2.5:1, 3:1
Size	10 sizes
Shaft arrangement	42 patterns
Case material	Gray cast iron (FC) Ductile cast iron (FCD) * ED2 is die cast aluminum (ADC)

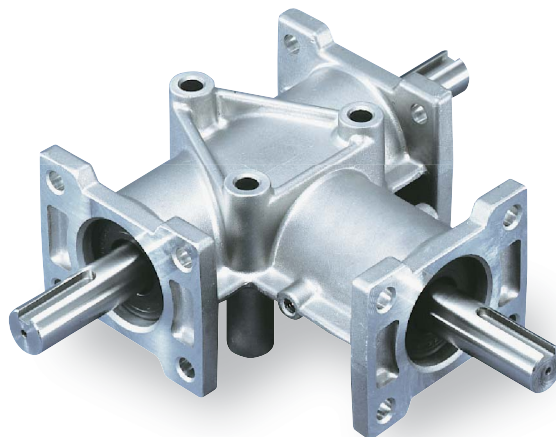


ARA Gear Box

ARA Gear Boxes were first released in 1987 as a smaller series of Miter Gear Boxes.

ARA stands for "Aluminum Right Angle." Tsubaki ARA Gear Boxes have been used in food processing machinery and many applications in the IT industry.

Reduction ratio	1:1, 2:1
Size	3 sizes
Shaft arrangement	3 patterns
Case material	Die cast aluminum (ADC)



Contents

■ Miter Gear Box

Features, Structure, and Functions	Page 7
Lineup	Page 9
Standard Specifications	Page 10
Models	Page 11
Selection	Page 15
Transmission Capacity Table	Page 17
Dimensional Drawings	Page 21

■ ARA Gear Box

Features and Lineup	Page 39
Models	Page 40
Transmission Capacity Tables and Dimensional Drawings	Page 41

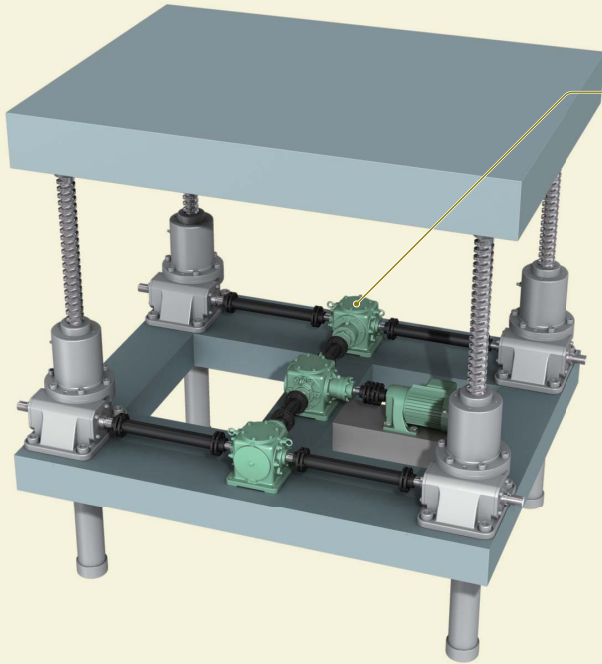
■ Technical Data

Technical Data	Page 45
Options	Page 48
Special Types	Page 50
Handling	Page 53
Inquiry Form	Page 58
Jack System Selection Service	Page 59



Tsubaki offers better

Miter Gear Box



Lifting equipment

For table lifting, jack system drive units that combine a gear motor, Miter Gear Boxes, couplings, and jacks are widely used. The system is used in many applications, such as LCD and semiconductor production, servo presses, and stage equipment.

Benefits

Tsubaki offers jack lifting system components to suit customer layout and use conditions (page 58 and 59).

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings
- Lini Power Jacks

Conveyor lifter

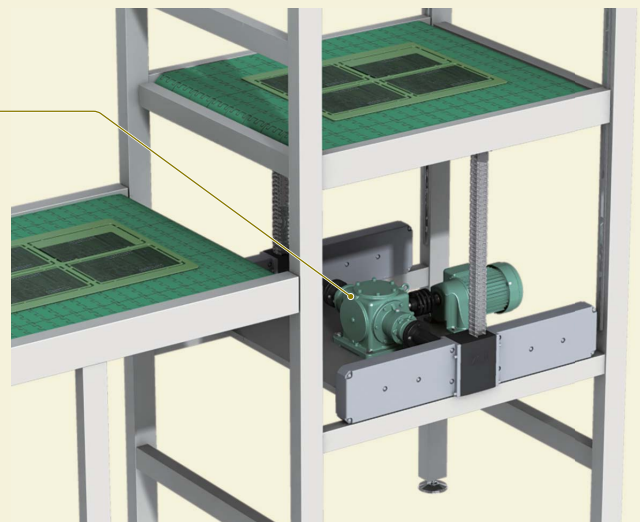
While different types of conveyor lifting mechanisms exist, smaller sizes are in demand for the drive section. Miter Gear Boxes allow changing the direction of drive shafts and distribution of power, which makes them a preferred choice for a wide variety of applications.

Benefits

By combining gear motors, Miter Gear Boxes, and a Zip Chain Lifter for stepped lifting in conveyors, productivity can be improved by having a lower drive section and higher speed.

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings
- Zip Chain Actuators



Carton box former

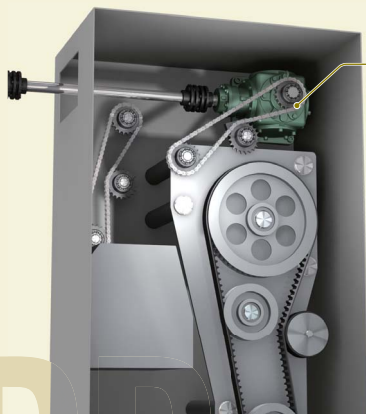
Carton box formers need complex directional changes in the drive section. Miter gear box fit and perform in limited spaces.

Benefits

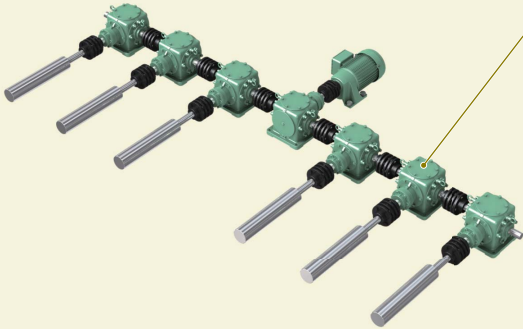
Transmission direction can be changed even in complex, limited spaces. Gear boxes can be mounted on both ceilings and walls, which offer greater flexibility in system layout as well as better maintenance accessibility.

Related products

- Echt-Flex Couplings



specifications for any application.



Iron process roller conveyor

Connecting multiple Miter Gear Boxes to a single drive makes steady conveyor speed with double mechanical synchronization.

Benefits

The synchronous multiple drive sections offer a simple design and better maintenance accessibility.

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings

Pipe forming machine

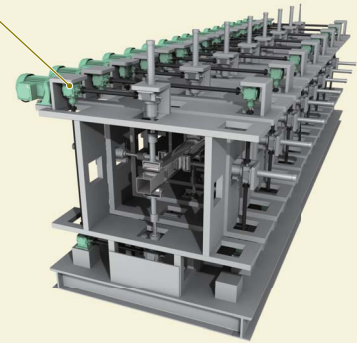
In a pipe forming machine, the drive from multiple gear motors is transmitted via couplings to the jacks for forming.

Benefits

Using gear motors, couplings, Miter Gear Boxes, and jacks enables synchronized operation as well as downsizes the drive section.

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings
- Lini Power Jacks



ARA Gear Box



Agitator

With multiple ARA Gear Boxes, the agitator fins can be efficiently rotated only by one drive.

Benefits

Connecting multiple ARA Gear Boxes to a single gear motor makes the drive section simple and lowers the costs. Additionally, shaft arrangement can be changed to switch the rotation of the agitator fins, offering increased flexibility.

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings

Food packaging machine

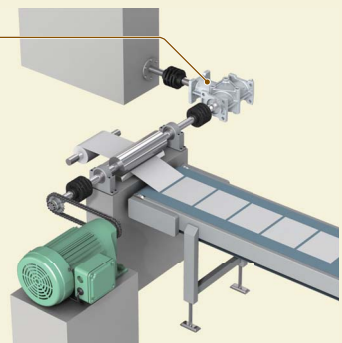
By coordinating with the packaging machine's film counter, the gear box setup can also be used to count the packages.

Benefits

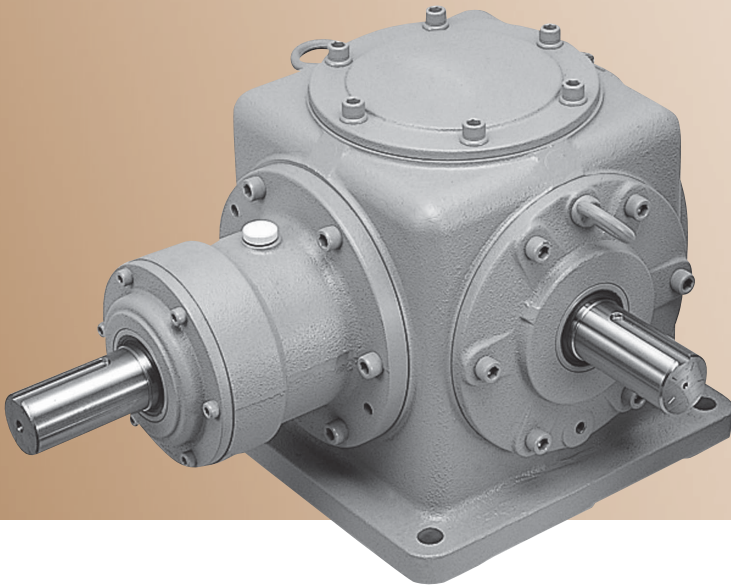
Compact design of ARA Gear Boxes saves space. Good corrosion resistance with stainless steel shafts.

Related products

- Gear Motors
- Hypoid Motors
- Croise Motors
- Echt-Flex Couplings



Miter Gear Box



C O N T E N T S

Features, Structure, and Functions	Page 7
Lineup	Page 9
Standard Specifications	Page 10
Models	Page 11
Shaft Arrangements, Rotation Details, and Mounting Types	
Selection	Page 15
Transmission Capacity Table ...	Page 17
Dimensional Drawings	Page 21

Miter Gear Box

Features, Structure, and Functions

Features

Wide variety of models

We offer a wide range of variations from which you can choose the unit best suited to your needs. Tsubaki provides customized models to serve every application need.

High quality

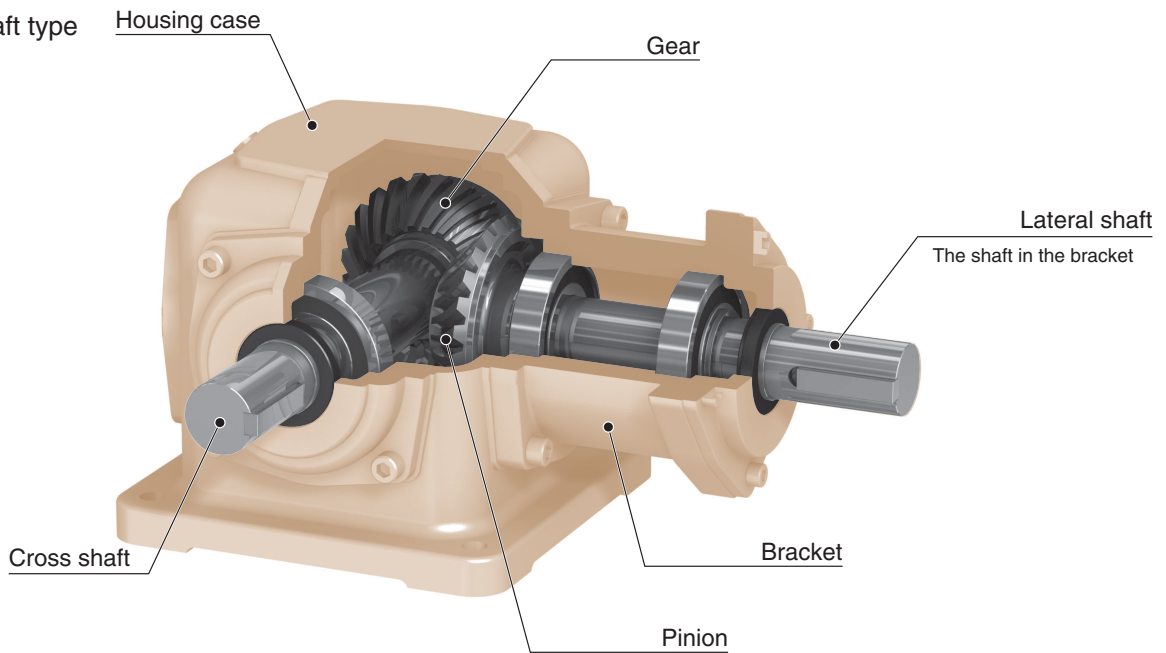
Tsubaki's precision spiral bevel gear is based on AGMA standards and it ensures advanced functionality, including high efficiency and high transmission capacity.

Standardized design

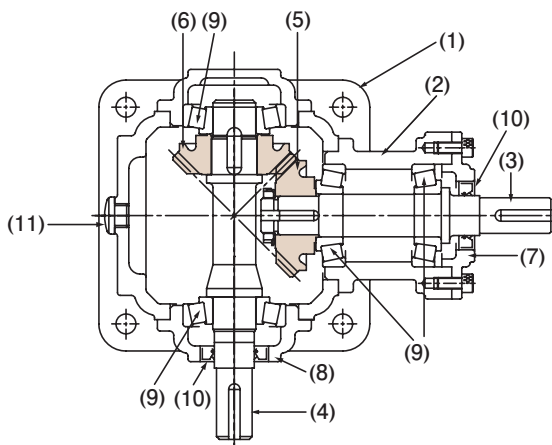
A wide range of models are standardized design, and we offer best fitting model to application needs.

Structure

Horizontal shaft type



Internal structure of ED6M-1-L-O-Y



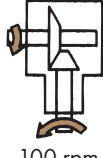

- (1) Housing case
- (2) Bracket
- (3) Lateral shaft
- (4) Cross shaft
- (5) Pinion
- (6) Gear
- (7) Input seal support
- (8) Output bearing support
- (9) Taper roller bearing
(Sizes 2 and 4 are ball bearings)
- (10) Oil seal
- (11) Oil gauge

Note: No oil gauge for sizes 2 and 4 (Grease lubrication).

1. Input can be from either the lateral shaft or cross shaft.

However, with models that have a reduction ratio other than 1:1, input from the lateral shaft to the cross shaft produces reduced speed while the opposite produces increased speed.

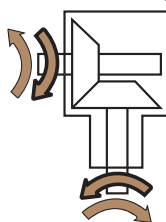
Reference of ED-B

Lateral shaft input/Cross shaft output		Cross shaft input/Lateral shaft output			
50 rpm		[Reduced speed] 100 rpm input from lateral shaft / 50 rpm output from cross shaft	100 rpm		[Increased speed] 100 rpm input from cross shaft / 200 rpm output from lateral shaft

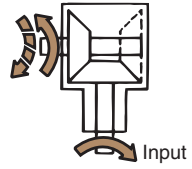
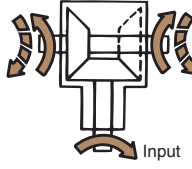
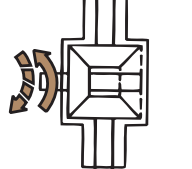
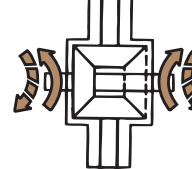
* This explains the output shaft rotation speed when the input is 100 rpm with a reduction ratio of 2:1 (ED00-B20).

* The values in the transmission capacity tables on pages 17 through 20 are based on a lateral shaft input and cross shaft output.

2. The input shaft can rotate to both the left and right.



3. Lateral 1- and 2-shaft types

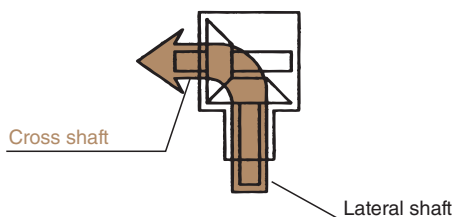
Lateral 1-shaft type		Lateral 2-shaft type	
2-shaft	3-shaft	3-shaft	4-shaft
			

* Reversing the gear mounting position (shown in dotted line) changes the direction of the rotation.

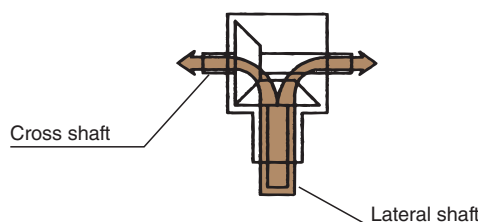
Functions

Basic functions

1. Changes the direction of power transmission by 90°.

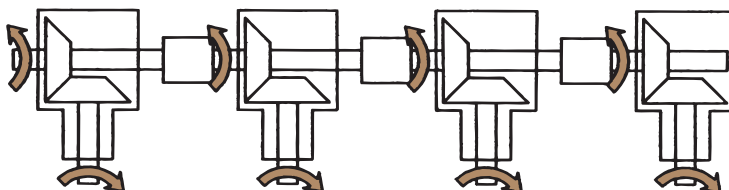


2. Changes the direction of power transmission by 90° and distributes the power horizontally (vertically).

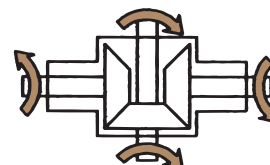


Examples of application

3. Align the Miter Gear Boxes and connect cross shafts for input, rotating the mechanical synchronize lateral shaft.



4. Using a lateral 2-shaft type, power input from the cross shaft rotates the lateral shafts in the opposite direction.



Miter Gear Box

Lineup

Lineup

1. Lateral 1-shaft type

○: Standard product △: Semi-standard product

Size	Reduction ratio		M (1:1)		B15 (1.5:1)		B20 (2:1)		B25 (2.5:1)		B30 (3:1)	
	Material		FC	FCD	FC	FCD	FC	FCD	FC	FCD	FC	FCD
2	○ (ADC)		—	—	—	—	—	—	—	—	—	—
4	○	△	—	—	○	△	—	—	—	—	—	—
6	○	△	○	△	○	△	○	△	○	△	○	△
7	○	△	○	△	○	△	○	△	○	△	○	△
8	○	△	○	△	○	△	○	△	○	△	○	△
10	○	△	○	△	○	△	○	△	○	△	○	△
12	○	△	○	△	○	△	○	△	○	△	○	△
16	○	△	—	—	○	△	—	—	—	—	—	—
20	○	—	—	—	○	—	—	—	—	—	—	—
25	○	—	—	—	○	—	—	—	—	—	—	—

2. Lateral 2-shaft type

Size	Reduction ratio		M (1:1)	B15 (1.5:1)	B20 (2:1)	B25 (2.5:1)	B30 (3:1)
	Material		FC				
2	*△ (ADC)		—	—	—	—	—
4	○		—	○	—	—	—
6	○		○	○	○	○	○
7	○		○	○	○	○	○
8	○		○	○	○	○	○
10	○		○	○	○	○	○
12	○		○	○	○	○	○
16	△		—	△	—	—	—
20	△		—	△	—	—	—
25	△		—	△	—	—	—

Note 1. ADC (Aluminum die-cast), FC (Gray cast iron), FCD (Ductile cast iron)

2. ED2 is available for the following shaft arrangements: 1-1-UD(-O), 1-1-U(-O), 1-1-D(-O), U-D-LR(-O), U-D-R(-O), and U-D-L(-O).

3. FCD types are limited for the following shaft arrangements: 1-LR(-O), 1-R(-O), and 1-L(-O).

Standard Specifications

Gear box	Reduction method	Spiral bevel gears
	Lubrication method	Sizes 2 & 4: Grease lubrication Sizes 6 through 25: Oil lubrication
	Keyway	New JIS standard, normal grade - JIS B1301-1976 (key supplied with gear box)
	Case material	Size 2: ADC Sizes 4 to 25: FC
	Seal design	Single oil seal
	Coating color	Light green (Munsell 2.5G6/3)
	Rust proofing specifications	Rust proof effective for 6 months when stored indoors (after shipping). Outside: rust-proofing grease Inside: sealed after filled with lubrication oil
Ambient conditions	Installation	Indoors
	Ambient temperature	-10 to 50°C
	Humidity	95% or lower
	Altitude	1,000 m or lower
	Atmosphere	Area must be free of corrosive and explosive gases, steam, condensation, and have little or no dust.
Mounting type		Floor (Y), Ceiling (T), Wall (K1, K2, K3, K4)

Note: ADC (Aluminium die-cast), FC (Gray cast iron), FCD (Ductile cast iron)

Miter Gear Box

Models Shaft Arrangements and Rotation Details

Lateral 1-shaft type **ED** **6** **M** - **1-LR** - **Y**

Lateral 2-shaft type **ED** **10** **B20** - **1-1-UD** - **T**

Size	Reduction ratio	Shaft arrangements and rotation details							
2	M (1:1)	Lateral 1-shaft/Cross 2-shaft	1-LR	1-UD	U-LR				
			1-LR-O	1-UD-O	U-LR-O				
4	B15 (1.5:1)		1-R	1-U	U-R				
			1-R-O	1-U-O	U-R-O				
6	B25 (2.5:1)		Lateral 1-shaft/Cross 1-shaft	1-L	1-D	U-L			
				1-L-O	1-D-O	U-L-O			
7	B20 (2:1)	1-LR		1-UD	U-LR				
		1-LR-O		1-UD-O	U-LR-O				
8	B30 (3:1)	1-R		1-U	U-R				
		1-R-O		1-U-O	U-R-O				
10	B25 (2.5:1)	1-L	1-D	U-L					
		1-L-O	1-D-O	U-L-O					
12	B30 (3:1)	1-LR	1-UD	U-LR					
		1-LR-O	1-UD-O	U-LR-O					
16	B20 (2:1)	1-R	1-U	U-R					
		1-R-O	1-U-O	U-R-O					
20	B15 (1.5:1)	1-L	1-D	U-L					
		1-L-O	1-D-O	U-L-O					
25	M (1:1)	1-LR	1-UD	U-LR					
		1-LR-O	1-UD-O	U-LR-O					

Note: The following shaft arrangements have the same rotation details. Note that the positions of the oil plug, oil gauge, and nameplate are different.
 U-LR = U-LR-O, U-R = U-L-O, U-L = U-R-O, D-LR = D-LR-O, D-R = D-L-O, D-L = D-R-O, 1-1-LR = 1-1-LR-O, 1-1-R = 1-1-L-O, 1-1-L = 1-1-R-O,
 U-D-LR = U-D-LR-O, U-D-R = U-D-L-O, U-D-L = U-D-R-O

Mounting type See pages 13 and 14 for the actual mounting type for each shaft arrangement.

Lateral 2-shaft type

Shaft arrangement
 1-1-UD(-O)
 1-1-U(-O)
 1-1-D(-O)

	Floor		Wall			
	Y	T	K1	K2	K3	K4

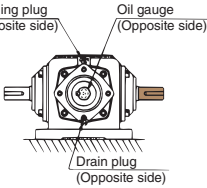
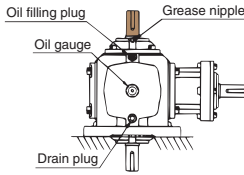
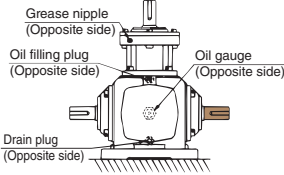
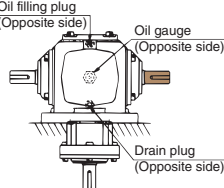
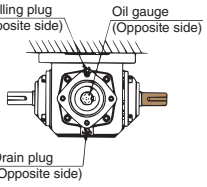
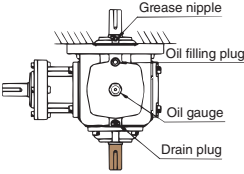
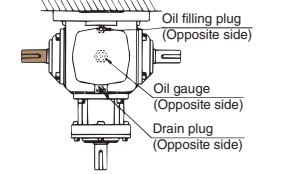
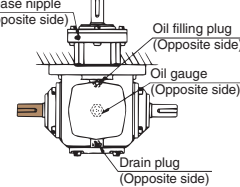
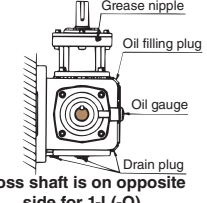
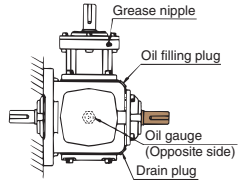
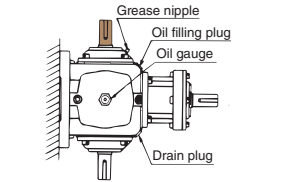
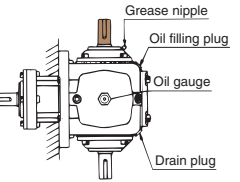
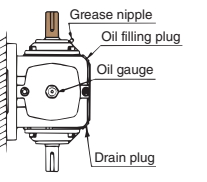
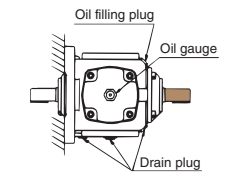
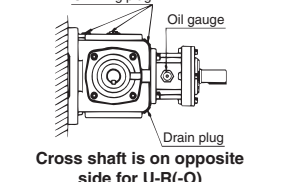
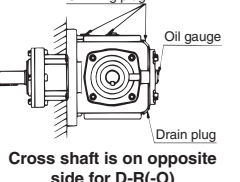
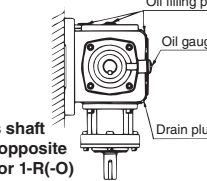
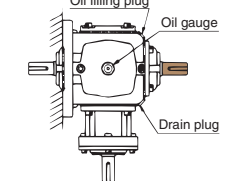
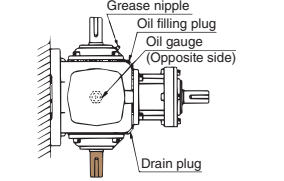
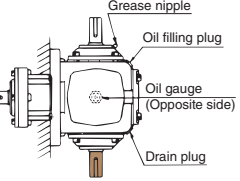
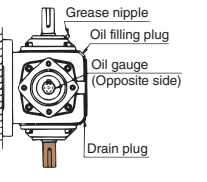
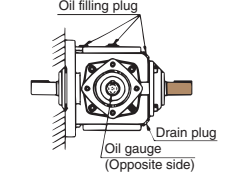
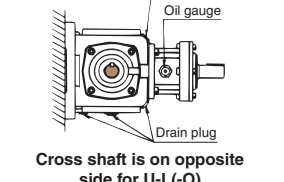
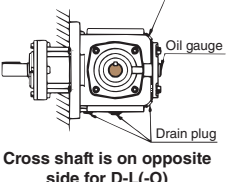
<p>D-LR</p>	Lateral 2-shaft/Cross 2-shaft	1-1-LR	1-1-UD	U-D-LR
		<p>D-LR-O</p>	1-1-LR-O	1-1-UD-O
<p>D-R</p>	Lateral 2-shaft/Cross 1-shaft	1-1-R	1-1-U	U-D-R
		<p>D-R-O</p>	1-1-R-O	1-1-U-O
<p>D-L</p>	Lateral 2-shaft/Cross 1-shaft	1-1-L	1-1-D	U-D-L
		<p>D-L-O</p>	1-1-L-O	1-1-D-O

Miter Gear Box

Models Mounting Types

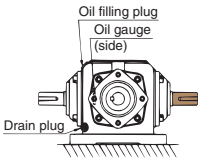
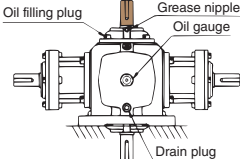
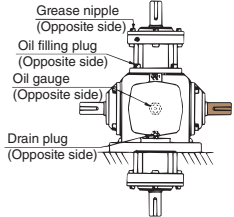
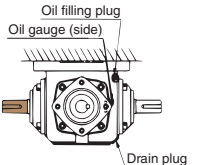
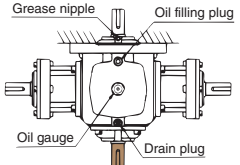
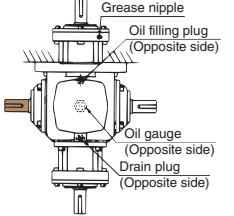
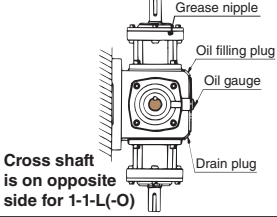
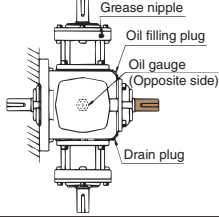
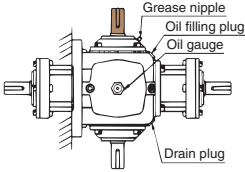
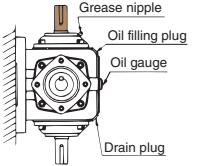
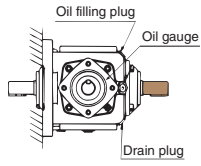
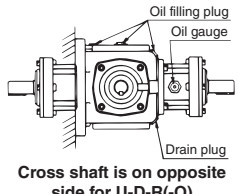
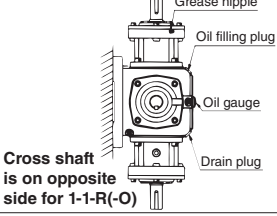
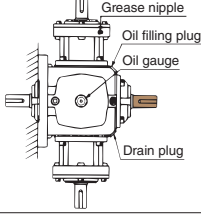
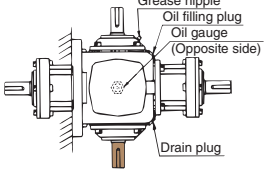
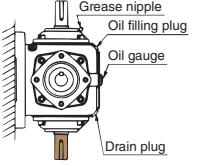
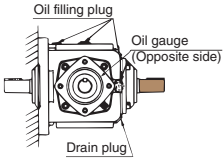
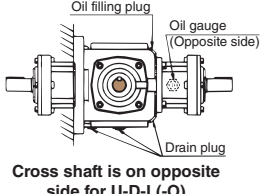
Lateral 1-shaft

Mounting Types and Plug Positions

Shaft arrangement		1-LR(-O) 1-R(-O) 1-L(-O)	1-UD(-O) 1-U(-O) 1-D(-O)	U-LR(-O) U-R(-O) U-L(-O)	D-LR(-O) D-R(-O) D-L(-O)
Mounting type					
Floor	Y				
	T				
Wall	K1				
	K2				
	K3				
	K4				

- Note 1. ED2 and ED4 are grease lubrication and do not come with an oil gauge or grease nipple. (Mountable in any direction)
2. Floor mounting (Y) is standard for sizes 6 to 25. When the gear box is mounted on the ceiling (T), or wall (K1 to K4), the positions of the oil gauge, plug, and grease nipple will be different.
3. The above table covers sizes 6 to 16. Sizes 20 and 25 have different oil gauge and plug positions.
4. A pressure vent is necessary for sizes 12 and over. Refer to each dimensional drawing (pages 33 to 37) for mounting locations.

Lateral 2-shaft Mounting Types and Plug Positions

Shaft arrangement		1-1-LR(-O) 1-1-R(-O) 1-1-L(-O)	1-1-UD(-O) 1-1-U(-O) 1-1-D(-O)	U-D-LR(-O) U-D-R(-O) U-D-L(-O)
Floor	Y			
	T			
Wall	K1			
	K2			
	K3			
	K4			

- Note 1. ED2 and ED4 are grease lubrication and do not come with an oil gauge or grease nipple. (Mountable in any direction)
2. Floor mounting (Y) is standard for sizes 6 to 25. When the gear box is mounted on the ceiling (T), or wall (K1 to K4), the positions of the oil gauge, plug, and grease nipple will be different.
3. The above table covers sizes 6 to 16. Sizes 20 and 25 have different oil gauge and plug positions.
4. A pressure vent is necessary for sizes 12 and over. Refer to each dimensional drawing (pages 33 to 37) for mounting locations.

Miter Gear Box Selection

Selection Requirements

<p>1. Machine, system, and layout</p> <p>2. Operating conditions</p> <p>3. Ambient atmosphere</p> <p>4. Other</p> <p>1. Machine, system, and layout</p> <p>2. Operating conditions</p> <ul style="list-style-type: none"> • Motor type • Load torque [N·m] or transmission [kW] • Operating hours : () hours/day Continuous/Intermittent • Start/Stop frequency : () times/hour • Input rotation speed : Constant () rpm Max. () rpm • Input shaft direction : Lateral shaft, Cross shaft 	<ul style="list-style-type: none"> • Reduction ratio : 1:1, 1.5:1, 2:1, 2.5:1, 3:1 • Load types : Uniform load, Load with moderate impact, or Load with large impact <p>3. Ambient atmosphere</p> <ul style="list-style-type: none"> • Operating environment : Indoors, Outdoors, Near furnaces, Inside freezers, or Other () • Ambient temperature : Constant () °C, High temperature () °C, or Low temperature () °C • Ambient atmosphere : Salt, Dust and particles, Acid, or Other () <p>4. Other</p> <ul style="list-style-type: none"> • Options (pages 48 and 49), special types (pages 50 and 51), etc. <p>* Inquiry Form (page 58) is also available.</p>
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Selection Procedure

Consider the selection requirements and select a model according to the following steps:

1. Service factor

The transmission capacity values in the catalogs are all based on SF=1.0. Find the service factor from the service factor table (Table 1) according to operating conditions.

2. Calculate the corrected torque or corrected kW

Calculate the corrected torque or corrected kW using the service factor. Corrected torque or corrected kW = (Load torque or transmission kW applied to the Miter Gear Box) × Service factor (Table 1)

3. Determine the size

Use the transmission capacity table to select the size that satisfies the corrected torque or corrected kW at the operating rotation speed. Check whether the peak torque at start/stop is within 200% of the transmission capacity of the selected size.

4. Calculate the radial load

When driving a system by mounting a sprocket, gear, and/or pulley on the lateral shaft or cross shaft, calculate the radial load by using the following formula:

■ Radial load calculation formula

$$\text{Allowable radial load} \geq \frac{T \times f \times L_f}{r}$$

(See page 46 for allowable radial load)

T = Corrected torque [N·m]
 f = O.H.L. factor (Table 2)
 L_f = Load position factor (Table 3)
 r = Pitch radius of sprocket or pulley (m)

If the calculated radial load is greater than the allowable radial load, the r value, which is the pitch radius of the sprocket or pulley, must be greater than that used in the calculation.

Table 1: Service factors

Load type \ Operating hours	Operating hours		
	2 hours	10 hours	24 hours
Uniform load	1.00 (1.00)	1.00 (1.25)	1.25 (1.50)
Load with moderate impact	1.00 (1.25)	1.25 (1.50)	1.50 (1.75)
Load with large impact	1.25 (1.50)	1.50 (1.75)	1.75 (2.00)

Note 1. Use the values in parentheses if operation stops 10 times or more in an hour or when using a multi-cylinder engine as the motor.
 2. The service factors in the table above are to be used as a general reference. Determine the appropriate model based on the actual operating conditions.

Table 2: O.H.L. factors (f)

Chain	1.00
Gear	1.25
Toothed belt	1.25
V belt or heavy duty toothed belt	1.50

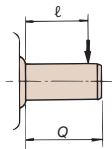


Table 3: Load position factors (L_f)

Load is applied at the shaft center or closer to the gear box	$l \leq \frac{Q}{2}$	L _f = 1
Load is applied farther than the shaft center	$l > \frac{Q}{2}$	L _f = $\frac{2l}{Q}$

Q = Length of output shaft end l = Radial load position

Note: Contact us if radial and axial loads are applied at the same time.

5. Determine the shaft arrangement, rotation details, and mounting types—Find the model

- Shaft arrangements and rotation details
Select model from Shaft Arrangements and Rotation Details (pages 11 and 12). (Note the direction of the shaft's rotation)
 - Mounting type
Select model from Mounting Types (pages 13 and 14). (ED2 and ED4 have no restriction on installation direction for grease lubrication)
- Determine the final model from the above conditions.

6. Review options and special types

Aside from standard models, we also manufacture options (see pages 48 and 49) and special types (see pages 50 to 52). Contact Tsubaki representative.

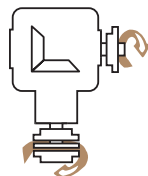
Miter Gear Box

Selection Examples

Example 1

■ General selection

Layout



Operating conditions

- Driven by induction motor (15 kW, 4P, 60 Hz) with a coupling for direct input from a lateral shaft.
- Install a P.C.D. 100 mm sprocket on the cross shaft side.
- Operate with a load transmission of 10 kW.
- Operating time is 10 hours per day with loads with moderate impact.
Operation is intermittent, stopping 12 times an hour.
- Reduction ratio is 1:1.

Ambient atmosphere

- Indoors, constant 30°C, normal atmosphere (no dust or particles)

Optional products

- None (standard products only)

(1) Determine the service factor

Based on the operating conditions (loads with moderate impact, operating 10 hours per day with 12 stops per hour), the service factor is 1.50, referring to Table 1.

(2) Calculate the corrected kW

Corrected kW = 10 kW (Load transmission kW) × 1.50 (service factor) = 15 kW

The corrected kW is 15 kW.

(3) Determine the size

The size that satisfies a corrected kW of 15 kW and an input rotation speed of 1750 rpm is ED6M, referring to the transmission capacity table.

(4) Calculate the radial load

(Assuming that the radial load is applied to the center of the cross shaft)

Based on the chain transmission, the O.H.L. factor (f) is 1.0 from Table 2, and the load position factor (Lf) is 1 due to the radial load being applied to the center of the shaft.

According to the radial load calculation formula and operating conditions:

$$\text{Radial load} = \frac{9550 \times 15}{1750} \times 1.0 \times 1.0 = 1637 \text{ N}$$

The calculated radial load 1637 N is less than the ED6M cross shaft's allowable radial load 2303 N, which means that the product is usable.

(5) Find the model

Based on the shaft arrangement, rotation details, and mounting type of the layout, find the appropriate model.

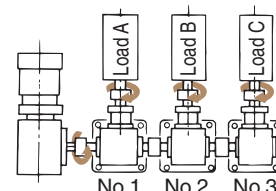
ED6M-1-R-Y is selected.

* Check the rotation direction.

Example 2

■ Line shaft drive

Layout



Operating conditions

- Loads A, B, and C are all 245 N·m (uniform loads), and the operating time is 8 hours a day.
- Input rotation speed is 300 rpm, and the reduction ratio is all 1:1.

Ambient atmosphere

- Indoors, constant 30°C, normal atmosphere (no dust or particles)

Optional products

- None (standard products only)

* Precautions for selecting line shaft drive

The loads on the gear and line shaft (cross shaft) are different in the case of line shaft drives, for which models have to be selected individually.

For the allowable torsional transmission capacity of only the cross shaft (allowable cross shaft torque), see page 45.

(1) Determine the service factor

Based on the operating conditions (uniform loads, operating 8 hours a day), the service factor is 1.0, referring to Table 1.

(2) Select Miter Gear Boxes

(1) Miter Gear Box No.1

- Gear only drives load A.
→ Needs a transmission capacity of at least 245 N·m × 1.0 = 245 N·m.
- Cross shaft drives loads A, B, and C.
→ Needs a cross shaft torque of at least (245 N·m + 245 N·m + 245 N·m) × 1.0 = 735 N·m. Therefore, ED10M is selected based on the transmission capacity table (pages 17 and 18) and the allowable cross shaft torque (page 45).

$$\left(\begin{array}{l} \text{ED10M Transmission Capacity } 513 \text{ N}\cdot\text{m} > 245 \text{ N}\cdot\text{m}, \\ \text{Allowable cross shaft torque } 891 \text{ N}\cdot\text{m} > 735 \text{ N}\cdot\text{m} \end{array} \right)$$

(2) Miter Gear Box No.2

- Gear only drives load B.
→ Needs a transmission capacity of at least 245 N·m × 1.0 = 245 N·m.
- Cross shaft drives loads B and C.
→ Needs a cross shaft torque of at least (245 N·m + 245 N·m) × 1.0 = 490 N·m. Therefore, ED8M is selected based on the transmission capacity table (pages 17 and 18) and the allowable cross shaft torque (page 45).

$$\left(\begin{array}{l} \text{ED8M Transmission Capacity } 331 \text{ N}\cdot\text{m} > 245 \text{ N}\cdot\text{m}, \\ \text{Allowable cross shaft torque } 627 \text{ N}\cdot\text{m} > 490 \text{ N}\cdot\text{m} \end{array} \right)$$

(3) Miter Gear Box No.3

- Gear and cross shaft both drive only load C.
→ Needs a transmission capacity and cross shaft torque of at least 245 N·m × 1.0 = 245 N·m. Therefore, ED8M is selected based on the transmission capacity table (pages 17 and 18) and the allowable cross shaft torque (page 45).

$$\left(\begin{array}{l} \text{ED8M Transmission Capacity } 331 \text{ N}\cdot\text{m} > 245 \text{ N}\cdot\text{m}, \\ \text{Allowable cross shaft torque } 627 \text{ N}\cdot\text{m} > 245 \text{ N}\cdot\text{m} \end{array} \right)$$

(3) Find the model

Based on the shaft arrangement, rotation details, and mounting type (pages 11 to 14) of the layout, find the appropriate model.

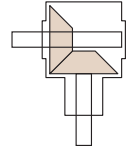
No.1 ED10M-1-LR-O-Y

No.2 ED8M-1-LR-O-Y and No.3 ED8M-1-R-O-Y are suitable.

* Check the rotation direction.

Miter Gear Box

Lateral 1-shaft Transmission Capacity Table



Reduction ratio	Lateral shaft speed rpm	ED2		ED4		ED6		ED7		ED8	
		Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m
1:1	3000	3.41	10.6	7.71	24.0	22.8	71.1	–	–	–	–
	2000	2.43	11.3	5.96	27.9	18.6	87.0	27.1	105	57.3	268
	1750	2.15	11.5	5.61	30.0	17.1	91.1	24.8	132	52.3	279
	1450	1.79	11.6	4.94	31.9	14.9	96.0	22.0	142	45.6	294
	1150	1.43	11.7	4.19	34.1	12.7	103	18.4	150	37.5	305
	870	1.12	12.1	3.46	37.2	10.5	113	15.2	164	29.0	312
	580	0.74	12.1	2.45	39.5	7.35	119	11.4	184	19.8	319
	300	0.39	12.3	1.30	40.5	3.93	123	6.35	198	10.6	331
	100	0.13	12.7	0.44	41.9	1.36	127	2.20	206	3.70	346
	10	0.01	13.0	0.04	43.0	0.14	132	0.22	214	0.38	361
1.5:1	3000	–	–	–	–	19.7	92.1	–	–	–	–
	2000	–	–	–	–	14.9	105	19.2	135	25.8	181
	1750	–	–	–	–	13.7	110	17.4	139	22.7	182
	1450	–	–	–	–	12.1	117	15.0	145	19.1	185
	1150	–	–	–	–	9.96	122	12.0	147	15.4	188
	870	–	–	–	–	7.66	123	9.30	150	11.8	191
	580	–	–	–	–	5.23	126	6.32	153	8.14	197
	300	–	–	–	–	2.77	129	3.35	157	4.34	203
	100	–	–	–	–	0.95	134	1.16	163	1.49	210
	10	–	–	–	–	0.09	139	0.12	169	0.15	218
2:1	3000	–	–	5.56	34.6	15.6	97.3	–	–	–	–
	2000	–	–	4.30	40.2	10.7	100	14.2	133	18.9	176
	1750	–	–	3.97	42.4	9.44	101	12.7	135	16.9	180
	1450	–	–	3.32	42.8	7.90	102	10.6	137	14.0	180
	1150	–	–	2.67	43.4	6.39	104	8.55	139	11.3	183
	870	–	–	2.04	43.8	4.88	105	6.56	141	8.70	187
	580	–	–	1.38	44.4	3.34	108	4.47	144	5.92	191
	300	–	–	0.72	45.5	1.76	110	2.37	148	3.14	196
	100	–	–	0.24	46.6	0.60	114	0.81	152	1.08	202
	10	–	–	0.02	48.5	0.06	116	0.08	157	0.11	209
2.5:1	3000	–	–	–	–	11.7	91.1	–	–	–	–
	2000	–	–	–	–	8.00	93.5	9.40	110	15.2	177
	1750	–	–	–	–	7.13	95.3	8.36	112	13.5	180
	1450	–	–	–	–	5.97	96.2	6.99	113	11.4	184
	1150	–	–	–	–	4.78	97.2	5.64	115	9.11	185
	870	–	–	–	–	3.68	99.0	4.30	116	7.00	188
	580	–	–	–	–	2.48	100	2.92	118	4.76	192
	300	–	–	–	–	1.32	102	1.55	121	2.53	197
	100	–	–	–	–	0.44	104	0.52	123	0.86	203
	10	–	–	–	–	0.04	107	0.05	126	0.08	208
3:1	3000	–	–	–	–	9.59	89.7	–	–	–	–
	2000	–	–	–	–	6.56	92.0	7.30	102	10.9	152
	1750	–	–	–	–	5.78	92.7	6.48	104	9.78	157
	1450	–	–	–	–	4.84	93.6	5.42	105	8.20	159
	1150	–	–	–	–	3.88	94.8	4.34	106	6.55	160
	870	–	–	–	–	2.97	95.9	3.34	108	5.04	163
	580	–	–	–	–	2.02	97.6	2.25	109	3.42	166
	300	–	–	–	–	1.07	100	1.18	111	1.80	169
	100	–	–	–	–	0.36	102	0.40	115	0.61	173
	10	–	–	–	–	0.03	104	0.04	118	0.06	179

Note 1. For operation between the listed speeds, calculate the transmission capacity by proportional calculation.

2. If the speed of the lateral shaft is below 10 rpm, use the torque for 10 rpm.

3. : Oil lubrication products are required at the specified rotation speed. See the section about made to order.

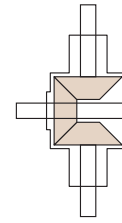
4. : Forced lubrication may be necessary when using products at this speed range. Contact Tsubaki representative.

 : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

Reduction ratio	Lateral shaft speed rpm	ED10		ED12		ED16		ED20		ED25	
		Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m
1:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	79.0	358	-	-	-	-	-	-	-	-
	1750	74.6	399	109.6	586	-	-	-	-	-	-
	1450	65.3	421	96.0	619	163	1019	-	-	-	-
	1150	55.7	453	81.8	665	139	1098	234	1842	-	-
	870	44.6	479	67.5	726	114	1186	193	2009	335	3489
	580	30.6	493	49.7	802	85.9	1343	145	2274	252	3940
	300	16.4	513	26.8	835	54.1	1637	90.8	2744	159	4792
	100	5.72	535	9.36	875	20.3	1842	35.3	3205	60.0	5439
10	0.59	561	0.98	919	2.14	1940	3.53	3205	6.30	5713	
1.5:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	49.5	336	-	-	-	-	-	-	-	-
	1750	46.0	368	65.9	528	-	-	-	-	-	-
	1450	38.7	374	58.3	564	-	-	-	-	-	-
	1150	31.2	380	49.2	601	-	-	-	-	-	-
	870	24.1	389	40.7	656	-	-	-	-	-	-
	580	16.4	396	28.9	699	-	-	-	-	-	-
	300	8.78	411	15.5	724	-	-	-	-	-	-
	100	3.04	426	5.37	754	-	-	-	-	-	-
10	0.31	443	0.56	785	-	-	-	-	-	-	
2:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	32.0	290	-	-	-	-	-	-	-	-
	1750	28.2	302	48.3	516	87.7	908	-	-	-	-
	1450	23.6	305	40.0	516	73.7	921	126	1578	-	-
	1150	19.0	309	31.7	516	59.5	938	102	1607	199	3146
	870	14.6	315	24.0	516	46.0	958	79.0	1646	155	3224
	580	10.0	322	16.3	524	31.3	980	54.2	1695	107	3332
	300	5.33	332	8.71	543	16.7	1009	29.0	1754	57.5	3479
	100	1.84	344	3.01	563	5.84	1058	10.1	1833	20.1	3646
10	0.19	357	0.31	586	0.60	1098	1.06	1921	2.11	3822	
2.5:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	24.3	275	-	-	-	-	-	-	-	-
	1750	21.7	290	37.4	500	-	-	-	-	-	-
	1450	18.2	293	31.4	507	-	-	-	-	-	-
	1150	14.7	298	25.3	514	-	-	-	-	-	-
	870	11.2	302	19.5	523	-	-	-	-	-	-
	580	7.68	310	13.3	535	-	-	-	-	-	-
	300	4.06	317	7.08	552	-	-	-	-	-	-
	100	1.40	326	2.43	568	-	-	-	-	-	-
10	0.14	336	0.25	588	-	-	-	-	-	-	
3:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	18.6	252	-	-	-	-	-	-	-	-
	1750	16.8	270	28.2	452	-	-	-	-	-	-
	1450	14.0	270	23.6	458	-	-	-	-	-	-
	1150	11.3	275	19.0	464	-	-	-	-	-	-
	870	8.66	279	14.6	469	-	-	-	-	-	-
	580	5.89	285	9.92	480	-	-	-	-	-	-
	300	3.11	291	5.29	495	-	-	-	-	-	-
	100	1.07	300	1.82	510	-	-	-	-	-	-
10	0.11	308	0.18	527	-	-	-	-	-	-	

Miter Gear Box

Lateral 2-shaft Transmission Capacity Table



Reduction ratio	Lateral shaft speed rpm	ED2		ED4		ED6		ED7		ED8	
		Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m
1:1	3000	2.38	7.42	5.39	16.8	15.9	49.7	-	-	-	-
	2000	1.70	7.91	4.17	19.5	13.0	60.9	18.9	73.5	40.1	187
	1750	1.50	8.05	3.92	21.0	11.9	63.7	17.3	92.4	36.6	195
	1450	1.25	8.12	3.45	22.3	10.4	67.2	15.4	99.4	31.9	205
	1150	1.00	8.19	2.93	23.8	8.89	72.1	12.8	105	26.2	213
	870	0.78	8.47	2.42	26.0	7.35	79.1	10.6	114	20.3	218
	580	0.51	8.47	1.71	27.6	5.14	83.3	7.98	128	13.8	223
	300	0.27	8.61	0.91	28.3	2.75	86.1	4.44	138	7.42	231
	100	0.09	8.89	0.30	29.3	0.95	88.9	1.54	144	2.59	242
	10	0.01	9.10	0.02	30.1	0.09	92.4	0.15	149	0.26	252
1.5:1	3000	-	-	-	-	13.7	64.4	-	-	-	-
	2000	-	-	-	-	10.4	73.5	13.4	94.5	18.0	126
	1750	-	-	-	-	9.59	77.0	12.1	97.3	15.8	127
	1450	-	-	-	-	8.47	81.9	10.5	101	13.3	129
	1150	-	-	-	-	6.97	85.4	8.4	102	10.7	131
	870	-	-	-	-	5.36	86.1	6.51	105	8.26	133
	580	-	-	-	-	3.66	88.2	4.42	107	5.69	137
	300	-	-	-	-	1.93	90.3	2.34	109	3.03	142
	100	-	-	-	-	0.66	93.8	0.81	114	1.04	147
	10	-	-	-	-	0.06	97.3	0.08	118	0.10	152
2:1	3000	-	-	3.89	24.2	10.9	68.1	-	-	-	-
	2000	-	-	3.01	28.1	7.49	70.0	9.94	93.1	13.2	123
	1750	-	-	2.77	29.6	6.60	70.7	8.89	94.5	11.8	126
	1450	-	-	2.32	29.9	5.53	71.4	7.42	95.9	9.80	126
	1150	-	-	1.86	30.3	4.47	72.8	5.98	97.3	7.91	128
	870	-	-	1.42	30.6	3.41	73.5	4.59	98.7	6.09	130
	580	-	-	0.96	31.0	2.33	75.6	3.12	100	4.14	133
	300	-	-	0.50	31.8	1.23	77.0	1.65	103	2.19	137
	100	-	-	0.16	32.6	0.42	79.8	0.56	106	0.75	141
	10	-	-	0.01	33.9	0.04	81.2	0.05	109	0.07	146
2.5:1	3000	-	-	-	-	8.19	63.7	-	-	-	-
	2000	-	-	-	-	5.60	65.4	6.58	77.0	10.6	123
	1750	-	-	-	-	4.99	66.7	5.85	78.4	9.45	126
	1450	-	-	-	-	4.17	67.3	4.89	79.1	7.98	128
	1150	-	-	-	-	3.34	68.0	3.94	80.5	6.37	129
	870	-	-	-	-	2.57	69.3	3.01	81.2	4.9	131
	580	-	-	-	-	1.73	70.0	2.04	82.6	3.33	134
	300	-	-	-	-	0.92	71.4	1.08	84.7	1.77	137
	100	-	-	-	-	0.30	72.8	0.36	86.1	0.60	142
	10	-	-	-	-	0.02	74.9	0.03	88.2	0.05	145
3:1	3000	-	-	-	-	6.71	62.7	-	-	-	-
	2000	-	-	-	-	4.59	64.4	5.11	71.4	7.63	106
	1750	-	-	-	-	4.04	64.8	4.53	72.8	6.84	109
	1450	-	-	-	-	3.38	65.5	3.79	73.5	5.74	111
	1150	-	-	-	-	2.71	66.3	3.03	74.2	4.58	112
	870	-	-	-	-	2.07	67.1	2.33	75.6	3.52	114
	580	-	-	-	-	1.41	68.3	1.57	76.3	2.39	116
	300	-	-	-	-	0.74	70.0	0.82	77.7	1.26	118
	100	-	-	-	-	0.25	71.4	0.28	80.5	0.42	121
	10	-	-	-	-	0.02	72.8	0.02	82.6	0.04	125

Note 1. For operation between the listed speeds, calculate the transmission capacity by proportional calculation.

2. If the speed of the lateral shaft is below 10 rpm, use the torque for 10 rpm.

3. : Oil lubrication products are required at the specified rotation speed. See the section about made to order.

4. : Forced lubrication may be necessary when using products at this speed range. Contact Tsubaki representative.

 : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

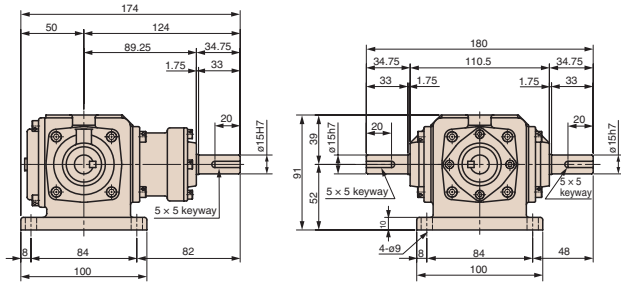
Reduction ratio	Lateral shaft speed rpm	ED10		ED12		ED16		ED20		ED25	
		Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m	Input kW	Cross shaft torque N·m
1:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	55.3	250	-	-	-	-	-	-	-	-
	1750	52.2	279	76.7	410	-	-	-	-	-	-
	1450	45.7	294	67.2	433	114	713	-	-	-	-
	1150	38.9	317	57.2	465	97.3	769	164	1289	-	-
	870	31.2	335	47.2	508	79.8	830	135	1406	235	2442
	580	21.4	345	34.7	561	60.1	940	102	1592	176	2758
	300	11.4	359	18.7	584	37.9	1146	63.6	1921	111	3354
	100	4.00	374	6.55	612	14.2	1289	24.7	2244	42.0	3807
10	0.41	392	0.68	643	1.50	1358	2.47	2244	4.41	3999	
1.5:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	34.6	235	-	-	-	-	-	-	-	-
	1750	32.2	257	46.1	369	-	-	-	-	-	-
	1450	27.0	261	40.8	394	-	-	-	-	-	-
	1150	21.8	266	34.4	420	-	-	-	-	-	-
	870	16.8	272	28.4	459	-	-	-	-	-	-
	580	11.4	277	20.2	489	-	-	-	-	-	-
	300	6.14	287	10.8	506	-	-	-	-	-	-
	100	2.12	298	3.75	527	-	-	-	-	-	-
10	0.21	310	0.39	549	-	-	-	-	-	-	
2:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	22.4	203	-	-	-	-	-	-	-	-
	1750	19.7	211	33.8	361	61.4	636	-	-	-	-
	1450	16.5	213	28.0	361	51.6	645	88.2	1105	-	-
	1150	13.3	216	22.1	361	41.7	657	71.4	1125	139	2202
	870	10.2	220	16.8	361	32.2	671	55.3	1152	109	2257
	580	7.00	225	11.4	366	21.9	686	37.9	1187	74.9	2332
	300	3.73	232	6.09	380	11.7	706	20.3	1228	40.3	2435
	100	1.28	240	2.10	394	4.09	741	7.07	1283	14.1	2552
10	0.13	249	0.21	410	0.42	769	0.74	1345	1.48	2675	
2.5:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	17.0	192	-	-	-	-	-	-	-	-
	1750	15.1	203	26.1	350	-	-	-	-	-	-
	1450	12.7	205	21.9	354	-	-	-	-	-	-
	1150	10.2	208	17.7	359	-	-	-	-	-	-
	870	7.84	211	13.6	366	-	-	-	-	-	-
	580	5.37	217	9.31	374	-	-	-	-	-	-
	300	2.84	221	4.95	386	-	-	-	-	-	-
	100	0.98	228	1.70	397	-	-	-	-	-	-
10	0.09	235	0.17	411	-	-	-	-	-	-	
3:1	3000	-	-	-	-	-	-	-	-	-	-
	2000	13.0	176	-	-	-	-	-	-	-	-
	1750	11.7	189	19.7	316	-	-	-	-	-	-
	1450	9.8	189	16.5	320	-	-	-	-	-	-
	1150	7.91	192	13.3	324	-	-	-	-	-	-
	870	6.06	195	10.2	328	-	-	-	-	-	-
	580	4.12	199	6.94	336	-	-	-	-	-	-
	300	2.17	203	3.70	346	-	-	-	-	-	-
	100	0.74	210	1.27	357	-	-	-	-	-	-
10	0.07	215	0.12	368	-	-	-	-	-	-	

ED2 Lateral 1-shaft

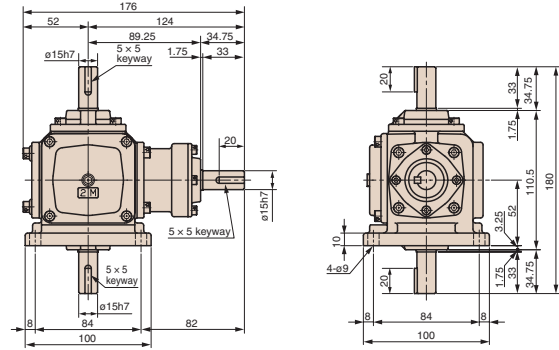
■ Reduction Ratio: M (1:1) ■ Mounting type: Y (mountable in any direction) Approximate mass: 2.0 kg Grease lubrication: 150 g

Dimensional Drawings

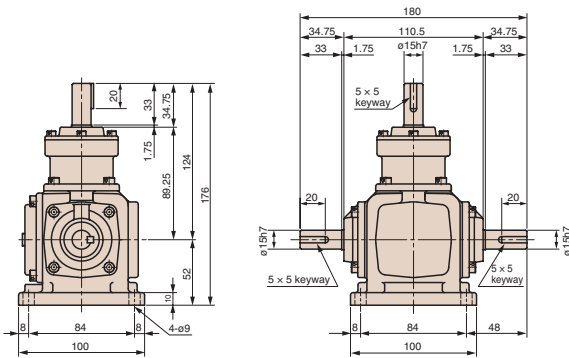
1-LR, 1-LR-O



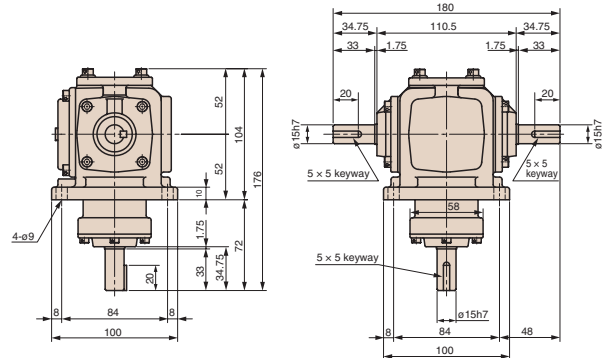
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



* The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
 * The keyway may not be aligned in the same phase.

Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)			
		Input kW	Cross shaft torque	Allowable radial load N	
			N-m	Lateral shaft	Cross shaft
ED2	3000	3.41	10.6	127	117
	2000	2.43	11.3	186	176
	1750	2.15	11.5	216	196
	1450	1.79	11.6	265	216
	1150	1.43	11.7	323	235
	870	1.12	12.1	402	255
	580	0.74	12.1	549	314
	300	0.39	12.3	696	392
	100	0.13	12.7	980	588
10	0.01	13.0	980	588	

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by interpolation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

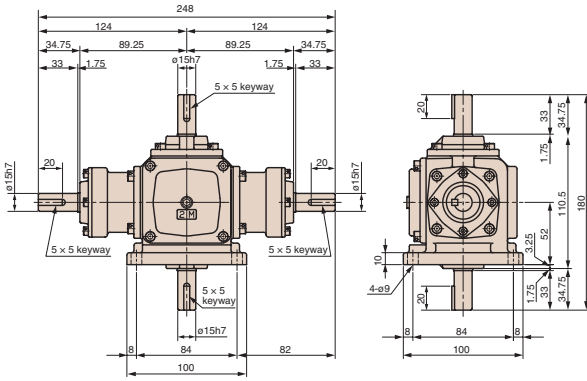
2. Oil lubrication products are required at the specified rotation speed. See the section about special types. (page 50)

3. Refer to the section on selection for details on radial load position. (page 15)

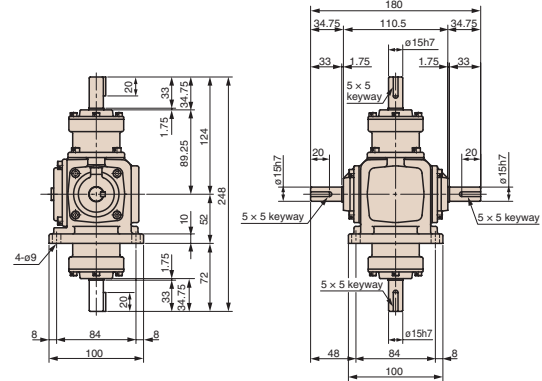
Lateral 2-shaft

Approximate mass: 2.6 kg Grease lubrication: 180 g

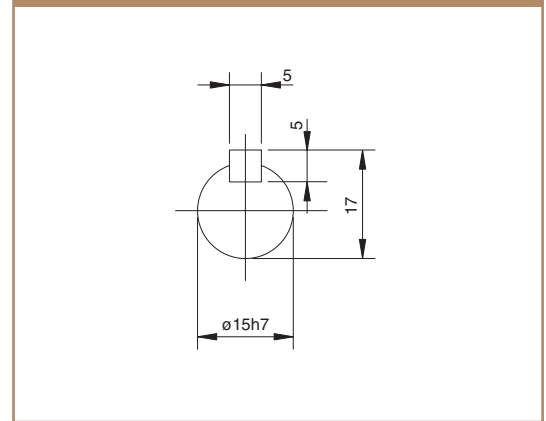
1-1-UD, 1-1-UD-O



U-D-LR, U-D-LR-O



Detailed view of lateral/cross shaft ends



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)			
		Input kW	Cross shaft torque	Allowable radial load N	
			N·m	Lateral shaft	Cross shaft
ED2	3000	2.38	7.42	127	117
	2000	1.70	7.91	186	176
	1750	1.50	8.05	216	196
	1450	1.25	8.12	265	216
	1150	1.00	8.19	323	235
	870	0.78	8.47	402	255
	580	0.51	8.47	549	314
	300	0.27	8.61	696	392
	100	0.09	8.89	980	588
	10	0.01	9.10	980	588

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by interpolation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. Oil lubrication products are required at the specified rotation speed. See the section about special types. (page 50)

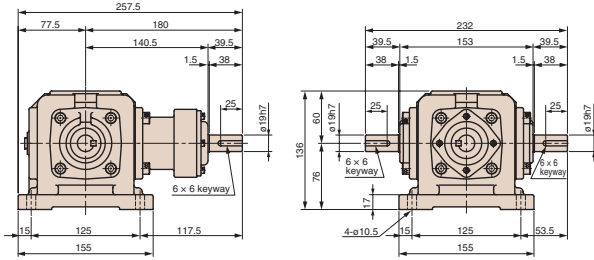
3. Refer to the section on selection for details on radial load position. (page 15)

ED4 Lateral 1-shaft

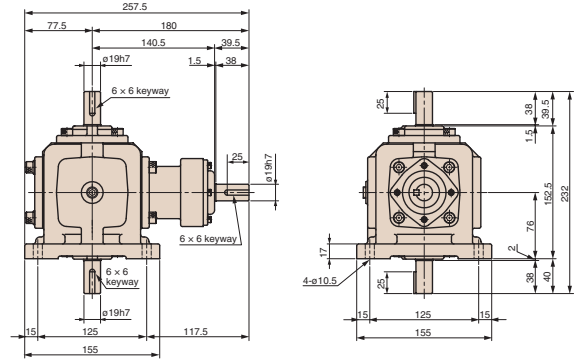
■ Reduction Ratio: M (1:1), B20 (2:1) ■ Mounting type: Y (mountable in any direction) Approximate mass: 10 kg Grease lubrication: 350 g

Dimensional Drawings

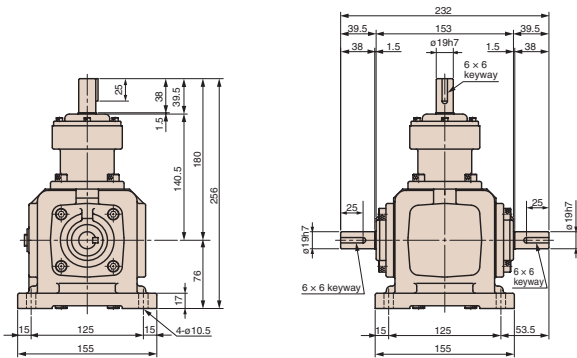
1-LR, 1-LR-O



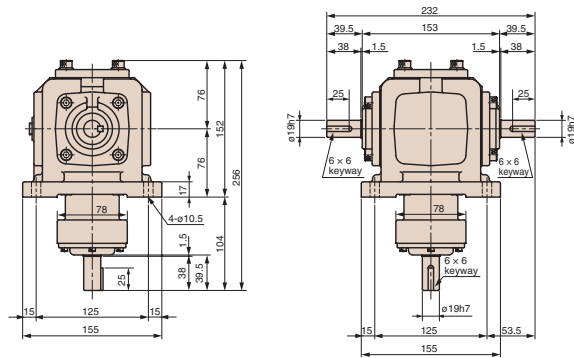
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The dimensional drawings show the shaft diameters for a reduction ratio of M (1:1). The dimensions of the shaft diameter depend on the reduction ratio. Check the detailed view on page 24.
- * The keyway may not be aligned in the same phase.

Transmission Capacity Table

Size	Lateral shaft speed rpm	Input kW	Reduction ratio M (1:1)			Reduction ratio B20 (2:1)			
			Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N	
				N-m	Lateral shaft			Cross shaft	N-m
ED4	3000	7.71	24.0	647	764	5.56	34.6	686	1569
	2000	5.96	27.9	745	862	4.30	40.2	833	1765
	1750	5.61	30.0	784	902	3.97	42.4	1078	1960
	1450	4.94	31.9	833	951	3.32	42.8	1078	1960
	1150	4.19	34.1	882	1029	2.67	43.4	1078	1960
	870	3.46	37.2	960	1127	2.04	43.8	1078	1960
	580	2.45	39.5	1078	1323	1.38	44.4	1078	1960
	300	1.30	40.5	1519	1960	0.72	45.5	1078	1960
	100	0.44	41.9	1911	1960	0.24	46.6	1078	1960
	10	0.04	43.0	1911	1960	0.02	48.5	1078	1960

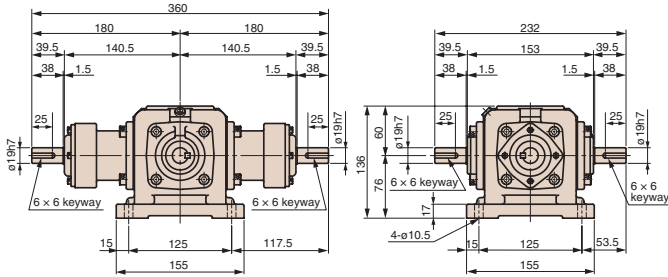
Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by interpolation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

- Oil lubrication products are required at the specified rotation speed. See the section about special types. (page 50)
- Refer to the section on selection for details on radial load position. (page 15)

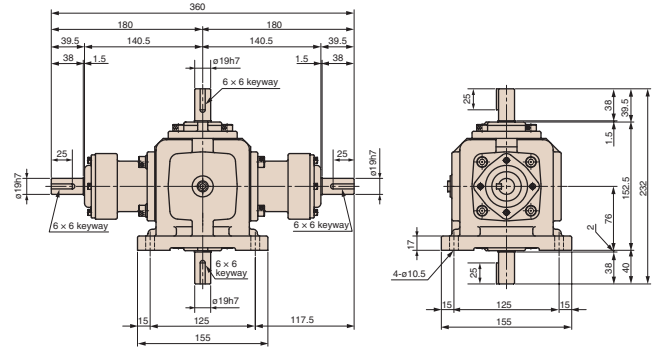
Lateral 2-shaft

Approximate mass: 12.5 kg Grease lubrication: 450 g

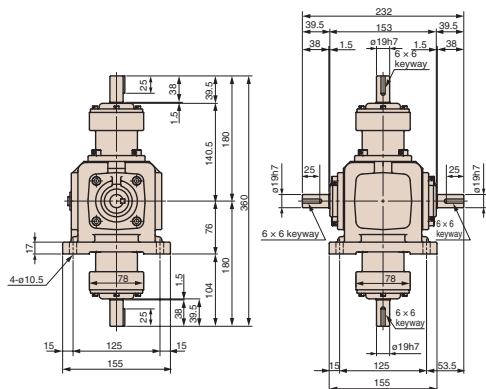
1-1-LR, 1-1-LR-O



1-1-UD, 1-1-UD-O

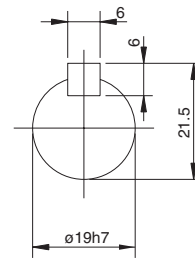


U-D-LR, U-D-LR-O

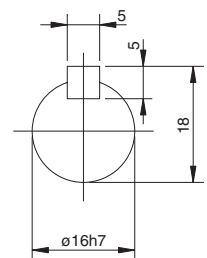


Detailed view of lateral/cross shaft ends

4M Lateral shaft/Cross shaft
4B Cross shaft



4B Lateral shaft



Transmission Capacity Table

Size	Lateral shaft speed rpm	Input kW	Reduction ratio M (1:1)			Reduction ratio B20 (2:1)			
			Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N	
				N-m	Lateral shaft			Cross shaft	N-m
ED4	3000	5.39	16.8	647	764	3.89	24.2	686	1569
	2000	4.17	19.5	745	862	3.01	28.1	833	1765
	1750	3.92	21.0	784	902	2.77	29.6	1078	1960
	1450	3.45	22.3	833	951	2.32	29.9	1078	1960
	1150	2.93	23.8	882	1029	1.86	30.3	1078	1960
	870	2.42	26.0	960	1127	1.42	30.6	1078	1960
	580	1.71	27.6	1078	1323	0.96	31.0	1078	1960
	300	0.91	28.3	1519	1960	0.50	31.8	1078	1960
	100	0.30	29.3	1911	1960	0.16	32.6	1078	1960
	10	0.02	30.1	1911	1960	0.01	33.9	1078	1960

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by interpolation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. : Oil lubrication products are required at the specified rotation speed. See the section about special types. (page 50)

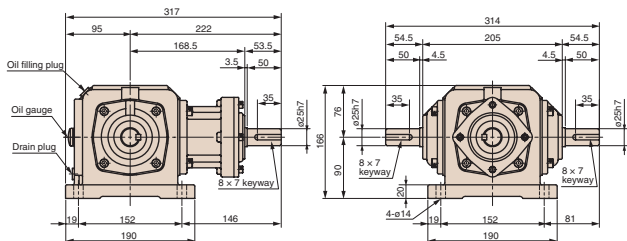
3. Refer to the section on selection for details on radial load position. (page 15)

ED6 Lateral 1-shaft

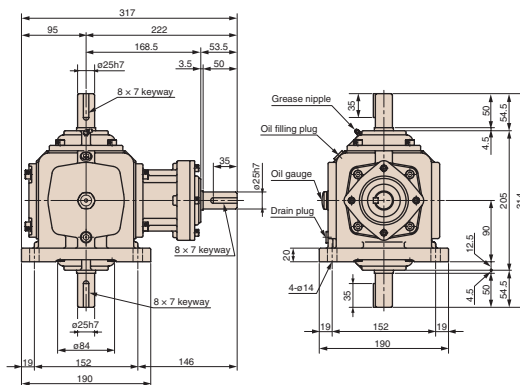
■ Reduction Ratio: M (1:1), B15 (1.5:1), B20 (2:1), B25 (2.5:1), B30 (3:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)
 Approximate mass: 21 kg Approximate oil volume: 0.95 L

Dimensional Drawings

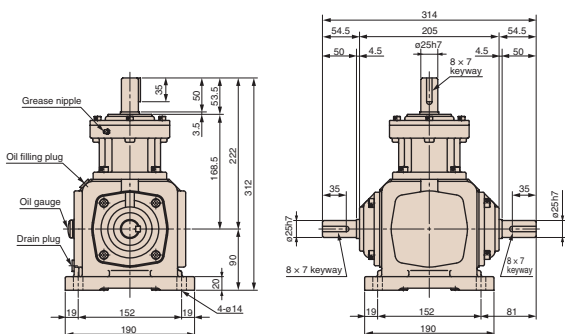
1-LR, 1-LR-O



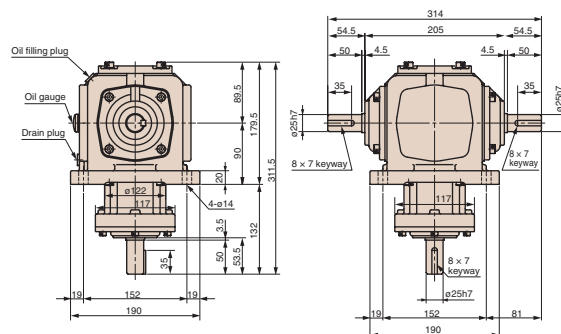
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

Transmission Capacity Table

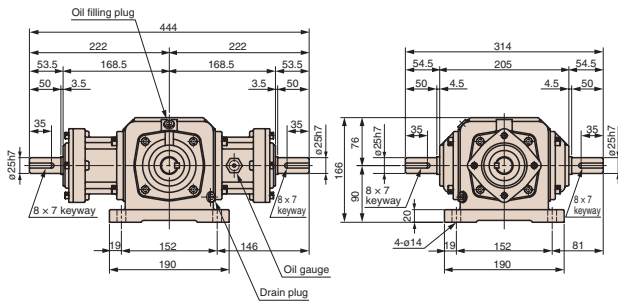
Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque N·m	Allowable radial load N		Input kW	Cross shaft torque N·m	Allowable radial load N		Input kW	Cross shaft torque N·m	Allowable radial load N		Input kW	Cross shaft torque N·m	Allowable radial load N		Input kW	Cross shaft torque N·m	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED6	3000	22.8	71.1	1520	1912	19.7	92.1	1274	2255	15.6	97.3	1274	2255	11.7	91.1	1274	2255	9.59	89.7	1274	2255
	2000	18.6	87.0	1716	2157	14.9	105	1814	2500	10.7	100	1814	2500	8.00	93.5	1814	2500	6.56	92.0	1814	2500
	1750	17.1	91.1	1813	2303	13.7	110	2205	2744	9.44	101	2205	2744	7.13	95.3	2205	2744	5.78	92.7	2205	2744
	1450	14.9	96.0	1911	2450	12.1	117	2548	2842	7.90	102	2548	2842	5.97	96.2	2548	2842	4.84	93.6	2548	2842
	1150	12.7	103	2058	2597	9.96	122	3038	3087	6.39	104	3038	3087	4.78	97.2	3038	3087	3.88	94.8	3038	3087
	870	10.5	113	2205	2842	7.66	123	3430	3332	4.88	105	3430	3332	3.68	99.0	3430	3332	2.97	95.9	3430	3332
	580	7.35	119	2499	3185	5.23	126	3430	3528	3.34	108	3430	3528	2.48	100	3430	3528	2.02	97.6	3430	3528
	300	3.93	123	3430	3528	2.77	129	3430	3528	1.76	110	3430	3528	1.32	102	3430	3528	1.07	100	3430	3528
	100	1.36	127	3430	3528	0.95	134	3430	3528	0.60	114	3430	3528	0.44	104	3430	3528	0.36	102	3430	3528
	10	0.14	132	3430	3528	0.09	139	3430	3528	0.06	116	3430	3528	0.04	107	3430	3528	0.03	104	3430	3528

- Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.
- Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
 - Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
 - Refer to the section on selection for details on radial load position. (page 15)

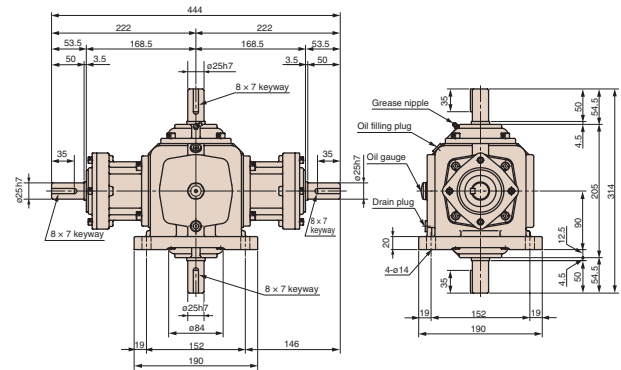
Lateral 2-shaft

Approximate mass: 27 kg Approximate oil volume: 1.0 L

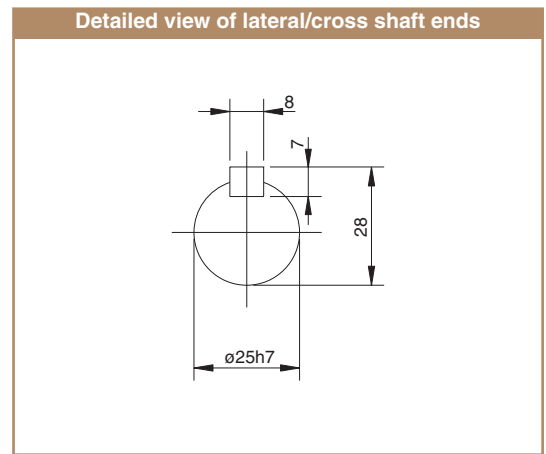
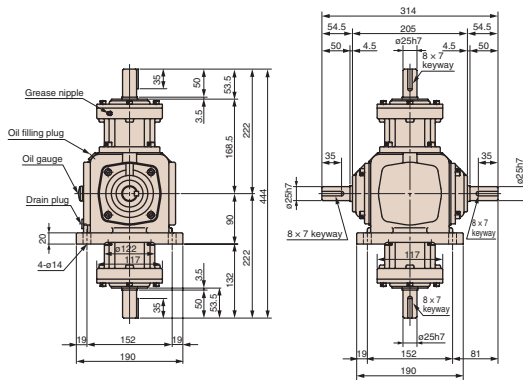
1-1-LR, 1-1-LR-O



1-1-UD, 1-1-UD-O



U-D-LR, U-D-LR-O



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED6	3000	15.9	49.7	1520	1912	13.7	64.4	1274	2255	10.9	68.1	1274	2255	8.19	63.7	1274	2255	6.71	62.7	1274	2255
	2000	13.0	60.9	1716	2157	10.4	73.5	1814	2500	7.49	70.0	1814	2500	5.60	65.4	1814	2500	4.59	64.4	1814	2500
	1750	11.9	63.7	1813	2303	9.59	77.0	2205	2744	6.6	70.7	2205	2744	4.99	66.7	2205	2744	4.04	64.8	2205	2744
	1450	10.4	67.2	1911	2450	8.47	81.9	2548	2842	5.53	71.4	2548	2842	4.17	67.3	2548	2842	3.38	65.5	2548	2842
	1150	8.89	72.1	2058	2597	6.97	85.4	3038	3087	4.47	72.8	3038	3087	3.34	68.0	3038	3087	2.71	66.3	3038	3087
	870	7.35	79.1	2205	2842	5.36	86.1	3430	3332	3.41	73.5	3430	3332	2.57	69.3	3430	3332	2.07	67.1	3430	3332
	580	5.14	83.3	2499	3185	3.66	88.2	3430	3528	2.33	75.6	3430	3528	1.73	70.0	3430	3528	1.41	68.3	3430	3528
	300	2.75	86.1	3430	3528	1.93	90.3	3430	3528	1.23	77.0	3430	3528	0.92	71.4	3430	3528	0.74	70.0	3430	3528
	100	0.95	88.9	3430	3528	0.66	93.8	3430	3528	0.42	79.8	3430	3528	0.30	72.8	3430	3528	0.25	71.4	3430	3528
	10	0.09	92.4	3430	3528	0.06	97.3	3430	3528	0.04	81.2	3430	3528	0.02	74.9	3430	3528	0.02	72.8	3430	3528

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.

3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

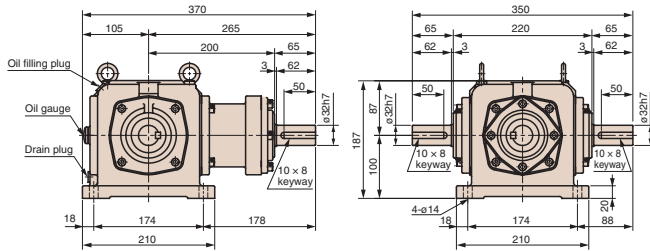
4. Refer to the section on selection for details on radial load position. (page 15)

ED7 Lateral 1-shaft

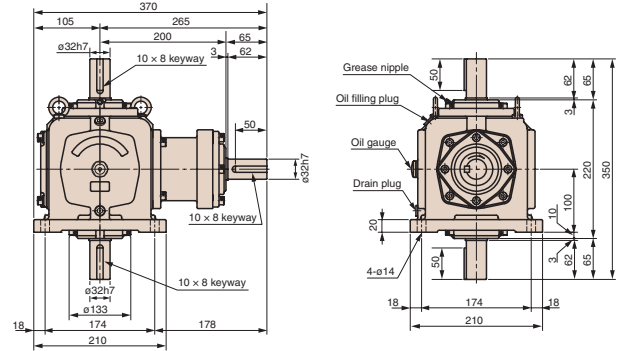
■ Reduction Ratio: M (1:1), B15 (1.5:1), B20 (2:1), B25 (2.5:1), B30 (3:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)
 Approximate mass: 32 kg Approximate oil volume: 1.5 L

Dimensional Drawings

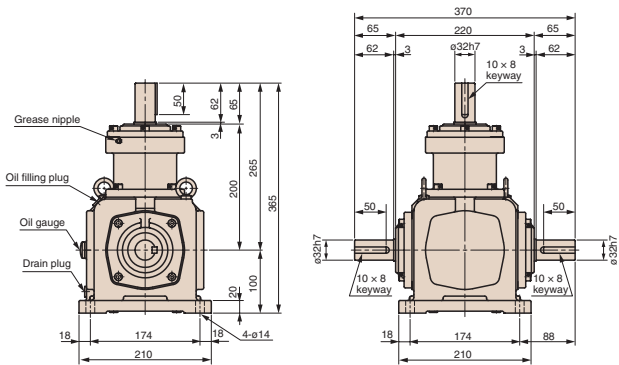
1-LR, 1-LR-O



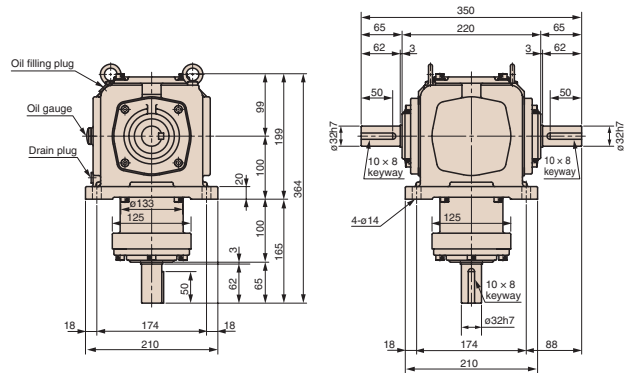
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.
- * The dimensional drawings show the shaft diameters for a reduction ratio of M (1:1). The dimensions of the shaft diameter depend on the reduction ratio. Check the detailed view on page 28.

Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N
			N-m	Lateral shaft			Cross shaft	N-m			Lateral shaft	Cross shaft			N-m	Lateral shaft			Cross shaft	N-m	
ED7	2000	27.1	105	2010	2500	19.2	135	2696	4756	14.2	133	2696	4756	9.40	110	2696	4756	7.30	102	2696	4756
	1750	24.8	132	2156	2842	17.4	139	3038	4998	12.7	135	3038	4998	8.36	112	3038	4998	6.48	104	3038	4998
	1450	22.0	142	2450	3136	15.0	145	3430	5390	10.6	137	3430	5390	6.99	113	3430	5390	5.42	105	3430	5390
	1150	18.4	150	2744	3234	12.0	147	4067	5978	8.55	139	4067	5978	5.64	115	4067	5978	4.34	106	4067	5978
	870	15.2	164	2989	3381	9.30	150	4753	6076	6.56	141	4753	6076	4.30	116	4753	6076	3.34	108	4753	6076
	580	11.4	184	3381	3822	6.32	153	5096	6174	4.47	144	5096	6174	2.92	118	5096	6174	2.25	109	5096	6174
	300	6.35	198	4410	5537	3.35	157	5096	6272	2.37	148	5096	6272	1.55	121	5096	6272	1.18	111	5096	6272
	100	2.20	206	5096	6272	1.16	163	5096	6272	0.81	152	5096	6272	0.52	123	5096	6272	0.40	115	5096	6272
10	0.22	214	5096	6272	0.12	169	5096	6272	0.08	157	5096	6272	0.05	126	5096	6272	0.04	118	5096	6272	

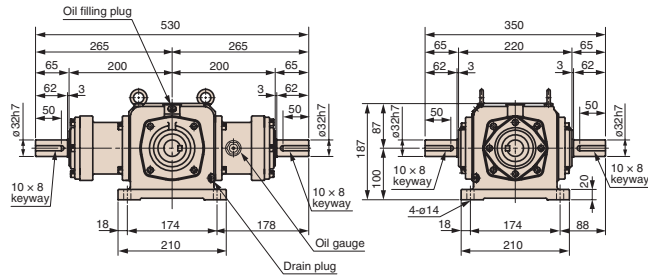
Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

- Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
- Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
- Refer to the section on selection for details on radial load position. (page 15)

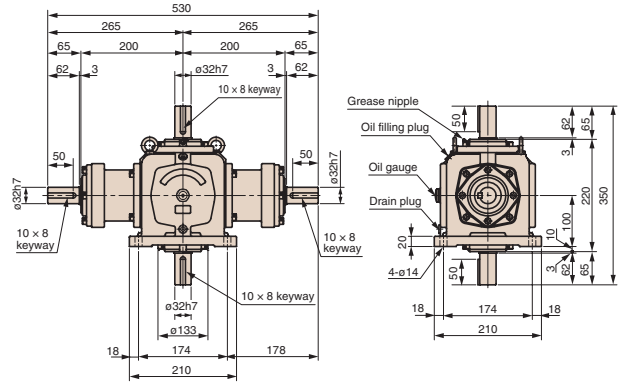
Lateral 2-shaft

Approximate mass: 41 kg Approximate oil volume: 1.6 L

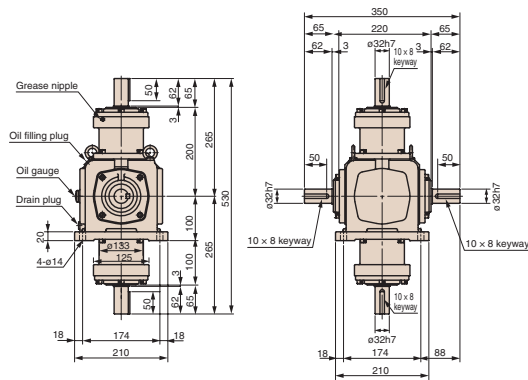
1-1-LR, 1-1-LR-O



1-1-UD, 1-1-UD-O



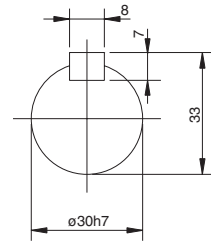
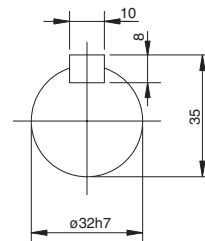
U-D-LR, U-D-LR-O



Detailed view of lateral/cross shaft ends

7M Lateral shaft/Cross shaft
7B15 Lateral shaft
7B15, 20, 25, 30 Cross shaft

7B20, 25, 30
Lateral shaft



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED7	2000	18.9	73.5	2010	2500	13.4	94.5	2696	4756	9.94	93.1	2696	4756	6.58	77.0	2696	4756	5.11	71.4	2696	4756
	1750	17.3	92.4	2156	2842	12.1	97.3	3038	4998	8.89	94.5	3038	4998	5.85	78.4	3038	4998	4.53	72.8	3038	4998
	1450	15.4	99.4	2450	3136	10.5	101	3430	5390	7.42	95.9	3430	5390	4.89	79.1	3430	5390	3.79	73.5	3430	5390
	1150	12.8	105	2744	3234	8.4	102	4067	5978	5.98	97.3	4067	5978	3.94	80.5	4067	5978	3.03	74.2	4067	5978
	870	10.6	114	2989	3381	6.51	105	4753	6076	4.59	98.7	4753	6076	3.01	81.2	4753	6076	2.33	75.6	4753	6076
	580	7.98	128	3381	3822	4.42	107	5096	6174	3.12	100	5096	6174	2.04	82.6	5096	6174	1.57	76.3	5096	6174
	300	4.44	138	4410	5537	2.34	109	5096	6272	1.65	103	5096	6272	1.08	84.7	5096	6272	0.82	77.7	5096	6272
	100	1.54	144	5096	6272	0.81	114	5096	6272	0.56	106	5096	6272	0.36	86.1	5096	6272	0.28	80.5	5096	6272
10	0.15	149	5096	6272	0.08	118	5096	6272	0.05	109	5096	6272	0.03	88.2	5096	6272	0.02	82.6	5096	6272	

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.

3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

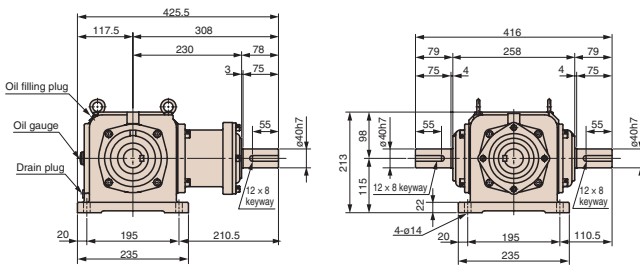
4. Refer to the section on selection for details on radial load position. (page 15)

ED8 Lateral 1-shaft

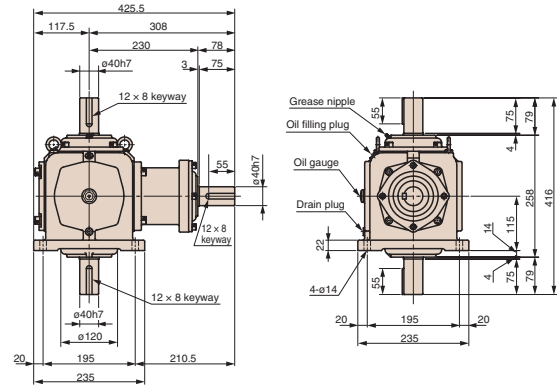
■ Reduction Ratio: M (1:1), B15 (1.5:1), B20 (2:1), B25 (2.5:1), B30 (3:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)
 Approximate mass: 49 kg Approximate oil volume: 1.9 L

Dimensional Drawings

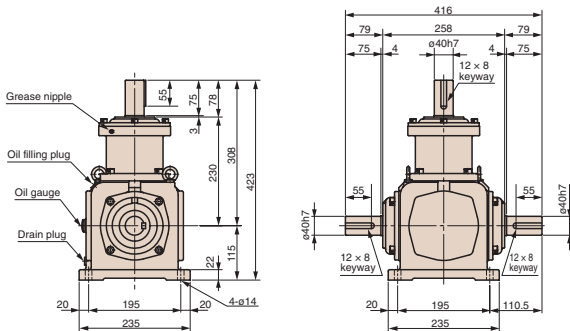
1-LR, 1-LR-O



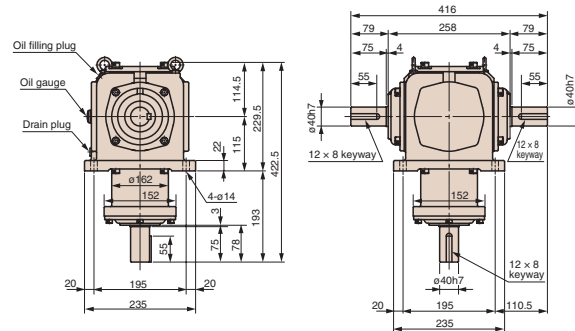
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

Transmission Capacity Table

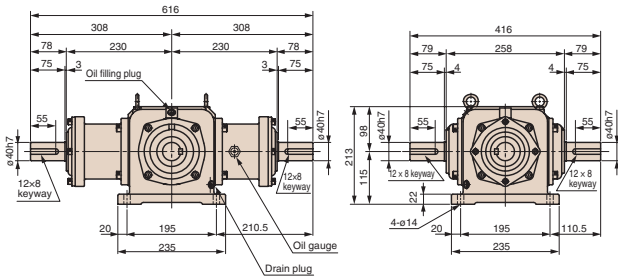
Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED8	2000	57.3	268	2941	3040	25.8	181	3432	6864	18.9	176	3432	6864	15.2	177	3432	6864	10.9	152	3432	6864
	1750	52.3	279	3087	3234	22.7	182	3822	7252	16.9	180	3822	7252	13.5	180	3822	7252	9.78	157	3822	7252
	1450	45.6	294	3234	3381	19.1	185	4361	7987	14.0	180	4361	7987	11.4	184	4361	7987	8.20	159	4361	7987
	1150	37.5	305	3479	3626	15.4	188	5096	8820	11.3	183	5096	8820	9.11	185	5096	8820	6.55	160	5096	8820
	870	29.0	312	3773	3969	11.8	191	6076	8820	8.70	187	6076	8820	7.00	188	6076	8820	5.04	163	6076	8820
	580	19.8	319	4263	4459	8.14	197	7644	8820	5.92	191	7644	8820	4.76	192	7644	8820	3.42	166	7644	8820
	300	10.6	331	5243	6958	4.34	203	8428	8820	3.14	196	8428	8820	2.53	197	8428	8820	1.80	169	8428	8820
	100	3.70	346	8428	8820	1.49	210	8428	8820	1.08	202	8428	8820	0.86	203	8428	8820	0.61	173	8428	8820
	10	0.38	361	8428	8820	0.15	218	8428	8820	0.11	209	8428	8820	0.08	208	8428	8820	0.06	179	8428	8820

- Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.
2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
4. Refer to the section on selection for details on radial load position. (page 15)

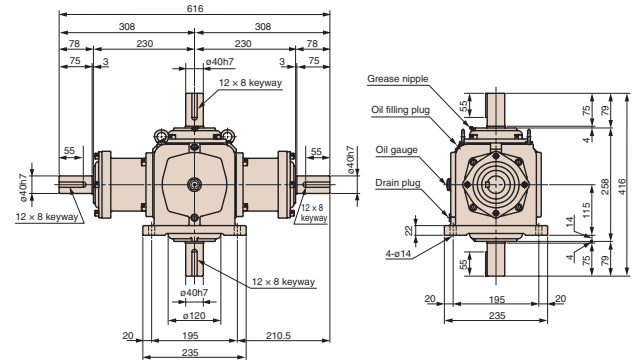
Lateral 2-shaft

Approximate mass: 62 kg Approximate oil volume: 2.1 L

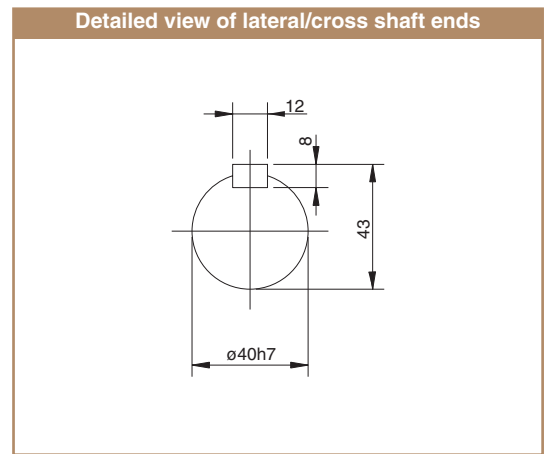
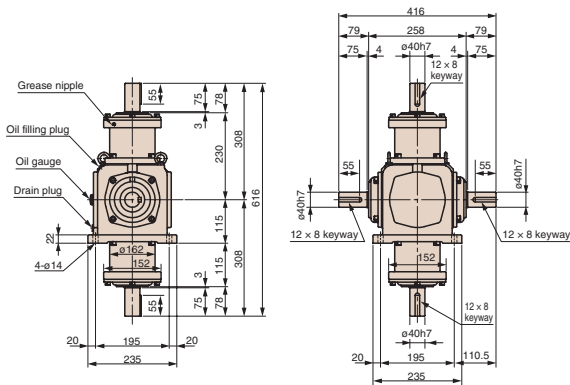
1-1-LR, 1-1-LR-O



1-1-UD, 1-1-UD-O



U-D-LR, U-D-LR-O



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N		Input kW	Cross shaft torque	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED8	2000	40.1	187	2941	3040	18.0	126	3432	6864	13.2	123	3432	6864	10.6	123	3432	6864	7.63	106	3432	6864
	1750	36.6	195	3087	3234	15.8	127	3822	7252	11.8	126	3822	7252	9.45	126	3822	7252	6.84	109	3822	7252
	1450	31.9	205	3234	3381	13.3	129	4361	7987	9.80	126	4361	7987	7.98	128	4361	7987	5.74	111	4361	7987
	1150	26.2	213	3479	3626	10.7	131	5096	8820	7.91	128	5096	8820	6.37	129	5096	8820	4.58	112	5096	8820
	870	20.3	218	3773	3969	8.26	133	6076	8820	6.09	130	6076	8820	4.9	131	6076	8820	3.52	114	6076	8820
	580	13.8	223	4263	4459	5.69	137	7644	8820	4.14	133	7644	8820	3.33	134	7644	8820	2.39	116	7644	8820
	300	7.42	231	5243	6958	3.03	142	8428	8820	2.19	137	8428	8820	1.77	137	8428	8820	1.26	118	8428	8820
	100	2.59	242	8428	8820	1.04	147	8428	8820	0.75	141	8428	8820	0.6	142	8428	8820	0.42	121	8428	8820
	10	0.26	252	8428	8820	0.10	152	8428	8820	0.07	146	8428	8820	0.05	145	8428	8820	0.04	125	8428	8820

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.

3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

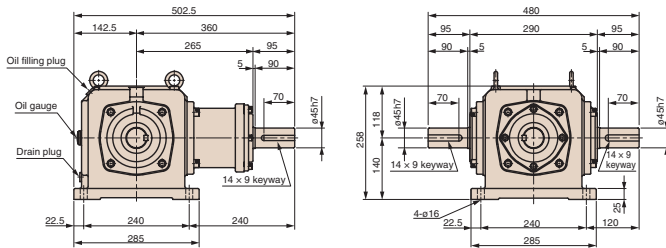
4. Refer to the section on selection for details on radial load position. (page 15)

ED10 Lateral 1-shaft

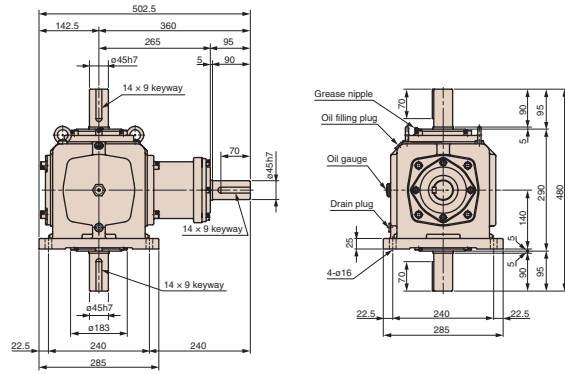
■ Reduction Ratio: M (1:1), B15 (1.5:1), B20 (2:1), B25 (2.5:1), B30 (3:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)
 Approximate mass: 78 kg Approximate oil volume: 3.5 L

Dimensional Drawings

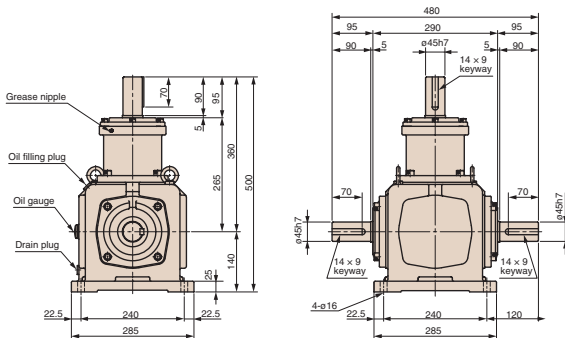
1-LR, 1-LR-O



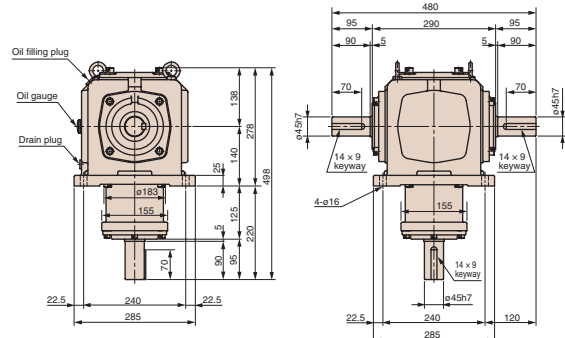
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



* The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
 * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
 * The keyway may not be aligned in the same phase.

Transmission Capacity Table

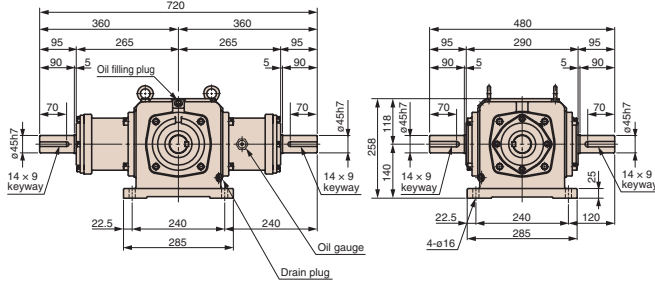
Size	Lateral shaft speed rpm	Reduction ratio M (1:1)			Reduction ratio B15 (1.5:1)			Reduction ratio B20 (2:1)			Reduction ratio B25 (2.5:1)			Reduction ratio B30 (3:1)							
		Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque		Allowable radial load N	Input kW	Cross shaft torque						
			N-m	Lateral shaft			N-m	Lateral shaft			N-m	Lateral shaft			N-m	Lateral shaft					
ED10	2000	79.0	358	3677	4069	49.5	336	4167	7845	32.0	290	4167	7845	24.3	275	4167	7845	18.6	252	4167	7845
	1750	74.6	399	3969	4263	46.0	368	4459	8232	28.2	302	4459	8232	21.7	290	4459	8232	16.8	270	4459	8232
	1450	65.3	421	4165	4508	38.7	374	5194	9212	23.6	305	5194	9212	18.2	293	5194	9212	14.0	270	5194	9212
	1150	55.7	453	4459	4851	31.2	380	6174	10486	19.0	309	6174	10486	14.7	298	6174	10486	11.3	275	6174	10486
	870	44.6	479	4851	5292	24.1	389	7448	11760	14.6	315	7448	11760	11.2	302	7448	11760	8.66	279	7448	11760
	580	30.6	493	5488	5880	16.4	396	9555	11760	10.0	322	9555	11760	7.68	310	9555	11760	5.89	285	9555	11760
	300	16.4	513	9713	7987	8.78	411	9996	11760	5.33	332	9996	11760	4.06	317	9996	11760	3.11	291	9996	11760
	100	5.72	535	9996	11760	3.04	426	9996	11760	1.84	344	9996	11760	1.40	326	9996	11760	1.07	300	9996	11760
	10	0.59	561	9996	11760	0.31	443	9996	11760	0.19	357	9996	11760	0.14	336	9996	11760	0.11	308	9996	11760

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.
 2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
 3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
 4. Refer to the section on selection for details on radial load position. (page 15)

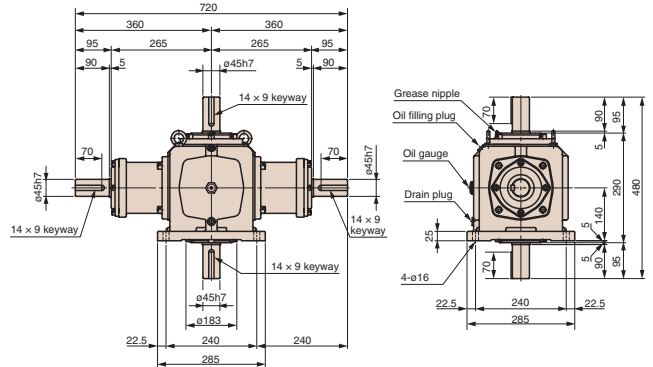
Lateral 2-shaft

Approximate mass: 100 kg Approximate oil volume: 3.7 L

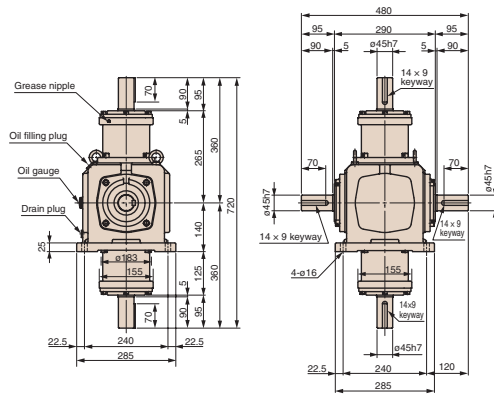
1-1-LR, 1-1-LR-O



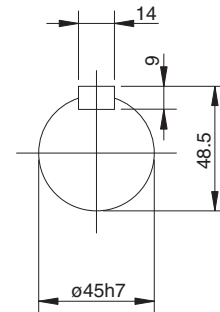
1-1-UD, 1-1-UD-O



U-D-LR, U-D-LR-O



Detailed view of lateral/cross shaft ends



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N	
			N-m	Lateral shaft	Cross shaft	N-m		Lateral shaft	Cross shaft	N-m	Lateral shaft		Cross shaft	N-m	Lateral shaft	Cross shaft		N-m	Lateral shaft	Cross shaft	
ED10	2000	55.3	250	3677	4069	34.6	235	4167	7845	22.4	203	4167	7845	17.0	192	4167	7845	13.0	176	4167	7845
	1750	52.2	279	3969	4263	32.2	257	4459	8232	19.7	211	4459	8232	15.1	203	4459	8232	11.7	189	4459	8232
	1450	45.7	294	4165	4508	27.0	261	5194	9212	16.5	213	5194	9212	12.7	205	5194	9212	9.80	189	5194	9212
	1150	38.9	317	4459	4851	21.8	266	6174	10486	13.3	216	6174	10486	10.2	208	6174	10486	7.91	192	6174	10486
	870	31.2	335	4851	5292	16.8	272	7448	11760	10.2	220	7448	11760	7.84	211	7448	11760	6.06	195	7448	11760
	580	21.4	345	5488	5880	11.4	277	9555	11760	7.00	225	9555	11760	5.37	217	9555	11760	4.12	199	9555	11760
	300	11.4	359	9713	7987	6.14	287	9996	11760	3.73	232	9996	11760	2.84	221	9996	11760	2.17	203	9996	11760
	100	4.00	374	9996	11760	2.12	298	9996	11760	1.28	240	9996	11760	0.98	228	9996	11760	0.74	210	9996	11760
10	0.41	392	9996	11760	0.21	310	9996	11760	0.13	249	9996	11760	0.09	235	9996	11760	0.07	215	9996	11760	

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

2. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.

3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.

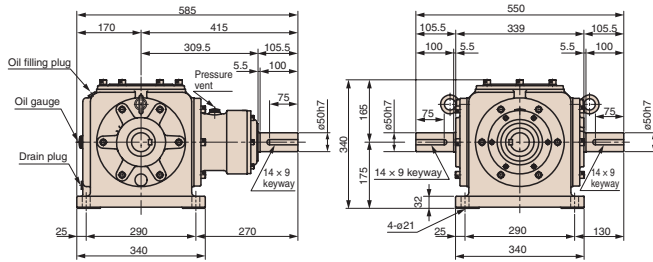
4. Refer to the section on selection for details on radial load position. (page 15)

ED12 Lateral 1-shaft

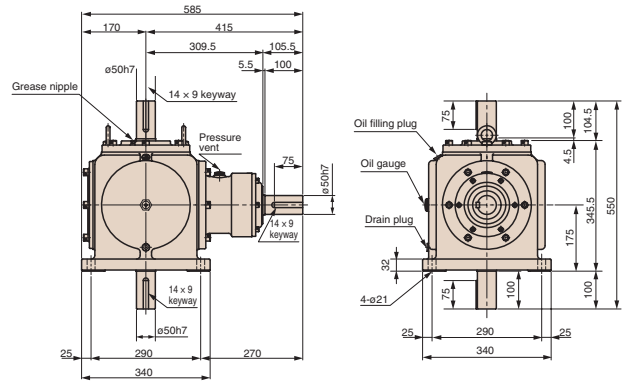
■ Reduction Ratio: M (1:1), B15 (1.5:1), B20 (2:1), B25 (2.5:1), B30 (3:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)
 Approximate mass: 124 kg Approximate oil volume: 7.0 L

Dimensional Drawings

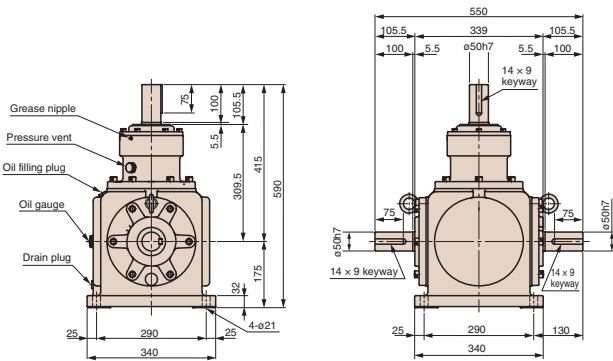
1-LR, 1-LR-O



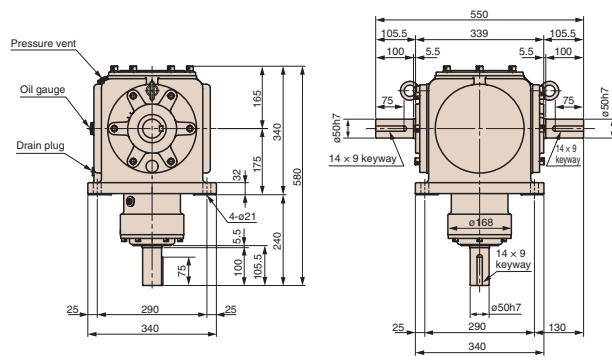
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

Transmission Capacity Table

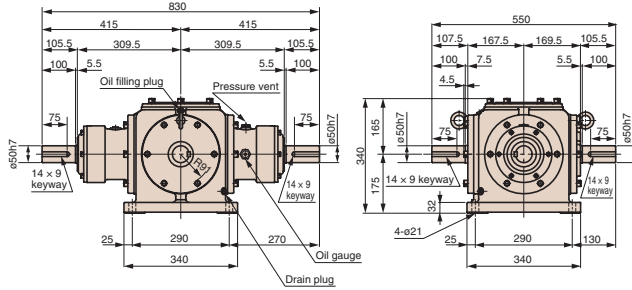
Size	Lateral shaft speed rpm	Reduction ratio M (1:1)					Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)							
		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N	
			N-m	Lateral shaft	Cross shaft	N-m		Lateral shaft	Cross shaft	N-m	Lateral shaft		Cross shaft	N-m	Lateral shaft	Cross shaft		N-m	Lateral shaft	Cross shaft	N-m		Lateral shaft	Cross shaft		
ED12	1750	109.6	586	4851	5341	65.9	528	5096	9212	48.3	516	5096	9212	37.4	500	5096	9212	28.2	452	5096	9212	28.2	452	5096	9212	
	1450	96.0	619	5096	5586	58.3	564	5978	10486	40.0	516	5978	10486	31.4	507	5978	10486	23.6	458	5978	10486	23.6	458	5978	10486	
	1150	81.8	665	5488	6076	49.2	601	7252	12151	31.7	516	7252	12151	25.3	514	7252	12151	19.0	464	7252	12151	19.0	464	7252	12151	
	870	67.5	726	5880	6566	40.7	656	8869	14504	24.0	516	8869	14504	19.5	523	8869	14504	14.6	469	8869	14504	14.6	469	8869	14504	
	580	49.7	802	6713	7301	28.9	699	11466	14504	16.3	524	11466	14504	13.3	535	11466	14504	9.92	480	11466	14504	9.92	480	11466	14504	
	300	26.8	835	8232	9065	15.5	724	11858	14504	8.71	543	11858	14504	7.08	552	11858	14504	5.29	495	11858	14504	5.29	495	11858	14504	
	100	9.36	875	11368	12593	5.37	754	11858	14504	3.01	563	11858	14504	2.43	568	11858	14504	1.82	510	11858	14504	1.82	510	11858	14504	
	10	0.98	919	11858	14504	0.56	785	11858	14504	0.31	586	11858	14504	0.25	588	11858	14504	0.18	527	11858	14504	0.18	527	11858	14504	

- Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.
- Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
 - Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
 - Refer to the section on selection for details on radial load position. (page 15)

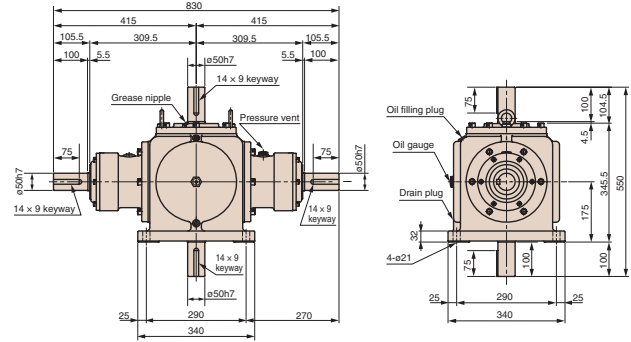
Lateral 2-shaft

Approximate mass: 159 kg Approximate oil volume: 7.4 L

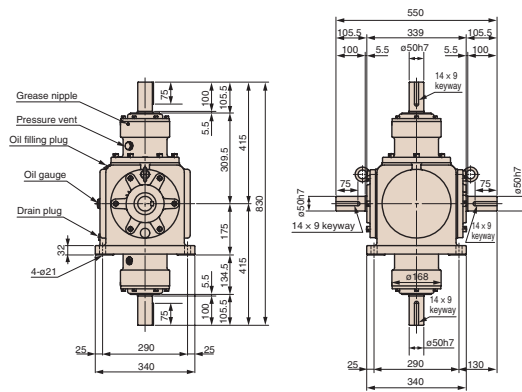
1-1-LR, 1-1-LR-O



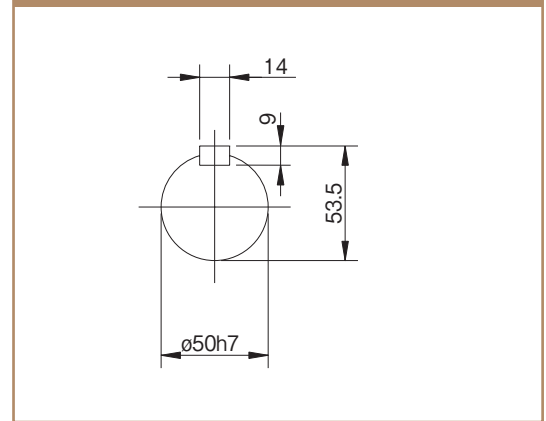
1-1-UD, 1-1-UD-O



U-D-LR, U-D-LR-O



Detailed view of lateral/cross shaft ends



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B15 (1.5:1)				Reduction ratio B20 (2:1)				Reduction ratio B25 (2.5:1)				Reduction ratio B30 (3:1)			
		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N		Input kW	Cross shaft torque N-m	Allowable radial load N	
				Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft			Lateral shaft	Cross shaft
ED12	1750	76.7	410	4851	5341	46.1	369	5096	9212	33.8	361	5096	9212	26.1	350	5096	9212	19.7	316	5096	9212
	1450	67.2	433	5096	5586	40.8	394	5978	10486	28.0	361	5978	10486	21.9	354	5978	10486	16.5	320	5978	10486
	1150	57.2	465	5488	6076	34.4	420	7252	12151	22.1	361	7252	12151	17.7	359	7252	12151	13.3	324	7252	12151
	870	47.2	508	5880	6566	28.4	459	8869	14504	16.8	361	8869	14504	13.6	366	8869	14504	10.2	328	8869	14504
	580	34.7	561	6713	7301	20.2	489	11466	14504	11.4	366	11466	14504	9.31	374	11466	14504	6.94	336	11466	14504
	300	18.7	584	8232	9065	10.8	506	11858	14504	6.09	380	11858	14504	4.95	386	11858	14504	3.70	346	11858	14504
	100	6.55	612	11368	12593	3.75	527	11858	14504	2.10	394	11858	14504	1.70	397	11858	14504	1.27	357	11858	14504
	10	0.68	643	11858	14504	0.39	549	11858	14504	0.21	410	11858	14504	0.17	411	11858	14504	0.12	368	11858	14504

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

- Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
- Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
- Refer to the section on selection for details on radial load position. (page 15)

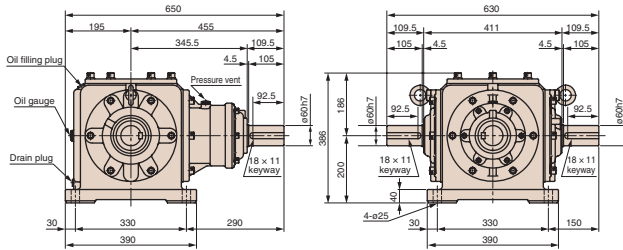
ED16 Lateral 1-shaft

■ Reduction Ratio: M (1:1), B20 (2:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)

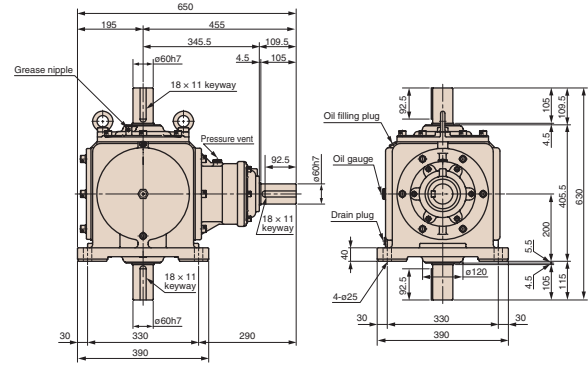
Approximate mass: 188 kg Approximate oil volume: 10 L

Dimensional Drawings

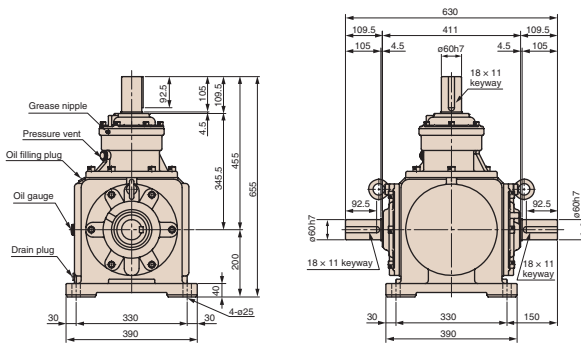
1-LR, 1-LR-O



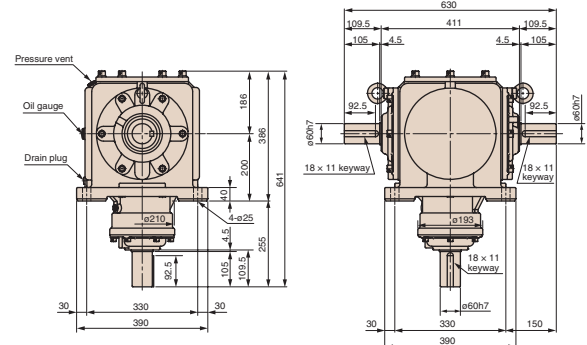
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

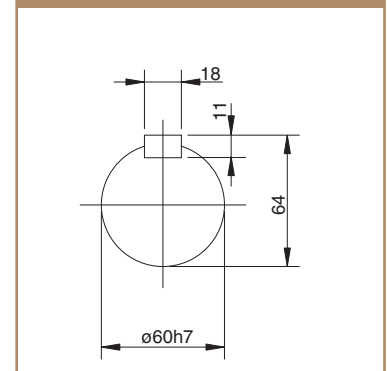
Transmission Capacity Table

Size	Lateral shaft speed rpm	Input kW	Reduction ratio M (1:1)			Reduction ratio B20 (2:1)			
			Allowable radial load N		Input kW	Allowable radial load N			
			Cross shaft torque N-m	Lateral shaft		Cross shaft	Cross shaft torque N-m	Lateral shaft	Cross shaft
ED16	1750	—	—	—	—	87.7	908	5439	10339
	1450	163	1091	10633	10976	73.7	921	5978	12152
	1150	139	1098	11368	11760	59.5	938	6419	13083
	870	114	1186	12446	12740	46.0	958	6958	14210
	580	85.9	1343	14014	14504	31.3	980	7840	16072
	300	54.1	1637	17150	17640	16.7	1009	9604	19600
	100	20.3	1842	22540	22540	5.84	1058	13328	22540
	10	2.14	1940	22540	22540	0.60	1098	22540	22540

Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

1. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
2. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
4. Refer to the section on selection for details on radial load position. (page 15)

Detailed view of lateral/cross shaft ends

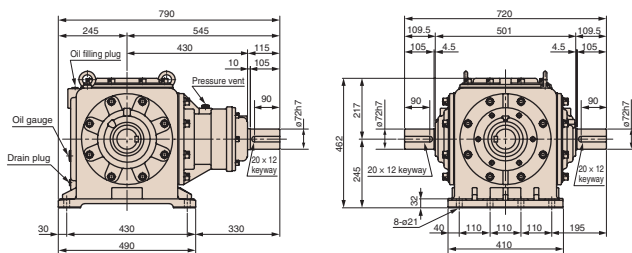


ED20 Lateral 1-shaft

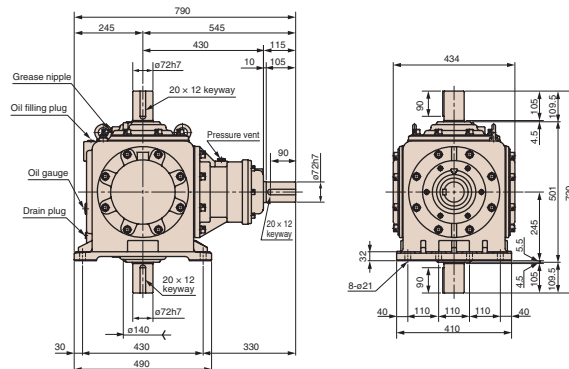
■ Reduction Ratio: M (1:1), B20 (2:1) ■ Mounting Type: Y (T, K1, K2, K3, K4) Approximate mass: 297 kg Approximate oil volume: 11 L

Dimensional Drawings

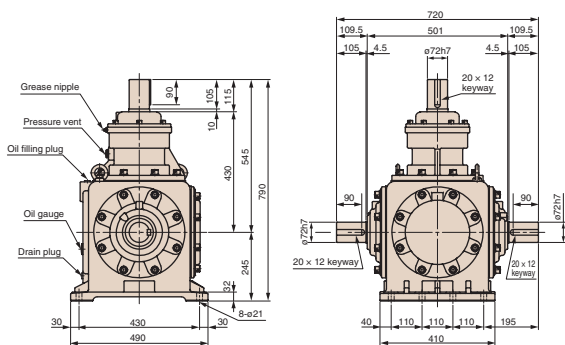
1-LR, 1-LR-O



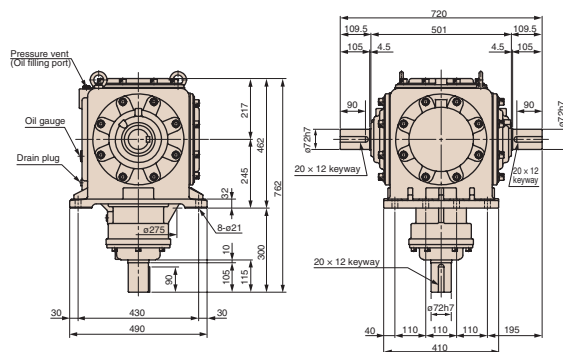
1-UD, 1-UD-O



U-LR, U-LR-O

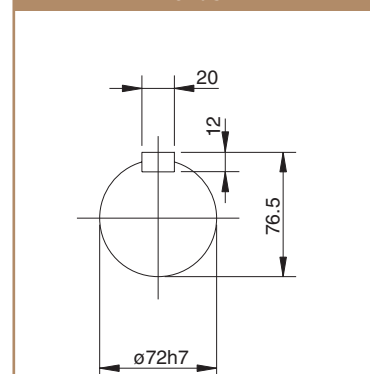


D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

Detailed view of lateral/cross shaft ends



Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B20 (2:1)			
		Input kW	Cross shaft torque		Input kW	Cross shaft torque		Allowable radial load N	
			N-m	Lateral shaft		Cross shaft	N-m		Lateral shaft
ED20	1450	—	—	—	—	126	1578	7693	14602
	1150	234	1842	15386	15680	102	1607	8771	17934
	870	193	2009	16660	17150	79.0	1646	9506	19453
	580	145	2274	18816	19404	54.2	1695	10780	22001
	300	90.8	2744	23422	24108	29.0	1754	13132	27342
	100	35.3	3205	28420	32928	10.1	1833	18228	33320
	10	3.53	3205	28420	33320	1.06	1921	28420	33320

- Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.
- Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
 - Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
 - Refer to the section on selection for details on radial load position. (page 15)

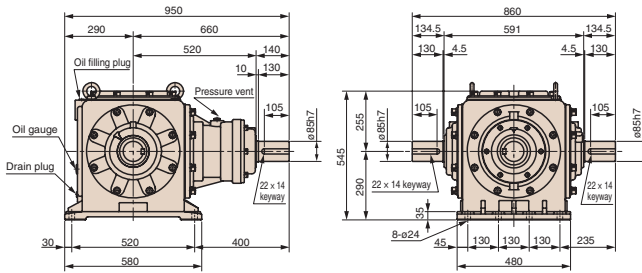
ED25 Lateral 1-shaft

■ Reduction Ratio: M (1:1), B20 (2:1) ■ Mounting Type: Y (T, K1, K2, K3, K4)

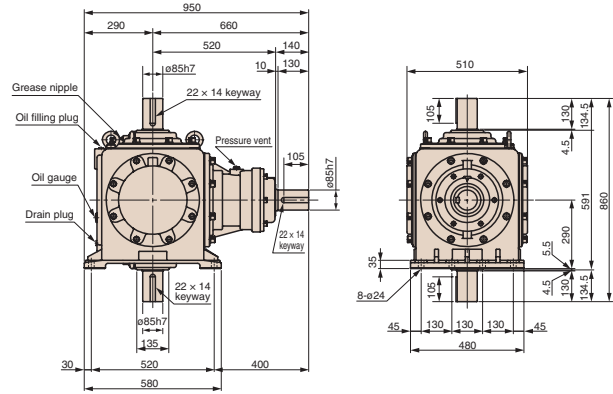
Approximate mass: 488 kg Approximate oil volume: 18 L

Dimensional Drawings

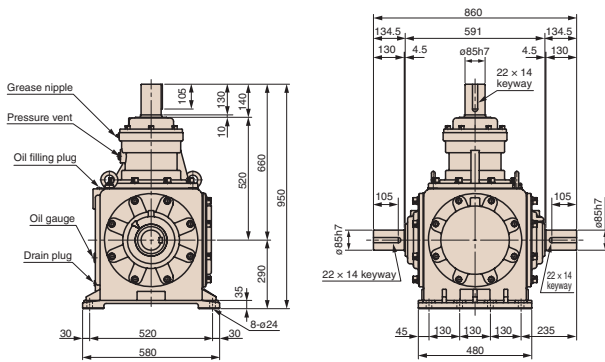
1-LR, 1-LR-O



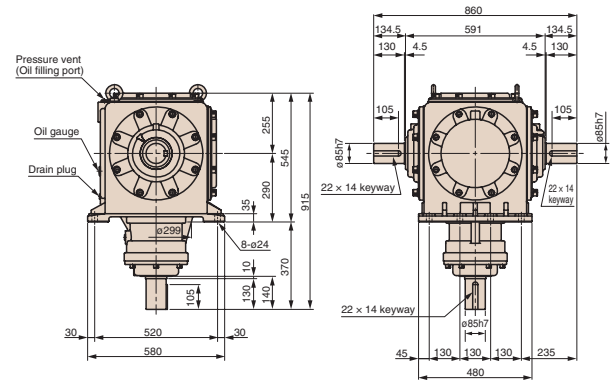
1-UD, 1-UD-O



U-LR, U-LR-O



D-LR, D-LR-O



- * The above drawings only show the cross 2-shaft types. For other shaft arrangements, see pages 11 and 12.
- * The plugs, oil gauges, and grease nipples are shown in their locations for mounting type Y.
- * The keyway may not be aligned in the same phase.

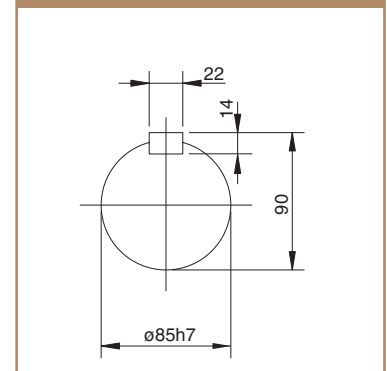
Transmission Capacity Table

Size	Lateral shaft speed rpm	Reduction ratio M (1:1)				Reduction ratio B20 (2:1)					
		Input kW	Cross shaft torque		Allowable radial load N		Input kW	Cross shaft torque		Allowable radial load N	
			N-m	Lateral shaft	Cross shaft	N-m		Lateral shaft	Cross shaft		
ED25	1150	—	—	—	—	199	3146	12985	24647		
	870	335	3489	24794	25480	155	3224	13573	29400		
	580	252	3940	28028	28910	107	3332	15680	33222		
	300	159	4792	34300	35280	57.5	3479	19159	40474		
	100	60.0	5439	39200	49000	20.1	3646	26656	49000		
	10	6.30	5713	39200	49000	2.11	3822	39200	49000		

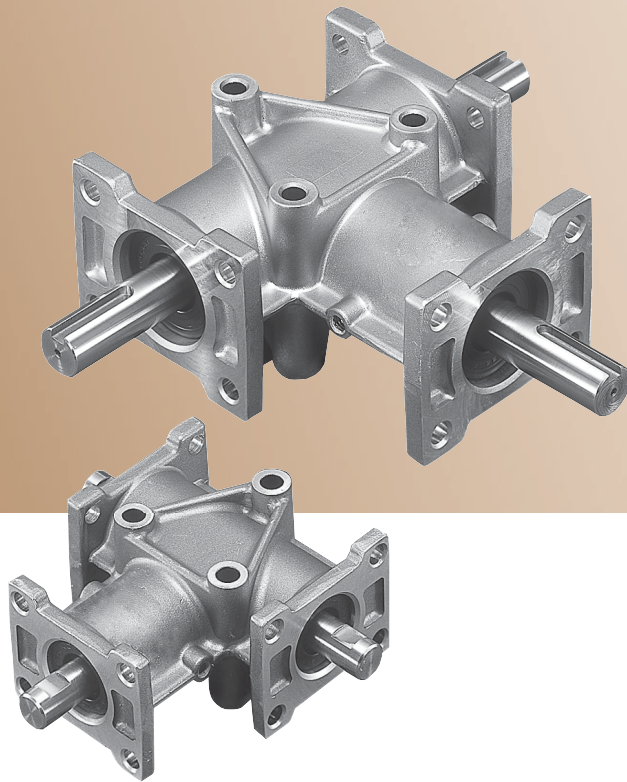
Note 1. For operation between the listed lateral shaft speeds, calculate the transmission capacity by proportional calculation. If the speed of the lateral shaft is less than 10 rpm, use the torque for 10 rpm.

1. : Forced lubrication may be necessary when using products at a speed higher than each specified rotation speed. Contact Tsubaki representative.
2. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
3. : Contact Tsubaki representative when using products at a rotation speed between a rotation speed in colored and the rotation speed below it.
4. Refer to the section on selection for details on radial load position. (page 15)

Detailed view of lateral/cross shaft ends



ARA Gear Box



C O N T E N T S

Features and Lineup..... Page 39
Standard Specifications, Shaft Arrangements,
and Rotation Details

Models Page 40

Transmission Capacity Tables and
Dimensional Drawings..... Page 41

Features and Lineup

ARA Gear Box

Features

Compact, lightweight, and attractive

The case is made of aluminum die-cast (ADC).

Corrosion resistance

Shafts are made of corrosion-resistant stainless steel (SUS304).

Universal mounting

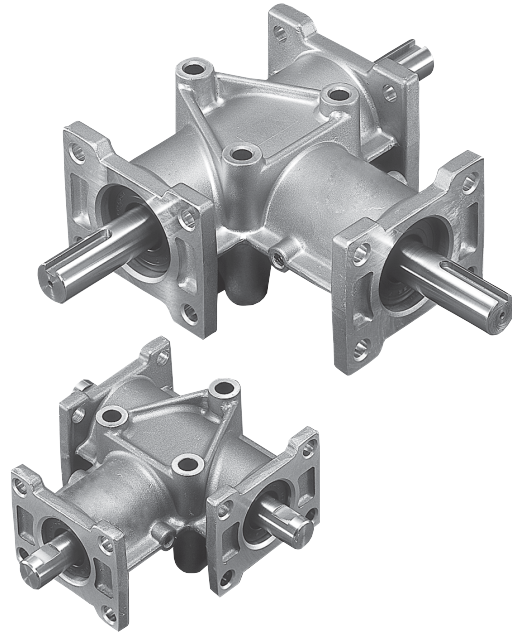
The units can be mounted in any direction.

High efficiency, high transmission capacity, low noise, and low vibration

Precision spiral bevel gears offer a high quality drive.

Standardized design

All shaft arrangement ratio are standardized.



Lineup

●: Standard product

ARA	Reduction ratio	1:1	2:1
	3	●	●
5	●	●	
6	●	●	

Standard Specifications

Gear box	Reduction method	Spiral bevel gears
	Lubrication method	Grease lubrication
	Keyway	New JIS standard, normal grade - JIS B1301-1976 parallel key (Size 3 is D cut)
	Case material	Aluminum die-cast (ADC)
	Seal design	Single oil seal
	Paint specifications	Not painted
Ambient Conditions	Installation	Indoors
	Ambient temperature	-10 to 50°C
	Humidity	95% or lower
	Altitude	1,000 m or lower
	Atmosphere	Area must be free of corrosive and explosive gases, steam, condensation, and have little or no dust.
Mounting type		Mountable in any direction

Shaft Arrangements and Rotation Details

	Type LR	Type SN	Type SF
Plug on rear side - A			
Plug on front side - B			

- Note 1. Input can be from either the lateral shaft or cross shaft. The input shaft can rotate to both CW and CCW.
- Note 2. With models that have a reduction ratio of 2:1, input from the lateral shaft to the cross shaft produces reduced speed while the opposite produces increased speed.
- Note 3. A and B are shown using the same products.

ARA Gear Box Models

Model

ARA 3 10 LR

Series

Size

Reduction ratio

Shaft arrangements and rotation details

Reduction ratio $\left\{ \begin{array}{l} 10 = 1:1 \\ 20 = 2:1 \end{array} \right.$

Selection

Selection Requirements

(1) Load torque or transmission kW, (2) Input rotation speed, (3) Rotation ratio, (4) Load type, and (5) Start/Stop frequency

Selection Procedure

Consider the requirements and select a model according to the following guide.

1. Determine the service factor

The transmission capacity values in the catalogs are all based on a service factor of 1.0. Find the service factor from the service factor table (Table 1) according to operating conditions.

Table 1: Service factors

Operating hours \ Load type	2 hours	10 hours	24 hours
Uniform load	1.00(1.00)	1.00(1.25)	1.25(1.50)
Load with moderate impact	1.00(1.25)	1.25(1.50)	1.50(1.75)
Load with large impact	1.25(1.50)	1.50(1.75)	1.75(2.00)

Note 1. Use the values in parentheses if operation stops 10 or more times an hour or when using a multi-cylinder engine as the motor.
2. The service factors in the table above are to be used as a general reference. Determine the appropriate model based on the actual operating conditions.

2. Calculate the corrected torque or corrected kW

Calculate the corrected torque or corrected kW using the service factor (Table 1).

Corrected torque or corrected kW = (Load torque or transmission kW applied to the ARA Series) × Service factor (Table 1)

3. Find the model

- Use the transmission capacity table (page 41) to select the size that satisfies the corrected torque or corrected kW at the operating rotation speed. Next, check whether the peak torque at start/stop is within 200% of the transmission capacity of the selected size.
- Select appropriate models from the above Shaft Arrangements and Rotation Details section.

4. Calculate the radial load

When driving a system by mounting a sprocket, gear, and/or pulley on the lateral shaft or cross shaft, calculate the radial load by using the following formula:

■ Radial load calculation formula

$$\text{Allowable radial load} \geq \frac{T \times f \times L_f}{r}$$

(Allowable radial load → See page 46)

T = Corrected torque [N·m]
 f = O.H.L. factor (Table 2)
 L_f = Load position factor (Table 3)
 r = Pitch radius of sprocket or pulley (m)

Note: If the calculated radial load is greater than the allowable radial load, the r value, which is the pitch radius of the sprocket or pulley, must be greater than that used in the calculation.

Table 2: O.H.L. factors (f)

Chain	1.00
Gear	1.25
Toothed belt	1.25
V belt, heavy duty toothed belt	1.50

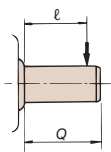


Table 3: Load position factors (L_f)

Load is applied at the shaft center or closer to the gear box	$l \leq \frac{Q}{2}$	$L_f = 1$
Load is applied farther than the shaft center	$l > \frac{Q}{2}$	$L_f = \frac{2l}{Q}$

Q = Length of output shaft end l = Radial load position

Note: Contact us if radial and axial loads are applied at the same time.

Transmission Capacity Tables and Dimensional Drawings

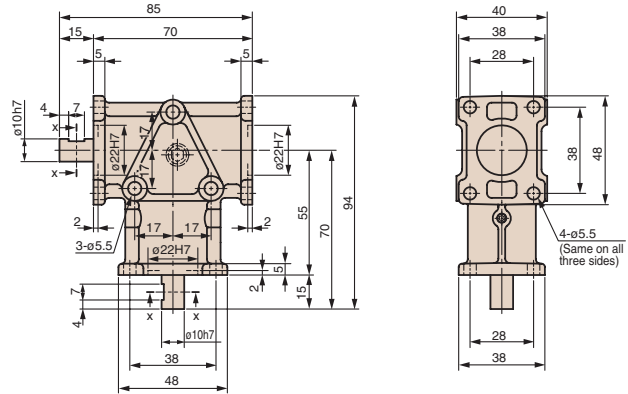
ARA Gear Box

ARA3

- Reduction Ratio: 10 (1:1), 20 (2:1)
- Mounting type: Mountable in any direction Approximate mass: 0.4 kg

Lateral shaft speed rpm	1:1		2:1	
	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m
3600	0.52	1.37	0.28	1.37
2750	0.45	1.47	0.24	1.56
1900	0.37	1.76	0.18	1.66
1750	0.36	1.96	0.17	1.76
1450	0.31	1.96	0.14	1.76
1150	0.28	2.25	0.11	1.76
870	0.24	2.55	0.08	1.76
580	0.18	2.94	0.05	1.76
400	0.14	3.23	0.04	1.76
300	0.12	3.72	0.03	1.76
200	0.08	3.72	0.02	1.76
150	0.06	3.72	0.014	1.76
100	0.04	3.72	0.010	1.76
50	0.02	3.72	0.005	1.76

SN

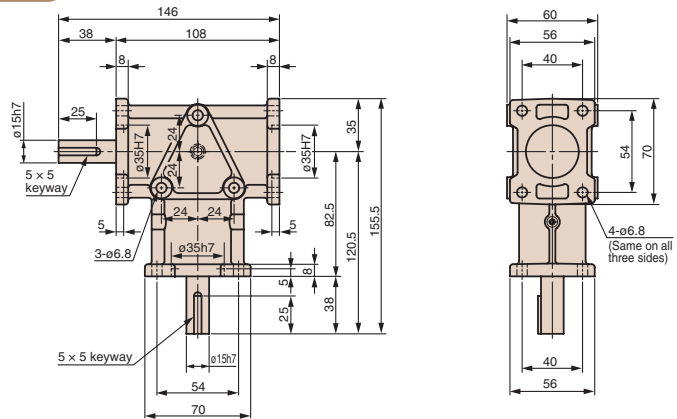


ARA5

- Reduction Ratio: 10 (1:1), 20 (2:1)
- Mounting type: Mountable in any direction Approximate mass: 1.3 kg

Lateral shaft speed rpm	1:1		2:1	
	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m
3600	2.11	5.49	1.35	6.95
2750	1.82	6.17	1.03	6.95
1900	1.45	7.15	0.71	6.95
1750	1.34	7.15	0.66	6.95
1450	1.11	7.15	0.55	6.95
1150	0.88	7.15	0.43	6.95
870	0.66	7.15	0.33	6.95
580	0.44	7.15	0.22	6.95
400	0.30	7.15	0.15	6.95
300	0.23	7.15	0.11	6.95
200	0.15	7.15	0.075	6.95
150	0.11	7.15	0.056	6.95
100	0.08	7.15	0.038	6.95
50	0.04	7.15	0.018	6.95

SN

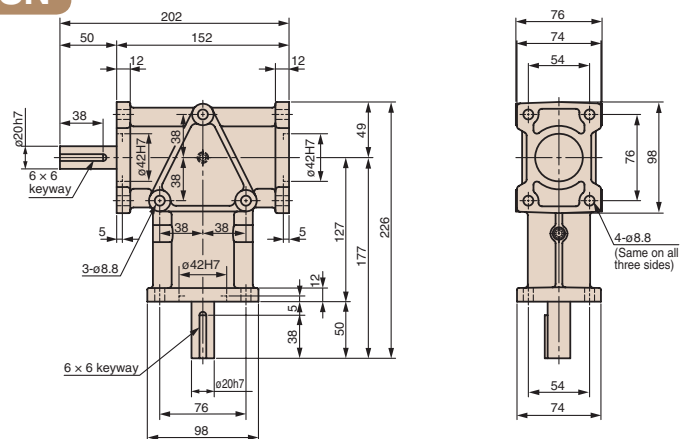


ARA6

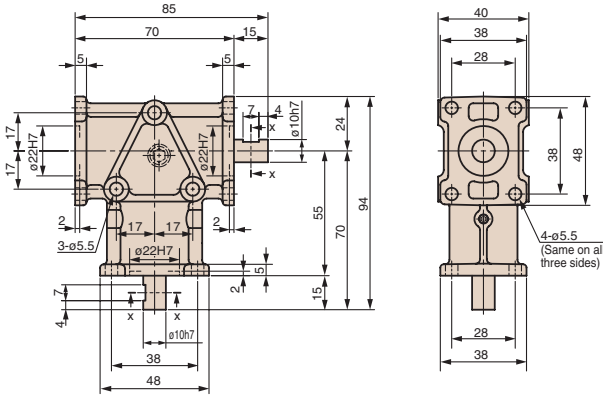
- Reduction Ratio: 10 (1:1), 20 (2:1)
- Mounting type: Mountable in any direction Approximate mass: 3.1 kg

Lateral shaft speed rpm	1:1		2:1	
	Input kW	Cross shaft torque N-m	Input kW	Cross shaft torque N-m
3600	3.15	8.13	1.81	9.41
2750	2.75	9.31	1.58	10.78
1900	2.26	11.07	1.22	11.96
1750	2.19	11.66	1.12	11.96
1450	1.92	12.25	0.94	11.96
1150	1.73	14.01	0.74	11.96
870	1.47	15.78	0.56	11.96
580	1.10	17.74	0.37	11.96
400	0.76	17.74	0.26	11.96
300	0.57	17.74	0.19	11.96
200	0.38	17.74	0.13	11.96
150	0.28	17.74	0.10	11.96
100	0.19	17.74	0.064	11.96
50	0.095	17.74	0.032	11.96

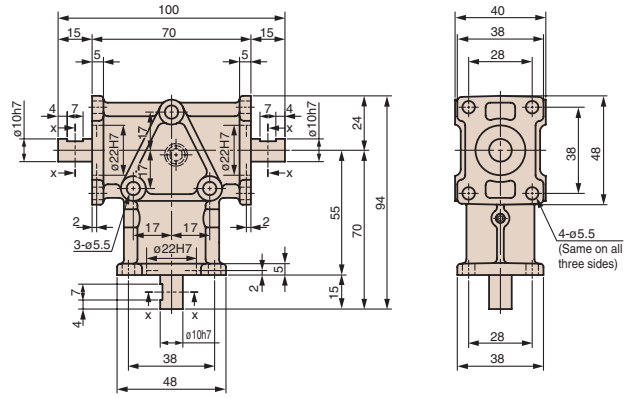
SN



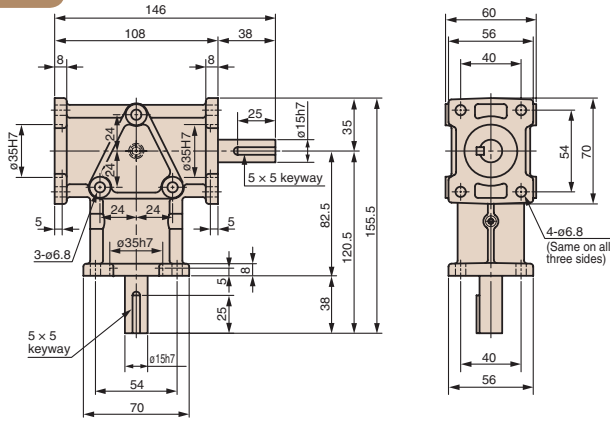
SF



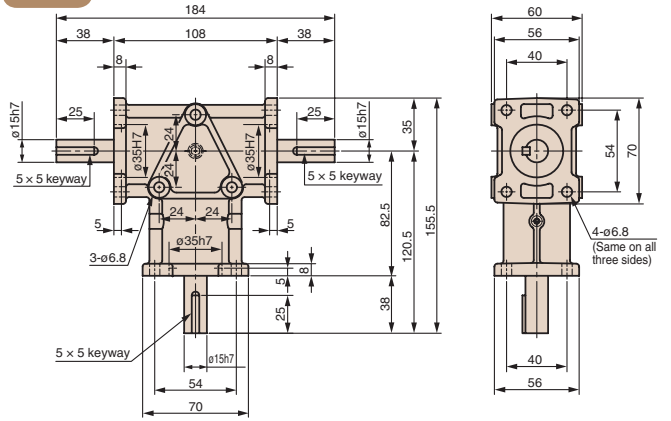
LR



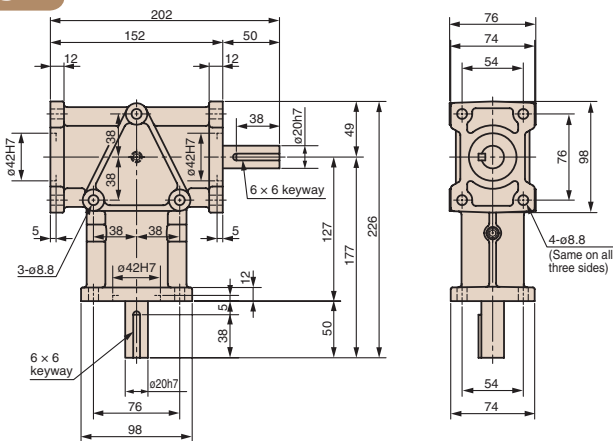
SF



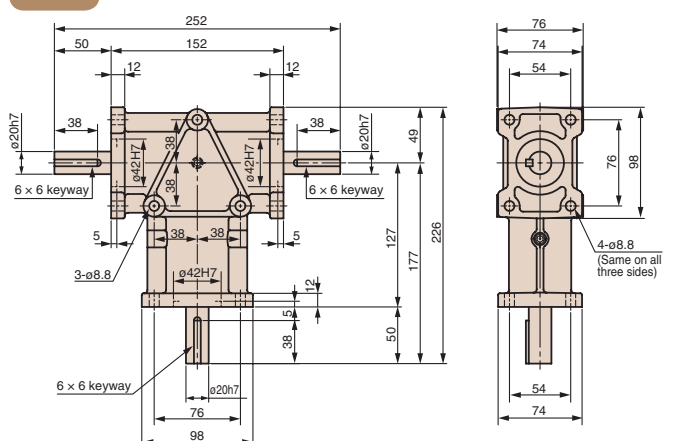
LR



SF



LR



Technical Data

C O N T E N T S

Technical Data	Page 45
Options	Page 48
Special Types.....	Page 50
Handling	Page 53
Inquiry Form	Page 58
Jack System Selection Service ...	Page 59

Technical Data

1. Efficiency

Miter Gear Boxes and ARA Gear Boxes use precision spiral bevel gears for high efficiency.

(1) ED2 to ED12: 98% (2) ED16 to ED25: 95% (3) ARA3 to ARA6: 98%

The above may change depending on rotation speed, ambient temperature, and/or load rate.

2. Backlash

The backlash is the total mechanical clearance that can be calculated in the rotating direction of the cross shaft when the lateral shaft is fixed.

2-1. Miter Gear Box

Unit: Angle °

Reduction ratio ED	1:1	1.5:1	2:1	2.5:1	3:1
2	0.20 to 1.51	—	—	—	—
4	0.15 to 1.16	—	0.12 to 0.65	—	—
6	0.19 to 1.00	0.17 to 0.85	0.17 to 0.59	0.09 to 0.51	0.09 to 0.51
7	0.24 to 0.94	0.17 to 0.79	0.15 to 0.50	0.17 to 0.53	0.08 to 0.45
8	0.19 to 0.82	0.14 to 0.70	0.12 to 0.45	0.14 to 0.47	0.07 to 0.40

Unit: Angle °

Reduction ratio ED	1:1	1.5:1	2:1	2.5:1	3:1
10	0.18 to 0.75	0.16 to 0.65	0.11 to 0.58	0.12 to 0.42	0.12 to 0.42
12	0.16 to 0.65	0.13 to 0.57	0.12 to 0.53	0.13 to 0.40	0.10 to 0.37
16	0.16 to 0.66	—	0.12 to 0.51	—	—
20	0.16 to 0.60	—	0.09 to 0.43	—	—
25	0.15 to 0.53	—	0.09 to 0.38	—	—

Note: Low-backlash models are available for applications that require positioning accuracy. (See page 52)

2-2. ARA Gear Box

Unit: Angle °

Reduction ratio ARA	10 (1:1)	20 (2:1)
3	0.31 to 1.97	0.31 to 1.75
5	0.24 to 1.42	0.19 to 1.15
6	0.18 to 1.16	0.16 to 0.94

3. Moment of inertia on lateral shaft

3-1. Miter Gear Box

Lateral 1-shaft

Unit: kg·m²

Reduction ratio ED	1:1	1.5:1	2:1	2.5:1	3:1
2	0.05×10 ⁻³	—	—	—	—
4	0.15×10 ⁻³	—	0.12×10 ⁻³	—	—
6	1.40×10 ⁻³	0.90×10 ⁻³	0.67×10 ⁻³	0.58×10 ⁻³	0.50×10 ⁻³
7	3.50×10 ⁻³	1.70×10 ⁻³	1.40×10 ⁻³	1.10×10 ⁻³	0.93×10 ⁻³
8	4.80×10 ⁻³	4.30×10 ⁻³	3.50×10 ⁻³	3.20×10 ⁻³	2.90×10 ⁻³
10	23.0×10 ⁻³	9.60×10 ⁻³	6.80×10 ⁻³	5.70×10 ⁻³	4.60×10 ⁻³
12	25.0×10 ⁻³	22.0×10 ⁻³	14.0×10 ⁻³	13.0×10 ⁻³	11.0×10 ⁻³
16	85.0×10 ⁻³	—	37.0×10 ⁻³	—	—
20	255×10 ⁻³	—	76.0×10 ⁻³	—	—
25	733×10 ⁻³	—	217×10 ⁻³	—	—

Lateral 2-shaft

Unit: kg·m²

Reduction ratio ED	1:1	1.5:1	2:1	2.5:1	3:1
2	0.08×10 ⁻³	—	—	—	—
4	0.23×10 ⁻³	—	0.18×10 ⁻³	—	—
6	2.00×10 ⁻³	1.40×10 ⁻³	1.10×10 ⁻³	0.94×10 ⁻³	0.83×10 ⁻³
7	5.30×10 ⁻³	2.50×10 ⁻³	2.20×10 ⁻³	1.70×10 ⁻³	1.60×10 ⁻³
8	7.10×10 ⁻³	6.40×10 ⁻³	5.50×10 ⁻³	5.40×10 ⁻³	5.00×10 ⁻³
10	34.0×10 ⁻³	14.0×10 ⁻³	11.0×10 ⁻³	9.10×10 ⁻³	7.80×10 ⁻³
12	38.0×10 ⁻³	33.0×10 ⁻³	21.0×10 ⁻³	20.0×10 ⁻³	19.0×10 ⁻³
16	—	—	—	—	—
20	—	—	—	—	—
25	—	—	—	—	—

3-2. ARA Gear Box

Unit: kg·m²

Reduction ratio ARA	10 (1:1)	20 (2:1)
3	0.45×10 ⁻⁵	0.28×10 ⁻⁵
5	3.70×10 ⁻⁵	2.10×10 ⁻⁵
6	22.0×10 ⁻⁵	13.0×10 ⁻⁵

4. Allowable cross shaft torque

Allowable cross shaft torque is the allowable torsional transmission capacity of only the cross shaft.

For line shaft drive, the torque applied to the cross shaft must be checked. (See Example 2 on page 16)

Unit: N·m

ED	2	4	6	7	8	10	12	16	20	25
Allowable cross shaft torque	32.0	66.0	152	320	627	891	1225	2116	3626	6017

Note: Change with a special material for the shaft can increase the allowable torque. (See page 51)

5. Allowable radial load

Radial load means the load in the vertical direction that acts on the shaft and must be checked when selecting a Miter Gear Box or ARA Gear Box. (See page 15 for Miter Gear Boxes and page 40 for ARA Gear Boxes) If the radial load exceeds the allowable value, contact a Tsubaki representative.

5-1. Miter Gear Box

Unit: N

ED Reduction ratio	Lateral shaft speed rpm	2		4		6		7		8		10		12		16		20		25	
		Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft	Lateral shaft	Cross shaft
1:1	3000	127	117	647	764	1520	1912	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2000	186	176	745	862	1716	2157	2010	2500	2941	3040	3677	4069	—	—	—	—	—	—	—	—
	1750	216	196	784	902	1813	2303	2156	2842	3087	3234	3969	4263	4851	5341	—	—	—	—	—	—
	1450	265	216	833	951	1911	2450	2450	3136	3234	3381	4165	4508	5096	5586	10633	10976	—	—	—	—
	1150	323	235	882	1029	2058	2597	2744	3234	3479	3626	4459	4851	5488	6076	11368	11760	15386	15680	—	—
	870	402	255	960	1127	2205	2842	2989	3381	3773	3969	4851	5292	5880	6566	12446	12740	16660	17150	24794	25480
	580	549	314	1078	1323	2499	3185	3381	3822	4263	4459	5488	5880	6713	7301	14014	14504	18816	19404	28028	28910
	300	696	392	1519	1960	3430	3528	4410	5537	5243	6958	9713	7987	8232	9065	17150	17640	23422	24108	34300	35280
	100	980	588	1911	1960	3430	3528	5096	6272	8428	8820	9996	11760	11368	12593	22540	22540	28420	32928	39200	49000
10	980	588	1911	1960	3430	3528	5096	6272	8428	8820	9996	11760	11858	14504	22540	22540	28420	33320	39200	49000	
1.5:1	3000	—	—	686	1569	1274	2255	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	2000	—	—	833	1765	1814	2500	2696	4756	3432	6864	4167	7845	—	—	—	—	—	—	—	—
	1750	—	—	1078	1960	2205	2744	3038	4998	3822	7252	4459	8232	5096	9212	5439	10339	—	—	—	—
	1450	—	—	1078	1960	2548	2842	3430	5390	4361	7987	5194	9212	5978	10486	5978	12152	7693	14602	—	—
2:1	1150	—	—	1078	1960	3038	3087	4067	5978	5096	8820	6174	10486	7252	12151	6419	13083	8771	17934	12985	24647
2.5:1	870	—	—	1078	1960	3430	3332	4753	6076	6076	8820	7448	11760	8869	14504	6958	14210	9506	19453	13573	29400
3:1	580	—	—	1078	1960	3430	3528	5096	6174	7644	8820	9555	11760	11466	14504	7840	16072	10780	22001	15680	33222
	300	—	—	1078	1960	3430	3528	5096	6272	8428	8820	9996	11760	11858	14504	9604	19600	13132	27342	19159	40474
	100	—	—	1078	1960	3430	3528	5096	6272	8428	8820	9996	11760	11858	14504	13328	22540	18228	33320	26656	49000
	10	—	—	1078	1960	3430	3528	5096	6272	8428	8820	9996	11760	11858	14504	22540	22540	28420	33320	39200	49000

Note 1. The values are for allowable radial load at the center of the lateral or cross shaft.
2. For operation between the listed speeds, calculate the transmission capacity by proportional calculation.

5-2. ARA Gear Box

Unit: N

ARA Reduction ratio	3	5	6
1:1, 2:1	108	216	441

Note 1. The values are for allowable radial load at the center of the lateral or cross shaft.
2. For operation between the listed speeds, calculate the transmission capacity by proportional calculation.

6. No-load loss

The no-load loss rates of Miter Gear Boxes are shown in the table below.

This data is calculated from actual measurements at room temperature (25°C) and should only be used as a reference as it can be affected by the ambient environment and operating conditions. The values are for reference.

Refer to the table below for other reduction ratios. For lateral 2-shaft types, refer to the following table according to the transmission capacity of the lateral 2-shaft type.

Unit: %

Reduction ratio	Lateral shaft speed rpm	10	100	300	580	870	1150	1450	1750	2000	3000
1:1	ED2M	2.0	2.0	2.0	3.0	5.0	7.0	8.0	9.0	10.0	15.0
	ED4M	2.0	2.0	2.0	3.0	5.0	7.0	8.0	9.0	10.0	15.0
	ED6M	2.0	2.0	2.0	3.0	5.0	7.0	8.0	9.0	10.0	15.0
	ED7M	2.0	2.0	2.0	3.0	5.0	7.0	8.0	9.0	10.0	—
	ED8M	2.0	2.0	2.0	3.0	5.0	7.0	8.0	10.0	12.0	—
	ED10M	2.0	2.0	2.0	5.0	8.0	8.0	9.0	10.0	12.0	—
	ED12M	3.0	3.0	5.0	8.0	10.0	11.0	12.0	15.0	—	—
	ED16M	5.0	5.0	5.0	5.0	11.0	12.0	12.0	—	—	—
	ED20M	5.0	5.0	5.0	8.0	11.0	12.0	—	—	—	—
ED25M	5.0	5.0	8.0	10.0	12.0	—	—	—	—	—	

Note : Oil lubrication model
 : Forced lubrication model

Calculation of no-load loss (reference of ED6M)

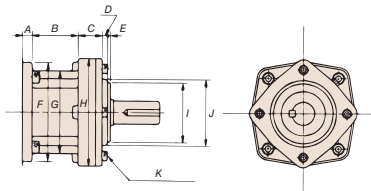
• When running ED6M1-LR-Y (reduction ratio: 1:1) at 2000 rpm:

Based on an input kW of 18.6 kW and a no-load loss of 10%, no-load loss is calculated as $18.6 \times 0.1 = 1.86$ kW.

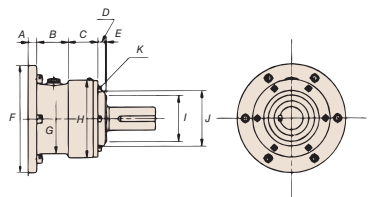
Technical Data

7. Detailed dimensions of brackets

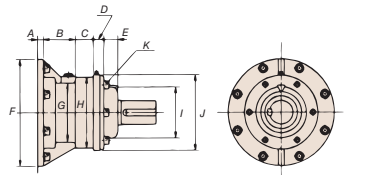
ED2 to 10



ED12 to 16



ED20 to 25

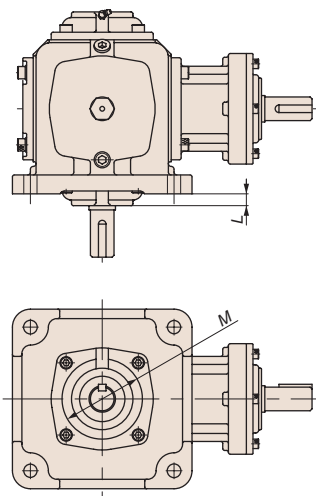


Unit: mm

ED	A	B	C	D	E	F	G	H	I	J	K
2	5	22	26	7	—	60	50	58	—	36	4-M4 Hex cap bolt PCD 48
4	8	34.5	31.5	8	—	82	60	78	—	50	4-M4 Hex cap bolt PCD 62
6	10	49	26	6	3	108	90	117	65	72	4-M8 Hex cap bolt PCD 95
7	12	57.5	35	8	3	125	100	124	70	80	4-M8 Hex cap bolt PCD 100
8	15	78	29	8	4	145	120	152	85	105	4-M8 Hex cap bolt PCD 130
10	15	94.5	30	10	—	165	135	154	—	110	4-M8 Hex cap bolt PCD 130
12	18	73	58	16	3	232	150	168	100	120	6-M8 Hex cap bolt PCD 148
16	18	107	30	25	10	272	180	193	105	140	6-M10 Hex cap bolt PCD 170
20	17.5	152	32	41	2	325	215	230	125	155	6-M12 Hex cap bolt PCD 195
25	20	179.5	50	47	3	395	250	270	140	190	6-M14 Hex cap bolt PCD 230

8. Housing case bracket dimension

[Shaft arrangement: 1-UD(-O), 1-U(-O), 1-D(-O), 1-1-UD(-O), 1-1-U(-O), and 1-1-D(-O)]



Unit: mm

ED	L	M
2	3.25	ø40
4	0.5	ø50
6	12.5	ø84
7	10	ø133
8	14	ø120
10	5	ø183
12	—	—
16	5.5	ø120
20	5.5	ø140
25	5.5	ø135

Options

1. Case and bracket material - Ductile cast iron (FCD)

The case and bracket material can be changed from the standard gray cast iron (FC) to ductile cast iron (FCD) to meet special usage conditions. The transmission capacity, dimensions, and shape are the same as standard models. See Lineup (page 9) for applicable models.

2. Lateral and cross shafts - Former JIS keyway

Former JIS key specifications (JIS B 1301-1959 parallel key 2 types) are also available with new shafts.

3. Plug layout modification

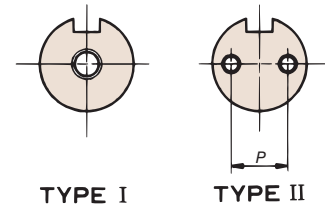
The plug locations of the oil gauge, pressure vent, and/or drain plug can be changed to your preferred locations.

4. Shaft end tapping

Taps can be machined at the end of lateral and cross shafts when using end plates to prevent sprockets and gears mounted on the shafts from falling off.

The dimensions of the shaft end taps are as follows:

ED	Type	Number of taps	Size	Depth (L)	Pitch (P)
2	I	1	M6	12	—
4	I	1	M6	12	—
6	I	1	M8	12	—
7	I	1	M8	12	—
8*	II (I)	2 (1)	M8 (M12)	12 (22)	20 (—)
10*	II (I)	2 (1)	M8 (M12)	12 (22)	22 (—)
12*	II (I)	2 (1)	M10 (M12)	15 (22)	26 (—)
16	II	2	M10	15	36
20	II	2	M12	18	44
25	II	2	M12	18	54



Note *With ED8B 20/25/30, ED10B 25/30, and ED12B 25/30, the lateral shafts are Type I while cross shafts are Type II.

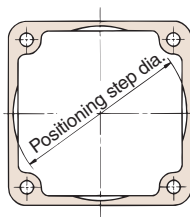
5. Lateral and cross shafts - Hard chromium plating

Lateral and cross shafts can be plated with hard chromium to improve the corrosion resistance and wear resistance of the oil seals. (Shaft surface on oil seal position is partially plated.)

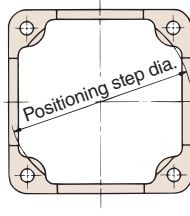
6. Case bottom positioning machined

Positioning step can be machined at housing case bottom to fit centering position for installation. The Miter Gear Box side has the female machined.

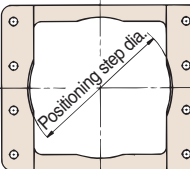
ED2



ED4 to 16



ED20, 25



ED	Dimensions	
	Diameter (mm)	Depth (mm)
2	ø94H8	3
4	ø155H8	5
6	ø190H8	5
7	ø220H8	5
8	ø250H8	5
10	ø305H8	5
12	ø370H8	7
16	ø420H8	7
20	ø360H8	10
25	ø430H8	10

Options

7. Oil gauges

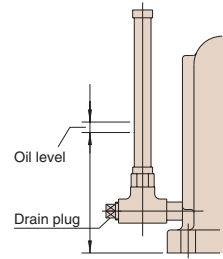
Round oil gauge as standard for checking the oil level, and we offer other types of oil gauges upon request.

7-1. Vertical oil gauge

A visible gauge that enables oil level check during operation.
This is only for indoor use.

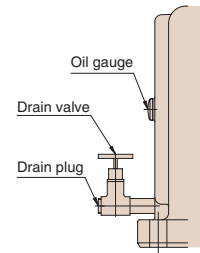
7-2. Metal oil gauge

The standard plastic resin oil gauge can be replaced to a metal oil gauge.



8. Drain valve

A drain valve can be furnished to make draining oil easier when replacing the oil, and when installing piping.



9. Inspection cover

An inspection cover can be designed for efficient maintenance and periodical inspection service.
The inspection cover can be made from either gray cast iron (FC) or clear acrylic resin upon request.

10. Paint specifications

Non-standard painting is available upon request to meet special requirements.

Classification	Paint type		Paint specifications				Applications	
	Paint	Generic name	Weather resistance	Water resistant	Acid resistant	Alkali resistant		
Semi-standard	Outdoor standard	Primer	Lacquer-based base paint	△	△	△	△	Outdoor standard paint specification
		Top coat	Phthalic acid (alkyd) resin					
Semi-standard	Waterproof standard	Primer	Special modified epoxy	○	◎	○	◎	Waterproof standard paint specification
		Top coat	Two-component urethane resin					
Special painting	Long-oil phthalic acid resin	Primer	Long-oil alkyd resin rust prevention	○	○	△	△	Ships, bridges, coastal areas, outdoor humid environments
		Top coat	Long-oil alkyd resin top coat					
	Phenolic resin	Primer	Rust prevention JIS-K-5623 (2 grade)	○	○	◎	△	Factory indoor/outdoor areas where acid is used, chemical plant sites, on-water areas
		Top coat	Phenolic resin acid-resistant					
	Chlorinated rubber	Primer	Epoxide resin for prime coat	◎	○	○	○	Ships, bridges, coastal areas, outdoor humid environments, corrosive gases
		Middle coat	Chlorinated rubber for middle coat					
		Top coat	Chlorinated rubber for top coat					
	Heat-resistant	Primer	Special alkyd for heat-resistant prime coat	○	×	×	×	Normally withstands 100°C, momentarily withstands 150°C
		Top coat	Special alkyd for heat-resistant top coat					
	Epoxide resin	Primer	Epoxide resin for prime coat	○	◎	○	◎	Good resistance against seawater and chemicals
Top coat		Epoxide resin for top coat						
Tar epoxide	Primer	Organic zinc rich primer	×	◎	◎	◎	Good resistance against chemicals, oil, seawater and water	
	Top coat	Tar epoxide resin JIS-K-5664 (1 grade)						

Note: Contact Tsubaki representative for details.

◎: Most suitable ○: Suitable △: Contact Tsubaki representative ×: Unsuitable

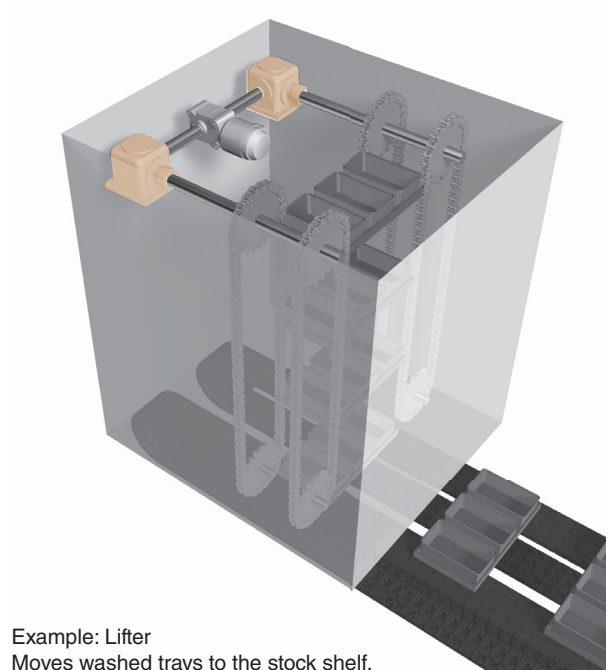
11. Special rust-proofing specifications

Upon request, we can provide export-grade rust prevention or a longer lasting treatment than the standard rust-prevention.
(Standard rust prevention lasts six months after shipment from our factory when stored indoors.)

Special Types

1. Lubricant for food processing machinery

We can provide H1 grade (NFS-certified) lubricant. Lubricated types ensure food safety with Miter Gear Boxes, which are widely used in the food processing machinery industry. See below for applicable models.



Example: Lifter
Moves washed trays to the stock shelf.

Technical Data

Miter Gear Box

Supporting model(s)

Size	ED2 to ED12
Reduction ratio	1:1 to 3:1

Standard specifications

Reduction method	Spiral bevel gears
Lubrication method	Sizes 2 & 4: H1 grade grease lubrication Sizes 6 to 12: H1 grade oil lubrication
Keyway	New JIS standard, normal grade - JIS B1301-1976 (key supplied with gear box)
Case material	Size 2: ADC Sizes 4 to 25: FC (FCD is optional)
Seal design	Single oil seal
Coating color	Munsell 2.5G6/3
Rust proofing specifications	Rust proof effective for 6 months when stored indoors (after shipping). Outside: rust-proofing grease Inside: sealed after filling with lubricant
Mounting type	Floor (Y), Ceiling (T), Wall (K1, K2, K3, K4)

Ambient conditions

Installation	Indoors
Ambient temperature	-10 to 50°C
Humidity	95% or lower
Altitude	1,000 m or lower
Atmosphere	Area must be free of corrosive and explosive gases, steam, condensation, and have little or no dust.

ARA Gear Box

Supporting model(s)

Size	ARA3 to ARA6
Reduction ratio	1:1 to 2:1

Standard specifications

Reduction method	Spiral bevel gears
Lubrication method	H1 grade grease lubrication
Keyway	New JIS standard, normal grade - JIS B1301-1976 parallel key (Size 3 is D cut)
Case material	Aluminum die-casting (ADC)
Seal design	Single oil seal
Coating color	Not painted (aluminum color)
Mounting type	Mountable in any direction

Ambient conditions

Installation	Indoors
Ambient temperature	-10 to 50°C
Humidity	95% or lower
Altitude	1,000 m or lower
Atmosphere	Area must be free of corrosive and explosive gases, steam, condensation, and have little or no dust.

Special Types

2. High speed operation

We offer customized specifications for high-speed operations to prevent heat generation.

Note: The operational range and transmission capacity will be limited by the operating time, operating cycle, ambient temperature, and loading conditions of the high-speed operation. Contact Tsubaki representative and provide Inquiry Form on page 58.

2-1. ED2 & 4 - Oil lubrication

While standard products are lubricated with grease, oil lubrication must be used for operations where the speed of the input shaft or output shaft exceeds 1750 rpm, as the temperature of the gear box may rise over the allowable temperature depending on operating time and load. Oil-lubricated types support an input rotation speed of up to 3000 rpm.

Refer to the values marked with in the transmission capacity tables (pages 17 to 20) for transmission capacity.

2-2. ED6 to 25

Operating at a speed marked with in the transmission capacity tables (pages 17 to 20) may cause the temperature of the gear box to rise over the allowable temperature depending on operating time and load if standard lubrication is used.

In such cases, extra cooling specifications such as forced lubrication, fan installation, or fin installation will be necessary.

Cooling specification 1 Forced lubrication

This function lubricates the gears and bearings to prevent the temperature rise.

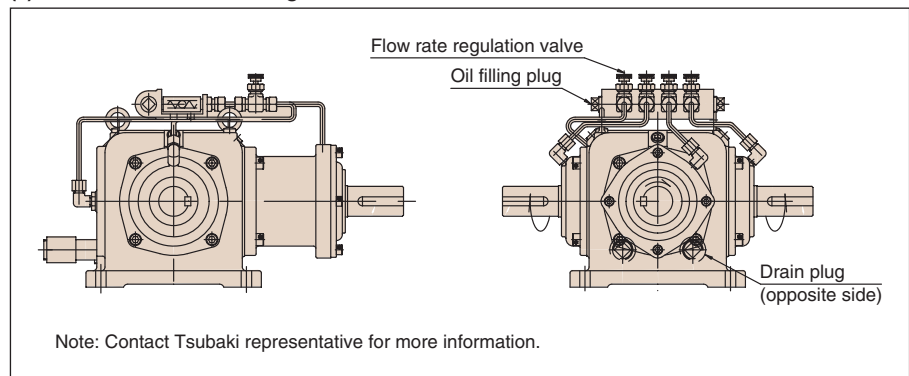
Forced lubrication is recommended for applications that need a speed marked with in the transmission capacity tables (pages 17 to 20).

(1) Approximate lubricant volume and tank capacity

ED	Lubrication rate (L/min)		
	Gears	Bearings	Total
6	0.8	0.3	2
7	1	0.5	3
8	1	0.5	3
10	1.5	0.7	4.3
12	2	1	6
16	2.5	1	6.5
20	3	1.5	9
25	4	1.5	10

Note 1. Use the tank capacity as reference and determine the actual lubrication rate from other conditions, including the length of piping.
2. Forced lubrication needs a dedicated system for lubrication, which needs to be supplied by the customer.

(2) Reference external drawing



Cooling specification 2 Fan installation

Heat generation in gear boxes can be reduced by installing a cooling fan.

This installation is not available for cross 2-shaft types or low-speed applications.

Cooling specification 3 Fin installation

Attaching a fin on the gear box case can help cool the gear box.

Fins cannot be used where ventilation conditions are poor.

3. Special conditions

Special types may be necessary when operating under ambient conditions outside of the ranges listed in the catalog or using the gear boxes in particular ambient environments.

Following specifications are reference of special ambient conditions.

3-1. High or low temperature conditions

In an environment where the ambient temperature can fall below -10°C or rise above 50°C , the operating range may be restricted depending on the operating time, load, and/or operating conditions.

The type of oil seal, oil, and material of case, bracket, and shaft are selected based on the requirements.

3-2. Special materials for lateral and cross shafts

Different shaft materials are available according to operating conditions and ambient atmosphere.

(1) Heated SCM440 shaft

Heated SCM440 shaft, with greater torsional and flexural strengths compared to the standard shaft material S45C, is also available as shaft material.

Models ED4B20, ED6B20/25/30, ED7B20/25/30, ED8B20/25/30, ED10B25/30, and ED12B25/30 use case-hardened SCM415 as the standard material for lateral shafts.

(2) Stainless steel shaft

Stainless steel shafts are available where corrosion resistance and rust-proofing are critical requirements in a harsh operating environment.

The stainless steel option is not available for models ED4B20, ED6B20/25/30, ED7B20/25/30, ED8B20/25/30, ED10B25/30, and ED12B25/30.

3-3. Case and bracket material - Rolled structure steel

Cases and brackets can be manufactured from SS400 steel with the same dimensions (shaft diameter, shaft length, shaft center height, and mounting pitch) as standard products.

4. High precision

4-1. Low backlash

Low backlash models are available for applications that require positioning accuracy.

(See Technical Data 2. Backlash on page 45 for more information on the backlash of standard products.)

The backlash is the total mechanical clearance that can be calculated in the rotating direction of the cross shaft when the lateral shaft is fixed.

Unit: Angle °

ED \ Reduction ratio	1:1	1.5:1	2:1	2.5:1	3:1
2	0.18 to 0.42	—	—	—	—
4	0.14 to 0.32	—	0.11 to 0.26	—	—
6	0.17 to 0.29	0.16 to 0.27	0.15 to 0.27	0.08 to 0.19	0.08 to 0.18
7	0.21 to 0.34	0.15 to 0.27	0.13 to 0.23	0.15 to 0.26	0.08 to 0.18
8	0.17 to 0.27	0.13 to 0.23	0.11 to 0.20	0.12 to 0.21	0.06 to 0.14
10	0.16 to 0.25	0.15 to 0.23	0.11 to 0.18	0.11 to 0.18	0.11 to 0.19
12	0.14 to 0.22	0.12 to 0.19	0.11 to 0.18	0.12 to 0.19	0.09 to 0.15
16	0.14 to 0.24	—	0.11 to 0.17	—	—
20	0.14 to 0.22	—	0.09 to 0.13	—	—
25	0.14 to 0.21	—	0.08 to 0.12	—	—

4-2. Keyless lateral and cross shafts

Keyless lateral and cross shafts are available for keyless shaft locking such as Power Locks and other friction locking devices.

The basic dimensions are the same dimensional drawings in the catalog.

5. Other special types

5-1. ED6 and higher - Grease lubrication

The lubrication of models ED6 and higher models can be changed to grease lubrication (NIGTIGHT LMS No.000) for layout purposes.

Contact Tsubaki representative and inform with Inquiry Form.

5-2. Lateral and cross shafts - Special sizes

Contact Tsubaki representative and inform with Inquiry Form.

5-3. Special reduction ratios

Contact Tsubaki representative and inform with Inquiry Form (other than 1:1, 1.5:1, 2:1, 2.5:1, and 3:1).

Handling

This section contains general information regarding the handling of your reducer.

For details, refer to the manual supplied with your reducer.

1. Before using the product

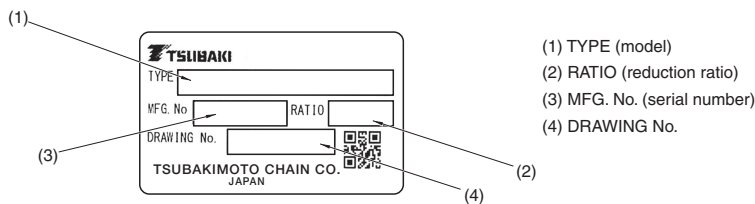
(1) Before installing, check the nameplate to verify that the listed specifications match those requested.

Note: Particularly, check the oil gauge and plug positions to ensure that the mounting type is correct, along with the rotation specifications. (ED2 & 4 and ARA Gear Boxes use grease lubrication; they do not have oil gauges.)

(2) Check for any visible damage incurred during transportation.

(3) Check for any loose bolts.

Reading the nameplate



2. Installation

2-1. Ambient conditions

Install the product in a well-ventilated, dry, dust-free location with an ambient temperature of -10 to 50°C . Avoid use in locations that have corrosive liquids or gases, or locations with the possibility of fires or explosions.

If the gear box is to be used outdoors, furnish a cover or similar protection to avoid direct exposure to rain.

2-2. Transporting

Be sure to use the eye bolt on the top of the case or a suspension ring when transporting the reducer. Never hook wires or slings to the lateral/cross shafts. Doing so may cause the shaft to lose its center position or other problems that can shorten the life of the gear box or cause it to fail.

Note: ED2/4/6 and ARA Gear Boxes do not come with eye bolts.

2-3. Installing

Install the gear box by firmly fixing it on a solid, flat surface. Ensure that the Miter Gear Box is in complete contact with the mounting surface, which will prevent shaking. While ED2 & 4 and ARA Gear Boxes have no restrictions on the installation angle, the installation angle for ED6 through ED16 should be within $\pm 5^{\circ}$ and for ED20 and ED25 should be within $\pm 2^{\circ}$. To install an ARA Gear Box, use the three mounting holes at the center or the four mounting holes on the flange.

<Recommended mounting bolt sizes>

ED	2	4	6	7	8	10	12	16	20	25
Bolt	M8	M8	M12	M12	M12	M14	M18	M20	M18	M20

Note 1. After installing the system, be sure to apply grease before actual operation. See 3-3 on page 54 for information on greasing.

2. ED2 & 4 can be installed in any direction. Avoid installing ED6 through ED25 in any direction other than the direction specified in the order. (Contact us when changing the mounting, as the positions of the oil gauge and grease nipple change along with the mounting.)

3. ED12 and higher number models need a pressure vent. After completing the installation, be sure to replace the bleeder plug on the specified location with the supplied pressure vent.

2-4. Installation on shafts

- When mounting a pulley, sprocket, or coupling on the lateral and/or cross shafts of a Miter Gear Box or ARA Gear Box, use due care to avoid bending the shaft or damaging bearings or oil seals.
- Align the shafts correctly. Shaft eccentricity as well as radial load exceeding allowable values can shorten gear, bearing, and shaft life and cause vibration or noise.
- When using a coupling, ensure correct attachment within the allowable alignment range recommended by the manufacturer. We recommend our flexible couplings, which are available in a variety of types and suitable for many applications.

3. Lubrication

3-1. Introduction

ED2 & 4 are shipped with Nippon Grease's NIGTIGHT LMS No.000, ED6 through ED25 are shipped with Shell Lubricants Japan's Shell Omala S2G150, and ARA Gear Boxes are shipped with grease (EMG Lubricants' Mobilux EP2) supplied ready for use.

With models ED6 and higher, be sure to check the oil level with the oil gauge after completing the installation. If the oil level does not appear in the oil gauge, supply the same oil until it is visible.

* The models cannot be used with the supplied lubricant if using them with a lateral shaft speed of below 200 rpm or in an ambient temperature between 35 and 50°C . A different lubricant is necessary.

Refer to the recommended lubricant table (Table 1 on page 54) to change to a suitable lubricant.

(ED2 & 4 and ARA models can be used with the supplied lubricant.)

3-2. Changing the lubricant

- ED2 & 4 use grease lubrication, which in principle does not need to be changed. However, replacing the grease about every 20,000 hours can help extend product life. When changing the grease, use the grease listed in 3-1 on page 53: approx. 150 g for ED2 and approx. 350 g for ED4.
- For ED6 through ED25, replace the oil with new oil 500 hours after the first use. This will clean out the initial abrasion powder and contribute to better performance and a longer life.
Subsequent oil changes should be done every 2,500 hours or six months depending on operating conditions, whichever comes first. (Long hours of operation under high temperature, or use in an environment with high temperatures, humidity, or corrosive gas may require more frequent oil changes.)
- Select an appropriate lubricant from Table 1 below based on the rotation speed and ambient temperature.
- ARA Gear Boxes use grease lubrication, which in principle does not need to be changed.
- For forced lubrication systems, refer to the supplied instruction manual.

Table 1: Recommended oils

Lateral shaft speed rpm	Manufacturer	Ambient temperature		Lateral shaft speed rpm	Manufacturer	Ambient temperature	
		-10 to 35°C	35 to 50°C			-10 to 35°C	35 to 50°C
1750 to 200	Industrial gear oils, class 2	ISO VG 150	ISO VG 220	Below 200	Industrial gear oils, class 2	ISO VG 220	ISO VG 320
	Shell Lubricants Japan	Shell Omala S2G150	Shell Omala S2G220		Shell Lubricants Japan	Shell Omala S2G220	Shell Omala S2G320
	Idemitsu Kosan	Daphne Super Gear Oil 150	Daphne Super Gear Oil 220		Idemitsu Kosan	Daphne Super Gear Oil 220	Daphne Super Gear Oil 320
	EMG Lubricants	Mobilgear 600 XP-150	Mobilgear 600 XP-220		EMG Lubricants	Mobilgear 600 XP-220	Mobile Gear 600XP-320
	Cosmo Oil Lubricants	Cosmo gear oil SE150	Cosmo gear oil SE220		Cosmo Oil Lubricants	Cosmo gear oil SE220	Cosmo gear oil SE320
	JXTG Nippon Oil & Energy	BONNOC M150	BONNOC M220		JXTG Nippon Oil & Energy	BONNOC M220	BONNOC M320

Table 2: Approximate oil volume

ED	Unit: L							
	6	7	8	10	12	16	20	25
Lateral 1-shaft	0.95	1.5	1.9	3.5	7	10	11	18
Lateral 2-shaft	1.0	1.6	2.1	3.7	7.4	-	-	-

3-3. Supplying grease (For ED6 and higher models with a vertical upward shaft arrangement)

- If the bearing is positioned higher than the oil level, oil spray on its own cannot sufficiently lubricate the bearing. Such bearings are filled with the following grease upon shipment. EMG Lubricants' Mobilux EP2
- This bearing needs periodic supply of grease (approx. every 1,000 hours). Exchange the plug at the specified position on pages 13 and 14 with the supplied grease nipple and add grease.
Note: All shaft arrangements are shipped with a grease nipple.

Table 3: Recommended greases

Manufacturer	Brand
Shell Lubricants Japan	Alvania EP 2
Idemitsu Kosan	Daphne Eponex SR2
EMG Lubricants	Mobilux EP2
COSMO Oil Lubricants	Cosmo Dynamax No.2
JXTG Nippon Oil & Energy	EPNOC Grease AP2

Table 4: Recommended grease amount

ED	Unit: g							
	6	7	8	10	12	16	20	25
Lateral shaft	22	35	70	100	170	270	370	640
Output bearing support I	3	7	12	17	20	55	90	150
Output bearing support II	6	9	12	17	20	70	85	135

3-4. Oil seal inspection and replacement

- Oil seal has wear life and it may cause oil leak. Lifetimes may be shorter when used at high temperatures, high rotating speeds, outdoors, or otherwise harsh conditions. Inspect the oil seal at regular intervals, and replace immediately if any oil leak is found. Always replace oil seals with the same model and material. (Do not use oil seals made of different materials as this can cause oil leakage.) Refer to the oil seal manufacturer's catalog when replacing.
- Occasionally, during the first few hours of operation, grease filled during the assembly process may seep out of the oil seal lip. This is normal and does not affect the performance of the gear box.

Handling

4. Operation

4-1. Pre-use inspection

Upon completing installation, check the following prior to operation:

- Correct rotation specifications
- Secure connection to the driven shaft
- No loose mountings or bolts
- After completing installation, supply grease using the grease nipple before starting operation.

4-2. Test run

Before running in production, run the reducer without a load. Check for any problems in the rotation specifications and any vibration, noise, or heat generation. Gradually increase the load.

4-3. Production run

Check for the following after starting production:

- Unusual vibration, noise, heat generation, etc.
- Impact or excessive load on the gear box.

Note: The gear box may generate heat during the first two or three days of operation. However, if the case surface temperature exceeds 93°C, it could indicate an incorrect oil level or improper installation. Check each part.

5. Daily inspection and maintenance

5-1. Precautions

- When performing maintenance, wear suitable clothing and use protection including safety glasses, gloves, safety shoes, etc.
- To prevent secondary accidents, keep the surrounding area safe and tidy.
- Always turn the power off and wait for the machine to come to a full stop. Also, use lock-outs to prevent any unintentional supply of power.
- The Miter Gear Box or ARA Gear Box reaches extremely high temperatures during operation. Do not touch with your bare hands to avoid burns.

5-2. Daily inspection

Make daily inspections using appropriate measuring instruments for the following procedures. Take note of operating conditions when performing maintenance.

Be sure to inspect the following items daily. Failure to do so may result in problems.

Inspection item	Inspection details
Noise	Is the noise louder than usual? Are there any unusual noises?
Vibration	Is there any unusual vibration? Any rapid changes in vibration?
Temperature	Is the surface temperature of the reducer higher than usual? Any rapid temperature rises?
Oil level	Is the oil level correct when the machine is stopped?
Mounting bolts	Are any of the bolts loose?
Chain/Belt	Are the chains/belts loose?
Lubricant condition	Has the lubricant blackened due to powder produced by abrasion?
Oil leakage	Is there any leakage from the connection points on the gear reducer, oil seal, or cap?
Pressure vent	Are the holes for air bleeding clogged?

If you discover any abnormalities during the daily inspection, take the appropriate measures by referring to “10. Troubleshooting”. If the problem persists, contact your dealer.

6. Disassembly and Assembly

- Never disassemble the reducer.
- Tooth contact and bearings have been adjusted for optimal performance.
- Contact us if the reducer needs to be disassembled.

7. Parts List

ED	Bearing size and qty	Oil seal and qty	Plug size	Oil gauge	Grease nipple	
2	6203R SH	D16.28.7	1/8"	-	-	
	Lateral (2)	Lateral (1)				
4	6304R SH	DM20.35.10	1/4"	-	-	
	Lateral (2)	(*DM17.35.8) Lateral (1)				
6	30306	DM28.48.11	3/8"	3/8"	A-M6F (Bracket)	
	Lateral (2)	Lateral (1)				
7	30307	DM35.52.11	3/8"	3/8"		B-M6F
	Lateral (2)	(*DM26.48.11) Lateral (1)				
8	30309	DM42.65.12	3/8"	3/8"		
	Lateral (2)	Lateral (1)				
	Cross (2)	Cross (1/2)				

ED	Bearing size and qty	Oil seal and qty	Plug size	Oil gauge	Grease nipple	
10	30310	DM48.70.12	1/2"	1/2"	A-M6F (Bracket)	
	Lateral (2)	Lateral (1)				
12	30312	DM52.75.12	1/2"	1/2"	B-M6F	
	Lateral (2)	Lateral (1)				
16	30311	DM52.75.12	1/2"	1/2"		
	Cross (2)	Cross (1/2)				
20	32314	DM65.88.12	1/2"	1/2"	A-PT 1/8"	
	Lateral (2)	Lateral (1)				
25	32316	DM75.100.13	1/2"	VAB	A-PT 1/4"	
	Lateral (2)	Lateral (1)				
25	32319	DM90.115.13	1/2"	VAB		
	Lateral (2)	Lateral (1)				
	Cross (2)	Cross (1/2)				

Note: 1. Quantities of bearings and oil seals:

- "Lateral (2)" means that 2 bearings or 2 oil seals are used on the lateral shaft. As an example, a lateral 2-shaft type will need 4 (2 pcs on 2 shafts) bearings or oil seals.
 - "Cross (1/2)" means that 1 bearing or 1 oil seal is used for a single shaft and 2 bearings or 2 oil seals are used for a dual shaft.
 - For models 4B, 6B, and 7B, oil seals marked with * are used on the lateral shaft while those without the marks are used on the cross shaft.
2. Oil gauge indications listed for ED20 and ED25 are Koho Industries' models.

8. Shaft arrangement change

Miter Gear Box models that can be rearranged using common parts are listed below. Contact Tsubaki representative for the actual shaft rearrangement.

Basic shaft arrangement	→	Exchangeable shaft arrangement
1-LR	→	1-LR-O
1-R	→	1-L-O
1-L	→	1-R-O

Basic shaft arrangement	→	Exchangeable shaft arrangement
1-UD	→	1-UD-O, D-LR, D-LR-O, U-LR, U-LR-O
1-U	→	1-D-O, D-R, D-L-O, U-L, U-R-O
1-D	→	1-U-O, D-L, D-R-O, U-LR, U-L-O

9. Storage

If you will not be using the gear box immediately upon delivery, store it by observing these precautions.

9-1. Storage location

Store in a clean and dry indoor environment.

Do not store outside where the reducer/motor may be exposed to humidity, dust, extreme temperature fluctuations, or corrosive gases.

9-2. Storage period

- The maximum storage period is six months.
- Special anti-rust treatment is required for storage longer than six months. Contact Tsubaki representative for details.
- Anti-rust treatment for export models is special and must be done prior to export. Contact Tsubaki representative for details.

9-3. Using the reducer after storage

- Non-metallic parts like oil seals, oil gauges, and oil plugs wear easily from environmental conditions such as extreme temperatures and ultraviolet rays. Make sure to inspect these parts before operation and replace them if damaged.
- Make sure there is no abnormal noise, vibration, or overheating. Stop operation immediately if you notice any of these signs, and contact Tsubaki representative.

Handling

10. Troubleshooting

If a problem occurs, refer to the table below for troubleshooting.

Problem	Possible cause	Action
Abnormal temperature rise	Overload operation	Reduce the load or increase the size of the gear box.
	Dirty or deteriorated lubrication oil	Replace the oil with new oil.
	Insufficient or too much lubricant	Supply an appropriate amount of lubricant.
	Incorrect lubrication oil type	Replace the oil with a recommended type of oil.
	High ambient temperature	Use a cooling system or change the position of the gear box.
	No pressure vent	Attach a pressure vent.
	No shaft alignment	Center the shaft accurately so it is in alignment with the system.
Loud noise Strong vibration	Overload operation	Reduce the load or increase the size of the gear box.
	Dirty or deteriorated lubrication oil	Replace the oil with new oil.
	Insufficient lubricant	Supply an appropriate amount of lubricant.
	Incorrect lubrication oil type	Replace the oil with a recommended type of oil.
	Damaged bearing	Replace the bearing with a new one.
	Loose bolt	Re-tighten the bolt.
	No shaft alignment	Center the shaft accurately so it is in alignment with the system.
Oil leak	Damaged or deteriorated oil seal	Replace the oil seal with a new one.
	Loose plug	Re-tighten the plug.
	No pressure vent	Attach a pressure vent.
	Excessive lubricant	Supply an appropriate amount of lubricant.

* Contact a Tsubaki representative for any other problems.

Inquiry Form

Provide us with the following information when asking for assistance with the sizing and selection of Miter Gear Boxes and/or ARA Gear Boxes.

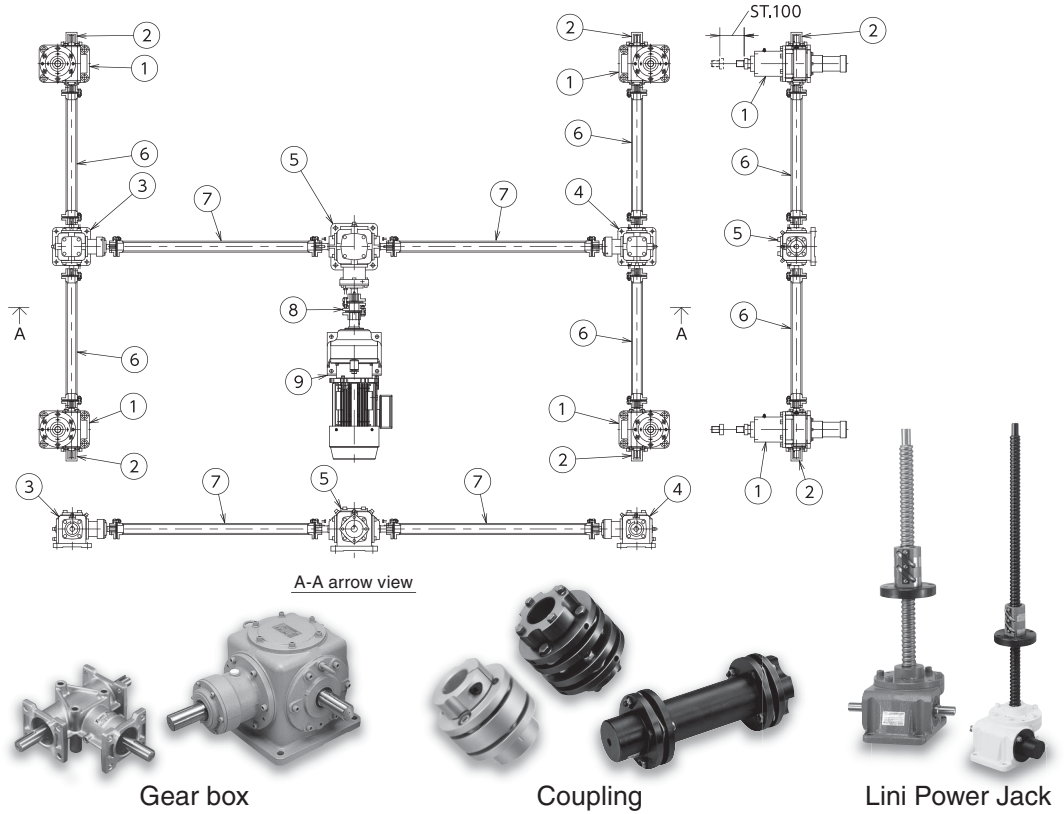
Machinery used	System	
	System description	
	Layout	* Please provide a detailed description below. (Shaft arrangement, rotating direction, installation direction, shaft connection method, etc.)
Operating conditions	Motor type	Motor/Servomotor/Engine/Other ()
	Load torque or transmission kW	() kW or () N-m
	Operating hours	() hours/day Continuous/Intermittent
	Start/Stop frequency	() times/hour
	Input rotation speed	Constant () rpm/Max. () rpm
	Input shaft direction	Lateral shaft/Cross shaft
	Gear box reduction ratio	1:1, 1.5:1, 2:1, 2.5:1, 3:1, ():1
	Load type	Uniform load/Load with moderate impact/Load with large impact
Ambient atmosphere	Operating environment	Indoors/Outdoors/Near furnaces/Inside freezers/Other ()
	Ambient temperature	Constant (°C)/High temperature (°C)/Low temperature (°C)
	Ambient atmosphere	Salt/Dust and particles/Acid/Other ()
Other	Options (pages 48 and 49)	Shaft end tapping/Case and bracket material - FCD/Other ()
	Special types (pages 50 to 52)	
Outline of equipment		

Tsubaki's Selection Jack System

We select and suggest not only gear box, but system components!

Your system requirements

Lift load : 40 kN Frequency : 4 reciprocations/hour
 Speed : 120 mm/sec Jack : 4 operating in coordination
 Stroke : 100 mm Drive section : Driven with Gear Motor



Tsubaki engineering team

Jack System Selection Service

Review

Product selection

Selection results

①	Lini Power Jack	4	JWH050USH1
②	Lini Power Jack safety cap	4	JW050CAP
③	Miter Gear Box	1	ED4M-1-LR-O-Y
④	Miter Gear Box	1	ED4M-1-LR-Y
⑤	Miter Gear Box	1	ED6B30-1-LR-O-Y
⑥	Echt-Flex Coupling	4	NEF10W-NH19JD2XNH25JD2-J○○
⑦	Echt-Flex Coupling	2	NEF10W-NH19JD2XNH20JD2-J○○
⑧	Echt-Flex Coupling	1	NEF18W-NH25JD2XKH38JD2
⑨	Gear Motor	1	GMTR150-38L5B

Gear Box

Tsubaki's gear box lineup using helical gears and spiral bevel gears supports all the needs of the present and the future.

► Miter Gear Box

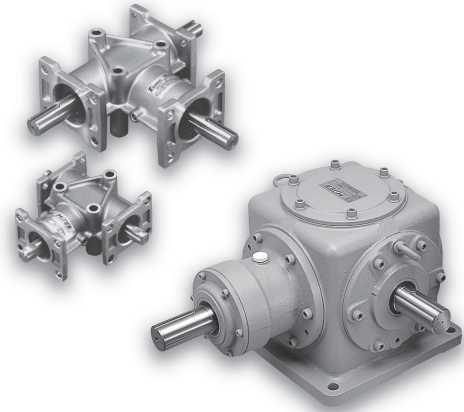
High-performance, high-efficiency spiral bevel gear boxes are available in a wide selection of sizes, all featuring smooth rotation and quiet operation.

► ARA Gear Box

Compact, ultra-lightweight, high-performance spiral bevel gears offer quiet operation and high transmission capacity. Shafts are made of corrosion-resistant stainless steel. Universal mounting type for installation in any direction.

	Miter Gear Box	ARA Gear Box
Input power	0.005 kW to 335 kW	0.005 kW to 3.15 kW
Reduction ratio	1/1 · 1/2 · 1/3	1/1 · 1/2

High transmission capacity



Jacks

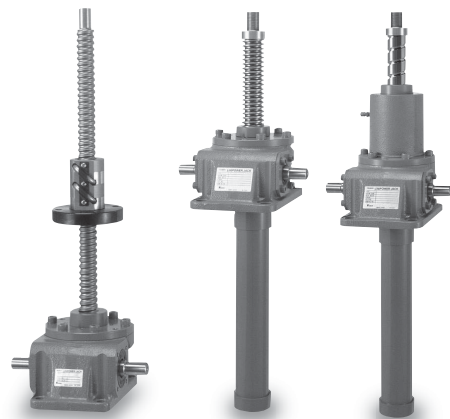
Our screw- and nut-type jacks can be used by hand-turning or motor drive.

► Lini Power Jack

The screw jacks come with ball screws, high-lead ball screws, or trapezoidal screws. Rotation prevention mechanisms and travel nut packages are also available in addition to the standard lineup. We offer a wide selection of options such as models with motors or Gear Motors, with potentiometers or rotary encoders, and with bellows. Special types like jacks for low-debris generation applications are also available.

	Lini Power Jack		
	JWB (Ball screw type)	JWH (High-lead ball screw type)	JWM (Trapezoidal screw type)
Basic capacity kN	4.9 to 980	9.8 to 196	1.96 to 980
Speed mm/sec	Low speed to High speed	High speed	Low speed to High speed
Stroke mm	Up to 2000	Up to 2000	Up to 2000

Screw jacks



Coupling

Connects shafts while absorbing misalignment. Offered in a wide variety that meets all needs with a perfect match.

► Echt-Flex Coupling

Shaft couplings for precision positioning and servomotors. Non-lubricated, non-backlash, and high torsional rigidity. Electrically insulated types are also available.

► Jaw-Flex Coupling

Shaft couplings for directly connecting to the motor. Simple structure and lightweight. Easy attachment and detachment. Economical. High-precision LN Series lineup features great vibration damping characteristics.

	Echt-Flex Coupling	Jaw-Flex Coupling
Allowable torque	0.7 to 176400 N·m	0.4 to 711 N·m
Bore diameter	ø4 to ø289 mm	ø5 to ø69 mm

Misalignment absorption



Safety Precautions



Warning To avoid danger, observe the following rules.

- When using in lifting applications, install a safety device on the equipment side to prevent sudden drops. Sudden equipment drops may lead to accidents resulting in injury or death, or damage to the equipment.
- When using the product in equipment hung from above, install a safety fence to prevent entering the area beneath any suspended objects. A safety device must also be installed in case a screw becomes damaged.
- Keep hands and any other part of the body, clothes, and accessories away from any movable parts. Otherwise, they may be entangled or trapped in movable parts, resulting in personal injury or death and/or damage to the equipment.
- Strictly observe the general standards stipulated in Section 1, Part 2 of the Japanese Ordinance on Industrial Safety and Health.
- For attachment/removal from equipment, transportation, installation, wiring, operation, maintenance and inspection of the product:
 - Always work by following the instructions in the instruction manual.
 - Work must be performed by those who have specialized knowledge and skills. Otherwise explosion, ignition, fire, electrical shock, injury or damage to equipment may occur.
 - Wear clothing suited to the work, and wear appropriate protective gear (safety goggles, gloves, safety footwear, or other necessary safety equipment).
- Do not attempt to modify the product.



Caution To prevent accidents, observe the following rules.

- Do not use the product outside of the specified ranges listed on the nameplate and external diagrams, and in the catalog. Doing so may result in injury and/or damage to the product.
- Functionality and performance may decrease because of part wear and the lifespan of parts. Perform periodic inspections according to the instruction manual. If the product shows degraded functionality and performance or is damaged, immediately stop operation and contact your local supplier. Failure to do so may result in injury and/or damage to the product.
- During operation, the product may heat up to a high temperature. Keep hands or any other part of body from coming in contact with such areas. Failure to do so may result in burn injuries.
- Do not operate the product with an applied load that is higher than the rated load. Doing so may result in injury and/or damage to the product.
- Do not remove the nameplate.
- Customer alterations of the unit are outside the scope of the Tsubaki warranty. Therefore, Tsubaki assumes no responsibility for such alterations.
- Before using the product, thoroughly read the instruction manual provided with the product, and ensure the product is used correctly. If no instruction manual is available, use the product name and model number to request an instruction manual from the distributor where the product was purchased, or from the Tsubaki sales office.
- Be sure to give the instruction manual to the end user.

Warranty

1. LIMITED WARRANTY

Products are covered by the Tsubaki warranty for up to 18 months from shipment from the factory or 12 months after the start of use (starting from the incorporation of the product into the customer's equipment), whichever is shortest. However, the warranty period may vary, depending on the usage conditions.

2. SCOPE OF WARRANTY

During the limited warranty period, a failure in a product installed, used, and maintained according to the catalog, instruction manual, or other appropriate documents, can be returned to Tsubaki for replacement or repair free of charge. However, please note that the limited warranty covers only Tsubaki products. The following expenses will not be covered by the warranty. (Instruction manuals and other appropriate documents include any documents specially submitted to the customer.)

- (1) Expenses required for removal/installation of the product from/to the customer's equipment for replacement or repair, or for related construction costs.
- (2) Costs required to transport the customer's equipment to a repair shop.
- (3) Lost profits or other extended damages due to breakdown or repair.

3. REPAIR SERVICES

Tsubaki will inspect and repair products that have failed due to the following items—regardless of whether the warranty period is in effect—for a fee.

- (1) The product was not installed correctly according to the instruction manual.
- (2) The product was not sufficiently maintained or was handled incorrectly.
- (3) The product failed due to a failure between the product and a separate device.
- (4) The product structure was changed in any way, such as through modification.
- (5) The product was repaired by someone other than Tsubaki or a Tsubaki-designated factory.
- (6) The product was used outside the correct operating environment as stated in the instruction manual.
- (7) The product failed due to a force majeure such as a natural disaster or improper actions by a third party.
- (8) The product failed due to a secondary failure resulting from a defect in a customer's device.
- (9) The product failed due to parts installed at the request of the customer or due to parts used per the customer's specifications.
- (10) The product failed due to a wiring failure or parameter setting error caused by the customer.
- (11) The product failed as a result of reaching its normal service life according to the conditions of use.
- (12) The product failed due to any damage for which Tsubaki is not responsible.

4. DISPATCHING OF TSUBAKI ENGINEERS

Service expenses such as those incurred when dispatching engineers to perform an investigation, adjustment, or trial operation of a Tsubaki product will be charged separately.



Caution

The product details described in this catalog are intended primarily for model selection. Before using the product, read the instruction manual thoroughly, and ensure the product is used correctly.



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