



Westinghouse Electric Corporation
Large Motor Division
Buffalo, New York, U.S.A. 14240

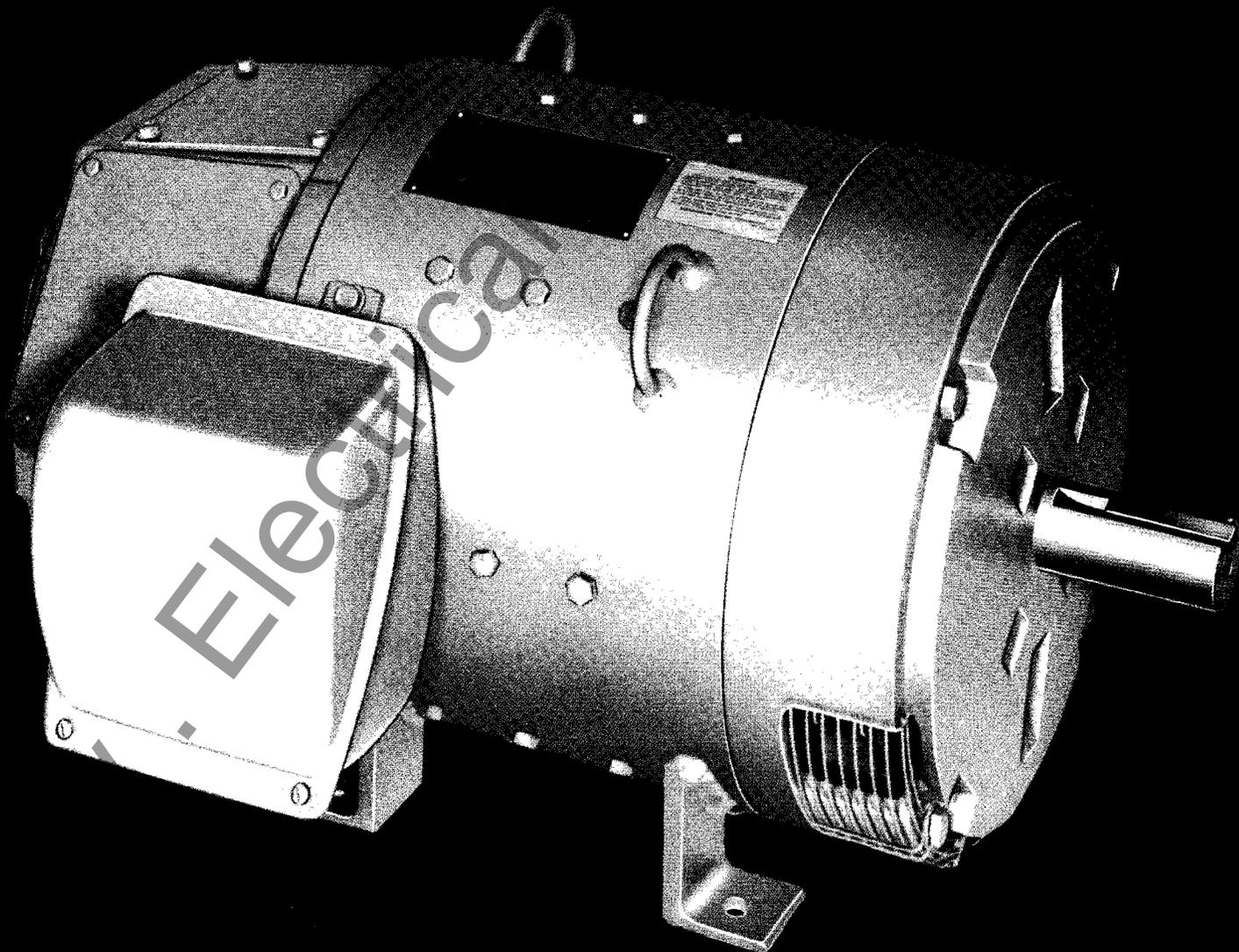
3510
Descriptive Bulletin

Page 1

September, 1976
New Information
Mailed to: E, D, C/1747/DB

Shunt and Stabilized Shunt Wound
½ to 500 Horsepower
Class F Insulation, 40°C Ambient
1.00 Service Factor
For Use With Rectified Power Supplies

Life-Line® S Drip-proof Guarded Dc Motors



Application

Life Line S Motors are designed specifically to work with today's sophisticated static power supplies and controls without costly external reactors or chokes.

Standard features, in most applications, are sufficient to meet OSHA requirements for quiet operation and personnel safety.

These versatile motors answer a wide variety of applications requiring either constant or adjustable speed, and the demands of modern highly automated industrial drives necessitating wide speed ranges. This is accomplished by reducing armature inertia (WK²), while increasing the torque producing D²L.

Dc Motors are used in a wide variety of industrial applications – machine tools, petrochemical, pulp and paper, steel, mining, printing and many others.

Every industry poses its own special requirements. In many instances, this has resulted in the specifying of expensive modifications. Life Line S Motors provide an economical solution because of their broad flexibility of application, and because they incorporate many of the features usually associated with "specialty" motors. Thus, the actual need for modification is reduced, or eliminated entirely, with a resultant saving in motor costs.

The following features have been designed into the Life Line S Motors. Standard NEMA "AT" dimensions and speed ranges allow for broad application possibilities and unit interchangeability. One standard shaft size is equally suitable for coupled or belted service.

Machined flange on the commutator end bracket enables quick and easy installation of peripheral devices. Tachometer and blower kits are available from stock.

Class F insulation system is better than or equivalent to the specifications required by mill environments.

Frame construction is designed for reliability and long service life.

Life Line S Motors are not revolutionary in design. Instead, they represent the cumulative advances in design, engineering and manufacturing which have developed to meet the evolving needs of industry. The design concepts are the result of over 90 years experience and a desire to serve industry now and for years to come.

Insulation

All insulation material is Class F, or better. In many critical temperature areas, Class H material is used to provide an additional margin of protection. The formulation and balance of the entire insulation system has evolved out of 90 years experience in design and engineering, and intensive research aimed at providing motors with maximum industrial reliability.

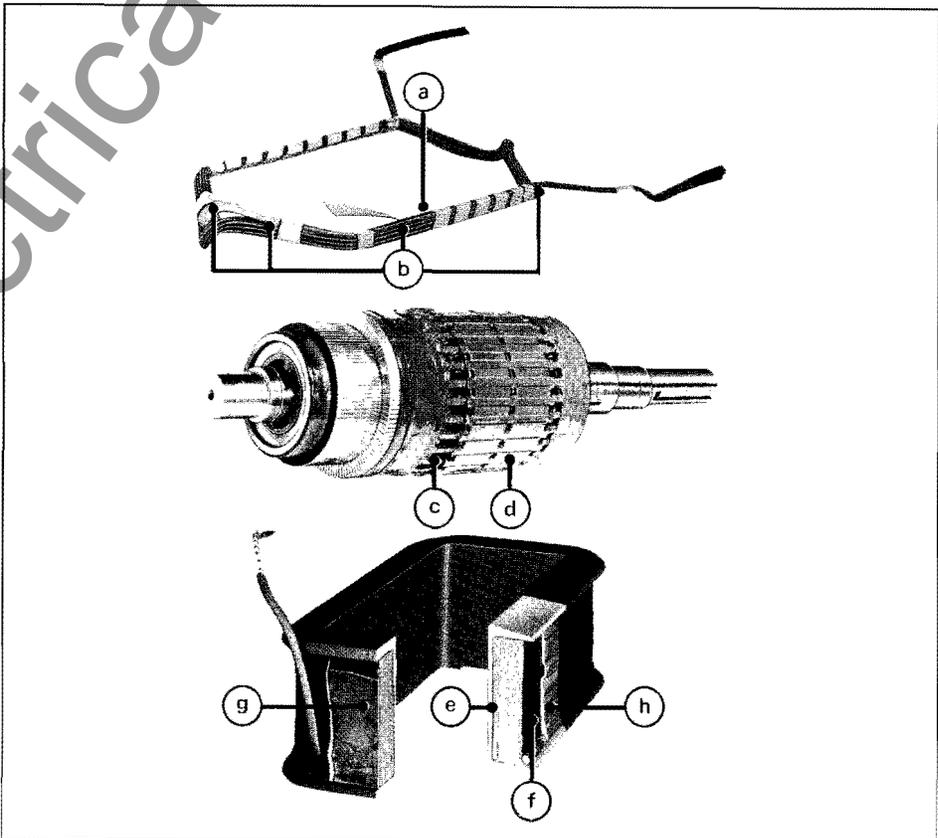
Our extensive research and development programs backed by field performance proved the high temperature system has greater long term reliability – more than ample thermal margin – than ordinary Class F.

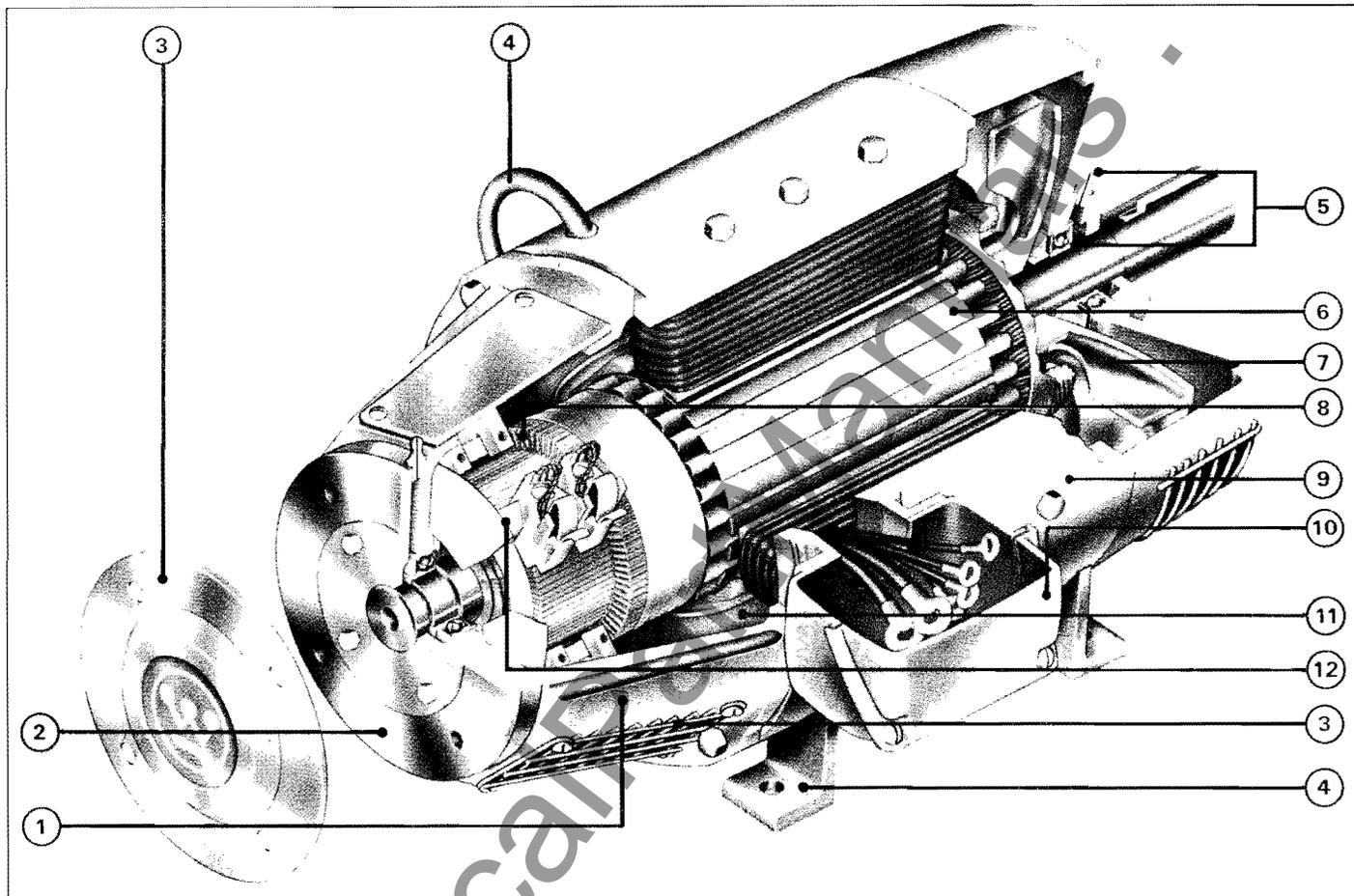
- a. Armature conductors are coated with high temperature enamel carefully selected and tested to be compatible with the rest of the insulation system. Conductor insulation is reinforced at critical points with close weave glass or glass-dacron tape pretreated with high temperature resin or with high temperature film.
- b. Extra protection is provided at crossovers and similar points inside the coil by treated glass strips, glass sleeving and similar reinforcing and barrier materials.
- c. All-around ground insulation is provided by a well consolidated, high dielectric

strength ground wall combining high temperature bonding resins with tough, flexible barrier and reinforcing materials. On small machines a combination is formed into high tear strength slot cells. On large machines wrappers are generally used.

d. Entire armature is high temperature varnish treated with multiple dips and bakes to give thorough impregnation and coating to provide a well filled and sealed unit with high bond strength, thermal stability and protection against dirt, moisture, solvents and other chemicals. This special high temperature varnish gives a smooth, dirt repellent surface.

- e. Field coils vary in design (shunt wound, shell type shown), to give the best combination of insulation reliability, heat dissipation and use of space, according to the particular application.
- f. High temperature enamel or glass insulated conductors depending on size.
- g. High dielectric strength insulation provides a barrier between coil and leads.
- h. Complete coil is vacuum impregnated with varnish and baked for external protection. This forms a solid mass of copper and insulation, impervious to liquids, vapor, dirt.





(1) Commutator bracket is designed for maximum accessibility, making it readily available for inspection and work access. Easier accessibility encourages maintenance of a regular routine up-keep schedule.

Cast iron construction for maximum rigidity and resistance to corrosive deterioration.

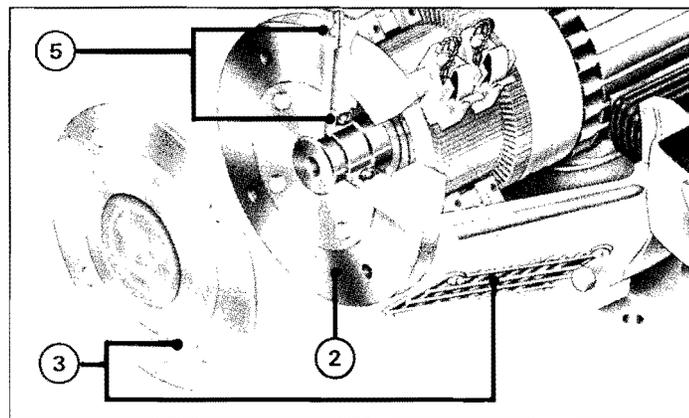
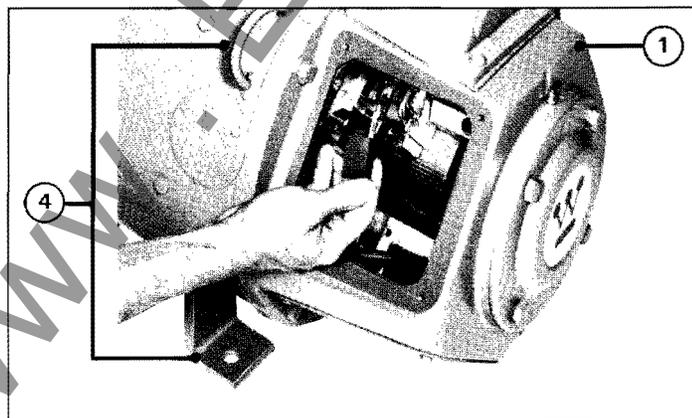
Bracket can be rotated in 90° increments to accommodate various blower or vent configurations.

(2) Accessory flange is machined on every front bracket as standard to utilize shaft extension for mounting tachometers and over-speed devices or brakes.

(3) Safety design features include: a metal covering over the front shaft extension to protect workers from rotating shaft, and to prevent damage to the machined flange face; screened openings to protect fingers from injury and prevent damage to insulation by rodents.

(4) Feet and lifting lugs are ruggedly constructed to withstand rough handling or abuse, minimizing nuisance repairs.

(5) Extra large ball bearings, suitable for belted loads are standard on all frame sizes. These bearings are packed at the factory with special Westinghouse lubricant – there is no need for greasing over many years of operation under most conditions. However, greasing and drain ports are provided on these machines for use if service lubrication is desirable.



(6) **Low inertia armature** provides 40% less WK² than competitive makes for fast response and reduced energy requirements for acceleration and deceleration.

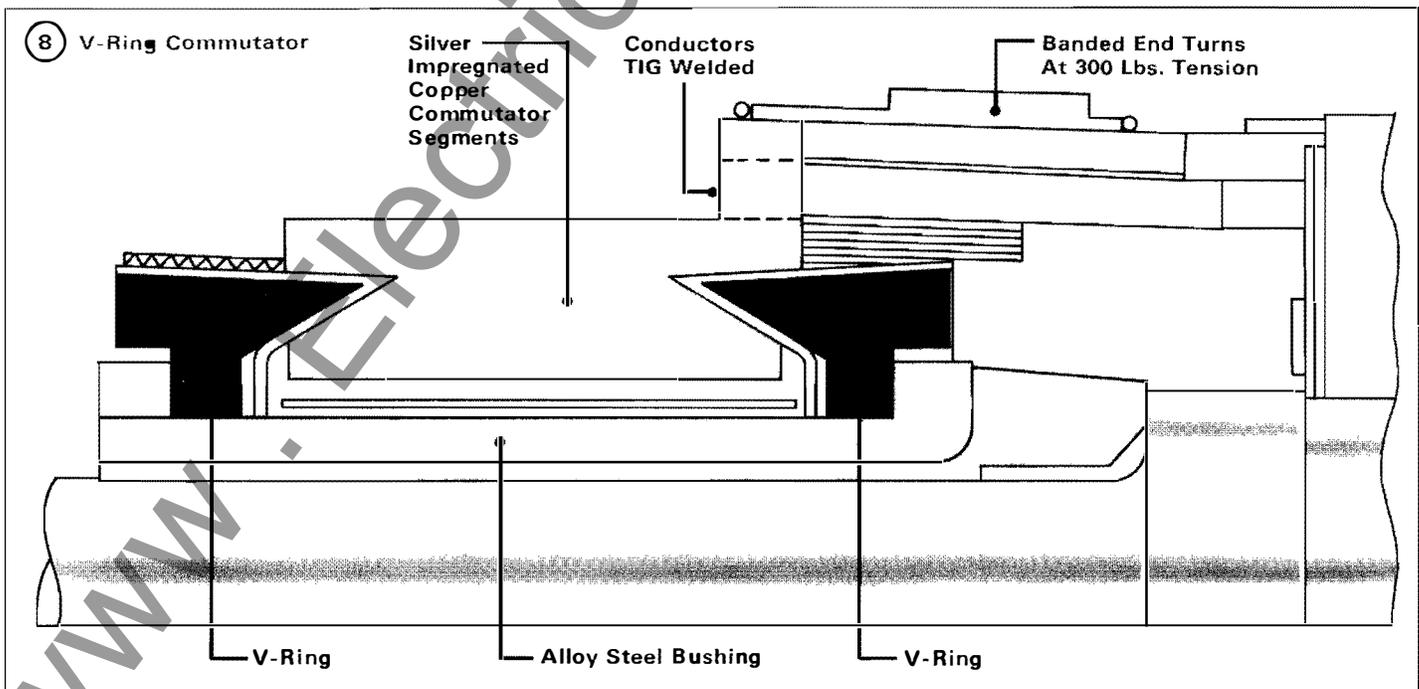
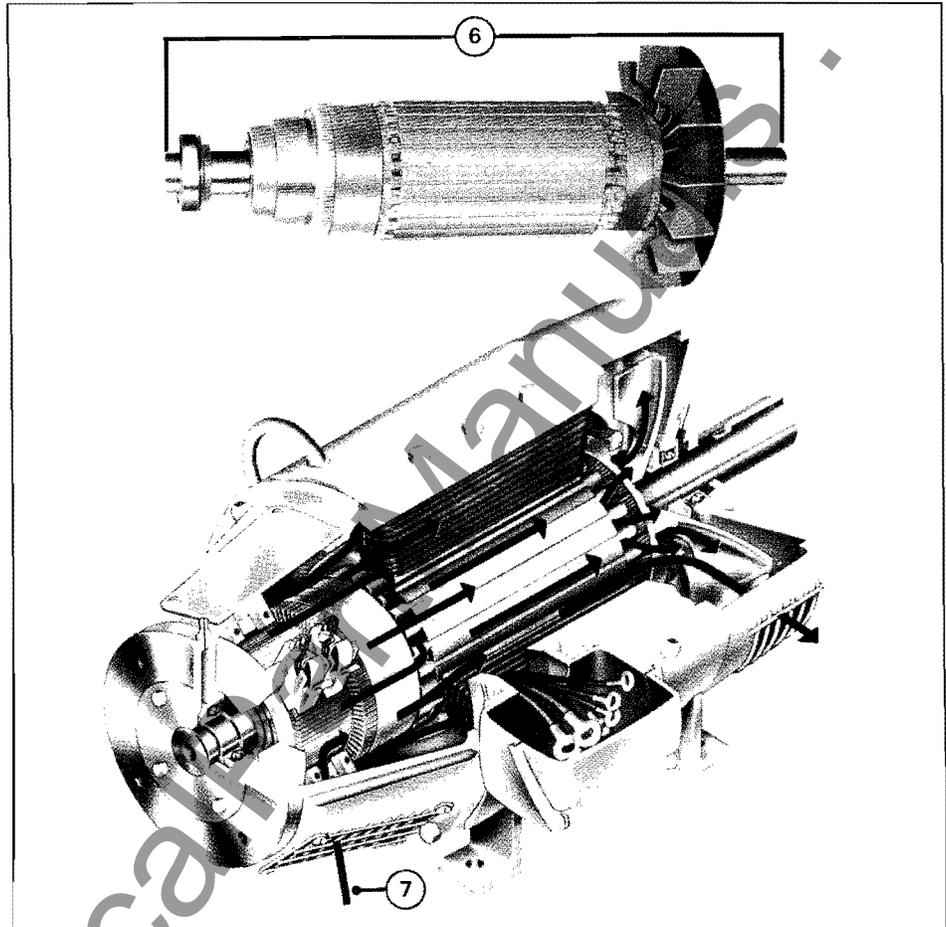
Each armature is dynamically balanced before assembly to insure longer bearing life and unit integrity.

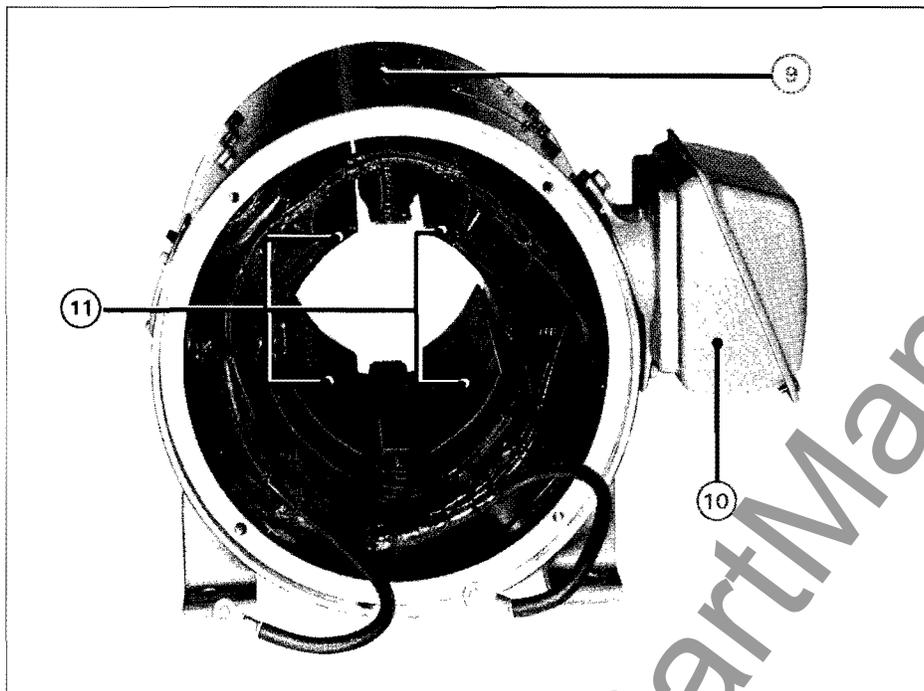
(7) **Ventilation system:** Integral fan mounted on armature shaft is designed to pull cool air over the commutator as well as through the core, adding thermal life to the insulation system.

(8) **V-Ring commutators** have proven themselves in years of service, thereby justifying the more expensive manufacturing process over glass banded or molded commutator designs. There is no resin compound to crack under the stresses of heat and centrifugal forces. In addition, the mechanical locking action of the V-Ring does not collect carbon dust or mildew which can lead to tracking and deterioration of glass bands.

Complete mechanical failure of the commutator is almost impossible. If maintenance is required local repair facilities can usually perform the tightening and heating required to cure a V-Ring commutator.

TIG welding on commutator risers reduces the likelihood of motor failure due to the "throwing" of solder during heavy overload conditions.





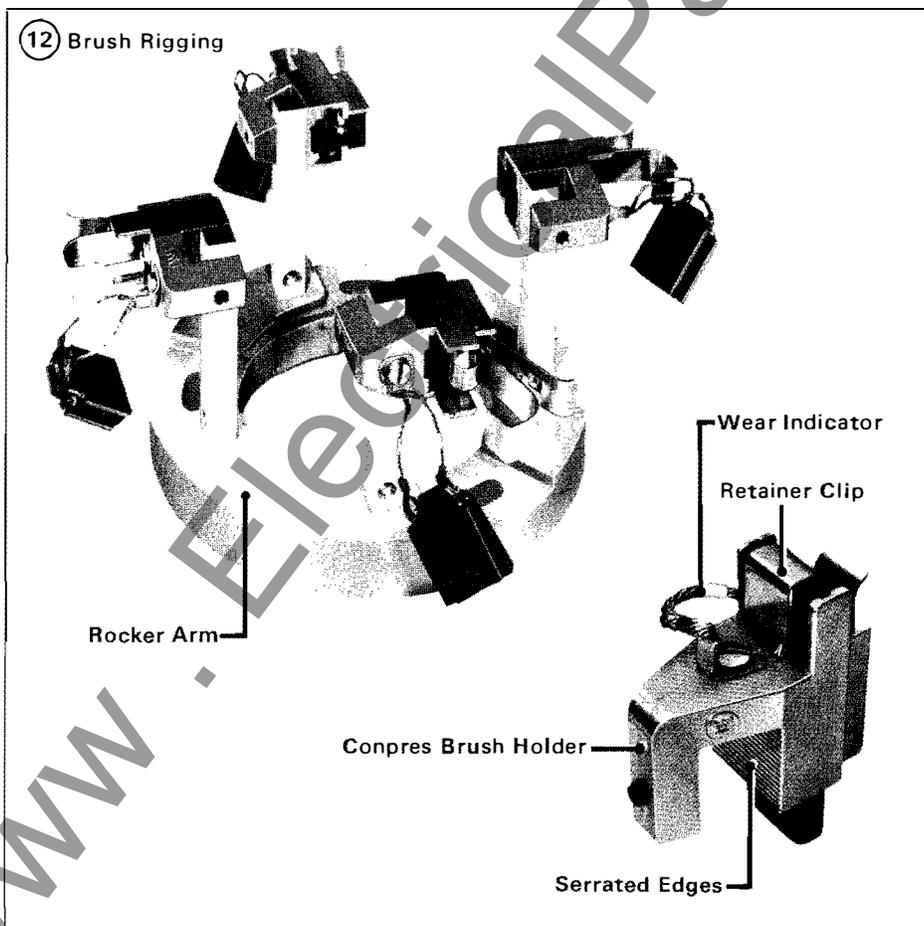
(9) **Heavy rolled steel frame** provides maximum mechanical stability and effective heat dissipation. This, coupled with the cast iron end brackets and machined rabbet fit, results in a solid frame that will not distort.

(10) **The giant conduit box** is diagonally split to permit cable connections to be made or broken easily and quickly. It is also fully gasketed to insure sealed integrity in harmful environments.

True F1/F2 conversion is achieved by designing longer internal wire leads to expedite conversion without breaking connections or splicing wires.

(11) **Four pole construction** has been adopted over two pole design because of its proven better commutating capability. Armature current requirements are reduced in four pole versus two pole designs during peak overload conditions.

(12) **Brushing rigging components** are specially selected for long trouble-free service and ease of maintenance. Molded rocker arm assembly is moisture resistant, non-tracking, non-warping, and non-distorting to maintain accurate brush spacing and alignment throughout the life of the brush.



Compres brush holders utilize rolled stainless spring steel to apply pressure evenly through special rubber yokes to the split brushes. This insures constant pressure and a "smooth ride" over the full service life of the motor.

The retainer clip is captive, preventing a broken spring or brush from falling on a rotating commutator - insurance against such a mishap causing complete motor failure.

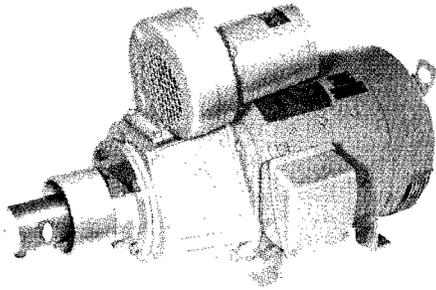
Serrated edges on the boxes and arms provide positive and accurate alignment of each box over the commutator. Maintenance time is cut by as much as 30 to 40% and brush life is nearly doubled since proper alignment is assured.

Indication of brush wear is provided by means of a color mark on the shunt. This enables instant inspection of brush wear without actually removing the brush from the holder. Routine inspection time is, therefore, minimal.

Modification Kits

Modification options are available to add to the flexibility of Life-Line S motors. These limited modifications were chosen because historically they have been the most popular. The blower assembly will enable continuous operation at constant full load torque from rated base speed down to ten rpm. The tachometer modification enables accurate speed feedback for drive system control or speed indication. Both of these modifications are available either on a factory-installed basis or in kit form, enabling the customer to make the addition in the field.

Many other factory modifications are available from the modification section 3530.



Life-Line S motor with blower (without filter) and tachometer generator modifications.

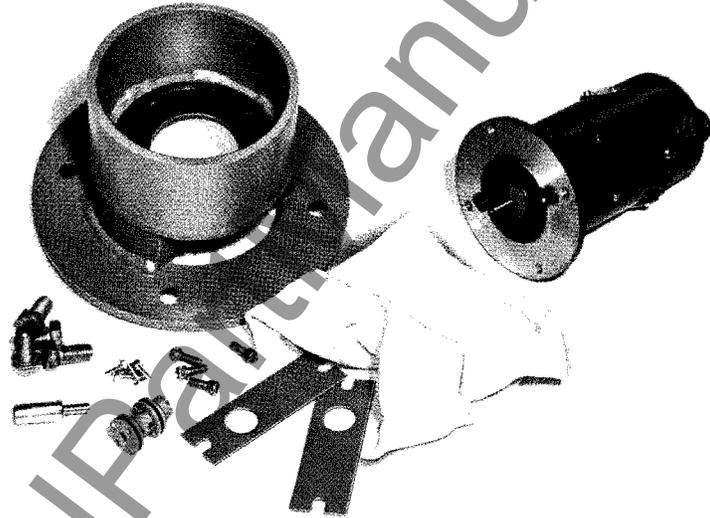
Tachometer Generator Kits

Various types of tachometers are available from stock. They range from extremely accurate Dc generators and pulse tachometers for feedback control to less expensive Ac and Dc tachometers for speed indicating devices.

For customers who want to mount their own tachometers, kits are available from stock. The kit includes the heavy duty mounting bracket, stub shaft, coupling and mounting

hardware. The tachometer generator can be supplied by the customer or ordered separately.

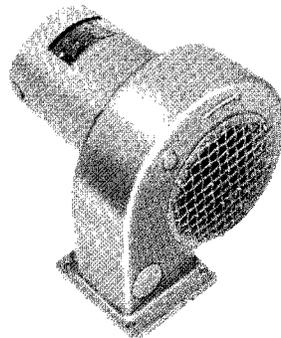
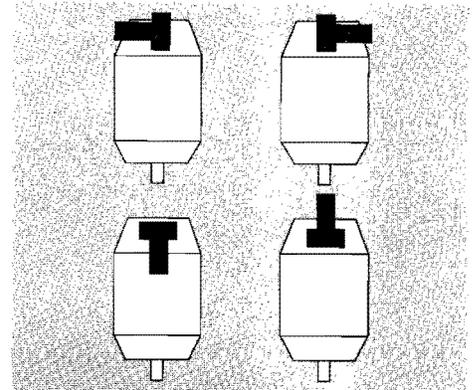
The tachometer assembly is extremely flexible because the adapter bracket will fit on any frame size. For example, a BC46 tachometer mounted on its bracket adapter will fit on a 286AT frame or a 508AT frame because the flange fit on these motors are identical.



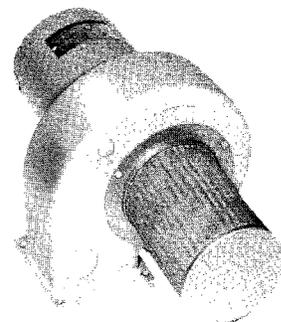
Motor Mounted Blower Kits

A rugged blower unit can be mounted on Life-Line S motors in a variety of configurations. These blower units are available with or without filters. As a kit the blower unit comes completely assembled with mounting hardware. The motors are squirrel cage Ac, operating from a 3 phase, 60 hertz, 230/460 volt supply; except in the case of the 250 frame size which uses single phase, 60 hertz, 115 volts.

By ventilating the motor at an optimum level, regardless of the motor speed the performance of a Dc motor is improved below base speed. Refer to the application data for further explanation.



Blower without filter



Blower with filter

www.ElectronicsManuals.com

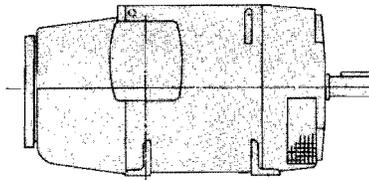


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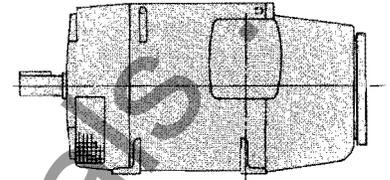
Mounting Assembly

F1/F2 Conversion for Frames 280AT-508AT

True F1/F2 conversion is easily accomplished without the expense of repair facilities. Sufficient internal cable length is provided on all leads to convert from one side of the motor to the other without splicing in new lengths. Electrical leads need only be rerouted, retied and the conduit box relocated.

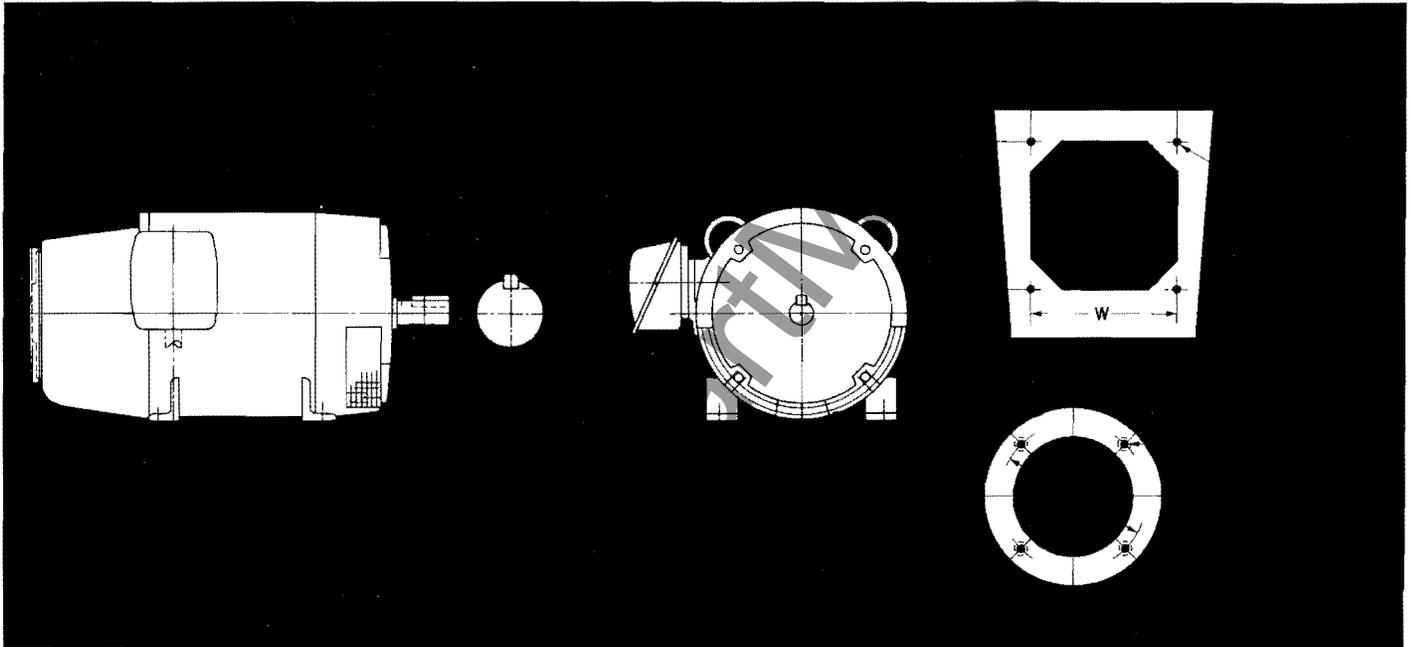


Mounting Assembly F-1 (Standard)



Mounting Assembly F-2

Dimensions, Drip-proof Guarded, Life-Line S



Frame Series	D	E	H	●	P	BA	Conduit Box				Front Bracket Opening					Tap Size
							AA	AB	AE	AF	W	X	Y	Z	V	
280AT	7.00	5.50	.537	14.0	14.0	4.76	1-1-25-1.5	11.7	9.1	3.0	4.10	4.10	4.10	4.10	4.10	.312-18
320AT	8.00	6.25	.656	15.9	15.9	5.26	1.5-2-2.5-3	14.5	10.5	5.4	5.00	5.00	5.00	5.00	5.00	.312-18
360AT	9.00	7.00	.812	17.9	17.8	5.88	1.5-2-2.5-3	15.8	11.5	5.4	5.00	5.00	5.00	5.00	5.00	.312-18
400AT	10.00	8.00	.94	19.9	19.8	6.62	1.5-2-2.5-3	16.6	12.8	5.4	5.00	5.00	5.00	5.00	5.00	.312-18
440AT	11.00	9.00	1.06	21.9	21.8	7.50	1.5-2-2.5-3	17.6	14.0	5.4	6.88	8.10	7.36	7.82	8.24	.250-20
500AT	12.50	10.00	1.18	24.8	24.6	8.50	Undrilled	20.0	15.5	7.0	8.00	8.82	8.00	8.62	9.24	.250-20

Frame No.	C	2F	Rear Shaft		Key Size ^③	N	V
			R	U			
283AT	25.94	8.00	1.591	1.875	.500 sq. x 2.50	3.90	3.50
284AT	27.44	9.50	1.591	1.875	.500 sq. x 2.50	3.90	3.50
286AT	28.94	11.00	1.591	1.875	.500 sq. x 2.50	3.90	3.50
324AT	30.84	10.50	1.845	2.125	.500 sq. x 3.00	4.36	4.00
326AT	32.84	12.00	1.845	2.125	.500 sq. x 3.00	4.36	4.00
327AT	34.34	14.00	1.845	2.125	.500 sq. x 3.00	4.36	4.00
364AT	33.16	11.24	2.021	2.375	.625 sq. x 3.50	4.94	4.50
366AT	35.92	14.00	2.021	2.375	.625 sq. x 3.50	4.94	4.50
367AT	37.92	16.00	2.021	2.375	.625 sq. x 3.50	4.94	4.50
406AT	39.70	16.00	2.275	2.625	.625 sq. x 4.00	5.44	5.00
408AT	44.20	20.00	2.275	2.625	.625 sq. x 4.00	5.44	5.00
447AT	44.50	20.00	2.450	2.875	.750 sq. x 4.50	5.94	5.50
448AT	46.50	22.00	2.450	2.875	.750 sq. x 4.50	5.94	5.50
506AT	47.74	20.00	2.831	3.250	.750 sq. x 5.25	6.68	6.38
507AT	49.74	22.00	2.831	3.250	.750 sq. x 5.25	6.68	6.38
508AT	52.74	25.00	2.831	3.250	.750 sq. x 5.25	6.68	6.38

Note: All dimensions are approximate, not to be used for construction purposes.

For detailed dimensions on Life-Line S motors refer to dimension sheets 3540, page series 100.

^③ Key size of drive end (rear end) of motor.



Normally Stocked, Standard-Line Drip-proof Guarded, Life-Line S Motors

The tables at right show the popular ratings that are usually kept in stock at Buffalo. Generally, ratings up to 200 horsepower will be available for immediate shipment with same day service capability in emergencies. Contact Westinghouse for stock status and application of modification kits on stock motors.

Life-Line S, specific purpose motors are available in other ratings but are manufactured on an order for order basis. A complete line of Dc motors ratings are available from 1/2 to 1250 horsepower with various base speeds, electrical ratings and enclosures by contacting Westinghouse.

Hp	1750 Rpm		1150 Rpm		Hp	1750 Rpm		1150 Rpm	
	Frames ②	Max. Speed Rpm	Frames ②	Max. Speed Rpm		Frames ②	Max. Speed Rpm	Frames ②	Max. Speed Rpm
240 Volt Armature, 150/300 Volt Field					500 Volt Armature, 150/300 Volt Field				
7.5	256A	2300	283AT	2000	15	283AT	2300	286AT	2000
10	256A	2300	284AT	2000	20	283AT	2300	324AT	2000
15	283AT	2300	286AT	2000	25	284AT	2300	326AT	2000
20	283AT	2300	324AT	2000	30	286AT	2300	327AT	2000
25	284AT	2300	326AT	2000	40	324AT	2100	364AT	2000
30	286AT	2300	327AT	2000	50	326AT	2100	366AT	2000
40	324AT	2100	364AT	2000	60	327AT	2100	367AT	2000
50	326AT	2100	366AT	2000	75	364AT	2100	408AT	2000
60	326AT	2100	367AT	2000	100	367AT	2000	448AT	2000
75	364AT	2100	408AT	2000	125	408AT	2000	506AT	2000
100	367AT	2000	448AT	2000	150	447AT	2000	506AT	2000
					200	448AT	1900	508AT	1800
					250	506AT ^③	1900	585A ^③	1700
					300	507AT ^③	1900	586A ^③	1600
					400	586A ^③	1900	685A ^③	1500
					500	587A ^③	1900	685A ^③	1500

② Frame sizes are tentative. Westinghouse reserves the right to substitute frames.
③ This rating must be force ventilated.

Life-Line S Motors cover a wide range of industrial applications, but they are only a part of the largest Dc product line in the industry. This Dc product line includes:

- Crane and hoist
- Permanent magnet
- Drill rig
- Mining (OX)
- Generators
- Traction
- Elevator
- AISE mill motors
- M-G sets

Westinghouse can meet the widely varying demands for Dc motors with capabilities that have developed along with the growth of modern, automated industries. A variety of enclosures, from force-ventilated to explosion resistant, means there is a Westinghouse motor for any environmental condition. And every motor in the line is backed by the Westinghouse reputation for reliability and long service life.

Westinghouse Service Is Where and When You Need It!

For the machinery manufacturer and user of industrial Dc motors, the worldwide service available through Westinghouse is an important and vital consideration.

Repair shops and service personnel are readily available in virtually every corner of the globe to provide assistance in repair or replacement – to keep equipment operating at top efficiency – to minimize downtime – to keep production rolling.

References

Discounts and Multipliers:
Selling Policy 3000

Prices:
Price List 3520

Dimensions:
Dimension Sheets 3540, page series 100

Modifications:
Price List 3530