ETP-TECHNO®

ETP Transmission AB

High Concentricity
Due to its complete single-piece construction, the hub can be mounted with the concentricity of (several μm).

Mounting/Dismounting with one screw
Mounting and dismounting can be easily and quickly done with only one pressure screw.

Economy of workspace
The pressure screw can be fastened from the radial direction that a workspace for mounting can be saved.

Key processing is not required.
Any trouble caused by keys such as a keyway processing can be resolved. Furthermore, the processing tolerance of the shaft · hub is general tolerance that special finish is not required.

Zero thrust load
Only the radial load acts on the shaft and hub that the thrust load becomes zero.

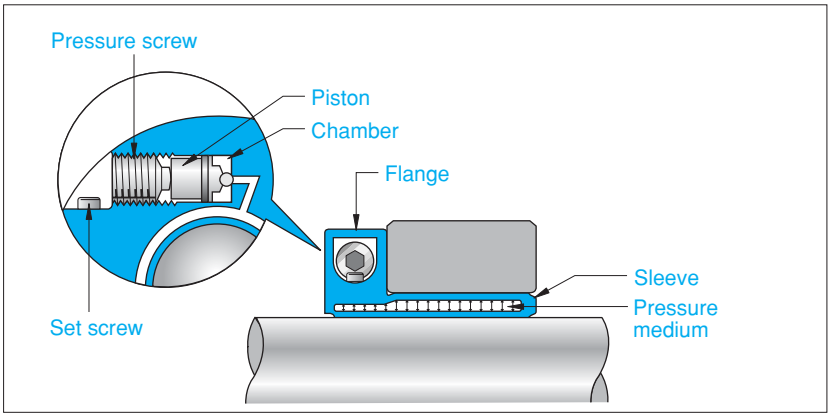
Adapted to the RoHS
Adapted to the Restriction of Hazardous Substances defined by EU that bans the use of 6 substances such as mercury or lead.

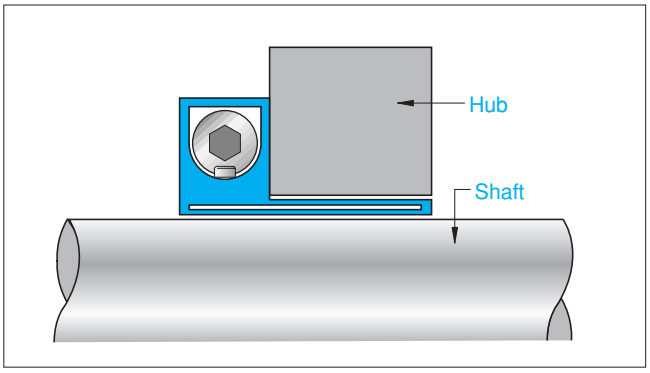
Max. permissible torque [N·m]	30～18000
Max. permissible thrust power [N]	3750～360000
Bore diameter [mm]	ϕ15～100
Operating temp. limit [℃]	−30～+110
Backlash	Zero
Concentricity [mm]	0.006

Principle of Operation

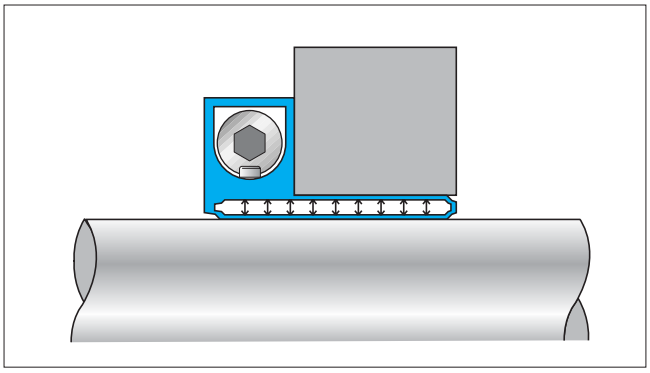
ETP-TECHNO

- The pressure medium contained in the chamber is pressurized by fastening the pressure screw, and it moves into the sleeve. Due to the pressurization of the pressure medium, the sleeve is pressured from inside. This makes the shaft-side sleeve expand and the hub-side sleeve enlarge that the shaft and hub are fastened through the sleeve.





- Set the ETP-TECHNO between the shaft and hub.

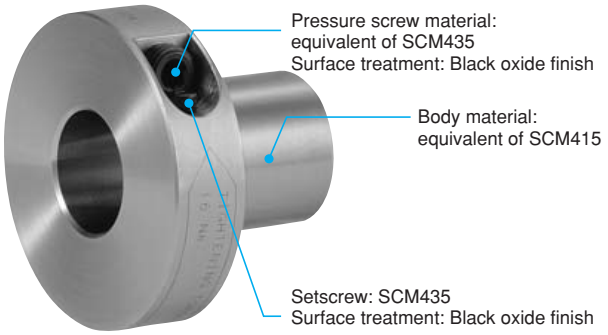


- By fastening the pressure screw, equalize the surface pressure against the shaft and hub.

Structure and Material

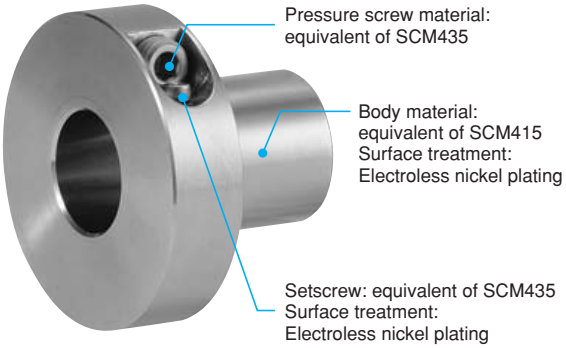
ETP-T

The ETP-T can be easily fixed by tightening one bolt. The standard and basic antirust specifications are available. Its concentricity is 0.006mm that it is suitable where higher precision is required.



ETP-T-C (Basic antirust specification)

A Basic antirust specification with electroless nickel plating coated on the body and pressure screw.



Correspondence example for special specifications

Application example for a slitter knife holder

Hydraulic slitter knife holder based on the fastening principle of the ETP-TECHNO. This holder is used to set the rotary knife for cutting a tin plate, iron plate, aluminum, and paper, etc. to the optional position. The knife holder can be easily placed and displaced by one bolt. The reproducibility of surface swing by mounting and dismounting can be kept at μm of accuracy.

Application example for a built-in gear

By integrating the ETP-TECHNO and a gear as one structure, easy positioning with a high concentricity and accuracy is possible.

On-demand sleeve length

By shortening the sleeve length than the standard type of the ETP-TECHNO, meet specifications for the use of a thin part of the mating hub.

Application example for a retention tool

A stable operation becomes possible by setting the holder on a workbench, etc. for assembling and manufacturing. The reproducibility of the part retention position can be set very high.

ETP-T

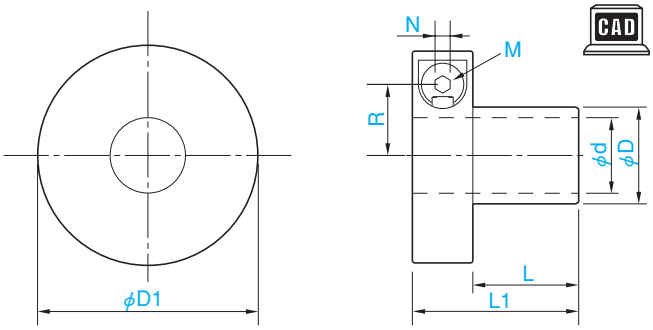
Single bolt tightening | Center ring | No axial direction displacement | Basic antirust | Stain less

Specification

Model	Max. permissible torque [N·m]	Max. permissible thrust power [N]	Max. permissible radial load [N]	Shaft-side surface pressure [N/mm²]	Hub-side surface pressure [N/mm²]	Bolt tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]	Price
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	186000	13000	90	70	40	8.80×10^{-3}	3.60	—
ETP-T-75	7800	208000	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 ETP-T-70 through ETP-T-100 are order products.
* The maximum permissible torque is the value when the thrust power is zero, and the maximum permissible thrust power is the value when the torque is zero.
* The maximum permissible torque, the maximum permissible thrust power, the shaft-side surface pressure and the hub-side surface pressure are the values when the temperature is 20℃.

Dimensions



Ordering Information

ETP - T - □

Size

unit [mm]

Model	d	D	D1	L	L1	R	N	M	CAD file No.
ETP-T-15	15	19	52	25	41	14.5	6	M12	ETP-T001
ETP-T-19	19	24	58	28	44	18	6	M12	ETP-T002
ETP-T-20	20	25	59	30	46	19	6	M12	ETP-T003
ETP-T-24	24	30	71	33	53	23	6	M14	ETP-T004
ETP-T-25	25	32	73	35	55	23.5	6	M14	ETP-T005
ETP-T-30	30	38	78	40	60	26.5	6	M14	ETP-T006
ETP-T-35	35	44	88	45	65	30	6	M14	ETP-T007
ETP-T-40	40	52	100	55	75	34	8	M16	ETP-T008
ETP-T-50	50	65	110	60	80	40	8	M16	ETP-T009
ETP-T-60	60	75	122	70	95	46.5	10	M20	ETP-T010
ETP-T-70	70	90	138	85	110	52	10	M20	ETP-T011
ETP-T-75	75	95	146	90	115	56	10	M20	ETP-T012
ETP-T-80	80	100	154	95	120	58	10	M20	ETP-T013
ETP-T-90	90	112	170	105	133	64.5	10	M22	ETP-T014
ETP-T-100	100	125	184	115	145	72	12	M24	ETP-T015

ETP-T-C Make-to-order product

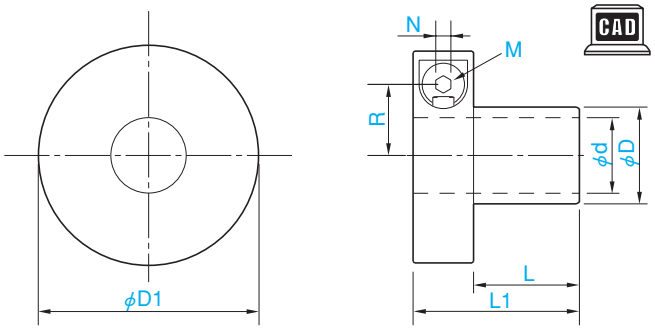
Single bolt tightening | Center ring | No axial direction displace-ment | Basic antirust | Stain less

Specification

Model	Max. permissible torque [N·m]	Max. permissible thrust power [N]	Max. permissible radial load [N]	Shaft-side surface pressure [N/mm²]	Hub-side surface pressure [N/mm²]	Bolt tightening torque [N·m]	Moment of inertia [kg·m²]	Mass [kg]	Price
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 maximum permissible torque is the value when the thrust power is zero, and the maximum permissible thrust power is the value when the torque is zero.
* The maximum permissible torque, the maximum permissible thrust power, the shaft-side surface pressure and the hub-side surface pressure are the values when the temperature is 20℃.

Dimensions



Ordering Information

ETP - T - □ - C

Size

Type (C: Basic antirust specification)

unit [mm]

Model	d	D	D1	L	L1	R	N	M	CAD file No.
ETP-T-15-C	15	19	52	25	41	14.5	6	M12	ETP-T001
ETP-T-19-C	19	24	58	28	44	18	6	M12	ETP-T002
ETP-T-20-C	20	25	59	30	46	19	6	M12	ETP-T003
ETP-T-24-C	24	30	71	33	53	23	6	M14	ETP-T004
ETP-T-25-C	25	32	73	35	55	23.5	6	M14	ETP-T005
ETP-T-30-C	30	38	78	40	60	26.5	6	M14	ETP-T006
ETP-T-35-C	35	44	88	45	65	30	6	M14	ETP-T007
ETP-T-40-C	40	52	100	55	75	34	8	M16	ETP-T008
ETP-T-50-C	50	65	110	60	80	40	8	M16	ETP-T009
ETP-T-60-C	60	75	122	70	95	46.5	10	M20	ETP-T010

Selection

Selection Procedure

❶ The torque Ta is determined by the shaft diameter to be used, however, evaluate the torque Ta basically from the output of the power driver P and the revolution speed of the fastening element n.

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

Ta: Torque added to the fastening element [N·m]
P: Output of the power driver [kW]
n: Revolution speed of the fastening element [min^{-1}]
Fa: Thrust power added to the fastening element [N]

Evaluate the thrust power Fa.

❷ Determine the service factor K1 from the loading character, and evaluate the corrective torque Td and the corrective thrust power Fd that are added to the fastening element.

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

Td: Corrective torque added to the fastening element [N·m]
Fd: Corrective thrust power added to the fastening element [N]
K1: Service factor by loading character

❸ Perform the corrections by loading type.

(1) In the case of torque only
Compare the maximum permissible torque T of the fastening element and the evaluated corrective torque Td, by the shaft diameter to be used.

$T \geqq Td$ T: Max. permissible torque of fastening element [N·m]

(2) In the case of thrust power only
Compare the maximum permissible thrust power F of the fastening element and the evaluated corrective thrust power Fd, by the shaft diameter to be used.

$F \geqq Fd$ F: Max. permissible thrust power of fastening element [N]

(3) In case that both torque and thrust power are applied.
Evaluate the combined load Mr to compare with the maximum permissible torque T.

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

$T \geqq Mr$

Mr: Combined load added to the fastening element [N·m] . d: shaft diameter [N]

❹ Evaluate the minimum outside diameter of the hub and the maximum inside diameter of the quill.

(1) Evaluate the minimum outside diameter of the hub by the material strength of the hub to be used.

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

C=1 B=L
C=0.8 L<B<2L
C=0.6 B≧2L

DO : Min. hub outside dia. [mm]
D : Hub inside dia. [mm]
P_2 : Hub side surface pressure [N/mm^2]
$\delta_{0.2N}$: Yield point stress of the hub material [N/mm^2]
B: Hub length [mm]
L: Effective contact length [mm]
C: Coefficient

If yield point stress of the hub material is high, the ratio of the min. hub outside dia. and the hub inside dia. must be 1.3 times bigger or more, concerning the deformation of hub.

(2) Evaluate the maximum inside diameter of the quill by the material strength of the quill to be used.

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

C=0.6 when singular number is used
C=0.8 When plural number is used

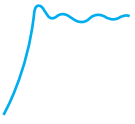
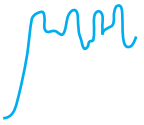
di: Max. inside dia. of the quill [mm]
$\delta_{0.2N}$: Yield point stress of the quill material [N/mm^2]
d : Shaft dia. [mm]
P_1: Shaft side surface pressure [N/mm^2]
C: Coefficient

Since the shaft-side surface pressure and hub-side surface pressure is changed by the environmental temperature, temperature conditioning is necessary. Also, all the surface pressure values are based on the temperature of 20℃, therefore, if the environmental temperature is over 20℃, evaluate the minimum outside diameter of the hub and the maximum inside diameter of the quill from the formula below.

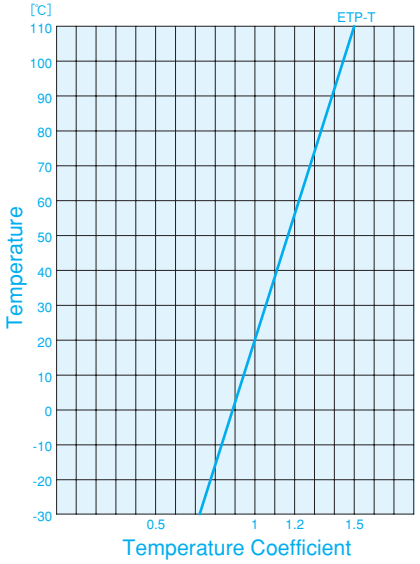
P_1 · P_2=Surface pressure when the temperature is 20℃× Temperature coefficient K2
Operating temperature limit is: -30℃~ +110℃

Service factor

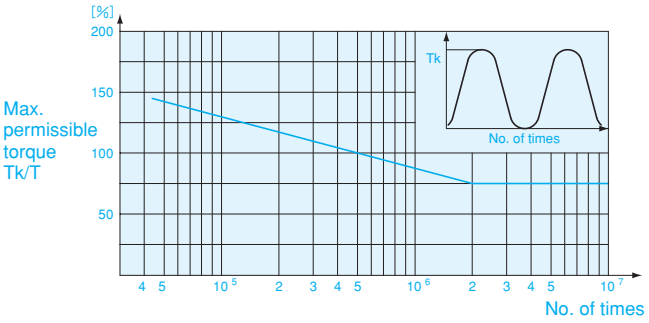
Use factor of the loading character: K1

Loading character			
Constant	Variation: small	Variation: medium	Variation: large
			
1.0	1.25	1.75	2.25

Coefficient by the applied environmental temperature: K2



Fatigue of periodical fluctuation torque



Above chart shows the fatigue when applying the static periodical fluctuation torque Tk to the ETP-TECHNO. The vertical line indicates the percentage of the maximum permissible torque, and the horizontal line indicates the number of times of static periodical fluctuation torque.

If the maximum permissible torque is periodically applied to the ETP-TECHNO, its fatigue becomes 500,000 times. And if 75% of the maximum permissible torque is periodically applied, the above chart indicates that its fatigue becomes semipermanent.

Points to be checked in design

Mating shaft tolerance, mating hub tolerance and surface roughness

Model	Mating shaft tolerance	Mating hub tolerance	Surface roughness
ETP-T	h8	H7	25S (average roughness of center line 6.3a) or less
ETP-T-C			

Operating temperature limit

Model	Operating tem. limit [℃]
ETP-T	−30～+110
ETP-T-C	

No. of mounting and dismounting

Model	No. of mounting/dismounting [times]
ETP-T-15～50	5000
ETP-T-15～50-C	5000
ETP-T-60～80	3000
ETP-T-60-C	3000
ETP-T-90・100	500

Concentricity and balance

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

Torque・Thrust power coefficient

When torque and thrust power are simultaneously applied to the ETP-TECHNO, their maximum permissible values are both reduced. The value can be evaluated by the coefficient of the cart below.

Calculation Example: When the ETP-T-30 is used at 20℃ in temperature.

The maximum permissible torque T and thrust power F at 20℃ are;

T= 500［N･m］, F=33000［N］

The maximum permissible torque Tmax when the thrust power is maximally (Fmax=20000 [N]) applied can be evaluated by the formula below.

Thrust factor Kf
= Fmax/F×Temperature coefficient K2
=20000/33000×1.0=0.61

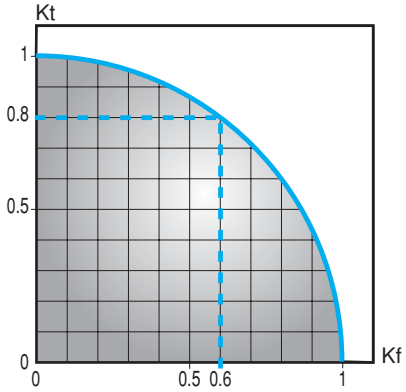
The torque coefficient Kt when Kf = 0.61 is approximately 0.8 by the chart below.

It is, therefore, the maximum permissible torque Tmax in this case is;

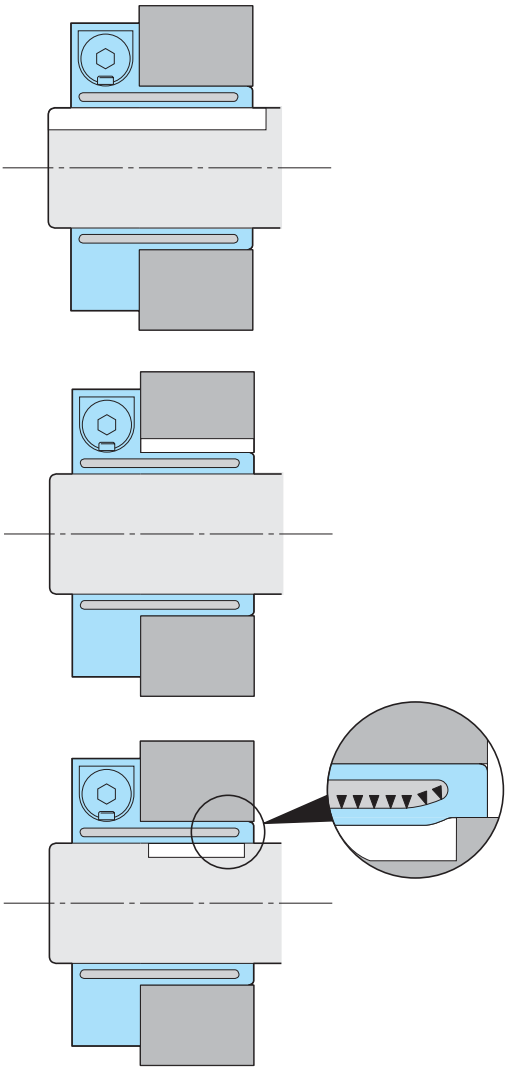
Tmax=T×K2×Kt=500×1.0×0.8=400［N･m］

Relation between Kt and Kf can be evaluated by the formula below.

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



Keyway shape that may become unable to disconnect by the sleeve deformation



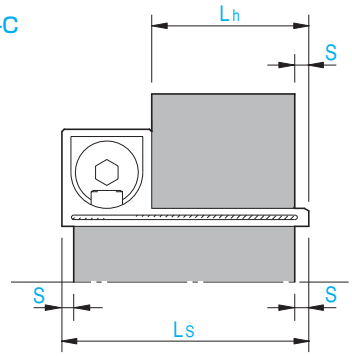
In case there is a keyway in the shaft and hub as illustrated above, ETP-TECHNO cannot be used. However, ETP-TECHNO can be used if the keyway is completely filled, and formed with epoxy putty (Recommendation: Bond-all AB).

Points to be checked in design

Tolerance of the edge

The performance of the ETP-TECHNO is defined when the shaft and hub act over the entire length for the shaft-side basic dimension Ls and the hub-side basic dimension Ln. Therefore, set out the shaft and hub to act over the entire length for the basic dimension. If the length of shaft・hub is limited in design, set the size in order that it becomes under the S sizes indicated in the chart below. In case the size is over the S size, the stress becomes concentrated at the edge of sleeve, which causes deformation of the sleeve. In that case, the ETP-TECHNO becomes unable to disconnect.

■ ETP-T
ETP-T-C



ETP-T ETP-T-C 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 and Dismounting

● Mounting the ETP-TECHNO

1 Cleaning the shaft and hub

Wipe off the rust, dust and oil content sit on the surface of the shaft and hub with an alcohols solvent. If any grease is attached, remove the grease completely. Meanwhile, the oil content attached on the surface of the ETP-TECHNO should be also removed.

Notice

Do not use the molybdenum-containing oil. It effects a change in the coefficient of friction.

2 Mounting on the shaft and hub

Place the ETP-TECHNO by the hub and mount in the shaft. If a correct positioning for the shaft and hub is necessary, adjust their positions before fastening the pressure screw.

Notice

Do not fasten the pressure screw until the ETP-TECHNO is completely set to the shaft and hub.

3 Fastening the pressure screw

By using a torque wrench, fasten the pressure screw with the specified torque.

● Dismounting the ETP-TECHNO

1 Confirming safe conditions

Confirm if any torque or thrust power is not applied to the ETP-TECHNO before to start dismounting. Also, make sure if there is any danger of fall due to the empty weight of the shaft and hub. There is no self-locking mechanism for the ETP-TECHNO. By loosening the pressure screw, its fastening power is quickly released.

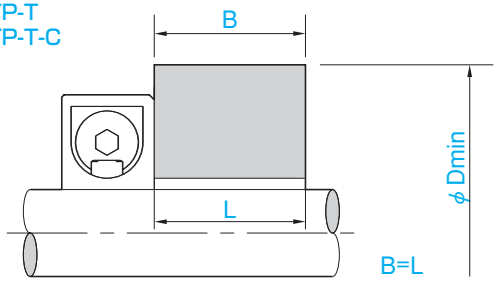
2 Dismounting

Loosen the pressure screw until the fastening power is released. The pressure screw should be just slackened, not to be removed.

A list of the minimum outside diameter for a hub

A hub may be deformed if the stress value applied to it is high.
Refer to the list below to find the appropriate outside diameter.

■ ETP-T
ETP-T-C



ϕ Dmin unit [mm]

ETP-T ETP-T-C Size	Hub-side surface pressure [N/mm²]	Yield point stress of the material 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

* The hub-side surface pressure shown in the list is when the applied environmental temperature is 20℃. The surface pressure is changed by increased temperature.
* If the applied environmental temperature is over 20℃, evaluate the minimum outside diameter by the selection procedure on page 21.
* The minimum outside diameter of the hub is evaluated by C=1 of the selection procedure on page 21.
* The above SUS values indicate their bearing force [N/mm²] after thermal refining (quenched and tempered).