Flow Rates of up to 168 l/m at 155 bar and 46 l/m at 636 bar

Ultra Compact for Given Pressure and Flow Rates

All External Pump Components 316 Stainless Steel

Worldwide Approvals

In Accordance with API 674

No External Lubrication or Cooling Systems

Direct Drive - No External Pulleys

Innovative and Reliable Pump Solutions

www.bifold.co.uk
The Bifold Group of companies have provided peace of mind to contractors, installers and end users for over a century. Our innovative range of products, specifically designed with the customer in mind, have gained worldwide approval and credibility for the onerous conditions as found in hazardous (classified) locations, hostile and subsea environments.

The customer requirements for sustained safety and reliability under extreme operating conditions are Bifold Marshalsea’s primary objectives.

Our state of the art production facilities based in the UK, allows our superior and innovative designs to be manufactured to rigorous manufacturing and quality standards.

The policy and overall business objective of Bifold Marshalsea, is to provide system packages of the highest quality and in compliance with customer requirements. We guarantee ease of installation and low lifetime cost of ownership - due to superior design, long-life materials, precision manufacturing and testing facilities.

Located in Taunton, UK, Bifold Marshalsea has subsidiary locations in Houston, USA, Singapore and Manchester, UK. The Bifold Group of Companies are supported worldwide with our engineers and a global network of agents and distributors.

The Group have invested in state of the art machining centres ensuring accuracy of close tolerances, and a rapid turnaround capability together with state of the art assembly and testing facilities.

The customer can be confident that Bifold Marshalsea has the product portfolio and the technical and production capability to provide the correct solution for their system requirements, and provide support during and after installation.

Bifold Marshalsea provide pumps for use with fluids which include a variety of water-based, fire resistant and other media types. The properties of these fluids include a combination of high or low viscosity with either high or low lubricity.

Various pump models are available for use with water glycol and other calibration fluids.
The high pressure 50 kW (350 kg) Type XWH Hydraulic Pump is specifically designed for water-based fluids. Separation of the lubricating oil and the pumped fluid is achieved by the installation of a cavity between the cylinder block and the case. Bypass from the pistons is collected in this cavity and returned to the inlet side of the pump. The XWH pump incorporates six axial pistons actuated by a single rotating swash plate. This high powered pump is highly suitable for Blow Out Preventer (BOP) applications, hydraulic power units (HPUs) and flushing skids.

All external pump components are manufactured from 316 Stainless Steel.

Rotation is bi-directional and the pump is mounted horizontally. A suction filter of at least 60 microns should be used, and care should be taken to ensure that the filter is of adequate size and does not cause more than 300mm Hg depression. Pipes/tubing should be of sufficient size to give not more than 3.7m/sec velocity in the delivery line and 1.2m/sec in the suction line. The suction line should be kept under positive pressure when the pump is stationary to allow priming.

The pump model XWH is compliant to API 674.

 Certification Details

This pump conforms to European Directive 94/9/EC relating to equipment intended for use in potentially explosive atmospheres and is ATEX compliant.

Bifold Marshalsea has been third party assessed and certified as meeting the requirements of ISO 9001:2000 for the design, development, manufacture and servicing of Hydraulic Pumps, Relief Valves and Pressure Intensifiers.

Use of Marshalsea Pumps with Castrol Transaqua Water Based Subsea Control Fluids

Castrol Offshore has worked closely with Marshalsea Hydraulics to ensure that Marshalsea’s range of Water Glycol Pumps are fully compatible with Castrol’s Transaqua range of products.

Castrol has an extensive track record with Transaqua fluids in these types of high pressure Water Glycol Pumps. The fundamental design of the pumps ensures a maximum separation of the pumped fluid from the bearing lubricating oil. This provides a robust design, which gives long and reliable operation with Castrol water based control fluids. We recommend Castrol Alkylpolyglycol PG gear oils for use in the lubricating lubrication system; these oils are fully compatible with the Transaqua range of control fluids.

Marshalsea pumps which incorporate separation of the lubricating oil and the pumped fluid are approved for use with the following Castrol Transaqua grades.

- Castrol Transaqua HT
- Castrol Transaqua HD
- Castrol Transaqua DT
- Castrol Transaqua HD (Superised by M72)
- Castrol Transaqua DT (Superseded by HT2)


Accuracy of Information
We take care to ensure that product information is up-to-date and accurate. However, we reserve the right to make changes to this information at any time. We accept no liability for errors or omissions.

Quality Assurance
We are committed to ensuring the highest quality and performance of our products. We operate to EN ISO 9001:2008 and ensure that all products meet the specifications and design criteria, and are manufactured to the highest standards. We reserve the right to make changes in the specifications and design criteria, without prior notice.
Features

Smallest Overall Footprint

In Accordance with API 674

No External Lubrication or Cooling Systems

Direct Drive - No External Pulleys
Features

**Ultra Compact for Given Pressure and Flow Rates**

**All External Pump Components**
316 Stainless Steel

**Flow Rates of up to 168 l/m at 155 bar and 46 l/m at 636 bar**

Accuracy of information: We make every effort to ensure that product information is accurate. However, the products in this catalogue are subject to change and we reserve the right to make changes, without prior notice. Please refer to the product catalogue issue list on our website or contact a member of our sales team for the most accurate information.

When selecting a product, the applicable operating system design must be considered to ensure safe operation. The products handled, operating environment and application are the responsibility of the system designer and user.

Quality Assurance: All Bifold products are manufactured to a most stringent QA programme to ensure that every product will give optimum performance and reliability. The best performance can be obtained if the user follows the instructions in the operating manual. We reserve the right to make changes to the specifications and design due to improvements in quality or technology.
The pictures below show the difference in size between a Bifold Marshalsea pump and motor arrangement and a competitors equivalent product.

Advantages with the Bifold Marshalsea arrangement are:-

- Smallest Overall Footprint.
- No external lubrication or cooling systems.
- All external components 316 Stainless Steel.
- Ultra Compact for given pressures & flow rates.
- In Accordance with API 674.
- Direct drive - no external pulleys.

LOWEST COST SOLUTION

The pump arrangements illustrated in figure 5 show the difference in size between a competitors arrangement with a large footprint compared to the Bifold Marshalsea compact pump and motor arrangement. All our pump packages provide high performance, and reduction in maintenance and service requirements.

The pictures below show the difference in size between a Bifold Marshalsea pump and motor arrangement and a competitors equivalent product.

The pump arrangements illustrated in figure 5 show the difference in size between a competitors arrangement with a large footprint compared to the Bifold Marshalsea compact pump and motor arrangement. All our pump packages provide high performance, and reduction in maintenance and service requirements.

The pumps illustrated in figure 6 show the difference in size between a competitors pump with a large footprint compared to the Bifold Marshalsea compact pump.
## Pump Specifications

### PRESSURE AND FLOW COMBINATIONS

<table>
<thead>
<tr>
<th>Pump No</th>
<th>No. of pistons</th>
<th>Size (inches)</th>
<th>Theoretical Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>cc/rev at 1450 RPM</td>
<td>cc/rev at 1750 RPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
<td>38</td>
</tr>
<tr>
<td>21400 - 01</td>
<td>6 x 0.625</td>
<td>26</td>
<td>38</td>
</tr>
<tr>
<td>21400 - 02</td>
<td>6 x 0.688</td>
<td>32</td>
<td>46</td>
</tr>
<tr>
<td>21400 - 03</td>
<td>6 x 0.750</td>
<td>38</td>
<td>55</td>
</tr>
<tr>
<td>21400 - 04</td>
<td>6 x 0.813</td>
<td>45</td>
<td>65</td>
</tr>
<tr>
<td>21400 - 05</td>
<td>6 x 0.875</td>
<td>52</td>
<td>75</td>
</tr>
<tr>
<td>21400 - 06</td>
<td>6 x 0.938</td>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>21400 - 07</td>
<td>6 x 1.000</td>
<td>68</td>
<td>99</td>
</tr>
<tr>
<td>21400 - 08</td>
<td>6 x 1.063</td>
<td>77</td>
<td>112</td>
</tr>
<tr>
<td>21400 - 09</td>
<td>6 x 1.125</td>
<td>86</td>
<td>125</td>
</tr>
<tr>
<td>21400 - 10</td>
<td>6 x 1.188</td>
<td>96</td>
<td>139</td>
</tr>
<tr>
<td>21400 - 11</td>
<td>6 x 1.250</td>
<td>107</td>
<td>155</td>
</tr>
</tbody>
</table>

Table 1

### XWH Pump Performance

![Graph 1](image)

**Table 1**

**Accuracy of information:**

The information in this product data sheet is intended for guidance only and should be accompanied by further detailed specification, datasheet and drawings. The manufacturer reserves the right to modify design and specifications without notice.

**Application data:**

When selecting a pump the applicable operating system design must be considered in more detail. The products type, size, speed, and any other operational detail can vary and the system designer and user is responsible for this selection.

**Testing:**

Functional test, letter of conformity and copies of original mill certificates are available on request. Total traceability is available to BSEN 10204.3.1.B where applicable. We reserve the right to make changes to the specifications and design data, without prior notice.

**Quality Assurance:**

All Bifold products are manufactured to a stringent QA programme to ensure that every product will give optimum performance and reliability. We are a UKAS 2008 certified company and our products are third party certified to EN ISO 9001:2008. Functional test, letter of conformity and copies of original mill certificates are available on request. Total traceability is available to BSEN 10204.3.1.B where applicable. We reserve the right to make changes to the specifications and design data, without prior notice.

**www.bifold.co.uk**

BFD54 August '11

© Bifold 2011
Pump Performance

XWH Pump Performance

Graph 2

Accuracy of Information
We take care to ensure that product information in the catalogue is reasonably accurate and up-to-date. However, our products are continually developed and updated so to ensure accurate and up-to-date information please refer to the product catalogue issue list on our website or contact a member of our sales team.

When selecting a product, the applicable operating system design must be considered to ensure safe use. The product function, material compatibility, adequate ratings, correct installation, operation and maintenance are the responsibilities of the system designer and user.

Quality Assurance
All Bifold products are manufactured to a most stringent QA programme to ensure that every product will give optimum performance and reliability. We are third party certified to EN ISO 9001:2008. Functional test certificate, letter of conformity and copies of original mill certificates, providing total traceability are available on request, to BSEN 10204.3.1.B where available. We reserve the right to make changes to the specifications and design etc., without prior notice.
Pump Specifications

Figure 8 Shows Dimensions

![Diagram](image)

**Suction Valve Lifters**

The pumps are fitted with suction valve lifters to assist with priming.

![Diagram](image)

**Alternative Pump for Aggressive Fluids**

The XWH Water Glycol / Oil Based Fluids pump can be configured with alternative pistons and back-up sealing safety features for pumping chemicals. For details of this pump, designated Type XWHC, refer to the Bifold Marshalsea Brochure for Chemical Injection Motor Pump Unit (CIMPU). Issue Number BFD52 August 2011.

![Diagram](image)

Figure 9

Figure 8

Figure 10
Comparison of Pump Types

Pump Comparisons

Comparison of Pump Types for Water-Based Fluids

Figure 11 shows the internal arrangement of a typical three piston triplex pump design. As can be seen from previous illustrations, pumps of this design are large and occupy a significant level of skid space. An external drive belt and pulley system is needed to drive these pumps. Typically, motors are mounted on top of the pump producing a large unit.

Guarding is required to enclose the belts further adding to the overall footprint and cost. Anti-sparking materials and corrosion protection are necessary for the external drive system components and guards. It is unusual for pumps of this type to be manufactured from stainless steel and as such further corrosion protection required.

Pulsation dampers are generally required when using triplex pumps.

The Bifold Marshalsea compact pump design is shown in figure 12. The motor is close-coupled to the pump, negating the requirement for pulleys and drive belts. There are no exposed rotating parts resulting in improved user and application safety, particularly in hazardous (classified) locations.

These pumps are manufactured from 316 Stainless Steel. The flow delivery of these pumps is smoother than with triplex pumps and there is generally no requirement for pulsation dampers. Since the design does not have belts or pulleys and is dynamically balanced, it has extremely low levels of vibration.
Information

**Weight**
The pump weighs 350 kg.

**Installation**
The units must be mounted horizontally. To ensure that low speed self-priming operates, a positive head must be provided by mounting the process fluid tank above the suction intake line.

**Quotations**
For this product, variations in ranges of flow rates, operating pressures, control options and other parameters are extensive. If you can provide the information shown opposite, we will be delighted to respond with a specific quotation.

### Examples of Projects Supply for Pumps of this type

<table>
<thead>
<tr>
<th>Operator</th>
<th>Project / Rig</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>Clair</td>
<td>North Sea</td>
</tr>
<tr>
<td>BP</td>
<td>Nam Con Son</td>
<td>Vietnam Offshore</td>
</tr>
<tr>
<td>BP</td>
<td>Shearwater</td>
<td>North Sea Central (UK)</td>
</tr>
<tr>
<td>BP</td>
<td>Thunderhorse</td>
<td>Gulf of Mexico</td>
</tr>
<tr>
<td>British Gas</td>
<td>Blake</td>
<td>North Sea</td>
</tr>
<tr>
<td>ConocoPhillips</td>
<td>Britannia</td>
<td>North Sea</td>
</tr>
<tr>
<td>Encana</td>
<td>Ross FPSO</td>
<td>North Sea (UK)</td>
</tr>
<tr>
<td>Esso</td>
<td>Balder</td>
<td>Norway</td>
</tr>
<tr>
<td>Statoil</td>
<td>Garn West</td>
<td>North Sea</td>
</tr>
<tr>
<td>Total</td>
<td>Nuggets</td>
<td>North Sea</td>
</tr>
</tbody>
</table>

**Table 2**

The table above is an extract taken from our main Project Reference List, where our range of pumps have been utilized.

**Information Required**

**Pump Fluid**
Flow rate range required from ___ l/m to ___ l/m.
Operating pressure at discharge flange ___ bar.
Operating pressure at suction flange ___ bar.
Operating temperature, min ___°C to max ___°C.
Density at max operating temperature ___ g/cm³.
Viscosity at max operating temperature ___ cP.
Solids content / solids density ___%/g/cm³.
Solids grain size / solids hardness ___ mm/Mohs.

**Motor Data**
Hazardous (classified) location and protection technique requirements. Voltage, phases and frequency or dc.
Innovative and Reliable
Pump Solutions

www.bifold.co.uk