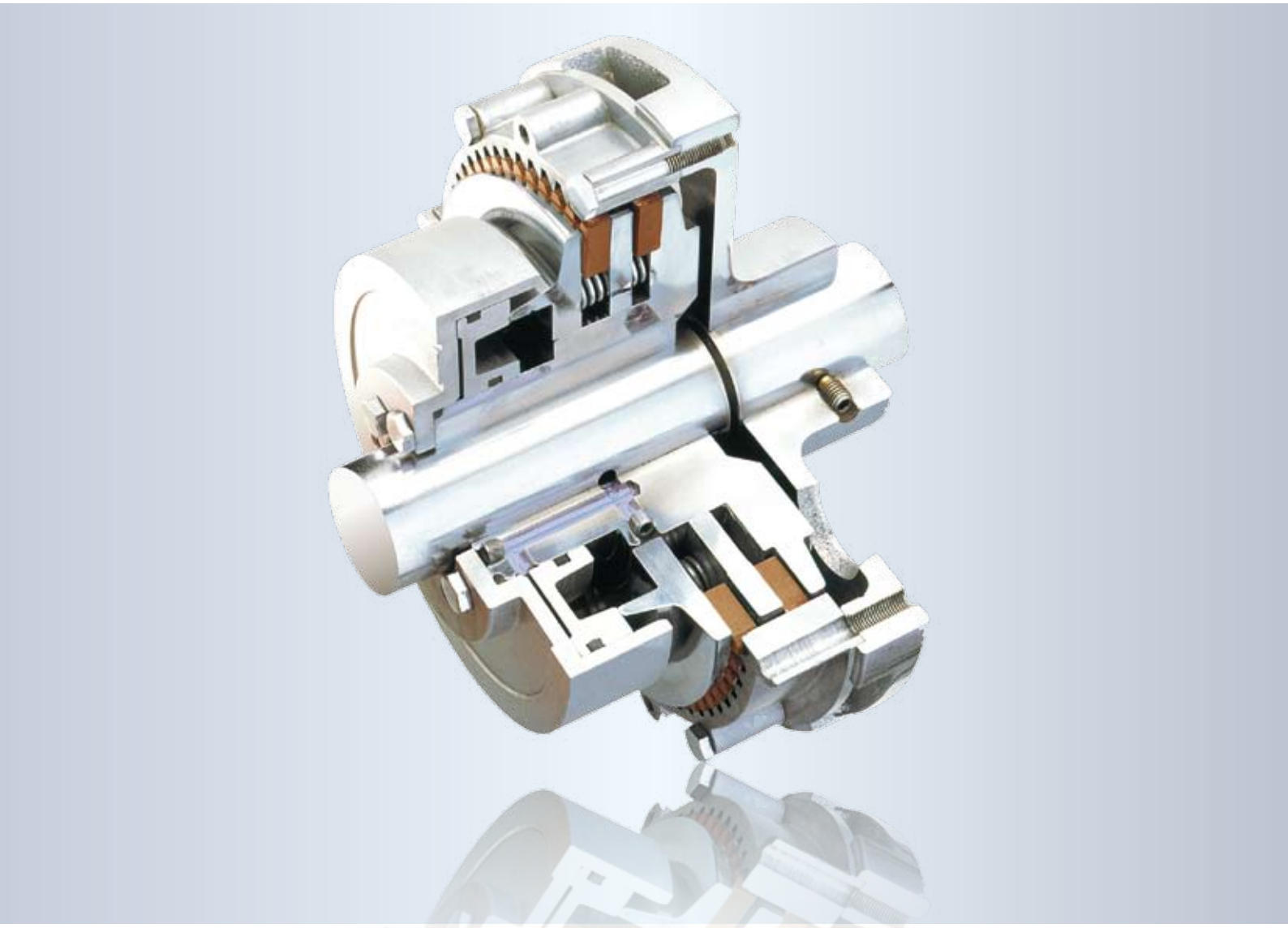
DESCH
DRIVE TECHNOLOGY

DESCH Planox® - PP

Friction Clutches pneumatically actuated

DCT



Technology PP 09 - GB

Planox®- Friction Clutches

Pneumatically switchable

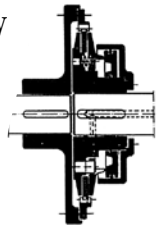
DESCH Planox®-friction clutches are engageable resp. disengageable dry-friction clutches with transmit torque by friction. These clutches permit rapid acceleration of the driven machines or machinery groups as well as reliable torque transmission. Machines connected with friction clutches are protected against damage which can occur through peak torques during operation or during the engaging/disengaging process. The toothed ring must always be fitted at the input side of the clutch.

Pneumatically engageable

With the pneumatically engageable Planox®-clutch, type PP, the compressed air is passed through a central bore in the shaft via a rotor connection into the ring cylinder and it governs the torque. The engaging section, consisting of the cylinder and piston, is sealed with O-rings or lip seals. Simple, maintenance-free and sturdy design are just some of its benefits. This design has proved highly successful in power transmission applications with a high engaging/disengaging frequency. The wear which occurs is offset via the piston path. The design PPR has a further advantage in addition to the known benefits of the pneumatically engageable version type PP. The compressed air is passed from outside into the cylinder in radial direction which means that it is possible to use pneumatically engageable clutches, for example, with long shafts. The engaging section, comprising cylinder and piston, runs in angular-contact ball bearings through which the required contact forces are transmitted. The torque resulting from the friction of the angular-contact ball bearing is absorbed by a torque arm fixed to the foundation or farm of the machine.

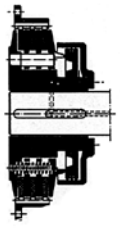
The clutch can be used up to an air pressure of about 8 bar. The transmitted torque is roughly proportional to the air pressure. Documentation about friction clutches type PT on request.

Type PPW



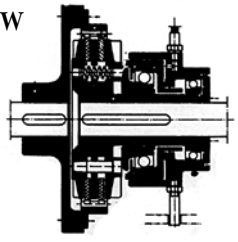
Type PPW Planox® Pneumatically engageable shaft to shaft connection

Type PPF



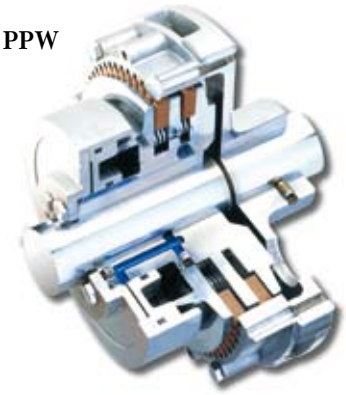
Type PPF Planox® Pneumatically engageable flange to shaft connection

Type PPRW

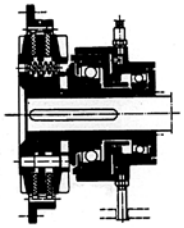


Type PPRW Planox® Pneumatically engageable with radiale air supply to shaft

Fig. 1
Type PPW



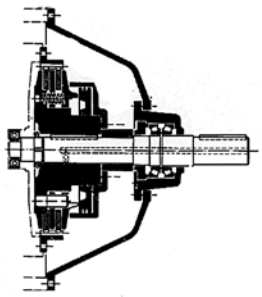
Type PPRF



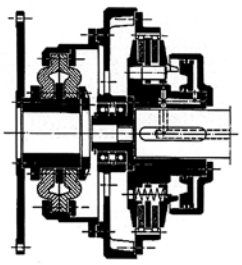
Type PPRF Planox® Pneumatically engageable with radial air supply flange to shaft connection

Types with outside bearing

Type PPA



Combinations



Special documentation on request

DESCH
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Parts of the Planox®-Friction Clutches

Type PPW and PPF

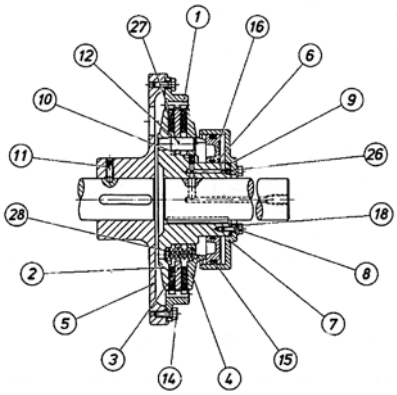


Fig. 2
Size 51-243

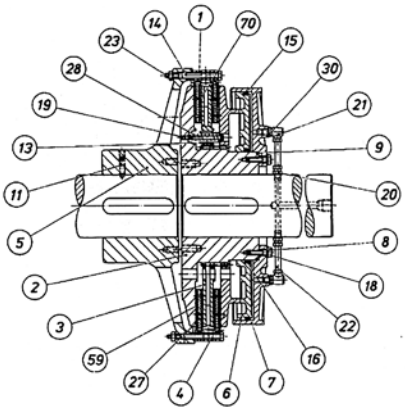


Fig. 3
Size 271-603

1 Toothed ring
2 Hub
3 Inner disc (Hollow Inner disc sizes 271-603)
4 Pressure plate
5 Flanged hub
6 Piston
7 Cylinder
8 Hexangon screw
9 O-ring
10 Plug (sizes 51-243)
11 Grub screw
12 Bolt (sizes 51-243)
13 Bush for springs
14 Hexagon screw
15 O-ring (Grooved ring sizes 271-603)
16 O-ring (Grooved ring sizes 271-603)
18 Plate (sizes 271-483)
19 Hexagon screw (sizes 271-603)
20 Straight pipe union (sizes 271-603)
21 Angular swivel joint (sizes 271-603)
22 Tube (sizes 271-603)
23 Hexagon nut (sizes 271-603)
24 Retaining ring (sizes 273, 303, 363, 423, 483, 603, not shown)
25 Bolt (sizes 272, 273, not shown)
26 Grub screw (sizes 51-81)
27 Friction disc (Steel carrier, sizes 301-603)
28 Pressure spring
30 Plate (sizes 301-603)
59 Friction pad (sizes 301-603)
70 Hollow rivet (size 301-603)

Parts of the Planox®-Friction Clutch Type PPRW and PPRF

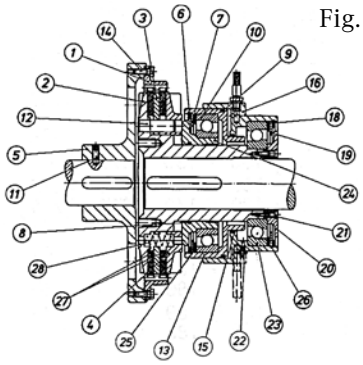


Fig. 4

1 Toothed ring
2 Hub
3 Inner disc
4 Pressure plate
5 Flanged hub
6 Retaining ring (sizes 211-243)
7 Sheet ring (sizes 211-243)
8 O-ring
9 O-ring
10 Ball bearing
11 Grub screw
12 Pin
13 Piston
14 Hexagon screw
15 O-ring
16 Cylinder
18 Retaining ring (sizes 211-243)
19 Sheet ring (grease regulating ring, sizes 211-243)
20 Collar greaser
21 Socket head screw
22 Grease nipple
23 Ball bearing
24 Pressure ring
25 Retaining ring
26 Retaining ring
28 Pressure spring

Parts of the divided friction disc with clamping pad

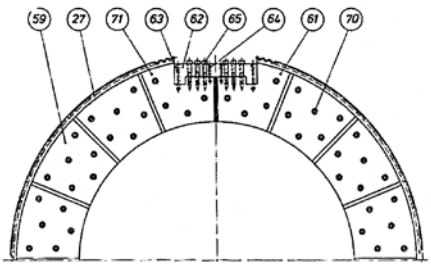


Fig. 5
Size 301-603

27 Carrier
59 Divided outer disc
61 Friction pad
62 Clamping pad
63 Clamping pin
64 Clamping pin
65 Socket head screw
70 Hollow rivet
71 Friction pad

Type PPW and PPF

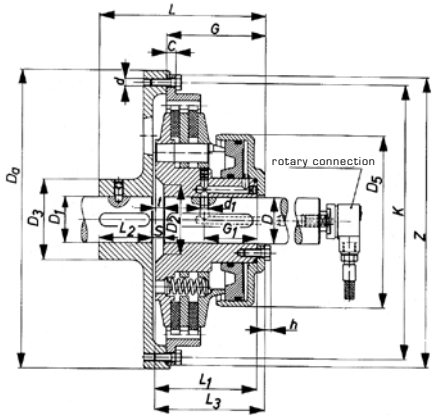


Fig. 6 Type PPW Size 51-243

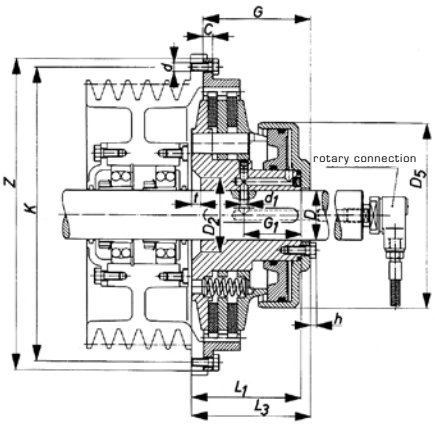


Fig. 7 Type PPF Size 51-243

Dimensions in mm • can be delivered ex stock

Size	Torque [1] T_s at 5 bar Nm	at 7 bar Nm	max. speed[4] PPW min^{-1}	PPF min^{-1}	Volume of cylinder with new frictions discs dm^3	with worn discs dm^3	A[5]	C	D_a	D and D_1 Pilot bore	D[3] max.	D_1[3] max.	D_2	D_3	D_5
• 51	100	140	3500	3500	0,023	0,059	44	13	170	14	28	28	-	55	125
• 61	150	210	3500	3500	0,047	0,11	55	15	225	18	34	34	50	65	150
• 71	220	308	3350	3350	0,064	0,13	62,5	16	250	18	45	45	65	80	168
• 81	300	420	3000	3200	0,078	0,16	65	16	275	18	45	45	65	80	178
•101	500	700	2500	3000	0,14	0,29	80	20	325	28	60	60	90	105	225
•102	1000	1400	2500	3000	0,14	0,44	80	44	325	28	60	60	90	105	225
•111	700	980	2200	2850	0,14	0,29	80	20	365	28	60	60	90	105	225
•112	1400	1960	2200	2850	0,14	0,44	80	44	365	28	60	60	90	105	225
141	1000	1400	1700	2500	0,32	0,52	100	12	480	48	90	90	125	155	264
•142	2000	2800	1700	2500	0,32	0,72	100	12	480	48	90	90	125	155	264
•143	3000	4200	1700	2500	0,32	0,92	100	12	480	48	90	90	125	155	264
161	1700	2380	1550	2200	0,52	0,9	135	16	530	58	110	100	130	170	340
162	3400	4760	1550	2200	0,52	1,3	135	16	530	58	110	100	130	170	340
163	5100	7140	1550	2200	0,52	1,7	135	16	530	58	110	100	130	170	340
181	2300	3220	1400	1960	0,56	0,96	140	16	585	68	125	110	150	185	360
182	4600	6440	1400	1960	0,56	1,4	140	16	585	68	125	110	150	185	360
183	6900	9660	1400	1960	0,56	1,8	140	16	585	68	125	110	150	185	360
211	3800	5320	1200	1600	0,71	1,4	170	18	685	73	150	130	175	220	430
212	7600	10640	1200	1600	0,71	2,2	170	18	685	73	150	130	175	220	430
213	11400	15960	1200	1600	0,71	2,9	170	18	685	73	150	130	175	220	430
241	5250	7350	1100	1200	0,84	1,7	180	18	745	88	180	140	210	235	470
242	10500	14700	1100	1200	0,84	2,6	180	18	745	88	180	140	210	235	470
243	15750	22050	1100	1200	0,84	3,4	180	18	745	88	180	140	210	235	470
271	12500	17500	1000	1250	0,74	2,8	215	47	810	-	180	180	-	340	610
272	25000	35000	1000	1250	1,3	5,3	215	109	810	-	180	180	-	340	610
273	37500	52500	1000	1250	1,8	7,9	215	171	810	-	180	180	-	340	610
301	21000	29400	900	1150	1,7	4,5	217,5	51	910	-	180	180	-	340	710
302	42000	58800	900	1150	3,7	9,3	217,5	123	910	-	180	180	-	340	710
303	63000	88200	900	1150	3,7	12	217,5	195	910	-	180	180	-	340	710
361	41000	57400	750	950	2,7	7,3	277,5	51	1060	-	230	230	-	400	890
362	82000	114800	750	950	5,9	15	277,5	123	1060	-	230	230	-	400	890
363	123000	172200	750	950	5,9	19,5	277,5	195	1060	-	230	230	-	400	890
421	66000	92400	660	825	3,6	11	325	52	1225	-	280	280	-	500	1040
422	132000	184800	660	825	9,7	24	325	141	1225	-	280	280	-	500	1040
423	198000	277200	660	825	9,7	32	325	230	1225	-	280	280	-	500	1040
481	100000	140000	600	760	4,9	15	375	52	1385	-	320	320	-	570	1200
482	200000	280000	600	760	13	33	375	141	1385	-	320	320	-	570	1200
483	300000	420000	600	760	13	43	375	230	1385	-	320	320	-	570	1200
601	160000	224000	500	630	4	13,5	500	60	1670	-	360	360	-	640	1350
602	320000	448000	500	630	8	27	500	150	1670	-	360	360	-	640	1350
603	480000	672000	500	630	12	40	500	235	1670	-	360	360	-	640	1350

1) The torque changes with increased air pressure: multiply torque values by 1,2 at 6 bar resp. 1,6 at 8 bar.

2) Outside centering Z:
ISO j 7 on size 51-143;
ISO js 7 on size 161-242;
ISO k 6 on size 271-603

3) Final bores: clutch hub D = ISO H6, recommendation for shaft = ISO m 6; flanged hub D_1 = ISO H7; 1 set screw displaced by 180 degrees against keyway, keyways according to DIN 6885, page 1. Bore d_1 for air supply through the hub displaced by 180 degrees against keyway.

4) Speeds are valid if flanged hub is made of grey cast iron EN-GJS. Higher speeds are allowed only if flanged hub is made of spherodial graphite iron EN-GJS (max. speed see type PPF)

5) Air supply for size 51-243 into the cylinder via d_1 (see fig. 6+7). Via d_2 on request (see fig. 8).

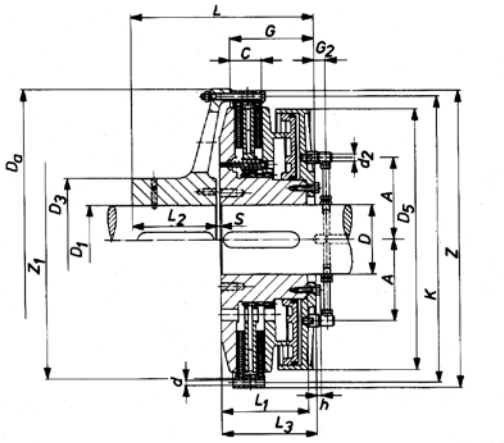


Fig. 8 Types PMW and PPF Size 271-603

Dimensions in mm • can be delivered ex stock

Size	d quantity of bolts x Ø	d_1 [3]	d_2 [5]	G	G_1	G_2	h	K	L	L_1	L_2	L_3	s	t	Z^{2}	Z_1 H7
• 51	6 x M6	9	M 10 x 1	57	38	-	4	153	102	60	35	65	2	6	165	-
• 61	6 x M8	9	M 10 x 1	71	48	-	4	200,02	121	73	40	79	8	6	215,9	-
• 71	8 x M8	9	M 10 x 1	75	48	-	5,5	222,25	140	76	55	83	8	6	241,3	-
• 81	6 x M10	9	M 10 x 1	75	48	-	5,5	244,48	140	76	55	83	8	6	263,52	-
• 101	8 x M10	9	M 12 x 1,5	105	70	-	7	295,28	194	110	70	120	15	11	314,32	-
• 102	8 x M10	9	M 12 x 1,5	129	70	-	7	295,28	218	134	70	144	15	11	314,32	-
• 111	8 x M10	9	M 12 x 1,5	105	70	-	7	333,38	194	110	70	120	15	11	352,42	-
• 112	8 x M10	9	M 12 x 1,5	129	70	-	7	333,38	218	134	70	144	15	11	352,42	-
141	8 x M12	9	M 12 x 1,5	111	75	-	7	438,15	240	116	110	126	15	11	466,72	-
• 142	8 x M12	9	M 12 x 1,5	135	75	-	7	438,15	264	140	110	150	15	11	466,72	-
• 143	8 x M12	9	M 12 x 1,5	159	75	-	7	438,15	288	164	110	174	15	11	466,72	-
161	8 x M12	12	M 14 x 1,5	137	92	-	8	488,92	276	140	120	152	15	11	517,52	-
162	8 x M12	12	M 14 x 1,5	167	92	-	8	488,92	306	170	120	182	15	11	517,52	-
163	8 x M12	12	M 14 x 1,5	197	92	-	8	488,92	336	200	120	212	15	11	517,52	-
181	6 x M16	12	M 14 x 1,5	137	95	-	8	542,92	288	140	130	152	17	11	571,5	-
182	6 x M16	12	M 14 x 1,5	167	95	-	8	542,92	318	170	130	182	17	11	571,5	-
183	6 x M16	12	M 14 x 1,5	197	95	-	8	542,92	348	200	130	212	17	11	571,5	-
211	12 x M16	12	M 14 x 1,5	167	110	-	8	641,35	348	170	155	185	23	15	673,1	-
212	12 x M16	12	M 14 x 1,5	203	110	-	8	641,35	384	206	155	221	23	15	673,1	-
213	12 x M16	12	M 14 x 1,5	239	110	-	8	641,35	420	242	155	257	23	15	673,1	-
241	12 x M20	12	M 14 x 1,5	172	115	-	8	692,15	368	170	170	190	23	15	733,42	-
242	12 x M20	12	M 14 x 1,5	208	115	-	8	692,15	404	206	170	226	23	15	733,42	-
243	12 x M20	12	M 14 x 1,5	244	115	-	8	692,15	440	242	170	262	23	15	733,42	-
271	12 x M20	-	M 22 x 1,5	186	-	23	10	760	401	191	180	211	10	-	800	735
272	12 x M20	-	M 22 x 1,5	251	-	23	10	760	466	256	180	276	10	-	800	735
273	12 x M20	-	M 22 x 1,5	316	-	23	10	760	531	321	180	341	10	-	800	735
301	12 x M20	-	M 22 x 1,5	229	-	35	10	850	484	229	220	254	10	-	890	820
302	12 x M20	-	M 22 x 1,5	308	-	35	10	850	563	308	220	333	10	-	890	820
303	12 x M20	-	M 22 x 1,5	380	-	35	10	850	635	380	220	405	10	-	890	820
361	16 x M20	-	M 22 x 1,5	229	-	35	10	1000	544	229	280	254	10	-	1040	965
362	16 x M20	-	M 22 x 1,5	308	-	35	10	1000	623	308	280	333	10	-	1040	965
363	16 x M20	-	M 22 x 1,5	380	-	35	10	1000	695	380	280	405	10	-	1040	965
421	16 x M24	-	M 22 x 1,5	282	-	22	13	1160	677	292	335	327	15	-	1210	1125
422	16 x M24	-	M 22 x 1,5	381	-	22	13	1160	776	391	335	426	15	-	1210	1125
423	16 x M24	-	M 22 x 1,5	470	-	22	13	1160	865	480	335	515	15	-	1210	1125
481	24 x M24	-	M 33 x 2	287	-	35	15	1320	747	302	390	342	15	-	1370	1280
482	24 x M24	-	M 33 x 2	386	-	35	15	1320	846	401	390	441	15	-	1370	1280
483	24 x M24	-	M 33 x 2	475	-	35	15	1320	935	460	390	530	15	-	1370	1280
601	36 x M24	-	M 42 x 2	368	-	67	-	1600	918	378	450	448	20	-	1650	1560
602	36 x M24	-	M 42 x 2	461	-	67	-	1600	1011	471	450	541	20	-	1650	1560
603	36 x M24	-	M 42 x 2	554	-	67	-	1600	1104	564	450	634	20	-	1650	1560

Weights and moments of inertia: see page 11
Selection of the clutch: see pages 12-14

Type PPRW and PPRF

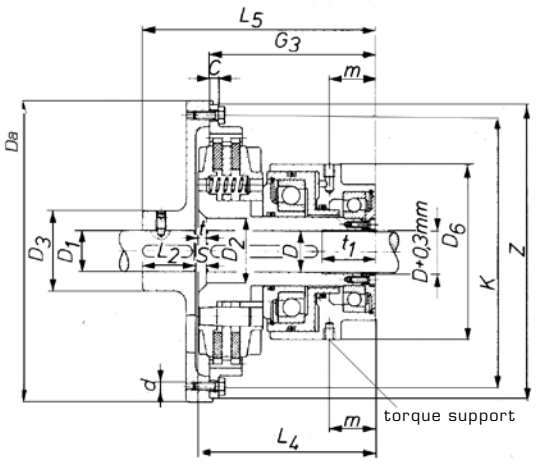


Fig. 10 Type PPRW

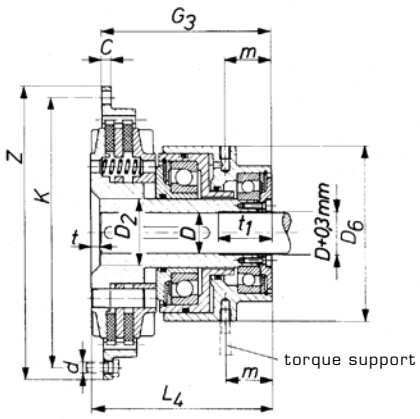
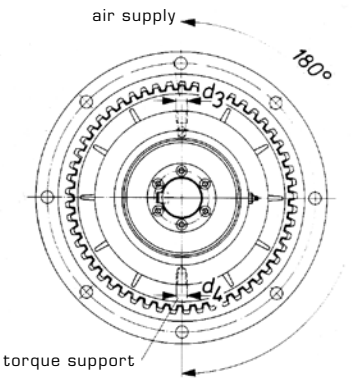


Fig. 11 Type PPRF



Dimensions in mm • can be delivered ex stock

Size	Torque[1] T_s at 5 bar Nm	at 7 bar Nm	max. speed[4] PPRW min^{-1}	PPRF min^{-1}	Volume of cylinder with new friction discs dm^3	with worn dm^3	C	D_a	D and D_1 Pilot bore	D[3] max.	D_1[3] max.	D_3	D_6
• 51	140	196	3500	3500	0,023	0,059	13	170	14	28	28	55	140
• 61	180	252	3500	3500	0,047	0,11	15	225	18	34	34	65	160
• 71	310	434	3350	3350	0,064	0,13	16	250	18	45	45	80	180
• 81	345	483	3000	3200	0,078	0,16	16	275	18	45	45	80	180
• 101	700	980	2500	3000	0,14	0,29	20	325	28	60	60	105	230
• 102	1400	1960	2500	3000	0,14	0,44	44	325	28	60	60	105	230
• 111	780	1092	2200	2850	0,14	0,29	20	365	28	60	60	105	230
• 112	1560	2184	2200	2850	0,14	0,44	44	365	28	60	60	105	230
141	1200	1680	1700	2375	0,32	0,52	12	480	48	90	90	155	325
• 142	2400	3360	1700	2375	0,32	0,72	12	480	48	90	90	155	325
• 143	3600	5040	1700	2375	0,32	0,92	12	480	48	90	90	155	325
161	1700	2380	1550	2000	0,52	0,9	16	530	58	110	100	170	368
162	3400	4760	1550	2000	0,52	1,3	16	530	58	110	100	170	368
163	5100	7140	1550	2000	0,52	1,7	16	530	58	110	100	170	368
181	2700	3780	1400	1750	0,56	0,96	16	585	68	125	110	185	400
182	5400	7560	1400	1750	0,56	1,4	16	585	68	125	110	185	400
183	8100	11340	1400	1750	0,56	1,8	16	585	68	125	110	185	400
211	4400	6160	1200	1500	0,71	1,4	18	685	73	150	130	220	460
212	8800	12320	1200	1500	0,71	2,2	18	685	73	150	130	220	460
213	13200	18480	1200	1500	0,71	2,9	18	685	73	150	130	220	460
241	7300	10220	1100	1200	0,84	1,7	18	745	88	180	140	235	535
242	14600	20440	1100	1200	0,84	2,6	18	745	88	180	140	235	535
243	21900	30660	1100	1200	0,84	3,4	18	745	88	180	140	235	535

Size	d quantity of bolts x Ø	d_3	d_4	G_3	K	L_2	L_4	L_5	m	S	t	t_1	Z[2]
• 51	6 x M6	M 14 x 1,5	M 14	122	153	35	130	167	40	2	6	65	165
• 61	6 x M8	M 14 x 1,5	M 14	135	200,02	40	143	185	46,5	8	6	70	215,9
• 71	8 x M8	M 14 x 1,5	M 14	139	222,25	55	147	204	47	8	6	55	241,3
• 81	6 x M10	M 14 x 1,5	M 14	139	244,48	55	147	204	47	8	6	55	263,52
• 101	8 x M10	M 14 x 1,5	M 14	186	295,28	70	201	275	59	15	11	70	314,32
• 102	8 x M10	M 14 x 1,5	M 14	210	295,28	70	225	299	59	15	11	70	314,32
• 111	8 x M10	M 14 x 1,5	M 14	186	333,38	70	201	275	59	15	11	70	352,42
• 112	8 x M10	M 14 x 1,5	M 14	210	333,38	70	225	299	59	15	11	70	352,42
141	8 x M12	M 14 x 1,5	M 14	236	438,15	110	251	365	77	15	11	100	466,72
• 142	8 x M12	M 14 x 1,5	M 14	260	438,15	110	275	389	77	15	11	100	466,72
• 143	8 x M12	M 14 x 1,5	M 14	284	438,15	110	299	413	77	15	11	100	466,72
161	8 x M12	M 14 x 1,5	M 20	260	488,92	120	275	399	84	15	11	100	517,52
162	8 x M12	M 14 x 1,5	M 20	290	488,92	120	305	429	84	15	11	100	517,52
163	8 x M12	M 14 x 1,5	M 20	320	488,92	120	335	459	84	15	11	100	517,52
181	6 x M16	M 14 x 1,5	M 20	268	542,92	130	283	419	92	17	11	100	571,5
182	6 x M16	M 14 x 1,5	M 20	298	542,92	130	313	449	92	17	11	100	571,5
183	6 x M16	M 14 x 1,5	M 20	328	542,92	130	343	479	92	17	11	100	571,5
211	12 x M16	M 22 x 1,5	M 24	353	641,35	155	371	534	120	23	15	130	673,1
212	12 x M16	M 22 x 1,5	M 24	389	641,35	155	407	570	120	23	15	130	673,1
213	12 x M16	M 22 x 1,5	M 24	425	641,35	155	443	606	120	23	15	130	673,1
241	12 x M20	M 22 x 1,5	M 24	380	692,15	170	398	576	135	23	15	150	733,42
242	12 x M20	M 22 x 1,5	M 24	416	692,15	170	434	612	135	23	15	150	733,42
243	12 x M20	M 22 x 1,5	M 24	452	692,15	170	470	648	135	23	15	150	733,42

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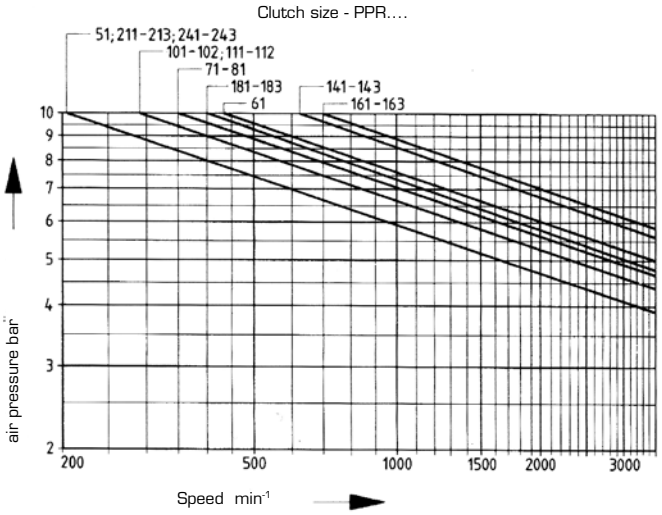
1) The torque changes with increasde air pressur: multiply torque values by 1,2 at 6 bar resp. by 1,6 at 8 bar.
2) Outside centering Z: ISO j 7 on size 51-143; ISO js 7 on size 161-243.
3) Final bores: clutch hub D and flanged hub D_1 = ISO H7, flanged hub with 1 set screw displaced by 180 degrees against keyway. Keyways according to DIN 6885, page 1.
4) Speeds are valid if flanged hub is made of grey cast iron EN-GJL. Higher speeds are allowed only if flanged hub is made of spheroidal graphite iron EN-GJS (max. speeds see type PPRF)
5) Bor for oil supply dislaces by 180 degrees against keyway

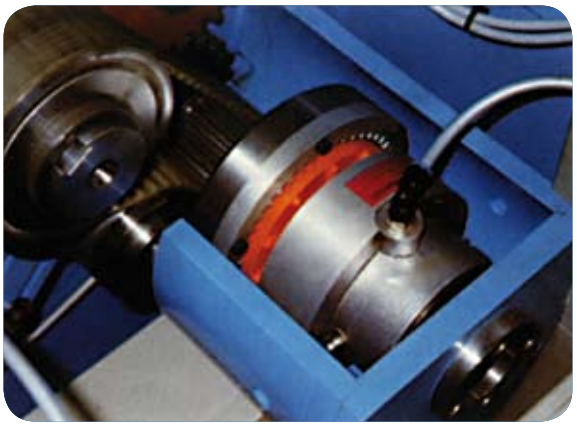
Calculated life time of the bearings of type PPR

Apart from following selection of clutch it is necessary to check the bearings. The values shown in the margin refer to a life time of the angular contact ball bearing of 10.000 hours. For a life time of 5000 hours of operation the applicable air pressure must be multiplied.

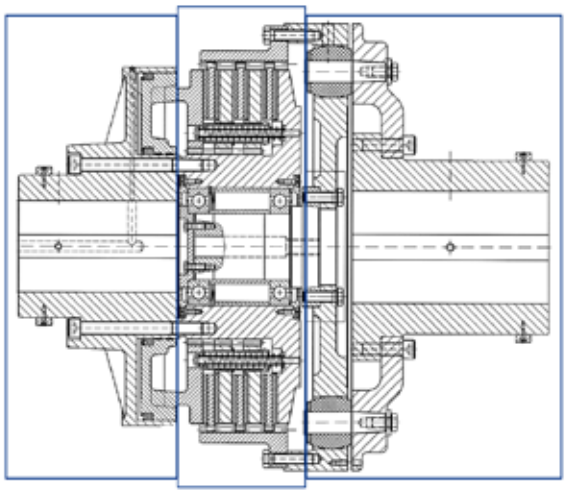


Example of use for Planox®-Clutches

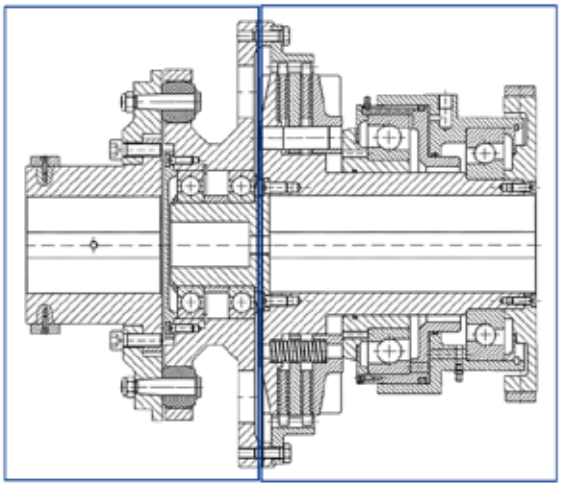
Planox®-Safty Clutches for Extruder Drives



Planox®-Clutches in the cutter drive of cardboard machines



Clutch Combianation PPRF 273-Orpex® F 630 with radial dissasembly



Clutch Combianation PPRF 142-Orpex® F 360

Type PPA and PPRA

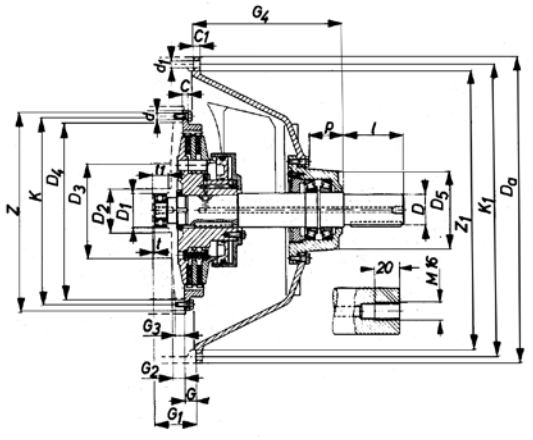


Fig.11 Type PPA

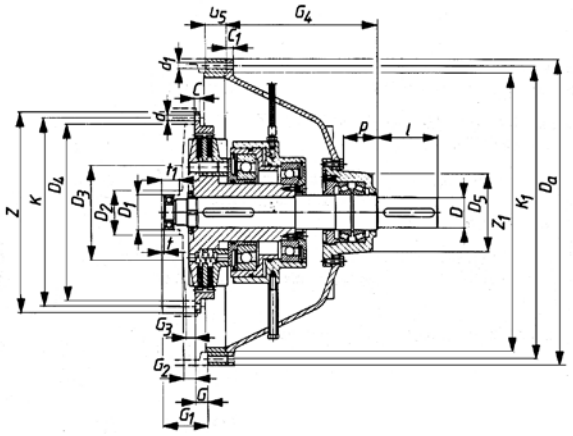


Fig.12 Type PPRA

Dimensios in mm resp. inches

Size	Bell[4] housing SAE-Size	Torque T_s PPA at 5 bar Nm	PPA at 7 bar Nm	PPRA at 5 bar Nm	PPRA at 7 bar Nm	max. speed PPA min^{-1}	PPRA min^{-1}	C	C_1	D[1]	D_1[3]	D_2	D_3	D_4	D_5[1]	d Number of holes x Ø
61	-6-5-4-3	150	210	180	280	3500	3500	15	8	30	2,047 52	2 ½ 63,5	5 127	7 ¼ 184,2	105	6 x 8,5
71	-6-5-4-3	220	208	310	465	3350	3350	16	8	30	2,047 52	2 ½ 63,5	- -	8 ⅛ 206,2	105	6 x 8,5
81	-5-4-3	300	420	345	510	3200	3200	16	8	40	2,441 62	3 76,2	- -	8 ⅞ 225,6	130	6 x 10,5
101	-4-3-2-1	500	700	700	1040	3000	3000	20	10	55	2,835 72	3 76,2	7 ¾ 196,85	10 ⅞ 276,4	130	8 x 11
111	-4-3-2-1	700	980	780	1170	2850	2850	20	10	55	2,835 72	- -	8 203,2	12 ⅜ 314,32	130	8 x 11
112	-3-2-1-0	1400	1960	1560	2340	2850	2850	44	12	60	2,835 72	- -	8 203,2	12 ⅜ 314,32	140	8 x 11
141	-1-0-00	1000	1400	1200	1900	2500	2375	12	15	60	3,150 80	4 101,6	8 ¾ 222,25	16 ⅛ 409,4	155	8 x 13,5
142	-1-0-00	2000	2800	2400	3800	2500	2375	12	16	70	3,150 80	4 101,6	8 ¾ 222,25	16 ⅛ 409,4	180	8 x 13,5
143	-1-0-00	3000	4200	3600	5700	2500	2375	12	16	70	3,150 80	4 101,6	8 ¾ 222,25	16 ⅛ 409,4	180	8 x 13,5
162	-0	3400	4760	3400	5100	2200	2000	16	16	70	3,937 100	4 ⅛ 104,6	10 254	18 ⅛ 460,2	180	8 x 13,5
163	-0-00	5100	7140	5100	7650	2200	2000	16	18	80	3,937 100	4 ⅛ 104,6	10 254	18 ⅛ 460,2	190	8 x 13,5
181	-0-00	2300	3220	2700	4100	1960	1750	16	16	70	3,937 100	4 ⅛ 104,6	- -	19 ⅝ 498,3	180	6 x 18
182	-0-00	4600	6440	5400	8200	1960	1750	16	18	80	3,937 100	4 ⅛ 104,6	- -	19 ⅝ 498,3	190	6 x 18
183	-0-00	6900	9660	8100	12300	1960	1750	16	18	90	3,937 100	4 ⅛ 104,6	- -	19 ⅝ 498,3	220	6 x 18
211	-00	3800	5320	4400	6600	1600	1500	18	18	80	5,118 130	5 ¾ 146	- -	23 584,2	190	12 x 18
212	-00	7600	10640	8800	13200	1600	1500	18	18	90	5,118 130	5 ¾ 146	- -	23 584,2	220	12 x 18
241	-00	5250	7350	7300	11000	1200	1200	18	18	90	5,118 130	5 ¾ 146	- -	25 ⅜ 644,7	220	12 x 22
242	-00	10500	14700	14600	22000	1200	1200	18	18	90	5,118 130	5 ¾ 146	- -	25 ⅜ 644,7	220	12 x 22

Housing-Dimensions

SAE-housing		6	5	4	3[4]	2	1	0	00
Z_1[2]	inches	10 ½	12 ⅜	14 ¼	16 ⅛	17 ⅝	20 ⅛	25 ½	31
	mm	266,7	314,32	361,95	409,58	447,68	511,17	647,7	787,4
K_1	inches	11 ¼	13 ⅛	15	16 ⅞	18 ⅜	20 ⅞	26 ¾	33 ½
	mm	285,75	333,37	381	428,62	466,72	530,22	679,45	850,9
D_a	inches	12 ⅛	14	15 ⅞	17 ¾	19 ¼	21 ¾	28	34 ¾
	mm	307,97	355,6	403,22	450,85	488,95	552,45	711	883
Number of holes		8	8	12	12	12	12	16	16
Hole-Ø d_1		11	11	11	11	11	11	13,5	13,5

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Planox®-Friction Clutches with external storage area

The Planox®-friction clutches type PPA and PPRA for application with Diesel Engines have been designed in close cooperation with manufactures of engines according to the horsepower ratings and SAE-sizes. Planox®-clutches are standardized for the major brands of Diesel Engines.

Specifications are available on request. The dimensions of intallations are according to SAE-standards J 617, J 620 and J 621 resp. to VDMA-specification 24380.

Size	G	G_1	G_2	G_3	G_4	G_5	K	l[1]	p[1]	t	t1	Z[2]
61	1 3/16 30,2	2 13/16 71,4	½ 12,7	⅜ 9,7	5 9/16 141,288	20	7 ⅞ 200,02	80	34	1/16 1,583	11/16 17,463	8 ½ 215,9
71	1 3/16 30,2	2 13/16 71,4	½ 12,7	½ 12,7	5 9/16 141,288	20	8 ¾ 222,25	80	34	1/16 1,583	11/16 17,463	9 ½ 241,3
81	2 7/16 62	3 15/16 100,1	½ 12,7	½ 12,7	7 1/16 179,388	-	9 ⅝ 244,48	110	59	1/16 1,583	¾ 19,05	10 ⅜ 263,52
101	2 ⅛ 53,8	3 15/16 100,1	⅝ 15,7	½ 12,7	8 ⅝ 219,075	30	11 ⅝ 295,28	110	78	1/16 1,583	1 ⅛ 28,58	12 ⅜ 314,32
111	1 9/16 39,6	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	9 ¼ 234,95	35	13 ⅛ 333,38	110	94	1/16 1,583	1 ¼ 31,75	13 ⅜ 352,42
112	1 9/16 39,6	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	9 ⅝ 244,475	35	13 ⅛ 333,38	140	84	1/16 1,583	1 ¼ 31,75	13 ⅜ 352,42
141	1 25,4	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	12 ⅛ 307,975	75	17 ¼ 438,15	140	102	⅛ 3,175	1 ½ 38,1	18 ⅜ 466,72
142	1 25,4	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	13 ¾ 349,25	20	17 ¼ 438,15	140	77	⅛ 3,175	1 ½ 38,1	18 ⅜ 466,72
143	1 25,4	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	14 ½ 368,3	44	17 ¼ 438,15	140	96	⅛ 3,175	1 ½ 38,1	18 ⅜ 466,72
162	⅝ 15,7	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	14 ¾ 374,65	60	19 ¼ 488,92	140	102	⅛ 3,175	1 ¾ 44,45	20 ⅜ 517,52
163	⅝ 15,7	3 15/16 100,1	1 ⅛ 28,4	⅞ 22,4	16 11/16 423,863	35	19 ¼ 488,92	170	76	⅛ 3,175	1 ¾ 44,45	20 ⅜ 517,52
181	⅝ 15,7	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	14 ¾ 374,65	40	21 ⅜ 542,92	140	102	⅛ 3,175	1 ¾ 44,45	22 ½ 571,5
182	⅝ 15,7	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	16 11/16 423,863	20	21 ⅜ 542,92	170	76	⅛ 3,175	1 ¾ 44,45	22 ½ 571,5
183	⅝ 15,7	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	18 ¼ 463,55	40	21 ⅜ 542,92	170	116	⅛ 3,175	1 ¾ 44,45	22 ½ 571,5
211	- -	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	16 ½ 419,1	80	25 ¼ 641,35	170	72	⅛ 3,175	2 ¼ 57,15	26 ½ 673,1
212	- -	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	18 457,2	120	25 ¼ 641,35	170	110	⅛ 3,175	2 ¼ 57,15	26 ½ 673,1
241	- -	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	19 ¾ 501,65	110	27 ¼ 692,15	170	154	⅛ 3,175	2 ¼ 57,15	28 ⅞ 733,42
242	- -	3 15/16 100,1	1 ¼ 31,8	1 ¼ 31,8	20 ¼ 514,35	140	27 ¼ 692,15	170	167	⅛ 3,175	2 ¼ 57,15	28 ⅞ 733,42

1) These dimensions are not according to SAE-standard; shaft dimensions according to DIN 748; shaft tolerances D: up to 50 mm = k6, above 50 mm = m6.

2) Outside centering Z:
ISO j 7 on size 61-143;
ISO js 7 on size 162-242.
Centering Z_1: SAE-housing 6-2 = ISO j 7;
SAE-housing 1-00 = ISO js 7.

3) The appropriate bore should have ISO J 6 as tolerance.

4) SAE-housing 3 is not available for type PPRA 112.

Weights and moments of inertia: see page 11

Selection of the clutch: see pages 12-14

Allowable radial load: see page 10

Planox®-Friction Clutches with external storage area

Max. allowable load [N]

Size	Speed min⁻¹	Distance X [mm] 25	50	75	100	125
61	1000	3500	3100			
61	2000	2900	2600			
61	3000	2500	2300			
61	3500	2400	2200			
71	1000	3500	3100			
71	2000	2900	2600			
71	3000	2500	2300			
71	3350	2400	2200			
81	1000	6000	5600	5100		
81	2000	4900	4500	4200		
81	3000	4300	4000	3700		
81	3200	4200	3900	3600		
101	1000	14300	11500	10400		
101	2000	12500	10500	9000		
101	3000	10500	9500	8000		
111	1000	14500	12000	11000		
111	2000	12500	11000	10000		
111	2850	10500	10000	9500		
112	1000	19000	17000	13500		
112	2000	17000	15000	12500		
112	2850	14000	13500	12000		
141	500	22500	18000	17900	17000	
141	1000	22000	16500	15500	14000	
141	2000	20500	15500	14000	12000	
141	2500	19000	15000	13000	11000	
142	500	27600	26000	24800	23600	
142	1000	26000	24000	22000	19200	
142	2000	24000	22000	20000	17500	
142	2500	22000	20000	19000	16000	
143	500	32000	26500	23900	22800	
143	1000	27000	24000	21000	18500	
143	2000	25000	22000	20000	17000	
143	2500	24000	22000	19500	16500	
162	500	30000	26500	23600	22500	21500
162	1000	26500	24000	21000	18300	17500
162	2000	24000	22000	20000	17000	14200
162	2200	23000	22000	19500	16500	13800
163	500	35000	34000	32500	31000	29000
163	1000	28000	27000	26000	25000	23000
163	1500	26500	26000	25000	24000	22000
163	2200	24000	23000	22500	21500	20000
181	500	32200	30500	27000	22500	21500
181	1000	30000	28500	25000	22000	18000
181	1500	27500	25550	24000	21000	18000
181	1960	25000	23500	22000	20000	18000
182	500	33000	32000	30500	29500	26600
182	1000	31000	30000	28000	26000	22000
182	1500	27500	26500	25500	23500	20000
182	1960	25000	24000	23000	21000	18500
183	500	48000	46000	44000	40000	37000
183	1000	41000	39500	38000	36500	34500
183	1500	37000	35500	35000	32500	31000
183	1960	34500	33000	31500	28000	27000
211	500	45000	43000	41000	39000	36000
211	1000	40000	38000	36500	35000	33500
211	1250	37500	35500	34000	32500	31500
211	1600	34500	33000	31500	30000	29000
212	500	59000	55000	54000	43000	37200
212	1000	52000	49000	48000	43000	33500
212	1250	48000	46000	45000	42000	33500
212	1600	45000	43000	42000	41000	33500
241	500	47000	46000	44000	42500	40000
241	800	42000	41000	39000	37500	36500
241	1000	39000	38000	36000	35000	34000
241	1200	37000	36000	34000	33000	32000
242	500	62000	56000	40900	39400	38100
242	800	59000	56000	37500	34300	33100
242	1000	55000	52000	37500	32100	31000
242	1200	52000	49000	37500	30300	29300

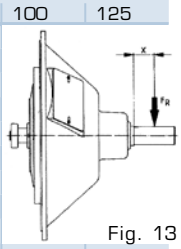


Fig. 13

These values refer to 5000 hours.
For 10.000 hours to be multiplied by 0,8;
for 15.000 hours to be multiplied by 0,68.

Weights (kg)

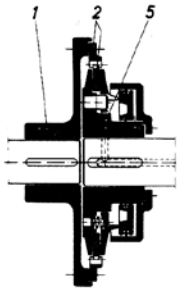
Size	Type	with SAE-housing 6	5	4	3	2	1	0	00
61	PPA	15,2	15,5	17,1	18,2	-	-	-	-
	PPRA	20,3	20,6	22,2	23,3	-	-	-	-
71		17,7	18,0	19,6	21,0	-	-	-	-
		23,8	24,1	25,7	27,1	-	-	-	-
81		-	23,4	25,2	26,4	-	-	-	-
		-	29,6	31,5	32,6	-	-	-	-
101		-	-	46,1	45,6	48,2	45,7	-	-
		-	-	60,6	60,1	62,7	60,2	-	-
111		-	-	49,0	48,5	51,0	48,5	-	-
		-	-	64	63	66	63	-	-
112		-	-	-	-	63	66	75	-
		-	-	-	-	78	81	90	-
141		-	-	-	-	-	94	104	120
		-	-	-	-	-	137	147	163
142		-	-	-	-	-	125	143	160
		-	-	-	-	-	168	186	203
143		-	-	-	-	-	140	158	176
		-	-	-	-	-	183	201	219
162		-	-	-	-	-	-	181	-
		-	-	-	-	-	-	239	-
163		-	-	-	-	-	-	228	264
		-	-	-	-	-	-	286	322
181		-	-	-	-	-	-	173	190
		-	-	-	-	-	-	276	293
182		-	-	-	-	-	-	227	260
		-	-	-	-	-	-	330	363
183		-	-	-	-	-	-	267	303
		-	-	-	-	-	-	370	406
211		-	-	-	-	-	-	-	293
		-	-	-	-	-	-	-	462
212		-	-	-	-	-	-	-	354
		-	-	-	-	-	-	-	523
241		-	-	-	-	-	-	-	352
		-	-	-	-	-	-	-	631
242		-	-	-	-	-	-	-	411
		-	-	-	-	-	-	-	690

The allowable radial load F_R is to be calculated with the circumferentia force F_N and the factor A according to the following formula:

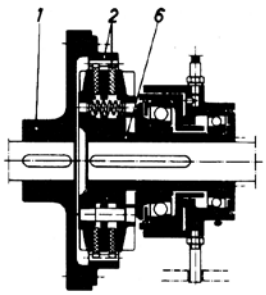
$$F_R = F_N \cdot A$$

$$F_N = \frac{P \cdot 9550}{n \cdot r} \text{ [N]}$$

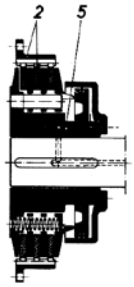
Kind of drive:	=	Factor A
Open flat belt drive	=	4
Drive with tension pulley	=	2,5
V-belt drive	=	2,5
Gear or chain drive	=	1,25
Radius of V-belt pulley or chain drive in m	=	r



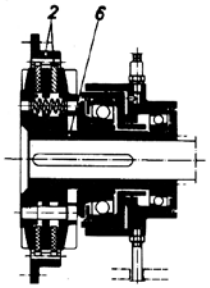
PPW



PPRW



PPF



PPRF

Weights (kg)

Size	PPW	PPF	PPRW	PPRF
51	4,9	3,1	8,5	6,7
61	8,7	5,2	13,7	10,3
71	12,0	7,3	18,0	13,4
81	14,5	8,9	20,6	15,1
101	29,1	18,4	43,7	32,9
102	35,4	24,6	49,9	39,1
111	34,0	21,2	48,8	36,0
112	41,5	28,6	56	43,4
141	65	37,2	108	80
142	79	51	122	94
143	94	66	136	108
161	102	62	160	120
162	124	84	181	142
163	145	105	203	163
181	129	74	232	177
182	156	101	259	204
183	182	128	285	231
211	210	125	380	294
212	256	171	423	338
213	298	213	468	382
241	258	153	536	432
242	311	207	590	485
243	365	261	643	439
271	508	329	-	-
272	649	468	-	-
273	789	606	-	-
301	719	489	-	-
302	935	703	-	-
303	1142	908	-	-
361	1087	704	-	-
362	1377	991	-	-
363	1657	1268	-	-
421	1930	1263	-	-
422	2410	1737	-	-
423	2878	2201	-	-
481	2755	1804	-	-
482	3361	2403	-	-
483	3953	2988	-	-

Weights refer to max. bore.

Moments of inertia [kgm²]

Size	1	2	5	6
51	0,006	0,002	0,005	0,005
61	0,022	0,006	0,011	0,011
71	0,034	0,007	0,022	0,021
81	0,051	0,014	0,034	0,032
101	0,134	0,023	0,111	0,120
102	0,136	0,043	0,148	0,157
111	0,210	0,037	0,148	0,164
112	0,213	0,068	0,202	0,215
141	0,686	0,336	0,341	0,464
142	0,686	0,515	0,465	0,589
143	0,686	0,694	0,599	0,714
161	1,21	0,582	0,821	1,03
162	1,21	0,857	1,12	1,32
163	1,21	1,13	1,39	1,60
181	2,07	0,887	1,17	1,52
182	2,07	1,34	1,59	1,94
183	2,07	1,80	2,01	2,36
211	4,34	1,92	2,76	3,53
212	4,34	2,86	3,84	4,55
213	4,34	3,81	4,80	5,57
241	6,28	2,56	4,58	6,46
242	6,28	3,96	6,20	8,08
243	6,28	5,35	7,81	9,70
271	11,07	5,53	15,02	-
272	11,32	12,60	19,63	-
273	11,57	19,60	24,25	-
301	16,66	11,60	26,64	-
302	17,12	27,16	33,52	-
303	17,48	42,71	40,08	-
361	41,14	20,55	59	-
362	42,04	46,91	73	-
363	42,75	73	87	-
421	94	40,87	149	-
422	96	100	183	-
423	97	158	215	-
481	170	66	283	-
482	173	158	340	-
483	176	248	395	-

Moments of inertia refer to max. bore.

Selection of clutch size according to mechanical load

The torque values T_S = engageable clutch torque (dyn.) in Nm are listed in the tables.

The torque values stated will be transmitted under constant load. However, in the event of varying load conditions the corresponding operating factors „S“ must be taken into consideration: These can be found in the tables.

Peak torque load can occur during engagement or operation dependent on the types of machines being connected. The clutch size should always be orientated to the maximum load.

One should distinguish between the following cases:

1. The clutch has to accelerate an insignificant mass such that nominal torque (T_K) is equal to the clutch torque (T_S) with regard to operating factor „S“.

$$T_K = T_L \cdot S \leqq T_S \qquad [1]$$

$$T_K = \frac{P}{n} \cdot 9550 \cdot S \quad (Nm) \qquad [2]$$

2. The clutch has to transmit a load torque (T_L) during the engagement process itself and to accelerate a large mass.

$$T_K = T_L + T_a \leqq T_S \qquad [3]$$

$$T_K = \frac{P}{n} \cdot 9550 + \frac{J_L \cdot n}{9{,}55 \cdot t_B} \quad (Nm) \qquad [4]$$

Clutches for use with driving engines and driven machines with a high coefficient of cyclic load variation (i.e. piston engines) should be selected according to the specific torque requirements (a torque diagramme of the application may help). The operating factors can only serve as reference values.

The symbols have the following meaning:

F = Power [N]
J_A = Moment of inertia – Driving parts [kgm²]
J_L = Moment of inertia – Driven parts [kgm²]
n = Speed [min^{-1}]
P = Capacity [kW]
Q = Friction work [J]
S = Operating factor
S_h = Number of engagement per hour [1/h]
T_a = Moment of acceleration [Nm]
T_K = Nominal torque [Nm]
T_L = Load torque [Nm]
T_S = max. Clutch torque [Nm] (see catalogue)
t = Slipping time [s]
t_B = Accelration time [s]
t_s = Time of engagement [s]

Selection of clutch size according to mechanical load and friction work

Besides ensuring optimum torque transmission the friction clutch must also be able to withstand the heat generated during the engagement process.

It is known that 50% of the work required for acceleration is converted to heat during this process. In case of machines where power is also taken by the machine during the acceleration process (i.e. the machine stars under load) then the friction work increases by the ratio of the clutch torque to the load torque.

Friction work per engagement during a on-load start

$$Q_{present} \leqq Q_{allowed} \qquad [5]$$

$$Q = \frac{J_L \cdot n^2}{182{,}5} \quad (J) \qquad [6]$$

Friction work per engagement during a load start

$$Q_{present} \leqq Q_{allowed} \qquad [7]$$

$$Q = \frac{J_L \cdot n^2}{182{,}5} \cdot \frac{T_L + T_a}{T_a} \quad (J) \qquad [8]$$

Friction work per engagement during a no-load start taking into account the mounting conditions as per fig. 14 the ambient temperature and the time of engagement.

$$Q = \frac{J_L \cdot n^2 \cdot E_2}{182{,}5 \cdot E_1 \cdot E_2} \quad (J) \qquad [9]$$

Friction work per engagement during a load start taking into account the mounting conditions as per fig. 14 and the ambient temperature.

$$Q = \frac{J_L \cdot n^2}{182{,}5} \cdot \frac{T_L + T_a}{T_a} \cdot \frac{E_2}{E_1 \cdot E_3} (J) \qquad [10]$$

Friction work per hour

$Q/h = Q \cdot S_h$ [J/h] (see fig. 16) [11]

Friction work per second

$$Q/s = \frac{Q}{t_s} \quad [J/s] \qquad [12]$$

Friction work per engagement during a no-load start

$$t_s = \frac{J_L \cdot n}{9{,}55 \cdot T_s} \quad [s] \qquad [13]$$

Friction work per engagement during a load start

$$t_s = \frac{J_L \cdot n}{9{,}55 \cdot (T_K - T_L)} \quad [s] \qquad [14]$$

Friction work in slipping clutches, when slipping speed and torque remain constant

$$Q = T_S \cdot n \cdot t \cdot 0{,}105 \quad [J] \qquad [15]$$

allowable load symbols of application: see page 14

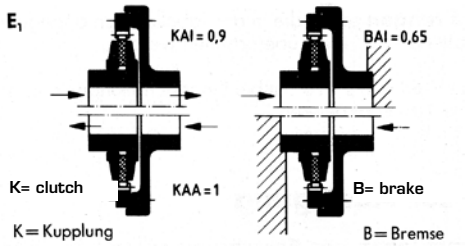


Fig. 14 **Faktor E_1** depending on installation rep. application
AI= drive from inside; AA= drive from outside.

Safety factors “S”

Assignment of load characteristics according to type of working machine

	DREDGERS		**RUBBER MACHINERY**		**PUMPS**
S	Bucket conveyor	S	Extruders	S	Piston pumps
S	Landing gear (caterpillar)	M	Calenders	G	Centrifugal pumps (light liquids)
M	Landing gear (rail)	S	Kneading mill	M	Centrifugal pumps (viscous liquids)
M	Manoeuvring winches	M	Mixers	S	Plunger pumps
M	Pumps	S	Rolling mills	S	Press pumps
S	Impellers		**WOOD WORKING MACHINES**		**STONE AND CLAY WORKING MACHINES**
S	Cutter heads	S	Barkers	S	Crusher
M	Slewing gear	M	Planing machines	S	Rotary ovens
	GENERATORS, TRANSFORMERS	G	Wood working machines	S	Hammer mills
M	Frequency transformers	S	Saw frames	S	Ball mills
M	Generators		**CRANES**	S	Tube mills
M	Welding generators	G	Luffing gear block	S	Beater mills
	CHEMICAL INDUSTRY	S	Travelling gear	S	Brick pressesn
M	Cooling drums	G	Hoist gear		**TEXTILE MACHINES**
M	Mixers	M	Slewing gear	M	Batchers
G	Agitators (liquid material)	M	Derricking jib gear	M	Printing and dyeing machines
M	Agitators (semi-liquid material)		**PLASIC INDUSTRY MACHINES**	M	Tanning vats
M	Drying drums	M	Extruders	M	Willows
G	Centrifuges (light)	M	Calenders	M	Looms
M	Centrifuges (heavy	M	Mixers		**COMPRESSORS**
	OIL INDUSTRY	M	Crushers	S	Piston compressors
M	Pipeline pumps		**METAL WORKING MACHINES**	M	Turbo compressors
S	Rotary drilling equipment	M	Plate bending machines		**METAL ROLLING MILLS**
	CONVEYORS	S	Plate straightening machines	S	Plate shears
M	Pit-head winches	S	Hammers	M	Manipulator for turning sheets
S	Winding engines	S	Metal planning machines	S	Ingot pushers
M	jointed-band conveyors	S	Presses	S	Ingot and slabbing-mill train
G	Belt conveyors (bulk material)	M	Shears	S	Ingot handling machinery
M	Belt conveyors (piece goods)	S	Forging presses	M	Wire drawing benches
M	Band pocket conveyors	S	Punch presses	S	Descaling machines
M	Chain conveyors	G	Countershafts, line shafts	S	Thin plate mills
M	Circular conveyors	M	Machine tools (main drives)	S	Heavy and medium plate mills
M	Load elevators	G	Machine tools (auxiliary drives)	M	Winding machines (strip and wire)
G	Bucket conveyors for flour		**FOOD INDUSTRY MACHINERY**	S	Cold rolling mills
M	Passenger lifts	G	Bottling and container filling machines	M	Chain tractor
M	Plate conveyors	M	Kneading machines	S	Billet shears
M	Screw conveyors	M	Mash tubs	M	Cooling beds
M	Ballast elevators	G	Packaging machines	M	Cross tractor
S	Inclined hoists	M	Cane crushers	M	Roller tables (light)
M	Steel belt conveyors	M	Cane cutters	S	Roller tables (heavy)
M	Drag chain conveyors	S	Cane mills	M	Roller straighteners
	BLOWERS,VENTILATORS	M	Sugar beet cutters	S	Tube welding machines
M	Rotary piston blowers	M	Sugar beet washing machines	M	Trimming shears
G	Blowers (axial/radial)		**PAPER MACHINES**	S	Cropping shears
M	Cooling tower fans	S	Couches	S	Continuous casting plant
M	Induced draught fans	S	Glazing cylinders	M	Rollers adjustment drive
G	Turbo blowers	M	Pulper	S	Manipulators
	BUILDING MACHINERY	S	Pulp grinders		**LAUNDRIES**
S	Hoists	M	Calenders	M	Tumblers
G	Concrete mixers	S	Wet presses	M	Washing machines
S	Road construction machinery	S	Willows		**WATER TREATMENT**
		S	Suction presses	M	Aerators
		S	Suction rolls	M	Screw pumps
		S	Drying cylinders		

Operating factors „S“

driving machine	Load symbol of application		
	G	M	S
Electric motors, Turbines, Hydraulic motors	1,2	1,6	1,8
Piston engines 4 – 6 cylinders	2,0	2,5	2,8
Piston engines 1 – 3 cylinders	2,2	2,8	3,2

Reference values of service faktor „S“

Faktor E_3	20°	30°	40°	50°	60° Celsius
	1	0,92	0,86	0,81	0,75

Faktor E_2 depending on ambient temperature

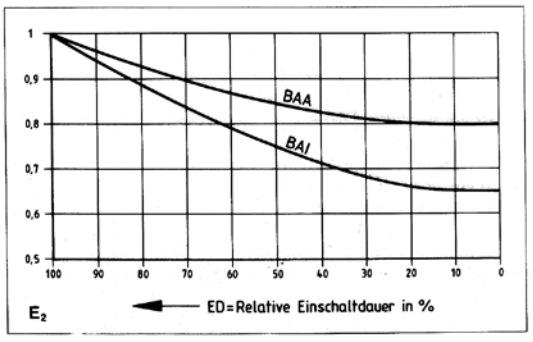


Fig. 15 Factor E2 depending on time of engagement for installation when clutches are used as a brake, (i.e. as in the case of BAI and BAA)

Max. friction wotk per engagement or per sec. (single engagement)

Planox®-clutch size	Q max. friction work per engagement J/engagement · 10^3	Q/s max. friction work per second J/s · 10^3
51	78	11
61	110	16
71	135	19
81	195	28
101	225	31
102	165	62
111	310	40
112	225	80
141	610	71
142	445	142
143	665	213
161	860	92
162	625	184
163	935	276
181	1105	111
182	805	222
183	1200	333
211	1725	162
212	1260	324
213	1880	486
241	2340	208
242	1710	416
243	2550	624
271	3720	320
272	2715	640
273	4055	960
301	5425	445
302	3960	990
303	5915	1335
361	8590	650
362	6270	1300
363	9365	1950
421	12495	880
422	9120	1760
423	13620	2640
481	18415	1215
482	13440	2430
483	20100	3645

Max. friction work of the Planox®-friction clutches size 601 - 603 on request.

In the event of a single engagement the values in J/engagement · 10^3 indicated in the table should not be exceeded.
The value in J/s · 10^3 indicated in the same table should be checked in the case of single engagement and higher frequencies of engagements.

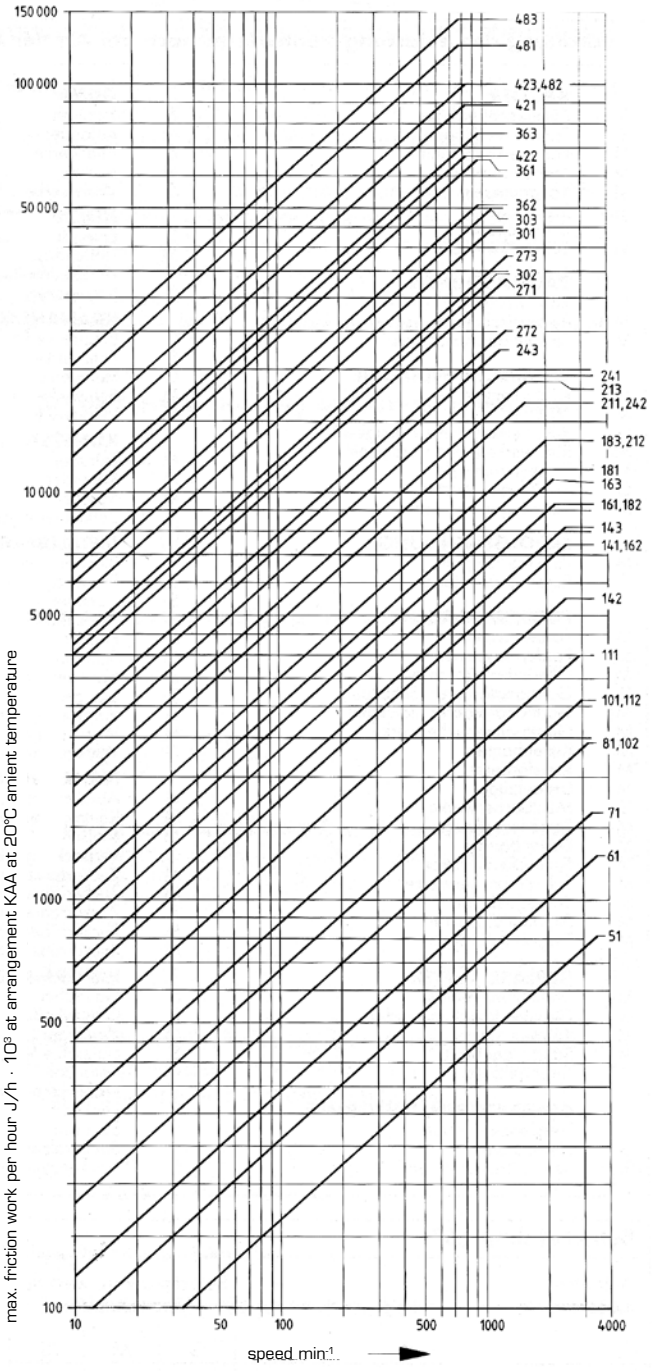


Fig.16 Max. friction work/h

Directions for selection

Definitions and **calculations** are according to VDI-regulations 2241, page 1 for externally operated clutches and brakes.
Other materials can be supplied for **classification** and f**or higher speeds.**
For **vibrational calculations** we refer to DIN 740. Further more we can offer to carry out torsional vibration simulations of the components upon special request.
As a general principle the design of a clutch should be orientated to the maximum load. This can be constituted either by the amount of torque to be transmitted, the amount of frictional heat generated by a high engagenment frequency, or by large inertal masses to be accelerated. The size of the clutch must be considered with great care to enable its performance to meet the drive requirements. The operating conditions and performance data must be known in order to select the correct size and type of clutch unit. The most important points are as follows:

1. Type of driving machine (Electric motor, diesel engine, ect.)
2. Capacity P [kW]
3. Speed n [min^{-1}]
4. Type of driven machine
5. Highest torque load during engagement T_L [Nm]
6. Moment of inertai J_l referred to the clutch output shaft [kgm^2]
7. Number of clutch engagements per hour S_h [1/h]
8. Engagement time t_s [s]
9. Drive arragement per Fig. 14, page 12
10. Ambient temperature [°C]
11. Type of clutch control required

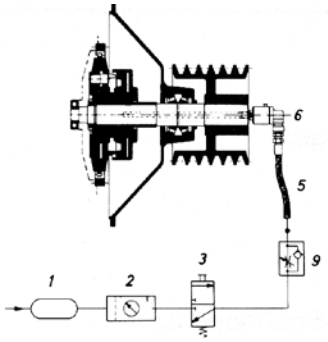


Fig. 17 Pneumatic actuation of a Planox®-clutch, type PP, with manual operation and reduced air flow.

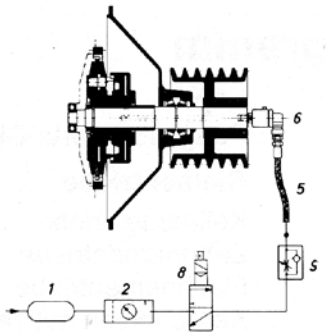


Fig. 18 Pneumatic actuation of a Planox®-clutch, type PP, with electro-magnetic operation and reduced air flow.

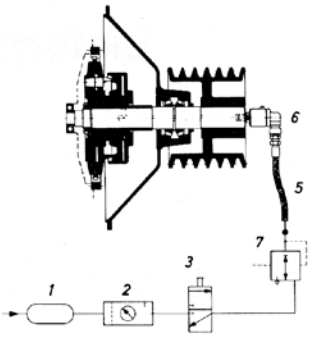


Fig. 19 Pneumatic actuation of a Planox®-clutch, type PP, with manual operation and without reduced air flow.

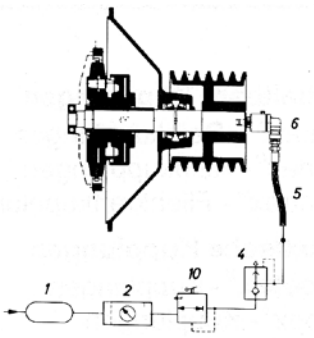


Fig. 20 Pneumatic actuation of a Planox®-clutch, type PP, for variable torque during engagement

The Fig. 17-20 are only examples. Operating devices according to the operating conditions are available on erquest

Designation of the pneumatic elements
1. Compressed air chamber: Tank in which the compressed air is stored up to a maximum pressure.
2. Maintenance unit: The maintenance unit represents a combination of filter pressure reducing valve and oiler.
3. 3-way valve: The 3-way valve regulates air intake and outlet in the conduit control.
4. Quick acting release valve: Air can be rapidly released from long pipes including clutch by means of this valve.
5. Hose connection: Should be installed, so that excessive load is not placed on the bearings in the rotary seal.
6. Rotary seal: The rotary seal serves as a link between a stationary and a rotating part in order to connect an air supply.
7. Relay valve: The valve controls the rapid air intake and outlet in pneumatic clutches.
8. 3-way magnetic valve: When the circuit is complete, the valve connects the air piping with the conduit control and regulates air outlet when the circuit is open.
9. Nonreturn-throttle valve: Reduces the flow of compressed air in one direction, while allowing the air to flow freely in the opposite direction.
10. Precision regulation valve: The precision regulating valve controls the continuous variation of the air pressure between a minimum and maximum value conditional on the particular direction.

Clutch monitoring

The FS-2/FS-2/N monitor is an impulse evaluation system. It is used primarily to monitor the slip in friction clutches, belt conveyors and other applications where rotary speed differentials have to be evaluated.

For this purpose the monitor records the speed-proportional impulse sequences on the drive and take-off sides at two separate input points, it passes them onto two internal meters and continuously monitors the difference between the two values shown on the meters.

The measure for slip is the rotary speed differential arising between the drive and take-off sides with blocking or overload. From the rotary speed differential the monitor determines the number of differential impulses and compares them with the limit values/switching points set.

The monitor switches if the number of differential impulses is reached within the reset time set.

The FS-2/FS-2/N monitor is only of single-channel structure. By making an electrical connection between the outputs of two or more units with the aim of creating a redundant switching structure, these units can also be used to perform safety-related functions. The relevant technical standards must be adhered to.

Mode of functioning

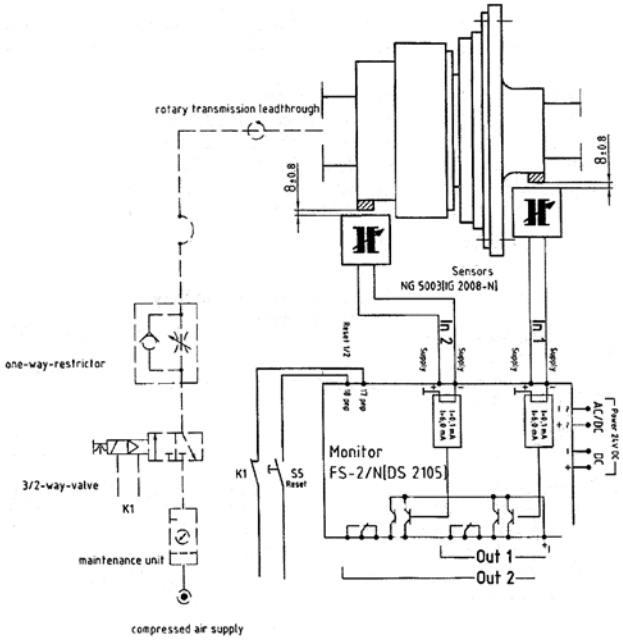
To ensure that multiple non-critical slips over an extended period do not lead to an accumulation of differential impulses which lead to a limit value/switching point, they are reset regularly by the adjustable reset time.

Only with a critical slip or blocking will the permitted number of differential impulses be exceeded within the reset time and the monitor switched.

Differential impulses arise through:
- blocking = maximum rotary speed differential in a few ms
- overload = small rotary speed differential over an extended period

The length of the reset time also depends on the permitted rotary speed differential and the clutch's data.

The basic principle is:
The sensitivity of the monitoring system is greater if the reset time is extended with the same number of differential impulses.



DESCH
DRIVE TECHNOLOGY

Product Range

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Planox® friction clutches
Conax® friction clutches
Centrex® centrifugal clutches

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Hadeflex® couplings
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Orpex® couplings
DESCH Flex couplings
DESCH HRC couplings

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V-belt pulley drives
with taper bushes
V-belt pulley and flywheels
to customers' specification
V-belts and timings belts
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Weld-on-hubs

Bearings

Grease lubricated plain bearings

Telephone numbers of our head office in Arnsberg

		Telephone	Fax
DES DESCH Engineering Service	+49 29 32	300-200	300-154
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DCT DESCH Clutch Technology	+49 29 32	300-170	300-50
DGP DESCH Gearbox and Press Drives	+49 29 32	300-153	300-811

DESCH is a member FVA VDMA EUROPEAN

DESCH Drive Technology
PO Box 14 40
D-59753 Arnsberg/Germany
Kleinbahnstraße 21
D-59759 Arnsberg/Germany
Telephone +49 29 32 - 3 00 - 0
Fax +49 29 32 - 3 00 - 899
Internet www.desch.de
E-mail info@desch.de

DESCH Drive Technology
Limited Partnership
240 Shearson Crescent
Cambridge, Ontario
Canada N 1T 1J6
Telephone +1800 - 2 63 18 66
+1519 - 6 21 45 60
Fax +1519 - 6 23 11 69
Internet www.desch.on.ca
E-mail desch@desch.on.ca

DESCH Drive Technology
Ufficio di rappresentanza in Italia
Via Cavriana, 3
I-20134 Milano
Telephone +3902 - 7 39 12 80
Fax +3902 - 7 39 12 81
Internet www.desch.de
E-mail desch.italia@desch.de

www.desch.de