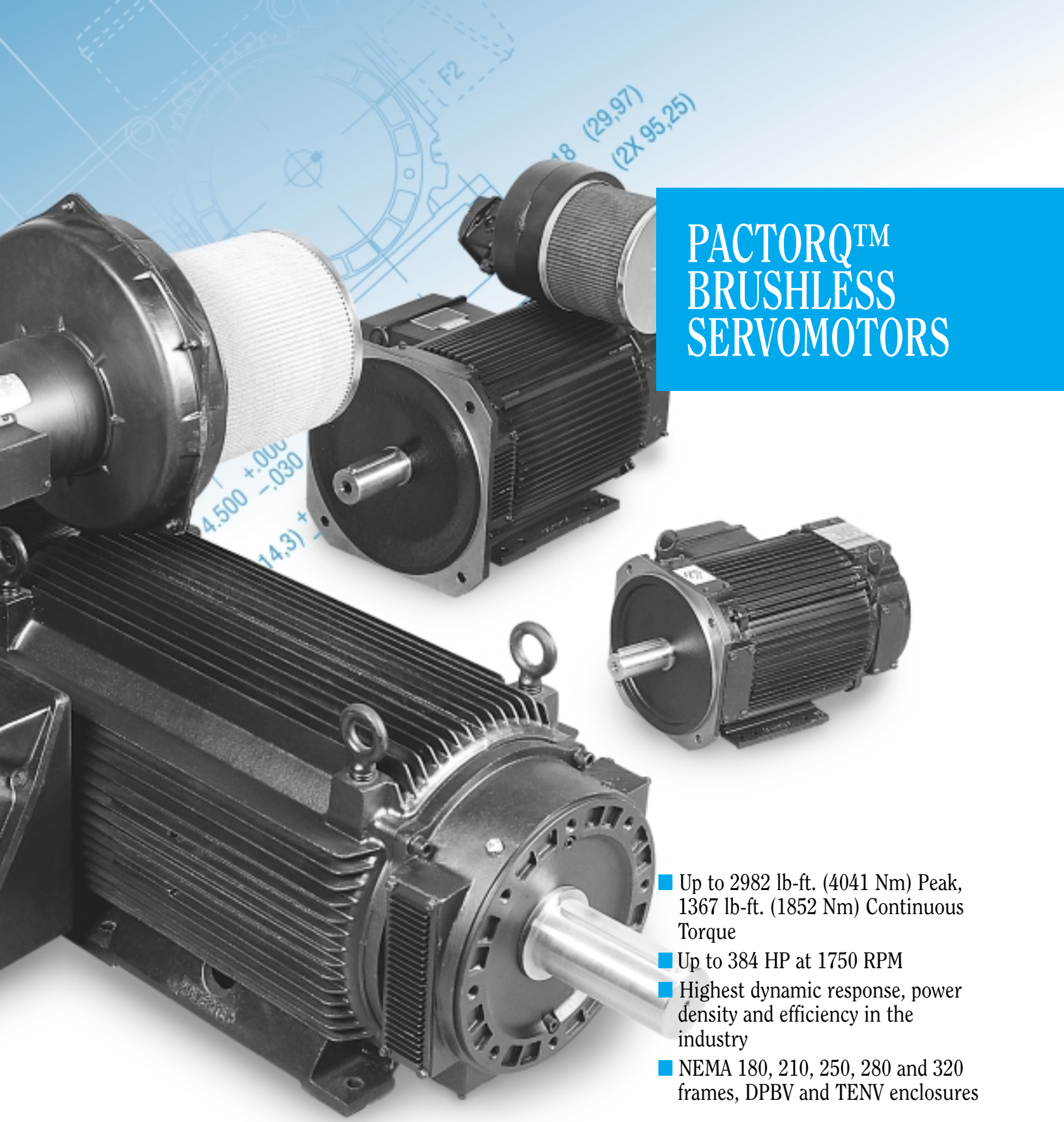


# PACTORQ™ BRUSHLESS SERVOMOTORS

- Up to 2982 lb-ft. (4041 Nm) Peak, 1367 lb-ft. (1852 Nm) Continuous Torque
- Up to 384 HP at 1750 RPM
- Highest dynamic response, power density and efficiency in the industry
- NEMA 180, 210, 250, 280 and 320 frames, DPBV and TENV enclosures

PACIFIC SCIENTIFIC

**AUTOMATION TECHNOLOGY GROUP**

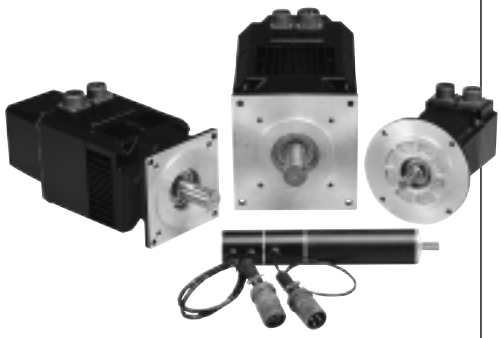
February, 1998

ISO 9001

# PACTORQ™ BRUSHLESS SERVOMOTORS

## Brushless Servomotors

Pacific Scientific has supplied high performance, tough and reliable brushless servomotors for customers worldwide for more than 15 years. The REGAL™ Series features standard and custom electrical and mechanical options to meet the most demanding torque, velocity and position control requirements.



## REGAL Series

- Five frame sizes, from 2" to 7.5" (square frame)
- Low inertia rotors for fast start-stop performance
- Peak torques from 25 to 1757 lb-in., continuous stall torques from 14 to 451 lb-in.

The newer SENTRY™ Series extends the brushless servomotor offering and complements the REGAL Series of low inertia products by adding a medium inertia, high performance family.

## SENTRY Series

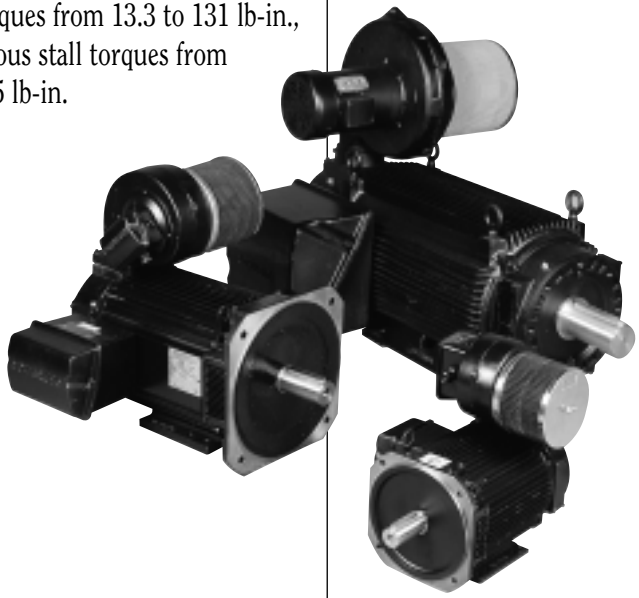
- NEMA 23 and 34 frame sizes
- High torque density per frame size
- Medium rotor inertia for improved load matching
- Peak torques from 13.3 to 131 lb-in., continuous stall torques from 4.3 to 45 lb-in.

## PACTORQ Series

This new Series represents a very significant expansion of our high performance brushless servomotor capabilities. Optimized magnetic circuit designs result in extremely high torque in relatively small NEMA frame sizes. In addition to high power density, other key features are high dynamic response and high efficiency.

Rely on the PACTORQ Series for high continuous and peak torque servo performance, energy efficient savings and high power in smaller frames to minimize the size of your machines and equipment.

Discover PACTORQ in the pages that follow.



# INDEX

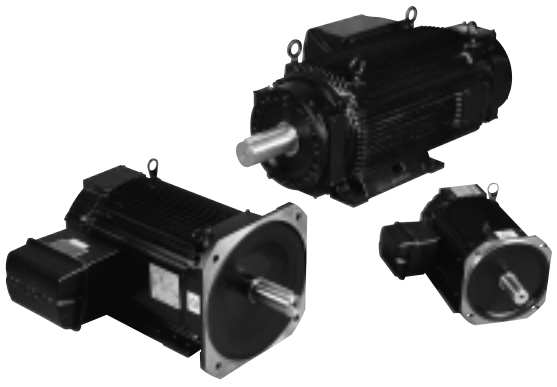
## How to use this selection guide

Select the proper motor using one of the following procedures:

- If you are already familiar with these motors and the available options, refer to the Model Number Codes on pages 5 (NEMA 180 diameter frames), 15 (NEMA 210 diameter frames), 25 (NEMA 250 diameter frames), 37 (NEMA 280 diameter frames) and 46 (NEMA 320 diameter frames) to verify the coded information prior to ordering.

- If you are not familiar with these motors and the available options, refer to the selection overview (page 3), the general specifications (page 4) and/or the index at the right. Note that each frame size is covered separately and the Technical Data applies to all motors. Contruct a model number after all the technical parameters, including options, are determined.

| FEATURES | BENEFITS |
|---|---|
| Optimized magnetic design incorporating high energy Neodymium magnets provides many key benefits. | Highest dynamic response. Servo motor performance— rapid start-stop capability to position loads fast… high peak torque ratings to move loads even faster. Quick speed changes for precise process control.<br><br>Highest power density. Extremely high torque in relatively small standard NEMA frame sizes to minimize the size of machines and equipment. Results in less weight too, compared to same power in other motor technologies.<br><br>Highest efficiency motor technology. Significant energy savings at both base speed and much lower than base speed. |
| Brushless construction. | Long, trouble-free life. Location flexibility—no brushes to maintain. |
| Long life bearings and bearing grease. | Long, maintenance-free operation. |
| Patented, double finned aluminum frame. | Highest thermal efficiency and light weight. |
| Selection of industry standard enclosures with NEMA and Metric mounting options. | Satisfy broad end use requirements. |
| Rugged IGBT class “H” insulation system but rated for class “F” temperature rise. | Additional assurance of motor integrity over broad temperature range. Longer life for reduced machine downtime. |
| Flexible design incorporates many options. | Choices of mounting, terminations, feedback devices and holding brake to meet your application-specific requirements. |
| Agency approvals:<br>-UL Recognized, file 130709<br>-CSA Certification Pending<br>-CE (Conformity European), Pending | Easier recognition of machine or equipment. |
| Two year warranty. | Quality and reliability for reduced machine downtime. |



# SELECTION OVERVIEW

## DRIPPROOF BLOWER VENTILATED (DPBV) MOTORS

| NEMA Frame | Stack Length △1 | Continuous Stall Torque lb-ft (Nm) | Peak Torque △3 lb-ft (Nm) | Rated Current at 1750 RPM △2 | Rated Power at 1750 RPM △2 | | Page |
|---|---|---|---|---|---|---|---|
| | | | | Amps (rms) | HP | KW | |
| E180 | 2 | 41 (56) | 164 (222) | 14.8 | 12.8 | 9.6 | 6 |
| | 3 | 66 (90) | 250 (339) | 24.0 | 20.8 | 15.6 | 6 |
| | 4 | 86 (116) | 335 (454) | 31.5 | 26.9 | 20.2 | 6 |
| E210 | 3 | 128 (192) | 420 (569) | 43.3 | 40.2 | 30.1 | 16 |
| | 5 | 160 (217) | 554 (751) | 54.7 | 49.2 | 36.9 | 16 |
| | 8 | 190 (258) | 720 (976) | 63.6 | 57.0 | 42.7 | 16 |
| E250 | 4 | 254 (344) | 462 (626) | 86 | 76 | 57.0 | 26 |
| | 6 | 280 (379) | 558 (756) | 92 | 81 | 60.8 | 26 |
| | 8 | 356 (482) | 775 (1050) | 123 | 102 | 76.5 | 26 |
| | 9 | 475 (644) | 945 (1280) | 156 | 138 | 103.5 | 26 |
| E280 | A | 531 (720) | 1250 (1694) | 166 | 153 | 114.7 | 38 |
| | C | 722 (978) | 1670 (2263) | 252 | 205 | 153.7 | 38 |
| E320 | 8 | 900 (1220) | 1955 (2649) | 286 | 263 | 197.3 | 47 |
| | B | 1089 (1476) | 2276 (3084) | 357 | 315 | 236.2 | 47 |
| | D | 1367 (1852) | 2982 (4041) | 435 | 384 | 288.0 | 47 |

## TOTALLY ENCLOSED, NON-VENTILATED (TENV) MOTORS

| NEMA Frame | Stack Length △1 | Continuous Stall Torque lb-ft (Nm) | Peak Torque △3 lb-ft (Nm) | Rated Current at 1750 RPM △2 | Rated Power at 1750 RPM △2 | | Page |
|---|---|---|---|---|---|---|---|
| | | | | Amps (rms) | HP | KW | |
| E180 | 2 | 16 (22) | 164 (222) | 3.6 | 3.0 | 2.2 | 6 |
| | 3 | 29 (39) | 250 (339) | 8.2 | 6.8 | 5.1 | 6 |
| | 4 | 38 (51) | 335 (454) | 10.3 | 8.4 | 6.3 | 6 |
| E210 | 3 | 64 (87) | 420 (569) | 17.4 | 15.7 | 11.7 | 16 |
| | 5 | 81 (110) | 554 (751) | 20.9 | 18.2 | 13.6 | 16 |
| | 8 | 100 (136) | 720 (976) | 23.0 | 19.9 | 14.9 | 16 |
| E250 | 4 | 139 (189) | 462 (626) | 35.0 | 30.2 | 22.6 | 26 |
| | 6 | 173 (235) | 558 (756) | 42.6 | 36.9 | 27.6 | 26 |
| | 8 | 211 (286) | 775 (1050) | - | - | - | 26 |
| | 9 | 245 (332) | 945 (1280) | - | - | - | 26 |
| E280 | A | 275 (373) | 1250 (1694) | - | - | - | 38 |
| | C | 374 (507) | 1670 (2263) | - | - | - | 38 |
| E320 | 8 | 440 (597) | 1955 (2649) | - | - | - | 47 |
| | B | 530 (719) | 2276 (3084) | - | - | - | 47 |
| | D | 680 (923) | 2982 (4041) | - | - | - | 47 |

**Note:**

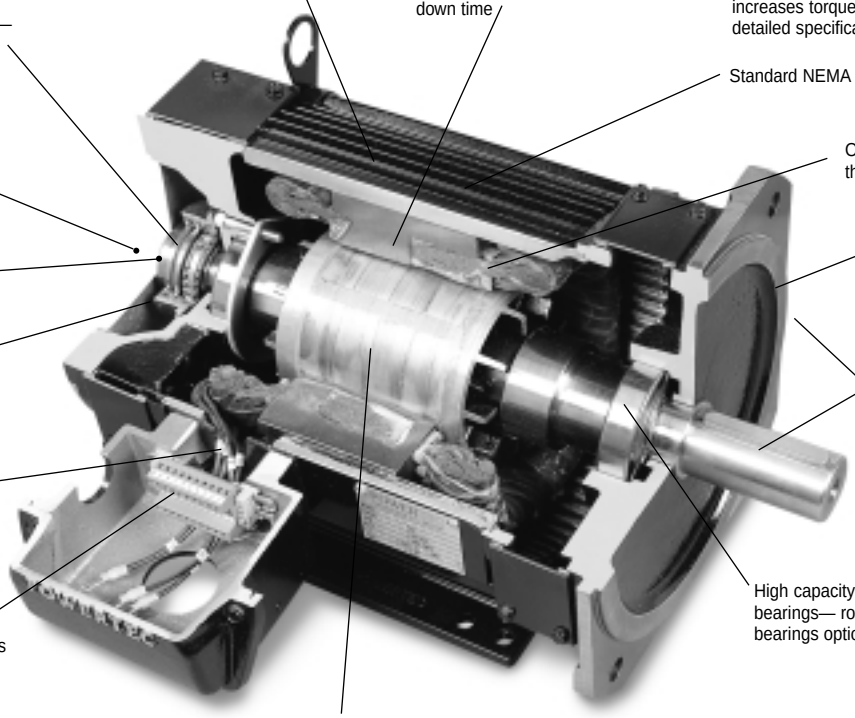
△1 See Model Number Code in section starting on page referenced in table.

△2 For ratings at other base speeds, see Ratings and Characteristics in section starting on page referenced in table.

△3 Theoretical (cold). Also see individual torque speed curves for performance at rated temperature.

# PACTORQ PRODUCT FEATURES

Totally Enclosed, Non-Ventilated (TENV) motor shown in cutaway. The addition of a blower— our standard Dripproof Blower Ventilated (DPBV) motor significantly increases torque and HP ratings. See detailed specifications



Standard top speeds from 3000 to 6000 RPM— high speed options available

Patented, double-finned aluminum frame (highest thermal efficiency and lighter weight)

Rugged IGBT Class H (180°C) insulation but rated conservatively for Class F (155°C) for added assurance of motor integrity over broad temperature range, longer life, reduced machine down time

Primary feedback devices— Hall sensors or resolver

Standard NEMA frames

Optional secondary feedback device— factory mounted optical encoder or encoder mounting provisions on rear end bell

Overtemperature protection— thermostat or thermistor

Optional integral (rear mounted) holding brake

NEMA or Metric mounting

Rugged TENV construction, sealed per IP44 and IP56

Custom shafts and mounting available

Stator connection flexibility— four separate connections provide four different power and speed ratings

Termination versatility— to terminal block in oversized terminal box or MS connectors

High capacity ball bearings— roller bearings optional

Long maintenance-free brushless construction— no harmonically induced bearing pitting... no brushes to replace provides location flexibility

Optimized magnetic design using neodymium rare earth magnets provides:

- High torque to rotor inertia ratios for highest dynamic response. Servo motor performance—rapid start-stop capability to position loads fast... high peak torque ratings to move loads even faster. Quick speed changes for precise process control
- Highest power density— very high torque in smaller NEMA frames to minimize size of machine... less weight than other motor technologies
- Highest efficiency motor technology— significant energy savings at both base speed and much lower

Two year warranty

Linear torque-current characteristics—predictable performance

* Pending

## PRIMARY FEEDBACK OPTIONS

- Hall Sensors (with dual channel in quadrature outputs)
- Integral, through shaft frameless resolver

## SECONDARY FEEDBACK OPTIONS

- 600, and 1024 - line driver encoder

## OTHER OPTIONS

- 100V dc brakes
- Encoder feedback mounting kit
- Max capacity ball bearings & roller bearings
- Wide variety of windings to match torque and speed requirements
- Wide selection of termination options
- Custom mounting and shaft extensions

## GENERAL SPECIFICATIONS

| | |
|---|---|
| Number of poles | 6 (E180 & 210), 8 (E250, E280, & E320) |
| Winding | 3 phase Wye or Delta (12 lead reconnectable) |
| Magnet type | Neodymium Iron Boron |
| Enclosures | TENV (IP44, IP56), DPBV standard |
| Mounting | NEMA C & D face, foot mounting, IEC D square flange |
| Terminations | High-capacity (oversized) Terminal Box: F1, F2, or top mounting: MS feedback connector with power terminal block: MS power and feedback connectors |
| Thermal Protection | Thermal switch with Hall Sensor Feedback, NTC Thermistor with Resolver |