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User Manual

Including Installation Guide for Thruster Monitoring Unit, TMU-1

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DATE: 2025
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UM

Contents

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.

Sleipner Motor AS
P.O. Box 519, Arne Svendsensgt. 6-8
N-1612 Fredrikstad, Norway

MC_0451

Product Description

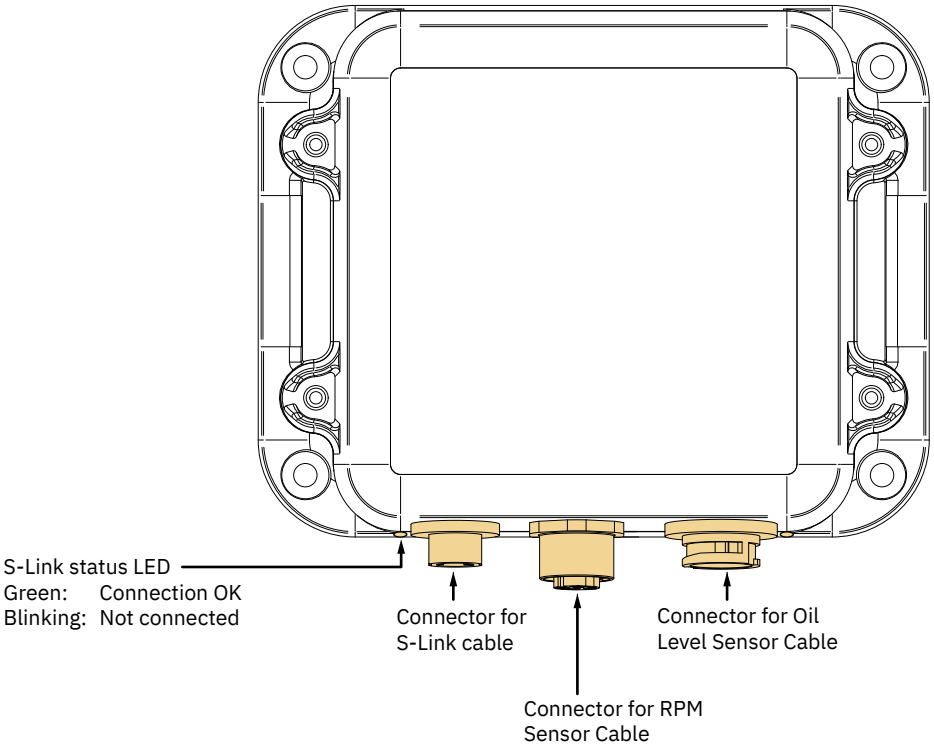
MC_0434

The Thruster Monitoring Unit (TMU-1) makes RPM of the thruster motor and gearleg low oil level alarm available on the S-Link bus. This requires a thruster motor with RPM sensor installed and Sleipner Oil tank kit supporting TMU-1.

Different TMU-1 product variants are available for interfacing motors with different RPM sensors. Both product variants are delivered with Oil Level Sensor Cable and RPM Sensor Cable.

Product	Oil Level Sensor Cable	RPM Sensor Cable	Comment
TMU-1-SAC	Cable length 5m	Cable length 5m M23 connector	For AC thrusters
TMU-1-SH	Cable length 5m	Cable length 5m Deutsch DT connector	For hydraulic motor

Layout & Functions



MG_0491

TMU-1 Technical Specification

MC_0450

Parameter	Specification		
Supply Voltage	Min 9VDC	Typical 12V/24V	Max 31VDC
Rated max input power	< 1W		
Operating temperature	-20°C to +70°C		
IP rating	IP66		
Weight	150g		
Size	121x96x43mm (WxLxH)		

The following parameters can be configured for TMU-1:
- Location
- Oil Level Sensor
- Speed Sensor
- Pulse Per Revolution

Location
TMU-1 can report data from 4 thruster locations.

Location	Description
Bow	Represents bow thruster or bow thruster on port side if two bow thrusters are installed.
Stern	Represent stern thruster or stern thruster on port side if two stern thrusters are installed.
Bow Starboard	Represents bow thruster on starboard side.
Stern Starboard	Represents stern thruster on starboard side.

Location should be configured to match the physical location of the thruster which the TMU-1 is connected to.

Default value for Location is Bow.

Oil Level Sensor
Some thrusters have the option of connecting an external oil tank to the gear leg. To monitor the oil level in the gear leg an oil tank with a level switch could be used. The level switch is normally closed and would open if the oil level in the tank goes beyond a certain level. To monitor the oil level and generate a low-level alarm the switch must be connected to the TMU-1. This parameter is used to disable or enable monitoring of the oil tank level switch.

Oil Level Sensor	Description
Enable	The TMU-1 monitors if the switch is closed or open and generates an alarm if the switch is open.
Disable	The TMU-1 does not monitor if the switch is closed or open. No alarm based on Oil Level Switch status is generated.

Default value for Oil Level Sensor is Enable.

Speed Sensor
This parameter is used to disable or enable RPM measurement.

Speed Sensor	Description
Enable	Measured RPM is reported on the S-Link bus.
Disable	RPM measurement is not reported on the S-Link bus.

Default value for Speed Sensor is Enable.

Speed Sensor Resolution
By connecting the TMU-1 to a speed sensor on the motor it is possible to share actual measured speed on the S-Link bus. Either for displaying in control panel or for logging in a Voyage Data Recorder system. Since different speed sensors have different number of pulses per revolution, the resolution must be configured in TMU-1 for each installed instance. Typical Speed Sensor Resolution for sensors on AC thrusters is 1024.

Speed Sensor Resolution	Description
Pulse per revolution	Configure by inputting a number in the range 1 to 5000

Default value for Speed Sensor Resolution is 1024.

Speed Sensor Resolution for applicable thruster models delivered by Sleipner is listed in below table. Consult your documentation to identify correct thruster model.

Thruster model	Pulses per revolution	Motor brand
SHx/x-BA32-S	38	Rexroth
SHx/x-BA40-S	35	Parker
SHx/x-BA45-S	47	Rexroth
SHx/x-BA56-S	47	Rexroth
SHx/x-BA60-S	35	Parker
SHx/x-BA80-S	35	Parker
SHx/x-BA90-S	35	Parker
SHx/x-BA110-S	35	Parker
SHx/x-BA125-S	35	Parker
SHx/x-BA150-S	40	Parker
SHx/x-BA160-S	67	Rexroth
SHx/x-BA180-S	67	Rexroth
SACx/x-x-x-x	1024	Sleipner

Speed Sensor Direction
This parameter is used to swap the sign of the reported RPM.

Speed Sensor Direction	Description
Normal	Sign of reported RPM follows sensor reading. Should be used if starboard direction results in positive RPM readings and negative RPM readings for port direction.
Swapped	Swap the sign of the reported RPM. Should be used if the Normal setting does not give positive RPM readings for starboard direction and negative RPM readings for port direction.

Default value for Speed Sensor Direction is Normal.

S-Link Fault Codes

MC_0472

Fault situations in S-Link compliant products generates Fault Codes which are broadcasted on the S-Link bus. If a control panel receives a Fault Code, it will trigger an alarm in the control panel and the user will be able to get information about which product that reports the fault and the reason for the fault. Please see the user manual of your S-Link compliant control panel for more information on how to access Fault Code information in case of an alarm situation.

All Sleipner S-Link compliant products have product specific Fault Codes. For legacy reasons some control panels display Generic Fault Codes for certain products.

Fault Code Navigator

MC_0974

Scan the QR code below to access Sleipner's Fault Code Navigator. Fault codes can be entered in the Fault Code Navigator to receive fault description and guidance on resolving the issue.

A complete list of fault codes and troubleshooting tips can also be downloaded.

www.sleipnergroup.com/support/fault-code-navigator

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Installation Guide

Responsibility of the installer

MC_0038

General:

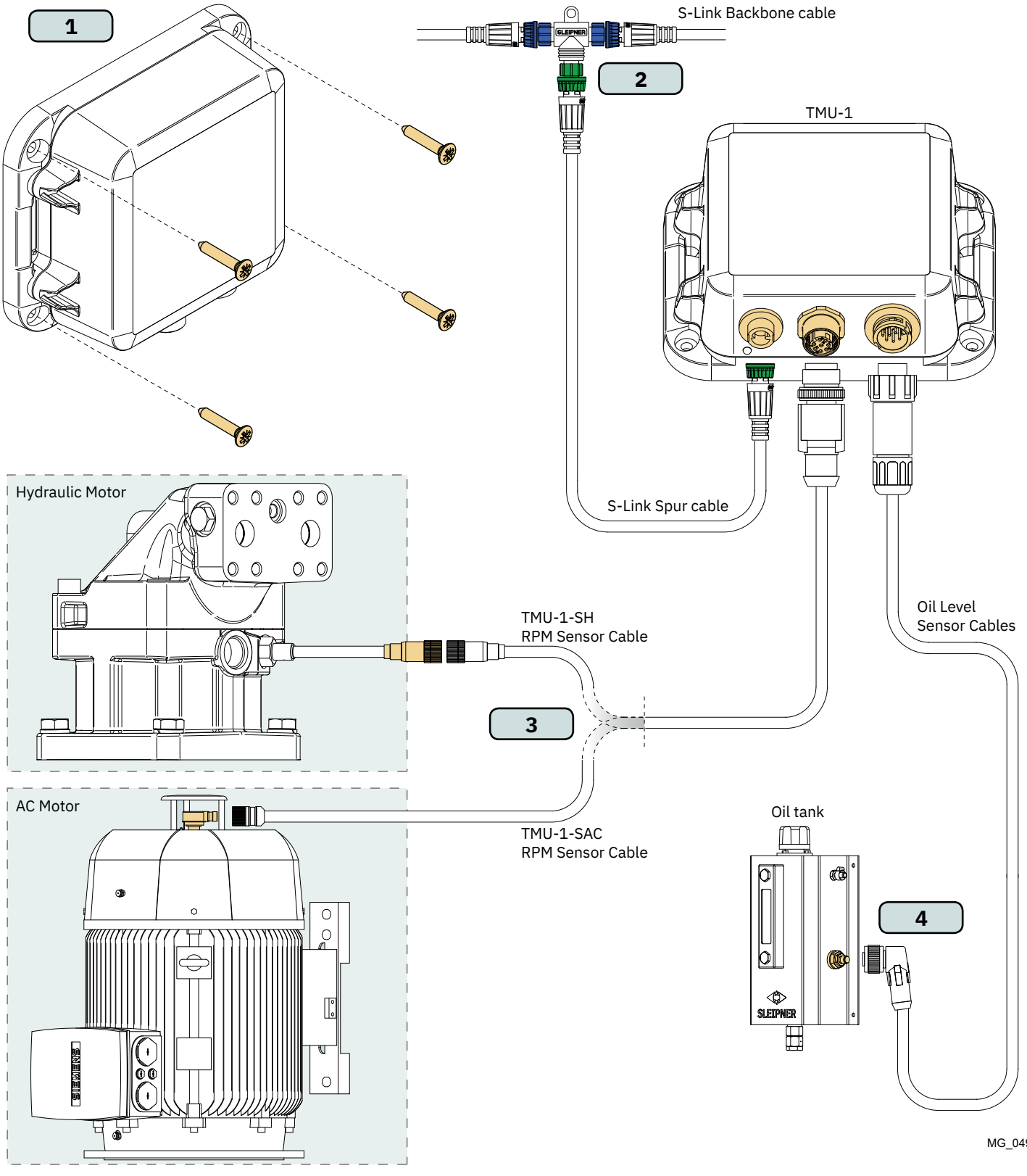
- The installer must read this document to ensure necessary familiarity with the product before installation.
- Directions outlined in this document cannot be guaranteed to comply with all international and national regulations, including but not limited to health and safety procedures. It is the installers responsibility to adhere to all applicable international and national regulations when installing Sleipner products.
- This document contains general installation guidelines intended to support experienced installers. Contact professional installers familiar with the vessel, Sleipner products and applicable regulations if assistance is required.
- If local regulation requires any electrical work to be performed by a licensed professional, seek a licensed professional.
- When planning the installation of Sleipner products, ensure easy access to the products for future service and inspection requirements.

For Sleipner S-Link™ systems:

MC_0105

- When installing an S-Link™ system, connect ONLY original Sleipner S-Link™ products or other authorized control equipment directly to the S-Link™ bus. When connecting non-authorized third-party equipment, it must always be connected through a Sleipner-supplied interface product.
- Any attempt to directly control or connect to the S-Link™ control system without a designated and approved interface from Sleipner will void all warranties and responsibilities of the connected Sleipner products. If you interface the S-Link™ bus by agreement with Sleipner through a designated Sleipner-supplied interface, you are still required to install at least one original Sleipner control panel to enable efficient troubleshooting if necessary.

1. Screw the box to a solid surface.
2. Connected S-Link SPUR Cable between TMU-1 and a T-connector on the S-Link BACKBONE Cable. See S-Link System Description chapter for detailed information.
3. Connect RPM Sensor Cable between TMU1- and RPM sensor on motor.
4. Connect Oil Level Sensor Cable between TMU-1 and oil tank.
5. Configure TMU-1. See PJC4xx User Manual for configuration instructions.



S-Link system description

MC_0120

S-Link is a CAN-based control system used for communication between Sleipner products installed on a vessel. The system uses BACKBONE Cables as a common power and communication bus with separate SPUR Cables to each connected unit. Only one S-Link POWER cable shall be connected to the BACKBONE Cable. Units with low power consumption are powered directly from the S-Link bus.

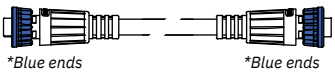
Main advantages of S-Link system:
- Compact and waterproof plugs.
- BACKBONE and SPUR Cables have different colour coding and keying to ensure correct and easy installation. BACKBONE Cables have blue connectors and SPUR Cables have green connectors.
- Different cable lengths and BACKBONE Extenders make the system scalable and flexible to install.

Installation of S-Link cables:
Select appropriate cables to keep the length of BACKBONE- and SPUR Cables to a minimum. In case of planned installation with total BACKBONE Cable length exceeding 100 meters please consult your local distributor. The S-Link cables should be properly fastened when installed to avoid sharp bend radius, cable chafing and undesired strain on connectors. Locking mechanism on connectors must be fully closed. To ensure long lifetime, cables, T-Connectors and Extenders should not be located so that they are permanently immersed in water or other fluids. It is recommended to install cables in such a way that water and condensation do not flow along the cables into the connectors. This can be done for example by introducing a u-shape bend before the cable enters the product connector.

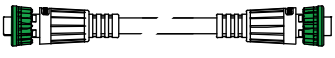
Ideally, the POWER Cable should be connected to the middle of the BACKBONE bus to ensure an equal voltage drop at both ends of the BACKBONE Cable. The yellow and black wire in the POWER Cable shall be connected to GND and the red wire connected to +12VDC or +24VDC.

To reduce the risk of interference, avoid routing the S-Link cables close to equipment such as radio transmitters, antennas or high voltage cables. The backbone must be terminated at each end with the END Terminator.

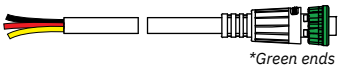
SPUR cables can be left unterminated to prepare for the installation of future additional equipment. In such cases, ensure to protect open connectors from water and moisture to avoid corrosion in the connectors.



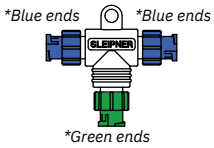
BACKBONE Cable
Forms the communication and power bus throughout a vessel. Available in different standard lengths.



SPUR Cable
Used to connect S-Link compliant products to the backbone cable. One SPUR Cable must be used for each connected component, with no exceptions. Recommended to be as short as practically possible. Available in different standard lengths.

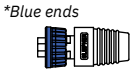


POWER Cable
Required in all installations for connection of BACKBONE Cable to a power supply and should be protected with a 2A fuse.

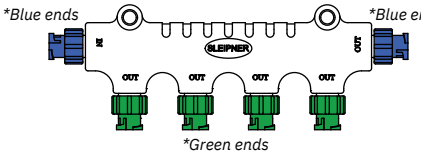


T-Connector
Used for connection of SPUR or POWER Cable to the BACKBONE Cable. One T-Connector for each connected cable.

BACKBONE Extender
Connects two BACKBONE Cables to extend the length.

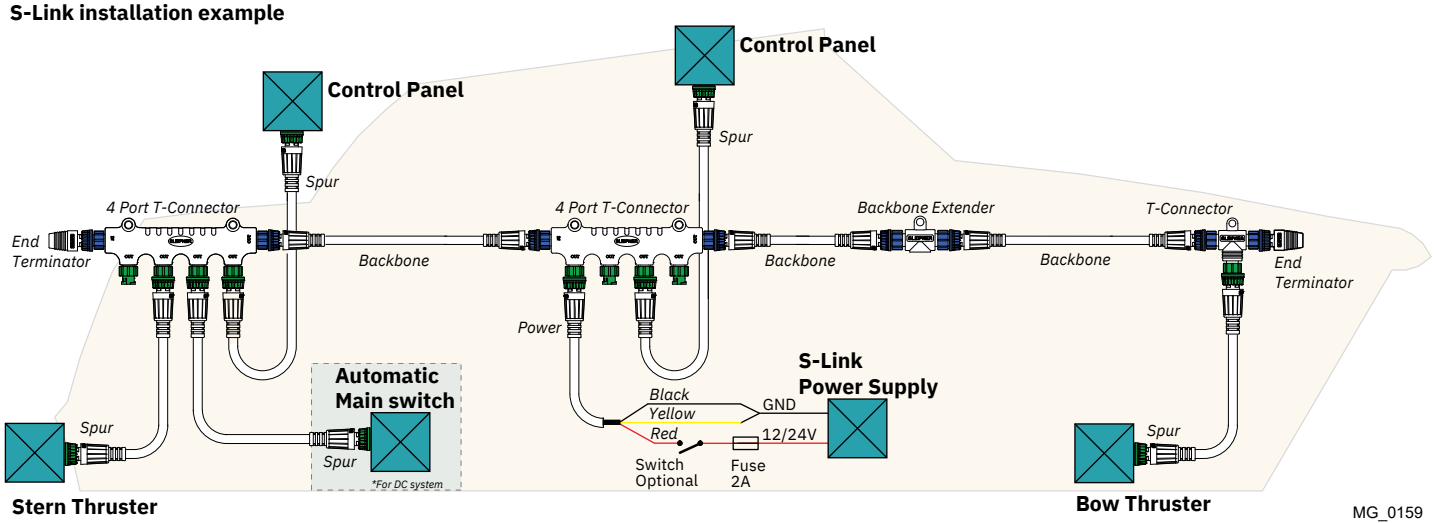


END Terminator
Must be one at each end of the BACKBONE bus.



4-Port T-Connector
The 4-PORT T-connector allows multiple SPUR Cables to be connected. The 4-PORT T-connector comes with two sealing caps to protect unused ports.

S-Link installation example



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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

CE Declaration of conformity (DoC)

We, The Manufacturer:	**Sleipner Motor AS** Arne Svendsens gate 6-8, NO 1612 Fredrikstad, Norway
With ISO 9001 certificate:	1484-2007-AQ-NOR-NA, issued by DNV-GL
Declare that the product: **Product Description:** Thruster Monitoring Unit **Model Numbers:** TMU-1-SAC Thruster Monitoring Unit for SAC TMU-1-SH Thruster Monitoring Unit for hydraulic motor	
Subject to installation, maintenance and use conforming to their intended purpose, is in conformity with the provisions of the following EU Directives: • Electromagnetic Compatibility (EMC) - Directive 2014/30/EU • Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) - Directive 2011/65/EC	
The product is designed to meet the standards and criteria outlined in:	**EMC** IEC 60533:2015 **RoHS** EN 63000:2018

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.

Fredrikstad, 8th of February 2022

Ronny Skauen, President and CEO

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UK Declaration of conformity (DoC)

We, The Manufacturer:	**Sleipner Motor AS** Arne Svendsens gate 6-8, NO 1612 Fredrikstad, Norway
With ISO 9001 certificate:	1484-2007-AQ-NOR-NA, issued by DNV-GL
Declare that the product: **Product Description:** Thruster Monitoring Unit **Model Numbers:** TMU-1-SAC Thruster Monitoring Unit for SAC TMU-1-SH Thruster Monitoring Unit for hydraulic motor	
Subject to installation, maintenance and use conforming to their intended purpose, is in conformity with the provisions of the following UK Regulations: • Radio Equipment Regulations 2017 • The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations - 2012	
The product is tested to meet the standards and criteria outlined in:	**EMC** IEC 60533:2015 **RoHS** EN 63000:2018

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.

Fredrikstad, 8th of February 2022

Ronny Skauen, President and CEO

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Learn more about our products at www.sleipnergroup.com

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MC_0030