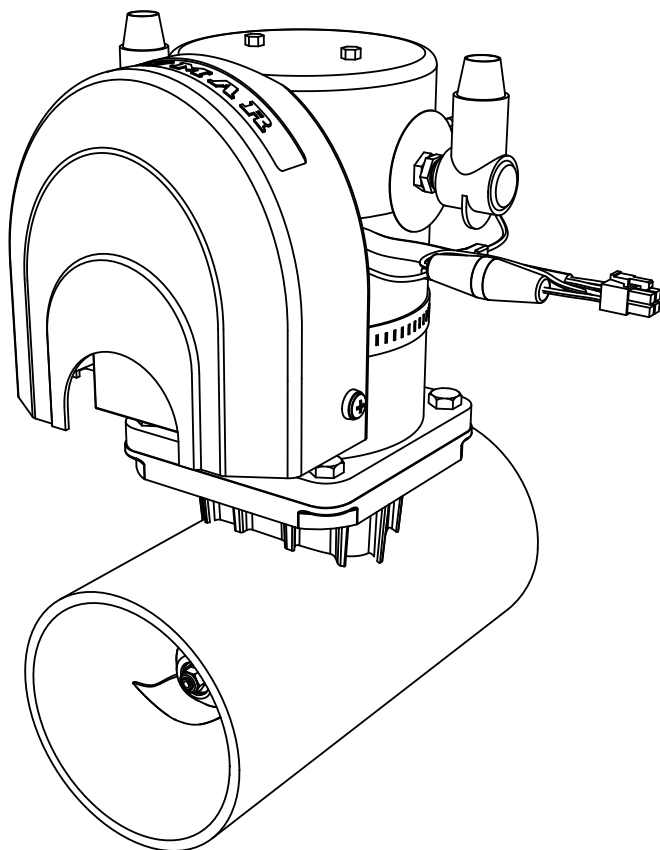


LEWMAR®

TT Electric Thruster

110-140TT 2.0



Owner's Installations, Operation & servicing manual

1- Introduction

Dear Customer,

Thank you for choosing Lewmar. Lewmar products are world renowned for their quality, technical innovation and proven performance. With a Lewmar product you will be provided with many years of outstanding service.

Product support

Lewmar products are supported by a worldwide network of distributors and Authorised Service Representatives. If you encounter any difficulties with this product, please contact your national distributor, or your local Lewmar dealer. Details are available at: www.lewmar.com

CE Approvals

For CE approval certificates contact Lewmar.

Important information about this manual

Throughout this manual, you will see safety and product damage warnings. You must follow these warnings carefully to avoid possible injury or damage.

2- Safety Notice

WARNING!

General

Please ensure that you thoroughly understand the operation and safety requirements of the thruster before commencing the installation. Only persons who are completely familiar with the controls and those who have been fully made aware of the correct use of the thruster should be allowed to use it. If there is any doubt of how to install or operate this unit please seek advice from a suitably qualified engineer.

- ▶ Please ensure that you thoroughly understand the operation and safety requirements of the thruster.
- ▶ Your thruster should not be operated close to swimmers, as a powerful suction of water is generated when in use.
- ▶ The tunnel installation and any hull modifications should only be carried out by a specialist. This manual is based on a GRP tunnel installation.
- ▶ We recommend that a qualified person install the thruster. Faulty installation will place the boat and crew in danger and make the warranty invalid.
- ▶ It is the unavoidable responsibility of the owner or master or other responsible party to assess the risk of any operation on the vessel.

Thruster supply

- ▶ The thruster is securely packed for transit. However all parts should be inspected for signs of damage before installation. If any parts are found to be damaged please contact lewmar.

Fitting

- ▶ This equipment must be installed and operated in accordance with the instructions contained in this manual. Failure to do so could result in poor product performance, personal injury and/or damage to your boat.
- ▶ Electric thrusters must be located in a dry environment.
- ▶ Electric bow thrusters use powerful electric motors, it is very important that there is sufficient battery capacity and large enough cables for safe operation. Using smaller than recommended battery and cables will cause loss of performance and may cause dangerous overheating.
- ▶ Electric motors spark and run hot. Do not place near flammable or sealed areas.
- ▶ Main battery must not be connected and power must not be switched on until all covers and terminal protectors are correctly fitted.

- It is very dangerous to run the thruster out of the water, even for a few seconds, the motor will over speed by 300%, causing damage to the motor seals etc. and the propeller will cause serious damage to whatever comes into contact with it. This action will invalidate the warranty.
- Consult the boat manufacturer if you have any doubt about the strength or suitability of the mounting location.

Electrical

- Make sure you have switched off the power before you start installing this product.
- If in doubt about installing electrical equipment please seek advice from a suitably qualified electrical engineer.

To the best of our knowledge, the information in this manual was correct when it went to press. However, Lewmar cannot accept liability for any inaccuracies or omissions it may contain.

In addition, our policy of continuous product improvement may change specifications without notice. As a result, Lewmar cannot accept liability for any differences between the product and the manual.

⚠ This manual forms part of the product and **MUST BE RETAINED** along with, OR incorporated into, the Owner's Manual for the vessel to which the thruster is fitted.

3- Installation

3.1 Choosing the location

⚠ A competent, marine engineer must carry out any work on the hull of your boat.

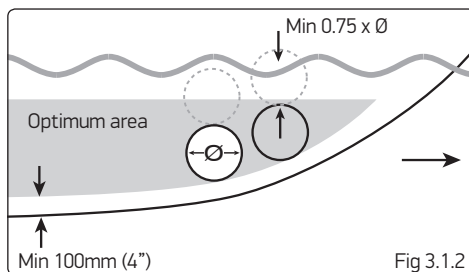
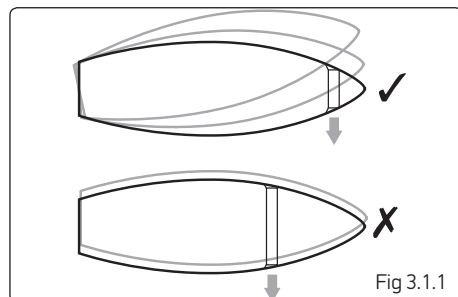
⚠ The boat **MUST** be out of the water, levelled and secure in its cradle.

The actual position of the Thruster will depend on the internal & external construction of the Motor Boat or Sailing Yacht. For optimal performance the Thruster should be mounted within the following:

- As far forward as possible (Fig 3.1.1 / lever effect).
- 1 x Ø below the waterline to prevent air being sucked into the tunnel. (Fig. 3.1.2 / 0.75 x Ø minimum.).
- Minimum suggested tunnel length 2 x Ø.

NOTE: Ensure there is sufficient space for the Thruster assembly complete with motor and controls in the boat.

Ø = Tunnel Diameter



TT Thruster can be fitted new or as a replacement for an existing thruster. Tunnel dimensions listed on the following table.

NOTE: Check mounting holes on the saw template

THRUSTER MODEL (kW)	INSIDE DIAMETER		WALL THICKNESS	
	mm	inch	mm	inch
110 (1.5)	110	4 ⁵ / ₁₆	5.0	³ / ₁₆
140 (2.0)	140	5 ¹ / ₂	4.0-5.0	⁵ / ₃₂ - ³ / ₁₆

- ▶ The recommended tunnel is designed to fit a Lewmar saddle, take the weight of the Thruster and the torque of the motor.
- ▶ Fig 3.1.3 - To reduce any potential loss of performance or damage to the propeller the entrance of the tunnel can be altered to improve thrust as well as reduce noise.

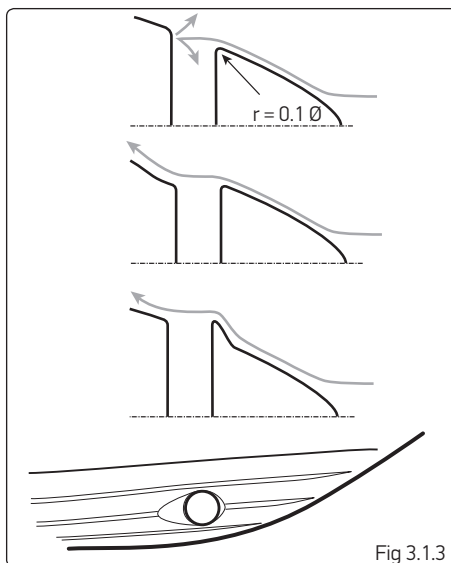


Fig 3.1.3

3.2 Preparing the hole for the tube

⚠ For general guidance for GRP boats only. Problems caused by faulty installation of the tunnel are the installers full responsibility.

⚠ A competent, marine engineer must carry out any work on the hull of your boat.

When you are satisfied the best location for the Thruster unit has been found within the parameters available proceed as follows.

- ▶ Fig 3.2.1 - Make a jig to precisely align the drill holes either side of the hull.

NOTE: Double check everything before drilling.

- ▶ Drill a pilot hole in both sides of the hull.

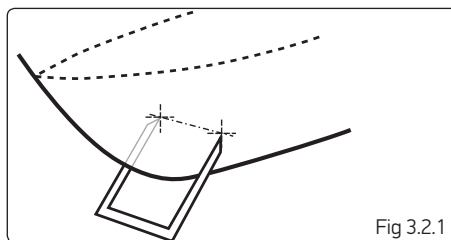


Fig 3.2.1

- ▶ Form a wire guide to diameter of the tunnel hole, mark, check and cut.
- ▶ Insert tube in the hole, mark and remove excess.

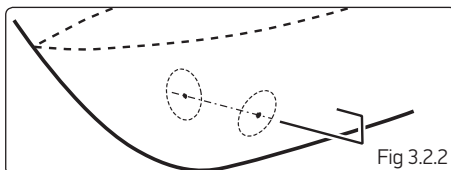


Fig 3.2.2

- ▶ Grind off gel coat etc. Insert tunnel and fix allowing enough room inside for saddle location on the tunnel.
- ▶ Gel coat finished installation and antifoul.

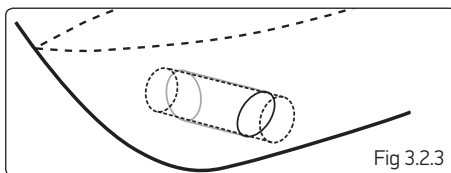


Fig 3.2.3

3.3 Preparing for fitting the thruster

The Thruster can be installed at any angle within 90° from vertical.

⚠ Electric motors must be supported if installed more than 30° from vertical (Fig 3.3.1).

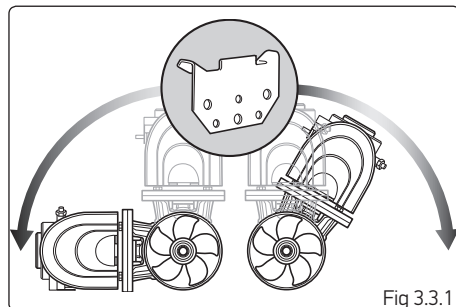


Fig 3.3.1

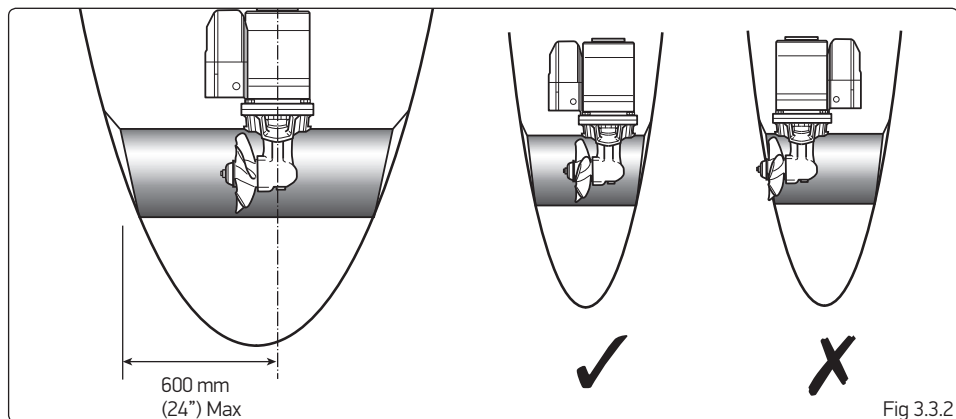


Fig 3.3.2

- Choose position of thruster, ensuring internal room for motor and controls and that the propeller is easily reached from outside.

NOTE: Fig 3.3.2. - Normal install is to Port

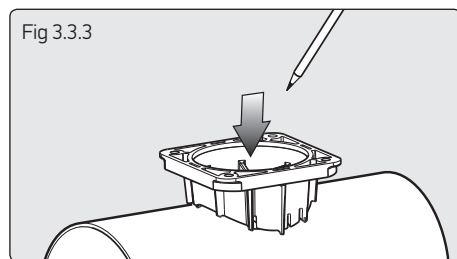


Fig 3.3.3

- Place the thruster saddle in the desired position, ensure the fit is firm and free from movement then mark centre.
- To aid installation a kit is available. See Sec 6.6 Accessories.

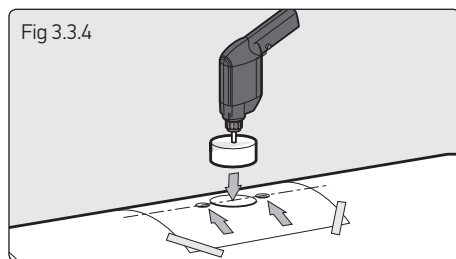


Fig 3.3.4

- Position template on centre line, double check everything and drill. Remove all burrs. All the holes must be on the centre line. Poor alignment may affect hub positioning.

3.4 Installing hub unit and saddle

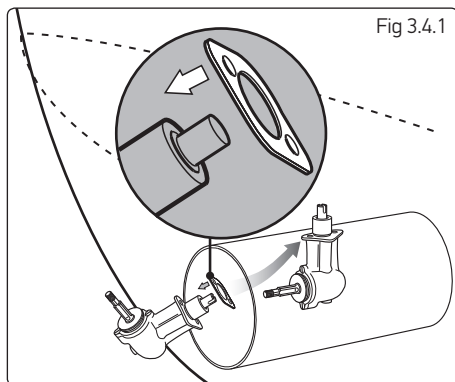


Fig 3.4.1

NOTE: Illustrations based on 140TT saddle.

- To suit the wiring configuration supplied fit the thruster propeller on the port side.
- Place gasket on hub and locate through centre hole. Sealant can be applied to gasket and flange to aid sealing.

NOTE: To achieve the correct position of the propeller in the tunnel the gasket must be in place.

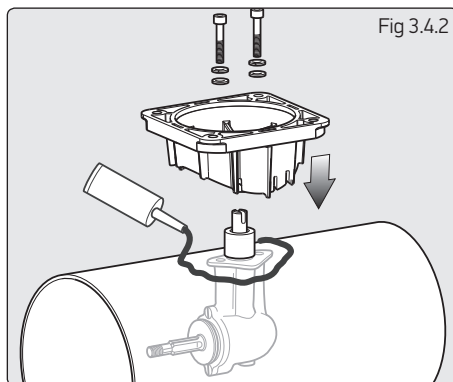


Fig 3.4.2

NOTE: Poor exterior tunnel surface could cause leakage and noise. Apply sealant to this area as required (Fig. 3.4.2).

- Apply zinc chromate paste or marine grease to location bore and assemble saddle onto hub (SikaFlex® or similar maybe used to seal saddle in place). Apply Blue Loctite® 243 to bolts and hand tighten along with supplied washers (Fig. 3.4.2).

NOTE: Tighten to full torque within 10 minutes.

3.5 Propeller assembly

- Check the hub gasket is in place.
- Fig 3.5.1 - Assemble propeller as shown: nyloc nut onto propeller shaft.

Note: Tighten each bolt alternately a number of times to full torque.

⚠ Check the propeller has been assembled in the correct order.

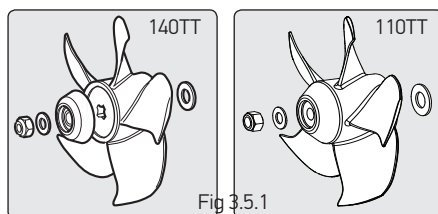


Fig 3.5.1

Fig 3.5.2 - Tighten hub/saddle bolts to

- 5 Nm (3.7 lbs.ft) for 110
- 9 Nm (6.6 lbs.ft) for 140

⊘ DO NOT allow propeller to touch tunnel.

Check that propeller is centred and free turning (within 10 minutes of applying Blue Loctite® 243).

- Antifoul propeller if desired.

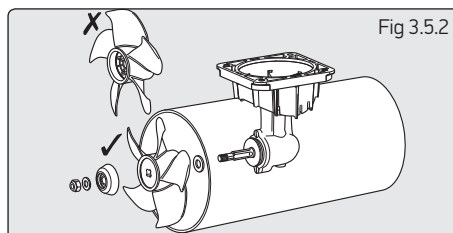


Fig 3.5.2

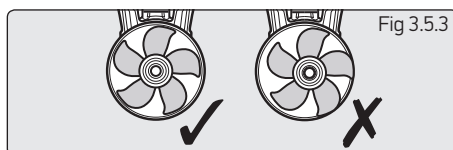


Fig 3.5.3

Tighten propeller nut to

- ▶ 6Nm (4.4 lbs.ft) for 110
- ▶ 10 Nm (7.4 lbs.ft) for 140

A length of wood placed between propeller blade and tunnel will stop movement.

⚠ DO NOT overtighten propeller nuts.

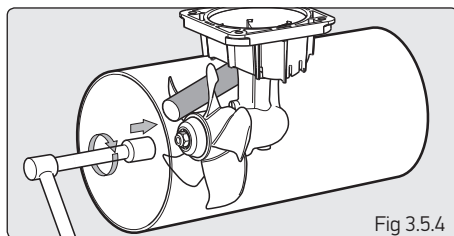


Fig 3.5.4

3.6 Electric motor unit support

If the electric motor is installed more than 30° from the vertical it **MUST** be supported and secured to the support with a strap (not supplied) around the main motor unit.

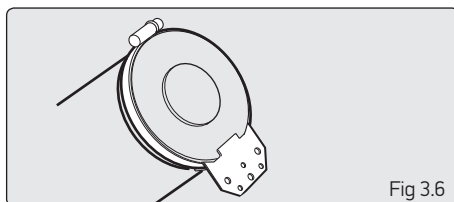


Fig 3.6

3.7 Installing electric motor unit

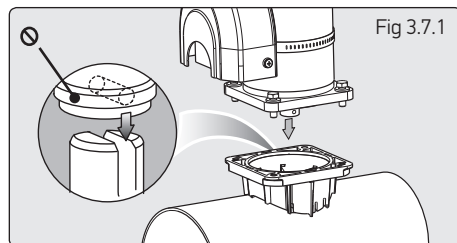


Fig 3.7.1

Illustrations based on 140TT saddle.

- ▶ Align motor drive pin inline with slot in shaft.
- Apply grease to hub shaft.

⚠ DO NOT REMOVE the drive pin plastic retainer tie on the motor drive shaft.

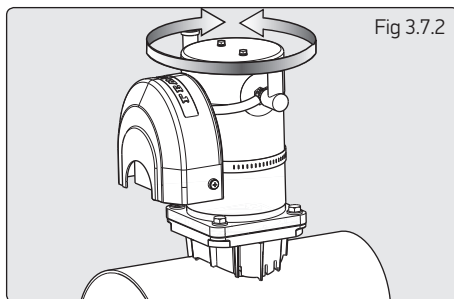


Fig 3.7.2

- ▶ Slide motor into position and align holes for most suitable installation.
- ▶ Bolt motor assembly to saddle and tighten bolts to 20 Nm (15 lbs.ft) . Apply Blue Loctite® 243 to all bolts.

3.8 Final checks

Check list mechanical

- ▶ Check all bolts and nuts are tight.
- ▶ Check the propeller/s are correctly installed and the nuts tightened.
- ▶ Check the motor control box cover is in place.
- ▶ Check the propeller/s can be turned - before working on unit check battery switch is off or remove the fuse
- ▶ Saddle and motor are firmly seated on the tube.

4- Electrical wiring installation

4.1 Typical electrical layout

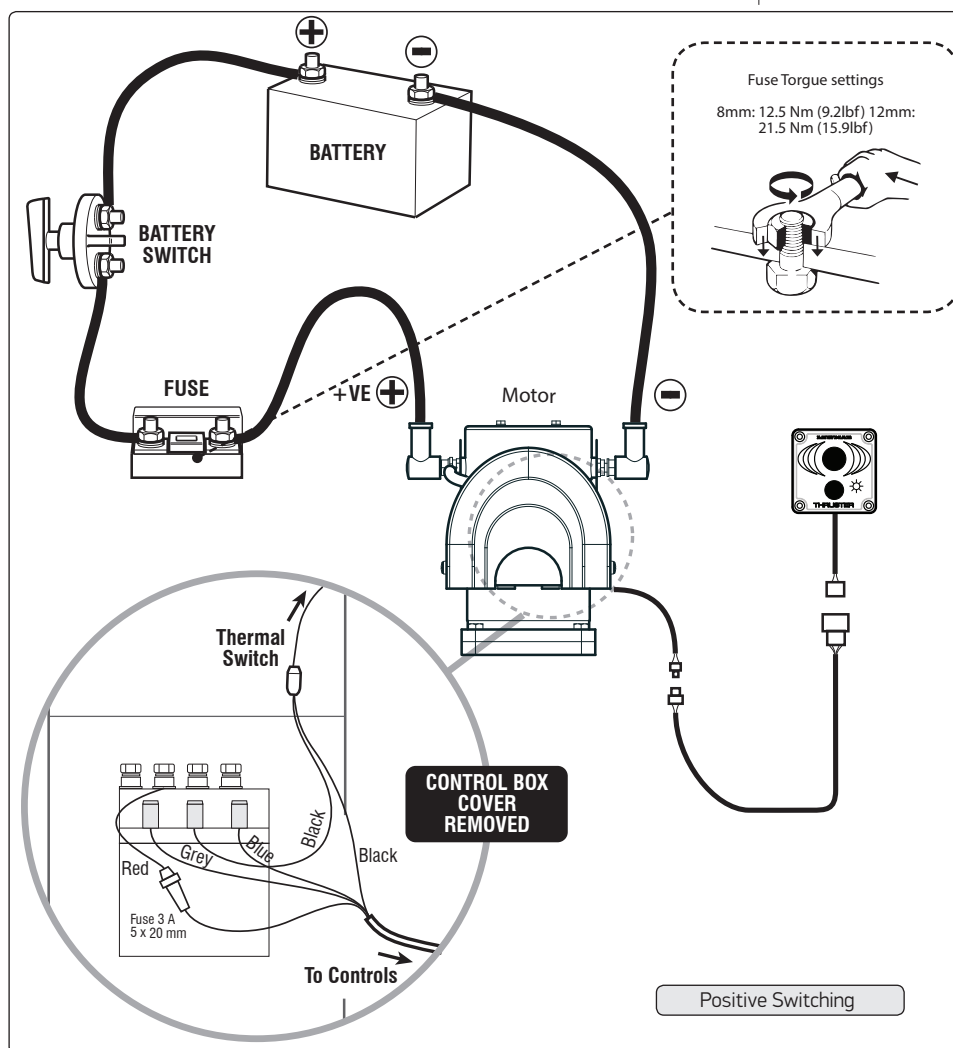
If the thruster operates in an opposite direction to the control panel, swap the grey and blue wire connections on the contactor coils.

NOTE: Automatic battery switch can not be used with this product.

- ⚠ To satisfy International standards, a suitably sized battery switch should be fitted to the thruster +VE supply. It should be switched off whilst the thruster is not in use or the boat is unoccupied. Lewmar recommend this as best practice for safe installations.

LOOM WIRING

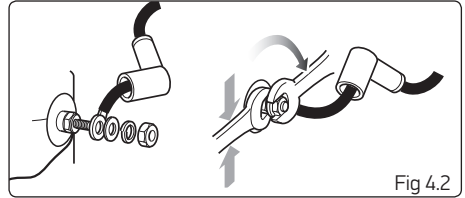
Red	+VE
Blue	Thrust port switch
Grey	Thrust starboard switch
Black	-VE



4.2 Electric motor terminal connections

- ▶ Terminals must be correctly clamped to motor studs. Use a pair of spanners - the one nearest motor to stop rotation of the stud.
- ▶ Spanner size is 13 mm. Tighten the bolts to 20 Nm (15 lbs.ft).

⚠ DO NOT overtighten electric motor terminal nuts.



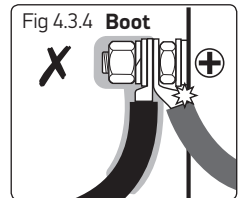
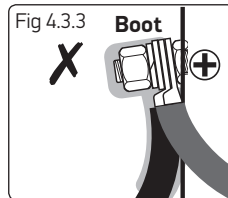
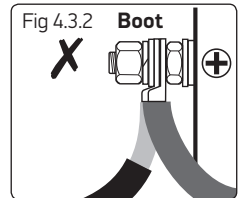
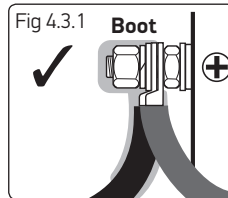
4.3 Battery cable connections

- ▶ The cables should be terminated with a ring terminal corresponding to the motor studs, 8 mm (5/16"). It is important that this termination is secure so that the high current is transferred to the motor efficiently. The minimum voltage at motor when running should be 10 V for 12 V units.
- ▶ Ensure the insulating boots, supplied with the unit, are correctly fitted.

⚠ Incorrect installation of battery cables or damage to connection studs may result in a short to the thruster body. Use the examples opposite to check for a correct installation on both +V and -V battery connections.

- ▶ Correct installation. Supplied cable boots are used and no bare wires exposed (Fig 4.3.1).
- ▶ Live wire exposed! (Fig. 4.3.2). Correct the cable installation to match (Fig 4.3.1).
- ▶ Terminal or motor is damaged. Contact Lewmar Limited (Fig 4.3.3).
- ▶ Crimp inverted and is touching motor! (Fig 4.3.4). Correct the cable installation to match as (Fig 4.3.1).

NOTE: If very large cables are used discard supplied boots and fit appropriate sized ones.



4.4 Recommended cable sizes

- ▶ Battery crank capacity should be at least 1.5 times the thruster current.
- ▶ Main power cables should be run from the batteries and must have an inline fuse fitted.

NOTE: Cable length is total from battery to thruster and back.

TT Model	Current (A)	Max cable length (meters)	Cable size (mm C.S.A)
110 1.5 kW-12V	215	12	50
140 2.0 kW-12 V	270	14	70

4.5 Electrolytic test

- ⚠ To prevent electrolytic corrosion or faults, the thruster motor body and assembly **MUST** remain isolated from any power supply or grounds. The installer can check for this using a multimeter in the following ways.

Test 1. Fig.4.5.1

With the negative not connected and the positive cable connected but with battery switch off or fuse removed. Use a continuity tester to check for a connection between the -VE stud and motor body and also between +VE stud and motor body. In both cases the meter should give no indication of an electrical connection.

If a connection is measured between the +VE stud and the motor body, check installation for cables or wires touching the assembly or for damage to assembly.

If a connection is measured between the -VE stud and the motor body, remove any bonding straps attached to the assembly and check as before.

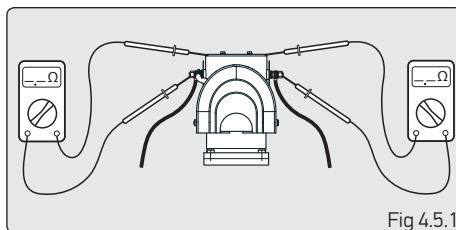


Fig 4.5.1

Test 2. Fig 4.5.2

With the battery applied: Use a voltmeter to test the voltage between the -VE motor stud and the thruster motor body. If the supply voltage (12 V/24 V) is measured, disconnect power immediately and inspect the assembly for faulty installation or damage.

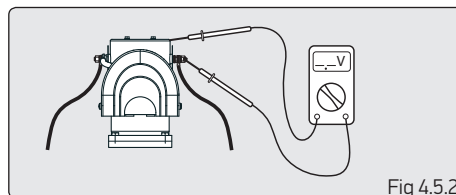


Fig 4.5.2

4.6 Installing control panel

- ▶ Refer to the cutting template opposite, use a 50mm (2") hole saw and a 3mm drill for mounting screws
- ▶ Mount on a clean flat surface
- ▶ Connect panel wiring loom to the plug and play thruster control loom

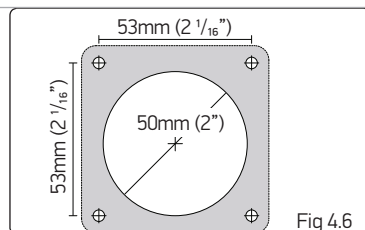


Fig 4.6

4.7 Final checks

- ⚠ Check the power is OFF

- ⚠ The thruster must not be operated unless it is in water.

Check list electrical

- ▶ Check motor connections are tight with rubber boots in place.
- ▶ The correct fuse is in place.
- ▶ Check all switch wires are connected to correct motor terminal.
- ▶ Now the cables can be connected to the battery.

Operation of electrical unit

- ▶ Ensure batteries are fully charged before switching on the main power.
- ▶ Before operating the thruster, check that the water is free from swimmers, divers or debris and make sure you are not close to other vessels.

5- Operating your thruster

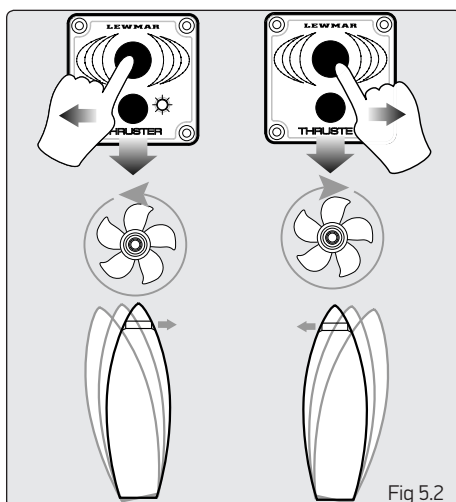
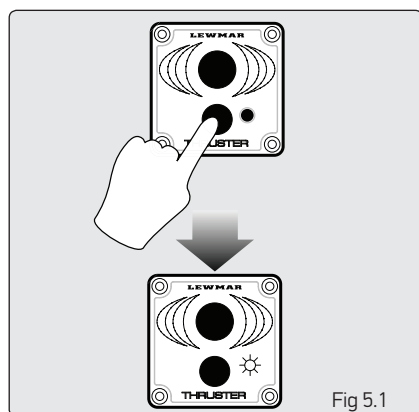
The thruster can be operated using the Lewmar simple joystick (Part No. 589094) or any water proof momentary two direction switch with a 5 amp rating.

- ▶ Switch ON the battery switch.
- ▶ To turn on the panel, press and release the ON/OFF button (fig.5.1). This will cause the LED to illuminate indicating the panel is ON
- ▶ Move the joystick in the desired direction to operate the Thruster (fig.5.2)
- ▶ To turn off the panel, press and release the ON/OFF button. This will cause the LED to turn off indicating the panel is off.

⚠ DO NOT frequently move port to starboard on the joystick in quick succession as this could damage the electric motor.

⚠ Please ensure that you thoroughly understand the operation and safety requirements of the thruster.

⚠ Your thruster should not be operated close to swimmers, as a powerful suction of water is generated when in use.



6- Servicing your thruster

6.1 Service schedule

Thrusters are more likely to attract 'debris', so it is necessary to regularly check the tunnel.

At the annual boat service:

- ▶ Remove any debris from tunnel, propeller and hub.
- ▶ If the propeller is damaged or heavily contaminated, replace it, best to be safe.
- ▶ Apply grease to exposed thruster seal and shaft.
- ▶ If hub is removed the tunnel gasket must be replaced.
- ▶ Inspect motor, ensure all leads are still tight.
- ▶ Check all bolts and nuts are to correct torque.
- ▶ Check the motor assembly is dry and that the compartment is water tight.
- ▶ Check and clean out thruster compartment.

Electric:

- ▶ Inspect electric motor, ensure all leads are still tight.
- ▶ Brush out carbon dust from top of electric motor especially on aluminium boats. Recommend qualified electrician.

6.2 Changing drive pin

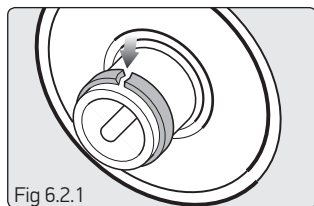


Fig 6.2.1

Cut cable tie on shaft (if fitted)

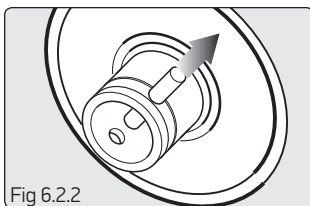


Fig 6.2.2

Punch out pin parts

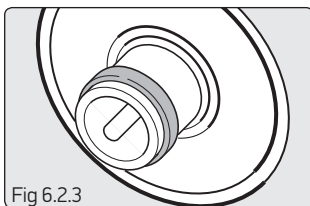


Fig 6.2.3

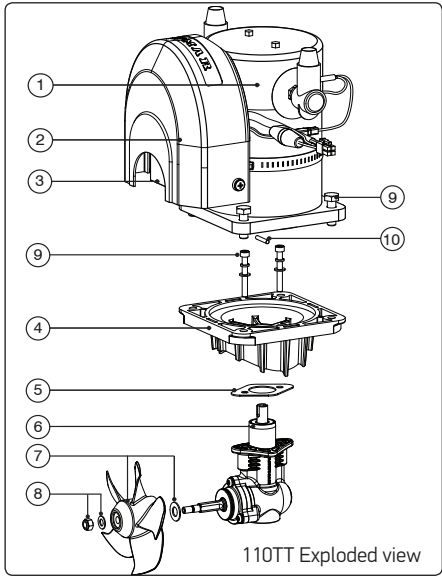
Tap in new pin and secure with new plastic cable tie

7- Specifications

PART NO	MODEL	VOLTAGE	POWER		GEARBOX MATERIAL	TUNNEL (mm)	THRUST		WEIGHT		FUSE
		V	kW	hp			kgf	lbs	Kg	lbs	
591101	110TT1.5	12	1.5	2.0	Composite	110	28	62	10	22	200A- 589012
591482	140TT2.0	12	2.0	2.7	Composite	140	37	81	13	29	200A- 589012

- ▶ Propeller: Single 5 blade
- ▶ Suitable fuse holder:
Standard - 589006 or T2- 589013

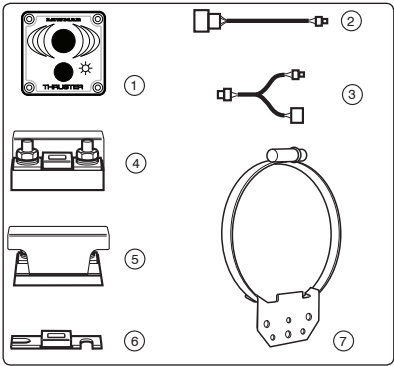
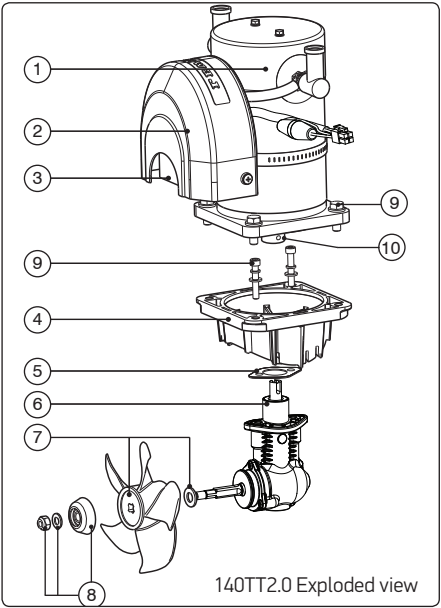
8- Parts list



ITEM	PART NO 110TT	PART NO 140TT2.0	DESCRIPTION
1	582003	581029	Motor Assembly
2	553034	553034	Cover
3	B12526	B12526	Solenoid
	559070	559070	Solenoid loom
4	552004	551052	Mounting Saddle
5	552005	551035	Tunnel gasket
6	582001	581001	Hub assembly
7	589451	589151	Propeller and washer
8	589453	589150	Propeller fixing kit
9	589452	589152	Installation fixing kit
10	559107	559018	Drive pin

Accessories

ITEM	PART NO	DESCRIPTION
1	589094	Joystick
2	589021	2m Control cable & Connectors
	589016	7m Control cable & Connectors
	589017	10m Control cable & Connectors
	589018	14m Control cable & Connectors
	589019	18m Control cable & Connectors
3	589206	Y connector for dual controls
4	589006	Fuse Holder
5	589013	T2 Fuse Holder
6	589012	200A ANL Type Fuse
7	589096	Motor Support Bracket kit



9- Dimensions

MODEL	A		B		C		D	
110TT	123	4 ½	261	10 ¼	110	4 ½	67	2 ½
140TT2.0	123	4 ½	305	12	140	5 ½	73	2 ½

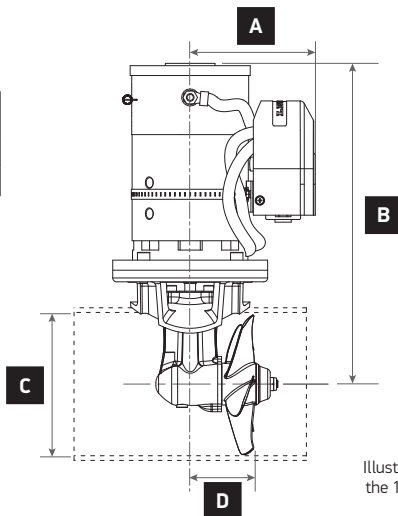


Illustration based on the 140TT2.0 model

10- Fault finding

Thrust in wrong direction?

Change contactor wires on motor solenoid (See section 4.1).

Fuse keeps blowing?

- ▶ Wrong fuse fitted - check rating and replace.
- ▶ Propeller restricted or jammed causing excessive load on motor - check and clear. Check that propeller washer is fitted see Section 3.5.

Control panel does not illuminate?

Check

- ▶ Battery is connected.
- ▶ Main switch ON, check fuse.
- ▶ Control loom connections.
- ▶ Long operation has tripped thermal switch. Wait 20 minutes for motor to cool and reset.

⚠ DO NOT attempt to cool motor by any other means.

Control panel illuminates but no thrust?

- ▶ Are batteries charged?
- ▶ Check main motor connections are tight.

Poor thrust or thrust in one direction only?

- ▶ Batteries not large enough or charged, cables not recommended size. Voltage at motor when running should be a minimum 10 V for 12 V and 21 V for 24 V units.
- ▶ Blockage in tunnel/propeller jammed with debris, switch off main power, inspect and clear.
- ▶ Propeller washers fitted wrong. See Section 3.5
- ▶ Check motor brush springs are located properly, brushes should have good contact with the commutator.

Motor turns but no drive?

⚠ DO NOT continue to run thruster.

- ▶ Shear pin broken, remove 4 motor bolts, see Sec. 6.2, drive out old pin and replace with new pin.
- ▶ Propeller blades broken. Replace with new.

Thruster noisy and vibrating?

- ▶ Check propeller is not touching the tunnel wall.
- ▶ Check hub height is correct, see section 9.

11- Warranty

Limited Warranty and Key Terms of Supply by Lewmar

Lewmar warrants that in normal private pleasure boat usage and with proper maintenance its products will conform with their specification for a period of three years from the date of purchase by the end user, subject to the conditions, limitations and exceptions listed below. Any product, which proves to be defective in normal usage during that three-year period, will be repaired or, at Lewmar's option, replaced by Lewmar.

A CONDITIONS AND LIMITATIONS

- i Lewmar's liability shall be limited to the repair or replacement of any parts of the product which are defective in materials or workmanship.
- ii Responsibility for the selection of products appropriate for the use intended by the Buyer shall rest solely with the Buyer and Lewmar accepts no responsibility for any such selection.
- iii Lewmar shall not be liable in any way for Product failure, or any resulting loss or damage that arises from:
 - a. use of a product in an application for which it was not designed or intended;
 - b. corrosion, ultra violet degradation or wear and tear;
 - c. a failure to service or maintain the product in accordance with Lewmar's recommendations;
 - d. faulty or deficient installation of the product (unless conducted by Lewmar);
 - e. any modification or alteration of the product;
 - f. conditions that exceed the product's performance specifications or safe working loads.
- g. Abuse
- iv Product subject to a warranty claim must be returned to the Lewmar outlet that supplied the product for examination unless otherwise approved by Lewmar in writing.
- v This warranty does not cover any incidental costs incurred for the investigation, removal, carriage, transport or installation of product.
- vi Service by anyone other than authorized Lewmar representatives shall void this warranty unless it accords with Lewmar guidelines and standards of workmanship.
- vii Lewmar's products are intended for use only in the marine environment. Buyers intending to use them for any other purpose should seek independent professional advice as to their suitability. Lewmar accepts no liability arising from such other use.

B EXCEPTIONS

Cover under this Warranty is limited to a period of one year from the date of purchase by the end user in the case of any of the following products or parts of products:

- Electric motors and associated electrical equipment
- Electronic controls
- Hydraulic pumps, valves and actuators
- Hatch & Portlight weather seals
- Products used in "Grand Prix" racing applications
- Products used in commercial or charter applications
- Anchor rode

C LIABILITY

- i Lewmar's liability under this warranty shall be to the

exclusion of all other warranties or liabilities (to the extent permitted by law). In particular (but without limitation):

- a. Lewmar shall not be liable for:
 - Any loss of anticipated turnover or profit or indirect, consequential or economic loss;
 - Damages, costs or expenses payable to any third party;
 - Any damage to yachts or equipment;
 - Death or personal Injury (unless caused by Lewmar's negligence).
- Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you
- b. Lewmar grants no other warranties regarding the fitness for purpose, use, nature or satisfactory quality of the products.
 - ii Where applicable law does not permit a statutory or implied warranty to be excluded, then such warranty, if permitted by that state or country's law, shall be limited to a period of one year from the date of purchase by the end user. Some states and countries do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you.

D PROCEDURE

Notice of a claim for service under this warranty shall be made promptly and in writing by the end user to the Lewmar outlet that supplied the product or to Lewmar Limited at Southmoor Lane, Havant, Hampshire PO9 1JJ, England.

E SEVERANCE CLAUSE

If any clause of this warranty is held by any court or other competent authority to be invalid or unenforceable in whole or in part, the validity of the remaining clauses of this warranty and the remainder of the clause in question shall not be affected.

F OTHER RIGHTS

This warranty gives you specific legal rights, and you may also have other legal rights, which vary from state to state and country to country. In the case of European States a Consumer customer (as defined nationally) has legal rights under the applicable national law governing the sale of Consumer Goods; this Warranty does not affect those rights.

G LAW

This warranty shall be governed by and read in accordance with the laws of England or the state or country in which the first end user is domiciled at the time of purchase of the product.

H DISPUTES

Any dispute arising under this warranty may, at the option of the end-user, be referred to alternative dispute resolution under the rules of the British Marine Federation or to the Courts of the State whose law shall govern the warranty or to the Courts of England and Wales.

The British Marine Federation may be contacted at Marine House, Thorpe Lea Road, Egham, England, TW20 8BF

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