

TSUBAKI CAM CLUTCH BS-F SERIES

One-way clutch

BACKSTOP Cam Clutch



Developing new tec TSUBAKI abundant B

Ideal for tough environment

Special labyrinth seal mechanism for dusty environment

Flexible labyrinth blocked dust and water against cement and mining tough condition.



Sealing performance test by cement powder



TSUBAKI BS-F
(Flexible labyrinth)



Others
(Grease fitting)

Special double lip oil seal and multi temperature grease for wide temperature range

Ambient temperature range
-40°C to +65°C(-40°F to +149°F)

Drop in design

The narrowest width with I-beam structure makes easy installation for customer's current layout

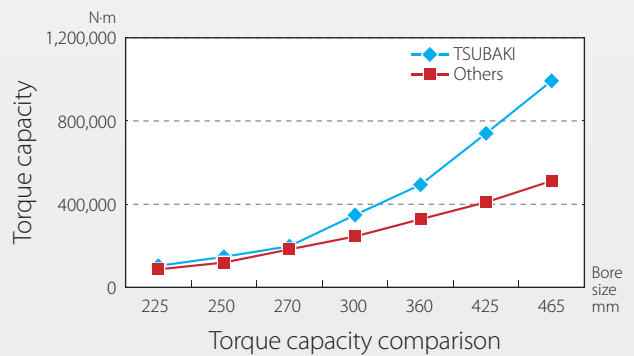
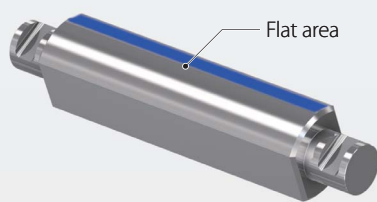
- 1 No need to modify a current layout when a customer replaces the BACKSTOP.
- 2 New conveyor system also has a benefit to save the space and reduce the installation time.

Technologies based on ACKSTOP experiences.

Ingenious BACKSTOP mechanism

Non-rollover cam

TSUBAKI original cam design can hold higher backstop torque as well as excessive torque by flat area.



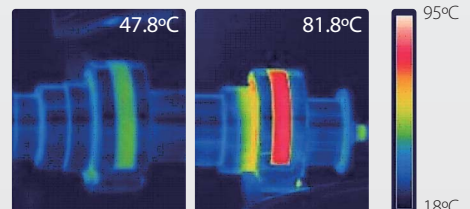
Cam & roller cage for longer life at overrunning

Cam and roller cage orbit at low speed to convey grease from bottom to top continuously.

- 1 Ideal lubricant condition
- 2 Wear on the cams is diminished



Cam & roller construction



TSUBAKI Cam Clutch Roller Ramp Clutch

Temperature comparison at the same overrunning speed

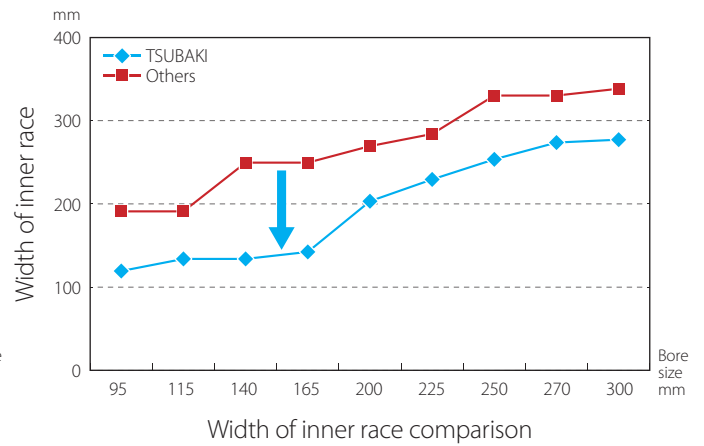
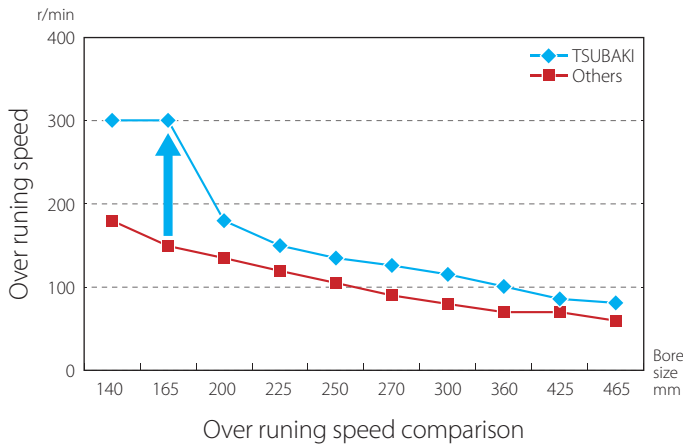
3 Steps
easy connection



High speed and Down sizing

TSUBAKI BACKSTOP BS-F series can meet the high speed trend of inclined conveyors as well as reducing width with our new improved design.

It is easy replacement from customer's current BACKSTOP.

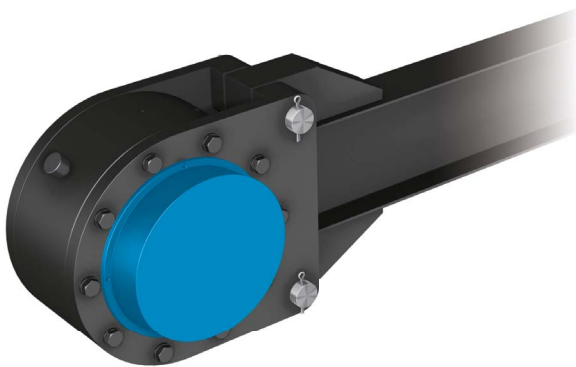


Variety of options to satisfy customer demands

For details, please contact TSUBAKI.

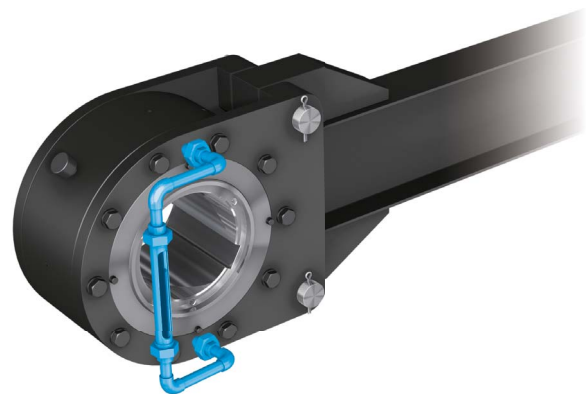
1 Safety cover

Prevent physical injury at operation as well as dust and water from outside



2 Oil lubrication

Easy maintenance
Oil level and condition monitoring



3 Clutch Mounting Accessories



Shaft collar



End plate



Shaft key

Mounting arrangement

BACKSTOP Mounting Arrangements

Preventing reverse rotation of inclined or vertical conveyor systems is one of the most common applications for BACKSTOPS. There are many configurations of conveyor systems that employ BACKSTOPS.

This paper presents the most common types and provides examples and calculations needed to properly size BACKSTOP in order to maximize performance and improve safety of the conveying system.

*Suggested arrangement may not meet local design standards, please check local design standards.

Single and Dual Drives

BACKSTOPS for low speed overrunning type are installed directly on the extended head shaft, as shown in Figure 1 and 2. TSUBAKI recommends the single installation of the BACKSTOP to prevent the reverse rotation of head shaft.

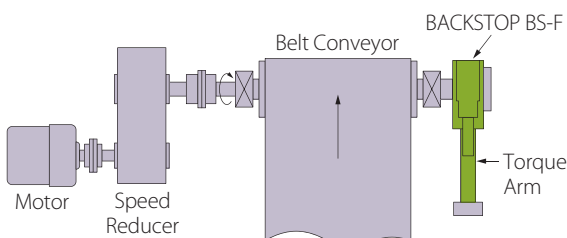


Figure 1

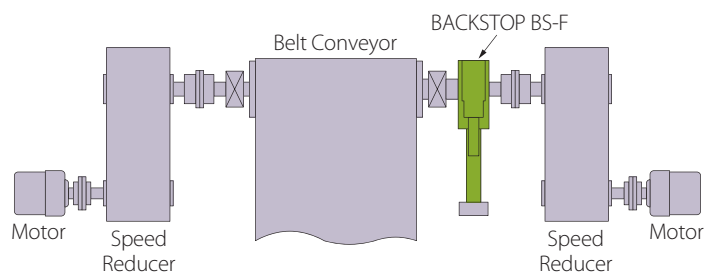


Figure 2

Tandem Drives

When the conveyor arrangement calls for a primary and secondary drive, as shown in Figure 3, the BACKSTOP on the primary drive unit holds the full load. The BACKSTOP on the secondary drive unit holds the back tension from the belt. It keeps belt traction on both conveyor systems.

TSUBAKI recommends that the BACKSTOP, having the torque capacity equal to the sum of the primary and secondary motors, be installed on the primary drive unit.

The BACKSTOP for secondary drive should be sized from secondary drive motor only.

*Suggested arrangement may not meet local design standards, please check local design standards.

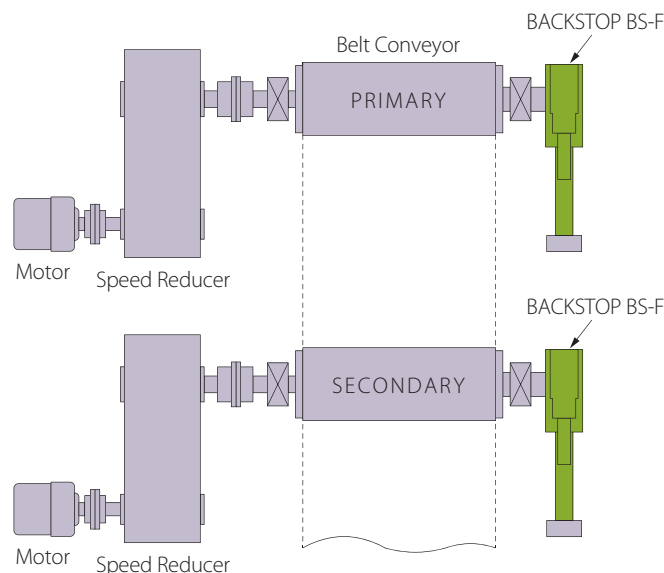


Figure 3

Selection procedures by motor stall torque

BACKSTOP Size Selection

Service Factor

A backstop by definition are required to hold back a load from moving in a reverse direction.

Care must be taken in calculating the torque requirements and should be based on maximum or worst case conditions and not average/normal loads.

Because any failure of BACKSTOP might result in costly damage or injury, care must be exercised to consider all the possible loads and select appropriate service factors.

The BACKSTOP needs to be sized for the breakdown or stalled torque of the drive motors.

The following table shows typical service factors to be applied when size selecting BACKSTOPS.

Required torque for selection = Motor nominal torque × Service Factor

Motor Stalled Torque = Motor maximum torque experienced with no shaft rotation

Maximum Stalled Torque or Breakdown torque % of Normal Motor Rating	Service Factor
175%	1.30
200%	1.30
250%	1.67
300%	2.00

Load sharing

The BACKSTOP has no backlash, two BACKSTOPS can share the total calculated torque 50%/50% theoretically.

However, we have to consider "Load sharing factor" because Load sharing of BACKSTOPS on conveyors with multiple drives is a key factor.

Dual Drive Application

For dual drive to a single head shaft, if the required backstop capacity is in excess of the listed capacity in the catalogue, a twin arrangement of BACKSTOP Cam Clutch is the solution, as shown in Figure 4.

And we have to consider "Load sharing factor".

In this arrangement, load sharing factor becomes 1.7 for two BACKSTOP Cam Clutches

For proper load sharing the torque arm gap clearance should be reduced to a zero gap, thus no swing of the torque arm before the cams in both BACKSTOPS prevent the inner race from rolling back.

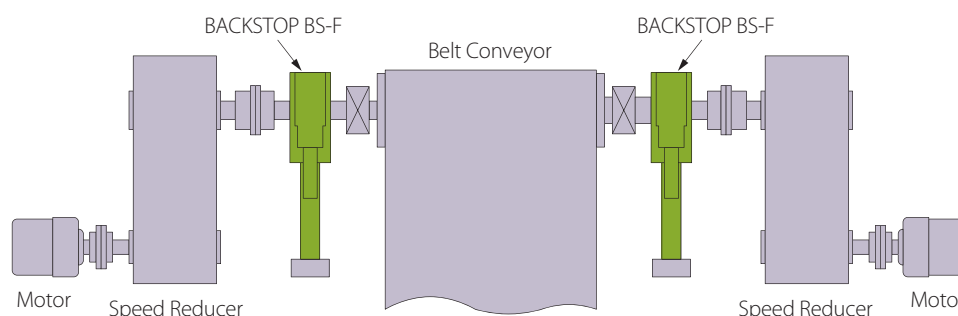


Figure 4

Selection procedures by backstop torque

INFORMATION FOR SELECTION

Selection Procedure

- 1 Determine the mode of operation
- 2 Refer to the selection procedure corresponding to the mode of operation

For Belt Conveyors (Short inclined yard conveyors)

Selection Procedure:

- 1 Calculate the power to move an empty belt and idlers: (P_1)

$$P_1 = 0.06 \times f \times W \times V \times \frac{\ell + \ell_0}{367} \text{ (kW)}$$
- 2 Calculate the power to move a loaded belt horizontally: (P_2)

$$P_2 = f \times Q_t \times \frac{\ell + \ell_0}{367} \text{ (kW)}$$
- 3 Calculate the power to move the load vertically: (P_3)

$$P_3 = \frac{h \times Q_t}{367} \text{ (kW)}$$
- 4 Calculate the back stop power: (P_r)

$$P_r = P_3 - 0.7(P_1 + P_2) \text{ (kW)}$$
- 5 Calculate the back stop torque: (T)

$$T = \frac{9550 \times P_r}{N} \times SF \text{ (N-m)}$$
- 6 Select the proper clutch which satisfies the calculated backstop torque.

Note:

f = Friction coefficient of rollers
 = 0.03 (normally used)
 W = Weight of moving parts of the conveyor in the unloaded condition (kg/m)

Use the values from the table below.

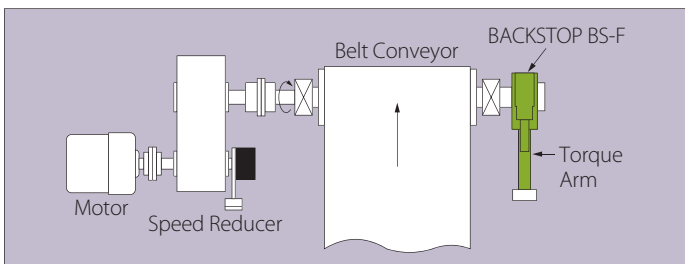
Width of Belt (mm)	400	450	500	600	750	900
Estimated Weight: W	22.4	28	30	35.5	53	63

Width of Belt (mm)	1,050	1,200	1,400	1,600	1,800	2,000
Estimated Weight: W	80	90	112	125	150	160

V = Velocity of conveyor (m/min)
 Q_t = Max. possible load (tonnes/hour)
 h = Total lift (m)
 ℓ = Horizontal distance between head pulley and tail pulley (m)
 ℓ_0 = Modification coefficient for ℓ
 = 49 m (normally used)
 N = Shaft speed (r/min) on which the clutch is mounted.
 SF = Service factor

Select service factor from table below:

SF	Service condition
1.5	Backstopping: Several times a day
2.0	Backstopping: More than several times a day



Selection procedures for bucket elevator

For Bucket Elevators

Selection Procedure:

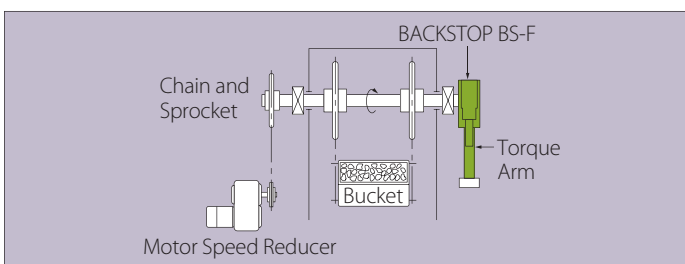
- 1
$$T = \frac{(L + D) \times Q_t \times D \times 9800}{120 \times V} \times SF \text{ (N-m)}$$
- 2 Select the correct clutch which satisfies the calculated backstop torque (T).

Note:

L = Total lift (m)
 D = Pitch circle dia. of head sprocket (m)
 Q_t = Possible maximum load (tons/hour)
 V = Velocity of conveyor (m/min)
 SF = Service factor

Use the values from the table below.

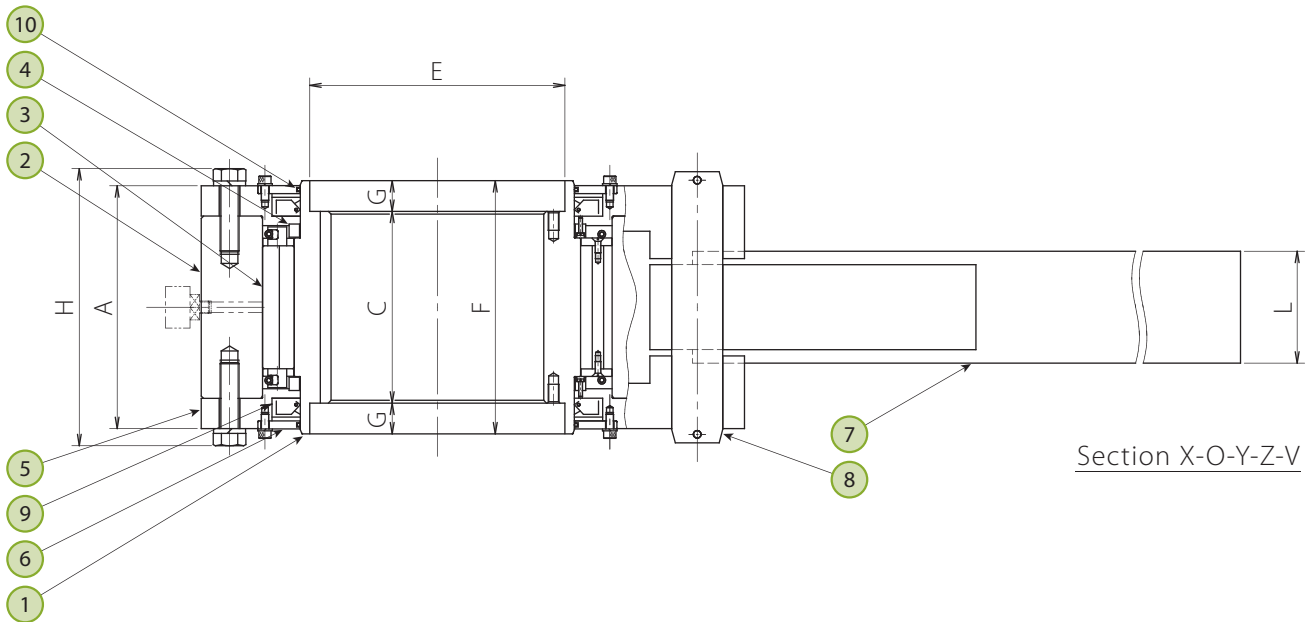
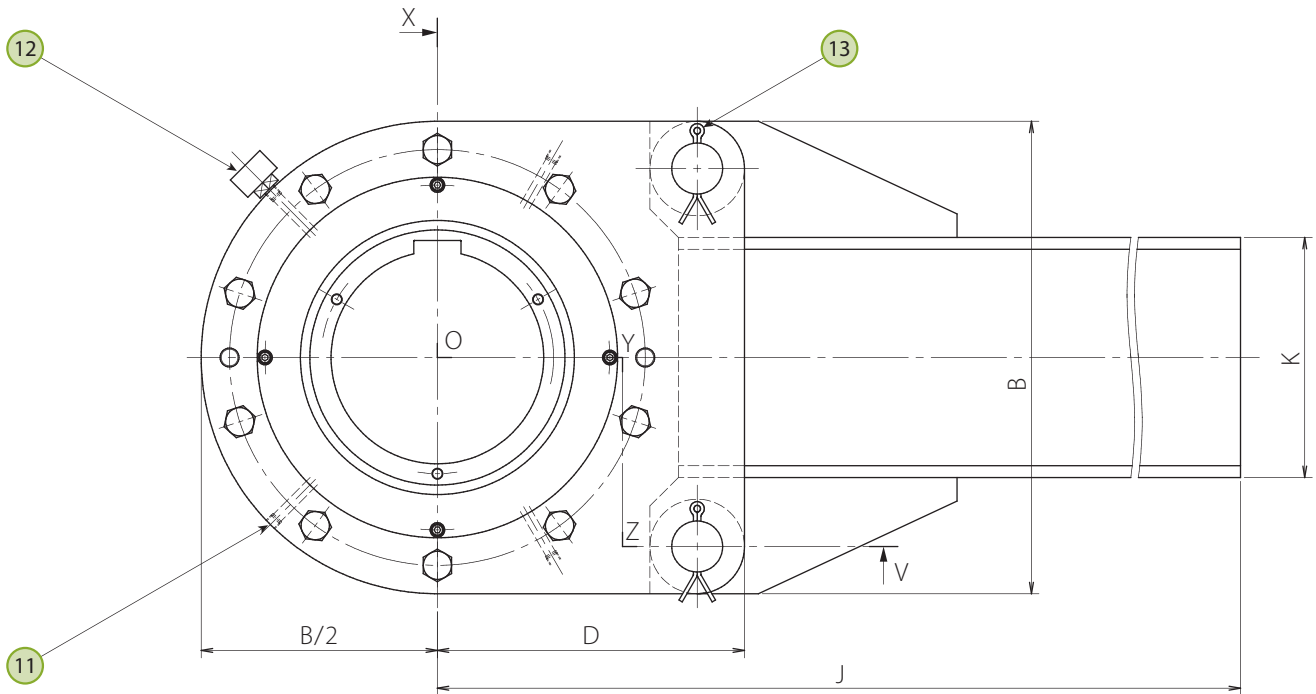
SF	Service condition
1.5	Several times a day
2.0	More than several times a day



Note:

For the conveyor types other than those in the above examples, calculate the backstop torque accordingly. Always allow for the maximum possible load in your calculations, since backstopping often occurs when the conveyor is loaded above its normal loading capacity.

Capacities and Dimensions



Parts name

- | | | | | |
|--------------|-------------------|--------------|------------------|--------------|
| ① Inner race | ④ Thrust bearing | ⑦ Torque arm | ⑩ Labyrinth ring | ⑬ Cotter pin |
| ② Outer race | ⑤ Side plate | ⑧ Pin | ⑪ Socket plug | |
| ③ Cam cage | ⑥ Labyrinth plate | ⑨ Oil seal | ⑫ Air breather | |

Capacities

Size	Torque capacity (N·m)	Max. Overrunning speed (r/min)	Bore range (mm)		Drag torque (N·m)	Mass (kg)				Amount of grease (kg)
						Within Torque arm		Without Torque arm		
						Min.bore	Max.bore	Min.bore	Max.bore	
BS85F	6,760	300	60	85	8	43	40	31	28	0.065
BS95F	8,940	300	70	95	10	52	48	37	34	0.075
BS115F	16,300	300	80	115	15	82	76	59	53	0.105
BS140F	24,400	300	90	140	20	114	104	84	74	0.15
BS165F	44,100	300	100	165	34	174	159	118	103	0.16
BS200F	61,700	180	100	200	44	263	235	185	157	0.19
BS225F	102,000	150	150	225	74	489	439	386	336	1.3
BS250F	147,000	135	175	250	93	692	635	556	499	1.4
BS270F	192,000	125	200	270	98	889	828	692	631	1.6
BS300F	345,000	115	230	300	108	1,300	1,230	1,050	973	1.8
BS360F	489,000	100	250	360	157	1,870	1,750	1,580	1,460	1.9
BS425F	735,000	85	325	425	216	3,080	2,890	2,610	2,420	3.5
BS465F	980,000	80	350	465	245	3,770	3,510	3,160	2,900	4.4

Dimensions

All dimensions are in mm.

Size	A	B	C	D	E	F	G	H	* J	* K	* L
BS85F	107	210	105	151	106	120	7.5	127	813	76	64
BS95F	107	230	112	161	120	120	4	127	914	102	71
BS115F	127	270	127	181	142	135	4	149	1,270	102	71
BS140F	127	320	134	207.5	170	142	4	151	1,422	127	76
BS165F	141	360	134	242.5	209	142	4	169	1,676	152	91
BS200F	150	430	142	284	251	150	4	178	1,829	203	106
BS225F	257	500	203	325	270	268	32.5	293	1,981	254	118
BS250F	247	600	229	385	300	272	21.5	283	2,083	305	127
BS270F	267	650	254	415	344	280	13	303	2,235	305	140
BS300F	278	780	273	490	430	286	6.5	320	2,388	381	143
BS360F	292	930	278	585	490	286	4	345	2,540	457	152
BS425F	380	1,030	396	645	600	404	4	433	2,743	508	162
BS465F	410	1,090	417	690	600	432	7.5	474	3,048	610	184

Notes: Torque arm dimensions are imperial base. Please contact TSUBAKI for metric torque arm dimensions.

Model name

BS 300 F – 280 J

Model name

BS : BACKSTOP

300 : Size

F : F series

Bore size in mm

280 : 280mm H7

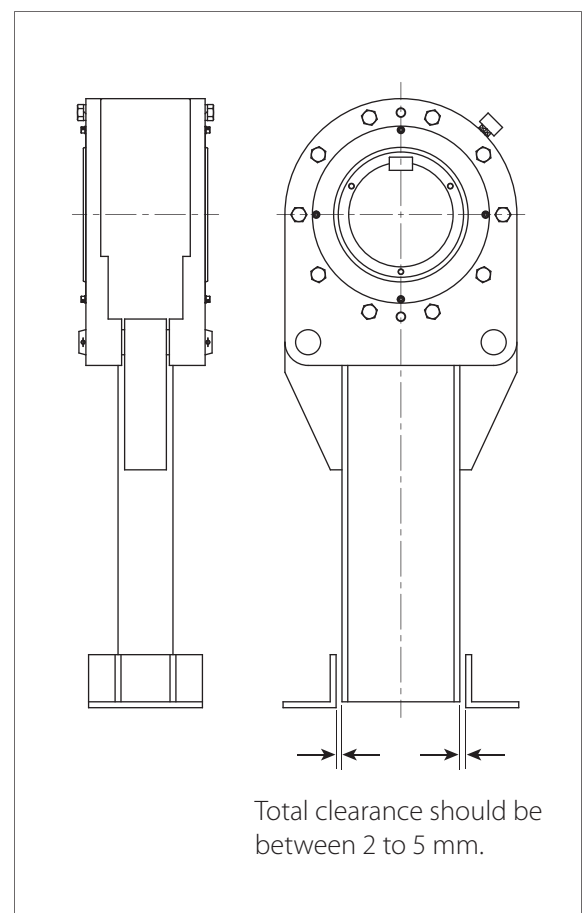
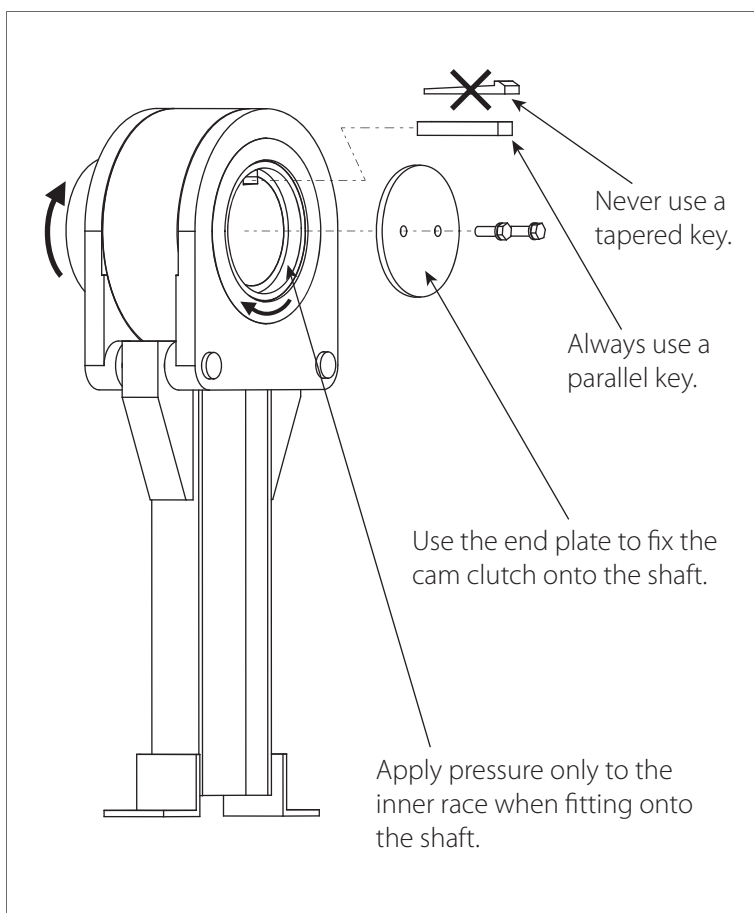
Keyway

J : JIS B1301-1996, ISO R773

Installation and Usage

For details, see the manual supplied with the product.

- 1 Recommended shaft tolerance is h7 or h8.
- 2 Before installation, verify that the direction of the rotation of the inner race of the BS-F Cam Clutch (shown by the arrow on the end face of the inner race) is the same as the direction of the rotation of the conveyor.
- 3 Securely install the torque arm to the BS-F Cam Clutch using furnished torque arm pins and cotter pins.
- 4 Apply pressure only on the end face of the inner race when inserting the BS-F Cam Clutch on to the shaft. Do not hit the inner race directly with a hammer or apply pressure on the side plate, labyrinth plate, or bolts.
- 5 Always use a parallel key for installation onto the shaft and then fix the BS-F Cam Clutch to the shaft with the end plate. Never use a tapered key, otherwise the Cam Clutch will be damaged.
- 6 The end tip of the torque arm will swing to some extent while the conveyor is operating. Support the torque arm end tip only in the direction of rotation, but be sure to allow it a certain amount of free movement axially. (See illustration below.) The Cam Clutch will sustain damage if the torque arm end tip is fixed securely.



Lubrication and Maintenance

Maintenance Instructions

Series		Lubricant	Maintenance
BS-F	85 to 465	Grease	Pre-lubricated with grease. Drain and clean inside of the Backstop and inject new grease, minimum once a year.

Recommended Grease

Brand	BS-F Series
Exxon Mobil	Beacon 325

- Notes:
- Do not use grease that contains EP additives.
 - The ambient operating temperature range of the grease listed above is -40°C (-40°F) and +65°C (+149°F). Please consult Tsubaki if operating outside of this range.
 - Beacon 325 is available from Tsubaki and is NOT able to be mixed with other greases.

Safety Guide



WARNING

This mark indicates a situation where incorrect handling may cause hazardous conditions, resulting in death or severe injury.

- Guards must be provided on all power transmission and conveyor applications in accordance with provisions of ANSI/ASME B 15.1 1992 and ANSI/ASME B 20.1 1993 or other applicable standards. When revisions of these standards are published, the updated edition shall apply.
- When using any of the products described in this catalog, be sure to follow any applicable safety laws and regulations (such as the Labor Safety and Health Regulations).
- Follow the instructions below when installing, maintaining, or inspecting a product.
 1. Turn the power switch off.
 2. Do not store the device under equipment that may fall.
 3. Secure the movable parts of the equipment so as not to move.
 4. Wear clothing and protective gear suitable for the work.
- When performing a test operation or during periodic inspections, verify that the protective equipment is functioning properly.
- Always lock out power switch before installing, removing, lubricating or servicing a system that uses Cam Clutch products.
- If the Cam Clutch is used for repeated starting and stopping, make sure the strength of the supports for the Cam Clutch are sufficient.
- The capacity of your Cam Clutch may be effected by the accuracy of its set up, the amount of pressure exerted on it, wear on other parts in your system, or wear life of the Cam Clutch itself. Check the Cam Clutch at regular intervals and take any necessary safety precautions.
- When connecting or disconnecting Cam Clutch products, eye protection is required. Wear safety glasses, protective clothing, gloves and safety shoes.
- Cam Clutch maintenance and inspection should be performed only by qualified personnel with specialized knowledge.
- **Otherwise, fire, and injury may occur.**
- Operate the Cam Clutch according to the manufacturer's instructions.



CAUTION

This mark indicates a situation where incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or property damage.

- Ensure that the end user of the device receives the appropriate instruction manual. Also make sure that the contents of the manual are carefully read before use.
- In the event that an instruction manual is not available, use the device name and model number to request one from the distributor where you purchased the device or from our sales office.
- Do not rearrange the device's components or perform additional work in order to modify the device in any way.
- Periodically check the product's functions and operations according to the instruction manual. If a function or operation is found to be inadequate, contact the distributor for repair.
- When disposing of the device, treat it as industrial waste.
- The device details described in this catalog are intended primarily for model selection. Before using the device, read the instruction manual thoroughly, and ensure the device is used correctly.

Warranty: Tsubaki E&M Co.: hereinafter referred to as "Seller" Customer: hereinafter referred to as "Buyer"
Goods sold or supplied by Seller to Buyer: hereinafter referred to as "Goods"

1. Warranty period without charge

Effective 18 months from the date of shipment or 12 months from the first use of Goods, including the installation of the Goods to the Buyer's equipment or machine - whichever comes first.

2. Warranty coverage

Should any damage or problem with the Goods arise within the warranty period, given that the Goods were operated and maintained according to the instructions provided in the manual, the Seller will repair and replace at no charge once the Goods are returned to the Seller. This warranty does not include the following:

- 1) Any costs related to removal of Goods from the Buyer's equipment or machine to repair or replace parts.
- 2) Cost to transport Buyer's equipment or machines to the Buyer's repair shop.
- 3) Costs to reimburse any profit loss due to any repair or damage and consequential losses caused by the Buyer.

3. Warranty with charge

Seller will charge for any investigation and repair of Goods caused by:

- 1) Improper installation by failing to follow the instruction manual.
- 2) Insufficient maintenance or improper operation by the Buyer.
- 3) Incorrect installation of the Goods to other equipment or machines.
- 4) Any modifications or alterations of Goods by the Buyer.
- 5) Any repair by engineers other than the Seller or those designated by the Seller.
- 6) Operation in an environment not specified in the manual.
- 7) Force Majeure or forces beyond the Seller's control such as natural disasters and injustices inflicted by a third party.
- 8) Secondary damage or problems incurred by the Buyer's equipment or machines.
- 9) Defective parts supplied or specified by the Buyer.
- 10) Incorrect wiring or parameter settings by the Buyer.
- 11) The end of life cycle of the Goods under normal usage.
- 12) Losses or damages not liable to the Seller.

4. Dispatch service

The service to dispatch a Seller's engineer to investigate, adjust or trial test the Seller's Goods is at the Buyer's expense.

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