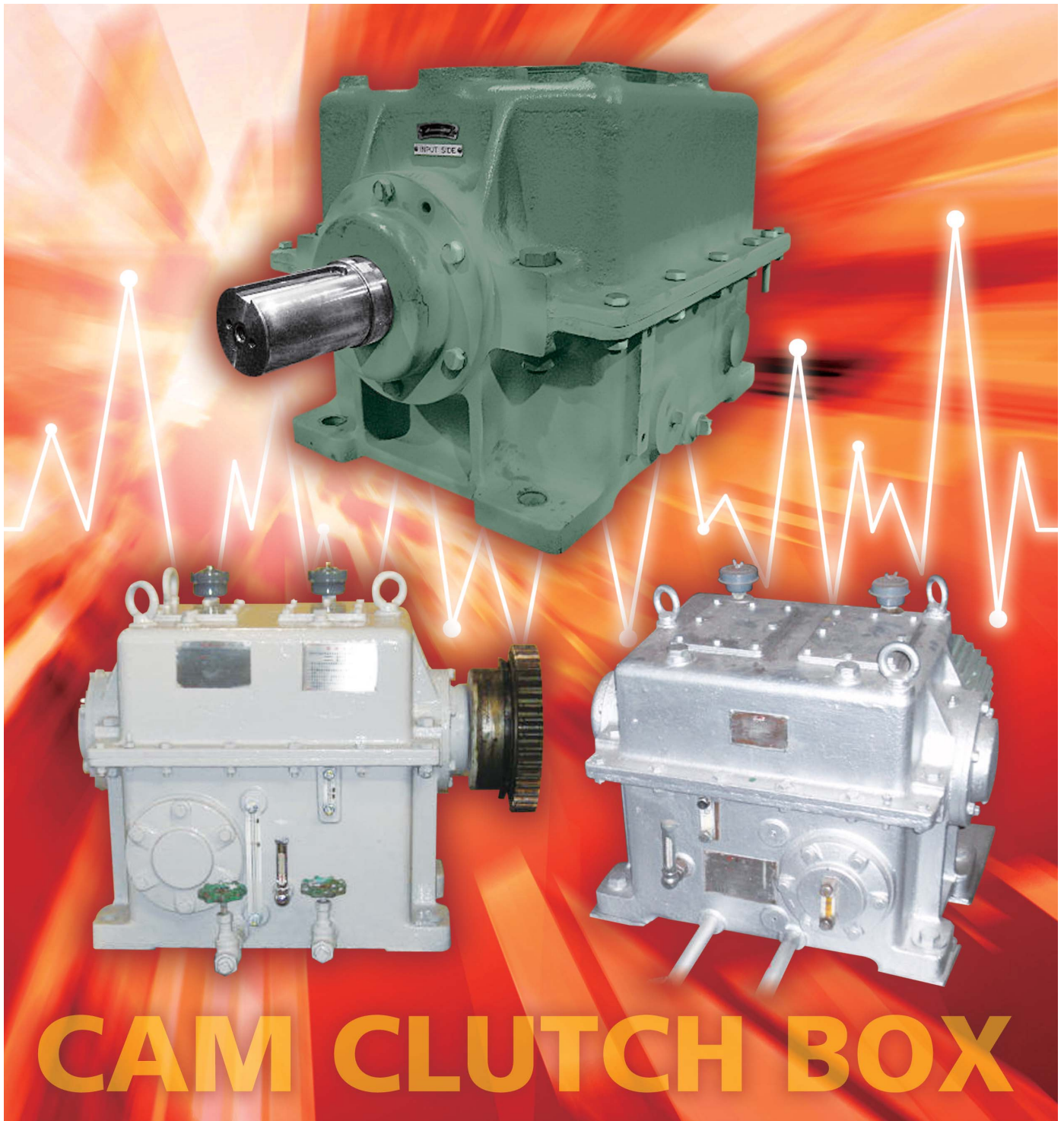


# **TSUBAKI CAM CLUTCH BOX SERIES**

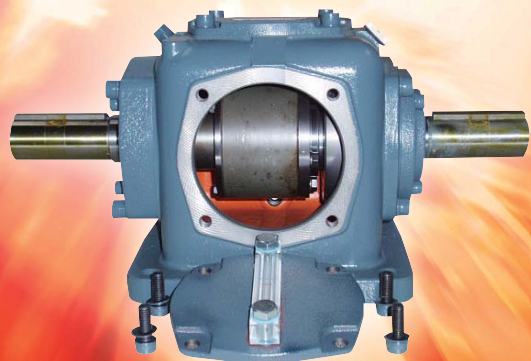


# Features of Cam Clutch Boxes

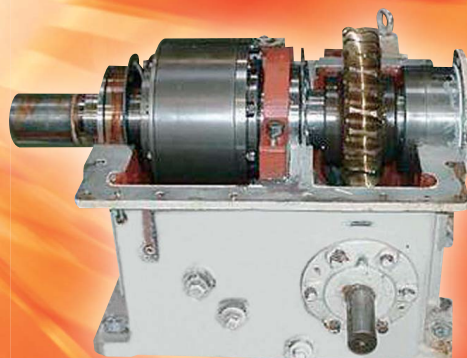
Ideal lubrication and cooling systems

- Long-term, continuous high-speed operation -

The Cam Clutch Box Series offers Cam Clutches designed within cases that use an ideal lubrication method to enable continuous high-speed operation.

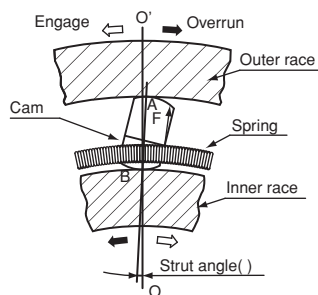


OB-ON series



TB series

## Operating Principles of a Cam Clutch



The space between inner and outer races is kept by bearings and precision formed cams are set there.

Springs always provide force 'F' to cams, so cams lightly contact with each race at the point A and B in order to provide instantaneous wedging action of cam between both races.

The straight line segment A and B is called 'strut' and it forms strut angle ( ) with the center line O' and O.

When the inner race rotates in the direction of the black arrow, the inner race overruns smoothly because A and B does not act as a strut.

When the outer race rotates in the direction of the white arrow, torque can be transmitted, because A and B act as a strut.

### Table of Contents

■ Operating Principles of a Cam Clutch .....	page 1
■ Structures and Features .....	page 2
■ Application Examples: Rotary Kiln and Large Mixer .....	page 3
■ Application Examples: Pump and Belt Conveyor .....	page 4
■ Application Examples: Fans .....	page 5
■ Capacity and Dimension Tables: OB-ON and OB-OF Series .....	page 6
■ Capacity and Dimension Tables: OB-SN and OB-SF Series .....	page 7
■ Capacity and Dimension Tables: OB-PN and OB-PF Series .....	page 8
■ Capacity and Dimension Tables: OB-S Series .....	page 9
■ Capacity and Dimension Tables: TB Series .....	page 10
■ Service Life .....	page 11
■ Lubrication, Maintenance, and Selection .....	page 12
■ Selection Sheet .....	page 13

# Structures and Features

The Cam Clutch Box Series has been developed to enable continuous high-speed operation by housing Cam Clutches within cases that use an efficient lubrication method.

**TSUBAKI offers a wide variety of series to meet every customer's need.**

MODEL	LUBRICATION SYSTEM	SEALING	APPLICATION
<b>OB-ON</b>	Oil bath	Oil seal	High speed overrunning High-speed, low-mid speed engaged
<b>OB-OF</b>	Oil bath (Water cooled)	Oil seal	High speed overrunning High-speed, low-mid speed engaged

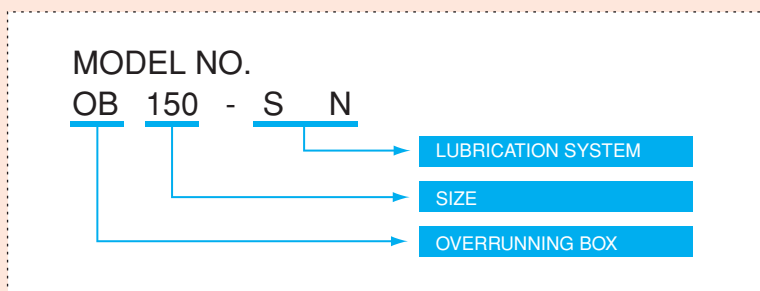
Economical models using oil seals and oil bath system. The oil leak detectors can be added as an option to quickly detect oil leaks from the oil seal. The OB-OF model is cooled by water, which enables high speed operation.

MODEL	LUBRICATION SYSTEM	SEALING	APPLICATION
<b>OB-PN</b>	Screw pump and oil bath	Oil flinger and labyrinth seal	High speed overrunning Low-mid speed engaged
<b>OB-PF</b>	Screw pump and oil bath (Water cooled)	Oil flinger and labyrinth seal	High speed overrunning Low-mid speed engaged
<b>OB-SN</b>	Screw pump and impeller	Oil flinger and labyrinth seal	High speed overrunning High-speed engaged
<b>OB-SF</b>	Screw pump and impeller (Water cooled)	Oil flinger and labyrinth seal	High speed overrunning High-speed engaged
<b>OB-S</b>	Forced lubrication	Oil flinger and labyrinth seal	High speed overrunning High-speed engaged

These models are designed to eliminate oil leaks by adopting TSUBAKI's original "labyrinth" technique using oil flingers. Ideal for high-speed equipment operated continuously for 24 hours. The OB-PF and OB-SF models are cooled by water, which enables high speed operation.

MODEL	LUBRICATION SYSTEM	SEALING	APPLICATION
<b>TB</b>	Screw pump and oil bath	Oil flinger and labyrinth seal	High speed overrunning Low-speed engaged

Combines Cam Clutch and TSUBAKI's highly-reliable worm gear reducer as an auxiliary reducer into a compact unit for turning and inching applications.



## Options

### 1 ) Brake

Prevents the input shaft from corotating due to the drag torque of the Cam Clutch when the driven and driving units are disengaged during repair or inspection. Not provided as a standard item. A brake can be added upon request to sizes over OB100 except for the OB-ON series.

### 2 ) Oil leak detector (OB-ON and OB-OF only)

Depending on customer's requirement, quickly detects oil leaks from the oil seal to prevent external spread.

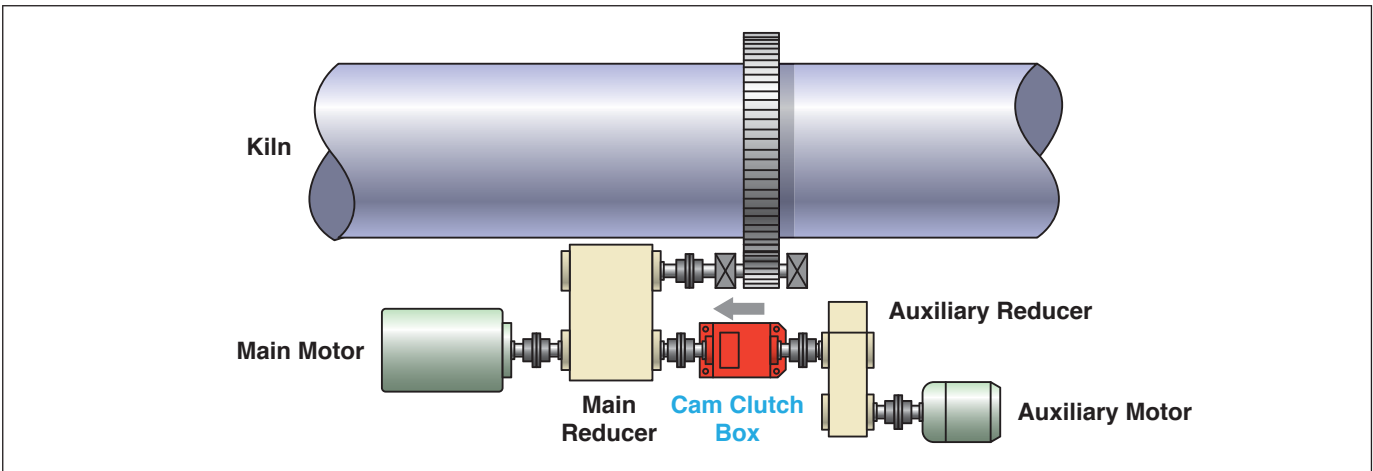
### 3 ) Echt-Flex coupling hubs

If you plan to use TSUBAKI's Echt-Flex coupling, we will complete necessary processing such as shaft bores and keyways on coupling hubs and attach them to the input and output shafts of the Cam Clutch Box before shipment. Please provide us with the desired hub dimensions when placing an order. Single-type of disk couplings such as Echt-Flex couplings cannot absorb parallel misalignment and axial displacement. Please use the spacer type as necessary.

### 4 ) Paint

Our standard paint is for indoor use (Finish coat thickness 15µm, color munsell scale 10b 4/1.5 of acrylic lacquer painted only once). Please contact TSUBAKI when special paint is required.

## ■ Inching Operation for Cement Kiln



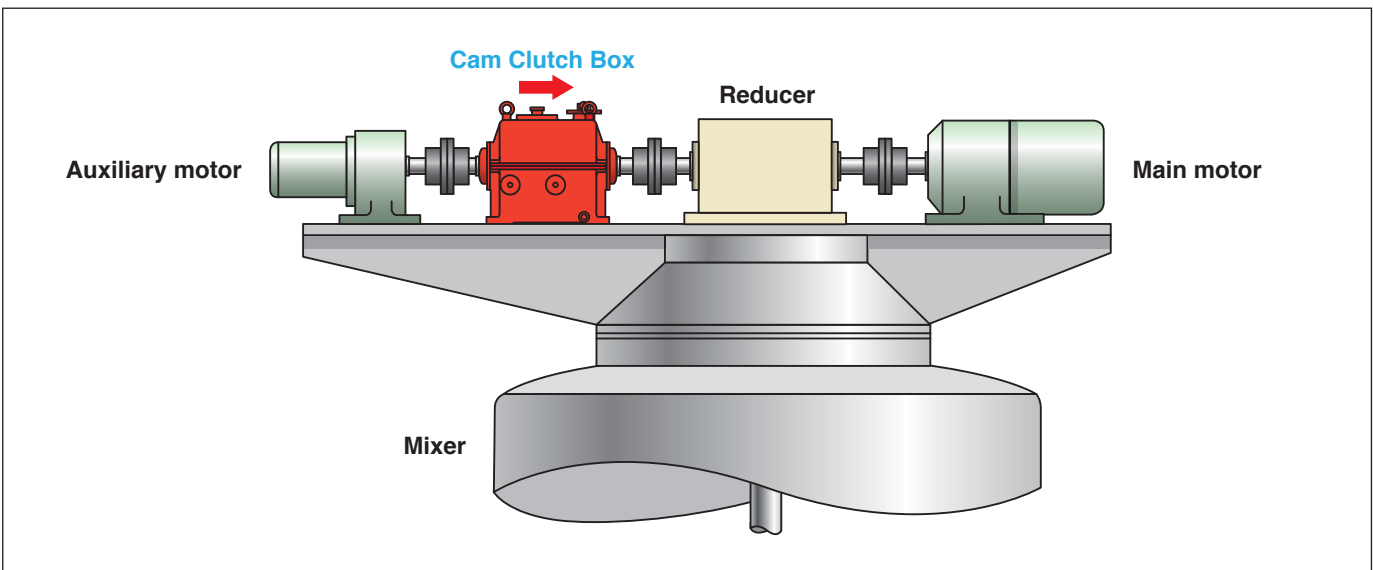
### Intended purpose of a Cam Clutch

This example shows how to use a Cam Clutch as turning equipment for a kiln furnace in a cement facility or incinerator. Generally, a rotary kiln is provided with emergency turning equipment. In some cases, a manual jaw clutch is used to switch between normal and turning operations. With this method, however, the clutch must be operated on site even in an emergency. By using a Cam Clutch, this on-site operation can be eliminated and remote switching can be performed simply by turning on/off the main and turning motors. During normal operation, the kiln is driven from the main motor and main reducer side, and the Cam Clutch Box overruns. If the main motor or main reducer fails, the Cam Clutch Box is engaged to operate the kiln at a low speed after the turning motor is turned on. In situations such as regular repair, the Cam Clutch Box is also engaged to enable inching operation.

Applicable series

OB-PN, OB-PF, TB, OB-ON, OB-OF

## ■ Driving a Large Mixer at a Low Speed



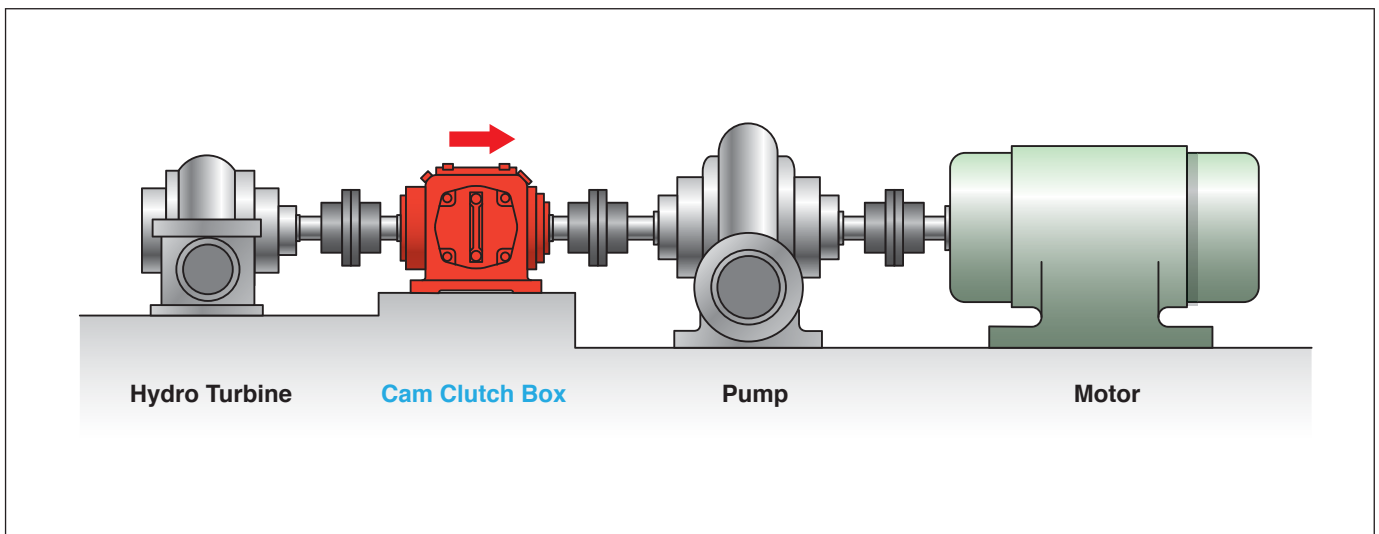
### Intended purpose of a Cam Clutch

Usually, the mixer is driven by the main motor. In this mode, the Cam Clutch Box continuously overruns and does not transfer torque to the low-speed driving side. When driven by the auxiliary motor, the Cam Clutch Box is engaged automatically to drive the mixer at a low speed.

Applicable series

OB-PN, OB-PF, TB, OB-ON, OB-OF

## ■ Energy Recovery System



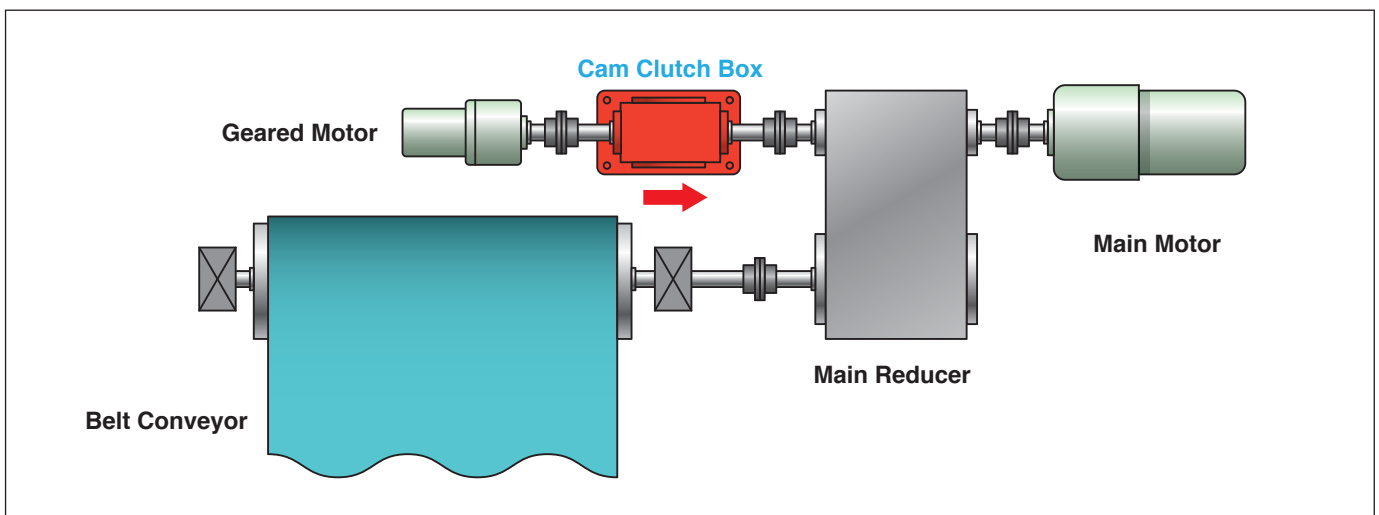
### Intended purpose of a Cam Clutch Box

This example shows how to reduce power consumption by recovering power from residual water pressure delivered from a pump. The motor-driven pump discharges high-pressure liquid, which, after circulating, is used to drive a hydro turbine. The turbine is then used to help drive the pump. The Cam Clutch overruns at startup or when the available liquid pressure is low and the hydro turbine is rotated at a low speed. Once the rotation of the hydro turbine reaches that of the motor, the Cam Clutch is engaged automatically and the pump is driven by the turbine and the motor. The power consumption of the motor can be reduced in response to the output from the turbine.

Applicable series

OB-SN, OB-SF, OB-S, OB-ON, OB-OF

## ■ Driving a Belt Conveyor at a Low Speed



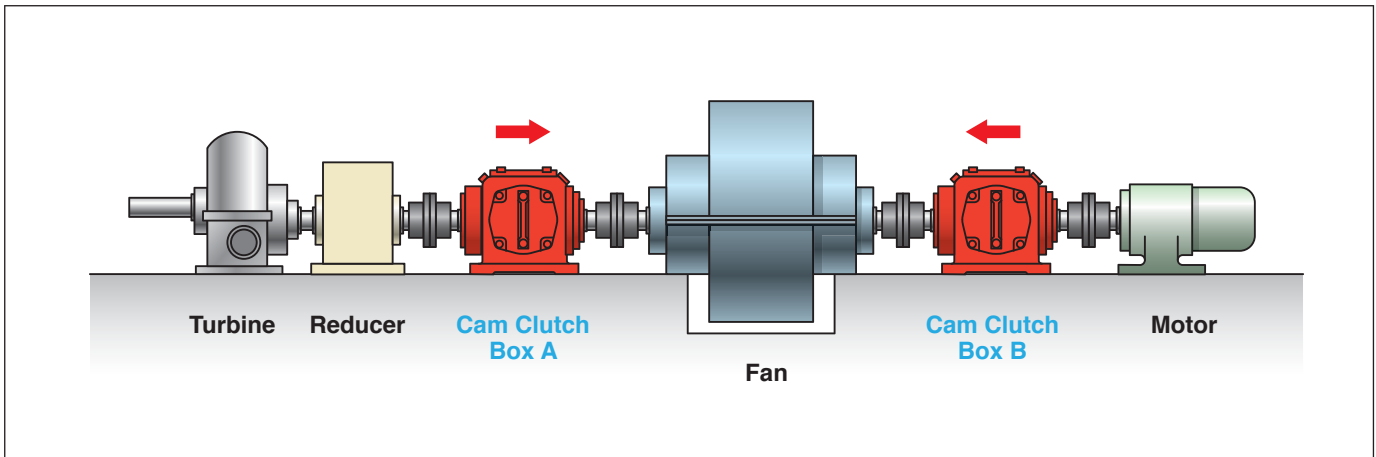
### Intended purpose of a Cam Clutch Box

The conveyor is driven by the main motor under normal operation. In this mode, the Cam Clutch Box continuously overruns to prevent the geared motor from being rotated by the main motor. When the conveyor is operated at a low speed by the geared motor for purposes such as inspection, repair, test run, and adjustment, the Cam Clutch Box is engaged to facilitate the shift to a specific low-speed operation. Engagement and overrunning can be switched automatically depending on the speed difference.

Applicable series

OB-PN, OB-PF, TB, OB-ON, OB-OF

## ■ Dual Drive for Fan



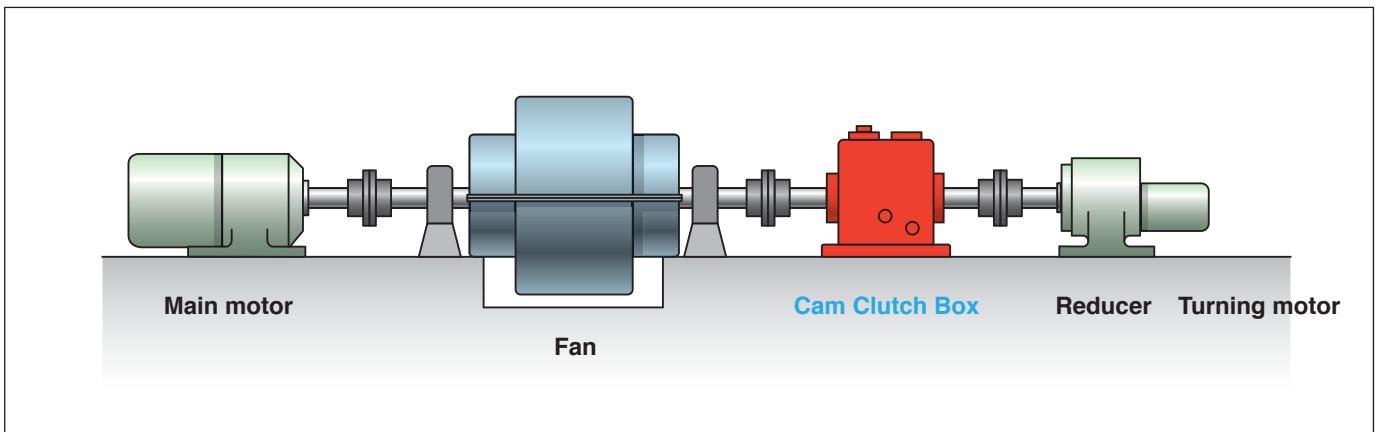
### Intended purpose of a Cam Clutch Box

This example shows how to reduce power consumption by surplus stems generated from a boiler. In this system fan is driven by a dual drive consisting of a motor and turbine. The Cam Clutch Boxes are used for automatic switching between the driving unit. The fan is normally driven on the turbine side and in this mode, motor power consumption can be reduced. When starting, or when steam pressure to turbine drops, the motor takes over from the turbine to drive the fan. Cam Clutch Box A engages when the turbine drives the fan, and it overruns when the motor drives the fan. Conversely, Cam Clutch B overruns when the turbine drives the fan, and it engages when the motor drives the fan. The driving system can be changed over without switching the clutch. this is because the difference in the speed of rotation between the motor and turbine turns the Cam Clutch Boxes on and off, and the driving device rotating the fastest is connected automatically to the unit.

Applicable series

OB-SN, OB-SF, OB-S, OB-ON, OB-OF

## ■ Turning Operation for Induced Draft Fan



### Intended purpose of a Cam Clutch Box

This example shows how to use a Cam Clutch Box for a fan that introduces combustion exhaust gas from a boiler to a chimney. The fan is activated by the turning geared motor. In this mode, the Cam Clutch is engaged to drive the fan at a low speed. Then, the main motor is started to shift to normal operation. In this mode, the Cam Clutch Box overruns. If a hot fan is left as it is after the boiler is stopped, a temperature difference is caused between the top and bottom of the fan. If this state is maintained for a long time, the fan is deformed, resulting in vibration or breakage during the next operation. To prevent this problem, rotate it at a low speed to cool the entire fan evenly. Turning operation at the time of stoppage is driven by the turning geared motor. In this mode, the Cam Clutch is engaged to drive the fan at a low speed to cool it.

Applicable series

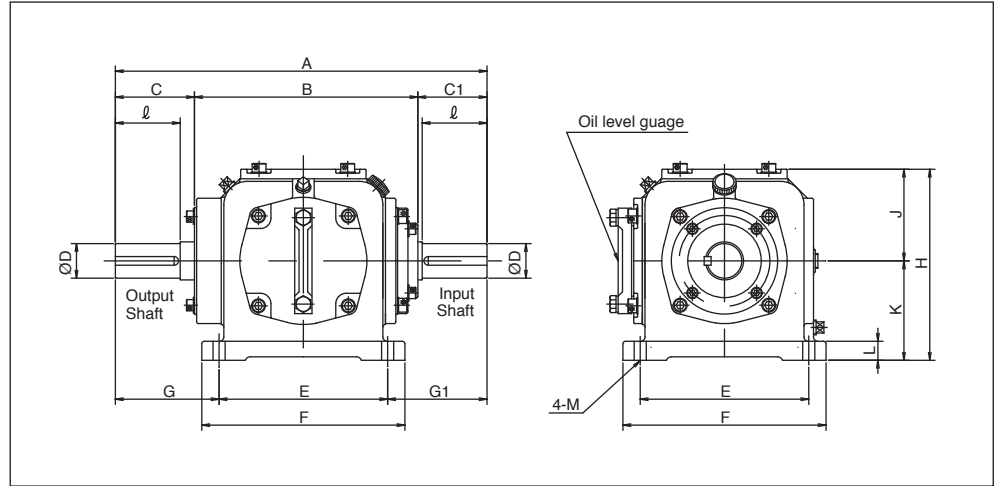
OB-PN, OB-PF, TB, OB-ON, OB-OF

# Capacity and Dimension Tables

## MODELS OB-ON For Continuous High-speed Overrunning

### Features

OB-ON series use oil seal and apply oil bath system.



### Dimensions and Capacities

Dimensions in mm

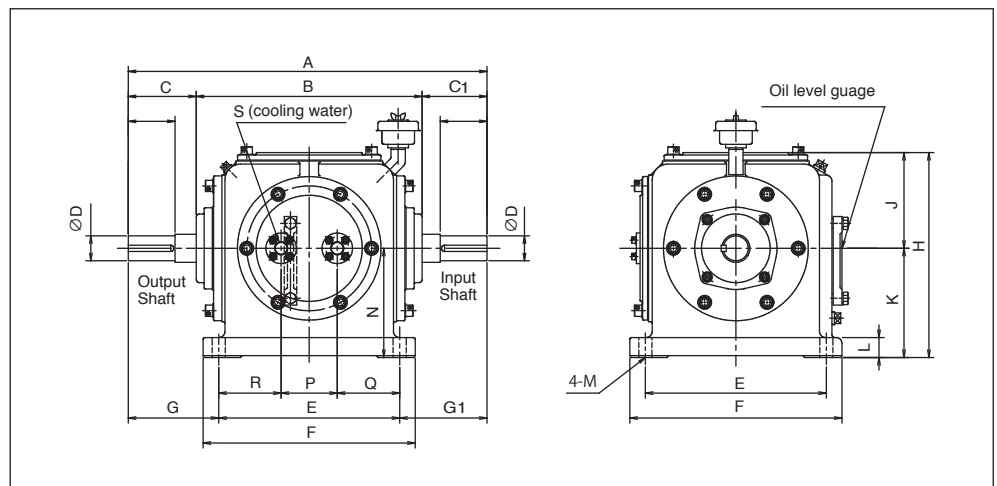
Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	C1	E	F	G	G1	H	J	K	L	M	N	P	Q	R	S	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	
OB 60-ON	314	0 ~ 3,000	0 ~ 1,800	300	200	55	45	152	190	77	71	174	84	90	20	14	-	-	-	-	-	-	40	25	8 x 7 x 34ℓ	15	1
OB100-ON	1,620	0 ~ 2,500	0 ~ 1,800	430	258.5	91.5	80	195	235	120	115	221	106	115	22	14	-	-	-	-	-	-	75	40	12 x 8 x 67ℓ	45	2
OB120-ON	3,140	0 ~ 1,800	0 ~ 1,500	605	355	130	120	290	340	160	155	328.5	153.5	175	32	21	-	-	-	-	-	-	115	50	14 x 9 x 106ℓ	90	7
OB140-ON	5,880	0 ~ 1,500	0 ~ 1,000	670	400	140	130	330	390	175	165	368.5	168.5	200	40	25	-	-	-	-	-	-	125	60	18 x 11 x 114ℓ	150	10

Note: After you place an order, contact us to request a drawing for your approval.

## MODELS OB-OF For Continuous High-speed Overrunning

### Features

Water cooling piping is added to the ON series to suppress oil temperature rise. OB-OF series apply water cooling system and please supply cold water (less than 35°C) through the cooling pipe. The cooling pipe is made of copper and please do not use sea water. If you request special specification, please contact TSUBAKI. OB-OF series can be used for higher speed applications compared with the ON series.



### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	C1	E	F	G	G1	H	J	K	L	M	N	P	Q	R	S	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	Cooling Water (ℓ/min)
OB 60-OF	314	0 ~ 3,600	0 ~ 3,600	360	258.5	56.5	45	195	235	85	80	221	106	115	22	14	130	75	60	60	Rc3/8	40	25	8 x 7 x 34ℓ	21	2	3
OB100-OF	1,620	0 ~ 3,600	0 ~ 3,600	538	360	89	89	290	340	124	124	328.5	153.5	175	32	19	86.5	110	90	90	Rc1/2	75	40	12 x 8 x 67ℓ	90	7	3
OB120-OF	3,140	0 ~ 3,600	0 ~ 3,600	644	355	147	142	290	340	177	177	328.5	153.5	175	32	19	86.5	110	90	90	Rc1/2	115	50	14 x 9 x 106ℓ	90	7	3
OB140-OF	5,880	0 ~ 3,000	0 ~ 2,000	670	400	140	130	330	390	175	165	368.5	168.5	200	40	25	220	140	95	95	Rc1/2	125	60	18 x 11 x 114ℓ	150	10	3

Note: After you place an order, contact us to request a drawing for your approval.

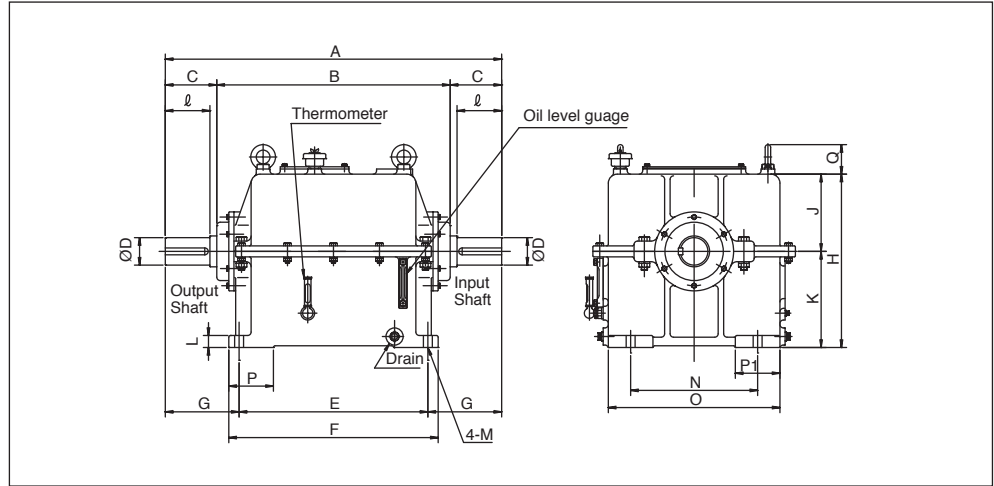
# Capacity and Dimension Tables

## MODELS OB-SN

### For Continuous High-speed Overrunning and Engaging

#### Features

Uses a self-lubrication method with impeller and screw pump to lubricate each required part from an oil bath with its oil level set lower than the shaft center through shaft rotation. Oil seal is not used, which eliminates oil leakage during operation.



#### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	E	F	G	H	J	K	L	M	N	O	P	P1	Q	R	S	T	U	V	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	
OB 120-SN	3,140	500 ~ 3,000	500 ~ 3,000	770	570	100	440	500	165	380	180	200	30	24	270	370	100	100	66	-	-	-	-	-	-	80	60	18 x 11 x 66ℓ	190	12
OB 140-SN	5,880	500 ~ 2,400	500 ~ 2,400	800	570	115	440	500	180	380	180	200	30	24	270	370	100	100	66	-	-	-	-	-	-	110	70	20 x 12 x 95ℓ	210	12
OB 150-SN	9,500	500 ~ 2,000	500 ~ 2,000	980	680	150	550	610	215	505	225	280	35	26	370	500	130	130	86	-	-	-	-	-	-	130	80	22 x 14 x 114ℓ	480	30
OB 160-SN	17,600	500 ~ 1,500	500 ~ 1,500	1,070	750	160	610	670	230	550	250	300	40	28	400	550	150	185	86	-	-	-	-	-	-	140	100	28 x 16 x 121ℓ	630	35

Note: After you place an order, contact us to request a drawing for your approval.

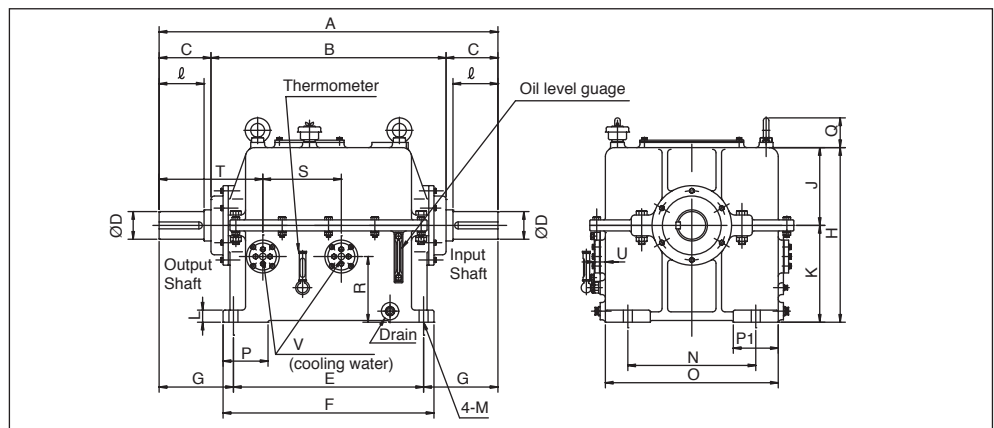
## MODELS OB-SF

### For Continuous High-speed Overrunning and Engaging

#### Features

Water cooling piping is added to the SN series to suppress oil temperature rise. OB-SF series apply water cooling system and please supply cold water (less than 35°C) through the cooling pipe.

The cooling pipe is made of copper and please do not use sea water. If you request special specification, please contact to TSUBAKI. OB-SF series can be used for higher speed applications compared with the SN series.



#### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	E	F	G	H	J	K	L	M	N	O	P	P1	Q	R	S	T	U	V	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	Cooling Water (ℓ/min)
OB 120-SF	3,140	500 ~ 3,150	500 ~ 3,150	880	680	100	550	610	165	505	225	280	35	26	370	500	130	130	86	190	227	250	30	Rc1/2	80	60	18 x 11 x 66ℓ	460	30	10
OB 140-SF	5,880	500 ~ 3,000	500 ~ 3,000	940	680	130	550	610	195	505	225	280	35	26	370	500	130	130	86	190	227	280	30	Rc1/2	110	70	20 x 12 x 95ℓ	480	30	10
OB 150-SF	9,500	500 ~ 2,400	500 ~ 2,400	980	680	150	550	610	215	505	225	280	35	26	370	500	130	130	86	190	227	300	30	Rc1/2	130	80	22 x 14 x 114ℓ	500	30	10
OB 160-SF	17,600	500 ~ 1,800	500 ~ 1,800	1,070	750	160	610	670	230	550	250	300	40	28	400	550	150	185	86	190	227	326	30	Rc1/2	140	100	28 x 16 x 121ℓ	650	35	10
OB 180-SF	24,500	400 ~ 1,500	400 ~ 1,500	1,160	800	180	660	730	250	655	300	355	45	32	450	610	180	205	105	255	265	349	30	Rc1/2	160	120	32 x 18 x 139ℓ	800	45	10
OB 200-SF	40,180	400 ~ 1,200	400 ~ 1,200	1,620	1,000	310	840	910	390	700	320	380	45	33	550	710	85	-	105	245	265	610	30	Rc1/2	290	155	40 x 22 x 265ℓ	1,190	71	12
OB 200W-SF	80,360	400 ~ 1,000	400 ~ 1,000	1,620	1,000	310	840	910	390	700	320	380	45	33	550	710	85	-	105	245	265	610	30	Rc1/2	290	155	40 x 22 x 265ℓ	1,240	71	12

Note: After you place an order, contact us to request a drawing for your approval.

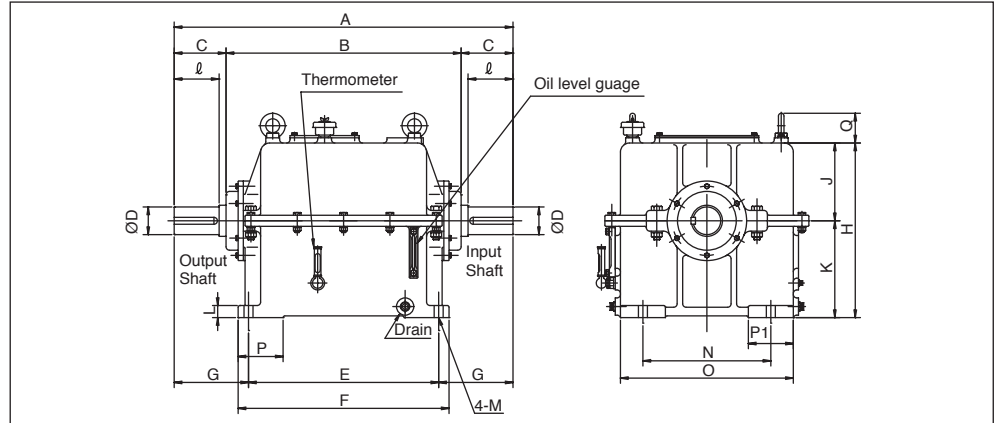


## MODELS OB-PN

### For High-speed Overrunning and Medium and Low-speed Engaging

#### Features

Uses a self-lubrication method with a screw pump to lubricate each required part from an oil bath with its oil level set lower than the shaft center through shaft rotation. Oil seal is not used, which eliminates oil leakage during operation.



#### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	E	F	G	H	J	K	L	M	N	O	P	P1	Q	R	S	T	U	V	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	
OB 120-PN	3,140	0 ~ 1,800	0 ~ 600	770	570	100	440	500	165	380	180	200	30	24	270	370	100	100	66	-	-	-	-	-	-	80	60	18 x 11 x 66ℓ	180	14.5
OB 140-PN	5,880	0 ~ 1,800	0 ~ 600	830	570	130	440	500	195	380	180	200	30	24	270	370	100	100	66	-	-	-	-	-	-	110	70	20 x 12 x 95ℓ	200	15
OB 150-PN	9,500	0 ~ 1,800	0 ~ 600	910	570	170	440	500	235	380	180	200	30	24	270	370	100	100	66	-	-	-	-	-	-	150	70	20 x 12 x 135ℓ	250	15
OB 160-PN	17,600	0 ~ 1,500	0 ~ 500	1,060	680	190	550	610	255	505	225	280	35	26	370	500	130	130	86	-	-	-	-	-	-	170	85	22 x 14 x 154ℓ	400	40
OB 180-PN	24,500	0 ~ 1,200	0 ~ 400	1,150	750	200	610	670	270	550	250	300	40	28	400	550	150	185	86	-	-	-	-	-	-	180	100	28 x 16 x 161ℓ	550	50
OB 200-PN	40,180	0 ~ 1,000	0 ~ 300	1,170	750	210	630	700	270	600	250	350	45	32	410	550	200	200	110	-	-	-	-	-	-	190	130	32 x 18 x 169ℓ	700	60
OB 200W-PN	80,360	0 ~ 1,000	0 ~ 300	1,170	750	210	630	700	270	600	250	350	45	32	410	550	200	200	110	-	-	-	-	-	-	190	130	32 x 18 x 169ℓ	750	60

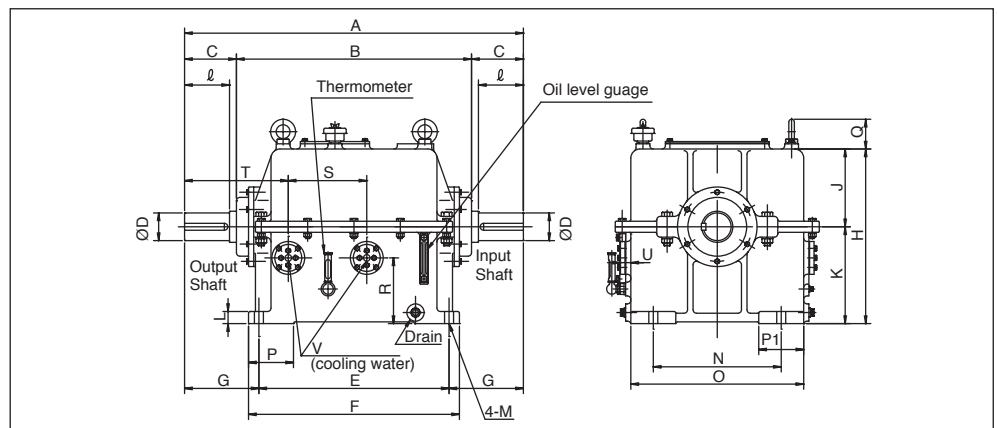
Note: After you place an order, contact us to request a drawing for your approval.

## MODELS OB-PF

### For High-speed Overrunning and Medium and Low-speed Engaging

#### Features

Water cooling piping is added to the PN series to suppress oil temperature rise. OB-PF series apply water cooling system and please supply cold water (less than 35°C) through the cooling pipe. The cooling pipe is made of copper and please do not use sea water. If you request special specification, please contact to TSUBAKI. OB-PF series can be used for higher speed applications compared with the PN series.



#### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min) Output shaft	Max. Engaging (r/min)	A	B	C	E	F	G	H	J	K	L	M	N	O	P	P1	Q	R	S	T	U	V	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ)	Cooling Water (ℓ/min)
OB 120-PF	3,140	0 ~ 2,000	0 ~ 700	880	680	100	550	610	165	505	225	280	35	26	370	500	130	130	86	190	227	250	30	Rc1/2	80	60	18 x 11 x 66ℓ	450	40	10
OB 140-PF	5,880	0 ~ 2,000	0 ~ 700	940	680	130	550	610	195	505	225	280	35	26	370	500	130	130	86	190	227	280	30	Rc1/2	110	70	20 x 12 x 95ℓ	470	40	10
OB 150-PF	9,500	0 ~ 2,000	0 ~ 700	980	680	150	550	610	215	505	225	280	35	26	370	500	130	130	86	190	227	300	30	Rc1/2	130	80	22 x 14 x 114ℓ	490	40	10
OB 160-PF	17,600	0 ~ 1,800	0 ~ 600	1,060	680	190	550	610	255	505	225	280	35	26	370	500	130	130	86	190	227	340	30	Rc1/2	170	85	22 x 14 x 154ℓ	630	45	10
OB 180-PF	24,500	0 ~ 1,500	0 ~ 500	1,160	800	180	660	730	250	655	300	355	45	32	450	610	79	-	105	255	265	349	30	Rc1/2	160	120	32 x 18 x 139ℓ	770	55	10
OB 200-PF	40,180	0 ~ 1,200	0 ~ 400	1,170	750	210	630	700	290	600	250	350	45	32	410	550	94	-	105	215	227	384	30	Rc1/2	190	130	32 x 18 x 169ℓ	850	60	12
OB 200W-PF	80,360	0 ~ 1,200	0 ~ 400	1,170	750	210	630	700	290	600	250	350	45	32	410	550	94	-	105	215	227	384	30	Rc1/2	190	130	32 x 18 x 169ℓ	900	60	12

Note: After you place an order, contact us to request a drawing for your approval.

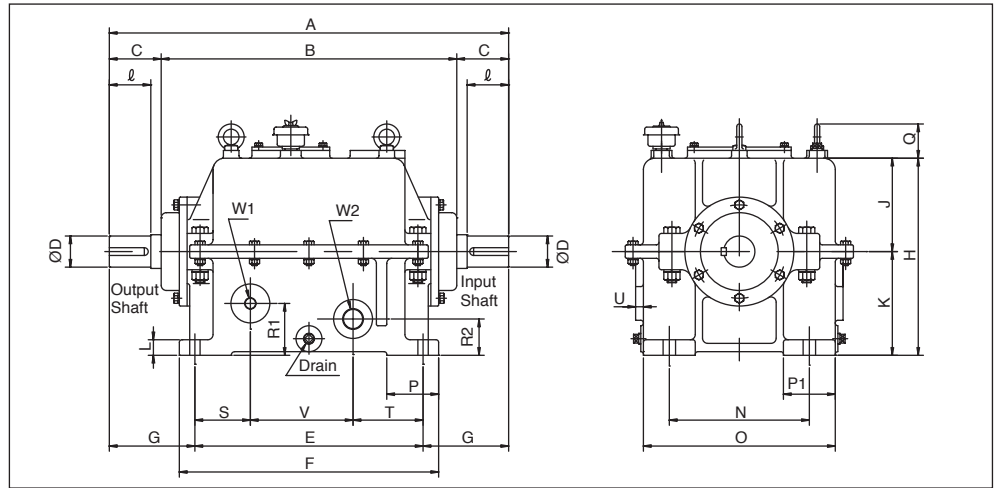
# Capacity and Dimension Tables

## MODELS OB-S

### For Continuous High-speed Overrunning and Engaging

#### Features

OB-S series apply forced lubrication system for each required parts such as bearings and Cam Clutch to enable operation in a wide range from low to high speed. Please prepare oil supply system and supply oil (less than 35°C) through OB-S series. If oil temperature is higher than it. For further details please contact to TSUBAKI. Oil seal is not used, which eliminates oil leakage during operation.



#### Dimensions and Capacities

Dimensions in mm

Model	Torque Capacity (N·m)	Max. Overrunning (r/min)	Max. Engaging (r/min)	A	B	C	E	F	G	H	J	K	L	M	N	O	P	P1	Q	R1	R2	S	T	U	V	W1	W2	ℓ	D (m6)	Key	Mass (kg)	Oil (ℓ /min)
OB 120-S	3,140	0 ~ 3,600	0 ~ 3,600	770	570	100	440	500	165	380	180	200	30	24	270	370	100	100	66	100	70	107	145	15	188	Rc1/2	Rc1-1/4	80	60	18 x 11 x 66ℓ	320	10
OB 140-S	5,880	0 ~ 3,600	0 ~ 3,600	840	580	130	370	470	235	410	180	230	25	20	390	440	-	60	66	100	100	60	75	-	235	Rc1/2	Rc2	110	70	20 x 12 x 95ℓ	400	10
OB 150-S	9,500	0 ~ 3,600	0 ~ 3,600	920	620	150	390	510	265	455	225	230	30	24	430	480	-	60	66	130	85	75	90	-	225	Rc1/2	Rc2	130	80	22 x 14 x 114ℓ	450	20
OB 160-S	17,600	0 ~ 3,000	0 ~ 3,000	1,070	750	160	610	670	230	550	250	300	40	28	400	550	150	185	86	190	75	323	450	-	163	Rc3/4	Rc2	140	100	28 x 16 x 121ℓ	650	20
OB 180-S	24,500	0 ~ 2,000	0 ~ 2,000	1,200	800	200	660	730	270	655	300	355	45	32	450	610	79	-	105	255	110	260	250	-	150	Rc3/4	Rc3	170	120	32 x 18 x 149ℓ	800	20

Note: After you place an order, contact us to request a drawing for your approval.

## Reference Echt-Flex coupling for Cam Clutch Box

Model	Torque Capacity (N·m)
OB 60-ON	314
OB100-ON	1,620
OB120-ON	3,140
OB140-ON	5,880
OB 60-OF	314
OB100-OF	1,620
OB120-OF	3,140
OB140-OF	5,880
OB 120-SN	3,140
OB 140-SN	5,880
OB 150-SN	9,500
OB 160-SN	17,600
OB 120-SF	3,140
OB 140-SF	5,880
OB 150-SF	9,500
OB 160-SF	17,600
OB 180-SF	24,500
OB 200-SF	40,180
OB 200W-SF	80,360



Echt-Flex coupling	Allowable Torque (N·m)
NEF45W	441
NEF210W	2,060
NEF340W	3,330
NEF700W	6,860
NEF45W	441
NEF210W	2,060
NEF340W	3,330
NEF700W	6,860
NEF340W	3,330
NEF700W	6,860
NEH14W	13,700
NEH20W	19,600
NEF340W	3,330
NEF700W	6,860
NEH14W	13,700
NEH20W	19,600
NEH30W	29,400
NEH41W	40,200
NEH90W	88,200

Model	Torque Capacity (N·m)
OB 120-PN	3,140
OB 140-PN	5,880
OB 150-PN	9,500
OB 160-PN	17,600
OB 180-PN	24,500
OB 200-PN	40,180
OB 200W-PN	80,360
OB 120-PF	3,140
OB 140-PF	5,880
OB 150-PF	9,500
OB 160-PF	17,600
OB 180-PF	24,500
OB 200-PF	40,180
OB 200W-PF	80,360
OB 120-S	3,140
OB 140-S	5,880
OB 150-S	9,500
OB 160-S	17,600
OB 180-S	24,500



Echt-Flex coupling	Allowable Torque (N·m)
NEF340W	3,330
NEF700W	6,860
NEH14W	13,700
NEH20W	19,600
NEF30W	29,400
NEH41W	40,200
NEH90W	88,200
NEF340W	3,330
NEF700W	6,860
NEH14W	13,700
NEH20W	19,600
NEF30W	29,400
NEH41W	40,200
NEH90W	88,200
NEF340W	3,330
NEF700W	6,860
NEH14W	13,700
NEH20W	19,600
NEH30W	29,400

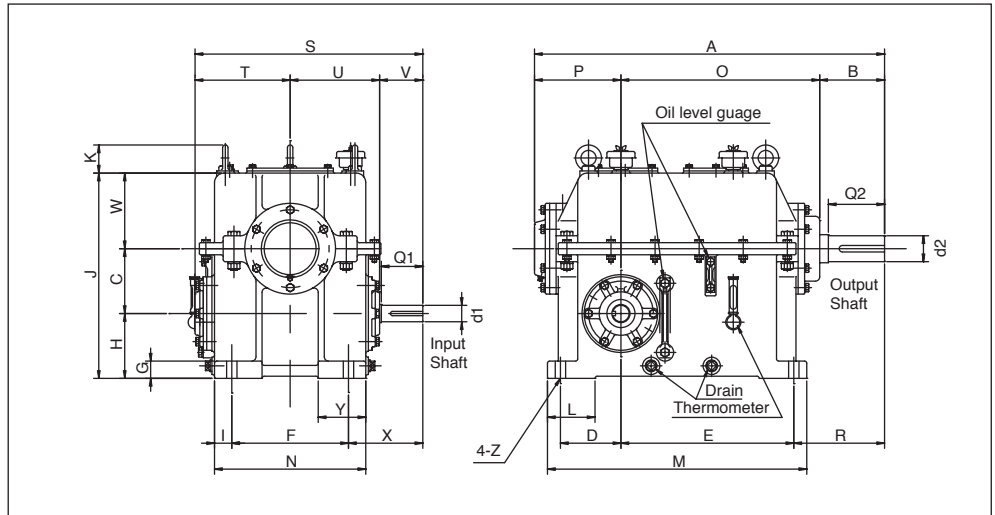
Use these tables as guides to the Echt-Flex couplings, and select suitable couplings on the basis of the Echt-Flex couplings catalog. Echt-Flex couplings cannot absorb axial displacement that is caused by an increase in temperature. Adjust the installation so that T.I.R. is within 3/100 mm. Use the spacer type as necessary. For further details, contact TSUBAKI.

# MODELS TB

## For Inching and Turning Drive Applications

### Features

Compact turning and inching equipment combined with Cam Clutch and highly-reliable worm gear reducer as an auxiliary reducer.



### Capacities

Model	Torque Capacity (N·m)	Max. Overrunning (r/min)
TB 40-120	3,140	1,800
TB 60-140	5,880	1,500
TB 60-150	9,500	1,800
TB 70-160	17,600	1,500
TB 80-180	24,500	1,200

### Applicable 6 pole motor and reduction ratios

Unit: kw

Ratio	Input Speed 1,150 r/min								Input Speed 950 r/min							
	10	15	20	25	30	40	50	60	10	15	20	25	30	40	50	60
TB 40-120	5.5	3.7	3.7	2.2	2.2	1.5	1.5	0.75	5.5	3.7	2.2	2.2	2.2	1.5	1.5	0.75
TB 60-140	15	11	7.5	7.5	5.5	3.7	3.7	2.2	11	7.5	7.5	5.5	5.5	3.7	3.7	2.2
TB 60-150	15	11	7.5	7.5	5.5	3.7	3.7	2.2	11	7.5	7.5	5.5	5.5	3.7	3.7	2.2
TB 70-160	22	15	11	7.5	7.5	5.5	5.5	3.7	15	15	11	7.5	7.5	5.5	3.7	3.7
TB 80-180	22	-	15	-	11	7.5	7.5	5.5	22	-	15	-	11	7.5	5.5	5.5

### Dimensions

Dimensions in mm

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S
TB 40-120	612	115	100	100	300	175	30	100	30	330	56	75	460	235	345	152	160	357
TB 60-140	810	150	150	140	400	270	40	150	40	475	65	110	600	350	460	200	210	527
TB 60-150	830	170	150	140	400	270	40	150	40	475	65	110	600	350	460	200	230	527
TB 70-160	890	190	175	150	430	330	45	180	45	565	76	120	640	420	490	210	250	607
TB 80-180	955	200	200	165	465	370	42	200	50	630	91	70	690	470	525	230	260	670

Model	T	U	V	W	X	Y	Z	Input Shaft			Output Shaft			Oil in Clutch Chamber (ℓ)	Oil in Reducer Chamber (ℓ)	Mass (kg)
								d1 (h7)	Key	Q1	d2 (m6)	Key	Q2			
TB 40-120	147	138	72	130	122	75	16	28	8 x 7 x 49ℓ	68	40	12 x 8 x 99ℓ	110	5.5	4	125
TB 60-140	220	207	100	175	172	110	24	38	10 x 8 x 73ℓ	96	60	18 x 11 x 115ℓ	130	17	10	290
TB 60-150	220	207	100	175	172	110	24	38	10 x 8 x 73ℓ	96	70	20 x 12 x 135ℓ	150	17	10	300
TB 70-160	252	242	113	210	190	130	30	45	14 x 9 x 87ℓ	108	85	22 x 14 x 154ℓ	170	25	15	500
TB 80-180	285	270	115	230	200	-	28	48	14 x 9 x 89ℓ	110	100	28 x 16 x 161ℓ	180	27	23	650

**Note:** The oil in the clutch chamber and in the reducer chamber are different. Be sure to use the recommended oil in each chamber. After you place an order, contact us to request a drawing for your approval.

For the TB series, a HY-VO chain coupling with a large elongation allowance for a shaft that connects the fan shaft and Cam Clutch output shaft can be provided together with the main unit. This HY-VO chain coupling is effective to absorb the axial displacement by heat up. For further details, please contact TSUBAKI.

## Life of Cam Clutch

Regarding Cam Clutch life there are two conditions that must be considered:

1. Overrunning abrasion (wear) life
2. Engagement fatigue life

When assessing the expected lifetime of the cam clutch, it is important to consider the above conditions in relation to the actual application.

### 1. Overrunning abrasion (wear) life

\*When the Cam Clutch overruns:

On the contact surfaces of cams and races, skids occur in direct proportion to the overrunning rotational speed. Therefore it is important to pay particular attention to abrasions at the contact points.

As the contact pressure by the weak spring force  $F$  is low, with sufficient lubrication, these parts will not wear or abrade in a short time.

Though it may vary depending on the lubricating condition, the following graphs show the calculated abrasion life, which has been properly lubricated based on the instructions provided in the catalog.

Abrasion life must be verified especially for applications involving high speed and long overrunning periods.

### 2. Engagement fatigue life

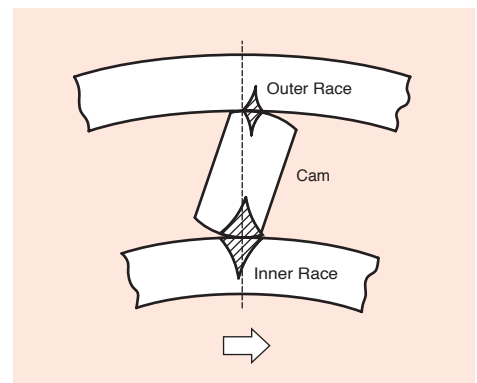
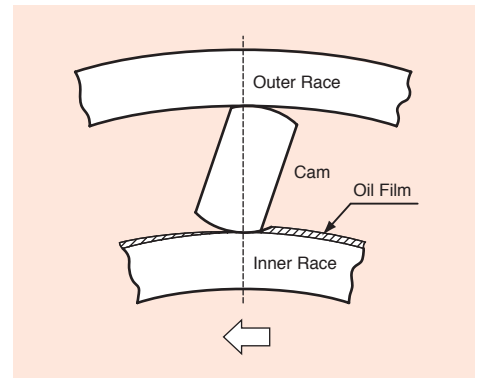
\*When the Cam Clutch engages:

At the contact surfaces of cams and races, the compression stress occurs in direct proportion to engagement torque.

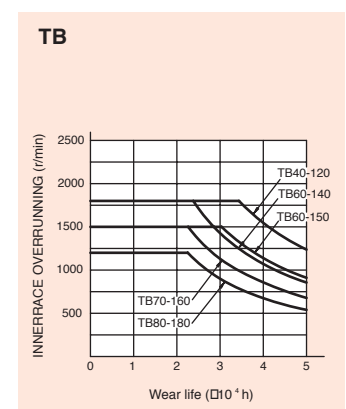
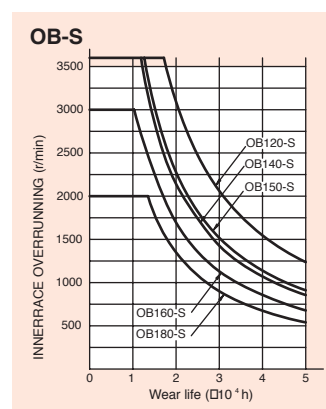
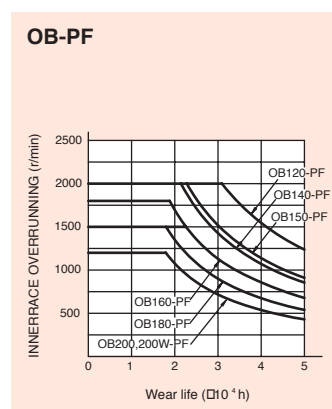
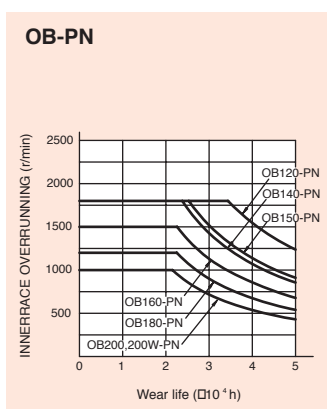
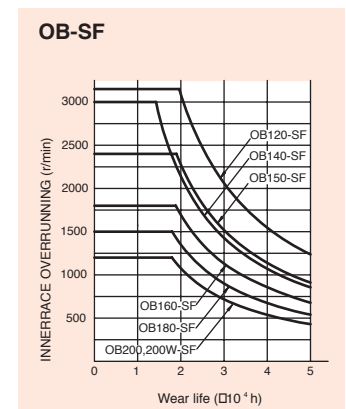
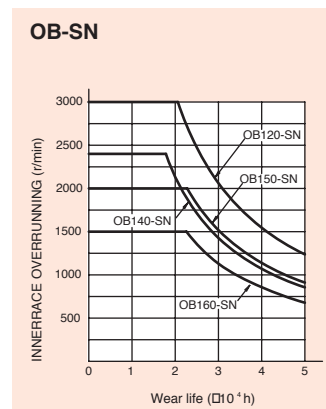
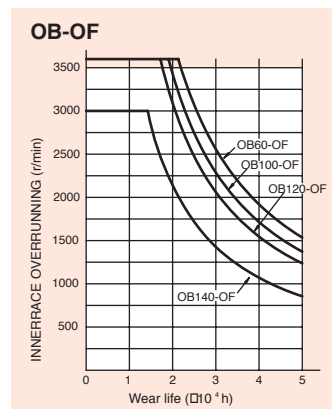
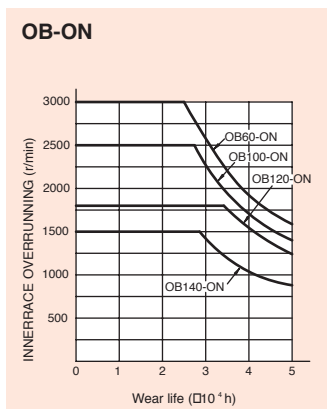
Contact surface of inner/outer races move infinitely with respect to each engagement, while that of the cams are almost stable.

Therefore, the fatigue caused by this stress will then result in the surface pitting of cams.

Please contact TSUBAKI.



## Wear Life Curve



# Lubrication and Maintenance

Selection of a proper lubricant is vital when using a Cam Clutch Box in a stable condition over a long time. For Cam Clutches, lubricants containing a large amount of extreme pressure additive such as gear oils are not appropriate. Select an appropriate one by referring to the recommended lubricants listed below.

## 1. Recommended Lubricants

Selection of lubricant is an important factor to ensure long life performance. Avoid the use of lubricants that include extreme pressure additives. The recommended lubricants are listed below. All Cam Clutch Boxes are shipped without lubricant. Before use, fill the Cam Clutch Box with a recommended lubricant only to the line indicated on the oil gauge.

### 1) Recommended lubricants: OB series

Brand	Lubricant Name
IDEMITSU	Daphne Turbine Oil 32 to 68
	Daphne Super Turbine Oil 32 to 68
Shell	Turbo Oil T 32 to 68
JX Nippon Oil & Energy	FBK Turbine 32 to 68
	JOMO Turbine 32 to 68
	Diamond Turbine Oil 32 to 68
Exxon Mobil	Mobil DTE Oil Light
	Mobil DTE Oil Medium
	Mobil DTE Oil Heavy Medium
Cosmo Oil	Cosmo Turbine Super Oil 32 to 68
BP	BP Energol THB 32 to 68

### 2) Recommended lubricants: TB series

The TB series requires two types of lubricants: one for the worm gear reducer and the other for the Cam Clutch. For the Cam Clutch, lubricants containing a large amount of extreme pressure additive such as gear oils (for the worm gear) are not appropriate. Pay special attention to use an appropriate one for each component.

Brand	Lubricant Name		
	Cam Clutch Side	Reducer Side	Recommended Grease
IDEMITSU	Daphne Turbine Oil 32 to 68	Daphne Super Gear Oil M460	Daphne Eponex EP No.2
	Daphne Super Turbine Oil 32 to 68		
Shell	Turbo Oil T 32 to 68	Omala Oil 460	Alvania EP No.2
JX Nippon Oil & Energy	FBK Turbine 32 to 68	Bonnoc M460	Epinox Grease AP2
	JOMO Turbine 32 to 68		
	Diamond Turbine Oil 32 to 68		
Exxon Mobil	Mobil DTE Oil Light	Mobil Gear 634	Mobilux EP2 Plex No.48
	Mobil DTE Oil Medium		
	Mobil DTE Oil Heavy Medium		
Cosmo Oil	Cosmo Turbine Super Oil 32 to 68		

## 2. Allowable Oil Temperature

The oil temperature during continuous operation should not exceed 70°C. If the oil temperature exceeds this limit for an extended period, the oil quality will quickly deteriorate, and continued use may cause problems. Use an oil thermometer to check the oil temperature.

## 3. Replacement of Lubricant

Oil should be changed after the test run and before operation, and then at an interval of six months or one year. Do not run the Cam Clutch Box while changing the oil. Drain the old oil, use flushing oil to clean the inside of the box. Next pour new oil into the box. It is preferable to determine oil change interval by sampling and checking oil inside once a month, in case of operation in non-optimal environment.

## 4. Overhaul

We recommend regular overhauls of the Cam Clutch Box. For further details, contact TSUBAKI.

\* As OB-ON and OB-OF, oil seals are perishable it is recommended to keep spare oil seals in stock.

## 5. Thrust Load

If thrust load is generated such as shaft elongation, absorb it with a coupling so that it is not applied to the clutch.

## 6. Foundation

Recommended installation for Cam Clutch Box is mounted on a sufficiently solid foundation or fixed in line with surrounding associated components. Flexible coupling is recommended. Please avoid O.H.L acting on input and output shaft.

## 7. Center Alignment

Misalignment causes abnormal noise, vibration, and extreme temperature increases, all of which may damage the Cam Clutch Box. The allowable misalignment is within 3/100mm, in parallel for a normal coupling. Therefore, adjust and align the relative shafts so that their misalignment is within this range, and then check the alignment again after the installation bolts of the base are tightened. For disk, diaphragm, and other couplings where a reaction force acts, note that the misalignment allowed for the coupling itself differs from the mounting alignment accuracy required by the Cam Clutch Box.

## 8. Handling of Brake (For Drag)

The brake's purpose is to prevent the input shaft of the Cam Clutch Box from rotating due to the drag force of the output shaft rotation during maintenance. When separating the drive machine from the Cam Clutch Box, the input shaft of the Cam Clutch Box may be rotated by the drag force from the output shaft rotation, since the driven machine that is connected to the output shaft is still running. Only in this situation, use the brake to stop the rotation of the input shaft caused by the drag force. Do not use the brake to stop the drive machine or the driven machine. In addition, during normal operation, do not use the brake to stop a drive machine that is inoperative and hence is rotated by the drag force. Do not use the brake when the input shaft is rotating. Do not rotate the input shaft when the brake is used. Forcing the input shaft to rotate when the brake is used will cause wear to the brake shoe, which will cause damage to the Cam Clutch Box. Before operation, check that the brake lever on the Cam Clutch Box is set to the "Free" position. Use the brake only when the input shaft is not rotating and when the coupling is disconnected to allow for repairs to or inspections of the drive machine. Use the brake before disconnecting the coupling on the shafts, and then set the brake lever to the "Locked" position. The drive machine may be rotated by the drag force from the rotation of the driven machine. In this situation, stop this drag rotation by some means before using the brake.

## 9. About Servomotors

Do not use servomotors with the Cam Clutch drive. Doing so may cause abnormal wear on the cam.

### Information for selection

a) Calculate the torque on the Cam Clutch according to the following formula:

$$T = \frac{9550 \cdot kW}{N} \times SF$$

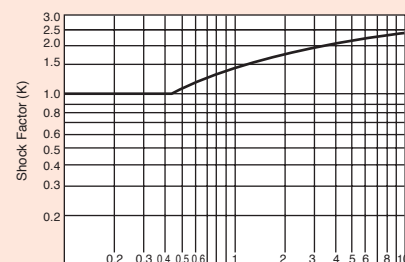
T: Loaded torque (N·m)  
 kW: Transmitted power (kW)  
 N: Speed of Cam Clutch shaft rotation (r/min)  
 SF: Service factor

b) Select clutch by:

- 1) Design torque requirement and service factor
  - 2) Maximum overrunning speed and engagement speed.
  - 3) Bore and shaft size, torque capacity.
- If the SF is not known, use the peak torque with shock factor method.

Type of Load	SF
No shock load	1 - 1.5
Moderate shock load	1.5 - 2.5
Shock load	2 - 3
Heavy shock load	4 - 6

SF = Motor peak torque at starting x shock factor, K. The shock factor K is obtained from the chart below by calculating inertia ratio. Use a shock factor of K = 1 when the inertia ratio is below 0.48.



$$\text{Inertia Ratio} = \frac{\text{Load inertia on clutch shaft}}{\text{Input inertia on clutch shaft}}$$

# Selection of Cam Clutch Box (Application Data for selection)

This form is for selection of Cam Clutch Box. Please fill in this form for your selection.

Date: \_\_\_\_\_

Contact person: \_\_\_\_\_

Company Name: \_\_\_\_\_

TEL: \_\_\_\_\_ FAX: \_\_\_\_\_

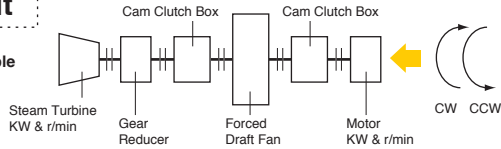
E-mail: \_\_\_\_\_

Address: \_\_\_\_\_

Attached Documents: Yes = (      pcs)

## Layout

Example



Please provide layout or print of installation if possible.

## Application Data Form

**1 Type of Equipment** Pump / Fan (type of fan \_\_\_\_\_) / Compressor / Conveyor / Kiln / Others ( \_\_\_\_\_ )

**2 Application** Turning drive / Inching drive / Dual drive / Energy recovery system / Others ( \_\_\_\_\_ )

**3 Power Source 1** Electric motor : \_\_\_\_\_ kw \_\_\_\_\_ r/min Start up torque= \_\_\_\_\_ %  
 Gasoline engine \_\_\_\_\_ HP at r/min \_\_\_\_\_ r/min  
 Steam turbine \_\_\_\_\_ kw \_\_\_\_\_ r/min  
 Diesel engine \_\_\_\_\_ HP at r/min \_\_\_\_\_ r/min  
 Others \_\_\_\_\_

**Power Source 2** Electric motor : \_\_\_\_\_ kw \_\_\_\_\_ r/min Start up torque= \_\_\_\_\_ %  
 Gasoline engine \_\_\_\_\_ HP at r/min \_\_\_\_\_ r/min  
 Steam turbine \_\_\_\_\_ kw \_\_\_\_\_ r/min  
 Diesel engine \_\_\_\_\_ HP at r/min \_\_\_\_\_ r/min  
 Others \_\_\_\_\_

**4 Type of Couplings** Disk Coupling \_\_\_\_\_ (Maker) \_\_\_\_\_ (Type)  
 Fluid Coupling \_\_\_\_\_ (Maker) \_\_\_\_\_ (Type)  
 Others \_\_\_\_\_ (Maker) \_\_\_\_\_ (Type)

**5 Gear reducer and others** Gear Reducer \_\_\_\_\_ (Maker) \_\_\_\_\_ (Type) Ratio= \_\_\_\_\_  
 Torque Converter \_\_\_\_\_ Specification Others \_\_\_\_\_ Specification

**6 Ambient Temperature** from \_\_\_\_\_ °C to \_\_\_\_\_ °C

**7 Thermal Expansion of shafts** No/ \_\_\_\_\_ Yes/ expansion = \_\_\_\_\_ mm

**8 Operation environment** Open door Indoor Dirt Other \_\_\_\_\_

**9 Required maximum torque at Cam Clutch Box** \_\_\_\_\_ Nm \_\_\_\_\_ kgf-m \_\_\_\_\_ lb-ft

**10 Time cycle of Cam Clutch Box** Engage = \_\_\_\_\_ min Rest = \_\_\_\_\_ min overrun = \_\_\_\_\_ min

**11 Cam Clutch Box operating time** \_\_\_\_\_ hours/day \_\_\_\_\_ days/year

**12 Rotation speed** Engage \_\_\_\_\_ r/min overrun \_\_\_\_\_ r/min

**13 In fan application** Weight of fan \_\_\_\_\_ kgf At bearings installed bore diameter of fanshaft \_\_\_\_\_ φ  
 Inertia of fan (GD2) \_\_\_\_\_ kg-m2 \_\_\_\_\_ (kgf-m2)

**14 Others and Special Requirements** Please Dimension=mm  
 (accessibility, dust condition, other ambient factors which may be important)

**15 Direction of Rotation (sight from yellow arrow)** CW \_\_\_\_\_ CCW \_\_\_\_\_

**16 Quantity required** \_\_\_\_\_ pcs



## WARNING

### USE CARE TO PREVENT INJURY.

#### COMPLY WITH THE FOLLOWING TO AVOID SERIOUS PERSONAL INJURY.

1. 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.
2. Always lock out power switch before installing, removing, lubricating or servicing a system that uses Cam Clutch products.
3. If the Cam Clutch is used for repeated starting and stopping, make sure the strength of the supports for the Cam Clutch are sufficient.
4. 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.
5. When connecting or disconnecting Cam Clutch products, eye protection is required. Wear safety glasses, protective clothing, gloves and safety shoes.

## 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

18 months effective the date of shipment or 12 months effective the first use of Goods, including installation of Goods to Buyer's equipment or machines - 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 under instructions provided in the manual, Seller would repair and replace at no charge once the Goods are returned to Seller. The following are excluded from the warranty.

- 1) Any costs related to removing Goods from the Buyer's equipment or machines to repair or replace parts.
- 2) Costs 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 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 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 inappropriate environment not specified in the manual.

7) Force Majeure or forces beyond the Seller's control such as natural disasters and injustice done by a third party.

8) Secondary damage or problem incurred by the Buyer's equipment or machines.

9) Defected parts supplied, or specified by the Buyer.

10) Incorrect wiring or parameter setting by the Buyer.

11) The end of life cycle of the Goods under normal usage.

12) Loss or damage not liable to the Seller.

#### 4. Dispatch Service

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

#### 5. Disclaimer

1) In our constant efforts to improve, Tsubaki may change the contents of this document without notice.

2) Considerable effort has been made to ensure that the contents of this document are free from errors. However, Tsubaki makes no warranties with respect to the accuracy of information described herein. In the mean time, we would appreciate comments or reports on any inaccuracies or omissions found in this document to help us make timely amendments as necessary. Your cooperation is greatly appreciated.

The logo mark and goods name entered into this catalog are the trademark and registered trademark of Tsubakimoto Chain Co., Ltd. in Japan and other countries.



## TSUBAKIMOTO CHAIN CO.

### Headquarters

Nakanoshima Mitsui Building  
3-3-3 Nakanoshima, Kita-ku  
Osaka, 530-0005, Japan  
Phone : +81-6-6441-0011  
URL : <http://tsubakimoto.com>

### Chain & Power Transmission Sales

1-3 Kannabidai, 1-chome  
Kyotanabe,  
Kyoto, 610-0380, Japan  
Phone : +81-774-64-5022

### Group companies

#### NORTH and SOUTH AMERICA

**U.S. TSUBAKI POWER TRANSMISSION, LLC**  
301 E. Marquardt Drive, Wheeling, IL 60090, U.S.A.  
Phone : +1-847-459-9500  
URL : <http://ustsubaki.com/>

**TSUBAKI of CANADA LIMITED**  
1630 Drew Road, Mississauga, Ontario, L5S 1J6, Canada  
Phone : +1-905-676-0400  
URL : <http://tsubaki.ca>

**TSUBAKI BRASIL EQUIPAMENTOS INDUSTRIAIS LTDA.**  
R. Pamplona, 1018, C.J. 73/74, Jd. Paulista  
CEP 01405-001, São Paulo, S.P.Brazil  
Phone : +55-11-3253-5656  
URL : <http://tsubaki.ind.br>

#### EUROPE

**TSUBAKIMOTO EUROPE B.V.**  
Aventurijn 1200, 3316 LB Dordrecht, The Netherlands  
Phone : +31-78-620-4000  
URL : <http://tsubaki.eu>

**TSUBAKIMOTO U.K. LTD**  
Osier Drive, Sherwood Park, Annesley, Nottingham  
NG15 0DX, United Kingdom  
Phone : +44-1623-688-700  
URL : <http://tsubaki.eu>

**TSUBAKI DEUTSCHLAND GmbH**  
ASTO Park Oberpfaffenhofen, Friedrichshafener Straße 1  
D-82205, Gilching, Germany  
Phone : +49-8105-7307100  
URL : <http://tsubaki.de/>

**OOO "TSUBAKI KABELSCHLEPP"**  
Prospekt Andropova 18, Building 6  
115432 Moscow, Russia  
Phone : +7-499-418212  
URL : <http://kabelschlepp.ru/>

#### ASIA and OCEANIA

**TAIWAN TSUBAKIMOTO CO.**  
No. 33, Lane 17, Zihciang North Road  
Gueishan Township Taoyuan County Taiwan R.O.C.  
Phone : +886-3-3293827/8/9  
URL : <http://tsubakimoto.com.tw>

**TSUBAKIMOTO CHAIN (SHANGHAI) CO. LTD.**  
Room 601, Urban City Centre, 45 Nanchang Road  
Huangpu District, Shanghai 2000020, People's Republic of China  
Phone : +86-21-5396-6651/2  
URL : <http://tsubaki.cn/>

**TSUBAKI INDIA POWER TRANSMISSION PVT. LTD.**  
Chandrika Chambers No.4, 3rd Floor, Anthony Street  
Royapettah, Chennai, Tamil Nadu 600014, India  
Phone : +91-44-4231-5251  
URL : <http://tsubaki.in/>

**TSUBAKIMOTO SINGAPORE PTE. LTD.**  
25 Gul Lane, Jurong, Singapore 629419  
Phone : +65-6861-0422/3/4  
URL : <http://tsubaki.sg>

**TSUBAKIMOTO SINGAPORE PTE. LTD.**  
**VIETNAM REPRESENTATIVE OFFICE**  
H&H Building 8F, 209 Hoàng V □ n Th □  
Phú Nhu □ n District, H □ Chi Minh City, Vietnam  
Phone : +84-8-3999-0131/2  
URL : <http://tsubaki.net.vn/>

**PT. TSUBAKI INDONESIA TRADING**  
Wisma 46 - Kota BNI, 24th Floor, Suite 24.15  
Jl. Jend. Sudirman, Kav. 1, Jakarta 10220, Indonesia  
Phone : +62-21-571-4230/31  
URL : <http://tsubakimoto.co.id/>

**TSUBAKI POWER TRANSMISSION (MALAYSIA) SDN. BHD.**  
No. 22, Jalan Astaka U8/84A,  
Bukit Jelutong Industrial Park  
Section U8, 40150 Shah Alam, Selangor, Malaysia  
Phone : +60-3-7859-8585  
URL : <http://tsubaki.sg>

**TSUBAKI AUSTRALIA PTY. LTD.**  
Unit E, 95-101 Silverwater Road  
Silverwater NSW 2128, Australia  
Phone : +61-02-9704-2500  
URL : <http://tsubaki.com.au>

**TSUBAKI AUSTRALIA PTY. LTD.**  
**NEW ZEALAND BRANCH**  
2 Kalmia Street, Ellerslie, Auckland 1051, New Zealand  
Phone : +64-275-082-726  
Phone : <http://tsubaki.com.au>

**TSUBAKIMOTO (THAILAND) CO. LTD.**  
388 Exchange Tower, 19th Floor Unit 1902  
Sukhumvit Road, Klongtoey, Bangkok 10110, Thailand  
Phone : +66-2-262-0667/8/9  
URL : <http://tsubaki.co.th>

**TSUBAKIMOTO KOREA CO., LTD.**  
#1004/1005 East Wing, Hanshin Intervalley 24, 707-34  
Yeoksam-dong, Gangnam-gu, Seoul, Korea  
Phone : +82-02-2183-0311  
URL : <http://tsubakimoto.com>

Distributed by: