SKF SYSTEM 24

Connected single point lubricator / TLDD series

Instructions for use

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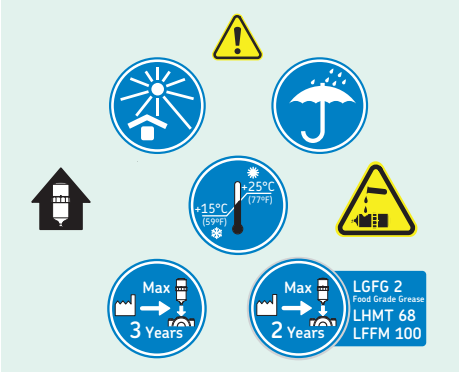
Original instructions

Original instructions



Safety recommendations

Read this instruction for use fully. Follow all safety precautions to avoid personal injury or property damage during equipment operation. SKF cannot be responsible for damage or injury resulting from unsafe product use, lack of maintenance or incorrect equipment operation. In case of any uncertainties as regards the use of the equipment contact SKF.

⚠ WARNING:

- Your safety is extremely important.
- Read and follow all warnings in this document before handling and operating the equipment.
- You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings.

⚠ WARNING:

- Warning messages can alert you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.

⚠ WARNING!:

- Do not replace the power supply on the gateway with one designed for another product; doing so can damage the gateway and void your warranty. Adapter shall be installed near the equipment and shall be easily accessible.

⚠ WARNING!:

- Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The device is not designed for or intended to be used in portable applications within 20 cm (8 inches) of the user's body.

⚠ IMPORTANT:

- Important messages means that there is a risk of product or property damage if the instruction is not heeded.

General safety

- The device is designed for and intended to be used in fixed and mobile applications.
- Fixed means the device is physically secured at one location and cannot be easily moved to another location.
- Mobile means the device is used in other than fixed locations.

Personnel safety

- Dress properly.
- Do not wear loose clothing or jewelry.
- Keep your hair, clothing, and gloves away from moving parts.
- Do not overreach. Keep proper footing and balance at all times to enable better control of the device during unexpected situations.
- Use safety equipment.
- Always wear eye protection.
- Non-skid safety shoes, hard hat, or hearing protection must be used for appropriate conditions.
- Do not repair or adjust energized equipment alone, under any circumstances. Someone capable of providing first aid must always be present for your safety.
- To work on or near high voltage, you should be familiar with approved industrial first aid methods.
- Always obtain first aid or medical attention immediately after an injury.
- Never neglect an injury, no matter how slight it seems.

Handling precautions

- To avoid damage due to the accumulation of static charge, use proper precautions when handling any cellular device. Although input protection circuitry has been incorporated into the devices to minimize the effect of static build-up, use proper precautions to avoid exposure to electronic discharge during handling and mounting the device.

EU Declaration of Conformity
SKF SYSTEM 24
Connected single point lubricator / TLDD series

We, SKF MPT, Meidoornkade 14,
3992 AE Houten, The Netherlands herewith declare under our sole responsibility that the products described in these instructions for use, are in accordance with the conditions of the following Directive(s):
RADIO EQUIPMENT DIRECTIVE 2014/53/EU and EMC DIRECTIVE 2014/30/EU,
in conformity with the following standards:

EMC 2014/30/EU
EN 301 489-1
EN 301 489-3
EN61000-6-2:2005/AC:2005
EN61000-4-2
EN61000-4-3
EN61000-4-8

RED 2014/53/EU
EN 300 220-1
EN 300 220-2

RoHS DIRECTIVE (EU) 2015/863

Houten, The Netherlands, August 2024

Guillaume Dubois
Manager Quality and Compliance

UK Declaration of Conformity
SKF SYSTEM 24
Connected single point lubricator / TLDD series

We, SKF MPT, Meidoornkade 14,
3992 AE Houten, The Netherlands herewith declare under our sole responsibility that the products described in these instructions for use, are in accordance with the conditions of the following Directive(s):
Radio Equipment Regulations 2017 (2017 No. 1206) and
Electromagnetic Compatibility Regulations 2016 (2016 No. 1091),
in conformity with the following standards:

Electromagnetic Compatibility Regulations 2016 (2016 No. 1091)
EN 301 489-1
EN 301 489-3
EN61000-6-2:2005/AC:2005
EN61000-4-2
EN61000-4-3
EN61000-4-8

Radio Equipment Regulations 2017 (2017 No. 1206)
EN 300 220-1
EN 300 220-2

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (2012 No. 3032)

The person authorised to compile the technical documentation on behalf of the manufacturer is SKF (U.K.) Limited, 2 Canada Close, Banbury, Oxfordshire, OX16 2RT, GBR.

Houten, The Netherlands, August 2024

Guillaume Dubois
Manager Quality and Compliance

1. System overview

1.1 About this user manual

This user manual provides technical information about SKF SYSTEM 24 Connected single point lubricator TLDD, commonly called the “TLDD series”.
Setting up the TLDD system includes installing and using the Lubrication Cloud user interface to:

- Establish the list of assets lubricated with single point lubricators.
- Register gateway (s) to set up a connectivity network.
- Register the lubricant use at each lubrication point, setting dispensing time.
- View dashboard alarm, warning, off, total lubricators, lubricant consumption.
- Export the dashboard information from Lubrication Cloud.
- Set up alarm notifications.
- Invite users to access the organization.
- Organize the on-site assets in a structured and flexible multi-level hierarchy, according to the complexity of the local application.
- Onboard other SKF connected lubrication products, besides the TLDD.

This user manual provides information on how to create an organization and set up a network of gateways distributed properly at customer facilities. Visualization of the location of the TLDD installed in the field is key to properly use the technology.

As you use this manual, you’ll discover certain conventions used:

- **Bold** type is used to indicate text that appears on a menu, window or dialog.
- Italics are used to emphasize important information.
- → are used to indicate notes to the reader.
- Step-by-step procedures are sequenced using bullets, •.

In writing this manual we assume you are familiar with Lubrication Management good practices. Moreover, with common Windows®, iOS or Android operations. Refer to the corresponding guides for information in these areas.

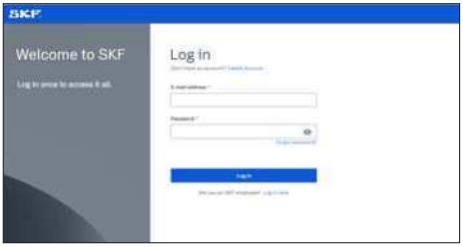
Related documentation:

Document On-line training Lubrication **Publication** Click here
Selection tools for:
Document - LubeSelect for SKF greases **Publication** Click here
Document - Lubricators settings Dial Set **Publication** Click here
Document SKF SYSTEM 24 – TLDD series **Publication** PUB MP/P8 18877 EN
Document Electro-mechanical single point automatic lubricators **Publication** PUB MP/P8 13744/2 EN

1.2 Quick start guide

1. **Access from your computer or phone web browser:**
- Go to https://lubrication-cloud.skf.com.
- Press the Log in button.

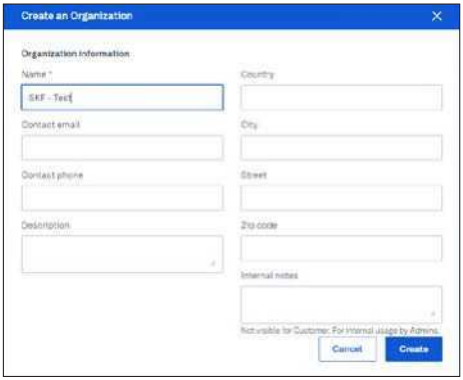
2. **Create an account at SKF:**
- Click on “create account”.



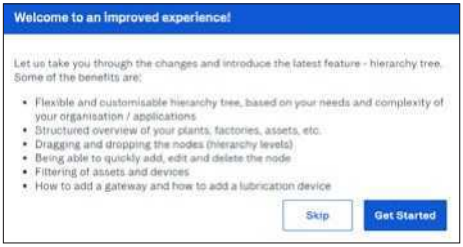
- Enter “First name”, “Last name” and verify your e-mail address.
- Enter the verification code received by email to continue.
- Enter account information (company name, location and desired language).
- Create a password and check “I have read the Terms & Conditions and the Privacy Policy and agree to them”.

3. **Access your new account:**
- Enter your login credentials.
- Click on “Log in”.

4. **Create an Organization and start the onboarding tutorial:**
- Click on “Create Organization” and enter your organization information.
- In case you would like to access an existing organization please ask for an invitation from one of the currently active users.

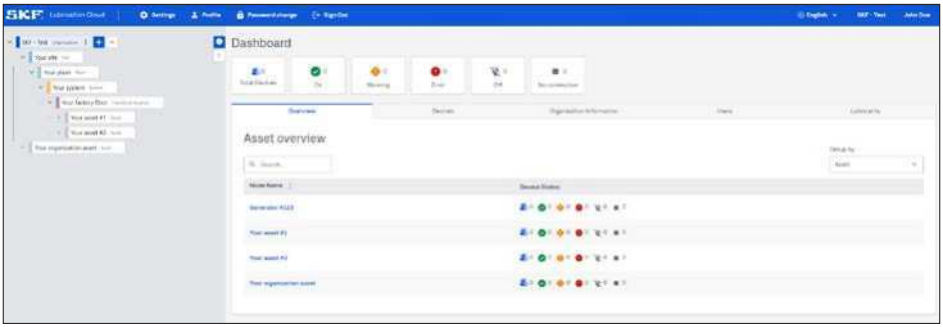


Start the onboarding tutorial
- This step is highly recommended, especially if this is the first time using the platform.
  The tutorial is optional and can be skipped by clicking the “Skip” button.

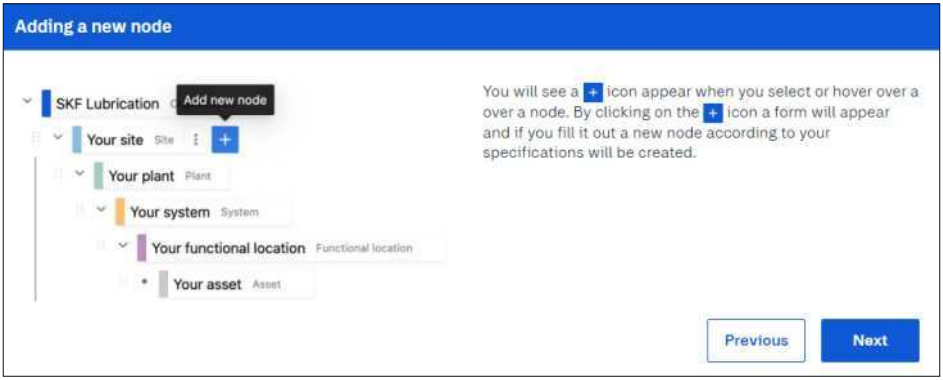


5. **View your dashboard:**

- The Dashboard is used to set up organizations in a structured way so that the status of the lubrication devices and assets can be monitored.
- Initially, your dashboard will be empty as no Devices, Gateway (s) and Lubricants have been added.



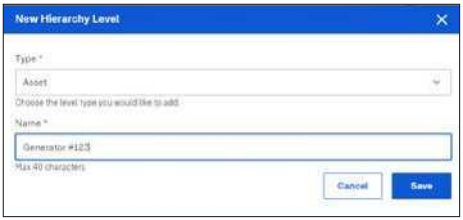
6. The dashboard displays an overview of a organization's list of Assets which contain one or more Lubrication devices.



Add your first Asset (e.g. machine, motor, pump, etc):

- The hierarchy tree is predefined for your convenience.
- Begin by editing the names, deleting the unnecessary nodes and adding new ones if needed.
- We recommend starting with the highest node and work your way down to assets.

To add a new asset or node, click the + sign which shows next to the selected node of the hierarchy. To edit an existing asset or node, press the three dots button (...) next to the name of the selected node and then Edit.



Click Save:

- Add as many assets as required following the steps above.

7. Add your gateway (s):

- Choose the node (Organization, Site, Plant, System, Functional Location)* in which the gateway device will be added and click on it (From the Hierarchy).
- Click on “Devices tab”.
- Click on “Add gateway”, this will open a relevant form.
  - Enter a name to identify the Gateway.
  - Enter Gateway ID printed on the label of the Gateway.
  - Click + Add gateway.
- Fill out the form and click “Add”.
  The unique Gateway ID can be found on the SKF label, located behind or on the side of the gateway, according to the model which is being used.
  The format of the Gateway ID is AA11AA11 (where AA stands for letters and 11 stands for numbers)

***NOTE:**
Gateways CANNOT be added inside Assets.

- Add as many Gateways as required following the steps above. The gateways can be positioned in different nodes to facilitate locating them on the field.

8. **Add your first Device (Lubricator) to an Asset:**

- Choose the asset node* in which the lubrication device will be added and click on it (From the Hierarchy).
- Click on “Devices tab”.
- Click on “+ Add Device”
- Choose “Add TLDD” from the dropdown selection, this will open the relevant form.
  - Enter Device ID printed on the label of the lubricator.
  - Enter a name, e.g. lubricator location at asset.
  - Select cartridge size.
  - Select lubricant type. In case using a customized lubricant, go to → **section 2.3 Lubricants and Manufacturers**.
  - Select Dispense setting.
  - Fill out the form and click “Add”.

*__NOTE:__
Lubrication devices can be added ONLY within Asset nodes.

9. **Mount the gateway in your plant:**

- Select a location that is central to all the devices (lubricators) that you would like to connect to the gateway.
  Go to → **section 4 Gateway installation** process for further information.
- Connect the power supply to the gateway’s power jack and plug it into an electrical outlet.
- Make sure that the gateway LED’s are blinking.

10. **Mount the unit on your machine (asset):**

- Screw the cartridge on the support flange.
- Check that the batteries are properly inserted in the drive unit.
- Make sure the plastic cap is adjusted and properly secured.
- Screw the unit on your machine.

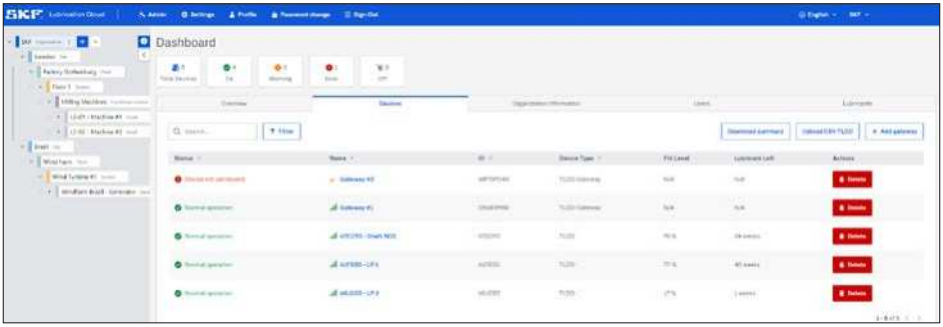
11. **View your new lubricator in the Devices section:**

- Once the batteries are inserted in the drive unit, the LED indicator will blink, then turn blank.
- The lubricator will automatically find the nearest powered gateway.
- After 30 seconds, a green LED will indicate that the connection was successful.
- The lubricator will then perform an initial shot of grease.
- Please bear in mind that it can take some time for the device to update its status in Lubrication Cloud. The platform will sync automatically.

12. Congratulations your device is connected!

Device status should display
“Normal Operation” in green, along with the connection strength.

PLEASE NOTE:
Upon first starting the device it may take some time to start the lubrication cycle, depending on the selected setting. The device may show the “TLDD Disabled” status, although it has connected correctly. This means the device is connected and will start the lubrication cycle soon (may take at least 1 hour to issue the first lubricant shot). After the cycle starts, the status will change to “Normal Operation”.



SKF SYSTEM 24

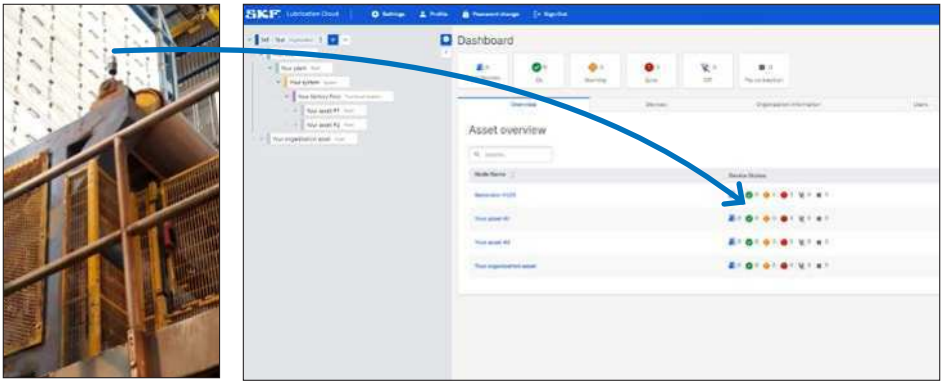
Connected single point lubricator / TLDD series

At several companies monitoring and lubricating the very large number of bearings has been done manually for years. However, manual lubrication is often not the most suitable method, especially if the lubrication points are difficult to reach.

This can result in important safety risks to workers, as top-ups and greasing normally occurs around moving equipment. Working in close proximity to machines that rotate or move, as happens in a paper mill, food and beverage factories among others requires special caution to avoid potential accidents.

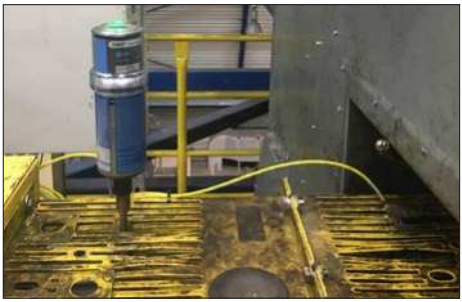
Replacing manual lubrication will increase efficiency and save costs, preventing lubricant contamination which can affect bearing life and increase the risk of machine failure. In manual lubrication programs, avoiding grease contamination can be a challenge. By comparison, a properly installed single-point automatic lubricator can supply a continuous and accurate flow of fresh and clean lubricant, keeping the application in proper condition while at the same time preventing contaminant ingress.

The application of the connected single point lubricator TLDD (Tool Lubricant Digital Dispenser) has resulted in a safer and more sustainable production process, contributing to solve the challenges previously described.



1.4 Typical applications

The connected single point lubricator TLDD system is commonly used in isolated assets that are difficult to access, applications like electrical motors, funs, pumps mixers, conveyors among others. It withstands harsh environmental conditions therefore is suitable for heavy industry segments Pulp and Paper, Mining, Food and Beverage, Steel among others.



1.5 Technology concept

The TLDD connected single-point lubricator system, which is part of the SKF SYSTEM 24 portfolio, is a solution for wireless monitoring of automatic single-point lubricators. The system uses a web-based dashboard and interface to monitor the status of each lubricator and control its settings.
The visual representation of the machines and lubrication level of each bearing position includes a customizable alarm to indicate when a new lubricant cartridge needs to be replaced or where lubrication points are blocked.

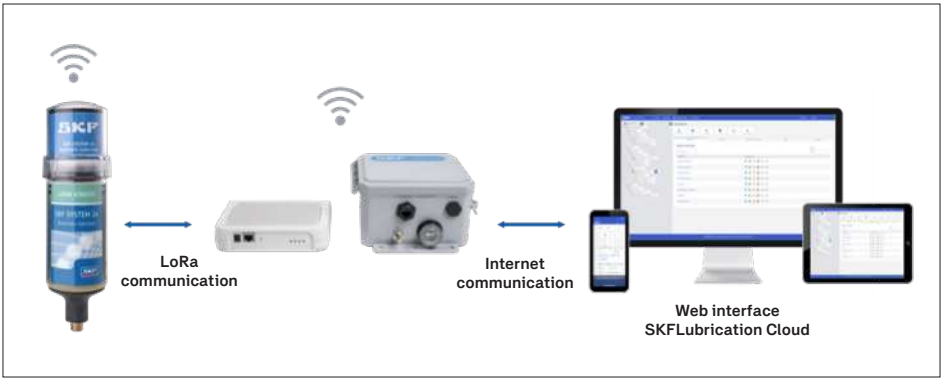
The Lubrication Cloud dashboard is used to set up the companies' lubrication points in a structured way so that the status of its assets can be visualized. Each asset can contain several lubrication points.

Installing the TLDD to lubricate an asset will help the maintenance team to be aware of the lubrication condition of the asset and the connectivity status of the lubrication points.

The platform quickly provides insights about installed TLDD's, such as how many are operating normally, in alarm state or missing connection.

Additionally, the user is able to quickly assess how many devices require a grease cartridge replacement soon, as well as the amount of grease which was applied by the installed units. With this information the maintenance team will then be able to plan in advance their maintenance routines, keeping the system lubrication in optimal condition, which then results in reducing the unplanned downtime at the current site.

To ensure that all the lubrication points are monitored properly, the user needs to set up a network of gateways that will enable the connection of the lubricators and the LC Dashboard.



1.6 Hardware and network requirements

1.6.1 Required product components

All TLDD components need to be purchased individually depending on the customer region location and needs. These components are:

- Select the appropriate gateway and drive unit designation according to the region where the TLDD will be installed.
  Please see → **section 1.6.3** for more information and contact SKF MPT for further information or support regarding the appropriate regional configuration.
- Select the lubricant according to the application requirements.
  Refer to SKF Lube Select for more information or assistance in selecting the correct lubricant (link available in page 6).
- Register the user account at https://lubrication-cloud.skf.com.

1.6.2 Single point lubricator

Connected SYSTEM 24 TLDD follows the same working principle of the TLSD, with the added benefit of being equipped with electronics that enable the connectivity to the cloud.

1.6.2.1 Ambient temperature

Recommended temperature is between 0 °C to 50 °C (32 °F - 122° F).

1.6.2.2 Lubricator setting time

Fix settings at OFF, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 months. To determine the best setting for your application, please use the SKF Dialset tool, available at https://dialset.skf.com/.

1.6.2.3 Maximum working pressure

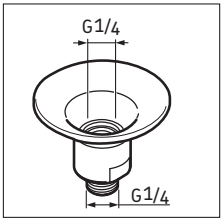
- Maximum working pressure of grease filled units is 5 bar (72 psi).
- Maximum recommended working pressure of oil filled units is 3 bar (43 psi).

⚠ WARNING!:

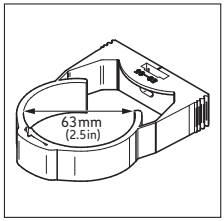
- Verify that the application has a draining point to release the lubricant excess.

1.6.2.4 Resistance to vibration

In all applications, the support flange (TLSD 1-SP) should be used to mount the lubricant cartridge.
If required use the accessory LAPC 63 to fix the cartridge to the application:



TLSD 1-SP



LAPC 63

In applications where vibration is constant or intense the TLDD lubricator may be mounted remotely and connected to the lubrication point via a lubrication line (tubing).
Please see → **section 1.6.3** for more details on remote mounting and the relevant list of accessories in → **section 1.6.4**.

1.6.3 Main product designations and regional versions

According to the country of application, different regional versions of the TLDD drive units and gateways must be selected, to comply with local approvals and regulations. Regional units must match to operate (for example, an EU drive unit will only connect to an EU gateway).

Please contact your local SKF representative to confirm whether the product is readily available in your region and which regional version is applicable.

Regional differentiation	
Country availability	See below list of countries to select the correct regional version. If your country is not available, please reach out to your SKF local representative for more information.
Europe	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom
North and Central America	United States of America, Canada*, Mexico*, Puerto Rico
South America	Chile*, Colombia*, Argentina*, Brazil*, Paraguay*, Peru*, Uruguay*
Oceania	Australia, New Zealand
Gateway	
- EU version	TLDD 1/EU-GAT and TLDD 2/EU-GAT
- US version	TLDD 1/US-GAT and TLDD 2/US-GAT
- AU version	TLDD 1/AU-GAT (Australia and South America) and TLDD 2/AU-GAT (only Australia)
- LA version	TLDD 2/LA-GAT (only South America)
Lubricator drive unit	
- EU version	TLDD 1/EU-DS
- US version	TLDD 1/US-DS
- AU version	TLDD 1/AU-DS

* Pending local radio communications approval - please visit skf.com or contact your local SKF representative to confirm availability.

Additional power adapters are available for the IP67 gateway (TLDD 2/**-GAT).
Please see → **section 2.2.2** for more details.

Matching product versions per region				
Region	**Lubricator**	**Standard gateway**	**Heavy duty gateway**	**Frequency range**
- Europe	EU version	EU version	EU version	863-870 MHz
- North America	US version	US version	US version	902-928 MHz
- Australia and New Zealand	AU version	AU version	AU version	915-928 MHz
- South America	AU version	AU version	LA version	915-928 MHz
- Other region	Contact SKF			

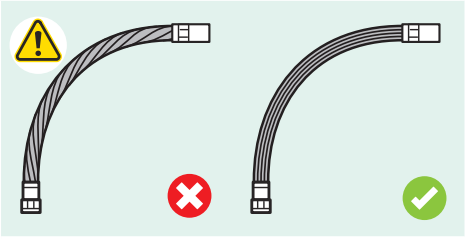
1.6.4 Lubricant lines

The TLDD may be mounted remotely and feed the lubrication point via a lubricant line. Tubing and available accessories are listed in → **section 1.6.5**.

The maximum length of the lubrication line with grease is 3 meters and with oil it can extend up to 5 meters. This is dependent on ambient temperatures: lower temperatures may increase grease stiffness and require higher pressure for lubrication, thus potentially preventing the lubrication cycle. When using feed lines it is important that these are pre-filled with grease or oil.

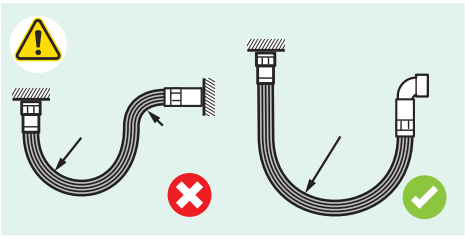
Mount the primed lubricant lines and connect them to the lubrication points. Follow the rules for installation of hose lines DIN 20066:

At low temperature applications is recommended direct mounting, avoid tubing.



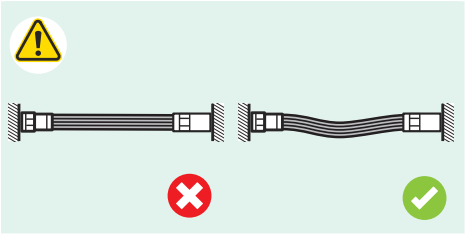
Wrong ✖ Twisted during installation

Correct ✔ Do not twist during installation



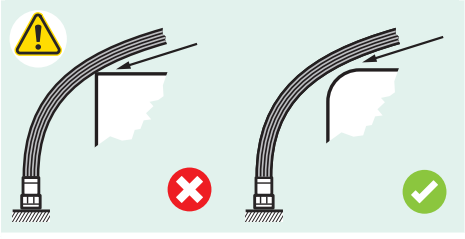
Wrong ✖ Too small bending radius

Correct
- ✔ Determine the correct hose length
- ✔ Adhere to the minimum bending radius



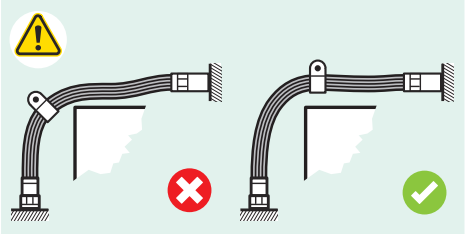
Wrong
- ✖ Hose is too short
- ✖ Hose is subject to high tensile load / jamming load

Correct
- ✔ Determine the correct hose length
- ✔ Route hose slightly sagging



Wrong ✖ Damages caused by sharp edges and abrasion

Correct
- ✔ Cover sharp-edged components
- ✔ Protect hose by means of protective hose
- ✔ Keep sufficient distance to edges



Wrong ✖ Damage by kinking

Correct ✔ If possible, fix hose brackets to straight sections

1.6.5 Spare parts and accessories

TLDD system utilizes the following spare parts and accessories:

Designation	Description
LAPA 45	Angle connection 45°
LAPA 90	Angle connection 90°
LAPG 1/4	Grease nipple G 1/4
LAPN 1/4UNF	Nipple G 1/4 – 1/4 UNF
LAPN 1/2	Nipple G 1/4 - G 1/2
LAPN 1/4	Nipple G 1/4 - G 1/4
LAPN 1/8	Nipple G 1/4 - G 1/8
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 - M8 x 1
LAPN 10	Nipple G 1/4 - M10
LAPN 10x1	Nipple G 1/4 - M10 x 1
LAPN 12	Nipple G 1/4 - M12
LAPN 12x1.5	Nipple G 1/4 - M12 x 1,5
LAPE 50	Extension 50 mm
LAPE 35	Extension 35 mm
LAPM 2	Y-connection
LAPF F1/4	Tube connection female G 1/4
LAPF M1/8	Tube connection male G 1/8
LAPF M1/4	Tube connection male G 1/4
LAPF M3/8	Tube connection male G 3/8
LAPT 1000	Flexible tube, 1000 mm long, 8 x 6 mm
LAPV 1/4*	Non return valve G 1/4
LAPV 1/8*	Non return valve G 1/8
LAPB 3x4E1*	Brush 30 x 40 mm
LAPB 3x7E1*	Brush 30 x 60 mm
LAPB 3x10E1*	Brush 30 x 100 mm
LAPB 5-16E1*	Elevator brush, 5-16 mm gap
LAPC 63**	Clamp SYSTEM 24 TLSD
LAPC 13**	Bracket
TLSD 1-SP**	Support flange
TLSD 1-SPV*/**	Support Flange with non-return valve
LAPT 5000**	Flexible tube, 5000 mm long, 8 x 6 mm
* Suitable for use with oil filled automatic single point lubricators only.	
** New accessories for TLSD. See separate specifications for details.	

Use a sealant or general purpose thread locker (PTFE tape or Loctite) when applying threaded connections.

Different SKF lubricants are available for use with the TLDD to support distinct applications and requirements, influenced by:

- Operating conditions: Speed, operating regimen and temperature, load type.
- Environmental conditions: Contamination/ moisture.
- Load type: Moderate, shock load.

Please refer to the SKF LubeSelect application (see related documentation referenced in page 6) for the best lubricant recommendations from SKF.

SKF Lubricant cartridge set (batteries included)	**Content 125 ml**	**Content 250 ml**
LGWA 2	LGWA 2/SD125	LGWA 2/SD250
LGEM 2	LGEM 2/SD125	LGEM 2/SD250
LGFQ 2	LGFQ 2/SD125	LGFQ 2/SD250
LGFG 2	LGFG 2/SD125	LGFG 2/SD250
LGHB 2	LGHB 2/SD125	LGHB 2/SD250
LGHQ2	LGHQ2/SD125	LGHQ2/SD250
LHMT 68	LHMT 68/SD125	LHMT 68/SD250
LFFM 100	LFFM 100/SD125	LFFM 100/SD250

2. Pre-commissioning

Prepare the installation of TLDD by following the steps below.

2.1 SKF Lubrication Cloud (LC)

Lubrication Cloud (LC) is the user interface to register the SKF SYSTEM 24 Connected TLDD series and associate them with the assets to monitor their performance remotely from your PC/Tablet or smartphone. LC is a web based interface, therefore you do not need to install any application to access the Dashboard, go to https://lubrication-cloud.skf.com.

2.1.1 User registration and password reset

To make sure that LC works as intended, please ensure that:

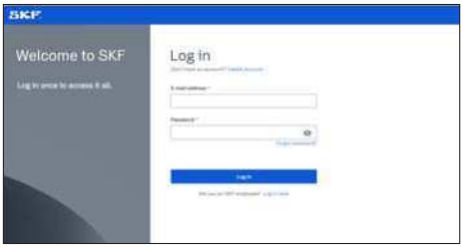
- The Lubrication Cloud user interface https://lubrication-cloud.skf.com is registered as a trusted site.

- The following addresses are added to the user's mailbox and not blocked by a spam filter: info.lubrication-cloud@skf.com and skfsso-service@skf.com

The user will receive notifications from these e-mail addresses, such as: password reset, alarms, warnings, invitation to access other accounts etc.

Register an account:

- Go to https://lubrication-cloud.skf.com (from your computer or phone web browser)
- Click on ***"Create account"***
- enter ***"First name", "Last name"*** and verify your e-mail address
- Find your verification link from: skfsso-service@skf.com Sometimes the verification e-mail from LC can be at the spam folder.
- Enter the verification code
- Enter account information (Company name, Location, Language)
- Create a password and check "I have read the Terms & Conditions and the Privacy Policy and agree to them."
- Go to https://lubrication-cloud.skf.com
- Enter your login credentials.
- Click on ***"Log in"***.



Initially, your dashboard will be empty as no Assets, Devices (lubricators) and gateway (s) have been added yet.

Password reset / forgot password:

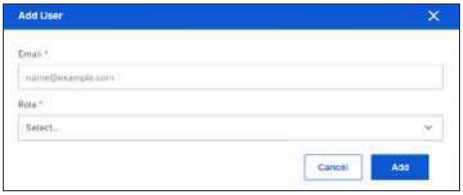
- Go to https://lubrication-cloud.skf.com
- Use the ***"Forgot password?"*** option at the login page.
- Enter the e-mail registered at LC (The e-mail field is case sensitive.)
- Click on ***"Verify e-mail"***.
- Check your mailbox for a verification code.
- Input verification code to update your password.
- Login to LC

2.1.2 Organization and Users

Organization information can be edited by pressing the “Update” button in the respective tab. The tab is visible when selecting the top node of the hierarchy (Organization).

Invitees can be added to an organization:

- Go to your Organization ***“User”*** tab
- Click on ***+ Add User***
- Type the invitees e-mail address
- Select Role
- Add User



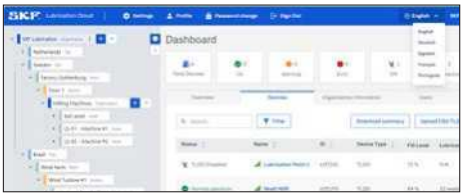
⚠ We recommend that each organization has at least two users to ensure that access is not lost in case one of the accounts is no longer accessible (e.g. due to lost credentials).

2.1.3 Account settings (General Settings):

Access the settings via the button on the top left of the Lubrication Cloud interface

- Select how frequently you would like to receive a reminder on the status of the SKF SYSTEM 24 Connected TLDD series by e-mail notifications:
  Never, Daily, Weekly, Monthly.
- Restart the onboarding tutorial

- Select the language via the top right button in Lubrication Cloud:
  German, English, Spanish, Portuguese, Italian, French.



2.2 Connectivity

Reliable information of the status of the devices installed on the field depends on a stable internet connection of the gateway and constant power supply of the drive unit and gateway.

2.2.1 Gateway general information

The gateway access point extends LoRa® connectivity in industrial buildings like factories, distribution centers and other facilities providing coverage in difficult to reach areas. A proper installation of the gateway(s) will ensure maximum network coverage, network flexibility and stable connectivity. LoRa® Networks are set individually per country, for TLDD availability refer to → **section 1.6**. Hardware and network requirements.

The TLDD lubricators communicate exclusively through the TLDD gateways with the SKF cloud service. This ensures secure data communication, correct data handling in the cloud and assures precise control of the lubricators.

⚠ **TLDD drive unit:** is battery powered therefore, if it runs out of battery, the unit will stop working and it will show ***Empty battery*** in the Lubrication Cloud Dashboard. Review User Manual MP5479, Section 3.3 Single point lubricators installation.

⚠ **TLDD gateway:** requires constant power supply, should it be disabled the gateway will stop working and it will show ***No connection alarm*** in the Lubrication Cloud Dashboard → **section 4 Gateway installation**.

⚠ **SKF SYSTEM 24 Connected single point lubricator / TLDD series** guarantees consistent supply of lubricant even under unstable connectivity.

TLDD works with bi-directional encrypted data communication safeguarded by the communication module in the drive unit together with the hardware and configuration of the gateway.

The TLDD lubricator will connect exclusively to a gateway that is registered under the same customer account.

2.2.2 Power supply

TLDD 1/-GAT (standard model)**

- Connect the power supply to the gateway's power jack and plug it into an electrical outlet.
- Ensure that the power supply is constant.
- The Ethernet port on the standard gateway model is disabled from factory, not being used for powering the device or communication.

TLDD 2/-GAT (IP67 model)**

- The IP67 gateway is powered over Ethernet (PoE).
- Connect the gateway to a suitable Ethernet port, capable of providing 15W at 42.5 to 57 VDC (e.g. in a nearby network switch).
- Apply the supplied cable gland to ensure IP67 compliance. The grounding stud can be used to properly ground the device upon installing.

⚠ WARNING!:
The Ethernet port must be capable of providing at least 25W to properly power the gateway (PoE Standard IEEE 802.3at).

For applications where there is no available Ethernet port, a PoE adapter can be purchased separately from SKF, enabling the user to connect the gateway to a normal power outlet. Please select the most appropriate designation according to the required power adapter for the region.

TLDD 2/EU-POE	PoE power adapter with EU plug (type E)
TLDD 2/US-POE	PoE power adapter with US plug (type A)
TLDD 2/AU-POE	PoE power adapter with Australian plug (type I)

For powering up the device with the PoE adapter, use an Ethernet cable to connect the Ethernet port of the gateway to the POWER OUT port of the adapter.
Afterwards connect the PoE adapter to a normal power outlet with the power cable.
By default, the gateway Ethernet port is only used for providing power to the device, not enabling data transmission or Internet connection.

⚠ WARNING!:
The PoE adapter is not IP67 rated like the gateway, therefore it should not be installed outdoors or in an unprotected environment, subject to water or dust.

Legend:	
1.	Ethernet Port with IP67 rated cable gland (RJ-45 Jack)
2.	Grounding Stud, connector for ground wire (7/16 HEX 1/4 x 20 Stainless Steel)
3.	SIM Slot and LEDs (under plastic cover)
4.	Vent Valve (S-Flange)

2.2.3 Internet connection

The gateway is supplied with a global SIM to provide internet connection. As soon as the gateway is powered, the SIM will find the best service provider at the local network to take advantage of better rates or to comply with the local regulations.

⚠ Make sure that the location of the gateway has good GSM/LTE coverage.

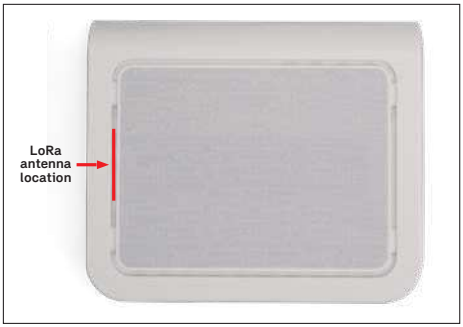
⚠ Check GSM/LTE coverage using your personal mobile phone, verify that the GSM/LTE signal is strong.

There are global roaming coverage exceptions at countries where the constant roaming service is prohibited.
In case of experiencing gateway disconnection, please contact the SKF Technical Support Group for a support request related with System 24 TLDD (system24support@skftechnicalsupport.zendesk.com).

It is recommended to have more than one gateway in the vicinity of the assets where the TLDD devices (lubricators) are installed, thus improving the connectivity. The devices will automatically choose the most suitable gateway to establish a connection.

The TLDD devices connect to the gateway using LoRa®. Therefore the LoRa® antenna of the gateway should be unrestricted.

The LoRa® antenna of the gateway is an omni-directional antenna, for best connectivity results, mount the device so the LoRa® antenna is in a vertical position near the top of a wall.



Once the TLDD device is powered up, it will automatically find the nearest gateway to connect to LC. In case there isn't an available gateway, the TLDD will wait until a valid connection can be established.
Refer to → **section 5** Troubleshooting for more information.

2.2.4 Gateway LED's

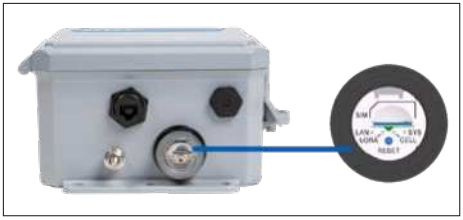
TLDD 1/-GAT (standard model)**
Once the gateway is powered the operating system will load the configuration of the gateway and initiate connection with the SKF Lubrication Cloud and the TLDD lubricators.

The gateway's LED's will indicate the connectivity status of the hardware.

LED	Status
STATUS	Blinks **green** when operating system is fully loaded. → SKF Gateway configuration is loaded.
LORA®	Lights **green** when LoRa® software is active. → Optimal connection with the SKF Cloud and TLDD lubricators.
CELL	Lights **green** when there is power to the radio. → SIM searching for internet provider.
	Blinks **green** when the SIM is registered with the carrier. → SIM connected to internet provider.
WIFI	Not used.

Once the gateway is powered and the LED STATUS blinks **green**, initiate the registration of the gateway at your LC account.

TLDD 2/-GAT (IP67 model)**



LAN:	Lights when Ethernet is connected. Blinks when there is data.
LORA:	Lights when LoRa software is active.
SYS:	Blinks when operating system is fully loaded.
CELL:	Cellular models only. Lights when there is power to the radio. Blinks when the SIM is registered with the carrier.
RESET Button:	Recessed push-button used to reset device

2.2.5 Add a new gateway

1. Choose the node (Organization, Site, Plant, System, Functional Location)* in which the gateway device will be added and click on it (From the Hierarchy).
2. Click on *"Devices tab".*
3. Click on *"Add gateway"*, this will open a relevant form.
   - Enter a name to identify the Gateway.
   - Enter Gateway ID printed on the label of the Gateway.
   - Click +Add gateway.
4. Fill out the form and click *"Add".*

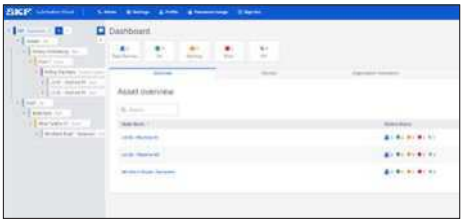
⚠ WARNING!:
Gateways CAN NOT be added in Asset nodes.

⚠ Wait between 30 to 90 minutes for the gateway to show up as connected in LC. The connection to LC will depend on the speed of the mobile data connection that the gateway acquires from the local service provider.

Add as many Gateways as required following the steps above.

2.2.6 Gateways status state in Lubrication Cloud

- Go to *"Lubrication Cloud"* (access with your credentials)
- Go to your Organization, then within the "Device" Tab press the "Filter" button
- Within "Device Type" select the TLDD Gateway device type to only show gateways in the list



The status bars in green will indicate the signal strength of the gateway.
Four bars indicate excellent signal coverage.

The status bars with alarm will indicate that the gateway has connectivity problems.
Refer to → **section 5**. Troubleshooting for more information.

2.2.7 Delete a gateway (s):

Once a gateway is removed from the account, the TLDD lubricators connecting to that gateway will automatically try to find another one in the vicinity to connect to LC.

The TLDD's will continue dispensing lubricant according to the last setting saved at LC.

- Go to LC (access with your credentials)
- Go to Gateways
- Select Delete
- Should you confirm to delete it, the gateway will be removed from the account.

In case of absence of a gateway in the vicinity of the TLDD's, they will display display the *Device not connected* status.
Refer to → **section 5**.
Troubleshooting for more information.

2.2.8 Mounting location

Find a central position to mount the gateway(s), close to the assets where the **SKF SYSTEM 24 Connected TLDD** series will be installed.

- To identify the ideal location for the gateway(s) use a factory layout plan. Identify the asset position where the TLDD devices will be installed and plan to set up a network of gateways that cover the area.
- A proper network of gateways will create redundancy of LoRa® signals enhancing connectivity for the **SKF SYSTEM 24 Connected TLDD**.
- Bear in mind that at open factory environments sites, the optimal distance between gateway's to lubricators is up to 300 m *(985 ft)* – depending on the existence of obstacles.
- Define how many gateways will be required to connect all the TLDD devices according to the distance between the TLDD's and the gateway.
- You can register an unlimited number of gateways in LC.

⚠ Ensure that the gateway (s) are connected in LC before adding devices.
Refer to → **section 5**.
Troubleshooting for more information.

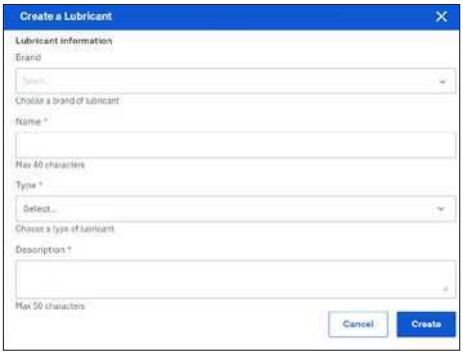
2.3 Lubricants and Manufacturers

SKF lubricants are pre-registered at LC. Customized lubricants can be added manually following the steps below:

2.3.1 Add, Edit, Delete Lubricants and Manufacturers

- Go to your Organization, then to the "Lubricants" Tab
- Click on + Add lubricant
- Select or create the lubricant Manufacturer Name
- Enter a lubricant name
- Select Type (Grease, Oil)
- Enter a description
- Click on "Create"

⚠ **WARNING!:**
Every user in your organization can use, edit and delete this lubricant



3. Commissioning

3.1 SKF Lubrication Cloud Dashboard

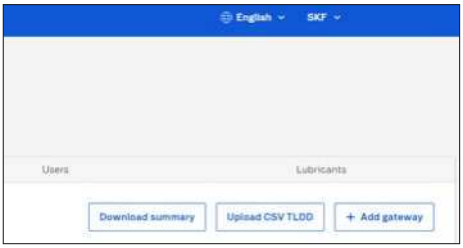
Lubrication Cloud (LC) is a web-based software that is designed to facilitate installation and analysis of lubrication performance. LC then uses this data to provide insight and actions that help the users factory efficiency and reliability.

The Dashboard provides information of the estate of the lubrication points where **SKF SYSTEM 24 Connected TLDD** is fitted.

Error:	List the amount of the devices that require immediate physical intervention derived of: empty alarm, high pressure alarm, internal alarm, no connection. Go to Troubleshooting section to know more information.
Warnings:	List the amount of the devices that will soon require physical intervention derived of: low grease level, high pressure warning, low battery. Go to Troubleshooting section to know more information.
Normal (OK):	List the amount of the devices that are performing lubrication cycles according to the dispense time settings.
OFF:	List the amount of devices which are disabled (dispense setting is OFF). These devices have stopped performing lubrication cycles until a different setting is defined. The devices are still connected. Refer to → section 3.3.2. Add, Edit, Delete devices and lubrication points.
No Connection:	List the amount of the devices require immediate physical intervention derived of: disconnection of a gateway or empty batteries. Go to Troubleshooting section to know more information.
Total devices:	List the amount of devices registered in the Lubrication Cloud user account.
Download summary	The summary file contains a list of devices and gateways registered at the LC account and their operational state. This list assists the user to keep a monthly status report, plan the replacement of cartridges and establish an action plan to resolve the list of faults or functional failures and restore the device (s) and gateway (s) to normal operation.

Download the summary

- Go to your Organization, ***"Device"*** Tab
- Click on ***"Download summary"***
- Save the file at your PC



⚠ Initially, the dashboard will be empty as Assets, Devices (lubricators) and Gateway (s) haven't been added.
Follow the steps below to populate LC.

3.2 Assets and lubrication points

3.2.1 Asset general information

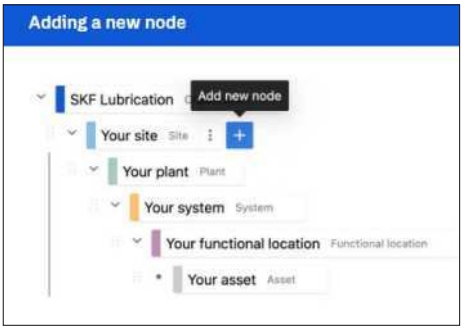
Asset could be a motor, pump, fan, screens, turbo-separators etc. where you're going to install the SKF SYSTEM 24 Connected TLDD series at the lubrication point.

3.2.2 Add, Edit, Delete Assets

Hierarchy Tree

- The hierarchy tree is predefined for your convenience:

Organisation	The organisational structure that is the owner of the site installation.
Site	The geographic location of a site installation e.g. Germany.
Plant	A production unit within a site e.g. Factory xyz, Wind farm xyz, etc.
System	A group of Functional locations or Systems that represents a functional area e.g. Floor 1, windturbine #1, etc.
Functional location	A group of Assets connected to each other, representing a common function or a machine train e.g. Milling machines, Nacelle, etc.
Asset	Asset values of a company, which are monitored with Devices. Could be the machine itself or the components of the machine e.g. Milling machine #1, Main bearing, Generator, Yaw, etc.

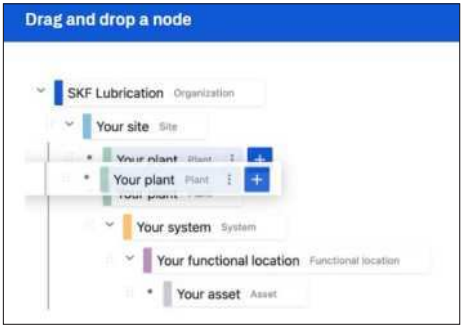


We strongly recommend following the onboarding tutorial available upon first starting the Lubrication Cloud platform or in the Settings menu (accessible via the Settings button on the top left of the screen). The tutorial can be replayed as many times as required and visually explains the steps described below.

- Begin by editing the names, deleting the unnecessary nodes and adding new ones if needed.
- We recommend starting with the highest node and work your way down to assets.

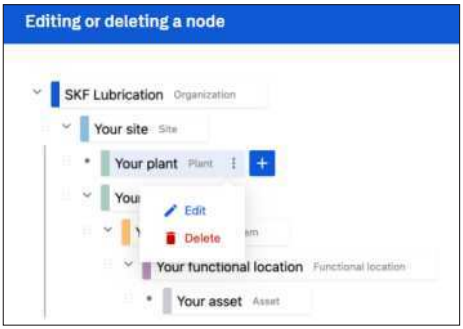
Adding your first Asset (e.g. machine, motor, pump, etc):

- You will see a + icon appear when you select or hover over a node. By clicking on the + icon a form will appear and if you fill it out a new node according to your specifications will be created.
- If you wish to edit or delete a node, select the node of your choice and click on the three dot icon.
- For your convenience, we have enabled drag and drop functionality, making it easy for you to move the nodes within the organization. Restriction is that you are not able to add a node within assets (assets should contain only devices).



- Add as many assets as required following the steps above.

Edit an asset:
Use the search box to find a specific asset:
- Go to your ***Organization, "Overview"*** tab
- Search by ***name***.
- Click on the Asset.
- You will see that the asset is automatically marked in the hierarchy tree
- Click on the 3 dots to edit or delete the asset
- Click on Edit
- Update the required information
- Save changes



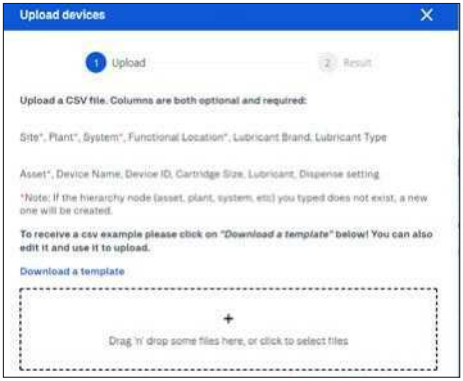
Delete an asset:
Only assets without devices associated can be removed.

- Click on the Asset.
- Click on the device and delete.
- Confirm deletion. Repeat the steps above until all the devices linked to an asset are removed.
- Delete the asset. (Click on the 3 dots to edit or delete the asset)

Within the assets Overview, ***device count*** shows the number of TLDD's devices that are registered under a specific asset.

Batch upload devices with a list:
Prepare a list of the assets and lubricators (TLDDs) where SKF SYSTEM 24 Connected TLDD series will be mounted. Use the template available within Lubrication Cloud.

With this upload, both the hierarchy tree is created and the TLDD is added to the asset.
- Go to your organization, ***"Devices"*** tab.
- Click on ***"Upload CSV TLDD"***
- Download the CSV template and save it in your PC. Do not change the first 2 lines and register the asset information in the desired order. Do not change the table headers (second line).
- In line 3,4 and 5 you can find pre-filled examples. These can be deleted or overwritten.
- Save the file as CSV and upload it in the Lubrication Cloud form (either by drag and dropping or by clicking the delimited area and selecting a file via the file explorer).



3.3 Single point lubricator:

Connected SYSTEM 24 TLDD is the evolution of TLSD. Main difference is the implementation of electronics that enable the connectivity to the cloud within the drive unit.
The drive unit is called a ***Device*** in LC.

3.3.1 Device general information

The Device ID printed at the label will assign a unique identification of the lubrication point where a single point lubricator is fitted.

The settings of the single point lubricator and status updates of the device will be stored in the LC Dashboard.

An asset can have one or more lubrication points. Make sure to identify each lubrication point with
a unique name, e.g. NDE (Non-Drive End), DE (Drive End), this will facilitate identifying the location where the required troubleshooting will take place. Refer to → **section 3.2.1** Asset general information.

3.3.2 Add, Edit, Delete devices and lubrication points

⚠ Before adding devices ensure that the gateway(s) are connected to LC. Refer to → **section 2.2.6**
Check the status of the gateways in LC.

Add new device (s):

- Go to Lubrication Cloud (access with your credentials)
- Go to Assets
- Click on the name of the Asset where the lubricator will be installed.
- Click on + Add device

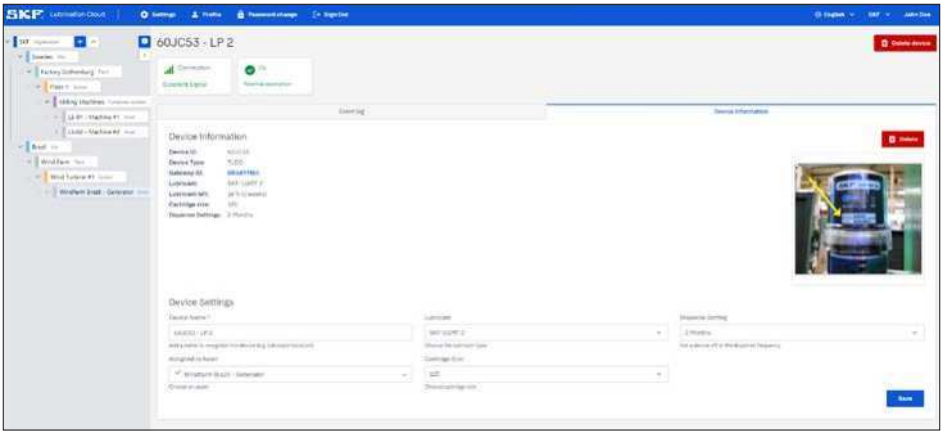
- Enter Device ID printed on the label of the lubricator.
- Select cartridge size: 125 ml, 250 ml.
- Select lubricant type.

In case of a customized lubricant, go to → **section 2.3** *Lubricants and Manufacturers to first register the name of the lubricant.*

- Select dispense setting: 1 – 12 months.

To calculate optimal dispense setting please use ***SKF DialSet***
(available online at dialset.skf.com).

- Click on + Add device and the device will now be accessible within Lubrication Cloud.



The batch uploading of devices follows the same approach as described for assets
→ **See page 25,section 3.2.2**.

⚠ **WARNING!:**
Lubrication devices can be added ONLY in Asset nodes.

3.3.3 Device state status

- Go to Lubrication Cloud (access with your credentials).
- Go to your organization, “Device” tab.
- Search by the Device ID printed on the label of the lubricator or name.
- Click on the Device ID.
- Check the Device state. Refer to the table below for more information.
- Review and Event Log to identify what is the failure. Follow Troubleshooting steps at → **section 5**.

3.3.4 Dashboard warnings

LC dashboard will display the status of the lubricators. Once the gateway (s), asset (s) and device (s) are added to your dashboard, you will be able to visualize:

Icon	Status	What to do?
	OFF	Devices that are not dispensing lubricant. Change the setting according to the frequency of lubrication (1 – 12 months). Devices are still connected.
	Normal	Lubricant is dispensed at the application according to time settings selected: frequency of lubrication (1 – 12 months).
	High pressure warning	The counter pressure is between 4.5 bar and 6 bar. The lubricator will attempt to continue dispensing lubricant for 3 additional cycles and will stop if the counter pressure is not reduced below 5 bar.
	High pressure alarm	The counter pressure is not reduced. The lubricator stops dispensing to protect the device.
	Empty cartridge	Replace cartridge with the proper lubricant cartridge for the application. Make sure the new cartridge is full with lubricant. Make sure to install the support flange in the cartridge. Make sure the batteries are new.
	Lost connection to the Gateway	The lubricator lost connection: Monitor if the lubricator is close to a gateway. Verify the gateway installation location. Make sure the gateway signal is strong. If required, change the location of the gateway to a free of interference space.
	Waiting for connection to the Gateway	The lubricator couldn’t reach a gateway. Verify the gateway installation location. Make sure the gateway signal is strong. If required, change the location of the gateway to a free of interference space.

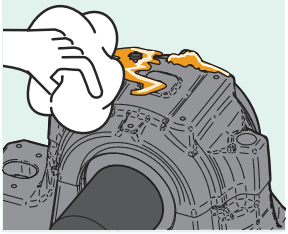
3.3.5 Installation of new lubricators

⚠ Before installing the lubricator (devices) confirm that those are added to your LC account. Refer to → **section 3.3.2**. Add, Edit, Delete Devices and lubrication points at LC.

Paragraph → **section 3.3.6** explains how to replace empty cartridges.

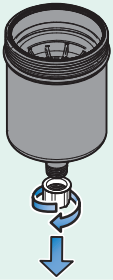
Please follow the instructions below:

1



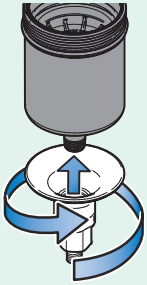
Clean the lubrication point from dirt and old grease in such a way that the dirt is not entering the lubrication point itself.

2



Remove the yellow protection cap from the new grease cannister.

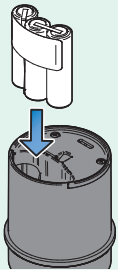
3



Screw the support flange on the cartridge until it is fixed.

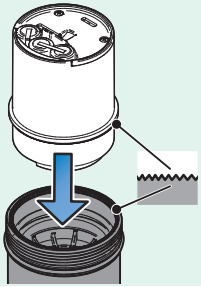
If the support flange is mounted already on the application, don't remove it.
Use sealing tape at the thread of the new cannister tip.

4



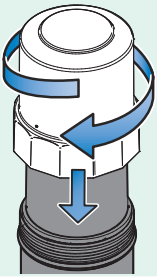
Place the new full batteries in the TLDD drive unit.

5



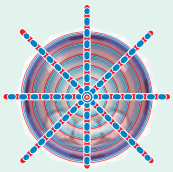
Place the drive unit on top of the full grease cannister and make sure the teeth of both parts are engaged.
The spindle head should now be inside of the motor coupler.

6



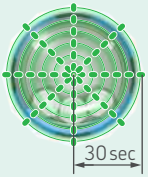
Screw the drive unit cap onto the cannister.

7



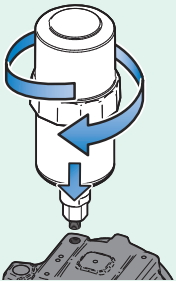
Check that the lubricator is joining a network.
The LED should be blinking Blue-Red while attempting to connect.
Afterwards the lubricator will flash green every 2 seconds, indicating a successful connection and start up.
If the lubricator flashes a fixed red LED it means that it was unable to establish a connection. The user may try to reconnect by removing and reinstalling the batteries.
Please see paragraph → **3.3.7** for more details.

8



Check that the lubricator joined the network.
The LED should blink Green every 2 seconds, followed by an initial longer dispense (with a continuous green LED flash).
This indicates that the connection was established.
Afterwards the device will blink Green every 30 seconds, indicating that it is operating normally.
Please see paragraph → **3.3.7**.

9

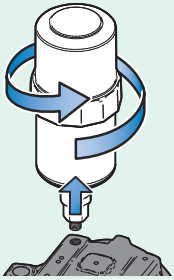
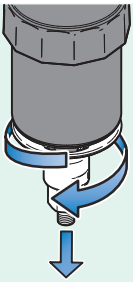
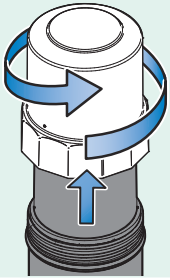
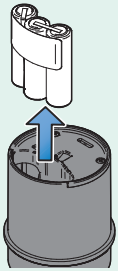


If the support flange is not mounted on the application, screw the complete lubricator onto the application. Your lubricator is ready.

If the support flange is mounted already on the application, the use of sealing tape (PTFE) on the thread of the new cannister tip is recommended.
Then screw the cartridge on the support flange mounted in the application.
Your lubricator is ready.

3.3.6 Replacement of cartridges

In case the lubricator or the battery is empty, the cannister and/or battery should be replaced with a new full one.

1		Dismount the lubricator from the application. It is recommended to keep the support flange mounted to the lubricator.
2		Remove the support flange from the lubricator.
3		Remove the drive unit cap from the lubricator.
4		Remove the battery. ⚠ Do not re-use partially empty batteries.

Continue with cleaning the lubrication point from dirt and old grease in such a way that the dirt is not entering the lubrication point itself, see paragraph → **section 3.3.3**, step 1.
Continue further as from step 4 from paragraph → **section 3.3.3** and use a new cartridge and new battery.

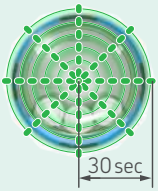
3.3.7 Drive unit LED indications

TLDD is wirelessly connected to the Lubrication Cloud (LC) which reduces the frequency of field inspections for lubrication. It is recommended to occasionally visually inspect the lubricators. To facilitate the field inspection of the drive unit, a multicolor LED emits different colors according to the TLDD's operational status. These are described below.

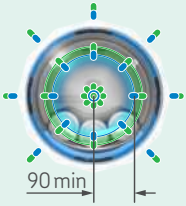
Normal Use LED indications

OFF
LED OFF
Device is **not** dispensing lubricant.
Check settings at LC
Review Troubleshooting section.

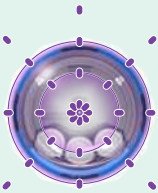
Starting up
Once the battery pack is placed in the drive unit and communication is established, the lubricator will start up. The LED will blink Green every 2 seconds, indicating that the system is ON and starts to find the nearest gateway.



Normal operation
LED blinks green every 30 seconds indicating that the device is operating normally.
Check settings at LC.

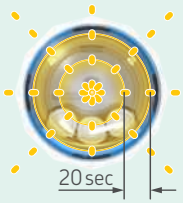


Connected
Once the lubricator established contact with the gateway and Lubrication Cloud the LED will flash Blue-Green every 90 minutes.

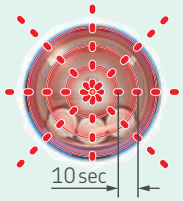


Communicating
When the lubricator is communicating with the gateway and Lubrication Cloud the LED will flash Purple.

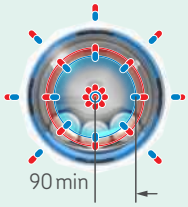
LED warnings and alarms



Pressure warning / Battery warning
If the battery level is low or if a counter pressure higher than 5 bar is detected, the LED will blink Yellow every 20 seconds.



Empty cartridge/High pressure alarm/ Battery depleted/ Malfunction
If the drive unit can no longer rotate the piston due to continuous high counter pressure or a depleted battery then then the LED will blink Red every 10 seconds.



No connection
In case the lubricator cannot connect to the nearest Gateway the LED will flash Blue-Red every 90 minutes. If the lubricator was previously setup with a successful connection, it will continue to lubricate even if connection is lost during the lubrication cycle.

Communication error
In case the lubricator failed to send and receive data from the Gateway the LED will flash Blue-Yellow. The lubricator will continue to operate as initially configured.

Guidelines of what to do when any of the LED warnings appear on the device can be found in chapter → **section 5** Troubleshooting."

Go to LC to verify the state log of the device, → **section 3.3.2**. Add, Edit, Delete Devices and lubrication points.

4. Gateway installation

Once the gateway is registered in the Lubrication Cloud you must turn it on and await for it to connect with the cellular network supplier. As soon as it connects it will show green in the dashboard.
Depending on the network provider this process may take up to 90 minutes.

4.1 Power supply caution

- ⚠ **WARNING!:**
  Do not replace the power supply on the gateway with one designed for another product; doing so can damage the gateway and void your warranty. Adapter shall be installed near the equipment and shall be easily accessible.

- General safety
  The device is designed for and intended to be used in fixed and mobile applications. Fixed means the device is physically secured at one location and cannot be easily moved to another location. Mobile means the device is used in other than fixed locations.

- ⚠ **WARNING!:**
  Maintain a separation distance of at least 20 cm (8 inches) between the transmitter's antenna and the body of the user or nearby persons. The device is not designed for or intended to be used in portable applications within 20 cm (8 inches) of the user's body.

4.2 Handling precautions

To avoid damage due to the accumulation of static charge, use proper precautions when handling any cellular device. Although input protection circuitry has been incorporated into the devices to minimize the effect of static build-up, use proper precautions to avoid exposure to electronic discharge during handling and mounting the device.

When using the IP67 gateway (TLDD 2/**-GAT), please make sure that the device is properly grounded.
The grounding stud can be used to ground the device (see → **section 2.2.2** for more details).

4.3 Radio Frequency (RF) safety

- **⚠ WARNING!:**
  Due to the possibility of radio frequency (RF) interference, it is important that you follow
  any special regulations regarding the use of radio equipment.
  Follow the safety advice given below.
  - Operating your device close to other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
  - Different industries and businesses restrict the use of cellular devices. Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or where blasting operations are in process. Follow restrictions for any environment where you operate the device.
  - Do not place the antenna outdoors.
  - Switch OFF your wireless device when in an aircraft. Using portable electronic devices in an aircraft may endanger aircraft operation, disrupt the cellular network, and is illegal. Failing to observe this restriction may lead to suspension or denial of cellular services to the offender, legal action, or both.
  - Switch OFF your wireless device when around gasoline or diesel-fuel pumps and before filling your vehicle with fuel.
  - Switch OFF your wireless device in hospitals and any other place where medical equipment may be in use.

4.4 Interference with Pacemakers and Other Medical Devices

4.4.1 Potential interference

Radio frequency energy (RF) from cellular devices can interact with some electronic devices. This is electromagnetic interference (EMI).
The FDA helped develop a detailed test method to measure EMI of implanted cardiac pacemakers and defibrillators from cellular devices. This test method is part of the Association for the Advancement of Medical Instrumentation (AAMI) standard.
This standard allows manufacturers to ensure that cardiac pacemakers and defibrillators are safe from cellular device EMI.

The FDA continues to monitor cellular devices for interactions with other medical devices.
If harmful interference occurs, the FDA will assess the interference and work to resolve the problem.

4.4.2 Precautions for pacemaker wearers

If EMI occurs, it could affect a pacemaker in one of three ways:

1. Stop the pacemaker from delivering the stimulating pulses that regulate the heart's rhythm.
2. Cause the pacemaker to deliver the pulses irregularly.
3. Cause the pacemaker to ignore the heart's own rhythm and deliver pulses at a fixed rate.

Based on current research, cellular devices do not pose a significant health problem for most pacemaker wearers. However, people with pacemakers may want to take simple precautions to be sure that their device doesn't cause a problem.

- Keep the device on the opposite side of the body from the pacemaker to add extra distance between the pacemaker and the device.
- Avoid placing a turned-on device next to the pacemaker (for example, don't carry the device in a shirt or jacket pocket directly over the pacemaker).

4.5 Gateway installation considerations

The connected single point lubricator TLDD system functionality depends on the performance of the cellular signal. The gateway is provided with an active SIM card.

4.5.1 Installation

- Select an appropriate place to install the gateway where the cellular signal strength is high. If you face connectivity issues the first suggestion is to check that the gateway has power and the cell LED is constantly blinking. Otherwise change the gateway to a better position with better cellular signal.

- Make sure that the gateway has constant power supply. At some facilities the power is disrupted.

- In case the used gateway unit is not IP67, make sure to not expose it to water, rain or spilled beverages. Exposure to liquids or excessive contamination could result in damage to the device.
  Any power adapters which are not IP67 (including the TLDD 2/**-POE adapter) should be protected from water or excessive humidity.

Fig. 1 – Select a clear area with good GSM signal. The concrete pillar could block all signals. Ideal place for the gateway is high inside the building without wall interferences.

Fig. 2 – Avoid installing the power cable on top of the embedded antenna

Fig. 3 – Check that the gateway (s) are green at LC.

5. Troubleshooting

Here by a description of actions to resolve the faults or functional failures and restore the LC, device (s) and gateway (s) to normal operation:s:

Problem description	Explanation	Solution
SKF Lubrication Cloud		
Restricted access to the URL: https://lubrication-cloud.skf.com	Active firewall restricting access to the LC Dashboard.	Register https:/.lubrication-cloud.skf.com as a trusted site.
Notification or Invitees e-mail not found	The notification, invite e-mail from the sender info.lubrication-cloud@skf.com was received at the Junk/Spam folder inbox of the LC user's e-mail account. The user's e-mail address used to register, invite to LC account was misspelled.	Go to the LC user's e-mail account: • Look for the sender info.lubrication-cloud@skf.com at the Junk/Spam folder inbox. • Add the e-mail address info.lubrication-cloud@skf.com to your contacts. Follow instructions to recover password: 2.1.1. User registration and password reset.
The user could not see their gateway on the portal nor invite others to see it.	Although the user could register and access the portal, as well as add a device and gateway the user couldn't see it.	Need to review and identify the firewall issues prior to registration and on-site visits. Register https://lubrication-cloud.skf.com as a trusted site.
Empty dashboard	Wrong user account. Internet browser glitch.	**Verify the user account that you're accessing:** • Go to Organization users table • View the invitees e-mail address **Check web browser configuration:** • Refresh the internet browser press F5, CTRL+R or CMD+R. • Switching to "InPrivate" search, user was able to see the device. • Change the setting on the browser to Incognito (Chrome) or Private (Explorer).
I am unable to upload a location photo to a lubricator.	Wrong type of picture file.	Lubrication Cloud saves images with format type: jpg/jpeg, png.
I am trying to add a device/ gateway and get a "Device not Found" message	Device/Gateway ID misspelled. Potential issue with Device/Gateway ID.	• Check the **Device ID** printed on the label of the lubricator. Make sure that you are using the correct Device ID, the format should be **DDCCDD** (D = digit 0-9, C = character A-Z) • Check the **Gateway ID** printed on the label of the gateway. Make sure that you are using the correct Gateway ID, the format should be **CCDDCCDD** (D = digit 0-9, C = character A-Z) • Contact support and refer the **Device ID/Gateway ID** to TSG Support TLDD (system24support@skftechnicalsupport.zendesk.com).

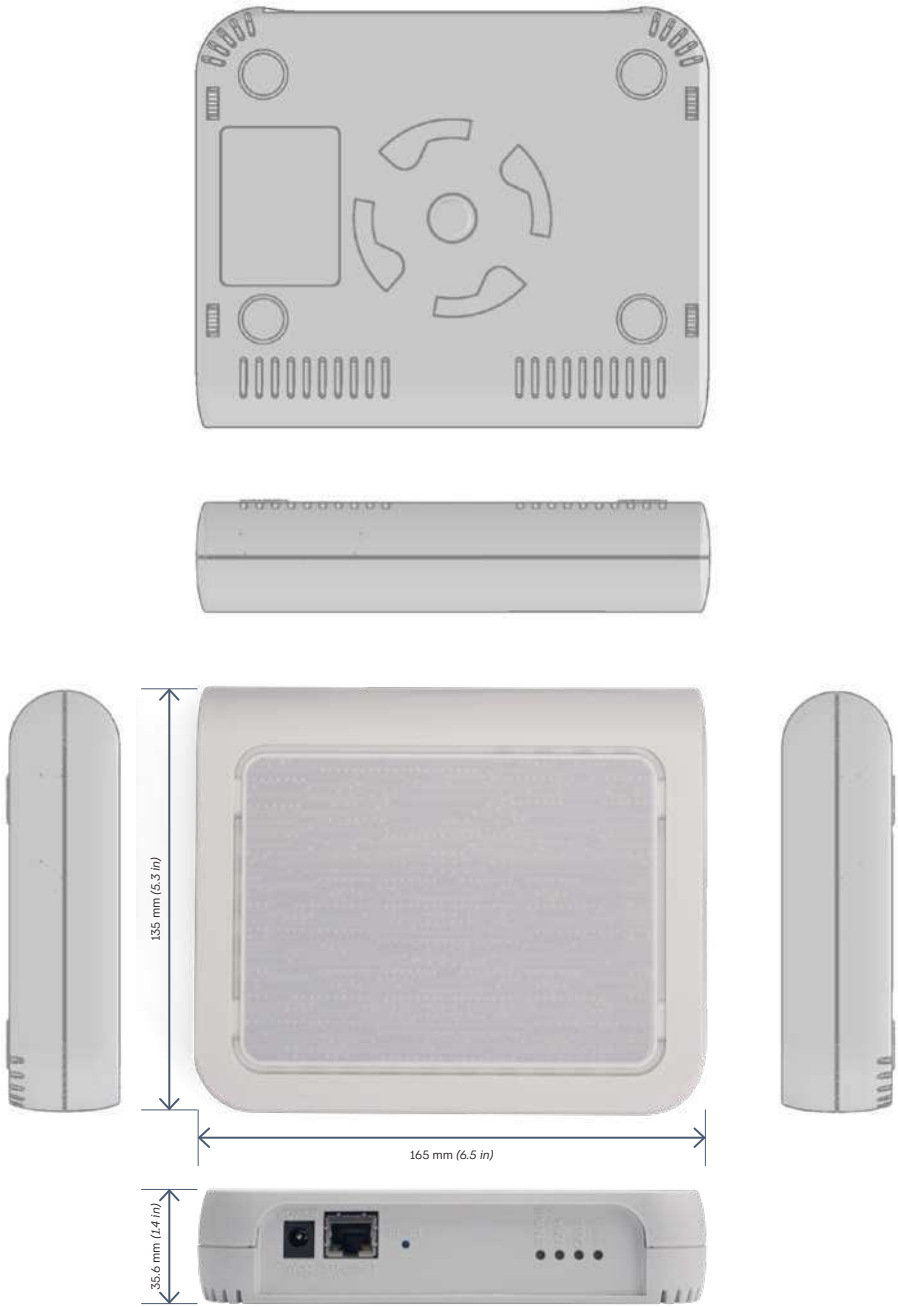
Connectivity		
LC dashboard alerts **Device not connected**	Gateway power supply OFF. Gateway internet signal lost.	**Plan a field inspection:** • Check the power supply of the gateway. Follow instructions 2.2.2. Power supply. • Check the LED's of the gateway. Follow instructions 2.2.4. Gateway LED's. • Check the gateway mounting location. Follow instructions 2.2.8. Mounting location.
Gateway unable to connect to Cloud	Alert status visible in the list of gateways (next to the gateway). Gateway power supply OFF. Gateway internet signal lost.	**Plan a field inspection:** • Check the power supply of the gateway. Follow instructions 2.2.2. Power supply. • Check the LED's of the gateway. Follow instructions 2.2.4. Gateway LED's. • Check the gateway mounting location. Follow instructions 2.2.8. Mounting location.
Gateway LoRa® LED OFF	Gateway power supply OFF Gateway configuration lost.	**Plan a field inspection:** • Check the power supply of the gateway. Follow instructions 2.2.2. Power supply. • Contact support: TSG Support TLDD (system24support@skftechnicalsupport.zendesk.com).
Gateway no connecting devices.	Gateway power supply OFF Devices not registered on the gateway. Gateway configuration lost.	**Plan a field inspection:** • Check the power supply of the gateway. Follow instructions 2.2.2. Power supply. • Check the LED's of the gateway. Follow instructions 2.2.4. Gateway LED's. • Delete and add a device following the instructions at: 3.3.2 Add, Edit, Delete Devices and lubrication points. This will update the list of devices registered at the gateway (s) of the organization. • Contact support: TSG Support TLDD (system24support@skftechnicalsupport.zendesk.com).

Single point lubricator		
LC dashboard alerts **Device not connected.**	Devices not registered on the gateway (s). Device power supply OFF- Gateway power supply OFF- Gateway configuration lost.	**Plan a field inspection:** • Check the power supply of the Device. Follow instructions 3.3.6. Replacement of cartridges. • Check the power supply of the gateway. Follow instructions 2.2.2. Power supply. • Check the LED's of the gateway. Follow instructions 2.2.4. Gateway LED's. In case that none of the above solve the problem: • Contact support: TSG Support TLDD (system24support@skftechnicalsupport.zendesk.com).
LC dashboard alerts **high pressure warning.**	Blockage at the lubrication point limiting lubricant dispense from the cartridge. In case of high pressure, the lubricator will blink the yellow LED every 20 seconds and will keep trying to dispense lubricant for 3 additional cycles until it fully stops (red LED turns on).	Clear up blockage at the lubrication point: • Dismount the lubricator from the application, maintain the cap, batteries and support plate fitted to the cartridge. • Verify that there is grease pushed from the cartridge. **If Yes:** • Verify that there is an outlet to release used grease from the lubrication point. • Use a manual grease gun to clear up the blockage at the lubrication point. • Mount the cartridge back at the lubrication point. • Check the status at LC. Refer to 3.3.3. Device state status. **If Not:** • Check operating conditions and selection of automatic lubrication systems. 1.6.2. Single point lubricator (TLDD). • Follow instructions 3.3.6. Replacement of canisters.
LC dashboard alerts **empty alarm.**	The dashboard notifies the user before the cartridge is completely empty and it stops dispensing. Empty cartridge.	**Follow instructions 3.3.6 Replacement of cartridges.**
Drive unit water ingress.	The drive unit isn't properly screwed onto the grease cartridge, causing o-ring misplacement, resulting in water ingress.	The o-ring on the cap should be sealing between the cap and the cartridge to avoid water ingress. Follow instructions 3.3.6. Replacement of canisters.

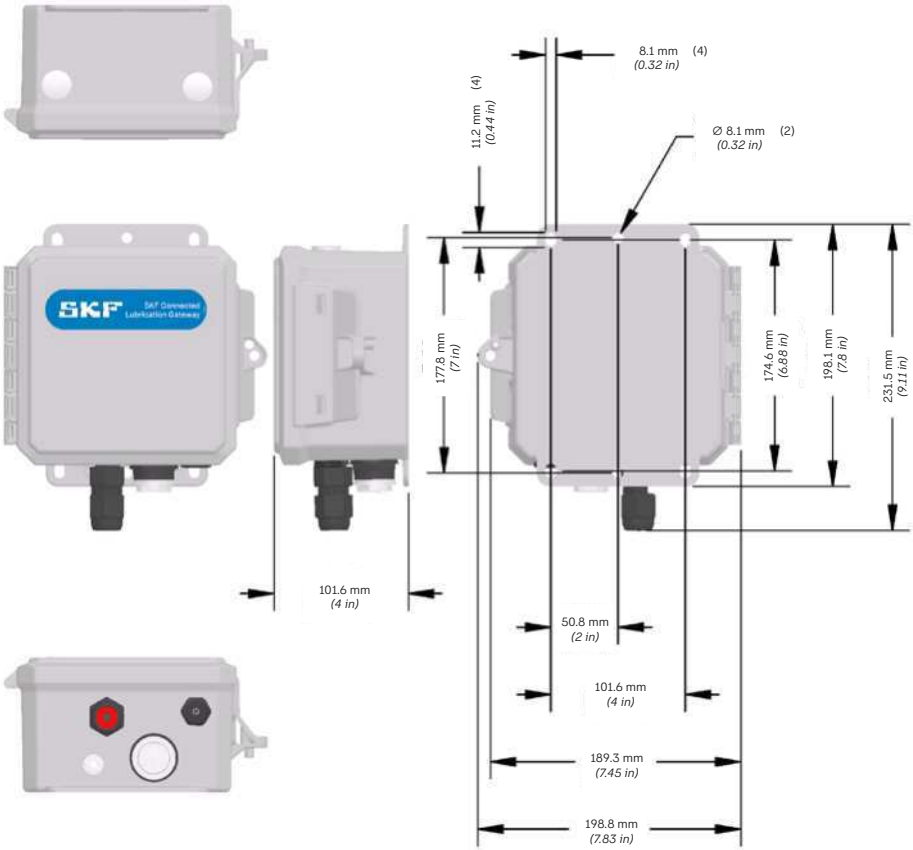
Cartridge tip is broken.	The cartridge tip close to the nipple connector on the application breaks. The cartridge was mounted without the support flange **TLSD 1-SP**.	Mount a new refill set and fit the support flange **TLSD 1-SP**. Follow instructions 3.3.6. Replacement of cartridges.
LC dashboard shows full cartridge, however the cartridge is partially empty.	The drive unit isn't firmly screwed onto the grease cartridge, resulting on interlock failure between the drive unit and the spindle head of the cartridge. It stops lubricant dispense. The batteries where removed and reinstalled without replacing the cartridge for a new cartridge. TLDD resets to 100% filled level once the batteries are removed.	The drive unit interlocks the drive unit and the spindle head of the cartridge. Follow instructions 3.3.6. Replacement of cartridges. Mount a new refill set and fit the support flange **TLSD 1-SP**. Follow instructions 3.3.6. Replacement of cartridges.
LC dashboard shows lubricator OFF. Having schedule the dispense setting between 1-12 months and after inserting the batteries at the lubricator, the status at LC stays as a gray button OFF.	The status of the lubricator at LC stays as a gray button (OFF) at least for 30-90 minutes after the batteries have been installed.	After inserting the batteries at the lubricator, wait for at least 30 - 90 minutes and refresh the webpage. Check the status of the lubricator following the instructions at: 3.3.3. Device state status.
LC dashboard shows lubricator OFF.	The dispense setting time is OFF. The lubricators is not dispensing lubricant.	Change dispense setting at LC. Follow instructions at: 3.3.2. Add, Edit, Delete Devices and lubrication points and 3.3.6. Replacement of cartridges.
Batteries		
LC dashboard alerts **low battery alarm.**	The lubricator stopped dispensing lubricant.	Install a new refill set. Follow instructions 3.3.6. Replacement of cartridges.
Batteries heating up, unable to hold the batteries with bare hands. Glue holding the 3 batteries together was melting off.	The drive unit isn't firmly screwed onto the grease cartridge, resulting on loose batteries inside the drive unit causing batteries over heat.	Mount a new refill set and fit the support flange TLSD 1-SP. Follow instructions 3.3.6. Replacement of cartridges.
Water ingress in the batteries.	The drive unit isn't properly screwed onto the grease cartridge, causing o-ring misplacement, resulting in water ingress.	The o-ring on the cap should be sealing between the cap and the cartridge to avoid water ingress. Follow instructions 3.3.6. Replacement of cartridges.

6. APPENDIX

6.1 Radio Gateway dimensions:



IP67 Gateway dimensions:



Dimensions in mm *(in)*

6.2 Regulatory Approvals

6.2.1 United States – FCC

TLDD 1/US-DS and TLDD 1/AU-DS contain transmitter module FCC ID: T9JRN2903.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

6.2.2 Canada – IC RSS

TLDD 1/US-DS and TLDD 1/AU-DS contain transmitter module IC: 6514A-RN2903.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:
(1) this device may not cause interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation of the device."

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement."

6.2.3 Brazil – ANATEL

TLDD 1/US-DS e TLDD 1/AU-DS contêm a placa Modelo RN2093A, código de homologação ANATEL 00082-19-08759

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