Manual # 99905495

16000SIII Automatic Grease System

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Revisions

DATE	LOCATION	DESCRIPTION
20170417	Gear Pump Tech Data	Changed 4:00 AM to 4 A.

CHAPTER 1

Automated Grease Systems

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Automatic Grease System Introduction

With a Single Line Automatic Greasing System, all lubrication points of a vehicle or machine are automatically lubricated at the correct time with the correct dose. Moreover, optimum grease or lube-oil distribution over the whole lubricating surface is achieved, because the lubrication takes place while the machinery or vehicle is in operation. Every action is automatically carried out by the system. The user needs only to refill the reservoir periodically.

IMT's automatic greasing systems are designed with great care and thoroughly tested to guarantee a long and fault-free life span, under the most heavy operational conditions.

A system which functions well requires:

- correct assembly;
- use of the prescribed type of grease or lube oil;
- a periodic check of the functionality of the system.

The periodic check can easily be carried out at the same time as the normal maintenance of the machine or vehicle. Moreover, because of the careful choice of materials, the greasing system is nearly maintenance-free.

NOTE

An automatic greasing system allows the user to avoid the time-consuming process of manually lubricating important parts. However, there may be lubricating points that still have to be lubricated manually. See Crane Reference section of the crane parts manual for specific crane manual and automated grease locations.

Grease System Principles of Operation

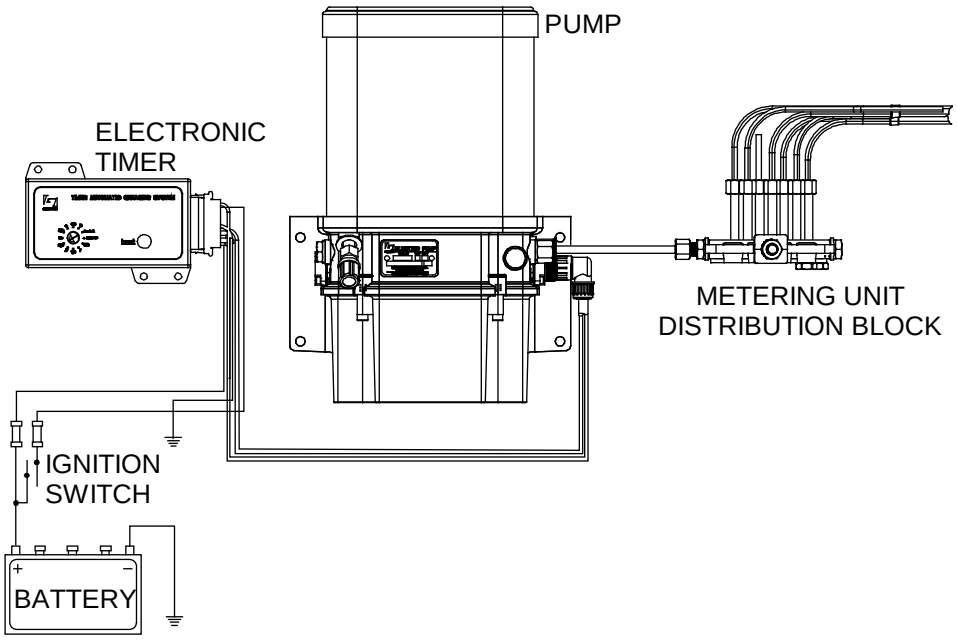
Each system consists of a pump with an integral reservoir, a control unit, a main pipe, one or more metering unit blocks, metering units, secondary piping and connectors. Lubricant is transferred from the reservoir by the pump, via the main pipe, to the metering unit blocks.

Each metering unit is connected by a secondary pipe to a lubrication point. An electronic timer is used to determine when lubrication occurs, via an electrically-operated pump.

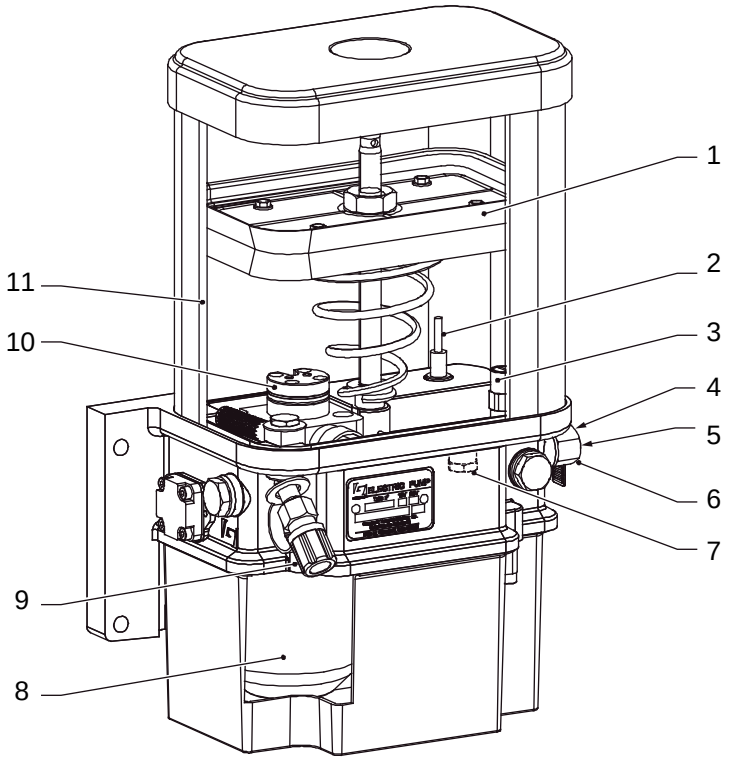
The electrically operated pump is used mainly for installations or vehicles without a compressed air supply. The electrically operated pump is also used for installations where a large lubricant delivery is required. The delivery is larger as the pump operates for longer periods.

At a time set by the electronic timer or PLC, a gear pump under the grease reservoir is started. The lubricant is pumped from the reservoir via the main pipe, to the metering unit blocks. The metering units then simultaneously allow a measured quantity of lubricant to be pressurized to the points to be lubricated. A pressure bypass valve keeps the system at a preset pressure during the pumping cycle.

To end the lubrication cycle, the electronic timer opens the electrical circuit, and the gear pump then stops. Pressure in the output main (primary) pipe to the metering units then falls by means of a built-in pressure discharge valve. The metering units then automatically refill themselves after which they are ready for the next lubrication cycle.



Electrically-Operated Gear Pump Components



GEAR PUMP PARTS LIST	
ITEM	DESCRIPTION
1.	FOLLOWER PLATE
2.	LOW LEVEL INDICATOR SWITCH
3.	PRESSURE CONTROL VALVE
4.	CONNECTOR FITTING
5.	VENT OPENING
6.	MAIN PIPE LINE CONNECTOR
7.	PRESSURE SWITCH CONNECTION
8.	ELECTRO-MOTOR
9.	FILLER CONNECTOR
10.	GEAR PUMP
11.	RESERVOIR

The gear pump (9) is activated by the electronic timer. The lubricant will now be pumped from the reservoir (10) through the main pipe line (6) to the metering unit distribution blocks. The pump remains in operation throughout the entire cycle period. This cycle or impulse period is 3 minutes, when the standard version of the electronic timer is used. The pump builds up the lubricant pressure during the cycle. When the pressure reaches 838 psi, the pressure control valve (3) opens, lubricant is then no longer pumped into the main line but returns to the reservoir. The pressure is thus limited to 838 psi.

The standard version of the electrically operated pump is fitted with a pressure switch (7). If, during the lubrication cycle, the pressure does not rise above 588 psi the electronic timer or PLC will sound an alarm signal. A level indicator switch (2) (not in all versions) provides an alarm signal if the lubricant in the reservoir falls below a certain minimum level.

On the right-hand side between the connector for the primary line (6) and the connector fitting (4) there is a right-angle connector for air venting and overflow (5).

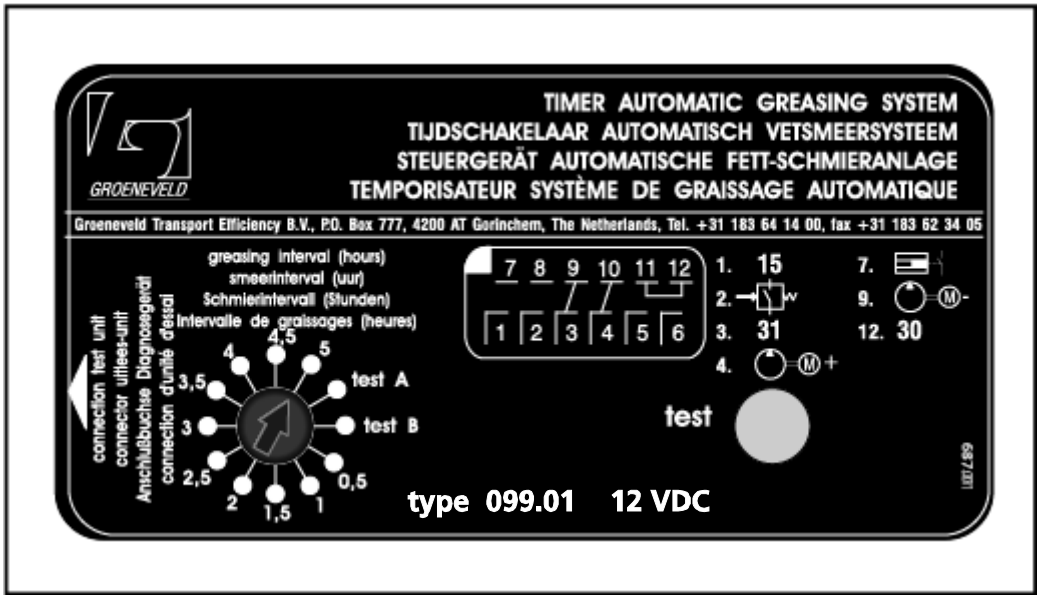
When filling the reservoir with lubricant, the air above the follower plate escapes. This air flows downward through an opening in the piston line and leaves the pump via the right-angle connector (5). The escape of a small quantity of lubricant via this connector during venting is quite normal.

(A version with the connections for the primary line and for the connector on the left-hand side of the pump can also be supplied if required.)

Gear Pump Technical Data

	Pump Type	
	12 v	24 v
Current Consumption	8 A	4 A
Reservoir Capacity	2.7 litres	2.7 litres
Grease Delivery Rate	120 cc/minute (NLGI 0 grease) at 20 °C	120 cc/minute (NLGI 0 grease) at 20 °C
Grease Pressure	855 psi	855 psi
Temperature Range	-4°F to +158°F (NLGI 0 grease)	-4°F to +158°F (NLGI 0 grease)
	(*Contact IMT for more extreme temp ranges.)	
Weight	14.74 lb	14.74 lb

Grease System Electronic Timer



The greasing system is controlled by an electronic timer. The timer produces, at set time intervals impulses lasting 3 minutes. These impulses energize the solenoid valve in the air supply to start the lubrication cycle. With an electrically operated pump the impulses start the pump. The interval between successive lubrication cycles is adjusted on the electronic timer.

If the power supply is switched off during a cycle, a complete new lubrication cycle will restart when the power supply is again switched on.

The electronic timer has a memory in which data is stored even after switching off the power supply. The data stored includes:

- interval duration
- impulse duration
- conditions for an alarm signal
- total number of cycles since first fitted
- total number of alarm signals since first fitted
- longest series of successive alarm signals in a certain period
- remaining interval time

The data in the memory can be recovered using a special test or read-out unit. This device should be connected via the socket on the left-hand side of the timer.

Adjusting the Timer Cycle Time Interval

The interval time between two successive lubrication cycles can be adjusted using the step switch. One of ten time intervals can be selected. The standard version has time intervals increasing by 0.5 h steps (0.5 h, 1 h, 1.5 h etc. to 5 h). If the power supply is switched off during a cycle the cycle will be ended. When the power supply is switched on again a complete new cycle will be started.

Testing the Timer

Test the electronic timer functions as follows:

1 Test 1, step switch test:

- This test checks the step switch contacts in all positions.
- Set the step switch to position ‘test A’.
- Activate the electronic timer by switching on the ignition.
- Press the ‘test’ button.
- Wait for the audible alarm signal then release the ‘test’ button.
- Within 5 seconds turn the step switch to the required interval time position. Each position produces a number of signals: position 1 gives one signal, position 2 two signals etc.
- The switch can be set to all positions; positions ‘test A’ and ‘test B’ will not produce an alarm signal.
- End the test by switching off the ignition.

2 Test 2, accelerated cycle test:

- Set the step switch to position ‘test A’.
- Press and hold the ‘test’ button.
- Switch the ignition on while still keeping the ‘test’ button pressed in.
- The alarm signal buzzer will now sound. The ‘test’ button must be pressed as long as the alarm signal continues.
- Within 5 seconds of the end of the alarm signal turn the step switch to the required position.
- The electronic timer is now fully operational; the time intervals are now 1/20 of their usual times.
- End the test by switching off the power supply.

3 Test 3, normal system test:

- Switch the ignition on.
- Press the ‘test’ button; a normal lubrication cycle will then follow. The switch can be set in any position except ‘test A’ or ‘test B’.

After this test the electronic timer will work at the interval set. The ‘test B’ position is only for use with the test or read-out unit.

Alarm Signals

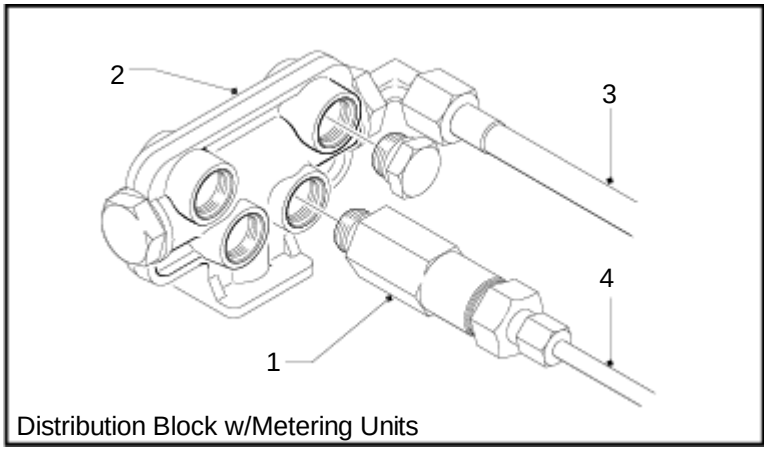
Alarm signals can be generated by the electronic timer in various circumstances. The standard version uses a built-in buzzer. In other versions, an (external) alarm indicator can be fitted, for example, to a lamp.

The alarm signal is generated in the following situations:

- After reaching 70% of the cycle time (70% of 3 minutes = 2 minutes) the pressure switch should have connected to earth. If this is not the case, because insufficient pressure has been built up, then a continuous alarm signal is generated.
- If a level indicator switch is fitted to an electrically operated pump, an intermittent alarm is generated when the level of the lubricant in the reservoir falls below a set minimum. This signal will be generated throughout the entire cycle. If, moreover, insufficient pressure is built up, the pressure alarm will take over after 2 minutes, causing a change in the frequency of the alarm signal.
- The electronic timer runs a self-test after the power supply is switched on; if there is a fault condition an intermittent alarm is generated. This can occur if no interval is selected by the step switch.

If the electronic timer sounds an alarm to indicate that the timer or greasing system is not functioning properly, check and repair the greasing system. If the system is not checked, and repaired (if required), damage to either the installation or the greasing system may result.

Metering Units



Distribution Block w/Metering Units

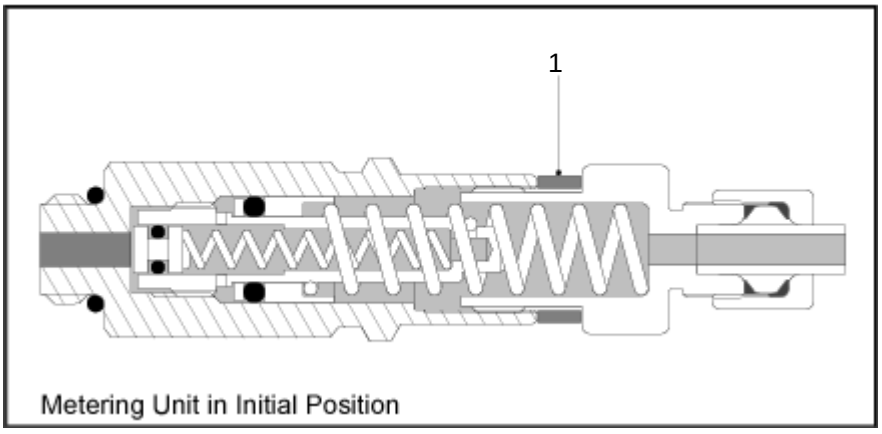
There are 11 metering unit types (1) available for the single line system, each with a differing metered lubricant quantity. By careful selection of the type of metering unit each lubrication point can be provided with the right quantity of lubricant.

The metering units are fitted in groups on distribution blocks (2); this is a cast brass distribution block to which the primary (main) line (3) is connected. The blocks are available with several ports or outlets to which metering units can be connected. The unused outlets should be blanked-off.

The metering units are also made of brass and are, because of their enclosed design, exceptionally suitable for use in dirty and dusty conditions. Do not open the metering units as this allows the entry of dirt, and thus is a potential cause of faults.

The delivery (per lubrication cycle) of a metering unit is determined by the number and thickness of the spacers mounted between the head and the housing of the metering unit.

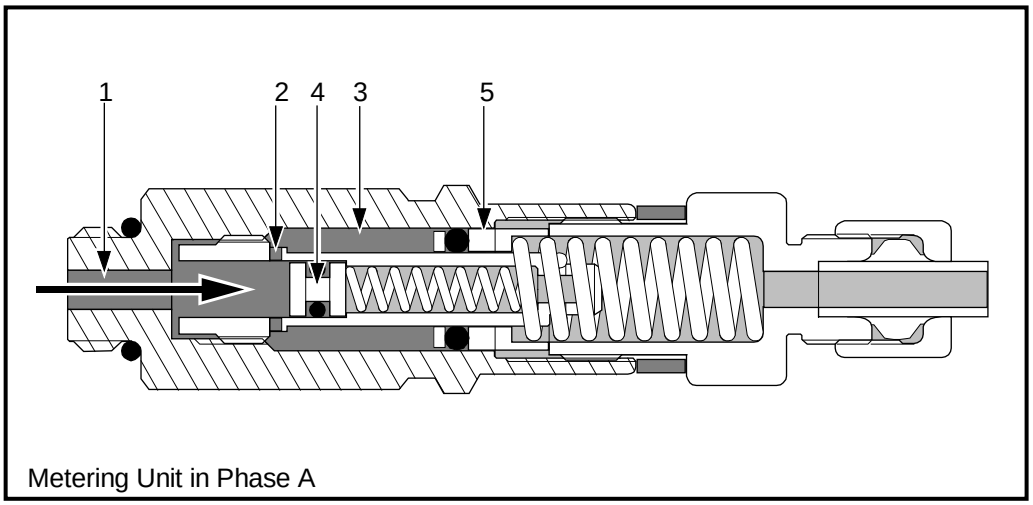
Metering Units Principles of Operation



Metering Unit in Initial Position

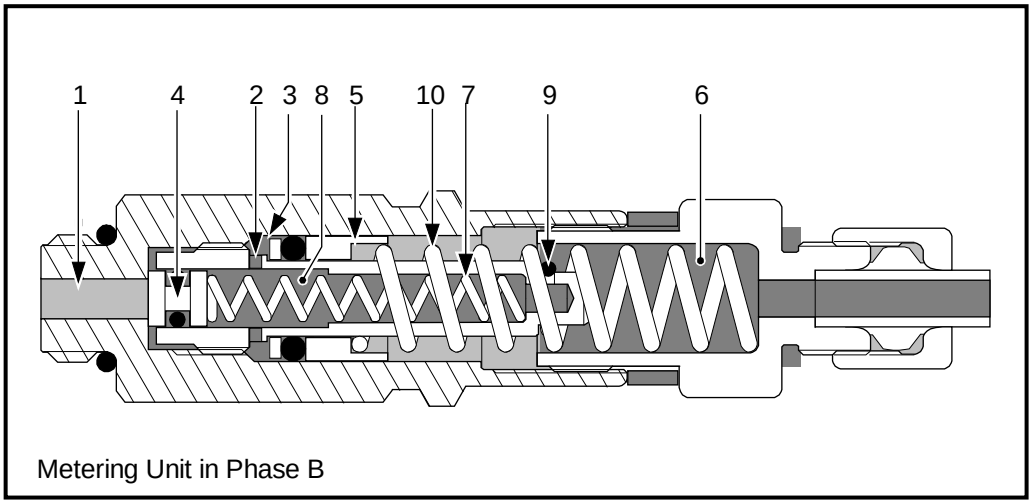
The figure above shows a new metering unit which has not yet been filled with grease. Item (1) in this figure is the spacer, which determines the delivery of the metering unit.

The metering units that are used in your greasing system may differ externally, or even internally, from the one illustrated here. However, the operating principle is always the same.



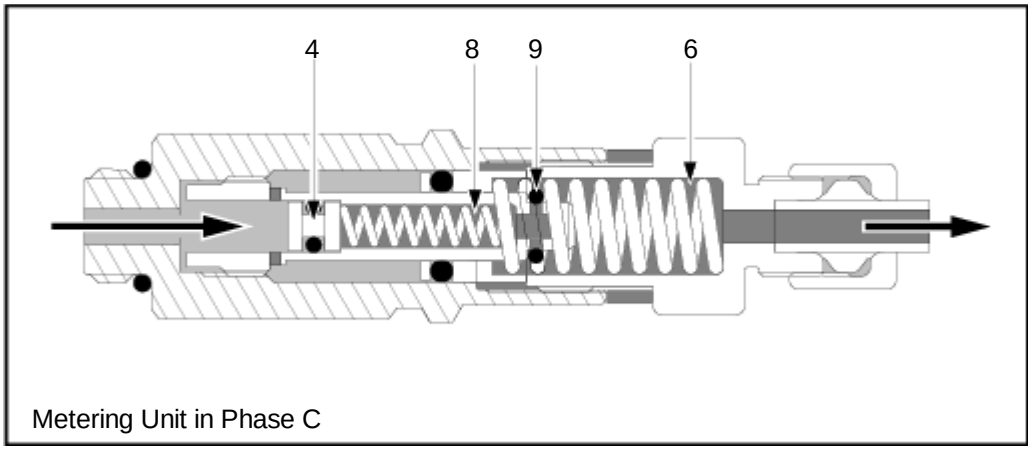
Metering Unit in Phase A

The pump presses the grease into grease channel (1). The grease pushes plunger (4) past channel (2). The grease now fills chamber (3) and pushes plunger (5) to the right. The stroke length of plunger (5) will determine the amount of grease that will be pressed through the secondary grease line to the grease point. This stroke length - hence the capacity of chamber (3) – is determined by the number and thickness of the spacers.



Metering Unit in Phase B

When the pump stops and as the grease pressure drops, spring (7) will push plunger (4) back to the left, closing off channel (1). O-ring (9) prevents grease from being sucked back from chamber (6). Plunger (5) is pushed back by spring (10) and presses the grease in chamber (3), via channel (2), to chamber (8).



Metering Unit in Phase C

During the next lubrication cycle, the same happens as in phase A. Chamber (8) (Phase C), however, is now filled with grease. As plunger (4) moves right under influence of the grease pressure, the grease in chamber (8) is pressed, via chamber (6) and the secondary grease line, to the grease point.

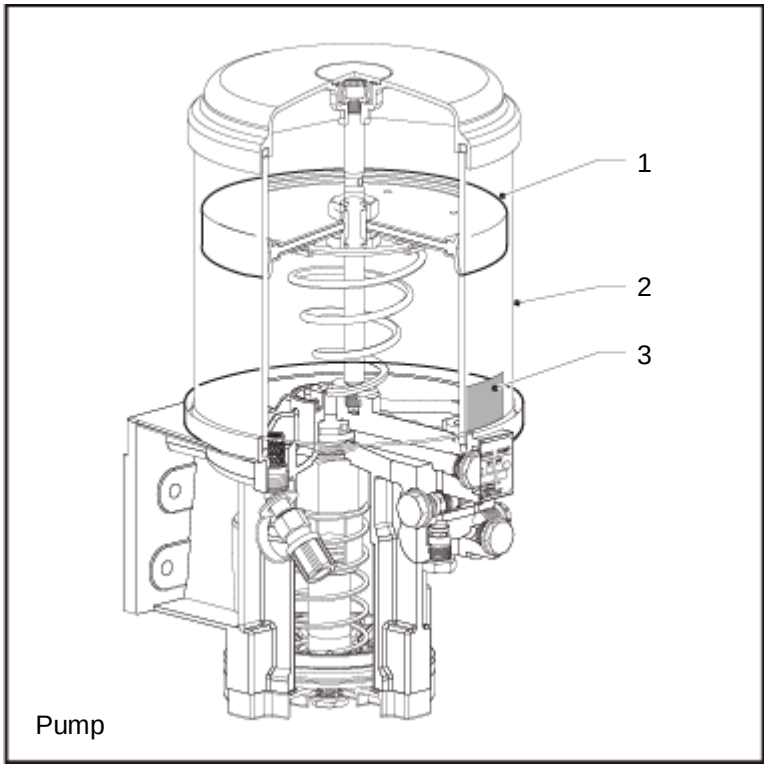
During all this, O-ring (9) is pressed outward to allow the grease to leave chamber (8).

Additional Components

Pressure Switch

A pressure switch is included in the lubrication system (in the main pipe) to provide an alarm for too low a pressure in the system during the lubrication cycle. This switch closes at a pressure of 600 psi, making a connection to earth. If this does not happen during the lubrication cycle, because insufficient or no grease pressure is generated, an alarm will be given. During the remaining cycle time there will be an intermittent alarm signal. This alarm will be repeated after a preset time if the problem is not corrected.

An M24 screw connector connects the switch electrically. On a system with a pneumatically operated pump the pressure switch is fitted to a distribution block. The electrically operated pump is provided with a built-in pressure switch.



Pump

Reservoir

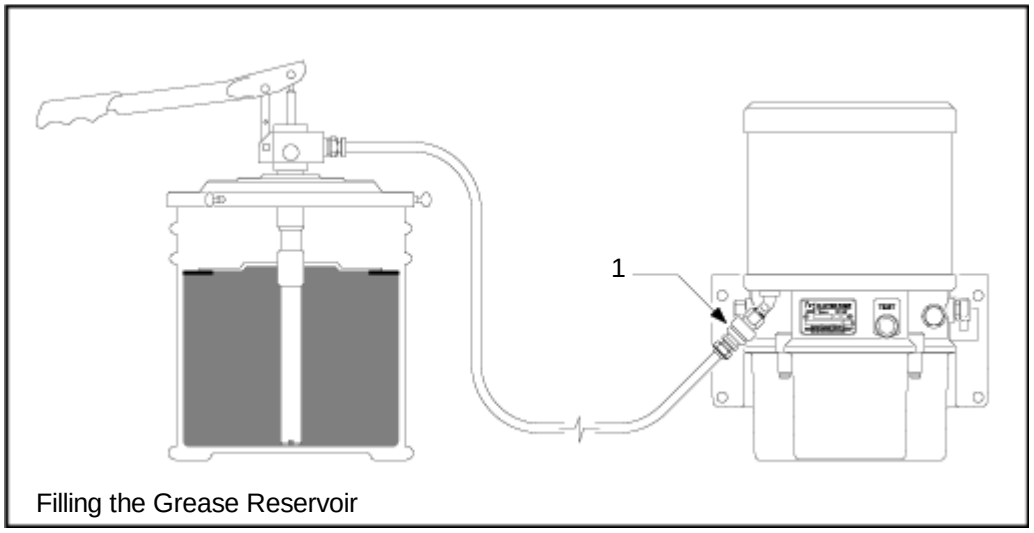
The reservoir (2) (Pump drawing) is made from impact-resistant plastic that can withstand the influences of fluctuating temperatures. The reservoir can hold a quantity of lubricant that in most cases is sufficient for about 4 months, depending on the number of grease points.

The minimum level (5 cm) is marked by a label (3) on the reservoir.

Follower Plate

In the standard reservoir a follower plate is placed above the level of the lubricant (1) (Pump). This plate follows the level of the lubricant; as the level falls the follower plate falls with it under the action of a tension spring. The follower plate prevents the increase of air into the lubricant and any consequent soaping of the lubricant. Funneling of grease as the level falls is also prevented. The follower plate also wipes the reservoir wall clean. This allows the level of the lubricant to be checked easily at a glance.

Filling the Reservoir



Filling the Grease Reservoir

When the lubricant in the reservoir has fallen to the minimum level it must be refilled. Generally a filler pump is used for this purpose. The procedure is as follows:

- With a new filler pump (or filling hose) the hose should first be primed with lubricant. This avoids the pumping of air into the reservoir. For this the ball (1) in the snap-on connector on the filler hose should be depressed while pumping lubricant through the hose until it is filled with the lubricant.
- Remove the dust cap from the filler connector.
- Carefully clean the filler connector and the connector on the filler hose.
- Secure the filler hose to the filler connector.
- Fill the reservoir to not more than the maximum level (2 cm below the top of the reservoir) or until the follower plate meets its stop.
- Replace the dust cap on the filler connector.
- There is a filter within the filler connector in the reservoir. If pumping is very difficult the filter could be blocked. In this case, dismantle and clean the filter.

NOTE
Keep main pump raised from the bottom of grease pail to insure no plastic shavings enter the grease system.

Grease System Maintenance

Maintain your automated grease system along with regular crane maintenance.

System	
Pump	Lubricant level
	External damage
Electronic Timer	Complete Test 2, Accelerated Test as described in section ***Testing the Timer*** (on page 9).
Brake Impulse Counter (if applicable)	Check brake impulse counter manually using the screw.
Grease System	Tubing
	Metering operation

Avoid pressure washing the grease pump to prevent water from entering the venting openings. Water will not enter the pump during normal operation.

NOTE

An automatic greasing system allows the user to avoid the time-consuming process of manually lubricating important parts. However, there may be lubricating points that still have to be lubricated manually. See Crane Reference section of the crane parts manual for specific crane manual and automated grease locations.

Grease System Troubleshooting

PROBLEM	CAUSE	RESOLUTION
1. All points to be lubricated are dry.	a. Pump reservoir is empty. b. Reservoir filled with grease that is too thick and unsuitable for the system. c. Main pipe leaking. d. Electronic timer, PLC or pneumatic impulse counter not set correctly. If there is another cause, please consult your dealer.	a. Fill the reservoir (see ***Filling the Reservoir*** (on page 15)). b. Remove and clean the reservoir. Reinstall and fill the reservoir with the correct grease. Remove the end plugs from the distribution blocks and pump the old grease out of the system. c. Repair the line and bleed the system if a new piece of piping has been fitted. d. Reset the electronic timer, PLC or brake impulse counter.
2. Pump does not work or does not reach working pressure.	a. Pneumatically operated pump: No or too-low air pressure. b. Piston does not rise. If there is another cause, please consult your dealer.	a. Ensure there is an air pressure of 90 to 125 psi. b. Dismantle the cover of the pump casing and clean the piston.
3. One or more lubrication points are dry while the others receive sufficient grease.	a. Break in the secondary tubing. b. Inoperative metering unit.	a. Repair or replace the line. b. Remove the metering unit and fit a new unit.
4. A lubrication point receives too much grease.	a. Internal leak in the metering unit.	a. Remove and clean the metering unit or fit a new unit.
5. Pneumatically operated pump: Solenoid valve fails to operate or does not operate correctly.	a. Bad or open electrical connections. b. Solenoid valve internally fouled with water and/or rust from the vehicle air sys- tem.	a. Check the electrical cir- cuit and connections to the solenoid valve. Check the valve with direct current bypassing the electronic timer. Watch out for short- circuits! b. Dismantle, clean and refit the valve or fit a new valve. Clean the vehicle air system.
6. Continuous buzzing from the electronic timer.	a. Short circuit.	a. Check wiring and test solenoid.
7. Electronic timer does not operate.	a. Fuse blown.	a. Fit new fuse.
8. Too much grease at all lubrication points.	a. System greasing frequency does not corre- spond with vehicle operating conditions.	b. Reduce the greasing frequency. Do not be too sparing, it is better to grease too much than too little.

PROBLEM	CAUSE	RESOLUTION
9. Alarm buzzer in electronic timer sounds intermittently.	a. Grease level in the reservoir below the minimum. b. System not reaching working pressure. c. No cycle time interval selected on the electronic timer.	a. Fill the reservoir (see ***Filling the Reservoir*** (on page 15).) b. Top up the reservoir with grease and/or repair the main pipe. Check pump pressure. c. Set a cycle time interval on the electronic timer.