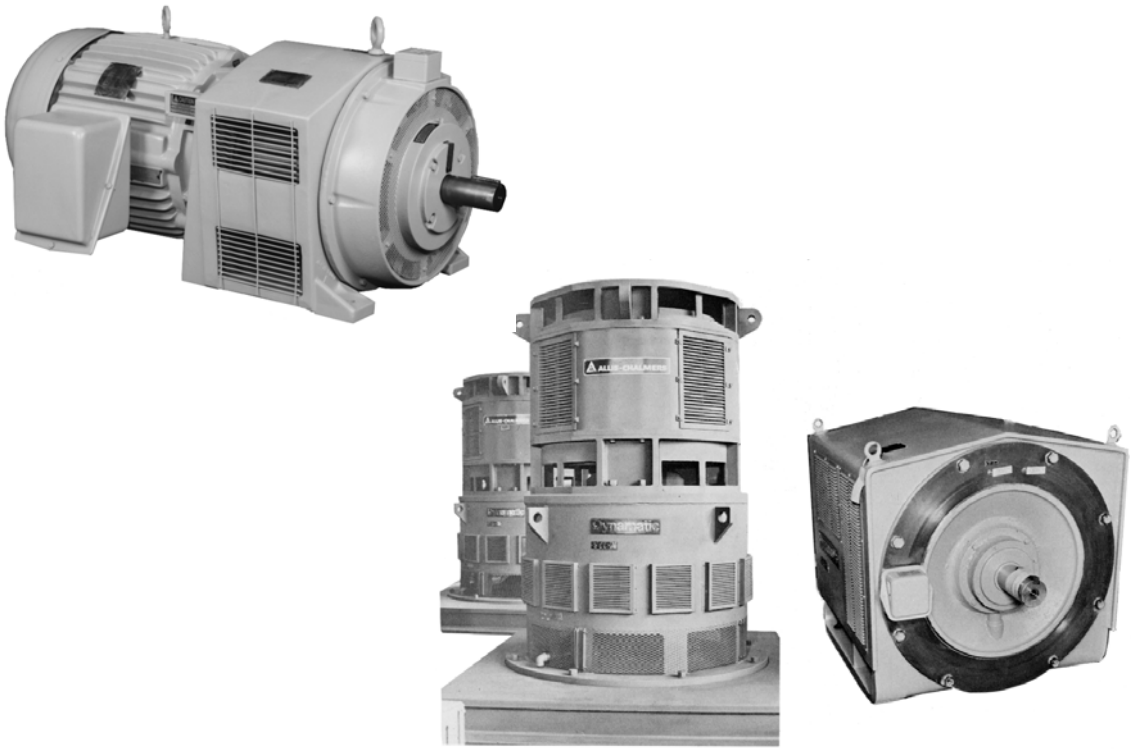
Dynamatic®

DRIVE SOURCE INTERNATIONAL, INC.

AT, IP, SPM, SPMV and SPC Ajusto-Spede® Pump Drives Models 8100 through 8240 & AT-320 through AT-440

Technical Guide

(SPMV & AT – Revised Oct 31, 2011)



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*Application Engineering * Quality Products * Total Solution*

Table of Contents

Product Description

Introduction

Dynamatic® fan and pump drives are adjustable speed, air cooled salient pole, rotating field units. The salient pole design is ideally suited for fan or pump applications where the torque requirement increases with speed.

Principles of Operation

The eddy-current clutch consists of a constant speed member or drum, and an adjustable speed member or salient pole rotor, with field coils.

Energizing the field coils causes the rotor and drum to be magnetically coupled. Induced eddy-currents within the drum surface occur due to slip there by producing a means to transmit torque.

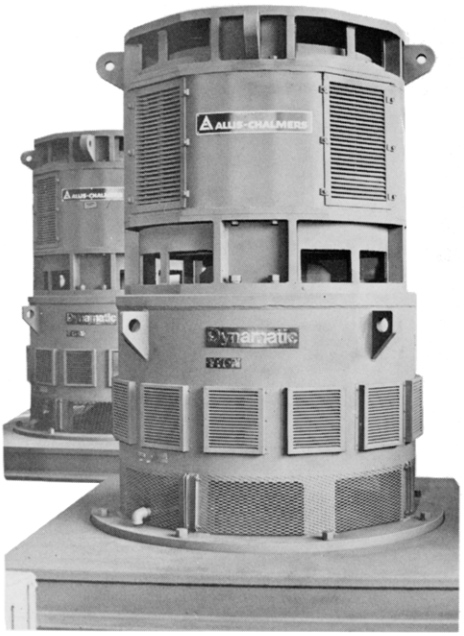
The amount of torque transmitted from the drum to the rotor, and the actual out put speed of the clutch vary with the current applied to the field coil by the solid state controller.

Versatility

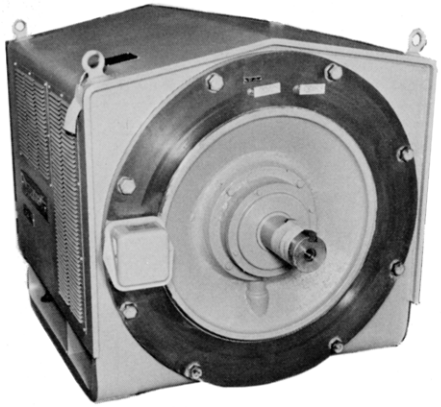
Dynamatic drives are available with integrally mounted flanged motors or as separate clutches for use with foot mounted motors. Units with an integrally mounted motor are designated by an SPM model prefix and separate clutches by an SPC prefix.

Features:

- Economical for Fan & Pump Duty - Salient pole construction enables use of smaller frame size eddy-current clutches.
- Eddy-Current - No physical contact between input and output members results in longer equipment life.
- Horizontal or Vertical - These units may be horizontal foot mounted or vertical flange mounted.
- With or Without Motor - Available from 10 HP through 2000 HP.
- Closed Loop Controller - Incorporates current and velocity feedback closed loop circuits for optimum performance.
- Low Excitation - Full control of maximum pump load torque is accomplished with low excitation power.
- Wide Speed Range - Accurate regulation is maintained through the use of a tachometer feedback system.
- High Resolution - High pre-set accuracy and ability that follow an external command signal such as liquid level, flow and pressure signals.



Model SPMV Drive



Model SPC Clutch

Models IPM, IPMV & IPC Mono Coil Drives & Clutches*

Three types of eddy-current, air cooled, mono coil units are listed below: Model IPM drives, IPMV drives and model IPC separate clutches. IPM drives are for horizontal duty and have an integrally mounted open drip proof AC induction motor. Model IPMV drives are for vertical duty and have an AC, CDP motor and a P-flange output end for mounting to a support foundation. Model IPC units are separate clutches for horizontal duty, and have input and output shafts for connecting to a separate foot mounted motor. All drives and clutches include a clutch thermal switch.

Integral Drives (less motor)						**Separate Clutches**		
Horizontal Duty[1]			**Vertical Duty[2]**			**Horizontal Duty**		
Sales Part Number			**Sales Part Number**			**Sales Part Number**		
IPM			**IPMV**			**IPC**		
SP-00	8100	-0004	SP-00	8100	-0005	SP-00	8100	-0006
SP-00	8101	-0004	SP-00	8101	-0005	SP-00	8101	-0006
SP-00	8120	-0004	SP-00	8120	-0005	SP-00	8120	-0006
SP-00	8121	-0004	SP-00	8121	-0005	SP-00	8121	-0006
SP-00	8140	-0004	SP-00	8140	-0005	SP-00	8140	-0006
SP-00	8141	-0004	SP-00	8141	-0005	SP-00	8141	-0006

Models SPM, SPMV & SPC Salient Pole Drives & Clutches*

Three types of eddy-current, air cooled salient pole units are listed below: Model SPM drives, SPMV drives and model SPC separate clutches. SPM drives are for horizontal duty and have an integrally mounted open drip proof AC induction motor. Model SPMV drives are for vertical duty and have an AC open drip proof motor and a P-flange output end for mounting to a support foundation. Model SPC units are separate clutches for horizontal duty, and have output and input shafts for connecting to a separate foot mounted motor. All drives and clutches include a clutch thermal switch.

Integral Drives (less motor)						**Separate Clutches**		
Horizontal Duty[1]			**Vertical Duty[2]**			**Horizontal Duty**		
Sales Part Number			**Sales Part Number**			**Sales Part Number**		
SPM			**SPMV**			**SPC**		
SP-00	8120	-0001	SP-00	8120	-0003	SP-00	8120	-0002
SP-00	8121	-0001	SP-00	8121	-0003	SP-00	8121	-0002
SP-00	8140	-0001	SP-00	8140	-0003	SP-00	8140	-0002
SP-00	8141	-0001	SP-00	8141	-0003	SP-00	8141	-0002
			SP-00	8160	-0003	SP-00	8160	-0002
			SP-00	8161	-0003	SP-00	8161	-0002
			SP-00	8163	-0003	SP-00	8163	-0002
			SP-00	8164	-0003	SP-00	8164	-0002
			SP-00	8180	-0003	SP-00	8180	-0002
			SP-00	8181	-0003	SP-00	8181	-0002
			SP-00	8183	-0003	SP-00	8183	-0002
			SP-00	8184	-0003	SP-00	8184	-0002
			SP-00	8200	-0003	SP-00	8200	-0002
			SP-00	8201	-0003	SP-00	8201	-0002
			SP-00	8203	-0003	SP-00	8203	-0002
			SP-00	8204	-0003	SP-00	8204	-0002
			SP-00	8220	-0003	SP-00	8220	-0002
			SP-00	8223	-0003	SP-00	8223	-0002
			SP-00	8221	-0003	SP-00	8221	-0002
			SP-00	8224	-0003	SP-00	8224	-0002
			SP-00	8240	-0003	SP-00	8240	-0002
			SP-00	8241	-0003	SP-00	8241	-0002
			SP-00	8243	-0003	SP-00	8243	-0002
			SP-00	8244	-0003	SP-00	8244	-0002

NOTES:

1. Prices for Dynamatic® supplied motors for integrally mounting, must be obtained from the factory.
2. Prices for Eaton supplied D-flange motors for integrally mounting, must be obtained from the factory

*All drives and clutches and their controllers meet CSA approval.

Sizing Chart

Models SPM or SPC-8100 through 8224 (salient pole)

Input (RPM)	1750			1150			870			700			585			495		
Percent Slip	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Output (RPM)	1733	1715	1697	1139	1127	1116	861	853	844	693	687	679	579	573	568	490	485	480
Model	Brake Horsepower																	
8100	53	81	80	24	43	53	14	25	33	9	16	23	6	12	16	4	18	12
8101	66	98	97	29	53	64	18	31	40	11	19	28	8	15	20	6	10	15
8120	142	176	174	67	112	114	40	67	82	18	42	58	17	32	41	12	23	31
8121	167	204	202	79	127	127	48	78	96	30	50	68	21	38	49	15	27	37
8140	252	261	258	132	172	170	85	120	126	56	83	99	42	65	78	29	49	60
8141	305	305	305	158	204	204	102	146	151	67	100	119	47	79	94	36	59	73
8160	395	395	395	241	261	259	149	195	193	100	144	152	63	104	124	46	77	97
8161	395	395	395	282	293	293	182	236	236	123	172	190	85	131	146	59	100	121
8164	511	513	507	282	337	334	191	252	252	132	182	203	99	147	168	75	115	134
8180	-	-	-	360	451	446	239	328	337	160	231	266	116	182	210	82	135	165
8181	-	-	-	416	465	465	282	364	382	186	272	318	132	209	242	93	156	192
8184	-	-	-	416	558	552	282	364	418	187	277	331	141	223	257	103	166	206
8200	-	-	-	672	700	700	432	561	561	307	429	437	218	333	351	160	256	296
8201	-	-	-	700	700	700	516	561	561	345	459	459	254	390	390	180	293	344
8204	-	-	-	770	858	850	516	650	642	356	507	517	262	406	433	193	312	366
8220	-	-	-	-	-	-	991	1020	1020	692	853	853	519	723	727	386	575	630
8223	-	-	-	-	-	-	991	1137	1125	706	916	905	540	753	757	411	586	640
8221	-	-	-	-	-	-	1020	1020	1020	808	853	853	609	732	732	447	649	649
8224	-	-	-	-	-	-	1164	1331	1318	825	1073	1060	634	884	887	476	693	749

Models IP-8100 through 8141 & SP-8120 through 8244

Input (RPM)	1745						1163						872					
Percent Slip	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Output (RPM)	1727	1710	1692	1675	1657	1640	1151	1139	1128	1116	1104	1093	863	854	845	837	828	819
Model	Brake Horsepower*																	
IP-8100	42	65	64	63	63	62	20	35	42	42	42	41	10	20	27	30	29	29
IP-8101	54	84	84	83	82	82	25	44	55	55	55	54	14	25	34	39	39	38
IP-8120	65	100	99	98	97	96	30	53	66	65	65	64	17	30	40	46	46	45
IP-8121	83	131	133	132	130	129	38	68	87	88	87	86	21	39	52	61	62	61
IP-8140	91	142	145	143	142	140	43	75	93	95	94	93	24	43	57	66	67	66
IP-8141	119	186	193	191	189	187	56	98	123	127	126	124	31	56	75	86	89	88
SP-8120	148	175	174	-	-	-	72	115	116	-	-	-	40	69	82	-	-	-
SP-8121	173	203	201	-	-	-	85	134	134	-	-	-	48	81	92	-	-	-
SP-8140	259	263	261	-	-	-	140	175	174	-	-	-	83	121	123	-	-	-
SP-8141	296	293	290	-	-	-	169	195	193	-	-	-	100	144	143	-	-	-
SP-8160	381	377	364	-	-	-	255	265	263	-	-	-	155	189	187	-	-	-
SP-8161	384	381	377	-	-	-	295	340	337	-	-	-	181	221	218	-	-	-
SP-8163	402	399	364	-	-	-	380	399	395	-	-	-	155	189	187	-	-	-
SP-8164	516	511	505	-	-	-	407	403	399	-	-	-	181	242	240	-	-	-
SP-8180	-	-	-	-	-	-	380	455	451	-	-	-	239	322	318	-	-	-
SP-8181	-	-	-	-	-	-	440	564	558	-	-	-	278	330	326	-	-	-
SP-8183	-	-	-	-	-	-	677	670	663	-	-	-	239	335	338	-	-	-
SP-8184	-	-	-	-	-	-	681	674	668	-	-	-	278	394	418	-	-	-
SP-8200	-	-	-	-	-	-	707	748	741	-	-	-	452	530	524	-	-	-
SP-8201	-	-	-	-	-	-	817	867	859	-	-	-	520	536	531	-	-	-
SP-8203	-	-	-	-	-	-	-	-	-	-	-	-	452	561	555	-	-	-
SP-8204	-	-	-	-	-	-	-	-	-	-	-	-	520	650	643	-	-	-
SP-8220	-	-	-	-	-	-	-	-	-	-	-	-	904	894	885	-	-	-
SP-8221	-	-	-	-	-	-	-	-	-	-	-	-	904	894	885	-	-	-
SP-8223	-	-	-	-	-	-	-	-	-	-	-	-	994	1138	1126	-	-	-
SP-8224	-	-	-	-	-	-	-	-	-	-	-	-	1173	1333	1319	-	-	-
SP-8240	-	-	-	-	-	-	-	-	-	-	-	-	1413	1398	1384	-	-	-
SP-8241	-	-	-	-	-	-	-	-	-	-	-	-	1430	1415	1400	-	-	-
SP-8243	-	-	-	-	-	-	-	-	-	-	-	-	1529	1577	1561	-	-	-
SP-8244	-	-	-	-	-	-	-	-	-	-	-	-	1827	1870	1850	-	-	-

*All horsepowers based on 40°C. ambient.

Models IP-8100 through 8141 & SP-8120 through 8244

Input (RPM)	698						581						498					
Percent Slip	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Output (RPM)	691	684	677	670	663	656	575	569	563	557	551	546	493	488	483	478	473	468
Model	Brake Horsepower*																	
IP-8100	6	12	17	21	23	23	4	9	12	15	18	18	3	6	9	11	12	15
IP-8101	8	16	22	27	30	30	6	11	16	19	22	24	4	8	11	14	16	18
IP-8120	10	19	26	32	36	36	7	13	19	23	27	29	5	9	14	17	20	22
IP-8121	13	24	34	41	47	48	9	17	24	30	35	38	6	12	17	22	26	29
IP-8140	15	27	37	45	51	52	10	19	27	33	38	41	7	14	19	24	28	31
IP-8141	19	35	49	59	67	69	13	25	35	43	50	54	9	18	25	32	37	41
SP-8120	25	45	59	-	-	-	17	32	44	-	-	-	12	23	32	-	-	-
SP-8121	30	53	69	-	-	-	21	38	51	-	-	-	15	27	38	-	-	-
SP-8140	54	84	97	-	-	-	39	63	77	-	-	-	28	47	59	-	-	-
SP-8141	65	102	112	-	-	-	47	76	92	-	-	-	34	57	71	-	-	-
SP-8160	102	148	146	-	-	-	74	115	119	-	-	-	54	87	100	-	-	-
SP-8161	122	174	181	-	-	-	90	132	153	-	-	-	67	101	121	-	-	-
SP-8163	102	148	146	-	-	-	74	115	119	-	-	-	54	87	100	-	-	-
SP-8164	122	174	188	-	-	-	90	132	153	-	-	-	71	101	121	-	-	-
SP-8180	152	231	257	-	-	-	110	174	205	-	-	-	80	131	161	-	-	-
SP-8181	179	268	282	-	-	-	131	202	241	-	-	-	95	153	187	-	-	-
SP-8183	152	231	257	-	-	-	110	174	205	-	-	-	80	131	161	-	-	-
SP-8184	179	268	313	-	-	-	131	202	241	-	-	-	95	153	187	-	-	-
SP-8200	290	427	422	-	-	-	211	325	344	-	-	-	153	247	288	-	-	-
SP-8201	334	435	430	-	-	-	243	372	368	-	-	-	177	285	334	-	-	-
SP-8203	290	427	422	-	-	-	211	325	344	-	-	-	153	247	288	-	-	-
SP-8204	334	495	490	-	-	-	243	375	398	-	-	-	177	285	334	-	-	-
SP-8220	665	736	728	-	-	-	497	634	627	-	-	-	373	537	552	-	-	-
SP-8221	756	749	741	-	-	-	582	639	632	-	-	-	435	567	561	-	-	-
SP-8223	665	866	857	-	-	-	497	691	698	-	-	-	373	537	586	-	-	-
SP-8224	782	1014	1004	-	-	-	582	816	817	-	-	-	435	634	686	-	-	-
SP-8240	1037	1166	1154	-	-	-	779	977	967	-	-	-	589	820	812	-	-	-
SP-8241	1191	1179	1167	-	-	-	912	1024	1013	-	-	-	686	910	901	-	-	-
SP-8243	1037	1200	1188	-	-	-	779	977	967	-	-	-	589	820	812	-	-	-
SP-8244	1220	1423	1408	-	-	-	912	1159	1146	-	-	-	686	972	962	-	-	-

Renewal Parts

Spare Parts List* (Mechanical)

Description	Clutch Model	Part Number
Bearing output Ball Bearing	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	DY-004799-0000 DY-003764-0000 DY-004619-0000 DY-006699-0000 DY-003261-0000 DY-011475-0000 DY-014980-0000
Bearing, output Angular contact, duplex	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	DY-015351-0000 DY-015189-0000 DY-015324-0000 - - - -
Bearing, output Combination angular contact and split race	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	Consult Factory
Bearing, pilot	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	DY-014924-0000 DY-014859-0000 DY-014855-0000 DY-014973-0000 DY-014981-0000 DY-014981-0000 DY-015333-0000

Description	Clutch Model	Part Number
Brushes	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	000-000244-0000 000-000244-0000 000-000244-0000 000-000244-0000 000-000244-0000 000-000244-0000 000-000244-0000
Generator Field	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	000-047183-0100 000-043087-0000 000-066991-0100 000-071119-0100 000-067737-0100 000-067939-0100 000-067939-0100
Generator Rotor	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	000-048557-0000 000-043001-0500 000-062130-0100 000-067736-0100 000-067736-0100 000-068346-0100 000-067959-0100
Seal/Slip Ring assembly	8100,1 8120,1 8140,1 8160,1 8180,1 8200,1 8220,1	000-070692-0100 000-070659-0100 000-070659-0200 000-070968-0100 000-070910-0100 000-070980-0100 000-070445-0100

Drive Specifications

Adjustable Speed Drive Specification for Pumps Vertical Salient Pole Eddy-Current Clutches Models-8100 through 8261 with motor

The pump shall be driven by means of a vertical adjustable speed eddy-current slip device used to transmit the torque supplied from the integral AC squirrel cage induction motor. The drive shall be capable of providing an infinitely adjustable speed range to the pump.

The vertical motor shall be flange mounted to the eddy-current clutch. It shall be rated ___HP, _____ RPM, NEMA B design, Class B insulated, open drip proof construction (WPI a WPII enclosures can be supplied and should be so specified when required) and suitable for connecting to the ____V, 3 phase, ___HZ customer's power supply.

The air cooled eddy-current clutch shall be comprised of a rigid frame, constant speed input drum member, and an adjustable speed output member for coupling to the pump shafting. The design of the eddy-current clutch shall be such that the drive can be easily disassembled for service with a minimum amount of down time. Removal of the motor from the clutch flange adapter plate shall allow the motor and drum to be lifted from the clutch frame for easy access to the internal pilot bearing and other internal components. Removal of other internal drive components shall be further facilitated by not having to remove the clutch frame. The frame shall be of open drip proof design (WPI enclosure can be supplied and should be so specified when required) and shall support the vertical motor. It shall provide for; baffles to direct the cooling air to the constant speed member, and mounting space for the output support bearing housing, terminal box, lifting lugs and motor flange adapter. The input drum shall be firmly secured to the motor output shaft, shall be of low carbon content steel and shall be designed with adequate exterior surface for internal self-cooling.

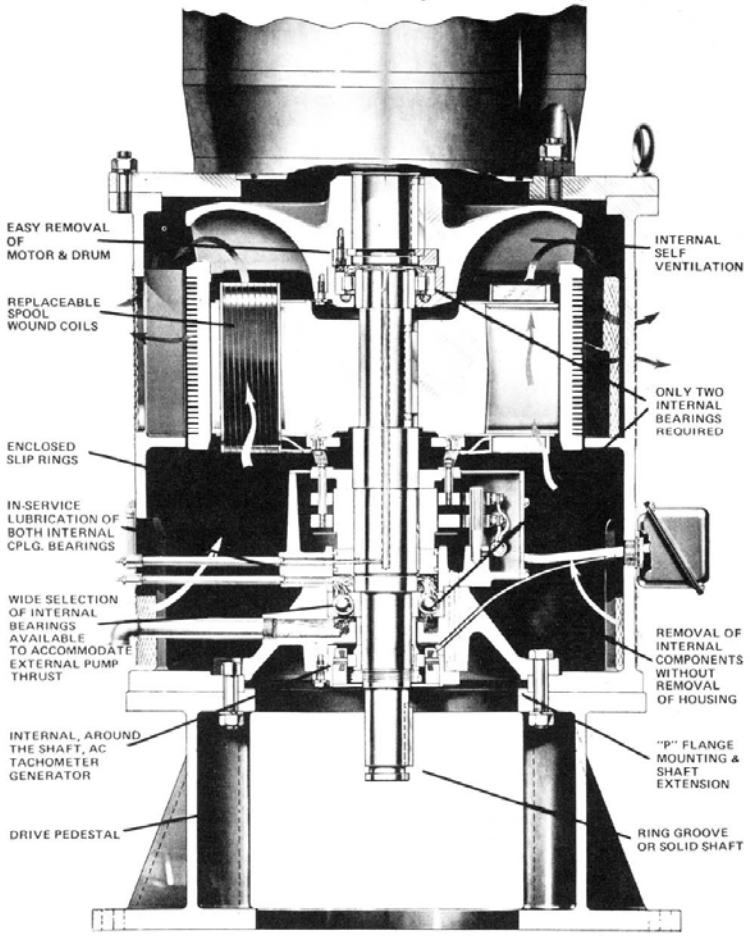
The adjustable speed output rotor shall be of the salient pole design and shall be mounted within and concentric to the smooth inner surface of the drum. The rotor shall be cast of high permeability steel and shall be machined to insure a uniform precision air gap. The pole windings shall be spool wound for ease of replacement, of class F insulated glass magnet wire and wrapped in a protective tape to insure protection against moisture. The output rotor shall be supported and held within accurate clearances by means of grease lubricated internal anti-friction bearings. The internal pilot bearing shall separate the input drum and the rotor. The output bearing support housing shall support the weight of the rotating members and shall be suitable for external thrust loading due to intermediate shafting, pump rotating parts or hydraulic loading. All bearings should be capable of being lubricated while the drive is in operation from fittings easily accessible on the clutch frame. The output bearing support housing shall also provide for the mounting of the enclosed slip ring and brush assembly. The brushes and slip rings shall be easily accessible through a removable cover plate on the assembly. Each brush of the dual brush assembly for each slip ring shall be capable of handling the current required by the coils. An internal alnico type AC generator is to be used to provide the speed feedback signal for the controller, and tachometer readout.

The vertical adjustable speed drive shall be fully assembled, balanced and tested at the factory to insure satisfactory performance. The motor and clutch shall be shipped as a unit. The clutch output flange shall be suitably drilled for mounting to the customer's support foundation. The clutch output shaft shall be suitable for coupling to the pump shaft.

The speed controller for the adjustable speed drive shall be of the solid state SCR type and be mounted in a NEMA 1 enclosure. The power input to the controller isolation transformer shall be 230/460 volts, 1 phase, 60 Hz. (Other input voltages are available upon re-quest). The controller shall be suitable for accepting a remote instrument signal from a liquid level control or directly from the customer's pressure-to-current transducer, in the automatic mode of operation or suitable for manual operation from a manual speed potentiometer. The controller shall be designed to regulate the output speed within +/-1% of maximum speed at any preset speed. The controller shall have maximum and minimum speed limiting potentiometers as a standard on-board feature. The controller shall have the inherent design features of inversion for improved dynamic response and phase limit, current feedback and velocity feedback circuits for optimum controller performance. The adjustable speed salient pole eddy current drive and controller intended herein shall be a Model SPMV_____ as supplied by DSI/Dynamatic® or approved equal.

MODEL SPMV

Salient Pole Air Cooled, Eddy-Current Pump Drive



Engineering Data

Friction and Windage Losses

The following values of friction and windage losses are given in horsepower and apply to vertical or horizontal clutches only. The values shown do not include the motor.

Clutch Model	Speed (RPM)						
	1750	1150	870	700	585	495	435
8100, 8101	1.00	0.5	0.25	0.20	0.15	0.12	0.10
8120, 8121	2.00	0.8	0.40	0.30	0.25	0.20	0.15
8140, 8141	3.15	1.3	0.90	0.65	0.50	0.45	0.30
8160, 8161, 8164	6.10	2.0	1.10	0.67	0.30	0.80	0.60
8180, 8181, 8184	10.80	6.2	3.10	1.80	1.30	1.00	0.85
8200, 8201, 8204	-	10.8	5.10	3.30	2.10	1.60	1.10
8220, 8223, 8221, 8224	-	-	13.00	7.00	4.20	2.60	1.50
8240, 8243, 8241, 8244	-	-	27.00	14.00	10.00	6.00	3.00

Clutch Coil, Excitation Values

Clutch			Transformer	
Model	Volts	Amperes (hot)	KVA Rating	Weight (lbs.)
8100, 8101	90	9.70	2.0	55
8120, 8121	90	12.10	3.5	68
8140, 8141	90	18.60	3.5	68
8160, 8161, 8164	90	21.10	5.3	119
8180, 8181, 8184	90	29.20	5.3	119
8200, 8201, 8204	90	40.40	8.6	130
8220,8223,8221,8224	180	31.30	17.2	260
8240,8243,8241,8244	180	36.80	17.2	260

Vibration Limits

The standard drives are balanced so that vibration in any direction will not exceed 0.003 inches at 1800 RPM. The drives can be further balanced so that the vibration will not exceed 0.0015 inches at 1800.

Clutch Inertia Values

The following table gives the WK^2 values in lb.-ft.^{2} for both input and output members of the clutch.

Clutch Model	Inertia (lb-ft^2)	
	Input	Output
8100, 8101	47.3	31.20
8120, 8121	94.6	70.30
8140, 8141	160.0	125.00
8160, 8161, 8164	312.0	249.00
8180, 8181, 8184	655.0	490.00
8200, 8201, 8204	1670.0	850.00
8220, 8223, 8221, 8224	3340.0	1700.00

Clutch Noise Levels

The values given below are sound pressure levels taken on the A scale at five feet from the clutch. Values for Models 9033 through 9094 include the motor, other models are clutch only.

Clutch Model	Speed (RPM)				
	1800	1200	900	700	600
	dba				
8100, 8101	81	73	66	61	57
8120, 8121	85	77	70	65	61
8140, 8141	88	80	73	68	64
8160, 8161, 8164	91	83	76	71	67
8180, 8181, 8184	-	89	82	78	74
8200, 8201, 8204	-	95	85	82	80
8220, 8223, 8221, 8224	-	-	94	89	85
8240, 8243, 8241, 8244	-	-	99	93	88

Clutch Weights

The weights in the table below are approximate shipping weights.

Clutch Model	Weights			
	Type			High Ring Base
	SPM	SPC	SPMV [2]	
8100, 8101	[1]	1150	725	270
8120, 8121	[1]	1150	1300	450
8140, 8141	[1]	2100	1700	450
8160, 8161, 8164	-	2800	2200	650
8180, 8181, 8184	-	4400	3000	650
8200, 8201, 8204	-	6250	4500	1600
8220, 8223, 8221,8224	-	8200	6500	-
8240, 8243, 8241, 8244	-	12000	10000	-

NOTES:

[1] See Print C-71880, Page _____.

[2] Less motor and high ring base.

Clutch Inertia Values

The following table gives the WK^2 values in lb.-ft.^{2} for both input and output members of the clutch.

Clutch Model	Inertia (lb-ft^2)	
	Input	Output
8100, 8101	47.3	31.20
8120, 8121	94.6	70.30
8140, 8141	160.0	125.00
8160, 8161, 8164	312.0	249.00
8180, 8181, 8184	655.0	490.00
8200, 8201, 8204	1670.0	850.00
8220, 8223, 8221, 8224	3340.0	1700.00

Clutch Noise Levels

The values given below are sound pressure levels taken on the A scale at five feet from the clutch. Values for Models 9033 through 9094 include the motor, other models are clutch only.

Clutch Model	Speed (RPM)				
	1800	1200	900	700	600
	dba				
8100, 8101	81	73	66	61	57
8120, 8121	85	77	70	65	61
8140, 8141	88	80	73	68	64
8160, 8161, 8164	91	83	76	71	67
8180, 8181, 8184	-	89	82	78	74
8200, 8201, 8204	-	95	85	82	80
8220, 8223, 8221, 8224	-	-	94	89	85
8240, 8243, 8241, 8244	-	-	99	93	88

Clutch Weights

The weights in the table below are approximate shipping weights.

Clutch Model	Weights			
	Type			High Ring Base
	SPM	SPC	SPMV [2]	
8100, 8101	[1]	1150	725	270
8120, 8121	[1]	1150	1300	450
8140, 8141	[1]	2100	1700	450
8160, 8161, 8164	-	2800	2200	650
8180, 8181, 8184	-	4400	3000	650
8200, 8201, 8204	-	6250	4500	1600
8220, 8223, 8221, 8224	-	8200	6500	-
8240, 8243, 8241, 8244	-	12000	10000	-

NOTES:

[1] See Print C-71880, Page _____.

[2] Less motor and high ring base.

Thrust- Vertical Drive External Thrust Capacity

The standard eddy-current pump drives are designed to carry the external thrust loads shown in Table I below. For applications requiring greater values of thrust consult Tables II and III, and make price additions on page 4. For applications requiring still greater thrust capacities, consult the factory. All values shown below are in pounds and based upon a B-10 minimum life of 5 years and an average output speed of 85% of the input speed in accordance with the AFBMA method of life calculation.

Standard Single Output Bearing - Grease Lubricated, Air Cooled, Anti-Friction **TABLE I**

Clutch Model	Rotor Weight (lbs.)	Downthrust (lbs) Input Speed (RPM)					
		1750	1150	870	700	585	495
8100, 8101	206	410	485	575	655	795	880
8120, 8121	375	525	640	780	1500	1735	1865
8140, 8141	515	815	990	1175	1345	1655	1835
8160, 8161	730	845	1035	1265	1385	1830	2040
8180, 8181	1250	-	800	1065	1260	1675	1925
8200, 8201	1330	-	-	1020	1250	1680	1925
8220, 8221	1850	-	-	710	960	1435	1690
8240, 8241	3200	-	-	-	-	-	-

Duplex Angular Contact Bearing **TABLE II**

Clutch Model	Rotor Weight (lbs.)	Downthrust (lbs) Input Speed (RPM)					
		1750	1150	870	700	585	495
8100,8101	206	1680	1940	2160	2320	2500	2630
8120,8121	375	2430	2810	3150	3380	3650	3850
8140,8141	515	3790	4380	4880	5245	5670	5960
8160,8161	730	4250	4925	5500	5930	6410	6760
8180,8181	1250	-	5433	6125	6625	7195	7598
8200,8201	1330	-	-	6890	7450	8090	8535
8220,8221	1850	-	-	7180	7795	8495	8990
8240,8241	3200	-	-	7750	8040	8680	9250

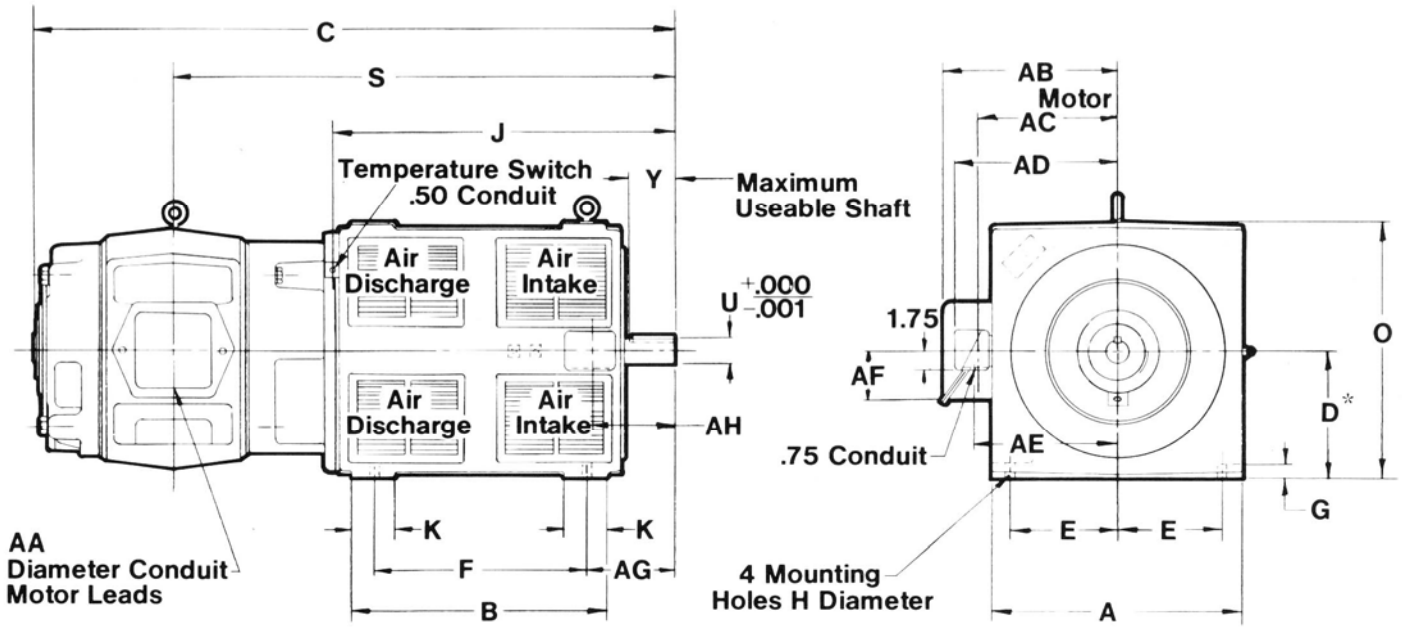
Combination Angular Contact & Split Race Bearing **TABLE III**

Clutch Model	Rotor Weight (lbs.)	Downthrust (lbs) Input Speed (RPM)					
		1750	1150	870	700	585	495
8100, 8101	206	165	2525	2780	3010	3210	3390
8120, 8121	375	2960	3450	3810	5035	4415	4660
8140, 8141	515	5160	6020	6635	7185	7670	8090
8160, 8161	730	5800					
8181	1250						

NOTE: Up-thrust will never be less than 50% of the down thrust shown above.

Outline Dimensions

Model SPM-8100 through SPM-8140 Drives for Horizontal Duty



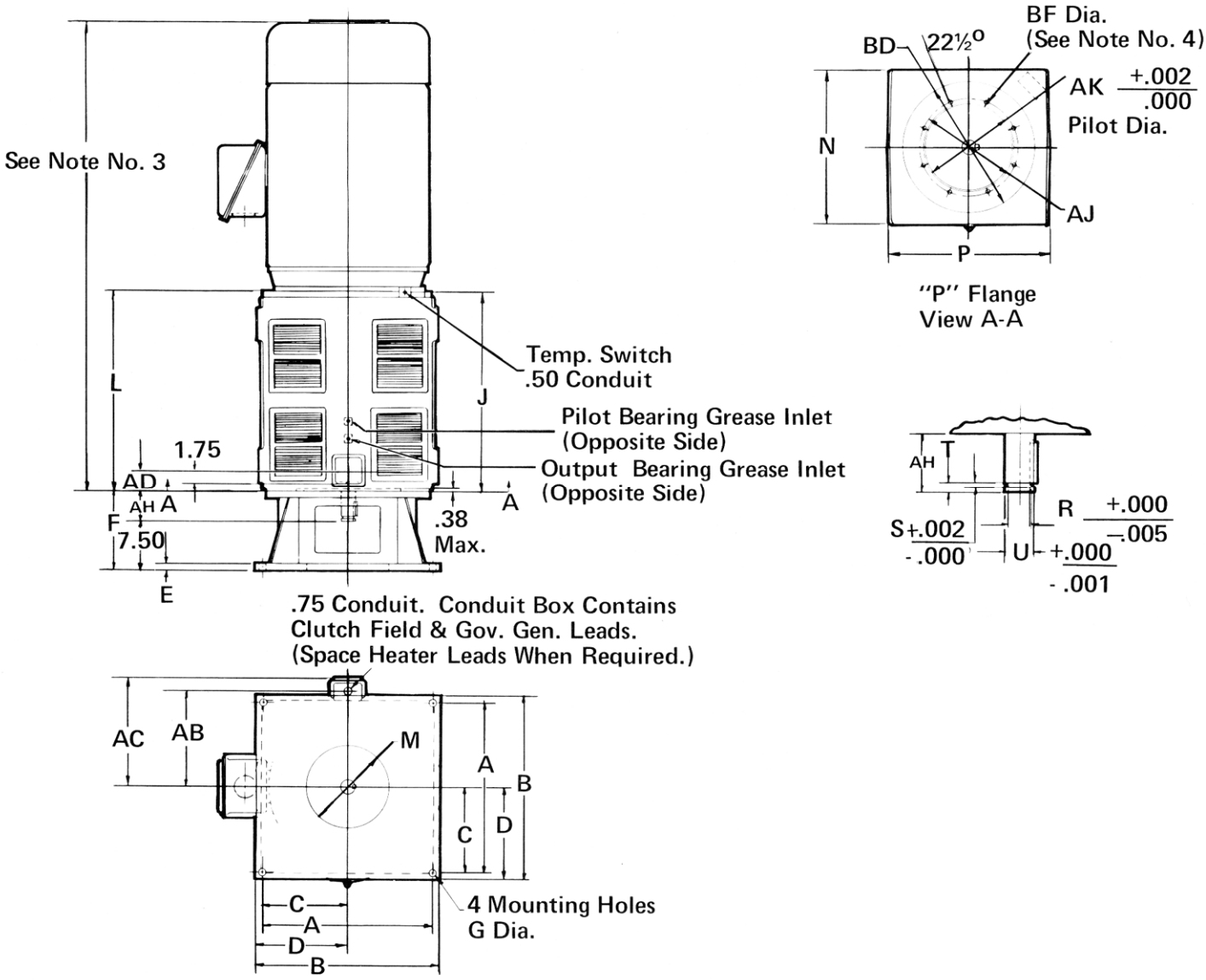
Frame SPM	A	B	C	D*	E	F	G	H	J	K	S	O	SHAFT EXTENSION		
													U	Y	KEY
324T-8100	19.95	20.00	47.82	10.00	8.00	16.00	1.06	.75	27.04	4.00	37.36	20.50	1.875	3.50	.50SQ x 3.50LG
326T-8100	19.95	20.00	49.33	10.00	8.00	16.00	1.06	.75	27.04	4.00	38.33	20.50	1.875	3.50	.50SQ x 3.50LG
364T-8100	19.95	20.00	50.30	10.00	8.00	16.00	1.06	.75	27.04	4.00	39.05	20.50	1.875	3.50	.50SQ x 3.50LG
365T-8100	19.95	20.00	51.30	10.00	8.00	16.00	1.06	.75	27.04	4.00	39.55	20.50	1.875	3.50	.50SQ x 3.50LG
405T-8120	23.50	24.00	59.86	12.00	10.00	20.00	1.25	.82	32.60	4.00	46.60	24.56	2.375	4.50	.62SQ x 4.00LG
444T-8120	23.50	24.00	62.04	12.00	10.00	20.00	1.25	.82	32.60	4.00	47.36	24.56	2.375	4.50	.62SQ x 4.00LG
445T-8120	23.50	24.00	64.04	12.00	10.00	20.00	1.25	.82	32.60	4.00	48.36	24.56	2.375	4.50	.62SQ x 4.00LG
445T-8140	25.50	26.00	68.07	13.00	11.00	22.00	1.25	.94	36.25	4.00	52.38	26.58	2.875	5.75	.75SQ x 4.50LG
447T-8140	25.50	26.00	71.57	13.00	11.00	22.00	1.25	.94	36.25	4.00	54.13	26.58	2.875	5.75	.75SQ x 4.50LG
449T-8140	25.50	26.00	-	13.00	11.00	22.00	1.25	.94	36.25	4.00	-	26.58	2.875	5.75	.75SQ x 4.50LG

Frame SPM	AA	AB	AC	AD	AE	AF	AG	AH	Approximate Weight lbs.
324T-8100	2.00	13.18	10.68	13.38	11.42	5.00	7.08	6.64	1325
326T-8100	2.00	13.18	10.68	13.38	11.42	5.00	7.08	6.64	1490
364T-8100	3.00	16.68	12.75	13.38	11.42	6.75	7.08	6.64	1570
365T-8100	3.00	16.68	12.75	13.38	11.42	6.75	7.08	6.64	1640
405T-8120	3.00	17.68	13.75	15.25	13.30	6.75	8.16	7.80	2320
444T-8120	3.00	18.68	14.75	15.25	13.30	6.75	8.16	7.80	2600
445T-8120	3.00	18.68	14.75	15.25	13.30	6.75	8.16	7.80	2775
445T-8140	3.00	18.68	14.75	16.28	14.32	6.75	9.60	9.00	3175
447T-8140	3.00	18.68	14.75	16.28	14.32	6.75	9.60	9.00	3550
449T-8140	3.00	18.68	14.75	16.28	14.32	6.75	9.60	9.00	4200

"D" dimension will never be exceeded, when exact dimension is needed, liners up to .03" may be required on Model 8100. Liners up to .06" may be required on Models 8120 and 8140.

Outline Dimensions

Model SPMV-8100 through SPMV-8160, for Vertical Duty



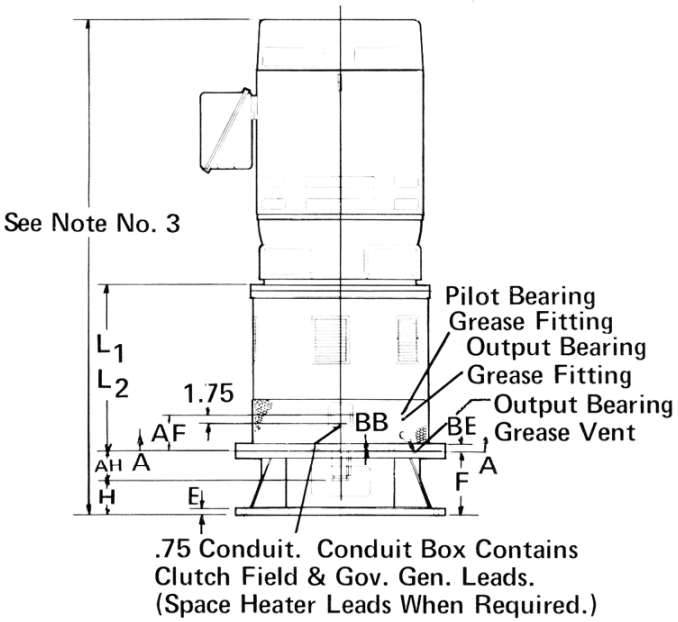
MAX. RPM	Model SPMV	A	B	C	D	E	F	G	J	L	M	N	P	R	S	T
1800	8100	22.00	24.00	11.00	12.00	1.00	12.00	11.06	23.16	23.06	12.50	19.75	21.00	1.250	.375	.75
	8120	26.00	28.00	13.00	14.00	1.00	12.00	1.06	28.04	28.20	12.50	23.50	25.12	1.750	.375	.75
900	8140	26.00	28.00	13.00	14.00	1.00	12.00	1.06	30.38	30.75	12.50	25.50	27.16	1.750	.375	.75
	8160	33.50	36.00	16.75	18.00	1.25	12.75	1.18	31.74	31.88	21.00	30.50	32.30	2.375	.500	1.00

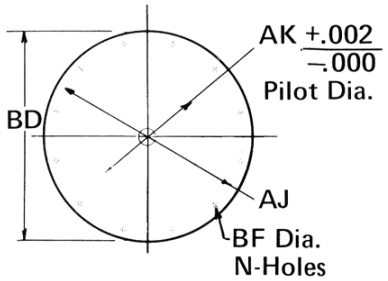
Model SPMV	U	Key	AB	AC	AD	AH	AJ	AK	BD	BF
8100	1.625	.38 Sq. x 3.00	11.42	13.38	2.76	4.50	14.75	13.5	19.75	5/8-11
8120	2.125	.50 Sq. x 3.00	13.30	15.25	3.26	4.50	14.75	13.50	20.00	5/8-11
8140	2.125	.50 Sq. x 2.50	14.32	16.28	3.12	4.50	14.75	13.50	24.50	5/8-11
8160	2.875	.75 Sq. x 3.50	16.80	18.75	3.34	5.25	26.00	22.00	30.50	.82

1. NOTES:
2. Ring base is optional.
3. Conduit box can be turned to any of four positions vertically or horizontally to provide entrance from top, bottom, or either side. Box will be mounted on opposite side upon request.
4. Overall height & other motor dimensions are dependent upon motor manufacturer.
5. 8100, 8120, 8140 - 8 mounting screws.; 8160 - 8 mounting holes

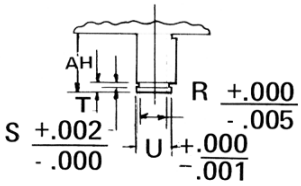
Outline Dimensions

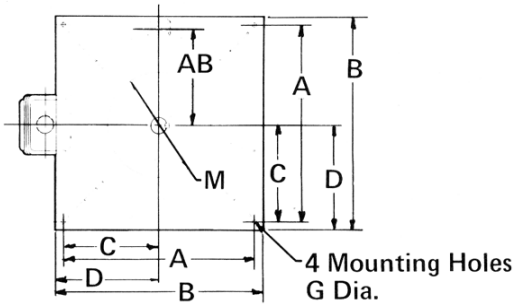
Models SPMV-8120 through SPMV-8240, for Vertical Duty





"P" Flange
View A-A





MAX RPM	MODEL SPMV	A	B	C	D	E	F	G	H	L_1	L_2[2]	M	N	R	S	T
1800	8120	26.00	28.00	13.00	14.00	1.00	12.00	1.06	7.50	28.20	28.20	12.50	12	1.750	.375	.75
	8140	26.00	28.00	13.00	14.00	1.00	12.00	1.06	7.50	30.75	30.75	12.50	12	1,750	.375	.75
	8160	33.50	36.00	16.75	18.00	1.25	12.75	1.18	7.50	31.88	31.88	21.00	12	2,375	.500	1.00
1200	8180	33.50	36.00	16.75	18.00	1.25	12.75	1.18	6.75	35.25	37.22	21.00	12	2,875	.500	1.00
	8200	40.50	44.00	20.25	22.00	1.62	13.50	1.32	6.50	38.50	40.66	25.00	14	3,375	.500	1.00
900	8220	54.00	58.00	27.00	29.00	1.75	15.00	1.56	7.50	41.25	43.54	32.75	16	3.500	.500	1.00
	8240	CONSULT FACTORY FOR DIMENSIONS														

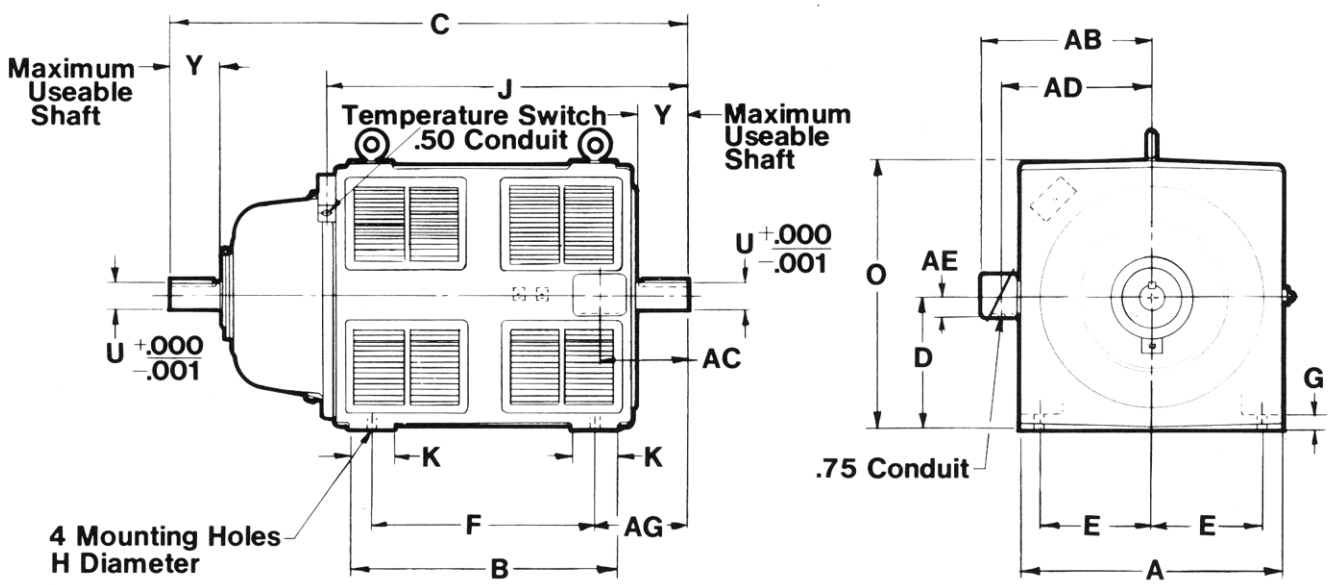
Model SPMV	U	KEY	AB[4]	AF	AH	AJ	AK	BB[5]	BD	BE	BF
8120	2.125	.50 Sq. x 3.00	13.56	7.50	4.50	27.25	13.50	.25	28.75	1.00	.68
8140	2.125	.50 Sq. x 2.50	14.68	7.50	4.50	29.50	13.50	.25	31.00	1.00	.68
8160	2.875	.75 Sq. x 3.50	17.04	7.50	5.25	33.50	22.00	.32	36.00	1.40	.82
8180	3.375	.88 Sq. x 4.50	19.18	7.50	6.00	33.50	22.00	.32	36.00	1.56	.82
8200	3.875	1.00 Sq. x 5.50	23.18	13.00	7.00	46.50	26.00	.32	48.50	1.82	1.12
8220	4.000	1.00 Sq. x 5.50	26.78	13.25	7.50	53.50	33.75	.32	55.50	1.82	1.12
8240	CONSULT FACTORY FOR DIMENSIONS										

NOTES:

1. Ring base is optional.
2. Denotes length required when using duplex bearings.
3. Overall height & other motor dimensions are dependent upon motor manufacturer.
4. Conduit box can be turned to any of four positions vertically or horizontally to provide entrance from top, bottom, or either side. Box will be mounted on opposite side upon request.
5. For higher thrust capacity

Outline Drawings

Models SPC-8100 through SPC-8160 Separate Clutches for Horizontal Duty



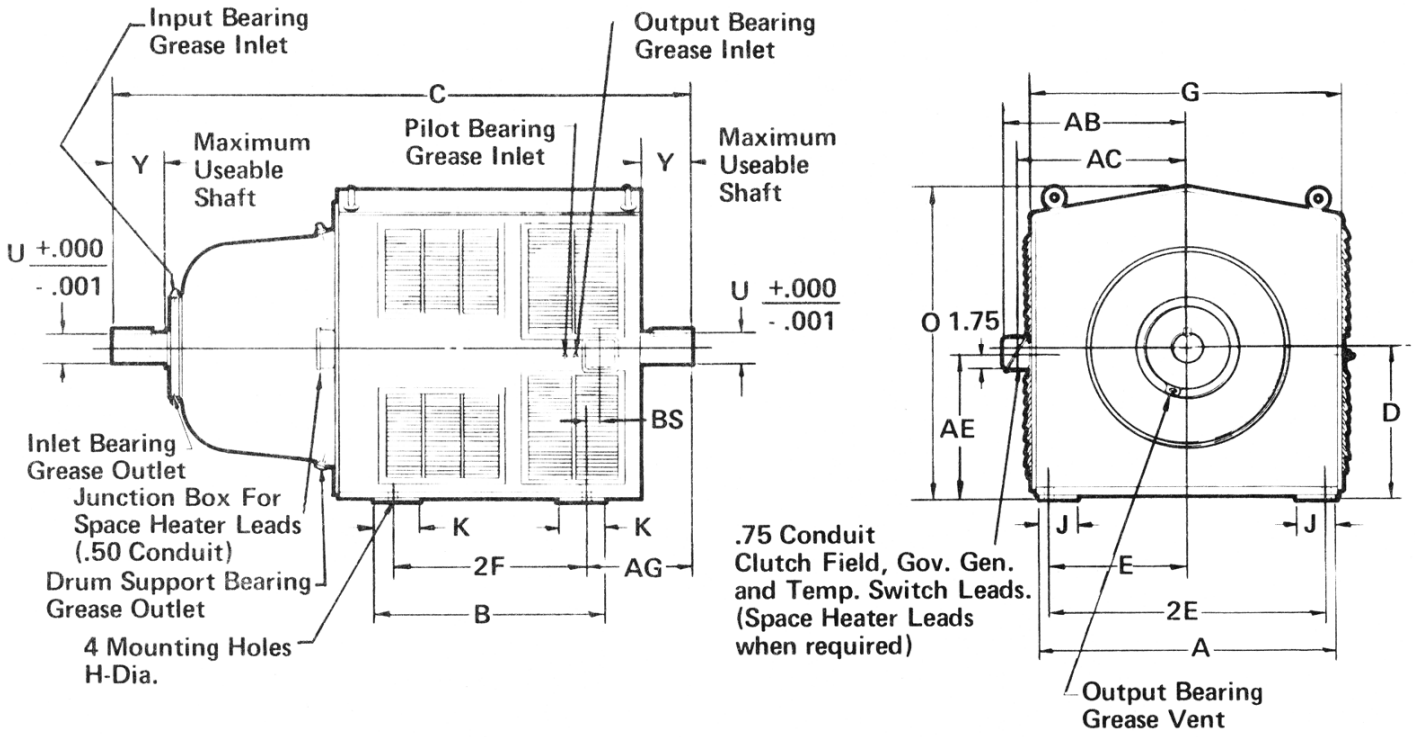
Frame SPC	A	B	C	D*	E	F	G	H	J	K	0	Shaft Extension			AB	AC	AD	AE[1]	AG
												U	Y	KEY					
8100	19.75	20.00	39.14	10.00	8.00	16.00	1.06	.75	27.04	4.00	20.50	1.875	3.50	1/2 SQ x 3.50	13.38	6.6	1.42	1.75	7.08
8120	23.50	24.00	46.56	12.00	10.00	20.00	1.25	.82	32.60	4.00	24.56	2.375	4.50	5/8 SQ x 4.00	15.25	7.80	13.30	1.75	8.16
8140	25.50	26.00	54.00	13.00	11.00	22.00	1.32	.94	36.25	4.00	26.58	2.875	5.75	3/4 SQ x 4.50	16.28	9.00	14.32	1.75	9.60
8160	30.50	27.00	63.50	15.50	13.00	22.00	1.38	1.18	38.32	5.00	31.65	3.250	6.25	3/4 SQ x 5.25	18.75	9.50	16.80	1.75	10.75

"D" dimension will never be exceeded. When exact dimension is needed, liners up to .03" may be required on Model 8100. Liners up to .06" may be required on Models 8120, 8140 and 8160.

1. Conduit box can be turned to any of four positions vertically or horizontally to provide entrance from top, bottom, or either side. Conduit box will be mounted on opposite side upon request.

Outline Dimensions

Models SPC-8180 through SPC-8240 Separate Clutch for Horizontal Duty



Max RPM	MODEL SPC	A	B	C	D[1]	E	2F	G	H	J	K	O	SHAFT EXTENSIONS			AB	AC	AE[2]	AG
													U	Y	KEY				
1200	8180	33.50	27.00	67.25	17.00	15.00	22.00	35.00	1.12	4.50	5.50	34.75	3.625	7.00	.88 Sq. x 5.75	21 00	19.04	17.00	13.48
	8200	39.50	30.00	74.62	20.00	18.00	25.00	41.25	1.25	5.00	6.00	40.86	3.875	7.00	1.00 Sq. x 5.75	24.12	22.16	18.92	13.30
900	8220	47.50	33.00	79.75	24.00	22.00	28.00	49.50	1.38	5.50	6.00	49.00	4.250	8.25	1.00 Sq. x 6.50	28.26	26.30	23.32	13.75
	8240	Consult Factory for Dimensions																	

NOTES:
"D" Dimension will never be exceeded. When exact dimension is needed, liners up to.06 may be required.

[1] Conduit box can be turned to any of four positions vertically or horizontally to provide entrance from top, bottom, or either side. Conduit box will be mounted on opposite side upon request.

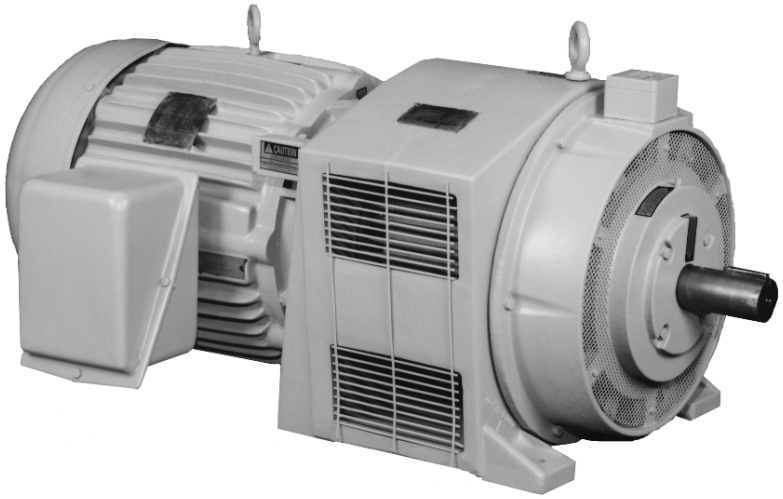
Models AT-320 through AT-440 Drives
Product Description

Description

Dynamatic® Model AT Drives is a combination of an air-cooled, adjustable speed clutch and a flange mounted AC induction motor. The AT Drive transmits torque at variable speeds. There is no physical contact between input and output members. This results in smooth response, thereby eliminating shock loading and extending equipment life. All drives have an integral tachometer generator mounted around the output shaft to provide a feedback signal to the drive's controller. The controller provides the DC excitation for the clutch coil. The feedback signal from the tachometer generator is used as a reference signal within the controller to maintain accurate speed regulation. The controllers for the drives are described in the Product Catalog.

Features

- AC power input - AT drives and controllers are available to run on virtually any three phase voltage input.
- Approximately 250% motor torque available at clutch output.
- Three-year warranty on AT mechanical drives.
- Simple design - Drive consists of a clutch, AC induction motor and a separate controller.
- Fewer wearing parts - All AT variable speed drives have only four bearings and no slip rings or brushes.
- 0.5% speed regulation is standard.
- Uses existing wiring and motor starters.
- Controller circuits are isolated from power lines.
- Totally enclosed fan cooled AC motor is standard.



AT-320 through AT-440

Product Information

The Model AT drive includes an 1800 RPM, TEFC, AC induction motor, with 230/460 VAC, 3 phase, 60 Hz input (220/380 VAC, 3 phase 50 Hz. input also available), 1.15 SF, NEMA design B, Class F insulation, motor is flange mounted to a brushless clutch in a cast iron housing with 100% rated motor torque continuously available over the speed range shown.

Model Numbers

HP	Speed Range (RPM)	Model Number	Motor Frame Size
25	1092-50	AT-320250-4061	326TD
30	1705-50	AT-320300-4041	326TD
	1097-50	AT-320300-4161	326TD
40	1665-50	AT-320400-4041	326TD
	1082-233	AT-320400-4161	365TD
50	1700-175	AT-320500-4141	326TD
	1122-50	AT-360500-4161	365TD
60	1690-438	AT-320600-4141	365TD
	1670-50	AT-360600-4041	365TD
	1102-214	AT-360600-4161	405TD
75	1665-700	AT-320750-4141	365TD
	1705-163	AT-360750-4141	365TD
	1097-156	AT-440750-4161	405TD
100	1675-560	AT-361000-4141	405TD
	1685-175	AT-441000-4041	405TD
	1112-408	AT-441000-4161	445TD
125	1650-798	AT-361250-4141	445TD
	1690-490	AT-441250-4141	445TD
	1097-560	AT-441250-4161	445TD
150	1695-700	AT-441500-4141	445TD
200	1660-963	AT-442000-4141	449TD

Renewal Parts

Description	Clutch Model	Part Number
Ball Bearing	AT-320	0DY-015621-0000
Ball Bearing	AT-320	0DY-007377-0000
Bearing, Spherical Roller (Opt)	AT-320	0DY-016826-0000
Ball Bearing	AT-360	0DY-016729-0000
Ball Bearing	AT-360	0DY-005001-0000
Bearing, Spherical Roller (Opt)	AT-360	0DY-016845-0000
Ball Bearing	AT-440	0DY-007377-0000
Bearing, Spherical Roller	AT-440	0DY-016840-0000
Generator Field Assy	AT-320	000-092194-0100
Generator Field Assy	AT-360	000-093182-0100
Generator Field Assy	AT-440	000-094182-0100
Generator Rotor Assy	AT-320	000-092167-0100
Generator Rotor Assy	AT-360	000-087102-0100
Generator Rotor Assy	AT-440	000-094167-0100
Oil Seal	AT-320	0DY-016810-0000
Oil Seal	AT-360	0DY-016822-0000
Oil Seal	AT-440	0DY-016823-0000
Shaft	AT-320	000-092181-0100
Shaft, Special Length (Opt)	AT-320	000-092201-0200
Shaft	AT-360	000-093181-0100
Shaft, Special Length (Opt)	AT-360	000-093201-0200
Shaft	AT-440	000-094181-0100
Wave Spring	AT-320	0DY-016757-0000
Wave Spring	AT-360	0DY-016718-0000
Wave Spring	AT-440	0DY-016816-0000

Specifications

Adjustable Speed Drive Specification for Pumps Models AT-320 through AT-440 Drives
The pump shall be driven by means of a vertical adjustable speed eddy-current slip device used to transmit the torque supplied from the integral AC squirrel cage induction motor. The drive shall be capable of providing an infinitely adjustable speed range to the pump.

The vertical or horizontal motor shall be flange mounted to the eddy-current clutch. It shall be rated ___HP, _____ RPM, NEMA B design, Class B insulated, totally enclosed fan cooled construction and suitable for connecting to the ____V, 3 phase, ___HZ customer's power supply.

The air cooled eddy-current clutch shall be comprised of a rigid frame, constant speed input drum member, and an adjustable speed output member for coupling to the pump shafting. The design of the eddy-current clutch shall be such that the drive can be easily disassembled for service with a minimum amount of down time. Removal of the motor from the clutch flange adapter plate shall allow the motor and drum to be lifted from the clutch frame for easy access to the internal pilot bearing and other internal components. Removal of other internal drive components shall be further facilitated by not having to remove the clutch frame. The frame shall be of totally enclosed fan cooled design and shall support the vertical or horizontal motor. It shall provide for; baffles to direct the cooling air to the constant speed member, and mounting space for the output support bearing housing, terminal box, lifting lugs and motor flange adapter. The input drum shall be firmly secured to the motor output shaft, shall be of low carbon content steel and shall be designed with adequate exterior surface for internal self-cooling.

The adjustable speed output rotor shall be of the eddy current design and shall be mounted within and concentric to the smooth inner surface of the drum. The rotor shall be cast of high permeability steel and shall be machined to insure a uniform precision air gap. The pole windings shall be spool wound for ease of replacement, of class F insulated glass magnet wire and wrapped in a protective tape to insure protection against moisture. The output rotor shall be supported and held within accurate clearances by means of grease lubricated internal anti-friction bearings. The internal pilot bearing shall separate the input drum and the rotor. The output bearing support housing shall support the weight of the rotating members and shall be suitable for external thrust loading due to intermediate shafting, pump rotating parts or hydraulic loading. All bearings should be capable of being lubricated while the drive is in operation from fittings easily accessible on the clutch frame. An internal alnico type AC generator is to be used to provide the speed feedback signal for the controller, and tachometer readout.

The vertical and horizontal adjustable speed drive shall be fully assembled, balanced and tested at the factory to insure satisfactory performance. The motor and clutch shall be shipped as a unit. The clutch output flange shall be suitably drilled for mounting to the customer's support foundation. The clutch output shaft shall be suitable for coupling to the pump shaft.

The speed controller for the adjustable speed drive shall be of the digital type or solid state SCR type and be mounted in a NEMA 1 enclosure. The power input to the controller isolation transformer shall be 230/460 volts, 1 phase, 60 Hz. (Other input voltages are available upon request). The controller shall be suitable for accepting a remote instrument signal from a liquid level control or directly from the customer's pressure-to-current transducer, in the automatic mode of operation or suitable for manual operation from a manual speed potentiometer. The controller shall be designed to regulate the output speed within +/-1% of maximum speed at any preset speed. The controller shall have maximum and minimum speed limiting potentiometers as a standard on-board feature. The controller shall have the inherent design features of inversion for improved dynamic response and phase limit, current feedback and velocity feedback circuits for optimum controller performance. The adjustable speed eddy current drive and controller intended herein shall be a Model AT_____ as supplied by DSI/Dynamatic® or approved equal.

Drive Engineering Data

Adjustable Speed Drive Data

Model	Clutch Torque Lb. Ft. at Slip RPM of ❶					Rated Dissipation HP at Input RPM of❷					Inertia Lb. Ft. ² Output Member
	50	75	100	150	1750	900	1000	1200	1500	1800	
AT-140	4.5	6.0	7.2	9.5	25.0	1.6	1.8	2.0	2.6	3.0	0.9
AT-140C ❺	6.0	7.5	9.0	12.0	27.0	1.6	1.8	2.0	2.6	3.0	0.9
AT-180	10.0	13.5	16.0	21.0	46.0	3.3	3.6	4.1	5.2	6.0	2.0
AT-180C	13.0	17.5	21.5	26.0	50.0	3.3	3.6	4.1	5.2	6.0	2.0
AT-210	19.0	25.0	32.0	44.0	74.0	5.0	5.3	6.2	7.8	9.0	3.6
AT-210C	23.0	33.0	38.0	50.0	78.0	5.0	5.3	6.2	7.8	9.0	3.6
AT-250	42.0	56.0	68.0	82.0	115.0	8.8	9.5	11.0	14.0	16.0	6.2
AT-250C	60.0	80.0	92.0	110.0	130.0	8.8	9.5	11.0	14.0	16.0	6.2
AT-280	56.0	73.0	85.0	105.0	195.0	15.0	17.0	20.0	24.0	27.0	15.9
AT-280C	100.0	128.0	160.0	200.0	230.0	15.0	17.0	20.0	24.0	27.0	15.9
AT-320	70.0	110.0	140.0	185.0	460.0	24.5	27.0	32.0	39.0	45.0	30.5
AT-320C	140.0	200.0	250.0	300.0	550.0	24.5	27.0	32.0	39.0	45.0	30.5
AT-360	130.0	170.0	210.0	250.0	640.0	39.0	42.5	49.0	59.0	68.0	55.0
AT-360C	230.0	320.0	370.0	440.0	700.0	39.0	42.5	49.0	59.0	68.0	55.0
AT-440	325.0	380.0	415.0	485.0	860.0	51.0	56.0	65.0	78.0	90.0	123.0
AT-440C	450.0	575.0	650.0	760.0	1060.0	51.0	56.0	65.0	78.0	90.0	123.0

Adjustable Speed Drive Data

Model	Motor Frame	Overhung Load Lbs. at Output RPM of ❸						45V Clutch Coil Current (Hot Amps)	Weight Lbs.❹
		900		1200		1800			
		Std.	Spher.	Std.	Spher.	Std.	Spher.		
AT-140	143T/145T	378	-	378	-	378	-	3.40	150
AT-180	182T/215T	281	-	281	-	281	-	3.90	263
AT-210	213T/254T	790	-	790	-	680	-	3.90	430
AT-250	254T/286T	682	-	682	-	664	-	4.20	630-675
AT-280	284T/326T	1124	1124	1116	-	961	1124	7.20	1050-1214
AT-320	326T/365T	1490	1739	1341	1739	1156	1739	7.04	1297-1806
AT-360	365T/405T	2012	2796	1811	2796	1560	2796	8.37	2490-2712
AT-440	405T/447T	3372	3372	3372	3372	3372	3372	8.23	3055-3650

❶ Values are for four-pole motor speeds.
❷ Indicates maximum HP that can be safely dissipated at a given input speed. Dissipation should be de-rated 10% for each 10° F (5.5° C) above 100° F (38° C) ambient, to 150° F (71° C) maximum ambient.
❸ Values are based on B-10 bearing life of 15,000 hours. For 20,000 hours use 91% of the values shown. The figures are the maximum weights at the center of a standard output shaft keyway perpendicular to the axis. Ratings are for ball bearings or spherical roller bearings, as noted.
❹ Approximate weight of brake.
❺ Copper plated drum.

Brake Engineering Data

Adjustable Torque Brake Data

Model	Brake Torque in Lb. Ft. at Output RPM of Model				Brake Dissipation HP at Brake RPM of				Brake Rotor Lb. Ft^2	45 V Brake Coil Current (Hot Amps)	Wt. Lbs.❹
	600	900	1200	1800	600	900	1200	1800			
AT-320B	120	138	147	153	3.3	5.0	6.7	10.0	7.1	5.5	150
AT-360B	120	138	147	153	3.3	5.0	6.7	10.0	7.1	5.5	150
AT-440B	120	138	147	153	3.3	5.0	6.7	10.0	7.1	5.5	150

Adjustable Speed Drive with Adjustable Torque Brake Data

Model	Motor Frame	Drive with Motor Overhung Load in Lbs. at Output RPM of ❸		
		900 Spherical	1200 Spherical	1800 Spherical
AT-320B	326T/365T	1739	1739	1739
AT-360B	365T/405T	2796	2796	2796
AT-440B	405T/445T	3372	3372	3372

Adjustable Speed Drive with Friction Brake Data

Model	Motor Frame	Electrically Engaged			Drive with Overhung Load in Lbs. at Output RPM of			Weight Lbs. ❹
		Static Torque Lb. Ft.	Inertia Lb. Ft.^{2}	Brake Model	900	1200	1800	
AT-320F	326T/365T	240	1.06	310	1490	1340	1155	30
AT-360F	365T/405T	465	2.14	312	2010	1810	1560	50
AT-440F	405T/445T	-	-	-	-	-	-	-

❸ Values are based on B-10 bearing life of 15,000 hours. For 20,000 hours use 91% of the values shown. The figures are the maximum weights at the center of a standard output shaft keyway perpendicular to the axis. Contact the factory for overhung load ratings on model/motor frame combinations and other configurations not listed.

❹ Approximate weight of brake.

Engineering Data

Noise Levels

These sound pressure levels are **typical** values given for engineering information only, and it is **not guaranteed** that any particular production unit will exceed these values.

Microphone 3 feet from side of drive, tested in a semi-anechoic chamber above reflecting plane per IEEE-85. All readings are sound pressure level, dB; reference 20 micro-Newton's per square meter. Average sound pressure in a 3-foot radius hemispherical free field. Noise level for 1200 RPM drives will be 9 dB less than 1800-RPM values shown, and for 3600 RPM the noise level will be 15 dB greater.

Model	RPM	Sound Pressure dB	
		Output Rating	Output Stalled
AT-320	1800	83.2	86.4
AT-360	1800	85.9	87.3
AT-440	1800	87.1	89.0

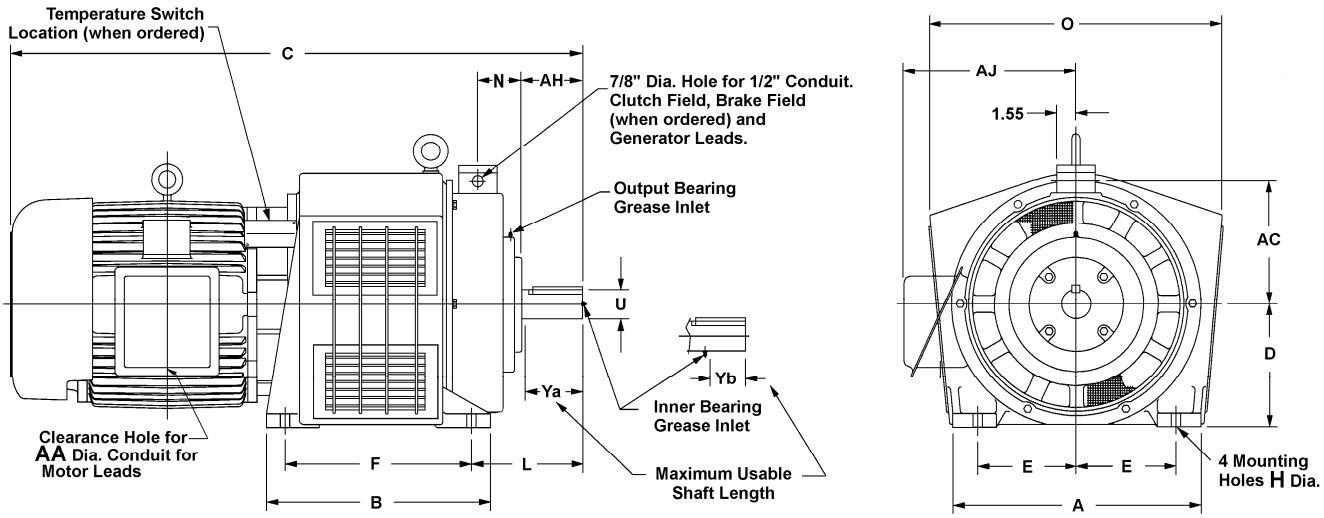
Full Load Motor Currents

The full load motor currents shown in the following table are typical values for 4-pole motors. Full load current for 6-and 8-pole motors will typically be higher than the values listed for 4-pole motors. This table is intended for use as an aid in sizing motor branch circuit components. For setting motor over-current protection devices, consult the motor name-plate. For full load motor currents of 200 and 208-volt motors, increase the corresponding 230 volt motor full load current by 15% and 10% respectively. Multi-speed motors will have the full load current varying with speed in which case the nameplate rating shall be used.

HP	Full Load Amperes for 4 Pole Motors at				
	230V 60Hz	460V 60Hz	575V 60Hz	220V 50Hz	380V 50Hz
30	66.0	33.0	-	-	42.0
40	104.0	52.0	41.0	-	-
50	130.0	65.0	52.0	-	-
60	152.0	76.0	61.0	-	-
75	184.0	92.0	74.0	-	-
100	240.0	120.0	96.0	-	-
125	296.0	148.0	118.0	-	-
150	344.0	172.0	138.0	-	-
200	448.0	224.0	179.0	-	-

❶ 184TC Frame

Outline Drawings



C-92190/C-92191, C-93190/C-93191, C-94190/C-94191

Model	Motor Frame	A	B	C	D❶	E	F	H	L	N	O	Shaft Extension		
												U❷	Ya❸	Yb❸
320 (STD)	326T 365T	20.00	18.00	47.57 49.19	10.00	8.00	15.00	.75	9.00	3.29	23.60	2.375	4.75	2.88
360 (STD)	365T 405T 445T	22.00	23.00	56.18 59.62 64.24	11.00 10.97	9.00	20.00	.88	14.00	5.78	25.76	2.875	6.44	4.62
440 (STD)	405T 445T 449T	24.00	24.00	64.02 68.64 77.14	12.00 11.97	10.00	21.00	.88	17.14	6.80	28.72	3.375	8.26	5.62

Model	Motor Frame	KEY	AA❹	AB	AC	AH	AJ
320 (STD)	326T 365T	.62 Sq. x 4.00 Lg.	2.00 3.00	11.25	10.00	4.88	13.18 16.68
360 (STD)	365T 405T 445T	.75 Sq. x 6.00 Lg.	3.00	12.37	11.12	6.57	16.68 17.68 19.75
440 (STD)	405T 445T 449T	.88 Sq. x 7.50 Lg.	3.00	13.87	12.62	8.58	17.94 19.56 19.56

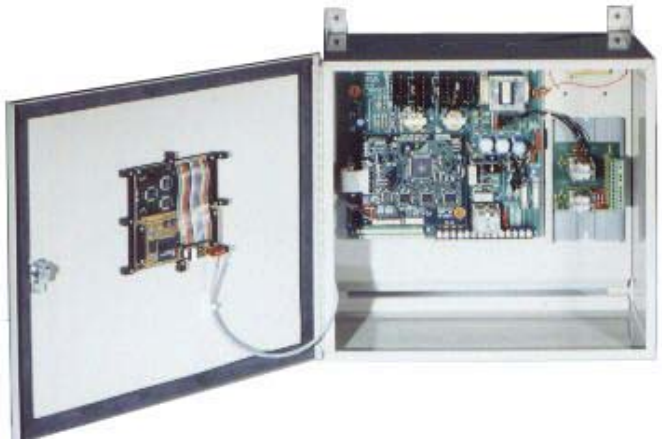
❶ **D** dimension will never be exceeded. When exact dimension is needed, shims up to .03 inch may be required.
❷ **U** shaft diameter tolerance: +.000/-.001 inch. Diameter shown is standard. Smaller diameter shafts of 2.125 for Model 320 and 2.375 for Model 360 are available upon request.
❸ **Y** Dimensions are usable shaft lengths: **Ya** grease fitting on end; **Yb** grease fitting on side.
❹ Conduit box can be turned to any of four positions: horizontally, vertically, opposite side or on top upon request.

To get weights on above units, please contact the factory.

DIMENSIONS ARE IN INCHES

Controllers

Model EC-2000 & EC-2000 High Power Controller



The Model EC-2000 Family of controls is a high quality, high performance universal eddy-current drives controller capable of providing excitation for the Dynamatic® brand Eddy Current drives as well as similar drives manufactured by others. The EC-2000 may be used with drives ranging from the Fractional Horsepower FAS brand of drives from ¼ to 1½ HP, to the complete Ajusto-Spede® AS brand of integral motor-clutch drives from 1- through 40 HP, as well as the full line of Ajusto-Spede® AT brand drives up to 200 HP. These controllers also provide excellent sources for the Eddy Current Brake series such as the Dynamatic® AS-707 brands.

The New EC-2000 High Power version was designed to power Dynamatic® and other brands Eddy Current drives from 100 Through 10,000 HP. This includes Eddy Current brakes up to 5000 HP as well. The 460 V maximum input power requirement makes them ideal choices for control of high power output variable speed without the Medium Voltage control normally required at these HP's . This means reduced maintenance personnel and a safer control operating environment.

The EC-2000 is offered in an Original Equipment Manufacturers' (OEM) package as a basic, central control unit to provide maximum performance at the lowest price. It is offered to Users and Distributors as a complete drive unit for customer mounting. It also is offered in a Mark III panel replacement version. The EC-2000 was designed around the idea that standard industrial modifications would be included in software for customer use at no additional charge. This will simplify distributor and user stocking by creating one drive to handle all plant applications through 200 HP. It will also benefit user maintenance training and facilities management by offering the benefits of digital control.

The EC-2000 features dual circuit board construction with integral heat dissipaters for the power components. The EC-2000 uses hybrid surface-mount as well as through-hole technologies. The Daughter Boards is mounted on stand-off and allows parameter storage for quick power board swaps. The Daughter Board retains the drives program, thus retaining customer settings. The control comes in Panel, Dynamatic® Mark III replacement panel, NEMA 1 and NEMA 12 configuration. We offer separately mounted transformers if required by the customer installation, however the EC-2000 was designed to work off of any 115VAC source at a minimum of 500 VA to a maximum power requirement of 1 KVA.

The EC-2000 High Power is merely an extension of the HP range with some thoughtful design additions to make the EC-2000 line of controls complete through 10,000 HP. While the EC-2000 features dual circuit board construction, the High Power version adds simple to replace, separate power devices, to the design for ease of maintenance. Unlike other more complicated controls the power components can be changed without complete board disassembly . Merely open the door (interlocking power disconnect required for safety) and you have instant access to the output devices for testing and replacement . The design is clean, looks nice, and is easy to work on.

In keeping with future development of this control product, custom built special option versions of the EC-2000 High Power are possible with a minimum required design and implementation time. Special software can accommodate major feature changes. Hardware can be added for ease of wiring, extra relaying functions, or extra terminals. Thus creating a powerful and flexible drive package.

The following are the built in programmable features of the EC-2000 line of controls:

i. Linear Acceleration and deceleration Control
ii. Jog Separately Adjustable
iii. Thread Separately Adjustable
iv. Auto Restart
v. PLC Run with Safety interlock
vi. Manual/Auto
vii. Local/Remote
viii. Analog input 4-20 mA
ix. Analog input 0-10VDC
x. Analog Output 4-20 mA
xi. Analog Output 0-10 VDC
xii. Speed/torque mode
xiii. Programmable PID
xiv. Torque limit
xv. Programmable fault response
xvi. Coil loss fault
xvii. Tach loss fault
xviii. Reference loss fault
xix. Clutch current limiting
xx. Field Forcing

DSI/Dynamatic recognizes a large market for replacement of controls on High HP drives. There are numerous High HP applications in industry. Many have large water cooled Eddy Current drives on them. These systems have older design controls. The EC-2000 High Power was conceived and designed to address this market need.

The Eddy Current water cooled coupling is a natural for controlling the variable speed requirement of medium voltage motors at a reasonable cost. The EC-2000 High Power is the perfect choice for these applications. Its digital capability, reliability, system diagnostics, and communication capability make it a perfect choice for replacement of controls such as:

- Louis Allis MDB-36
- Louis Allis MDB-70
- EM Regutrol
- Dynamatic Mark III
- As Well as new applications for variable speed output of medium voltage motors.

These controls cover industrial and commercial applications such as:

- Waste Water Treatment
- Fresh Water Pumping
- Petrochemical Processing
- Plastic Extruding
- Pulp and Paper Processing
- Air Handling
- Mining
- Wind Tunnel Testing
- Ore Conveying
- Ore Feeding
- Coal Conveying
- Electric Power Plants
- Dredges

These controls cover Machines such as:

- Effluent Pumps
- Water Pumps
- Chemical pumps
- Chemical Mixers
- Extruders
- Wire Cable Coating
- Paper Machines
- Large Fans
- Large Drill Compressors
- Wind Tunnel Blowers
- Mine Site Ore Conveyors
- Port Ore Conveyors
- Coal storage Conveyors
- Coal Feeder conveyors for Electric power generation.
- Dredge Pumps

The EC-2000 High Power will not only upgrade existing older controllers to the state of the art but will also save money. As a result of retaining large Eddy Current drives the need for huge investments in new equipment is eliminated. This eliminates the cost of redesign, installation and commissioning of a new system. The long life of the Eddy Current Drives and Controls means that the plant systems may continue for years to come with the continued proven reliability of Eddy Current.

The Eddy Current drive and EC-2000 control have higher starting torque capabilities, high power handling capabilities, lower maintenance, simpler electronics and troubleshooting, lower input voltage, no fault features, and mechanical fault diagnostics. Along with its low relative cost compared to other drive solutions, it is a very economical drive solution.

The Model EC-2000 Controller can be provided as a panel mount, or it can be provided in a NEMA 1 or NEMA 12 Enclosure. The NEMA 1 and NEMA 12 enclosures include the installed keypad. The panel mount versions do not include the keypad, cable or mounting hardware, but may be ordered loose (see below). A power relay is built in. Optional current transformers are required for torque limit operation. Input transformers are not required, but are available. Please contact the factory for further information.

EC-2000 Standard Controller

Description	Part Number
Panel Mount Control w/o Keypad	15-002000-0100
Panel Mount Replacement for Mark III Control w/o Keypad (Dimensional Replacement)	15-002000-0200
Includes NEMA 1 Enclosure and Keypad	15-002000-0300
Includes NEMA 12 Enclosure and Keypad	15-002000-0400
Press Drive Control (keypad not included, CT extra)	15-002000-0500
Keypad Kit with Cable & Mounting Hardware	37-000544-0100

NOTE:
Panel mount, NEMA 1 and NEMA 12 are standard designs, 45VDC/90VDC programmable, see below for large Higher Power Eddy Current units. For Specials, consult factory.

The Model EC-2000 High Power Controller can be provided as a panel mount, or in a NEMA 12 Enclosure. The NEMA 12 Enclosure includes the installed keypad. The panel mount versions include the keypad loose in a NEMA 4 plastic enclosure. The keypad is required for programming but not for operation. The keypad doubles as a drive display and can be mounted through the door of any enclosure by removing the rear cover and cutting the appropriate space in the enclosure door. A power relay is built in. Optional current transformers are required for torque limit operation. Input transformers, when required, are supplied loose for customer mounting. No braking output is available as standard. If braking is required, consult factory for optional special unit. Please contact the factory for further information.

EC-2000 High Power Controller

Description	Part Number
Panel Mounted 50VDC at 24 ADC w/o Keypad	15-020525-0100
NEMA 12 Enclosure and Keypad 50VDC at 25 ADC	15-020525-0200
Panel Mounted 50VDC at 50 ADC w/o Keypad	15-020550-0100
NEMA 12 Enclosure and Keypad 50VDC at 50 ADC	15-020550-0200
Panel Mounted 100VDC at 25 ADC w/o Keypad	15-021025-0100
NEMA 12 Enclosure and Keypad 100VDC at 25 ADC	15-021025-0200
Panel Mounted 100VDC at 25 ADC w/o Keypad	15-021050-0100
NEMA 12 Enclosure and Keypad 100VDC at 25 ADC	15-021050-0200
Panel Mounted 200VDC at 25 ADC w/o Keypad	15-022025-0100
NEMA 12 Enclosure and Keypad 200VDC at 25 ADC	15-022025-0200
Panel Mounted 230VDC at 25 ADC w/o Keypad	15-022325-0100
NEMA 12 Enclosure and Keypad 230VDC at 25 ADC	15-022325-0200
Panel Mounted 230VDC at 50 ADC w/o Keypad	15-022325-0100
NEMA 12 Enclosure and Keypad 230VDC at 50 ADC	15-022325-0200
Specials	15-02XXXX-5XXX

NOTE:
Panel mount and NEMA 12 are standard designs, single output voltage as rated. Provide feedback specifications at the time of order. For Specials, consult factory. These are the commonly used sizes. Others voltages and current ratings are available. Call factory for pricing.

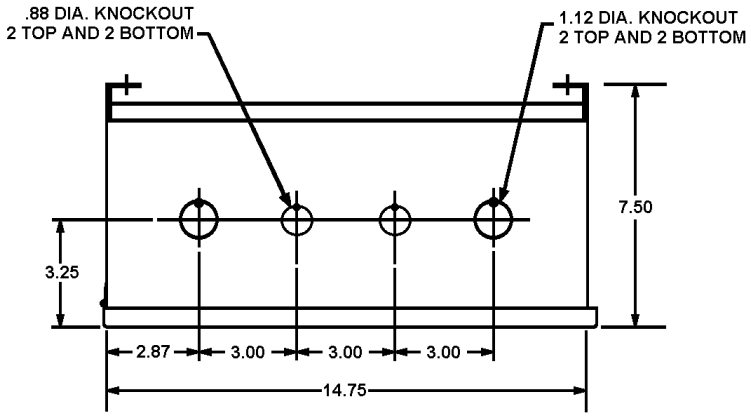
The Model EC-2000 High Power Pump Controller can be provided as a panel mount, or in a NEMA 12 Enclosure. The NEMA 12 Enclosure includes the installed keypad. The panel mount versions do not include the keypad. The keypad is available below as an option. The keypad is required for programming but not for operation. One keypad can program many drives and may be used as a display on any or all of the drives separately. A power relay is built in. Input transformers, when required, are supplied loose for customer mounting. No braking output is available as standard. If braking is required, consult factory for optional special unit. Please contact the factory for further information.

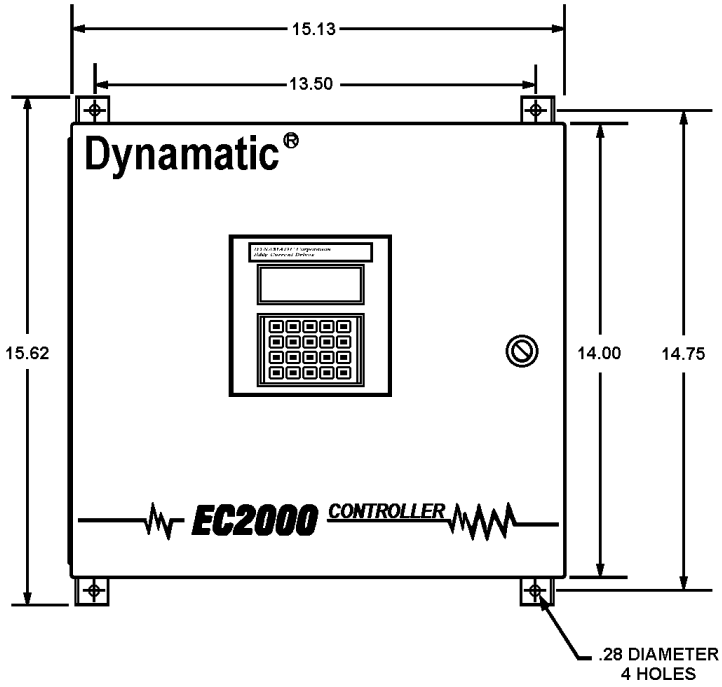
EC-2000 High Power Pump Controller

Description	Part Number	Input
EC-2000 HPP, 45VDC, 25A, Panel Mount	15-020525-0300	Transformer
EC-2000 HPP, 45VDC, 50A, Panel Mount	15-020550-0300	Transformer
EC-2000 HPP, 90VDC, 25A, Panel Mount	15-021025-0300	115 Volt
EC-2000 HPP, 90VDC, 50A, Panel Mount	15-021050-0300	115 Volt
EC-2000 HPP, 200VDC, 25A, Panel Mount	15-022025-0300	230 Volt
EC-2000 HPP, 230VDC, 25A, Panel Mount	15-022325-0300	Transformer
EC-2000 HPP, 200VDC, 50A, Panel Mount	15-022050-0300	230 Volt
EC-2000 HPP 230VDC, 50A, Panel Mount	15-022350-0300	Transformer
EC-2000 HPP, 45VDC, 25A, NEMA 12	15-020525-0400	Transformer
EC-2000 HPP, 45VDC, 50A, NEMA 12	15-020550-0400	Transformer
EC-2000 HPP, 90VDC, 25A, NEMA 12	15-021025-0400	115 Volt
EC-2000 HPP, 90VDC, 50A, NEMA 12	15-021050-0400	115 Volt
EC-2000 HPP, 200VDC, 25A, NEMA 12	15-022025-0400	230 Volt
EC-2000 HPP, 230VDC, 25A, NEMA 12	15-022325-0400	Transformer
EC-2000 HPP, 200VDC, 50A, NEMA 12	15-022050-0400	230 Volt
EC-2000 HPP, 230VDC, 50A, NEMA 12	15-022350-0400	Transformer
Special Feedback Board	Consult Factory	

NOTE:
Panel mount and NEMA 12 are standard designs, single output voltage as rated. Provide feedback specifications at the time of order. 4-20mA follower and 0-10 VDC follower standard. For Specials, consult factory. These controls are used to replace Pump drive controls and panels. These include Dynamatic® Tube type, 4-58, Mark III, and EM Regutron Controllers. Standard Feedback is AC Tachometer generator or 60 Pulse. Call for others.

Model EC-2000 Enclosure Outline Drawings





31-606-3 B

DIMENSIONS ARE IN INCHES

Model EC-2000 Input Transformer for Std. 8A Version

These center tapped transformers provide input power for Model EC-2000 controllers that do not receive their power from a motor winding of the drive or for AT and DCD drives.

Input Transformer

Input Voltage (Single Phase)	Part Number
230/460 Pri/115 Sec	64-000400-0001

Current Transformers

Part Number	Full Load Motor Amps
64-000020-0005	5 Amps
64-000020-0048	48 Amps
64-000020-0060	60 Amps
64-000020-0072	72 Amps
64-000020-0090	90 Amps
64-000020-0120	120 Amps
64-000020-0180	180 Amps

NOTE:
Furnished taped and dipped with mounting strap and wire.

Current Transformers

Part Number	Full Load Motor Amps
64-000031-0003	200 Amps
64-000031-0004	250 Amps
64-000031-0005	300 Amps
64-000031-0006	400 Amps
64-000031-0007	500 Amps
64-000031-0008	600 Amps
64-000031-0009	800 Amps

NOTE:
Furnished in molded mounting case and terminals.

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