420 Mobile Piston Pump
Design Code B
ADU041
ADU049
ADU062
ADU080
Introduction

420 Series Mobile Piston Pump

Eaton’s 420 Series mobile pumps are open circuit, axial piston designs with displacements of 41cc, 49cc, 62cc, and 80cc for operating speeds up to 2,650 rpm. They are available with a variety of control options to match their performance to a broad range of mobile applications.

The highly efficient pump controls reduce cooling system requirements, allowing a smaller and less expensive design to be used. Or, cooling capacity can be kept the same and the flow capability of the system increased to improve performance.

A strong, field-proven rotating group allows the pumps to handle pressures to 280 bar (4000 psi) continuous and 320 bar (4600 psi) intermittent – with less maintenance cost. 420 Series pumps use a saddle-type swashplate with steel-backed polymer bearings and a pressure lubrication passage to reduce wear and support internal loads.

The swashplate is very stiff, which reduces deflection and allows even loading of the bearings to extend the unit’s service life. The combination of high load capacity bearings and a stiff drive shaft help provide a pump B10 bearing life of up to 10,280 hours at rated mobile conditions, reducing operating costs and extending operating life.

A single control piston is used to vary pump output. This design reduces the forces acting on the swashplate, resulting in reduced package size, which allows pump installation into tighter locations.

In response to customer expectations and regulatory requirements, Eaton has designed the 420 Series pumps to operate at very low noise levels. A bimetal timing plate is used to improve pump filling characteristics which further reduces fluid-borne noise and extends pump life.

Both SAE and ISO mounting flange configurations are available as well as SAE and ISO tube- and flange-type ports. Side- or end-ported models are available to facilitate plumbing and help fit the pump to machine space needs, as are multiple drain ports to allow many mounting orientations.

Typical Applications
- Loader backhoes
- Vibratory cable plows
- Mining machinery
- Dump truck lifts
- Agriculture tractors
- Chemical applicator trucks
- Railroad equipment
- Container handling, all-terrain, and truck cranes
- Vibratory cable plows
- Mining machinery and tunnel boring equipment
- Utility boom, off-road dump, and refuse trucks
- Material handling trucks and rough terrain fork lifts
- Concrete and asphalt pavers
- Feller/bunchers, forwards, and log loaders
- Crawler dozers
- Articulate haulers
- Mini-excavators

Features and Benefits
- Long pump life
- Quiet pump operation
- Low installed and operating costs
- Reduced maintenance
- Flexibility in machine design
- Compact size saves space
- Design promotes leak-free system
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- Load Sense and Pressure Compensator
- Pressure Compensator
- Torque Control
- EH Inverse Proportional Pressure Control (IPPC)
- Remote Pressure Control
- Cold Start Valve

## Performance

<table>
<thead>
<tr>
<th>ADU041</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADU049</td>
<td>16</td>
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<tr>
<td>ADU062</td>
<td>19</td>
</tr>
<tr>
<td>ADU080</td>
<td>22</td>
</tr>
</tbody>
</table>

## Pump Installation

- B-mount – Rear-ported
- B-mount – Side-ported
- C-mount – Rear-ported
- C-mount – Side-ported
- Thru-Drive SAE A Option
- Thru-Drive SAE B Option
- Dual Shaft Seal Option

## Control Installation

- Load Sense and Pressure Compensator
- Pressure Compensator
- Torque Control
- EH Inverse Proportional Pressure Control (IPPC)
- Cold Start Valve

## External Manual Stroke Adjustment

## Input Shaft Options

## Center of Gravity

## Installation and Start-up
### Model Codes

**420 Mobile Piston Pump**

<table>
<thead>
<tr>
<th>ADU</th>
<th>062</th>
<th>R</th>
<th>08</th>
<th>AB</th>
<th>1</th>
<th>0</th>
<th>A</th>
<th>43</th>
<th>14</th>
<th>00</th>
<th>0A</th>
<th>1</th>
<th>AB</th>
<th>1</th>
<th>00</th>
<th>CD</th>
<th>0</th>
<th>B</th>
</tr>
</thead>
</table>

### Pump Series
- **ADU** – 420 Series Open Circuit Piston Pump

### Pump Displacement
- **041** – 41.0 cm³/r [2.50 in³/r]
- **049** – 49.2 cm³/r [3.00 in³/r]
- **062** – 62.3 cm³/r [3.80 in³/r]
- **080** – 80.0 cm³/r [4.88 in³/r]

### Input Shaft Rotation
- **R** – Right Hand
- **L** – Left Hand

### Front Mount and Shaft
- **01** – 2 Bolt B, 22.2 mm (.875in.) Dia. Keyed Shaft
- **02** – 2 Bolt B, 25.4 mm (1.00in.) Dia. Keyed Shaft
- **03** – 2 Bolt B, 22.22 mm (.875in.) Dia. Tapered Keyed Shaft
- **05** – 2 Bolt B, 13 Tooth 16/32 Spline
- **08** – 2 Bolt B, 16 Tooth 16/32 Spline
- **32** – 2/4 Bolt C, 14 Tooth 12/24 Spline
- **33** – 2/4 Bolt C, 31.8 mm (1.25in) Dia. Keyed Shaft
- **34** – 2 Bolt B, 15 Tooth 16/32 Sled Runner Spline
- **35** – 2 Bolt B, 14 Tooth 12/24 Spline
- **38** – 2/4 Bolt C, 31.75 mm (1.25i) Dia. Tapered Keyed Shaft

### Main Ports Size & Location
- **AA** – Rear Ports
  - Suction - 2” (Code 61); Pressure - 1” (Code 61)
- **AB** – Side Ports
  - Suction - 2” (Code 61); Pressure - 1” (Code 61)
- **AC** – Rear Ports
  - Suction - 2” (Code 61) with M12 Threads; Pressure - 1” (Code 61) with M10 Threads.
- **AD** – Side Ports
  - Suction - 2” (Code 61) with M12 Threads; Pressure - 1” (Code 61) with M10 Threads.
- **AE** – Rear Ports
  - Suction - SAE O-Ring Port; Pressure - UN-2B SAE O-Ring Port (ADU041 & ADU049 only)
- **AF** – Side Ports
  - Suction - #24 SAE O-Ring; Pressure - #16 SAE O-Ring (ADU041 and ADU049 Only)
- **AG** – Rear Ports
  - Suction - M48 Metric O-Ring; Pressure - M33 Metric O-Ring (ADU041 & ADU049 Only)
- **AH** – Side Ports
  - Suction - M48 Metric O-Ring; Pressure - M33 Metric O-Ring (ADU041 & ADU049 Only)
- **AK** – Rear Ports
  - Suction - 2” (Code 61); Pressure - #16 SAE O-Ring (ADU062 Only)

### Case Drain Ports
- **1** – #12 SAE O-Ring - Top
- **2** – #12 SAE O-Ring - Bottom
- **3** – M27 x 2 O-Ring - Top
- **4** – M27 O-Ring - Bottom
- **5** – #12 SAE O-Ring - Left Side (Swash Sensor Boss)

### Diagnostic Pressure Ports
Not available on thru-drive units
- **0** – No Diagnostic Pressure Ports
- **1** – #6 SAE O-Ring - Plugged (Rear Ports Only)
- **2** – M14 Metric O-Ring - Plugged (Rear Ports Only)
- **3** – #4 SAE O-Ring - Plugged (Side Ports Only)
- **4** – M12 Metric O-Ring - Plugged (Side Ports Only)

### Controller Type
- **A** – Pressure Flow Compensator With #4 SAE O-Ring Load Sense Port
- **B** – Pressure Flow Compensator With M12 Metric O-Ring Load Sense Port
- **C** – Pressure Compensator Only
- **H** – Pressure Flow Compensator With Torque Control #4 SAE O-Ring Load Sense Port
- **J** – Pressure Flow Compensator With Torque Control M12 Metric O-Ring Load Sense Port
- **K** – Pressure Compensator With Torque Control
- **V** – EH Inverse Proportional Pressure Control (vertical mounting)
- **W** – Remote Pressure Control with .4375-20 SAE O-Ring Port, Left Side
- **1** – Remote Pressure Control M12 Metric O-Ring Port, Left Side

### Pressure Compensator Setting (Tolerance on Setting)*
- **28** – 207-214 bar [3000-3100 lbf/in²]
- **35** – 241-248 bar [3500-3600 lbf/in²]
- **43** – 276-283 bar [4000-4100 lbf/in²]

* Additional Settings Available by Request

# - Recommend RPC pressure settings

10-21 bar (140-350 psi)
## Model Codes

420 Mobile Piston Pump

### Flow Compensator / Remote Pressure Control Setting*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No Flow Compensator</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>12-15 bar [180-220 lbf/in²]</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>23-26 bar [330-370 lbf/in²]</td>
<td></td>
</tr>
</tbody>
</table>

### Torque Control Setting

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No Torque Control</td>
</tr>
<tr>
<td>AA</td>
<td>40 Nm [350 in-lbs]</td>
</tr>
<tr>
<td>AB</td>
<td>51 Nm [450 in-lbs]</td>
</tr>
<tr>
<td>AC</td>
<td>62 Nm [550 in-lbs]</td>
</tr>
<tr>
<td>AD</td>
<td>73 Nm [650 in-lbs]</td>
</tr>
<tr>
<td>AE</td>
<td>85 Nm [750 in-lbs]</td>
</tr>
<tr>
<td>AF</td>
<td>96 Nm [850 in-lbs]</td>
</tr>
<tr>
<td>AG</td>
<td>107 Nm [950 in-lbs]</td>
</tr>
<tr>
<td>AH</td>
<td>119 Nm [1050 in-lbs]</td>
</tr>
<tr>
<td>AJ</td>
<td>130 Nm [1150 in-lbs]</td>
</tr>
<tr>
<td>AK</td>
<td>141 Nm [1250 in-lbs]</td>
</tr>
<tr>
<td>AL</td>
<td>153 Nm [1350 in-lbs]</td>
</tr>
<tr>
<td>AM</td>
<td>164 Nm [1450 in-lbs]</td>
</tr>
<tr>
<td>AN</td>
<td>175 Nm [1550 in-lbs]</td>
</tr>
<tr>
<td>AP</td>
<td>186 Nm [1650 in-lbs]</td>
</tr>
<tr>
<td>AR</td>
<td>198 Nm [1750 in-lbs]</td>
</tr>
<tr>
<td>AT</td>
<td>209 Nm [1850 in-lbs]</td>
</tr>
<tr>
<td>AU</td>
<td>220 Nm [1950 in-lbs]</td>
</tr>
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</table>

### Control Special Features

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>00</td>
<td>Control Special Features</td>
</tr>
<tr>
<td>0A</td>
<td>Bleed Down Orifice</td>
</tr>
<tr>
<td>0B</td>
<td>24V Cold Start Valve</td>
</tr>
<tr>
<td>0D</td>
<td>12V Cold Start Valve</td>
</tr>
<tr>
<td>0S</td>
<td>12V DC Solenoid AMP Jr Connector (used with EH inverse proportional pressure control)</td>
</tr>
<tr>
<td>0T</td>
<td>24V DC Solenoid AMP Jr Connector (used with EH inverse proportional pressure control)</td>
</tr>
<tr>
<td>0U</td>
<td>12V DC Solenoid Deutsch Connector (used with EH inverse proportional pressure control)</td>
</tr>
<tr>
<td>0V</td>
<td>24V DC Solenoid Deutsch Connector (used with EH inverse proportional pressure control)</td>
</tr>
</tbody>
</table>

### Maximum Displacement Option*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Standard Displacement (As Given In Code Title)</td>
</tr>
<tr>
<td>02</td>
<td>External Manual Stroke Adjustment</td>
</tr>
</tbody>
</table>

### Auxiliary (Rear) Mount & Output Shaft

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>00</td>
<td>No Auxiliary Mounting Features</td>
</tr>
<tr>
<td>AB</td>
<td>SAE A 2 Bolt, 11T 16/32 Spline</td>
</tr>
<tr>
<td>AC</td>
<td>SAE B 2 Bolt, 13T 16/32 Spline</td>
</tr>
<tr>
<td>AD</td>
<td>SAE B 2 Bolt, 15T 16/32 Spline</td>
</tr>
<tr>
<td>AE</td>
<td>SAE A 2 Bolt, 9T 16/32 Spline</td>
</tr>
</tbody>
</table>

### Shaft Seal

<table>
<thead>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>0</td>
<td>No Shaft Seal</td>
</tr>
<tr>
<td>1</td>
<td>Standard Polyacrylate Shaft Seal</td>
</tr>
<tr>
<td>2</td>
<td>Viton Shaft Seal</td>
</tr>
<tr>
<td>3†</td>
<td>Double, Two-Way Shaft Seal, Viton With VHO Filter</td>
</tr>
<tr>
<td>4</td>
<td>Nitrile Shaft Seal</td>
</tr>
<tr>
<td>5</td>
<td>Single Viton Shaft Seal in 2/4 Bolt C Mount Pump Housing</td>
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</table>

### Paint

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No Paint</td>
</tr>
<tr>
<td>CD</td>
<td>Blue Primer</td>
</tr>
<tr>
<td>0B</td>
<td>Black</td>
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</table>

### Identification/Packaging

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<th>Description</th>
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<tbody>
<tr>
<td>J</td>
<td>ATEX certification</td>
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</table>

### Design Level

<table>
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<tbody>
<tr>
<td>B</td>
<td>Second Design</td>
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</tbody>
</table>

* Additional Settings Available by Request Additional settings available by request, including fixed displacement stops.

† Not available on SAE B mount
### Inlet Pressure, Case Pressure, and Operating Temperature Requirements

<table>
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<tr>
<th>Inlet Pressure</th>
<th>Case Pressure</th>
<th>Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated bar abs (psig)</td>
<td>Minimum bar abs (in. Hg)</td>
<td>Maximum Continuous bar abs (psig)</td>
</tr>
<tr>
<td>1.0 (0)</td>
<td>0.85 (5)</td>
<td>4.4 (50)</td>
</tr>
</tbody>
</table>

### Hydraulic Fluids

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Recommended Operating Viscosity Range cSt (SUS)</th>
<th>Maximum Continuous at Startup cSt (SUS)</th>
<th>Maximum Viscosity at 93°C (200°F) cSt (SUS)</th>
<th>Minimum Viscosity @ Max. Intermittent Temperature of 93°C (200°F) cSt (SUS)</th>
<th>Minimum Intermittent 93°C (200°F) cSt (SUS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use antiwear hydraulic oil, or automotive type crankcase oil (designations SC, SD, SE or SF) per SAE J183 FEB80</td>
<td>16 to 40 (80 to 188)</td>
<td>430 (1192)</td>
<td>2100 (9720)</td>
<td>10 (59)</td>
<td>6 (46)</td>
</tr>
</tbody>
</table>

For more information, see Eaton publication 579. For operation on other alternative or environmentally friendly fluids, please contact your Eaton Representative.
Control Options
Load Sense and Pressure Compensator Control
The pump will provide power matching of pump output to system load demand, maximizing efficiency and improving load metering characteristics of any directional control valve installed between the pump and the load.

Load sensing ensures that the pump always provides only the amount of flow needed by the load. At the same time, the pump operating pressure adjusts to the actual load pressure plus a pressure differential required for the control action. When the system is not demanding power, the load sense control will operate in an energy-saving stand-by mode.

Typically, the differential pressure is that between the pressure inlet and service port of a proportionally controlled directional valve, or a load sensing directional control valve. See the model code on page 4 for differential pressure settings for load sensing.

If the load pressure exceeds the system pressure setting, the pressure compensator de-strokes the pump. The load sensing line must be as short as possible and can also be used for remote control or unloading of the pump pressure. For remote control purposes, it is recommended that you contact your Eaton Representative for the correct configuration of the control.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings
The pressure compensator uses two springs to cover the full pressure range of the ADU pumps. The high pressure spring covers the range from 140 bar (2050 psi) to 280 bar (4060 psi). The low pressure spring is adjustable from minimum pressure through 140 bar (2050 psi).

Flow Compensator (Load Sense) Settings
There are three springs used to cover the load sense adjustment range of this control.

Pressure Compensator Spring Pressure Ranges:
60 bar (870 psi) to 144 bar (2089 psi)
144 bar (2089 psi) to 280 bar (4060 psi)

Flow Compensator (Load Sense) Spring Pressure Range:
10.3 bar (150 psi) to 17.2 bar (250 psi)
17.2 bar (250 psi) to 31.0 bar (450 psi)

Typical Operating Curve

Dynamic Response per SAE J745 (Using Swash Plate Position)

<table>
<thead>
<tr>
<th></th>
<th>Response (off stroke)</th>
<th>Recovery (on stroke)</th>
<th>Load Sense Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADU041</td>
<td>20</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>ADU049</td>
<td>20</td>
<td>75</td>
<td>90</td>
</tr>
<tr>
<td>ADU062</td>
<td>25</td>
<td>90</td>
<td>115</td>
</tr>
<tr>
<td>ADU080</td>
<td>26</td>
<td>75</td>
<td>115</td>
</tr>
</tbody>
</table>
Control Options
Pressure Compensator

Pressure Compensator Control
The pump will provide a continuously modulated flow to meet changing load demands at a pre-adjusted compensator pressure. At pressures below the compensator setting, the pump will operate at maximum displacement. See model code on page 4 for compensator pressure ranges.

Warning: The pressure compensator may be adjusted beyond the rated pressure of the pump. When adjusting the pressure limiter, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings
The pressure compensator uses two springs to cover the full pressure range of the ADU pumps. The high pressure spring covers the range from 140 bar (2050 psi) to 280 bar (4060 psi). The low pressure spring is adjustable from minimum pressure through 140 bar (2050 psi).

Dynamic Response per SAE J745 (Using Swash Plate Position)

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<thead>
<tr>
<th></th>
<th>Response (off stroke)</th>
<th>Recovery (on stroke)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADU041</td>
<td>20</td>
<td>75</td>
</tr>
<tr>
<td>ADU049</td>
<td>20</td>
<td>75</td>
</tr>
<tr>
<td>ADU062</td>
<td>25</td>
<td>90</td>
</tr>
<tr>
<td>ADU080</td>
<td>26</td>
<td>75</td>
</tr>
</tbody>
</table>
Control Options

Torque Control

The 420 Torque Control limits the power input to the pump preventing the engine from stalling while also optimizing the use of the engine power.

When combined with Pressure Compensator Control and/or Load Sense (refer to page 7) it will allow the 420 to remain inside the power envelope of the Pressure Flow curve. When the combination of pump flow and outlet pressure moves outside the envelope, the pump displacement will automatically be reduced.

This maximum setting is easily calculated using the following steps:

1. Select the 420 pump displacement you intend to use
2. Identify the available engine horsepower (HP) and speed (rpm)
3. Calculate the torque limit required by the system using the equations shown
4. Select the MAX torque setting from the table shown

\[
\text{Torque} = \frac{\text{Horsepower (HP)} \times 63025}{\text{Engine RPM}} \quad \text{Torque} = \frac{\text{Horsepower (KW)} \times 9550}{\text{Engine RPM}}
\]

<table>
<thead>
<tr>
<th>Code</th>
<th>Torque Setting</th>
<th>41cc</th>
<th>49cc</th>
<th>62cc</th>
<th>80cc</th>
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</thead>
<tbody>
<tr>
<td>AA</td>
<td>40 Nm (350 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AB</td>
<td>51 Nm (450 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AC</td>
<td>62 Nm (550 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AD</td>
<td>73 Nm (650 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AE</td>
<td>85 Nm (750 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AF</td>
<td>96 Nm (850 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AG*</td>
<td>107 Nm (950 in-lbs)</td>
<td>☒</td>
<td>☒</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AH</td>
<td>119 Nm (1050 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AJ</td>
<td>130 Nm (1150 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AK</td>
<td>141 Nm (1250 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AL</td>
<td>153 Nm (1350 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AM</td>
<td>164 Nm (1450 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AN</td>
<td>175 Nm (1550 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>AP</td>
<td>186 Nm (1650 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AR</td>
<td>198 Nm (1750 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AT*</td>
<td>209 Nm (1850 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AU</td>
<td>220 Nm (1950 in-lbs)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* reference 62cc
Control Options

EH Inverse Proportional Pressure Control (IPPC)

The EH Inverse Proportional Pressure control allows for stepless variation of the max pump output pressure, as per the current signal provided to the control valve solenoid.

The integrated pump control makes use of an external current signal to vary the pump output pressure. This control has an inverse proportional characteristic i.e. with increasing current signal, the max output pressure is proportionately reduced.

Warning: The pressure setting may be adjusted beyond the rated pressure of the pump. When adjusting the pressure, install a 0-350 bar (0-5000 psi) gage in the outlet gage port and limit the pressure setting to the continuous rated pressure for the pump displacement shown on page 6.

Pressure Limit Settings

The EH IPPC covers pressure range of the ADU pumps. The max pressure can be set from 140 bar (2050 psi) to 280 bar (4060 psi).

Typ. Current vs Pressure Characteristics of IPPC at 1800 rpm at various max pressure settings at 49 deg C (120deg F), static conditions.

### ELECTRICAL DATA

<table>
<thead>
<tr>
<th></th>
<th>12 V</th>
<th>24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>12 V</td>
<td>24 V</td>
</tr>
<tr>
<td>Max Current</td>
<td>1500 mA</td>
<td>750 mA</td>
</tr>
<tr>
<td>R20, Resistance(ohm)</td>
<td>5.3 +/- 5%</td>
<td>21.2 +/- 5%</td>
</tr>
<tr>
<td>Type of Control</td>
<td>Current</td>
<td>Current</td>
</tr>
<tr>
<td>Recommended PWM Control Frequency</td>
<td>100 Hz</td>
<td>100 Hz</td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Insulation material</td>
<td>Class H, 180 deg C</td>
<td>Class H, 180 deg C</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP69K/IPX9K</td>
<td>IP69K/IPX9K</td>
</tr>
<tr>
<td>Connector</td>
<td>AMP Junior Power</td>
<td>AMP Junior Power</td>
</tr>
<tr>
<td>Timer/ Deutsch</td>
<td>Connector DT04-2P</td>
<td>Connector DT04-2P</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-30 deg C; 105 deg C</td>
<td>-30 deg C; 105 deg C</td>
</tr>
</tbody>
</table>
Remote Pressure Control

Remote relief valve is to be connected to pilot port “J” through necessary external piping. Standard differential pressure of 20 bar is set at RPC spool. The required outlet pressure (below 280 bar) can be set by adjusting remote relief valve setting. Once pressure reaches preset value, flow across remote relief valve starts, this results in RPC spool movement due to pressure imbalance. This will de-stroke the pump to maintain the set pressure.

Secondary pressure compensator is provided to limit the max pressure setting as a fail safe measure. The delta pressure is factory set which can not be changed. If the remote line is connected directly to tank, the flow compensator setting selected in the model code will be the minimum pressure setting.

* Flow Compensator is not available with RPC.

* Flow Compensator/Remote Pressure Control setting should be selected within range of 10-24 bar (140-350 psi).

* Remote relief valve is not included in supply scope of the pump.

| Delta Pressure setting at control valve - bar (psi) | 14 - 24 (200 - 350) |
| Control fluid consumption - lpm (gpm) | 4.5 (1.2) max |
| Recommended flow rating of remote relief valve- lpm (gpm) | 3 – 5 (0.8 – 1.32) |
| Recommended Eaton Relief Valve part number | RV5-10-S-0-50 |
Control Options

Cold Start Valve

The 420 Cold Start Valve reduces pump start-up torque by directing control pressure to the outlet. It is primarily used in cold weather applications and includes a 12 or 24 VDC directional control valve mounted between the pump housing and compensator.
Performance

ADU041

Overall Efficiency Versus
Speed @ 49° C (120° F),
Full Flow, and 1.0 bar
(0 psi) Inlet

Overall Efficiency Versus
Speed @ 49° C (120° F),
Full Flow, and 1.0 bar
(0 psi) Inlet
Performance
ADU041

Input Power Versus Speed
@ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet

Input Torque Versus Speed
@ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet
Performance

ADU041

Delivery and Case Flow
Versus Speed @ 49° C
(120° F)

Input Torque and Case Flow
Stand-by @ 49° C (120° F)

Input Torque and Case Flow
Cut-off @ 49° C (120° F)
Performance

ADU049

Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet

Overall Efficiency Versus Speed @ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet
**Performance**

ADU049

---

**Input Power Versus Speed**  
@ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet

---

**Input Torque Versus Speed**  
@ 49° C (120° F), Full Flow, and 1.0 bar (0 psi) Inlet
### Performance

**ADU049**

#### Delivery and Case Flow
**Versus Speed @ 49° C (120° F)**

![Graph showing delivery and case flow versus speed at 49° C (120° F).](image)

#### Input Torque and Case Flow
**Stand-by @ 49° C (120° F)**

![Graph showing input torque and case flow for stand-by mode at 49° C (120° F).](image)

**Cut-off @ 49° C (120° F)**

![Graph showing input torque and case flow for cut-off mode at 49° C (120° F).](image)
Performance
ADU062

Overall Efficiency Versus Speed @ 49°C (120°F), Full Flow, and 1.0 bar (0 psi) Inlet

Overall Efficiency Versus Speed @ 49°C (120°F), Full Flow, and 1.0 bar (0 psi) Inlet
Performance

ADU062

Input Torque Versus Speed @ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet

Input Power Versus Speed @ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet
Performance

ADU062

Delivery and Case Flow Versus Speed @ 49º C (120º F)

<table>
<thead>
<tr>
<th>Input Speed, rpm</th>
<th>Main Flow, lpm (gpm)</th>
<th>Case Flow, lpm (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>500</td>
<td>191 (50)</td>
<td>280 bar (4060 psi)</td>
</tr>
<tr>
<td>1000</td>
<td>172 (45)</td>
<td>150 bar (2175 psi)</td>
</tr>
<tr>
<td>1500</td>
<td>153 (40)</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>134 (35)</td>
<td></td>
</tr>
<tr>
<td>2500</td>
<td>115 (30)</td>
<td></td>
</tr>
<tr>
<td>3000</td>
<td>95 (25)</td>
<td></td>
</tr>
<tr>
<td>3500</td>
<td>76 (20)</td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td>57 (15)</td>
<td></td>
</tr>
<tr>
<td>4500</td>
<td>38 (10)</td>
<td></td>
</tr>
<tr>
<td>5000</td>
<td>19 (5)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>0.56 (5)</td>
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<tr>
<td>1.0 (25)</td>
</tr>
<tr>
<td>1.33 (10)</td>
</tr>
<tr>
<td>1.69 (15)</td>
</tr>
<tr>
<td>2.25 (20)</td>
</tr>
<tr>
<td>2.81 (25)</td>
</tr>
<tr>
<td>3.38 (30)</td>
</tr>
<tr>
<td>3.94 (35)</td>
</tr>
<tr>
<td>4.50 (40)</td>
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</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 bar (365 psi)</td>
</tr>
<tr>
<td>280 bar (4000 psi)</td>
</tr>
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</table>

Cut-off @ 49º C (120º F)

<table>
<thead>
<tr>
<th>Input Speed, rpm</th>
<th>Main Flow, lpm (gpm)</th>
<th>Case Flow, lpm (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>19 (5)</td>
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<tr>
<td>2.81 (25)</td>
</tr>
<tr>
<td>3.38 (30)</td>
</tr>
<tr>
<td>3.94 (35)</td>
</tr>
<tr>
<td>4.50 (40)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 bar (365 psi)</td>
</tr>
<tr>
<td>280 bar (4000 psi)</td>
</tr>
</tbody>
</table>

Stand-by @ 49º C (120º F)

<table>
<thead>
<tr>
<th>Input Speed, rpm</th>
<th>Main Flow, lpm (gpm)</th>
<th>Case Flow, lpm (gpm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>500</td>
<td>19 (5)</td>
<td>19 (5)</td>
</tr>
<tr>
<td>1000</td>
<td>38 (10)</td>
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<td>1500</td>
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<td>19 (5)</td>
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<tr>
<td>2500</td>
<td>95 (25)</td>
<td>19 (5)</td>
</tr>
<tr>
<td>3000</td>
<td>115 (30)</td>
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<tr>
<td>3500</td>
<td>134 (35)</td>
<td>19 (5)</td>
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<tr>
<td>4000</td>
<td>153 (40)</td>
<td>19 (5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>0.56 (5)</td>
</tr>
<tr>
<td>1.0 (25)</td>
</tr>
<tr>
<td>1.33 (10)</td>
</tr>
<tr>
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<td>2.81 (25)</td>
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<td>3.38 (30)</td>
</tr>
<tr>
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</tr>
<tr>
<td>4.50 (40)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 bar (365 psi)</td>
</tr>
<tr>
<td>280 bar (4000 psi)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 bar (290 psi)</td>
</tr>
<tr>
<td>11 bar (160 psi)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>280 bar (4000 psi)</td>
</tr>
<tr>
<td>150 bar (2175 psi)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Input Torque, Nm (in-lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 bar (2175 psi)</td>
</tr>
</tbody>
</table>
Performance

ADU080

Input Power Versus Speed @ 49°C (120°F), Full Flow, and 1.0 bar (0 psi) Inlet

Overall Efficiency Versus Speed @ 49°C (120°F), Full Flow, and 1.0 bar (0 psi) Inlet
Performance
ADU080

Input Power Versus Speed
@ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet

Input Torque Versus Speed
@ 49º C (120º F), Full Flow, and 1.0 bar (0 psi) Inlet
Delivery and Case Flow Versus Speed @ 49°C (120°F)

Input Torque and Case Flow Stand-by @ 49°C (120°F)

Input Torque and Case Flow Cut-off @ 49°C (120°F)
Pump Installation

B-mount / Rear-ported

**RH Rotation**

Top Case Drain

- 72.6 (2.86) (Diagnostic Port)
- 69.1 (2.72) (Diagnostic Port)
- 46 (1.81)
- 72.1 (2.84) (Case Drain)
- 2X 13.6 (54)

Optional Case Drain

For Compensator Configuration See Separate Compensator Installation Drawing

Pressure Port

- 77.5 (3.05)

Suction Port

- 191 (7.52)

Optional diagnostic pressure port

191 (7.52)

For Shaft Configuration See Separate Shaft Installation Drawing

97.3 (3.83)

- 74.7 (2.94)
- 77.5 (3.05)

Bottom Case Drain

2X Ø14.2 (.56)

146.1 (5.75)

View A – A

Suction Port

- 38.1 [1.50]
- 41.1 [1.62]

Optional diagnostic suction port

192.6 [7.58]

Pressure Port

Optional diagnostic pressure port

1.81 [20.6]

**LH Rotation**

Pressure Port

Suction Port

122.2 (4.81)

- 79.2 (3.12) (Case Drain)
- 72.1 (2.84) (Case Drain)

2X Ø101.6 (4.00)

101.6 (4.00)

7.52 [0.37]

46

192.6 [7.58]
Pump Installation
B-mount / Side-ported

RH Rotation

View A – A

LH Rotation
Pump Installation

C-mount / Rear-ported

RH Rotation

For Compensator Configuration
See Separate Compensator Installation Drawing

Optional Case Drain

Bottom Case Drain

View A – A

LH Rotation

Optional diagnostic suction port

Pressure Port

Suction Port

For Shaft Configuration
See Separate Shaft Installation Drawing

Pump Installation
C-mount / Side-ported

RH Rotation

View A – A

Suction Port

LH Rotation

Case Drain Top

Optional Diagnostic Pressure Port

For Compensator Configuration See Separate Compensator Installation Drawing

Pressure Port

Case Drain Left

For Shaft Configuration See Separate Shaft Installation Drawing

Case Drain Bottom

Optional Diagnostic Suction Port

Case Drain Top

Case Drain Left

Case Drain Bottom

Optional Diagnostic Pressure Port

Suction Port

230.8
(9.09)

266.9
(10.59)

264.1
(10.40)

253.6
(9.99)

251.2
(9.89)

110
(4.33)

122.2
(4.81)

73.2
(3.12)

21.3
(.84)

53.1
(2.09)

44.5
(1.75)

2x Ø175
(6.89)

178.3
(7.02)

4x Ø14.33
(.564)

2x 15.4
(.61)

2x Ø17.5
(.69)

Ø127.0
(5.00)

72.1
(2.84)

74.7
(2.94)

71.4
(2.81)

72.3
(2.89)

122.2
(4.81)

72.14
(2.84)

46
(1.81)

4x Ø14.33
(.564)

2x Ø175
(6.89)

122.2
(4.81)

73.2
(3.12)

21.3
(.84)

53.1
(2.09)

44.5
(1.75)

2x Ø175
(6.89)

178.3
(7.02)

4x Ø14.33
(.564)

2x 15.4
(.61)

2x Ø17.5
(.69)

Ø127.0
(5.00)

72.1
(2.84)

74.7
(2.94)

71.4
(2.81)

72.3
(2.89)

122.2
(4.81)

72.14
(2.84)

46
(1.81)
**Pump Installation**

**Thru-Drive SAE A**

---

**For Output Shaft Configuration**

See Separate Output Shaft Installation Drawing.

---

### A Thru-Drive Cover Plate Installation

- Groove to Accept an O-Ring as SAE J642 (1/16 X 3 1/4 ID) O-ring
- 19 Min
- .375-16 UNC-2B

---

### Output Shaft Installation 9T Spline

**Maximum Torque**

- 75 Nm (660 in-lbf)

---

### Output Shaft Installation 11T Spline

**Maximum Torque**

- 119 Nm (1056 in-lbf)

---

- Ø16.54 (.651) 9 Tooth 30˚ Flat Root Side Fit 16/32 Class 5
- Internal Spline per ANSI B92.1
- Accepts 9 Tooth 30˚ Flat Root Side Fit 16/32 External Splines per SAE J498b Class 1 or ANSI B92.1 Class 5 with 31.8 (.125) Extension From Mounting Flange
- Additional Units Driven by this Spline Must Not Require More Than 74.6 N·m (55 Lbf·ft) of Torque

---

- Ø19.33 (.761) 11 Tooth 30˚ Flat Root Side Fit 16/32 Class 1
- Internal Spline per SAE J498b
- Accepts 11 Tooth 30˚ Flat Root Side Fit 16/32 External Splines per SAE J498b Class 1 or ANSI B92.1 Class 5 with 31.8 (.125) Extension From Mounting Flange
- Additional Units Driven by This Spline Must Not Require More Than 118.6 N·m (88 Lbf·ft) of Torque

---

- With Double Shaft Seal and C-maint
- With Double Shaft Seal and C-maint

---

Pump Installation

Thru-Drive SAE B

Output Shaft Installation 13T Spline

Maximum Torque
209 Nm (1850 in-lbf)

Output Shaft Installation 15T Spline

Maximum Torque
337 Nm (2987 in-lbf)

* Contact your Eaton Representative for this option.
Pump Installation
Dual Shaft Seal

B-Mount Dual Shaft Seal*

C-Mount Dual Shaft Seal*

* Refer to C-Mount Pump installation drawings for port locations.
Control Installation

Load Sense and Pressure Compensator

Load Sense and Pressure Compensator

With Double Shaft Seal

Load Sense Port
Control Installation

Pressure Compensator

Pressure Compensator with Double Shaft Seal

Dimensions:
- 103.7 [4.08]
- 158.1 [6.22]
- 117.9 [4.64]
- 71.4 [2.81]
- 93.5 [3.68]

With Double Shaft Seal
Control Installation

Torque Control

Compensator/Control
Not Shown For Clarity

262.12 (10.32)

74.67 (2.94)

148.59 (5.85)
Control Installation

EH Inverse Proportional Pressure Control (IPPC)

AMP CONNECTOR

DEUTSCH CONNECTOR

Dimensions:
- 208.1 [8.19]
- 97.9 [3.85]
- 81.3 [3.20]
- 107.4 [4.23]
- 166 [6.54]
Control Installation

Cold Start Valve

Optional Connectors

Deutsch Option
Metri-pack 280 Option
Metri-pack 150 Option
Maximum Stroke Limiter

Max Displacement is Reduced By Approximately 5 to 6% Per Clockwise Turn

Max Displacement

Torque 20±5 Lbf-ft After Adjusting Max Displacement

Compensator/Control Not Shown For Clarity

20° 105.1 [4.14]

18 [.71]

3.5 [.14] 25% of Max Displacement

177.9 [7.0]

190.6 [7.5]

With Double Seal Housing and C-mount

External Manual Stroke Adjustment
**Input Shaft Options**

**01 Code**

**Maximum Torque**

209 Nm (1850 in-lbf)

![Diagram of 01 Code Input Shaft Options]

**02 Code**

**Maximum Torque**

337 Nm (2987 in-lbf)

![Diagram of 02 Code Input Shaft Options]

**03 Code**

**Maximum Torque**

209 Nm (1850 in-lbf)

Section A-A

![Diagram of 03 Code Input Shaft Options]

**05 Code**

**Maximum Torque**

307 Nm (2717 in-lbf)

![Diagram of 05 Code Input Shaft Options]

---

**Input Shaft Options**

- **01 Code**
  - Maximum Torque: 209 Nm (1850 in-lbf)
  - 01 Code: 02 Code
  - Maximum Torque: 337 Nm (2987 in-lbf)
  - 03 Code: 05 Code
  - Maximum Torque: 307 Nm (2717 in-lbf)

---

**Input Shaft Options**

- **01 Code**
  - Maximum Torque: 209 Nm (1850 in-lbf)
  - 01 Code: 02 Code
  - Maximum Torque: 337 Nm (2987 in-lbf)
  - 03 Code: 05 Code
  - Maximum Torque: 307 Nm (2717 in-lbf)

---

**Input Shaft Options**

- **01 Code**
  - Maximum Torque: 209 Nm (1850 in-lbf)
  - 01 Code: 02 Code
  - Maximum Torque: 337 Nm (2987 in-lbf)
  - 03 Code: 05 Code
  - Maximum Torque: 307 Nm (2717 in-lbf)

---

**Input Shaft Options**

- **01 Code**
  - Maximum Torque: 209 Nm (1850 in-lbf)
  - 01 Code: 02 Code
  - Maximum Torque: 337 Nm (2987 in-lbf)
  - 03 Code: 05 Code
  - Maximum Torque: 307 Nm (2717 in-lbf)

---

**Input Shaft Options**

- **01 Code**
  - Maximum Torque: 209 Nm (1850 in-lbf)
  - 01 Code: 02 Code
  - Maximum Torque: 337 Nm (2987 in-lbf)
  - 03 Code: 05 Code
  - Maximum Torque: 307 Nm (2717 in-lbf)
Input Shaft Options

08 Code

Maximum Torque
397 Nm
(3514 in-lbf)

Ø 24.912 (.9808) 15 Tooth 30° Flat Root Side Fit
16/32 Class 5 Spline per ANSI B92.1 (Modified)
Fits 15 tooth 30° Flat Root Side Fit 16/32 Internal Splines per SAE J498B Class 1 or ANSI B92.1 Class 5

32 Code

Maximum Torque
640 Nm
(5660 in-lbf)

Ø 31.224 (1.2293) 14 Tooth 30° Flat Root Side Fit 12/24 Class 5 Spline per ANSI B92.1 (Modified)
Fits 14 Tooth Flat Root Side Fit 12/24 Internal Splines per SAE J498B Class 1 or ANSI B92.1 Class 5

33 Code

Maximum Torque
450 Nm
(3980 in-lbf)

34 Code

Maximum Torque
397 Nm
(3514 in-lbf)
**Input Shaft Options**

### 35 Code

**Maximum Torque**
640 Nm  
(5660 in-lbf)

- Ø 31.224 (1.2293) 14 Tooth 30° Flat Root Side Fit 12/24 Class 5 Spline per ANSI B92.1 (Modified)
- Fits 14 Tooth Flat Root Side Fit 12/24 Internal Splines per SAE J498B Class 1 or ANSI B92.1 Class 5

### 38 Code

**Maximum Torque**
450 Nm  
(3980 in-lbf)
## Center of Gravity

### Dimensions in mm (in)

<table>
<thead>
<tr>
<th>Rear Port</th>
<th>Side Port</th>
<th>Thru-Drive</th>
<th>Length</th>
<th>Dual Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lcg</td>
<td>L3</td>
<td>L4</td>
<td>Lcg</td>
</tr>
<tr>
<td>ADU041</td>
<td>109.6 (4.31)</td>
<td>9.6 (0.38)</td>
<td>2.9 (0.11)</td>
<td>114.7 (4.51)</td>
</tr>
<tr>
<td>ADU049</td>
<td>109.6 (4.31)</td>
<td>9.6 (0.38)</td>
<td>2.9 (0.11)</td>
<td>114.7 (4.51)</td>
</tr>
<tr>
<td>ADU062</td>
<td>109.9 (4.32)</td>
<td>9.4 (0.37)</td>
<td>2.9 (0.11)</td>
<td>114.9 (4.52)</td>
</tr>
<tr>
<td>ADU080</td>
<td>109.9 (4.32)</td>
<td>9.4 (0.37)</td>
<td>2.9 (0.11)</td>
<td>114.9 (4.52)</td>
</tr>
</tbody>
</table>

**Examples: Calculation $L_1$ and $L_2$**

**Tandem ADU062 Thru-drive with ADU041 Rear Ported**

$L_1 = Lcg$  
$L_2 = Lt + Lcg$  

$131.3mm$ (5.17 inches)  
$287.3mm + 109.6mm = 396.9mm$ (15.6 inches)

**Tandem Dual Seal ADU049 Thru-drive with ADU049 Side Ported**

$L_1 = Lcg + Lds$  
$L_2 = Lt + Lds + Lcg$  

$131.5mm + 13mm = 144.5mm$ (5.69 inches)  
$287.3mm + 13mm + 114.7mm = 415mm$ (16.34 inches)

**Tandem Pump Applications**

Eaton recommends that tandem pump applications be provided with additional support to limit overhung loading of the mounting flange. The thru-drive alternate attachment points on the rear flange may be used with a customer designed support.
Installation and Start-up

**Warning:** Care should be taken that mechanical and hydraulic resonances are avoided in the application of the pump. Such resonances can seriously compromise the life and/or safe operation of the pump.

**Drive Data**
Mounting attitude should be horizontal using the appropriate case drain ports to ensure that the case remains full of fluid at all times. Consult your local Eaton Representative if a different arrangement is required.

**Fluid Cleanliness**
The 420 Series pumps are rated in anti-wear petroleum fluids with a contamination level of 21/18/13 per ISO 4406. Operation in fluids with levels more contaminated than this is not recommended. Fluids other than petroleum, severe service cycles, or temperature extremes are cause for adjustment of these codes. Please contact your Eaton Representative for specific duty cycle recommendation.

Eaton 420 Series pumps, as with any variable displacement piston pumps, will operate with apparent satisfaction in fluids up to the rating specified here. Experience has shown however, that pump and hydraulic system life is not optimized with high fluid contamination levels (high ISO cleanliness codes).

Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials, and additives for protection against wear of components, elevated viscosity and inclusion of air. Essential information on the correct methods for treating hydraulic fluid is included in Eaton publication 561 – “Eaton Guide to Systemic Contamination Control” – available from your local Eaton distributor. In this publication, filtration and cleanliness levels for extending the life of axial piston pumps and other system components are listed. Included is an excellent discussion of the selection of products needed to control fluid condition.

**Start-up Procedure**
Make sure the reservoir and circuit are clean and free of dirt/debris prior to filling with hydraulic fluid.

Fill the reservoir with filtered oil and fill to a level sufficient enough to prevent vortexing at the suction connection to pump inlet. It is good practice to clean the system by flushing and filtering, using an external slave pump.

**Caution:** Before the pump is started, fill the case through the uppermost drain port with hydraulic fluid of the type to be used. The case drain line must be connected directly to the reservoir and must terminate below the oil level.

Once the pump is started, it should prime within a few seconds. If the pump does not prime, check to make sure that there are no restrictions between the reservoir and the inlet to the pump, and that the pump is being rotated in the proper direction, and that there are no air leaks in the inlet line and connections. Also check to make sure that trapped air can escape at the pump outlet.

After the pump is primed, tighten the loose outlet connections, then operate for five to ten minutes (unloaded) to remove all trapped air from the circuit.

If the reservoir has a sight gage, make sure the fluid is clear – not milky.