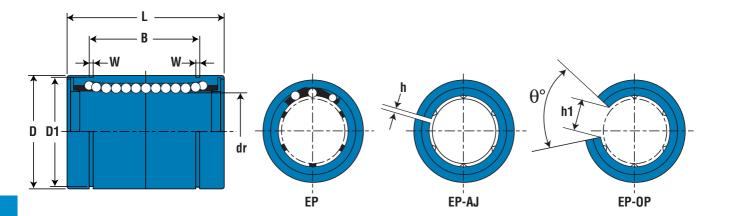


Simplicity® Ball Bearings Linear Ball Bearings - ISO Metric

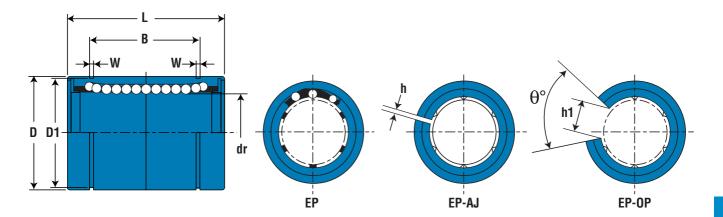


EP SERIES - DIMENSIONAL INFORMATION

		F	PART NUMBE	R		MAJOR DIMENSIONS & TOLERANCES					
NOMINAL SHAFT DIAMETER (mm)	STANDARD CLOSE POLYMER CAGE	BALL CIRCUIT	WEIGHT (g)	STANDARD OPEN POLYMER CAGE	ADJUSTABLE POLYMER CAGE	dr (mm)	TOLERANCE (µm)	D (mm)	TOLERANCE (µm)	L (mm)	TOLERANCE (mm)
5	EP5G		11	-	-	5		12		22	
8	EP8G	4	20	-	-	8	+8	16	0 -8	25	
10	EP10G	4	36	-	-	10	0	19		29	0
12	EP12G		45	EP12G-OP	EP12G-AJ	12		22	0	32	-0.2
16	EP16G	5	60	EP16G-OP	EP16G-AJ	16	+9	26	-9	36	
20	EP20G	5	102	EP20G-0P	EP20G-AJ	20	-1	32		45	
25	EP25G		235	EP25G-OP	EP25G-AJ	25	+11	40	0 -11	58	
30	EP30G		360	EP30G-0P	EP30G-AJ	30	- 1	47		68	0
40	EP40G	6	770	EP40G-0P	EP40G-AJ	40		62	0	80	-0.3
50	EP50G		1,250	EP50G-OP	EP50G-AJ	50	+13	75	-13	100	
60	EP60G		2,220	EP60G-0P	EP60G-AJ	60		90	0 -15	125	0 -0.4



Simplicity® Ball Bearings Linear Ball Bearings - ISO Metric

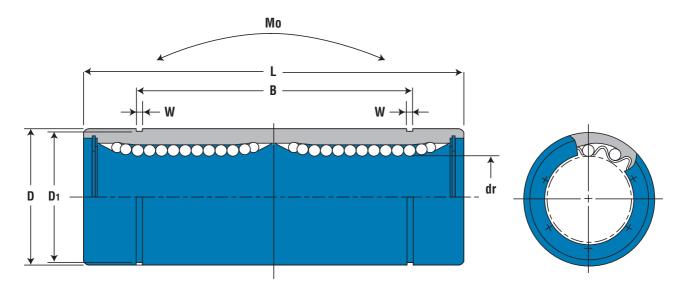


EP SERIES - DIMENSIONAL INFORMATION (cont.)

										(Standard Ste			
			IV	IAJOR DIM	ENSIONS &	TOLERANC	ES				LOAD RATING		
B (mm)	TOLERANCE (mm)	W (mm)	TOLERANCE (mm)	D1 (mm)	TOLERANCE (mm)	h (mm)	h1 (mm)	θ°	ECCENTRICITY (µm)	MAX RADIAL CLEARANCE (µm)	DYNAMIC C (N)	STATIC Co (N)	NOMINAL SHAFT DIAMETER (mm)
14.5		1.1		11.5			-	-			206	265	5
16.5		1.1		15.2	0 11	1	-	-		-5	265	402	8
22	0	1.3		18			-	-	12		372	549	10
22.9	-0.3	1.3		21	0 13	1.5	7.5	80		-7	510	784	12
24.9		1.3		24.9	0	1.0	10	00		-1	774	1,180	16
31.5		1.6	+.14 0	30.3	21		10	60			882	1,370	20
44.1		1.85		37.5	0	2	12.5	00	15	-9	980	1,570	25
52.1		1.85		44.5	25		12.5				1,570	2,740	30
60.6	0 -0.4	2.15		59	0		16.8	50	17	-13	2,160	4,020	40
77.6		2.65		72	30	3	21		17	-13	3,820	7,940	50
101.7		3.15		86.5	0 35		27.2	54	20	-16	4,700	10,000	60



Simplicity® Ball Bearings Double Wide Linear Ball Bearings - ISO Metric

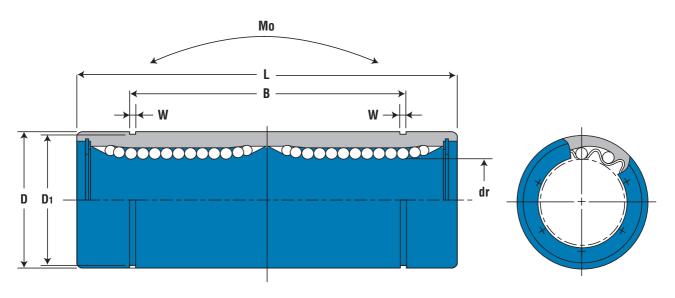


EP-W SERIES - DIMENSIONAL INFORMATION

	PART NUMBER			M	AJOR DIMENSIO	NS & TOLERANO	CES		
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (µm)	D (mm)	TOLERANCE (µm)	L (mm)	TOLERANCE (mm)
8	EP8GW	4	40	8	+9	16	0 -9	45	
12	EP12GW	4	80	12	-1	22	0	57	0
16	EP16GW	F.	115	16	+11 - 1	26	-11	68	-0.3
20	EP20GW	5	180	20		32		80	
25	EP25GW		430	25	+13	40	0 -13	112	
30	EP30GW		615	30	- 2	47		123	
40	EP40GW	6	1,400	40		62	0 -15	151	0 -0.4
50	EP50GW		2,320	50	+16 - 4	75	0 -20	192	
60	EP60GW		3,920	60		90		209	



Simplicity® Ball Bearings Double Wide Linear Ball Bearings - ISO Metric

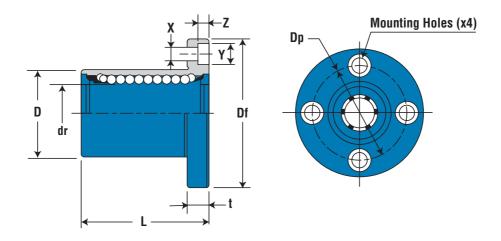


EP-W SERIES - DIMENSIONAL INFORMATION (cont.)

	IXIII - D		MAL INF	OKMAII	(com.)				(Otanuare	I Steel Fillisii
		MAJOR DIN	IENSIONS & TO	DLERANCES				LOAD RATING		
B (mm)	TOLERANCE (mm)	W (mm)	TOLERANCE (mm)	D1 (mm)	TOLERANCE (mm)	ECCENTRICITY (µm)	DYNAMIC C (N)	STATIC Co (N)	ALLOWABLE STATIC MOMENT Mo (N-m)	NOMINAL SHAFT DIAMETER (mm)
33		1.1		15.2	0 11		421	804	4.3	8
45.8	0	1.3		21	0 13	15	813	1,570	11.7	12
49.8	-0.3	1.3		24.9	0		921	1,780	14.2	16
61		1.6		30.3	21		1,370	2,740	25	20
82		1.85	+.14 0	37.5	0	17	1,570	3,140	44	25
104.2		1.85		44.5	25		2,500	5,490	78.9	30
121.2	0 -0.4	2.15		59	0	20	3,430	8,040	147	40
155.2		2.65		72	30	20	6,080	15,900	396	50
170		3.15		86.5	0 35	25	7,550	20,000	487	60



Simplicity® Ball Bearings Round Flange Mount - ISO Metric

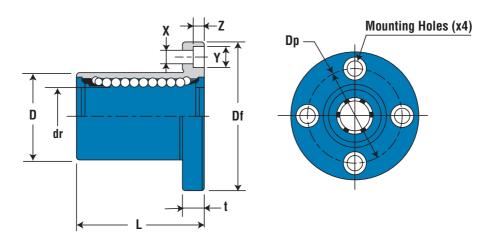


EPF SERIES - DIMENSIONAL INFORMATION

	PART NUMBER		MAJOR DIMENSIONS & TOLERANCES										
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (μm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)				
8	EPF8G	4	41	8	+8	16	0 -13	25					
12	EPF12G	4	80	12	0	22	0	32					
16	EPF16G	5	103	16	+9 -1	26	-16	36	± 0.3				
20	EPF20G	5	182	20		32		45					
25	EPF25G		335	25	+11	40	0 -19	58					
30	EPF30G		560	30	-1	47		68					
40	EPF40G	6	1,175	40		62	0	80					
50	EPF50G		1,745	50	+13 -2	75	-22	100					
60	EPF60G		3,220	60		90	0 -25	125					



Simplicity® Ball Bearings Round Flange Mount - ISO Metric

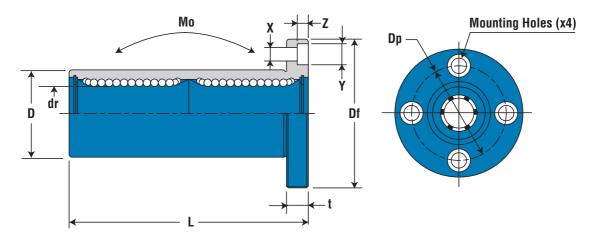


EPF SERIES - DIMENSIONAL INFORMATION (cont.)

			······	- (55)			•	aru oteer riilisii)
		MAJOR DIMENS	IONS & TOLERANCES			LOAD	RATING	
Df (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	DYNAMIC C (N)	STATIC Co (N)	NOMINAL SHAFT DIAMETER (mm)
32	5	24	3.5 x 6.0 x 3.1			265	402	8
42	- 6	32	4.5 x 8.0 x 4.1	12	12	510	784	12
46	0	36	4.5 x 8.0 x 4.1			578	892	16
54	- 8	43	5.5 x 9.3 x 5.1			862	1,370	20
62	0	51	5.5 x 9.3 x 5.1	15	15	980	1,570	25
76	10	62	6.6 x 11.0 x 6.1			1,570	2,740	30
98	13	80	9.0 x 14.0 x 8.1	17	17	2,160	4,020	40
112	13	94	9.0 x 14.0 x 8.1	17	17	3,820	7,940	50
134	18	112	11.0 x 17.5 x 11.1	20	20	4,700	9,800	60



Simplicity® Ball Bearings Round Flange Mount Double Wide - ISO Metric

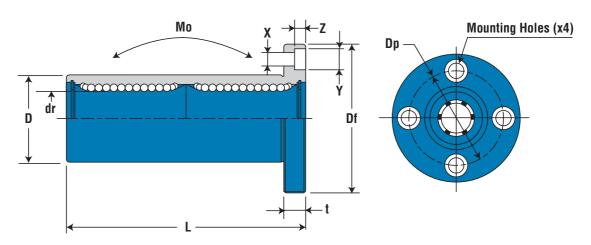


EPF-W SERIES - DIMENSIONAL INFORMATION

	PART NUMBER			MA	AJOR DIMENSIO	NS & TOLERANO	ES		
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (μm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)
8	EPF8GW	4	59	8	+9	16	0 -13	45	
12	EPF12GW	4	110	12	-1	22	0	57	
16	EPF16GW	5	160	16	+11 - 1	26	-16	68	± 0.3
20	EPF20GW	5	260	20		32		80	
25	EPF25GW		540	25	+13	40	0 -19	112	
30	EPF30GW		815	30	- 2	47		123	
40	EPF40GW	6	1,805	40		62	0	151	
50	EPF50GW		2,820	50	+16 - 4	75	-22	192	
60	EPF60GW		4,920	60		90	0 -25	209	



Simplicity® Ball Bearings Round Flange Mount Double Wide - ISO Metric

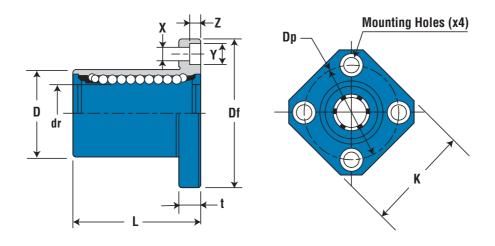


EPF-W SERIES - DIMENSIONAL INFORMATION (cont.)

		MAJOR DIMENS	SIONS & TOLERANCES	3		DYNAMIC C (N) STATIC C (N) STATIC MOMENT MO (N-m) 421 804 4.3 813 1,570 11.7 921 1,780 14.2 1,370 2,740 25 1,570 3,140 44 2,500 5,490 78.9 3,430 8,040 147		G	
Df (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	C	Co	MOMENT Mo	NOMINAL SHAFT DIAMETER (mm)
32	5	24	3.5 x 6.5 x 3.1			421	804	4.3	8
42		32	4.5 x 8.0 x 4.1	15	15	813	1,570	11.7	12
46	6	36	4.5 x 8.0 x 4.1			921	1,780	14.2	16
54	- 8	43	5.5 x 9.3 x 5.1			1,370	2,740	25	20
62	0	51	5.5 x 9.3 x 5.1	17	17	1,570	3,140	44	25
76	10	62	6.6 x 11.0 x 6.1			2,500	5,490	78.9	30
98	- 13	80	9.0 x 14.0 x 8.1	20	20	3,430	8,040	147	40
112	13	94	9.0 x 14.0 x 8.1	20	20	6,080	15,900	396	50
134	18	112	11.0 x 17.5 x 11.1	25	25	7,550	20,000	487	60



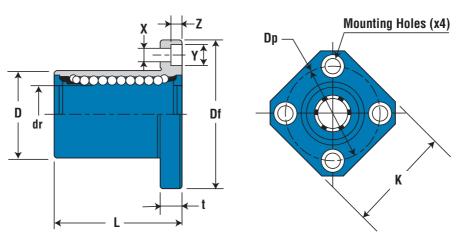
Simplicity® Ball Bearings Square Flange Mount - ISO Metric



EPK SERIES - DIMENSIONAL INFORMATION

	PART NUMBER		MAJOR DIMENSIONS & TOLERANCES											
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (μm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)					
8	EPK8G	4	41	8	+8	16	0 -13	25						
12	EPK12G	4	80	12	0	22	0	32						
16	EPK16G	5	103	16	+9 -1	26	-16	36						
20	EPK20G	5	182	20		32		45						
25	EPK25G		335	25	+11	40	0 -19	58	± 0.3					
30	EPK30G		560	30	-1	47		68						
40	EPK40G	6	1,175	40		62	0	80						
50	EPK50G		1,745	50	+13 -2	75	-22	100						
60	EPK60G		3,220	60		90	0 -25	125						



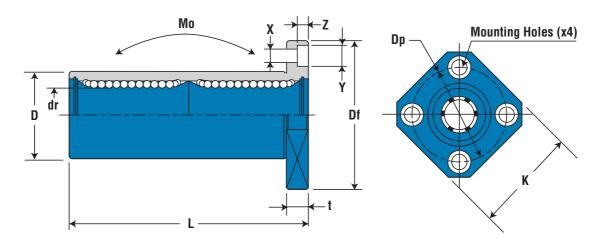


EPK SERIES - DIMENSIONAL INFORMATION (cont.)

		MAJOR I	DIMENSIONS &	TOLERANCES			LOAD F	RATING	
Df (mm)	K (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	DYNAMIC C (N)	STATIC Co (N)	NOMINAL SHAFT DIAMETER (mm)
32	25	5	24	3.5 x 6.5 x 3.1			265	402	8
42	32	6	32	4.5 x 8.0 x 4.1	12	12	510	784	12
46	35	0	36	4.5 x 8.0 x 4.1			578	892	16
54	42	8	43	5.5 x 9.3 x 5.1			862	1,370	20
62	50	0	51	5.5 x 9.3 x 5.1	15	15	980	1,570	25
76	60	10	62	6.6 x 11.0 x 6.1			1,570	2,740	30
98	75	13	80	9.0 x 14.0 x 8.1	17	17	2,160	4,020	40
112	88	13	94	9.0 x 14.0 x 8.1	17	17	3,820	7,940	50
134	106	18	112	11.0 x 17.5 x 11.1	20	20	4,700	9,800	60



Simplicity® Ball Bearings Square Flange Mount Double Wide - ISO Metric

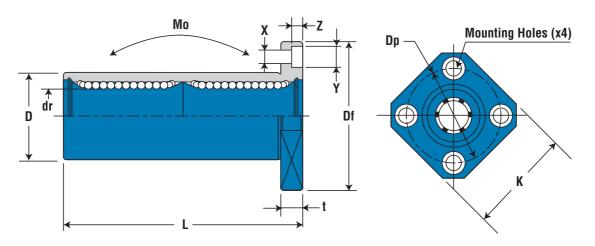


EPK-W SERIES - DIMENSIONAL INFORMATION

	PART NUMBER			MA	AJOR DIMENSIO	NS & TOLERANO	CES		
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (μm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)
8	EPK8GW	4	51	8	+9	16	0 -13	45	
12	EPK12GW	4	90	12	-1	22	0	57	
16	EPK16GW	5	135	16	+11 -1	26	-16	68	± 0.3
20	EPK20GW	5	225	20		32		80	
25	EPK25GW		500	25	+13	40	0 -19	112	
30	EPK30GW		720	30	-2	47		123	
40	EPK40GW	6	1,600	40		62	0	151	
50	EPK50GW		2,620	50	+16 -4	75	-22	192	
60	EPK60GW		4,480	60	-	90	0 -25	209	



Simplicity® Ball Bearings Square Flange Mount Double Wide - ISO Metric

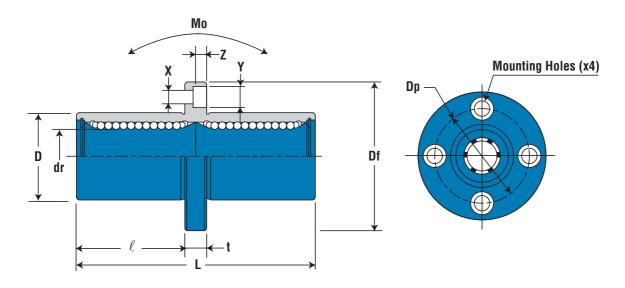


EPK-W SERIES - DIMENSIONAL INFORMATION (cont.)

	K-W SERIES - SIMERSIONAL INI ORMATION (COIII.)							(Stanuaru			
		MAJOR	DIMENSIONS	& TOLERANCES				LOAD RATING	i		
Df (mm)	K (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	DYNAMIC C (N)	STATIC Co (N)	ALLOWABLE STATIC MOMENT Mo (N-m)	NOMINAL SHAFT DIAMETER (mm)	
32	25	5	24	3.5 x 6.5 x 3.1			421	804	4.3	8	
42	32	6	32	4.5 x 8.0 x 4.1	15	15	813	1,570	11.7	12	
46	35	0	36	4.5 x 8.0 x 4.1			921	1,780	14.2	16	
54	42	. 8	43	5.5 x 9.3 x 5.1			1,370	2,740	25	20	
62	50	0	51	5.5 x 9.3 x 5.1	17	17	1,570	3,140	44	25	
76	60	10	62	6.6 x 11.0 x 6.1			2,500	5,490	78.9	30	
98	75	13	80	9.0 x 14.0 x 8.1	20	20	3,430	8,040	147	40	
112	88	13	94	9.0 x 14.0 x 8.1	20	20	6,080	15,900	396	50	
134	106	18	112	11.0 x 17.5 x 11.1	25	25	7,550	20,000	487	60	



Simplicity® Ball Bearings Round Flange Center Mount - ISO Metric

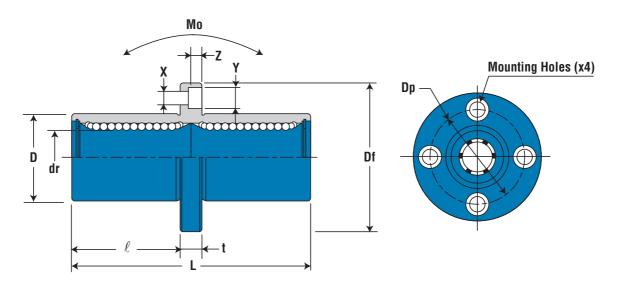


EPFC SERIES - DIMENSIONAL INFORMATION

	PART NUMBER				MAJOR DIM	ENSIONS & T	OLERANCES			
NOMINAL SHAFT DIAMETER (mm)	STANDARD POLYMER CAGE	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (µm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)	ℓ (mm)
8	EPFC8G	4	59	8	+9	16	0 -13	45		20
12	EPFC12G	4	110	12	-1	22	0	57	± 0.3	25.5
16	EPFC16G	- 5	160	16	+11	26	-16	68		31
20	EPFC20G		260	20	-1	32		80		36
25	EPFC25G		540	25	+13	40	0 -19	112		52
30	EPFC30G		815	30	-2	47		123		56.5
40	EPFC40G	6	1,805	40		62	0	151		69
50	EPFC50G		2,820	50	+16 -4	75	-22	192		89.5
60	EPFC60G		4,920	60		90	0 -25	209		95.5



Simplicity® Ball Bearings Round Flange Center Mount - ISO Metric

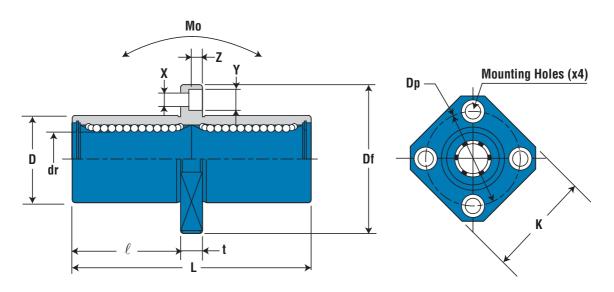


EPFC SERIES - DIMENSIONAL INFORMATION (cont.)

EPFC SER	IES - DIN	TENSION	AL INFORM	AIION (C	oni.)			(Statiual	a Steel Finish)			
	ľ	MAJOR DIMENS	IONS & TOLERANC	ES			LOAD RATING					
Df (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	DYNAMIC C (N)	STATIC Co (N)	Co MOMENT				
32	5	24	3.5 x 6.5x 3.1			421	804	4.3	8			
42	6	32	4.5 x 8.0 x 4.1	15	15	913	1,570	11.7	12			
46	0	36	4.5 x 8.0 x 4.1			921	1,780	14.2	16			
54	. 8	43	5.5 x 9.3 x 5.1			1,370	2,740	25	20			
62	0	51	5.5 x 9.3 x 5.1	17	17	1,570	3,140	44	25			
76	10	62	6.6 x 11.0 x 6.1			2,500	5,490	78.9	30			
98	13	80	9.0 x 14.0 x 8.1	00	00	3,430	8,040	147	40			
112	13	94	9.0 x 14.0 x 8.1	20	20	6,080	15,900	396	50			
134	18	112	11.0 x 17.5 x 11.1	25	25	7,550	20,000	487	60			



Simplicity® Ball Bearings Square Flange Center Mount - ISO Metric

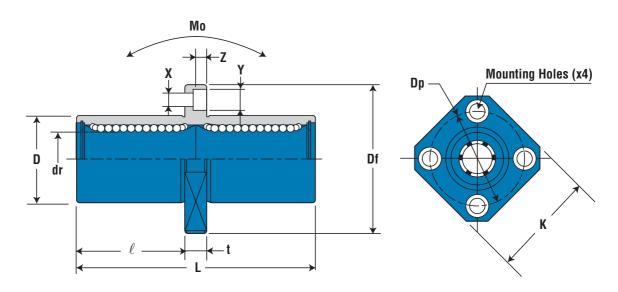


EPKC SERIES - DIMENSIONAL INFORMATION

	PART NUMBER			MA	JOR DIMENSIO	NS & TOLERANO	ES		
NOMINAL SHAFT DIAMETER (mm)	STANDARD Polymer Cage	BALL Circuit	WEIGHT (g)	dr (mm)	TOLERANCE (μm)	D (mm)	TOLERANCE (μm)	L (mm)	TOLERANCE (mm)
8	EPKC8G	4	51	8	+9	16	0 -13	46	± 0.3
12	EPKC12G	7	90	12	-1	22	0	61	
16	EPKC16G	5	135	16	+11	26	-16	68	
20	EPKC20G		225	20	-1	32		80	
25	EPKC25G		500	25	+13	40	0 -19	112	
30	EPKC30G		720	30	-2	47		123	
40	EPKC40G	6	1,600	40		62	0	151	
50	EPKC50G		2,620	50	+16 -4	75	-22	192	
60	EPKC60G		4,480	60		90	0 -25	209	



Simplicity® Ball Bearings Square Flange Center Mount - ISO Metric

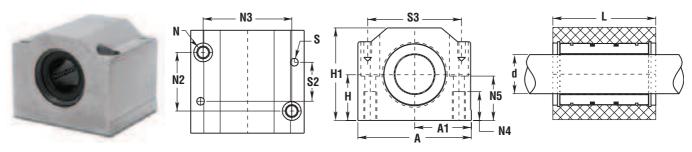


EPKC SERIES - DIMENSIONAL INFORMATION (cont.)

				oleei i iiiisii)							
			MAJOR DII	WENSIONS	& TOLERANCES			ı	LOAD RATING	3	
ℓ (mm)	Df (mm)	K (mm)	t (mm)	Dp (mm)	X x Y x Z (mm)	ECCENTRICITY ID to OD (inch/ µm)	PERPENDICULARITY FLANGE FACE to ID (inch/ µm)	DYNAMIC C (N)	STATIC Co (N)	ALLOWABLE STATIC MOMENT Mo (N-m)	NOMINAL SHAFT DIAMETER (mm)
20.5	32	25	5	24	3.5 x 6.5 x 3.1			421	804	4.3	8
27.5	42	32	6	32	4.5 x 8.0 x 4.1	15	15	913	1,570	11.7	12
31	46	35	0	36	4.5 x 8.0 x 4.1			921	1,780	14.2	16
36	54	42	8	43	5.5 x 9.3 x 5.1			1,370	2,740	25	20
52	62	50	0	51	5.5 x 9.3 x 5.1	17	17	1,570	3,140	44	25
56.5	76	60	10	62	6.6 x 11.0 x 6.1			2,500	5,490	78.9	30
69	98	75	13	80	9.0 x 14.0 x 8.1	20	20	3,430	8,040	147	40
89.5	112	88	13	94	9.0 x 14.0 x 8.1	20	20	6,080	15,900	396	50
95.5	134	106	18	112	11.0 x 17.5 x 11.1	25	25	7,550	20,000	487	60



Simplicity® Ball Bearings Closed & Open Pillow Blocks - ISO & JIS Metric

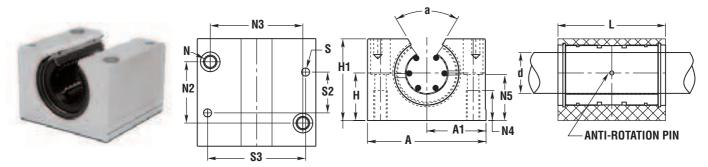


CLOSED PILLOW BLOCKS

PART NO.	d NOM. I.D.	Н	H1	A	A1	L	N								ASSEM. WT.
PRECISION	MIN.	CENTERLINE .015	HEIGHT	WIDTH	.013	LENGTH	BOLT	N2	N3	N4	N5	S	S 2	\$3	(kg.)
EPPM08G	8	15	28	35	17.5	32	M4 x 0.7	20.15	25.15	9	14.5	N/A	N/A	N/A	0.069
EPPM10G	10	16	31.5	40	20	36	M5 x 0.8	20.15	29.15	44	15		29	31	0.095
EPPM12G	12	18	35	43	21.5	39	M5 x 0.8	23.15	3 .15	''	16.5	4	32	34	0.118
EPPM16G	16	22	42	53	26.5	43	M6 x 1.0	26.15	40.15	13	21		35	42	0.200
EPPM20G	20	25	50	60	30	54	M8 x 1.25	32.15	45.15	18	24	5	45	50	0.329
EPPM25G	25	30	60	78	39	67	M10 x 1.5	40.15	60.15	22	29	6	20	64	0.655
EPPM30G	30	35	71	87	43.5	79	M10 x 1.5	45.15	68.15	22	34	0	30	72	1.020
EPPM40G	40	45	91	108	54	91	M12 x1.75	58.15	86.15	26	44	8	35	90	1.846
EPPM50G	50	50	105	132	66	113	M16 x 2.0	50.20	108.2	34	49	10	42	108	3.169

NOTES: (1) Standard pillow block assembly includes self-aligning housing and precision bearing.

- (2) All standard metric pillow blocks use standard "EP" series bearings found on page 88-89.
- (3) Straight bore pillow block assembly includes standard O.D. "EP" series bearing in straight bore housing.



OPEN PILLOW BLOCKS

PART NO.	d NOM. I.D.	Н	H1	A	A1	L	N									ASSEM. WT.
PRECISION	MIN.	CENTERLINE .015	HEIGHT	WIDTH	CENTERLINE .013	LENGTH	BOLT	N2	N3	N4	N5	s	S2	S3	a	(kg.)
EPPMN12G	12	18	28	43	21.5	39	M5 x 0.8	23.15	32.15	11	16.5	4	32	34	66	0.096
EPPMN16G	16	22	35	53	26.5	43	M6 x 1.0	26.15	40.15	13	21	4	35	42	68	0.162
EPPMN20G	20	25	42	60	30	54	M8 x 1.25	32.15	45.15	18	24	5	45	50	60	0.267
EPPMN25G	25	30	51	78	39	67	M10 x 1.5	40.15	60.15	00	29		20	64	60	0.536
EPPMN30G	30	35	60	87	43.5	79	M10 x 1.5	45.15	68.15	22	34	6	30	72	60	0.831
EPPMN40G	40	45	77	108	54	91	M12 x 1.75	58.15	86.15	26	44	8	35	90	60	1.499
EPPMN50G	50	50	88	132	66	113	M16 x 2.0	50.20	108.2	34	49	10	42	108	60	2.539

NOTES: (1) Standard pillow block assembly includes self-aligning housing and precision bearing.

(2) All standard metric pillow blocks use standard "EP" series bearings found on page 88-89.

(For Empty Pillow Block with no bearings included add LBB after the part number.)

The data and specifications in this publication have been carefully compiled and are believed to be accurate and correct. However, it is the responsibility of the user to determine and ensure the suitability of Pacific Bearing® products for a specific application. Pacific Bearing's only obligation will be to repair or replace without charge, any defective components if returned promptly. No liability is assumed beyond such replacement. *Consult www.pacific-bearing.com for the latest technical updates.