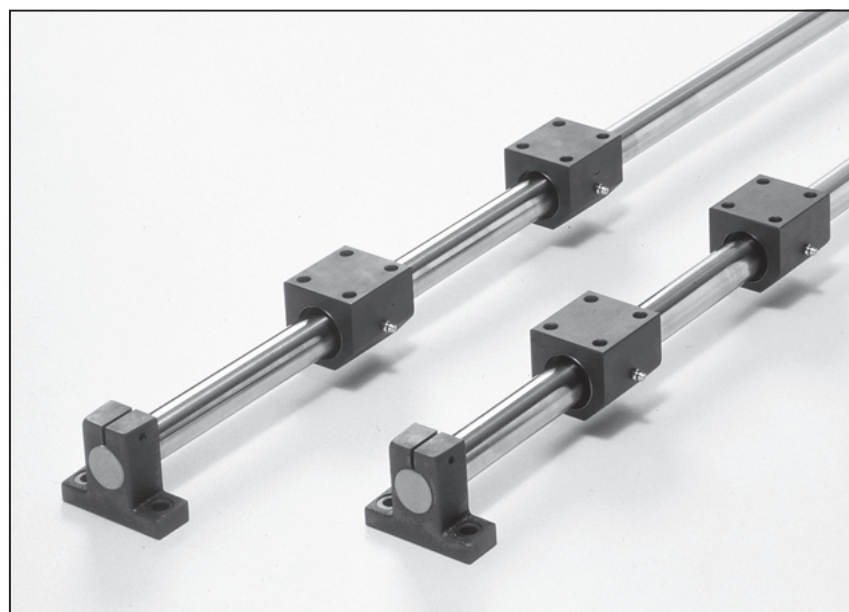
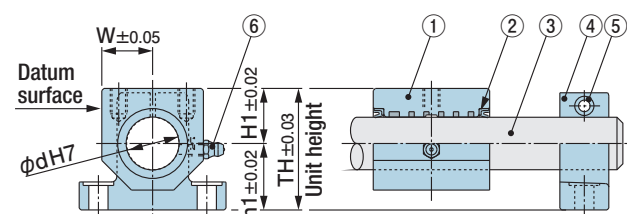


Oiles Slide Shifter BC Type (Compact type) **BTC BH/BHS** Shaft **BGS/BGSP** Hollow shaft



RoHS2 ELV

Component Parts · Accuracy



Component Parts

No.	Name	Material
①	Shift table	FC250+Oiles metal
②	Dust seal	NBR
③	Guide shaft BGS	S45C+hard chrome-plated
③	Guide shaft BGSP	STKM13A+hard chrome-plated
④	Shaft holder	FCD450
⑤	Shaft fixing bolt	—
⑥	Grease nipple	A-M6F (Screw mounting hole size M6×P0.75)

※Use BGS or BGSP standard guide shaft (P.319) or ϕd e7 tolerance shaft.

Service Range

Allowable Velocity

Lubrication conditions	Allowable max velocity	Remarks
Dry	0.5m/s {30m/min}	—
Periodical lubrication	1.0m/s {60m/min}	Apply lubrication every 10 km of sliding

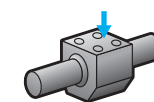
※Greasing is needed if the stroke is 1 meter or more or the allowable wear amount is small.

Seal Friction F_s / Metal Scraper Friction M_s

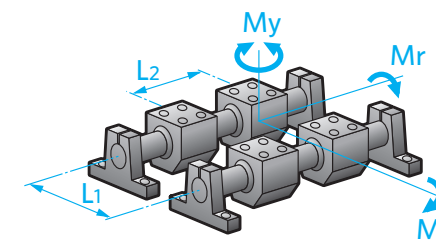
Part No.	BTC16	BTC20	BTC25	BTC30	BTC40	BTC50
F_s	1.5N {0.15kgf}	2.0N {0.20kgf}	2.5N {0.25kgf}	2.9N {0.30kgf}	3.9N {0.40kgf}	4.9N {0.50kgf}
M_s	11.8N { 1.2kgf}	11.8N { 1.2kgf}	14.7N { 1.5kgf}	14.7N { 1.5kgf}	16.7N { 1.7kgf}	16.7N { 1.7kgf}

Allowable Load, Allowable Moment

Static and Dynamic Allowable Load for Shift Tables N {kgf}



Allowable Moment for four Shift Tables on two shafts N.m {kgf.m}



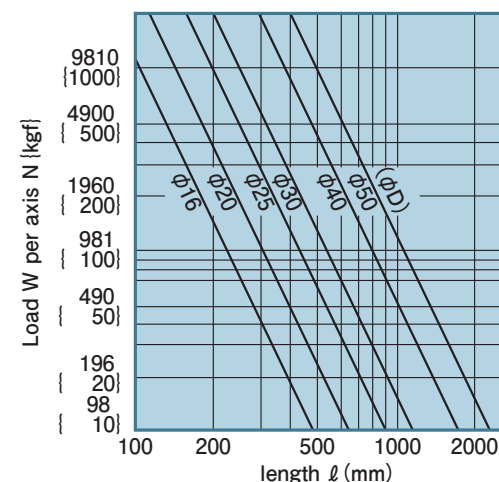
※Allowable static load: Allowable load when it is born in the stationary condition or at quite low speed near stopping (not more than 0.0017 m/s [0.1 m/min].)
 ※Allowable dynamic load: Allowable load in the condition with sliding speed of 1.0m/s [60 m/min] or less.

Part No.	BTC16	BTC20	BTC25	BTC30	BTC40	BTC50	
Allowable load N {kgf}	Static	2,940 {300}	4,120 {420}	5,880 {600}	8,830 {900}	14,100 {1,440}	17,700 {1,800}
	Dynamic	981 {100}	1,370 {140}	1,960 {200}	2,940 {300}	4,710 { 480}	5,880 { 600}
Allowable moment N · m {kgf · m}	M_p	$1,960 \times L_2$	$2,750 \times L_2$	$3,920 \times L_2$	$5,880 \times L_2$	$9,410 \times L_2$	$11,800 \times L_2$
	M_y	$\{200\} \times L_2$	$\{280\} \times L_2$	$\{400\} \times L_2$	$\{600\} \times L_2$	$\{960\} \times L_2$	$\{1,200\} \times L_2$
	M_r	$1,960 \times L_1$	$2,750 \times L_1$	$3,920 \times L_1$	$5,880 \times L_1$	$9,410 \times L_1$	$11,800 \times L_1$
		$\{200\} \times L_1$	$\{280\} \times L_1$	$\{400\} \times L_1$	$\{600\} \times L_1$	$\{960\} \times L_1$	$\{1,200\} \times L_1$

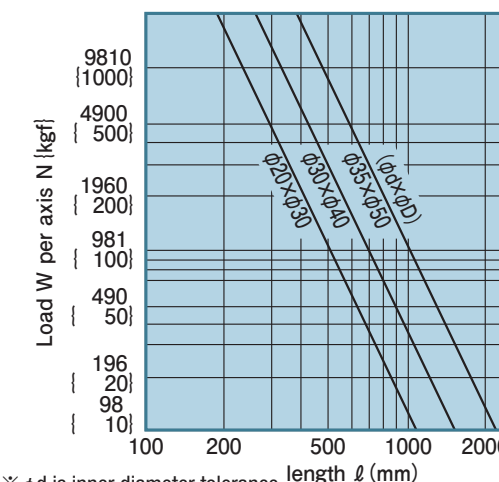
Maximum Amount of Deflection

If bend of the guide shaft exceeds 0.1 mm, the sliding resistance may increase for reasons of clearance. See the graphs below and adjust the bend of the guide shaft below 0.1 mm.

BGS Relationship between length ℓ and load W, provided maximum bend is 0.1 (mm)



BGSP Relationship between length ℓ and load W, provided maximum bend is 0.1 (mm)



Calculating formula

$$\text{Maximum bent} = \frac{W\ell^3}{192EI}$$

W : Concentric load (N {kgf})

ℓ : Length (mm)

E : Young's modulus ($2.06 \times 10^5 \text{N/mm}^2$ [$2.09 \times 10^4 \text{kgf/mm}^2$])

I : Geometrical moment of inertia (mm^4)

Solid shaft $\frac{\pi D^4}{64}$ Hollow shaft $\frac{\pi (D^4 - d^4)}{64}$

Product Identification for Ordering

Shift Table

Refer to page 317 for metal scrapers.
Dust seal will not be assembled when using a metal scraper.

Specify by **BTC I.D. - MS**
Part No. Metal scraper (option)

No symbol: None
MS: both ends

(e.g.) I.D. is 16mm with no metal scraper.

BTC16

Guide Shaft

Maximum shaft length is 3000mm.
Refer to page 319 for guide shafts.

Specify by **BGS O.D. - Length**
Part No.

(e.g.) O.D. is 16mm and length is 300mm.

BGS16-300

Shaft Holder

Refer to page 315 for BH type,
to page 316 for BHS type.

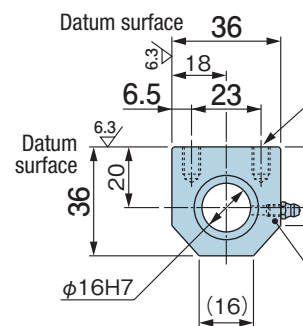
Specify by **BH Hole diameter**
Part No.

(e.g.) Using Type BH,
hole diameter is 16mm.

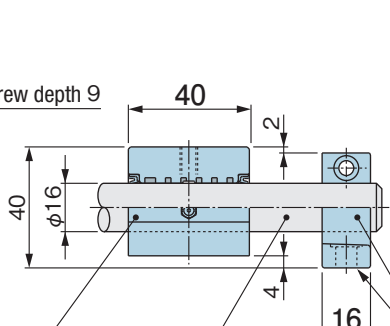
BH16

Parts Drawings

BTC16 (Shift Table)



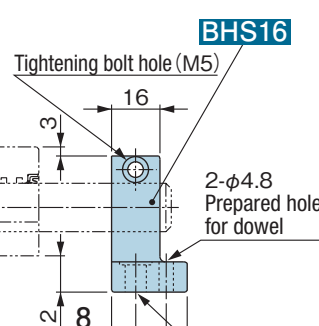
BGS16 (Guide Shaft)



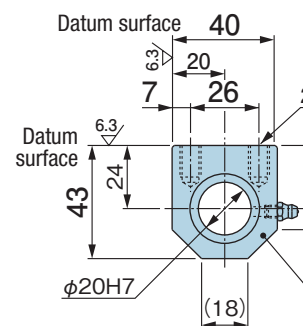
BH16 (Shaft Holder)



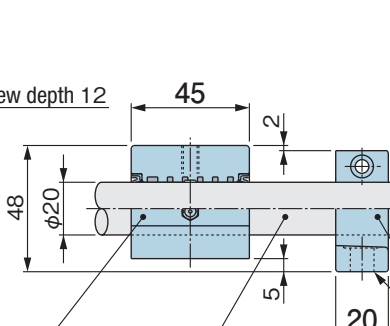
BHS16 (Shaft Holder)



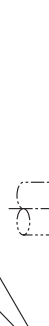
BTC20 (Shift Table)



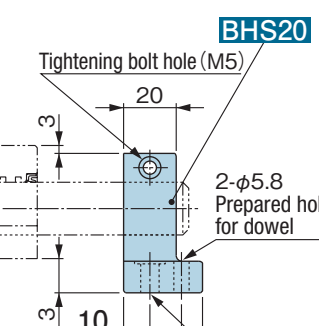
BGS20 (Guide Shaft)



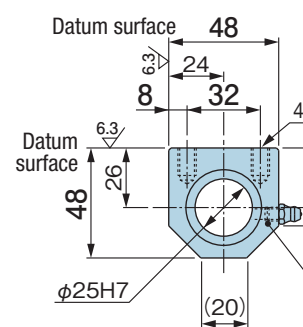
BH20 (Shaft Holder)



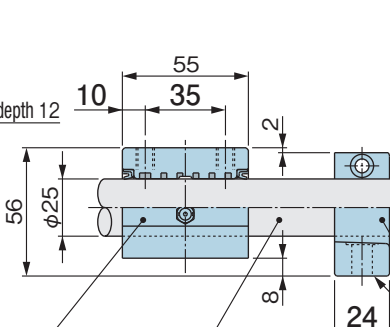
BHS20 (Shaft Holder)



BTC25 (Shift Table)



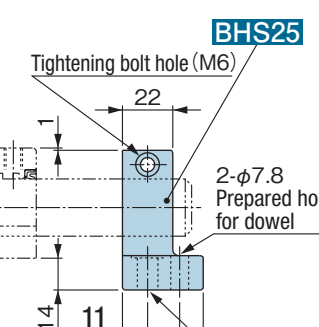
BGS25 (Guide Shaft)



BH25 (Shaft Holder)

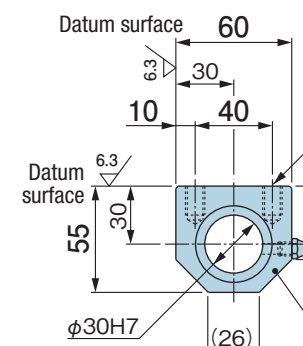


BHS25 (Shaft Holder)

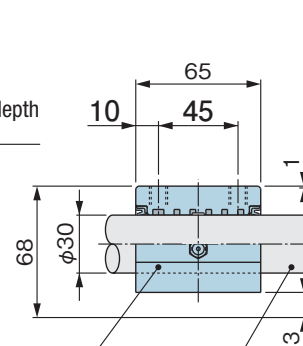


Parts Drawings

BTC30 (Shift Table)



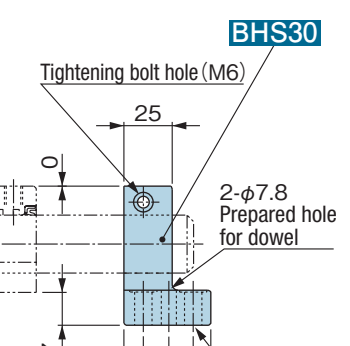
BGS30 (Guide Shaft)



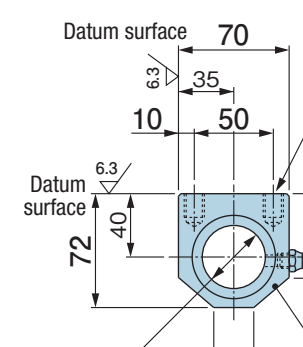
BH30 (Shaft Holder)



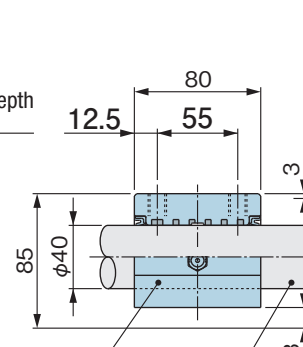
BHS30 (Shaft Holder)



BTC40 (Shift Table)



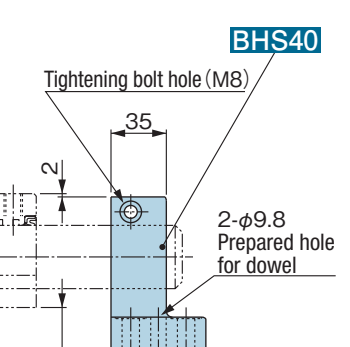
BGS40 (Guide Shaft)



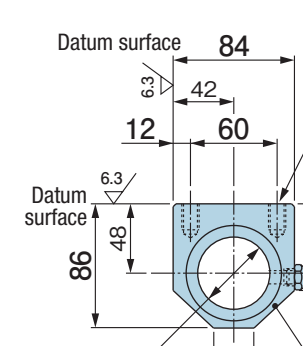
BH40 (Shaft Holder)



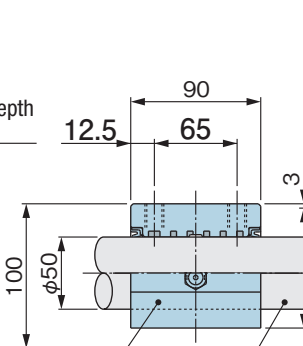
BHS40 (Shaft Holder)



BTC50 (Shift Table)



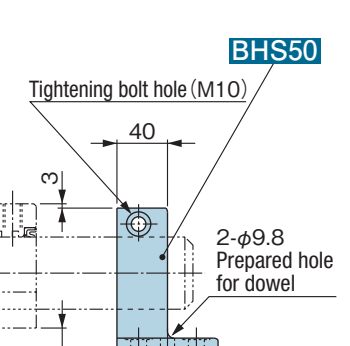
BGS50 (Guide Shaft)



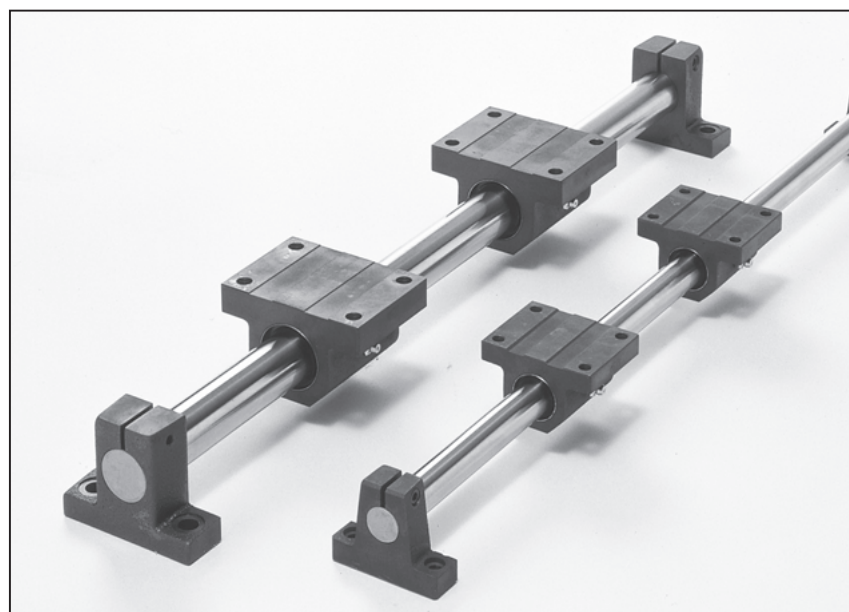
BH50 (Shaft Holder)



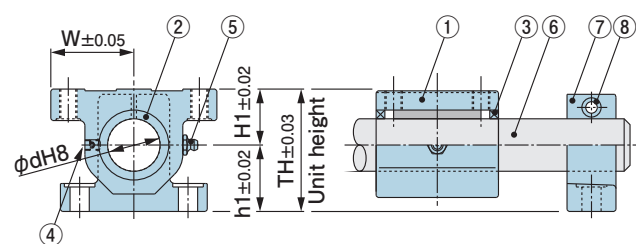
BHS50 (Shaft Holder)



Oiles Slide Shifter BF Type (Flange Type) Shaft: BTF BH/BHS Hollow shaft: BGS/BGSP



Component Parts · Accuracy



Component Parts

No.	Name	Material
①	Shift table	FC250
②	Guide bushing	Oiles metal
③	Dust seal	NBR
④	Fixing bolt	—
⑤	Grease nipple	A-PF1/8 (Screw mounting hole size Rp 1/8)
⑥	Guide shaft BGS	S45C+hard chrome-plated
	Guide shaft BGSP	STKM13A+hard chrome-plated
⑦	Shaft holder	FCD450
⑧	Shaft fixing bolt	—

※Use BGS or BGSP standard shaft (P.319) or ϕd e7 tolerance shaft.

Service Range

Allowable Velocity

Lubrication conditions	Allowable velocity	Remarks
Dry	0.5m/s [30m/min]	—
Periodical lubrication	1.0m/s [60m/min]	Apply lubrication every 10 km of sliding

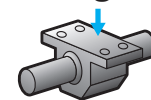
※Greasing is needed if the stroke is 1 meter or more or the allowable wear amount is small.

Seal Friction F_s / Metal Scraper Friction M_s

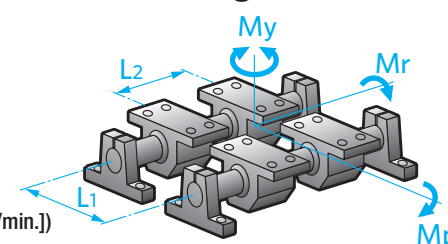
Part No.	BTF16	BTF20	BTF25	BTF30	BTF40	BTF50
F_s	1.5N [0.15kgf]	2.0N [0.20kgf]	2.5N [0.25kgf]	2.9N [0.30kgf]	3.9N [0.40kgf]	4.9N [0.50kgf]
M_s	11.8N 1.2kgf	11.8N 1.2kgf	14.7N 1.5kgf	14.7N 1.5kgf	16.7N 1.7kgf	16.7N 1.7kgf

Allowable Load, Allowable Moment

Static and Dynamic Allowable Load for Shift Tables N {kgf}



Allowable Moment for four Shift Tables on two shafts N.m {kgf.m}



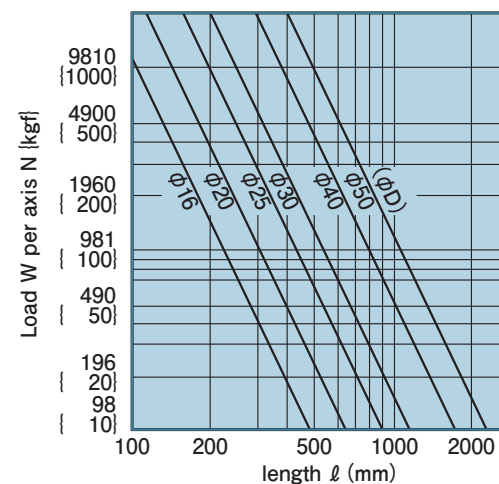
※Allowable static load: Allowable load when a load is applied at a stationary condition or at quite low speed near stopping (not more than 0.0017 m/s [0.1 m/min.])
 ※Allowable dynamic load: Allowable load in the condition with sliding speed of 1.0m/s [60 m/min] or less.

Part No.		BTF16	BTF20	BTF25	BTF30	BTF40	BTF50
Allowable load N {kgf}	Static	4,240 {430}	6,180 {630}	8,830 {900}	13,250 {1,350}	21,200 {2,160}	26,500 {2,700}
	Dynamic	1,410 {140}	2,060 {210}	2,940 {300}	4,410 {450}	7,060 {720}	8,830 {900}
Allowable moment N · m {kgf · m}	M_p	$2,940 \times L_2$ {300} × L_2	$4,120 \times L_2$ {420} × L_2	$5,880 \times L_2$ {600} × L_2	$8,830 \times L_2$ {900} × L_2	$14,100 \times L_2$ {1,440} × L_2	$17,700 \times L_2$ {1,800} × L_2
	M_y	$2,940 \times L_1$ {300} × L_1	$4,120 \times L_1$ {420} × L_1	$5,880 \times L_1$ {600} × L_1	$8,830 \times L_1$ {900} × L_1	$14,100 \times L_1$ {1,440} × L_1	$17,700 \times L_1$ {1,800} × L_1
	M_r	$2,940 \times L_1$ {300} × L_1	$4,120 \times L_1$ {420} × L_1	$5,880 \times L_1$ {600} × L_1	$8,830 \times L_1$ {900} × L_1	$14,100 \times L_1$ {1,440} × L_1	$17,700 \times L_1$ {1,800} × L_1

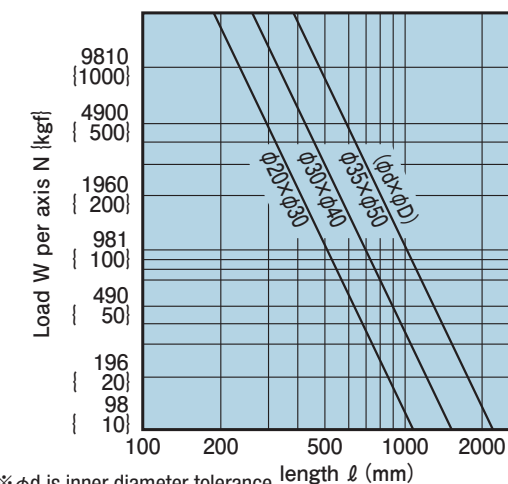
Maximum Amount of Deflection

If bend of the guide shaft exceeds 0.1 mm, the sliding resistance may increase for reasons of clearance. See the graphs below and adjust the bend of the guide shaft below 0.1 mm.

BGS Relationship between length ℓ and load W, provided maximum bend is 0.1 (mm)



BGSP Relationship between length ℓ and load W, provided maximum bend is 0.1 (mm)



Calculating formula

$$\text{Maximum bent} = \frac{W \ell^3}{192 EI}$$

W : Concentric load (N {kgf})

ℓ : Length (mm)

E : Young's modulus ($2.06 \times 10^5 \text{N/mm}^2$ [$2.09 \times 10^4 \text{kgf/mm}^2$])

I : Geometrical moment of inertia (mm^4)

Solid shaft $\frac{\pi D^4}{64}$ Hollow shaft $\frac{\pi (D^4 - d^4)}{64}$

Product Identification for Ordering

Shift Table

Refer to page 317 for metal scrapers.

Specify by **BTF** **I.D.** - **MS**
Part No. Metal scraper (option)

No symbol: None
MS: both ends

(e.g.) I.D. is 16mm with no metal scraper.

BTF16

Guide Shaft

Maximum shaft length is 2900mm.
Refer to page 319 for guide shafts.

Specify by **BGS** **O.D.** - **Length**
Part No.

(e.g.) O.D. is 16mm and length is 300mm.

BGS16-300

Shaft Holder

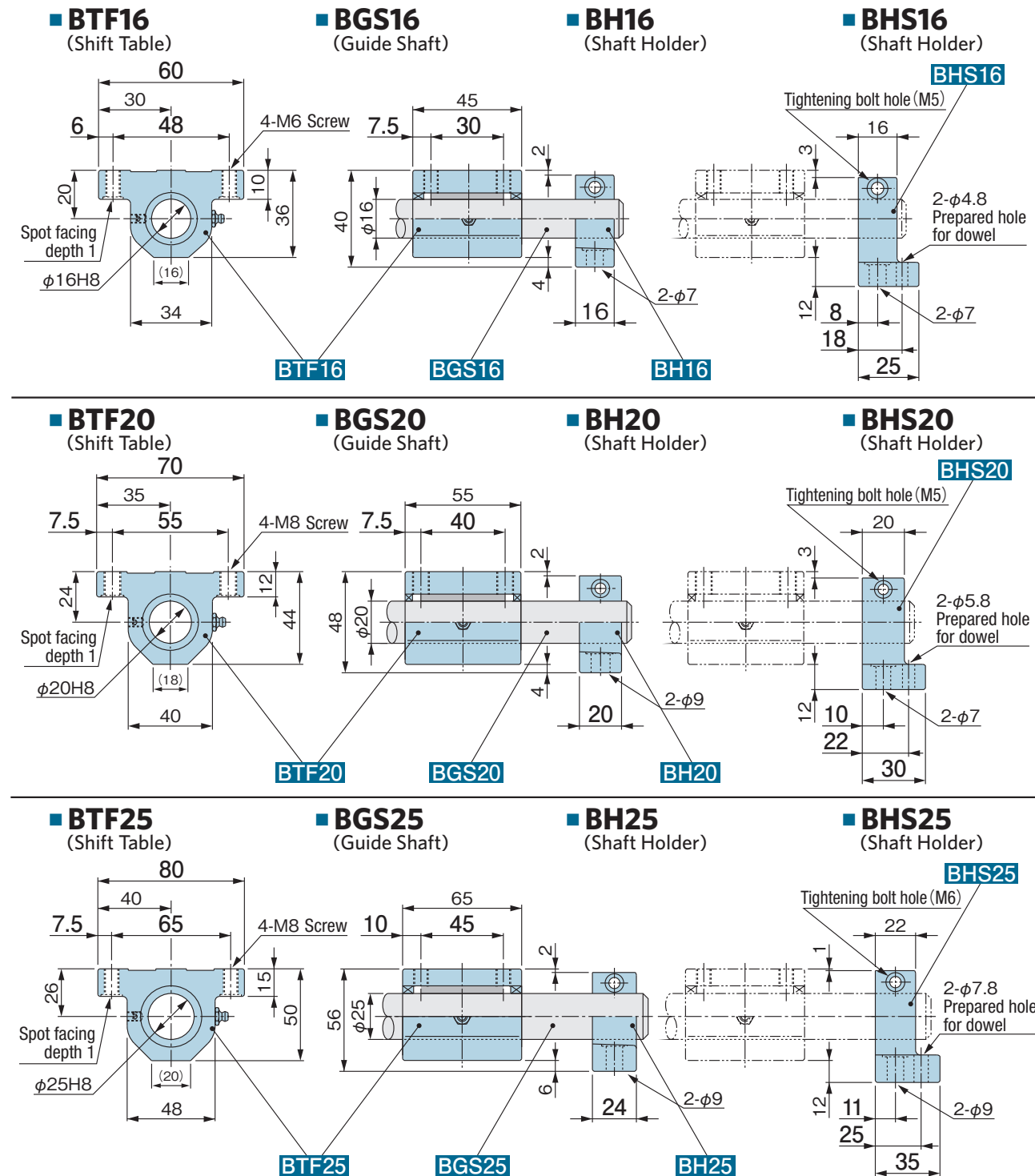
Refer to page 315 for BH type,
to page 316 for BHS type.

Specify by **BH** **Hole diameter**
Part No.

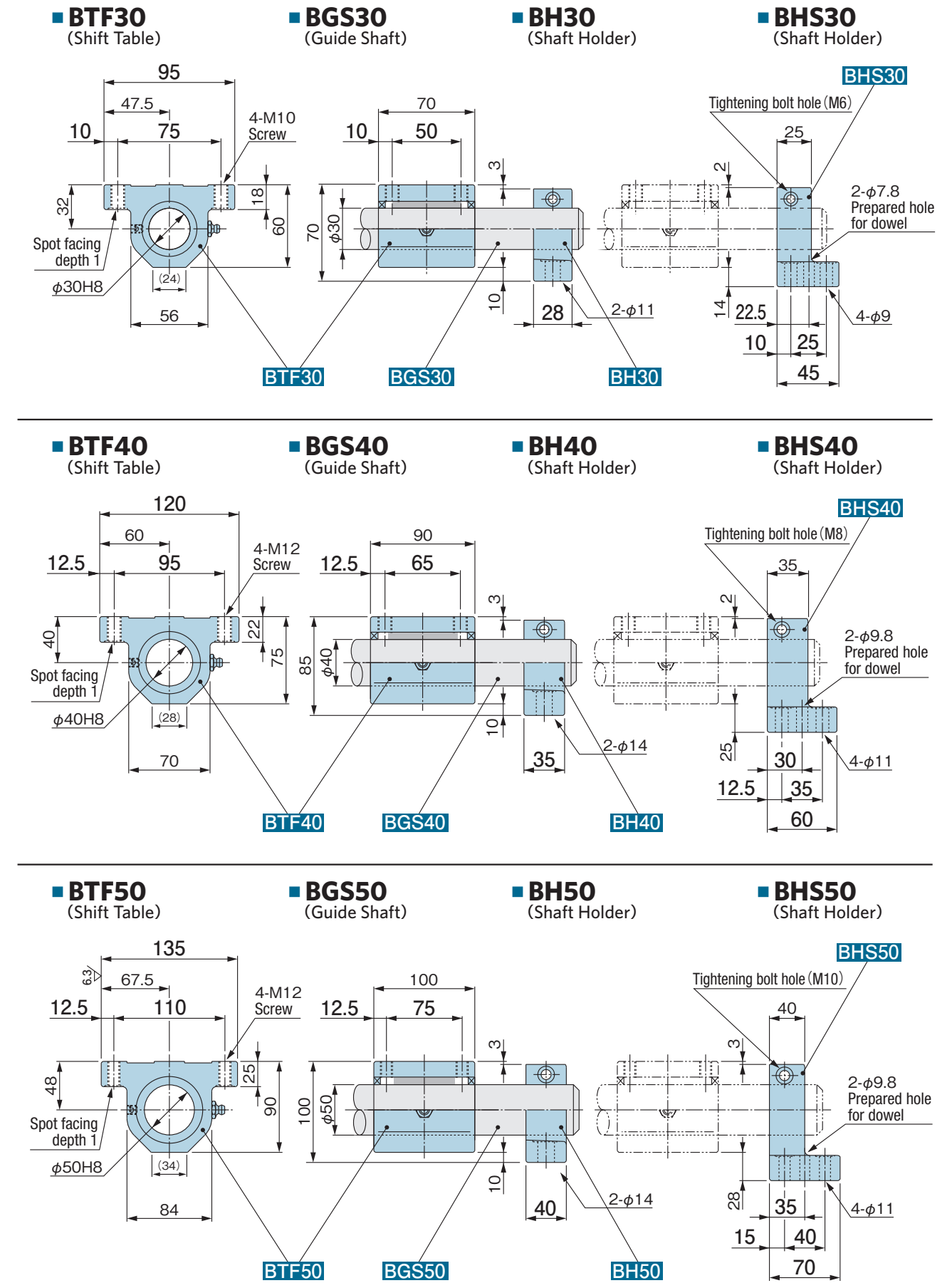
(e.g.) Using Type BH,
hole diameter is 16mm.

BH16

Parts Drawings



Parts Drawings



Product Identification for Ordering

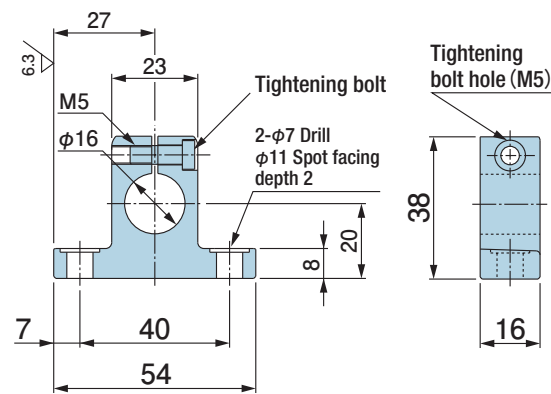
■ Type BH

Specify by **BH** Hole diameter
Part No.

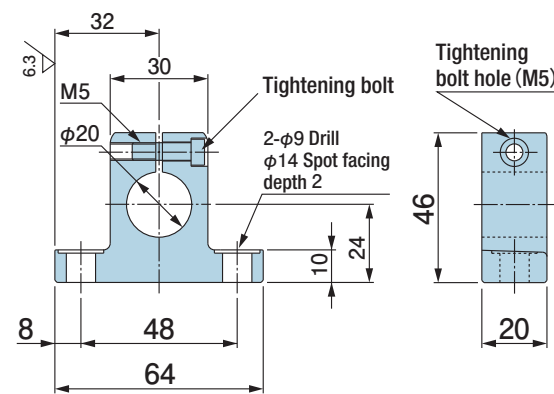
(e.g.) Hole diameter is 16mm.
BH16

Parts Drawings

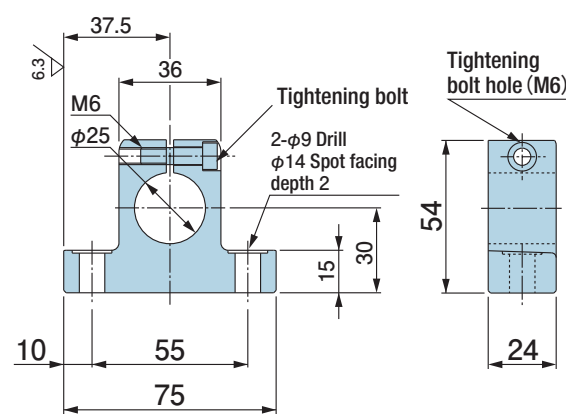
■ **BH16** (Shaft holder)



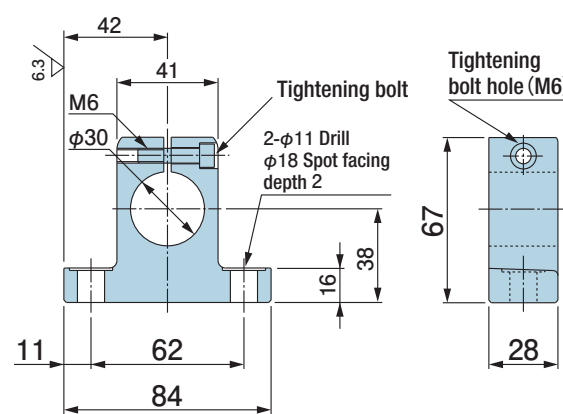
■ **BH20** (Shaft holder)



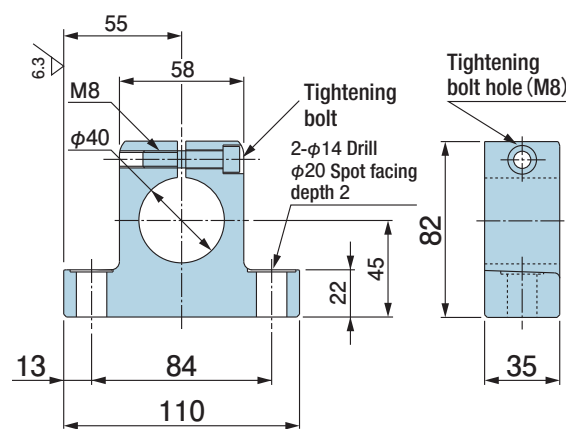
■ **BH25** (Shaft holder)



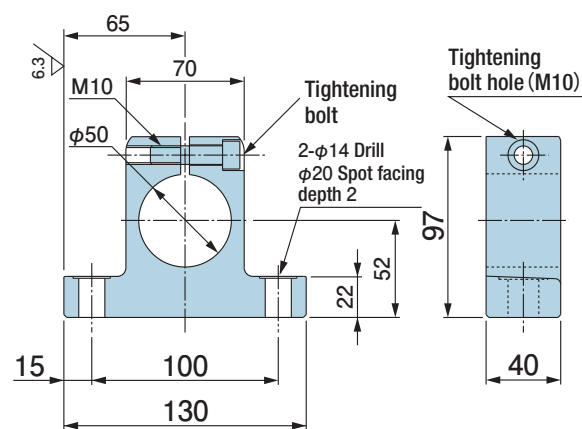
■ **BH30** (Shaft holder)



■ **BH40** (Shaft holder)



■ **BH50** (Shaft holder)



Product Identification for Ordering

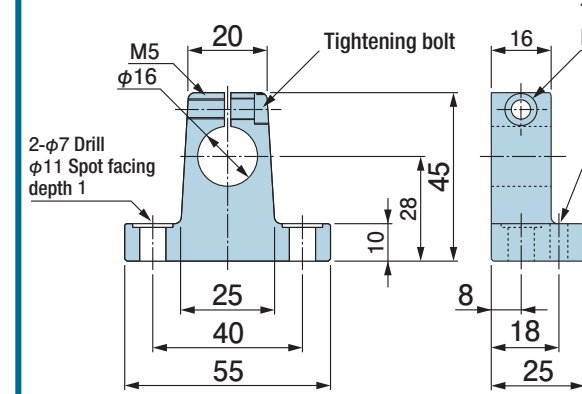
■ Type BHS

Specify by **BHS** Hole diameter
Part No.

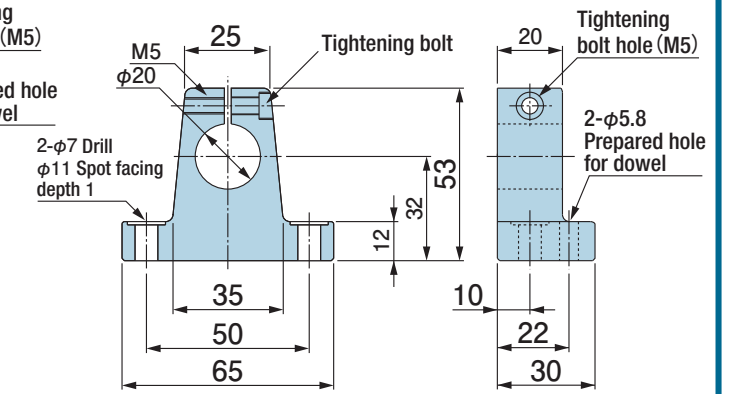
(e.g.) Hole diameter is 16mm.
BHS16

Parts Drawings

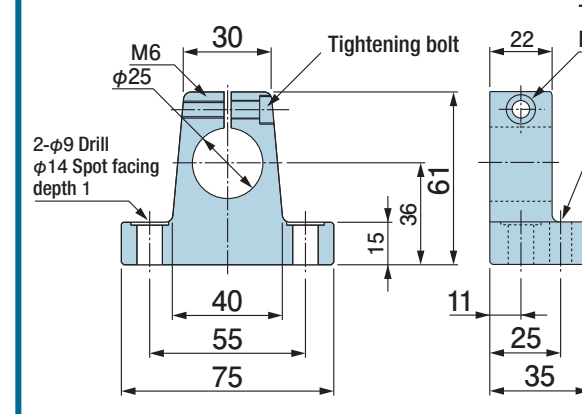
■ **BHS16** (Shaft holder)



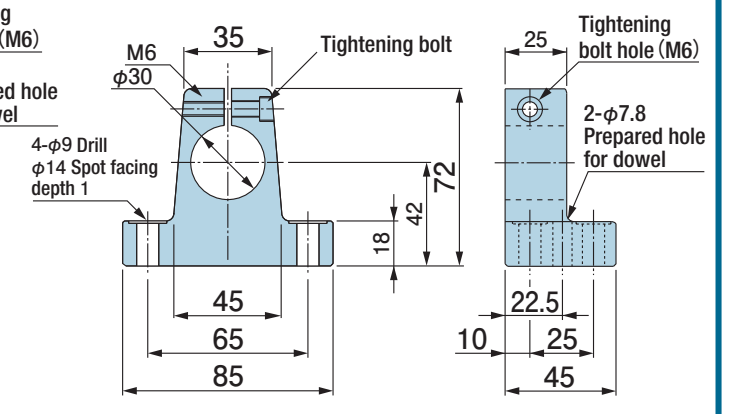
■ **BHS20** (Shaft holder)



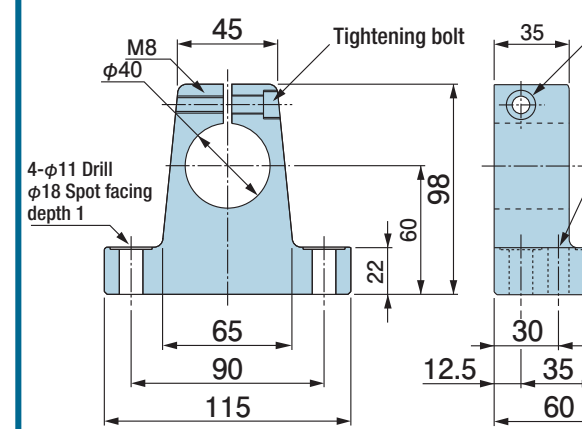
■ **BHS25** (Shaft holder)



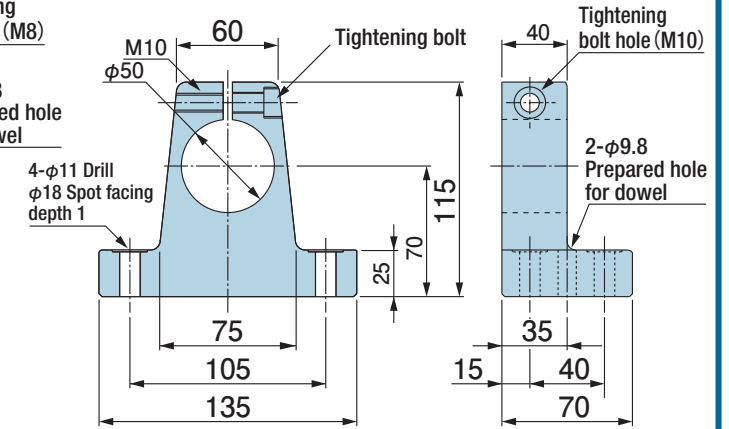
■ **BHS30** (Shaft holder)



■ **BHS40** (Shaft holder)



■ **BHS50** (Shaft holder)



Optional Parts Applicable to BC and BF Types

● Dust seals are the standard accessories of the shift tables.

Dimension Table of Applicable Optional Parts

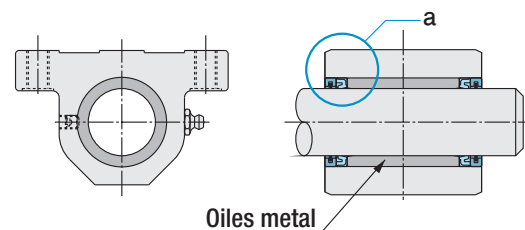
Product Identification for Ordering

Specify by **BTC** **BTF** **I.D.** - **MS** **Part No.**
 Metal scraper (MS)
 No symbol: None
 MS: both ends

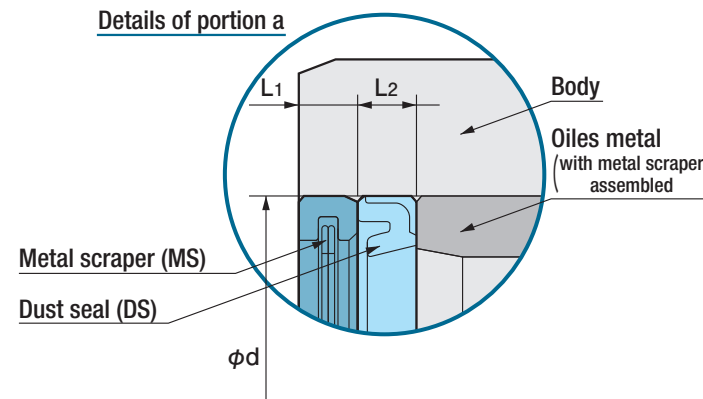
(e.g.) When BC type is used and 16-mm I.D. metal scraper is used
BTC16-MS

■ Metal scraper (MS)

- Use the metal scraper (MS standard) to remove welding splutters adhered to the guide shaft, stuck grease, etc.
- The metal scraper causes no damages to the guide shaft, since it is a coil scraper made of phosphor bronze.
- No dust seal (DS) is assembled when the metal scraper (MS) is attached to the BC type.



Details of portion a



When Using Alone

■ Metal Scraper (MS)

No dust seal (DS) is assembled when the metal scraper (MS) is attached to the BC type.

Specify by **MS** **I.D.** **Part No.**

■ Dust Seal (DS)

Specify by **DS** **I.D.** **Part No.**

Applicable shaft dia. (φd)	Metal scraper (MS)			Dust seal (DS)		
	Part No.	Outer dia. D	Length L1	Part No.	Outer dia. D	Length L2
16	MS16	22	4.4	DS16	22	3
20	MS20	28	4.9	DS20	28	5
25	MS25	33	4.9	DS25	33	5
30	MS30	40	3.9	DS30	40	6
35	MS35	45	4.9	DS35	45	6
40	MS40	50	5.3	DS40	50	6
50	MS50	62	5.3	DS50	62	7

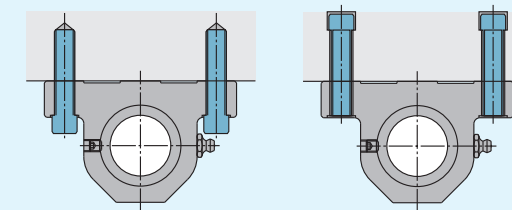
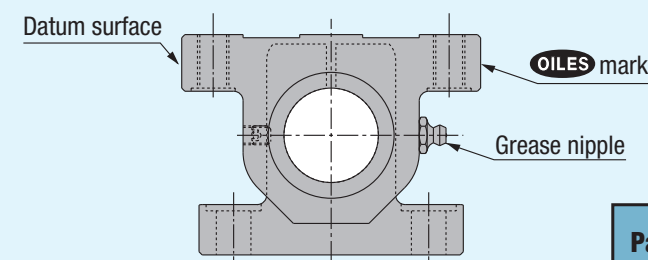
※ Press-fit hole tolerance, BC type: φD Js7 BF type: φD H8, applicable shaft diameter tolerance should be φde7 to h7.

Installation and Adjusting Methods of BC and BF Types

■ Installation and Adjustment Procedures

● Datum surface for fixing shift table

● Fixing bolts for installation

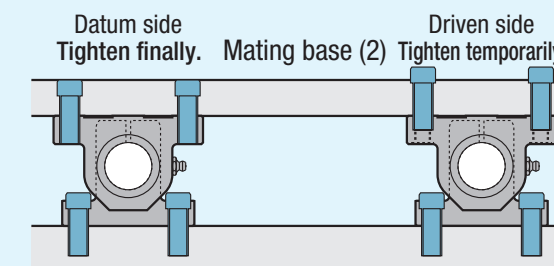
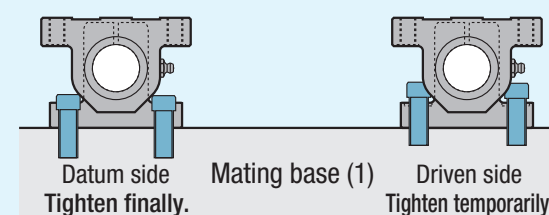


Part No.	Fixing bolt	Part No.	Fixing bolt	
			Left drawing	Right drawing
BTC16	M6	BTF16	M5	M6
BTC20	M8	BTF20	M6	M8
BTC25	M8	BTF25	M6	M8
BTC30	M10	BTF30	M8	M10
BTC40	M10	BTF40	M10	M12
BTC50	M12	BTF50	M10	M12

■ Assembly and Adjustment Procedures

① Place the assembled unit on mating base (1). Tighten the datum-side holder finally, and tighten the driven-side holder temporarily.

② Place the unit on mating base (2). Tighten the datum-side table finally, and tighten the driven-side table temporarily. Then, slide the tables all over the stroke several times. Tighten the driven-side holders finally when movement becomes smooth ($\mu \approx 0.15$). Then, slide the tables all over the stroke several times again, and tighten the tables finally.



③ If movement does not become smooth, the mating bases (1) and (2) are problematic. Adjust them. (Use aluminum foil for the shim.)

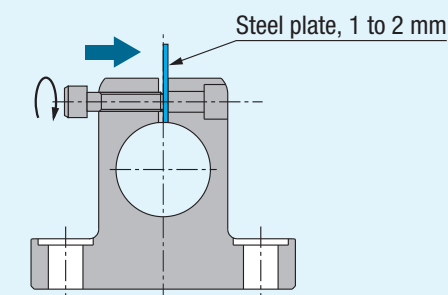
■ Usage of Shaft Holders (BH and BHS)

● How to pull out the shaft

Remove the clamp bolt, insert a steep plate in the slit, and tighten the bolt from the opposite side. The slit widens and the shaft becomes free. Be careful not to widen the slit excessively.

● How to fix the shaft

Tighten the clamp bolt. The slit of the holder becomes narrow, yielding strong clamping force.



Oiles Guide Shafts **BGS/BGSP**



- Guide shafts applicable to the Oiles Slide Shifters BTCA, BTSA, BTC, and BTF and Guide Units BK and BT.
- Guide shafts cut to various standard lengths are available.
- Guide shafts of 30 mm or larger diameters are made of hollow shafts effective for weight reduction.
- We also offer various types of end processing of the shafts.



Variation

Part No.	Type	Shaft diameter	Material	Maximum length	Applications
BGS	Solid	$\phi 8 \sim \phi 12$	S45C+hard chrome-plated (Plating thickness 15μ or more)	1,000mm	General
		$\phi 16 \sim \phi 50$		2,900mm	
BGSP	Hollow shaft	$\phi 30 \sim \phi 50$	STKM13C+hard chrome-plated (Plating thickness 15μ or more)		

BGS/BGSP Oiles Guide Shafts



Product Identification for Ordering

Specify by **BGS O.D. - Length**
Part No.

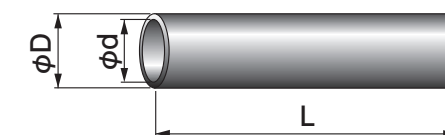
(e.g.) O.D. is 30mm and length is 1000mm. ▶ **BGS30-1000**

Dimension Table

■ BGS



■ BGSP



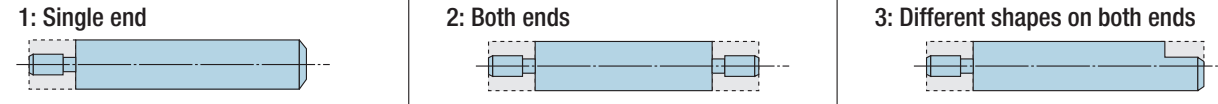
Part No.	O.D.		I.D.	Standard length L (mm)								
	ϕD	Tolerance		ϕd	300	400	500	600	800	1,000	1,200	1,500
BGS8	8	-0.013 -0.035	—	0.12		0.20				0.39		
BGS10	10	-0.013 -0.035	—	0.18		0.31				0.61		
BGS12	12	-0.016 -0.043	—	0.26		0.44				0.88		
BGS16	16	-0.025 -0.050	—	0.47	0.63					1.6		
BGS20	20	-0.030 -0.060	—	0.73	1.0	1.2	1.5			2.5		
BGS25	25	-0.030 -0.060	—	1.1	1.5	1.9	2.3			3.8		
BGS30	30	-0.035 -0.065	—	1.7	2.2	2.8	3.3	4.4		5.5		
BGS30P	30	-0.035 -0.065	20	0.9	1.2	1.5	1.8	2.4		3.0		
BGS35	35	-0.040 -0.070	—				4.5			7.5		
BGS40	40	-0.035 -0.065	—		3.9		5.9			9.8	11.8	
BGS40P	40	-0.035 -0.065	30		1.8		2.6			4.3	5.3	
BGS50	50	-0.040 -0.075	—		6.1		9.2			15.3		23.0
BGS50P	50	-0.040 -0.075	35		3.2		4.8			7.8		12.0

※The values shown above in Standard length column are weight (kg).

※Contact us for other length of shaft.

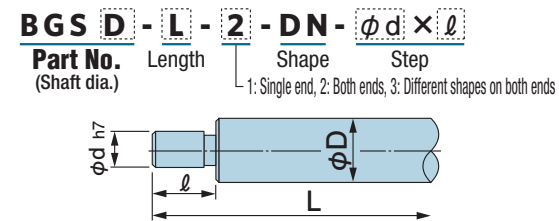
※Product identification methods differ with machining type. Refer to each product identification code entry methods.

Machining Areas

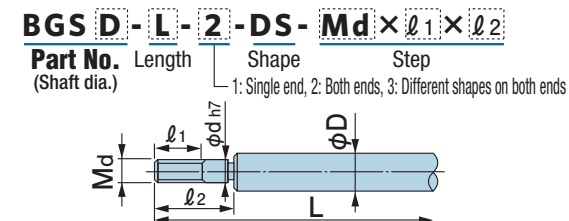


Machining Shapes and Product Identification Code Entry Methods

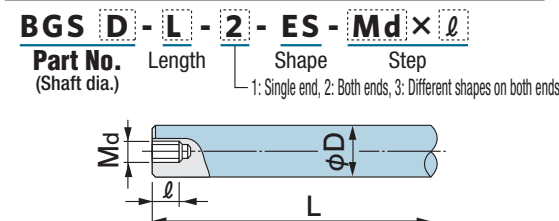
DN Step machining



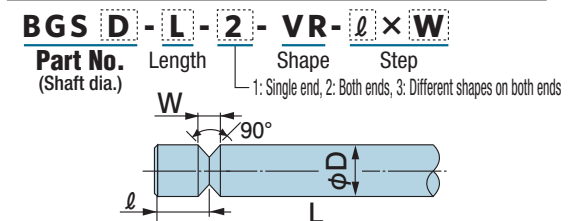
DS Stepped threading



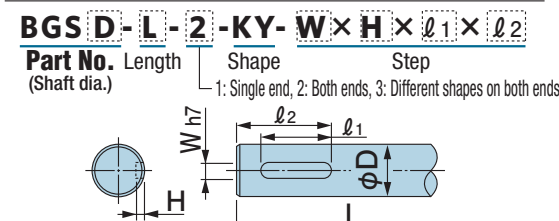
ES End face threading



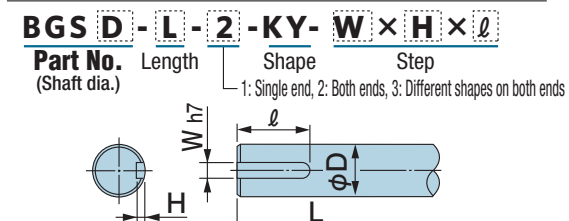
VR V-shaped ring groove machining



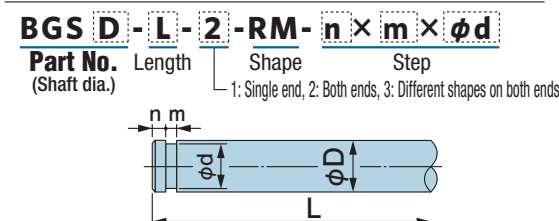
KY Keyway machining



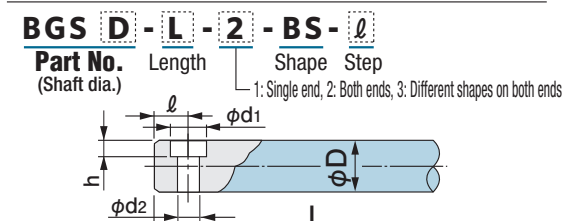
KY Keyway machining



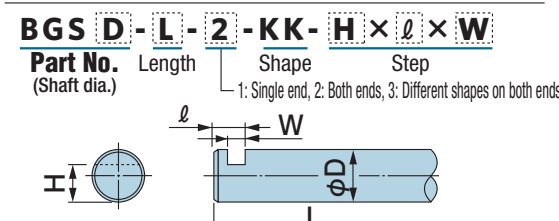
RM Ring groove machining



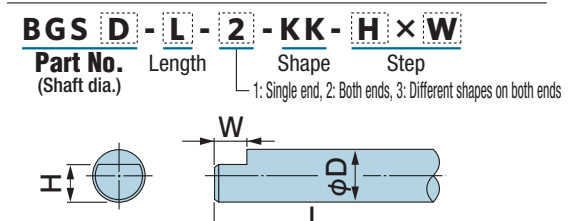
BS Counter boring (Note 1)



KK Cutout

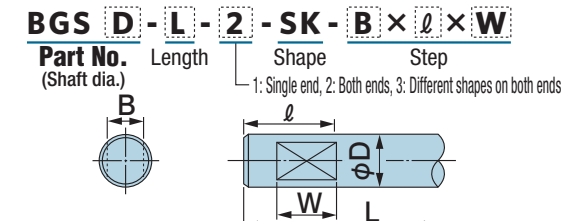


KK Cutout

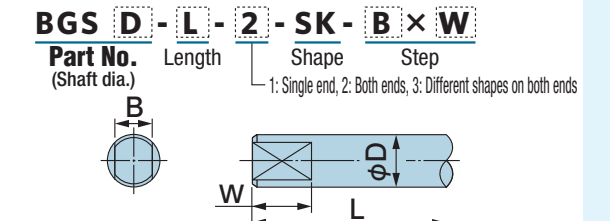


Machining Shapes and Product Identification Code Entry Methods

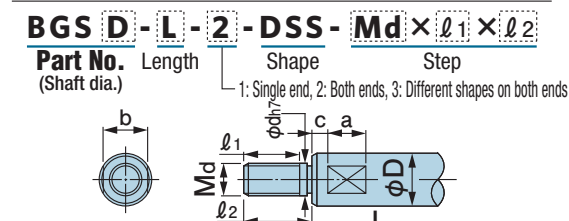
SK Wrench receptacle machining



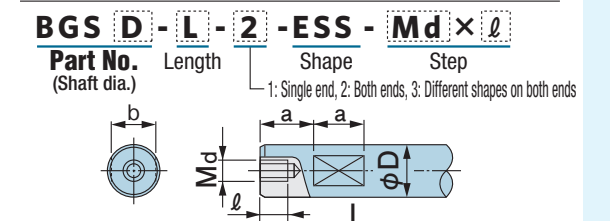
SK Wrench receptacle machining



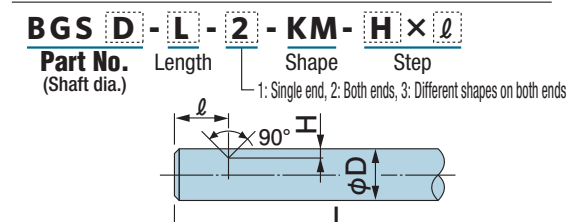
DSS Stepped threading with wrench receptacle (Note 2)



ESS End face threading with wrench receptacle (Note 2)



KM Drilling



- C0.5 unless chamfer dimensions are specified.
- Also specify the thread pitch ($Md \times P$) in the product identification code when fine thread is specified.

Note 1: d_1 , d_2 and h of BS (counter boring) are machined in the standard dimensions shown below. BS (counter boring) is applicable to solid shafts (BGS) only. Use hexagonal socket head bolts.

Note 2: a , b and c of DSS and ESS (threading with wrench receptacle) are machined in the standard dimensions shown below.

■ Standard dimensions of BS (counter boring) (Unit: mm)

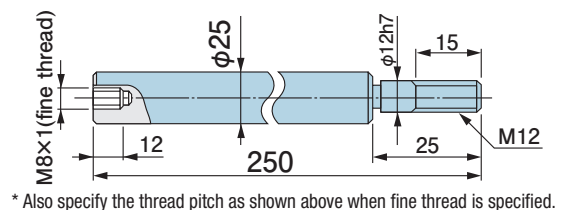
Shaft dia. ϕD	8	10	12	16	20	25	30	35	40	50
ϕd_1	6.5	8	9.5	11	14	14	14	14	17.5	20
ϕd_2	3.4	4.5	5.5	7	9	9	9	9	11	14
h	3.5	4.5	5.5	7	9	9	9	9	11	14.7

■ Standard dimensions of DSS and ESS (wrench receptacle machining) (Unit: mm)

Shaft dia. ϕD	8	10	12	16	20	25	30	35	40	50
a	8	8	10	10	10	10	15	15	20	20
b	7	8	10	14	17	22	27	32	36	41
c	5	5	5	5	5	5	5	5	10	10

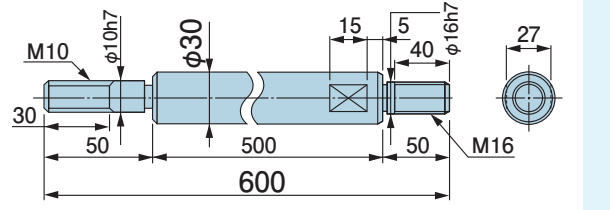
Examples of Product Identification

Example 1: Single end: end face threading + single end: stepped threading
 BGS25-250-3-ES-M8×P1.0×12-DS-M12×15×25

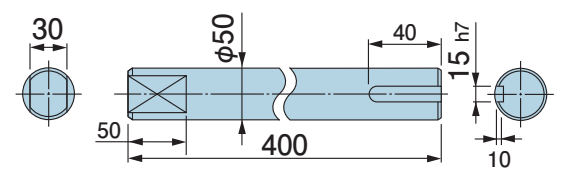


* Also specify the thread pitch as shown above when fine thread is specified.

Example 2: Single end: stepped threading + single end: stepped threading with wrench receptacle
 BGS30-600-3-DS-M10×30×50-DSS-M16×40×50



Example 3: Single end: wrench receptacle machining + single end: keyway machining
 BGS50-400-3-SK-30×50-KY-15×10×40



Example 4: Single end: counter boring
 BGS20-500-1-BS-20

