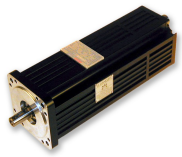
ELWOOD® HIGH PERFORMANCE MOTORS SERVOS - STEPPERS

# ELWOOD HIGH PERFORMANCE MOTORS
# SX-SERIES MOTOR DATA



http://www.elwood.com/dSX_Mtr_Data.pdf

## 230V Windings

| MOTOR MODEL | | M431-N | M432-N | M433-F | M433-H | M433-J | M433-M |
|---|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 1.17 | 2.35 | 3.16 | 3.16 | 3.16 | 3.16 |
| | lb-in | 10.4 | 20.8 | 28.0 | 28.0 | 28.0 | 28.0 |
| Peak Torque (Stall) | Nm | 3.51 | 7.05 | 9.48 | 9.48 | 9.48 | 9.48 |
| | lb-in | 31.2 | 62.3 | 83.9 | 83.9 | 83.9 | 83.9 |
| Rated Current | $A_{0\text{-}PK}$ | 4.0 | 7.4 | 5.8 | 6.4 | 7.2 | 10.5 |
| Rated Power | kW | 0.5 | 0.7 | 0.8 | 0.8 | 0.9 | 1.0 |
| | hp | 0.6 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 |
| Rated Voltage (Drive Supply) | Vrms | 230 | 230 | 230 | 230 | 230 | 230 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.000070 | 0.000124 | 0.000169 | 0.000169 | 0.000169 | 0.000169 |
| | $lb\text{-}in\text{-}s^2$ | 0.000620 | 0.001100 | 0.001500 | 0.001500 | 0.001500 | 0.001500 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.000087 | 0.000143 | 0.000183 | 0.000183 | 0.000183 | 0.000183 |
| | $lb\text{-}in\text{-}s^2$ | 0.000770 | 0.001270 | 0.001620 | 0.001620 | 0.001620 | 0.001620 |
| Motor Shipping Weight | kg | 5.0 | 6.4 | 8.0 | 8.0 | 8.0 | 8.0 |
| | lb | 11.0 | 14.0 | 17.5 | 17.5 | 17.5 | 17.5 |
| Motor Shipping Weight Brake Motors | kg | 6.8 | 8.0 | 9.5 | 9.5 | 9.5 | 9.5 |
| | lb | 15.0 | 17.5 | 21.0 | 21.0 | 21.0 | 21.0 |
| Friction Torque | Nm | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| | lb-in | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Max. Operating Speed | rpm | 6500 | 6500 | 3000 | 3500 | 4500 | 6500 |
| WINDING DATA (1) | | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 0.39 | 0.39 | 0.75 | 0.68 | 0.53 | 0.35 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 3.5 | 3.5 | 6.6 | 6.0 | 4.7 | 3.1 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 0.42 | 0.42 | 0.81 | 0.73 | 0.57 | 0.38 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 3.8 | 3.8 | 7.2 | 6.5 | 5.1 | 3.4 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 49 | 49 | 105 | 86 | 72 | 49 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 5.5 | 2 | 4.4 | 3.5 | 2.5 | 1.1 |
| Winding Inductance Phase to Phase | mH | 7.6 | 3.5 | 9.9 | 10.4 | 4.2 | 2.5 |
| Thermal Resistance | °C/Watt | 0.91 | 0.82 | 0.68 | 0.68 | 0.68 | 0.68 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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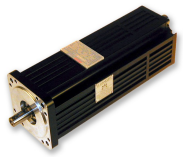

## 460V Windings

| MOTOR MODEL | | M431-N | M432-N | M433-F | M433-H | M433-J | M433-M |
|---|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 1.10 | 2.21 | 2.97 | 2.97 | 2.97 | 2.97 |
| | lb-in | 9.8 | 19.5 | 26.3 | 26.3 | 26.3 | 26.3 |
| Peak Torque (Stall) | Nm | 3.30 | 6.63 | 8.91 | 8.91 | 8.91 | 8.91 |
| | lb-in | 29.4 | 58.5 | 78.9 | 78.9 | 78.9 | 78.9 |
| Rated Current | $A_{0\text{-}PK}$ | 1.8 | 3.5 | 2.7 | 3.0 | 3.5 | 5.1 |
| Rated Power | kW | 0.5 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 |
| | hp | 0.6 | 0.9 | 1.0 | 1.0 | 1.2 | 1.2 |
| Rated Voltage (Drive Supply) | Vrms | 460 | 460 | 460 | 460 | 460 | 460 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.000070 | 0.000124 | 0.000169 | 0.000169 | 0.000169 | 0.000169 |
| | $lb\text{-}in\text{-}s^2$ | 0.000620 | 0.001100 | 0.001500 | 0.001500 | 0.001500 | 0.001500 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.000087 | 0.000143 | 0.000183 | 0.000183 | 0.000183 | 0.000183 |
| | $lb\text{-}in\text{-}s^2$ | 0.000770 | 0.001270 | 0.001620 | 0.001620 | 0.001620 | 0.001620 |
| Motor Shipping Weight | kg | 5.0 | 6.4 | 8.0 | 8.0 | 8.0 | 8.0 |
| | lb | 11.0 | 14.0 | 17.5 | 17.5 | 17.5 | 17.5 |
| Motor Shipping Weight Brake Motors | kg | 6.8 | 8.0 | 9.5 | 9.5 | 9.5 | 9.5 |
| | lb | 15.0 | 17.5 | 21.0 | 21.0 | 21.0 | 21.0 |
| Friction Torque | Nm | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| | lb-in | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Max. Operating Speed | rpm | 6500 | 6500 | 3000 | 3500 | 4500 | 6500 |
| WINDING DATA (1) | | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 0.72 | 0.72 | 1.63 | 1.35 | 1.07 | 0.70 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 6.4 | 6.4 | 14.5 | 11.9 | 9.4 | 6.2 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 0.78 | 0.78 | 1.76 | 1.46 | 1.16 | 0.76 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 7.0 | 7.0 | 15.8 | 13.0 | 10.2 | 6.8 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 96 | 98 | 205 | 173 | 139 | 98 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 27.2 | 9.9 | 22.8 | 18.4 | 12 | 4.7 |
| Winding Inductance Phase to Phase | mH | 30.4 | 14.0 | 61.5 | 41.7 | 30.7 | 13.6 |
| Thermal Resistance | °C/Watt | 0.91 | 0.82 | 0.68 | 0.68 | 0.68 | 0.68 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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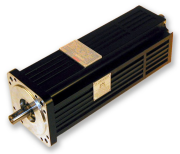

## 230V Windings

| MOTOR MODEL | | M442-E | M442-K | M443-E | M-443-K | M444-E | M444-H |
|---|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 3.52 | 3.52 | 4.69 | 4.69 | 6.59 | 6.59 |
| | lb-in | 31.2 | 31.2 | 41.5 | 41.5 | 58.3 | 58.3 |
| Peak Torque (Stall) | Nm | 10.56 | 10.56 | 14.07 | 14.07 | 19.77 | 19.77 |
| | lb-in | 93.5 | 93.5 | 124.7 | 124.7 | 180.0 | 180.0 |
| Rated Current | $A_{0\text{-}PK}$ | 5.0 | 8.9 | 6.9 | 13.6 | 9.9 | 13.2 |
| Rated Power | kW | 0.8 | 1.2 | 0.9 | 1.4 | 1.3 | 1.7 |
| | hp | 1.0 | 1.6 | 1.3 | 1.9 | 1.8 | 2.2 |
| Rated Voltage (Drive Supply) | Vrms | 230 | 230 | 230 | 230 | 230 | 230 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.000406 | 0.000406 | 0.000508 | 0.000508 | 0.000632 | 0.000632 |
| | $lb\text{-}in\text{-}s^2$ | 0.003600 | 0.003600 | 0.004500 | 0.004500 | 0.005600 | 0.005600 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.000423 | 0.000423 | 0.000525 | 0.000525 | 0.000649 | 0.000649 |
| | $lb\text{-}in\text{-}s^2$ | 0.003750 | 0.003750 | 0.004650 | 0.004650 | 0.005750 | 0.005750 |
| Motor Shipping Weight | kg | 9.5 | 9.5 | 10.9 | 10.9 | 13.2 | 13.2 |
| | lb | 21 | 21 | 24 | 24 | 29 | 29 |
| Motor Shipping Weight Brake Motors | kg | 9.5 | 9.5 | 10.9 | 10.9 | 13.2 | 13.2 |
| | lb | 21 | 21 | 24 | 24 | 29 | 29 |
| Friction Torque | Nm | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| | lb-in | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Max. Operating Speed | rpm | 3000 | 5500 | 3000 | 5500 | 3000 | 4500 |
| WINDING DATA (1) | | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 0.81 | 0.42 | 0.83 | 0.42 | 0.81 | 0.58 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 7.2 | 3.8 | 7.3 | 3.7 | 7.1 | 5.1 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 0.87 | 0.45 | 0.90 | 0.45 | 0.87 | 0.63 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 7.8 | 4.1 | 8.0 | 4.0 | 7.7 | 5.6 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 99 | 52 | 100 | 51 | 98 | 70 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 4.3 | 1.1 | 2.6 | 0.6 | 1.3 | 0.8 |
| Winding Inductance Phase to Phase | mH | 16.0 | 3.4 | 8.7 | 2.0 | 8.0 | 3.0 |
| Thermal Resistance | °C/Watt | 0.55 | 0.55 | 0.62 | 0.62 | 0.55 | 0.55 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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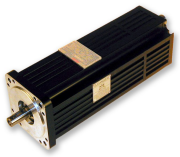

## 460V Windings

| MOTOR MODEL | | M442-E | M422-K | M443-E | M-443-K | M444-E | M444-H |
|---|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 3.31 | 3.31 | 4.41 | 4.41 | 6.13 | 6.13 |
| | lb-in | 29.3 | 29.3 | 39.1 | 39.1 | 54.2 | 54.2 |
| Peak Torque (Stall) | Nm | 9.93 | 9.93 | 13.23 | 13.23 | 18.39 | 18.39 |
| | lb-in | 87.9 | 87.9 | 117.3 | 117.3 | 162.6 | 162.6 |
| Rated Current | $A_{0\text{-}PK}$ | 2.3 | 4.1 | 3.3 | 6.5 | 4.7 | 6.2 |
| Rated Power | kW | 0.7 | 1.1 | 0.9 | 1.3 | 1.2 | 1.5 |
| | hp | 1.0 | 1.5 | 1.2 | 1.8 | 1.6 | 2.1 |
| Rated Voltage (Drive Supply) | Vrms | 460 | 460 | 460 | 460 | 460 | 460 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.000406 | 0.000406 | 0.000508 | 0.000508 | 0.000632 | 0.000632 |
| | $lb\text{-}in\text{-}s^2$ | 0.003600 | 0.003600 | 0.004500 | 0.004500 | 0.005600 | 0.005600 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.000423 | 0.000423 | 0.000525 | 0.000525 | 0.000649 | 0.000649 |
| | $lb\text{-}in\text{-}s^2$ | 0.003750 | 0.003750 | 0.004650 | 0.004650 | 0.005750 | 0.005750 |
| Motor Shipping Weight | kg | 9.5 | 9.5 | 10.9 | 10.9 | 13.2 | 13.2 |
| | lb | 21 | 21 | 24 | 24 | 29 | 29 |
| Motor Shipping Weight Brake Motors | kg | 9.5 | 9.5 | 10.9 | 10.9 | 13.2 | 13.2 |
| | lb | 21 | 21 | 24 | 24 | 29 | 29 |
| Friction Torque | Nm | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| | lb-in | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| Max. Operating Speed | rpm | 3000 | 5500 | 3000 | 5500 | 3000 | 4500 |
| WINDING DATA (1) | | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 1.63 | 1.04 | 1.65 | 0.83 | 1.57 | 1.16 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 14.4 | 9.2 | 14.6 | 7.4 | 13.9 | 10.3 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 1.76 | 1.12 | 1.78 | 0.90 | 1.70 | 1.25 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 15.7 | 10.0 | 15.9 | 8.1 | 15.2 | 11.2 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 197 | 126 | 200 | 101 | 190 | 140 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 18.2 | 7.3 | 10.9 | 2.7 | 6.5 | 3.8 |
| Winding Inductance Phase to Phase | mH | 64.0 | 13.6 | 34.8 | 8.0 | 31.8 | 12 |
| Thermal Resistance | °C/Watt | 0.55 | 0.55 | 0.62 | 0.62 | 0.55 | 0.55 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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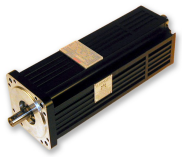

## 230V Windings

| MOTOR MODEL | | M461-G | M462-C | M462-G | M463-K | M464-G | M465-G |
|---|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 4.88 | 10.38 | 10.38 | 14.81 | 18.60 | 21.13 |
| | lb-in | 43.1 | 91.9 | 91.9 | 131 | 164.6 | 187 |
| Peak Torque (Stall) | Nm | 14.64 | 31.14 | 31.14 | 44.43 | 55.8 | 63.39 |
| | lb-in | 129.5 | 275.7 | 275.7 | 393.1 | 493.8 | 560.9 |
| Rated Current | $A_{0\text{-}PK}$ | 9.7 | 8.9 | 19.1 | 36.9 | 34.6 | 36.8 |
| Rated Power | kW | 1.4 | 1.3 | 2.2 | 2.5 | 2.9 | 3.8 |
| | hp | 1.9 | 1.7 | 2.9 | 3.4 | 3.9 | 5.1 |
| Rated Voltage (Drive Supply) | Vrms | 230 | 230 | 230 | 230 | 230 | 230 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.00124 | 0.00203 | 0.00203 | 0.00282 | 0.00361 | 0.00440 |
| | $lb\text{-}in\text{-}s^2$ | 0.01100 | 0.01800 | 0.01800 | 0.02500 | 0.03200 | 0.03900 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.00203 | 0.00282 | 0.00282 | 0.00361 | 0.00440 | 0.00542 |
| | $lb\text{-}in\text{-}s^2$ | 0.01800 | 0.02500 | 0.02500 | 0.03200 | 0.03900 | 0.04800 |
| Motor Shipping Weight | kg | 15.9 | 20.0 | 20.0 | 23.2 | 27.3 | 30.5 |
| | lb | 35.0 | 44.0 | 44.0 | 51.0 | 60.0 | 67.0 |
| Motor Shipping Weight Brake Motors | kg | 18.6 | 22.7 | 22.7 | 26.4 | 30.0 | 33.6 |
| | lb | 41.0 | 50.0 | 50.0 | 58.0 | 66.0 | 74.0 |
| Friction Torque | Nm | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 |
| | lb-in | 5 | 5 | 5 | 5 | 5 | 5 |
| Max. Operating Speed | rpm | 4000 | 2000 | 4000 | 5500 | 4000 | 4000 |
| WINDING DATA (1) | | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 0.62 | 1.16 | 0.61 | 0.45 | 0.60 | 0.64 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 5.4 | 10.3 | 5.4 | 4.0 | 5.4 | 5.7 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 0.67 | 1.25 | 0.66 | 0.49 | 0.65 | 0.69 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 5.9 | 11.2 | 5.9 | 4.4 | 5.9 | 6.2 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 74 | 140 | 74 | 55 | 74 | 78 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 1.9 | 2.7 | 0.7 | 0.2 | 0.2 | 0.2 |
| Winding Inductance Phase to Phase | mH | 14.9 | 27.0 | 6.8 | 2.8 | 3.0 | 3.2 |
| Thermal Resistance | °C/Watt | 0.46 | 0.43 | 0.43 | 0.37 | 0.36 | 0.36 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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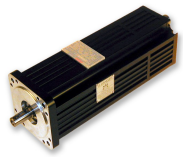
ELWOOD® HIGH PERFORMANCE MOTORS SERVOS - STEPPERS

# ELWOOD HIGH PERFORMANCE MOTORS
# SX-SERIES MOTOR DATA

http://www.elwood.com/dSX_Mtr_Data.pdf



## 460V Windings

| MOTOR MODEL | | M461-G | M462-G | M463-K | M464-G | M465-G |
|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 4.44 | 9.45 | 13.47 | 16.92 | 19.22 |
| | lb-in | 39.3 | 83.6 | 119.2 | 149.8 | 170.1 |
| Peak Torque (Stall) | Nm | 13.32 | 28.4 | 40.1 | 50.8 | 57.07 |
| | lb-in | 117.9 | 251 | 357.6 | 449 | 510 |
| Rated Current | $A_{0\text{-}PK}$ | 4.4 | 8.1 | 16.8 | 15.7 | 16.7 |
| Rated Power | kW | 1.3 | 2.0 | 2.3 | 2.6 | 3.5 |
| | hp | 1.7 | 2.7 | 3.1 | 3.5 | 4.7 |
| Rated Voltage (Drive Supply) | Vrms | 460 | 460 | 460 | 460 | 460 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.00124 | 0.00203 | 0.00282 | 0.00361 | 0.00440 |
| | $lb\text{-}in\text{-}s^2$ | 0.01100 | 0.01800 | 0.02500 | 0.03200 | 0.03900 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.00203 | 0.00282 | 0.00361 | 0.00440 | 0.00542 |
| | $lb\text{-}in\text{-}s^2$ | 0.01800 | 0.02500 | 0.03200 | 0.03900 | 0.04800 |
| Motor Shipping Weight | kg | 15.9 | 20.0 | 23.2 | 27.3 | 30.5 |
| | lb | 35.0 | 44.0 | 51.0 | 60.0 | 67.0 |
| Motor Shipping Weight Brake Motors | kg | 18.6 | 22.7 | 26.4 | 30.0 | 33.6 |
| | lb | 41.0 | 50.0 | 58.0 | 66.0 | 74.0 |
| Friction Torque | Nm | 0.56 | 0.56 | 0.56 | 0.56 | 0.56 |
| | lb-in | 5 | 5 | 5 | 5 | 5 |
| Max. Operating Speed | rpm | 4000 | 4000 | 5500 | 4000 | 4000 |
| WINDING DATA (1) | | | | | | |
| Poles | | 6 | 6 | 6 | 6 | 6 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 1.23 | 1.16 | 0.88 | 1.21 | 1.29 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 10.9 | 10.3 | 7.8 | 10.7 | 11.5 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 1.33 | 1.25 | 0.95 | 1.31 | 1.39 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 11.9 | 11.2 | 8.5 | 11.7 | 12.5 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 149 | 140 | 107 | 146 | 156 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 8.2 | 2.7 | 1.0 | 1.0 | 1.0 |
| Winding Inductance Phase to Phase | mH | 59.60 | 27.00 | 11.10 | 12.20 | 13.00 |
| Thermal Resistance | °C/Watt | 0.46 | 0.43 | 0.37 | 0.36 | 0.36 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes
(3) Peak value of per phase square wave Amperes
(4) Volts peak-peak Line-Line / kRPM

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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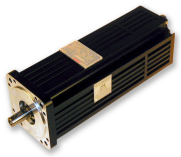
ELWOOD® HIGH PERFORMANCE MOTORS SERVOS - STEPPERS

# ELWOOD HIGH PERFORMANCE MOTORS
# SX-SERIES MOTOR DATA

http://www.elwood.com/dSX_Mtr_Data.pdf



## 230V Windings

| MOTOR MODEL | | M471-H | M473-C | M474-C | M476-C | M477-C |
|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 6.72 | 16.07 | 20.40 | 31.51 | 35.75 |
| | lb-in | 59.5 | 142.2 | 180.6 | 278.9 | 316.4 |
| Peak Torque (Stall) | Nm | 20.16 | 48.21 | 61.2 | 94.53 | 107.25 |
| | lb-in | 178.5 | 426.7 | 541.7 | 836.6 | 949.2 |
| Rated Current | $A_{0\text{-}PK}$ | 12.4 | 16.0 | 21.4 | 32.7 | 36.9 |
| Rated Power | kW | 1.7 | 2.2 | 3.0 | 3.7 | 4.3 |
| | hp | 2.3 | 3.0 | 4.0 | 4.9 | 5.7 |
| Rated Voltage (Drive Supply) | Vrms | 230 | 230 | 230 | 230 | 230 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.00171 | 0.00513 | 0.00744 | 0.01026 | 0.01197 |
| | $lb\text{-}in\text{-}s^2$ | 0.01515 | 0.04544 | 0.0659 | 0.09088 | 0.10603 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.001800 | 0.006560 | 0.008240 | 0.011630 | 0.012870 |
| | $lb\text{-}in\text{-}s^2$ | 0.015900 | 0.058100 | 0.073000 | 0.103000 | 0.114000 |
| Motor Shipping Weight | kg | 12.5 | 30.5 | 35.0 | 40.0 | 50.0 |
| | lb | 27.5 | 67.0 | 77.0 | 88.0 | 110.0 |
| Motor Shipping Weight Brake Motors | kg | 15.7 | 34.1 | 39.1 | 43.2 | 53.2 |
| | lb | 34.5 | 75.0 | 86.0 | 95.0 | 117.0 |
| Friction Torque | Nm | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 |
| | lb-in | 10 | 10 | 10 | 10 | 10 |
| Max. Operating Speed | rpm | 4000 | 2000 | 2000 | 2000 | 2000 |
| WINDING DATA (1) | | | | | | |
| Poles | | 8 | 8 | 8 | 8 | 8 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 0.69 | 1.12 | 1.10 | 1.09 | 1.10 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 6.1 | 10.0 | 9.8 | 9.6 | 9.7 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 0.75 | 1.21 | 1.19 | 1.18 | 1.19 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 6.6 | 10.9 | 10.7 | 10.5 | 10.6 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 83 | 136 | 134 | 132 | 132 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 1.8 | 0.8 | 0.6 | 0.4 | 0.3 |
| Winding Inductance Phase to Phase | mH | 6.5 | 4.4 | 3.1 | 2.0 | 1.6 |
| Thermal Resistance | °C/Watt | 0.50 | 0.48 | 0.47 | 0.46 | 0.44 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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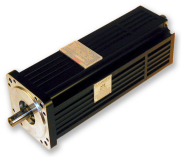
# ELWOOD HIGH PERFORMANCE MOTORS
# SX-SERIES MOTOR DATA

http://www.elwood.com/dSX_Mtr_Data.pdf



## 460V Windings

| MOTOR MODEL | | M471-H | M473-C | M474-C | M476-C | M477-C |
|---|---|---|---|---|---|---|
| MECHANICAL DATA (1) | | | | | | |
| Rated Torque, Cont (Stall) | Nm | 6.72 | 16.07 | 20.40 | 31.51 | 35.75 |
| | lb-in | 59.5 | 142.2 | 180.6 | 278.9 | 316.4 |
| Peak Torque (Stall) | Nm | 20.16 | 48.21 | 61.2 | 94.53 | 107.25 |
| | lb-in | 178.5 | 426.7 | 541.7 | 836.6 | 949.2 |
| Rated Current | $A_{0\text{-}PK}$ | 5.7 | 7.4 | 9.8 | 14.9 | 18.5 |
| Rated Power | kW | 1.7 | 2.2 | 3.0 | 3.7 | 4.3 |
| | hp | 2.3 | 3.0 | 4.0 | 4.9 | 5.7 |
| Rated Voltage (Drive Supply) | Vrms | 460 | 460 | 460 | 460 | 460 |
| Rotor Moment of Inertia | $kg\text{-}m^2$ | 0.00171 | 0.00513 | 0.00744 | 0.01026 | 0.01197 |
| | $lb\text{-}in\text{-}s^2$ | 0.01515 | 0.04544 | 0.0659 | 0.09088 | 0.10603 |
| Rotor Moment of Inertia Brake Motors | $kg\text{-}m^2$ | 0.001800 | 0.006560 | 0.008240 | 0.011630 | 0.012870 |
| | $lb\text{-}in\text{-}s^2$ | 0.015900 | 0.058100 | 0.073000 | 0.103000 | 0.114000 |
| Motor Shipping Weight | kg | 12.5 | 30.5 | 35.0 | 40.0 | 50.0 |
| | lb | 27.5 | 67.0 | 77.0 | 88.0 | 110.0 |
| Motor Shipping Weight Brake Motors | kg | 15.7 | 34.1 | 39.1 | 43.2 | 53.2 |
| | lb | 34.5 | 75.0 | 86.0 | 95.0 | 117.0 |
| Friction Torque | Nm | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 |
| | lb-in | 10 | 10 | 10 | 10 | 10 |
| Max. Operating Speed | rpm | 4000 | 2000 | 2000 | 2000 | 2000 |
| WINDING DATA (1) | | | | | | |
| Poles | | 8 | 8 | 8 | 8 | 8 |
| $K_T$, Sine Wave Torque Constant (2) | $Nm/A_{0\text{-}PK}$ | 1.37 | 2.25 | 2.21 | 2.18 | 2.19 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 12.2 | 19.9 | 19.6 | 19.2 | 19.4 |
| Square Wave KT Torque Constant (3) | $Nm/A_{0\text{-}PK}$ | 1.48 | 2.43 | 2.39 | 2.35 | 2.37 |
| | $lb\text{-}in/A_{0\text{-}PK}$ | 13.3 | 21.7 | 21.4 | 20.9 | 21.1 |
| $K_E$, Voltage Constant (4) | V(0-pk L-L)/kRPM | 166 | 272 | 267 | 263 | 265 |
| Winding Resistance Phase to Phase at 25±5°C | Ohms ±10% | 7.82 | 3.68 | 2.64 | 1.54 | 1.1 |
| Winding Inductance Phase to Phase | mH | 26 | 17.5 | 12.4 | 8.2 | 6.6 |
| Thermal Resistance | °C/Watt | 0.50 | 0.48 | 0.47 | 0.46 | 0.44 |
| Dielectric Rating | | Power Leads (R,S,T) to Ground:1500 VACrms 50/60 Hz for 1 minute. | | | | |

(1) Specifications are at 25°C unless otherwise noted.
(2) Peak value of per phase sine wave Amperes

| STORAGE AND OPERATING CONDITIONS | |
|---|---|
| Ambient Temperature | Operating: 0° to 40°C (32° to 104°F)<br>Storage: -30° to 70°C (-25° to 158°F) |
| Relative Humidity | 5% to 95% non-condensing |

| THERMOSTAT RATINGS | |
|---|---|
| Rated Voltage | 0-250 Volts DC or 50/60 Hz AC* |
| Rated Current | 2.5 Amps @ Power Factor of 1.0 |
| | 1.6 Amps @ Power Factor of 0.6 |
| Maximum Switching Current | 5 Amps |
| Contact Resistance | <0.10 Ohms maximum |
| Contacts | Normally closed |
| Insulation Dielectric | Mylar Nomex capable of withstanding 1500 VAC RMS 50/60 Hz for 1 minute |
| Opening Temperature (+/- 5°C) | 140°C |

*The thermostat is normally used as a switch for a 15VDC logic signal.

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