

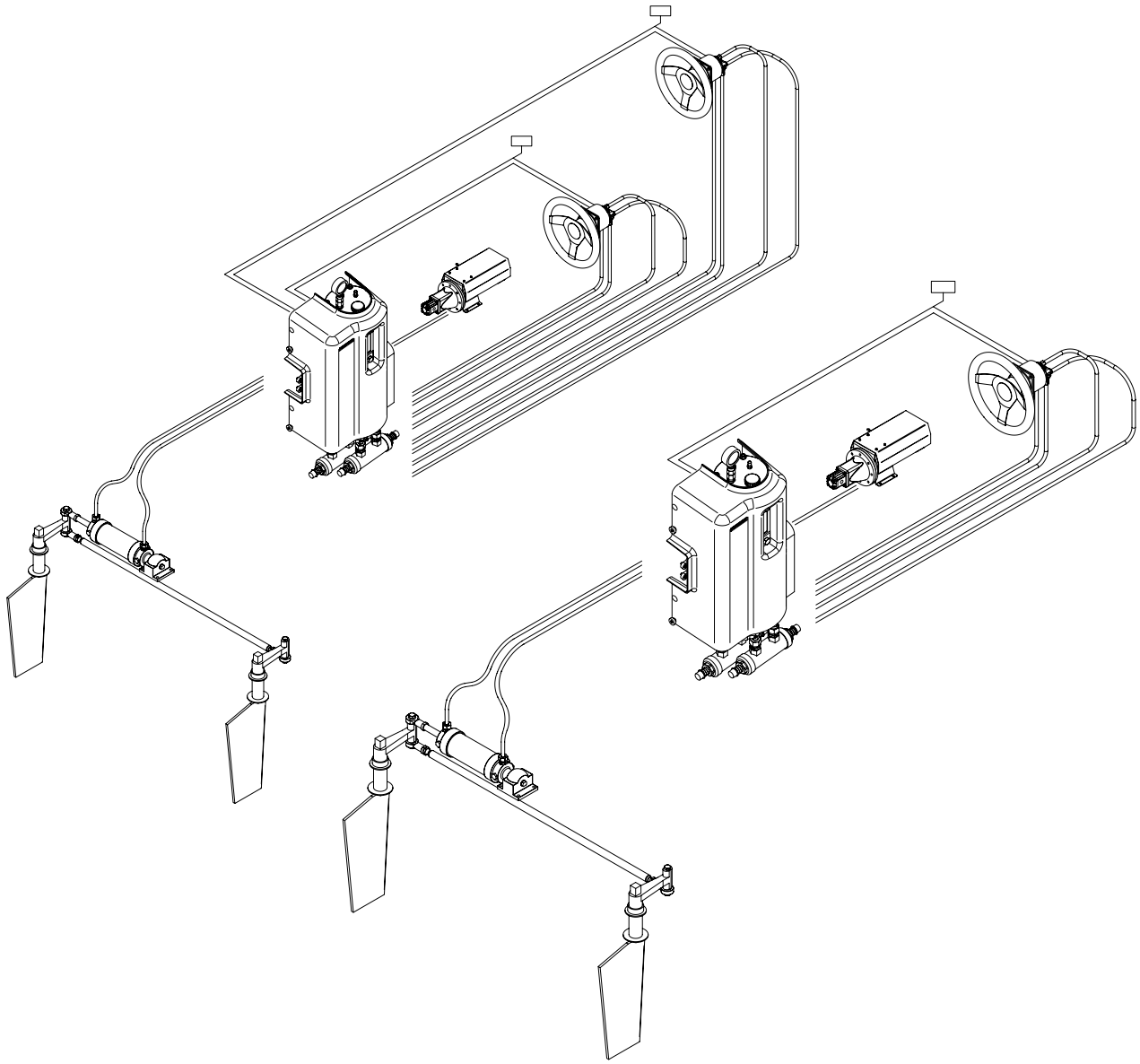
Keep this manual onboard!

SLEIPNER
Ocean born. Tech bred.

User Manual

For POWER STEERING SYSTEMS MK. III

ESPE600, ESPE700, ESPE1500



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Contents

Warnings and Safety **2**
Responsibility of the Operator **3**

User Manual
System Functionality 3
Twin Helm Flybridge Yacht System Description 4
Single Helm Flybridge Yacht System Description 5
System Unit Overview 6
Servo Pump Overview 6
ECU (Electronic Control Unit) 7
System Unit Hydraulic Ports 7
Helm Pump - Hydraulic Connections 8
Fill and Air Purging 9
Maintenance 10
Troubleshooting Guide 11

Spare Parts 12

Service and Support **15**
Product Spare Parts and Additional Resources **15**
Warranty Statement **15**
Patents **15**

Warnings and Safety

MC_0800

It is essential to follow all instructions within this document to avoid potential personal injury, death, or damage to existing products in the vessel, the vessel's hull integrity, and including this product during installation or operation. Failure to follow instructions within this document will render all warranties given by Sleipner Motor as VOID.

Warnings and situations requiring extra caution are outlined in the documentation. Take extra consideration when warnings are outlined.

WARNING
Indicate a potentially hazardous situation that, if not avoided, could result in death or severe injury.

CAUTION
Indicates a potentially hazardous situation that could result in minor or moderate injury or critical damage to vessel integrity if not avoided.

MC_0020

Responsibility of the Operator

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General:

- The operator must read this document to ensure necessary familiarity with the product before use.
- It is the owner/ captain/ operators full responsibility to assess the risk of any unexpected incidents or situation on the vessel or at sea. Familiarise yourself with your vessels safety operation in conjunction with Sleipner products.
- DO NOT allow children to operate Sleipner products.

WARNING
Sleipner Motor AS is not responsible for damage or injury caused by the misuse of our products.

For the Sleipner steering systems:

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- Take time to adequate yourself with the power system components, operation and safety features.
- The power steering system can have two types of helm pumps installed - 'with' or 'without hydraulic backup'.
- In the event of system shut down, the helm pump with 'hydraulic backup' function will become the only operational helm. (Electric only helms unit will not function.)
  (NB: The steering system will function as normal but with an increased number of required wheel rotations accompanied by a heavier wheel response. Do not continue to drive the boat at high speeds using the back up system.)
- The system will shut down immediately in the event of an unexpected major component failure related to the safe operation of the system. Oil or electric motor overheat conditions will activate the helm pump warning lights and/ or alarm sounder.

Cylinder bypass:
To centralize the rudders, release valve locknut, open valve NV3 & NV4 (turn counter clockwise until stop).The cylinder is now free and the rudders can be centralized. Return NV3 and NV4 to original closed position (Clockwise until stop) and tighten valve locknut.

CAUTION
IN THE EVENT OF SHUTDOWN
Immediately reduce engine power to idle and go to the helm position with hydraulic backup.

Release the system pressure when carrying out any servicing work on the Power Steering System or removal of the systems Oil Tank Filler Cap. (Invert the air pressure valve dust cover and press it against the top of the pressure valve)

For ESPE steering systems:

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- Should the helm pump warning light illuminate or the alarm sound, immediately reduce engine power to idle and go to the helm position with hydraulic back up (Lower helm on Flybridge boat).

  (NB: See fault type 1 and/or 2 in the "Troubleshooting Guide" chapter in this manual.)
- The system will monitor the alarm condition for a further two minutes before system shut down. If the alarm condition is resolved within 2 minutes the system will continue to function normally.

System Functionality

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Steering wheel turn stop-stop:

Servo mode:
3.5 - 6.5 turn depending on system setup.

Back up mode:
10 - 35 turn depending on system setup

The Power steering system comprises four main components.

1. The System Unit, consists of the Electronic Control Unit (ECU), an Oil filter and a Valve Block integrated with the Oil Tank (Reservoir).

2. A Hydraulic Pump Unit, driven by an attached 24volt D.C. electric motor.

3. 2 x Helm Pumps

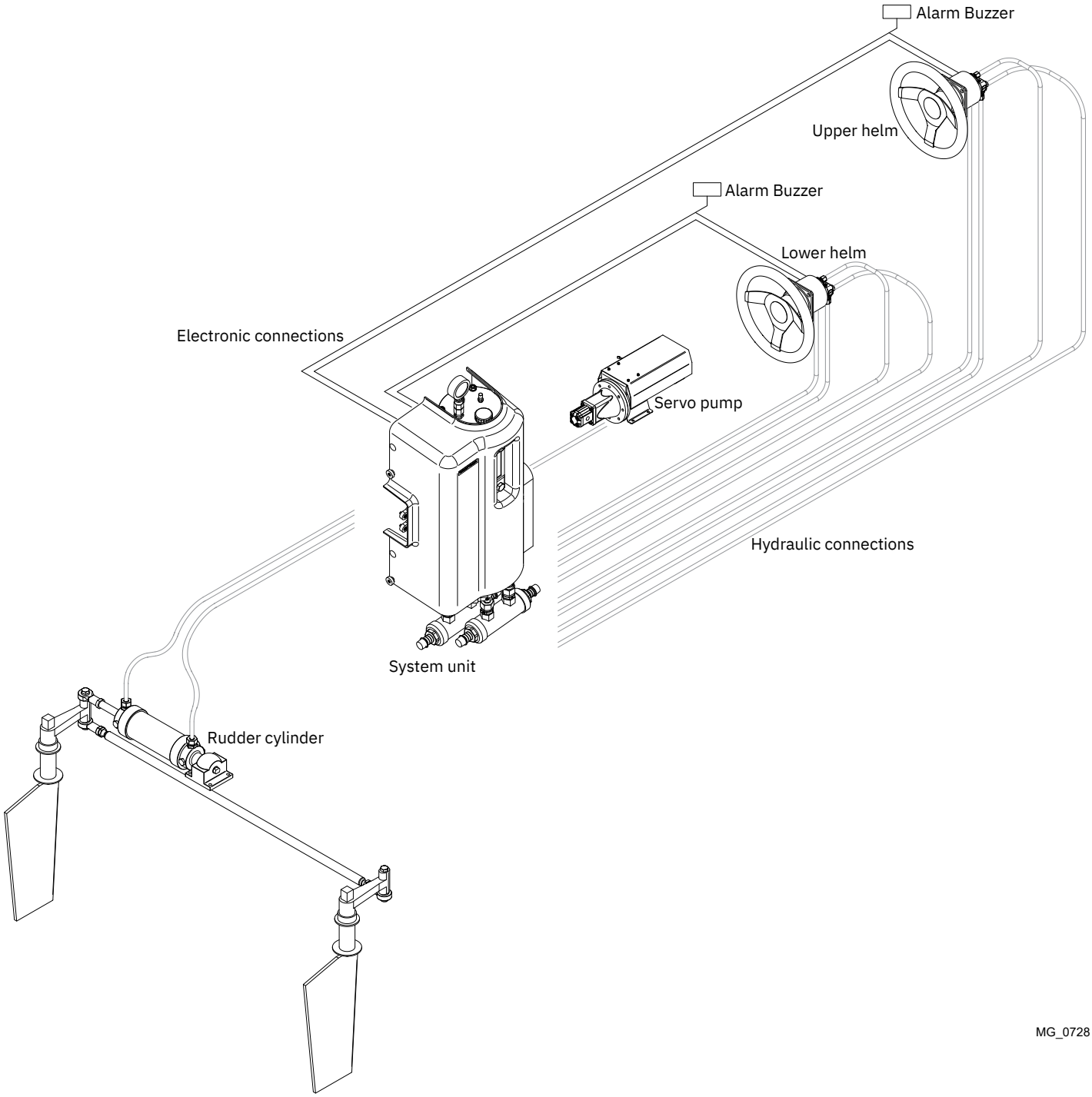
4. Hydraulic Cylinder(s)

The lower (primary) steering position helm has two functions:
a) It contains electronic sensors which transmit a signal to the ECU for normal Steering operation.

b) It acts as a Hydraulic Helm Pump (back-up) in the event of an ECU system shut down (NB, The number of wheel turns will increase from stop to stop during back up mode).

The upper/flybridge helm has electronic sensors that pulses signals to the ECU for normal Steering operation.

Both helms have a built in warning LED (Red). This will illuminate during an alarm condition.

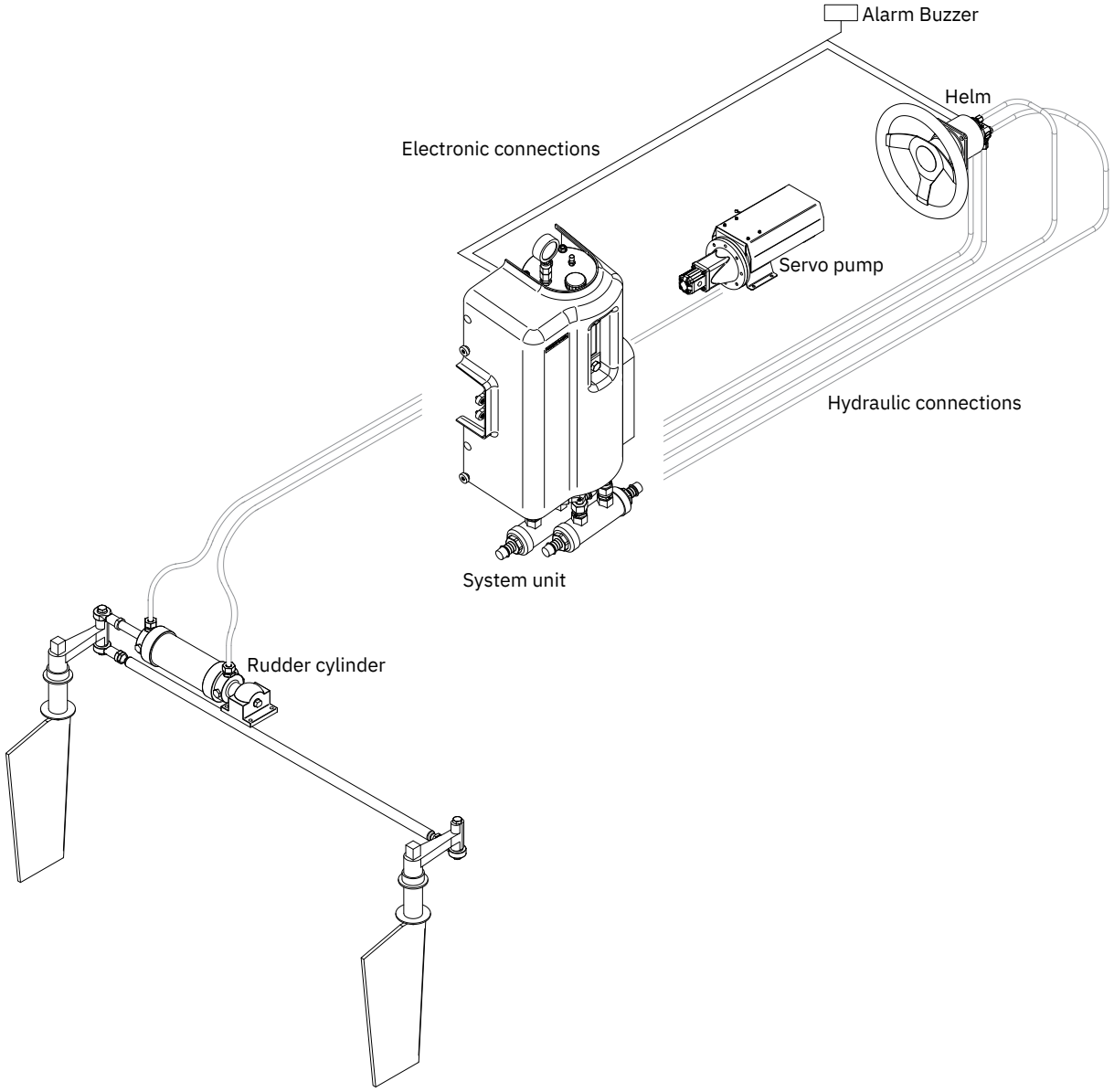


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The Power steering system comprises four main components.

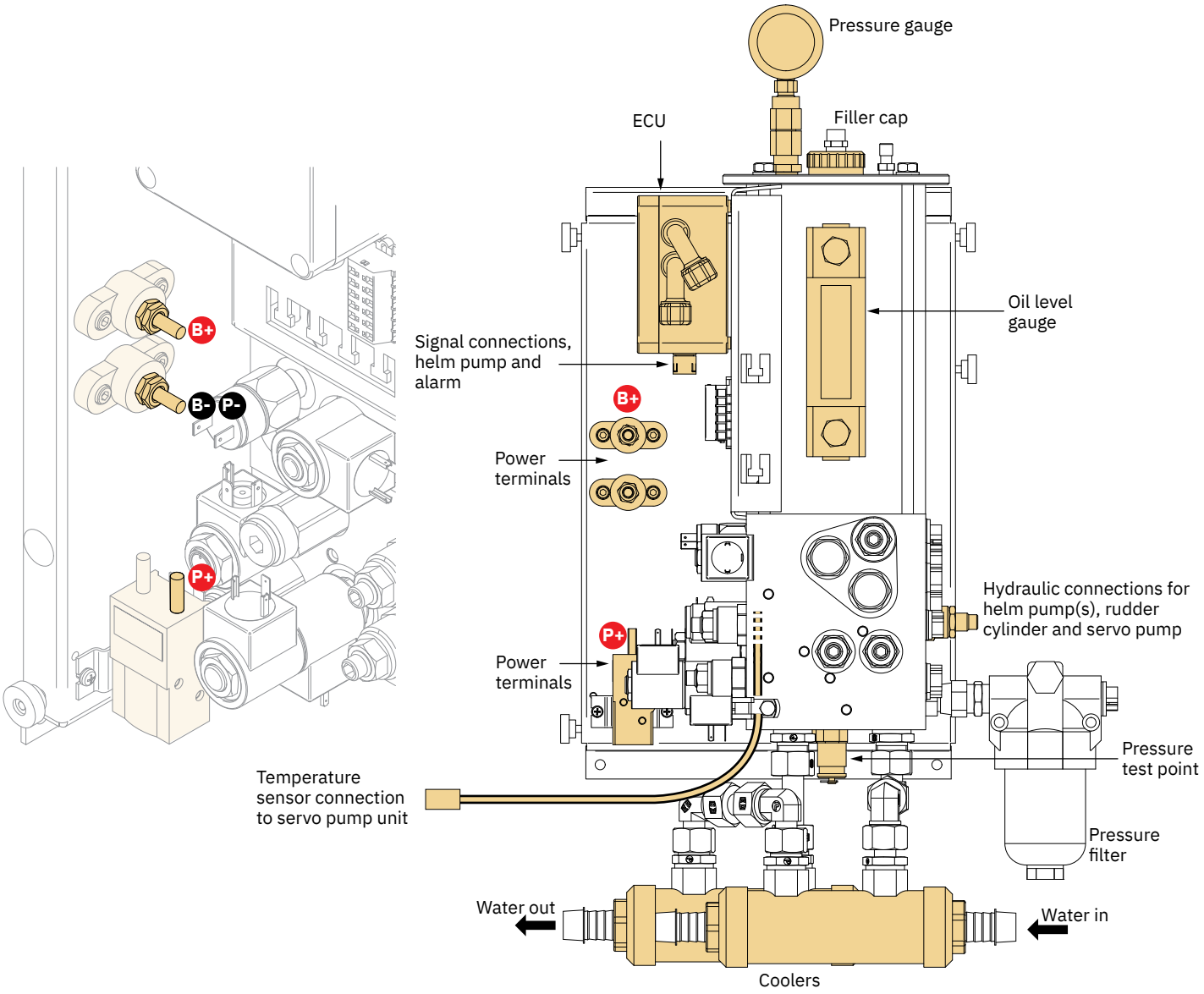
1. The System Unit, consists of the Electronic Control Unit (ECU), an Oil filter and a Valve Block integrated with the Oil Tank (Reservoir).
2. A Hydraulic Pump Unit, driven by an attached 24volt D.C. electric motor.
3. 1 x Helm Pumps
4. Hydraulic Cylinder(s)

The steering position helm contains electronic sensors which transmit a signal to the ECU for normal Steering operation.



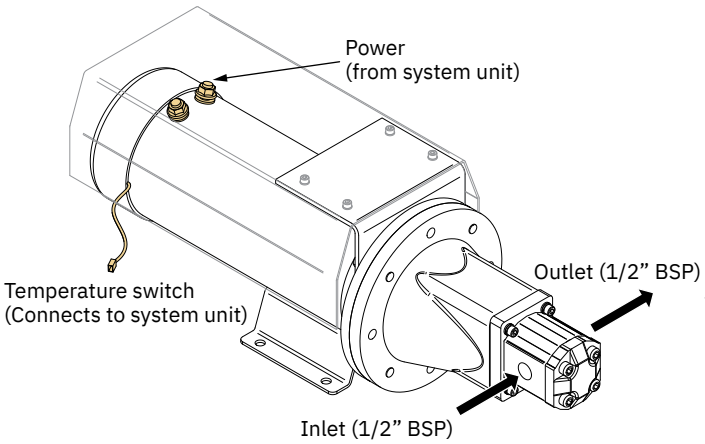
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System Unit Overview

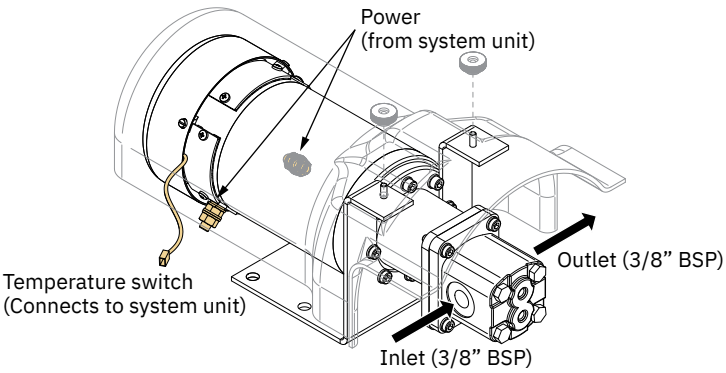


Servo Pump Overview

For ESPE 1500

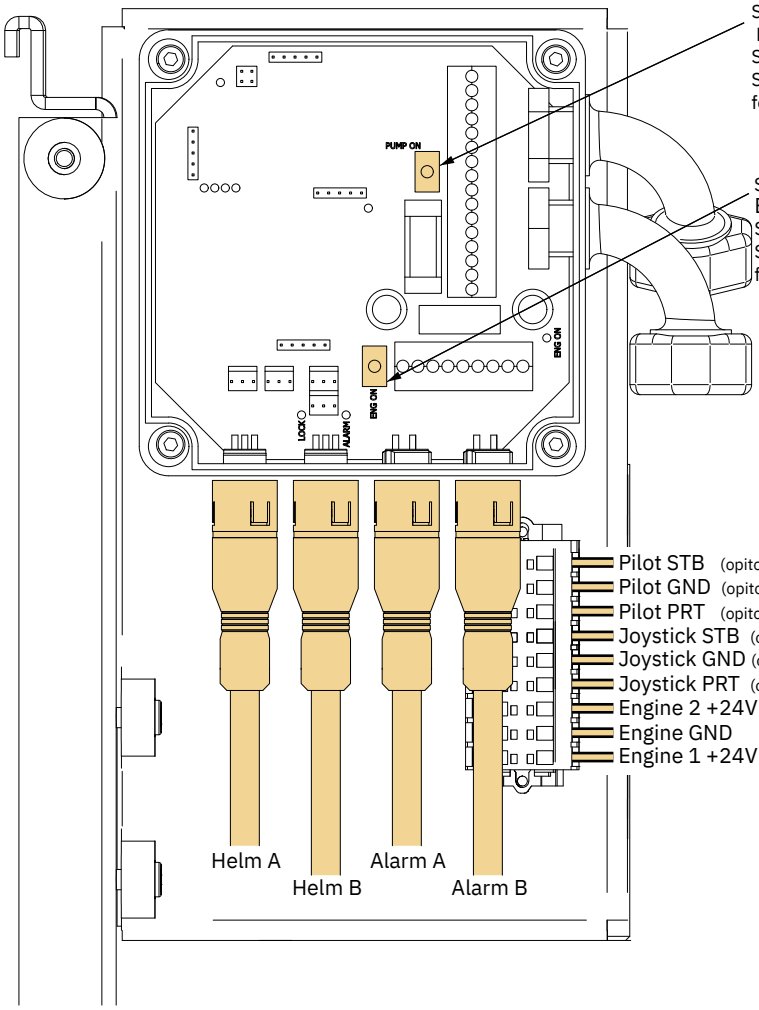


For ESPE 600 & ESPE700



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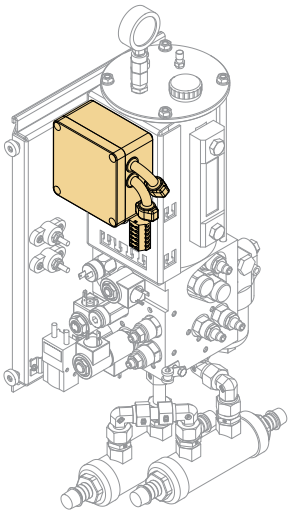
ECU (Electronic Control Unit)



Switch 1
PUMP OVERRIDE SWITCH
Switch position down - normal operation.
Switch position up - override mode used for system air purging

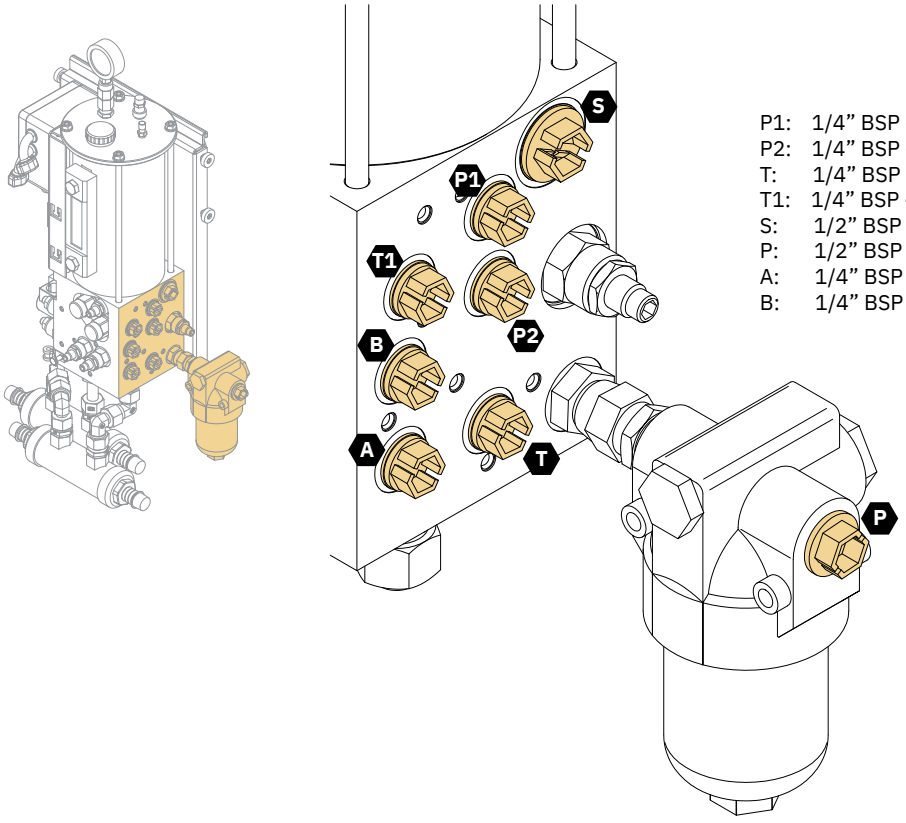
Switch 2
ENGINE ON OVERRIDE SWITCH
Switch position down - normal operation.
Switch position UP - override mode used for system air purging

Pilot STB (opitonal)
Pilot GND (opitonal)
Pilot PRT (opitonal)
Joystick STB (opitonal)
Joystick GND (opitonal)
Joystick PRT (opitonal)
Engine 2 +24V when motor is running
Engine GND
Engine 1 +24V when motor is running



24V input signal on engine 1 or engine 2 terminals, activates the system. The signal must come from a stable source, which is active when the vessel is in sailing mode.

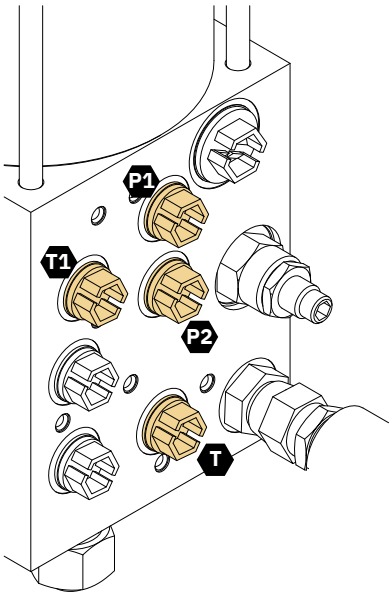
System Unit Hydraulic Ports



P1: 1/4” BSP - Helm pump pressure port A
P2: 1/4” BSP - Helm pump pressure port B
T: 1/4” BSP - Helm pump upper drain port
T1: 1/4” BSP - Helm pump lower drain port
S: 1/2” BSP - Servo pump, hydraulic inlet / suction
P: 1/2” BSP - Servo pump, hydraulic outlet / pressure
A: 1/4” BSP - Rudder cylinder stb feed / port return
B: 1/4” BSP - Rudder cylinder port feed / stb return

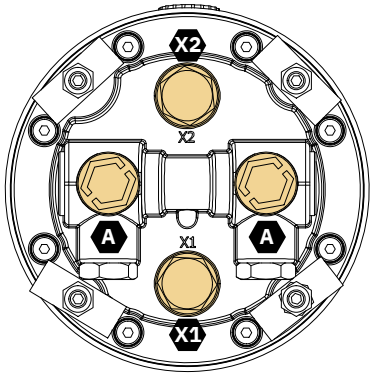
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Helm Pump - Hydraulic Connections



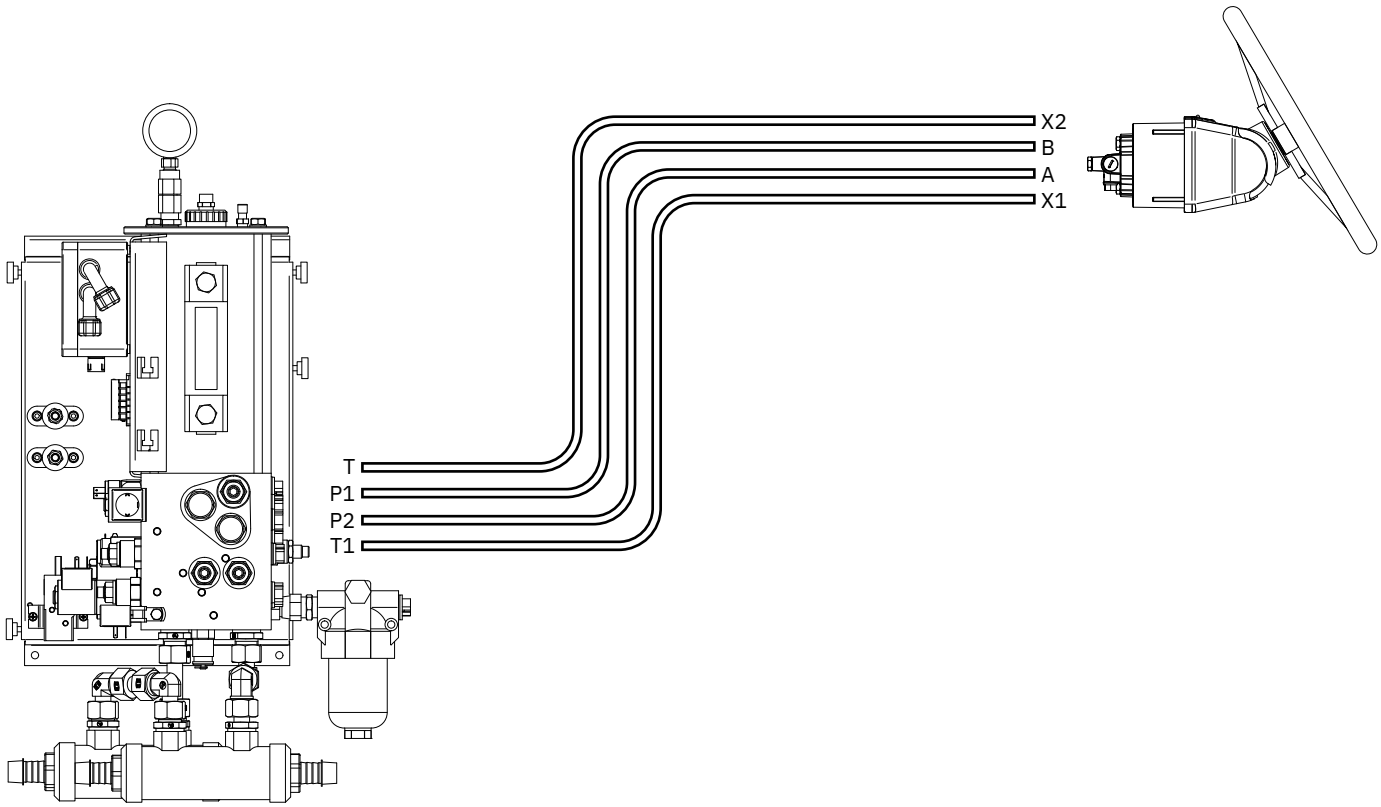
System unit

P1: 1/4” BSP - Helm pump pressure port A
P2: 1/4” BSP - Helm pump pressure port B
T: 1/4” BSP - Helm pump upper drain port
T1: 1/4” BSP - Helm pump lower drain port



System unit

A: 1/4” BSP - Helm pump pressure port A
B: 1/4” BSP - Helm pump pressure port B
X2: 1/4” BSP - Helm pump upper drain port
X1: 1/4” BSP - Helm pump lower drain port



MG_0733

CAUTION
Ensure that the Servo System (tank) Pressure is released before removing the Tank Filler Cap.

Filling and bleeding procedure

1. Fill the tank with hydraulic oil ISOVG-15 (DIN51524-3 HVLP specifications). Ensure that the oil is clean (use a filling filter).

2. Set Servo Unit valves to:
   NV1: Closed (turn CW to stop) NV3: Open (turn CCW to stop)
   NV2: Open (turn CCW to stop) NV4: Open (turn CCW to stop)

3. Switch 'ON' the main power to the Servo Unit.

4. Set the Ignition switch to "ON" or activate engine Override Switch to "UP" (Switch no.2), in the ECU Control Box.

5. Run the pump for 3 minutes by operating the Pump Override Switch (position "UP") (Switch no.1). If the oil level falls below the Level Gauge during bleeding, replenish the oil. **(NB: Larger yachts require several replenishments of the tank during bleeding.)**

6. Pressurize the tank to 1.5 bar with the supplied air pump (bicycle). Wait for 3 minutes.

7. Turn the steering wheel at the lower steering position (Helm hyd/electric Pump) 20 revolutions to Port, then 20 revolutions to Starboard.

8. Reset Servo Unit valves to their initial positions:
   NV1: Open (turn CCW to stop) NV2: Closed (turn CW to stop)
   NV3: Closed (turn CW to stop) NV4: Closed (turn CW to stop)

9. Deactivate Servo System By switching 'OFF' the Ignition Switch, Engine Override Switch (Switch no.2) and Pump Override Switch (Switch no.1). ***(NB: The steering system now will act as a normal hydraulic steering and will be heavier to operate.)***

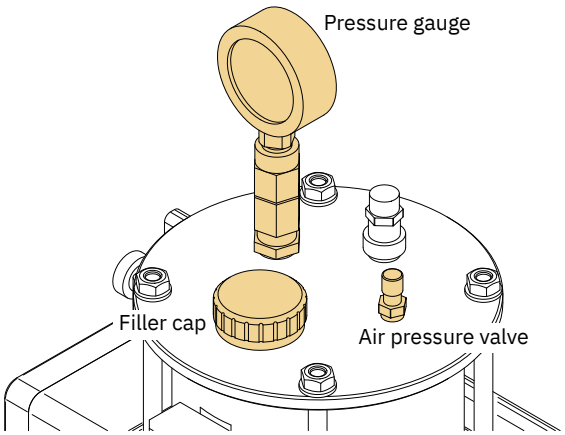
10. Finally, rotate the Steering Wheel to one of its end stops and hold with pressure against the stop, for approximately 5 sec. Carry out this procedure in the opposite direction. Repeat this procedure one more time in both directions.

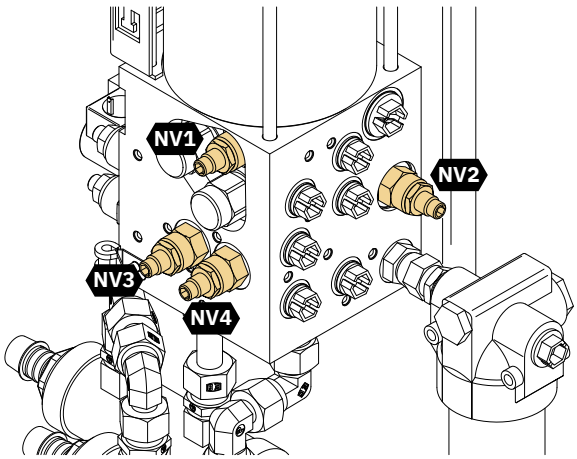
11. Check the system for signs of leakage.

12. Replenish oil to upper half of the oil level gauge.

13. Pressurize the tank to 1.5 bar with the supplied air pump (bicycle).

14. Both the Pump Override Switch and the Engine ON switch must be set in the "down" position during normal operations when the Main Engines are running.





MG_0732

CAUTION
Ensure that the Servo System (tank) Pressure is released before removing the Tank Filler Cap.

Monthly:
1. Check tank pressure (Min: 1.25 Bar/18 PSI - Max. 2.0 Bar/29 PSI)

2. Check the oil level - visible in the upper half of the level gauge.

(NB: If the system oil level is low, carry out the following:)
3. Check thoroughly for system leakage & replenish as necessary.

6th Monthly:
1. Check hoses and connections/fittings for leakages.

2. Check hoses for damage (caused by sharp edges, hot surfaces etc).

3. Check that all bolts are tightened and secure.

4. Ensure that bearings and joints are lubricated and free to rotate

Yearly/every third year:
1. The Hydraulic Oil and Filter require replacing after the first years service, and then consequently every third year there after.

2. Check DC motor brush wear yearly

For further support, contact you dealer or other authorized service personnel.

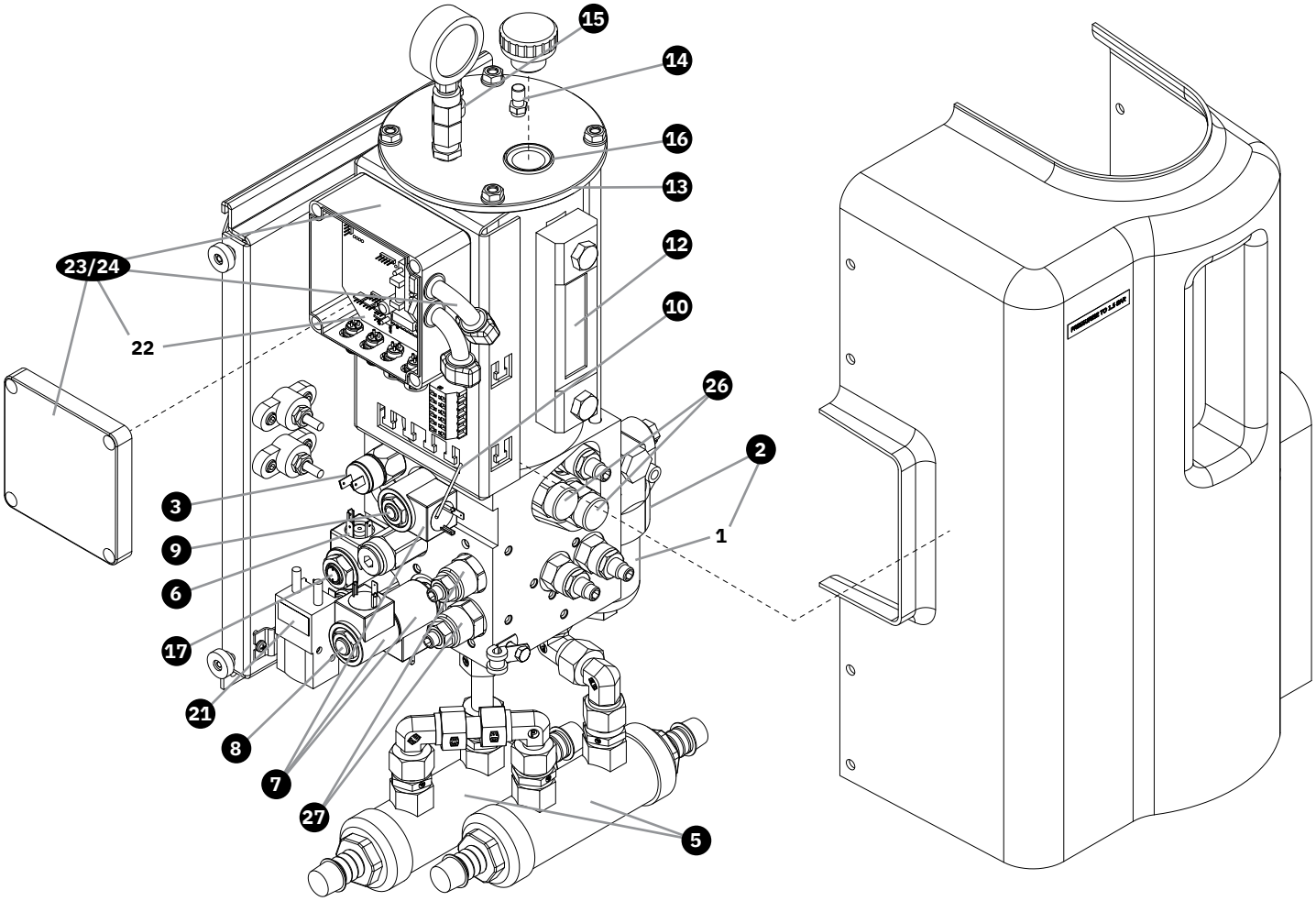
Fault Number	Fault Description	Helm Station	Version - MK1 / MK 2 (Possible Cause)	Version - MK3 (Possible Cause)	Check / Action / Comments
1	Steering stopped working, no alarms		No power	No power	-Check Circuit Breaker -Check voltage on B+/B- terminals
			Motor broken	Motor broken	Replace Motor
			Worn Brushes		-ESPE 600/700 motor without fan, replace complete motor -Other motors, replace brushes
			Motor Starter Relay broken	N/A (Will cause alarm)	Change Relay
			Loom ECU to relay broken	N/A (Will cause alarm)	
			Corrosion on motor relay spade terminals.	N/A (Will cause alarm)	
2	No end stop	Both helms:	Pressure switch adjustment	Pressure switch adjustment	Check end stop LED (orange) at PCB, adjust switch
			Broken pressure switch	Broken pressure switch	Replace switch
		Lower helm only:	Pressure switch adjustment	Pressure switch adjustment	Check end stop LED (orange) at PCB, adjust switch
			Broken pressure switch	Broken pressure switch	Replace switch
			Lock valve sticking in open position	Lock valve sticking in open position	-Remove valve cartridge from main valve unit. -Connect 24V to coil and check spool movement.
			No oil in helm/system not pressurized	No oil in helm/system not pressurized	Refill, and run air purging procedure.
		Upper helm only:	End stop brake broken	End stop brake broken	Connect 24V to brake connector, check brake, check loom
			Brake signal failure	Brake signal failure	
3	Bad performance, weak steering		Worn Cylinder Piston Seals	Worn Cylinder Piston Seals	Replace Seals, or install new Cylinder.
			Worn hydraulic Pump	Worn hydraulic Pump	Replace Pump
4	Creeping Rudder		Leaking load Holding Valves	Leaking load Holding Valves	Valves to be adjusted
			Leaking Cylinder Piston Seal	Leaking Cylinder Piston Seal	Replace Seals, or install new Cylinder.
5	Grey / White oil		Water in oil	Water in oil	-Replace complete system -Replace Cooler kit. NB! To be discussed.
6	Unstable steering, temporary failures no alarms. Grey/White oil		Water in oil	Water in oil	-Replace complete system -Replace Cooler kit. NB! To be discussed.
7	No steering, no alarms, no fall back to backup from lower helm.		Sticking lock/bypass valve	Sticking lock/bypass valve	Water in oil, see pt. 5 - 6
			Motor stopped, see fault no.1	Motor stopped, see fault no.1	Change complete Motor.
			Sticking rely	N/A (Will cause alarm)	Change relay NB! Switch off circuit breaker for backup
8	No steering from Helm. Works fine from Pilot		Missing signal from helm	Missing signal from helm	Check green/red signal input led on PCB.
9	Alarm during Prt only		Valve coil broken	Valve coil broken	Check Coil resistance, to be 39,3Ω @20°C
			Connector failure or broken loom	Connector failure or broken loom	
10	Alarm during Stb only		Valve coil broken	Valve coil broken	Check Coil resistance, to be 39,3Ω @20°C
			Connector failure or loom failure	Connector failure or loom failure	
11	Alarm, both Prt and Stb		Servo valve coil broken	Servo valve coil broken	Check Coil resistance, to be 21,7Ω @20°C
				Lock Valve Coil Broken	Check Coil resistance, to be 39,3Ω @20°C
			Connector failure or loom failure	Connector failure or loom failure	
			Relay failure	Relay failure	

Fault Type	Fault Description	Version - MK1 / MK 2 (Possible Cause)	Version - MK3 (Possible Cause)	Check / Action / Comments
1	Motor stops immediately	Coil failure, servo valve	Coil failure, servo valve	Check Coil resistance, to be 21,7Ω @20°C
		Coil failure, directional valves	Coil failure, directional valves	Check Coil resistance, to be 39,3Ω @20°C
		Loom failure	Coil failure, lock valve	Check Coil resistance, to be 39,3Ω @20°C
			Motor starter relay failure	
			Loom failure	
			Low voltage	Alarms < 18V
2	System continue working for 2 minutes. Motor stops if alarm situation is still present after 2 minutes	Oil temperature	Oil temperature	-Check Oil temperature and cooling. -Check Sensor resistance, <130 Ω
		Motor temperature	Motor temperature	Check Switch (NC) Check Motor temp sticker.

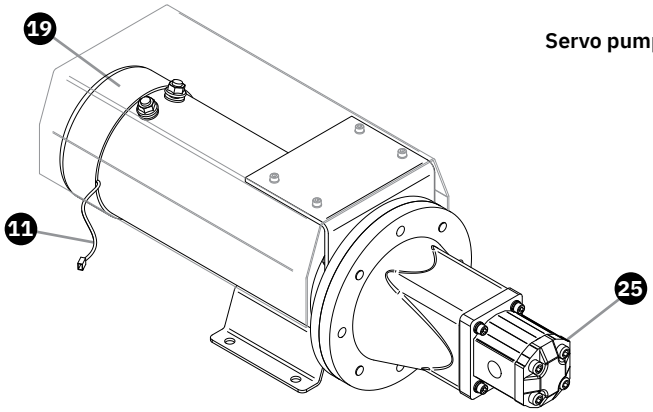
Item		ESPE600	ESPE700	ESPE1500
1	Filter element	74283	74283	74283
2	Complete filter	74091	74091	74091
3	Pressure switch	74310-KIT	74310-KIT	74310-KIT
4	Pressure gauge	74227	74227	74227
5	Cooler kit	74065-2	74065-2	74065-2
6	Coil servo/prop. value	74265	74265	74265
7	Coil dir. control values and lock/bypass value	74266	74266	74266
8	Value cartridge, directional control value	74263	74263	74263
9	Value cartridge, lock/bypass value	7462	7462	74262
10	Temp sensor tank	74231	74231	74231
11	Temp switch motor	74274	74274	74274
12	Sight glass/ level gauge	74320	74320	74320
13	O-rings tank cover	74219	74219	74219
14	Air filler value	74076	74076	74076
15	Tank pressure relief value	74223	74223	74223
16	O-rings oil filler plug	74216	74216	74216
17	Value cartridge, servo value	74260	74261	74261
18	Pump/ motor unit	74000	74000	74282
19	DC motor	74217-R-S *	74217-R-S *	74272-S
19.1	Brush kit	74369 **	74369 **	73996
19.2	Spring kit	-	-	73996-S
20	Cover for pump/ motor unit	74220A	74220A	74276
21	Motor starter relay	6 8877	6 8877	74278
22	ECU circuit board MK3	74294-600 ***	74294-700 ***	74294-1500 ***
22.1	ECU complete with harness MK3	74291-600 ***	74291-700 ***	74291-1500 ***
23	ECU complete with harness MK2 - MK3	74291-MK2-3-600 ****	74291-MK2-3-700 ****	74291-MK2-3-1500 ****
24	ECU complete with harness MK1 - MK3	74291-MK1-3-600 *****	-	-
25	Gear pump	74089	74089	74256
26	Helm insulation value	74303	74303	74303
27	Load holding values	74302	74302	74302

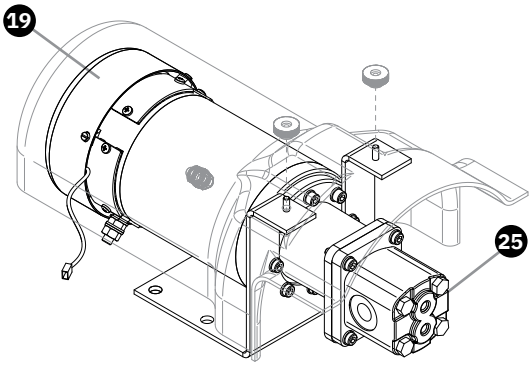
* New cover 74220A required when replacing motor without cooling fan
** For motor type with fan
*** For systems delivered after spring 2008.
**** Upgrade kit for systems delivered up to spring 2008. S/N and picture required.
***** Upgrade kit for systems delivered 2006/ early 2007. S/N and picture required.

System unit



Servo pump unit



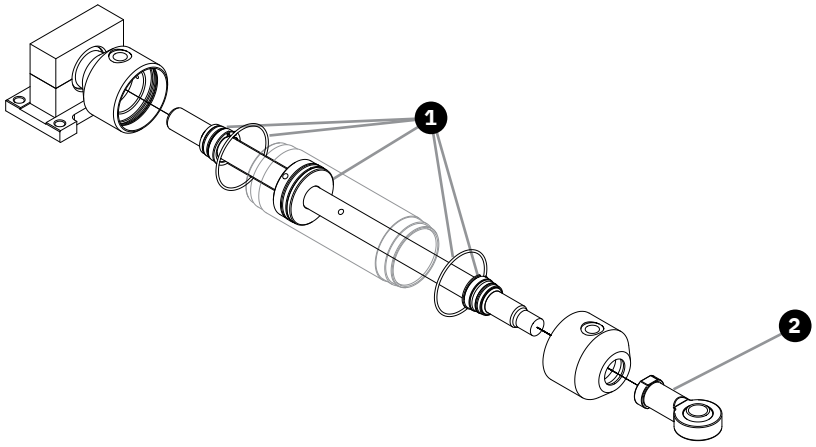


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Spare Parts

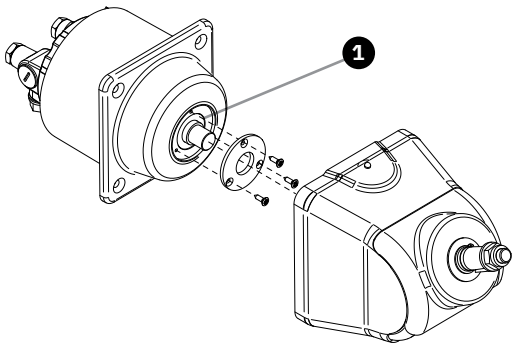
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Item		Steering cylinder 71140P190	Steering cylinder 71220P190	Steering cylinder 71220P220
1	Seal kit	75140	75220	75220
2	Rod end	73051	73051	73051



MG_0880

Item		Helm 74085	Helm 74087B
1	Shaft seal kit	74008	-



MG_0881

Sleipner Group Waste Disposal and Recycling Guide

MC_0848

Introduction:
At Sleipner Group, we prioritize sustainability and encourage the repair and re-manufacturing of products to extend their life cycles. If disposal is necessary, please follow these guidelines to recycle and manage waste responsibly, ensuring our efforts align with environmental protection efforts.

Electric Motors and Electronics:
- Disconnect from any power sources and dismantle them carefully.
- Recycle components through certified e-waste recycling centers that can adequately handle and recover electronic materials.
- Dispose of any non-recyclable electronic parts according to local environmental regulations.

Metals:
- Collect and sort metal parts for recycling as scrap metal.
- To increase recycling efficiency, ensure that metals are clean and free from non-metal attachments.

Plastics:
- Identify recyclable plastics based on local recycling guidelines.
- Remove any non-plastic components and clean them before recycling to improve the quality of the recycled material.

Hazardous Materials:
- Correctly identify any hazardous substances within components, such as batteries or capacitors etc.
- Follow local regulations for the safe disposal of hazardous materials to prevent pollution and protect environmental health.

General Disposal Instructions:
- Consult local recycling programs to determine the acceptability of various materials.
- Use authorized disposal services to ensure compliance with environmental standards.

Safe Disposal Practices:
- Adhere to local laws and regulations for waste management to minimize environmental impact and ensure community safety.

This guide is designed to help reduce our products' environmental footprint through responsible end-of-life management. Please contact your local waste management supplier or our support team for more specific disposal information or further assistance.

Service and support

MC_0024

Find your local professional dealer from our certified worldwide network for expert service and support. visit our website www.sleipnergroup.com/support

Product spare parts and additional resources

MC_0024

For additional supporting documentation, we advise you to visit our website www.sleipnergroup.com and find your Sleipner product.

Warranty statement

MC_0024

1. Sleipner Motor AS (The “Warrantor”) warrants that the equipment (parts, materials, and embedded software of products) manufactured by the Warrantor is free from defects in workmanship and materials for purpose for which the equipment is intended and under normal use and maintenance service (the “Warranty”).
2. This Warranty is in effect for two years (Leisure Use) or one year (Commercial and other Non-leisure Use) from the date of delivery/purchase by the end user, with the following exceptions;
   (a) For demonstration vessels, or vessels kept on the water, the dealer is considered as the end user from 6 months after their launch of the vessel;
   (b) The warranty period starts no later than 18 months after the first launch of the vessel.
   Please note that the boat manufacturer and dealer must pay particular attention to correct maintenance and service both by the products manuals as well as general good practice for the location the boat is kept in the period the boat is in their care. In cases where the 6 and 18 months grace periods for boat builders and dealers are passed, it is possible to obtain a full warranty upon inspection and approval of the warrantor or such representative.
3. Certain parts, classified as wearable or service parts, are not covered by the warranty. A failure to follow the required maintenance and service work as described in the product manual render all warranty on parts or components directly or indirectly affected by this void. Please also note that for some parts, time is also a factor separately from actual operational hours.
4. This Warranty is transferable and covers the equipment for the specified warranty period.
5. The warranty does not apply to defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically designed as waterproof.
6. In case the equipment seems to be defective, the warranty holder (the “Claimant”) must do the following to make a claim:
   (a) Contact the dealer or service centre where the equipment was purchased and make the claim. Alternatively, the Claimant can make the claim to a dealer or service centre found at www.sleipnergroup.com. The Claimant must present a detailed written statement of the nature and circumstances of the defect, to the best of the Claimant’s knowledge, including product identification and serial nbr., the date and place of purchase and the name and address of the installer. Proof of purchase date should be included with the claim, to verify that the warranty period has not expired;
   (b) Make the equipment available for troubleshooting and repair, with direct and workable access, including dismantling of furnishings or similar, if any, either at the premises of the Warrantor or an authorised service representative approved by the Warrantor. Equipment can only be returned to the Warrantor or an authorised service representative for repair following a pre-approval by the Warrantor’s Help Desk and if so, with the Return Authorisation Number visible postage/shipping prepaid and at the expense of the Claimant.
7. Examination and handling of the warranty claim:
   (a) If upon the Warrantor’s or authorised service Representative’s examination, the defect is determined to result from defective material or workmanship in the warranty period, the equipment will be repaired or replaced at the Warrantor’s option without charge, and returned to the Purchaser at the Warrantor’s expense. If, on the other hand, the claim is determined to result from circumstances such as described in section 4 above or a result of wear and tear exceeding that for which the equipment is intended (e.g. commercial use of equipment intended for leisure use), the costs for the troubleshooting and repair shall be borne by the Claimant;
   (b) No refund of the purchase price will be granted to the Claimant, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. In the event that attempts to remedy the defect have failed, the Claimant may claim a refund of the purchase price, provided that the Claimant submits a statement in writing from a professional boating equipment supplier that the installation instructions of the Installation and Operation Manual have been complied with and that the defect remains.
8. Warranty service shall be performed only by the Warrantor, or an authorised service representative, and any attempt to remedy the defect by anyone else shall render this warranty void.
9. No other warranty is given beyond those described above, implied or otherwise, including any implied warranty of merchantability, fitness for a particular purpose other than the purpose for which the equipment is intended, and any other obligations on the part of the Warrantor or its employees and representatives.
10. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives based on this Warranty for injury to any person or persons, or damage to property, loss of income or profit, or any other incidental, consequential or resulting damage or cost claimed to have been incurred through the use or sale of the equipment, including any possible failure or malfunction of the equipment or damages arising from collision with other vessels or objects.
11. This warranty gives you specific legal rights, and you may also have other rights which vary from country to country.

Patents

MC_0024

At Sleipner we continually reinvest to develop and offer the latest technology in marine advancements. To see the many unique designs we have patented, visit our website www.sleipnergroup.com/patents

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