LUBMANN
Centralized Lubrication System

Lubmann Pressurized Single Line Lubrication System

Instruction Manual

LFS1/LFS2/LFS3

Lubmann Centralized Lubrication System

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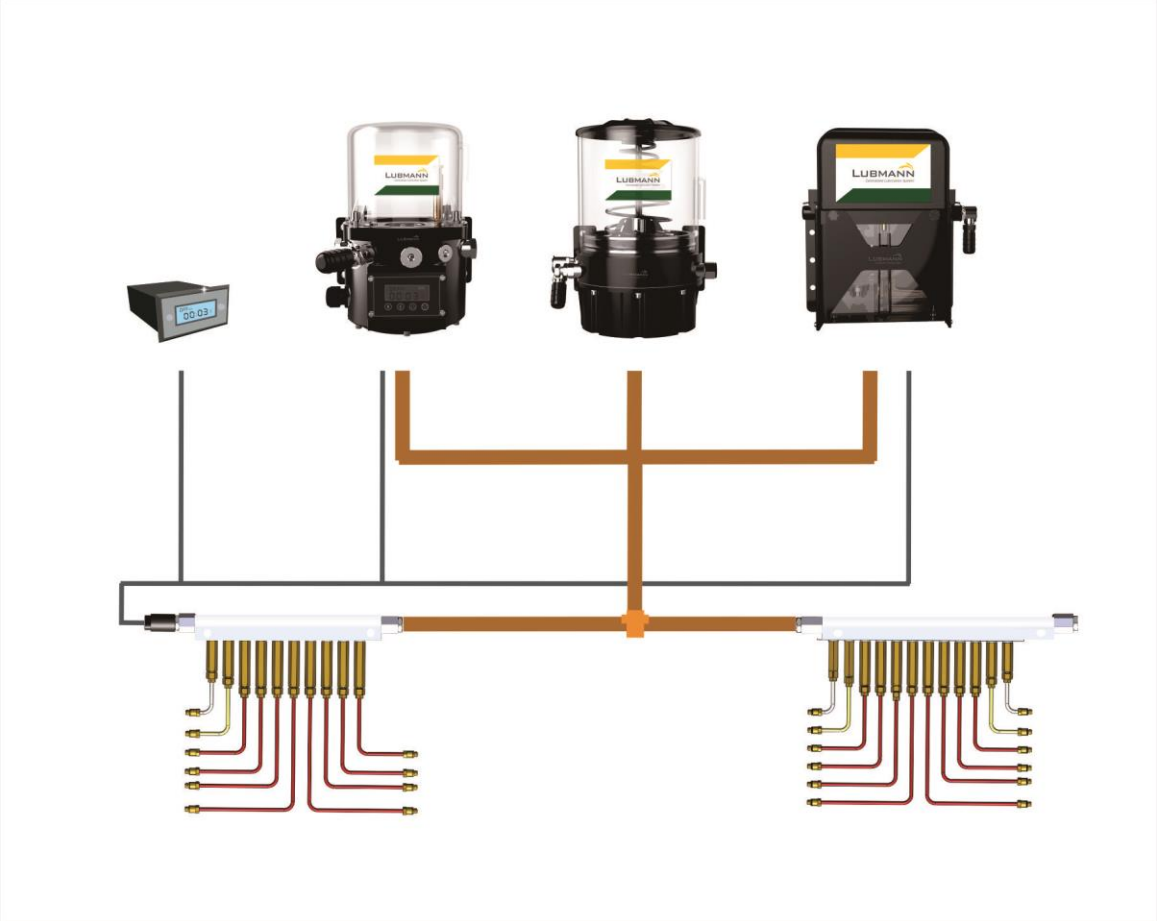
System Overview

Lubmann Pressurized Single Line series centralized lubrication systems have been widely used in industries like commercial vehicles, machine tools, construction machinery, Agriculture Machinery, etc.

Grease pump delivers grease alternatively into each lube points through pressurized single line distributors.



Layout of Pressurized Single Line System

Product	Function Principle	Grease Thickness till	Metering Quantity per Pump Element ml/Min	Reservoir Liter	Operating Max. Pressure in bar	Operating Max. Pressure in psi	Power Supply	Max. Pump Elements
LFS-1	Gear Pump/Paddle Mode	Up to 0	90	1	40 bar	751	12/24 V DC 220V AC	1
LFS-2	Gear Pump/Paddle Mode	Up to 0	55	2	63 bar	923	12/24 V DC 220V AC	1
LFS-3	Gear Pump/Spring Mode	Up to 0	120	2.8	40 bar	751	12/24 V DC 220V AC	1

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System Structure and Working Principle

LFS Series centralized lubrication system consists of a monitoring unit and a grease supply unit. The monitoring unit consists of a monitor and sensors, which controls the system through electric circuits. The grease supply unit composed of a pump module and distributors integrates the lube points of the vehicle into an enclosed system through tubing accessories.

The system can distribute lubricant to friction pairs automatically at preset times and in a definite quantity so as to ensure that they can get good lubrication.

System Composition

The system is composed of lubrication pump, external/integrated monitor, pressurized single line distributor, sensor (optional), grease hose and accessories.

Working Principle

Take LFS1 for example. When the pause interval ends, the pump module gets a signal from the monitor, and then the motor-driven gear pump is activated. The grease is pressurized by the gear pump into the exit. Meanwhile, the pressure unloading valve is opened, and the pump module pressurizes the mainline. Grease pressurizes mainlines and causes distributers to dispense preset volumes of grease to lube points. Thereafter, when the exit of pump module has enough pressure to open overflow valve, redundant grease reflows to the reservoir through the orifice in overflow valve. The pump module receives the signal from monitor and the gear pump stops. Finally, the pressure unloading valve opens, grease in mainlines reflows to the reservoir. Then the pressure in mainlines is about 0.05-0.1Mpa.

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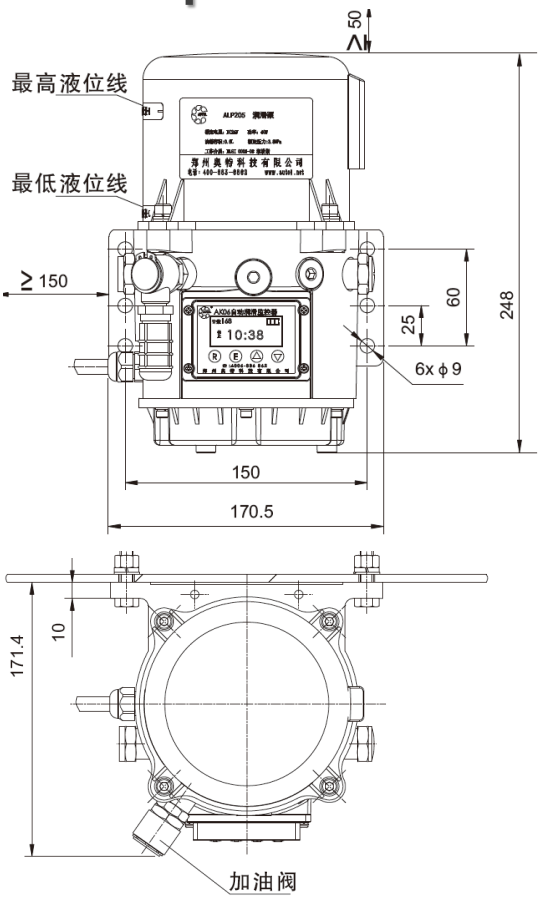
System Structure and Working Principle

Lubrication Pump– LFS-1 Serie



Product description

The LFS-1 Serie lubrication pump can be used as a centralized lubrication pump in small-sized pressurized single line systems. It can drive 1 element. The pump's drive and eccentric shaft design, high-efficiency worm gear, minimal number of parts and multi-range motor provide several advantages. LFS-1 pumps are available with a three-phase flange mount and multi-range motor or with a free shaft end for use with other motors Various gear ratios and reservoir sizes with or without level control are offered.

Features and benefits

Durable, versatile and reliable pump series
Designed for continual lubrication of machines systems operating in harsh environments
Broad range of output options
Modular design and easy maintenance

Applications

Commercial Vehicle
Food Line, Beverage Line
Machine Tool

Technical data

Function principle:	electrically operated piston pump
Metering quantity Grease:	90 ml/Min
Outlets:	1
Lubricant:	Grease up to NLGI 0
Operating Pressure:	40 bar/751 psi
Operating Temperature:	–40 to +70 °C
Protection Class:	IP 65
Line Connection:	G1/4
Electrical Connection:	12 or 24V DC/220V AC
Dimensions :	
Height	248mm
Width	171mm
Depth	171mm
Mounting Position:	Vertical
Options:	Pressure Sensor
	Grease Level Sensor
	Main Switch
	Refill Coupling

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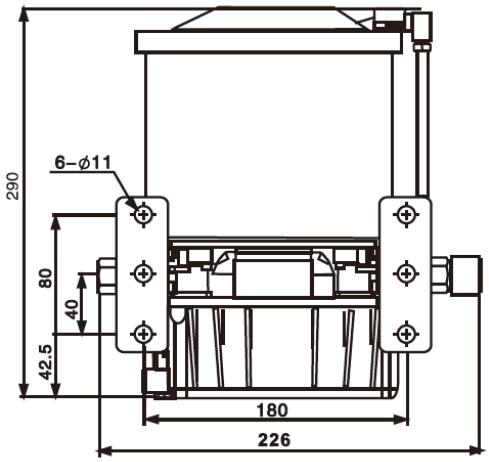
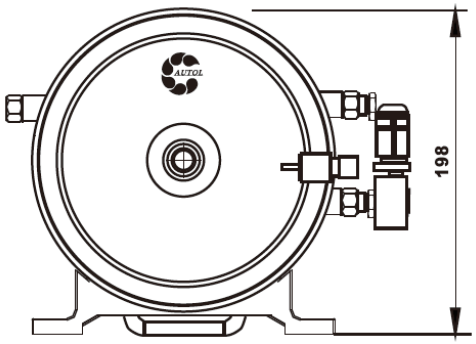
System Structure and Working Principle

Lubrication Pump– LFS-2 Serie





Product description

The LFS-2 Serie lubrication pump can be used as a centralized lubrication pump in small-sized pressurized single line systems. It can drive 1 element. The pump's drive and eccentric shaft design, high-efficiency worm gear, minimal number of parts and multi-range motor provide several advantages. LFS-2 pumps are available with a three-phase flange mount and multi-range motor or with a free shaft end for use with other motors Various gear ratios and reservoir sizes with or without level control are offered.

Features and benefits

Durable, versatile and reliable pump series
Designed for continual lubrication of machines systems operating in harsh environments
Broad range of output options
Modular design and easy maintenance

Applications

Commercial Vehicle
Food Line, Beverage Line
Machine Tool

Technical data

Function principle:	electrically operated piston pump
Metering quantity Grease:	55 ml/Min
Outlets:	1
Lubricant:	Grease up to NLGI 0
Operating Pressure:	63 bar/923 psi
Operating Temperature:	–40 to +70 °C
Protection Class:	IP 65
Line Connection:	G1/4
Electrical Connection:	12 or 24V DC/220V AC
Dimensions :	
Height	290mm
Width	226mm
Depth	198mm
Mounting Position:	Vertical
Options:	Pressure Sensor
	Grease Level Sensor
	Main Switch
	Refill Coupling

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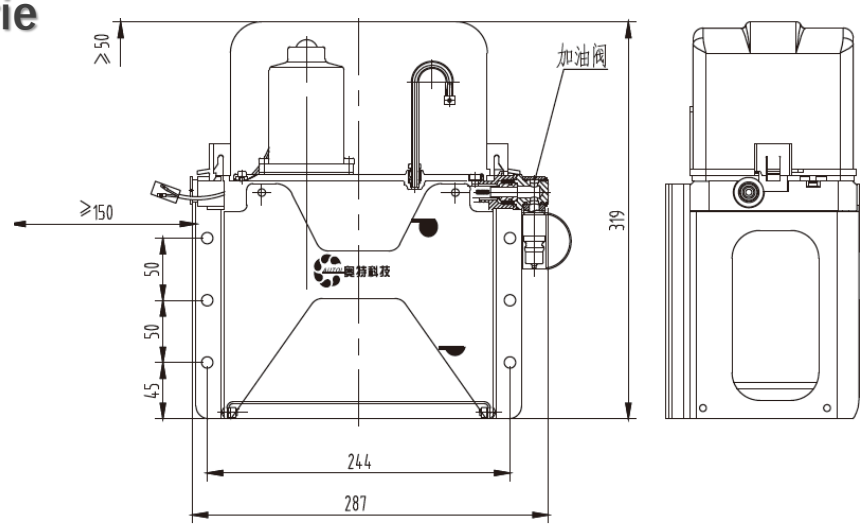
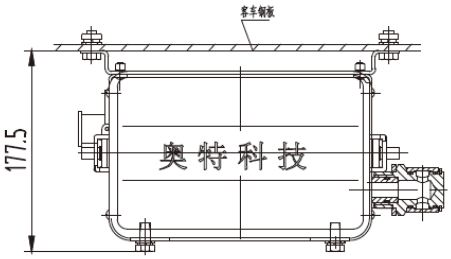
System Structure and Working Principle

Lubrication Pump– LFS-1 Serie





Product description

The LFS-3 Serie lubrication pump can be used as a centralized lubrication pump in small-sized pressurized single line systems. It can drive 1 element. The pump's drive and eccentric shaft design, high-efficiency worm gear, minimal number of parts and multi-range motor provide several advantages. LFS-3 pumps are available with a three-phase flange mount and multi-range motor or with a free shaft end for use with other motors Various gear ratios and reservoir sizes with or without level control are offered.

Features and benefits

Durable, versatile and reliable pump series
Designed for continual lubrication of machines systems operating in harsh environments
Broad range of output options
Modular design and easy maintenance

Applications

Commercial Vehicle
Food Line, Beverage Line
Machine Tool

Technical data

Function principle:	electrically operated piston pump
Metering quantity Grease:	120 ml/Min
Outlets:	1
Lubricant:	Grease up to NLGI 0
Operating Pressure:	40 bar/751 psi
Operating Temperature:	–40 to +70 °C
Protection Class:	IP 65
Line Connection:	G1/4
Electrical Connection:	12 or 24V DC/220V AC
Dimensions :	
Height	319mm
Width	287mm
Depth	177mm
Mounting Position:	Vertical
Options:	Pressure Sensor
	Grease Level Sensor
	Main Switch
	Refill Coupling

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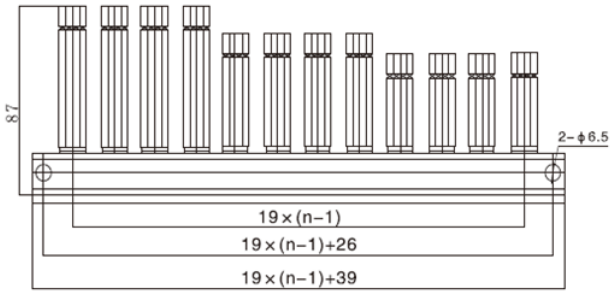
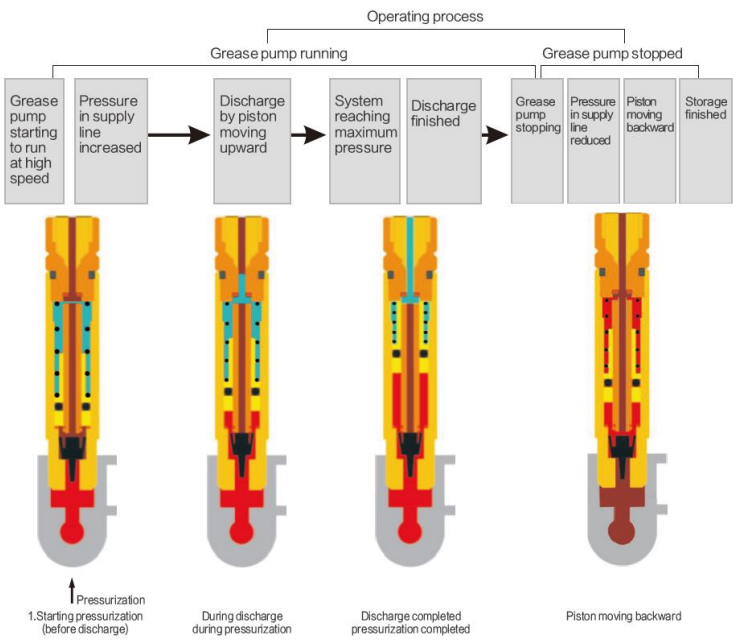
System Structure and Working Principle

Metering Unit – LRK-SLA

The pressurized single line LRK-SLA type metering device is a rack type metering device. Its metering sections cover a metering volume per outlet and cycle of 0,13 ml to 0,40 ml. According to the needs of the greasing points, the volume of the outlet fitting can be amounted very easily.





Dimensions

Outlets	Max. Height (mm)	Depth (mm)	Width W1 (mm)	Width W2 (mm)
4			83	96
6			121	134
8			159	172
10			197	210
12	87	22	235	248
14			273	286
16			311	324
18			349	362
20			387	400

Technical data

Function principle:	Rack metering device
Outlets:	4-20
Lubricant:	Grease up to NLGI 0
Input Pressure:	63 bar
Displacement:	0.13/0.2/0.4 ml/cy
Working Temperature:	–40 to +70 °C
Material:	Steel/Copper
Surface treatment (Coating):	Zn-Ni plated (free of Cr-VI)

More details for the distributor accessories like input/output fitting, closure plug and pressure sensor please check the following pages from x to x in this catalogue.

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System Structure and Working Principle

External/Integrated Monitor

AK04/06 monitor displays the real-time data from the system dynamically, such as grease pressure, countdown in the pause interval, running time, accumulative running cycles and fault code. Moreover, it has the features of overload protection and fault warning. It is suitable to DC12V and DC24V power supply and installed at drivers' compartment for watching conveniently. Monitors are also equipped with remote controls in order to repair the system. Pause interface: It tells countdown in the pause interval and running cycles, which can be stored perpetually. The system's pause interval has 15 adjustable steps from 6 hours to 20 hours, and the default setting is 12 hours. Running interface: It tells grease press OFF or ON and running time.

Operation: Take pause interval set at 12 hours for example, after ignition being turned on, the LCD screen counts down remaining time in the pause interval. If the time reaches 00:00, the monitor initiates the pump to pressurize the mainline, the screen starts to count the lube time. When the pressure at the end of the mainline is up to 2.6MPa, the pressure sensor transmits the signal to the monitor immediately, the ON pressure reverts to the OFF one, and the pump operates 60 more seconds (AK04) until de-energized. Then the monitor counts down to the next lube cycle, and 1 is added to the cycle count.

Fault display: If the monitor doesn't detect the preset pressure from the mainline, the pump module operates total 120 seconds until de-energized. At this moment, the OFF pressure and the fault code EE-1 occurs on the screen, accompanied by an alarming signal (buzzer sound). The signal will disappear automatically in 20 seconds. Then please check the system immediately.

Monitor （Integrated）

Control Mode:	ECU Microcomputer Control
Operating Voltage:	12/24V DC/220V AC
Off Time:	1-30 hours
Operating Mode:	Run according to the preset time
Signal Output:	Grease Level/Fault(due to pressure)

Monitor （External）

Control Mode:	ECU Microcomputer Control
Operating Voltage:	12/24V DC/220V AC
Off Time:	1-30 hours
Operating Mode:	Run according to the preset time
Signal Output:	Grease Level/Fault(due to pressure)

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System Design/Cautions in Installation/Debugging

Determination of Lube Points

Lube points are the friction fairs lubricated by grease fitting in the machine. Those can rotate 360 degrees or have a high temperature are excluded.

Determination of the required volumes of grease of lube points

Generally, the interval time for lubricating is from 4-8 hours. The volume each point required is from 0.1 to 0.4 ml/cy.

Determination of the supply volumes

Q= q1+q2+q3=(1+20%)q1(ml)+c (ml/m)×L(m)
Q- The supply volumes of the system
q1- The sum of the volumes that lube points required
q2- Safe added-value （20%q1）
q3- The loss of the mainline
c- Increasing volume of the mainline per meter from 0.05Mpa to regular working data
L- The length of the mainline

Cautions in Installation

Installing notice of the pump module

Pump module should be installed vertically and firmly in a place where the device is polluted less , convenient maintenance and easy to observe and operate If conditions permit, a separate door can be set near the pump module.

Installing notice of distributers

Distributors also should be installed in a place where the device is polluted less and convenient to fix, maintain and observe. A few distributers can be caught together in groups and finally connect to the mainline.

Installing notice of system tubes

1. The mainline usually useΦ10×1.5 nylon tubing whose pressure-proof should above 10MPa and orifice should have rigid bushing. Moreover, Φ10× 1steel tubing is also available.

2. The distribution lines should be short as much as possible, especially the distribution lines to firmly hermetical lube points whose length should not be longer than 3 meters. In addition, the distribution lines from exits of distributers to lube points should not be longer than 3.5 meters. The distribution line use nylon tubing and their both ends must have rigid bushing.

3. Tubes should be incised vertically in axial direction and avoid squashing, cracking and scratching.

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System Design/Cautions in Installation/Debugging

Cautions in Installation

4. The mainline and distribution line should be short as much as possible in order to avoid more bends (when they are bended, the minimum bending radius of Φ10×1.5 and Φ4×0.75 nylon tubing is R90 and R40). Less bends can decrease the loss of the pressure and ensure free discharge.

5. The distribution line must be full of grease before installation. The Mainline also must be full of grease in installation below centigrade 5℃.

6. Tubes must keep clean and have not contaminator.

7. Flexible tubes should be 1% longer than straight length when they are installed on in-line installation.

8. The installation of mainlines and distribution lines should avoid engine, warm air blower and the bends of and steel spring plates.

9. If the mainline and distribution line use nylon tubing, they should be enclosed by corrugated tubes.

10. Some tubes, which are removable or across holes in the beam, must be protected by tube shroud.

Debugging

When the system are being debugged, terminals of mainlines must keep open (i.e. don't screw on choke plug and pressure sensor). Pressing the C key in the remote control will make the pump module work 20 seconds, and then do it again after the pause for 20 seconds. The discontinuous running can exhaust air from mainlines. Afterwards the terminals that are bleeding should be blocked by choke plug or connected the pressure sensor.

Press C key in the remote control makes the pump module work. Then press it again after the pump stops for 120 seconds. Repeat it several times until every friction pairs is overflowing.

If some lube points are not overflowing, a manual operated reservoir-fill gun must be full of grease that is also used in the system to clear the blockage. And then see if the working condition is in accord with requirements.

[Note]: Opening and shutting methods of the reservoir housing

1. **Opening method:** Pressing the semicircular bulges on both sides of the reservoir cap with both thumbs, and then propping the earlike parts on both sides of the housing with your bent index finger. Squeezing and then pulling upward the parts sharply can remove the housing easily. Single-hand operation is also available at your inconvenience.

2. **Shutting method:** Taking the housing, and making its ear-holes on the both side level at the semicircular bulges on both sides of the reservoir cap. Then pressing the top of the housing can make the housing and the reservoir cap locked.

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Operation of Refilling Equipment

Operating procedures of grease gun

Thanks for the special transfer coupling for grease gun (manual, pneumatic, electrical), the refilling nozzle of lubrication pump and grease gun can be easily connected with each other for pump refilling.

Before connecting the grease gun and refilling nozzle of lubrication pump, it is necessary to read the instruction for pump reservoir refilling again to make sure no air go into the reservoir during the refilling procedure.

Grease Gun (manual, pneumatic, electrical)

Transfer Coupling

Nozzle of Lubrication Pump

Operating procedures of Grease Refilling Device

By high pressure grease transfer unit including high pressure hoses, connectors and pressure relief valve, the refilling nozzle of lubrication pump and grease refilling devices (manual, pneumatic, electrical)can be easily connected with each other for pump refilling.

Before connecting the grease refilling devices and refilling nozzle of lubrication pump, it is necessary to read the instruction for pump reservoir refilling again to make sure no air go into the reservoir during the refilling procedure.

Grease Refilling Device (manual, pneumatic, electrical)

High Pressure Grease Transfer Unit

Nozzle of Lubrication Pump

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System Maintenance (For Commercial Vehicle)

The first level service of the vehicle:

1. After ignition being turned on, press C key in the monitor and verify that LCD screen is working correctly.

2. Check if mainlines and distribution lines are leaking or bended and if every lube point can get grease. If there are lube points in the engine, please check if distribution lines in the engine are ruptured and if each lube point can be lubricated.

3. Check if pipe bundles are fastened firmly and if wiring harness are connected firmly. Then check if some movable distribution lines are tied firmly.

4. Clear away the dirt from each part of system and grease dirt leaked from lube points.

5. Check remaining grease in the reservoir and refill the reservoir in time. Note: Some customers say that sometimes the grease cannot be injected to the reservoir smoothly. The problem is caused by blockage in the gauze filter. Cleaning or changing the gauze filter will solve the problem. Moreover, it should be noted that the process of filling the reservoir and storage of grease (grease can) should be in a sanitary condition.

The second level service of the vehicle:

1. To do the all items that should be done in the first level service.

2. Check remaining grease in the reservoir and make sure that the reservoir should be filled to the upper limit in the second level service.

Cautions:

Centralized lubrication system is controlled by the monitor automatically, so the driver should not perform any operation but monitor the LCD screen. If adjusting discharge frequencies is necessary, this should be performed by the maintenance and management department.

Grease recommended for the system is NLGI 0# or NLGI 00# . Storage of grease and the process of filling the reservoir should be kept clean. Filling the reservoir should not exceed the upper limit and should not be performed on the condition that the reservoir is empty, which can ensure smooth filling in the second level service.

If some tubes need to be moved or dismounted temporarily from the system in maintenance, the original installation state must be remembered. After maintenance being accomplished, these tubes must be back to their original state, or else they will be broken.

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Fault Analysis and Elimination

Faults	Reasons	Solution
When the system begins to lubricate, the motor stops working. The monitor sounds the alarm in 150 seconds because it does not detect the preset pressure from the mainline. At this time, the OFF pressure and the fault code EE-1 occurs on the screen and the “grease Pressure” twinkles.	The monitor is connected mistakenly	Connecting as wiring diagram of the monitor shown
	The monitor is damaged	Replacing the monitor
	Wires of the pump module are broken	Connecting the wires properly
	The gear pump seizes up	Cleaning and repair the gear pump
When the system begins to lubricate, the motor works. The monitor sounds the alarm in 150 seconds because it does not detect the preset pressure from the mainline. Currently, the OFF pressure and the fault code EE-1 occurs on the screen and the Grease Pressure twinkles.	There is air in the inlet port of the gear pump	Shaking the reservoir to expel the air
	Mainlines are broken and joints are loose	Overhauling and Replacing
	The consistency of grease injected into reservoir is higher	Changing the grease according to the instructions
	The overflow valve of pump module is damaged	Replacing
	Pressure sensor is damage, or the wire is disconnected	Replacing and Repairing
	The holes of unloading valve core are blocked off	Removing it and cleaning it with diesel, otherwise cleaning the reservoir and changing the grease
	The inlet port of gear pump is blocking	
	Several sealing cups in drainage ports of distributer are damaged or seized up	Replacing the related distributor
	The monitor is damaged	Replacing
	The spiracle is blocked	Pressurizing air from the reservoir to the spiracle to clear out the blockage
	There is a lack of grease in the reservoir	Filling the reservoir to prescriptive scale mark
When the system begins to lubricate, the motor works. But the ON pressure reverts to the OFF one takes longer time than normal.	Mainlines leak	Overhauling and connecting the mainlines
	Several sealing cups of drainage ports of injectors are damaged or seized up	Changing corresponding joints
	The consistency of grease injected into reservoir is higher	Changing the grease according to the instructions

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Fault Analysis and Elimination

Faults	Reasons	Solution
The monitor detect that pressure is normal. The OFF pressure occurs on the screen, but there are not time counting in the pause interval.	The monitor is damaged	Replacing the monitor
	Pressure unloading valve seizes up and do not return in order to that it cannot relieve the pressure	Dismounting the cups, and then cleaning them with diesel fuel or changing them
	A blue line and a green line in pressure sensor are short-circuited	Checking wiring harness, finding the short-circuited points, then separating the two lines and wrapping up them respectively with black tape
Grease cannot be delivered to several friction pairs (grease fitting)	The injectors connected to them are damaged	Cleaning or replacing
	The distribution lines connected to them are broken or blocked (main cause)	Connecting distribution lines rapidly with quick change coupler or changing them
	Hard lumps of grease, which is turned from the grease that had existed in friction pairs before the machine was installed, block the friction pairs	Grease gun, which is injected with the grease that is also used in the system, is used to clear out grease tubes
LCD screen doesn't work or works anomalously	Electromagnetic or static interference	Turning off and subsequently turning on the power
	Wires are connected mistakenly or loose	Checking the wires and connecting it correctly
	The monitor is damaged	Replacing

Transport and Storage

Transport

During loading unloading, be careful and avoid upside down.
During loading/unloading and transportation, avoid collision with other items.

Storage

The products should be stored in a ventilated and dry warehouse free from direct sunlight and without corrosive gas in the air.
Close all open pipelines to prevent dust and impurities from entering.
The products should be packed neatly in the warehouse and ensure the ventilation, meanwhile pay attention to the logo on the packing box and avoid upside down. The packing box should keep a distance of at least 100mm from the ground and wall.

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