AXIAL VANE

HYDRAULIC MOTORS

PLANETARY GEAR BOXES

MOTOR/GEAR BOX/
BRAKE PACKAGES

Smooth, precise position control and rotary power transmission.
AXIAL VANE MOTORS

Compare with the others — only Von Ruden Axial Vane hydraulic motors offer all of these advantages.

1. HOLD POSITION REPEATEDLY AND ACCURATELY
   The case drain leakage in Von Ruden Axial Vane motors is so low that servo valves can easily compensate for it. Case drain leakage is limited to the amount of fluid that can pass through the very tight diametral clearance between the rotor shaft and journal bearings.

   In servo systems cross port leakage is effectively zero since servo valves apply equal pressure to both motor ports when in the "null" position.

2. MECHANICALLY "STIFF" WHEN LOCKED
   Rigid one piece rotor and shaft.

   No internal backlash from keys, splines or gears.

3. SMOOTH STARTS AND SMOOTH SLOW SPEED OPERATION
   Low torque and speed ripple. Breakaway pressure is typically less than 10 psi.

   Mechanically Smooth since:
   • Rotor is 360° pressure balanced.
   • The diametral clearance between the vanes and housing is fixed. There is no metal-to-metal contact.
   • The design incorporates only a few rotating parts.
   • All bearings are pressure lubricated.

4. LONG LIFE
   A fixed diametral clearance exists between the rotor veins and housing instead of metal-to-metal contact.

   All other rotating parts are pressure lubricated operating on a definite oil film.

   Extremely long life can be expected when properly applied within recommended operating specifications.

   External radial or thrust loads must not be applied to the output shaft.

5. HIGH STARTING TORQUE
   Typically 97% of the theoretical at rated pressure.

   Due to their mechanical smoothness.

6. MANIFOLD PORT CAPABILITY
   For direct valve mounting.

   Or for use with Von Ruden optional cross-over relief valves.

## INDUSTRIAL SERIES

Our standard series, with performance suitable for most high performance industrial applications.

## SERVO SERIES

For more demanding applications requiring the highest level of performance.

Servo series motors are obtained by:
• A tighter diametral "select fit" between the housing and rotor vane assembly.
• Additional production test requirements. Torque ripple variation, mechanical binding, total cross port leakage and the variation of cross port leakage within a revolution must all be within tight specific limits.
How the Axial Vane motors work.

Pressure acting on vanes #1 and #4 causes rotation in the clock wise direction and pressure balances the rotor. Vanes #2 and #5 are inactive in the position shown. Vanes #3 and #6 have been rotated to the position shown to clear steps on the housing.

Now, a single source for pre-engineered drive packages.

- Single source responsibility
- Pre-engineered and tested
- Reduce your development time
- Reduce your assembly time
- Eliminate duplicate shafts and bearings
- Reduce envelope dimensions
- Reduce your overall cost

Hydraulic Motor Options
- Choice of motor output shafts
- Motor mounted dual relief valves
- Rotor shaft extensions
- SAE “B” flange mount
- Tach generator packages

Motors with Brakes
- Brakes mounted directly on rear of motors.
- Normally-on brakes with hydraulic pressure release.
- Optional brake torque capacities.

Motor/gear Box Packages
- Gear box torque capacities to 25,000 lb-inches.
- Gear box ratios up to 10:1.
- Choice of gear box output shafts.
AXIAL VANE MOTORS

MODEL 10

Fluid cleanliness
A cleanliness of ISO 18/15 (NAS 1638 Class 9, or SAE 749D, Class 6) should be maintained prior to and during operation. A nominal filtration of 25 microns or better is recommended.

Fluids
MOTORS—High grade mineral base hydraulic oil with 75-400 SSU viscosity is recommended. Fluid temperature should be between -40° and 160°F. Seals are also available for fire resistant fluids such as phosphate ester.

GEARBOX—90 wt. lub. oil above 20°F; 80 wt. below 20°F.

Braking Circuits
For hydraulic surge pressure, applied to or generated by the motor, a close coupled direct acting relief valve must be provided in the circuit. This will keep these surges from exceeding the maximum pressure rating.

Overrunning Loads
The inlet must be provided with sufficient oil to prevent cavitation in overrunning loads.

Radial loads (Output Shaft)
The Axial Vane motors must be protected from any side loads. In applications where this cannot be avoided a radial load adapter must be used.

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Displacement in³/Rev</th>
<th>Pressure Δ PSI</th>
<th>Continuous</th>
<th>Intermittent</th>
<th>Max. RPM</th>
<th>Theoretical Torque (continuous)</th>
<th>Theoretical Horsepower at Continuous Speed and Pressure</th>
<th>Weight Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.0</td>
<td>3000</td>
<td>3000</td>
<td>2000</td>
<td>3000</td>
<td>477 (8.7 GPM)</td>
<td>15.2</td>
<td>23</td>
</tr>
<tr>
<td>10A</td>
<td>1.0</td>
<td>1500</td>
<td>2200</td>
<td>1500</td>
<td>2000</td>
<td>1194 (16.2 GPM)</td>
<td>28.4</td>
<td>39</td>
</tr>
<tr>
<td>25</td>
<td>2.5</td>
<td>3000</td>
<td>3000</td>
<td>1500</td>
<td>2000</td>
<td>1671 (22.7 GPM)</td>
<td>39.73</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>3.5</td>
<td>3000</td>
<td>3000</td>
<td>1500</td>
<td>2000</td>
<td>1990 (32.5 GPM)</td>
<td>47.7</td>
<td>46</td>
</tr>
<tr>
<td>50</td>
<td>5.0</td>
<td>2500</td>
<td>3000</td>
<td>1500</td>
<td>1500</td>
<td>2229 (40.9 GPM)</td>
<td>47.7</td>
<td>52</td>
</tr>
<tr>
<td>70</td>
<td>7.0</td>
<td>2000</td>
<td>2000</td>
<td>1350</td>
<td>1500</td>
<td>2774 (45.5 GPM)</td>
<td>47.7</td>
<td>52</td>
</tr>
</tbody>
</table>

1. Running torque approximately 94% of the theoretical
2. Stall torque approximately 98% of theoretical
3. Volumetric efficiency up to 98% depending on speed and pressure
4. Case drain line not to exceed 25 PSI (optional seals available for 250 PSI)
5. Intermittent conditions to be less than 10% of every minute
6. Inlet and return pressures not to exceed the ratings listed above
7. Model 10A is 1.0 in³ performance in 2.5 in³ form size. For maximum performance maintain a minimum of 500 PSI Δ

Start Up of a New System
Be certain the case is full of oil before starting the motor. The case may be filled through the case filling and flushing port. The case may also be filled by subjecting the motor to 200 to 500 PSI “null pressures” (pressure on both ports) with the case filling and flushing port plug back out slightly. When oil begins to flow out of this port, with motor horizontal, the case is assumed to full.

A filter installed in the inlet line is recommended for the first 15 minutes of operation in a new system.

“Null Pressure” (Pressure on both ports)
If during Operation, “Null Pressure” are expected to exceed 2000 PSI, connect the case filling and flushing port to a relief valve set at 1000 PSI and drain to the reservoir with a ¾-inch I.D. line.

Blocked Center Valves
Whenever a block center valve is used, crossover relief valves should be included to protect the motor from excessive pressure surges.
### MODEL 10 SPECIFICATIONS

- **Operating pressure (Continuous)**: 3000 PSI  
  (Intermittent): 3000 PSI
- **Speed (Rated Continuous)**: 2000 RPM
- **Displacement**: 1.0 Cu. In./Rev.
- **Torque (Theoretical)**: 15.9 lb. in. @ 100 PSI  
  477 lb. in. @ 3000 PSI
- **Theoretical Input Flow**: 8.7 GPM @ 2000 RPM
- **Volume of Oil under Compression**: .84 cu. in.
- **WK²**: 1.47 lb. in.²
- **Weight**: 23 lbs.
- **Shaft will turn clockwise with pressure applied to port (A).**

### MODEL 10 TYPICAL PERFORMANCE CHARACTERISTICS

- Graphs showing pressure vs. torque and flow vs. speed.
AXIAL VANE MOTORS

MODELS 10A, 25, 35, 50, & 70

Shaft will turn clockwise with pressure applied to Port (A). See notes 5 and 6 on page 4.

MODELS 10A, 25, 35, 50, & 70 SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th>Model 10A</th>
<th>Model 25</th>
<th>Model 35</th>
<th>Model 50</th>
<th>Model 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ PSI</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>2500</td>
<td>2000</td>
</tr>
<tr>
<td>Δ PSI</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>2000</td>
</tr>
<tr>
<td>Speed (RPM)</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>1350</td>
</tr>
<tr>
<td>Displacement (in.³/rev)</td>
<td>1.0</td>
<td>2.5</td>
<td>3.5</td>
<td>5.0</td>
<td>7.0</td>
</tr>
<tr>
<td>Thoretical (lb. in @ PSI)</td>
<td>15.9 @ 100</td>
<td>39.7 @ 100</td>
<td>55.4 @ 100</td>
<td>79.6 @ 100</td>
<td>111.4 @ 100</td>
</tr>
<tr>
<td>Thoretical INPUT FLOW (GPM @ RPM)</td>
<td>8.7 @ 2000</td>
<td>16.2 @ 1500</td>
<td>22.7 @ 1500</td>
<td>32.5 @ 1500</td>
<td>40.9 @ 1350</td>
</tr>
<tr>
<td>Volume of oil under compression (in.³)</td>
<td>.84</td>
<td>2.02</td>
<td>3.09</td>
<td>4.81</td>
<td>5.60</td>
</tr>
<tr>
<td>WK² lb. in.</td>
<td>1.47</td>
<td>12.2</td>
<td>13.4</td>
<td>15.25</td>
<td>17.7</td>
</tr>
<tr>
<td>Weight lbs.</td>
<td>23</td>
<td>39</td>
<td>40</td>
<td>46</td>
<td>52</td>
</tr>
</tbody>
</table>

Von Ruden (763) 682-3122 Phone (763) 682-3954 FAX www.vonruden.com
BRAKES, REAR MOUNTED

General Information
An optional feature of the Von Ruden Axial Vane motor is our rear-mounted normally-on, wet friction disc type brake.

Use of the brake prevents creep under high static loads, which would be due to system leakage, or where positive locking of the motor shaft is required.

The torque capacity of the brake must never exceed the torque capacity of the device driven by the hydraulic Motor.

Case Drain
These brakes are provided with a case drain connection. A line must be provided to return case drain flow to the reservoir at no more than 25 PSI surge pressure. Optional motor seals are available for case drain pressures up to 250 psi.

WK² of Brake ............................................... 2.6 lb.in²
Volume of Oil to Release Brake ...................... 0.6 in.³

<table>
<thead>
<tr>
<th>Model Numbers</th>
<th>Holding Capacities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Brake</td>
<td>w/Tach Adapter Shaft</td>
</tr>
<tr>
<td>222</td>
<td>222S</td>
</tr>
<tr>
<td>223</td>
<td>223S</td>
</tr>
<tr>
<td>224</td>
<td>224S</td>
</tr>
<tr>
<td>225</td>
<td>225S</td>
</tr>
</tbody>
</table>

Note: The above are holding capacities with no back pressure in release line, and using a mineral based hydraulic oil, in applications where excessive holding torque is a concern, please contact factory.

Optional Tach Adapter Shaft
Tach adapter shafts are available as an option either on the rear of the brakes or motors.
# AXIAL VANE MOTOR OPTIONS
## MODELS 10A, 25, 35, 50 & 70

## FOUR BOLT FLANGE

<table>
<thead>
<tr>
<th>Flange Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>10A/25</td>
</tr>
<tr>
<td>35 &amp; 50</td>
</tr>
<tr>
<td>70</td>
</tr>
</tbody>
</table>

## REAR SHAFT EXTENSION  (-49 Option)

## FOOT MOUNTING BRACKET  (Part No. 60549)

## DUAL RELIEF VALVES  (-12 Option)

Factory Preset at 2000 PSI  (Adjustable from 750 PSI to 2500 PSI)

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Model 10A/25</th>
<th>Model 35</th>
<th>Model 50 &amp; 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.62</td>
<td>2.06</td>
<td>2.44</td>
</tr>
<tr>
<td>B</td>
<td>11.50</td>
<td>9.12</td>
<td>9.88</td>
</tr>
<tr>
<td>C</td>
<td>6.25</td>
<td>5.00</td>
<td>5.00</td>
</tr>
<tr>
<td>D</td>
<td>1.50</td>
<td>1.50</td>
<td>1.94</td>
</tr>
<tr>
<td>E</td>
<td>2.38</td>
<td>1.75</td>
<td>1.53</td>
</tr>
<tr>
<td>F</td>
<td>7/8-14 UNF</td>
<td>7/8-14 UNF</td>
<td>1-5/16-12 UN</td>
</tr>
<tr>
<td>G</td>
<td>2.50</td>
<td>2.88</td>
<td>3.00</td>
</tr>
<tr>
<td>H</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

## Typical Pressure Differential Across Valve Versus Flow

### Features
- Direct acting, differential piston–fast response.
- Mounted DIRECTLY on the Von Ruden Hydraulic Motor to reduce plumb-ing and to protect the motor from high pressure surges.
- Provide safe, smooth starts and stops for fast-acting, reliable protection.
- High-strength aluminum alloy body with steel cartridge-style reliefs.

### Operation

These valves relieve shock pressures at the VRM hydraulic motor when controls are suddenly reversed, centered, or when external loads are applied to the motor. The dual relief is a “cross over” type valve, so that oil relieved from one side of the motor is added to the opposite side.
AXIAL VANE MOTOR OPTIONS
MODELS 10A, 25, 35, 50 & 70

TACH PACKAGE (-32 Option)

The Axial Vane Motors can be supplied with a tach generator package which produces 20.8 V/1000 RPM. Optional voltages available on special request.

• Bi Directional Operation.
• Linearity from 0-12,000 RPM is better than .1% of the output at 3600 RPM.
• RMS value of ripple will not exceed 3% of the DC value at any speed in excess of 40 RPM.

RADIAL LOAD ADAPTOR (-20 Option)

• Isolates Von Ruden motor from radial and thrust loading.
• Mounts directly (by factory) on ALL Axial Vane motors.
• Accepts radial loads up to 1,000 lbs., thrust loads up to 500 lbs.
• Allows Von Ruden motor to be direct coupled using sprockets, cog belts, sheaves, and gears.
• Provides bulkhead mounting capabilities.
• Bearings are factory sealed.
• Available with SAE “B” flange(-21 option), added to face.
PLANETARY GEAR BOXES

MODEL 200B

- Torques to 25,000 lb-inches.
- Maximum output speed 350 R.P.M.
- Bi-directional rotation.
- 95-98% mechanical efficiency.
- Sealed output bearing requires no grease.
- Choice of output shafts.

<table>
<thead>
<tr>
<th>Gear Ratio</th>
<th>Input Torque (LB-IN)</th>
<th>Output Torque (LB-IN)</th>
<th>Maximum Continuous Horsepower (Thermal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Actual</td>
<td>Continuous</td>
</tr>
<tr>
<td>10:1</td>
<td>9.94:1</td>
<td>1510</td>
<td>2515</td>
</tr>
<tr>
<td>8:1</td>
<td>8.06:1</td>
<td>1860</td>
<td>3100</td>
</tr>
<tr>
<td>7:1</td>
<td>7.07:1</td>
<td>2040</td>
<td>3400</td>
</tr>
<tr>
<td>6:1</td>
<td>5.85:1</td>
<td>2225</td>
<td>3710</td>
</tr>
<tr>
<td>5:1</td>
<td>5.2:1</td>
<td>2350</td>
<td>3915</td>
</tr>
</tbody>
</table>

*Intermittent conditions are less than 10% of every minute.
Intermittent torque and intermittent speed must not occur simultaneously.

MAXIMUM OUTPUT SHAFT LOAD CAPACITIES

<table>
<thead>
<tr>
<th>Load (LBS)</th>
<th>25</th>
<th>50</th>
<th>100</th>
<th>200</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial</td>
<td>6490</td>
<td>5275</td>
<td>4285</td>
<td>3480</td>
<td>3080</td>
</tr>
<tr>
<td>Thrust</td>
<td>6660</td>
<td>5415</td>
<td>4400</td>
<td>3570</td>
<td>3160</td>
</tr>
</tbody>
</table>

Radial capacities shown are with load located 1.5 inches from mounting face of gear box.
Maximum radial and thrust loads should not occur simultaneously.

CONSTRUCTION DETAILS

Ring gear .............................................................. Case hardened alloy steel
All other gears and pinion shafts .............................. Case hardened alloy steel
Housing ........................................................................ Ductile iron
Output shaft ............................................................... High tensile ductile iron
Output bearings ......................................................... Sealed double row ball bearing
AXIAL VANE WITH PLANETARY GEAR BOX

DIMENSIONS

See Page 14 for Optional Mounting Flanges and Shafts

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>11.250</td>
<td>8.687</td>
<td>4.531</td>
<td>74 lbs.</td>
</tr>
<tr>
<td>35</td>
<td>12.062</td>
<td>8.875</td>
<td>6.312</td>
<td>91 lbs.</td>
</tr>
</tbody>
</table>

TYPICAL PERFORMANCE SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>10/10A</td>
<td>5:1</td>
<td>5</td>
<td>10.</td>
<td>25</td>
<td>8:1</td>
<td>20</td>
<td>18.</td>
<td>50</td>
<td>7:1</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>10/10A</td>
<td>6:1</td>
<td>6</td>
<td>11.</td>
<td>35</td>
<td>6:1</td>
<td>21</td>
<td>19.</td>
<td>70</td>
<td>5:1</td>
<td>35</td>
</tr>
<tr>
<td>3.</td>
<td>10/10A</td>
<td>7:1</td>
<td>7</td>
<td>12.</td>
<td>35</td>
<td>7:1</td>
<td>24.5</td>
<td>20.</td>
<td>50</td>
<td>8:1</td>
<td>40</td>
</tr>
<tr>
<td>4.</td>
<td>10/10A</td>
<td>8:1</td>
<td>8</td>
<td>13.</td>
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<td>10:1</td>
<td>25</td>
<td>21.</td>
<td>70</td>
<td>6:1</td>
<td>42</td>
</tr>
<tr>
<td>5.</td>
<td>10/10A</td>
<td>10:1</td>
<td>10</td>
<td>14.</td>
<td>50</td>
<td>5:1</td>
<td>25</td>
<td>22.</td>
<td>70</td>
<td>7:1</td>
<td>49</td>
</tr>
<tr>
<td>6.</td>
<td>25</td>
<td>5:1</td>
<td>12.5</td>
<td>15.</td>
<td>35</td>
<td>8:1</td>
<td>28</td>
<td>23.</td>
<td>50</td>
<td>10:1</td>
<td>50</td>
</tr>
<tr>
<td>7.</td>
<td>25</td>
<td>6:1</td>
<td>15</td>
<td>16.</td>
<td>50</td>
<td>6:1</td>
<td>30</td>
<td>24.</td>
<td>70</td>
<td>8:1</td>
<td>56</td>
</tr>
<tr>
<td>8.</td>
<td>25</td>
<td>7:1</td>
<td>17.5</td>
<td>17.</td>
<td>35</td>
<td>10:1</td>
<td>35</td>
<td>25.</td>
<td>70</td>
<td>10:1</td>
<td>70</td>
</tr>
<tr>
<td>9.</td>
<td>35</td>
<td>5:1</td>
<td>17.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

THEORETICAL DISPLACEMENT = MOTOR DISPLACEMENT x GEAR BOX RATIO

Von Ruden  (763) 682-3122 Phone  (763) 682-3954 FAX  www.vonruden.com
PLANETARY GEAR BOX OPTIONS

4-BOLT FLANGE

FOOT MOUNTING BRACKET

PART NO. 62347 (-14 Option)

PART NO. 61077

OUTPUT SHAFTS

OPTION B

OPTION C

OPTION D
GENERAL DATA

Fluid cleanliness
A cleanliness of ISO 18/15 (NAS 1638 Class 9, or SAE 749D, Class 6) should be maintained prior to and during operation. A nominal filtration of 25 microns or better is recommended.

Fluids
MOTORS—High grade mineral base hydraulic oil with 75-400 SSU viscosity is recommended. Fluid temperature should be between -40° and 160°F. Seals are also available for fire resistant fluids such as phosphate ester.
GEARBOX—90 wt. lub. oil above 20°F; 80 wt. below 20°F.

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The inlet must be provided with sufficient oil to prevent cavitation in overrunning loads.

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**AXIAL-VANE MODEL CODE**

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The Axial Vane motors must be protected from any side loads. In applications where this cannot be avoided a radial load adapter must be used.

Start Up of a New System
Be certain the case is full of oil before starting the motor. The case may be filled through the case filling and flushing port. The case may also be filled by subjecting the motor to 200 to 500 PSI “null pressures” (pressure on both ports) with the case filling and flushing port plug back out slightly. When oil begin to flow out of this port, with motor horizontal, the case is assumed to full.
A filter installed in the inlet line is recommended for the first 15 minutes of operation in a new system.

“Null Pressure” (Pressure on both ports)
If during Operation, “Null Pressure” are expected to exceed 2000 PSI, connect the case filling and flushing port to a relief valve set at 1000 PSI and drain to the reservoir with a ¾-inch I.D. line.

Blocked Center Valves
Whenever a block center valve is used, crossover relief valves should be included to protect the motor from excessive pressure surges.
VON RUDEN® “A PROVEN SOURCE...”

FLUID POWER, POWER TRAIN, CUSTOM PRODUCTS

Since 1946, the name Von Ruden®, has been significant in the design and manufacture of drive components, beginning with right angle gear boxes and parallel shaft-mounted reducers. In 1973, the Von Ruden Company was purchased by Washington Scientific Industries (WSI), and the product line was combined with WSI Rol-Seal® and Axial Vane hydraulic motors, motor planetaries and brakes.

In 1989, the WSI Power Components Division was sold to the division General Manger, Al Anderson, who formed the present Von Ruden Manufacturing, Inc. to manufacture the combined lines of WSI hydraulic and Von Ruden® mechanical drive components.

Today, Von Ruden Manufacturing is a prime source of drive components, combining the best elements of quality, pricing and delivery in a product line constantly added to and refined to meet ever-increasing performance requirements in every industry.

QUALITY SINCE 1946

Von Ruden® has been designing and producing drive components for over fifty years. Von Ruden® now manufactures and distributes complete lines of bevel gear boxes, machine tool gear boxes, parallel reducers, hydraulic motors, planetary gear boxes, brakes and overhung load adapters. These quality product lines cover a wide variety of requirements to meet nearly all performance and cost specifications.

TEAM MANAGEMENT

Von Ruden® stands apart in modern management methods. Teams oriented to specific manufacturing or support functions control all aspects of their contributions. The teams determine their own work schedules and even hire their own members, reviewing applications, interviewing and making the final hiring decisions. There are no foremen or shop supervisors. Company advisors support the teams with information, expertise and a common focus.

MANUFACTURING CELLS

While the employees are organized into teams, the manufacturing efforts are organized into cells. Each cell acts as an autonomous unit controlling almost all facets in the manufacture of its parts or product.

CUSTOM MANUFACTURING

Because of the flexible nature of our manufacturing system we are capable of incorporating your project into our schedule. We offer a modern, well equipped facility with a well trained enthusiastic work force. Put our efficient operation to work on your next project.
Von Ruden® motors give you more usable torque. Smooth and precise.

**ROL-SEAL® HYDRAULIC MOTORS**

Unique rolling abutment design offers smooth low speed, high torque with a proven measurable difference. Compare with all others – gerotor, piston, and gear.

**Specifications:** (32 to 163cc)
Seven displacements, 2 to 10 in 3/rev.
SAE A, B and C flanges and shafts.

**Benefits:**
- Higher starting torque.
- Increased vehicle gradeability.
- Less torque “ripple”.
- Less torque “droop” at high speed.
- More usable speed over entire range.
- Double-ended shaft capability.

**AXIAL VANE HYDRAULIC MOTORS**

The ultimate hydraulic design for smooth, precise, repeatable positioning applications such as robotics.

**Specifications:** (16 to 115cc)
Five displacements, 1 to 7 in 3/rev.
Options include tach generator, dual relief valves and rear shaft extension.

**Benefits:**
- Accurate, repeatable positioning.
- Case drain leakage is so low that a servo valve can easily control speed and position.
- Mechanically and hydraulically “stiff.”
- Smooth slow speed operation.
- High starting torque.
- Fewer wearing parts, exceptional life.

**PLANETARY GEAR BOXES**

Specially designed for use with Von Ruden® Rol-Seal® and Axial Vane motors and any other hydraulic motors.

Rated 1,000,000 lb.-inches (113,000 NM) intermittent output torque. Gear reduction ratios to 90,000:1.

**HYDRAULIC MOTOR BRAKES**

Von Ruden® rear-mounted, normally on, wet friction disc-type brakes for Rol-Seal and Axial Vane motors. Prevent creep under high static load, or where positive locking of motor shaft is required. Choice of torque capacity.

**MOTOR/GEAR BOX/ BRAKE PACKAGES**

Now, a single source for pre-engineered drive packages. Von Ruden® offers combinations ready to meet requirements in most applications.

**Benefits:**
- Reduce your development time.
- Reduce your assembly time.
- Eliminate duplicate shafts and bearings.
- Reduce envelope dimensions.
- Reduce your overall cost.

**OVER HUNG LOAD ADAPTORS**

Over Hung Load Adaptors (Bearing Blocks) are used for increasing hydraulic motor shaft load capacity and motor life. Permit the removal of hydraulic motors for servicing without disturbing driven gears, pulleys or sprockets while sealing out dirt and grime.

**Benefits:**
- Increase hydraulic motor life.
- Increase radial and thrust loads to motors.
- Easily remove or install hydraulic motors.
- Can be used to protect from motor shaft seal leak contamination.

**GEAR BOXES**

Von Ruden® manufactures both Right Angle Gear Boxes and Parallel Shaft Gear Boxes. There are 11 series of standard right angle gear boxes ranging up to 200 h.p. and shafts to 2”. Our parallel shaft standard box comes in 1:1 up to 6.38:1 ratios and 277 max. h.p.