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General Manual

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Modular “Spyder” MLP
Automated Lubrication System

NEXT GENERATION AUTOMATED LUBRICATION

lubecore™

Document information

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For the first release, some photos as used in this document reflect the Spyder MK1 pump instead of the Modular Spyder.
REV 04: text / warranty / grease

Contents Manual

Preface to the Manual

The operation instructions contain important information for the safe and proper operation of an automated lubrication system. It is recommended that a user read the instructions carefully prior to operation, Lubecore will not be held liable for damages and failures resulting from non-observance of these instructions. All instructions must be completed respective to national regulations pertaining to accident and environmental protection.

Disclaimer.
Lubecore™ International reserves the right to modify, correct, update, expand or delete items, descriptions, directions, explanations from this document without prior or direct notification of distributors, customers, dealers, end users or persons whether spoken or written.

Responsibility to ensure the safe operation of the automated lubrication system, the end user is responsible for the following:

1). The automated lubrication system shall be operated only for the intended use and its design shall neither be modified nor transformed.

2). The automated lubrication system shall be operated properly only if it is in a proper functioning condition and if it is operated in accordance with the maintenance requirements.

3). Personnel must be familiar with this operation manual and the safety instructions mentioned herein and observe these carefully.

4). Wastes (e.g. used oil, detergents, lubricant) must be disposed in accordance with relevant federal, state, provincial and territorial environmental regulations.

Service

Lubecore offers users full service in the form of advice, on-site installation assistance, training, etc if requested. In case of inquiries pertaining to maintenance, repairs and parts, Lubecore requires model specific data to enable us to identify the components of the automated lubrication system. Lubecore will not accept any liability for damages caused by the misuse of the designed automated lubrication system and/or the repair of said system by using any other parts other that Lubecore International original (OEM) parts.

Safety Precautions

1). Comply with all safety regulations applicable within the locality where all work is performed.

2). Always take the necessary precautions to prevent potentially dangerous situations from occurring during installation, inspection and maintenance. Always apply or use adequate safety measures to prevent personal injury and material damage, before starting work on any piece of the equipment.

3). The electrical system of the equipment must be disconnected before any work is performed.

4). The pressurized air system of the equipment must be drained of all air and pressure.

5). Inquire with the facilities management to the prescribed procedure to immobilize equipment and prevent operation of equipment. When these are not prescribed, remove any means that can start the equipment (ignition key / main power switch) and place indicator tags to show others not to start the equipment.

6). Never work underneath a machine, vehicle or any other piece of equipment, which is raised by a jack only. Always use a jack stand and check that the ground is firm and sufficiently flat.

7). Keep in mind that a vehicle with air suspension may drop of its own accord.

8). Only work underneath a cab if it is fully tilted and latched, or otherwise secured preventing accidental return-tilt.

9). Disconnect the ground battery lead from the vehicle's battery. This prevents electrical equipment from being inadvertently activated or otherwise electrically damaged.

10). Avoid working on a machine, vehicle or other equipment that recently was in use. Give time to allow components to cool (coolant, exhaust, turbo, etc).

11). A vehicle, machine or other equipment may only be operated by those who are trained and licensed to do so and are aware of all possible dangers.

12). Only use tools that fit and are designed for the specific task.

13). Adhere to all regulations, specifications and limitations as specified by the manufacturer of the machine, vehicle, equipment and /or engine.

Keep the environment in which you work clean for you and others.

Introduction

Lubecore™ Automated Lubrication Systems take care of daily regular and preventive maintenance for components requiring lubrication.

An automated lubrication systems prevents unnecessary wear and downtime, thus reducing operating costs and preventing unforeseen expenses.

Automated lubrication systems not only assist with extending maintenance intervals, they also prolong the useful technical and economic life of the equipment thus providing a higher residual value.

Lubecore automated lubrication systems are environmentally friendly; they are suitable for biodegradable lubricants, and prevent manual over-lubrication, and grease waste. The reduced need for replacement components also has a positive impact on the environment reducing the need for raw materials and energy to produce these replacement components.

The most important advantages:

- Extension of maintenance intervals.
- Reduced wear on components.
- Lower repair and replacement costs.
- Prevents downtime.
- More effective use of lubricant.
- Less time spent by technicians servicing equipment.
- Less expensive lubricant required, as expensive additives can be avoided.
- Reduces strain on equipment.
- Improved fifth wheel performance; avoid trailer-steer and improves safety.
- Promotes the use of a single type of lubricant. Preventing compatibility problems and the accidental application of the incorrect type of grease.

A Lubecore automated lubrication system ensures that all connected lubrication points on a vehicle or equipment are lubricated with a predetermined amount of grease at the correct interval. As lubrication takes place while the vehicle is in use, the lubricant is dispensed to all the connected lubrication points during movement of those components that are connected, ensuring an improved distribution of the lubricant over the surface area.

Apart from refilling the grease reservoir and performing a periodic quick system inspection, the Lubecore automated lubrication system does not require anything else to get the job done.

Lubecore's automated lubrication systems are designed with the utmost care and tested rigorously. This ensures an extended operational life and trouble-free operation, even under extreme operating conditions.

High Lubecore installation standards along with the use of the correct type of grease and periodic inspections ensures years of trouble-free system operation. Periodic inspections, which take little time and effort, can be performed during the regular daily circle check by the operator as well as monthly by the maintenance staff..

The Concept of Automated Lubrication

Greases are used where a mechanism can only be lubricated infrequently and where a lubricating oil would not stay in position. They also act as valuable sealants to prevent ingress of water and dust.

Equipment requires lubrication for the following reasons:

1). Keep moving components separated.

Lubricants are typically used to separate moving components, reducing friction, surface fatigue, heat generation, operating noise and vibrations. The most common way lubricants achieve this is by creating a physical barrier. In cases of high surface pressure (EP) or temperatures the fluid film is thin and some of the forces are transmitted between the surfaces through the lubricant. This is termed elastohydrodynamic lubrication.

2). Carry away contaminants and debris ("Wash Out" or "Purge").

Any accidental metal-to-metal contact created by debris or externally introduced contaminants like dirt or water, need to be removed to reduce the risk of damage and prevent corrosion.

3). Protect against wear.

Lubricants do not just prevent wear by keeping the moving parts apart. Lubricants may also contain anti wear or extreme pressure additives to boost their performance against wear and fatigue.

4). Prevent corrosion.

Quality lubricants are typically formulated with additives that form chemical bonds with surfaces to prevent corrosion and rust.

Under normal circumstances, lubricants / greases are applied to moving parts using a manual grease gun during regular maintenance intervals. These maintenance intervals could coincide with other service requirements like engine oil changes or can be determined based on hours of operation.

Proper equipment maintenance incorporates OEM recommended lubricant application at regular intervals. The goal is to ensure that the protective grease film is preserved between moving surfaces. The required interval (hours of operation or mileage) is determined by user operating information, equipment type, and environmental conditions. The equipment owner/operator is responsible to review the equipment and the lubricant application interval and adjust as needed to refresh the lubricant and prevent premature wear.

The manual application of lubricant relies on flush out of old lubricant in one instance during a service interval, while the equipment is idle. The goal is to prevent the failure of the lubricant film, as mentioned earlier, to prevent metal to metal contact.

Benefits

Automated lubrication Systems by Lubecore™ are designed to ensure the proper quantity of lubricant is applied during equipment operation ensuring:

The better distribution of lubricant to moving parts, increases the longevity and reliability of the equipment being lubricated. Automated lubrication systems (ALS) provides higher frequency of lubricant application with nominal quantities of lubricant to sustain the lubrication film while the equipment is in operation. This ensures proper protection without over greasing and unnecessary waste.

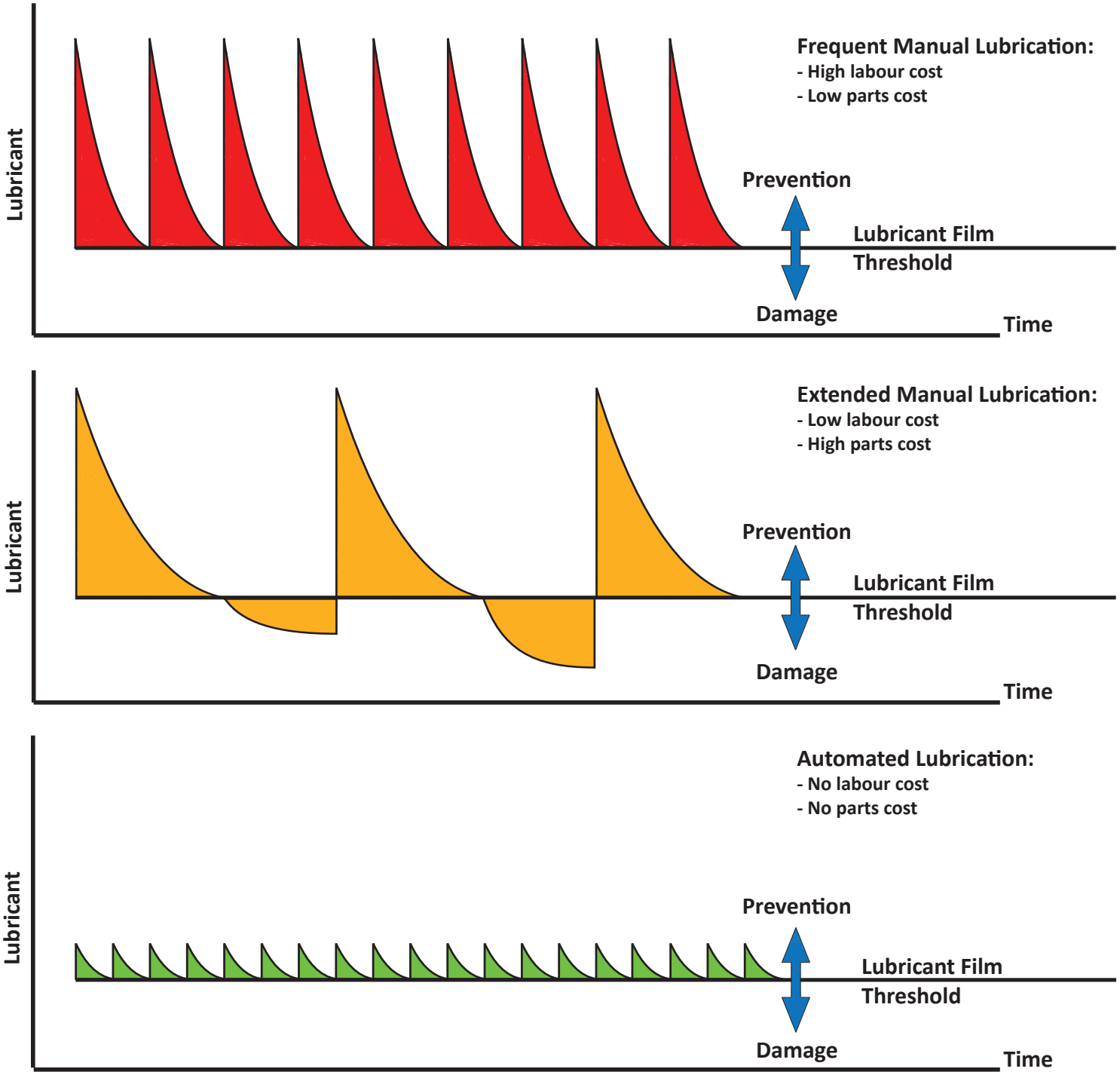


Illustration 1. **Manual Versus Automatic Lubrication, Representation of Concept.**

General Operation of the Modular "Spyder" ALS

The Lubecore™ Modular Spyder Automated Lubrication System can be used in a variety of applications. This section describes the general operation of a standard Modular Spyder lubrication system with standard components. For details regarding the operation of our other pumps and components, please refer to the appropriate Lubecore documentation or contact Lubecore directly. A Lubecore Modular Spyder automated lubrication system consists of the following main components.

Note: The ① are identification markers referring to items in the illustration on the next page.

- ① Electrically operated Modular Spyder pump unit.
- ②Potted timer with 7 segment LED is integrated in the motor housing.
- ③ Metering elements and ④ filler coupling ⑤ Secondary tubing with fittings.

A Lubecore Automated Lubrication System will be designed and assembled according to the specific type of equipment and the associated operating conditions. Starting with the equipment specifications regarding the lubrication requirement, the system layout will be designed and the appropriate components will be selected.

This automated lubrication system is designed to function as follows:

While the equipment is in operation, the ignition switch provides the electronic timer ② with ignition power (In case of trailers ABS-power is used) to perform its program. When connected to ignition, the timer's flash memory retains the last status prior to shut down (ignition off); at start-up, the program resumes and counts down the time that remains of the pause interval.

After reaching the end of the pause interval, the timer engages an electric motor located in the bottom of the Modular Spyder pump ① . The electric motor drives a steel cam at 23 RPM in a clockwise direction pushing against the metering elements.

Depending on the programmed setting the motor will be activated for either 8,12,16,20 or 24 **seconds**, and pump lubricant in excess of 70 bar (1000 psi) to the connected lubrication points.

The metering elements③ are calibrated to dispense a pre-determined amount of grease to the connected lubrication points. A colored ring on the metering element indicates the size and quantity of lubricant delivered. This colored ring is not a sealing ring, it is for indicating purposes only!

At the completion of the lubrication cycle, the electric motor is de-activated by the timer. After the timer deactivates the electric motor, the system program sets the time interval back to the start of the pre-set value and initiates another countdown (as long as the timer is supplied with ignition power). The time between pump cycles can be set from 30,60,120,240 or 480 minutes.

Optionally the pump can be equipped with a low level sensor. This sensor, once triggered by the follower plate, when minimum grease level is reached, will stop the timer and alert the operator via the 7 segment LED that the reservoir needs to be filled.

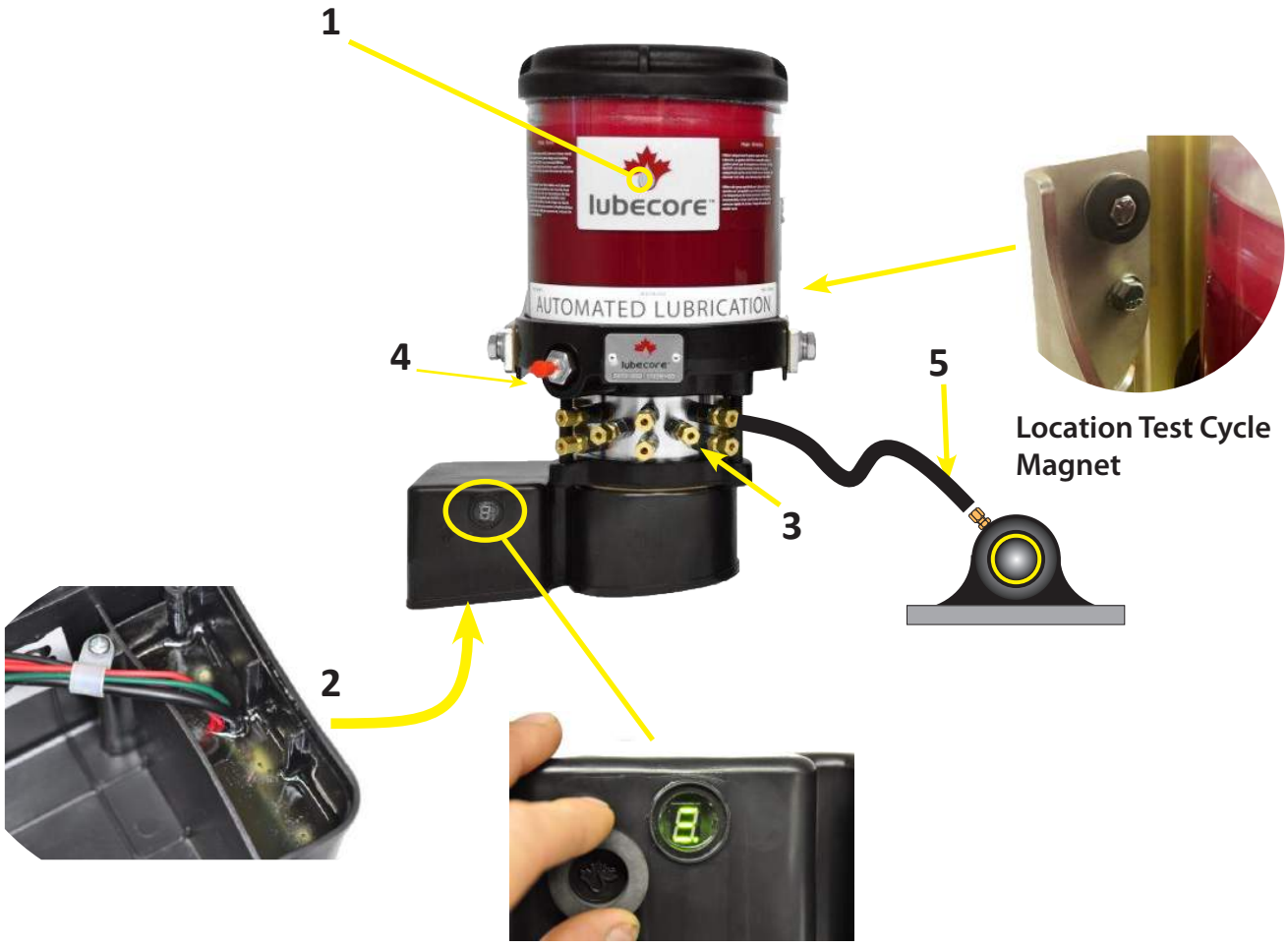


Illustration 2. **Modular Spyder Automated Lubrication System layout.**

Modular Spyder MLP Pump

- ***Pump features:***

  - The pump is available with either a 4 Kg (8.8lbs) or 6 Kg (13.2 lbs) capacity reservoir. The Makrolon® impact proof reservoir is fitted with a bright red silicone follower plate. This provides a clear indication of the grease level and prevents funneling of the grease.

Illustration 3.
4 / 6 Kg Modular "Spyder" MLP.

  - The 4 / 6 Kg reservoir comes equipped with a PIP - Positive Inlet Pressure spring (patent pending). This spring is situated on top of the red follower plate pushing it down, providing extra pressure to the grease. This prevents air-locks from developing in and at the elements, allowing the use of NLGI / EP2 grade greases.

Illustration 4.
Makrolon™ Reservoir with Red Follower Plate.

Illustration 5.
PIP™ Spring Follower Plate

  - A fill connector of either a 1/4" quick disconnect for EP0 or a standard grease fitting for EP2 or other greases may be used. The filler coupling is threaded into the pump housing and is equipped with a large capacity, reusable stainless steel filter. The reservoir can be filled using a hand pump or standard grease gun. It is recommended to service (replace or clean) the filter every 5 pails of grease to ensure ease of filling.

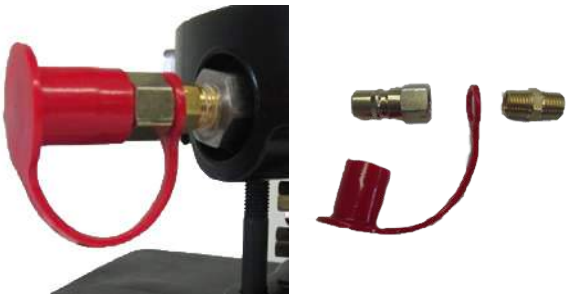


Illustration 6.
1/4" QD Fill Coupling with Red Dust Cap.

Illustration 7.
Stainless Steel Filter with Standard Grease Fitting and Dust Cap.

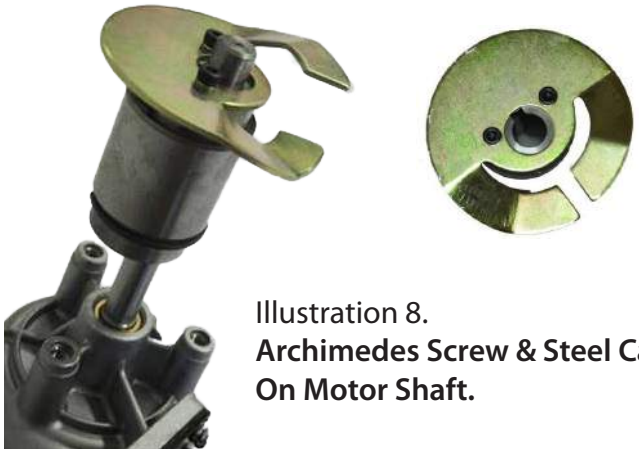


Illustration 8.
Archimedes Screw & Steel Cam On Motor Shaft.

- There is a magnet attached to a pump bracket mounting bolt. 1 extra large 5/16 washer is placed behind the bolt to provide an attachment surface for the magnet. It can be used to operate the pump manually or to make adjustments to the timer settings.
- A multi-voltage (10-30 Vdc) electronic timer with segmented LED's is epoxied into the motor housing. Electrical connections are made with high quality fully insulated Deutsch® connectors.
- The segmented LED indicates when pump is active and when timer setting adjustments are made.
- The pump may optionally be equipped with a low level proximity sensor. The timer is ready and set to receive the signal from the sensor.
- The bottom of the motor and timer housing is slightly sloped. This allows for any accumulated moisture to run off through the slots in the bottom cover preventing any possibility of corrosion from taking place.

Illustration 13.
Sloped Housing Prevents Moisture Build Up.

- Occasionally small air pockets may accidentally enter the reservoir during filling. In order to prevent air-lock at the elements during the recharge cycle, an Archimedes screw is installed to push the grease toward the cam and elements.
- A steel rather than plastic cam is used on the motor shaft to push the pistons in the elements. This prevents premature wear and allows for higher operating pressures.

Illustration 9.
One Possible Magnet Location Shown

Illustration 10.
7-Segment LED

Illustration 11.
Timer Location

Illustration 12.
Standard Timer Location

- The pump is equipped with 2 overflow vents. The vents are located at the rear right of the pump housing when looking directly at the front of the pump. In case the pump is filled beyond the maximum level the vent opening in the guide rod will allow excess grease to escape. Also, when air is trapped under the follower plate it is recommended to fill the reservoir such that the bottom of the follower plate surpasses the vent opening to allow air to escape.

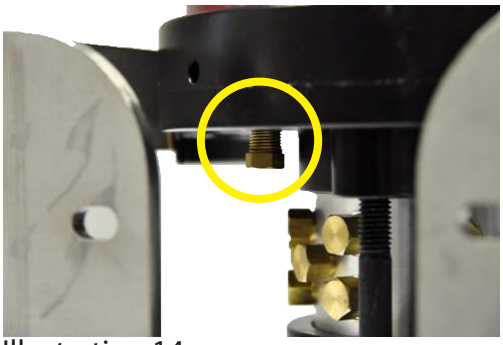


Illustration 14.
Grease Overflow Locations

- The pump comes with 2 over-flow galleries / vents. One of the vent openings is threaded which allows for installation of a tube to redirect excess grease.

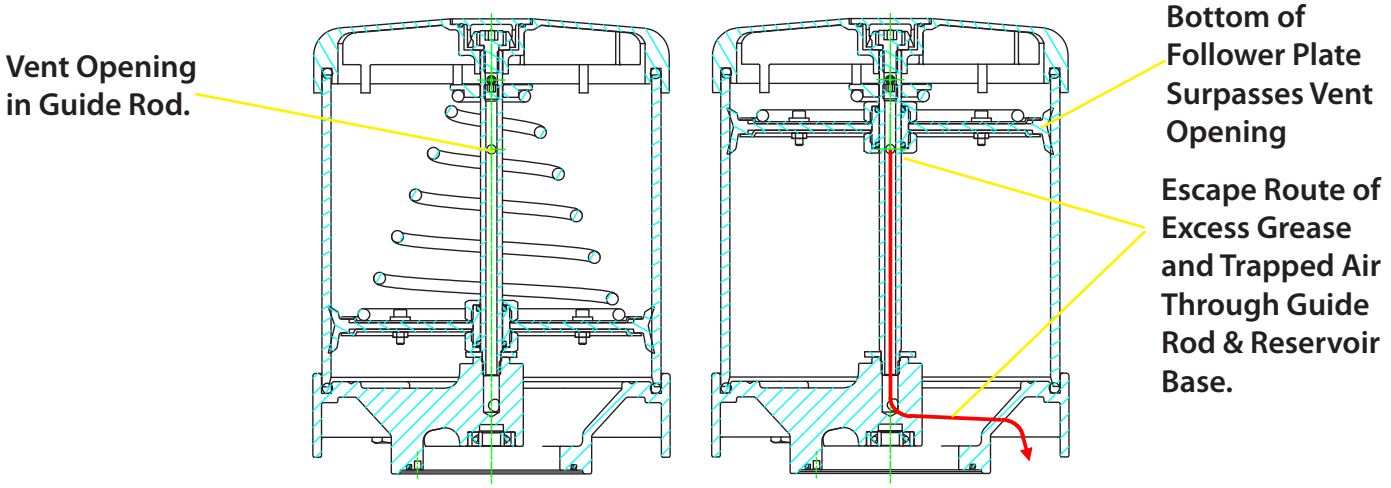
Illustration 15.
Low Level Proximity Sensor (LLPS)

Illustration 16.
Grease Overflow Ports Shown in Yellow. Low Level Sensor Port Shown in Red

CAUTION:

Caution!!! Must be observed when changing elements, plugs, and low level sensor in the Modular pump series.

DO NOT ATTEMPT to remove the guide rod and follower plate assembly in a Modular series pump, due to the increased downward force applied by the PIP spring upon the surface of the grease when the reservoir is full. It is highly recommended to perform all these procedures when the reservoir is empty of grease or is going to be emptied by removing of the fill connector.



- Pump collars; suitable for ether 9, 15 or 24 elements, can be stacked up to 3 collars tall to provide a maximum service capacity of up to 72 lubrication points.

Illustration 20.
Pump with Maximum of 72 Element Positions.

Pump Mounting

The pump should be mounted vertically at an easily accessible location. The pump mounting brackets (arms) and installation hardware are made from Stainless steel. As the pump housing is an aluminum casting, it is required to utilize the provided nylon inserts and gaskets to prevent a galvanic reaction leading to oxidation of metals..

The bolt pattern, to mount the pump bracket, is the same as used with the Lubecore pneumatic and hydraulic pumps. As such, if so required, pneumatic and hydraulic pump bracket can be inter-changed.

It should be noted that the secondary lining to the lubrication points be kept as short as possible. These lines should not exceed 10 meters / 30 feet in length. Contact Lubecore or an authorized re-seller when secondary line length exceeds 10 meters long.

Illustration 17.
Stainless Steel Mounting Hardware and Insulation Components.

Illustration 19.
Pump Bracket Installation Options

Illustration 18.
Pump Bracket Mounting Hardware Assembly Order. (Pre-tightening)

Electrical Connections

The 10-30 VDC timer for the automated operation of the lubrication system is located inside the motor housing. The motor housing is slotted on the bottom to allow moisture to dissipate while the timer itself is permanently sealed (potted).

The pump comes pre-wired with a 2 core SAE approved cable connected to a Deutsch DT weather proof connector. The DT connector is wired: Ignition (Red) +15 / Ground (Black) -31. When connecting ignition it is recommended to use a 5 Amp fuse.

A second connection is available for an optional low level sensor. The 3 - core wire provides a proximity sensor with a power source, ground and signal contact. The proximity sensor may be ordered separately and can be connected to the pump with no need for programming. When installing a proximity sensor adhere to the safety precautions as listed on page 13.

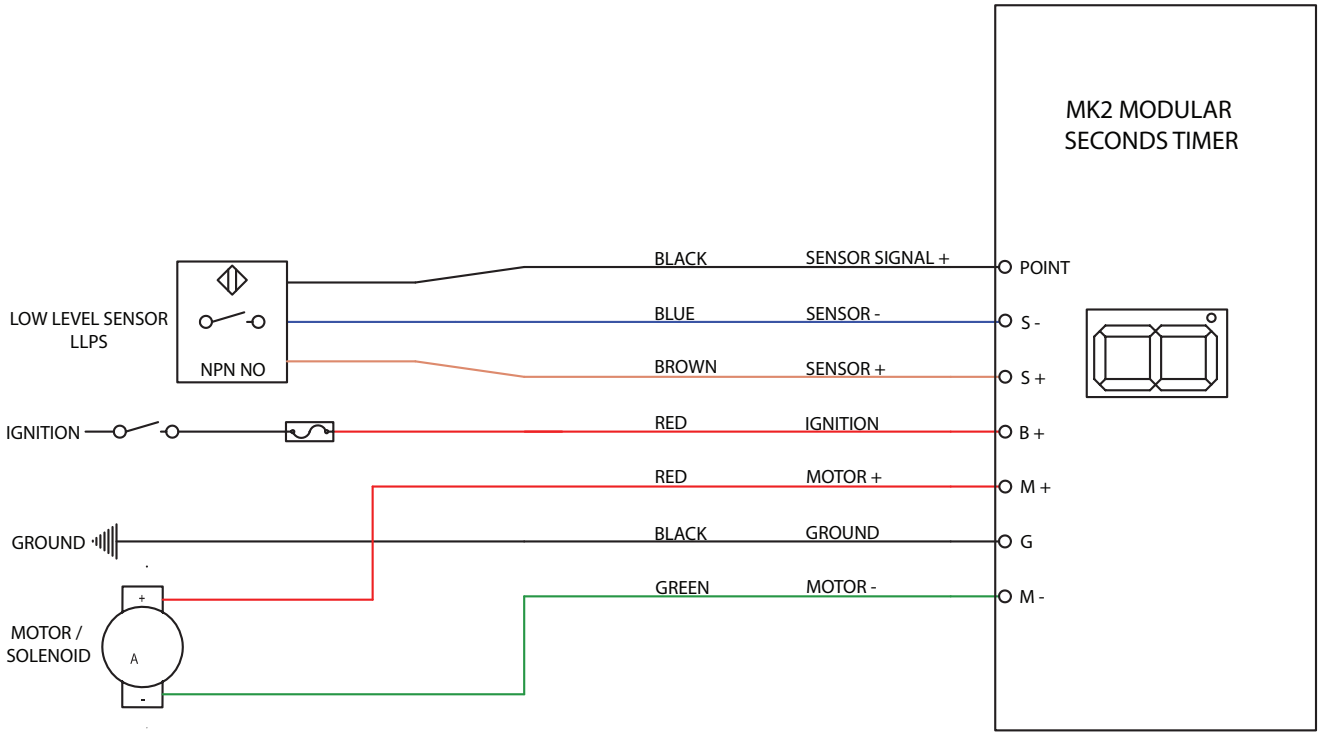


Illustration 21. **Electrical Connections for Modular Spyder MLP.**

Illustration 22. **Deutsch® DT Electrical Connectors**

Timer Setting and Display Operation

The Modular Spyder pump is equipped with a 7-segment digital display. This display indicates power, operation, error and is used for timer setting.

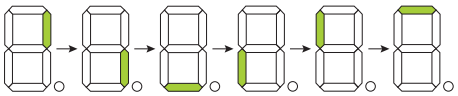
Following is an overview of possible display codes:

- No segments lit. Power is "off".

- Solitary LED (Bottom right corner of the Segmented display) momentarily stays on (5 Seconds) performing a self check.

- Solitary LED starts blinking, 1 blinks per second indicating that the timer is active

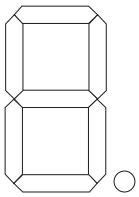
- Pump ON (T2) is started the segmented LED 'rotates'. The bar rotates clockwise for the entire pump cycle.



- If during a pump cycle (T2) an error occurs, the display shows "E". The error can be low level or over current draw. The "ERROR" status is displayed throughout the entire T2 pump cycle time.

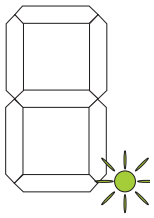
- After the pump cycle (T2) the display will show "E" and a blinking solitary LED during the T1, pause time. The "E" status will return to normal after the error is resolved (example: pump filled) and a new cycle is started.

Power "Off"



No Segments Lit.

Power "On" Battery & Ignition

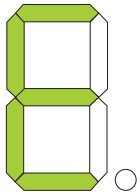


Solitary LED

Motor Running

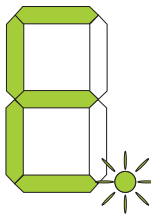
Rotating Segments.

Error During Pump Cycle



An Error Is Present During Pump Cycle.

Error at Pause Time.



An Error Is Present When Power Is On. Blinking Solitary

Testing and Programming

For correct operation of the pump (T1) the "Pause", and (T2) "Work" times must be set using the magnet. The following menu choices are available.

With power on (ignition) hold the magnet against the Lubecore logo on the motor housing near the segment display. After 3 seconds and with about 3 second steps thereafter, the segment display will change as follows:

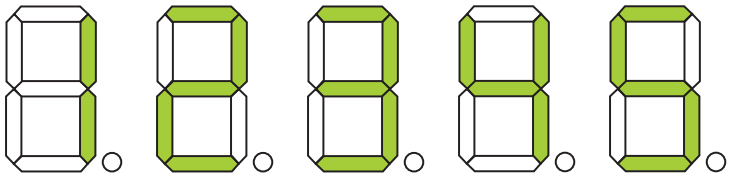
7 Segment Display Mode Selection

1). To start a single test cycle, place the magnet on the maple leaf logo. When the bottom horizontal bar lights up, remove the magnet from the logo to initiate a single test cycle. The pump will run for the programmed period of "on time".

2). To start a continuos cycle, place the magnet on the maple leaf logo. When the bottom 2 horizontal bars light up, remove the magnet to initiate continuous running of the pump. Turn off power or place the magnet back on the maple leaf logo to stop the pump.

3). To change the pump running/working time (T2) setting. Place the magnet on the maple leaf logo until 3 horizontal bars light up.

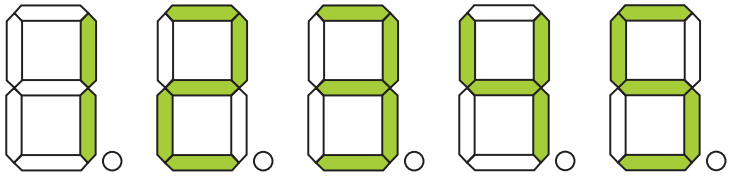
When the display shows 3 horizontal bars, remove the magnet to go into time selection mode.
- When the sensor is not operated for 20 seconds it will return to the start.
- After a change the display will show an "A" for accept after 20 seconds or if the magnet is placed on the sensor for 5 seconds.
The display will show your current choice of one of the following 5 settings:



8 seconds 12 seconds 16 seconds 20 seconds 24 seconds

A one second touch or slow swipe with the magnet, at the maple leaf logo, will change the time selection.

4). To set the "Off time" (cycle interval), place the magnet on the maple leaf logo until the top 4 bars light up in the shape of a square. This indicates that the "off time" change mode is selected. The function is the same as in the "on time" programming mode. When the sensor is not operated for 20 seconds or the magnet is placed on the sensor for longer than 5 seconds the timer returns to normal start mode. If a change has been made the display will indicate this with an "A" for accept.



30 min. 60 min. 120 min. 240 min. 480 min.

7 Segment Display Mode Selection

The display will show your current choice of one of the following 5 settings:
A one second touch or slow swipe with the magnet, at the maple leaf logo, will change the selection.

After changing times or testing, switch off the ignition and the timer accepted the new values. The timer can at any point be returned to 'normal' by switching off the ignition.

Error reporting by the display

When the display indicates an "E" for error, the following could be the problem:

- Low grease level detected.

When installed and activated by the follower plate, the low level switch signal stops the pump from pumping and indicates

- Motor Over-load / Short Circuit.

PIP™ - Positive Inlet Pressure Follower Plate

PIP (Positive Inlet Pressure Spring Patent Pending)

Modular Progressive and Modular Spyder MLP lubrication systems are suitable for use with NLGI-2 / EP2 grade grease when a PIP™ - Positive Inlet Pressure spring is installed on top of the follower plate. Especially with low temperatures, it may occur that air pockets present in the grease accumulate at the intake opening of the metering elements. The PIP™ follower plate allows, even at low temperatures, the use of a NLGI2 / EP2 grease.

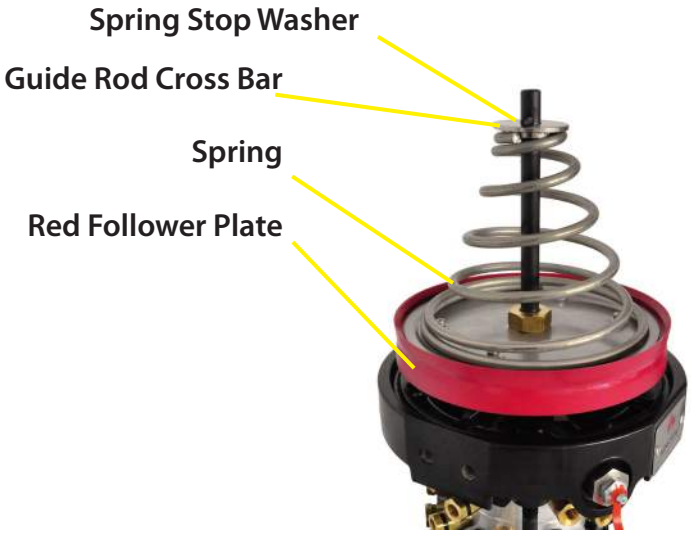


Illustration 23.
PIP™ Spring Follower Plate

Note In case of service / repairs:

- *Before starting any repairs ensure reservoir is empty to reduce spring tension.*
- *When removing M8 Allen cover bolt ensure guide rod is not rotating / coming loose: it is under spring tension, when guide rod is spinning loose stop and call Lubecore for alternative disassembly procedure.*
- *Always follow supplied instructions with OEM replacement part to prevent damage and personal injury!*
- *Although when reservoir is empty there is still an assembly tension in the spring! When loosening components this may be released and cause harm when done incorrectly!*

CAUTION:

Caution!!! Must be observed when changing elements, plugs, and low level sensor in the Modular pump series.

DO NOT ATTEMPT!!! To remove the guide rod and follower plate assembly in a Modular series pump, due to the increased downward force applied by the PIP spring upon the surface of the grease when the reservoir is full. It is highly recommended to perform all these procedures when the reservoir is empty of grease or is going to be emptied by removing of the fill connector.

Low Level Proximity Sensor - LLPS

The pump may be equipped or retrofitted with a low level proximity sensor. This sensor is a normally closed proximity sensor which detects the metal components on the bottom of the follower plate. The benefits of a low level proximity sensor are that the operators are additionally informed by the 7 segment LED display of a low level event when the reservoir is obscured by dirt such that a clear level indication is not visible.

The timer stops the pump from operating during a low level event, preventing air from being pumped into the grease points and the requirement to prime the pump after filling.

The sensor is located on the lower rear right side of the reservoir assembly.

Illustration 24.
12.045 Low Level Proximity Sensor (LLPS).

Fitting instructions:

Remove the bottom cover from the pump housing. Make sure that there is no power to the timer (disconnect the 2 pin Deutsch connector)

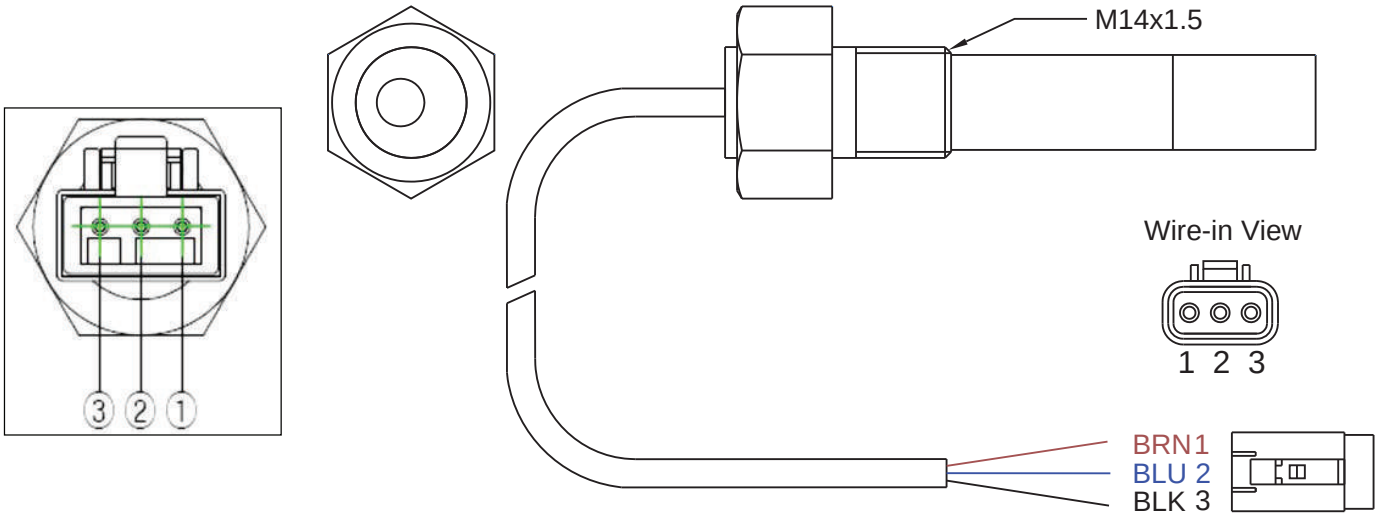
Inside the housing you will find a black cable with a white insulator cap on the end. This is the 3 core low level switch pigtail. Cut off the end cap and strip the 3 wires so that the terminals provided in the kit can be connected. Use appropriate stripping and crimp tools to do this.

After crimping the terminals plug them into the Deutsch body that is in the kit, match the colors of the wires (i.e. blue on blue, brown on brown and black on black).

Remove the brass plug from the underside of the pump body (grease will come out if the reservoir is full, (it is highly recommended that this procedure be done with the reservoir empty) and fit the low level sensor in place. Move "O" ring from plug to the sensor. Lead the low level switch wire into the pump housing and connect the two halves of the 3 pin connector and re-connect the two pin power connector. Secure the wires and connector and close the housing.

Your Lubecore Modular pump is now ready and will signal a low level event when the follower plate in the reservoir is nearing 'empty'. In case of a low level event the timer will show an 'E' on the display for as long as the reservoir is empty. As long as the 'E' is displayed, the pump will not do any cycles. After filling the pump, it is advisable, to perform at least one minute continuous test cycle to make sure the pump is operational and functioning normally.

Note: When the pump is empty (low level event) and showing an "E" on the display, it is possible to use the magnet to initiate a continuous cycle, this will override a low level event ('E' error). Filling while the pump is running assist with re-priming the pump.



Position	Color	Identity
1	Brown	+
2	Blue	-
3	Black	signal

Table 25. Low Level Sensor Connections (LLPS)

Operation, Selection & Installation of Pump Elements

Pump elements can be installed into any of the available ports of the 9, 15 or 24- port collars. The arrangement of the pump elements can be selected to suit to the most convenient delivery lining route and fastening.

Pump elements are suitable for use with either a 5 mm inverted flare crimp nut or alternatively a 1/8" NPT male coupling can be used. The 5 mm inverted flare crimp is intended for use with 5 mm OD nylon tubing only. The 1/8" NPT crimp couplings are for other tubing styles and sizes such as Korilla and reinforced high pressure hose.

Note: *The 5 mm OD pipe end as used with the 8.4OD Korilla tubing cannot be used with the inverted compression nut and sleeve. The pipe end is too short to ensure an appropriate crimp.*

Each pump element is threaded into the outlet port until it meets with solid resistance. (NOTE: The color ring is NOT a sealing ring) Using the appropriate socket to turn the elements for further 1/8 turn (45°) with torque of 16 Nm / 12 ft-lbs.

Unused outlet ports need to be closed off with a plug. Tighten each closing plug firmly into unused outlet ports using 12 mm socket.

Ring Color Identification	Output: CC's / Stroke	Output: CC's / Min @ 23 RPM
Brown	0.01	0.23
Red	0.02	0.46
Black	0.04	0.92
Green	0.06	1.38
Yellow	0.08	1.84
Blue	0.10	2.30
White	0.12	2.76
Brass	0.28	6.44

Table 26. **Available Pump Elements**

* Modular Spyder MLP Elements Have A M12x1.25 Thread, Older Series Elements Are Not Suitable For Use In A Modular Spyder MLP model ring collar.

Illustration 28. **Selection of Modular Spyder Elements.**

Illustration 27.
Pump Equipped with Elements.

The MLP piston elements deliver an consistent amount of grease per stroke. Based on the selected working time T2, ranging from 8 to 24 seconds, the total amount grease delivered is dependant on the total number of cam rotations. Please use the table below to determine the exact delivery of each piston element based on the selected working time. For reference a chart is provided to compare the MLP element output amount to the delivery of Lubecore's EP0 Single line injectors.

Lubecore MLP Element Delivery Calculations by Pump Times										
Pump Element Part Number - Delivery / Stroke										
			Output In CC's / Pump Working Time T2							
			Brown	Red	Black	Green	Yellow	Blue	White	Brass
RPM:	23		11.601	11.602	11.604	11.406	11.408	11.410	11.412	11.636
Pump Time :	Sec.	Strokes	0.01	0.02	0.04	0.06	0.08	0.10	0.12	0.28
T2 - 1	8	3.067	0.03	0.06	0.12	0.18	0.25	0.31	0.37	0.86
T2 - 2	12	4.600	0.05	0.09	0.18	0.28	0.37	0.46	0.55	1.29
T2 - 3	16	6.133	0.061	0.12	0.25	0.37	0.49	0.61	0.74	1.72
T2 - 4	20	7.667	0.08	0.15	0.31	0.46	0.61	0.77	0.92	2.15
T2 - 5	24	9.200	0.09	0.18	0.37	0.55	0.74	0.92	1.10	2.58
Table 29.	Lubecore Element Delivery Calculations by Pump Times / Seconds Timer									

Reference Table to Compare Element Output to EP0 Pneumatic

Pneumatic EP0 Injectors		
ID	CC's / Stroke	Part #
#0	0.025	11.100
#1	0.050	11.101
#2	0.100	11.102
#3	0.150	11.103
#4	0.200	11.104
#8	0.400	11.108
#9	1.000	11.109
Table 30.	Single Line EP0 ALS Injector Output in CC's / Cycle.	

The table below provides a list of suggested injector sizes for truck lubrication points under normal operating conditions. For assistance with selection of injectors, contact Lubecore or your local authorized Lubecore representative.

Component	Element	Per Stroke	Strokes/ Interval	Grease Del. EP-0 Grease	Single line Reference	T2 - On Time T2 = 2	Strokes/ Interval	Grease Del. EP-2 Grease	Single line Reference	T2 - On Time T2 = 1	T1 - Off Time T1 = 3
Release Bearing	Brown	0.01	4.60 Strokes / Interval	0.046	#1	12 Seconds	3.07 Strokes / Interval	0.031	#0	8 Seconds	Pause Time T1= 120 Minutes
Clevis Pin	Brown	0.01		0.046	#1			0.031	#0		
S-Cam	Red	0.02		0.092	#2			0.061	#1		
Cross Shaft	Red	0.02		0.092	#2			0.061	#1		
Tie Rod End	Black	0.04		0.184	#4			0.123	#2		
Drag Link	Black	0.04		0.184	#4			0.123	#2		
Slack	Black	0.04		0.184	#4			0.123	#2		
King Pin	Green	0.06		0.276	#5			0.184	#3		
Springs Pin	Green	0.06		0.276	#5			0.184	#3		
Spring Shackles	Green	0.06		0.276	#5			0.184	#3		
5th Wheel	Blue	0.10		0.460	#8.5			0.307	#6		
5th Wheel	White	0.12		0.552	#8.5			0.368	#8		

Table 31. **Suggested Injector Size for Truck Application - Standard Conditions.**

Filling of the Reservoir

If during a system inspection it is visible that the reservoir has reached minimum level, the pump needs to be filled with an appropriate NLGI - grade lubricant. Review the labeling as the pump is suitable for use with a wide range of lubricants.

For filling the reservoir, follow the steps as described below to ensure that no contaminants and/or air enter the lubrication system.

Step 1: Remove the dust cap from the male filler coupler (EP0) or grease fitting (EP2) located on the pump.

Step 2: Clean the male filler coupler or grease fitting located on the pump.

Step 3: With the female coupler of the filler pump, still mounted on the lid to the male coupler, ensure there are no air-pockets in the filler hose, by making **at least 3** strokes, circulating the grease. This is especially important when exchanging buckets of grease.

Step 4: Inspect the female coupler or other filler nozzle used, for dirt and clean when required. Then secure it to the male coupler on the pump, until it latches.

Step 5: Fill the reservoir with grease until the top of the follower plate has reached the maximum level mark on the reservoir. (This is located 1 inch / 3 cm below the black reservoir cap.) The bottom of the follower plate should have passed the vent opening in the follower plate guide rod.

During filling of the reservoir or immediately after the maximum level has been reached, some lubricant may be expelled from the pump at the vent opening. Air possibly trapped underneath the follower plate and excess lubricant may come out at this opening. The opening corresponds to the vent opening as located in the centre guide rod.

Step 6: Place the dust cap back on the male coupler or grease fitting on the pump and the female filler pump coupler on the male coupling on the lid of the filler pump.

It is suggested that the filter be replaced after every 5 pails of grease

Illustration 35.
Male Filler Coupling with Dust Cap. Either a Regular Grease Zerk for EP2 Grease or a Male Quick Disconnect for EP0 Grease.

Illustration 37.
Reservoir Overflow / Vent Location

Illustration 34.
Circulate Grease to Remove Air Pockets.

Illustration 36.
Overflow Opening in the Center Guide Rod.

Illustration 38.
Reservoir Filter.

Caution note:
Automatic Lubrication Systems are not compatible with Moly or Metallic greases!

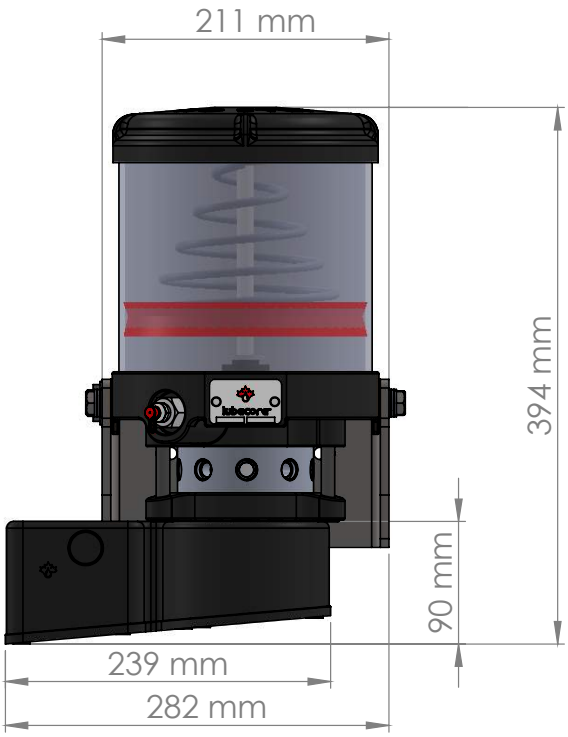
Extra caution must be used when mixing greases. See Lubecore Grease Compatibility chart for details

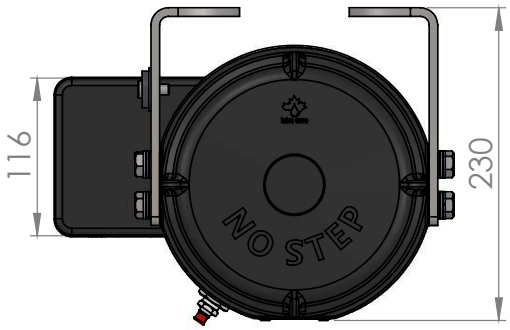
Technical Specifications

Modular Spyder MLP

Feature	Modular Spyder MLP
Reservoir Capacity	4 & 6 Kg (8.8 - 13.2 Lbs)
Standard Number of Element Ports	9 /15 / 24 (Maximum 3 Collars)
Pressure @ 23 RPM - Max	70 Bar - 1000 PSI
Timer	10-30 VDC Integrated
Working Time Interval [Seconds] - T2	8/12/16/20/24
Pause Time Interval [Minutes] - T1	30/60/120/240/480
Operating / Ambient Temperature Range	-20 C / 80 C | -4 F / +160 F
Lubricant Grade:	NLGI 000 to NLGI 2 Depending on Installed Tubing Size and Follower Plate.
Pump Weight Without Grease	8 Kg / 18 Lbs (4Kg Reservoir Model)
Available Number of Elements	8
Low Level Sensor LLPS	Optional - Proximity Sensor
Filler Coupling Size:	1/4" Quick Disconnect for EP0 with Filter or Standard Grease Zerk for EP2 with Filter.
Voltage / Amp (20 C)	(12V) 2 Amp (24V) 1 Amp Fuse: 20A Recommended.

Table 37. Overview: Modular "Spyder" MLP Technical Specifications





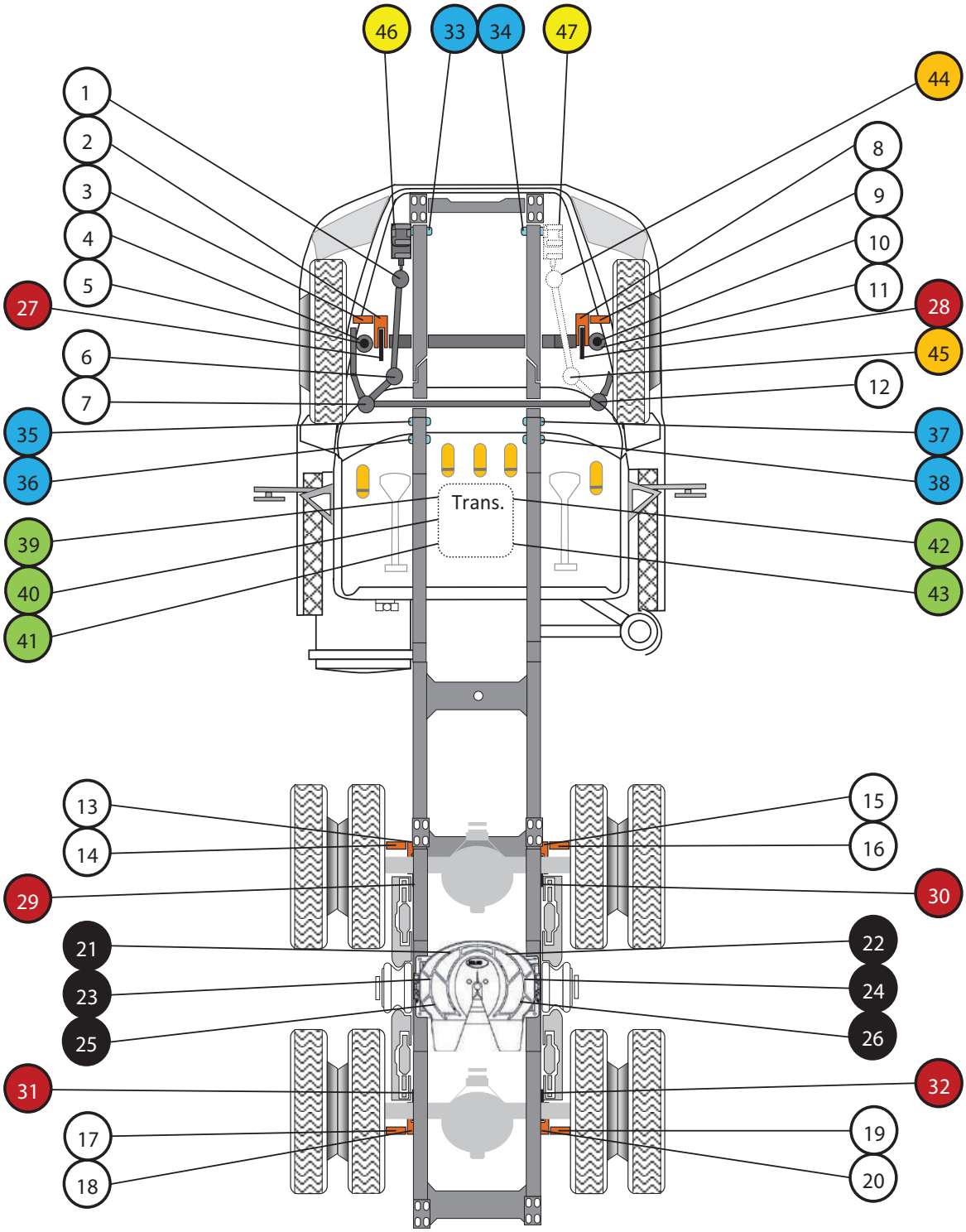
Lubrication Point Maps, Samples & General Parts

Injector and Point Identification of a Tandem Axle Tractor

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Standard Tandem Axle Tractor		
1	2	Left Forward Drag Link
2	2	Left Front Slack Adjuster
3	2	Left Front Cam Tube
4	4	Left Front King Pin
5	4	Left Lower King Pin
6	2	Left Rear Drag Link
7	2	Left Tie Rod End
8	2	Right Front Slack Adjuster
9	2	Right Front Cam Tube
10	4	Right Upper King Pin
11	4	Right Lower King Pin
12	2	Right Tie Rod End
13	2	Left Front Drive Axle Slack Adjuster
14	2	Left Front Drive Axle Cam Tube
15	2	Right Front Drive Axle Slack Adjuster
16	2	Right Front Drive Axle Cam Tube
17	2	Left Rear Drive Axle Cam Tube
18	2	Left Rear Drive Axle Slack Adjuster
19	2	Right Rear Drive Axle Cam Tube
20	2	Right Rear Drive Axle Slack Adjuster
Optional Fifth Wheel Points		
21	8	Front Left 5th Wheel Plate
22	8	Front Right 5th Wheel Plate
23	9	Middle Left 5th Wheel Plate
24	9	Middle Right 5th Wheel Plate
25	9/2	Rear Left 5th Wheel Plate/Saddle Pin
26	9/2	Rear Right 5th Wheel Plate/Saddle Pin

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Optional Clevis Pins		
27	1	Front Left Clevis Pin
28	1	Front Right Clevis Pin
29	1	Front Left Drive Axle Clevis Pin
30	1	Front Right Drive Axle Clevis Pin
31	1	Rear Left Drive Axle Clevis Pin
32	1	Rear Right Drive Axle Clevis Pin
Optional Spring Pins		
33	3	Front Left Spring Pin
34	3	Front Right Spring Pin
35	3	Front Left Upper Spring Shackle
36	3	Front Left Lower Spring Shackle
37	3	Front Right Upper Spring Shackle
38	3	Front Right Lower Spring Shackle
Optional Transmission Points		
39	0	Release Bearing (Automatic)
40	1	Left Cross Shaft (Automatic)
41	1	Right Cross Shaft
42	1	Clutch Linkage
43	1	Clutch Linkage
Optional Double Drag Link		
44	2	Right Forward Drag Link
45	2	Right Rear Drag Link
Optional Steering Box		
46	1	Left Steering Box
47	1	Right Steering Box

Example - Possible Number of Grease Points on a Tandem Axle Tractor



Lubrication Injector and Point Identification of a Tandem Axle Trailer with Steer Lift

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Tandem Axle Trailer		
1A	2	Left Front Cam Tube
2A	2	Right Front Cam Tube
3A	2	Left Rear Cam Tube
4A	2	Right Rear Cam Tube
1B	2	Left Front Inner Cam Bushing
2B	1	Left Front Outer Cam Bushing
3B	2	Right Front Inner Cam Bushing
4B	1	Right Front Outer Cam Bushing
5B	2	Left Rear Inner Cam Bushing
6B	1	Left Rear Outer Cam Bushing
7B	2	Right Rear Inner Cam Bushing
8B	1	Right Rear Outer Cam Bushing
5	2	Left Front Slack Adjuster
6	2	Right Front Slack Adjuster
7	2	Left Rear Slack Adjuster
8	2	Right Rear Slack Adjuster
Optional Tandem Axle Clevis		
9	1	Clevis Pin
10	1	Clevis Pin
11	1	Clevis Pin
12	1	Clevis Pin

Lube Point	Injector Size 1hr/3min	Lubrication Point Description
Lift Steer 10/12/14/16 Point		
13	2	Left Steer Axle Cam Tube
14	3	Left Upper King Pin
15	3	Left Lower King Pin
16	3	Right Lower King Pin
17	3	Right Upper King Pin
18	2	Right Steer Axle Cam Tube
19	2	Left Tie Rod End
20	2	Left Steer Axle Slack Adjuster
21	2	Right Steer Axle Slack Adjuster
22	2	Right Tie Rod End
23	1	Left Steer Axle Spider Bushing (Select Models)
24	1	Right Steer Axle Spider Bushing (Select Models)
25	1	Clevis Pin (Optional)
26	1	Clevis Pin (Optional)
27	2	Steer Axle Lock (Select Models)
28	2	Steer Axle Lock (Select Models)
Optional Dolly Legs		
29	4	Left Lower Dolly Leg
30	4	Left Upper Dolly Leg
31	4	Gear Box
32	4	Right Lower Dolly Leg
33	4	Right Upper Dolly Leg
Special Application - Upper Coupler		
34	9	Front Upper Coupler/Pickup Plate
35	9	Rear Upper Coupler/Pickup Plate
36	9	Front Upper Coupler/Pickup Plate
37	9	Rear Upper Coupler/Pickup Plate

Trailer Axle Configuration - Lubrication Point Count:

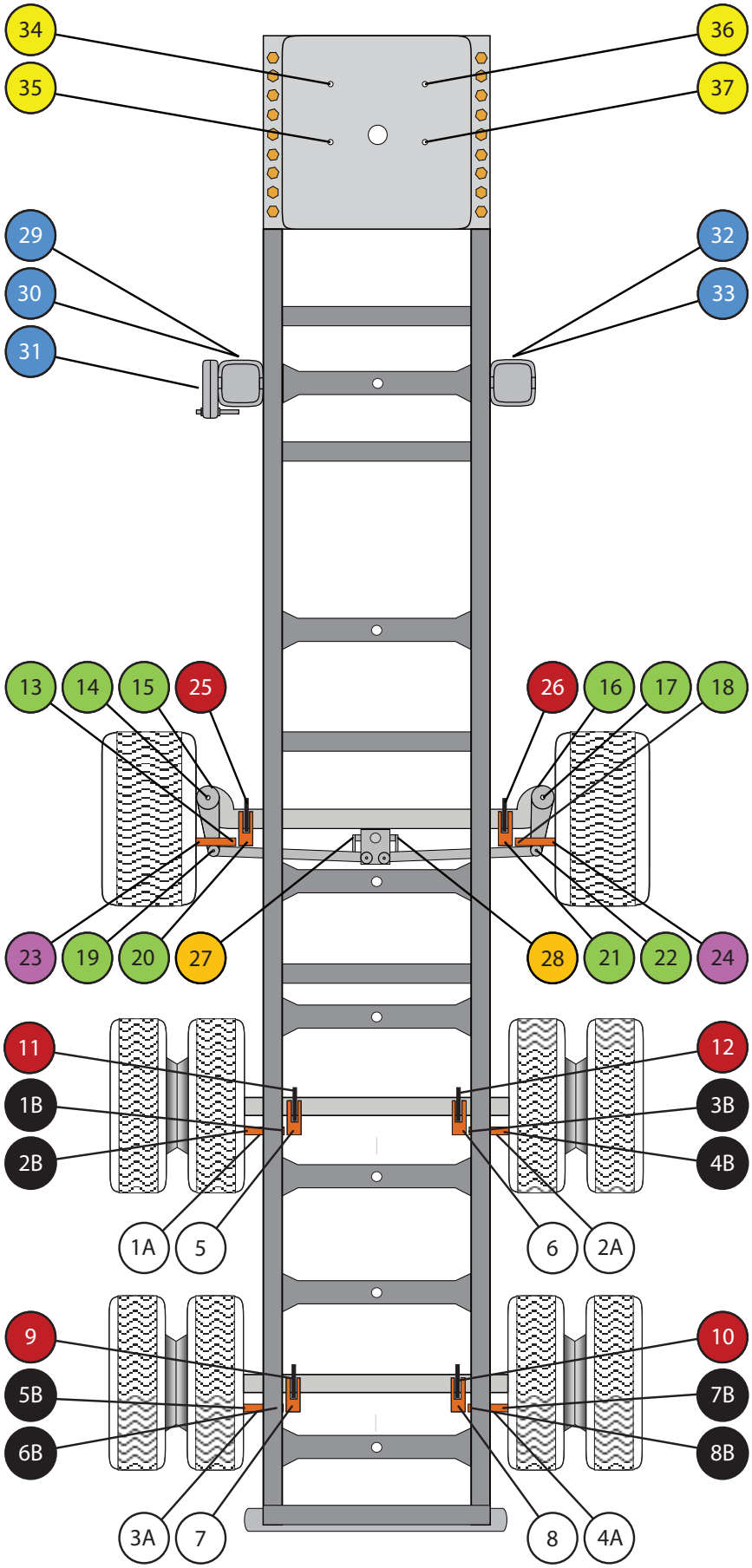
1)	Disc Brake	None
2)	"S" Cam Inner & Outer	4
3)	"S" Cam Tube	2
4)	"S" Cam Tube	4

Trailer Steer Axle Configuration - Lubrication Point Count:

1)	Disc Brake	None
2)	Mod 1 "S" Cam Tube	10
3)	Mod 2 "S" Cam Tube & Locks	12
3)	Mod 3 "S" Cam Tube & Spider Bushing	12
4)	Mod 4 "S" Cam Tube, Locks & Spider Bushings	14

NOTE: THESE MODS DO NOT INCLUDE CLEVIS PINS

Possible Lubrication Points and Identification of a Tandem Axle Trailer with Lift Steer



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Sample -
31Pt - Tandem Axle Tractor Modular Spyder Kit

Part#	Part Description	Quantity
57.003	Pump/SpyderMK2/12v/4kg/39pt/Timer/EP2	1. ea
12.045	Sensor, LOWL Modular – 4kg Bottom/4 & 6kg Top Spring	1. ea
31.710	Grease, Steadylube Lithium Complex Semi Synthetic EP2 Bulk	4. Kg
12.019	Pin for Mark 2 Truck Timer Connector (12.020)	2. ea
50.179	Kit, Spyder/MLP Fuse	1. ea
41.006	Hex Bolt 5/16 - 18 X 1 1/2 Grade 5 PLTD	4. ea
41.008	Locknut 5/16 - 18 Nylon Insert	4. ea
41.010	Flat Washer 5/16 PLTD	8. ea
11.601	Element MLP MK2 - 0.01cc (Brown)	6. ea
11.602	Element MLP MK2 - 0.02cc (Red)	7. ea
11.604	Element MLP MK2 - 0.04cc (Black)	10. ea
11.606	Element MLP MK2 - 0.06cc (Green)	4. ea
11.612	Element MLP MK2 - 0.12cc (White)	4. ea
11.032	Element Plug M12X1.25 with 'O' Ring for Spyder MLP	8. ea
41.022	Clevis Pin 1/2" Greasable (truck) + Cotter Pin + Yellow Hat	6. ea
20.020	Olive Compression 5mm	31. ea
20.021	Nut, Internal for 5mm Olive	31. ea
20.022	Straight Compression 1/8 BSPT X 5mm	14. ea
20.024	Elbow Compression 1/8 BSPT X 5mm - Brass	12. ea
20.056	Fitting, 5mm - M6x1 Conical Male	6. ea
20.001	Cube Connector 1/4 -28 (M) UNF X 1/8 (F) BSPT - 21 Long	10. ea
20.003	Cube Connector 1/8 (M) NPT X 1/8 (F) BSPT - 25.5 Long	10. ea
13.196	1" ID Nylon Woven Sheathing - Heat Resistant	4.0000 feet
30.003	Tubing Secondary Single 5mm X 2.6mm FILLED - Black	61. feet
30.004	Tubing Secondary Double 5mm X 2.6mm FILLED - Red/Blk	116. feet
30.013	Tubing Secondary Triple 5mm X 2.6mm FILLED Red/Black/Blue	122. feet
53.001	SUB - Wraps and Straps Kit MEDIUM - 21 - 36pt	1. ea

NOTE:

THESE ARE GENERIC KITS GIVEN AS A SAMPLE -
PLEASE CONTACT LUBECORE INTERNATIONAL AND PROVIDE A REQUIREMENT SHEET DETAILING THE PARTICULAR SYSTEM REQUIREMENTS

Sample -
16.Pt - Tandem Axle Trailer Modular Spyder Kit

Part#	Part Description	Quantity	
57.034	Pump/SpyderMK2/12v/4kg/15pt/Timer/EP2 (Trailer)	1	ea
31.710	Grease, Steadylube Lithium Complex Semi Synthetic EP2 Bulk	4	Kg
11.602	Element MLP MK2 - 0.02cc (Red)	8	ea
11.604	Element MLP MK2 - 0.04cc (Black)	8	ea
11.032	Element Plug M12X1.25 with 'O' Ring for Spyder MLP	7	ea
20.020	Olive Compression 5mm	8	ea
20.021	Nut, Internal for 5mm Olive	8	ea
20.001	Cube Connector 1/4 -28 (M) UNF X 1/8 (F) BSPT - 21 Long	4	ea
20.002	Cube Connector 1/4 - 28 (M) UNF X 1/8 (F) BSPT - 33 Long	4	ea
20.003	Cube Connector 1/8 (M) NPT X 1/8 (F) BSPT - 25.5 Long	8	ea
20.056	Fitting, 5mm - M6x1 Conical Male	4	ea
20.022	Straight Compression 1/8 BSPT X 5mm	16	ea
50.389	Bracket - Secondary Line Axle Bracket with Gear Clamp	2	ea
13.033	Nylon Braided Expandable Sheathing - 1/2"	32	feet
30.004	Tubing Secondary Double 5mm X 2.6mm FILLED - Red/Blk	100	feet
30.013	Tubing Secondary Triple 5mm X 2.6mm FILLED Red/Black/Blue	100	feet
41.000	Ty-Rap Large (13UV) - Black	100	ea
41.001	Ty-Rap Small (7UV) - Black	100	ea
41.002	Spiral Wrap Large 1/2"	15	feet
41.003	Spiral Wrap Small 3/8"	15	feet

NOTE:

THESE ARE GENERIC KITS GIVEN AS A SAMPLE -
PLEASE CONTACT LUBECORE INTERNATIONAL AND PROVIDE A REQUIREMENT SHEET DETAILING THE PARTICULAR SYSTEM REQUIREMENTS

Common Parts List - Modular Spyder MLP System

Category	Part#	Part Description
Elements		
	11.601	Element MLP MK2 - 0.01cc (Brown)
	11.602	Element MLP MK2 - 0.02cc (Red)
	11.604	Element MLP MK2 - 0.04cc (Black)
	11.606	Element MLP MK2 - 0.06cc (Green)
	11.608	Element MLP MK2 - 0.08cc (Yellow)
	11.610	Element MLP MK2 - 0.10cc (Blue)
	11.612	Element MLP MK2 - 0.12cc (White)
	11.636	Element MLP MK2 - 0.28cc (Brass) M12
Line & Plug Fittings		
	11.031	Element Plug M12x1 for Spyder MLP
	20.021	Nut, Internal for 5mm Olive
	20.020	5mm Compression Olive
Lubrication Point Adapter Fittings (In Conjunction With Compression Fittings)		
	20.001	Cube 1/4 - 28 (M) UNF x 1/8 (F) BSPT - 21.0 Long - Steel
	20.002	Cube 1/4 - 28 (M) UNF x 1/8 (F) BSPT - 33.0 Long - Steel
	20.003	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 25.5 Long - Steel
	20.004	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 38.3 Long - Steel
	20.005	Cube 1/8 - 27 (M) NPT x 1/8 (F) BSPT - 51.0 Long - Steel
	20.028	Cube M8 x 1 (M) x 1/8 (F) BSPP - Steel
	20.059	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 25.5 Long - Steel
	20.061	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 38.3 Long - Steel
	20.062	Cube 1/8 (M) BSPT x 1/8 (F) BSPT - 51.0 Long - Steel
	20.006	Straight Adapter 1/4 - 28 (M) UNF x 1/8 (F) BSPP - Steel
	20.060	Cube Connector 1/8 (M) BSPT X 1/8 (F) BSPT - 25.5 Long
Lubrication Point Compression Fittings		
	20.022	5mm x 1/8 (M) BSPT Compression Straight - Brass
	20.024	5mm x 1/8 (M) BSPT Compression 90° Elbow - Brass
	20.025	5mm x 5mm Compression Union - Brass
	20.056	5mm x M6 x 1 (M) Compression Conical - Brass
Lubrication Point Secondary Tubing		
	30.003	5mm Single Secondary Lining - Black
	30.004	5mm Double Secondary Lining - Black/Red
	30.013	5mm Triple Secondary Lining - Black/Red/Blue

Common Parts List - Modular Spyder MLP System

Category	Part#	Part Description
System Mounting Hardware, Brackets & Protection		
	40.000	6Kg Bracket
	40.001	4kg Bracket
	40.004	Universal Bracket
	40.027	Backing Plate
	40.043	Deck Bracket
	50.070	Pump Mounting Hardware Kit
	41.000	Ty-Rap - Large (13UV) Black
	41.001	Ty-Rap - Small (7uv) Black
	41.002	1/2" Large Spiral Wrap
	41.003	3/8" Small Spiral Wrap
Electrical		
	12.057	MKII Progressive - Externalized Timer - 10V - 30V
	12.045	LLPS 4 & 6 Kg Low Level Sensor

Special Application

Lubrication Point 6mm Compression Fittings		
	20.031	6mm x 1/8 (M) BSPT Compression Straight - Brass
	20.046	6mm x 1/8 (M) BSPT Compression 90° Elbow - Brass
	20.057	6mm x M6 x 1 (M) Compression Conical - Brass
	20.200	6mm x 1/8 (M) BSPT Push-IN Elbow
	20.218	6mm x 1/8 (M) BSPT Push-IN Elbow Swivel
	20.201	6mm x 1/8 (M) BSPT Push-IN Straight
	20.214	6mm x 6mm Push-IN Union
	20.207	6mm x 1/8 (M) BSPT Compression Elbow - Steel
	20.208	6mm x 1/8 (M) BSPT Compression Straight - Steel
	20.033	6mm Compression Olive (Brass)
	20.047	6mm Compression Nut (Brass)
	20.234	6mm Compression Nut (Steel)
	20.235	6mm Compression Olive (Steel)
Lubrication Point 6mm Secondary Tubing		
	30.017	6mm Single Secondary Lining - Black
	30.255	6mm Double Secondary Lining - Black/Red
	30.208	6mm Triple Secondary Lining - Black/Red/Blue

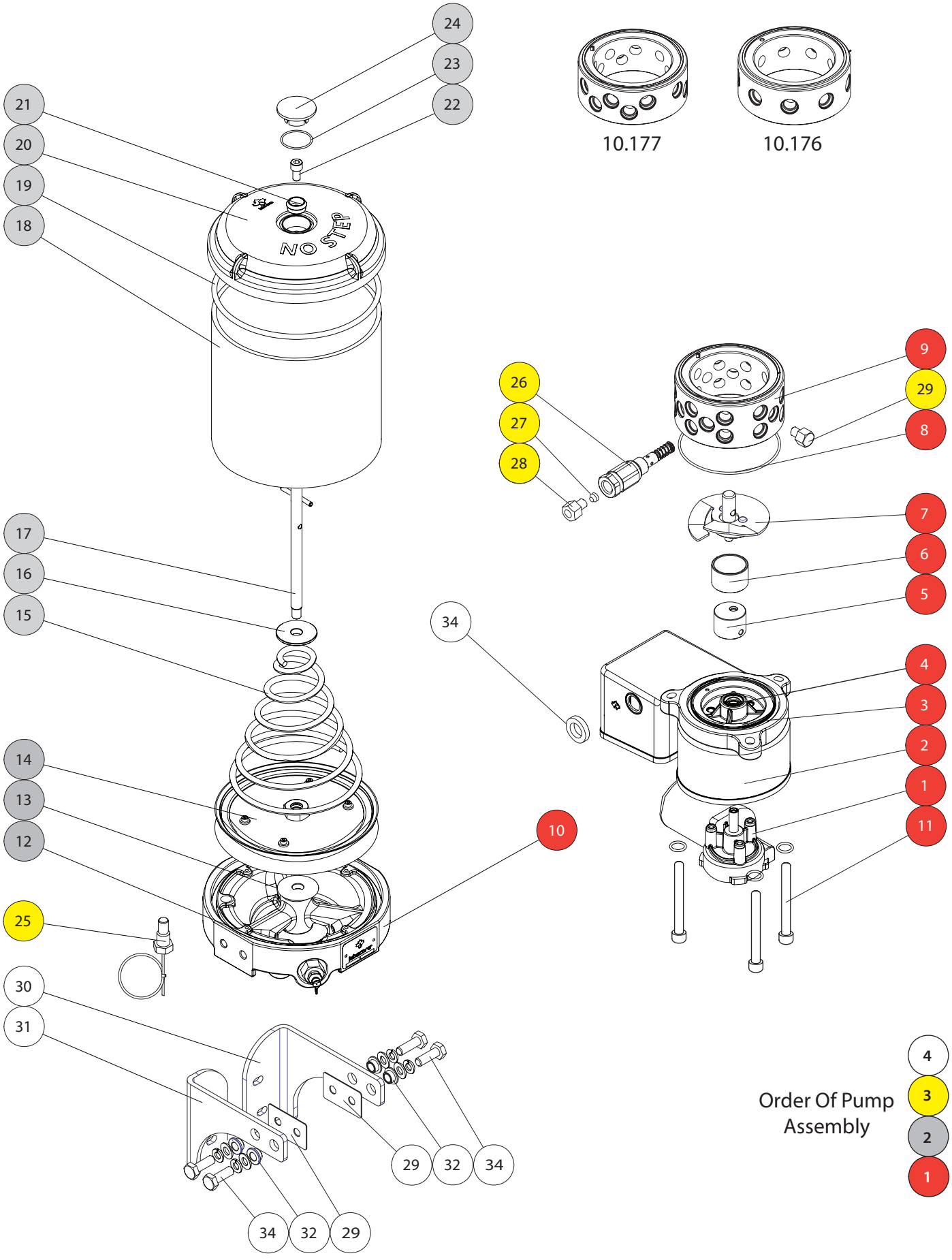
Lubecore™
Modular Spyder
Parts & Service Components

Modular Progressive Pump Base Assemblies

Pump	Part #	Description
57.001	10.213	Spyder 4KG Reservoir Module - Top Spring
	10.182	Spyder, Bottom, 12 Volt + Timer Module SECONDS
	10.177	Ring Module, 15 Port Spyder
	10.173	Cam Spacer
	10.174	Screw Plate Module
	10.190	Bolt Kit - 100mm (2L)
	10.109	Label (bottom) for Pump 1.6 X 9
	10.231	Label, Top of Pump 2.48 X 9 - Generic
	10.187	Spyder, Bracket Kit, 6 mm
	50.594	Bolt Kit, Modular Bracket Mount (Purchased)
	50.931	kit, LCI Modular Pump Mount Hardware
	50.581	kit, 30' LCI Spyder Pump Power Harness
57.008	10.213	Spyder 4KG Reservoir Module - Top Spring
	10.221	Label, Caution PIP
	10.183	Spyder, Bottom, 24 Volt + Timer Module SECONDS
	10.177	Ring Module, 15 Port Spyder
	10.173	Cam Spacer
	10.174	Screw Plate Module
	10.190	Bolt Kit - 100mm (2L)
	10.109	Label (bottom) for Pump 1.6 X 9
	10.231	Label, Top of Pump 2.48 X 9 - Generic
	10.187	Spyder, Bracket Kit, 6 mm
	50.594	Bolt Kit, Modular Bracket Mount (Purchased)
	50.931	kit, LCI Modular Pump Mount Hardware
	50.581	kit, 30' LCI Spyder Pump Power Harness
57.042	10.214	Spyder 6KG Reservoir Module - Top Spring
	10.182	Spyder, Bottom, 12 Volt + Timer Module SECONDS
	10.177	Ring Module, 15 Port Spyder
	10.173	Cam Spacer
	10.174	Screw Plate Module
	10.190	Bolt Kit - 100mm (2L)
	10.109	Label (bottom) for Pump 1.6 X 9
	10.231	Label, Top of Pump 2.48 X 9 - Generic
	10.187	Spyder, Bracket Kit, 6 mm
	50.594	Bolt Kit, Modular Bracket Mount (Purchased)
	50.931	kit, LCI Modular Pump Mount Hardware
	50.581	kit, 30' LCI Spyder Pump Power Harness
57.037	10.214	Spyder 6KG Reservoir Module - Top Spring
	10.183	Spyder, Bottom, 24 Volt + Timer Module SECONDS
	10.177	Ring Module, 15 Port Spyder
	10.173	Cam Spacer
	10.174	Screw Plate Module
	10.190	Bolt Kit - 100mm (2L)
	10.109	Label (bottom) for Pump 1.6 X 9
	10.231	Label, Top of Pump 2.48 X 9 - Generic
	10.187	Spyder, Bracket Kit, 6 mm
	50.594	Bolt Kit, Modular Bracket Mount (Purchased)
	50.931	kit, LCI Modular Pump Mount Hardware
	50.581	kit, 30' LCI Spyder Pump Power Harness

Table 1. Modular Series Pump Components.

The above listed pumps are base pumps only and do not come with elements, plugs, grease or low, level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Order Of Pump Assembly
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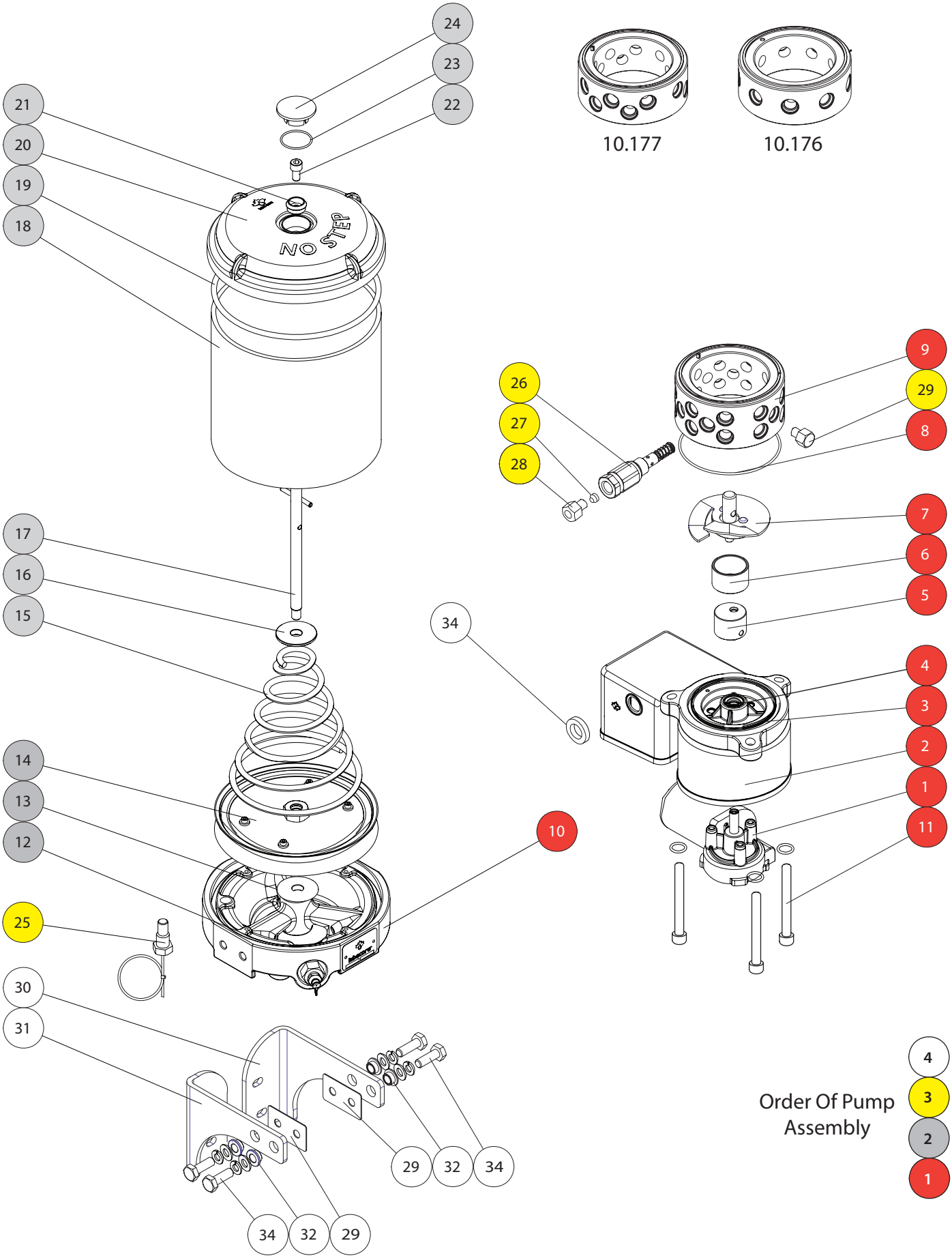
Modular Spyder Pump Components
Order of Assembly

Pos #	Part #	Description
1	10.261	Motor & Gear Assembly - 12V
	10.262	Motor & Gear Assembly - 24V
2	10.182	Motor Assembly 12V - MLP (Second Timer)
	10.183	Motor Assembly 24V - MLP (Second Timer)
	10.197	Motor Assembly 12V - Progressive (Minute Timer)
	10.198	Motor Assembly 24V - Progressive (Minute Timer)
	10.184	Motor Assembly 12V - No Timer
	10.185	Motor Assembly 24V - No Timer
3	10.267	"O" Ring
4	10.173	Cam Spacer
5+6	10.257 + 10.258	Cam 20mm with Ring (L: Low Profile Ring Module)
	10.259 + 10.260	Cam 30mm with Ring (H: High Profile Ring Module)
7	10.174	Screw Plate Module
	10.176	Ring Module 9 Port (L) (Includes Cam 20mm)
	10.264	Ring Module 9 Port (L) (Excluding "O" Ring)
	10.177	Ring Module 15 Port (L) (Includes Cam 20mm)
	10.265	Ring Module 15 Port (L) (Excluding "O" Ring)
5+6+8+9	10.178	Ring Module 24 Port (H) (includes Cam 30mm)
	10.266	Ring Module 24 Port (H) (Excluding "O" Ring)
10	-	Modular Pump Body
11	10.188	Bolt Kit - 60mm (1L)
	10.189	Bolt Kit - 70mm (1H)
	10.190	Bolt Kit - 100mm (2L)
	10.191	Bolt Kit - 110mm (1L+1H)
	10.192	Bolt Kit - 120mm (2H)
	10.193	Bolt Kit - 160mm (1L+2H)
	10.194	Bolt Kit - 170mm (3H)
12+19	10.007	Reservoir Seal (Top & Bottom)
13	10.114	M10x28x3mm Washer (Guide Rod)
14	10.110	Follower Plate - 4kg & 6kg - Top Spring
15	10.253	PIP™ Spring 4Kg
	10.254	PIP™ Spring 6Kg
	10.213	4KG Reservoir Module- PIP™ (Top) Spring

Table 2. Modular Series Pump Replacement Components.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Order Of Pump Assembly
4
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1

Modular Spyder Pump Components

Pos #	Part #	Description
24	10.003	Lid Cap
23	10.004	"O" Ring Seal Cover Cap
22	10.011	Lid Bolt - PIP™ Spring Model / Bolt For Reservoir Lid - M8 x 1.25 x 15 mm SS
21	10.008	Reservoir Spacer Bushing
20	10.006	Reservoir Lid
19+12	10.007	Reservoir Seal (Top & Bottom)
18	10.001	Makrolon™ Reservoir 4Kg
	10.207	Makrolon™ Reservoir 6Kg
17	10.251	Guide Rod, 4kg Bottom Spring
	10.252	Guide rod, 6kg Bottom Spring
	10.224	Guide Rod Assembly 4Kg - PIP™ (Top) Spring (Rod with Spring Stopper)
	10.223	Guide Rod Assembly 6Kg - PIP™ (Top) Spring (Rod with Spring Stopper)
16	10.255	Spring Stopper - Washer for PIP™ / Guide Rod
15	10.253	PIP™ Spring 4Kg
	10.254	PIP™ Spring 6Kg
	10.213	4KG Reservoir Module- PIP™ (Top) Spring
	10.214	6KG Reservoir Module- PIP™ (Top) Spring
14	10.110	Follower Plate - 4kg & 6kg - Top Spring
13	10.114	M10x28x3mm Washer (Guide Rod)
23	12.045	Sensor Low Level Modular – 4kg Std & 4/6kg PIP™ Top Spring
	54.128	1/4" Quick Fill Connector- 1/4"M NPT (With Dust Cap)
1	10.261	Motor & Gear Assembly - 12V
	10.262	Motor & Gear Assembly - 24V
34	10.153	Magnet
2	10.182	Motor Assembly 12V - MLP (Second Timer)
	10.183	Motor Assembly 24V - MLP (Second Timer)
	10.197	Motor Assembly 12V - Progressive (Minute Timer)
	10.198	Motor Assembly 24V - Progressive (Minute Timer)
	10.184	Motor Assembly 12V - No Timer
	10.185	Motor Assembly 24V - No Timer
11	10.188	Bolt Kit - 60mm (1L)
	10.189	Bolt Kit - 70mm (1H)
	10.190	Bolt Kit - 100mm (2L)
	10.191	Bolt Kit - 110mm (1L+1H)

Table 3. Modular Series Pump Replacement Components.

Lubecore™ Limited Warranty

Lubecore™ warrants the product manufactured and supplied by Lubecore and its authorized distributors to be free from defects in material and workmanship for a term as defined in the enclosed table, following the date of purchase, excluding any special, extended, or limited warranty published by Lubecore.

If product is determined to be defective during this warranty period, it will be repaired or replaced, within Lubecore sole discretion, without charge. This warranty is conditional upon the determination by Lubecore or authorized representative that the product is defective. For a complete list of Lubecore and authorized representative locations call 1-905-864-3110 or visit www.lubecore.com.

This warranty is non-transferable and applies to the original retail purchaser only. This warranty does not apply to product damaged from accident, overload, abuse, misuse, negligence, faulty installation or abrasive or corrosive material, equipment that has been altered, or equipment repaired by anyone not authorized by Lubecore.

This warranty applies only to product installed, operated and maintained in strict accordance with the written specifications and recommendations provided by Lubecore or authorized representative.

This warranty is exclusive of any other warranties, expressed or implied, including, but not limited to, the warranty of merchantability or warranty of fitness for a particular purpose.

In no event shall Lubecore or authorized representative be liable for incidental or consequential damages. Lubecore or authorized representative's liability for any claim for loss or damages arising out of the sale, resale or use of any Lubecore equipment shall in no event exceed the purchase price. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, therefore the above limitation or exclusion may not apply. Warranty shall not exceed original purchase price.

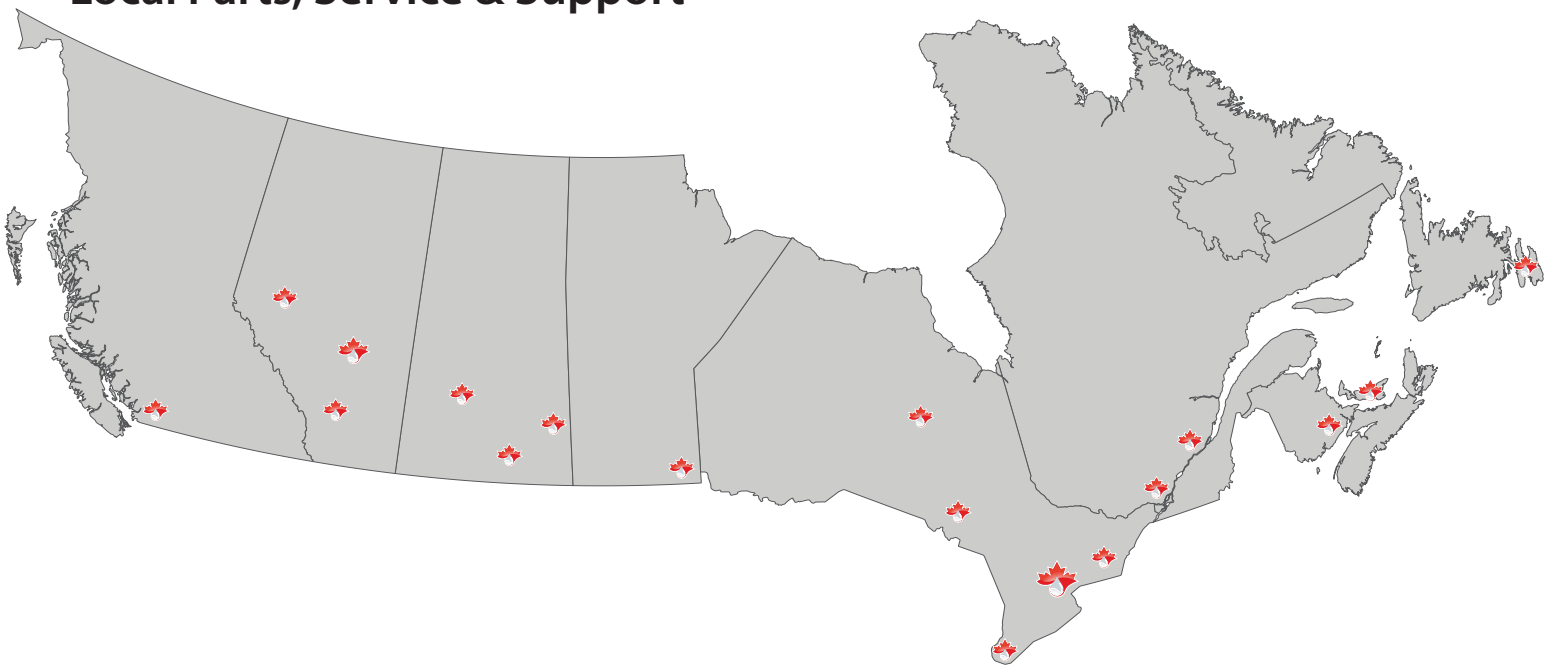
Product	Limited Product Warranty	Limited Steadylube Extended Warranty	
		On-Road / Transport	Off-Road
Parallel Pneumatic* EP0	1- year	5 -years	2 -years
Parallel Electric* Gear EP0		2 years	1 -year
Parallel High Pressure Electric* - Hydraulic		-	1 -year
Series Progressive Electric*		-	1 -year
Series Progressive Pneumatic*		5 -years	2 -year
MLP/Multiline - Including Modular		1 -years	1 -year

Table 65. **Limited Warranty Terms / Period. * Defines the Method of Pump Operation.**

Both the Regular and the Extended Warranty are void in case of the following:

- Damage from grease contamination or using alternate grease. - Service from an unauthorized dealer - Cut wires or missing parts - Water above the follower plate from pressure washing - Damage caused by negligence, theft, or accident.
- Contact Lubecore International or your local distributor for further details pertaining to the extended warranty provided with the use of Lubecore lubrication products.

Lubecore International - Canadian Local Parts, Service & Support



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(506) 857-9788
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dave.thompson4@sympatico.ca

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ets@sasktel.net

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Service Location
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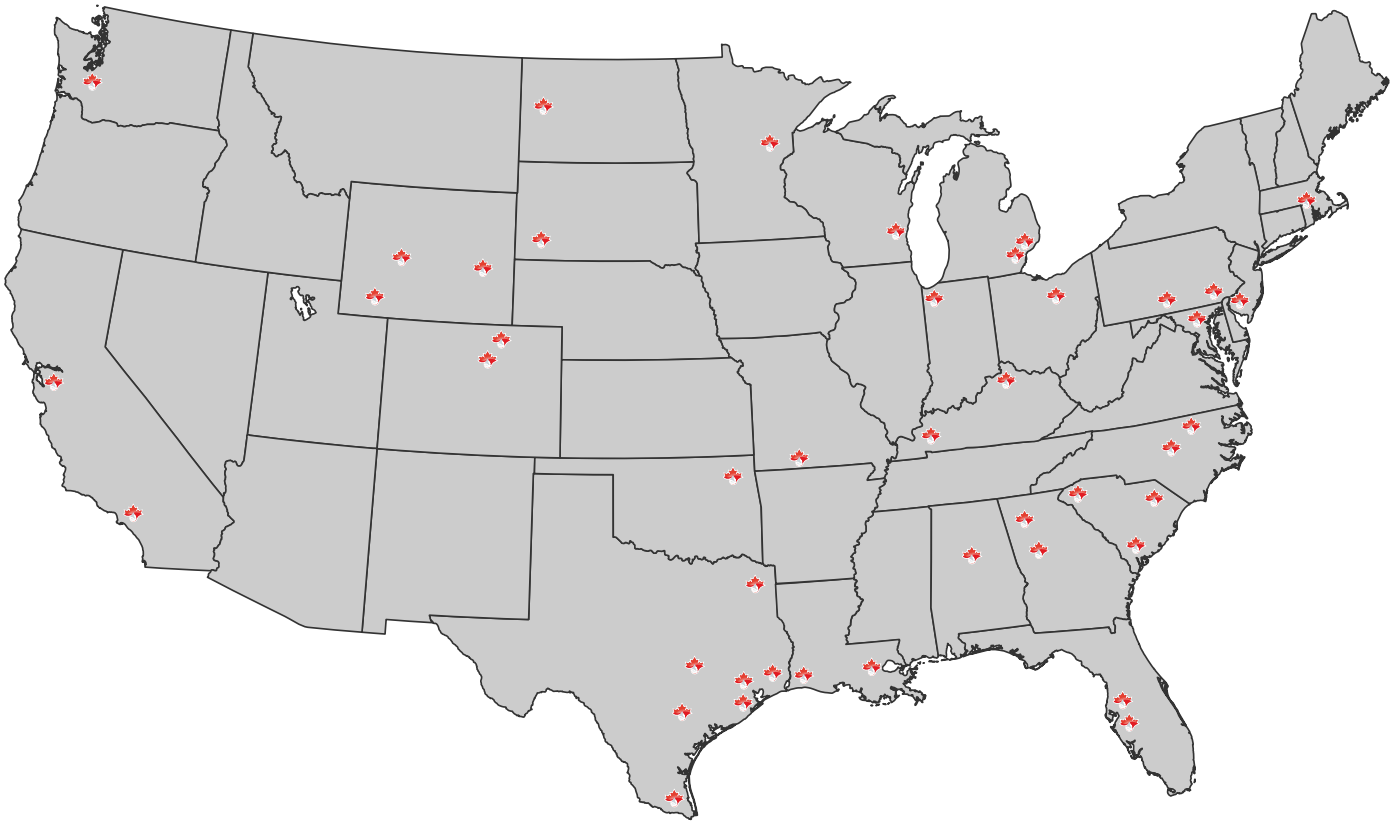
adminbc@lubecore.com

Lubecore International - United States
Local Parts, Service & Support



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30213
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29936
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1 (800) 269-8426
1 (912) 232-9025
rdennis@ticotractors.com
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National Tank Services Holly Hill
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National Tank Services Charlotte
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National Tank Services Winston-Salem
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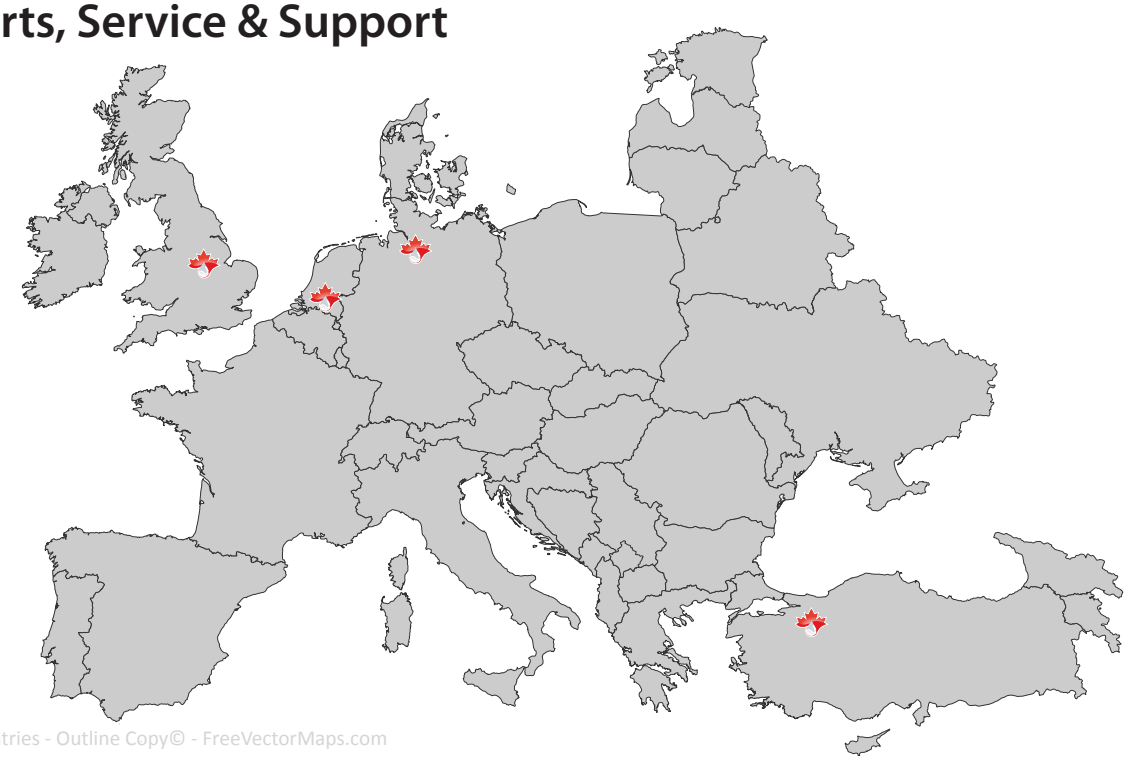

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NEXT GENERATION AUTOMATED LUBRICATION