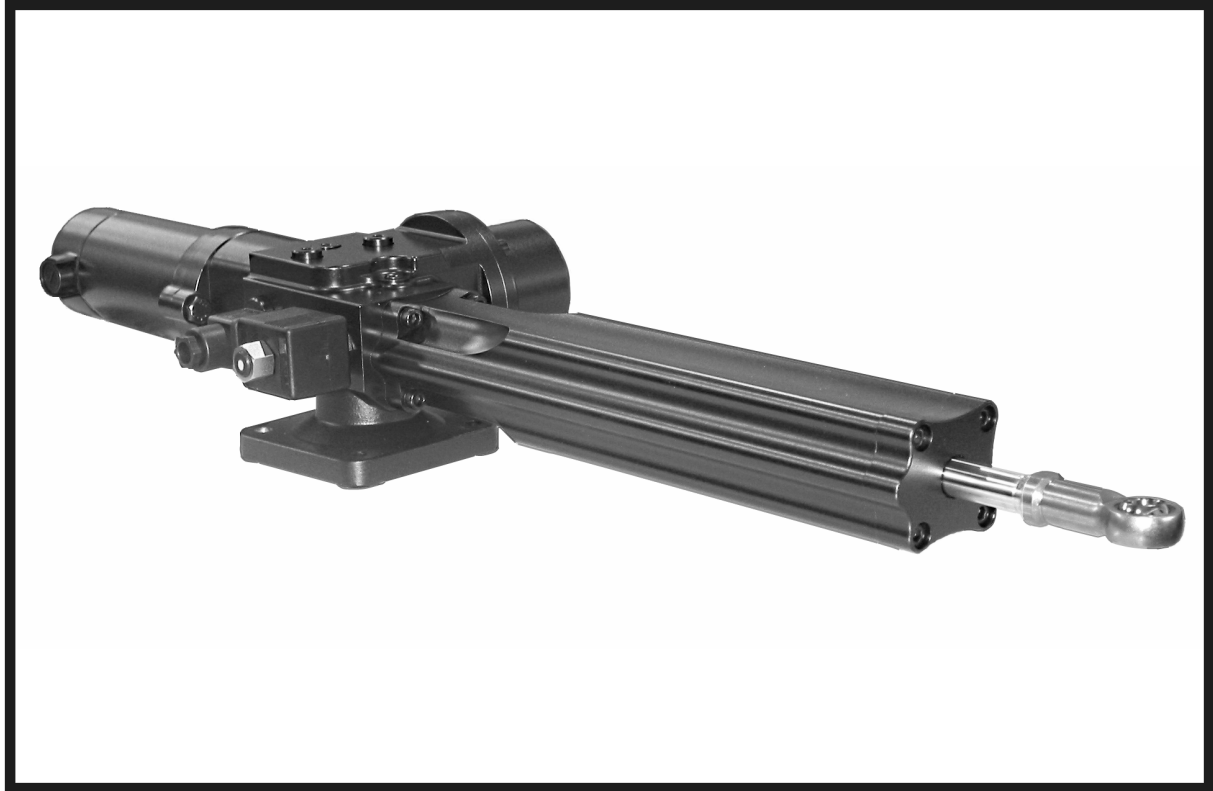


# Hydraulic Projects



## **ML40PLUS** Marine Linear Actuator Installation and Service Instructions

Serial Number

**“Engineering Excellence”**

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 recreational 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.

### **DO NOT FLASH TEST**

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

## **DESCRIPTION**

'ML40*PLUS*' Linear Actuators combine a hydraulic cylinder, pump, motor, clutch and reservoir in one compact unit. 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 - Ref. Installation details.

## **PUMP AND CYLINDER**

Nominal pump flow and cylinder size are indicated on the rating plate. Check the voltage shown is correct for the output of your autopilot.

## **LOCATION**

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

Excessive temperature, vibration and fumes in the atmosphere can drastically reduce motor brush 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. Refer to the installation and technical data pages for further information.

## DISMOUNTING THE UNIT FROM ITS BASE

The ML40PLUS 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.

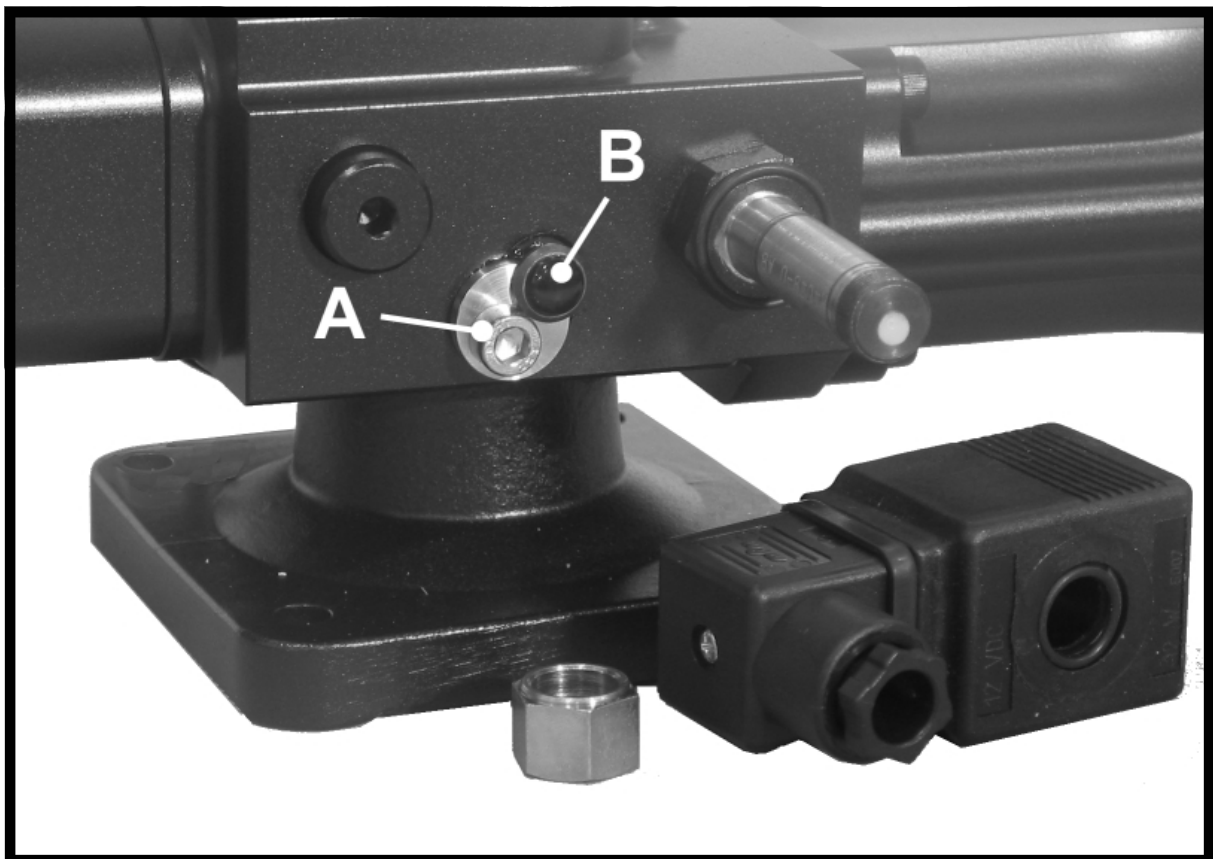
### NOTE!

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.



## **MAINTENANCE & SERVICE**

With a minimum of moving parts and top quality precision engineering the actuator will give 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 tasks on a regular basis:

- Check the security of the mounting base.
- Lubricate the mounting pin & rod end - use only a good quality marine grease that is compatible with nitrile seals.
- Examine all electrical connections.

### **Brushes**

Inspect the motor brushes every 500 hours, or annually, for wear. Replacement motor brushes are available from your dealer. State the serial number of your unit when ordering.

Be sure to clean out all loose carbon before fitting new brushes. If fluid has entered the motor, degrease the brush gear and commutator before running the unit, otherwise arcing will reduce brush life.

### **Motor**

The motor can be removed without affecting the hydraulic circuit. Undo and remove the two M8 nuts and washers and withdraw the motor. When refitting ensure that the coupling is in place.

### **Seals**

Should service replacement seals be required, a kit is available from your nearest dealer under the following part code: ML40PLUS-sk. State the serial number of your unit when ordering.

### **Bleeding**

Special tooling is required to bleed the unit which is available from your dealer. Part no. R4051. Failure to use the kit may result in damage to the actuator.

## 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 7.**

Caution: Any damage to the piston rod will damage its seals and allow air into the cylinder.

### 1) Motor does not run

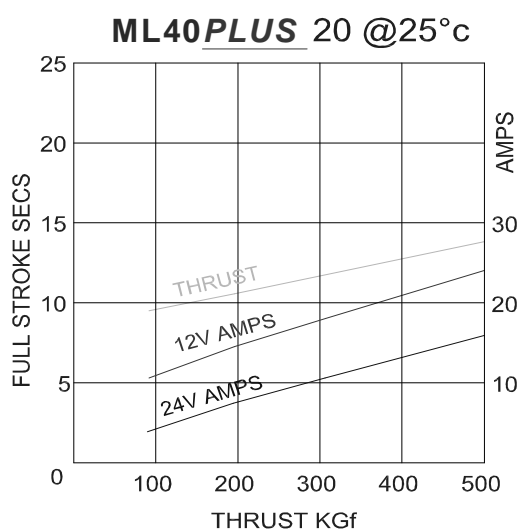
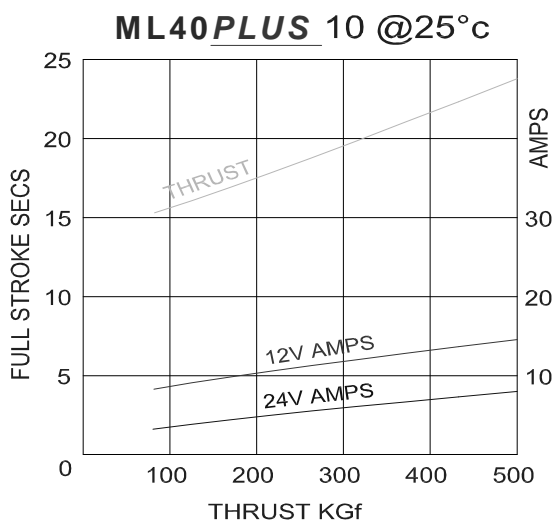
- : check electrical connections.
- : check autopilot output.
- : check motor brushes.

### 2) Motor runs, but erratic or no piston movement

- : check for solenoid operation.
- : check for air in the cylinder -obviated by external oil loss.
- : check drive coupling.

### 3) Excessive noise from the pump

- : check the motor for damage.
- : check for air in the cylinder -obviated by external oil loss.
- : check drive coupling.



## TECHNICAL DATA

### Performance

Maximum thrust (intermittent)	732 kg
Hard over time nominal ML40 <del>plus</del> 10	13 sec
Hard over time nominal ML40 <del>plus</del> 20	9 sec
Temperature rating minimum	-20°C
Temperature rating maximum	+65°C
Relief valve setting	62 bar
Back-drive at 12 sec Hard-over	7kg

### Motor

Motor voltage nominal	12 or 24v DC
Motor power	100 watt
Max current 12v 25% duty	22.5 A
Max current 24v 25% duty	11.2 A
Rotation	Reversing
Protection	IP55
Ignition protection	BS EN 28846:1993
EMC	BS EN 60945:2002
Orientation	Red Lead Positive Cylinder retracts

### Clutch

Coil power continuous	12 watt
Protection	IP65
Connection	DIN 43650 1m Flying Lead 2 Core 2.5mm <sup>2</sup>
Cable Ø (not supplied)	6 - 8mm

### Recommended oil

Mineral based hydraulic	ISO VG10
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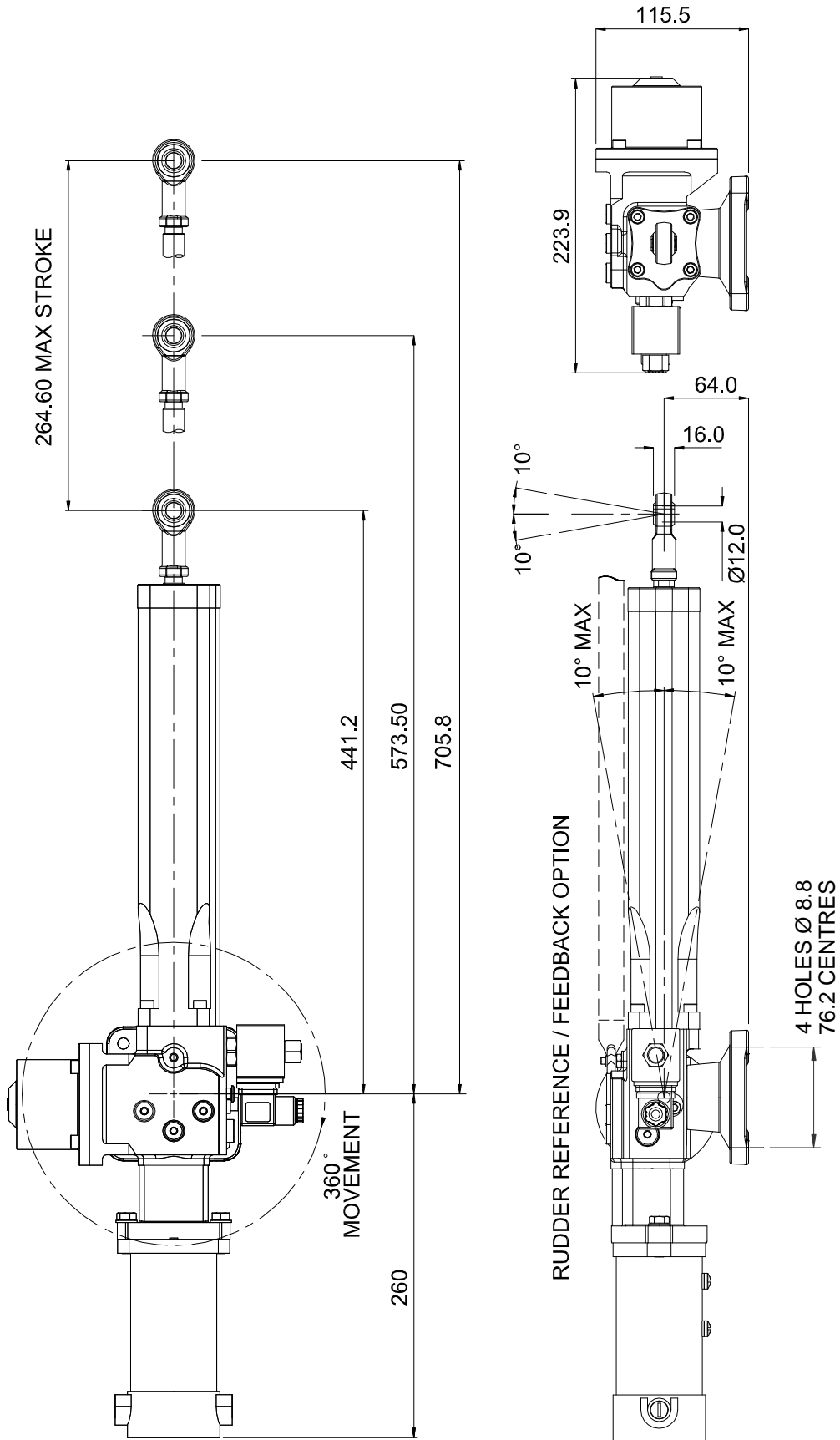
### Materials

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

### Weight

9.0 kg Gross

# GENERAL DIMENSIONS



## INSTALLATION DETAILS

### QUADRANT

Typical installation for an 8.4" ( 214mm) quadrant with total rudder angle of 70deg.

### CONSIDERATIONS

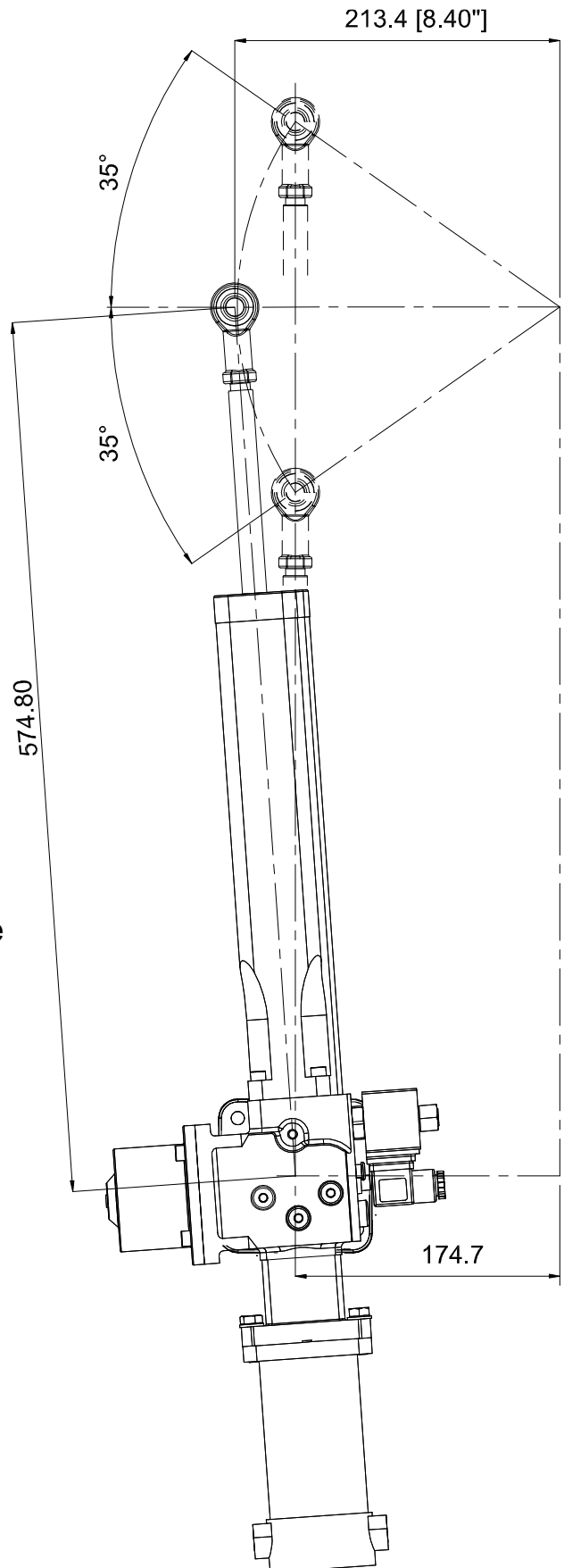
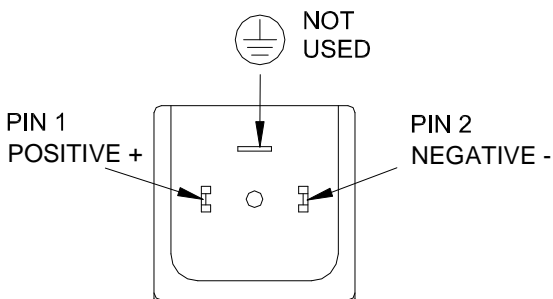
Ensure that piston movement is limited by the rudder end-stops and not by the actuator end-stops.

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

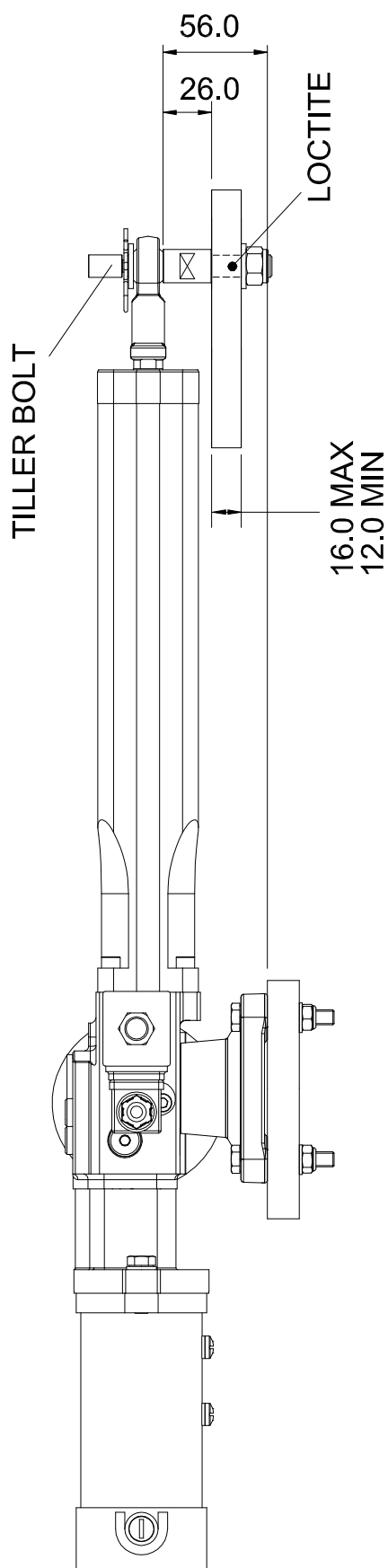
Allow sufficient clearance for removal of the mounting pin (Ref. page 6).

Warning! Do not exceed the +/-10° angle at the extremes of stroke, damage to the cylinder bearings and rod will occur. Check carefully before commissioning.

### COIL CONNECTIONS



## INSTALLATION DETAILS



### TILLER BOLT

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

The tiller bolt mounting hole should be drilled  $\text{\O}12.2$  to 12.3mm.

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

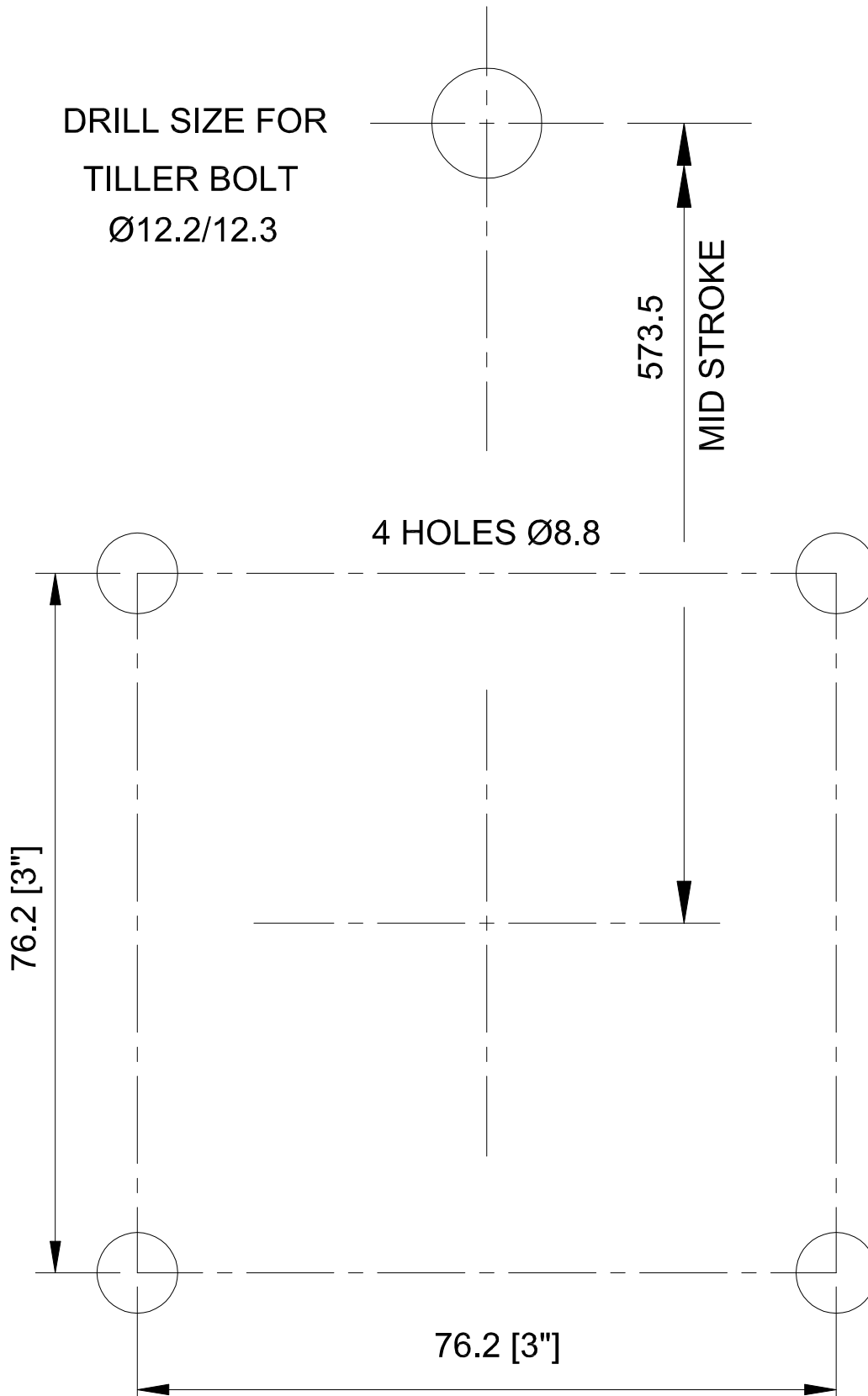
Tighten the M12 nut to 27Nm Torque

### 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

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



## GENERAL INFORMATION

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

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

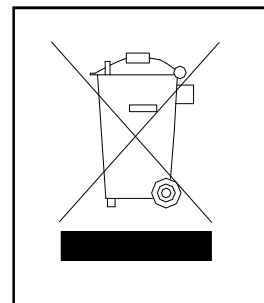
Date of Purchase: \_\_\_\_\_

Dealer: \_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 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 on the back cover.



## CONTACT DETAILS

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

Telephone: +44 (0)1626 863634

Fax : +44 (0)1626 866283

Email : [enquiries@hypro.co.uk](mailto:enquiries@hypro.co.uk)

Web : [www.hypro.co.uk](http://www.hypro.co.uk)



## About Hydraulic Projects

**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**

[www.hypro.co.uk](http://www.hypro.co.uk)



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