DC MOTOR/PUMP CAPABILITIES GUIDE

Concentric AB

Innovation in Hydraulics
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A Concentric D.C. motor/hydraulic pump assemblies are compact, versatile hydraulic power systems which include a pump and a D.C. motor. Numerous control valves can be incorporated in the basic packages to meet a wide variety of system requirements. These systems are typically applied in mobile applications where a common reservoir is accessible.

Concentric' expertise in designing, applying and producing D.C. motor/hydraulic pump assemblies is highly regarded within the industries that we serve. We are considered a source of knowledge in this area by the material handling industry, aerial lift industry and the construction equipment industry, among others.

Material Handling Industry
The Material Handling Industry relies on Concentric' knowledge and experience for applications such as lift, tilt, power steering and auxiliary functions on many types of industrial lift trucks. These motor/pump units can be designed for pallet trucks that require separate motor, pump and reservoir packages. These units provide primary hydraulic power for lifting and other functions.

They can also be designed for high reach stackers that require separate motor, pump and reservoir packages as well. They provide primary hydraulic power for lifting and, under certain applications, can provide secondary power for fork carriage extension or side-to-side shift operation.

Narrow aisle or 3-wheel sit down forklifts also typically require separate motor/pump and reservoir packages. These units provide primary hydraulic power for lifting and vehicle steering along with secondary power for fork carriage extension or side-to-side shift operation.

Aerial Lift Industry
The Aerial Lift Industry also relies on Concentric' long history of success in applying D.C. motor/pump assemblies for it's equipment. Our systems are well suited for auxiliary / secondary lowering requirements for off-highway vehicles, lift platforms, or boom applications where the primary hydraulic source becomes nonfunctional or unavailable. They may also be used for minor jib or basket adjustments by the operator.

These motor/pump units are also designed for scissor and boom lift vehicles as the primary power source. These units provide hydraulic power to propel, raise and steer the vehicles.

Construction Industry
In the Construction Equipment Industry, we are called upon for assistance with traction drive applications as well as the lift functions for aerial devices.

Also, many construction machines require a supplemental source of hydraulic power when the primary source becomes nonfunctional or unavailable. Examples of these include large hoists, cranes and wheel loaders. Concentric' D.C. motor/hydraulic pump assemblies are ideally suited to meet these needs.

Concentric' D.C. motor construction is also well suited for applications in off-highway equipment where the conditions are harsh and rugged performance is required. For example, power units can be constructed with heavy duty start switches and insulated wiring boots.

The mating of a D.C. motor and hydraulic pump into an assembly and the application of these assemblies is dependent on a diverse set of variables. Each application varies in complexity. Complete knowledge of the unique characteristics of individual D.C. motors is essential and, of course, expert knowledge of individual hydraulic pump performance is necessary. But the merging of D.C. motors and hydraulic pumps is a technology all its own. And, it is in this area that Concentric excels.

Why Specify Concentric?
Specifying a complete D.C. motor/hydraulic pump assembly ensures system reliability. All Concentric' D.C. motor/pump assemblies are tested for proper coupling engagement, balance motor armature, amp. draw at rated voltage and flow at specified pressure.

The Intent of this Catalog . . .
This catalog draws on our extensive experience to illustrate the range of Concentric D.C. motor/hydraulic pump capabilities. Included are performance curves and dimensional drawings. This catalog will present various types of D.C. motors available and the extensive selection of Concentric pumps available to be applied with them.
**MOTOR FEATURES OFFERED**

**MOTORS . . .**
Concentric offers an extensive range of D.C. motors from 12 to 48 volts. The two motor designs that are incorporated in the majority of our applications are the permanent magnet type and the wound field type. Under these broad categories, there are numerous combinations of voltages, frame sizes and duty ratings available.

**Permanent Magnet**
Motors with permanent magnet excitation are characterized by simple design. Because the magnetic field is created by permanent magnets, excitation of the motor is constant under all operating conditions. The speed variation vs. torque will remain relatively consistent over the motor’s operating range.

**Series Wound Field**
In Series-Wound Field motors, the excitation and armature windings are both electrically operated with the current passing through the armature. Series Wound motors, therefore, develop high initial torque which decreases sharply as the motor speed increases.

Wound field motors are higher speed motors which exhibit a very high stall torque. Their thermal characteristics are such that they can generate higher power levels for short periods of time. Wound field motors are available with different duty ratings. At Concentric these motors are classified as standard duty (usually single terminal motor, totally enclosed non-ventilated (TENV), with sleeve type bearing and 4½ inch diameter), medium duty (usually has ball bearing in rear housing, U.L. approved, totally enclosed non-ventilated (TENV), 4½ inch diameter motor and duty cycle is somewhat longer than standard depending on application) and heavy duty (usually 2 terminal, 5 inch diameter motor, open ventilated fan cooled (OFC), exhibiting longer duty cycles, depending on application).

The above are distinguished by motor diameter or frame size, and the ability to dissipate heat at different current levels over a specific time interval. In general, wound field motors are used in applications where the loads are higher and greater speed is required but only on an intermittent basis. Wound field motors are load sensitive and speed will vary with the applied load; performance curves are required to determine the output at a given point. Applications include lift functions on aerial devices and material handling equipment as well as auxiliary power steering on construction equipment.

Listed below are the standard features available on Concentric’ D.C. motors. A brief explanation of these features is also included for each section.

**Voltage**
Concentric offers a full range of D.C. motor capabilities from 12 to 48 volts.

**Single or Double Terminal**
Concentric offers single terminal motors where the motor is internally grounded. Cost savings is achieved by eliminating additional wiring. We also offer double terminal motors where an external ground is required.

**Several Sizes and Construction**
We offer the standard 4½ inch diameter motors as well as 3 and 5 inch diameter. Available features include open drip proof, thermal protection and sealed designs.

**Start Switches**
Concentric offers start switches which can be mounted in a variety of locations to suit your applications. We offer 3 terminal and 4 terminal (U.L.) switches in heavy duty designs, with or without boots.

**Various Mounts**
Concentric offers a number of standard motor mounting brackets and will work to meet your specific mounting requirements. Shown here are foot mounts, pump/stator mounts, and horseshoe mounts.

**U.L. Approval**
Concentric can provide Direct Current electric motors intended for use in the electric battery powered industrial truck market. These motors are intended to comply with the requirements of UL 583 for Type E, ES or EE industrial trucks.
PUMPS . . .
The Concentric line of high quality cast iron and aluminum bodied gear pumps range in size from .065 in.³/rev. to 2.40 in.³/rev. (1.06 to 39.32 cc) displacements. The two pump styles offered are fixed clearance and pressure balanced. These two pump styles differ in design and in the volumetric efficiency they exhibit under various conditions.

Choosing a Pump . . .
Choosing the type of pump is determined by a number of factors that are inter-related. The system pressure requirement may completely dictate the type of pump required and the motor may have to be sized accordingly. When the selection of a pump type is not dictated, overall efficiency (as it relates to choosing the most economical D.C. motor and the cost of operating the vehicle) must be considered. In many cases, where high pressure, high duty cycle or low viscosity fluid are not factors, a fixed clearance pump is the most economical design to use. These units are less expensive, and their volumetric efficiencies at low to moderate pressures are comparable to pressure balanced pumps.

Volumetric efficiency is the actual flow a pump produces relative to the theoretical (or maximum) flow it could produce if it had no internal losses. The two major leak paths that determine volumetric efficiency in a gear pump are between the gear tips and the housing, and between the gear faces and the housing. Reducing the leakage over the gear tips is a function of being able to hold component parts to precise and exacting tolerances. We have demonstrated over many years that we have the equipment and expertise to consistently provide the required precision in the fabrication of the components used in our gear pumps.

In applications where fixed clearance pump efficiency is not adequate, the pressure balanced design may be desired because of the higher volumetric efficiency. Higher volumetric efficiency on the pump side typically results in faster machine cycle speeds. Cycle speed is important in most battery powered mobile equipment applications because battery life is rated in amp./hours. The less time that amps are being drawn from a battery pack, the longer the battery pack will last before recharge or replacement. In most applications, overall efficiency of pressure balanced pumps is higher than that of fixed clearance pumps. The understanding of how the overall efficiency of a pump varies based on different application parameters is critical to the selection of the optimum D.C. motor for a specific motor/pump application. Concentric has many years of experience in this area.
PUMP FEATURES OFFERED (Cont.)

Listed below are the standard features available on Concentric pumps. A brief explanation of these features is also included.

GC Series
Fixed Clearance Pumps
Concentric GC Series hydraulic pumps are high-efficiency cast iron gear pumps designed for reliability and long-life performance under rugged conditions. GC Series pumps are built with cast iron bodies and hardened steel gears. They are suitable for use in a wide variety of applications.

W Series
Pressure Balanced Pumps
The pressure balanced W Series hydraulic pump offers outstanding performance, flexibility, high efficiency, low noise performance and a variety of options to suit a wide range of equipment needs. It features a through-bore bushing type design construction.

Split Gear Pumps
A Split Gear pump incorporates two gears offset by one tooth to obtain the desired displacement. By offsetting the teeth of the gears, the number of pressure pulses is increased and the magnitude of these pulses is decreased; therefore, reducing any noise caused by the pump.

Multiple Pumps
Multiple pumps provide multiple hydraulic functions from one power source at a significantly lower cost than separate pumps. Some can also be sealed between sections to allow for independent circuit operation without mixing hydraulic fluids.

High/Low Pumps
Two-Stage High/Low pumps provide two section flow for high speed positioning, and unload one section of the pump at a predetermined pressure to provide a maximum working pressure.

Pressure Balanced Pumps
This design incorporates floating bearing blocks in the pump housing on the sides of the gear faces. As pressure is developed by the pump, it creates a hydraulic force which tends to push the bearing blocks away from the gear faces. However, this hydraulic force is balanced by an opposite pressure which is applied on the block via a port behind the block. As the pressure level increases, the opposite pressure on the block increases to insure that the clearance between the bearing block and the gear face is at the smallest possible increment without creating excess friction which would decrease the mechanical efficiency of the pump.

Adjustable Relief Valve
Concentric’ external gear pumps are available with integral adjustable relief valves. Tamper proof versions are also available.

Check Valve
Concentric’ external gear pumps can incorporate integral check valves. All Concentric’ check valves feature hardened steel seats.

Solenoid L-H-L Valve
Concentric’ external gear pumps can incorporate lift-hold-lower valve circuits, integral to the pump housing and electronically actuated by either a 12, 24, 36 or 48 volt D.C. UL approved coils.

Unload Valve
Concentric’ external gear pumps can be designed with an unload valve to optimize system performance and vehicle operation.

Solenoid w/Manual Override
The solenoid actuated valve option can include a manual override feature to allow for manual actuation of the valve.

Load Sense Valve
Load Sensing is a hydraulic circuit configuration which allows the load, as sensed at the control valve, to modulate pump output in relation to system demand. Controlling both flow and pressure at the pump allows for a significant reduction in valving losses and circuit inefficiencies. This provides many of the operational benefits of a piston pump with the performance, reliability and cost advantages of a gear pump.

SAE Side/Rear Ports
Concentric’ standard porting is SAE (Straight Thread O-Ring) side ports. This type of port offers greater resistance to leakage and is more serviceable than other port styles. SAE rear ports are also available.

Inlet Tubes
Oversized inlet tubes are available on Concentric pumps to ensure proper fill and fluid inlet conditions.

Drive Systems . . .
The other critical element to be considered when specifying a D.C. motor/pump unit for your application is the drive system. Drive system failure is known to be a significant problem in many D.C. motor/pump applications today. Concentric has both the product and a wealth of application expertise in this area to ensure that your D.C. motor/pump unit incorporates the correct drive system for your application requirements. The following descriptions define the four (4) drive systems available for Concentric D.C. motor/pump units.

Tang Drive System
A .171” wide tang for GC pumps and a .244” wide tang for PB (Pressure Balanced) pumps are the most durable standard tang drives offered. These wider tangs provide greater tang / shaft engagement, thereby reducing the play between the shaft and tang. Reduced play results in reduced wear of the tang during motor starts and longer drive system life.

Extended Duty
Tang Drive System
For higher duty cycle or high torque applications, we have developed the Concentric’ extended duty tang drive. This innovative drive reduces axial play between tang and shaft to a minimum by means of a wave washer placed behind the ball bearing on the shaft. This washer keeps a constant spring load on the shaft to ensure maximum tang engagement at all times.

Flexible Coupling
Drive System
This drive system eliminates all metal to metal contact by means of a rubber spider which engages inside two metal coupling housings. The material Concentric has selected for its flexible drive coupling exhibits superior resistance to deformation and wear. This system provides maximum torque transfer and quiet operation and is primarily used for continuous duty applications.

SAE 9 Tooth Spline
Drive System
This drive system allows for direct pump/motor spline connection to distribute higher torque and duty cycle operation with lower noise levels emitted from the pump/motor combination.
**PRODUCT/FEATURE MATRIX**

Numbers represent page numbers in this catalog where you can find examples of your desired product features for your market, vehicle and application.

### Product Features

<table>
<thead>
<tr>
<th>Motors</th>
<th>Voltage</th>
<th>Terminals</th>
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<th>Approvals</th>
<th>Controls</th>
<th>Mounting</th>
<th>Pumps</th>
<th>Valves</th>
<th>Shafts</th>
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<tr>
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<td>12</td>
<td>Single</td>
<td>Permanent Magnet</td>
<td>Low</td>
<td>Standard 4.5&quot;</td>
<td>UL</td>
<td>Start Switch</td>
<td>Foot Mount</td>
<td>Type</td>
<td>Sections</td>
<td>Relief Valve</td>
<td>Tang</td>
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<td>24</td>
<td>Double</td>
<td>Wound Field</td>
<td>Medium</td>
<td>3&quot;</td>
<td>3 Terminal</td>
<td>3 Terminal (UL)</td>
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<td>GC</td>
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<td>9,10,11,12,13,15</td>
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<td>36</td>
<td>Single</td>
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<td>Extended</td>
<td>5&quot;</td>
<td>3 Terminal</td>
<td>10</td>
<td>13</td>
<td>9,10,11,12,13,15</td>
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<td>Continuous</td>
<td>9,10,11,12,13,15</td>
<td>17,18,19,22</td>
<td>4 Terminal (UL)</td>
<td>12,13,14</td>
<td>17,18,19,22</td>
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<td>Double</td>
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<td>24,25</td>
<td>15</td>
<td>Heavy Duty</td>
<td>12,13,14</td>
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<td>25,27</td>
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<td>24,25</td>
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<td>w/Boots</td>
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<td>25,27</td>
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<td>w/o Boots</td>
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</table>

**Market**
- Boom
- Scissors/Boom
- APU
- Lift/Propel/Steer
- Lift
- Power Steering

**Aerial Lift**
- 12
- 24
- 36
- 48

**Material Handling**
- Single
- Double
- Permanent Magnet
- Wound Field
- Standard 4.5" 3" 5" 9,10,11,12,13,15
- Open Drip Proof
- Sealed
- Thermal Protection
- UL 3 Terminal 4 Terminal (UL)

**Construction**
- Heavy Duty
- w/Boots
- w/o Boots
- Various

**Start Switch**
- 10
- 12,13,14
- 24,25,27 34,36,37,39,40
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- GC
- Split Gear
- W600
- W900
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- Sealed Between Sections
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- SAE 9 Tooth Spline
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**Ports**
- Side
- Rear
- Inlet Tube
- 35
- 29,32

Concentric AB-DC MtrPmp-USA-2011-6
These pump and motor power units are designed for applications requiring auxiliary hydraulic power. Typical applications are for truck, mobile crane and boom equipment. These power units are well suited for auxiliary / secondary lowering requirements for off-highway vehicles, lift platforms, or boom applications when the primary hydraulic source becomes disabled or nonfunctional. They may also be used for minor positioning adjustments by the operator.

Unit complexity can range from a simple pump and motor unit without any valving, to units that incorporate pressure holding check valves and over-pressurization protecting relief valves. Units range in size from light duty 3 inch motors to medium duty 4.5 inch motors.
**Motor:** 12 Volt DC, 1 Terminal, Wound Field, Low Duty, Standard 4.5" Motor, No Start Switch, with "Horseshoe" Mounting

**Pump:** GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive

### 1300027 Base Motor

#### Nominal Performance of Pump and Motor

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<th>Current (Amps)</th>
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</table>

#### S2 and S3 CURVES

12 VDC, 1 TERMINAL, SERIES WOUND MOTOR

<table>
<thead>
<tr>
<th>I (AMPS)</th>
<th>S2 (%)</th>
<th>S3 (%)</th>
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<tbody>
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<td>9</td>
<td>10</td>
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</tbody>
</table>

### Motor & Accessories

#### Description

- (12 VDC single terminal motor and endhead)
- (12 VDC 3-pole start switch - not shown)

#### Stock P/N

- 1300368
- 1300939

### NOTE:

Dimensions are inches [mm].

### Pump Selection

Any one of these pumps can be used with the motor and accessories on the left. Reference Haldex GC Series Hydraulic Pumps catalog for a complete list of model code options.

#### Description

- (G1104E1A125N00) 0.065 in.³/rev. (1.07 cc) 2500 psi relief valve setting
- (G1108E1A125N00) 0.129 in.³/rev. (2.11 cc) 2500 psi relief valve setting
- (G1112E1A125N00) 0.194 in.³/rev. (3.18 cc) 2500 psi relief valve setting
- (G1116E1A125N00) 0.258 in.³/rev. (4.23 cc) 2500 psi relief valve setting

#### Stock P/N

- 1320458
- 1320142
- 1320460
- 1320461
Motor: 12 Volt DC, 1 Terminal, Wound Field, Low Duty, Standard 4.5" Motor, 3 Terminal Start Switch with Boots, and “Horseshoe” Mounting

Pump: GC Series Pump, Single Section, Relief Valve, Check Valve, SV08 Solenoid Valve Cavity w/ Steel Plug, Tang Drive

1300027 Base Motor

Motor & Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12 VDC single terminal motor and endhead)</td>
<td>1300368</td>
</tr>
<tr>
<td>(12 VDC 3-pole start switch)</td>
<td>1300939</td>
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<tr>
<td>(DC rubber boot kit - not shown)</td>
<td>1303553</td>
</tr>
<tr>
<td>Optional Lowering Valve</td>
<td>1300914</td>
</tr>
<tr>
<td>(12 VDC, 2-pos, NC, spade connection)</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Dimensions are inches [mm].

Pump Selection

Any one of these pumps can be used with the motor and accessories on the left. Reference Haldex GC Series Hydraulic Pumps catalog for a complete list of model code options.

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(G1104H1A122RPG) 0.065 in.³/rev. (1.07 cc)</td>
<td>1320486</td>
</tr>
<tr>
<td>2200 psi relief valve setting</td>
<td></td>
</tr>
<tr>
<td>(G1108H1A120RPG) 0.129 in.³/rev. (2.11 cc)</td>
<td>1300380</td>
</tr>
<tr>
<td>2000 psi relief valve setting</td>
<td></td>
</tr>
<tr>
<td>(G1112H1A120RPG) 0.194 in.³/rev. (3.18 cc)</td>
<td>1300381</td>
</tr>
<tr>
<td>2000 psi relief valve setting</td>
<td></td>
</tr>
<tr>
<td>(G1116H1A125RPG) 0.258 in.³/rev. (4.23 cc)</td>
<td>1320755</td>
</tr>
<tr>
<td>2500 psi relief valve setting</td>
<td></td>
</tr>
</tbody>
</table>
Motor:
12 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5” Motor, UL Approved, No Start Switch, with “Horseshoe” Mounting

Pump:
GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive

1300618 Base Motor

Motor & Accessories
Description
(12 VDC double terminal motor and endhead) 1300621
(12 VDC 4-pole start switch - not shown) 1300937
(ground strap - not shown) 1300620

Pump Selection
Any one of these pumps can be used with the motor and accessories on the left. Reference Haldex GC Series Hydraulic Pumps catalog for a complete list of model code options.

Description
Stock P/N
(G1104E1A125N00) 0.065 in.³/rev. (1.07 cc) 1320458
2500 psi relief valve setting
(G1108E1A125N00) 0.129 in.³/rev. (2.11 cc) 1320142
2500 psi relief valve setting
(G1112E1A125N00) 0.194 in.³/rev. (3.18 cc) 1320460
2500 psi relief valve setting
(G1116E1A125N00) 0.258 in.³/rev. (4.23 cc) 1320461
2500 psi relief valve setting

NOTE: Dimensions are inches [mm].
Motor: 12 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5” Motor, UL Approved, 4 Terminal Start Switch with No Boots, and “Horseshoe” Mounting

Pump: GC Series Pump, Single Section, Relief Valve, Check Valve, SV08 Solenoid Valve Cavity w/ Steel Plug, Tang Drive

**1300618 Base Motor**

**Motor & Accessories**

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(12 VDC double terminal motor and endhead)</td>
<td>1300621</td>
</tr>
<tr>
<td>(12 VDC 4-pole start switch)</td>
<td>1300937</td>
</tr>
<tr>
<td>(ground strap)</td>
<td>1300620</td>
</tr>
<tr>
<td>(DC rubber boot kit - not shown)</td>
<td>1303553</td>
</tr>
<tr>
<td>Optional Lowering Valve</td>
<td>1300914</td>
</tr>
<tr>
<td>(12 VDC, 2-pos, NC, spade connection)</td>
<td>1300914</td>
</tr>
</tbody>
</table>

**Pump Selection** Any one of these pumps can be used with the motor and accessories on the left. Reference Haldex GC Series Hydraulic Pumps catalog for a complete list of model code options.

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(G1116H1A125RPG) 0.258 in.³/rev. (4.23 cc)</td>
<td>1320755</td>
</tr>
<tr>
<td>(G1104H1A122RPG) 0.065 in.³/rev. (1.07 cc)</td>
<td>1320486</td>
</tr>
<tr>
<td>(G1108H1A120RPG) 0.129 in.³/rev. (2.11 cc)</td>
<td>1300380</td>
</tr>
<tr>
<td>(G1112H1A120RPG) 0.194 in.³/rev. (3.18 cc)</td>
<td>1300381</td>
</tr>
</tbody>
</table>

**NOTE:** Dimensions are inches [mm].
Motor: 12 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5" Motor, UL Approved, 4 Terminal Start Switch with No Boots, and Motor Foot Mounting

Pump: GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive

**Nominal Performance of Pump and Motor**

<table>
<thead>
<tr>
<th>PSI</th>
<th>Flow (GPM)</th>
<th>Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7.00</td>
<td>500</td>
</tr>
<tr>
<td>500</td>
<td>6.00</td>
<td>450</td>
</tr>
<tr>
<td>1000</td>
<td>5.00</td>
<td>400</td>
</tr>
<tr>
<td>1500</td>
<td>4.00</td>
<td>350</td>
</tr>
<tr>
<td>2000</td>
<td>3.00</td>
<td>300</td>
</tr>
<tr>
<td>2500</td>
<td>2.00</td>
<td>250</td>
</tr>
<tr>
<td>3000</td>
<td>1.00</td>
<td>200</td>
</tr>
<tr>
<td>3500</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>4000</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

**NOTE:** Dimensions are inches [mm].

**Diagram:**

- **Motor:** 12 Volt, 2 Terminal, DC Motor
- **Pump:** GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive

**Dimensions:**

- 2X 5/16-24 UNF-2A
- Ø 4.50 [114.3]
- 3.96 [100.58]
- 2.55 [65.02]
- 2.75 [69.85]
- 3.75 [95.25]
- 3.25 [82.55]
- 3.05 [77.47]
- 1.25 TYP. (4)
- 0.375 TYP. (4)
- 10.41 [264.41]
- 5/16-24 UNF-2A
- 7.41 [188.24]
- 9/16-18 SAE

**Models:**

- Flow .065 cir
- Flow .129 cir
- Flow .194 cir
- Flow .258 cir
- Amps .065 cir
- Amps .129 cir
- Amps .194 cir
- Amps .258 cir
**Motor:**
24 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5” Motor, UL Approved, 4 Terminal Start Switch with No Boots, and “Horseshoe” Mounting.

**Pump:**
GC Series Pump, Single Section, Relief Valve, Check Valve, **SV08** Solenoid Valve Cavity w/ Steel Plug, Tang Drive

1300619 Base Motor

### Motor & Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(ground strap)</td>
<td>1300620</td>
</tr>
<tr>
<td>(24 VDC double terminal motor and endhead)</td>
<td>1300622</td>
</tr>
<tr>
<td>(24 VDC 4-pole start switch)</td>
<td>1300938</td>
</tr>
<tr>
<td>Optional Lowering Valve (24 VDC, 2-pos, NC, spade connection)</td>
<td>1300915</td>
</tr>
</tbody>
</table>

**NOTE:** Dimensions are inches [mm].

### Pump Selection
Any one of these pumps can be used with the motor and accessories on the left. Reference Haldex GC Series Hydraulic Pumps catalog for a complete list model code options.

<table>
<thead>
<tr>
<th>Description</th>
<th>Stock P/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>(G1104H1A122RPG) 0.065 in.³/rev. (1.07 cc) 2200 psi relief valve setting</td>
<td>1320486</td>
</tr>
<tr>
<td>(G1108H1A120RPG) 0.129 in.³/rev. (2.11 cc) 2000 psi relief valve setting</td>
<td>1300380</td>
</tr>
<tr>
<td>(G1112H1A120RPG) 0.194 in.³/rev. (3.18 cc) 2000 psi relief valve setting</td>
<td>1300381</td>
</tr>
<tr>
<td>(G1116H1A125RPG) 0.258 in.³/rev. (4.23 cc) 2500 psi relief valve setting</td>
<td>1320755</td>
</tr>
</tbody>
</table>

### Nominal Performance of Pump and Motor

<table>
<thead>
<tr>
<th>Flow (GPM)</th>
<th>PSI</th>
<th>Current (Amp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow .065 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow .129 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow .194 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow .268 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amps .065 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amps .129 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amps .194 c.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amps .268 c.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Pump Schematic

- **Inlet Port:** 3/4-16 SAE (opp. side) (plastic plug)
- **Outlet Port:** 9/16-18 SAE (this side) (plastic plug)
- **Valve Cavity:** Steel plug
- **Check Valve**
- **Customers Power Connection:** 5/16-24 UNF-2A
- **Motor Term.**
- **Drive A:** 50 [127]
- **Rots Adj. Relief Valve**
- **3/8-16 UNC-2A x .625 [15.87] MFD (2) MTG. Holes**
Motor: 12 Volt DC, 2 Terminal, Wound Field, Light Duty, 3” Motor, No Start Switch, Integrated Pump Stator Mounting, UL Approved

Pump: GC Series Pump, Single Section, Relief Valve, Direct Drive

NOTE: Dimensions are inches [mm].
These pump and motor units are designed for scissor and boom lift vehicles for primary power applications. These units provide hydraulic power to propel, raise and steer the vehicles. Pumping requirement may be provided for by single or multiple sections. The pump may be supplied with a tube inlet or other standard inlet porting. Electrical D.C. motors may be provided in 24, 36 or 48 volt combinations. The units may be equipped with pressure holding check valves, over-pressurization protecting relief valves, or even pressure unloading valves to optimize system operation.
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof, UL Approved, No Start Switch, Motor Foot Mounting

Pump: GC Series Pump, Single Section, No Valves, Direct Tang

**NOTE:** Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**NOTE:** Dimensions are inches [mm].
**Motor:**
24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof, UL Approved, No Start Switch, Motor Foot Mounting

**Pump:**
GC Series Pump, Single Section, No Valves, Flex Coupling Drive for Low Noise Operation

**NOTE:** Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**Nominal Performance of Pump and Motor**

![Nominal Performance Graph]

**NOTE:** Dimensions are inches [mm].

![Hydraulic Schematic]
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof, UL Approved, No Start Switch, Motor Foot Mounting

Pump: GC Series Pump, Two Section, No Valves, Flex Coupling Drive for Low Noise Operation

NOTE: Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**Nominal Performance of Pump and Motor**

![Nominal Performance Graph]

NOTE: Dimensions are inches [mm].

**Hydraulic Schematic**

![Hydraulic Schematic Diagram]
Motor: 48 Volt DC, 2 Terminal, Permanent Magnet, Extended Duty, Thermal Overload Protection, Motor Foot Mounting

Pump: GC Series Pump, Three Section, No Valves, Flex Coupling Drive for Low Noise Operation

NOTE: Dimensions are inches [mm].
**Motor:** 24 Volt DC, 2 Terminal, Permanent Magnet, Extended Duty, Open Drip Proof, No Start Switch, Motor Foot Mounting

**Pump:** GC Series Pump, Three Section, Relief Valve, Check Valve, Unload Valve, Flex Coupling Drive for Low Noise Operation

---

**Nominal Performance of Pump and Motor**

- **Flow:**
  - 0.129 cir
  - 0.161 cir
  - 0.226 cir
  - 0.258 cir

- **Amps:**
  - 0.129 cir
  - 0.161 cir
  - 0.226 cir
  - 0.258 cir

---

**NOTE:** Dimensions are inches [mm].

---

**Hydraulic Schematic**

---

**Dimensions:**

- INLET PORT: 3/4-16 SAE
- OUTLET PORT: 3/4-16 SAE
- RELIEF VALVE: 8.03 [203.96]
- UNLOAD VALVE: 4.16 [105.66]
- CHECK VALVE: 4.03 [102.36]
- ROTATION: 22.12 [561.98]
- 3/4-16 SAE OUTLET PORT (OPP SIDE): 8.03 [203.96]
- 3/4-16 SAE INLET PORT: 3.94 [99.98]

---

Concentric AB-DC MtrPmp-USA-2011-6
**Motor:** 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof, UL Approved, No Start Switch, Motor Foot Mounting

**Pump:** GC Series Pump, Two Section, No Valves, Flex Coupling Drive for Low Noise Operation

**NOTE:** Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**NOTE:** Dimensions are inches [mm].
These pump and motor power units are designed for the Material Handling market for pallet trucks that require separate motor, pump and reservoir packages. They are available in both 12 and 24 volt motor options that comply with the requirements of UL583. The units provide primary hydraulic power for lifting. Power units are available with valving that incorporates pressure holding check valves, solenoid operated directional control valves and over-pressurization protecting relief valves.
Motor: 12 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5” Motor, UL Approved, Start Switch, and “Horseshoe” Mounting

Pump: GC Series Pump, Single Section, Relief Valve, Tang Drive

1300618 Base Motor

Motor & Accessories

Description | Stock P/N
---|---
(ground strap) | 1300620
(12 VDC double terminal motor and endhead) | 1300621
(12 VDC 4-pole start switch) | 1300937

Pump Selection

Any one of these pumps can be used with the motor and accessories on the left. Reference Concentric GC Series Hydraulic Pumps catalog for a complete list of model code options.

Description | Stock P/N
---|---
(G1104B1A125N00) 0.065 in.³/rev. (1.07 cc) | 1321572
2500 psi relief valve setting

(G1108B1A125N00) 0.129 in.³/rev. (2.11 cc) | 1320661
2500 psi relief valve setting

(G1112B1A125N00) 0.194 in.³/rev. (3.18 cc) | 1321130
2500 psi relief valve setting

(G1116B1A125N00) 0.258 in.³/rev. (4.23 cc) | 1320676
2500 psi relief valve setting

NOTE: Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Medium Duty, Standard 4.5" Motor, UL Approved, 4 Terminal Start Switch with Boots, Motor Foot Mounting with Weld Nuts

Pump: GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive

**1300619 Base Motor**

**Motor & Accessories**

**Description**
- (ground strap - not shown)
- (24 VDC double terminal motor and endhead)
- (24 VDC 4-pole start switch)
- (DC rubber boot kit)

**Stock P/N**
- 1300620
- 1300622
- 1300938
- 1303553

**Pump Selection** Any one of these pumps can be used with the motor and accessories on the left. Reference Concentric GC Series Hydraulic Pumps catalog for a complete list of model code options.

**Description**
- (G1104E1A125N00) 0.065 in.³/rev. (1.07 cc) 1320458
  - 2500 psi relief valve setting
- (G1108E1A125N00) 0.129 in.³/rev. (2.11 cc) 1320142
  - 2500 psi relief valve setting
- (G1112E1A125N00) 0.194 in.³/rev. (3.18 cc) 1320460
  - 2500 psi relief valve setting
- (G1116E1A125N00) 0.258 in.³/rev. (4.23 cc) 1320461
  - 2500 psi relief valve setting

**NOTE:** Dimensions are inches [mm].
These pump and motor power units are designed for the Material Handling market for high reach stackers that require separate motor, pump and reservoir packages. They are available in 12 to 48 volt motor options which comply with the requirements of UL583. The units provide primary hydraulic power for lifting and, under certain applications, can provide secondary power for fork carriage extension or side-to-side shift operation. Power units are available with valving that incorporates pressure holding check valves, solenoid operated directional control valves and over-pressurization protecting relief valves.
Motor:
24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof,
UL583 Approved, Heavy Duty 4 Terminal Start Switch with Boots, Motor Foot Mounting

Pump:
GC Series Pump, Single Section, Relief Valve, Check Valve, Solenoid Lift-Hold-Lower Valve, Tang Drive

NOTE: Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

NOTE: Dimensions are inches [mm].
These pump and motor power units are designed for the Material Handling market for narrow aisle or 3-wheel sit down forklifts that require separate motor, pump and reservoir packages. They are available in 12 to 48 volt motor options which comply with the requirements of UL583. These units provide primary hydraulic power for lifting and vehicle steering along with secondary power for fork carriage extension or side-to-side shift operation. Power units are available with valving that incorporates pressure holding check valves and over-pressurization protecting relief valves.
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, 5" Motor, UL Approved, Open Drip Proof, No Start Switch, Motor Foot Mounting

Pump: GC Series Pump, Single Section, Tang Drive, Inlet Tube

**NOTE:** Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**NOTE:** Dimensions are inches [mm].
Motor: 12 Volt DC, 2 Terminal, Wound Field, Extended Duty, 5” Motor, UL Approved, Open Drip Proof, No Start Switch, Motor Foot Mounting

Pump: GC Series Pump, Single Section, Relief Valve, Check Valve, Tang Drive
NOTE: Slippage could occur at higher pressures. You may need to specify a PB (Pressure Balanced) pump for improved flow at higher pressures for the larger displacement pumps (.226 in.³ and up).

**Nominal Performance of Pump and Motor**

![Nominal Performance of Pump and Motor](image)

**NOTE:** Dimensions are inches [mm].

![Hydraulic Schematic](image)
**Motor:** 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Open Drip Proof, UL Approved, No Start Switch, Motor Foot Mounting

**Pump:** PB Series Pump, Single Section, Check Valve, Relief Valve, Solenoid Release Valve with Manual Override (L-H-L), Tang Drive

NOTE: Dimensions are inches [mm].
Motor: 36/48 Volt DC, 2 Terminal, Externally Vented, Permanent Magnet Motor, Continuous Duty, Open Drip Proof, Motor Foot Mounting

Pump: Single Section Split Gear Pump, Relief Valve, Check Valve, Flex Coupling Drive for Low Noise Operation

NOTE: Dimensions are inches [mm].
These pump and motor power units are designed for applications requiring a secondary source for supplying steering when the primary source becomes nonfunctional.

The pumps are available in single or multiple section, designed with optional priority load sense in the rear valve cover. Motor construction is suited for applications in off-highway equipment where the conditions are harsh, and rugged performance is required. Power units can be constructed with heavy duty start switches and insulated wiring boots.
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, Motor Foot Mounting

Pump: W600 Series Pump, Single Section, 9 Tooth Spline, Adjustable Relief Valve, Side Inlet/Outlet Porting

NOTE: Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, No Start Switch, Motor Foot Mounting

Pump: W900 Series Pump, Single Section, 9 Tooth Spline, No Valves, Rear Inlet/Outlet

NOTE: Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, Heavy Duty 4 Terminal Start Switch Without Boots, Motor Foot Mounting

Pump: W900 Series Pump, Single Section, 9 Tooth Spline, No Valves, Side Inlet/Outlet

2201136 Base Motor

Motor & Accessories
Description
(24 VDC double terminal, heavy duty motor)
(24 VDC heavy duty 4-pole start switch)

Pump Selection
Any one of these pumps can be used with the motor and accessories on the left. Reference Concentric W900 Series Hydraulic Pumps catalog for a complete list of model code options.

NOTE: Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, Heavy Duty 4 Terminal Start Switch with Boots, Motor Foot Mounting

Pump: W900 Series Pump, Single Section, 9 Tooth Spline, Adjustable Relief Valve, Rear Inlet/Outlet

**Nominal Performance of Pump and Motor**

![Graph showing performance data for the pump and motor.](chart)

**NOTE:** Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, No Start Switch, Motor Foot Mounting

Pump: W900 Series Pump, Single Section, 9 Tooth Spline, Side Inlet/Outlet, Priority Load Sense in Rear Valve Cover

NOTE: Dimensions are inches [mm].
**Motor:**
24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, No Start Switch, Motor Foot Mounting

**Pump:**
W900 Series Pump, Two Section (Sealed Between Sections), 9 Tooth Spline, Side Inlet/Outlet, Priority Load Sense in Rear Valve Cover

**NOTE:** Dimensions are inches [mm].
Motor: 24 Volt DC, 2 Terminal, Wound Field, Extended Duty, Sealed Motor, Heavy Duty
4 Terminal Start Switch with Boots, Motor Foot Mounting

Pump: W900 Series Pump, Single Section, 9 Tooth Spline, Side Inlet/Outlet,
Priority Load Sense in Rear Valve Cover

NOTE: Dimensions are inches [mm].
**Cast Iron Pumps**  
**Heavy Duty**

**GC Series Pumps**
- Displacements: 0.065 to 0.711 cu. In. (1.06 to 11.65 cc)

**GC Series High/Low Pumps**
- High Pressure Displacements: 0.065 to 0.258 cu. In. (1.06 to 4.22 cc)
- Low Pressure Displacements: 0.258 to 0.776 cu. In. (4.22 to 12.71 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: 4,000 rpm

**F12 & F15 Ferra Series Pumps**
- F12 Displacements: 0.976 to 2.502 cu. In. (16 to 41 cc)
- F15 Displacements: 1.159 to 3.051 cu. In. (19 to 50 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: 3,600 rpm

**F20/F30 Pumps & F20-LS/F30-LS Load Sense Ferra Series Pumps**
- Displacements: 1.41 to 9.82 cu. In. (23 to 161 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: 3,600 rpm

**D Series Pumps**
- Displacements: 0.232 to 1.395 cu. In. (3.80 to 22.85 cc)

**D Series High/Low Pumps**
- High Pressure Displacements: 0.465 cu. In. (7.62 cc)
- Low Pressure Displacements: 0.930 to 1.395 cu. In. (15.24 to 22.86 cc)
- Maximum Pressure: 3,000 – 4,000 psi (207 – 276 bar)
- Maximum Speed: 3,600 – 4,000 rpm

**Aluminum Pumps**  
**Medium/Light Duty**

**W-Series Pumps**
- W100 Displacements: 0.031 to 0.122 cu. In. (0.50 to 2.00 cc)
- W300 Displacements: 0.049 to 0.347 cu. In. (0.80 to 5.70 cc)
- W600 Displacements: 0.244 to 0.732 cu. In. (4.22 to 12 cc)
- W900 Displacements: 0.305 to 1.891 cu. In. (5 to 31 cc)
- W1200 Displacements: 1.526 to 2.014 cu. In. (25 to 33 cc)
- W1500 Displacements: 1.159 to 3.051 cu. In. (19 to 50 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: 4,000 rpm

**WK900 CALMA Pumps**
- Displacements: 0.305 to 1.648 cu. In. (5 to 27 cc)
- Maximum Pressure: 3,336 psi (230 bar)
- Maximum Speed: 4,000 rpm

**Fluid Motors**

**Cast Iron**
- Displacements: 0.065 to 9.82 cu. In. (1.06 to 161 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: 3,600 rpm

**Aluminum**
- Displacements: 0.244 to 3.050 cu. In. (4 to 50 cc)
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Speed: Up to 4,000 rpm

**Flow Dividers**

**GC & D Series**
- GC Displacements: 2.00 to 12.71 cc
- D Displacements: 2.39 to 13.32 cc
- Maximum Pressure: 4,000 psi (276 bar)
- Maximum Input Flow Per Section: 14 gpm (53 lpm)

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E-mail us: info.hydraulics.us@concentricAB.com
Only Concentric offers this extensive range of products worldwide.

**POWER PACKS**

**PUMP/MOTORS (DC/AC)**
- DC Voltage Range: 12 to 72 VDC
- AC Horsepower Range: 1/2 to 3 HP
- Pump Displacements: 0.04 – 1.71 cu. in. (0.65 to 28 cc)
- Maximum Pressure: 4,000 psi (276 bar)

**HE “BOX” POWER PACKS**
- Voltage Range: 12 to 24 VDC
- Pump Displacements: 0.049 to 0.388 cu. in. (0.80 to 6.36 cc)
- Maximum Pressure: 3,336 psi (230 bar)
- Reservoirs: 3 qt. to 5.0 gal. (2.84 to 19 ltr.) steel

**HB800 POWER PACKS**
- Voltage Range: 12 to 24 VDC
- Pump Displacements: 0.037 to 0.092 cu. in. (0.60 to 1.5 cc)
- Reservoirs: 0.13 to 1 gal. (0.5 to 3.8 ltr.) plastic
- Maximum Pressure: 2,610 psi (180 bar)

**HE1000 SERIES POWER PACKS**
- Voltage Range: 12 to 24 VDC
- Pump Displacements: 0.015 to 0.122 cu. in. (0.24 to 2 cc)
- Maximum Pressure: 3,336 psi (230 bar)
- Reservoirs: 0.13 to 1.0 gal. (0.5 to 3.8 ltr.) plastic

**HE2000 SERIES POWER PACKS**
- Voltage Range: 12 to 24 VDC, 115 to 230 VAC
- Pump Displacements: 0.049 to 0.388 cu. in. (0.80 to 6.36 cc)
- Maximum Pressure: 3,336 psi (230 bar)
- Reservoirs: 0.95 qt. to 3.96 gal. (0.9 to 15 ltr.) steel, 0.8 to 1.7 qt. (0.76 to 1.6 ltr.) plastic

**HE-Q (QUIET) POWER PACKS**
- Voltage Range: 24 VDC
- WQ300 Pump Displacements: 0.073 to 0.347 cu. in. (1.2 to 5.7 cc)
- Noise: 42dB(A)

**BIROTATIONAL POWER PACKS**
- Voltage Range: 12 to 24 VDC, 115 to 230 VAC
- Pump Displacements: 0.049 to 0.129 cu. in. (0.80 to 2.11 cc)
- Maximum Pressure: 3,336 psi (230 bar)
- Reservoirs: 2 to 2.96 qt. (1.9 to 2.8 ltr.) plastic, 1 to 2 gal. (3.8 to 7.6 ltr.) steel

**AC POWER PACKS**
**GC-9500 SERIES**
- Displacements: 0.065 to 1.394 cu. in. (1.06 to 22.85 cc)
- Maximum Pressure: 3,000 psi (207 bar)
- Maximum Speed: 3,600 rpm
- Reservoirs: 5 to 20 gal. (19 to 76 ltr.) steel

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Our applications specialists seek to understand the overall goals for the vehicle, the vehicle subsystems and then the hydraulics system. This understanding enables them to respond with customized value engineered solutions. Concentric was the first to offer many of the solutions shown here.
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