

INSTALLATION MANUAL

OCTOPUS 45mm Bore Linear Actuator
Sailboat Drive – Style LAR

OC1674



Revision History

Revision	Description
A	Released in Book Format

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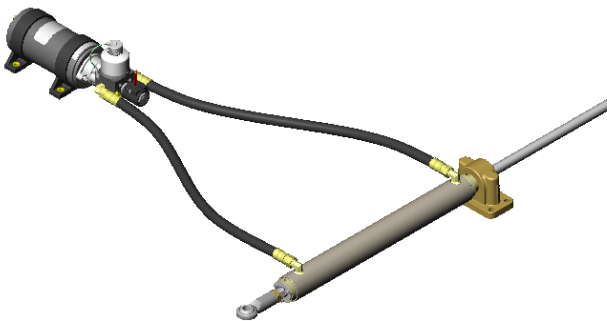
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A. LINEAR ACTUATOR – SYSTEM OVERVIEW:

The Octopus 45mm bore hydraulic linear actuator is a simple, efficient and reliable way of driving the rudder on vessels with mechanical steering systems. The system is an assembly of an Octopus 2.0 litre/min reversing pump and a marine hydraulic cylinder; it has a total of only 5 moving parts. The pump is a patented single radial piston design and the hydraulic cylinder is a design proven in thousands of steering systems, producing minimal "drag" on the steering system.

This assembly is mounted on the rudder quadrant and hull superstructure. When the autopilot is not in use (hand steering) the cylinder runs freely along with the rudder. When the autopilot is in use, a solenoid valve on the pump closes and locks the cylinder. Steering correction signals from the autopilot are now fed to the dc motor which drives the pump to move the cylinder back and forth.

De-energizing the solenoid valve immediately disconnects the automatic pilot from the rudder enabling hand steering. The unit has a small translucent oil reservoir making it easy to check the fluid level. The system is shipped from the factory filled with oil and requires no additional hydraulic plumbing or purging.



45mm Bore Linear Drive
Remote Style

B. SELECTION:

45mm Bore actuators are configured in the remote style (LAR). They are available in either 12” (305mm) or 9” (229mm) stroke with 12v or 24v pump voltage. The LAR style has the pump remotely mounted from the cylinder, connected by 2 x 24” (60cm) long hoses.

Make sure you have selected the correct model linear actuator for your vessel see Table 1. The Actuators produce a similar torque but the 9” stroke version is limited to a 60 degree HO-HO. The shorter stroke actuator requires a smaller installation envelope.

For installation geometry and envelope see diagrams on pages 12 -14.

- How To Order

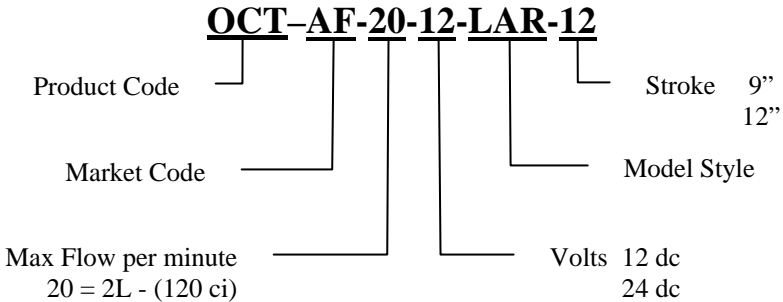


Table 1									
Recommended for Vessels 60'+ (18m) – 50,000lb 23000 kg									
Stroke		Tiller Radius		HO Angle	Peak Thrust		HO-HO Time	Rudder Torque	
in	mm	in	mm	degree	lbs	kg	seconds	lb.in	Nm
12	305	10	250	± 35	1320	600	16	13,200	1491
9	229	9	229	± 30	1320	600	12	11,880	1342

C. INSTALLATION:

1. When planning an installation; provision should be made to access the unit for topping up the reservoir and service purposes and care should be taken to prevent water from splashing or dripping onto the actuator.
2. Mount the cylinder directly to the quadrant or tiller and the pump set with the plastic oil reservoir upmost. Take note of the mid-position and necessary clearances for operating from full H.O. to full H.O., see diagrams on page 12 & 13.
3. After mounting, swing the rudder from side to side to make sure that there is no binding in the cylinder or mountings.
4. The rudder stops on the vessel should be set so that the cylinder does not "bottom out" at the ends of its stroke.
5. Make electrical connections according to the information supplied by the autopilot manufacturer.
6. The unit is shipped with a white plastic sealing cap on the plastic reservoir; this should be **REMOVED** and **REPLACED** with the **METAL VENTED** cap that is supplied attached by a nylon line to the valve block.
7. Save the plastic cap in case the unit needs to be shipped for service in the future.
8. If the unit is installed before construction of the vessel is complete, protect the unit (especially the cylinder rod) from dirt, paint and damage.

D. TOPPING UP & PURGING:

The unit is shipped from the factory filled, tested and ready for service. It should run immediately on installation. If however the oil has been displaced during shipping, the unit may need to be topped up and re-purged of air before running. Re-purging may also be required if the unit has been inoperative for a long period or has been driven for extended periods by the rudder without using the autopilot.

D1. TOPPING UP:

Check the oil level occasionally and top up as required. Do not overfill. Use Shell Tellus 22 hydraulic oil or automatic transmission oil (ATF). Do not use thinner grades of oil such as are used in some hydraulic systems. The oil in the system will show some discoloration with use. This is quite normal. A film of oil will show on the cylinder rod - this is normal.

D2. PURGING:

DO NOT RUN THE PUMP DURING PURGING OPERATION

To purge air from the cylinder, proceed as follows:

1. Undo the 2 brass bleeder screws 2 TURNS ONLY. They are located on either side of the valve block just below the plastic reservoir.
2. Energize the solenoid valve coil.
3. Turn the steering wheel from full lock left to full lock right and back again for a few minutes. Air will be seen bubbling from the cylinder into the tank. Top up the oil level if needed. Stop the procedure when no more bubbles are observed.
4. Close the 2 brass bleeder screws firmly.

E. SYSTEM OIL CHANGE:

E1. DRAINING:

To drain the actuator for a system oil change, remove the actuator and the pump set from the vessel. Remove the metal vented cap from the plastic reservoir and open the 2 brass bleeder screws (2 TURNS ONLY). Invert the actuator and drain the oil out whilst sliding the rod back and forth by hand.

E2. FILLING:

When filling, position the actuator and pump set the right way up (plastic reservoir uppermost) and ensure that the 2 brass bleeder screws are open (2 TURNS ONLY), fill the reservoir with oil whilst sliding the rod back and forth by hand. The oil will be drawn into the cylinder and the air will be seen bubbling into the plastic reservoir. Stop when the bubbles stop appearing and tighten the 2 bleeder screws firmly.

F. SERVICE:

1. The Octopus pump requires no routine service.
2. The marine hydraulic cylinder requires no routine service.
3. The fluid level in the system reservoir should be maintained.
4. A complete oil change should be made about once every 3 years - more often if used for extended cruising.
5. Check all electrical connections on a periodic basis.

G. 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 onto 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. Bypass valve open. (Check autopilot output for signal).
- iii. Pump adjustment set too low. (Adjust flow setting up).
- iv. Bleed screws not closed (tighten 2 brass screws on by pass valve).
- v. Pump has been dismantled and not assembled correctly. (Ensure piston is not backwards).
- vi. U-cup seal failure. (Install new cylinder seal kit).

3. Excess oil leaking from front or rear of cylinder, along shaft:

- i. Shaft seal failure (inspect shaft for damage, including nicks, scratches, varnish/paint spots - install new cylinder seal kit and either repair or replace the shaft).

4. Shaft seizes into barrel and unit does not run freely:

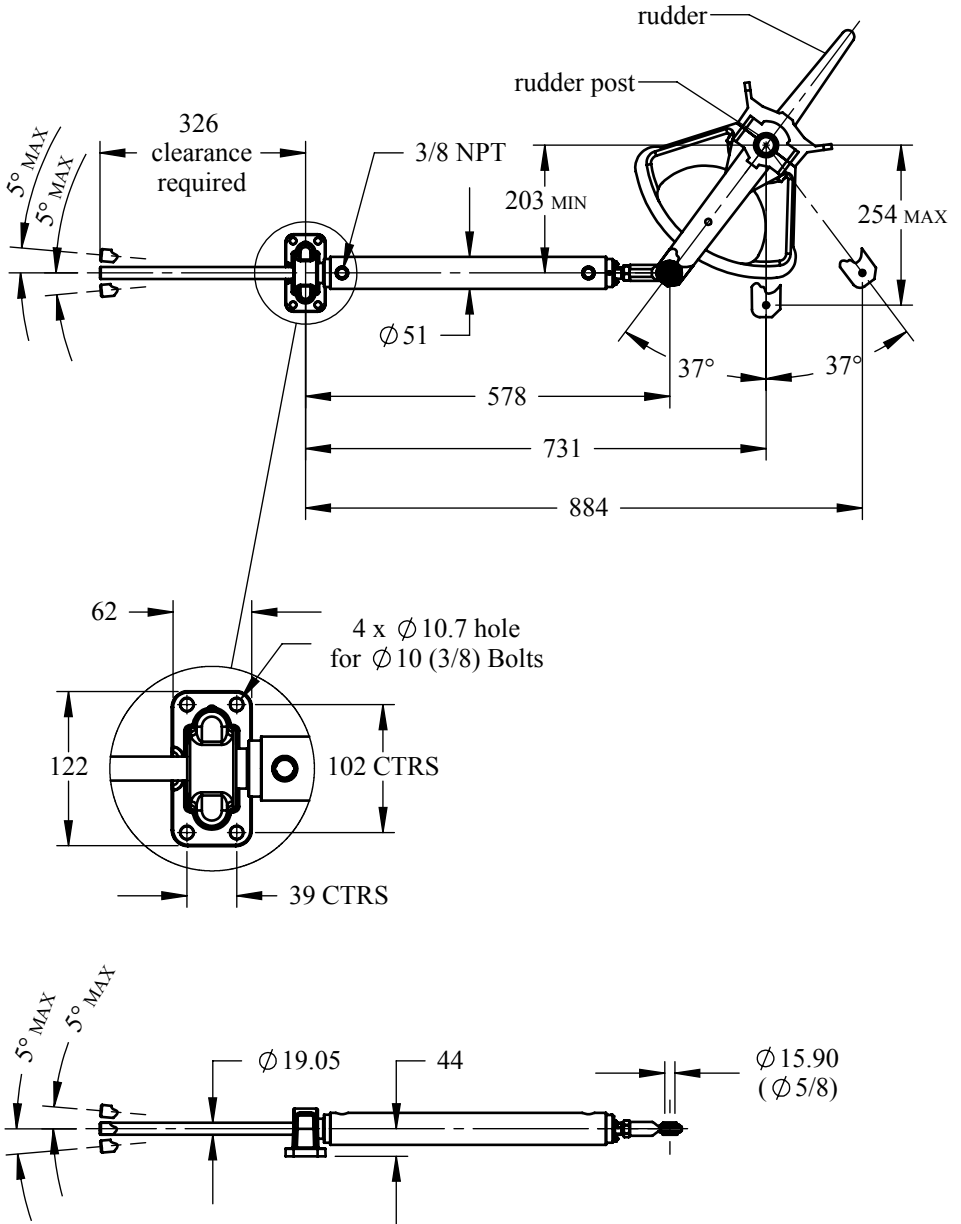
- i. Shaft bent or rear gland damaged. (Inspect shaft for straightness or damage and rear gland/trunnion for damage, also ensure integrity of structural attachment to hull - either repair or replace damaged parts).

H. SPARE PARTS:

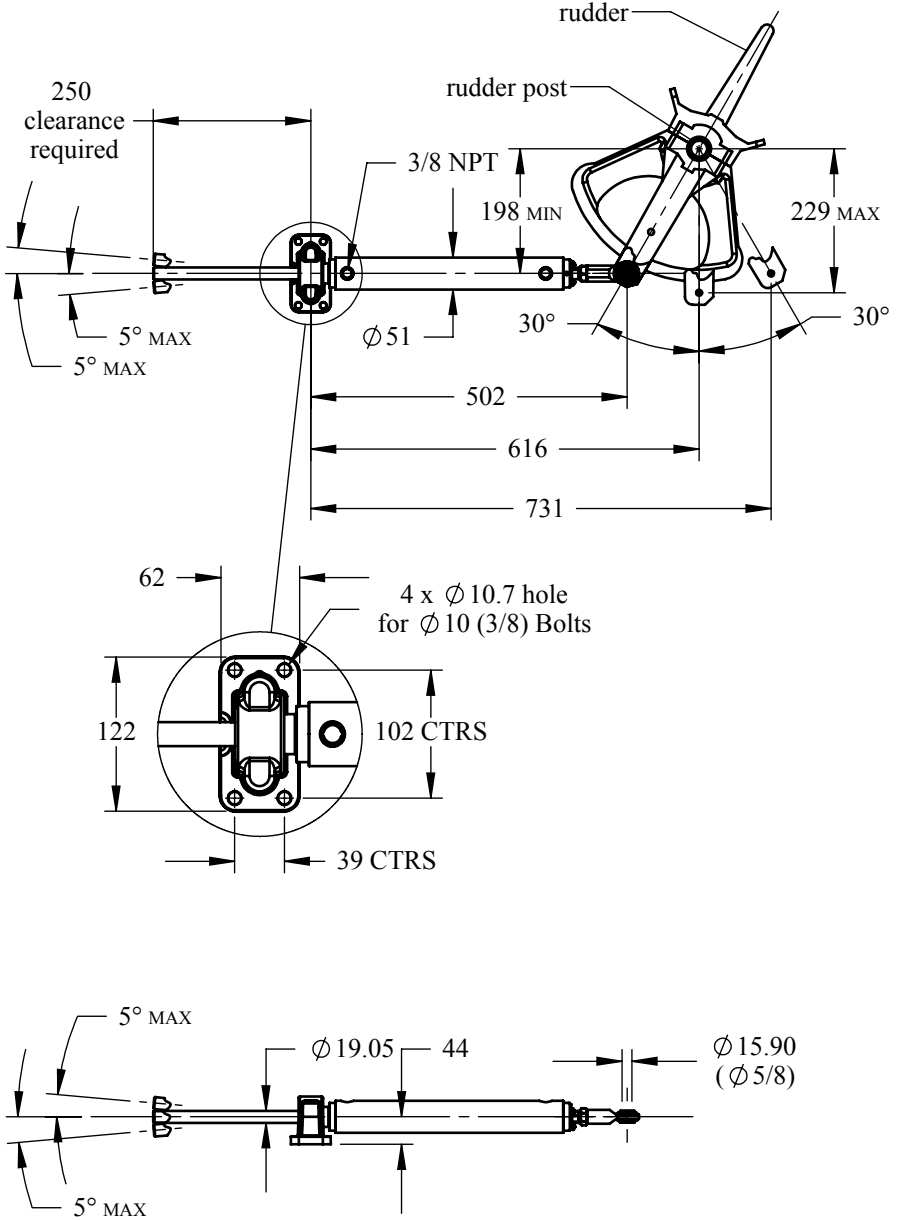
The following parts are available as spares and are recommended for vessels undertaking extensive passages or when autopilot downtime must be kept to an absolute minimum.

	Description	Part Number
1.	2.0L – 12volt motor & pump assembly	OC14SUK12
2.	2.0L – 24volt motor & pump assembly	OC14SUK15
3.	12volt Type 2 motor module assembly	OC14SUK21
4.	24volt Type 2 motor module assembly	OC14SUK22
5.	2.0L pump module assembly	OC14SUK25
6.	# 8 Solenoid valve cartridge	OC1712
7.	# 8 Solenoid valve coil 12 volt	OC1713
8.	# 8 Solenoid valve coil 24 volt	OC1714
9.	Reversing pump seal kit	OC14SUK26
10.	45mm bore cylinder seal repair kit	OC16SUK09
11.	#8 by-pass valve seal kit	OC17SUK14
12.	3/8 SAE Hose assembly x 24”	OC1621

I: INSTALLATION ENVELOPE 12" STROKE ACTUATOR



J: INSTALLATION ENVELOPE 9" STROKE ACTUATOR



K: INSTALLATION ENVELOPE 12" & 9" STROKE SYSTEMS

