# Nexus Linear Drive AN-23

## *Installation Manual*

Thank you for choosing a Nexus Linear Drive. Through this manual we will help you to install your new Nexus product. Please read through this manual carefully before starting your installation.

## 1 Introduction

The Linear Drive should be connected at the tiller arm or the quadrant of a mechanical steering system to provide rudder drive for an autopilot. The Linear Drive is driven by a hydraulic pumpset. When activated the pumpset motor turns clockwise or counter-clockwise upon command signals from the autopilot, to produce port or starboard movement of the rudder. When the autopilot is turned off, a solenoid operated bypass valve mounted on the pumpset opens, permitting hydraulic oil to flow from one side of the hydraulic cylinder to the other, allowing manual steering and the mechanical system to regain control.

**Warning!** Manual steering with the Linear Drive is not possible when the autopilot is activated.

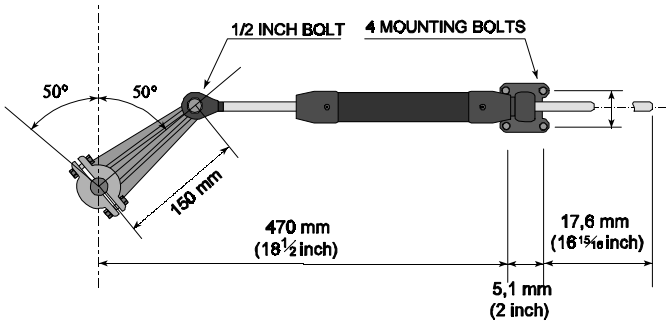
The Linear Drive provides a cleaner installation, being entirely below deck, and delivers more torque to the rudder than wheel driven units. In case the mechanical steering should fail, the Linear Drive will provide a back-up hydraulic steering.

## 2 Installation

**Note!** Because most installations differ, the following items are not supplied and need to be sourced or made locally: support bracket for Linear Drive, 4 mounting bolts, hydraulic fittings and hoseline.

### 2.1 Installing the Linear Drive

**Warning!** A strong mounting bracket must be made for the Linear Drive trunnion mount since forces up to 680 kg (1500 lb) can be developed.




The Linear Drive should be connected to the tiller arm or the quadrant with the 1/2" bolt and spring clip supplied through the tiller arm or quadrant and according to the geometry shown in figure.

**Note!** Use the spring clip to secure the 1/2 " bolt so the Linear Drive can be disconnected fast if needed in an emergency situation.

A bridging bracket may have to be made across the quadrant arm if a suitable connection point is not available. Alternatively a separate tiller arm may be connected to the rudder-stock above or below the quadrant and the Linear Drive rod end bolted to it. The Linear Drive has self aligning and self lubricating bearings making alignment less critical and reducing maintenance.

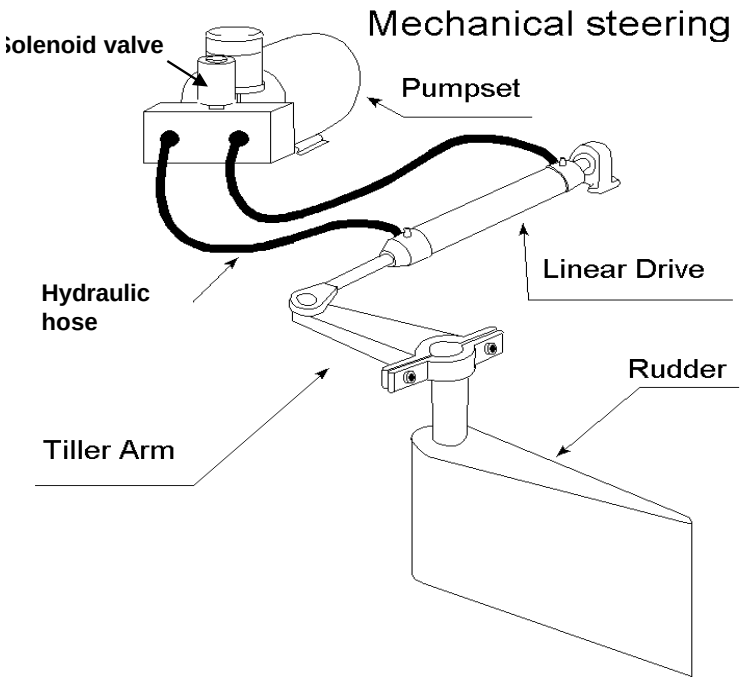
The recommended tiller arm length is 150 mm to provide 50° of rudder angle movement (on both sides). The maximum cylinder stroke is 229 mm (9").

| Tiller length mm (inch) | Max rudder angle at tiller length | Max torque at 0° Nm (lb inch) (lb ft) |
|---|---|---|
| 150 (5 7/8) | 50 | 1085 (9,600) (800) |
| 161 (6 3/8) | 45 | 1164 (10,300) (860) |
| 178 (7) | 40 | 1290 (11,390) (950) |
| 200 (7 7/8) | 35 | 1447 (12,800) (1067) |

**Note!** Do not use a tiller shorter then 150 mm or longer then 200 mm.

If your boat has less rudder angle, or if the tiller has another length, you may use a tiller length that will correspond as close as possible to your boats maximum rudder angle.

**Figure 1: Typical installation on a boat with mechanical steering.**




**Note!** The tiller arm or the quadrant must have a mechanical stop installed before the Linear Drive reaches the maximum cylinder stroke. The Linear Drive itself shall not be the end stop.

## 2.2 Installing hydraulic fittings and hydraulic hoses

Recommended size for all connections are hydraulic hoses and fittings with inner diameter of 8 mm (0.32”) minimum, to reduce the drag.

Use only hydraulic hoses, suitable for a working pressure of 1,000 PSI (70bar). The hydraulic fittings selected must be suitable for the hydraulic hose size used.

**Note!** All ports on the Linear Drive are 1/4" NPT.

Pipe sealant or teflon tape is required on all male pipe thread fittings. Be certain to keep the sealant or tape at least two threads away from the starting threads to prevent threaded tape or sealant from contaminating the system.

### 2.3 Linear Drive oil filling

Use hydraulic oil viscosity grade ISO 20. About 110 ml is needed for the cylinder only without piping. The filling procedure for the Linear Drive can be made faster if the two flexible hose pipings from the Linear Drive are placed in a clean bucket filled with oil. Then move the steering by hand back and forth so that the oil is sucked into the Linear Drive. This action will fill the Linear Drive with most of the oil needed, and will speed up the procedure of getting air out of the system. Then move the hydraulic hoses into position and connect to the pumpset. Fill up the remaining oil through the pumpset reservoir. A typical installation with normal piping length will require about 300 ml oil in total.

## 3 Dockside testing

When the complete electrical installation is checked and the power is turned on, there are further procedures to be carried out in order to completely remove any air in the system. See "Dockside Testing" of the Nexus Autopilot manual.

## 4 Maintenance and inspection schedule

If the boat does not accumulate the hours indicated below within 3 months, the frequency is every 3:rd month.

**Warning!**

Failure to rectify any faulty conditions discovered as a result of the inspection could cause sudden loss of Autopilot control, with consequential danger. It is recommended that all items referenced in the following table be inspected before commencing any cruise.

| Type: | Equipment: | Check for: | Remedy: | Inspection Frequency: |
|---|---|---|---|---|
| Hydraulic | Oil reservoir level | Correct | Fill | 200 hrs |
| | Oil condition | Discoloration<br>Contamination | Flush system and replace the oil | 1000 hrs<br>1000 hrs |
| | Hydraulic hoses | Damage<br>Leaks & Corrosion | Replace | 1000 hrs |
| | Hydraulic fittings | Damage<br>Leaks & Loosening | Replace<br>Tighten | 500 hrs |
| | Piston rod seals on pumpset | Leaking | Replace | 1000 hrs |
| Mechanical | Linear drive | Corrosion | Replace or Repair | 2000 hrs |
| | Tiller arm | Corrosion | Replace | 2000 hrs |
| | Tiller bolts | Corrosion<br>Loosening | Replace<br>Tighten | 2000 hrs<br>500 hrs |
| | Rod end bolt on linear drive | Corrosion<br>Loosening | Replace<br>Tighten | 2000 hrs<br>500 hrs |
| | Trunnion bolts on linear drive | Corrosion<br>Loosening | Replace<br>Tighten | 2000 hrs<br>500 hrs |

## 5 Specifications

| | |
|---|---|
| Type of Linear Drive: | Hydraulic linear drive cylinder |
| Dimensions: | Length 670 x width 70 x height 70 mm (26.4 x 2.8 x 2.8”) |
| Weight (without oil): | 2 kg (4.40 lb) |
| Enclosure: | Splash proof |
| Temperature range: | -5° to +50° C (+40° to 122° F). |
| Max stroke: | 229 mm (9”) |
| Peak thrust: | 680 kg (1430 lb) |
| Max. rudder torque: | 1020 Nm (9020 lb in), with 150 mm tiller arm (+/- 50°) |
| Hardover to hardover time: | 12 sec. (no load) |
| Average power consumption: | See pumpset |
| Piping pressure: | 1000 PSI (70bar) |
| Piping size: | Min. 8 mm (0.32”) inner diameter |
| Hydraulic oil viscosity: | ISO 20 |
| Port dimensions: | ¼" NPT |
| Warranty period: | 2 years, see separate conditions |

# 6 Warranty

## GENERAL

All our products are designed and built to comply to the highest class industry standards. If the products are correctly installed, maintained and operated, as described in the installation and operation manual, they will provide long and reliable service. Our international Network of distributors can provide you with the information and assistance you may require virtually anywhere in the world.
*Please read through and fill in this warranty card and send it to your national distributor for product registration.*

## LIMITED WARRANTY

The warranty covers repair of defective parts due to faulty Manufacturing and includes labour when repaired in the country of purchase. The warranty period is stated in the product manual, and commences from the date of purchase. The above warranty is the Manufacturer's only warranty and no other terms, expressed or implied, will apply. The Manufacturer specifically excludes the implied warranty of merchantability and fitness for a particular purpose.

## CONDITIONS

- The supplied warranty card and receipt with proof of purchase date, must be shown to validate any warranty claim. Claims are to be made in accordance with the claims procedure outlined below.
- The warranty is non-transferrable and extends only to the original purchaser.
- The warranty does not apply to Products from which serial numbers have been removed, faulty installation or incorrect fusing, to conditions resulting from improper use, external causes, including service or modifications not performed by the Manufacturer or by its national distributors, or operation outside the environmental parameters specified for the Product.
- The Manufacturer will not compensate for consequential damage caused directly or indirectly by the malfunction of its equipment. The Manufacturer is not liable for any personal damage caused as a consequence of using its equipment.
- The Manufacturer, its national distributors or dealers are not liable for charges arising from sea trials, installation surveys or visits to the boat to attend to the equipment, whether under warranty or not. The right is reserved to charge for such services at an appropriate rate.
- The Manufacturer reserves the right to replace any products returned for repair, within the warranty period, with the nearest equivalent, if repair within a reasonable time period should not be possible.
- The terms and conditions of the warranty as described do not affect your statutory rights.

## CLAIMS PROCEDURE

Equipment should be returned to the national distributor, or one of its appointed dealers, in the country where it was originally purchased. Valid claims will then be serviced and returned to the sender free of charge.

Alternatively, if the equipment is being used away from the country of purchase, it may be returned to the national distributor, or one of its appointed dealers, in the country where it is being used. In this case valid claims will cover parts only. Labour and return postage will be invoiced to the sender at an appropriate rate.

## DISCLAIMER

Common sense must be used at all times when navigating and the Manufacturer's navigation equipment should only be considered as aids to navigation.
The Manufacturers policy of continuous improvement may result in changes to product specification without prior notice.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