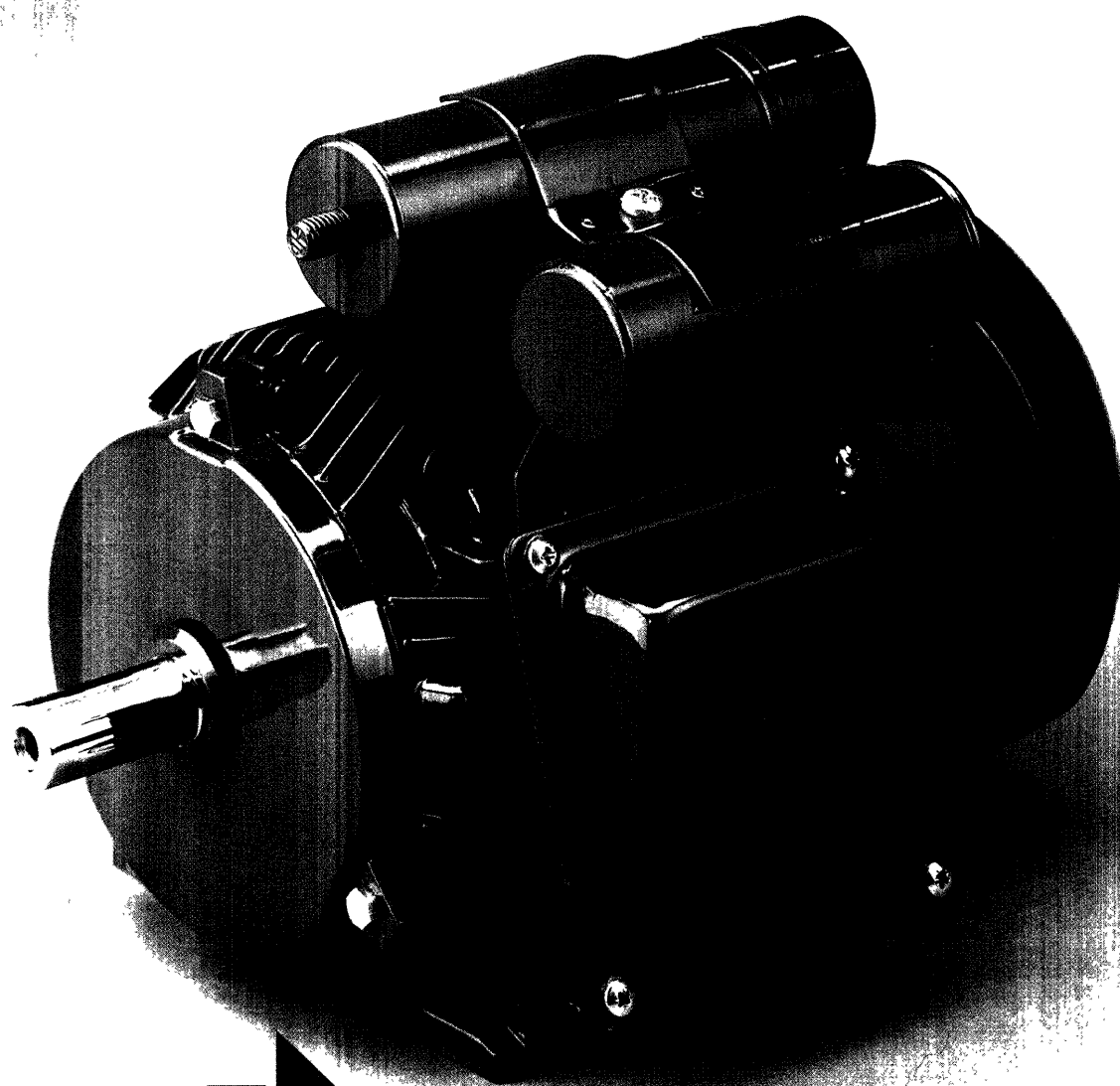


Alpak



ELECTRODRIVES

NOTES

TYPES AND APPLICATIONS

Single-phase supplies are generally available for agricultural, light industrial, domestic and commercial use where other considerations preclude a three-phase supply. Single-phase motors are available in types best suited to specific applications as follows:

PERMANENT CAPACITOR MOTOR (PD)

The limited starting performance of this type of motor makes it most suited to fan, blower or centrifugal pump drives with light starting requirements or for light power applications up to 3kW. It operates with high power-factor and efficiency and has the same overall dimensions as a three-phase motor of the same frame size. This motor requires a simple direct-on-line starter. The capacitor is mounted on the motor frame as standard.

CAPACITOR-START

CAPACITOR-RUN MOTOR (TD)

This type of motor has a high starting performance with kW outputs the same as for a three-phase motor of equal frame size. Both start and run capacitors are used with the start capacitor being disconnected by an inbuilt centrifugal switch. On frames TD71 this is replaced with a current sensitive relay. A simple direct-on-line starter is required. Both start and run capacitors are mounted on the motor frame as standard.

CAPACITOR-START

INDUCTION-RUN MOTOR (ED)

The high starting performance of this motor (similar to that of the three-phase motor), makes this type ideally suited to industrial and agricultural applications where 110V or 240/480V motors are required. The start capacitor and auxiliary winding are disconnected by an inbuilt centrifugal switch. On frames ED63 and ED71 this is replaced with a current sensitive relay. The capacitor is mounted on the motor frame as standard.

SERIES-PARALLEL

CAPACITOR-START MOTOR (SD)

This type has the low starting current that power supply limitations impose on motors of higher output power. Starting performance, intermediate between PD and TD, is commensurate with the low starting current and is generally suited to agricultural applications including fans, blowers and pumps. Capacitors are housed in the special starter unit.

SERIES 101 VARIABLE VOLTAGE CONTROL

These motors are specifically designed for variable voltage control (see page 18).

Type Selection Summary

Type	Start Mode	Run Mode	Applications
PD	One capacitor permanently connected		Fans, centrifugal pumps
TD	Start capacitor on Run capacitor on	Start capacitor off Run capacitor on	Gearboxes, mechanical handling, general purpose
ED	Start capacitor on No run capacitor	Start capacitor off No run capacitor	Machinery, general purpose
SD	Start capacitor on Series connected	Start capacitor off Parallel connected	Larger outputs 3.7-7.5kW General purpose
Series 101	Variable voltage control		Fans, pumps, square law torque

GENERAL INFORMATION

Single phase motors are generally identical to Alpak three-phase motors when relating to Environmental Protection and Finish; Cooling Forms; Degrees of Protection, Windings and Insulation; Mounting Arrangements; Duty Types; Rating and Performance Definitions; and Electrical Protection.

The major differences between the two are outlined below:

AMBIENT TEMPERATURE AND ALTITUDE

Adjustments for ambient temperature and altitude as generally used for 3-phase motors are not applicable to single-phase motors at temperatures greater than 40°C and altitudes greater than 1000m since:

►It is not possible to derate a standard single-phase motor for increase in altitude in the same proportion as a 3-phase motor

►Any increase in ambient must be considered from the point of view of the capacitors as well as the motor

Single-phase motors can be designed for ambients greater than 40°C, but this may mean the capacitors being located away from the motor at a lower temperature.

SUPPLY VOLTAGE AND FREQUENCY

The standard supply for single-phase motors is 240V 50Hz, although motors can be wound for different voltages

Unlike standard 3-phase 50Hz motors, single-phase 50Hz motors cannot be operated on 60Hz without modification.

CONSTRUCTION AND BEARING ARRANGEMENTS

The construction of the single-phase Alpak range is based on the 3-phase Alpak. The main differences are:

►The use of a deep non-drive-end endshield on sizes TD/ED80-112, to accommodate an inbuilt centrifugal switch.

►The use of bearing 62012Z on the non-drive end of TD/ED80 motors and bearing 62052Z on the non-drive end of TD/ED100-112 motors.

RATINGS AND PERFORMANCE

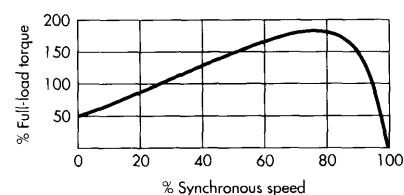
Permanent Capacitor Motor

TORQUE/SPEED CHARACTERISTICS

A typical curve is shown to the right. Operating values for each rating are given in the rating table for the more important characteristics of performance. The characteristics are ideal for fan or centrifugal blower or pump drives

involved in starting the motor. The motor circuit is connected direct-on-line as shown to the right, but terminal and connection details are supplied with each motor, with instructions on the reconnection required to give reversal of rotation.

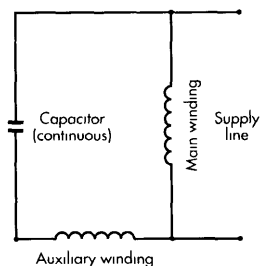
Typical torque/speed curves



STARTERS

A direct-on-line starter with overload and no-volt protection should be used

Connection diagram



CONNECTIONS

A single capacitor (paper-type, continuously rated) in series with the auxiliary winding remains in circuit during the operation of the motor. No centrifugal switch or relay is

240V, 1ph, 50Hz, Class F insulation, Class B temperature rise

Poles	Rated Output	Frame Size	Performance at Rated Output				Locked Rotor Current ratio	Torque Ratios		Capacitor 400V Continuous
			Speed	Current at 240V	Efficiency %	Power-Factor (cos Ø)		Locked Rotor	Pull-out	
	kW		r/min	A	1/1	1/1	x rated current	x rated torque		µF
2	0.12	PD63	2900	1.0	55	0.90	3.50	0.45	3.0	5
2	0.18	PD63	2900	1.4	56	0.97	3.00	0.50	2.5	10
2	0.25	PD63	2850	1.7	62	0.99	2.50	0.45	2.1	12
2	0.37	PD71	2840	2.4	64	0.99	3.50	0.50	2.1	16
2	0.55	PD71	2740	3.3	70	0.99	2.70	0.50	1.6	20
2	0.75	PD80	2800	4.5	72	0.97	3.90	0.50	2.9	30
2	1.1	PD80	2840	6.6	72	0.97	3.50	0.40	2.9	50
2	1.5	PD90S	2780	8.5	74	0.99	3.70	0.40	2.5	50
2	2.2	PD100L	2780	12.9	74	0.96	3.40	0.40	2.2	80
2	3.0	PD100L	2780	18.0	74	0.94	3.40	0.40	2.1	100
4	0.12	PD63	1460	0.95	55	0.96	3.00	0.45	2.5	5
4	0.18	PD63	1410	1.4	56	0.98	2.10	0.40	2.0	10
4	0.25	PD71	1420	2.0	57	0.92	3.70	0.35	2.0	10
4	0.37	PD71	1390	2.8	59	0.94	2.90	0.30	1.6	12
4	0.55	PD80	1430	3.5	68	0.96	3.80	0.40	2.2	20
4	0.75	PD80	1430	4.6	69	0.99	3.30	0.40	2.1	30
4	1.1	PD90S	1430	6.5	72	0.98	3.90	0.25	2.0	40
4	1.5	PD90L	1430	8.5	74	0.99	3.90	0.25	2.0	60
4	2.2	PD100L	1410	11.6	80	0.99	3.70	0.45	1.8	80
6	0.37	PD80	930	3.0	57	0.90	3.30	0.40	2.2	16
6	0.55	PD80	920	3.8	64	0.94	2.70	0.35	1.6	20
6	0.75	PD90S	950	5.2	63	0.95	2.80	0.30	2.0	40
6	1.1	PD90L	940	7.0	70	0.94	3.00	0.35	1.8	50
6	1.5	PD100L	960	9.0	74	0.94	3.70	0.30	1.9	50

RATINGS AND PERFORMANCE

Capacitor Start Capacitor Run Motor

TORQUE/SPEED CHARACTERISTICS

A typical curve is shown below. Operating values for each rating are given in the rating table for the more important characteristics of performance.

The characteristics are ideally suited for high torque applications encountered in industrial and agricultural drives.

CONNECTIONS

An intermittently-rated electrolytic start capacitor and a continuously-rated run

capacitor are used with this motor, mounted on the motor frame.

At start, both capacitors are connected in parallel to give a high starting and accelerating torque

At approximately 75% of normal full-load speed the centrifugal switch automatically switches the start capacitor out of circuit leaving the run capacitor permanently connected. On frames TD71 this is replaced with a current sensitive relay. The motor circuit is connected as shown with terminal and connection details

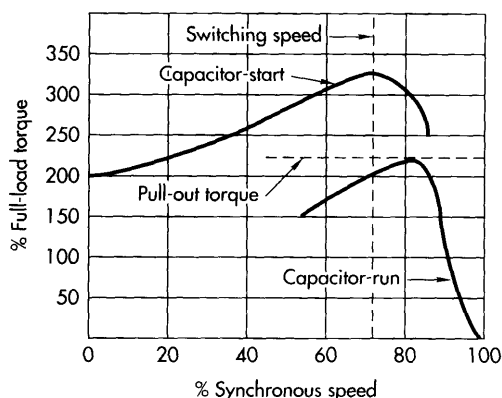
supplied with each motor giving instructions for reverse rotation. Plug reversal of rotation is not possible with this type of motor as the motor must be brought to rest before reversal of connections and rotation.

The intermittently-rated capacitor limits the frequency of motor starting to 15 starts/hour

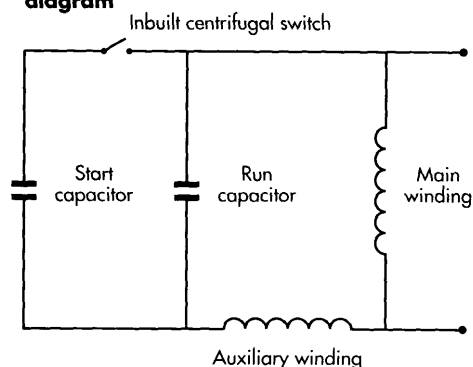
STARTERS

A direct-on-line starter with overload and no-volt protection should be used.

Typical torque/speed curves



Connection diagram



240V, 1ph, 50Hz, Class F insulation, Class B temperature rise

Poles	Rated Output kW	Frame Size	Performance at Rated Output				Locked Rotor Current ratio x rated current	Torque Ratios		Capacitor	
			Speed r/min	Current at 240V A	Efficiency % 1/1	Power-Factor (cos ϕ) 1/1		Locked Rotor x rated torque	Pull-out x rated torque	Start 275V Int μ F	Run 400V Cont μ F
2	1.1	TD80	2800	6.2	75	0.98	5.2	1.9	2.0	100/130	20
2	1.5	TD90S	2860	8.5	75	0.98	6.5	2.2	2.4	160/200	30
2	2.2	TD90L	2850	12.5	78	0.94	5.8	2.0	2.4	180/225	30
2	3.0	TD100L	2900	15.8	80	0.98	6.0	1.8	2.2	200/250	40
2	4.0	TD112M	2870	21.0	80	0.99	5.5	2.0	2.0	300/360	50
4	0.37	TD71	1400	2.6	66	0.92	4.3	1.9	1.65	40/ 50	12
4	0.75	TD80	1420	4.9	66	0.96	5.9	2.0	2.1	100/130	20
4	1.1	TD90S	1430	6.8	74	0.91	5.8	1.9	2.0	130/160	20
4	1.5	TD90L	1430	9.2	75	0.91	5.8	2.0	2.1	160/200	30
4	2.2	TD100L	1420	12.8	75	0.95	6.0	2.1	2.1	200/250	30
4	3.0	TD100L	1420	17.0	79	0.93	5.4	2.0	2.0	200/250	40
4	4.0*	TD112M	1440	22.0	78	0.98	5.5	2.0	2.0	300/360	50

*Class F rise.

RATINGS AND PERFORMANCE

Capacitor Start Induction Run Motor

TORQUE/SPEED CHARACTERISTICS

A typical curve is shown below. Operating values for each rating are given in the rating table for the more important characteristics of performance.

The characteristics are ideally suited for high torque applications encountered in industrial and agricultural drives.

CONNECTIONS FOR FRAMES ED63 AND ED71

An intermittently-rated electrolytic capacitor in series with the auxiliary windings is in circuit during the starting cycle. They are switched out of circuit automatically by a current sensitive relay when the motor reaches about 75% of normal full-load speed, leaving the motor running on the

main winding. The motor circuit is connected as shown below, but terminal and connection details are supplied with each motor with instructions on the reconnection required to give reversal of rotation. Plug reversal of rotation is not possible with this type of motor as the motor must be brought to rest before reversal of connections and rotation.

The intermittently-rated capacitor limits the frequency of motor starting to 20 starts/hour.

CONNECTIONS FOR FRAMES ED80-100L

An intermittently-rated electrolytic capacitor in series with the auxiliary winding is in circuit during the starting cycle. They are switched out of circuit automatically by a

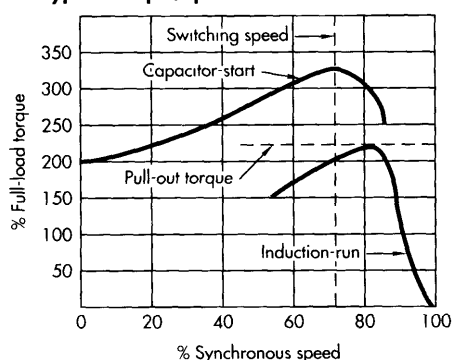
centrifugal switch when the motor reaches about 75% of normal full-load speed, leaving the motor running on the main winding. The motor circuit is connected as shown below, but terminal and connection details are supplied with each motor with instructions on the reconnection required to give reversal of rotation. Plug reversal of rotation is not possible with this type of motor as the motor must be brought to rest before reversal of connections and rotation.

The intermittently-rated capacitor limits the frequency of motor starting to 15 starts/hour.

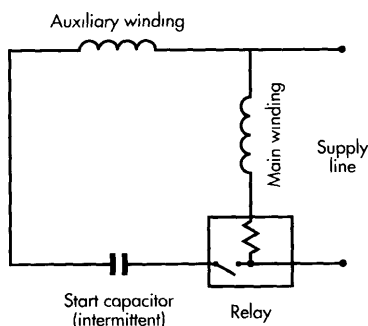
STARTERS

A direct-on-line starter with overload and no-volt protection should be used.

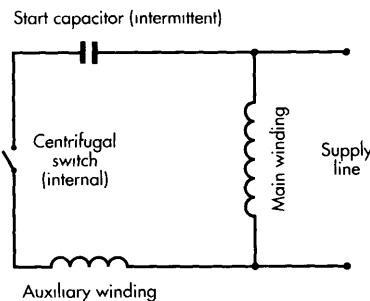
Typical torque/speed curve



Connections for frames ED63 and ED71



Connections for frames ED80-100L



240V, 1ph, 50Hz, Class F insulation, Class B temperature rise

Poles	Rated Output kW	Frame Size	Performance at Rated Output				Locked Rotor Current ratio x rated current	Torque Ratios		Capacitor 275V Int μF
			Speed r/min	Current at 240V A	Efficiency % 1/1	Power-Factor (cos Ø) 1/1		Locked Rotor x rated torque	Pull-out x rated torque	
2	0.18	ED63	2800	1.70	56	0.76	5.0	2.50	2.60	40/50
2	0.37	ED71	2900	3.5	58	0.76	4.0	1.90	1.90	65/81
2	0.55	ED80	2900	3.8	71	0.85	5.0	2.25	2.30	75/94
2	0.75	ED80	2800	5.7	65	0.84	4.9	1.80	2.60	100/130
2	1.1	ED90S	2800	8.4	62	0.88	4.5	2.25	2.00	130/160
2	1.5	ED90L	2840	11.0	70	0.81	5.2	2.00	2.25	160/200
2	2.2	ED100L*	2830	15/7.5	70	0.87	5.0	2.00	2.25	30/37.5

See overleaf for 4- and 6-pole ratings

Poles	Rated Output	Frame Size	Performance at Rated Output				Locked Rotor Current ratio	Torque Ratios		Capacitor 275V Int μ F
			Speed	Current at 240V A	Efficiency % 1/1	Power-Factor (cos ϕ) 1/1		Locked Rotor	Pull-out	
	kW		r/min				x rated current	x rated torque		
4	0.12	ED63	1430	1.65	50	0.63	3.6	2.90	1.80	40/50
4	0.25	ED71	1430	3.1	50	0.67	3.5	2.50	2.20	65/81
4	0.37	ED80	1420	3.6	56	0.75	5.2	2.00	2.50	65/81
4	0.55	ED90S	1430	5.0	62	0.75	5.5	2.00	2.40	130/160
4	0.75	ED90S	1425	6.8	62	0.75	5.3	1.90	2.30	160/200
4	1.1	ED90L	1420	9.0	65	0.79	4.8	2.00	2.20	160/200
4	1.5	ED100L	1420	12.0	66	0.79	5.0	2.25	2.25	160/200
4	2.2	ED100L*	1420	16.8/8.4	71	0.77	5.0	2.00	2.20	160/200
6	0.37	ED90S	950	4.0	60	0.60	4.5	2.00	2.20	65/81
6	0.55	ED90L	950	5.3	60	0.60	4.5	1.80	2.00	100/130
6	0.75	ED100L	960	6.8	65	0.65	4.5	2.00	2.25	100/130
6	1.1	ED100L	960	9.5	60	0.66	4.0	2.00	2.25	130/160

*These motors are suitable for dual voltage 240/480V by reconnection.

RATINGS AND PERFORMANCE

Series-Parallel Capacitor-Start Motor

(low starting current range for operation with auto or manual push-button starter)

TORQUE/SPEED CHARACTERISTICS

A typical curve is shown to the right. Operating values for each rating are given in the rating table for the more important characteristics of performance.

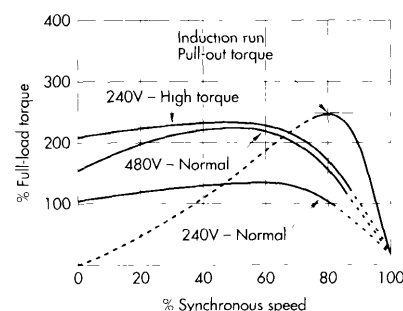
The characteristics are ideal for fan, centrifugal blower and pump drives, and have been designed to suit agricultural and other applications where the supply capacity load is limiting.

wound for dual voltage (240/480V) to suit the application. Standard motors of over 3.7kW are wound for single voltage 240V operation, alternatively 480V, and involve series-parallel operation.

The intermittently-rated capacitor limits the frequency to 15 starts/hour (manual) and 40 starts/hour (automatic starter).

A range of manual or automatic starters, with inbuilt capacitors, is available from Brook Crompton Controls, Moncton Road, Wakefield, Tel: +1(0)1924 368251.

Torque/speed curves of 3.7kW capacitor-start motors



CONNECTIONS

Standard 3.7kW (SD132S and SD132M) motors are

240/480V, 1ph, 50Hz, Class F insulation, Class B temperature rise

Poles	Rated Output	Frame Size	Performance at Rated Output					Locked Rotor Current Ratio			Torque Ratios				Capacitor (Elect)	
			Speed	Current at 240V	Current at 480V	Efficiency % 1/1	Power-factor (cos Ø) 1/1	Normal Connection		High Torque 240V	Normal Connection Locked Rotor Torque		High Torque 240V	Pull-out	240V µF	480V µF
	240V							480V	240V		480V					
	x rated current							x rated torque								
	kW		r/min	A	A											
2	3.7	SD132S	2900	25	12.5	78	0.80	1.80	6.0	6.0	1.2	2.2	2.4	2.0	300	400
2	5.5	SD132M	2850	38	–	77	0.80	1.75	–	–	0.9	–	–	2.0	400	–
2	5.5	SD132M	2850	–	19.0	77	0.80	–	1.75	–	–	0.9	–	2.0	–	400
2	7.5	SD160M	2900	50	–	71	0.87	1.60	–	–	1.0	–	–	2.0	500	–
2	7.5	SD160M	2900	–	25.0	71	0.87	–	1.70	–	–	1.1	–	2.0	–	600
4	3.7	SD132M	1450	25	12.5	76	0.78	1.6	5.0	5.5	1.1	1.8	2.0	2.0	300	400
4	5.5	SD160M	1430	38	–	79	0.76	1.8	–	–	1.0	–	–	2.0	400	–
4	5.5	SD160M	1430	–	19.0	79	0.76	–	1.8	–	–	1.0	–	2.0	–	400
4	7.5	SD160L	1460	50	–	78	0.80	1.70	–	–	1.1	–	–	2.0	500	–
4	7.5	SD160L	1460	–	25.0	78	0.80	–	2.0	–	–	1.0	–	2.0	–	600

RATINGS AND PERFORMANCE

Steinmetz Connection of a Three-Phase Motor

Smaller standard Alpak three-phase motors can, by re-connection at the terminals, operate on single-phase supplies, but at a reduced torque performance. The standard three-phase motor wound for 240/415V 50Hz (dual voltage) is connected in the 240V (Δ) condition and a capacitor of suitable value applied as shown below, switching direct-on-line to a supply of single phase 240V 50Hz

TORQUE/SPEED CHARACTERISTICS

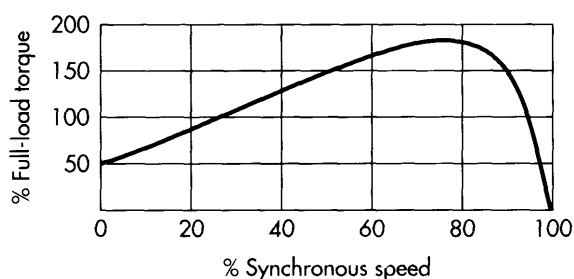
A typical curve is shown, being very similar to permanent capacitor motors and suited to fan and centrifugal blower and pump drives. Operating values for each rating are given in the table, noting that the power output is the same as the three-phase rating for each frame/pole.

CONNECTIONS

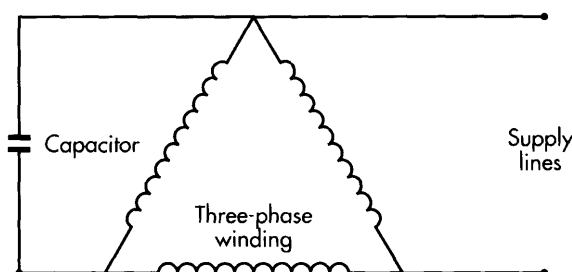
As shown below, using a capacitor (paper-type) continuously-rated for the voltage and capacitance listed in the rating table. No centrifugal switch or relay is involved in the operation.

Instruction diagrams on the re-connection and for reversing are available.

Typical torque/speed curve



Connection diagram



240V, 1ph, 50Hz, Class F insulation, Class B temperature rise

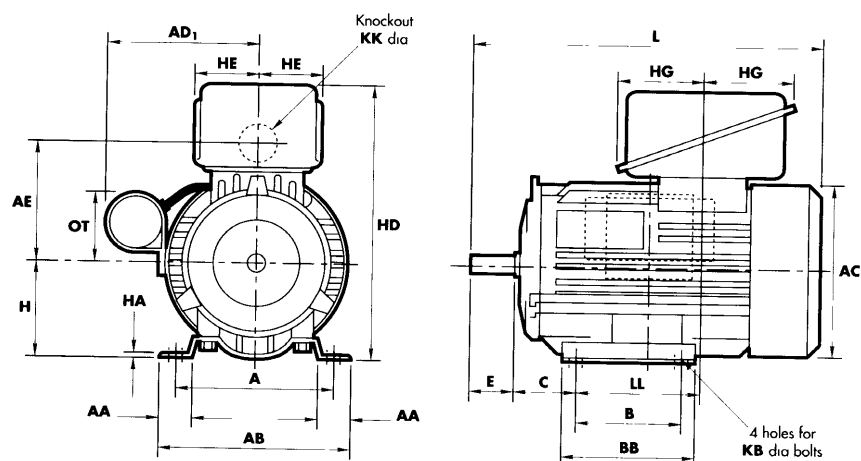
Poles	Rated Output kW	Frame Size	Performance at Rated Output				Locked Rotor Current ratio x rated current	Torque Ratios		Capacitor 250V Continuous μ F
			Speed r/min	Current at 240V A	Efficiency % 1/1	Power-Factor (cos ϕ) 1/1		Locked Rotor x rated torque	Pull-out x rated torque	
2	0.18	PD63	2830	1.6	50	0.98	2.0	0.4	3.0	20
2	0.25	PD63	2830	2.0	52	0.98	2.3	0.5	1.7	25
2	0.37	PD71	2860	2.5	62	0.98	2.7	0.4	2.5	30
2	0.55	PD71	2860	3.2	72	0.98	2.6	0.4	1.7	35
4	0.12	PD63	1435	0.9	61	0.93	2.9	0.4	2.8	10
4	0.18	PD63	1390	1.5	54	0.97	2.2	0.5	2.0	20
4	0.25	PD71	1460	1.7	64	0.98	3.0	0.5	2.0	25
4	0.37	PD71	1400	2.6	65	0.90	2.4	0.3	1.7	30

Dimensions are the same as for the standard 3-phase range given in Catalogue AC9

DIMENSIONS AND MASS - Foot Mounting

Frames 63 and 71

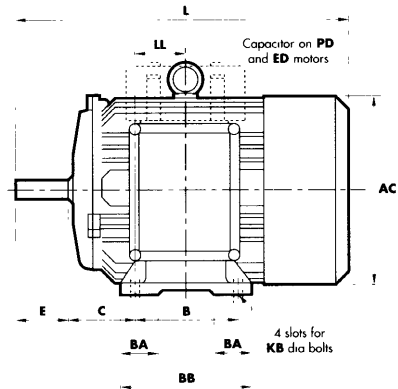
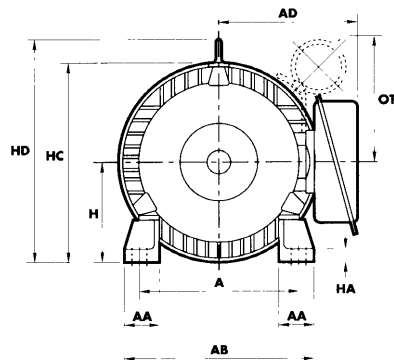
PD and ED Types



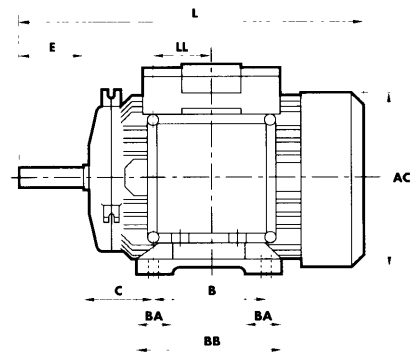
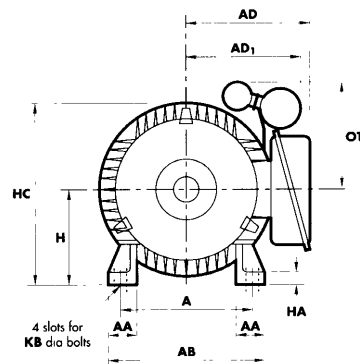
Electrical Type	Frame Size	Poles						
			A	AA	AB	AC	AD	AD ₁
Permanent capacitor motor	PD63	2 & 4	100	19.5	116	117	—	110
	PD71	2 & 4	112	22.0	128	117	—	110
	PD80	2-6	125	33.0	156	164	125	—
	PD90S	2-6	140	36.0	174	182	132	—
	PD90L	4 & 6	140	36.0	174	182	132	—
	PD100L	2-6	160	36.0	196	218	146	—
Capacitor-start capacitor-run motor	TD80	2 & 4	125	33.0	156	164	125	120
	TD90S	2 & 4	140	36.0	174	182	132	136
	TD90L	2 & 4	140	36.0	174	182	132	136
	TD100L	2 & 4	160	36.0	196	218	146	146
	TD112M	2 & 4	190	50.0	224	218	146	146
	TD112M	2 & 4	190	50.0	224	218	146	146
Capacitor-start induction-run motor	ED63	2 & 4	100	19.5	116	117	—	98
	ED71	2 & 4	112	22.0	128	117	—	98
	ED80	2 & 4	125	33.0	156	164	125	—
	ED90S	2-6	140	36.0	174	182	132	—
	ED90L	2-6	140	36.0	174	182	132	—
	ED100L	2-6	160	36.0	196	218	146	—
Series-parallel capacitor-start motor	SD132S	2	216	54.0	260	260	198	—
	SD132M	2 & 4	216	54.0	260	260	198	—
	SD160M	2 & 4	254	66.0	312	312	245	—
	SD160L	4	254	66.0	312	312	245	—
	SD160L	4	254	66.0	312	312	245	—

Frames 80-160L

PD, ED and SD Types



TD Types



On frame sizes 80-112M no lifting eyebolt is fitted

All Dimensions in Millimetres

AE	B	BA	BB	C	D		E	ED Min
					Nom	Tolerance		
75	80	—	96	40	11	+0.008	-0.003	10
75	90	—	106	45	14	+0.008	-0.003	16
96	100	33	125	50	19	+0.009	-0.004	25
106	100	35	130	56	24	+0.009	-0.004	32
106	125	35	155	56	24	+0.009	-0.004	37
122	140	35	170	63	28	+0.009	-0.004	40
96	100	33	125	50	19	+0.009	-0.004	25
106	100	35	130	56	24	+0.009	-0.004	32
106	125	35	155	56	24	+0.009	-0.004	32
122	140	35	170	63	28	+0.009	-0.004	40
122	140	40	176	70	28	+0.009	-0.004	40
75	80	—	96	40	11	+0.008	-0.003	10
75	90	—	106	45	14	+0.008	-0.003	16
96	100	33	125	50	19	+0.009	-0.004	25
106	100	35	130	56	24	+0.009	-0.004	32
106	125	35	155	56	24	+0.009	-0.004	32
122	140	35	170	63	28	+0.009	-0.004	40
156	140	57	184	89	38	+0.018	-0.002	56
156	178	57	222	89	38	+0.018	-0.002	56
195	210	50	252	108	42	+0.018	-0.002	80
195	254	50	296	108	42	+0.018	-0.002	80

Table continued overleaf.

DIMENSIONS AND MASS -

Foot mounting continued from previous page

COUPLING OR PULLEY DETAILS

Frame Size	Recommended Bore of Coupling or Pulley							
	Coupling Bore		Pulley Bore		Keyway Width		Keyseat Depth	
	Bore	Tol	Bore	Tol (H7)	Nom	Tol (F7)	Nom	Tol (Js9)
63	10.977	+0.018	11.000	+0.018	3.985	+0.030	12.8	+0.1
71	13.977	+0.018	14.000	+0.018	4.985	+0.030	16.3	+0.1
80	18.977	+0.021	19.000	+0.021	5.985	+0.030	21.8	+0.1
90S	23.977	+0.021	24.000	+0.021	7.982	+0.036	27.3	+0.2
90L	23.977	+0.021	24.000	+0.021	7.982	+0.036	27.3	+0.2
100L	27.977	+0.021	28.000	+0.021	7.982	+0.036	31.3	+0.2
132S	37.977	+0.025	38.000	+0.025	9.982	+0.036	41.3	+0.2
132M	37.977	+0.025	38.000	+0.025	9.982	+0.036	41.3	+0.2
160M	41.977	+0.025	42.000	+0.025	11.979	+0.042	45.3	+0.2
160L	41.977	+0.025	42.000	+0.025	11.979	+0.042	45.3	+0.2

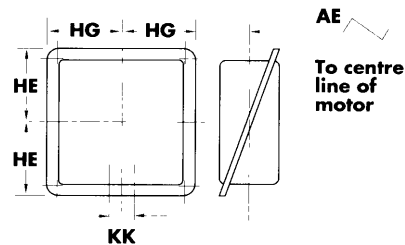
Electrical Type	Frame Size	All Dimensions									
		F		G		GD	DH	EH	H		HA
		Nom	Tol	Nom	Tol				Nom	Tol	
Permanent capacitor motor	PD63	4	-0.030	8.5	-0.1	4	M4	10	63	-0.5	2.5
	PD71	5	-0.030	11.0	-0.1	5	M5	12	71	-0.5	2.5
	PD80	6	-0.030	15.5	-0.2	6	M6	16	80	-0.5	3.0
	PD90S	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	PD90L	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	PD100L	8	-0.036	24.0	-0.2	7	M10	22	100	-0.5	12.0
Capacitor-start capacitor-run motor	TD80	6	-0.030	15.5	-0.2	6	M6	16	80	-0.5	3.0
	TD90S	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	TD90L	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	TD100L	8	-0.036	24.0	-0.2	7	M10	22	100	-0.5	12.0
	TD112M	8	-0.036	24.0	-0.2	7	M10	22	112	-0.5	13.0
Capacitor-start induction-run motor	ED63	4	-0.030	8.5	-0.1	4	M4	10	63	-0.5	2.5
	ED71	5	-0.030	11.0	-0.1	5	M5	12	71	-0.5	2.5
	ED80	6	-0.030	15.5	-0.2	6	M6	16	80	-0.5	3.0
	ED90S	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	ED90L	8	-0.036	20.0	-0.2	7	M8	19	90	-0.5	10.0
	ED100L	8	-0.036	24.0	-0.2	7	M10	22	100	-0.5	12.0
Series-parallel capacitor-start motor	SD132S	10	-0.036	33.0	-0.2	8	M12	28	132	-0.5	16.5
	SD132M	10	-0.036	33.0	-0.2	8	M12	28	132	-0.5	16.5
	SD160M	12	-0.043	37.0	-0.2	8	M16	36	160	-0.5	16.5
	SD160L	12	-0.043	37.0	-0.2	8	M16	36	160	-0.5	16.5

*Mass varies with polarity of machine. Figures quoted are the heaviest for a given frame size.

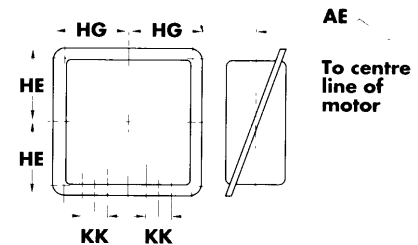
When using indirect drives such as belts, ropes and pinions to couple motors to their loads, there is a danger that excessive stress may be imposed on the motor shaft and bearings by the side loadings inherent in these methods of power transmission. It is advisable to consult the works when such drives are being designed.

CABLE ENTRY DETAILS

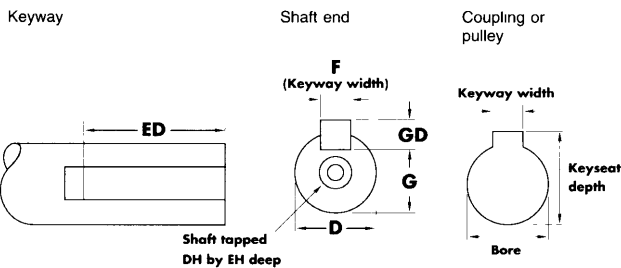
Frames 63-80 and 160 - These frames have one knockout KK dia. The box can be turned through 90° intervals



Frames 90-132 - These frames have two knockouts KK dia. The box can be turned through 90° intervals



SHAFT EXTENSION

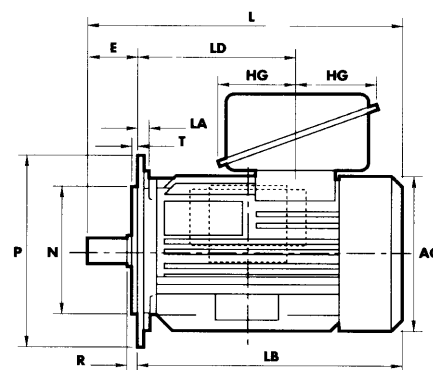
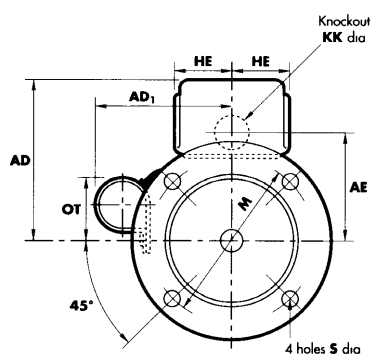


in millimetres									Approx Shipping Specification		
HC	HD	HE	HG	KB	KK	L	LL	OT	Mass (kg*)		Capacity of Case (m³)
									Net	Gross	
-	160	34.0	30	M6	21	221	82.5	-	4.5	6.9	0.016
-	168	34.0	30	M6	21	228	77.5	-	6.2	8.7	0.017
162	-	51.0	44	M8	21	269	50.0	-	10.9	13.6	0.030
181	-	62.5	65	M8	21	294	50.0	-	13.5	16.2	0.030
181	-	62.5	65	M8	21	294	50.0	-	15.0	17.8	0.030
209	-	61.0	65	M10	21	365	70.0	-	25.4	28.6	0.054
162	-	51.0	44	M8	21	298	50.0	146	14.0	16.7	0.030
181	-	62.5	65	M8	21	335	50.0	153	18.5	21.2	0.030
181	-	62.5	65	M8	21	335	50.0	153	21.2	23.9	0.030
209	-	61.0	65	M10	21	393	70.0	170	28.5	31.7	0.054
221	-	61.0	65	M10	21	393	70.0	170	31.7	34.9	0.054
-	177	44.0	51	M6	21	221	82.5	46	4.9	7.2	0.016
-	185	44.0	51	M6	21	228	77.5	46	6.6	9.1	0.017
162	-	51.0	44	M8	21	298	50.0	115	11.5	14.2	0.030
181	-	62.5	65	M8	21	335	50.0	120	15.0	19.2	0.030
181	-	62.5	65	M8	21	335	50.0	120	16.8	20.1	0.030
209	-	61.0	65	M10	21	393	70.0	120	27.2	30.5	0.054
-	307	75.0	77	M10	26	448	70.0	-	44.5	50.8	0.100
-	307	75.0	77	M10	26	448	70.0	-	49.0	55.3	0.100
-	366	75.0	77	M12	40	594	105.0	-	80.3	89.8	0.147
-	366	75.0	77	M12	40	594	105.0	-	94.3	103.4	0.147

DIMENSIONS AND MASS - Flange Mounting

Frames 63 and 71

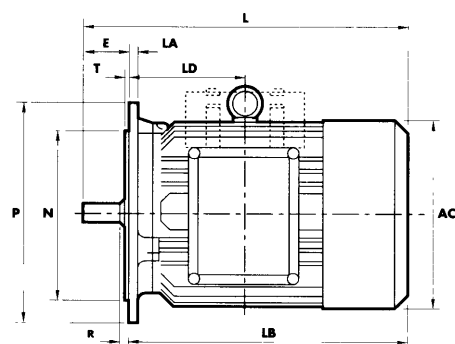
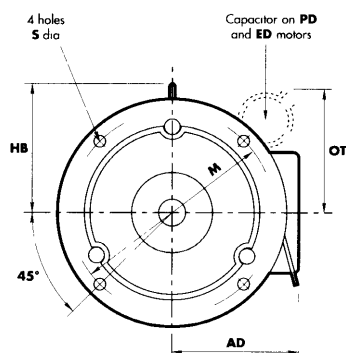
PD and ED Types



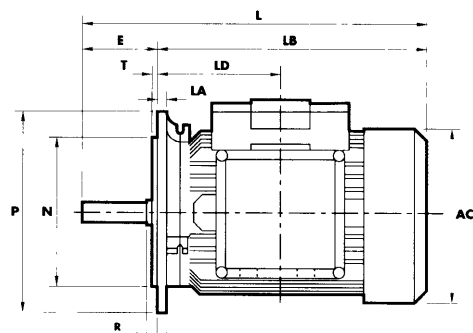
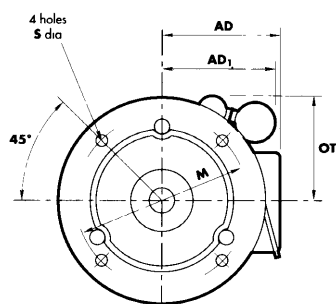
Electrical Type	Frame Size	Poles							
			AC	AD	AD ₁	AE	D		
							Nom	Tolerance	
Permanent capacitor motor	PD63	2 & 4	117	96	110	75	11	+0.008	-0.003
	PD71	2 & 4	117	96	110	75	14	+0.008	-0.003
	PD80	2-6	164	125	-	96	19	+0.009	-0.004
	PD90S	2-6	182	132	-	106	24	+0.009	-0.004
	PD90L	4 & 6	182	132	-	106	24	+0.009	-0.004
	PD100L	2-6	218	146	-	122	28	+0.009	-0.004
Capacitor-start capacitor-run motor	TD80	2 & 4	164	125	120	96	19	+0.009	-0.004
	TD90S	2 & 4	182	132	136	106	24	+0.009	-0.004
	TD90L	2 & 4	182	132	136	106	24	+0.009	-0.004
	TD100L	2 & 4	218	146	146	122	28	+0.009	-0.004
	TD112M	2 & 4	218	146	146	122	28	+0.009	-0.004
Capacitor-start induction-run motor	ED63	2 & 4	117	114	98	75	11	+0.008	-0.003
	ED71	2 & 4	117	114	98	75	14	+0.008	-0.003
	ED80	2 & 4	164	125	-	96	19	+0.009	-0.004
	ED90S	2-6	182	132	-	106	24	+0.009	-0.004
	ED90L	2-6	182	132	-	106	24	+0.009	-0.004
	ED100L	2-6	218	146	-	122	28	+0.009	-0.004
Series-parallel capacitor-start motor	SD132S	2	260	198	-	156	38	+0.018	+0.002
	SD132M	2 & 4	260	198	-	156	38	+0.018	+0.002
	SD160M	2 & 4	312	245	-	195	42	+0.018	+0.002
	SD160L	4	312	245	-	195	42	+0.018	+0.002

Frames 80-160L

PD, ED and SD Types



TD Types



On frame sizes 80-112M no lifting eyebolt is fitted

All Dimensions in Millimetres

E	ED Min	F		G		GD	DH	EH
		Nom	Tol (N9)	Nom	Tol			
23	10	4	-0.030	8.5	-0.1	4	M4	10
30	16	5	-0.030	11.0	-0.1	5	M5	12
40	25	6	-0.030	15.5	-0.2	6	M6	16
50	32	8	-0.036	20.0	-0.2	7	M8	19
50	32	8	-0.036	20.0	-0.2	7	M8	19
60	40	8	-0.036	24.0	-0.2	7	M10	22
40	25	6	-0.030	15.5	-0.2	6	M6	16
50	32	8	-0.036	20.0	-0.2	7	M8	19
50	32	8	-0.036	20.0	-0.2	7	M8	19
60	40	8	-0.036	24.0	-0.2	7	M10	22
60	40	8	-0.036	24.0	-0.2	7	M10	22
23	10	4	-0.030	8.5	-0.1	4	M4	10
30	16	5	-0.030	11.0	-0.1	5	M5	12
40	25	6	-0.030	15.5	-0.2	6	M6	16
50	32	8	-0.036	20.0	-0.2	7	M8	19
50	32	8	-0.036	20.0	-0.2	7	M8	19
60	40	8	-0.036	24.0	-0.2	7	M10	22
80	56	10	-0.036	33.0	-0.2	8	M12	28
80	56	10	-0.036	33.0	-0.2	8	M12	28
110	80	12	-0.043	37.0	-0.2	8	M16	36
110	80	12	-0.043	37.0	-0.2	8	M16	36

Table continued overleaf.

DIMENSIONS AND MASS -

Flange mounting continued from previous page

COUPLING DETAILS

Frame Size	Recommended Bore of Coupling					
	Coupling Bore		Keyway Width		Keyseat Depth	
	Bore	Tol	Nom	Tol (F7)	Nom	Tol (Js9)
63	10.977	+0.018	3.985	+0.030	12.8	+0.1
71	13.977	+0.018	4.985	+0.030	16.3	+0.1
80	18.977	+0.021	5.985	+0.030	21.8	+0.1
90S	23.977	+0.021	7.982	+0.036	27.3	+0.2
90L	23.977	+0.021	7.982	+0.036	27.3	+0.2
100L	27.977	+0.021	7.982	+0.036	31.3	+0.2
132S	37.977	+0.025	9.982	+0.036	41.3	+0.2
132M	37.977	+0.025	9.982	+0.036	41.3	+0.2
160M	41.977	+0.025	11.979	+0.042	45.3	+0.2
160L	41.977	+0.025	11.979	+0.042	45.3	+0.2

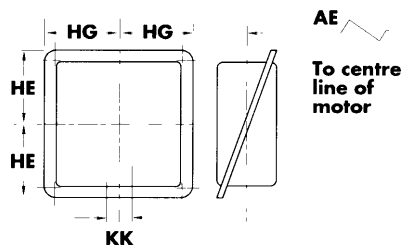
Electrical Type	Frame Size	All Dimensions							
		HB	HE	HG	KK	L	LA	LB	LD
Permanent capacitor motor	PD63	—	34.0	30	21	221	9	198	122.5
	PD71	—	34.0	30	21	228	9	198	122.5
	PD80	—	51.0	44	21	269	10	229	100.0
	PD90S	—	62.5	65	21	294	10	244	106.0
	PD90L	—	62.5	65	21	294	10	244	106.0
Capacitor-start capacitor-run motor	PD100L	—	61.0	65	21	365	12	305	133.0
	TD80	—	51.0	44	21	298	10	258	100.0
	TD90S	—	62.5	65	21	335	10	285	106.0
	TD90L	—	62.5	65	21	335	10	285	106.0
	TD100L	—	61.0	65	21	391	12	331	133.0
Capacitor-start induction-run motor	TD112M	—	61.0	65	21	391	12	331	133.0
	ED63	—	44.0	51	21	221	9	198	122.5
	ED71	—	44.0	51	21	228	9	198	122.5
	ED80	—	51.0	44	21	298	10	258	100.0
	ED90S	—	62.5	65	21	335	10	285	106.0
Series-parallel capacitor-start motor	ED90L	—	62.5	65	21	335	10	285	106.0
	ED100L	—	61.0	65	21	393	12	331	133.0
	SD132S	177	75.0	77	26	448	12	368	159.0
	SD132M	177	75.0	77	26	448	12	368	159.0
	SD160M	206	75.0	77	40	594	19	484	213.0
	SD160L	206	75.0	77	40	594	19	484	213.0

*Mass varies with polarity of machine. Figures quoted are the heaviest for a given frame size.

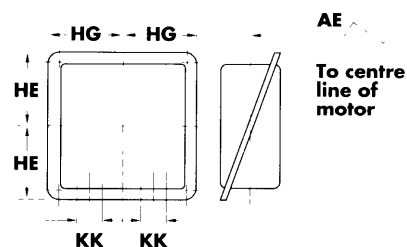
When using indirect drives such as pinions to couple motors to their loads, there is a danger that excessive stress may be imposed on the motor shaft and bearings by the side loadings inherent in these methods of power transmission. It is advisable to consult the works when such drives are being designed

CABLE ENTRY DETAILS

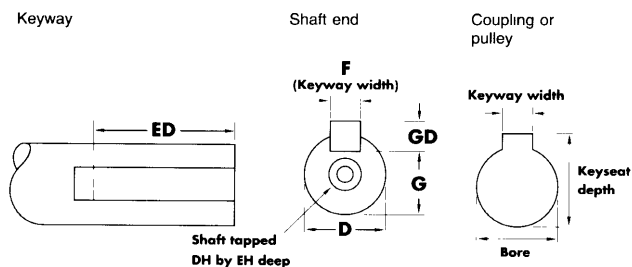
Frames 63-80 and 160 - These frames have one knockout KK dia. The box can be turned through 90° intervals.



Frames 90-132 - These frames have two knockouts KK dia. The box can be turned through 90° intervals.



SHAFT EXTENSION



in millimetres								Approx Shipping Specification		
M	N (BS4999: Part 141)		OT	P	R	S	T	Mass (kg*)		Capacity of Case (m³)
	Nom	Tol						Nett	Gross	
115	95	-0.054	-	140	0	10	3.0	4.5	6.9	0.016
130	110	-0.054	-	160	0	10	3.5	6.2	8.7	0.017
165	130	-0.063	-	200	0	12	3.5	11.0	13.7	0.030
165	130	-0.063	-	200	0	12	3.5	14.0	16.7	0.030
165	130	-0.063	-	200	0	12	3.5	15.0	17.7	0.030
215	180	-0.063	-	250	0	15	4.0	23.0	26.2	0.054
165	130	-0.063	146	200	0	12	3.5	14.0	16.7	0.030
165	130	-0.063	153	200	0	12	3.5	18.5	21.2	0.030
165	130	-0.063	153	200	0	12	3.5	21.2	23.9	0.030
215	180	-0.063	170	250	0	15	4.0	28.5	31.9	0.054
215	180	-0.063	170	250	0	15	4.0	35.6	38.7	0.054
115	95	-0.054	46	140	0	10	3.0	4.9	7.2	0.016
130	110	-0.054	46	160	0	10	3.5	6.6	9.1	0.017
165	130	-0.063	115	200	0	12	3.5	12.7	15.4	0.030
165	130	-0.063	120	200	0	12	3.5	17.2	19.9	0.030
165	130	-0.063	120	200	0	12	3.5	19.9	22.6	0.030
215	180	-0.063	120	250	0	15	4.0	27.2	30.4	0.054
265	230	-0.072	-	300	0	15	4.0	49.0	55.3	0.100
265	230	-0.072	-	300	0	15	4.0	53.5	59.9	0.100
300	250	-0.072	-	350	0	19	5.0	83.5	93.0	0.147
300	250	-0.072	-	350	0	19	5.0	96.2	105.7	0.147

VARIABLE VOLTAGE SPEED CONTROL - SERIES 101

Series 101 variable speed motors are specially designed permanent capacitor (PD) motors for use with single-phase voltage control on applications where, typically, torque varies as the square of the speed and power as a cube of the speed.

Variable speed motors can provide major benefits in terms of:-

- Improved system performance and flexibility, with stepless control

- Significant reductions in noise, vibration and maintenance with reduced speeds
- Elimination of mechanical throttling or damping methods
- Reduced energy consumption
- Reduced mechanical wear of transmission components

Series 101 motors can be supplied with built-on tacho for closed loop feedback control for optimum efficiency

and stability (standard tacho 3 phase ac, 22-5V/1000r/min)

Where stepped control is preferred, the motors are equally suitable for use with tapped auto-transformers

Three phase motor designs are available. Details can be obtained from your local sales office.

Dimensions are identical to PD motors, details from pages 10-11 & 14-15.

Permanent Capacitor Design (PD) Totally Enclosed Fan Ventilated (ICO141) Class F Insulation, Class F temperature rise

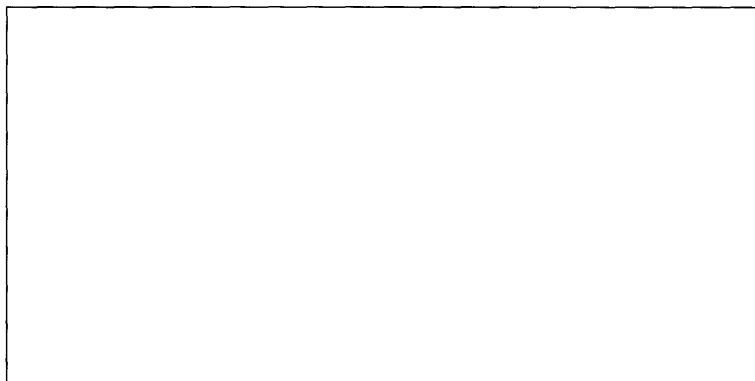
Poles	Rated Output At Full Speed kW	Frame Size	Performance at Rated Output					Capacitor 440V μF
			Full Load Speed r/min	Full Load Amps	Peak Current		Efficiency (%) 1/1	
					Motor Amps	Main Winding Amps		
4	0.24	PD63	1370	1.8	1.8	1.6	56	10
4	0.30	PD71	1400	2.0	2.0	1.9	64	16
4	0.37	PD80	1390	3.1	3.1	3.5	55	16
4	0.50	PD80	1390	3.6	3.7	4.1	62	16
4	0.78	PD90S	1420	5.0	5.1	5.5	68	40
4	0.90	PD90L	1430	6.0	6.5	7.4	67	40
4	1.05	PD100L	1470	6.6	13.6	15.5	70	80
6	0.37	PD80	870	3.0	3.0	2.6	53	20
6	0.65	PD90S	880	4.6	4.6	4.3	61	30
6	0.82	PD90L	890	5.5	5.5	5.1	64	40
6	1.05	PD100L	940	6.7	6.7	7.5	67	60

Permanent Capacitor Design (PD) Totally Enclosed Airstream Cooled (ICO841) Class F Insulation, Class F temperature rise

Poles	Rated Output At Full Speed kW	Frame Size	Performance at Rated Output					Minimum Air Velocity at Full Speed	Capacitor 440V μF
			Full Load Speed r/min	Full Load Amps	Peak Current		Efficiency (%) 1/1		
					Motor Amps	Main Winding Amps			
4	0.25	PD63	1370	1.88	1.88	1.56	56	12.3	10
4	0.35	PD71	1420	2.25	2.25	2.15	67	14.5	16
4	0.40	PD80	1380	3.2	3.2	3.6	58	11.5	16
4	0.55	PD80	1380	4.0	4.15	4.5	62	14.2	20
4	0.87	PD90S	1410	5.7	5.9	6.4	66	17.2	40
4	1.0	PD90L	1420	6.3	6.8	7.7	70	13.8	40
4	1.5	PD100L	1450	8.2	16.2	18.0	77	18.3	80
6	0.44	PD80	860	3.4	3.4	2.6	55	11.6	20
6	0.69	PD90S	870	4.8	4.8	4.3	62	12.0	30
6	0.90	PD90L	870	6.2	6.2	5.6	63	14.5	40
6	1.30	PD100L	920	7.9	7.9	8.8	69	15.6	60
6	1.55	PD100L	940	9.5	9.5	11.0	69	17.2	80

NOTES

STOCKISTS/DISTRIBUTORS



Due to a policy of continuous development and improvement the right is reserved to supply products which may differ slightly from those described and illustrated in this publication. Dimensions should not be used for installation purposes unless certified.

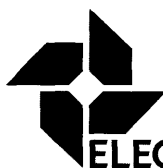
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Fax: 0116 272 0591.

West Wing, Jason House,
Kerry Hill,
Horsforth, Leeds LS18 4JR.
Tel: 0113 259 0088.
Fax: 0113 258 9366.

Badminton Court,
Station Road
Yate, Bristol BS17 5HZ.
Tel: 01454 320800.
Fax: 01454 320047.



ELECTRODRIVES

Electrodrives Ltd.
Cakemore Road, Rowley Regis, Warley
West Midlands B65 0QT.
Tel: (0121) 559 1500.
Fax: (0121) 561 3068. Telex: 338381.



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