

Lubrication Solutions Mining and Heavy Industry



The Expert in Lubrication Solutions

perma

Company introduction – perma-tec group

For more than 50 years, the perma name has stood for innovative and creative lubrication solutions. perma single- and multi-point lubrication systems are used in almost all types of industries and applications around the world.

perma's leadership in the single-point lubrication market is based on numerous patented and specifically certified products. All perma products are developed, tested and manufactured in the company's headquarters in Germany and meet the quality standard "Made in Germany".

With many years of sales experience and a global network of subsidiaries and competent partners around the world, perma can offer customers many solutions that meet the highest technical requirements.



Invention and patenting of **perma CLASSIC** single-point lubrication system

1934

Foundation of metal goods factory for household and kitchen appliances in Bad Kissingen

1964

New management and extensive reorganisation

1989

Sale / acquisition by private investment group

1991

Change of company name to **perma-tec GmbH & Co. KG**

1995

Foundation of subsidiary **H-T-L perma USA**



2000

Completion of additional warehouse / office building

2005

New production and warehouse building as well as office building extension

2011



Legend

Applications:



Conveyors



Electric motors



Pumps



Blowers / Fans

The four main applications represent the most common equipment used for heavy duty materials handling and processing tasks. perma USA can also assist with solutions on other heavy duty applications and equipment.

Ex-proof certification:

Testing and certification of equipment intended for use in potentially explosive atmospheres. It certifies that the device was tested and is in compliance with ex-proof requirements and safety standards.



Ex
→ Europe



FM APPROVED
→ Canada and USA



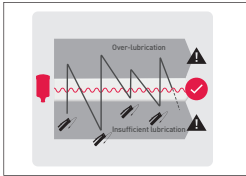
IECEX
→ Global



UL (Underwriters Laboratories)
→ Canada and USA

ANZEx

ANZEx
→ Australia and New Zealand



Benefits of automatic lubrication

4-9

- Bearing life extension
- Contamination prevention
- Safe work practices

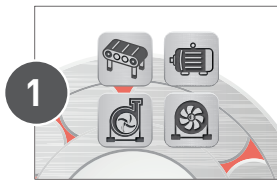


Assessment & selection procedure

10-11

- 4 simple STEPS to choose the right lubrication solution

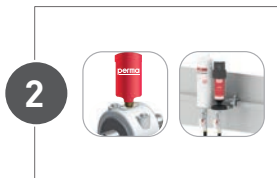
4 steps to the best practice lubrication solution



STEP 1: Assess application / equipment

12-19

- perma lubrication systems for **Conveyors, Electric motors, Pumps, Blowers / Fans**



STEP 2: Assess installation method

20-21

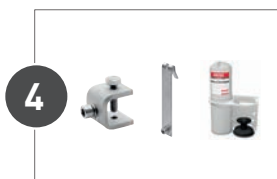
- Direct mount / remote mount decision making



STEP 3: Select system / lubricant

22-25

- Selection single-point lubrication system
- Grease fill selection
 - Regular load / high speed greases
 - Multipurpose / extreme pressure greases



STEP 4: Select mounting type / kit

26-33

- INSTALLATION KITS Standard Duty: Beam clamp mount, cage hanger mount, rail mount
- INSTALLATION KITS Heavy Duty: Beam clamp mount, cage hanger mount



Accessories & mounting components

34-38


- **Catalog information and part numbers for:** Brackets, mounting beam clamps and cage hangers, hose and connector fittings, accessories for perma FLEX / perma STAR VARIO, angles, special purpose fittings, reducers and extensions



perma SERVICE

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- **www.permausa.com:** Product- / Application flyer, perma SELECT APP, Videos / Photos, Installation Instructions
- **perma SERVICE:** Project Planning, Installation, Maintenance, perma MLP, perma ACADEMY



perma lubrication systems

Benefits of automatic lubrication

Bearing life extension

Lubrication systems which deliver small volumes of lubricant at short time intervals extend bearing service life and deliver a reliability advantage. The example below provides a statistical demonstration of a single-point lubrication system program at work.

A site with 500 perma single-point lubrication systems (in this example perma STAR VARIO 250 with an average setting of 3 months) reveals the following statistics:

- 1 injection of grease, somewhere on site, every 32 seconds
- 2,667 individual injections per day
- 1,946 injections of grease per year to each point
- Almost 1 million individual injections each year

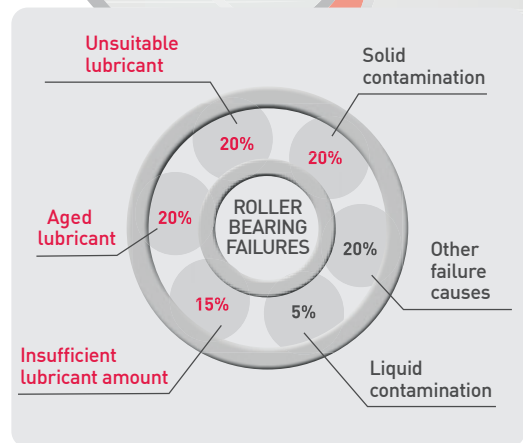
Introduction

To maintain competitiveness, mining and heavy industry operations such as steel mills must maximize production output while minimizing long-term operating costs. A key component to achieve this is the implementation of preventative maintenance strategies which extend equipment service life and minimize the downtime required for maintenance, repair and overhaul. Success in this area reduces the total cost of production assets and ultimately improves business performance.

Cost and downtime due to premature wear is significant. For grease lubricated bearings, well considered lubrication strategies have a dramatic effect on extending bearing service life and therefore reducing costs and improving equipment reliability. The chart provides estimates of the causes of premature bearing failures. Major causes are poor lubrication practices and contamination.

In recognition of this, industry leading businesses invest in automatic lubrication systems for the purpose of bearing relubrication and contaminant exclusion because they deliver superior reliability results compared to manual lubrication.

Source:
Calculation leading bearing manufacturers: Material cost and time, maintenance runs / roller bearing industry



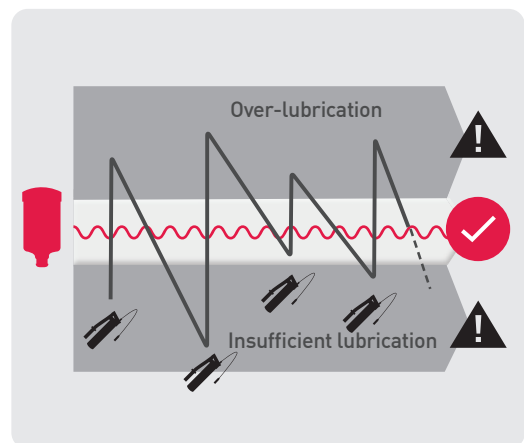
Benefits of short relubrication intervals

Bearing relubrication addresses the need to maintain sufficient fresh grease around the working components of bearings as they rotate. Insufficient or infrequent relubrication leads to deterioration of lubrication conditions, lubricant starvation, and premature wear. Meanwhile, for high speed bearings, the rapid supply of excessive amounts of grease can cause over-lubrication which leads to degradation of grease condition and threatens the service life of bearings.

The longest bearing service life is achieved when grease is added in small amounts at short intervals. When implemented correctly, this regime of grease delivery maintains a steady state of lubrication protection where over-lubrication and lubricant starvation do not occur.

Factors which reduce the service life of grease include high speeds, elevated operating temperatures, vibration and high loads. When operating conditions such as these prevail, the benefits of delivering small amounts of grease at short time intervals are at their greatest.

The diagram to the right demonstrates the differences between re-lubrication methods which deliver small amounts of grease at short intervals and those which deliver large amounts at extended intervals.



Too much grease

- Potential for elevated operating temperature and rapid degradation of grease for high speed bearings
- Less efficient use of fresh grease
- Potential to damage contact type seals

Too little grease

- Starvation causing premature wear
- Under-lubrication leads to accelerated degradation of remaining grease
- Increased potential for contamination entry due to lack of lubricant purge

A photograph of industrial machinery. In the foreground, there is a large, grey, cylindrical component, possibly a bearing housing, which is part of a larger machine. To the right, a yellow-painted machine component is visible, with a white, foamy substance being dispensed from a nozzle. A yellow metal railing runs across the middle ground. The background shows a concrete floor and other industrial structures.

perma lubrication systems

Benefits of automatic lubrication

Contamination prevention

The contamination of bearings by water and solid particles causes accelerated wear and dramatically reduces bearing service life. Industries which involve the handling of abrasive material suffer the greatest losses as a result of inadequate contamination control procedures and systems. perma automatic lubrication systems provide a means to achieve a purge of clean grease through bearing seals in order to prevent the entry of water, solid contaminants and dust, and in doing so extend bearing service life.

Preventing contamination in harsh operating environments

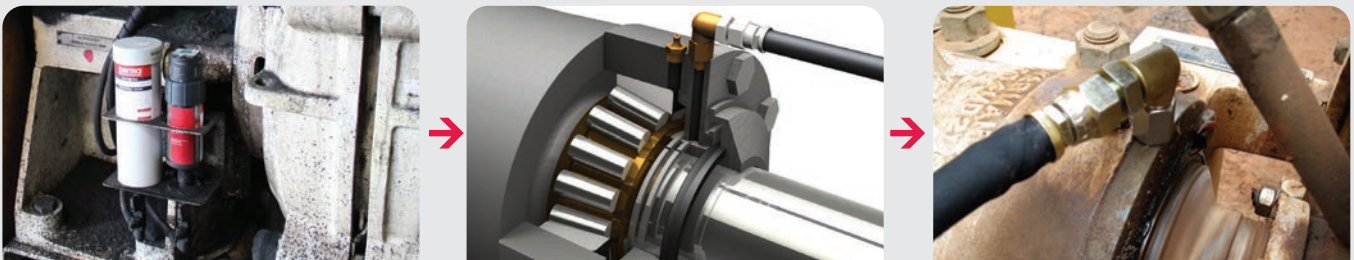
When solid or liquid contaminants enter a bearing they cause accelerated wear and the early onset of fatigue. For solid contaminants the rate of wear increases with the size, concentration and hardness of contaminants. Smaller particles lead to abrasive wear while larger particles can cause indentation of bearing raceways which later become sources of surface-initiated fatigue. Greasing practices which prevent the ingress of contaminants provide long-term financial return by means of longer bearing service life and reduced downtime.

Strategies for preventing contamination vary depending on bearing housing and seal configurations. For bearings with free-purging labyrinth or taconite seals, contamination prevention is achieved by delivering a consistent purge of clean grease through the seals. In simple terms, if clean grease is purging out of the seal, contaminants (solid or liquid) cannot enter the bearing. Bearings which operate in harsh environments, including high humidity and high levels of liquid or particulate contaminants, demand the strictest attention to regular seal purging. Under such conditions, automated purging of seals provides the greatest benefits.

Strategies for the prevention of bearing contamination

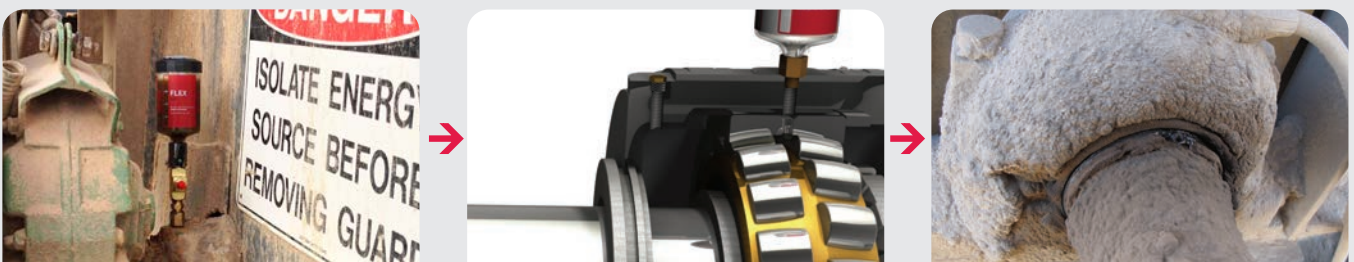
Strategy 1 – Slurry pump seal purging

Automated purging of labyrinth seals provides constant protection against ingress of solids and liquids. For pumps where the wet-end seal is subjected to water spray, a higher rate of automated purging is commonly applied to compensate for the elevated rate of grease washout.



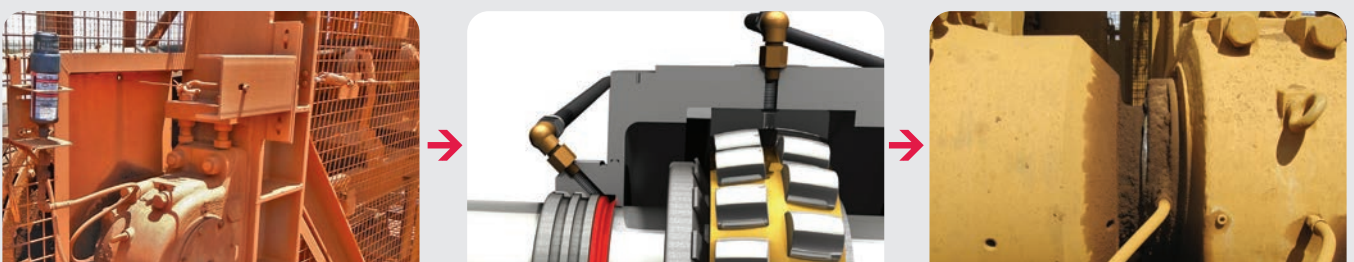
Strategy 2 – Conveyor pulley bearing relubrication & seal purging

Automated lubrication provides constant protection against the ingress of contaminants. In the example shown, bearing relubrication and seal purging is provided by a single automatic lubrication system.



Strategy 3 – Conveyor pulley bearing seal purging (hybrid solution)

Automated purging of taconite or labyrinth seals provides constant protection against the ingress of contaminants. For the hybrid solution, bearing relubrication is provided manually on a periodic maintenance cycle. The hybrid system can provide a practical balance between automated and manual greasing for large pulley bearings.





perma lubrication systems

Benefits of automatic lubrication

Safe work practices

Workplace safety is of ultimate importance. Reliable systems which reduce the interface between people and operating equipment are a key element to reduce the likelihood of workplace accidents. Automatic lubrication systems significantly minimize workplace accidents and the time required to lubricate equipment.

Workplace safety and efficiency improvements

Automatic lubrication systems are maintenance tools which make a positive contribution to workplace safety and efficiency. This is particularly the case for large operations in hot and cold climates where the physical demands of performing regular manual greasing increases the risk of fatigue, heat exhaustion, and hypothermia.

The implementation of automatic lubrication systems does not mean that the frequency of equipment inspections should be reduced. Automated systems save time which can be invested into other tasks such as mechanical inspections, condition monitoring data collection, breather maintenance, and oil cleanliness management activities such as filtration and clarification.

Strategies to improve safety and efficiency

Strategy 1 – Remote mount lubrication systems at safe and easy-to-reach locations at ground level which would otherwise be difficult to reach for large electric motors, fans, and pumps.

Safety gain – Improve safety via the remote installation of lubrication systems at safe-to-access locations to avoid the temptation for personnel to step up onto, or climb onto, equipment structures.

Efficiency gain – Save time which would otherwise be required to locate and use safety steps.

Example – The perma STAR VARIO lubrication systems shown are mounted to the cage by using a cage hanger kit to lubricate the bearings of a fan shaft mounted on an elevated frame via remote two-meter grease hoses.



Strategy 2 – Remote mount lubrication systems used for conveyor pulley bearings which are located behind cages to avoid unnecessary manual handling of cages.

Safety gain – Improve safety by avoiding the need to lift and handle cages and guards.

Efficiency gain – Save time which would otherwise be required during shutdowns for permits, isolations, cage removal, and cage reinstatement.

Example – The perma STAR VARIO lubrication systems shown provide consistent grease delivery to the tail pulley bearings of a conveyor.



Strategy 3 – Automatically lubricate equipment which would otherwise require working in confined spaces or areas where fall protection is required.

Safety gain – Improve safety by reducing the need to perform work at heights or within confined spaces.

Efficiency gain – Save time which would otherwise be required during shutdowns for permits, isolations, equipment preparation and other time-consuming requirements.

Example – The perma STAR VARIO lubrication system shown is lubricating the bearing of a gravity take-up pulley on a conveyor via a 15 ft / 5 m remote grease hose.





perma lubrication systems

Benefits of automatic lubrication

Assessment of equipment lubrication

Equipment lubrication requirements will most commonly be categorized according to one of the main applications: Conveyors, electric motors, pumps or blowers & fans. Assessment may also include: Reference to lubrication specifications from original equipment manufacturer (OEM), consideration of variations in equipment, bearing size and orientation as well as bearing housing and seal configuration. Additional operational and environmental assessment criteria include: Equipment operating speeds, ambient temperature, operating temperature, bearing load and drive type, equipment vibration and the presence and severity of solid and liquid contaminants.

This catalog has been developed to assist the reader by outlining the application and equipment assessment process and linking this to the specification of a complete perma automatic lubrication solution.

Assessment & selection procedure

perma application engineers and specialists have developed a 4-step process for determining the most appropriate combinations of perma lubrication systems and mounting solutions for common equipment categories. The 4-step process can be used for conducting site surveys and preparing formal lubrication recommendations.

This catalog guides the reader through the 4-step assessment and specification process:

Steps 1 & 2 relate to equipment requirements and decision making for lubrication system installation practices.

Steps 3 & 4 relate to selection of lubrication system type and suitable perma installation and mounting methods.

1

STEP 1: Page 12-19 ASSESS APPLICATION / EQUIPMENT



Assessment of the application or equipment type:

- Determine the application type, equipment OEM, frame or model size, and bearing part designations
- Determine the influence of operating parameters (speed, load, vibration, temperature)
- Determine the influence of environmental factors (water, moisture, abrasive particles, slurry, air movement, ambient temperature)
- Assess relubrication rates referencing OEM specifications or the perma SELECT calculation

2

STEP 2: Page 20-21 ASSESS INSTALLATION METHOD



Assess the application location, equipment physical size, access to lubrication points, proximity to hazardous areas or materials, restrictions due to guarding, exposure to high vibration or temperature:

- Conduct the remote installation decision making process to find out if your lubrication point requires direct or remote installation
- Assess requirement for lubrication system protection and select standard or heavy duty bracket design

3

STEP 3: Page 22-25 SELECT SYSTEM / LUBRICANT



Select preferred perma automatic lubrication system and lubricant:

- Select a perma automatic lubrication system based on the application/equipment assessment (technical data and operating characteristics, remote grease hose length restrictions, environmental conditions)
- Select grease suitability by application or by site preferences

4

STEP 4: Page 26-33 SELECT MOUNTING TYPE / KIT



Select and specify installation kits, mounting types and accessories based on the application /equipment assessment:

- Select installation kit to suit perma lubrication system
- Select installation kit design and mounting method based on number of lubrication points and requirement for standard or heavy duty
- Select additional accessories required (angles, reducers, extensions)

perma lubrication systems

STEP 1: Assess application



Conveyors

Pulley bearing configurations can vary considerably and lubrication programs must be designed to take the specific requirements of different bearing and seal combinations into account. Overall, for typical spherical roller bearings with labyrinth or taconite seals, the lubrication strategy must address two requirements:

- 1) The relubrication of the bearing rolling elements to prevent lubricant starvation
- 2) The regular purging of seals to prevent the entry of contaminants



Challenges

Lubrication challenges associated with conveyor bearing maintenance include:

- Typically large amounts of particle contamination particularly at feed and transfer points or ground level
- Large conveyor systems may feature remote locations and cover geographically large areas. Stairs or walkways may be incorporated to access transfer points located above surge storage bins or processing plants
- Time required for manual greasing cycle leaves less time for effective relubrication frequency / volumes
- Restricted access due to hazardous conditions (under transfer / conveyor feed points, elevated take-up pulleys or take-up trolleys)



Maintenance challenges which restrict or limit effective relubrication may result in:

- Inadequate grease purging of seals, allowing water or abrasive particle contaminants to enter the bearing housing
- Contamination of bearings (from inadequate lubrication) causing rapid deterioration of lubrication conditions
- Accelerated wear rates (caused by contaminants) and finally premature bearing failure



Lubrication assessment criteria

For conveyor pulley bearing lubrication, the following factors are generally assessed in order to develop the lubrication solution:

- Bearing types & speeds
- Seal types
- Characteristics of recommended lubricant
- Operating conditions
- Historical lubrication practices
- Requirements for safe access
- Desired service schedule
- Location of lubrication points on bearing housings

Solutions



Industry: Quarry
Application: Conveyor bearings
Lubrication system: perma FLEX
Installation solution: Direct mount incl. manual purge valve



Industry: Iron ore mining
Application: Conveyor bearing / seal (hybrid solution)
Lubrication system: perma STAR VARIO
Installation solution: Remote cage hanger mount



perma lubrication systems

STEP 1: Assess application

Electric motors

Electric motor bearing relubrication is a critical aspect of maintenance. As with other high speed bearing applications, it is important for relubrication practices to consider the risks associated with over-lubrication while providing sufficient relubrication to deliver long bearing service life.

The combination of the following practices can provide a lubrication program which avoids over-lubrication and lubricant starvation:

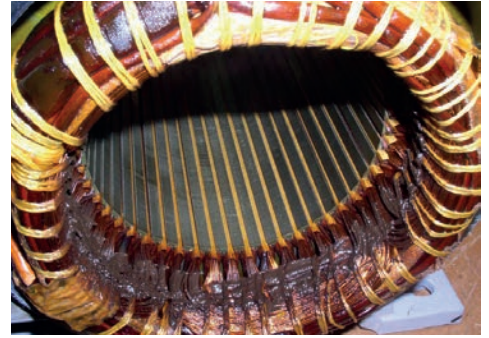
- Add small amounts of grease at short intervals using an automatic lubrication system which provides accurate dispensing rates, independent of temperature
- Relubricate when the motor is in operation
- Always ensure that discharged grease can escape from the bearing housing via well maintained grease escape holes or collection traps



Challenges

Lubrication challenges associated with electric motor maintenance include:

- High speed and high mechanical working of the grease requires more frequent and controlled grease replenishment /exchange
- Insufficient grease exchange intervals may result in lubrication deterioration or more extreme 'starvation' conditions
- Large or excess grease addition volumes result in grease 'churning' and overheating
- Hazardous working conditions (rotating equipment pinch points, falling from access ladders or platforms, falling debris and high levels of airborne dust)
- Maintenance staff may have limited understanding of motor lubrication requirements



Maintenance challenges which restrict or limit effective relubrication may result in:

- Inadequate / excessive lubrication causing deteriorating lubrication conditions, accelerated grease ageing, oxidation and wear rates
- Contamination of bearings (from inadequate lubrication) causing rapid deterioration of lubrication conditions
- Accelerated wear rates (caused by contaminants or inadequate / excessive grease replenishment) and finally premature bearing failure



Lubrication assessment criteria

For electric motor lubrication, the following factors are generally assessed in order to develop the lubrication solution:

- Motor manufacturer's recommendations
- Motor speed
- Grease trap / escape port design, access and condition
- Bearing types
- Historical lubrication practices
- Requirements for safe access
- Desired service schedule
- Location of lubrication points on bearing housings

Solutions



Industry: Mining
Application: Electric motor bearings
Lubrication system: perma STAR VARIO
Installation solution: Remote beam clamp mount



Industry: Mining
Application: Electric motor bearings
Lubrication system: perma STAR VARIO
Installation solution: Direct mount

perma lubrication systems

STEP 1: Assess application



Pumps

Slurry pumps used in operations such as coal preparation plants and other wet plant operations endure harsh conditions. Efforts to prevent the entry of water and solid contaminants to pump barrels will extend bearing service life. The use of automatic lubrication systems to provide a regular purge of fresh grease through the labyrinth seals of pump barrels is a common and proven method of preventing contaminant entry. The harsher the operating conditions, the greater the importance of automatic purging.

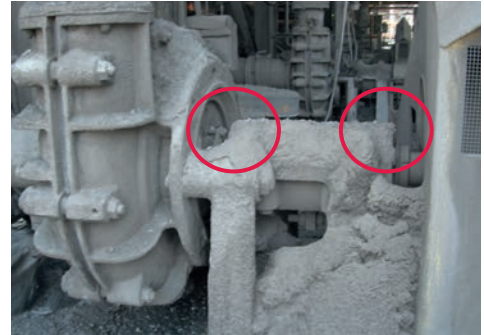
Pumps which are subjected to regular wash down or which face water impingement to the wet-end labyrinth demand higher labyrinth purge rates.



Challenges

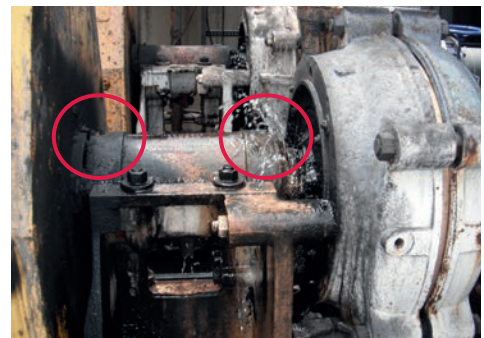
Lubrication challenges associated with pump maintenance include:

- Liquid and slurry contamination require frequent or continuous grease purging to prevent ingress into the pump mechanical assembly
- High speed / high mechanical working of the grease on large pumps require more frequent and controlled grease replenishment /exchange
- Insufficient grease exchange intervals may result in lubrication deterioration or more extreme 'starvation' conditions
- Large or excess grease addition volumes results in grease 'churning' and overheating
- Hazardous working conditions (rotating equipment pinch points, falling into open drains or sumps, or exposure to hazardous chemicals)



Maintenance challenges which restrict or limit effective relubrication may result in:

- Contamination of bearings (from inadequate seal purging) causing rapid deterioration of lubrication conditions
- Inadequate / excessive lubrication causing deteriorating lubrication conditions, accelerated grease aging, oxidation and wear rates
- Accelerated wear rates (caused by contaminants or inadequate / excessive grease replenishment) and finally premature bearing failure

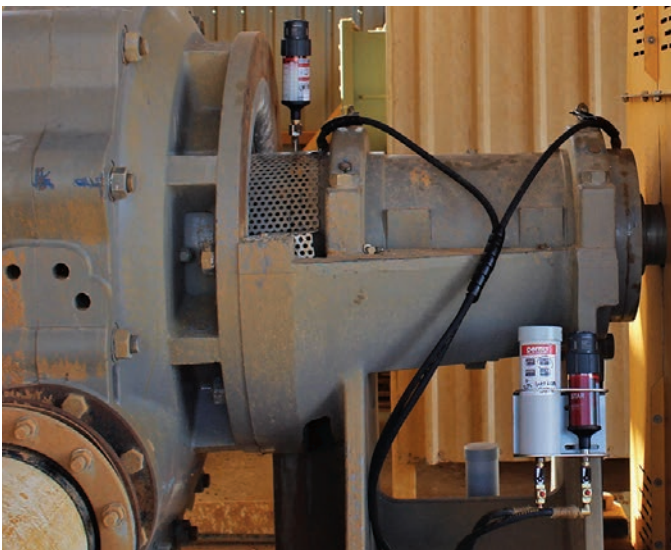


Lubrication assessment criteria

For slurry pump lubrication the following factors are generally assessed in order to develop the lubrication solution:

- Pump manufacturer's recommendations
- Seal types
- Characteristics of recommended lubricant
- Typical bearing operating temperatures
- Operating conditions
- Bearing types, lubrication points and grease migration directions
- Historical lubrication practices
- Desired service schedule
- Wash down procedures
- Requirements for safe access

Solutions



Industry: Iron Ore Mining
Application: Slurry pump
Lubrication system: perma STAR VARIO
Installation solution: Remote beam clamp mount



Industry: Mining
Application: Slurry pump
Lubrication system: perma STAR VARIO
Installation solution: Remote beam clamp mount

STEP 1: Assess application



Blowers / Fans

Fan support bearings require particular attention when devising a lubrication strategy. Because a broad range of bearing types can be employed, it is important to understand the bearing and seal types before proceeding. This information is critical in order to understand the optimal grease delivery points, grease flow paths, the requirements for efficient grease exchange and the point(s) of grease exit from bearing housings.



Challenges

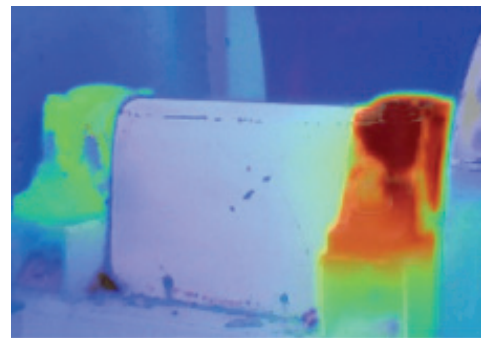
Lubrication challenges associated with fan maintenance include:

- High speed and high mechanical working of the grease requires more frequent and controlled grease replenishment / exchange
- High operating temperature for hot fan applications requires more frequent and controlled grease replenishment and exchange
- Insufficient grease exchange intervals may result in lubrication deterioration or more extreme 'starvation' conditions
- Large or excess grease addition volumes results in grease 'churning' and overheating
- Hazardous working conditions (rotating equipment pinch points, falling from access ladders or platforms, exposure to high levels of airborne dust or heat / steam)



Maintenance challenges which restrict or limit effective relubrication may result in:

- Inadequate / excessive lubrication causing deteriorating lubrication conditions, accelerated grease aging, oxidation and wear rates
- Contamination of bearings (from inadequate lubrication) causing rapid deterioration of lubrication conditions
- Accelerated wear rates (caused by contaminants or inadequate / excessive grease replenishment) and finally premature bearing failure



Lubrication assessment criteria

For fan bearing and seal lubrication the following factors are generally assessed in order to develop the lubrication solution:

- Bearing types & speeds
- Seal types
- Characteristics of recommended lubricant
- Operating conditions
- Historical lubrication practices
- Requirements for safe access
- Desired service schedule
- Location of lubrication points on bearing housings

Solutions



Industry: Quarry
Application: Fan / blower bearings
Lubrication system: perma STAR VARIO
Installation solution: Direct mount



Industry: Power Plant
Application: Fan / blower bearings
Lubrication system: perma STAR VARIO
Installation solution: Remote mount

Selection made easy

STEP 2: Assess installation method

NO!
= Direct mounting

Order
lubrication system +
accessories for
direct mounting

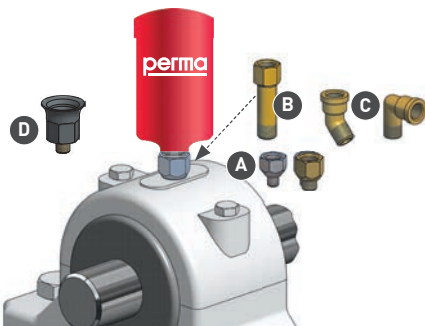


REMOTE INSTALLATION

For many lubrication points it is beneficial to remote mount lubrication systems at locations which are safe to access while machinery is operating. The following questions can be used to help guide remote mounting decisions.

A **“YES”** to any of the questions indicates that **remote mounting** is likely to be required.

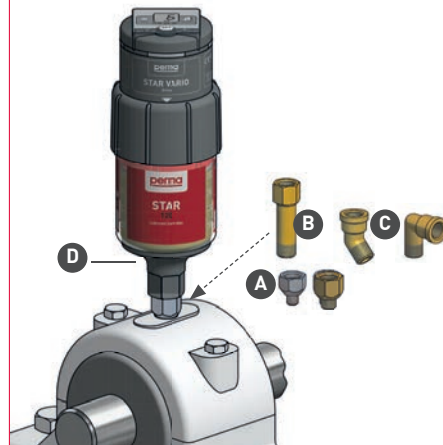
Direct mounting example for
perma CLASSIC / FUTURA / FLEX / NOVA



Common mounting accessories

A	1 x Reducer 1/8" NPT male x 1/4" NPT female 1 x Reducer 1/4-28 UNF male x 1/4" NPT female 1 x Reducer M8x10 x G1/4 female
B	1 x Extension 2 inch 1/4" NPT male x 1/4" NPT female
C	1 x Angle 45° or 90° 1/4" NPT male x 1/4" NPT female
D	1 x Support flange FLEX 1/4" NPT male x G1/4 female >> only for perma FLEX

Direct mounting example for
perma STAR VARIO



Common mounting accessories

A	1 x Reducer 1/8" NPT male x 1/4" NPT female 1 x Reducer 1/4-28 UNF male x 1/4" NPT female 1 x Reducer M8x10 x G1/4 female
B	1 x Extension 2 inch 1/4" NPT male x 1/4" NPT female
C	1 x Angle 45° or 90° 1/4" NPT male x 1/4" NPT female
D	1 x Support flange STAR 1/4" NPT male x G1/4 female

→ Go to page 35 for accessories

1
STEP 1: Page 12-19
ASSESS APPLICATION / EQUIPMENT

2
STEP 2: Page 20-21
ASSESS INSTALLATION METHOD

3
STEP 3: Page 22-25
SELECT SYSTEM / LUBRICANT

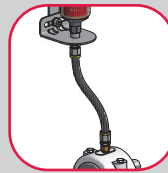
4
STEP 4: Page 26-33
SELECT MOUNTING TYPE / KIT

ON DECISION MAKING

1. Is it necessary to remove protective guards or safety cages to access the lubrication point?
2. Is it difficult or unsafe to access the lubrication point while equipment is running?
3. Is the lubrication point subject to severe vibration or high temperatures which may damage the lubrication system?
4. Is it necessary to get permits to access lubrication points when in confined spaces or fall protection is required?
5. Is the lubrication point exposed to excessive amounts of water, process materials or impact from solid material?

YES!

= Remote mounting



STEP 4: Page 26-33
SELECT MOUNTING TYPE / KIT



There are two main categories of brackets - Standard Duty and Heavy Duty. Both categories include stainless steel construction, G1/4 female sockets and laser cut profiles to minimize contamination build-up. Heavy Duty brackets also feature a C-section design which provides a robust holding system for the lubrication system covers. The C-section design is especially suited for installations which are exposed to water wash down, as would be anticipated for applications such as slurry pumps in coal preparation plants. This design also provides greater mounting flexibility due to the 4-slot design of the bracket mounting face.

The images of 2-point brackets shown demonstrate the differences between Standard Duty and Heavy Duty designs.

INSTALLATION KITS Standard Duty

are highly versatile and can be adapted for attachment to beam sections or square mesh safety cages.



INSTALLATION KITS Heavy Duty

have been specifically designed for use in operational areas which are subject to regular wash down and water impact, such as the conditions found in coal handling preparation plants.






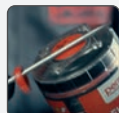
















→ Go to page 26 for **INSTALLATION KITS**

Selection made easy

STEP 3: Select system / lubricant

Selection single-point lubrication system

	perma CLASSIC / perma FUTURA	perma FLEX	perma NOVA	perma STAR VARIO
				
Specifications				
	Activator 	Rotary switch 	Push button + LCD display 	Push button + LCD display + LED signals red/green 
	30 to 104 °F / 0 to +40 °C	-4 to 140 °F / -20 to +60 °C		-4 to 140 °F / -20 to +60 °C
	max 50 psi / 4 bar	max 73 psi / 5 bar	max 87 psi / 6 bar	87 psi / 6 bar
	120 cc / 4.06 oz	60 cc / 2.03 oz 125 cc / 4.23 oz	65 cc / 2.20 oz 125 cc / 4.23 oz	60 cc / 2.03 oz, 120 cc / 4.06 oz 250 cc / 8.45 oz
	Electrochemical			Electromechanical Battery pack STAR VARIO
	Tamper-proof	Discharge period can be altered at any time/system can be shut down		
	1, 3, 6, 12 months at 68 °F / +20 °C / perma Multipurpose grease SF01	1, 2, 3 ... 12 months at 68 °F / +20 °C / perma Multipurpose grease SF01	1, 2, 3 ... 12 months independent of operating temperature	1, 2, 3 ... 12 months independent of operating temperature and counter pressure
	< 3 ft / 1 meter hose at 68 °F / +20 °C with perma Multipurpose grease SF01, hose iØ 3/8, Part # 901006	< 6 ft / 2 meter hose at 68 °F / +20 °C with perma Multipurpose grease SF01, hose iØ 3/8, Part # 901006		< 15 ft / 5 meter hose at 68 °F / +20 °C with perma Multipurpose grease SF01, hose iØ 3/8, Part # 901006
	Contact perma for specific mining certifications	IP 68	IP 65	IP 65
				

Total resistance to grease flow must be less than the pressure delivery capability of the lubrication system. Note that for the previous model of the perma STAR VARIO the guideline for maximum grease hose length was 9 ft / 3 meters.

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STEP 3: Page 22-25
SELECT SYSTEM / LUBRICANT

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STEP 4: Page 26-33
SELECT MOUNTING TYPE / KIT





Lubrication system and grease fill selection

					
					
		Conveyors	Electric motors	Pumps	Blowers & fans
Single-point lubrication systems					
	perma CLASSIC / perma FUTURA	+	0	+	0
	perma FLEX	+	+	++	++
	perma NOVA	+	++	+	++
	perma STAR VARIO	++	++	++	++
RL GREASES (Regular load / high speed greases)					
	Shell Gadus S2 V100 2 (Alvania RL 2)		✓		✓
	Shell Gadus S5 T100 2 (Stamina RLS 2)		✓		✓
	ExxonMobil MOBIL POLYREX EM		✓		✓
	ExxonMobil MOBILITH SHC 100		✓		✓
	Phillips 66 Polytac # 2		✓		✓
EP GREASES (Multipurpose / extreme pressure greases)					
	perma Multipurpose grease SF01	✓		✓	
	Shell Gadus S3 V220C 2 (Albida EP 2)	✓		✓	
	ExxonMobil MOBILGREASE XHP 222	✓		✓	
	Chevron STARPLEX EP 2	✓		✓	
	Phillips 66 Multiplex Red Grease #2	✓		✓	

Lubrication systems can be filled with lubricants from other manufacturers such as Shell, ExxonMobil, Phillips 66, BP Castrol, Chevron, Royal Purple, etc. upon request. Technical data on lubricants can be sourced from perma or related oil company.

Selection made easy

STEP 3: Select system / lubricant












	perma CLASSIC / FUTURA	perma FLEX			
I Drive / Activator	The classic lubrication system	The all-in-one lubrication system			
	Activator, yellow 1 month	Please start with step II			
	Activator, green 3 months				
	Activator, red 6 months				
	Activator, grey 12 months				
II Lubrication systems / LC (= Lubricant Cartridge)					
	perma CLASSIC 120 cc / 4.06 oz	perma FUTURA 120 cc / 4.06 oz	perma FLEX 60 cc / 2.03 oz	perma FLEX 125 cc / 4.23 oz	
	III RL GREASES (Regular load / high temp greases)	Shell Gadus S2 V100 2 (Alvania RL 2)			
		Shell Gadus S5 T100 2 (Stamina RLS 2)			
		ExxonMobil Mobil Polyrex EM			
ExxonMobil Mobilith SHC 100					
Phillips 66 Polytac # 2					
EP GREASES (Multipurpose / extreme pressure greases)	perma Multipurpose grease SF01				
	Shell Gadus S3 V220C 2 (Albida EP 2)				
	ExxonMobil Mobilgrease XHP 222				
	Chevron Starplex EP 2				
	Phillips 66 Multiplex Red Grease #2				

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perma NOVA		perma STAR VARIO		GREASE GUN	
The first temperature-independent, electrochemical lubrication system		High-precision lubrication system – independent of temperature and counter pressure			
Complete	Refill	Complete	Refill		
	Please start with step II			Grease gun 901035  Hose with rotary joint, slide and hydraulic coupling for grease gun 901043 	
+		+		+	
					
perma NOVA LC 65 cc / 2.20 oz	perma NOVA LC 125 cc / 4.23 oz	perma STAR LC 60 60 cc / 2.03 oz	STAR LC 120 120 cc / 4.06 oz	STAR LC 250 250 cc / 8.45 oz	Cartridge 400 g for grease gun

Shell Gadus S2 V100 2 (Alvania RL 2)
Shell Gadus S5 T100 2 (Stamina RLS 2)
ExxonMobil Mobil Polyrex EM
ExxonMobil Mobilith SHC 100
Phillips 66 Polytac # 2
perma Multipurpose grease SF01
Shell Gadus S3 V220C 2 (Albida EP 2)
ExxonMobil Mobilgrease XHP 222
Chevron Starplex EP 2
Phillips 66 Multiplex Red Grease #2

Selection made easy

STEP 4: Select mounting type / kit

A. Brackets

Compact stainless steel brackets are available and can be easily attached to square cage mesh using a hook attachment design or to beam sections using beam clamps.

B. Beam clamp

Easy-to-use beam clamps, supplied with case-hardened cup head set screws and stainless steel assembly screws. **Available in 1.18 inch or 2.56 inch (30 or 65 mm)**

C. Purge connection with manual valve 1/4" NPT

Used for convenient additions of supplementary grease, line purging, and grease blockage clearing.

D. Angle 90° 1/4" NPT male x 1/4" NPT female

Optional use. One angle included per lubrication point.

E. Hose connector 1/4" NPT male

For hose $\text{i}\varnothing$ 3/8 push-lock (brass). Two included per lubrication point.

F. Heavy Duty hose

Supplied with $\text{i}\varnothing$ 3/8 and easy-to-use push-lock type swivel hose ends. Hose 3 ft / 1 m per lubrication point is included, other lengths upon request.

G. Reducing adapter

Two reducers 1/8" NPT and 1/4-28 UNF included for each lubrication point.

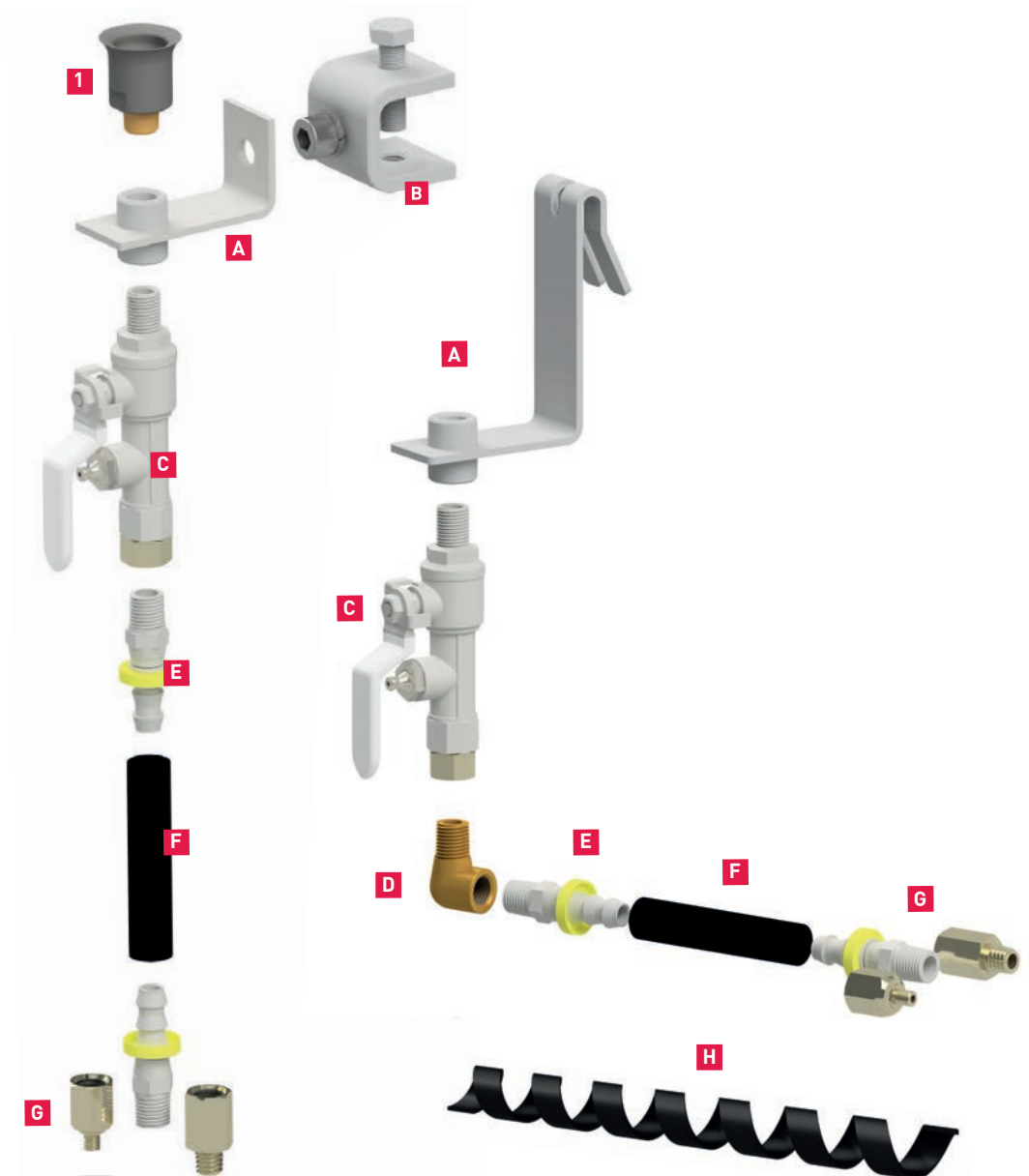
H. Hose spiral guard

Use to bundle hoses in multi-point kits.

1. Support flange FLEX G1/4 male x G1/4 female

Only for perma FLEX. Please order separately.

Electrochemical Standard Duty remote mounting assembly



Support flange with G-male threads required for brackets
Original size and color may vary from the illustrations

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Typical kit configuration shown below. perma lubrication systems not included in INSTALLATION KIT.
Different kit configuration available upon request.

INSTALLATION KIT Standard Duty beam clamp mount



INSTALLATION KIT
CLASSIC / FUTURA / FLEX / NOVA Standard Duty
1-point beam clamp mount incl. 3 ft / 1 m hose



INSTALLATION KIT
CLASSIC / FUTURA / FLEX / NOVA Standard Duty
2-point beam clamp mount incl. 6 ft / 2 m hose



901046

901048



901047

901049



INSTALLATION KIT Standard Duty cage hanger mount



INSTALLATION KIT
CLASSIC / FUTURA / FLEX / NOVA Standard Duty
1-point cage hanger mount incl. 3 ft / 1 m hose

901050



INSTALLATION KIT
CLASSIC / FUTURA / FLEX / NOVA Standard Duty
2-point cage hanger mount incl. 6 ft / 2 m hose

901051



Selection made easy

STEP 4: Select mounting type / kit

Electromechanical remote mounting assembly



A. Brackets incl.

1. Support flange STAR
2. Cover clip for protection cap
3. Protection cap STAR VARIO Heavy Duty 250 (plastic)

Compact stainless steel brackets are available and can be easily attached to square cage mesh using a hook attachment design or to beam sections using beam clamps.

B. Beam clamp

Easy-to-use beam clamps, supplied with case-hardened cup head set screws and stainless steel assembly screws. **Available in 1.18 inch or 2.56 inch (30 or 65 mm)**

C. Purge connection with manual valve 1/4" NPT

Used for convenient additions of supplementary grease, line purging, and grease blockage clearing.

D. Angle 90° 1/4" NPT male x 1/4" NPT female

Optional use. One angle included per lubrication point.

E. Hose connector 1/4" NPT male

For hose iØ 3/8 push-lock (brass). Two included per lubrication point.

F. Heavy Duty hose

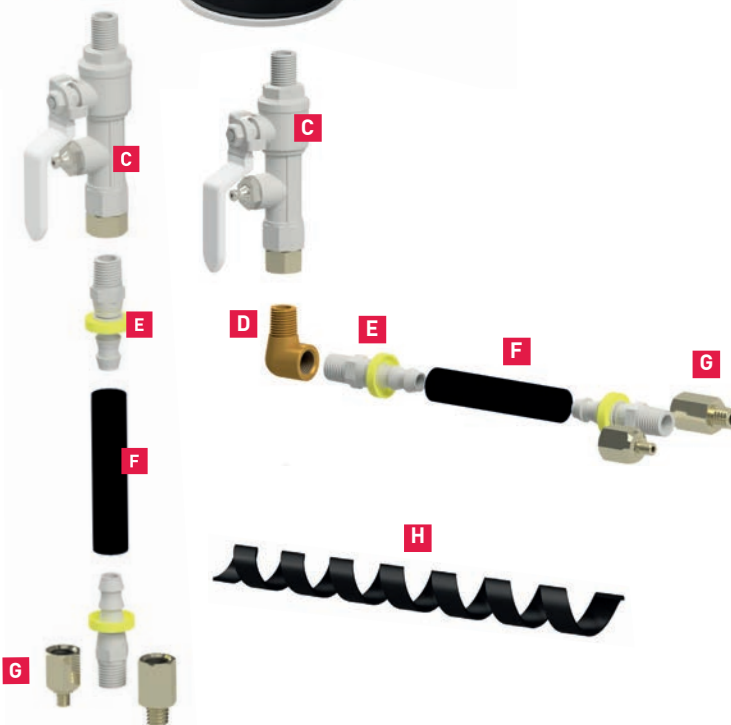
Supplied with iØ 3/8 and easy-to-use push-lock type swivel hose ends. Hose 6 ft / 2 m per lubrication point is included, other lengths upon request.

G. Reducing adapter

Two reducers 1/8" NPT and 1/4-28 UNF included for each lubrication point.

H. Hose spiral guard

Use to bundle hoses in multi-point kits.



Support flange with G-male threads required for brackets
Original size and color may vary from the illustrations

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SELECT MOUNTING TYPE / KIT

Typical kit configuration shown below. perma lubrication systems not included in INSTALLATION KIT.
Different kit configuration available upon request.

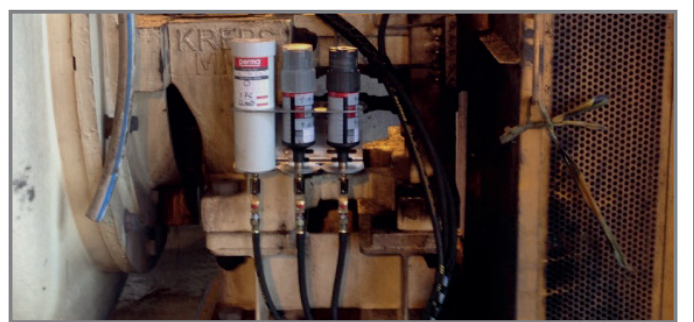
INSTALLATION KIT Standard Duty beam clamp mount

INSTALLATION KIT STAR Standard Duty 1-point beam clamp mount incl. 6 ft / 2 m hose	INSTALLATION KIT STAR Standard Duty 2-point beam clamp mount incl. 12 ft / 4 m hose	INSTALLATION KIT STAR Standard Duty 3-point beam clamp mount incl. 18 ft / 6 m hose	INSTALLATION KIT STAR Standard Duty 4-point beam clamp mount incl. 24 ft / 8 m hose
1,18 inch 30 mm	901052	901054	901056
2,56 inch 65 mm	901053	901055	901057



INSTALLATION KIT Heavy Duty beam clamp mount

INSTALLATION KIT STAR Heavy Duty 1-point beam clamp mount incl. 6 ft / 2 m hose	INSTALLATION KIT STAR Heavy Duty 2-point beam clamp mount incl. 12 ft / 4 m hose	INSTALLATION KIT STAR Heavy Duty 3-point beam clamp mount incl. 18 ft / 6 m hose	INSTALLATION KIT STAR Heavy Duty 4-point beam clamp mount incl. 24 ft / 8 m hose
1,18 inch 30 mm	901060	901062	901064
2,56 inch 65 mm	901061	901063	901065



Selection made easy

STEP 4: Select mounting type / kit

Electromechanical remote mounting assembly



A. Cage hanger incl.

1. Support flange STAR
2. Cover clip for protection cap
3. Protection cap STAR VARIO Heavy Duty 250 (plastic)

Compact stainless steel brackets are available and can be easily attached to square cage mesh using a hook attachment design or to beam sections using beam clamps.

B. Cage hanger

Compact stainless steel brackets are available and can be easily attached to square cage mesh using a hook attachment design.

C. Purge connection with manual valve 1/4" NPT

Used for convenient additions of supplementary grease, line purging, and grease blockage clearing.

D. Angle 90° 1/4" NPT male x 1/4 NPT female

Optional use. One angle included per lubrication point.

E. Hose connector 1/4" NPT male

For hose iØ 3/8 push-lock (brass). Two included per lubrication point.

F. Heavy Duty hose

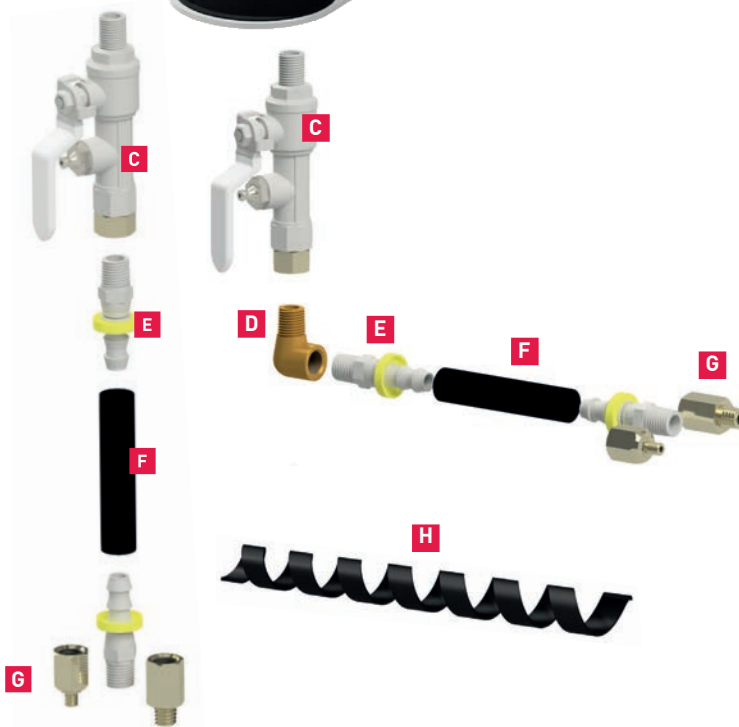
Supplied with iØ 3/8 and easy-to-use push-lock type swivel hose ends. Hose 6 ft / 2 m per lubrication point is included, other lengths upon request.

G. Reducing adapter

Two reducers 1/8" NPT and 1/4-28 UNF included for each lubrication point.

H. Hose spiral guard

Use to bundle hoses in multi-point kits.



Support flange with G-male threads required for brackets
Original size and color may vary from the illustrations

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SELECT MOUNTING TYPE / KIT

Typical kit configuration shown below. perma lubrication systems not included in INSTALLATION KIT.
Different kit configuration available upon request.

INSTALLATION KIT Standard Duty cage hanger mount

INSTALLATION KIT STAR Standard Duty 1-point cage hanger mount incl. 6 ft / 2 m hose	INSTALLATION KIT STAR Standard Duty 2-point cage hanger mount incl. 12 ft / 4 m hose	INSTALLATION KIT STAR Standard Duty 3-point cage hanger mount incl. 18 ft / 6 m hose	INSTALLATION KIT STAR Standard Duty 4-point cage hanger mount incl. 24 ft / 8 m hose
901068	901069	901070	901071

INSTALLATION KIT Heavy Duty cage hanger mount

INSTALLATION KIT STAR Heavy Duty 1-point cage hanger mount incl. 6 ft / 2 m hose	INSTALLATION KIT STAR Heavy Duty 2-point cage hanger mount incl. 12 ft / 4 m hose	INSTALLATION KIT STAR Heavy Duty 3-point cage hanger mount incl. 18 ft / 6 m hose	INSTALLATION KIT STAR Heavy Duty 4-point cage hanger mount incl. 24 ft / 8 m hose
901072	901073	901074	901075

Selection made easy

STEP 4: Select mounting type / kit

Electromechanical remote assembly



C. Purge connection with manual valve G1/4

Used for convenient additions of supplementary grease, line purging, and grease blockage clearing.

D. Angle 90° 1/4" NPT male x 1/4" NPT female

Optional use. One angle included per lubrication point.

E. Hose connector 1/4" NPT male

For hose iØ 3/8 push-lock (brass). Two included per lubrication point

F. Heavy Duty hose

Supplied with iØ 3/8 and easy-to-use push-lock type swivel hose ends. Hose 6 ft / 2 m per lubrication point is included, other lengths upon request.

G. Reducing adapter

Two reducers 1/8" NPT and 1/4-28 UNF included for each lubrication point.

H. Hose spiral guard

Use to bundle hoses in multipoint kits.

A. Bracket STAR rail mount incl.

1. Support flange STAR
2. Cover clip for protection cap
3. Protection cap STAR VARIO Heavy Duty 250 (plastic)

Compact stainless steel brackets are available which can be easily attached to rail using a U-bolt design.

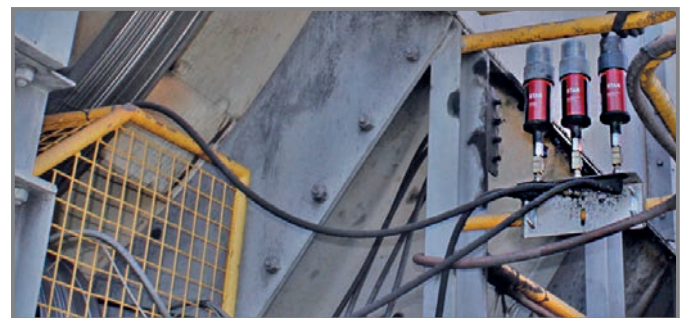
B. 2 U-Bolts

Used to mount bracket to rail

Support flange with G-male threads required for brackets

INSTALLATION KIT rail mount (for rails up to 1 1/2 inch diameter)

INSTALLATION KIT STAR 1-point rail mount incl. 6 ft / 2 m hose	INSTALLATION KIT STAR 2-point rail mount incl. 12 ft / 4 m hose	INSTALLATION KIT STAR 3-point rail mount incl. 18 ft / 6 m hose	INSTALLATION KIT STAR 4-point rail mount incl. 24 ft / 8 m hose
901076	901077	901078	901079

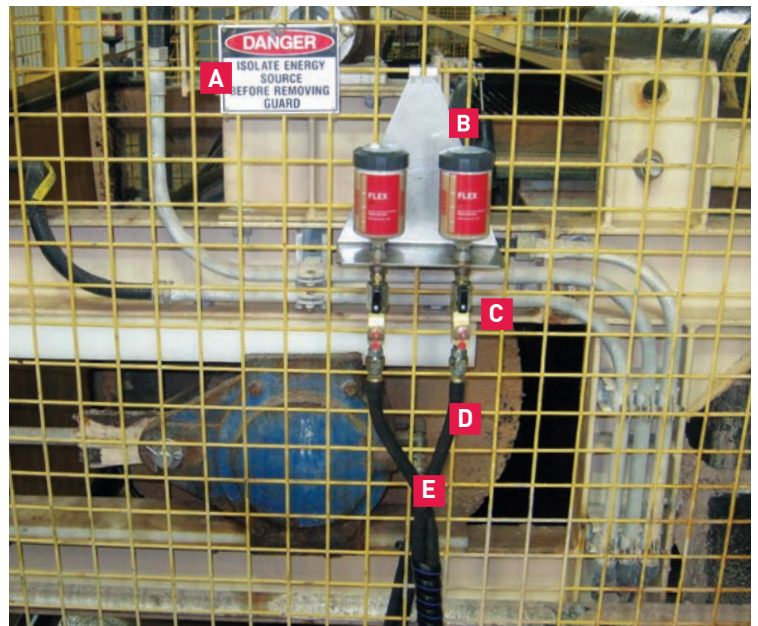




Guidelines for remote installation

Year by year, improvements to safe work practices and increased production demands lead to an increasing requirement to remote mount automatic lubrication systems.

- A** Locate where lubrication systems can be safely and easily accessed while equipment is in operation
- B** Select stainless steel brackets which can be easily removed if required for maintenance access
- C** Include manual purge points to provide an efficient means of occasional manual purging
- D** Use only full-bore elbow fittings
- E** Use $\text{i}\varnothing$ 3/8 grease hose and run lines under or around cages



Hose length installations

Restrict maximum grease hose lengths to

- 3 ft / 1 m** for perma CLASSIC / FUTURA
- 6 ft / 2 m** for perma FLEX / NOVA
- 15 ft / 5 m** for perma STAR VARIO

Limits depend on variables such as grease hose diameter, grease type, ambient temperature and the resistance of the lubrication point itself. Please consult perma for detailed analysis.



- ← Prime grease hose and fittings.
- Route grease hose under or around cage mesh, not through, and locate perma lubrication systems at a safe point of access.

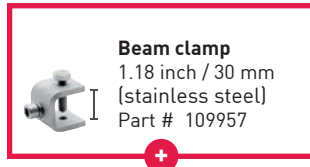


Selection made easy

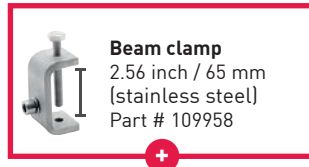
Accessories & mounting components

perma STAR VARIO should always be used with support flange. Use protection cap [109999] with cover clip [108606] and support flange [109420] for heavy duty applications. The table below includes bare brackets. Note that STAR Standard Duty and Heavy Duty C-Section brackets can be ordered with support flange, cover clip and full length protection cap. With the exception of some cage hanger brackets, only bare brackets without mounting attachments are pictured below.

1 Choose mounting type



or







or







2 Choose bracket >>

For perma CLASSIC, FUTURA, FLEX, NOVA	Pic.	Part # - stainless steel
Mounting Bracket CLASSIC, FUTURA, FLEX, NOVA 1-point G1/4 female	1	109685
Mounting Bracket CLASSIC, FUTURA, FLEX, NOVA 2-point G1/4 female	2	109686
Mounting Bracket CLASSIC, FUTURA, FLEX, NOVA cage hanger 1-point G1/4 female	3	109689
Mounting Bracket CLASSIC, FUTURA, FLEX, NOVA cage hanger 2-point G1/4 female	4	109690










2 Choose bracket >>



For perma STAR VARIO	Pic.	Part # - stainless steel
Mounting Bracket STAR Standard Duty 1-point G1/4 female	5	109663
Mounting Bracket STAR Standard Duty 2-point G1/4 female	6	109667
Mounting Bracket STAR Standard Duty 3-point G1/4 female	7	109670
Mounting Bracket STAR Standard Duty 4-point G1/4 female	8	109673

Mounting Bracket STAR Heavy Duty C-section 1-point G1/4 female	9	109664
Mounting Bracket STAR Heavy Duty C-section 2-point G1/4 female	10	108648
Mounting Bracket STAR Heavy Duty C-section 3-point G1/4 female	11	109671
Mounting Bracket STAR Heavy Duty C-section 4-point G1/4 female	12	109674







Mounting Bracket STAR Standard Duty cage hanger 1-point G1/4 female	13	109665
Mounting Bracket STAR Standard Duty cage hanger 2-point G1/4 female	14	109668

2 Choose bracket >>

For perma STAR VARIO	Pic.	Part # - stainless steel
Mounting Bracket STAR rail mount 1-point G1/4 female incl. 2 U-Bolts	1	110014
Mounting Bracket STAR rail mount 2-point G1/4 female incl. 2 U-Bolts	2	110015
Mounting Bracket STAR rail mount 3-point G1/4 female incl. 2 U-Bolts	3	110016
Mounting Bracket STAR rail mount 4-point G1/4 female incl. 2 U-Bolts	4	110017



For rails up to 1 1/2 inch diameter.

3 Choose accessories >>

Hose / Connector / Accessories	Pic.	Part #
Heavy Duty hose up to + 260 °F / + 127 °C iØ 3/8 (black)	1	901006
Hose connector 1/4" NPT male for hose iØ 3/8 - push-lock (brass)	2	901007
Purge connection with manual valve R1/4 male x 1/4 NPT female (brass nickel-plated)	3	113982
Purge connection with manual valve R1/4 male x 1/4 NPT female (stainless steel)	4	113983
Hose spiral guard 1 inch / 25 mm (plastic)	5	109695
Prefill adapter 1/4" NPT male	6	901041
Prefill adapter G1/4 male	7	109003
Grease gun	8	901035
Flex hose 18" with button head and hydraulic coupling for grease gun	9	901043



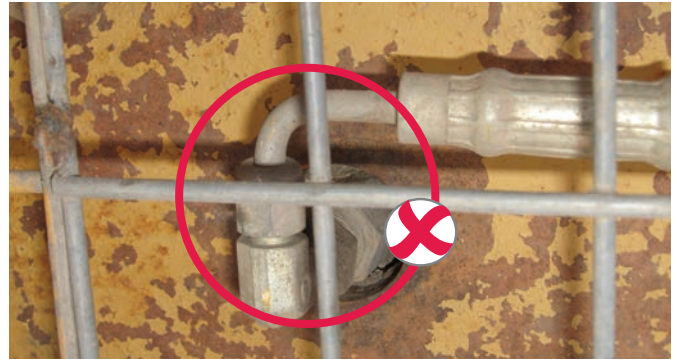
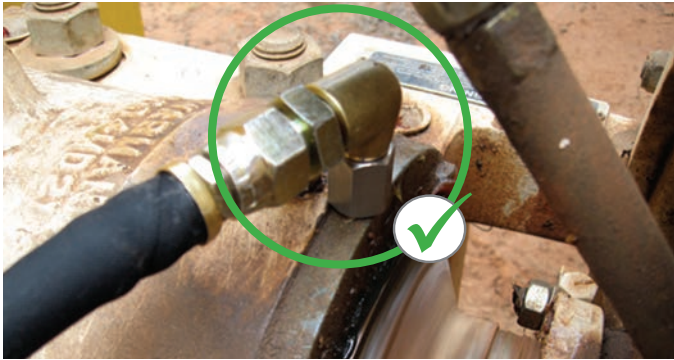
Accessories for FLEX / STAR	Pic.	Part #
Support flange FLEX 1/4" NPT male x G1/4 female (brass / plastic)	1	109322
Support flange FLEX 1/8" NPT male x G1/4 female (brass / plastic)	2	109323
Support flange FLEX G1/4 male x G1/4 female (brass / plastic) *	3	101427
Protection cap STAR Standard Duty 250 (plastic)	4	109519
Support flange STAR 1/4" NPT male x G1/4 female (brass / plastic)	5	109419
Support flange STAR 1/8" NPT male x G1/4 female (brass / plastic)	6	109418
Support flange STAR G1/4 male x G1/4 female (brass / plastic) *	7	109420
Cover clip for protection cap STAR VARIO Heavy Duty	8	108606
Protection cap STAR VARIO Heavy Duty (plastic)	9	109999
Manifold 2-to-1 G1/4 male (stainless steel)	10	109696



*Support flange with G-male threads required for brackets



Seal all connection parts with a metal bonding adhesive (medium)



perma STAR VARIO lubrication systems have a G1/4 male thread at the grease outlet. Where reducers, elbows or extensions are required to simplify installation, it is important to adhere to the following guidelines:

- When using reducing adaptors with fine threads such as 6 mm metric or 1/4 UNF, select stainless steel to avoid breakage
- Minimize the number of elbow fittings
- Always select full-bore elbows

Angles	Pic.	Material	Part #
Angle 45° 1/4" NPT male x 1/4" NPT female	1	brass	901019
Angle 45° 1/8" NPT male x 1/4" NPT female	2	brass	901020
Angle 45° 1/8" NPT male x 1/4" NPT female	3	nickel-plated	901021
Angle 45° 1/4-28 UNF male x 1/4" NPT female	4	nickel-plated	901022
Angle 45° 1/4-28 UNF male x 1/8" NPT female	5	nickel-plated	901023
Angle 45° 1/4" NPT male x 1/4" NPT female square	6	brass	901024
Angle 45° G1/4 male x G1/4 female	7	brass	104823
Angle 45° M10x1 male x G1/4 female	8	brass	104826
Angle 90° 1/4" NPT male x 1/4" NPT female	9	brass	901025
Angle 90° 1/8" NPT male x 1/4" NPT female	10	brass	901026
Angle 90° 1/8" NPT male x 1/4" NPT female	11	nickel-plated	901027
Angle 90° 1/4-28 UNF male x 1/4" NPT female	12	nickel-plated	901028
Angle 90° 1/4-28 UNF male x 1/8" NPT female	13	nickel-plated	901029
Angle 90° 1/4" NPT male x 1/4" NPT female square	14	brass	901030
Angle 90° 1/8" NPT male x 1/4" NPT female square	15	brass	901031
Angle 90° G1/4 male x G1/4 female	16	brass	104827
Angle 90° M10x1 male x G1/4 female	17	brass	104830



Check thread size at lubrication point

Special purpose fittings	Pic.	Part #
T-Adapter 3 x 1/4" NPT female	1	901012
Coupler 1/4" NPT female (brass)	2	901013
Hexagon-nipple 1/4" NPT male (brass)	3	901014
Relief valve 1/8" NPT male (5 lbs)	4	901015
Electric motor drain cup kit 120 cc / 4.06 oz	5	901085



Reducers	Pic.	Material	Part #
Reducer 1/8" NPT male x 1/4" NPT female	1	nickel-plated	901008
Reducer 1/4-28 UNF male x 1/4" NPT female	2	nickel-plated	901009
Reducer 1/4-28 UNF male x 1/8" NPT female	3	nickel-plated	901010
Reducer M6 male x G1/4 female	4	brass	104837
Reducer M6 male x G1/4 female	5	stainless steel	104876
Reducer M6 male x G1/8 female	6	stainless steel	109847
Reducer M8 male x G1/4 female	7	brass	104839
Reducer M10 male x G1/4 female	8	brass	104841
Reducer 1/4 UNF male x G1/4 female	9	stainless steel	109845
Reducer 1/4 UNF male x G1/8 female	10	stainless steel	109846
Bushing 1/4" NPT male x 1/8" NPT female	11	brass	901011
Reducer R1/8 male x G1/4 female	12	brass	109953
Reducer R1/4 male x G1/4 female	13	brass	109954
Reducer G1/4 male x 1/4" NPT female	14	nickel-plated	901000



Other metric / BSP fittings available upon request

Not familiar with perma's thread descriptions?
perma uses ISO denomination. See examples:

G1/4 male = 1/4 BSPP-M R1/4 male = 1/4 BSPT -M
G1/4 female = 1/4 BSPP-F R1/4 female = 1/4 BSPT-F

Extensions	Pic.	Material	Part #
Extension 2 inch 1/4" NPT male x 1/4" NPT female	1	brass	901001
Extension 4 inch 1/4" NPT male x 1/4" NPT female	2	brass	901002
Extension 6 inch 1/4" NPT male x 1/4" NPT female	3	brass	901003
Extension 2 inch 1/8" NPT male x 1/4" NPT female	4	brass	901004
Extension 4 inch 1/8" NPT male x 1/4" NPT" female	5	brass	901005
Extension 30 mm G1/4 male x G1/4 female	6	brass	104854
Extension 45 mm G1/4 male x G1/4 female	7	brass	104855
Extension 115 mm G1/4 male x G1/4 female	8	brass	104857
Extension 50 mm M6 male x G1/4 female	9	stainless-steel	109697
Extension 50 mm 1/4 UNF male x G1/4 female	10	stainless-steel	109854



Service equipment	Pic.	Part #
50 ml Bottle Loctite® 243™ thread sealant (medium strength)	1	110278
perma Fitting thread tester	2	110374
perma REDUCER / ANGLE KIT includes several different reducers → Detailed bill of material on request or on our website	3	901044
perma UNIVERSAL ACCESSORY KIT includes reducers, angels, extensions, hose connectors, service equipment, etc. → Detailed bill of material on request or on our website	4	901045
perma HOSE FITTING mounting tool	5	901082



Additional service tools & support

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Visit our website and conveniently download operating manuals or installation instructions, brochures or other product information on all perma lubrication systems.

Product- / Application Flyer



perma SELECT APP Selection Software

Free download for iOS and Android:



Videos / Installation Instructions



www.permausa.com/videos

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perma MLP: Maintenance Lubrication Program

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Product Pocket Guides

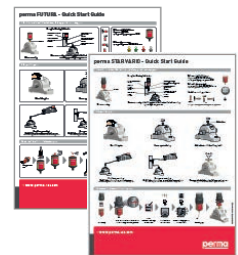


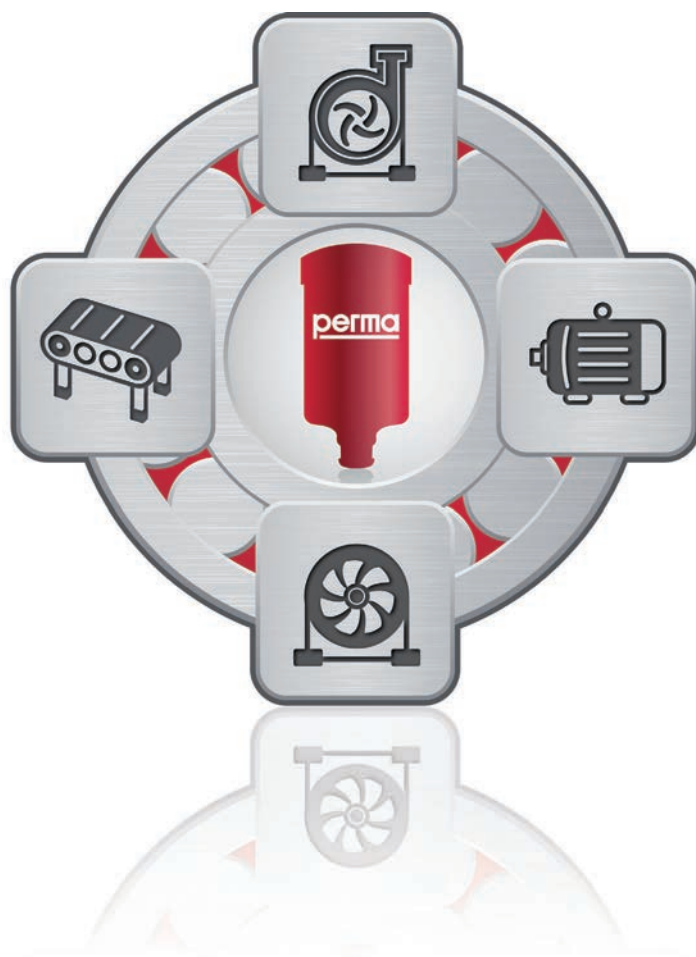
Heavy Duty Literature



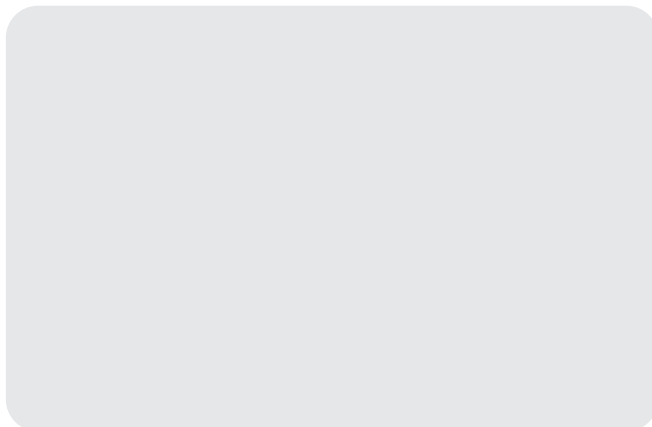
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