HAS
Hybrid Actuation System
Solar Tracking Solutions

Parker
ENGINEERING YOUR SUCCESS.
Actuation systems must be efficient, precise, and durable enough to withstand harsh power-generation environments. Parker Hannifin Corporation has developed a hybrid actuation system (HAS) that is ideal for renewable-energy actuation applications, such as those used with solar panels, wind turbines, and hydro-electric dams.

The new hybrid design combines the controllability of traditional electromechanical actuators with the power density, longer life, and resistive-force capabilities of traditional hydraulic systems. The result is an improved actuation system for single and dual axis tracking and other renewable energy systems, with a wider range of capabilities.

**More efficiency, less maintenance**

This high-efficiency, modular system allows for various traditional cylinder mounting configurations and stroke lengths. The hybrid design is a fully self-contained system with no hydraulic hoses or power units. Hybrid hydraulics achieve exceptional economies of scale, with the ability to move over a megawatt from a single point. This makes HAS a good choice for large or small arrays.

**Solar applications**

For solar panels, HAS is a ultra-efficient, completely self-contained reversible hydraulic pump and electric motor that eliminate nearly all leak paths into or out of the package. Parker engineers designed a hybrid actuator into the pitch system so designers can move more photo-voltaic panels with fewer actuators and controls, resulting in lower installation costs and longer service over the life of the solar field. The design offers clear advantages over comparable electromechanical actuator (EMA) systems because all the internal-wear items are permanently lubricated for extended life. The power density of HAS is typically three times that of a comparable electric cylinder.

Photo courtesy of GMI Solar.
# Model Ordering Code

## How to Order Basic Model with HAS Pump Motor Code:

1. Specify the complete Parker Cylinder Model Number.
2. Specify the Pump Motor Code.

### Basic Model Numbers

<table>
<thead>
<tr>
<th>Bore Dia.</th>
<th>Cushion Head</th>
<th>Double Rod</th>
<th>Mounting Style</th>
<th>Series</th>
<th>Piston</th>
<th>Ports</th>
<th>Seals</th>
<th>Special Modifications</th>
<th>Piston Rod Number</th>
<th>Rod End Thread Style</th>
<th>Thread Type</th>
<th>Stroke</th>
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</table>

- Specify bore sizes
- Consult factory for cushion

### B = Standard seal package
- See specific catalog for seal selection

### Blank = No ports sealed actuator
- Specify an “S” for HAS modification

### X = no ports sealed actuator
- Specify Style
- Small
- Male
- Style 4
- Intermediate
- Male
- Style 8
- Special
- Specify
- KK
- A
- W or
- WF dimension required.

### MD00 = No load holding
- PA00 = A port PO check
- PB00 = B port PO check
- PDC00 = Dual PO Check
- CAH0 = A port counterbalance, 1000-4000 psi, 3K setting
- CBH0 = B port counterbalance, 1000-4000 psi, 3K setting
- CDH0 = Dual counterbalance 1000-4000 psi 3K setting
- XXXX = other specify

### M010 = 0.010 in³/rev
- M019 = 0.019 in³/rev
- M025 = 0.025 in³/rev
- M032 = 0.032 in³/rev
- XXXX = other specify

### 10 = 1000 psi
- 15 = 1500 psi
- 30 = 3000 psi
- 40 = x 100 psi

### A30 = Aluminum 3X Rod Area
- C30 = Composite 3X Rod Area
- KB = Kendal Blue
- DC = Parker DuraClean
- XX = other specify

### A = Reservoir Cap End
- B = Reservoir Head End

*Consult current RDH, 2H/3H or 3L catalog for complete dimensions, specifications and model number information.*
Parker HAS actuators offer low cost, ease of maintenance and durable choice for large and small arrays

HAS Solar Actuators are built for maintenance free operation for several years. Oil volumes are reduced minimal amounts, generally less than 1 gallon reservoir sizes. Serviceability is built into the design. The system can be serviced on site, with Parker’s fluid exchange system.

**Sealed Reservoir** – Composite or aluminum construction. Multiple fluid options to meet your environmental needs including arctic conditions.

**Completely Sealed** – Self contained hydraulic system. No fluid to add, plug and play ready.

**Heavy Chrome Plated Rod Standard** – Global Shield Coated and stainless also available.

**Optional Absolute Linear Feedback** – Parker’s Intellinder, optical reader and bar coded rod for piston position measurements. Shown with dual sensors for redundant measurements.

**No Fittings, Fluid Transfer** – Tubes with elastomer seals to ensure worry free operation.

**Product Features**

- Simple two wire operation
- AC and DC supply voltages available
- Low amp draw, 50% duty cycle, high efficiency tracking solutions
- No hydraulic hoses, no hydraulic power unit, self contained system
- High locked hold force to withstand wind gusts
- No reduction in life commonly found with screw-type actuators when loaded

- Modular system allows for various traditional cylinder mounting configurations and stroke lengths
- Surface preparation for outdoor installations
- Heavy chrome plated rods are standard, Global Shield™ rod coating and stainless steel rods for extreme corrosion prevention are optional
- Available with Intellinder™ continuous feedback or end of stroke, stroke to go switch options
HAS Hybrid Actuation System
Solar Tracking Solutions

Design Features

Low Amp Draw – 12 and 24V DC permanent magnet motors

Nine Mounting Styles – including front and rear pivoting mounts

Epoxy Paint Standard – shown with Optional Global Shield Corrosion Resistance Coatings

Fluid Exchange Connections – on solar panel servicing when required

Other highlights include

- Complete actuator ready for operation
- Robust steel hydraulic cylinder, welded round line or tie rod construction
- Thrust forces to 676 kN standard
- Anodized aluminum pump manifold, weight savings
- Load holding (PO checks) standard with optional counterbalance valves
- Custom circuits available
- Virtually maintenance free for low operating costs
- 25 year product life*
- Industry leading warranty**

* Based upon typical solar tracking cycles
** Extended warranty available

<table>
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<tr>
<th>Bore</th>
<th>Model No.</th>
<th>Push Force Typical, Low Amp Draw</th>
<th>Maximum Force</th>
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<td>inch</td>
<td>mm</td>
<td>lbf</td>
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<td>51</td>
<td>2.00 XX XX</td>
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<td>3.25 XX XX</td>
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<td>5.00 XX XX</td>
<td>9817</td>
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<td>153</td>
<td>6.00 XX XX</td>
<td>14137</td>
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<tr>
<td>8.00</td>
<td>204</td>
<td>8.00 XX XX</td>
<td>25133</td>
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</table>

1 Consult Factory for sizing, complete model number; various stroke lengths and custom configurations available
2 Increase in force will result in higher amp draw up to locked force rating
HAS-RDH Series Cylinders from Parker

Advanced Sealing Technology
All components are manufactured by Parker and designed for high performance, long service life, low friction and zero leakage.

- **Tri-lip rod seal** (3 sealing edges!) and bi-directional piston seal feature proven leak-free performance.
- **Durable polyurethane** material is used to maximize seal life.
- **Nitrile end seals** and backup rings on a smooth bore of the cylinder body for optimal sealing and elimination of extrusion problems.
- **Composite rod and piston wear rings** are internally lubricated for reduced friction and formulated for heavy-duty, load-bearing applications.
- **Standard rod material is case-hardened, hard chrome plated and polished to an optimum finish.**
- **And since we make our own seals, all seals have immediate availability in other popular compounds.**

Switch-Ready
- **The Parker ALS Switch is the lowest cost point feedback solution** for carbon steel cylinders with a piston magnet ring.
- **Switches can be located anywhere along the stroke** and in any orientation.
- **Unique round body brackets** minimize installation time.
- **EPS & CLS threaded switches** are available for end-of-stroke sensing.

Easy Installation
Standard mounts and rod ends accommodate commercially-available NFPA accessories.

Proven Exterior Toughness
- **Steel cap, cylinder body and ports** for high-strength in rough environments.
- **Case-hardened, hard chrome plated** and polished carbon steel piston rod for damage resistance, long rod seal life and low friction.
- **Outboard urethane rod wiper seal** to remove external debris and adherents from the piston rod.
- **High quality paint coating** for interior or exterior applications.

Composite Wear Rings
Parker WearGard™ bearing materials are backed by over 30 years of manufacturing expertise.

- Heat stabilized and internally lubricated for **low friction and maximum service** life in any application.
- Strength characteristics meet or exceed most metals traditionally used in wear rings.

Environmentally Friendly
RoHS-compliant materials
HAS-RDH Series Mounting Styles and Specifications

Available Mounting Styles

<table>
<thead>
<tr>
<th>Available Mounting Styles</th>
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<td>Basic, No Mount</td>
<td>Cap Fixed Eye</td>
<td>Cap Fixed Clevis</td>
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<td>Style T</td>
<td>Style B</td>
<td>Style BB</td>
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<tr>
<td>Spherical Bearing Cap End</td>
<td>Crosstube Cap End</td>
<td>Intermediate Fixed Trunnion</td>
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<td>Style SB/SBM</td>
<td>Style TT</td>
<td>Style DD</td>
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<td></td>
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<tr>
<td>Round Head Flange</td>
<td>Round Cap Flange</td>
<td>Double Rod Cylinders</td>
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<tr>
<td>Style J</td>
<td>Style H</td>
<td>Style KT Shown</td>
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<tr>
<td>Style JP with close tolerance pilot</td>
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Specifications

Actuator
Type: Hydraulic, double and single acting, (power up gravity down)
Bore Size: 1-1/2" thru 8" bore

Motors
Motor Types:
12V DC, 245W (M12L)
12V DC, 560W (M12H)
24V DC, 245W (M24L)
24V DC, 560W (M24H)
Other voltages available, consult factory

Pumps
Type: Gear Reversible
Displacements:
M010 - 0.010 in³/rev (0.16 cc/rev)
M019 - 0.019 in³/rev (0.31 cc/rev)
M025 - 0.025 in³/rev (0.41 cc/rev)
M032 - 0.032 in³/rev (0.53 cc/rev)

Reservoir
Style: Sealed, (standard) Optional Vented
Construction: Aluminum, Composite
Capacity: 3 times piston rod area
Fluid: Parker Duraclean™, Hyken Glacial Blu, other available

Manifolds
Circuits:
Load holding single and dual pilot operated checks
Load holding single and dual counterbalance valve
Power up, gravity down
Custom solutions available

Temperature
-34°C (-30°F) to 65°C (150°F)
HAS Hybrid Actuation System
Solar Tracking Solutions

Hydraulic and Electric Circuits

Circuit Options

Typical Dual Acting Hydraulic Circuit, shown with PD00 manifold option

Single Acting Hydraulic Circuit powered up, gravity lower

Electrical Schematic

Weight Estimates

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<tr>
<th>Bore</th>
<th>Base Weight (lbs)</th>
<th>Add per inch of stroke</th>
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Basic Cylinder weight in lbs. Based upon DD mount, and largest rod combination. Consult factory for specific weights details.

Simplified Electrical Wiring Schematic

<table>
<thead>
<tr>
<th>Function</th>
<th>Positive</th>
<th>Ground</th>
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<tbody>
<tr>
<td>Extend</td>
<td>Blue</td>
<td>Green</td>
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<tr>
<td>Retract</td>
<td>Green</td>
<td>Blue</td>
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With pump on cylinder cap end
Performance Data – Metric

Note: Theoretical values, actual data may vary.
Performance Data – Metric

Note: Theoretical values, actual data may vary.
Performance Data – Metric

Note: Theoretical values, actual data may vary.
<table>
<thead>
<tr>
<th>Bore Size</th>
<th>Push Force (lbs)</th>
<th>Thrust Forces</th>
<th>Max Velocity (inch/sec)</th>
<th>Thrust Forces</th>
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<tr>
<td>Motor Amps</td>
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<td>0.128</td>
<td>0.075</td>
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<td>PRODUCE</td>
<td>1.028</td>
<td>0.842</td>
<td>0.726</td>
<td>0.677</td>
<td>0.60</td>
<td>0.57</td>
<td>0.54</td>
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<td>1.093</td>
<td>0.961</td>
<td>0.806</td>
<td>0.618</td>
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<td>1.215</td>
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<td>0.959</td>
<td>0.806</td>
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<td>1.942</td>
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<td>0.379</td>
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<td>0.323</td>
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<td>0.128</td>
<td>0.075</td>
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</tbody>
</table>
Theoretical Pull Forces / Duty Cycle

Theoretical Pull Forces

<table>
<thead>
<tr>
<th>Rod Dia (inch)</th>
<th>To determine HAS Pull Force, select the proper rod diameter and deduct the value from the Push graphs or chart data to confirm the HAS actuator can achieve the proper pull loads.</th>
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<tbody>
<tr>
<td>1.000 lbs</td>
<td>N 393 785 1178 1571 1963 2356</td>
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<tr>
<td>1.375 lbs</td>
<td>N 1747 3494 5240 6987 8734 10481</td>
</tr>
<tr>
<td>1.750 lbs</td>
<td>N 742 1485 2227 2970 3712 4455</td>
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<td>2.000 lbs</td>
<td>N 3303 6605 9908 13210 16513 19815</td>
</tr>
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<td>2.500 lbs</td>
<td>N 1203 2405 3608 4811 6013 7216</td>
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<td>3.000 lbs</td>
<td>N 5350 10699 16049 21398 26748 32098</td>
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<td>3.500 lbs</td>
<td>N 1571 3142 4712 6283 7854 9425</td>
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<td>4.000 lbs</td>
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<td>5.000 lbs</td>
<td>N 10918 21835 32753 43670 54588 65505</td>
</tr>
<tr>
<td>5.500 lbs</td>
<td>N 3534 7069 10603 14137 17671 21206</td>
</tr>
</tbody>
</table>

For 24V motors, current draw is approximately one half charted data. Consult factory for Pull values.

Standard Duty Cycle Characteristics

For 24V motors, current draw is approximately one half charted data. Consult factory for Pull values.
Series Applications Worksheet

Please provide as much information as possible

Customer Information

Company Name: ____________________________
Contact: ________________________________
Phone: _______ Fax: _________________
E-Mail: __________________________________
Address: __________________________________

Cylinder Information: Quantity: __________

Move Distance: ______________ in. __________ mm
or
Overall Stroke: ______________ in. __________ mm

Rod End: Male English
          Female Metric
          Rod Eye
          Other: ____________________________

Mounting
Primary: ________________________________
Secondary: ______________________________

Rod Orientation: Horizontal    Up    Down
                Angle: _______ Degrees

Applications Sketch and Notes:

Completed form can be returned via email to
cylproductinfo@parker.com or faxed to (800) 892-1008.

Application Information:

Dynamic Force Required: __________ lbs / kN
Resistive (locked) Force: __________ lbs / kN
Load/Fixture Weight: __________ lbs / kN

Speed:
Maximum: __________ in./sec. __________ mm/sec.
Minimum: __________ in./sec. __________ mm/sec.

Move Time: __________ seconds

Total Cycle Time: __________ seconds

Environmental:
Ambient Temp: __________________________
Humidity: ______________________________

Drive Power: 12 VDC  24 VDC
Other __________

Parker Hannifin Corporation
Cylinder Division
Des Plaines, Illinois USA