



PERMANENT
MAGNET

DIRECT CURRENT MOTORS & GEARMOTORS

IEC Frames
NEMA Frames
Small Frames

LEESON[®]

ELECTRIC MOTORS
GEARMOTORS AND DRIVES





LEESON...Your Complete Source For Quality DC Motors And More



LEESON electric motors are manufactured in the United States and are stocked in more than 35 warehouses across the United States, Canada and Europe. LEESON is a subsidiary of Regal-Beloit Corporation, a world leader in the manufacture of power transmission equipment.

Today's LEESON offers one of the industry's broadest and most accessible ranges of AC and DC commercial and industrial electric motors, gearmotors, and drives.

LEESON Permanent Magnet Direct Current (PMDC) motors are available for thyristor input through 2,2kW. Low-voltage motors for battery, generated DC, or solar power are available through 6,0kW. All are manufactured to LEESON's precise standards, which include certification to the International Standards Organization (ISO) 9001 Quality System Standard. Product support is provided worldwide, through a network of Authorized Service Centers.

Where a custom motor is the answer, no one can match LEESON's flexibility in custom motor design, manufacturing and delivery. LEESON manufacturing operations are certified to ISO 9000 international quality standards, your assurance of consistent-quality product.

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Thyristor-Rated and Low Voltage Permanent Magnet DC Motors

Thyristor Rated Motors — 90 & 180 VDC

LEESON thyristor rated permanent magnet DC motors are available in sizes ranging from 12,5W through 2,2kW. These motors are designed to withstand the additional heating produced by the pulsating direct current power output of unfiltered or filtered thyristor adjustable speed controls. They may also be used with PWM-type DC drives.



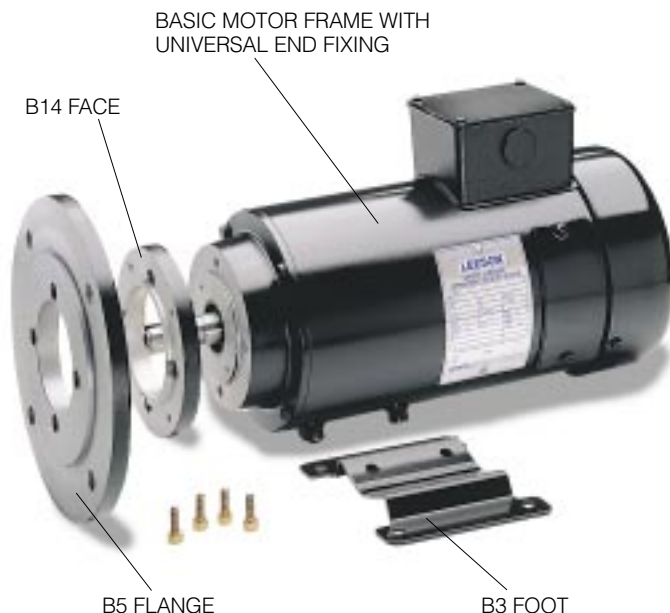
Low Voltage Motors — 12, 24, 36 or higher VDC

LEESON low voltage DC motors are available from 15W through 6,0kW. These motors are high torque, continuous S1 or S3 periodic-duty products suitable for a wide variety of applications ranging from pumps to propulsion. The motors operate on battery power or generated "pure" DC power.





IEC and NEMA frame DC motors from LEESON feature oversized brushes, accessible without disassembly of the motor. Integral constant pressure springs and bi-directional brush holders help ensure long service before maintenance — up to four times that of other DC motors. Four brushes are used in larger horsepower low voltage motors.



IEC & NEMA Frame Permanent Magnet DC Motor Features—

- Designed and manufactured to IEC 34-1 and NEMA MG1 (USA) mechanical and electrical standards.
- Available in IP 54, 44 and 23 enclosures with IEC B3, B5, B14 mounting provisions. Also available in NEMA (USA) footed, face and flange mountings as well as a wide variety of special and custom mountings.
- Thyristor motors in frames 71 through 112 have provisions for mounting a variety of B5 and B14 flange or faces and B3 bases. Tachometer mounting provisions are also standard on each motor with adaptor packages for a variety of tachometers.
- IEC motors utilize metric fasteners. NEMA frame motors have imperial fasteners.
- Recognized by Underwriters Laboratories (USA) component approval program, file number E57948, guide number PRGY2, and by Canadian Standards Association, file number LR33543.
- Full-fact metal rating plate lists a permanent record of motor data. Thyristor motors have dual kW ratings listing 1,05 and 1,40 form factor output capability and full load DC amperage for each kW rating.
- Steel frames with rugged high-pressure cast 380 alloy aluminum machined endshields, with steel bearing seat inserts (IEC 71 and larger) for precision alignment and bearing life, accurate brush tracking and maximum motor life.
- Ceramic permanent magnet field, ferrite type, operate cooler and more efficiently than do wound field motors. Four pole designs used in larger ratings. Designed for ambient temperature range of -20°C to 40°C.
- IEC frame motors have a terminal board in a cast, gasketed terminal housing. Larger low voltage motors have machined studs for connections. Smaller motors have high temperature leads.
- Precision dynamically balanced armatures for quiet, smooth operation.
- Class F & H insulation materials used throughout with fusion welded, molded commutators for dimensional stability.
- Oversized brushes, accessible without disassembly of the motor, with integral constant pressure springs and bi-directional brush holders assure longer service before maintenance — up to four times that of other DC motors. Four brushes are used in larger low voltage motors.
- Reversible by interchanging armature connections and capable of dynamic braking for faster stopping.
- Sealed or shielded, permanently lubricated, selected electric motor grade ball bearings are used for quiet operation and long life.



STOCK DC MOTORS

METRIC (IEC) FRAME • THYRISTOR RATED

DC METRIC (IEC) FRAME MOTORS IP54

General Specifications:

These metric dimensioned motors are built to IEC 34-1 electrical and mechanical standards.

The IEC 63 and smaller frames are stocked with an integral B5 flange or B14 face less base.

An optional B3 rigid base kit is available.

A unique modular approach for IEC 71 frame and larger allows the motor to be field modified to B3 rigid base mounted construction, B5 flange mounted or B14 face mounted construction using conversion kits. Please note that one or more of the mounting kits must be used with IEC motors of these frame sizes. See listing on following page for B5 flange and B14 face kits, as well as B3 rigid base kits.

Electrical & Mechanical Features:

A terminal board is provided for connections. All fasteners are metric. Electrical and mechanical features are the same as listed for the motors on the opposite page. Tachometer mounting kits are available—please contact LEESON for data.



B5 IEC 56 & 63



B14 IEC 56 & 63



WASHGUARD IEC

TOTALLY ENCLOSED • THYRISTOR RATED 180V_C WITH B5 FLANGE

Watts	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	F.L. Amps DC	C Dim. (mm)
60	1/12	1800	56	M1130146	3,6	0,5	159
90	1/8	1800	56	M1130147 ¹	5,0	0,7	192
120	1/6	1800	63	M1130148	5,0	0,9	223
180	1/4	3000	63	M1130152 ¹	5,9	1,3	223
		1800	63	M1130149	5,9	1,3	253
250	1/3	3000	63	M1130153	5,9	1,7	253

These mountings have accommodations for B3 base mountings with the kits shown on page 5.

For dimensions, see drawing **E** on page 33.

TOTALLY ENCLOSED • THYRISTOR RATED 180V_C WITH B14 FACE

Watts	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	F.L. Amps DC	C Dim. (mm)
60	1/12	3000	56	M1110024 ¹	2,7	0,4	177
		1800	56	M1130136 ¹	3,6	0,5	159
90	1/8	3000	56	M1130140 ¹	4,1	0,7	171
		1800	56	M1130137 ¹	4,5	0,7	192
120	1/6	3000	56	M1130141 ¹	4,5	0,9	192
		1800	63	M1130138	5,0	0,9	223
180	1/4	3000	63	M1130142 ¹	5,4	1,3	223
		1800	63	M1130139	5,9	1,3	253
250	1/3	3000	63	M1130143	5,9	1,7	253

These mountings have accommodations for B3 base mountings with the kits shown on page 5.

For dimensions, see drawing **F** on page 33.

WASHGUARD® • IEC FRAME • TENV IP55 B5 FLANGE WITH REMOVABLE B3 BASE_s THYRISTOR RATED 180V

kW	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	F.L. Amps DC	C Dim. (mm)
0,37	1/2	1750	71	098040	10,0	2,5	299
0,55	3/4	1750	80	108407 ^①	14,5	3,5	372

For dimensions, see drawing **H** on page 33.

^c For 230 VAC input controls.

¹ These motors are totally enclosed, non-ventilated. Other ratings utilize IC41 cooling—external cooling fan on motor shaft.

^① These motors are totally enclosed, fan cooled, utilizing IC41 cooling — external cooling fan on motor shaft. Others are totally enclosed non-ventilated. WASHGUARD® fan covers are stainless steel.

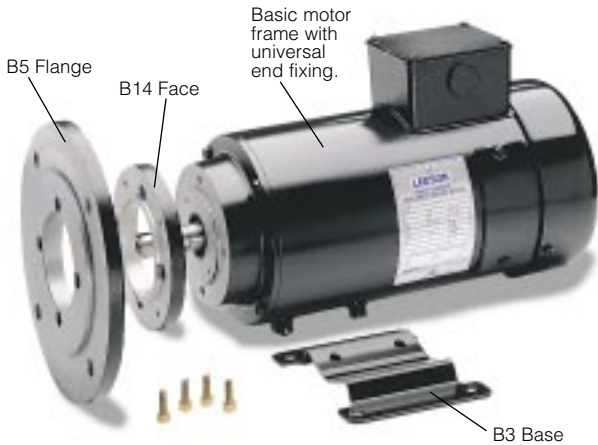
▲ These WASHGUARD® motors are modular design but stocked with B5 flange and B3 foot. The foot is removable. The B5 flange can be replaced with a B14 face or other diameter B5 flanges noted on page 5.

MODULAR DESIGN CONCEPT

LEESON's larger horsepower thyristor rated motors, in IEC frames 71 through 100, utilize a unique modular mounting design. The basic frame is fitted with a universal end fixing and also has provisions to accept a rigid foot.

The basic frame can be field-adapted for use as a B3 footed motor, B5 or B14 flange or face mounted motor or a combination such as B3 foot with B5 flange.

The universal end fixing of the frame will accept the IEC 71, 80, 90, 100 or 112 frame B5 flange or B14 face adapter packages.



METRIC FRAME FLANGE AND FACE KITS (FRAMES 71-112)

An advantage of LEESON'S modular design concept is the possible use of a different diameter B5 flange or B14 face than is normally assigned to a motor by IEC dimensional standards. This flexibility makes it possible to accommodate a wide variety of gear reducers, pumps and similar close coupled motor mounted loads.



B5 FLANGE KITS

IEC Frame	Catalog Number	Bulk Pack (10) Catalog Number	BD Flange Dia. (mm)	AK Register (mm)	BF Hole (mm)	AJ Bolt Circle (mm)
71	175106	175160	160	110	9	130
80	175108	175161	200	130	12	165
90S/90L	175108	175161	200	130	12	165
100L/112M	175137	175162	250	180	15	215

B14 FACE KITS

IEC Frame	Catalog Number	Bulk Pack (10) Catalog Number	BD Flange Dia. (mm)	AK Register (mm)	BF Hole (mm)	AJ Bolt Circle (mm)
71	175107	175163	105	70	6	85
80	175109	175164	120	80	6	100
90S/90L	175129	175165	140	95	6	115
100L/112M	175130	175166	160	110	6	130

METRIC (IEC) FRAME THYRISTOR RATED 180V_C • TEFC MODULAR DESIGN

kW	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	F.L. Amps DC	C Dim. (mm)
0,25	1/3	1800	71	098014	10,4	1,7	287
0,37	1/2	3000	71	098016	9,1	2,5	274
		1800	71	098015	10,9	2,5	299
0,55	3/4	3000	71	098017	10,4	3,6	299
		1800	80	108369	15,4	3,5	372
0,75	1	3000	80	108372	20,4	4,9	372
		1800	80	108370	21,8	4,6	435
1,1	1 1/2	3000	80	108373	20,0	7,1	385
		1800	80	108371	22,7	7,0	435
		1800	90L	118007	29,0	7,0	482
1,5	2	3000	90L	118009	32,7	8,6	469
		1800	90L	118008	32,7	9,5	520
2,2	3	3000	90L	118010	37,2	14,0	495
		1800	112M	118014	37,2	14,0	498

IMPORTANT: These round body motors require either a B3 rigid base, B14 face or B5 flange kit. Catalog number 118014 comes complete with IEC 112 B14 face and B3 foot; shaft diameter is 24mm.

For dimensions, see drawings G, H, I or J on page 33.

C Control input is 230 volts AC.

METRIC (IEC) FRAME LOW VOLTAGE 24V • TEFC • MODULAR DESIGN

kW	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	F.L. Amps DC	C Dim. (mm)
0,06	1/12	3000	56	M1110025^	3,2	3,3	152
		1800	56	M1110026^	3,2	3,4	177
0,18	1/4	3000	63	M1130206*	5,9	11,0	197
		3000	63	M1130296^	5,9	11,0	197
		1800	63	M1130207*	5,9	10,0	222
		1800	63	M1130297^	5,9	10,0	222
		1800	71	098065	9,1	11,0	274
		1800	71	098066	10,0	20,0	286
0,37	1/2	3000	71	098066	10,0	20,0	286
		1800	71	098067	10,9	20,0	312
0,75	1	3000	80	108456+	15,0	40,0	359
		1800	80	108455+	20,0	39,0	372
1,1	1 1/2	3000	80	108457+	21,8	65,0	397
1,5	2	3000	80	108458+	23,1	78,0	435

IMPORTANT: These round body motors (IEC71 and 80) require either B14 face, B5 flange or B3 foot. See listings below.

For dimensions, see drawings E, F, G, H or I on page 33.

* Dedicated B5 Flange
 ^ Dedicated B14 Face
 + Studs at 12:00



B3

B3 FOOT MOUNTING

All motors are stocked with provisions to accommodate B3 foot mountings.

IEC Frame	Catalog No.	Bulk Pack (10) Catalog No.
56	175142	175167
63	175143	175168
71	175144	175169
80	175145	175170
90	175146	175171



STOCK DC MOTORS LOW VOLTAGE 12 & 24 VOLTS

METRIC (IEC) FRAME

Specially designed low voltage DC motors for use in OEM applications. Combination of features and low cost makes these motors excellent for many uses. All feature IP44 (TENV) enclosure and dedicated B14 face mount. Rated S1 for continuous duty, and zinc plated steel frame construction.



LOW VOLTAGE 12 & 24V • TENV B14 FACE MOUNT

Watts	HP	Full Load RPM	IEC Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	F.L. Amps DC	C Dim. (mm)
50	1/15	3000	56	980.159	2,3	12	6,0	116,6
		3000	56	980.143	2,3	24	3,2	116,6
100	1/8	3000	56	970.600	3,0	12	12,0	140,5
		3000	56	970.601	3,0	24	5,30	140,5
125	1/6	3000	56	970.620	3,5	12	13,0	153,0
		3000	56	970.621	3,5	24	6,50	153,0

For dimensions, see drawings **O** & **P** on page 35.

NEMA FRAME LOW VOLTAGE MOTORS



General Specifications:

Low voltage permanent magnet DC motors are suitable for installations having battery or solar powered operations, or generator supplied low voltage DC.

Mechanical Features:

Unique brush holder design provides easy access to brushes and integral, constant pressure brush/spring assembly for servicing. Larger over-sized brushes assure longer brush life. Heavy-duty, stamped steel, bolt-on base (removable). NEMA C face mounting flange at no additional cost. High strength rolled steel frame. Rugged die cast aluminum endshields with steel bearing inserts. Permanently lubricated sealed ball bearings. May be converted to NEMA 48 frame base dimensions or NEMA 42/48 frame C face dimensions using modification kits noted on page 7.

Electrical Features:

High starting torques for heavy load applications. Linear speed/torque characteristics over entire speed range. Capable of dynamic braking for faster stops. Reversible rotation and simple two-lead connection. Convenient wiring access.

LOW VOLTAGE 12 & 24V • TENV NEMA C FACE WITH REMOVABLE BASE^Σ

kW	HP	Full Load RPM	NEMA Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	F.L. Amps DC	C Dim. (mm)
0,18	1/4	1800	S56C	108045 [Ⓞ]	9,5	12	21,0	265
		1800	S56C	108046 [Ⓞ]	10,0	12	27,0	291
0,25	1/3	1800	S56C	108050 [Ⓞ]	10,0	24	13,5	278
		1800	S56C	108047 [Ⓞ]	12,7	12	39,0	316
0,37	1/2	1800	S56C	108051 [Ⓞ]	12,7	24	20,0	303
		1800	S56C	108048 ^u **	13,6	12	58,0	351
0,55	3/4	1800	S56C	108052 ^{**}	13,2	24	29,0	325
		1800	S56C	108052 ^{**}	13,2	24	29,0	325
0,75	1	1800	S56C	108322 ^u **	15,9	12	80,0	338
		1800	S56C	108053 ^u **	15,0	24	39,0	351

For dimensions, see drawing **L** on page 34.

SUB-FHP LOW VOLTAGE MOTORS

General Specifications:

Precision sub-fractional horsepower low voltage direct current permanent magnet motors designed for battery or solar powered operations, or generator supplied low voltage DC.

Mechanical Features:

Compact space saving designs. Standard conduit box simplifies connections. Ball bearings. Long-life brushes for demanding applications. Brushes easily replaced without disassembly of motor.

Electrical Features:

High starting torques for heavy load applications. Linear speed/torque characteristics over entire speed range. Capable of dynamic braking for faster stops. Reversible rotation from a simple two lead connection. Class F insulated with high temperature welded commutators.



LOW VOLTAGE 12 & 24V • TENV SQUARE FLANGE

Watts	HP [▲]	Full Load RPM	Frame	Catalog Number	App. Wgt. (Kg.)	Input Volts DC	F.L. Amps DC
37	1/20	1750	24CS	M1110006 [Ⓞ]	1,8	12	4,4
75	1/10	4200				24	
50	1/14	1750	31AS	M1120040	2,7	12	7,7
100	1/7	4200				24	
100	1/7	1750	31ES	M1120044	4,1	12	13,0
180	1/4	3500				24	
120	1/6	1800	31GS	M1120046	4,5	12	14,0
250	1/3	3900				24	

For dimensions, see drawing **A** on page 32.

Ⓢ These motors may be operated at 12, 24V, or at intermediate voltages between 12 and 24V, within horsepower ranges noted.

Ⓞ Built-in conduit box located at 12:00.

^u Studs at 12:00.

^Σ If base is removed, do not reinstall bolts without using washers to compensate for thickness of base.

** These motors are totally enclosed fan cooled.

Ⓟ 24 frame motors have provision for an optional conduit box catalog number M1760000, see page 11.

NEMA FRAME MOTORS THYRISTOR RATED

General Specifications:

High voltage permanent magnet DC motors are typically used with a thyristor controller in applications requiring adjustable speed and constant torque throughout the speed range. They are also widely used in applications requiring dynamic braking or adjustable speed/ reversing capabilities.



Mechanical Features:

Low profile space-saving design. Unique brush holder design provides easy access to brushes and integral constant pressure brush/spring assembly for servicing. Large over-sized brushes assure longer brush life. Heavy-duty, stamped steel, bolt-on base (removable). NEMA C face mounting at no additional cost. Rugged die cast aluminum endshields with cast iron bearing inserts. Permanently lubricated sealed ball bearings. May be converted NEMA 48 base and/or C face using modification kits noted below.

Electrical Features:

Input power of 115 or 230 volts rectified AC when used with an appropriate thyristor control. Linear speed/torque characteristics over entire speed range. High starting torque for heavy load applications. Capable of dynamic braking for faster stops. Reversible rotation with simple two-lead connection.

PWM RATED PM DC MOTORS

The DC motors listed above have been designed for use on unfiltered thyristor type rectified AC input. These motors may also be used with PWM (pulse width modulated) type DC adjustable speed drives at a higher HP rating.

TACH ADAPTER KITS

All necessary parts to mount listed tachometers to stock TEFC thyristor motors. Consists of machined cast fan cover, coupling and hardware. Does not include tachometer. Tach adapter kit is not suitable for catalog number 108502.



Tachometer Type	Frame	Catalog Number	App. Wgt. (Kg.)
GE 5PY Series	SS56	175156	2,3
	S56	175193	2,3
	56/145	175158	2,3
Servo-tek SA740 Series	SS56	175157	3,6
	S56	175194	3,6
	56/145	175159	3,6

TEFC • THYRISTOR RATED 90 & 180V NEMA 56C • C FACE WITH REMOVABLE BASE^Σ

kW	HP	Full Load RPM	NEMA Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	Control Volts AC Input	F.L. Amps DC	C Dim. (mm)
0,18	¼	1750	SS56C	098002	8,6	90	115	2,5	275
		1750	SS56C	098003	10,0	180	230	1,4	287
0,25	⅓	1750	SS56C	098004	10,4	90	115	3,5	287
		1750	SS56C	098005	10,0	180	230	1,7	287
0,37	½	2500	SS56C	098006	9,5	90	115	5,0	275
			SS56C	098007	10,0	180	230	2,5	275
		1750	SS56C	098000	10,9	90	115	5,0	300
		1750	S56C	108014	14,1	90	115	5,0	325
		1750	SS56C	098008	11,3	180	230	2,5	300
		1750	S56C	108015	13,6	180	230	2,5	325
0,55	¾	2500	SS56C	098009	11,3	90	115	7,6	300
			S56C	108016	13,2	90	115	7,6	325
		2500	SS56C	098010	11,3	180	230	3,8	300
		2500	S56C	108017	13,2	180	230	3,8	325
		1750	SS56C	098032	12,2	90	115	7,6	363
		1750	S56C	108018	15,9	90	115	7,6	351
0,75	1	2500	S56C	108020	15,4	90	115	10,0	351
			S56C	108021	15,4	180	230	5,0	351
		1750	S56C	108022	18,1	90	115	10,0	389
		1750	S56C	108023	18,1	180	230	5,0	376
1,1	1½	2500	S56C	108265	18,6	180	230	7,5	376
			1750	S56C	108092	23,1	180	230	7,6
		1750	S56/145TC	108262_n	23,1	180	230	7,6	441
		1750	145TC	128000	30,8	180	230	7,5	466
1,5	2	2500	S56/145TC	108266_n	23,1	180	230	8,6	427
		1750	145TC	128010	35,4	180	230	9,5	512
		1750	182/145TC	128001 ◀	35,4	180	230	9,5	512
2,2	3	1750	182/145TC	108502 ◀	40,4	180	230	14,0	556

For dimensions, see drawing **K** on page 34.

MODIFICATION KITS

DC motors in NEMA 56C frame may be converted to 42/48 C face using the following:

Frame	Catalog No.
SS56C	175182
S56C	175082 ◊

DC motors in NEMA S56 frame may be converted to 48 base using the following:

Frame	Catalog No.
S56C	175080 ◊

◊ Addition of base kit will result in non-NEMA BA dimension of 69,9mm. Addition of C face kit will result in conduit box located at 1 o'clock facing lead end.

Σ If base is removed, do not reinstall bolts without using washers to compensate for thickness of base.

◀ NEMA 145TC face mounting with removable NEMA 182T rigid base.

_n NEMA 145TC frame shaft 7/8" x 2 1/4" and NEMA 56 removable base.



STOCK DC MOTORS EXPLOSION-PROOF AND WASHGUARD® • THYRISTOR RATED

NEMA FRAME • EXPLOSION-PROOF FOR HAZARDOUS LOCATIONS

General Specifications:

These explosion-proof motors are designed and approved for application in hazardous environments having certain explosive gases or materials present.

Features:

Rugged mechanical construction meeting all requirements for safety. UL and CSA listed. NEMA 56C face with removable 56 frame base. Leads exit through 3/4"-14NPT pipe-nipple in the top of the motor frame, opposite the shaft end. **No conduit box is provided.** See optional conduit box below. These motors have pilot-duty thermostats as standard that must be connected to the thyristor control. They are rated for continuous duty with full wave thyristor controls. Double-shielded, pre-lubricated ball bearings are standard. Easy brush access for field service. These motor are UL and CSA listed.

Application Notes:

These motors must be applied in accordance with the National Electrical Code, Article #500. For a listing of explosive agents, consult NFPA Publication 497M.



EXPLOSION-PROOF • CLASS I, GROUPS C & D – CLASS II, GROUPS F & G • THYRISTOR RATED 90 & 180V • C FACE WITH REMOVABLE BASE

kW	HP	Full Load RPM	NEMA Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	Control Volts AC Input	F.L. Amps DC	C Dim. (mm)
0,25	1/3	1750	S56C	118015	10,4	90	115	3,5	341
0,37	1/2	1750	S56C	118016	13,6	90	115	4,7	366
		1750	S56C	118017	13,6	180	230	2,5	366
0,55	3/4	1750	S56C	118018	16,3	90	115	7,1	417
		1750	S56C	118019	16,3	180	230	3,3	417

For dimensions, see drawing **K** on page 34.

EXPLOSION-PROOF CONDUIT BOX

UL and CSA listed for Class I, Group C & D, and Class II, Groups F & G locations. Has grounding screw and all hardware provided. Mounts to motor by 3/4"-14NPT opening at rear of box. For NEMA 56 frame motors only.



Catalog Number	App. Wgt. (Kg.)
175026	1,0

NEMA FRAME • WASHGUARD®^V

LEESON WASHGUARD® motors are designed for extended life in applications requiring regular washdown as in food processing, or otherwise wet, high humidity environments.

WASHGUARD® motors retard the entrance of water during cleaning operations and release any water that does enter the motor. Extra protection for the motor's interior prevents rust and corrosion build-up and drains release trapped moisture to insure a longer life than possible with a standard motor.



Mechanical Protection Features:

High quality, corrosion resistant 303 stainless steel shaft plus lubricated spring-loaded contact seals and patented, "V" ring Forsheda seal deflect water, protect bearings and the motor's interior. Double sealed, oversized bearings with high temperature moisture resistant lubricant are used.

Frame, base, endshields, armature and interior components protected by enamel and polyester compounds of outstanding adhesion and resistance to moisture, acids, alkalies and oil.

Cast conduit box with threaded entrance, drain holes and tough, high temperature Nitrile gaskets keep water out and resist deflection under high pressure washdowns. Conduit box cover and fan cover, when used, are type 304 stainless steel.

Four drains in each endshield at 3, 6, 9, and 12 o'clock purge water, and can be repositioned for maximum effectiveness regardless of the motor's mounting. Machined fits are sealed, and nylon gaskets are used to seal bolt heads. Stainless steel data plate.

Chemically inert static free fan is positively positioned on the shaft by opposing flats, shoulder and snap ring arrangement and protected by heavy gauge, stainless steel fan guards. Finished in USDA approved tough white epoxy for superior corrosion resistance and protection against harsh caustic cleaning solutions.

WASHGUARD® • NEMA C FACE • REMOVABLE BASE TENV • THYRISTOR RATED 90 & 180V

kW	HP	Full Load RPM	NEMA Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	Control Volts AC Input	F.L. Amps DC	C Dim. (mm)
0,18	1/4	1750	S56C	108423	10,4	90	115	2,7	272
0,25	1/3	1750	S56C	108424	11,8	90	115	3,5	297
		1750	S56C	108226	17,2	90	115	4,9	353
0,37	1/2	1750	S56C	108227	17,7	180	230	2,4	353
		1750	S56C	108228	22,7	90	115	7,0	403
0,55	3/4	1750	S56C	108229	22,7	180	230	3,5	403
		1750	S56C	108230**	19,1	90	115	10,0	402
0,75	1	1750	S56C	108231**	19,1	180	230	5,0	376
		1750	S56C	108232**	22,7	180	230	7,6	427
1,1	1 1/2	1750	S56C	108232**	22,7	180	230	7,6	427

For dimensions, see drawing **K** on page 34.

** These motors are totally enclosed fan cooled.

✓ These motors meet IEEE 45 and military specification CCM-1807 including fungus proofing conforming to MIL-173. If base is removed, do not reinstall bolts without using washers to compensate for the thickness of base.

SUB-FHP MOTORS

General Specifications:

Precision subfractional horsepower DC permanent magnet motors designed for use with full wave non-filtered thyristor controls for adjustable speed applications requiring dynamic braking and constant torque throughout the speed range.

Mechanical Features:

Compact space saving designs. Ball bearings. Long-life brushes for demanding applications. Brushes easily replaced without disassembly of the motor. Standard mounted conduit box on 31 and 34 frame models simplifies connections.

Electrical Features:

Continuous duty with full wave un-filtered rectified thyristor controls. Linear speed torque characteristics throughout the speed range. High starting torques. Reversible rotation from a simple two lead connection. Class F insulated with high temperature welded commutators.



31/34 Frame



24 Frame

THYRISTOR RATED 90 & 180V • TENV SQUARE FLANGE OR C FACE

Watts	HP	Full Load RPM	Frame	Catalog Number	App. Wgt. (Kg.)	Arm. Volts DC	Control Volts AC Input	F.L. Amps DC
30	1/25	3500	24AS	M1110014 [ⓑ]	1,4	90	115	0,5
		1750	24CS	M1110003 [ⓑ]	1,8	90	115	0,5
		1750	31AS	M1120064	2,7	180	230	0,3
50	1/15	3500	24CS	M1110015 [ⓑ]	2,7	90	115	0,8
		1750	31BS	M1120013	3,2	90	115	0,8
		1750	31BS	M1120039	3,2	180	230	0,4
75	1/10	3500	31BS	M1120060	3,2	90	115	1,3
		1750	31CS	M1120014	3,6	90	115	1,1
		1750	31CS	M1120041	3,6	180	230	0,6
90	1/8	3500	31CS	M1120059	3,6	90	115	1,5
		1750	31ES	M1120027	4,1	90	115	1,5
		1750	31ES	M1120045	4,1	180	230	0,8
		1750	34D42CZ	M1130053	4,1	90	115	1,4
120	1/6	3500	31ES	M1120058	4,1	90	115	1,9
		1750	31GS	M1120042	5,0	90	115	1,7
		1750	31GS	M1120043	5,0	180	230	0,9
		1750	34E56C	M1130054	5,0	90	115	1,7
180	1/4	3500	31GS	M1120062	5,4	90	115	2,6
		1750	34G56C	M1130055**	5,9	90	115	2,7
		1750	34G56C	M1130120**	5,9	180	230	1,4
		1750	34G56C	M1130118	4,1	180	230	0,7

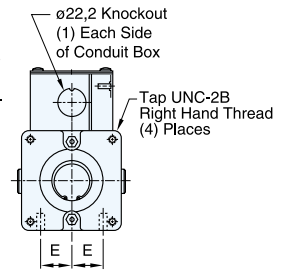
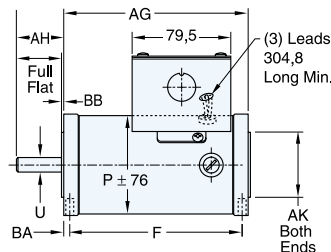
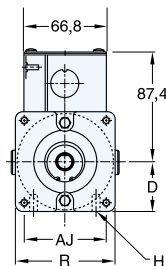
[ⓑ] 24 frame motors have provisions for an optional conduit box catalog number M1760000, see page 11.

** These motors are totally enclosed fan cooled.

24 & 31 FRAME SQUARE FLANGE MOUNT

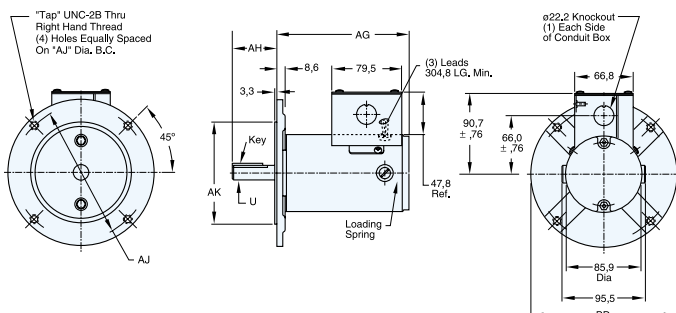
Note: Optional conduit box not included on 24 frame models.

Conduit box dimensions shown here are for 31 frame only.



Frame & Type	AG	P	BD	U	AH	N-W	AJ	TAP	R	AK	BB	D	BA	E	F	H	
24	AS	100	60	73	10	38	25	44	8-32	63	25	1	31	3	16	94	8-32
	CS	125	60	73	10	38	25	44	8-32	63	25	1	31	3	16	119	8-32
31	AS	124	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	112	1/4-20
	BS	137	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	124	1/4-20
	CS	149	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	137	1/4-20
	ES	175	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	163	1/4-20
GS	200	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	188	1/4-20	

34-FRAME, NEMA C FACE, LESS BASE



42C FACE MOUNT

Frame	AG	P	U	AH	N-W	KEY	AJ	TAP	AK	BD
34D42C	162	86	13	33	29	3 SQ.	95	1/4-20	76	108

56C FACE MOUNT

Frame	AG*	P*	U	AH	N-W	KEY	AJ	TAP	AK	BD
34E56C	176	86	16	52	48	5 SQ.	149	3/8-16	114	165
34G56C	201	86	16	52	48	5 SQ.	149	3/8-16	114	165

*For 180W 34 frame TEFC designs, add 17.8mm to AG dimension. Fan cover diameter is 85.7mm.



STOCK SUB-FHP DC GEARMOTORS PARALLEL SHAFT GEARMOTORS

1,1 through 11,3 Nm Output Torque

Design Specifications:

Totally enclosed, permanent magnet DC gearmotors, performance matched for continuous duty service over a 60:1 speed range. All have constant torque throughout the range when powered by a full-wave unfiltered thyristor-type adjustable speed control having a typical form factor of 1,3 to 1,4.

Precision machined in-line steel gears, with a first stage steel helical gear followed by spur-type gears. Lubrication is permanent semi-fluid grease, reducing possibility of leakage. Output shafts have needle bearings for high load capacities. Shafts are hardened steel.



Application Notes:

These gearmotors are designed for mounting at any angle, but motor below the reducer should be avoided to prevent leakage of lubricant into the motor should the motor shaft seal fail.

The motor's stall torque could exceed recommended full load torques. If this service is anticipated, a current limiting device should be used.

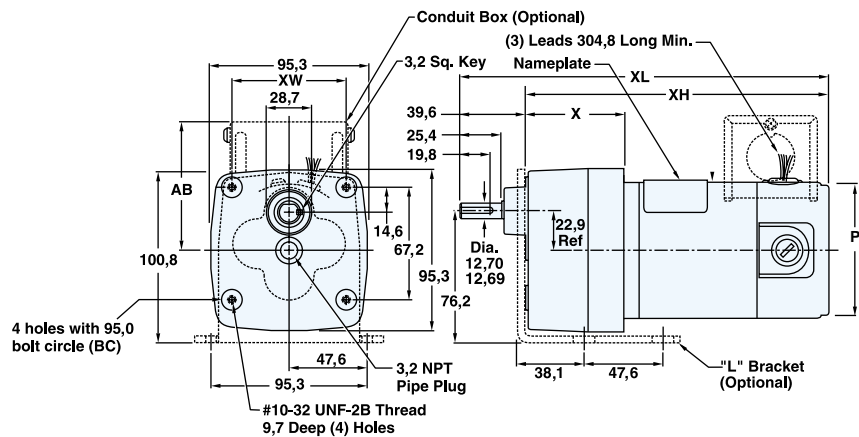
Overhung load capacities shown are at center of output shaft.

Model PZ gearmotors have the same mounting dimensions as Bodine model D and Z, Baldor/Boehm, Bison 100 gearmotors, and a number of Dayton gearmotors.

PZ SERIES DC GEARMOTORS PARALLEL SHAFT • TENV • 1,0 S.F. • THYRISTOR RATED

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input Watts	HP	Catalog Number	Gearmotor Type & Frame	Ratio to 1	Arm. Volts DC	F.L. Amps DC	Over- hung Load (Kg.)	DIMENSIONS			
										P	X mm	XL	XH
4-0,06	11,3	19	1/40	M1115002	PZ5-24A	450	90	0,46	70,3	60	83	212	158
				M1115046	PZ5-31A					79	83	236	197
10-0,17	11,3	37	1/20	M1115001	PZ4-30E	180	90	0,54	70,3	76	83	236	182
				M1125047	PZ4-31A					79	83	236	182
20-0,33	11,3	37	1/20	M1115000	PZ4-30E	90	90	0,54	70,3	76	83	236	182
				M1125048	PZ4-31A					79	83	236	182
30-0,50	11,3	45	1/17	M1125002	PZ3-31B	60	90	0,80	70,3	76	68	222	168
				M1125037	PZ4-31A					79	83	236	182
60-1,0	6,3	45	1/17	M1125003	PZ3-31B	30	90	0,80	77,6	76	68	222	168
				M1125036	PZ4-31A					79	83	236	182
100-1,7	4,1	45	1/17	M1125004	PZ3-31B	18	90	0,80	77,6	76	68	222	168
				M1125035	PZ4-31A					79	83	236	182
150-2,5	2,7	45	1/17	M1125005	PZ2-31B	12	90	0,80	81,7	76	61	215	161
				M1125034	PZ4-31A					79	83	236	182
300-5,0	1,1	45	1/17	M1125006	PZ2-31B	6	90	0,80	81,7	76	61	215	161
				M1125033	PZ4-31A					79	83	236	182

PZ SERIES - DC



BODINE/BISON/DAYTON DIRECT INTERCHANGE

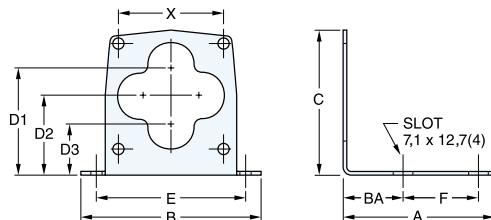
See Cross Reference page 31

See page 11 for optional conduit box



SUB-FHP GEARMOTOR "L" MOUNTING BRACKET

Optional "L" bracket used to mount parallel shaft type PZ gearmotor. Of steel construction, bracket is painted and includes screws for mounting to the motor, but not the application.



Catalog Number	For Gearmotors	DIMENSIONS (mm)									
		A	B	C	D ¹	D ²	D ³	X	BA	F	E
M1760003*	PZ	95	114	100	76	57	38	67	38	48	95

* Maximum radial load no greater than 22,9 Kgs.

3,1 through 39,9 Nm
Output Torque

Design Specifications:

Totally enclosed, permanent magnet DC gearmotors, performance matched for continuous duty service over a 60:1 speed range. All have constant torque throughout the range when powered by a full-wave unfiltered thyristor-type adjustable speed control having a typical form factor of 1,3 to 1,4.



Precision machined in-line steel gears, with a first stage steel helical gear followed by spur-type gears. Lubrication is permanent semi-fluid grease, reducing possibility of leakage. Output shafts have needle bearings for high load capacities. Shafts are hardened steel.

Application Notes:

These gearmotors are designed for mounting at any angle, but shaft up with motor below should be avoided to prevent leakage of lubricant into the motor should the motor's shaft seal fail.

Overhung load capacities shown are at center of output shaft.

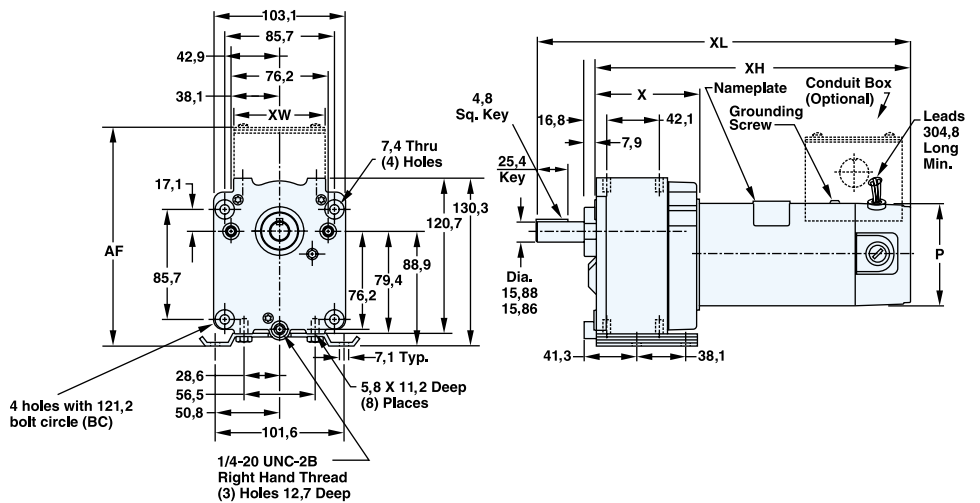
The motor's stall torque exceeds recommended full load torques. A current limiting device such as an thyristor control should be used to prevent damage.

Model 300 gearmotors have the same mounting dimensions as Bison's 300 and many Dayton gearmotors.

P300 SERIES DC GEARMOTORS
PARALLEL SHAFT • TENV • 1,0 S.F. • THYRISTOR RATED

Speed Range RPM min ¹	F.L. Torque Nm	Input Watts	HP	Catalog Number	Gearmotor Type & Frame	Ratio to 1	Arm. Volts DC	F.L. Amps DC	Over- hung Load (Kg.)	DIMENSIONS			
										P	X	XL	XH
5-0,08	39,9	37	1/20	M1115024	P303-30E	336	90	0,54	256,3	76	90	256	210
9-0,15	30,3	37	1/20	M1115025	P303-30E	216	90	0,54	215,0	76	90	256	210
18-0,30	17,0	37	1/20	M1115026	P303-30E	103	90	0,54	174,6	76	90	256	210
20-0,33	15,8	37	1/20	M1125092	P303-31E	90	180	0,66	144,2	76	90	256	210
24-0,40	31,6	90	1/8	M1125069	P303-31E	76	90	1,30	160,1	79	82	293	247
31-0,52	24,9	90	1/8	M1125070 M1125038	P303-31E	58	90 180	1,30 0,66	148,3	79	82	293	247
34-0,57	9,3	37	1/20	M1115027	P303-30E	52	90	0,54	144,2	76	90	256	210
53	14,7	90	1/8	M1125071 M1125039	P302-31E	33	90 180	1,30 0,66	125,7	79	82	293	247 252
53	6,2	37	1/20	M1115028	P302-30E	33	90	0,54	127,5	76	90	256	210
61-1,02	12,8 5,1	90 37	1/8 1/20	M1125072 M1125093	P302-31E	29	90 180	1,30 0,31	121,1	79	82	293	247
94-1,60	8,7	90	1/8	M1125073 M1125040	P302-31E	19	90 180	1,30 0,66	107,1	79	82	293	247
109-1,82	3,1	37	1/20	M1115029 M1125094	P302-30E	16	90 180	0,54 0,31	101,6	76	90	256	210
170-2,80	4,9	90	1/8	M1125074 M1125041	P302-31E	11 10	90 180	1,30 0,66	89,4 88,9	79	82	293	247

P300 SERIES



BISON/DAYTON
DIRECT INTERCHANGE

See Cross Reference page 31

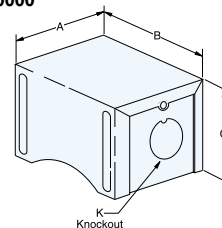
GEARMOTOR CONDUIT BOX

Optional steel conduit or junction box is available for 24, 30 and 34 frame gearmotors. The box is painted and mounts in holes using screws provided with all stock motors and gearmotors.

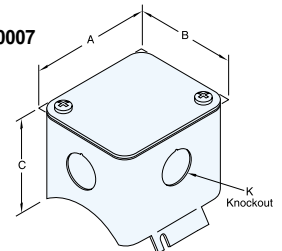


Catalog Number	For Motor Frames	DIMENSIONS (mm)			
		A	B	C	K
M1760000	24	53	62	57	22
M1760007	30/34	80	67	58	22

M1760000



M1760007





STOCK SUB-FHP DC GEARMOTORS PARALLEL SHAFT GEARMOTORS

2,8 through 41,9 Nm Output Torque

Design Specifications:

Totally enclosed, permanent magnet DC gearmotors, performance matched for continuous duty service over a 60:1 speed range. All have constant torque throughout the range when powered by a full-wave unfiltered thyristor-type adjustable speed control having a typical form factor of 1,3 to 1,4.

Gearbox has rugged aluminum die cast housing, for maximum gear and bearing support. Precision machined gearing, hardened for maximum load capability. All gearing designed and rated to AGMA Class 9 standards and to withstand momentary shock overload of 200%. Oversized output bearings for greater overhung load capacity and longer life. High-carbon alloy output shaft provides maximum strength and rigidity. All needle bearing journals are precision-ground after heat treating, to provide maximum finish and fit. Heavy-duty industrial oil seals help keep lubricant in and dirt out. Gears and bearings are splash lubricated with permanent, heavy-duty gear oil.

Application Notes:

These gearmotors are designed for mounting at any angle, but shaft up with motor below should be avoided to prevent leakage of lubricant into the motor should the motor's shaft seal fail.

Overhung load capacities shown are at center of output shaft.

The motor's stall torque exceeds recommended full load torques. A current limiting device such as an thyristor control should be used to prevent damage. Model PE350 gearmotors have the same mounting dimensions as Bodine's "E" box and many Baldor gearmotors.



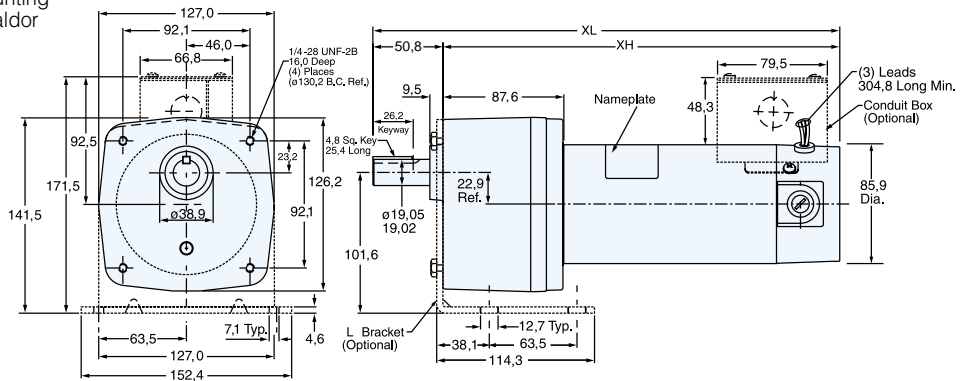
See Cross Reference page 31



PE350 SERIES DC GEARMOTORS PARALLEL SHAFT • TENV • 1,0 S.F. • THYRISTOR RATED

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input Watts	HP	Catalog Number	Gearmotor Type & Frame	Ratio to 1	Arm Volts DC	F.L. Amps DC	Overhung Load (Kg.)	DIMENSIONS XL XH mm	
7-0,12	37,3	90	1/8	M1135106 M1135139	P353-34	336	90 180	0,70 0,35	256,3	287	236
14-0,23	38,5	90	1/8	M1135107 M1135140	P353-34	180	90 180	1,00 0,50	154,7	287	236
21-0,35	41,9	180	1/4	M1135117 M1135141	P353-34	124	90 180	1,10 0,55	168,3	338	287
27-0,45	34,5	180	1/4	M1135115 M1135142	P353-34	91	90 180	1,50 0,75	169,7	338	287
42-0,7	31,6	180	1/4	M1135108 M1135143	P353-34	58	90 180	2,30 1,20	148,3	338	287
50-0,83	28,3	180	1/4	M1135109 M1135144	P353-34	50	90 180	2,30 1,20	137,4	338	287
62-1,0	24,9	180	1/4	M1135110 M1135145	P353-34	43	90 180	2,30 1,20	137,4	338	287
83-1,38	17,5	180	1/4	M1135114 M1135146	P352-34	29	90 180	2,30 1,20	121,1	338	287
125-2,1	11,3	180	1/4	M1135111 M1135147	P352-34	23	90 180	2,00 1,00	116,1	338	287
165-2,75	7,9	180	1/4	M1135112 M1135148	P352-34	15	90 180	2,00 1,00	105,2	338	287
250-4,0	5,1	180	1/4	M1135116 M1135149	P352-34	10	90 180	2,00 1,00	91,2	338	287
500-8,0	2,8	180	1/4	M1135113 M1135150	P352-34	5	90 180	2,00 1,00	68,0	338	287

PE350 SERIES - DC

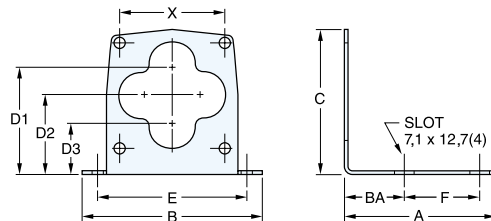


See page 11 for optional conduit box



SUB-FHP GEARMOTOR "L" MOUNTING BRACKET

Optional "L" bracket can be used to mount PE350 gearmotors. Of steel construction, bracket is painted and includes screws for mounting to the motor, but not the application.



Catalog Number	For Gearmotors	DIMENSIONS (mm)									
		A	B	C	D ¹	D ²	D ³	X	BA	F	E
M1760011*	PE350	114	152	140	102	79	56	92	38	64	127

* Maximum radial load no greater than 90,7 Kgs.

**11,9 through 125,7 Nm
Output Torque**

Design Specifications:

Thyristor rated, permanent magnet DC gearmotors. Totally enclosed for continuous duty, general purpose applications. All have constant torque throughout the 60:1 speed range, when powered by a full-wave, unfiltered thyristor-type adjustable speed control having a typical form factor of 1,3 to 1,4. Gearbox has rugged aluminum die cast housing, for maximum gear and bearing support. Precision machined gearing, hardened for maximum load capability. All gearing designed and rated to AGMA Class 9 standards and to withstand momentary shock overload of 200%. Oversized output bearings for greater overhung load capacity and longer life. High-carbon alloy output shaft provides maximum strength and rigidity. All needle bearing journals are precision-ground after heat treating, to provide maximum finish and fit. Heavy-duty industrial oil seals help keep lubricant in and dirt out. Gears and bearings are splash lubricated with permanent, heavy-duty gear oil. Conduit box is standard.



Application Notes:

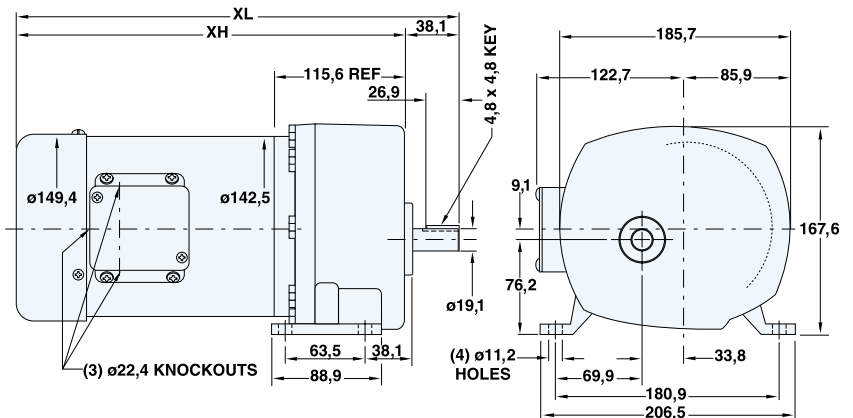
These gearmotors are designed for mounting at any angle, but shaft-up with motor below gearhead is not recommended. Overhung load capacities shown are at center of output shaft. P1100 DC gearmotors have the same mounting dimensions as Bison 483 gearmotors and many Dayton gearmotors. The motor's stall torque exceeds recommended full load torques. A current limiting device such as an thyristor control should be used to prevent damage.

P1100 SERIES DC GEARMOTORS
FRACTIONAL HP • PARALLEL SHAFT • TOTALLY ENCLOSED
1,0 SERVICE FACTOR • THYRISTOR RATED

Speed Range RPM min ¹	F.L. Torque Nm	Input kW	HP	Catalog Number	Gearmotor Type & Frame	Ratio to 1	Arm Volts DC	F.L. Amps DC	Overhung Load (Kg.)	DIMENSIONS XL XH mm	
8-0,13	122,8	0,18	¼	108700	P1103-48	212	90	2,7	317,5	366	328
12-0,2	116,4	0,18	¼	108701	P1103-48	143	90	2,7	317,5	366	328
18-0,3	84,8	0,18	¼	108702	P1103-48	95	90	2,7	317,5	366	328
42-0,7	39,9	0,18	¼	108703	P1102-48	42	90	2,7	294,8	366	328
60-1,0	26,9	0,18	¼	108704	P1102-48	29	90	2,7	283,5	366	328
92-1,53	18,1	0,18	¼	108705	P1102-48	19	90	2,7	260,8	366	328
135-2,25	11,9	0,18	¼	108706	P1102-48	13	90	2,7	238,1	366	328
18-0,3	125,7	0,37	½	108707**	P1103-48	95	90	5,0	317,5	425	387
33-0,55	99,7	0,37	½	108708**	P1103-48	53	90	5,0	294,8	425	387
42-0,7	79,7	0,37	½	108709**	P1102-48	42	90	5,0	294,8	425	387
60-1,0	53,8	0,37	½	108710**	P1102-48	29	90	5,0	283,5	425	387
92-1,53	36,2	0,37	½	108711**	P1102-48	19	90	5,0	260,8	425	387
135-2,25	23,7	0,37	½	108712**	P1102-48	13	90	5,0	238,1	425	387

**Totally enclosed fan cooled, others are totally enclosed non-ventilated.

P1100 SERIES - DC



**BISON/DAYTON
DIRECT INTERCHANGE**

See Cross Reference page 31



STOCK SUB-FHP DC GEARMOTORS RIGHT-ANGLE SHAFT GEARMOTORS

0,6 through 15,3 Nm Output Torque

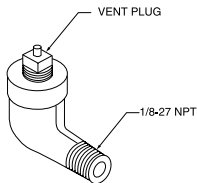
Design Specifications:

Totally enclosed right-angle gearmotors, performance matched for continuous service over a 60:1 speed range. All have constant torque throughout the range when powered by a full-wave, unfiltered thyristor-type adjustable speed control having a typical form factor of 1,3 to 1,4. Also available as factory options are motors for low voltage input and with double output shafts. This worm-type right-angle gearing features hardened, steel worm with bronze worm wheel for long life and quiet operation. Precision machined aluminum housings are used. Gearbox has all ball bearings. The housing is sealed and lubrication is permanent with an oil bath. The output shaft is field interchangeable from left hand style to right hand style by reassembly.



Application Notes:

For optimum seal life, these right-angle gearmotors have a lubrication breather positioned for horizontal mounting. For other mountings, the breather-plug must be reoriented by using a NPT taper pipe elbow (see drawing). However, the motor portion of the gearmotor should never be mounted below the gearhead.

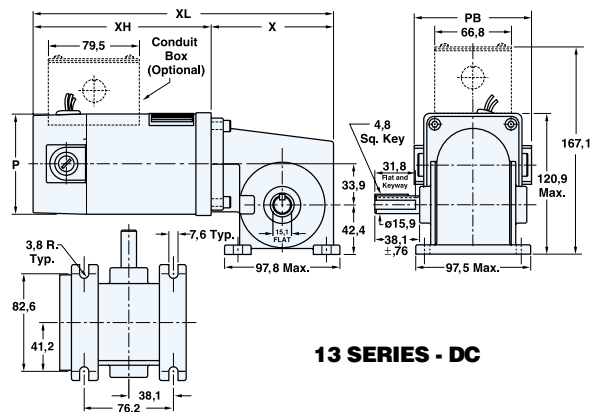
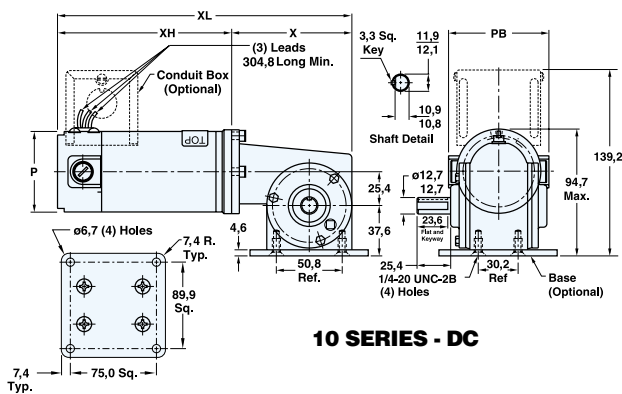


RIGHT-ANGLE DC GEARMOTORS TENV • 1,0 SERVICE FACTOR • THYRISTOR RATED

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input Watts	HP	Catalog Number	Gearmotor Type & Frame	Ratio to 1	Arm Volts DC	Full Load Amps. DC	Over- hung Load (Kg.)	DIMENSIONS				
										P	PB	X mm	XL	XH
42-0,7	3,4	45	1/17	M1115018	10F60-24D	60	90	0,68	83,9	60	76	91	223	132
62-1,0	4,0	45	1/17	M1115019	10F40-24D	40	90	0,68	83,9	60	76	91	223	132
125-2,1	2,3	45	1/17	M1115020	10F20-24D	20	90	0,68	83,9	60	76	91	223	132
250-4,0	1,2	45	1/17	M1115021	10F10-24D	10	90	0,68	83,9	60	76	91	223	132
500-8,0	0,7	45	1/17	M1115022	10F05-24D	5	90	0,68	106,6	60	76	91	223	132
42-0,7	3,4	60	1/12	M1135053	13F60-34A	60	180	0,53	106,6	86	102	114	245	131
62-1,0	4,0	60	1/12	M1135054	13F40-34A	40	180	0,53	106,6	86	102	114	245	131
125-2,1	2,0	60	1/12	M1135055	13F20-34A	20	180	0,53	106,6	86	102	114	245	131
250-4,0	1,1	60	1/12	M1135056	13F10-34A	10	180	0,53	106,6	86	102	114	245	131
500-8,0	0,6	60	1/12	M1135057	13F05-34A	5	180	0,53	106,6	86	102	114	245	131
42-0,7	9,0	90	1/8	M1135069	13F60-34C	60	90	1,40	106,6	86	102	114	270	156
62-1,0	7,9	90	1/8	M1135038 M1135058	13F40-34C	40	90 180	1,40 0,70	106,6	86	102	114	270	156
125-2,1	5,1	90	1/8	M1135039 M1135059	13F20-34C	20	90 180	1,40 0,70	106,6	86	102	114	270	156
250-4,0	2,8	90	1/8	M1135040 M1135060	13F10-34C	10	90 180	1,40 0,70	106,6	86	102	114	270	156
500-8,0	1,5	90	1/8	M1135041 M1135061	13F05-34C	5	90 180	1,40 0,70	106,6	86	102	114	270	156
62-1,0	15,3	180	1/4	M1135042 M1135062	13F40-34G	40	90 180	2,30 1,30	106,6	86	102	114	321	207
83-1,38	14,1	180	1/4	M1135043 M1135063	13F30-34G	30	90 180	2,30 1,30	106,6	86	102	114	321	207
125-2,1	10,2	180	1/4	M1135044 M1135064	13F20-34G	20	90 180	2,30 1,30	106,6	86	102	114	321	207
250-4,0	5,7	180	1/4	M1135045 M1135065	13F10-34G	10	90 180	2,30 1,30	106,6	86	102	114	321	207
500-8,0	3,4	180	1/4	M1135046 M1135066	13F05-34G	5	90 180	2,30 1,30	106,6	86	102	114	321	207

BODINE/DAYTON DIRECT INTERCHANGE

See Cross Reference page 31

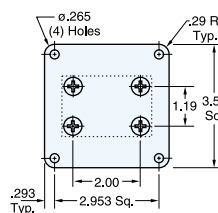


RIGHT-ANGLE GEARMOTOR BASE KIT

This optional base kit can be used with the 10 series right-angle gearmotors. (Includes screws for mounting to gearbox, but not the application).



Catalog Number
M1760006



See page 11 for optional conduit box

GEAR+ MOTOR™



Start with a 600 Series IRONMAN™ or 500 Series Bravo™ worm gear reducer. Then add one of LEESON's dozens of NEMA C face DC motors to produce a performance-matched GEAR+MOTOR™ package.

LEESON HYDRO-MEC Bravo™ ALUMINUM GEAR REDUCERS

Bravo™ aluminum-housed gear reducers for specific OEM applications with size and weight targets.



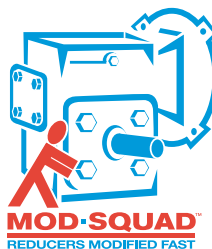
IRONMAN™ cast iron-housed gear reducers for general industrial applications and other heavy-duty uses.

Stock Gear+Motors

Listings of off-the-shelf GEAR+MOTORS™ using LEESON DC motors combined with IRONMAN™ general-purpose and WASHGUARD® washdown-duty reducers follow on pages 16 and 17. These ratings have been pre-selected and assembled to provide a variety of torque and output speed combinations that meet many general industrial gearmotor needs. They're ready for immediate shipment, saving you time and expense.

Modified Stock Gear+Motors

Stock GEAR+MOTORS™ can also be modified using the accessories shown on this page. Modifications may be field assembled from off-the-shelf kits, or factory assembled by the LEESON Gear ModSquad™ on a quick-ship basis. Request Catalog 6050 or check www.leeson.com for more information.



Custom-Selected Gear+Motors

For specialized needs not covered by pre-selected GEAR+MOTOR™ units, LEESON's Gear ModSquad™ can assemble IRONMAN™ gearmotor packages up to 1500W. Request Catalog 6050 or check www.leeson.com for more information.

In addition, for OEM applications targeting compact size and lightweight, GEAR+MOTORS™ can be assembled using LEESON/Hydro-Mec Bravo™ reducers. These modular, aluminum-housed units weigh up to two-thirds less and are one-third smaller than comparable cast iron designs. Request Catalog 5050 for details.

ACCESSORIES



Vertical Mount Kit



Horizontal Base Kit



J Mount Kit



Output Flange Mount Kit



STOCK FRACTIONAL & INTEGRAL HP GEAR+MOTORS

DC THYRISTOR GEARMOTORS • STYLE BMQ
FOR ADJUSTABLE SPEED SERVICE



600 SERIES BMQ STYLE CAST IRON REDUCERS DC THYRISTOR MOTOR • TOTALLY ENCLOSED • CONTINUOUS DUTY PERMANENT MAGNET • 20:1 SPEED RANGE WITH FULL WAVE THYRISTOR CONTROLS

Output RPM	Output TQ Nm	Input kW	Input HP	GEAR+MOTOR™ Catalog Number	OHL	Service* Factor	NEMA Frame	ARM Volts DC	Control Volts AC Input	F.L. Amps DC	App. Wgt. (Kg.)	AG Dim. (mm)
175 10:1 Ratio	11,5	0,25	1/3	W6130075-098004 W6130075-098005	200	2,15	SS56C	90 180	115 230	3,5 1,7	18,1 17,7	235
	17,6	0,37	1/2	W6130075-098000 W6130075-098008	200	1,40	SS56C	90 180	115 230	5,0 2,5	18,6 19,1	248
	26,3	0,55	3/4	W6130075-098032 W6130075-098069	200	0,94	SS56C	90 180	115 230	7,3 3,8	18,6	311 298
	35,6	0,75	1	W6180111-108022 W6180111-108023	500	1,38	S56C	90 180	115 230	10,0 5,0	29,0	337
	54,0	1,1	1 1/2	W6210111-108092	700	1,40	S56C	180	230	7,6	36,7	375
	72,1	1,5	2	W6210147-128010	700	1,05	145TC	180	230	9,5	49,0	458
117 15:1 Ratio	16,2	0,25	1/3	W6130076-098004 W6130076-098005	200	1,69	SS56C	90 180	115 230	3,5 1,7	18,1 17,7	235
	24,4	0,37	1/2	W6130076-098000 W6130076-098008	200	1,12	SS56C	90 180	115 230	5,0 2,5	18,6 19,1	248
	37,9	0,55	3/4	W6180112-098032 W6180112-098069	500	1,40	SS56C	90 180	115 230	7,3 3,8	23,1	311 298
	50,4	0,75	1	W6180112-108022 W6180112-108023	500	1,05	S56C	90 180	115 230	10,0 5,0	29,0	337
	77,4	1,1	1 1/2	W6210112-108092	700	1,06	S56C	180	230	7,6	36,7	375
	104,0	1,5	2	W6240184-128010	900	1,17	145TC	180	230	9,5	56,2	458
88 20:1 Ratio	20,0	0,25	1/3	W6130077-098004 W6130077-098005	200	1,36	SS56C	90 180	115 230	3,5 1,7	18,1 17,7	235
	30,4	0,37	1/2	W6180113-098000 W6180113-098008	500	1,78	SS56C	90 180	115 230	5,0 2,5	21,8 22,2	248
	49,6	0,55	3/4	W6180113-098032 W6180113-098069	500	1,09	SS56C	90 180	115 230	7,3 3,8	23,1	311 298
	66,7	0,75	1	W6210113-108022 W6210113-108023	700	1,26	S56C	90 180	115 230	10,0 5,0	31,8	337
	100,3	1,1	1 1/2	W6240149-108092	900	1,24	S56C	180	230	7,6	44,0	375
	135,8	1,5	2	W6260185-128010	1000	1,22	145TC	180	230	9,5	62,1	458
58 30:1 Ratio	27,9	0,25	1/3	W6130079-098004 W6130079-098005	200	0,98	SS56C	90 180	115 230	3,5 1,7	18,1 17,7	235
	45,4	0,37	1/2	W6180115-098000 W6180115-098008	500	1,21	SS56C	90 180	115 230	5,0 2,5	21,8 22,2	248
	70,6	0,55	3/4	W6210115-098032 W6210115-098069	700	1,20	SS56C	90 180	115 230	7,3 3,8	25,9	311 298
	95,2	0,75	1	W6240151-108022 W6240151-108023	900	1,32	S56C	90 180	115 230	10,0 5,0	39,0	337
	141,8	1,1	1 1/2	W6260151-108092	1000	1,18	S56C	180	230	7,6	49,9	375
	36,7	0,25	1/3	W6180116-098004 W6180116-098005	500	1,48	SS56C	90 180	115 230	3,5 1,7	21,3 20,9	235
44 40:1 Ratio	55,6	0,37	1/2	W6180116-098000 W6180116-098008	500	0,98	S56C	90 180	115 230	5,0 2,5	21,8 22,2	248
	87,7	0,55	3/4	W6210116-098032 W6210116-098069	700	0,96	SS56C	90 180	115 230	7,3 3,8	25,9	311 298
	117,2	0,75	1	W6240152-108022 W6240152-108023	900	1,06	S56C	90 180	115 230	10,0 5,0	39,0	337
	43,6	0,25	1/3	W6180117-098004 W6180117-098005	500	1,20	SS56C	90 180	115 230	3,5 1,7	21,3 20,9	235
35 50:1 Ratio	71,4	0,37	1/2	W6210117-098000 W6210117-098008	700	1,14	SS56C	90 180	115 230	5,0 2,5	24,5 25,0	248
	104,8	0,55	3/4	W6240153-098032 W6240153-098069	900	1,15	SS56C	90 180	115 230	7,3 3,8	33,1	311 298
	143,5	0,75	1	W6260153-108022 W6260153-108023	1000	1,11	S56C	90 180	115 230	10,0 5,0	44,9	337
	50,6	0,25	1/3	W6180118-098004 W6180118-098005	500	0,97	SS56C	90 180	115 230	3,5 1,7	21,3 20,9	235
29 60: Ratio	77,6	0,37	1/2	W6210118-098000 W6210118-098008	700	0,98	SS56C	90 180	115 230	5,0 2,5	24,5 25,0	248
	120,2	0,55	3/4	W6240154-098032 W6240154-098069	900	0,95	SS56C	90 180	115 230	7,3 3,8	33,1	311 298

* Service Factor is based on maximum torque rating of reducer.

STOCK FRACTIONAL & INTEGRAL HP GEAR+MOTORS



WASHGUARD® DC THYRISTOR GEARMOTORS • STYLE WBMQ
FOR ADJUSTABLE SPEED SERVICE



600 SERIES WBMQ STYLE CAST IRON WASHDOWN REDUCERS DC THYRISTOR MOTOR • TOTALLY ENCLOSED • CONTINUOUS DUTY PERMANENT MAGNET • 20:1 SPEED RANGE WITH FULL WAVE THYRISTOR CONTROLS 1750 RPM INPUT

Output RPM	Output TQ Nm	Input kW	Input HP	GEAR+MOTOR™ Catalog Number	OHL	Service* Factor	NEMA Frame	ARM Volts DC	Control Volts AC Input	F.L. Amps DC	App. Wgt. (Kg.)	AG Dim. (mm)
175 10:1 Ratio	11,5	0,25	1/3	W6133003-108424	200	2,15	S56C	90	115	3,5	19,5	245
	17,6	0,37	1/2	W6133003-108226 W6133003-108227	200	1,40	S56C	90 180	115 230	4,9 2,4	25,0 25,4	300
	26,3	0,55	3/4	W6133003-108228 W6133003-108229	200	0,94	S56C	90 180	115 230	7,0 3,5	30,4	351
	35,6	0,75	1	W6183003-108230 W6183003-108231	500	1,38	S56C	90 180	115 230	10,0 5,0	29,9	349 324
	54,0	1,1	1 1/2	W6213003-108232	700	1,40	S56C	180	230	7,6	36,3	375
117 15:1 Ratio	16,2	0,25	1/3	W6133004-108424	200	1,69	VS56C	90	115	3,5	19,5	245
	24,4	0,37	1/2	W6133004-108226 W6133004-108227	200	1,12	S56C	90 180	115 230	4,9 2,4	25,0 25,4	300
	37,9	0,55	3/4	W6183004-108228 W6183004-108229	500	1,40	S56C	90 180	115 230	7,0 3,5	33,6	351
	50,4	0,75	1	W6183004-108230 W6183004-108231	500	1,05	S56C	90 180	115 230	10,0 5,0	29,9	349 324
	77,4	1,1	1 1/2	W6213004-108232	700	1,06	S56C	180	230	7,6	36,3	375
88 20:1 Ratio	20,0	0,25	1/3	W6133005-108424	200	1,36	S56C	90	115	3,5	19,5	245
	30,4	0,37	1/2	W6183005-108226 W6183005-108227	500	1,78	S56C	90 180	115 230	4,9 2,4	28,1 28,6	300
	49,6	0,55	3/4	W6183005-108228 W6183005-108229	500	1,09	S56C	90 180	115 230	7,0 3,5	33,6	351
	66,7	0,75	1	W6213005-108230 W6213005-108231	700	1,26	S56C	90 180	115 230	10,0 5,0	32,7	349 324
	100,3	1,1	1 1/2	W6243005-108232	900	1,24	S56C	180	230	7,6	43,6	375
58 30:1 Ratio	27,9	0,25	1/3	W6133007-108424	200	0,98	S56C	90	115	3,5	19,5	245
	45,4	0,37	1/2	W6183007-108226 W6183007-108227	500	1,21	S56C	90 180	115 230	4,9 2,4	28,1 28,6	300
	70,6	0,55	3/4	W6213007-108228 W6213007-108229	700	1,20	S56C	90 180	115 230	7,0 3,5	36,3	351
	95,2	0,75	1	W6243007-108230 W6243007-108231	900	1,32	S56C	90 180	115 230	10,0 5,0	39,9	349 324
	141,8	1,1	1 1/2	W6263007-108232	1000	1,18	S56C	180	230	7,6	49,4	375
44 40:1 Ratio	36,7	0,25	1/3	W6183008-108424	500	1,48	S56C	90	115	3,5	22,7	245
	55,6	0,37	1/2	W6183008-108226 W6183008-108227	500	0,98	S56C	90 180	115 230	4,9 2,4	28,1 28,6	300
	87,7	0,55	3/4	W6213008-108228 W6213008-108229	700	0,96	S56C	90 180	115 230	7,0 3,5	43,6	351
	117,2	0,75	1	W6243008-108230 W6243008-108231	900	1,06	S56C	90 180	115 230	10,0 5,0	39,9	349 324
35 50:1 Ratio	43,6	0,25	1/3	W6183009-108424	500	1,20	S56C	90	115	3,5	22,7	245
	71,4	0,37	1/2	W6213009-108226 W6213009-108227	700	1,14	S56C	90 180	115 230	4,9 2,4	30,8 30,4	300
	104,8	0,55	3/4	W6243009-108228 W6243009-108229	900	1,15	S56C	90 180	115 230	7,0 3,5	43,6	351
	143,5	0,75	1	W6263009-108230 W6263009-108231	1000	1,11	S56C	90 180	115 230	10,0 5,0	39,0	349 324
29 60:1 Ratio	50,6	0,25	1/3	W6183010-108424	500	0,97	S56C	90	115	3,5	22,7	245
	77,6	0,37	1/2	W6213010-108226 W6213010-108227	700	0,98	S56C	90 180	115 230	4,9 2,4	30,8 30,4	300
	120,2	0,55	3/4	W6243010-108228 W6243010-108229	900	0,95	S56C	90 180	115 230	7,0 3,5	43,6	351

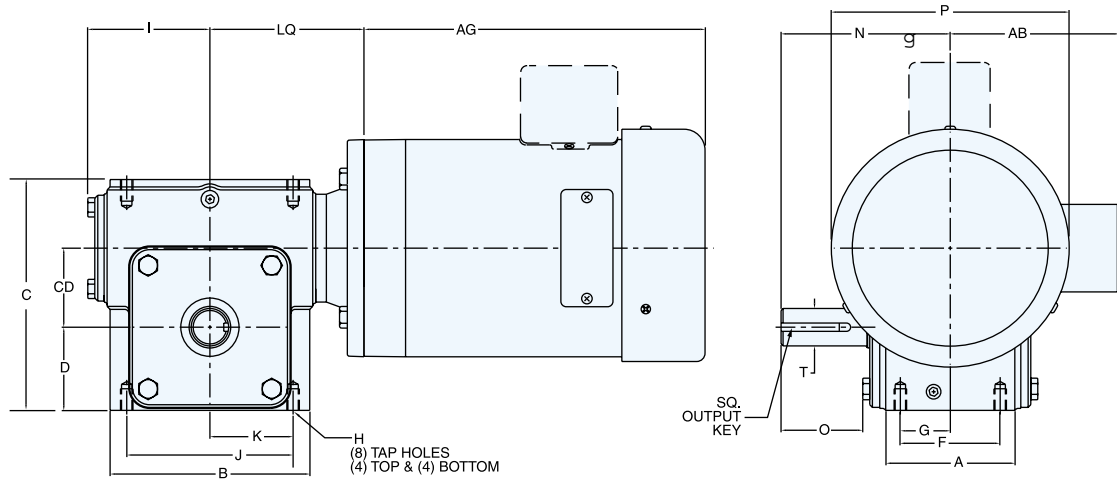
* Service Factor is based on maximum torque rating of reducer.

Note: Gear reducer catalog numbers are for left hand output shaft extensions. For right hand output shaft, specify GR1.
For double output shaft extensions, consult LEESON for price and availability.

For dimensions, see page 18



FRACTIONAL & INTEGRAL HP GEAR+MOTORS DIMENSIONS



BMQ & BM STYLE GEARMOTOR DIMENSIONS (mm)

Series ^D	CD	A	B	C	D	F	G	H		I	J	K	LQ		N	O	P	T +0,000 -0,001	Output Key	AB
								Tap Size	Depth				BMQ 56/140TC	BM						
613	34	70	99	118	44	51	25	5/16-18 UNC	13	68	83	41	87	165	102	50	167	16	3/16 X 38	135
618	44	89	127	146	52	70	35	5/16-18 UNC	13	81	106	53	101	179	109	48	167	22	3/16 X 38	135
621	52	92	148	162	58	73	37	3/8-16 UNC	15	91	127	64	112	190	119	56	167	25	1/4 X 44	135
624	60	99	152	176	64	73	37	3/8-16 UNC	17	93	127	64	118	207	129	62	167	29	1/4 X 51	135
626	67	108	183	203	75	86	43	3/8-16 UNC	17	109	162	81	133	222	143	63	167	29	1/4 X 51	135

D Series number is the 3 digits immediately following the W prefix of the Gear+Motor catalog number.
g Conduit box top-mounted on WASHGUARD® models, side-mounted on general-purpose models.

AG DIMENSION – See GEAR+MOTORS pages 16 and 17 for AG dimension of individual ratings.



CUSTOM MOTORS & GEARMOTORS

LEESON is a leading manufacturer of application specific "customerized" AC and DC motors and gearmotors. In fact, about 50% of LEESON's production is dedicated to serving the custom motor requirements of a wide variety of OEM's manufacturing machinery for industrial and commercial use. Reasonable custom production lots, combined with LEESON's DIT, Delivery-in-Time Program, can tailor shipments to your production needs.

To a greater degree than for AC applications, the careful matching of a direct current motor to an application can result in enhanced performance, life and minimum motor purchase cost. This is especially true of intermittent duty DC low voltage and sub-fractional HP applications. LEESON's DC application engineering staff is experienced in a wide variety of applications and is available to assist you in the design and development

of the motor best suited to your needs and wants. Usually a prototype is produced for test and evaluation on the application before production quantities.

The application data on the following page addresses the possibilities and opportunities for an application specific design in only a very general sense. Many additional voltage, speed, duty cycle ratings and mechanical features are possible. If you feel your application can be most efficiently addressed by a custom motor solution...please contact LEESON.

Tell us about your custom motor needs by completing the Application Design Outline on page 30 and faxing it to us. We'll contact you promptly to mutually determine the next step in the design process.



Custom Application Specific Mounting



B14 Face Mounting

General Specifications:

The ratings listed are typical designs in continuous and periodic intermittent duty rated motors. Various additional speeds, voltages and duty ratings are possible.

Low voltage direct current motors are well suited for intermittent duty applications requiring peak torques of several times the rated dead load capability of the motor. Proper application of motors to loads having these characteristics will result in the most compact, cost effective motor design. A detailed description of the duty cycle, including off and running time with or without load, and duration and repetition of cycle per hour or day is required.

Electrical Specifications:

These motors are intended for direct current input having a form factor of 1,0 to 1,05 such as is provided by a battery, generator or solar power. They have linear speed and torque characteristics. The output speed can be adjusted by voltage change using series/parallel battery connections or adjustable voltage controls having a form factor of 1,05 or lower.

Mechanical Features:

In addition to the standardized mountings pictured here, many application specific modifications have been developed for close coupling of hydraulic pumps and gear reducers. In addition motors encased within driven equipment, or otherwise protected from the environment, can be built to open drip-proof protection standards often resulting in a smaller more cost effective design.

Engineering Services:

LEESON's application engineering staff is available, at no additional cost, to assist in developing the motor design best suited for applications. See page 30 for easy-to-use Design Outline.

LOW VOLTAGE MOTORS

IEC 71 and 80 FRAMES

12, 24 or 36 VOLTS

kW	HP	RPM	Full Load Amperage			S1 Continuous Duty Enclosures				15 Minute Duty ^s Approximate Amperage					
			12V	24V	36V	ODP Frame	C Dim.	TEFC Frame	C Dim.	kW	HP	12V	24V	36V	
0,18	¼	1200	20	10	6,7	71	234	71	262	0,37	½	40	20	15	
		1500	20	10	6,7	71	234	71	262			40	20	15	
		1800	21	10	6,9	71	234	71	262			40	20	15	
		2500	21	11	7,0	71	234	71	249			40	20	15	
		3000	21	11	7,0	71	234	71	249			40	20	15	
0,25	⅓	1200	27	13	8,9	71	247	71	287	0,55	¾	65	30	20	
		1500	27	13	8,9	71	234	71	275			65	30	20	
		1800	27	14	9,2	71	234	71	262			65	30	20	
		2500	28	14	9,2	71	234	71	262			65	30	20	
		3000	28	14	9,3	71	234	71	262			65	30	20	
0,37	½	1200	40	20	13	71	272	71	313	0,75	1	80	40	30	
		1500	40	20	13	71	260	71	300			80	40	30	
		1800	40	20	13	71	247	71	300			80	40	30	
		2500	40	20	13	71	234	71	287			80	40	30	
		3000	41	21	14	71	234	71	287			80	40	30	
0,55	¾	1200	58	29	19	71	323	71	363	1,1	1½	—	65	45	
		1500	58	29	19	71	298	71	338			—	65	45	
		1800	58	29	19	71	285	71	338			—	65	45	
		2500	60	30	20	71	260	71	325			—	65	45	
		3000	60	30	20	71	247	71	325			—	65	45	
	1,1	1½	1200	58	29	19	80	335	80	389	1,1	1½	150	65	45
			1500	58	29	19	80	310	80	376			150	65	45
			1800	58	29	19	80	297	80	363			150	65	45
			2500	60	30	20	80	272	80	351			150	65	45
			3000	60	30	20	80	259	80	351			150	65	45
0,75	1	1200	74	37	25	80	373	80	427	1,5	2	—	90	60	
		1500	78	39	26	80	348	80	414			—	90	60	
		1800	78	39	26	80	322	80	402			—	90	60	
		2500	78	39	26	80	297	80	389			—	90	60	
		3000	80	40	27	80	284	80	376			—	90	60	
1,1	1½	1800	110	57	38	80	386	—	—	2,2	3	—	—	—	
		2500	110	57	38	80	348	80	402			—	—	90	
		3000	120	58	39	80	322	80	389			—	—	90	
1,5	2	2500	—	76	51	80	399	—	—	3,0	4	—	—	100	
		3000	—	78	52	80	373	80	427			—	—	100	

For dimensions, see drawing **L** on page 34.

^s S3 periodic intermittent duty of 15 minutes on at rated load followed by 30 minutes off. Additional voltage ratings of 48, 60, 72 or other inputs also available.

General Specifications:

“Turbo” design low-voltage DC motors offer enhanced performance where greater torque and horsepower ratings are required in a compact package. Thinner, longer magnets allow increased armature diameter without additional barrel diameter. Four-brush design used in larger horsepower. Use this table as a guide to availability and performance. Various additional speeds, voltages, duty ratings and frame lengths (C dimensions) are possible. Because low-voltage DC motors are typically used in intermittent-duty applications, careful application engineering will result in the most compact and cost-effective motor design. A detailed description of duty cycle, including run time and off time duration, motor loading and repetition of cycles is required.

Electrical Specifications:

These motors are intended for direct current input having a form factor of 1,0 to 1,05 such as that provided by battery, generator or solar power. They have linear speed and torque characteristics. Output speed can be adjusted by changing voltage through series/parallel battery connections or adjustable voltage controls having a form factor of 1,05 or lower.

Mechanical Features:

Low-profile “48 frame” barrel. Strong, rolled steel construction with cast aluminum endshields and cast iron bearing inserts. Permanently lubricated sealed ball bearings. Available in a variety of mountings including universal end fixing to accept the IEC 71, 80, 90, 100 or 112 frame B5 flange or B14 face adapter packages, NEMA C face, with or without base, and four-bolt pump mounting. Special mountings quoted on request.



Engineering Services:

LEESON's engineering staff is available, at no additional cost, to assist in application-specific designs. Please use the Design Outline on page 30 to provide input.

**ENHANCED PERFORMANCE “TURBO” DESIGN
LOW VOLTAGE MOTORS**

IEC 80 FRAME

12, 24, 36 or 48 VOLTS

kW	HP	RPM	Full Load Amperage				S1 Continuous Duty Enclosures						15 Minute Duty Enclosures ^s					
			12V	24V	36V	48V	ODP Frame	C Dim.	TEFC Frame	C Dim.	TENV Frame	C Dim.	ODP Frame	C Dim.	TEFC Frame	C Dim.	TENV Frame	C Dim.
1,5	2	1800	146	73	49	37	80	332	80	414	80	421	80	383	80	376	80	344
		2500	146	73	49	37	80	357	80	376	80	370	80	332	80	414	80	319
		4000	146	73	49	37	80	306	80	389	80	319	80	281	80	363	80	344
2,2	3	1800	—	110	73	55	80	370	—	—	—	—	80	370	80	427	80	421
		2500	—	110	73	55	80	332	80	427	—	—	80	332	80	389	80	370
		4000	—	110	73	55	80	357	80	363	80	370	80	319	80	402	80	319
3,0	4	1800	—	146	98	73	80	421	—	—	—	—	80	421	80	465	—	—
		2500	—	146	98	73	80	370	—	—	—	—	80	370	80	414	80	395
		4000	—	146	98	73	80	319	80	402	80	370	80	357	S56	440	80	332
3,7	5	1800	—	183	122	91	—	—	—	—	—	—	—	—	—	—	—	—
		2500	—	183	122	91	80	408	—	—	—	—	80	395	80	465	—	—
		4000	—	183	122	91	80	332	—	—	—	—	80	332	80	389	80	370
4,5	6	1800	—	—	146	110	—	—	—	—	—	—	—	—	—	—	—	—
		2500	—	—	146	110	—	—	—	—	—	—	80	421	—	—	—	—
		4000	—	—	146	110	80	395	—	—	—	—	80	344	80	414	—	—
5,2	7	1800	—	—	170	128	—	—	—	—	—	—	—	—	—	—	—	—
		2500	—	—	170	128	—	—	—	—	—	—	—	—	—	—	—	—
		4000	—	—	170	128	—	—	—	—	—	—	80	370	80	440	—	—
6,0	8	1800	—	—	195	146	—	—	—	—	—	—	—	—	—	—	—	—
		2500	—	—	195	146	—	—	—	—	—	—	—	—	—	—	—	—
		4000	—	—	195	146	—	—	—	—	—	—	80	395	80	465	—	—

For dimensions, see drawing **L** on page 34.

^s S3 periodic intermittent duty of 15 minutes on at rated load followed by 30 minutes off. Additional voltage ratings of 48, 60, 72 or other inputs also available.



IP23 enclosures allow maximum cooling and highest horsepower ratings in clean, protected environments. Use IP44 or IP55 enclosures where greater protection is required.



Custom shaft configurations and mountings allow ideal fit with driven equipment.



CUSTOM DC MOTORS SUB-FHP

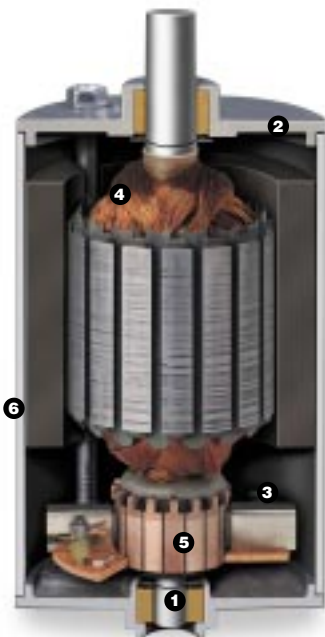
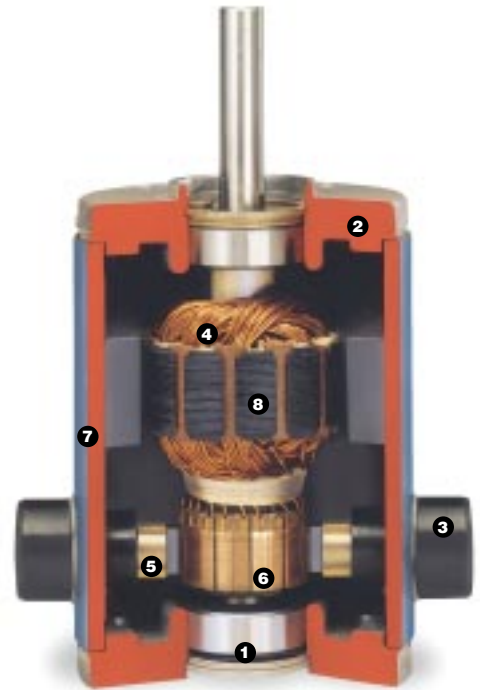
LEESON now offers OEM customers two major design types of custom sub-fractional horsepower DC motors. For demanding applications, there's the LEESON line with a complete range of industrial-duty features. For light industrial or commercial applications, especially those involving longer manufacturing runs, look to our Tru-Torq line, which offers maximum value with application-appropriate features.

LEESON Motors: Top Performance In Demanding Applications

TYPICAL LEESON PM DC MOTOR FEATURES:

- 1 **Ball bearings (sealed or shielded)** ensure positive shaft alignment, increased reliability, and all-angle mounting flexibility. Preload spring with washer minimizes end play, reduces vibration and noise.
- 2 **380 alloy aluminum end shields** are high-pressure die cast. Mating surfaces are machined for precise alignment and bearing fit, allowing accurate brush tracking and maximum motor life.
- 3 **Brushes are accessible** for easy inspection and replacement, without disassembly of motor.
- 4 **UL recognized insulation system** rated Class F or Class H. Copper magnet wire protected by solventless polyester varnish, for a homogenous, vibration-resistant winding with environmental resistance and high overload capacity.
- 5 **Brass cartridge-type brush holders** with constant pressure stainless steel spring for positive alignment of high current capacity brushes. Provides for "black band" commutation even in reversing applications.
- 6 **Molded commutator** of silver-bearing copper with high temperature, fusion-welded connections for vibration resistance and enhanced reliability.
- 7 **Heavy-gauge, painted steel frame** for maximum structural integrity.
- 8 **Dynamically balanced armature/rotor** for vibration-free, quiet performance.

A wide variety of mountings are available for both LEESON and Tru-Torq motors. This includes customer-specific designs. Motor-mounted gearheads, brakes, tachometers, and encoders are also available.



Tru-Torq Motors: Maximum Value In PM DC Motors

TYPICAL TRU-TORQ PM DC MOTOR FEATURES:

- 1 **Self-aligning sleeve bearings** of sintered bronze, with wide temperature range oil impregnation for quiet operation and long life. Ball bearing designs optional.
- 2 **Zinc alloy endplates** are high-pressure cast for rigidity and reduced cost.
- 3 **Internal brushes are standard** for lower cost. A wide range of brush grades and sizes are available to match application voltages and life expectations. Cartridge-type brush holders also available.
- 4 **UL recognized insulation system.** Copper magnet wire is varnish-impregnated, yielding a vibration-resistant winding with environmental protection.
- 5 **Molded commutator** of silver-bearing copper with high temperature, fusion welded tang connections for reduced cost. Epoxy reinforcement available for vibration resistance and enhanced reliability.
- 6 **Zinc-plated steel frame** for extra corrosion resistance. Unpainted endcaps are standard. Painted frame and endcaps available. Ceramic magnets are bonded to the frame with high-strength, single component epoxy, for structural integrity and performance.

THYRISTOR RATED MOTORS

SMALL FRAMES 24, 31 & 34

90 or 180 VOLTS, 1,3 TO 1,4 FORM FACTOR



24 Frame, 60mm diameter



31 Frame, 79mm diameter



34 Frame, 86mm diameter

Watts S1	RPM	Full Load Amperage		Torque Nm	IP44 Frame & Type*	
		90V	180V			
30	1500	0,5	..	0,19	24	D
	1800	0,5	..	0,16	24	C
	2500	0,5	0,2	0,11	24	B
	3000	0,5	0,2	0,09	24	A
37	1500	0,5	..	0,24	24	E
	1800	0,5	..	0,20	24	D
	2500	0,5	0,3	0,14	24	D
	3000	0,5	0,3	0,12	24	C
45	1500	0,8	0,4	0,32	31	C
	1800	0,8	0,4	0,26	31	B
	2500	0,8	0,4	0,19	31	A
	3000	0,8	0,4	0,16	31	A
60	1500	1,0	0,5	0,40	31	D
	1800	1,0	0,5	0,33	31	C
	2500	1,0	0,5	0,24	31	B
	3000	1,0	0,5	0,20	31	A
75	1500	1,2	0,6	0,47	31	E
	1800	1,2	0,6	0,40	31	D
	2500	1,2	0,6	0,28	31	B
	3000	1,2	0,6	0,24	31	B
90	1500	1,5	0,8	0,59	34	F
	1800	1,5	0,8	0,49	34	D
	2500	1,5	0,8	0,35	34	C
	3000	1,5	0,8	0,30	34	C
120	1500	2,2	1,1	0,95	34	G**
	1800	2,2	1,1	0,79	34	G
	2500	2,2	1,1	0,57	34	G
	3000	2,2	1,1	0,47	34	E
180	1800	2,7	1,4	1,00	34	G**
	2500	2,7	1,4	0,71	34	G
	3000	2,7	1,4	0,59	34	G

For dimensions, see drawings **A**, **B**, **C** or **D** on page 32.

.. Consult factory, since 31 frame needed for 180V designs.

* 24 frame diameter is 60mm.

31 frame diameter is 79mm.

34 frame diameter is 86mm.

** These motors are totally enclosed fan cooled.

General Specifications:

The ratings listed are typical designs in continuous and periodic intermittent duty rated motors. Various additional speeds, voltages and duty ratings are possible.

Precision sub-fractional horsepower, permanent magnet DC motors designed for use with full-wave, non-filtered thyristor controls for adjustable speed applications requiring dynamic braking and constant torque throughout the speed range.

Electrical Features:

S1 duty with full-wave, unfiltered rectified thyristor controls.

Filtered and pulse width modulated (PWM) motor ratings also available.

Linear speed torque characteristics throughout the speed range.

High starting torques.

Reversible rotation from a simple two lead connection.

Class F insulated with high temperature welded commutators.

Mechanical Features:

Compact space-saving designs. Ball bearings. Long-life brushes for demanding applications. Brushes easily replaced without disassembly of the motor. Standard mounted conduit box simplifies connections.

Worm-type and parallel shaft speed reducers also available.

Engineering Services:

LEESON's application engineering staff is available, at no additional cost, to assist in developing the motor design best suited for applications.



24 Frame, 60mm diameter



31 Frame, 79mm diameter



34 Frame, 86mm diameter

LOW VOLTAGE MOTORS

SMALL FRAMES 24, 31 & 34

12, 24 or 36 VOLTS , 1,0 FORM FACTOR

Watts S1	RPM	Full Load Amperage			IP44 Frame & Type*	15 Minute Duty ^s Approximate Amperage			
		12V	24V	36V		Watts S1	12V	24V	36V
30	1500	3,5	1,8	1,2	24 C	60	7	3,5	2,5
	1800	3,5	1,8	1,2	24 B		7	3,5	2,5
	2500	3,5	1,8	1,2	24 B		7	3,5	2,5
	3000	3,5	1,8	1,2	24 A		7	3,5	2,5
37	1500	4,3	2,1	1,4	24 C	75	8,5	4	3
	1800	4,3	2,1	1,4	24 C		8,5	4	3
	2500	4,3	2,1	1,4	24 B		8,5	4	3
	3000	4,3	2,1	1,4	24 B		8,5	4	3
45	1500	5,7	2,8	1,6	24 D	90	10	5,5	3,5
	1800	5,7	2,8	1,6	24 C		10	5,5	3,5
	2500	5,7	2,8	1,6	24 C		10	5,5	3,5
	3000	5,7	2,8	1,6	24 B		10	5,5	3,5
60	1500	7,1	3,5	2,4	24 E	120	15	7	5
	1800	7,1	3,5	2,4	24 E		15	7	5
	2500	7,1	3,5	2,4	24 D		15	7	5
	3000	7,1	3,5	2,4	24 C		15	7	5
75	1500	8,5	4,3	2,8	31 C	150	15	8,5	5,5
	1800	8,5	4,3	2,8	31 B		15	8,5	5,5
	2500	8,5	4,3	2,8	31 B		15	8,5	5,5
	3000	8,5	4,3	2,8	31 A		15	8,5	5,5
90	1500	10	5,2	3,5	31 E	180	20	10	7
	1800	10	5,2	3,5	31 C		20	10	7
	2500	10	5,2	3,5	31 B		20	10	7
	3000	10	5,2	3,5	31 B		20	10	7
150	1500	16↔	7,8	5,2	34 G**	250	25	15	8,5
	1800	16↔	7,8	5,2	34 G		25	15	8,5
	2500	16↔	7,8	5,2	34 D		25	15	8,5
	3000	16↔	7,8	5,2	34 C		25	15	8,5
180	1800	19↔	9,7	6,5	34 F**	370	40	20	15
	2500	19↔	9,7	6,5	34 G		40	20	15
	3000	19↔	9,7	6,5	34 E		40	20	15

For dimensions, see drawings **A**, **B**, **C** or **D** on page 32.

- ↔ Consult factory, since amps exceed brush current density for continuous duty.
- ^s S3 periodic intermittent duty of 15 minutes on at rated load followed by 30 minutes off.
- * 24 frame diameter is 60mm.
- * 31 frame diameter is 79mm.
- * 34 frame diameter is 86mm.
- Additional voltage ratings of 48, 60, 72 or other inputs also available.
- ** These motors are totally enclosed fan cooled.

General Specifications:

The ratings listed are typical designs in continuous and periodic intermittent duty rated motors. Various additional speeds, voltages and duty ratings are possible.

Low voltage direct current motors are well suited for intermittent duty applications requiring peak torques of several times the rated dead load capability of the motor. Proper application of motors to loads having these characteristics will result in the most compact, cost effective motor design. A detailed description of the duty cycle, including off time and running time with or without load, and duration and repetition of the cycle per hour or day is required.

Electrical Specifications:

These motors are intended for direct current input having a form factor of 1,0 to 1,05 such as is provided by a battery, generator or solar power. They have linear speed torque characteristics. The output speed can be adjusted by voltage change using series/parallel battery connections or adjustable voltage controls having a form factor of 1,05 or lower.

Mechanical Features:

In addition to the standardized mountings pictured here, many application specific modifications have been developed for close coupling of hydraulic pumps and gear reducers. Worm-type and parallel shaft speed reducers also available.

Engineering Services:

LEESON's application engineering staff is available, at no additional cost, to assist in developing the motor design best suited for applications.



THYRISTOR RATED MOTORS

SMALL FRAMES 57mm, 64mm, 76mm, & 80mm
 90 or 180 VOLTS, 1,3 TO 1,4 FORM FACTOR



64mm Frame



76mm Frame



80mm Frame

Watts S1	Rated Torque Nm	RPM	Amperage 90V	IP44 Frame & Type
12,5	0,07	1750	0,25	57 A
20	0,07	2500	0,35	57 B
25	0,11	2500	0,48	57 B
	0,14	1750	0,42	57 B
	0,15	1750	0,44	64 B
30	0,12	2500	0,52	64 A
	0,18	1750	0,50	64 C
	0,18	1750	0,50	76 A
	0,18	1750	0,50	80 A
	0,18	1750	0,50	80 A
37	0,14	2500	0,59	57 B
	0,15	2500	0,62	64 C
	0,20	1750	0,54	76 B
	0,20	1750	0,54	80 B
	0,20	1750	0,54	80 B
45	0,18	2500	0,71	64 C
	0,18	2500	0,71	76 A
	0,18	1750	0,71	80 A
	0,24	1750	0,64	76 C
	0,24	1750	0,64	80 C
50	0,20	2500	0,77	76 B
	0,20	2500	0,77	80 B
	0,28	1750	0,73	76 D
	0,28	1750	0,73	80 D
	0,28	1750	0,73	80 D
75	0,28	2500	1,04	76 D
	0,28	2500	1,04	80 D
150	0,49	2900	2,00	80 E

For dimensions, see drawings **M**, **N**, **Q** or **R** on page 35.

General Specifications:

The ratings listed are typical designs in S1 and S3 periodic intermittent duty rated motors. Various additional speeds, voltages and duty ratings are possible.

Electrical Options:

- Thyristor ratings include 90 or 180V and 115 or 220V (half-wave)
- Filtered and pulse width modulated (PWM) motor ratings also available
- Reversible
- Thermal protection
- Cartridge-type brush holders

Mechanical Options:

- Ball bearing design
- Special shafts
- Custom mounting configurations
- Worm-type and parallel shaft speed reducers also available
- Custom finish/painted
- Metric thru-bolts & shafts
- Vented housing
- Dynamically balanced armature

Engineering Services:

LEESON's application engineering staff is available, at no additional cost, to assist in developing the motor design best suited for applications.



TYPICAL TRU-TORQ CUSTOM MOTORS



CUSTOM DC MOTORS

SMALL FRAME MOTORS • LOW VOLTAGE



LOW VOLTAGE MOTORS

SMALL FRAMES 57mm, 64mm, 76mm, & 80mm
12, 24 & 36 VOLTS, 1,0 FORM FACTOR

Watts S1	Rated Torque Nm	RPM	Amperage 90V	IP44 Frame & Type	
15	0,07	1800	1,91	57	A
20	0,07	2400	2,55	57	B
25	0,13	1800	3,12	57	B
	0,14	1800	3,41	64	A
30	0,13	2400	4,16	57	B
	0,16	1800	3,75	57	B
	0,17	1800	3,92	64	B
	0,18	1800	4,08	76	A
	0,18	1800	4,08	80	A
37	0,14	2400	4,55	64	A
	0,20	1800	4,44	64	C
45	0,16	2400	5,00	57	B
	0,17	2400	5,22	64	B
	0,18	2400	5,44	76	A
	0,23	1800	4,93	76	B
	0,18	2400	5,44	80	A
50	0,23	1800	4,93	80	B
	0,20	2400	5,92	64	C
	0,23	2400	6,57	76	B
	0,27	1800	5,62	76	C
	0,23	2400	6,57	80	B
75	0,27	1800	5,62	80	C
	0,34	2400	9,10	76	D
	0,34	2400	9,10	80	D
125	0,67	1800	11,40	80	E

General Specifications:

The ratings listed are typical designs in continuous and periodic intermittent duty rated motors. Various additional speeds, voltages and duty ratings are possible.

Electrical Options:

- Low voltage ratings 12 through 72V
- Reversible
- Thermal protection
- Cartridge-type brush holders

Mechanical Options:

- Ball bearing design
- Special shafts
- Worm-type and parallel shaft speed reducers also available
- Custom mounting configurations
- Custom finish/painted
- Metric thru-bolts & shafts
- Vented housing
- Dynamically balanced armature

Engineering Services:

LEESON's application engineering staff is available, at no additional cost, to assist in developing the motor design best suited for applications.

For dimensions, see drawings **M**, **N**, **Q** or **R** on page 35.



TYPICAL TRU-TORQ CUSTOM MOTORS



NEMA 4/12
TOTALLY ENCLOSED



174902
Non-Reversing

174903
Reversing

LEESON Speedmaster® DC controls are general purpose drives designed for use with permanent magnet type direct current motors. NEMA 1 enclosed drives are suitable for most industrial applications, with the NEMA 4X enclosures best suited for washdown or outdoor installations or for extremely dusty applications. Chassis only units are available for building into equipment, machinery or existing enclosures. Most controls have a dual voltage switch allowing the control to be used on 115 or 230 volt, single phase, 50/60 Hertz service. However, the proper voltage motor should be selected for use with the power supply input, i.e., 90 volt DC motors for 115 volt input or 180 volt motors for 230 volt input service. Installation and adjustment instructions are included.

Thyristor drives are available in unidirectional and electro-mechanical type reversing styles for NEMA frame ratings and sub-fractional HP sizes.

Regenerative, four quadrant controls in NEMA 4X or chassis style available for applications requiring more precise motion control. These controls will produce both motoring and braking torque regulation for NEMA frame 180W through 1500W motors.

Pulse Width Modulated (PWM) controls are available in NEMA 1 and chassis style units for subfractional frame motors from 19W through 180W. Due to their improved form factor, these PWM controls will result in quieter operation, lower operating temperatures, longer brush life, and greater motor overload capacity than for the same motor on an thyristor type control.

FOR NEMA FRAME MOTORS & GEARMOTORS

THYRISTOR CONTROLS • ENCLOSED • SINGLE PHASE 50/60 HZ

Description	Catalog Number	Output Current Amps	Range				App. Wgt. (Kg.)
			115V kW	115V HP	230V kW	230V HP	
NEMA 1 General Purpose							
—Non-Reversing	174307	10	0,09 to 0,75	1/8 to 1Ⓜ	0,18 to 1,5	1/4 to 2Ⓜ	2,3
—Reversing	174308	10	0,09 to 0,75	1/8 to 1Ⓜ	0,18 to 1,5	1/4 to 2Ⓜ	2,3
—Heat Sink	174316	—	—	—	—	—	0,45
NEMA 4X Washdown—Dust-Tight							
—Non-Reversing, Steel Enclosure	174100	10	0,18 to 1,1	1/4 to 1	0,18 to 1,5	1/4 to 2	3,2
—Non-Reversing, Noryl N190 Plastic Enclosure	174902	12	0,18 to 1,1	1/4 to 1	0,18 to 1,5	1/4 to 2	0,9
—Reversing, Steel With Dynamic Braking	174105	10	0,18 to 1,1	1/4 to 1	0,18 to 1,5	1/4 to 2	3,6
—Reversing, Noryl N190 Plastic Enclosure *	174903	12	0,18 to 1,1	1/4 to 1	0,18 to 1,5	1/4 to 2	0,9
NEMA 4							
—Non-Reversing 3HP	174709	15	—	—	2,2	3	3,6

THYRISTOR CONTROLS • OPEN CHASSIS

Description	Catalog Number	Output Current Amps	Range				App. Wgt. (Kg.)
			115V kW	115V HP	230V kW	230V HP	
Chassis with Speed Pot	174311	10	0,09 to 1,1	1/8 to 1Ⓜ	0,18 to 1,5	1/4 to 2Ⓜ	0,45
Chassis Heat Sink Ⓜ	174314	—	—	—	—	—	0,45

REGENERATIVE THYRISTOR DRIVES • FOUR QUADRANT • FULL WAVE

Description	Catalog Number	Output Current Amps	Range				App. Wgt. (Kg.)
			115V kW	115V HP	230V kW	230V HP	
NEMA 4X Washdown —Bi-Directional	175720	10	0,18 to 1,1	1/4 to 1	0,37 to 1,5	1/2 to 2	3,6
Open Chassis with Speed Pot	175721	10	0,18 to 1,1	1/4 to 1Ⓜ	0,37 to 1,5	1/2 to 2Ⓜ	0,9
Chassis Heat Sink Ⓜ	175722	—	—	—	—	—	0,9

FOR SUB-FHP MOTORS & GEARMOTORS

PWM & THYRISTOR CONTROLS • ENCLOSED • SINGLE PHASE 50/60 HZ

Description	Catalog Number	Output Current Amps	Range				App. Wgt. (Kg.)
			115V Watts	115V HP	230V Watts	230V HP	
NEMA 1 General Purpose							
—Thyristor Non-Reversing	M1740005	3	19 to 90	1/40 to 1/8	19 to 180	1/40 to 1/4	2,3
—Thyristor Reversing	M1740006	3	19 to 90	1/40 to 1/8	19 to 180	1/40 to 1/4	2,3
—PWM Non-Reversing	M1740008	3	19 to 90	1/40 to 1/8	19 to 180	1/40 to 1/4	0,9

PWM & THYRISTOR CONTROLS • OPEN CHASSIS

Description	Catalog Number	Output Current Amps	Range				App. Wgt. (Kg.)
			115V Watts	115V HP	230V Watts	230V HP	
Open Chassis Thyristor Type							
—Chassis with Speed Pot	M1740007	1,5	19 to 90	1/40 to 1/8	19 to 180	1/40 to 1/4	0,45
Open Chassis PWM Type							
—Chassis with Speed Pot	M1740009	2,0	19 to 90	1/40 to 1/8	—	—	0,45

FOR LOW VOLTAGE DC MOTOR CONTROLS, See page 9.

* Motor shaft must be at zero speed before reversing.
 Ⓜ Heat sink #174316 is required for NEMA 1 type 19mm and 0,75kW 115v. and 1,1kW and 1,5kW 230v.
 Ⓜ Chassis Heat Sink #174314 required for 19mm and 0,75kW 115v. and 1,1kW and 1,5kW 230v.
 Ⓜ Chassis Heat sink #175722 required for 0,75kW and above.



DC MOTOR AND SPEED CONTROL FORM FACTOR

Pure DC power as delivered by a battery, for example, has a form factor of 1,0. When a "full-wave" thyristor control converts AC power to rectified DC, the form factor ranges from 1,3 to 1,4 or higher because of the pulsing nature of the AC. This characteristic of the control output causes additional heating in the motor. All DC thyristor drive motors in this catalog have been selected for unfiltered power of this type. If a control is chosen that has a filtering network or is of PWM type, resulting in an improved form factor (usually a form factor of 1,1) a smaller motor may be possible.

THYRISTOR RATED DC MOTORS ON PWM POWER SUPPLIES

Pulse width modulated DC controls have a voltage output similar to pure direct current which has a form factor of 1,00. thyristor drives, such as the SPEEDMASTER™ controls listed on page 18, have a form factor of 1,4.

LEESON NEMA and IEC frame stock thyristor rated motors can also be used with PWM controls. In fact, the motor's HP rating can be increased because of less heating in the motor. In addition, the motor will operate quieter and the brush life will be extended.

Rated kW 1,40 FF	Rated HP	Rated RPM	Rated Volts	Catalog Number	Rated HP 1,05 FF
0,18	¼	1750	90	098002	0,40
		1750	90	108010	0,30
		1750	90	108423	0,30
		1750	180	098003	0,50
		1750	180	108323	0,37
		1750	180	108323	0,37
0,25	⅓	1750	90	098004	0,50
		1750	90	108011	0,56
		1750	90	108424	0,56
		1750	180	098005	0,50
		2500	90	098006	0,75
		2500	90	108012	0,63
0,37	½	2500	180	098007	0,70
		2500	180	108013	0,70
		1750	90	098000	0,70
		1750	90	108014	0,75
		1750	90	108226	0,75
		1750	180	098008	0,56
		1750	180	108015	0,70
		1750	180	108227	0,70
		2500	90	098009	1,00
		2500	90	108016	1,00
		2500	180	098010	1,00
		2500	180	108017	0,86
0,55	¾	1750	90	098032	1,00
		1750	90	108018	1,00
		1750	90	108228	1,25
		1750	180	098069	1,00
		1750	180	108019	1,00
		1750	180	108229	1,25
		2500	90	108020	1,50
		2500	180	108021	1,50
		1750	90	108022	1,25
		1750	90	108230	1,25
		1750	180	108023	1,25
		1750	180	108231	1,25
0,75	1	2500	180	108265	2,00
		1750	180	108092	1,75
		1750	180	108262	1,75
		1750	180	108232	1,75
		1750	180	128000	—
		2500	180	108266	3,00
1,1	1½	1750	180	128001	—
		1750	180	108502	—
1,5	2	1750	180	108502	—
		1750	180	108502	—
2,2	3	1750	180	108502	—

DC MOTOR SPEED RANGE

The speed ranges noted for PM DC motors and gearmotors in this catalog are based upon ideal conditions and can vary due to the nature of the load and the load regulation or IR compensation of the speed control. The upper end of the speed range is usually not critical. However, in some applications, and some motor and speed control combinations, erratic operation or "cogging" of the motor's speed may be noticed in the lower extremes of the listed speed range. Often, this can be eliminated through adjustment of the control or increasing the ratio of the drive train to reduce the minimum speed at which the motor is required to operate.

ENCLOSURES AND ENVIRONMENT

DRIP-PROOF: Venting in end frame and/or main frame located to prevent drops of liquid from falling into motor within a 15° angle from vertical. Designed for use in areas that are reasonably dry, clean, and well ventilated (usually indoors). If installed outdoors, it is recommended that the motor be protected with a cover that does not restrict the flow of air to the motor.

TOTALLY ENCLOSED NON-VENTILATED (TENV): No vent openings, tightly enclosed to prevent the free exchange of air, but not airtight. Has no external cooling fan and relies on convection for cooling. Suitable for use where exposed to dirt or dampness, but not for very moist or hazardous (explosive) locations.

TOTALLY ENCLOSED FAN COOLED (TEFC): Same as the TENV except has external fan as an integral part of the motor, to provide cooling by blowing air around the outside frame of the motor.

TOTALLY ENCLOSED, HOSTILE AND SEVERE ENVIRONMENT MOTORS: Designed for use in extremely moist or chemical environments, but not for hazardous locations.

EXPLOSION-PROOF MOTORS: These motors meet Underwriters Laboratories and Canadian Standards Association standards for use in hazardous (explosive) locations, as indicated by the UL label affixed to the motor. Locations are considered hazardous because the atmosphere does or may contain gas, vapor, or dust in explosive quantities. The motor user must specify the explosion proof motors required.

U.L., CSA, ISO AND OTHER STANDARDS & APPROVALS

UNDERWRITERS LABORATORIES INC.

- All motor models listed with prefix "C" have U.L. component recognition (without thermal overload). File Number E57948, Guide Number PRGY2.
- All units have U.L. recognized Class B insulation system unless otherwise noted. File Number E55555, Guide Number OBJY2.
- Permanent Magnet DC motors are recognized components under File Number E57948, Guide Number PRGY2.
- Speedmaster Thyristor Drives, Component Recognition, File E35603, except catalog numbers 174709, 174902 and 174903.
- Speedmaster Thyristor Drives, catalog numbers 174902 and 174903. File Number E78180.

CANADIAN STANDARDS ASSOCIATION

- Permanent Magnet DC motors are listed under File Number LR33543.
- Speedmaster Thyristor Drives, catalog numbers 174902 and 174903. File Number LR 85877.

ISO QUALITY CERTIFICATION

Grafton and Saukville, Wisconsin administrative, design and manufacturing facility, ISO 9001, Certificate Number RvC #93-102. EN29001, BS5750: Part 1 and ANSI/ASQC Q91-19.

Black River Falls, Wisconsin manufacturing facility, ISO 9002, Certificate Number RvC #93-090.

Mississauga (Toronto), Ontario, administrative, distribution facility, ISO 9002, Certificate Number QMI #003027.

Hanover, Ontario, manufacturing facility, ISO 9002, Certificate Number QMI #003028.

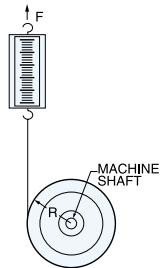
SELECTING A DC MOTOR OR GEARMOTOR

When applying larger motors, it is only HP and speed, rather than torque (the twisting force that produces rotation) that are key elements of concern. However, for sub-fractional HP motors and gearmotors, the speed and torque required are more critical.

GEARMOTORS

In most applications using geared motors, the running torque required is approximately the same or less than the starting torque, where the load consists primarily of friction. In these instances, the torque required can be determined simply by applying a rope and pulley with scale to the driven shaft and measuring the torque required to turn the shaft. An even simpler method is to use a mechanic's torque wrench.

ROPE & PULLEY METHOD—Fix a pulley to the shaft of the machine. Secure and wrap a rope around the pulley. Using a spring scale, measure the force required in pounds or ounces to turn the shaft. The force measured by the spring, multiplied by the radius of the pulley will equal the inch-pounds or inch-ounces required. The reading obtained just as the shaft begins to rotate is the starting torque. The force required to continue turning the shaft is the running torque. The measurements should be taken several times and averaged.



TORQUE WRENCH METHOD—Using a torque wrench, turn the shaft and read the torque values from the wrench's scale.

INPUT HORSEPOWER

After determining the torque speed, input HP can be determined by the following formula:

$$HP = \frac{RPM \times Torque (Nm)}{63,025}$$

USING A MOTOR TO CONFIRM THE RESULTS

While the above methods usually yield adequate results, the measurements can be confirmed using the data to select a test motor or gearmotor. Using performance data from the motor's manufacturer, the amperage or wattage required by the application can be compared for confirmation of the sizing.

OTHER TYPES OF LOADS

Applications having other characteristics may require different techniques to select an optimum sized motor. Fan and pump manufacturers can usually supply characteristic curves of their loading requirements that can be matched to a motor's performance curve.

GEARMOTOR EFFICIENCY

Gearmotor efficiency is determined by the type of gearing and the number of stages of reduction. Efficiency can also be affected by ambient temperatures, lubricant, and the actual transmitted torque relative to the rated torque of the gearmotor.

Parallel shaft gearmotor efficiency is equal to 0,96n, where n is the number of stages of reduction indicated by the last digit of the gear type number (for example, PZ2 or P302 are two-stage reducers).

Right-angle, worm-type gearmotors are not as efficient as parallel shaft gearmotors and can vary greatly depending upon the size and ratio.

A conservative formula for worm reducers is:

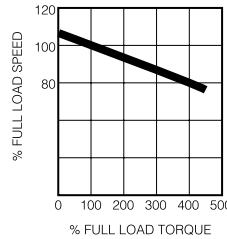
$$E = \frac{74 - 0.66r}{100}$$

where r = the gear ratio

PEAK LOADS, SHOCK LOADS AND GEARMOTOR LIFE

Some applications subject gearmotors to periodic, unusually heavy, "shock" loads. LEESON gearmotors are designed to withstand periodic overloads of up to 200% of the listed safe torques. The frequency and duration of such shock loading must be carefully considered and compared to the safe torque values for reasonable gear life.

TYPICAL SPEED TORQUE CURVE



Permanent magnet DC motors have linear speed/torque characteristic over the entire speed range. Their very high starting and maximum torque capability make them ideal for intermittent duty applications. DC permanent magnet powered gearmotors can produce sufficient peak torques to damage the gear train or driven equipment. Failures of the gear train caused by these maximum torques should be prevented by fusing or the current limit feature of adjustable speed controls. Gear train failures caused by locked torques are not covered by the warranty.

MOTOR AND GEARMOTOR NOISE

While electric motor noise alone is usually not objectionable in even the most sensitive applications, the use of thyristor-type speed controls with DC motors and the addition of a gear reducer to the equation may be of concern.

The "pulsed-power" output of thyristor controls can introduce noise into DC motors that may be a problem in noise sensitive applications. This can usually be eliminated by the addition of resiliency to the motor mounting or in extreme conditions through the addition of a filter network to the control system that "smooths" the flow of power to the motor or a PWM type control.

The stock gearmotors in this catalog have been designed for general purpose use in industrial applications where noise is not generally a critical factor. For maximum performance of these motors, LEESON has chosen all-steel gearing for parallel shaft reducers and bronze worm wheels for the right-angle gearing. While this substantially increases the shock and maximum load capacity of the gearmotors, it does result in a unit somewhat more noisy than is possible with the use of thermoplastic or laminated gearing as used by many manufacturers in their stock and custom products. For noise sensitive applications, LEESON can supply gearmotors with gearing specially designed for the application.

OVERHUNG LOAD

When a sprocket, pulley or gear is mounted to a gearmotor shaft, a load perpendicular to the shaft is exerted. This is commonly known as overhung load. The listings in this catalog are for the center of the output shaft. Exceeding these values can result in bearing, shaft or mounting failure. The need to consider overhung load can be eliminated by direct coupling of gearmotors to the load. The formula for overhung load is:

$$OHL (Kgs.) = \frac{Torque (Nm) \times K (Load Factor)}{R (Radius of Pulley or Sprocket)}$$

The result of this calculation must be corrected for the device mounted using the factors noted below:

- Chain and Sprocket —1,00
- Gear—1,25
- V-Belt—1,50

FOR CUSTOM MOTORS OR GEARMOTORS, COMPLETE THE EASY-TO-USE DESIGN OUTLINE ON THE NEXT PAGE AND FAX TO LEESON. *



DC CUSTOM MOTOR/GEARMOTOR DESIGN OUTLINE

Company: _____ Contact: _____
 Address: _____ Title: _____
 City: _____ State: _____ Zip: _____
 Phone: _____ Fax: _____

Application of motor/gearmotor: _____

 Current Supplier: _____ New Application _____
 Estimated annual quantity: _____ Price Target: _____

Please complete applicable portions of the data below.

MOTOR DATA

Enclosure: TEFC TENV TEAO ODP Other _____
 HP: _____ RPM: _____ Frame: _____ Voltage: _____ Insul. Class: _____

(If gearmotor, also complete "Gearhead" section below.)

Power Source: Thyristor* PWM* Rectifier* Battery Generator

*Please Note: AC Input Voltage: _____ Form Factor: _____ Armature Voltage: _____

Thermostat: Normally Closed _____ Normally Open _____

Duty: Continuous _____ Ambient Temperature _____
 Intermittent (Describe On/Off Cycle and Speed Range) _____

GEARHEAD DATA

Output Torque: _____ Ratio _____

Gear Type Preferred: Parallel Shaft _____ Right-Angle Shaft _____

Overhung Load (Kg.) _____

Shock Load (Kg.) _____ How Often? _____

Other _____

Mounting position (i.e. gearhead relative to motor) _____

Environmental conditions _____

Desired life requirements _____

Weight requirements _____

Dimensional characteristics. Specify any space restrictions. Use additional page for sketch.

PLEASE SPECIFY: Shaft Extension Length: Diameter:

Keyway or flat dimension, other shaft features: _____

Conduit Box: None Side Box Built-In Terminal Posts

Conduit Box Location: Standard Special _____

Mounting: None Rigid Resilient C Face Other _____

Mounting Position: Horizontal Shaft Up Shaft Down Other _____

Any other critical mounting dimensions: _____

Other special features: _____

Fax to LEESON Electric at +1.262.377.9025



PZ SERIES DC GEARMOTORS: Parallel Shaft

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input		LEESON Catalog No.	Cross Reference			
		Watts	HP		Dayton	Bodine	Baldor	Bison
4	4,5	20	1/40	M1115002	6Z911	199	—	011-190-0362
10	11,3	37	1/20	M1115001	6Z912	198	GPP231108	011-190-0186
20	11,3	37	1/20	M1115000	6Z913	196	GPP232110	011-190-0096
				M1125048	—	—	GPP233120	—
30	11,3	45	1/17	M1125002	6Z914	190	GPP233112	011-190-0072
60	6,3	45	1/17	M1125003	6Z914	—	GPP233111	011-190-0025
				M1125036	—	—	GPP233121	—
100	4,1	45	1/17	M1125004	—	189	GPP12503	011-190-0019
150	2,7	45	1/17	M1125005	6Z916	188	—	011-190-0013
300	1,1	45	1/17	M1125006	—	157	—	011-190-0007

P300 SERIES DC GEARMOTORS: Parallel Shaft

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input		LEESON Catalog No.	Cross Reference			
		Watts	HP		Dayton	Bodine	Baldor	Bison
5	39,9	37	1/20	M1115024	6A193	—	—	011-336-1369
9	30,9	37	1/20	M1115025	6A194	4147	GPP233141	011-336-1208
18	17,0	37	1/20	M1115026	4Z134	4146	GPP233140	011-336-1091
24	31,6	90	1/8	M1125069	4Z130	4156	—	011-336-2082
31	24,9	90	1/8	M1125070	4Z383	4155	GPP12547	011-336-2060
34	9,3	37	1/20	M1115027	4Z133	—	GPP233112	011-336-1053
51	14,7	90	1/8	M1125071	4Z129	4154	—	011-336-2036
51	6,2	37	1/20	M1115028	4Z132	—	GPP233111	011-336-1030
61	12,8	90	1/8	M1125072	4Z382	4154	GPP12545	011-336-2028
94	8,7	90	1/8	M1125073	4Z381	4153	GPP12544	011-336-2019
109	3,1	37	1/20	M1115029	4Z131	—	—	011-336-1017
170	4,9	90	1/8	M1125074	4Z128	4151	GPP12542	011-336-2011

P1100 SERIES DC GEARMOTORS: Parallel Shaft

Speed Range RPM min ⁻¹	F.L. Torque Nm	Ratio to 1	Input		LEESON Catalog No.	Cross Reference	
			Watts	HP		Dayton	Bison
8	122,8	212	180	1/4	108700	6Z406	011-483-4197
12	116,4	143	180	1/4	108701	6Z407	011-483-4131
18	84,8	95	180	1/4	108702	6Z408	011-483-4087
42	39,9	42	180	1/4	108703	6Z409	011-483-4041
60	26,9	29	180	1/4	108704	6Z410	011-483-4028
92	18,1	19	180	1/4	108705	6Z411	011-483-4018
135	11,9	13	180	1/4	108706	6Z412	011-483-4012
18	125,7	95	370	1/2	108707*	6Z413	011-483-2087
33	99,7	53	370	1/2	108708*	6Z414	011-483-2058
42	79,7	42	370	1/2	108709*	6Z415	011-483-2041
60	53,8	29	370	1/2	108710*	6Z416	011-483-2028
92	36,2	19	370	1/2	108711*	6Z417	011-483-2018
135	23,7	13	370	1/2	108712*	6Z418	011-483-2012

RIGHT-ANGLE DC GEARMOTORS

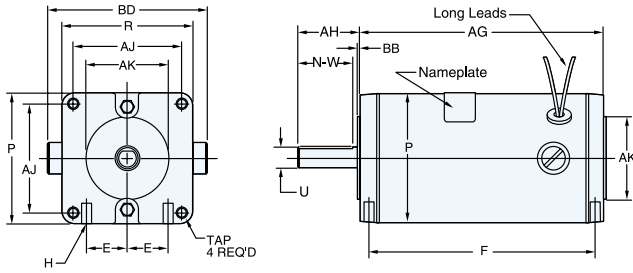
Speed Range RPM min ⁻¹	F.L. Torque Nm	Input		LEESON Catalog No.	Cross Reference		
		Watts	HP		Dayton	Bodine	Baldor
42	3,4	45	1/17	M1115018	—	99	—
62	4,0	45	1/17	M1115019	—	98	GP233003~
125	2,3	45	1/17	M1115020	—	96	GP233007~
250	1,2	45	1/17	M1115021	—	94	—
500	0,7	45	1/17	M1115022	—	93	—
42	9,0	90	1/8	M1135069	6A192	—	GP7403~
				M1135038	4Z137	4144	GP7402~
62	7,9	90	1/8	M1135058	—	6144	—
				M1135039	—	4142	—
125	5,1	90	1/8	M1135040	—	4141	—
				M1135041	—	4140	—
250	2,8	90	1/8	M1135042	—	4138	GP7405~
				M1135062	—	—	GP7425~
62	15,3	180	1/4	M1135043	1L498	4137	GP7407~
				M1135063	—	—	GP7427~
83	14,1	180	1/4	M1135044	—	4136	—
				M1135045	—	4135	—
125	10,2	180	1/4	M1135046	—	4134	—
250	5,7	180	1/4	M1135047	—	4133	—
500	3,4	180	1/4	M1135048	—	4132	—

~Mounting base and output shaft height are not 'drop-in' replacement.

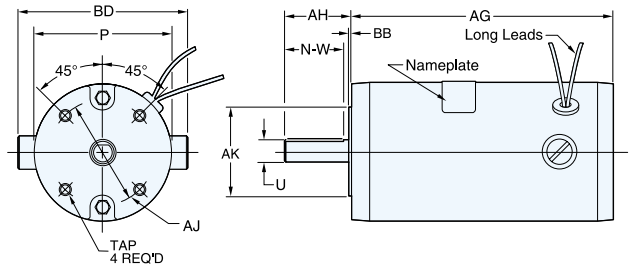
PE350 SERIES DC GEARMOTORS: Parallel Shaft

Speed Range RPM min ⁻¹	F.L. Torque Nm	Input		LEESON Catalog No.	Cross Reference		
		Watts	HP		Baldor	Bodine	Bison
7	37,3	90	1/8	M1135106	GPP7459	4175	011-348-7215
				M1135139	GPP7479	—	—
14	38,5	90	1/8	M1135107	GPP7462	4174	011-348-7102
				M1135140	GPP7478	—	—
21	41,9	180	1/4	M1135117	GPP7457	4173	—
				M1135141	GPP7477	—	—
27	34,5	180	1/4	M1135115	GPP7461	—	—
42	31,6	180	1/4	M1135108	GPP7456	4185	011-348-7041
				M1135143	GPP7476	—	—
50	28,3	180	1/4	M1135109	GPP7450	—	011-348-7034
62	24,9	180	1/4	M1135110	GPP7455	4184	011-348-7029
				M1135145	GPP7475	—	—
83	17,5	180	1/4	M1135114	GPP7454	4183	—
				M1135146	GPP7474	—	—
125	11,3	180	1/4	M1135111	GPP7453	4182	—
				M1135147	GPP7473	—	—
165	7,9	180	1/4	M1135112	GPP7452	4181	—
				M1135148	GPP7472	—	—
250	5,1	180	1/4	M1135116	GPP7451	4180	—
				M1135149	GPP7471	—	—
500	2,8	180	1/4	M1135113	GPP7450	4179	—
				M1135150	GPP7470	—	—

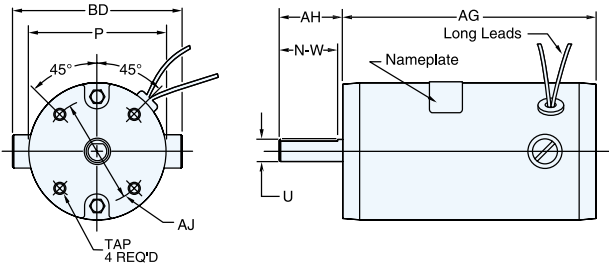
A
DC SQUARE FLANGE MOUNT



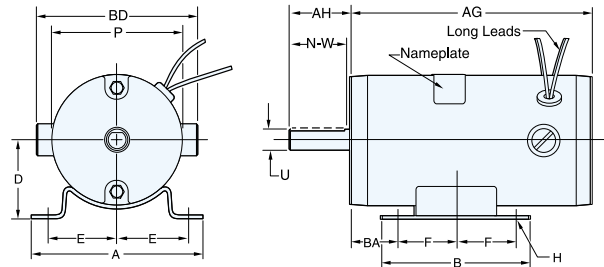
B
DC FLANGE MOUNT



C
DC FACE MOUNT



D
DC BASE MOUNT



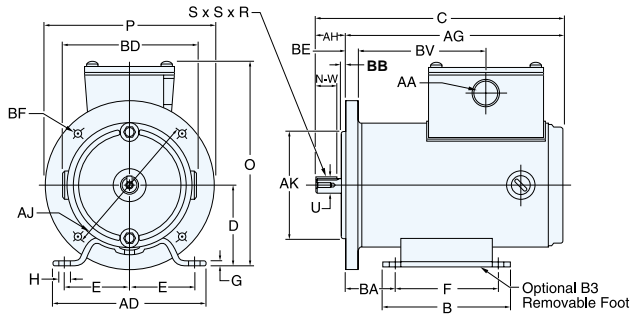
LEESON CUSTOM DC MOTORS - SQUARE FLANGE (mm)

Frame & Type	AG	P	BD	U	AH	N-W	AJ	TAP	R	AK	BB	D	BA	E	F	H	
24	A	100	60	73	10	38	25	44	8-32	63	25	1	31	3	16	94	8-32
	B	113	60	73	10	38	25	44	8-32	63	25	1	31	3	16	107	8-32
	C	125	60	73	10	38	25	44	8-32	63	25	1	31	3	16	119	8-32
	D	138	60	73	10	38	25	44	8-32	63	25	1	31	3	16	132	8-32
	E	151	60	73	10	38	25	44	8-32	63	25	1	31	3	16	145	8-32
31	A	124	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	112	1/4-20
	B	137	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	124	1/4-20
	C	149	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	137	1/4-20
	D	162	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	150	1/4-20
	E	175	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	163	1/4-20
	F	187	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	175	1/4-20
	G	200	79	89	13	38	25	67	1/4-20	80	51	2	40	6	25	188	1/4-20

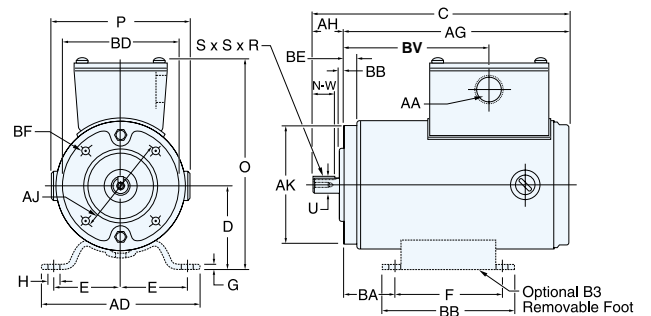
LEESON CUSTOM DC MOTORS - FLANGE, FACE, AND BASE MOUNT (mm)

Frame & Type	AG	P	BD	U	AH	N-W	AJ	TAP	AK	BB	D	BA	A	B	E	F	H	
24	A	98	60	73	10	38	25	45	8-32	25	3	—	—	—	—	—	—	
	B	110	60	73	10	38	25	45	8-32	25	3	—	—	—	—	—	—	
	C	123	60	73	10	38	25	45	8-32	25	3	—	—	—	—	—	—	
	D	136	60	73	10	38	25	45	8-32	25	3	—	—	—	—	—	—	
	E	148	60	73	10	38	25	45	8-32	25	3	—	—	—	—	—	—	
31	A	123	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	B	135	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	C	148	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	D	161	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	E	173	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	F	186	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
	G	199	79	90	13	38	25	67	8-32	51	3	41	19	89	80	36	32	5,6 x 7,9
34	A	123	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	B	135	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	C	148	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	D	161	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	E	173	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	F	186	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.
	G	199	86	102	13	38	25	67	8-32	51	3	48	19	106	90	43	36	1/4 dia.

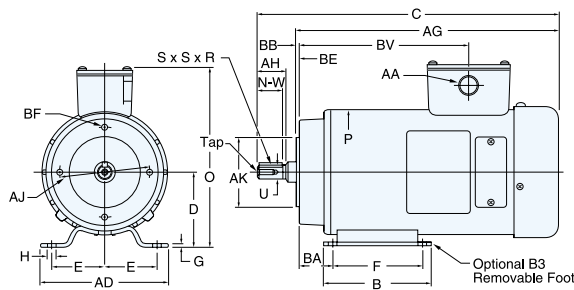
E
METRIC FRAMES - 56/63 B5



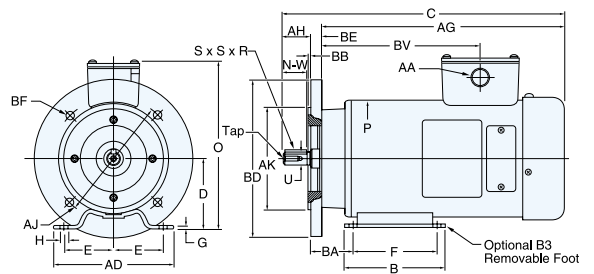
F
METRIC FRAMES - 56/63 B14



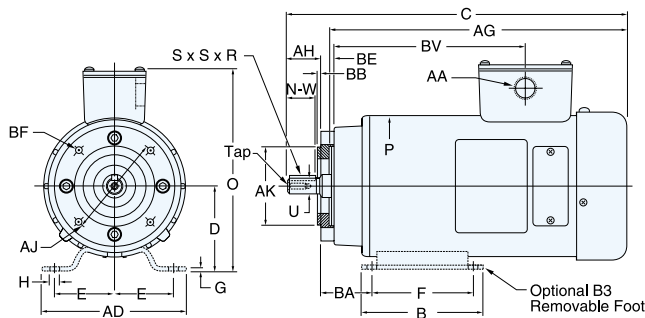
G
METRIC FRAMES - 71/80/90 B3



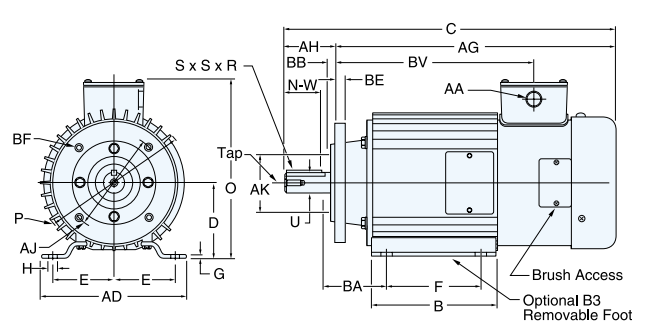
H
METRIC FRAMES - 71/80/90 B5



I
METRIC FRAMES - 71/80/90 B14



J
METRIC FRAMES - 100 B14



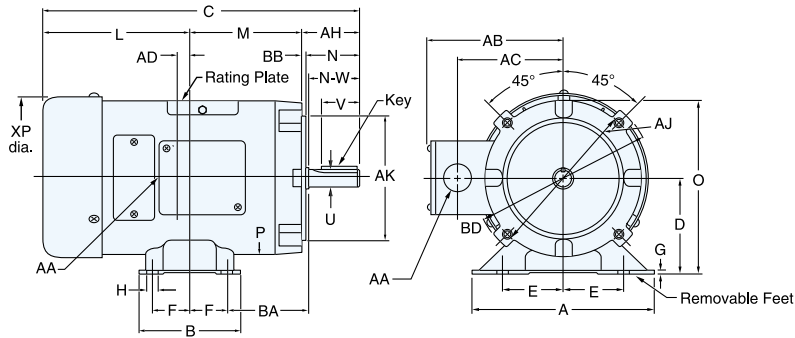
METRIC (IEC) FRAMES (mm)

IEC Frame	Mounting							Shaft					B14 Face/B5 Flange**								General							
	2E	AD	F	B	BA	D	G	H	U	AH	N-W	S	R	TAP	AJ *	AK **	BD *	BF **	BB *	BE **	AA *	P	O	BE	AA			
56	90	106	71	90	36	56	3	6	9	20	16	3	15	M3	65	100	50	80	80	120	M5	7	2,5	2,5	96	139	9	11,0
63	100	116	80	96	40	63	3	7	11	23	19	4	18	M4	75	115	60	95	90	140	M5	9	2,5	3,0	96	146	9	11,0
71	112	128	90	106	45	71	3	7	14	30	26	5	25	M5	85	130	70	110	105	160	M6	9	2,5	3,5	124	179	12	13,5
80	125	156	100	127	50	80	3	10	19	40	33	6	32	M6	100	165	80	130	120	200	M6	12	3,0	3,5	143	204	12	16,0
90S	140	174	100	152	56	90	3	10	24	50	36	8	35	M8	115	165	95	130	140	200	M8	12	3,0	3,5	166	233	12	16,0
90L	140	174	125	152	56	90	3	10	24	50	36	8	35	M8	115	165	95	130	140	200	M8	12	3,0	3,5	166	233	12	16,0
100L	160	196	140	170	63	100	3	12	28	60	41	8	40	M10	130	215	110	180	160	250	M8	15	3,5	3,5	193	243	12	16,0

For C dimension, see motor selection charts.

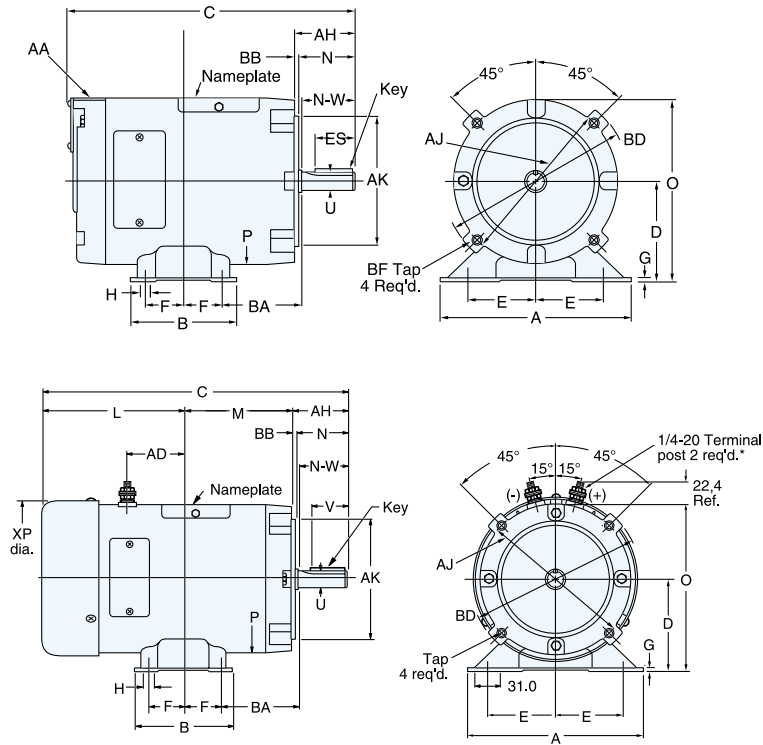
K

NEMA FRAMES, THYRISTOR RATED



L

NEMA FRAMES, LOW VOLTAGE



NEMA FRAMES (mm)

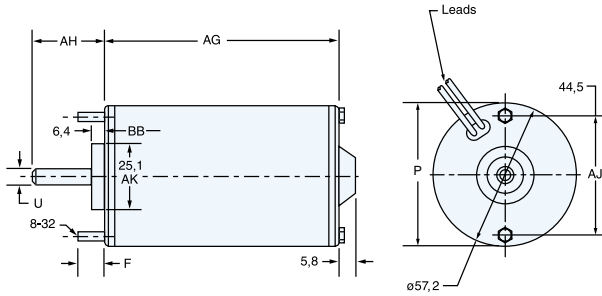
NEMA Frame	Mounting Foot								Shaft			Mounting Face					General		
	2E	A	2F	B	BA	D	G	H	U	AH	V	AK	AJ	BD	TAP	BB	P	O	AA
42	89	121	43	62	52	67	3	10	10	33	25	76	95	124	1/4-20	3	124	129	95
48	108	146	70	89	64	76	3	9	13	43	35	76	95	127	1/4-20	3	142	148	13
SS56	124	165	76	102	70	89	3	9	16	52	36	114	149	165	3/8-16	3	124	129	13
S56	124	165	76	102	70	89	3	9	16	52	36	114	149	165	3/8-16	3	142	160	13
56	124	165	76	102	70	89	3	9	16	52	36	114	149	165	3/8-16	3	166	197	13
143T	140	165	102	165	70	89	3	9	22	54	36	114	149	165	3/8-16	3	166	197	19
145T	140	165	102	165	70	89	3	9	22	54	36	114	149	165	3/8-16	3	166	197	19
182/145TC	191	216	114	140	89	114	3	10	22	54	36	114	149	165	3/8-16	3	166	197	29

*143-5TC NEMA C Face BA dimension is 70mm.

For C dimension, see motor selection charts.

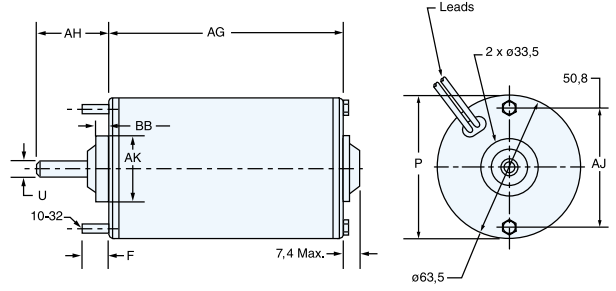
M

TRU-TORQ DC 57mm FRAME



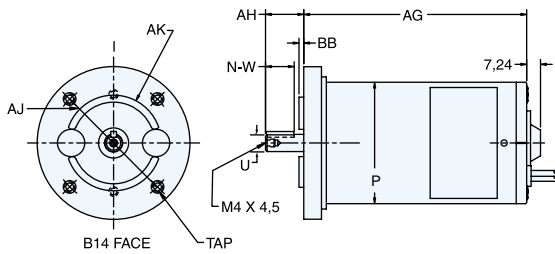
N

TRU-TORQ DC 64mm FRAME



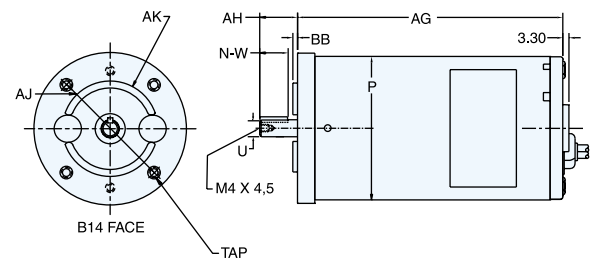
O

TRU-TORQ DC 64mm FRAME • B14 • 50W



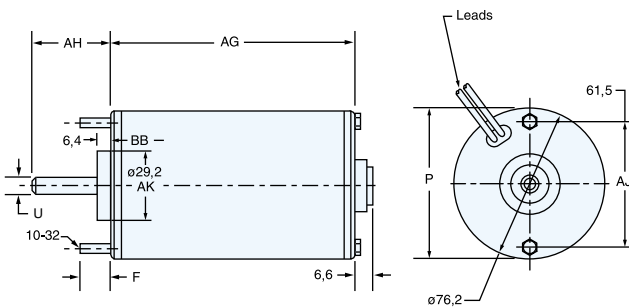
P

TRU-TORQ DC 76mm FRAME • B14 • 100 & 125W



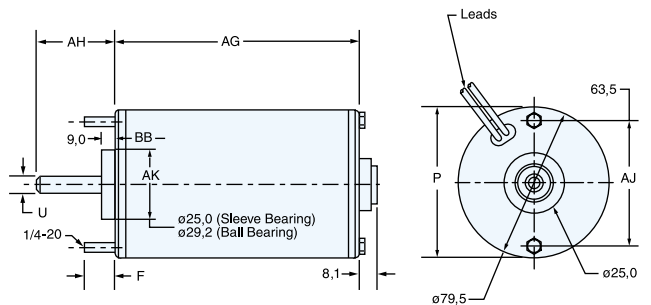
Q

TRU-TORQ DC 76mm FRAME



R

TRU-TORQ DC 80mm FRAME



TRU-TORQ DC MOTORS (mm)

Frame & Type	AG	P	U	AH	AJ	TAP	AK	BB	F	
57	A	76	57	6	38	44	8-32	25	6	13
	B	93	57	6	38	44	8-32	25	6	13
64	A	85	64	8	38	51	10-32	26	11	19
	B	93	64	8	38	51	10-32	26	11	19
	C	112	64	8	38	51	10-32	26	11	19
	D	116	64	9	20	85	M5	50	2.5	—
76	A	96	76	10	38	61	10-32	29	6	19
	B	110	76	10	38	61	10-32	29	6	19
	C	121	76	10	38	61	10-32	29	6	19
	D	144	76	10	38	61	10-32	29	6	19
	E	140	76	9	20	85	M5	50	2.5	—
80	A	92	80	10	38	64	1/4-20	25	9	19
	B	123	80	10	38	64	1/4-20	25	9	19
	C	130	80	10	38	64	1/4-20	25	9	19
	D	142	80	10	38	64	1/4-20	25	9	19
	E	166	80	10	38	64	1/4-20	25	9	19

These dimensions are the usual maximum shaft diameter and shaft length available.
For greater length or shaft dimensions, please contact LEESON.

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