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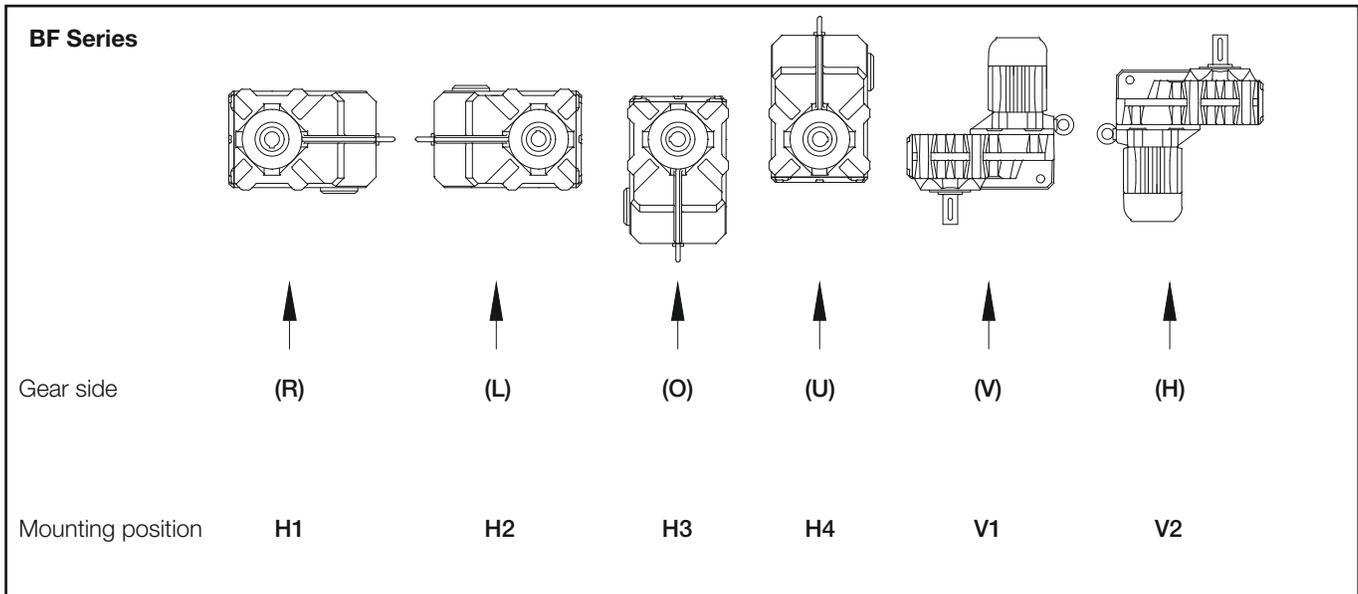
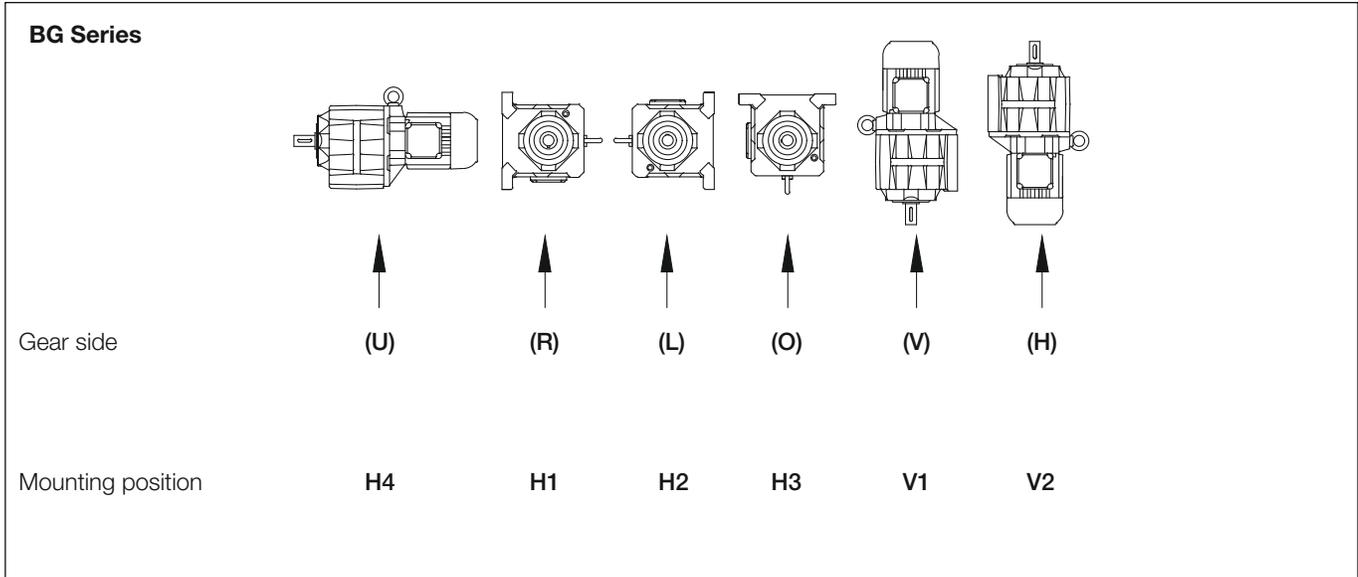
Energy Efficient Geared Motors

AC Line Operated / North America

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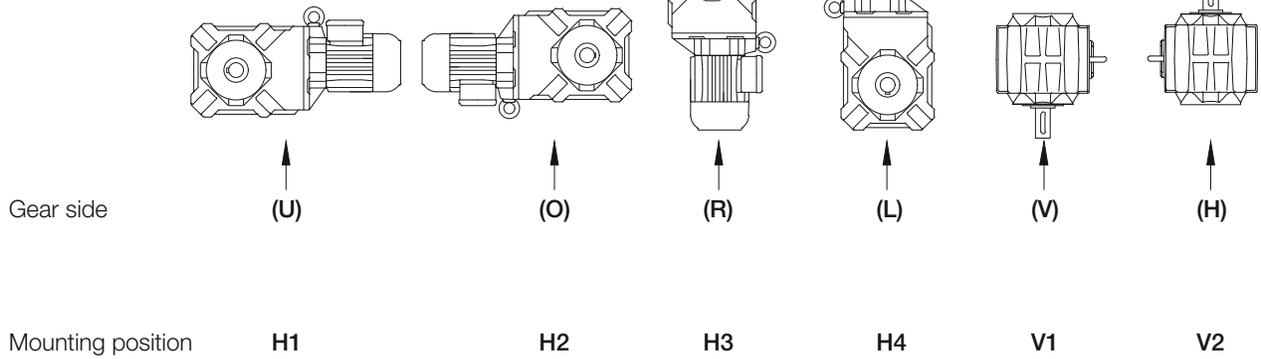
Standard mounting positions



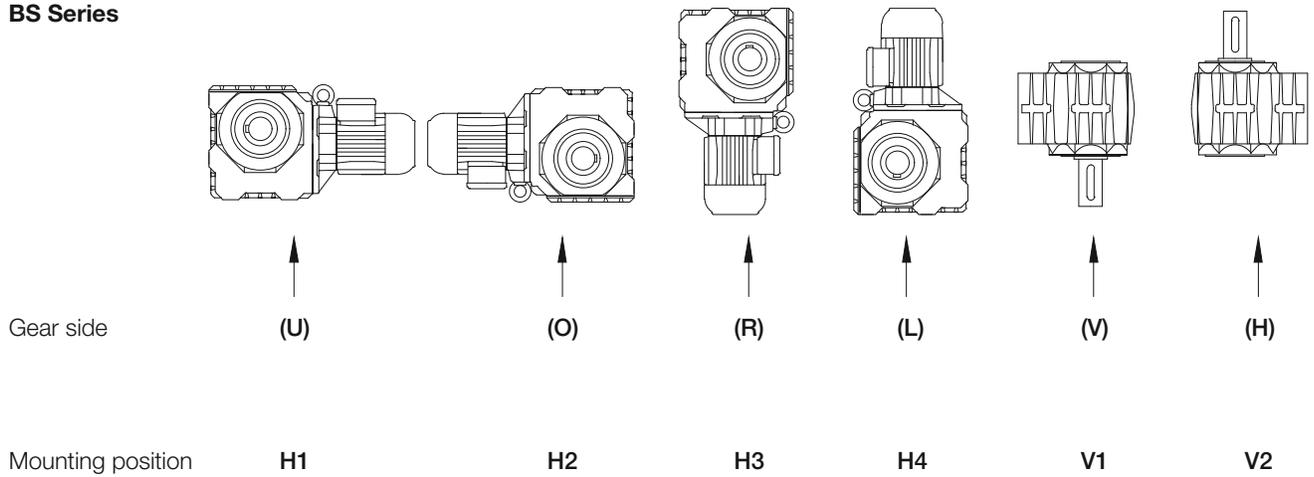
Gearboxes & Lubrication

Standard mounting positions

BK Series

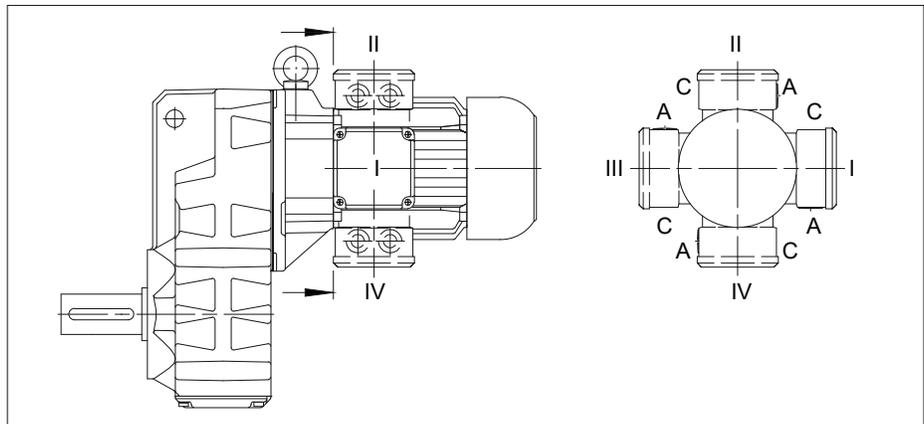
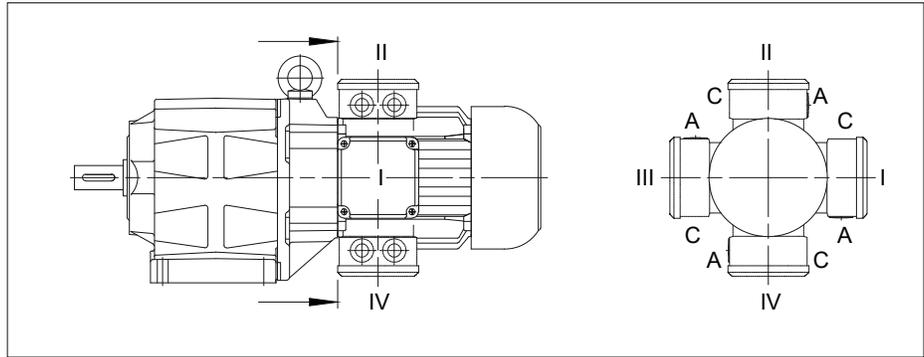


BS Series



Position of the terminal box and the cable entry points (BG and BF)

The standard position of the terminal box for helical-gear and shaft-mounted geared motors is position I. Cables may be introduced from side A or C.



Turning or rotating the gearbox in space in the different mounting positions according to DIN 42950 does not influence the marking as shown. The details of the terminal box always show the position of the terminal box and the cable entry in relation to the gearbox and not in space. The mounting according to DIN 42950 is to be given separately.

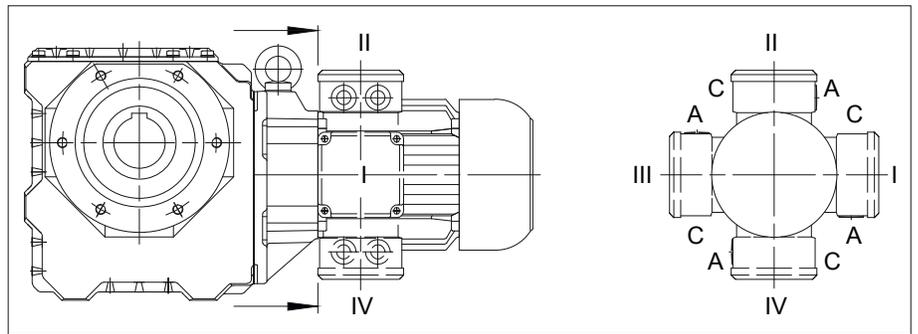
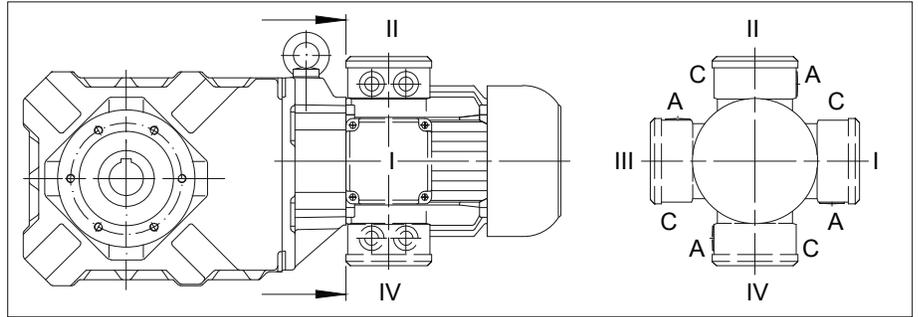
Gearboxes & Lubrication

Position of the terminal box

Position of the terminal box and the cable entry points (BK and BS)

The standard position of the terminal box for bevel-gear and worm-gear motors is position II.

Cable entry through side A or side C is possible



Turning or rotating the gearbox in space in the different mounting positions according to DIN 42950 does not influence the marking as shown. The details of the terminal box always show the position of the terminal box and the cable entry in relation to the gearbox and not in space. The mounting according to DIN 42950 is to be given separately.

Radial and axial forces at the output shaft

The output shafts and output-shaft bearings are matched to the motor torques. It is advisable to locate the drive-transmission element's point of application as close as possible to the shaft collar to ensure that the load imposed by external radial forces is not unnecessarily high. Permissible values for radial forces referred to the output shaft center line are listed in the selection tables. Please consult us if your application involves extra-high axial loading.

Dimensions and fits of output shafts and keyways

The output shaft and second motor shaft extension together with keyways are machined to the following standards:

Solid shafts

Suffix letters		AV Dimensions and tolerances	AM or CS or none		
			Dimen- sions	Tolerances	
				up to 50 mm dia	above 50 mm dia
Output dia	shaft	ANSI B4.1	ISO R 775	k6	m6
Keyway		ANSI B17.1	ISO R 773	P9	P9
Keyway shape	high	ANSI B17.1	ISO R 773	h9	h9
Bore of power transmission elements		AGMA 511.02	ISO R 286	H7	H7

Hollow shafts with keyway

Suffix letters		AV Dimensions and tolerances	AM or CS or none	
			Dimensions	Tolerances
Bore dia		ANSI B4.1	ISO R 775	H7
Keyway		ANSI B17.1	ISO R 773	JS9
Keyway shape	high	ANSI B17.1	ISO R 773	h9
Countershaft		ANSI B4.1	ISO R 286	h6

Plain hollow shafts without keyway for shrink disk connection (SSV)

Suffix letters		AV Dimensions and tolerances	AM or CS or none	
			Dimensions	Tolerances
External dia		ANSI B4.1	manufacturer's standard	f7
Internal dia		ANSI B4.1	manufacturer's standard	H7
Countershaft		ANSI B4.1	ISO R 286	h6

H7 permits the following tolerances:

Boring diameter (mm)	Limiting tolerances (1/1000 mm)
above 6 to 10	0 to +15
above 10 to 18	0 to +18
above 18 to 30	0 to +21
above 30 to 50	0 to +25
above 50 to 80	0 to +30
above 80 to 120	0 to +35
above 120 to 140	0 to +40

Boring diameter (inch)	Limiting tolerances (1/1000 inch)
above 0 to 0.12	0 to -0.4
above 0.12 to 0.24	0 to -0.5
above 0.24 to 0.40	0 to -0.6
above 0.40 to 0.71	0 to -0.7
above 0.71 to 1.19	0 to -0.8
above 1.19 to 1.97	0 to -1.0
above 1.97 to 3.15	0 to -1.2
above 3.15 to 4.73	0 to -1.4
above 4.73 to 7.09	0 to -1.6
above 7.09 to 9.85	0 to -1.8
above 9.85 to 12.41	0 to -2.0
above 12.41 to 15.75	0 to -2.2
above 15.75 to 19.69	0 to -2.5

H 6 permits the following tolerances:

Boring diameter (mm)	Limiting tolerances (1/1000 mm)
above 30 to 50	0 to -16
above 50 to 80	0 to -19
above 80 to 120	0 to -22
above 120 to 180	0 to -25

Boring diameter (inch)	Limiting tolerances (1/1000 inch)
above 0 to 0.12	0 to -0.25
above 0.12 to 0.24	0 to -0.3
above 0.24 to 0.40	0 to -0.4
above 0.40 to 0.71	0 to -0.4
above 0.71 to 1.19	0 to -0.5
above 1.19 to 1.97	0 to -0.6
above 1.97 to 3.15	0 to -0.7
above 3.15 to 4.73	0 to -0.9
above 4.73 to 7.09	0 to -1.0
above 7.09 to 9.85	0 to -1.2
above 9.85 to 12.41	0 to -1.2
above 12.41 to 15.75	0 to -1.4
above 15.75 to 19.69	0 to -1.6

Installing transmission elements

Note:

Gearboxes using torque reaction by means of a flange (Code 2.; 3; 4.; 7.; 8.) or torque arm (Code 5.), must have the side for the torque reaction the same as where the radial force on the output shaft occurs (see rubber buffers for torque arms)! Please consult the factory for other designs.

Gear with solid shaft

Always exercise meticulous care when fitting transmission elements onto output shafts and, whenever possible, use the DIN 332 tapped bore provided for this purpose. Fitting is usually easier if the transmission element can be heated to approximately 100° C for installation. Dimension the locating bore to ISO H7.

Gears with solid shaft at each end (gear code -.3/): alignment of the two keys is subject to the DIN 7168 tolerances, the degree of accuracy is "fine".

Gear with hollow shaft

Hollow shafts usually engage solid shafts of the driven machinery. The gear unit must be mounted such as to be free of constraint and be fixed axially (e.g. by means of assembly help acc. following description "notes for installing shaft mount gears with hollow shaft and keyway"). Special contract provision must be made if the hollow shaft has to guide the solid shaft or, for any other reason, close out-of-round tolerance referenced to a point on the gear housing (such as a flange, for instance) is required.

Shrink disc coupling

A shrink disc coupling (SSV) can transmit high torque from the non- grooved hub to the smooth shaft. The SSV is easily secured and released, using commercially available bolts. SSVs are the ideal supplement for shaft mount gears. The maximum transmittable torque for the selected shrink discs when fitted and mounted according to instructions is above the starting torque of the respective motors classified as standard (for classification of shrink disc sizes see chapter 11, 12, 13 "Additional dimensional drawings for Shrink disc coupling).

Torque restraint

Shaft-mounted geared motors require a suitable torque restraint to resist the reaction torque. Shaft-mounted gears have cast torque arms as standard. Bevel gears and worm gears are available with bolt-on torque arms on request. The torque arm is screwed onto the front “V” on the side of the gear unit. It is always important to ensure that the torque arm does not create excessive constraining forces due to the driven shaft running untrue, for example. Excessive play can result in excessive shock torques in switching or reversing operations. Consequently, we recommend the use of pre-tensioned rubber damping elements. These rubber buffers are part of the scope of supply for designs with a torque arm (see chapter 11, 12, 13 dimensional drawings “Rubber buffer for torque restraint”).

Notes for installing shaft mount gears with hollow shaft and keyway

(1) Attaching the hollow shaft to the customer shaft

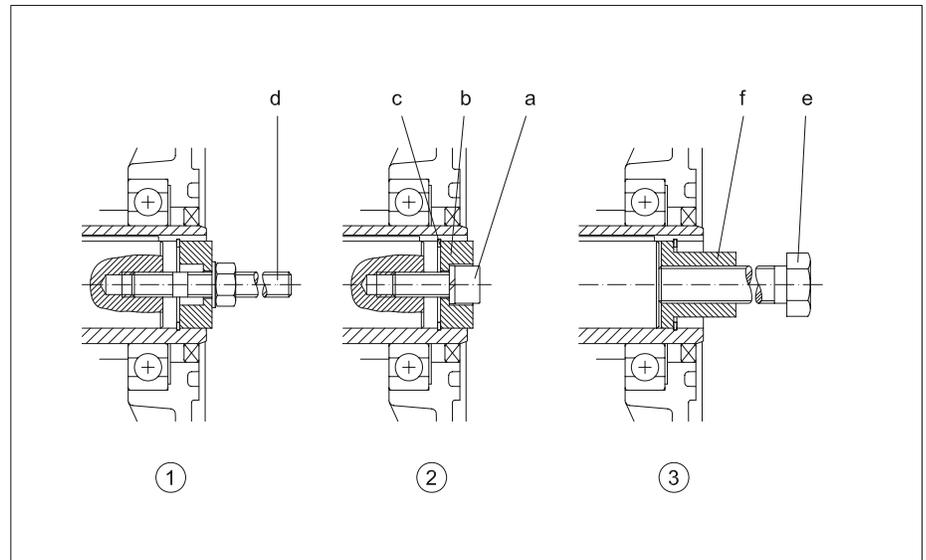
Threaded bolt (d) is screwed into the end thread of the shaft to be driven. By tightening the nut, apply force to thrust plate (b) and locating ring (c) to draw the gear unit onto the shaft.

(2) Axial fastening

Pressure piece (b) is rotated and fitted against retaining ring (c) using fixing screw (a).

(3) Removing

Extractor (f) is fitted between the end face of the shaft and retainer ring (c). Tighten press-off screw (e) against the end of the shaft and pull the gear unit off the shaft. Manufacturing drawings for the required parts are available on request. These parts are not included in the scope of supply.



Detailed information on shaft-mounted gear units, bevel-gear units and worm-gear units is available (see chapter 11, 12, 13 dimensional drawings “Tools for fitting shaft-mounted gear with hollow shaft and keyway”).

Gear ventilation

The lifetime of the gearbox lubricant increases, the better it is protected from negative environmental influences. Should the oil level or the gearbox ratio cause a very high lubricant temperature, the gearbox will be supplied as standard with a breather plug. Either on request or for corresponding high ambient temperatures, all gearboxes from size 10 can be supplied with a breather plug.

For the position of the threaded plugs see chapter 5 threaded plugs.

Output shaft seals

All size 10 and larger gears are available with double seals for the output shaft on request and at extra cost. Double seals are particularly effective if the output shaft points down and as protection against external influences

Lubricants

The drives are shipped ready-filled with gear lubricant. Lubricated in this way, the gear units are suitable for ambient temperatures in the range -20 °C to + 40 °C. The quantity of lubricant is optimized for the desired installed position as is stated on the nameplate. The type of lubricant is stated in the Operating Instructions. Lubricants for other temperature ranges or special applications available on request.

Wear-protective EP gear oils as indicated in the following table have proven particularly effective:

Manufacturer	Lubricant type					
	Mineral Oil	Synthetic Oil		USDA H1 Oil		
	ISO VG 220	ISO VG 68	ISO VG 220	ISO VG 460	ISO VG 220	
	Standard oil for gearboxes in the series BF06-BF90 BG04-BG100 BK60-BK90	Low temperature oil for gearboxes in the series BF06-BF90 BG04-BG100	BK06-BK90 BM09-BM40 BS02-BS40	Standard oil for gearboxes in the series BS02-BS10 BK06-BK10 BM09-BM40 High temperature oil for gearboxes in the series BS02-BS10 BK06-BK10 BF06-BF90 BG04-BG100 BK60-BK90 BM09-BM10	Standard oil for gearboxes in the series BS20-BS40 BK17-BK50 BM20-BM40 High temperature oil for gearboxes BS20-BS40 BK17-BK50 BM20-BM40	Food and Beverage Industry Oil for gearboxes in the series BF06-BF90 BG04-BG100 BK06-BK90 BM09-BM40 BS02-BS40
AGIP	BLASIA 220 [13 02 08]	—	—	BLASIA S 220 [13 02 06]	BLASIA S 460 [13 02 06]	—
BECHER RHUS	STAROIL G 220 [13 02 08]	—	BERUSYNTH EP 68 [13 02 06]	BERUSYNTH EP 220 [13 02 06]	BERUSYNTH EP 460 [13 02 06]	BERUSYNTH EP 220 H1 [13 02 06]
CASTROL	ALPHA EP 220 [13 02 08] ALPHA SP 220 [13 02 08] OPTIGEAR EP 220 [13 02 08] OPTIGEAR 1100/220 [13 02 08]	Alphasyn T68 [13 02 06]	—	ALPHASYN PG 220 [13 02 06] OPTIGEAR 800/220 [13 02 06] OPTIGEAR 1300/220 [13 02 06] ALPHASYN GS 220 [13 02 06]	ALPHASYN PG 460 [13 02 06] OPTIGEAR 800/460 [13 02 06] OPTIGEAR 1300/460 [13 02 06] ALPHASYN GS 460 [13 02 06]	OPTILEB GT 220 (CLP-HC) [13 02 06] OPTILEB GT 1800/220 (CLP-PG) [13 02 08]
CHEVRON	Meropa 220 [13 02 08] GEARTEX EP-A SAE 85W-90 [13 02 06]	—	Meropa Synlu- be WS 68 [13 02 06]	Meropa Synlube WS 220 [13 02 06]	Meropa Synlube WS 460 [13 02 06]	Chevron lubricating oils FM 220 (USA) [13 02 06]
FUCHS	RENOLIN CLP 220 [13 02 08] RENOLIN CLPF 220 SUPER [13 02 08] RENOLIN CLP 220 PLUS [13 02 08]	RENOLIN UNI- SYN CLP 68 [13 02 06]	RENOLIN PG 68 [13 02 06]	RENOLIN PG 220 [13 02 06]	RENOLIN PG 460 [13 02 06]	CASSIDA FLUID GL 220 [13 02 06]
KLÜBER	KLÜBEROIL GEM 1-220 N [13 02 08]	—	KLÜBER- SYNTH GH 6-80 [13 02 06]	KLÜBERSYNTH GH 6-220 [13 02 06]	KLÜBERSYNTH GH 6-460 [13 02 06]	KLÜBEROIL 4UH1-220 N [13 02 06] KLÜBERSYNTH UH1 6-220 [13 02 06]
MOBIL	MOBILGEAR 600 XP 220 [13 02 08]	MOBIL SHC 626 [13 02 06]	—	MOBIL SHC Gear 220 [13 02 06] MOBIL SHC 630 [13 02 06]	MOBIL SHC Gear460 [13 02 06] MOBIL SHC 634 [13 02 06]	MOBIL SHC CIBUS 220 [13 02 06]
OEST	Gearol 220 [13 02 06]	—	—	—	—	—
SHELL	OMALA S2 GX220 [13 02 08]	—	—	OMALA S4 WE 220 [13 02 06]	OMALA S4 WE 460 [13 02 06]	—
TOTAL	CARTER EP 220 [13 02 08] CARTER XEP 220 [13 02 06]	—	—	CARTER SY 220 [13 02 06]	CARTER SY 460 [13 02 06]	NEVASTANE SL220 [13 02 06] NEVASTANE EP 220 [13 02 06] NEVASTANE SY 220 [13 02 06]
WINTERSHALL	SRS ERSOLAN 220 [13 02 08]	—	—	—	—	—

[...] European Waste Catalogue Code (Decision 2001/118/CE)

Important:

Synthetic gear oils of a Polyglykol base (e.g. PGLP...) must be disposed of separately to mineral oil as **special waste**.

So long as the ambient temperature does not fall below -20 °C the international definition of the viscosity class at 40 °C according to ISO 3448 and DIN 51519 ISO the viscosity class VG220 (SAE90) is recommended according, in North America AGMA 5EP.

For lower temperatures it is recommended to use oils of a lower nominal viscosity with a corresponding better starting characteristic, for instance a PGLP with a nominal viscosity VG68 (SAE80) or AGMA 2EP respectively. These types of oil can already be necessary at a temperature around the freezing point, if the break away torque of a drive is reduced by some smooth starting device or if the motor has a relatively low power.

The preferred quantity of lubricant for the planned type of installation is stated on the motor's rating plate (symbol "oil can"). Unless a Sight Glass is present oil should Never Be Topped UP. Information about the quantity of lubricant required for other types of installation can be obtained from the factory.

Lubricant quantities, BG-series gears

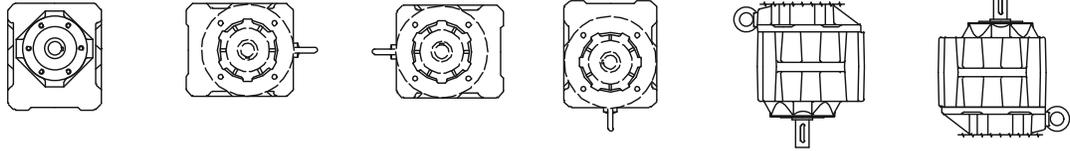
Gear-housing with flange or foot

Flange (Code-2./Code-3./Code-4./Code-7.)

Foot with threaded holes (Code -6.)

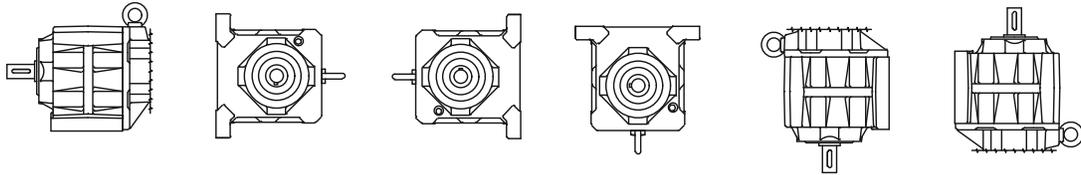
Foot with clearance holes (Code-9.)

Completely machined (Code -8.)



Foot housing

cast foot with clearance holes (Code -1.)



Gearbox type		H4	H1	H2	H3	V1	V2
BG04	*	0.03	0.03	0.03	0.03	0.05	0.05
	**	0.05	0.05	0.05	0.05	0.1	0.05
BG05	*	0.05	0.05	0.05	0.05	0.08	0.08
	**	0.08	0.08	0.08	0.08	0.16	0.8
BG06	*	0.08	0.08	0.08	0.08	0.15	0.15
	**	0.12	0.12	0.12	0.12	0.24	0.15
BG10	*	0.65	0.65	0.65	0.85	1.05	0.85
	**	0.45	0.45	0.45	0.6	0.75	0.6
BG15	**	0.4	0.4	0.4	0.35	0.62	0.55
BG20	*	0.8	0.8	0.8	1.1	1.4	1.1
	**	0.6	0.6	0.6	1.0	1.15	0.9
BG30	*	1.0	1.0	1.0	1.7	2.4	1.6
	**	1.0	1.0	1.0	1.7	2.3	1.7
BG40	*	1.7	1.7	1.7	2.5	3.5	2.1
	**	1.7	1.7	1.7	2.5	3.5	2.1
BG50	*	3.0	3.0	3.0	4.5	5.5	3.3
	**	3.0	3.0	3.0	4.5	5.5	3.3
BG60	*	5.5	5.5	5.5	7.0	10.9	6.4
	**	5.5	5.5	5.5	7.0	10.9	6.4
BG70		6.5	6.5	6.5	8.0	13.5	9.0
BG80		11.0	11.0	11.0	11.0	22.5	15.0
BG90		19.0	19.0	19.0	19.0	40.0	26.0
BG100		35.0	35.0	55.0	50.0	66.0	50.0

* Flange Housing

** Foot Housing

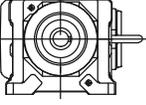
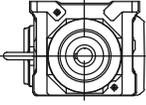
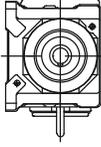
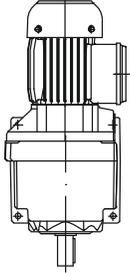
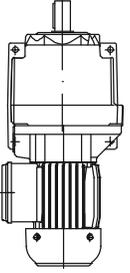
Lubrication quantity in liquid pint

Gearboxes & Lubrication

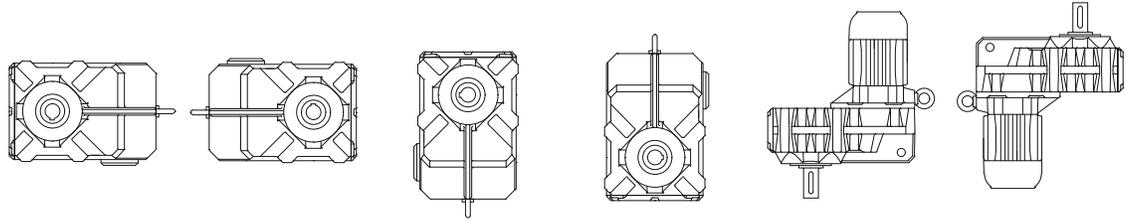
Lubricants

Lubricant quantities, BG20-01R

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Gear type	H4	H1	H2	H3	V1	V2
BG20R	1.69	2.11	1.69	2.96	3.49	2.11
	Lubrication quantity in liquid pint					

Lubricant quantities, BF-series gears

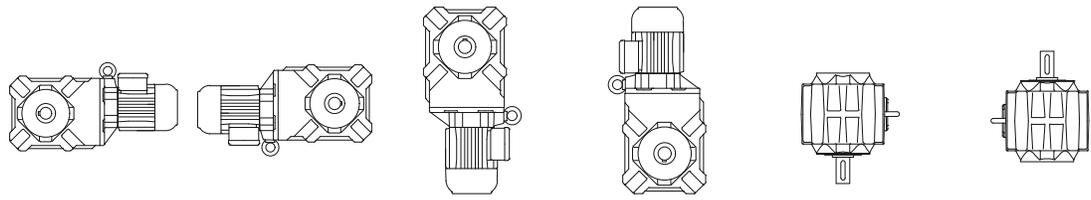


Gear type	H1	H2	H3	H4	V1	V2
BF06	0.53	0.53	0.53	0.78	0.74	0.63
BF10	1.80	1.180	1.80	2.32	3.06	3.17
BF20	2.75	2.75	2.75	3.59	4.65	4.76
BF30	3.59	3.59	3.59	4.65	6.76	6.34
BF40	5.71	5.71	5.71	7.40	10.36	10.14
BF50	8.03	8.03	8.03	10.57	14.16	14.16
BF60	14.16	14.16	14.16	19.02	25.99	25.36
BF70	25.78	25.78	25.78	33.81	51.14	46.07
BF80	35.93	35.93	35.93	44.38	68.05	58.12
BF90	67.63	67.63	67.63	86.65	131.03	112.01
Lubrication quantity in liquid pint						

Gearboxes & Lubrication

Lubricants

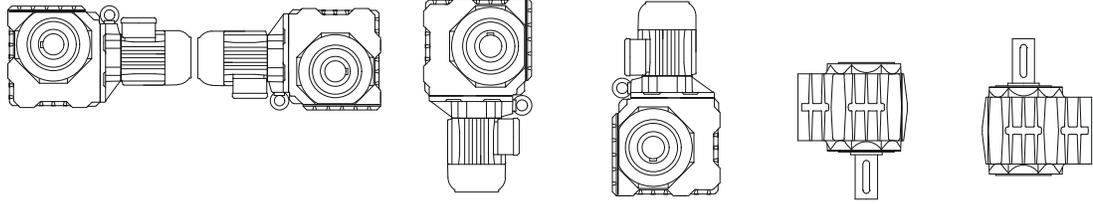
Lubricant quantities, BK-series gears



Gear type	H1	H2	H3	H4	V1	V2
BK06	0.32	0.49	0.61	0.66	0.38	0.49
BK10	1.75	1.75	1.94	3.70	1.94	1.94
BK17	2.11	3.59	3.80	5.49	2.75	3.80
BK20	3.17	3.17	3.38	6.13	3.49	3.49
BK30	4.65	4.65	4.86	9.30	5.07	5.07
BK40	7.40	7.40	7.40	14.16	7.82	7.82
BK50	12.26	12.26	12.26	24.30	12.68	12.68
BK60	12.68	18.39	14.58	25.36	18.18	18.18
BK70	21.56	31.70	24.30	43.32	28.53	30.64
BK80	38.04	53.89	40.15	78.20	49.67	53.89
BK90	69.74	101.44	76.08	145.83	95.10	101.44

Lubrication quantity in liquid pint

Lubricant quantities, BS-series gears

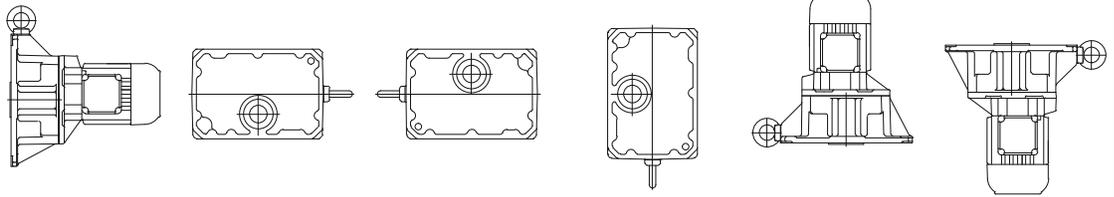


Gear type	H1	H2	H3	H4	V1	V2
BS02	0.13	0.13	0.13	0.13	0.13	0.13
BS03	0.36	0.36	0.36	0.36	0.36	0.36
BS04	0.23	0.36	0.23	0.42	0.23	0.23
BS06	0.51	0.76	0.51	0.95	0.51	0.51
BS10	1.90	2.75	1.90	3.38	1.90	1.90
BS20	3.17	4.44	3.17	5.71	3.17	3.17
BS30	4.65	6.34	4.65	8.03	4.65	4.65
BS40	7.40	9.93	7.40	12.68	7.40	7.40
Lubrication quantity in liquid pint						

Gearboxes & Lubrication

Lubricants

Lubricant quantities, pre-stage gears (Z)



		H4	H1	H2	H3	V1	V2
BF		H4	H1	H2	H3	V1	V2
BG							
BK		H1	V1	V2	H2	H4	H3
BS							
Gear type							
BF10Z BF10Z		0.21	0.11	0.25	0.15	0.34	0.15
BK10Z BS10Z							
BG20Z BF20Z		0.32	0.15	0.40	0.36	0.57	0.21
BK20Z BS20Z							
BG30Z BF30Z		0.42*	0.21	0.74	0.46	0.74	0.40
BK30Z BS30Z							
BM30Z BM30Z							
BG40Z BF40Z		0.68*	0.36	1.06	0.78	1.27	0.68
BK40Z BS40Z							
BM40Z							
BG50Z BF50Z		1.06	0.63	1.94	1.48	2.43	1.06
BK50Z							
BG60Z BF60Z		2.54	1.06	3.28	2.32	4.23	1.48
BK60Z							
BG70Z BF70Z		2.54	1.27	3.80	3.38	5.07	2.96
BK70Z BS70Z							
BG80Z BF80Z		6.55	2.75	7.45	5.49	10.99	4.23
BK80Z BS80Z							
BG90Z		8.88	3.17	11.41	7.40	16.27	6.34
BK90Z							
*: with BM30Z/BM40Z the pre-stage lubricant is filled via the main gearbox.							
Lubrication quantity in liquid pint							

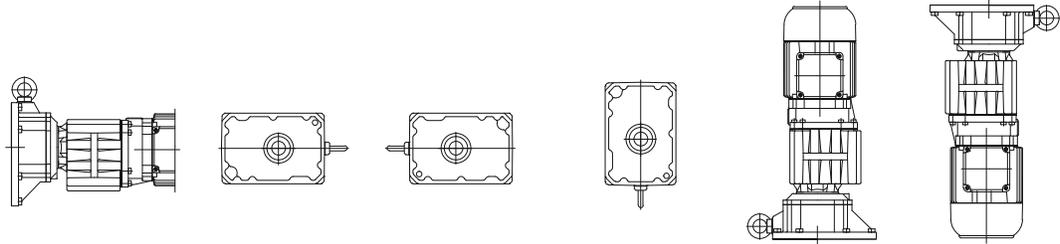
Lubrication quantity for intermediate gear

Definition of the terminal box position

Terminal box position for intermediate gear is similar to the main gearbox that means

Main gearbox BG, BF terminal box pos. I -> intermediate gearbox terminal box pos. I

Main gearbox BK, BS terminal box pos. II -> intermediate gearbox terminal box pos. II



Mounting position of main gearbox	BF	H4	H1	H2	H3	V1	V2
	BG						
	BK	H1	V1	V2	H2	H4	H3
	BS						

Type designation of double gearbox combination

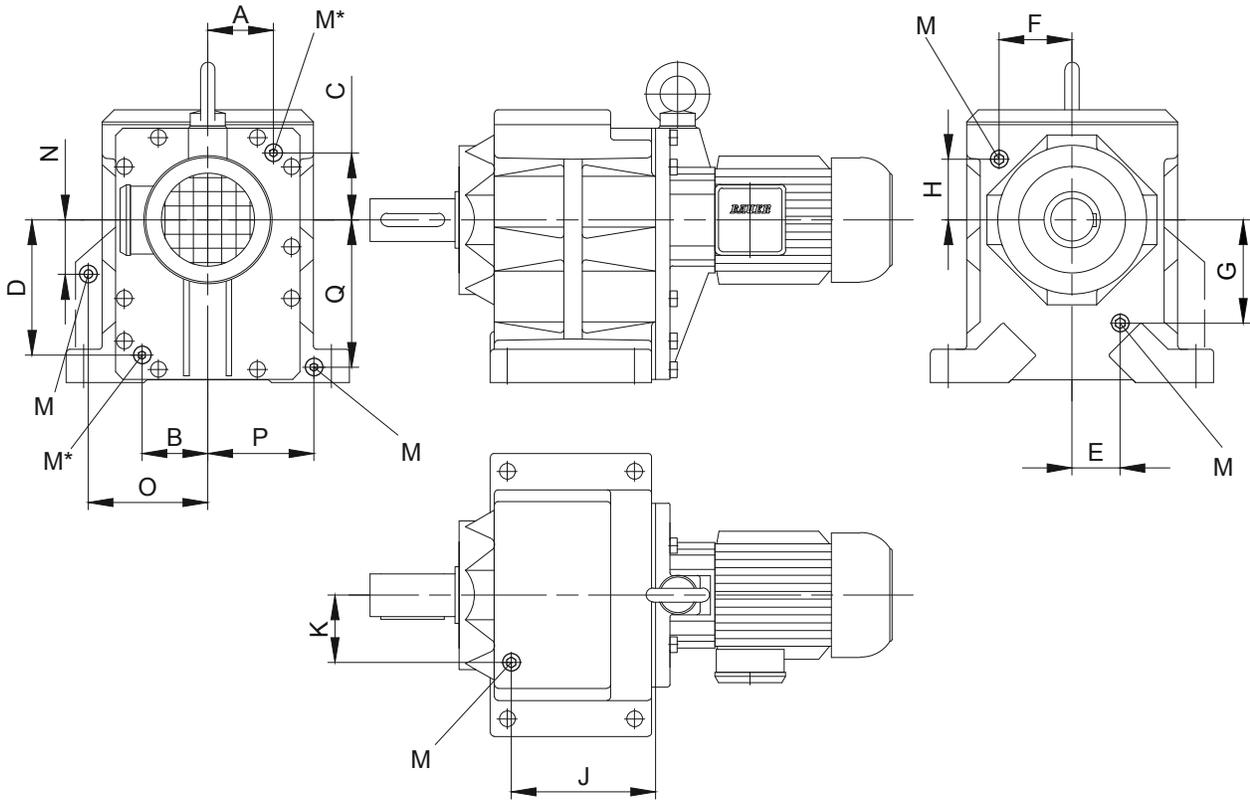
BG06G04	BS06G04	0.06	0.06	0.06	0.06	0.11	0.11
BK06G04							
BG10G06	BF10G06	0.17	0.17	0.17	0.17	0.32	0.32
BK10G06	BS10G06						
BG20G06	BF20G06	0.17	0.17	0.17	0.17	0.32	0.32
BK20G06	BS20G06						
BG30G06	BF30G06	0.17	0.17	0.17	0.17	0.32	0.32
BK30G06	BS30G06						
BG40G10	BF40G10	1.37	1.37	1.37	1.80	2.22	1.80
BK40G10	BS40G10						
BG50G10	BF50G10	1.37	1.37	1.37	1.80	2.22	1.80
BK50G10							
BG60G20	BF60G20	1.69	1.69	1.69	2.32	2.96	2.32
BK60G20							
BG70G20	BF70G20	1.69	1.69	1.69	2.32	2.96	2.32
BK70G20							
BG80G40	BF80G40	3.59	3.59	3.59	5.28	6.97	4.44
BK80G40							
BG90G50	BF90G50	6.34	6.34	6.34	9.51	11.62	6.97
BK90G50	BG100G50						

Lubrication quantity in liquid pint

Gearboxes & Lubrication

Threaded plugs

Position of threaded plugs
-BG-series gears

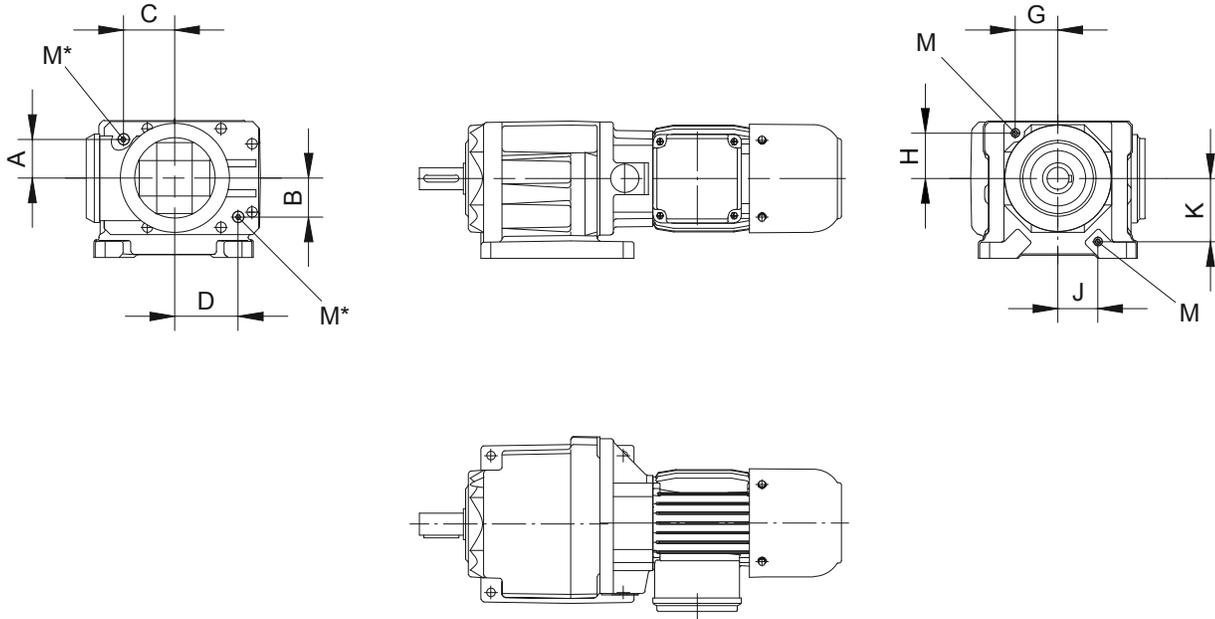


Type		A	B	C	D	E	F	G	H	J	K	N	O	P	Q	M		
BG10	Foot housing	see position of the oil drain an filler plugs on the system cover	Tab.I-Tab.III size B.10			1.30	1.65	1.89	1.63	-	-	-	-	-	-	-	M10x1	
BG10	Flange housing		Tab.I-Tab.III size B.10			1.06	-	2.87	-	-	-	-	-	-	-	-	M10x1	
BG15	Foot housing		Tab.I-Tab.III size B.10			-	-	-	-	-	-	-	-	-	-	-	-	
BG20	Foot housing		Tab.I-Tab.III size B.20			-	1.85	-	2.07	-	-	-	-	-	-	-	-	M10x1
BG20	Flange housing		Tab.I-Tab.III size B.20			-	1.10	-	2.68	-	-	-	-	-	-	-	-	M10x1
BG30	Foot housing		Tab.I-Tab.III size B.30			-	2.13	-	2.28	-	-	-	-	-	-	-	-	M10x1
BG30	Flange housing		Tab.I-Tab.III size B.30			-	2.28	-	1.89	-	-	-	-	-	-	-	-	M10x1
BG40	Foot housing		Tab.I-Tab.III size B.40			-	2.95	-	1.89	-	-	-	-	-	-	-	-	M10x1
BG40	Flange housing		Tab.I-Tab.III size B.40			-	2.95	-	1.89	-	-	-	-	-	-	-	-	M10x1.5
BG50	Foot housing		Tab.I-Tab.III size B.50			-	2.09	-	3.94	-	-	-	-	-	-	-	-	M10x1.5
BG50	Flange housing		Tab.I-Tab.III size B.50			-	2.09	-	3.94	-	-	-	-	-	-	-	-	M10x1.5
BG60	Foot housing		Tab.I-Tab.III size B.60			-	2.76	-	4.69	-	-	-	-	-	-	-	-	M10x1.5
BG60	Flange housing		Tab.I-Tab.III size B.60			-	2.76	-	4.69	-	-	-	-	-	-	-	-	M10x1.5
BG70			Tab.I-Tab.III size B.70			-	4.06	-	3.39	8.03	3.74	-	-	-	-	-	-	M10x1.5
BG80			Tab.I-Tab.III size B.80			-	5.24	-	4.33	9.33	4.37	-	-	-	-	-	-	M10x1.5
BG90			Tab.I-Tab.III size B.90			-	6.50	-	4.88	11.69	5.51	-	-	-	-	-	-	M24x1.5
BG100		Tab.I-Tab.III size B.80			-	7.95	-	5.04	16.54	6.50	5.32	10.35	7.95	11.54	-	-	M24x1.5	

M = Plug according to DIN 908
Dimensions in inch

M* = Size and position of the drain plug see page 82.

Position of threaded plugs -BG-20-01R



Type	A	B	C	D	G	H	J	K	M
BG20-01R Roller table	see position of the oil drain and filler plugs on the system cover Tab.I-Tab.III size B20				1.91	2.03	1.77	2.82	M10x1
M = Plug according to DIN 908 Dimensions in inch									

M* = Size and position of the drain plug see page 82.

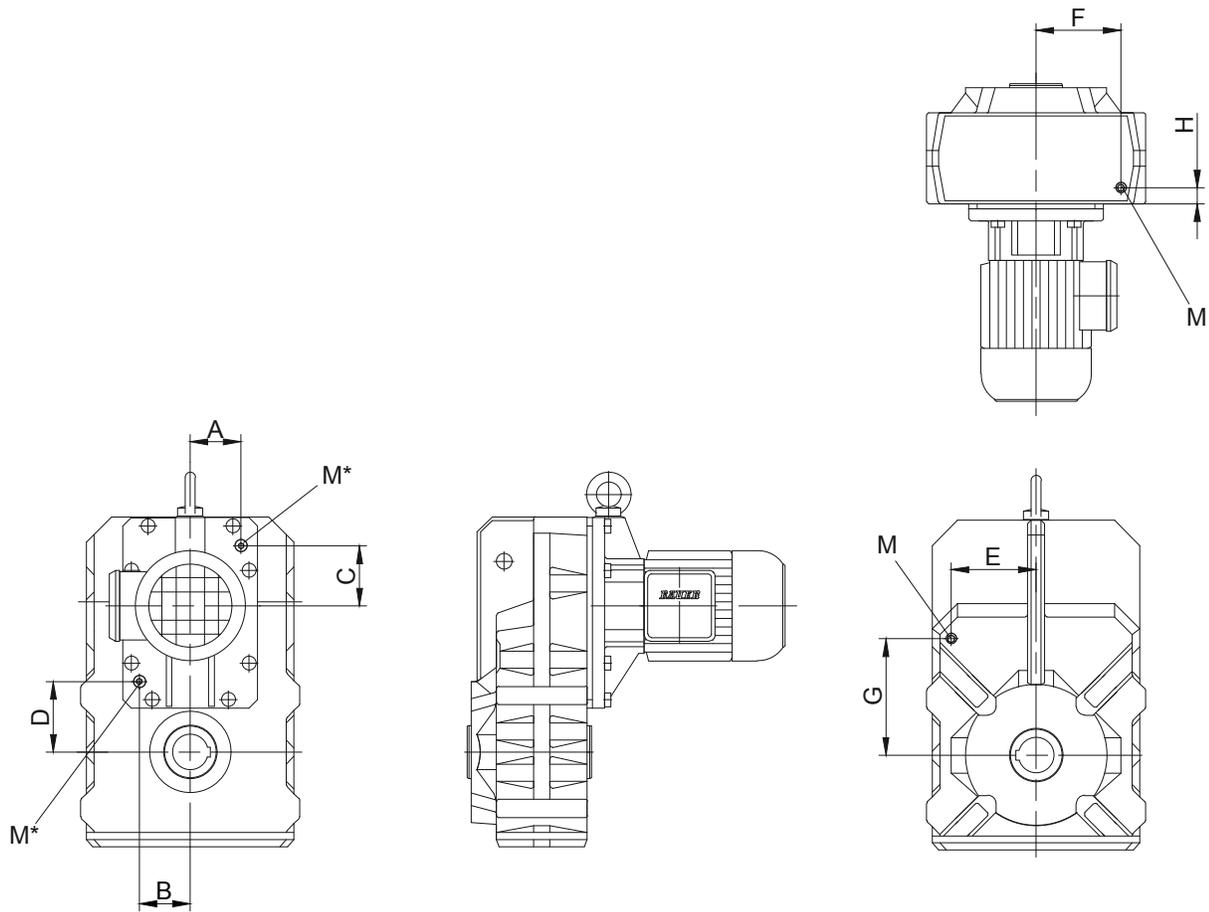
Gearboxes & Lubrication

Threaded plugs

Position of threaded plugs

-BF-series gears

5



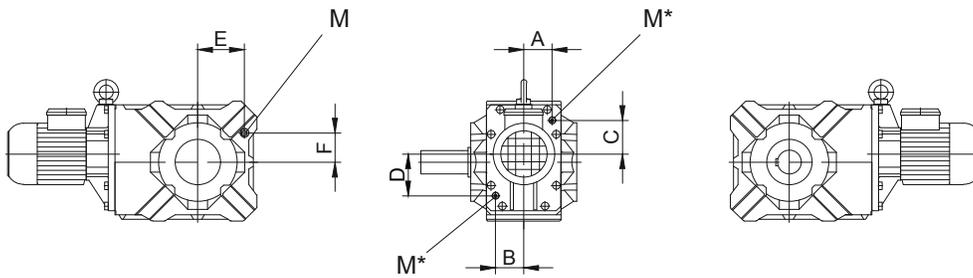
Type	A	B	C	D	E	F	G	H	M
BF06	see position of the oil drain and filler plugs on the system cover	on request							
BF10		Tab.I-Tab.III size	B.10	2.52	2.56	3.82	1.10	M10x1	
BF20		Tab.I-Tab.III size	B.20	3.03	2.76	4.53	1.20	M10x1	
BF30		Tab.I-Tab.III size	B.30	3.46	3.23	4.92	1.44	M10x1	
BF40		Tab.I-Tab.III size	B.40	3.94	3.39	5.55	1.30	M14x1.5	
BF50		Tab.I-Tab.III size	B.50	4.72	4.13	6.50	1.67	M14x1.5	
BF60		Tab.I-Tab.III size	B.60	5.51	5.71	7.87	1.99	M20x1.5	
BF70		Tab.I-Tab.III size	B.70	6.50	6.97	9.25	2.07	M20x1.5	
BF80		Tab.I-Tab.III size	B.70	5.71	5.83	10.04	4.84	M20x1.5	
BF90		Tab.I-Tab.III size	B.80	6.10	6.93	13.68	10.24	M24x1.5	

M = Plug according to DIN 908
Dimensions in inch

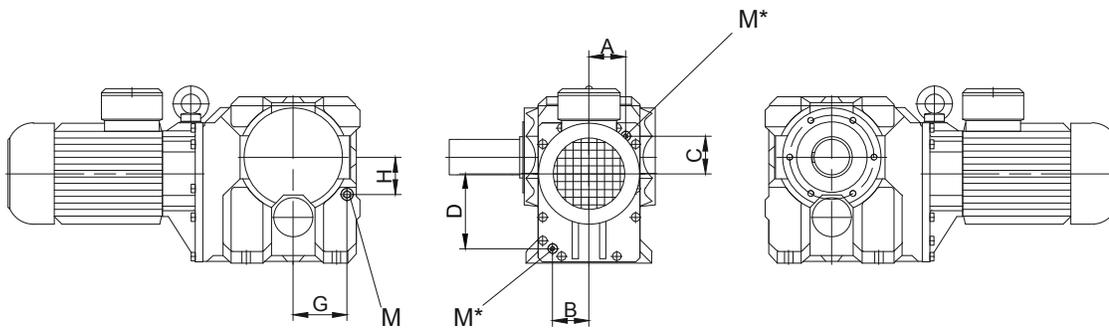
M* = Size and position of the drain plug see page 82.

Position of threaded plugs -BK-series gears

BK10 - BK50



BK60 - BK90



5

Type	A	B	C	D	E	F	G	H	M
BK06	see position of the oil drain and filler plugs on the system cover	on request							
BK10		Tab.I-Tab.III size B.10	2.44	1.28	-	-	M10x1		
BK20		Tab.I-Tab.III size B.20	2.89	1.48	-	-	M10x1		
BK30		Tab.I-Tab.III size B.30	3.15	1.69	-	-	M10x1		
BK40		Tab.I-Tab.III size B.40	3.46	1.93	-	-	M14x1.5		
BK50		Tab.I-Tab.III size B.50	4.65	2.91	-	-	M14x1.5		
BK60		Tab.I-Tab.III size B.60	-	-	3.66	3.43	M20x1.5		
BK70		Tab.I-Tab.III size B.70	-	-	5.39	3.74	M20x1.5		
BK80		Tab.I-Tab.III size B.80	-	-	5.91	4.61	M20x1.5		
BK90		Tab.I-Tab.III size B.90	-	-	8.19	5.32	M24x1.5		

M = Plug according to DIN 908
Dimensions in inch

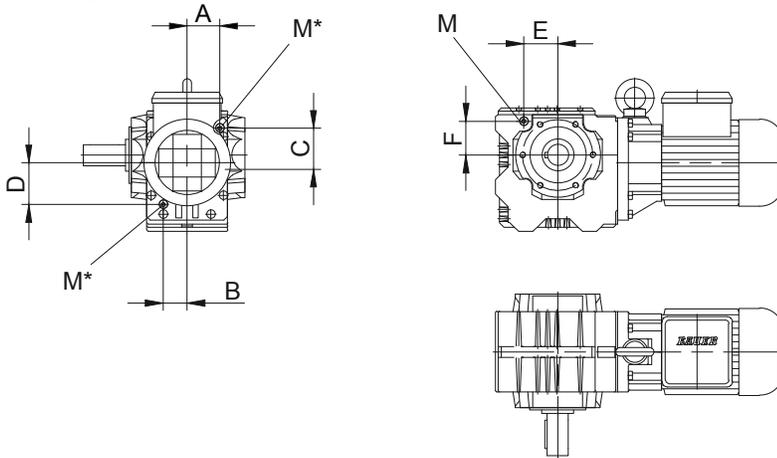
M* = Size and position of the drain plug see page 82.

Gearboxes & Lubrication

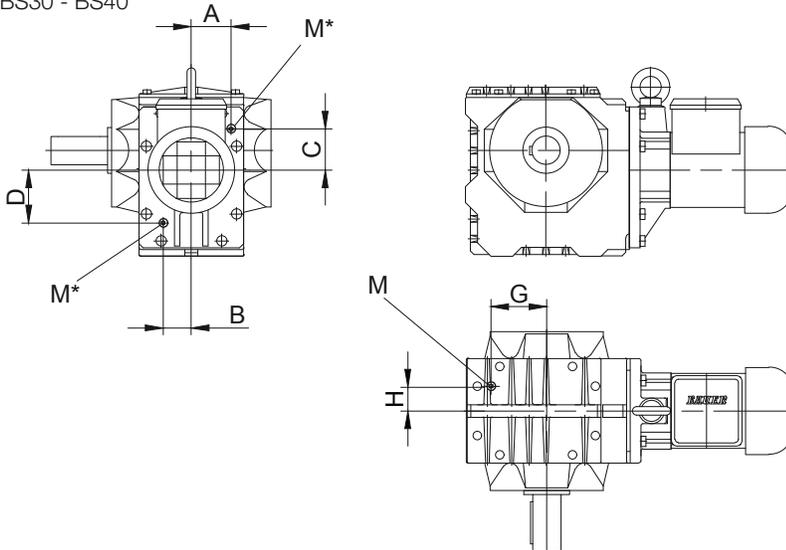
Threaded plugs

Position of threaded plugs -BS-series gears

BS10 - BS20



BS30 - BS40

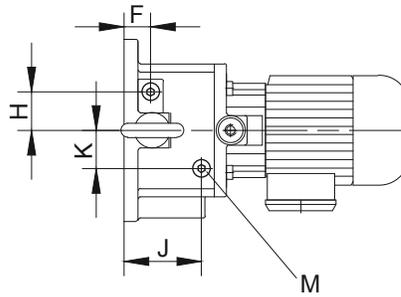
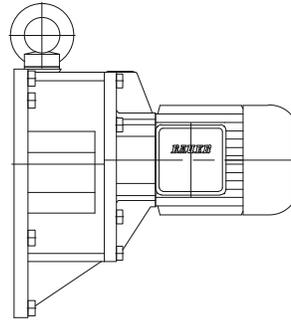
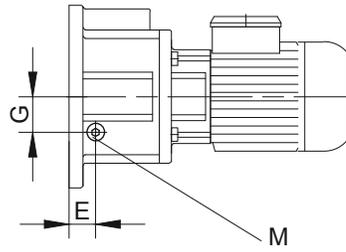
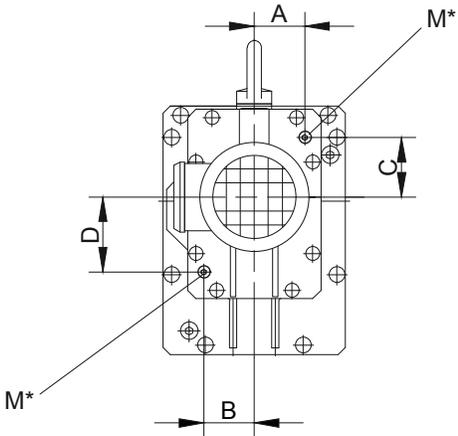


Type	A	B	C	D	E	F	G	H	M
BS10	see position of the oil drain and filler plugs on the system cover	Tab.I-Tab.III size B.10			1.89	1.97	-	-	M10x1
BS20		Tab.I-Tab.III size B.20			2.32	2.48	-	-	M10x1
BS30		Tab.I-Tab.III size B.30			-	-	3.11	1.38	M10x1
BS40		Tab.I-Tab.III size B.40			-	-	3.68	1.63	M14x1.5

M = Plug according to DIN 908
Dimensions in inch

M* = Size and position of the drain plug see page 82.

Position of threaded plugs -pre-stage gears (Z)



5

Gear	A	B	C	D	E	F	G	H	J	K	M
BG10(Z);BK10(Z)	-	-	-	-	0.98	-	0.69	-	1.79	0.98	M10x1
BF10(Z);BS10(Z)	-	-	-	-	1.93	-	1.12	-	0.93	1.10	M10x1
BG20(Z);BK20(Z)	-	-	-	-	1.93	-	1.12	-	0.93	1.10	M10x1
BF20(Z);BS20(Z)	-	-	-	-	1.93	-	1.12	-	0.93	1.10	M10x1
BG30(Z);BK30(Z)	see position of the oil drain and filler plugs on the system cover	Tab.I and Tab.III size	B10	-	0.94	-	1.18	-	-	-	M10x1
BF30(Z);BS30(Z)		Tab.I and Tab.III size	B20	-	1.08	-	1.44	-	-	-	M14x1.5
BG40(Z);BK40(Z)		Tab.I and Tab.III size	B30	-	-	-	-	-	1.14	1.69	M14x1.5
BF40(Z);BS40(Z)		Tab.I and Tab.III size	B40	-	1.30	-	1.89	-	-	-	M20x1.5
BG50(Z);BK50(Z)		Tab.I and Tab.III size	B50	-	1.50	-	2.17	-	-	-	M20x1.5
BF50(Z)		Tab.I and Tab.III size	B60	-	1.77	-	2.87	-	-	-	M20x1.5
BG60(Z);BK60(Z)		Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5
BF60(Z)		Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5
BG70(Z);BK70(Z)		Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5
BF70(Z);BS70(Z)		Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5
BG80(Z);BK80(Z)	Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5	
BF80(Z);BS80(Z)	Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5	
BG90(Z);BK90(Z)	Tab.I and Tab.III size	B70	-	1.77	-	2.44	-	-	-	M24x1.5	

M = Plug according to DIN 908
Dimensions in inch

M* = Size and position of the drain plug see page 82.

Gearboxes & Lubrication

Threaded plugs

Position of threaded plugs
-in the System Cover Design with Standard Geared Motor

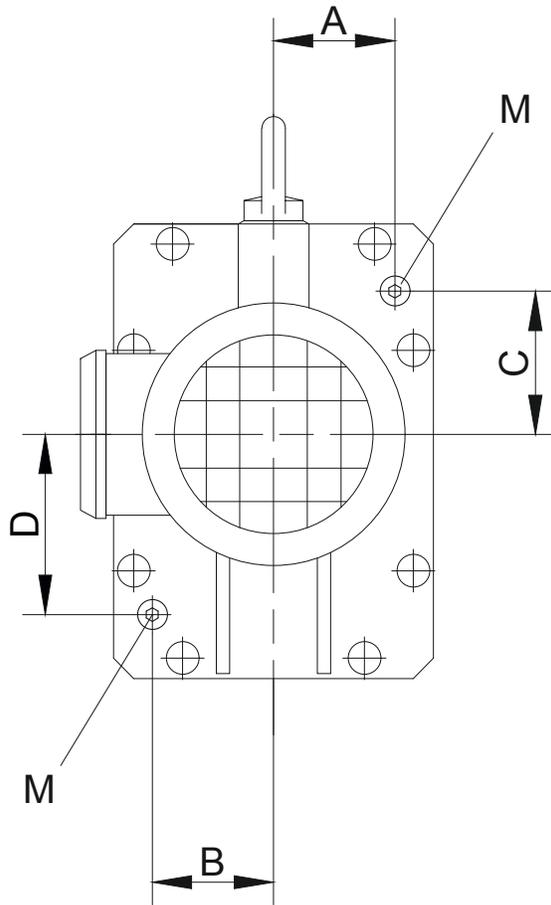


Table I: Design with Standard Geared Motor

Gear	Size	A	B	C	D	M
BG10(Z); BK10(Z); BF10(Z);BS10(Z)	D05-D..09	1.42	1.34	1.71	2.32	M10x1
BG15	D05-D..09	1.42	1.34	1.71	2.32	M10x1
BG20(Z); BK20(Z); BF20(Z);BS20(Z)	D05-D..09	1.73	1.73	2.28	2.85	M10x1
BG30(Z); BK30(Z); BF30(Z);BS30(Z)	D05-D..09	2.22	1.57	2.29	2.95	M10x1
BG40(Z); BK40(Z); BF40(Z);BS40(Z)	D..08-D..11	2.60	2.80	2.80	3.70	M14x1.5
BG50(Z); BK50(Z); BF50(Z);	D..08-D..11	2.83	2.91	3.35	4.29	M14x1.5
BG60(Z); BK60(Z); BF60(Z);	D..13-D..16	3.07	2.91	3.23	4.29	M14x1.5
BG60(Z); BK60(Z); BF60(Z);	D..09-D..13	3.31	3.19	4.72	6.10	M20x1.5
BG70(Z); BK70(Z); BF70(Z);BF80(Z)	D..16	3.39	3.19	4.72	6.10	M20x1.5
BG70(Z); BK70(Z); BF70(Z);BF80(Z)	D..09-D..18	3.74	3.35	3.82	7.60	M20x1.5
BG80(Z); BK80(Z); BF90(Z);BG100(Z)	D..11-D..18	4.65	4.65	4.33.	9.65	M20x1.5
BG90(Z); BK90(Z);	D..13-D..18	5.71	5.71	4.57	11.57	M24x1.5

M = Plug according to DIN 908
Dimensions in inch

Position of the drain plugs for BG, BK, BS and BF gear ranges and pre-stages.

Position of threaded plugs

-in the System Cover Design with foreign motor or gear design with input shaft

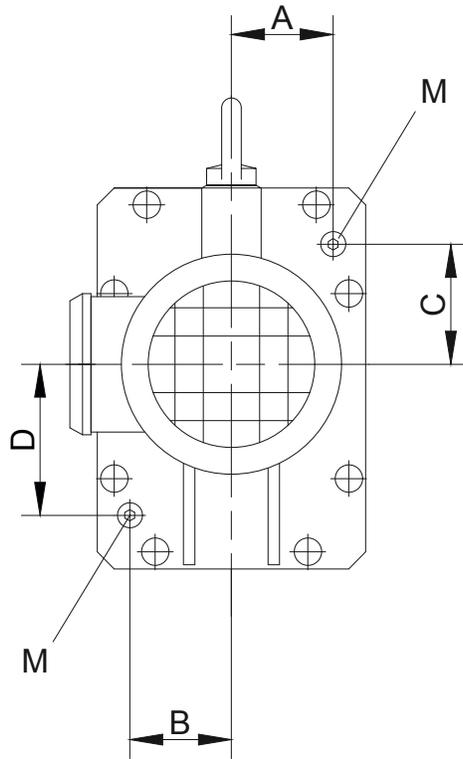


Table II: Design with foreign motor or gear design with input shaft

Gear	A	B	C	D	M
BG10(Z); BK10(Z);	1.34	1.34	1.59	2.24	M10x1
BF10(Z);BS10(Z)					
BG15	1.34	1.34	1.59	2.24	M10x1
BG20(Z); BK20(Z);	1.73	1.73	2.24	2.83	M10x1
BF20(Z);BS20(Z)					
BG30(Z); BK30(Z);	2.30	1.61	2.27	3.03	M10x1
BF30(Z);BS30(Z)					
BG40(Z); BK40(Z);	2.72	2.87	2.76	3.82	M14x1.5
BF40(Z);BS40(Z)					
BG50(Z); BK50(Z);	2.95	2.95	3.23	4.33	M14x1.5
BF50(Z);					
BG60(Z); BK60(Z);	3.31	3.19	4.69	6.10	M20x1.5
BF60(Z);					
BG70(Z); BK70(Z);	3.78	3.74	3.78	7.60	M20x1.5
BF70(Z);BF80(Z)					
BG80(Z); BK80(Z);	4.65	4.65	4.33	9.65	M20x1.5
BF90(Z);BG100(Z)					
BG90(Z); BK90(Z);	5.71	5.71	4.57	11.57	M24x1.5
M = Plug according to DIN 908 Dimensions in inch					

Position of the drain plugs for BG, BK, BS and BF gear ranges and pre-stages.

Gearboxes & Lubrication

Threaded plugs

Position of threaded plugs
-in the System Cover Design with pre-stage Z

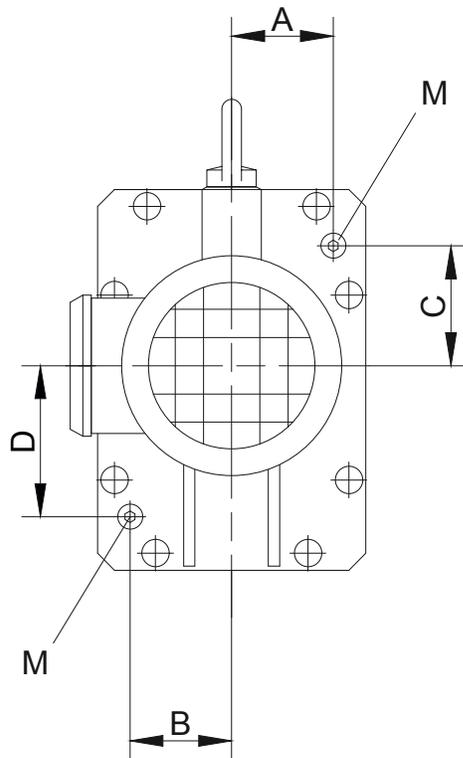


Table III: Design with pre-stage Z

Gear					M
B.10	1.50	1.56	1.73	2.42	M10x1
B.20	1.73	1.73	2.28	2.83	M10x1
B.30	2.32	1.65	2.29	3.03	M10x1
B.40	2.60	2.80	2.80	3.78	M14x1.5
B.50	2.83	2.87	3.35	4.37	M14x1.5
B.60	3.35	3.19	4.72	7.56	M20x1.5
B.70	3.74	3.74	3.82	7.60	M20x1.5
B.80	4.65	4.65	4.33	9.65	M20x1.5
B.90	5.47	5.47	4.88	11.89	M24x1.5

M = Plug according to DIN 908
Dimensions in inch

Position of the drain plugs for BG, BK, BS and BF gear ranges and pre-stages.