Warner Linear H-TRACK
Electric Linear Actuator System
Warner Linear H-Track Actuators

MORE POWER IN LESS SPACE

The H-Track provides the performance of hydraulics without the expansive space requirements nor the prohibitive cost of full-sized hydraulic systems.

The H-Track is a robust electric actuator solution with a force up to 4800lbs (21350N) and travel speeds near 4 inches (100mm) per second. The H-Track family feature the smallest mounting envelope in their class with a patented valve and reservoir design that provides significant space savings compared to competitive models.

The completely sealed H-Track models are weather-proof, dust tight, corrosive resistant, and IP67 static (temporary submersion) and IP69K (high pressure wash-down) tested. The H-Track features three different hydraulic fluid options that allow the units to operate in temperatures as low as -40°F (-40°C) to as high as 180°F (82°C), making the H-Track an ideal option for use in demanding conditions.

With stroke lengths up to 16 inches (406mm), end switch options, and multiple configurations available, the H-Track is an exciting new addition to the actuator market.

Designed for use in extreme applications requiring high load capacity in a small footprint

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**H-Track Applications**

The H-Track is a new electric actuator with self-contained hydraulic actuation to meet the growing demand for power dense actuators used in a variety of industrial applications including ag sprayer booms, snow plow blades, patient lifts and mower deck lifts.

**DESIGNED TO WITHSTAND HIGH LOADS AND JARRING BOUNCES IN THE FIELD**

With agricultural sprayers becoming larger, their boom lengths reaching 130ft in the U.S. and 177ft in Europe, the strain on the actuators have increased exponentially. The H-Track is an excellent option to meet these daunting requirements.

Actuators are used to fold the long sprayer booms from an extended position to a stowed position for transport. The folding and unfolding of the booms apply very high loads on the actuators. The strain on the units is dramatically increased when the sprayer is in motion and the bouncing of the booms put extreme loads on the actuator system.

These combined loads create tremendous impact force that can easily destroy most other electric actuators. The H-Track is designed to handle this type of extreme loading with ease.

**H-TRACK MODELS ARE IDEAL FOR USE IN DEMANDING OUTDOOR APPLICATIONS**

The outdoor environment creates very severe conditions for actuator applications. The fully-sealed H-Track family can easily meet the demands of the great outdoors.

Snow plows are a harsh application for actuators and routinely encounter damaging events that could quickly destroy most other linear actuators, such as striking a stationary concrete object at speed. The H-Track’s unique valve and reservoir design gives it the ability to cushion these blows and continue operating without issue. And the optional ability to operate in temperatures of -40°F makes it a perfect fit for even the coldest climates.

Mower deck lifts are typically where electric actuators shine. However, with the increasing deck sizes and ground speeds being developed for faster mowing, the limits of traditional electric actuators are being exceeded. With its reliable load-holding capabilities, enhanced durability for higher transport speeds, and ability to withstand high-pressure wash-downs, the H-Track is a perfect choice for the next generation of larger and faster mowers.
H-Track Electric Linear Actuator System

**Completely Self-Contained**
The motor, pump and valves are contained in one mini Power Pack mounted directly to the Integrated Cylinder/Tank

**The Power Pack**
- Only two wires to connect
- Two gear size options in combination with multiple gear housing thickness allow for variable pressures and flow
- Flow direction controlled by the rotational direction of the attached motor
- Unique valve arrangement minimizes parts and solve volume/pressure differential problems
- Patent-pending split tanks shuttle valve with backpressure relief improves efficiencies
- Three-piece design allows for multiple arrangements beyond just the one attached actuator, such as accumulators, external cylinders, and stand-alone tanks
- Many motor options can be tailored to match just about any application offense

**Integrated Cylinder and Tank**
The cylinder, reservoir is utilized for an extremely compact solution that is consistent in proportion to stroke.
- The cylinder and reservoir is utilized for an extremely compact solution that is consistent in proportion to stroke
- Cover tube acts as a reservoir for the pump that improves the cooling of the media
- Tie rod construction
- Tank reservoir covers pressure cylinder volumetrically proportional to stroke length
- Manual override allows the rod to float for operating in emergency situations

Compact gear pump and valves have many configurations to accommodate many different pressure and flow outputs

2 standard base end fitting options available.

Manual release
**H-Track Electric Linear Actuator System**

**Compact design**
H-Track actuators can fit into applications with a pin-to-pin length as small as 4.8 inches (121.92mm) + stroke and still provide up to 4800lbs (21350N) of force.

**Maintenance-Free**
Units are lubricated for life during assembly requiring no adjustments or maintenance for the actuators after they leave the factory ensuring consistent performance for the life of the actuator. All actuators feature a one year limited warranty protection.

**Superb Load Holding Power**
Warner Linear H-Track actuators operate in both tension and compression. They will hold a load stationary without power in either direction. Static load holding capability will always exceed the dynamic load moving capability.

**Energy Efficient**
Electric control provides clean, smooth linear motion without hydraulic plumbing or other expensive componentry. The H-Track’s power demands are significantly less than those of a full hydraulic system as the actuators require power only when in motion.

**Overload Protection**
Motors incorporate thermal switches in their windings to shut the actuator motor off in case of overheating or high overcurrent. Reset is automatic after the motor has cooled. A standard overload value detects if the load is excessive or reaches end of stroke.

**Versatile**
Various pump configurations create speeds that range from 0.2 inches (5mm) per second to nearly 4 inches (100mm) per second. Multiple rod ends allow for mounting flexibility. 250 and 560 Watt motor options that can use 12, 24, or 48VDC eases power supply connectivity constraints.

**Other Advantages**
- Simple installation and operation
- Safely absorbs impact shocks
- Resists drifting and locks during load reversals

**FEATURES INCLUDE:**
- Flexible bore and rod combinations allow for multiple mounting configurations
- Solid rods allow for increased resistance to buckling
- Actuator mounting length is shorter than any other electromechanical actuator on the market
- Immune to vibrational drifting and hydraulically self-locks
- Optional meter out circuits on one or both sides of the actuator ensures load run-away situations will not occur
- Fluid reservoir is vented and isolated from the atmosphere with a flexible lid allowing actuator and pump operation in any orientation without entraining or cavitation
- Minimum mounting clearance of 4.8 inches
The H1, H2 and H3 are the base models in the H-Track family. They incorporate a patented fluid power design which provides high load capability for extreme duty use, a more compact pin to pin than other actuators of the same load capability, excellent ingress protection and corrosion resistance.

The H-Track uses an external gear pump connected to a reservoir and actuator yielding the most impact resistant actuator offered by Warner Linear. The H-Track pump is burnished, cleaned, flushed and vacuum filled with degassed hydraulic fluid. The system is completely sealed with no hoses to leak. This ensures you receive contaminant-free and maintenance-free product for the life of the actuator.

**Features**

- **Hydraulic** drive delivers up to 4800 pounds (21350N) of force and travel speeds near 4 inches (100mm) per second.

- **The anodized aluminum alloy** housing resists corrosion and provides protection from dirt, dust, humidity and many corrosives. See Compliance Matrix on page 18-19.

- **Temperature operating range** of -20º F to +150º F (-26º C to +65º C). Standard -40º F to +130º F (-40º C to +54º C) and 0º F to +180º F (-18º C to +80º C) available.

- **Standard stroke lengths** of 2, 4, 6, 8, 10, 12, 14 and 16 inches (51, 102, 152, 203, 254, 305, 356, 406 millimeters)

- Consult factory for special or longer strokes

- **IP69K Dynamic**

- **IP67 Static (Temporary Submersion)**

- **Rod does not require torsional restraint**

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**Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Load Capacity</strong></td>
<td>Up to 4800 lbs. (21350N), see page 13</td>
</tr>
<tr>
<td><strong>Speed</strong></td>
<td>.2 in (5mm) to near 4 in. (100mm) /sec</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>12, 24 or 48 volt DC for all models</td>
</tr>
<tr>
<td><strong>Static Load Capacity</strong></td>
<td>5000 lbs. (22241N) for all models in compression</td>
</tr>
<tr>
<td><strong>Stroke Length</strong></td>
<td>2, 4, 6, 8, 10,12, 14 and 16 in. (51, 102, 152, 203, 254, 305, 356, 406 mm) for all models</td>
</tr>
<tr>
<td><strong>Clevis Ends</strong></td>
<td>STD .625 in. (15.9mm) diameter</td>
</tr>
<tr>
<td><strong>Duty Cycle</strong></td>
<td>25% for all models</td>
</tr>
<tr>
<td><strong>Operation Temperature Range</strong></td>
<td>-20º F to +150º F (-26º C to +65º C) for all models</td>
</tr>
<tr>
<td></td>
<td>40º F to +130º F (-40º C to +54º C) and 0º F to +180º F (-18º C to +80º C) available</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td>IP65 Dynamic, IP69K and IP67 Static</td>
</tr>
</tbody>
</table>
Selection Guide

How To Select
The minimum data required to select a unit is:

1. Working Load
2. Stroke
3. Operating Voltage
4. Operating Orientation

Step 1 – Working Load
The working load should be the amount of force required from the actuator to push or pull the load in the mechanism. Ensure a proper mechanical analysis has been completed to identify the correct force requirements. It is recommended you apply 1.2 safety-factor to your force requirement to identify the working load.

Example (Figure 1): Through analysis you find the known weight on the lever arm results in 1500lb force requirement from the H-Track actuator. The working load= 1.2 X 1500 = 1800LB

Step 2 – Stroke
This is the amount of travel from full retract to full extend that can be expected from the actuator. In Figure 2, the lever arm is to move 5.5” from point “A” to point “B”. As a rule of thumb add a small amount of extra travel to determine stroke so that the actuator does not bottom out internally. Although it is safe to bottom out the actuator, it is best practice to avoid doing so when possible.

Example (Figure 2): 5.5” (140mm) of travel required to move the load from point A to point B. Select an H-Track with 6” of stroke.

Step 3 – Operating Voltage
There are three cataloged options for the operating voltage. Typically the H-Track actuator is used on a mobile device with battery power, 12VDC, 24VDC and/or 48VDC are typical. Consult the factory for other available voltages. Be sure to size the wires accordingly. The 250Watt motor should have 10AWG to 12AWG supply wire size and the 560Watt motor 8AWG to 10AWG wire size.

Example: The application is a UTV with a 12VDC battery with 440 cold cranking amps and charged by an alternator. There are 10AWG wires available to power the actuator through a switching system that is capable of 60AMP’s continuous current draw.

Step 4 – Operating Orientation
It is important to know if the load is compression, tension or both. See page 8 (Step 2) for application considerations. It is also important to know the effect from gravity. When moving the load in the same direction as acceleration from gravity, the load can over accelerate causing a chatter effect. In these cases a meter-out valve must be specified. Although the H-Track actuator in most cases can be operated in any orientation, consult factory for assistance with perfectly vertical rod-down orientation.

Example (Figure 3): Gravity will cause the load to accelerate compressing the actuator in the direction shown by the arrow. This is a rod-up condition. It requires a “meter out compression” valve to control the load safely.
Building A Model Code

Using the previous example for defining the minimum data required to select an actuator we have the following information:

1. 1800LB Working Load
2. 6" Stroke
3. 12VDC Operating Voltage
4. Compression-Rod-Up Operating Orientation

Step 1:
Look up the working load in the Load Selection Charts provided on page 13. Example:

We find an actuator that is able to move 2000lbs during extend. We are not too concerned with the retracting load because the actuator is not required to pull in this application. We find a Bore Code of “H2”, Pump Code “A2”, Operating code “12” and a Motor Code of “1” (see Load Chart on page 13). “H2” also indicates we must have a .63” diameter. The Rod Code is “2” for that diameter rod. Looking at the H-Track configurator we have the start of a model code:

H2-12-A22-__

Step 2:
We are able to define the stroke needs to be 6". Looking at the H-Track configurator our model code now becomes:

H2-12-A22-06

Step 3:
The load is compression rod-up. With that information select a Metering code of “C”.

**NOTE** If you are not sure of your load/rod orientation it is safest to select “B” for both to avoid an unsafe condition.

Our model code now becomes:

H2C-12-A22-06

Step 4:
12VDC is what is available on the mechanism we are applying the H-Track actuator to.

Our model code now becomes:

H2C-12-A22-06

Step 5:
Mounting in our example is ideal for the H-Track. Standard rod eye and base eye clevis style mounting are sufficient.

Finally the model code is complete:

H2C-12-A22-A-06

---

**H-Track Configurator**

<table>
<thead>
<tr>
<th>Bore</th>
<th>Operating</th>
<th>Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>12VDC</td>
<td>A1</td>
</tr>
<tr>
<td>H2</td>
<td>24VDC</td>
<td>A2</td>
</tr>
<tr>
<td>H3</td>
<td>48VDC</td>
<td>A3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A4</td>
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<tr>
<td></td>
<td></td>
<td>A5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A6</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Rod Diameter**</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/4&quot;</td>
</tr>
<tr>
<td>2</td>
<td>1/2&quot;</td>
</tr>
<tr>
<td>3</td>
<td>3/4&quot;</td>
</tr>
</tbody>
</table>

**Load Chart**

**Motor Code “1” 250 Watt Motor Performance**
Below provides a selection as per this example

<table>
<thead>
<tr>
<th>EXTENDING</th>
<th>RETRACTING</th>
<th>Bore Code</th>
<th>Pump Code</th>
<th>No Load Speed</th>
<th>Max Load Speed (in/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>375</td>
<td>H1</td>
<td>B4</td>
<td>3.5</td>
<td>1</td>
</tr>
<tr>
<td>750</td>
<td>563</td>
<td>H1</td>
<td>A4</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>1000</td>
<td>750</td>
<td>H1</td>
<td>B1</td>
<td>1.75</td>
<td>0.5</td>
</tr>
<tr>
<td>1250</td>
<td>992</td>
<td>H2</td>
<td>B3</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>1500</td>
<td>1125</td>
<td>H3</td>
<td>B3</td>
<td>1.2</td>
<td>0.35</td>
</tr>
<tr>
<td>1750</td>
<td>1313</td>
<td>H3</td>
<td>B2</td>
<td>1</td>
<td>0.29</td>
</tr>
<tr>
<td>2000</td>
<td>1587</td>
<td>H2</td>
<td>A2</td>
<td>0.65</td>
<td>0.19</td>
</tr>
<tr>
<td>2250</td>
<td>1688</td>
<td>H3</td>
<td>B1</td>
<td>0.8</td>
<td>0.23</td>
</tr>
<tr>
<td>2500</td>
<td>1983</td>
<td>H2</td>
<td>A1</td>
<td>0.5</td>
<td>0.15</td>
</tr>
<tr>
<td>3200</td>
<td>2400</td>
<td>H3</td>
<td>A1</td>
<td>0.45</td>
<td>0.13</td>
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<table>
<thead>
<tr>
<th>Rod End</th>
<th>Mount</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Blank</td>
</tr>
<tr>
<td>B</td>
<td>Standard</td>
</tr>
<tr>
<td>C</td>
<td>R90 - “90” Position</td>
</tr>
<tr>
<td>D</td>
<td>“Female Thread”</td>
</tr>
</tbody>
</table>

**Special stroke lengths are available — Consult factory for special order information.”

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* These standard options may increase lead-time. Consult factory for current lead-times.
** Other rod/bore combinations available. Contact factory for options.
H-Track Electric Linear Actuator System

Product Configurator Overview

1 Step 1: Bore
Three bore sizes allowing for variable forces and travel speeds. See load charts (Step 4) to determine the bore code.

2 Meter Out Circuits
It is critical to understand the loading conditions for “Metering” model code designators to select the correct configuration. Improper selection can cause chattering. Chattering is when the gravity accelerates the load faster than the motor can move it. It causes the load to slip and stick. It is damaging to the components connected to the actuator, however the actuator has protection to prevent damaging itself.

**NOTE** If you are not sure of the metering code you must select, you may contact Warner Linear Engineering for assistance or select “B” for both. Selecting both will increase your minimum current draw, however, you will prevent chattering regardless of the load conditions.

Meter Out Compression: In this case the load is positioned in such a way that gravity will accelerate the load when the rod is retracting, pushing the rod back into the actuator. Select metering code “C”.

![Figure 4](image)

Meter Out Tension: In this case the load is positioned in such a way that gravity will accelerate the load when the rod is extending, pulling the rod out of the actuator. Select metering code “H”.

![Figure 5](image)

3 Power Supply:
Ensure the power supply is capable of delivering full rated voltage and current for your selected configuration actuator for the length of required run-time. Operating voltage, see page 14 for electrical information.

<table>
<thead>
<tr>
<th>Power Supply Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Code</td>
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<tr>
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</tr>
<tr>
<td>12</td>
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<td>24</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>48</td>
</tr>
</tbody>
</table>

Meter Out Both: In this case the load is positioned in such a way that gravity will accelerate the load when the rod is both extending, pushing the rod into the actuator and retracting, pulling the rod out of the actuator. Select metering code “B”.

![Figure 6](image)

No Meter Out: In this case the load is unaffected by acceleration of gravity. There is no need to control the load because it is controlled by an external means. Select metering code “N”.

![Figure 7](image)
Load Chart – For example, see Building a Model Code on page 7

Motor Code “1” 250 Watt Motor Performance

<table>
<thead>
<tr>
<th>Max Load</th>
<th>Max Load</th>
<th>Bore Code</th>
<th>Pump Code</th>
<th>No Load Max Load</th>
<th>Speed</th>
<th>No Load Speed</th>
<th>Max Load Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>375</td>
<td>H1</td>
<td>B4</td>
<td>3.5</td>
<td>1</td>
<td>4.38</td>
<td>1.25</td>
</tr>
<tr>
<td>750</td>
<td>563</td>
<td>H1</td>
<td>A4</td>
<td>2</td>
<td>0.6</td>
<td>2.50</td>
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</tr>
<tr>
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<td>750</td>
<td>H1</td>
<td>B1</td>
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<td>2.19</td>
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<td>992</td>
<td>H2</td>
<td>B3</td>
<td>1.4</td>
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<td>1.69</td>
<td>0.48</td>
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<td>1500</td>
<td>1125</td>
<td>H3</td>
<td>B3</td>
<td>1.2</td>
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<td>1.50</td>
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<tr>
<td>1750</td>
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<td>H3</td>
<td>B2</td>
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<td>0.29</td>
<td>1.25</td>
<td>0.36</td>
</tr>
<tr>
<td>2000</td>
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<td>A2</td>
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<td>0.23</td>
<td>1.00</td>
<td>0.36</td>
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<tr>
<td>2500</td>
<td>1983</td>
<td>H2</td>
<td>A1</td>
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<td>0.15</td>
<td>0.60</td>
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<td>0.16</td>
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</table>

Load Chart

Motor Code “2” 560 Watt Motor Performance

<table>
<thead>
<tr>
<th>Max Load</th>
<th>Max Load</th>
<th>Bore Code</th>
<th>Pump Code</th>
<th>No Load Max Load</th>
<th>Speed</th>
<th>No Load Speed</th>
<th>Max Load Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>750</td>
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<td>B4</td>
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<td>0.45</td>
<td>0.13</td>
<td>0.56</td>
<td>0.16</td>
</tr>
</tbody>
</table>

Pump Code is from Load Chart

16 = Gear Tooth
.125 = Thickness
Three Housing Sizes (Thicknesses) allowing for variable pressures and volumes. See load charts (Step 4) to determine the pump code.

Rod/Bore Specials

Rod diameter relates to housing/cylinder. The rod diameter is dependent upon the selected bore size. If your application requires a different diameter than the one predetermined, please contact the factory for options.

H-Track Electric Linear Actuator System
**H-Track Electric Linear Actuator System**

### Dimensions

<table>
<thead>
<tr>
<th>Bore/Rod Combo</th>
<th>Rod End &quot;A&quot;</th>
<th>Rod End &quot;B&quot;</th>
<th>Rod End &quot;C&quot;</th>
<th>Rod End &quot;D&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H1</td>
<td>H2</td>
<td>H3</td>
<td>H1</td>
</tr>
<tr>
<td>Stroke Length</td>
<td>[(\text{in})]</td>
<td>[(\text{mm})]</td>
<td>[(\text{in})]</td>
<td>[(\text{mm})]</td>
</tr>
<tr>
<td>2&quot; (02)</td>
<td>50MM</td>
<td>6.8</td>
<td>173</td>
<td>6.8</td>
</tr>
<tr>
<td>4&quot; (04)</td>
<td>100MM</td>
<td>8.8</td>
<td>224</td>
<td>8.8</td>
</tr>
<tr>
<td>6&quot; (06)</td>
<td>150MM</td>
<td>10.8</td>
<td>274</td>
<td>10.8</td>
</tr>
<tr>
<td>8&quot; (08)</td>
<td>200MM</td>
<td>12.8</td>
<td>325</td>
<td>12.8</td>
</tr>
<tr>
<td>10&quot; (10)</td>
<td>254MM</td>
<td>14.8</td>
<td>376</td>
<td>14.8</td>
</tr>
<tr>
<td>12&quot; (12)</td>
<td>300MM</td>
<td>16.8</td>
<td>427</td>
<td>16.8</td>
</tr>
<tr>
<td>14&quot; (14)</td>
<td>350MM</td>
<td>18.8</td>
<td>478</td>
<td>18.8</td>
</tr>
<tr>
<td>16&quot; (16)</td>
<td>400MM</td>
<td>20.8</td>
<td>528</td>
<td>20.8</td>
</tr>
</tbody>
</table>

*PP* = Pin to Pin Length. All stroke dimensions are in inches, millimeter strokes are rounded.

### H-Track Dimensions

**with “A” Standard Rod End shown**

Dimensions in inches [mm]

See page 12 for dimensions for Rod End "B" Spherical, "C" Male Thread & "D" Female Thread

Dimensions are for installation only. Tolerances shown may not reflect component manufacturing tolerances.

### Stroke Selection

**How to Use the Stroke Selection Chart**

Avoid the potential for a piston rod to buckle under load.

**Step 1** Find your stroke length in the chart.

**Step 2** Draw a straight vertical line perpendicular from your stroke length (found in step 1) until it crosses all three of the graphed lines.

**Step 3** Find your maximum load in the chart.

**Step 4** Draw a straight horizontal line from your load (found in step 3) until you cross the first line drawn in step 2.

**Step 5** You can use any of the cylinder bore sizes in which the graphed lines are to the left of the line you drew in step 2 and above the line you drew in step 4.
Warner Linear actuators are quickly and easily mounted by slipping pins through the holes at each end of the unit and into the brackets on the machine frame and load to be moved.

Use of solid pins provide maximum holding capability with a retaining ring or cotter pin on each end to prevent pin from falling out (it is best to avoid roll pins and spring pins).

Mounting pins must be parallel to each other as shown above. Pins which are not parallel can cause excess vibration or actuator binding.

Loads should act along the axis of the actuator. Off-center loads may cause binding and lead to premature unit failure.

Ensure that mounting pins are supported at both ends. Cantilevered mounting is unacceptable. Failure to provide proper support will shorten unit life.

Do not attempt to mount H-Track actuators by the cover tube. The tube is not designed to support the forces required for tube mounting.
### H-Track Electric Linear Actuator System

#### Dimension and Rod End Data

**Additional H-Track Rod Ends Available**  Contact factory for options.

Dimensions in inches (mm)

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>H1</th>
<th>H2</th>
<th>H3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin to Pin Length (mm)</td>
<td><strong>INCH</strong></td>
<td><strong>MM</strong></td>
<td><strong>INCH</strong></td>
</tr>
<tr>
<td>2&quot; (02) 50MM</td>
<td>6.8</td>
<td>173</td>
<td>6.8</td>
</tr>
<tr>
<td>4&quot; (04) 100MM</td>
<td>8.8</td>
<td>224</td>
<td>8.8</td>
</tr>
<tr>
<td>6&quot; (06) 150MM</td>
<td>10.8</td>
<td>274</td>
<td>10.8</td>
</tr>
<tr>
<td>8&quot; (08) 200MM</td>
<td>12.8</td>
<td>325</td>
<td>12.8</td>
</tr>
<tr>
<td>10&quot; (10) 254MM</td>
<td>14.8</td>
<td>376</td>
<td>14.8</td>
</tr>
<tr>
<td>12&quot; (12) 300MM</td>
<td>16.8</td>
<td>427</td>
<td>16.8</td>
</tr>
<tr>
<td>14&quot; (14) 350MM</td>
<td>18.8</td>
<td>478</td>
<td>18.8</td>
</tr>
<tr>
<td>16&quot; (16) 400MM</td>
<td>20.8</td>
<td>528</td>
<td>20.8</td>
</tr>
</tbody>
</table>

*PP* = Pin to Pin Length as shown in chart on page 10 alongside the outline drawing for reference. All stroke dimensions are in inches, millimeter strokes are rounded.
# H-Track Electric Linear Actuator System

## Performance Data

**Load Chart**

**Motor Code “1” 250 Watt Motor Performance**

<table>
<thead>
<tr>
<th>Bore Code</th>
<th>Pump Code</th>
<th>No Load Speed IN</th>
<th>Max Load Speed IN</th>
<th>No Load Speed IN</th>
<th>Max Load Speed IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>B4</td>
<td>3.5</td>
<td>88.9</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>H1</td>
<td>A4</td>
<td>2</td>
<td>50.8</td>
<td>0.6</td>
<td>15</td>
</tr>
<tr>
<td>H1</td>
<td>B1</td>
<td>1.75</td>
<td>44.5</td>
<td>0.5</td>
<td>13</td>
</tr>
<tr>
<td>H2</td>
<td>B3</td>
<td>1.4</td>
<td>35.6</td>
<td>0.4</td>
<td>10</td>
</tr>
<tr>
<td>H3</td>
<td>B3</td>
<td>1.2</td>
<td>30.5</td>
<td>0.35</td>
<td>8.9</td>
</tr>
<tr>
<td>H3</td>
<td>B2</td>
<td>1</td>
<td>25.4</td>
<td>0.29</td>
<td>7.4</td>
</tr>
<tr>
<td>H2</td>
<td>A2</td>
<td>0.65</td>
<td>16.5</td>
<td>0.19</td>
<td>4.8</td>
</tr>
<tr>
<td>H3</td>
<td>B1</td>
<td>0.8</td>
<td>20.3</td>
<td>0.23</td>
<td>5.8</td>
</tr>
<tr>
<td>H2</td>
<td>A1</td>
<td>0.5</td>
<td>12.7</td>
<td>0.15</td>
<td>3.8</td>
</tr>
<tr>
<td>H3</td>
<td>A1</td>
<td>0.45</td>
<td>11.4</td>
<td>0.13</td>
<td>3.3</td>
</tr>
</tbody>
</table>

**Load Chart**

**Motor Code “2” 560 Watt Motor Performance**

<table>
<thead>
<tr>
<th>Bore Code</th>
<th>Pump Code</th>
<th>No Load Speed IN</th>
<th>Max Load Speed IN</th>
<th>No Load Speed IN</th>
<th>Max Load Speed IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>B4</td>
<td>3.5</td>
<td>89</td>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>H1</td>
<td>A4</td>
<td>2</td>
<td>51</td>
<td>0.6</td>
<td>15</td>
</tr>
<tr>
<td>H1</td>
<td>B3</td>
<td>1.4</td>
<td>36</td>
<td>0.4</td>
<td>10</td>
</tr>
<tr>
<td>H2</td>
<td>B3</td>
<td>1.2</td>
<td>30</td>
<td>0.35</td>
<td>9</td>
</tr>
<tr>
<td>H2</td>
<td>B1</td>
<td>1.75</td>
<td>44</td>
<td>0.5</td>
<td>13</td>
</tr>
<tr>
<td>H3</td>
<td>B1</td>
<td>0.8</td>
<td>20</td>
<td>0.23</td>
<td>6</td>
</tr>
<tr>
<td>H2</td>
<td>A2</td>
<td>0.65</td>
<td>17</td>
<td>0.19</td>
<td>5</td>
</tr>
<tr>
<td>H3</td>
<td>B1</td>
<td>0.8</td>
<td>20</td>
<td>0.23</td>
<td>6</td>
</tr>
<tr>
<td>H3</td>
<td>A1</td>
<td>0.5</td>
<td>13</td>
<td>0.15</td>
<td>4</td>
</tr>
<tr>
<td>H3</td>
<td>A1</td>
<td>0.45</td>
<td>11</td>
<td>0.13</td>
<td>3</td>
</tr>
</tbody>
</table>

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H-Track Electric Linear Actuator System

Electrical Data

Power Supply
Ensure the power supply is capable of delivering full rated voltage and current for your selected configuration actuator for the length of required run-time. See Power Supply Chart below.

<table>
<thead>
<tr>
<th>Power Supply Chart</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Code</strong></td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>12</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>48</td>
</tr>
</tbody>
</table>

Maximum current requirement is the amount of current (AMPS) the power supply should be capable of supplying safely at the nominal operating voltage. It is not the operating current. Operating current draw of the H-Track actuator is load dependent. It will vary when/as load varies. It is recommended you evaluate the H-Track actuator in your application to determine your true maximum current draw.

Connections
It is important to correctly size wires routed from the power supply to the H-Track actuator. Below is a guide to assist in selecting the correct wires.

<table>
<thead>
<tr>
<th>Current Amps</th>
<th>AWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>4</td>
</tr>
<tr>
<td>90</td>
<td>4</td>
</tr>
<tr>
<td>80</td>
<td>4</td>
</tr>
<tr>
<td>70</td>
<td>6</td>
</tr>
<tr>
<td>60</td>
<td>6</td>
</tr>
<tr>
<td>50</td>
<td>6</td>
</tr>
<tr>
<td>40</td>
<td>8</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>10</td>
<td>14</td>
</tr>
</tbody>
</table>

5ft (1.5m) 10ft (3.0m) 15ft (4.6m) 20ft (6.1m) 25ft (7.6m)

* = not recommended

Fuse Recommendation for All Systems:
The fuse should be sized to 135% of full-load steady-state current.

Component Protection and DC Motors:
DC motors can produce large voltage and current spikes when powered on or off. Back-to-back Zener diodes across the motor are recommended to help suppress the large spike from affecting other sensitive components in the system. Use a 20V-30V back-to-back Zener for a 12VDC motor and a 30V-40V back-to-back Zener for a 24VDC motor. Consult the factory for further recommendations.

Application Consideration
The 12VDC 240 watt motor can consume 40 amps of current. For example, you need to provide 10 ft of wire from the power supply to the H-Track actuator. From the chart we find a recommendation for 8AWG wire. This chart is for 100% duty cycle and is based on ABYC E-11 (3% drop). With careful analysis you may find a smaller gauge wire is sufficient for your application.

Connectors are provided with each actuator. Packard 56 male connectors are provided with all motor code “1” regardless of voltage. 12 AWG ring terminals are provided for motor code “2” regardless of voltage. As a standard the male version is attached to the actuator motor at the factory and the female mate is included as a kit to be assembled by the end-user. Special connectors are available, consult the factory for assistance.

Fusing or circuit breakers are recommended for all H-Track installations. Fuse should be sized to be 135% of the full-load steady-state current draw.
**Actuator Speed**

H-Track travel speed specifications are given as speed at maximum load and no-load speed. All values are given at 70°F (21°C) and at the normal operating voltage. See below graphs of speed versus load. Please consult Warner Linear Engineering for documentation. Care should be taken when using actuator speed to calculate cycle time. This is especially important if cycle time is critical for the application. It is important to understand travel speed can be affected by the operating environment. Operating temperature, actual voltage (voltage drop), varied load conditions, etc. can affect the speed and cycle time. It is recommended the H-Track is tested to determine actual cycle times.

**A1 Pump Performance Motor Code 1**

![Graph A1 Pump Performance Motor Code 1](image1)

**A2 Pump Performance Motor Code 1**

![Graph A2 Pump Performance Motor Code 1](image2)
H-Track Electric Linear Actuator System

Performance Graphs Imperial (Metric)
Measurements*
*Performance Chart Measurements are Nominal

A3 Pump Performance Motor Code 1

B1 Pump Performance Motor Code 1

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Performance Graphs Imperial (Metric)

*Performance Chart Measurements are Nominal

B2 Pump Performance Motor Code 1

B3 Pump Performance Motor Code 1

B4 Pump Performance Motor Code 1
### Compliancy Matrix

#### H-Track Electric Linear Actuator System

<table>
<thead>
<tr>
<th>Environment</th>
<th>Test Method</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sealing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inorganic Dust</td>
<td>WL-PVM-3.1.1</td>
<td>Unit must meet IP69K operating IEC 60529</td>
</tr>
<tr>
<td></td>
<td>IEC SPECIFIED</td>
<td></td>
</tr>
</tbody>
</table>
| **Particle Impact** | WL-PVM-3.2    | Name: Gravel Bombardment  
Media Size: .96-1.6CM in diameter gravel  
Method of Delivery: 1 cubic foot poured onto unit from a height of 1 meter  
Unit Orientation: Cubic (six sides) in retracted position  
Duration: 10 cycles in each orientation  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but no alteration in operation allowed  
Note: Connectors must be mated |
|                 | Custom based on SAE J1455 |                                                                            |
| **Cleaning**    | WL-PVM-3.1        | Unit must meet IP69K per IEC 60529                                        |
|                 | IEC SPECIFIED     |                                                                            |
| **Immersion**   | WL-PVM-3.5        | Per IP-67 operating per IEC 60529                                         |
|                 | IEC SPECIFIED     |                                                                            |
| **Corrosion Resistance** |          |                                                                            |
| Chemical Resistance | WL-PVM-3.4      | Diesel Fuel  
Paint  
Ethylene Glycol  
Refrigerants  
Hydraulic Oil  
Lubricating Oil API CD (SAE J183)  
Coolant Conditioner  
Chlorox Solution (3%)  
R134a Refrigerant  
PAG Refrigerant Oil |
|                 | REFERENCE ASTM D3912 |                                                                            |
| Salt Environment | WL-PVM-3.3        | Name: Salt fog/spray  
Media Size: Mist and direct spray 25psi .3GPM minimum through a .03" nozzle  
Method of Delivery: WL Chamber EVW 50  
Unit Orientation: Not applicable  
Duration: 200 total hours  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but coatings must adhere. No alteration in operation allowed.  
Note: Connectors must be mated |
|                 | Ref ASTM B117-03  |                                                                            |
| **Vibration and Mechanical Shock** |                  |                                                                            |
| Swept Sine      | WL-PVM-4.1        | Frequency: Logarithmic sweep from 10Hz to 2000Hz  
Sweep Period: 20 minutes  
Axis: All 3 axis  
Displacement Limits: 1.5MM from 10Hz to 91Hz  
Acceleration Limits: 104m/sec^2 RMS 15G peak from 70.5Hz to 2000Hz  
Duration: 8 hours per axis  
Orientation: Horizon parallel to cylinder rod/bore axis  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but no alteration in operation allowed  
Note: Connectors must be mated |
|                 |                   |                                                                            |
| Operating Shock | CUSTOM FIELD TEST | CUSTOMER TO DEFINED CONFIDENTIAL                                            |
| Bench Handling  | WL-PVM-4.3        | Height: Drop from 1M  
Acceleration: Gravity only  
Orientation: Cubic 6 faces  
Duration: 1 time each orientation  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but no alteration in operation allowed  
Note: Connectors must not be mated |

DUT: H3N-12-IA23-A06R90
# H-Track Electric Linear Actuator System

## Compliancy Matrix

<table>
<thead>
<tr>
<th>Environment</th>
<th>Test Method</th>
<th>Definition</th>
</tr>
</thead>
</table>
| Transit       | WL-PVM-4.4  | Height: Drop from 1.2M  
Acceleration: Gravity only  
Orientation: In packaging, bulk pack only  
Duration: 1 time  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but no alteration in operation allowed  
Note: Connectors must not be mated |
| Installation  | WL-PVM-4.5  | Height: Drop from .2M do not reach ground must be restrained by wire harness.  
Acceleration: Gravity only  
Orientation: Not applicable  
Duration: 6 times  
Pass-Fail Criteria: Must be fully functional after test, cosmetic damage allowed, but no alteration in operation allowed. Crimps must be intact and meet Warner’s non-destructive pull-test.  
Note: Connectors must be mated |

### TEMPERATURE / HUMIDITY

- **Operational Temperature**  
  WL-PVM-5.1.2 REFER TO COMBINED ENVIRONMENT SECTION 2.3.2

- **Humidity**  
  WL-PVM-5.1.3 REFER TO COMBINED ENVIRONMENT SECTION 2.3.2

- **Storage Temperature**  
  WL-PVM-5.0 REFER TO COMBINED ENVIRONMENT SECTION 2.3.2

- **Storage Humidity**  
  WL-PVM-5.0 REFER TO COMBINED ENVIRONMENT SECTION 2.3.2

- **Thermal shock**  
  WL-PVM-5.0  
  TEMP MAX: 70°C (158°F)  
  TEMP MIN: -40°C (-40°F)  
  TRANSITION TIME: LESS THAN 1 MINUTE  
  CYCLE TIME: 5 MINUTE SOAK AT EXTREME TEMPS measured at the motor shell  
  NUMBER OF CYCLES: 20

### RADIATION

- **Ultraviolet Effects**  
  ISO 4892 METHOD A  
  300 HOURS 100% UV EXPOSURE

### Combined Environmental

- **Test in environmental chamber**  
  where temperature, humidity, voltage and load vary over a 12 hours equalling 1 cycle. The device under test must endure 51 cycles without loss of performance  
  WL-PVM-2.3.2  
  Temperature varied from -20F to +150F over 12 hours  
  Relative humidity varied from 10% to 90% over 12 hours  
  Loading- varies from -500lbf (tensile) 1250lbf (compression) totaling 500 actuations in 12 hours  
  Voltage varies from 9VDC to 16VDC

## Combined Environment Schedule

![Combined Environment Schedule](image)
**H-Track Electric Linear Actuator System**

**Glossary**

**Axial Load**  
A load along the axis of the actuator screw (Figure 1).

**Cantilevered Mount**  
A mounting where the mounting pin is not supported on both sides. Cantilevered mounts are common causes of failure (Figure 2).

**Clevis Mount**  
A U-shaped metal piece that has the ends drilled to accept a pin or bolt through actuator mount holes (Figure 3).

**Compression Load**  
Compression loading will press on the unit (Figure 4).

**Current vs. Load**  
The current load on the motor is measured by amperes. Current draw will increase as load increases.

**Cycle**  
Movement from a fully retracted to fully extended position and back to fully retracted.

**Duty Cycle**  
The amount of ‘on-time’ vs ‘total time.’ A 25% duty cycle means that a unit operates for 10 seconds out of 40 seconds or 4 seconds out of 16 seconds.

**Eccentric Load**  
An off-center load which may cause binding and shorten actuator life (Figure 5).

**Extension Rate**  
The rate of speed at which the actuator extends or retracts. The impact of load on speed has a greater effect on DC units than AC units.

**Efficiency**  
Ratio of input power to output power.

**Extended Length**  
The overall length of the actuator from the center of the rear clevis to the center of the extension tube pin hole when the unit is at full extension (see figure 6).
Load
The force, measured in pounds, that is applied as an axial load on the actuator.

Load Holding
The ability of the actuator to hold a load stationary when power is off.

Peak Load
The maximum dynamic load that will be applied to the actuator or that the actuator is capable of moving.

Pin Mount
The use of a dowel or pin through the hole in the clevis mount on the rear of an actuator or the extension tube (on the front of an actuator) (Figure 7).

Radial Load
A load applied to the side of the rod or across the body of the actuator. Radial loading will have a negative impact on unit life (Figure 8).

Retracted Length
The overall length of the actuator from the center of the rear clevis to the center of the extension tube pin hole when the unit is at full retracted position (Figure 9).

Side Load
See radial loading (Figure 8).

Static Load
The maximum non-operating (or non-moving) load. Static load is the load holding capability of an actuator.

Synchronous Operation
Having more than one actuator extend and retract together maintaining ± 0.20 position relative to each other.

Tension Load
A load that will tend to pull on the unit (Figure 10).

Thermal Overload
A switch within the motor that will stop the motor if it exceeds a safe heat level.
# H-Track Application Data Form

**Mail or Fax to:** Warner Linear | Application Engineering | 449 Gardner St. | South Beloit, IL 61080  
**FAX:** 815.389.6678  
**Phone:** 800.825.9050

<table>
<thead>
<tr>
<th>Contact:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company:</td>
<td>Application:</td>
</tr>
<tr>
<td>Location:</td>
<td>Cust. Project ID:</td>
</tr>
<tr>
<td>PDR number:</td>
<td>EAU:</td>
</tr>
<tr>
<td>Production Launch:</td>
<td>Target Cost:</td>
</tr>
<tr>
<td>Electrical System:</td>
<td>Operating Voltage</td>
</tr>
<tr>
<td>Cylinder Stroke:</td>
<td>inches</td>
</tr>
<tr>
<td>Cylinder Bore/Rod:</td>
<td>Ø1.00”B</td>
</tr>
<tr>
<td>Electric Wire End:</td>
<td>Connector Requirement</td>
</tr>
<tr>
<td>Time to extend/retract:</td>
<td>Speed under load IPS</td>
</tr>
<tr>
<td>Temperature Range:</td>
<td>Min °F</td>
</tr>
<tr>
<td>Installation:</td>
<td>Indoor</td>
</tr>
<tr>
<td>Mounting Angle:</td>
<td>Angle at Full Retract</td>
</tr>
<tr>
<td>if applicable:</td>
<td>Angle at Full Extend</td>
</tr>
<tr>
<td>Vibration in Application:</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Duty Cycle:</td>
<td>Cycles/Day</td>
</tr>
<tr>
<td>Minutes Between Cycles:</td>
<td>Days/Year</td>
</tr>
<tr>
<td>Machine Life Hours:</td>
<td></td>
</tr>
<tr>
<td>Load on Cylinder:</td>
<td>Compression</td>
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</tbody>
</table>

![Diagram](image)

<table>
<thead>
<tr>
<th>Static Loading:</th>
<th>Minimum</th>
<th>Reduced Force Req’d:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator Force Required:</td>
<td>Extension</td>
<td>Retract</td>
</tr>
<tr>
<td></td>
<td></td>
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</table>

**Additional Notes:**

**Altra Seller:**  
**Account ID #:**  
**Model Code:**
ONLINE RESOURCES

Thomson offers a wide variety of online resources to help you learn more about electric linear actuators. An experienced team of application engineers is also available to help you. To explore additional technical resources and options, contact Thomson customer support at www.thomsonlinear.com/cs.

Smart Actuators Product Website
Learn more about smart actuators and how they can help you build better machines at: www.thomsonlinear.com/smart

Free CAD Models
Download free interactive 3D CAD models in the most common CAD formats at: www.thomsonlinear.com/en/products/linear-actuators-drawings

Electrak® HD Product Website
Get additional information and learn more about Electrak HD at: www.thomsonlinear.com/hd

Mobile Off-Highway Product Website
Learn how actuators can be used in mobile off-highway vehicles at: www.thomsonlinear.com/moh

www.thomsonlinear.com
## Specifications

Specifications are subject to change without notice. It is the responsibility of the product user to determine the suitability of this product for a specific application. All trademarks property of their respective owners. © 2019 Thomson Industries, Inc.

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