Manual No. 102-0615-01
Rev. 3

Parker

LP/LD28 Series Product Manual

Effective: August 21, 2007
Supersedes: August 2, 2006

Electromechanical Positioning Systems

Automation

Important User Information

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries, and authorized distributors provide product and/or systems options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these product systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuming that all performance, safety, and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Since Parker Hannifin Corporation, Electromechanical Automation-Parker constantly strives to improve all of its products, we reserve the right to change this product manual and equipment mentioned therein at any time without notice.

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Revision 3 - 8/21/2007
Updated to include strip seal option

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Chapter 1 - Introduction

Product Description

LP28 Positioner

The LP28 is a linear positioning table of miniature cross section (28mm x 28mm) which provides travel length up to 500mm. It's an assembled package including stepper motor, with motor options ranging from a single stack NEMA 11 to NEMA 17. It employs a PTFE coated leadscrew drive train, with lead selectable from 1mm to 1". Linear bearing support is provided by an external square rail bearing. The table can be protected from the environment by selecting the strip seal option.

LD28 Actuator

The LD28 is a linear actuator based upon the LP28, providing nominal travel distance up to 300mm. It utilizes the same high performance leadscrew as the LP, as well as the same motor options.

Unpacking

Unpacking

Carefully remove the positioner from the shipping container and inspect the unit for any evidence of shipping damage. Report any damage immediately to your local authorized distributor. Please save the shipping container for damage inspection or future transportation.

Incorrect handling of the positioner may adversely affect the performance of the unit in its application. Please observe the following guidelines for handling and mounting of your new positioner.

DO NOT allow the positioner to drop onto the mounting surface. Dropping the positioner can generate impact loads that may result in flat spots on bearing surfaces or misalignment of drive components.

DO NOT drill holes into the positioner. Drilling holes into the positioner can generate particles and machining forces that may effect the operation of the positioner. Parker will drill holes if necessary; contact your local authorized distributor.

DO NOT subject the unit to impact loads such as hammering, riveting, etc. Impacts loads generated by hammering or riveting may result in flat spots on bearing surfaces or misalignment of drive components.

DO NOT lift the positioner by the cables. Lifting positioner by the cables may effect electrical connections. The unit should be lifted by the base structure only.

DO NOT expose positioner to mist, spray or submersion in liquids.

DO NOT disassemble positioner. Unauthorized adjustments may alter the positioner's specifications and void the product warranty.

Return Information

Returns
All returns must reference a "*R*eturn *M*aterial *A*uthorization" *(RMA)* number. Please call your local authorized distributor or Parker Customer Service Department at 800-245-6903 to obtain an "RMA" number.

Repair Information

Out-of-Warranty Repair
Our Customer Service Department repairs Out-of-Warranty products. All returns must reference an "RMA" number. Please call your local authorized distributor or Parker Customer Service Department at 800-245-6903 to obtain an "RMA" number. You will be notified of any cost prior to making the repair.

Warnings and Precautions

Hot Surfaces

DO NOT touch stepper motors after energizing. Motor temperature may approach 85°C.

Vertical Operation

Depending on your load and leadscrew selection the carriage and load may backdrive in power loss situations potentially causing product damage or personal injury.

Strain Relieve Electrical Components

All electrical components (such as motors and limit/home switches) must be strain relieved. Failure to strain relieve electrical wires or cables may result in component failure and/or personal injury.

General Safety

Sometimes positioning equipment moves without warning. Keep all personnel away from dynamic travel range.

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Specification Conditions

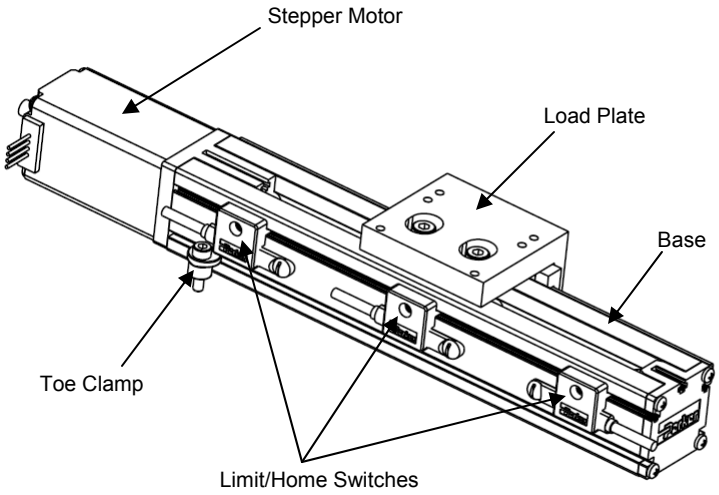
Specifications Are Temperature Dependent
Catalog specifications are obtained and measured at 20°C. Specifications at any other temperature may deviate from catalog specifications. Minimum to maximum continuous operating temperature range (with NO guarantee of any specification except motion) of a standard unit before failure is 5°C to 40°C.

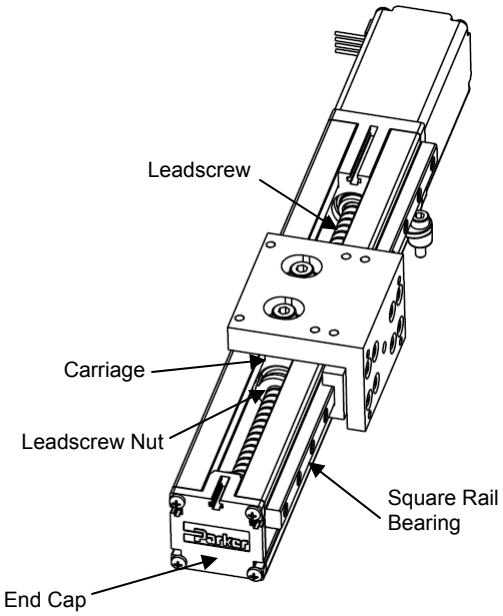
Specifications Are Mounting Surface Dependent
Catalog specifications are obtained and measured when the positioner is fully supported, bolted down, and is mounted to a work surface that has a maximum flatness error of 0.13mm/300mm (0.005”/ft)

Specifications Are Point of Measurement Dependent
Catalog specifications and specifications in this manual are measured from the center of the carriage, 37.5mm above the carriage surface. All measurements taken at any other location may deviate from these values.

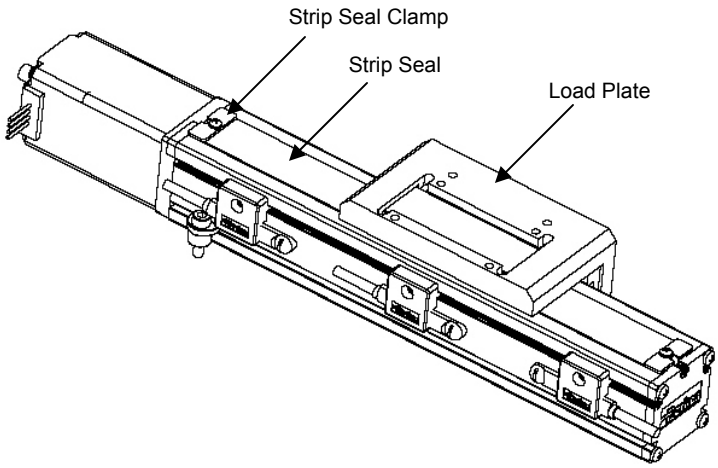
Assembly Diagrams

LP28

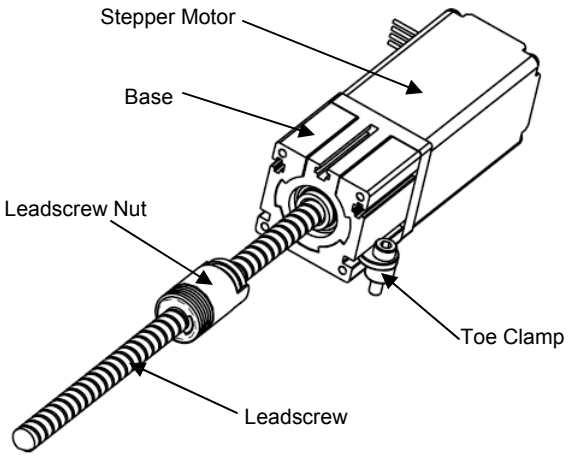




LP28 w/ Strip Seal



LD28



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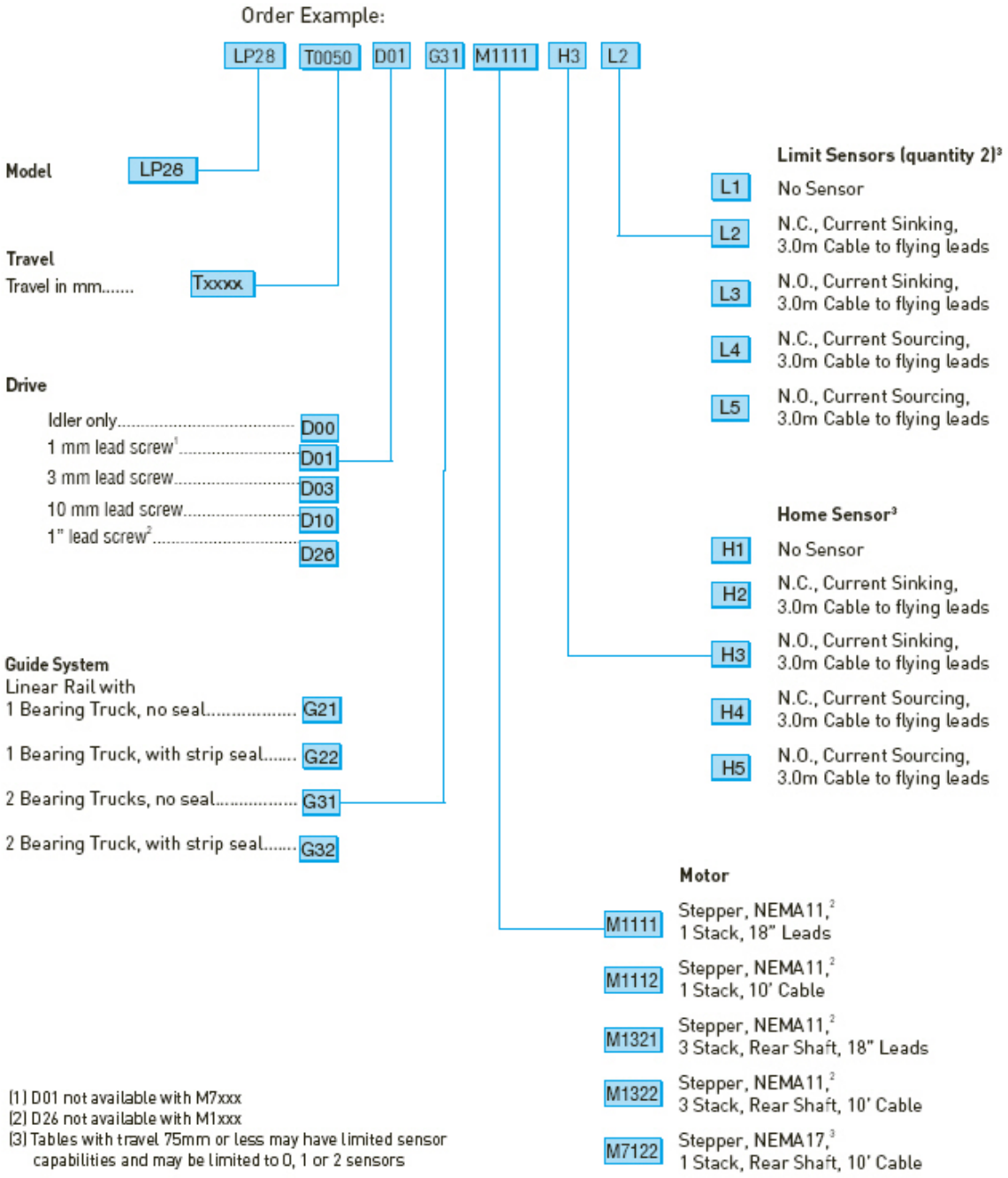
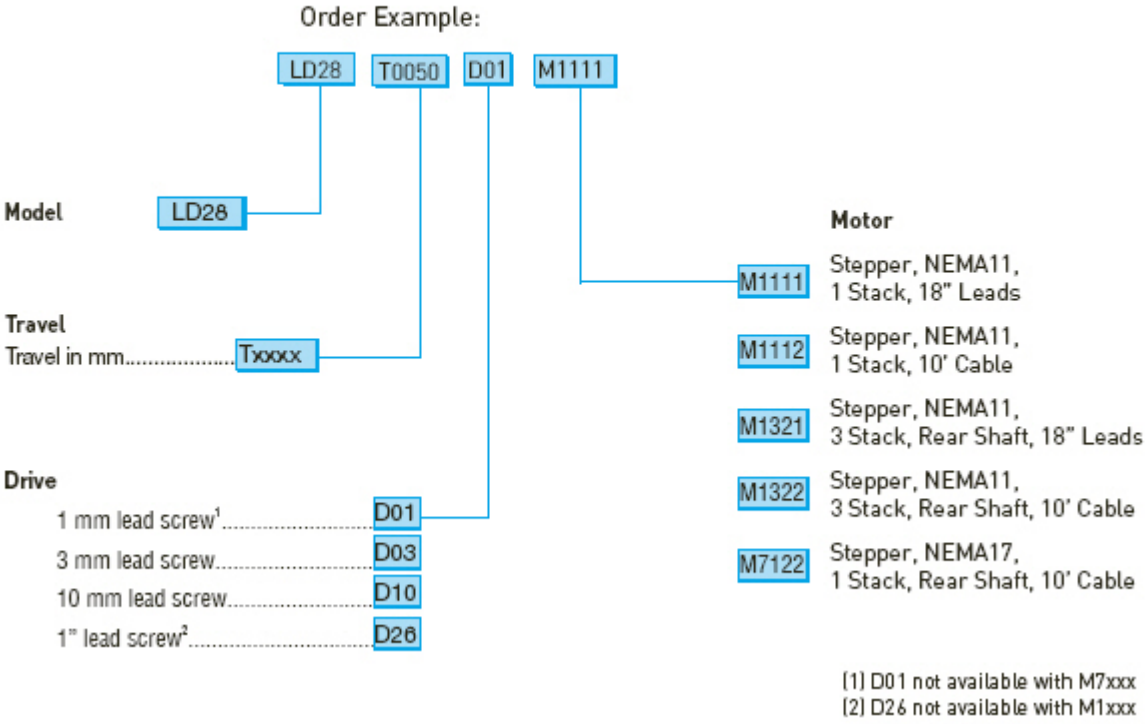
Chapter 2 - LP/LD28 Specifications

PROmech LP28 - How to Order:



(1) D01 not available with M7xxx
(2) D26 not available with M1xxx
(3) Tables with travel 75mm or less may have limited sensor capabilities and may be limited to 0, 1 or 2 sensors

PROmech LD28 - How to Order:



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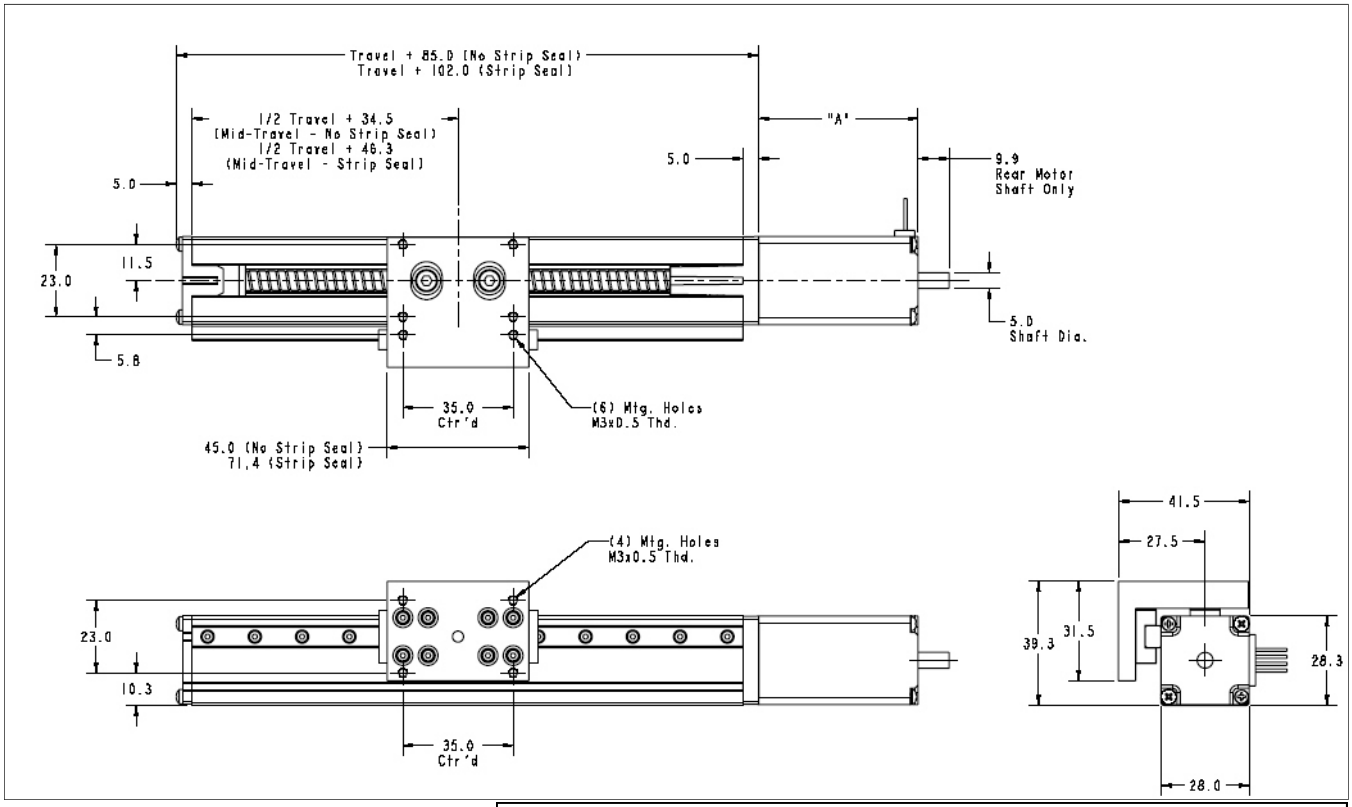
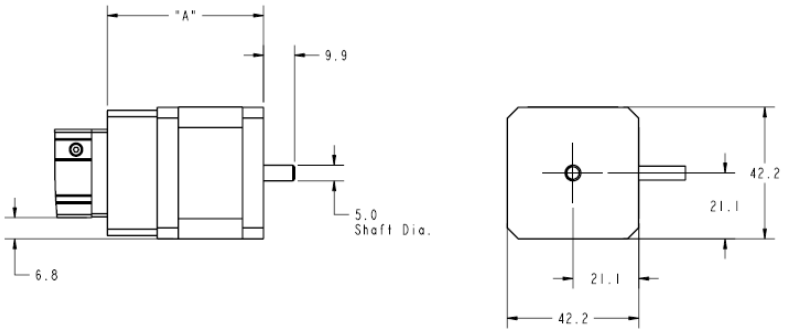
Dimensional Drawings - LP28



Motor Option	"A"
M11xx	31.5
M13xx	50.6
M71xx	50.0



NEMA 17 Motor (M71xx Option)

Visit
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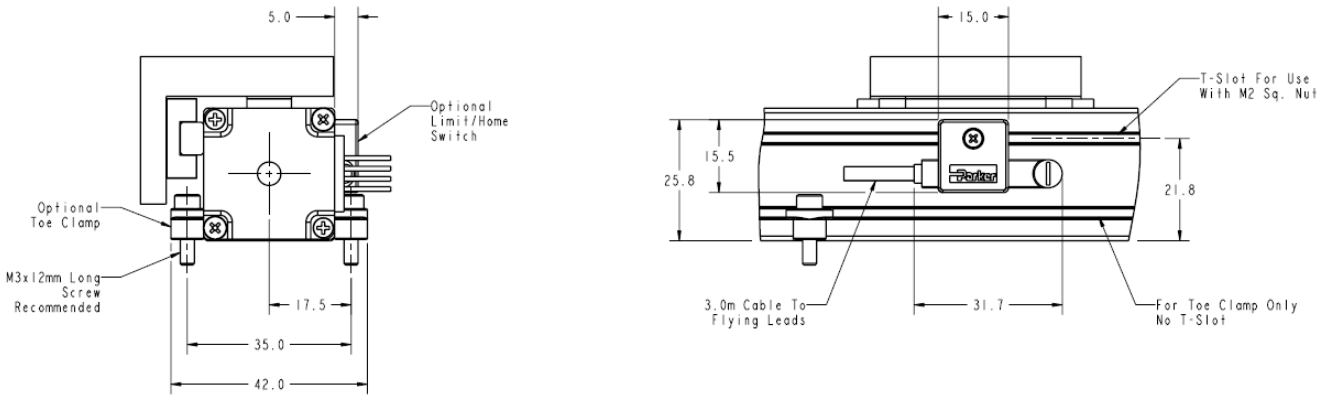
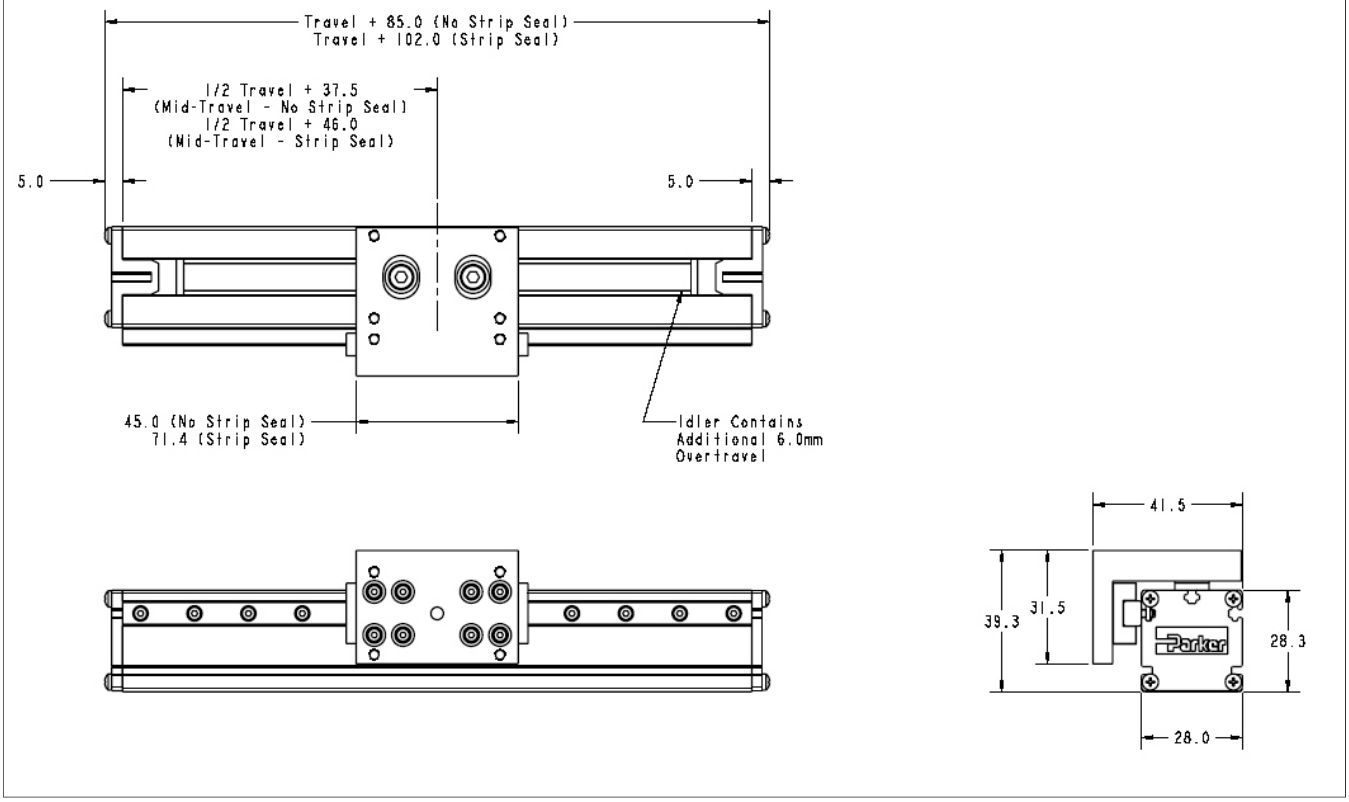
Dimensional Drawings - LP28



Limit/Home Switch and Toe Clamp Accessories



LP28 Idler (D00 Option)

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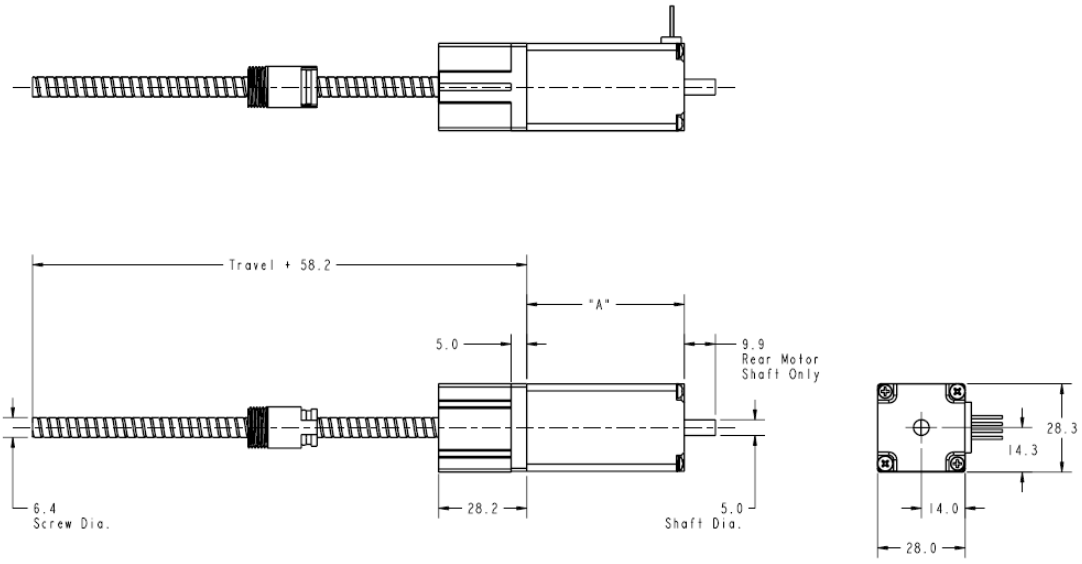
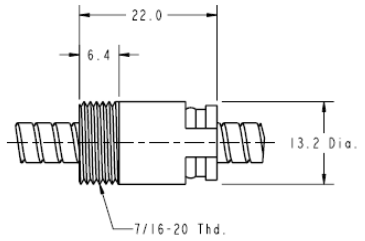
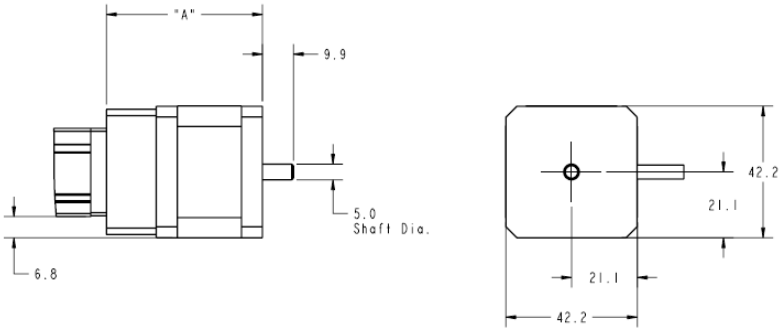
Dimensional Drawings - LD28

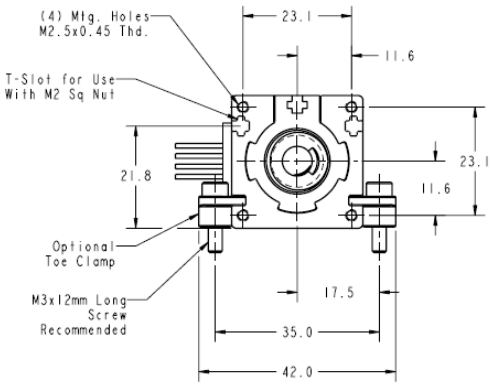




Leadscrew Nut Detail



NEMA 17 Motor (M71xx Option)



End View Including Accessory Toe Clamps

Motor Option	"A"
M11xx	31.5
M13xx	50.6
M71xx	50.0

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Performance Specifications - LP28

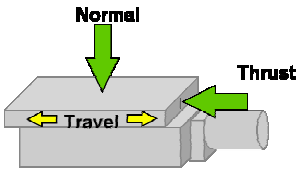
Common Performance Characteristics

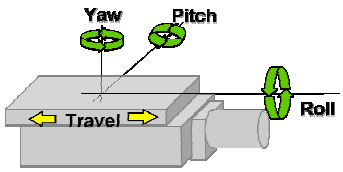
			1mm Lead (D01 Option)	3mm Lead (D03 Option)	10mm Lead (D10 Option)	1.0" Lead (D26 Option)
Bidirectional Repeatability - µm			+/- 50	+/- 50	+/- 100	+/- 100
Duty Cycle			100%			
Max Acceleration - m/s^2 (in/s^2)			20 (787)			
Max Speed[1] - mm/s (in/s)			15 (0.6)	45 (1.8)	150 (5.9)	375 (14.8)
Normal Load[3] - Kgf (lbs)		Single Bearing (G21 Option)	5 (11)			
		Double Bearing (G31 Option)	10 (22)			
Moment Load[3] - Nm (in-lbs)	Roll	Single Bearing (G21 Option)	0.5 (4.4)			
		Double Bearing (G31 Option)	1.0 (8.8)			
	Pitch	Single Bearing (G21 Option)	0.5 (4.4)			
		Double Bearing (G31 Option)	2.0 (18)			
	Yaw	Single Bearing (G21 Option)	0.5 (4.4)			
		Double Bearing (G31 Option)	2.0 (18)			
Max Thrust[2][3] - N (lbs)			45 (10)			
Screw Efficiency			40%	65%	75%	80%
Breakaway Torque - Nm (oz-in)			0.02 (2.8)	0.02 (2.8)	0.03 (4.2)	0.06 (8.5)
Screw Diameter - mm (in)			6.35 (0.25)			
Coefficient of Friction			0.02			

[1] Max speed based on maximum motor speed of 15 rps. Critical screw speed is not less than 15 rps regardless of travel length.

[2] See speed versus thrust graphs for combined motor-screw thrust capacity.

[3] See diagrams:





Positioner Weight

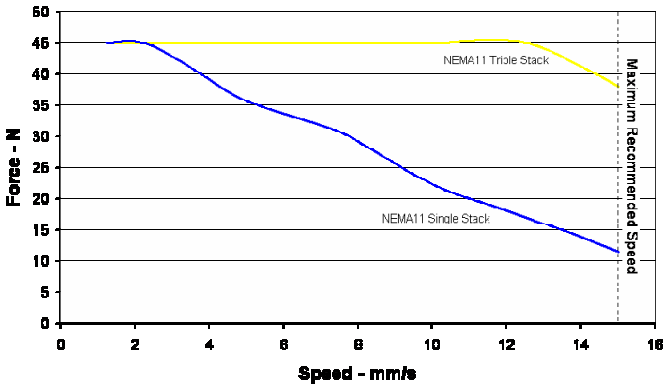
	M11xx Option	M13xx Option	M71xx Option
Unit Weight[1] (Basic Unit with Zero Travel) - Kgf (lbs)	0.38 (0.84)	0.47 (1.04)	0.51 (1.12)
Weight of Additional Travel Length - Kgf/mm (lbs/mm)	0.0015 (0.0033)		

[1] Unit weight based on double bearing truck with no limit/home switches. Other options will vary slightly.

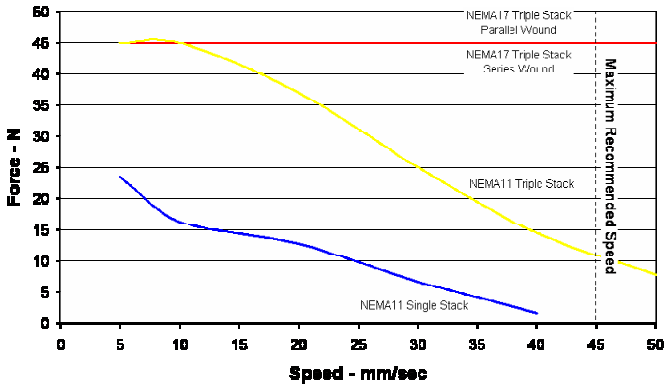
Performance Specifications - LP28

Linear Speed Versus Thrust Graphs

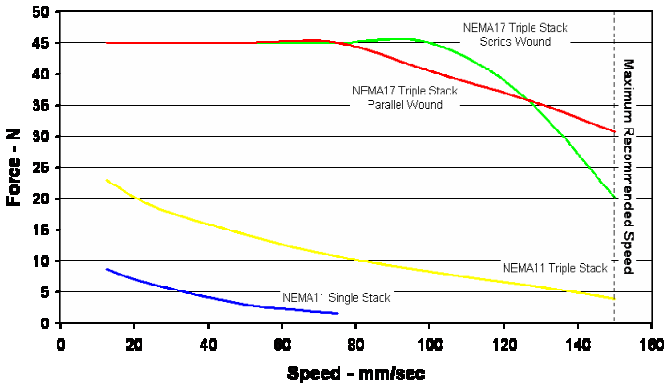
1mm Lead Screw (D01 Option)



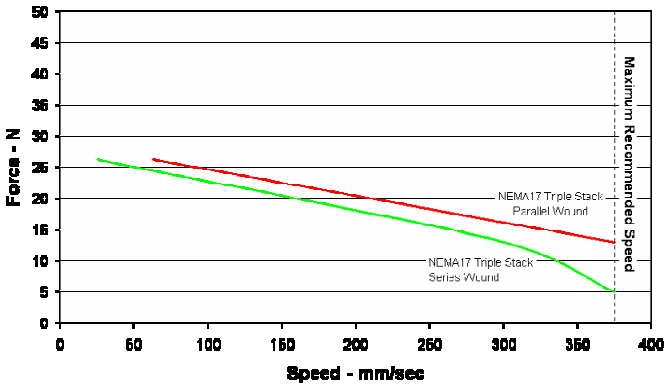
3mm Lead Screw (D03 Option)



10mm Lead Screw (D10 Option)



1.0" Lead Screw (D26 Option)



Performance Graph Notes:

To simplify application, the different aspects of positioner performance including motor torque, motor speed, screw efficiency, friction, safety margin, etc. have been consolidated into these speed versus thrust graphs. To make a selection first use the X axis scale of the different graphs to identify a screw lead that will deliver the desired peak velocity. Next, using the specific screw lead graph, identify the motor with enough torque to deliver the needed thrust to lift or accelerate the load.

NEMA 11 Stepper motor curves (M11xx and M13xx options) assume 24VDC bus voltage at 0.67 amps. NEMA 17 stepper motor curves (M71xx option) assume 48VDC bus voltage at 1.14 amps for series wound operation and 2.28 amps for parallel wound operation. All graphs are limited to 45N (10lbs) thrust due to mechanical limitations. Care should be taken not to stall the axis into the end of travel, particularly with the 1mm lead screw (D01 option) as this motor-screw combination can generate significant amounts of thrust. All curves include a 10% safety margin.

The "Maximum Recommended Speed" is based on a maximum motor speed of 15 rps. Generally, the motors can rotate faster than 15 rps; however, at about 20 rps, they pass through a resonance which adversely and unpredictably affects useable motor torque. For applications requiring higher speeds, Parker recommends using a faster lead or a servo motor. Applications using a stepper motor above this recommended limit must be fully tested and qualified by the user.

Performance Specifications - LD28

Common Performance Characteristics

	1mm Lead (D01 Option)	3mm Lead (D03 Option)	10mm Lead (D10 Option)	1.0" Lead (D26 Option)
Bidirectional Repeatability - µm	+/- 50	+/- 50	+/- 100	+/- 100
Duty Cycle	100%			
Max Acceleration - m/s^2 (in/s^2)	20 (787)			
Max Speed[(1)] - mm/s (in/s)	15 (0.6)	45 (1.8)	150 (5.9)	375 (14.8)
Max Axial Load[(2)] - N (lbs)	45 (10)			
Screw Efficiency	40%	65%	75%	80%
Breakaway Torque - Nm (oz-in)	0.02 (2.8)	0.02 (2.8)	0.03 (4.2)	0.06 (8.5)
Screw Diameter - mm (in)	6.35 (0.25)			

(1) Max speed based on maximum motor speed of 15 rps. Critical screw speed is not less than 15 rps regardless of travel length.

(2) See LP28 speed versus thrust graphs for combined motor-screw thrust capacity.

Actuator Weight

	M11xx Option	M13xx Option	M71xx Option
Unit Weight (Basic Unit with Zero Travel) - Kgf (lbs)	0.18 (0.40)	0.27 (0.60)	0.32 (0.71)
Weight of Additional Travel Length - Kgf/mm (lbs/mm)	0.0002 (0.0004)		

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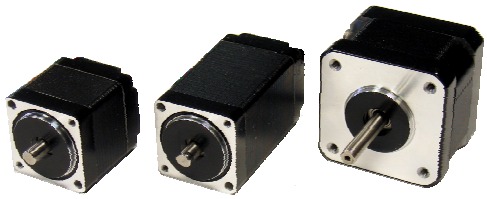
Chapter 3 - Component Specifications

Motor Information

Standard NEMA 11 stepper motor offerings (M1xxx options) for the LP/LD28 product include a single stack without rear shaft and a triple stack with rear shaft. Either is can be equipped with 18" flying leads or a 10' cable which terminates in flying leads. Standard NEMA17 motor is a single stack with rear shaft and 10' cable that terminates in flying leads. The NEMA17 motor can be wired to operate as either a series or parallel winding. Motor information is below. See Appendix A for motor part numbers.



Specifications

	M11xx Option	M13xx Option	M71xx Option - Series Wound	M71xx Option - Parallel Wound
Full Step Angle	1.8°			
Torque - Nm (oz-in)	0.06 (9.2)	0.14 (16.6)	0.40 (56.0)	0.40 (56.0)
Rotor Inertia - Kg-cm^2 (oz-in^2)	0.009 (0.05)	0.018 (0.10)	0.033 (0.18)	0.033 (0.18)
Peak Current - A/Phase	0.67	0.67	1.14	2.28
RMS Current - A/Phase	0.47	0.47	0.81	1.61
Resistance - Ω/Phase	5.6	8.6	11.1	2.8
Inductance - mH/Phase	3.4	6.7	14.3	3.6
Bus Voltage	48 VDC Max		80 VDC Max	48 VDC Max
Weight - Kgf (lbs)	0.11 (0.24)	0.20 (0.44)	0.18 (0.40)	0.18 (0.40)

Wiring Code for Parker Drives

	M11xx Option	M13xx Option	M71xx Option - Series Wound	M71xx Option - Parallel Wound
A+	Red		Red	Red & Blue
A-	Black		Black	Black & Yellow
B+	White(1)		White(1)	White & Brown(1)
B-	Green(1)		Green(1)	Green & Orange(1)
Notes	None		Link Yellow and Blue, Link Orange and Brown	None

(1) If using Parker ViX drive, default positive direction is opposite other Parker products. To account for this, reverse a phase by interchanging B+ and B- when using ViX drive.

Switching Sequence

	Step	A+	A-	B+	B-
CCW Rotation Viewed from Front Shaft End	1	+	-	+	-
	2	+	-	-	+
	3	-	+	-	+
	4	-	+	+	-
	1	+	-	+	-

Limit/Home Switch Information

The limit/home switch installed on the LP28 is a hall effect sensor tripped by a magnet embedded in the carriage. On the switch body is an LED to indicate activation, visible through the clear polycarbonate mounting clip. Normally open (N.O.), normally closed (N.C.), current sinking (NPN) and current sourcing (PNP) variations are selectable with the product. Normally open sensors are typically used for home and normally closed are typically used for limits. With a current sinking sensor, the output lead provides a path to ground when activated, and with a current sourcing sensor, the output lead provides a positive (+) voltage potential relative to ground. Refer to you controller's manual for compatibility. Limit/home switch information is below. See Appendix A for switch part numbers.

Specifications

	H2 or L2 Option	H3 or L3 Option	H4 or L4 Option	H5 or L5 Option
Switch Type	N.C.	N.O.	N.C.	N.O.
Logic	NPN	NPN	PNP	PNP
Operating Voltage	10-30 VDC			
Voltage Drop	2.5 VDC Max			
Continuous Current	100 mA			
Repeatability	100 µm Max			
Reverse Polarity Protection	Yes			
Short Circuit Protection	Yes			
Power-Up Pulse Suppression	Yes			
Enclosure Rating	IP67			
Operating Temperature Range	-25°C to +75°C			
Cable Length	3.0 m			

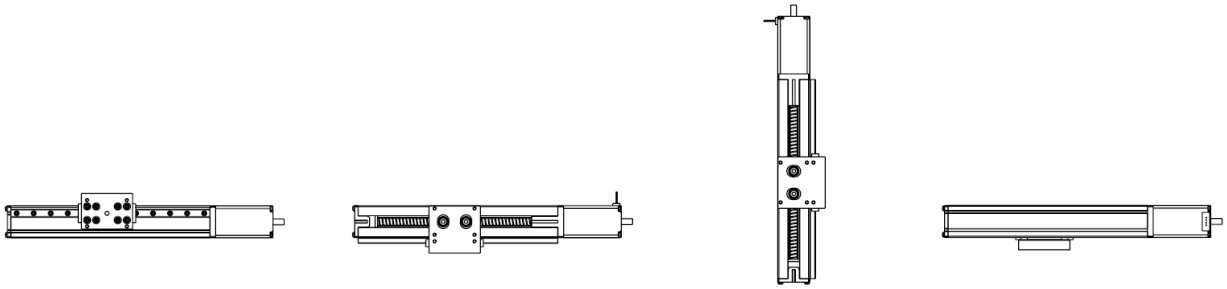
Wiring Code

Power (+)	Brown
Output Signal	Black
Ground (-)	Blue

Chapter 4 - Setup and Usage

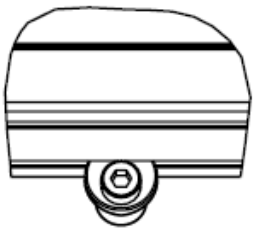
Mounting - LP28

The LP28 positioner can be mounted in a normal, side, vertical, or inverted orientation. For vertical (Z axis) mounting, care must be taken since certain leadscrew and load combinations can backdrive in a power loss situation. If possible, in the vertical orientation it is preferred that the positioner be mounted such that the motor is at the top. For all orientations, the cables should be secured as to not interfere with the movement of the carriage and load plate.



Normal Side Vertical Inverted

The LP28 positioner is mounted via accessory toe clamps that engage the bottom slot in the base profile and are intended for use with an M3 screw. The clamps are a cam style that can be loosely installed without the positioner in place, then rotated into the slot and tightened. Minimum toe clamp spacing along the length of the base profile is 150mm. With shorter units, a minimum of four clamps are recommended. See Chapter 2 for toe clamp location, and Appendix A for toe clamp drawing and part number.

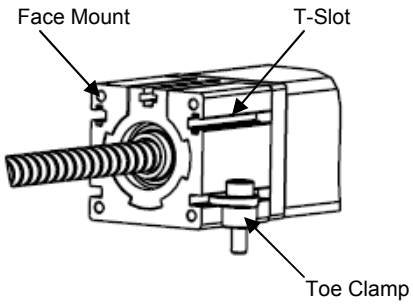


Mounting - LD28

The LD28 actuator can be mounted in a horizontal or vertical orientation. For vertical mounting, care must be taken since certain leadscrew and load combinations can backdrive in a power loss situation. If possible, in the vertical orientation it is preferred that the positioner be mounted such that the motor is at the top.

The LD28 actuator can be mounted by the following three methods:

- Toe Clamps - Installation is similar to the LP28. Four toe clamps are recommended for mounting the LD28.
- Face Mount - Four M2.5x0.45 tapped holes exist in the face of the base profile for mounting. See Chapter 2 for location.
- T-Slots - Two T-slots exist in the sides of base profile that can be employed for mounting. M2 square nuts are intended for use in the T-slots. See Chapter 2 for slot location and Appendix A for square nut drawing and part number.



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Payload Mounting - LP28

Payload is mounted to the LP28 using M3x0.5 tapped holes in the load plate. Six holes exist in the top of the load plate and four exist in the side. When fastening to the load plate, take precaution in using screws with no more than 5.5mm of engagement, as to not damage the positioner. See Chapter 2 for hole location. The hole patterns are designed to build X-Y and X-Z configurations using only accessory toe clamps. If doing so, be certain not exceed the moment load specifications outlined in Chapter 2.

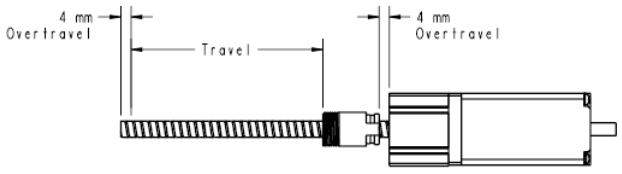
Use Appropriate Length Bolt

The LP28 design requires proper size bolts to be used when mounting payloads to the load plate. Excessive length bolts can cause damage or pin the table in position.

Leadscrew Nut Attachment - LD28

The LD28 leadscrew nut is attached to its mating component using a 7/16-20 male thread on the nut. See Chapter 2 for dimensional specifics. If the leadscrew nut needs to be removed from the leadscrew in order to install the actuator, preload will need to be reset. See Chapter 5 for procedure.

The LD 28 has approximately 8mm total overtravel (travel distance in addition to nominal travel) that must be taken into consideration when installing the actuator. The overtravel is in place so the leadscrew nut is not required to move over the extreme ends of the screw during use. At the fixed end there may be ≤ 2mm of length that contains traces of adhesive, and at the free end there will be a chamfer ≤ 2mm long on the end of the screw, rendering these areas undesirable for travel of the nut. Further, extreme care should be taken not to travel the leadscrew nut so that it makes contact at the fixed end, because this will change preload setting and possibly cause damage.



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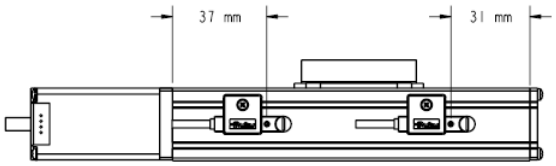
Limit/Home Switch Adjustment - LP28

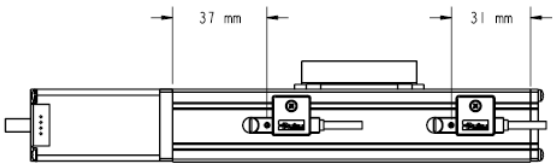
Travel limit sensors signal the motor to stop whenever the carriage is approaching the end of travel. The home sensor provides a fixed reference point to which the carriage can be commanded to return repeatedly.

If equipped, the LP28 limit and home switches are installed at the factory but not set. To adjust the switches, loosen the screw that secures the mounting clip using a #0 Phillips driver, slide the clip and switch into the desired position, and retighten. Take care not to overtighten the screw to avoid damaging the mounting clip.

The switches can be oriented on the positioner with their cable toward the motor or toward the end cap. In cases of shorter travel length, it will be necessary to orient one switch with its cable in the opposite direction relative to the other switch or switches.

Printed on the body of the switch is a target (crosshairs). Limit switch settings to utilize full travel are 37mm and 31mm from the target centerline to the end of the base profile for the motor and end cap locations, respectively.





The switches are identifiable by a cross reference part number printed on the body. These numbers are provided in the table to the right:

Limit/Home Option	Part Number	Cross Reference
H2 or L2	003-3743-07	P8S-GMFLX
H3 or L3	003-3743-05	P8S-GNFLX
H4 or L4	003-3743-08	P8S-GQFLX
H5 or L5	003-3743-06	P8S-GPFLX

Chapter 5 - Maintenance and Repair

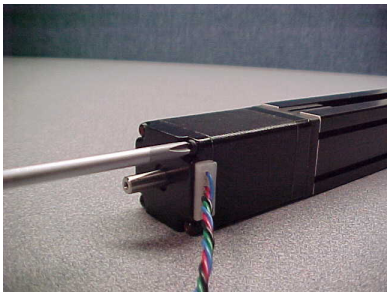
Lubrication

The LP/LD28 is a maintenance free design that requires no lubrication service over the life of the product. This includes the square rail bearing installed on the LP28 that feature a self lubricating design.

NEMA 11 Motor Installation

Follow the below procedure to remove and install the NEMA 11 motor (M1xxx Option) on the LP/LD28:

Tools Required: #1 Phillips Driver, 1.5mm Hex Wrench, Loctite 638 or Equivalent



Step 1: Remove power from unit and allow all components to reach room temperature.

Step 2: Remove the two (2) pan head screws at the back of the motor that are not covered with brown lacquer. DO NOT attempt to remove the two (2) screws that are covered with lacquer.

Step 3: Remove motor from the unit. Take care not to misplace the wave spring and spacer which will now be loose. Note the coupling hub is attached to the motor shaft at the factory with adhesive and is not intended to be removed and reused.

Step 4: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Apply Loctite 638 to coupling bore.

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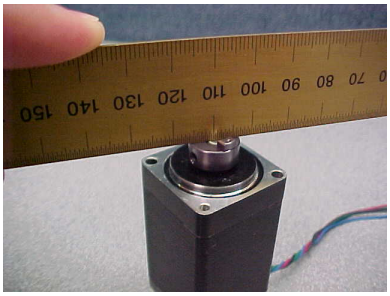
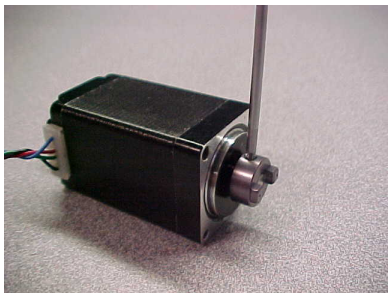
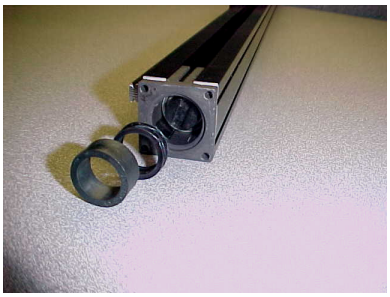
Step 5: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Place coupling hub onto motor shaft. Align set screw with flat on shaft and position hub so surface is flush with end of shaft as shown.

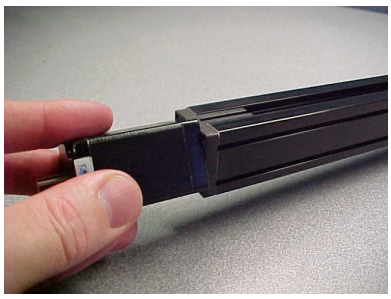




Step 6: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Tighten set screw.

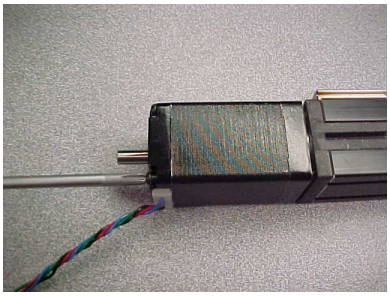
Step 7: Check that wave spring, spacer, and torque disk are in place. If wave spring and spacer need to be installed, be sure wave spring is inserted first.





Step 8: Install motor onto unit making sure coupling hub engages torque disk. Rotate motor into proper orientation. Note standard orientation from factory is such that the motor leads or cable are toward limit/home switches.

Step 9: Install pan head screws and tighten evenly as wave spring compresses.



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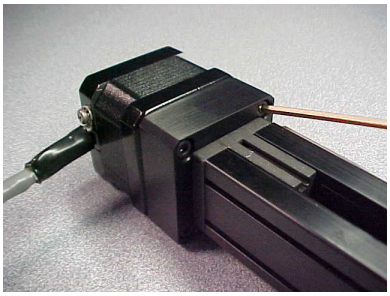
NEMA17 Motor Installation

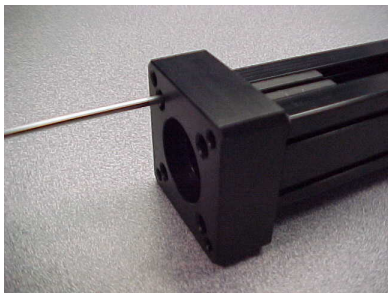
Follow the below procedure to remove and install the NEMA 17 motor (M7xxx Option) on the LP/LD28:

Tools Required: 1.5mm, 2.0mm and 2.5mm Hex Wrenches, Loctite 638 or Equivalent

Step 1: Remove power from unit and allow all components to reach room temperature.

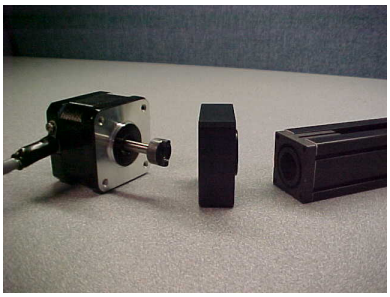
Step 2: Remove the four (4) socket head cap screws at the front of the motor adapter and remove motor. Note the coupling hub is attached to the motor shaft at the factory with adhesive and is not intended to be removed and reused.





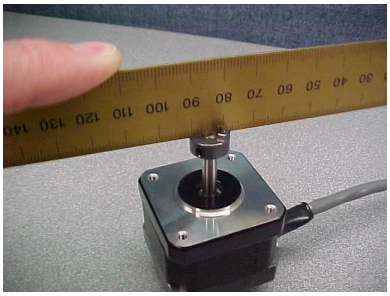
Step 3: IF REMOVING/INSTALLING NEMA 17 ADAPTER: Remove the four (4) socket head cap screws that mount the adapter.

Step 4: IF REMOVING/INSTALLING NEMA 17 ADAPTER: Remove adapter from the unit. Take care not to misplace the wave spring and spacer which will now be loose.



Step 5: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Apply Loctite 638 to coupling bore.

Step 6: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Place coupling hub onto motor shaft. Position hub so surface is flush with end of shaft as shown.



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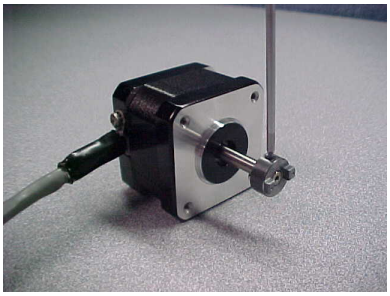
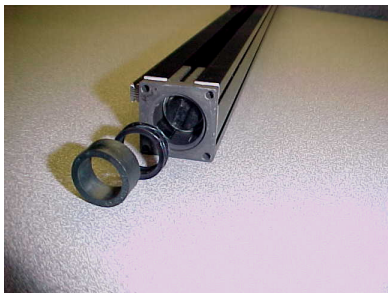
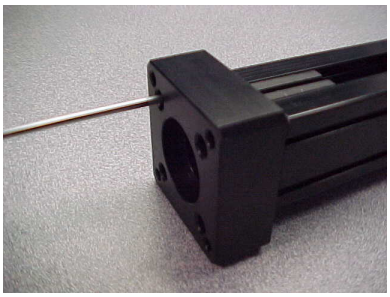
Step 7: IF INSTALLING NEW COUPLING HUB ON MOTOR SHAFT: Tighten set screw.

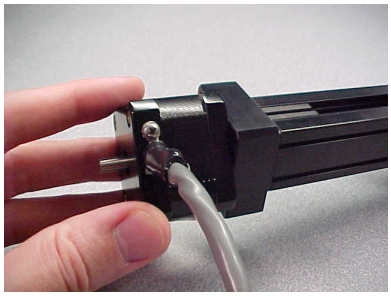




Step 8: IF REMOVING/INSTALLING NEMA 17 ADAPTER: Check that wave spring, spacer, and torque disk are in place. If wave spring and spacer need to be installed, be sure wave spring is inserted first.

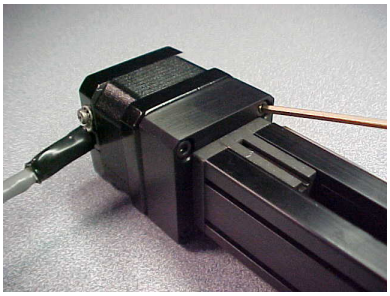
Step 9: IF REMOVING/INSTALLING NEMA 17 ADAPTER: Install adapter and socket head cap screws. Tighten screws evenly as wave spring compresses.





Step 10: Install motor onto unit making sure coupling hub engages torque disk. Rotate motor into proper orientation. Note standard orientation from factory is such that the motor leads or cable are toward limit/home switches.

Step 11: Install socket head cap screws and tighten.



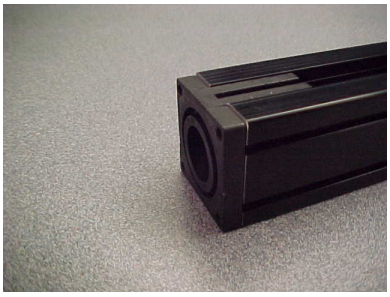
Leadscrew Preload Adjustment

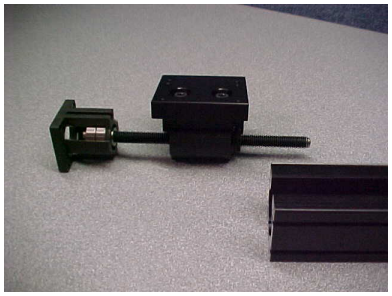
The leadscrew nut installed in the LP/LD28 includes a mechanism to compensate for backlash by adjusting preload against the leadscrew. Preload is set at the factory and readjustment is NOT advised. Variation from the factory set preload can have adverse affects on bidirectional repeatability or available thrust and component wear. However, if the adjustment is lost or preload becomes noticeably looser over time, follow the below procedure to reset preload:

Tools Required: #1 Phillips Driver (NEMA 11 motor) or 2.0mm and 2.5mm Hex Wrenches (NEMA 17 motor), Torque Watch

Step 1: Remove power from unit and allow all components to reach room temperature.

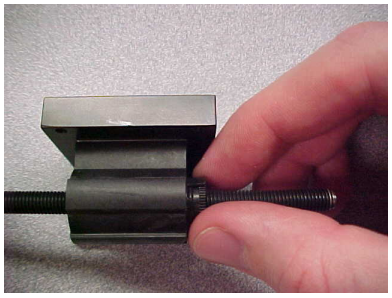
Step 2: Remove motor and motor adapter if equipped. See previous section for procedure.



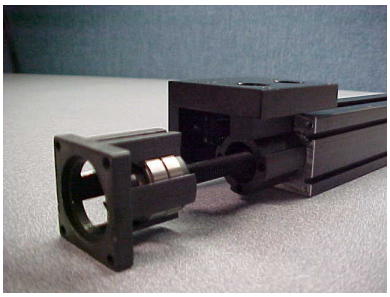


Step 3: LP28 ONLY: Slide the drive train out of positioner base. The square rail bearing trucks will need to be removed from the rail. Although the trucks have retainers to prevent the balls from escaping, use extreme care in doing this.

Step 4: Attach a torque watch to the end of the leadscrew. Holding the leadscrew nut stationary, measure the torque required to rotate the screw.



Step 5: Change preload by turning the adjuster CW for higher and CCW for lower preload until the torque required to rotate the screw is between 2 oz-in and 3 oz-in. Note torque value is NOT appropriate if motor is installed on unit and required to rotate.



Step 6: LP28 ONLY: Slide drive train into positioner base taking care when installing bearing trucks onto rail and inserting leadscrew into endcap bore.

Step 7: Reinstall motor. See previous section for procedure.

Strip Seal Replacement

Follow the procedure below to remove and replace the optional strip seal on the LP28:

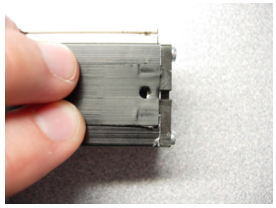
Tools Required: #1 Phillips Driver

Step 1: Remove power from unit and allow all components to reach room temperature.

Step 2: Remove the Phillips head screw and strip seal clamp from each end of the positioner. Note the location of the square nuts in the end cap slots so they are not misplaced or fall into the positioner. The strip seal kit is supplied with square nuts.

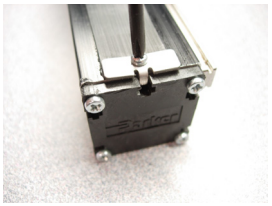
Step 3: Remove the old strip seal by pulling it from either end of the positioner through the carriage. The strip seal kit will include (2) clamps, (2) screws, (2) square nuts, and (1) 600mm length of strip seal with one end hole.

Step 4: Feed the new strip seal through the carriage. This is done by feeding each end of the strip seal through the slots in the top of the carriage.



Step 5: Align the end of the strip seal, that contains a through hole, with the end of the base extrusion.

Step 6: Secure this end with (1) clamp, (1) screw, and (1) square nut.



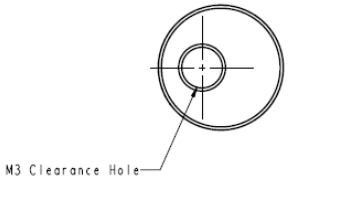
Step 7: The replacement seal will be longer than the base extrusion. To properly size the length of the seal, pull the seal at the unattached end until the seal lays flat on the base and flat on the carriage top opening. This only takes slight amount of force. Cut the seal even with the end of the base extrusion

Step 8: Punch a 1.5mm (1/16”) diameter hole in the end of the seal, 4mm (0.015”) from the end and in the center of the seal widthwise. This can be done with an awl or hole punch.

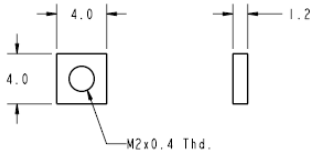
Step 9: Secure this end with a clamp, screw, and square nut. Stroke positioner from end to end to observe how seal travels. If seal is lifting from base extrusion, “bubbles up”, adjust by loosening one clamp and apply slightly more axial force to seal before tightening clamp.

Appendix A - Accessories & Spare Parts

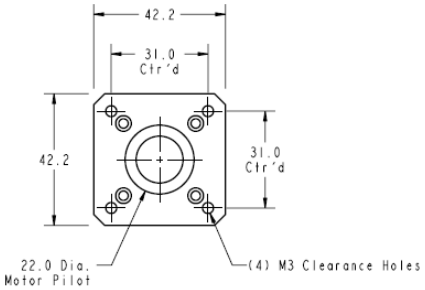
Part Number	Description
002-2530-01	Toe Clamp Kit - Includes (4) Toe Clamps and (4) M3x12 SHCS
002-2531-01	Bulk Toe Clamps - Includes (100) Toe Clamps Only
002-2532-01	Sensor Mounting Kit - Includes Mounting Clip, M2 Square Nut, and M2x5 Pan Head Screw
002-2533-01	T-Nut Kit - Includes (10) M2 Square Nuts
002-2534-01	NEMA 17 Motor Adapter Kit - Includes Adapter, (4) M2.5x20 SHCS, and (4) M3x16 SHCS
003-3550-01	Motor, NEMA 11 Triple Stack, Rear Shaft, 18” Leads - For M1321 Option
003-3550-08	Motor, NEMA 11 Single Stack, 18” Leads - For M111 Option
003-3550-09	Motor, NEMA 11 Triple Stack, Rear Shaft, 10’ Cable - For M1322 Option
003-3550-12	Motor, NEMA 11 Single Stack, 10’ Cable - For M1112 Option
003-3551-01	M2.5x60 Pan Head Screw, Mounts NEMA 11 Triple Stack Motor
003-3551-02	M2.5x40 Pan Head Screw, Mounts NEMA 11 Single Stack Motor
003-3558-03	Coupling Hub, 5mm Bore
003-3560-01	Coupling Torque Disk
003-3743-07	Sensor, N.C. Current Sinking, 3m Cable to Flying Leads - For H2 or L2 Option
003-3743-05	Sensor, N.O. Current Sinking, 3m Cable to Flying Leads - For H3 or L3 Option
003-3743-08	Sensor, N.C. Current Sourcing, 3m Cable to Flying Leads - For H4 or L4 Option
003-3743-06	Sensor, N.O. Current Sourcing, 3m Cable to Flying Leads - For H5 or L5 Option
003-3908-01	M2 Square Nut
101-1564-01	Toe Clamp
101-1567-01	NEMA 17 Motor Adapter
C*LV171-02-10	Motor, NEMA 17 Single Stack, Rear Shaft, 10’ Cable - For M7122 Option
002-2535-01	Strip Seal Kit - Includes 600mm Strip Seal, (2) Clamps, (2) Screws, (2) M2 Square Nuts



101-1564-01 Toe Clamp



003-3908-01 M2 Square Nut



101-1567-01 NEMA17 Motor Adapter

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