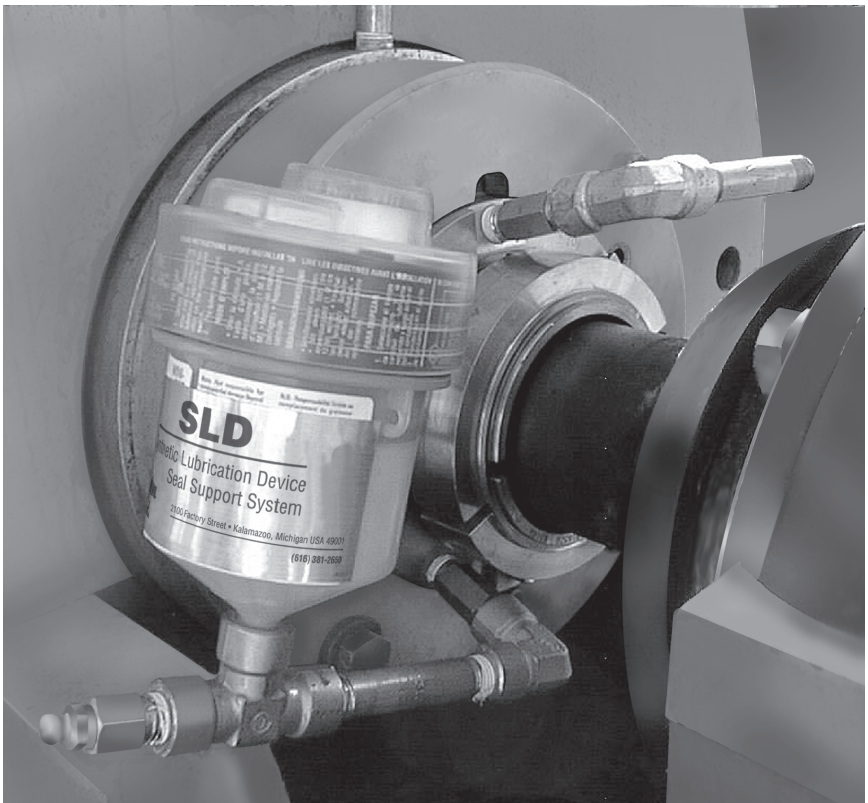




Installation Instructions

SLD

Synthetic Lubrication Device
Seal Support System



SLD Installation Instructions

The following instructions are designed to simplify the installation of a typical SLD (Synthetic Lubrication Device) seal support system. By reading this manual and following its guidelines, seal performance can be improved by helping to reduce the chances of premature failure attributed to improper installation or use. In addition to these instructions, consult the seal assembly drawing included for your specific seal design, materials of construction, critical dimensions, and any auxiliary piping connections. If any problems arise during installation, **Do Not Try to Force Anything.**

These instructions are written for trained, experienced technicians who are familiar with the basic principles and tools involved in the installation, care and service of mechanical seals and seal support systems.

A complete reading of these instructions by personnel in contact with the equipment is essential to safety. Incorrect installation, operation or maintenance can result in personal injury or death to personnel and damage to the equipment.

Description

The SLD Seal Support System is a stand-alone system that dispenses a supply of synthetic lubricant to the atmospheric side of mechanical seal faces during periods of marginal equipment operation. Ideally suited for single mechanical end face seals incorporating two hard carbide faces and a quench containment device (QCD), it is primarily utilized in water based slurry applications when operating flushless mechanical seal designs. The SLD Seal Support System allows synthetic lubricant to be wicked between the faces due to centrifugal action during periods of uncontrolled equipment cavitation or periods of unintentional dry running. When proper dispensing rate is selected the SLD Seal Support System may be able to take the place of a continuous water quench traditionally used only as a means to help prevent seal face damage associated with periods of starved operation. The SLD Seal Support System is not intended to supply added cooling or able to dissolve scaling products that a continuous water quench may provide. With a properly installed and functioning SLD Seal Support System, friction generated heat levels leading to face damage have not been observed in laboratory tests for periods of up to 30 minutes when normal liquid pumpage is not present.

The SLD Seal Support System does not require compressed air, electricity, or external water in order to function correctly. This makes it ideal for equipment having frequent automatic start/stop sequences or for installations at remote field locations. The SLD Seal Support System should be a consideration for use with new equipment that will be sitting at a job site for extended periods of time prior to being placed into operation. The SLD allows for hand rotation of shafts as requested by many bearing manufacturers to reduce scoring effects to mechanical seal faces during the procedure. The SLD Seal Support System can also help keep dirt, dust, and moisture debris from the atmosphere from

contaminating the seal quench chamber. The SLD Seal Support System is a single point lubricator and is not designed to supply more than one seal quench cavity at a time.

Synthetic Lubricant

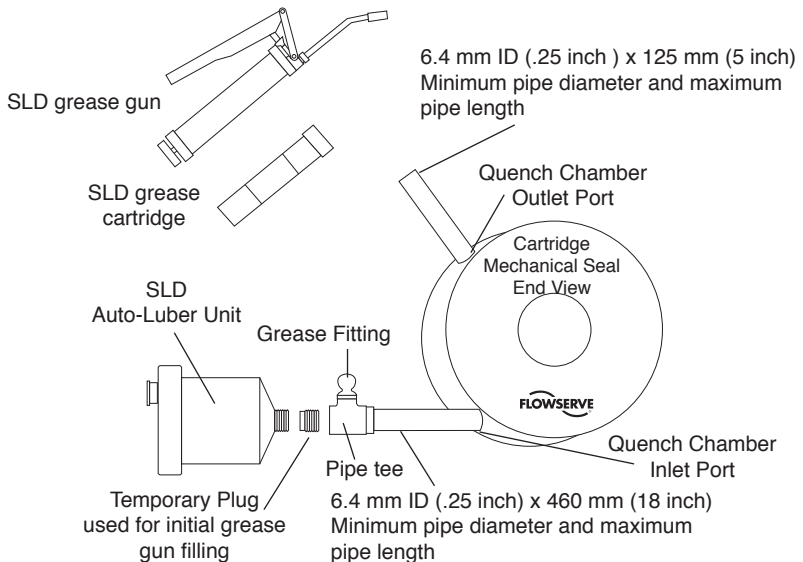
The specially formulated Flowserve lubricant (DS-920-OG) lubricant has been selected because of its inert nature to acids and caustics and proven ability to promote seal face survivability during periods of marginal hydraulic equipment operation. The lubricant complies with Occupational Safety and Health Standards (OSHA) regulations 29 CFR 1910.120 related to "Hazardous Waste Operations and Emergency Response". To obtain best seal life, alternative lubricants are not recommended. Contact your nearest Flowserve Sales and Service Representative or Authorized Distributor for possible substitutes that will not invalidate your mechanical seal warranty when used.

1 Initial Filling and Installation

- 1.1 Install mechanical seal cartridge in equipment with INLET quench connection located towards the bottom and the OUTLET quench connection located towards the top to allow for proper venting of seal quench cavity. See Figure 1.

Mounting Details SLD Seal Support System

Figure 1



- 1.2 Install INLET piping using 1/4 inch NPT **[6.4mm (0.25 inch) minimum pipe ID]** to connect the pipe tee with the hydraulic lube fitting to the bottom INLET quench connection of the seal. The maximum length of pipe from SLD auto-luber to INLET quench connection of the seal should be 460 mm (18 inches).

It is recommended that the shortest possible pipe length be used. The piping should be installed with good design and minimal bends from the SLD to the seal. It should be filled with clean grease prior to start up and vented to make sure no air has been trapped prior to start up.

Additional support to the SLD auto-luber may be required for pipe lengths over 100mm (4 inch). High vibration levels or improper support of the SLD auto-luber unit can cause threaded fitting fracture or failure. The unit should be monitored carefully to ensure that it does not experience excessive vibration caused by pump operation. If vibration is observed due to inadequate support from the piping alone, additional bracing should be used to support the unit. The bracing should connect directly to the fitting near the SLD auto-luber, not directly to the unit.

The SLD auto-luber should be located so that it will not be impacted during normal pump operation and maintenance. Excessive or sudden force on the threaded fittings may lead to a fracture or failure.

Take care using tube fittings or special connectors as they may have an ID smaller than the 6.4 mm (.25 inch) recommended. Restrictions in the INLET or OUTLET lines may create back pressure in the system affecting performance of the SLD auto-luber.

- 1.3 Temporarily plug the pipe tee with a pipe plug prior to initially filling the seal quench cavity by use of the SLD grease gun.
- 1.4 Fill the seal quench cavity with SLD synthetic lubricant supplied using the specified grease gun until lubricant expels from the OUTLET quench connection located towards the top of the seal. This step does not need to be repeated later when only replacing an empty SLD auto-luber unit.
- 1.5 Install OUTLET piping using 1/4 inch NPT **[6.4 mm (0.25 inch) minimum pipe ID]** to the OUTLET quench connection of the seal. Piping should have no restrictions and be a maximum length of 125 mm (5 inch). The piping should expel the lubricant to a safe location. For dusting or blowing sand environments, a 90 degree elbow can be connected with the opened end facing down.
- 1.6 Remove the pipe plug from the pipe tee and thread the SLD auto-luber unit in place to finish installation.
- 1.7 Set the dispensing rate of the SLD auto-luber unit by clicking the appropriate DIP (direction input positioner) switch or switches located through the top access port. See Figure 2. It is recommended that the initial dispensing rate should be between 1-2cc per day (2-3 month setting for Mini Luber or 8-12 month setting for Jumbo Luber) to start with. Be sure to also click on the “Blip” light switch. See paragraph 4 Maintenance for blip light indicators. The visual presence of the blip light every 15 to 20 seconds indicates that the SLD system is functioning and operational. Be sure to replace the DIP switch access cap and weather proof cover to protect the SLD auto-luber unit against dust and moisture contamination. Lubricant dispensing rate may vary depending on atmospheric pressures, temperatures, and seal size. Please see Section 3 for appropriate considerations.

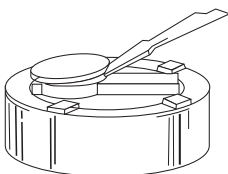
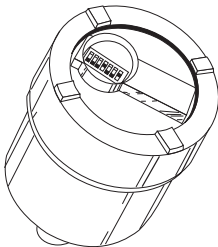
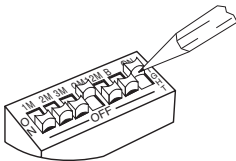
2 Normal Operation

- 2.1 Once the SLD auto-luber unit is switched on, an electro-chemical reaction cell is activated that creates inert nitrogen gas. This produces an internal pressure of up to 345 kPa (50 psi) that expands a bladder that acts against a piston to force the lubricant out of the dispensing cylinder at a controlled rate according to the specific time period previously selected. This is an automatic operation.
- 2.2 After initial activation, there is a delay before enough nitrogen gas is generated to start moving the piston to dispense lubricant. The longer the dispensing period selected the longer the delay before lubricant is dispensed. See Figure 3. If immediate dispensing is desired, prestart the SLD auto-luber unit 12 hours prior to installation by moving all DIP switches to the “On” position. After this period of time, return all DIP switches to “Off” and reselect desired dispensing period. If this step is not done and all switches are left on, then the entire contents will be dispensed in only 14 days.

Set Dispensing Rate

Figure 2

Dispensing Rate *cc per day	125cc Mini Luber Setting to Empty		475cc Jumbo Luber Setting to Empty	
	Unit Life	Switch Setting	Unit Life	Switch Setting
30 - 32			14 days	
14 - 15			1 month	
7 - 8	14 days		2 months	
4 - 5			3 months	
3 - 4	1 month		4 months	
2.5 - 3			4.5 months	
2 - 2.5			6 months	
1 - 2	2 months		8 months	
1 - 1.4	3 months		12 months	
0.8 - 1	4 months			
0.7 - 0.8	4.5 months			
0.5 - 0.7	6 months		24 months	
0.25 - 0.3	12 months			
0.1 - 0.15	24 months			
Not Recommended over 24 months				
*Note that one stroke from a typical hand grease gun is approximately equal to one cubic centimeter (cc) at normal (101 KPa and 20°C, 14.7 psia and 68°F) atmospheric conditions				



Time Delay to Dispense						
Month Switch	1 mo.	2 mo.	3 mo.	6 mo.	12 mo.	B
Days Delay to Start	1	2	3	5	10	20

- 2.3 If it is desired to decrease or increase the rate of lubricant dispensing after initial setting, simply click all the DIP switches to “Off” and reselect the new dispensing period desired.
- 2.4 To turn off the SLD auto-luber unit during periods of extended equipment shutdown (months), click all the DIP switches, including the “Blip” light, to “Off”. Reactivate settings prior to placing equipment back into normal operation. See paragraph 4 Maintenance for blip light indicators.

3 Dispensing Variations

Variables can be considered when selecting the dispensing rate based on the operating environment. The SLD auto-luber dispensing rates are based on seal quench chamber parameters found at normal sea level atmospheric conditions of 101 kPa and 20°C (14.7 psia and 68°F) and for equipment shaft diameters of 100 mm (4 inch). In general, it is a good practice to first select a faster dispensing rate than anticipated and make adjustments based on actual field observations. Because of the wide number of variables found with each application, the following information is being provided only as a guide for making an informed decision when selecting the appropriate dispensing rate. There is an additive effect of variables that can cancel or compound with each other. This may help explain why grease consumption varies between installations, seasons, or from published rates.

3.1 Altitude Effect

The rate of dispensing will increase at higher altitudes and decrease at lower altitudes because of the difference in atmospheric pressure acting against the SLD auto-luber unit. For every change in elevation of 305 meters (1000 feet) from sea level, the discharge rate will naturally increase or decrease by an additional 5%. For example, at 610 meters (2000 feet) above sea level, the dispensing rate will be 10% faster. Similarly, at 305 meters (1000 feet) below seal level, the dispensing rate will be 5% slower. Installation at high altitude may require selection of a slower dispensing rate to help compensate.

3.2 Temperature Effect

The rate of dispensing will increase at higher temperatures and decrease at lower temperatures because of the change in lubricant viscosity. For every change in temperature of 5.5°C (10°F) above or below ambient, the discharge rate will naturally increase or decrease by an additional 4%.

For example, at 37°C (98°F), the dispensing rate will be 12% faster. Similarly, at 9°C (48°F), the dispensing rate will be 8% slower. Installation at high or low temperature may require selection of a slower or faster dispensing rate to help compensate.

3.3 Shaft Diameter Effect

The rate of dispensing will need to be increased for large equipment shaft diameters and can be decreased for small equipment shaft diameters because of the change in mechanical seal face surface area. For every change in shaft diameter of 50 mm (2 inch) above or below 100 mm (4 inch), the discharge rate should be increased or decreased by an additional 3%. For example, a piece of equipment having a shaft diameter of 200 mm (8 inch), the dispensing rate should be 6% faster. Similarly, for a piece of equipment having a shaft diameter of 50 mm (2 inch), the dispensing rate can be 3% slower. Installation for larger or smaller shaft diameters may require selection of a faster or slower dispensing rate to help compensate and provide adequate protection from damage to seal faces.

Please contact your Flowserve Sales and Service Representative or Authorized Distributor for applications at extreme elevations above 3050 meters (10,000 feet) or atmospheric temperatures above 55°C (130°F) or below -20°C (-4°F) and for equipment shaft diameters larger than 250 mm (10 inch).

4 Maintenance

The Flowserve SLD Seal Support System components are relatively maintenance free. Check frequently to be sure that the synthetic lubricant is being expelled by observing the end of the stand pipe connected to the OUTLET quench chamber connection and also take notice that the SLD auto-luber is becoming empty. When the SLD auto-luber is empty, replace with a new one. **Never try to refill the SLD auto-luber or inject lubricant into the grease fitting by means of the grease gun while the auto-luber is installed. There are no user replaceable or serviceable components located inside of the SLD auto-luber unit itself.**

Blip Light Indicators

Flashing Green Light: The system is purging. This means the SLD auto-luber is functioning but lubricant is not yet being delivered beyond the end of the canister.

Flashing Red Light: The system is functioning normally. The lubricant is now exiting the SLD auto-luber and is pressurized properly, supplying lubricant at the current setting.

Steady Red Light: The system battery is dead and the SLD auto-luber is no longer pressurizing. The SLD auto-luber should be replaced immediately.

No Light: The system is off, or battery is completely dead (if the system switches are in the "on" position). If the battery is dead, the unit must be replaced.

Steady Red and Green Light: There is a system error. There is an electrical error in the SLD auto-luber and the unit needs to be replaced.

Note: An empty SLD auto-luber might still have a flashing red light. There is no light pattern that indicates that the SLD auto-luber is empty. Level must be checked by a periodic visual inspection on the side of the canister.



TO REORDER REFER TO
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5 Specifications

The Flowserve SLD Seal Support System is designed to work best in temperature environments between minus -20°C (4°F) and plus 55°C (130°F).

Mini Luber dimensions:	117.5 mm high X 79.5 mm diameter (4.625 inch X 3.125 inch) nipple 1/4 inch NPT
Mini Luber grease capacity:	125 cc (approximately 4 oz.)
Jumbo Luber dimensions:	168.5 mm high X 120.5 mm diameter (6.625 inch) X (4.750 inch) nipple 1/2 inch NPT
Jumbo Luber grease capacity:	475 cc (approximately 16 oz.)

For special problems encountered during installation or for further information regarding applications outside of specifications, contact your nearest Flowserve Sales and Service Representative or Authorized Distributor.

FIS119eng REV 09/2018 Printed in USA

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USA and Canada

Kalamazoo, Michigan USA
Telephone: 1 269 381 2650
Telefax: 1 269 382 8726

Europe, Middle East, Africa

Etten-Leur, the Netherlands
Telephone: 31 765 028 200
Telefax: 31 765 028 487

Asia Pacific

Singapore
Telephone: 65 6544 6800
Telefax: 65 6214 0541

Latin America

Mexico City
Telephone: 52 55 5567 7170
Telefax: 52 55 5567 4224