



XL, XLT & XLi Series stepping motor drives

*192-100612 N2 / UK
October, 2004*



A product specifically for the OEM & system builder



XL, XLT & XLi Series stepper motor drives

The XL family of stepper motor drives and power supplies from Parker Hannifin's Electromechanical Division bring new standards of economy for the systems builder and original equipment manufacturer. Derived from the successful L series modular drives, the XL range represents exceptional value without compromising on performance.

Parker has taken the core of the L series plug-in drive and housed it in a robust, 'no-frills' aluchrome aluminium casing. Equipped with screw terminals and D-type connectors, the resulting package is suitable for direct panel mounting in the equipment cabinet. Installation is particularly straightforward - cooling is either by natural convection or by an internal fan, depending on the current rating, so no cold plate is needed as with many competitive products.

The XL range comprises three basic drive types. The XL single axis step-direction version permits operation from an independent controller, while the three-axis XLT step-direction version permits space saving in multi-axis systems. The intelligent XLi indexer version, with an optional CANopen interface, provides a stand-alone drive/controller package capable of solving a wide range of automation applications.

Common features on all XL series stepper drives include programmable motor current down to 50% of the maximum value, automatic current reduction at standby, a choice of four resolutions between 400 and 4000 steps/rev and full protection against short circuits, overvoltage and excessive temperature rise. The drives comply fully with European LVD and EMC requirements when installed according to the information in the User Guide.

All drive types are available in three current ratings, giving an output of either 2.5A, 5A or 8A peak per phase.

An advanced indexer with CANbus option

XLi Series intelligent drives incorporate a powerful indexer based on Parker's proven EASI control language. In addition to all standard motion control functions, the indexer can perform accurate registration moves for applications such as packaging and labelling. The use of pre-defined move profiles and labelled program blocks allows for more efficient programming and improves the response of the indexer by reducing execution time. The indexer operating system is held in Flash-ROM to allow for straightforward field upgrades and enhancements. Optimum noise immunity is assured by the use of PLC-compatible 24V input and output levels.

An optional CANopen interface in the XLCAN model allows indexer commands to be sent using some of the objects specified in the CANopen standards DS301 and DS402. Additional objects allow the user to take advantage of the more advanced indexer features, such as registration.

All XLi intelligent drives are shipped with a copy of EASI-Tools, a Windows™-based software package designed to get your system up and running in the minimum time. As well as performing the functions of a terminal emulator, EASI-Tools allows you to configure the drive and to create, edit and save all your motion programs. It will run under Windows™ 95/98, ME, 2000 or NT4.

Power supplies & motors

The XL-PSU and PL1100 power supplies offer a convenient way of powering XL Series drives. The XL-PSU module has been designed to operate up to six XL stepper drives (depending on shaft loading) and operates directly from any AC voltage between 95V and 264V. For more demanding applications the transformer-fed PL1100 power supply module is capable of delivering up to 14A at 80VDC.

Parker SY stepper motors are particularly suitable for use with XL Series drives. They offer excellent performance in relation to price and are available in a range of flange sizes and stack lengths. The smaller flange sizes may be supplied either with screw terminals or flying leads, and additional variants are available including double shaft, enhanced IP rating and alternative windings. Mechanical details, dimensions and performance curves will be found at the end of this brochure.

Drive specifications

Main specifications, all versions

| | |
|------------------------------|--|
| Output current per phase | XL25/25i/25CAN & XLT25: 2.5A peak (1.8A RMS) $\pm 10\%$ XL50/50i/50CAN & XLT50: 5.0A peak (3.5A RMS) $\pm 10\%$ XL80/80i/80CAN & XLT80: 8.0A peak (5.6A RMS) $\pm 10\%$ |
| Output current adjustment | By bit switch (XL & XLT) or by software (XLi/XLCAN) |
| Current adjustment range | 50% - 100% of drive peak current rating |
| Automatic standby reduction | 50% or 70% of programmed current |
| Standby reduction time | 30mS from last step pulse |
| Drive resolution | 400, 800, 2000 or 4000 steps/rev |
| Minimum motor inductance | 0.5mH |
| Recommended inductance range | 0.8mH - 10mH |
| Motor supply voltage | 2.5A/phase models: 24 - 80VDC nominal (20 - 84V abs. limits) 5.0A & 8.0A/phase models: 48 - 80VDC nominal (40 - 84V abs. limits) |
| Recommended PSU capacitance | 2.5A/phase models: 2200 μ F/axis 5.0A & 8.0A/phase models: 3300 μ F/axis |
| Logic supply voltage | 24V DC $+10\%$ - 15% (not required on XLT25/XLT50) |
| Logic supply current | XL25/50 and XLT80: 100mA; XL80 150mA XL25i/50i: 200mA (no outputs loaded), 600mA max. with all outputs loaded XL80i: 250mA (no outputs loaded), 650mA max. with all outputs loaded |
| Protection | Motor overcurrent/short circuit, over & under voltage, logic supply fault, *over temperature (*not on XLT25/XLT50) |
| Ambient temperature range | 0° - 50°C; cooling by natural convection, fan-assisted on 8.0A/phase models |
| Humidity | 0% - 95%, non-condensing |
| Weight | 0.4 - 0.6kg |

XL & XLT step-direction drives

| | |
|--|--|
| Command input | Step/direction or step-up/-down, configurable in hardware; differential TTL levels |
| Step-pulse generator (XL drives only): | |
| Fast speed range | 0 - 50rps (at 4000 steps/rev) |
| Slow speed range | 0 - 8rps |
| Acceleration/deceleration time | 45mS/30mS, may be increased by external capacitor |

XLi & XLCAN intelligent drives

| | |
|--------------------------------|--|
| Communication | RS232, 9600 baud, 8 data bits, 1 start bit, 1 stop bit, no parity |
| CANopen interface (XLCAN only) | Communications profile based on DS301; device profile based on DS402 PDO : 2 Tx/2 Rx; SDO : 1 Tx/1 Rx; communication rates up to 1MHz |
| Addressing | 1 - 255, selected by software |
| Digital I/O | 8 configurable I/O ports, 24V DC operation |
| Max. load per output | 200mA |
| Max. total output load | 400mA |
| Positioning range | $\pm 2,147,483,647$ steps |
| Velocity range | 0.01 to 50 revs/sec |
| Acceleration range | 0.1 to 1024 revs/sec ² |
| Positioning modes | Incremental, absolute, registration, continuous run |

XL Series Power Supplies

XL Series drives are powered by an external DC supply in the range 48-80VDC for the motor supply, plus a 24VDC logic supply where required. Parker can offer a choice of two power supply systems which are suitable for use with the XL Series drives.

The XL-PSU power supply module offers a convenient way of powering up to six XL series stepper drives. Operating directly from all AC supplies between 95V and 264V, it has a continuous rated output of 250W at 230VAC input with a 1-second peak rating of 600W. The XL-PSU supplies both the main 80VDC supply rail and the 24VDC logic voltage - no external EMC filters are required unless the motor leads are exceptionally long (greater than 30m).

The transformer-fed PL1100 supply has a 1.1kW rating and is suitable for powering up to twenty-four XL series stepper drives in applications with typical duty cycles. Separate mains transformers may be used for the main 80VDC rail and the 24V logic supply, allowing communication to be retained during shutdown. To minimise cost, EMC filters are not included so that where appropriate a common filter system may be used. To power the PL1100 power supply, Parker offers the TO255 1kVA high-voltage toroidal transformer for the motor supply and the TO256 120VA low-voltage toroidal transformer for the logic supply. Both transformers can be wired to permit operation from either 115 or 230VAC mains supplies.

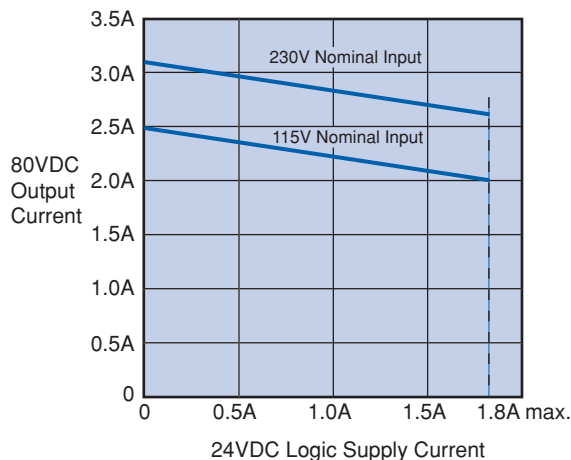
As a guide, the XL-PSU can supply up to six 2.5A axes, three 5A axes or two 8A axes, assuming typical duty cycles, whilst the PL1100 can supply up to twenty-four 2.5A axes, twelve 5A axes or eight 8A axes, again with typical duty cycles.

PL1100 power supply specification

| | |
|--------------------------------------|--|
| AC input voltage, nominal | 55V AC, 1 ϕ or 3 ϕ |
| absolute maximum | 61V AC |
| Main DC output, nominal | 75V DC, 12A max. (on 1 ϕ) 14A max. (on 3 ϕ) |
| Logic supply output | 24V DC, 3A max. |
| Rated output power | 950W (on 1 ϕ), 1.1kW (on 3 ϕ) |
| Power factor at full load | 0.9 |
| Power dump resistor (if required) | 5R, 100W |
| Main EMC filter* | Corcom 12FC10 (for 1 ϕ), Corcom 12FCD10 (for 3 ϕ) |
| 24V EMC filter | Corcom 3VK1 |
| Dimensions (h \times w \times d) | 145 x 119 x 143mm |
| Weight | 1.25kg |

*For motor leads up to 30m long

XL-PSU power supply performance



XL-PSU specification

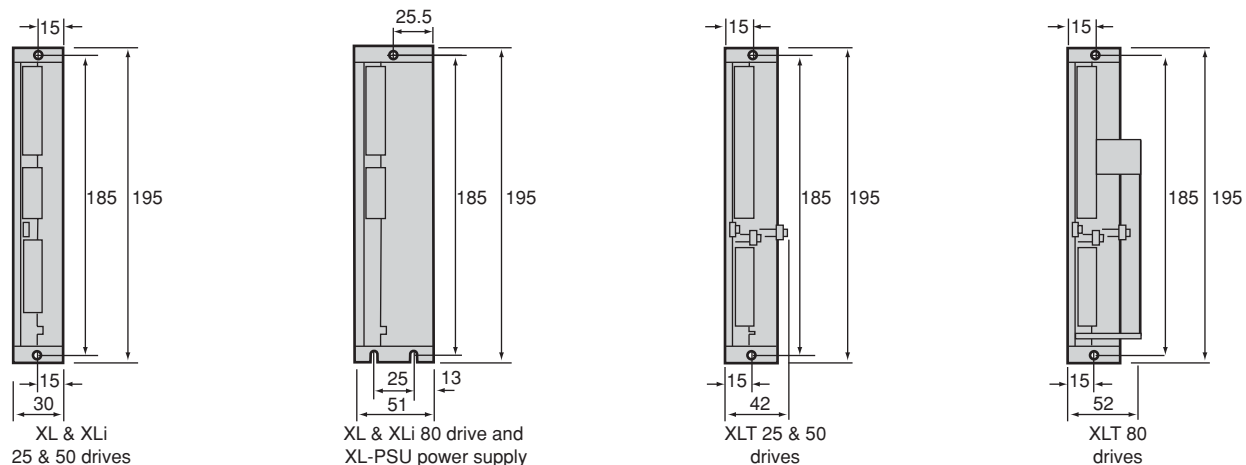
| | |
|-----------------------------------|---------------------------|
| AC input voltage, nominal | 115V to 230V AC, 1 ϕ |
| absolute limits | 95 to 264V AC |
| Main DC output | 80V DC, 3.1A max. cont.* |
| Logic supply output | 24V DC, 1.8A max. |
| Rated total output power | 250W cont. @ 230VAC in |
| Peak power (1-sec rating) | 600W |
| Power factor at full load | 0.9 |
| Power dump resistor (if required) | 10R, 100W |
| Weight | 1kg |

*Dependent on supply voltage and 24V power drawn, as shown in performance graph above

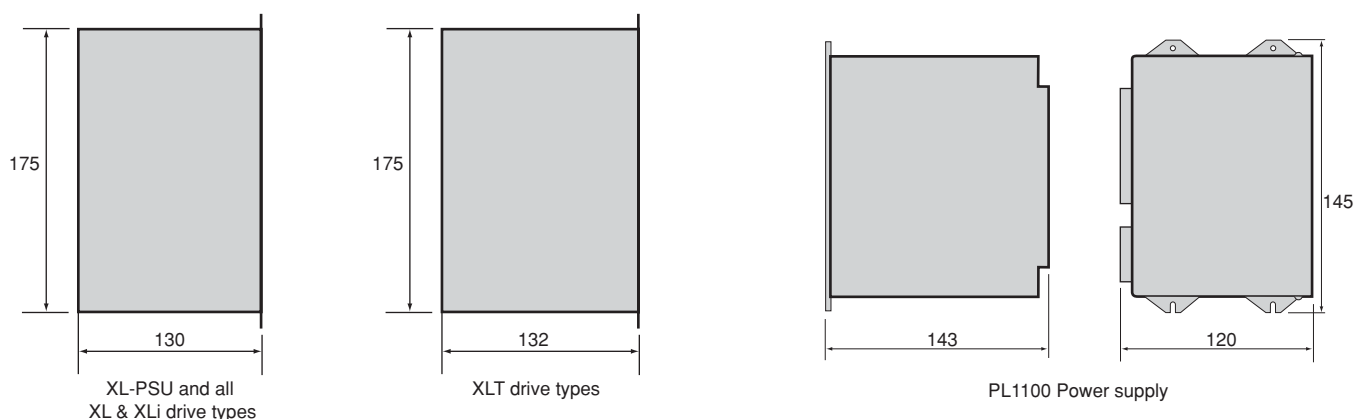
TO255/TO256 specifications

| | |
|--------------------------------|---|
| Primary input | 115 or 230VAC, 1 ϕ +15% / -10% |
| TO255 Motor Supply Transformer | |
| Secondary Voltage | 2x 50VAC _{RMS} full load voltage |
| Secondary Current | 2x 10A _{RMS} |
| Power Rating | 1000VA |
| Regulation | 3.5% |
| Dimensions (DIA \times H) | 165 x 75mm |
| Weight | 6.5kg |
| TO256 Logic Supply Transformer | |
| Secondary Voltage | 2x 18VAC _{RMS} full load voltage |
| Secondary Current | 2x 3.3A _{RMS} |
| Power Rating | 120VA |
| Regulation | 5.5% |
| Dimensions (DIA \times H) | 104 x 52mm |
| Weight | 1.2kg |

Drive & power supply dimensions



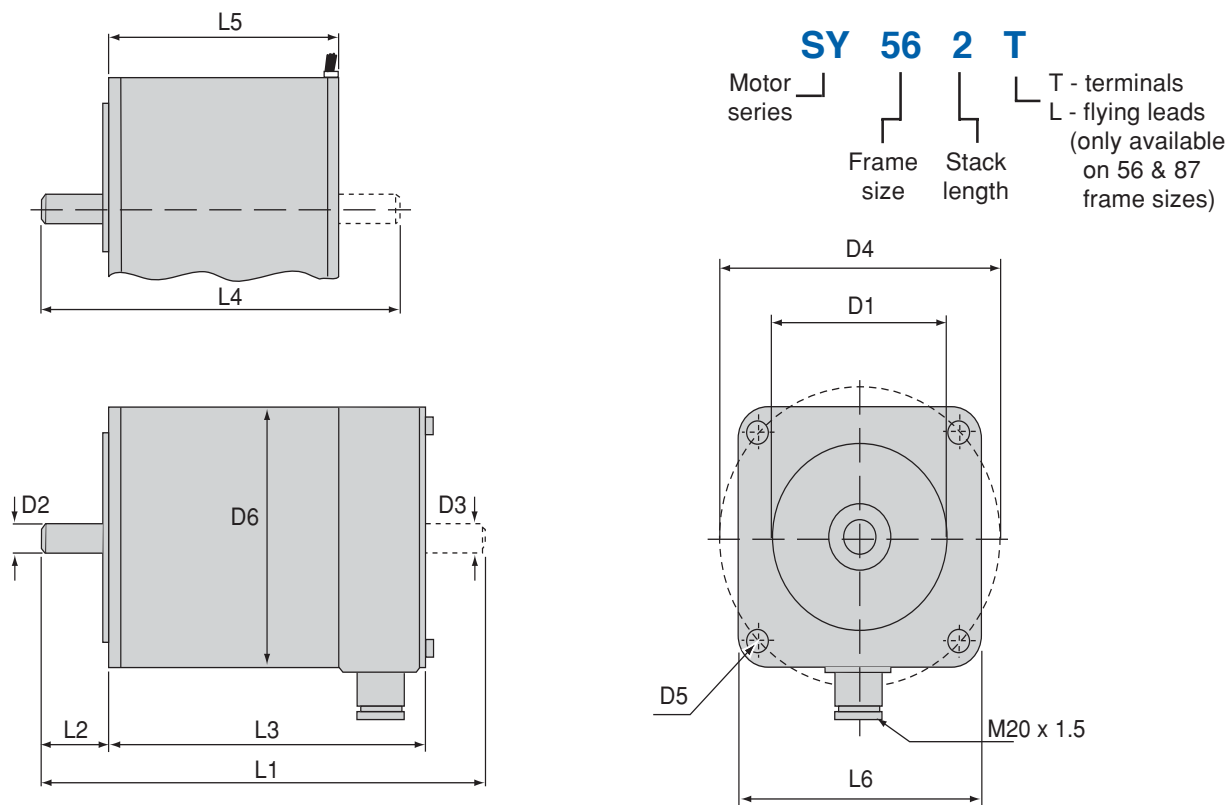
All mounting holes 4.5mm diameter



Product ordering codes

| | | | |
|---------|--|-------------|--|
| XL25 | 2.5A/phase, Step/Direction Drive | XL-PSU | 250W DOL Power Supply Module |
| XL50 | 5.0A/phase, Step/Direction Drive | XL-DUMP | 10R, 100W dump resistor for XL-PSU |
| XL80 | 8.0A/phase, Step/Direction Drive | XL-CONNECT | Interconnect kit (single axis XL) |
| XLT25 | 2.5A/phase, 3-Axes, Step/Direction Drive | PL1100 | 1.1kW Linear Power Supply Module |
| XLT50 | 5.0A/phase, 3-Axes, Step/Direction Drive | PL1100-DUMP | 5R, 200W dump resistor for PL1100 |
| XLT80 | 8.0A/phase, 3-Axes, Step/Direction Drive | TO255 | 1000VA Motor Supply Transformer |
| XL25i | 2.5A/phase, Intelligent Drive | TO256 | 120VA Logic Supply Transformer |
| XL50i | 5.0A/phase, Intelligent Drive | STC20-0300 | Motor cable, M20x1.5 gland, 3m length |
| XL80i | 8.0A/phase, Intelligent Drive | STC20-0500 | Motor cable, M20x1.5 gland, 5m length |
| XL25CAN | 2.5A/phase, Intelligent Drive with CANopen | STC20-1500 | Motor cable, M20x1.5 gland, 15m length |
| XL50CAN | 5.0A/phase, Intelligent Drive with CANopen | | |
| XL80CAN | 8.0A/phase, Intelligent Drive with CANopen | | |

Motor dimensions



Dimensions (mm)

| Series | Type | D1 | D2 | D3 | D4 | D5 | D6 | L1 | L2 | L3 | L4 | L5 | L6 |
|--------|--------|-------|-------|------|-------|-----|------|-----|------|-------|-----|-------|------|
| 56 | SY561 | 38.1 | 6.35 | 6.35 | 66.5 | 5.3 | 56.5 | 108 | 21 | 76 | 90 | 50 | 56.5 |
| | SY562 | 38.1 | 6.35 | 6.35 | 66.5 | 5.3 | 56.5 | 134 | 21 | 102 | 116 | 76 | 56.5 |
| | SY563 | 38.1 | 6.35 | 6.35 | 66.5 | 5.3 | 56.5 | 162 | 21 | 130 | 144 | 104 | 56.5 |
| 87 | SY871 | 73 | 9.52 | 9.52 | 99 | 6.5 | 86 | 137 | 31.5 | 85.5 | 137 | 60.5 | 86 |
| | SY872 | 73 | 9.52 | 9.52 | 99 | 6.5 | 86 | 169 | 31.5 | 117.5 | 169 | 92.5 | 86 |
| | SY873 | 73 | 9.52 | 9.52 | 99 | 6.5 | 86 | 201 | 31.5 | 149.5 | 201 | 124.5 | 86 |
| 107 | SY1072 | 55.54 | 15.87 | 12.7 | 125.5 | 8.5 | 108 | 238 | 50 | 161 | N/A | N/A | 108 |
| | SY1073 | 55.54 | 15.87 | 12.7 | 125.5 | 8.5 | 108 | 288 | 50 | 211 | N/A | N/A | 108 |

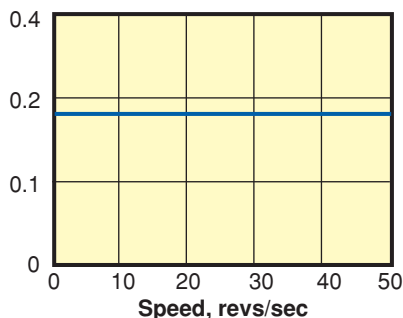
Electrical & mechanical data

| Part number | Maximum Holding Torque Nm | Current per phase (parallel) A (RMS) | Inductance per phase mH | Rotor inertia kgcm ² | Weight kg | Axial bearing loading N | Radial bearing loading N |
|-------------|------------------------------|---|----------------------------|------------------------------------|--------------|----------------------------|-----------------------------|
| SY561 | 0.45 | 4.2 | 1 | 0.125 | 0.6 | 80 | 150 |
| SY562 | 0.85 | 4.2 | 2.6 | 0.25 | 1 | 80 | 150 |
| SY563 | 1.25 | 6.5 | 1.2 | 0.375 | 1.35 | 80 | 150 |
| SY871 | 1.8 | 4.2 | 1.6 | 0.65 | 1.7 | 180 | 280 |
| SY872 | 3.6 | 6.5 | 1.5 | 1.3 | 2.65 | 180 | 280 |
| SY873 | 5.4 | 8.4 | 1.7 | 1.95 | 3.65 | 180 | 280 |
| SY1072 | 9 | 8 | 2.4 | 8 | 7.2 | 400 | 650 |
| SY1073 | 13 | 10 | 2.7 | 12 | 9.8 | 400 | 650 |

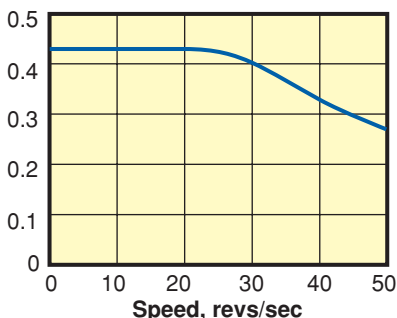
Standard IP ratings are IP55 for screw terminal version (T) and IP41 for flying leads (L).
 Information on additional variants including double shaft, encoder, brake, higher IP rating and alternative windings is available on request.

Torque speed curves - XL series drives with SY motors

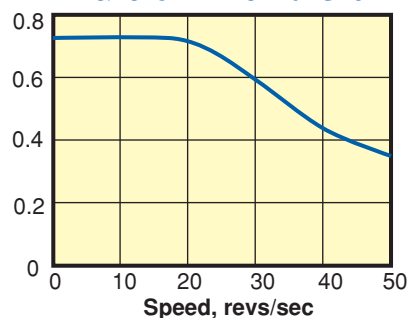
Nm XL25/25i or XLT25 with SY561



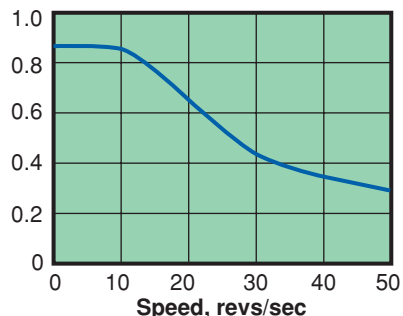
Nm XL25/25i or XLT25 with SY562



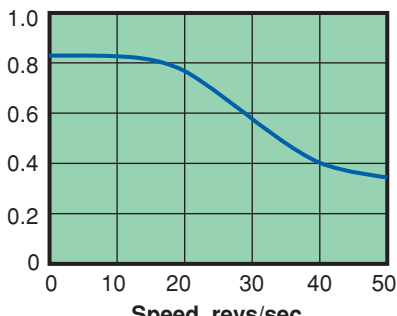
Nm XL25/25i or XLT25 with SY871



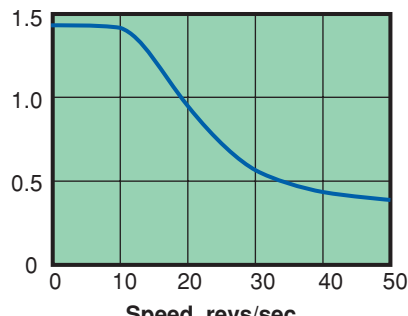
Nm XL50/50i or XLT50 with SY562



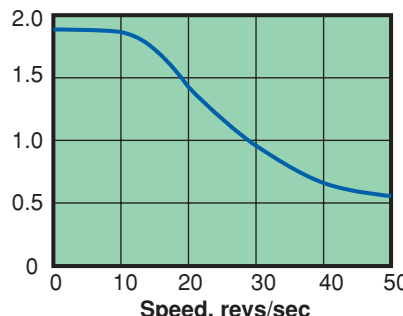
Nm XL50/50i or XLT50 with SY563



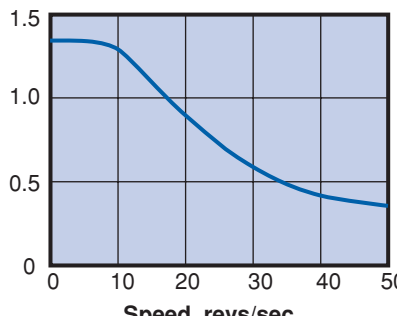
Nm XL50/50i or XLT50 with SY871



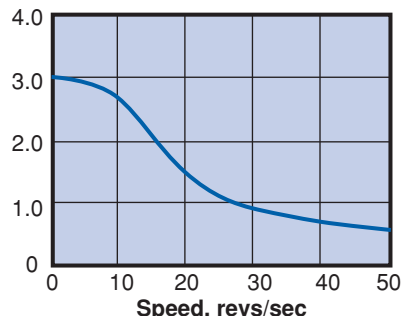
Nm XL50/50i or XLT50 with SY872



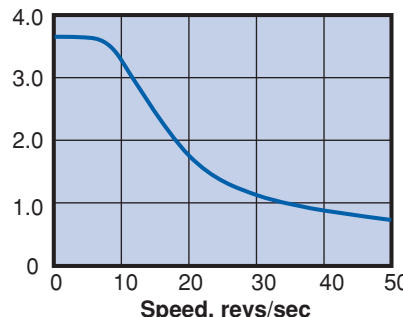
Nm XL80/80i or XLT80 with SY563



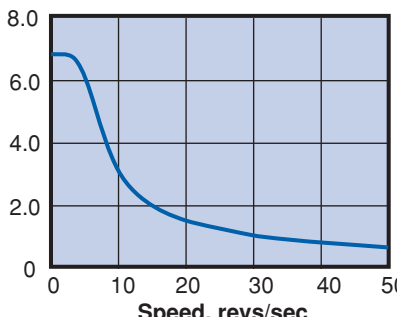
Nm XL80/80i or XLT80 with SY872



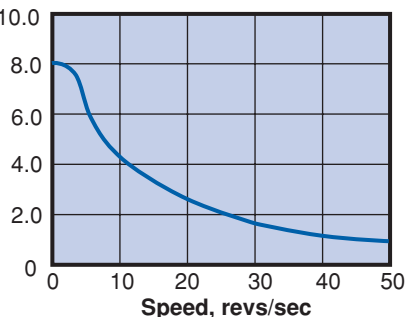
Nm XL80/80i or XLT80 with SY873



Nm XL80/80i or XLT80 with SY1072



Nm XL80/80i or XLT80 with SY1073



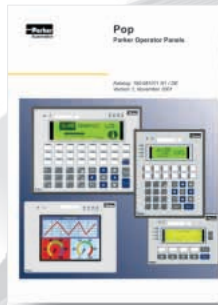
All performance measurements taken with windings in parallel



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We reserve the right to make technical changes.
The information contained in this manual corresponds to the current status at the time of printing.



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