

Dear Valued Customer,

January, 2017

Subject: OILGEAR OFFERINGS for D150 PUMPS, PVV540 Conversion Packages, and Integration services for YOUR EQUIPMENT.

Executive Summary:

The objective of this document is to present and explain all alternatives for Oilgear D Pump users. Our D Pump program offers wide flexibility to meet our customer's needs, whether focused on a short-term, mid-term, or long-term solution.

Our D Pump program includes supply of complete new D pumps, repair of D Pumps, D Pump exchange-repair, and conversion to Oilgear's PVV pumps. These services are provided by Oilgear and through our partners.

Our D Pump program takes into consideration the integration on your particular machine of C pumps, D pumps and PVV replacement kits. Oilgear experts at your site will review installation, mounting, and electronic control interfaces.

Oilgear PVV replacement kits offer a short ROI due to significant cost reduction. PVV pumps also offer immediate performance improvements due to higher efficiency and more flow. In addition, PVV pumps are suitable for upgrading to Oilgear's Power On Demand (POD) solutions.

→ *A complete offering from Oilgear with multiple alternatives for your long term operations and management of heavy duty piston pumps. Solutions are based on proven, comprehensive, modern technology. Industry experts, working within a standard program process, will supply engineering and equipment to support your machine's efficient and economical operation.*

Note: The Standard Offering Process also applies to vintage Oilgear prefill valves, electronic interfaces, PVL pump, and PVK pump upgrades.

Introduction:

After completing the transfer of Oilgear's **Industrial Aftermarket Segment** to Traverse City (Michigan) and achieving full production, and in coordination with our **Oilgear Industrial Systems Group** located in Milwaukee/New Berlin (Wisconsin), we are pleased to formally restate Oilgear's offerings for your short term, middle term, and long term needs. Our offerings continue to feature Oilgear's durability and focus on Performance Achievement.

Your Oilgear experts (Sales and Engineering) are, of course, at your disposal and will contact you after your receipt of this Oilgear offering in order to provide further information and answer any questions you may have. Our valued Oilgear distribution partners will also be available for support.

Summary:

For nearly a century, Oilgear has been delivering innovative, large piston pumps for the Industrial market. Chronologically, these were the **D pump** (first industrial variable delivery unit, one way or two way, radial piston), then the **PVL pump**, **PVK pump** (Axial piston, up to 5000PSI) and finally the **PVV pump**. The **PVV pump** is the current, modern offering. It is available in displacements from 200cc/rev to 540cc/rev, in four sizes, with rated continuous pressure up to 6500 PSI.

All of these pumps were most commonly servo controlled in industrial applications, with various mechanical mounting arrangements and electrical interfaces:

- Oilgear is proud to serve all of these units (Ds, PVLs, PVKs and PVVs) for our Customer's benefit, including solutions to upgrade your equipment to arrive at the latest and most price competitive PVV range.
- The required Integration engineering support, specific to YOUR equipment, has not been forgotten and is part of this Standard Offering.
- This Standard Offering and associated technical annexes describes all the possibilities and support for your business success.
- The Standard Offering described below is very flexible in terms of implementation, from a simple repair to a complete pump rebuild, or conversion to a modern PVV pump. This gives YOU the opportunity to decide and manage the solution that works best for YOU.

A) **The D pump offering:**

Our Traverse City (Michigan) Industrial aftermarket operation will be pleased to receive, inspect, quote, **Repair**, test and return to you any D150 and larger pump.

We will repair Your pump with **genuine, original manufacturer parts**. (Warning: Oilgear continues to hear reports from end users of problems and issues with pumps repaired by unauthorized local repair shops who improperly repair and assemble our products, usually with non-OEM parts.) Oilgear does not authorize the repair of D pumps by any other business. Only Oilgear can offer OEM parts, a factory overhaul, and a full Oilgear repair warranty.

You want a **NEW D pump**? Oilgear continues to manufacture new D pumps of sizes D150 and larger with V (Servo) or M (Multi-position) controls.

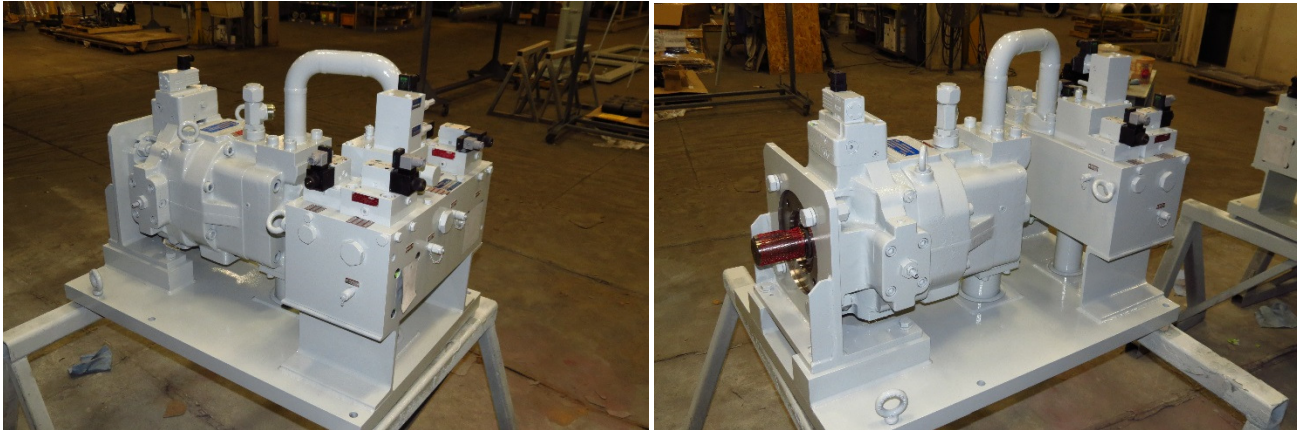
If you have any other type of D pump (a smaller size or different controls), we will support Parts and Repairs when available, or propose a replacement engineered alternative when required. Annex A describes these options in more detail, including standard delivery times and prices for D pumps. For discontinued D pumps (small sizes or rare controls), do not hesitate to contact our System Engineering group in New Berlin or Product line product manager in Traverse city for assistance in building the solution you need.

Note: New D pumps are manufactured in lower and lower quantities each year, as the PVV line has generally been preferred for new applications due to higher pressure capability and higher levels of efficiency. Due to declining numbers, the price of a D pump has been increasing, but we are proud to offer you the continuity you may require if a new D pump best fits your needs.

B) The D150 pump conversion Kit to PVV-540 pumps: “Drop in” configuration.

For sizes D150 and larger, Oilgear has developed a replacement Kit with PVV-540 pump on a mounting plate (D pump footprint) to replace the existing D-150 units. → A significant number of machines are operating with these replacement kits and are delivering 24/7 reliable service to their users; this offer is industrially proven in multiple applications (extrusion, vertical presses, forming machinery, etc.) for more than 5 years.

- The conversion unit will include an integrated valve manifold to fit in place of your current 1-way or 2-way D pump.
- The drive shaft of the PVV540 will be in the same location as the existing D-150 pump shaft.
- The PVV-540 drive shaft is a different size, so the pump motor coupling will need to be replaced.
- The delivery port(s) of the PVV540 conversion unit are the exact size, and located in the exact position, as those of the D-150 pump making the conversion unit a “**drop-in**” replacement. **No piping changes or electric motor position changes are required.**
- The Oilgear PVV-540 is a state-of-the-art axial piston pump with a rated output of 155 GPM at 5000 PSI non-supercharged at 1200 rpm. When operated at 900 rpm the delivery is 116 gpm, or 8 gpm more than most standard D pumps → Gives additional flow to your system with more production performance immediately!
- The overall volumetric efficiency of the PVV pump is 15% to 20% higher than D pumps due to its port plate technology and axial piston design. This will result in a significant reduction in energy consumption and cost of use → Gives a reduction to your ownership and operating costs in addition to enhanced performance (potential higher speed, faster compression, and better response time) to your machines.
- The PVV-540 pump is a one way pump. Directing of flow is accomplished with DIN cartridge valves. A conversion unit with VM control and 2-way valve manifold is shown below



Annex B contains more technical details about the Standard D pump replacement kit including pricing, lead times, and the two main configuration options (one way delivery and two way delivery).

Important notes: Oilgear is proud of the ability of the D pump to perform with fluid in “less than optimal cleanliness” condition. However, this is a key factor which must be investigated when converting a system to modern PVV pumps. In addition, fluid type, viscosity, location and quality of pilot oil sources, and suction conditions (altitude, for example) are key factors for PVV reliability which have not been minimized or overlooked in this offering.

Modern, axial piston port plate pumps like the PVV are by nature of their architecture more sensitive to these factors than radial piston D pumps.

To achieve Oilgear durability, several options to address these factors have been implemented and are site-proven in 24/7 use. Examples of these solutions include partial supercharge and supercharge filtration.

Oilgear also offers a modern electronic interface for the servo controls of PVV pumps. Oilgear’s EPC3 programmable digital amplifier is the market-leading solution for easy interfacing with PLC or analog controls.

- ➔ The INTEGRATION of our Oilgear Standard Offering solution can be properly engineered during a visit to your site, on your machine, by Oilgear’s knowledgeable experts in hydraulics, electrical controls and pump applications. ➔ **Please refer to Equipment Integration Services below.**
- ➔ The upgrade on your machines can be performed one pump at a time (step by step) giving you the flexibility to manage your capital expenditures over time while maintaining production at full capacity.

Option: Horizontal Mounting Alternative: (not a “Drop in” replacement).

For several customers we have developed a simplified alternative to upgrade the D pump. This alternative is not a form and fit replacement, but offers other benefits which some users may prefer.

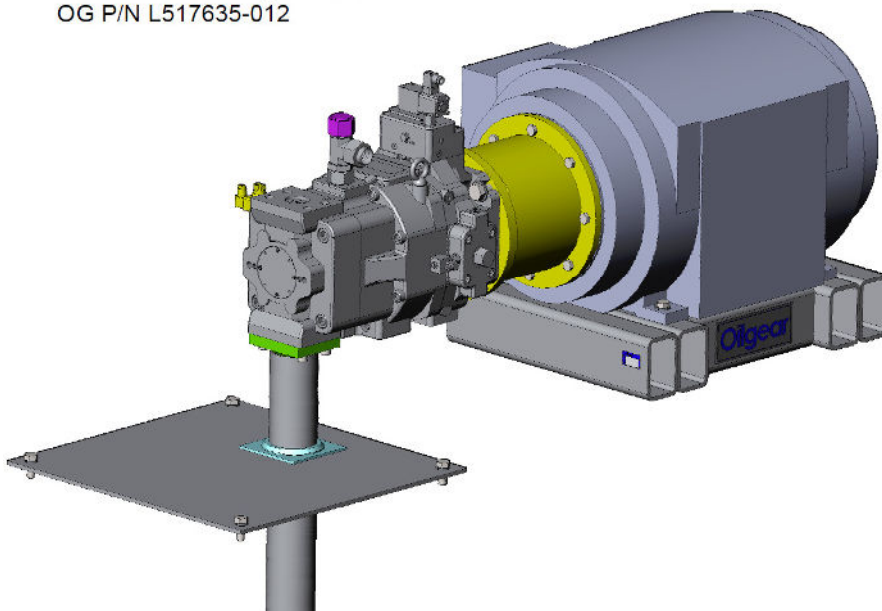
This alternative is useful for a user who needs to free up extra room on the top of a tank for other purposes (manifold mounting, for example) or to replace old or obsolete electrical motors while upgrading a D pump to a PVV. Oilgear has supplied multiple examples of this alternative in the past years, and we now include this option as part of our Standard Offer. Pricing and other details are found in Annex B2.

The Horizontal Mounting Alternative requires mounting and piping changes. Oilgear’s application engineering and recommendations offer also applies as explained below.

A vertical mount skid option can also be supplied.

A typical example of the Horizontal Mounting option is shown below:

PVV540-VM x 250HP ODP Motor Unit
Free Suction w/Purge Valve
OG P/N L517635-012



PVV Pump Serviceability: “Drop in” or “Horizontal Mounting Alternative”

The PVV pump range is a current product, made in quantity, with decades of future availability. Oilgear is producing PVV parts in volume production, whereas the D Pump parts are produced on an “as-needed” basis.

This keeps the PVV pump cost, as well as repair costs, significantly less than the D pumps. This cost gap will likely become greater in the future as fewer D pumps are produced and repaired.

The typical preventative repair cost of a PVV540 pump will be in the range of one third of the cost of a D pump repair.

Your Equipment/Machine Integration, Engineering Support and Site Survey Visit

- 1) Oilgear engineers are available to assist you with guidance in choosing your best solution. Whether the choice is a D pump repair or PVV replacement, our goal is to help you to precisely evaluate the cost and ROI of the options.

 - 2) To determine the best configuration of your PVV540 x D-150 conversion unit and related options, and to Engineer and Validate with you the **INTEGRATION OF A STANDARD REPLACEMENT KIT on YOUR EQUIPMENT** (or any control upgrade on a D pump which you choose to keep in service) the proven solution is to have one of **Oilgear's skilled experts AT YOUR SITE** who will:
 - Observe your machine and main pumps in operation and collect your input and comments as the user
 - Investigate all integration details on Your machine
 - Review options and determine which are mandatory, recommended, or not needed.
 - Discuss and validate your objectives (one pump at a time, or all at once, electronic card or D pump control upgrade, need for boost or not, additional filtration requirements, etc.).
 - Review your Equipment and Fluid condition, as well as a review of your Maintenance plan to offer guidance.
 - Evaluate basic system performance as far as possible within the visit duration (Cycle times, excessive pressure spikes, energy consumption, volumetric efficiency estimates...).
 - Receive and review the latest version of your existing Hydraulic circuit and related literature to prepare the new "post change" technical literature.
- ➔ Draft and issue, within 10 days of the site visit, a **full report with a description requirements to convert to the standard PVV pump kit** or upgrade the D pump (Electronic cards, D pump Controls, etc.).
- ➔ The Oilgear expert can extend his stay at your site in order to perform more detailed recordings and analysis of your machine. Multiple users have requested this additional time in order to help them with preventative maintenance and receive a baseline reference for their machine performance. This information can include cycle times, pressures, pressure peaks, speeds, ramp times, efficiencies, D pump slip tests, and more. An additional cost per day is charged for these extra services.

Notes:

The Oilgear site report will define the changes required on your machine in order to integrate the PVV upgrade or D pump changes into your system and receive a valid, full warranty for the new equipment.

A valid warranty will require the presence of an Oilgear employee at start up.

- ➔ The site visit by an **Oilgear expert** is offered at a fixed price. The fixed price includes all travel expenses, pre-visit preparation work, time at site, engineering time, and time to write the report.
- ➔ If preferred, the site visit can be billed on the basis of time and material.
- ➔ If an extended site visit is requested, the additional time will be billed as an additional price per day.

The choice of the best solution is up to the Customer. Throughout Oilgear's history our engineers have promoted and respected the customer's choices. Today, we are again pleased to provide a flexible, reliable offer with fully engineered integration services.

Let's make your business better together,

Thank you for the opportunity to quote.

For further information on this offer, please contact:

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Annexes:

- A: D pump Oilgear offering, pricing and delivery time.
- B: D150 to PVV540 Standard Replacement Kit, pricing, delivery time and options.
- C: Service Integration and support site visits pricing and rates.
- D: Type D pump bulletin, PVV type pump bulletin and D pump conversion presentation.
- E: Pictures, references and examples.