POWER

CONTROL TO THE **MAX**

MANUAL

FOR

MAX POWER RETRACT R600

SERIES THRUSTERS

FOR _____

BUILT BY_____

DELIVERED _____

A copy of this manual must remain on board forconsultation.

CONTENTS

INTRODUCTION

AFTER SALES SERVICE

ADDRESS :

MAX POWER
Via Philips 5, 20900, Monza (MI), Italy
TEL : + 39 039 200 1973-936
Email:

RETRACT SERIAL N° S 0 1. R600. _. _ _ _ _

IMPORTANT GENERAL INFORMATION

With a constant concern of improving our products, we reserve the right to make changes to this manual without prior notification. All statistics and explanations within this manual were believed to be correct at the time of printing.

Each RETRACT installation requires a preliminary study of performance and feasibility.
This study covers 3 distinct sub systems:

1. The RETRACT thruster unit, (positioning, space available, structural compatibility etc.)
2. Hydraulic equipment, (positioning equipment, power available, flows pressures pipe sizes etc.)
3. Electrical equipment, (positioning, power supply, control box function, protection / isolation, etc.)

CHECK LIST FOR THE PROJECT MANAGER

It is very important to carefully read the entire manual before starting the installation.

At the end of the manual, you will find a MAJOR POINT CHECKLIST when you are inspecting the work of your installers. All the points listed must be strictly respected for the proper and safe operation of the RETRACT system.

The RETRACT should be installed by a professional specializing in this type of installation.
Architects, construction shipyards and surveyors should be contacted before installation.
All official bodies or classification experts should be contacted before the installation.
All mechanical installation must apply with the conditions as laid down in the country of the boats registration.
All electrical installation must apply with the conditions as laid down in the country of the boats registration origin.
All hydraulic installation must apply with the conditions as laid down in the country of the boats registration origin.

WARRANTY REQUIREMENT

IMPORTANT: All Test readings must be filled out on the form provided and sent to Max Power by email no later than one week after the water tests have been completed so that the Max Power standard warranty is correctly validated. This form is attached at the end of this manual. Advise page 29 for more information.

DETERMINING BEST EQUIPMENT LOCATION

POSITIONING OF THE RETRACT UNIT

IMPORTANT: Correct positioning is essential for correct operation.

(See drawing 1)

The turbines center requires being 900 mm below the water line when fully extended.

Therefore, the turbine should be at least one full diameter below the water line.

The following considerations must be taken into account when determining the final position of the thruster assembly:

- → The space available given the vessel's fixtures, space and shape, and the installation at the farthest point forward (or aft) while respecting the minimum immersion of the turbine.
- → The structural compatibility of the mounting base with the hull.
- → The access needed for installation and **complete removal of unit**.
- → Sufficient access for all maintenance procedures must be allowed.
- → The turbine, when in down position, must be clear of all obstacles that might disturb water flow, as this will decrease the performance.

IMPORTANT: Always check and make sure that there is enough room to allow for complete removal of the RETRACT unit, and room for the connection of the hydraulic piping.

LOCATION OF THE AUXILIARY EQUIPMENT

The transmission lube oil tank and the hydraulic directional valve should be located near the RETRACT unit, but in an accessible and dry place. The hydraulic oil reservoir must be located above the water line, above and as near to the pump as possible there must be no sharp elbows between the pump and the oil tank.

The control panel (s) joystick (s), or foot switches are to be installed as required at helm stations. The remote control box is to be installed in a convenient dry and well-ventilated position.

INSTALLATION PROCEDURES

CONSTRUCTION OF THE MOUNTING BASE

The general method and materials used must be adapted to the particular hull material (laminated wood, GRP, sandwich, aluminum, or steel). Naval Architects, Classification Societies or engineering firms should be consulted.

GRP/CARBON HULLS: The mounting base may be molded into the hull during construction or prefabricated, and then laminated onto the hull later. Care must be taken for the protection of the unit against galvanic corrosion or electrolysis by connecting the thruster with a bonding wire to the main cathodic protection system onboard.

METAL HULLS: The mounting base may be constructed with the hull or prefabricated, and then welded onto the hull later. Care must be taken for the protection of the unit against galvanic corrosion or electrolysis by connecting the thruster with a bonding wire to the main cathodic protection system onboard.

The thruster's mechanical stresses are spread over the hull by the mounting base and the guide blocks. Installation, which should be executed by welding or bonding to the hulls plating, normally reinforces the hull, the mounting base should be attached to frames and stringers as well. The guide blocks should be replaceable should they be found worn at a later date.
After the mounting base has been made, the RETRACT should be temporarily secured on the flange to check its height its, centering, the accessibility of fittings.

THRUST PLATES

Another important reason for this is to determine the exact location of the two thrust plates.
These plates are to be fabricated by the installer from a suitable material.
The thrust plates distribute the thrust forces to the hull. They should be fixed to the interior of the mounting base so that they will be directly in contact with the thrust pads when the turbine is fully extended (See building plan).

IMPORTANT: In both cases, the top surface of the mounting base (the flange) must be given **particular attention** and machined perfectly flat in order to accept the « O » ring seal of the RETRACT base flange and ensure perfect water tightness.

The bolts fixing the RETRACT onto the mounting flange must be inserted from top to bottom.
Provide sufficient access underneath the flange to allow for tightening the nuts. If the access is not possible, provide a special mounting flange with metric 16 mm studs or tapped holes.

CONSTRUCTION OF HULL OPENING & CLOSING PLATE

The opening is closed by a plate, which may be made from the cutout hull section, or specially fabricated. This closing plate should bear against a gasket fixed to a **20 mm wide rebate** when in the raised position.
While the hull opening closing plate is being fabricated, the RETRACT must be temporarily secured on the mounting base flange to facilitate correct closing plate installation.

The closing plate **must be fixed** to the fabricated aluminum adjustable mounting, which should have 4 elongated holes for re adjustment at a later date.

To obtain a perfect hull plate fit follow these instructions:

With the thrusters securely bolted down on its flange, install the hull plate bracket on to the mounting points. Score the bracket and the mounting points to mark the position in which it is fitted (1).
Raise the thrusters to its highest position and then remove the locking knuckles.
Fit the locking point adjusting tools in their place. Then lower the thrusters onto its locks (2).
Take the finished and formed hull plate and place four piles of bedding compound on the back of the plate. Then push the plate firmly into its recess in the hull, and hold in place until total curing of the compound (3).
Remove the locking point adjusting tools and refit the locking knuckles.
Unlock and lower the thrusters then reinforce bond between the bracket and the hull plate with mechanical fasteners as per construction technology (4).

A gasket needs to be installed in the hulls rebate. This gasket can be made either out off sealed cell neoprene rubber or molded in «SIKAFLEX» (or a similar product) to form a flexible seal. Precaution must be taken to ensure that the flexible gasket does not glue the closing plate to the hull while drying. The plate must rest evenly, on the gasket with a reasonable pressure.

The closing plate should be tested for adjustment at this point, raise and lower the unit a few times.

IMPORTANT: To prevent marine growth inside the casing, it is essential that once the unit is raised, no light be allowed to enter the turbine enclosure. Therefore, the closing plate gasket is essential and requires careful and permanent fixation.

NOTE: Never use antifouling or other paints on the RETRACT unit.

FINAL FITTING OF THE RETRACT UNIT TO THE MOUNTING BASE

CAUTION: To ensure absolute cleanliness, hydraulic lines and ports must remain plugged until final connection.
Final installation on the mounting base must be made after thoroughly cleaning and then liberally coating both joint surfaces (case and base) with good quality marine grease. This is so that the « O » ring seal is compressed flat, evenly, smoothly and squarely when the bolts are tightened.

CAUTION: Under no circumstances should the RETRACT be glued or bedded down with a marine type mastic/glue such as Sikaflex or other similar product.
The flange bolt should be tightened sequentially and in successive passes until the two surfaces touch. If desired, a torque wrench can be used and the bolts can be tightened to a torque of **5,0 kg/M**. The flange bolts should be metric size 16 mm of stainless steel, and should have a large stainless steel washer placed above a nylon washer. The nylon washers avoid stainless steel contact with the aluminum case.
The nuts should be NYLOCK self-locking type.

FINAL ADJUSTING OF THE CLOSING PLATE

Once the thruster is permanently bolted onto the mounting base, reinstall the plate and check it's adjustment. While the thruster is in the "up/closed" position the two mechanical locks must be engaged properly (check page 24). Adjust the closing plate so that it fits evenly and squarely in its hull recess. When testing the cover plate fit, Two rubber blocks have been placed on the top of the turbine to help adjust the closing plate in the correct position. **Tighten its fixation bolts then remove the rubber blocks.**

RAISE / LOWER POWER PACK INSTALLATION

The Max Power raise/lower powerpack, ref. 313352, consists of a 1,1 kw 4 poles 3Ph 380/400V- 50HZ AC motor, a fixed displacement 6.2cc gear pump (flow 9 LPM) and a 30 lt vertical rectangular oil tank. The AC motor of the powerpack will need to be supplied by a switchboard and protected by a dedicated circuit breaker.
The electric motor of the raise/lower powerpack will be actuated through a 24V contactor present in the switchboard. This 24V contactor will be connected to terminals 15 & 16 of the control box (See diagram on page 30).
The power supply cables between the switchboard and the motor must be seized according. The cable cross section between the control box and the 24V direction solenoids of the raise/lower powerpack must be at least 3 x 2 mm².

The hydraulic ports (LA and LB) on the raise/lower pump unit must be connected A to A and B to B. The flexible hoses must be 1/4 with an operating pressure rating of at least 100 bars.

CAUTION: to prevent the risk of electrical earth leakage's, the hydraulic hoses connected directly to the RETRACT should be non-conductive (non-metal braided hose) high-pressure thermoplastic hose. **Absolute internal cleanliness is essential**. After pipes and hoses have been equipped with their fittings, they must be blown out with compressed air, and then plugged until connected.

The pressure limiter on the unit is pre set and should need no adjustment!

HYDRAULIC POWER SYSTEM INSTALLATION

Hydraulic power system general

A RETRACT R600 can take **up to 200 LPM** of hydraulic flow this will causes on a normal installation **250 bar pressure** at the thruster's inlet ports.
NOTE variations of approximately 10% are possible depending on hull shape and immersion depth.
The hydraulic power system should be designed in consequence.
The hydraulic power system must start the thruster gently (soft start) either by using a ramping valve or by using a 2 stage slow / fast speed bypass system.
The control box is equipped for both but may need re programming.
All the hydraulic power equipment, such as the piping, reservoir, pump, directional valve, etc. should be installed in compliance with the usual rules of accessibility to enable periodic checks and maintenance.
MAX POWER recommends the use of **ISO GRADE 15 to 32 hydraulic oils** for the power circuit.

PRESSURE PIPING

All hydraulic high pressure power circuit piping must comply with high pressure standards, and have a diameter at least equal to that recommended in order to reduce pressure loss especially when the installation's layout requires long hose lines.

All power circuit piping must have a continuous service pressure rating of at least 350 bar. Fittings must be of good quality, and crimped as per manufacturer's instructions. The pump intake hose line (from the reservoir) must be of a quality that is not subject to pinching or crimping. This hose should preferably be shorter than 2 meters and have no 90-degree elbows bends.

CAUTION: to prevent the risk of electrical earth leakage's, the hydraulic hoses connected directly to the RETRACT should be non-conductive (non-metal braided hose) high-pressure thermoplastic hose (main 575X-12 ¾ 5000 Parker). **Absolute internal cleanliness is essential**. After pipes and hoses have been equipped with their fittings, they must be blown out with compressed air, and then plugged until connected.

RESERVOIR

The reservoir should be mounted as close to the pump as possible and must always be higher than any other component in the system. The reservoir must be mounted at a height that allows the breather to be situated 500 mm, or higher, above the waterline. If this is not possible, then the breather can be removed and installed on the end of an extension pipe or hose.

Mounting the reservoir too low could result in oil draining back, or overflowing the tank. Be sure to allow enough space above the reservoir to service the filter.

If the reservoir is not supplied by MAX POWER, then provide a return filter of 60 microns and a suction strainer.

The thrusters' motor case drain, must return directly to the top of the tank. With no filters check valves or other drain lines connected to it.

The reservoir must be flushed after installation.

DIRECTIONAL CONTROL VALVE

The directional control valve (DCV) must be placed between the pump and the RETRACT unit, it is recommended to locate the DCV as near to the RETRACT as possible (in an accessible and dry place). The DCV block used must be equipped with a pressure gauge so as to check operating pressure on commissioning and for maintenance. The block must be equipped with a pressure relief valve set to 250 bars (varies are possible depending on the installation). The direction solenoids of the DCV must be 24V.

ELECTRICAL SYSTEM INSTALLATION

Although MAX POWER has used the best materials available, the installer should endeavor to install all electrical equipment with the view that it should be in a well ventilated and dry environment at all times. Control panels mounted at helm stations must be provided with protection if the station is exposed to the weather.

All wiring must be insulated from ground and its installation executed in compliance with safety and classification standards.

CONTROL SYSTEM

CONTROL SYSTEM MAX POWER

The Retract R600 control system is all centralized in the electronic control box. All numbers indicated on our diagrams must be connected 1 to 1 and 2 to 2 wire sections must be respected to the letter. The control box commands the raise/lower and hydraulic power spool valves in the correct sequence with correct timing. There is scope for modifying sequence timing in this box but consult MAX POWER first. All Retract equipment is connected to this box (See diagram on page 31).

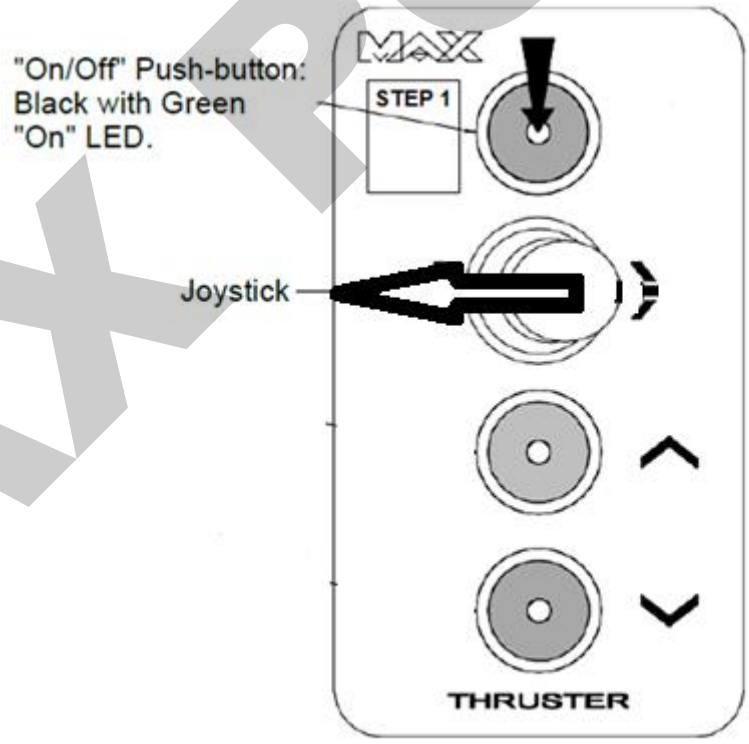
The number of each wire must correspond **to the number included in the table on page 31 to reduce the chance of error** and simplify checking and troubleshooting. All wire ends for terminals should be tinned before inserting into terminal blocks.
The electronic control box of the RETRACT requires a minimum 32 amps of stabilized 24V DC power. The 24 volt input power is automatically transformed to produce 12 volts for the control panel use **(do not use this supply for any other need onboard).**
The major power consuming components of the RETRACTS electrical system (the directional valve solenoids, lock/unlock rams, raise/lower valve and power relay and the electromagnetic clutch) are supplied with 24 volts from the control box.

Switching the thruster **system** ON is achieved by a two-pole 40A circuit breaker, which is located inside the R600 control box (ref. 636543, supplied by Max Power).

CONTROL PANEL AND CONTROL BOX FUNCTIONS

The R600 thruster unit has a mechanical lock, which must be disengaged before the thruster is used and reengaged when the thruster is no longer required. To properly use the thruster, the following steps must be followed **in the correct sequence by the user**:

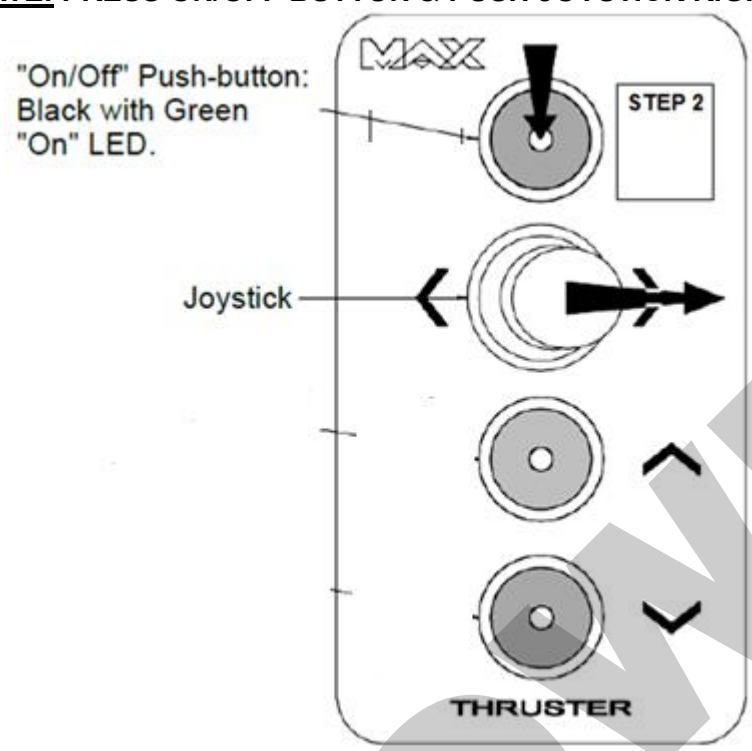
STEP 1 - UNLOCK: HOLD ON/OFF BUTTON & JOYSTICK LEFT RELEASE ONCE UP LED IS ON



Before Activation

You must continue holding the on / off button and the Joystick to the left for approximately 7 seconds until the alarm stops and the green button LED is ON then release the joystick.
Now the lock is disengaged.

STEP 2 - ACTIVATE: PRESS ON/OFF BUTTON & PUSH JOYSTICK RIGHT FOR 1 SECOND



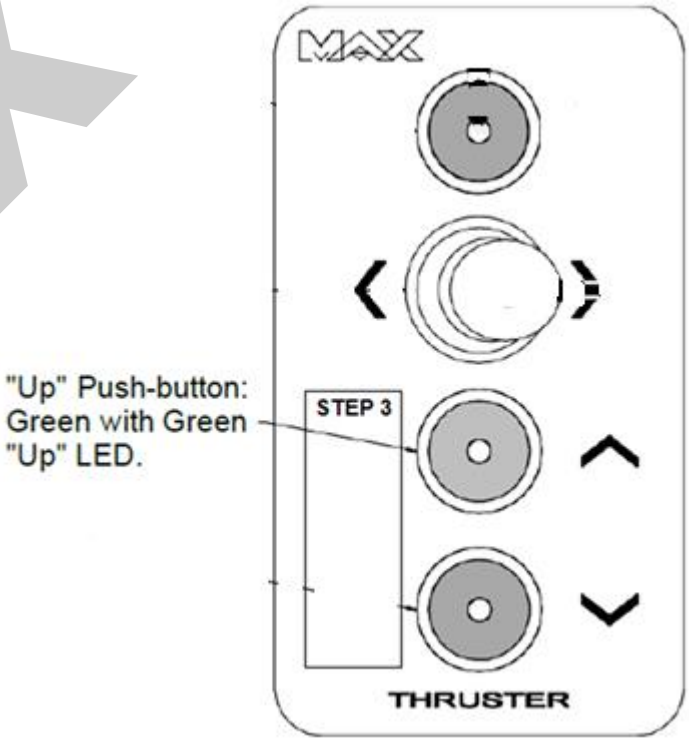
After Activation

When the lock is disengaged and the thruster is activated properly the LED light of the up\green button will be ON indicating that the thruster is in the up position and ready to be used.

Down thruster movement

Press down\red button to move the thruster to the down position. You have to press the button until the DOWN position is reached (red button led is ON), **now the thruster can be operated**.

STEP 3 - LOCK: HOLD THE UP BUTTON UNTIL THE SOUND ALARM STOPS



Up thruster movement

Press up\green button to move the thruster to the up position. You have to continue pressing the button until the alarm stops, indicating that the thruster is in up position and the lock is engaged (green button led is ON).

TO DEACTIVATE: **PRESS ON/OFF BUTTON & PUSH JOYSTICK RIGHT FOR 1 SECOND**

General notes

- If STEP 1 is performed and you do not want to use the thruster, you can go directly to STEP 3 to make sure the thruster returns to the lock position.
- The buzzer alarm is always ON while we move the thruster from the UP to DOWN position (or from DOWN to UP) to inform the user that the thruster is at the wrong position. The buzzer will be ON if the thruster in not UP even if the unit is off.
- CAUTION: Never leave the RETRACT in lowered position when not in use. The RETRACT must be in up position (retracted) when sailing. The RETRACT is designed to be used in harbor when maneuvering at low speed (below 3 knots).

CHECKS, TESTS & ADJUSTMENTS

BEFORE LAUNCHING

IMPORTANT: Before the launch, verify that the RETRACT unit inspection top plate has been replaced (if it was removed during installation) and that all the lower flange bolts have been tightened. Torque for all these bolts is 5 kg/m.

IMPORTANT: The cathodic protection system on board must provide sufficient protection to the aluminium body of the RETRACT unit against galvanic corrosion or electrolysis. The RETRACT unit must be grounded by connecting a bonding wire to the main cathodic protection system.

Filling the hydraulic circuit.

MAX POWER recommends the use of **ISO GRADE 15 to 32 hydraulic oils** for the power circuit. This mineral oil has already been used by Max Power during the run in tests and consequently the RETRACT motor and piping are already filled with this kind off oil.

CAUTION: Biodegradable and mineral (commonly used) oils are non-compatible and should not be mixed or used together. Mixing them will deteriorate certain hydraulic elements. If you intend to use a biodegradable oil, thoroughly flush the existing mineral oil from the RETRACT unit first with the appropriate oil.

Before carrying out the below test we recommend to disconnect the R600 control box.

→ Check all fittings for tightness and leaks.
→ The transmission is already filled with oil at the time of delivery.
→ Max Power uses HYPIOD HD 80W/90 oil in the transmission; therefore, fill the transmission lube oil header tank with similar grade oil. The function of this lubricant tank is to ensure a constant pressure, as well as a visual control of the oil-level. The tank should be filled to the ¾ level. Purge air in tube before fitting the pipe to the RETRACT.
Performing the UP / DOWN tests (standard joystick control panel).
→ Check UP / DOWN operation.
→ This unit has a second function, in that it blocks the turbine in the down position when thrust is applied.
Move joystick to port or starboard and check that the up/down hydraulic pump is pushing the turbine down.

AFTER LAUNCHING

→ Check for water leaks.
→ Switch on the system power at the breaker and repeat the UP / DOWN tests.
→ Execute a few short left and right maneuvers to fill the circuits and thereby purge the system of all air. After each maneuver, check and fill if necessary, the hydraulic tank. Repeat until the level remains stable.

Warning: All hydraulic systems develop very high pressures. Failure of piping, connections etc. that have been improperly installed will most likely happen on start up. Stay clear of these components. Wear eye protection, and be aware that high- pressure oil can cause major skin damage.

→ Check the thrust direction:
→ With the Joystick to the left (port), the vessel should move to port and conversely. If the direction is not correct, inverse to connectors on the hydraulic distributor.

Once all the above tests have checked out correctly, you may now carry out the directional control valve (DCV) adjustments and the thrust tests.

<u>TROUBLESHOOTING GUIDE</u>

PROBLEM: Thrust stops almost immediately after it has been applied. The alarm buzzer comes on and the green light turns off.

PROBABLE CAUSE 1 – The Raise/lower Electro-pump unit is not working correctly.
REMEDY: Check that the motor has 3Ph 380/400V- 50HZ power to its terminals. Check that the pump operates in down position before the thruster starts.

PROBABLE CAUSE 2 - position switches out of adjustment.
REMEDY: Readjust the position switches by loosening its securing nut and readjusting it closer to the actuator.

PROBLEM: The thruster seems to be developing less thrust.

SECONDARY CAUSE: Low oil pressure.

REMEDY: Check pressure. Consult hydraulic technician
THIRD CAUSE: Propeller problem (plastic bag, rope, etc.)

PROBLEM: The turbine retracts, but the alarm does not stop or the red light does not illuminate.

PROBABLE CAUSE: An object such as a line, or other flotsam is caught between the closing plate and the hull.
REMEDY: Raise and lower the unit a few times to see if the object clears. If it does not, try to remove the object manually.

WARNING! NEVER put your hand into the opening of the hull.
PROBLEM: The RETRACT will not open.
PROBABLE CAUSE: No power (3Ph 380/400V- 50HZ) to the Raise/lower unit.
REMEDY: Check the 40 fuse inside the control box, Check that power arrived to the R600 control box,
Check that power is available to the unit, by checking the voltage on wires
Check oil in the reservoir of R/L unit
Check joystick operation.

MAINTENANCE OF THE RETRACT

Regular checks

1. Lower and raise several times every month
2. Transmission lubricating oil.
3. Hydraulic power oil reservoir level.
4. Hydraulic hoses for chaffing and leaks.
5. Condition of the anodes

Control panels, like all external equipment, should be protected from the sun and weather when not in use. Clean with a soft cloth and mild detergent solution.

Yearly checks boat ashore:

1. Clean the turbine, gearbox and the propeller with a sponge and detergent soap. It is also advisable to remove the top cover plate and clean the interior of the caisson and rinse well the articulated joints.

   IMPORTANT: If the vessel will remain out of the water for some time, for example: dry storage for the winter, the top cover plate must be removed and the RETRACT mechanism must be thoroughly rinsed with fresh water, especially the articulated joints. Do not operate below 0° C.
2. Replace all anodes & Check the underwater unit for loses bolts.
3. Inspect and replace all anodes of the unit. If the anodes are not consumed, check for signs of galvanic corrosion or electrolysis to the body of the RETRACT.
4. Clean the surface corrosion and repaint the hydraulic motor.
5. Change transmission oil, if you find water in the drive leg oil check seals.
6. Remove the propellers and check oil seals replace if necessary.
7. Inspect and repair the hull closing plate gasket for deterioration or missing pieces. Check and tighten if necessary, the plate fixation bolts.
8. Apply antifouling paint to the closing plate on the outside, on the edges and if desired to the plates inner surface. If you find growth on the unit, this is because your closing plate gasket allows light to enter the enclosure.

   CAUTION: **Do not use antifouling or other copper based paints on the RETRACT turbine.**
9. The transmission oil must be changed each year. Extracting the sump plug screw can do this. Never let the oil level in the lube tank descend below the level of the ships waterline.
10. Check the entire hydraulic system hoses and connections for possible chaffing and leaks.
11. Every two years, drain the entire hydraulic oil system. Clean and replace filters.

5 Years:

After 5 years of operation at sea it is highly recommended to completely remove the RETRACT unit and return it to the factory or an authorized service station, in order to:

1. Replace all submerged flexible hoses
2. Replace all oil seals and check for bearing and shaft wear.
3. Disassembly the unit and re corrosion treated / painted the aluminum body and the hydraulic motor.
4. Replacement of all articulation bushes.
5. Service the complete hydraulic oil system included pump, oil tank, DCV, etc.

IMPORTANT

PROJECT MANAGER'S
TEST RESULTS FORM

To be filled out and
Faxed to MAX POWER

TEST RESULT FORM (part 1)

This form must be filled out and faxed to MAX POWER within a week after launching so that the MAX POWER standard warranty is validated.

Date: ……

REFERENCE: S _ _ .R6_ _. _ _ _ _

10.Shipyard that installed the RETRACT: ……
11. Name of the Project Manager: ……..
12. Name of the Vessel: ……..
13. Type & Make of the Vessel:……..
14.Date of launching: ……..

Please answer by YES or NO the following questions concerning the installation:

No	Description	YES	NO
1	Is the R600 mounted parallel with the bottom of the hull? Turbine must not come in contact with hull		
2	Is there enough space around the thruster for the general maintenance of the R600 and its auxiliary equipment? Available space for complete removal if needed in the future		
3	Does the closing plate rest upon a gasket? Is the hull surface smooth from outside the boat?		
4	With the R600 retracted does the closing plate protrude from the hull?		
5	Is the adjustment of the closing plate done in such a way that no light is allowed to enter and that the mechanical lock is properly engaged with the R600 retracted?		
6	Are the anodes correctly fitted to the closing plate supports?		
7	Do the locks engage and disengage properly?		
8	Is the R600 unit glued to the mounting base? (Only yellow marine grease is needed)		
9	Has any water leakage been observed from the thruster inside the boat (boat in water)?		
10	Is the pressure relief valve of the main hydraulic circuit set to 250 bar?		
11	Are all-electrical wires numbered at each end and with their terminals tinned?		
12	Is the electrical supply to the control box constant and stable?		
13	Is the R600 connected to the main cathodic protection system onboard? (for corrosion protection)		
14	Is the AC electric motor of the powerpack powered by a 3Ph 380/400V- 50HZ supply?		
15	Does the dimensions of the hull opening match the ones advised in the manual?		
16	When the R600 is deployed is the tunnel lower than the hull?		
17	Is the up/down operation of the R600 smooth with no contact of the thruster assembly on the hull?		
18	Is the material of the mounting base compatible with the thruster?		
19	Are any vibrations present during operation of the thruster? This would indicate weak weld in base		
20	Are the thrust plates installed?		
21	Are the nuts for the mounting base a locking type?		
22	Are the flexible hoses for the up/down powerpack a 100 bar rated and for main supply 300 bar rated?		
23	(If PLC is custom) Are all PLC functions advised in pages 10 – 11 respected during the operation?		
24	Does the thrust direction match the direction of the joystick?		
25	Are there any oil leaks from the hydraulic circuit?		
26	Are the specs advised for the hydraulic fittings been respected in the installation?		

When all the tests have been completed as per the manual, please record the following measurements where applicable.

With the engine(s) running, thruster in the down position, but not running:

- Record the voltage at the remote control box: …… Volts

With the engine(s) running and the thruster running (either direction):

- Record the voltage at the remote control box: …… Volts
- Record the hydraulic pressure: slow speed …… Bars
- Record the hydraulic pressure: full speed …… Bars
- Record the hydraulic flow: slow speed …… LPM
- Record the hydraulic flow: full speed …… LPM
- Record the hydraulic pressure on the up/ down unit:..... Bars
- If ramping used please give approximate time from 0 to 250 bars. In Seconds

Other comments:

DATE OF TESTS: …… LOCATION : ……...

PERSON RESPONSIBLE : ……..

SIGNATURE :

TECHNICAL DATA SHEET R600 (111,7HP)

OIL – LUBRIFICATION

Drive leg	
Litres	4l
Type	EP 90 Gear oil
Recommended grease	Molycote HV silicone

OIL – HYDRAULIC

Flow	200 lpm (test 75 lpm)
Maximum Pressure	250 bar (test 120 bar)
Oil type	ISO GRADE 15 to 32 mineral oil
Viscosity	46 csst

THRUSTER SPECIFICATIONS

Maximum Power	83,3kW
Total weight unit	300kg
Propeller diameter	600mm
Propeller thrust	1000kg

RAISE/LOWER POWERPACK SPECIFICATIONS

Operating Pressure	70 bar (max pressure 100 bar)
Operating flow	9 lpm
Power supply	3Ph 380/400V- 50HZ

ELECTROMECHANICAL RAM ACTUATORS SPECIFICATIONS

Voltage	24V
Power consumption in Amps	10 A each

PROXIMITY SWITCHES

Voltage limits	10 58V
Load switching capacity	1.5 100mA
Voltage drop	$\leq$ 4V
Leakage current	$\leq$ 0.5mA

IF IN DOUBT PLEASE ASK

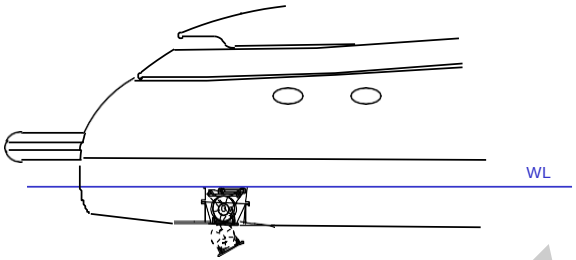
R600 111,7hp

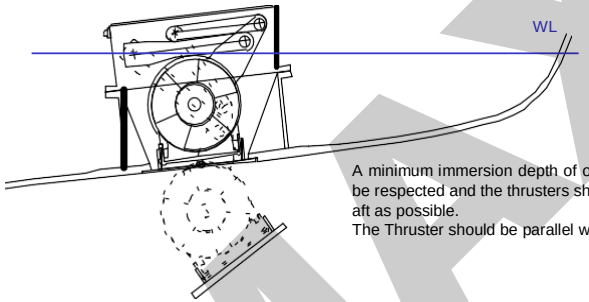
PROPELLER POWER MAX 83 KW

THRUST 1000KG

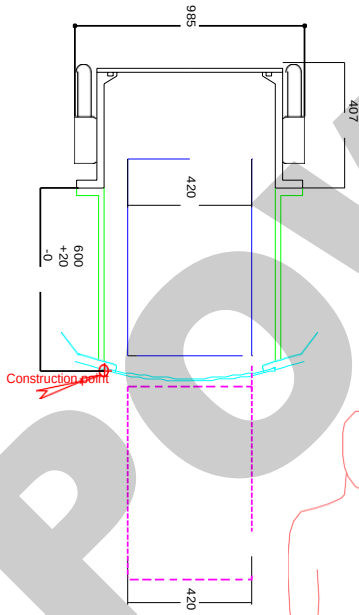
HYDRAULIC PRESSURE 250 BAR

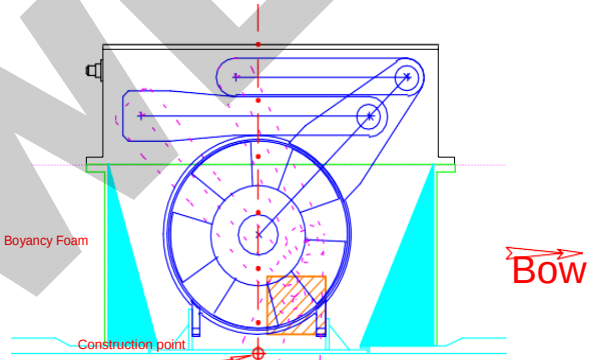
HYDRAULIC FLOW 200 LPM

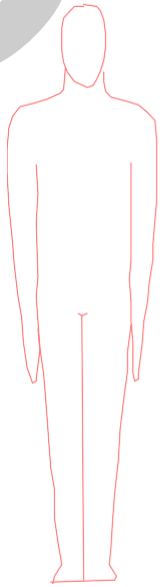


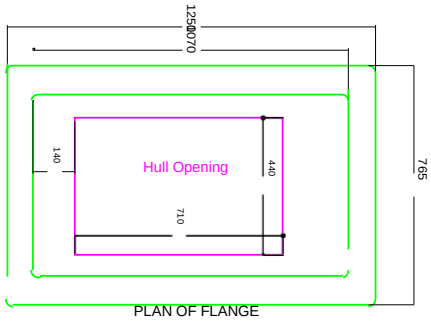


A minimum immersion depth of one full turbine diameter should be respected and the thrusters should be as far forward or aft as possible.
The Thruster should be parallel with the bottom of the hull



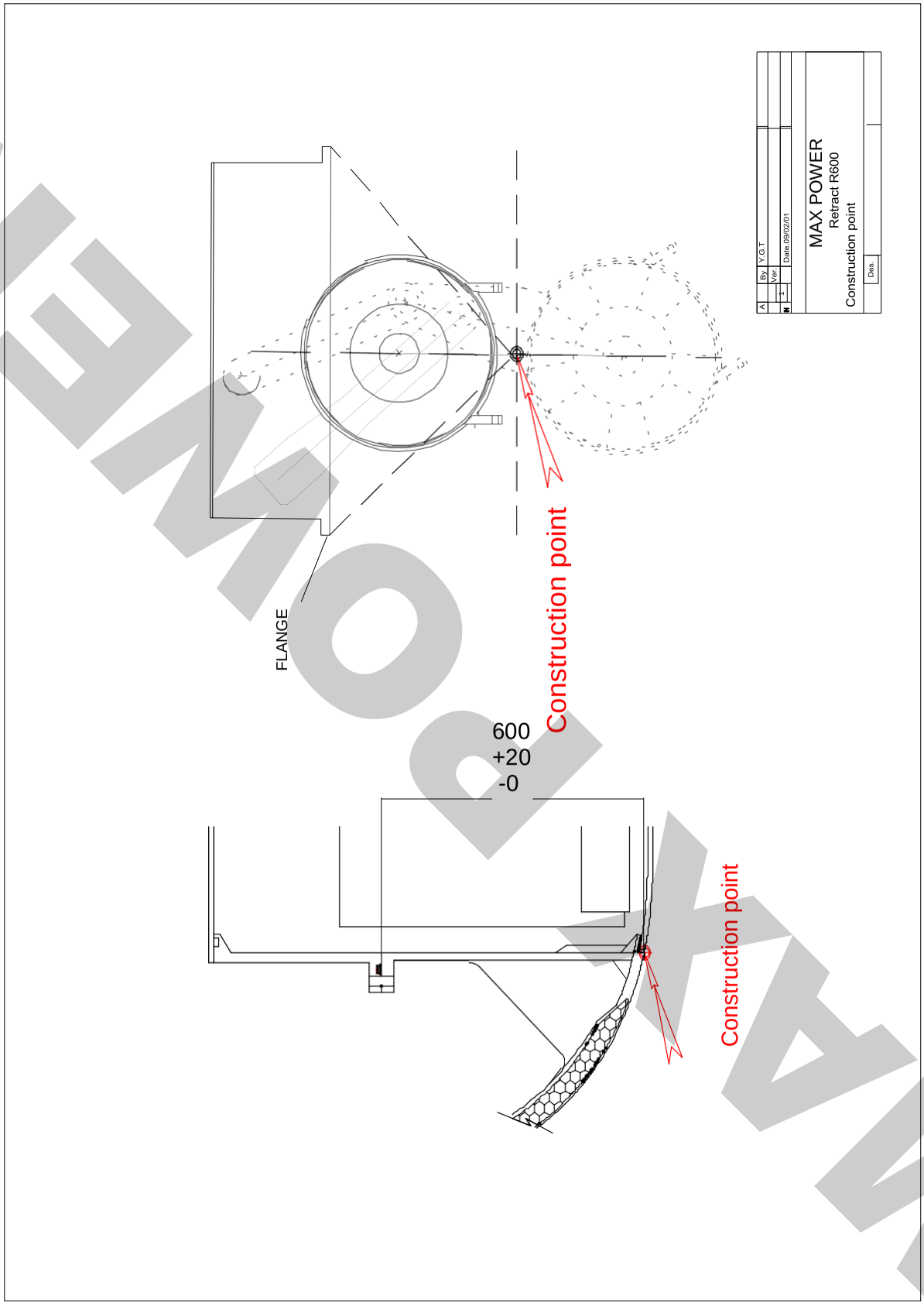






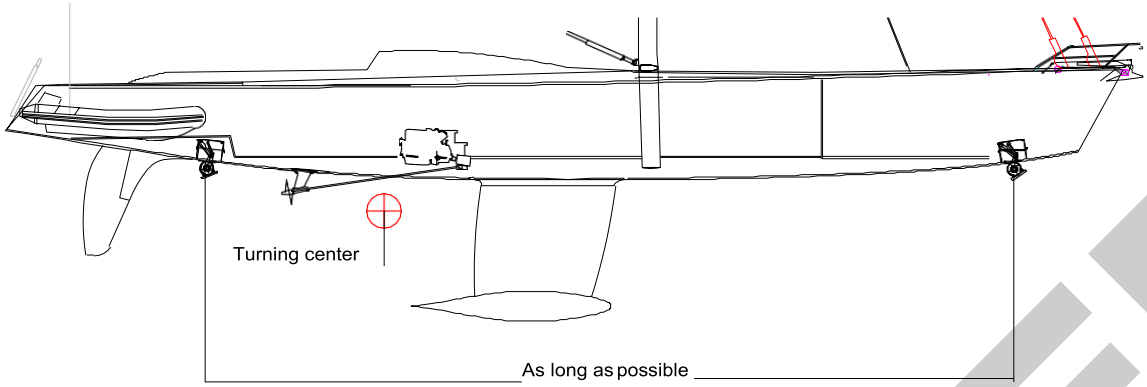
PLAN OF FLANGE

				DIMENSIONS	MM	REF	TITLE 111,7 HP RETRACT
				SCALE	NPTS	Do not build from these drawings use those supplied with the unit .	NO: / ISSUE: 4
				DRN	YGT		
		DATE		DATE	12/02/21		

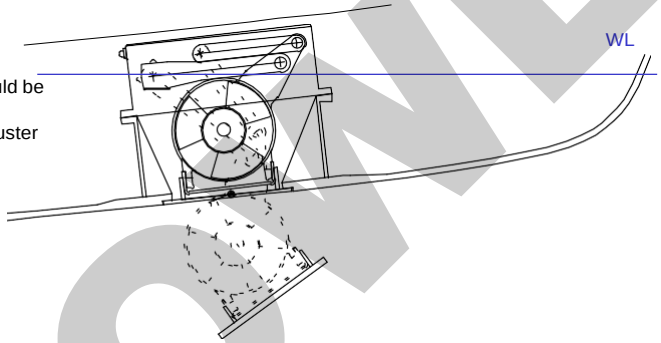

MAX POWER
Retract R600
Construction point
A
By Y.G.T
Ver.1
Date.09/02/01
Des.
FLANGE
600
+20
-0
Construction point
Construction point

MAX POWER

Positioning

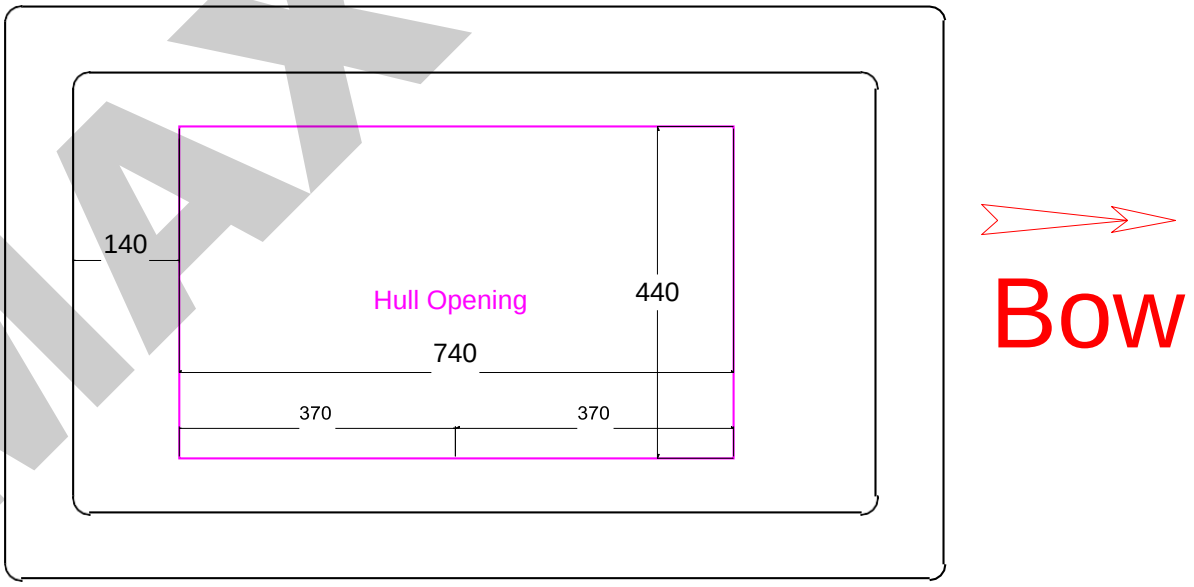


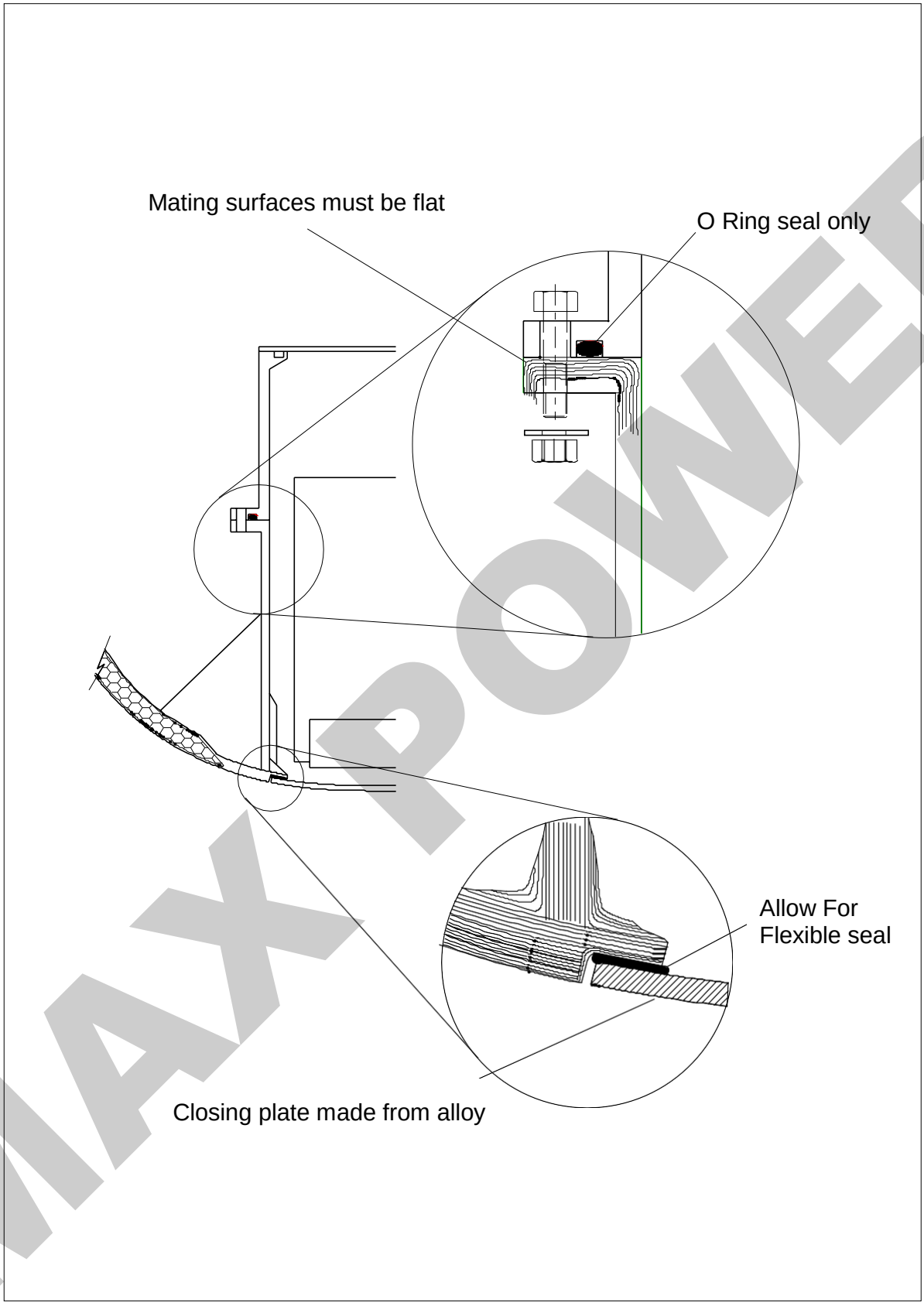
The Retract must be parallel
with the bottom of the hull

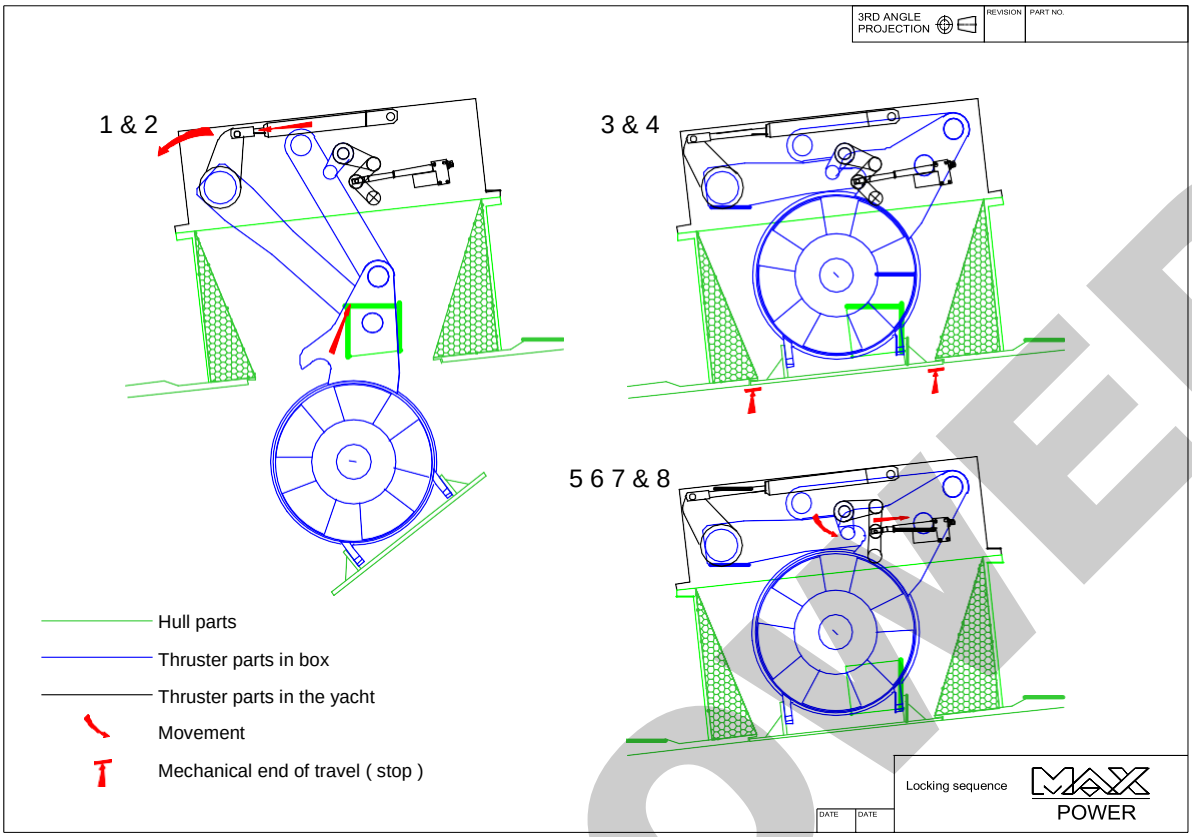


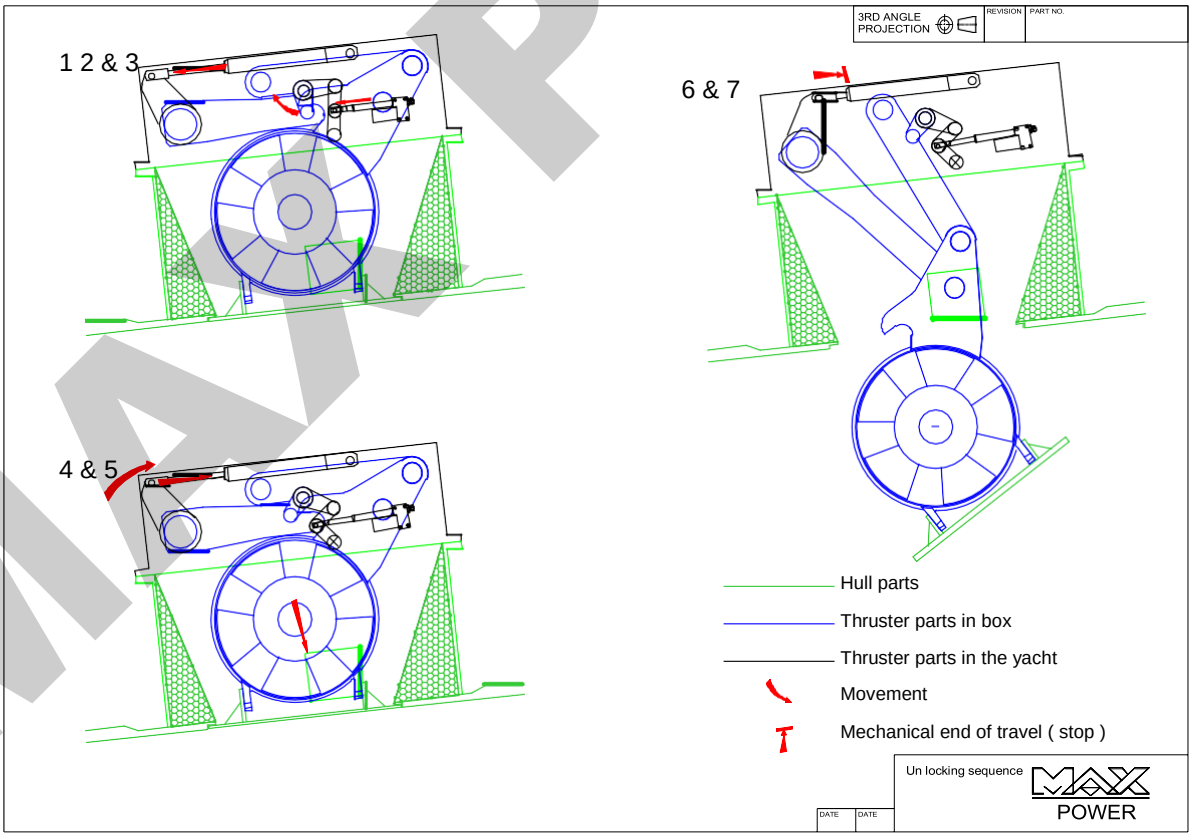
A minimum immersion depth of one full turbine diameter should be respected and the thrusters should be as far forward or aft as possible. The flow of water that is displaced by the thruster in this position must not interfere with the hull of the boat.

Hull Opening

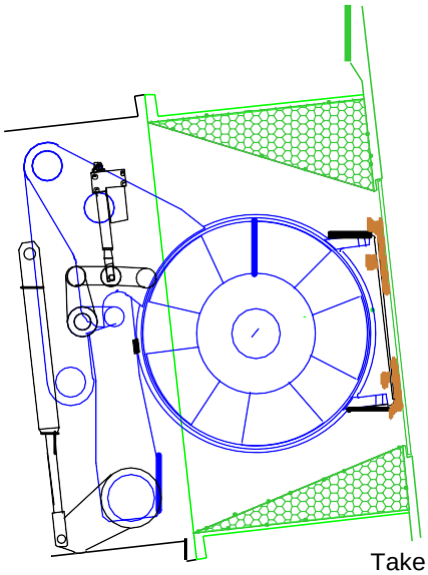


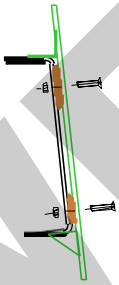

Mating surfaces must be flat
O Ring seal only
Allow For
Flexible seal
Closing plate made from alloy


3RD ANGLE PROJECTION
REVISION
PART NO.
1 & 2
3 & 4
5 6 7 & 8
Hull parts
Thruster parts in box
Thruster parts in the yacht
Movement
Mechanical end of travel (stop)
DATE
DATE
Locking sequence
MAX POWER


3RD ANGLE PROJECTION
REVISION
PART NO.
1 2 & 3
6 & 7
4 & 5
Hull parts
Thruster parts in box
Thruster parts in the yacht
Movement
Mechanical end of travel (stop)
DATE
DATE
Un locking sequence
MAX POWER

To obtain a perfect hull plate fit follow these instructions

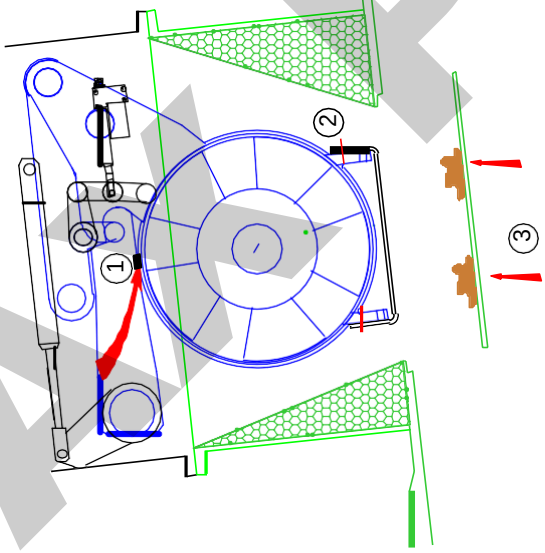


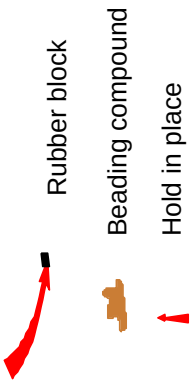


Take the finished and formed hull plate and place four piles of beading compound on it and push the plate into place (3).

Hold the plate in place until total curing of the compound. Then lower the thruster and remove the bracket hull plate assembly now glued together.

Reinforce the bond between plate and bracket using mechanical fasteners as per construction technology.





With thruster securely bolted down on its flange, install the hull plate bracket on the thrusters mounting points. Be sure that the locking point positioning blocks are in place (1).
Score the position so as to be able to re fit it in exactly the correct place (2).

PART NO.
REVISION
3RD ANGLE PROJECTION
Fitting the hullplate
MAX POWER
DATE
DATE

PART NO.
REVISION
3RD ANGLE PROJECTION

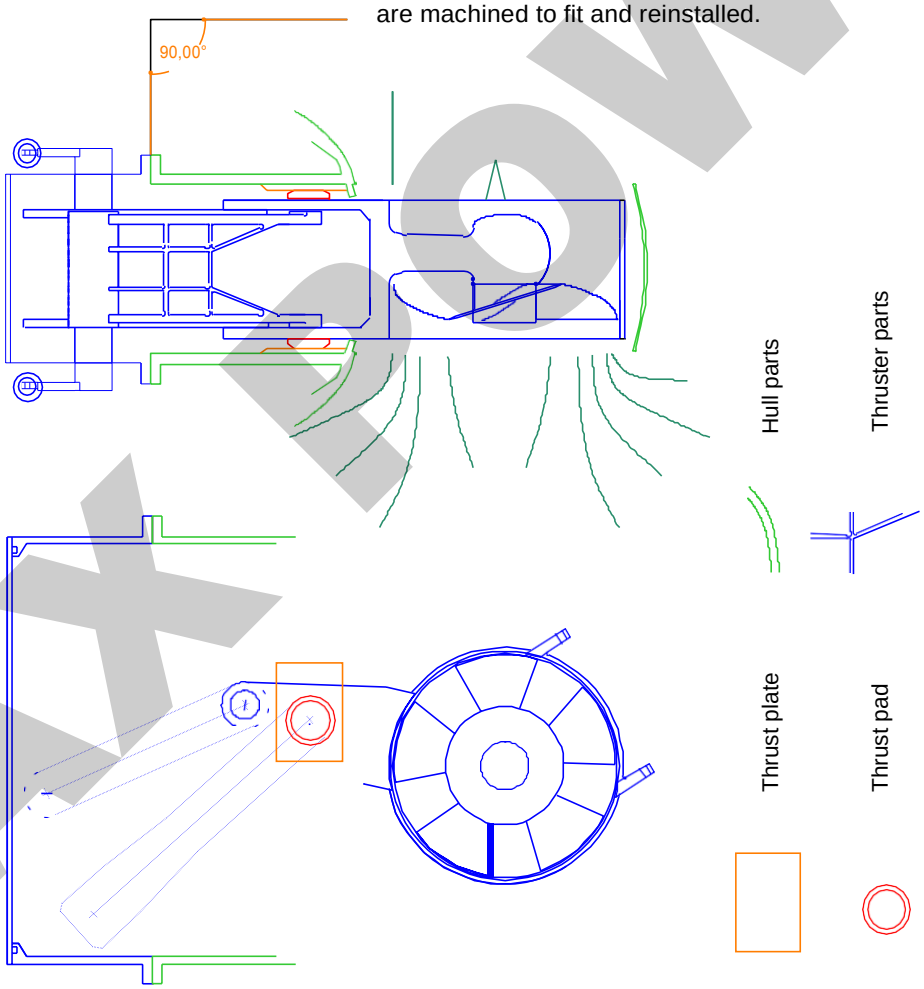
Thrust plate instalation
MAX POWER
DATE
DATE

Lateral thrust when in action on an R600 can be enormous. For this reason, the unit uses a thrust plate system.
This system is essentially comprised of two parts.

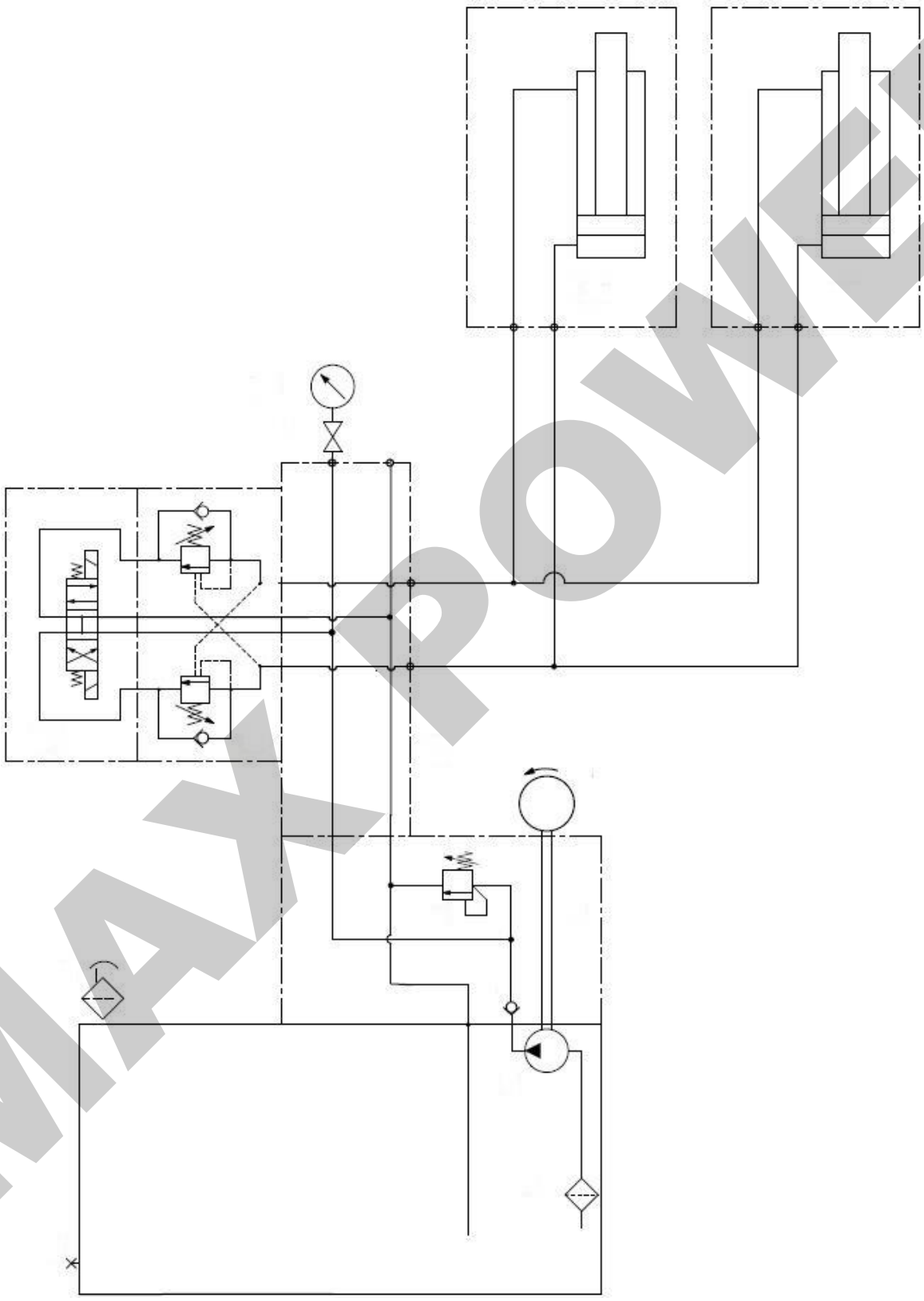
1 The reinforced hull plates to be manufactured by the shipyard and

2 The adjustable thrust pads are supplied by max power, but will need adjustment to suit the thrust plates.

The thrust pads must be at exactly 90° to the hull flange and strong enough to support at least a one-tone load.
The thruster is first installed with the thrust pads removed.
The distance between the plate and the pad seat is then measured; lastly the pads are machined to fit and reinstalled.



Hydraulic Diagram raise/lower powerpack



MAX POWER

Warranty Coverage

The purpose of this document is to set out the terms of warranty cover offered in relation to products purchased by the End User from Max Power or its approved network of resellers.
This document will adhere to the following format:

1) Definitions

Authorized Repair Number – The number given by Max Power on reporting a fault with your thruster
Dealer – An authorized Max Power sales center
End User – The boat supplied with supplied equipment and the owner thereof *Installer* – The authorized center responsible for the installation of your thruster *Manufacturer* – supplier of the equipment under warranty
Pleasure Craft – Vessels used for owner's personal use that have no commercial use (i.e Charter boats or work boats)
Resellers – Max Power approved distributors and dealers
Serial Number – Number in upper right hand corner of Warranty document
Supplier – The manufacturer (Max Power)
Warranty – The terms and conditions that are covered by the manufacturer

2) Period of Coverage

The equipment manufactured by the Supplier is guaranteed to be free from defective workmanship, components and materials under normal usage conditions for a period of two years from the date of purchase by the End User. This warranty is transferable to subsequent owners of this equipment during the period of coverage.

3) Warranty Registration

Register your purchase now to receive free extended warranty coverage by 1 year (total 3 years' warranty coverage). This can be done using one of the following methods (NB. proof of purchase must be included to establish that equipment is still under warranty):

The quickest and easiest method to register your warranty is to send the attached installation check list and warranty registration to our website:
https://www.max-power.com/warranty
Mail in your warranty registration document, please ensure that you make a copy before sending it.

4) Warranty Terms

If the material is used for anything other than for pleasure craft, the guarantee is limited to one year.

Year 1 -All factory testing, diagnosis, repairs and replacements are performed at no charge to the End User.

All parts and up to two hours of labor are covered for repairs and replacements conducted in the field.

Year 2 & 3 - All factory testing, diagnosis, repairs and replacements are performed at no charge to the End User. This excludes any damage or faults occurring from normal wear and tear on the following items: engine, oil seals, relay contacts.

5) Warranty Exclusions

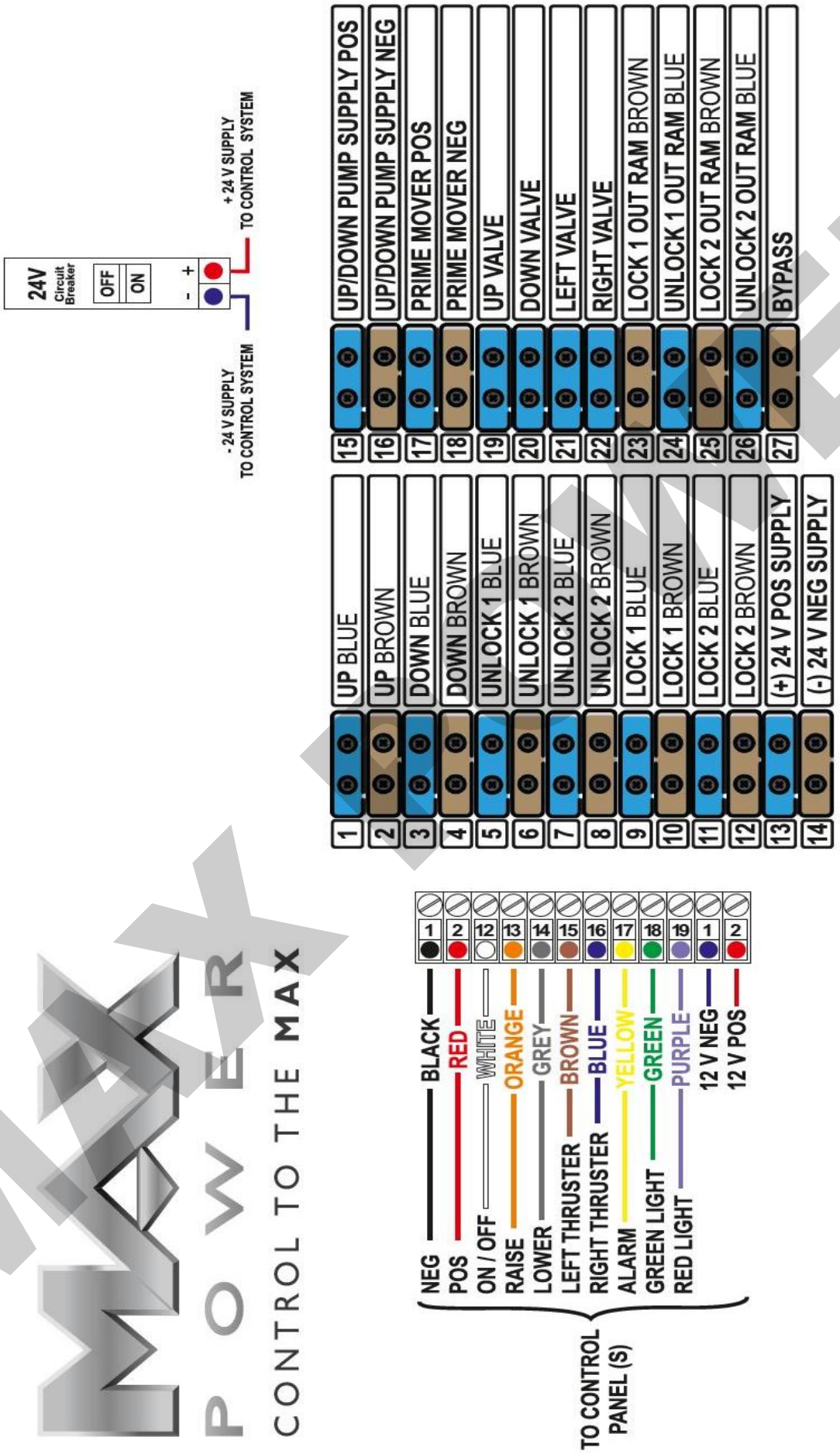
Damage due to modifications or installation contrary to published specifications
Damage due to contact with a foreign object
Damage due to repairs performed by an unauthorized service center Damage due to lack of normal maintenance services
Damage due to water infiltration or humidity
Parts replaced due to normal wear and tear, such as seals, pins, screws and heat sensors
Repairs performed without knowledge of manufacturer (please contact dealer to receive Repair Authorization Number)
Tampering of equipment by the End User Cost of travel to and from the job site
Cost of economic loss, including injury to any person, damage to property, loss of income or profit, communication, lodging, inconvenience
Consequential damage due to failure, including those arising from collision with other vessels or object
Incidental costs incurred for the removal or re installation of a product

6) Procedural Guidelines

PLEASE VIEW THE TROUBLE SHOOTING LIST TO ASCERTAIN OR SOLVE ORIGIN OF PROBLEM PRIOR TO CONTACTING THE DEALER/INSTALLER

Contact your dealer/installer to report the problem.
If you do not know who this is contact the nearest Max Power distributor
If you are in foreign waters, please contact the nearest Max Power distributor
Ensure you have your serial number and model number to hand (top right hand corner of warranty) Dealer/Installer will come to site to decipher the cause of the fault
If the cause of fault is due to a manufacturing problem the dealer will contact Max Power to receive Repair Authorization Number.
If the problem is due to an installation error, please contact your installer.

IF POSSIBLE: PLEASE TAKE PHOTOGRAPHS OF THE THRUSTER TO SHOW THE PROBLEM

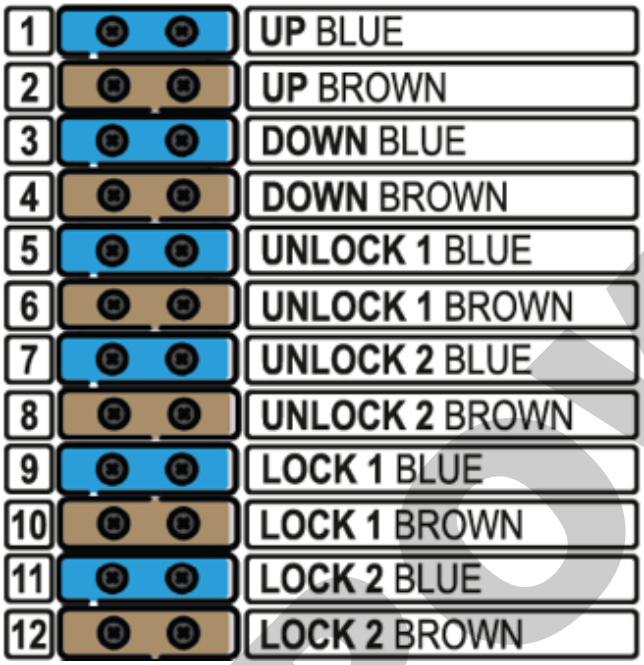

24V
Circuit Breaker
OFF
ON
- +
+ 24 V SUPPLY
TO CONTROL SYSTEM
- 24 V SUPPLY
TO CONTROL SYSTEM
1 UP BLUE
2 UP BROWN
3 DOWN BLUE
4 DOWN BROWN
5 UNLOCK 1 BLUE
6 UNLOCK 1 BROWN
7 UNLOCK 2 BLUE
8 UNLOCK 2 BROWN
9 LOCK 1 BLUE
10 LOCK 1 BROWN
11 LOCK 2 BLUE
12 LOCK 2 BROWN
13 (+) 24 V POS SUPPLY
14 (-) 24 V NEG SUPPLY
15 UP/DOWN PUMP SUPPLY POS
16 UP/DOWN PUMP SUPPLY NEG
17 PRIME MOVER POS
18 PRIME MOVER NEG
19 UP VALVE
20 DOWN VALVE
21 LEFT VALVE
22 RIGHT VALVE
23 LOCK 1 OUT RAM BROWN
24 UNLOCK 1 OUT RAM BLUE
25 LOCK 2 OUT RAM BROWN
26 UNLOCK 2 OUT RAM BLUE
27 BYPASS
TO CONTROL PANEL (S)
NEG BLACK
POS RED
ON / OFF WHITE
RAISE ORANGE
LOWER GREY
LEFT THRUSTER BROWN
RIGHT THRUSTER BLUE
ALARM YELLOW
GREEN LIGHT GREEN
RED LIGHT PURPLE
12 V NEG
12 V POS
MAX POWER
CONTROL TO THE MAX

MAX POWER

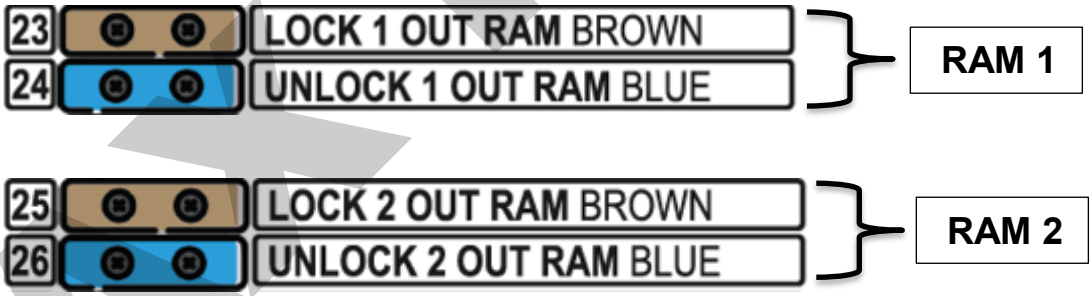
MAX POWER CONTROL BOX WIRING

The area in which the control panel and control box will be installed must not have any humidity present and that electronics will be protected from direct water contact.

Connect the PROXIMITY SWITCHES to detect the relevant positions:
UP, DOWN, UNLOCK 1 (starboard), LOCK 1 (starboard), UNLOCK 2 (port) & LOCK 2 (port) to the respective terminals **1-12**.



Connect the **2** x 24V RAM ACTUATORS from starboard and port respectively:



CAUTION: The Max Power raise/lower powerpack, ref. 313352, consists of a 1,1 kw 4 poles 3Ph 380/400V- 50HZ AC motor, which will need to be supplied by a switchboard and protected by a dedicated circuit breaker. The electric motor of the raise/lower powerpack will be actuated through a 24V contactor present in the switchboard. This 24V contactor will be connected to terminals **15 & 16** of the control box.
The power supply cables between the switchboard and the motor must be seized according.