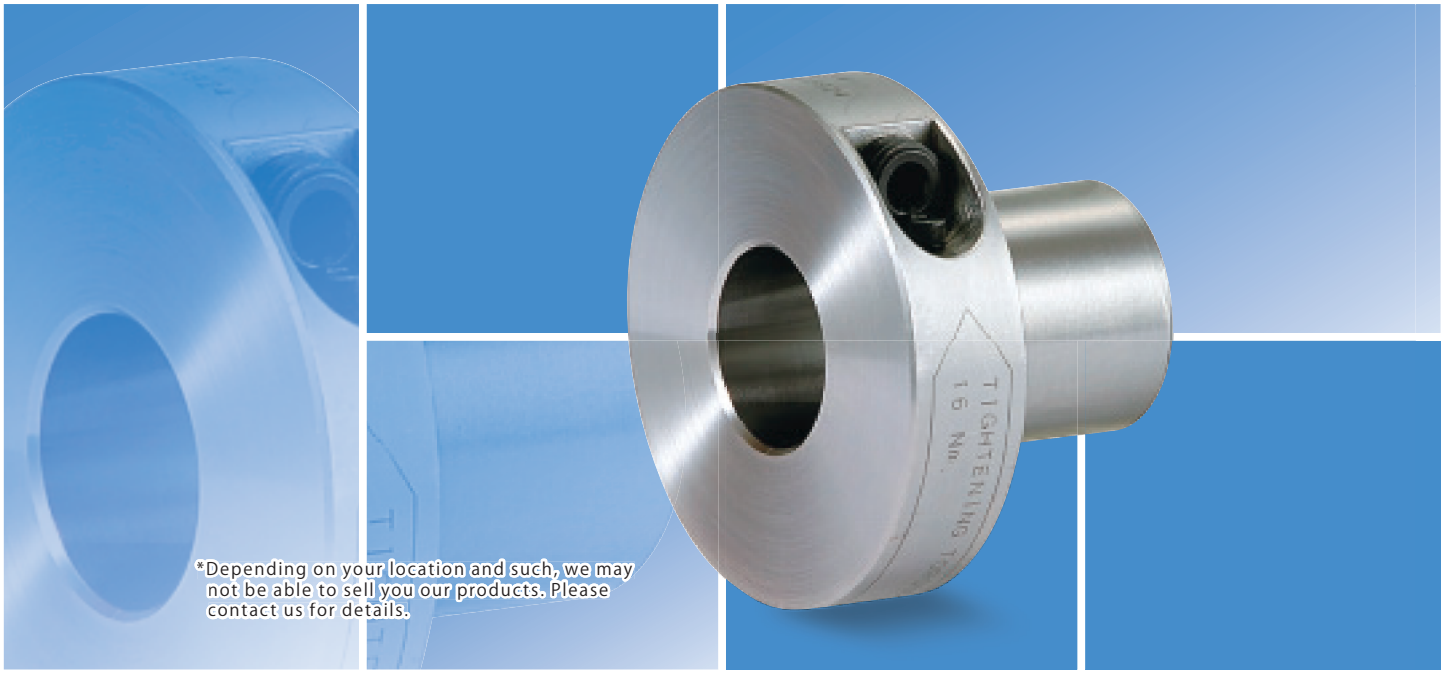
Hydraulic Shaft Lock

ETP BUSHINGS

Application	Machine tool, pump, molding machine, printing machine, palletizing robot, various jigs and tools

Easy and Precise Frictional Coupling Using the Pascal's Principle

A hydraulic method using the Pascal's principle is employed to connect the shaft and the hub to eliminate all the disadvantages and inconvenience of the key connection. The machining tolerance of the shaft and the hub is just the general fitting tolerance and no special specification is needed. Positioning can be performed freely both in the rotation and shaft directions. Furthermore, a 1-bolt tightening task unique to the hydraulic method significantly reduces man-hours.

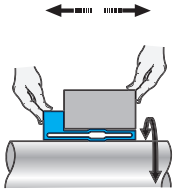


*Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Features

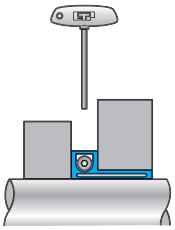
Easy and Precise Positioning

Positioning in the shaft and rotation directions can be performed arbitrarily, and it is easy to mount the device to equipment where accurate sync adjustment is required.



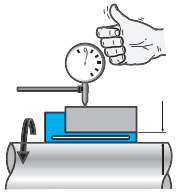
Saving Space

You can design so that the device is connected to the shaft from the radial direction to save space. The device contributes to a compact and lightweight low inertia design.



High Concentricity

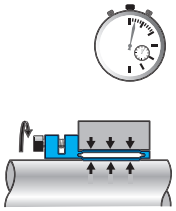
Since the contact pressure on the shaft and hub sides is uniform, high concentricity can be maintained even if the hub's external diameter is reduced. Accordingly, unbalance caused by a centrifugal force can be reduced in applications where the device is used at a high rotation speed.



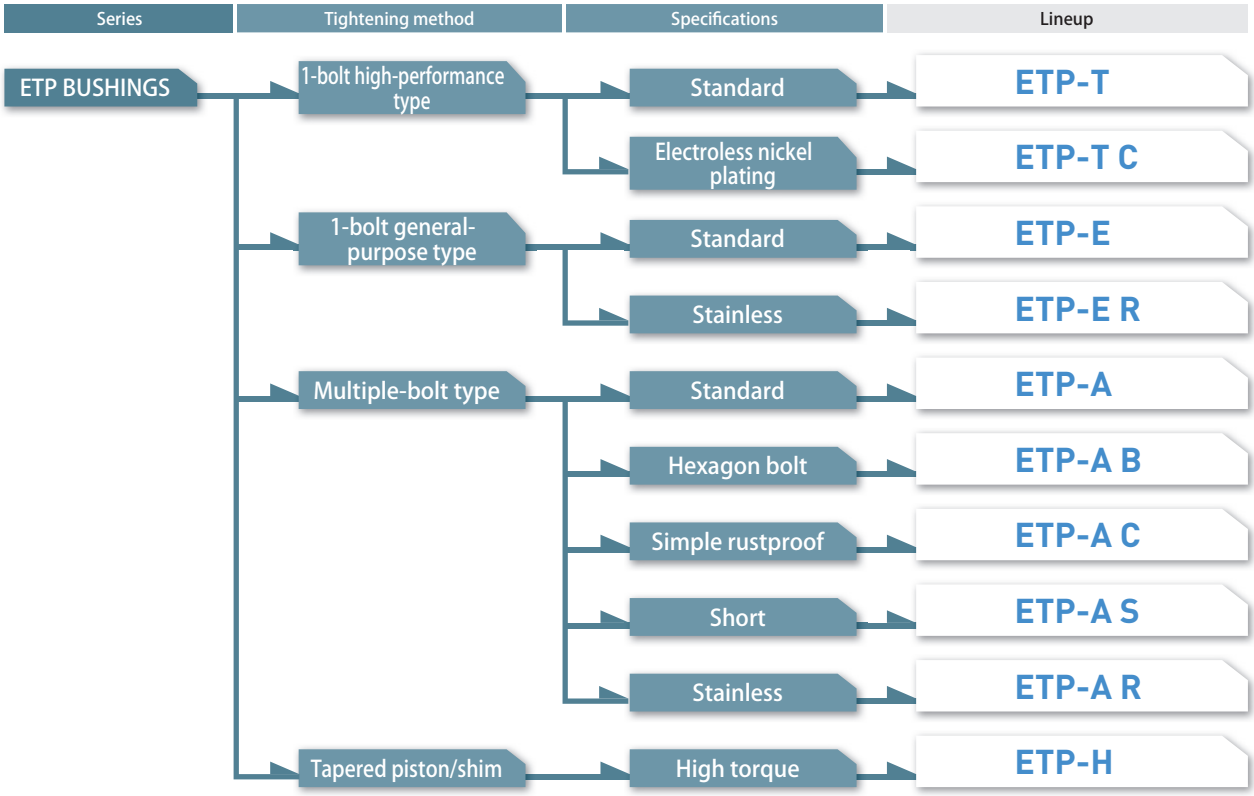
Secure and Quick Mounting

Secure mounting can be performed by just tightening a couple of bolts to the specified torque.

* To firmly secure the device with the appropriate contact pressure to the shaft and hub, mount the device so that the shaft and the hub completely contact each other.



Available Models



* Some sizes are fixed with 2 bolts.

Model Selection

Model/Type	Main body material	Surface finishing	Applied shaft diameter [mm]	Max. rated torque [N • m]	Max. rated thrust [N]	Operating temperature [℃]	Concentricity [mm]
ETP-T	SCM415 or an equivalent	—	15 ～ 100	18000	360000	−30 ～ 110	0.006
ETP-T C	SCM415 or an equivalent	Electroless nickel plating	15 ～ 60	3000	99750	−30 ～ 110	0.006
ETP-E	SMn420 or an equivalent	—	15 ～ 100	17000	280000	−30 ～ 85	0.02
ETP-E R	SUS431 or an equivalent	—	15 ～ 60	3300	90000	−30 ～ 85	0.02
ETP-A	SCM415 or an equivalent	—	15 ～ 100	15500	310000	−30 ～ 85	0.05
ETP-A B	SCM415 or an equivalent	—	15 ～ 100	15500	310000	−30 ～ 85	0.05
ETP-A C	SCM415 or an equivalent	Electroless nickel plating	15 ～ 50	1426	53000	−30 ～ 85	0.05
ETP-A S	SCM415 or an equivalent	—	19 ～ 50	1000	40000	−30 ～ 85	0.05
ETP-A R	SUS630 or an equivalent	—	15 ～ 50	1550	62000	−30 ～ 85	0.05
ETP-H	SMn420 or an equivalent	—	50 ～ 220	273000	2485000	−40 ～ 150	0.02

Product Lineup

ETP-T

ETP TECHNO

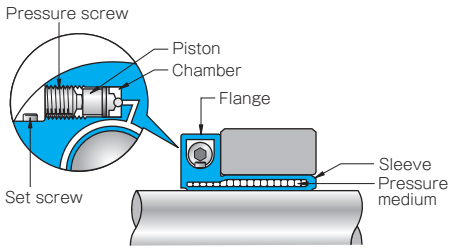
RoHS-compliant

The shaft and the hub can be connected easily and quickly with 1 bolt. Since the concentricity is as accurate as 0.006 mm, this model is most suitable for applications that require high accuracy and where the device is frequently attached and detached. It is structured to be tightened from the radial direction to save work space.

Max. rated torque	[N·m]	18000
Max. rated thrust	[N]	360000
Applied shaft diameter	[mm]	ϕ 15 ~ 100
Operating temperature	[℃]	− 30 ~ 110
Backlash		Zero
Concentricity	[mm]	0.006

Operating Principles

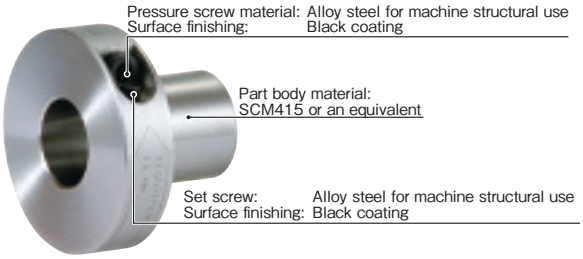
Tightening the pressure screw applies pressure to the pressure medium sealed in the chamber so the pressure medium moves into the sleeve. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

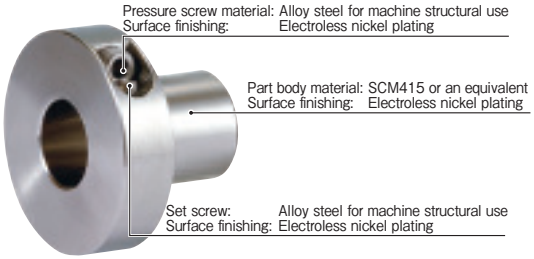
ETP-T

Standard type of the ETP-T model.



ETP-T C

The main body and pressure screw are electroless nickel coated (simple rustproof finishing).



ETP-E

ETP EXPRESS

RoHS-compliant

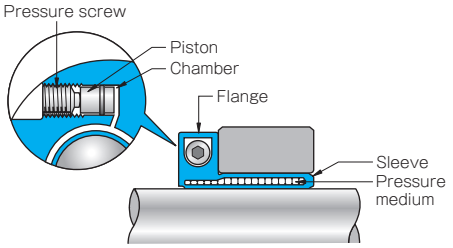
The shaft and the hub can be connected easily and quickly with 1 bolt. Since the concentricity is as accurate as 0.02 mm, this model is most suitable for applications that require high accuracy and where the device is frequently attached and detached. It is structured to be tightened from the radial direction to save work space.

Max. rated torque	[N·m]	17000
Max. rated thrust	[N]	280000
Applied shaft diameter	[mm]	ϕ 15 ~ 100
Operating temperature	[℃]	− 30 ~ 85
Backlash		Zero
Concentricity	[mm]	0.02

* Some sizes are fixed with 2 bolts.

Operating Principles

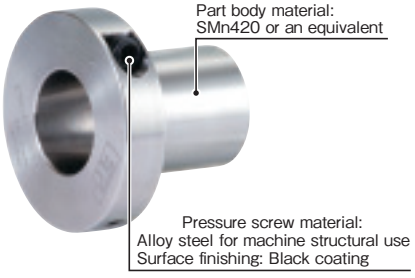
Tightening the pressure screw applies pressure to the pressure medium sealed in the chamber so the pressure medium moves into the sleeve. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

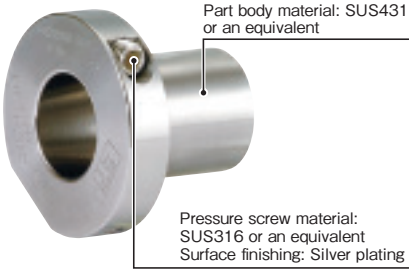
ETP-E

Standard type of the ETP-E model.



ETP-E R

The main body is made of stainless material (rustproof coating).



ETP-A

ETP CLASSIC

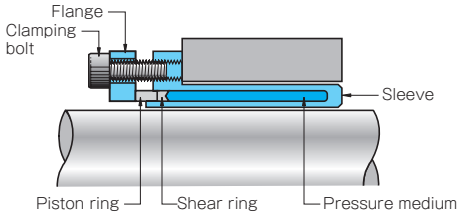
RoHS-compliant

Compared to the mechanical connecting element, the number of bolts can be reduced and attachment and detachment can be simplified. The concentricity is 0.05 mm so mounting can be performed with relatively high precision.

Max. rated torque	[N·m]	15500
Max. rated thrust	[N]	310000
Applied shaft diameter	[mm]	ϕ 15 ~ 100
Operating temperature	[℃]	−30 ~ 85
Backlash		Zero
Concentricity	[mm]	0.05

Operating Principle

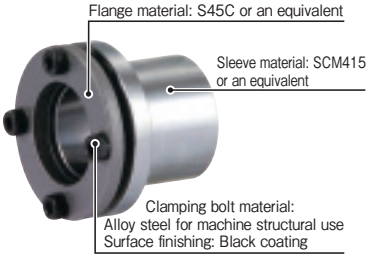
The pressure medium inserted in the sleeve is sealed by a sealing ring. Tightening the clamping bolt compresses the pressure medium mechanically through the flange, piston ring, and sealing ring. Applying pressure to the pressure medium applies pressure to the sleeve from the inside, so that the shaft side sleeve is shrunk and the hub side sleeve is expanded. Thus, the shaft and the hub are connected through the sleeve.



Variations and Materials

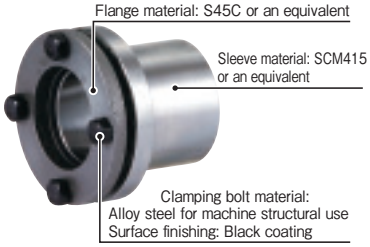
ETP-A

Standard type of the ETP-A model.



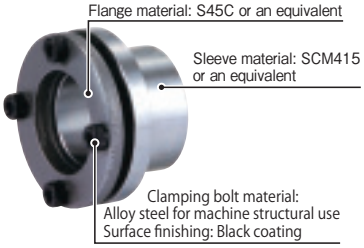
ETP-A B

A hexagon bolt is used for the clamping bolt so the device can be mounted even in tight space in the thrust direction.



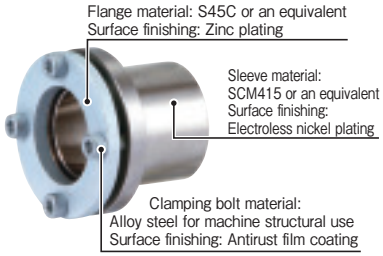
ETP-A S

A short-sleeve type, which can be mounted to the thin part of the hub.



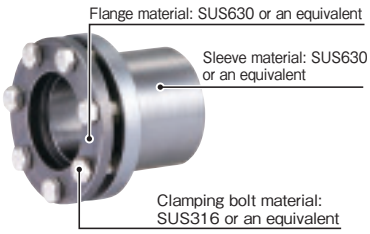
ETP-A C

The main body is electroless nickel coated (simple rustproof finishing).



ETP-A R

The main body is made of stainless material (rustproof coating).



ETP-H

ETP HYLOC

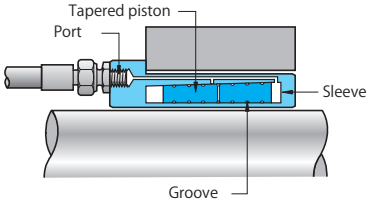
RoHS-compliant

The maximum rated torque is very large so this model is suitable for applications where a heavy thrust load is applied.

Max. rated torque	[N·m]	273000
Max. rated thrust	[N]	2485000
Applied shaft diameter	[mm]	ϕ 50 ~ 220
Operating temperature	[℃]	−40 ~ 150
Backlash		Zero
Concentricity	[mm]	0.02

Operating Principle

A hydraulic pressure from the port moves the tapered piston inserted in the sleeve to the shaft direction. The movement of the tapered piston shrinks the shaft side sleeve and expands the hub side sleeve. Thus, the shaft and the hub are connected through the sleeve. The hydraulic pressure just moves the tapered piston and does not apply pressure after the connection. The connecting force is maintained by the wedge effect of the tapered piston.



Customization Examples

Case of an Application to a Slitter Knife Holder

This is a hydraulic slitter knife holder. This holder is used to position the rotating knife to cut tin, iron, aluminum plates, or paper sheet in any position. Petitioning in the shaft direction can be performed arbitrarily with 1 bolt. For the angular deflection caused by detachment and attachment, a micron meter (μ m) level repeatable accuracy can be maintained.

Case of an Application to the Integration of a Gear

A very accurate concentricity can be maintained by integrating the gear into the device. Positioning in the shaft and fitting directions can be performed easily.

Customization of the Sleeve Length to Meet the Customer's Requirement

If the customer makes a request, the standard sleeve length can be customized (reduced) to enable it to be fitted to the thin part of the mating hub.

Case of an Application to a Holding Jig

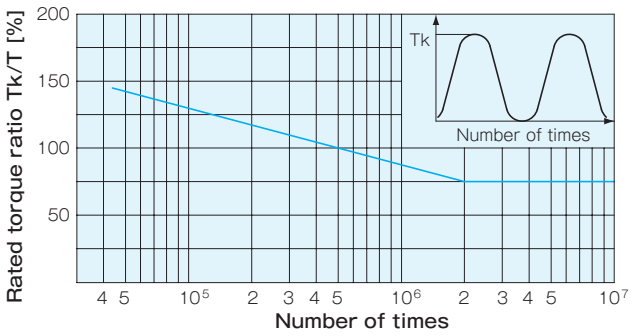
This can be mounted to a work bench as a holder for assembly and machining to ensure stable work. Furthermore, work pieces can be held with an extremely high repeatable hold position accuracy.

For details, please visit our website.

FAQ

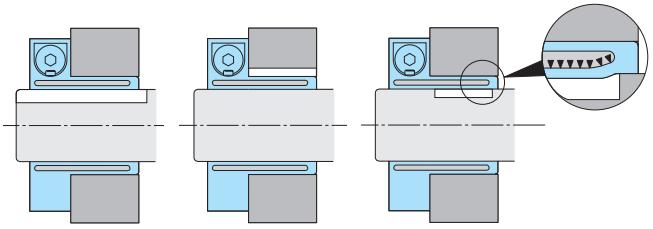
Q1 Please let me know about the durability of the ETP bushings.

A If the rated torque is cyclically applied to the ETP bushing, it can withstand about 500,000 cycles in terms of fatigue life. If 75% of the rated torque is applied, it can withstand an unlimited number of cycles in terms of fatigue life.



Q2 Can I use the ETP bushings for the shaft and hub with keyways in them?

A You can use the ETP bushing by completely filling the keyway with epoxy putty for metals and then shaping it. If you use the device with keyways on the shaft and hub, the sleeve may be deformed and the device may become unable to be detached and attached again.



Q3 Can I use the ETP bushing when the shaft and hub do not overlap the entire sleeve length?

A Please select a short sleeve so that the shaft and the hub overlap the entire sleeve length, or please consult with us. If there is a part of the sleeve that does not contact the shaft and hub, the deformation of that part of the sleeve is not controlled and the amount of deformation increases, so the sleeve will be deformed and enough friction force will not be able to be obtained. As a result, the specified value cannot be met.

Q4 Can the rated torque be transmitted even if thrust load is applied?

A The specified rated torque and rated thrust are the maximum rated values when they are applied independently. If the torque and thrust are applied at the same time, obtain the combined load and check that it is less than the rated torque.

Q5 If an ETP bushing slips once, can it be reused?

A Whether or not it can be reused depends on the degree of slip. If the degree of slip is small, it can be reused. However, if you reuse it, you need to check it to make sure there is no scratch on the surface of the ETP bushing, shaft, and hub, and there is no deformation on the ETP bushing main body. And, if you reuse it, you need to remove the cause of the slip.

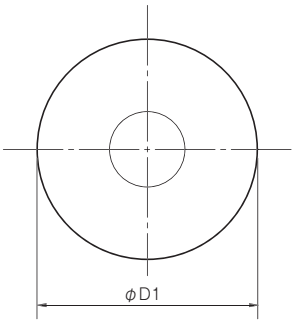
ETP-T Models

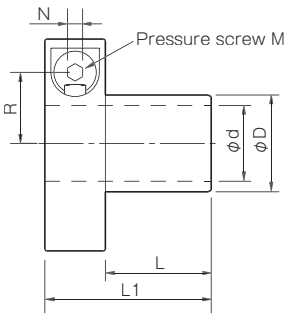
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-T-15	40	5000	1000	90	70	12	0.09×10^{-3}	0.25
ETP-T-19	90	9000	1000	90	70	12	0.14×10^{-3}	0.31
ETP-T-20	120	12000	2000	90	70	12	0.15×10^{-3}	0.32
ETP-T-24	220	18000	2000	90	70	16	0.40×10^{-3}	0.57
ETP-T-25	290	23000	3000	90	70	16	0.44×10^{-3}	0.60
ETP-T-30	500	33000	4000	90	70	16	0.60×10^{-3}	0.70
ETP-T-35	800	45000	5000	90	70	16	1.00×10^{-3}	1.00
ETP-T-40	1200	60000	6000	90	70	24	1.70×10^{-3}	1.30
ETP-T-50	2000	94000	9000	90	70	24	2.70×10^{-3}	1.70
ETP-T-60	4000	133000	12000	90	70	40	5.00×10^{-3}	2.50
ETP-T-70	6500	18600	13000	90	70	40	8.80×10^{-3}	3.60
ETP-T-75	7800	20800	14000	90	70	40	11.60×10^{-3}	4.20
ETP-T-80	9000	225000	15000	90	70	40	14.37×10^{-3}	4.77
ETP-T-90	13000	288000	17000	90	70	60	24.07×10^{-3}	6.48
ETP-T-100	18000	360000	19000	90	70	80	37.02×10^{-3}	8.41

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20℃ .
* ETP-T-70, 75, 80, 90, and 100 are made to order.

Dimensions





CAD

How to Place an Order

ETP-T-□
Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	R	N	M
ETP-T-15	15	19	52	25	41	14.5	6	1-M12
ETP-T-19	19	24	58	28	44	18	6	1-M12
ETP-T-20	20	25	59	30	46	19	6	1-M12
ETP-T-24	24	30	71	33	53	23	6	1-M14
ETP-T-25	25	32	73	35	55	23.5	6	1-M14
ETP-T-30	30	38	78	40	60	26.5	6	1-M14
ETP-T-35	35	44	88	45	65	30	6	1-M14
ETP-T-40	40	52	100	55	75	34	8	1-M16
ETP-T-50	50	65	110	60	80	40	8	1-M16
ETP-T-60	60	75	122	70	95	46.5	10	1-M20
ETP-T-70	70	90	138	85	110	52	10	1-M20
ETP-T-75	75	95	146	90	115	56	10	1-M20
ETP-T-80	80	100	154	95	120	58	10	1-M20
ETP-T-90	90	112	170	105	133	64.5	10	1-M22
ETP-T-100	100	125	184	115	145	70	12	1-M24

* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-T C Types

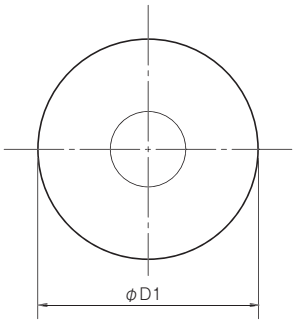
Made to order

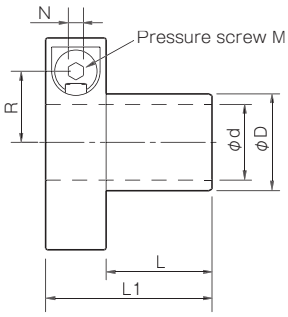
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-T-15-C	30	3750	1000	90	70	12	0.09×10^{-3}	0.25
ETP-T-19-C	67	6750	1000	90	70	12	0.14×10^{-3}	0.31
ETP-T-20-C	90	9000	2000	90	70	12	0.15×10^{-3}	0.32
ETP-T-24-C	165	13500	2000	90	70	16	0.40×10^{-3}	0.57
ETP-T-25-C	217	17250	3000	90	70	16	0.44×10^{-3}	0.60
ETP-T-30-C	375	24750	4000	90	70	16	0.60×10^{-3}	0.70
ETP-T-35-C	600	33750	5000	90	70	16	1.00×10^{-3}	1.00
ETP-T-40-C	900	45000	6000	90	70	24	1.70×10^{-3}	1.30
ETP-T-50-C	1500	70500	9000	90	70	24	2.70×10^{-3}	1.70
ETP-T-60-C	3000	99750	12000	90	70	40	5.00×10^{-3}	2.50

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Sizes





CAD

How to Place an Order

ETP-T-□-C

Size

Type (C: Simple antirust specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	R	N	M
ETP-T-15-C	15	19	52	25	41	14.5	6	1-M12
ETP-T-19-C	19	24	58	28	44	18	6	1-M12
ETP-T-20-C	20	25	59	30	46	19	6	1-M12
ETP-T-24-C	24	30	71	33	53	23	6	1-M14
ETP-T-25-C	25	32	73	35	55	23.5	6	1-M14
ETP-T-30-C	30	38	78	40	60	26.5	6	1-M14
ETP-T-35-C	35	44	88	45	65	30	6	1-M14
ETP-T-40-C	40	52	100	55	75	34	8	1-M16
ETP-T-50-C	50	65	110	60	80	40	8	1-M16
ETP-T-60-C	60	75	122	70	95	46.5	10	1-M20

* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-T Models

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N\cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m] P: Driver's output [kW]
n: Connecting element's rotation speed [min^{-1}] Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$Td = Ta \times K1$
$Fd = Fa \times K1$

Td: Corrected torque applied to the connecting element [N・m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$T \geqq Td$ T: Connecting element's rated torque [N·m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$F \geqq Fd$ F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$T \geqq Mr$ $\quad Mr = \sqrt{Td^2 + (Fd \times \frac{d}{2})^2}$

Mr: Combined load applied to the connecting element [N·m] d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + CP_2}{\delta_{0.2N} - CP_2}}$$

$C = 1 \quad B = L$
$C = 0.8 \quad L < B < 2L$
$C = 0.6 \quad B \geqq 2L$

DO: Hub's minimum external diameter [mm] B: Hub length [mm]
D: Hub's internal diameter [mm] L: Effective contact length [mm]
P_2: Hub contact pressure [N/mm^2] C: Coefficient
$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2.Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1C}{\delta_{0.2N}}}$$

$C = 0.6$ when using a single one
$C = 0.8$ when using multiple ones

di: Hollow shaft's maximum internal diameter [mm] d: Shaft diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2] C: Coefficient
P_1: Shaft contact pressure [N/mm^2]

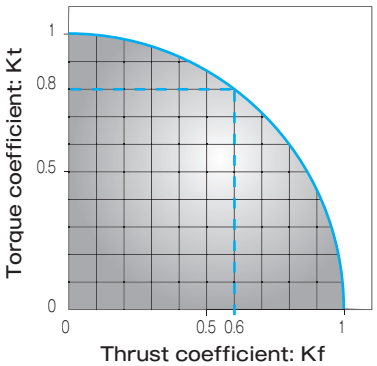
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

$P_1 \cdot P_2$ = contact pressure at 20℃ × temperature coefficient (K 2)

The operating temperature range is from -30℃ to 110℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to ETP-TECHNO at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure on the right.



Calculation example:
When using the ETP-T-30 at 20℃ .

Maximum rated torque at 20℃ [T] and thrust (F): T=500 [N·m]and F = 33000 [N]

The maximum rated torque, Tmax, when the maximum thrust (Fmax = 20000 [N]) is applied can be obtained as follows.

Thrust coefficient (Kf) = Fmax / F × temperature coefficient (K2)
= 20000/33000 × 1.0 = 0.61

The torque coefficient, Kt, when Kf = 0.61 is about 0.8 based on the figure above. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

$Tmax = T \times K2 \times Kt = 500 \times 1.0 \times 0.8 = 400\ [N\cdot m]$

The relationship between Kt and Kf can be obtained from the following formula.

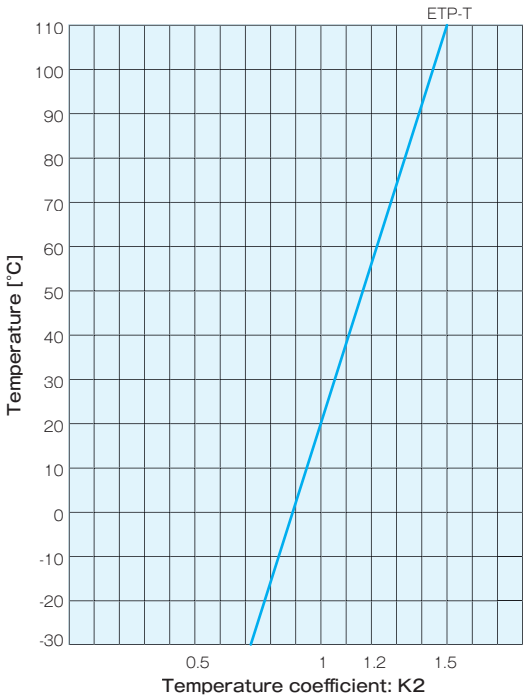
$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$

Service Factor

■ Service factor based on the load property: K1

Load property	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
K1	1.0	1.25	1.75	2.25

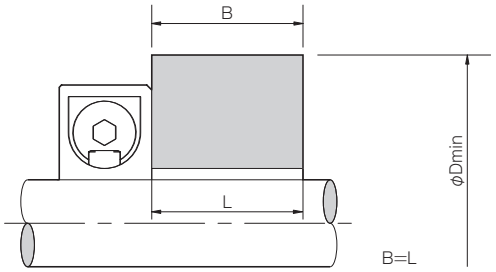
■ Service factor based on the operating temperature: K2



Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-TECHNO



ϕ Dmin unit [mm]

ETP-TECHNO size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	70	32	29	27	27	26	25	25	25	25	25
19	70	40	37	35	33	33	32	32	32	32	32
20	70	42	38	36	35	34	33	33	33	33	33
24	70	50	46	43	42	41	39	39	39	39	39
25	70	54	49	46	44	43	42	42	42	42	42
30	70	64	58	54	53	51	50	50	50	50	50
35	70	74	67	63	61	59	58	58	58	58	58
40	70	87	79	74	72	70	68	68	68	68	68
50	70	108	99	93	90	88	85	85	85	85	85
60	70	125	114	107	103	101	98	98	98	98	98
70	70	150	136	128	124	121	117	117	117	117	117
75	70	158	144	135	131	128	124	124	124	124	124
80	70	166	151	142	137	134	130	130	130	130	130
90	70	186	170	160	154	151	146	146	146	146	146
100	70	208	189	178	172	168	163	163	163	163	163

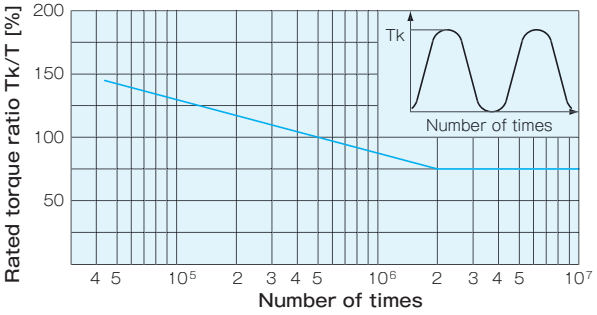
* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.198.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.198.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

ETP-T Models

Items Checked for Design Purposes

Fatigue Caused by Periodically Applied Varying Torque

The following figure shows the fatigue state when a varying static torque, Tk, is applied periodically to the ETP-TECHNO. The vertical axis shows the percentage of the rated torque, T, and the horizontal axis shows the number of periodically applied varying static torque events.
If the rated torque, T, is periodically applied to the ETP-TECHNO, it can withstand about 500,000 events in terms of fatigue life. If 75% of the rated torque, T, is applied, it can withstand an unlimited number of events in terms of fatigue life.



Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-T	h8	H7	25S (center line's average roughness 6.3a) or less
ETP-T C			

Operating Temperature Range

Model	Operating temperature range [° C]
ETP-T	− 30 ~ 110
ETP-T C	

Concentricity and Balance

Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-T	0.006	50
ETP-T C		

Number of Attachments and Detachments

The number of attachments/detachments only applies if you prevent foreign particles from adhering to the pressure screw and make sure oil containing molybdenum-based antifriction material always remains on the pressure screw's surface.
In addition, be sure to use a torque wrench and do not use an impact wrench that has large torque fluctuation.

■ ETP-T

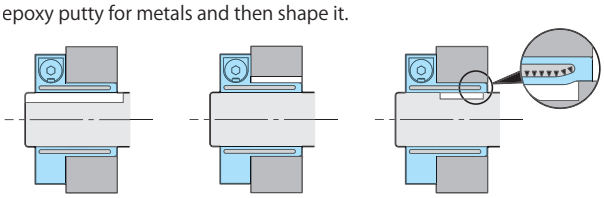
Model	No. of attachments/detachments
ETP-T-15 ~ 50	5000
ETP-T-60 ~ 80	3000
ETP-T-90 • 100	500

■ ETP-T C

Model	No. of attachments/detachments
ETP-T-15 ~ 50 C	5000
ETP-T-60 C	3000

Keyway Shape where the ETP-TECHNO Cannot Be Detached due to a Deformation of the Sleeve

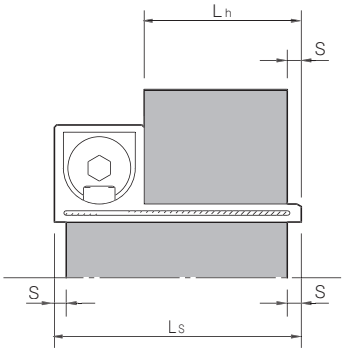
The ETP-TECHNO cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-TECHNO for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-TECHNO is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-TECHNO cannot be detached.

■ ETP-TECHNO



ETP-TECHNO size	S [mm]
15	5
19	5
20	5
24	5
25	6
30	6
35	6
40	7
50	8
60	9
70	10
75	10
80	10
90	10
100	10

Mounting

(1) Wipe the rust, dust, and oil off from the surfaces of the shaft and hub with a cloth or alcohol solution. In particular, if grease remains, wipe it off completely. If oil remains on the surfaces of the ETP-TECHNO, wipe it off with a cloth, etc.
If the oil is wiped off, the friction coefficient basically changes. Never allow oil containing molybdenum-based antifriction material to contact the surface.

(2) Attach the ETP-TECHNO to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the pressure screw.
Never tighten the pressure screw before mounting the ETP-TECHNO to the shaft and hub.

(3) Tighten the pressure screw to the specified torque using a torque wrench.

Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-TECHNO and there is no risk of a fall due to the self-weight of the shaft and hub.
The ETP-TECHNO does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the pressure screw.

(2) Loosen the pressure screw until it comes into contact with the set screw. Also, do not remove the pressure screw by removing the set screw.

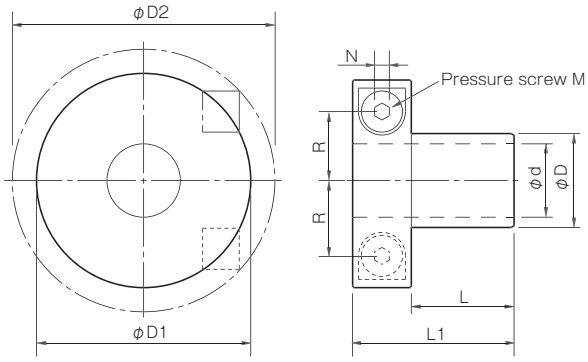
ETP-E Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-E-15	46	5100	500	90	70	5	0.043×10^{-3}	0.16
ETP-E-19	85	7300	1000	90	70	5	0.064×10^{-3}	0.20
ETP-E-20	110	9100	1000	90	70	5	0.070×10^{-3}	0.21
ETP-E-22	130	9600	1200	90	70	5	0.097×10^{-3}	0.25
ETP-E-24	190	13000	1400	90	70	5	0.112×10^{-3}	0.27
ETP-E-25	230	15000	1500	90	70	5	0.117×10^{-3}	0.27
ETP-E-28	280	16000	1800	90	70	5	0.170×10^{-3}	0.34
ETP-E-30	380	21000	2000	90	70	5	0.189×10^{-3}	0.35
ETP-E-32	440	22000	2200	90	70	5	0.249×10^{-3}	0.42
ETP-E-35	640	30000	2500	90	70	5	0.325×10^{-3}	0.48
ETP-E-38	890	38000	2800	90	70	21	0.761×10^{-3}	0.84
ETP-E-40	1100	45000	3000	90	70	21	0.844×10^{-3}	0.88
ETP-E-42	1100	43000	3200	90	70	21	0.971×10^{-3}	0.96
ETP-E-45	1400	51000	3500	90	70	21	1.170×10^{-3}	1.05
ETP-E-48	1700	57000	4000	90	70	21	1.458×10^{-3}	1.21
ETP-E-50	1900	63000	4500	90	70	21	1.524×10^{-3}	1.20
ETP-E-55	2400	71000	5000	90	70	21	2.182×10^{-3}	1.50
ETP-E-60	3300	90000	5300	90	70	21	3.167×10^{-3}	1.85
ETP-E-70	5600	130000	6400	90	70	39	7.125×10^{-3}	3.04
ETP-E-80	8700	180000	7500	90	70	39	10.4×10^{-3}	3.75
ETP-E-90	12000	230000	8600	90	70	39	15.2×10^{-3}	4.80
ETP-E-100	17000	280000	9700	90	70	39	21.9×10^{-3}	5.90

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.
* ETP-E-55, 60, 70, 80, 90, and 100 are made to order.

Dimensions



CAD

How to Place an Order

ETP-E-□
Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	D2	L	L1	R	N	M
ETP-E-15	15	18	46	48.9	25	39	15.1	5	1-M10
ETP-E-19	19	23	50.5	53	28	42	17.4	5	1-M10
ETP-E-20	20	24	51.5	54.1	30	44	18	5	1-M10
ETP-E-22	22	27	55.5	60.5	32	46	19.3	5	1-M10
ETP-E-24	24	29	57.5	62.3	33	47	20.3	5	1-M10
ETP-E-25	25	30	58	62.9	35	49	20.8	5	1-M10
ETP-E-28	28	34	63	69.6	38	52	22.6	5	1-M10
ETP-E-30	30	36	64.5	71	40	54	23.6	5	1-M10
ETP-E-32	32	39	68.5	77.7	42	56	24.8	5	1-M10
ETP-E-35	35	42	73	85.1	45	59	26.4	5	1-M10
ETP-E-38	38	46	84.5	89.5	52	72	31	8	1-M16
ETP-E-40	40	48	86.5	91.2	55	75	32	8	1-M16
ETP-E-42	42	51	89	93.5	56	76	33.2	8	1-M16
ETP-E-45	45	54	93	100.3	58	78	34.8	8	1-M16
ETP-E-48	48	59	97	103.8	59	79	36.8	8	1-M16
ETP-E-50	50	60	98.5	105.1	60	80	37.5	8	1-M16
ETP-E-55	55	67	106	115.9	65	85	40.5	8	1-M16
ETP-E-60	60	73	115.5	132.7	70	90	43.3	8	1-M16
ETP-E-70	70	85	135.5	153.9	85	109	50.8	10	1-M20
ETP-E-80	80	97	145.5	162.6	95	119	56.3	10	1-M20
ETP-E-90	90	109	155.5	171.7	105	129	61.8	10	2-M20
ETP-E-100	100	121	166	181	115	139	67.3	10	2-M20

* Dimension ϕD2 is that before tightening the ETP-EXPRESS.
* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

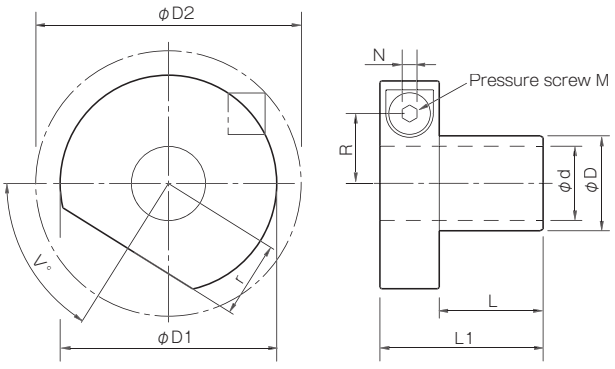
ETP-E R Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Rated radial load [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-E-15-R	46	5100	500	90	70	5	0.043×10^{-3}	0.16
ETP-E-20-R	110	9100	1000	90	70	5	0.070×10^{-3}	0.21
ETP-E-25-R	230	15000	1500	90	70	5	0.117×10^{-3}	0.27
ETP-E-30-R	380	21000	2000	90	70	5	0.189×10^{-3}	0.35
ETP-E-35-R	640	30000	2500	90	70	5	0.325×10^{-3}	0.48
ETP-E-40-R	1100	45000	3000	90	70	21	0.844×10^{-3}	0.88
ETP-E-45-R	1400	51000	3500	90	70	21	1.170×10^{-3}	1.05
ETP-E-50-R	1900	63000	4500	90	70	21	1.524×10^{-3}	1.20
ETP-E-60-R	3300	90000	5300	90	70	21	3.167×10^{-3}	1.85

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.
* ETP-E-60-R is made to order.

Dimensions



CAD

How to Place an Order

ETP-E-□-R

Size

Type (R: Stainless steel specifications)

*Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	D2	L	L1	R	N	M	r	V [°]
ETP-E-15-R	15	18	46	48.9	25	39	15.1	5	1-M10	19.9	53
ETP-E-20-R	20	24	51.5	54.1	30	44	18	5	1-M10	22.6	56
ETP-E-25-R	25	30	58	62.9	35	49	20.8	5	1-M10	25.8	58
ETP-E-30-R	30	36	64.5	71	40	54	23.6	5	1-M10	29.1	59
ETP-E-35-R	35	42	73	85.1	45	59	26.4	5	1-M10	33.7	58
ETP-E-40-R	40	48	86.5	91.2	55	75	32	8	1-M16	37.7	59
ETP-E-45-R	45	54	93	100.3	58	78	34.8	8	1-M16	41.1	59
ETP-E-50-R	50	60	98.5	105.1	60	80	37.5	8	1-M16	43.7	60
ETP-E-60-R	60	73	115.5	132.7	70	90	43.3	8	1-M16	53.3	59

* Dimension ϕ D2 is that before tightening the ETP-EXPRESS.
* The nominal diameter of the pressure screw M is equal to the quantity minus the nominal diameter of the screw threads.

ETP-E Models

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N\cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m] P: Driver's output [kW]
n : Connecting element's rotation speed [min^{-1}] Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$Td = Ta \times K1$
$Fd = Fa \times K1$

Td: Corrected torque applied to the connecting element [N·m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$T \geqq Td$ T: Connecting element's rated torque [N·m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$F \geqq Fd$ F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$T \geqq Mr$ $\quad Mr = \sqrt{Td^2 + (Fd \times \frac{d}{2})^2}$

Mr: Combined load applied to the connecting element [N·m] d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the usedhub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + CP_2}{\delta_{0.2N} - CP_2}}$$

$C = 1 \quad B = L$
$C = 0.8 \quad L < B < 2L$
$C = 0.6 \quad B \geqq 2L$

DO: Hub's minimum external diameter [mm] B: Hub length [mm]
D: Hub's internal diameter [mm] L: Effective contact length [mm]
P_2: Hub contact pressure [N/mm^2] C: Coefficient
$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2. Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1C}{\delta_{0.2N}}}$$

C = 0.6 when using a single one
C = 0.8 when using multiple ones

di: Hollow shaft's maximum internal diameter [mm] d: Shaft diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2] C: Coefficient
P_1: Shaft contact pressure [N/mm^2]

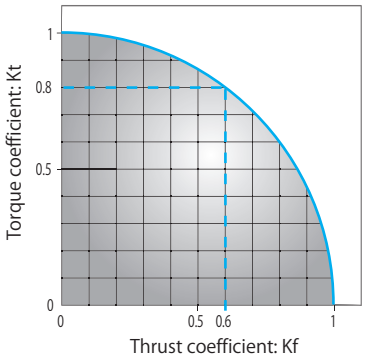
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20 ℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

$P_1 \cdot P_2$ = contact pressure at 20℃ × temperature coefficient (K2)

The operating temperature range is from -30℃ to 85℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-EXPRESS at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure on the right.



Calculation example:
When using the ETP-E-30 at 20℃ .

Maximum rated torque, T, and thrust, F, at 20℃ ,
T = 380 [N·m] and
F = 25000 [N]
The maximum rated torque, Tmax, when the maximum thrust (Fmax = 15000 [N]) is applied can be obtained as follows.

Thrust coefficient (Kf) = Fmax / F × temperature coefficient (K2)
= 15000/25000 × 1.0 = 0.6

The torque coefficient, Kt, when Kf = 0.6 is about 0.8 based on the above figure. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

$Tmax = T \times K2 \times Kt = 380 \times 1.0 \times 0.8 = 304\ [N\cdot m]$

The relationship between Kt and Kf can be obtained from the following formula.

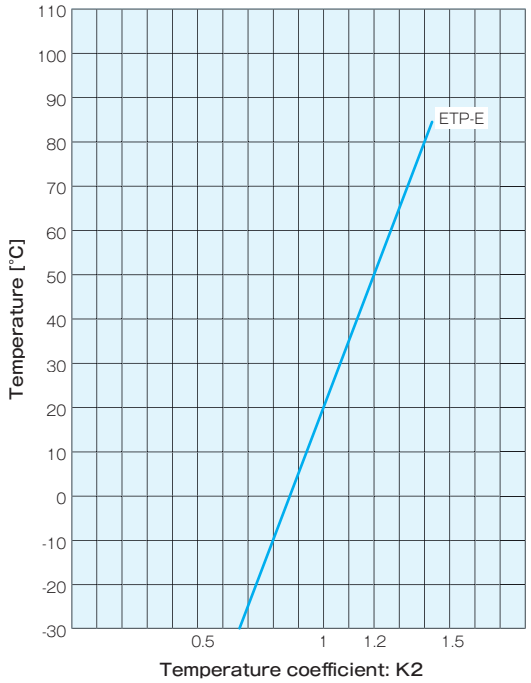
$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$

Service Factor

■ Service factor based on the load property: K1

Load property	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
				
K1	1.0	1.25	1.75	2.25

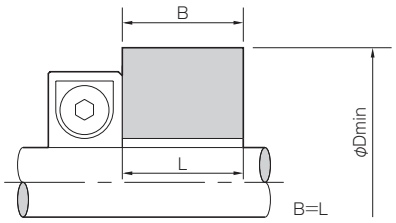
■ Service factor based on the operating temperature (K2)



Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-EXPRESS



ϕ Dmin unit [mm]

ETP-EXPRESS size	Hub contact pressure [N/mm²]	Material's yield stress δ0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	70	30	28	26	25	24	24	24	24	24	24
19	70	39	35	33	32	31	30	30	30	30	30
20	70	40	37	34	33	32	32	32	32	32	32
22	70	45	41	39	37	36	36	36	36	36	36
24	70	49	44	42	40	39	38	38	38	38	38
25	70	50	46	43	42	40	39	39	39	39	39
28	70	57	52	49	47	46	45	45	45	45	45
30	70	60	55	51	50	48	47	47	47	47	47
32	70	65	59	56	54	52	51	51	51	51	51
35	70	70	64	60	58	56	55	55	55	55	55
38	70	77	70	66	63	62	60	60	60	60	60
40	70	80	73	68	66	64	63	63	63	63	63
42	70	85	77	73	70	68	67	67	67	67	67
45	70	90	82	77	74	72	71	71	71	71	71
48	70	98	89	84	81	79	77	77	77	77	77
50	70	100	91	85	83	80	78	78	78	78	78
55	70	112	102	95	92	90	88	88	88	88	88
60	70	122	111	104	100	98	95	95	95	95	95
70	70	141	129	121	117	114	111	111	111	111	111
80	70	161	147	138	133	130	127	127	127	127	127
90	70	181	165	155	150	146	141	142	142	142	142
100	70	201	183	172	166	162	157	158	158	158	158

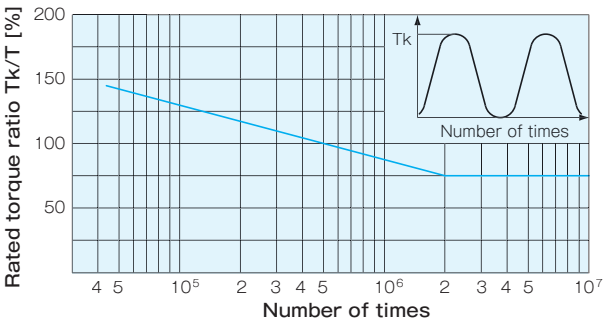
* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.204.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.204.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

ETP-E Models

Items Checked for Design Purposes

Fatigue Caused by Periodically Applied Varying Torque

The following figure shows the fatigue state when a static varying torque, Tk, is applied periodically to the ETP-EXPRESS. The vertical axis shows the percentage of the rated torque, T, and the horizontal axis shows the number of periodically applied static varying torque events.
If the rated torque, T, is periodically applied to the ETP-EXPRESS, it can withstand about 500,000 events in terms of fatigue life. If 75% of the rated torque, T, is applied, it can withstand an unlimited number of events in terms of fatigue life.



Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

■ ETP-E

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-E-15	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-E-19.22.24.28.32.38.42.48.55	h7 ~ k6		
ETP-E-20.25.30.35.40.45.50.60.70.80.90.100	h8		

■ ETP-E R

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-E-15-R	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-E R other than the above	h8		

Operating Temperature Range

Model	Operating temperature range [° C]
ETP-E	− 30 ~ 85
ETP-E R	

Concentricity and Balance

Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-E	0.02	75
ETP-E R		

Number of Attachments and Detachments

The number of attachments/detachments only applies if you prevent foreign particles from adhering to the pressure screw and make sure oil containing molybdenum-based antifriction material always remains on the pressure screw's surface.
In addition, be sure to use a torque wrench and do not use an impact wrench that has large torque fluctuation.

■ ETP-E

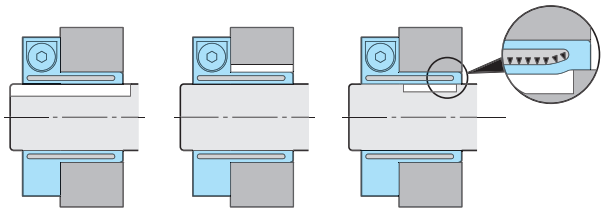
Model	No. of attachments/detachments
ETP-E-15 ~ 35	2000
ETP-E-38 ~ 60	1000
ETP-E-70 ~ 100	500

■ ETP-E R

Model	No. of attachments/detachments
ETP-E-15 ~ 35 R	800
ETP-E-38 ~ 60 R	400

Keyway Shape where the ETP-EXPRESS Cannot Be Detached due to a Deformation of the Sleeve

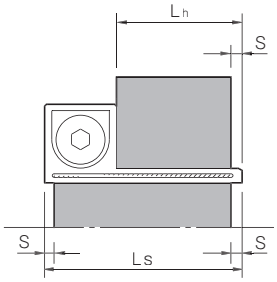
The ETP-EXPRESS cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-EXPRESS for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-EXPRESS is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-EXPRESS cannot be detached.

■ ETP-EXPRESS



ETP-EXPRESS size	S [mm]
15	3
19	4
20	4
22	5
24	5
25	5
28	5
30	5
32	6
35	6
38	7
40	7
42	7
45	7
48	7
50	7
55	8
60	8
70	9
80	9
90	10
100	10

Mounting

(1) Wipe the rust, dust, and oil off from the surface of the shaft and hub with a cloth or alcohol solution. In particular, if grease remains, wipe it off completely. If oil remains on the surface of the ETP-EXPRESS, wipe it off with a cloth, etc.
If the oil is wiped off, the friction coefficient basically changes. Never allow oil containing molybdenum-based antifriction material to contact the surface.

(2) Attach the ETP-EXPRESS to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the pressure screw.
Never tighten the pressure screw before mounting the ETP-EXPRESS to the shaft and hub.

(3) Tighten the pressure screw to the specified torque using a torque wrench.

Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-EXPRESS and there is no risk of a fall due to the self-weight of the shaft and hub.
The ETP-EXPRESS does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the pressure screw.

(2) Loosen the pressure screw until the connecting force is released. The pressure screw should only be loosened. Do not remove it.

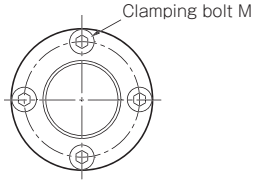
ETP-A Models

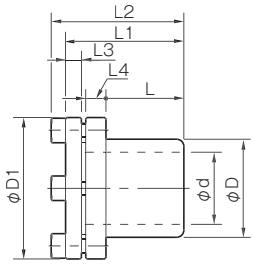
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-A-15	55	7300	90	80	6	0.018×10^{-3}	0.10
ETP-A-19	100	10600	90	80	8	0.046×10^{-3}	0.17
ETP-A-20	125	12500	90	80	8	0.046×10^{-3}	0.16
ETP-A-22	135	12300	90	80	8	0.065×10^{-3}	0.19
ETP-A-24	200	16700	90	80	8	0.067×10^{-3}	0.20
ETP-A-25	250	20000	90	80	8	0.071×10^{-3}	0.19
ETP-A-28	300	21400	90	80	8	0.12×10^{-3}	0.26
ETP-A-30	420	28000	90	80	8	0.14×10^{-3}	0.29
ETP-A-32	420	26300	90	80	8	0.20×10^{-3}	0.35
ETP-A-35	650	37100	90	80	8	0.25×10^{-3}	0.40
ETP-A-38	750	39500	90	80	8	0.31×10^{-3}	0.43
ETP-A-40	940	47000	90	80	8	0.44×10^{-3}	0.55
ETP-A-42	940	44800	90	80	8	0.47×10^{-3}	0.55
ETP-A-45	1290	57300	90	80	13	0.69×10^{-3}	0.71
ETP-A-48	1570	65400	90	80	13	0.83×10^{-3}	0.78
ETP-A-50	1900	76000	90	80	13	1.05×10^{-3}	0.86
ETP-A-55	2500	90900	90	80	13	1.43×10^{-3}	1.06
ETP-A-60	3400	113000	90	80	13	2.15×10^{-3}	1.37
ETP-A-65	3500	108000	90	80	13	3.10×10^{-3}	1.67
ETP-A-70	5200	149000	90	80	32	4.08×10^{-3}	2.04
ETP-A-75	6300	168000	90	80	32	5.50×10^{-3}	2.42
ETP-A-80	8800	220000	90	80	32	8.10×10^{-3}	2.64
ETP-A-90	11000	244000	90	80	32	12.2×10^{-3}	3.54
ETP-A-100	15500	310000	90	80	32	19.9×10^{-3}	4.80

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.
* ETP-A-75, 80, 90, and 100 are made to order.

Dimensions





CAD

How to Place an Order

ETP-A-□
Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15	15	23	37.5	17	28	33	5	5.4	3-M5 × 10
ETP-A-19	19	28	45	21	34	39	5.5	6.9	3-M5 × 12
ETP-A-20	20	28	45	22	35	40	5.5	6.4	3-M5 × 12
ETP-A-22	22	32	49	22	35	40	5.5	6.4	4-M5 × 12
ETP-A-24	24	34	49	25	38	43	5.5	6.4	4-M5 × 12
ETP-A-25	25	34	49	27	41	46	5.5	6.9	4-M5 × 12
ETP-A-28	28	39	55	29	43	48	5.5	6.9	4-M5 × 12
ETP-A-30	30	41	57	32	46	51	5.5	6.9	4-M5 × 12
ETP-A-32	32	43	60	34	50	55	7	7.4	4-M5 × 14
ETP-A-35	35	47	62.5	37	53	58	7	7.4	6-M5 × 14
ETP-A-38	38	50	65	41	57	62	7	7.4	6-M5 × 14
ETP-A-40	40	53	70	43	60	65	7.5	8.4	6-M5 × 16
ETP-A-42	42	55	70	45	62	67	7.5	8.4	6-M5 × 16
ETP-A-45	45	59	77	49	66	72	8	8.4	6-M6 × 16
ETP-A-48	48	62	80	52	70	76	8	8.4	6-M6 × 16
ETP-A-50	50	65	83	53	72	78	8.5	9.4	6-M6 × 18
ETP-A-55	55	71	88	58	77	83	9	9.4	8-M6 × 18
ETP-A-60	60	77	95	64	85	91	10	10.4	8-M6 × 20
ETP-A-65	65	84	102	68	90	96	9.5	10.9	8-M6 × 20
ETP-A-70	70	90	113	72	94	102	9.5	10.9	6-M8 × 20
ETP-A-75	75	95	118	85	108	116	11	11	6-M8 × 22
ETP-A-80	80	100	123	90	114	122	11	11	6-M8 × 22
ETP-A-90	90	112	135	100	127	135	12.5	12.5	8-M8 × 25
ETP-A-100	100	125	148	110	139	147	13.5	13	8-M8 × 25

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

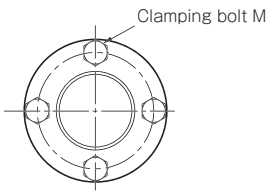
ETP-A B Types

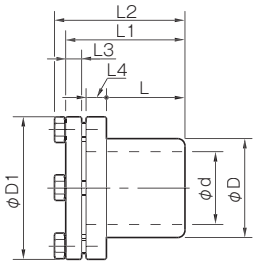
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-A-15-B	55	7300	90	80	6	0.018×10^{-3}	0.10
ETP-A-19-B	100	10600	90	80	8	0.046×10^{-3}	0.17
ETP-A-20-B	125	12500	90	80	8	0.046×10^{-3}	0.16
ETP-A-22-B	135	12300	90	80	8	0.065×10^{-3}	0.19
ETP-A-24-B	200	16700	90	80	8	0.067×10^{-3}	0.20
ETP-A-25-B	250	20000	90	80	8	0.071×10^{-3}	0.19
ETP-A-28-B	300	21400	90	80	8	0.12×10^{-3}	0.26
ETP-A-30-B	420	28000	90	80	8	0.14×10^{-3}	0.29
ETP-A-32-B	420	26300	90	80	8	0.20×10^{-3}	0.35
ETP-A-35-B	650	37100	90	80	8	0.25×10^{-3}	0.40
ETP-A-38-B	750	39500	90	80	8	0.31×10^{-3}	0.43
ETP-A-40-B	940	47000	90	80	8	0.44×10^{-3}	0.55
ETP-A-42-B	940	44800	90	80	8	0.47×10^{-3}	0.55
ETP-A-45-B	1290	57300	90	80	13	0.69×10^{-3}	0.71
ETP-A-48-B	1570	65400	90	80	13	0.83×10^{-3}	0.78
ETP-A-50-B	1900	76000	90	80	13	1.05×10^{-3}	0.86
ETP-A-55-B	2500	90900	90	80	13	1.43×10^{-3}	1.06
ETP-A-60-B	3400	113000	90	80	13	2.15×10^{-3}	1.37
ETP-A-65-B	3500	108000	90	80	13	3.10×10^{-3}	1.67
ETP-A-70-B	5200	149000	90	80	32	4.08×10^{-3}	2.04
ETP-A-75-B	6300	168000	90	80	32	5.50×10^{-3}	2.42
ETP-A-80-B	8800	220000	90	80	32	8.10×10^{-3}	2.64
ETP-A-90-B	11000	244000	90	80	32	12.2×10^{-3}	3.54
ETP-A-100-B	15500	310000	90	80	32	19.9×10^{-3}	4.80

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.
* ETP-A-75, 80, 90, and 100-B are made to order.

Dimensions





CAD

How to Place an Order

ETP-A-□-B

Size

Type (B: Hexagon head bolt specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-B	15	23	37.5	17	28	32.5	5	5.4	3-M5 × 10
ETP-A-19-B	19	28	45	21	34	38.5	5.5	6.9	3-M5 × 12
ETP-A-20-B	20	28	45	22	35	39.5	5.5	6.4	3-M5 × 12
ETP-A-22-B	22	32	49	22	35	39.5	5.5	6.4	4-M5 × 12
ETP-A-24-B	24	34	49	25	38	42.5	5.5	6.4	4-M5 × 12
ETP-A-25-B	25	34	49	27	41	45.5	5.5	6.9	4-M5 × 12
ETP-A-28-B	28	39	55	29	43	47.5	5.5	6.9	4-M5 × 12
ETP-A-30-B	30	41	57	32	46	50.5	5.5	6.9	4-M5 × 12
ETP-A-32-B	32	43	60	34	50	54.5	7	7.4	4-M5 × 14
ETP-A-35-B	35	47	62.5	37	53	57.5	7	7.4	6-M5 × 14
ETP-A-38-B	38	50	65	41	57	61.5	7	7.4	6-M5 × 14
ETP-A-40-B	40	53	70	43	60	64.5	7.5	8.4	6-M5 × 16
ETP-A-42-B	42	55	70	45	62	66.5	7.5	8.4	6-M5 × 16
ETP-A-45-B	45	59	77	49	66	71	8	8.4	6-M6 × 16
ETP-A-48-B	48	62	80	52	70	75	8	8.4	6-M6 × 16
ETP-A-50-B	50	65	83	53	72	77	8.5	9.4	6-M6 × 18
ETP-A-55-B	55	71	88	58	77	82	9	9.4	8-M6 × 18
ETP-A-60-B	60	77	95	64	85	90	10	10.4	8-M6 × 20
ETP-A-65-B	65	84	102	68	90	95	9.5	10.9	8-M6 × 20
ETP-A-70-B	70	90	113	72	94	100.5	9.5	10.9	6-M8 × 20
ETP-A-75-B	75	95	118	85	108	114.5	11	11	6-M8 × 22
ETP-A-80-B	80	100	123	90	114	120.5	11	11	6-M8 × 22
ETP-A-90-B	90	112	135	100	127	133.5	12.5	12.5	8-M8 × 25
ETP-A-100-B	100	125	148	110	139	145.5	13.5	13	8-M8 × 25

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

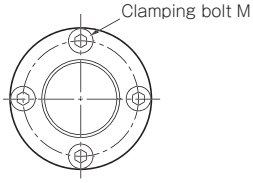
ETP-A C Types

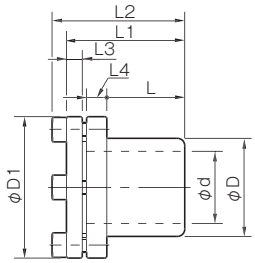
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Momentof inertia [kg·m²]	Mass [kg]
ETP-A-15-C	41	5000	90	80	6	0.018×10^{-3}	0.10
ETP-A-19-C	75	7400	90	80	8	0.046×10^{-3}	0.17
ETP-A-20-C	94	8700	90	80	8	0.046×10^{-3}	0.16
ETP-A-25-C	188	14000	90	80	8	0.071×10^{-3}	0.19
ETP-A-30-C	315	19000	90	80	8	0.14×10^{-3}	0.29
ETP-A-35-C	488	26000	90	80	8	0.25×10^{-3}	0.40
ETP-A-40-C	705	33000	90	80	8	0.44×10^{-3}	0.55
ETP-A-45-C	968	40000	90	80	13	0.69×10^{-3}	0.71
ETP-A-50-C	1426	53000	90	80	13	1.05×10^{-3}	0.86

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions





CAD

How to Place an Order

ETP-A-□-C

Size

Type (C: Simple antirust specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-C	15	23	37.5	17	28	33	5	5.4	3-M5 × 10
ETP-A-19-C	19	28	45	21	34	39	5.5	6.9	3-M5 × 12
ETP-A-20-C	20	28	45	22	35	40	5.5	6.4	3-M5 × 12
ETP-A-25-C	25	34	49	27	41	46	5.5	6.9	4-M5 × 12
ETP-A-30-C	30	41	57	32	46	51	5.5	6.9	4-M5 × 12
ETP-A-35-C	35	47	62.5	37	53	58	7	7.4	6-M5 × 14
ETP-A-40-C	40	53	70	43	60	65	7.5	8.4	6-M5 × 16
ETP-A-45-C	45	59	77	49	66	72	8	8.4	6-M6 × 16
ETP-A-50-C	50	65	83	53	72	78	8.5	9.4	6-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

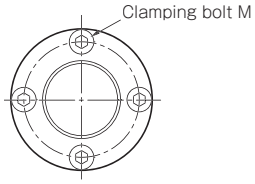
ETP-A S Types

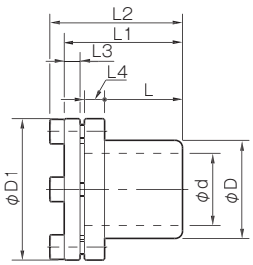
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Momentof inertia [kg·m²]	Mass [kg]
ETP-A-19-S	53	5000	90	80	8	0.044×10^{-3}	0.15
ETP-A-20-S	75	6000	90	80	8	0.042×10^{-3}	0.14
ETP-A-25-S	120	10000	90	80	8	0.065×10^{-3}	0.17
ETP-A-30-S	210	14000	90	80	8	0.12×10^{-3}	0.24
ETP-A-35-S	330	19000	90	80	8	0.22×10^{-3}	0.32
ETP-A-40-S	500	26000	90	80	8	0.37×10^{-3}	0.46
ETP-A-45-S	700	31000	90	80	13	0.56×10^{-3}	0.57
ETP-A-50-S	1000	40000	90	80	13	0.85×10^{-3}	0.72

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions





CAD

How to Place an Order

ETP-A-□-S

Size

Type (S: Short length specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-19-S	19	28	45	13	26	31	5.5	6.9	3-M5 × 12
ETP-A-20-S	20	28	45	15	28	33	5.5	6.4	3-M5 × 12
ETP-A-25-S	25	34	49	15	29	34	5.5	6.9	4-M5 × 12
ETP-A-30-S	30	41	57	20	34	39	5.5	6.9	4-M5 × 12
ETP-A-35-S	35	47	62.5	22	38	43	7	7.4	6-M5 × 14
ETP-A-40-S	40	53	70	25	42	47	7.5	8.4	6-M5 × 16
ETP-A-45-S	45	59	77	28	45	51	8	8.4	6-M6 × 16
ETP-A-50-S	50	65	83	26	45	51	8.5	9.4	6-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

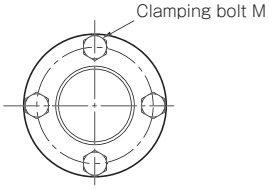
ETP-A R Types

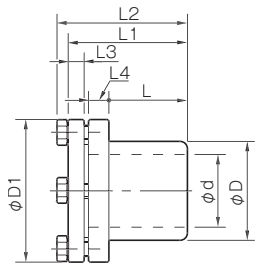
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
ETP-A-15-R	45	6000	90	70	4.5	0.018×10^{-3}	0.10
ETP-A-20-R	100	10000	90	70	4.5	0.046×10^{-3}	0.16
ETP-A-25-R	210	16800	90	70	4.5	0.071×10^{-3}	0.19
ETP-A-30-R	350	23300	90	70	4.5	0.142×10^{-3}	0.29
ETP-A-35-R	500	28500	90	70	4.5	0.250×10^{-3}	0.40
ETP-A-40-R	750	37500	90	70	4.5	0.441×10^{-3}	0.55
ETP-A-45-R	1100	48800	90	70	7.8	0.686×10^{-3}	0.71
ETP-A-50-R	1550	62000	90	70	7.8	1.045×10^{-3}	0.86

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.
* The rated torque, rated thrust, shaft contact pressure, and hub contact pressure values given are measured values at a temperature of 20° C.

Dimensions





CAD

How to Place an Order

ETP-A-□-R

Size

Type (R: Stainless steel specifications)

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	L2	L3	L4	M
ETP-A-15-R	15	23	37.5	17	28	32	5	5.4	4-M5 × 10
ETP-A-20-R	20	28	45	22	36	40	5.5	6.4	5-M5 × 12
ETP-A-25-R	25	34	49	27	41	45	5.5	6.9	7-M5 × 12
ETP-A-30-R	30	41	57	32	46	50	5.3	6.9	7-M5 × 12
ETP-A-35-R	35	47	62.5	37	53	57	7	7.4	9-M5 × 14
ETP-A-40-R	40	53	70	43	60	64	8	8.4	9-M5 × 16
ETP-A-45-R	45	59	77	49	66	70	8	8.4	9-M6 × 16
ETP-A-50-R	50	65	83	53	72	76	8.5	9.4	9-M6 × 18

* L1 and L2 are dimensions when the ETP-CLASSIC is mounted. These values may vary slightly depending on the fit tolerances of the shaft diameter and internal hub diameter.
* The nominal diameter of the clamping bolt M is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N{\cdot}m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m]
P: Driver's output [kW]
n: Connecting element's rotation speed [min^{-1}]
Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$Td = Ta \times K1$
$Fd = Fa \times K1$

Td: Corrected torque applied to the connecting element [N·m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$T \geqq Td$ T: Connecting element's rated torque [N·m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$F \geqq Fd$ F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$T \geqq Mr$ $\quad Mr = \sqrt{Td^2 + (Fd \times \frac{d}{2})^2}$

Mr: Combined load applied to the connecting element [N·m] d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + CP_2}{\delta_{0.2N} - CP_2}}$$

$C = 1 \quad B = L$
$C = 0.8 \quad L < B < 2L$
$C = 0.6 \quad B \geqq 2L$

DO: Hub's minimum external diameter [mm]
D: Hub's internal diameter [mm]
P_2: Hub contact pressure [N/mm^2]
$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]
B: Hub length [mm]
L: Effective contact length [mm]
C: Coefficient

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2. Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1C}{\delta_{0.2N}}}$$

$C = 0.6$ when using a single one
$C = 0.8$ when using multiple ones

di: Hollow shaft's maximum internal diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2]
P_1: Shaft contact pressure [N/mm^2]
d: Shaft diameter [mm]
C: Coefficient

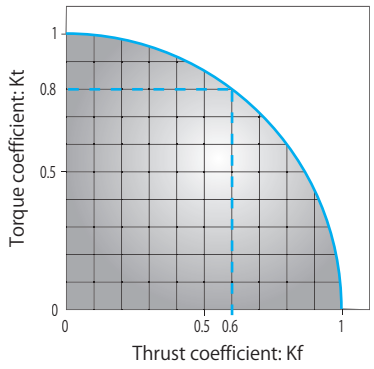
The shaft contact pressure and hub contact pressure vary depending on the operating temperature. You need to correct these values based on the operating temperature. Note that the contact pressure values were those measured at 20℃ . If the operating temperature exceeds 20℃ , obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter with the following formulas.

$P_1 \cdot P_2$ = contact pressure at 20℃ × temperature coefficient (K2)

The operating temperature range is from -30℃ to 85℃ .

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-CLASSIC at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure below.



Calculation example:
When using the ETP-A-30 at 20℃ .

Maximum rated torque (T) and thrust (F) at 20℃ , T = 340 [N·m] and F = 23100 [N]. The maximum rated torque, Tmax, when the maximum thrust (Fmax = 14000 [N]) is applied can be obtained as follows.

Thrust coefficient (Kf) = Fmax / F × temperature coefficient (K2)
= 14000/23100 × 1.0 = 0.61

The torque coefficient, Kt, when Kf = 0.61 is about 0.8 based on the above figure. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

$Tmax = T \times K2 \times Kt = 340 \times 1.0 \times 0.8 = 272\ [N{\cdot}m]$

The relationship between Kt and Kf can be obtained from the following formula.

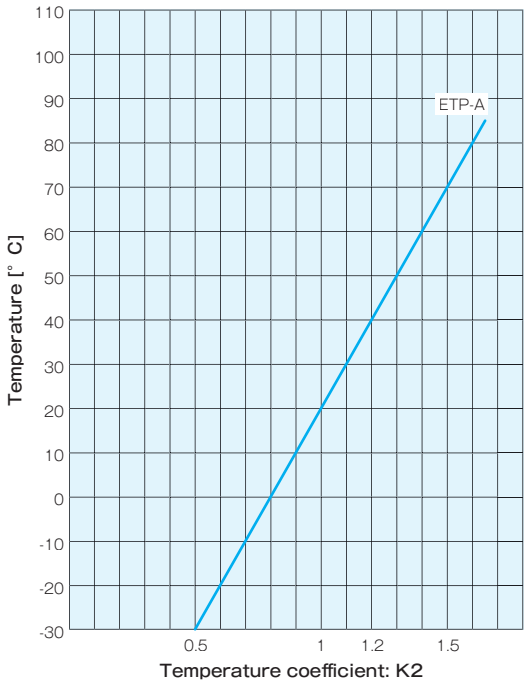
$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$

Service Factor

■ Service factor based on the load property: K1

Load property	Constant	Vibrations: Small	Vibrations: Medium	Vibrations: Large
K1	1.0	1.25	1.75	2.25

■ Service factor based on the operating temperature: K2



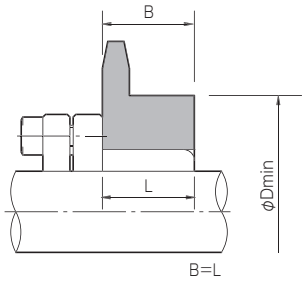
ETP-A Models

Items Checked for Design Purposes

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-A, ETP-A B, ETP-A C, ETP-A S



ø Dmin, unit [mm]

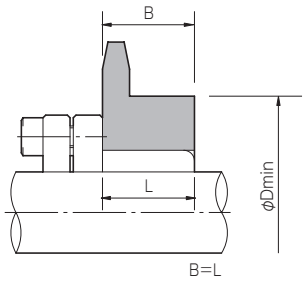
ETP-A ETP-A B ETP-A C ETP-A S size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	80	42	37	35	33	32	31	31	30	30	30
19	80	51	46	42	41	39	38	37	37	37	37
20	80	51	46	42	41	39	38	37	37	37	37
22	80	58	52	48	46	45	43	42	42	42	42
24	80	62	55	51	49	48	46	45	45	45	45
25	80	62	55	51	49	48	46	45	45	45	45
28	80	71	63	59	56	55	53	52	51	51	51
30	80	75	67	62	59	58	55	54	54	54	54
32	80	78	70	65	62	60	58	57	56	56	56
35	80	86	76	71	68	66	63	62	62	62	62
38	80	91	81	75	72	70	67	66	65	65	65
40	80	96	86	80	77	74	72	70	69	69	69
42	80	100	89	83	79	77	74	73	72	72	72
45	80	107	96	89	85	83	80	78	77	77	77
48	80	113	100	93	90	87	84	82	81	81	81
50	80	118	105	97	94	91	88	86	85	85	85
55	80	129	115	106	102	99	96	94	93	93	93
60	80	140	125	115	111	108	104	102	101	101	101
65	80	153	136	126	121	117	113	111	110	110	110
70	80	164	146	135	130	126	121	119	117	117	117
75	80	173	154	142	137	133	128	125	124	124	124
80	80	182	162	150	144	140	135	132	130	130	130
90	80	203	181	168	161	156	151	148	146	146	146
100	80	227	202	187	180	175	168	165	163	163	163

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.213.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.213.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ ETP-A R



ø Dmin, unit [mm]

ETP-A R size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
15	70	39	35	33	32	31	30	30	30	30	30
20	70	47	43	40	39	38	37	37	37	37	37
25	70	57	52	49	47	46	45	45	45	45	45
30	70	68	62	58	57	55	54	54	54	54	54
35	70	78	71	67	65	63	62	62	62	62	62
40	70	88	80	75	73	71	69	69	69	69	69
45	70	98	89	84	81	79	77	77	77	77	77
50	70	108	98	92	90	87	85	85	85	85	85

* Hub contact pressure at an operating temperature of 20℃ . The contact pressure increases as the temperature rises.
* If the operating temperature exceeds 20℃ , you need to obtain the hub's minimum external diameter according to the selection procedure on P.213.
* The hub's minimum external diameter shows a value calculated based on C=1 in the selection procedure on P.213.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

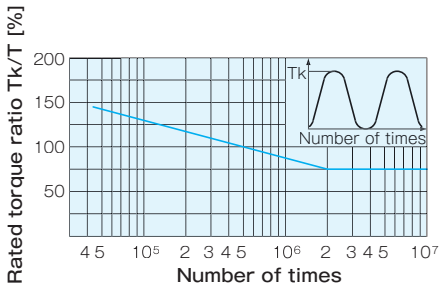
ETP-A Models

Items Checked for Design Purposes

Fatigue Caused by Periodically Applied Varying Torque

The following figure shows the fatigue state when a static varying torque, Tk, is applied periodically to the ETP-CLASSIC. The vertical axis shows the percentage of the rated torque, T, and the horizontal axis shows the number of periodically applied static varying torque events.

If the rated torque, T, is periodically applied to the ETP-CLASSIC, it can withstand about 500,000 events in terms of fatigue life. If 75% of the rated torque, T, is applied, it can withstand an unlimited number of events in terms of fatigue life.



Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

■ ETP-A

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-19 ~ 100	h8 ~ k6		

■ ETP-A B, C

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15-B • C	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-19-B • C ~ 100-B • C	h8 ~ k6		

■ ETP-A S

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-19-S ~ 50-S	h8 ~ k6	H7	25S (center line's average roughness 6.3a) or less

■ ETP-A R

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-A-15-R	h7	H7	25S (center line's average roughness 6.3a) or less
ETP-A-20-R ~ 50-R	h8		

Operating Temperature Range

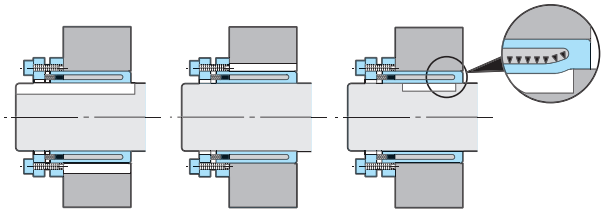
Model	Operating temperature range [° C]
ETP-A ETP-A B ETP-A C ETP-A S ETP-A R	− 30 ~ 85

Concentricity and Balance

Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-A ETP-A B ETP-A C ETP-A S ETP-A R	0.05	100

Keyway Shape where the ETP-CLASSIC Cannot Be Detached due to a Deformation of the Sleeve

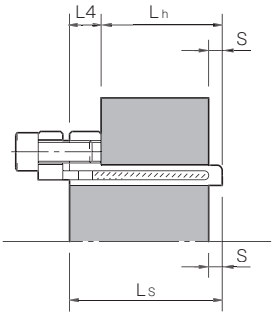
The ETP-CLASSIC cannot be used if the shaft and hub have a keyway as shown in the figure below. Note that you can use the ETP-CLASSIC for the shaft and hub with a keyway if you completely fill the keyway with epoxy putty for metals and then shape it.



Allowable Range of Edge

The performance of the ETP-CLASSIC is based on the case where the shaft and the hub have the effect for the entire standard shaft length, Ls, and the entire standard hub length, Lh, respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length. If the length of the shaft and hub is limited due to design reasons, make sure it is less than the dimension S in the figure below. If it exceeds the dimension S, stress concentrates on the sleeve edge and the sleeve is deformed, so there is the possibility that the ETP-CLASSIC cannot be detached.

■ ETP-CLASSIC



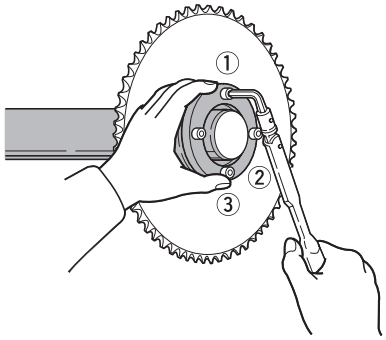
ETP-CLASSIC size	S [mm]
15	3
19	3.5
20	3.5
22	4
24	4
25	3.6
28	4.5
30	5
32	5
35	5.5
38	5.5
40	6
42	6
45	6.5
48	7
50	7
55	7.5
60	8
65	9
70	9.5
75	9.5
80	9.5
90	10.5
100	12.5

Mounting

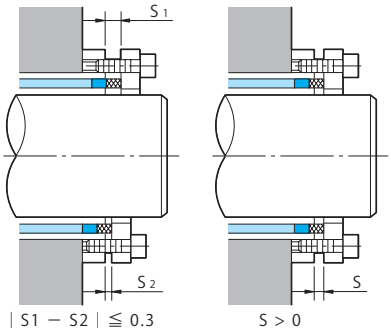
(1) Wipe the rust, dust, and oil off from the surface of the shaft and hub with a cloth or alcohol solution. In particular, if grease remains, wipe it off completely. If oil remains on the surface of the ETP-CLASSIC, wipe it off with a cloth, etc.
If the oil is wiped off, the friction coefficient basically changes. Never allow oil containing molybdenum-based antifriction material to contact the surface.

(2) Attach the ETP-CLASSIC to the hub and mount them to the shaft. If accurate positioning of the shaft and hub is needed, adjust the position of both before tightening the clamping bolts.
Never tighten the clamping bolts before mounting the ETP-CLASSIC to the shaft and hub.

(3) Gently put a hand on the ETP-CLASSIC and tighten the clamping bolts one by one by a half turn in order of (1), (2), and (3) as shown in the figure. Tighten the clamping bolts for the ETP-CLASSIC to the specified torque using a torque wrench. Do not tighten the clamping bolt to a torque greater than the specified torque and then loosen the clamping bolt to the specified tightening torque. The clamping bolts of the ETP-A-R are made of stainless steel. Stainless steel can gall easily. Slowly tighten the stainless steel bolts to prevent galling.



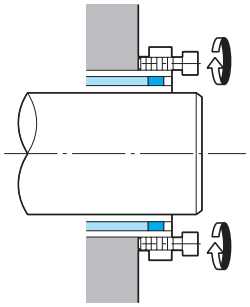
(4) When the mounting is finished, check to make sure the spacing between the flange and sleeve is uniform. If the flange and the sleeve are in close contact with each other, the ETP-CLASSIC may not be able to achieve its full performance. In this case, re-check the shaft and hub tolerances and the material.



Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the ETP-CLASSIC and there is no risk of a fall due to the self-weight of the shaft and hub. The ETP-CLASSIC does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the clamping bolts.

(2) The clamping bolts should only be loosened until the connecting force is released. Do not remove them. If for any reason the ETP-CLASSIC cannot be removed, remove all the clamping bolts, flange, and piston ring, and then remove the ETP-CLASSIC using the sleeve's tapped holes as removal screw holes.



ETP-H Models

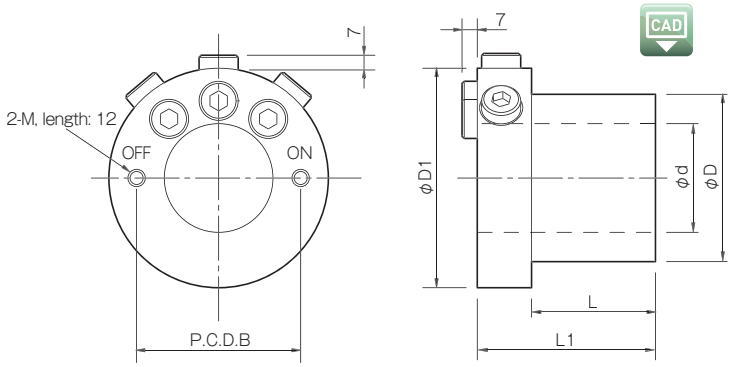
Made to order

Specifications

Model	Rated torque [N·m]						Rated thrust [N]						Moment of inertia [kg・m²]	Mass [kg]
	Oil pressure: 60 MPa		Oil pressure: 80 MPa		Oil pressure: 100 MPa		Oil pressure: 60 MPa		Oil pressure: 80 MPa		Oil pressure: 100 MPa			
	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8	Shaft tol. h7	Shaft tol. h8		
ETP-H-50	800	800	1600	1400	2600	2400	30000	30000	55000	55000	70000	70000	3.2×10^{-3}	2.4
ETP-H-60	1100	1100	3300	3000	4600	4300	60000	60000	100000	100000	130000	130000	5.4×10^{-3}	3.1
ETP-H-70	2400	2400	5800	5300	7900	7400	100000	95000	150000	150000	210000	200000	8.7×10^{-3}	4.1
ETP-H-80	5600	5300	9000	8400	12100	11500	150000	135000	220000	210000	290000	280000	14×10^{-3}	5.4
ETP-H-90	8300	7400	12700	11800	17100	16200	185000	165000	285000	265000	380000	360000	23×10^{-3}	7
ETP-H-100	12100	11000	18200	17100	24200	23100	245000	220000	365000	340000	485000	460000	34×10^{-3}	8.6
ETP-H-110	16800	15400	24800	23500	32900	31500	305000	280000	450000	430000	595000	570000	51×10^{-3}	11
ETP-H-120	22300	20600	32700	31100	43200	41600	370000	345000	545000	520000	720000	690000	76×10^{-3}	14
ETP-H-130	27200	24900	40500	38100	53800	51400	420000	385000	620000	590000	825000	790000	110×10^{-3}	17
ETP-H-140	35600	32900	52300	49600	68900	66200	510000	470000	750000	710000	985000	945000	150×10^{-3}	21
ETP-H-150	44500	41400	65000	61900	85400	82300	595000	550000	870000	825000	1135000	1095000	210×10^{-3}	25
ETP-H-160	54800	51200	79500	76000	104000	100000	685000	640000	995000	950000	1305000	1260000	290×10^{-3}	30
ETP-H-180	80000	75000	115000	110000	150000	146000	890000	835000	1280000	1220000	1675000	1625000	500×10^{-3}	42
ETP-H-200	109000	103000	157000	151000	206000	200000	1090000	1030000	1570000	1510000	2060000	2000000	830×10^{-3}	56
ETP-H-220	144000	137000	209000	201000	273000	266000	1310000	1245000	1900000	1830000	2485000	2415000	1300×10^{-3}	73

* The maximum rated torque values are those when the thrust is zero and the maximum rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

ETP-H-□

Size

* Depending on your location and such, we may not be able to sell you our products. Please contact us for details.

Unit [mm]

Model	d	D	D1	L	L1	P.C.D.B	M
ETP-H-50	50	77	101	57	82	75	M8
ETP-H-60	60	89	113	65	90	86	M8
ETP-H-70	70	102	122	75	100	96	M8
ETP-H-80	80	115	135	85	110	107	M8
ETP-H-90	90	128	148	95	120	124	M12
ETP-H-100	100	140	160	105	130	140	M12
ETP-H-110	110	154	173	115	140	150	M12
ETP-H-120	120	168	186	125	150	160	M12
ETP-H-130	130	182	200	135	160	175	M16
ETP-H-140	140	196	213	145	170	185	M16
ETP-H-150	150	210	227	155	180	195	M16
ETP-H-160	160	224	240	165	190	205	M16
ETP-H-180	180	252	267	185	210	223	M16
ETP-H-200	200	280	293	205	230	247	M16
ETP-H-220	220	308	320	225	250	280	M16

* The port (for connecting the radial thrust hose) is G1/8.

Items Checked for Design Purposes

Torque and Thrust Coefficients

If torque and thrust are applied to the ETP-HYLOC at the same time, the rated values of both decrease. These values can be obtained based on the coefficients in the figure below.

Calculation example: When using the ETP-H-100.

Maximum rated torque, T, and thrust, F, at 20℃ ,
T = 24200 [N·m] and F = 485000 [N]
The maximum rated torque, Tmax, when the maximum thrust (Fmax = 290000 [N]) is applied can be obtained as follows.

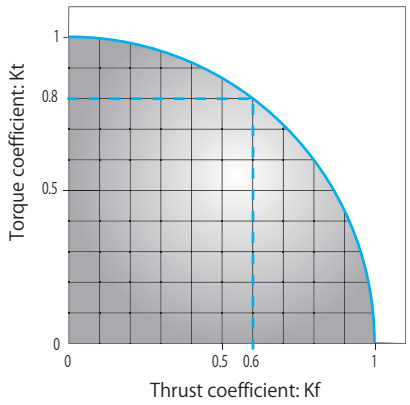
Thrust coefficient: Kf = Fmax / F
= 290000/485000 ≒ 0.6

The torque coefficient, Kt, when Kf ≒ 0.6 is about 0.8 based on the figure below. Accordingly, the maximum rated torque, Tmax, in this case is as follows.

$$Tmax = T \times Kt = 24200 \times 0.8 = 19360\ [N{\cdot}m]$$

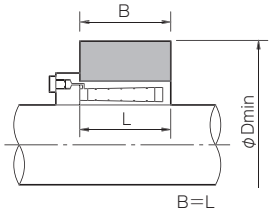
The relationship between Kt and Kf can be obtained with the following formula.

$$\sqrt{(Kt)^2 + (Kf)^2} = 1$$



Hub's Minimum External Diameters

If the stress applied to the hub is large, the hub may be deformed. Select the appropriate external diameter size from the hub's external diameters in the table below in the design phase.



ø Dmin, unit [mm]

Model	Material's yield stress [N/mm²]						
	Oil pressure: 60 MPa			Oil pressure: 80 MPa		Oil pressure: 100 MPa	
	> 200	> 300	> 400	> 300	> 400	> 300	> 400
ETP-H-50	90	90	90	95	90	110	105
ETP-H-60	115	105	95	120	110	140	125
ETP-H-70	135	120	110	140	125	170	145
ETP-H-80	155	140	130	165	140	200	160
ETP-H-90	180	160	145	185	160	235	180
ETP-H-100	200	170	160	210	180	270	200
ETP-H-110	220	195	180	235	195	295	220
ETP-H-120	240	215	195	255	215	320	240
ETP-H-130	260	230	210	275	230	350	260
ETP-H-140	285	250	225	295	250	375	280
ETP-H-150	300	265	240	315	265	400	300
ETP-H-160	320	285	260	335	285	425	320
ETP-H-180	360	320	290	375	320	480	360
ETP-H-200	400	355	320	420	355	535	400
ETP-H-220	440	390	355	460	390	585	435

ETP-H Model

Items Checked for Design Purposes

Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
ETP-H	h7 or h8	H7	25S (center line's average roughness 6.3a) or less

* Note that the maximum rated torque and the maximum rated thrust vary depending on the mounting shaft tolerance.

Operating Temperature Range

Model	Operating temperature range [° C]
ETP-H	− 40 ~ 150

Number of Attachments and Detachments

Model	No. of attachments/detachments
ETP-H	2000

Concentricity and Balance

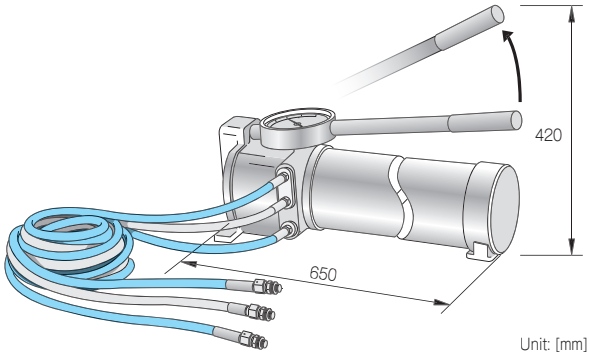
Model	Concentricity [mm]	Balance [g·mm/kg]
ETP-H	0.02	75

* If a steel plug is attached in the radial direction, the unbalance amount increases for size 100 or more.

Recommended Hydraulic Pump

To attach and detach the ETP-HYLOC, you need a pump capable of applying pressure of up to about 150 MPa and a hose that can withstand that pressure. Hand Pump (H-11) that meets these requirements is available (made to order). The Hand Pump (H-11) includes a 3 m-long hose that can be mounted directly.
In addition, Quick Connection (Type 02) is also available for applications where the hose is attached and detached frequently.

■ Hand Pump (H-11)

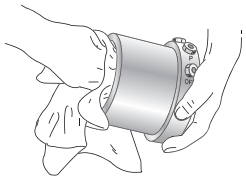


Unit: [mm]

■ Quick Connection (Type 02)

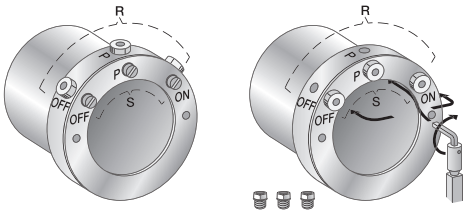
Mounting

(1) Wipe the rust, dust, and oil off from the surface of the shaft and hub with a cloth or alcohol solution. In particular, if grease remains, wipe it off completely.
Note that if oil remains on the surface of the ETP-HYLOC, wipe it off with a cloth, etc.



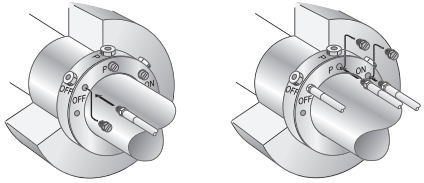
The friction coefficient basically changes. Never allow oil containing molybdenum-based antifriction material to contact the surface.

(2) The ETP-HYLOC is delivered with a plastic plug attached to it in the thrust direction (S). If you use it in the radial direction (R), remove 3 steel plugs and cover the thrust (S) port with a steel plug. (The width across the flat of the steel plug is 5 mm.)



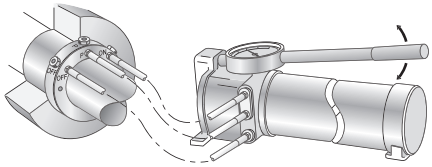
Then, mount the ETP-HYLOC to the shaft and hub.

(3) Remove the plastic plug from the OFF port and connect the pump's return hose (black).
Remove the plastic plug from the ON/P port and connect the pump's pressure hose (blue).

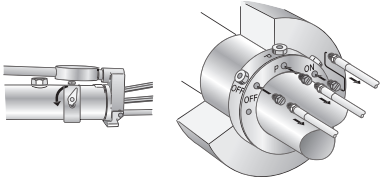


Never apply pressure before the ETP-HYLOC is mounted to the shaft and hub.

(4) Before applying pressure, check to make sure unused ports are covered by steel plugs. When the specified pressure is reached, keep the state for about 5 to 10 seconds. The specified pressure is 100 MPa.

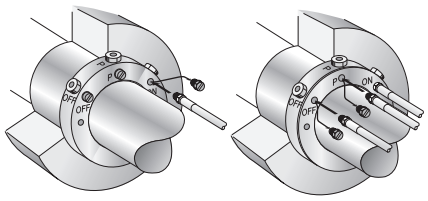


(5) Remove the hose from the ETP-HYLOC. Before removing it, open the pump's valve to relieve pressure from the pump.
After removing the hose, attach the plastic plug to prevent dust from entering inside the ETP-HYLOC.



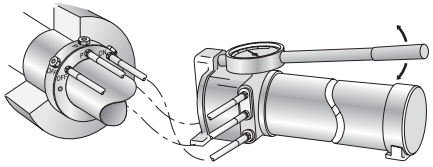
Removal

(1) Remove the plastic plug from the ON port and connect the pump's return hose (black).
Remove the plastic plug from the OFF/P port and connect the pump's pressure hose (blue).

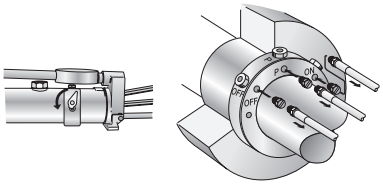


If the return hose is not connected to the ON port, the oil inside may spew out.

(2) Before applying pressure, check to make sure that unused ports are covered by steel plugs. When the specified pressure is reached, keep the state for about 10 seconds. (Check the pressure gage.) When the tapered piston moves, the pressure begins to decrease. Apply pressure slowly with the pump until the pressure begins to start to increase again. At this point, the ETP-HYLOC is completely released. The allowable pressure for removal is 120 MPa.



(3) Remove the hose from the ETP-HYLOC. Before removing it, open the pump's valve to relieve pressure from the pump.
After removing the hose, attach the plastic plug to prevent dust from entering inside the ETP-HYLOC.



Mechanical Shaft Lock

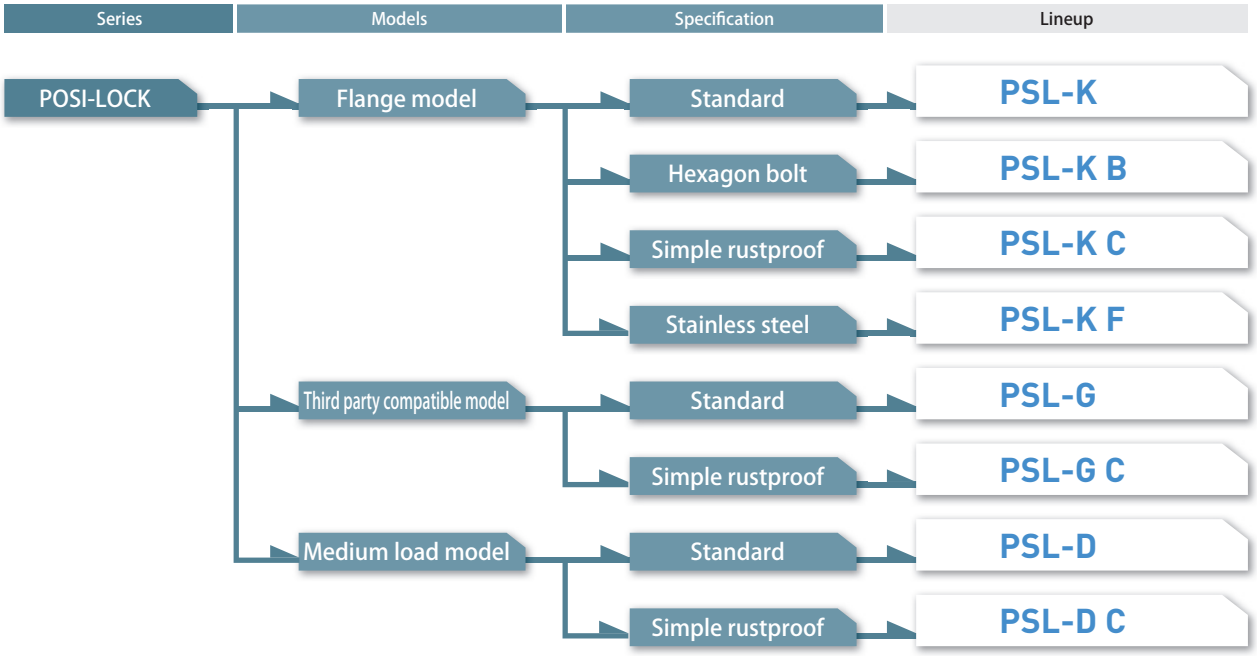
POSI-LOCK

Application	Machine tool, pump, molding machine, printing machine, palletizing robot, various jigs and tools

Connects the Shaft and Hub with the Wedging Action of the Tapered Surface

The shaft and hub are connected with the wedging action of the tapered surface. The machining tolerance of the shaft and hub is just the general fitting tolerance and no special finishing is needed. Compared to the key connection, high precision machining such as keyway machining is not needed, and the shaft and hub can be connected with high concentricity.

Available Models



Model Selection

Model/Type	Main body material	Surface finishing	Applied shaft diameter [mm]	Max. rated torque [N • m]	Max. rated thrust [N]	Operating temperature [℃]
PSL-K	S45C refined or equivalent	—	6 ～ 42	750	36000	−40 ～ 150
PSL-K B	S45C refined or equivalent	—	6 ～ 42	750	36000	−40 ～ 150
PSL-K C	S45C refined or equivalent	Electroless nickel plating	6 ～ 42	750	36000	−40 ～ 150
PSL-K F	SUS304 or an equivalent	—	6 ～ 35	504	28800	−40 ～ 150
PSL-G	S45C refined or equivalent	—	19 ～ 120	13500	225000	−40 ～ 150
PSL-G C	S45C refined or equivalent	Electroless nickel plating	19 ～ 60	2810	93600	−40 ～ 150
PSL-D	S45C refined or equivalent	—	6 ～ 50	1760	70300	−40 ～ 150
PSL-D C	S45C refined or equivalent	Electroless nickel plating	16 ～ 50	1760	70300	−40 ～ 150

Product Lineup

PSL-K

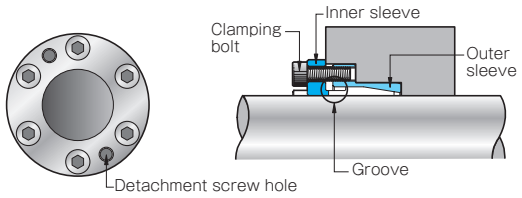
RoHS-compliant

The sleeve's internal/external diameter ratio is small. The mounting part's diameter as well as the moment of inertia can be reduced. The mechanism is simple and high concentricity can be maintained.

Max. rated torque	[N·m]	750
Max. rated thrust	[N]	36000
Applied shaft diameter	[mm]	6 ～ 42
Operating temperature	[℃]	− 40 ～ 150

Operating Principle

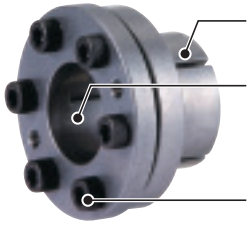
Tightening the clamping bolt moves the outer sleeve in the shaft direction. At this point, the wedge action of the tapered surface with the inner sleeve generates a force to press the inner surface of the shaft and hub and this force connects the shaft and hub completely. The groove of the inner sleeve increases the wedge effect so a high transmission torque can be obtained.



Variations and Materials

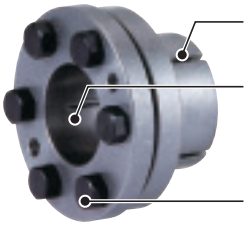
PSL-K

Standard type of the PSL-K model.



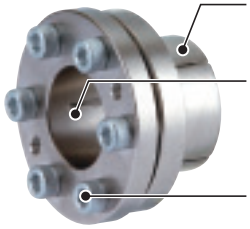
PSL-K B

A hexagon bolt is used for the clamping bolt so the device can be mounted even in tight space in the thrust direction.



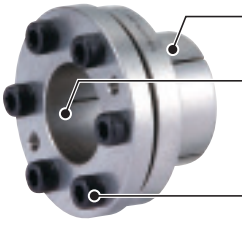
PSL-K C

The main body is electroless nickel coated (simple rustproof finishing).



PSL-K F

The main body is made of stainless material (rustproof coating).



*A special coating is applied to the clamping bolt to stabilize the shaft force.

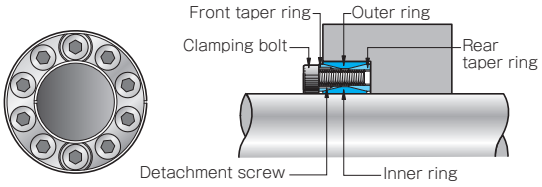
PSL-G

A simple structure and rigid parts provide uniform transmission and can withstand heavy load. A short shaft direction length saves space.

Max. rated torque	[N·m]	13500
Max. rated thrust	[N]	225000
Applied shaft diameter	[mm]	19 ~ 120
Operating temperature	[℃]	−40 ~ 150

Operating Principle

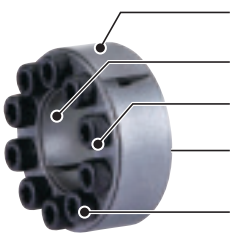
Tightening the clamping bolt moves the 2 tapered rings in the shaft direction. At this point, the outer ring and the inner ring independently generate a force to press the inner surface of the shaft and hub due to the wedge action of the tapered surface and this force connects the shaft and hub completely.



Variations and Materials

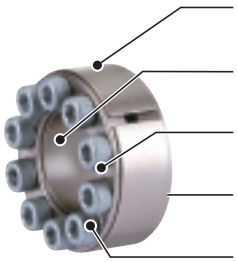
PSL-G

Standard type of the PLS-G model.



PSL-G C

The main body is electroless nickel coated (simple rustproof finishing).



PSL-D

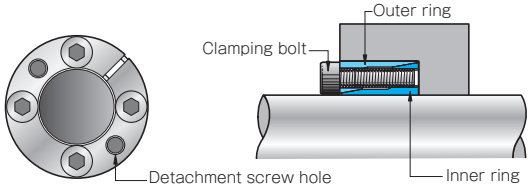
RoHS-compliant

This is designed for a medium load. The contact pressure is small and the mounting diameter and mass can be reduced. A short shaft direction length saves space.

Max. rated torque	[N·m]	1760
Max. rated thrust	[N]	70300
Applied shaft diameter	[mm]	6 ~ 50
Operating temperature	[℃]	−40 ~ 150

Operating Principle

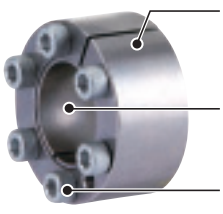
Tightening the clamping bolt moves the outer ring in the shaft direction. At this point, the wedge action of the tapered surface with the inner sleeve generates a force to press the inner surface of the shaft and hub and this force connects the shaft and hub completely.



Variations and Materials

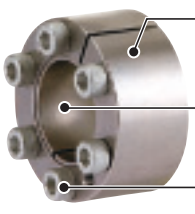
PSL-D

Standard type of the PSL-D model.



PSL-D C

The main body is electroless nickel coated (simple rustproof finishing).



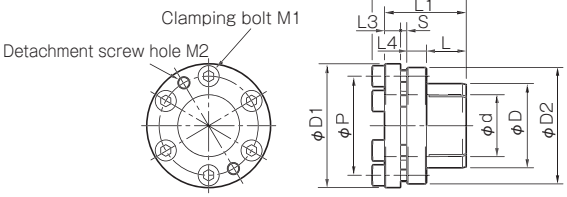
PSL-K Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-K-6	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-K-□
Size
Old model ETP - K - □

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-38	38	50	73	70	58	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-40	40	53	76	73	61	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-42	42	55	78	75	63	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

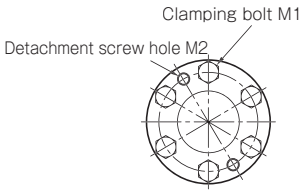
PSL-K B Types

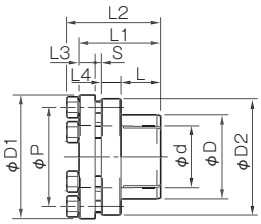
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-K-6-B	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35-B	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7-B	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8-B	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9-B	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525-B	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10-B	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11-B	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12-B	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7-B	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14-B	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15-B	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16-B	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17-B	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18-B	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19-B	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20-B	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22-B	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24-B	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25-B	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28-B	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30-B	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32-B	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35-B	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38-B	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40-B	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42-B	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions





CAD

How to Place an Order

PSL-K-□-B

Size

Type (B: Hexagon head bolt specifications)

Old model ETP - K - □ - B

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-B	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-B	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-B	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-B	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-B	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-B	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-B	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-B	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-B	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-B	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-B	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-B	15	23	39	36	29	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-16-B	16	24	40	37	30	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-17-B	17	26	42	39	32	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-18-B	18	26	42	39	32	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-19-B	19	28	44	41	34	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-20-B	20	28	44	41	34	14	29	33.5	6	7	2	4-M5 × 12	2-M5
PSL-K-22-B	22	32	48	45	38	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-B	24	34	50	47	40	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-B	25	34	50	47	40	16	33	37.5	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-B	28	39	62	59	47	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-B	30	41	64	61	49	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-B	32	43	66	63	51	20	39	44	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-B	35	47	70	67	55	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-38-B	38	50	73	70	58	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-40-B	40	53	76	73	61	22	43	48	8	10	3	8-M6 × 18	2-M6
PSL-K-42-B	42	55	78	75	63	22	43	48	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

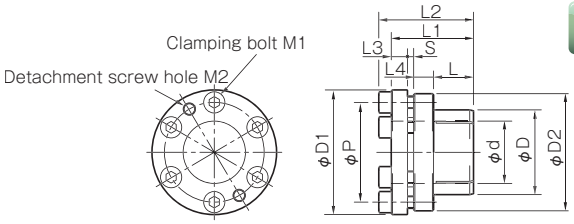
PSL-K C Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-K-6-C	5.9	1950	160	80	2	2.5×10^{-6}	0.037
PSL-K-6.35-C	6.2	1950	150	80	2	2.5×10^{-6}	0.036
PSL-K-7-C	6.8	1950	130	80	2	2.5×10^{-6}	0.035
PSL-K-8-C	23	5900	290	160	4	5.0×10^{-6}	0.056
PSL-K-9-C	26	5900	260	160	4	5.0×10^{-6}	0.053
PSL-K-9.525-C	28	5900	250	130	4	7.8×10^{-6}	0.069
PSL-K-10-C	29	5900	230	130	4	7.7×10^{-6}	0.068
PSL-K-11-C	32	5900	210	130	4	7.6×10^{-6}	0.065
PSL-K-12-C	47	7800	260	160	4	10×10^{-6}	0.076
PSL-K-12.7-C	50	7800	250	140	4	10×10^{-6}	0.073
PSL-K-14-C	55	7800	220	140	4	13×10^{-6}	0.083
PSL-K-15-C	95	12700	290	190	8	24×10^{-6}	0.125
PSL-K-16-C	100	12700	270	180	8	27×10^{-6}	0.130
PSL-K-17-C	110	12700	260	170	8	33×10^{-6}	0.145
PSL-K-18-C	110	12700	240	170	8	32×10^{-6}	0.140
PSL-K-19-C	120	12700	230	160	8	40×10^{-6}	0.155
PSL-K-20-C	130	12700	220	160	8	39×10^{-6}	0.150
PSL-K-22-C	210	19000	250	170	8	65×10^{-6}	0.210
PSL-K-24-C	230	19000	230	160	8	76×10^{-6}	0.220
PSL-K-25-C	240	19000	220	160	8	75×10^{-6}	0.210
PSL-K-28-C	380	27000	220	160	14	203×10^{-6}	0.390
PSL-K-30-C	400	27000	210	150	14	230×10^{-6}	0.400
PSL-K-32-C	430	27000	190	140	14	260×10^{-6}	0.425
PSL-K-35-C	630	36000	210	150	14	366×10^{-6}	0.525
PSL-K-38-C	680	35700	210	160	14	426×10^{-6}	0.580
PSL-K-40-C	720	36000	160	120	14	511×10^{-6}	0.599
PSL-K-42-C	750	35700	170	130	14	561×10^{-6}	0.657

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-K-□-C
Size
Type (C: Simple antirust specifications)
Old model ETP - K - □ - C

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-C	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-C	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-C	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-C	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-C	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-C	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-C	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-C	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-C	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-C	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-C	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-C	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16-C	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17-C	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18-C	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19-C	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20-C	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22-C	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-C	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-C	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-C	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-C	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-C	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-C	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-38-C	38	50	73	70	58	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-40-C	40	53	76	73	61	22	43	49	8	10	3	8-M6 × 18	2-M6
PSL-K-42-C	42	55	78	75	63	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POS-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

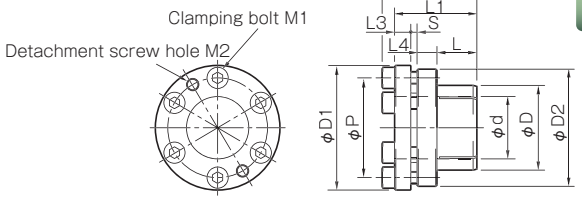
PSL-K F Types

Specifications

Model	Rated torque [N·m]	Rated thrust (N)	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-K-6-F	4.7	1560	120	60	2	2.5×10^{-6}	0.037
PSL-K-6.35-F	4.9	1560	120	60	2	2.5×10^{-6}	0.036
PSL-K-7-F	5.4	1560	100	60	2	2.5×10^{-6}	0.035
PSL-K-8-F	18	4720	230	120	3.5	5.0×10^{-6}	0.056
PSL-K-9-F	20	4720	200	120	3.5	5.0×10^{-6}	0.053
PSL-K-9.525-F	22	4720	200	100	3.5	7.8×10^{-6}	0.069
PSL-K-10-F	23	4720	180	100	3.5	7.7×10^{-6}	0.068
PSL-K-11-F	25	4720	160	100	3.5	7.6×10^{-6}	0.065
PSL-K-12-F	37	6240	200	120	3.5	10×10^{-6}	0.076
PSL-K-12.7-F	40	6240	200	110	3.5	10×10^{-6}	0.073
PSL-K-14-F	44	6240	170	110	3.5	13×10^{-6}	0.083
PSL-K-15-F	76	10160	230	150	7	24×10^{-6}	0.125
PSL-K-16-F	80	10160	210	140	7	27×10^{-6}	0.130
PSL-K-17-F	88	10160	200	130	7	33×10^{-6}	0.145
PSL-K-18-F	88	10160	190	130	7	32×10^{-6}	0.140
PSL-K-19-F	96	10160	180	120	7	40×10^{-6}	0.155
PSL-K-20-F	104	10160	170	120	7	39×10^{-6}	0.150
PSL-K-22-F	168	15200	200	130	7	65×10^{-6}	0.210
PSL-K-24-F	184	15200	180	120	7	76×10^{-6}	0.220
PSL-K-25-F	192	15200	170	120	7	75×10^{-6}	0.210
PSL-K-28-F	304	21600	170	120	12	203×10^{-6}	0.390
PSL-K-30-F	320	21600	160	120	12	230×10^{-6}	0.400
PSL-K-32-F	344	21600	150	110	12	260×10^{-6}	0.425
PSL-K-35-F	504	28800	160	120	12	366×10^{-6}	0.525

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-K-□-F
Size
Type (F: Stainless-steel specification)
Old model ETP - K - □ - F

Unit [mm]

Model	d	D	D1	D2	P	L	L1	L2	L3	L4	S	M1	M2
PSL-K-6-F	6	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-6.35-F	6.35	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-7-F	7	12	25	23	17	10	20	24	3.5	5	1.5	2-M4 × 8	2-M4
PSL-K-8-F	8	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9-F	9	15	28	26	20	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-9.525-F	9.525	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-10-F	10	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-11-F	11	18	31	29	23	12	24	28	5	5	2	3-M4 × 10	3-M4
PSL-K-12-F	12	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-12.7-F	12.7	20	33	31	25	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-14-F	14	22	35	33	27	12	24	28	5	5	2	4-M4 × 10	2-M4
PSL-K-15-F	15	23	39	36	29	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-16-F	16	24	40	37	30	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-17-F	17	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-18-F	18	26	42	39	32	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-19-F	19	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-20-F	20	28	44	41	34	14	29	34	6	7	2	4-M5 × 12	2-M5
PSL-K-22-F	22	32	48	45	38	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-24-F	24	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-25-F	25	34	50	47	40	16	33	38	6.5	8	2.5	6-M5 × 14	2-M5
PSL-K-28-F	28	39	62	59	47	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-30-F	30	41	64	61	49	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-32-F	32	43	66	63	51	20	39	45	7.5	9	2.5	6-M6 × 16	2-M6
PSL-K-35-F	35	47	70	67	55	22	43	49	8	10	3	8-M6 × 18	2-M6

* L1, L2, and S are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

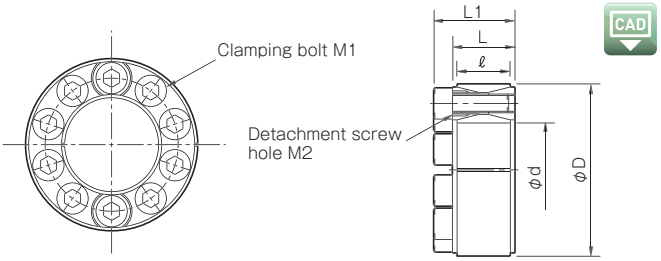
PSL-G Models

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-G-19	289	30500	250	101	17	0.70×10^{-4}	0.22
PSL-G-20	305	30500	238	101	17	0.70×10^{-4}	0.21
PSL-G-22	335	30500	216	101	17	0.69×10^{-4}	0.20
PSL-G-24	411	34300	223	107	17	0.89×10^{-4}	0.23
PSL-G-25	428	34300	214	107	17	0.88×10^{-4}	0.22
PSL-G-28	533	38100	212	108	17	1.28×10^{-4}	0.26
PSL-G-30	571	38100	198	108	17	1.25×10^{-4}	0.25
PSL-G-32	731	45700	223	119	17	1.80×10^{-4}	0.30
PSL-G-35	800	45700	204	119	17	1.74×10^{-4}	0.28
PSL-G-38	1020	53500	220	129	17	2.43×10^{-4}	0.34
PSL-G-40	1070	53500	209	129	17	2.37×10^{-4}	0.32
PSL-G-42	1680	80200	253	142	41	5.26×10^{-4}	0.56
PSL-G-45	1800	80200	236	142	41	5.11×10^{-4}	0.53
PSL-G-48	1920	80200	222	133	41	6.51×10^{-4}	0.59
PSL-G-50	2010	80200	213	133	41	6.36×10^{-4}	0.56
PSL-G-55	2570	93600	226	146	41	8.01×10^{-4}	0.62
PSL-G-60	2810	93600	207	138	41	9.68×10^{-4}	0.65
PSL-G-65	3090	95000	194	133	41	12.8×10^{-4}	0.77
PSL-G-70	4800	137000	218	138	82	28.3×10^{-4}	1.34
PSL-G-75	5160	138000	203	132	82	32.9×10^{-4}	1.40
PSL-G-80	5510	138000	190	127	82	37.9×10^{-4}	1.46
PSL-G-85	6500	153000	199	135	82	44.3×10^{-4}	1.56
PSL-G-90	6880	153000	188	130	82	50.4×10^{-4}	1.62
PSL-G-95	7940	167000	195	137	82	56.6×10^{-4}	1.67
PSL-G-100	10100	202000	205	142	142	91.4×10^{-4}	2.36
PSL-G-110	11100	202000	187	133	142	113.9×10^{-4}	2.53
PSL-G-120	13500	225000	190	138	142	142.7×10^{-4}	2.74

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-G-□
Size
Old model ETP - G - □

Unit [mm]

Model	d	D	L	ℓ	L1	M1	M2
PSL-G-19	19	47	20	17	26	8-M6 × 18	2-M8
PSL-G-20	20	47	20	17	26	8-M6 × 18	2-M8
PSL-G-22	22	47	20	17	26	8-M6 × 18	2-M8
PSL-G-24	24	50	20	17	26	8-M6 × 18	2-M8
PSL-G-25	25	50	20	17	26	8-M6 × 18	2-M8
PSL-G-28	28	55	20	17	26	10-M6 × 18	2-M8
PSL-G-30	30	55	20	17	26	10-M6 × 18	2-M8
PSL-G-32	32	60	20	17	26	12-M6 × 18	2-M8
PSL-G-35	35	60	20	17	26	12-M6 × 18	2-M8
PSL-G-38	38	65	20	17	26	14-M6 × 18	2-M8
PSL-G-40	40	65	20	17	26	14-M6 × 18	2-M8
PSL-G-42	42	75	24	20	32	12-M8 × 22	2-M10
PSL-G-45	45	75	24	20	32	12-M8 × 22	2-M10
PSL-G-48	48	80	24	20	32	12-M8 × 22	2-M10
PSL-G-50	50	80	24	20	32	12-M8 × 22	2-M10
PSL-G-55	55	85	24	20	32	14-M8 × 22	2-M10
PSL-G-60	60	90	24	20	32	14-M8 × 22	2-M10
PSL-G-65	65	95	24	20	32	16-M8 × 22	3-M10
PSL-G-70	70	110	28	24	38	14-M10 × 25	3-M12
PSL-G-75	75	115	28	24	38	14-M10 × 25	3-M12
PSL-G-80	80	120	28	24	38	14-M10 × 25	3-M12
PSL-G-85	85	125	28	24	38	16-M10 × 25	3-M12
PSL-G-90	90	130	28	24	38	16-M10 × 25	3-M12
PSL-G-95	95	135	28	24	38	18-M10 × 25	3-M12
PSL-G-100	100	145	33	26	45	14-M12 × 30	3-M14
PSL-G-110	110	155	33	26	45	14-M12 × 30	3-M14
PSL-G-120	120	165	33	26	45	16-M12 × 30	3-M14

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.
* Screw hole M2 for removal purpose is indicated with a tool mark for sizes 19 to 60 and indicated by marking the head of the bolt with paint for sizes 65 or more.

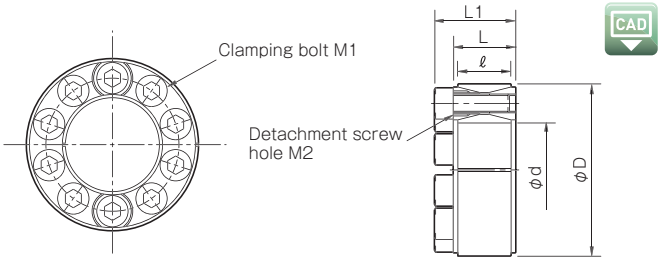
PSL-G C Types

Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-G-19-C	289	30500	250	101	17	0.70×10^{-4}	0.22
PSL-G-20-C	305	30500	238	101	17	0.70×10^{-4}	0.21
PSL-G-22-C	335	30500	216	101	17	0.69×10^{-4}	0.20
PSL-G-24-C	411	34300	223	107	17	0.89×10^{-4}	0.23
PSL-G-25-C	428	34300	214	107	17	0.88×10^{-4}	0.22
PSL-G-28-C	533	38100	212	108	17	1.28×10^{-4}	0.26
PSL-G-30-C	571	38100	198	108	17	1.25×10^{-4}	0.25
PSL-G-32-C	731	45700	223	119	17	1.80×10^{-4}	0.30
PSL-G-35-C	800	45700	204	119	17	1.74×10^{-4}	0.28
PSL-G-38-C	1020	53500	220	129	17	2.43×10^{-4}	0.34
PSL-G-40-C	1070	53500	209	129	17	2.37×10^{-4}	0.32
PSL-G-42-C	1680	80200	253	142	41	5.26×10^{-4}	0.56
PSL-G-45-C	1800	80200	236	142	41	5.11×10^{-4}	0.53
PSL-G-48-C	1920	80200	222	133	41	6.51×10^{-4}	0.59
PSL-G-50-C	2010	80200	213	133	41	6.36×10^{-4}	0.56
PSL-G-55-C	2570	93600	226	146	41	8.01×10^{-4}	0.62
PSL-G-60-C	2810	93600	207	138	41	9.68×10^{-4}	0.65

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions



CAD

How to Place an Order

PSL-G-□-C
Size
Type (C: Simple antirust specifications)
Old model ETP - G - □ - C

Unit [mm]

Model	d	D	L	ℓ	L1	M1	M2
PSL-G-19-C	19	47	20	17	26	8-M6 × 18	2-M8
PSL-G-20-C	20	47	20	17	26	8-M6 × 18	2-M8
PSL-G-22-C	22	47	20	17	26	8-M6 × 18	2-M8
PSL-G-24-C	24	50	20	17	26	8-M6 × 18	2-M8
PSL-G-25-C	25	50	20	17	26	8-M6 × 18	2-M8
PSL-G-28-C	28	55	20	17	26	10-M6 × 18	2-M8
PSL-G-30-C	30	55	20	17	26	10-M6 × 18	2-M8
PSL-G-32-C	32	60	20	17	26	12-M6 × 18	2-M8
PSL-G-35-C	35	60	20	17	26	12-M6 × 18	2-M8
PSL-G-38-C	38	65	20	17	26	14-M6 × 18	2-M8
PSL-G-40-C	40	65	20	17	26	14-M6 × 18	2-M8
PSL-G-42-C	42	75	24	20	32	12-M8 × 22	2-M10
PSL-G-45-C	45	75	24	20	32	12-M8 × 22	2-M10
PSL-G-48-C	48	80	24	20	32	12-M8 × 22	2-M10
PSL-G-50-C	50	80	24	20	32	12-M8 × 22	2-M10
PSL-G-55-C	55	85	24	20	32	14-M8 × 22	2-M10
PSL-G-60-C	60	90	24	20	32	14-M8 × 22	2-M10

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

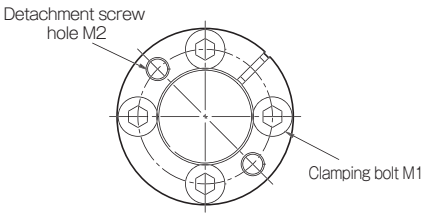
PSL-D Models

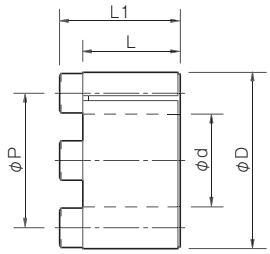
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-D-6	6	2100	150	60	1	0.48×10^{-6}	0.012
PSL-D-7	8	2100	140	60	1	0.52×10^{-6}	0.013
PSL-D-8	10	2600	110	50	1	0.77×10^{-6}	0.015
PSL-D-9	15	3200	130	60	1	1.1×10^{-6}	0.020
PSL-D-10	16	3200	110	60	1	1.2×10^{-6}	0.019
PSL-D-11	17	3200	100	50	1	1.8×10^{-6}	0.024
PSL-D-12	19	3200	100	50	1	1.7×10^{-6}	0.022
PSL-D-14	34	4800	100	50	2	4.3×10^{-6}	0.039
PSL-D-15	36	4800	90	50	2	5.7×10^{-6}	0.044
PSL-D-16	67	8400	130	60	4	10×10^{-6}	0.068
PSL-D-17	70	8400	120	60	4	18×10^{-6}	0.093
PSL-D-18	75	8400	110	60	4	17×10^{-6}	0.090
PSL-D-19	80	8400	110	60	4	16×10^{-6}	0.085
PSL-D-20	140	13600	150	80	8	24×10^{-6}	0.120
PSL-D-22	150	13600	140	80	8	29×10^{-6}	0.130
PSL-D-24	230	19300	150	80	14	70×10^{-6}	0.220
PSL-D-25	240	19300	140	80	14	69×10^{-6}	0.210
PSL-D-28	400	28900	190	110	14	86×10^{-6}	0.240
PSL-D-30	430	28900	180	100	14	128×10^{-6}	0.270
PSL-D-32	460	28900	170	100	14	123×10^{-6}	0.260
PSL-D-35	670	38600	160	90	14	215×10^{-6}	0.370
PSL-D-38	730	38600	150	90	14	298×10^{-6}	0.420
PSL-D-40	770	38600	140	90	14	286×10^{-6}	0.410
PSL-D-42	1110	52700	150	80	34	682×10^{-6}	0.700
PSL-D-45	1200	52700	140	80	34	609×10^{-6}	0.630
PSL-D-48	1690	70300	190	110	34	769×10^{-6}	0.730
PSL-D-50	1760	70300	180	110	34	742×10^{-6}	0.710

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions





CAD

How to Place an Order

PSL-D-□

Size

Old model ETP - D - □

Unit [mm]

Model	d	D	P	L	L1	M1	M2
PSL-D-6	6	16	11	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-7	7	17	12	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-8	8	18	13	11	13.5	3-M2.5 × 10	2-M2.5
PSL-D-9	9	20	15	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-10	10	20	15	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-11	11	22	17	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-12	12	22	17	13	15.5	4-M2.5 × 12	2-M2.5
PSL-D-14	14	26	20	17	20	4-M3 × 16	2-M3
PSL-D-15	15	28	21.5	17	20	4-M3 × 16	2-M3
PSL-D-16	16	32	24	17	21	4-M4 × 16	2-M4
PSL-D-17	17	35	27	21	25	4-M4 × 20	2-M4
PSL-D-18	18	35	27	21	25	4-M4 × 20	2-M4
PSL-D-19	19	35	27	21	25	4-M4 × 20	2-M4
PSL-D-20	20	38	29	21	26	4-M5 × 20	2-M5
PSL-D-22	22	40	31	21	26	4-M5 × 20	2-M5
PSL-D-24	24	47	36	26	32	4-M6 × 25	2-M6
PSL-D-25	25	47	36	26	32	4-M6 × 25	2-M6
PSL-D-28	28	50	39	26	32	6-M6 × 25	2-M6
PSL-D-30	30	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-32	32	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-35	35	60	47.5	31	37	8-M6 × 30	2-M6
PSL-D-38	38	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-40	40	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-42	42	75	60	36	44	6-M8 × 35	2-M8
PSL-D-45	45	75	60	36	44	6-M8 × 35	2-M8
PSL-D-48	48	80	65	36	44	8-M8 × 35	2-M8
PSL-D-50	50	80	65	36	44	8-M8 × 35	2-M8

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

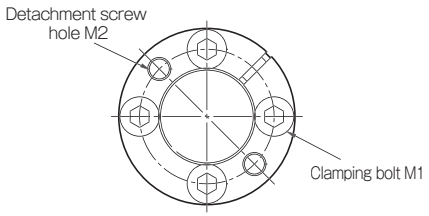
PSL-D C Types

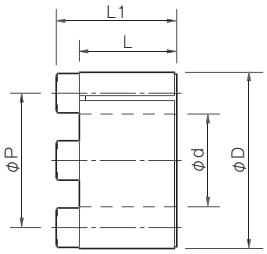
Specifications

Model	Rated torque [N·m]	Rated thrust [N]	Shaft contact pressure [N/mm²]	Hub contact pressure [N/mm²]	Tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]
PSL-D-16-C	67	8400	130	60	4	10×10^{-6}	0.068
PSL-D-17-C	70	8400	120	60	4	18×10^{-6}	0.093
PSL-D-18-C	75	8400	110	60	4	17×10^{-6}	0.090
PSL-D-19-C	80	8400	110	60	4	16×10^{-6}	0.085
PSL-D-20-C	140	13600	150	80	8	24×10^{-6}	0.120
PSL-D-22-C	150	13600	140	80	8	29×10^{-6}	0.130
PSL-D-24-C	230	19300	150	80	14	70×10^{-6}	0.220
PSL-D-25-C	240	19300	140	80	14	69×10^{-6}	0.210
PSL-D-28-C	400	28900	190	110	14	86×10^{-6}	0.240
PSL-D-30-C	430	28900	180	100	14	128×10^{-6}	0.270
PSL-D-32-C	460	28900	170	100	14	123×10^{-6}	0.260
PSL-D-35-C	670	38600	160	90	14	215×10^{-6}	0.370
PSL-D-38-C	730	38600	150	90	14	298×10^{-6}	0.420
PSL-D-40-C	770	38600	140	90	14	286×10^{-6}	0.410
PSL-D-42-C	1110	52700	180	110	34	682×10^{-6}	0.700
PSL-D-45-C	1200	52700	140	80	34	609×10^{-6}	0.630
PSL-D-48-C	1690	70300	190	110	34	769×10^{-6}	0.730
PSL-D-50-C	1760	70300	180	110	34	742×10^{-6}	0.710

* The rated torque values are those when the thrust is zero and the rated thrust values are those when the torque is zero.

Dimensions





CAD

How to Place an Order

PSL-D-□-C

Size

Type (C: Simple antirust specifications)

Old model ETP - D - □ - C

Unit [mm]

Model	d	D	P	L	L1	M1	M2
PSL-D-16-C	16	32	24	17	21	4-M4 × 16	2-M4
PSL-D-17-C	17	35	27	21	25	4-M4 × 20	2-M4
PSL-D-18-C	18	35	27	21	25	4-M4 × 20	2-M4
PSL-D-19-C	19	35	27	21	25	4-M4 × 20	2-M4
PSL-D-20-C	20	38	29	21	26	4-M5 × 20	2-M5
PSL-D-22-C	22	40	31	21	26	4-M5 × 20	2-M5
PSL-D-24-C	24	47	36	26	32	4-M6 × 25	2-M6
PSL-D-25-C	25	47	36	26	32	4-M6 × 25	2-M6
PSL-D-28-C	28	50	39	26	32	6-M6 × 25	2-M6
PSL-D-30-C	30	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-32-C	32	55	43.5	26	32	6-M6 × 25	2-M6
PSL-D-35-C	35	60	47.5	31	37	8-M6 × 30	2-M6
PSL-D-38-C	38	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-40-C	40	65	52.5	31	37	8-M6 × 30	2-M6
PSL-D-42-C	42	75	60	36	44	6-M8 × 35	2-M8
PSL-D-45-C	45	75	60	36	44	6-M8 × 35	2-M8
PSL-D-48-C	48	80	65	36	44	8-M8 × 35	2-M8
PSL-D-50-C	50	80	65	36	44	8-M8 × 35	2-M8

* L and L1 are dimensions before the POSI-LOCK is mounted.
* The nominal diameter of each bolt and tap is equal to the quantity minus the nominal diameter of the screw threads times the nominal length.

PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Selection Procedure

(1) Selection is determined by the used shaft diameter. In general, find the torque, Ta, applied to the connecting element using the output capacity, P, of the driver and usage rotation speed, n. Next, obtain the thrust, Fa, applied to the connecting element.

$$Ta\ [N\cdot m] = 9550 \times \frac{P\ [kW]}{n\ [min^{-1}]}$$

Ta: Torque applied to the connecting element [N·m]
P: Driver's output [kW]
n: Connecting element's rotation speed [min^{-1}]
Fa: Thrust applied to the connecting element [N]

(2) Determine the service factor, K1, based on the load property and obtain the corrected torque, Td, and corrected thrust, Fd, applied to the connecting element.

$$Td = Ta \times K1$$
$$Fd = Fa \times K1$$

Td: Corrected torque applied to the connecting element [N·m]
Fd: Corrected thrust applied to the connecting element [N]
K1: Service factor based on the load property

(3) Correct the values according to the load property.

1. For the torque alone

Compare the connecting element's rated torque, T, based on the used diameter with the calculated corrected torque, Td.

$$T \geqq Td$$

T: Connecting element's rated torque [N·m]

2. For the thrust alone

Compare the connecting element's rated thrust, F, based on the used diameter with the calculated corrected thrust, Fd.

$$F \geqq Fd$$

F: Connecting element's rated thrust [N]

3. If torque and thrust are applied at the same time

Calculate the combined load, Mr, and compare the result with the rated torque, T.

$$Mr = \sqrt{Td^2 + (Fd \times \frac{d}{2})^2}$$

$$T \geqq Mr$$

Mr: Combined load applied to the connecting element [N·m]
d: Shaft diameter [m]

(4) Obtain the hub's minimum external diameter and the hollow shaft's maximum internal diameter.

1. Obtain the hub's minimum external diameter based on the used hub material's strength.

$$DO \geqq D\sqrt{\frac{\delta_{0.2N} + CP_2}{\delta_{0.2N} - CP_2}}$$

$C = 1 \quad B = L$
$C = 0.8 \quad L < B < 2L$
$C = 0.6 \quad B \geqq 2L$

DO: Hub's minimum external diameter [mm]
D : Hub's internal diameter [mm]
P_2 : Hub contact pressure [N/mm^2]
$\delta_{0.2N}$: Hub material's yield stress [N/mm^2]
B : Hub length [mm]
L : Effective contact length [mm]
C : Coefficient

If the hub material's yield stress value is large, make sure the ratio of the hub's minimum external diameter to the hub's internal diameter is more than about 1.3 times to prevent the hub's deformation.

2.Obtain the hollow shaft's maximum internal diameter based on the used hollow shaft material's strength.

$$di \leqq d\sqrt{\frac{\delta_{0.2N} - 2P_1C}{\delta_{0.2N}}}$$

$C = 0.6$ when using a single one
$C = 0.8$ when using multiple ones

di : Hollow shaft's maximum internal diameter [mm]
$\delta_{0.2N}$: Hollow shaft material's yield stress [N/mm^2]
P_1 : Shaft contact pressure [N/mm^2]
d: Shaft diameter [mm]
C: Coefficient

Service Factors

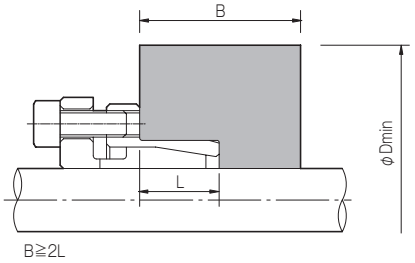
■ Service factor based on the load property: K1

Load property	Constant	Fluctuation: Small	Fluctuation: Medium	Fluctuation: Large
				
K1	1.0	1.25	1.75	2.25

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-K/PSL-K B/PSL-K C/PSL-K F



ø Dmin, unit [mm]

PSL-K PSL-K B PSL-K C (PSL-K F) size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 (N/mm²)									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
6	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
6.35	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
7	80 (60)	17 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)	16 (16)
8	160 (120)	32 (25)	27 (23)	25 (21)	23 (21)	22 (20)	21 (20)	21 (20)	20 (20)	20 (20)	20 (20)
9	160 (120)	32 (25)	27 (23)	25 (21)	23 (21)	22 (20)	21 (20)	21 (20)	20 (20)	20 (20)	20 (20)
9.525	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
10	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
11	130 (100)	32 (27)	29 (25)	27 (24)	26 (24)	25 (24)	24 (24)	24 (24)	24 (24)	24 (24)	24 (24)
12	160 (120)	43 (34)	36 (31)	33 (29)	31 (28)	30 (27)	29 (26)	28 (26)	27 (26)	26 (26)	26 (26)
12.7	140 (110)	38 (32)	33 (29)	31 (28)	29 (27)	28 (26)	27 (26)	27 (26)	26 (26)	26 (26)	26 (26)
14	140 (110)	41 (35)	36 (32)	34 (30)	32 (30)	31 (29)	30 (29)	29 (29)	29 (29)	29 (29)	29 (29)
15	190 (150)	62 (46)	49 (40)	42 (36)	40 (35)	38 (34)	35 (32)	34 (31)	32 (30)	31 (30)	30 (30)
16	180 (140)	59 (45)	48 (40)	42 (37)	40 (35)	38 (34)	36 (33)	35 (32)	33 (32)	32 (32)	32 (32)
17	170 (130)	60 (46)	49 (41)	44 (38)	42 (37)	40 (36)	38 (35)	37 (34)	35 (34)	34 (34)	34 (34)
18	170 (130)	60 (46)	49 (41)	44 (38)	42 (37)	40 (36)	38 (35)	37 (34)	35 (34)	34 (34)	34 (34)
19	160 (120)	60 (47)	51 (43)	46 (40)	44 (39)	42 (38)	40 (37)	39 (37)	37 (37)	37 (37)	37 (37)
20	160 (120)	60 (47)	51 (43)	46 (40)	44 (39)	42 (38)	40 (37)	39 (37)	37 (37)	37 (37)	37 (37)
22	170 (130)	73 (57)	61 (51)	54 (47)	52 (46)	49 (44)	47 (43)	46 (42)	43 (42)	42 (42)	42 (42)
24	160 (120)	73 (57)	62 (52)	56 (49)	53 (47)	51 (46)	49 (45)	47 (45)	45 (45)	45 (45)	45 (45)
25	160 (120)	73 (57)	62 (52)	56 (49)	53 (47)	51 (46)	49 (45)	47 (45)	45 (45)	45 (45)	45 (45)
28	160 (120)	83 (66)	71 (60)	64 (56)	61 (54)	58 (52)	56 (51)	54 (51)	52 (51)	51 (51)	51 (51)
30	150 (120)	82 (69)	71 (63)	65 (59)	62 (57)	60 (55)	57 (54)	56 (54)	54 (54)	54 (54)	54 (54)
32	140 (110)	81 (69)	71 (63)	66 (60)	63 (58)	61 (56)	59 (56)	57 (56)	56 (56)	56 (56)	56 (56)
35	150 (120)	94 (79)	81 (72)	74 (67)	71 (65)	69 (63)	66 (62)	64 (62)	62 (62)	62 (62)	62 (62)
38	160	107	91	82	78	75	71	70	66	65	65
40	120	89	81	76	73	71	69	69	69	69	69
42	130	98	87	81	78	76	73	72	72	72	72

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.234.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.
* The values in parentheses are those of PSL-KF.

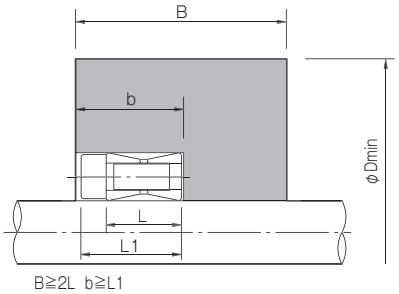
PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-G/PSL-G-C



ø Dmin, unit [mm]

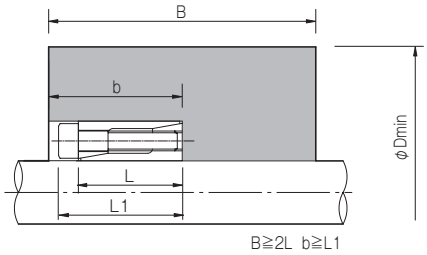
PSL-G PSL-G C size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
19	101	72	67	63	62	62	62	62	62	62	62
20	101	72	67	63	62	62	62	62	62	62	62
22	101	72	67	63	62	62	62	62	62	62	62
24	107	79	73	69	67	65	65	65	65	65	65
25	107	79	73	69	67	65	65	65	65	65	65
28	108	87	80	76	73	72	72	72	72	72	72
30	108	87	80	76	73	72	72	72	72	72	72
32	119	101	91	85	83	80	78	78	78	78	78
35	119	101	91	85	83	80	78	78	78	78	78
38	129	115	103	96	92	90	86	85	85	85	85
40	129	115	103	96	92	90	86	85	85	85	85
42	142	143	125	115	111	107	103	100	98	98	98
45	142	143	125	115	111	107	103	100	98	98	98
48	133	145	129	119	115	111	107	105	104	104	104
50	133	145	129	119	115	111	107	105	104	104	104
55	146	166	145	133	127	123	117	117	117	117	117
60	138	168	148	137	131	127	122	119	117	117	117
65	133	172	153	142	136	132	127	125	124	124	124
70	138	205	181	167	160	155	149	146	143	143	143
75	132	207	184	171	165	160	154	151	150	150	150
80	127	210	189	176	169	164	159	156	156	156	156
85	135	229	203	188	181	175	168	165	163	163	163
90	130	231	207	192	185	180	173	170	169	169	169
95	137	250	221	204	196	190	183	179	176	176	176
100	142	276	243	223	214	207	199	194	189	189	189
110	133	280	250	231	223	216	208	204	202	202	202
120	138	307	271	250	241	233	224	219	215	215	215

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.234.
* The above SUS values are proof stress values [N/mm²] after quenching and tempering.

Hub's Minimum External Diameters

If the stress applied to the hub is too large, the hub may be deformed. Select the appropriate external diameter size from the hub's minimum external diameters in the table below in the design phase.

■ PSL-D/PSL-D C



ø Dmin, unit [mm]

PSL-D PSL-D C size	Hub contact pressure [N/mm²]	Material's yield stress δ 0.2 [N /mm²]									
		150	180	210	230	250	280	300	350	400	450
		FC250	FC300 SS330 SC360 FCMB310	FC350 SS400 SC410 FCMB360 SUS304	SC450 S15C SF440	FCD400 SS490 SC480 S20C SF490	S30C SF540 SUS201	FCD450 S35C SF590	FCD500 S45C SUS410	FCD600 S55C SUS403	FCD700 SUS420
6	60	21	21	21	21	21	21	21	21	21	21
7	60	23	23	23	23	23	23	23	23	23	23
8	50	24	24	24	24	24	24	24	24	24	24
9	60	26	26	26	26	26	26	26	26	26	26
10	60	26	26	26	26	26	26	26	26	26	26
11	50	29	29	29	29	29	29	29	29	29	29
12	50	29	29	29	29	29	29	29	29	29	29
14	50	34	34	34	34	34	34	34	34	34	34
15	50	37	37	37	37	37	37	37	37	37	37
16	60	42	42	42	42	42	42	42	42	42	42
17	60	46	46	46	46	46	46	46	46	46	46
18	60	46	46	46	46	46	46	46	46	46	46
19	60	46	46	46	46	46	46	46	46	46	46
20	80	53	50	50	50	50	50	50	50	50	50
22	80	56	53	52	52	52	52	52	52	52	52
24	80	65	62	62	62	62	62	62	62	62	62
25	80	65	62	62	62	62	62	62	62	62	62
28	110	80	73	69	67	66	65	65	65	65	65
30	100	84	78	74	72	72	72	72	72	72	72
32	100	84	78	74	72	72	72	72	72	72	72
35	90	87	82	78	78	78	78	78	78	78	78
38	90	95	89	85	85	85	85	85	85	85	85
40	90	95	89	85	85	85	85	85	85	85	85
42	80	105	99	98	98	98	98	98	98	98	98
45	80	105	99	98	98	98	98	98	98	98	98
48	110	128	118	111	107	105	104	104	104	104	104
50	110	128	118	111	107	105	104	104	104	104	104

* The hub's minimum external diameter shows a value calculated based on C=0.6 in the selection procedure on P.234.
* The above SUS values are proof stress values (N/mm²) after quenching and tempering.

PSL-K/PSL-G/PSL-D Models

Items Checked for Design Purposes

Mounting Shaft Tolerance, Mounting Hub Tolerance, and Surface Roughness

■ PSL-K

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-K	h8	H7	12.5S (center line's average roughness 3.2a) or less
PSL-K B			
PSL-K C			
PSL-K F			

■ PSL-G

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-G	h9	H8	12.5S (center line's average roughness 3.2a) or less
PSL-G C			

■ PSL-D

Model	Mounting shaft tolerance	Mounting hub tolerance	Surface roughness
PSL-D	h9	H9	12.5S (center line's average roughness 3.2a) or less
PSL-D C			

Operating Temperature Range

■ PSL-K

Model	Operating temperature range [℃]
PSL-K	− 40 ～ 150
PSL-K B	
PSL-K C	
PSL-K F	

■ PSL-G

Model	Operating temperature range [℃]
PSL-G	− 40 ～ 150
PSL-G C	

■ PSL-D

Model	Operating temperature range [℃]
PSL-D	− 40 ～ 150
PSL-D C	

When the Shaft Has a Keyway

When the shaft of a motor or speed reducer has a keyway, the PSL-D can be used if the keyway width meets the JIS standard, but the rated torque and rated thrust decrease 10% to 15%.

Bending Moment

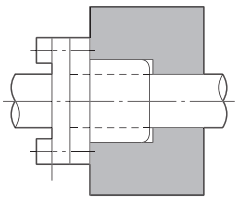
In principle, the POSI-LOCK does not allow a bending moment.

Centering Mechanism

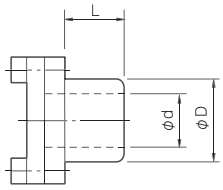
The POSI-LOCK does not have a centering mechanism. Accordingly, if you need accurate concentricity and runout, provide a centering mechanism. A centering mechanism brings the shaft in direct contact with part of the hub to control the concentricity and runout amount (see Figure A).

The accuracy by centering is determined by the centering length (the contact length of the shaft and the hub) and the fit tolerance. It is generally thought that the centering length (the contact length of the shaft and the hub) should be longer than the shaft diameter (see Figure B).

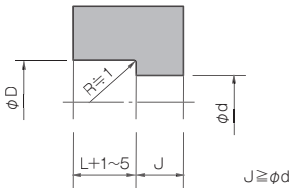
■ Figure A: Centering mechanism



■ PSL dimension series numbers



■ Figure B: Hub machining dimensions



The concentricity and runout accuracy by the centering mechanism is determined by the machining dimensions of the shaft and the hub. In other words, there is the possibility that the hub is inclined by a gap between the shaft's external diameter and the hub's internal diameter of the centering part. Accordingly, the shaft and the hub must be machined so that the concentricity and runout accuracy are within the desired values. Note that the concentricity and runout accuracy by the centering mechanisms can be calculated with the following formula.

● Maximum runout accuracy:
Ea (the runout is measured at the radius r)

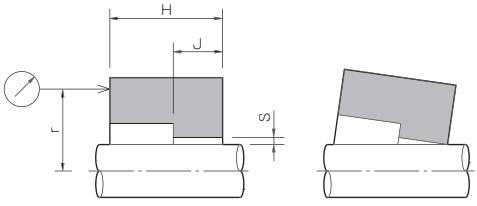
$$Ea \fallingdotseq 2 \times r \times S/J$$

$$S = [(\text{hub's machining size}) - (\text{shaft's machining size})]/2$$

● Maximum concentricity runout: Eb

$$Eb \fallingdotseq H \times S/J$$

■ Runout by the centering mechanism



J: Centering length (contact length of the shaft and the hub)
r: Measurement position of the runout accuracy
H: Overall length of the hub

Items Checked for Design Purposes

Mounting

(1) Wipe the rust, dust, and oil completely off the inner surface of the shaft and hub, and apply oil or grease to coat it thinly.

(2) Wipe the rust-proof oil and dirt off the exterior of the POSI-LOCK (the outer sleeve's (ring's) external surface and inner sleeve's (ring's) internal surface). Do not disassemble or wipe any other parts. Never allow oil containing molybdenum-based antifriction material to contact the surface. If that happens, the friction coefficient basically changes.

(3) Mount the POSI-LOCK to the shaft and hub, lightly tighten the clamping bolts so that the parts slightly contact each other, and then perform positioning.

At this point, never tighten the clamping bolts before mounting the POSI-LOCK to the shaft and hub.

(4) Tighten the clamping bolts.

・For PSL-K/PSL-D

Increase tightening on diagonally opposed clamping bolts evenly. After that, tighten all the clamping bolts to the specified torque using a torque wrench. Because the PSL-K F clamping bolts are coated with a solid lubricant film, do not apply lubricants such as oil or grease to the clamping bolts when tightening them.

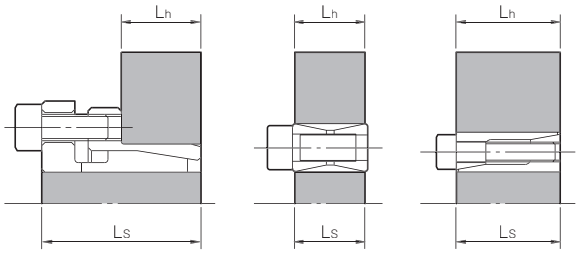
・For PSL-G

The PSL-G has many clamping bolts compared with other POSI-LOCK models, so tighten diagonally opposed clamping bolts evenly about four times to the specified torque. (If you tighten a bolt four times, tighten it so that the torque will increase about 25% every time.) Finally, tighten all the clamping bolts again to the specified torque. To prevent the bolts from coming loose after tightening them, check the tightening torque again after operating for a certain period of time.

Standard Dimensions of the Shaft and the Hub

The performance of the POSI-LOCK is based on the case where the shaft and the hub have the effect for the entire standard shaft length (Ls) and the entire standard hub length (Lh), respectively. Accordingly, make sure in the design phase that the shaft and the hub have the effect for the respective entire standard length.

■ PSL-K ■ PSL-G ■ PSL-D



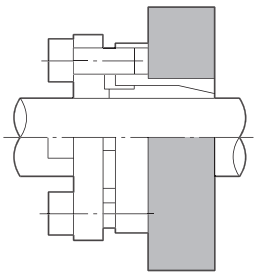
■ POSI-LOCK standard dimension series numbers

Model	Nominal standard dimensions	Dimensional drawing symbols
PSL-K	Shaft's standard dimension Ls	L1
	Hub's standard dimension Lh	L
PSL-G	Shaft's standard dimension Ls	ℓ
	Hub's standard dimension Lh	ℓ
PSL-D	Shaft's standard dimension Ls	L
	Hub's standard dimension Lh	L

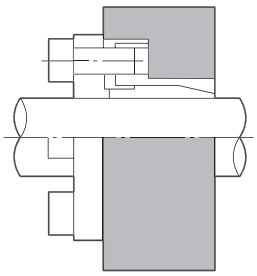
Hub's Movement in the Axial Direction

For the PSL-K and PSL-D models, mount the shaft and hub and then tighten the bolts. The hub will be slightly drawn and moved in the shaft direction. Special attention is required to mount it in the axial direction with high accuracy. However, if the hub is mounted as shown in Figure 1 for the PSL-K, tightening the bolt moves the hub (outer sleeve) slightly in the shaft direction. On the other hand, mounting the hub as shown in Figure 2 eliminates the movement in the shaft direction. In this case, the torque, thrust, and contact pressure decrease to 70% of the specified values.

■ Figure 1



■ Figure 2



Removal

(1) Before starting work, ensure safety by making sure no torque and thrust are applied to the POSI-LOCK and there is no risk of a fall due to the self-weight of the shaft and hub. The POSI-LOCK does not have a self-locking mechanism. The connecting force is instantaneously released by loosening the clamping bolts.

(2) Remove it.

・For PSL-K/PSL-D

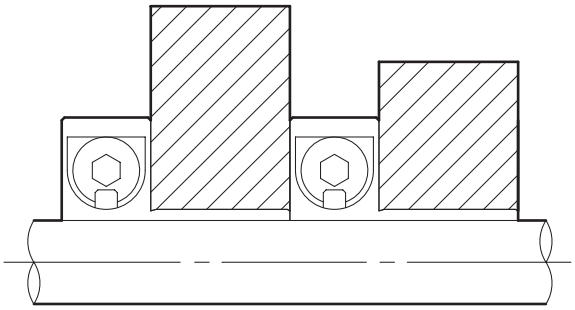
The PSL-K or PSL-D model may not be removed by loosening the clamping bolts, because it is self-locked depending on the conditions. Never remove it forcibly, because the shaft, hub, and main body may be damaged. To remove it, first loosen the clamping bolts to open a gap between the flange and the clamping bolt bearing surface. (About a 2-mm gap is sufficient.) Then insert a bolt into the threaded hole for removal to release the connection. Normally one removal screw is enough to remove the device. If the device cannot be moved, use two screws.

・For PSL-G

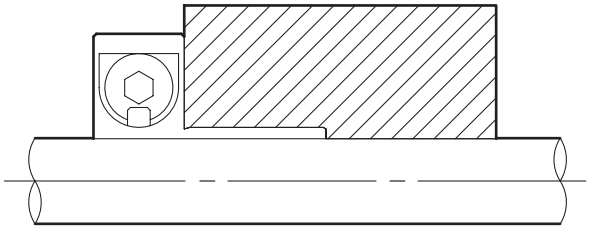
After ensuring safety, loosen the clamping bolts. The parts are automatically separated from each other. The PSL-G may not be removed by loosening the clamping bolts depending on the conditions. Never remove it forcibly, because the shaft, hub, and main body may be damaged. If the rear tapering cannot be loosened by loosening the clamping bolts, tap on the heads of the clamping bolts. The spring action of each part moves the rear tapering backward so that it is released. If the front tapering cannot be loosened by loosening the clamping bolts, insert a bolt into the threaded hole for removal (which is one size larger than the clamping bolt) and tap the bolt head with a hammer. This will enable the front tapering to be released.

Mounting Example

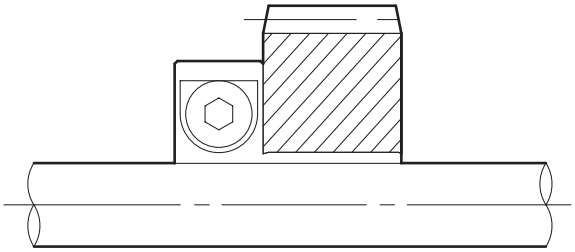
Connection with a Cam, Etc. (Phase Matching)
■ ETP-T



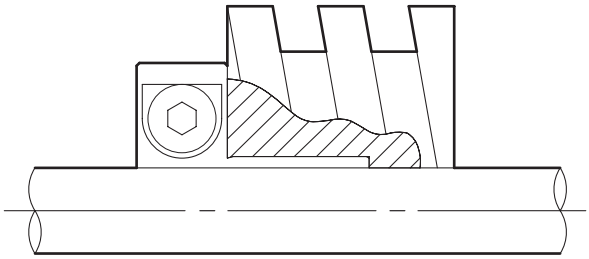
Connection with a Roller of a Printing Machinery
■ ETP-T



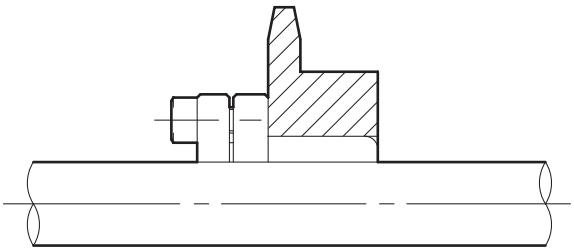
Connection with a Timing Gear
■ ETP-E



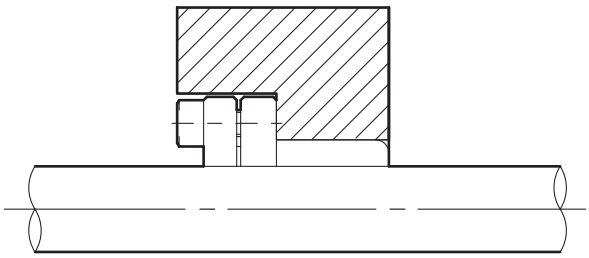
Connection with a Rotor
■ ETP-E



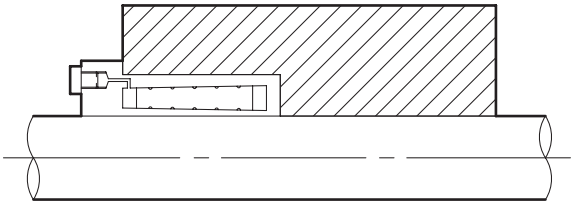
Connection with a Sprocket
■ ETP-A



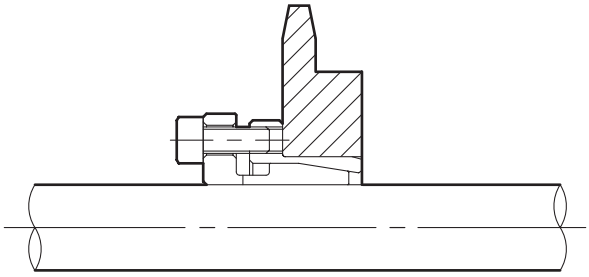
Drilling a Stepped Hole in the Hub for Connection
■ ETP-A



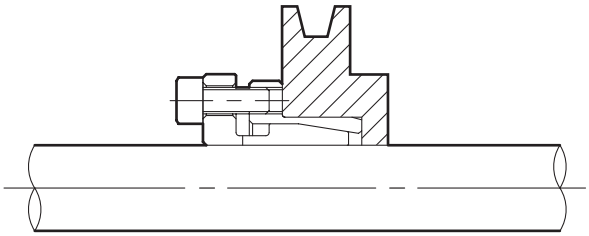
Connection with a Rolling Roller
■ ETP-H



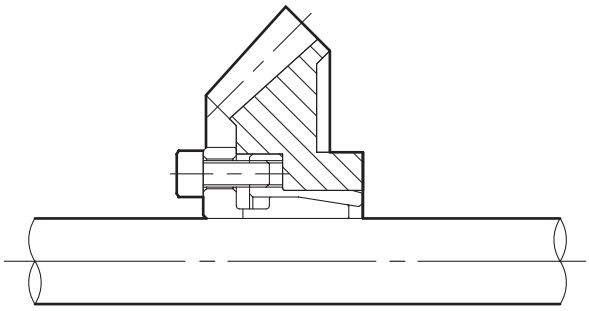
Connection with a Sprocket
■ PSL-K



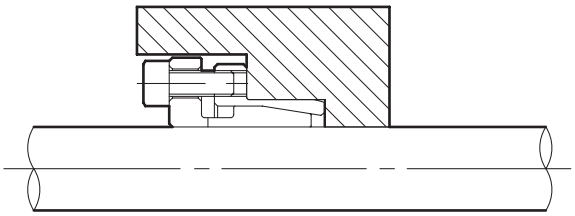
Connection with a V-pulley
■ PSL-K



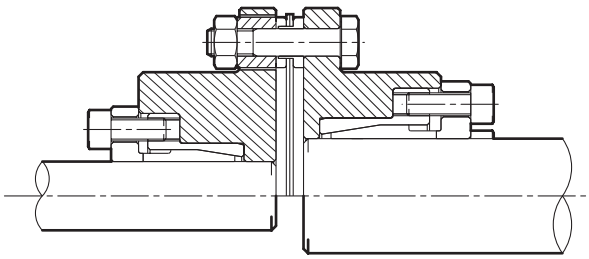
Connection with a Bevel Gear (Suppress Axial Movement)
■ PSL-K



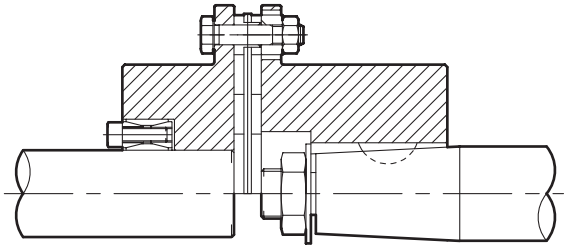
Stepped Hub (Saving Space)
■ PSL-K



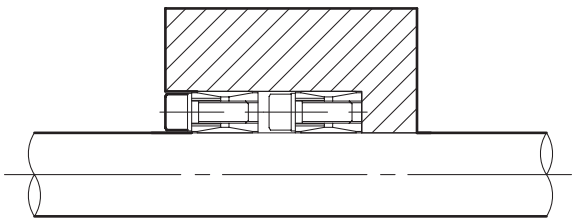
As a Connecting Element for Shaft Couplings
■ PSL-K



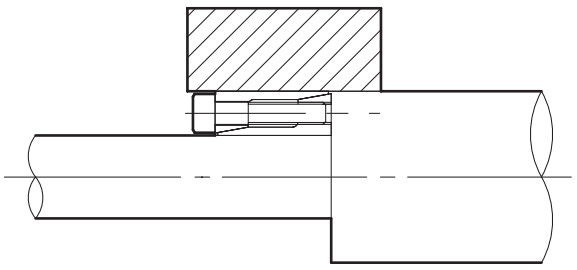
As a Connecting Element for Shaft Couplings
■ PSL-G



Connection when the Torque Is High (Using 2 Pieces)
■ PSL-G



Connection with a Small Diameter Hub
■ PSL-D



Torque Wrenches

ETP-T, ETP-T C

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M12	12.0	N230SPCK × 12.0N・m	230HCK 6mm	15 ～ 20
M14	16.0	N230SPCK × 16.0N・m	230HCK 6mm	24 ～ 35
M16	24.0	N450SPCK × 24.0N・m	450HCK 8mm	40 ～ 50
M20	40.0	N450SPCK × 40.0N・m	450HCK 10mm	60 ～ 80
M22	60.0	N900SPCK × 60.0N・m	900HCK 10mm	90
M24	80.0	N900SPCK × 80.0N・m	900HCK 12mm	100

ETP-E, ETP-E R

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M10	5.0	N 60SPCK × 5.0N・m	230HCK 5mm	15 ～ 35
M16	21.0	N230SPCK × 21.0N・m	230HCK 8mm	38 ～ 60
M20	39.0	N450SPCK × 39.0N・m	450HCK 10mm	70 ～ 100

ETP-A, ETP-A C, ETP-A S

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M5	6.0	N60SPCK × 6.0N・m	230HCK 4mm	15
M5	8.0	N120SPCK × 8.0N・m	230HCK 4mm	19 ～ 42
M6	13.0	N230SPCK × 13.0N・m	230HCK 5mm	45 ～ 65
M8	32.0	N450SPCK × 32.0N・m	450HCK 6mm	70 ～ 100

ETP-A B

Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M5	6.0	N60SPCK × 6.0N・m	230SCK 8mm	15
M5	8.0	N120SPCK × 8.0N・m	230SCK 8mm	19 ～ 42
M6	13.0	N230SPCK × 13.0N・m	230SCK 10mm	45 ～ 65
M8	32.0	N450SPCK × 32.0N・m	450SCK 13mm	70 ～ 100

ETP-A R

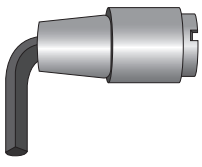
Nominal diameter	Tightening torque [N・m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M5	4.5	N60SPCK × 4.5N・m	230SCK 8mm	15 ～ 40
M6	7.8	N120SPCK × 7.8N・m	230SCK 10mm	45 ～ 50

Torque Wrench (Single-function)

■ N-SPCK

Hexagonal Head

■ HCK

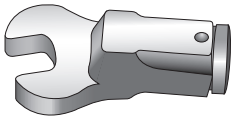


Torque Wrench (Preset Type)

■ N-LCK

Wrench Attachment

■ SCK



* The above torque wrench and wrench attachment models are those of Nakamura Mfg. Co., Ltd.

PSL-K, PSL-K C

Nominal diameter	Tightening torque [N ·m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M4	2.0	N60SPCK × 2.0N ·m	230HCK 3mm	6 ~ 7
M4	4.0	N60SPCK × 4.0N ·m	230HCK 3mm	8 ~ 14
M5	8.0	N120SPCK × 8.0N ·m	230HCK 4mm	15 ~ 25
M6	14.0	N230SPCK × 14.0N ·m	230HCK 5mm	28 ~ 42

PSL-K B

Nominal diameter	Tightening torque [N ·m]	Torque wrench (Single-function)	Wrench attachment	Applicable size
M4	2.0	N60SPCK × 2.0N ·m	230SCK 7mm	6 ~ 7
M4	4.0	N60SPCK × 4.0N ·m	230SCK 7mm	8 ~ 14
M5	8.0	N120SPCK × 8.0N ·m	230SCK 8mm	15 ~ 25
M6	14.0	N230SPCK × 14.0N ·m	230SCK 10mm	28 ~ 42

PSL-K F

Nominal diameter	Tightening torque [N ·m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M4	2.0	N60SPCK × 2.0N ·m	230HCK 3mm	6 ~ 7
M4	3.5	N60SPCK × 3.5N ·m	230HCK 3mm	8 ~ 14
M5	7.0	N120SPCK × 7.0N ·m	230HCK 4mm	15 ~ 25
M6	12.0	N230SPCK × 12.0N ·m	230HCK 5mm	28 ~ 35

PSL-G, PSL-G C

Nominal diameter	Tightening torque [N ·m]	Torque wrench (Preset type)	Hexagonal head	Applicable size
M6	17.0	N230LCK	230HCK 5mm	19 ~ 40
M8	41.0	N450LCK	450HCK 6mm	42 ~ 65
M10	82.0	N900LCK	900HCK 8mm	70 ~ 95
M12	142.0	N1800LCK	1800HCK 10mm	100 ~ 120

PSL-D, PSL-D C

Nominal diameter	Tightening torque [N ·m]	Torque wrench (Single-function)	Hexagonal head	Applicable size
M2.5	1.0	N60SPCK × 1.0N ·m	230HCK 2mm	6 ~ 12
M3	2.0	N60SPCK × 2.0N ·m	230HCK 2.5mm	14 ~ 15
M4	4.0	N60SPCK × 4.0N ·m	230HCK 3mm	16 ~ 19
M5	8.0	N120SPCK × 8.0N ·m	230HCK 4mm	20 ~ 22
M6	14.0	N230SPCK × 14.0N ·m	230HCK 5mm	24 ~ 40
M8	34.0	N450SPCK × 34.0N ·m	450HCK 6mm	42 ~ 50