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FLUIDMAX

FLUID COUPLINGS

FLUIDMAX

FLUID COUPLINGS

Operating principle

① start-up impeller

② driven impeller

③ cover

④ sub coupling

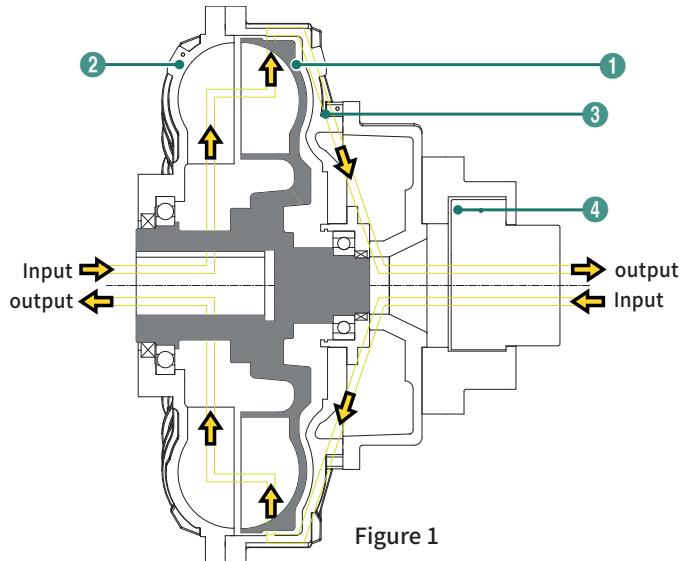


Figure 1

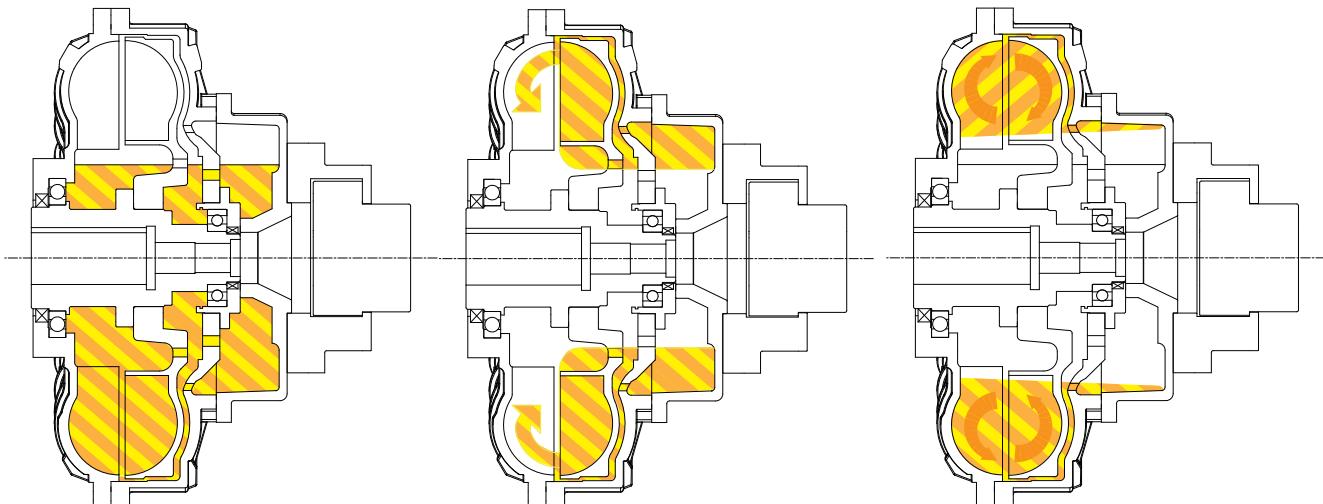
A fluid coupling is a transmission based on the kinetic energy of a fluid. Each fluid coupling shaft is rigidly coupled to an impeller, and between them circulates a fluid flow. The kinetic energy of the flow thrown by the driver impeller 1 is greater than the kinetic energy of the flow thrown by the driven impeller 2. The torque T transmitted by the fluid coupling is proportional to the difference of speed (slip) between the impellers.

Under operation at rated torque, the relative slip of the fluid coupling stays normally on the range 1.5% – 6.0%. The relative slip in % of a fluid clutch is defined as $100 \times (n_1 - n_2) / n_1$

Shutdown

Accelerating

Operating



Types

Standard type

- It is possible to protect driver and driven equipment from shock and vibration since there is no mechanical connection.
- It is possible to shutdown driven equipment by reversing the motor.
- It is possible to replace an expensive wound-rotor motor with a general motor.
- It is possible to distribute the load by adjusting the oil level for each motor fluid coupling in multi-motor drives.



PHH

Chamber type

Chamber type fluid coupling makes possible a very soft start or stop operation, by a gradual filling or emptying of oil from the impellers, since oil is stored in the chamber at holding time and flows into the circuit through the nozzle during operation. And there is less slip since oil in the chamber is in the operating circuit during the constant speed operation. It can be used effectively to control the starting torque to prevent belt breakage, especially on belt conveyors.



PHCH

Model



PHD



PHF



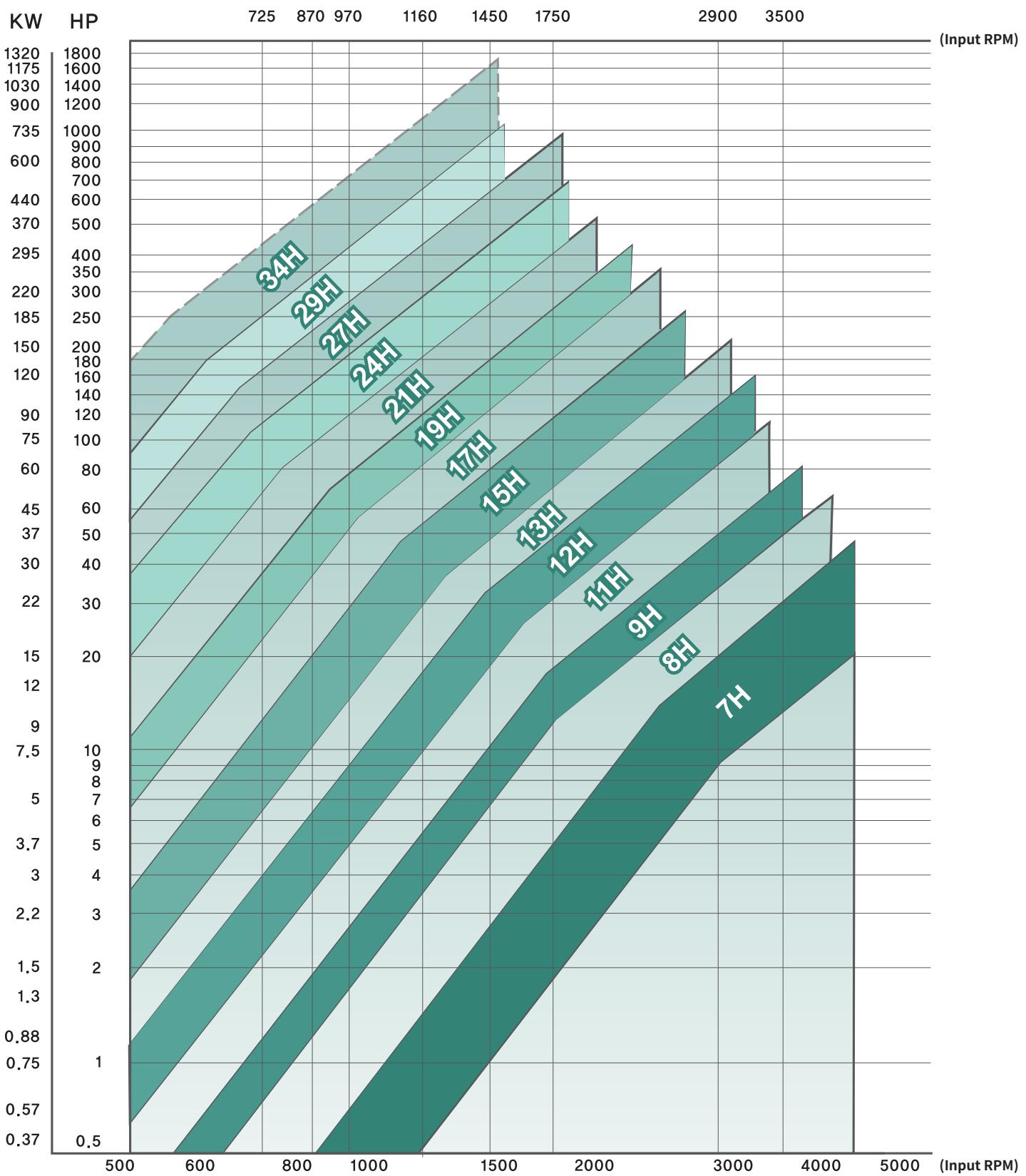
PHG



PHP

Selection of Fluid Couplings

Table for selecting specification by used power and input speed



* If the selected position is at the boundary, select the size one step higher.

Mounting

PHH / PHP (TYPE in which the motor shaft is directly connected to the input shaft)

- 1 Mount the Fluid Coupling to the motor shaft using engaging bolts as shown in the figure 2.

NOTE

Never assemble the Fluid Coupling in the shrinkage fitting when assembling it to the motor shaft. Oil leaks may be caused due to damage of the oil seal.

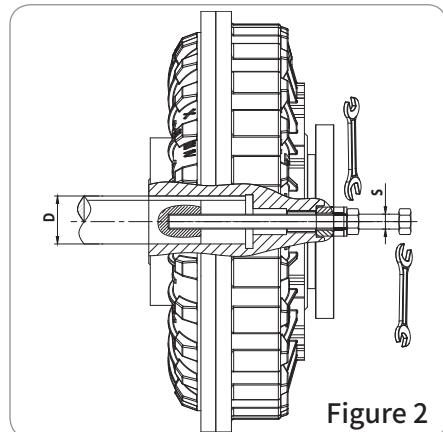


Figure 2

- 2 Mount the Holset coupling of Sub-couplings the driven shaft.

- 3 Tighten the main frame of the fluid coupling with fixing bolts as shown in the figure 3.

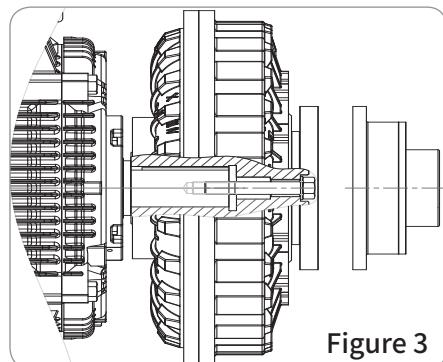


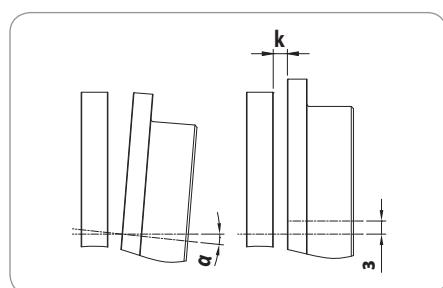
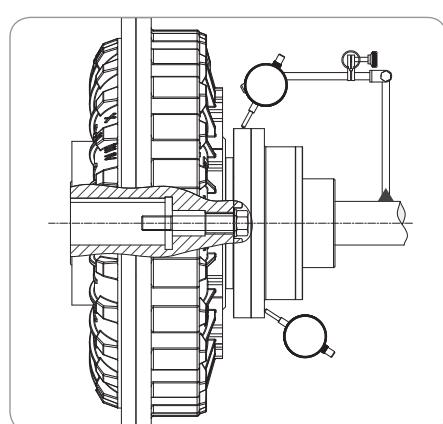
Figure 3

- 4 Align the shaft with a gauge as shown. It is recommended to adjust the parallel misalignment (ϵ), angular misalignment (α) and gap (K) within the range of Table (1) for a long life.

Table 1

Specification	Sub Coupling	Parallel misalignment(ϵ) (mm)	Angular misalignment(α)	Gap(K)
9H / 11H / 12H	HS20	0.15	0.1	2
13H / 15H	HS23	0.20	0.1	3
17H / 19H	HS26	0.25	0.1	3
21H / 24H	HS31	0.30	0.1	3
27H / 29H	HS36	0.30	0.1	4
34H	HS47	0.30	0.1	5

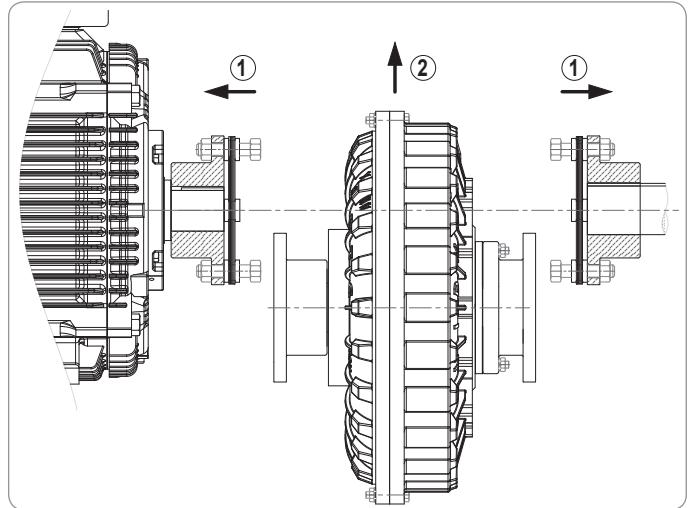
* Apply only half the values of Table 1 for parallel misalignment or angular misalignment when using it at 1,500 RPM or more.



PHD / PHG / PHF TYPE (I/O Separation TYPE)

Sub coupling such as gear, disc and flange is installed on both sides of input and output, and it is convenient to equip to or unequip from the motor and the driven part.

- 1** Mount Flange or Hub on shafts of both sides. For shrinkage fitting, the heating temperature should be 100 °C to 120 °C.



- 2** If the axial alignment is completed and assembled within the allowable specifications, insert the fluid coupling between the axes and connect the pressure side and the output side to each other with fastening bolts.

- 3** Align the shaft with a dial gauge as shown in the figure. Adjust the parallel misalignments (ϵ_1 , ϵ_2), angular misalignments (α_1 , α_2), and axial displacements (S_1 , S_2) within the values of Table 20 for a long life.

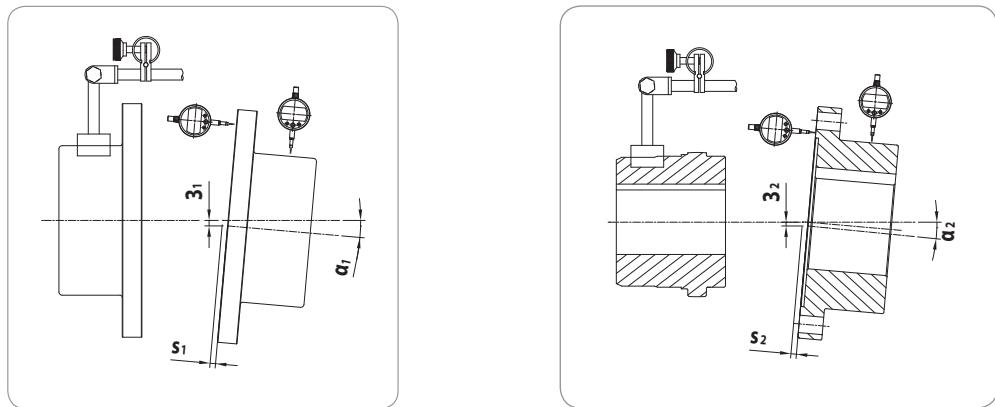
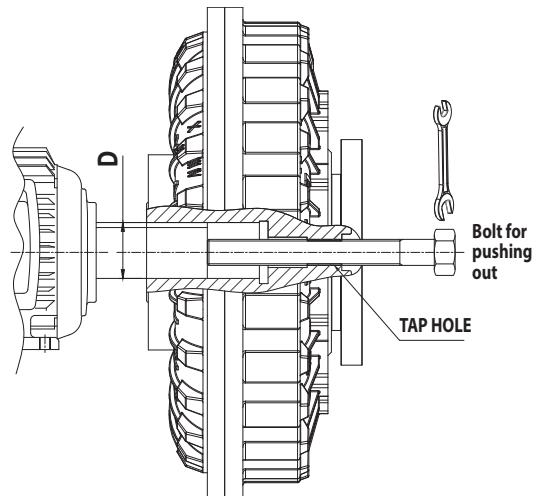


Table 2

Specification	PHD, PHCD, PHF, PHCF			PHG, PHCG		
	Parallel misalignment(ϵ_1) (mm)	Angular misalignment(α_1) (°)	Axial displacement (S_1) (mm)	Parallel misalignment(ϵ_2) (mm)	Angular misalignment(α_2) (°)	Axial displacement (S_2) (mm)
9H / 11H / 12H	0.12	0.1	± 0.25	0.15	0.05	-0.5~3
13H / 15H	0.15	0.1	± 0.25	0.15	0.05	-0.5~3
17H / 19H	0.15	0.1	± 0.25	0.15	0.05	-0.5~3
21H / 24H	0.2	0.1	± 0.25	0.20	0.05	-0.5~4
27H / 29H	0.2	0.1	± 0.25	0.25	0.05	-0.5~4.5
34H	0.2	0.1	± 0.25	0.30	0.05	-0.5~5.5

Dismounting

Dismount the main frame of the fluid coupling from the motor shaft by pushing it out with an opposite bolt. Do not use a hammer or hydraulic jack. Otherwise, the main frame of the coupling may be damaged.



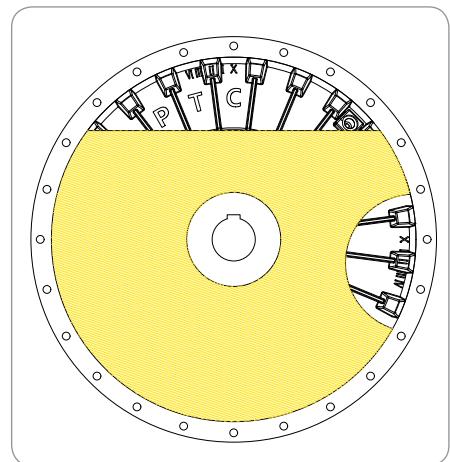
Specification	9 / 11 / 12 H	13 / 15 H	17 / 19 H	21 / 24 H	27 / 29 H	34 H
Diameter	28, 38	42, 48	48, 55, 60, 65	60, 65, 75, 80	80, 90, 100	100, 120, 135
Bolt for pushing out H	M16 x 250	M20 X 250	M30 x 340	M30 x 360	M36 x 460	M45 x 530
CH	M16 x 320	M20 X 320	M30 x 410	M30 x 440	M36 x 560	M45 x 690

Oil filling

- 1 If the fluid coupling is installed horizontally, rotate it to select the desired amount of oil feeding (marks X, I, II, III, IV) indicated on the outside of the fluid coupling.

- 2 The efficiency of the fluid coupling lowers and the oil temperature increases as the slip goes up. Thus, select the proper level of oil filling.

- 3 Turn the fluid coupling and loosen the opposite plug to allow inside air to escape. And pour enough oil to make it flow out from the inlet opening.



- 4** See tables 4 and 5 for the amount of the oil feeding. If you cannot find the point of the oil feeding, feed the oil at “X” and at “II” for the standard type and chamber type, respectively.

Table 4 H Type

Specification of Standard type	Amount of oil (L)				
	X	I	II	III	IV
9H	1.7	1.59	1.48	1.35	1.2
11H	2.6	2.42	2.24	2.04	1.84
12H	3.8	3.55	3.3	3.03	2.74
13H	4.3	3.99	3.68	3.29	2.9
15H	7.2	6.8	6.3	5.7	5.1
17H	10.5	9.8	9	8.2	7.3
19H	13.7	12.8	11.8	10.7	9.6
21H	18	16.8	15.4	14	12.6
24H	28	26.2	24.2	22	19.6
27H	39	36.5	33.6	30.7	27.6
29H	51	47.6	44.2	40.6	36.8
34H	82.5	76.6	70.7	65.8	61.9

Table 5 CH Type

Specification of Chamber type	Amount of oil (L)		
	II	III	IV
12H	4.5	3.9	3.3
13H	5	4.5	4.1
15H	7.9	7.1	5.9
17H	13	12.2	11.2
19H	15.6	14.5	13.4
21H	22.1	20.5	18.6
24H	31.2	28.6	26
27H	47	43.7	40.4
29H	61	57.1	52.3
34H	88	84.2	79.4

- 5** For the chamber type, select “II” as the maximum.

- 6** To prevent oil leaks, apply a sealant to the plug.



NOTE Do not use an adhesive for screw. Otherwise, the thread may be damaged during disassembly.

- 7** For installing vertically, feed oil in the order of the above 1 to 6 before installing.

- 8** See table 6 for used oils.

Table 6

Recommended oil	Agip	Esso	Mobil	Shell	Texaco
ISO 32 HM	Castrol	NUTO H 32	DTE 24(OIL LIGHT)	TELLUS 32	RANDO HD 32

Operation and maintenance

If start-ups are frequent, make sure that the maximum oil temperature of the fluid coupling does not exceed 90°C. If you want to operate at higher temperatures, you must use special seals.

Please contact PT COUPLINGS. Excessive heat may be caused by the followings:

- insufficient oil
- less rated power of the motor than the demanded power of the driven machine
- high ambient temperature for operation; coupling which is not cooled due to poor ventilation
- long operation time; and frequent starting-up.

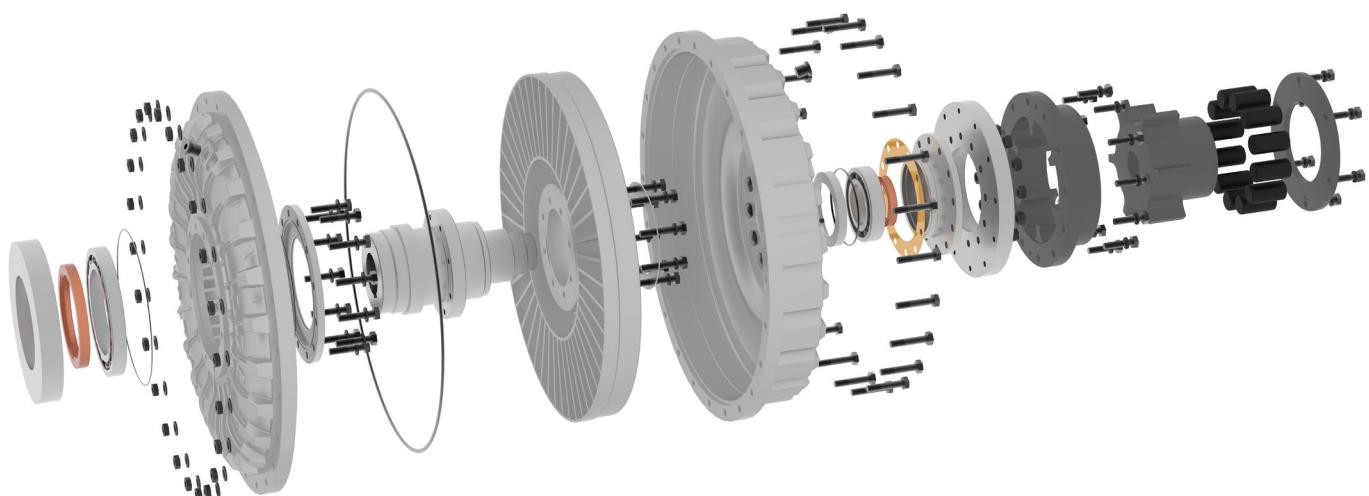
Check the amount of the oil and the fastening of the fixing bolt after 500 hours of initial operation.

The standard of fusible plug is 145°C. If 120°C or 175°C is required, please contact us.

Replace the oil approximately every 5000 hours of operation.

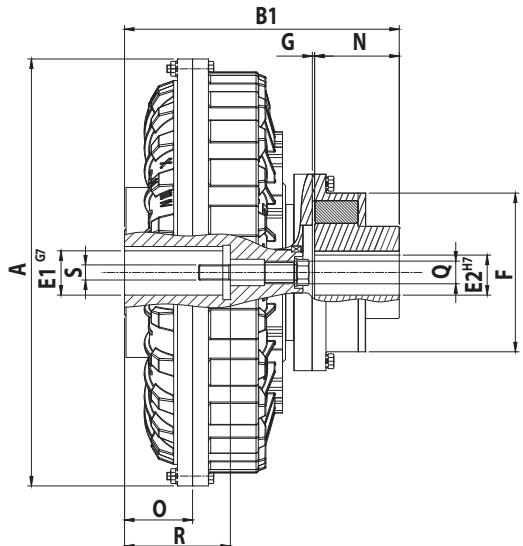
If the driven machine rotates in reverse, there are concerns about equipment and safety accidents. Therefore, be sure to install the braking device (BRAKE DRUM or BRAKE DISC) before use.

Assembly drawing

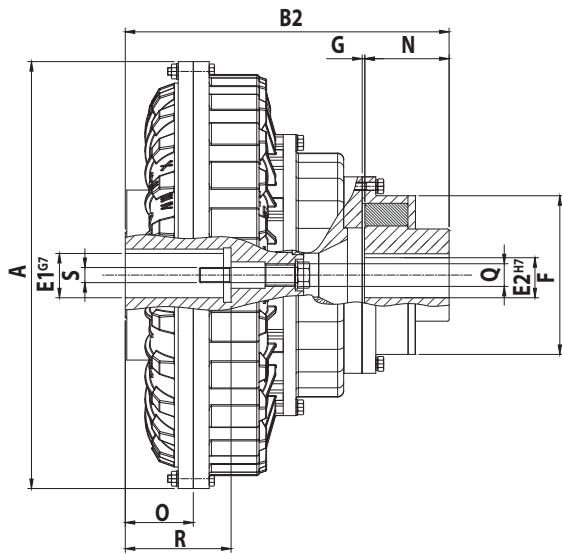


Dimensions

PHH



PHCH



Specification	Dimensions (mm)													Sub-COPLING	WEIGHT(kg)		
	A	B1	B2	E1	E2 max	F	N	O	Q	R	S	G	PHH	PHCH			
9H	295	249	-	28 42	38 •48	55	132	80	43 74	54 MI6	60 110	80 MI10	MI12 MI6	2	HS20	16	-
11H	325	258	-	28 42	38 •48	55	132	80	42 83	63 MI6	60 110	80 MI10	MI12 MI6	2	HS20	18	-
12H	370	258	322	38 42	48 •48	55	132	80	63 83	MI6	80 110	MI12 MI6	2	HS20	21.5	24.5	
13H	398	285	345	42 55	48 •60	70	170	80	84 84 104	M30	110 110 140	MI6 M20	3	HS23	34	37	
15H	460	343	411	48 60	55 65	80	170	110	81 111	M30	110 140	MI6 M20	3	HS23	50.3	54.3	
17H	520	362	442	60 75	65 80	90	250	110	104 104 134	M30	140 140 170	M20	3	HS26	77	83	
19H	565	362	442	60 75	65 80	90	250	110	104 104 134	M30	140 140 170	M20	3	HS26	84	90	
21H	620	433	533	75 80	80 90	110	290	140	100 130	M36	140 170	M20 M20 M24	3	HS31	129	139	
24H	710	433	533	80 468	90 568	110	290	140	130 165	M36	170 210	M20 M24 M24	3	HS31	147	157	
27H	780	504	622	120 max	120	350	150	*167	M45	*210	*M24	4	HS36	228	246		
29H	860	533	651	135 max	120	350	150	*167	M45	*240	*M24	4	HS36	281	299		
34H	1000	615	746	150 max	155	425	180	*200	M45	*265	*M36	5	HS47	449	464		

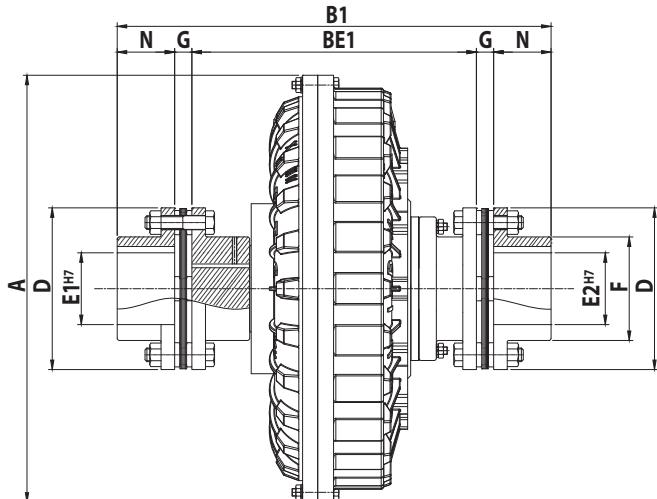
※ Please refer to Table 4 and Table 5 for the amount of oil.

※ “ • ”: Please apply Lower key(DIN 6885/2)

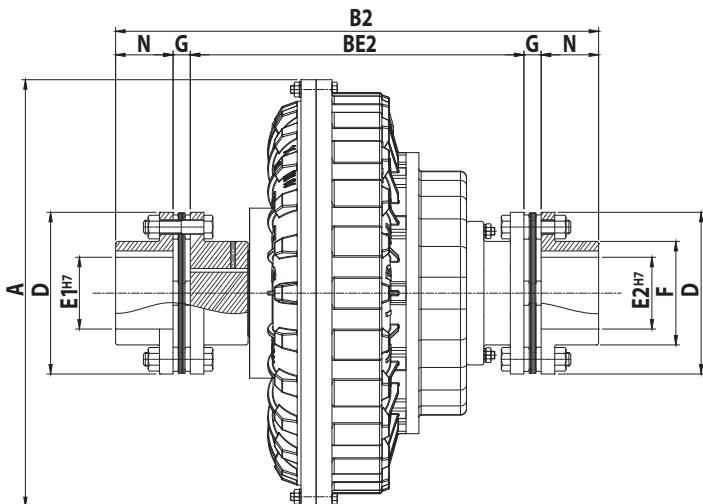
※ “ * ”: The dimension of the indication is the maximum shaft diameter.

Dimensions

PHD



PHCD



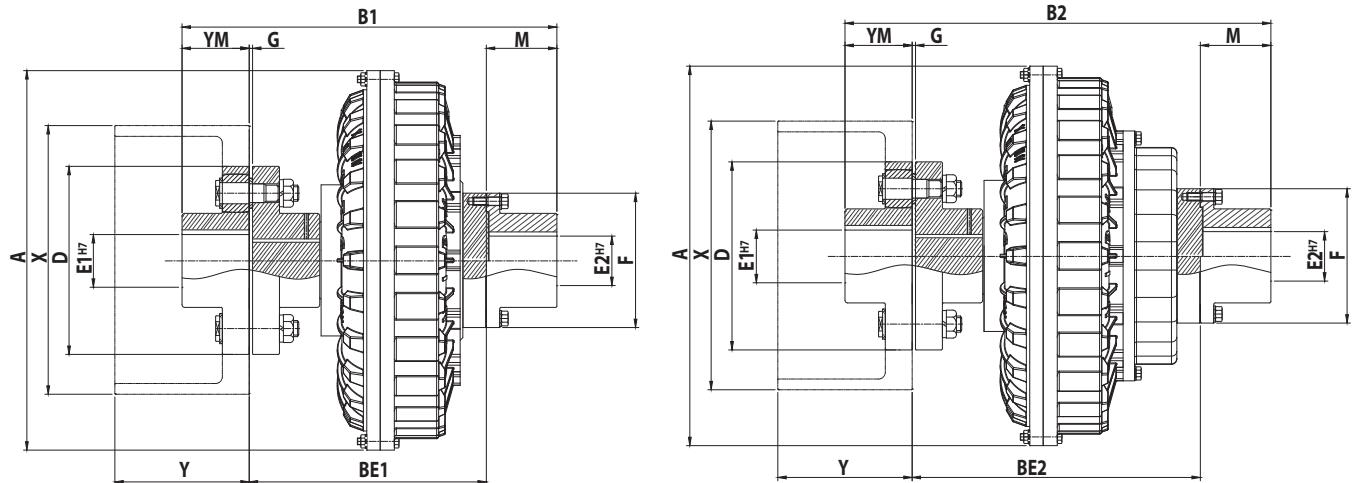
Specification	Dimensions (mm)										Weight(kg)	
	A	B1	B2	BE 1	BE 2	D	E max	F	N	G	PHD	PHCD
9H	295	377.3	-	258.3	-	143	58	84	47.8	11.7	24.4	-
11H	325	386.3	-	267.3	-	143	58	84	47.8	11.7	26.4	-
12H	370	398.3	465.3	279.3	346.3	143	58	84	47.8	11.7	31.4	34.4
13H	398	446.2	521.7	298.2	373.7	168	74	106	57.2	16.8	45	48
15H	460	513	592	352	431	194	83	119	63.5	17	64.2	68
17H	520	588.3	670.3	392.7	474.7	214	95	137	76.2	21.6	100	106
19H	565	588.3	670.3	392.7	474.7	214	95	137	76.2	21.6	109	115
21H	620	733.6	835.7	476.1	578.1	276	118	170	101.6	27.2	187	197
24H	710	738.2	840.2	480.6	582.6	276	118	170	101.6	27.2	209	219
27H	780	869	1028	563	722	308	133	198	134	19	368	391
29H	860	972.5	1131.5	623.5	782.5	346	152	218	153	21.5	503	526
34H	1000	1169.5	1296.5	760.5	887.5	346	152	218	183	21.5	697	712

※ Please refer to Table 4 and Table 5 for the amount of oil.

Dimensions

PHF

PHCF



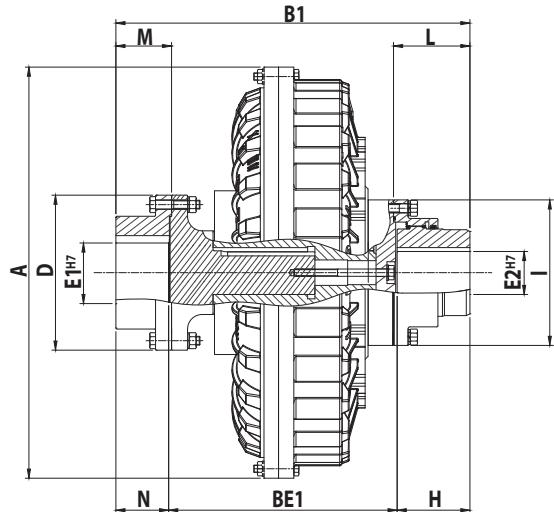
Specification	Dimensions (mm)													Weight(kg)	
	A	B1	B2	BE1	BE2	D	E1 max	E2 max	F	M	YM	G	PHF	PHCF	
9H	295	355	-	214	-	160	45	75	160	85	56	3	28	-	
11H	325	378	-	230	-	180	50	75	160	85	63	3	32	-	
12H	370	407	474	251	318	200	56	75	160	85	71	4	42	45	
13H	398	435	510.5	270	345.5	224	63	75	160	85	80	4	53	56	
15H	460	509	588	314	393	250	71	95	200	105	90	4	85	89	
17H	520	556	638	351	433	280	80	95	200	105	100	4	114	120	
19H	565	556	638	351	433	280	80	95	200	105	100	4	123	129	
21H	620	633	735	403	505	315	90	105	224	118	112	4	177	187	
24H	710	660	762	417	519	355	100	105	224	118	125	5	226	236	
27H	780	722	881	450	609	400	110	150	280	147	125	5	335	358	
29H	860	781	940	494	653	450	125	150	280	147	140	5	416	439	
34H	1000	-	1022	659	659	450	130	135	318	160	140	5	505	520	

※ Please refer to Table 4 and Table 5 for the amount of oil.

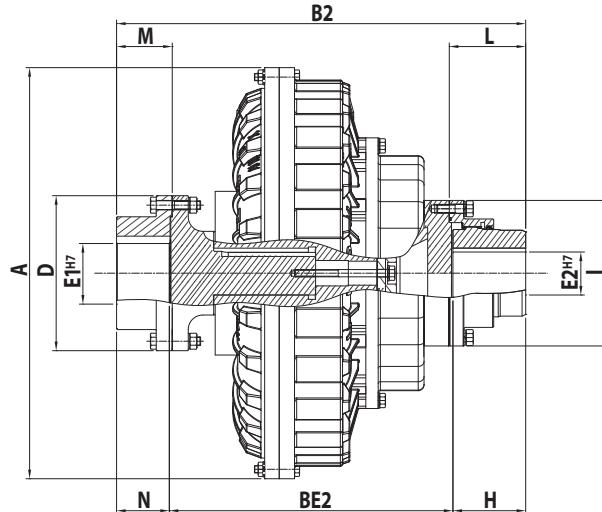
※ "X", "Y" dimensions are determined by the brake specifications.

Dimensions

PHG



PHCG



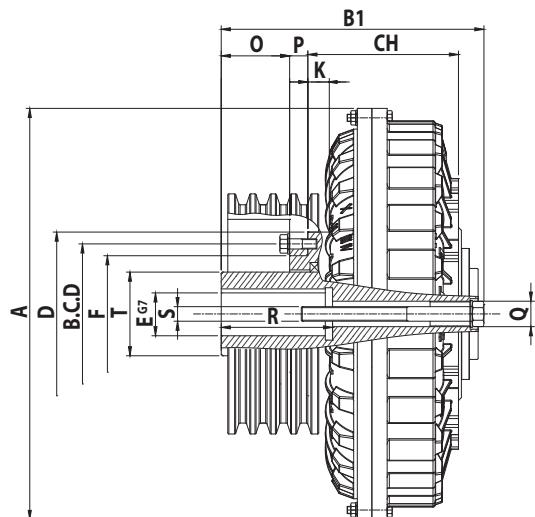
Specification	Dimensions (mm)										Weight(kg)	
	A	B1	B2	BE1	BE2	D	E1 max	E2 max	H	M	PHG	PHCG
9H	295	307	-	209	-	152	75	60	49	55	24	-
11H	325	312	-	214	-	152	75	60	49	55	26	-
12H	370	313	395	215	297	152	75	60	49	55	29.6	32.5
13H	398	340	406	242	308	152	75	60	49	55	38.7	41.7
15H	460	429	517	275	363	213	111	92	77	83	80	84
17H	520	457	544	303	390	213	111	92	77	83	94.5	100.5
19H	565	457	544	303	390	213	111	92	77	83	101.5	107.5
21H	620	517	643	335	461	240	130	105	91	97	147.1	157.1
24H	710	517	643	335	461	240	130	105	91	97	165.1	175.1
27H	780	598	761	386	549	279	149	124	106	114	262	281
29H	860	632	789	420	577	279	149	124	106	114	316	334
34H	1000	722	864	480	622	318	171	146	121	129	500.5	515.5

* Please refer to Table 4 and Table 5 for the amount of oil.

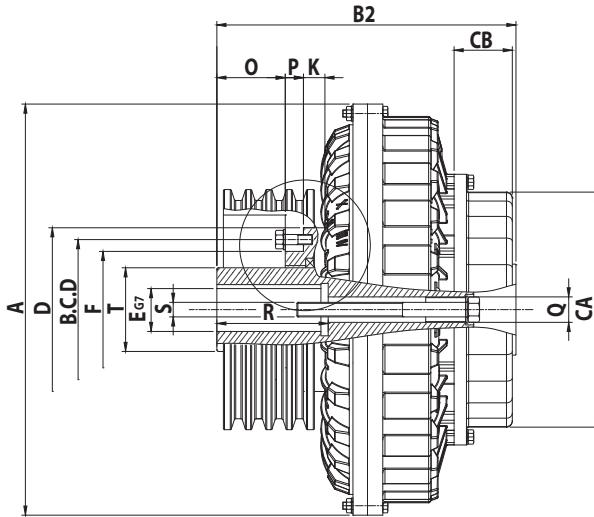
* Please fill grease to Gear Coupling.

Dimensions

PHP



PHCP



Specification	Dimensions (mm)																		Weight(kg)					
	A	B1 max	B2	CA	CB	CH	D	E	R	K	TAP	B.C.D	O	P	F	T max	Q	S	PHP	PHCP				
9H	295	250	-	-	-	96	128	28 42	38 48	60 110	80	20	8xM8 (DP13)	114	85	5	96	69	M16 M16	M10 M16	M12	13	-	
11H	325	259	-	-	-	107	128	28 42	38 •48	60 110	80	20	8xM8 (DP13)	114	85	5	96	69	M16 M16	M10 M16	M12	15	-	
12H	370	274	330	233	69	122	145	38 42	48 48	80 110	110	22	8xM8 (DP13)	130	98	7	112	80	M16 M16	M12 M16	19	22		
13H	398	359	410	233	65	137	179	42 55	48 60	110 110	140	29	12xM8 (DP13)	155	158	6	135	88	M30	M16 M20	31	34		
15H	460	384	438	262	73	151	206	55 65	60 •75	110 140	140	28	12xM10 (DP17)	178	159	7	150	100	M30	M20	46	50		
17H	520	455	516	329	85	170	225	60 75	65 80	140 140	170	60	12xM10 (DP17)	200	180	7	180	132	M30	M20	74	80		
19H	565	455	516	329	85	190	225	60 75	65 80	140 140	170	45	12xM10 (DP17)	200	180	7	180	132	M30	M20	82	88		
21H	620	505	580	405	107	205	250	80 100	90 210	170 210	170	57	8xM14 (DP20)	228	190 230	7	200	145	M36	M20 M24	M24	110	120	
24H	710	505	580	405	107	229	250	80 100	90 210	170 210	170	46	8xM14 (DP20)	228	190 230	7	200	145	M36	M20 M24	M24	125	137	
27H	780			544	128	278		120 max	* 210										Please contact PT COUPLINGS.					

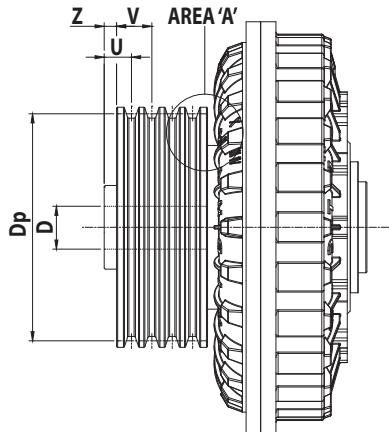
※ Please refer to Table 4 and Table 5 for the amount of oil.

※ “*” The dimension of the indication is the maximum shaft diameter.

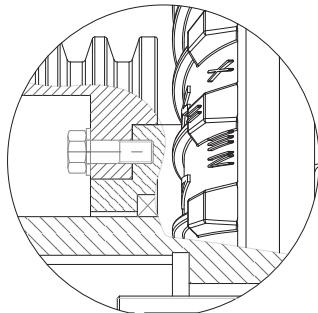
※ “•”: Please apply Lower key(DIN 6885/2)

Dimensions

PULLEY

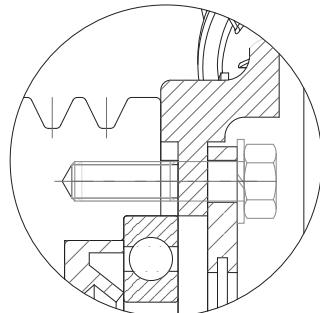


PHP, PHCP



AREA 'A'

PHSP, PHCSP



AREA 'A'

Specification	Dimensions (mm)				Type
	D	U	Dp	Pulley Number-Type	
9H	28	10	112	5-A	PHSP, PHCSP
	38	15	125	4-B	
	42	34	160	4-B	
	48	58	200	3-B	
	12H	38	12	140	
		50	180	4-B	
		42	51	200	
		48	26	4-C	
13H	48	50	180	6-B	PHP, PHCP
	55		250		
	60	49	250	5-C	
15H	60	50	200	6-B	
	65	17	250		
			280	5-C	
17H	65	12	265	7-B	
	75	72	315	6-B	
		35	355	6-C	
19H	75	72	315	6-B	
	80	35	355	6-C	
21H	80	20	355	8-C	
	90		400		
21H	100	60	355		
			400	8-C	
24H	80	20	355		
	90		400	8-C	
24H	100	60	355		
			400	8-C	

※ Other pulley specs are also available, Even if it is not provided on the list

※ The dimensions excluding the pulleys are same as PHP and PHCP.