



User Manual

Rev. 0

24-Nov-'16

MANUFACTURER:

SEPRO TECHNOLOGY AS

CUSTOMER:

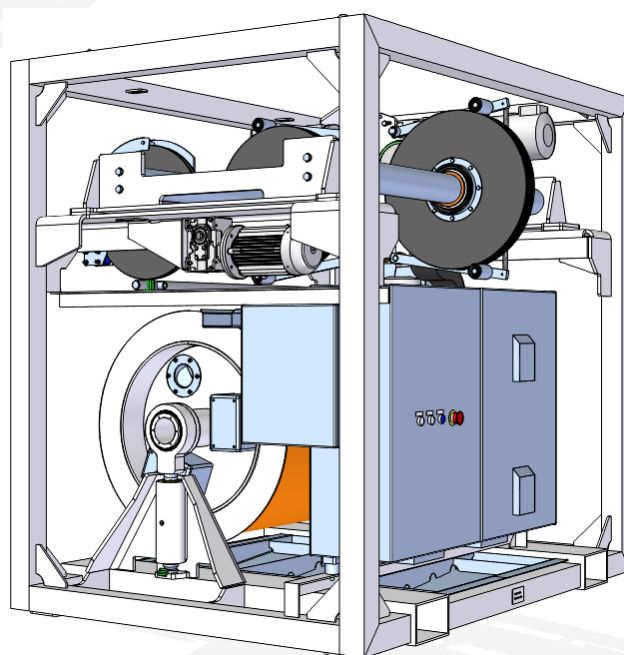
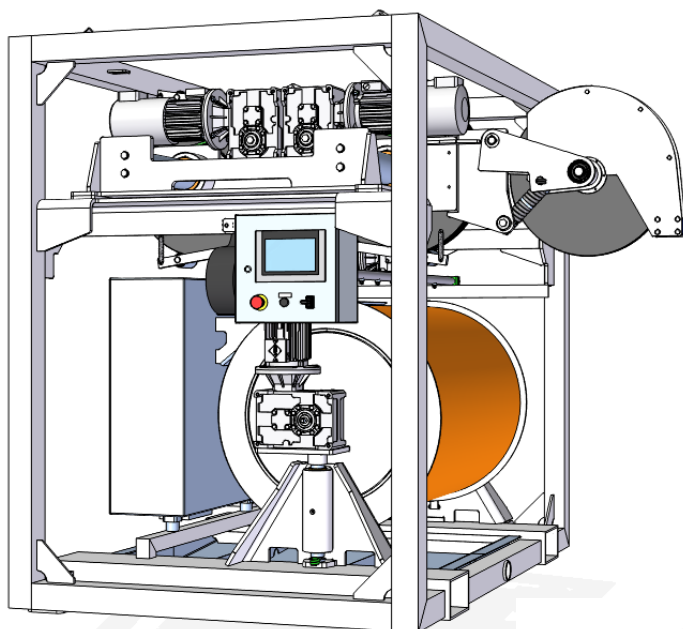
MODUS

PRODUCT KEY:

OE-2000-A3-4-7-2-FS-NZ-003

SERIAL NO.

SHG-000973



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Sepro Technology AS
Strandgata 151
4307 Sandnes
Norway

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Extreme care should be exercised when operating or servicing this equipment. It should be operated or serviced only by qualified personnel with knowledge and training in the handling and maintenance of mechanical, hydraulic and electrical equipment.

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End User

Sepro Technology is constantly working to provide the best service to our customers. Therefore we kindly ask you to fill out a copy of this sheet and mail it to us. In the event that Sepro Technology has to reach the specific user with product information it is important that we have the latest contact information.

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Address: _____

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Please mail or E-Mail current contact information.

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Documentation

The final documentation delivered with this machinery is ordered in three binders: User Manual, Systems Documentation, and the Manufacturers Record Book. The winch is a complex machine composed of multiple independent systems that combine and function together as a larger and more complex system.

The purpose of the User Manual is to inform the user of the safe and proper use of the winch and serve as a resource for relevant information regarding the winch's functions and capacities.

The Systems Documentation Manual provides descriptions of the different mechanical systems in the form of text, illustrations, and data. It provides a detailed inventory of the systems and parts of the winch for reference purposes.

The Manufacturers Record Book is a compilation of technical information regarding the off-site fabrication of the machine. The extent of the documentation included depends on the work performed and may include: material certificates and test reports, weld records, non-destructive test results, and heat treatment information. The results from the Factory Acceptance Test are also to be found here.

Digital versions of the User Manual, Systems Documentation, and the Manufacturers Record Book are provided on a USB flash drive.

Abbreviations, Acronyms & Terms

E-Stop	Emergency Stop
JB	Junction Box
LCP	Local Control Panel
PLC	Programmable Logic Controller
RCU	Radio Control Unit
VSD	Variable Speed Drive
Winch	Traction Winch

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Revisions

The first issue of any onboard documentation will be known as **Rev. 0** (Revision 0). The Revision status includes the date it is issued and is found on the cover page and in the header, e.g., *Rev. 3 - 17-08-2016*. Any changes thereafter to the document will result in an issue of the complete revised document and the revision number will change in ascending order.

The revision log will include the location and a short description of the changes.

Within the body of the document new text will be preceded by the relevant revision number and will be indicated by a red vertical line in the left margin. The revision date is not shown and the obsolete text is omitted.

Example:

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Maecenas porttitor congue massa.

Rev. 1

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Ut nonummy. Fusce aliquet pede non pede. Suspendisse dapibus lorem pellentesque magna. Integer nulla.

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Manufacturer's Data Plate



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1 Safety

1.1 Precautionary Statements

Read this section before operating the Moonpool LARS.

Some of the safety messages in this section are defined by one of the following warning labels that inform the user of the severity of the hazard associated with the described condition. In addition, these warning labels will be found throughout this document in conjunction with operational procedures and descriptions of other conditions that have associated hazards. It is essential that all personnel associated with the operation and maintenance of this equipment read and understand the Safety section.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Indicates a situation that constitutes unsafe practices and could result in varying degrees of property damage.

1.2 Emergency Stops

An emergency is an immediately hazardous situation that needs to be stopped or averted quickly in order to prevent injury or equipment damage.

The Emergency Stop is a function that is intended to avert actual or impending danger.

All personnel shall be informed where the E-Stops are located.

Functional Description:

- Operation procedures can always be stopped from the following locations:
 - Local Control Panel
 - Radio Control Unit
 - Control Compartment Door
- Operation is only possible when all E-Stop buttons are disengaged from the stop command position and the blue E-Stop Reset button is **NOT ILLUMINATED**.
- When an E-Stop button is pressed the current operating mode is disabled and the Fail Safe Brakes will be engaged. Pay-in and Pay-out functions are disabled.
- When an E-Stop button is pressed it is automatically engaged in the stop command position.
- When an E-Stop button is pressed a corresponding message will be displayed in the message field at the top of the HMI touchscreen.

1.2.1 Emergency Stop Reset

Procedure:



1. **Before the system is reset the operator shall verify there are no personnel in the winch operating area.**
2. The E-Stop buttons must be disengaged from the stop command position by turning it in the direction indicated by the arrow. Disengaging the button does not restart the system but only permits restarting.
3. If the E-Stop is used during an Emergency Steering Procedure, the Emergency Steering selector switch must be returned to the normal operating position before pressing the E-Stop Reset button.
4. If the E-Stop is used during a Recovery Procedure, the Brake Bypass switch must be returned to the normal operating position before pressing the E-Stop Reset button.
5. Press the illuminated blue E-Stop Reset button on the Control Compartment door. The E-Stop Reset button will automatically be extinguished.
6. When the system is energized by pushing the main circuit breakers to the 'On' position the E-Stop Reset button must be pressed. After energizing the system wait approximately 30 seconds before pressing the reset button.

RCU Procedure:

1. See 1. above
2. The E-Stop button must be disengaged from the stop command position by turning it in the direction indicated by the arrow.
3. Connect to the Base Unit. Refer to section 9.5 Connect To Base Unit.
4. Press the illuminated blue E-Stop Reset button on the Control Compartment door.

1.2.2 Emergency Stop Overview



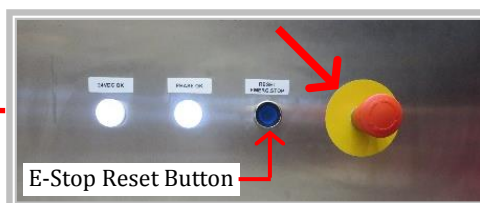
Local Control Panel, LCP



Radio Control Unit, RCU



Control Compartment Door



E-Stop Reset Button

1.3 Normal Operations

Material Safety

Refer to the Material Safety Data Sheets for information regarding the safe use and disposal of the products recommended by the manufacturer for the use and maintenance of the winch.

Personal Protective Equipment (PPE)

Operating the winch or working near a winch is a hazardous environment. Adhere to the vessel's safety measures regarding personal protective equipment.

Operator

Use a trained operator familiar with winch operations. The operator should read and understand this manual before operating the winch.



WARNING

The many moving parts of the winch constitute crushing hazards.

1.4 Ready For Operation

The term Ready For Operation is used to describe the following condition of the winch:

- All equipment has been maintained according to their respective user manuals.
- The winch is energized at the Power Supply Compartment.
- There are no active alarms or Emergency Stops and the E-Stop Reset button is not illuminated.

1.5 Maintenance

- Only qualified electricians should maintain or perform repairs to the electrical systems.
- Only qualified mechanics should maintain or perform repairs to the mechanical systems.

WARNING

- Mechanical and electrical modifications may only be made with the prior written consent of SEPRO A/S. Unauthorized modifications will unconditionally void the warranty and SEPRO A/S disclaims responsibility for the functionality and safety of the equipment, as it may no longer comply with the applicable directives and / or design standards.
- Do not make repairs while the winch is in operation.
- Electrical maintenance and repairs shall only be performed with the power disconnected at the circuit breakers in the Power Supply Compartment or otherwise isolated from the electrical power supply.
- Electrical maintenance and repairs shall only be performed with the UPS breaker switch in the position shown in the illustration below.



UPS breaker switch in Maintenance position

- The owner assumes responsibility for implementing procedures necessary to safely perform the tasks found in the Maintenance section.

2 Restrictions

WARNING

2.1 Intended Use

The winch must not be used for any purpose other than that stipulated in this and other related documentation.

2.2 Operating Limits

The winch must not be subjected to loads or functional demands exceeding those stipulated in this and other related documentation.

2.3 Operator Requirements

The operator must read and understand the Operation section thoroughly before assuming control. SH Group offers a training program if this is needed. Refer to the Contact Information at the front of this document.

2.4 Personnel Requirements

Personnel responsible for maintaining the winch must read and understand section 1 Safety.

3 Lifting



A wire rope, 4 leg symmetric bridle sling with a master link is provided for lifting.

The design of the lifting set meets or exceeds the requirements set forth by the DNV Standard for certification No. 2.7-1 and the ILO Code of Practice, Safety and Health in Ports.

The image is for illustrative purposes only.

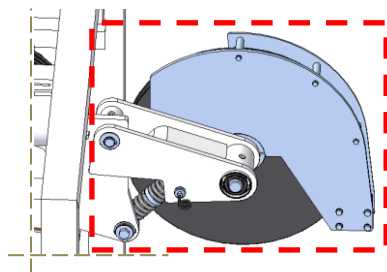
3.1 Operational Procedure



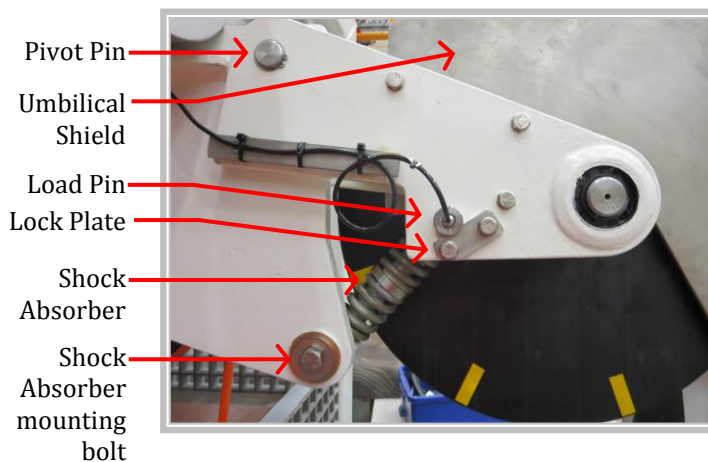
WARNING

Adhere to the procedures in the following section.

- To prevent damage to the Pivot Sheave it is recommended to remove it before lifting.
- #### 3.1.1 Removing the Pivot Sheave



Pivot Sheave Assembly



Procedure:

- The assembly weighs approx. 75 kg. Support the assembly to prevent uncontrolled movement during the procedure.
- Thread the umbilical through the shield and secure it to the LW.
- Remove the lock plate at the Load Pin and withdraw the Load Pin. The assembly is free to rotate about the Pivot Pin.
- Clip the plastic ties that secure the data cable from the assembly and secure the Load Pin and data cable to the LW.
- Secure the Shock Absorber to the winch to LW.
- Remove a single Circlip from the Pivot Pin and withdraw the pin. The assembly is now unattached to the LW.

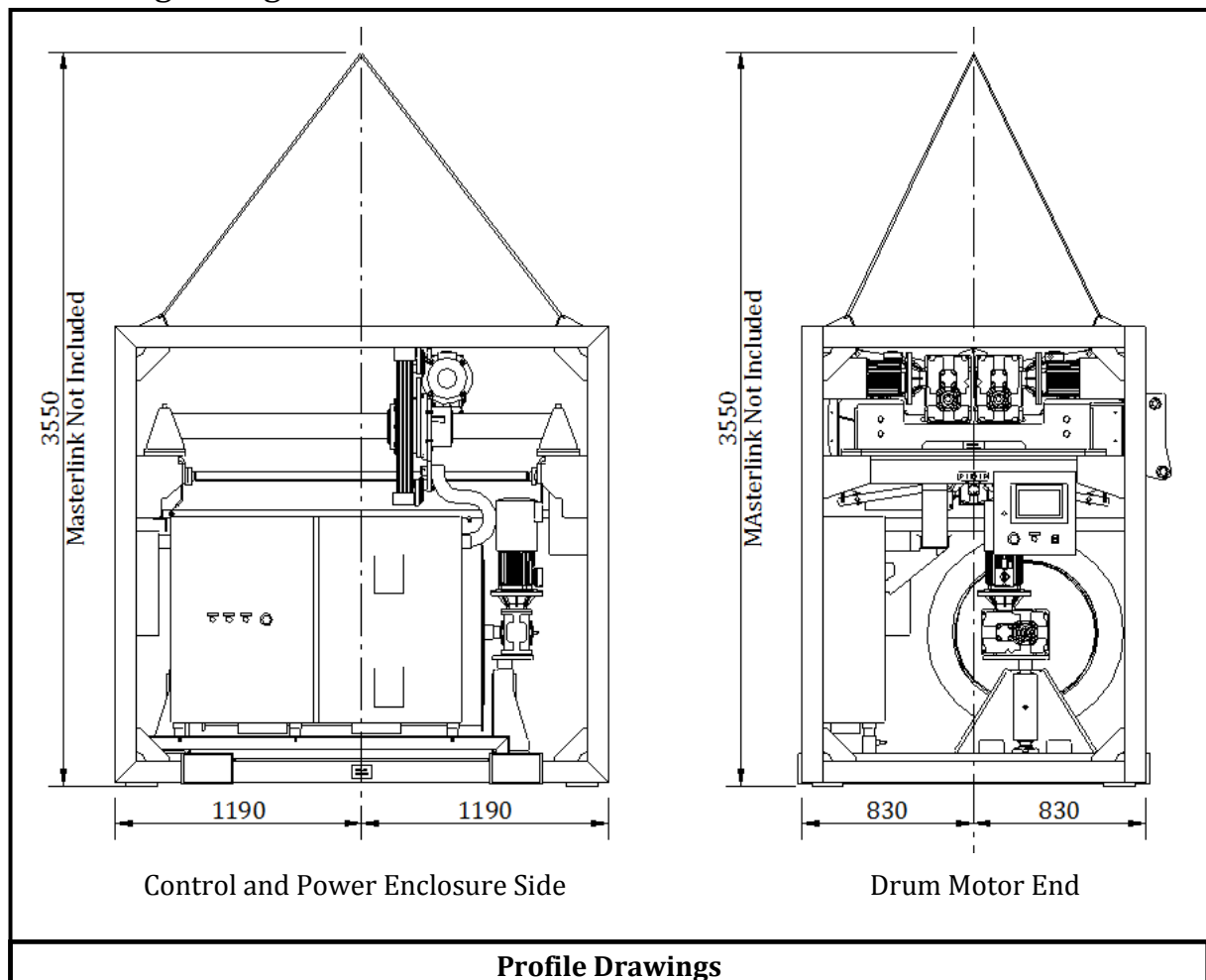
Operational Procedure Continued

- Use only the certified lifting set provided with the winch.
- Only the 4 lifting points shown on the illustration may be used for lifting the winch.
- Remove or fasten securely all loose items to prevent snagging during the lift.

3.1.2 Lifting Lugs



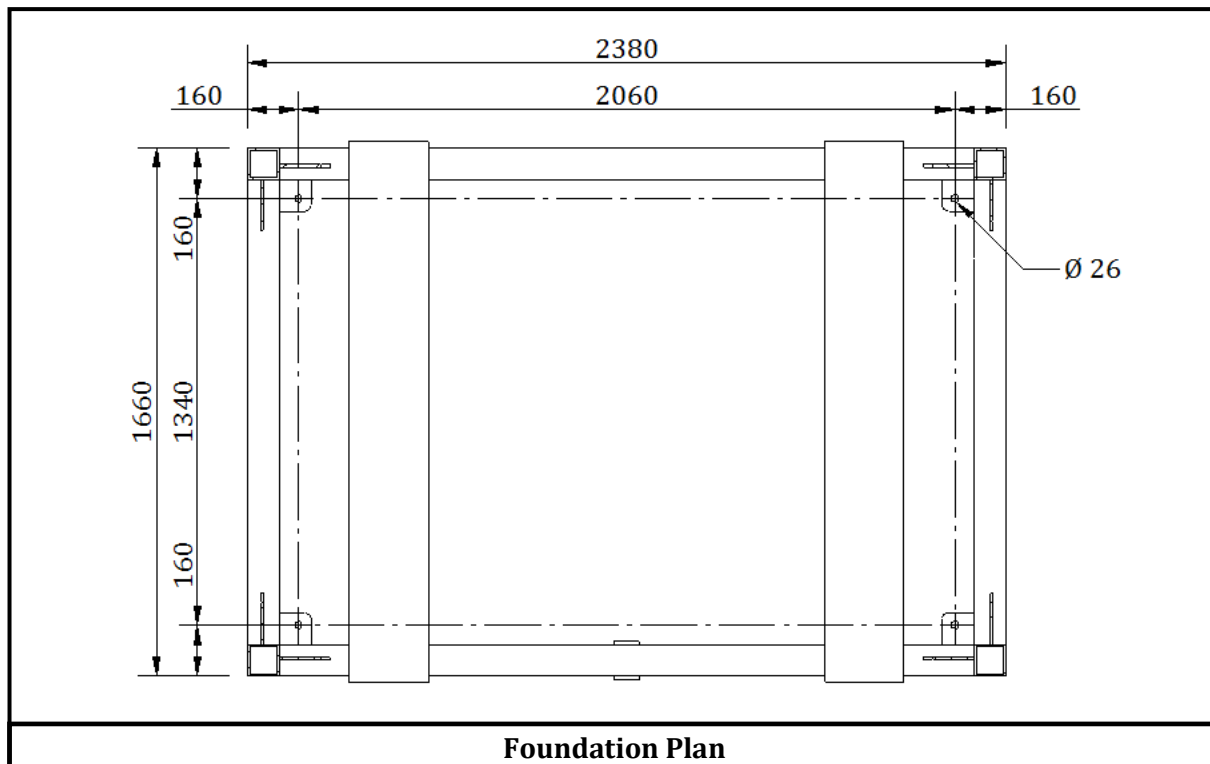
3.2 Lifting Configuration



4 Installation

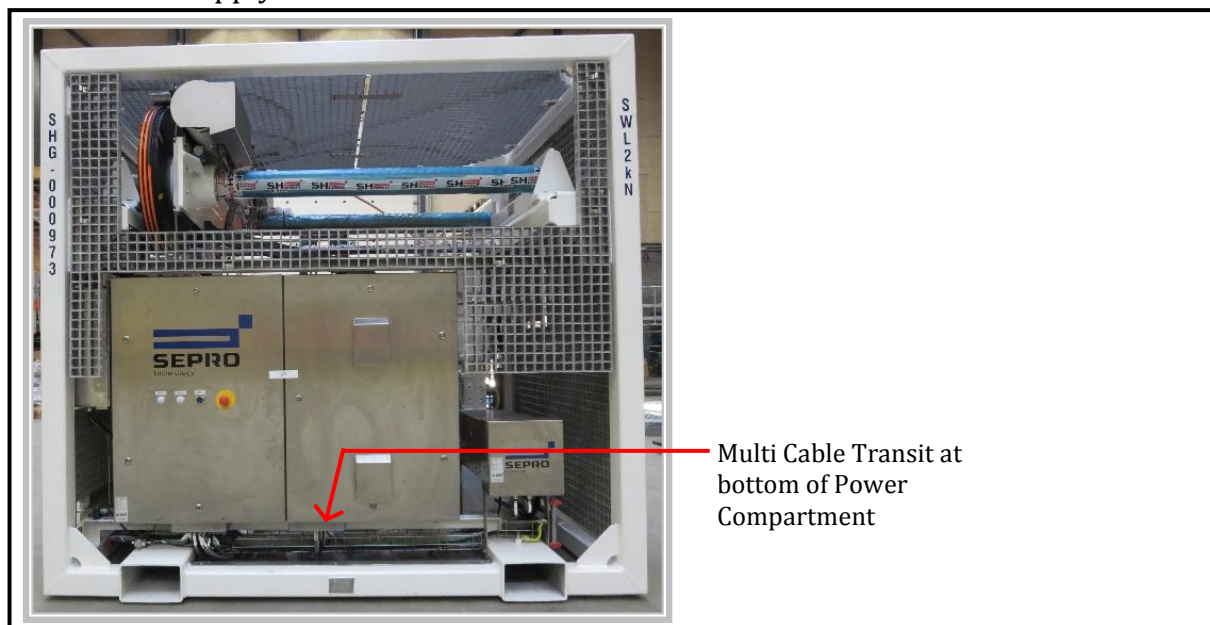
4.1 Foundation Plan

The winch is designed for a bolt connection mechanical interface. The bottom frame of the winch is provided with 4 bolt plates and each plate has a \varnothing 26mm through hole as shown below. Use M24 FZV 10.9 bolt, nut, and washer set, and tighten to 650Nm. If fastening directly into a threaded foundation, minimum thread engagement shall be 20 mm.



4.2 External Connections

4.2.1 Power Supply



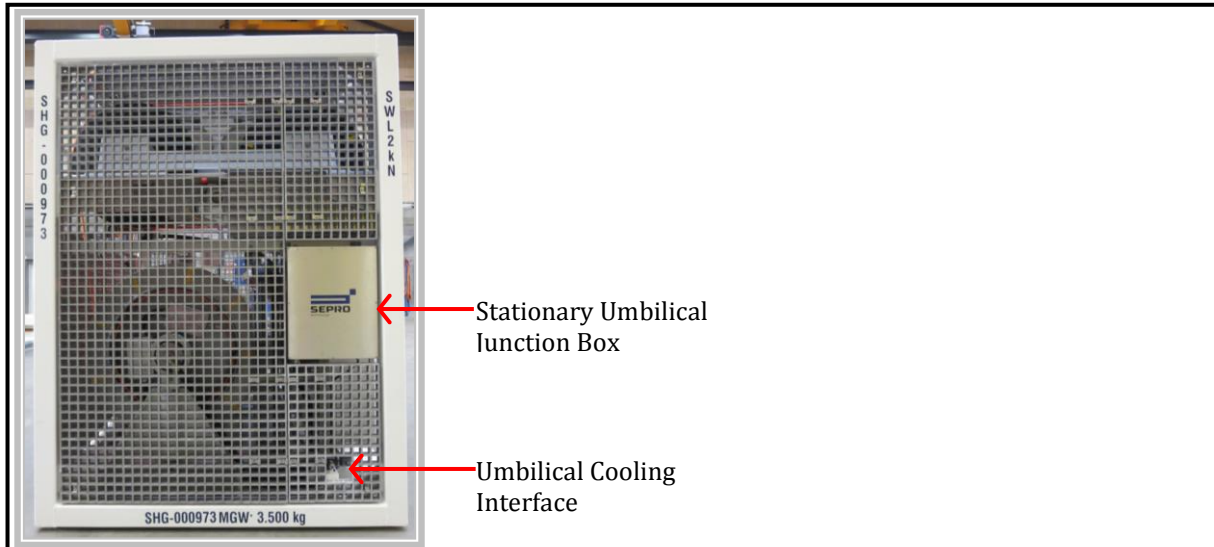
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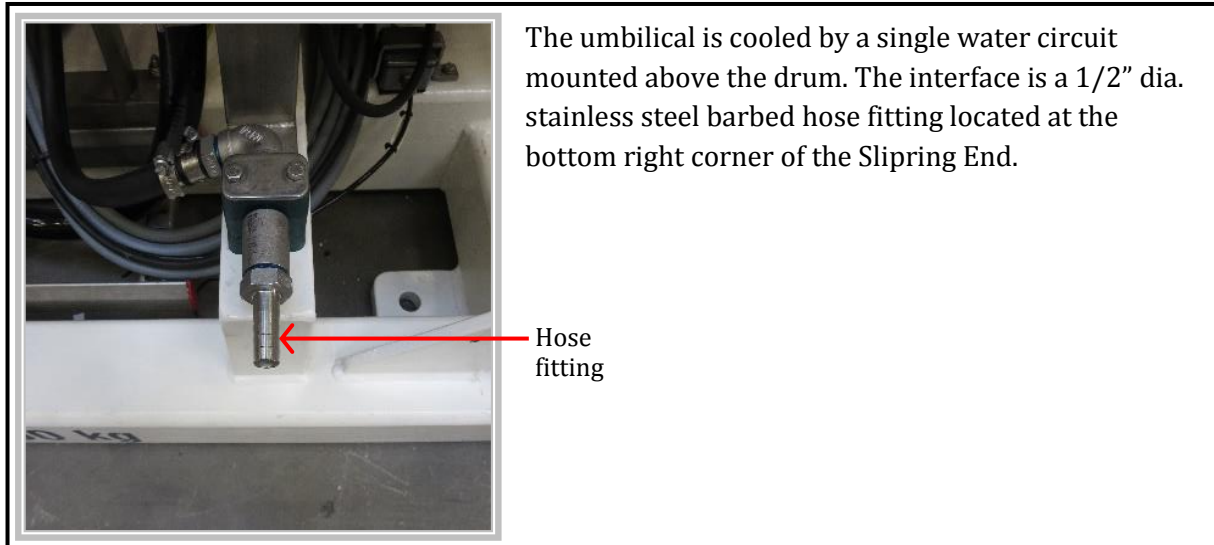


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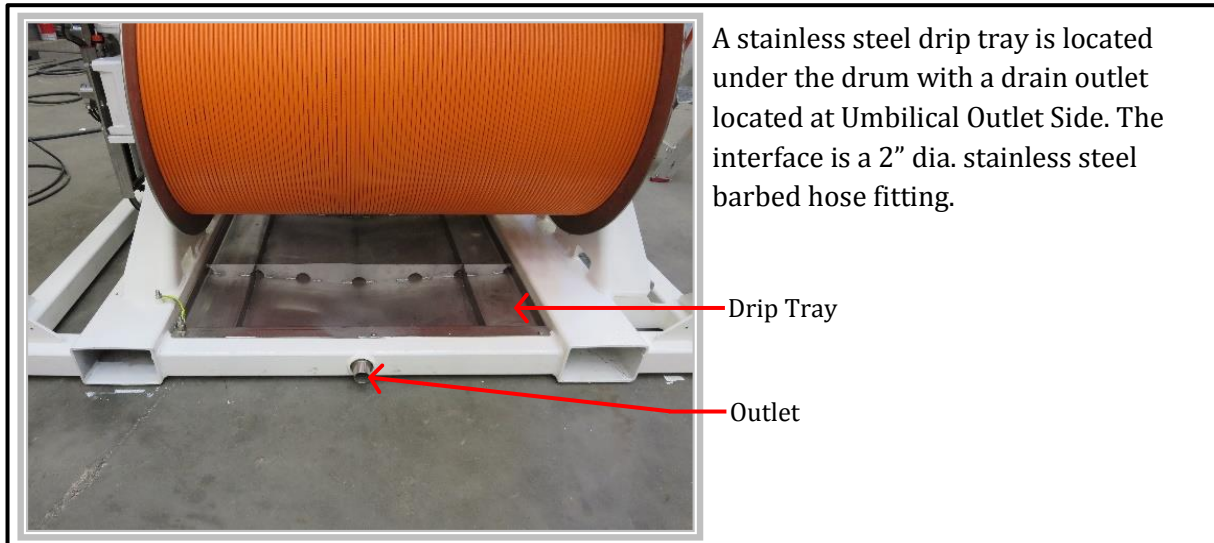
4.2.2 Umbilical



4.2.3 Umbilical Cooling



4.2.4 Drip Tray



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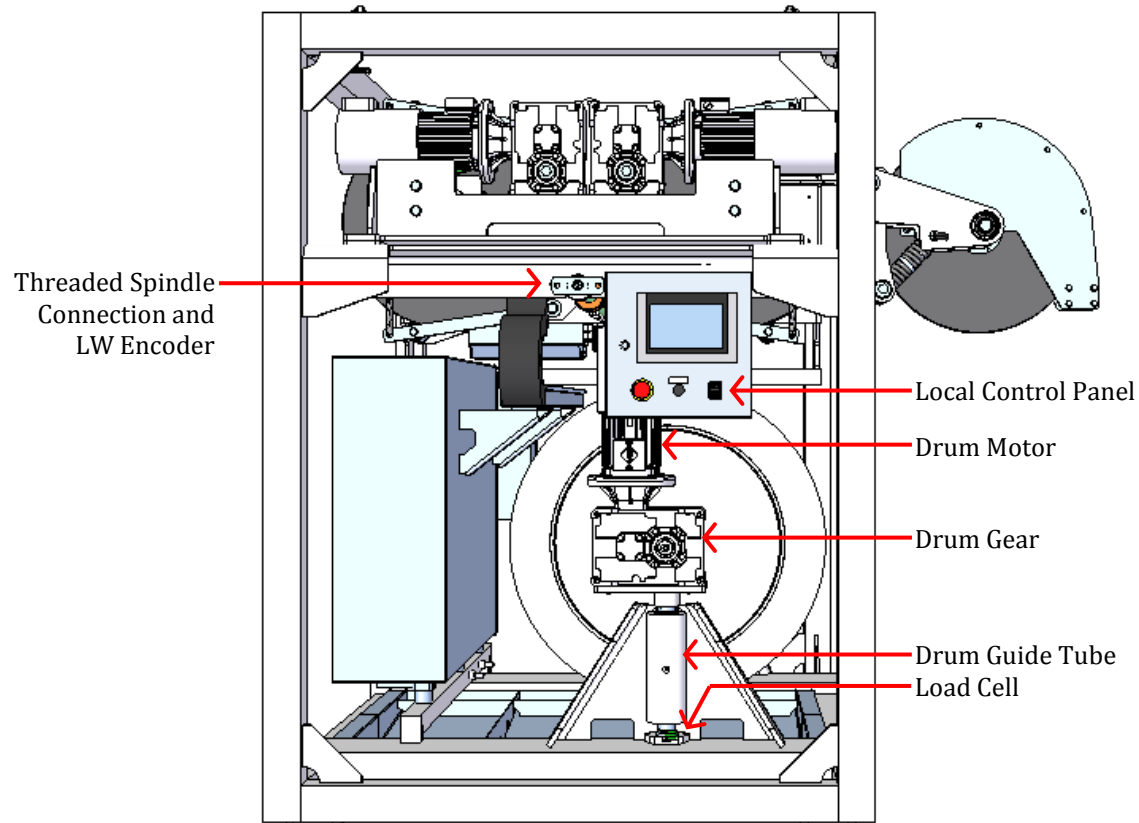
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5 System Illustrations

5.1 Winch

Protection Screens and Motor Shields not shown



Drum Motor End

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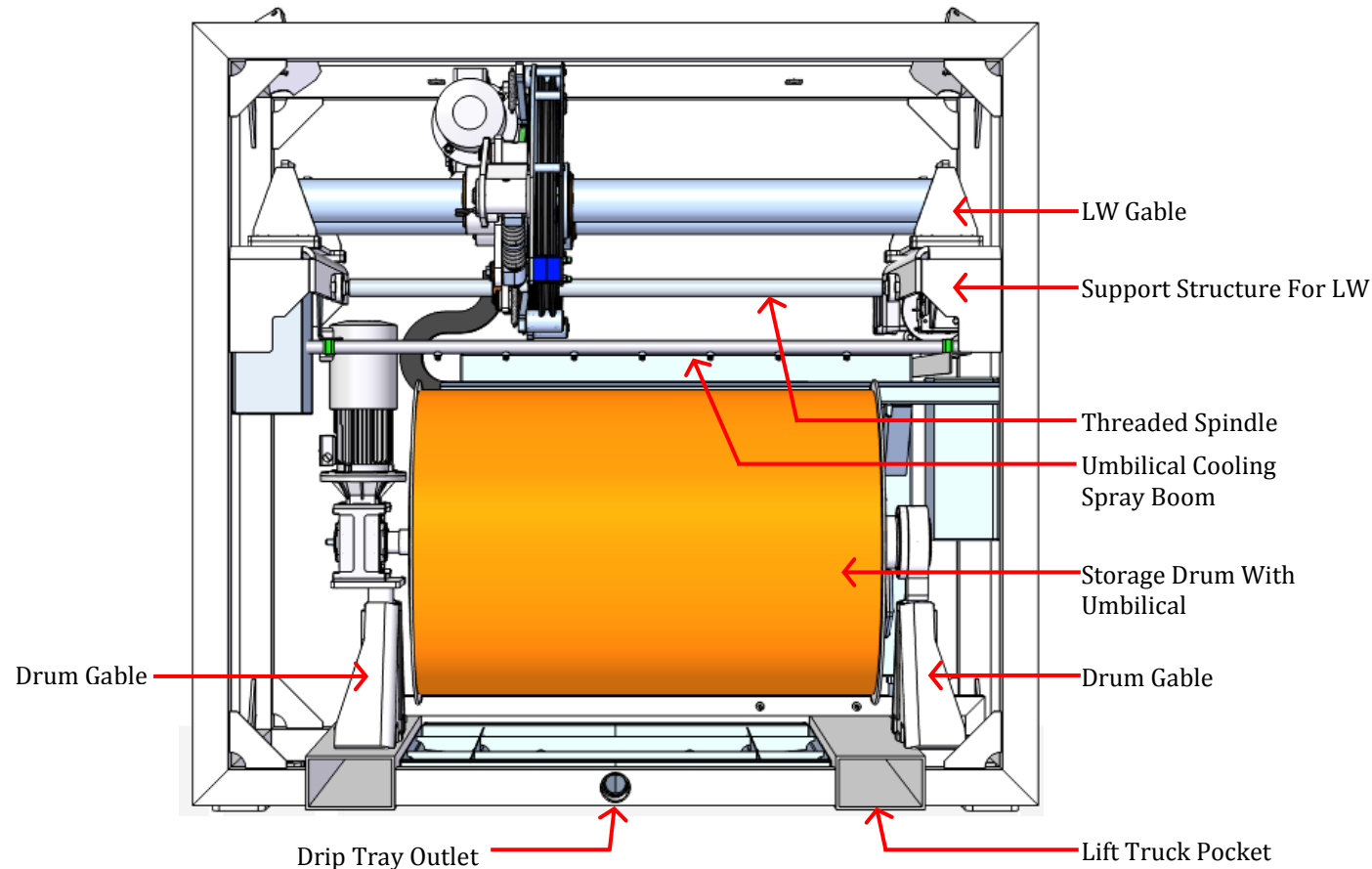
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Protection Screens and Motor Shields not shown



Umbilical Outlet Side

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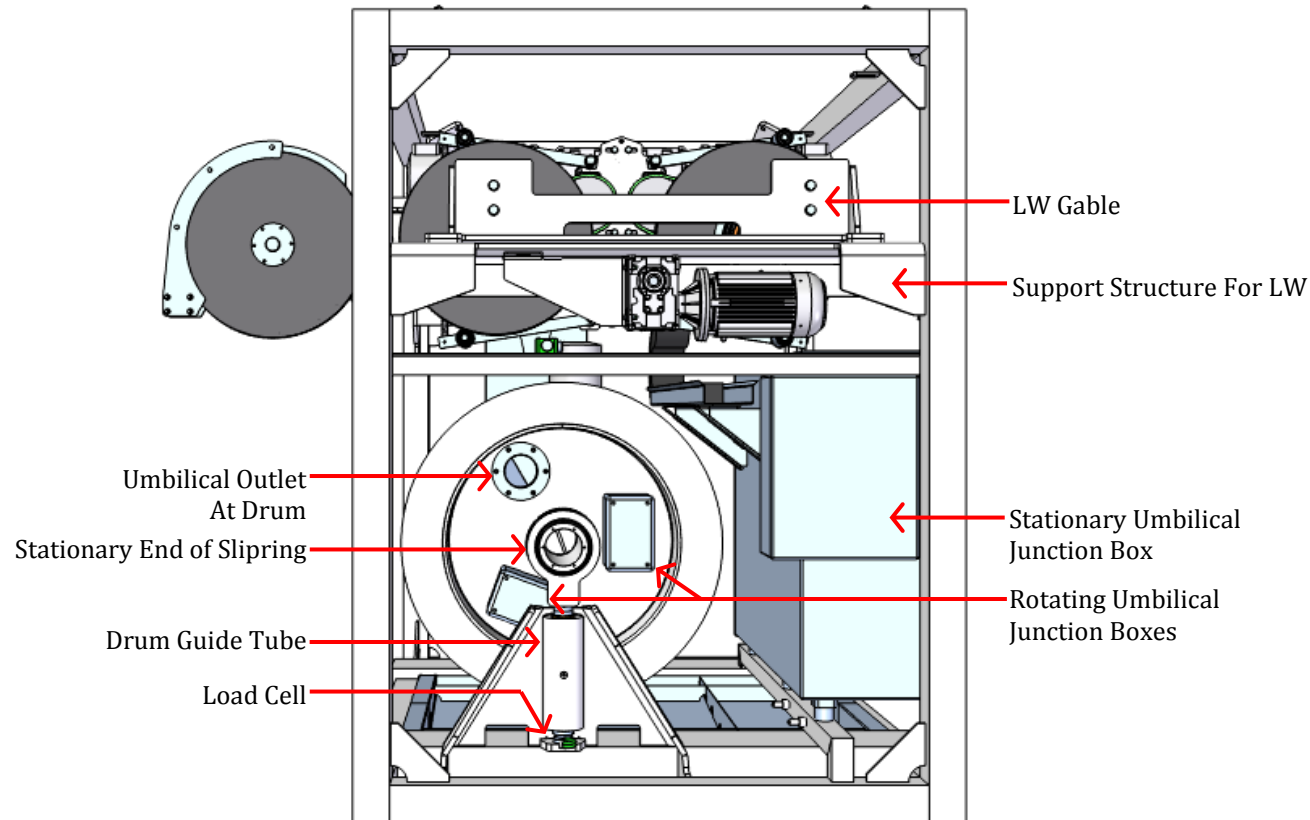
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Slipring End

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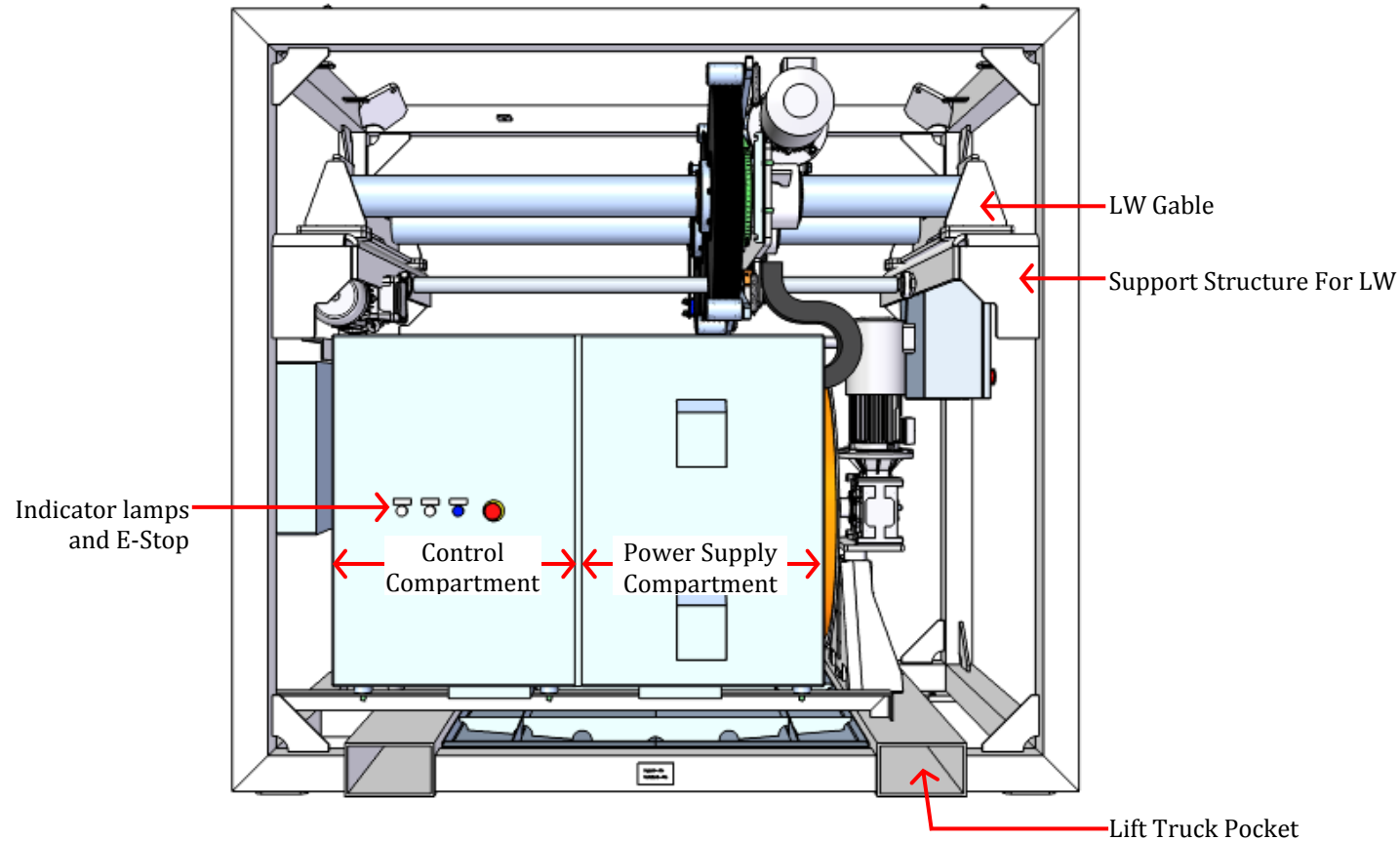
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Control & Power Enclosure Side

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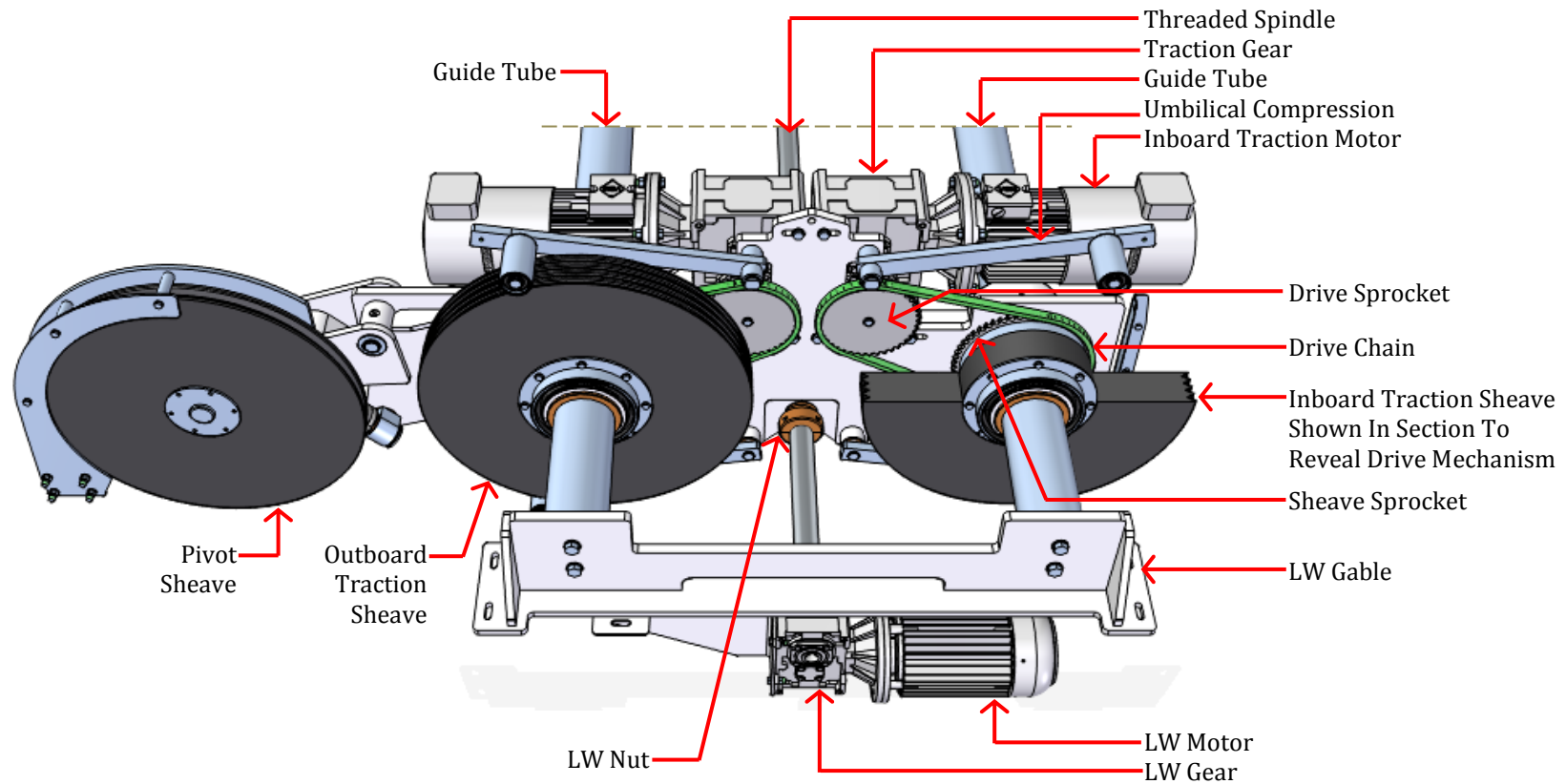
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5.2 Level Wind

Motor Shields not shown



Levelwind

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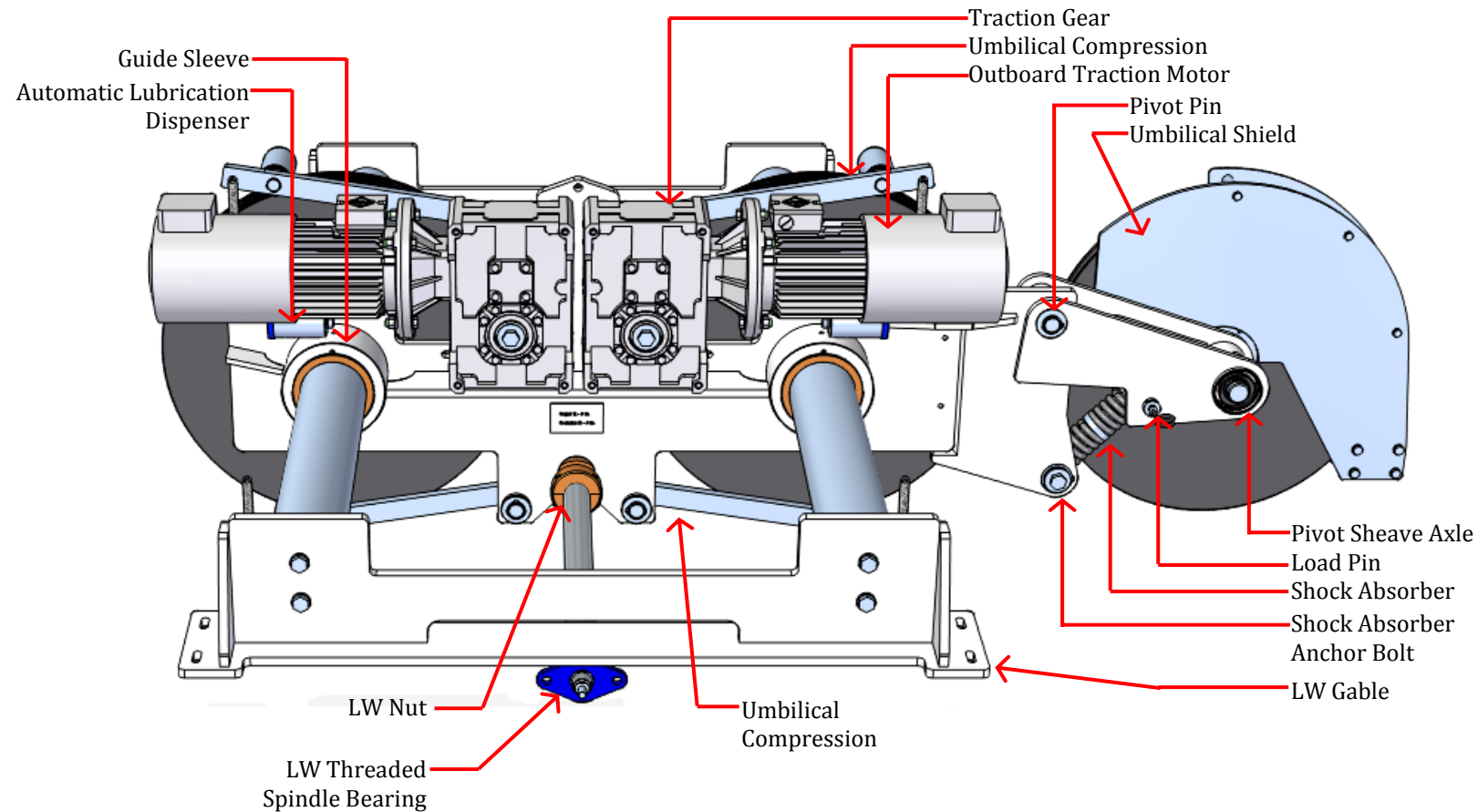
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Motor Shields not shown



Levelwind

6 System Descriptions

6.1 Traction Winch

To prevent excessive tension on the umbilical as it spools onto the storage drum a traction winch principle is employed.

The umbilical is wound in several windings over the two grooved traction sheaves in a single layer. The high tension at the inlet to the outboard traction sheave is dissipated through the friction developed between the umbilical and the grooves in the sheaves. The effect of this is low tension in the umbilical at the inlet to the inboard traction sheave. The umbilical is wound at low tension on the storage drum with the use of a Levelwind. The storage drum is programmed to keep a constant tension on the umbilical. When the traction sheaves pay-out, the tension on the umbilical between the inboard sheave and the drum increases. To reduce the tension to the programmed value the storage drum will pay-out. When the traction sheaves pay-in the tension in the umbilical between the inboard sheave and the storage drum decreases. To increase the tension to the programmed value the storage drum will pay-in.

6.2 Braking

In the context of normal operations, the winch does not employ mechanical friction brakes to slow and stop the traction sheaves and the storage drum rotation. The controllability of the electric traction motors and the drum motor, provided by the VSDs, is the mechanism that controls the rotation traction sheaves and the storage drum. This method of controlling large electrically powered systems is referred to as Dynamic Braking. When a load is suspended stationary subsea, and still in an active operating mode, it is the motors that prevent drum rotation.

Additionally, a mechanical friction type Fail-Safe brake system is provided.

6.2.1 Dynamic Braking

When the speed of the winch is reduced using the joystick, the kinetic energy of the system forces the rotors in the electrical motors to turn faster than the speed set by the operator. The motors are at this point generating electricity and send a current back towards the VSDs. How effectively this energy can be dissipated determines, in part, how well the motors can stop. In this case, the energy generated by the drum motors is diverted to an external resistor and is dissipated as heat. Dynamic braking provides excellent controllability and is not subject to mechanical wear.

6.2.2 Fail Safe Brake

The fail-safe brake system consists of electro-mechanical disc brakes at each traction motor and the drum motor. The disc brakes are actuated by spring pressure and require power to release. When power is applied the springs are compressed by electromagnetic force and in the event of power loss the springs are released and the brakes will engage.

The fail-safe brake system is also implemented when the Emergency Stop is used.

During normal operation the system is also used to hold the payload by pressing the Stop button on the main operation page. This function should only be used when the winch is at stand-still and it has been determined that the load should be held by the brakes.

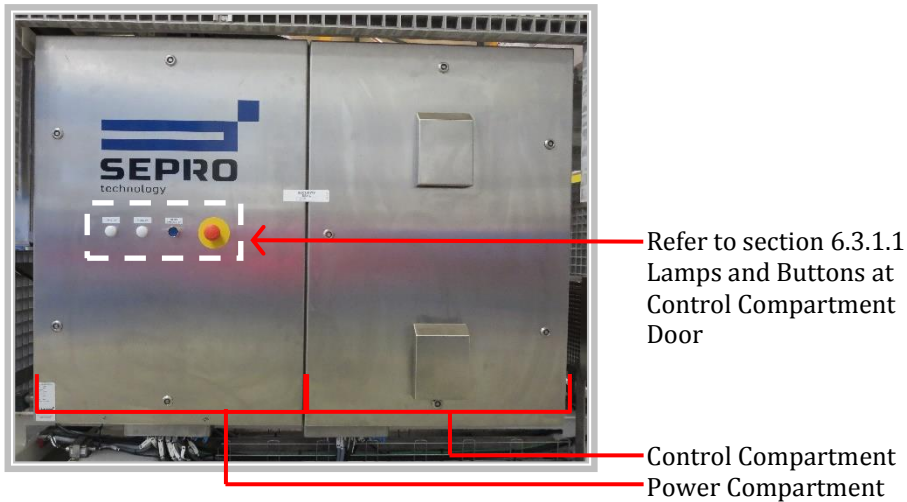
The brakes comply with DNV Standard for Certification, No. 2.22, Lifting Appliances, October 2011.

6.2.3 Brake Resistor

The energy created by the drum motors during Dynamic Braking is diverted to an external resistor and is dissipated as heat. The brake resistor is air cooled and mounted within the winch frame.

6.3 Control System and Power Supply Enclosure

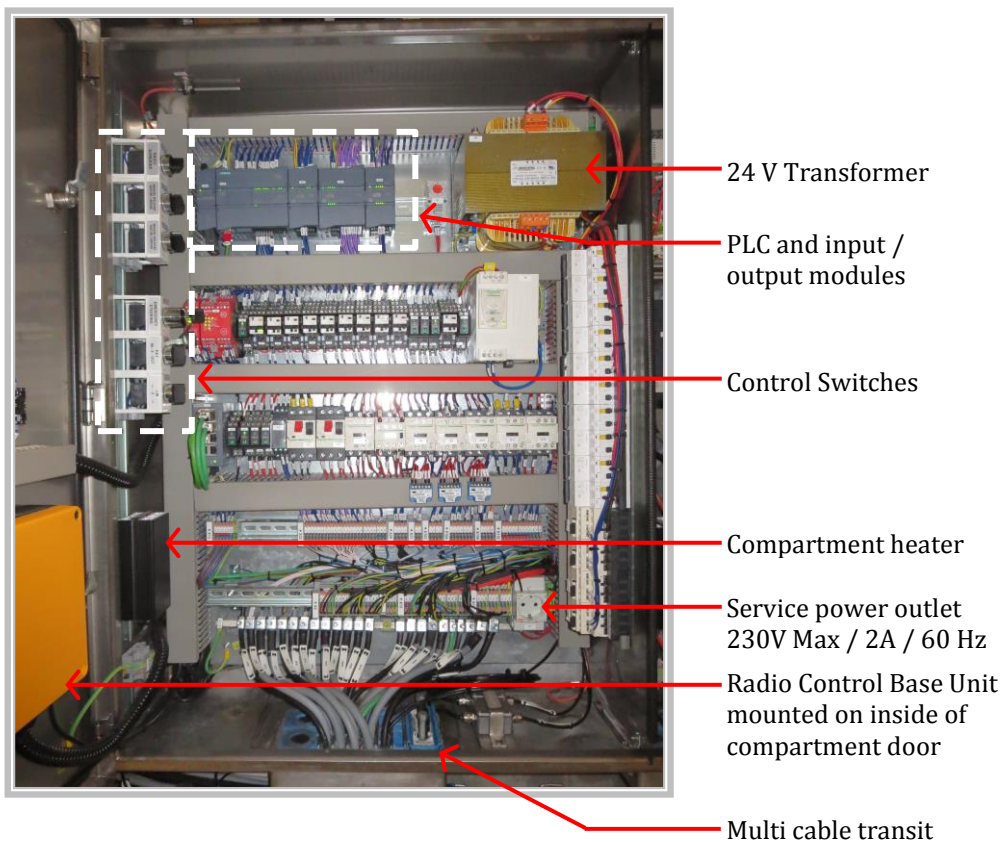
The main electrical installation enclosure is partitioned by function into two compartments, the Control System compartment and the Power Supply compartment.



6.3.1 Control System Compartment

The control enclosure houses the PLC, a transformer, switches and relays and a series of control and selector switches. The cables that serve the compartment are fed through a Multi Cable Transit frame from the bottom.

Not that the image was recorded during construction and may not depict the final configuration of the control compartment.



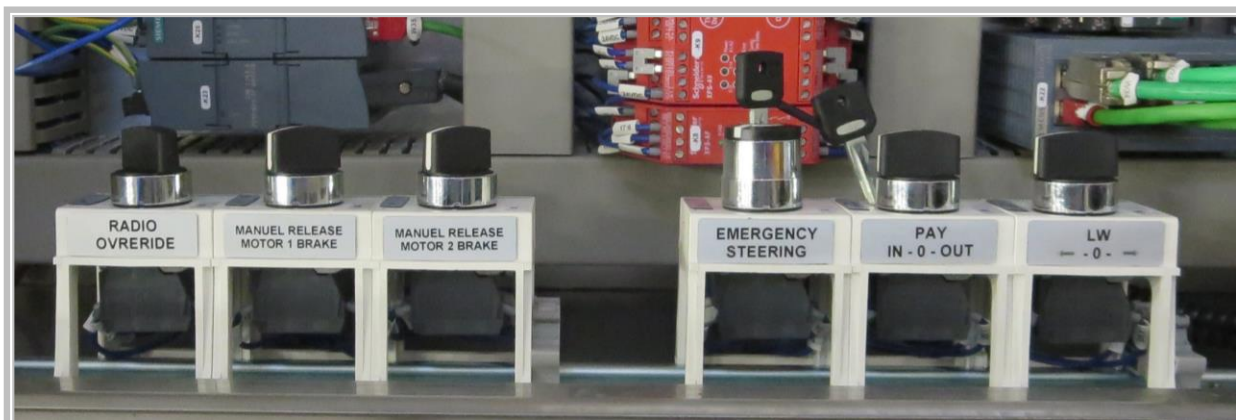
6.3.1.1 Lamps and Buttons at Control Compartment Door



- **Emergency Stop:** Press the Emergency Stop Button if there is an immediately hazardous situation that needs to be stopped or averted quickly in order to prevent injury or equipment damage. Refer to section 1.2 Emergency Stops.
- **E-Stop Reset:** Refer to section 1.2 Emergency Stops for functional description.
- **Phase OK:** Illuminated lamp indicates correct phase sequence.
- **24V DC OK:** Illuminated lamp indicates 24V DC is available.

6.3.1.2 Control Switches in the Control Compartment

The image below has been rotated for clarity, the switches are oriented vertically in the compartment.



Radio Control Selector Switch

2 position.

Refer to section
6.3.1.2.2 Radio
Override Switch for
more information.

Brake Release Switches

2 position

Refer to section
6.3.1.2.3 Manual
Brake Release
Switches for more
information.

E-Steering Selector Switch

Key controlled,
2 position

Refer to section 6.3.1.2.1 Emergency
Steering for more information.

E-Steering Control Switches

2 position, hold-to-operate,
spring return to neutral

6.3.1.2.1 Emergency Steering

In the event of PLC failure, the LCP and the RCU are disabled. The payload can be recovered by using the control switches in the Control Compartment. The two-position, key-controlled, Emergency Steering selector switch, shifts control of the winch to the E-Steering control switches. The VSDs are still functioning and still send the signals that control the Fail-Safe brakes. Therefore, the Brake Release switches are not to be used. The winch and level wind can be controlled by coordinated use of the control switches.

- 0 = Normal Operation
- 1 = Emergency Steering



Emergency Steering Switch

Procedure:

1. Personnel shall verify the PLC is in failure.
2. Check the E-Stop Reset button
 - a. If the button is illuminated, press to reset E-Stop system.
3. Turn the key-operated switch to the EMERGENCY STEERING position.



E-Steering Switch

E-Steering Position

4. The winch is ready to operate.
5. The winch and level wind can be controlled by coordinated use of the control switches.

6.3.1.2.2 Radio Override Switch

Functional Description:

- When the switch is in the '**1**' position the RCU is completely disabled.
- When the switch is in the '**0**' position the following conditions must be met before the winch can operate;
 - The RCU E-Stop button must be disengaged from the stop command position.
 - The RCU must be connected to the Base Unit.



Radio Override Switch

6.3.1.2.3 Manual Brake Release Switches

The Manual Brake Release Switches are only used during a procedure for recovering the payload if a motor or the VSD that controls it fails. However, because of the nature of the traction winch configuration and the options purchased, this procedure cannot be performed. The switches are superfluous to normal operation but under special circumstances they may have some utility and therefore are included.

NOTICE



CAUTION

The switches affect the function of the brakes. The switches must always be in the Normal Operation position.

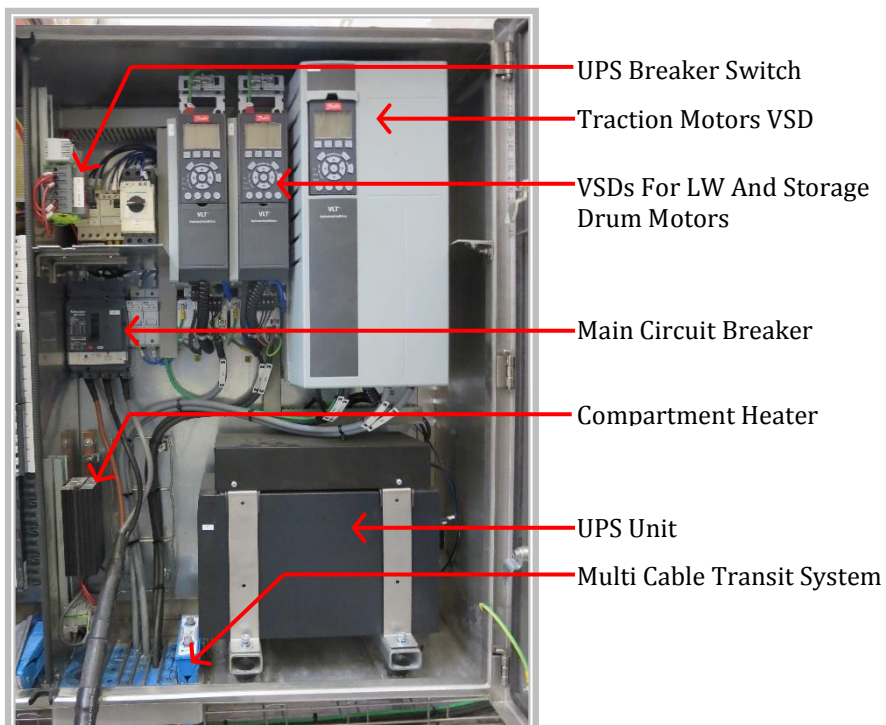
- 0 = Normal Operation
- 1 = Service Procedure



Motor 1 Brake Bypass

Motor 2 Brake Bypass

6.3.2 Power Supply Compartment



6.4 Encoders

6.4.1 Encoder at Drum

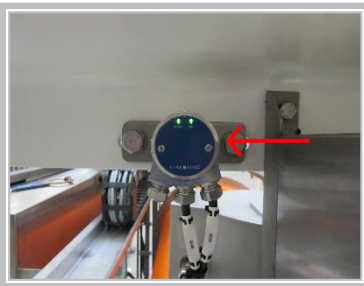


An absolute encoder that monitors drum rotation is attached to the gear of the storage drum motor. It is an Input source to the PLC and a vital component of the system that coordinates the Level wind movement relative to drum.

6.4.2 Encoder at Traction Motors

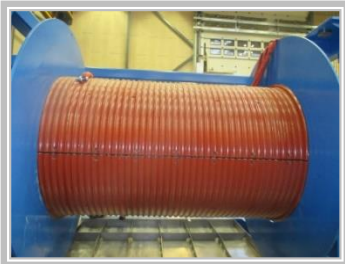
The Traction motors are controlled as a pair by a single VSD and one of the motors is fitted with an incremental encoder. It is an Input source to the PLC, providing vital information to the VSD's that control the motors.

6.4.3 Encoder at Level Wind



An absolute encoder is attached to the end of the threaded spindle opposite the LW Motor. It monitors the rotation of the threaded spindle, is an Input source to the PLC, and a vital component of the system that coordinates the Level wind movement relative to drum.

6.5 Lebus Shell



A Lebus shell is a grooved 2 piece shell that is bolted to the drum. The grooves ensure that the umbilical spools precisely onto the drum and thereby increases the life of the umbilical. This feature works in concert with the level wind.

6.6 Level Wind

The Level wind is of the Front Spooling type, it allows the umbilical to pay-out / pay-in 90° to the axis of the drum. The motor is regulated by a VSD and is fitted with stand-still heating, ptc, pt100 ,and forced ventilation.

6.7 Load Cells

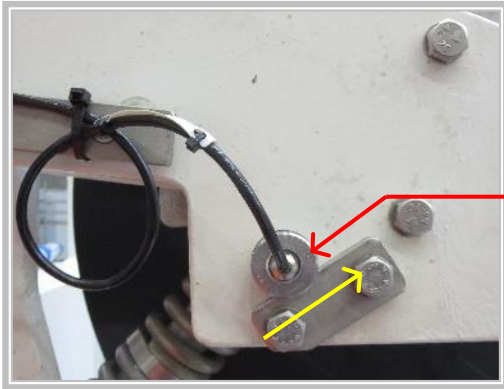


← Drum Guide Tube

← Load Cell

There is a load cell placed beneath each of the Drum Guide Tubes. The Load Cells provide Input data to the PLC and are instrumental in monitoring and regulating the tension in the umbilical between the storage drum and the inboard traction sheave.

6.8 Load Pin



There is a Load Pin installed at the Pivot Sheave, refer to System Illustrations section 5.2 Level Wind. The Load Pin provides Input data to the PLC and is instrumental in monitoring and regulating the tension in the deployed umbilical.

Load Pin

A directional arrow is inscribed at the head of the Load Pin. The Load pin must be installed with the arrow pointing in the direction indicated by the yellow arrow superimposed on the image.

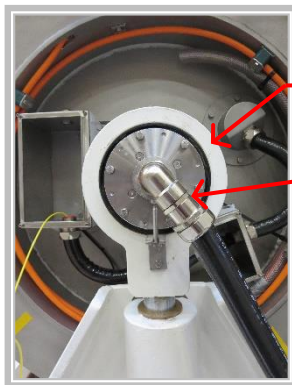
6.9 Multi Cable Transit System

A transit system is a mechanical system that seals the areas around pipes and cables as they penetrate walls, floors, bulkheads and other applications. Transit systems are typically comprised of a steel frame in which synthetic blocks are arrayed. The frame has a compression system that compresses the blocks around the cables ensuring an effective seal. The transit system is used in this application to protect the interior of the Control and Power Supply Enclosure.

6.10 Programmable Logic Controller PLC

The Programmable Logic Controller, PLC, is a digital computer used for automation of electromechanical processes. The PLC is composed of a Central Processing Unit (CPU) and additional Input / Output (I/O) modules. It is housed in the Control Compartment, usually in the top left corner. The control program is stored on a Flash Memory Card in the CPU.

6.11 Slip Ring



Drum Bearing
Housing

Stationary End
Of Slip Ring

A slip ring is an electromechanical device that allows the transmission of power and electrical signals from a stationary structure to a rotating structure and can be used in any electromechanical system that requires unrestrained, intermittent or continuous rotation while transmitting power and / or data. The slip ring is specified and delivered by the owner. The slip ring is mounted in the drum and the stationary end protrudes through the Drum bearing at the Slipping end of the winch.

6.12 Umbilical Cooling

The umbilical is cooled by a single, 7 nozzle water circuit mounted above the storage drum. Refer to sections 4.2 External Connections and 12.4 Other Requirements for more information.

6.13 Variable Speed Drives, VSDs

A device that varies the voltage and frequency of the electrical power supplied to electrical motors, thereby providing control over motor speed and torque. The traction motors are paired and the pair is controlled by a single VSD. The motor at the level wind and the storage drum motor are each controlled by a single VSD. All the VSDs are located in the Power Supply Compartment.

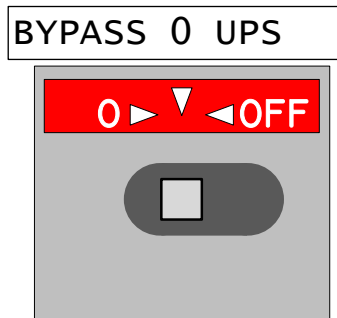
6.14 Uninterruptible Power Supply, UPS

The UPS device provides emergency electrical power in the event of a Dead Ship Condition. The UPS provides the VSDs enough energy to significantly slow the traction motors before the Fail Safe Brakes are engaged thereby preventing a potentially damaging tension on the umbilical. The emergency power is stored in batteries and the device is located in the Power Compartment. Refer to section 6.3.2 Power Supply Compartment.

The UPS breaker switch has (3) operating positions as shown below.



UPS Breaker Switch
(3) position turn switch,
shown in Normal
Operating Position.

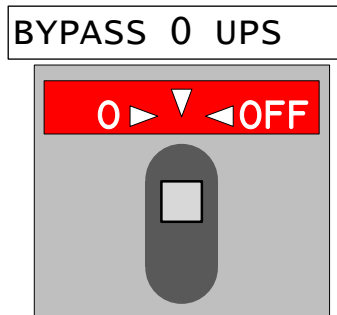


Bypass Position

In the event of UPS failure a Warning will be issued and the winch is inoperable. Refer to section 10.10.1 Warnings.

NOTICE

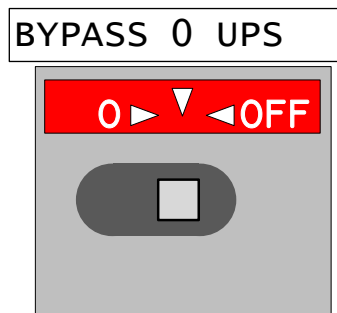
In the Bypass position the winch can operate but without the protection of the UPS system.



Maintenance Position

! WARNING

Electrical maintenance and repairs shall only be performed with the UPS breaker switch in the position shown. The winch is inoperable.



Normal Operating Position

7 Stand Still Heating

There are heating elements, provided to prevent condensation, in the following components:

- Local Control Panel
- Control Compartment
- Power Supply Compartment
- Rotating Umbilical Junction Boxes
- Stationary Umbilical Junction Box
- Traction Motors
- LW Motor
- Storage Drum Motor

The heating elements are on a single dedicated electrical circuit and when the winch is energized the heating elements always have power available. When the winch is not energized, the heating circuit can be energized by implementing the Shore Connection. When the Shore Connection has been made the heating circuit is automatically energized.

If there has been an interruption of power for a period of days and the winch has been exposed to temperature swings of more than 10° C, condensation in the electrical system may occur. It is recommended to use the Shore Connection, or other provisions, to energize the heating circuit for a 24 hour period before energizing the winch. This allows the heating elements to dry the electrical components before being energized.

It is recommended to energize the heating circuit if the winch has been decommissioned and is being stored.

7.1 Shore Connection

The Shore Connection terminal is located in the Control Compartment, refer to the Electrical Documentation in the Systems Documentation Manual and section 12.3 Power Requirements.

The owner must determine the method of routing the power cables into the Control compartment.

NOTICE

If an opening is made in the Control and Power Supply Enclosure to provide access for external power the opening shall be made water tight.

8 Start Up

8.1 Normal Start Up

1. Perform a visual inspection of the winch.



2. Confirm that there is no personnel within the working area of the winch.

3. Switch on the circuit breakers at the power supply connection.
4. Check the buttons and indicator lamps on the door to the Control System Enclosure. Refer to 6.3.1.1, Lamps and Buttons at Control Compartment Door.
 - Disengage the E-Stop button if necessary
 - Press the E-Stop reset button if necessary
 - Phase confirmation lamp is illuminated
 - 24 V confirmation lamp is illuminated
5. Check if there are alarms or warnings indicated the HMI Alarm Page. Take remedial action if necessary.

8.2 Start Up after Long Term Storage

This section regards the procedures and precautions to be used when putting the winch into operation after an extended period of disuse.

The Start Up Procedure is composed of three sequential sections.

- Preparing the winch
- Energizing the winch
- Function Test

8.2.1 Preparing the Winch

1. Open the Control and Power enclosures and inspect for condensation and dry if required.
2. Energize the heating circuit for electrical components for at least 24 hrs. if required.
3. Verify the LW guide tubes are free of debris
4. Verify the threads on the LW spindle are free from debris
5. Inspect the LW nut. Refer to section 11.3.4.2 Nut Inspection at Level Wind.
6. Check the fluid levels in:
 - a. Drum motor gear box
 - b. Level wind motor gear box
7. Charge the grease lines with grease.
8. Inspect the Multi Cable Transits.

8.2.2 Energizing the Winch



WARNING

Before putting the main circuit breakers in the 'ON' position, verify the power supply is correct and confirm there are no personnel in the working area.

8.2.3 Function Test

The Function Test is especially relevant when putting the winch into operation after an extended period of disuse. The focus of the Function Test are the E-Stop functions and Emergency Steering. Refer to section 10 Operation for more information.

Procedure:

1. Turn on and connect the RCU to the Base Unit. Refer to section 9.5 Connect To Base Unit.
2. Verify the touchscreen is active at the LCP and the display screen is active on the RCU.
3. Observe the Alarm Banner at the LCP touchscreen. Take remedial action if required to resolve any active alarms or warnings that may affect or prevent normal operation.
4. Verify the indicator lamps at the Control Compartment door. Refer to section 6.3.1.1.
5. Verify Control can be exchanged between the LCP and the RCU. Refer to section 9.6 Control.
6. Give control to the LCP. Press the Start button on the Main Operation Page and verify the operating mode defaults to Speed Control. While in Speed Control, test the Emergency Stops at the LCP, Control Compartment door, and the RCU. After each reset of the Emergency Stop press the Start button and activate Speed Control mode. Refer to section 1.2.1 Emergency Stop Reset.

While testing the Emergency Stops verify the following functions:

- a. The Fail Safe brakes should make an audible 'clack' when they are released and when they are engaged.
 - b. The background color of the Start and Speed Control button on the HMI screen turns grey and there is no Pay In/Out function.
 - c. Emergency Stop is displayed in the alarm field on the HMI screen.
 - d. Fail Safe brake status at the Main Operation Page and the Motor Information Page.
7. Press the Start button on the Main Operation Page and perform a short Pay In and Pay Out function.

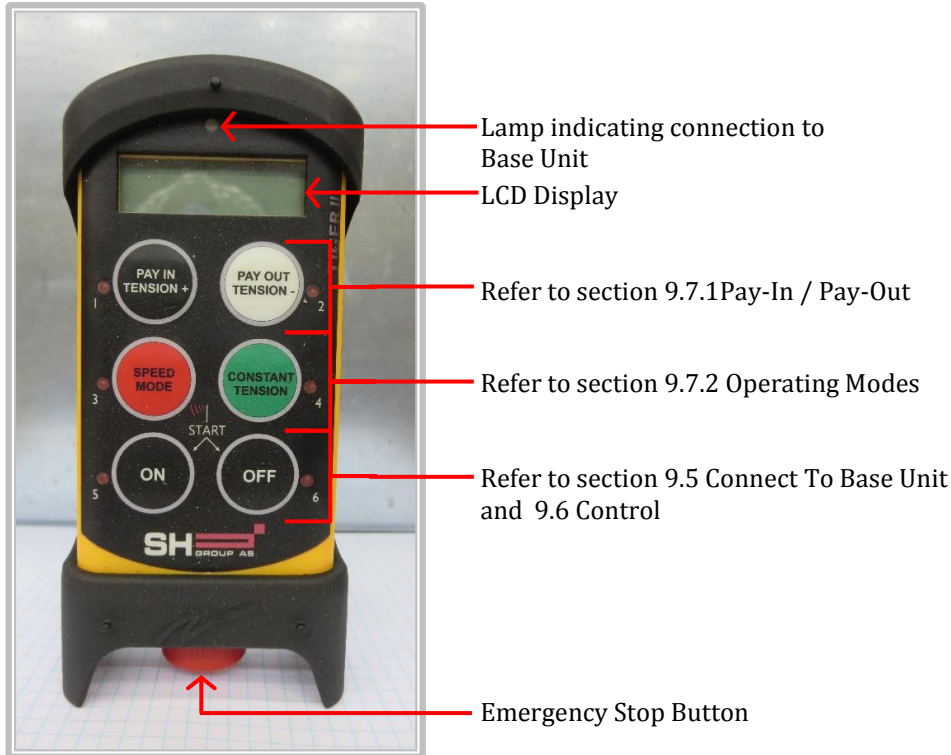
NOTICE

8. Before the first extended Pay Out function lubricate the winch. Refer to sections 11.2 Lubrication and 11.3.2 Weekly Maintenance.
9. Remove the Automatic Lubrication Dispensers and charge the ports manually using a grease gun. Verify the lubrication dispensers are functioning and reinstall or replace with new units.
10. Verify that the Level Wind reverses direction appropriately at the end of each layer of cable. If necessary change the End Stop Settings. Refer to 10.5.4 Level wind Page.

9 Radio Control Unit - RCU

This section concerns the operational control of the winch via the Radio Control Unit, RCU. It is essential that operators read and understand this section before using the RCU. All operating modes for the winch are available and changing operating modes is allowed. There is an emergency stop button on the RCU which will stop the winch when the RCU is connected to the base unit. In the event of PLC failure, the LCP and the RCU are disabled.

9.1 RCU Layout



9.2 Base Unit



The Base Unit receives radio signals from the RCU and is located on the interior side of the Control Compartment door.

9.3 E-Stop and E-Stop Reset

Refer to section 1.2 Emergency Stops.

9.4 LCD Display

The following (4) information messages are always displayed:

- Speed, meters / min.
- Constant Tension Set Point, kg
- Line Out, meters
- Load, kg

9.5 Connect To Base Unit

Conditions:

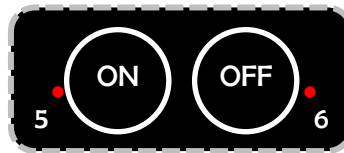
- The winch is powered up and there are no active alarms

Procedure:

1. Turn the Radio Override switch inside the Control Compartment to the '0' position.
2. Press and hold approx. 3 seconds, buttons 5. & 6. on the RCU simultaneously.
3. Observe the message in the top line of the LCD Display. The green lamp at the top of the RCU will illuminate when connected



Radio Override Switch



Buttons at RCU

When the RCU is turned on and Connected to the Base Unit

- **The Emergency Stop function of the RCU is enabled.**
- **The RCU does not have control of the Winch**

If radio connection with the base unit is interrupted for more than 2 seconds, an E-Stop condition will occur, all operation is stopped. The E-Stop reset button on the winch control compartment door must be pressed before attempting to reestablish connection to the base unit.

9.6 Control

It is not possible for the winch to be controlled by the RCU and the LCP simultaneously. This section explains how control of the winch can be transferred between the RCU and the LCP. In this context the RCU is said to be *Taking Control* or *Giving Control*. Control is never granted to the RCU when the winch is first powered up.

Transferring control from or to the RCU is initiated by the operator at the RCU. A successful transfer requires an initial action at the RCU and a subsequent response from a control panel. To initiate a transfer, the operator at the RCU presses and holds the **ON** or the **OFF** button for 5 seconds. This sends a signal indicating the RCU is ready to change its Control status, i.e., the operator wishes to give control of the winch to the control panel or the operator wishes to take control of the winch from the control panel. The HMI Control Page responds accordingly to the RCU's control status. i.e., it will indicate it is ready to accept control from the RCU or it will indicate the RCU is requesting control. Operators have three minutes to complete a transfer. If no action is taken within three minutes the request is nullified and the HMI Control Page is no longer active.

It is allowed to transfer Control while the winch is in an active operating mode and the operating mode is still active after a transfer. Regardless of which operating mode is active, it is required that the joystick be in neutral position and the winch at stand still.

9.6.1 Taking Control

Conditions:

- The RCU is connected to the Base Unit.

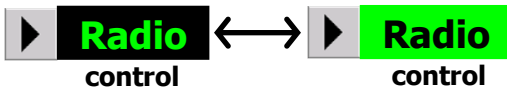
Procedure:

- Press and hold button 5. on the RCU, in the second position, for 5 seconds
- Observe the message in the top line of the LCD Display.



Button at RCU

- At the HMI Control Page, the Radio button will begin to flash alternating colors as shown



- Pressing the Radio button completes the transfer and the RCU has Control. The Radio button will display black text on grey background



After a successful transfer observe the following:

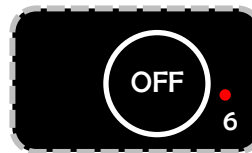
- At the HMI Control Page, the text field that indicates control status will change color accordingly.

Not in Control

9.6.2 Giving Control

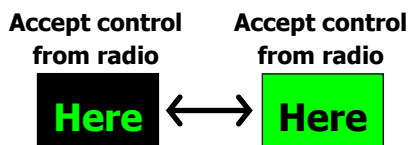
Procedure:

- Press and hold button 6. on the RCU, in the second position, for 5 seconds
- Observe the message in the top line of the LCD Display



Button at RCU

- At the RCP and the LCP HMI Control Page, the Accept control from radio Here button will begin to flash alternating colors as shown. Either station may accept control.



- Pressing the Here button completes the transfer and the relevant station has Control. The Here button will display black text on green background



After a successful transfer observe the following:





- At the HMI Control Page, the text field that indicates control status will change color accordingly.

In Control

9.7 Operation RCU

9.7.1 Pay-In / Pay-Out

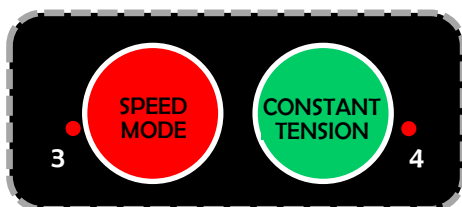


PAY IN (Speed Control) TENSION + (Constant Tension)	PAY OUT (Speed Control) TENSION - (Constant Tension)
2 position push button	2 position push button
1 st pos. =  m / min	1 st pos. =  m / min
2 nd pos. =  m / min	2 nd pos. =  m / min

The Pay In / Out speed associated with the button position can be set by the operator. Refer to section 10.5.1 Radio Control Unit, RCU

9.7.2 Operating Modes

Refer to section 10.3.4 Operating Modes for more information.



SPEED MODE	CONSTANT TENSION
2 position push button	2 position push button
Push to 2 nd position and hold to change operating mode. Adjacent lamp is illuminated when operating mode is enabled.	Push to 2 nd position and hold to change operating mode. Adjacent lamp is illuminated when operating mode is enabled.

10 Operation

This section concerns the operational control of the winch via the touchscreen interface. The touchscreen is the operator's interface with the Programmable Logic Controller (PLC), the computer system that controls the winch. In addition to the basic Start / Stop and choosing Operating Modes, the touchscreen interface allows the operator to observe different operating conditions such as operating temperatures, the status of cooling fans, or total hours of operation. Using the touchscreen interface the operator can change operational settings to improve overall winch performance or adjust winch performance temporarily for a special procedure.

In this section each touchscreen page is explained in detail, often including background information that provides the operator a fuller understanding of the functionality of the winch. Combined with the information available in the Systems Descriptions section the operator can obtain a comprehensive understanding of the different mechanical and operational systems to safely and efficiently operate the winch.

NOTICE

It is essential that operators read and achieve a thorough understanding of this section before operating the winch.

Normal operation of the winch is performed from the Local Control Panel (LCP) via the coordinated use of the touchscreen and the joystick or the Radio Control Unit (RCU).

In the event of PLC failure the LCP and the RCU are disabled and the payload can be recovered by using the control switches on the Emergency Steering box. Refer to section 6.3.1.2.1 Emergency Steering.

10.1 Introduction

10.1.1 Control Overview



Local Control Panel, LCP

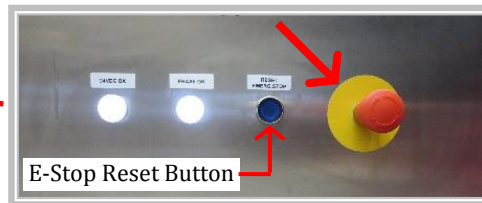


Joystick Detail

The joystick is enabled only when the adjacent 'Activate Joystick' button is pushed and held.



Control Compartment Door



Indicator and Button Detail



Radio Control Unit, RCU

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Serial No. SHG-000973

Rev. 0, 24-Nov-'16



10.1.2 User Administration

The winch control system is provided with three passwords that allow the operator different levels of access to settings and options. Normal operation does not require the operator to Log In using a password.

When a password is required to change a setting, one of the three icons shown will be displayed indicating which password level is required.

Passwords are normally delivered to the client representative at the Site Acceptance Test by the SH Group SAT Manager. In a few cases when a password could be expected but is not required it is indicated like this:

Both the Start Page and the Menu Page have a Log in / Log out button that links to the User Administration Page.

Log in
Log out

When a password is required to change a setting and there is not an operator logged on at the appropriate level, this Login menu will appear automatically.

Pressing a row in the User column will bring up the Login menu

Each access level is assigned an operation period. After the period has expired the operator is logged out automatically.

15:07:26 16/03/2016		User administration		Not in control
User	Password	Group	Logoff time	
Administrator	*****	Admi...	5	
Guest	*****	View	0	
Level1	*****	Users	5	
Level2	*****	Senior	5	
Level3	*****	Admi...	5	
PLC User	*****	Unaut...	5	
SHA	*****	Admi...	15	
<div> Log in Menu Main page Log off I/O list Level wind Curves </div>				

10.1.3 Panel Settings

The Menu Page has a Panel Setup button that links to this page

Panel Setup

Time and Date are entered by pressing the field which then brings up a numerical keyboard.

Background lighting intensity is adjusted by pressing the

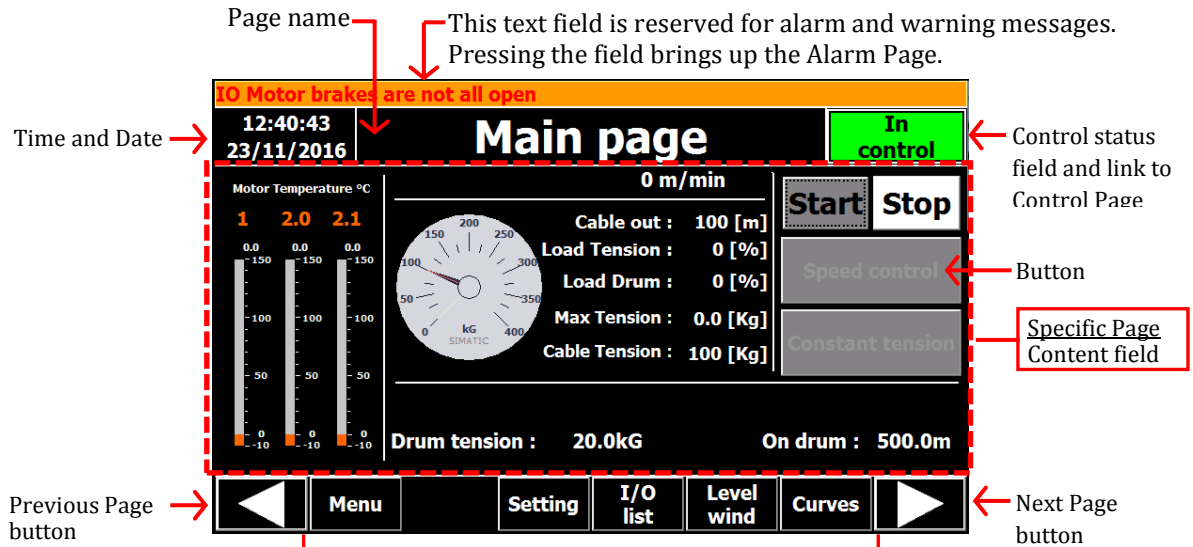
User Manual

OE-2000-A3-4-7-2-FS-NZ-003
Serial No. SHG-000973

Rev. 0, 24-Nov-'16



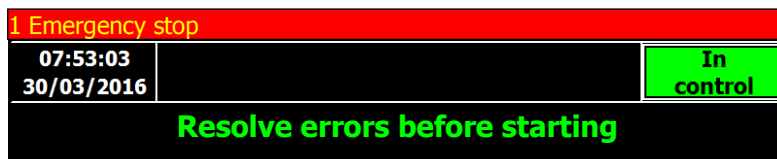
10.1.4 General Page Layout



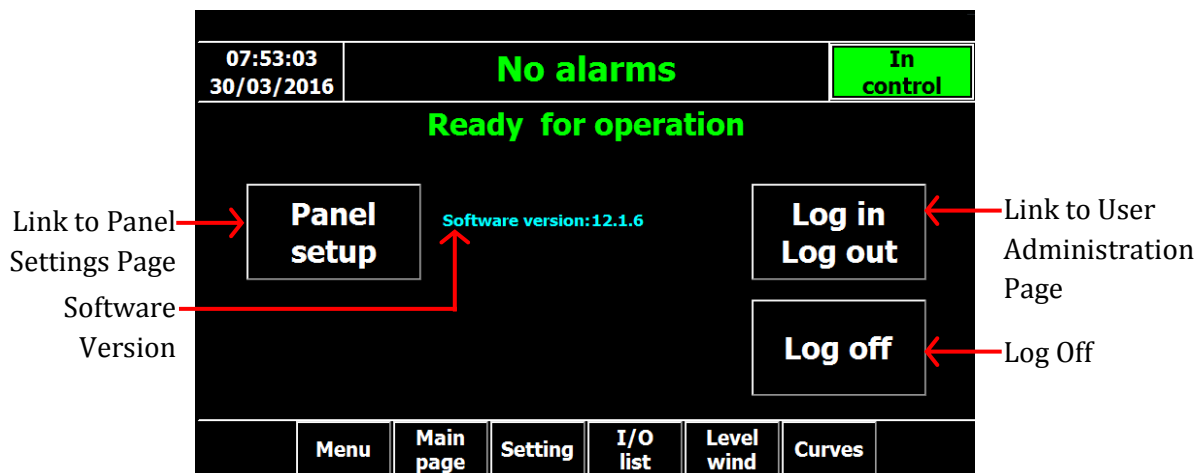
The bottom of the page is reserved for links to specific pages or groups of pages.

- Values that can be adjusted are shown black on white with a black frame **10 m**. Pressing the number brings up a numerical keyboard for entering values.
- Many single pages will have one or more Help Pages. Help pages are accessed by pressing the Next Page button.
- Pages may be grouped. A group of pages will have a Primary page that is the first page displayed when the group is selected. Pages in the groups are accessed by using the Previous and Next buttons. Settings and I/O List are examples of page groups.
- Text within the Specific Page Content field that is contained within a frame are referred to as 'buttons', and are the active interface at the touch screen.

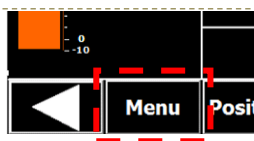
10.1.5 Start Page



In an alarm condition the top of the page will appear as shown

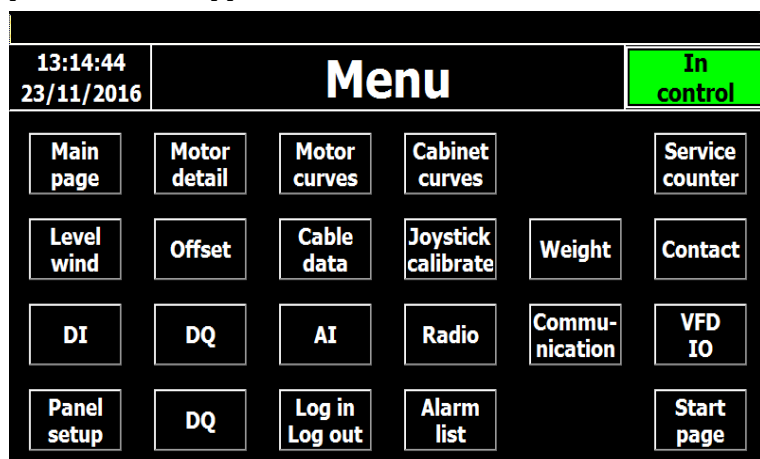


10.1.6 Menu Page



The Menu Page can be accessed from every page by using the link adjacent to the Previous Page button.

The Menu Page provides links to the Primary Page of page groups or to individual pages. The links themselves are organized in rows as shown below. Empty positions are for options not present in this application.



Operating Pages

Settings Pages

Input / Output Pages

Information Pages

10.2 Control

It is not possible for the winch to be controlled by the RCU and the LCP simultaneously. The LCP or the RCU must have 'Control' before it can be used to operate the winch. Refer to section 9.6 Control for guidance on transferring Control.

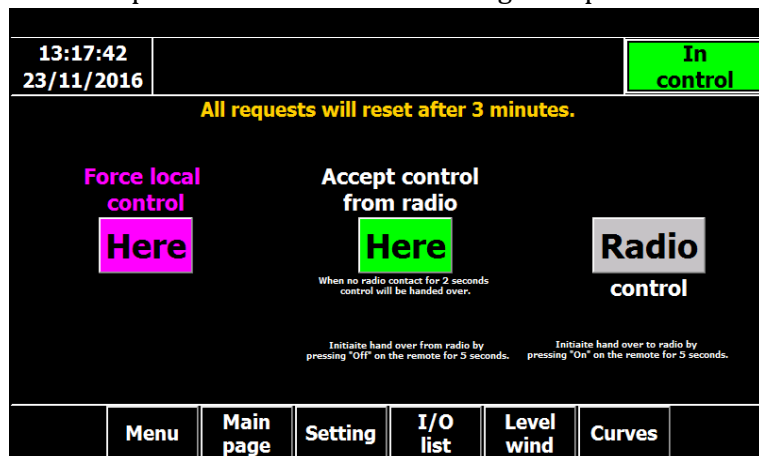
When the winch is initially energized Control defaults to the LCP. Changes to settings can only be performed from the LCP when it has Control.

10.2.1 Control Page

Transferring Control is performed at the Control Page.

At the top right corner of all screen pages is a button that indicates if the panel has control. Pressing the button brings up the Control Page. A green background and black text indicates that the control station has control of the winch, a black background and white text indicates another panel has control.

The example below shows a Control Page at a panel that has control.



The LCP identifies itself as **Here**, and the LCP as **Radio**.

The buttons normally have black text on a grey background. They will flash, alternating black and green background colors, indicating that action is required from the operator.

10.2.2 Transferring Control

Refer to section 9.6 Control

10.2.3 Force Transfer



If the RCU is damaged or malfunctions and Control cannot be transferred normally, the LCP can force a transfer. The Force Local Control Here button is only displayed when the LCP does not have Control.



The operator is required to Log In using the Level 3 password before a transfer can be forced.

10.2.4 Allow Full Unwinding



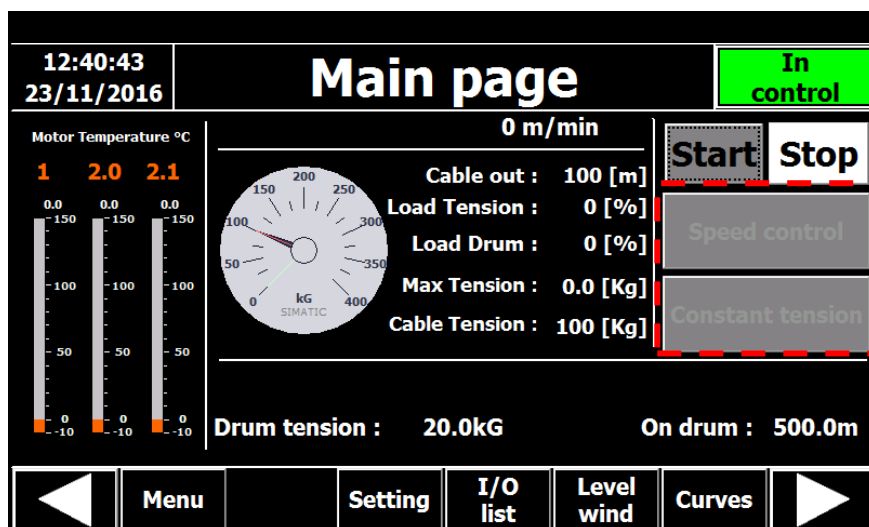
If there are less than 8 turns of cable on the winch the unwinding will stop. A warning will start. Press the button to allow unwinding. When allowed, the last length can only be paid out at low speed. The allowance will be reset after 3 minutes or if there are more than 8 turns of cable on the winch.

Allow full unwinding.

Stop full unwinding.

10.3 Main Operation Page

The Main Operation Page is considered the hub of normal operation. The winch is Started and Stopped and Operating Modes are selected from this page. Primary operating data is shown.



Operating Mode selector buttons

10.3.1 Start Stop Buttons

The following conditions are required before the winch can be Started

- The winch must be energized
- E-Stop buttons must be disengaged from the stop command position
- E-Stop Reset Button is **Not Illuminated**
- No active alarms




The winch is started and one of the available Operating Modes is active, indicated by black text on a green background. When the winch is started it defaults to the Speed Control Operating Mode.

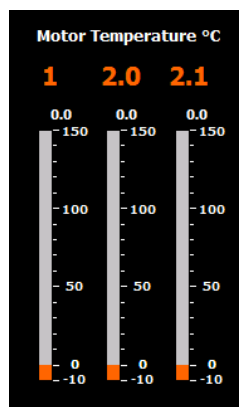


The winch is stopped and no Operating Modes are active. The Operating Mode selector buttons are indicated by black text on a grey background.

10.3.2 Numerical Data

32 m/min Rate of Pay In or Pay Out	Cable Out: 100 [m] Amount of umbilical payed out	Load Tension: 80 [%] Percentage of allowable torque developed at Traction Motors
Load Drum: 100 [%] Percentage of allowable torque developed at Storage Drum Motor	Max Tension: 200 [kg] Maximum Cable Tension is 200 kg, a static value on the screen	Cable Tension: 80 [kg] Tension on the deployed umbilical as determined by the Load Pin at the Pivot Sheave
Drum Tension: 20 [kg] Tension on the umbilical between the storage drum and the inboard traction sheave		
On Drum: 500.5 m Amount of umbilical remaining on drum	Dial indicator showing dynamic Cable Tension	

10.3.3 Motor Temperature at Operation Page



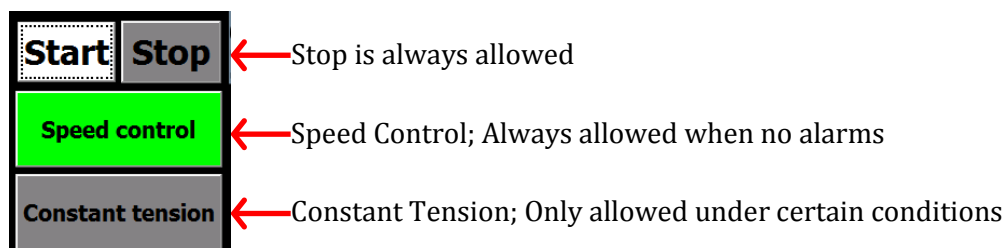
Temperatures of the motors are displayed here.

1 = Storage Drum Motor, **2.0** = Inboard Traction Motor and **2.1** = Outboard Traction Motor

The temperature display will flash, an alarm will display, and operations will be stopped if the motors overheat. Refer to section 10.10.2 Alarms. Pressing the temperature graph, as shown here, on the Main Operations Page brings up the Motor Information page.

10.3.4 Operating Modes

After pressing the Start button the operating mode defaults to Speed Control. The Speed Control button will flash until the Fail Safe Brakes have been released, at which point it stops flashing and operations may begin. Changing from one operating mode to another is only allowed while the winch is started, during active operation. **Do not press Stop to change operating mode.** Before changing to Constant Tension mode the winch must be at a stand still condition for 5 seconds. The Stop button should only be used when the winch is at stand-still and it has been determined that the load should be held by the Fail Safe Brakes.



10.3.4.1 Button Attributes

	Grey text on grey.	Is not selected. May not be selected.	Selection not allowed or station is not in Control
	Black text on grey Background.	Is not selected. May be selected.	Control Station has Control.
	Alternating black and green.	Operation mode has been selected and is waiting for verification.	Control Station has Control.
	Black text on green Background.	Operation mode is active.	Control Station has Control. Operating mode may be deselected.
	Grey text on green background.	Operation mode is active. Operating mode may not be deselected.	Control Station does not have Control

10.3.4.2 Speed Control

Speed control

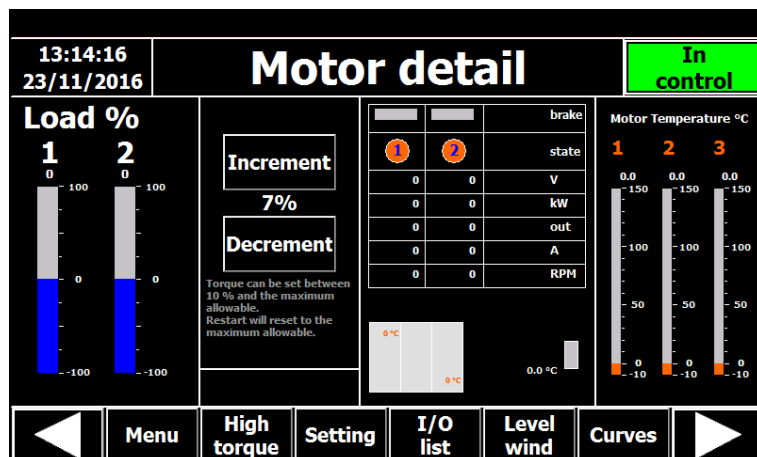
Speed control can always be selected. Pay-in and pay-out speed is controlled by manipulating the joystick. The desired torque for the operation is set at the Motor Detail page. The torque setting can restrict the speed. Speed is automatically restricted when cable is nearly all paid out.

10.3.4.3 Constant Tension

Constant tension

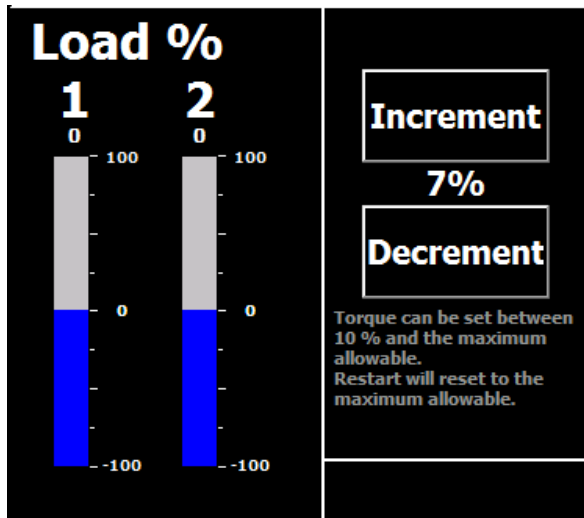
Constant Tension can only be selected when more than 50 m of umbilical has been payed out. The winch must be at stand still condition for 5 seconds before Constant Tension can be enabled. 100% speed and 100% torque is allowed. The joystick now adjusts the tension (Max torque) which is visible during this operation. Changing the tension will eventually result in pay in or pay out. Should the conditions fail during operation the operating mode automatically changes to speed control.

10.4 Motor Detail Page



The values and indications shown here are only examples not from a running winch.

10.4.1 Torque – Adjustment and Values



The operator can set the upper limit of the torque, Max:, desired for the operation by pressing the arrows. The value displayed is a percentage of total torque available from the winch.

Example:

Max: 50% means that the maximum torque allowed for the current operation is 50% of total torque available from the winch.

The bar graph shows the status of the torque delivered from the VSDs, as a percentage of the Max: value set by the operator, and is defined as Load. It is important to note that Load is a value dependent on the Max: torque setting.

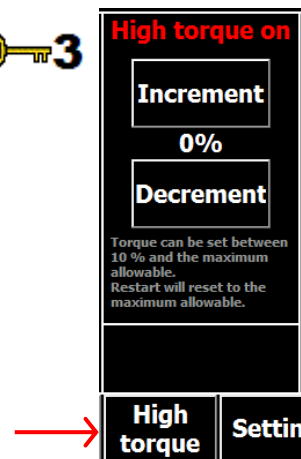
Example:

The bar graph will indicate that the VSD are providing 25% of the Maximum allowed torque for the operation, which is 50% of the total torque available from the winch. In terms of total torque available from the winch, the VSD are providing 12.5%. Load (25%) x Max (50%) = 12.5%.

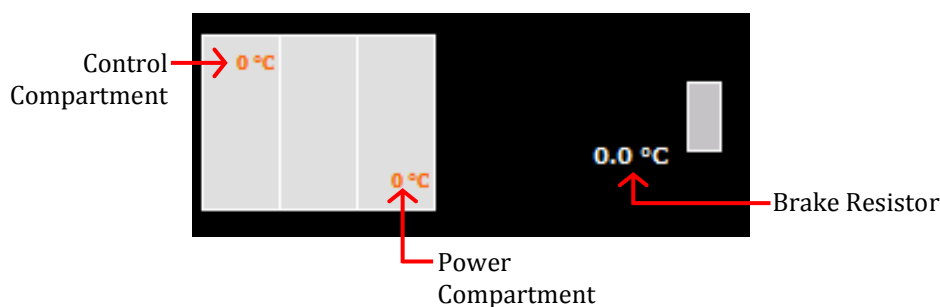
The consequence of this is that the Load value displayed on the Operation Page indicates to the operator the status of the torque for a given operation.

10.4.1.1 Temporary Increase of Maximum Torque

At the bottom of the Motor detail page is a button for increasing the maximum torque for up to 15 minutes. The winch must be started to do so and in speed control. It is shown by the text **High torque on** in red. Torque is reset with every new start.







10.4.2 Compartment & Brake Resistor Temperatures








10.4.3 Motor Status

The table below provides the following information for the Traction Motors: Brake status, motor states, and VSD performance information.

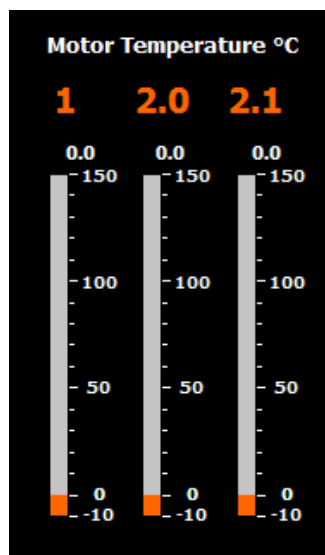
Traction Motors	Storage drum Motor		
		brake	← Brake Released ← Brake Engaged
		state	← Brake Status
0	0	V	← Motor State - See Below
0	0	kW	← VSD, Volts in the DC circuit
0	0	out	← VSD, Power Output
0	0	A	← VSD, Motor set point
0	0	RPM	← VSD, Current in Ampere
			← Speed of the rotor at the motor

Motor State

The motors are identified by a numbered circle. Alarm Status is indicated by the background color of the circle.

-  Flashing, not ready to run, power may be missing.
-  Ready to run, no faults or warnings.
-  Running
-  Fault or warning, close to trip.
-  Alarm and trip, motor disabled, operation not allowed.

10.4.4 Motor Temperature



Temperatures of the motors are displayed here.

1 = Storage Drum Motor, **2.0** = Inboard Traction Motor and **2.1** = Outboard Traction Motor

This temperature is used to control the motor fans after operation.

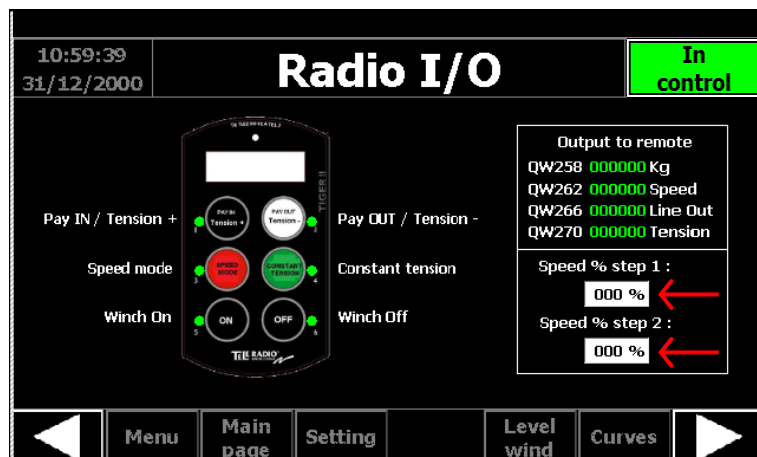
The fans will stop when all motors are below 40 °C.

Operations will be stopped if the motors overheat but this is controlled by a thermistor directly connected to the VSD.

10.5 Settings

The Settings pages are: Radio Control Unit, Joystick calibration, Cable Data, Level wind, and Weight Calibration. Selecting the Settings icon will display the Joystick calibration page first, browse the pages using the horizontal navigation arrows to bring up the desired page.

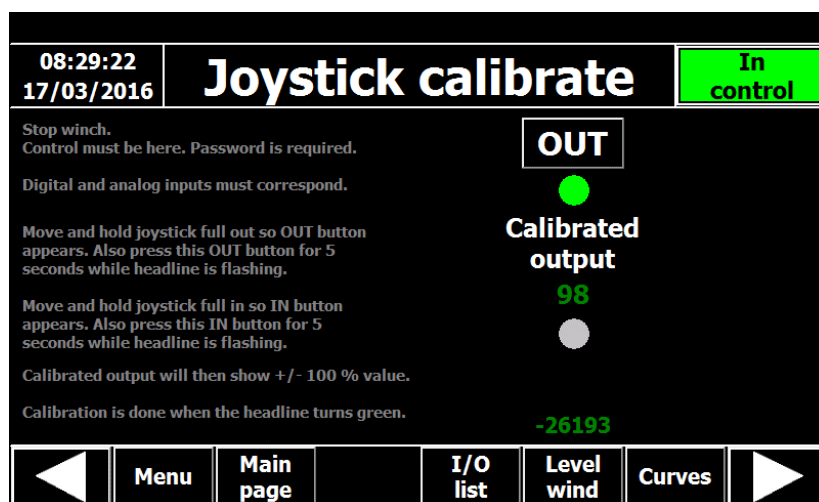
10.5.1 Radio Control Unit, RCU



The Pay In and Pay Out buttons on the RCU are 2 position, hold-to-operate. The operator can set the speeds for each position. Pressing the indicated buttons will bring up a numerical keyboard and the speed can be set for each button position.

10.5.2 Joystick calibration.

Joystick calibration is done using joystick and this page. Follow the text to get through the calibration. Be sure control is here and the winch is stopped. The OUT and IN buttons only appear when the analogue input value is beyond a certain limit. This limit depends on the type of joystick being used.



Move the joystick to the out end position and hold it here. When the OUT button appears press it for 5 seconds. The headline is flashing during this time. Then the headline turns green and the first calibration is done. Repeat for in and the second and final calibration is done.

10.5.2.1 Joystick Sensitivity



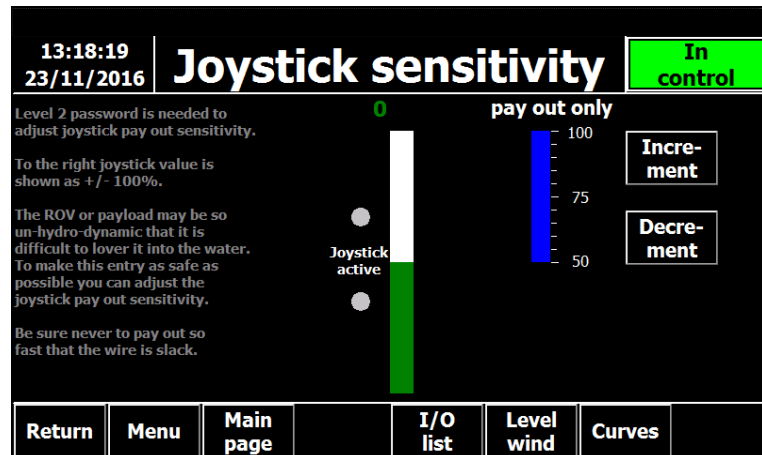
The bar graph shows the cable **paying out** at 56% of max. capacity.

Joystick active

A zero joystick value indicates no pay-in or pay-out

Joystick value **56**

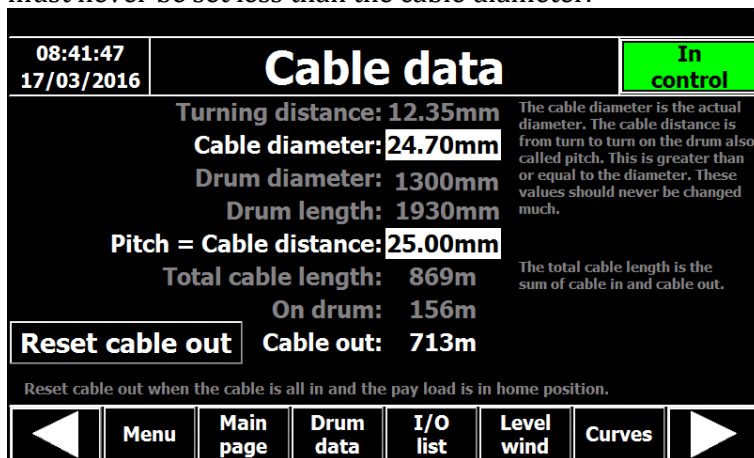
If the winch was **paying in** at 100% capacity, the bar would be totally grey and the Joystick value would read -100%



Joystick sensitivity can be scaled between 50% and 100%. A 50% setting, for example, allows the operator more control over the pay-out speed. This is a useful function to use to prevent a slack cable during pay-out.

10.5.3 Cable Data

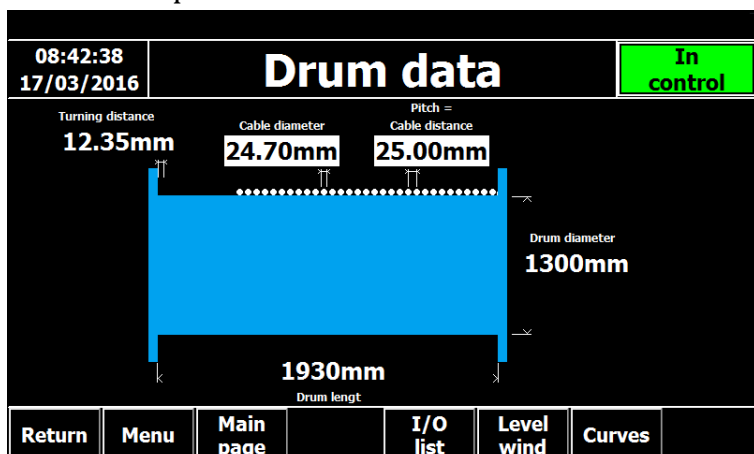
Turning Distance, Drum Diameter, and Drum Length are values that are set up during programming and cannot be changed. Turning distance is set to half the cable diameter. Pitch is defined as the distance between the centrelines of two adjacent strands of cable and the value must never be set less than the cable diameter.



Cable diameter and Pitch values can be changed at this page using a Level 2 Password. The Cable Out value can only be reset to zero. The Total Cable Length will then display as equal to the length On Drum.

Pressing the button Drum data brings up the Cable Settings Help page and the Graphic Drum and Cable Data page.

10.5.3.1 Graphic Drum and Cable Data

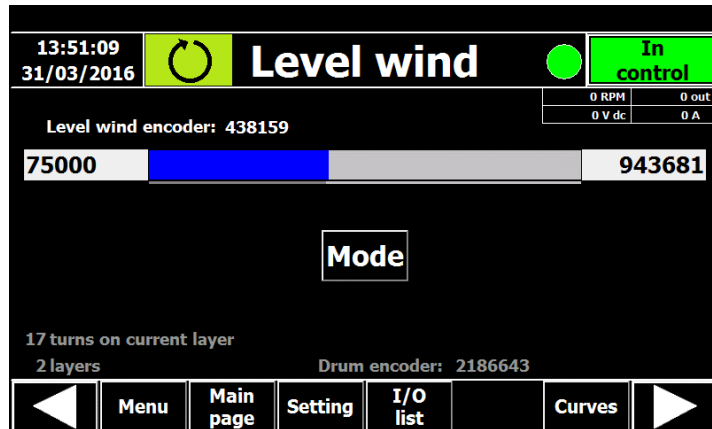


The page displays the same data as the Cable Data page.

Cable diameter and Pitch values can be changed at this page using a Level 2 Password.

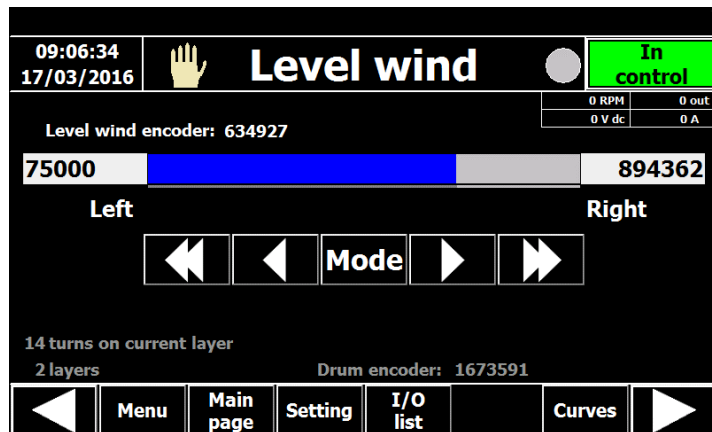
Press the Return button to return to the Cable Data page.

10.5.4 Level wind Page



Functional Principles

The cable is spooled onto the drum in layers. As the drum revolves the Level wind travels parallel to the drum axis and ensures that the cable spools precisely onto the drum relative to the strand of cable that it will lie next to. If there are 50 strands of cable per layer, the Level wind must reverse direction after the drum makes 50 revolutions (turns).



Automatic and manual

The top picture shows the Level wind in automatic mode. To change to manual you must press the Mode button. Then the page will look like the next picture. Note that the level wind motor is also stopped now.

Controlling Direction of Travel

The system data that the PLC uses to reverse the direction of the Level wind is the Encoder data identified as End Position Values. They are the numbers displayed at the ends of the position bar. It may be necessary to re-set the End Position Value to ensure that the Level wind reverses direction appropriately. The Level wind encoder is of the incremental type and tracks Level wind position by monitoring the revolutions of the spindle to which the Level wind is attached. Level wind position can therefore be read as a numerical encoder value.

Resetting the End Position Values

The level wind stops $\frac{1}{2}$ cable diameter from the drum flange to prevent wear on the cable and to better control layer shift.

Each layer of cable has the same end position values. Resetting the End Position Value is done using a rod of same diameter as the cable. Move the level wind to the end, so the rod aligns with the inner side of the drum flange and the level wind. Setting the end point is then achieved by pressing the number at the end of the position bar for 5 seconds. The $\frac{1}{2}$ cable diameter point is then made automatically.

10.5.4.1 Level wind Position Bar

Numerical value of current Level wind position. This value changes as a function of Level wind movement.



The blue bar is used as a visual indicator of Level Wind position.

The thin grey bar below is the Level Wind Setpoint value.

The Level Wind will automatically stop half a cable diameter from the End Stop.

10.5.4.2 Drum Status

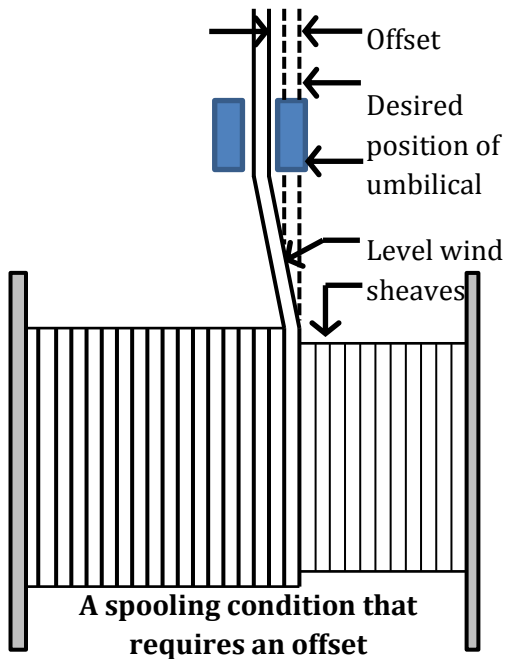
A 'turn' is one revolution of the drum. A layer of cable is composed of a certain number of turns.



Adjusted value of the absolute encoder at the drum. Refer to Level Wind Start Point for more information.

Shows which layer of cable is currently being paid-in or out.

10.5.4.3 Level Wind Offset Settings



Offsets

Due to normal irregularities in the umbilical there can occur imprecise spooling. This is a normal occurrence and Offset Settings is the provision used to correct the condition. An offset forces the level wind to speed up during operation, relative to its normal traverse speed, to reposition itself accordingly. It is common to have offsets on different layers and at different turns. The operator must, by observation, determine where an offset is necessary. Not using offsets when the conditions require one, results in unnecessary and costly wear on the equipment and the umbilical.

Offset Settings Page

The **Number** column. The number is not related to the layer where the offset is occurs and does indicate the sequence of the offsets.

The **Start Layer** column. The whole number value indicates which layer the offset occurs and the turn at which the offset occurs is given by the decimal

The **Offset turns** column. This value is the distance the level wind has been moved, in terms of the number of turns of the drum, or fraction of, if the level wind were travelling normally.

Setting an Offset

1. Stop the winch where the offset is needed.
2. At Level wind page (LWP), change operation to manual. The horizontal offset arrows will appear.
3. At level wind offset page (LWOP), press Start. The Start layer value will automatically display position.
4. At the LWP, use the arrows to reposition the level wind. The drum does not revolve.
5. At the LWOP press Stop. The Offset turns value will automatically display a + or - value.
6. At LWP change operation to automatic and resume operation.

Offset at another layer than the current cannot be deleted.
Offset at layer 2 after step 3

Offset at layer 2. Spooling is at layer two, offset can thus be deleted.

Number	Start layer	Offset turns	
1	0.00	0.00	
2	2.84	1.64	Delete
3	0.00	0.00	
4	0.00	0.00	
5	0.00	0.00	
6	0.00	0.00	
7	0.00	0.00	

2.37 layers Level wind encoder: 659143

Menu Main page Setting I/O list ? curves

Link to Offset Settings Help Page

Current level wind position, layer two and 37% full

10.5.4.4 Level Wind Start Point

NOTICE

The Start Point must only be set when a new umbilical is being installed on the drum and when there are zero meters of umbilical on the drum. The operational functions that are dependent on this setting are critical to safe operation.

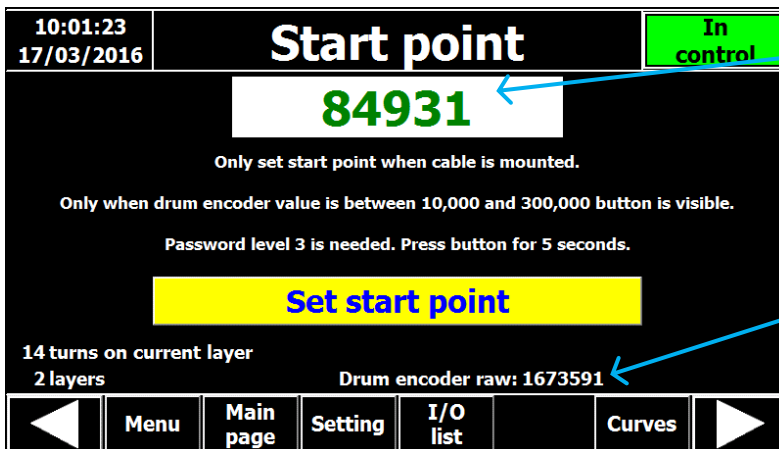


WARNING

The Start Point page has three functions: It enters the value of the absolute encoder at the drum, when there are zero meters of umbilical on the drum, into the mathematical functions that coordinate level wind movement with drum rotation. It records the value of the absolute encoder, when there are zero meters of umbilical on the drum. And, when the start point is set, the Drum Encoder value that is displayed on the Level Wind Page will show zero.

For the mathematical functions to work, the drum encoder value must fall into a range between 10,000 and 300,000. A suggested value is 50,000. If the encoder value is not suitable the value can be adjusted by removing the drive chain at the drum encoder and rotating the spindle manually. The Drum Encoder Raw value on the screen will change. When the Drum Encoder Raw value is acceptable, the yellow Set Start Point button will display.

Press the Set Start Point button for 5 seconds and the operation is completed.



This is the recorded value of the absolute encoder at the drum when there is zero meters of cable on the drum. It does not display the operational value of the drum encoder.

The Drum Encoder Raw field displays the value of the absolute encoder at the drum. During operations it would be observed to change, and at the start point it will show the same value as the start point.

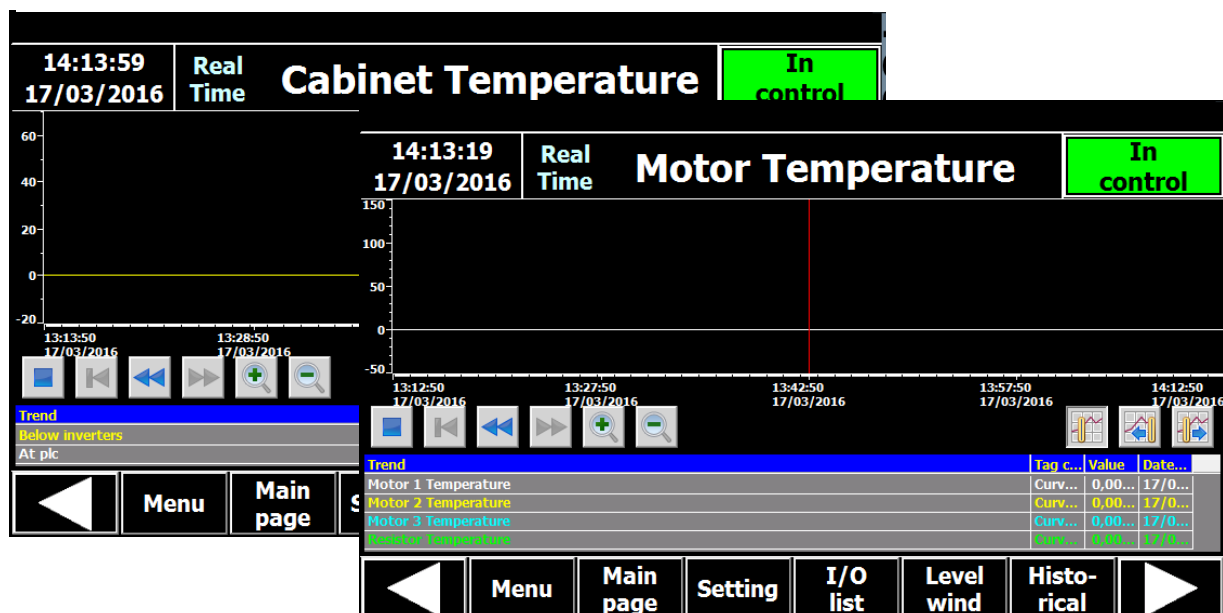


Level Wind Page

The Drum Encoder field on the Level Wind page will display '0' when the Start Point is set. During operations it would be observed to change, having the same point of origin as the meter Cable Out.

10.6 Curves

There are two pages that display Historical or Real Time data for the temperature sensors. There are temperature sensors distributed among the winch motors, the level wind motor, the HPU motor, the Brake Resistor, the Power Supply Cabinet, and the Control Cabinet. There are also curves for the MRU signal.

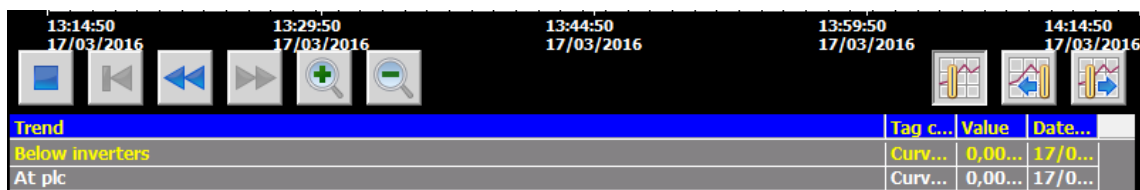


Real Time Historical data is shown on the graphs, and Real Time data can be shown by pressing the button.

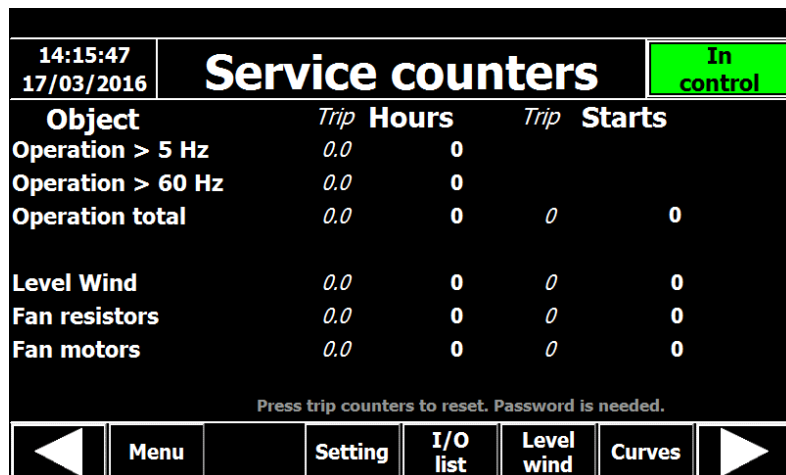
Historical Real Time data is shown on the graphs, and Historical data can be shown by pressing the button.

Browse, pause, and zoom functions are located above the data field.

Read out ruler adjustment

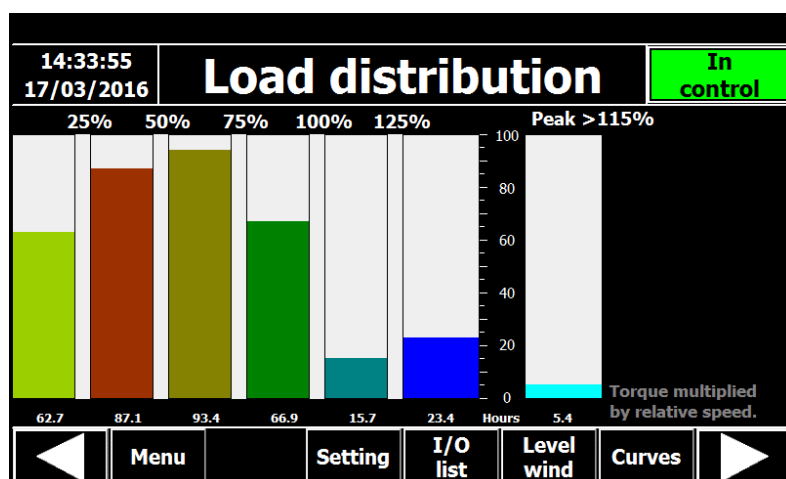


10.7 Counters



For the winch as a whole there are counters for starts and for operation hours with different speed. Operation in total is also including the two next lines.

The trip counters can be reset by pressing the value.

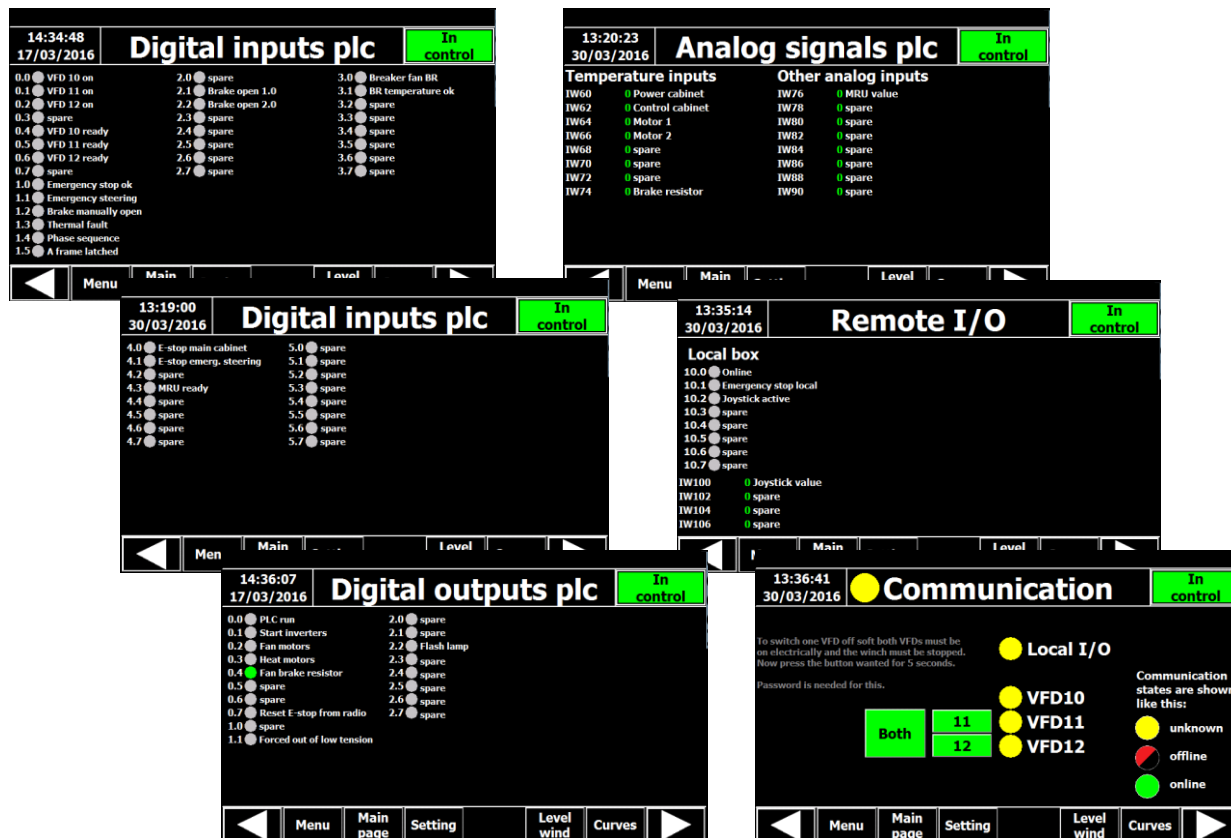


The operation of the winch is recorded in hours of load applied to the winch as a percentage of allowable torque. It is also coupled to the relative speed, such that 1 hour of 25% torque at 50% speed is recorded as 30 minutes.

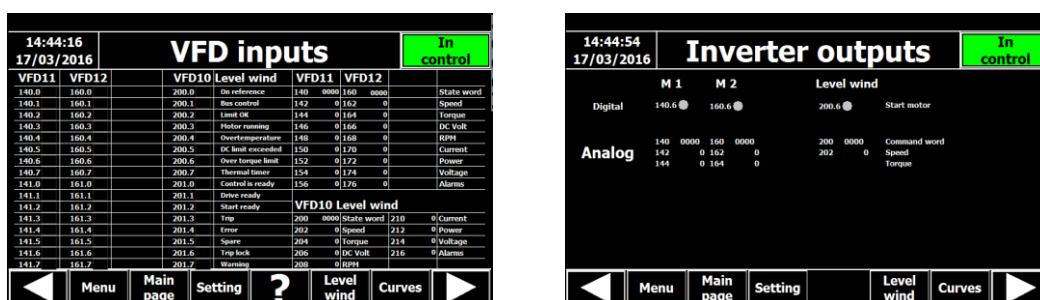
Peak load is shown separately.

10.8 I/O - Input and Output

Eight pages showing the Input and Outputs of the Programmable Logic Controller (PLC) system, including the Inputs/Outputs from the Variable Speed Drives (VFDs)



The status of the elements on the Communication Page is shown by a colored circle. Green indicates Online and functioning. Yellow indicates an unknown status. Flashing red indicates an error. A solid green circle beside the headline will display when all is well.



Note especially for inverters that the command and state words (first analog value) can be read as single bits here. This can be useful for service and maintenance.

10.9 Alarm and Warning Page, Alarm Log

The line at the top of every page is reserved for alarm and warning banners. Alarms and alarm log is common for both winches and cursor frame but located

I Drum encoder not counting

Pressing the alarm/banner field brings up the alarm page where current alarms and warnings are displayed. Alarms stop operations while warnings do not. Alarms must be resolved and they must be acknowledged on the alarm page before normal operations can resume. Warnings are assigned numbers between 1 and 80 and alarms are assigned numbers 101 and above.

Numerical reference to the alarm or warning

Time and date of the alarm

Status

Description of alarm

Columns widths are adjustable

Acknowledge button

Navigate to the Alarm Log Page by using the navigation arrows

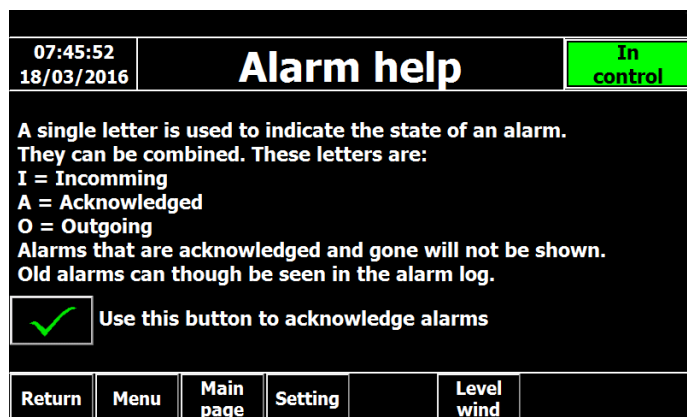
No.	Time	Date	Status	Text
114	07:42:57	18/03/2016	I	Low pressure gear oil
111	07:42:57	18/03/2016	I	Level wind thermistor
110	07:42:57	18/03/2016	I	Level wind encoder fault
108	07:42:57	18/03/2016	I	Inverter level wind error
105	07:42:57	18/03/2016	I	Inverter 1 error
102	07:42:57	18/03/2016	I	Emergency stop
45	07:42:33	18/03/2016	I	Info-Motor temperature difference
43	07:42:33	18/03/2016	I	Info-Resistor hot no pay out
42	07:42:33	18/03/2016	I	Info-Overload protection is active
38	07:42:33	18/03/2016	I	Info-Motor 2.1 hot
36	07:42:33	18/03/2016	I	Info-Motor 1.1 hot
35	07:42:33	18/03/2016	I	Info-Motor 1 hot
34	07:42:33	18/03/2016	I	Info-Low pressure cooling water

10.9.1 Alarm Status

Alarm status is shown by the background colour of the table rows.

Status	Colour
Incoming	flashing red I Emergency stop
Incoming Acknowledged	pink IA Low pressure HPU
Incoming Outgoing	orange IO Low level HPU oil
Incoming Outgoing Acknowledged	white IOA Emergency stop
Incoming warning	yellow I Info-Level wind manual

Status for warnings do not include Acknowledged **A**, or Outgoing **O**



10.9.2 Distinction Between Alarms and Warnings

When an alarm occurs operation is stopped immediately in a fashion similar to an Emergency Stop. Warnings do not stop operation but in some cases may impose restrictions. Some warnings associated with the Brake Resistor, for example, will result in the loss of the pay out function. Alarms that result in the loss of pay out have the phrase 'no pay out' in their explanatory text. The operational condition that is responsible for causing the Alarm must be resolved and the alarm must be acknowledged on the Alarm Page before normal operations can resume. When an alarm has been acknowledged and the conditions have been resolved the alarm will be removed from the list. Acknowledgement of an alarm is for administrative purposes only.

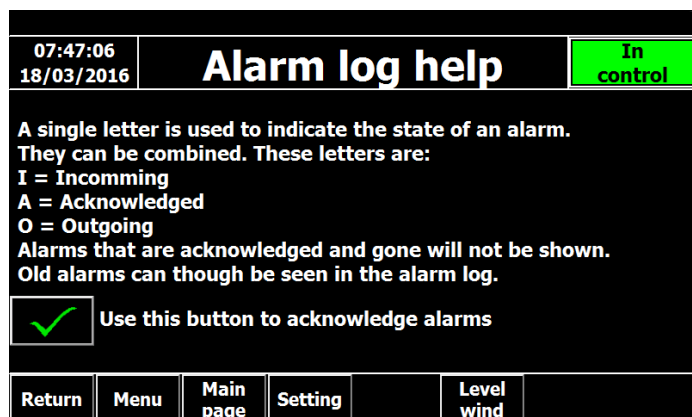
Though operation may be limited it is possible to operate with multiple active warnings. A pattern of warnings or a series of associated warnings may indicate a mechanical problem that can be resolved before a failure occurs that results in loss of operation time. A warning will remain on the list until the operational conditions that caused the warning are resolved.

10.9.3 Alarm Log

07:46:27 18/03/2016		Alarm log			In control
No.	Time	Date	Status	Text	
102	07:4...	18/03...	IOA	Emergency stop	
105	07:4...	18/03...	IOA	Inverter 1 error	
108	07:4...	18/03...	IOA	Inverter level wind error	
110	07:4...	18/03...	IOA	Level wind encoder fault	
111	07:4...	18/03...	IOA	Level wind thermistor	
114	07:4...	18/03...	IOA	Low pressure gear oil	
45	07:4...	18/03...	IO	Info-Motor temperature difference	
43	07:4...	18/03...	IO	Info-Resistor hot - no pay out	
42	07:4...	18/03...	IO	Info-Overload protection is active	
38	07:4...	18/03...	IO	Info-Motor 2.1 hot	
36	07:4...	18/03...	IO	Info-Motor 1.1 hot	
35	07:4...	18/03...	IO	Info-Motor 1 hot	

Acknowledgement of alarms is not possible from this page.

The log can be used as a tool to tell how long an alarm or warning was present and for alarms how long it took before they were acknowledged. By comparing it with the graphs a cause in the operation might be found.



10.10 Troubleshooting



- Electrical maintenance and repairs must only be performed with the power disconnected at the circuit breakers at the Power Supply Cabinet.
- Only certified electricians or qualified personnel should maintain or perform repairs to the electrical systems.
- Only certified hydraulic technicians or qualified personnel should maintain or perform repairs to the hydraulic systems.
- Only certified mechanics or qualified personnel should maintain or perform repairs to the mechanical systems.
- All personal safety precautions apply.

10.10.1 Warnings

No.	Text	Meaning	Troubleshooting
1	Info-Override brake control	Motor brake has been opened manually.	When the brake problem has been resolved, turn the "Brake release button", placed on main cabinet, back in normal position. For marking and position in cabinet, see relevant section of user manual.
2	Info-Breaker fan resistor	The motor for cooling the brake resistor has cut off. <i>It will cause no cooling air on the brake resistor, which will lead to overheating of the brake resistor during pay out.</i>	Check the fan-motor and if the fan is blocked.

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		<i>Hauling inn will always be possible.</i>	
3	Info-one VFD is off by software	On the communication page one VFD can be turned off by software.	Restrictions apply as AHC is not possible.
7	Info-breaker inverter 1	Inverter breaker been cut off. <i>If a breaker trips during operation the winch will stop.</i>	Switch on the breaker, see if any messages is written in the front-panel in the VFD. It is possible to start operation again, but the brake on that specific VFD has to be released manually. At least 2 VFDs must be active for the operation to continue. NOTE: Only allowed for a limited period

10	Info-Breaker level wind	Inverter breaker been cut off.	Switch on the breaker, see if any messages is written in the front-panel in the VSD. It is possible to start operation again. The drum will move but the Level Wind will keep its position. NOTE: This may cause serious spooling problems.
12	Info-Thermal breaker	Operation will be limited.	Check if the motor in question runs freely.
22	Info-E. stop local box	Activated in local control box.	If alarm 102 is not present: Check the wiring to the activated emergency stop.
23	Info-E. stop main cabinet	Activated in the main cabinet.	If alarm 102 is not present: Check the wiring to the activated emergency stop.
25	Info-E. stop remote box	Activated in rack control box.	If alarm 102 is not present: Check the wiring to the activated emergency stop.
26	Info-Electric cabinet too hot	The cabinet is more than 45 °C <i>This will over time degrade the electrical components.</i>	Check if measurement is valid. If no: Replace pt100 If yes: Check the cooling to cabinet, air through vent louvres Eliminate: Sunlight and external heating source
27	Info-Hand over control wanted	Warning will be present on HMI after request for switching	For handing over control, one HMI or radio shall ask for

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		control between on Local control panel and Remote control panel and radio control unit	control and the one in control shall allow it by pressing the buttons on the screens. See this manual under Control for further information.
30	Info-High temperature resistor	The brake resistor is hot. <i>If temperature keeps rising, it will exceed the limit and it will then not be possible to pay out.</i>	Check cooling of the brake resistor If warning 2 is present then the fan is off. If the cooling is OK, run the winch more moderately.
32	Info-Level wind manual	Level wind operation is set to manual. <i>The Level Wind will not position itself automatically.</i>	This is a setting changeable in the HMI panel in control. See this manual under Level wind page for further information.
33	Info-Level wind position error	The level wind is not where the steering has calculated it to be. If the level wind is in manual mode this warning is likely to occur. Spooling will be wrong.	If the level wind is set to automatic and the winch has started it is a mechanical problem. Control tightening of the fixing bolts and the spindle. Check the encoders and the chains.

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34	Info-Low pressure cooling water	There is not enough cooling water so the cable is not cooled properly in the drum. It can cause errors on the equipment at the end of the cable.	Operation should be stopped in the equipment at the end of the cable until the cooling water supply is correct again. Check water supply and pressure switch.
35	Info-Motor 1 too hot	There is not enough cooling of the motor. If one motor is warmer than the rest it is probably a mechanical error like a bad bearing. If warning 45 is active that is most likely the case.	Operation can continue but one should keep an eye on the temperature development. Control the fan and feel using a hand if the warning is right. Be aware of the motor temperatures.
41	Info-MRU not ready	This signal is required to run AHC. Without this signal AHC is not possible. If the signal disappears following a severe rolling of the ship the signal might return after 10 minutes.	Control will automatically switch to speed control if the signal disappears during AHC operation. Constant tension may in some cases be used instead of AHC.
42	Info-Overload protection is active	The winch is being pulled backwards (pay out) with the joystick in middle position in speed control. The load or cable is probably entangled with some installation on the seabed.	Joystick cannot be used in speed control until this warning has been acknowledged in the alarm list. This is to make the operator aware of this unusual and potentially hazardous situation (for the cable).
43	Info-Resistor hot – no pay out	The brake resistor is very hot, over 100 °C and <i>pay out is impossible</i> . Pay in is possible.	Wait for the temperature in the brake resistor to drop. Maybe operation should be more moderate. Check the cooling.

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44	Info-Cable nearly all out	There are less than 8 rounds of cable on the drum. Only pay in is possible. <i>Pay out is not possible without permission.</i>	To be able to pay out more cable press the button "allow full unwinding" on the page for operation selections. The last round of cable can only ever be unwound using emergency steering.
45	Info-Motor temperature difference	There is a big difference on each of the motors' temperatures. More than 20 °C. If the motor temperature is way out of normal range the motor may be defect.	Check the hot motor for mechanical errors like defect bearings. Control the sensor. And check the cooling for obstacles. Check the gear.
46	Info-Emergency steering	The knob is turned to emergency steering. This is hopefully intended.	Only emergency steering is possible until the knob is turned back. If it is working the panel can be used for read outs.
48	Info-Forced out of low tension	This applies to latched A-frame operation. It is only possible with an A-frame connected. Control mode has been changed automatically from low tension to speed control.	The A-frame has most likely been running too fast. A 30 second output is given to possibly stop the A-frame. Low tension must be selected again.
50	Info-Resistor warm	The brake resistor is warm. Pay out will soon become impossible if temperature increases.	Pay out with less speed.

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10.10.2 Alarms

As all alarms causes operation to stop instantly this is not stated for each alarm.

No.	Text	Meaning	Solution
101	Testing too long	No operation is possible.	For service technicians only.
102	Emergency stop	An emergency stop button has been activated. No operation is possible.	Reset emergency stop. - If no emergency stops are activated a wire is broken or similar damage.
105	VSD1 error	Something serious has happened with the VFD. See the local panel on the VFD for more information. Press the Info button on the VFD.	If further trouble shooting is needed see the VFD manufacturers manual. The winch can be operated with one VFD off.
108	VSD level wind error	Something serious has happened with the VFD. See the local panel on the VFD for more information. Press the Info button on the VFD.	If further trouble shooting is needed see the VFD manufacturers manual. The winch can be operated with one VFD off.
110	Level wind encoder fault	The level wind encoder is not counting or is counting incorrectly.	If the encoder input is 0 there is most likely a problem with the communication. Otherwise, control the encoder mechanically especially the chain drive.
111	Level wind thermistor	Level wind is overloaded.	There is most likely a mechanical reason for the overload. Control bolts and bearings. And control sensor.

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116	Drum encoder not counting	No counting pulse when the drum is turning	If the encoder input is zero then there is a problem with the communication. Otherwise, control the encoder mechanically especially the chain drive and fixing of sprocket to encoder shaft.
117	Motor 1 brake is not open	Feedback signal for "brake open" is missing	<ul style="list-style-type: none"> - Check that the brake is working correctly. Try opening and closing it manually and listen for the sound, compare with the other brakes. - Check if the feedback switch is defect or incorrectly adjusted. - Check wiring from the feedback switch.
123	Motor brakes are not all open	Common alarm for all the drum brakes.	Find the brake with the error and repair it.
124	Motor brakes are not all closed	Common alarm for all the drum brakes	Find the brake with the error and repair it.
133	Motor 1 brake is not closed	The brake is not closing when the winch is stopped on the "stop" button on the HMI. This alarm is to check that the brake feedback sensor is not constantly on.	<ul style="list-style-type: none"> - Check brake functionality as described under 117-122 - Check brake feedback switch adjustment.
139	Local I/O communication lost	Communication to the local control is lost or the 24 V dc control circuit power is lost. Signals are not reliable.	<p>This alarm can be acknowledged to make it possible to run with only rack.</p> <p>This is most likely caused by a broken cable or bad connector.</p> <p>Correct the error if possible.</p>
140	Rack I/O communication lost	Communication to the rack is lost or the 24 V dc control circuit power is lost. Signals are not reliable.	<p>This alarm can be acknowledged to make it possible to run with only local control box.</p> <p>This is most likely caused by a broken cable or bad connector.</p> <p>Correct the error if possible.</p>
141	Inverter 1 not auto	The VFD is set to the wrong kind of operation.	Press the button "Auto" on the VFD.

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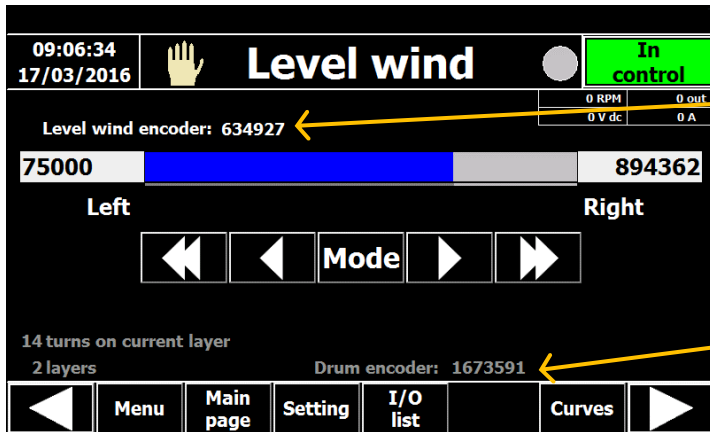
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144	Inverter level wind not auto	The VFD is set to the wrong kind of operation.	Press the button "Auto" on the VFD.
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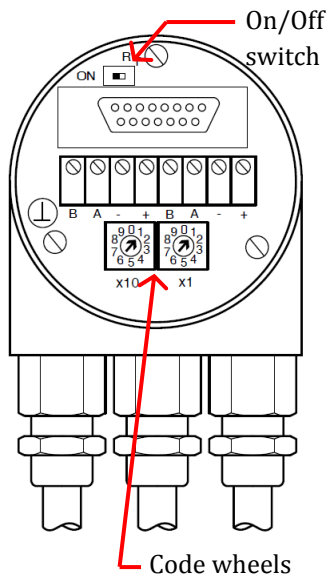
10.11 Encoder Replacement



Value from level wind absolute encoder

Value from drum absolute encoder

1. Record the encoder values from the Level wind and drum at the Level wind page
2. Switch off the power supply at the Power Control cabinet.
3. Before removing it is advisable to photograph or otherwise record the following elements of the encoder installation; The configuration of the leads, the position of the code wheels, the position of the On/Off switch Disconnect the various leads from the faulty encoder and remove it from the winch and the mechanical connection of the encoder to the winch.



4. Each encoder is identified by the PLC by the position of the code wheels and the On/Off switch. Set the code wheels and the On/OFF switch to match the old encoder.
5. Mount the encoder onto the winch and reconnect the leads. Do not reassemble the chain drive.
6. Turn on the power supply at the Power Supply cabinet.

NOTICE

Do not resume operations! Observe that the encoder value recorded at step 1. is different from the value now shown on the Level wind page. The operational functions that are dependent on this setting are critical to safe operation. It is necessary to manually rotate the encoder axle such that the displayed value is the same as the recorded value.

7. When the encoder value has been set correctly it is safe to reassemble the chain drive and resume operations

10.12 PLC Replacement

The Programmable Logic Controller, PLC, is a digital computer used for automation of electromechanical processes. The PLC is composed of a Central Processing Unit (CPU) and additional Input / Output (I/O) modules. It is housed in the Control Cabinet, usually in the top left corner. The control program is stored on a Flash Memory Card in the CPU.

The modular construction of the PLC means that in the event of a failure, it is only required to replace the faulty CPU or individual I/O module as needed. Before removing it is advisable to photograph or otherwise record the configuration of the I/O leads and have available the relevant wiring diagram found in the Systems Documentation manual.

Replacing an I/O module does not require any modification to the CPU.

If the CPU is replaced, it is required to install the Flash Memory Card.

10.12.1 Flash Memory Card

The computer programming which controls the PLC is stored on a flash memory card which must be in the CPU, the CPU does not store the 'program'. The flash memory card is synonymous with the 'program'. A replacement flash card is provided by the manufacturer. Follow the guidelines for installing a new program in an existing CPU or for installing an existing program in a new CPU.



Flash memory cards are sensitive to electrostatic discharge (ESD) damage. ESD damage, which can occur when electronic cards or components are handled improperly, results in complete or intermittent failures. Follow the provided guidelines for proper handling.

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished surface.
- Place a removed flash memory card on an antistatic surface or in a static shielding bag. If the card will be returned to the manufacturer, immediately place it in a static shielding bag.
- Avoid contact between the card and clothing. The wrist strap protects the card from ESD voltages on the body only; ESD voltages on clothing can still cause damage.
- Do not remove the wrist strap until the installation is complete.

Restarting after replacement:

1. Power up the winch
2. If the CPU is in RUN, the CPU will go to STOP mode. The maintenance (MAINT) LED flashes to indicate that the memory card needs to be evaluated.
3. Turn power at the Power Supply cabinet off and then on.
4. The RUN/STOP LED alternately flashes green and yellow. When the RUN/STOP LED turns to solid green and the MAINT LED is off, operations may resume.

11 Maintenance

NOTICE

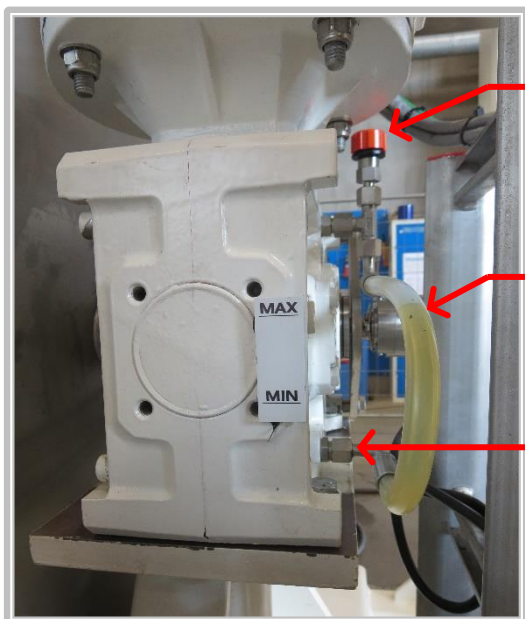
Use only the products specified in section 12.5
Recommended Fluids and Lubrication.

To maintain the warranty for the full period, replacement parts must conform to the specifications found in the User Manual, Systems Documentation Manual, or specifications otherwise authorized by SEPRO A/S.

Failure to perform the activities outlined in the Maintenance section may significantly reduce the working life of the winch.

11.1 Fluid levels

11.1.1 Gear at Drum Motors

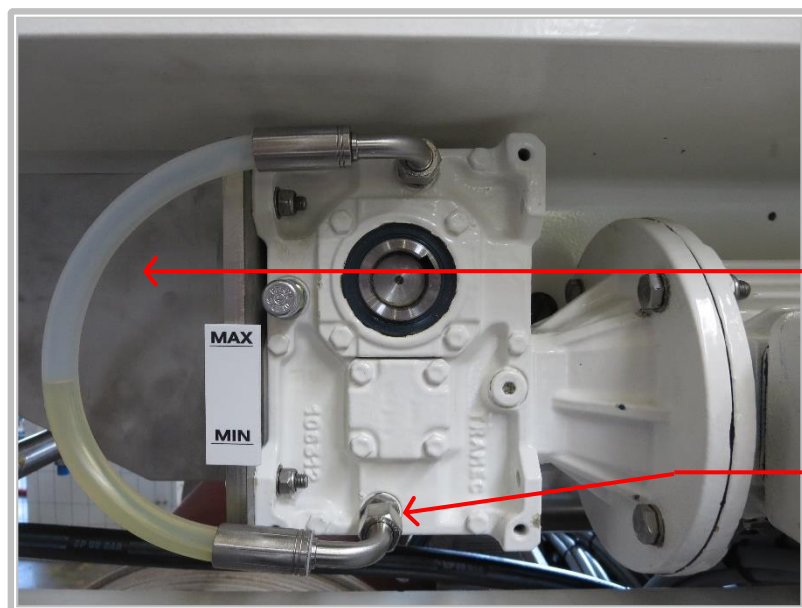


Breather type fill cap

Fluid level inspection hose.

The inspection hose can be removed at the bottom to drain the gear box

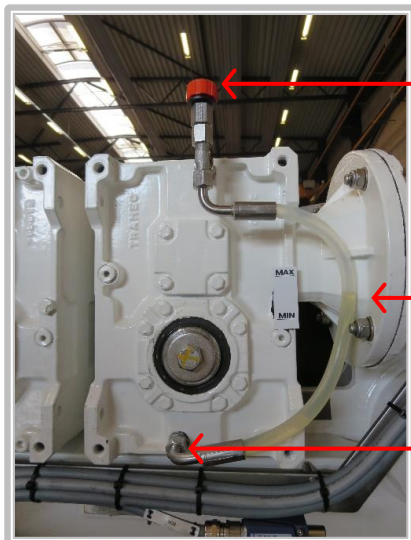
11.1.2 Gear at LW Motor



Fluid level inspection hose.

The inspection hose can be removed at the bottom to drain the system

11.1.3 Gear at Traction Motors



Breather type fill cap

Fluid level inspection hose.

The inspection hose can be removed at the bottom to drain the system

11.2 Lubrication

This section illustrates the components that are provided with grease fittings. Refer to sections 5 System Illustrations and 11.3 Maintenance Schedule.

NOTICE

It is essential to verify by observation that the grease is reaching the components

There are (8) grease fittings on the traction winch. Additionally there are provided (2) battery powered, gas driven automatic lubrication dispensers on the Levelwind that lubricate the Guide Sleeve bushings and the Traction Sheave bushings.

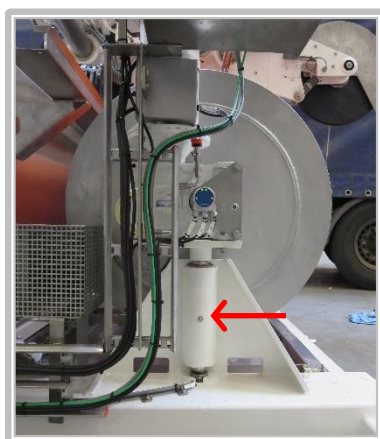
Grease Fittings:

- | | | |
|--------------------------------|-------------------------------|----------------------|
| 1. Drum Guide Tube Motor End | 2. Drum Guide Tube Outlet End | 3. Drum Axle Bearing |
| 4. Spindle Bearing Encoder End | 5. Spindle Bearing Motor End | 6. Pivot Pin |
| 7. Pivot Sheave axle | 8. Levelwind Nut | |

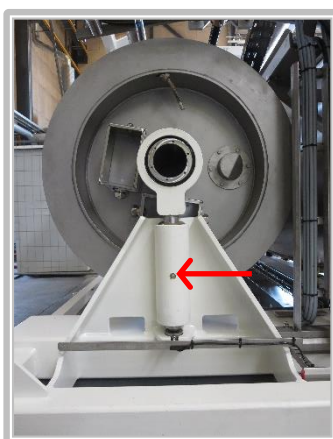
Automatic Dispensers:

Refer to Section

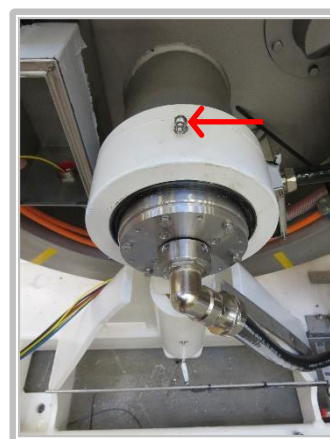
- | | |
|-----------------------------|----------------------------|
| A. Outboard Traction Sheave | B. Inboard Traction Sheave |
|-----------------------------|----------------------------|



1. Guide Tube at Motor End



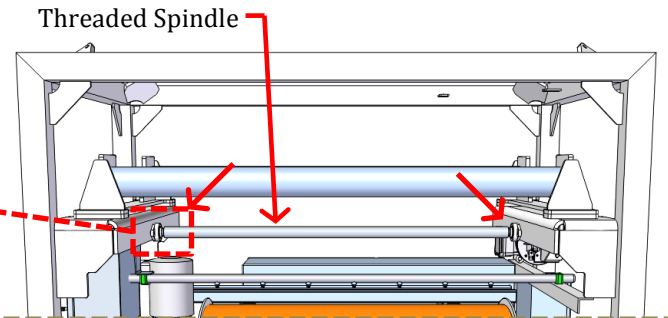
2. Guide Tube at Outlet End



3. Drum Axle Bearing



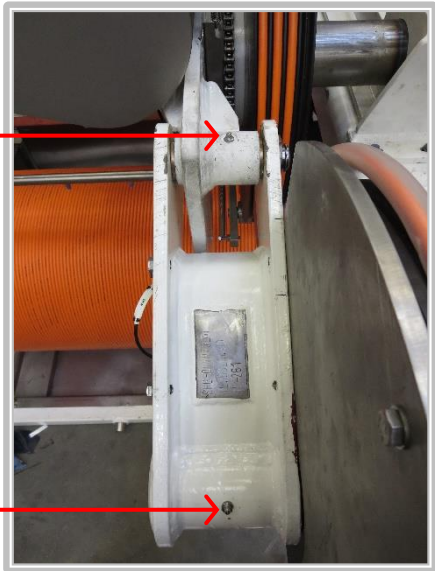
4. Bearing at Encoder End
5. Motor End Similar



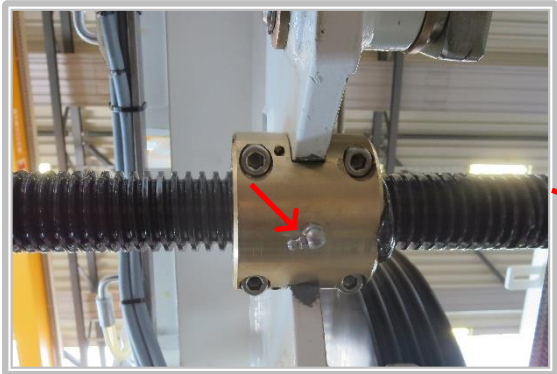
Bearings at Threaded Spindle
Many Parts Not Shown For Clarity

6. Pivot Pin

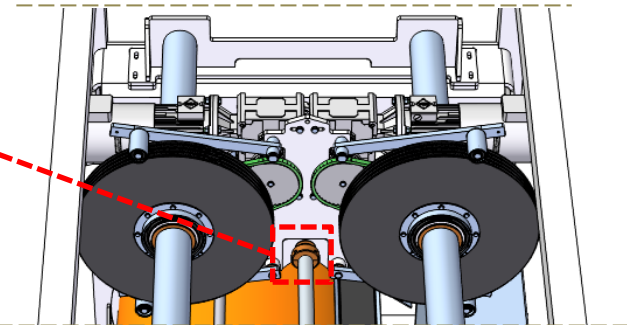
7. Pivot Sheave Axle



Grease Fittings at Pivot Sheave



8. LW Nut

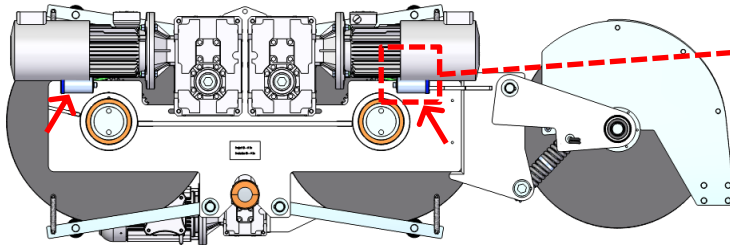


Grease Fitting at LW Nut

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Dispensers at Traction Sheaves

Refer to section OEM Instructions,
Lubrication Dispenser on page 129.



A. Dispenser at Outboard Traction Sheave

B. Dispenser at
Inboard Traction Sheave Similar

Set the lubrication time setting for 9 months.

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11.3 Maintenance Schedule

Maintenance Logs are provided at the end of this document.
Note: Logs for daily maintenance are not provided

The gearbox oil at the drum motors must be changed after the first 100 operating hours.

Date:

Signature:

11.3.1 Daily

Check Oil Level at storage drum motor, traction motors, and LW motor
Visually inspect the threaded spindle at the Level wind for adequate lubrication.
Visually inspect the guide tubes at the Level wind for adequate grease.
Before and during operation, make a visual inspection.
During operation, listen for any unusual noises that might indicate malfunction.

11.3.2 Weekly / 50 Operating Hours

Inspect the guide tubes at the LW and remove any debris. Manually apply lubrication to the guide tubes.
Inspect the threaded spindle at the LW and remove any debris. Manually apply lubrication to the spindle and charge the grease fitting with a grease gun at the LW Nut.
Apply grease to the drive chains with a brush.
Charge the grease fittings with a grease gun at the remaining locations as described in section 11.2 Lubrication.

11.3.3 Monthly / 200 Operating Hours

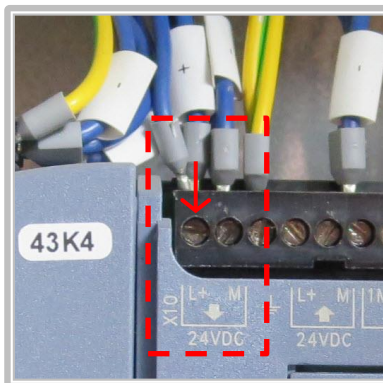
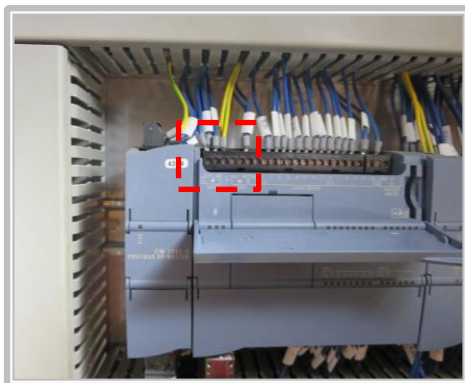
Perform a functional test of the emergency stops at all locations.

11.3.4 6 Months / 1,000 Operating Hours

Test Emergency Steering
Inspect Levelwind Nut

11.3.4.1 Emergency Steering Test Procedure

Refer to section 6.3.1.2.1 Emergency Steering. To simulate a failure of the PLC the power to the PLC must be removed at the 24 V supply terminal.



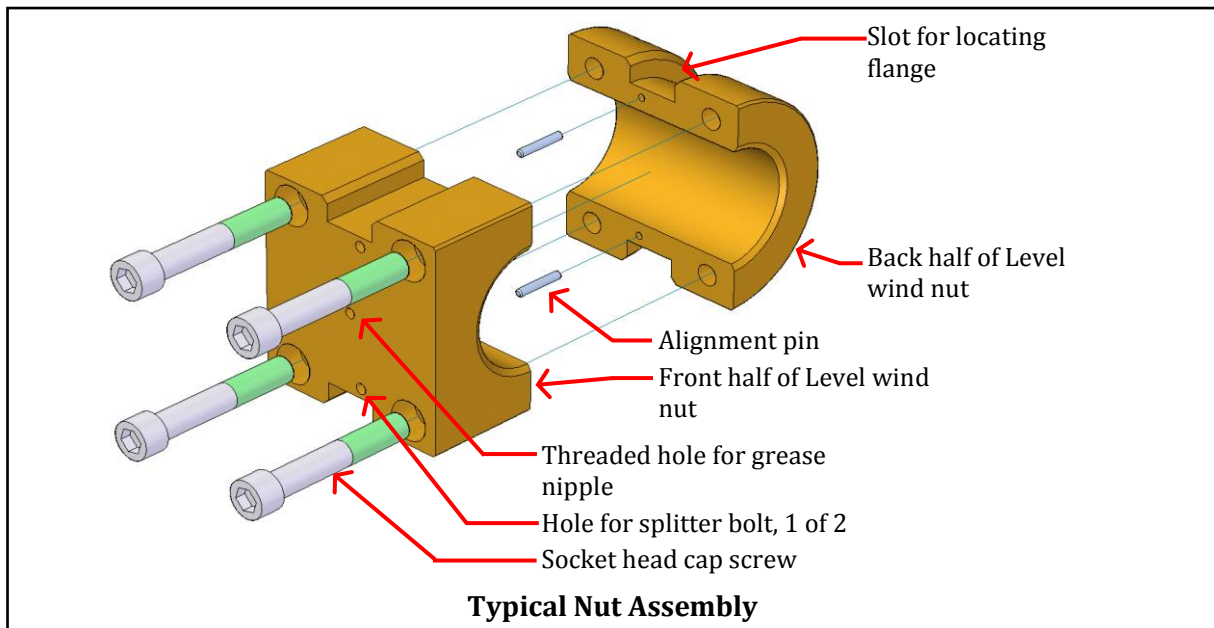
Use the procedure described in section 6.3.1.2.1. A short pay in/out is adequate to confirm proper function.

11.3.4.2 Nut Inspection at Level Wind

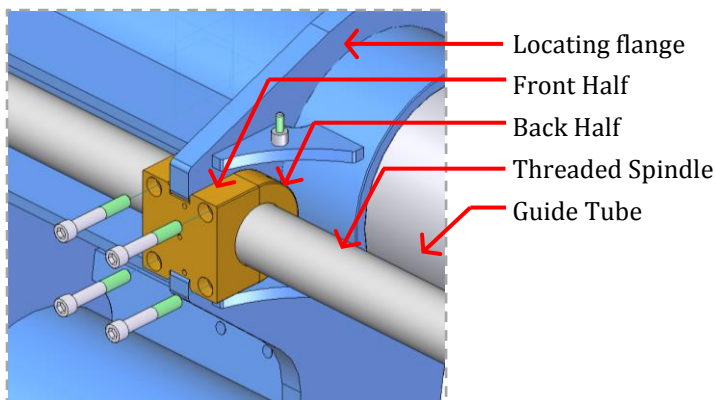


The following procedures are designed for and with the following conditions;

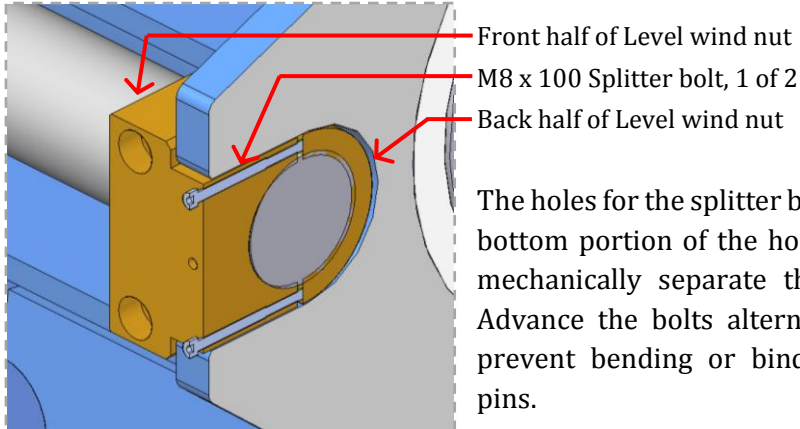
- The inspection may be performed while the winch is energized.
- The inspection requires personnel at the nut and an operator at the active control station.
- The active control station must not be left unattended during the inspection.
- Before beginning the procedure establish a communication protocol between the personnel at the nut and the operator.
- The illustrations show a Level wind nut with a 4-bolt assembly configuration. The procedure is valid for 2-bolt assembly.



1. With the payload parked and secured, make a short pay out to ensure the umbilical is completely slack. This also forces the nut into contact with one side of the locating flange. **This step is important if it is required to remove the back half of the nut.**
2. Remove the grease supply hose and any electronic devices. Before disconnecting it is advisable to photograph or record by other means the configuration of the wiring of any electronic devices connected to the nut.
3. Remove the front half of the Level Wind nut.

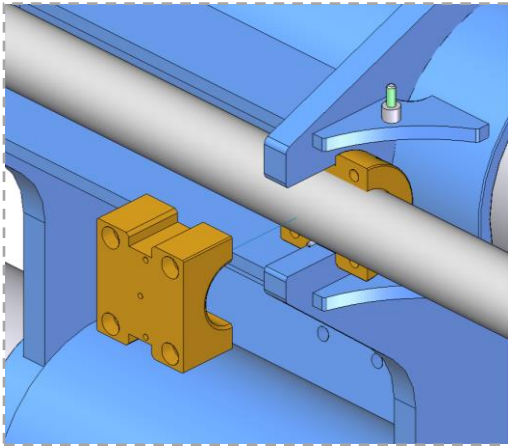


- a. Remove the 4 socket head cap screws



The holes for the splitter bolts are threaded only at the bottom portion of the hole. Advancing the bolts will mechanically separate the two halves of the nut. Advance the bolts alternately and incrementally to prevent bending or binding against the alignment pins.

- b. If the front half of the nut does not release it may be necessary to separate the halves by using (2) M8 x 100 splitter bolts



- c. Remove the front half of the Level wind nut

4. Inspect.

It is safe to conclude that the condition of the front half of the nut indicates the condition of the back half and therefore it is not required at this point to remove the back half of the nut. A visual inspection of the front half should be performed by a qualified mechanic or engineer to determine if there has occurred any unusual wear.

The following are suggested areas of investigation;

Level Wind Nut

- Filings
- Chips
- Areas of discoloration that indicate uneven wear
- Deformations in the thread profile

Threaded Spindle

- Warp or bends
- Areas of discoloration that indicate uneven wear
- Deformations in the thread profile



An unused front half

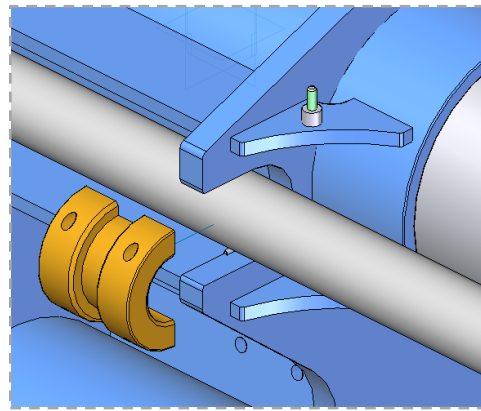
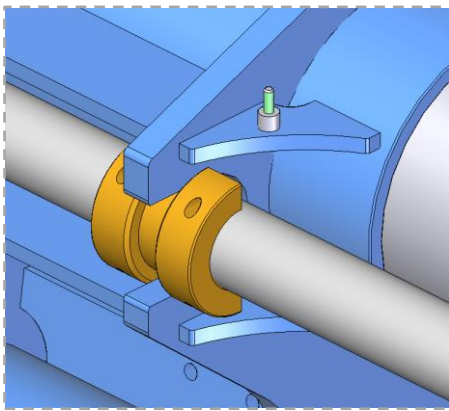
If the visual inspection indicates that further investigation is required and it is desirable to inspect the back half of the nut, use the following procedure.

5. Remove the back half of the Level wind nut.

Freeing the back half will require rotating the spindle. There must be personnel placed at the nut to guide and catch the nut.

- a. Preparations should be made to prevent the nut from falling and being damaged, or causing damage. The nut can weigh approximately 15 kg.

From step 1., the last operation was pay out, therefore the spindle must be rotated in the pay in direction to take advantage of the clearance between the face of the locating flange and the slot on the nut.



- b. In Speed mode, the operator must pay in as slowly as possible while the person at the nut guides and catches it when it becomes free.

6. Inspect as at step 4.

7. Reassemble the Level wind nut.

Items a. and b. apply only if the back half of the nut was removed for inspection.

- a. Apply a generous amount of grease to the threads of the back half of the nut.
- b. Place the back half of the nut onto the spindle and manually hold in place. The operator must now pay out as slowly as possible while the half nut is guided into position.
- c. Apply a generous amount of grease to the threads of the front half of the nut.
- d. Align the nut with the alignment pins and tap into place.
- e. For assemblies using M20 bolts, tighten the bolts to 210 Nm.
For assemblies using M12 bolts, tighten the bolts to 50 Nm.

8. Connect the grease supply hose to the nut. Connect any electronic devices.



9. If the back half of the Level wind nut was removed it is important to verify that the Level Wind changes direction correctly. In the Operations section of the User Manual refer to the Level Wind Page, Resetting the End Stop Values, for a description of correct LW direction change.

11.3.5 Annually / 2,000 Operating Hours

Verify torque values on indicated bolted connections.
Perform static brake test of the Fail Safe Brake System.
Verify function of heating elements.
Verify Function of Brake Resistor.
Check and tighten fasteners in the electrical system.

11.3.5.1 Bolted Connections

The torque values of specified bolted connections are required to be verified annually. Unless otherwise noted, refer to this table to determine the proper torque values based on **Strength Classification** and **Thread Designation**.

- **Strength Classification** is shown at the bolt head.
- **Thread Designation** is determined by the size of the bolt head (wrench size).

The illustrations are not intended to represent the complete equipment. Many parts are omitted for purposes of clarity.

The illustrations indicating the connections sometimes indicate one bolt in a pattern. Similarly, only one connection location may be shown.

NOTICE

WARNING

Maintenance personnel must verify all bolts in the pattern at all connection locations.

Thread Designation	Wrench Size (mm)	Strength Classification			
		10.9 Black/FZV WR2	8.8 FZV/FZB WR2	70 A4 805	80 A4 805
		Tightening Torque (Nm)		Tightening Torque (Nm)	
M5	8	6	4	4	4
M6	10	10	7	6	7
M8	13	25	20	15	20
M10	17	50	35	25	35
M12	19	80	60	50	60
M14	22	120	100	70	100
M16	24	200	150	110	150
M20	30	400	300	210	300
M22	32	500	400	300	400
M24	36	650	500	400	500
M30	46	1,250	900	-	-

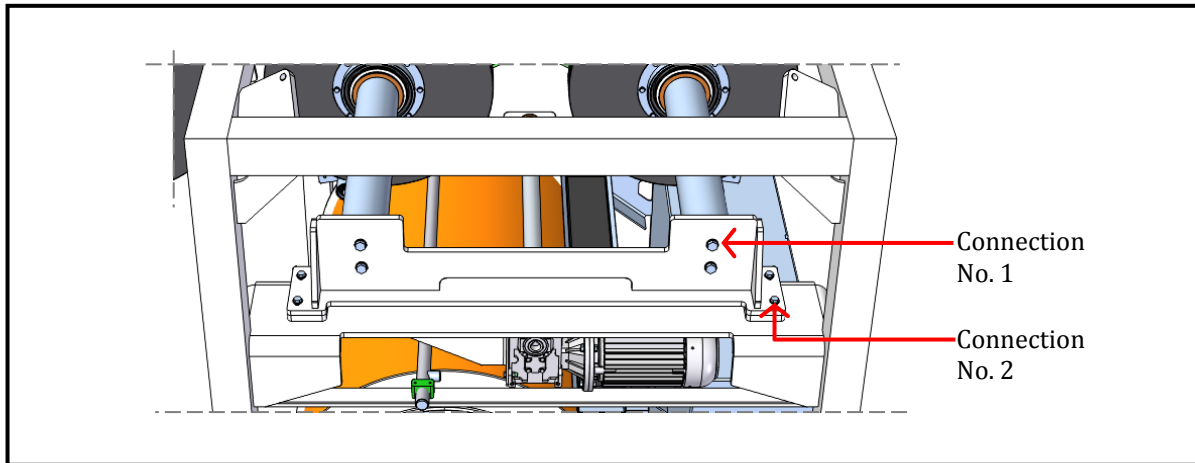
Black = Untreated
 FZV = Hot-dip Galvanized / Hot Galvanized
 FZB = Electric Galvanized / Blue Chromium
 A4 = Stainless Steel (Austentic)

Bolts must be lubricated with the following product
 WR2 = CERAN XM 220
 805 = GLEITMO 805

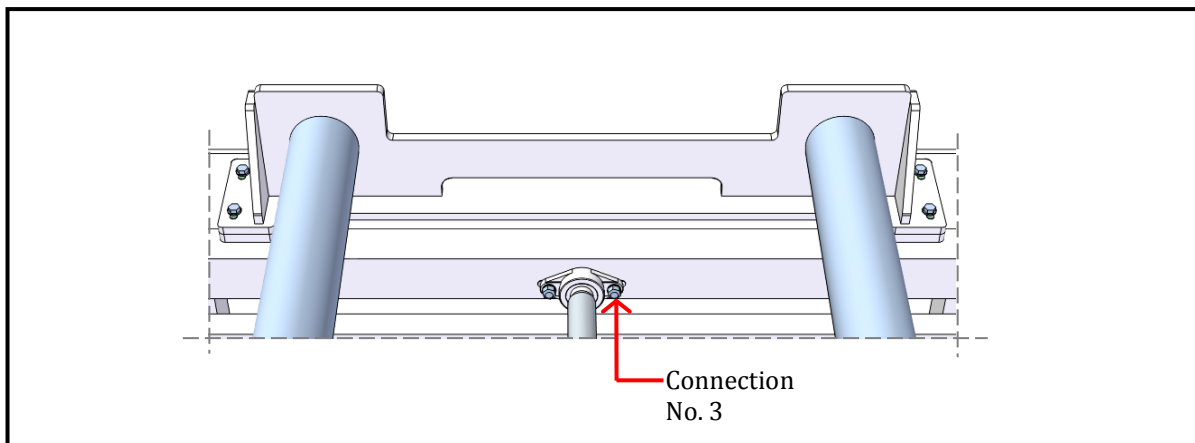
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OE-2000-A3-4-7-2-FS-NZ-003
Serial No. SHG-000973

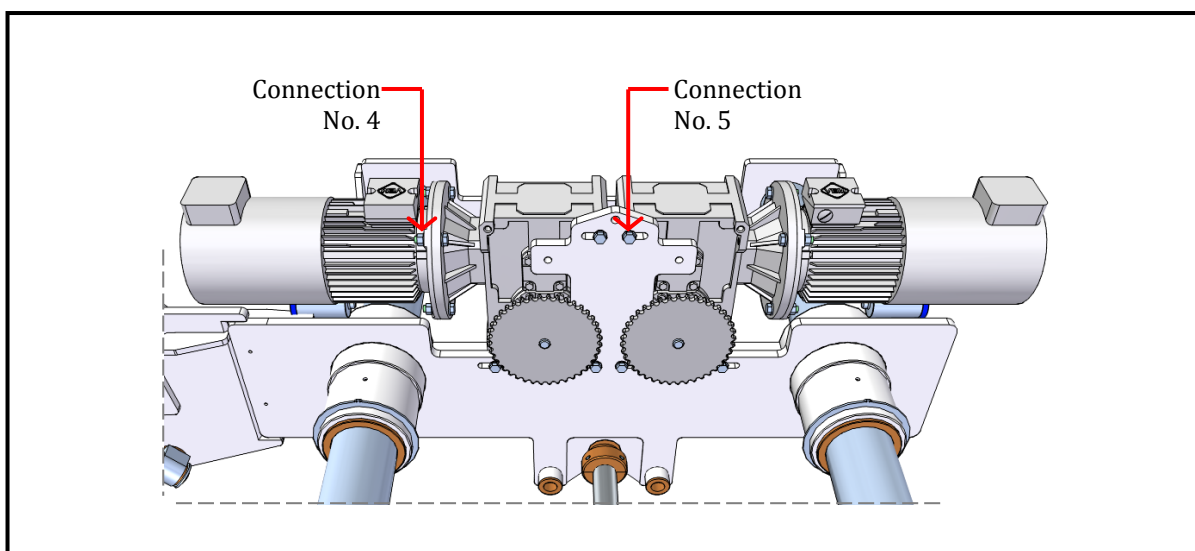
Rev. 0, 24-Nov-'16



Connection No. 1	Guide Tube to LW Gable
Connection No. 2	LW Gable to Winch Frame



Connection No. 3	Spindle Bearing to Winch Frame
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Connection No. 4	Traction Motor to Gear
Connection No. 5	Traction Drive Train to LW Structure

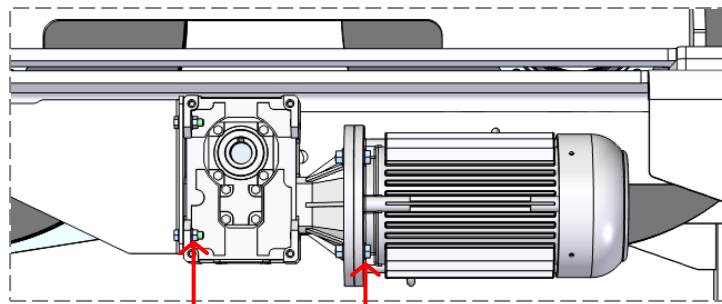
User Manual

OE-2000-A3-4-7-2-FS-NZ-003

Serial No. SHG-000973

Rev. 0,

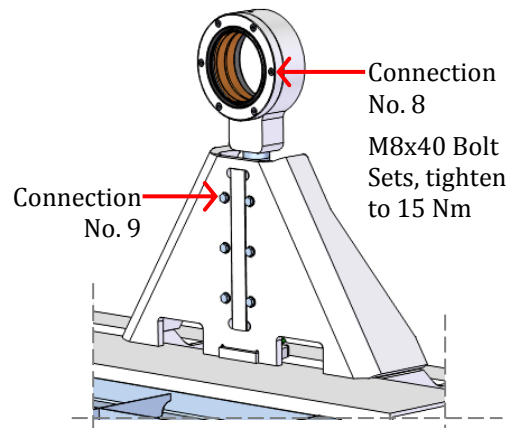
24-Nov-'16



Connection
No. 6

Connection
No. 7

Connection No. 6	LW Drive Train to Winch Frame
Connection No. 7	LW Motor to Gear

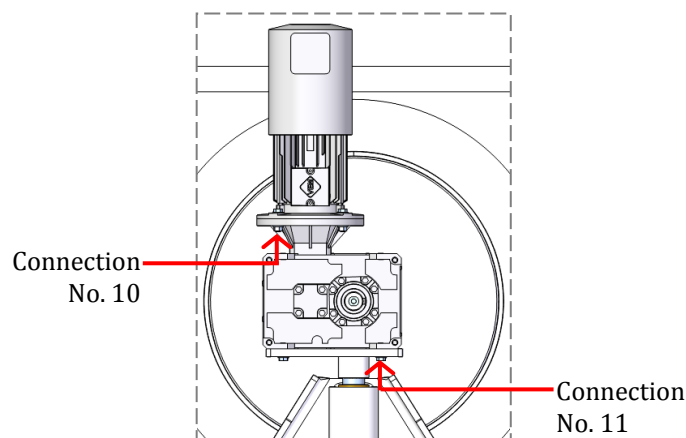


Connection
No. 8

M8x40 Bolt
Sets, tighten
to 15 Nm

Connection
No. 9

Connection No. 8	Axle Bearing Retainer to Bearing Housing
Connection No. 9	Drum Guide Tube to Drum Gable



Connection
No. 10

Connection
No. 11

Connection No. 10	Drum Motor to gear
Connection No. 11	Drum Motor Drive Train to Structure

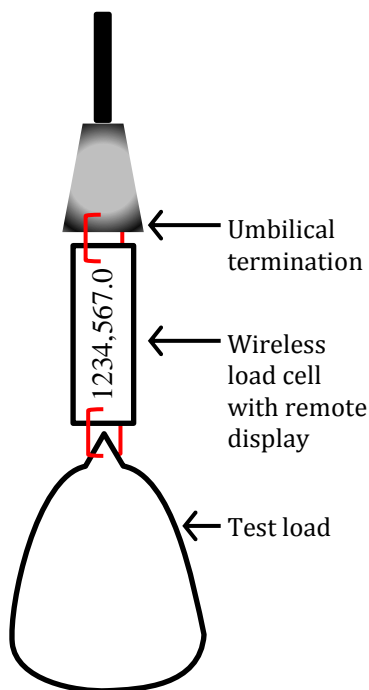
11.3.5.2 Static Brake Test Procedure (Fail Safe Brakes)

Refer to section 12.2 Performance and Design for Design Factor Ψ and Safe Working Load (SWL). Where an SWL is specified for top and bottom layers, use SWL at Top Layer. The test must be performed with the wire spooled from the top layer.

Annual Test Load

TEST LOAD		
SWL	x	1.25

The Test Load is greater than the winch is allowed to lift and therefore the load cannot be lifted by the winch with the intent to apply the brakes to perform the test. The test must be designed such that the test configuration is suspended and held by the brakes and the test load is then applied to the measuring device.



- It is the responsibility of the owner to design the test to conform to best rigging practice
- Determine that the rigging to be used has appropriate SWL to perform the test
- Lift the test configuration into place and engage the Fail Safe Brakes by pressing the Stop button on the Main Operation page on the control screen.
- Record the Cable Out value displayed on the Operations Page
- Depending on the test configuration it may be required to reset the Zero Cable Out value. Refer to section 10.5.3 Cable Data.
- Apply the Test Load
- The Test Load must be suspended for 5 minutes to complete the test
- If it is observed visually, or by variation in the Cable Out value, that the brakes cannot support the test load it is the owners responsibility to provide for repairs
- Record the results of the test in the Maintenance Log

11.3.6 Additional Intervals

2,500 Operating Hours
Change the gearbox oil at storage drum motor and traction motors

15,000 Operating Hours
Change the gearbox oil at the Level wind motor.

5 Years
Replace the smoothing capacitor in the Variable Speed Drive.
Replace the aluminum capacitors on the PCB in the Variable Speed Drives.
Replace the battery in the PLC.

10 Years
Replace the fuses in the Variable Speed Drives.

12 Technical Data

12.1 Weights

Winch	Approx : 3,300 kg. with drum + umbilical
Drum	Approx : 613 kg with umbilical
Umbilical	Approx : 222 kg (0.11 kg / meter)
Max. Gross Weight	: 3,500 kg

12.2 Performance and Design

Cable Capacity	: 2,000 m, Ø 12 mm, 8 Layers
Output Angle From Vertical	: -5° to +5°
SWL	: 2 kN
Speed	60 Hz : 90 m/min at SWL
Design Dynamic Factor	Ψ : 2
Braking Capability	$\Psi \times$ SWL : 4 kN
Design Temperature	: -20° C to +45° C

12.3 Power Requirements

The following provisions are provided by the purchaser.

Main	: (3) x 440 VAC / 60 Hz / 24 A / Max. Fuse 32 A
Stand Still Heating	: (2) x 230 VAC / 60 Hz / 10 A / Max. Fuse 16 A

12.4 Other Requirements

Umbilical Cooling Water

Description	Cooling water is provided by the owner. Refer to the following graph for Flow Characteristics. Refer to section 4.2.2 Umbilical.
-------------	---

12.5 Recommended Fluids and Lubrication

Products that meet or exceed the performance characteristics of the recommended product may be substituted.

Gear Box at Traction Motors	TOTAL CARTER SH 150
Gear Box at Drum Motor	TOTAL CARTER SH 150
Gear Box at LW Motor	TOTAL CARTER SH 150
Lubrication	TOTAL CERAN XM 220
Lubrication at Threaded Spindle	TOTAL CERAN GEP
Lubrication at Auto Dispenser	SKF LGWA 2

User Manual

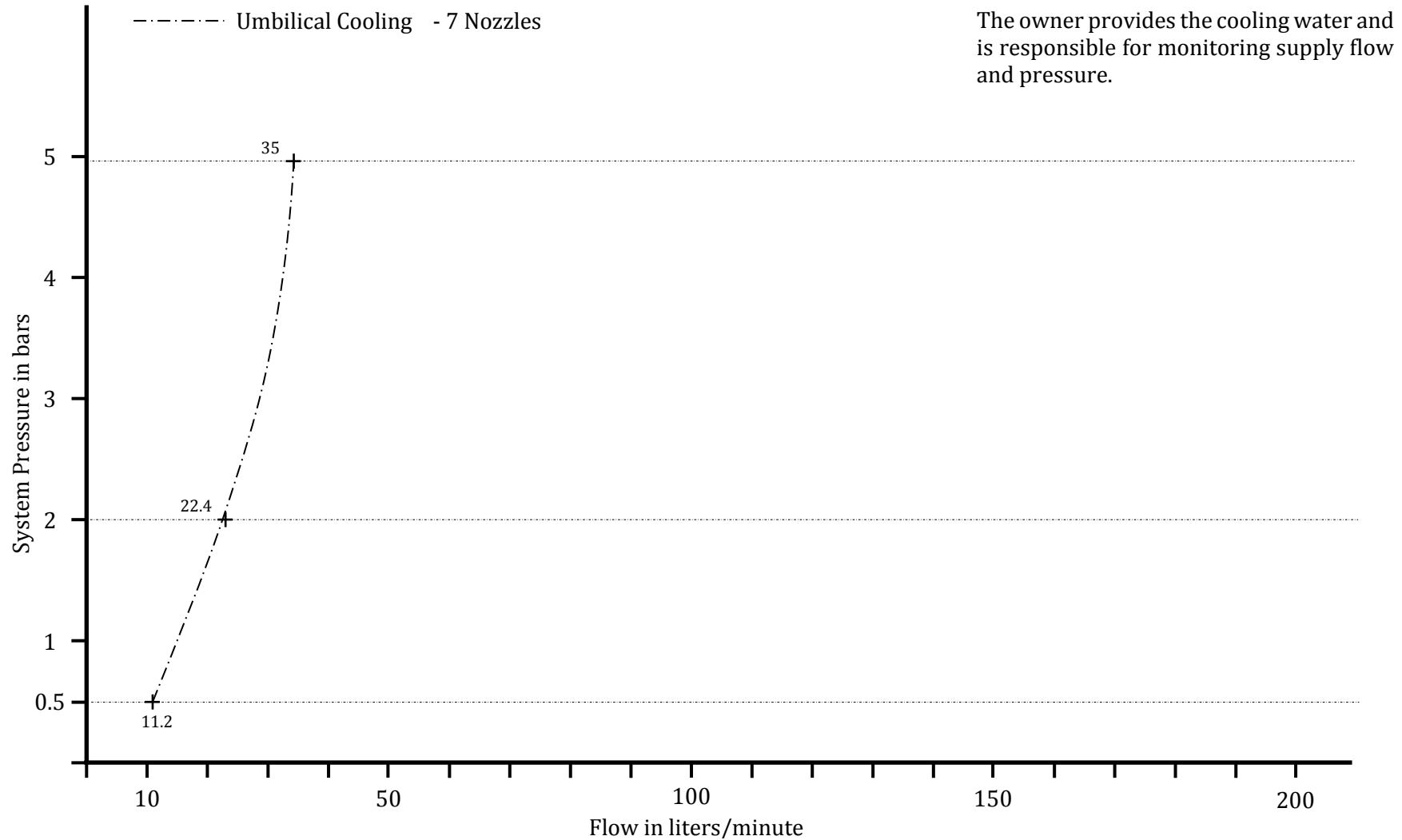
OE-2000-A3-4-7-2-FS-NZ-003

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24-Nov-'16



Flow Characteristics for Umbilical Cooling

User Manual

OE-2000-A3-4-7-2-FS-NZ-003

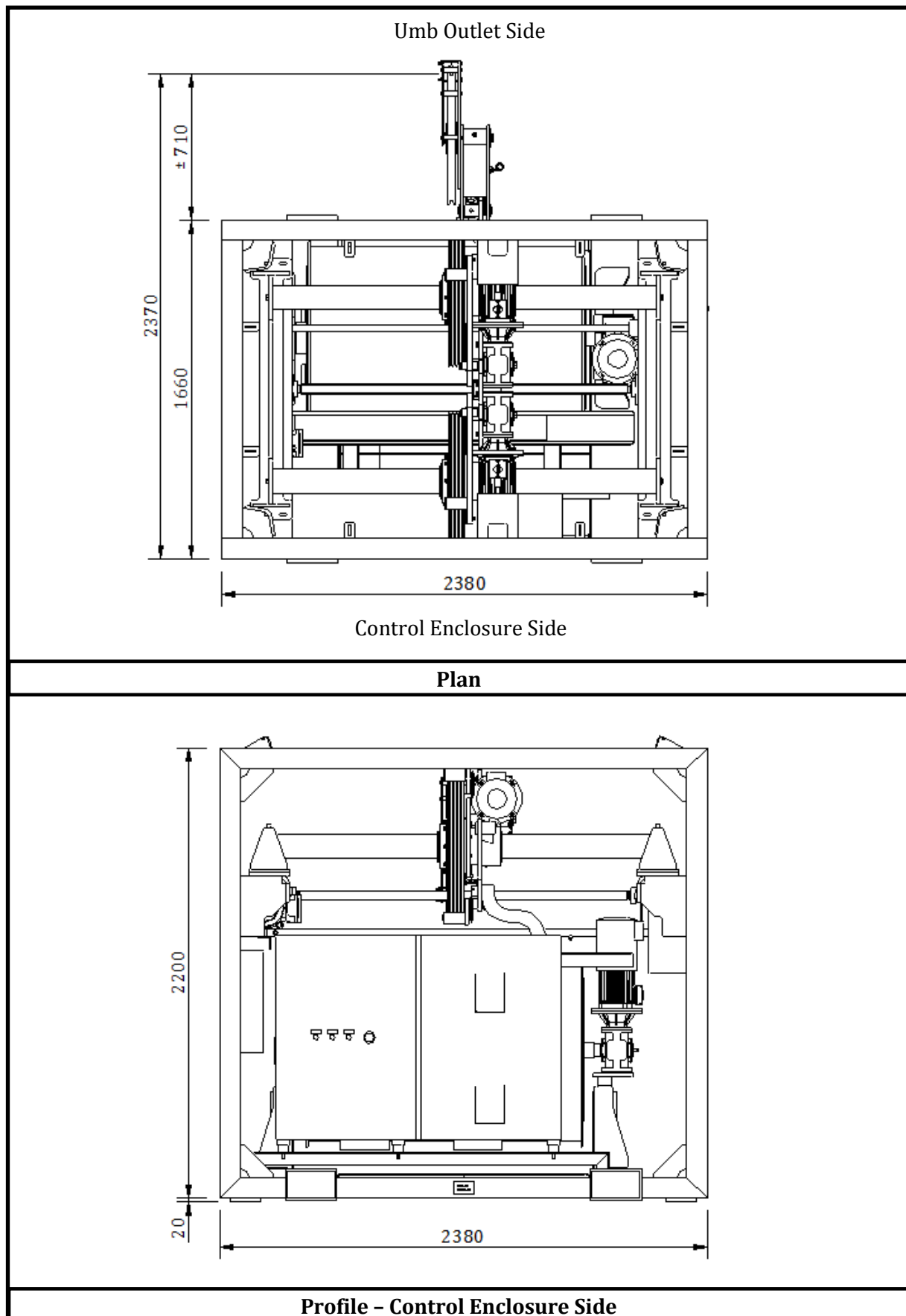
Serial No. SHG-000973

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12.6 Dimensioned Drawings

Note. Drawings not to scale



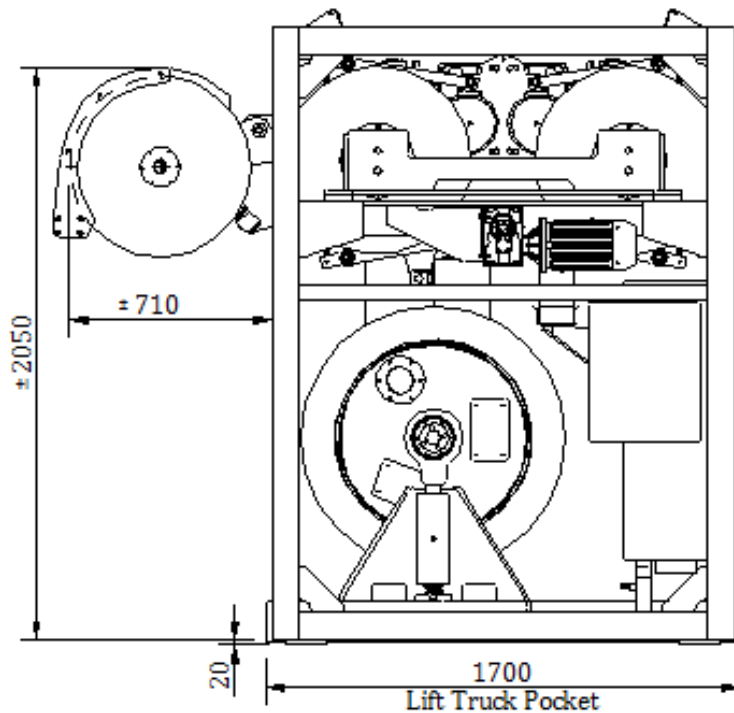
User Manual

OE-2000-A3-4-7-2-FS-NZ-003

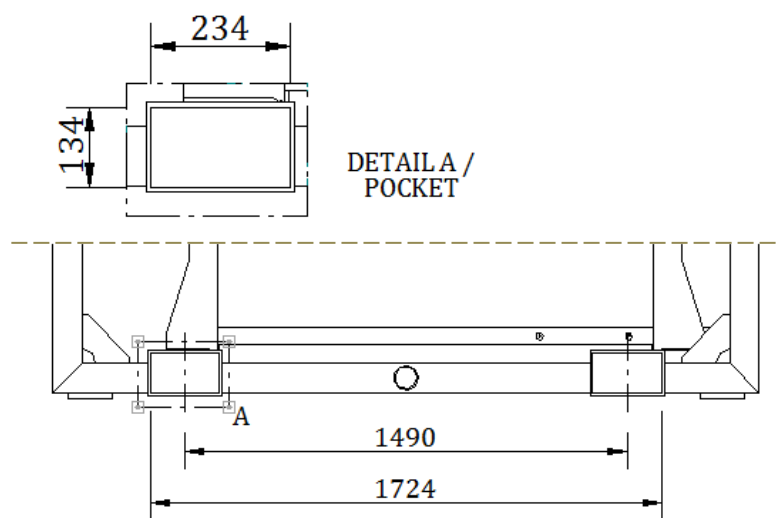
Serial No. SHG-000973

Rev. 0,

24-Nov-'16



Profile - Slipping End




Umbilical Outlet Side

Detail - Lift Truck Pockets

13 Material Safety Data Sheets

13.1 TOTAL CARTER SH 150



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SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

SDS # : 30559

CARTER SH 150

Date of the previous version: 2013-04-23

Revision Date: 2015-03-27

Version 3

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name	CARTER SH 150
Number	1KP
Substance/mixture	Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Industrial gear oil.
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1.3. Details of the supplier of the safety data sheet

Supplier	TOTAL UK LIMITED One Euston Square 40 Melton Street, London, NW1 2FD UNITED KINGDOM Tel: +44 (0)20 7339 8000 Fax: +44 (0)20 7339 8033
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For further information, please contact:

Contact Point	Specific Product Related Info : 01977 636200
E-mail Address	rm.gb-msds@total.co.uk

1.4. Emergency telephone number

00 33 149 00 00 49 (24h/24, 7d/7)
TOTAL UK Ltd: + 44 (0) 20 7339 8000
For Lubricants only: TOTAL Lubricants - +44 (0)1977 636200
For bitumen only: Total Bitumen -+44 (0) 17 7272 9302

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008 ***
*For the full text of the H-Statements mentioned in this Section, see Section 2.2.****

Classification***
The product is not classified as dangerous according to Regulation (EC) No. 1272/2008***

DIRECTIVE 67/548/EEC or 1999/45/EC

Version EUUK



SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

For the full text of the R-phrases mentioned in this Section, see Section 16.

The substance/mixture is non-dangerous in accordance with Directive(s) 67/548/EEC with amendments and/or 1999/45/EC with amendments

Symbol(s)
Not classified***

2.2. Label elements

Labelled according to REGULATION (EC) No 1272/2008***

Hazard Statements ***
None***

Precautionary statements
None***

Contains Amines, C12-14-tert-alkyl May produce an allergic reaction***

2.3. Other hazards

Physical-Chemical Properties Contaminated surfaces will be extremely slippery.

Environmental properties Should not be released into the environment.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**3.2. Mixture**

Hazardous components Do not contain hazardous substance nor substance with european workplace exposure limits in concentration above regulatory thresholds***

Additional information The product is made from synthetic base oils (Polyalphaolefins). The product is made from synthetic base oils (esters).

For the full text of the R-phrases mentioned in this Section, see Section 16.

For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: FIRST AID MEASURES**4.1. Description of first aid measures**

General advice IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CALL A DOCTOR OR EMERGENCY MEDICAL CARE.

Eye contact Rinse thoroughly with plenty of water, also under the eyelids.

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CARTER SH 150

Revision Date: 2015-03-27

Version 3

Skin contact	Remove contaminated clothing and shoes. Wash off with soap and water. Wash contaminated clothing before reuse.
Inhalation	Move to fresh air.
Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or poison control centre immediately.

4.2. Most important symptoms and effects, both acute and delayed

Eye contact	Not classified.
Skin contact	Not classified. May produce an allergic reaction.
Inhalation	Not classified. Inhalation of vapours in high concentration may cause irritation of respiratory system.
Ingestion	Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically.
---------------------------	------------------------

Section 5: FIRE-FIGHTING MEASURES**5.1. Extinguishing media**

Suitable extinguishing media	Carbon dioxide (CO ₂). ABC powder. Foam. Water spray or fog.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Special hazard	Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. These may be highly dangerous if inhaled in confined spaces or at high concentration.
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5.3. Precautions for fire-fighters

Special protective equipment for fire-fighters	Wear self-contained breathing apparatus and protective suit.
Other information	Cool containers / tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section 6: ACCIDENTAL RELEASE MEASURES**6.1. Personal precautions, protective equipment and emergency procedures**

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SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

General Information	Do not touch or walk through spilled material. Contaminated surfaces will be extremely slippery. Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.
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6.2. Environmental precautions

General Information	Do not allow material to contaminate ground water system. Try to prevent the material from entering drains or water courses. Local authorities should be advised if significant spillages cannot be contained.
----------------------------	--

6.3. Methods and materials for containment and cleaning up

Methods for cleaning up	Dam up. Contain spillage, and then collect with non-combustable absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.
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6.4. Reference to other sections

Personal protective equipment	See Section 8 for more detail.
Waste treatment	See section 13.

Section 7: HANDLING AND STORAGE**7.1. Precautions for safe handling**

Advice on safe handling	When using, do not eat, drink or smoke. For personal protection see section 8. Use only in well-ventilated areas. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing.
Prevention of fire and explosion	Take precautionary measures against static discharges. Ground/bond containers, tanks and transfer/receiving equipment.
Hygiene measures	Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Do not use abrasives, solvents or fuels. Do not dry hands with rags that have been contaminated with product. Do not put product contaminated rags into workwear pockets.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions	Keep away from food, drink and animal feedingstuffs. Keep in a bonded area. Keep container tightly closed. Preferably keep in the original container. Otherwise, reproduce all the statutory information from the labels onto the new container. Do not remove the hazard labels of the containers (even if they are empty). Design the installations in order to avoid accidental emissions of product (due to seal breakage, for example) onto hot casings or electrical contacts. Protect from frost, heat and sunlight. Protect from moisture.
Materials to avoid	Strong oxidising agents.

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7.3. Specific use(s)

Specific use(s) No information available.***

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**8.1. Control parameters**

Exposure limits	Do not contain substance with european workplace exposure limits in concentration above regulatory thresholds
Legend	See section 16

8.2. Exposure controls**Occupational Exposure Controls**

Engineering measures	Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.
----------------------	--

Personal protective equipment

General Information	If the product is used in mixtures, it is recommended that you contact the appropriate protective equipment suppliers. These recommendations apply to the product as supplied.
Respiratory protection	None under normal use conditions. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Respirator with combination filter for vapour/particulate (EN 14387). Type A/P1. The use of breathing apparatus must comply strictly with the manufacturer's instructions and the regulations governing their choices and uses.***
Eye protection	If splashes are likely to occur, wear.. Safety glasses with side-shields.
Skin and body protection	Wear suitable protective clothing. Protective shoes or boots. Long sleeved clothing.
Hand protection	Protective gloves: Nitrile rubber, Fluorinated rubber. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves.

Environmental exposure controls

General Information	The product should not be allowed to enter drains, water courses or the soil.
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Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Version EUUK



SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

9.1. Information on basic physical and chemical properties

Colour		yellow to amber	
Physical state @20°C		Liquid	
Odour		characteristic	
<u>Property</u>	<u>Values</u>	<u>Remarks</u>	<u>Method</u>
pH		Not applicable	
Boiling point/boiling range		Not applicable	
Flash point	230 °C 446 °F		Cleveland Open Cup (COC) Cleveland Open Cup (CO C)
Evaporation rate		No information available	
Flammability Limits in Air		No information available	
Vapour pressure		No information available	
Vapour density		No information available	
Density	850 - 860 kg/m³	@ 15 °C	
Water solubility		Insoluble	
Solubility in other solvents		No information available	
logPow		No information available	
Autoignition temperature		No information available	
Viscosity, kinematic	150 mm²/s	@ 40 °C	ISO 3104
Explosive properties	Not explosive		
Oxidising properties	Not applicable		
Possibility of hazardous reactions	Not applicable		

9.2. Other information

No information available***

Section 10: STABILITY AND REACTIVITY**10.1. Reactivity**

General Information No information available.***

10.2. Chemical stability

Stability Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous reactions None under normal processing.

10.4. Conditions to Avoid

Conditions to Avoid Heat (temperatures above flash point), sparks, ignition points, flames, static electricity.

10.5. Incompatible materials

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SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

Materials to avoid Strong oxidising agents.

10.6. Hazardous Decomposition Products

Hazardous Decomposition Products None under normal use.

Section 11: TOXICOLOGICAL INFORMATION**11.1. Information on toxicological effects****Acute toxicity Local effects Product Information**

Skin contact	. Not classified. May produce an allergic reaction.
Eye contact	. Not classified.
Inhalation	. Not classified. Inhalation of vapours in high concentration may cause irritation of respiratory system.
Ingestion	. Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Acute toxicity - Component Information**Sensitisation**

Sensitisation Not classified as a sensitizer. Contains sensitizer(s). May produce an allergic reaction.

Specific effects

Carcinogenicity	This product is not classified carcinogenic.
Mutagenicity	This product is not classified as mutagenic.
Reproductive toxicity	This product does not present any known or suspected reproductive hazards.

Repeated Dose Toxicity

Subchronic Toxicity No information available.

Target Organ Effects (STOT)

Target Organ Effects (STOT) No information available.

Other information

Other adverse effects Characteristic skin lesions (oil blisters) may develop following prolonged and repeated exposures (contact with contaminated clothing).

Section 12: ECOLOGICAL INFORMATION**12.1. Toxicity**

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CARTER SH 150

Revision Date: 2015-03-27

Version 3

Not classified.

Acute aquatic toxicity - Product Information

No information available.

Acute aquatic toxicity - Component Information

No information available.

Chronic aquatic toxicity - Product Information

No information available.

Chronic aquatic toxicity - Component Information

No information available.

Effects on terrestrial organisms

No information available.

12.2. Persistence and Degradability**General Information**

No information available.

12.3. Bioaccumulative potential

Product Information	No information available.
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logPow	No information available
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Component Information	.
------------------------------	---

12.4. Mobility in soil

Soil	Given its physical and chemical characteristics, the product generally shows low soil mobility.
-------------	---

Air	Loss by evaporation is limited.
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Water	Insoluble. The product spreads on the surface of the water.
--------------	---

12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment	No information available.
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12.6. Other adverse effects

General Information	No information available.
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SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

Section 13: DISPOSAL CONSIDERATIONS**13.1. Waste treatment methods****Waste from residues / unused products**

Should not be released into the environment. Dispose of in accordance with the European Directives on waste and hazardous waste. Do not empty into drains. Dispose of in accordance with local regulations. Where possible recycling is preferred to disposal or incineration. After use, this oil must be sent to a licensed waste oil facility. Incorrect disposal of used oil poses a risk to the environment. Mixture with other waste types such as solvents, brake- and cooling liquids is forbidden.***

Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal.

EWC Waste Disposal No

The following Waste Codes are only suggestions: 13 02 06. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

Section 14: TRANSPORT INFORMATION**ADR/RID** not regulated**IMDG/IMO** not regulated**ICAO/IATA** not regulated**ADN** not regulated**Section 15: REGULATORY INFORMATION****15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****European Union****Further information**

No information available***

15.2. Chemical Safety Assessment**Chemical Safety Assessment** No information available

Version EUUK



SDS # : 30559

CARTER SH 150

Revision Date: 2015-03-27

Version 3

15.3. National regulatory information**The United Kingdom**

- Avoid exceeding occupational exposure limits (see section 8).

Ireland

- Avoid exceeding occupational exposure limits (see section 8).

Section 16: OTHER INFORMATION

Full text of R-phrases referred to under sections 2 and 3

Not applicable***

Abbreviations, acronyms

Legend Section 8

TWA: Time Weight Average

STEL: Short Time Exposure Limit

+ Sensitiser
 ** Hazard Designation
 M: Mutagen

* Skin designation
 C: Carcinogen
 R: Toxic to reproduction

Revision Date:

2015-03-27

Revision Note

*** Indicates updated section.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above. It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk. The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity. The user bears sole liability for the precautions required when using the product. The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive. It is the user's responsibility to ensure that he is subject to no other obligations than those mentioned.

End of Safety Data Sheet

Version EUUK

13.2 TOTAL CERAN XM 220



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SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

SDS # : 080100

CERAN XM 220

Date of the previous version: 2015-10-16

Revision Date: 2016-03-30

Version 3.04

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name	CERAN XM 220
Number	4KF
Substance/mixture	Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Lubricating grease.
-----------------	---------------------

1.3. Details of the supplier of the safety data sheet

Supplier	TOTAL LUBRIFIANTS 562 Avenue du Parc de L'île 92029 Nanterre Cedex FRANCE Tél: +33 (0)1 41 35 40 00 Fax: +33 (0)1 41 35 84 71
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For further information, please contact:

Contact Point	HSE
E-mail Address	rm.msds-lubs@total.com

1.4. Emergency telephone number

+33 1 49 00 00 49 (24h/24, 7d/7)
France - ORFILA (INRS) Tél : +33 (0)1 45 42 59 59
In France : - PARIS : Hôpital Fernand Widal 200, rue du Faubourg Saint-Denis 75475 Paris Cédex 10 , Tel : 01.40.05.48.48. -
MARSEILLE : Hopital Salvator, 249 bd Ste Marguerite 13274 Marseille cedex 5, Tel : 04.91.75.25.25. - LYON : Hopital Edouard
Herriot, 5 place d'Arsonvol, 69437 Lyon cedex 3, Tel : 04.72.11.69.11. - NANCY : Hopital central, 29 Av du Mal De Lattre de
Tassigny, 54000 Nancy, Tel : 03.83.32.36.36 ou le SAMU : Tel (15)

Section 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

REGULATION (EC) No 1272/2008
For the full text of the H-Statements mentioned in this Section, see Section 2.2.

Classification
The product is not classified as dangerous according to Regulation (EC) No. 1272/2008

Version EU

Quick-FDS [17655-47102-23034-014452] - 2016-05-02 - 13:05:02



SDS #: 080100

CERAN XM 220

Revision Date: 2016-03-30

Version 3.04

2.2. Label elements

Labelled according to REGULATION (EC) No 1272/2008

Hazard Statements
NonePrecautionary Statements
None***Supplemental Hazard Statements
EUH210 - Safety data sheet available on request***

Contains Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts Sulfonic acids, petroleum, calcium salt Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts May produce an allergic reaction

2.3. Other hazards

Physical-Chemical Properties Contaminated surfaces will be extremely slippery.

Environmental properties Should not be released into the environment.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**3.2. Mixture****Hazardous ingredients**

Chemical Name	EC-No	REACH registration No	CAS-No	Weight %	Classification (Reg. 1272/2008)
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts***	274-263-7	01-2119492616-28	70024-69-0	5-<10	Skin Sens. 1B (H317)
Sulfonic acids, petroleum, calcium salt***	263-093-9	no data available	61789-86-4	1-<3	Skin Sens. 1 (H317)
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts***	271-529-4	no data available	68584-23-6	1-<3	Skin Sens. 1 (H317)

Additional information Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: FIRST AID MEASURES**4.1. Description of first-aid measures**

General advice IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CALL A DOCTOR OR EMERGENCY MEDICAL CARE.

Eye contact Rinse thoroughly with plenty of water, also under the eyelids.

Version EU



SDS # : 080100

CERAN XM 220

Revision Date: 2016-03-30

Version 3.04

Skin contact	Remove contaminated clothing and shoes. Wash skin with soap and water. Wash contaminated clothing before reuse. High pressure jets may cause skin damage. Take victim immediately to hospital.
Inhalation	Move to fresh air.
Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or Poison Control Center immediately.

4.2. Most important symptoms and effects, both acute and delayed

Eye contact	Not classified.
Skin contact	Not classified. May produce an allergic reaction. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.
Inhalation	Not classified. Inhalation of vapors in high concentration may cause irritation of respiratory system.
Ingestion	Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	Treat symptomatically.
--------------------	------------------------

Section 5: FIRE-FIGHTING MEASURES**5.1. Extinguishing media**

Suitable Extinguishing Media	Carbon dioxide (CO ₂). ABC powder. Foam. Water spray or fog.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Special Hazard	Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. These may be highly dangerous if inhaled in confined spaces or at high concentration.
----------------	--

5.3. Advice for fire-fighters

Special protective equipment for fire-fighters	Wear self-contained breathing apparatus and protective suit.
Other information	Cool containers / tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section 6: ACCIDENTAL RELEASE MEASURES

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6.1. Personal precautions, protective equipment and emergency procedures

General Information Do not touch or walk through spilled material. Contaminated surfaces will be extremely slippery. Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.

6.2. Environmental precautions

General Information Do not allow material to contaminate ground water system. Try to prevent the material from entering drains or water courses. Local authorities should be advised if significant spillages cannot be contained.

6.3. Methods and materials for containment and cleaning up

Methods for cleaning up Dam up. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Collect free product with suitable mechanical means. Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Personal Protective Equipment See Section 8 for more detail.
Waste treatment See section 13.
Other information No information available.

Section 7: HANDLING AND STORAGE**7.1. Precautions for safe handling**

Advice on safe handling When using, do not eat, drink or smoke. For personal protection see section 8. Use only in well-ventilated areas. Do not breathe vapors or spray mist. Avoid contact with skin, eyes and clothing.

Prevention of fire and explosion Take precautionary measures against static discharges. Ground/bond containers, tanks and transfer/receiving equipment.

Hygiene measures Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Do not use abrasives, solvents or fuels. Do not dry hands with rags that have been contaminated with product. Do not put product contaminated rags into workwear pockets.

7.2. Conditions for safe storage, including any incompatibilities

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Technical measures/Storage conditions

Keep away from food, drink and animal feedingstuffs. Keep in a bunded area. Keep container tightly closed. Keep preferably in the original container. Otherwise reproduce all indication of the regulation label on the new container. Do not remove the hazard labels of the containers (even if they are empty). Design the installations in order to avoid accidental emissions of product (due to seal breakage, for example) onto hot casings or electrical contacts. Protect from frost, heat and sunlight. Protect from moisture.

Materials to Avoid

Strong oxidizing agents.

7.3. Specific end uses**Specific use(s)**

No information available.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION**8.1. Control parameters****Exposure limits**

Mineral oil mist:
USA: OSHA (PEL) TWA 5 mg/m³, NIOSH (REL) TWA 5 mg/m³, STEL 10 mg/m³, ACGIH (TLV) TWA 5 mg/m³ (highly refined)

Legend

See section 16

DNEL Worker (Industrial/Professional)

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0			0.66 mg/m ³ Inhalation 3.33 mg/kg bw/day Dermal	
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6			3.33 mg/kg bw/day (dermal) 0.66 mg/m ³ (inhalation)	

DNEL Consumer

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0			0.33 mg/m ³ Inhalation 1.667 mg/kg bw/day Dermal 0.8333 mg/kg bw/day Oral	
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6			1.667 mg/kg bw/day (dermal) 0.33 mg/m ³ (inhalation) 0.8333 mg/kg bw/day (oral)	

Predicted No Effect Concentration (PNEC)

Chemical Name	Water	Sediment	Soil	Air	STP	Oral
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Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0	1 mg/l fw 1 mg/l mw 10 mg/l or	723500000 mg/kg dw fw 723500000 mg/kg dw mw	868700000 mg/kg dw***		100 mg/l	16.667 mg/kg food
Sulfonic acids, petroleum, calcium salt*** 61789-86-4	1 mg/l fw 1 mg/l mw 10 mg/l or	226000000 mg/kg sediment dw fw 226000000 mg/kg sediment dw mw	271000000 mg/kg soil dw		1000 mg/l	16.667 mg/kg food
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6	1 mg/l fw 1 mg/l mw 10 mg/l or	723500000 mg/kg dw fw 723500000 mg/kg dw mw	868700000 mg/kg dw		100 mg/l	16.667 mg/kg food

8.2. Exposure controls**Occupational Exposure Controls****Engineering Measures**

Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Personal Protective Equipment**General Information**

If the product is used in mixtures, it is recommended that you contact the appropriate protective equipment suppliers. These recommendations apply to the product as supplied.

Respiratory protection

None under normal use conditions. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Respirator with combination filter for vapour/particulate (EN 14387), Type A/P1. The use of breathing apparatus must comply strictly with the manufacturer's instructions and the regulations governing their choices and uses.

Eye Protection

If splashes are likely to occur, wear: Safety glasses with side-shields.

Skin and body protection

Wear suitable protective clothing. Protective shoes or boots. Long sleeved clothing.

Hand Protection

Hydrocarbon-proof gloves: Fluorinated rubber, Nitrile rubber. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves.

Environmental exposure controls**General Information**

The product should not be allowed to enter drains, water courses or the soil.

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Section 9: PHYSICAL AND CHEMICAL PROPERTIES**9.1. Information on basic physical and chemical properties**

Color		amber	
Physical State @20°C		solid	
Odor		Characteristic	
Odor Threshold		No information available	
<u>Property</u>	<u>Values</u>	<u>Remarks</u>	<u>Method</u>
pH		Not applicable	
Melting point/range		Not applicable***	
Boiling point/boiling range		No information available	
Flash point		Not applicable	
Evaporation rate		No information available	
Flammability Limits in Air		No information available	
upper		No information available	
Lower		No information available	
Vapor Pressure		No information available	
Vapor density		No information available	
Relative density	0.9	@ 20 °C	
Density	~ 900 kg/m ³	@ 20 °C	
Water solubility		Insoluble	
Solubility in other solvents		Soluble in many common organic solvents	
logPow		No information available***	
Autoignition temperature		No information available	
Decomposition temperature		No information available	
Viscosity, kinematic	220 mm ² /s	@ 40 °C	ISO 3104
Explosive properties	Not explosive		
Oxidizing Properties	Not applicable		
Possibility of hazardous reactions	No information available		

9.2. Other information

Penetration index	28 - 31 mm	I-2137
Freezing Point		No information available
Drop point	300 °C	I-396

Section 10: STABILITY AND REACTIVITY**10.1. Reactivity**

General Information No information available.

10.2. Chemical stability

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Stability Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous Reactions None under normal processing.

10.4. Conditions to Avoid

Conditions to Avoid Heat (temperatures above flash point), sparks, ignition points, flames, static electricity.

10.5. Incompatible Materials

Materials to Avoid Strong oxidizing agents.

10.6. Hazardous Decomposition Products

Hazardous Decomposition Products None under normal use. Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot.

Section 11: TOXICOLOGICAL INFORMATION**11.1. Information on toxicological effects****Acute toxicity Local effects Product Information**

Skin contact . Not classified. May produce an allergic reaction. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.

Eye contact . Not classified.

Inhalation . Not classified. Inhalation of vapors in high concentration may cause irritation of respiratory system.

Ingestion . Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

ATEmix (oral) 50,419.00 mg/kg

ATEmix (dermal) 43,487.00 mg/kg

ATEmix (inhalation-dust/mist) 55.40 mg/l

Acute toxicity - Component Information

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts***	LD50 > 5000 mg/kg (Rat - OECD 401)***	LD50 > 5000 mg/kg (Rabbit - OECD 402)***	

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Sulfonic acids, petroleum, calcium salt***	> 16000 mg/kg bw (rat)	> 4000 mg/kg (rabbit)	LC50(4h) > 1.9 mg/l (rat - aerosol)
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts***	> 5000 mg/kg (Rat - OECD 401)	> 5000 mg/kg bw (rabbit - OECD 402)	> 1.9 mg/l (Rat - aerosol-OECD 403)

Sensitization**Sensitization**

The supplier of one of the components contained within this formulation has indicated that they have data, which confirms that at the concentration used, no sensitisation classification is required. Not classified as a sensitizer. May produce an allergic reaction.

Specific effects**Carcinogenicity**

This product is not classified carcinogenic.

Mutagenicity

This product is not classified as mutagenic.

Reproductive toxicity

This product does not present any known or suspected reproductive hazards.

Repeated Dose Toxicity**Subchronic toxicity**

No information available.

Target Organ Effects (STOT)**Target Organ Effects (STOT)**

No information available.

Other information**Other adverse effects**

Characteristic skin lesions (pimples) may develop following prolonged and repeated exposures (contact with contaminated clothing).

Section 12: ECOLOGICAL INFORMATION**12.1. Toxicity**

Not classified.

Acute aquatic toxicity - Product Information

No information available.

Acute aquatic toxicity - Component Information

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates	Toxicity to fish	Toxicity to microorganisms
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0	EC50 (72h) > 1000 mg/l (Pseudokirchnerella subcapitata - static)	EC50 (48h) > 1000 mg/l (Daphnia magna - static)	LL50 (96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	
Sulfonic acids, petroleum, calcium salt*** 61789-86-4	EC50(72h) > 1000 mg/l (Pseudokirchnerella subcapitata)	EC50(48h) > 1000 mg/l (Daphnia magna - OECD 202)	LC50(96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	

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Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6	EL50(72h) > 1000 mg/l (Pseudokirchneriella subcapitata)	EL50(48h) > 1000 mg/l (Daphnia magna)	LL50(96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	
--	---	--	---	--

Chronic aquatic toxicity - Product Information

No information available.

Chronic aquatic toxicity - Component Information

No information available.

Effects on terrestrial organisms

No information available.***

12.2. Persistence and degradability**General Information**

No information available.

12.3. Bioaccumulative potential**Product Information**

No information available.***

logPow

No information available.***

Component Information

No information available.***

12.4. Mobility in soil**Soil**

Given its physical and chemical characteristics, the product has no soil mobility.***

Air

Loss by evaporation is limited.***

Water

The product is insoluble and floats on water.***

12.5. Results of PBT and vPvB assessment**PBT and vPvB assessment**

No information available.

12.6. Other adverse effects**General Information**

No information available.***

Section 13: DISPOSAL CONSIDERATIONS**13.1. Waste treatment methods****Waste from Residues / Unused Products**

Should not be released into the environment. Dispose of in accordance with local regulations.

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Contaminated packaging

Empty containers should be taken to an approved waste handling site for recycling or disposal. Dispose of in accordance with local regulations.***

EWG Waste Disposal No.

The following Waste Codes are only suggestions: 12 01 12. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

Section 14: TRANSPORT INFORMATION**ADR/RID**

Not regulated

IMDG/IMO

Not regulated

ICAO/IATA

Not regulated

ADN

Not regulated

Section 15: REGULATORY INFORMATION**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****European Union****Further information**

No information available

15.2. Chemical Safety Assessment**Chemical Safety Assessment**

No information available

Section 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3
H317 - May cause an allergic skin reaction

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Abbreviations, acronyms

ACGIH = American Conference of Governmental Industrial Hygienists

bw = body weight

bw/day = body weight/day

EC x = Effect Concentration associated with x% response

GLP = Good Laboratory Practice

IARC = International Agency for Research of Cancer

LC50 = 50% Lethal concentration - Concentration of a chemical in air or a chemical in water which causes the death of 50% (one half) of a group of test animals

LD50 = 50% Lethal Dose - Chemical amount, given at once, which causes the death of 50% (one half) of a group of test animals

LL = Lethal Loading

NIOSH = National Institute of Occupational Safety and Health

NOAEL = No Observed Adverse Effect Level

NOEC = No Observed Effect Concentration

NOEL = No Observed Effect Level

OECD = Organization for Economic Co-operation and Development

OSHA = Occupational Safety and Health Administration

UVCB = Substance of unknown or Variable composition, Complex reaction products or Biological material

DNEL = Derived No Effect Level

PNEC = Predicted No Effect Concentration

dw = dry weight

fw = fresh water

mw = marine water

or = occasional release

Legend Section 8

TWA: Time Weight Average

STEL: Short Time Exposure Limit

PEL: Permissible exposure limit

REL: Recommended exposure limit

TLV: Threshold Limit Values

+ Sensitizer

** Hazard Designation

M: Mutagen

*

C:

R:

Skin designation

Carcinogen

Toxic to reproduction

Revision Date: 2016-03-30

Revision Note: *** Indicates updated section.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above. It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk. The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity. The user bears sole liability for the precautions required when using the product. The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive. It is the user's responsibility to ensure that he is subject to no other obligations than those mentioned.


End of the Safety Data Sheet

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13.3 TOTAL CERAN GEP

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SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

SDS # : 33318 **CERAN GEP**

Date of the previous version: 2015-04-08 **Revision Date:** 2016-02-10 **Version** 4.01

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name	CERAN GEP
Number	HNQ
Substance/mixture	Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Lubricating grease.
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1.3. Details of the supplier of the safety data sheet

Supplier	A - TOTAL UK LIMITED One Euston Square 40 Melton Street, London, NW1 2FD UNITED KINGDOM Tel: +44 (0)20 7339 8000 Fax: +44 (0)20 7339 8033 B - TOTAL LUBRIFIANTS 562 Avenue du Parc de L'île 92029 Nanterre Cedex FRANCE Tél: +33 (0)1 41 35 40 00 Fax: +33 (0)1 41 35 84 71
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For further information, please contact:

Contact Point	A - Specific Product Related Info: 01977 636200 B - HSE
E-mail Address	A - rm.gb-msds@total.co.uk B - rm.msds-lubs@total.com

1.4. Emergency telephone number

00 33 149 00 00 49 (24h/24, 7d/7)
TOTAL UK Ltd: + 44 (0) 20 7339 8000
For Lubricants only: TOTAL Lubricants - +44 (0)1977 636200
For bitumen only: Total Bitumen -+44 (0) 17 7272 9302

UK: National Poisons Information Service (NPIS): NHS111 or a doctor

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Revision Date: 2016-02-10

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Section 2: HAZARDS IDENTIFICATION**2.1. Classification of the substance or mixture**

REGULATION (EC) No 1272/2008 ***

For the full text of the H-Statements mentioned in this Section, see Section 2.2.***

Classification

Chronic aquatic toxicity - Category 3*** - (H412)***

2.2. Label elements

Labelled according to

REGULATION (EC) No 1272/2008

Hazard Statements ***

H412 - Harmful to aquatic life with long lasting effects***

Precautionary statements

P501 - Dispose of contents/container in accordance with local/regional/national/international regulation***

Contains Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts, Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts, Sulfonic acids, petroleum, calcium salt, Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentoxide, and salted by amines, C12-14- tert-alkyl. **May produce an allergic reaction*****

2.3. Other hazards**Physical-Chemical Properties**

Contaminated surfaces will be extremely slippery.

Environmental properties

Should not be released into the environment.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS**3.2. Mixture****Hazardous components**

Chemical Name	EC-No	REACH Registration Number	CAS-No	Weight %	GHS Classification
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts***	274-263-7	01-2119492616-28	70024-69-0	5-10	Skin Sens. 1B (H317)***
Sulfonic acids, petroleum, calcium salt***	263-093-9	no data available	61789-86-4	1-5	Skin Sens. 1 (H317)
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts***	271-529-4	no data available	68584-23-6	1-5	Skin Sens. 1 (H317)

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Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14- tert-alkyl***	931-384-6	01-2119493620-38	^	1-2.4	Acute Tox. 4 (H302) Aquatic Chronic 2 (H411) Eye Dam. 1 (H318) Skin Sens. 1 (H317)***
(Z)-N-9-octadecenylpropane-1,3-diamine***	230-528-9	no data available	7173-62-8	0.01-0.1	STOT RE 1 (H372) Skin Corr. 1B (H314) Eye Dam. 1 (H318) Acute Tox. 4 (H302) Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410) Met. Corr. 1 (H290)***
(Z)-octadec-9-enylamine***	204-015-5	no data available	112-90-3	0.01-0.1	Acute Tox. 4 (H302) Skin Corr. 1B (H314) Eye Dam. 1 (H318) STOT SE 3 (H335) STOT RE 2 (H373) Asp. Tox. 1 (H304) Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410)

Additional information Product containing mineral oil with less than 3% DMSO extract as measured by IP 346.

For the full text of the H-Statements mentioned in this Section, see Section 16.

Section 4: FIRST AID MEASURES**4.1. Description of first aid measures**

General advice	IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CALL A DOCTOR OR EMERGENCY MEDICAL CARE.
Eye contact	Rinse thoroughly with plenty of water, also under the eyelids. Rinse immediately with plenty of water and seek medical advice. Keep eye wide open while rinsing.
Skin contact	Remove contaminated clothing and shoes. Wash skin with soap and water. Wash contaminated clothing before reuse. High pressure jets may cause skin damage. Take victim immediately to hospital. Wash off with soap and water.
Inhalation	Inhalation of high concentrations of vapour or aerosols may cause irritation of the upper respiratory tract.
Ingestion	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a physician or poison control centre immediately.

4.2. Most important symptoms and effects, both acute and delayed

Eye contact	Not classified. The supplier of some components contained within this formulation has indicated that the classification as irritant is not required.
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Revision Date: 2016-02-10

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Skin contact	Not classified. May produce an allergic reaction. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.
Inhalation	Not classified. Inhalation of vapours in high concentration may cause irritation of respiratory system.
Ingestion	Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

4.3. Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician Treat symptomatically.

Section 5: FIRE-FIGHTING MEASURES**5.1. Extinguishing media**

Suitable extinguishing media	Carbon dioxide (CO ₂). ABC powder. Foam. Water spray or fog.
Unsuitable Extinguishing Media	Do not use a solid water stream as it may scatter and spread fire.

5.2. Special hazards arising from the substance or mixture

Special hazard	Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. These may be highly dangerous if inhaled in confined spaces or at high concentration.
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5.3. Precautions for fire-fighters

Special protective equipment for fire-fighters	Wear self-contained breathing apparatus and protective suit.
Other information	Cool containers / tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Section 6: ACCIDENTAL RELEASE MEASURES**6.1. Personal precautions, protective equipment and emergency procedures**

General Information	Do not touch or walk through spilled material. Contaminated surfaces will be extremely slippery. Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition.
---------------------	--

6.2. Environmental precautions

General Information	Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Local authorities should be advised if significant spillages cannot be contained. Try to prevent the material from entering drains or water courses.
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6.3. Methods and materials for containment and cleaning up**Methods for cleaning up**

Sweep up and shovel into suitable containers for disposal. Avoid dust formation. Powdered material may form explosive dust-air mixtures. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4. Reference to other sections

Personal protective equipment	See Section 8 for more detail.
Waste treatment	See section 13.

Section 7: HANDLING AND STORAGE**7.1. Precautions for safe handling**

Advice on safe handling	When using, do not eat, drink or smoke. For personal protection see section 8. Use only in well-ventilated areas. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing.
Prevention of fire and explosion	Take precautionary measures against static discharges. Ground/bond containers, tanks and transfer/receiving equipment.
Hygiene measures	Ensure the application of strict rules of hygiene by the personnel exposed to the risk of contact with the product. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Do not use abrasives, solvents or fuels. Do not dry hands with rags that have been contaminated with product. Do not put product contaminated rags into workwear pockets. Use personal protective equipment as required. Wash hands with water as a precaution. Avoid extended and repeated contact with the skin as this may cause skin disorders, which may also be aggravated by minor injuries or by contact with soiled clothing.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures/Storage conditions	Keep away from food, drink and animal feedingstuffs. Keep in a bonded area. Keep container tightly closed. Preferably keep in the original container. Otherwise, reproduce all the statutory information from the labels onto the new container. Design the installations in order to avoid accidental emissions of product (due to seal breakage, for example) onto hot casings or electrical contacts. Protect from frost, heat and sunlight. Protect from moisture.
Materials to avoid	Strong oxidising agents.

7.3. Specific use(s)

Specific use(s)	No information available.
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Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**8.1. Control parameters**

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Exposure limits

Mineral oil mist:
USA: OSHA (PEL) TWA 5 mg/m³, NIOSH (REL) TWA 5 mg/m³, STEL 10 mg/m³, ACGIH (TLV) TWA 5 mg/m³ (highly refined)

Legend

See section 16

DNEL Worker (Industrial/Professional)

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0			0.66 mg/m ³ Inhalation 3.33 mg/kg bw/day Dermal	
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6			3.33 mg/kg bw/day (dermal) 0.66 mg/m ³ (inhalation)	
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14-tert-alkyl*** ^			12.5 mg/kg/8h (dermal) 8.56 mg/m ³ /8h (inhalation) (ECHA CHEM)	
(Z)-N-9-octadecenylpropane-1,3-diamine*** 7173-62-8			0.035 mg/m ³ (inhalation) 0.010 mg/kg bw/day (dermal)***	

DNEL Consumer

Chemical Name	Short term, systemic effects	Short term, local effects	Long term, systemic effects	Long term, local effects
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0			0.33 mg/m ³ Inhalation 1.667 mg/kg bw/day Dermal 0.8333 mg/kg bw/day Oral	
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6			1.667 mg/kg bw/day (dermal) 0.33 mg/m ³ (inhalation) 0.8333 mg/kg bw/day (oral)	

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Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14-tert-alkyl*** ^			6.25 mg/kg/24h (dermal) 2.2 mg/m ³ /24h (inhalation) 0.25 mg/kg/24h (oral) (ECHA CHEM)	
--	--	--	--	--

Predicted No Effect Concentration (PNEC)

Chemical Name	Water	Sediment	Soil	Air	STP	Oral
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0	1 mg/l fw 1 mg/l mw 10 mg/l or	723500000 mg/kg dw fw 723500000 mg/kg dw mw			100 mg/l	16.667 mg/kg food
Sulfonic acids, petroleum, calcium salt*** 61789-86-4	1 mg/l fw 1 mg/l mw 10 mg/l or	226000000 mg/kg sediment dw fw 226000000 mg/kg sediment dw mw	271000000 mg/kg soil dw		1000 mg/l	16.667 mg/kg food
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6	1 mg/l fw 1 mg/l mw 10 mg/l or	723500000 mg/kg dw fw 723500000 mg/kg dw mw	868700000 mg/kg dw		100 mg/l	16.667 mg/kg food
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14-tert-alkyl*** ^	0.0012 mg/l fw 0.00012 mg/l mw 0.064 mg/ or	3.13 mg/kg fw 0.313 mg/kg mw	2.54 mg/kg soil dw		24.33 mg/l	10 mg/kg food
(Z)-N-9-octadecenyl propane-1,3-diamine*** 7173-62-8	0.01 mg/l fw 0.001 mg/l mw***	1.72 mg/kg/dw fw 0.172 mg/kg/dw mw***	10 mg/kg/dw***		0.251 mg/l***	

8.2. Exposure controls**Occupational Exposure Controls**

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Engineering measures	Apply technical measures to comply with the occupational exposure limits. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.
Personal protective equipment	
General information	Protective engineering solutions should be implemented and in use before personal protective equipment is considered.
Respiratory protection	None under normal use conditions. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Respirator with combination filter for vapour/particulate (EN 14387). Type A/P2. The use of breathing apparatus must comply strictly with the manufacturer's instructions and the regulations governing their choices and uses.
Eye protection	If splashes are likely to occur, wear: Safety glasses with side-shields.
Skin and body protection	Wear suitable protective clothing. Protective shoes or boots. Long sleeved clothing. Do not wear rings, watches or anything similar which can retain the product and may cause a skin reaction. Extended and repeated contacts with skin can cause skin ailments which may be aggravated by minor injuries or contact with soiled clothing.
Hand protection	Hydrocarbon-proof gloves: Fluorinated rubber, Nitrile rubber. In case of prolonged contact with the product, it is recommended to wear gloves complying with EN 420 and EN 374 standards, protecting at least for 480 minutes and having a thickness of 0,38 mm at least. These values are indicative only. The level of protection is provided by the material of the glove, its technical characteristics, its resistance to the chemicals to be handled, the appropriateness of its use and its replacement frequency.***

Environmental exposure controls

General Information The product should not be allowed to enter drains, water courses or the soil.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES**9.1. Information on basic physical and chemical properties**

Appearance		smooth
Colour		black
Physical state @20°C		solid
Odour		characteristic
Odour Threshold		No information available
<u>Property</u>	<u>Values</u>	<u>Remarks</u>
pH		Not applicable
Melting point/range		No information available
Boiling point/boiling range		Not applicable
Flash point		No information available

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Evaporation rate	No information available
Flammability Limits in Air	No information available
Vapour pressure	No information available
Vapour density	No information available
Relative density	No information available
Density	900 kg/m ³
Water solubility	No information available
Solubility in other solvents	No information available
logPow	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Viscosity, kinematic	No information available
Explosive properties	Not explosive
Oxidising properties	Not applicable
Possibility of hazardous reactions	No information available***

9.2. Other information

Freezing point	No information available
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Section 10: STABILITY AND REACTIVITY**10.1. Reactivity**

General Information	No information available.
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10.2. Chemical stability

Stability	Stable under recommended storage conditions.
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10.3. Possibility of hazardous reactions

Hazardous reactions	None under normal processing.
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10.4. Conditions to Avoid

Conditions to Avoid	Heat (temperatures above flash point), sparks, ignition points, flames, static electricity. Take precautionary measures against static discharges. Strong oxidising agents.
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10.5. Incompatible materials

Materials to avoid	Strong oxidising agents.
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10.6. Hazardous Decomposition Products

Hazardous Decomposition Products	None under normal use. Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot.
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Section 11: TOXICOLOGICAL INFORMATION**11.1. Information on toxicological effects**Acute toxicity Local effects Product Information

Skin contact	. Not classified. May produce an allergic reaction. High pressure injection of the products under the skin may have very serious consequences even though no symptom or injury may be apparent.
Eye contact	. Not classified. The supplier of some components contained within this formulation has indicated that the classification as irritant is not required.
Inhalation	. Not classified. Inhalation of vapours in high concentration may cause irritation of respiratory system.
Ingestion	. Not classified. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Acute toxicity - Component Information

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts***	LD50 > 5000 mg/kg (OECD 401)	LD50 > 2000 mg/kg (OECD 402)	
Sulfonic acids, petroleum, calcium salt***	> 16000 mg/kg bw (rat)	> 4000 mg/kg (rabbit)	LC50(4h) > 1.9 mg/l (rat - aerosol)
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts***	> 5000 mg/kg (Rat - OECD 401)	> 5000 mg/kg bw (rabbit - OECD 402)	> 1.9 mg/l (Rat - aerosol-OECD 403)
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14-tert-alkyl***	LD50 2000 mg/kg bw (Rat - OECD TG 401)		-
(Z)-N-9-octadecenylpropane-1,3-diamine***	LD50 500-1000 mg/kg (rat)***		
(Z)-octadec-9-enylamine***	LD50 1689 mg/kg bw (Rat)		

Sensitisation

Sensitisation	The supplier of one of the components contained within this formulation has indicated that they have data, which confirms that at the concentration used, no sensitisation classification is required. Contains sensitizer(s). Not classified as a sensitizer. May produce an allergic reaction.
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Specific effects

Carcinogenicity	This product is not classified carcinogenic.
Mutagenicity	This product is not classified as mutagenic.
Reproductive toxicity	This product does not present any known or suspected reproductive hazards.

Repeated Dose Toxicity

Subchronic Toxicity	No information available.
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Target Organ Effects (STOT)**Target Organ Effects (STOT)** No information available. Central Vascular System (CVS). Eyes. Respiratory system. Skin.**Other information****Other adverse effects** Characteristic skin lesions (oil blisters) may develop following prolonged and repeated exposures (contact with contaminated clothing).**Section 12: ECOLOGICAL INFORMATION****12.1. Toxicity**

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Acute aquatic toxicity - Product Information

No information available.

Acute aquatic toxicity - Component Information

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
Benzenesulfonic acid, mono-C16-24-alkyl derivs., calcium salts*** 70024-69-0	EC50 (72h) > 1000 mg/l (Pseudokirchnerella subcapitata - static)	EC50 (48h) > 1000 mg/l (Daphnia magna - static)	LL50 (96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	
Sulfonic acids, petroleum, calcium salt*** 61789-86-4	EC50(72h) > 1000 mg/l (Pseudokirchnerella subcapitata)	EC50(48h) > 1000 mg/l (Daphnia magna - OECD 202)	LC50(96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	
Benzenesulfonic acid, C10-16-alkyl derivs., calcium salts*** 68584-23-6	EL50(72h) > 1000 mg/l (Pseudokirchnerella subcapitata)	EL50(48h) > 1000 mg/l (Daphnia magna)	LL50(96h) > 10000 mg/l (Cyprinodon variegatus - OECD 203)	
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14- tert-alkyl*** ^	EL50 (96h) > 15 mg (Selenastrum capricornutum - OECD 201) EC50 (96h) 6.4 mg/l (Pseudokirchnerella subcapitata - OECD 201) EC50 (96h) 15 mg/l (Pseudokirchnerella subcapitata - OECD 201) EC50 (96h) 6.4 mg/L (Selenastrum capricornutum - OECD TG 201) (ECHA CHEM)	EL50 (48h) ca. 91.4 mg/l (Daphnia magna - OECD 202)	LL50 (96h) ca. 24 mg/l (Oncorhynchus mykiss - OECD 203)	
(Z)-octadec-9-enylamine*** 112-90-3	ERC50 (72h) 0.46 mg/l (Desmodesmus subspicatus - OECD 201) EBC50 (72h) 0.38 mg/l (Desmodesmus subspicatus - OECD 201)	EC50 (48h) 0.011mg/l (Daphnia magna - OECD 202)	LC50 (96h) 0.11 mg/l (Pimephales promelas - OECD 203)	

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Chronic aquatic toxicity - Product Information

No information available.

Chronic aquatic toxicity - Component Information

Chemical Name	Toxicity to algae	Toxicity to daphnia and other aquatic invertebrates.	Toxicity to fish	Toxicity to microorganisms
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14- tert-alkyl*** A	NOEC (96h) 1.7 mg/l (Pseudokirchnerella subcapitata - OECD 201) par NOEC (96h) 3.3 mg/l (Pseudokirchnerella subcapitata - OECD 201)	EL50 (21d) 0.91 mg/l (Daphnia magna - OECD 211) NOEL (21d) 0.12 mg/l (Daphnia magna - OECD 211) EL50 (21d) 0.66 mg/l (Daphnia magna - OECD 211)	-	EC50 (3h) ca. 2433 mg/L (Activated Sludge, domestic - OECD TG 209) (ECHA CHEM)
(Z)-octadec-9-enylamine*** 112-90-3	NOEC(72h) 0.15 mg/l (Desmodesmus subspicatus - OECD 201) NOEC(96h) 0.01 mg/l (Selenastrum capricornutum - OECD 201)	NOEC(21d) 0.013 mg/l (Daphnia magna - OECD 211)		

Effects on terrestrial organisms

No information available.

12.2. Persistence and Degradability**General Information**

No information available.

12.3. Bioaccumulative potential**Product Information** No information available.**logPow** No information available**Component Information**

Chemical Name	log Pow
Reaction products of 4-methyl-2-pentanol and diphosphorus pentasulfide, propoxylated, esterified with diphosphorus pentaoxide, and salted by amines, C12-14- tert-alkyl*** - A	< 0.30 to >7.10 (OECD TG 117) (ECHA CHEM)
(Z)-N-9-octadecenylpropane-1,3-diamine*** - 7173-62-8	0.03 à 25.7°C et pH 6.8***

12.4. Mobility in soil**Soil** Given its physical and chemical characteristics, the product has no soil mobility.**Air** Loss by evaporation is limited.**Water** The product is insoluble and floats on water.

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12.5. Results of PBT and vPvB assessment

PBT and vPvB assessment No information available.

12.6. Other adverse effects

General Information No information available.

Section 13: DISPOSAL CONSIDERATIONS**13.1. Waste treatment methods**

Waste from residues / unused products Should not be released into the environment. Dispose of in accordance with the European Directives on waste and hazardous waste. If recycling is not practicable, dispose of in compliance with local regulations.

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

EWG Waste Disposal No The following Waste Codes are only suggestions: 12 01 12. According to the European Waste Catalogue, Waste Codes are not product specific, but application specific. Waste codes should be assigned by the user based on the application for which the product was used.

Other information No information available.

Section 14: TRANSPORT INFORMATION

ADR/RID not regulated

IMDG/IMO not regulated

ICAO/IATA not regulated

ADN not regulated

Section 15: REGULATORY INFORMATION**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****European Union**

International Inventories No information available***

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Further information

No information available***

15.2. Chemical Safety Assessment

Chemical Safety Assessment No information available

15.3. National regulatory information

The United Kingdom

- Avoid exceeding occupational exposure limits (see section 8).

Ireland

- Avoid exceeding occupational exposure limits (see section 8).

Section 16: OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3

H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H335 - May cause respiratory irritation
H373 - May cause damage to the kidneys/ liver/ eyes/ brain/ digestive system/ central nervous system through prolonged or repeated exposure if swallowed
H304 - May be fatal if swallowed and enters airways
H400 - Very toxic to aquatic life
H410 - Very toxic to aquatic life with long lasting effects
H317 - May cause an allergic skin reaction
H301 - Toxic if swallowed
H315 - Causes skin irritation
H290 - May be corrosive to metals
H411 - Toxic to aquatic life with long lasting effects***

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Abbreviations, acronyms

UVCB = Substance of unknown or Variable composition, Complex reaction products or Biological material
OECD = Organization for Economic Co-operation and Development
bw = body weight
bw/day = body weight/day
GLP = Good Laboratory Practice
fw = fresh water
mw = marine water
or = occasional release
dw = dry weight
NIOSH = National Institute of Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
ACGIH = American Conference of Governmental Industrial Hygienists
IARC = International Agency for Research of Cancer
DNEL = Derived No Effect Level
PNEC = Predicted No Effect Concentration
LD50 = 50% Lethal Dose - Chemical amount, given at once, which causes the death of 50% (one half) of a group of test animals
LC50 = 50% Lethal concentration - Concentration of a chemical in air or a chemical in water which causes the death of 50% (one half) of a group of test animals
LL = Lethal Loading
NOEC = No Observed Effect Concentration
NOEL = No Observed Effect Level
NOAEL = No Observed Adverse Effect Level
EC x = Effect Concentration associated with x% response

Legend Section 8

TWA: Time Weight Average

STEL: Short Time Exposure Limit

+ Sensitiser
** Hazard Designation
M: Mutagen

* Skin designation
C: Carcinogen
R: Toxic to reproduction

Revision Date:

2016-02-10

Revision Note

*** Indicates updated section.

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above. It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk. The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity. The user bears sole liability for the precautions required when using the product. The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive. It is the user's responsibility to ensure that he is subject to no other obligations than those mentioned.

End of Safety Data Sheet

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13.4 SKF LGWA 2



Safety data sheet

Revision: 31-05-2016
Replaces: 12-09-2014
Version: 04.01/GBR

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Trade name: LGWA 2

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended uses: Lubricating grease

1.3. Details of the supplier of the safety data sheet

Supplier: SKF MAINTENANCE PRODUCTS
Postbus 1008
NL-3430 BA Nieuwegein
The Netherlands
Tel: +31 30 6307200
Email: sebastien.david@skf.com
WWW: www.skf.com

1.4. Emergency telephone number

0870 600 6266 (UK only) Only available to health professionals.

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

CLP-classification (Regulation (EC) No 1272/2008):

The product shall not be classified as hazardous according to the classification and labelling rules for substances and mixtures.

Most serious harmful effects:

May cause slight irritation to the skin and eyes. Persons with a known allergy to reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14-alkyl (branched) may exhibit an allergic response to the product.

2.2. Label elements

The product shall not be classified as hazardous according to the classification and labelling rules for substances and mixtures.

Supplemental information:

Contains reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14-alkyl (branched). May produce an allergic reaction. Safety data sheet available on request.

2.3. Other hazards

Assessment to determine PBT and vPvB has not been made.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Registration number	CAS/EC Number	Substance	CLP-classification (Regulation (EC) No 1272/2008)	w/w%	Note
.	12001-85-3	Naphthenic acids, zinc salts	Aquatic Chronic 2;H411	<2,5	.
.	234-409-2

01-211949362 -	reaction products of	Acute Tox. 4;H302 Eye Dam. 1;H318 Skin Sens.	0,1 - 1
0-38-XXXX 931-384-6	bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide,	1;H317 Aquatic Chronic 2;H411	.
.	propylene oxide and amines,	.	.
.	C12-14-alkyl (branched)	.	.

Please see section 16 for the full text of H-phrases.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation: Seek fresh air. Seek medical advice in case of persistent discomfort.

Ingestion: Wash out mouth thoroughly and drink 1-2 glasses of water in small sips. Seek medical advice in case of discomfort.

Skin: Remove contaminated clothing. Wash skin with soap and water. Seek medical advice in case of persistent discomfort.

Eyes: Flush with water (preferably using eye wash equipment) until irritation subsides. Seek medical advice if symptoms persist.

Other information: When obtaining medical advice, show the safety data sheet or label.

4.2. Most important symptoms and effects, both acute and delayed

May cause slight irritation to the skin and eyes. The product contains small amounts of reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14-alkyl (branched). Persons with a known allergy may exhibit an allergic response to the product.

4.3. Indication of any immediate medical attention and special treatment needed

No special immediate treatment required. Treat symptoms.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media Extinguish with powder, foam, carbon dioxide or water mist. Use water or water mist to cool non-ignited stock.

Unsuitable extinguishing media Do not use water stream, as it may spread the fire.

5.2. Special hazards arising from the substance or mixture

Not flammable, but combustible. Can generate harmful flue gases containing carbon monoxide in the event of fire.

5.3. Advice for firefighters

Move containers from danger area if it can be done without risk. Avoid inhalation of vapour and flue gases – seek fresh air. Wear Self-Contained Breathing Apparatus (SCBA) with chemical resistant gloves.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: Wear gloves. Wear safety goggles if there is a risk of eye splash.

For emergency responders: In addition to the above: Normal protective clothing equivalent to EN 469 is recommended.

6.2. Environmental precautions

Prevent spillage from entering drains and/or surface water.

6.3. Methods and material for containment and cleaning up

Contain and absorb spill with sand or other absorbent material and transfer to suitable waste containers. Wipe up minor spills with a cloth.

6.4. Reference to other sections

See section 8 for type of protective equipment. See section 13 for instructions on disposal.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Use the product under well-ventilated conditions. Running water and eye wash equipment should be available. Wash hands before breaks, before using restroom facilities, and at the end of work.

7.2. Conditions for safe storage, including any incompatibilities

Store safely, out of reach of children and away from food, animal feeding stuffs, medicines, etc.

Keep in tightly closed original packaging. Store in a dry, cool, well-ventilated area. Store at temperatures below 45°C. Do not store with the following: Oxidisers.

7.3. Specific end use(s)

None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Legal basis: EH40/2005 Workplace exposure limits. Last amended December 2011.
Contains no substances subject to reporting requirements.

8.2. Exposure controls

Appropriate engineering controls: Wear the personal protective equipment specified below.

Personal protective equipment, eye/face protection: Wear safety goggles if there is a risk of eye splash. Eye protection must conform to EN 166.

Personal protective equipment, skin protection: In the event of direct skin contact, wear protective gloves: Type of material and thickness: Nitrile rubber >0,38mm. Penetration time: >8 hours. Gloves must conform to EN 374.

Personal protective equipment, respiratory protection: Not required. In case of risk of formation of spray mist, wear respiratory protective equipment with A/P2 filter. Respiratory protection must conform to one of the following standards: EN 136/140/145.

Environmental exposure controls: Ensure compliance with local regulations for emissions.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

State: Fat.

Colour: Yellow /Brown

Odour: Characteristic

Odour threshold: No data

pH (solution for use): No data

pH (concentrate): No data

Melting point/freezing point: No data

Initial boiling point and boiling range: No data

Flash point: > 150 °C

Evaporation rate: No data

Flammability (solid, gas): No data

Upper/lower flammability limits: No data

Upper/lower explosive limits: No data

Vapour pressure: No data

Vapour density: No data

Relative density: < 1,0 g/cm³ (25 °C)

Solubility: Insoluble in the following: Water.

Partition coefficient n-octanol/water: No data

Auto-ignition temperature: No data

Decomposition temperature: No data

Viscosity: No data

Explosive properties: No data

Oxidising properties: No data

9.2. Other information

None.

SECTION 10: Stability and reactivity

10.1. Reactivity

Reacts with the following: Oxidisers.

10.2. Chemical stability

The product is stable when used in accordance with the supplier's directions.

10.3. Possibility of hazardous reactions

None known.

10.4. Conditions to avoid

Do not expose to heat (e.g. sunlight).

10.5. Incompatible materials

Oxidisers.

10.6. Hazardous decomposition products

Can generate harmful flue gases containing carbon monoxide in the event of fire.

SECTION 11: Toxicological information**11.1. Information on toxicological effects**

Acute toxicity - oral: Ingestion of large quantities may cause discomfort. The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

LGWA 2:
LD50: 5247 mg/kg

Acute toxicity - dermal: The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

LGWA 2:
LD50 3941 mg/kg

Acute toxicity - inhalation: The product does not have to be classified. Based on existing data, the classification criteria are deemed not to have been met.

LGWA 2:
17.08 mg/l (Mist)
24.85 mg/l (Vapour)

Skin corrosion/irritation: May cause slight irritation. The product does not have to be classified. Test data are not available.

Serious eye damage/eye irritation: Temporary irritation. The product does not have to be classified. Test data are not available.

Respiratory sensitisation or skin sensitisation: The product contains small amounts of reaction products of bis(4-methylpentan-2-yl)dithiophosphoric acid with phosphorus oxide, propylene oxide and amines, C12-14-alkyl (branched). Persons with a known allergy may exhibit an allergic response to the product. The product does not have to be classified. Test data are not available.

Germ cell mutagenicity: The product does not have to be classified. Test data are not available.

Carcinogenic properties: The product does not have to be classified. Test data are not available.

Reproductive toxicity: The product does not have to be classified. Test data are not available.

Single STOT exposure: The product does not have to be classified. Test data are not available.

Repeated STOT exposure: The product does not have to be classified. Test data are not available.

Aspiration hazard: The product does not have to be classified. Test data are not available.

Other toxicological effects: On warming/heating, the vapours emitted may cause irritation to the respiratory organs. May cause coughing and breathing difficulties.

SECTION 12: Ecological information**12.1. Toxicity**

The product does not have to be classified. Test data are not available.

12.2. Persistence and degradability

Not expected to be biodegradable. Test data are not available.

12.3. Bioaccumulative potential

Test data are not available.

12.4. Mobility in soil

Test data are not available.

12.5. Results of PBT and vPvB assessment

No assessment has been made.

12.6. Other adverse effects

Oil products may cause soil and water pollution.

German water pollution classification (WGK): 1

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Avoid discharge to drain or surface water. Collect spills and waste in closed, leak-proof containers for disposal at the local hazardous waste site.

EWC code: Depends on line of business and use, for instance 13 02 08* other engine, gear and lubricating oils

Absorbent/cloth contaminated with the product:
EWC code: 15 02 02 absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances

Uncleansed packaging is to be disposed of via the local waste-removal scheme. Empty, cleansed packaging should be disposed of for recycling.

SECTION 14: Transport information

The product is not covered by the rules for transport of dangerous goods.

14.1. UN number

-

14.2. UN proper shipping name

-

14.3. Transport hazard class(es)

-

14.4. Packing group

-

14.5. Environmental hazards

-

14.6. Special precautions for user

-

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

-

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

Special provisions: None.

15.2. Chemical safety assessment

Chemical safety assessment has not been performed.

SECTION 16: Other information

Changes have been made in the following sections: 1

Abbreviation explanations:

PBT: Persistent, Bioaccumulative and Toxic
vPvB: Very Persistent and Very Bioaccumulative ,
STOT: Specific Target Organ Toxicity

Classification method:

Calculation based on the hazards of the known components.

H-phrases:

H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Training:

A thorough knowledge of this safety data sheet should be a prerequisite condition.

Other information:

This safety data sheet has been prepared for and applies to this product only. It is based on our current knowledge and the information that the supplier was able to provide about the product at the time of preparation. The safety data sheet complies with applicable law on preparation of safety data sheets in accordance with 1907/2006/EC (REACH) as subsequently changed.

14 Maintenance Logs

Use the provided maintenance logs as originals and make copies as needed.

14.1 Weekly / 50 Operating Hours

<h2 style="margin: 0;">Maintenance Log - Weekly / 50 Hours</h2> <p style="margin: 0;">Pg. 1 of 3</p>								
Y E A R								
January	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
February	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
March	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
April	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								

Maintenance Log - Weekly / 50 Hours

Pg. 2 of 3

Y E A R								
May	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
June	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
July	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
August	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								

Maintenance Log - Weekly / 50 Hours

Pg. 1 of 3

Y E A R								
September	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
October	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
November	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								
December	Week 1	Date	Week 2	Date	Week 3	Date	Week 4	Date
Activity	Hours	Sign.	Hours	Sign.	Hours	Sign.	Hours	Sign.
Inspect and lubricate Guide Tubes								
Inspect spindle, lubricate spindle & LW nut								
Lubricate Drive Chains								
Charge remaining grease fittings								

User Manual

OE-2000-A3-4-7-2-FS-NZ-003
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Rev. 0, 24-Nov-'16



14.2 Monthly / 200 Operating Hours

Maintenance Log - Monthly / 200 Hours						
Y E A R						
Activity	Jan. Hours	Date Sign.	Feb. Hours	Date Sign.	March Hours	Date Sign.
Test Emergency Stops						
Activity	April Hours	Date Sign.	May Hours	Date Sign.	June Hours	Date Sign.
Test Emergency Stops						
Activity	July Hours	Date Sign.	Aug. Hours	Date Sign.	Sept. Hours	Date Sign.
Test Emergency Stops						
Activity	Oct. Hours	Date Sign.	Nov. Hours	Date Sign.	Dec. Hours	Date Sign.
Test Emergency Stops						

14.3 6 Months / 1,000 Operating Hours

Maintenance Log - 6 Months / 1,000 Hours						
Y E A R						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Test Emergency Steering						
Inspect Levelwind Nut						
Y E A R						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Test Emergency Steering						
Inspect Levelwind Nut						
Y E A R						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Test Emergency Steering						
Inspect Levelwind Nut						
Y E A R						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Test Emergency Steering						
Inspect Levelwind Nut						

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Rev. 0, 24-Nov-'16



14.4 Annually / 2,000 Operating hours

Maintenance Log - Annual / 2,000 Hours						
Activity	Y E A R			Y E A R		
	Date	Hours	Sign.	Date	Hours	Sign.
Verify Torque Values at Indicated Bolted Connections						
Perform Static Brake Test of Fail Safe Brakes						
Verify function of heating elements						
Verify Function of brake resistor						
Check and Tighten Fasteners in Electrical System						
Activity	Y E A R			Y E A R		
	Date	Hours	Sign.	Date	Hours	Sign.
Verify Torque Values at Indicated Bolted Connections						
Perform Static Brake Test of Fail Safe Brakes						
Verify function of heating elements						
Verify Function of brake resistor						
Check and Tighten Fasteners in Electrical System						
Activity	Y E A R			Y E A R		
	Date	Hours	Sign.	Date	Hours	Sign.
Verify Torque Values at Indicated Bolted Connections						
Perform Static Brake Test of Fail Safe Brakes						
Verify function of heating elements						
Verify Function of brake resistor						
Check and Tighten Fasteners in Electrical System						

14.5 Additional Intervals

Maintenance Log - Additional Intervals						
2,500 Operating Hours						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Change Gearbox Oil At Storage Drum Motors And Traction Motors						
15,000 Operating Hours						
Activity	Date	Hours	Sign.	Date	Hours	Sign.
Change Gearbox Oil At LW Motor						
5 Years						
Activity	Date	Sign.	Date	Sign.	Date	Sign.
Replace smoothing capacitor at VSDs						
Replace aluminum capacitors on the PCB in the VSDs						
Replace the battery in the PLC						
10 Years						
Activity	Date	Sign.	Date	Sign.	Date	Sign.
Replace the fuses in the VSDs						

User Manual

OE-2000-A3-4-7-2-FS-NZ-003

Serial No. SHG-000973



Rev. 1

1-July-'16

Appendix i OEM Instructions, Lubrication Dispenser



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English

Original instructions

SKF SYSTEM 24 - LAGD 60 / LAGD 125

3

EU Declaration of conformity

We, SKF Maintenance Products, Kelvinbaan 16,
3439 MT Nieuwegein, The Netherlands declare that the

SKF System 24 LAGD 60 and LAGD 125

have been designed and manufactured in accordance with:
DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND THE COUNCIL of
26 February 2014 on the approximation of the laws of the Member States
concerning equipment and protective systems intended for use in potentially
explosive atmospheres as outlined in Harmonised Standards

EN 60079-0: 2012
EN 60079-11: 2012
EN 50303: 2000



II 1 G Ex ia IIC T6 Ga
II 1 D Ex ia IIIC T85°C Da
I M1 Ex ia I Ma

EC-Type Approval:
KEMA 07ATEX0132 X

CE 0537

IECEx Certificate of Conformity:
IECEx DEK 15.0066X

Where in X denotes: $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$ (LAGD 60/... and LAGD 125/...) appropriate measures must be taken to prevent electric discharge

EUROPEAN ROHS DIRECTIVE 2011/65/EU

Nieuwegein, The Netherlands, April 4, 2016



Sébastien David
Manager Product Development and Quality



Safety recommendations

To prevent electrostatic discharge in hazardous areas,
only wet cleaning is permitted.



1. Technical data

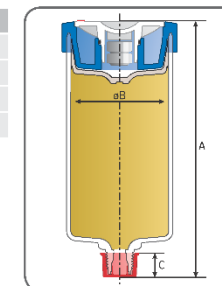
Grease capacity LAGD 60	60 ml, (2,03 fl.oz US)
Grease capacity LAGD 125	125 ml, (4,25 fl.oz US)
Nominal emptying time	adjustable; 1-12 months
Ambient temperature range LAGD 60/125	-20 °C to 60 °C (-5 °F to 140 °F)
Intrinsically Safe approval	II 1G Ex ia IIC T6 Ga II 1D Ex ia IIIC T85°C Da I M1 Ex ia I Ma
Protection Class	IP 68
Maximum operating pressure	5 bar (75 psi)*
Drive source	pressurised inert gas
Connection thread	R 1/4
Recommended storage temperature	+20 °C (+70 °F)
Storage life of lubricator	2 years **
Weight LAGD 60	approx. 130 g (4,3 oz) (grease included)
Weight LAGD 125	approx. 185 g (6,9 oz) (grease included)
Designation	LAGD 125/WA2 (filled with LGWA 2) LAGD "Capacity"/"lubricant"

* The maximum internal pressure of a full lubricator applied to a fully blocked application.

** Storage life lasts for 2 years from the production date printed on the side of the lubricator. The lubricator may be used for the maximum 12 months after 2 years of storage.

Empty S24 units are for oil only and must be used with a non-return valve.

	LAGD 125		LAGD 60	
	mm	inch	mm	inch
A	118	4.645	86	3.386
øB	50	1.968	50	1.968
C	11	0.433	11	0.433





2. Installation

1. Write the installation date on the unit with a water-resistant pen. (Fig A)
2. Remove the end cap of the lubricator. (Fig B)
3. Turn the dial to activate the lubricator. (Fig C)
4. Clean the area around the lubrication point.
5. Remove the previous unit or old grease fitting.
6. Attach the new unit hand tight. (Fig D)
7. We recommend to check the general condition of the bearing and the position of the lubricator piston every normal manual lubrication interval.



When the unit is installed on a new application:

1. Make sure that the grease in the SYSTEM 24 is suitable.
2. Fill the supply lines and the bearing with grease.
3. Make sure the grease is compatible.
4. Make sure the ambient temperature is within the acceptable limits. If the ambient temperature is constantly above +40 °C do not select a dispense rate of more than 6 months for optimum performance.
5. Make sure the unit supplies grease to the bearing, or component to be lubricated.
6. Make sure that there is no connection for a grease gun on the same lubrication point.
7. Install the unit no more than 300 mm (grease) or 1500 mm (oil) from the bearing.
8. Use only supply lines with an internal diameter of 6 mm.
9. Protect the unit against impact or vibration. Use the protection base LAPP 4 to shield the unit, or install the unit remotely.
10. Protect the unit against heat and sudden temperature changes.



Note:

- The lubricator can be temporarily de-activated. Set the lubricator time set dial to 0.
- The unit can be installed in any position. The unit is waterproof (IP 68) and can be installed under water.
- Oil filled lubricators have non-return valve plugs as standard. Do not remove it.
- Empty S24 units are for oil only and must be used with a non-return valve.

3. Selection of dispense rate

SKF recommends using one of the following methods to select the dispense rate.

3.1 Experience based approach

If the previous selection rate is satisfactory apply the same to the new lubricator.

3.2 Grease gun equivalence

Set the lubricator time to make sure the bearing receives the same amount of lubricant as previously supplied by a grease gun.

Example:

- Bearing "X" receives 10 strokes from SKF hand operated grease gun (SKF 1077600) per month.
- One full stroke = 1,5 cm³.

LAGD 60

- The content of the lubricator LAGD 60 is 60 ml = 60 cm³.
- Therefore 60 cm³ divided by 1,5 cm³ = 40 strokes.
- 10 strokes per month equals 40 divided by 10 = 4 months.

Set the lubricator time setting on 4 months.

LAGD 125

- The content of the lubricator LAGD 125 is 125 ml = 125 cm³.
- Therefore 125 cm³ divided by 1,5 cm³ = 83 strokes.
- 10 strokes per month equals 83 divided by 10 = 8,3 months.

Set the lubricator time setting on 8 months.

3.3 SKF DialSet 4.0

DialSet is a re-lubrication calculation program, which easily determines the right time setting for SKF SYSTEM 24 and SYSTEM MultiPoint automatic lubricators applications. The DialSet program and documentation MP3501 can be found on www.mapro.skf.com.

3.4 SKF LubeSelect for SKF greases

SKF LubeSelect for SKF greases is a website that can be consulted through an internet connection, which easily determines the right lubricant and lubricator setting for bearings. The website is only available on www.skf.com after logging in at @ptitute exchange.

4. Activation period

The lubricator has a time delay before the unit starts to supply lubricant. The delay varies according to the time setting selected and the operating temperature. In most cases the lubricant in the bearing housing contains sufficient lubrication during this activation period. The activation period can be reduced by running the lubricator for 1 day on 1 month time setting before changing it to the required time setting.

4.1 Influences on time setting

The dispense rate can be influenced by resistance in lubrication channels and the ambient temperature.

If the ambient temperature is below -10 °C (+14 °F) then the emptying time will be approximately twice that is shown on the lubricator. If the ambient temperature is above +40 °C (+104 °F) then for the LAGD 60/... and LAGD 125/... the emptying time is approximately half that shown on the lubricator.

5. Problem solving

Problem	Possible causes	Action
Lubricator does not dispense or dispenses too slowly	Incorrect adjustment	Adjust the dispense rate
	Lubricator is not activated	Activate the lubricator time set dial
	Lubrication channels are blocked	Clear the blockage by forcing grease with a grease gun through the lubrication channels
	The resistance is too high	Make sure that: <ul style="list-style-type: none"> - excessive grease can escape - supply lines are not longer than 300 mm - supply lines have a inner diameter of 6 mm - Lubrication point is suitable for gas driven lubricators
Lubricant dispenses too quickly	Incorrect adjustment	Adjust the dispense rate
	Short term temperature peak	No corrective action needed
Air between the piston and the lubricant	Installed longer period than the selected time	Replace the unit
	The ambient temperature is more than the acceptable limit	Replace the unit and protect the unit against high ambient temperatures
Lubricator neck breaks	Too high vibration or impact	Support the unit with the clamp LAPC 50 or protection plate LAPP 4
If the lubricator still fails to operate, contact your local SKF SYSTEM 24 supplier.		

Material safety data sheets for the LAGD 60/125 and for the lubricants used can be found at www.mapro.skf.com.



6. Disposal advice

Separate the lubricator in parts for disposal.

1. Turn the arrow on the dial to the screwdriver slot.
2. Insert a screw driver into the screwdriver slot.
3. Lever the dial out of the lubricator.
4. The parts must be discarded in accordance with local regulations.

- Consider the lubricator reservoir as industrial waste (oil, greases, filters.....)
EU waste code 150110
- Consider the dial, with battery, as battery waste.
EU waste code 160603
- Consider the resistor plate as electronic waste.



7. Accessories

Designation	Description
LAPA 45	Angle connection 45°
LAPA 90	Angle connection 90°
LAPB 3X4E1	Lubrication brush 3 x 4 cm*
LAPB 3X7E1	Lubrication brush 3 x 6 cm*
LAPB 3X10E1	Lubrication brush 3 x 10 cm*
LAPB 5-16E1	Lift rail lubrication brush*
LAPC 50	Clamp
LAPE 35	Extension 35 mm
LAPE 50	Extension 50 mm
LAPF F1/4	Tube connection female G 1/4
LAPF M1/4	Tube connection male G 1/4
LAPF M1/8	Tube connection male G 1/8
LAPF M3/8	Tube connection male G 3/8
LAPG 1/4	Grease nipple G 1/4
LAPM 2	Y-connection
LAPM 4	4 in 1 manifold G 1/2
LAPN 1/8	Nipple G 1/4 - G 1/8
LAPN 1/2	Nipple G 1/4 - G 1/2
LAPN 1/4	Nipple G 1/4 - G 1/4
LAPN 1/4UNF	Nipple G 1/4 - G 1/4 28 UNF
LAPN 3/8	Nipple G 1/4 - G 3/8
LAPN 6	Nipple G 1/4 - M6
LAPN 8	Nipple G 1/4 - M8
LAPN 8X1	Nipple G 1/4 - M8x1
LAPN 10	Nipple G 1/4 - M10
LAPN 10X1	Nipple G 1/4 - M10x1
LAPN 12	Nipple G 1/4 - M12
LAPN 12X1.5	Nipple G 1/4 - M12x1.5
LAPP 4	Protection base
LAPT 1000	Flexible tube, 1 000 mm long
LAPV 1/4	Non return valve G 1/4
LAPV 1/8	Non return valve G 1/8

* Use only with oil filled SKF SYSTEM 24 units.