Hy-ProDrive

Marine Steering Technology
By Hydraulic Projects Ltd

HS+40

Marine Hydraulic Steering System
Installation and Service Instructions

Serial Number

Please record your serial number here

R4432-m21 iss.02
Released\11 Product Documentation & Labels\Manuals & Enclosures\Customer Documentation\Hypro\R4432-m21.pdf

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

Please keep this manual in a safe place

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 not designed as a primary steering mechanism and 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.

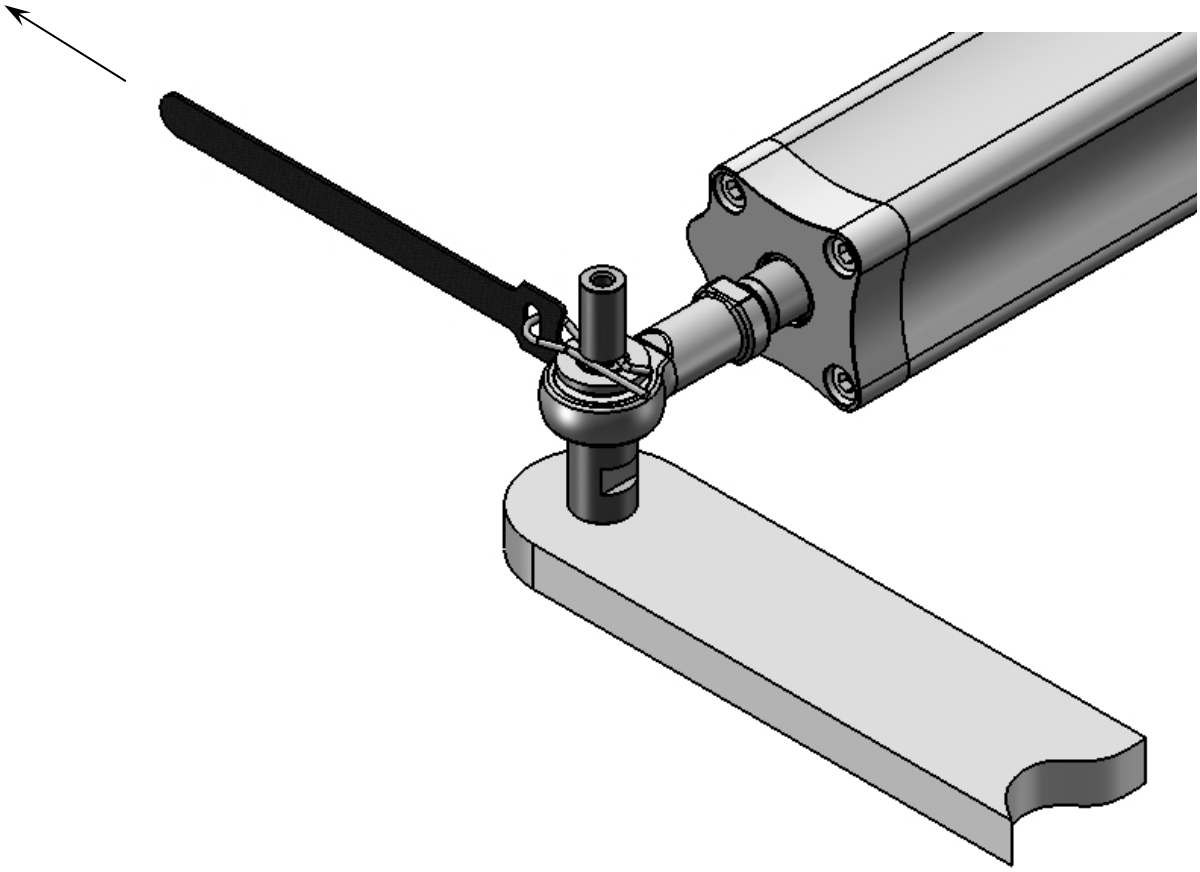
Beware of hot motor and solenoid components and the risk of entrapment from moving parts.

Do not flash test.

EMERGENCY QUICK RELEASE

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

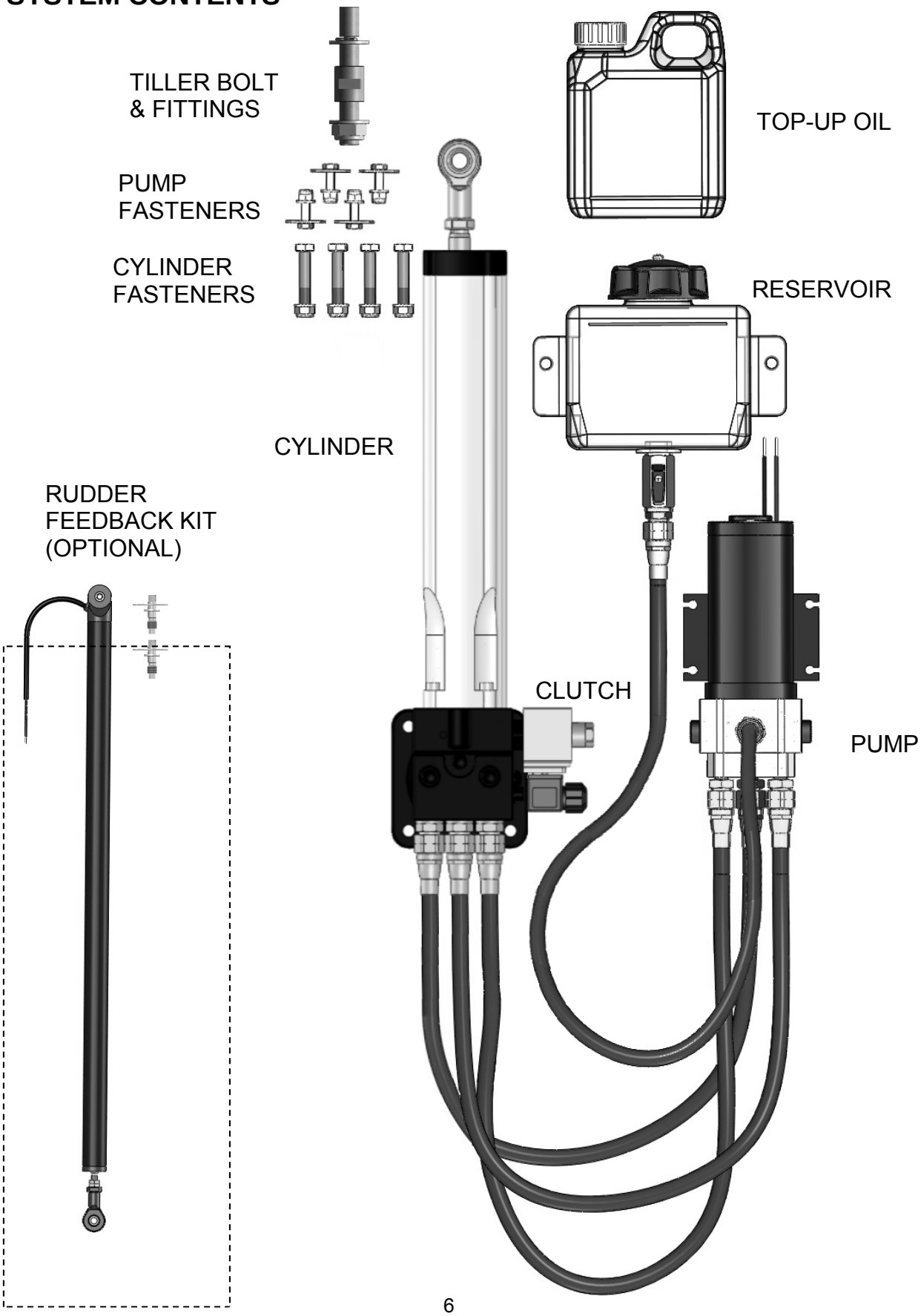
Pull the red tab to release the R-Clip and then manually lift the cylinder clear of the steering quadrant.



EMERGENCY STEERING - PRIMARY STEERING FAILURE

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

SYSTEM CONTENTS



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DESCRIPTION

'HS+40' 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 16 before commencing installation.

Pump

The pump fitted to the HS+40 systems are the PR+10 and PR+20 models. Please refer to the PR+ manual for technical details.

Cylinder

Volume	293cc (Nominal)
Stroke	254mm
Adjustment	± 5mm

PERFORMANCE

	Hard over time seconds at 5 kg	Typical max thrust kg
HS+4010	13	700
HS+4020	9	700

TECHNICAL DATA

Voltage	12 / 24 VDC			
Current	Typical Amp-hour 60 kg at 25% duty		Typical Current Intermittent 650 kg	
	12V	24V	12V	24V
HS40+10	2.0	1.0	19.0	9.0
HS40+20	2.5	1.3	25.0	12.0

Ingress protection	IP67
EMC Protection	BS EN 60945:2002 (DC)
Ignition Protection	BS EN 8846:2017
Ambient operating Temperature	-15 to + 55 deg C
Max Operating Thrust	700 kg (Intermittent)
Relief Valve setting	62 bar (730 kg)
Orientation	Red lead to positive - Cylinder Retracts
Clutch coil	12W
Clutch connection	DIN 43650 (6-8 mm cable)
Fluid	ISO VG10 to VG40 hydraulic mineral fluid to ISO 6743-4 HV The following commercial fluids are suitable. Fuchs Renolin B 15 HV1 Seastar HA5430
Weight	8 kg

TECHNICAL DATA

Ports

Cylinder	G1/4(BSP) parallel BS2779’73

Hoses

Threads	5/8-18 SAE female swivel
Material	Brass
Type	Marine Steering Hose 1000 PSI Working Pressure 5/16” I/D
Length	1m

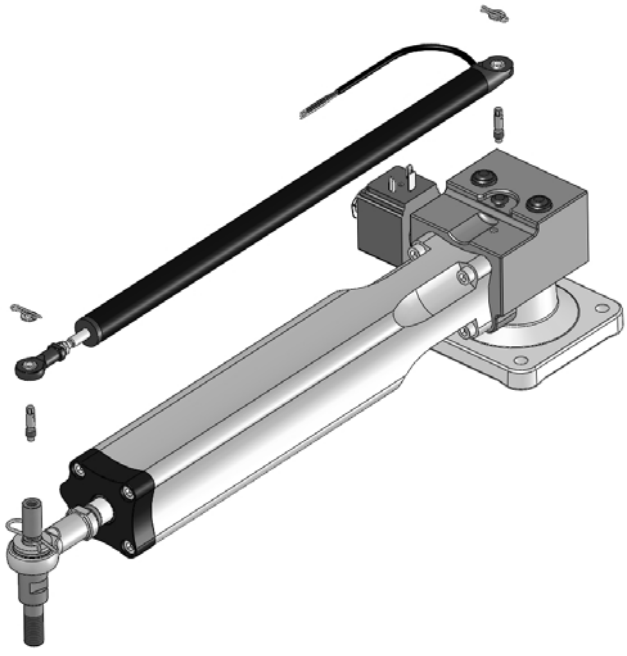
Materials

Body	Aluminium BS 1490
Cylinder rod	Stainless Steel Chrome Plated
Seals	Nitrile & PTFE
Body Protection	SP270

System Weight 15 kg Gross

RUDDER FEEDBACK UNIT (Optional)

A rudder reference or ‘feedback’ unit is available as an option for the HS+40 System. Please contact your dealer for details Ref. Part no. R4054.



SYSTEM SELECTION

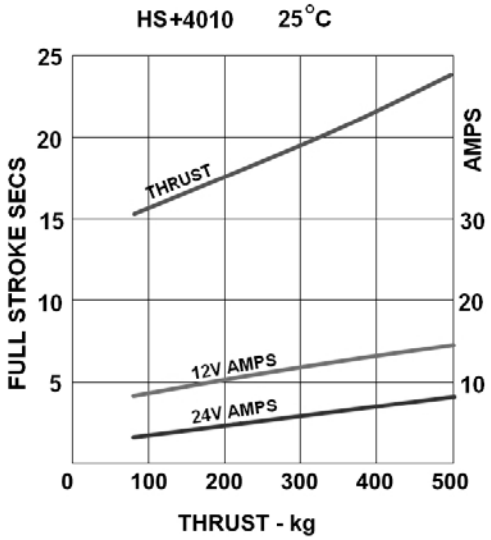
It is important to select the correct size of system as it directly influences the steering performance and power consumption.

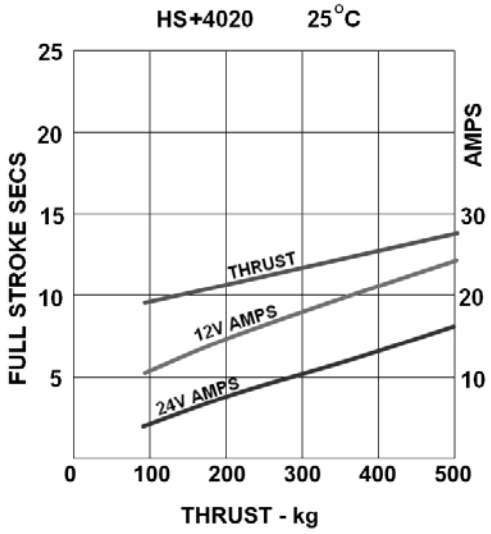
The type of vessel to be steered must be considered. The hard over time may be faster on a light weight planning craft and modern yachts or slower on a displacement power boat or long keel yacht.

Also consider the rudder, an unbalanced rudder will require more torque than a semi- balanced or balanced design.

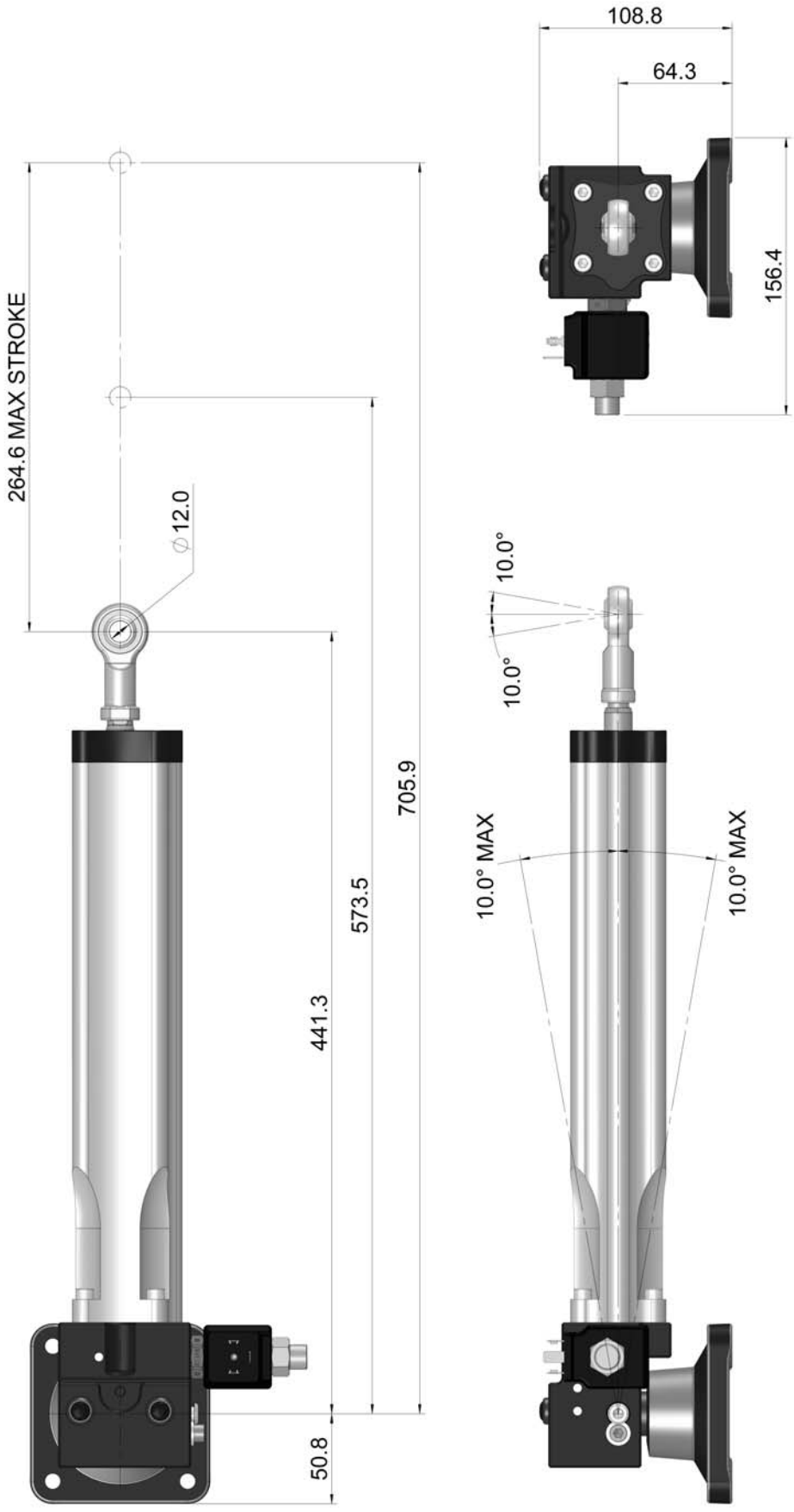
	Hard over time	Tiller arm	Rudder Deg.	Typical Max Torque
HS+4010	13 sec	190 mm	80	120 kg
	13 sec	213 mm	70	140 kg
	13 sec	245 mm	60	160 kg
HS+4020	9 sec	190 mm	80	120 kg
	9 sec	213 mm	70	140 kg
	9 sec	245 mm	60	160 kg

Hard over time is the time to move the cylinder full stroke (255 mm at 5 kg)
Typical max torque intermittent is calculated at 650 kg thrust.





DIMENSIONS


108.8
64.3
156.4
264.6 MAX STROKE
Ø12.0
705.9
573.5
441.3
50.8
10.0°
10.0°
10.0° MAX
10.0° MAX

LOCATION

The HS+40 System is designed for under-deck installations only.
When considering where to mount the actuator the following points should be taken in to account.

- Keep cable runs short
- Mount away from sources of heat
- Install the system above areas liable to flooding.
- Use a solid surface, capable of supporting the large thrusts generated.
- Ensure that piston movement is limited by the rudder hard stops and not by the cylinder end stops.
- Allow sufficient clearance for removal of the mounting pin. (See page 15)
- Check that no part of the cylinder fouls the vessel or rudder quadrant throughout its full range of movement.
- Keep the area in which it is mounted clear of equipment and obstructions.
- Maintain access to the quick release tab at all times and ensure that it is not liable to entanglement.
- Warning! Do not exceed the +/-10º angle at the extremes of stroke. Damage to the cylinder bearings and rod will occur.
  Check carefully before commissioning.

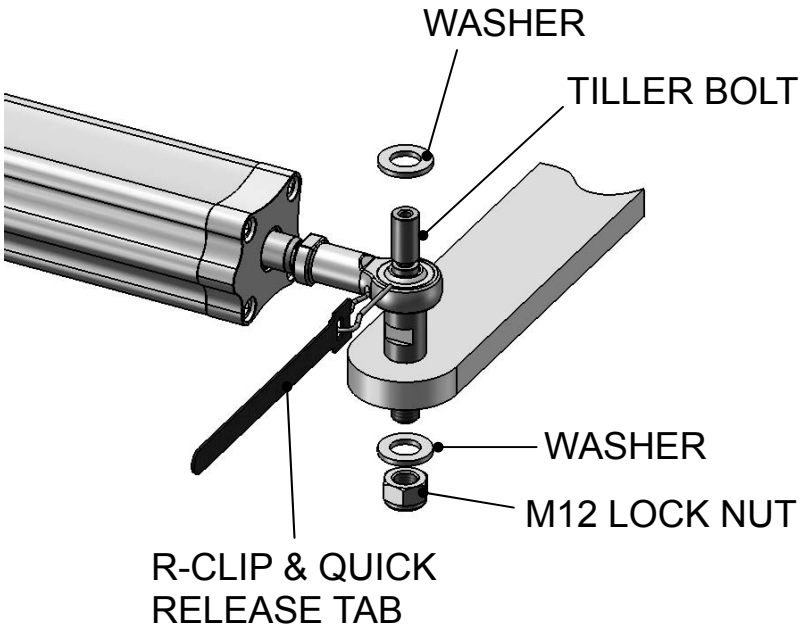
TILLER BOLT

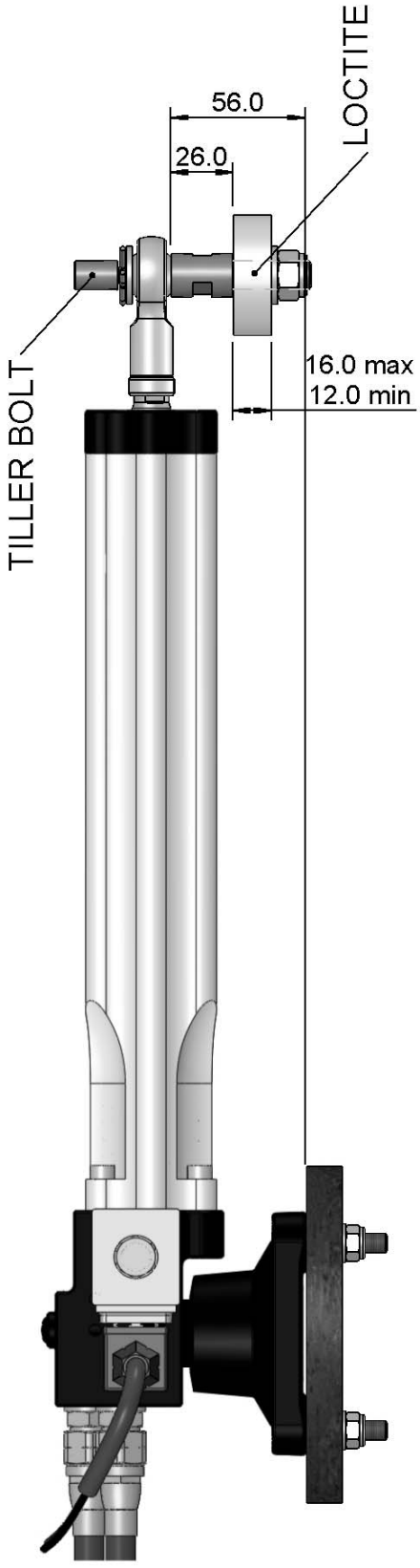
The tiller bolt supplied is suitable for a quadrant thickness of 12 to 16mm.

The tiller bolt mounting hole should be drilled Ø12.2 to 12.3mm.

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

Tighten the M12 nut to 27Nm Torque





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

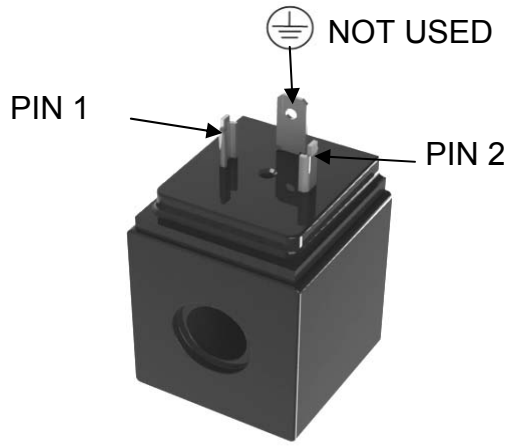
QUADRANT

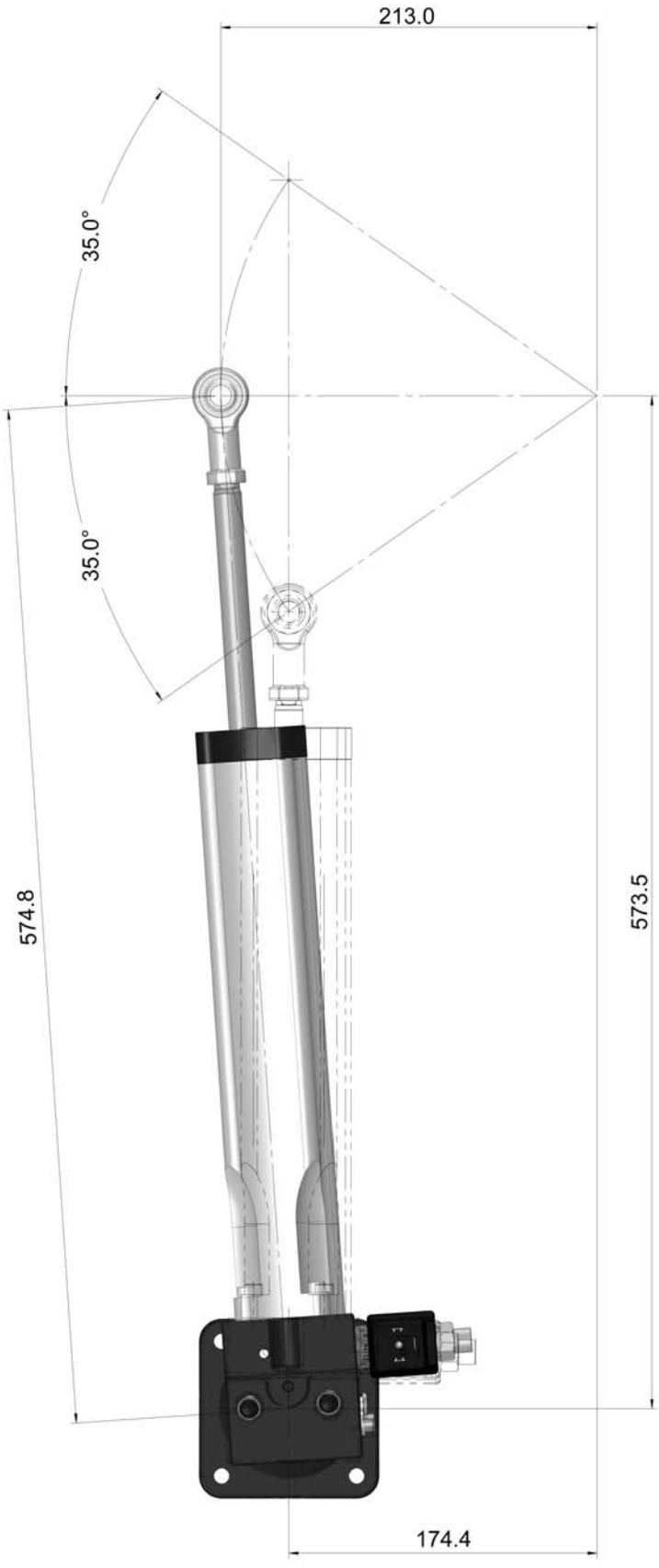
Typical installation for an 8.4” (213mm) radius with total rudder angle of 70deg.

CONSIDERATIONS

Allow sufficient clearance for removal of the mounting pin and rod end from the tiller bolt.

COIL CONNECTIONS





DISMOUNTING THE UNIT FROM ITS BASE

The HS+40 features a quick-dismount base.

To remove the base from the unit first take off the coil which is secured by a 17mm A/F nut. Next undo and remove the Allen screw ‘A’ and the retaining plate ‘B’ . Withdraw the mounting pin ‘C’ which will release the base.

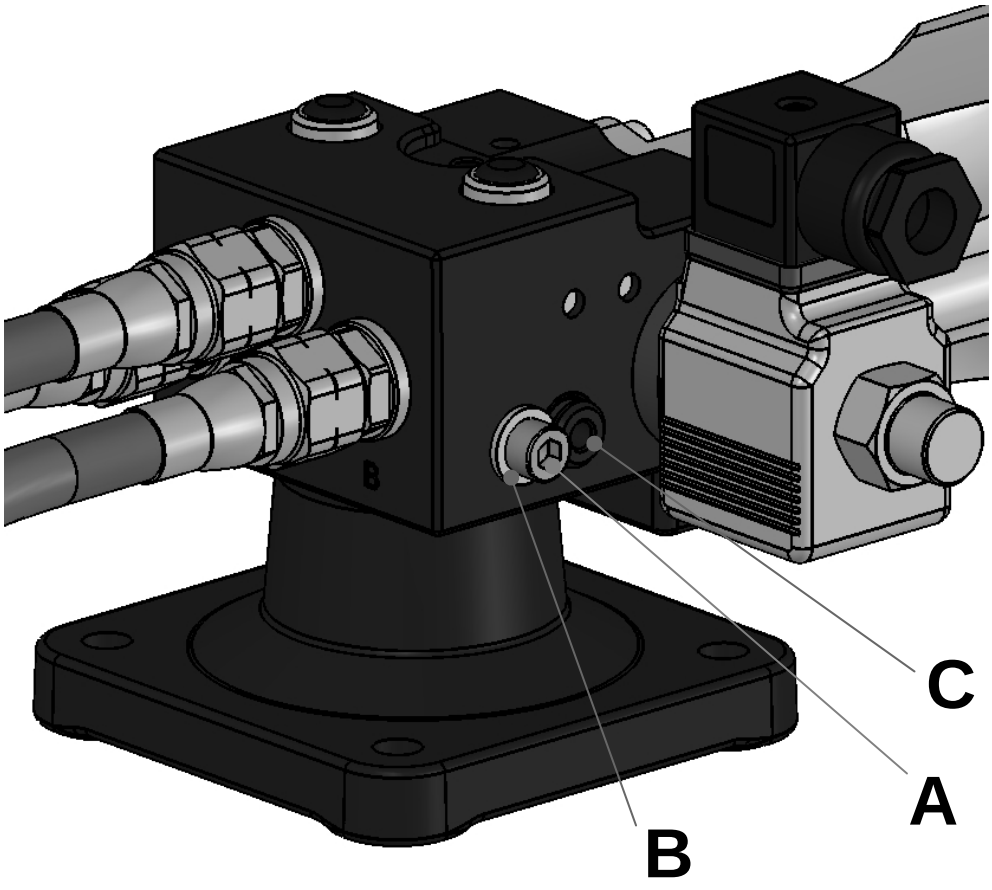
NOTE!

The pin is a close engineered fit and if it proves difficult to remove take off the plastic cap from the head of the pin and insert screw ‘A’ into it. It will then be possible to withdraw the pin using a pair of pliers or grips.

IMPORTANT!

Avoid damage to the pin

Assembly is a reversal of the removal process. Ensure the plastic cap is re-fitted to the pin upon completion.



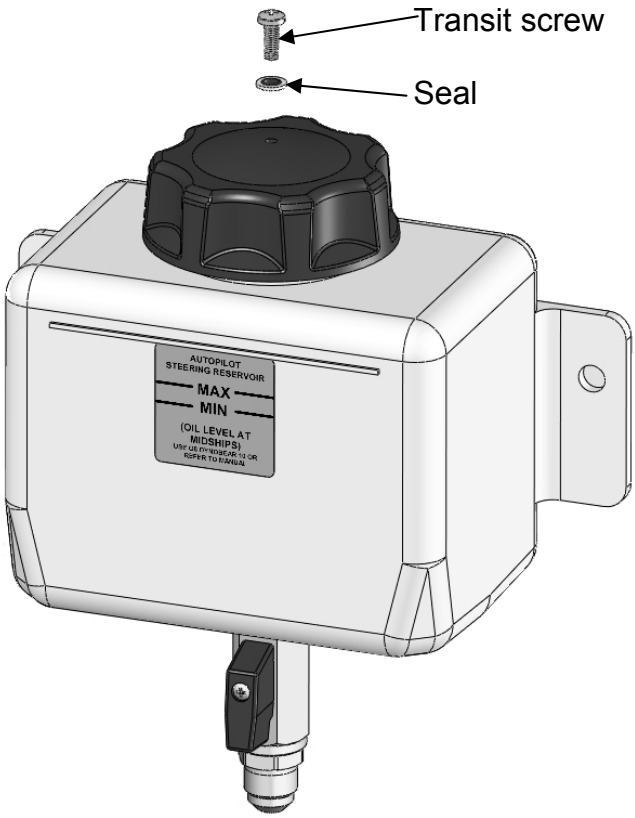
RESERVOIR PREPARATION

IMPORTANT!

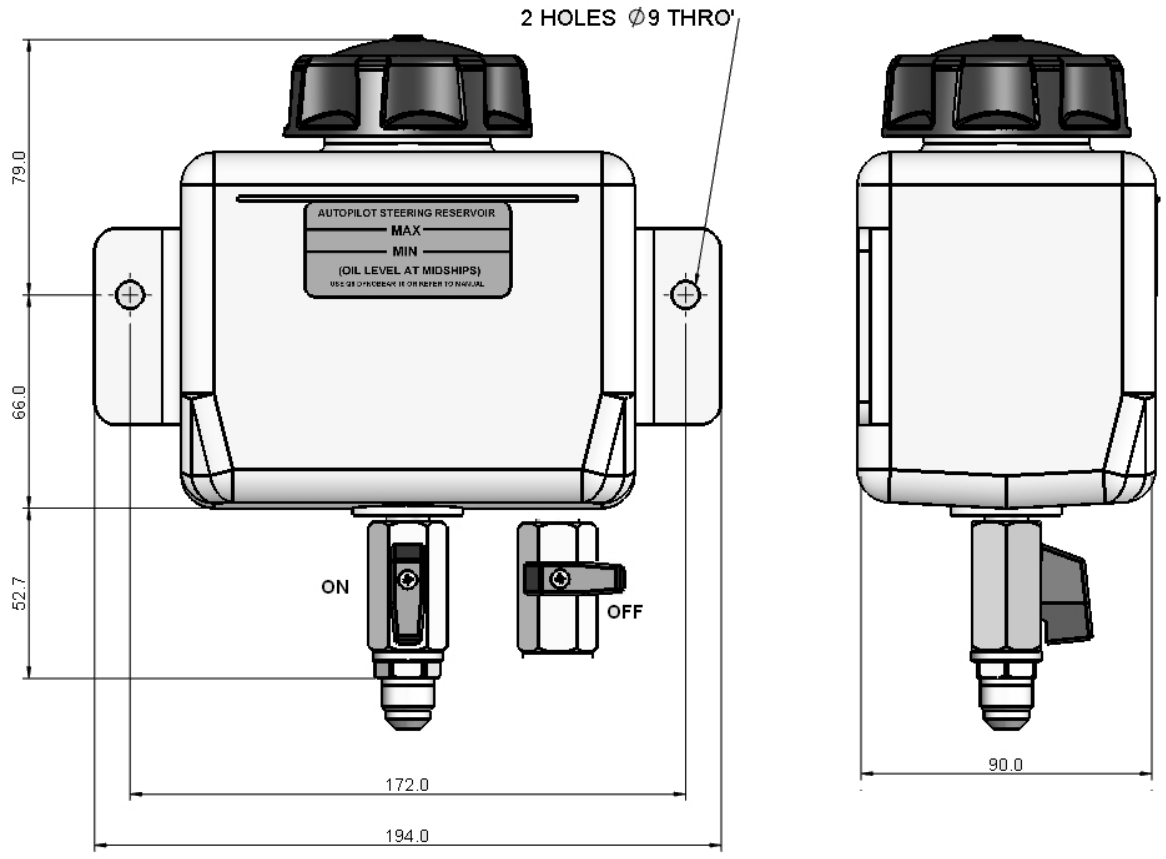
The reservoir is fitted with a special cap with a breather hole that is sealed for transit and must be opened before operation.

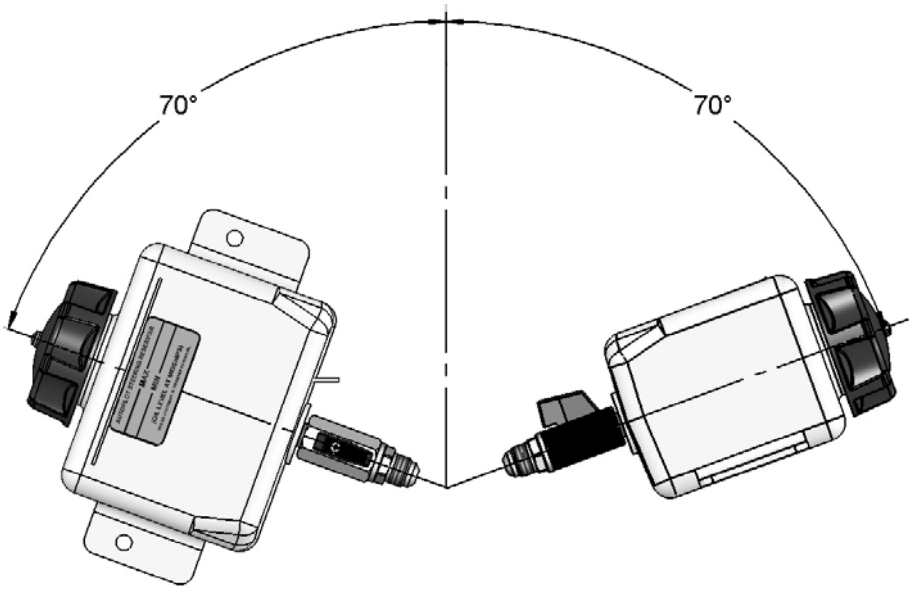
Do not attempt to move the cylinder rod before completing the following steps;

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.



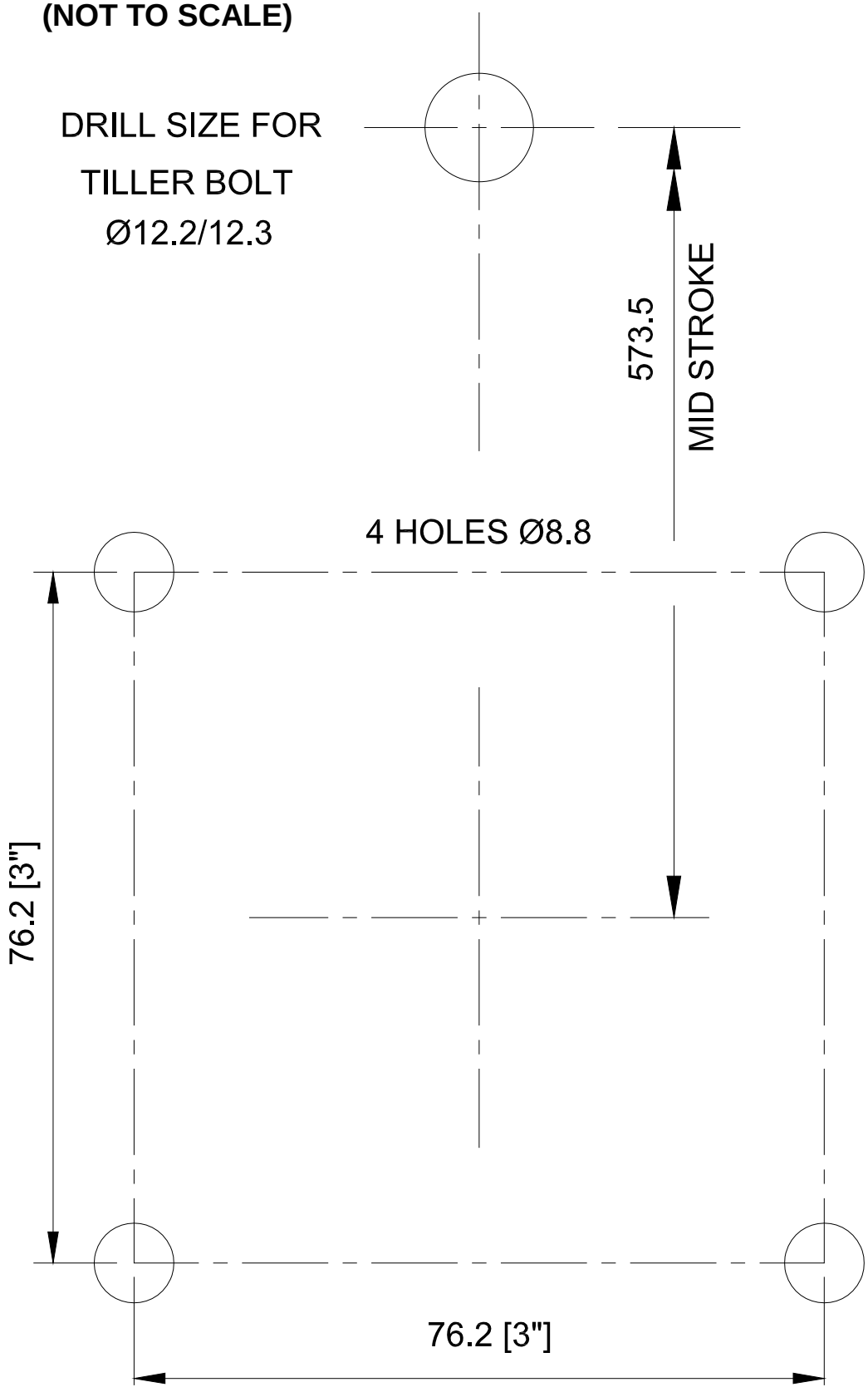
RESERVOIR INSTALLATION





MAX HEEL ANGLES
(BULKHEAD MOUNTED

DIMENSIONS FOR MOUNTING FOOT
(NOT TO SCALE)



MAINTAINANCE

Quality precision engineering will ensure many years of trouble free service if the following points are adhered to.

: Keep the piston rod free from damage
: Avoid exposing the unit to salt water.

Perform the following checks regularly:

: Check the security of the mounting bolts and tiller pin.
: Examine electrical cables and connections for damage and corrosion.
: Lubricate the mounting pin and rod end with marine grade grease.

In the unlikely event that new seals are required a kit is available:
Hydraulic Projects Ltd Part No. R4100-sk.

HYDRAULIC FLUID

Caution ⚠
Do not use Brake fluid. Use mineral based good quality hydraulic fluid compatible with nitrile hydraulic seals. Ref technical Data on page 8.

COMMISSIONING

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

The system is pre-filled and bled from new. Do not disassemble the system as this will allow air to enter and necessitate refilling and bleeding (ref. page 20).
Use the primary steering to check the full range of movement before commissioning the Auto-Pilot

Caution ⚠
Check the system for damage and leaks after installation.

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 –

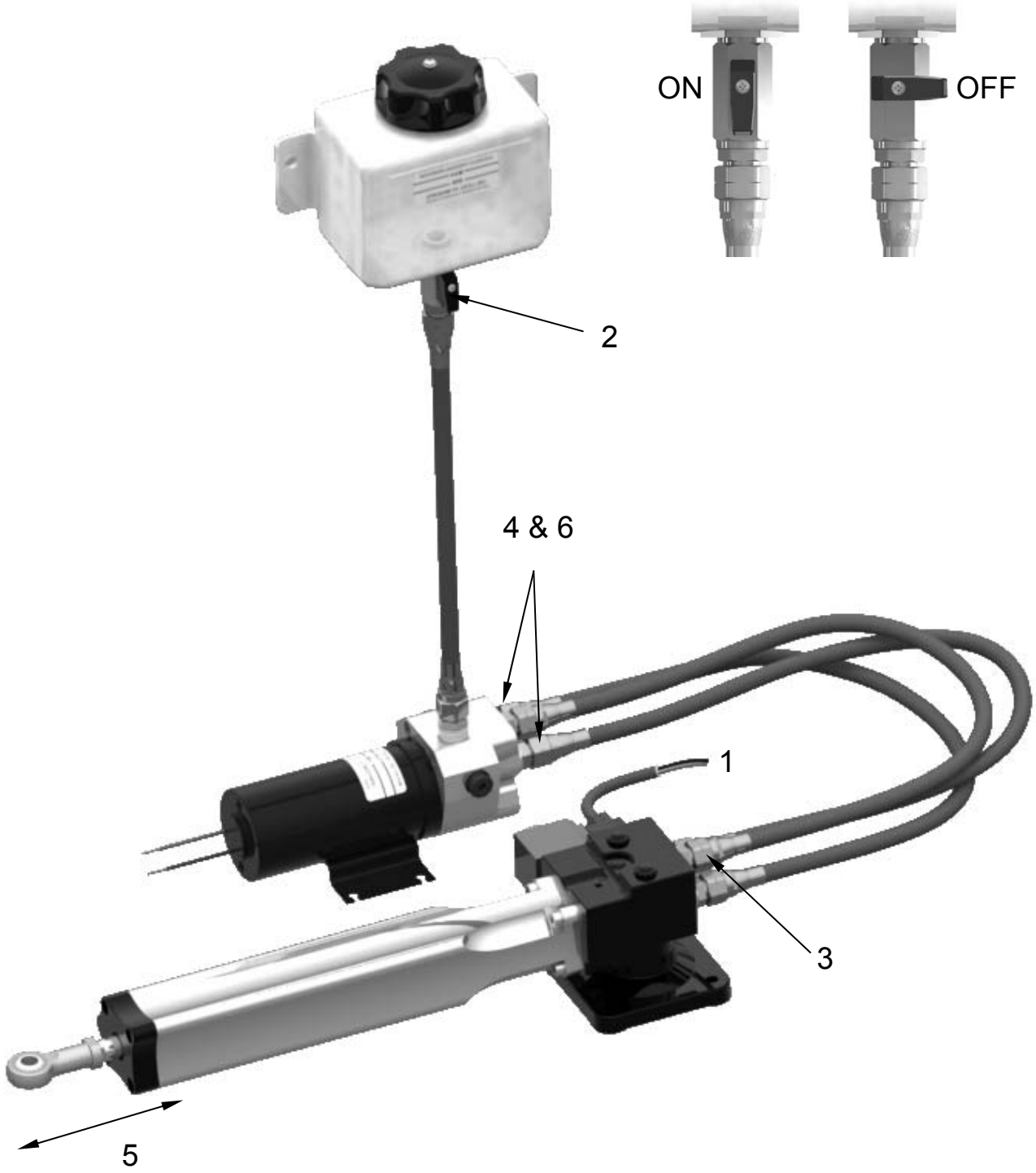
Do not connect the motor to the course computer (the pump is not used to bleed the system).

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.


ON
OFF
2
4 & 6
1
3
5

FAULT FINDING

Under no circumstances dismantle the system unless it is certain that the fault is internal. Doing so will allow air into the cylinder, requiring the system to be re-bled.

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.

GENERAL INFORMATION

Keep this manual in a safe place. Quote the model and serial numbers in all correspondence.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Dealer: _____

CONTACT DETAILS

Hydraulic Projects Limited
Dawlish Business Park
Dawlish
Devon
EX7 0NH
United Kingdom

Telephone +44 (0)1626 863634

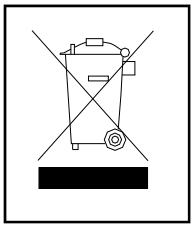
Email sales@hypro.co.uk

Web www.hypro.co.uk

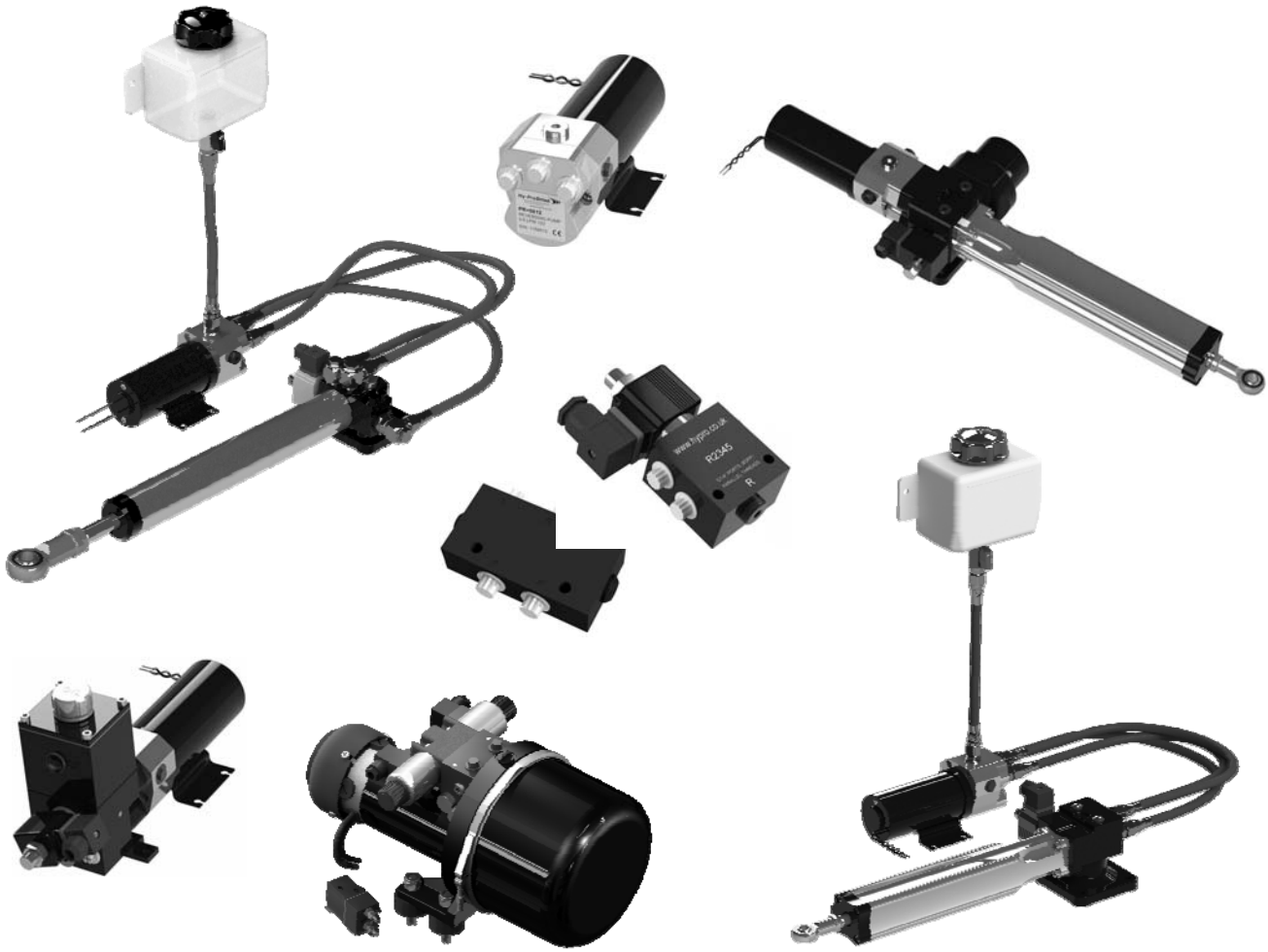
END OF LIFE DISPOSAL

Please dispose of End of Life items responsibly.

In the event that you are unable to use your nearest local authority civic amenity sites to recycle, units can be returned to us at the address above.



Hy-ProDrive
Marine Steering Technology



Our in-house design and technical teams offer the expertise and support expected of an established world-class manufacturer. Our customers, ranging from the agricultural, transport, rail, fishing, construction and industrial sectors, expect named personal support, excellent quality and a rapid service with full back-up…

….we aim to deliver in full.

Call us today to discuss a bespoke solution from our extensive range or simply for competitively priced spares.

Full technical details of our entire range are available to download from our website

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