

Hercules

HYDRAULICS LTD.

Hydraulic specialists in

PROPULSION SYSTEMS

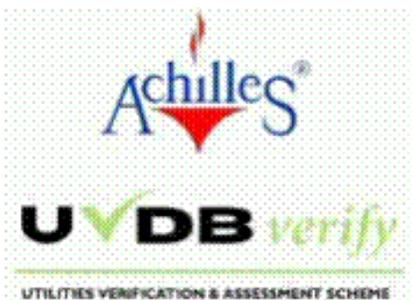
10 to 150 HP



Contact

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BFPDA

The British Fluid Power
Distributors Association
(Affiliated to BFPA)



Advantages of Hydraulic Propulsion

Simple installation: With most systems only flexible tubing is required to connect between the components, there are no alignment issues between the engine and the propeller shaft. Technical installation labour is vastly reduced to that of a conventional drive system.

Engine Positioning Hydraulic propulsion systems allow you to position the engine anywhere you like within the vessel, thus allowing the boat designer to make the best use of the space available.

Multiple drive systems: If required two propellers can be driven from a single engine, this can improve manoeuvrability. A propeller is less efficient when going astern, hydraulics can compensate for this, thus allowing the same power to be used in both directions

Ancillary drives: Other hydraulic systems can be integrated into the propulsion system, thus reducing the need for extra PTO etc

Maximized propeller efficiency: Upon commissioning it is not unusual to find a propeller slightly over or under pitched. The hydraulic system can be slightly adjusted to compensate for this thus maximizing the vessel's performance.

Instant response: Full ahead or full astern can be selected immediately with no delay

Propeller protection: In the event of propeller becoming fouled, no damage will be incurred to either the hydraulic system or engine due to a pre-set system pressure relief valve.

Alignment of propeller: The flexibility of the hydraulic drive allows the boat designer to best position the angle of the propeller, thus allowing for the best boat trim being achieved, reduced noise level and improved service accessibility.

Less vibration and noise levels: if installed correctly a hydraulic propulsion system can be quieter and transmit less vibration than a conventional system.

Propeller Thrust: Full thrust can be taken directly onto the piston hydraulic motors taper roller bearings without the need for any additional bearing assemblies; we can also supply the system with a proportional control valve which will give infinite propeller speed and torque control.

British Waterways trusted Hercules Hydraulics to design, supply, install and support their Hydraulic Propulsion requirements in 2005, 2006, & 2007.

Their new fleet of vessels have exceeded most individual's expectations.

These systems were designed for reliability, long life, and power.



Knowledge is our strength



Warning

1. Don't be fooled by other hydraulic system suppliers in believing that a hydraulic system can transmit up to 95 % of the engines HP to the propeller. **It cannot.**
2. Don't be fooled in believing that a hydraulic system can transmit the engine power with the same losses and efficiency of a conventional gear box. **It cannot.**
3. Disbelieving will only result in you obtaining a system with a propeller which is sized or pitched incorrectly.
4. The average losses with in a hydraulic power transmission from any given engines fly wheel to the propeller will be approximately 18 %.
Therefore if the engine is rated to **40 HP** you will only achieve approx **33 HP** at the propeller.
5. The average losses through a conventional hydraulic gear box, drive shaft, stern tube arrangement is approximately up towards 10 %.
Therefore if the engine is rated to **40 HP** you will only achieve approx **36 HP** at the propeller.
6. So at best a hydraulic transmission will transmit approximately 8% less than a conventional gear box system, which on the above example would = **3 HP**
7. We would challenge any other supplier to discuss and debate any of the above statements reference to Hydraulic transmission systems.
8. The most important thing when designing a hydraulic propulsion system is to make sure all the components are compatible and the propeller supplier is furnished with all the relevant information and including the calculated HP, Torque and speed which will be achieved at the propeller.
9. Please note the quality of the hydraulic components, oil cleanliness, installation, and the compatibility of the system will have a direct effect on the systems efficiency, performance and life expectancy.
10. We believe a good quality designed hydraulic system is far superior than a conventional gear box transmission system and installation.

We have 2 basic systems we can offer

Option 1

This option includes a Piston pump and Motor

The advantage of this product is its efficiency (approx 18% losses), quality and the life expectancy of up to 30 years.

We in build within our system a boost filter arrangement which allows the use of a small and compact oil tank arrangement, the boost unit also serves other purposes such as maintaining a positive pump suction pressure, which can be crucial when the ambient temperature is very low.

The hydraulic motor has inbuilt taper roller bearings on its out put shaft which can with stand the full thrust of the propeller shaft in both directions, this removes the need to include a thrust bearing assembly on the propeller shaft if the hydraulic motor is going to be installed in a conventional manner.

Option 2

This option includes a Vane pump and Motor

The advantage of this product is the cost, a 43 HP system and above will be cheaper than a piston product, BUT its efficiency will be (approx 23%) which will increase in a shorter period of time than the piston units if used to its capacity, its quality and life expectancy will also be less.

The pump unit requires a positive head of oil for the suction, and the maximum speed of these units is **2800 abs max.**

The system will need an oil tank at least equal to the pumps output flow, and the oil tank will need to be designed carefully to reduce the risk of aeration.

The hydraulic motor has no bearings installed on its output shaft and cannot support any thrust load, therefore if its going to be installed onto a propeller shaft in the conventional manner a extra bearing support will be needed, either on the motor itself or on the prop shaft.

There is a wide variety of ratios within both options, but for this document we have only included the 2 most commonly used which are approximately between the 2:1 and 3:1.

Please note

The second option is perfectly adequate if the purchaser is not too concerned about the efficiency and generally only uses the maximum HP of the system on occasions.

Basic Hydraulic Design for the “ Piston “ System

The single hydraulic pump will be mounted directly to the engines flywheel via a bell housing and coupling.

The hydraulic pump will draw oil from the single 35 ltr capacity via the boost unit and oil tank.

The oil flow from the pump will be directed into directional control valve, which will direct the oil flow to the hydraulic motor to give either, ahead or astern motion and drive. This valve will be supplied ready for Morse or Cobalt 33c or 43 c cable control.

The speed of the propulsion unit will be proportional to the engine speed.

The return oil will then be directed through a full flow oil cooler which will be integrated into the engines cooling system, before the oil returns back to the oil tank and boost unit.

Basic Hydraulic Design for the “ Vane “ System

The single hydraulic pump will be mounted directly to the engines flywheel via a bell housing and coupling.

The hydraulic pump will draw oil from the single oil tank. This tank will be larger than the piston unit mainly because we are not able to incorporate the boost unit within the pumps technical capabilities.

The oil flow from the pump will be directed into directional control valve, which will direct the oil flow to the hydraulic motor to give either, ahead or astern motion and drive. This valve will be supplied ready for Morse or Cobalt 33c or 43 c cable control.

The speed of the propulsion unit will be proportional to the engine speed.

The return oil will then be directed through a full flow oil cooler which will be integrated into the engines cooling system but fixed to the hydraulic oil tank, before the oil returns back into the oil tank.

For other options

If a potential customer requires either proportional control, electronic proportional control, a hydraulic system for a fixed speed engine or to integrate other hydraulic equipment with the hydraulic propulsion system such as thrusters it would be advisable to always contact our sales office.

We believe that the options available to us and our customers are too great to include into a spread sheet matrix and could soon become confusing.

We can promise that we will come back within the working day with a proposal and price.

All the different drive motors can be specified to suit our Drive Pod.

Components Included Within the Price for “Piston System”

Equipment, personal services and other items included within our standard quotation are as follows

- 1) As much guidance and advice you require to achieve the system, performance you require to suit you and your vessels needs.
- 2) We will liaise with your propeller supplier to make sure that the propeller suits the system, the vessel and your operating parameters.
- 3) 3 years guarantee on all the hydraulic equipment supplied.

Our competitors do not offer the above

- 4) High efficiency Bent axis fixed displacement piston motor with taper roller bearings which can absorb the full thrust of the propeller
- 5) High efficiency Bent axis piston pump. High pressure. To be driven off your engines flywheel
- 6) Pump suction boost unit including 20 absolute micron filter unit
- 7) Directional control valve including maximum working pressure and system safety relief valve
- 8) Mounting Bracket, cable control mounting and cable linkage for the directional control valve to suit 33c or 43c cables
- 9) Mild steel 35 litre capacity oil reservoir including
 - a. Baffle plate
 - b. Inspection plate fully sealed
 - c. Pump suction isolating lockable ball valve
 - d. Oil level and temperature sight gauge
 - e. Manifold for boost unit to be mounted to the reservoir painted in a colour of the customers choice
 - f. All of the above completely assembled and pressure tested prior to despatch
- 10) System Manual including
 - a. Circuit drawings
 - b. Installation drawings
 - c. Fault diagnosis chart
 - d. Installation details and recommended practices
 - e. Preventative maintenance schemes and check lists
 - f. Start up procedure
 - g. Commissioning check list
 - h. System test and performance report list

Other Items and services which can be provided are

Hercules Drive Pod
Incorporation of additional hydraulic equipment
Hydraulic adaptors and flanges
Specially designed oil tanks
Proportional control
Wheel house monitoring panel
Electrical joy stick control
Clutched pump units

Hydraulic motor coupling and tail shaft
Installation on site
Oil cooler
Commissioning on site
Systems for fixed speed engines
Installation on site
Electrical remote control

Components Included Within the Price for “Vane System”

Equipment, personal services and other items included within our standard quotation are as follows

- 1) As much guidance and advice you require to achieve the system, performance you require to suit you and your vessels needs.
- 2) We will liaise with your propeller supplier to make sure that the propeller suits the system, the vessel and your operating parameters.
- 3) 3 years guarantee on all the hydraulic equipment supplied.

Our competitors do not offer the above

- 4) Fixed displacement vane motor.
- 5) Fixed displacement vane pump. To be driven off your engines flywheel
- 6) Directional control valve including maximum working pressure and system safety relief valve
- 7) Mounting Bracket, cable control mounting and cable linkage for the directional control valve to suit 33c and 43c cables
- 8) Mild steel oil reservoir including, size of tank to be confirmed
 - a. Baffle plate
 - b. Inspection plate fully sealed
 - c. Pump suction isolating lockable ball valve
 - d. Oil level and temperature sight gauge
 - e. Cooler
 - f. All of the above components within items 3 / 4 and 5 will be completely assembled and pressure tested prior to dispatch
- 9) Manual including
 - a. Circuit drawings
 - b. Installation drawings
 - c. Fault diagnosis chart
 - d. Installation details and recommended practices
 - e. Preventative maintenance schemes and check lists
 - f. Start up procedure
 - g. Commissioning check list
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Installation on site
Electrical remote control