

WASHGUARD® ALL-STAINLESS MOTORS

ALL-STAINLESS • THREE PHASE



New Products



WASHGUARD® SST™

This new member of LEESON's family of tough ducks is designed for long life in demanding washdown applications. LEESON's new FHP WASHGUARD® SST™ All-Stainless motors are Stainless Steel Tough!

Built with all stainless steel external components to prevent corrosion and well sealed against moisture and condensation to protect internal components, the Washguard® SST™ all-stainless motors are able to withstand the severe washdown environments found in the food processing, chemical processing, and beverage industries.

Mechanical Protection Features:

All exterior components – frame, base, endshields, fan guard, shaft, hardware, conduit box and cover – are made from 300 series stainless steel for maximum corrosion resistance. Nameplate data is permanently laser-etched into the motor frame – no Mylar nameplate that can wash off or riveted metal nameplate to trap dirt. No paint or any type of coating is used on the exterior of the motor.

Sealant is applied to endshield and frame fits before assembly to prevent water entry. Shaft seals on both ends of TEFC motors – shaft end only on TENV. Double-sealed bearings have high performance Exxon Polyrex EM grease. Conduit box is fully gasketed half-split design with flanged cover and body gasket with lead separator. Anti-corrosion coating on rotor prevents corrosion. Four quadrant drain locations on each endbell allow drainage of condensation in any mounting position. Stainless steel T-drains are provided to prevent liquids from splashing into the drain locations. Motors are shipped with a T-drain assembled in the six o'clock position on the opposite endshield. Another T-drain is shipped loose in the conduit box for installation at the lowest point of the shaft-end endshield. For a totally sealed motor, a spare pipe plug is included to replace the pre-installed T-drain.

Mechanical performance is further enhanced by over-sized bearings, heavy 12 gauge base, shaft-end bearing is locked internally to limit axial endplay, and specially designed shaft extension resists breakage at bearing journal.

Electrical Performance and Protection Features:

FHP Washguard® SST™ full load efficiencies meet EPACT standards for non-exempt motors when tested without shaft seals. For extra moisture resistance, windings are immersed and cured in polyester insulating varnish. LEESON's exclusive IRIS™ Inverter-Rated Insulation System provides extra protection and long life, especially in inverter driven applications.

Standards and Approvals:

UL component recognized, file number E57948, guide number PRGY2. Energy efficiency ratings are verified by an independent testing laboratory.

CSA Energy Efficiency Verification Program, report number EEV 78720-1.

Construction is CSA Certified for safety report number LR33543. Motor is CE marked for European acceptance.

ALL-STAINLESS • TENV/TEFC • C FACE WITH BASE

HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	Voltage	FL Amps 230V	% FL Eff.	"C" Dim. (Inches)		
1/3	3450	56C	191200●	\$347	A	29	208-230/460	1.0	74.0	9.40		
			191201●	389	A	30	208-230/460	1.3	78.5	9.40		
1/2	3450	56C	191203●	356	A	32	208-230/460	1.5	77.0	9.40		
			191204●	401	A	33	208-230/460	1.6	81.5	9.40		
3/4	3450	56C	191206●	391	A	33	208-230/460	2.0	78.5	9.40		
			191207●	463	A	38	208-230/460	2.3	82.5	9.40		
1	3450	56C	191209	459	A	41	208-230/460	2.6	80.0	13.40		
			143TC	G191210	494	B	42	208-230/460	2.6	80.0	13.87	
			1750	56C	191291●□	483	A	49	208-230/460	3.0	81.0	13.50
				56C	191211	483	A	47	208-230/460	3.0	82.5	13.40
			1750	143TC	G191212	519	B	48	208-230/460	3.0	82.5	13.87
1½	3450	56C	191215	507	A	48	208-230/460	3.8	82.5	13.40		
			143TC	G191216	545	B	49	208-230/460	3.8	82.5	13.87	
			1750	56C	191217	504	A	48	208-230/460	4.8	84.0	13.40
145TC	G191218	540		B	49	208-230/460	4.8	84.0	13.87			
2	3450	56C	191221	562	A	49	208-230/460	5.0	84.0	13.40		
			145TC	G191222	654	B	50	208-230/460	5.0	84.0	13.87	
			1750	56C	191223	574	A	52	208-230/460	5.8	84.0	13.40
				145TC	G191224	641	B	53	208-230/460	5.8	84.0	13.87
3	3450	145TC	G191293□	700	B	62	208-230/460	7.4	85.5	13.87		

● These motors are totally enclosed, non-ventilated—Others are fan cooled.
□ Available August 2004



ALL-STAINLESS • TENV/TEFC • C FACE LESS BASE

HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	Voltage	FL Amps 230V	% FL Eff.	"C" Dim. (Inches)	
1/3	1750	56C	191202●	\$386	A	29	208-230/460	1.3	78.5	9.40	
1/2	1750	56C	191205●	396	A	32	208-230/460	1.6	81.5	9.40	
3/4	1750	56C	191208●	461	A	38	208-230/460	2.3	82.5	9.40	
1	1750	56C	191290●□	481	A	48	208-230/460	3.0	81.0	13.50	
			56C	191213	481	A	46	208-230/460	3.0	82.5	13.40
			143TC	191214	495	B	47	208-230/460	3.0	82.5	13.87
1½	1750	56C	191219	502	A	47	208-230/460	4.8	84.0	13.40	
			145TC	191220	516	B	48	208-230/460	4.8	84.0	13.87
2	1750	56C	191225	572	A	51	208-230/460	5.8	84.0	13.40	
			145TC	191226	589	B	52	208-230/460	5.8	84.0	13.87

● These motors are totally enclosed, non-ventilated—Others are fan cooled.
□ Available August 2004



CONFORMITE
EUROPEENE



Numbers in green are EPACT motors.
Catalog numbers in blue are NEW items.

LEESON WASHGUARD® ALL-STAINLESS MOTORS

ALL-STAINLESS • SINGLE PHASE • THREE PHASE

PREMIUM STAINLESS STEEL DUCK

For maximum service in the most critically clean or corrosive environments, nothing beats LEESON's new Premium WASHGUARD® All-Stainless Motors.

Specifically designed to meet the demanding sanitation requirements of the pharmaceutical and food processing industries, these motors are also ideal in severe chemical-processing applications involving nitric acid and caustic lye. In fact, WASHGUARD® All-Stainless Motors include IEEE 841 severe-duty features right out of the box!

Mechanical Protection Features:

Exterior components are entirely of 300 series stainless steel, including frame, base, endshields, conduit box, box cover and hardware. Plus, full-fact nameplate data is etched into the motor frame (56, 143T & 145T frames) or etched directly on the conduit box (182T thru 215T frames) to prevent destruction or loss of the nameplate during washdown and eliminating rivet holes in the frame as a source of entry for moisture. Nothing on the motor's exterior is painted or coated in any way.

Endshields are o-ring sealed to the frame. Double-lip shaft seals, o-rings, and gaskets are made from chemically resistant Viton® material. Hydrophobic breathers in the opposite shaft endbell and conduit box equalize pressure without allowing moisture to enter the motor. Double-sealed bearings are pre-lubricated with moisture-resistant high-temperature grease. Single phase motors have capacitors and solid state switch mounted inside the opposite endbell. Easy access to leads, caps and switch through full-diameter endbell cover.

Electrical Performance and Protection Features:

WASHGUARD® efficiencies meet EPACT mandates for non-exempt motors when tested without shaft seals. For extra moisture resistance, windings are immersed and cured in polyester insulating compound. Single phase motors feature electronic solid state encapsulated starting switches for maximum reliability. Three phase motors include LEESON's exclusive IRIS™ Inverter-Rated Insulation System that provides extra protection and long life, especially in inverter-driven applications.

Standards and Approvals:

UL component recognized, file number E57948, guide number PRGY2. Energy efficiency ratings are verified by an independent testing laboratory.

CSA Energy Efficiency Verification Program, report number EEV 78720-1.

Construction is CSA Certified for safety report number LR33543 and listed under BISSC authorization number 769.



CHEMICAL RESISTANCE RATING CHART

CHEMICAL	CONCENTRATION	ALL STAINLESS COMPONENTS
WATER:		
De-Ionized Boiling	100%	Excellent
Salt (Immersed)	30%	Excellent
Salt (Spray)	5%	Excellent
Tap - 250°F/120°C @ 10,000 PSI	100%	Excellent
ACIDS:		
Hydrochloric	35%	Poor
Sulfuric	25%	Poor
Nitric	35%	Excellent
Picric	Saturated Solution	Excellent
BASE:		
Caustic	100%	Excellent
Caustic	12.5 pH	Excellent
Caustic - 125°F/50°C	9.5 pH	Excellent
SOLVENTS:	--	Excellent



ALL-STAINLESS SINGLE PHASE • TENV/TEFC • C FACE WITH BASE

HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	Voltage	Over- load Prot.	FL Amps 230V	"C" Dim. (Inches)
1/3	1750	56C	116343 ●	\$772	A	28	115/208-230	None	2.7	12.20
1/2	3450	56C	116344 ●	763	A	25	115/208-230	None	3.8	12.20
	1750	56C	116345 ●	784	A	28	115/208-230	None	3.3	12.70
3/4	1750	56C	116346 ●	827	A	30	115/208-230	None	3.8	12.70
1	3450	56C	116347 ●	866	A	31	115/208-230	None	6.0	13.70
	1750	56C	116348 ●	860	A	33	115/208-230	None	4.5	13.70
1½	3450	56C	116482 □	883	A	36	115/208-230	None	6.7	13.19
	1750	145TC	121622 □	920	B	45	115/208-230	None	8.6	14.19
2	3450	145TC	121623 □	991	B	43	115/208-230	None	8.6	14.19
	1750	145TC	121632 □	1032	B	60	115/208-230	None	9.2	13.96

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□ Available August 2004

ALL-STAINLESS SINGLE PHASE • TENV/TEFC • C FACE LESS BASE

HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	Voltage	Over- load Prot.	FL Amps 230V	"C" Dim. (Inches)
1/3	1750	56C	116349 ●	\$756	A	25	115/208-230	None	2.7	12.20
1/2	1750	56C	116350 ●	769	A	29	115/208-230	None	3.3	12.70
3/4	1750	56C	116351 ●	810	A	31	115/208-230	None	3.8	12.70
1	1750	56C	116352 ●	839	A	34	115/208-230	None	4.5	13.70
1½	1750	145TC	121624 □	853	B	43	115/208-230	None	8.6	14.19
2	1750	145TC	121633 □	981	B	60	115/208-230	None	9.2	13.96

● These motors are totally enclosed, non-ventilated—Others are fan cooled.
□ Available August 2004



ALL-STAINLESS • TEFC • JM PUMP

HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	Voltage	FL Amps 230V	% FL Eff.	"C" Dim. (Inches)
1	1750	143JM	121626	\$780	B	51	208-230/460	3.0	81.5	14.41
1½	3450	143JM	121627	781	B	46	208-230/460	4.0	82.5	15.82
	1750	145JM	121628	795	B	47	208-230/460	4.4	84.0	15.82
2	3450	145JM	121629	953	B	50	208-230/460	5.0	84.0	15.82
	1750	145JM	121630	964	B	48	208-230/460	6.0	84.0	16.32
3	3450	145JM	121631	1146	B	51	208-230/460	7.4	85.5	15.82
	1750	182JM	131996	1148	B	71	208-230/460	8.2	87.5	16.50
5	3450	184JM	131997	1300	B	81	208-230/460	12.0	87.5	16.50
	1750	184JM	131998	1308	B	81	208-230/460	13.0	87.5	17.00
7½	3450	213JM	140740	1930	B	151	208-230/460	18.4	88.5	19.82
	1750	213JM	140741	1899	B	154	208-230/460	20.4	89.5	19.82
10	3450	215JM	140742	1997	B	165	208-230/460	24.0	89.5	19.82
	1750	215JM	140743	1958	B	170	208-230/460	26.0	89.5	19.82

All-Stainless JM Pump motors available August 2004

Catalog numbers in blue are NEW items.

AC ADJUSTABLE SPEED DRIVES

FHP SERIES • SINGLE & DUAL VOLTAGE AC DRIVES



FHP SERIES AC DRIVES

General Specifications:

The FHP Series volts/hertz-type AC drives are as simple to setup and calibrate as an SCR-type DC drive. Rated from 1/4 to 1HP with 115V, 230V, or 115/230V "doubler" input power ratings.

The cost-conscious and compact chassis design of the FHP Series maintains the industry standard for mounting hole location.

The NEMA 4X enclosed drive has additional features in a compact package size.

With its compact size, standard features and application flexibility, the FHP Series is an excellent choice for most 1 hp and under AC applications.

Common features for chassis and enclosed units:

- Compact size – (4.30" x 3.70")
- Industry standard mounting
- Output voltage on dual voltage models is jumper selectable and can double the output voltage – allowing the use of a 230V motor when only 115V power is available.
- Quickly and easily change trimmer pot ranges for 1/15 to 1 hp motors.
- Easy calibration and setup with on board trim pot adjustments for boost, max speed, acceleration, deceleration, to overcome intermittent peak loads, then reduces the torque and torque limit.
- Torque 'foldback' feature – Allows up to 200% torque for short periods (output current) to a safe level that is set with the TQ LIMIT trim pot.
- 16kHz switching frequency, with option to change between 4 and 16kHz in the field.
- Adjustable torque boost for startup – Up to 200% additional torque for loads with high inertia or friction.
- Color-coded on-board LEDs for Power, Fault and Torque Limit enable easy visual determination of drive status.
- Easy start/stop and direction control with enable and Direction terminal connections.
- Accepts speed reference from 0-5VDC isolated signal or wired in speed potentiometer.
- Plug-in Process Control Module (PCM) kit available to accept 0-5VDC, 0-10VDC or 4-20mA input.
- UL listed

Special features of the NEMA 4X drive:

- NEMA 4X enclosure
- Jumper selectable DC injection braking or coast to stop
- Brake time and current are adjustable
- Built-in isolation card to accept a speed reference signal
- Min speed adjustment
- Auto or manual restart after power loss

PARAMETER	SPECIFICATIONS FOR ALL FHP MODELS
Max load	150% for 5 minutes
Output frequency	0-120Hz
Output type	6 step PWM
Switching frequency	4-16kHz range* with 16kHz as factory default
Speed regulation and range	±3% of base speed; up to 50:1
On-board adjustable trim pots	Max speed, accel, decel, boost & torque limit
Adjustable maximum frequency range	32-120Hz
Adjustable accel and decel time range	1-12 seconds
Torque boost range	0-200%
LED indicators	Power (green), Fault† (red), Torque Limit (yellow)
Instantaneous over-current trip time	3 µsec
Analog reference input and impedance	0-5VDC isolated, ~100Kohm
Plug-in PCM isolator card input	0-5 VDC, 0-10VDC, 4-20mA
Ambient temperature range	0-40°C
Weight (Chassis Models)	1.2 lbs.
Vibration	0.5G max (20-50Hz); 0.1G max (>50Hz)
Approvals	UL, cUL

* Plug-in capacitor kit (175325) for field adjustments to less than 16kHz.

† Faults are Over-voltage, Under-voltage and Instantaneous Over Current trip.



FHP SERIES AC DRIVES • CHASSIS MOUNT SINGLE PHASE INPUT/THREE PHASE OUTPUT

HP	Input Voltage	Output Amps	Output Voltage	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/4	230	1.2	230	175318	\$259	A	2
	115/230	1.2	230	175319	309	A	2
	115	2.4	115	175320	267	A	3
1/2	230	2.4	230	175321	267	A	3
	115/230	2.4	230	175310	340	A	3
	115	4.0	115	175322	331	A	4
1	230	4.0	230	175323	328	A	4
	115/230	4.0	230	175311	430	A	4

FHP SERIES AC DRIVES • ACCESSORIES

Item Description	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
Process Control Module (PCM) Kit*	175324	\$84	A	2
Carrier Frequency Capacitor Kit	175325	20	A	1

* PCM Kit is for use with chassis drives only.

FHP SERIES AC DRIVES • NEMA 4X (IP65) SINGLE PHASE INPUT/THREE PHASE OUTPUT

- NEMA 4X enclosure
- Min speed adjustment
- Jumper selectable features:
 - DC injection braking or coast to stop
 - Brake time and current are adjustable
 - Auto or manual restart after power loss
- Built-in isolation card to accept a speed reference signal



HP	Input Voltage	Output Amps	Output Voltage	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)
1/6-1	115/230	4.0	230	175326	\$604	A	7

□ Available June 2004

FHP MOTORS FOR AC DRIVES THREE PHASE • TEFC • C FACE WITH BASE

- Compact 48-frame design with keyed shaft
- Class F insulation
- 20:1 Constant torque rated
- Inverter IRIS™ insulation system
- 1/2" diameter keyed shaft with 48-C Face
- 115/230V 3-phase design optimized for FHP drives



HP	RPM 60 Hz	NEMA Frame	Catalog Number	List Price	Disc. Sym.	App. Wgt. (lbs.)	FL. Amps 230V	% F.L. Eff.	"C" Dim. (Inches)
1/6	1725	48CZ	102792	\$184	A	15	1.3	56.0	8.94
1/4	1725	48CZ	102793	208	A	15	1.4	58.0	8.94
1/3	1725	48CZ	102794	228	A	20	1.6	64.0	9.19
1/2	1725	48CZ	102795	256	A	24	1.8	77.0	10.19

SERIES 12 SUB-FHP

Electrical Specifications:

Both SCR (90 volt) and Low Voltage (12 volt) right angle gearmotors, the 90 volt motors are performance matched for continuous service over a 60:1 speed range. All have constant torque throughout the speed range when powered by a full-wave, unfiltered SCR-type 115 volt input adjustable speed control having a typical form factor of 1.3 to 1.4. The low voltage motors are also performance matched for continuous duty. Motors are designed for battery power or can be used with a low voltage controller with form factor up to 1.05.



Mechanical Specifications:

This worm-type right-angle gearing features hardened, steel worm with bronze worm wheel for long life and quiet operation. Single-piece die cast aluminum alloy housing is vacuum impregnated with Resinol RT for protection and sealing. This gearbox combines light weight with high tensile strength along with being precision machined for alignment of bearings and gearing. For optimum seal life, we use high-temperature Nitrile seals. Gearbox provided with solid output shaft, but can be converted to a hollow output shaft mounting by using snap-ring pliers and remove the snap ring and solid output shaft. Also the T-base feet are bolted to the gearbox, but can easily be removed and converted to face mounting.



**RIGHT-ANGLE DC • SCR 90 VOLT RATED
TEFC • 1.0 SERVICE FACTOR**

Input HP	F.L. Torque (In.-Lbs.)	Output RPM	Catalog Number	List Price	Enclosure	Gearmotor Type & Frame	Ratio to 1	Full Arm Volts DC	Load Amps. DC
1/8*	125	28	M1135292	\$412	TENV	12B60-34D	61	90	1.6
1/8*	87	45	M1135291	412	TENV	12B39-34D	39	90	1.6
1/4	158	58	M1135290	433	TEFC	12B30-34G	30	90	2.8
1/4	100	90	M1135289	433	TEFC	12B19-34G	19	90	2.6
1/4	85	115	M1135288	433	TEFC	12B15-34G	15	90	2.6
1/4	61	167	M1135287	433	TEFC	12B11-34G	10.6	90	2.6
1/4	46	250	M1135286	433	TEFC	12B7-34G	7	90	2.6

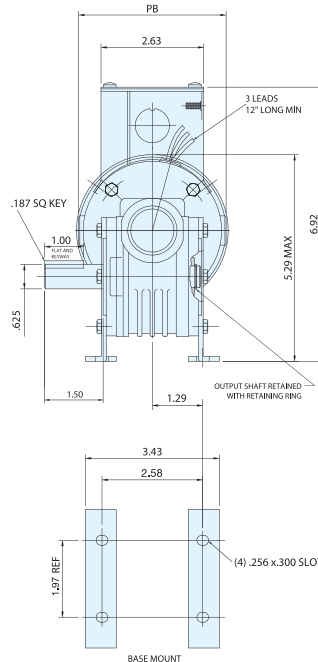
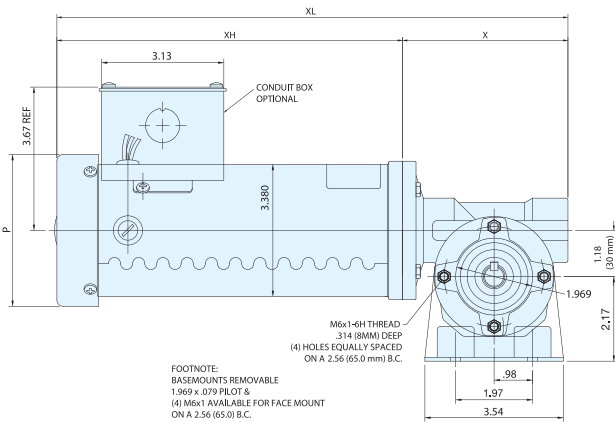
* Supplied with TENV motor enclosure

**RIGHT-ANGLE DC • LOW VOLTAGE (12V)
TENV • 1.0 SERVICE FACTOR**

Input HP	F.L. Torque (In.-Lbs.)	Output RPM	Catalog Number	List Price	Enclosure	Gearmotor Type & Frame	Ratio to 1	Arm Volts DC	Full Load Amps. DC
1/8	134	27	M1135285	\$428	TENV	12B60-34C	61	12	14
1/8	94	45	M1135284	428	TENV	12B39-34C	39	12	15
1/4	158	58	M1135297	448	TENV	12B30-34F	30	12	24
1/4	100	90	M1135296	448	TENV	12B19-34F	19	12	24
1/4	85	115	M1135295	448	TENV	12B15-34F	15	12	23
1/4	61	167	M1135294	448	TENV	12B11-34F	10.6	12	21
1/4	46	250	M1135293	448	TENV	12B7-34F	7	12	23

NOTES:

- Conduit box not supplied with the gearmotor. Mounting provisions are provided and can use conduit box kit catalog number M1760007 found on page 156.
- For solid double output shaft, consult factory.



**SCR 90 VOLT RATED
DIMENSIONS (INCHES)**

P	X	XL	XH	PB
3.38	4.32	11.07	6.75	4.00
3.38	4.32	11.07	6.75	4.00
3.88	4.32	13.16	8.84	3.76
3.88	4.32	13.16	8.84	3.76
3.88	4.32	13.16	8.84	3.76
3.88	4.32	13.16	8.84	3.76
3.88	4.32	13.16	8.84	3.76
3.88	4.32	13.16	8.84	3.76

**LOW VOLTAGE (12V)
DIMENSIONS (INCHES)**

P	X	XL	XH	PB
3.38	4.32	10.57	6.25	4.21
3.38	4.32	10.57	6.25	4.21
3.38	4.32	11.82	7.5	4.21
3.38	4.32	11.82	7.5	4.21
3.38	4.32	11.82	7.5	4.21
3.38	4.32	11.82	7.5	4.21
3.38	4.32	11.82	7.5	4.21
3.38	4.32	11.82	7.5	4.21