HTL perma Australia Pty Ltd

perma Automatic Lubrication Systems

perma STAR VARIO

Reliable products delivering practical lubrication solutions

perma-tec GmbH & Co (Germany)
perma-tec GmbH & Co is the global leader in the research, development and manufacturing of automatic, single-point lubricators based in Germany.

perma lubrication systems can be found in all types of industries and applications around the world. perma-tec has a network of subsidiaries and competent distribution partners in more than 60 countries.

perma lubrication systems are manufactured in Germany in state-of-the-art facilities. In order to conform to globally-accepted manufacturing standards, perma products are continuously tested and inspected. perma-tec has been certified according to DIN EN ISO 9001 since 1997.

HTL perma Australia Pty Ltd
As a wholly owned subsidiary of perma-tec GmbH & Co, HTL perma Australia Pty Ltd has direct access to the Research & Development Centre and Engineering Group in Germany.

HTL perma Australia Pty Ltd responds to the demands of preventative maintenance programs by focusing on service, customised solutions and knowledge sharing. We understand that our products deliver maximum value when combined with robust installation systems, a practical approach to maintenance scheduling and ongoing technical support.

Company history

1934
Formation of the metal ware factory for house and kitchen appliances in Bad Kissingen

1964
Invention and patent of perma CLASSIC single-point lubrication system

1989
Acquisition by private investment group

1991
New management and extensive reorganisation

1995
Foundation of subsidiaries **H-T-L-perma**
USA (1995), France (1995)
Iberica (1996), Italia (1997)
UK (1998), Australia (2004)
India (2008)

2000
Change of company name to perma-tec GmbH & Co. KG

2005
New manufacturing and warehouse building and office building expansion

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Improved reliability, reduced maintenance costs and less downtime

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 lubricator program at work:

A site with 500 perma single-point lubricators*, with an average setting of 3 months, reveals the following statistics.

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

* For this example perma STAR VARIO L250

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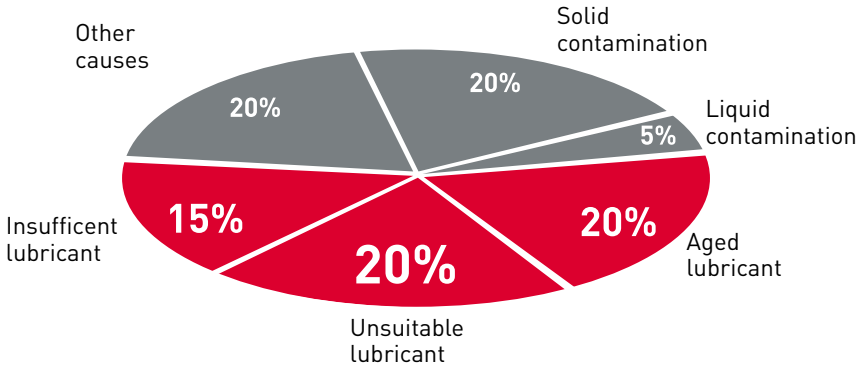
Bearing service life extension

Effective preventative maintenance programs support the implementation of automatic lubrication systems because they extend the service life of bearings and deliver superior reliability results compared to manual lubrication.

A requirement for optimal bearing service life is the reliable supply of clean lubricant. If bearings are not sufficiently lubricated, they prematurely fail, resulting in maintenance cost increases and equipment downtime. In recognition of this, industry leading businesses invest in automated systems, lubrication competency development, procedure documentation and the implementation of practical systems for contamination prevention.

As investment in preventative maintenance increases to help meet production demands, the investment in automated lubrication systems also increases. But automated systems alone do not provide an adequate solution. Quality systems must be combined with straightforward implementation methods and realistic management plans. At perma we focus on these facts to deliver high quality, sustainable lubrication programs.

Causes of rolling element bearings failures



Over 50% of all rolling element bearing failures are lubrication related.

Tribology, A Means to Increase Profitability:

The Australian Section of The American Society of Lubrication Engineers define wear as 'progressive damage, usually involving material loss, which occurs to the surface of a component as a result of relative motion at the surface'.

They go on to state...

"The costs of wear are widespread, involving not only replacement parts but also down time, lost production and loss of opportunity."

"Countries which rely on mining as a means of elevating their relative prosperity will, of necessity, suffer an even greater penalty unless the advantages of tribological knowledge are used to offset the ravages of abrasion."

"The essence of the majority of machine breakdown is tribological; about one percent of the Gross Domestic Product of industrialised nations is lost due to abrasive wear alone."

"The cost of wear to the Australia community represents approximately 6 percent of the Gross Domestic Product."

Quoted from – "Tribology, A Means to Increase Profitability"

Published by The Australian Section of The American Society of Lubrication Engineers

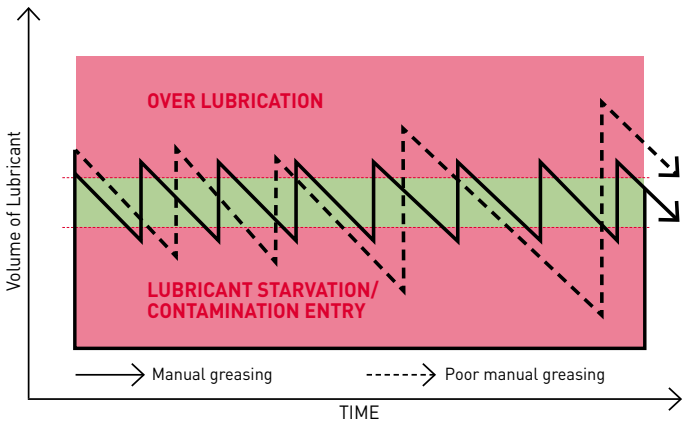
Benefits of short re-lubrication intervals

The longest bearing service life is achieved when grease is added in small amounts at short time intervals. This optimal form of lubrication is achieved using automated systems and cannot be practically achieved via manual lubrication programs.

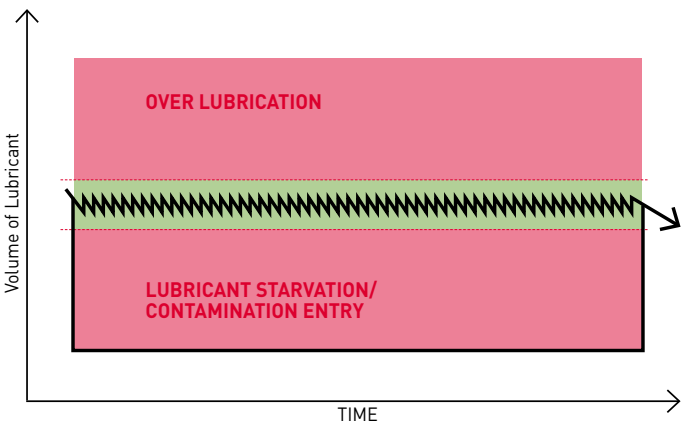
Bearings which operate in harsh environments demand the shortest re-lubrication intervals. Under conditions such as these manual programs become very labour intensive and often impractical.

When manual lubrication programs fail to lubricate regularly due to lack of available resources the absence of fresh grease leads to lubrication starvation and contaminant entry, eventually resulting in premature bearing failure.

Manual Greasing



Automatic Greasing



Addressing contamination related wear

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 lubricators provide a means to achieving a purge of clean grease through bearing seals in order to prevent the entry of water, dirt and dust, and thereby extend bearing service life.

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Contamination prevention for harsh operating environments

Solid contaminants cause noise, accelerated wear and the early onset of fatigue. The rate of wear increases with the size, concentration and hardness of contaminants. Smaller particles lead to abrasive wear whilst larger particles can cause indentation of bearing raceways which later become sites of fatigue related wear.

Greasing practices which prevent the ingress of contaminants will provide long term financial return by means of longer bearing service lives and reduced downtime.

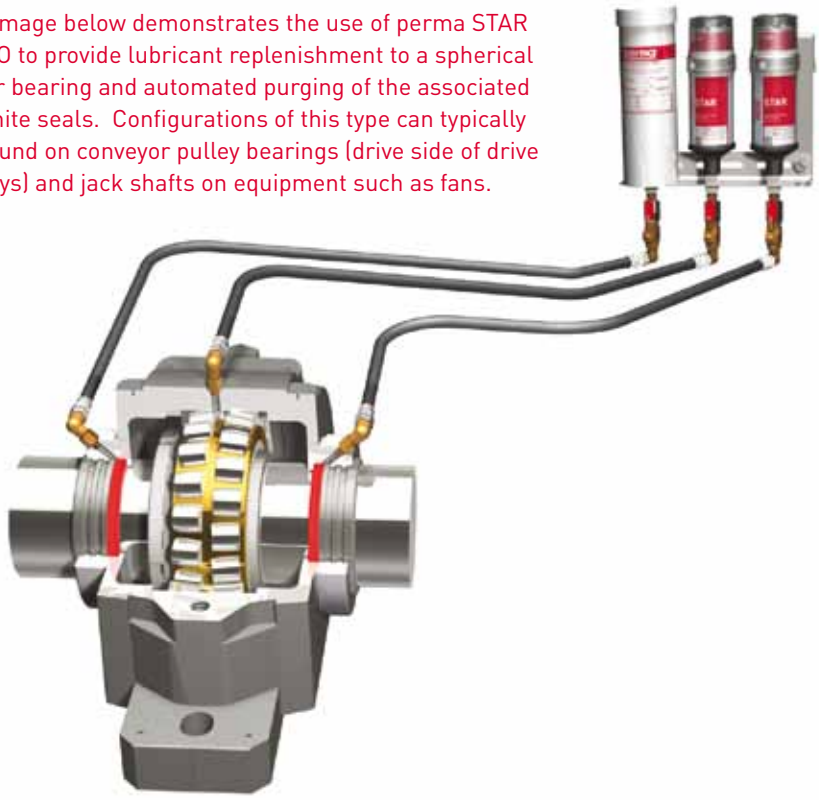
Different bearing configurations have different greasing requirements. Three of the commonly accepted methods of contamination prevention for rolling element bearings are listed below:

→ For sites where the threat of contamination entry is high it is a common strategy to apply grease directly to taconite and labyrinth seals, in addition to automatically lubricating the bearing itself.

→ For modest sized bearings running at relatively low speeds it is sometimes practical to apply an elevated lubrication rate to the bearing grease point only in order to fulfill the requirements of the bearing and the seal.

→ Yet another strategy is to automatically lubricate seal purge points in combination with a manual lubrication program for bearing lubrication points.

The image below demonstrates the use of perma STAR VARIO to provide lubricant replenishment to a spherical roller bearing and automated purging of the associated taconite seals. Configurations of this type can typically be found on conveyor pulley bearings (drive side of drive pulleys) and jack shafts on equipment such as fans.



The daily, automatic lubrication of labyrinth seals on horizontal Warman pumps provides protection from contamination from the operating environment, wash down and water spray from poorly adjusted glands.

Taconite seal purging example:

Automatic lubrication of taconite seals provides constant protection against the ingress of contaminants.

Labyrinth seal purging example:

Automatic lubrication of labyrinth seals provides constant protection against the ingress of contaminants.

Safer Lubrication Practices

Workplace safety is of ultimate importance. Reliable systems which reduce the interface between people and operating equipment are a key element to reducing the likelihood of workplace accidents.

Automated systems provide a serious contribution to reducing the likelihood of workplace accidents by significantly reducing the time required to lubricate equipment. Automated systems also reduce the risk of repetitive strain injuries which can develop due to the demands of intensive manual greasing programs.

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Workplace safety and efficiency improvements

Automated lubrication systems are maintenance tools which make a positive contribution to work place safety and efficiency. This is particularly the case for large sites in hot climates where the physical demands of performing regular manual greasing "runs" increase the risk of heat exhaustion compared to automated alternatives.

The implementation of automatic lubrication systems does not mean that the frequency of equipment inspections will be reduced. The integration of automated systems liberates time which can be invested into other preventative maintenance tasks such as regular equipment inspections, condition monitoring data collection, filter and breather maintenance and oil cleanliness management activities such a filtration.

Safer Greasing – Example

Comparing manual greasing programs to automated programs provides an estimate of the reduction in exposure to the safety hazards associated with manual greasing such as heat stress, slips, trips and repetitive strain injuries. Comparisons will vary from site to site.

Basis for this Comparison

Number of points = 500
Time period = 3 years

Manual Greasing Program

Manual Greasing Frequency = Weekly
Manual Pumps per point per visit = 20

Time per point (including time to move between points) = 3 minutes per point

Total Time over 3 years
= 500 (points) x 3 (years) x 52 (weeks per year) x 3 (minutes per point)
= 234000 minutes = 3900 hours

Automatic Lubricators – 3 Month Setting using 250cc size perma STAR VARIO

Automatic greasing = 0.5cc of grease pumped every 4 hours and 37 minutes

Time to perform monthly inspections = 2 minutes per lubricator

Time to perform 3 monthly services & manual purge = 6 minutes per lubricator

Total Time over 3 years
= [500 x 3 (years) x 12 (inspections per year) x 2 (minutes per point for inspection)] + [500 x 3 (years) x 4 (service change outs per year) x 6 (minutes to change lubricator & manually purge)]
= 72000 minutes = 1200 hours

Based on this comparison the reduction in exposure to the safety hazards associated with greasing bearings is approximately 70% and an estimated 2,700 hours are liberated which can be invested into other preventative maintenance tasks which may otherwise be neglected. In addition to this, the automatic solution removes the need for 1.5 million pumps of a manual grease gun over a 3 year period.

3 ways to improve safety and save time:

1. **Reduce working at heights and confined space entry requirements -** Improve safe work practices by extending the time periods between access requirements. Save time otherwise required for permits, isolations and access.
2. **Remove reliance on downtime to access points behind cages and avoid unnecessary manual handling of cages -** Improve safe work practices via the remote installation of lubricators to avoid the need to lift and handle cages and guards. Save time otherwise required during shutdowns for permits, isolations and cage removal and re-instatement.
3. **Minimise highly repetitious use of manual grease guns -** Improve safe work practices by reducing the risk of repetitive strain injury associated with excessive grease gun use. Save time by automating an otherwise laborious manual task.

perma STAR VARIO remote mounted to a conveyor pulley bearing providing safe access for inspections and servicing.

perma STAR VARIO remote mounted to a fan jack shaft providing safe access for inspections and servicing.

perma STAR VARIO remote mounted to an overhead electric motor.

perma STAR VARIO

Temperature independent, precise lubrication

Made in Germany

Electro-mechanical, variable time settings, temperature independent

perma STAR VARIO consists of a reusable electro-mechanical drive unit and a single-use lubricant cartridge. Because the lubricator is mechanically driven the dispensing rate is independent of ambient temperature and back pressure*. Inspections of the STAR VARIO are made easy via the transparent lubricant cartridge and the alert system which utilises different flashing sequences of red and green LED's to communicate the status of the lubricator to maintenance personnel.

The label of the lubricant cartridge includes allocated spaces for recording the date of installation and the date of next service. The label also confirms the % of grease remaining. These features support responsible lubricator management.

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Application

perma STAR VARIO is a single-point, automatic lubricator which is suited to a broad range of bearing and chain applications. perma STAR VARIO is ideal for applications which demand precise grease delivery or for operating environments which include significant temperature fluctuations. The remote mounting options for the perma STAR VARIO provides practical options for lubricators to be installed in safe and easy to access locations.



Characteristics

- Precise lubricant delivery which is independent of temperature and back pressure*
- Transparent housing to facilitate inspection of the lubricant piston position
- LED alert system to provide feedback to users confirming operational status
- Reusable Drive Unit
- Immediate pressure generation
- Broadest range of options for safe, robust and easy to implement remote mounting
- Lubricates a single point with greases up to NLGI 2 or oils
- Lubricant canisters are filled under controlled conditions in order maintain lubricant cleanliness and are not refillable

Benefits

Facilitates precise lubrication programs across a broad range of equipment, particularly where remote mounting is required

- Provides accurate lubricant delivery with immediate pressure build-up to help ensure that lubricant starvation or over lubrication do not occur.
- Whilst requiring an initial investment in Drive Units and Mounting Systems, provides long term cost benefits compared to gas type lubricators.

Extends Equipment Service Life

- Lubricates equipment while it is running to provide optimal lubricant exchange
- Delivers intermittent injections of fresh grease to labyrinth and taconite seals to prevent the ingress of contaminants

Safer lubrication option compared to manual greasing

- Reduces manual work load by automating an otherwise laborious manual process
- Continues to lubricate without the need for shutdown and isolation
- Provides extensive options for safe remote mounting, up to 3 meters from the lubrication point

* Total back pressure must be less than the pressure delivery capability of the lubricator

Technical data

Housing
Transparent plastic

Drive – reusable
Electromechanical

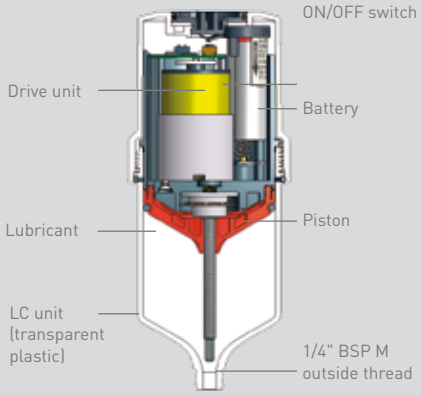
Power supply
STAR battery pack

Discharge period
1, 3, 6 or 12 months

Lubricant volume
60 cm³, 120 cm³ or 250 cm³

Operating temperature
-10 °C to +50 °C

Remote installations
3 meter of 3/8" ID line (grease)



LED Flashing Sequence	Alert System Message
Flash every 15 sec	Normal operation
Flash every 8 sec	Blockage
Flash every 3 sec	Lubricator empty

Discharge amounts in cm³ per day:

TIME	Time setting	Dwell time h:min	S60 60 cm³ VOL 3 4	M120 120 cm³ VOL 3 4	L250 250 cm³ VOL 3 4
1 2	1 month	1:30	2.0 cm³	4.0 cm³	8.3 cm³
1 2	3 months	4:37	0.67 cm³	1.3 cm³	2.8 cm³
1 2	6 months	9:17	0.33 cm³	0.67 cm³	1.4 cm³
1 2	12 months	18:36	0.17 cm³	0.33 cm³	0.7 cm³

1 2 ← Switch position indicated by white square

Remote installation kits for robust installations which provide for safe and efficient servicing

Quality installations are essential to the implementation of lubrication programs which will stand the test of time. Care taken to "get it right" during implementation will ensure long-term lubricator reliability and sets the foundation for a robust maintenance solution.

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Explanation of kit part numbers

Perma supplies a comprehensive range of installation kits to enable simple and robust installations of perma STAR VARIO.
The brackets are made from stainless steel and are attached to beam sections, square cage mesh or horizontal rails using simple hand tools.
Part numbers for remote mount kits are explained below. The first 4 digits indicate the part type, the number of lubricators held by the kit assembly and the attachment method. Additional suffixes are used to indicate design variations.

There are four methods of attachment. The three most common are 30mm beam clamps, 65mm beam clamps and cage hooks. Some brackets are designed for rail attachment using U-bolts.

BC30 30mm beam clamp

BC65 65mm beam clamp

CH-ARMS Cage hook arm pair

1st Four Digits of Part Numbers

Digit Reference	Meaning
1st digit	Denotes part type; K = Kit
2nd digit	Denotes the number of lubricator points
3rd and 4th digits	Denotes the attachment type; **30** = 30mm beam clamps, **65** = 65mm beam clamps, **CH** = cage hangers, **RR** = round rail U-bolts

Suffixes of Part Numbers

Suffix (in order of use)	Meaning of Suffix
2M	Bracket includes 2 manual grease points
3M	Bracket includes 3 manual grease points
C	Bracket is heavy duty C-Section design
J	Bracket points joined by manifold
VA	Point for VA data cable included
S	Stainless reducers to 1/4" SAE included

Customised fabrication

Examples of customised installation kits are shown below. Perma can custom design and fabricate remote installation kits to meet site specific requirements.

Manifold Designs

For applications where higher grease rates are required or when the rationalisation of lubricator time settings is important.

Example: K230CJ

Manual Grease Points

For applications where a combination of automated and manual greasing is required.

Example: K265C1M

perma MOUNTING SYSTEMS
Standard Duty installation kits for perma STAR VARIO

STANDARD DUTY installation kits include stainless steel brackets and beam clamps.
Lubricators are not included in kits.

Attachment option	Kit Part Number
30mm beam clamp	K130
65mm beam clamp	K165

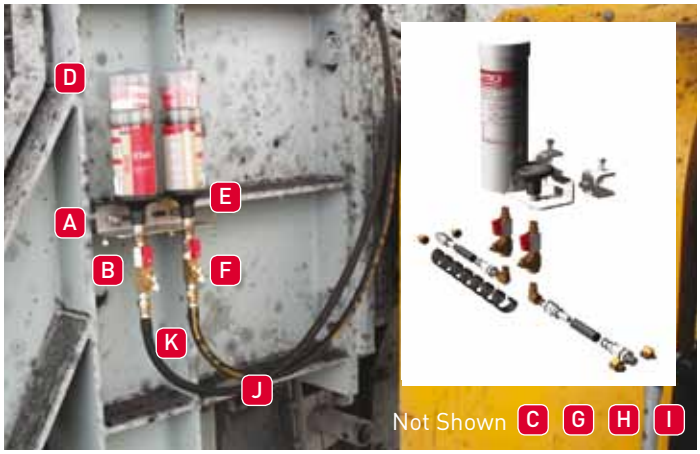
Attachment option	Kit Part Number
30mm beam clamp	K230
65mm beam clamp	K265

Attachment option	Kit Part Number
30mm beam clamp	K330
65mm beam clamp	K365

Attachment option	Kit Part Number
30mm beam clamp	K430
65mm beam clamp	K465

Kit Example.

Kit Part #	Description
K230	Kit 2 point with standard duty bracket and 30mm beam clamps



A	1 x 2 point standard duty bracket	G	2 x 90 degree elbow
B	2 x 30mm S/S beam clamp	H	2 x ¼" BSPF–1/8"BSPM reducer
C	2 x PVC lubricator cover	I	2 x ¼" BSPF -¼"BSPM ext.
D	2 x Soft wet cap	J	4m of 3/8" ID grease line
E	2 x Lubricator support flange	K	4 x Female swivel hose ends
F	2 x Manual purge kit		

Heavy Duty installation kits for perma STAR VARIO

HEAVY DUTY installation kits include stainless steel C-section brackets designed for high contamination areas which can be attached using beam clamps or cage hanger arms.
Lubricators are not included in kits.

Attachment option	Kit Part Number
30mm beam clamp	K130C
65mm beam clamp	K165C
Cage hanger arms	K1CHC

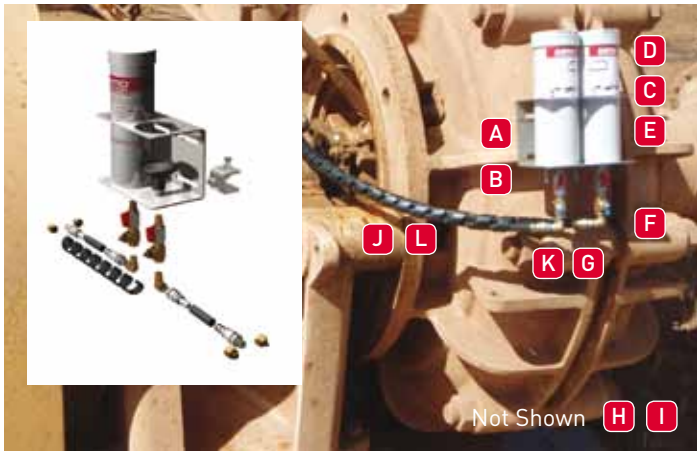
Attachment option	Kit Part Number
30mm beam clamp	K230C
65mm beam clamp	K265C
Cage hanger arms	K2CHC

Attachment option	Kit Part Number
30mm beam clamp	K330C
65mm beam clamp	K365C
Cage hanger arms	K3CHC

Attachment option	Kit Part Number
30mm beam clamp	K430C
65mm beam clamp	K465C
Cage hanger arms	K4CHC

Kit Example.

Kit Part #	Description
K230C	Kit 2 point with heavy duty bracket and 30mm beam clamps



A	1 x 2 point heavy duty bracket	G	2 x 90 degree elbow
B	2 x 30mm S/S beam clamp	H	2 x ¼" BSPF–1/8"BSPM reducer
C	2 x PVC lubricator cover	I	2 x ¼" BSPF -¼"BSPM ext.
D	2 x Soft wet cap	J	4m of 3/8" ID grease line
E	2 x Lubricator support flange	K	4 x Female swivel hose ends
F	2 x Manual purge kit	L	0.5 of Spiral Wrap

perma MOUNTING SYSTEMS

Cage installation kits for perma STAR VARIO

CAGE installation kits are designed for quick attachment to square cage mesh down to 25mm x 25mm.
Lubricators are not included in kits.

Attachment option	Kit Part Number
Cage hanger arms	K1CH

Attachment option	Kit Part Number
Cage hanger arms	K2CH

Attachment option	Kit Part Number
Cage hanger arms	K3CH

Attachment option	Kit Part Number
Cage hanger arms	K4CH

Kit Example.

Kit Part #	Description
K2CH	Kit 2 point with cage bracket

A	1 x 2 point standard duty bracket	F	2 x 90 degree elbow
B	2 x Manual purge kit	G	2 x ¼" BSPF–1/8"BSPM reducer
C	2 x PVC lubricator cover	H	2 x ¼" BSPF -¼"BSPM ext.
D	2 x Soft wet cap	I	4m of 3/8" ID grease line
E	2 x Lubricator support flange	J	4 x Female swivel hose ends

Rail installation kits for perma STAR VARIO

RAIL installation kits incorporate rail mount brackets suited to round rails ranging from 30mm to 50mm outside diameter.
Lubricators are not included in kits.

Attachment option	Kit Part Number
U-bolts	K1RR

Attachment option	Kit Part Number
U-bolts	K2RR

Attachment option	Kit Part Number
U-bolts	K3RR

Attachment option	Kit Part Number
U-bolts	K4RR

Kit Example.

Kit Part #	Description
K2RR	Kit 2 point with rail bracket

A	1 x 2 point rail duty bracket	G	2 x 90 degree elbow
B	2 x U-bolts	H	2 x ¼" BSPF–1/8"BSPM reducer
C	2 x PVC lubricator cover	I	2 x ¼" BSPF -¼"BSPM ext.
D	2 x Soft wet cap	J	4m of 3/8" ID grease line
E	2 x Lubricator support flange	K	4 x Female swivel hose ends
F	2 x Manual purge kit	L	0.5 of Spiral Wrap

Remote mount best practice examples
Electric motors

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
- → Operating conditions
- → Characteristics of proposed lubricant
- → Bearing types
- → Safe access requirements
- → Desired service schedule
- → Duty cycle
- → Motor orientation (vertical or horizontal)

Best practice installation examples

Application	Motor driving Warman slurry pump
Lubricator	STAR VARIO L250
Install Kit	K230C

Application	Motors driving scrubber
Lubricator	STAR VARIO L250
Install Kit	K230C

Application	Motor driving Krebs slurry pump
Lubricator	STAR VARIO L250
Install Kit	K230C

Application	Dragline hoist motor
Lubricator	STAR VARIO M120
Install Kit	Customised kit

Remote mount best practice examples
Slurry pumps

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
- → Wash down procedures
- → Operating conditions
- → Characteristics of proposed lubricant
- → Bearing types & grease entry points
- → Safe access requirements
- → Desired service schedule
- → Duty cycle
- → Typical bearing operating temperatures

Best practice installation examples

Application	Krebs slurry pump
Lubricator	STAR VARIO L250
Install Kit	K265C

Application	Warman slurry pump
Lubricator	STAR VARIO L250
Install Kit	K265C

Application	Warman slurry pump
Lubricator	STAR VARIO L250
Install Kit	K265C

Application	Metso slurry pump
Lubricator	STAR VARIO M120
Install Kit	K230C

Remote mount best practice examples
Conveyor pulley bearings

Lubrication Assessment Criteria

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

- → Bearing types & speeds
- → Operating conditions
- → Safe access requirements
- → Grease performance characteristics
- → Location of grease entry points on bearing housings
- → Seal types
- → Desired service schedule

Best practice installation examples

Application	Bearing & seal
Lubricator	STAR VARIO L250
Install Kit	K2CH

Application	Seal purging with manual bearing lubrication
Lubricator	STAR VARIO L250
Install Kit	K1CHC

Application	Bearing & seals
Lubricator	STAR VARIO L250
Install Kit	K330

Application	Bearing & seals
Lubricator	STAR VARIO L250
Install Kit	K3CH

Remote mount best practice examples
Fans

Lubrication Assessment Criteria

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

- → Bearing types & speeds
- → Operating conditions
- → Safe access requirements
- → Grease performance characteristics
- → Grease base oil viscosity
- → Location of grease entry points on bearing housings
- → Seal types
- → Desired service schedule
- → Bearing temperatures

Best practice installation examples

Application	Jack shaft bearings
Lubricator	STAR VARIO M120
Install Kit	K230

Application	Jack shaft bearings
Lubricator	STAR VARIO M120
Install Kit	K2CH

Application	Jack shaft bearings
Lubricator	STAR VARIO L250
Install Kit	K230C

Application	Jack shaft bearings
Lubricator	STAR VARIO L250
Install Kit	K230C

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