AUTOL

Efficiency makes life better

Excellent CLS and WGCS Application in Wind Turbines

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About Us

A WORLD LEADING BRAND IN CENTRALIZED LUBRICATION SOLUTION

No.1 CLS Brand in China

Autol is the No.1 brand of centralized lubrication system in China with annual production capacity up to 200,000 units. Autol is an only organization establishing "Work Station for Academicians of Healthy Management of Smart Equipment Lubrication" in the centralized lubrication system industry.

9 Testing Laboratories

Autol has 9 product testing laboratories including Hydraulic R&D Testing Laboratory, Bearing Lubrication Laboratory, Environment Laboratory, Reliability Laboratory, Electronic and Electrical Laboratory, Hydraulic Quality Laboratory, Precise Measurement Room, Oil Testing and Analysis Laboratory and Materials Testing and Analysis Laboratory.

We Export Products More Than 40 Countries and Regions

Autol exports products to more than 40 countries and regions and are highly appraised by overseas customers. Autol has offices in Germany, India and Philippines, sets up Lubmann research institute in Germany to accelerate its development of globalization.

Autol Full-time R&D Team includes 85 Engineers.

Autol has full-time 85 engineers, including 1 academician, 5 doctors, 10 masters and other personnel with special expertise. It has established a long-term strategic partnership with such well-known universities and institutes such as Tsinghua University, PLA Information Engineering University, Tianjin Research Institute for Advanced Equipment.

More Than 100 Technical Patents

Autol centralized lubrication system products have applied for more than 100 technical patents at home and abroad. They are widely applied to commercial vehicles, wind power generation, construction machinery, military machinery, metallurgy, port machinery, etc.

More Than 500,000 Units of Lubrication in Service

Up to now, more than 500,000 units of Autol lubrication equipment are in service, which are widely distributed in commercial vehicles, wind power, construction machinery.

What will CLS and WGCS bring to you?

According to statistics, the mechanical faults of wind turbines cover 55%, 65%, and 42% of all various faults respectively in Sweden, Finland and Germany. The fault rates caused by poor lubrication are 33%, 29% and 25%, respectively. Although the bearings are not the most common parts easy to damage, they are the parts that maybe result in the longest downtime of wind turbines.

Ensuring trouble-free operation, minimizing unexpected downtime

Autol CLS for wind turbines are intelligent systems which realize remote, real time, on-line monitoring of lubrication state of bearings through system transmission ports.
Autol waste grease collection system (hereinafter, WGCS) can maximize the reliability and stability of bearings and improve the safety of operation staff working in hubs. While getting a more intelligent and controllable lubrication state by WGCS, the bearing damage and electricity loss caused by poor grease drainage are greatly reduced.
Thus, Autol CLS and WGCS prolong the service life of bearing and minimize the breakdown frequency and downtime of wind turbines.

Simplifying maintenance,prolonging maintenance intervals

To get better lubrication effect, the waste grease in bearings should be cleared up timely. At a wind farm in Inner Mongolia, before installing Autol patented Suplub-W WGCS, the seals of pitch bearings showed serious grease leakage. After installing WGCS and CLS for nine months, the waste grease sucked out was as much as the fresh grease into bearings. The grease leakage stopped and the environmental pollution was prevented.
After installing CLS and WGCS on bearings, better lubrication can be gotten by periodical operation. Intelligent grease lubrication and drainage simplify the maintenance and prolong maintenance intervals.

WGCS benefits data

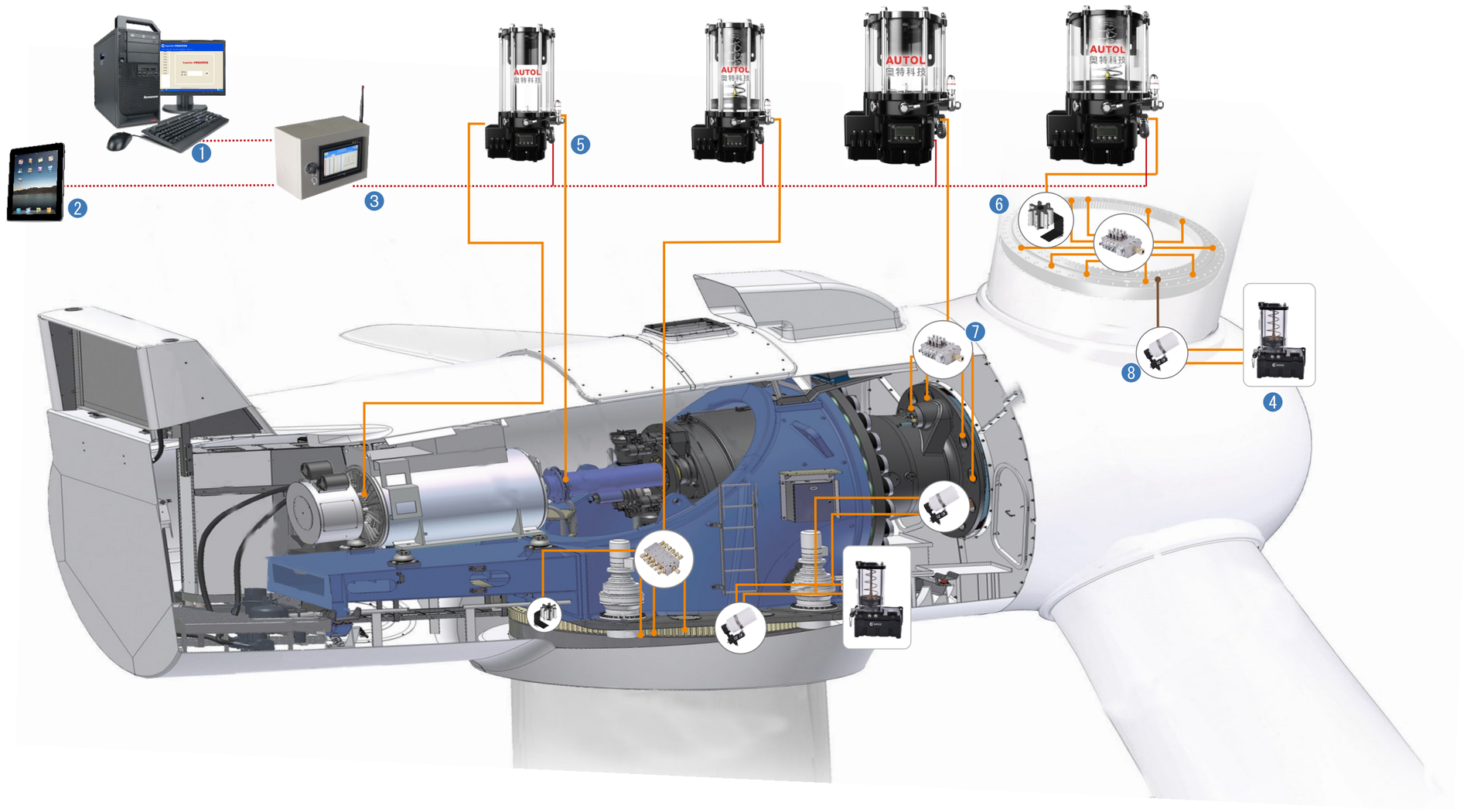
No.	Position of clear	time per clearance	cycle	cost per time	cost saving per year	power benefits increased	annual return
1	variable pitch bearing	6 hours interval	3 months	usd 265	usd 1060	usd 1765	usd 2825
2	base bearing	4 hours interval	6 months	usd 176	usd 352	usd 588	usd 940
3	generator bearing	3 hours interval	6 months	usd 88	usd 176	usd 441	usd 617
4	yaw bearing	3 hours interval	6 months	usd 88	usd 176	usd 441	usd 617

1.After analysis of the invest and the benefits of system application,the estimated rate of return proved that the cost can be recovered in one year. The income period can be more than 10 years.
2.The slewing bearing of the fan is damaged due to poor lubrication ,The costs incurred are as follows, bearing cost usd 7,500, lifting charge usd 60,000, labor cost and power loss around usd 120,000, total around 187,500.
3.Bearing waste oil is removed in time, bearing seal stop leaks ,Reduced flammability and fire incidence,Reduced fire hazards,More conducive to the safe operation of the unit.The automation of the lubrication system has improved the efficiency and level of production management,Reduce the labor intensity of maintenance personnel and facilitate the sustainable development of the wind farm.

Prolonging service life of parts

Autol CLS is smart, timed, quantitative and high-frequency. While Autol CLS and WGCS is installed simultaneously, more or less grease injection, serious grease leakage and poor drainage of waste grease can be greatly avoided. So, lubricated parts are always in the best lubrication state, and the service life is prolonged greatly.

Suplub-W Intelligent CLS and WGCS



Main Parts

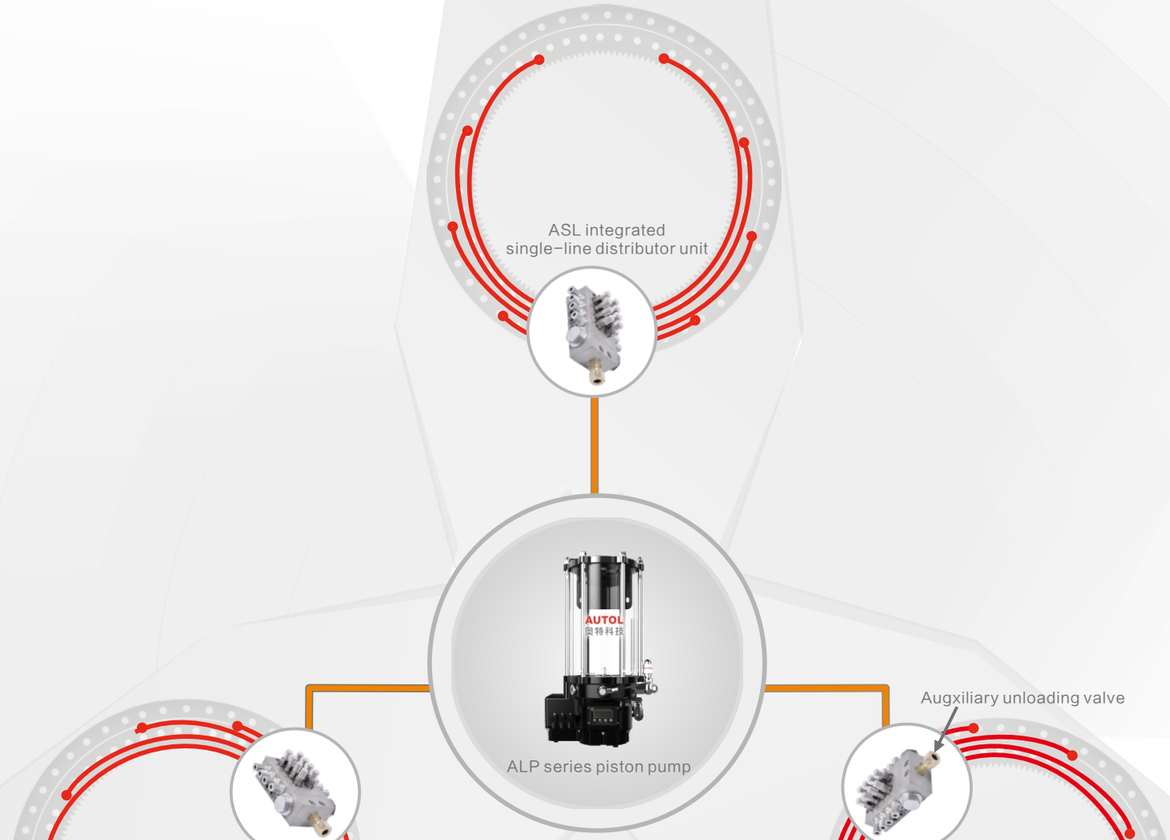
1. Remote centralized control computer 2. Mobile control terminal 3. Main control box 4. Hydraulic pump
5. Grease pump 6. Grease pinion 7. Distributor 8. Grease suction and discharge unit

Suplub-W CLS

Suplub-W CLS for wind turbines provide two lubrication solutions: integrated single-line CLS and progressive CLS.

Integrated Single-line CLS

The system is composed of a piston pump, an integrated single-line distributor unit, a monitor, a pressure sensor, a supply line, feed lines and accessories, etc.
The piston pump is connected to integrated single-line distributor units through the supply line. The pressure sensor is fixed at the end of the supply line, and the outlets of distributors are connected to the lube points through feed lines.



Operation Process

Lubrication interval is preset by the monitor. While it counts down to 00:00, the piston pump begins to operate, and the grease is delivered into the single-line distributor units, which discharge the grease into lube points through the feed lines. At this time, the grease supply is completed.

Then, the piston pump stops running, the high pressure in the supply line is fully unloaded by the unloading valve and the auxiliary unloading valves. And the grease is stored in the metering chambers of the single-line distributor units. At this time, the lubrication cycle is finished, and the system enters into the next cycle.

Innovations

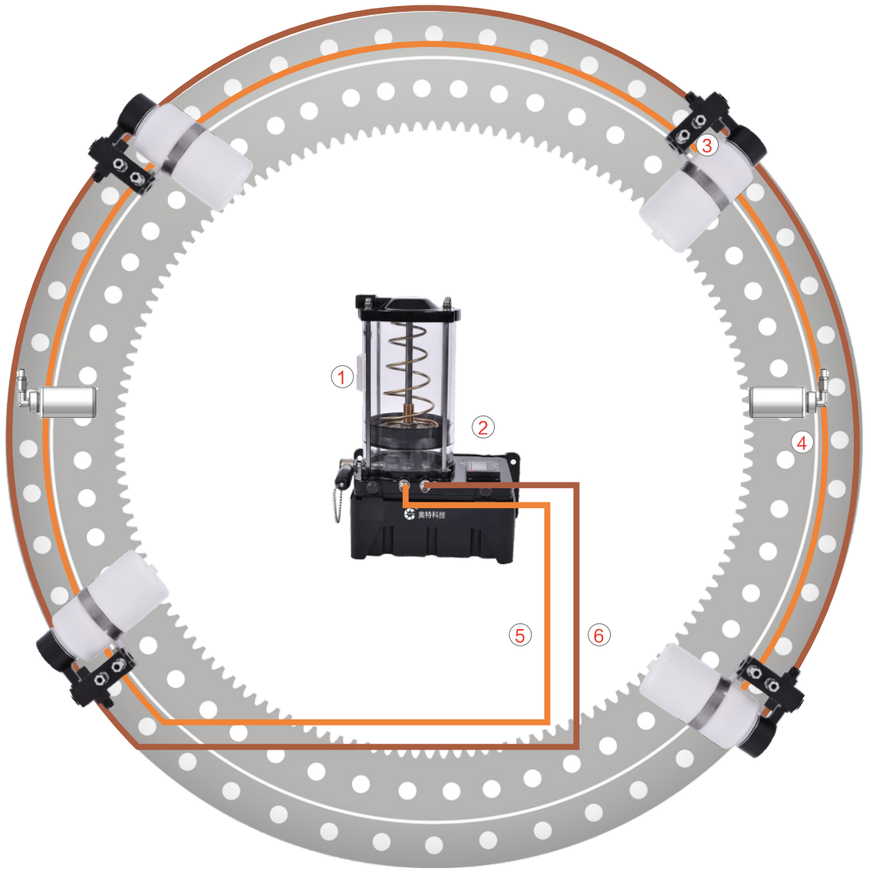
Discharging grease independently by parallel structure. If one branch is blocked, the others will not affected.
Patented technology, auxiliary unloading valve, effectively solves the unloading problem caused by the long supply line and thick grease.
New type integrated single-line distributor unit has the features of uneasy blockage and low fault rate.
Grease output and lube point number can be adjusted as required.
The metering chambers of a integrated single-line distributor unit are fixed with indicators, which can real time show the lubrication state of lube points.

Suplub-W WGCS

A Suplub-W WGCS is mainly composed of a hydraulic pump, a reversing valve, a grease suction and discharge unit, a waste grease collector, a monitor, sensors and accessories, etc.

Diagram of Operation Principle

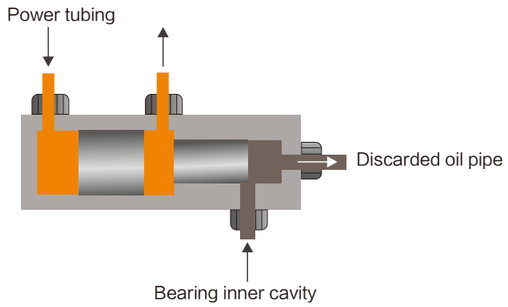
A WGCS and a CLS are installed and operate simutaneously. Under the program control of the monitor, while the fresh grease is discharged into bearings, the hydraulic pump drives the waste grease suction and discharge unit alternately through the reversing valve, the waste grease is sucked out from the bearing and discharged into the waste grease collectors.



1.Hydraulic pump 2. Monitor
3. Grease suction and discharge unit
4.Waste grease inspection bottle
5.Hydraulic power pipe A
6.Hydraulic power pipe B

Operation Process

Under the program control of the monitor, the hydraulic pump goes into operation, and drives the waste suction and discharge units alternately through the reversing valve and two hydraulic power pipes.
Waste grease suction stage: Pipe A opens up the channel of the grease bank and unloads its own pressure. Pipe B is pressurized, and the pressure grease pushes the pistons of the suction and discharge unit to the right, producing the vacuum suction and sucking the waste grease out from the bearing.
Waste grease discharge stage: The reversing valve changes its direction, and pipe B opens up the channel of the grease bank and unloads its own pressure. Pipe A is pressurized, and the pressure grease pushes the piston of the suction and discharge unit to the left pushing the waste grease into the waste grease collectors. At this time, the waste grease collection is completed, and the system enters into the next cycle.



WGCS Features

Clearing up the waste grease timely is beneficial to the heat dissipation of bearings and reduces bearing friction and wear largely.
Relieving high grease pressure in bearings makes the bearing cavities smooth, and ensures fresh grease can be easily discharged into bearings.
Ensuring the tight sealing of bearings, preventing environmental pollution caused by grease leakage.
Matched with CLS, the serious blockage inside bearings is effectively resolved. The proper amount of grease inside is beneficial to forming and maintaining the grease film. Thus, the service life of bearings is prolonged greatly .
Reducing mechanical friction strength, decreasing fault rate, saving maintenance cost, and enhancing the efficiency and productivity of wind turbines.

CLS and WGCS Solutions for Wind Turbines

System components and advantages

The system consists of centralized lubrication system server, wireless receiver-transmitter, Web client, centralized lubrication system, SMS service, and smart mobile phone client.

1. It supports mobile phone SMS inquiry function to know lubrication conditions at lube points whenever and wherever possible.
2. The Web client allows for checking operating conditions of the whole lubrication system, user management, lubrication parameters, and lubrication report.
3. Application of modern networking technology to network the distributed lube points. The personnel responsible for management and maintenance may know the lubrication operating conditions whenever possible.
4. The wireless remote monitoring system allows for checking lube points information on faults, without troubleshooting point by point, with less labor intensity of maintenance personnel.
5. The level information of every set of lubrication system and the operating condition of every distributor may be checked in a timely manner.
6. With the wireless remote monitoring system, the lubrication parameters of lube points can be set and checked.

Wireless Remote Monitoring System

Excavator set　　Server　　Client

Note: It is active when the mobile phone signal（3G/4G）is available under fibre-optical network conditions.

Equipment Health Management System

Application Layer
Lubrication health evaluation system

Information Layer
Data storage and management system

Transmission Layer
Internet

Physical Layer
Sensors of pressure, displacement, temperature, noise, vibration, etc.

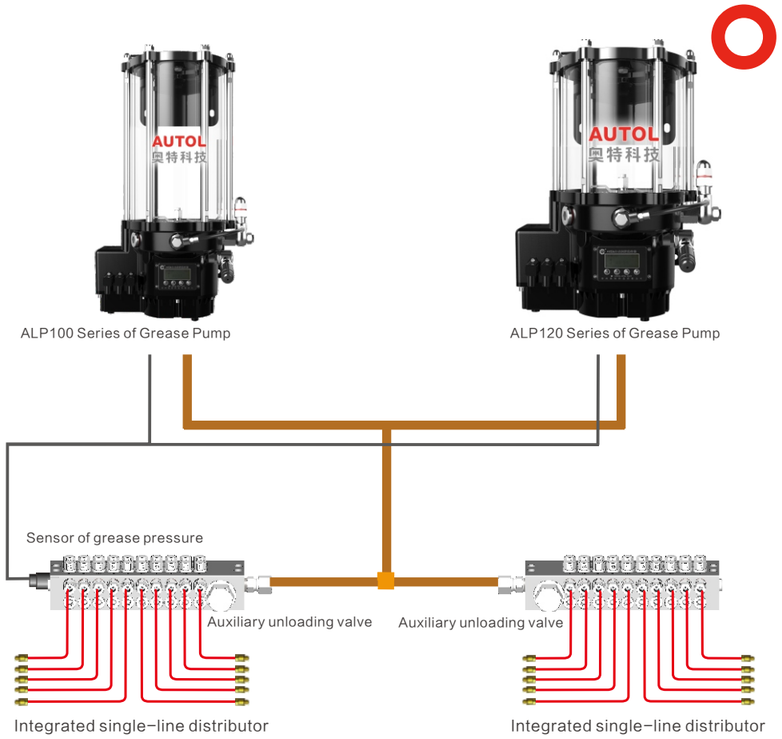
Note: It is active when the mobile phone signal（3G/4G）is available under fibre-optical network conditions.

Health Management Business Mode

Detection of status	Data integration	Analysis and diagnose	Plan of remedies	Maintenance
On-line automatic detection Off-line detection	Status of lubrication system Status of lube point Status of grease	Diagnostic strategies of general information Diagnostic strategies of early warning Diagnostic strategies of fault alarm Experts' joint diagnosis for difficult troubles	Remedies of minor trouble Remedies of experts' joint diagnosis	Current repair Medium repair Major repair
Real-time monitoring: Lubrication equipment, lubrication points, lubrication medium statuses	Various data are computed and integrated with mathematical model and algorithm	The processed data are strategically analyzed and diagnosed	Remedies upon results of diagnosis	Perform maintenance upon remedies

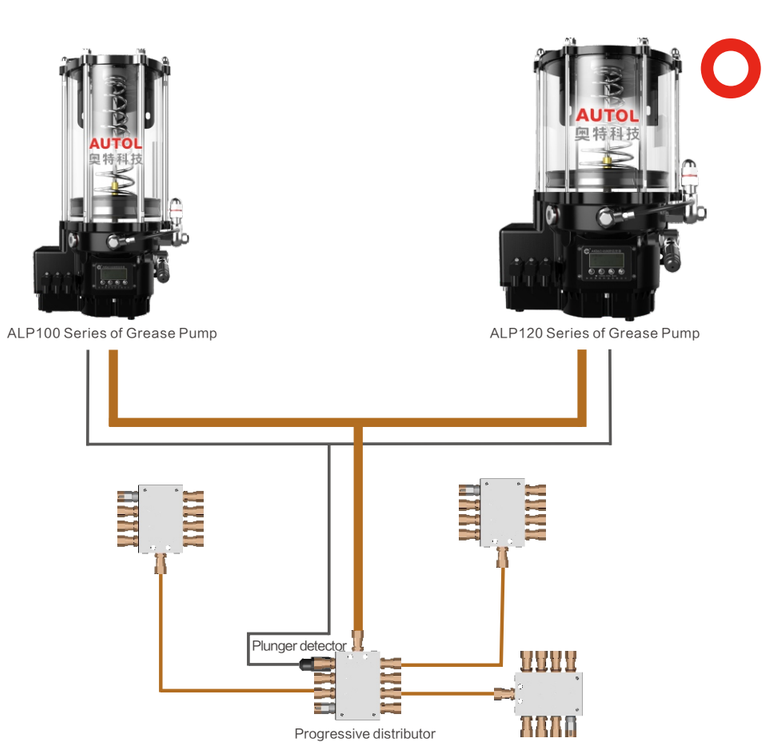
Integrated Single-line CLS

The integrated single-line CLS operates in cycles by the ECU monitor. The grease supplied by the pump is quantified by the metering chambers of integrated single-line distributor units and discharged into lube points simultaneously.
NLGI-0, NLGI-1 and NLGI-2 grease are suitable for the system.
The system is suitable for wind turbines, metallurgy, electric power, ports, mining, shipping, cranes, carpentry, food production and architectural engineering, etc.



Progressive CLS

The progressive CLS operates in cycles by the ECU monitor. The grease delivered by the pump is quantified by the pistons of progressive distributors and discharged into lube points one by one.
NLGI-0, NLGI-1 and NLGI-2 grease are suitable for the system.
The system is suitable for wind turbines, metallurgy, electric power, ports, mining, shipping, cranes, carpentry, food production and architectural engineering, etc.1 and NLGI-2 grease are suitable for the system.



ALP100/120 Series Piston Pump

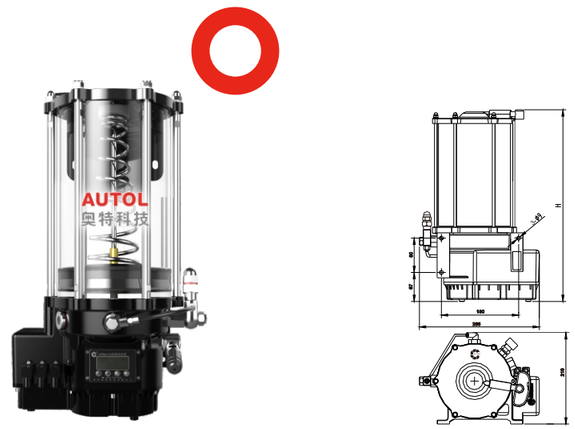
AL100/120 series of centralized lubrication system primarily consists of high-pressure lubrication pump, distributor and monitor.
The AL100/120 series applies to mechanical equipment of construction machinery, wind power, port, electric power, mining, crane, engineering, woodworking, beverage machinery, etc.
In the system, the ECU LCD-based monitor controlled the high-pressure grease pump operates cyclically. During operation, the reducer motor drives the eccentric wheel to reciprocate the plunger pair for grease pumping. After the pressurized grease enters into the supply line, the grease is supplied to lube points via the distributor metering chamber.

Technical Data of ALP100/ALP120 Series of Lubrication Pump

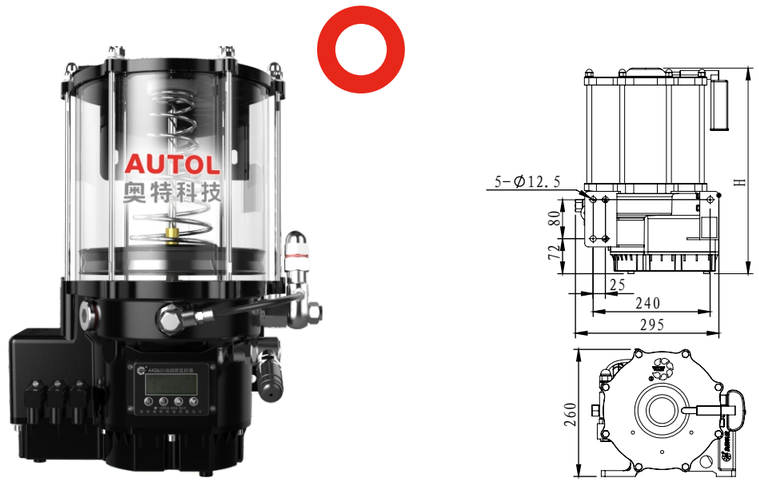
Model	Control mode	work time	Nominal flow	Maximum operating pressure	Capacity	Height	Parameters of motor	Grease available	Suitable temperature
ALP100	External/ built-in monitor	1~99min	2~5ml/min	35MPa	2L	335mm	24VDC 30W	NLGI-0#、1#、2#	-40℃~70℃
					4L	485mm			
					6L	585mm			
					8L	685mm			
ALP120	External/ built-in monitor	1~99min	2~5ml/min	35MPa	4L	428mm	24VDC 30W	NLGI-0#、1#、2#	-40℃~70℃
					8L	533mm			
					10L	596mm			
					15L	716mm			
					20L	848mm			

[Note] Please use reasonably the same grade of low-temperature grease in cold region in winter.

Drawing of Overall Dimension



ALP100 Series of Grease Pump



ALP120 Series of Grease Pump

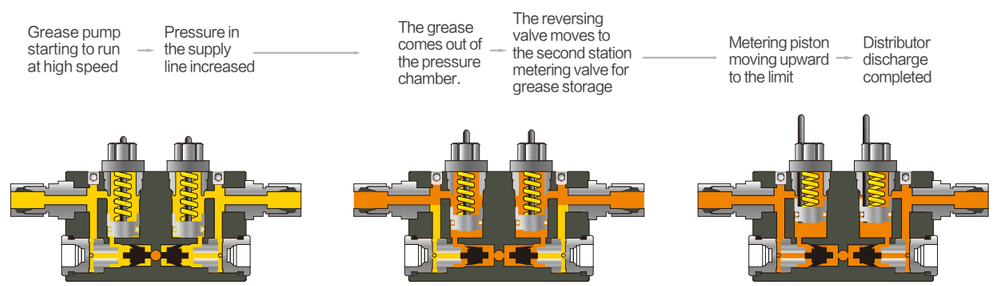
Points of innovation: NLGI-2# may be available throughout the year to challenge the high altitude and extremely cold climate.

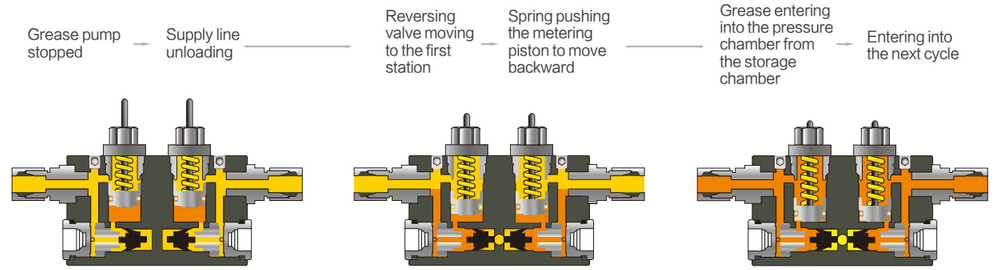
Integrated Single-line Distributor

The integrated single-line distributor is a greaser at fixed amount. It is suitable for a centralized lubrication system with a single supply line. With grease exchange between the distributor internal storage chamber and pressure oil chamber, the grease is distributed at fixed amount.
The integrated single-line distributor features combination of different grease deliveries. The internal valve hole is not prone to be effected by hardened separated grease. One clogged lube point will have no influence on the other lines.

Maximum operating pressure:30MPa
Grease available：NLGI-0#、1#、2#
Displacement：0.2、0.4、0.6ml/cy

Operating Principle

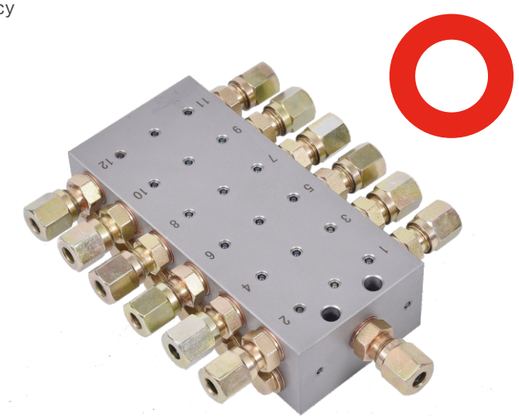




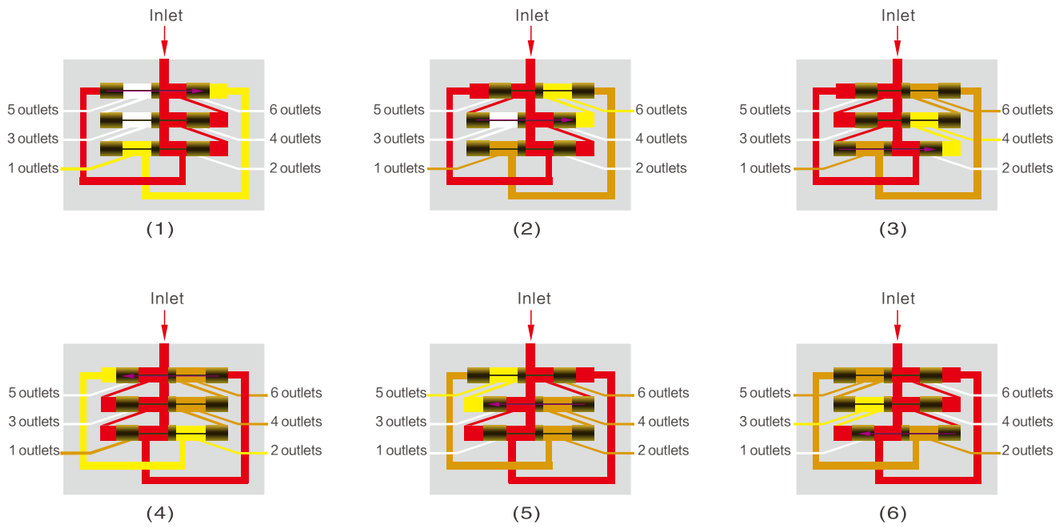
SSV Progressive Distributor

Through sequential actions of plungers, the progressive distributor progressively supplies lube points. It may be constructed with blocks or pieces. A block-type distributor is structured with one block, with outlet being connected with 6/8/10/12/14 ways, with high operating pressure, suitable for heavy-duty machinery. A piece-type distributor consists of one front piece, one rear piece and intermediate pieces. Each intermediate piece is designed with 2 outlets. Each group of intermediate piece include 3 to 8 pieces. Each delivery may be independently design, depending on plunger area and stroke.

Maximum operating pressure：30MPa
Grease available：NLGI-0#、1#、2#
Displacement：0.2mL/cy



Operating Principle



For a progressive distributor, plungers act in sequence. The pressure grease enters from the inlet of the distributor. The internal plungers act in sequence. As a result, the grease is delivered to lube points in turn. After the plungers stop moving for a long time, the high-pressure grease is supplied into the distributer again. And, the plungers will immediately move from the stopping point of last movement. After the previous plunger has finished filling, the next plunger can only be activated by the pushing force of the pressure grease (As an example, the following figure shows a block-type structure with 6 outlets).

Waste Grease Collection System

Waste Grease Collection System consists of power pump, ALR series grease suction-discharging device and relevant accessories. The power pump provides system with hydraulic power according to time preset, and grease suction-discharging device accomplishes suction and collection of waste oils under the push of hydraulic oil.

Hydraulic Pump

Control mode	Built-in monitor
Power supply	AC230V/ DC24V
Rated power	40W
Max working current	≤0.3A (AC230V)； ≤2.5A(DC24V)
Rated pressure	5Mpa
Grease discharging time	(1-99) min/regulable
Grease suction time	(1-99) min/regulable
Off time	(1 -30) h/regulable
Display mode	LED dynamic display: counting, off time, grease discharing time, grease suction time, temperature, liquid level, fault code etc.
Oil tank capacity	2L
Applicable oil	L-HS 46# hydraulic oil
Working temperature	-40℃ ~ 70℃
Survival temperature	-45℃ ~ 80℃

Grease suction-discharging device

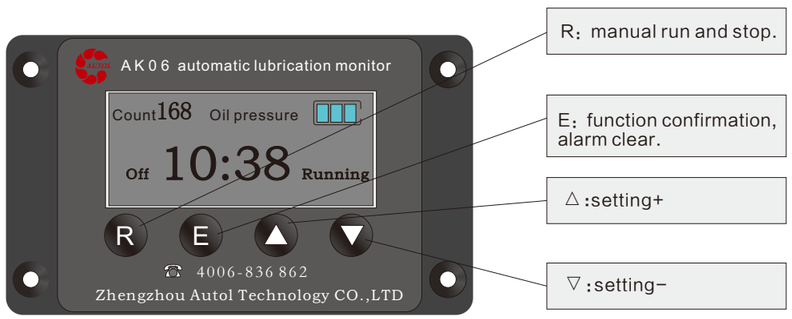
Driving mode	Hydraulic oil drive
Single grease suction volume	1.35ml (theoretic value)
Vaccum degree	Working circulation 10-25 times, vacuum degree of oil suction inlet no larger than -0.07MPa
Working temperature	-40℃ ~ 70℃
Survival temperature	-45℃ ~ 80℃
Oil collection mode	o.5L oil collecting bottle, 4L oil collecting barrel etc. optional according to site installation space.

Oil collecting bottole

Mainly used for passively collecting bearing waste grease.
Volume: 0.3L, 0.5L

Monitor

Built-in Monitor



Important information:

Press and hold both "▲" and " ▼" for 4s and above and press the "E" to enter into the mode of setting. It is automatically locked after exiting the mode of setting.Press briefly the "E" to enter into the setting interface and press briefly in turn the "E" to select the setting items “1P, 2P, 3P and 4P”. Confirmed.

1P: Press briefly the "▲" or " ▼ " to set the off time（1 to 30 h, customizable）;

2P: Set the number of pulses to be detected (0 to 99 min, customizable);

3P: Press briefly the "▲" or " ▼ " to set the operation time（1 to 60 min, customizable）;

4P: Press briefly the "▲" or " ▼" to set the low-temperature standby temperature (-50℃ to 0℃);

Briefly press the "E" to confirm entering into the "OFF" state.

Special Attention!

This monitor is designed with function against misoperation:

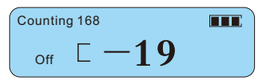
Setting Interface

1 Off status

2 Oil quantity pulse not detected during operation

3 Oil quantity pulse detected during operation

4 Low-temperature standby



5 Low level early warning status

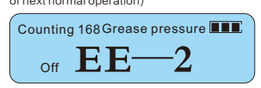
6 Low level early warning status

7 Alarm due to lack of grease

(Alarm sends and the machine will be shut down after 6 consecutive operations, the alarm will be automatically acknowledged after the tank is fully filled)

8 Alarm due to insufficient filling

(It has no influence on system operation. Fault will be automatically cleared at the time of next normal operation)



Enclosure

ADZ0505

New edition ADZ0505 refueling pump has the advantage of easy to operate,save time and labor ,minimum the waste of grease . It could be fixed on the standard grease bucket by lock up,
System running after power on, registered Autol’s own patents of utility model from China.

Technical parameter:
Model：ADZ0505
Power supply：AC230V
Rated power：200W
Weight：7.5Kg
Maximum working pressure：10MPa
Output flow：500mL/min
Temperature：-20℃~70℃
Grease：NLGI-1#~2#
Diameter：175-185mm

Pneumatic tanker

The device is powered by a gas source and is controlled by pneumatic components. It has stable performance, fast grease injection, and can be used with gas source.

Technical parameter
Capacity:40L
Pressure ratio : 45:1
Output flow: 410ml/min
Grease: NLGI 0-2#

Manually Operated Grease Gun

Technical parameters:
Displacement：42ml/cy
Grease：NLGI-0#、1#、2#

After-sales Services Freeing You From Worries

We keep forging ahead unswervingly to provide excellent products and best of the services to customers. We provide technical services to users with as quick response as possible and arrange regular visits to system inspection.

1. Before use of equipment, we will provide professional training services free of charge;
2.We will give instructions to installation and commissioning until normal operation.
3. After the equipment is put into service, we will go the customers' site for after-sales services such as follow-up inspection, etc. on a regular basis.
4. We provide training services to the users with respect to basic operation and routine maintenance of systems.
5. During warranty period, Autol will unconditionally replace or repair the defective products (if any) due to their quality.
6. For the products from the other manufactures, which were used by the customers in the past, we will provide service for the same.

Marketing Network

In China

Except Hong Kong special administrative region, the Autol's marketing network covers 23 provinces, 5 autonomous regions, 4 municipalities directly under the central government and 1 special administrative region.

In the world

In 2015, Autol established Lubmann GmbH Research Institute for Lubrication in Germany, one of eight major industrial countries in the world.
At present, the Autol's marketing network covers more than 30 countries and regions such as USA, Germany, Russia, France, Japan, India, South Africa, etc.

Appplication Cases in Wind Turbines