




Powering Business Worldwide

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Introduction to Eaton Gear Products

Eaton Gear Products

In the 1960s, Eaton began manufacturing gear pumps and gear motors for the growing aerospace industry. Today, we deliver gear products to worldwide customers in most mobile and industrial applications.

Eaton Gear Products combine state of the art innovation and manufacturing processes. These products are designed to satisfy global customer requirements for higher pressure, quiet operation, long life, and a full range of options and features.

Eaton offers a wide range of gear pumps. Many functions, such as valves and controls, are directly incorporated in the products in order to optimize space and costs for the system.

With our products you can choose preferred configurations and multiple combinations, or we can design a product to fit your specific application.

Eaton hydraulic gear pumps are suited for a wide range of equipment applications from construction, agriculture, material handling, aerial lifts, turf care and much more.

In addition, we develop solutions that make it possible to obtain hydraulic systems, such as, for example, the operation of a fan drive system for mobile vehicles.

Noise Reduction in Hydraulic Systems

It's a fact of life. Mechanical equipment makes noise. Some noise is unavoidable, such as when hardened materials make sudden contact. Other kinds of unwanted sound, such as airborne noise from hydraulic vibration, can be reduced through design improvements. Eaton global gear products provide high performance at lower decibel levels, which reduces operator fatigue and provides better working conditions for employees and visitors.

How Noise Is Created

Fluid power systems apply pressure to liquids in closed hydraulic circuits. That pressure is created by gear pumps, which convert rotary power into fluid power. When hydraulic fluid passes through the gears of a pump, it carries a waveform produced by the interaction of the gears. This pulsing results in vibration that can shake the hydraulic circuit and create noise. Often, the pulsing itself is audible.

Even without affecting other components, a gear pump can generate sounds that distract.

How Eaton Reduces Noise

The size and shape of the wave created in the gear pump depends on the way the gears fit together.

As more fluid is trapped between the gear teeth and then released, a larger wave is created, one with higher peaks and deeper valleys.

By refining the fit of the teeth between gears—Eaton has reduced the size of the wave, resulting in lower vibration and less airborne noise.

Eaton Gear Pumps

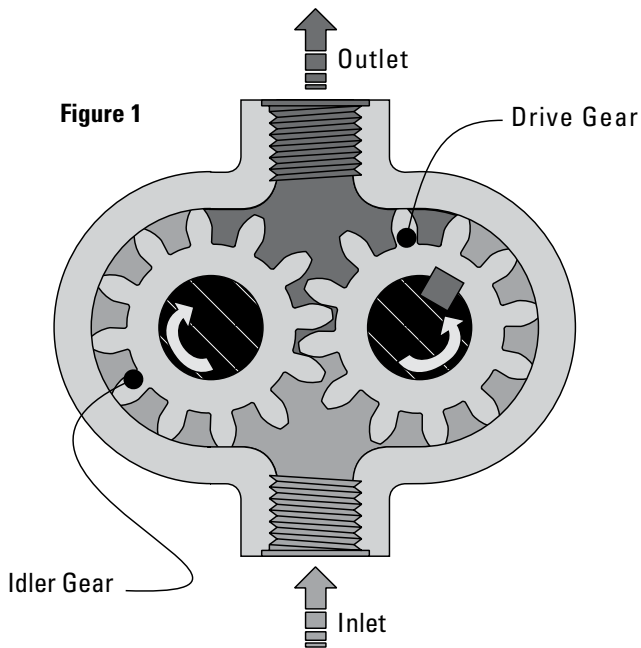
The design of any fluid power system will have many requirements. You select components based on their capabilities and compatibility. When you specify a gear pump, look for more than output. For reliable performance with reduced vibration and noise, choose gear products from Eaton.

GEAR PRODUCT QUICK-GUIDE (BASED ON MAXIMUM CONTINUOUS RATINGS)

Type	Displacement (Min.) cc ³ /rev (in ³ /rev)	Displacement (Max.) cc ³ /rev (in ³ /rev)	Pressure bar (psi)	Speed rpm
A-AL Pump	5.3 (.32)	33.4 (2.04)	276 (4000)	4000

What is a Gear Pump & Motor?

The gear pump is common type of hydraulic pump. The operation of a typical external gear pump (so called because the gear teeth are on the external surface of the hub) is shown in figure 1. A gear pump carries oil from the inlet to the outlet in the spaces between gear teeth. The pumping chamber is formed by the gears, the pump housing, and side plates. One of the two gears, called the drive gear, will be connected to the drive shaft. The other, idler gear, is driven by the drive gear.



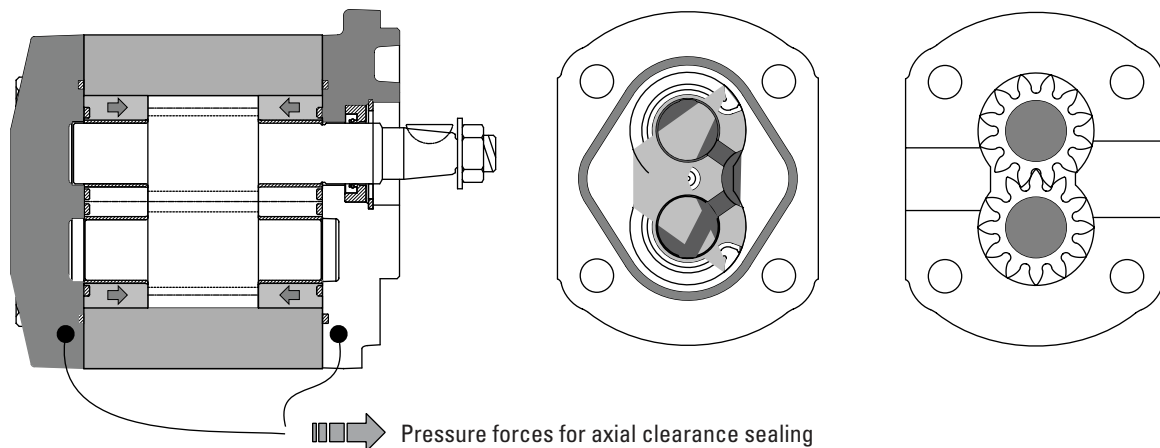
As the gear teeth unmesh at the bottom of figure 1, a partial vacuum is created, allowing fluid into the spaces between the teeth. As the gears rotate, the fluid is carried around to the outlet at the top of figure 1. The fluid is expelled from the spaces between the teeth as the gears mesh. The oil cannot return to the inlet because the spaces between the teeth are filled with a meshing gear as the teeth return to the inlet.

The displacement is equal to the size of each space between teeth multiplied by the number of such spaces which pass in a single input shaft revolution. The number of spaces is equal to the number of teeth on each gear multiplied by two since there are two gears. The flow output of such a pump is again equal to the rotational speed (rpm) times the displacement.

Although there can be pressurized wear compensation at the sides plates, there is no wear compensation at the gear housing. If the housing or the gear teeth wear, the internal leakage of the pump will increase.

External gear pumps are inherently unbalanced. In figure 2, the outlet pressure will create a force trying to push the gears down and apart. There will also be a force generated from the transmission of the power from the drive gear to the idler gear. These loads, combined with the external loads, must be borne by the shafts and bearings. Despite these drawbacks, gear pumps are very popular due to their simplicity and robustness.

Figure 2



Optional Features

OPTIONAL FEATURE	BENEFIT
Viton Seals	For higher temperature or chemical resistance applications
High Pressure Shaft Seal	More robust shaft seal that can withstand high case pressure spikes
Wiper Seal	Prevents physical damage to shaft seal from foreign debris
Double Shaft Seal	To keep internal fluid separate from external fluid
Multiple Section	Combines multiple pumps into a smaller and lighter package, driven by a single input shaft
Sealing Between Sections	To keep fluids separate between sections - ie. An applications where fluid of each section is taken from different reservoirs
Common Inlet	Allows multiple sections to have fewer ports. Reduced inlets provide savings by reducing the cost of redundant inlet hose and fittings.
Integral Relief Valves	Small, compact package. Protects against pressure spikes.
Integral Priority Flow Valves	Small, compact package. Provides controlled flow to a particular function.
Integral Load Sense Valves	Small, compact package. Provides metered priority flow on demand.
Field Reversible	Enables the pump to be easily disassembled and easily reassembled, resulting in opposite rotation.
Metric Shafts, Ports & Mounts	EU specific

Optional Features Application Matrix

TYPICAL APPLICATIONS*

OPTIONAL FEATURES	TURF CARE	AGRICULTURE MACHINE & IMPLEMENTS	LIFTTRUCK	SKIDSTEER LOADER	WHEEL LOADERS	DOZERS	FAN DRIVE SYSTEMS	STEERING CIRCUITS	SALT & SAND SPREADERS	AUXILIARY WORK CIRCUITS	PACKAGING EQUIPMENT	PLASTIC INJECTION MOLDING	METAL CUTTING & FORMING	PAPER MILLS
Viton Seals	x	x		x			x	x				x	x	x
High Pressure Shaft Seal	x	x					x							
Wiper Seal	x	x							x					
Double Shaft Seal				x	x					x				
Multiple Sections	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sealing Between Sections		x												
Common Inlet	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Integral Relief Valves	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Integral Priority Flow Valves								x						
Integral Load Sense Valves							x	x						
Field Reversible	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Metric Shafts, Ports & Mounts	x	x	x	x	x	x	x	x	x	x	x	x	x	x

* These features are not limited to these applications. Final configuration depends on individual application needs.

Design Calculations

Basic Formulas

Output Flow (Q)

$$\text{lpm} = \frac{\text{cm}^3/\text{r} \times \text{rpm}}{1000} \quad \text{gpm} = \frac{\text{in}^3/\text{r} \times \text{rpm}}{231}$$

Input Power (P)

$$\text{kW} = \frac{\text{l/min} \times \text{bar}}{600} \quad \text{hp} = \frac{\text{gpm} \times \text{psi}}{1714}$$

Shaft Torque (M)

$$\text{N-m} = \frac{\text{bar} \times \text{cm}^3/\text{r}}{62.8} \quad \text{lb-in} = \frac{\text{psi} \times \text{in}^3/\text{r}}{6.28}$$

Shaft Speed (n)

$$\text{rpm} = \frac{1000 \times \text{l/min}}{\text{cm}^3/\text{r}} \quad \text{RPM} = \frac{231 \times \text{gpm}}{\text{in}^3/\text{r}}$$

Output Power (P)

$$\text{kW} = \frac{\text{N-m} \times \text{RPM}}{9549} \quad \text{hp} = \frac{\text{lb-in} \times \text{rpm}}{63,025}$$

Volumetric Displacement

$$\text{cm}^3/\text{r} = \frac{\text{lpm} \times 1000}{\text{rpm}} \quad \text{in}^3/\text{r} = \frac{\text{gpm} \times 231}{\text{rpm}}$$

Basic Formulas

bar = 10 Newtons/cm²

gpm = gallons per minute

hp = horsepower

lb-in = pound inch

lb-ft = pound feet

kW = kilowatt

kgf = kilograms force

l/min = liters per minute

N-m = Newton meters

psi = pounds per square inch

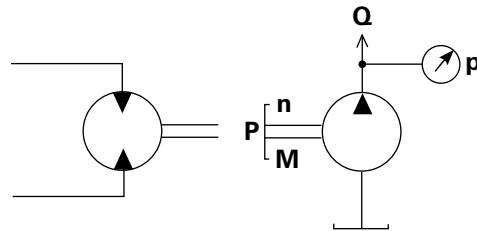
rpm = revolutions per minute

Efficiencies

$$\text{Volumetric } N_v = \frac{\text{gpm actual}}{\text{gpm theoretical}}$$

$$\text{Mechanical } N_m = \frac{\text{lb-in actual}}{\text{lb-in theoretical}}$$

$$\text{Total } N_t = N_v \times N_m$$



Commonly Used Conversions

To Convert	Into	Multiply by
bar	psi	14.5
cm ³	in ³	0.06102
°C	°F	(°C x 1.8) +32
gallons (US)	liters	3.785
kg	lbs	2.205
kgf/cm ²	psi	14.2
kW	hp	1.341
liters	US Gallons	0.2642
mm	inches	0.03937
N-m	lb-in	8.85
N-m	lb-ft	0.7375
°F	°C	(°F-32)/1.8
hp	kW	0.7457
inch	mm	2.54
in ³	cm ³	16.39
lb-in	N-m	0.113
lb-ft	N-m	1.356
lbs	kg	0.4535
psi	bar	0.06896
psi	kgf/cm ²	.070307

Note: Performance charts can be found on subsequent pages.

Notes on Installation and Maintenance

Mounting

Pump can be mounted with drive shaft in horizontal, vertical or at any angle in between. All flanges have pilot (spigot) for proper alignment of pump with respect to drive system. It is recommended that mating female pilot in pump mounting frame has 1mm (0.040 inch) X 45 deg chamfer to ensure proper installation of pump.

Rotation

Shaft rotation is denoted in the unit coding. Arrow indicating direction of rotation is stamped on pump's centre body. Direction of rotation is as viewed from pump's drive shaft end.

Drives

Coupling used to drive the pump must not transfer any radial or axial load on pump's drive shaft. A flexible coupling is recommended to accommodate slight misalignment and to dampen the vibration. A coupling which allows a minimum 0.30mm (0.012 inch) radial and axial movement is recommended. If pump is driven by a gear or a pulley, which causes side load on pump's drive shaft, follow recommendations given on side load application page of this catalogue. If direction and value of the side load is outside of the recommendations, consult EATON's engineering department for approval.

Fluid Reservoir

As a general rule of thumb, reservoir capacity for industrial systems with open loop flow should be at least 3 times as that of the flow. Pump suction line should draw oil from a point not less than 100 mm (4 inch) above the tank bottom to avoid sludge deposits from entering the pump. Return line should be submerged in the oil and should be positioned as far apart as possible from the inlet line. Return and inlet lines should be separated by baffles.

Lines

Inside diameter of inlet line must be as large as possible. Inlet line should be free from sharp bends, 90 degree elbow fittings or other restrictions which would cause resistance to flow. Positive head should be maintained at pump inlet as far as possible. However if pump is required to operate at low inlet pressure condition then inlet vacuum should not be more than 0.2 bar (6 inches of Hg).

Maximum inlet pressure of the pump is limited by the shaft seal and should not exceed 2 bar gauge. Inside diameter of outlet line should be at least equal to the opening diameter of outlet port. Do not over tighten coupling connected to threaded type inlet and outlet port as it may damage threads in pump body. Follow torque recommendations given in this catalogue in port detail table.

Fluids

Pressure ratings given in this catalogue are based on petroleum based hydraulic fluids. Recommended viscosity range is as per specifications page of this catalogue. Avoid using mixtures of two different oils which could result in decomposition and reduction of oil's lubricating capability. For use with other oils, consult EATON's engineering department for approval.

Filtration

Most of the premature failures of gear pumps are due to contaminated fluid. Oil contamination level should not exceed ISO cleanliness code 18/16/13 per ISO 4406. Full flow filtering is always recommended. Initial cleanliness level of the fluid with which system is filled must not exceed Class 10 to NAS 1638.

Shaft seal

Standard Global Gear Pumps are fitted with Nitrile seals. Viton seals are offered as an option for applications with high operating temperatures. Refer to specification page of this catalogue for maximum temperature limits for Nitrile and Viton seals. Cover shaft seal while spraying or brush-painting the equipment.

Starting up

Fill the pump with fluid before installing. Check direction of rotation- It should be in line with arrow marked on the pump. Check that all fitting connections are torqued to proper specifications. For first run of the pump gradually increase pressure and speed until operating levels are obtained.

Periodic checks

Keep outside surface of the pump clean, especially area near to the drive shaft seal. Contact of abrasive powder with shaft seal will cause faster wear of the seal and will lead to leakage. Replace filters regularly in order to keep hydraulic fluid clean. Monitor oil level and replenish oil if necessary.

Fluid Recommendations

Introduction

The ability of Eaton hydraulic components to provide the desired performance and life expectancy depends largely on the fluid used. The purpose of this section is to provide readers with the knowledge required to select the appropriate fluids for use in systems that employ Eaton hydraulic components.

One of the most important characteristic to consider when choosing a fluid to be used in a hydraulic system is viscosity. Viscosity choice is always a compromise; the fluid must be thin enough to flow easily but thick enough to seal and maintain a lubricating film between bearing and sealing surfaces. Viscosity requirements, see chart below.

Viscosity and Temperature

Fluid temperature affects viscosity. In general, as the fluid warms it gets thinner and its viscosity decreases. The opposite is true when fluid cools. When choosing a fluid, it is important to consider the start-up and operating temperatures of the hydraulic system.

Generally, the fluid is thick when the hydraulic system is started. With movement, the fluid warms to a point where a cooling system begins to operate.

From then on, the fluid is maintained at the temperature for which the hydraulic system was designed. In actual applications this sequence varies; hydraulic

systems are used in many environments from very cold to very hot. Cooling systems also vary from very elaborate to very simple, so ambient temperature may affect operating temperature. Equipment manufacturers who use Eaton hydraulic components in their products should anticipate temperature in their designs and make the appropriate fluid recommendations to their customers.

Cleanliness

Cleanliness of the fluid in a hydraulic system is extremely important. Eaton recommends that the fluid used in its hydraulic components be maintained at 21/19/16 per ISO Cleanliness Code 4406. OEM's and distributors who use Eaton hydraulic components in their products should provide for these requirements in their designs. A reputable filter supplier can supply filter information.

Fluid Maintenance

Maintaining correct fluid viscosity and cleanliness level is essential for all hydraulic systems. Since Eaton hydraulic components are used in a wide variety of applications it is impossible for Eaton to publish a fluid maintenance schedule that would cover every situation. Field testing and monitoring are the only ways to get accurate measurements of system cleanliness. OEM's and distributors who use Eaton hydraulic components should test and establish

PRODUCT LINE	VISCOSITY MINIMUM	VISCOSITY BEST RANGE	ISO CLEANLINESS REQUIREMENTS
A-AL Pump	52 SUS 8 cst	81-185 SUS 16-40 cst	21/19/16

fluid maintenance schedules for their products. These maintenance schedules should be designed to meet the viscosity and cleanliness requirements laid out in this document.

Fluid Selection

Premium grade petroleum based hydraulic fluids will provide the best performance in Eaton hydraulic components. These fluids typically contain additives that are beneficial to hydraulic systems. Eaton recommends fluids that contain anti-wear agents, rust inhibitors, anti-foaming agents, and oxidation inhibitors. Premium grade petroleum based hydraulic fluids carry an ISO VG rating.

SAE grade crankcase oils may be used in systems that employ Eaton hydraulic components, but it should be noted that these oils may not contain all of the recommended additives. This means using crankcase oils may increase fluid maintenance requirements.

Hydraulic fluids that contain V.I. (viscosity index) improvers, sometimes called multi-viscosity oils, may be used in systems that employ Eaton hydraulic components. These V.I. improved fluids are known to "shear-down" with use. This means that their actual viscosity drops below the rated value. Fluid maintenance must be increased if V.I. improved fluids are used. Automotive automatic transmission fluids contain V.I. improvers.

Synthetic fluids may be used in Eaton hydraulic components. A reputable fluid supplier can provide information on synthetic fluids. Review applications that require the use of synthetic fluids with your Eaton representative.

Additional Notes:

- Fluids too thick to flow in cold weather start-ups will cause pump cavitation and possible damage. Motor cavitation is not a problem during cold start-ups.
- When choosing a hydraulic fluid, all the components in the system must be considered and the best viscosity range adjusted accordingly. For example, when a medium duty piston pump is combined with a Geroler motor the best viscosity range becomes 100 - 150 SUS [20 - 32 cSt] and viscosity should never fall below 70 SUS [13 cSt].
- If the natural color of the fluid has become black it is possible that an overheating problem exists.
- If the fluid becomes milky a water contamination problem may exist.
- Take fluid level reading when the system is cold.
- Contact your Eaton representative if you have specific questions about the fluid requirements of Eaton hydraulic components.

A-Aluminum Pump

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A-Aluminum Pump

Highlights



Eaton Gear Products combine state of the art innovation and manufacturing processes. These products are designed to satisfy global customer requirements for higher pressure, quiet operation, long life, and a full range of options and features.

The Group 2 aluminum series is a floating bushing, pressure balanced design with a high strength extruded aluminum body and cast iron end cap and mounting flange.

Gear pumps made of floating bushing, pressure balanced design, with an extruded body in high resistance aluminum alloy and endcover and flange in cast iron. The wide choice of shafts, flanges and ports, in compliance with all international standards (SAE, DIN and EUROPEAN). Displacements from 0.4 in³/rev (6,6 cm³/rev) to 2.04 in³/rev (33.4 cm³/rev). Max. pressure up to 4425 psi (305 bar). Max. speed up to 4000 rpm.

Features:

- High efficiency gear profiles
- 12 tooth low noise and pressure ripple gear design
- Continuous operating pressures to 276 bar [4000 psi]
- Rated operating speeds to 4000 rpm
- 10 displacements available from 5.3cc [.32 cid] to 33.4cc [2.04 cid]
- Input shaft torques up to 160Nm (1418 lb-in)
- SAE, DIN, & ISO flange, shaft, and porting styles
- Field reversibility
- Built to ISO 9001 standards

Benefits:

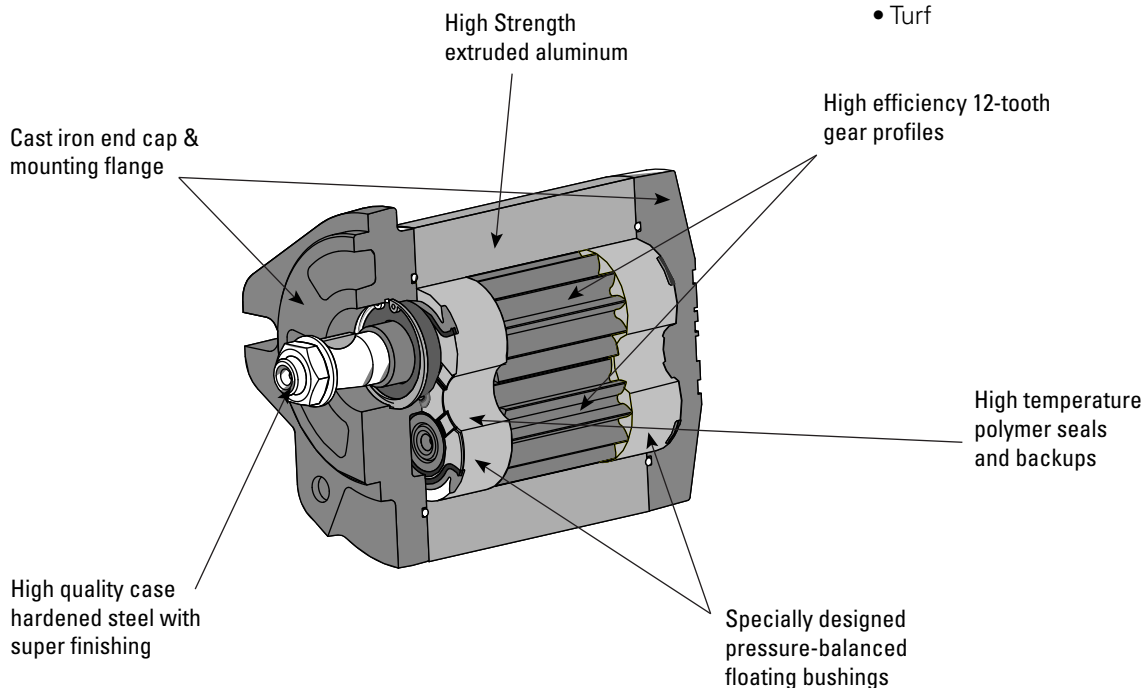
- Low noise and pressure ripple
- Wide array of features for design flexibility
- Integral SiCV (Screw-in Cartridge Valve) relief and priority flow for quick and simple solutions
- Stackable sections and field reversibility for changeability

Applications:

- Rotary and reel mowers
- Agriculture tractors and harvesters
- Lift trucks
- Skidsteer loaders
- Fan drive systems
- Steering circuits
- Salt and sand spreaders
- Auxiliary work circuits
- Industrial
- Sweepers
- Tractors
- Compactors
- Vibratory machines

Markets Served:

- Agricultural
- Construction
- Material Handling
- Utility
- Forestry
- Mining
- Earthmoving
- Truck and Bus
- Machine Tools
- Molding
- Primary Metals
- Automotive Plant
- Entertainment
- Turf



A-Aluminum Pump

Specifications

GGP A MOUNT ALUMINUM

Displacement	cm ³ /r in ³ /r	5.3 0.32	6.5 0.40	8.3 0.51	10.3 0.63	12.9 0.79	16.1 0.98	20.0 1.22	24.0 1.46	28.4 1.73	33.4 2.04
Max Continuous Pressure	bar psi	276 4000	276 4000	276 4000	276 4000	276 4000	276 4000	250 3625	235 3400	200 2900	170 2465
Max Intermittent Pressure	bar psi	305 4425	305 4425	305 4425	305 4425	305 4425	305 4425	276 4002	270 3920	220 3190	190 2750
Rated Speed**		4000	4000	4000	3600	3600	3200	3200	3000	3000	3000
Min Rated Speed		700	700	700	700	700	700	700	700	700	700
Min Output Flow at Continuous Rated Speed & Pressure	LPM GPM	18.7 4.9	22.9 6.0	29.2 7.7	32.6 8.6	40.9 10.8	47.4 12.5	58.9 15.6	66.2 17.5	78.4 20.7	92.2 24.4
Input Power at Continuous Rated Speed & Pressure	kW HP	11.6 15.6	14.3 19.1	18.2 24.4	20.4 27.3	25.5 34.2	28.3 37.9	31.4 42.1	33.2 44.5	33.4 44.8	33.4 44.8

Note: Performance data was collected using a mineral based oil with a viscosity of 133 SUS at 49°C (120°F)

** Rated speed is determined by maintaining the maximum inlet velocity to 4.3mm/sec and maximum inlet vacuum of 6.0 In.Hg.

GENERAL SPECIFICATIONS

Mounting flange	SAE 2 Bolt A	Max. Rotating Torque at 0 Pressure (single section)	5.5 N-m (4.0 ft-lb)
	SAE 2 Bolt B	Max Continuous Inlet Temperature (BUNA)	80°C (180°F) Viton 120°C (250°F)
	European Rectangular	Min. Operating Temperature	-29°C (- 20°F)
Max. Continuous Pressure	276 bar (4000 psi)*	Max. Inlet Vacuum at Operating Condition	6.0 In. Hg.
Max. Intermittent Pressure	305 bar (4400 psi)*		
Min. Speed at Constant Pressure	700 RPM		
Operating Viscosity	8 cSt Min. 2000 cSt Max. at start up under load (16-40 cSt optimum)		

* Displacements can vary with respect to pressure and speed capability. See table for individual ratings.

A-Aluminum Pump

Model Code

The following 33 digit coding system has been developed to identify feature options for the GGP A AL pump. Use this code to specify a pump with the desired features. All 33-digits of the code must be present to release a new product number for ordering. Please contact your local customer service representative for leadtime questions.

A	E	G	L	A	GA	00	00	01	0	1	AA	00	00	0	0	00	00	A	00	0	A	A
1,2,3	4	5	6,7	8,9	10,11	12,13	14	15	16,17	18,19	20,21	22	23	24,25	26,27	28	29,30	31	32	33		

1, 2, 3 Global Gear Pump

AEG – A Mount Aluminum

4 Input Rotation

L – Left-Hand Rotation

R – Right-Hand Rotation

5 Front Flange Cover

A – SAE A 2-Bolt

B – SAE B 2-Bolt

E – European Rectangular

F – German Rectangular

G – German 2-bolt

6, 7 Displacement (Single, Front)

8, 9 Displacement (Center for triple only)

10, 11 Displacement (Rear for double and triple)

00 – None

GA – 5,3 cm³/rev [.32 in³/rev]

GB – 6,5 cm³/rev [.40 in³/rev]

GC – 8,3 cm³/rev [.51 in³/rev]

GD – 10,3 cm³/rev [.63 in³/rev]

GE – 12,9 cm³/rev [.79 in³/rev]

GF – 16,1 cm³/rev [.98 in³/rev]

GG – 20,0 cm³/rev [1.22 in³/rev]

GH – 24,0 cm³/rev [1.46 in³/rev]

GJ – 28,4 cm³/rev [1.73 in³/rev]

GK – 33,4 cm³/rev [2.04 in³/rev]

12, 13 Input Shaft

01 – SAE A Spline – 9 Tooth

02 – SAE A Straight – 5/8" Keyed

03 – SAE A Tapered – 1:8

04 – SAE Spline – 11 Tooth

05 – SAE Spline – 10 Tooth

06 – DIN Spline – 14 Tooth

07 – DIN Spline – 9 Tooth

08 – SAE Straight – 3/4" Keyed

10 – European Tapered - 1:5

11 – Tang

16 – Tapered – 1:8

17 – European Tapered – 1:5

18 – European Tapered – 1:8

22 – SAE Spline – 13T

14 Auxiliary Mounting

0 – No Rear mounting

15 Port Location

Single, Double, Triple

1 – Side

2 – Rear (*Port Sizes Only Available)

3 – Side and Rear (Rear ports plugged)

Double (Common Inlet)

5 – Side, Common Front

6 – Side, Common Rear

Triple (Common Inlet)

7 – Side, Common Front

8 – Side, Common Center

9 – Side, Common Rear

L – Side, Common Front, Rear

R – Side, Common Center, Front

Valve Options

A – Side, SAE Straight Thread, Side Ports

B – Side, G-Ports DIN 3852, Side Ports

16, 17 Suction and Pressure (Front)

18, 19 Suction and Pressure (Center for triple only)

20, 21 Suction and Pressure (Rear for double and triple)

00 – None

SAE Straight Thread

AA* – SAE #10, SAE #8

AB* – SAE #12, SAE #10

AC* – SAE #16, SAE #10

AR* – SAE #16, SAE #8

AT* – SAE #12, SAE #8

AU* – SAE #10, SAE #10

AV – No Inlet, SAE #10 (Common Inlets)

AW – SAE #20, SAE #10

BG – No Inlet, #8 (Common Inlets)

BJ – SAE #16, SAE #12

Metric Straight Thread

AD* – M22 x 1.5, M18 x 1.5

AE* – M27 x 2.0, M22 x 1.5

AF* – M33 x 2.0, M27 x 2.0

SAE Split Flange

AG – 3/4 x 1/2

AH – 1 x 3/4

AS – 1/2 x 1/2

Metric Split Flange

AJ – 3/4 x 1/2

AK – 1 x 3/4

European 4-Bolt Rectangular

AL – 18 x 13

German 4-Bolt Rectangular

AM – 20 x 15

AX – 15 x 15

BR – 26 x 15

A-Aluminum Pump

Model Code

The following 33 digit coding system has been developed to identify feature options for the GGP A AL pump. Use this code to specify a pump with the desired features. All 33-digits of the code must be present to release a new product number for ordering. Please contact your local customer service representative for leadtime questions.

A	E	G	L	A	GA	00	00	01	0	1	AA	00	00	0	0	00	00	A	00	0	A	A
1,2,3	4	5	6,7	8,9	10,11	12,13	14	15	16,17	18,19	20,21	22	23	24,25	26,27	28	29,30	31	32	33		

JIS O-Ring

AN* – 3/4 x 1/2

AP* – 1 x 3/4

G Ports DIN 3852

AZ – G1 x G3/4

BA* – G3/4 x G1/2

BB* – G1 x G1/2

22 Pressure Relief Valve Style

- 0** – No Pressure Relief Valve
- A** – Relief Valve, External Drain
- B** – Relief Valve, Internal Drain
- C** – Relief Valve, Proportional, Internal Drain
- D** – Relief Valve, Proportional, External Drain
- E** – Relief Valve, Inverse Proportional, Internal Drain
- F** – Relief Valve, Inverse Proportional, External Drain
- G** – Relief Valve, Solenoid Operated, Internal Drain
- H** – Relief Valve, Solenoid Operated, External Drain
- I** – Solenoid Unloading Valve, External Drain
- J** – Solenoid Unloading Valve, Internal Drain
- P** – Anti-cavitation Valve
- Y** – No Valve, C-10-2, (Outlet-port 1, Port 2-Ext Drain)
- Z** – No Valve, C-10-2, (Outlet-port 1, Inlet-Port 2)

23 Priority Flow Valve Style

- 0** – No Priority Flow Valve
- A** – Priority Valve, Excess Flow, External Drain
- B** – Priority Valve, Excess Flow, Internal Drain
- C** – Electro-Proportional Priority Valve (N.O.), Excess Flow, External Drain
- D** – Electro-Proportional Priority Valve (N.O.), Excess Flow, Internal Drain
- E** – Electro-Proportional Priority Valve (N.C.), Excess Flow, External Drain
- F** – Electro-Proportional Priority Valve (N.C.), Excess Flow, Internal Drain
- G** – Load Sense Priority Valve, Static
- H** – Load Sense Priority Valve, Dynamic
- I** – Load Sense Priority Valve, Static, Relief Valve on Load Sense
- J** – Load Sense Priority Valve, Dynamic, Relief Valve on Load Sense
- M** – Solenoid Proportional Flow Control Valve, Excess Flow, External Drain
- N** – Solenoid Proportional Flow Control Valve, Excess Flow, Internal Drain
- X** – No Valve, C-12-5S
- Y** – No Valve, C-10-3 Cavity (Pump Outlet to Port 1, Port 2 to EF, Port 3 to CF)
- Z** – No Valve, C-10-3 Cavity (Pump Outlet to Port 1, Port 2 to Pump Inlet, Port 3 to CF)

24,25 Priority Flow Valve Setting

- 00** – No Flow Setting

- 01** – 3.8 L/min [1.00 gal/min]
- 02** – 7.6 L/min [2.00 gal/min]
- 03** – 11.4 L/min [3.00 gal/min]
- 04** – 15.1 L/min [4.00 gal/min]
- 05** – 18.9 L/min [5.00 gal/min]
- 06** – 22.7 L/min [6.00 gal/min]
- 07** – 26.5 L/min [7.00 gal/min]
- 08** – 30.3 L/min [8.00 gal/min]
- 09** – 34.1 L/min [9.00 gal/min]
- 11** – Load Sensing - Static 5.4 bar [78 psi]
- 14** – Load Sensing - Dynamic 7.6 bar [110 psi]
- 99** – 0.38-37.8 L/min [0.1-10.0 gpm]

26,27 Pressure Relief Valve Setting

- 00** – No Flow Setting
- 01** – 34.5 bar [500 lbf/in²]
- 02** – 51.7 bar [750 lbf/in²]
- 03** – 68.9 bar [1000 lbf/in²]
- 04** – 86.2 bar [1250 lbf/in²]
- 05** – 103.4 bar [1500 lbf/in²]
- 06** – 120.1 bar [1750 lbf/in²]
- 07** – 137.9 bar [2000 lbf/in²]
- 08** – 155.1 bar [2250 lbf/in²]
- 09** – 172.4 bar [2500 lbf/in²]
- 10** – 189.6 bar [2750 lbf/in²]
- 11** – 206.8 bar [3000 lbf/in²]
- 96** – 3.4-20 bar [50-300 lbf/in²]
- 97** – 7-140 bar [100-2000 lbf/in²]
- 98** – 17-240 bar [250-3500 lbf/in²]
- 99** – 35-350 bar [500-5000 lbf/in²]

28 Seal Type

- A** – Buna-N Seals
- B** – Viton Shaft Seal
- C** – Viton Seals

29,30 Special Features

- 00** – No Special Features
- 01** – Double Shaft Seal for Front Flange
- 02** – Sealing between Sections (Standard Torque Coupler)
- 04** – High Torque Coupler

31 Paint

- 0** – No Paint
- A** – Gray Primer
- B** – Black
- D** – Blue Primer

32 Identification

- A** – Eaton Number and Nameplate

33 Design Code

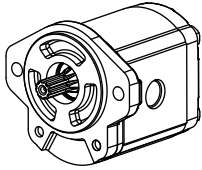
- A** – A

A-Aluminum Pump

Product Numbers

The following products have been developed to offer preferred configuration features for the GGP A AL pump. These products are locally stocked and have

shorter leadtimes. Please contact your local customer service representative for leadtime questions.

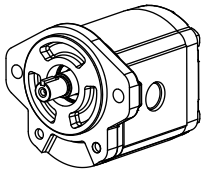


SAE A Mount (A), 9Tooth 16/32p Shaft (01)

Model Code:

AEG (L,R) A (DISP) 00000101 (AB, AC) 0000000000A000AA

DISPLACEMENT cm ³ /r (in ³ /r)	ORDERING-NUMBER		INLET PORT	OUTLET PORT
	Left	Right		
5.3 (.32) (GA)	221AD00126A	221AD00002A	1 1/16"-12 UN	7/8"-14 UN (AB)
6.5 (.40) (GB)	221AD00127A	221AD00010A	1 1/16"-12 UN	7/8"-14 UN (AB)
8.3 (.51) (GC)	221AD00129A	221AD00018A	1 1/16"-12 UN	7/8"-14 UN (AB)
10.3 (.63) (GD)	221AD00165A	221AD00026A	1 1/16"-12 UN	7/8"-14 UN (AB)
12.9 (.79) (GE)	221AD00132A	221AD00033A	1 5/16"-12 UN	7/8"-14 UN (AC)
16.1 (.98) (GF)	221AD00134A	221AD00041A	1 5/16"-12 UN	7/8"-14 UN (AC)
20.0 (1.22) (GG)	221AD00136A	221AD00049A	1 5/16"-12 UN	7/8"-14 UN (AC)
24.0 (1.46) (GH)	221AD00138A	221AD00057A	1 5/16"-12 UN	7/8"-14 UN (AC)
28.4 (1.73) (GJ)	221AD00139A	221AD00065A	1 5/16"-12 UN	7/8"-14 UN (AC)
33.4 (2.04) (GK)	221AD00141A	221AD00073A	1 5/16"-12 UN	7/8"-14 UN (AC)



SAE A Mount (A), 5/8" Straight Shaft (02)

Model Code:

AEG (L,R) A (DISP) 00000201 (AB, AC) 0000000000A000AA

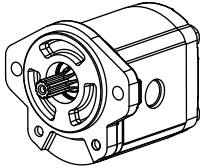
DISPLACEMENT cm ³ /r (in ³ /r)	ORDERING-NUMBER		INLET PORT	OUTLET PORT
	Left	Right		
5.3 (.32) (GA)	221AD00164A	221AD00008A	1 1/16"-12 UN	7/8"-14 UN (AB)
6.5 (.40) (GB)	221AD00128A	221AD00016A	1 1/16"-12 UN	7/8"-14 UN (AB)
8.3 (.51) (GC)	221AD00130A	221AD00024A	1 1/16"-12 UN	7/8"-14 UN (AB)
10.3 (.63) (GD)	221AD00131A	221AD00032A	1 1/16"-12 UN	7/8"-14 UN (AB)
12.9 (.79) (GE)	221AD00133A	221AD00039A	1 5/16"-12 UN	7/8"-14 UN (AC)
16.1 (.98) (GF)	221AD00135A	221AD00047A	1 5/16"-12 UN	7/8"-14 UN (AC)
20.0 (1.22) (GG)	221AD00137A	221AD00055A	1 5/16"-12 UN	7/8"-14 UN (AC)
24.0 (1.46) (GH)	221AD00166A	221AD00063A	1 5/16"-12 UN	7/8"-14 UN (AC)
28.4 (1.73) (GJ)	221AD00140A	221AD00071A	1 5/16"-12 UN	7/8"-14 UN (AC)
33.4 (2.04) (GK)	221AD00142A	221AD00079A	1 5/16"-12 UN	7/8"-14 UN (AC)

A-Aluminum Pump

Product Numbers

The following products has been developed to offer preferred configuration features for the GGP A AL pump. These products are locally stocked and have

shorter leadtimes. Please contact your local customer service representative for leadtime questions.

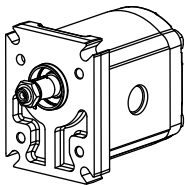


SAE A Mount (A), 9Tooth 16/32p Shaft (01) – 5.3cc to 12.9cc
SAE A Mount (A), 11Tooth 16/32p Shaft (04) – 16cc to 33.4cc

Model Code:

AEG (L,R) A (DISP) 0000 (01, 04) (BB, AZ) 0000000000A00AAA

DISPLACEMENT cm/rev (in/rev)	ORDERING-NUMBER		INLET PORT	OUTLET PORT
	Left	Right		
5.3 (.32)	221AD00224A	221AD00214A	G1"	G1/2" (BB)
6.5 (.40)	221AD00225A	221AD00215A	G1"	G1/2" (BB)
8.3 (.51)	221AD00226A	221AD00216A	G1"	G1/2" (BB)
10.3 (.63)	221AD00227A	221AD00217A	G1"	G1/2" (BB)
12.9 (.79)	221AD00228A	221AD00218A	G1"	G1/2" (BB)
16.1 (.98)	221AD00229A	221AD00219A	G1"	G3/4" (AZ)
20.0 (1.22)	221AD00230A	221AD00220A	G1"	G3/4" (AZ)
24.0 (1.46)	221AD00231A	221AD00221A	G1"	G3/4" (AZ)
28.4 (1.73)	221AD00232A	221AD00222A	G1"	G3/4" (AZ)
33.4 (2.04)	221AD00233A	221AD00223A	G1"	G3/4" (AZ)



Rectangular Mount (E), 1:8 Taper (18)

Model Code:

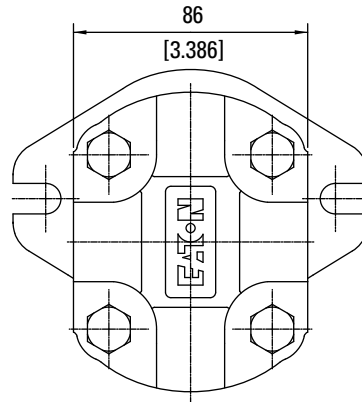
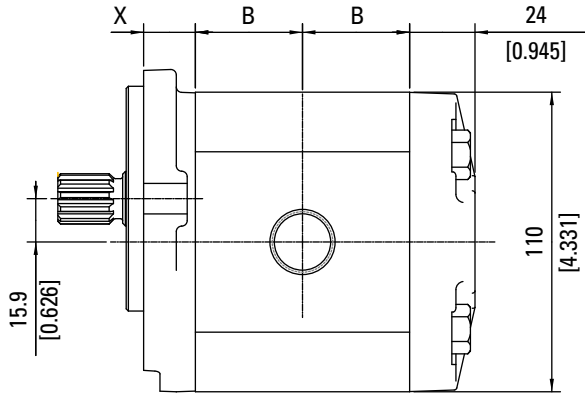
AEG (L,R) E (DISP) 00001801 (BB, AZ) 0000000000A00AAA

DISPLACEMENT cm/rev (in/rev)	ORDERING-NUMBER		INLET PORT	OUTLET PORT
	Left	Right		
5.3 (.32)	221AD00244A	221AD00234A	G1"	G1/2" (BB)
6.5 (.40)	221AD00245A	221AD00235A	G1"	G1/2" (BB)
8.3 (.51)	221AD00246A	221AD00236A	G1"	G1/2" (BB)
10.3 (.63)	221AD00247A	221AD00237A	G1"	G1/2" (BB)
12.9 (.79)	221AD00248A	221AD00238A	G1"	G1/2" (BB)
16.1 (.98)	221AD00249A	221AD00239A	G1"	G3/4" (AZ)
20.0 (1.22)	221AD00250A	221AD00240A	G1"	G3/4" (AZ)
24.0 (1.46)	221AD00251A	221AD00241A	G1"	G3/4" (AZ)
28.4 (1.73)	221AD00252A	221AD00242A	G1"	G3/4" (AZ)
33.4 (2.04)	221AD00253A	221AD00243A	G1"	G3/4" (AZ)

A-Aluminum Pump

Single Pump Dimensional Drawings

Side Ports



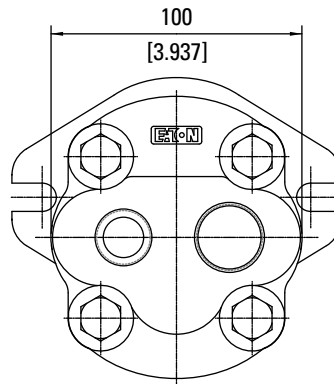
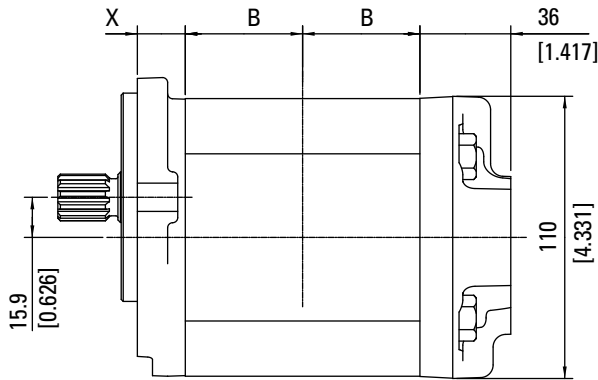
MOUNTING

FLANGE

TYPE VERSION X

	mm (inch)
A	19 (0.7480)
B	19 (0.7480)
E	19 (0.7480)
F	19 (0.7480)
G	19 (0.7480)

Rear Ports



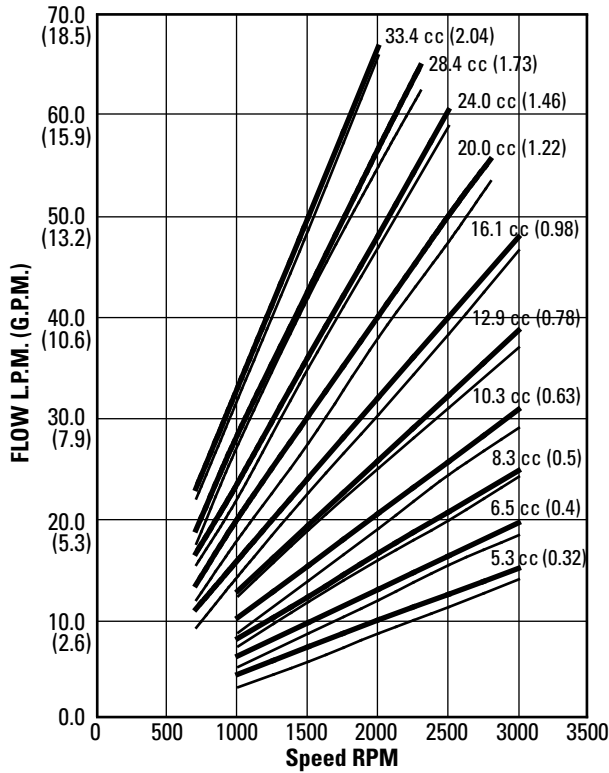
Displacement	A mm (in)	B mm (in)	Weight Kg (lb.)
5.3 (.32)	74.3 (2.93)	25.1 (0.99)	3.9 (8.60)
6.5 (.40)	76.1 (2.99)	26.0 (1.02)	3.9 (8.60)
8.3 (.51)	78.8 (3.10)	27.4 (1.08)	4.0 (8.80)
10.3 (.63)	81.9 (3.22)	28.9 (1.14)	4.1 (9.00)
12.9 (.79)	85.8 (3.38)	30.9 (1.22)	4.2 (9.20)
14.0 (.85)	87.5 (3.44)	31.7 (1.25)	4.2 (9.20)
16.1 (.98)	90.7 (3.57)	33.3 (1.31)	4.4 (9.70)
20.0 (1.22)	96.6 (3.80)	36.3 (1.43)	4.6 (10.10)
24.0 (1.46)	102.7 (4.04)	39.3 (1.55)	4.6 (10.10)
28.4 (1.73)	109.4 (4.31)	42.7 (1.68)	4.9 (10.80)
33.4 (2.04)	117.0 (4.61)	46.5 (1.83)	5.1 (11.20)

Displacement shown in cm³/r (in³/r) and dimensions are shown in mm (in).

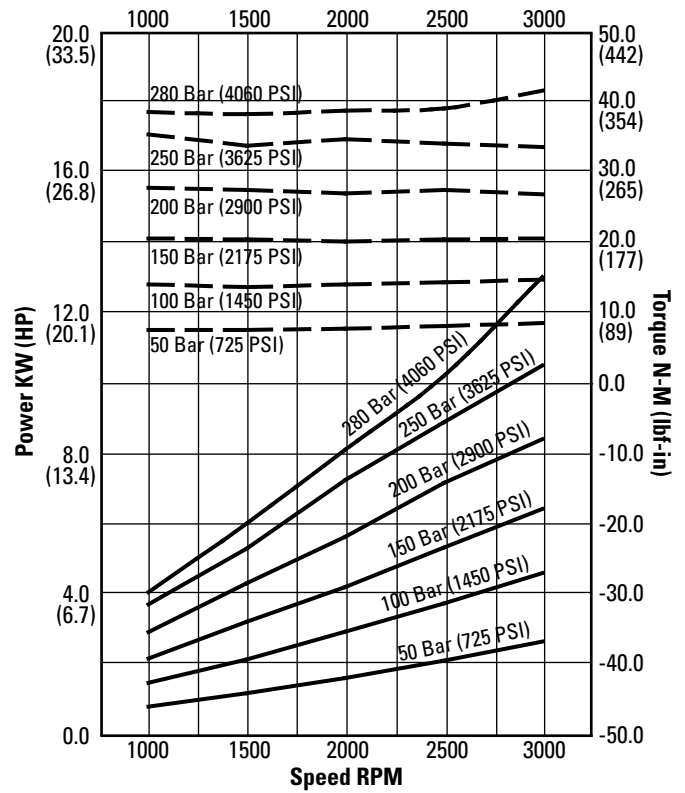
A-Aluminum Pump

Performance Curves

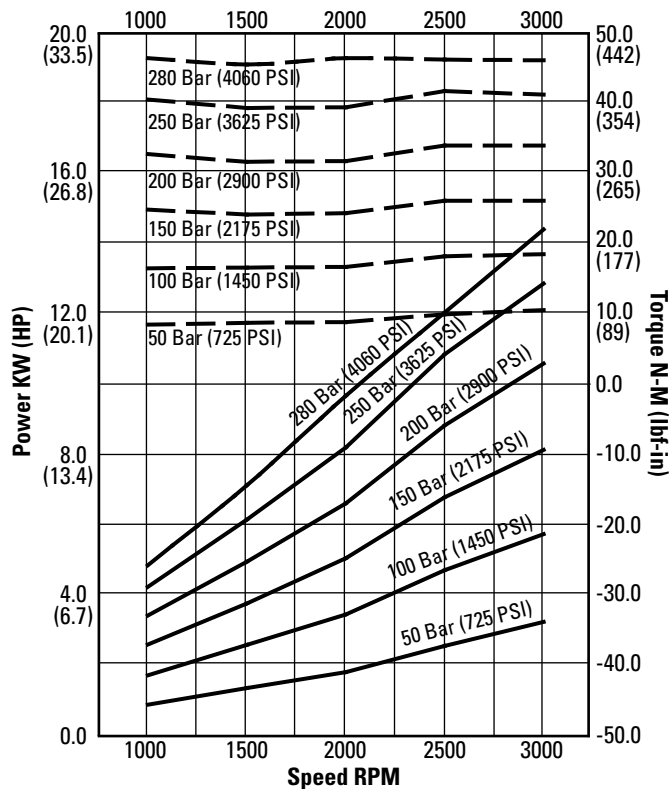
5.3-33.4 cm³/rev (.32-2.04 in³/rev)



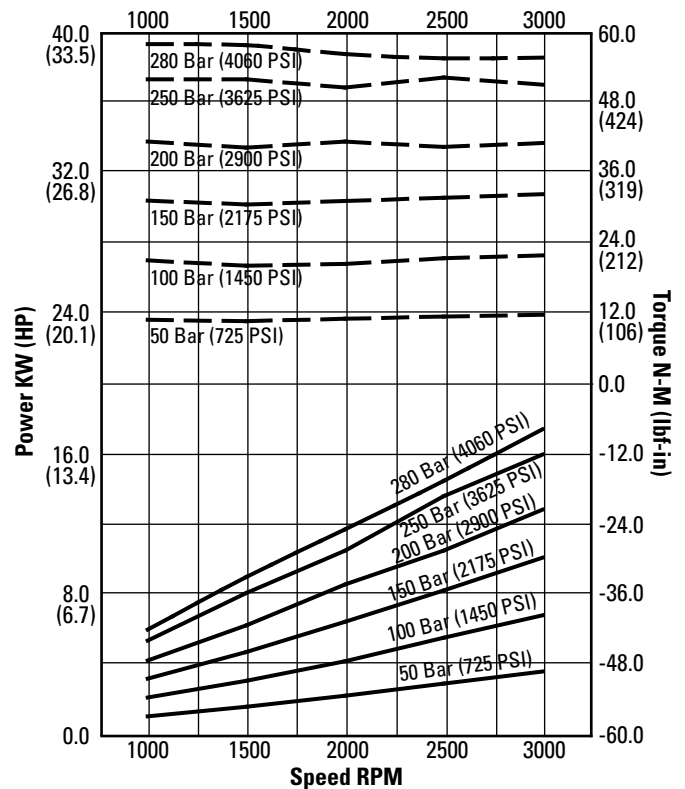
6.5 CC



8.3 CC



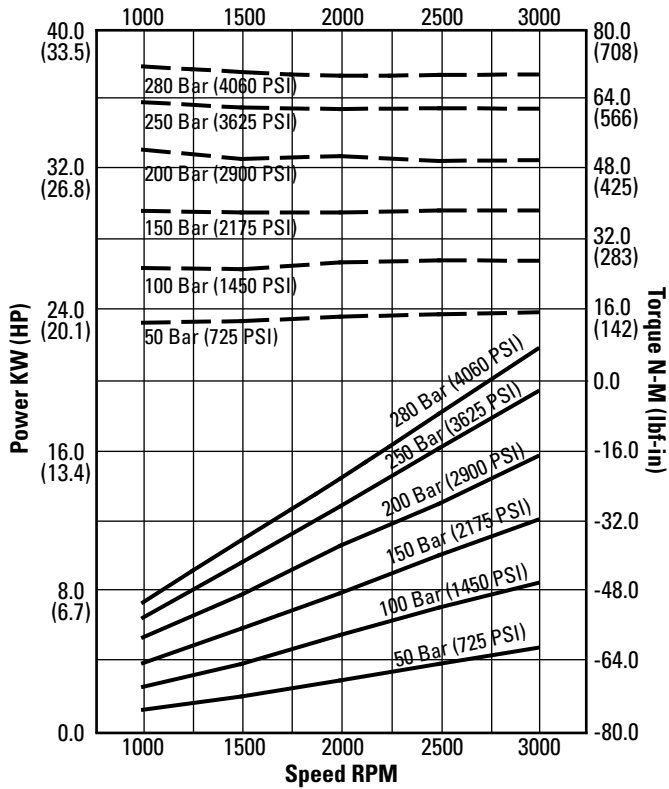
10.3 CC



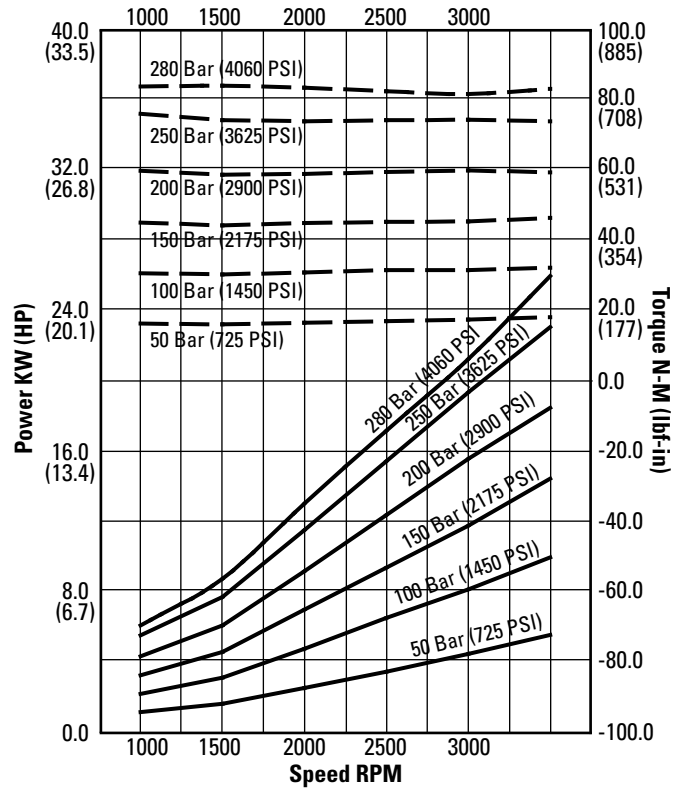
A-Aluminum Pump

Performance Curves

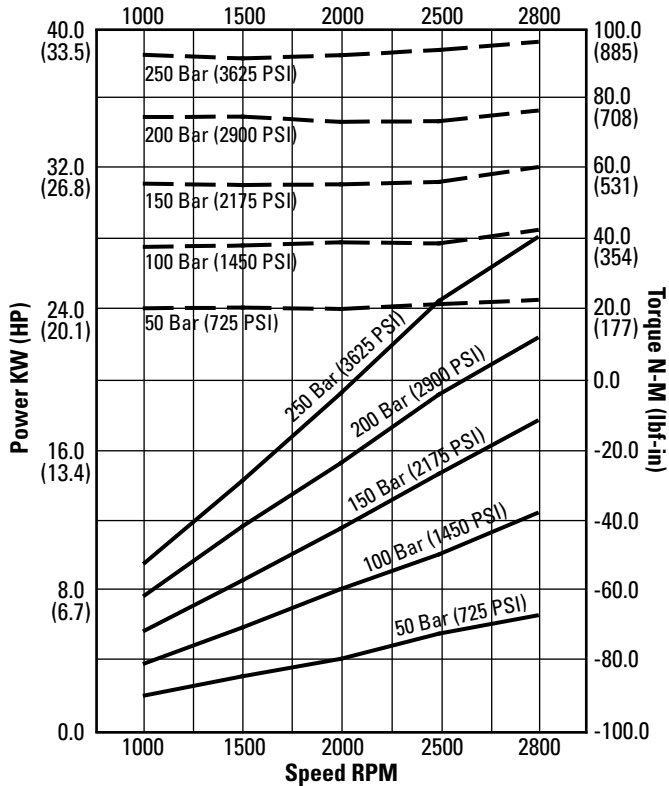
12.9 CC



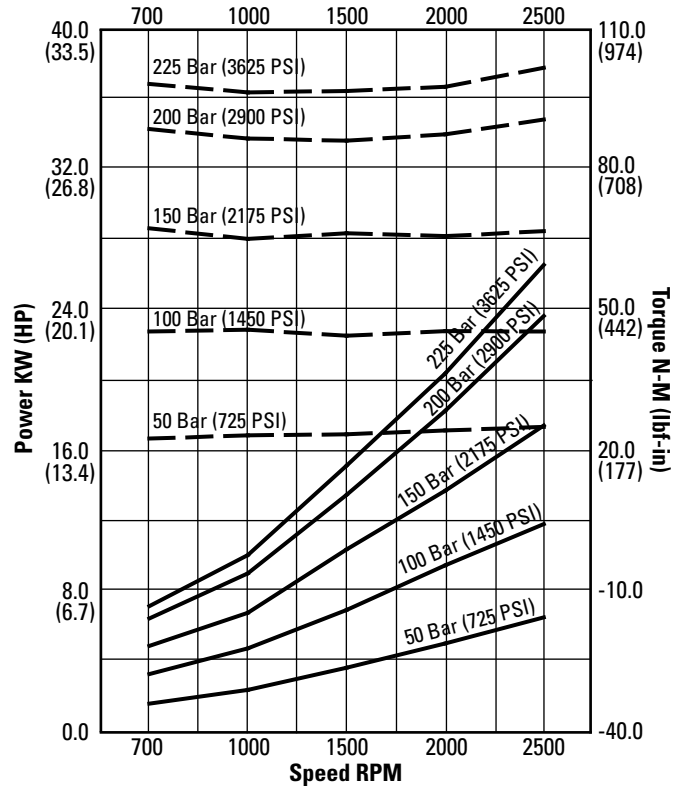
16.1 CC



20 CC

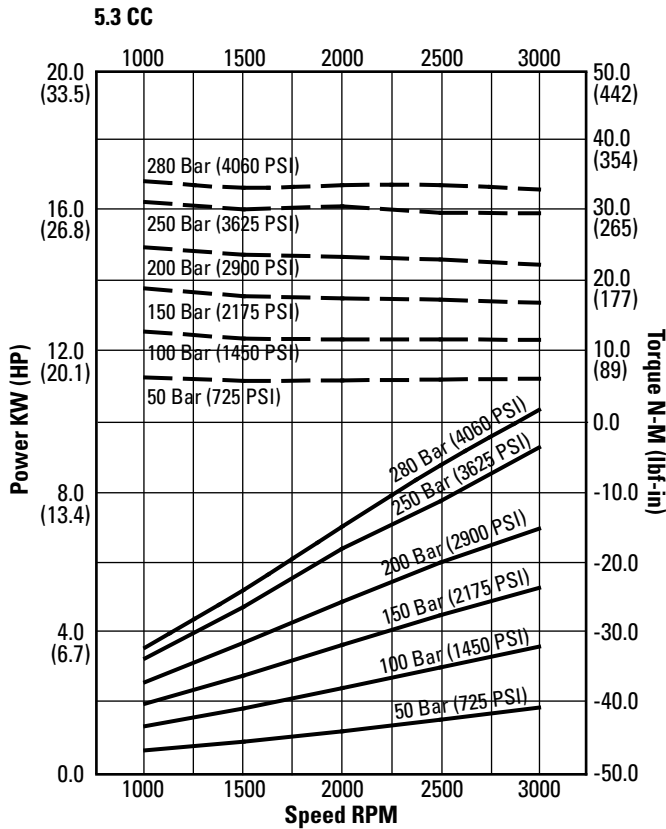
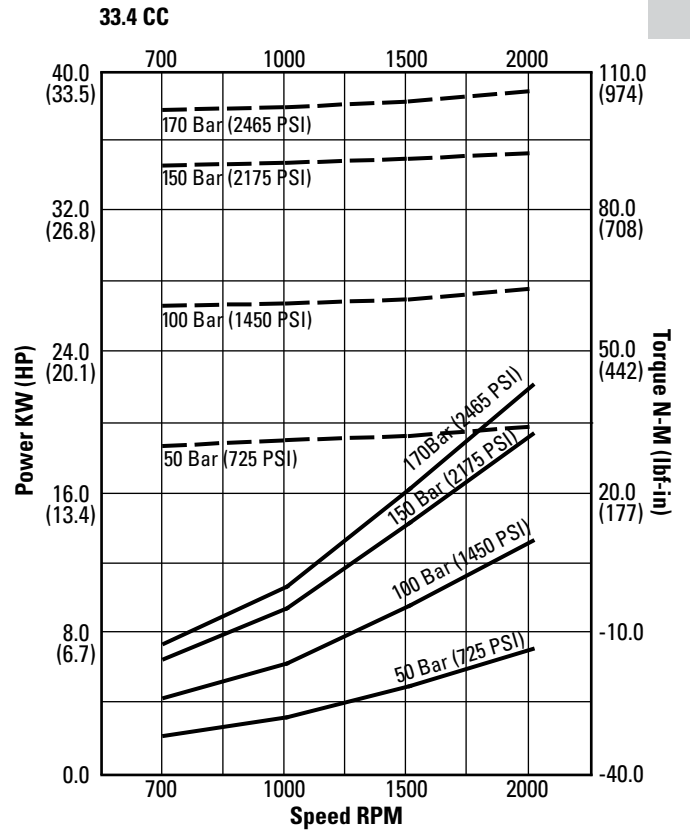
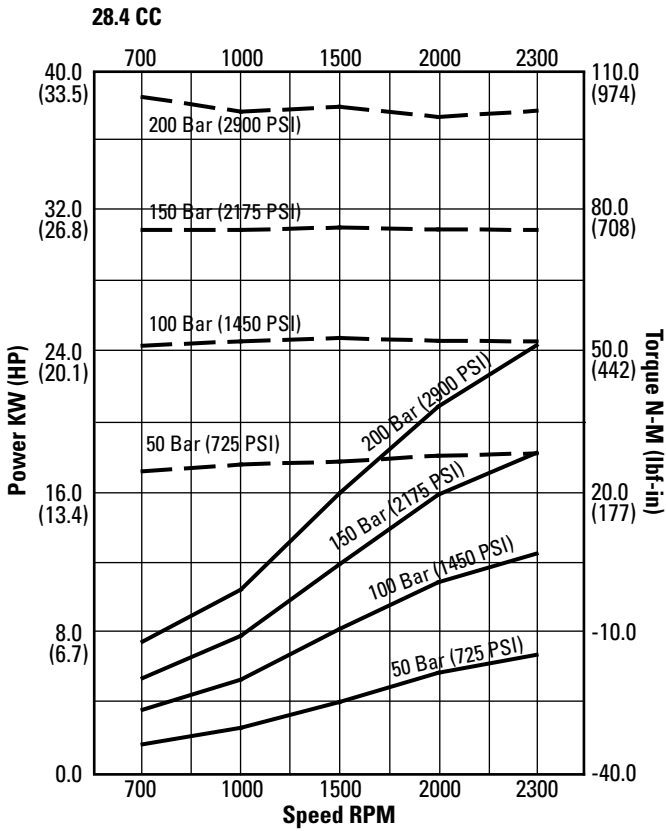


24 CC



A-Aluminum Pump

Performance Curves

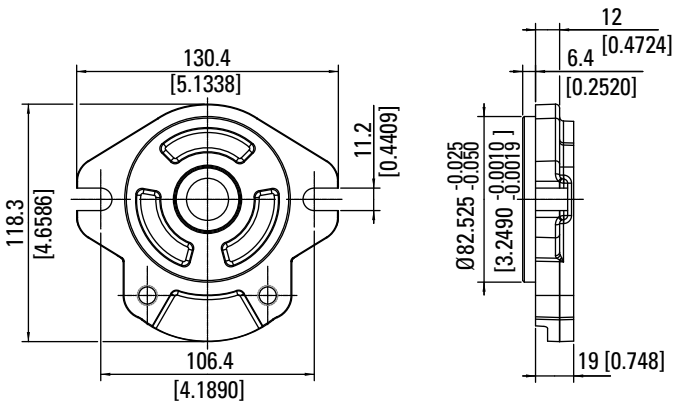


A-Aluminum Pump

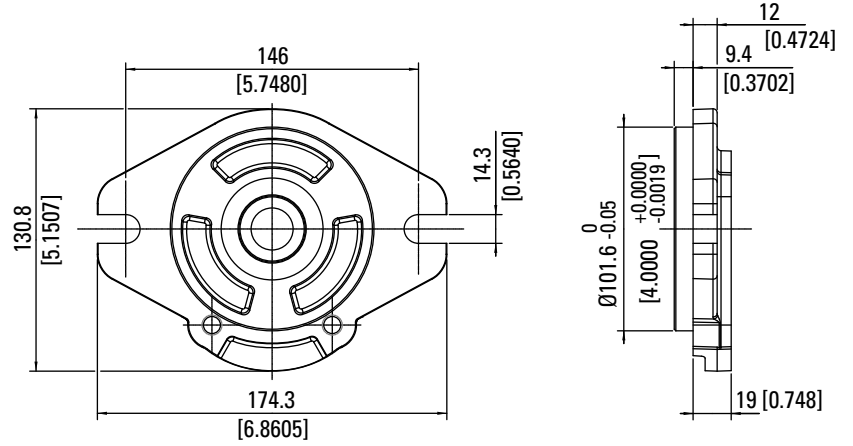
Mounting Flanges

mm (in)

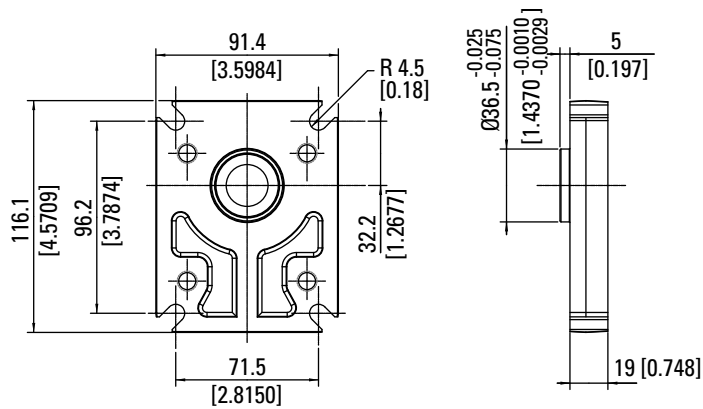
A - SAE A 2-Bolt



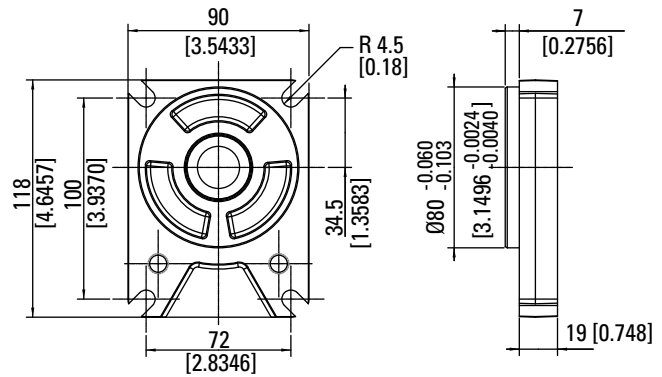
B - SAE B 2-Bolt



E - European Rectangular



F - German Rectangular

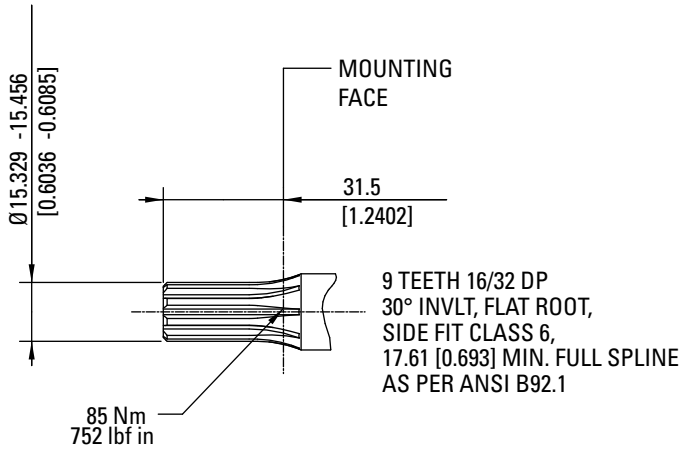


A-Aluminum Pump

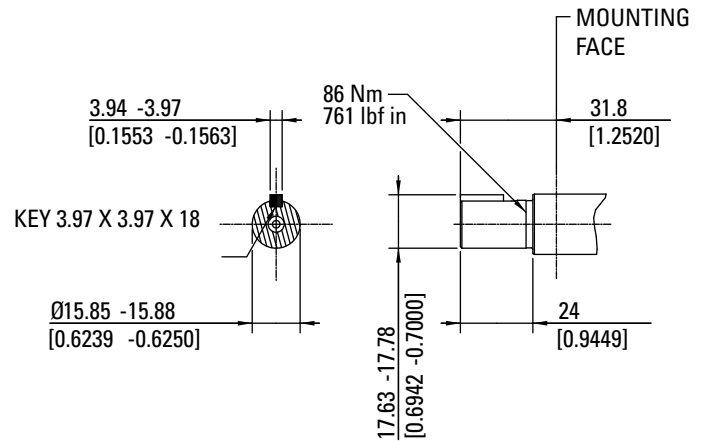
Input Shafts

mm (in)

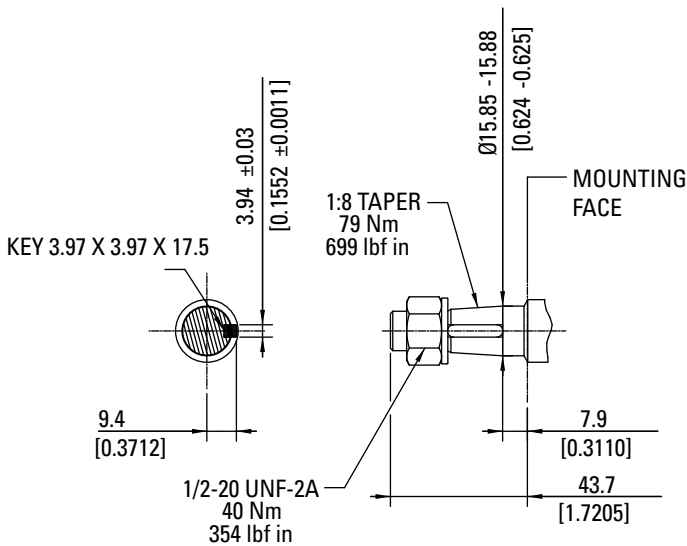
01 - SAE A Spline - 9 Tooth



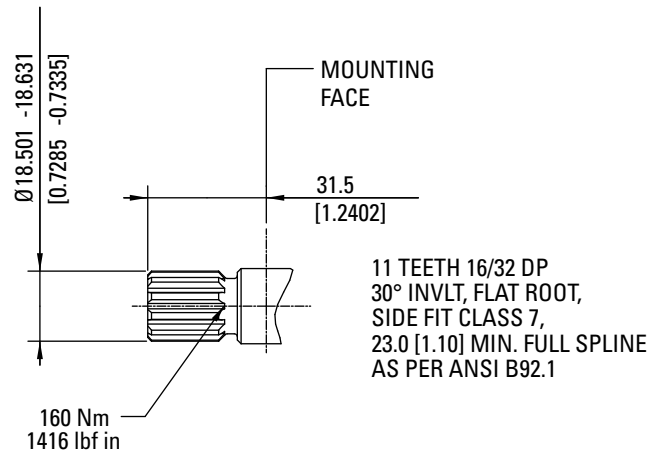
02 - SAE A Straight - 5/8" Keyed



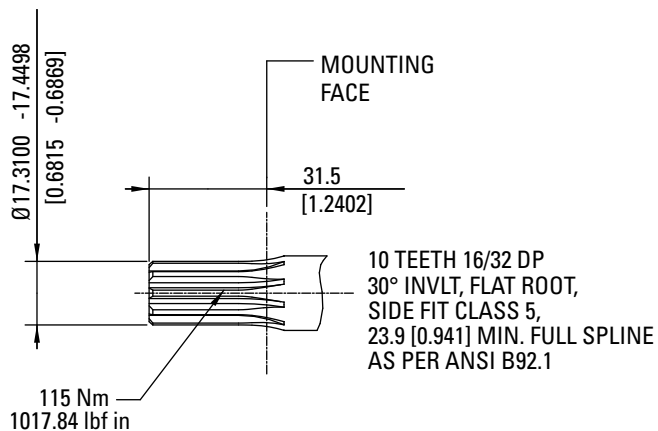
03 - SAE A Tapered - 1:8



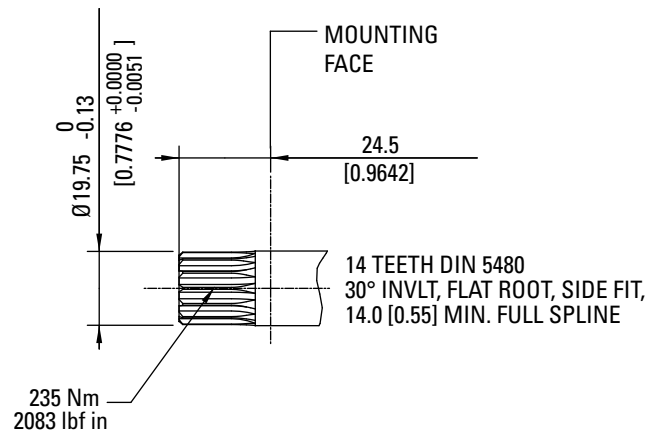
04 - SAE Spline - 11 Tooth



05 - SAE Spline - 10 Tooth



06 - DIN Spline - 14 Tooth

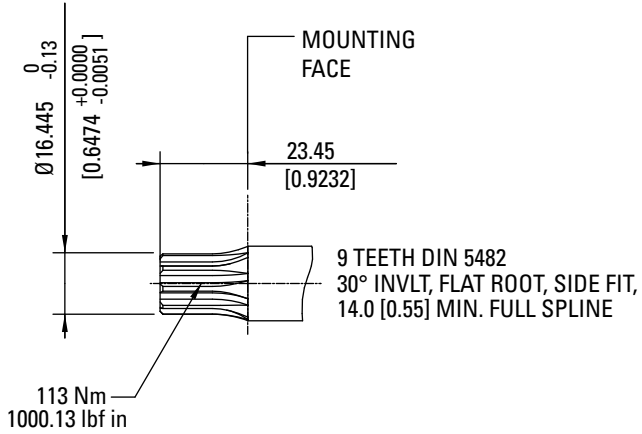


A-Aluminum Pump

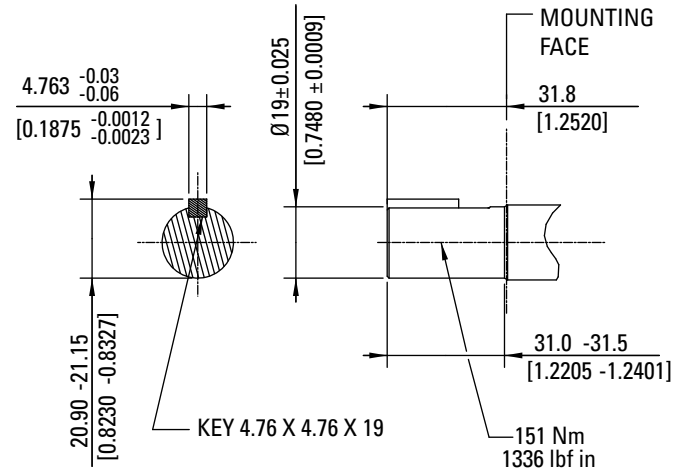
Input Shafts

mm (in)

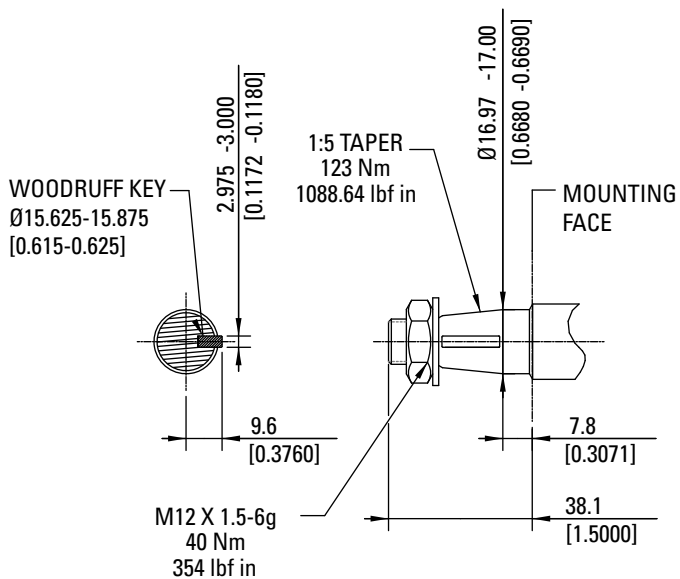
07 - DIN Spline - 9 Tooth



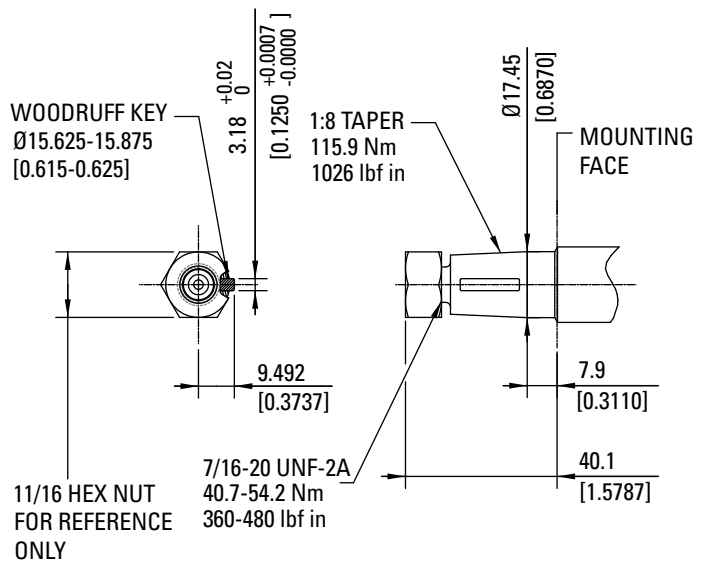
08 - SAE Straight - 3/4" Keyed



10 - European Tapered - 1:5



16 - Tapered - 1:8

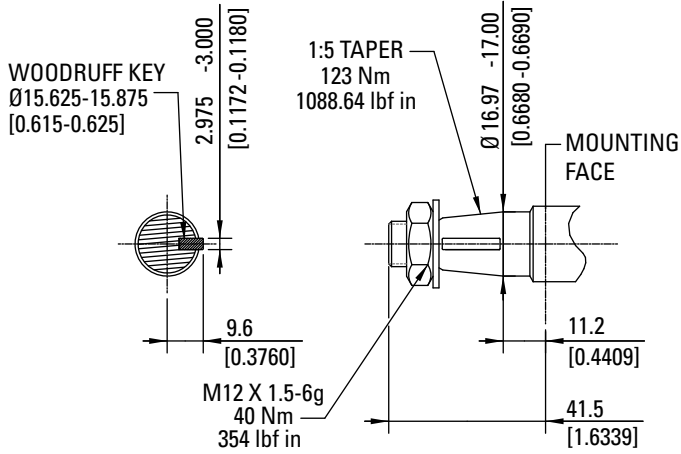


A-Aluminum Pump

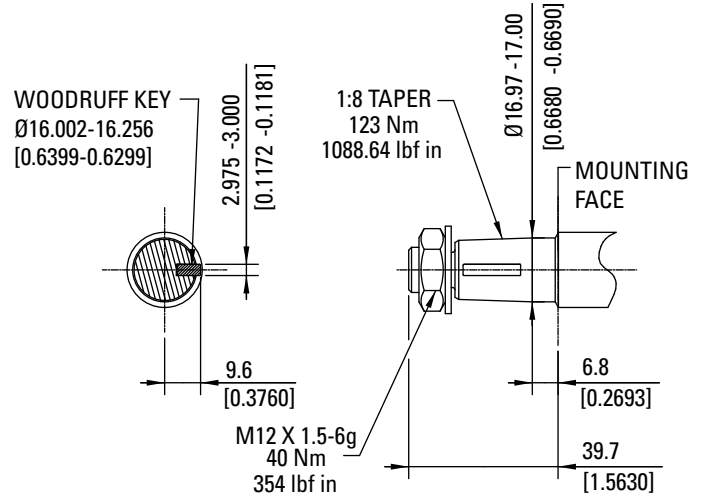
Input Shafts

mm (in)

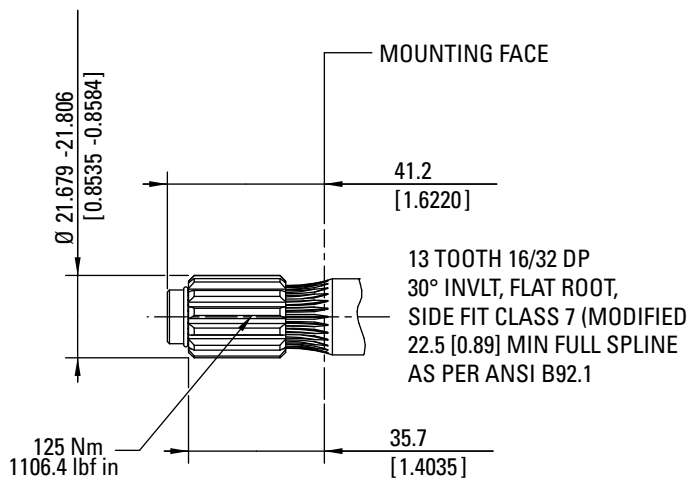
17 - European Tapered - 1:5



18 - European Tapered - 1:8



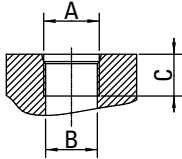
22 - 13 Tooth Spline



A-Aluminum Pump

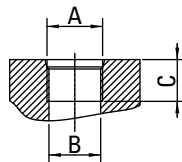
Port Options

SAE Straight Thread O-Ring Ports



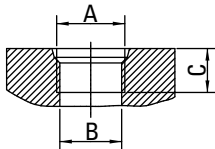
SAE NO.	A Thread Size	ØB mm (in)	C mm (in)	TORQUE	TORQUE
				LOW PRESSURE PORT	HIGH PRESSURE PORT
				Nm (lbf in)	Nm (lbf in)
# 8	0.750-16 UNF-2B	17.5 (0.6891)	14.3 (0.5629)	20 ⁺¹ (177-186)	45 ^{+2.5} (398-420)
# 10	0.875-14 UNF-2B	20.5 (0.8071)	16.7 (0.6575)	30 ^{+2.5} (266-288)	70 ⁺⁵ (620-664)
# 12	1.0625-12 UN-2B	24.9 (0.9803)	19.1 (0.7519)	40 ^{+2.5} (354-376)	120 ⁺¹⁰ (1062-1151)
# 16	1.3125-12 UN-2B	31.3 (1.2323)	19.1 (0.7519)	60 ⁺⁵ (531-575)	170 ⁺¹⁰ (1505-1593)
# 20	1.625-12 UN-2B	39.2 (1.5433)	19.1 (0.7519)	70 ⁺⁵ (620-664)	200 ⁺¹⁰ (1770-1858)

Metric Straight Thread Ports ISO6149



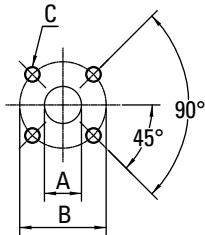
A Thread Size	ØB mm (in)	C mm (in)	TORQUE	TORQUE
			LOW PRESSURE PORT	HIGH PRESSURE PORT
			Nm (lbf in)	Nm (lbf in)
M 18 x 1.5	16.5 (0.6496)	12.5 (0.4921)	20 ⁺¹ (177-186)	45 ^{+2.5} (398-420)
M 22 x 1.5	20.5 (0.8071)	13.5 (0.5315)	30 ^{+2.5} (266-288)	70 ⁺⁵ (620-664)
M 27 x 2.0	25.0 (0.9842)	17.0 (0.6693)	40 ^{+2.5} (354-376)	120 ⁺¹⁰ (1062-1151)
M 33 x 2.0	31.0 (1.2205)	16.5 (0.6496)	60 ⁺⁵ (531-575)	170 ⁺¹⁰ (1505-1593)

JIS Type O-ring Ports



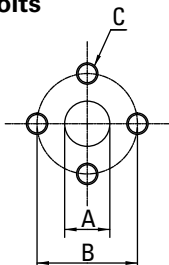
NOMINAL SIZE	A	ØB mm (in)	C mm (in)	TORQUE	TORQUE
				LOW PRESSURE PORT	HIGH PRESSURE PORT
				Nm (lbf in)	Nm (lbf in)
1/2"	PF 1/2	20.0 (0.7874)	16 (0.6299)	20 ⁺¹ (177-186)	50 ⁺⁵ (443-465)
3/4"	PF 3/4	24.5 (0.9646)	17 (0.6693)	30 ^{+2.5} (266-288)	90 ⁺⁵ (797-841)
1"	PF 1	30.75 (1.2106)	21 (0.8268)	50 ⁺⁵ (443-465)	130 ⁺⁵ (1151-1239)

German Flanged Ports – 4 Bolts



NOMINAL SIZE	A mm (in)	B mm (in)	C Thread Depth mm (in)	TORQUE	TORQUE
				LOW PRESSURE PORT	HIGH PRESSURE PORT
				Nm (lbf in)	Nm (lbf in)
15	15.0 (0.5905)	35.0 (1.3779)	M 6 13 (0.5118)	8 ^{+0.5} (71-75)	8 ^{+0.5} (71-75)
20	20.0 (0.7874)	40.0 (1.5748)	M 6 13 (0.5118)	15 ⁺¹ (133-142)	15 ⁺¹ (133-142)
26	26.0 (1.0236)	55.0 (2.1653)	M 8 13 (0.5118)	15 ⁺¹ (133-142)	20 ⁺¹ (177-186)

European Flanged Ports – 4 Bolts



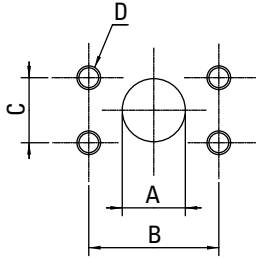
NOMINAL SIZE	A mm (in)	B mm (in)	C Thread Depth mm (in)	TORQUE	TORQUE
				LOW PRESSURE PORT	HIGH PRESSURE PORT
				Nm (lbf in)	Nm (lbf in)
13	13.0 (0.5118)	30.0 (1.1811)	M 6 13 (0.5118)	8 ^{+0.5} (71-75)	8 ^{+0.5} (71-75)
18	18.0 (0.7089)	40.0 (1.5748)	M 8 11.5 (0.4528)	15 ⁺¹ (133-142)	15 ⁺¹ (133-142)

A-Aluminum Pump

Port Options

Metric Flanged Ports J518 – Standard pressure series 3000 psi

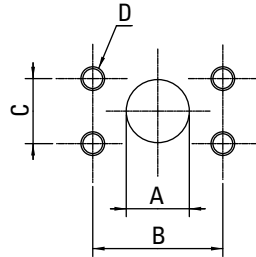
Metric thread ISO 60° conforms to ISO/R 262



NOMINAL SIZE	A		B		C		D		TORQUE LOW PRESSURE PORT Nm (lbf in)	TORQUE HIGH PRESSURE PORT Nm (lbf in)
	mm (in)	mm (in)	mm (in)	mm (in)	Thread	Depth mm (in)	mm (in)	mm (in)		
3/4	19.1 (0.7480)	47.6 (1.8740)	22.2 (0.8740)	M 10	14.0 (0.5512)	20 ⁺¹ (177-186)	25 ⁺¹ (221-230)			
1	25.4 (1.0000)	52.4 (2.0630)	26.2 (1.0315)	M 10	14.0 (0.5512)	20 ⁺¹ (177-186)	25 ⁺¹ (221-230)			

SAE Flanged Ports J518 – Standard pressure series 3000 psi

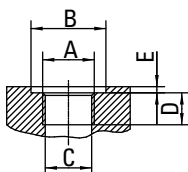
American straight thread UNC-UNF 60° conforms to ANSI B 1.1



NOMINAL SIZE	A		B		C		D		TORQUE LOW PRESSURE PORT Nm (lbf in)	TORQUE HIGH PRESSURE PORT Nm (lbf in)
	mm (in)	mm (in)	mm (in)	mm (in)	Thread	Depth mm (in)	mm (in)	mm (in)		
1/2	12.5 (0.4921)	38.1 (1.50)	17.5 (0.6890)	5/16 - 18 UNC - 2B	14.0 (0.5512)	15 ⁺¹ (133-142)	15 ⁺¹ (133-142)			
3/4	19.1 (0.7480)	47.6 (1.8740)	22.2 (0.8740)	3/8 - 16 UNC - 2B	14.0 (0.5512)	20 ⁺¹ (177-186)	20 ⁺¹ (177-186)			
1	25.4 (1.0000)	52.4 (2.0630)	26.2 (1.0315)	3/8 - 16 UNC - 2B	14.0 (0.5512)	20 ⁺¹ (177-186)	25 ⁺¹ (221-230)			

GAS Straight Thread Ports

British standard pipe parallel (55°) conforms to UNI- ISO 228



NOMINAL SIZE	A		B		C		D		E		TORQUE LOW PRESSURE Nm (lbf in)	TORQUE HIGH PRESSURE Nm (lbf in)
	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)			
1/2"	G 1/2	34.0 (1.3386)	21.0 (0.8268)	14.0 (0.5118)	2.5 (0.0984)	20 ⁺¹ (177-186)	50 ^{+2.5} (443-465)					
3/4"	G 3/4	42.0 (1.6535)	26.5 (1.0433)	16.0 (0.5512)	2.5 (0.0984)	30 ^{+2.5} (266-288)	90 ⁺⁵ (797-841)					
1"	G 1	47.0 (1.8504)	33.3 (1.3110)	18.0 (0.6299)	2.5 (0.0984)	50 ^{+2.5} (443-465)	130 ⁺¹⁰ (1151-1239)					

A-Aluminum Pump

Multiple Pumps – Common Inlet

Reduced inlets provide overall systems savings by reducing the cost of redundant inlet hose and fittings.
For other combinations please consult our sales department.

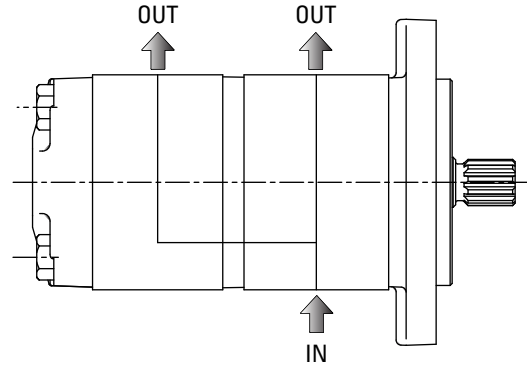
Double (Common Inlet)

Code	Suction	Pressure
5	Side, Common Front	Side
6	Side, Common Rear	Side

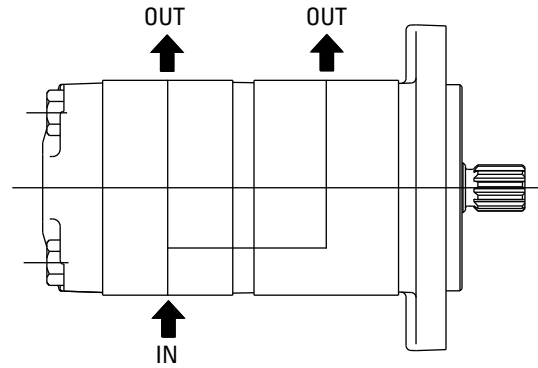
Triple (Common Inlet)

Code	Suction	Pressure
7	Side, Common Front	Side
8	Side, Common Center	Side
9	Side, Common Rear	Side
L	Side, Common Front, Rear	Side
R	Side, Common Center, Front	Side

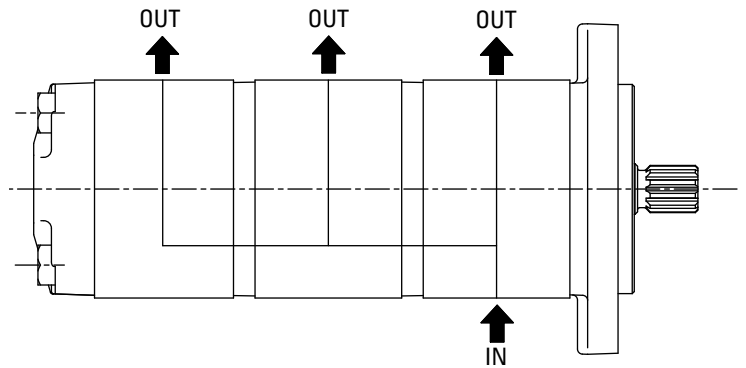
Code 5



Code 6



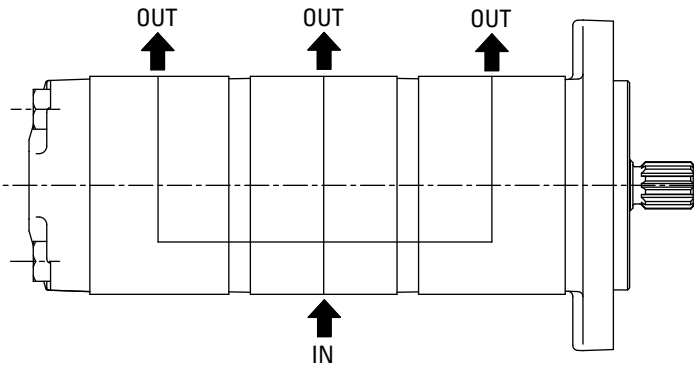
Code 7



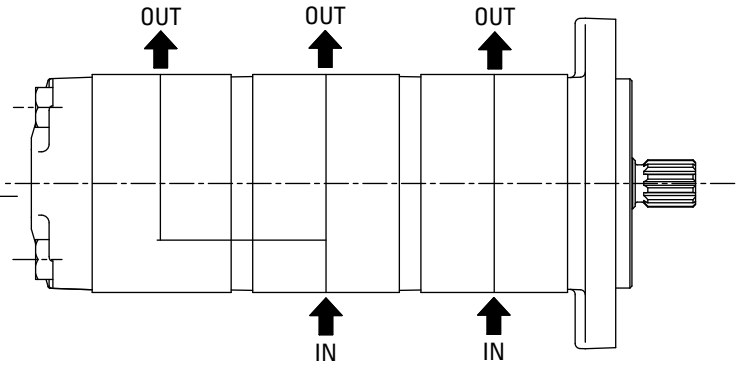
A-Aluminum Pump

Multiple Pumps – Common Inlet

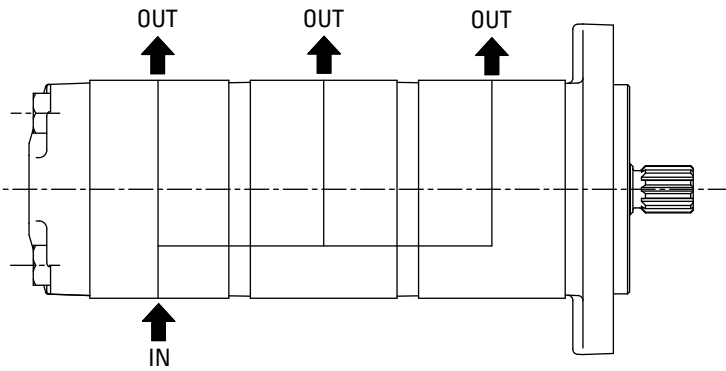
Code 8



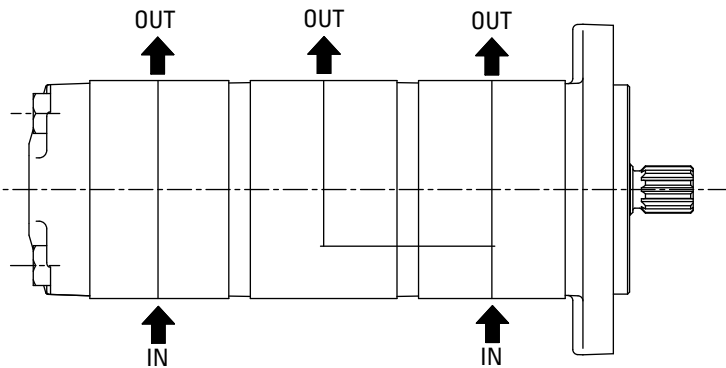
Code R



Code 9



Code L



A-Aluminum Pump

Multiple Pumps

Gear pumps are well-suited to tandem combinations of pumps in which the drive shaft of the first pump is extended to drive a second pump and sometimes a third pump in the same manner. A coupling is fitted between each pair of pumps. In most cases each pump is isolated from its neighbor, i.e. the suction ports are separate from one another. A common suction port is also possible as an option.

Note: Basically, the specifications for the individual pumps apply, but with certain restrictions:

Max. speed: This is determined by the highest rated pump speed in use.

Pressures: These are restricted by the strength of the drive shaft, the transmissions and the couplings.

Pressure restrictions during standard transmission

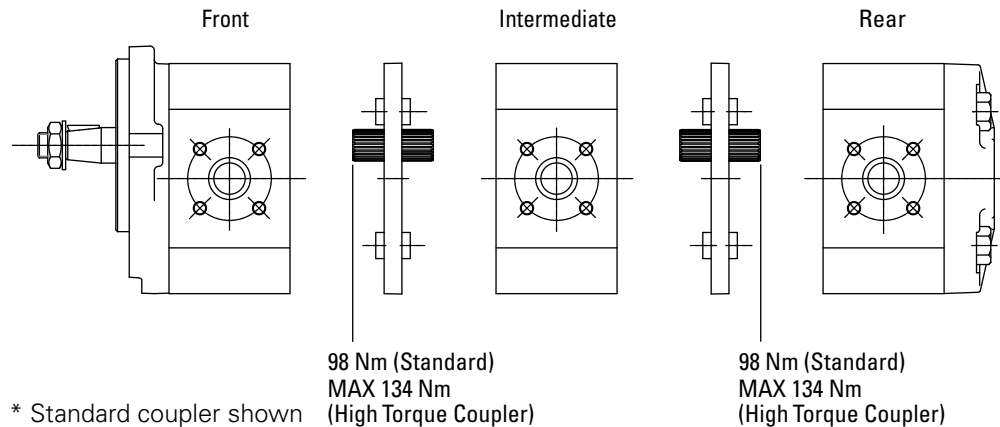
In the case of double suction, the second pump can carry a load of up to $T_{max.} = 98.4$ Nm, i.e. the pressure restriction for the second pump and any further pumps.

$T_{max.}$ [NM]	V [cm ³ /rev]	$P_{max.}$ [bar]	
98.4	6.5	230	305
	16	190	305
	28.4	160	217

$T_{max.} = 98.4$ n-m (Standard)
134n-m (High Torque Coupler)

*Theoretical

Reinforced transmissions are available for applications with higher transfer torques and/or torsional vibrations. Choose code "04" in model code feature 29, 30.



Pressure limitations in multiple section pumps.

Pressure for 2nd section in a double pump is limited by the maximum torque carrying capacity of coupling between 1st and 2nd section.

Similarly pressures for 2nd, 3rd section in a triple pump, is limited by torque carrying capacity of coupling between 1st section and 2nd section.

This is evaluated by finding the value of $P \times V$ for the pump section, where P is pressure and V is displacement of the section.

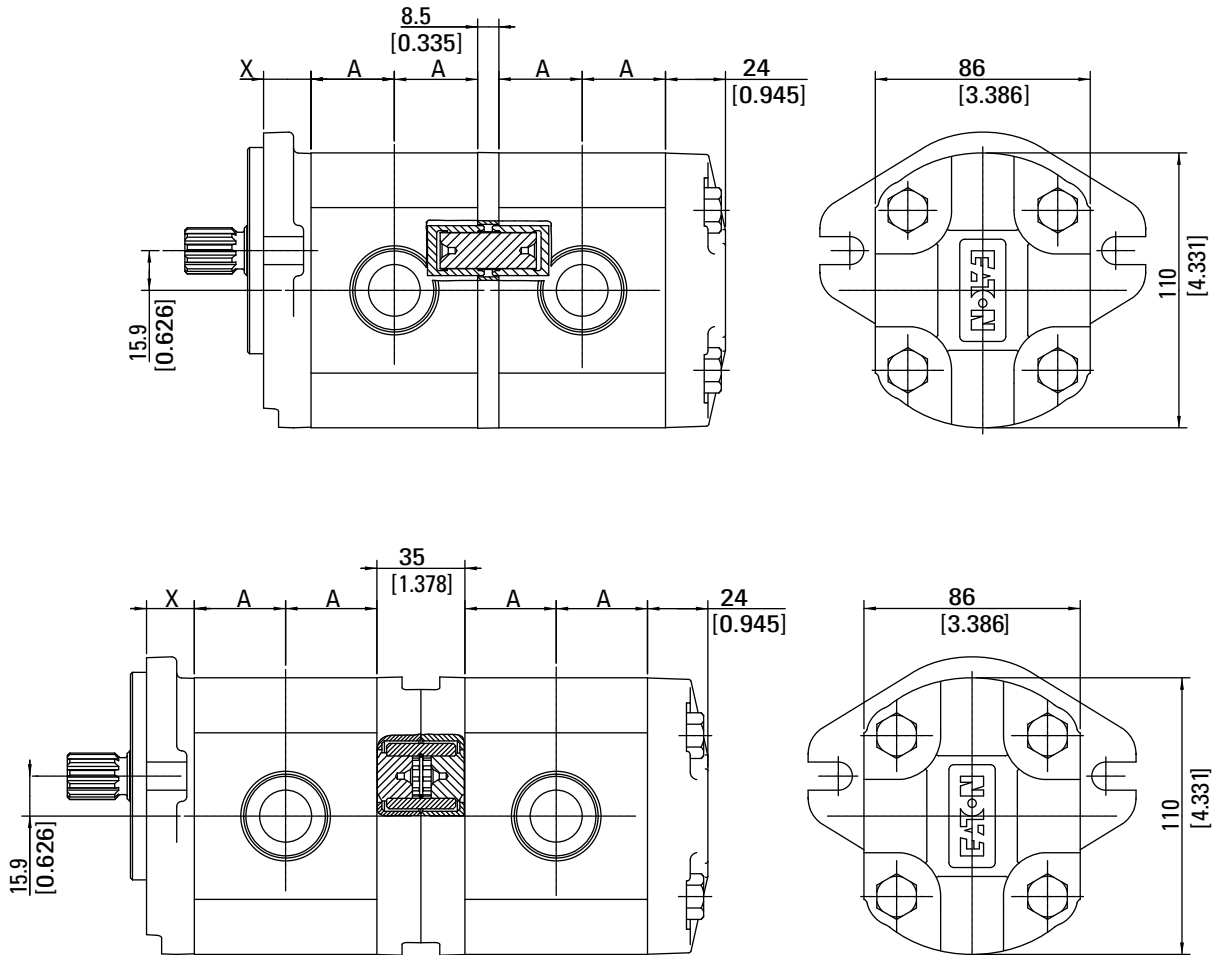
Condition given in following table needs to be met with.

How to Choose Coupling

PUMP TYPE	METRIC UNITS P = PRESSURE IN BAR V = DISPLACEMENT IN CC/REV		ENGLISH UNITS P = PRESSURE IN PSI V = DISPLACEMENT IN INCH ³ /REV	
	Standard Coupling (model code position 28,29 = 00)	High Torque Coupling (model code position 28,29 = 04)	Standard Coupling (model code position 28,29 = 00)	High Torque Coupling (model code position 28,29 = 04)
Double	$P_2 \times V_2 \leq 5233$	$P_2 \times V_2 \leq 7156$	$P_2 \times V_2 \leq 4631$	$P_2 \times V_2 \leq 6333$
Triple	$P_2 \times V_2 + P_3 \times V_3 \leq 5233$	$P_2 \times V_2 + P_3 \times V_3 \leq 7156$	$P_2 \times V_2 + P_3 \times V_3 \leq 4631$	$P_2 \times V_2 + P_3 \times V_3 \leq 6333$

A-Aluminum Pump

Double Pump Dimensional Drawings



* High torque coupler (option 4, feature 29, 30)

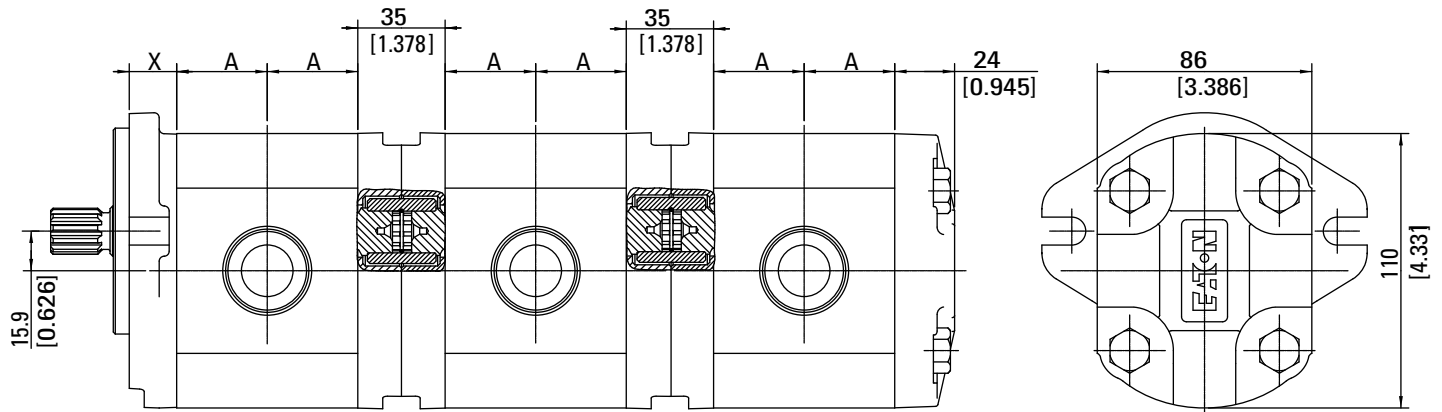
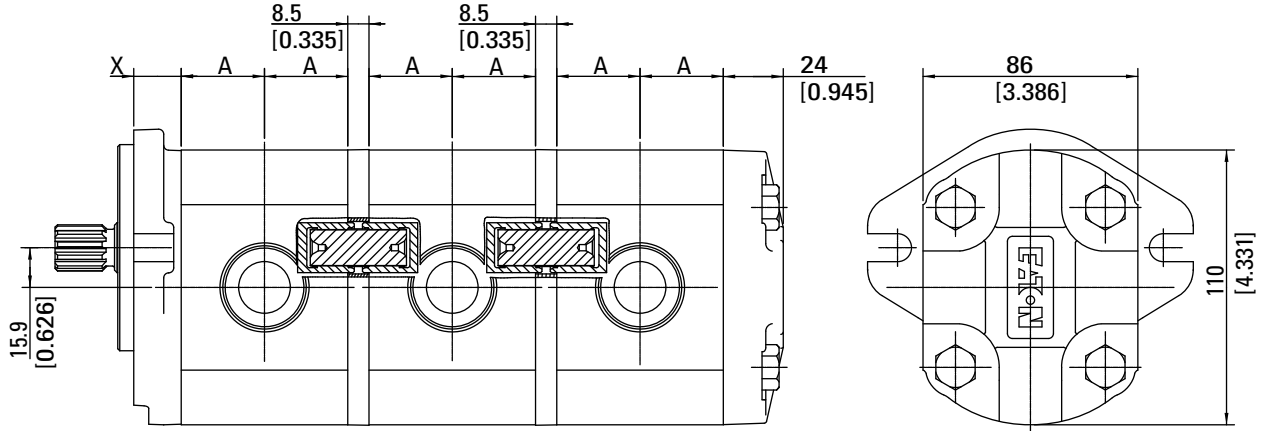
DISPLACEMENT	A MM (IN)
5.3 (.32)	25.1 (0.99)
6.5 (.40)	26.0 (1.02)
8.3 (.51)	27.4 (1.08)
10.3 (.63)	28.9 (1.14)
12.9 (.79)	30.9 (1.22)
14.0 (.85)	31.7 (1.25)
16.1 (.98)	33.3 (1.31)
20.0 (1.22)	36.3 (1.43)
24.0 (1.46)	39.3 (1.55)
28.4 (1.73)	42.7 (1.68)
33.4 (2.04)	46.5 (1.83)

MOUNTING FLANGE TYPE	X
version	mm (inch)
A	19 (0.7480)
B	19 (0.7480)
E	19 (0.7480)
F	19 (0.7480)
G	19 (0.7480)

Displacement shown in cm³/r (in³/r) and dimensions are shown in mm (in).

A-Aluminum Pump

Triple Pump Dimensional Drawings



* High torque coupler (option 4, feature 29, 30)

DISPLACEMENT	A MM (IN)
5.3 (.32)	25.1 (0.99)
6.5 (.40)	26.0 (1.02)
8.3 (.51)	27.4 (1.08)
10.3 (.63)	28.9 (1.14)
12.9 (.79)	30.9 (1.22)
14.0 (.85)	31.7 (1.25)
16.1 (.98)	33.3 (1.31)
20.0 (1.22)	36.3 (1.43)
24.0 (1.46)	39.3 (1.55)
28.4 (1.73)	42.7 (1.68)
33.4 (2.04)	46.5 (1.83)

MOUNTING FLANGE TYPE	X
version	mm (inch)
A	19 (0.7480)
B	19 (0.7480)
E	19 (0.7480)
F	19 (0.7480)
G	19 (0.7480)

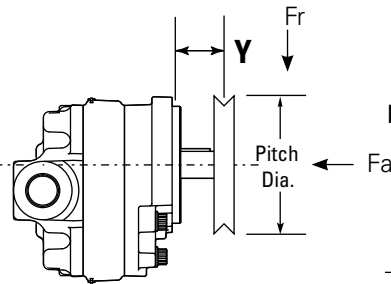
Displacement shown in cm³/r (in³/r) and dimensions are shown in mm (in).

A-Aluminum Pump

Side Load Application

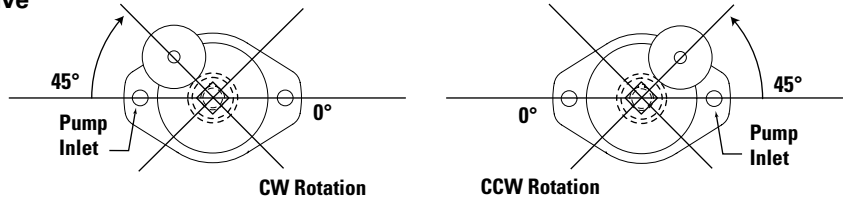
Maximum Allowable Operating Pressures

Ideal positions shown. Side load is acceptable within 90° of either side of the ideal position. Charts are based on 100% slack side tension. Max. speed per catalog. Max. operating pressure shown.

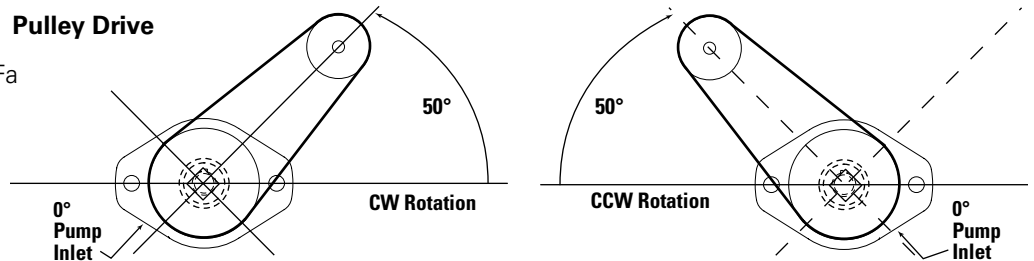


Preferred positions for side load are shown in sketch below.

Gear Drive



Pulley Drive



Maximum side loading (F_r) = 1068 N [240lbf] up to 159 bar [2300psi] 490 N [110lbf] up to 160 bar [230psi] and between 186 bar [2700psi]

Maximum Axial Load (F_a) = 700 N [157lbf] push

Side Loading

The maximum side loading = 1068 N [240 lbf] up to 159 bar [2300 psi].

The maximum side loading = 490 N [110 lbf] for pressures between 160 bar [2301 psi] and 186 bar [2700 psi].

Applications exceeding these ratings will be individually reviewed. All external side loads will have an effect on bearing life. Pump orientation, duty cycle, and desired loading should be reviewed for each application to determine the proper configuration.

Axial Loading

The maximum axial load on the drive shaft is 700 N [157 lbf] into the pump (push).

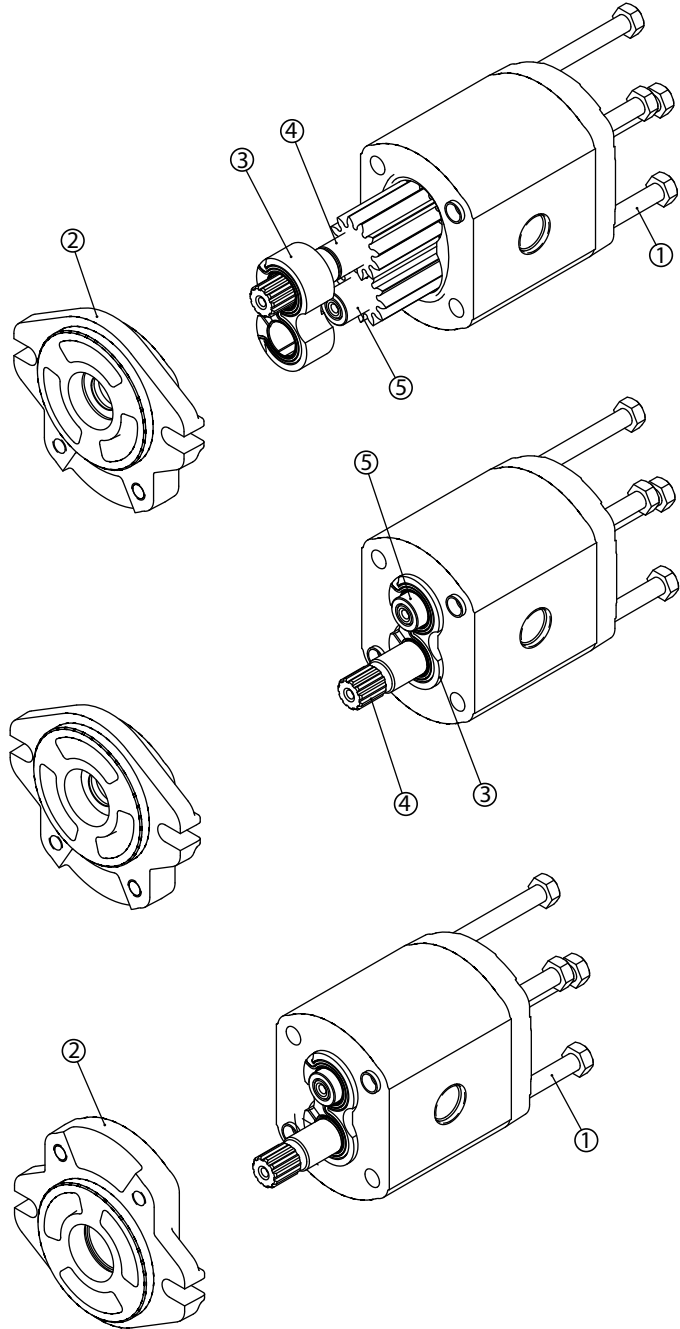
All external thrust loads will have an effect on bearing life. Pump orientation, duty cycle, and desired loading should be reviewed for each application to determine the proper configuration.

A-Aluminum Pump

Changing Rotation

To change rotation of GGP A Aluminum unidirectional pumps and motors:

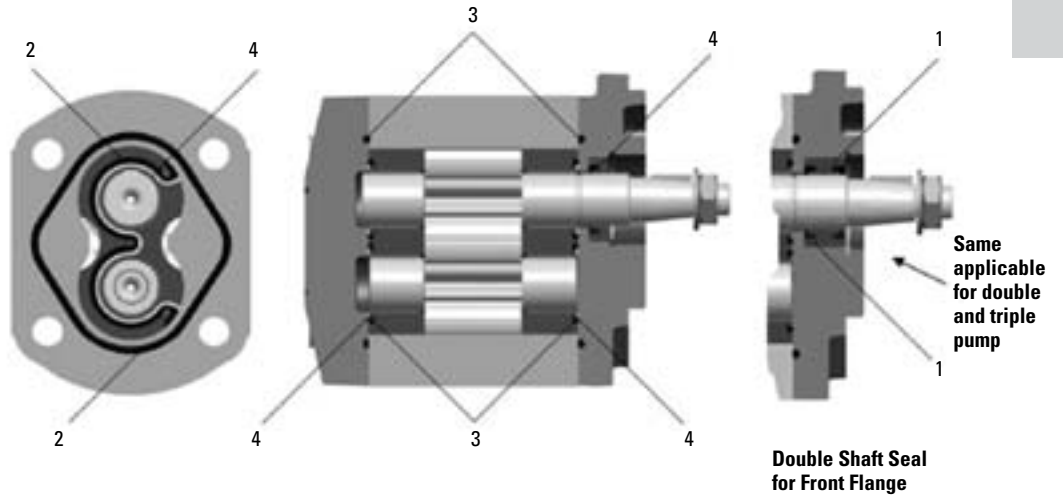
1. Clean the pump or motor externally with care.
2. Coat the sharp edges of the drive shaft (4) with adhesive tape and smear a layer of clean grease on the shaft end extension to avoid damaging the lip of the shaft seal when removing the mounting flange.
3. Loosen, and remove, the clamp bolts (1).
4. Remove the mounting flange (2), taking care to keep the flange as straight as possible during removal. If the flange is stuck, tap around the edge with a fibre or rubber mallet in order to break away from the body. Ensure that while removing the front mounting flange, the drive shaft and other components remain in position.
5. Remove front bushing block (3), do not remove rear backplate or bushing block.
6. Remove the driven gear (5) without overturning. The rear plate is not to be removed.
7. Re-locate the driven gear (5) in the position previously occupied by the drive gear (4).
8. Re-locate the drive gear (4) in the position previously occupied by the driven gear (5).
9. Replace the bushing block (3) in its original position.
10. Gently wipe the machined surface of the mounting flange (2).
11. Refit the front mounting flange (2) turned 180° from its original position.
12. Refit the clamp bolts (1) and tighten in a crisscross pattern with the following torque valve. 70+5 Nm (620 - 664 lbf in).
13. Check that the pump rotates freely when the drive shaft (4) is turned by hand. If not a pressure plate seal may be pinched.
14. The pump is ready for installation with the original rotation reversed.



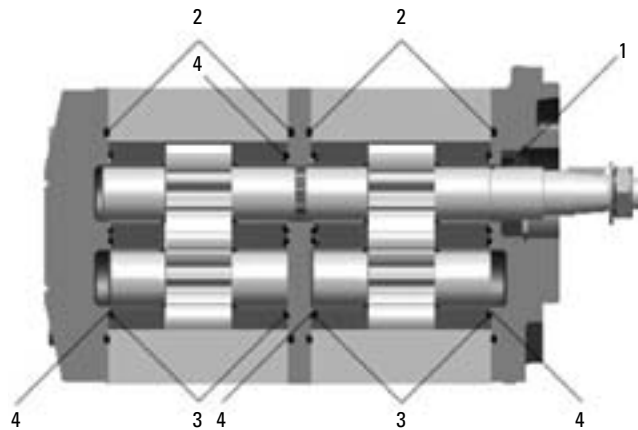
Changing rotation should be done by a trained service center or an authorized distributor.

Spare Parts

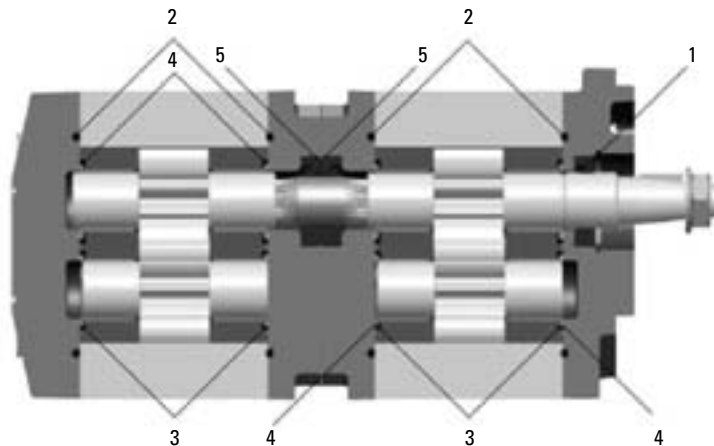
**Single Pump
With no special features**



**Double Pump
With no special features**



**Double Pump
With sealing between sections**



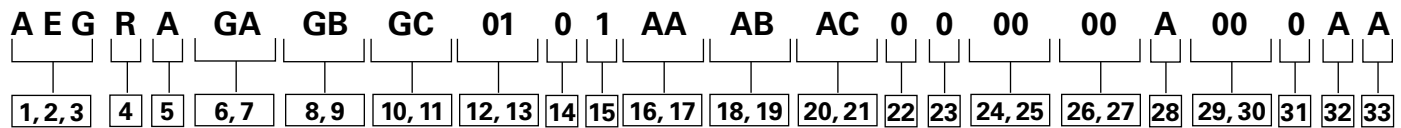
NO.	PART NAME
1	Shaft Seal
2	O-Ring
3	W-Seal
4	Backup Ring
5	Shaft Seal

Seal Kit Information

Seal kit for the pump is governed by pump type, seal type (model code position 28), special feature (model code position 29, 30) as shown in table below.

For example pump model code AEGRAGAGBGC0101AAABAC000000A000AA

Seal kit number would be 9900439-000



Position

1

2

3

PUMPTYPE	SEAL TYPE (POSITION 28)	SPECIAL FEATURE (POSITION 29,30)	SEAL KIT PART NO. (INCLUDES SHAFT SEAL)	SHAFT SEAL PART NUMBER (QTY)	SIZE	MATERIAL
Single (221AD*****A)	A	00	9900439-000	5001684-001(1)	20 x 32 x 7	Nitrile (Buna)
		01	9900596-000	5001684-001(2)	20 x 32 x 7	
	C	00	9900597-000	5994277-001(1)	20 x 32 x 7	Viton
		01	9900598-000	5994277-001(2)	20 x 32 x 7	
Double (222AD*****A)	A	00	9900599-000	5001684-001(1)	20 x 32 x 7	Nitrile (Buna)
		01	9900600-000	5001684-001(2)	20 x 32 x 7	
		02	9900601-000	5001684-001(1)	20 x 32 x 7	
	C	00	9900602-000	5994277-001(1)	20 x 32 x 7	Viton
		01	9900603-000	5994277-001(2)	20 x 32 x 7	
		02	9900604-000	5994277-001(1)	20 x 32 x 7	
Triple (223AD*****A)	A	00	9900605-000	5001684-001(1)	20 x 32 x 7	Nitrile (Buna)
		01	9900606-000	5001684-001(2)	20 x 32 x 7	
		02	9900607-000	5001684-001(1)	20 x 32 x 7	
	C	00	9900608-000	5994277-001(1)	20 x 32 x 7	Viton
		01	9900609-000	5994277-001(2)	20 x 32 x 7	
		02	9900610-000	5994277-001(1)	20 x 32 x 7	

The Eaton Advantage

Whether your products move, turn, shape, mold, lift, dig, or haul, you can depend on Eaton's hydraulics products to deliver the performance you need to stay competitive. Eaton's unwavering dedication to leadership in mobile and industrial applications has made Eaton one of the world's preferred suppliers of hydraulic solutions.

When The Job Calls For Hydraulic Muscle.

Eaton® hydraulic components, fluid conveyance and systems keep our customers one step ahead of the competition. On-road, off-road, agriculture, mining, marine, industrial, even on the lawn and in the garden — when the task requires reliable, efficient, cost-effective hydraulic muscle, Eaton's hydraulics deliver engineered solutions you can count on, backed by service designed to ensure your complete satisfaction.

Call On the ACE Team for Custom Solutions.

Eaton's Application and Commercial Engineering (ACE) team is a unique resource that works with your engineers to optimize a hydraulic solution with the exact flow, displacement, pressure, torque, speed, and control software required to meet your needs. From a single component to a complete system solution, Eaton and the ACE Team are ready to help you get the job done right the first time and every time.

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When the need goes beyond our wide range of standard product offerings, Eaton can offer OEMs a customized solution with world-class global engineering centers.

Global Distribution Means Global Support.

Eaton supports your products with more than 12,000 distributor locations worldwide. Service, parts, experienced technicians, and instant access to Eaton's hydraulic knowledge base and manufacturing resources are all as close as your local Eaton Hydraulics distributor.

Authentic Remanufactured Products.

Eaton Remanufactured parts and components meet the same exacting standards as the original products they replace. Insist on **authentic**:

- Eaton brand medium-duty and heavy-duty piston pumps and motors
- Vickers brand vane cartridge kits for pumps and motors
- Vickers brand piston rotating groups and complete units

They all come from our ISO 9001:2000 certified Reman facility. Before, during, and after the sale, Eaton's Hydraulics Business stands ready to meet all of your product, service and support needs.

World-Class Product Brands

You recognize the names because they are world-class leaders in their own right and integral parts of Eaton's Hydraulics Business worldwide reputation for quality and performance in hydraulic components, systems, fluid conveyance, service, and support.

Aeroquip®

Hose, fittings, adapters, couplings and fluid connectors for all pressures in industrial, aerospace, and automotive applications.

Boston®

Industrial hoses available in sizes 1/4" to 8" I.D. for chemical, petroleum, material handling, and food industry applications.

Char-Lynn®

Hydraulic steering units, general purpose motors, spool and disc valves, and Valve-In-Star™ (VIS) motors for both mobile and industrial applications.

Eaton®

Hydrostatic transmissions, valves, piston and gear pumps, and Valve-In-Star™ motors primarily focused on mobile equipment applications.

Hydro-Line®

Industrial cylinders in a range of sizes to meet the motion control needs of machine and equipment builders for products ranging from automobile production to large hydro-electric and off-shore drilling applications.

Focus on Sustainability

Sustainability has always been at the heart of Eaton's products.

That heritage has become an advantage as customers seek to partner with us to develop more efficient – and innovative – products and services.

Synflex®

Lightweight, high pressure, abrasion and chemical resistant thermoplastic hoses and tubing for a range of industries including transportation, beverage dispensing, fluid power and specialty applications.

Vickers®

Vane and piston pumps, valves, cylinders and filtration products for industrial, aerospace, marine and defense applications.

Walterscheid®

Hydraulic tube connectors and fittings for the mobile and stationary markets.

Weatherhead®

Hydraulic hose, hose ends, assembly equipment, tube fittings, couplings and support accessories for construction, mining, agriculture, truck and bus applications.

Solutions For Mobile and Industrial Applications That Have To Work

Eaton pumps, motors, transmissions, valves, cylinders, controls, hose and fittings offer a unique combination of proven technology and innovative design that translates directly into reliable performance and enhanced uptime.

Whether you need a single component, a custom-engineered solution, or anything in between, Eaton is the partner of choice for mobile and industrial applications that simply have to work.

Mobile Applications



Agricultural

Eaton has provided the technology to power agricultural equipment for over fifty years covering all types of machines and all types of functions. From innovative steering and sophisticated electro-hydraulic valves, tough hoses and fittings, to efficient pumps and motors, Eaton provides a full range of products to meet this market's needs.

Construction

Eaton's products provide compact, powerful products to meet the demanding needs of the construction market.

Components with fast, accurate response help meet the challenges for this market.

Earthmoving

Eaton's compact, powerful components help put the power where it's needed. From propel motors and swing drives to auxiliary work systems, Eaton has many solutions to the demanding requirements of earthmoving applications.

Forestry

Eaton provides rugged, long life hydraulic components for the demanding needs of the forestry market. Compact, powerful components help put the power where it's needed.



Material Handling

Eaton's product range for the material handling market is second to none. Whether for propel circuits, steering functions, or auxiliary work circuits, Eaton provides a full range of products to meet the demanding needs for these machines.

Truck and Bus

Eaton hose and fittings, fan drive systems and HLA® systems (a leader in hybrid power train solutions) set a standard for truck and bus applications.

Utility/Vocational

Versatile, complete system solutions are available with the broad product range that Eaton provides. From innovative steering and sophisticated electro-hydraulic valves, tough hoses and fittings, to efficient pumps and motors, Eaton provides a full range of products to meet this market's system needs.

Mining

Eaton is the preferred choice for many of the auxiliary systems on mining equipment. Eaton products can handle the harsh environments and the rigorous duty cycles, and can survive the tough applications.

Industrial Applications



Automotive

Eaton products are trusted and specified by the world's leading automakers.

You can count on Eaton aftermarket support anywhere in the world.

Machine Tools

Eaton products enable machinery to deliver high productivity and consistent accuracy for metal cutting machinery.

High pressure and flow components – piston pumps, cylinders and cartridge valves, provide the muscle and control required for metal forming machinery.

Molding

Strong application support coupled with a full range of hydraulic products – wide range of cylinders, vane and piston pumps, cartridge valves and manifolds – provides you with a single source solution.

Oil and Gas

Eaton offers the most robust line of customized hydraulic solutions for both land and sea based oil and gas exploration, production and refinement platforms starting with our specialized rod coatings on large cylinders, heavy duty pumps, high pressure hose



for subsea production and no leak tube fittings. From motion compensation systems, jack pumps, to top drives, blow out preventers, iron roughnecks, winches and crane systems when you need reliable performance, count on Eaton hydraulic systems.

Port Machinery

Eaton understands the fast paced action of dockyards. You can rely on Eaton components to provide high productivity with maximum efficiency.

Power Generation

Eaton provides the complete, rugged and customized hydraulic control systems for power generation plants of all platforms including wind power, hydropower and thermal power. Eaton has the specific solutions for the renewable energy industry that are environmentally friendly.

Primary Metals

Eaton high pressure pumps, cylinders and valves are the ideal components for delivering the muscle required in these rugged applications. We can handle the heat and provide long life in mill environments.

Motors



Spool Valve Hydraulic Motors

Spool valve motors are typically used where compact, economical solutions are most needed in low pressure applications. Spool valve motors use a spool to precisely time and control flow through the orbit gear set (Geroter or Geroler). Inlet flow is directed into and out of the orbit set via slots in the spool and passages through the motor housing. The result is a very cost-effective, compact package suited to many application requirements.

Applications: Harvesters, augers.

Specifications: Rated Speed: Up to 1,000 rpm. Torque Range: Up to 565 Nm (5,000 lb-in). Options: Variety of optional shafts, ports, mountings and displacements. Output Shafts: Straight with woodruff key, splined, tapered or straight with cross holes.

Delta Wheel Motors

The Char-Lynn® Delta wheel motor is designed to be an easy drop-in replacement for competitive wheel motors and offers several benefits. Char-Lynn's all new Delta Wheel motor will fill the growing need for a 4,000 psi intermittent pressure wheel motor. The Delta wheel motor's performance is based on proven disc valve technology with higher efficiencies and longer life through lower temperature operation.

Applications: Lawn and turf equipment, sweepers and scissor lifts.

Specifications: Size Range: 6.9 – 46 cid.



Motors



Disc Valve Hydraulic Motors

The Disc valve motors include the 2,000 series, 4,000 series, 4,000 compact series, 6,000 series and the 10,000 series. They all come with standard mount, wheel mount or bearingless. The Char-Lynn range offers many displacements, output shafts, port configurations and a multitude of special options that makes this product line the most flexible product to apply in the industry. The Eaton quality continues to be unrivaled and our plants consistently deliver excellent products on time.

Applications: Swing motor, brush cutters and mowers.

Specifications: Rated Speed: Up to 900 rpm. Torque Range: Up to 3,390 Nm (30,000 lb-in). Options: Wide variety of optional shafts, mountings, ports, displacements, speed sensors- and bolt-on valves. 2-Speed Models: Available in series 2,000 and 10,000.

HP30 Series Hydraulic Motors

The Char-Lynn® HP30 disc valve motor targets mobile off-highway applications requiring up to 3,389 Nm of intermittent torque and continuous operation with flow of 170 lpm at 310 bar, intermittent operation at 265 lpm and 345 bar and maximum inlet pressure of 400 bar.

Applications: Mobile off-highway vehicles.

Specifications: Efficiencies of the Char-Lynn valving system include: Rated Pressure: Up to 420 bar (6,000 psi) intermittent, 30,000 in-lbs of torque. Highest starting torque, even compared to cam lobe motors, smooth two speed option with integrated shift under load (1:1.5 ratio) and an integrated hydraulic brake option.



Motors



Valve-In-Star™ (VIS) Hydraulic Motors

The Valve-In-Star (VIS) motors are the next step in the evolution of the low speed high torque (LSHT) hydraulic motors. The VIS provides design advantages over other types of LSHT hydraulic motor valving resulting in a more compact package with better efficiency and higher pressure capability. These improvements have shown significant packaging and performance advantages in applications such as skid steer loaders, mini excavators, trenchers and logging equipment. VIS motors are primarily intended for use in closed loop applications.

Applications: Skid steer loaders, specialty harvesting, compactors, augers, forestry equipment, road rollers, sprayers and trenchers.

Specifications: Rated Speed: Up to 500 rpm. Torque Range: Up to 5,085 Nm (45,000 lb-in).

ME Series Hydraulic Motors

These double swash plate, opposed-piston, low-speed, high-torque hydraulic motors operate smoothly at low speed within the maximum ratings and cause very little torque ripple.

Applications: Swing drives, winches, top head drives, directional drilling machines and propel drives for large vehicles.

Specifications: Rated Pressure: 248 and 276 bar (3,600 and 4,000 psi). Torque Range: Up to 16,136 Nm (11,900 lb-in).



Motors



Hydrokraft Axial Piston Motors

Vickers Hydrokraft™ axial piston motors are ideally suited for the most demanding industrial type applications, including the harsh environment found in the off-shore and oilfield markets. These motors are designed with the largest shaft bearings available for full thru-drive capability and long life required for industrial applications. These motors are available with a wide range of controls for the variable displacement versions including full over-center capability. Hydrokraft products are able to operate on a wide range of fluids including water-glycol.

Applications: Steel mills and marine applications.

Specifications: Displacement: 66 cc–750 cc. Rated Pressure: Up to 350 bar (5,000 psi); intermittent to 420 bar (6,000 psi). Rated Speed (Max.): 2,800–1,800 rpm.

Vane Motors

Vane motors are used in industrial and mobile applications. The proven reliability and the available cartridge kit designs make for uptime and easy serviceability. Additionally, a low break out force smooths out the start-up speed allowing for vane motors to be more forgiving to system pressure spikes. Vane motors offer an economical, efficient and economical means of applying variable speed, rotary hydraulic power and offer variable horsepower (constant torque) characteristics. They can be stalled under load without damage when protected by a relief valve.

Applications: Plastic injection molding and conveyors.

Specifications: Displacement: 1.32 in³/rev (21.6 cc/rev)–19.35 in³/rev (317.1 cc/rev). Rated Pressure: Up to 175 bar (2,500 psi) (size dependent). Rated Speed: Up to 4,000 rpm. Torque Range: Up to 119–847 Nm (1,050 to 7,500 lb-in). Heavy duty shaft bearing is also available.



Steering Control Units



Series 5

The Series 5 Steering Control Units (SCU) are designed for low flow, low pressure applications. The Series 5 units are available in two compact designs: Square housing (mount) unit with side ports and round housing (mount) unit with end ports. In addition to the installation flexibility, this new family of products has best-in-class steering feel and provides crisp centering. These units also have better efficiency (lower pressure drop) than competitive units.

Applications: Lawn, garden and turf equipment, lift trucks, marine and compact utility tractors.

Specifications: Displacement: 31.5 (1.92 in³/rev)–120 cm³/r (7.33 in³/rev). Rated Flow: 11–19 lpm (3–5 gpm). Rated Pressure (Max.): 140 bar (2,030 psi).

Series 10

Eaton's Series 10 Steering Control Unit (SCU) facilitates hydraulic fluid flow like no other unit on the market. This highly-engineered product is the ultimate SCU for mid-range flow applications. The Series 10 SCU has an unprecedented, continuous pressure rating of 275 bar (4,000 psi), making it ideal for heavy-duty equipment, such as construction and agricultural machinery. Its high-pressure rating reduces overall equipment costs, since smaller cylinder sizes can be assigned into the system. The Series 10 can incorporate proven Eaton technologies, including Q-Amp, Wide Angle, Versa Steer and Two-speed Steering.

Applications: Heavy-duty equipment, such as construction, forestry and agricultural vehicles.

Specifications: Displacement: 60–739 cm³/r (3.6–45.1 in³/rev). Rated Flow: 3.8–45 or 8.0–76 (Q-Amp) lpm (1–16 or 2–20 gpm). Rated Pressure (Max.): 275 bar (4,000 psi).



Steering Control Units



Series 20

The Series 20 Steering Control Unit (SCU) continues Eaton's tradition of innovative design and high quality. The Series 20 SCU provides much smoother steering function with Eaton's patented wide-angle feature, minimizing jerk motion on articulated vehicles. The seal and centering spring designs provide positive, low-effort steering feel to ensure excellent vehicle control, an important feature for the vehicles for which these steering control units were designed.

Applications: Articulated vehicles, such as wheel loaders, forestry equipment and dump trucks.

Specifications: Displacement: 60–985 cm³/r (3.6–60 in³/rev). Rated Flow: 38–125 lpm (10–33 gpm). Rated Pressure (Max.): 241 bar (3,500 psi).

Series 25

The Series 25 Steering Control Unit (SCU) includes two patented designs (Balanced Architecture and Wide Angle) that make it even more responsive, reliable and cost effective. Symmetrical valving provides passageways and valving that are equal in both directions and pressure areas that are staged for minimum leakage. Progressive valving makes it possible to produce the spool/sleeve valve in a way that assures reliability and reduces costs. Eaton's high capacity gerotor assembly provides a lot of capacity in a small package.

Applications: Large articulated vehicles such as, loaders, mining trucks, graders, scrapers, haulers and transporters.

Specifications: Displacement: 490–1,230 cm³/r (30–75 in³/rev). Rated Flow: 95–151 lpm (25–40 gpm). Rated Pressure (Max.): 241 bar (3,500 psi).



Steering Control Units



Series 40

The Series 40 Steering Control Units (SCU) is designed for the highest flow, highest pressure applications, and is the most capable steering control unit on the market. This SCU features patented Eaton technology and has design attributes that result in responsive, smooth, stable and cost effective steering.

Applications: Large articulated and fixed frame vehicles.

Specifications: Displacement: 1,230 (75 in³/rev)–3,030 cm³/r (185 in³/rev). Rated Flow: 151–227 lpm (40–60 gpm). Rated Pressure (Max.): 241 bar (3,500 psi).

Steering Accessories

Eaton offers a complete line of steering columns and wheels to fit every need. Fixed and tilt columns feature a sturdy weldment design and are phosphate coated to maintain corrosion resistance. Columns are available with multiple jacket types and various horn wire configurations. Lengths from 2.2" to 33" will ensure that these columns can be customized for any application.

Eaton also offers steering wheels with added features like soft touch feel, spinner knobs and horn buttons. Wheels come in a standard 3-spoke design with size from 14" to 17".



Vane Pumps



VMQ Pumps

The Vickers VMQ is the world leader in pressure capacity and noise levels and is available in a complete range of singles, doubles, triples and thru-drives. The unique wafer plate design of the VMQ allows for the increase in viscosity and pressure rise during cold start-up – something that competitors do not have. The Vickers VMQ 32nd design is the highest pressure, lowest noise fixed vane pump available.

Applications: Marine and railway winches, oil field and drilling equipment, earthmoving and construction equipment, high-pressure plastic injection molding machines, large press machines, trash compactors and large balers.

Specifications: Displacements: .60 in³/rev (10 cc/rev)–28.2 in³/rev (463 cc/rev) Using single; double and triple pump combined flow. Rated Pressure: Up to 293 bar (4,250 psi). Rated Speed: Up to 3,000 rpm.

V/VQ Pumps

The V series pumps are designed for medium pressure industrial applications. Its industry-first intravane cartridge design provides long operating life, outstanding volumetric efficiency and excellent serviceability. The super-quiet 12-vane system is ideal for the indoor industrial environment. The 22nd design is well known for reliability and versatility, and is extensively used in industrial machinery all over the world.

Applications: V Series – General industrial applications such as plastic injection molding machines, presses, material handling machines, industrial power units, aerial booms.

VQ Series – General mobile applications such as wheel loaders.

Specifications: Displacement: .45 in³/rev–20.61 in³/rev (7.4–337.8 cc/rev). Using single; double and triple pump combined flow. Rated Pressure (Max.): Up to 210 bar (3,000 psi) continuous. Rated Speed: Up to 2,700 rpm.



Vane Pumps



V10/V20 Pumps

The V10 and V20 pumps are designed for medium to low-pressure mobile and industrial applications. Time proven dependable, durable, quiet and most economical vane pumps. They are the premium fixed pump choice as the main system pumps for small industrial and mobile equipment or as pilot and auxiliary pumps for complex systems. They are also the standard steering pump technology for heavy-duty trucks and interstate buses. Optional integrated flow control valves simplify system design and installation.

Applications: Use in less demanding applications. Power units, power steering, skid steers, lift trucks and balers.

Specifications: Displacement: 0.2 in³/rev (3.3 cc/rev)–5.18 in³/rev (84.8 cc/rev). Using single and double pump combined flow. Rated Pressure (Max.): Up to 175 bar (2,500 psi) continuous. Rated Speed: Up to 4,800 rpm.

VVS/VVP Pumps

The VVS and VVP series variable vane pumps are cost effective solutions for low to medium pressure industrial applications where a flexible flow and low noise is required. A full range of control options are available from basic pressure compensator to load sensing, torque limiting control. The pumps are designed for long operating life thanks to hydrodynamic lubrication of bearings.

Applications: These pumps have a large displacement capability and typically have low maximum pressures similar to the V10/V20. VVS/VVP are used on numerous industrial applications with low-pressure needs. Machine tools.

Specifications: Displacement: .37 in³/rev (6.0 cc/rev) – 6.1 in³/rev (100.0 cc/rev). Rated Pressure (Max.): Up to 160 bar (2,300 psi) continuous. Rated Speed: Up to 1,800 rpm.



Vane Pumps



VQ(H) Pumps

The VQ series pumps are designed for medium pressure mobile applications. Its 10-vane system is well tuned for higher pressure and higher speed mobile requirements. It has the industry-first intra-vane cartridge design that provides long operating life, outstanding volumetric efficiency and excellent serviceability. The design is widely adopted by world's leading mobile equipment manufacturers.

The VQH series pumps are the higher pressure and higher performance version of VQ series pumps. The new rotor design reduces internal leakage and enhances rotor rigidity. VQH pump uses strong ductile iron housing and has the same envelope size as VQ pump.

Applications: Wheel loaders, lift trucks, refuse trucks.

Specifications: Displacement: 2.45 in³/rev (40.2 cc/rev)–19.22 in³/rev (315 cc/rev). Using single and double pump combined flow. Rated Pressure (Max.): Up to 262 bar (3,800 psi) continuous. Rated Speed: Up to 2,700 rpm.



Open Circuit Piston Pumps



420

420 series mobile pumps are open circuit, axial piston designs. A variety of controls provide the ability to match the pumps to each application. Efficiency of the pump controls allows downsizing of systems cooling needs, allowing a smaller and less expensive design to be used. Alternatively, cooling capacity could be kept the same and the flow capability of the system increased, thus improving performance and customer satisfaction.

Applications: Refuse and utility boom trucks, ag. tractors, skid steer loaders, rough terrain fork lifts, wheel loaders, backhoe loaders, earth moving equipment, generator drives, fan drive systems.

Specifications: Displacements: 41 cc, 49 cc, 62 cc and 80 cc. Rated Pressure: 280 bar (4,060 psi) continuous, 320 bar (4,640 psi) intermittent. Rated Speed: Up to 2,650 rpm.

PVB

One of the most widely known industrial open circuit piston pumps on the market. The large number of control options provides for extreme flexibility in applications.

Applications: Factory automation, hydraulic power supplies, and small mobile equipment auxiliary circuits.

Specifications: Displacement: 10 cc – 94 cc. Rated Pressure: Up to 210 bar (3,000 psi). Rated Speed: 1,800 rpm maximum.



Open Circuit Piston Pumps



PVQ

Based on the industrial versions of PVB and PVE open circuit piston pumps, the Q Series greatly improves operating noise levels. The design of the PVQ reduces sound levels by 4 dBA. The large number of control options provides for extreme flexibility in applications.

Applications: Factory automation, hydraulic power supplies, food processing machines and machine tools.

Specifications: Displacement: 10 cc – 45 cc. Rated Pressure: Up to 210 bar (3,000 psi). Rated Speed: 1,800 rpm maximum.

PVE

Eaton PVE piston pumps are inline, variable displacement pumps that are available in three displacement sizes. An assortment of optional controls offers maximum operating flexibility.

Pump displacement is varied by means of pressure and/or flow compensator controls. Aluminum die cast housing allows low unit weight for unsupported PTO drive applications. Mobile pressure compensated, pressure and flow compensated and remote pressure control options are in wide use.

Applications: Farm tractors, agriculture equipment, utility vehicles, construction equipment and many other mobile applications.

Specifications: Displacement: 25 cc – 45 cc. Rated Pressure: Up to 210 bar (3,000 psi). Rated Speed: 3,000 rpm maximum.



Open Circuit Piston Pumps



PVH

PVH high flow, high performance pumps are a family of variable displacement, inline piston units that incorporate the proven design, quality manufacturing techniques and operating features of other Vickers® piston pumps, but in a smaller, lighter package. The PVH series has been specially designed to meet the 250 bar (3,625 psi) continuous duty performance requirements of new generation mobile machines.

Applications: Mobile: wheel loaders, graders, scrapers, utility vehicles, dozers, forestry harvesting machines, and rock drills.

Industrial: metal-forming equipment, hydraulic power supplies, press, factory automation and machine tools.

Specifications: Displacement: 57 cc–141 cc. Rated Pressure: Up to 250 bar (3,600 psi) continuous. Rated Speed: Up to 2,600 rpm.

PVM

One of the quietest medium pressure pumps available on the market, with up to 10 dBA quieter than most dual usage pump products. Noise levels significantly lower than other pump brands. Reduces need for expensive sound enclosures or inline pulsation dampers. Features like gauge ports and adjustable displacement come standard with each pump.

Applications: Metal forming, tube bending, machine tools, precision sawing, factory automation, press, and hydraulic power supplies.

Specifications: Displacement: 18 cc to 141 cc. Rated Pressure: Full 280 bar (4,000 psi) continuous, 320 bar (4,600 psi) intermittent. Pressure compensation and pressure/flow compensation controls. Electric motor speeds. Mineral-oil-based and fire-resistant fluid compatibility.



Open Circuit Piston Pumps



PVXS

The Hydrokraft™ PVXS design pumps are high pressure (350 bar) axial piston pumps designed for industrial markets. The PVXS pumps are widely used where their range of specialized pump controls can optimize circuits.

Applications: Metal forming, tube bending, press, marine and off-shore winches, chemical mixing grinding/shredding and hydraulic power supplies.

Specifications: Displacement: 66 cc (4.0 in³)–250 cc (15/2 in³). Rated Pressure: Full 350 bar (5,000 psi) continuous. Electric Motor Speeds. Mineral oil based and fire resistant fluid compatibility.

PVWS

The Hydrokraft™ PVWS design pumps are high pressure (350 bar) axial piston pumps. These products are designed for industrial markets and have a perpendicular style control mechanism allowing tandem pump combinations with short lengths. These high displacement pumps have a very long list of optimized control options that allow operation in many unique customer applications.

Applications: Metal forming, tube bending, press, marine and off-shore winches, chemical mixing grinding/shredding and hydraulic power supplies.

Specifications: Displacement: 250 cc (15.2 in³)–750 cc (45.7 in³). Rated Pressure: Full 350 bar (5,000 psi) continuous. Electric Motor Speeds. Mineral oil based and fire resistant fluid compatibility.



Closed Circuit Piston Pumps and Motors



Heavy Duty Series 1 Axial Piston Pumps

Series 1 offers durability and high power density, plus a variety of options and controls.

Applications: Agricultural, transit mixer drum drives, industrial applications, lift trucks, timber harvesters, road rollers, wheel loaders and construction equipment.

Specifications: Displacements (five): 64 cc/r (3.9 cir)–125 cc/r (7.62 cir). Rated Pressure: Up to 430 bar (6,250 psi). Rated Speed: Up to 4,160 rpm.

Heavy Duty Series 2 Axial Piston Pumps

Series 2 pump meets the market's demands for compact, quiet hydrostatic power. The power-dense, axial-piston design and wide range of controls are suited for mobile and industrial applications. Series 2 offers durability and high power density, plus a variety of options and controls.

Applications: Agricultural, crop sprayers, lift trucks, timber harvesters, road rollers, wheel loaders, road building, construction equipment and industrial applications.

Specifications: Displacements (four): 64–105 cc. Rated Pressure: 430 bar (6,250 psi). Rated Speed: Up to 4,510 rpm. Integral charge pumps. A, B, B-B, C auxiliary through-drives.



Closed Circuit Piston Pumps and Motors



Bent Axis Motors – Fixed and Variable

Our heavy duty Eaton® Model Series 1 fixed displacement piston motors and heavy duty Eaton® Model Series 1 variable displacement piston motors are well known for exceptional quality and longevity. With many mounting options and control features, we have a heavy duty motor for your most demanding applications.

Applications: Earthmoving machines and construction equipment, agricultural and forestry vehicles, marine and off-shore equipment, industrial conveying, mixing and other stationary in-plant uses.

Specifications: Displacement: Eleven fixed displacement options: 11 cc (.66 cir)–225 cc (13.73 cir); Five variable displacement options: 55 cc (3.34 cir)–225 cc (13.73 cir). Rated Pressure 350 bar (5,100 psi), peak pressure to 450 bar (6,500 psi). Rated Speed: Up to 5,590 rpm.

Heavy Duty Axial Piston Motors – Fixed and Variable

Our heavy duty Eaton® Model Series 1 fixed displacement piston motors and heavy duty Eaton® Model Series 1 variable displacement piston motors are well known for exceptional quality and longevity. With many mounting options and control features, we have a heavy duty motor for your most demanding applications.

Applications: Agricultural, construction, lawn and turf, utility equipment.

Specifications: Displacements (six): 64 cc/r (3.9 cir)–125 cc/r (7.62 cir). Rated Pressure: Up to 430 bar (6,250 psi). Rated Speed: Up to 4,160 rpm.



Closed Circuit Piston Pumps and Motors



Medium Duty Axial Piston Manual Pumps

Different valve plate options provide a range of control efforts that can closely match your application needs. A square control shaft reduces control linkage wear. A flexible pump design, with single, tandem, and back-to-back versions available.

Applications: Agricultural, construction, lawn and turf, utility equipment.

Specifications: Model 70160 – Displacement (Max.): 23,6 cc (1.44 cid). Rated Pressure (Max.): 345 bar (5,000 psi) intermittent; 210 bar (3,000 psi) continuous. Rated Speed (Max.): 3,600 rpm.
Model 70360 – Displacement (Max.): 40,6 cc (2.48 cid). Rated Pressure (Max.): 345 bar (5,000 psi) intermittent. Rated Pressure: 210 bar (3,000 psi) continuous. Rated Speed (Max.): 3,600 rpm.

Hydrokraft Axial Piston Pumps

Closed circuit X/W series pumps are closed loop axial piston pumps. Rated 350 bar continuous, 420 bar peak with advanced control options and through-drive for all heavy duty industrial and mobile applications.

Hydrokraft TVX variable open circuit piston pumps: The TVX product line is available from 66 cc to 90 cc at pressures up to 350 bar.

Hydrokraft TVW variable open circuit piston pumps: The TVW product line is available from 130 cc to 750 cc at pressures up to 350 bar.

Applications: Heavy duty industrial and mobile equipment.

Specifications: Displacement: 66 cc to 750 cc. Rated Pressure: Up to 350 bar (5,000 psi); intermittent to 420 bar (6,000 psi). Rated Speed (Max.): 2,600–1,800 rpm.



Light Duty Hydrostatics



Light Duty Transaxles

The Model 751, 771, 781 and 851 Hydrostatic transaxles use time proven ball piston design for both pumps and motors. The model 751 and 851 use one ball piston pump and two ball piston motors to provide the speed and torque required to propel vehicles of many different sizes. The 771 is an assembly of one pump and one motor. The 781 is two units similar to the 771 joined together to make one assembly.

Applications: Lawn and turf tractors, utility vehicles and ZTR mowers.

Specifications: Output Speed (Max.): Model 751–110 rpm (3,600 rpm Input), Model 771–153 rpm (3,600 rpm Input), Model 778–121 rpm (3,600 rpm Input), Model 851–112 rpm (at 3,200 rpm input).

Medium Duty Axial Piston Servo Pumps

For ease of operation or electronic pump controls this product is the choice. A versatile, pump with many features and options. For example, five different charge pump displacements are available. A flexible design configured to meet your needs with many features and options.

Applications: Agricultural, construction, lawn and turf, utility equipment.

Specifications: Displacement (Max.): 49 cc (3.00 cid). Rated Pressure: 210 bar (3,000 psi) continuous. Pressure (Max.): 379 bar (5,500 psi) intermittent. Rated Speed (Max.): 3,600 rpm.



Medium Duty Hydrostatics



Eaton 350 Series

The 350 Series mobile pump is an advanced, closed circuit, servo controlled, axial piston design offered as a dual pump (two pumps in one housing) for medium duty hydrostatic circuits. The pumps offer the latest design in Eaton technologies for closed circuit piston pumps along with a wide variety of responsive controls. These controls include mechanically or electrically-actuated feedback controls, hydraulic or electronic proportional controls and a three position (Forward-Neutral-Reverse) electric control.

Applications: Agricultural, construction and utility equipment.

Specifications: Displacements: 49 cc (3.00 cid), 62 cc (3.8 cid). Rated Pressure: 380 bar (5,500 psi). Rated Pressure: 280 bar (4,000 psi) continuous.

Medium Duty Axial Piston Motors – Fixed and Variable

Match these motors up with the appropriate pump for a robust hydrostatic transmission. They offer opposite, same and rear port configurations with many optional spline and keyed shafts. Available with shuttle valve, back pressure valve for improved loop cooling and flushing. Also offer speed sensors and a through-shaft option for brake mounts. Variable motors are available with hydraulic destroke or servo control.

Applications: Agricultural, construction, lawn and turf, utility equipment.

Specifications: Displacements: 1.50, 1.80, 2.01, 2.48, 3.02 cu. in. Rated Pressure: 210 bar (3,000 psi) continuous. Pressure (Max.): 370 bar (5,400 psi) intermittent. Rated Speed (Max.): 3,600 rpm.



Transmissions



Light Duty Transmissions

The Model 6, 7 and 11 hydrostatic transmission consists of a variable displacement pump, a fixed radial ball piston hydraulic motor and a system of valves, all contained in one housing.

Applications: Lawn tractors (8-20 HP) and seeders, commercial mowers, golf course maintenance equipment, concrete saws, utility trucks, garden tractors and ZTR (zero-turn radius) mowers.

Specifications: Models 6 and 7 – Speed (Max.): Input 3,600 rpm, Output 2,150 rpm. Torque output: 14 Nm (120 lb-in) continuous; 20 Nm (180 lb-in) intermittent; 27 Nm (240 lb-in) peak.

Model 11 – Speed (Max.): Input 3,600 rpm, Output 0–1,950 rpm. Torque Output: 41 Nm (360 lb-in) continuous; 61 Nm (540 lb-in) intermittent; 81 Nm (720 lb-in) peak.

Medium Duty Transmissions

These transmissions combine a variable displacement piston pump and either a fixed displacement or variable displacement hydraulic motor.

Applications: Skid steer loaders, trenchers, golf course maintenance equipment, commercial mowers, pavers, compact wheel loaders, telehandlers, rough terrain fork lifts, aerial work platforms, windrowers, road rollers, boring machines and directional drills, crawlers, small sprayers, tub grinders, mini-backhoes, sweepers, special purpose vehicles.

Specifications: Displacement – Pumps: 20 cc's (1.24 cid) – 49 cc's (3.00 cid).

Displacement – Motors: 12 cc's (0.75 cid) – 82,6 cc's (5.04 cid).

Rated Pressure (Max.): 350 bar (5,000 psi). Input Rated Speed (Max.): 3,600 rpm.



Gear Products



GGP Pumps

Gear pumps made of floating bushing, pressure balanced design, with an extruded body in high strength aluminum alloy and endcover and flange in cast iron. The wide choice of shafts, flanges and ports, in compliance with all international standards (SAE, DIN and EUROPEAN).

Applications: Garden and utility tractors, backhoes, lift trucks, combines, road graders, fan drive systems, agriculture tractors and harvesters and industrial power units.

Specifications: Displacement: 0.8 in³/rev (1.3 cm³/rev)–2.04 in³/rev (33.4 cm³/rev). Rated Pressure: 280 bar (4,000 psi). Max. Pressure: Up to 305 bar (4,425 psi). Rated Speed (Max.): 4,000 rpm.

S26/L2 Pumps and S26 Motors

SAE A and B mount aluminum pumps with many shaft and porting options. Meets SAE and Metric standards. Single and multiple sections available. Optional integral relief and flow valves simplify system design and installation. Easy field reversibility.

SAE A Bi-directional gear motors made of a fixed bushing, pressure balanced die cast aluminum design. A rigid and compact structure that makes it possible to incorporate a number of functions in a limited space.

Applications: Garden and utility tractors, backhoes, combines, road graders, hay swathers, fan drive systems, vibratory machines and industrial power units.

Specifications: Displacement: 0.43 in³/rev (7 cc/rev)–1.94 in³/rev (31.8 cc). Rated Pressure (Max): 207 bar (3,000 psi). Rated Speed (Max.): 4,000 rpm.



Power Units



Power Units

The most complete line of industrial power units in the marketplace, including verticals, horizontal, L's, overheads, JIC and custom configurations. We offer one of the industry's leading ways to buy power units with the most flexible range of standard configurations. Eaton standard system products include simple power units, bar manifolds and pump/motor groups that are configurable with Eaton's Packaged Systems Configurator (PSC2.0). In addition to engineered standards, Eaton's Application and Commercial Engineering (ACE) Group can design, manage and help install custom power units for special applications. Eaton has a network of approved integrators specializing in different applications and requirements for Custom Systems. The network allows Eaton to provide the highest quality at minimal cost.

Applications: Civil projects, primary metals, metal forming, automotive, pulp and paper, wind power, entertainment and food and beverage.



Valves



Proportional Control Valves

Eaton's Vickers® proportional valves have both product breadth and width consisting of onboard electronics (OBE) and non-OBE, full functionality, complete sizes, different performance levels to meet various customer demands in Industrial and Mobile markets. The KB family of proportional valves have integrated OBE with superior reliability and durability featuring digital electronics, IP65/8L, IP67 environmental protection, reduced power consumption, valve enable and ramp adjustment.

Applications: Metal forming, plastic machinery, wind power, primary metals, plus more.

Specifications: Rated Flow: Up to 700 lpm (185 gpm). Rated Pressure: Up to 350 bar (5,000 psi). Function: Direction, pressure, flow. Size: NG6-32 (D03-10).

Flange Valves

Flange mounted valves are ruggedly designed for direct mounting to pump flange, which reduces potential leak resistance, improve shock resistance, reliability and life.

Applications: Industrial balers, die casting, steel mills, plus other industrial applications.

Specifications: Rated Flow: Up to 750 lpm (200 gpm). Rated Pressure: 350 bar (5,000 psi). Size: SAE 3/4" – 1-1/2".



Valves



Directional Control Valves

Eaton's Vickers® DG valves mount on industry standard surfaces and provide 3 or 4-way control in a broad range of applications, industrial and mobile. Their primary function is to direct fluid flow to a cylinder or to control the direction of rotation of a hydraulic motor. These valves can be actuated by solenoid, hydraulic or pneumatic pilot, lever, or mechanically. A full range of complementary pressure, flow and check valve functions are available in the Eaton SystemStak™ family of sandwich mounted valves. Eaton DG valves are available in 10 different frame sizes.

Applications: Multiple industrial applications.

Specifications: Rated Flow: Up to 1,100 lpm (290 gpm). Rated Pressure: Up to 350 bar (5,000 psi). Size: NG4-32 (D02-10).

Flow Controls – Adjustable

Temperature and pressure-compensated flow controls allow precise volumetric control. Suitable for pressures up to 3,600 psi, flow controls are available with (bypass type) or without (restrictor type) integral relief valves. Adjustable flow control valves are suited for applications requiring flow regulation without pressure compensation.

Applications: Multiple industrial applications.

Specifications: Rated Flow: Up to 106 lpm (28 gpm). Rated Pressure: Up to 250 bar (3,600 psi).



Valves



SystemStak™ Modular Valves

These compact hydraulic systems feature modular valves that are “sandwich” mounted between a directional control valve and a standard mounting surface. These valves provide a compact hydraulic circuit at a reduced cost, eliminating interconnecting piping. Each valve “stack” can be configured to provide the specific system functions.

Applications: Machine tool and multiple industrial applications.

Specifications: Rated Flow: Up to 340 lpm (90 gpm). Rated Pressure: Up to 315 bar (4,500 psi). Function: Relief, reducing, sequence, check, PO check, throttle, counterbalance. Size: NG4-25 (D02-08).

Pressure Control Valves

Pressure control valves perform pressure relieving, reducing, sequencing and unloading control. Both subplate and in-line mounting types are available with various control types including remote, multiple pressure and venting.

Applications: Multiple industrial applications.

Specifications: Rated Flow: Up to 680 lpm (180 gpm). Rated Pressure: Up to 350 bar (5,000 psi).



Valves



Servo Valves

These two-stage, four-way, flap-per nozzle valves provide system closed loop control with exact positional accuracy, repeatable velocity and predictable force (torque regulation).

Compared to Vickers® SM4 servo valves, the SX4 offers extended frequency response for more demanding close loop applications. Eaton also offers a servo trade up program with incentives for replacing competitors valves.

Applications: Test and simulation equipment, plastic blow molding, sawmills and other industrial applications.

Specifications: Rated Flow: Up to 151 lpm (40 gpm). Rated Pressure: Up to 350 bar (5,000 psi). Function: Positioning, speed and pressure control. Size: SM4/10-40; SX4/20

Slip-in Cartridge Valves

Typically associated with relatively high flows, i.e., 40 gpm (150 lpm) or higher, slip-in cartridge valves are targeted at more efficient, faster and more compact hydraulic systems. Eaton’s cartridge valve system technology meets the changing needs of new generations of hydraulically operated machinery and equipment. Today’s machines need controls that are exceptionally cost effective and energy efficient. Vickers® cartridge valves fulfill these needs.

Applications: Metal forming, plastics machinery, primary metal, die casting machine.

Specifications: Rated Flow: 75 lpm (20 gpm). Rated Pressure: 240 bar (3,500 psi).



Valves



Ultrronics® Valve System – Twin Spool

The Ultrronics® ZTS16’s open architecture and patented twin spool design enables exciting new functionality and advanced control options for many applications and end-users. The valve features a J1939 or CANOpen CAN interface which allows system developers to apply a complete Eaton control system or simply a standalone valve. Each valve section has twin independent metering for system functionality, flow and pressure control. Open architecture allows users to develop their own application level programs using Eaton’s Control F(x)™ software and EFX controllers, or their own controller and associated software.

Applications: Mini-excavator, forestry, backhoe loaders, telehandlers, utility vehicles, cranes.

Specifications: Work Section Flow: 130 lpm (34 gpm). Rated Pressure (NFPA): 300 bar (4,350 psi).



Valves



Screw-in Cartridge Valves

For over seventy years the Vickers® brand has been providing customers with quality products and innovative solutions for all of their power and motion control needs with the very best in screw-in cartridge valve technology. Eaton is committed to maintaining this position by offering the most comprehensive range of cartridge valves for on/off high-way and stationary equipment.

Applications: Harvesters, refuse haulers, mobile and industrial applications.

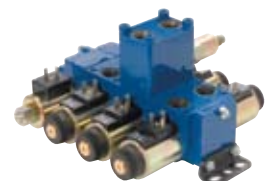
Specifications: Rated Flow: Up to 560 lpm (150 gpm). Rated Pressure: Up to 420 bar (6,000 psi).

MDG Mobile Valves

The Eaton MDG mobile directional control valve is a versatile and modular design based upon the proven, industry-leading Vickers® DG design. The MDG valve design is a closed center, parallel or series circuit that can also function as an open center circuit through the use of unloading inlet options. The MDG valve offers versatility and flexibility in system applications through a sectional design, allowing the use of up to six sections per bank assembly. The MDG valve can be configured to create custom, multi-functional circuits through the use of optional banking functions such as inlet and work port options.

Applications: Skid steer, excavators, tractors, harvesters, transit mixers, telehandlers.

Specifications: Rated Flow: 60 lpm (15.8 gpm), on/off 20 lpm (5.3 gpm). Rated Pressure: 350 bar (5,000 psi) proportional.



Valves



Monoblocks – 5 and 15 gpm

Excellent monoblock design results in fewer leakage paths. Hardened and plated spools provide superior impact and corrosion resistance. Two-point mounting prevents spool binding.

Applications: Trenchers, sweepers/scrubbers, stand-up lift trucks, aerial work platforms, small ag loaders, garden tractors, golf course maintenance equipment and highway mowers.

Specifications: Rated Flow: 19 and 56 lpm (5 and 15 gpm). Rated Pressure: 172-207 bar (2,500-3,000 psi).

Self-Leveling Valves

These linear flow divider valves are used on skid steer or agricultural loaders, for automatic leveling of bucket or attachments. Available in single directions (raise only) or dual direction.

Applications: Skid steers, front end loaders.

Specifications: Rated Flow: Up to 75 lpm (20 gpm). Rated Pressure: 240 bar (3,500 psi).



Valves



CMX Sectional Valves

CMX sectional valves provide hydraulic or electrical actuation, allowing generous flexibility for location and installation in a vehicle. Phasing between meter-out and meter-in can be pre-selected to easily match valve metering to type of load and cylinder area ratio and permit lowering without using pump flow. Pressure compensated meter-in provides good metering when two or more functions are operated simultaneously and permits priority to be accomplished in pilot circuit.

Applications: Forestry equipment, wheel loaders, rough terrain lift trucks and boom man lifts.

Specifications: Rated Flow: 98 and 159 lpm (26 and 42 gpm). Rated Pressure: Up to 350 bar (5,075 psi) depending on port configuration.

Flow Divider Valves

Eaton's flow dividers are available in priority, proportional, variable and load sensing versions with a wide range of standard flow ratings and relief settings. Eaton load sensing priority valves provide dependable flow on demand for load sensing steering, braking or other priority functions while allowing excess flow to be used for auxiliary functions.

Applications: Tractors, motor graders, lift trucks, and backhoe/loaders.

Specifications: Priority Flow Rate: 96 lpm (25 gpm), Rated Pressure: 172 bar (2,500 psi); Proportional 113 lpm (30 gpm), 172 bar (2,500 psi); Variable Priority: 76 lpm (20 gpm), 172 bar (2,500 psi); Priority: 175 lpm (45 gpm), 195 bar (2,800 psi); Load Sensing Priority Valve: 240 lpm (63 gpm), 297 bar (4,300 psi).



Cylinders



Heavy Duty Welded

Eaton's Vickers® and Hydro-Line® W-Series heavy duty welded cylinders are industrial grade products for the toughest applications. This robust product line has been designed to ensure the longest duty life and features an innovative sealing system design that eliminates leakage.

Applications: Huge range of applications including machine tools, balers, trash compactors, stationary material handling, and other general machinery.

Specifications: Rated Pressure: Up to 207 bar (3,000 psi) for Hydraulic; 17 bar (250 psi) for Pneumatic standard products (higher capability in custom cylinders). Available standard sizes: 102-305 mm (4-12") bore, to 7,620 mm (300") stroke, custom cylinders available.

Threaded

Eaton's Vickers® and Hydro-Line® T-Series threaded cylinders have been designed to provide robust capability in a compact envelope. These cylinders, ranging in size from 3/4" (20 mm) to 8" (200 mm) bore and to 180" (4.5M) stroke lengths, are sold to markets like waste processing and material handling.

Applications: Huge range of applications including machine tools, balers, trash compactors, stationary material handling, and other general machinery plus more.

Specifications: Rated Pressure: Up to 70 bar (1,000 psi) for Hydraulic and 17 bar (250 psi) for Pneumatic standard products (higher capability in custom cylinders). Available standard sizes: 19-203 mm (3/4-8") bore, to 4,572 mm (180") stroke, custom cylinders available.



Cylinders



Mill (Flanged)

Eaton's Vickers® and Hydro-Line® M-Series mill duty cylinders are designed to meet the tough demands of primary metals customers. These cylinders, ranging in size from 2" (50 mm) – 16" (400 mm) bore and to 300" (8m) stroke, are sold into arc furnaces, slab casters, rolling mills, and coating lines. Our robust product design is more than tough enough to last in these demanding applications.

Applications: Primary focus is steel mill and other primary metals/heavy industry applications.

Specifications: Rated Pressure: Up to 207 bar (3,000 psi) for Hydraulic and 17 bar (250 psi) for Pneumatic standard products (higher capability in custom cylinders). Available standard sizes: 51-406 mm (2-16") bore, to 7,620 mm (300") stroke, custom cylinders available.

Tie Rod

Eaton's Vickers® and Hydro-Line® G, N, I, and L-Series are a broad range of NFPA and ISO hydraulic, pneumatic, and electrohydraulic cylinders focused on industrial markets. This comprehensive line features a proven design coupled with the Eaton SureSeal™ system for improved performance and better service-ability. This line offers virtually unlimited options.

Applications: Presses, plastic blow and injection molding equipment, machine tools, packaging and material handling equipment, and food processing plus more.

Specifications: Rated Pressure: Up to 207 bar (3,000 psi) for Hydraulic and 17 bar (250 psi) for Pneumatic standard products (higher capability in custom cylinders). Available standard sizes: 19-763 mm (3/4-30") bore, to 7,620 mm (300") stroke.



Cylinders



Custom

From very small to extra-large scale (Hydrowa® XL-Series), Eaton offers the broadest range in the industry of custom cylinders. World-class base designs, advanced technology capability in coatings and seal systems, best-in-class simulation/modeling tools and processes, and decades of broad application expertise serve as the foundation for the custom cylinder business.

Applications: Huge range of applications varying from plastic molding equipment, presses, machine tools, primary metals, packaging and material handling, food processing, offshore, civil engineering and marine.

Specifications: Rated Pressure: Up to 690 bar (10,000 psi) for Hydraulic and 17 bar (250 psi) for Pneumatic products. Available sizes: to 1,200 mm (47") bore, to 22,000 mm (866") stroke.



Hose and Fittings



High Pressure Spiral Hose and Fittings

Eaton offers a wide variety of spiral hose constructions for all types of applications. These 4 and 6-wire hoses are well suited for a vast array of both industrial-stationary and on-off highway mobile applications. Our Spiral hoses are designed to meet the most demanding applications providing maximum durability and long-lasting performance.

Applications: Hydrostatic drives, oil rigs, construction equipment, mobile and industrial systems.

Specifications: Available in a broad range of cover materials and sizes that work in a variety of applications. Our hoses meet or exceed EN/DIN, Mil-spec and SAE specifications.

Medium Pressure Braided Hose and Fittings

Medium pressure braided hose and fittings represent the largest market and widest variety of hydraulic applications.

Applications: General hydraulic systems, mobile equipment, industrial equipment.

Specifications: A range of hose styles and sizes that meet a variety of EN/DIN, Mil-spec and SAE specifications. Certifications include ABS, DNV, MSHA, DOT/FMVSS and many more.



Hose and Fittings



Low Pressure Hose

Choose from a full range of low pressure hose including high-temperature AQP, abrasion resistant covers for demanding service life and color covered hose for installation identification. Use with Eaton's "Socketless hose fittings".

Applications: Size Range: 1/4" I.D. through 3/4" I.D. (Not recommended for hydraulic impulse applications). Ranging from low pressure machine tools, fuel, oil, air and water.

Thermoplastic

The versatility of thermoplastic and the experience of Synflex® combine to offer the best hoses for hydraulic, truck, sub-sea and specialty applications.

Applications: Off-shore oil and gas drilling, forklifts and agricultural equipment.

Specifications: Hose with I.D.'s that range from 1/8" thru 1". Rated Pressure: Up to 690 bar (10,000 psi).



Specialty Hose and Fitting Products



Industrial Hose

From low pressure air and water to hazardous chemical transfer, Eaton offers a variety of hoses to meet the exact needs of an application. These products range from 1/4" to 8" I.D. in size and many are available in either spiral or braided construction.

Applications: Air, water, cleaning, material handling, food, chemical, petroleum, steam hoses and specialty service.

Specifications: RMA Class A tube and cover materials, MSHA approved covers, FDA approved and NSF-51 certified food and beverage products.

Teflon® Hose

Teflon® hose for very high temperature applications as well as low temperature where a broad range of chemical resistance, low coefficient of friction, flexibility and non-aging is required. A broad range of hose and matched fittings are available for use in a wide variety of applications.

Applications: Truck, chemical, hot melt, paper and pulp, hot presses, steam, packaging, paint and machinery.

Specifications: Meet SAE 100R14A and B specifications. Rated Pressure: Up to 350 bar (5,000 psi).

Teflon® is a registered trademark of DuPont.



Specialty Hose and Fitting Products



A/C and Transportation Products

Engineered components and assemblies for a wide range of A/C and refrigeration systems. Hose materials range from barrier to nylon veneer. Hoses such as GH134 "Refresh" offering the lowest permeation for a multi-refrigerant hose, to reduce greenhouse emissions.

Applications: Hose and fittings for air conditioning and refrigeration. Truck, bus, agriculture and construction.

Specifications: Products are tested to SAE J2064.

Performance Products

High performing hose, fittings and adapters for motorsport enthusiasts and professionals around the world. Aeroquip® Performance Products...There is a difference!

Applications: Fuel, A/C, lube, oil, coolant, gauge, air tools and brake lines.

Specifications: Engineers and manufactures its own hose and fittings. State-of-the-art testing capabilities and ISO 9001 and QS 9000 quality certified facilities are Eaton hallmarks.



Specialty Hose and Fitting Products



Marine/Military

Wide variety of hose, fittings and adapters that meet many marine, military and government specifications. Aeroquip Marine/Military...there is no equal!

Applications: Hydraulics.

Specifications: A detailed catalog specifically listing the Mil Spec part numbers is available for the customer's use.

Quick Disconnect Couplings

A broad range of products encompassing the simple, air couplings, to the complex, hydraulic applications, to the most complex, self contained breathing apparatuses (SCBA).

Applications: Hydraulic attachments, SCBA.

Specifications: Full range of pneumatic, hydraulic, fluid transfer and DOT fittings. Couplings meet a variety of SAE and ISO specifications.



Specialty Hose and Fitting Products



Adapters and Tube Fittings

Offering a variety of standard and non-standard configurations to meet every need. Available in steel, brass and stainless steel. Tube fittings are designed for both inch and metric tubing. Numerous end-styles are available – ISO, SAE, BSP, DIN and NPT to name a few popular standards.

Applications: In-plant industrial equipment, mobile on/off highway equipment and general hydraulic system use.

Specifications: Sizes: 4 mm to 42 mm and 1/8" to 2". Additional sizes available upon request. SAE J512, J513, J518, J1926, J1453, DIN 2353, ISO 8434, ISO 6162 and others.

Metric Tube Fittings

Walterscheid™ tube fittings are available in a multiple of sizes and configurations. Eaton's Walterscheid tube fitting systems consist of the following:

- WALPro®
- WALForm®
- WALRing
- Flared
- Flared Flange

Across the globe, Eaton's Walterscheid tube fitting systems offer superior performance, as well as lower assembly and operating costs.

Applications: In-plant industrial equipment, mobile on/off highway equipment and general hydraulic system use.

Specifications: Sizes: 4 mm to 42 mm. Additional sizes available upon request. ISO 8434-1/DIN 2353/ISO 6162, DIN 3949, DIN 912 and others.



Specialty Hose and Fitting Products



STC®

The broadest range of threadless connectors in the industry! Eaton patented technology has been extremely successful in various rigorous mobile applications.

Applications: Truck/bus platforms and construction/agricultural equipment.

Specifications: Connections are offered in 3/8" up to 1". Rated Pressure: Up to 345 bar (5,000 psi).

STC® EZ-Torque

Eaton's STC® EZ-Torque is the solution to simplifying your fluid conveyance connections. STC EZ-Torque eliminates the need for port adapters while minimizing operator-dependent leak paths. This next generation connector also reduces hose installation time with a simple "push and torque" assembly feature. STC EZ-Torque opens opportunities for both mobile and stationary applications.

STC EZ-Torque will be available for connection with SAE, Metric and BSP ports in sizes -6 to -16.

Applications: General hydraulic systems, mobile equipment, industrial equipment.

Specifications: A variety of connections are offered in 3/8" up to 1".



Specialty Hose and Fitting Products



Swivels

Offering compact and robust designs while offering a wide variety of end configurations with the flexibility to perform in many dynamic hydraulic applications.

Applications: Hose reels, scissor lifts.

Specifications: Can be used in a full range of pneumatic, hydraulic and fluid transfer applications.

Quick-Connect Air Brake™

Leave air leaks behind with Eaton's 217 series, composite Quick-Connect Air Brake (Q-CAB) fittings. To reduce vehicle weight, many OEM's are replacing all brass-air connections with a combination brass and composite design.

Even though lighter, the Eaton® composite Q-CAB fittings, meet and exceed all of the industry requirements called out in D.O.T.

Applications: Medium and heavy duty truck, bus and mobile off-highway, and air brake systems.

Specifications: FMVSS 571.106-106, SAE J1131 and SAE J2494-3. A full line of brass Q-CAB is also available.



Specialty Hose and Fitting Products



E-Z Clip™ – Field Assembly

Eaton's patented E-Z Clip connector system, used with GH134 and GH134W hose, offers our customers the best value in assemblies for A/C and refrigeration systems, in the most demanding applications. In addition, the E-Z Clip system is qualified with a wide variety of refrigerants. Trust Eaton experience, with more than 4 Million E-Z Clip connections already used.

Applications: This connection is common to air conditioning systems, both in vehicle and commercial applications.

Specifications: E-Z Clip exceeds the performance requirements of SAE J2064.

Portable Crimp

Make factory-type hose assemblies anywhere-anytime! Versatile and portable, the portable crimp machines offer the ease of use you are looking for in a Coll-O-Crimp® hose assembly system. The Coll-O-Crimp press packages are offered with a multitude of options. Press/power unit packages are also available.

Applications: Ease of portability allows transporting the machine to the mobile applications.

Specifications: Size: 12-1/2" high, 8-1/2" wide, 5-1/2" deep. Capacity: 3/16" I.D. 1 fiber braid through 1-3/8" I.D. 2 wire hose.



Specialty Hose and Fitting Products



Production Crimp

A wide variety of crimp machines are available for every requirement (low and high volume hose assembly), for both distributors and OEMs. Select from a complete line of popular crimp machines.

Applications: Crimp machines for virtually any area of the shop.

Specifications: Ability to crimp hose of all sizes (1/8" up to 1-1/4").



Accessories



Accessories

Eaton offers a world-class range of clamps, protective sleeves and hose cleaning services that are compatible with hose and metal products of all sizes.

Applications: Wide range of applications and markets, such as: construction, forestry, lift trucks, utility vehicles, agriculture, truck and bus.

Specifications: Able to be used with all sizes of hose and metal products.

Bundling Sleeves

Eaton's bundling sleeve is designed to protect hydraulic hoses from abrasion and still allows enough flexibility for normal operation. The sleeves can be easily installed and removed to allow easy access to the individual hoses for repair.

The bundling sleeve increases productivity in assembly and reassembly of hose bundles. Save time and money on field repairs by replacing inefficient bundling methods and line damaging cable ties.

Applications: Case IH Patriot Sprayer SPX 4260 uses bundling sleeves to protect hydraulic and brake hoses. Champion Road Machinery Sales uses bundling sleeves to protect hydraulic lines. Rosco Manufacturing Company uses bundling sleeves on Model RA-200 Pothole Filler.

Specifications: 1,050 Ballistic Nylon, 0.71 mm thickness. Ambient Operating Temperature Range: 175° F.



Filtration



Filtration Products

Desired hydraulic system cleanliness can be achieved by incorporating Eaton's "Systemic Contamination Control" process. This process is based on proper selection of Eaton filters to meet the targeted cleanliness level and periodic sampling of fluid cleanliness to ensure compliance to the target. Eaton offers a full range of Vickers® hydraulic filters for industrial and mobile applications with flows to 1,700 lpm (450 gpm) and pressures to 420 bar (6,000 psi).

High-Performance Hydraulic Fluid

Why trust the lifeblood of your hydraulic systems to anything less than the best? Protect your investment in equipment and machinery with Eaton's high-performance hydraulic fluid. This specially-formulated hydraulic fluid offers advanced oxidative, thermal and hydrolytic stability to yield peak operating performance from today's high-speed, high-temperature and high-pressure systems — and that means uptime.

This proprietary fluid is also designed to maximize the long-term return on your investment. The formulation will provide extended service-life intervals compared to standard hydraulic fluids, thereby reducing preventive maintenance costs over the life of the equipment. And with its superior anti-wear properties, it extends the operating life and potential resale value of your equipment.



Filtration



Target Pro®

Eaton's® Target-Pro 2 Portable Particle Counter gives you laboratory quality particle count results in the field. It combines state-of-the-art laser particle counting technology with a user-friendly interface and compact size. It allows you to monitor the fluid cleanliness of hydraulic and lubrication systems and take action if necessary.

Target-Pro 2 software for Windows®, included with the analyzer, allows you to download test results and analyze cleanliness trends over time.

Windows® is a registered trademark of Microsoft® Corporation

Accumulators

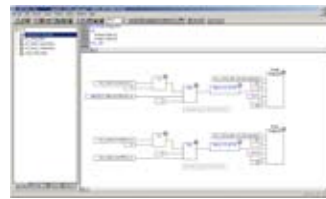
Eaton offers bladder, piston and diaphragm-type accumulators in a wide range of sizes, bladder materials, port configurations and pressure ratings to provide optimum design flexibility. Eaton also offers a complete line of accessories needed for proper installation and maintenance, including safety shut-off blocks, clamps, repair kits and charging and gauging units.

Applications: Energy storage, pulsation dampening, surge control, shock absorption.

Specifications: From 1 to 54 liters (1 US qt. to 15 US gal.)
Rated Pressures: 210 bar (3,000 psi) and 345 bar (5,000 psi)



Electronics and Software



CONTROL F(x)® Programming Software

Eaton CONTROL F(x) software allows you to develop programs for controlling electro-hydraulic components and systems. Eaton provides control function libraries based on the IEC 61131-3 standard that reduce application development time. With the CONTROL F(x) graphical interface, you can create, debug, and monitor the control logic. This gives customers a reliable system that can be rapidly developed, tested, implemented and maintained.

Applications: Excavators, forestry, telehandlers, utility vehicles, cranes, ag machinery and paving.

Specifications: A Windows-based software development environment with function libraries for electronic and electro-hydraulic components and systems. Six different programming languages. Full debugging and visualization capabilities.

VFX Display Controllers and LCD's

Eaton's VFX controllers provide an operator interface solution for electro-hydraulic systems. The VFX 1000 controller is used for dedicated display control, while the VFX 2000 also provides digital IO for additional controls. The VFX controllers are built for the harsh mobile and industrial application environment and are programmed and configured using the intuitive CONTROL F(x) programming software. There are two LCD display options available for use in conjunction with the VFX controllers.

Applications: Excavators, forestry, telehandlers, utility vehicles, cranes, ag machinery, and paving.

Specifications: VFX 1000 and 2000 are used for electronic display control and networked via CAN into electro-hydraulic systems. The VFX 2000 provides an additional 50 digital IO. Two LCD displays, 6.5 in and 10.4 in, used in conjunction with either of the VFX controllers.



Electronics and Software



EFX Electronic Controllers and IO Modules

Eaton EFX electronic controllers and IO modules provide a full range of electronic control solutions. With an array of controller options and IO modules, an EFX system can be created to address any application need. All EFX products are IP67 rated and are built for the harsh mobile and industrial application environment. The EFX line is programmed and configured using the intuitive CONTROL F(x) programming software.

Applications: Excavators, forestry, telehandlers, utility vehicles, cranes, ag machinery, and paving.

Specifications: 4 different EFX controllers and 3 IO expansion modules provide analog, digital, and frequency inputs as well as digital, PWM, and current-controlled outputs. Each EFX controller has both CANopen and J1939 interfaces.

SFX High Performance Controllers

The SFX 2000 high performance controller is designed to address applications where control loop times are critical. Whether it's a precise closed-loop control or a safety-critical application, the SFX 2000 controller is built to address the demands of complex applications. The SFX 2000 controller is built for the harsh mobile and industrial application environment and is programmed and configured using the intuitive CONTROL F(x) programming software.

Applications: Excavators, forestry, telehandlers, utility vehicles, cranes, ag machinery, and paving.

Specifications: The SFX 2000 has 69 total IO for analog, digital, and frequency inputs, and digital, PWM, and analog outputs. It also contains a 32 bit processor, two CAN ports and a Time-Triggered Protocol controller for safety-critical applications.



System Solutions



Electronic Transmission Automotive Control (ETAC)

Electronic Transmission Automotive Control (ETAC) systems provide many cost and operating benefits. Within the ETAC system, the electronic controller is integrated with the engine throttle management system, as well as a closed circuit pump. It drives high performance proportional valves and uses electronic swash-plate feedback to provide precise, dynamic system control.

Automotive style control of a hydrostatic drive allows large vehicles to be operated in a way similar to a standard automobile with an automotive transmission. A single throttle pedal controls the engine and transmission, giving output speed and torque as needed for vehicle operating systems.

Applications: Lift trucks, telehandlers, railway maintenance equipment, utility vehicles, and compact wheel loaders.

System Solutions



Hydraulic Launch Assist™ (HLA® System)

High-Power, High-Value Hydraulic Hybrid™

Ideally suited for refuse and other applications that require repeated starts and stops and frequent engine-off power-take-off (ePTO) operations at the worksite.

Some highlights include: Fuel Economy Improvement: 25%, Launch Improvement: 0-30 mph in 30% less time. Emission Reductions: 20% CO₂, 17% NO_x, Brake Energy Savings: 96%.

Specifications: Mass of HLA System: 1,000 lb. Pressure (Max.): 350 bar (5,000 psi). Active Rated Speed: Up to 25 mph. Torque: 1,000 ft-lbs. Total System Oil Volume: 79 liters (21 US gal.).

System Solutions



Fan Drive Solutions

The Electro-hydraulics (EH) Fan Drive System cools your engine and vehicle sub-systems by controlling a hydraulic pump and motor with a digitally programmable controller. Benefits include: Flexible installation for optimum fan location, elimination of belt maintenance, more accurate control of charge air temperature which can help reduce engine emissions, improved fuel economy, increased power output and a choice of variable or fixed-displacement systems.

Applications: On-highway vehicles such as buses and recreational vehicles, Construction machinery such as excavators, loaders, cranes and forklifts and Agriculture machinery such as tractors and forest machinery.

System Solutions



Steering Solutions

Eaton's complete steering system solutions including Char-Lynn® steering control units, priority valves, and Eaton® Gear or Piston pumps to provide completely fluid-linked power steering for off-highway vehicles. As innovators of gerotor power steering, Eaton features patented technologies such as Q-Amp™, Wide Angle, and VersaSteer™. Eaton's innovative Balanced Architecture and progressive valve design deliver low pressure drop for fuel efficiency.

Specifications: Displacements: 59 cc to 3030 cc (2 in³/rev to 185 in³/rev); Flow range: 6 lpm to 227 lpm (2 GPM to 60 GPM),

Applications: Off-highway and marine vehicles including; lawn and garden, ag tractors and combines, construction, forestry and mining equipment, lift trucks, front end loaders, and large speedboats and yachts.

World-Class Brands. Worldwide Presence.



Eaton Services

Authentic Remanufactured Products

You choose Eaton brand products because you want your customers to experience the quality, reliability, and performance that have made them the industry's benchmarks for more than 80 years. When those products reach the end of their useful life, it makes sense to repair or replace them with parts and components that deliver the same level of quality, reliability, and performance.

That's why you should insist on authentic Eaton remanufactured parts from Eaton and nothing else. They are the only replacements guaranteed to meet the same exacting standards found in original Eaton medium and heavy-duty pumps and motors



and Vickers vane cartridge kits, piston units, and rotating groups. Authentic Eaton Remanufactured products are produced in a dedicated facility in Memphis, Tennessee, a location chosen for its easy access to one of



the world's largest overnight shipping networks. There, experienced technicians remanufacture Eaton and Vickers products to match original tolerances and quality specifications. The facility is ISO 9001-2000 certified, and the entire remanufacturing operation is focused on meeting your needs for both quality and rapid response.

Fluid Analysis

70 – 90% of all hydraulic system failures are directly attributable to fluid contamination, and the Vickers Fluid Analysis Service is a great resource to help you avoid contamination failures.



Eaton's Fluid Analysis Laboratories provide on-demand testing and diagnosis of fluids and lubricants to customers worldwide.

Including an exclusive Fluid Analysis Kit developed by Eaton, the process follows simple step-by-step instructions to fill the ultra-clean container provided in the kit with hydraulic oil from your machine and send it to one of the Eaton labs. Highly-trained technicians analyze the sample using labora-

tory-grade diagnostic equipment and sophisticated computer programs to determine the health of the hydraulic system.

Within 24 hours of receipt by the lab, you will receive a detailed report including photos of the contaminants in an easily understood format, plus tips on improving and maintaining the health of the fluid. The tests performed include: particle count, viscosity, water content,

photomicrography, spectrometric analysis and energy dispersive x-ray fluorescence.

For additional information on Vickers Fluid Analysis Service, or fluid analysis kits, contact an Eaton distributor near you or go to www.eaton.com/hydraulics/fluid_analysis

Cylinder Repair

There's a reason why Eaton is one of the largest industrial cylinder manufacturers in the world ... we have unmatched quality, manufacturing capability, and application experience.

These core competencies are exactly why cylinders repaired by Eaton can give you greater assurance in performance, reliability, and overall lifetime of your cylinder. Even in the world's most rigorous applications.



Application and Engineering Expertise

We understand what it takes to do everything from standard, fast repair to turn-key projects with maintenance down-times. Eaton uses world class simulation tools, comprehensive 3D drawing capability, and finite element analysis expertise for failure mode determination, prediction of future failure analysis, and recommendation of general product improvements for optimum performance and reliability.

Decades of application experience coupled with these cutting edge tools translates to better recommendations and ultimately, better repairs.

Systems and Processes

Quality is an area that we excel in, and it is demonstrated every day in the new cylinders we manufacture. Besides the facility ISO certifications, we provide comprehensive quality reviews and customer reporting documentation. We've set the industry standard in detailed inspection reports, documentation logs, and customer communication processes which can save you a lot of time and money.



Old



Repaired

Eaton Services

Application and Commercial Engineering (ACE)

World-class products and systems need world-class design and engineering support, which is exactly what the Eaton Application and Commercial Engineering (ACE) teams deliver.

Working with your engineers and designers, an ACE team augments the technical capabilities of Eaton's distribution and OEM partners to provide assistance in:

- Product selection for complex applications

- System architecture definition and design
- Prototype technical support
- New product launches
- Development of application aids and education

Recognizing the unique needs of our customers and applications, the ACE teams are specialized by:

- The ACE Industrial team specializes in the automotive, primary metals, metal form-

ing, civil, and marine/off-shore sectors as well as electro-hydraulics and project-based power unit solutions.

- The ACE Mobile team focuses on off-road mobile applications with additional technical expertise in hydrostatics, work circuits, fan drives, steering and electro-hydraulics.

For more information on how to put an ACE team to work meeting your challenges, contact your Eaton sales representative.



Eaton's Hydraulics Training Services

At Eaton, we don't just talk about training, we deliver. With over 30 technical and product courses, we also offer numerous training aids including manuals, multimedia, and hands-on equipment. The investment made in training today can pay off with significant results for the future.



Experience

For over 60 years, with a combined 140 years in fluid power

and education experience, our instructors have made Eaton's Hydraulics Training Services the educational standard for the industry. We are the first choice of many customers for their fluid power training needs.

Eaton's Hydraulics Training Services offers both product and technology courses that cover a wide array of fluid power related topics. Our courses suit the needs of anyone involved in the industry, from newcomers to application specialists.

Improve Productivity

Whether for hydraulic repair personnel, supervisors, engineers, sales or purchasing, Eaton's Hydraulics Training will solidify hydraulic knowledge and aid increased job performance. Our technical training instructors are Fluid Power Society

Certified, Fluid Power Specialists and Fluid Power Accredited Instructors, ensuring a consistent and high quality experience for our students.

Facilities

Located in Maumee, Ohio (Toledo area) is our state-of-the-art training facility. The 18,000 square foot facility can accommodate all training offerings. Along with the Eaton training facility in Eden Prairie, Minnesota, both sites are fully equipped to serve training classes.

Customized On-site Training

Eaton's Hydraulics Training Services offers specialized, custom-tailored training at one of our facilities or your location. We provide simulators, cut-aways, take-aparts and other training materials that may be required. On-site training is quoted individually and based on the number of

course days, lab exercises and number of students.

Contact Information

Call us at 800-413-8809 to obtain additional information or a quote.

hydraulicstraining@eaton.com

Register for courses or order training products on-line at: www.eatonhydraulics.com/training



Field Services

Application of Eaton products, even by well trained users can sometimes result in unexpected and unplanned results, or system performance. On these occasions, Eaton's highly experienced Field Service staff is available for onsite support and system problem resolution.



Field Service provides onsite support, which can include:

- System Start Up
 - PID Loop tuning
 - Hydraulic pump set up
- Machine or System Diagnostics
 - Optimize circuit performance
 - Shock and pressure spike reduction or elimination
 - Address repeated component failure
- Prototype and new application
 - Full evaluation of Eaton product in a new system or application

- Utilization of the most up-to-date instrumentation equipment
 - Up to ten channels of high speed data acquisition
 - Monitor pressure, flow, temperature, current, and voltage
 - PC based data capture, transferable for Engineering analysis
- System maintenance and other consulting services

Eaton Hydraulics Field Service Technicians have vast product and application experience, with a history of solving the most complex system problems.

Field Service is a one stop support on all hydraulic and electrohydraulic product issues. As part of Technical Services organization that includes the ACE group, Field Service works directly with the ACE and Product Engineers to get, or keep, a hydraulic based machine or system running.

Contact your Eaton sales representative to discuss how you can best utilize Eaton Hydraulics Field Service staff with your system and application requirements.



Powering Business Worldwide

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