



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 IEC FRAME DC MOTORS

MOTOR SELECTION GUIDE



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

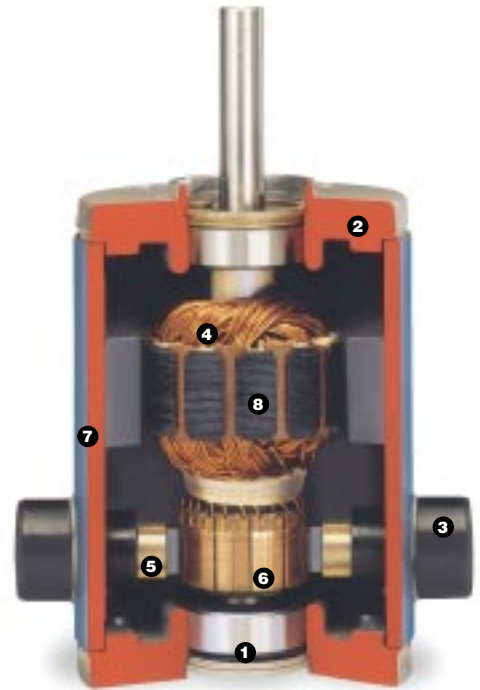
LEESON now offers OEM customers two major design types of custom sub-fractional horsepower DC motors. For demanding applications, there's the LEESON line with a complete range of industrial-duty features. For light industrial or commercial applications, especially those involving longer manufacturing 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

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.

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.



24 Frame, 60mm diameter



31 Frame, 79mm diameter



34 Frame, 86mm diameter

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.

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.



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