

ADDINOL[®]

THE ART OF OIL • SINCE 1936

➤ **ADDINOL High-performance Lubricants
for Wind Turbines**





➤ **ADDINOL – German Quality since 1936** **Solutions for all lubrication-related challenges**

ADDINOL is one of the few companies in the German mineral oil industry acting independently of any large business group and has distributor partners on all continents in more than 90 countries. Our high-performance lubricants are design elements reflecting the most recent state-of-the-art. Development and production are carried out according to latest standards at the chemical site in Leuna in the heart of Germany. Our lubricants reveal their full performance in symbiosis with engines, drives, chains, bearings and hydraulic systems.

ADDINOL provides intelligent solutions which guarantee optimum lubrication and ensure responsibility towards the environment at the same time. Many of our high-performance lubricants increase energy efficiency of plants and engines considerably. They achieve significantly longer drain intervals compared to conventional products and extend the service life of the components lubricated.

ADDINOL – Improve the Performance!



Now and then – Research and development make up a vital part of our company's core competence.



➤ ADDINOL Lubricants for wind turbines Safe operation at maximum efficiency

The generation of energy from wind power brings significant benefits for the environment. For operators, a wind turbine can be lucrative business too. However, in order to ensure that everything falls into place, all aspects need to be looked at. After all, wind turbines are high-maintenance and cost-intensive capital goods.

For this reason, their safe, reliable and efficient operation is of high importance – especially considering the extreme conditions prevailing in their operation. Daily challenges are best described by highest loads, which vary frequently and in a wide range depending on changing wind force, vibrations, varying ambient conditions and humidity especially for offshore plants. All these taken together mean enormous demands on gears, hydraulic units and bearings. Here, high-performance lubricants have the function of design elements ensuring:

- ✓ **reliable protection against corrosion and wear**
- ✓ **highest reliability of operation**
- ✓ **long operating lives**
- ✓ **minimum maintenance effort**

ADDINOL high-performance lubricants are available in more than 90 countries and on all continents. The range provides the optimum product for all points of lubrication, perfectly tailored to highest loads and extreme operating conditions. Product application is accompanied by comprehensive service, oil analyses at regular intervals and competent support.

**ADDINOL high-performance lubricants
For maximum safety and reliable operation**



ADDINOL Eco Gear 320 W

Synthetic high-performance gear oil with Advantec technology For highest loads in most modern plants at the latest state-of-the-art

- › temperature range between -48 and +140 °C depending on plant design
- › outstanding low temperature behaviour for reliable pumpability also at distinct sub-zero temperatures
- › lowers friction coefficient and thus increases efficiency
- › particularly recommended at critical thermal conditions and high specific, dynamically changing loads
- › naturally stable viscosity index also at high loads and over long periods
- › superior load bearing capacity
- › reliable protection against wear, friction and oil ageing
- › best anti-corrosion behaviour towards steel and non-ferrous metals
- › significantly reduced costs for maintenance and disposal, minimised downtimes
- › high stability towards the impact of water
- › excellent demulsibility
- › prevents foam formation
- › good compatibility with all sealing agents
- › free of solids
- › best filterability

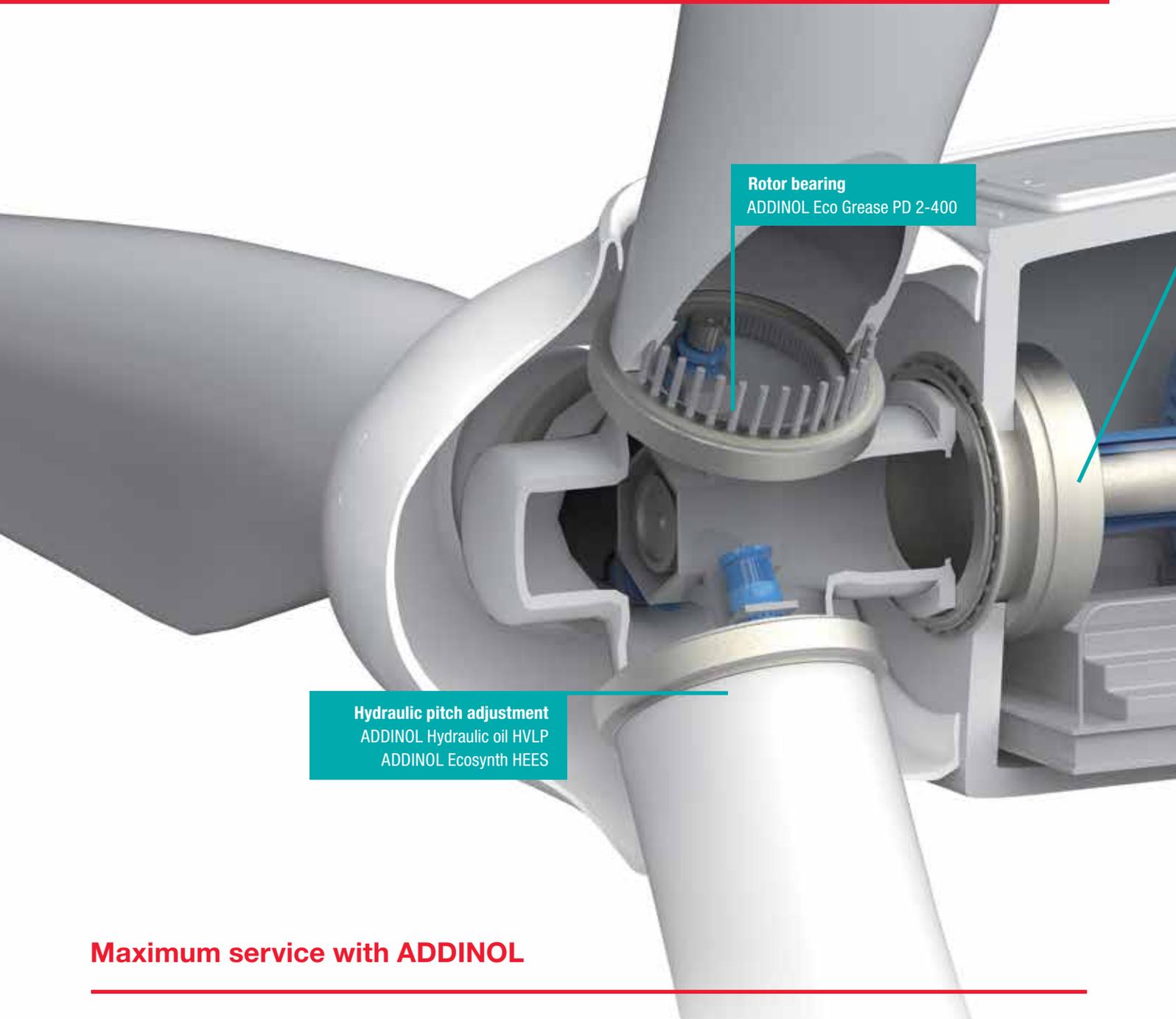
ADDINOL Eco Gear S and M

Synthetic high-performance gear oils with Surftec® technology For highest loads in toothings prone to micro-pitting

- › adapt to changing load conditions in gear teeth
- › increase load bearing capacity of tooth flanks
- › tried and proven Surftec® technology against wear, material removal, pitting and fatigue
- › re-smoothing of damaged friction surfaces
- › temperature range between -30 and +120 °C depending on construction type
- › superior load bearing capacity
- › stable viscosity index
- › low foaming tendency
- › high scuffing load capacity at low circumferential speed and mixed friction conditions
- › best anti-corrosion behaviour towards steel and non-ferrous metals
- › significantly reduced costs for maintenance and disposal
- › high stability towards the impact of water, best corrosion protection
- › excellent demulsibility
- › good compatibility with all sealing agents
- › free of solids, best filterability
- › lowers friction coefficient, increases efficiency



➤ ADDINOL High-performance lubricants



Rotor bearing
ADDINOL Eco Grease PD 2-400

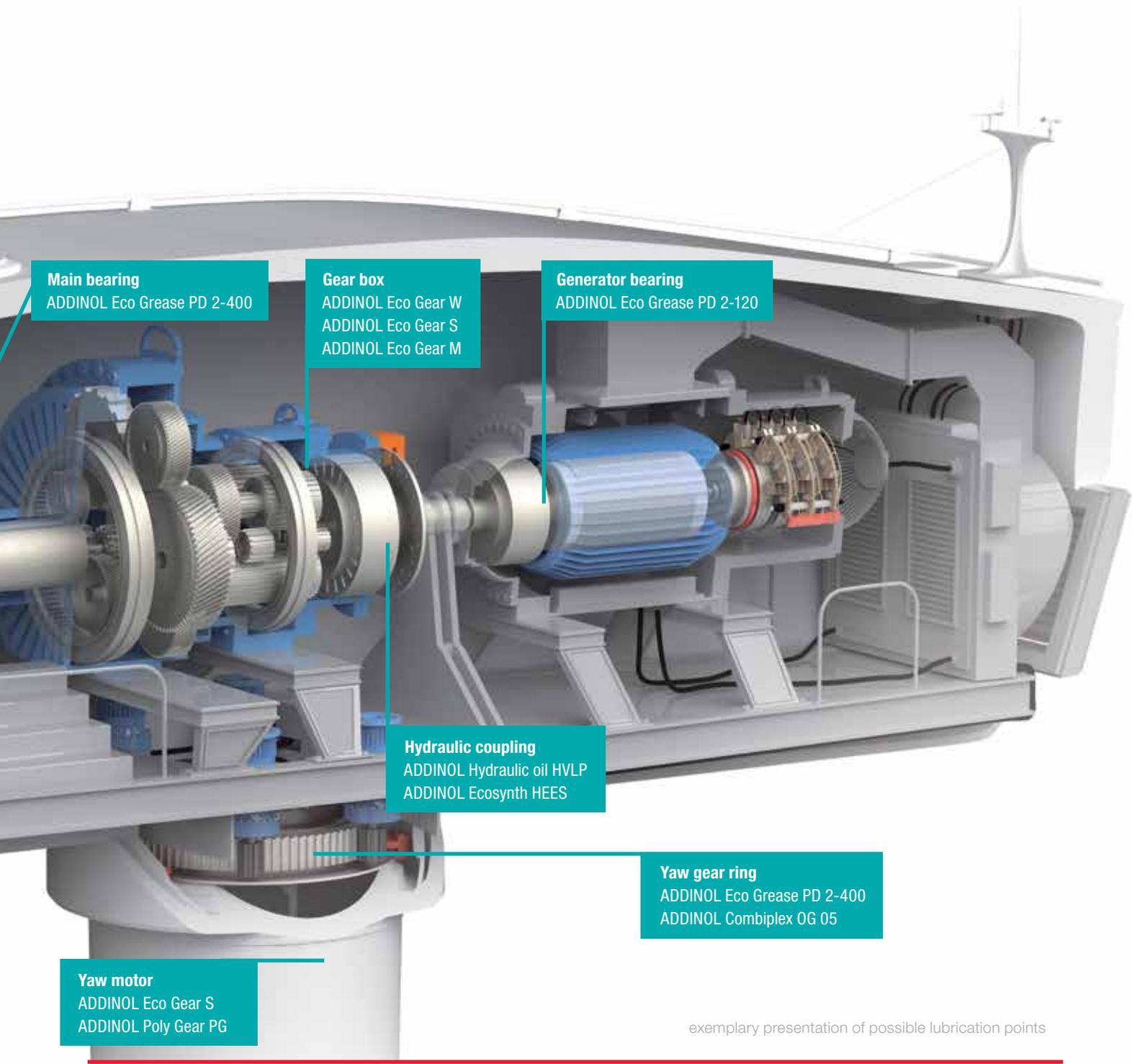
Hydraulic pitch adjustment
ADDINOL Hydraulic oil HVLP
ADDINOL Ecosynth HEES

Maximum service with ADDINOL

Minimise the risk of unscheduled downtimes, plan necessary maintenance and monitor the condition of oil and plant! We accompany the application of ADDINOL high-performance lubricants with our tried and proven analyses service.

Gear boxes, bearings and hydraulic units of a wind turbine are sensitive plant components exposed to a series of extreme conditions. The reliable assessment of their state is possible by the help of oil analyses. Equipment and plant manufacturers

as well as insurance companies explicitly demand such monitoring. The analyses service of ADDINOL is carried out in cooperation with leading independent laboratories and entails more than just meeting the above mentioned standards. Determined parameters provide specific information on the condition of oil and plant. The analyses results are checked and assessed in Leuna individually and for every single plant. The experts of ADDINOL are familiar with basic conditions and oil parameters. Thanks to careful monitoring, they reliably and promptly detect even the slightest changes and irregularities and react immediately.



Main bearing
ADDINOL Eco Grease PD 2-400

Gear box
ADDINOL Eco Gear W
ADDINOL Eco Gear S
ADDINOL Eco Gear M

Generator bearing
ADDINOL Eco Grease PD 2-120

Hydraulic coupling
ADDINOL Hydraulic oil HVLP
ADDINOL Ecosynth HEES

Yaw gear ring
ADDINOL Eco Grease PD 2-400
ADDINOL Combiplex OG 05

Yaw motor
ADDINOL Eco Gear S
ADDINOL Poly Gear PG

exemplary presentation of possible lubrication points

Parameters such as oil condition and additive content permit statements on loads, possible changes in operating conditions and the further useability of the applied lubricants. They also reveal contaminants and impurities. Single wear elements give insight into the maintenance state of plant components and early point to possible disturbances or damages. Furthermore, combinations of different wear elements often give useful clues for preventive maintenance. Thanks to the ADDINOL analyses service operators and service companies can closely monitor their plants. They can both plan necessary maintenance conveniently and react early to possible damages.

The advantages for operators and service companies at a glance:

- › **condition monitoring of oil and plant**
- › **better planning of maintenance and oil change**
- › **recommendation of optimum oil operating life**
- › **expert monitoring and application support**
- › **highest safety of operation**

ADDINOL Hydraulic oil HVLP 15, 32, 46

High-quality hydraulic fluids based on mineral oil

For hydraulic units in outdoor operation at varying temperatures and under difficult conditions

- › multi-grade characteristics for wide temperature range
- › clearly exceeds requirements of common standards
- › stable performance both for starting at low and operating at high temperatures
- › stable viscosity index guarantees safe power transmission and precise adjustment over long periods
- › highly ageing resistant for application terms above-average
- › reliable protection against corrosion and wear for long component lifetimes
- › best filterability reduces wear and oil ageing
- › outstanding air and water separation

ADDINOL Ecosynth HEES 32 and 46

Biodegradable hydraulic oils based on ester

For outdoor hydraulics in ecologically sensitive areas

- › multi-grade characteristics for usage in outdoor hydraulics
- › depending on unit design temperatures between -20 (-25 respectively) and +90 °C possible
- › free of zinc and heavy metals
- › safe protection against wear and corrosion for long component lifetimes
- › excellent viscosity-temperature-behaviour for extended applications (compared to products based on rapeseed oil)

ADDINOL Eco Grease PD 2-120 and ADDINOL Eco Grease PD 2-400

High-performance lubricants with tailored additive technology

Eco Grease PD-2-120 (mineral oil based, lithium soap) for long-term lubrication of high-speed generator bearings, Eco Grease PD 2-400 (synthetic oil, lithium complex soap) for bearings running at low speed and working under highest loads

- › temperature range for PD 2-120 between -35 and +140 °C, for PD 2-400 from -38 up to +180 °C
- › tried and proven PD-effect* against micro-pitting and pitting
- › re-smoothing of damaged friction surfaces,
- › ideal for extreme pressures, strong vibrations, temperature variation and impact loads
- › high scuffing load capacity also at low circumferential speed and mixed friction conditions
- › reliable protection against corrosion for extended component lifetimes
- › reduction of friction coefficient and power loss reduces thermal loads on all bearing components
- › free of solids and silicone
- › pumpable in central lubrication systems (SKF as well as Lincoln and Vogel, Bijur Delimon), PD 2-400 also for manual lubrication with long intervals

ADDINOL Combiplex OG 05

Lithium-calcium-soap complex grease based on mineral oil

For bearings at low speed and high pressure loads

- › extremely high load bearing capacity for high loads and difficult conditions
- › reliable protection against corrosion for long component lifetimes
- › temperature range from -30 up to +140 °C, short-term peaks up to +180 °C
- › high water resistance
- › pumpable in central lubrication systems

ADDINOL	Product characteristics	Temperature range in °C	Specifications
High-performance gear oils			
Eco Gear 150 W ... 460 W	for toothing surfaces of highest quality (super-finishing) outstanding low-temperature behaviour for use also at extreme sub-zero temperatures	-48 up to +140	DIN 51517-3 (CLP), ISO 12925-1 AGMA 9005-E02
Eco Gear 100 S ... 680 S	for high loads and toothings prone to micro-pitting, synthetic base oil	-30 up to +120	DIN 51517-3 (CLP), ISO 12925-1
Eco Gear 100 M ... 680 M	for high loads and toothings prone to micro-pitting, mineral base oil	-10 up to +100	DIN 51517-3 (CLP), ISO 12925-1
Hydraulic fluids			
Hydraulic oil HVLP 15, 32, 46	for outdoor hydraulics in all-season operation at varying ambient temperatures and difficult conditions	up to -30, maximum +90	DIN 51524-3 (HVLP) DIN EN ISO 6743-4 (HV) AFNOR NF E 48603 (HV) CETOP RP 91 H (HV) ISO 11158
Ecosynth HEES 32, 46	for outdoor hydraulics in all-season operation biodegradable zinc-free additive technology	-20/25 up to +90	DIN 51524-2 (HLP) DIN 51524-3 (HVLP) DIN ISO 15380 VDMA 24568 biodegradable: acc. to CEC-L-33-T-82 (min. 95%), acc. to DIN ISO 15380 (min. 60%)
Lubricating greases			
Eco Grease PD 2-120	for generator bearings at high speed	-35 up to +140	NLGI 2 KP2N-35
Eco Grease PD 2-400	for bearings at low speed and under high loads (main, azimuth and rotor bearings)	-38 up to +180	NLGI 2 KPHC2R-35
Combiplex OG 05	for bearings at low speed (rotor and azimuth bearings), gear rings and open greasing points	-30 up to +140 (short term +180)	NLGI 0-1 KPGOG0-1N-30
Service lubricants			
Gear oil CKT 68 ... 460	fully synthetic gear oil based on PAO for flushing gears before changing over or as needed	-30 up to +120	DIN 51517-3 (CLP)
Poly Gear PG 220, 320	fully synthetic gear oil on PG basis for worm gears of servomotors	up to +120	DIN 51517-3 (CLP)
System Cleaner 1-33	highly efficient cleaning concentrate for heavy contaminations in hydraulic circuits and gears, application recommended before oil change		
Grease spray W	universal lubricant for moving components and sliding bearings, water repellent, corrosion protection		
Universal cleaning spray	highly fit for cleaning and care, used for degreasing and removing residues on moving components, compatible with conventional rubber and plastic materials		
Electro-contact spray	cleaning and care for electrical contacts and components		

handed over by:

ADDINOL Lube Oil GmbH

High-performance lubricants

Am Haupttor, D-06237 Leuna/Germany
 Phone: +49 (0)3461 - 845 - 111
 Fax: +49 (0)3461 - 845 - 555
 E-Mail: info@addinol.de



www.addinol.de