

# Hy-ProDrive

Marine Steering Technology  
By Hydraulic Projects Ltd.



## HS+50

### Marine Hydraulic Steering System Installation and Service Instructions

Please record your serial number here

Serial Number

HS+50m ISS.03

This precision engineered product was designed and manufactured in the United Kingdom.

Please keep this manual in a safe place

## **CONTACT DETAILS**

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The information in this manual was, to the best of our knowledge, correct when it went to press and Hydraulic Projects Ltd cannot be liable for any inaccuracies or omissions. There may also be differences between the specifications in the manual and the product as a result of ongoing development for which we accept no liability.

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## **IMPORTANT SAFETY INFORMATION**

Failure to install and maintain this equipment in accordance with the instructions contained in this Manual could result in damage or injury.

This equipment must be installed and maintained by a person who is qualified to do so. This equipment is only for use with marine auto pilots within the limitations stated in the following pages.

Auto pilot steering systems are navigational aids and the user must still maintain a permanent watch.

This equipment meets the latest EMC (Electromagnetic Compatibility) standards required for use in the marine environment.

In order to ensure conformance and to prevent interference with electronic systems the unit must be properly bonded to earth and the supply cables screened.

Caution!



In operation this unit can rotate the vessels wheel rapidly.  
Keep clear of the wheel when this unit is engaged to avoid entrapment.

Beware of hot motor and solenoid components and the risk of entrapment from moving parts.

Do not flash test.

## **INTRODUCTION**

Congratulations on the purchase of your Hydraulic Projects HS+50 Marine Hydraulic Steering System. It has been designed to give many years of trouble-free service providing the information and instructions contained within this manual are adhered to.

## **DESCRIPTION**

'HS+50' Hydraulic Steering Systems combine a hydraulic cylinder with clutch, reversing pump and reservoir in a compact installation.

A solenoid clutch is engaged to extend or retract the rod. The cylinder and its mounting are protected by integral relief valves. Overall adjustment is incorporated into the stroke of the cylinder. Nominal cylinder size and pump flow are indicated on the rating plate. Check the voltage shown is correct for the output of your autopilot.

Please do not disconnect any of the hoses, the system has been filled and tested prior to shipment.

Ensure you read and understand the special reservoir instructions on page 10 before commencing installation.

## **LOCATION**

For marine applications these systems are designed for '**under deck**' installations only.

Excessive temperature, vibration and fumes in the atmosphere can drastically reduce motor life.

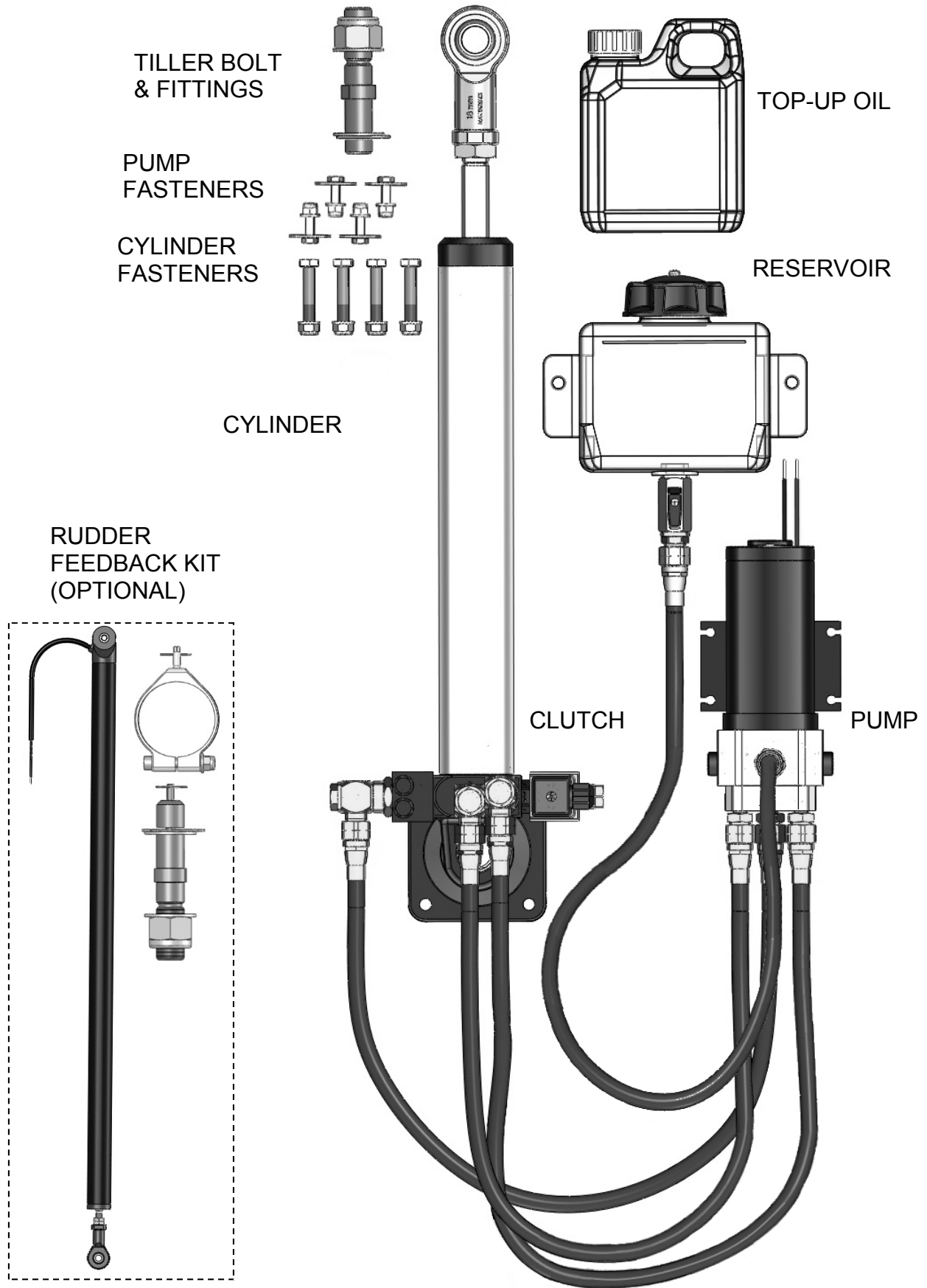
It must be mounted securely and on a surface that is able to withstand the high thrusts generated.

As in common with other electrical equipment contact with water and excessive humidity must be avoided.

Any attitude of mounting may be used but horizontal is preferred. Refer to the installation and technical data pages for further information.

The reservoir must be located in an area that is not subject to extremes of temperature and humidity and away from refrigeration compressors and air-conditioning plant.

## SYSTEM CONTENTS



## MAINTENANCE & SERVICE

With a minimum of moving parts and top quality precision engineering the system will give many years of trouble free service if the following points are adhered to.

- Keep the cylinder rod free from damage.
- Avoid exposing the unit to salt water.

Perform the following tasks on a regular basis:

- Check the security of the mounting base and tiller bolt.
- Lubricate the mounting pin & rod end - use only a good quality marine grease that is compatible with nitrile seals.
- Examine all electrical connections.
- Examine the condition of the oil in the reservoir and empty, clean and re-fill with fresh fluid if necessary. Refer page 18.

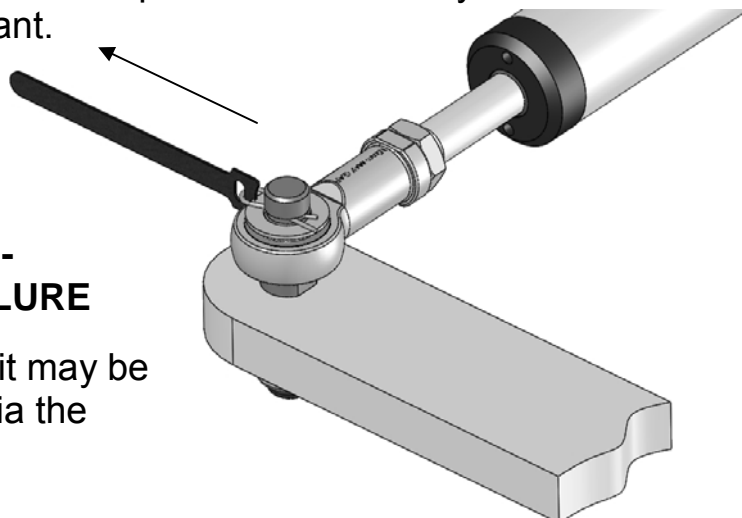
### Cylinder Seals

Should service replacement seals be required, a kit is available from your nearest dealer under the following part code: R4100-sk. State the serial number of your unit when ordering.

## EMERGENCY QUICK RELEASE

In the unlikely event of failure of the actuator a quick release R-Clip is fitted to the tiller bolt which secures the actuator to the steering quadrant.

Pull the red tab to release the R-Clip and then manually lift the actuator clear of the steering quadrant.



## EMERGENCY STEERING - PRIMARY STEERING FAILURE

If the primary steering fails it may be possible to steer the boat via the auto-pilot controls.

## TECHNICAL DATA

### Pump

The pump fitted to the HS+50+ system is the PR+25 model.  
Please refer to the PR+ manual for technical and service details.

### Cylinder

Volume	538cc (Nominal)
Area	176.6mm <sup>2</sup>
Stroke	305mm
Adjustment	± 15mm

### Performance

Maximum thrust (intermittent)	1080kg
Hard over time nominal	13 sec
Temperature rating minimum	-20°C
Temperature rating maximum	+65°C
Relief valve setting	62 bar (1080kg)

### Orientation

Red lead Positive  
Cylinder Retracts

### Clutch

Coil voltage nominal	12 or 24v DC
Coil power continuous	12 watt
Protection	IP67
Connection	DIN 43650 4-9mm cable

### Fluid

ISO VG10 to VG40 Hydraulic mineral fluid  
meeting ISO 6743-4 HV

The following commercial fluids are suitable.  
Fuchs Renolin B15 HV1  
Seastar HA5430





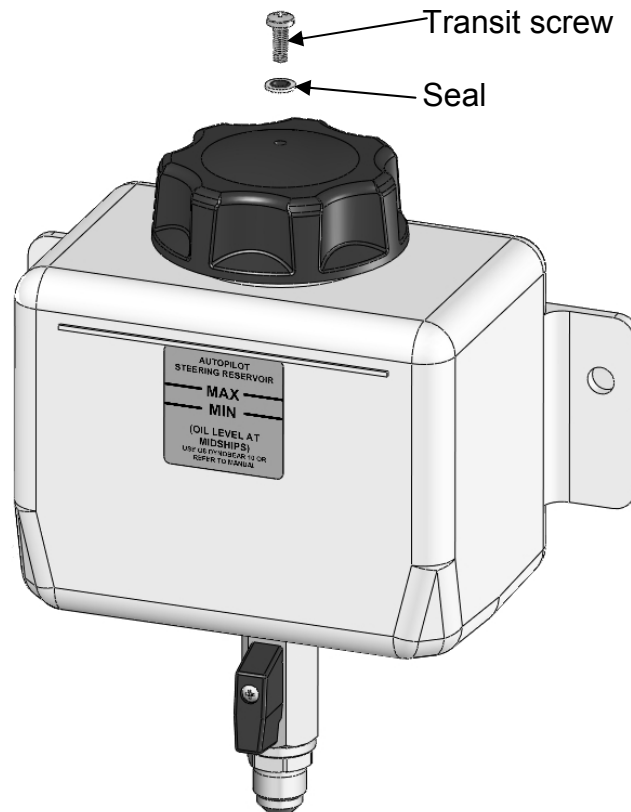
## RESERVOIR PREPARATION

### IMPORTANT!

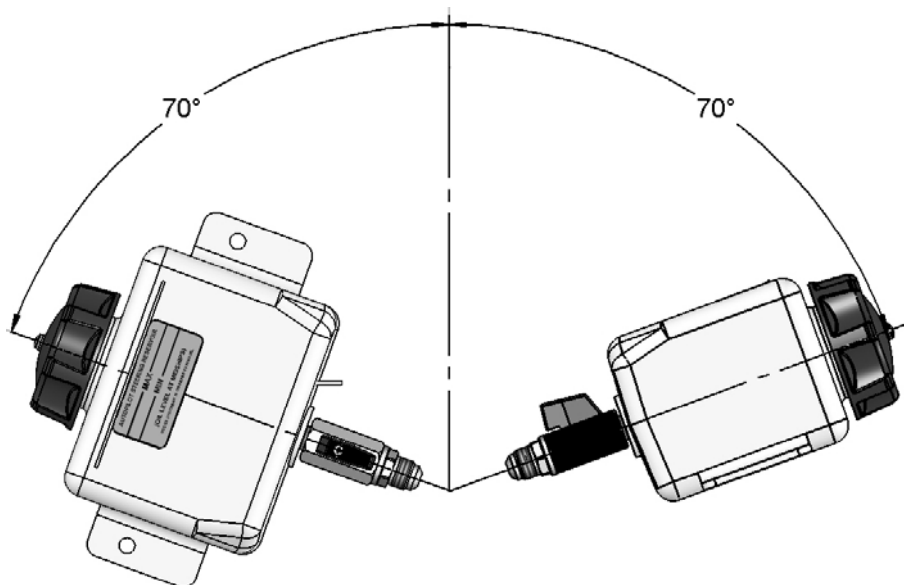
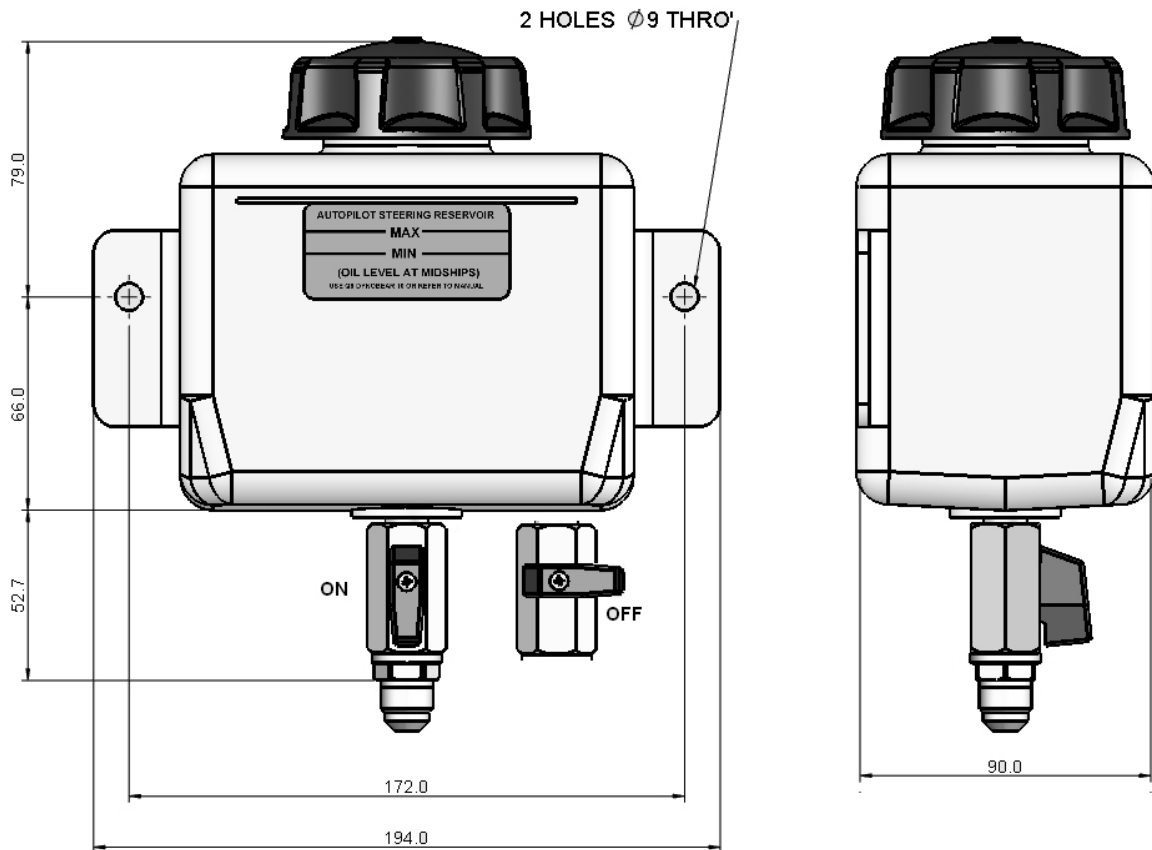
The reservoir is fitted with a special cap with a breather hole that is sealed for transit and must be opened before operation.

Do not attempt to move the cylinder rod before completing the following steps;

- 1) Mount the reservoir on a bulkhead as far above the pump and cylinder as possible using both the mounting holes provided.
- 2) Remove the transit screw and seal from the cap to open the breather. Retain for future use.
- 3) Fill the reservoir to the max level indicated on the label using the top-up oil included in the carton.
- 4) Turn the tap to the 'ON' position.
- 5) Check the mid-ships oil level and top up if necessary.

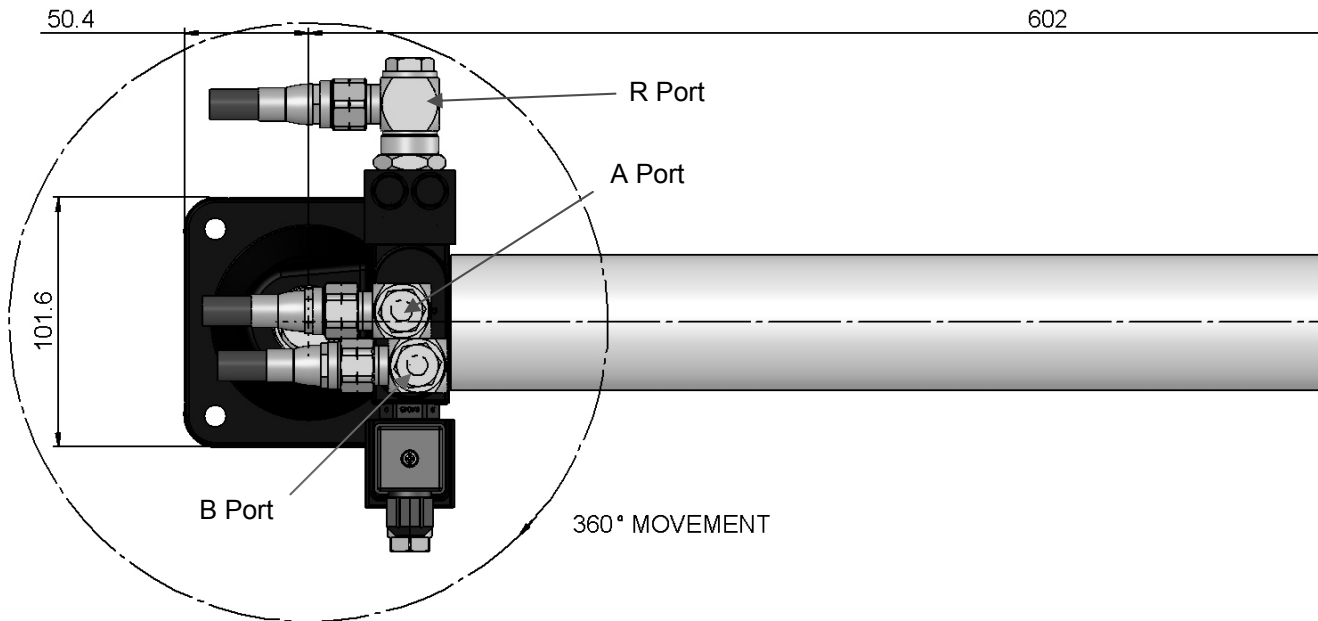


## RESERVOIR INSTALLATION



MAX HEEL ANGLES  
(BULKHEAD MOUNTED)

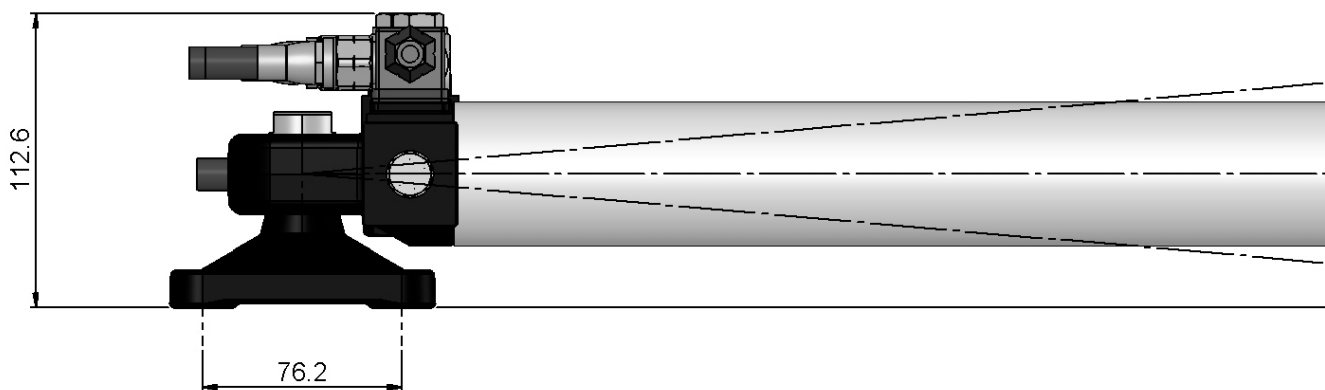
## CYLINDER INSTALLATION

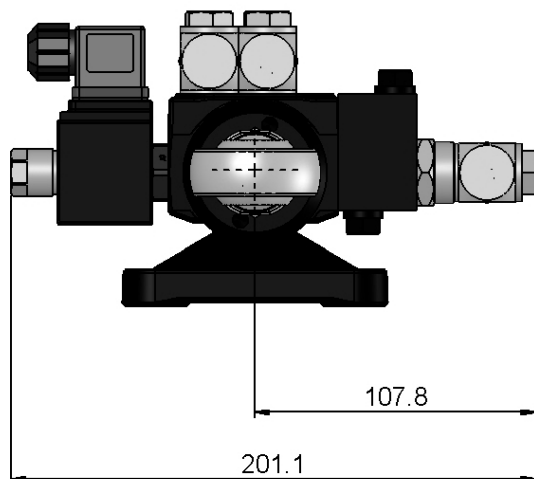
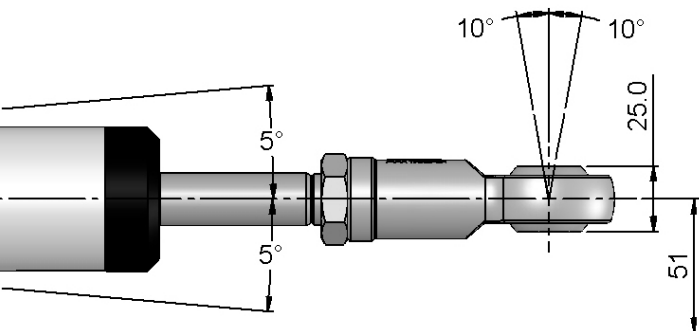
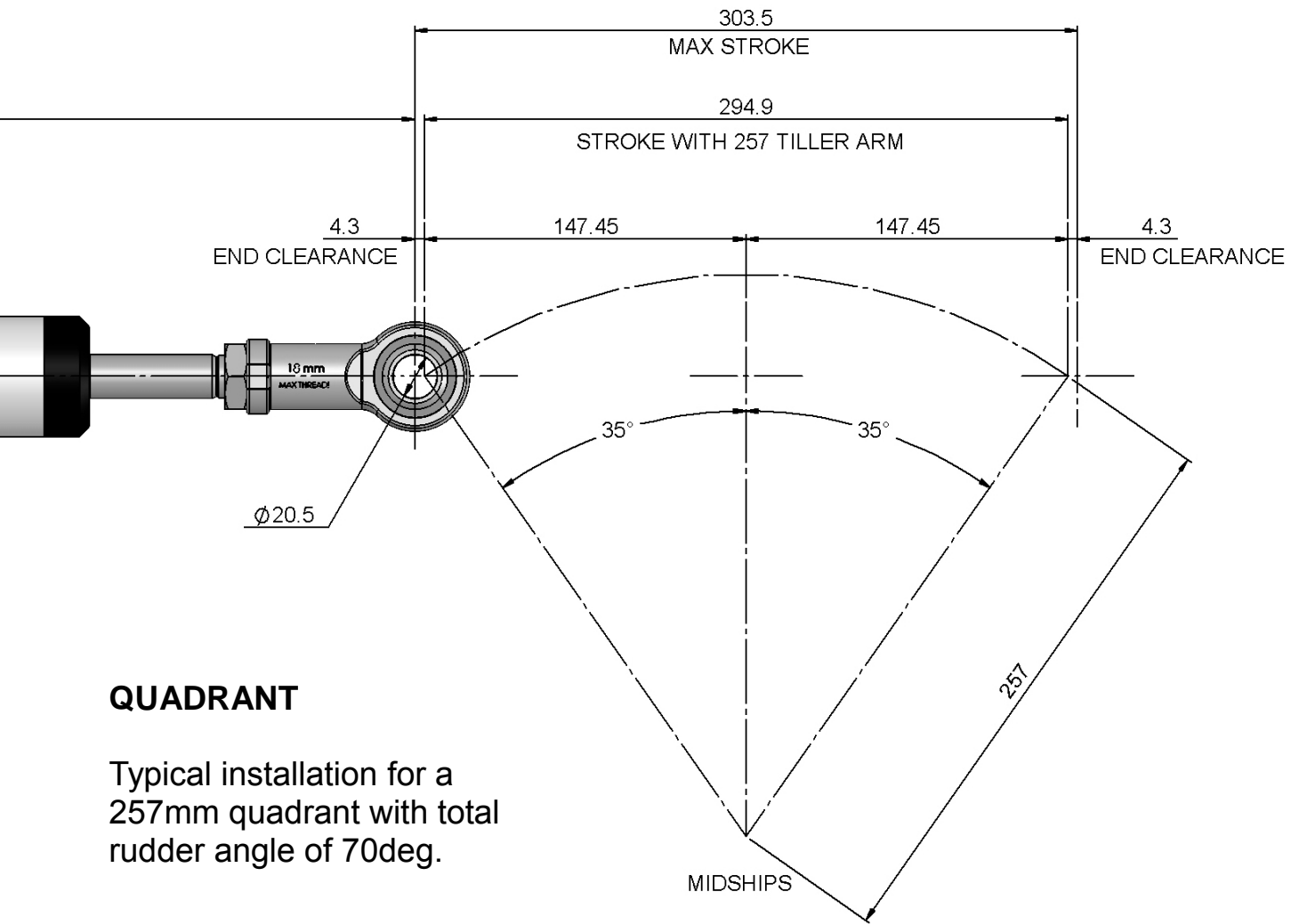


Ensure that cylinder rod movement is limited by the Steering end-stops and not by the actuator.

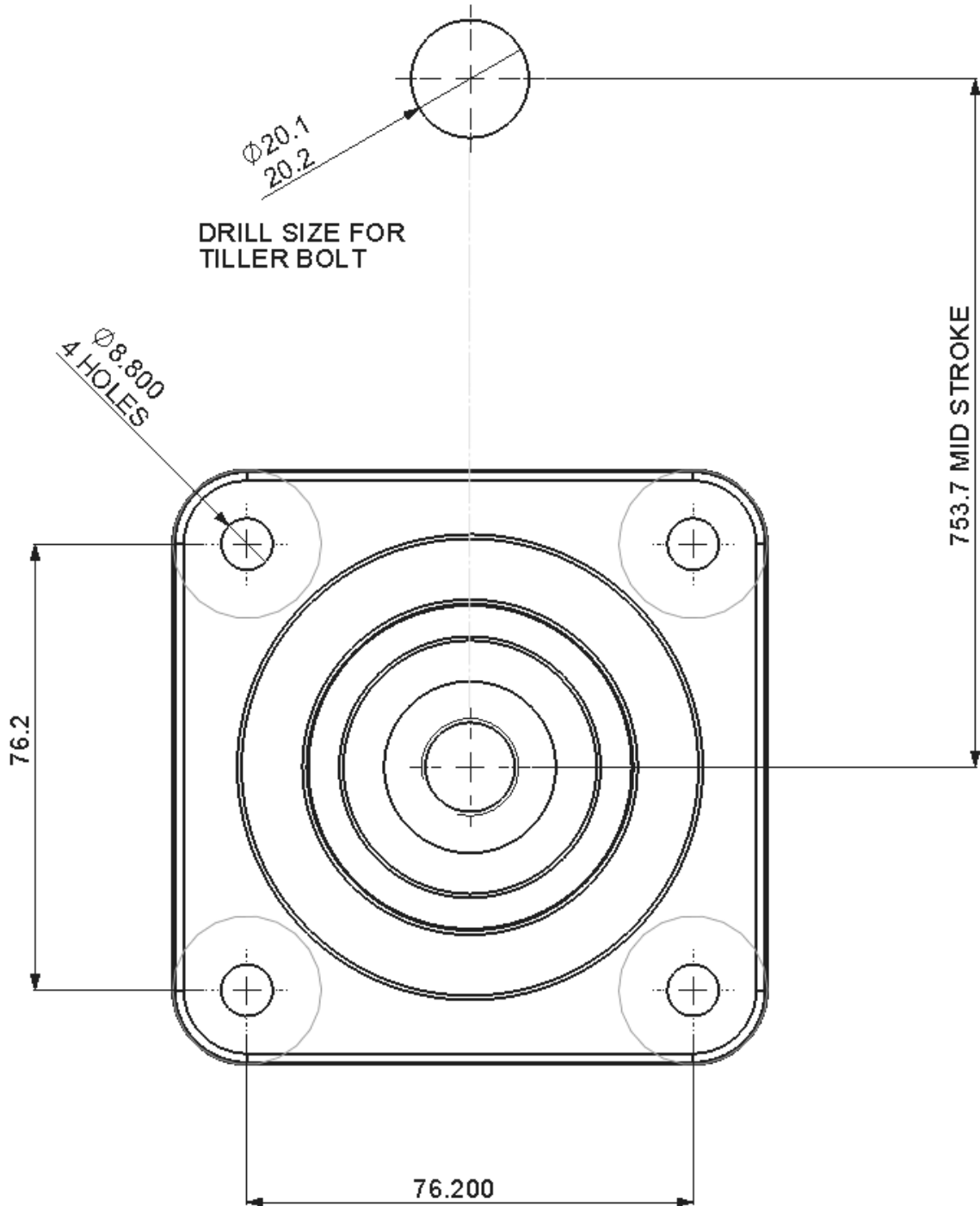
Check that no part of the actuator fouls the structure of the vessel or quadrant throughout its full range of movement.

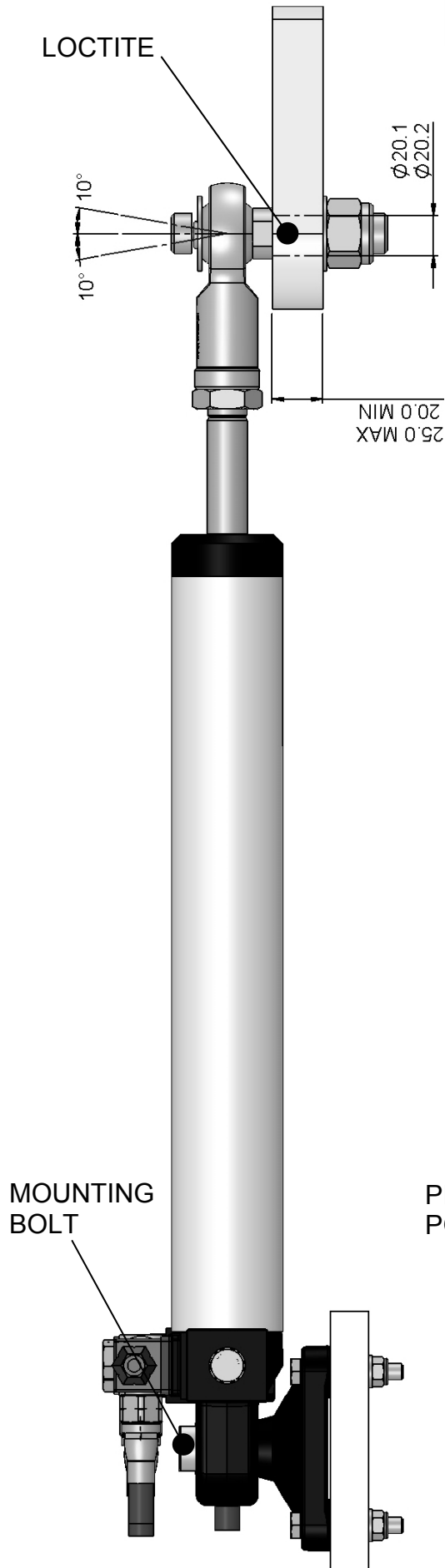
**Warning!** Do not exceed the  $\pm 5^\circ$  angle at the extremes of stroke, damage to the cylinder bearings and rod will occur. Check carefully before commissioning.





**DIMENSIONS FOR CYLINDER MOUNTING FOOT  
(NOT TO SCALE)**





## TILLER BOLT

The tiller bolt supplied is suitable for a quadrant thickness of 20 to 25mm.

The tiller bolt mounting hole should be drilled Ø20.1 to 20.2mm.

An application of Loctite 638 or a commercial equivalent where shown is recommended.

Tighten the M20 nut to 68Nm

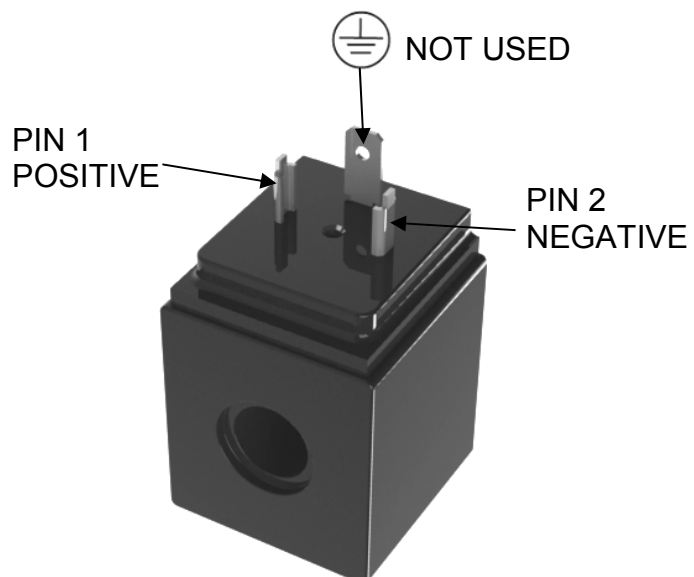
## MOUNTING FOOT

The four M8 nuts, bolts and washers supplied are suitable for mounting the actuator onto a surface of between 12mm and 24mm thick

Tighten the four M8 nuts to 17Nm

Tighten the central mounting bolt to 70Nm

## COIL CONNECTIONS



## REFILLING AND BLEEDING

**Use this procedure if air has entered the hydraulic system or if it has been dismantled.**

Important! Use only the recommended hydraulic fluid – see page 8.

Before commencing ensure that any containers are clean and free of contamination. Please dispose of any waste fluid and materials responsibly.

Danger of entrapment! - Keep clear of moving steering components and linkages at all times.

Procedure:

Assemble the drive with pump, hoses, reservoir and install. Except –

Do not connect the motor to the course computer (the pump is not used to bleed the system).

Do not connect the ram to the quadrant.

- 1) Engage the clutch by turning the Autopilot on (refer to the Autopilot manual).
- 2) Fill the reservoir and turn the tap on.
- 3) Loosen the reservoir hose at the ram (but do not disconnect it). Fluid will emerge, tighten when all air bubbles have gone, top up the reservoir
- 4) Remove A and B hoses from the pump and place the ends in a container of fluid.
- 5) Slowly pull and push the ram fully in and out ensuring the ends remain immersed until all air has been expelled.
- 6) With the ram in mid position reconnect A and B hoses to the pump. Check the reservoir level and top up if required.
- 7) Turn the Autopilot off.
- 8) Reconnect the motor to the course computer and the ram to the quadrant.

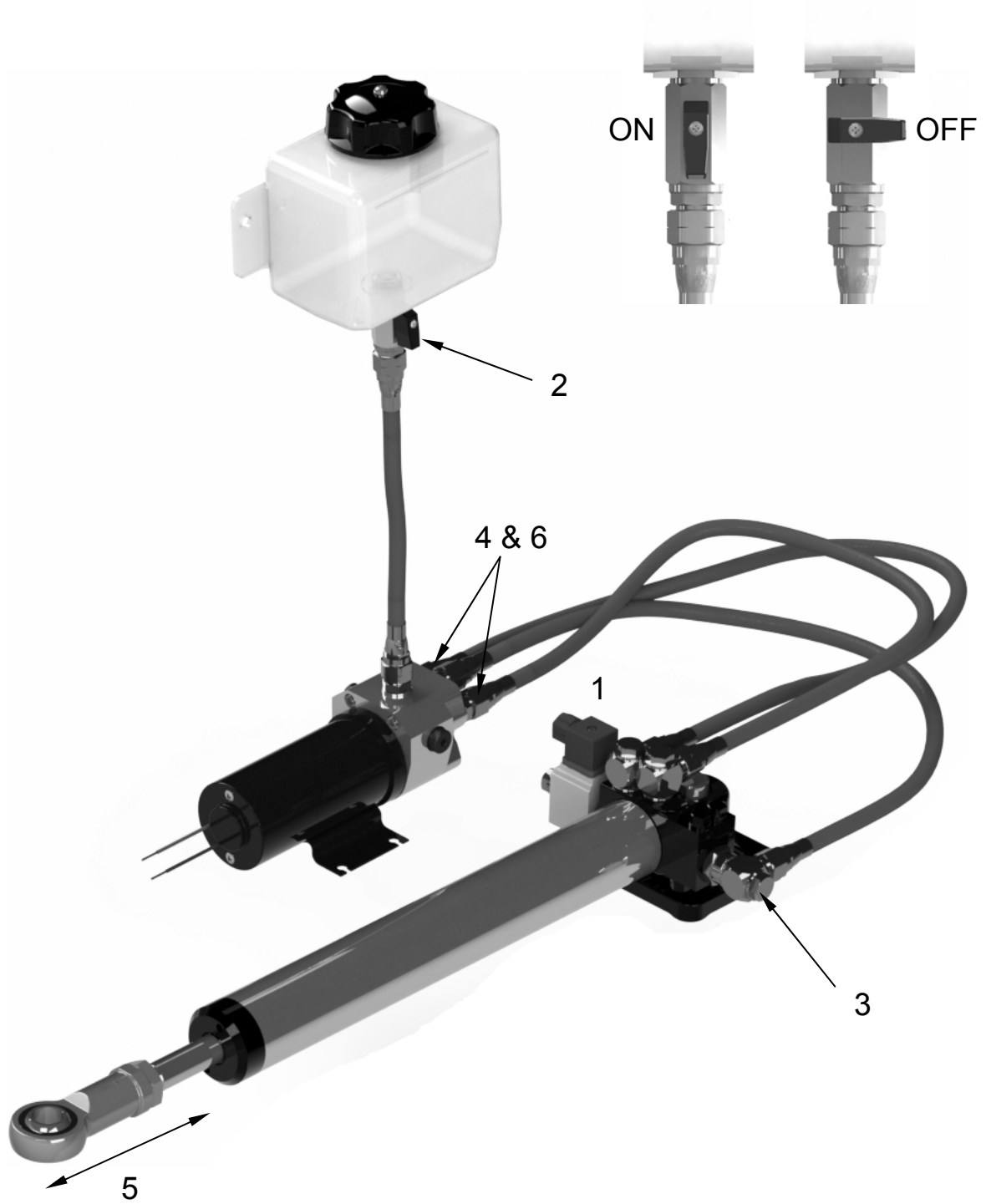
The Drive is now ready to run. If it initially fails to respond to the autopilot correctly use the wheel to assist by turning in the same direction as the ram. This will move any air trapped in the pump.

Note. If the drive uses a constant running pump remove the hose and fitting from the reservoir port, fill and replace the fitting and hose before 3) above.



# Hy-ProDrive™

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## HYDRAULIC FLUID

Caution 

Do not use Brake fluid. Use mineral based good quality hydraulic fluid compatible with nitrile hydraulic seals. Ref page 8.

## OIL BIO FOULING

It is recommended that the oil in the reservoir is inspected every 12 months for contamination (every 3 months in tropical climates). If there is any sign of discolouration, smell or growth, turn the tap off and remove the reservoir from its mountings. Drain the contents, clean and refill with fresh oil.

If the vessel is to be laid up for more than 3 months turn the reservoir tap off and inspect the oil prior to re-commissioning.

Bio fouling can result in damage to the solenoid clutch. If this is suspected the complete system must be drained, cleaned and refilled (Ref. page 16).

Replacement clutches are available from your dealer, please state your units serial number in all correspondence.

## COMMISSIONING

Caution 

Be aware of the danger of moving linkages and the risk of entrapment.

Use the primary steering to check the full range of movement before commissioning the Auto-Pilot.

Caution 

Check the unit for damage and leaks after installation.

## ENVIRONMENTAL

Please ensure all waste materials and fluid is disposed of properly after installation.  
At end of life disposal this product should be recycled.

## FAULT FINDING

**Under no circumstances dismantle the unit unless it is certain that the fault is internal. Doing so will allow air into the cylinder, requiring the unit to be bled for which special tools are needed. Ref. page 16.**

Caution 

Any damage to the piston rod will damage its seals and allow air into the cylinder and oil leaks.

1) Motor does not run

: check electrical connections.  
: check course computer output.

2) Motor runs, but erratic or no piston movement

: check for solenoid operation.  
: check for air in the cylinder and external leaks.  
: check drive coupling.

3) Excessive noise

: check the motor for damage.  
: check for air in the cylinder and external leaks.  
: check drive coupling.

4) Failure of clutch to engage or disengage

: check solenoid operation.



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