



# OCTOPUS

SELECTION & INSTALLATION GUIDE



## AUTOPILOT REVERSING PUMP MODELS 1212HKSV & 2012HKSV

### A. Selection:

The Octopus autopilot reversing pump is a very reliable and efficient pumpset which will give you years of trouble free service. The unit is a patented single piston radial pump with adjustable displacement and must be installed correctly to function well. The pump unit has a shut off valve attached to the front face. This valve facilitates pump service without loss of hand steering. Make sure that you have selected the correct model pump. They are available in 2 voltages 12vdc & 24vdc and 2 pumping capacities 1200cc/min & 2000cc/min. The first 2 characters in the model number are the abbreviated pumping capacity, the third and fourth characters in the model number are the voltage. The fifth and sixth characters are the hose kit, and the seventh and eighth characters are the shut off valve. The 1212HKSV (1224HKSV for 24vdc) pumps have a maximum pumping capacity of 1200 cc/min (72 cu. in./min) and are used on steering cylinders up to about 350 cc in volume (19 cu. in.). This size of cylinder is generally found on boats up to about 50 long. The 2012HKSV (2024HKSV for 24vdc) pumps have a maximum pumping capacity of 2000 cc/min (120 cu. in./min) and are used on larger steering cylinders up to about 700 cc in volume (38 cu. in.). This size of cylinder is generally found on boats up to about 70 long. If you have a steering system with a cylinder larger in volume than about 600 cc in volume (36 cu. in) and you want fast rudder speeds, you may be advised to use a larger model of pump such as one of the OCTOPUS CRA series. You should aim to operate the rudder from full left hard over to full right hard over in about 15 seconds.

The pump is designed to operate on a balanced hydraulic system where the volume of oil on each side of the steering cylinder is the same. (The cylinder is unbalanced if the actuating shaft only extends from the front of the cylinder, when the cylinder is fully retracted. If the actuating shaft extends from both the front and the rear of the cylinder, it is a balanced cylinder). Check that your cylinder is balanced. If you do not have a balanced system you need to either change the cylinder to a balanced one or add an unbalanced valve to the system OCTOPUS part number 1702.



### B. Installation:

Mount the pump anywhere in the vessel where it is close to the tubes connecting the hand steering helm pump to the rudder cylinder. Preferably this should be on a horizontal surface in a clean dry area. The best location is usually in the engine room. Be careful not to mount the pump on a flimsy panel as this may resonate and amplify any noise the pump makes.

### C. Hydraulic Connections:

In any hydraulic system it is important to use flexible hoses between the pump and the copper tubing to protect the tubing against fatigue. The pump is supplied with a hose kit K in the model

number. The hose kit comprises of 3 hoses made of SAE 100 R3 hose x 18 long, each hose has 1/4 SAE 45 degree flare fittings. The fixed male fitting mates with the V valve on the pump, the rotatable female fitting is for connection into the vessel steering system. It is most important to keep all dirt, including dust, out of the system during installation.

### **C1. Connecting the 2 Pressure Lines:**

With the pump mounted on a horizontal surface, the 2 lower ports on the front face of the shut off valve must be connected to the tubes connecting the hand steering helm pump to the rudder cylinder. Use 2 of the hoses supplied and suitable tee fittings.

### **C2. Connecting the Vent/Drain Line:**

The top port on the front face of the shut off valve **MUST** be connected to the existing reservoir on the steering system. This is either a separate pressurized reservoir tank or the steering helm itself. There is usually a port on the bottom of the helm pump. If there are 2 helm stations, use the most convenient. The correct installation of this **VENT/DRAIN LINE** is crucial for the operation of the pump.

Note:

1. Ensure that the existing hydraulic system incorporates non-return (lock out) valves in the helm pump (check with the steering system manufacturer); if it does not, then suitable valves must be fitted. Most North American steering systems do install non-return valves.
2. A suitable liquid pipe thread sealer may be used sparingly. Do not use plastic or PTFE tape, this can very easily separate and allow fragments into the system.

### **D. Filling and Purging the System:**

After installing the Octopus Pump the steering system can be filled following the steering system manufacturer instructions. The Octopus Pump can then be started using the following procedure:

- i. From fully closed, open the 3 brass screws on the shut off valve 2 full turns each.
- ii. Turn the steering wheel (direction not important) until the rudder is hard over. At hard over apply pressure to the steering wheel forcing the rudder against the rudder stop.
- iii. Whilst holding the rudder against the rudder stop via the steering wheel, energize the pump by applying system voltage on the 2 motor wires, occasionally reversing the polarity.
- iv. Repeat steps ii & iii until the pump runs smoothly, driving the rudder in both directions.

### **E. Adjusting Pump Flow:**

The Octopus pump is shipped set at its maximum rated flow. When facing the pump body, the left hand socket screw hole is round and used as a pivot point, the right hand socket screw hole is slotted and used for flow adjustment. On the right hand side there is a graduated scale on the motor end shield and a raised line marker on the pump body. If your rudder speed is too fast the flow can be reduced using the following procedure:

- i. Loosen the 2 socket screws that hold the pump body onto the front end shield of the motor 1 full turn. (4mm A/F allen key wrench required).
- ii. Slide the right hand side of the pump body down to a lower setting on the scale.
- iii. Re-tighten the 2 socket screws.

It may be necessary to try several settings to get the best autopilot performance. If your system is pressurized with air, it should be de-pressurized during the adjustment procedure.

## **F. Electrical Connections:**

Follow the autopilot manufacturers' instructions when connecting up the Octopus pump. Correct sizing of cable is important. You have purchased the most efficient autopilot pump available today and it is not to your advantage to compromise its performance by using undersize cable. Ensure all electrical connections are properly made.

## **G. Service:**

The Octopus pump has only 3 moving parts and requires no routine service. Installed correctly it will give many thousands of hours of trouble free operation. If it becomes necessary to service the pump, it can be removed from the vessel without draining the steering system. To remove the pump use the following procedure:

- i. Close the 3 brass needle valves positioned radially on the shut off valve on the front of the pump.
- ii. Remove the 4 socket screws that hold the shut off valve to the pump body. (4mm A/F allen key wrench required).
- iii. Disconnect the electric cables and the bolts holding the pump to the hull structure.
- iv. The pump is now free and can be removed for service.

## **H. Troubleshooting:**

If the unit fails to operate after installation is complete, check for the following common causes.

### 1. Motor does not run:

- i. No voltage applied to motor. (check voltage at motor with voltmeter)
- ii. Autopilot not switched on correct setting. (check autopilot manual)

### 2. Motor runs but pump does not move the rudder:

- i. System not filled with oil. (fill and purge system)
- ii. Shut off valve closed. (open needle valves 2 full turns each)
- iii. Pump adjustment set too low. (adjust flow setting up)
- iv. Hydraulic connection incorrect. (check that 2 side hoses from shut off valve connect to cylinder hoses)
- v. Vent/Drain line (top hose on shut off valve) not connected. (Must connect to reservoir)
- vi. Pump has been dismantled and not assembled correctly. (ensure piston is not backwards)

**MANUFACTURED & SERVICED BY  
OCTOPUS PRODUCTS  
660 Derwent Way,  
Delta, BC  
V3M 5P8, CANADA  
Tel. (604) 524 9641 - Fax. (604) 524 9671**

**PATENTED IN SEAFARING NATIONS WORLDWIDE**