

LINCOLN

Lubrication solutions for natural gas compressors

100 plus years experience in petrochemical and
refining, natural gas production and transmission



SKF

The importance of lubrication

Lubrication is the lifeblood of a compressor

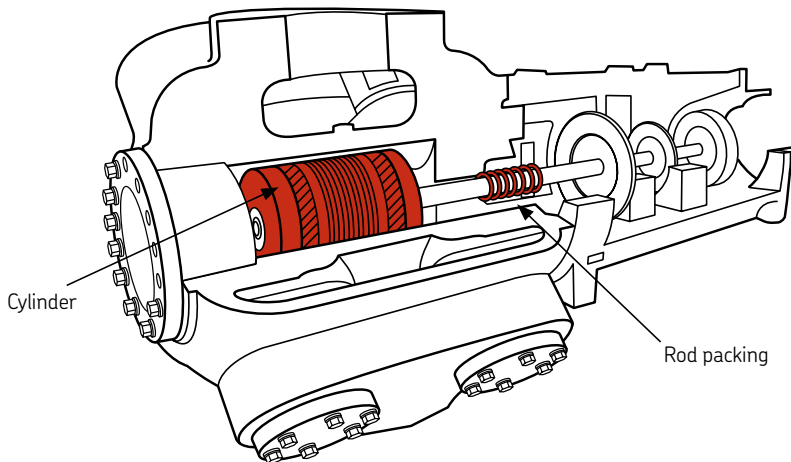
Delivering the right amount of oil at the right time to compressor cylinders and rod packing is a critical requirement to keep a natural gas compressor operating efficiently. Failure to do so will cause premature wear on compressor cylinders, cylinder rod packing and engine cylinders, potentially costing thousands of dollars for repairs and lost time. Under lubrication causes damaging metal-to-metal contact that generates excessive heat resulting in either premature cylinder or rod packing wear or potentially

a catastrophic failure. Over lubrication can negatively impact downstream gas processes, catalyst beds, compressor valves and be a cause of carbon deposits on engine cylinders. Over lubrication essentially wastes money and negatively impacts the environment. Proper lubrication protects your compressor, extends the life of its critical components and keeps this valued asset up and generating revenue.

Over lubricating?

- Auditing your compressor and engine lubrication systems can deliver immediate cost savings! Over lubrication is wasted dollars and can affect downstream gas processes.
- Over lubricating a typical high-speed, four-throw machine with 12 in. (305 mm) cylinders by 30% will waste approximately 182 gallons (688 liter) of oil per year.
- This is a cost of \$1 640.00 per year, based on \$9.00 per gal.
- Eliminating lubricant waste is typically a low-effort proposition but will yield a high return.

The right oil, at the right place, at the right time



Oil leaks?

- A single tube fitting leaking six drops per minute will waste up to 27 gallons (102 liter) of oil per year!
- At \$9.00 per gal., this single fitting carries an average cost of \$245.00 per year.
- Leaking tubing and fittings even on a properly sized system will “rob” the lubricant flow to individual points causing premature wear and tear.
- There are associated environmental disposal costs along with clean up costs such as labor, absorbent materials, disposing of these materials and unsafe conditions due to slippery surfaces.

CAUTION

For all systems described in this brochure, see important product usage information on the back cover.

The Lincoln solution

Eliminate downtime due to poor lubrication methods

A system properly engineered and sized will pay you back in lubricant savings and prolonged cylinder and packing life and will keep the compressor running, generating revenue. Poor lubrication methods can affect the revenue line while systems properly sized and maintained will help to ensure uptime and will assist with maximizing component life.

By utilizing a Lincoln lubrication system, you will ...

- lower costs associated with poor lubrication methods
- utilize "smart" technology that improves machine reliability and prolongs compressor life
- maximize oil consumption efficiency to prevent from over and under lubricating



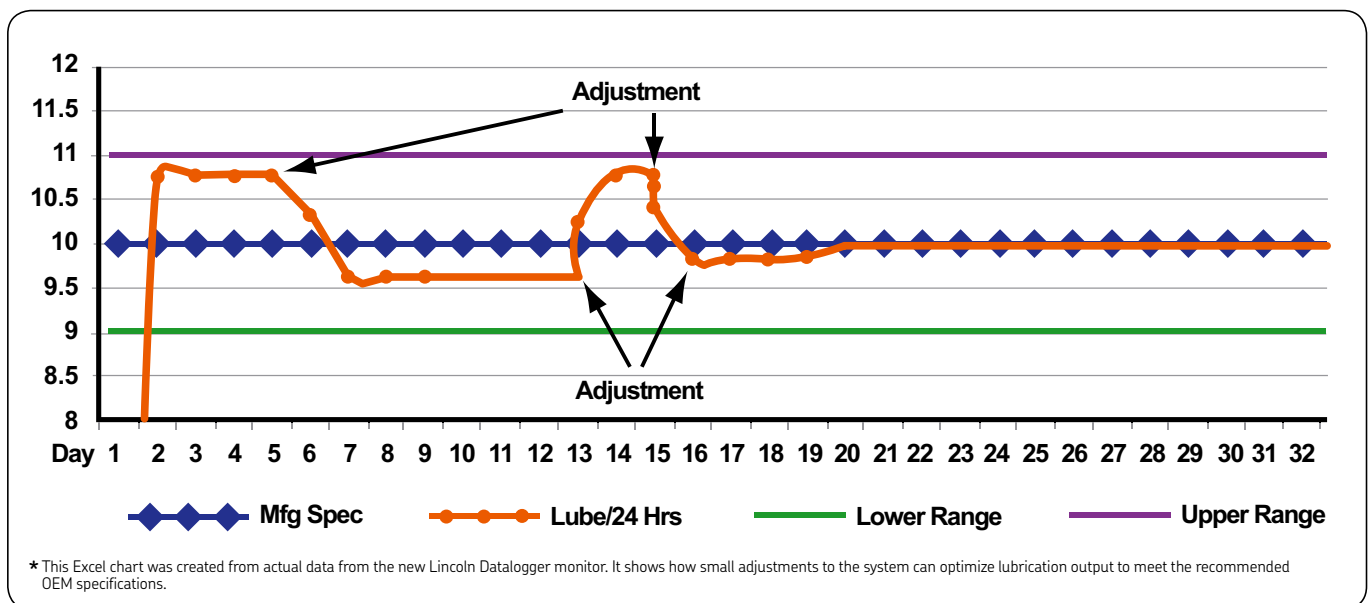
Get a system check-up

Let Lincoln and the most experienced distribution network in the industry help you improve your lubrication methods and lower your operating costs!

Real-world system audits

Lincoln's west Texas distributor audited a Dresser Clark RA6 for a major gas processor. The audit determined that the pump setting was incorrect on the compressor end of the machine and was over lubricating by 13.5 pints per day. **The impact to the customer was approximately \$5,500 per year (based on \$9.00 /gal) in oil savings and benefitted the downstream gas process by eliminating excess oil in the process beds.**

Another Lincoln gulf coast distributor worked with a major gulf coast refinery to lower lubricant consumption on 22 process compressors. **The impact was a 22% reduction of oil consumption or approximately over 1,500 gallons per year and reduced catalyst bed issues.**



We're up to meeting any challenging application

Separable compressor



Vane compressor



Integral compressor – 2 cycle



Integral compressor – 4 cycle

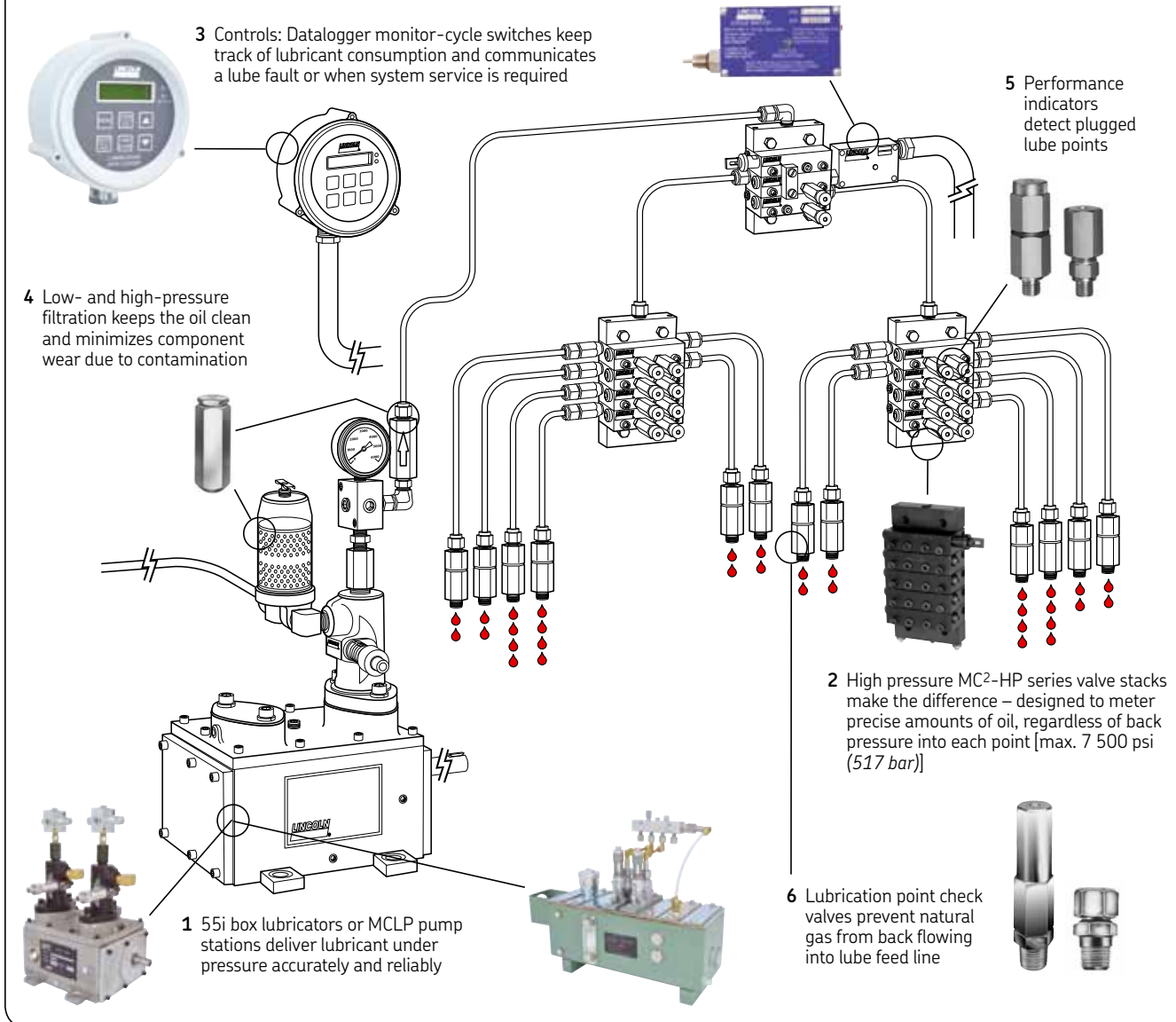
Lincoln systems lubricate these points on the following machines

	Engine cylinder	Compressor cylinder	Compressor packing	Engine valve guides
2-cycle integral engine and compressor	X	X	X	
4-cycle integral engine and compressor		X	X	X
High speed separable compressor		X	X	
Vapor recovery vane compressor		X		

Over a century of reliability, innovation and service

Lincoln's network of full-service distributors is the best in the industry. From system design, inventory, installation, warranty and repair, our highly skilled sales and service people are trained to take care of your needs quickly and professionally.

Typical Lincoln gas compression lube system



Advantages of a Lincoln automatic lubrication system

- Engineered components ensures oil is delivered accurately and consistently for improved machine reliability.
- Proper lubrication extends compressor component life which lowers maintenance and operating costs.
- Lincoln systems are designed to meet OEM specified lubricant requirements that lowers overall operating costs.
- The lubrication system is continuously monitored by the most advanced controls in the industry – keeps your machine running and generating income.
- Lincoln systems are supported by a global distribution network and backed by more than 100 years of Lincoln experience.

Lincoln's new Datalogger monitor and cycle switches



Download your data to a flash drive from a convenient access point away from heat and without an expensive PDA.

Protect your compressor from lube system failures

The Datalogger monitor tracks and trends lubricant consumption through innovative "smart" technology.

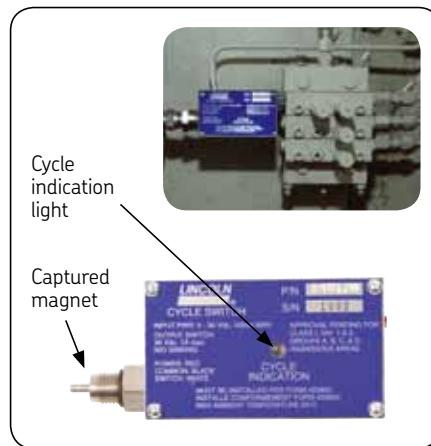
Features and benefits

- Download feature allows history to be transferred to a CSV report via a USB flash drive in less than a minute.
- Store data for up to one year.
- No special software or hand-held hardware device needed.
- One model will monitor either a single or dual lubrication system.
- Designed for use with Reed or Hall effect cycle switches.



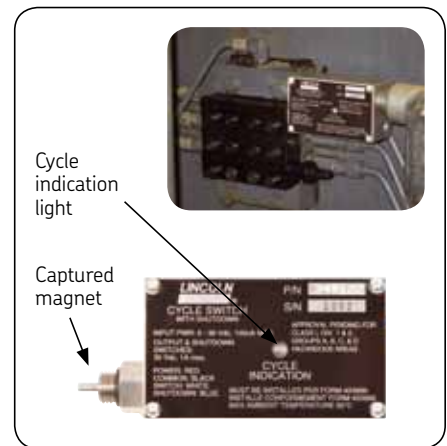
Lincoln has developed two new cycle switches to help protect against no-flow situations

- designed to work with Lincoln MC, MC² HP valves as well as with other brands
- captured magnet assembly
- simple installation reduces labor costs
- Hall effect switch



Cycle switch for use with the Datalogger lubrication monitor

- For use with the Datalogger lubrication monitor
- The industry's first class 1, division 1 and 2-cycle switch with a cycle indicator light



Cycle switch with shutdown feature for reliable "no-flow" protection

- Lower-cost, stand-alone solution
- Shutdown protection for "no-flow" conditions is factory set at two minutes
- Operates from 5-30 VDC for increased reliability

Specifications and ordering information

Datalogger lubrication monitor specifications

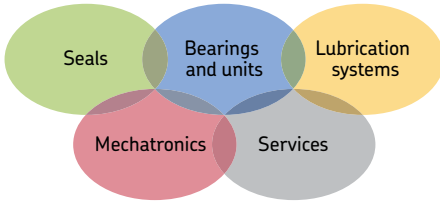
Input power	10-30 VDC 0.25 amp maximum
Internal battery	3.6 V long-life lithium, battery life 4 – 6 years
Output switches	2 each open drain sinking FET's, rated 30 VDC 500 mA maximum
Ambient temperature range	Operation: -40 to +85 °C (-40 to +185 °F), LCD: -20 to +70 °C (-4 to +158 °F), USB Download: 0 to 70 °C (32 to 158 °F)
Display	2 x 16 backlit character
Input cycle range	5 to 300 seconds
Units of measure	Pints, liters or gallons
Alarm time	Adjustable from 5 to 300 seconds
Switch response time	250 mS max
USB download port	USB 2.0 compliant, accepts universal flash drive
Data log file format	Comma-separated values file (CSV) for use in programs including Microsoft Excel
EX rating	Approval pending for Class I, Groups A, B, C & D, Division 2 CE, II 3G Ex Na IIA

Cycle switch and cycle switch with shut down feature specifications

Power requirement	5-30 VDC, 100 uA max.
Maximum working pressure	7 500 psi (517 bar)
Temperature range	-40 to +85 °C (-40 to +185 °F)
Materials	Aluminum housing, stainless steel magnet assembly
EX rating	Approval pending for Class I, Groups A, B, C & D, Divisions 1 & 2 CE, II 3G Ex Na IIA

Ordering information

249123	Hall effect cycle switch with shutdown for Lincoln MC ² -HP series blocks
249124	Hall effect cycle switch with shutdown for Lincoln UV and Graco Lubriquip-Manzel MHP series style block
87630	Single or dual Lincoln Datalogger monitor
249120	Hall effect cycle switch for Lincoln MC ² -HP series blocks
249122	Hall effect cycle switch for Lincoln UV and Graco Lubriquip [®] -Manzel MHP series style block
250001	Wall mounting bracket for 87630
249125	EX housing, rated class 1, division 1 and 2, group B, C, D
87617	Reed type cycle switch for Lincoln MC and MC ² -HP series blocks



The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

Important information on product usage

All products from SKF may be used only for their intended purpose as described in this brochure and in any instructions. If operating instructions are supplied with the products, they must be read and followed.

Not all lubricants are suitable for use in centralized lubrication systems. SKF does offer an inspection service to test customer supplied lubricant to determine if it can be used in a centralized system. SKF lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1 013 mbar) by more than 0,5 bar at their maximum permissible temperature.

Hazardous materials of any kind, especially the materials classified as hazardous by European Community Directive EC 67/548/EEC, Article 2, Par. 2, may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

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