LUBMANN
Centralized Lubrication System

WIND TURBINE INTELLIGENT LUBRICATION AND HYDRAULIC TECHNOLOGY SOLUTIONS

AUTOMATIC GREASE REPLACEMENT SYSTEM ADDED VALUE

Maintain 5S on the working site; Reduce potential safety hazards

Traditional lubrication method: unable to discharge old bearing grease, rising bearing internal pressure, damaged bearing seal, leakage of lubrication grease, environmental pollution and great potential safety hazards.

Automatic grease replacement system: solving the problems of bearing seal damage and grease leakage, keeping the cabinet clean and tidy, and eliminating potential safety hazards.

A ladder covered with oil droplets

New gloves soaked with oil
just off the machine

Too much oil stain in the hub

Reduce labor intensity of operators

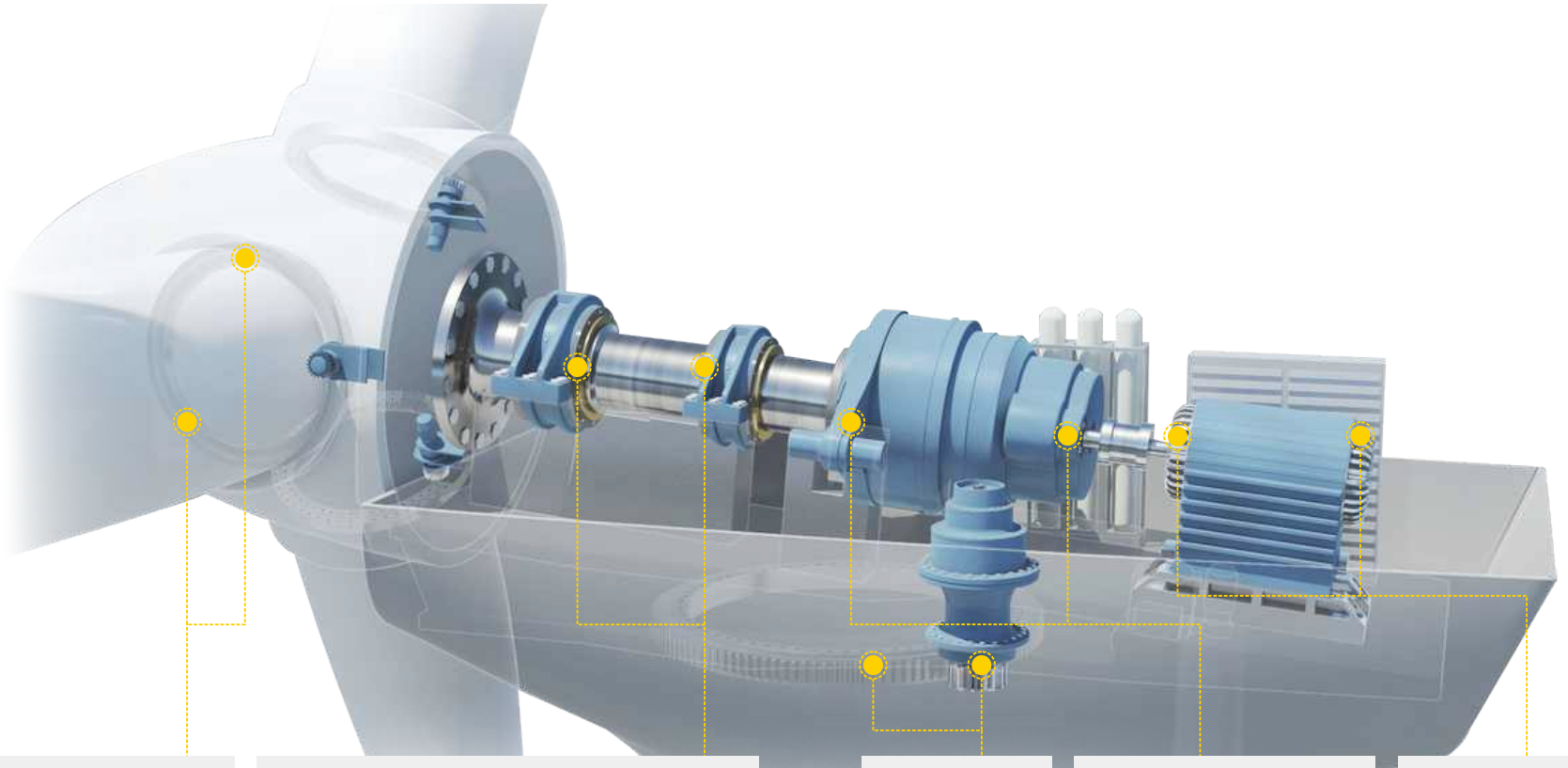
For wind turbines without automatic grease replacement system, it takes long woriking time and heavy workload for operators to wipe and clean the lubrication grease covered in the cabinet.

For wind turbines installed with grease replacement system, it takes short time for oprators to simply replace only the grease collecting bottles.

Reduce O&M costs

During the design life of turbines up to 20 years, some critical components such as bearings tend to fail prematurely due to various extreme environmental influences. Good and high-quality lubrication can effectively prolong the service life of bearings, reduce running malfunctions, thus lowering maintenance frequency and cost.

WIND TURBINE INTELLIGENT LUBRICATION AND HYDRAULIC TECHNOLOGY SOLUTIONS



Grease lubrication system

Waste grease collection system

Bearing cleaning

Seal replacement

Main Shaft Bearing

- Grease lubrication system
- Oil lubrication system
- Waste grease collection system
- Seal replacement
- Working condition monitoring (grease condition,temperature, vibration,rotation speed,shaft voltage/EDM)
- Bearing cleaning

Yaw bearing

- Grease lubrication system
- Hydraulic brake system

Gearbox

- Oil lubrication and cooling system
- Bypass fine filter
- Working condition monitoring (oil condition,temperature, vibration)

Generator

- Grease lubrication
- Working condition monitoring(temperature, vibration)

LUBRICATION TECHNOLOGY DEVELOPMENT TREND

Lubrication is indispensable for the good operation of mechanical equipment!

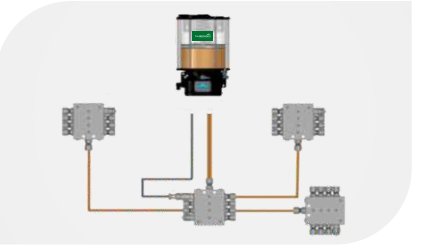
The development of intelligent lubrication technology is promoting the intelligentizaiton of mechanical equipment!

Manual lubrication

Relying on manual grease injection, impossible to accurately supply grease;

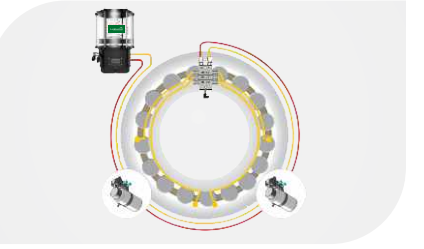
Centralized lubrication

Automatic regular and quantitative supply of grease according to the set grease injection amount and cycle;



Automatic grease replacement technology for bearings

Automatic lubrication and waste grease collection system;



Intelligent lubrication

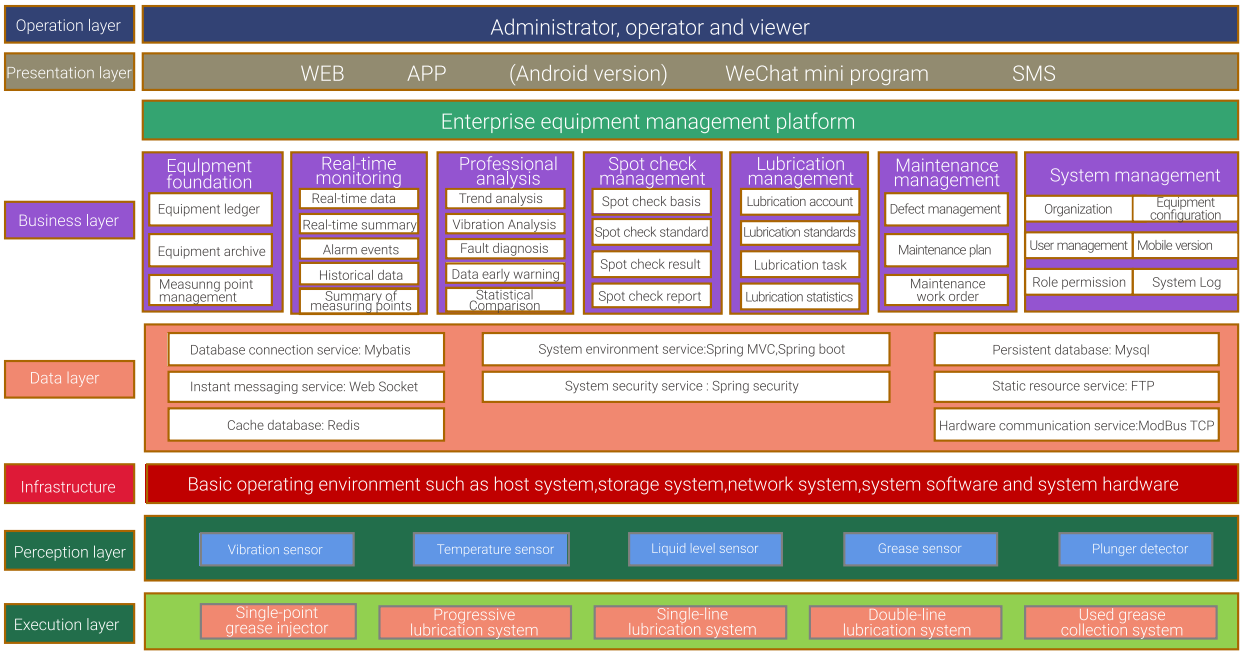
Linkage control with the whole machine, interlock with the lubrication system based on the parameters of speed and cumulative running time to achieve linkage control.

Intelligent lubrication

Automatic supply of grease as judged by online monitoring the lubrication status of lubricating parts through temperature, vibration and grease sensors;

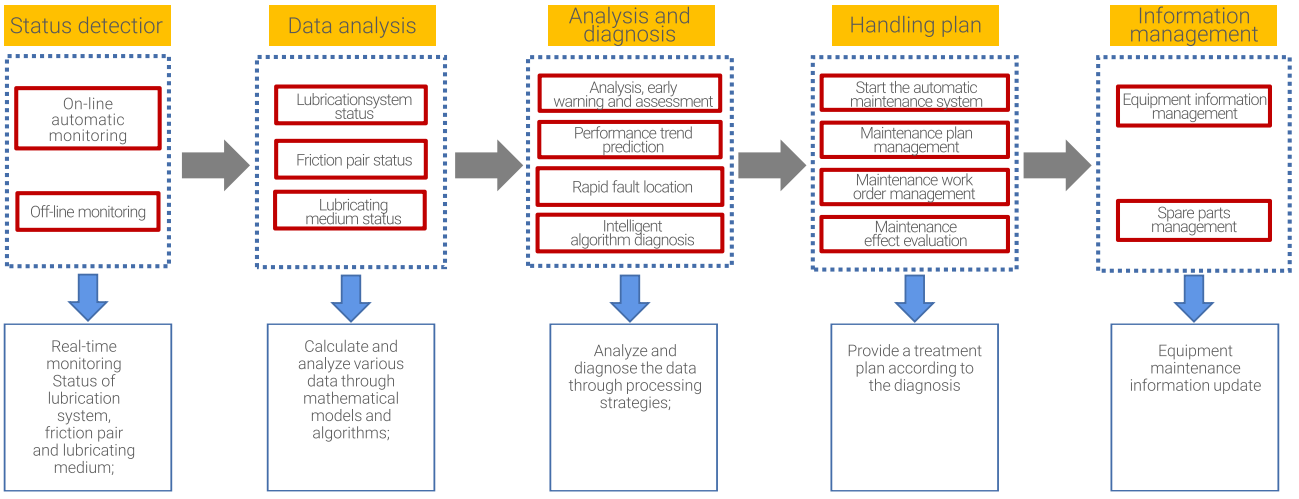
CONDITION MONITORING AND INTELLIGENT LUBRICATION

System architecture

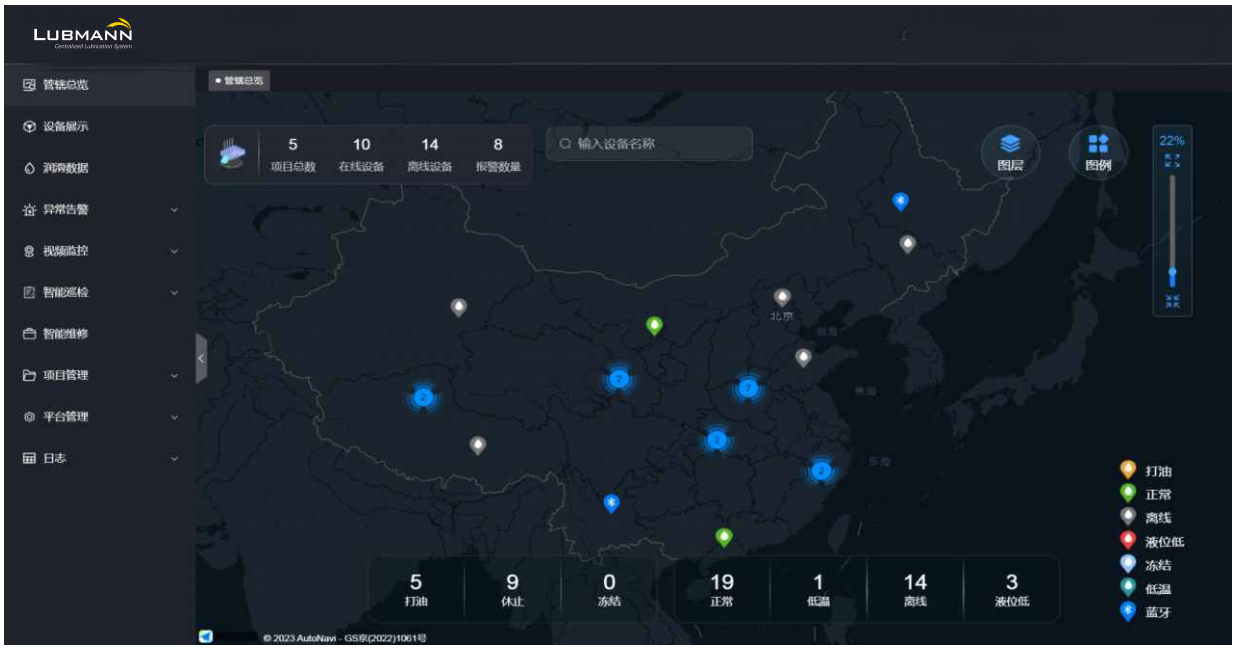


Business model

As a key part of industrial digital transformation, the role of equipment failure prediction and health management (PHM) in production process has been emphasized by increasingly more enterprises, for its reducing equipment maintenance costs and the loss of equipment failure to production and management.The equipment health management focuses on the "healthy and sub-healthy" stages of the equipment, with the persistent and stable healthy state as the evaluation criteria. It mainly includes data acquisition, equipment status monitoring, diagnostic evaluation, analysis and prediction, equipment maintenance strategy, performance assessment and statistical analysis.

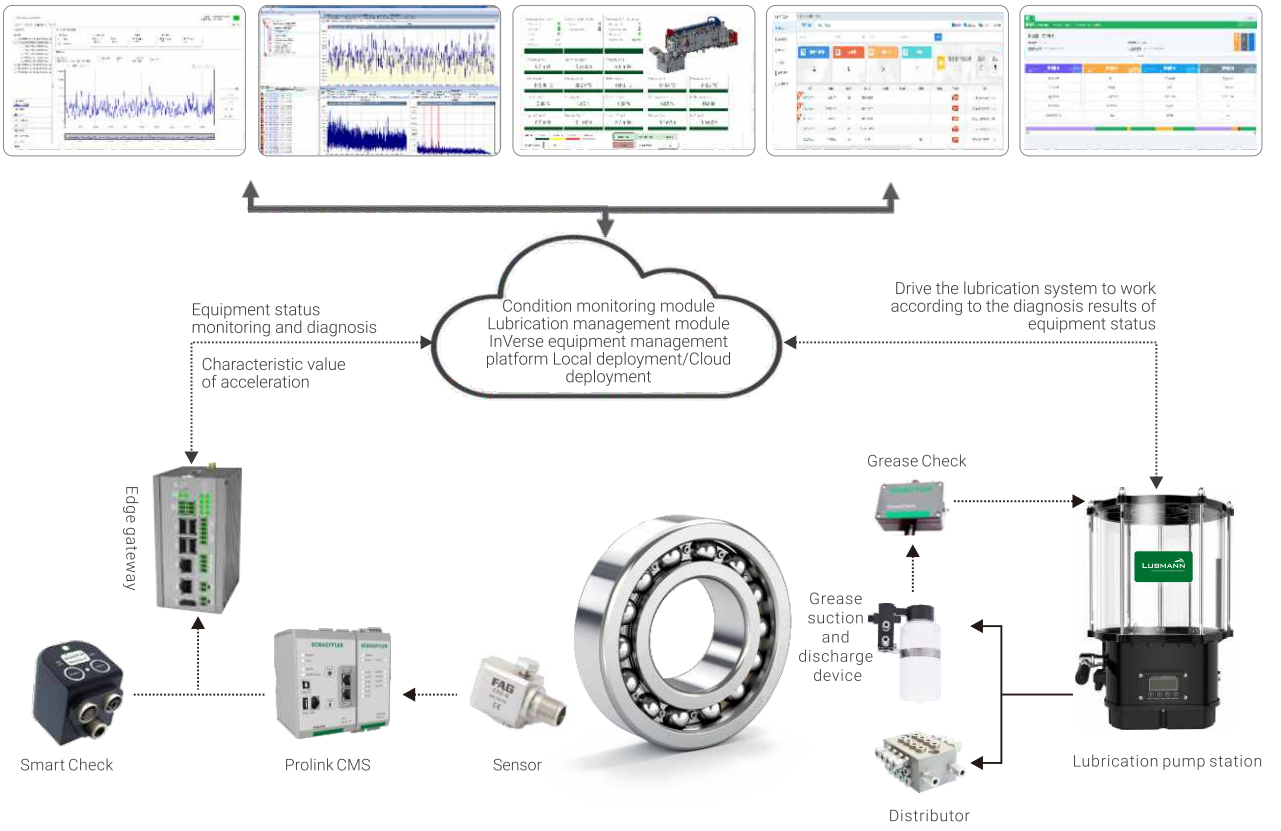


Equipment Lubrication Overview



Equipment lubrication status

EQUIPMENT STATUS ONLINE MONITORING AND INTELLIGENT LUBRICATION SYSTEM



Based on the online monitoring of bearing grease status, vibration, temperature and shaft voltage, high-risk factors in the operating environment of wind turbines are monitored in real time. The Inverse expert diagnosis platform is configured to effectively predict the occurrence of early failure of bearings. Once abnormalities are found, it can actively intervene in maintenance to eliminate or reduce high-risk factors and prevent additional secondary damage to wind turbines, aiming at helping users realize active operation and maintenance and risk management.

System Composition

Inverse Digital Service Platform-This platform integrates system simulation verification, expert service customization services, monitoring reports and alarms, equipment health status assessment, fault status and fault locating.

Equipment condition monitoring system- composed of monitoring elements (vibration sensor, grease sensor, temperature and humidity sensor, speed sensor, pre-tightening force sensor, etc.), edge gateway, I/O module, central controller, electronic evaluation system, etc.

Automatic grease replacement system- centralized lubrication system and waste grease collection system, etc.

Working principle

The monitoring element detects the bearing status according to the set sampling interval, and sends the bearing status signal to the Inverse device health management platform through Prolink and edge gateway;

When the bearing status is OK, the health management platform sends a signal to the centralized lubrication system for routine grease supplement process;

When the grease status is NO, the health management platform gives a corresponding control strategy to determine the volume of grease to be replaced and sends corresponding signals to two execution systems to complete more grease replacement;

After running for a certain period of time, the monitoring element detects the bearing condition until it is OK.

Innovations

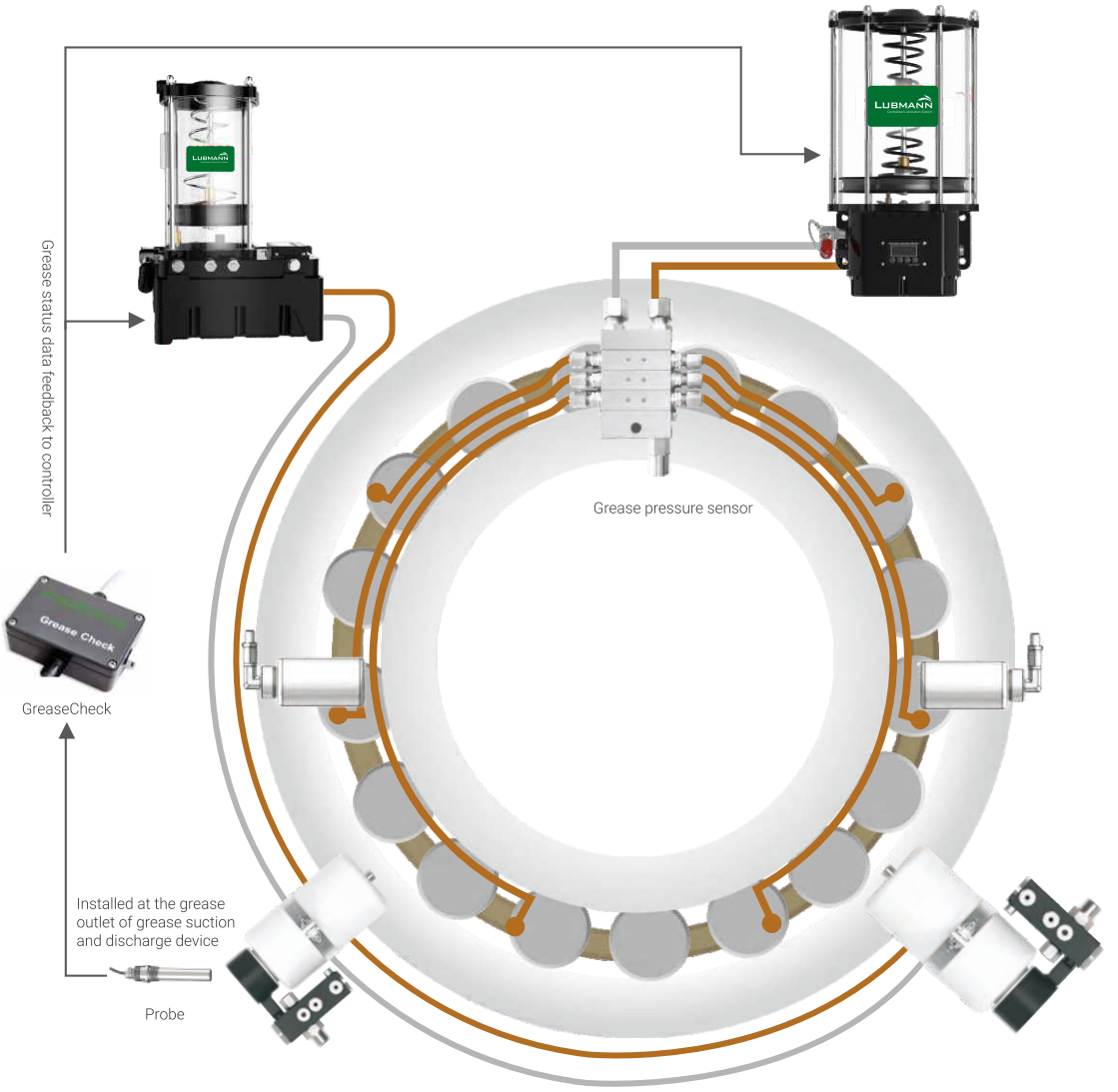
- Unified platform for unified management of equipment status and lubrication status;
- Drive the lubrication system to work according to the diagnosis results of lubricating grease state in the bearing, and dynamically improve the lubricating grease state in the bearing;
- Real-time online monitoring, diagnosis of equipment status and early fault warning;
- Local deployment or cloud deployment is optional;
- Visualization of equipment working status and lubrication status.

INTELLIGENT LUBRICATION SYSTEM BASED ON GREASE CONDITION MONITORING

On-line monitoring based on the state of bearing grease is to dynamically adjust the lubrication cycle and grease quantity according to the real grease state inside the bearing, so as to realize on-demand lubrication of the bearing. Grease condition monitoring precedes the occurrence of early failure of bearings. Once any abnormality is found, timely intervention can eliminate potential risks, prolong the service life and prevent additional secondary damage to the fan.

System Composition

The system consists of lubrication system, waste grease collection system , GreaseCheck, controller etc.



Working principle

GreaseCheck monitors in real-time the grease state in the bearing cavity ;

When the grease state in the bearing is OK, the lubrication system will carry out conventional grease supplement process ;

When the grease status in the bearing is NO, the volume of grease to be replaced is determined according to the control strategy, and the lubrication system and waste grease collection system are controlled for rapid grease replacement.

Innovations

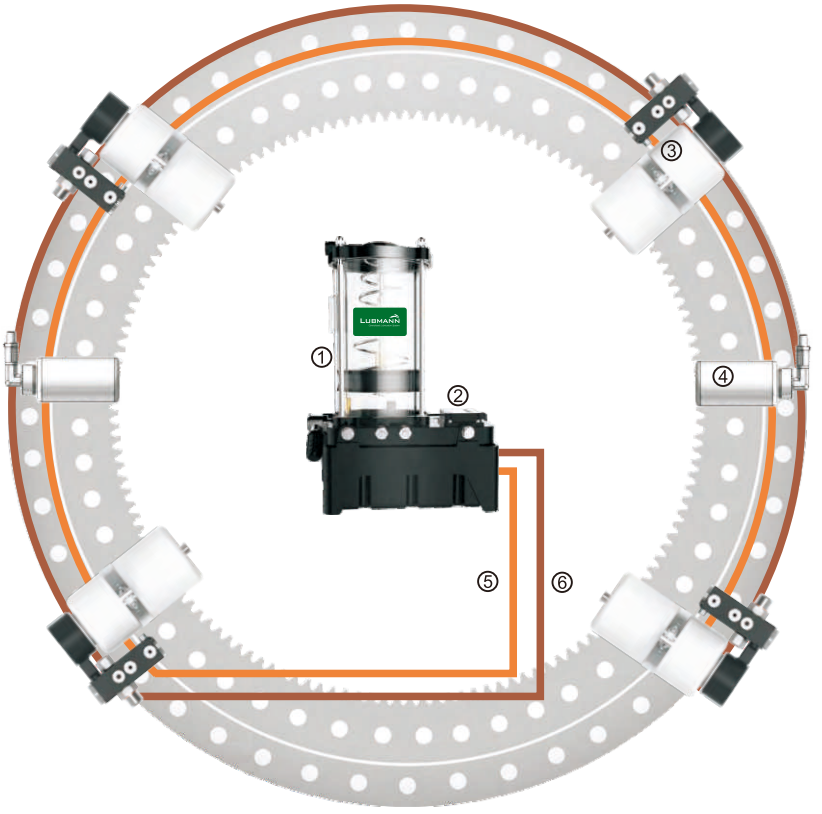
- Real-time monitoring of grease status in the bearing and dynamic improvement of grease status in the bearing;
- The lubrication system and waste grease collection system are driven to work according to the diagnosis results of lubricating grease status in bearings, so as to realize closed-loop control of grease replacement strategy.

INTELLIGENT LUBRICATION SYSTEM BASED ON GREASE CONDITION MONITORING

On-line monitoring based on the state of bearing grease is to dynamically adjust the lubrication cycle and oil quantity according to the real grease state inside the bearing, so as to realize on-demand lubrication of the bearing. Grease condition monitoring precedes the occurrence of early failure of bearings. Once any abnormality is found, timely intervention can eliminate potential risks, prolong the service life and prevent additional secondary damage to the fan.

System Composition

The waste grease collection system is mainly composed of power pump, grease suction and discharge device, monitor, sensor, waste grease collection device, pipeline accessories, etc.

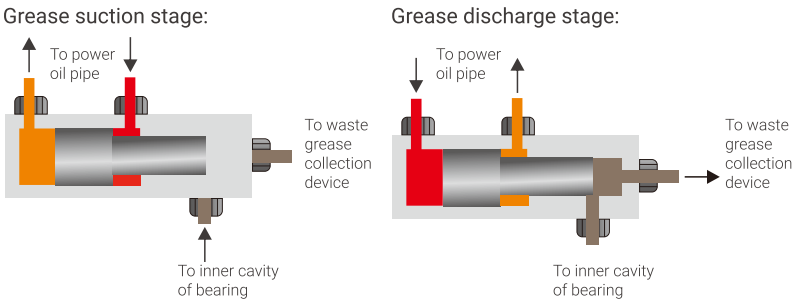


① Power pump ② Monitor ③ Grease suction and discharge device

④ Breathing bottle ⑤ Power pipe A ⑥ Power pipe B

Working principle

The system starts to work under the control of the monitor program, and driven by the power pump, the grease suction and discharge device works, in two steps: grease suction and grease discharge.



Innovations

- Cleaning up timely the waste grease with abrasive debris in the inner cavity of the bearing, conducive to heat dissipation and wear reduction of the bearing;
- Eliminating the pressure in the bearing cavity, ensuring an unblocked cavity and smooth injection of new grease into the bearing;
- Reducing the bearing internal pressure, avoiding environmental pollution caused by grease leakage;
- Solving effectively the problem of bearing oil passage blockage together with the centralized lubrication system, keeping appropriate amount of grease in the inner cavity of the bearing;
- Conducive to the formation and maintenance of lubricating oil film, greatly prolonging the service life of bearing;
- Reducing bearing failure rate and maintenance cost, improving equipment operation efficiency.

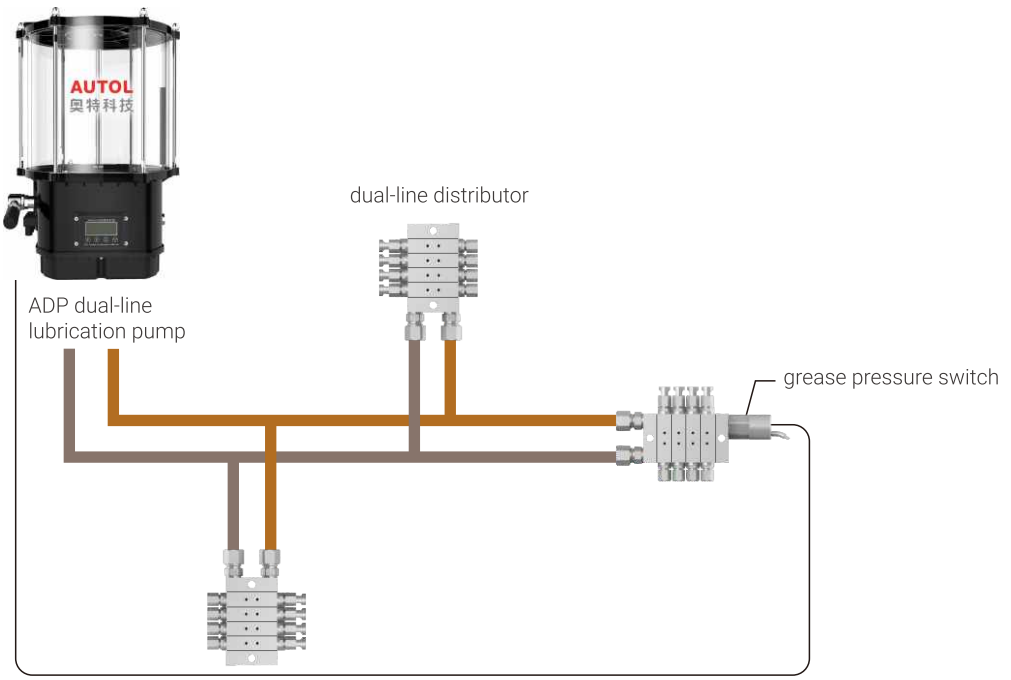
DUAL-LINE CENTRALIZED LUBRICATION SYSTEM

The dual-line centralized lubrication system enables flexible arrangement. An oil pressure switch at the end of the dual-line distributor monitors the operation state of the double-line centralized lubrication system.

Suitable for grease of NLGI-2 and below.

Innovations

- Built-in safety valve adopted. No need to consider the sealing of safety valve;
- The dual-line lubrication pump adopts a multi-plunger pair uniformly distributed structure, increasing the grease supply of the double-line pump, without increasing the motor load, avoiding emptying the lubrication pump;
- The plunger of the dual-line lubrication pump has a more reliable push-pull structure and eliminates the failure of plunger to retreat due to spring fatigue;
- Dual-line lubrication pump adopts mechanical power reversing, safe and reliable;
- The short internal oil passage of the dual-line distributor makes units independent from each other without mutual interference;
- The grease volume of the dual-line distributor is easy to adjust, and more than 10 times of grease volume ratio can be achieved by replacing the quantitative plug;
- Suitable for low temperature and high viscosity grease; long pumping distance.



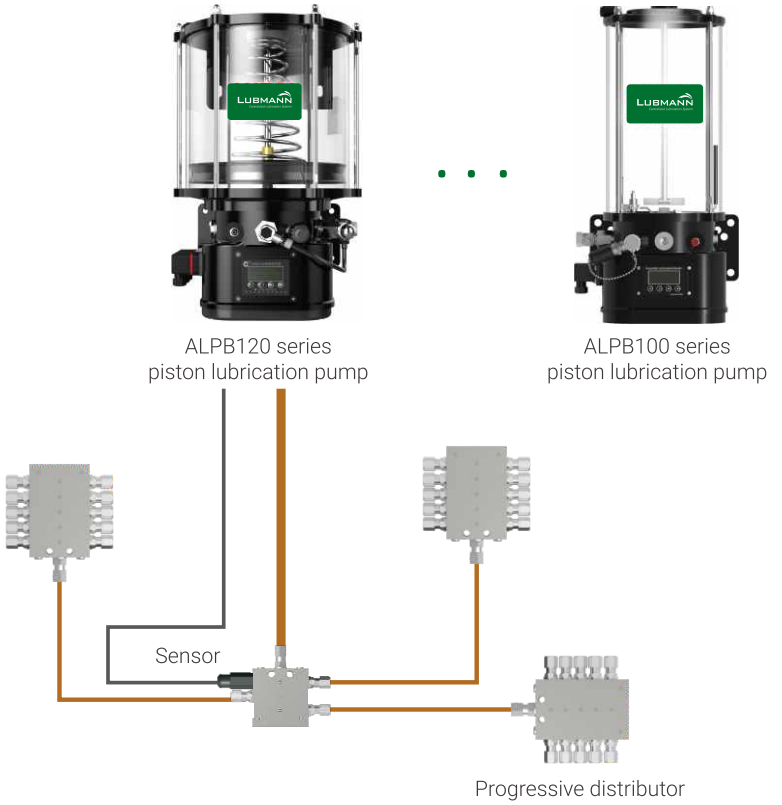
PROGRESSIVE CENTRALIZED LUBRICATION SYSTEM

The progressive centralized lubrication system consists of lubrication pump, progressive distributor, control unit and pipeline accessories. lubrication grease is supplied to each lubrication point by connecting the lubrication pump with progressive distributors at all levels. A sensor is set on the main distributor to monitor the working state of the whole system, and the grease output can be controlled by running time or by monitoring the pulse times of the sensor.

Suitable for grease of NLGI-2 and below.

Innovations

- Inside the distributor is a pilot structure, and each grease outlet discharges grease one by one in sequence;
- The discharge of each grease outlet of the progressive distributor is fixed, and can be doubled combining the oil outlets;
- The system status monitoring can be realized by monitoring the displacement of distributor spool.



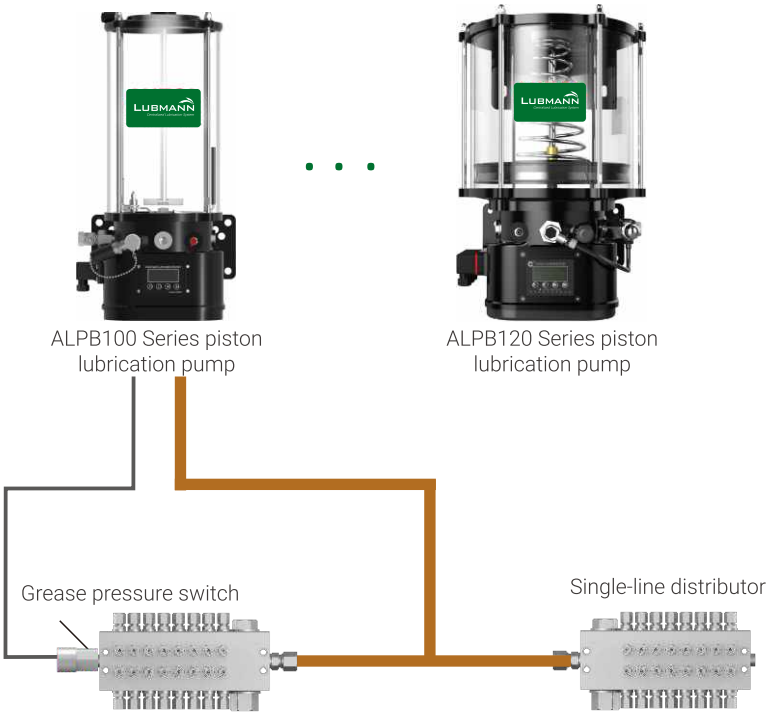
SINGLE-LINE CENTRALIZED LUBRICATION SYSTEM

The integrated single-line centralized lubrication system consists of a lubricating pump, single-line distributors, a control unit and pipeline accessories. The grease provided by the lubricating pump is delivered to each lubricating point through the integrated single-line distributor. A grease pressure switch is set on the end single-line distributor to monitor the working state of the whole system.

Suitable for grease of NLGI-2 and below.

Innovations

- Full-parallel independent grease supply structure that blockage of individual branches of the system does not affect the normal operation of other branches;
- The patented technology of auxiliary unloading valve effectively solves the unloading problem of long pipelines and viscous grease;
- Integrated single-line distributor, not easy to be blocked and with low failure rate;
- Adjust the number of lubrication points and grease quantity conveniently as required.



ALPA80 SERIES PISTON PUMP

The ALPA80 series piston lubrication pump is driven by a high-performance DC motor with a worm reducer inside, which can drive up to 3 pump elements. Pump body is made of casting aluminum with stable and reliable performance. The reservoir is made of transparent material to facilitate grease level observation. The overall protection grade of the pump can reach IP65, and ECU monitor and low level alarm device can be configured.

ALPA80 series piston pumps are suitable for progressive and single-line centralized lubrication systems.

Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	1L, 2L
Outlet quantity	1-3 pcs
Outlet thread	M10x1
Control method	External/Internal
Applicable grease	Grease below NLGI-2
Operating temperature	-40℃~70℃
Protection grade	IP65

ALPB100 SERIES PISTON PUMP

The ALPB100 series piston lubrication pump is driven by a high-performance DC motor with a worm reducer inside, which can drive up to 4 pump elements. Pump body is made of casting aluminum with stable and reliable performance. The reservoir is made of transparent material to facilitate grease level observation. The overall protection grade of the pump can reach IP65, and ECU monitor and low level alarm device can be configured.

ALPB100 series piston pumps are suitable for progressive and single-line centralized lubrication systems.

Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	2L, 4L
Outlet quantity	1-4 pcs
Outlet thread	M10x1
Control method	External/Internal
Applicable grease	Grease up to NLGI-2
Operating temperature	-40°C~70°C
Protection grade	IP65

ALPB120 SERIES PISTON PUMP

The ALPB120 series piston lubrication pump is driven by a high-performance DC motor with a worm reducer inside, which can drive up to 4 pump elements. Pump body is made of casting aluminum with stable and reliable performance. The reservoir is made of transparent material to facilitate grease level observation. The overall protection grade of the pump can reach IP65, and ECU monitor and low level alarm device can be configured.

ALPB120 series piston pumps are suitable for progressive and single-line centralized lubrication systems.

Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	4L, 8L,15L, 20L
Outlet quantity	1-4 pcs
Outlet thread	M10x1
Control method	External/Internal
Applicable grease	Grease up to NLGI-2
Operating temperature	-40°C~70°C
Protection grade	IP65

ALPB130 SERIES PISTON PUMP

ALPB130 series piston lubrication pump is driven by a high-performance DC motor, with a worm reducer inside, which can drive up to 4 pump elements. Pump body is made of casting aluminum with stable and reliable performance. The reservoir is made of transparent material to facilitate grease level observation. The overall protection grade of the pump can reach IP65, and ECU monitor and low level alarm device can be configured.

It is suitable for progressive and single-line centralized lubrication systems.

Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	20L, 30L
Outlet quantity	1-4 pcs
Outlet thread	M10x1
Control method	External/Internal
Applicable grease	Grease up to NLGI-2
Operating temperature	-40 °C~70 °C
Protection grade	IP65

ALPB140 SERIES PISTON PUMP

The ALPB140 series piston lubrication pump is driven by a high-performance DC motor with a worm reducer inside, which can drive up to 4 pump elements. Pump body is made of casting aluminum with stable and reliable performance. The reservoir is made of transparent material to facilitate grease level observation. The overall protection grade of the pump can reach IP65, and ECU monitor and low level alarm device can be configured. It is suitable for progressive and single-line centralized lubrication systems.

Suitable for narrow spaces.

Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	15L, 20L, 30L
Outlet quantity	1-4 pcs
Outlet thread	M10x1
Control method	External/Internal
Applicable grease	Grease up to NLGI-2
Operating temperature	-40°C~70°C
Protection grade	IP65

ALPE100 SERIES PISTON PUMP

The ALPE100 series piston lubrication pump is driven by a high-performance DC motor with a worm gear reducer inside. It can set up to 10 piston pump elements, including 8 single utilities - 2 progressive feeds. All the pump elements can deliver grease separately. The single utilities ones can be connected with the lubrication points directly and the progressive feeds can be used with a progressive distributor. So this pump is more fexible in application .

The pump body is made of engineering material. It can be apply to the wind turbine generator and the direct grease supply of the lubrication pump to multiple lubrication points.

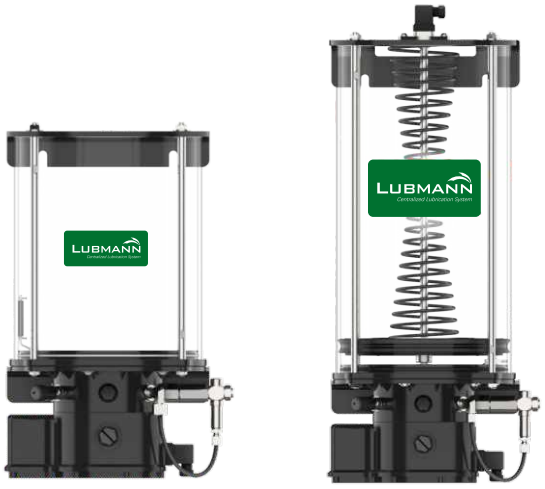
Technical Parameters

Operating voltage	24VDC
Pumping element for single utilities nominal flow rate	0.2mL/min, 0.3mL/min, 0.4mL/min, 1.0mL/min
Fixed pumping element nominal flow rate	2.5mL/min
Maximum pressure	35MPa
Reservoir	1L, 2L
Max number ofoutlets/ pumping elements	8 single utilities-2 progressive feeds
Delivery connection (pumping outlet)	Progressive power supply M22×1.5 Single utilities M14×1.5
Applicable grease	Grease up to NLGI-2
Operating temperature	-40℃~70℃
Protection grade	IP65

ALPE140 SERIES PISTON PUMP

The ALPE140 series piston lubrication pump is driven by a high-performance DC motor with a worm reducer inside, which can drive up to 3 pump elements The pump body is made of engineering material . It will be more reliable to install the pump with a metal bracket. the reservoir is made of transparent material to confirm the grease level. The protection class of the whole pump can reach IP65, and ECU monitor and low grease level alarm device can be configured.

It is suitable for progressive and single-line centralized lubrication system.



Technical Parameters

Operating voltage	24VDC
Grease output	2.8 mL/min, 4.0 mL/min
Maximum pressure	35MPa
Reservoir	20L, 30L, 40L
Outlet quantity	1-3 pcs
Outlet thread	M10x1
Applicable grease	Grease up to NLGI-2
Operating temperature	-40°C~70°C
Protection grade	IP65

ABDB 12 SERIES LUBRICATION PUMP

ABDB12 series Lubrication pump uses AC reducer motor to drive multiple pump elements to work to pump out the grease. The flow rate of the pump element is adjustable. This pump can meet the needs of large wind turbine bearings for large-volume pumps.

Applicable to progressive systems.

Technical Parameters

Operating voltage	380VAC
Grease output	3mL/min-30 mL/min
Maximum pressure	35MPa
Reservoir	30L, 60L, 100L
Outlet quantity	1-12 pcs
Outlet thread	M27x1.5
Control method	External/Internal
Applicable grease	Grease up to NLGI-2

ADP120 SERIES DUAL-LINE LUBRICATION PUMP

ADP120 series dual-line lubrication systems are the new generation of centralized lubrication systems developed by AUTOL after the long-term market survey and technological innovation. AUTOL has applied multiple technological invention and innovation patents during the development. ADP120 series dual-line lubrication pump is driven by high-performance DC motor, is internally equipped with worm reducers, and can drive 3 pump elements to work simultaneously. They are internally installed with overflow valves and mechanical direction valves, which not only provides a simple and aesthetic appearance of lubrication pump, but also ensures the sealing of overflow valve. They are suitable for dual-line centralized lubrication systems.

Technical Parameters

Operating voltage	24VDC
Grease output	11mL/min
Maximum pressure	25MPa
Reservoir	4L, 8L, 15L, 20L
Outlet quantity	2 pcs
Outlet thread	M12x1.5
Control method	External
Applicable grease	Grease up to NLGI-2
Operating temperature	-40 °C~70 °C
Protection grade	IP65

APP502W POWER PUMP

The power pump uses a high-performance DC motor to drive the internal gear pump, and the A and B oil outlets are switched through the internal directionvalve.

Technical Parameters

Control method	Internal
Operating voltage	24VDC
Maximum pressure	4.5MPa
Reservoir	2L
Applicable media	L-HS 46# hydraulic oil
Display mode	LCD dynamic display: counting, rest time, grease discharge time, grease suction time, temperature, fluid level, fault code, etc.
Grease discharge time	(1-99) min, adjustable
Grease suction time	(1-99) min, adjustable
Rest time	(1-30) h adjustable
Operating temperature	-40 °C~70 °C

GREASE SUCTION AND DRAINAGE APPARATUS

Drive medium	Hydraulic oil/grease
Single grease suction volume	1.35mL
Vacuum degree	After 10-25 working cycles, the vacuum degree of grease suction port shall not be greater than -0.07 MPa
Operating temperature	-40°C~70°C
Collection device	4L collection drum

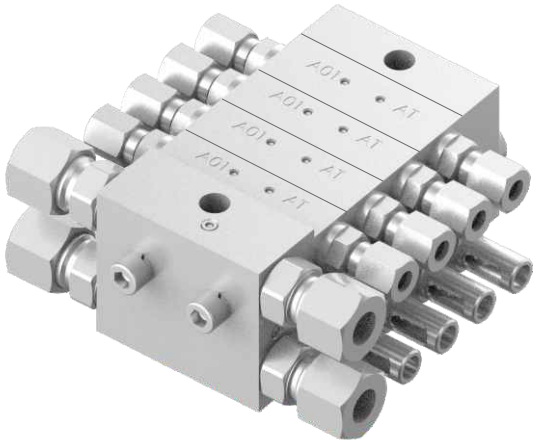
Drive medium	Hydraulic oil/grease
Single grease suction volume	1.35mL
Vacuum degree	After 10-25 working cycles, the vacuum degree of grease suction port shall not be greater than -0.07 MPa
Operating temperature	-40°C~70°C
Collection device	0.5L bottle

DUAL-LINE DISTRIBUTOR

CSP series dual-line distributor has short internal grease channels and independent units, which solves the problem of distributor blockage. By using diffent metering screws, more than ten times of volume ratio can be achieved, which is suitable for low temperature, high viscosity lubricating grease, long pumping distance and other advantages.

Maximum pressure	35MPa
Grease output	0.2, 0.4, 0.6, 0.8, 1.0 mL/cy
Inlet/outlet thread	M10x1
Number of outlets	2-20 pcs
Operating temperature	-40 °C~70 °C

Note: The dual-line distributor with displacement more than 1 mL/cy needs to be customized.



Working principle

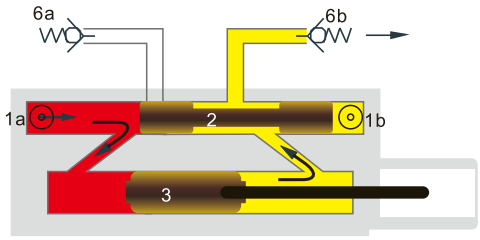


Figure 1

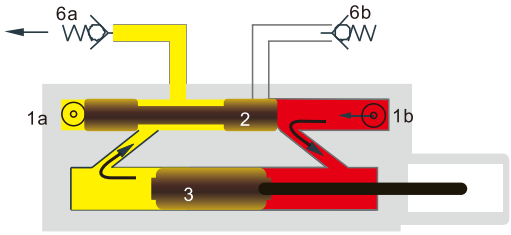


Figure 2

As shown in Figure. 1, The high-pressure lubricating grease output from the dual-line pump pushes the control piston 2 to move to the right limit position through the oil-way 1a, and the left chamber of the control piston 2 is connected with the left chamber of the metering piston 3. The high-pressure lubricating grease pushes the metering piston 3 to move to the right side, and delivers the quantitative grease in the right chamber of the metering piston 3 to the lubrication point through oil-way 6b.

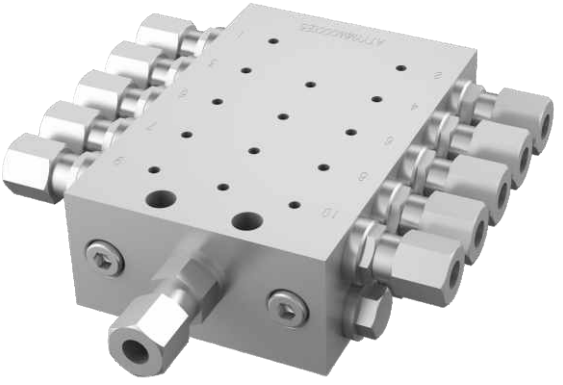
As shown in Figure 2, The high-pressure lubricating grease output from the dual-line pump pushes the control piston 2 to move to the left limit position through the oil-way 1b, and the right chamber of the control piston 2 is connected with the right chamber of the metering piston 3. The high-pressure grease pushes the metering piston 3 to move to the left side, and delivers the quantitative lubricating grease in the left chamber of the metering piston 3 to the lubrication point through the oil-way 6a.

PROGRESSIVE DISTRIBUTOR

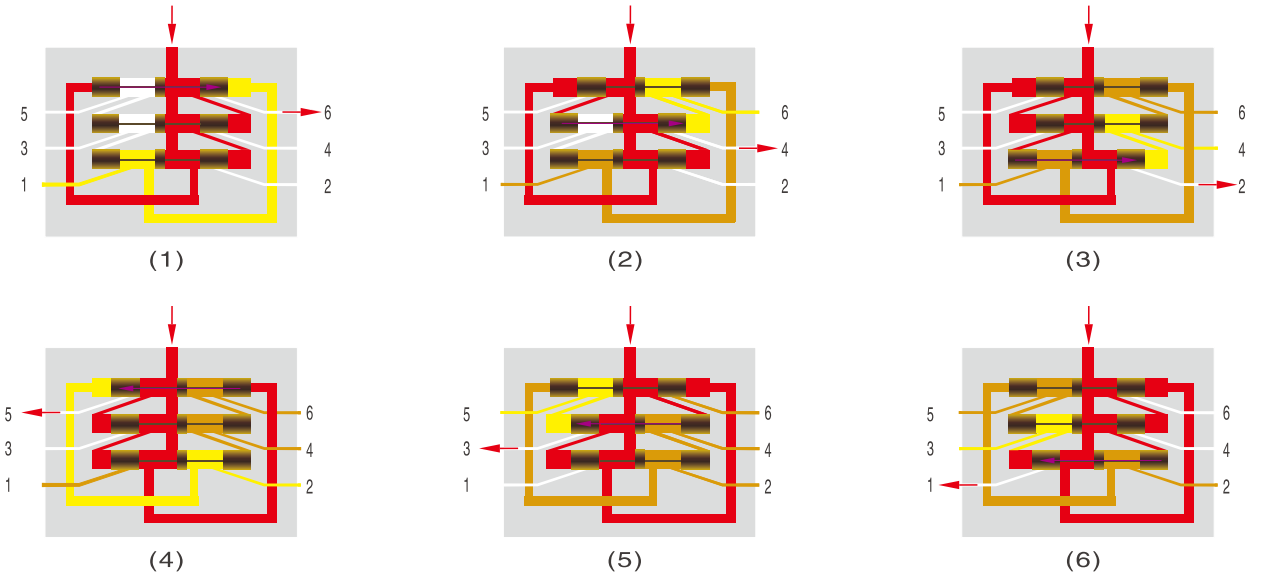
The SSVA series progressive distributor supplies grease point by point to each lubrication point in a progressive manner through the sequential action of each plunger.

Maximum pressure	35MPa
Grease output	0.2 mL/cy
Max. differential pressure between outlets	20MPa
Inlet/outlet thread	M10x1
Number of outlets	6-22 pcs
Operating temperature	-40 °C~70 ˚C

Note: Outlets #1 and #2 cannot be blocked simultaneously.



Working principle

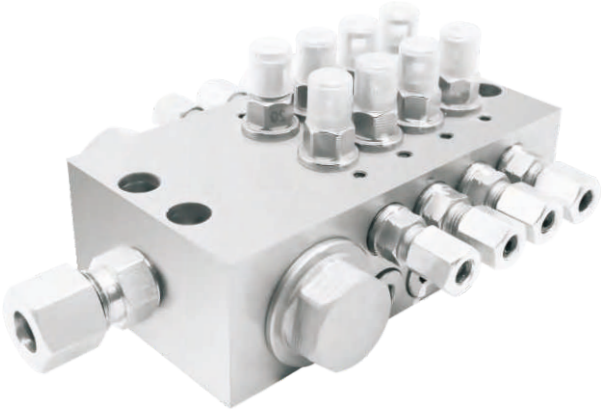


The individual plungers of the progressive distributor have a characteristic of sequential movement. The high-pressure grease enters from the inlet of the distributor, and each plunger in the distributor operates cyclically in sequence. The grease is pumped to each lubrication point in turn. When the plunger stops moving for a period of time and delivers high-pressure lubricating grease to the distributor again, the plunger movement will immediately follow the previous stop point movement. Only after the previous plunger completes the pump action, the subsequent plunger will be started under the push of high-pressure grease (as shown in the figure with a 6-way outlet block structure as an example).

SINGLE-LINE DISTRIBUTOR

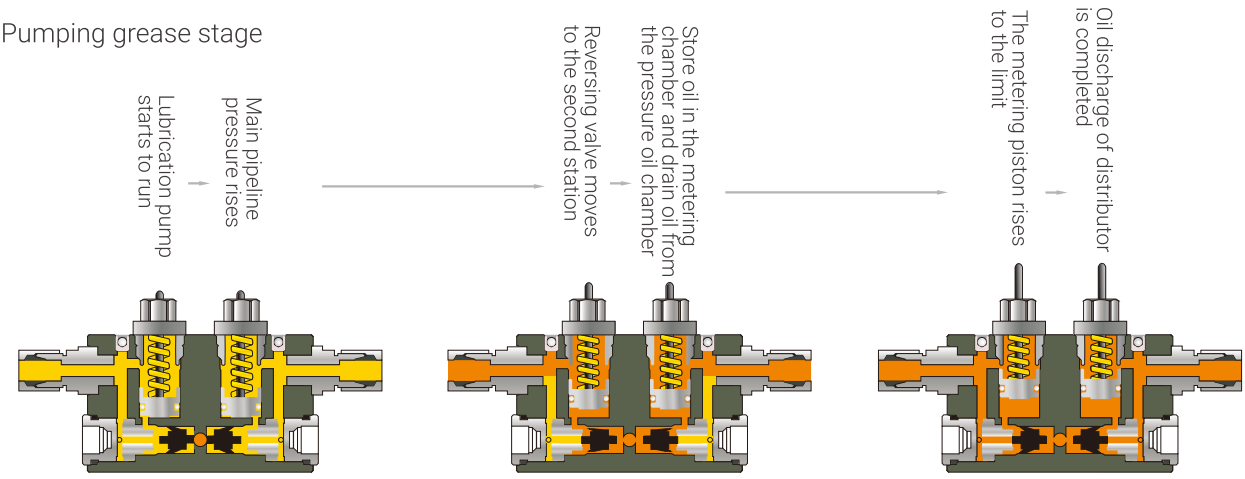
The integrated single-line distributor is a quantitative grease supply device. The lubricating grease pumped by the lubrication pump is delivered to the distributor through the main grease circuit, and the exchange of lubricating grease between the internal grease storage chamber and the pressure oil chamber of the distributor is realized through an electromagnetic directional valve, so as to achieve the function of quantitative distribution of lubricating grease. The integrated single-line distributor can achieve a variety of combinations with different metering screws. The distributor has a low failure rate, and the blockage of any lubrication point will not affect the normal operation of the system.

Maximum pressure	20MPa
Grease output	0.2, 0.4, 0.6 mL/cy
Inlet/outlet thread	M10x1
Number of outlets	2-16 pcs
Operating temperature	-40 °C~70 °C

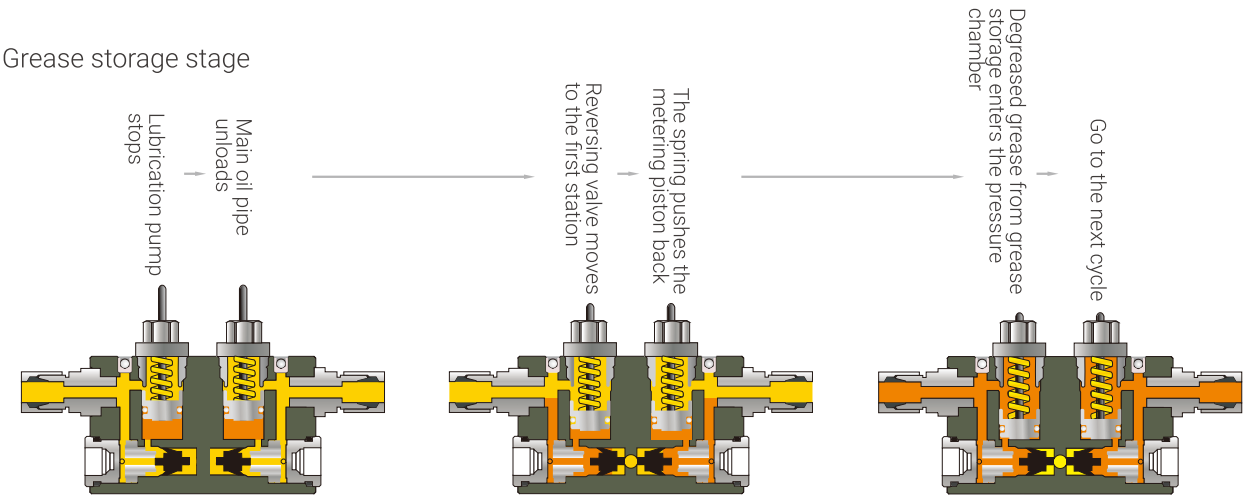


Working principle

Pumping grease stage



Grease storage stage



ACCESSORY

Electric grease filling machine

Product model	ADZ0305
Rated flow	300ml/min
Maximum pressure	15MPa
Operating voltage	AC230V
Operating temperature	-20°C~70°C
Applicable grease	FUCHS 585K Plus, Krupp 141/132, etc.
Net weight	<8kg
Diameter of grease drum	175-185mm

Product model	ADZ0315
Rated flow	300ml/min
Maximum pressure	30MPa
Operating voltage	AC230V
Operating temperature	-20°C~70°C
Applicable grease	Mobil 460WT/461, LOAD460, Shell BBZ,etc.
Net weight	<8kg
Diameter of grease drum	260-298mm

Innovations

- Adopt immersed barrel structure, not limited by the height of the barrel, suitable for 5kg/15kg-18kg standard oil drums;
- Small volume and light weight (＜8kg);
- The oil shall be scraped clean, and the residual lubricating grease in the oil drum shall not exceed 100g;
- Good low-temperature performance and strong applicability of lubricating grease (-20°C);
- Multi-plunger uniform distribution is adopted, with stable flow and low noise;
- It can effectively reduce the risk of air mixing.

Single point auto lubricator

Maximum pressure	4MPa
Delivery capacity per storke	0.24ml
Battery voltage	3.6V lithium battery (replaceable)
Reservoir Capacity	500ml\250ml\120ml
Applicable temperature	-20°C～60°C
Applicable grease	Grease up to NLGI-2
Protection grade	IP65
Outlet connector specification	R3/8 (male)
Control mode	Control by a built-in monitor
Display mode	Display by a LED indicator

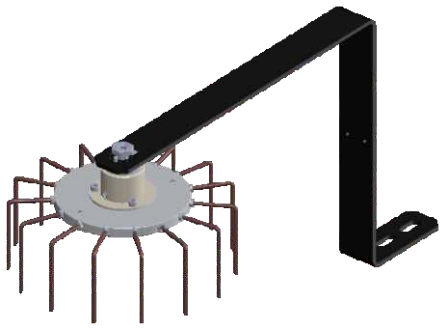
Innovations

- Plunger structure is adopted, and the maximum pressure can reach 4MPa;
- The reservoir adopts a spring piston structure, which can effectively prevent evacuation and is suitable for environmental conditions of -20°C-60°C;
- The battery pack is of modular design. The battery can be replaced without disassembling the pump body;
- Various reservoir volumes to meet the requirements of different working conditions;
- It is convenient to fill grease, which can be reused through the grease nipple on the upper part of the pump station oil tank.

Application condition

It is suitable for lubrication of generator bearings, pitch and yaw tooth surfaces.

ACCESSORY



Product name : Tooth Surface grease Separator
Operating temperature : -40°C ~ 70°C
Applicable grease : Grease up to NLGI-2

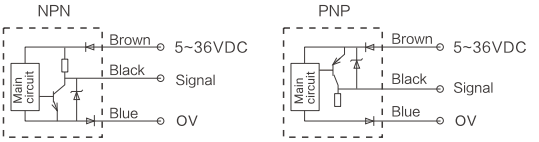
Innovations:

- Accurate lubrication: directly supply grease to 2-3 teeth at the meshing part to ensure sufficient lubrication of the meshing area;
- Simple structure and high reliability. Through the center hole, it is directly installed on the end face of the driving tooth to avoid the risk of jamming and falling off caused by improper installation fit size and wrong modulus of the transmission lubrication pinion;
- Small size, light weight and easy installation. The weight shall not exceed 2kg (excluding bracket), which will reduce the installation intensity of workers;
- High degree of standardization, convenient for batch stocking. The overall dimensions are not limited by the driving tooth modulus, and can be produced in batches with high supply efficiency;
- The mounting bracket only plays the role of transition oil pipe and does not bear load, which can simplify the design of bracket and reduce costs.

Product name: Lubricating Pinion
Operating temperature: -40°C ~ 70°C
Applicable grease: Grease up to NLGI-2

Product name: Pressure Sensor
Operating pressure range: 5MPa-20MPa
Contact type: normally open/
normally closed (passive)

Product name: Hall Sensor
Feedback of pulse signal to the monitor (or customer controller)



Grease bottle

Connector of lubrication point

Magnetic block

Tube

Tube connector

Tube clamp

BRAKE HYDRAULIC STATION

The braking hydraulic station of wind turbine generator system mainly includes hydraulic components such as motor, hydraulic pump' accumulator, electromagnetic reversing valve, pressure reducing valve and overflow valve. Its main function is to provide power for the high-speed shaft brake. At the beginning, it charges the accumulator. After charging, the motor stops and the system pressure is maintained by the accumulator.

Innovations

- Low-temperature resistant components are adopted, with a wide range of applicable temperatures. The operating ambient temperature is -40°C~40°C and the survival ambient temperature is -45°C~50°C;
- The valve block is used as a bell-shaped cover to install the motor and gear pump, reducing the size of the hydraulic station and making the overall structure more compact and concise.

System pressure	Set pressure of overflow valve	120bar
Oil pump	Displacement of gear pump	1.3ml/r
Accumulator	Volume	0.5L
Motor	Power	0.37KW

GEARBOX LUBRICATION SYSTEM

The gearbox lubrication system is used for the lubrication of generator gears, providing lubrication protection for generator gears. The lubrication device mainly consists of gear pump, motor, mechanical pump, single-cylinder double-precision filter, pipeline, valve, etc.

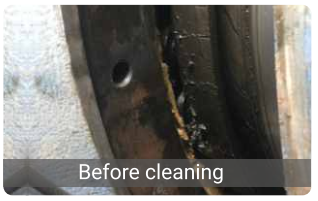
During the operation of the lubrication system, the oil pump and mechanical pump provide lubricating oil to the system. The lubricating oil flows through two single-cylinder double-precision filters to the check valve (with an opening pressure of 5 bar), and the flow direction of the oil is controlled according to the pressure set by the check valve.

Installation altitude	⩾4000m
Working medium	ISO VG320
Heat dissipation power	202KW
Filtration accuracy	10/50um
Rated working pressure	16bar
Operating flow of electric pump	120/240L/min
Oil pump motor power	9/13kW
Oil pump motor rotation speed	730/1460r/min
Air-cooled motor power	3.5/6.5KW
Air-cooled motor rotation speed	730/1460r/min
Mechanical pump flow	160L/min

BEARING CLEANING& SEAL REPLACEMENT

Bearing cleaning

Deeply clean the waste lubrication grease and impurities (80%) in the bearing to effectively reduce bearing wear;
It can visually judge the wear state of bearings and provide comprehensive solutions;
Dredge the oil passage inside the bearing to ensure that new lubrication grease can be evenly applied;
Reduce any abnormal temperature rise and vibration of bearings;
Replace the seal to ensure the bearing seal effectiveness;
Refill with new grease to ensure bearings' good lubrication.


Before cleaning

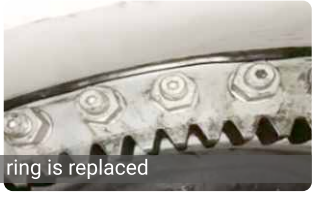

After cleaning


Impurities generated during cleaning

Seal replacement

Restore the bearing sealing ability to prevent dust and impurities from entering the bearing;
Reduce grease leakage at the seal, improve the cabinet environment and reduce any potential safety hazards;
Increase the holding capacity of lubrication grease to ensure good lubrication environment in bearings and facilitate bearing lubrication.


Seal ring before replacement


After the sealing ring is replaced

Case (I)

Wind turbine model: double-fed/1.5 MW

Fault location: main shaft

Description of problem: The wind turbine has been running continuously for 12 years. After the wind turbine works continuously for 4-6 h under full load, the main bearing suffers frequently from high temperature alarm fault, resulting in automatic shutdown of the wind turbine, seriously affecting the power generation efficiency of the wind turbine and causing potential safety hazards.

Solution: bearing cleaning

Conclusion: After cleaning, it is found that the amount of bearing grease is extremely insufficient, the internal lubrication oil passage is blocked, the lubrication grease saponifies and agglomerates, and the internal wear of the bearing is serious. At the same time, large iron particles and strip cutting particles are found after cleaning. It is preliminarily judged that the bearing rolling element and cage may be cracked, and the bearing has been seriously damaged. After cleaning, it is recommended to operate carefully according to the operating status of relevant wind turbine temperature control data and replace the bearing in time.


Before cleaning


After cleaning

Case (II)

Wind turbine model: double-fed/2.0 MW

Fault location: main shaft

Description of problem: The wind turbine has been running continuously for 8 years. After the wind turbine works continuously under full load in summer, the main bearing suffers occasionally from high temperature alarm fault, resulting in reduction of power generation efficiency of the wind turbine.

Solution: bearing cleaning

Conclusion: After cleaning, it is found that there are 5 saponification and agglomeration phenomena of lubrication grease inside the bearing, and no large particle wear matters are found. By re-injecting new lubrication grease, the wind turbine runs well, the overall temperature drops by 3-5°C, and the fault due to high temperature is removed.


Before cleaning


After cleaning

EXCELLENT AFTER-SALES SERVICE SYSTEM

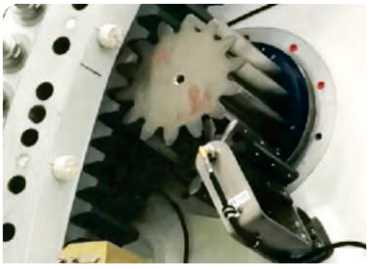
Providing customers with excellent products and perfect services is the driving force of our unremitting pursuit. We provide users with "first-time" technical services and arrange regular inspection mechanism.

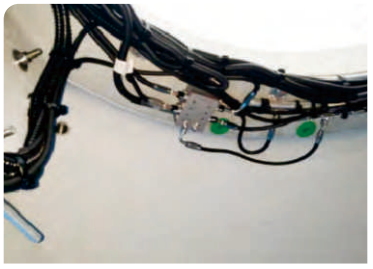
- Professional training service before use;
- Installation and trial run guidance;
- Training services on basic operation and daily maintenance;
- Two years quality guarantee,life time repair service.
- We have well organized after-sales network,and our professional engineers and partner distributors will response to your questions timely.

WIND POWER CASES DISPLAY

Envision energy

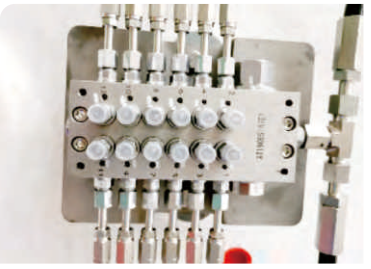
Model: 5 MW
Installation position: pitch/cabin
System type: Progressive Centralized Lubrication System

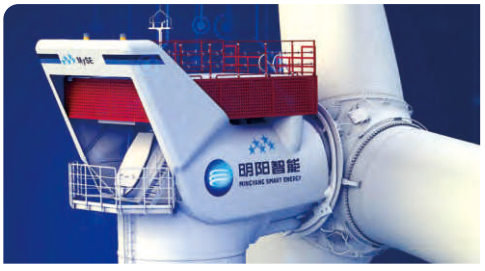


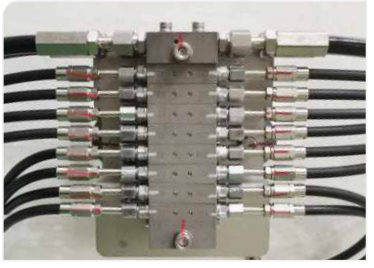


Mingyang Smart Energy

Model: 8MW/11 MW
Installation position: pitch/cabin
System type: Dual-line/single-line Centralized Lubrication System

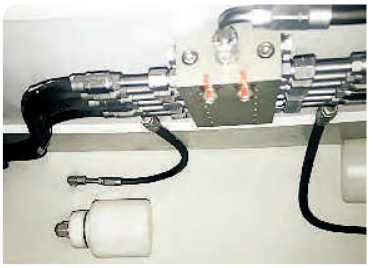


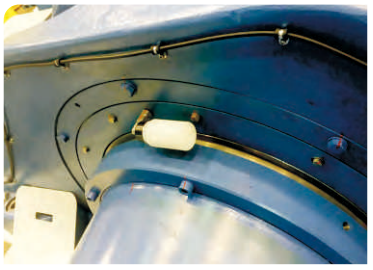
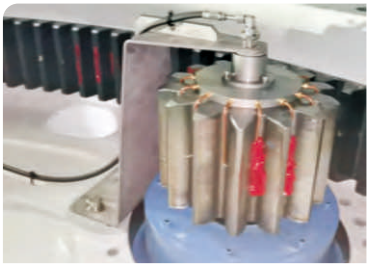




CSIC Wind Power

Model: 5 MW
Installation position: pitch/cabin
System type: Progressive Centralized Lubrication System

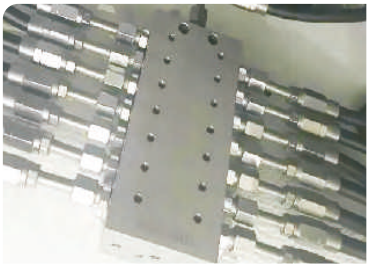



Dongfang Electric

Model: 6.25 MW-10 MW
Installation position: pitch/yaw/generator
System type: Progressive Centralized Lubrication System

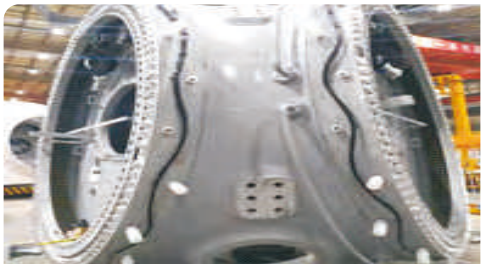


Sany

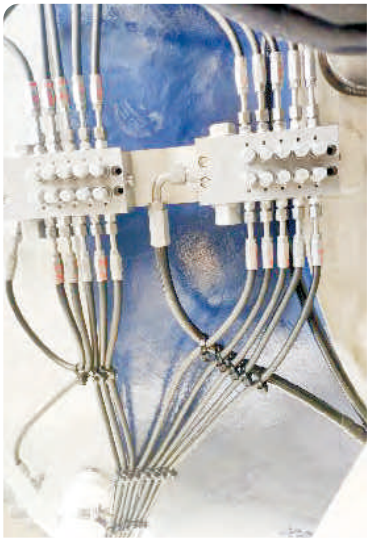
Model: 909/906
Installation position: yaw/main shaft/ pitch
System type: Progressive Centralized Lubrication System

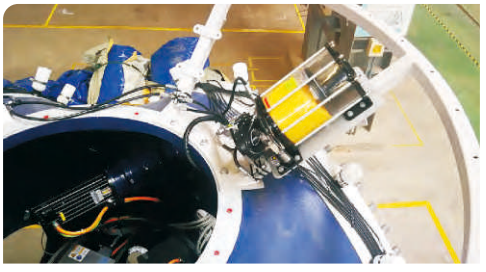




CRRC

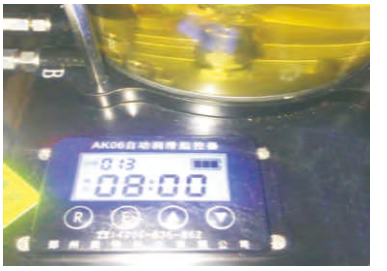
Model: 8MW/11 MW
Installation position: pitch
System type: Single-line Centralized Lubrication System





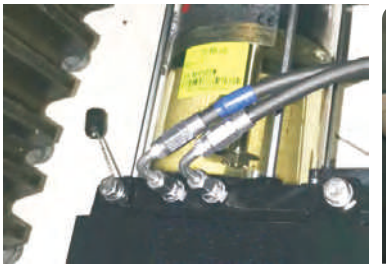
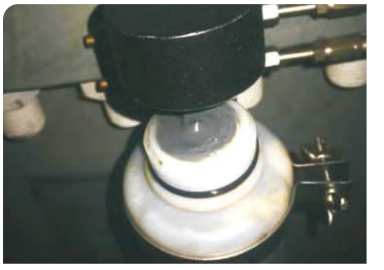

CHN Energy

Manufacturer: GOLDWIND
Model: 1.5 MW
Installation position: pitch
System type: Single-line Centralized Lubrication System
Waste grease collection system

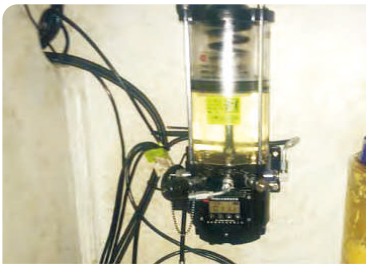

CR Power

Manufacturer: CRRC
Model: 2 MW
Installtion position: variable pitch
System type: Waste grease collection system

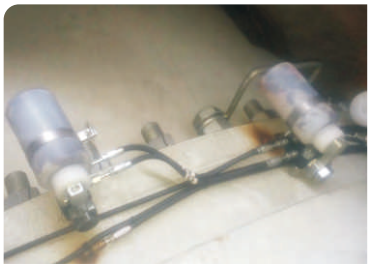




Huadian Fuxin

Manufacturer: CSIC Windpower
Model: 2 MW
Installation position: Main shaft / pitch
System type: Maste grease collection system



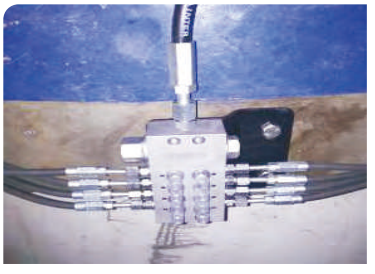




SPIC

Manufacturer: Mingyang Smart Energy
Model: 1.5 MW
Installation position: pitch
System type: Single-line Centralized
Lubrication System
Waste grease collection system




Oil lubrication products Cases

System type: Brake Hydraulic Station
Coupling Gear Box Lubircation System

Single point auto lubricator Cases

PARTNER


MINGYANG


Envision远景


SANY


金风科技
GOLDWIND


DEC
东方电气
DONGFANG ELECTRIC


中国中车
CRRC


运达风电
WINDEY


CSIC
海装风电


上海电气
SHANGHAI ELECTRIC


联合动力
United Power


Gamesa


中国华能集团公司
CHINA HUANENG GROUP


大唐集团公司
CHINA DATANG


中国华电集团公司
CHINAHUADIANCORPORATION


国家能源集团
CHN ENERGY


国家电投
SPIC


中广核
CGN


華潤

LUBMANN

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