THRUST IT TO THE MAX

Hydraulic Tunnel Thruster

Series 125 HYD

With Electronic Controller

INSTALLATION OPERATION MAINTENANCE

Serial N° : ----------

Date of Installation : ----------

THIS MANUAL MUST BE KEPT ON BOARD AT ALL TIMES

Via Philips 5, 20900 Monza (MI), Italy
Tel. +39 039 200 1973-936 - Fax +39 039 2004299
www.max-power.com E-mail:contact@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

Your thruster is a high quality technical product and should be treated as such. The employment of **qualified marine personnel**, with experience in bow thruster installation, is strongly advised. Where possible, the boat manufacturer's architects, design departments and/or shipyards 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. In any case, all other bodies, governmental or otherwise, should be contacted to ensure conformity with legal regulations relating to the boat in question.

Your thruster should be delivered with the following parts:

Hydraulic Motor & Coupling	Motor Support	Controller HYD	Drive Leg, Propeller Pin(s) & Coupling
Propellers (2)	Safety Stickers x 2	Manual	

1) GENERAL INSTALLATION GUIDLINES

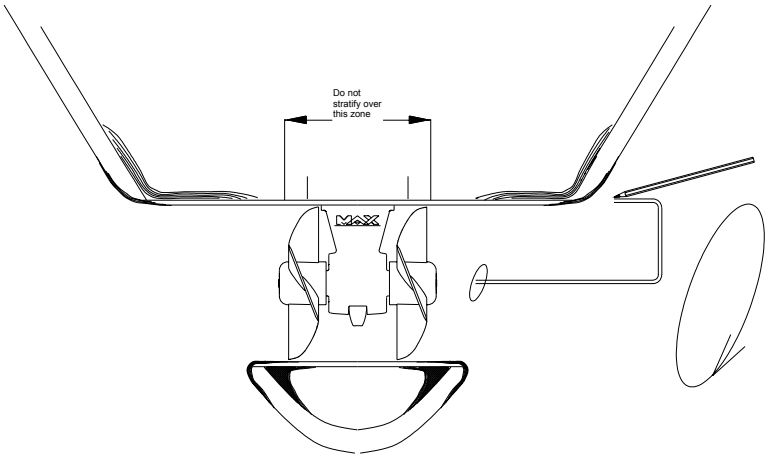
Decide on the best location for the SUPER POWER. (See drawing: "Positioning & Measurements" at back of manual)
The tunnel must be as low as possible and as far forward as possible.
The propellers must not protrude beyond the hull line.
The ideal position of the tunnel is such that there is at least the depth of one tunnel diameter from the water line to the top of the fitted tunnel.
Decreased performance of the SUPER POWER due to inadequate immersion depth can be compensated by fitting the tunnel as far forward as possible (increasing lever arm movement).
The SUPER POWER hydraulic thrusters can be fitted vertically, horizontally or tilting.

IMPORTANT: When using tunnels of different thickness (example: metallic tunnel) it is imperative that the area between the drive leg/gasket and the motor support, matches the thickness as indicated in the table on the drawing "Positioning & Measurements" at back of manual and that the motor support is stable.
If you have less than 6 mm thickness, you will require an extra hard rubber gasket between the motor support and the tunnel.

2) TUNNEL

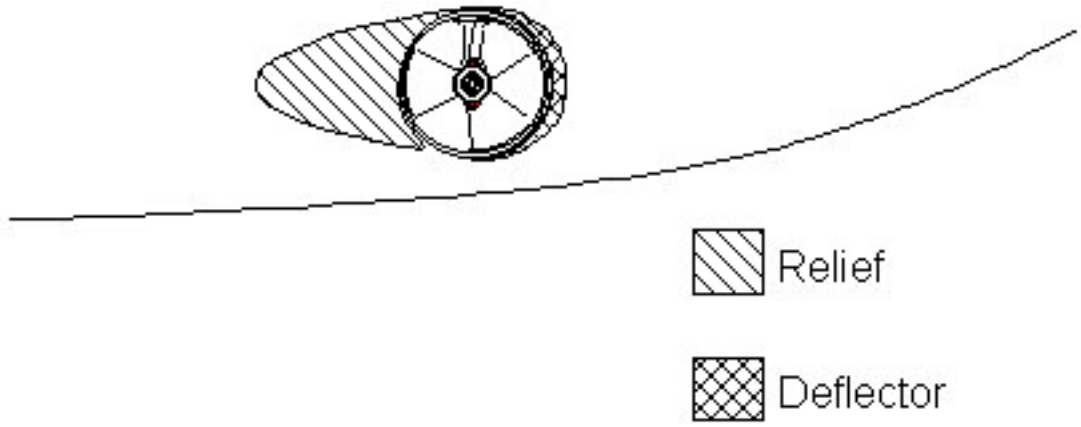
When the final tunnel position is determined (and all dimensions have been checked), mark the centre of the tunnel's position and drill a Ø 10 mm hole. Make up a metal compass from 8 mm rod.

Fit compass into the Ø 10 mm holes and trace the form of the tunnel on to the hull (elliptical).
After cutting out the elliptic hole, disc the interior surface of the hull, by approx. 10 to 15 cm around the holes.
The outside surface of the tunnel is then ready to be fibre-glassed.



Fit the tunnel and mark the areas to be fibre-glassed. Sand these areas inside and out.
In certain installations it is preferable to drill the position of the thruster support before the installation of the tunnel.
Refit the tunnel. Apply reinforced fibreglass filler to all areas, taking care that you fill the gap between hull and tunnel. Stratify with a minimum of 8 coats of material and ISOPHTALIQUE RESINE alternating with mat and roving.
In inaccessible areas (i.e. under the tunnel), it is possible to simply apply reinforced filler.

CAUTION: Do not fibre glass the area of the motor support.
It is recommended to lightly sand down the area where the motor support is fitted.
On the outside, when the ISOPHTALIQUE RESIN has set, finish with an application of resin and material, followed with an additional coat on the hull, in the tunnel area.
To optimise the flow of water while sailing, deflectors & a relief should be fashioned.
These can be made up with several coats of reinforced filler in order to obtain the required hydrodynamic lines.



Once all fibreglass work is complete, apply a coat of epoxy or gel-coat to waterproof the entire area.

3) PROPELLER DRIVE LEG & MOTOR SUPPORT

The leg's gasket and the motor's support can be used to mark up the drilling position, in some cases it might be easier, to mark out the position, and drill before the stratification of the tunnel.
Centre and trace the drilling positions for the leg and its support.
Fit the leg along with the gasket, in the tunnel.
Check general positioning of the propellers.
Small pieces of folded cardboard can be used to check the spacing between the propeller tips and the tunnel is even all round. Slight adjustment to align the leg in its tunnel may be necessary.
After checks, remove leg etc; remount the assembly, covering the gasket with an oil and salt water resistant jointing compound. After fitting, remove all excess compound.
The gasket must be between the leg and the tunnel, and not between the motor support and the tunnel.
Care must be taken at all times when fitting the leg into the motor support to ensure that the mating components are dirt free and covered with a light film of grease.
IMPORTANT: GRAPHITE GREASE MUST NOT BE USED.
Torque values: screw Ø 8 mm = 30 Nm screw; tighten the two fixing screws alternately.

The installation of the **composite drive leg** is identical to that of bronze leg, except for the following points: The composite drive leg is lubricated for life.
The composite drive leg does not require an anode.
The composite drive leg MUST NOT BE DISMANTLED, even partially.

<u>Once tightened, ensure that the propeller/s turn freely without touching the tunnel.</u>

4) THE HYDRAULIC MOTOR AND ITS ADAPTER

Do not separate the motor from its adapter.
Insert the lower metal coupling on the greased leg shaft.
Fit the flexible coupling, then the motor and its adapter, tighten the screws (∅ 10mm) to a torque of 40 Nm.

IMPORTANT: Using a screwdriver push the lower coupling up towards the motor, the contact between these parts must be without any slack or play.
Tighten locking screw for drive key (Allen Key of 3 mm with white mark).

5) PROPELLERS

Check the tightness of the oil drain screw (8 mm Allen Key) and the anode (a 10 mm key).

IMPORTANT: To prevent limestone deposits from forming (causing damage to the joints), we highly recommend applying silicone grease to the shaft and the joints before assembling the propellers.

Fit the propeller pins and propellers

NOTE: Position the propeller blades opposed and not in line with one another.

Make sure that the propellers turn freely. A certain amount of resistance from the motor is normal.
Tighten the screws (3 mm Allen key), only 2 mm should be visible above the hub/boss of the propeller.

WARNING: If more than 2mm is visible, the propeller is not correctly placed, as the screws are not in the shaft groove.

6) PROTECTION GRILLS

With a shallow tunnel installation, we recommend that you protect the propellers by fitting horizontal protection grills. These grills will however modify thruster performance.

7) HYDRAULIC (general remarks)

A typical installation of the hydraulic power thruster requires the following elements:

- oil reservoir/tank
- hydraulic pump
- directional control valve
- hydraulic motor
- circuit piping
- oil cooler (depending on type of installation)

The **oil reservoir/tank** with return filter and suction strainer should be as close to the pump as possible and on charge. Meaning that the level of the oil should be above the pump, preferably with the oil tank above the water line.

For future maintenance, make sure that the return filter is easily accessible. An isolation valve can be fitted to the suction.

The **pump** can be driven by either an internal combustion engine (crankshaft pulley or gearbox PTO) or an electric motor. Depending on the speed and choice of drive, **but** should always comply with the rated pressure/flow of the thruster.

For an **internal combustion engine** with fixed or variable speed, 3 types of pumps can be used, depending on the unit to be fitted:

Direct PTO:
- Fixed flow pump **(***)**
- Variable displacement pump, depending on the model **(**) (*)**
- Fixed flow pump with bypass **(**) (*)**

PTO with clutch:
- Fixed flow pump **(**) (*)**
- Variable displacement pump depending on the model **(**) (*)**
- Fixed flow pump with bypass **(**) (*)**

On a DC or AC **electric motor** the following types of pumps can be used:

DC MOTOR:
- Fixed flow pump **(*)**

AC MOTOR:
- Fixed flow pump or other **(**) (*)**

(***) **always** require oil cooler
(**) require oil cooler when time of operation exceeds 15 minutes,
(*) oil cooler not necessary
Note: The above choices also depend on capacity of the oil tank etc.

The **hydraulic directional control valve (DCV)** must be equipped with a pressure gauge and pressure relief valve and should preferably be placed as close as possible to the thruster unit.

The piping can be flexible or a mix of rigid and flexible type and should have crimp-connected fittings.
The piping should match interior diameters and the service pressure equal or above that which has been recommended.
The circuits must be as direct as possible and avoid any bends and joints.
The circuits must be clean and closed-off until final connection takes place.
The thruster hoses arriving at the thruster must be of the thermo-plastic non-conductive type.
The hydraulic motor drain line and the return T-line of the DCV should each go separately and directly, back into the top of the oil tank.

Use synthetic, mineral or vegetable hydraulic **oil,** to ISO standard 32 to 48.

8) HYDRAULIC SPECIFICATIONS

SUPER POWER Series 125 HYD: **Flow** = 30/35 litres/Min **Pressure** = 130 / 140 bars

Detailed **instructions** and **diagrams** are delivered with each **pack,** specific to the installation chosen.

9) HYDRAULIC CUSTOM PACK.

Tailor made according to specifications.

ELECTRO PUMP PACK: 1 x Electro Pump 24Volt 8 kW
1 x Power Relay
1 x Fuse Holder
1 x Power Fuse

HYDRAULIC CONTROL PACK (12 V / 24 V):
1 Directional Control Valve (Including pressure gauge & Pressure Relieve Valve)
1 Control Panel.

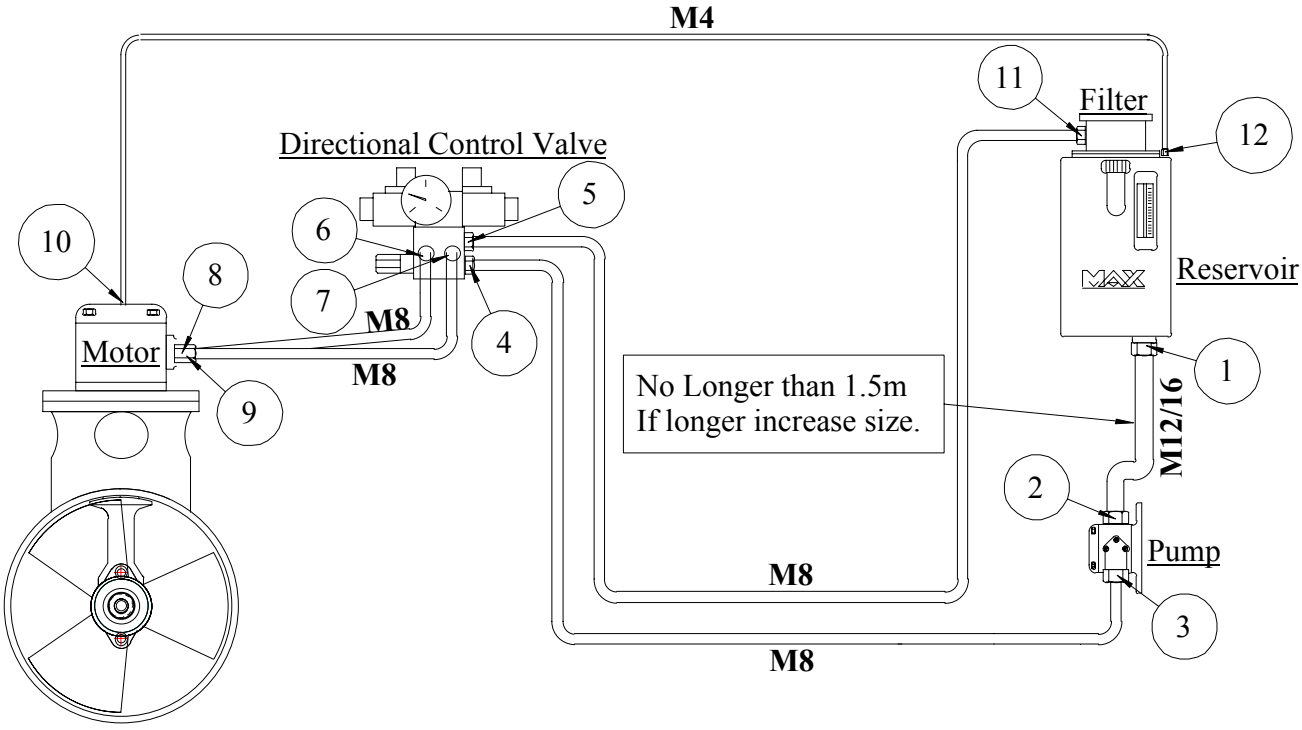
RESERVOIR PACK
Oil Reservoir 8 / 12 / 18 / 40 litres including: Return Filter
Suction Strainer
Oil Level Sight Gauge/ Thermometer
Filler Cap
Motor Drain Connection

INTERIOR DIAMETERS AND MODULES of the piping between the hydraulic elements:

M4 = 1/4''	M5 = 5/16''	M6 = 3/8''	M8 = 1/2''
M10 = 5/8''	M12 = 3/4''	M16 = 1''	

INTAKE DIAMETERS of standard hydraulic elements MAX POWER:

1 / 2 / 11 = Female **BSP 3/4"** 3 / 6 / 7 / 8 / 9 = Female **BSP 1/2",**
4 / 5 = Female **BSP 3/8"** 10 / 12 = Female **BSP 1/4"**



10) MAINTENANCE

In order to ensure peak performance from your SUPER POWER, the tunnel, the leg and the propellers must be kept clean.

IMPORTANT: In order to prevent chalky deposits, which cause damage to the oil seals, we recommend cleaning the shaft and the oil seals first, then applying a layer of silicon oil before assembling the propellers.

ANNUAL BASIS: CHANGE the anode (if necessary).
CHANGE drive leg oil, if classic (bronze) leg.
CHECK the oil and the hydraulic filtration circuit (only if necessary).

EVERY 5 YEARS: DRAIN hydraulic oil system and change the filter and refill.

THE MAX-POWER TEAM WISHES YOU SUCCESSFUL MANOEUVRING AND ENJOYABLE CRUISING.

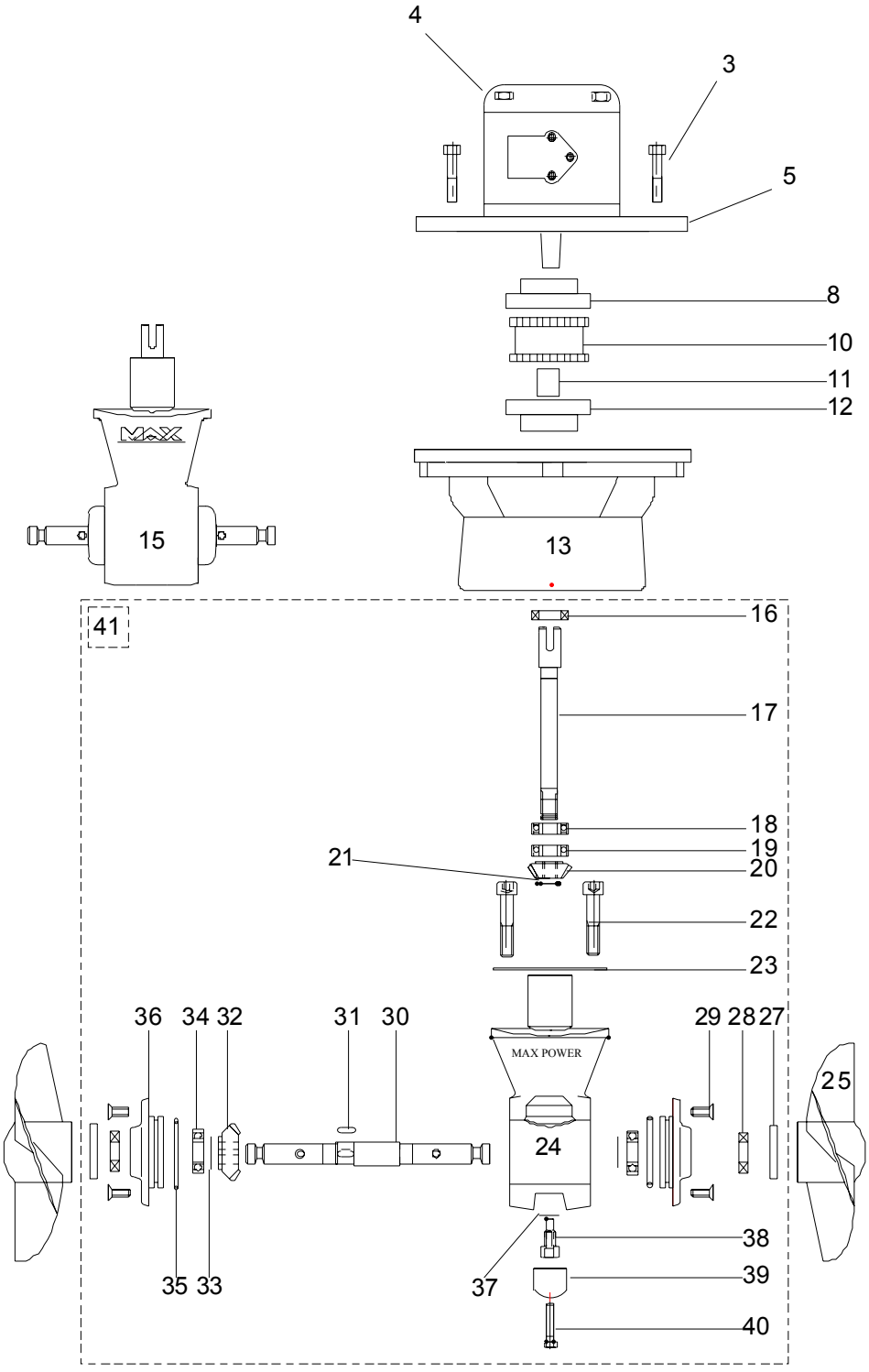
IT IS IMPORTANT TO KEEP THIS MANUAL ON BOARD!

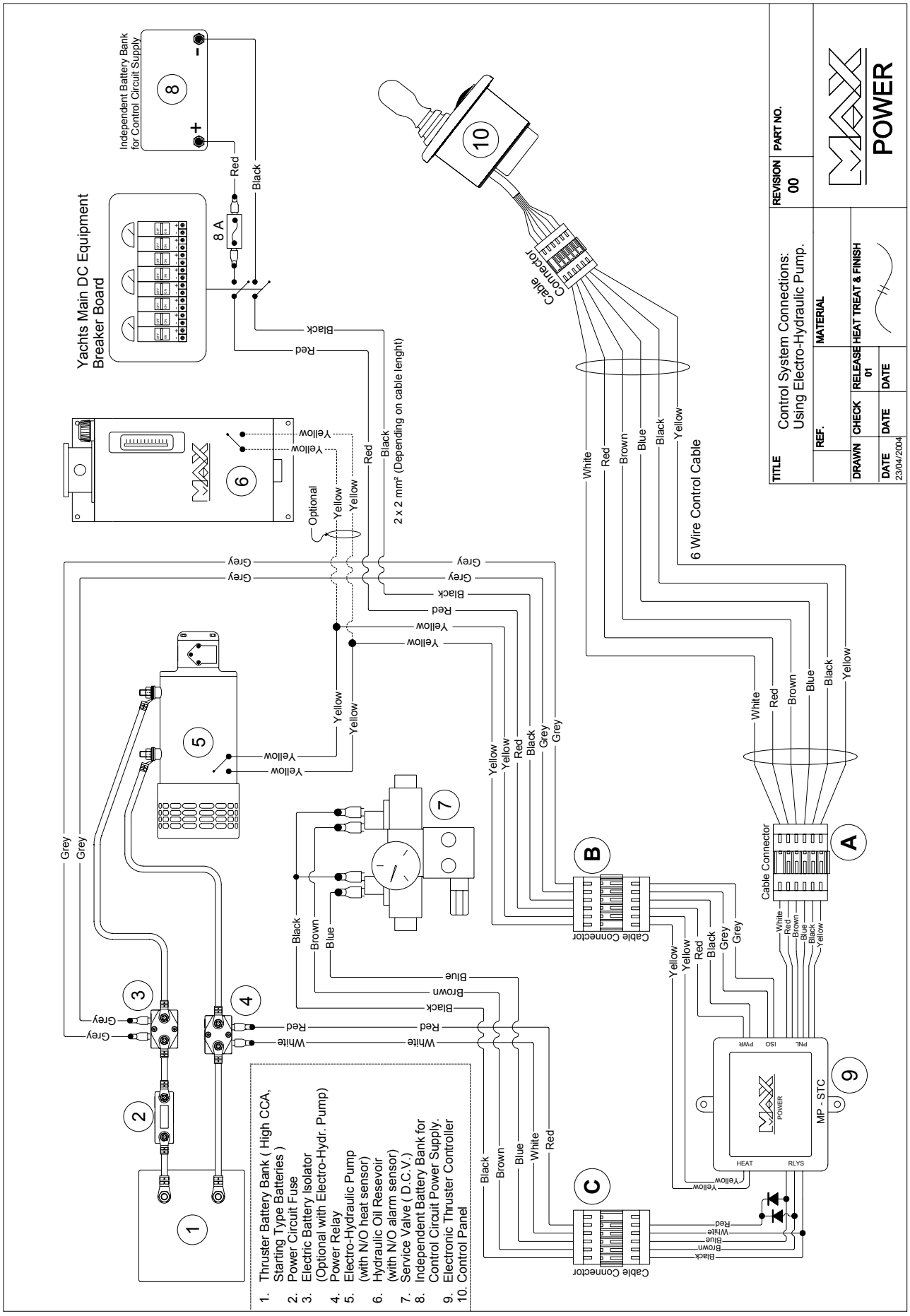
Installation Notes

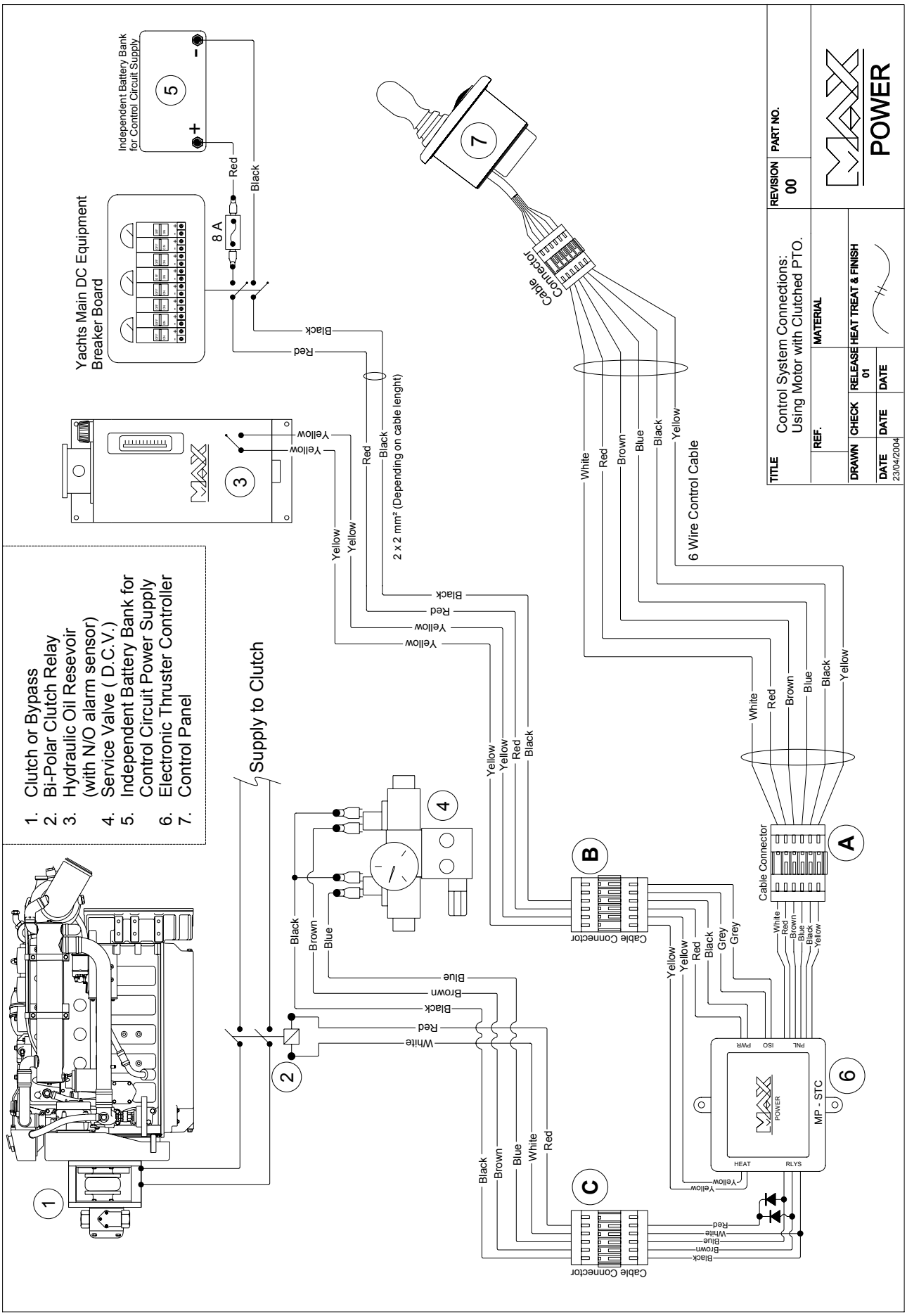
SPARE PARTS LIST
SP 125 HYD

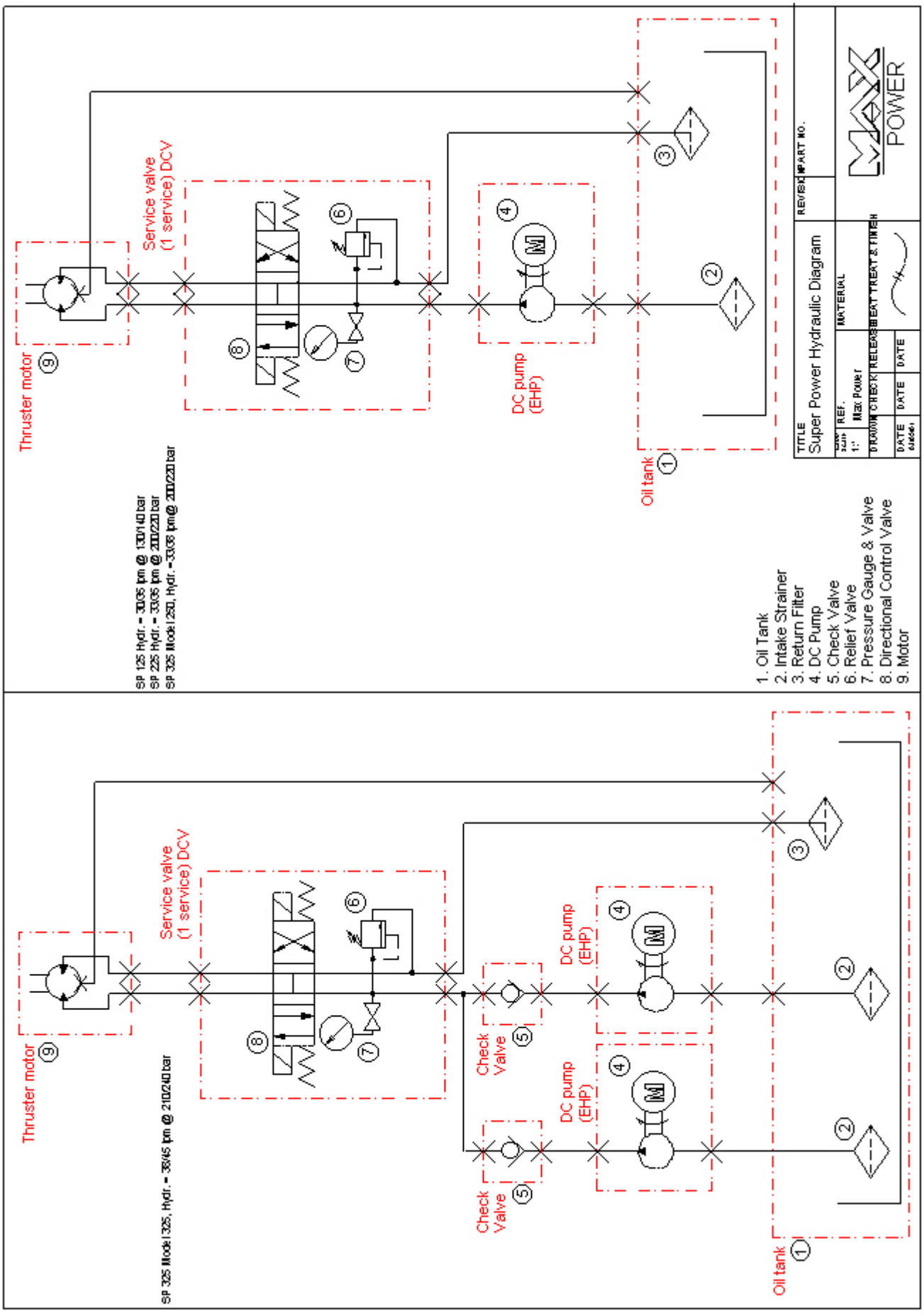
N°	DESCRIPTION	Composite Leg MPHYC800	Classic Leg MPHY0800	REFERENCES
3	Motor fixing bolts	4	4	MPOP 5240
4	Hydraulic motor	1	1	MPHY 6010
5	Adapter plate	1	1	MPHY 5012
8	Upper shaft coupling Hydraulic type	1	1	MP205027
10	Rubber coupling	1	1	MP205023
11	Shaft drive key	1	1	
12	Lower shaft coupling	1	1	MP205029
13	Motor support + heightening (composite)	1	1	MP088120
15	Composite drive leg	1		MP08 8100
16	Drive shaft seal		1	MPOP 2030
17	Drive shaft		1	MPOP 4060
18	Top drive shaft bearing		1	MPOP 5250
19	Lower drive shaft bearing		1	MPOP 5251
20	Upper gear		1	MPOP 5051
21	Clip		1	MPOP 5280
22	Composite Fixing Bolts	2		MPOP4130
22	Fixing screw		2	MPOP 5340
23	Fibre joint leg / tunnel 1,5 mm	1	1	MPOP 2060
24	Leg housing		1	MPOP 5270
25	Propeller D 185	2	2	MPOP 8080
27	Propeller pin	2	2	MPOP 5221
28	Oil seal		2	MPOP 2070
29	Screw Cap		4	MPOP 5320
30	Propeller shaft		1	MP08 5020
31	Shaft key		1	MPOP 5290
32	Lower gear		1	MPOP5061
33	Shim		2	MPOP 5350
34	Propeller shaft bearing		2	MPOP 5260
35	O-ring		2	MPOP 2040
36	Cap		2	MPOP 5380
37	Copper washer		1	MPOP 2050
38	Drain plug		1	MPOP 5300
39	Anode		1	MPOP 5390
40	Anode screw		1	MPOP 5311
41	Complete bronze drive leg		1	MP088040

SUPER POWER 125 HYD

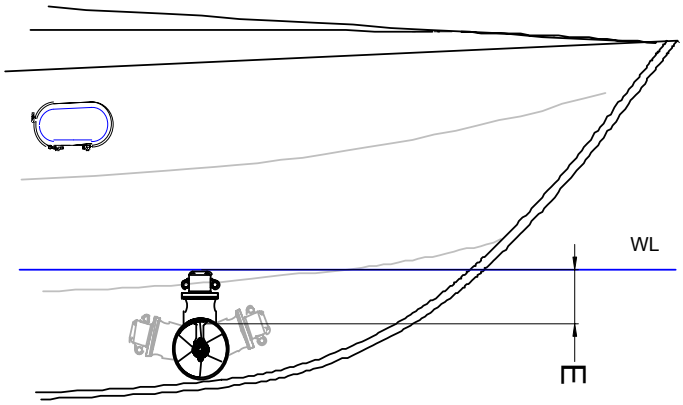


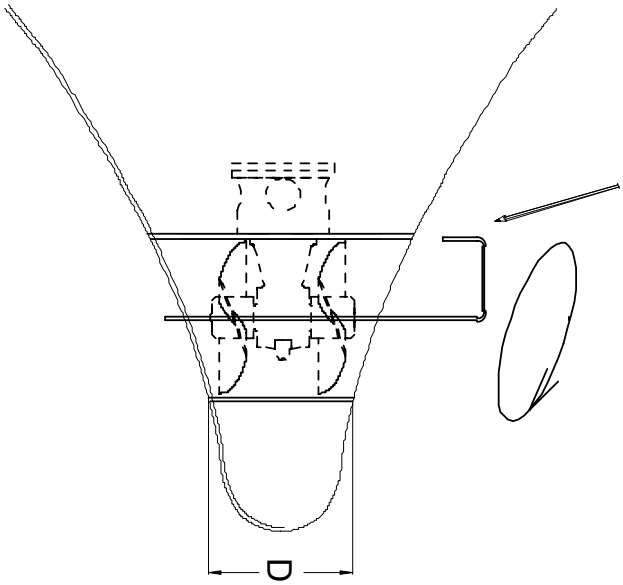

Independent Battery Bank for Control Circuit Supply
Yachts Main DC Equipment Breaker Board
8 A
Red
Black
Cable Connector
6 Wire Control Cable
White
Red
Brown
Blue
Black
Yellow
2 x 2 mm² (Depending on cable lenght)
Optional
Grey
Yellow
Red
Black
Blue
Brown
White
Cable Connector
MP - STC
HEAT
RLYS
PNL
ISO
PWR
1. Thruster Battery Bank (High CCA, Starting Type Batteries)
2. Power Circuit Fuse
3. Electric Battery Isolator (Optional with Electro-Hydr. Pump)
4. Power Relay
5. Electro-Hydraulic Pump (with N/O heat sensor)
6. Hydraulic Oil Resevoir (with N/O alarm sensor)
7. Service Valve (D.C.V.)
8. Independent Battery Bank for Control Circuit Power Supply.
9. Electronic Thruster Controller
10. Control Panel
TITLE
Control System Connections: Using Electro-Hydraulic Pump.
REVISION 00
PART NO.
REF.
MATERIAL
DRAWN
CHECK
RELEASE 01
HEAT TREAT & FINISH
DATE 23/04/2004
DATE
DATE
POWER

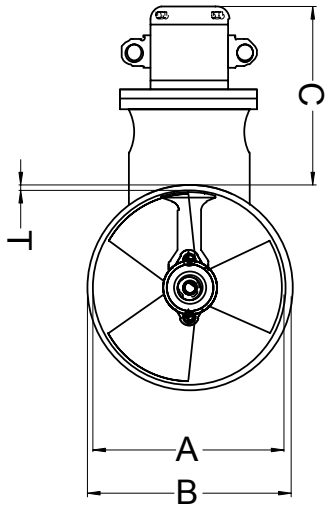

1. Clutch or Bypass
2. Bi-Polar Clutch Relay
3. Hydraulic Oil Resevoir (with N/O alarm sensor)
4. Service Valve (D.C.V.)
5. Independent Battery Bank for Control Circuit Power Supply
6. Electronic Thruster Controller
7. Control Panel
Independent Battery Bank for Control Circuit Supply
Yachts Main DC Equipment Breaker Board
8 A
Red
Black
Cable Connector
2 x 2 mm² (Depending on cable lenght)
6 Wire Control Cable
Supply to Clutch
Cable Connector
MP - STC
TITLE
Control System Connections: Using Motor with Clutched PTO.
REVISION 00
PART NO.
MATERIAL
REF.
DRAWN
CHECK
RELEASE 01
HEAT TREAT & FINISH
DATE 23/04/2004
POWER


Thruster motor
Service valve
(1 service) DCV
DC pump
(EHP)
Oil tank
SP 125 Hydr. - 3035 rpm @ 130/140 bar
SP 225 Hydr. - 3335 rpm @ 210/220 bar
SP 325 Model 250, Hydr. - 3335 rpm @ 210/220 bar
1. Oil Tank
2. Intake Strainer
3. Return Filter
4. DC Pump
5. Check Valve
6. Relief Valve
7. Pressure Gauge & Valve
8. Directional Control Valve
9. Motor
TITLE
Super Power Hydraulic Diagram
REF.
Max Power
MATERIAL
REVISION
PART NO.
POWER
Thruster motor
Service valve
(1 service) DCV
Check
Valve
DC pump
(EHP)
Check
Valve
DC pump
(EHP)
Oil tank
SP 325 Model 325, Hydr. - 3545 rpm @ 210/240 bar

Super Power Hydraulic: Positioning and Measurements







Dim (mm) \ Model	125	225	325
A	185	250	315
B	197	264	333
C	210	210	220
D	190	220	280
T	6	7	9
E Ideal	185	250	315
E Mini	110	140	160
Weight	9 Kg	12 Kg	20 Kg

THRUST IT THE MAX

Max Power
5, Via Philips Str, 20900, Monza (MI), Italy
Tel: +39 (0) 39 2001973 - 936, Fax: +39 (0) 39 2004299

Introduction

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.

1. Definitions

- **Authorized Repair Number:** The number given by Max Power on reporting a fault with your thruster
- **Dealer:** An authorized Max Power sales centre
- **End User:** The boat supplied with supplied equipment and the owner thereof
- **Installer:** The authorized centre 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 three (3) 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 at www.max-power.com. (NB. proof of purchase must be kept throughout the warranty period)

4. Warranty Terms

If the material is used for anything other than for pleasure craft, the guarantee is limited to a six-month period.

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 labour 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(If warranty is registered within the 3 month period following installation)

5. Warranty Exclusions

- Damage due to modifications or installation contrary to published specifications
- Cost of hauling the boat
- Damage due to repairs performed by an unauthorized service centre
- Damage due to lack of normal maintenance services
- Damage due to water
- Parts replaced due to normal wear and tear
- 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 objects

6. Procedural Guidelines

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

1. 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
2. Ensure you have your serial number and model number to hand (top right hand corner of warranty)
3. Dealer/Installer will come to site to decipher the cause of the fault
4. If the cause of fault is due to a manufacturing problem the dealer will contact Max Power to receive Repair Authorization Number.
5. If the problem is due to an installation error please contact your installer.

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

7. Service Centers

Please go online www.max-power.com to find the authorized service station of your area.

The warranty as outlined above is only applicable to Max Power manufactured thrusters and optional equipment as used in marine pleasure industry. The supplier holds the exclusive right to test the product and determine whether it is defective