SKF

Pop Release® plummer block units for easy mounting



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The SKF Group is an international manufacturing and marketing organistation operating in more than 130 countries. SKF has some 100 factories worldwide. SKF sales units are backed up by some 200 branch sales offices and over 7 000 distributors and retailers. Worldwide availability of SKF bearings is supported by a comprehensive technical advisory service. Apart from rolling bearings, SKF manufactures linear bearings, plain bearings, bearing housings, ball and roller screws, textile machinery components, components for the aerospace industry, seals, retaining rings, machine tools and a variety of precision machine components. The experience gained in these various fields provides SKF with the knowledge and expertise so necessary for the development, manufacture, and application of advanced engineering products

Pop Release® units – ready to mount and operate

Pop Release plummer block units are ready-to-mount units which are already greased. Each unit comprises

- a spherical roller bearing based on series 222,
- a non-split plummer block housing of grey cast iron,
- a special adapter sleeve, and
- two seals.

Pop Release units are available in two designs for locating and non-locating bearing positions, respectively.

Range
The Pop Release units are available for metric shafts in the diameter range 35 to 75 mm, inclusive, and for inch-size shafts of 1 7/16 to 3 1/2 in diameter. Please contact SKF if information on units for inch-size shafts is required.

Dimensions
The main dimensions of Pop Release units conform to ISO 113 and DIN 736 (housing series 5) and are fully interchangeable with such housings. Compared with conventional plummer block units, however, Pop Release units incorporate a smaller size of bearing for the same shaft diameter. The reason for this is the extremely low section of the adapter sleeve and the correspondingly designed bearing bore. Although the use of smaller bearings would normally mean lower load carrying capacity, this has been compensated for by the use of bearings having a reinforced design, where applicable.

Bearing internal clearance
In contrast to conventional plummer block units, Pop Release units are delivered complete and ready to mount. The length of the grub screws at the mounting side has been chosen so that the correct internal clearance will be obtained in the bearing if the unit is properly mounted.

Misalignment
Pop Release units allow misalignments of up to 1,5° to be compensated for. The maximum 1,5° misalignment is valid for units fitted with the standard “TriGard” seals as well as units having the optional labyrinth seals.



Designations
Details of the designation system used for the units and the meaning of the various designation suffixes can be seen in the following chart.

Designation system



Basic design: Housing of grey cast iron	
Shaft diameter d_a in mm:	e.g. 35
Supplementary designations:	
Nipple hole, 1/8″-27 NPSF thread, in the housing. Grease nipple AH 1/8″-27 PTF fitted	No symbol
Unit with locating bearing	F
Unit with non-locating bearing	L
Unit with labyrinth seals	TS
Nipple hole, G 1/4″ thread, in the housing. Grease nipple M1 G 1/4″ fitted	N2
Nipple hole, G 1/8″ thread, in the housing. Grease nipple M1 G 1/8″ fitted	N3

For combinations the symbols are written in the same order as presented above.

Example: **SYT 50 FN2**
Pop Release bearing unit for a 50 mm shaft and locating bearing position with nipple hole (thread G 1/4″) in housing and grease nipple M1 G 1/4″ fitted.

Customer benefits from Pop Release® units

Pop Release units can be used in all applications – with due consideration to the actual operating speeds and loads – where grease-lubricated plummer block units with split or one-piece housings fitted with spherical roller bearings or self-aligning ball bearings of ISO Dimension Series 22 are employed, see also application areas, page 13.

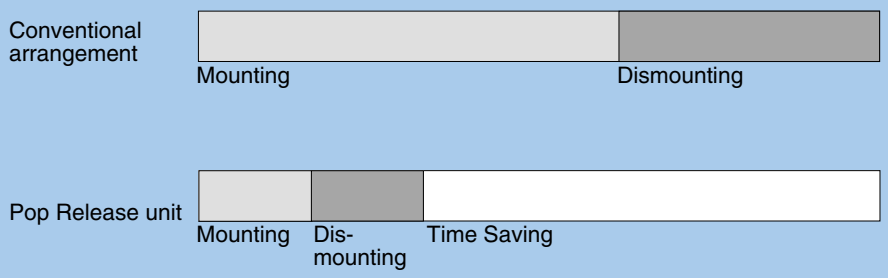
Conventional plummer block units
The mounting or dismounting of conventional plummer block units takes time and needs care. The adapter sleeve, bearing, seals and housing all have to be mounted separately. Where mounting conditions are unfavourable, parts of the arrangement may become dirty or damp and this can lead to premature bearing failure.

Pop Release® units
These bearing units are extremely simple to mount since they are already assembled to a ready-to-mount unit. The time required is very short (fig 1) and the bearing is protected at all times.

An example

To mount a conventional split plummer block housing with seals, bearing and adapter sleeve takes between 1,5 to 2 hours, depending on size. Dismounting takes about an hour. A Pop Release unit can be mounted in just half an hour and the time required for dismounting is equally short. The time saving will be most clearly appreciated if a conventional plummer block unit is replaced by a Pop Release unit – up to two hours can be saved.

Pop Release® units simplify and speed up mounting and dismounting



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Another advantage is the gain in reliability. The risk of any faulty mounting is virtually eliminated and dirt and moisture cannot penetrate the bearing arrangement.

Other advantages:

- commercial grade shafts can be used;
- there is virtually no risk of fretting corrosion;
- apart from the Allen key supplied with the unit and a spanner for the attachment bolts, no other tools are required for mounting.

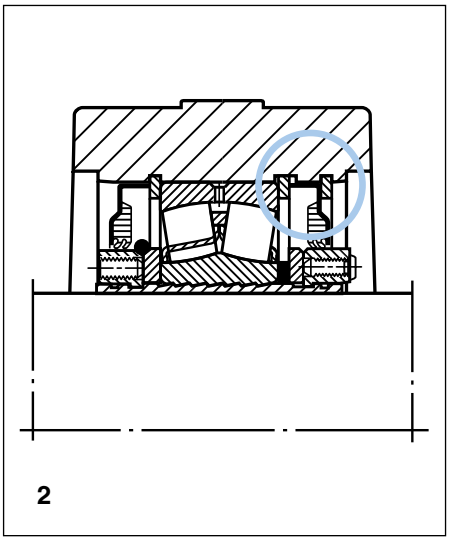
Characteristics of Pop Release® units

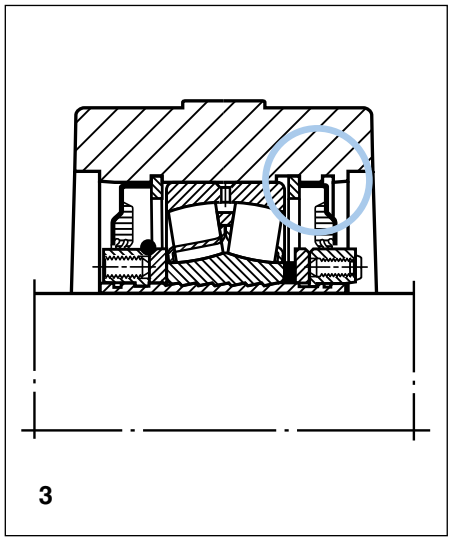
Types of arrangement
Two different types of arrangement are available:
- a locating bearing unit (fig 2) and
- a non-locating bearing unit (fig 3).

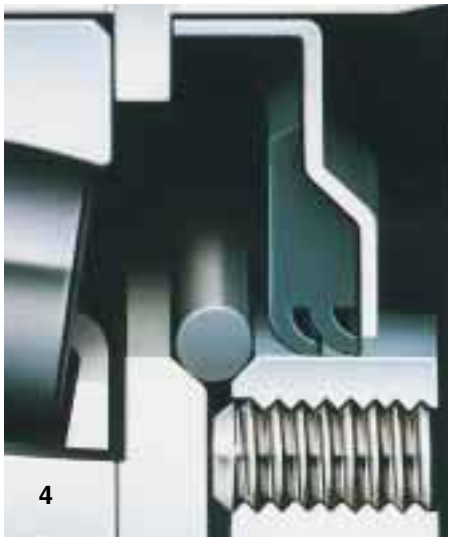
Seals
Pop Release bearing units can be supplied with two different seals: the standard “TriGard” or, to special order, labyrinth seals.

The TriGard seal is a rubbing seal which provides efficient triple-action protection to the bearing against contamination. It comprises a sheet steel washer on to which a double lip seal is vulcanised (fig 4). The steel washer forms a relatively narrow gap to the cylindrical outside diameter of the mounting collar and thus protects the inboard lips of the seal against coarse contaminants. The double-lip seal is of synthetic rubber and protects the bearing against the ingress of dust and moisture. It also prevents the grease from leaving the housing.

For applications where the operating speed exceeds the speed rating quoted in the product table, Pop Release units can be fitted with non-rubbing labyrinth seals. Please check availability before ordering.


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Lubrication
Pop Release units are supplied ready greased with the correct amount of SKF LGEP 2 grease. This is a lithium base grease of consistency 2; it has good rust inhibiting properties and can be used for the operating temperature range –30 to +110 °C. However the permissible operating temperature for the seal means that the upper operating temperature limit is +100 °C. The units can be relubricated via a grease nipple. The grease is supplied so that it enters the bearing via the annular groove and three lubrication holes in the bearing outer ring.



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Attachment to shaft
The Pop Release unit is characterised by its simple mounting on the shaft by means of a special adapter sleeve. Both bearing bore and the outside diameter of the sleeve have a matching stepped tapered profile (fig 5). The bearing is driven up on to the sleeve by tightening the grub screws in the collar at the mounting side marked “MOUNTING” (fig 6), resulting in an interference fit of the bearing on the sleeve and the sleeve on the shaft. This allows axial loads to be carried which are similar in magnitude to those which can be applied to a bearing on a conventional adapter sleeve. Depending on bearing size, the mounting collar has three, four or five screws.

Dismounting is simply accomplished by loosening the screws in the collar at the mounting side and tightening the two grub screws in the collar at the opposite (dismounting) side of the sleeve.


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Design of bearing arrangement

Shaft tolerances
Pop Release units can be used on commercial-grade, drawn shafting. For normal operation shafts made to tolerance h10 having a cylindricity tolerance to ISO 1101 IT7 are quite adequate. Where demands regarding running accuracy, load carrying ability and/or speed are more stringent, the use of shafts to tolerance h9/IT5 is recommended.

Associated components
When designing the bearing arrangement care should be taken to see that there is approximately 40 mm between the collar (at both the "MOUNTING" and "DISMOUNTING" side) and any adjacent component on the shaft. This space is required to enable the screws in the collars to be accessed.

Load carrying ability of housing
Approximate values for the breaking load P of the housings for different directions of loading are given in the table opposite. To obtain the permissible load for a given housing, the appropriate breaking load value should be divided by a factor which is selected after considering the operating conditions and safety requirements. In general engineering a safety factor of 6 is often used.

For the housings to be able to carry load, it is necessary that the attachment bolts in the base are correctly tightened. This is particularly true for directions of load exceeding 90°, when the bolts must be evenly tightened. For load directions between 55 and 120° and for axial load where the load acting parallel to the support surface exceeds 5 % of $P_{180°}$, the housing should be dowelled to its support or located by stops in the direction of the load.

Axial load carrying capacity of bearing
The amount of axial load which can be supported by the bearing depends on the friction between shaft and sleeve. When properly mounted Pop Release units can support heavier axial loads (up to 15 kN) than similar plummer block arrangements incorporating conventional adapter sleeves.

Equivalent bearing load
For Pop Release units which are to support simultaneously acting radial and axial loads, it is necessary to calculate the equivalent bearing load. This is defined as the calculated load which would have the same effect on bearing life as the actual loads; see also SKF General Catalogue.

Equivalent dynamic bearing load

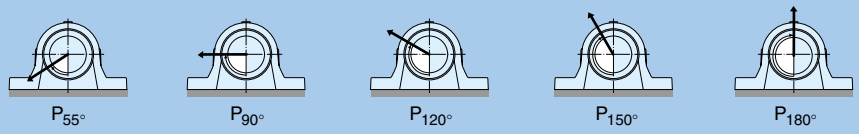
$P = F_r + Y_1F_a$ for $F_a/F_r \leq e$
$P = 0{,}67\ F_r + Y_2F_a$ for $F_a/F_r > e$

Equivalent static load

$P_0 = F_r + Y_0F_a$

The values of factors e, Y_1, Y_2 and Y_0 for the particular bearing size will be found in the product table.

Breaking loads for SYT housings



Housing Size	**Breaking loads** for housings of grey cast iron				
	$P_{55°}$	$P_{90°}$	$P_{120°}$	$P_{150°}$	$P_{180°}$
–	kN				
35	250	150	95	85	105
40	265	160	100	90	110
45	280	170	110	100	115
50	330	200	130	115	140
55	350	210	140	120	150
60	365	220	150	130	170
65	380	230	155	140	210
70	400	240	160	145	215
75	415	250	165	150	220

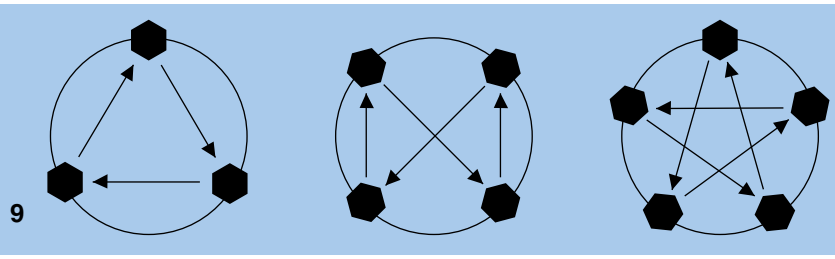
Mounting and dismounting



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Mounting

1. Clean the shaft and check to see that it is free of burrs. Lubricate the shaft with light oil.

2. Mount on the shaft any components which are to be between the units.

3. The support surface for the unit should be flat and burr-free. If the height of the unit is to be adjusted using shims, these must extend the full length and width of the support surface.

Caution
The grub screws of a Pop Release unit must not be tightened until the unit is on the shaft as otherwise the adapter sleeve can be deformed or the O-ring between the collar and the pressure ring (see also fig 4) squashed. It will then be impossible to mount the unit. Apart from the Allen key and a spanner to tighten the attachment bolts no additional tools such as hammers or pipes should be used when mounting.

4. The unit, with the “MOUNTING” side facing outwards, should be pushed on to the shaft (fig 7).

5. The attachment bolts in the base should be lightly tightened, so that the unit is held in position.

6. Tighten the grub screws in the mounting-side collar by holding the short arm (for low torque) of the Allen key until bearing and sleeve are held on the shaft.

7. Tighten the screws according to fig 8, this time holding the long arm of the key (for higher torque). Following one of the patterns shown in fig 9, the key should be turned through 180° in two stages: a quarter turn and then another quarter turn.

8. Finally tighten all the screws by hand until the long arm of the Allen key deflects between 10 and 15 mm (fig 10).

9. For non-locating bearing arrangements it should be checked that the bearing is centred in the housing. To do this it is recommended that the unloaded bearing is pushed axially in the housing from one end position to the other and the central position thus determined.

10. Carefully align the unit.

11. Fully tighten the attachment bolts in the base.

Caution
If the bearing unit will not come off the shaft, do not under any circumstances tighten the screws more than three to four turns. Any further tightening of the screws may re-attach the bearing to the shaft. Instead, it is recommended that steps 3 to 8 of the dismounting procedure be repeated.



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Dismounting

1. If required, remove dirt from the unit and, using emery cloth, remove any rust and smooth any damaged areas on the part of the shaft over which the unit is to be withdrawn.

2. Loosen the attachment bolts.

3. Tighten the screws in the mounting-side collar as under point 8 of the mounting instructions. (This serves to cancel any misalignment of the bearing inner ring with respect to the sleeve which may have occurred during operation.)

4. Loosen the screws in the mounting-side collar by three or four turns.

5. Remove the plastic protection plugs from the internal hexagon of the two screws in the collar at the dismounting side.

6. Tighten the two screws in the dismounting-side collar alternately in stages – a quarter turn at a time (fig 11) – until a distinct “POP” is heard as the bearing comes free from the sleeve.

7. Loosen the screws in the dismounting-side collar until they are in their original position.

8. Remove the attachment bolts from the base, and withdraw the unit from the shaft.


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Maintenance

Relubrication
The Pop Release units can be relubricated via the nipple on the housing which leads to the annular groove and three lubrication holes of the bearing outer ring. Before relubricating, the nipple and its surroundings should be carefully cleaned.

SKF lubricating grease LGEP 2 should be used. More information on this grease will be sent on request.

Condition monitoring
The condition of the bearing can be monitored by attaching vibration sensors to the unit. Three bosses are provided at suitable positions on the housing for the sensors (fig 12).

Detailed information on condition monitoring as well as SKF condition monitoring equipment can be supplied on request.



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Application areas

Pop Release units are recommended for applications where

- misalignment can occur,
- good sealing is important,
- oil lubrication is not required, and
- easy mounting and dismounting are appreciated.

Typical application areas include

– materials handling equipment,
– fans and ventilators,
– agricultural machinery (fig 13),
– forestry machinery.
– mining (fig 14), and
– equipment used in the metallurgical industry.

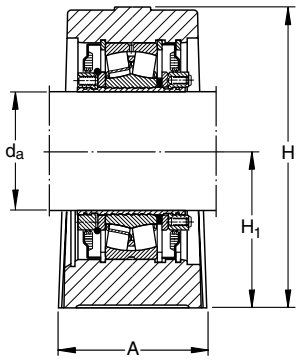


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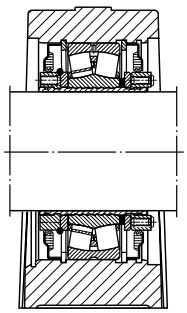


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Pop Release® units
d_a **35–75** mm

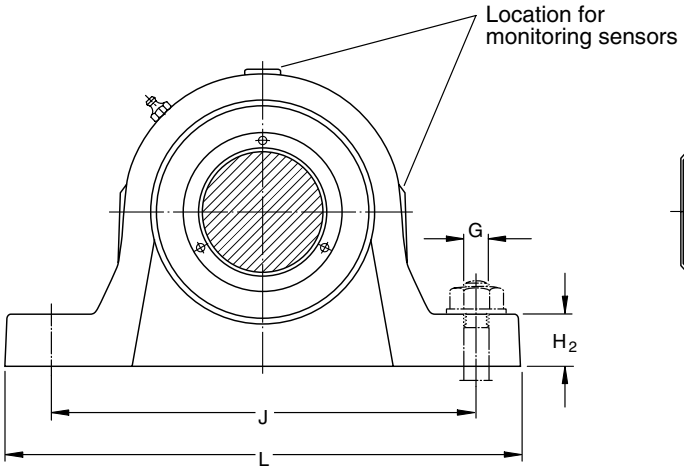


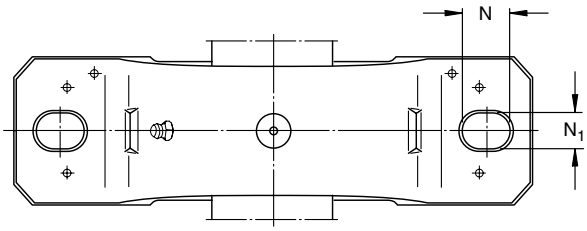
Locating bearing



Non-locating bearing

Shaft diameter d_a	**Dimensions** A	H	H_1	H_2	J	L	N	N_1	G		**Mass**	**Designation** Unit
mm	mm									in	kg	–
35	60	110	60	25	170	205	20	15	12	1/2	3,40	**SYT 35**
40	60	114	60	25	170	205	20	15	12	1/2	3,50	**SYT 40**
45	60	116	60	25	170	205	20	15	12	1/2	3,60	**SYT 45**
50	70	129	70	28	210	255	24	18	16	5/8	4,80	**SYT 50**
55	70	135	70	30	210	255	24	18	16	5/8	5,40	**SYT 55**
60	80	150	80	30	230	275	24	18	16	5/8	7,00	**SYT 60**
65	80	157	80	30	230	280	24	18	16	5/8	8,00	**SYT 65**
70	90	177	95	32	260	315	28	22	20	3/4	10,6	**SYT 70**
75	90	182	95	32	260	320	28	22	20	3/4	11,3	**SYT 75**





Shaft diameter d_a	**Bearing** Basic designation	Basic load ratings dynamic C	static C_0	Calculation factors e	Y_1	Y_2	Y_0	**Speed rating** TriGard seal	**Grub screws in the collar** No.	Size	**Regreasing quantity**
mm	–	N		–				r/min	–		g
35	22207	67 300	73 500	0,31	2,2	3,3	2,2	2 700	3	M6	10
40	22208	89 700	98 000	0,28	2,4	3,6	2,5	2 500	3	M6	10
45	22209	77 100	88 000	0,26	2,6	3,9	2,5	2 300	3	M6	10
50	22210	84 500	100 000	0,24	2,8	4,2	2,8	2 150	3	M6	10
55	22211	115 000	137 000	0,24	2,8	4,2	2,8	2 000	4	M6	15
60	22212	140 000	173 000	0,24	2,8	4,2	2,8	1 850	4	M6	15
65	22213	148 000	183 000	0,24	2,8	4,2	2,8	1 800	5	M6	20
70	22214	179 000	228 000	0,23	2,9	4,4	2,8	1 650	5	M6	20
75	22215	184 000	240 000	0,22	3	4,6	2,8	1 600	5	M6	20

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