

your global specialist

Reliable under pressure.

Lubrication solutions for air compressors





Protect and optimise your compressors	3
Selected lubricants for air compressors	6
Selected lubricants for the food-processing and pharmaceutical industries	10
Your benefit: additional products and services	13
Klüber Summit Varnasolv – Applications and procedures	14
Our products for lubricators	15
Klüber Summit product selection	16

Protect and optimise your compressors

Compressors have to stand some hard challenges – and they become harder and harder. You know what your compressors have to fulfil: they have to withstand extremely high speeds, temperatures and pressures. On the other hand you expect a reliable compressor with a minimum of downtime. Consequently, choosing the right compressor oil is vital – for the initial fill of a compressor as well as for regular oil changes.

Have you ever considered how lubricants can influence your operating costs? The lubricant is a relatively small investment which can make all the difference. On the following pages, we give you some good reasons to optimise the performance of your compressor with lubricants from Klüber Lubrication.

Reduce maintenance costs

Rotary vane and screw-type compressors must be kept free of oxidation residues to ensure trouble-free operation. Unfortunately, at the higher temperatures associated with compression, varnish can plate out on the rotors, bearings, shafts, and housings, as well as in the separators which leads to costly downtime and expensive repairs. The synthetic lubricants made by Klüber Lubrication consist of selected base oils and special additive combinations suited to the compressor requirements. They ensure that the entire system is kept clear of oxidation residue and sludge for extended compressor life.

When used in reciprocating compressors, our synthetic oils keep valves clean and reduce maintenance to a minimum. They combine superior lubricating properties with special antioxidant additives to provide your compressor with extended drain intervals.

Klüber Lubrication synthetic lubricants also offer a clean operation and reduced parts replacement, all of which significantly cut maintenance costs.

Your benefits:

- Reduced downtime
- Reduced costs for replacement parts, oil filters and oil separators
- Longer oil life
- Prevents deposit on compressor parts

Reduce lubricant consumption

Synthetic lubricants from Klüber Lubrication provide excellent thermal stability, low evaporation loss, excellent shear properties, and superior oxidation resistance. These benefits result in significant decreases in lubricant consumption when compared to conventional mineral oil-based lubricants. For example, rotary screw compressors using our synthetic lubricants can reach drain intervals up to 12,000 hours or over one year. Oil consumption is reduced due to the lubricant's good evaporation resistance. Use Klüber Lubrication synthetic lubricants to extend the oil change intervals in reciprocating compressors to 4,000 hours or one year. The good evaporation stability of our synthetic oils ensures that the oil consumption can be reduced by up to 30 percent.

Your benefits:

- Extended drain intervals
- Less evaporation
- Improved oxidation protection
- Reduced make-up consumption



Save Energy

Energy is a major factor in air compressor operating costs. Synthetic lubricants from Klüber Lubrication offer a significant economic advantage by improving thermal and mechanical efficiency. They exhibit lower coefficients of friction, high thermal stability, and superior heat-transfer ability.

These inherent properties reduce friction and result in reduced power consumption and lower operating temperatures for your compressor.

Reducing oil consumption by keeping oil content in compressed air low

Klüber Lubrication products lead to lower oil vapour content in the compressed air for less oil consumption and better efficiency.

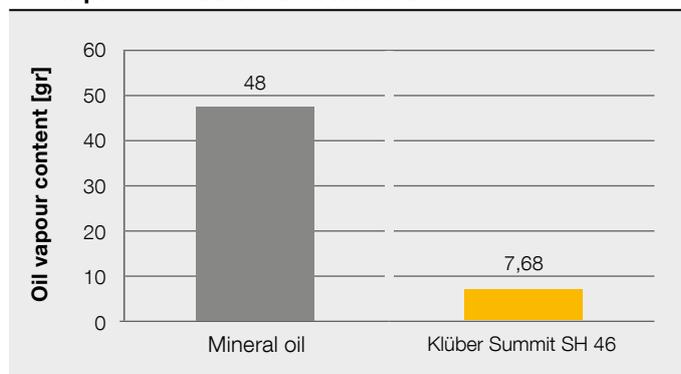
Downstream re-refinery requires less maintenance due to reduced residual oil content in the compressed air, with filter lifetime increasing as a result. This enables savings in terms of maintenance costs.

Field studies have also documented that a 3% to 5% efficiency improvement can be expected from synthetic lubricants. When multiplied over the life of your compressor, this can mean energy savings that significantly reduce your energy costs.

Your benefits:

- Reduced power consumption
- Improved thermal efficiency
- Improved mechanical efficiency
- Reduced friction

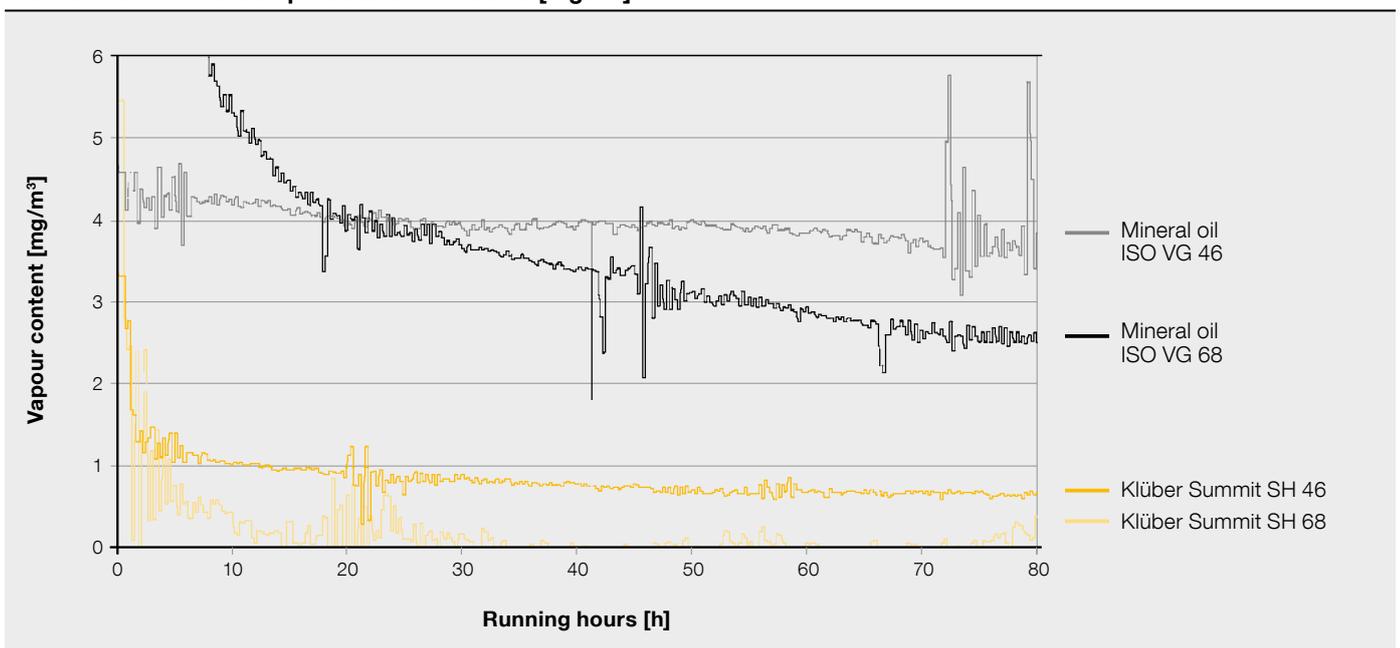
Difference in oil vapour content between Klüber Summit SH 46 and a conventional compressor oil based on mineral oil



Exemplary calculation from an average compressor setup

	Supply quantities			Residual oil content [mg/m³]	Total oil vapour [mg]	For re-refining [gr]
	m³/min	m³/h	m³/day			
Mineral	16	960	9,600	5.0	48,000	48.00
PAO	16	960	9,600	0.8	7,680	7.68

Oil content in the compressed air at 100 °C [mg/m³]



Increase operating safety

The flash point of synthetic lubricants is around 40 °C higher than that of comparable mineral oil products. This makes synthetic lubricants a safer product for compressor use. Even more importantly: The auto-ignition temperature of synthetic lubricants is approx. 70 °C higher than that of comparable mineral oil products at all pressures.

Fires and explosions in reciprocating compressors can usually be traced to deposits of carbon, overlubrication and improper lubricant. Klüber Lubrication synthetic lubricants' excellent cleaning action and superior oxidation resistance keeps your compressor almost carbon-free, providing you with an extra margin of operating safety.

Your benefits:

- Higher auto-ignition temperature
- Virtually a carbon-free system
- Superior oxidation resistance
- Lower operating temperature
- Reduced residue formation
- Longer valve lifetime

Help protect the environment

Klüber Lubrication synthetic lubricants last many times longer than mineral oil-based (2,000–3,000 hours) lubricants resulting in less volume and cost associated with their disposal.

Selected lubricants for air compressors

Klüber Summit TM

Klüber Summit TM 15 was especially developed for the oil-injected screw-type compressors and intended for oil change intervals of up to 3,000¹ operating hours. Compressors can be switched over from conventional mineral oils to Klüber Summit TM 15. Klüber Summit TM 15 is neutral towards most elastomers typically used in air compressors - no leakage is to be expected. Klüber Summit TM 15 was developed for compressors where the use of fully synthetic oils is undesirable or where such oils would not make sense economically due to a limited number of operating hours per year. As Klüber Summit TM 15 has a synthetic base oil component, it shows good resistance to oxidation. This in turn impedes the formation of oxidation residues in the compressor. The oil contains specific inhibitors to keep compressors clean to improve compressor efficiency.

Product data	Klüber Summit TM 15
Viscosity, 40 °C, mm ² /s	ca. 46
Viscosity, 100 °C, mm ² /s	ca. 6.7
Viscosity index	≥ 90
Flash point, °C	≥ 220
Pour point, °C	≤ -30

Klüber Summit PS series

Klüber Summit PS oils are based on high-purity hydrogenated mineral oil and synthetic ester oil especially designed for the lubrication of screw-type, reciprocating piston and vane compressors. They are used for oil change intervals up to 5,000¹ operating hours in oil-injected screw-type compressors. Klüber Summit PS oils can be used for compressors that were previously run with conventional mineral oils. These oils are neutral towards most elastomer seals used in air compressors, therefore leakage is not to be expected.

Klüber Summit PS oils offer good oxidation stability due to the synthetic base oil content, thus minimising oxidation residues in the compressors and extending oil change intervals and the service life of oil filters and separators. Special inhibitors contained in the oil keep the inside of compressors clean and ensure a high efficiency.

Product data	Klüber Summit PS 100	Klüber Summit PS 150	Klüber Summit PS 200	Klüber Summit PS 300	Klüber Summit PS 400
ISO viscosity grade	32	46	68	100	150
Viscosity, 40 °C, mm ² /s	32	46	68	100	150
Viscosity, 100 °C, mm ² /s	5.5	6.8	8.4	10.6	14.3
Viscosity index	≥ 90	≥ 90	≥ 90	≥ 90	≥ 90
Flash point, °C	≥ 200	≥ 210	≥ 230	≥ 240	≥ 240
Pour point, °C	≤ -30	≤ -30	≤ -27	≤ -30	≤ -27
Demulsifying capacity, ml	40/37/3	40/37/3	40/37/3	40/37/3	40/37/3

¹ Under normal operating conditions. As normal operating conditions are considered a discharge temperature of max. 85 °C, a discharge pressure of max. 8 bar, dry and clean intake air, oil cycle > 1.5.



Klüber Summit DSL series

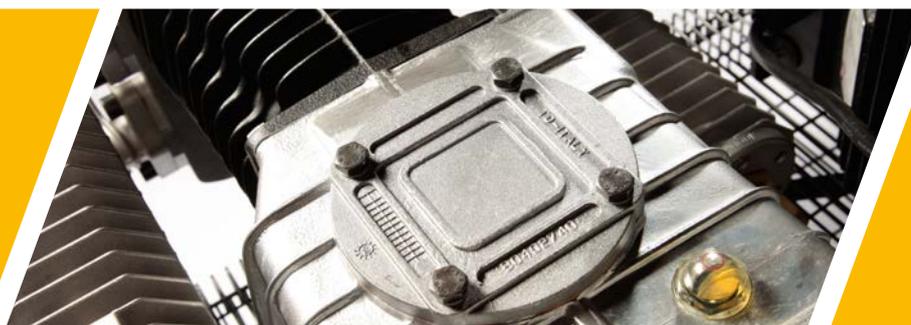
Klüber Summit DSL diester-based synthetic lubricants are unique combinations of quality diester base stocks and the latest additive technology. They are extremely stable to oxidation, have excellent thermal stability, natural solvency and superior lubricity. Special anti-wear additives have been added to protect compressors at times of unusual stress such as start-up and under heavy load conditions.

Klüber Summit DSL series lubricants are specifically designed to allow compressors to operate at optimum efficiency while

eliminating varnish, sludge and carbon deposits. This advantage makes the Klüber Summit DSL series excellent oils, especially for reciprocating piston and vane compressors. Apart from being lubricants for screw compressors, the Klüber Summit DSL series is designed for use in the crankcase as well as in the cylinders of piston compressors.

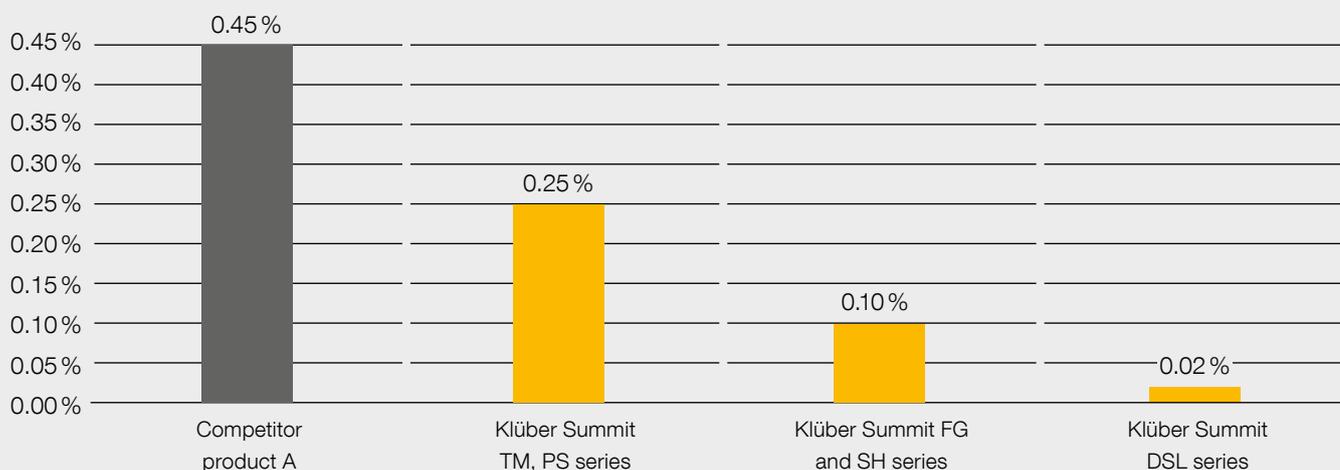
Klüber Summit DSL oils are biodegradable and can be used in all environmentally sensitive areas such as sewage plants, snow machines or maritime applications depending on the official regulations.

Product data	Klüber Summit DSL 32	Klüber Summit DSL 46	Klüber Summit DSL 68	Klüber Summit DSL 100	Klüber Summit DSL 125
ISO viscosity grade	32	46	68	100	–
Viscosity, 40 °C, mm ² /s	32	46	68	100	125
Viscosity, 100 °C, mm ² /s	5.8	5.7	8.3	10.7	13.4
Viscosity index	≥ 70	≥ 50	≥ 90	≥ 90	≥ 90
Flash point, °C	≥ 220	≥ 240	≥ 240	≥ 250	≥ 250
Pour point, °C	≤ -42	≤ -39	≤ -36	≤ -30	≤ -33
Demulsifying capacity, ml	40/37/3	40/37/3	40/37/3	40/37/3	40/37/3
Biodegradability	OECD 301 F	OECD 301 F	OECD 301 F	OECD 301 B	–



Conradson carbon residue* test percentage (%)

The oils of the Klüber Summit series reduce oxidation residues in pistons and valves for extended compressor lifetime.



* ASTM D 189

Klüber Summit Ultima series

Klüber Summit Ultima oils are high-performance lubricants formulated specifically to outperform other synthetic rotary screw, reciprocating piston and vane compressor lubricants on the market. Klüber Summit Ultima employs a unique base stock that allows improvements in oxidation stability and clean compressors. It eliminates oxidation residues, sludge and carbon deposits better than conventional synthetic base oils.

The Klüber Summit Ultima series is compatible with existing OEM-provided lubricants and offers oil change intervals of up to 12,000¹ operating hours under normal operating conditions. It was developed for oil-injected rotary screw compressors that operate under extreme pressures greater than 10 bars and temperatures up to 125 °C.

Product data	Klüber Summit Ultima 46	Klüber Summit Ultima 68
Viscosity, 40 °C, mm ² /s	52	65
Viscosity, 100 °C, mm ² /s	7.5	9.3
Viscosity index	≥ 90	≥ 100
Flash point, °C	≥ 248	≥ 246
Pour point, °C	≤ -39	≤ -39

¹ Under normal operating conditions. As normal operating conditions are considered a discharge temperature of max. 85 °C, a discharge pressure of max. 8 bar, dry and clean intake air, oil cycle > 1.5.

Klüber Summit SH series

Klüber Summit SH series is manufactured from selected base oils (PAO) and a special additive package designed for the demanding service conditions associated with air compressors. They are recommended for rotary screw, vane and reciprocating compressors and are compatible with most elastomers. Due to their composition, Klüber Summit SH oils keep the compressors clean, extend oil change intervals and the service life of oil filters and separators. Oil change intervals of up to 10,000¹ hours can be achieved.

Owing to the evaporation stability of the base oil, the oil vapour content in the compressed air can be considerably reduced. This contributes to a reduction of oil consumption and clean compressed air; gumming of pneumatic valves in the compressed air circuit can be prevented as well due to the low oil vapour content of the Klüber Summit SH oils. Their tailor-made formulation makes Klüber Summit SH oils the first choice for rotary screw compressors.

Klüber Summit SH 46 XS

Klüber Summit SH 46 XS was especially developed for the lubrication of highly loaded rotary screw compressors which require an oil formulated without the use of silicone raw materials. It is recommended for oil-injected rotary screw compressors with oil change intervals of up to 10,000¹ operating hours. Our experience so far has shown that the raw materials of Klüber Summit SH 46 XS are paint-compatible and thus do not interfere with the quality of a paint finish. In view of the many different paint systems and testing criteria, paint compatibility tests should be performed prior to series application.

Product data	Klüber Summit SH 32	Klüber Summit SH 46	Klüber Summit SH 46 XS	Klüber Summit SH 68	Klüber Summit SH 100
ISO viscosity grade	32	46	46	68	100
Viscosity, 40 °C, mm ² /s	32	46	46	68	100
Viscosity, 100 °C, mm ² /s	5.8	7.3	7.2	9.8	13.1
Viscosity index	≥ 115	≥ 115	≥ 115	≥ 115	≥ 115
Flash point, °C	≥ 230	≥ 240	≥ 240	≥ 240	≥ 240
Pour point, °C	≤ -51	≤ -36	≤ -36	≤ -36	≤ -33
Demulsifying capacity, ml	40/37/3	40/37/3	43/37/3	40/37/3	40/37/3

¹ Under normal operating conditions. As normal operating conditions are considered a discharge temperature of max. 85 °C, a discharge pressure of max. 8 bar, dry and clean intake air, oil cycle > 1.5.

Selected lubricants for the food-processing and pharmaceutical industries

Klüber Summit food-grade oils

Klüber Lubrication offers special compressor oils for the food-processing and pharmaceutical industries.

The Klüber Summit FG series is registered as NSF H1 and therefore complies with FDA 21 CFR 178.3570. It was developed for incidental contact with products and packaging materials in the food-processing, cosmetics, pharmaceutical or animal feed industries.

The products are produced in accordance with ISO 21469, supporting compliance with hygienic requirements in the food-processing, beverage and pharmaceutical industries. The use of these products can contribute to increasing the reliability of your production processes. Nevertheless, we recommend conducting an additional risk analysis, e.g. HACCP.



Note:

When switching a used compressor oil to a Klüber Lubrication food-grade product, drain old oil from the whole circuit of compressor while still warm. We also recommend exchanging oil filters and separators. Then refill the compressor with Klüber Lubrication food grade oil. When switching from mineral oil to a synthetic Klüber Summit food-grade oil, please bear in

mind that the compressor may contain oxidation residues that can affect the service life of the fresh Klüber Summit food grade oil. The compressor should be cleaned using the Klüber Summit Varnasolv conditioner. After switching to a Klüber Summit food-grade oil, it is recommended to determine the oil change interval through an oil analysis or the Klüber Summit TAN Kit after approx. 500 to 1,000 operating hours.



Klüber Summit FG series

Klüber Summit FG series lubricants are formulated from the latest synthesised hydrocarbon technology and are designed for the lubrication of rotary screw, vane and reciprocating piston compressors used in the food-processing industry. These oils are also suitable for gear lubrication in oil-free screw type compressors.

The synthetic base-fluid is blended with a special additive package providing extended lubricant life and protecting against wear, rust and corrosion. Oil change intervals up to 5,000 operating hours can be achieved, extending the normal lifetime achieved with conventional medical white oils 4 to 5 times.

Product data	Klüber Summit FG 100	Klüber Summit FG 200	Klüber Summit FG 250	Klüber Summit FG 300	Klüber Summit FG 500
ISO viscosity grade	32	46	68	100	150
Viscosity, 40 °C, mm ² /s	32	46	68	100	150
Viscosity, 100 °C, mm ² /s	5.8	7.5	10.4	13	19
Viscosity index	≥ 120	≥ 120	≥ 120	≥ 120	≥ 120
Flash point, °C	≥ 230	≥ 240	≥ 250	≥ 250	≥ 250
Pour point, °C	≤ -50	≤ -50	≤ -48	≤ -45	≤ -39
Demulsifying capacity, ml	43/37/3	43/37/3	43/37/3	43/37/3	43/37/3

Klüber Summit FG Elite 46

Klüber Summit FG Elite 46 is a compressor oil especially developed for the food-processing and pharmaceutical industries. It clearly outperforms conventional H1 compressor oils. Its high-quality base oils and special additive package tuned to the requirements of air compressors offer excellent oxidation stability. Due to the innovative product concept, the formation of oil-related residues is reduced and oxidative deposits or sludge build-up minimised. These benefits enable longer oil change intervals and service life of oil filters and separators.

Product data	Klüber Summit FG Elite 46
ISO viscosity grade	46
Viscosity, 40 °C, mm ² /s	46
Viscosity, 100 °C, mm ² /s	7.6
Viscosity index	132
Flash point, °C	≥ 230
Pour point, °C	≤ 34
Demulsifying capacity	43/37/3

Klüber Summit Supra 32 and Supra Coolant

Klüber Summit Supra 32 and Klüber Supra Coolant are synthetic compressor oils made to suit the requirements of rotary screw compressors made by Sullair and Ingersoll-Rand. These polyglycol-ester blends are formulated to surpass manufacturers' specifications for compressor coolants. They are exceptional in terms of varnish-free operation, low volatility and bearing wear protection. They provide oil change intervals up to 8,000 hours.

Their chemical composition ensures excellent adhesion on metal surfaces for extended component lifetime. These specialised compressor coolants can be used if the first fill oils were based on polyglycol. They are not miscible with mineral oil and PAO.

Product data	Klüber Summit Supra 32	Klüber Summit Supra Coolant
Viscosity, 40 °C, mm ² /s	38	55
Viscosity, 100 °C, mm ² /s	7.3	9.5
Viscosity index	≥ 145	≥ 145
Flash point, °C	≥ 230	≥ 240
Pour point, °C	≤ -45	≤ -36

Klüber Summit T.A.N.-Kit

Checking the oil condition was never so simple

The Klüber Summit T.A.N.-Kit has been especially designed for the simple and rapid determination of the neutralisation number to assess the ageing condition of compressor oils on the spot.

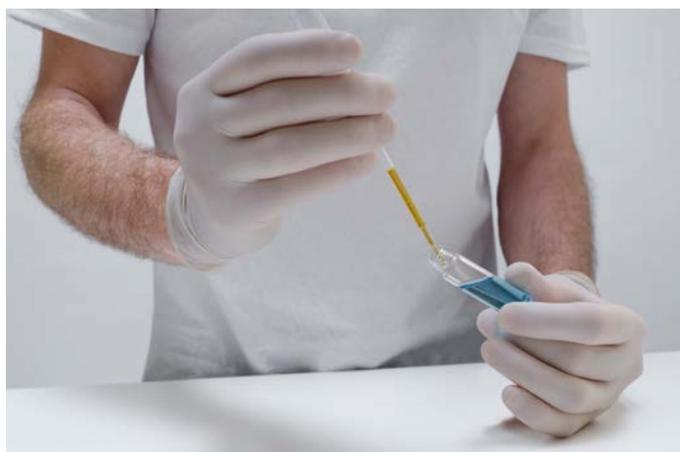
With a change in colour of the T.A.N.-Kit with 1 ml of the oil sample, come to know about the condition of your oil immediately.

The Klüber-Summit T.A.N.-Kit can be used to test all conventional mineral and synthetic compressor oils. The T.A.N.-Kit measures the neutralisation number in the range of 0 to 2 mg KOH/g. However, it should not be used for oils with a neutralisation number above 2.0 mg KOH/g of fresh oil.

Oil analysis programme

Klüber Lubrication's commitment to service continues after the sale by providing an oil analysis programme. You can take advantage of the oil analysis programme that is designed to give a complete overall view of the physical and chemical characteristics of the lubricant in use.

This analysis allows to detect any significant lubricant deterioration as well as discover machinery problems before they become serious and result in expensive repairs.



Your benefit: additional products and services



Klüber Summit Varnasolv Compressor varnish cleaner

Klüber Summit Varnasolv is a concentrated conditioner fluid containing synthetic ester oil and cleaning additives. It is miscible with mineral oils, synthetic hydrocarbons, ester oils and polyglycols. Klüber Summit Varnasolv was especially developed for cleaning rotary screw compressors, vane compressors, hydraulic systems, gears and other oil circulating systems.

Mineral oil-based compressor oils can cause deposits and oxidation residues, especially in oil-injected screw compressors and rotary vane compressors, which can settle anywhere in compressor.

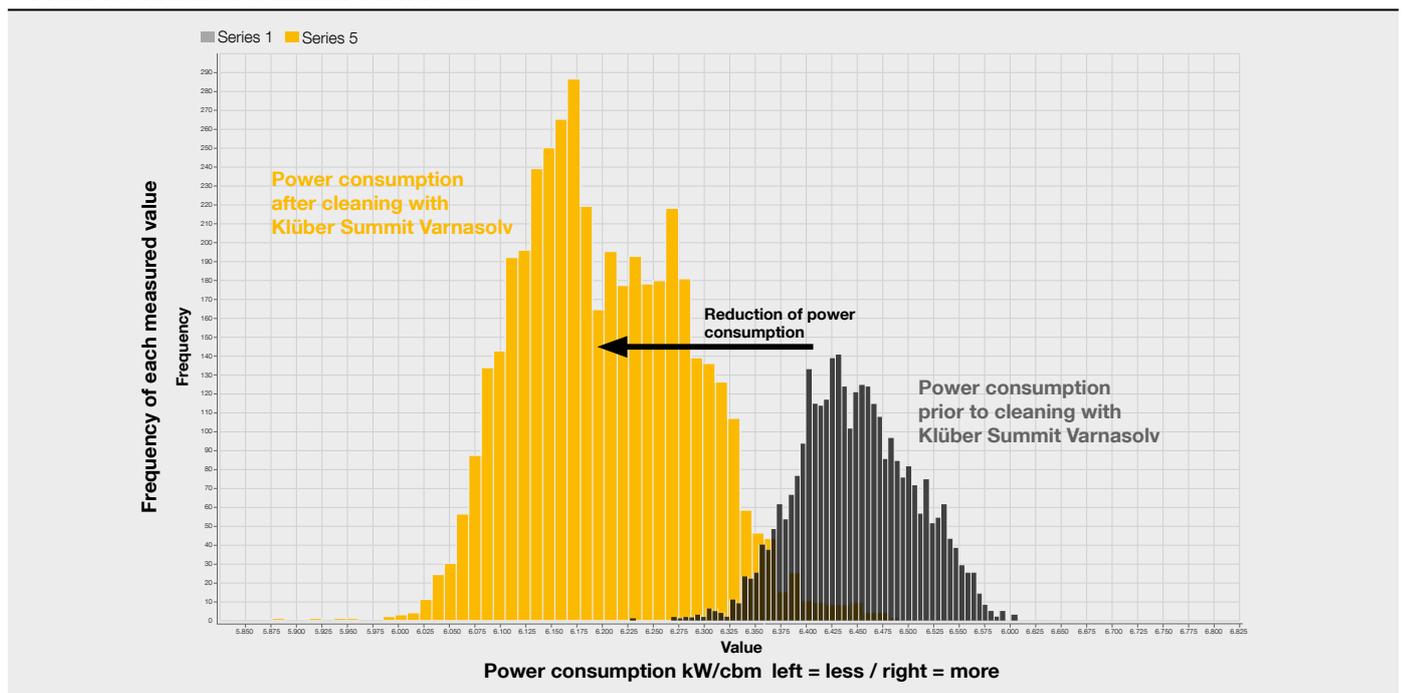
This often results in increased energy consumption, increased temperature, clogged oil lines and filters and high maintenance

costs and downtime. Klüber Summit Varnasolv is a fluid cleaning concentrate designed to dissolve sticky residues during operation and keep them suspended in the oil. The compressor unit does not have to be dismantled for cleaning purposes. The oil containing the residues is drained during oil change and the compressor is filled with fresh oil.

Klüber Summit Varnasolv is added to the oil fill at a concentration of 10% (1 l Klüber Summit Varnasolv to 10 l oil fill) after a sufficient amount of oil has been drained from the system. The compressor unit is then operated for 40 to 60 h, ideally at an operating oil temperature of 70–80 °C. Oil filters and separators should be replaced afterwards and fresh oil is to be filled into the compressor.

As the compressor can be cleaned while in operation, downtime can be minimised and compressor efficiency increased.

Field test Klüber Summit Varnasolv



The field test shows that power consumption decreased by 5% on average when using Klüber Summit Varnasolv

Klüber Summit Varnasolv – Applications and procedures

The procedures described below refer to rotary screw compressors. For other compressor types, please make sure you use the correct viscosity. We recommend performing an oil analysis prior to every cleaning operation to determine the exact cause of the problem. In particular with regard to problems with oil-water separation, we recommend performing

an oil analysis prior to cleaning to determine the reason for the formation of an emulsion. Also in cases where the oil reacted with ambient conditions, we recommend performing an oil analysis to determine the reason for this. It may be necessary to recommend a different oil. Please also refer to the product information leaflet for further details.

Changeover / light contaminations	Strong contaminations	Changeover to H1
Changeover in equipment operated with mineral oils for a long time	Very contaminated equipment subject to: <ul style="list-style-type: none"> – high residue formation – temperature issues – strongly oxidised oils 	Changeover of equipment from non-H1 compliant lubricants (mineral oil, semi or fully synthetic) to H1.
Drain 10–15% of the oil fill quantity while warm	Drain the oil completely while warm	Drain 10–15% of the oil fill quantity while warm
Fill with 10–15% Klüber Summit Varnasolv	Fill the equipment with 10–15% Varnasolv and Klüber Summit DSL46	Fill with 10–15% Klüber Summit Varnasolv
Operate the equipment filled with this mixture for 40 to 60 hours (maximum 80 hours) under operating conditions		
Drain complete oil quantity while warm		Drain complete oil quantity while warm
		Fill equipment up to the MIN oil fill level (observe warning lights) with Klüber Summit Elite 46
		Operate equipment for approx. 15–30 mins.
		Drain complete oil quantity while warm
Change all filters		
Fill with correct amount of Klüber Summit compressor oil		Fill with correct amount of Klüber Summit H1 compressor oil

Our products for lubricators



We offer you special oils for lubricators in two viscosities and NSF H1 registration if required. These oils can be used for pneumatic installations like compressed air tools, compressed-air conditioners, air systems in weaving machines and air pipes or to extend the lifetime of friction points like cylinders, valves and tappets.

Product data	AIRPRESS 15	AIRPRESS 32	Klüber Summit HySyn FG 15	Klüber Summit HySyn FG 32
Base oil type	Mineral oil and ester oil	Mineral oil and ester oil	PAO	PAO
NSF H1 registered	no	no	yes	yes
ISO viscosity grade	15	32	15	32
Viscosity, 40 °C, mm ² /s	approx. 16	approx. 32	approx. 15	approx. 32
Lower service temperature, °C	-30	-15	-45	-45
Upper service temperature, °C	100	100	100	120
Density, DIN 51757, 20 °C	approx. 0.88 g/cm ³	approx. 0.87 g/cm ³	approx. 0.82 g/cm ³	approx. 0.83 g/cm ³

Klüber Lubrication compressor oils – your benefits

- Reduced downtime
- Higher compressor availability
- Reduced costs for replacement parts like oil filters and separators as well as for oil
- Less strain on the environment due to lower energy consumption and lower disposal quantities
- Reduced friction in the compressor and better volumetric efficiency
- Low pour point
- Excellent water demulsibility
- For oil change intervals of up to 12,000 hours depending on the operating conditions and type of oil
- Klüber Summit compressor oils have also proven effective for the lubrication of gears in oil-free rotary screw compressors
- Klüber Summit Supra 32 and Klüber Summit PS 100 compressor oils have also proven effective for the lubrication of gears in oil-free rotary screw compressors

What's more: You can contact Klüber Lubrication for advice regarding refrigeration and process gas compressors. Just provide information on the gas flow to be compressed and we determine the right viscosity and the right product to obtain the required operating viscosity. And Klüber Lubrication has many more services to offer you.

Klüber Summit product selection

Which oil to use for which compressor

	Klüber Summit TM	Klüber Summit PS	Klüber Summit SH
Rotary screw compressor formerly filled with mineral oil	✓ For change intervals up to 3,000 op. hrs.	✓ For change intervals up to 5,000 op. hrs.	○
Rotary screw compressor formerly filled with semi-synthetic oil	○	✓ For change intervals up to 5,000 op. hrs.	✓ For change intervals up to 12,000 op. hrs.
Rotary screw compressor formerly filled with fully synthetic oil	○	○	✓ For change intervals up to 12,000 op. hrs.
Rotary screw or vane compressors formerly filled with H1-registered oil	X	X	X
Rotary screw compressor with heat recovery	○	○	✓ For change intervals up to 12,000 op. hrs.
Rotary screw compressor formerly filled with polyglycol-ester oil	X	○	○
Piston compressor formerly filled with mineral oil	X	X	X
Piston compressor formerly filled with fully synthetic oil	X	✓ For extended change intervals	X
Rotary compressor formerly filled with mineral oil	X	○	X
Rotary compressor formerly filled with fully synthetic oil	X	✓ For change intervals up to 5,000 op. hrs.	○

✓ = The optimum solution for your changeover

○ = Technically feasible

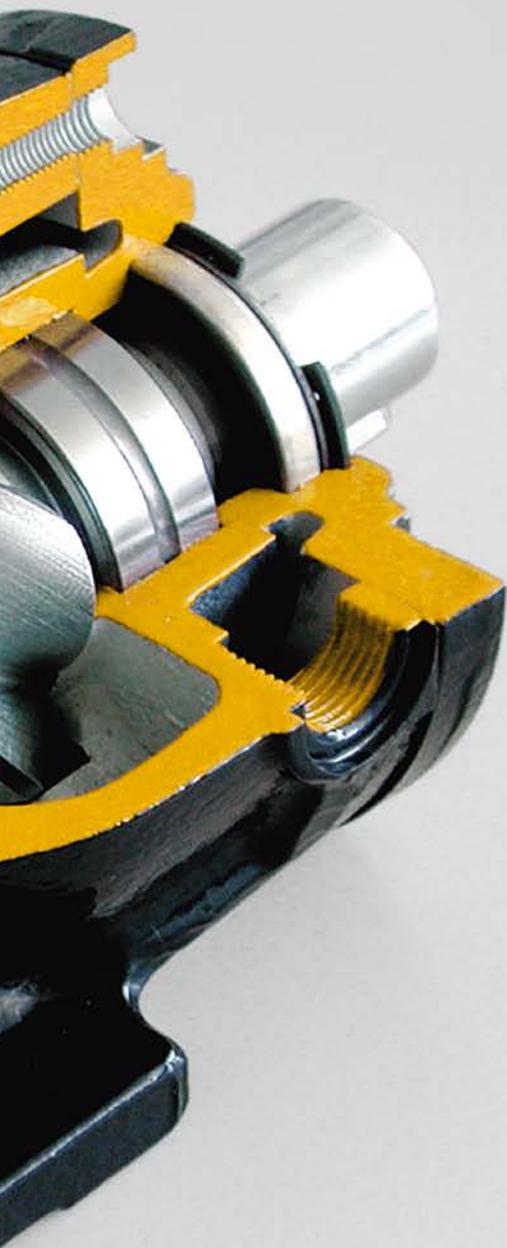
X = Not recommended for this changeover

Operating hours (op. hrs.)



	Klüber Summit FG	Klüber Summit FG Elite	Klüber Summit DSL	Klüber Summit Supra	Klüber Summit Ultima 46
	○	✓ For change intervals up to 8,000 op. hrs.	X	X	✓ For change intervals up to 12,000 op. hrs.
	○	✓ For change intervals up to 8,000 op. hrs.	X	X	✓ For change intervals up to 12,000 op. hrs.
	○	○	X	○	✓ For change intervals up to 12,000 op. hrs.
	✓ For change intervals up to 5,000 op. hrs	✓ For change intervals up to 8,000 op. hrs. (Rotary screw compressor)	X	X	X
	X	○	X	○	✓ For change intervals up to 12,000 op. hrs.
	X	X	✓ For change intervals of 8,000 op. hrs	X	X
	X	X	X	✓ For change intervals of 8,000 op. hrs	✓ For change intervals up to 12,000 op. hrs.
	X	X	○	X	X
	X	X	✓ For change intervals up to 4,000 op. hrs	X	X
	X	X	○	X	X





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Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 85 years.