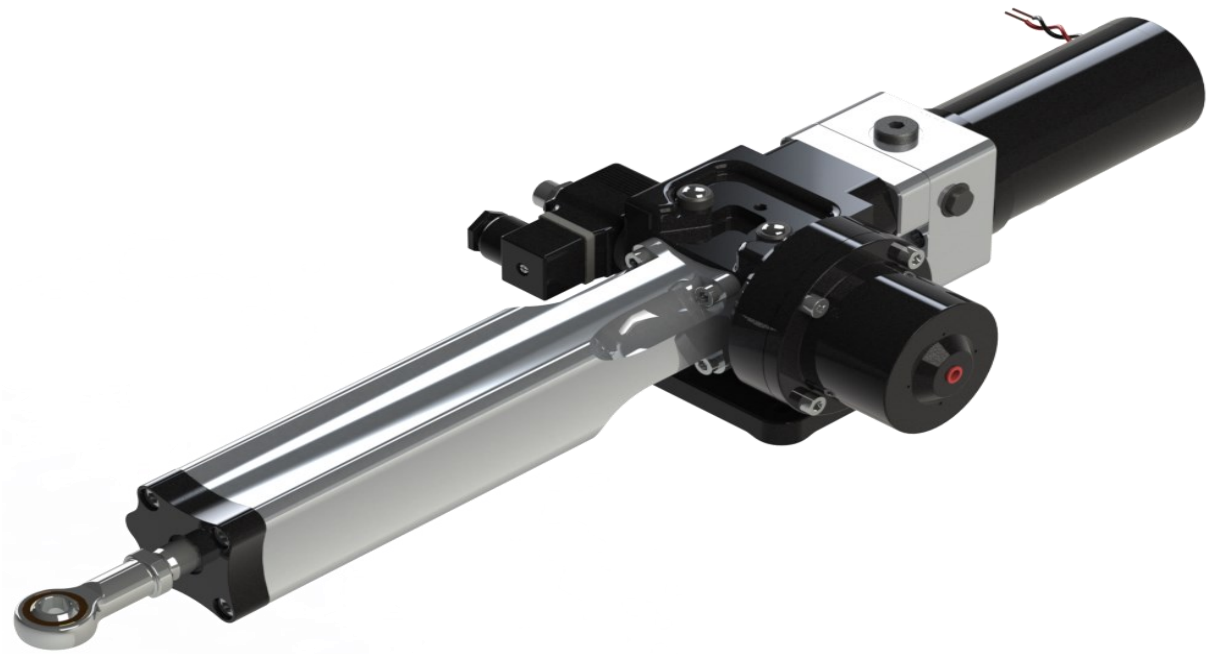
Hy-ProDrive

Marine Steering Technology
By Hydraulic Projects Ltd.



ML+40 S 200mm
ML+40 M 250mm
ML+40 L 300mm

Marine Linear Actuator
Installation and Service Instructions

Serial Number

Please record your serial number here

R4209m-21 ISS.05

Hy-ProDrive™
Marine Steering Technology
By Hydraulic Projects Ltd.

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.

Hy-ProDrive™
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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.

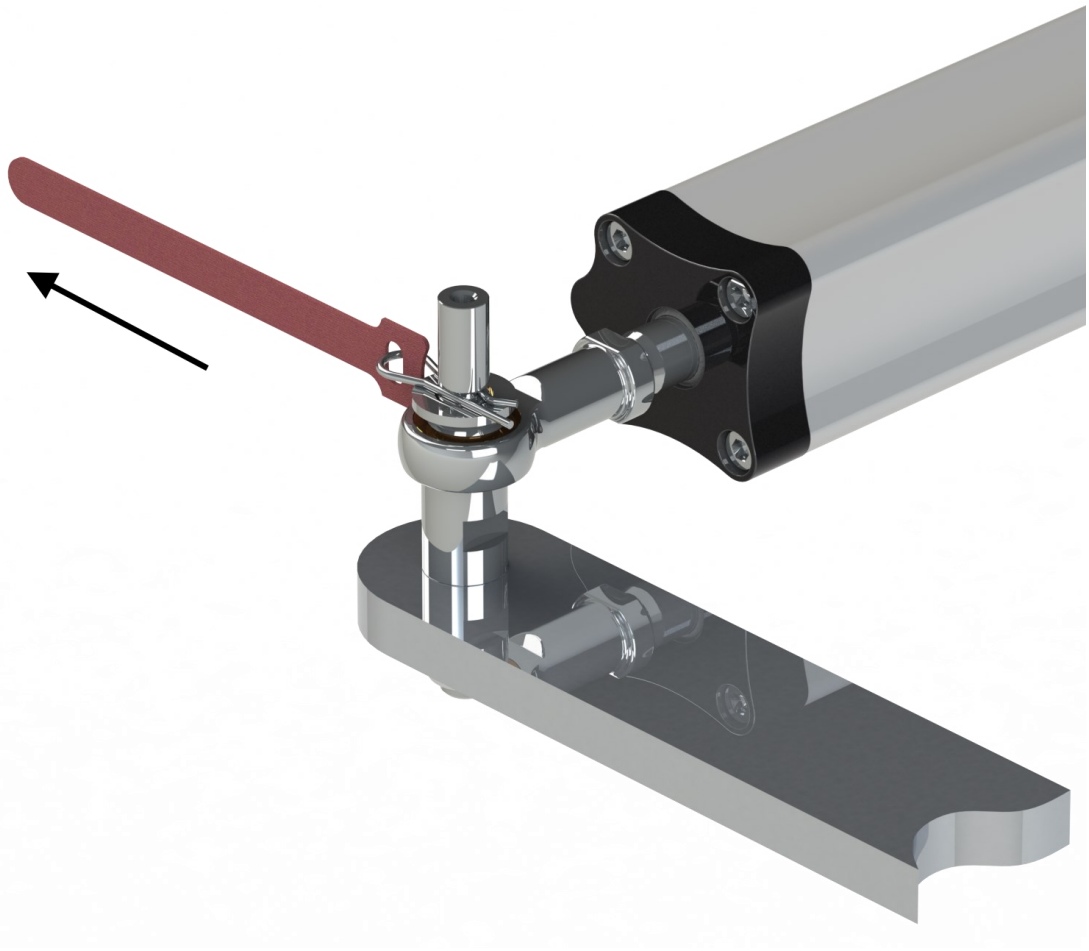
Beware of hot motor and solenoid components and the risk of entrapment from moving parts.

Do not flash test.

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.

DESCRIPTION

The ML+40 Hydraulic linear actuator combines a cylinder, pump, motor, clutch and reservoir in a pre-filled, sealed unit. It is designed to be used on vessels fitted with mechanical primary steering that can be back driven. When the clutch is disengaged the cylinder is free and moves with the primary steering. To operate the unit in autopilot mode the course computer energises the clutch solenoid coil and runs the bi-directional motor to extend and retract the ram.
Internal relief valves protect the unit and its mountings from rudder strikes, grounding etc.

LOCATION

The ML+40 Actuator 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 actuator above areas liable to flooding.

: Use a solid surface, capable of supporting the large thrusts generated by this unit.

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

: Allow sufficient clearance for removal of the mounting pin.

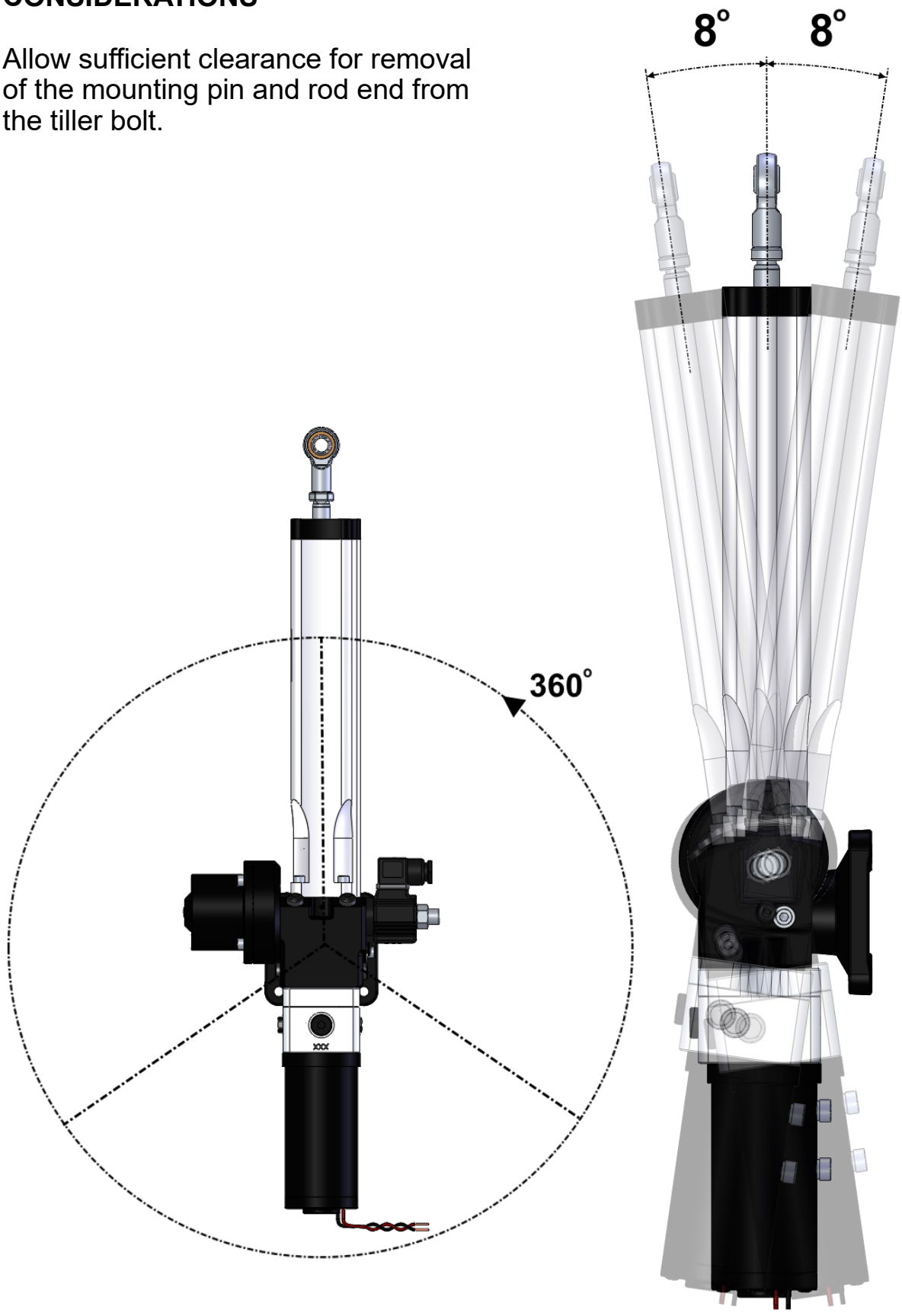
: Check that no part of the actuator fouls the vessel or rudder quadrant throughout its full range of movement.

: It may be mounted in any orientation providing the limits stated are not exceeded.

: Ambient operating temperature -15 to +55 deg C.

CONSIDERATIONS

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



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TECHNICAL DATA

Ram Stroke Part Number	Voltage V DC/W	Stroke Sec	Max Thrust Kg	Max Torque Nm	Tiller arm 70˚ mm	650Kg Amp
200mm						
ML+40 S 15 12	12/50	12	350	600	175	na
ML+40 S 10 12	12/100	10	703	1200	175	19.0
ML+40 S 10 24	24/100	10	703	1200	175	9.0
250mm						
ML+40 M 10 12	12/100	13	703	1470	213	19.0
ML+40 M 10 24	24/100	13	703	1470	213	9.0
ML+40 M 20 12	12/100	9	703	1470	213	25.0
ML+40 M 20 24	24/100	9	703	1470	213	12.0
300mm						
ML+40 L 20 12	12/100	11	703	1770	257	25.0
ML+40 L 20 24	24/100	11	703	1770	257	12.0
ML+40 L 25 12	12/100	9	703	1770	257	32.0
ML+40 L 25 24	24/100	9	703	1770	257	16.0

Ram Stroke Part Number	60Kg 25% Duty Ah	Relief set Bar	Clutch Watts	Weight Kg	Feedback Resistance kΩ
200mm					
ML+40 S 15 12	1.3	62	12	7.5	1.2
ML+40 S 10 12	2.0	62	12	7.5	1.2
ML+40 S 10 24	1.0	62	12	7.5	1.2
250mm					
ML+40 M 10 12	2.0	62	12	8.0	1.2
ML+40 M 10 24	1.0	62	12	8.0	1.2
ML+40 M 20 12	2.5	62	12	8.0	1.2
ML+40 M 20 24	1.3	62	12	8.0	1.2
300mm					
ML+40 L 20 12	2.5	62	12	8.5	1.2
ML+40 L 20 24	1.3	62	12	8.5	1.2
ML+40 L 25 12	3.0	62	12	8.5	1.2
ML+40 L 25 24	1.6	62	12	8.5	1.2

DISMOUNTING THE UNIT FROM ITS BASE

The ML+40 features a quick-dismount base.

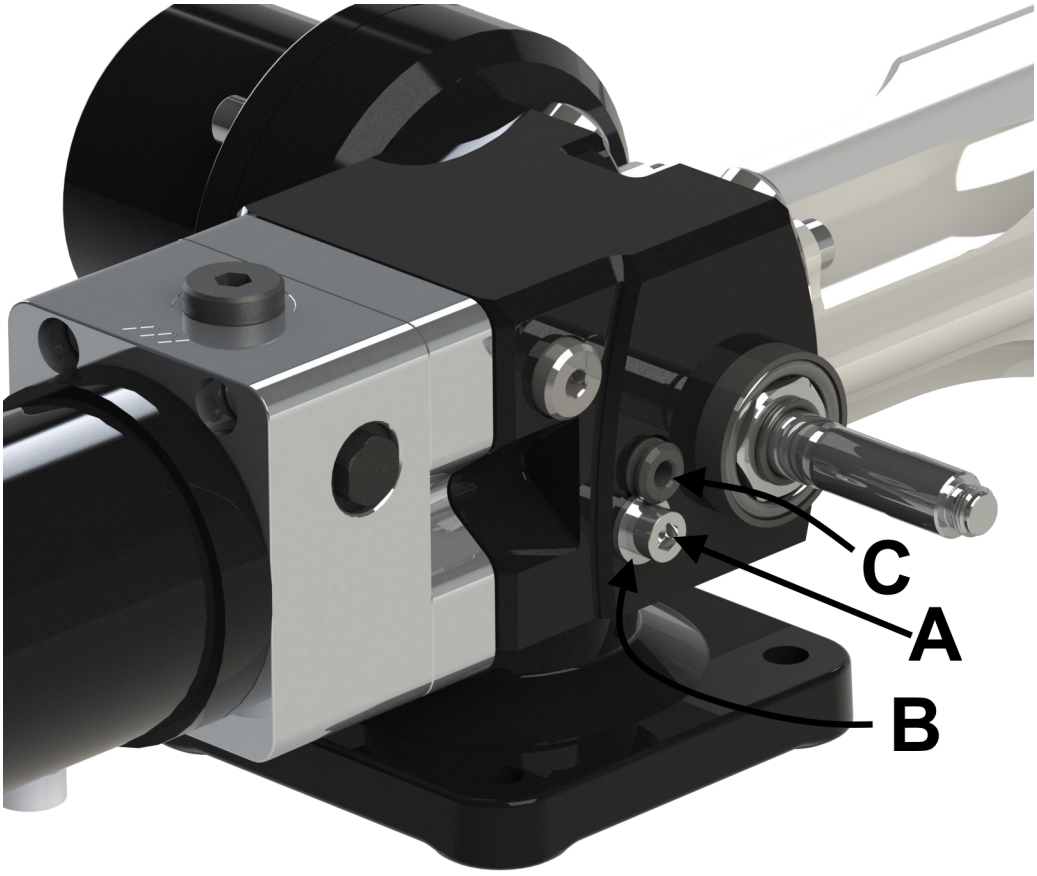
To remove the base from the unit first take off the coil which is secured by a 17mm A/F nut. Next undo and remove the Allen screw ‘A’ and the retaining plate ‘B’ . Withdraw the mounting pin ‘C’ which will release the base.

NOTE!

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

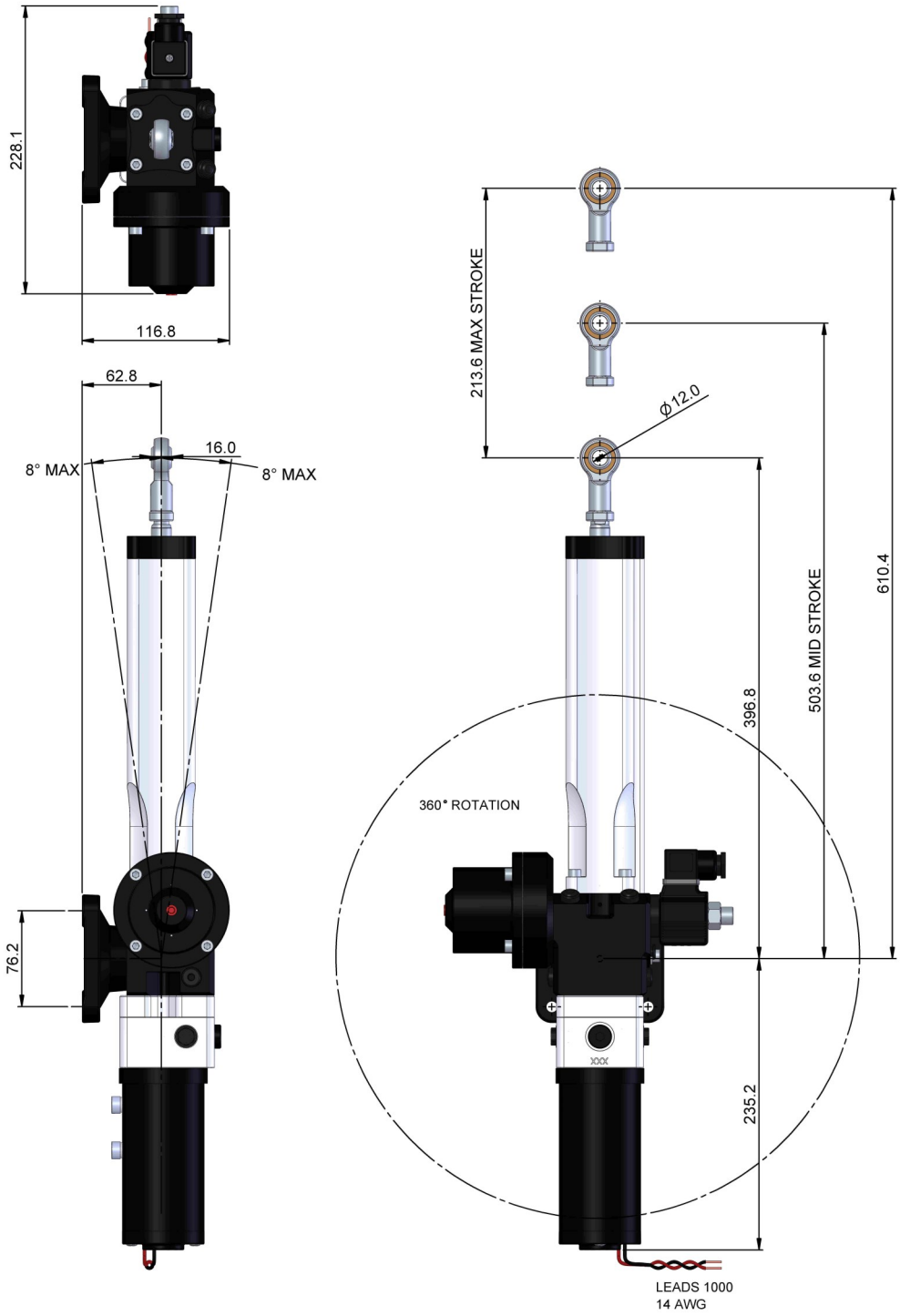
IMPORTANT!
Avoid damage to the pin

Assembly is a reversal of the removal process.



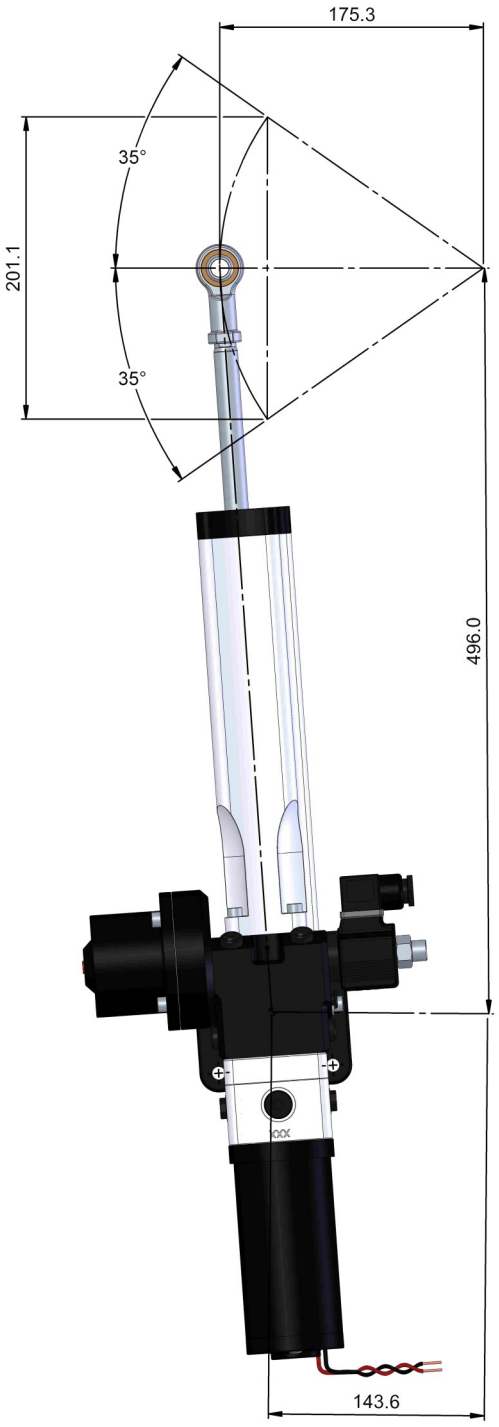
INSTALLATION

ML+40 S 10 (200mm stroke)
ML+40 S 15 (200mm stroke)



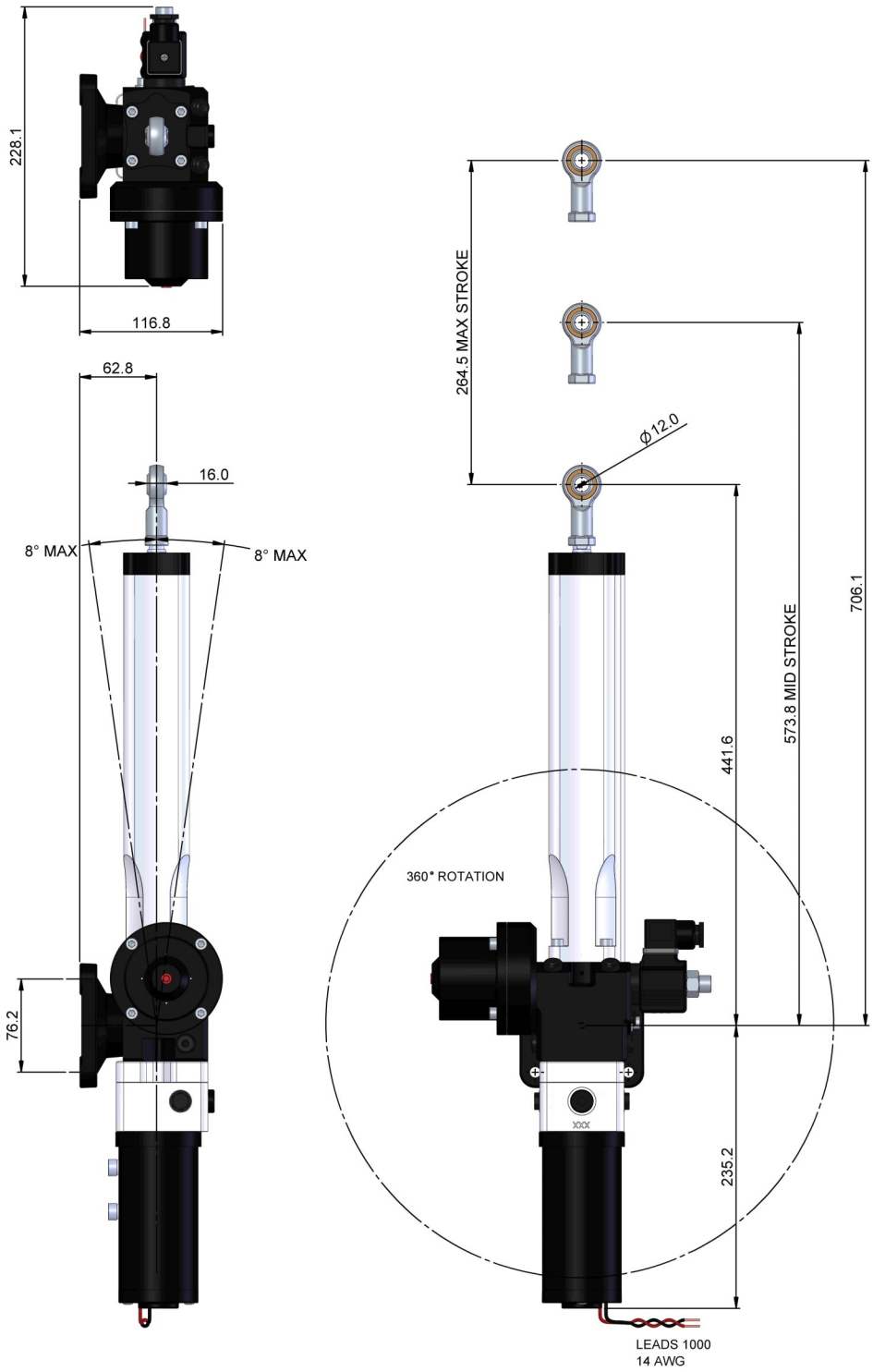
QUADRANT

Typical installation for an 6.9” (177mm) radius with total rudder angle of 70deg.



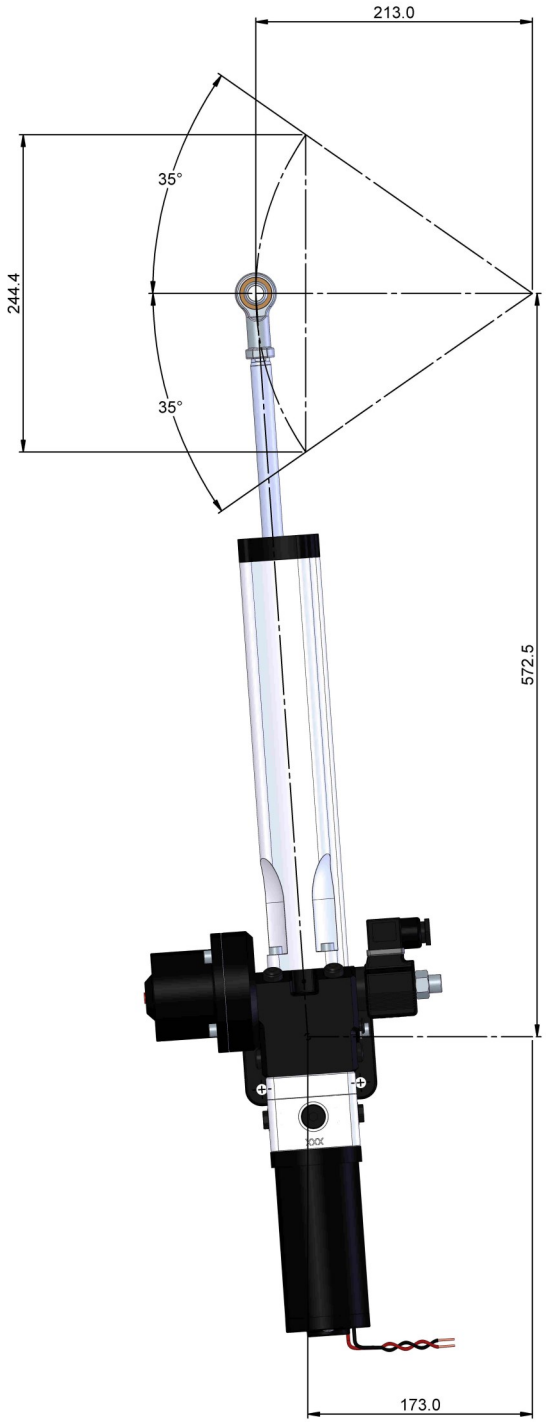
INSTALLATION

ML+40 M 10 (250mm stroke)
ML+40 M 20 (250mm stroke)



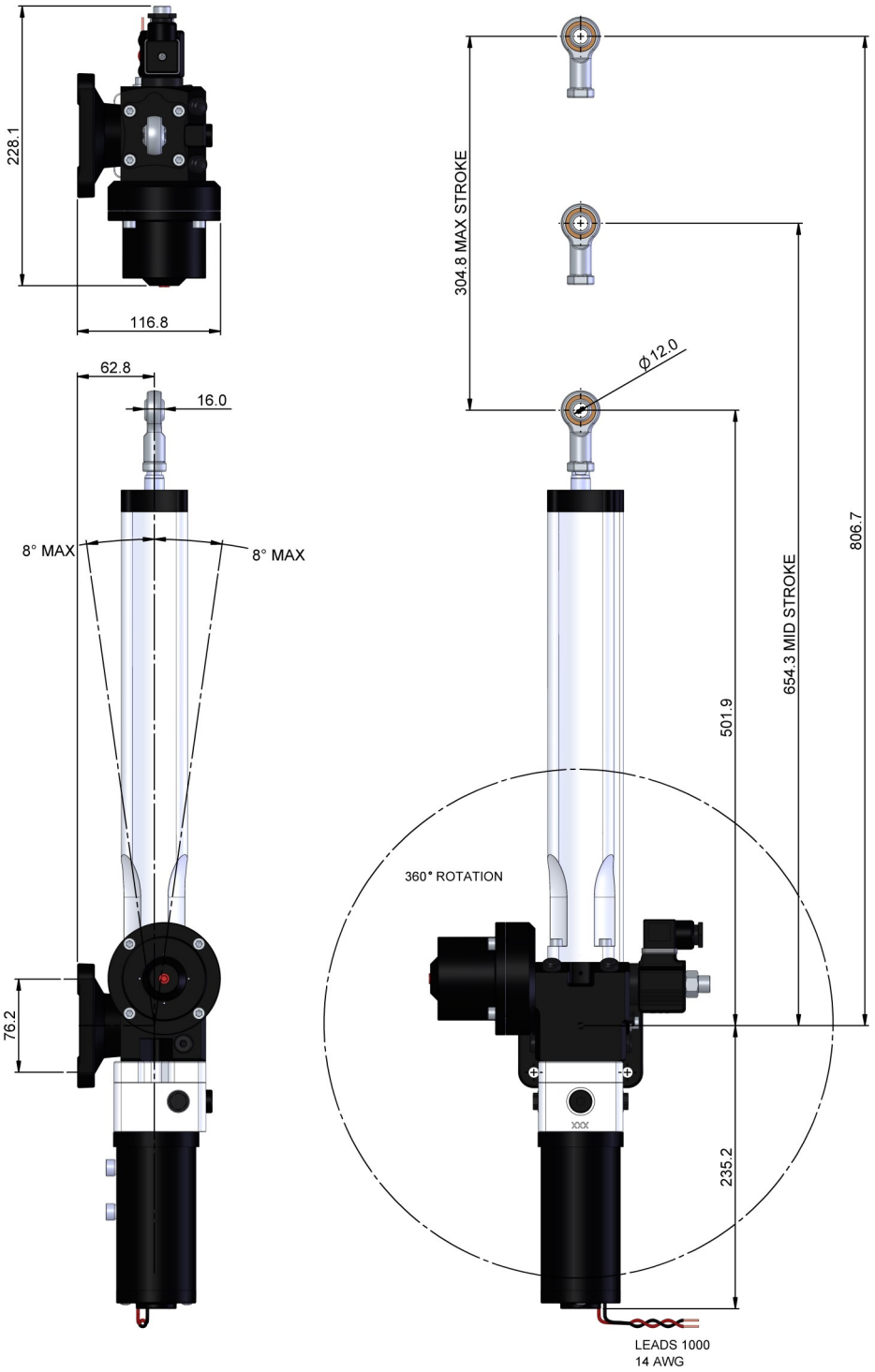
QUADRANT

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



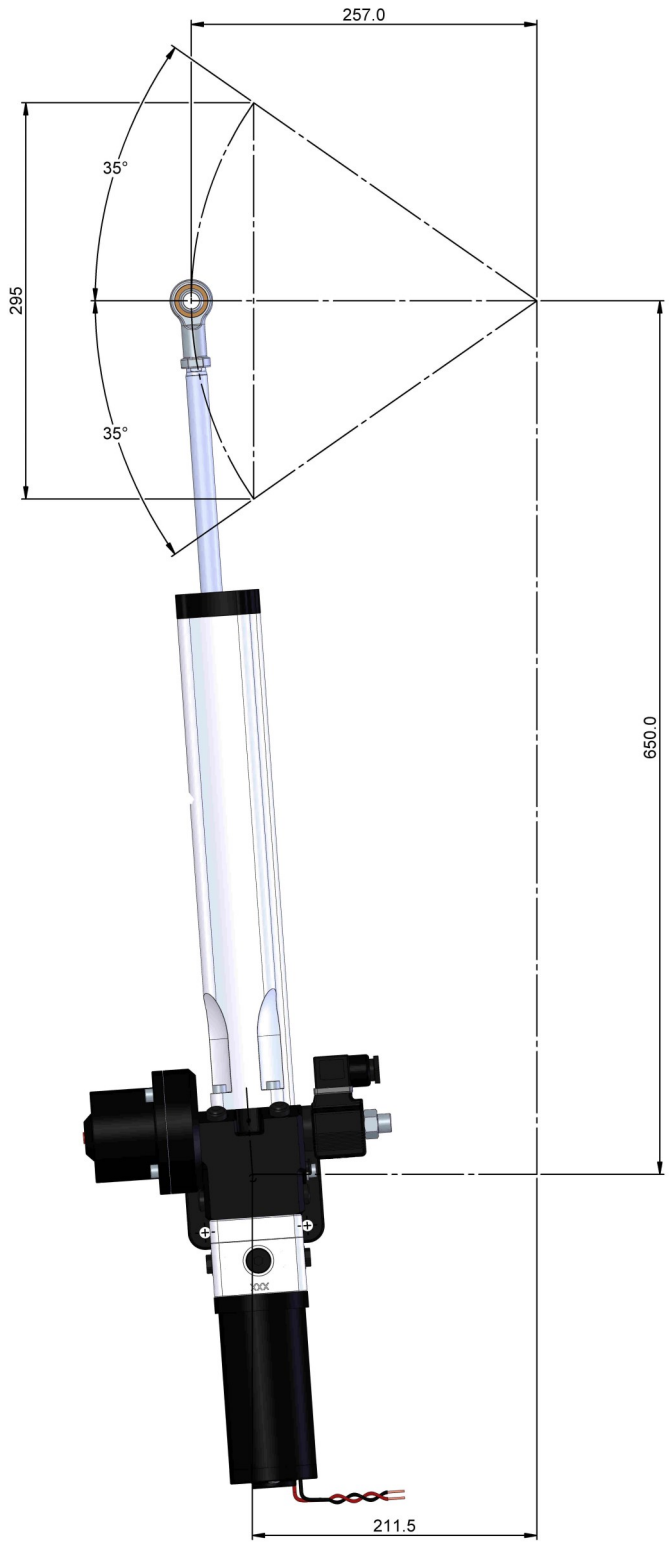
INSTALLATION

ML+40 L 10 (300mm stroke)
ML+40 L 20 (300mm stroke)



QUADRANT

Typical installation for an 10.1” (257mm) radius with total rudder angle of 70deg.



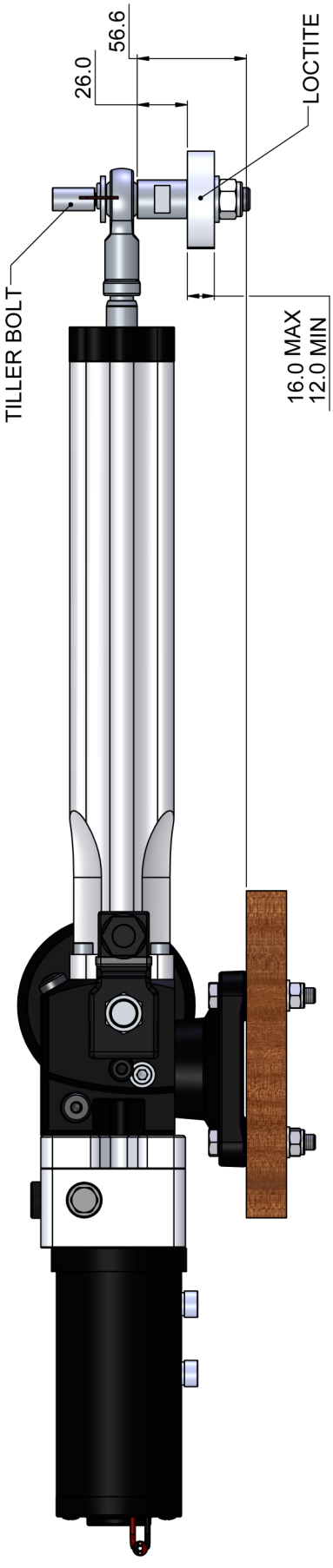
TILLER BOLT

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.

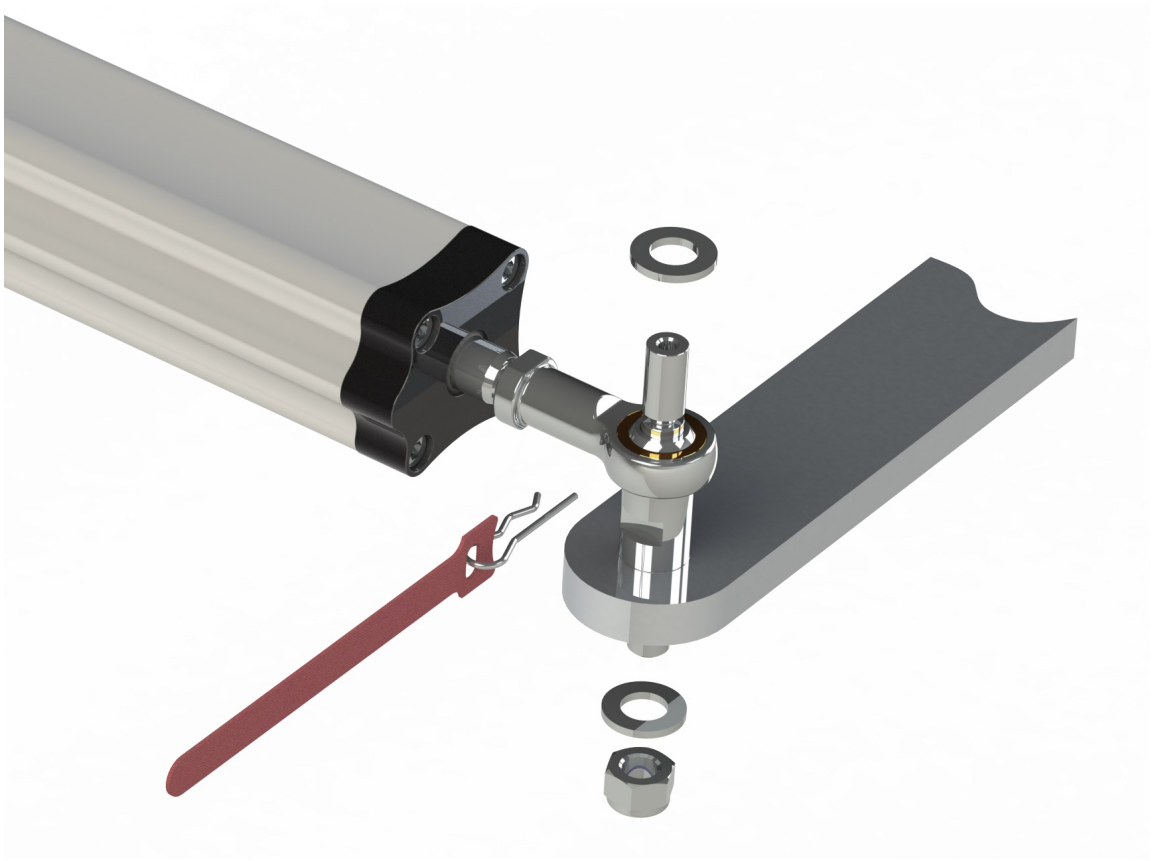
Tighten the M12 nut to 27Nm Torque



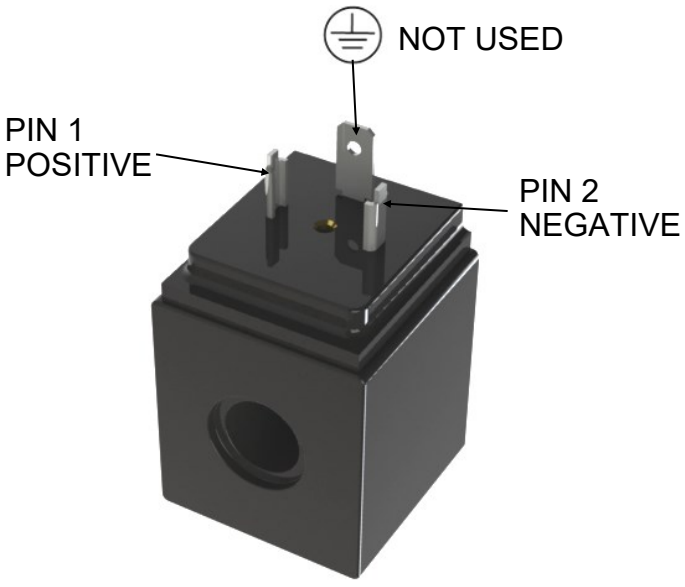
MOUNTING FOOT

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

Tighten the four M8 nuts to 17Nm



COIL CONNECTIONS



HYDRAULIC FLUID

Caution

Do not use Brake fluid

Use 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.

COMMISSIONING

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

The unit is pre-filled and sealed from new. Do not disassemble the unit, this will allow air to enter and necessitate refilling and bleeding the unit Ref. page 19.

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.

MAINTENANCE

The ML+40 is a sealed unit, 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.

SERVICING

The motor is a non-serviceable item and when it reaches End of Life should be replaced with a new motor and drive coupling Kit.

Part No.s:

ML+40 S 15 12:	R4510-sk 12 50 X
ML+40 S 10 12: ML+40 M 10 12: ML+40 M 20 12: ML+40 L 10 12: ML+40 L 20 12:	R4510-sk 12 100 X
ML+40 S 10 24: ML+40 M 10 24 ML+40 M 20 24 ML+40 L 10 24: ML+40 L 20 24:	R4510-sk 24 100 X

Please quote your units serial number when ordering.

In the unlikely event that new seals are required a kit is available:
Hydraulic Projects Ltd Part No. ML+40sk.

Caution ⚠

For filling and bleeding a special tool is required:
Hydraulic Projects Ltd Part no. R4051.
Failure to use this tool 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 19.

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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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

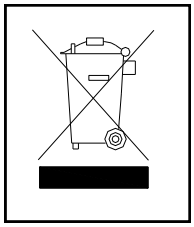
Email sales@hypro.co.uk

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.



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COMPLIANCE

EU Declaration of Conformity of Watercraft Components with the Design and Construction requirements of Directive 2013/53/EU (Recreational Craft)

Name of watercraft component manufacturer: Hydraulic Projects Limited

Address: Dawlish Business Park

Town: Dawlish **Post Code:** EX7 0NH **Country:** UK

Name of authorised representative (if applicable): _____

Address: _____

Town: _____ **Post Code:** _____ **Country:** _____

Module used for design and construction assessment: ☒ **B+C** ☐ **B+D** ☐ **B+E** ☐ **B+F** ☐ **G** ☐ **H**

Name of Notified Body for design and construction assessment (if applicable): HPI Verification Services (Ireland) Ltd

Address: HPi Verification Services (Ireland) Ltd

Town: Cloncross **Post Code:** A85 XN59 **Country:** Ireland **ID Number:** 2810

Notified Body certificate number: HPiVS-iR1247-002-I-01-00 **Date:** 19 / 12 / 2023

Other Community Directives applied: **2014/30/EU** (Electromagnetic Compatibility Directive)

DESCRIPTION OF WATERCRAFT COMPONENTS:

Brand/Model of the watercraft components: ML+40 & HS+40 Hy-Pro Drive range of hydraulic marine steering equipment

Designation of Annex II component:	Applicable Essential Requirement	Harmonised standards applied
☒ Ignition-protected equipment for petrol engine/tank spaces	Fire protection (5.6.1)	EN ISO 8846:2017 - Electrical devices - Protection against ignition of surrounding flammable gases
☐ Start-in-gear protection devices for outboard engines	Outboard engine starting (5.1.4)	EN ISO 11547:1995 - Start-in-gear protection
☐ Steering wheels	Steering system (5.4.1)	EN ISO 10592:2017- Small Craft – Hydraulic Steering Systems
☒ Steering mechanisms/cable assemblies		
☐ Fuel tanks intended for fixed installations	Fuel tanks (5.2.2)	EN ISO 21487:2012 - Permanently installed petrol and diesel fuel tanks
☐ Fuel hoses	Fuel system (5.2.1)	EN ISO 7840:2013 - Fire-resistant fuel hoses, *or* EN ISO 8469:2013 – Non-fire-resistant fuel hoses *(delete as appropriate)*
☐ Prefabricated hatches	Openings in hull, deck and superstructure (3.4)	EN ISO 12216:2002 - Windows, portlights, hatches, deadlights and doors - Strength and watertightness requirements
☐ Prefabricated port lights		

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the manufacturer that the watercraft component(s) mentioned above fulfils the requirements specified in Article 4 (1) and Annex I of Directive 2013/53/EU.

Name and function: Elaine Slater (Managing Director)
(identification of the person empowered to sign on behalf of the manufacturer or his authorised representative)

Signature and title:
(or an equivalent marking)

Date and place of issue : **04 / 01 / 2024**

Hy-ProDrive™
Marine Steering Technology
By Hydraulic Projects Ltd.

Jan 2024

UK Declaration of Conformity for Design and Construction for Watercraft Components - Schedule II - when placed on the UK market separately under the requirements of the Recreational Craft Regulations 2017 as amended.

Name of component manufacturer: Hydraulic Projects Limited

Address: Dawlish Business Park

Town: Dawlish **Post Code:** EX7 0NH **Country:** UK

Name of authorised representative (if applicable): _____

Address: _____

Town: _____ **Post Code:** _____ **Country:** _____

Module used for design and construction assessment: ☒ B+C ☐ B+D ☐ B+E ☐ B+F ☐ G ☐ H

Name of Approved Body for design and construction assessment: HPI Verification Services Ltd

Address: The Manor House, Howbery Park

Town: Wallingford **Post Code:** OX10 8BA **Country:** UK **ID Number:** 1521

Approved Body certificate number: HPiUK-R1247-002-I-01-00 **Date:** 19 / 12 / 2023

Other Regulations applied: BS EN 60945:2002 (DC) (Electromagnetic Compatibility)

DESCRIPTION OF WATERCRAFT COMPONENT:

Brand/Model: ML+40 & HS+40 Hy-Pro Drive range of hydraulic marine steering equipment

- ☐ Ignition-protected equipment for inboard and stern drive petrol engines
- ☒ Ignition-protected equipment for petrol tank spaces
- ☐ Start-in-gear protection devices for outboard engines
- ☐ Steering wheels
- ☒ Steering mechanisms and cable assemblies
- ☐ Fuel tanks intended for fixed installations
- ☐ Fuel hoses
- ☐ Prefabricated hatches
- ☐ Prefabricated port lights

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the manufacturer that the component mentioned above fulfils the requirements specified in Part 2 Regulation 6 and Schedule I of the Recreational Craft Regulations 2017 as amended.

Name and function: Elaine Slater (Managing Director)
(identification of the person empowered to sign on behalf of the manufacturer or his authorised representative)

Signature and title: _____
(or an equivalent marking)

Date and place of issue: 04/01/2024

WATERCRAFT COMPONENTS	Designated standards Full Application	Designated standards Partial application, see technical file	Other reference documents [1] Full Application	Other reference documents Partial Application, see technical file	Other proof of conformity See technical file	Designated[2] standards or other reference documents used
	Tick only one box per line					*All lines right of ticked boxes must be filled in*
Ignition-protected equipment for inboard and stern drive petrol engines and petrol tank spaces	☒	☐	☐	☐	☐	BS EN ISO 8846:2017
Start-in-gear protection devices for outboard engines	☐	☐	☐	☐	☐	
Steering wheels, steering mechanisms and cable assemblies	☒	☐	☐	☐	☐	EN ISO 10592:2017 (Small Craft – Hydraulic Steering)
Fuel tanks intended for fixed installations and fuel hoses	☐	☐	☐	☐	☐	
Prefabricated hatches, and port lights	☐	☐	☐	☐	☐	
Installation and/or use manual	☐	☐	☐	☐	☐	

[1] Such as non-harmonised standards, rules, regulations, guidelines, etc.
[2] Standards published on gov.uk

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Hydraulic Projects Ltd supply the world's leading autopilot manufacturers with hydraulic pumps, cylinders and valves of the highest quality for steering yachts and commercial craft.

Our in-house design and technical teams offer the expertise and support expected of an established world-class manufacturer.

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

www.hypro.co.uk

ISO 9001:2008
URS
UKAS QUALITY MANAGEMENT
043-A
Certificate No. 11935