P Series Electromagnetic Particle Clutches and Brakes

INDUSTRIAL CLUTCH PARTS LTD

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TECHNICAL DESCRIPTION

The electromagnetic powder clutch and brake combine the flexibility of hydraulic clutch with set stability of friction clutch (brake). Torque is transferred by special, alloy, dry ferromagnetic powder whose apparent viscosity can be changed by modulating the current of electromagnetic coil. The clutch (brake) can withstand continuous slip (within the framework of its empirically set, rated thermal values) at precisely specified and stable value of torque which is determined by level of electromagnet excitation. Slip between input and output member of the clutch is not indispensable for transferring the torque and if load torque does not exceed the value of rotating torque for which the clutch (brake) has been excited, synchronous action will occur.

Conversely, if load torque exceeds level of excitation torque, slip will occur in absolutely smooth manner with value of torque specified in advance.

For all practical purposes, coefficients of static and dynamic friction are practically identical, output torque is independent of speed or slip speed. Powder parameters are insensitive to temperature growth at working surfaces, and the clutch will all the time have the characteristic for which the torque transferred is directly proportional to current. It should be noted that utilization of dry powder instead of wet powder ensures better stability and accuracy of torque regulation.

CONSTRUCTION AND PRINCIPLE OF OPERATION

The clutch (brake) has two concentric members: body containing electromagnetic coil and, inside it and separated by small, ring gap, internal rotor, in case of clutch - its output member. The ring gap contains ferromagnetic powder which undergoes activation when electromagnetic excitation occurs. The resulting stream generated passes through the powder causing its setting in accordance with the stream path through which drive bonding occurs between body and rotor whose force depends exclusively on value of direct current applied to electromagnet coil. Torque transferred by the powder clutch is proportional to excitation current and is changed smoothly from maximum, rated design value , to a minimum value equal to the residual torque.

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The characteristic for torque in the current function can change by 5% depending on whether the current rises or falls. This happens as a result of magnetic hysteresis. For all practical purposes, torque is independent of speed, irrespective of whether slip occurs or does not occur, and this torque can be maintained with accuracy of 5% for speed in range of recommended operating speeds from 50 to 3000 rpm. Residual torque while switching off the clutch (brake) occurring as a result of residual circuit magnetism as well as bearing and sealing friction are less than 1% of rated, design torque for any clutch or brake. Torque reaction time is determined by relationship of electromagnet coil inductance to its resistance plus magnetic delay due to losses on rotary current.

Note: To ensure proper operation, all clutches and brakes must be mounted in the horizontal position of the axis.

APPLICATION:

Characteristics of powder clutches and brakes permit universal utilization. Torque transferred and electromagnet excitation current are approximately proportional to each other. For excitation current set to fixed value, torque transferred by the clutch is independent of speed difference of driving and driven shaft. When switching on, torque increases with certain time-lag. Switching off on direct current side gives shorter connecting time than on alternating current side.

EXAMPLES OF APPLICATION:

- at production machine inlet, pulling force in leading/feeding material is to be maintained at constant value,- on uncoiled, pulling force in leading/feeding material is to be maintained at constant value,

- after wire drawing machine, wire winding is to occur with variable drawing force.

Through analysis of winder drum diameter, with changing diameter of drum, pulling force is maintained at constant value. This ensures simple operation and simultaneous control of the process.

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Technical data	P3	P6	P12	P35	P65	P80	P120 ...	P170 ...
Nom. Torque	3 Nm	6 Nm	12 Nm	35 Nm	65 Nm	80 Nm	120 Nm	170 Nm
Residual Torque	0,04* Nm	0,06* Nm	0,15* Nm	0,25* Nm	0,4* Nm	0,4* Nm	0,6* Nm	1,5* Nm
Supply voltage	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
Current intensity	0,8 A	0,96 A	0,92 A	1A	1A	1,1 A	1,2 A	1,2 A
Resistance	30 Ohm	25 Ohm	26 Ohm	24 Ohm	24 Ohm	22 Ohm	21 Ohm	21 Ohm
Engaging time t 09	100* ms	110* ms	130* ms	280* ms	360* ms	350* ms	530* ms	800* ms
Disengaging time t 01	50* ms	60* ms	70* ms	100* ms	140* ms	170* ms	200* ms	270* ms
Brake	P 3 H	P 6 H	P 12 H	P 35 H	P 65 H	P 80 H	P 120 H	P 170 H
Continuous heat dissipation	50 W	80 W	100 W	150 W	200 W	250 W	400 W	500 W
Weight	0,75 kg	1,4 kg	2.6 kg	5.0 kg	9.0 kg	12.7 kg	18 kg	24 kg
Brake with radiator	P 3 HR	P 6 HR	P 12 HR	P 35 HR	P 65 HR	P 80 HR	P 120 HR	P 170 HR
Continuous heat dissipation	100 W	160 W	200 W	280 W	400 W	500 W	800 W	1000 W
Weight	1,1 kg	1,9 kg	3.8 kg	7.5 kg	13.0 kg	18.5 kg	23 kg	30 kg
Brake with fan (the fan voltage: 24, or 115, or 230 VAC)	P 3 HV	P 6 HV	P 12 HV	P 35 HV	P 65 HV	P 80 HV	P 120 HV	P 170 HV
Continuous heat dissipation	150 W	300 W	400 W	600 W	800 W	1050 W	1600 W	2000 W
Weight	1,4 kg	2,2 kg	4.5 kg	8.0 kg	13.0 kg	17.0 kg	24 kg	28kg
Clutch	P 3 S	P 6 S	P 12 S	P 35 S	P 65 S	P 80 S	P 120 S	P 170 S
Continuous heat dissipation (500 rpm)	80 W	100 W	120 W	250 W	280 W	350 W	800 W	1000 W
Continuous heat dissipation (1000 rpm)	100 W	120 W	150 W	250 W	350 W	550 W	1000 W	1250 W
Weight	0,8 kg	1,5 kg	2.8 kg	5.2 kg	9.4 kg	13.3 kg	18,9 kg	24,8 kg
Clutch with radiator	P 3 SR	P 6 SR	P 12 SR	P 35 SR	P 65 SR	P 80 SR	P 120 SR	P 170 SR
Continuous heat dissipation (500 rpm)	250 W	350 W	440 W	640 W	960 W	1200 W	1600 W	2200 W
Continuous heat dissipation (1000 rpm)	300 W	400 W	500 W	800 W	1200 W	1550 W	2000 W	2750 W
Weight	1,2 kg	2,0 kg	4.0 kg	7.7 kg	13.4 kg	19.0 kg	23,7 kg	28,8 kg

-Parameters with current regulator EZP-51

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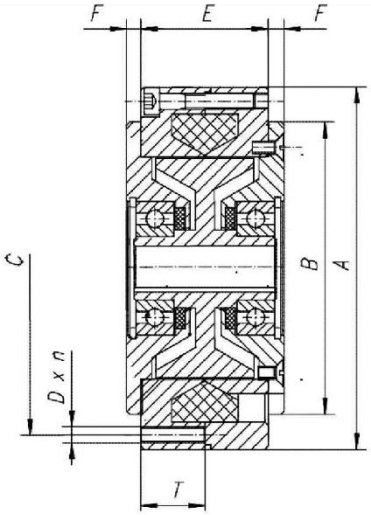
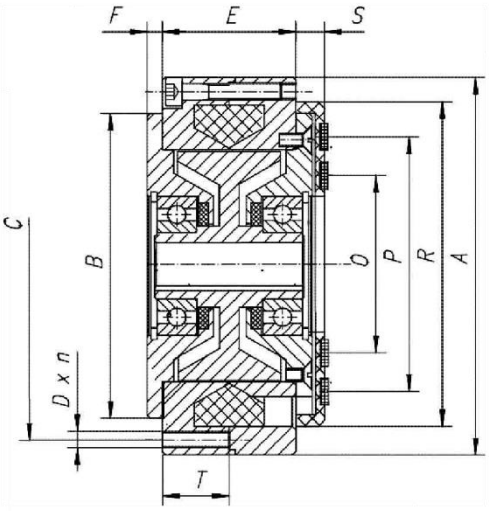
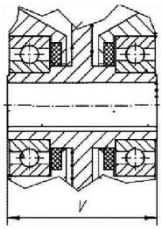
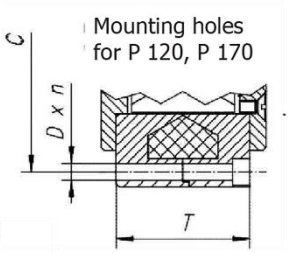
BRAKE

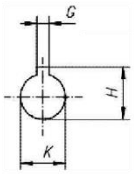


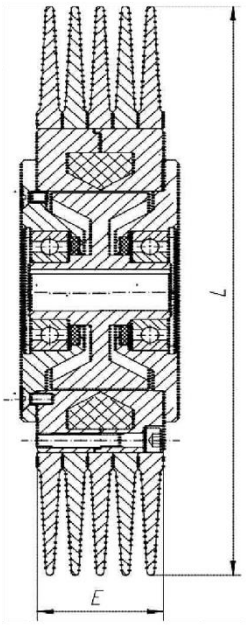
CLUTCH



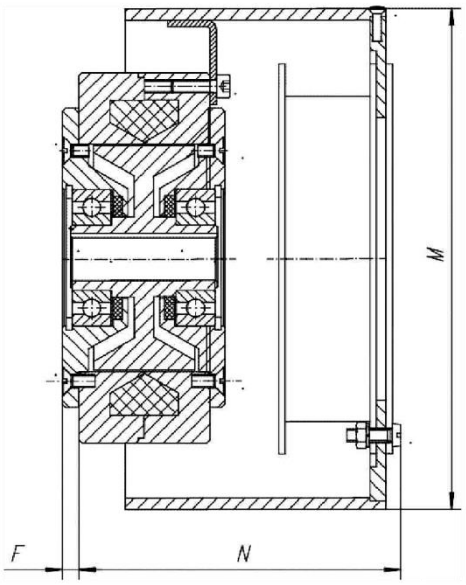








BRAKE , or CLUTCH with radiator



BRAKE with fan

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Dimension	P 3	P 6	P 12	P 35	P 65	P 80	P 120	P 170 ....
A [h8]	75	91	114	156	188	205	254	254
B	62	78	92	125	146	149	206	206
C	69	85	105	146	174	188	233	233
D x n	M 3 x 3	M 3 x 3	M 5 x 3	M 5 x 6	M 6 x 6	M 6 x 6	Æ 7 x 8	Æ 7 x 8
E	25	32	40	48	56	64	70	86
F	5,5	5,5	5	5	5	6	6	6
G	3 P 9	4 P 9	4 P 9	5 P 9	8 P 9	8 P 9	8 P 9	8 P 9
H	$11^{+0,1}$	$16^{+0,1}$	$16^{+0,1}$	$19.7^{+0,1}$	$28.3^{+0,1}$	$28.3^{+0,1}$	$31.3^{+0,2}$	$31.3^{+0,2}$
K (K max)	10 (15)	15 (22)	15 (25)	17 (35)	25 (38)	25 (38)	28 (42)	28 (42)
L	110	140	200	260	330	350	390	390
M	100	120	154	203	236	255	284	284
N	86	93	99	125	137	145	202	218
O	42	52	54	64	70	90	108	108
P	60	70	74	84	90	110	132	132
R	74,5	90,5	114	132	154	184	222	222
S	10	10	10	10	10	10	10	10
T	12,5	16	20	24	28	32	70	86
P-O / 2	9	9	10	10	10	10	12	12
V	31	37	45	50	58	66	74	90

Max. Dim.								
H HR	Φ 75x36 Φ 110x36	Φ 91x43 Φ 140x43	Φ 114x50 Φ 200 x 50	Φ 156x58 Φ 260 x 58	Φ 188x66 Φ 330 x 66	Φ 205x76 Φ 350 x 76	Φ 254x82 Φ 390 x 82	Φ 254x98 Φ 390 x 98
S SR	Φ 75x40,5 Φ110x40,5	Φ 91x47,5 Φ140x47,5	Φ 114x55 Φ 200 x 55	Φ 156x63 Φ 260 x 63	Φ 188x71 Φ 330 x 71	Φ 205x80 Φ 350 x 80	Φ 254x88 Φ 390 x 88	Φ 254x104 Φ 390x104
HV	Φ 100x91,5	Φ 120x98,5	Φ 154 x104	Φ 203x130	Φ 236x142	Φ 255x151	Φ 284x208	Φ 284x224

SAMPLE ORDER : P – 120 H , P-120 HR , P-120 S ,

P-120- SR, P-120 HV 230 V AC (Fans are manufactured for 24 or 115 or 230V AC.

The brake (clutch) coils is supplied with 24V DC.

The producer reserves the right to modify as a result of developing the product. It is possible to realize special version.

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