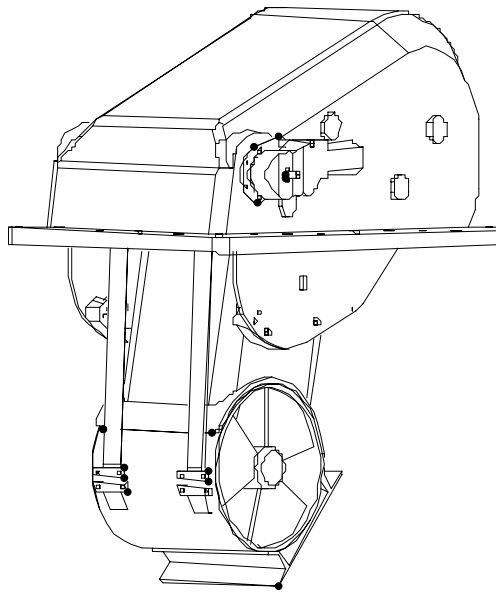


# MAX POWER

## THRUST IT TO THE MAX **COMPACT RETRACT 12 / 24 V**



### **MECHANICAL & ELECTRICAL INSTALLATION GUIDE & MAINTENANCE OVERVIEW**

**Serial N°:** -----

**Start up date:** -----

**IT IS VERY IMPORTANT TO KEEP THIS MANUAL ON BOARD**

Via Philips 5, 20900 Monza (MI), Italy  
Tel. +39 039 200 1973-936 - Fax +39 039 2004299  
Email: [contact@max-power.com](mailto:contact@max-power.com) [www.max-power.com](http://www.max-power.com)

To ensure a proper installation, correct usage and long-lasting enjoyment of this equipment, please take time to read this manual thoroughly.

## TABLE OF CONTENTS

1	Positioning of Unit	4
2	Location of Auxiliary Equipment	4
3	<b>Mechanical installation</b> General	5
3.2	Determining & Marking up Position	6
3.3	Construction of the Hull Opening & Closing Plate	7
3.4	Final Fitting of the Mounting Base to the Hull	8
3.5	Final Fitting of the thruster Unit to the Mounting Base	8
3.6	Fitting of Hull Closing Plate	10
3.7	Final Adjustment and Set-Up of Thruster Unit	11
4	<b>Electrical Installation</b> (General)	11
4.2	Control Panel Installation	11
4.3	Control System	12
4.4	Control Panel & Thruster Control Box functions & Modes of Operation	13
	a) General Remarks	13
	b) Manual Mode	13
	c) Automatic set-up Mode	14
	d) Normal Operation Mode	14
4.5	Battery Requirements	16
4.6	Power Cable Sections (battery to Relay)	16
4.7	Power Fuse	17
5	Operation Limitations	17
6	Basic Maintenance	18

## DIAGRAMS

1)	Build Diagram	19
2)	Wiring of Control Box	20
3)	Control Wiring	21
4)	Power Cable Connections	22

Your thruster is a highly technical product and should be treated as such. The employment of a qualified marine personnel, with bow and stern thruster installation experience is strongly advised. Where possible, the boat manufacturers architect, design departments and/or shipyard should be consulted, prior to installation taking place. For any boat requiring official classification, bodies of approval should also be consulted at the earliest opportunity.

---

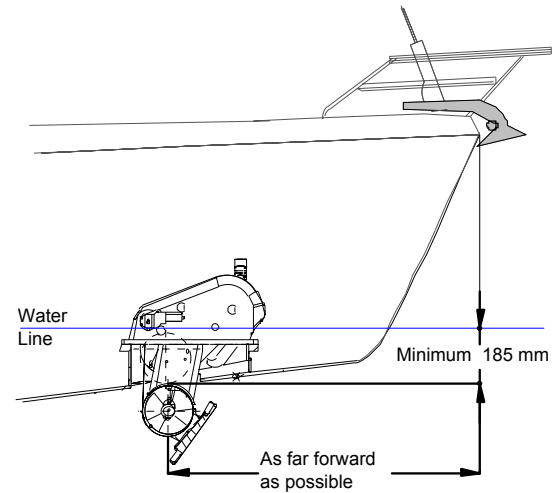
### Your thruster should be delivered with the following parts:

Thruster assembly with integrated thrusters motor, up / down motor, motor coupling, leg and propellers	Plaque for closing plate (kit)	Directional Relay Box	Control Box
Control Panel (Grey)	25m Control Cable	Manual	

## 1. POSITIONING


- **WARNING:** Correct positioning is essential for the correct operation of this unit.

- Find the point the farthest forward (or aft), while keeping in mind the space available, given the vessel's fixtures, space and shape ensuring you respect the minimum immersion depth of one full turbine diameter (185 mm).



- Always check and make sure that there is enough room to allow for the complete removal of the thruster unit and enough room for the connection of the electric cables.
- To install a Compact Retract in the stern, make sure that the turbine flow is clear of all obstacles, or select the best possible compromise.

## 2. DETERMINE THE LOCATION OF THE AUXILIARY EQUIPMENT

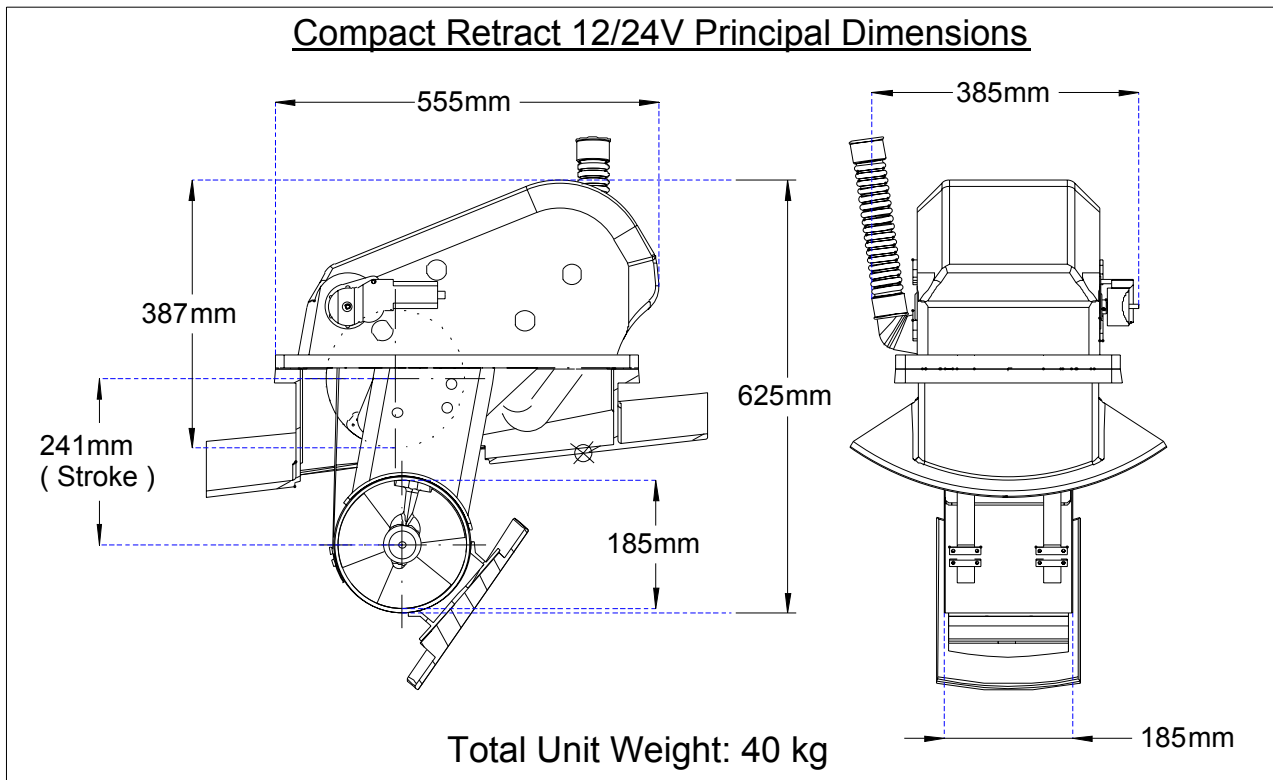
- A power fuse, of the correct size (see section 4.3), must be installed in the positive supply cable, as close as possible to the thruster's battery bank and it must be easily accessible and clearly marked.
- A manual battery isolator, of the correct size, should be installed in the positive supply cable, as close as possible to the thruster's battery bank and must be easily accessible and clearly marked.
- An electrical battery isolator, as supplied by Max Power, should be installed in the positive supply cable, as close as possible to the thruster's battery bank, in order to benefit from all automatic safety features of the electronic control system.
- The thruster electronic control box should be installed in proximity of the thruster unit in a completely dry and ventilated area.
- The thruster relay box should be installed in proximity of the thruster unit, above the waterline in a completely dry and ventilated area.
- The thruster motor terminal busbar should be installed above the waterline.
-  Care should be taken to securely fix the opening of the black rubber hose, containing power cables, above the vessel's waterline.
- The control panel(s) should be installed as desired at the helm station(s) in a protected and waterproof manner.

### 3. MECHANICAL INSTALLATION

*(Please refer to "Build Drawing" at back of this document, see pg 18):*

#### 3.1 GENERAL

- MAX POWER can supply, either a steel reinforced G.R.P. mounting base or a 5086 aluminium alloy-mounting flange. These bases save considerable shipyard time while assuring solid and precise installation.
  - a) For GRP hulls the mounting base should be laminated into the hull. The base supplied is only to help give the initial form; its strength will come from additional lamination (inside and out) added when laminating the hull.
  - b) For alloy hulls the mounting flange should be welded onto the base, which has been fabricated into the hull.
- The method and materials used for making the mounting base must be adapted to the particular hull material (laminated wood, GRP, sandwich, aluminium, or steel). Naval Architects, Classification Societies or specialised firms should be consulted.
- The thruster(s) mechanical stresses are spread over the hull by the mounting base. Its installation reinforces the hull, if well calculated, but it might be necessary to attach it by gussets to frames and stringers.



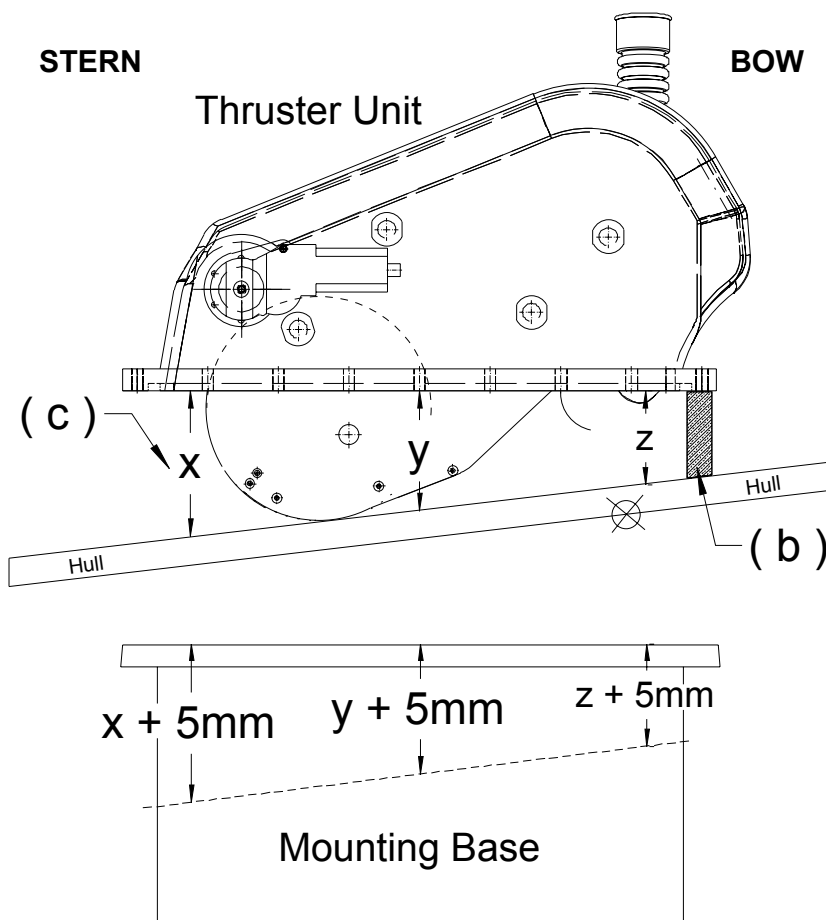
- When fixing the mounting base, do not forget to take into account the overall dimensions of the Compact Retract

### 3.2 DETERMINING & MARKING UP POSITION

a) Remove the counter-mould on the inside of the hull ,in area where thruster will be installed, allowing at least 15 cm on the outside of mounting base position for stratifying the mounting base to the hull.

b) Position the thruster inside the hull. Cut a piece of wood( length = 121mm – hull thickness) to use as a spacer. Place this spacer between the thruster’s flange and hull. This will give the installation height and position of the unit.

c) When satisfied with the initial position of the unit, take measurements at various points between the flange and the bottom of the hull. Mark these measurements onto the mounting base to determine the initial shape to which the base should be cut. To allow sufficient tolerance, add 5 mm to all the above measurements to allow for tolerances.



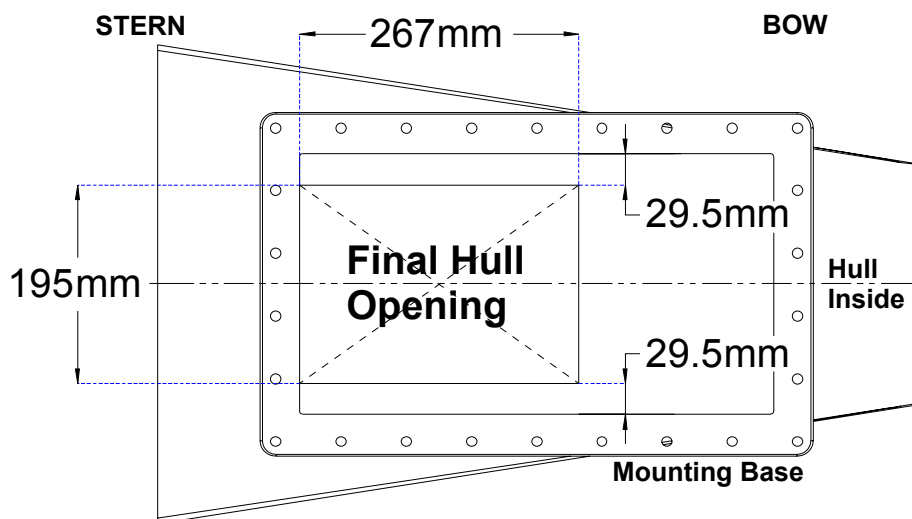
d) Mark-up the thrusters initial position on the inside of the hull before removing unit.

e) The thruster unit can now be removed and once the mounting base has been cut, using the above measurements, the base can be temporarily fixed in place in its marked position.

f) Place the thruster unit in the temporarily fixed mounting base to verify dimensions.

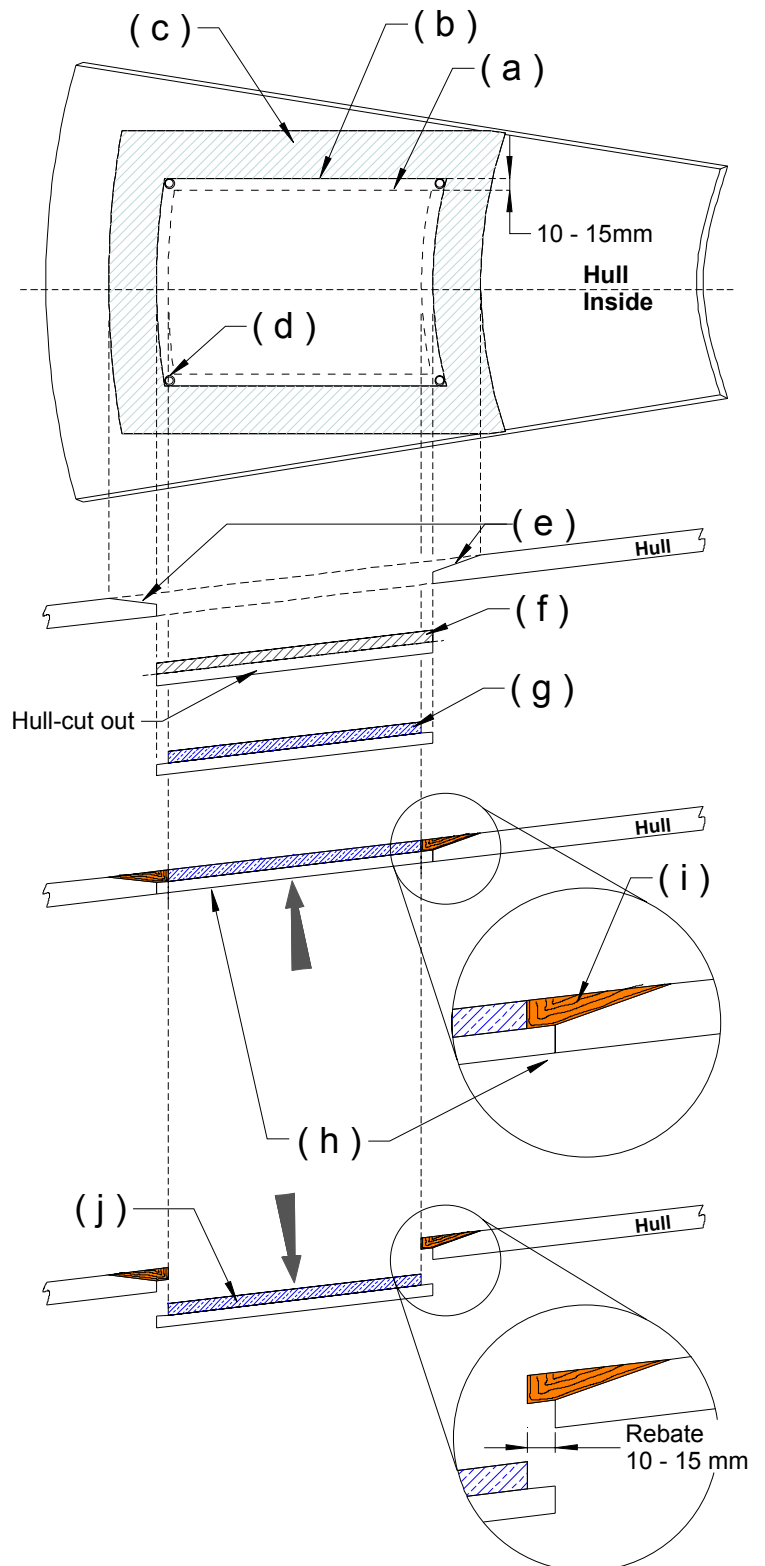
g) Once satisfied clearly mark the final position of the inside of the mounting base and remove base.

h) Measure and mark the hull opening using the dimensions noted on the diagram opposite. Also see “Build Drawing”.



### 3.3 CONSTRUCTION OF THE HULL OPENING AND CLOSING PLATE

- a) Measure & mark the hull opening as mentioned before.
- b) Trace a parallel line, 10 – 15 mm away from marked-up hull opening, to allow for position of rebate.
- c) Trace a parallel line, 100 – 150 mm away from marked-up position of rebate, to allow for area to be shaved down to allow for the construction of the rebate.
- d) Drill holes in the corners of lines marking the rebate position and cut out this piece of the hull.
- e) Shave down the marked up area for construction of rebate ( see "c" above ). Make sure when grading the hull not to exceed  $\frac{1}{2}$  the hull thickness.
- f) Shave down hull-cut out to half its original thickness.
- g) Use piece of wood (195 x 267 mm) to make male mould for rebate construction. Position & temporarily fix this on shaved down hull cut-out, allowing 10 – 15 mm all-round. Make sure all lines are smooth and liberally wax this mould.
- h) Position & secure this in hull opening, making sure outside hull lines are smooth.
- i) Build the rebate, using matt & roving on the inside of the hull. Do not exceed the original thickness and shape of the hull.
- j) Once rebate is set, remove the male plug. Now remove temporarily fixed piece of wood from shaved down hull cut-out and keep the hull cut-out to use as closing plate.

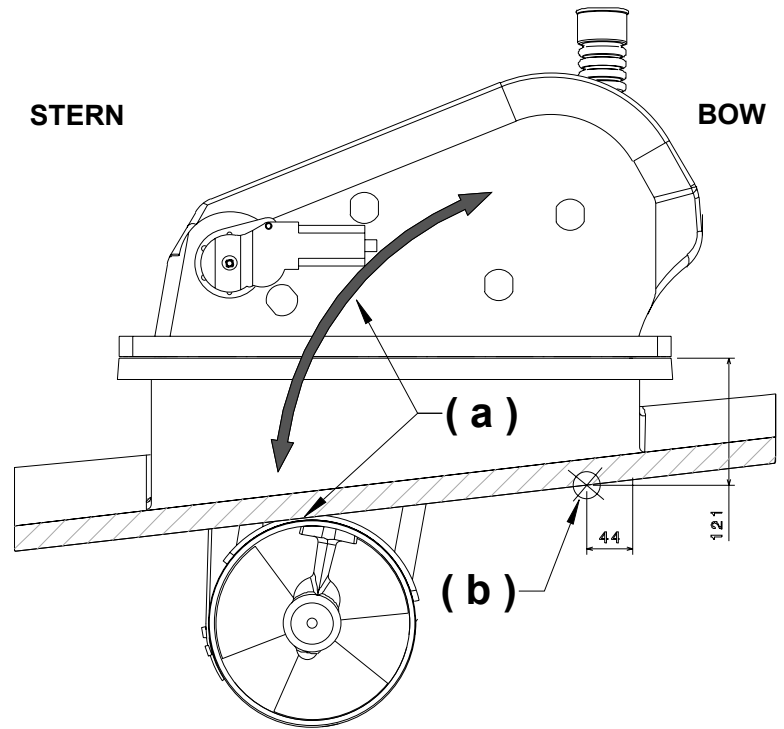


### 3.4 FINAL FITTING OF THE MOUNTING BASE TO HULL

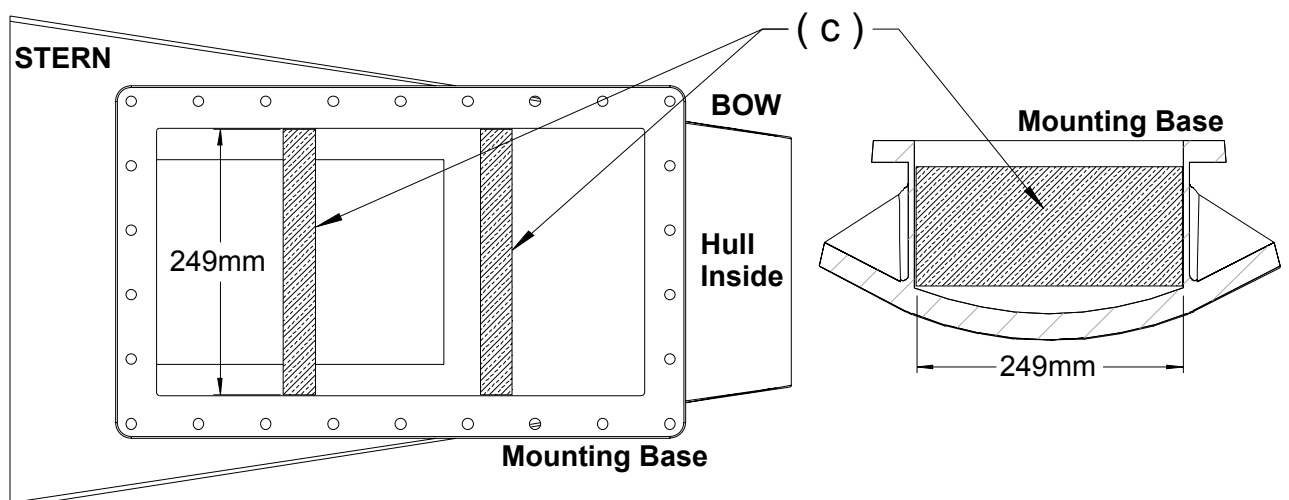


**WARNING** : Please keep in mind that thruster unit will automatically retract after 10 minutes, when in “Normal Operation Mode”. Thus before doing any work on the turbine, please ensure that thruster is in “Manual Mode”. When in doubt remove fuse in supply of the electronic control box.

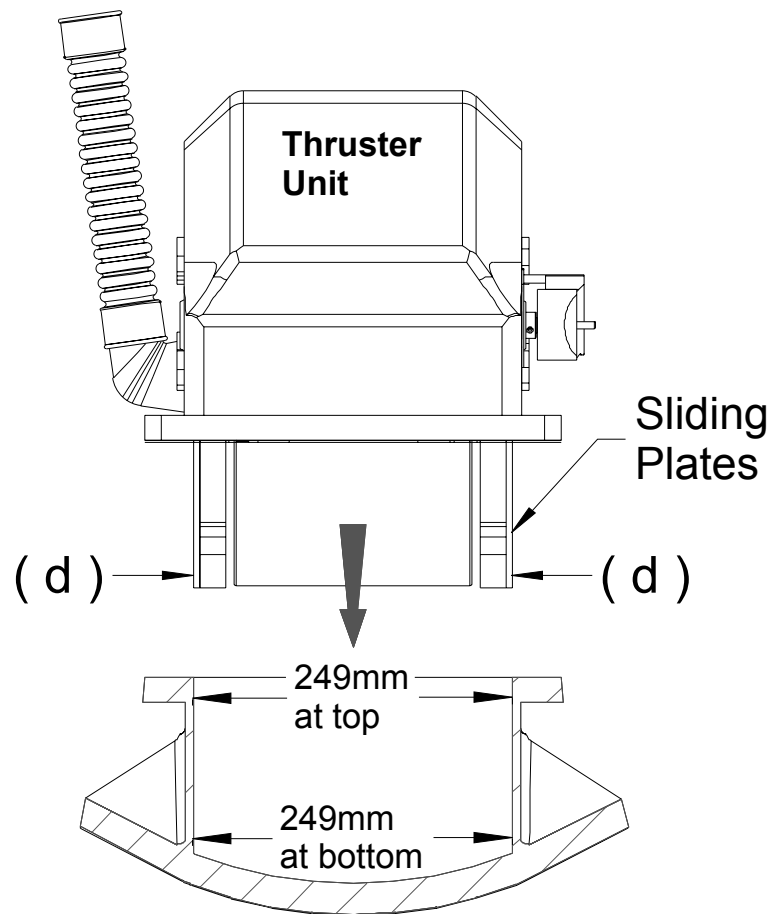
- a) Once the hull opening has been cut and rebate constructed, you need to temporarily fix the mounting base in its marked position. Install the thruster in position, fixing it with four bolts at the corners, raise and lower the unit, making sure that the unit is not being obstructed by anything and that the turbine completely clears the hull when fully down;
- b) **IMPORTANT** verify that the construction point, as shown on “Build Drawing” has been respected.



- c) Once completely satisfied with the position and height of the mounting base, the base can be permanently stratified and fixed into the hull while respecting the inside dimensions of the mounting base. In order to ensure that the mounting base keeps its initial form during the stratification process, one can use some wooden spacers ( length = 249 mm) on the inside of the mounting base.



- d) The reason for respecting these dimensions is to avoid the sliding plates becoming wedged into mounting base resulting in the unit getting stuck in the down position.
- e) Before fixing the thruster unit onto the mounting base flange it is important to ensure that the top surface of the mounting base flange is perfectly flat to accept the « O » ring seal of the Compact Retract base flange ensuring perfect water tightness.



### 3.5 FINAL FITTING OF THE THRUSTER UNIT TO THE MOUNTING BASE

- a) Make sure you provide sufficient access underneath the flange to allow for tightening the nuts. If access is not possible, provide a special mounting flange with metric studs or tapped holes. The bolts fixing the thruster onto the mounting flange must be inserted from top to bottom, **except** for the four bolts on the bow side of the flange, which should be inserted from the bottom to the top.
- b) Final installation of the thruster unit onto the mounting base must be made after thoroughly cleaning and then liberally coating both joint surfaces (thruster base flange and mounting base flange) with good quality marine grease, to ensure "O"-ring seal is compressed flat, evenly, smoothly and squarely when the bolts are tightened.
- c) Under no circumstances should the thruster be glued or bedded down with a marine type mastic/glue such as Sikaflex or other similar product(s).
- d) The flange bolts should be tightened sequentially and in successive passes until the two surfaces touch.



### 3.6 FITTING OF HULL CLOSING PLATE

Once the thruster unit is permanently bolted onto the mounting base, and once all electrical connections are completed you are now ready to fix the mounting plate to the base of the turbine.

**WARNING :** Please keep in mind that the thruster unit will automatically retract after 10 minutes, when in 'Normal Operation Mode'. Thus before doing any work on the turbine, please ensure that thruster is in "Manual / Installation Mode". When in doubt remove fuse in supply of the electronic control box.

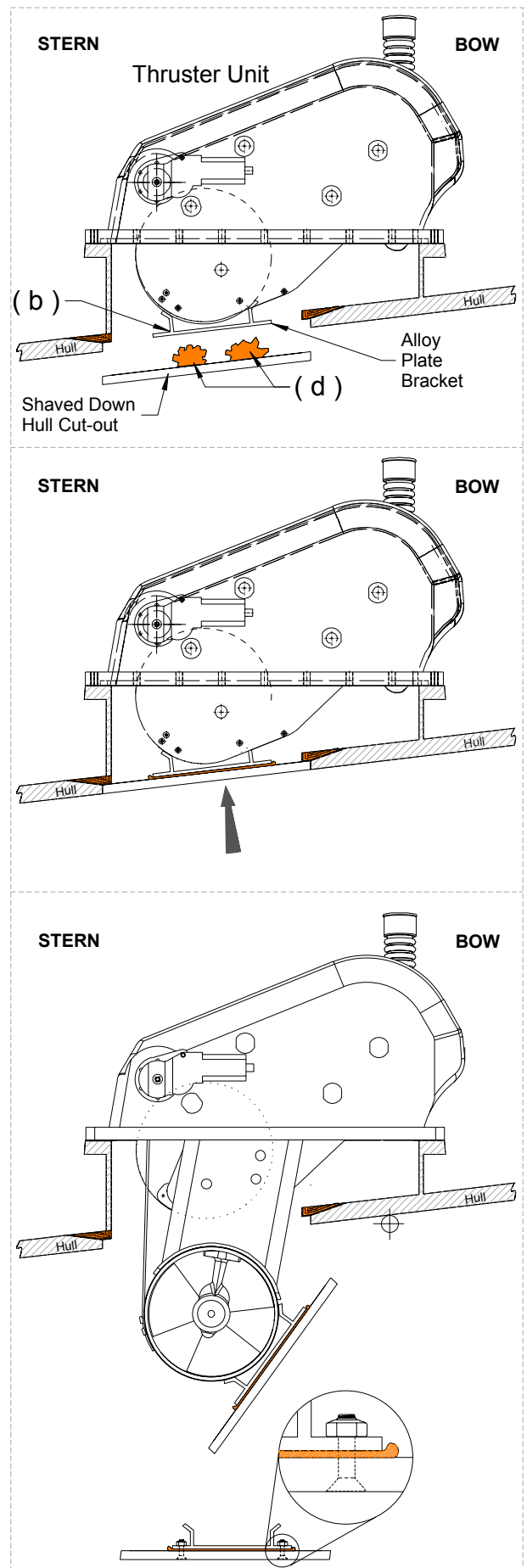
A) Go into 'Installation Mode' (see section 4.4 of this document for more detail on all operation modes) which will automatically lower the turbine and bring it back up, stopping 10mm short of the fully 'Up' position and switch off automatically.

B) Position & center the composite fixing bracket onto the turbine, make sure the bottom of the bracket is parallel to the hull line and mark the position of the four fixing holes on turbine.


C) Go into 'Manual Mode' lower thruster completely and drill these marked holes in turbine, mount the plate onto the turbine using stainless steel bolts with nylock nuts. After this is finished raise the thruster completely and switch the unit into 'Installation Mode', the thruster is now ready for the hull closing plate to be fixed.

D) Place a sufficient amount of reinforced fibreglass on the hull closing plate and firmly push the closing plate into its rebate, leaving it close until resin has set.

E) Once dry go into 'Manual Mode', lower unit and remove bracket with closing plate, fill up and finish off any gaps, after which the closing plate should be fixed to the bracket by means off nuts and bolts. You now have your closing plate



### 3.7 FINAL ADJUSTMENT AND SET-UP OF THRUSTER UNIT

-  **WARNING** : Please keep in mind that thruster unit will automatically retract after 10 minutes, when in “Normal Operation Mode”. Thus before doing any work on the turbine, please ensure that thruster is in “Manual Mode”. When in doubt remove fuse in supply of the electronic control box.
- b) With closing plate unit fixed to the turbine, raise and lower the thruster in ‘*Manual Mode*’ to be sure that it is closing tightly into the rebate. Once satisfied make sure that closing straps are tight, if not please adjust at the brackets located on the turbine with thruster in fully down position.
  - c) Once satisfied go into ‘*Automatic Setup Mode*’ during which the thruster will automatically find its fully “Up” and fully “Down” position, after which the system will automatically shut itself off.
  - d) Check that the hull closing plate shuts tightly into the rebate in the hull and when fully down that the turbine is completely clear of the hull.
  - e) The thruster can now be switched “On” normally and one will be able to use the thruster in “Normal Operation Mode”.
  - f) During the installation if you find the thruster stops prior to reaching fully “Up” or fully “Down” position and after making sure there is no mechanical problem, one should adjust the trip settings in the electronic control box (see electrical installation pg 20 for further detail).

## 4. ELECTRICAL INSTALLATION

### 4.1 GENERAL ELECTRICAL INSTALLATION

- **ATTENTION:** An incorrect electrical installation will cause rapid deterioration / failure of the unit.
- Excessive voltage drops will cause relay and brush failure. Special attention should be given to the quality, capacity and condition of your batteries, and cable sizes.
- **REMEMBER::** Take care to tighten correctly all electrical connections.
- **WARNING:** Under no circumstances should any inflammable products be stored next to the electrical components of the thruster.
- **WARNING:** It is essential to install a power fuse, manual battery isolator and if possible an electric battery isolator as close as possible to the source of power (thruster battery bank).
- The manual battery isolator must be visible, clearly marked & easily accessible.

### 4.2 CONTROL PANEL INSTALLATION

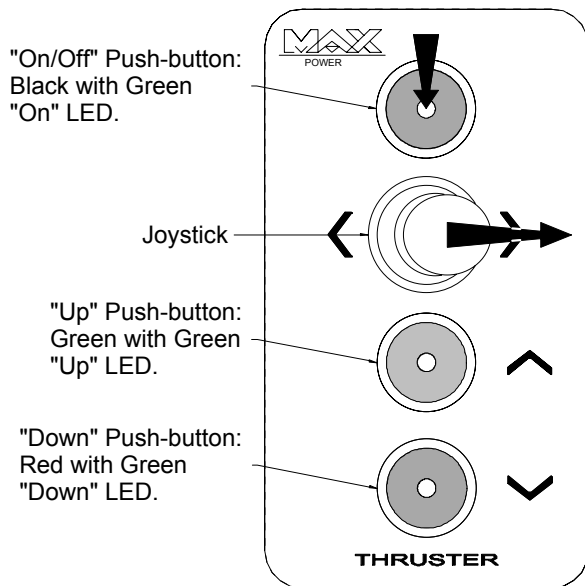
- Control panels should be protected from the natural elements while the thruster is not in use.
- Install the control panel(s) in easily accessible positions, **without** obstructing the main engine and/or steering controls.
- When fixing the panel with the stainless steel screws, make sure to install the pre-cut rubber seal, as supplied with the panel, ensuring that it is in the correct position.
- **IMPORTANT:** Only clip-on the face panel/cover when totally finished and satisfied with wiring and positioning of the unit.

- Please note that panels are only fully waterproof from the front, if installed correctly. However the area behind the dashboard should be kept dry to avoid the risk of oxidation of the cable connector contacts.
- For full installation instructions of the control panels please refer to "Installation Guidelines " as supplied with each control panel.

### 4.3 CONTROL SYSTEM

- For the wiring of the electronic control card and the control system, please refer to the diagrams "*Compact Retract, 12/24: Electronic Control Box Connections*" and "*Compact Retract 12/24V: Control Wiring*" page 20.
- Install the thruster control box as close as possible to the thruster unit and thruster relay box in a dry area above the waterline.
- All wires should be carefully labelled to reduce the chance of error and simplify checking and troubleshooting. Try to use the colour scheme as used on the control wiring diagram in order to facilitate future maintenance and troubleshooting.
- All wire ends for terminals should be tinned before crimping or inserting into terminal blocks. The wire dimensions should be of the specified dimensions.
- Install a double pole breaker/isolator in the supply wiring of the thruster control box on the boats' main electrical switchboard marked BOW THRUSTER: Please keep in mind voltage drop in cable run from control box to main electrical switch board.
- This breaker/isolator should ideally be supplied from an independent battery bank, to the one used for powering the thruster unit.
- The installer must protect the positive supply cable of the thruster control box by means of a fuse (8 A) as indicated in the above mentioned diagrams. The size of the supply wires (red & black) depends on the length of the cable run, the voltage drop in these cables should not exceed 5% of the nominal battery voltage.
- For safety reasons and in order to benefit from all the functions provided by the thruster's electronic controller, an electric battery isolator needs to be installed in the thruster motor's positive supply cable.
- It is important to isolate the thruster motor power circuit by means of a battery isolator (manual/electric) after having left port & when the manoeuvre is finished, after docking.
- **Please Note:** All wiring must be insulated from ground and should be installed in compliance with acceptable standards that require all junctions to be in waterproof boxes equipped with glands. All wiring should be kept outside of bilge's and other habitually wet areas.

#### 4.4 CONTROL PANEL AND THRUSTER CONTROL BOX FUNCTIONS AND MODES OF OPERATION




##### **Control Panel:**

To switch "ON" or "OFF" push down the black push-button, while pushing joystick to the right for one second.

To "Lower" or "Raise" press and hold the "Down" or "Up" pushbutton for one second until buzzer beeps once. The thruster will then lower or raise automatically and buzzer will double beep once fully down or fully up position is reached.

##### **General Remarks:**

 Before connecting power to the thruster control card or when raising or lowering the thruster in whatever mode of operation, make sure that all persons are clear of thruster unit, to avoid any human injuries.

- Before system can be used in normal operation mode, the system needs to be set-up following the procedures described in "Manual Mode", "Automatic Set-up Mode" and "Installation Mode".
- If power to control card was removed with system in any other mode than *Normal Operation Mode*, the system will automatically goes into *Manual Mode* when power is restored to control card. If thruster was not fully up then the "Up" LED will flash, and thruster will have to be raised by pushing and holding "Up" pushbutton.

##### **A. Manual Mode:**

- A.1 With system switched off, push and hold down "On/Off", "Up" and "Down" pushbuttons simultaneously for a period of **3 seconds**. The system will now go into *Manual Mode* with "On", "Up" and "Down" LED's all flashing.
- A.2 With the system in *Manual Mode* the thruster can now be lowered and raised by pushing and holding down the "Up" or "Down" pushbuttons. As soon as pushbutton is released the unit will stop.
- A.3 Buzzer will double beep as soon as down or up position is reached.
- A.4 If these "down" or "up" positions are reached before thruster is in the fully mechanical down or up position, the trip settings of the control card need to be increased.
- A.5 If buzzer double beep before fully down position is reached, as in point **A.2**, when unit is being lowered, then adjust "Down" trip setting screw on control card by a  $\frac{1}{4}$  of a turn clockwise. Repeat this step until thruster reaches fully down position or until setting screw has been set to maximum.
- A.6 The same procedure as in point **A.5** should be followed when raising the thruster, except that "Up" trip setting screw should be adjusted.
- A.7 To switch off the system while in *Manual Mode* follow procedures as described in drawing above.

## **B. Automatic Set-up Mode:**

- B.1 First go into *Manual Mode* following the procedure as described in section **A** above.
- B.2 With system now in *Manual Mode*, push and hold down “On /Off”, “Up” and “Down” pushbuttons simultaneously for a period of 3 seconds. The system will now go into *Automatic Set-Up Mode* with “On” LED on and “Up” and “Down” LED’s flashing.
- B.3 With the system in *Automatic Set-up Mode* the thruster will automatically lower, find it’s fully down position, then raise, find its fully up position and switch off automatically.
- B.4 The system can now be switched “On”, as shown in above drawing, and will be ready to use in *Normal Operation Mode*.

## **C. Installation Mode:**

- C.1 First go into *Manual Mode* following the procedure as described in section **A** above.
- C.2 Push and hold down “Up” pushbutton until unit double beeps, indicating that thruster is fully up.
- C.3 With system now in *Manual Mode* and fully up, push and hold down “On / Off”, “Up” and “Down” pushbuttons, while pushing joystick to the **right**, simultaneously for a period of 3 seconds. The system will now go into *Installation Mode* with alternate flashing of “On”, “Up” and “Down” LED’s.
- C.4 With the system in *Installation Mode* the thruster will automatically lower, find it’s fully down position, then raise and stop some distance from the fully up position and switch off automatically.
- C.5 The hull closing plate should now be fixed into place, as described in Section **3.6**.
- C.6 Once finished with fixing of hull closing plate the thruster will be ready for final set-up procedure.
- C.7 For final set-up of thruster go into *Automatic Set-up Mode*, as described in section **B**, to allow system to do its final set-up. System will now be ready to be used in *Normal Operation Mode* (see section **D**).

## **D. Normal Operation Mode:**

### **D.1 Switching the system “On” or “Off”:**

- a) To switch the thruster "ON" or "OFF" follow the instructions on the diagram above.
- b) When switched "ON" the unit will double beep and the “On” and “Up” LED’s will light up.
- c) When switched "OFF" the unit will double beep and all LED’s will go out.
- d) It’s only possible to switch off the unit with thruster in the fully up position.

### **D.2 “Lowering” & “Raising” Thruster Unit:**

- a) Once unit has been switched on as described above, press and hold the “Down” pushbutton for one second after which unit will beep once and then lower automatically to fully down position.
- b) When thruster will be fully down the “Down” LED comes on and the buzzer double beeps to indicate that thruster is completely down and ready to thrust.
- c) As long as thruster is in the down position the buzzer will beep (short) once every three seconds, to indicate that thruster is still in the down position.

- d) To raise thruster, press and hold the "Up" pushbutton for one second after which unit will beep once and then raise automatically.
- e) When thruster will be fully up the "Up" LED comes on and the buzzer double beeps to indicate that thruster is completely up and ready to be switched off.
- f) If thruster meets any abnormal resistance when lowering or raising, the system will automatically go into *Manual Mode*.

### D.3 Thrusting "Left" & "Right":

- a) Use joystick to thrust either left or right.
- b) Please note that it is only possible to thrust left or right when thruster is detected to be fully down.
- c) The thruster controller provides a time delay between left and right thrust in order to avoid rapid direction changes, but no delay when thrusting to same side.

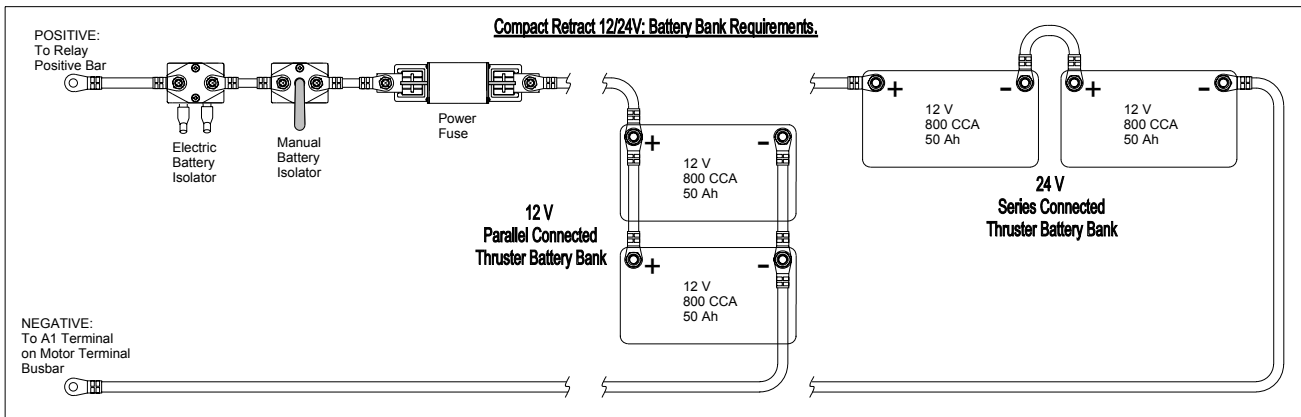
### D.4 Overheat Alarm & Shut-Down:

- a) If the thruster motor overheats the buzzer will start beeping and the "On" L.E.D. will flash with one-second intervals until the motor has cooled down.
- b) During this overheat condition one has a total of ten seconds of actual use (left & right thrust) of the thruster, after which the unit will auto retract and switch off automatically.
- c) After this overheat shut down it will not be possible to switch "On" the system again until the thruster motor has cooled down.

### D.5 General:

- a) If the thruster unit has not been used for a period of ten minutes the unit will automatically switch off.
- b) If unit is in the "Down" position, the thruster will auto-retract automatically before switching off.
- c) Ten seconds before system automatically switches off the unit will give an audible warning by means of 4 short beeps.
- d) In order to isolate the power circuit of the thruster motor each time the control circuit is switched off one would need to install an electric battery isolator, as advised by Max Power (*see "Control Wiring Diagram" in the back of this manual for more detail*).
- e) If power to control card was removed with system in *normal operation mode* (after correct set-up procedure was followed) and *with* the thruster not fully up, the unit will automatically raise and switch off as soon as power to control card is restored. The system can then be switched on normally and will be in *normal operation mode*

### 4.5 BATTERY REQUIREMENTS



- When choosing the type of batteries needed for your thruster’s battery bank, keep in mind that it is the CCA (Cold Cranking Amps) capacity that is the most important and not the Ah (Amp-hour) capacity. This is because thrusters draw high currents, but only for very short periods of time (maximum 3 min.)
- Max Power would recommend using Exide, Maxima 900 type batteries, which have an 800CCA and 50Ah capacity.
- If the dedicated batteries are charged by the alternator, the reference of the charge must be taken after the diode-splitting block (if in doubt, consult a marine electrician).
- If the batteries or cables are inferior to those recommended, the Compact Retract will not reach its potential thrust. The greater the batteries and cables size, the better the thrust.
- Thruster performances are quoted with a minimum 22 volts at the motor terminal busbar for a 24 volts model or 11 for 12 volts models (thruster running, boat in water).

### 4.6 POWER CABLE SECTIONS ( BATTERIES TO RELAY )

- According to the ISO 10133 standards: *“The length and cross sectional area of conductors in each circuit shall be such that the calculated voltage drop shall not exceed 10% of the nominal battery voltage at any appliance if the circuit is switched on at full load”.*
- The cable lengths as given in the table below are the total length of the positive cable measured from battery bank to thruster relay, then the cable from thruster relay to terminal D1 or D2 on thrusters motor terminal busbar plus the negative return cable from terminal A1 on terminal busbar to battery bank. Please refer to the diagram *“Compact Retract, 12/24: Power Cable Connections”* in the back of this manual.

Cable Lengths From battery to thruster (+) & back (-)	Compact Retract, 12V		Compact Retract, 24V	
	mm <sup>2</sup>	AWG	mm <sup>2</sup>	AWG
5 m (2 x 2.5m)	70 mm <sup>2</sup>	2/0	50 mm <sup>2</sup>	1
10 m (2 x 5.0m)	95 mm <sup>2</sup>	3/0	70 mm <sup>2</sup>	2/0
15 m (2 x 7.5m)	120 mm <sup>2</sup>	4/0	95 mm <sup>2</sup>	3/0
20 m (2 x 10m)	120 mm <sup>2</sup>	4/0	95 mm <sup>2</sup>	3/0

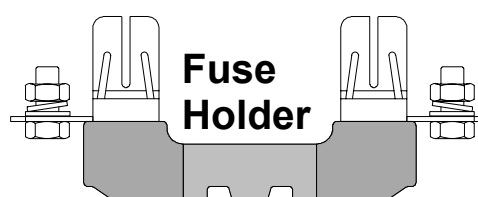
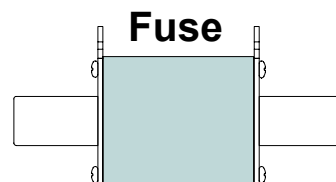
- When choosing or calculating the cable size needed for your thruster installation, do not forget to take into account the thermal rating of the conductor insulation which are directly related to the ampacity (current carrying capacity) of the cable. Always try to use cables with the highest thermal insulation rating available or at least 85° - 90°C.

- For large diameter cables it may be easier to use two smaller cables instead (in order to allow for a greater flexibility of movement). For example: 2 x 50 mm<sup>2</sup> instead of 95 mm<sup>2</sup>.

#### 4.7 POWER FUSE:

- Sizing of fuses for overcurrent protection are a function of the cable sizes in the circuit, not the amperage drawn by the appliance (thruster motor) in the circuit. It is thus not the electrical thruster motor that is protected by the fuse, but the power cables supplying the thruster motor.
- Considering the **importance** of selecting the correct fuse size for your thruster's power circuit and since incorrect sizing can cause nuisance tripping (to small fuse) when thruster is really needed or even fire, if fuse is over sized, it is recommended to use the following fuses and fuse holders as supplied by Max Power:


	Compact, 12V	Compact, 24V
<b>Fuse Size</b>	200 A	125 A
<b>Max Power Part Number for fuse.</b>	OPTI 3112	OPTI 3114
<b>Max Power Part Number for fuse holder.</b>	OPTI 3119	OPTI 3119



#### 4.8 BATTERY ISOLATOR:

- A **manual battery isolator**, of the correct size, should be installed in the positive supply cable, as close as possible to the thruster battery bank and should be easily accessible and clearly marked.
- An **electrical battery isolator**, as supplied by Max Power, should also be installed in the positive supply cable, as close as possible to the thruster battery bank, in order to benefit from all automatic safety features of the electronic control system.

### 5. OPERATION LIMITATIONS

 NEVER navigate at a speed greater than 3 knots when the thruster is in the down position.

- Please note that the electric motor is rated S2-2 min. This means the motor can run continuously for 2 minutes, after which it should be stopped for a sufficient time to cool down to the ambient temperature.
- The Compact Retract should always be used when batteries are all fully charged with the engine alternator running. Discharged batteries will damage the motor and / or relay.



## 6. **BASIC MAINTENANCE**

### 6.1 **GENERAL**

- Regularly check that power cable connections are tightened correctly and are in good condition.
- If the vessel is to remain out of the water for some time, for example dry storage for winter, the underwater mechanism must be thoroughly rinsed with fresh water, then the thruster column must be liberally greased.
- Inspect and repair the hull closing plate gasket for deterioration or missing pieces. Check and tighten, if necessary, the hull fixing bracket screws.

### 6.2 **CONTROL PANEL**

- Control panel(s) should be protected from the natural elements while the thruster is not in use.
- The area behind the dashboard should be kept dry at all times to avoid the risk of oxidation of the cable connector contacts.

### 6.3 **RELAY BOX & ELECTRONIC CONTROL BOX**

- Relay box and electronic control box must be kept in dry and aerated area and fitted above above the waterline.

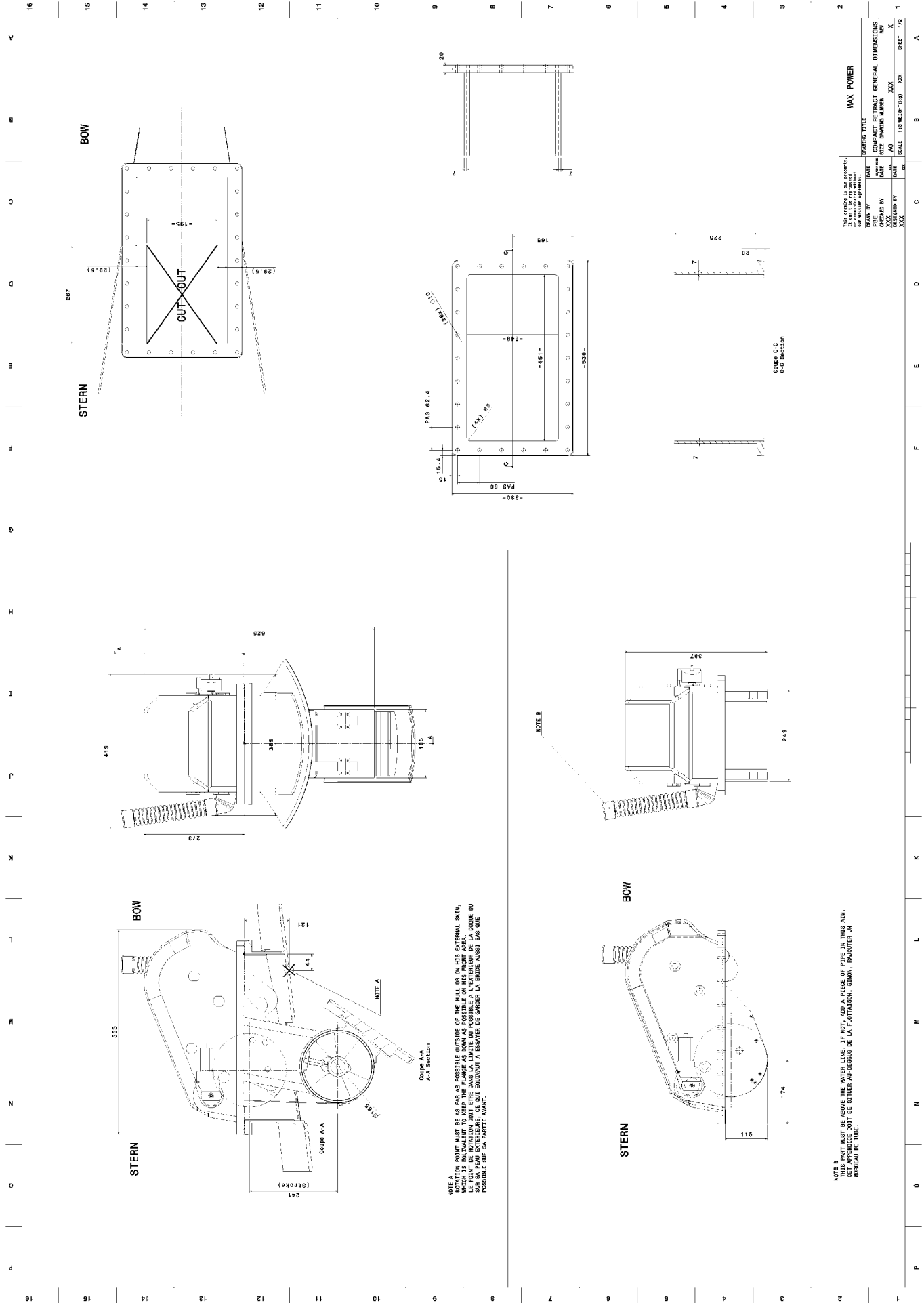
### 6.4 **BATTERIES**

- Check regularly the condition of the batteries used for the thruster and its charging system.
- Weak batteries (low voltage) are the most frequent cause of rapid deterioration of the thruster relay and motor.

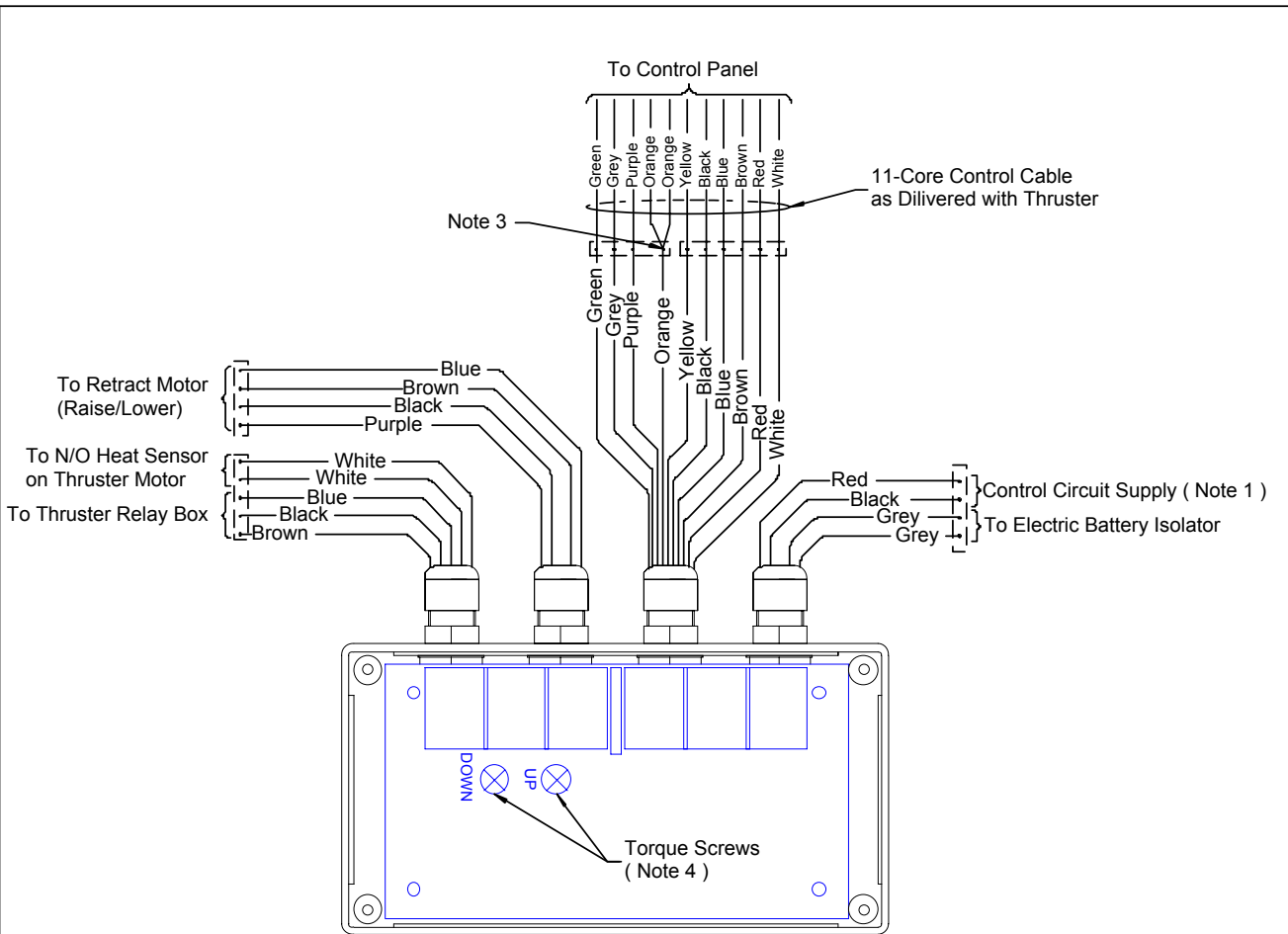
### 6.5 **COMPOSITE DRIVE LEG**

- The composite drive leg is lubricated for life.
- The composite drive leg does not require an anode.
- When the boat is ashore, check for evidence of fishing line, etc... in the propellers.
- For prevention of calcium build up on the drive shafts, which would damage the oil seals, before fitting the propeller(s), cover drive shaft and the oil seals stainless steel cover with silicon grease. This should be done on an annual basis after cleaning of outside of leg.
- Do not use aggressive solvents as they might damage drive leg seals.
- Always keep the propellers and tunnel clean.
- Please contact your closest Max Power distributor for local service points.

# 7. BUILD DRAWING



## 8. WIRING OF CONTROL BOX



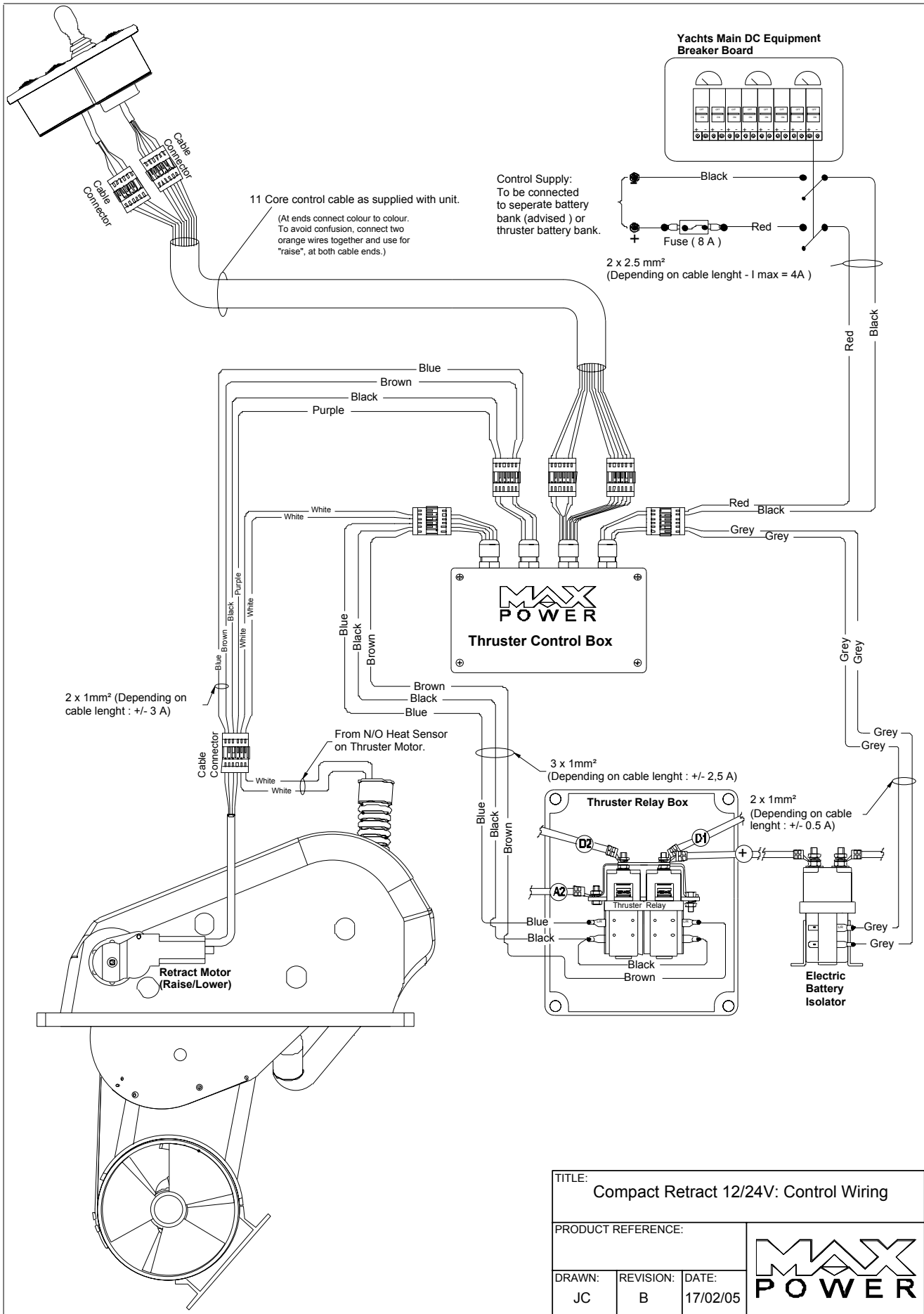
**Thruster Control Box**

### **NOTES:**

1. The installer must protect the positive supply cable by means of a fuse (slow blow) as indicated. The size of these supply wires (min. 2,5mm<sup>2</sup> with I<sub>max</sub> = 15 A) depends on the length of the cable run and the voltage drop in these cables should not exceed 5% of the nominal battery voltage.
2. Install an electric isolator/switch, in the supply of the thruster control box, on the boats main electrical switch board, marked "Bow Thruster". This breaker or switch should ideally be supplied from a source independent to that used for the thruster. See "Wiring Diagram for more detail.
3. All units are supplied with 25 meters of 11-core control cable, although only ten wires are needed to connect control box to control panel. In order to avoid confusion when doing wiring, it is recommended to connect together the two orange wires at both control box and control panel ends of the control cable.
4. When in "Manual Mode" during the final set-up and installation stages of the thruster unit, it might be necessary to increase the "up" or "down" torque values of the up/down motor in order to ensure that thruster turbine reach it's fully "up" or "fully" down position when being raised and lowered. To increase the torque the "up" or "down" torque screw should be adjusted clockwise in small steps until desired position is reached.

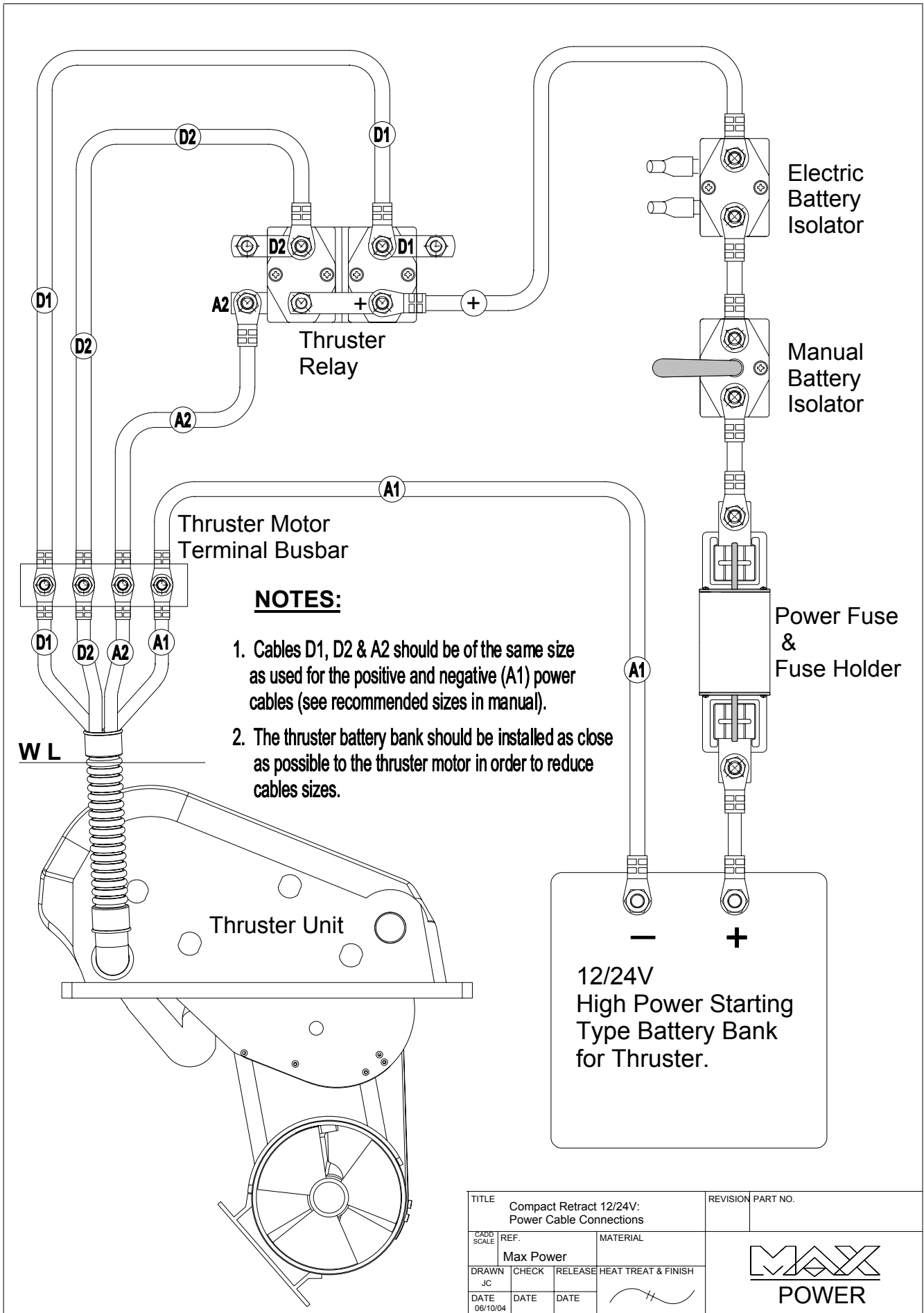
TITLE: Compact Retract 12/24V: Wiring of Control Box		
PRODUCT REFERENCE:		
DRAWN: JC	REVISION: A	DATE: 17/02/05
<b>MAX POWER</b>		

## 9. CONTROL WIRING



TITLE:			Compact Retract 12/24V: Control Wiring		
PRODUCT REFERENCE:					
DRAWN:	REVISION:	DATE:	<b>MAX POWER</b>		
JC	B	17/02/05			

## 10. POWER CABLE CONNECTIONS



TITLE				REVISION		PART NO.	
Compact Retract 12/24V: Power Cable Connections							
CADD SCALE	REF.	MATERIAL					
	Max Power						
DRAWN JC	CHECK	RELEASE	HEAT TREAT & FINISH				
DATE 06/10/04	DATE	DATE					