SKF Couplings

SKF FRC Couplings

With a higher load capacity than jaw couplings and maintenance-free operation, FRC couplings are designed as a general purpose coupling. They are able to cushion moderate shock loads, dampen low levels of vibration and accommodate incidental misalignment. FRC couplings offer a range of hubs and elements to select, to meet the demand for low cost, general purpose flexible coupling.

FRC couplings are phosphate coated for improved corrosion resistance and available with fire-resistant and anti-static elements (F.R.A.S.) FRC couplings are available with a pilot bore, finished bore or taper bushing (face or hub) to make installation quick and simple.

Fully machined outside surfaces allow alignment with a simple straight edge. Shaft connections are "fail safe" due to their interlocking jaw design.

Selection

1 Service factor
Determine the required service factor from **tables 9** and **10** on **pages 87** and **88**.

2 Design power
Multiply normal running power by the service factor. This gives the design power for coupling selection.

3 Coupling size
Using FRC **table 1** to find the speed rating for a coupling that has a power that is greater than the design power. The required FRC coupling is listed at the head of the column.

4 Bore size
Using the FRC product table on **page 76**, check that the selected flanges can accommodate both the drive and driven shafts.

Example

An FRC coupling is required to transmit 15 kW from an electric motor running at 500 r/min to a rotary pump for 15 hours per day. The shaft diameter of the motor is 25 mm and the shaft diameter of the pump is 20 mm.

1 Service factor
From **table 9** on **page 87** = 1,75.

2 Design power
15 × 1,75 = 26,25 kW

Table 1

Power ratings

Speed	Coupling size 70	90	110	130	150	180	230	280
r/min	kW							
50	0,16	0,42	0,84	1,65	3,14	4,97	10,47	16,49
100	0,33	0,84	1,68	3,3	6,28	9,95	20,94	32,98
200	0,66	1,68	3,35	6,6	12,57	19,9	41,88	65,97
300	0,99	2,51	5,03	9,9	18,85	29,84	62,83	98,95
400	1,32	3,35	6,7	13,19	25,13	39,79	83,77	131,94
500	1,65	4,19	8,38	16,49	31,41	49,74	104,71	164,92
600	1,98	5,03	10,05	19,79	37,7	59,69	125,65	197,91
700	2,31	5,86	11,73	23,09	43,98	69,63	146,6	230,89
720	2,37	6,03	12,06	23,75	45,24	71,62	150,79	237,49
800	2,64	6,7	13,4	26,39	50,26	79,58	167,54	263,87
900	2,97	7,54	15,08	29,69	56,54	89,53	188,48	296,86
960	3,17	8,04	16,08	31,66	60,31	95,5	201,05	316,65
1 000	3,3	8,38	16,75	32,98	62,83	99,48	209,42	329,84
1 200	3,96	10,05	20,1	39,58	75,39	119,37	251,31	395,81
1 400	4,62	11,73	23,46	46,18	87,96	139,27	293,19	461,78
1 440	4,75	12,06	24,13	47,5	90,47	143,25	301,57	474,97
1 600	5,28	13,4	26,81	52,77	100,52	159,16	335,08	527,75
1 800	5,94	15,08	30,16	59,37	113,09	179,06	376,96	593,72
2 000	6,6	16,75	33,51	65,97	125,65	198,95	418,85	659,69
2 200	7,26	18,43	36,86	72,57	138,22	218,85	460,73	725,65
2 400	7,92	20,1	40,21	79,16	150,79	238,74	502,62	–
2 600	8,58	21,78	43,56	85,76	163,35	258,64	544,5	–
2 800	9,24	23,46	46,91	92,36	175,92	278,53	–	–
2 880	9,5	24,13	48,25	94,99	180,94	286,49	–	–
3 000	9,9	25,13	50,26	98,95	188,48	298,43	–	–
3 600	11,87	30,16	60,31	118,74	226,18	–	–	–
Nominal torque Nm	31	80	160	315	600	950	2 000	3 150
Max. torque Nm	72	180	360	720	1 500	2 350	5 000	7 200

3 Coupling size
Search for 500 r/min in **table 1** on **page 73** and choose the first power figure which exceeds the required 26,25 kW. This is 31,41 kW of coupling size 150.

4 Bore size
By referring to product table on **page 76**, it can be seen that both shaft diameters fall within the bore range available.

Engineering data

Power ratings

Maximum torque figures should be treated as short duration overload ratings occurring in circumstances such as direct-on-line starting.

For speeds not shown, calculate the nominal torque for the design application using the formula below and select a coupling based on the nominal torque rating.

$$\text{Nominal torque (Nm)} = \frac{\text{Design power (kW)} \times 9\,550}{\text{r/min}}$$

For additional information on FRC couplings, refer to **tables 1** and **2**.

Order data

A complete FRC coupling consists of:
2 hubs and 1 element.

For more detailed information on ordering specific couplings, refer to **table 3**.

Table 2

Assembled dimensions and charachteristics

Size	Assembled length comprising flange types			Mass[1]	Inertia	Torsional stiffness	Misalignment			Nominal torque	Torque
	FF, FH, HH	FB, HB	BB				Angular	Parallel	Axial		Max.
–	mm			kg	kg/m²	Nm/°	°	mm		Nm	–
70	65,0	65,0	65,0	1,00	0,00085	–	1	0,3	0,2	31,5	72
90	69,5	76,0	82,5	1,17	0,00115	–	1	0,3	0,5	80	180
110	82,0	100,5	119,0	5,00	0,0040	65	1	0,3	0,6	160	360
130	89,0	110,0	131,0	5,46	0,0078	130	1	0,4	0,8	315	720
150	107,0	129,5	152,0	7,11	0,0181	175	1	0,4	0,9	600	1 500
180	142,0	165,5	189,0	16,60	0,0434	229	1	0,4	1,1	950	2 350
230	164,5	202,0	239,5	26,00	0,1207	587	1	0,5	1,3	2 000	5 000
280	207,5	246,5	285,5	50,00	0,4465	1025	1	0,5	1,7	3 150	7 200

[1] Mass is for an FF, FH or HH coupling with mid range tapered bushings.

Table 3

Order data

Coupling type	Flanges	Qty	Element	Qty	Taper bushing	Qty
RSB both sides	PHE FRC70RSB	2	PHE FRC70NR or	1	–	–
	–	–	PHE FRC70FR	–	–	–
RSB/F Combination	PHE FRC70RSB	1	PHE FRC70NR or	1	PHF TB1008X...MM	1
	PHE FRC70FTB	1	PHE FRC70FR	–	–	
RSB/H Combination	PHE FRC70RSB	1	PHE FRC70NR or	1	PHF TB1008X...MM	1
	PHE FRC70HTB	1	PHE FRC70FR	–	–	
F/F Combination	PHE FRC70FTB	1	PHE FRC70NR or	1	PHF TB1008X...MM	1
	PHE FRC70FTB	1	PHE FRC70FR	–	PHF TB1008X...MM	1
H/H Combination	PHE FRC70HTB	1	PHE FRC70NR or	1	PHF TB1008X...MM	1
	PHE FRC70HTB	1	PHE FRC70FR	–	PHF TB1008X...MM	1
F/H Combination	PHE FRC70FTB	1	PHE FRC70NR or	1	PHF TB1008X...MM	1
	PHE FRC70HTB	1	PHE FRC70FR		PHF TB1008X...MM	1

NR = Natural rubber
FR = Fire-resistant and anti-static (FRAS)

Installation

1 Place the couplings on their shafts so that shaft ends do not protrude into the internal section of the coupling. Then tighten the screws on the taper bushing to the torque values listed in the mounting instructions (→ **fig. 1**).

2 Insert the coupling element into one side of the coupling (→ **fig. 2**).

3 Move the other coupling into position and connect the two halves (→ **fig. 4**). Check that the assembled length is correct (→ **fig. 5**).

4 Check angular misalignment by measuring the assembled length in four positions at 90° around the coupling. Then check for parallel misalignment using a straight edge across the length of the coupling flange (→ **fig. 6**). Allowable angular misalignment for all FRC couplings is 1°. Allowable parallel misalignment for FRC couplings is based on size (→ **table 4**).

Note: For the most consistent results, check across at least 3 of the 6 points where the rubber elements are visible between the flanges.

Table 4

Allowable parallel misalignment

Coupling size	
–	mm
FRC70 to 110	0,3
FRC130 to 180	0,4
FRC230 to 280	0,5

Fig. 1

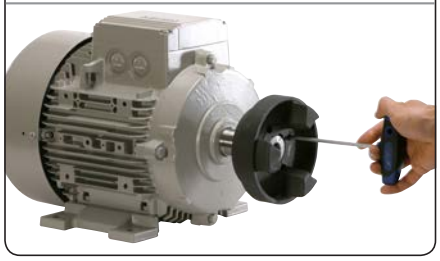


Fig. 2

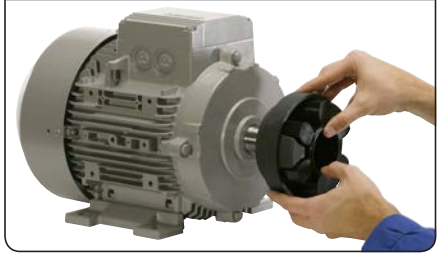


Fig. 3

Fig. 4

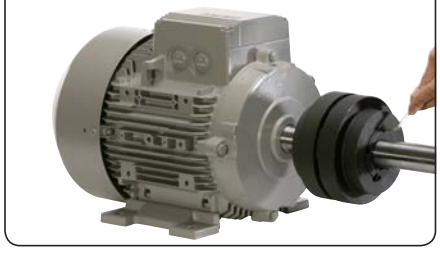


Fig. 5

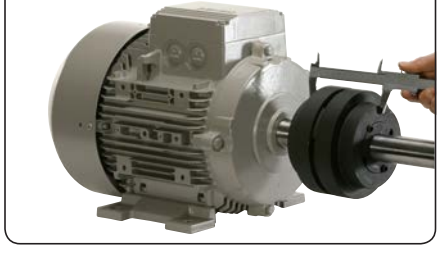
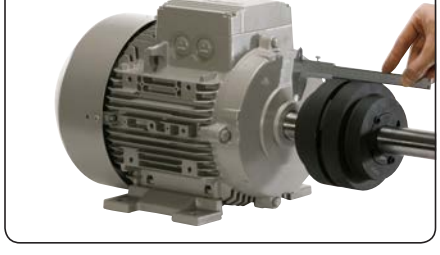
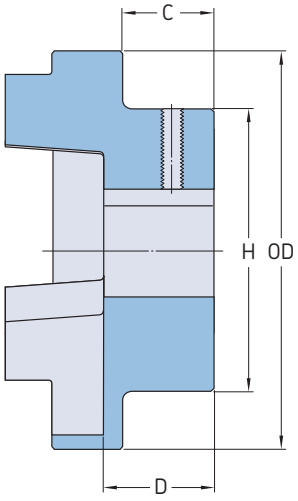
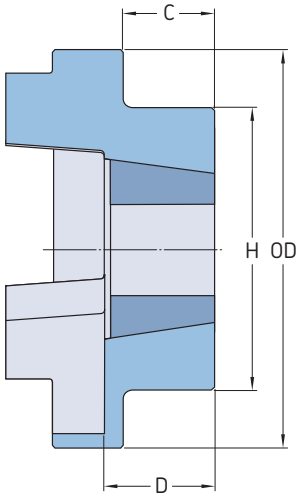


Fig. 6

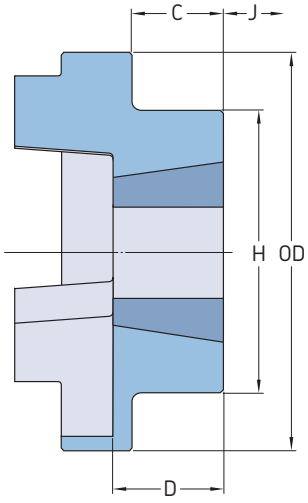




Type B



Type F



Type H

Coupling size	Dimensions													Hub designation		
	OD	H	Type F, H Bushing size	Bore		C	D	J[1]	Type B Bore Max	Pilot	Key screw	C	D	Type F	Type H	Type B Pilot bore
				Min.	Max.											
–	mm													–		
70	69	60	1 008	9	25	20	23,5	29	32	10	M6	20	25,8	**PHE FRC70FTB**	**PHE FRC70HTB**	**PHE FRC70RSB**
90	85	70	1 108	9	28	19,5	23,5	29	38	10	M6	26	30,0	**PHE FRC90FTB**	**PHE FRC90HTB**	**PHE FRC90RSB**
110	112	100	1 610	14	42	18,5	26,5	38	55	10	M10	37	45,3	**PHE FRC110FTB**	**PHE FRC110HTB**	**PHE FRC110RSB**
130	130	105	1 610	14	42	18	26,5	38	60	20	M10	39	47,5	**PHE FRC130FTB**	**PHE FRC130HTB**	**PHE FRC130RSB**
150	150	115	2 012	14	50	23,5	33,5	42	70	28	M10	46	60,0	**PHE FRC150FTB**	**PHE FRC150HTB**	**PHE FRC150RSB**
180	180	125	2 517	16	60	34,5	46,5	48	80	28	M10	58	70,0	**PHE FRC180FTB**	**PHE FRC180HTB**	**PHE FRC180RSB**
230	225	155	3 020	25	75	39,5	52,5	55	100	45	M12	77	90,0	**PHE FRC230FTB**	**PHE FRC230HTB**	**PHE FRC230RSB**
280	275	206	3 525	35	100	51	66,5	67	115	55	M16	90	105,5	**PHE FRC280FTB**	**PHE FRC280HTB**	**PHE FRC280RSB**

[1] Clearance required for tightening/losening the bushing on the shaft

SKF Jaw Couplings

Jaw couplings provide a cost-effective solution for standard power applications, cushioning moderate shock loads and dampening low vibration levels.

Maintenance-free and easy to install, jaw couplings are available with a "snap wrap" element allowing element replacement in situ.

Urethane and hytrel elements have a greater power rating than nitrile elements and are recommended for applications where a compact, high torque solution is required.

Selection

1 Service factor
Determine the required service factor in tables **tables 9** and **10** on **pages 87** and **88**.

2 Design power
Multiply normal running power by the service factor. This gives the design power for selecting a coupling with a nitrile element.

3 Alternative elements
To allow coupling selection based on one power rating table (nitrile), an element correction is required to give a new reference design power. This is done by dividing the design power calculated for a nitrile element by the alternative element power factor listed in **table 1**.

4 Coupling size
Using **table 2** on **page 78**, search for the appropriate speed until a power greater than the design power is found. The required jaw coupling is given at the head of the column.

5 Bore size
Using prodcut table on **page 80**, check that the selected flanges can accommodate both the drive and driven shaft.

Example

A jaw coupling is required to transmit 4 kW from an electric motor running at 300 r/min to a centrifugal fan for 12 hours per day. The motor shaft is 20 mm diameter and the pump shaft diameter 18 mm.

1 Service factor
From **table 9** on **page 87** = 1,0.

2 Design power
Design power = 4 × 1,0 = 4 kW

3 Coupling size
When looking for for 300 r/min in **table 2** on **page 78**, the first power figure to exceed the required 4 kW of step 2 is 4,7 kW. In this case, a nitrile element can be used with a jaw coupling size 150.

4 Bore size
By referring to the product table on **page 80**, it can be seen that both shaft diameters fall within the bore range available.

Engineering data

Power ratings

Maximum torque figures should be treated as short duration overload ratings occurring in circumstances such as direct-on-line starting.

For speeds not shown, calculate the nominal torque for the design application using the formula below and select coupling according to nominal torque ratings.

$$\text{Nominal torque (Nm)} = \frac{\text{Design power (kW)} \times 9\,550}{\text{r/min}}$$

For additional useful information on jaw couplings, such as standard bore and keyway data, please refer to **tables 1** to **3**.

Table 1

Elements

Type	Temperature range	Misalignment		Power factor
		Angular	Parallel	
–	°C	°	mm	–
Nitrile	–40 to 100	1	0,38	1
Urethane	–35 to 70	1	0,38	1,5
Hytrel®	–50 to 120	0,5	0,38	3

Order data

A complete jaw coupling consists of: 2 hubs and 1 element. A complete coupling with spacer consists of 2 hubs, 2 nitrile wrap elements, 2 ring kits and 1 spacer.

For more detailed information on ordering specific couplings, refer to **table 4**.

Table 2

Power ratings – Nitrile elements

Speed	Coupling sizes 50	70	75	90	95	100	110	150	190	225
r/min	kW									
50	0,018	0,030	0,06	0,10	0,14	0,3	0,5	0,8	1,1	1,5
100	0,037	0,060	0,12	0,20	0,27	0,6	1,1	1,6	2,1	2,9
200	0,074	0,121	0,25	0,40	0,54	1,2	2,2	3,1	4,2	5,9
300	0,110	0,181	0,37	0,60	0,81	1,7	3,3	4,7	6,3	8,8
400	0,147	0,242	0,50	0,80	1,08	2,3	4,4	6,3	8,4	11,7
500	0,184	0,302	0,62	1,01	1,35	2,9	5,5	7,9	10,5	14,7
600	0,221	0,363	0,75	1,21	1,62	3,5	6,6	9,4	12,6	17,6
700	0,257	0,423	0,87	1,41	1,89	4,1	7,7	11,0	14,7	20,5
720	0,265	0,435	0,90	1,45	1,95	4,2	7,9	11,3	15,1	21,1
800	0,294	0,483	1,00	1,61	2,16	4,6	8,8	12,6	16,8	23,5
900	0,331	0,544	1,12	1,81	2,43	5,2	9,9	14,1	18,8	26,4
960	0,353	0,580	1,20	1,93	2,59	5,6	10,6	15,1	20,1	28,1
1 000	0,368	0,604	1,25	2,01	2,70	5,8	11,0	15,7	20,9	29,3
1 200	0,441	0,725	1,50	2,41	3,24	7,0	13,2	18,8	25,1	35,2
1 400	0,515	0,846	1,74	2,81	3,78	8,1	15,4	22,0	29,3	41,1
1 440	0,529	0,870	1,79	2,90	3,89	8,4	15,8	22,6	30,2	42,2
1 600	0,588	0,967	1,99	3,22	4,32	9,3	17,6	25,1	33,5	46,9
1 800	0,662	1,088	2,24	3,62	4,86	10,4	19,8	28,3	37,7	52,8
2 000	0,735	1,208	2,49	4,02	5,40	11,6	22,0	31,4	41,9	58,6
2 200	0,809	1,329	2,74	4,42	5,94	12,8	24,2	34,6	46,1	64,5
2 400	0,882	1,450	2,99	4,83	6,48	13,9	26,4	37,7	50,3	70,4
2 600	0,956	1,571	3,24	5,23	7,02	15,1	28,6	40,8	54,5	76,2
2 800	1,029	1,692	3,49	5,63	7,56	16,2	30,8	44,0	58,6	82,1
2 880	1,059	1,740	3,59	5,79	7,78	16,7	31,7	45,2	60,3	84,4
3 000	1,103	1,813	3,74	6,03	8,10	17,4	33,0	47,1	62,8	88,0
3 600	1,323	2,175	4,49	7,24	9,73	20,9	39,6	56,5	75,4	105,5
Nominal torque Nm	3,51	5,77	11,9	19,2	25,8	55,4	105	150	200	280

Table 3

Standard bore and keyway chart

Bore	Keyway	Coupling size 050	070	075	090	095	100	110	150	190	225
mm	mm	–									
9	3×1,4	X	X	X	X	–	–	–	–	–	–
10	3×1,4	X	X	X	X	–	–	–	–	–	–
11	4×1,8	X	X	X	X	–	–	–	–	–	–
12	4×1,8	X	X	X	X	X	–	–	–	–	–
14	5×2,3	X	X	X	X	X	X	–	–	–	–
15	5×2,3	–	X	X	X	X	X	–	–	–	–
16	5×2,3	–	X	X	X	X	X	X	X	–	–
17	5×2,3	–	X	X	X	X	X	X	X	–	–
18	6×2,8	–	X	X	X	X	X	X	X	–	–
19	6×2,8	–	X	X	X	X	X	X	X	X	–
20	6×2,8	–	–	X	X	X	X	X	X	X	–
22	6×2,8	–	–	X	X	X	X	X	X	X	–
24	8×3,3	–	–	–	X	X	X	X	X	X	X
25	8×3,3	–	–	–	–	X	X	X	X	X	X
28	8×3,3	–	–	–	–	X	X	X	X	X	X
30	8×3,3	–	–	–	–	–	X	X	X	X	X
32	10×3,3	–	–	–	–	–	X	X	X	X	X
35	10×3,3	–	–	–	–	–	X	X	X	X	X
38	10×3,3	–	–	–	–	–	X	X	X	X	X
40	12×3,3	–	–	–	–	–	–	X	X	X	X
42	12×3,3	–	–	–	–	–	–	X	X	X	X
45	14×3,8	–	–	–	–	–	–	–	X	X	X
48	14×3,8	–	–	–	–	–	–	–	X	X	X
50	14×3,8	–	–	–	–	–	–	–	–	X	X
55	16×4,3	–	–	–	–	–	–	–	–	X	X
60	18×4,4	–	–	–	–	–	–	–	–	–	X

Table 4

Order data

Coupling type	Flanges	Qty	Element	Qty	Spacer shaft	Qty	Nitrile wrap element	Qty	Ring kit	Qty
RSB both sides	PHE L095HUB	2	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2
Bore with keyway/ RSB combination	PHE L095HUB PHE L095 – ... MM	1 1	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2
Bore with keyway on both sides	PHE L095 – ... MM	2	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2
Bore only/ RSB combination	PHE L095 – ... MMP PHE L095HUB	1 1	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2
Bore only	PHE L095 – ... MMP	2	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2
Bore only/bore with keyway combination	PHE L095 – ... MMP PHE L095 – ... MM	1 1	PHE L095NR or PHE L095UR PHE L095HL	1	PHE L090X ... SPACER	1	PHE L090NRWRAP	2	PHE L090RINGKIT	2

NR = Nitrile
UR = Urethane
HL = Hytrel

Available spacer shaft lengths are 100 mm and 140 mm. To complete the designation, add spacer length. For example: PHE L090X100SPACER for spacer of 100 mm, coupling size 090.
When ordering bored to size and keywayed hubs, it is required that the bore diameter is added to the designation found in the table above.
Where a keyway is NOT required, the designation should be suffixed with a P.
PHE L150-18MM = Hub Size 150 with 18 mm bore and keyway.
PHE L070-16MMP = Hub Size 070 with 16 mm bore (no keyway).

Installation

1 Place each coupling on its shaft so that shaft ends do not protrude into the internal section of the coupling (→ **fig. 1**). Then tighten the set screws.

2 Insert the coupling element into one side of the coupling (→ **fig. 2**).

3 Move the other coupling side into position and connect the two halves (→ **fig. 3**). Check that the assembled length is correct (→ **fig. 4**).

4 Check the angular misalignment by checking the assembled length in four positions at 90° around the coupling. Check parallel misalignment using a straight edge across the length of the coupling flange (→ **fig. 5**). Allowable angular misalignment for all jaw couplings is 1°. Allowable parallel misalignment for all jaw couplings is 0,38 mm.

Note: For most consistent results, check across at least 3 of the 6 points where the rubber elements are visible between the flanges.

Fig. 1

Fig. 2

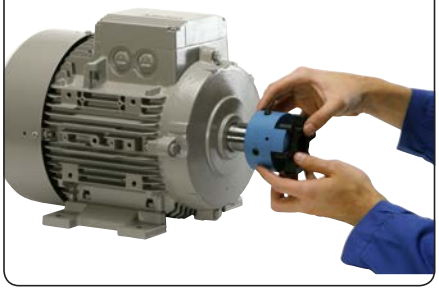


Fig. 3

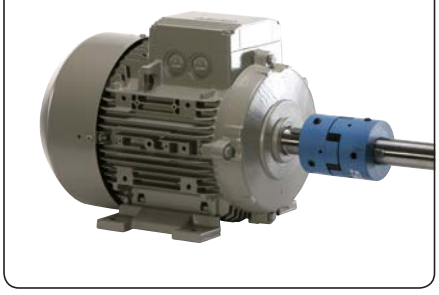


Fig. 4

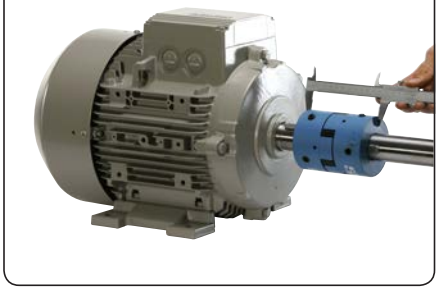
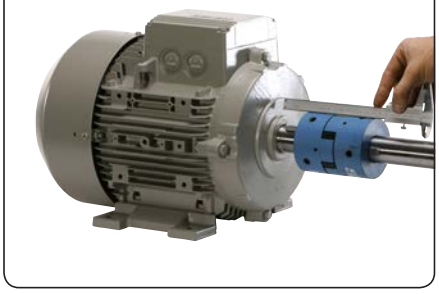
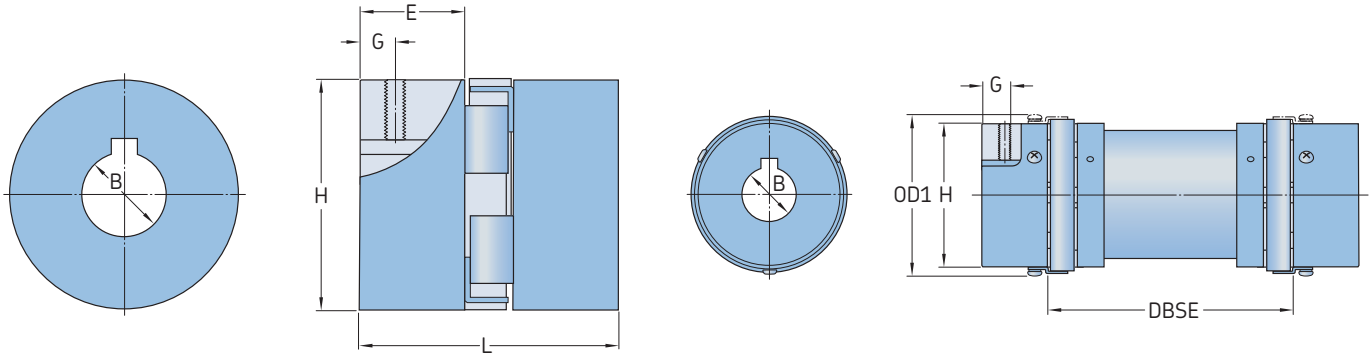


Fig. 5





Hub

Spacer

Size	Dimensions								Set screw	Approx. mass[2]	Speed	Designation
	Pilot B	Max.	OD	OD1[1]	L	E	H	G			Max.	
–	mm								–	kg	r/min	–
035	3,20	9,5	15,9	–	20,6	6,7	15,9	–	–	0,03	31 000	**PHE L035HUB**
050	6,35	14,0	27,5	–	44,0	16,0	27,5	6,5	M6	0,05	18 000	**PHE L050HUB**
070	6,35	19,0	35,0	–	51,0	19,0	35,0	9,5	M6	0,12	14 000	**PHE L070HUB**
075	6,35	24,0	44,5	–	54,0	21,0	44,5	9,0	M6	0,22	11 000	**PHE L075HUB**
090	6,35	24,0	54,0	–	54,0	21,0	54,0	8,7	M6	0,28	9 000	**PHE L090HUB**
095	11,11	28,0	54,0	64	64,0	25,0	54,0	11,0	M8	0,31	9 000	**PHE L095HUB**
100	12,70	35,0	65,0	77	89,0	35,0	65,0	11,0	M8	0,75	7 000	**PHE L100HUB**
110	15,87	42,0	84,0	97	108,0	43,0	84,0	19,0	M10	1,50	5 000	**PHE L110HUB**
150	15,87	48,0	96,0	112	115,0	45,0	96,0	22,0	M10	2,40	4 000	**PHE L150HUB**
190	19,05	55,0	115,0	130	133,0	54,0	102,0	22,0	M12	3,50	3 600	**PHE L190HUB**
225	19,05	60,0	127,0	143	153,0	64,0	108,0	29,0	M12	4,50	3 600	**PHE L225HUB**

[1] Outer diameter of ring kit
[2] Mass of hub with pilot bores
DBSE = Distance between shaft ends
Hub material is high grade cast iron. Spacer material is aluminium.

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