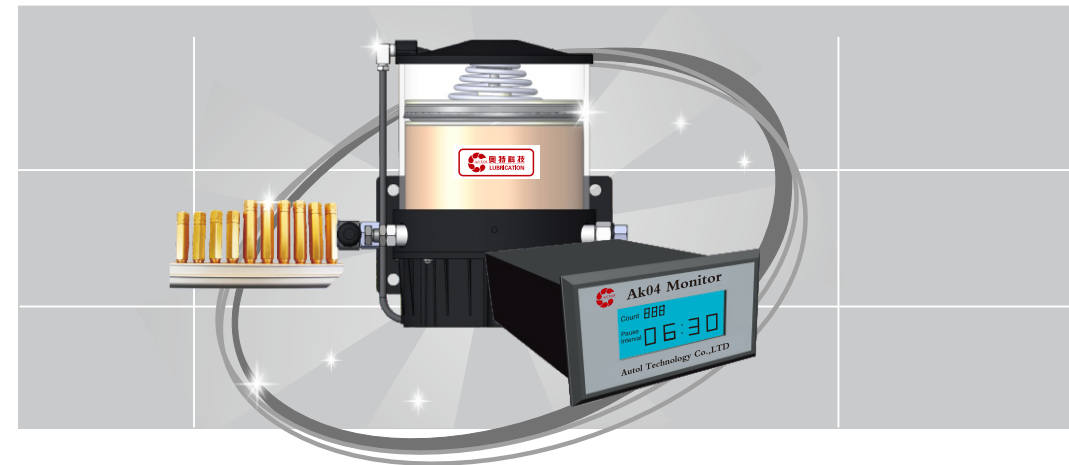


> > > CENTRALIZED LUBRICATION
SYSTEMS



ALP50 Series Operating Instruction Manual

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1、Components of Series of ALP50 Centralized Lubrication System

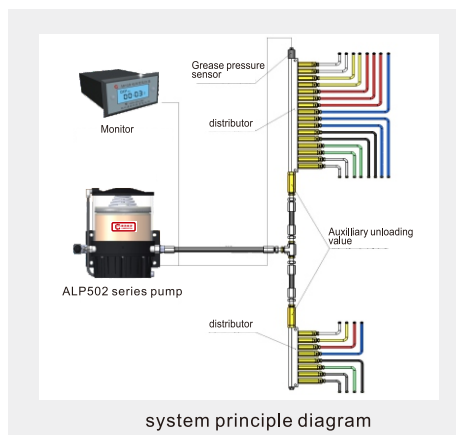
ALP50 centralized lubrication system consists of a monitoring unit and a grease supply unit. The monitoring unit consists of a monitor and sensors, which controls the system through electric circuits. The grease supply unit composed of a pump module and distributors integrates the lube points of the vehicle into an enclosed system through tubing accessories. The system can distribute lubricant to friction pairs automatically at preset times and in a definite quantity so as to ensure that they can get good lubrication.

Monitor

The monitor is a microcomputer-programmed monitoring and controlling device. That is the “brain” of the automatic lubrication system. Its function is to monitor and dynamically display the real-time data from the system, such as grease pressure, countdown in the pause interval, running time, accumulative running cycles and failure code. Moreover, it has the features of overload protection and failure warning. ALP50 system is equipped AKXX series monitors.

Pressure Sensor

The pressure sensor detects the mainline pressure and transmits the data to the monitor.



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Temperature Control Sensor

In the areas whose minimum temperature is below -15°C , the system can adjust the temperature control sensor, detects ambient temperature and transmits the data to the AK04 monitor.

Pump Module

Pump module is the “heart” of the system, which delivers the grease from the reservoir to the metering distributors at a higher pressure.

Metering Distributors

The metering distributors deliver preset volumes of grease to lube points according to the volumes of grease that different friction pairs require.

System Accessories

The system accessories include mainlines (connection: pump distributor manifolds), distribution lines (connection: individual distributors-lube points), electric circuits, hose fittings and others.

Through the accessories, the system is integrated into a complete closure one.

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2、Technical Parameter

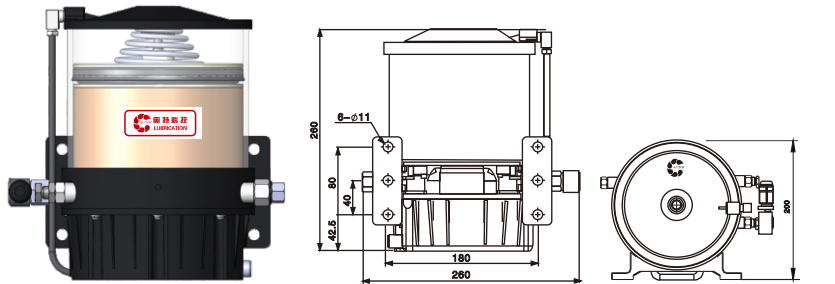
| Item | Content | ALP50 |
|------------------------|-------------------------|--|
| Moni-toring Unit | Control Model | ECU Microcomputer-programmed Control |
| | | Ak04 Monitor |
| | Pause Interval | 1hours - 30 hours (adjustable) |
| | LCD Screen | LCD Dynamic Display: Grease pressure, cycle count, "ON" and "OFF" time, fault code |
| | Pressure Sensor | Closed pressure: 6.3Mpa/ Exposed pressure: 4MPa |
| | Temperature sensor | Detect ambient temperature automatically and protect the system automatically at freezing temperatures |
| Pump module | Operating Time | operating under the defined interval flowrate |
| | Type | High-pumping gear pump |
| | Reservoir Capacities | 1.5L |
| | Power Output | 20W 12V/4A (or24V/2A) DC |
| | Pump Flow Rate | 55 ml/min |
| | Output Pressure | Normal temperature 6.3Mpa |
| | Max. Lube Point | 50 points |
| | Grease Recommended * | NLGI-0#、00#、000# |
| Meter distrib-uters | Discharge Pressure | Pressurization: under 12.5Mpa adjustable |
| | Quantity of Loop Output | 0.13 ml、0.2 ml、0.4 ml、0.6ml |
| Tubing specific-ations | Mainlines | Φ14.3×7.9 nylon tubing |
| | Distribution Lines | Φ4×0.75 nylon tubing |
| | Temperature range | -20℃~60℃ |

【 Note 】 : Be sure to use the recommended grease
“NLGI-0 #”is for the areas whose minimum temperature is no less than -20℃; “NLGI-000 #”or “NLGI-0PP” of low-temperature is for the areas whose minimum temperature is lower than -20℃;

3、Working principle of Parts and Mounting Dimensions

3.1 Pump module

The pump module is usually fixed to the handicraft doors on the side of the vehicle.



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Components:

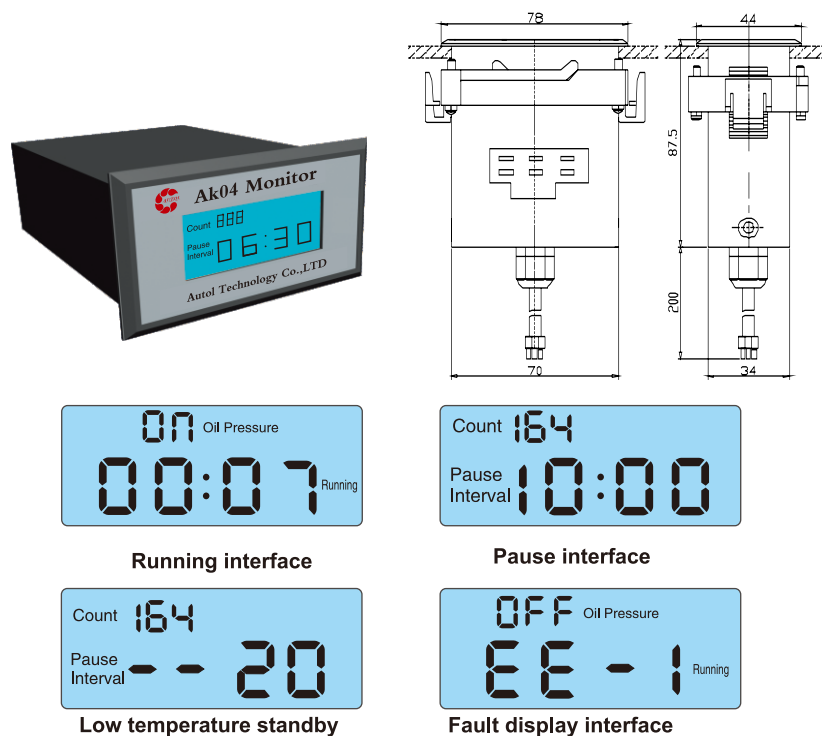
The pump module of the ALP50 centralized lubrication system is a pump system composed of a 12/24V DC motor, a gear pump, a overflow valve, a unloading valve and a transparent reservoir. It is semi-enclosed.
Housing fastened to reservoir cap is very easy to open and shut.
Through a manual grease gun or automatic refilling device, the reservoir can be fast refilled.

Working Principle:

When the pause interval ends, the pump module receives the signal from the monitor, and then the motor driven gear pump is activated.

The grease is pressurized by the gear pump into the exit. Meanwhile, the pressure unloading valve is opened, and the pump module pressurizes the mainline. Then the grease cylinder connected to the mainline begins to work so as to ensure the supply of grease through a conveying device that conveys the grease from the bottom of the reservoir.

Grease pressurizes mainlines and causes distributors to dispense preset volumes of grease to lube points. Thereafter, when the exit of pump module has enough pressure to open overflow valve, redundant grease reflows to the reservoir through the orifice in overflow valve.



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The pump module receives the signal from monitor and the gear pump stops. The unloading valve opens and the grease in the main line reflows back to the reservoir. The rest pressure of the main line is approximately 0.1Mpa-0.2Mpa.

3.2 Monitor

AK04 monitor is the “brain” of the ALP50 lubrication system. Their function are to monitor and display the real-time data from the system dynamically, such as grease pressure, countdown in the pause interval, running time, accumulative running cycles and fault code. Moreover, it has the features of overload protection and fault warning. They are suitable to DC12V and DC24V power supply and installed at drivers compartment for watching conveniently. Monitors are also equipped with remote controls in order to repair the system.

Pause interface:

It tells countdown in the pause interval and running cycles, which can be stored perpetually. The system's pause interval has multi-grades adjustable from 1 hours to 30 hours, and that is usually set at 10 hours.

Running interface:

It tells grease press OFF or ON and running time.

Operation:

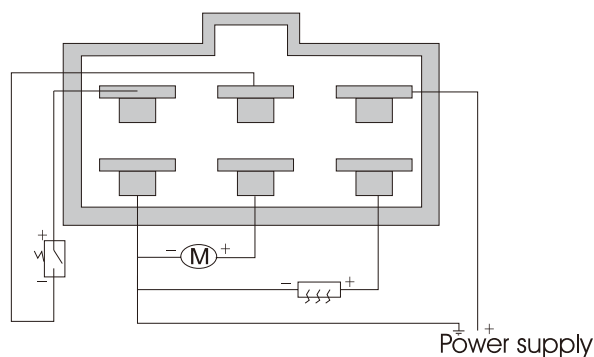
Take pause interval set at 10 hours for example, after ignition being turned on, the LCD screen counts down remaining time in the pause interval. If the time reaches 00:00, the monitor initiates the pump to pressurize the mainline, the screen starts to count the lube time. When the pressure at the end of the mainline is up to 4.6MPa, the

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pressure sensor transmits the signal to the monitor immediately, the ON pressure reverts to the OFF one, and the pump operates 60 more seconds (AK04) until de-energized. Then the monitor counts down to the next lube cycle, and 1 is added to the cycle count.

Fault display:

If the monitor doesn't detect the preset pressure from the mainline, the pump module operates total 150 seconds until de-energized. At this moment, the OFF pressure and the fault code EE-1 occurs on the screen, accompanied by an alarming signal (buzzer sound). The signal will disappear automatically in 20 seconds. Then please check the system immediately. Temperature control setting: In the areas whose minimum temperature is lower than -15°C , the system can detect ambient temperature through a temperature sensor. The pumps will not start, if the real time environment temperature is lower than the defined temperature.

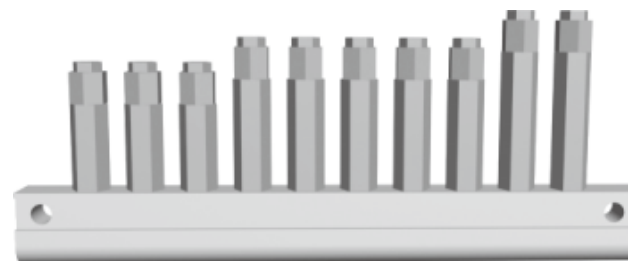


Electric circuit of monitoring system

Attentions:

- Remote control should only be used in debugging and overhauling the system. Pressing the key will make the pump module begin to work, and pressing it again will stop. If the system stands by in low temperatures, there is unavailable to press the key.
- AK04 monitor has the memory function. For example, if the pause interval is set at 10 hours and the system is powered down when the remaining time in the pause interval reaches 02:00, whenever the system is reset, the monitor will continue to count down 2 hours and then go to the lube cycle.
- Please do not adjust the fixed pause interval without permission.
- If sometimes LCD screen works anomalously because of electromagnetic interference. The pump must be restarted.

3.3 Pressurization distributors

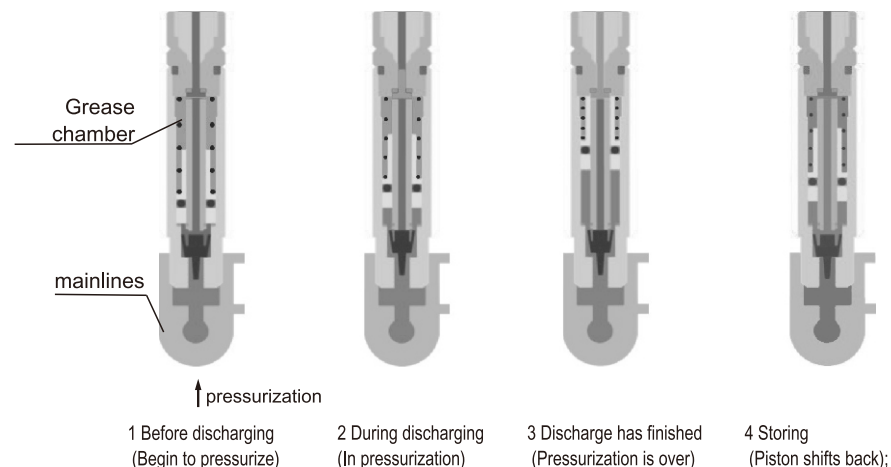


Pressurization distributors consist of distributor, valve mushroom, pistons, center port, return spring, fuel discharge port, jointing and others. While the pump module pressurizes the mainline, pressure build-up from a pressurization distributor forces a piston forward, and delivers a preset volume of grease to each lube point. The discharge pressure can be up to 10MPa. At freezing temperatures, discharge pressure will be improved as the temperature drops in order to make grease conveyed to friction pairs. When the pump module is de-energized, the internal vent valve vents, and the injectors can prime themselves in preparation for the next cycle. According to the volumes of grease that friction pairs require, pressurization distributors are available in three discharge volumes: 0.13 ml, 0.2 ml, 0.4 ml and 0.6ml per pump cycle.

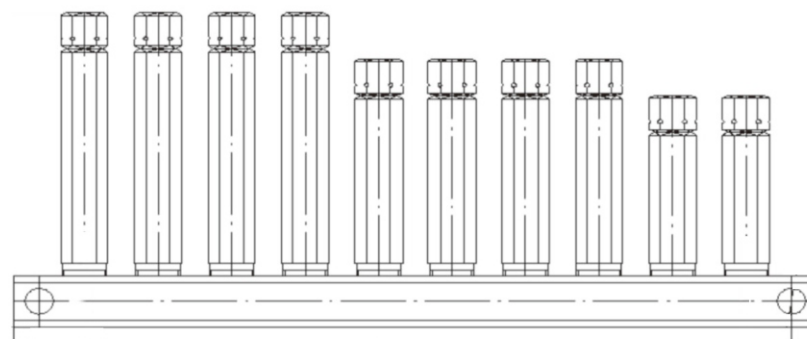
Operation:

- The pressurized grease from the mainline forces the valve mushroom in the distributor to shift forward.
- Upon the valve plugging the center port, the grease flows through both side inlets of the valve simultaneously, and pushes two parallel pistons towards the outlet to dispense a preset volume of grease in discharge chamber to lube points.
- When the piston is forced to the top of the chamber, the discharge has finished up.
- The pump stops working and the unloading valve opens. The pressurized grease of main line reflows back through the unloading valve and the system pressure goes down quickly. The piston of the distributors begins to replace to step 1) under the influence by the

spring. The mushroom goes back to block the main line tube. The grease in the under chamber is delivered by the center port of the piston to the upper chamber. At the meantime, the grease for the next circuit is prepared.



The installation diagram of pressurization distributors is as follows:



4、Design, Installation and the Cautions in Installation

4.1 Determination of lube points

Lube points are the friction pairs lubricated by grease fitting in the vehicle in which some that can rotate 360 degrees and have a high temperature are excluded.

4.2 Installation

4.2.1 Installing notice of the pump module

Pump module should be installed vertically and firmly in a place where the device is polluted less, convenient maintenance and easy to observe and operate. If conditions permit, a separate door can be set near the pump module.

4.2.2 Installing notice of distributors

Distributors also should be installed in a place where the device is polluted less and convenient to fix, maintain and observe. A few distributors can be caught together in groups and finally connect to the mainline.

4.2.3 Installing notice of system tubes

- The mainline usually use $\Phi 7.9 \times 14.3$ nylon tubing whose pressure-proof should above 21MPa and orifice should have rigid bushing. Moreover, $\Phi 10 \times 1$ steel tubing is also available.
- The distribution lines should be short as much as possible, especially the distribution lines to firmly hermetical lube points whose length should not be longer than 4.5 meters. In addition, the

distribution lines from exits of distributors to lube points should not be longer than 3 meters. The distribution line use nylon tubing and their both ends must have rigid bushing.

- Tubes should be incised vertically in axial direction and avoid squashing, cracking and scratching.
- The mainline and distribution line should be short as much as possible in order to avoid more bends (when they are bended, the minimum bending radius of $\Phi 7.9 \times 14.3$ and $\Phi 4 \times 0.75$ nylon tubing is R50 and R20). Less bends can decrease the loss of the pressure and ensure free discharge.
- The distribution line must be full of grease before installation. The mainline also must be full of grease in installation below centigrade 5°C.
- Tubes must keep clean, and have not contaminator.
- Flexible tubes should be 1% longer than straight length when they are installed on in-line installation.
- The installation of mainlines and distribution lines should avoid engine, warm air blower and the bends of and steel spring plates.
- If the mainline and distribution line use nylon tubing, they should be enclosed by corrugated tubes.
- Some tubes, which are removable or across holes in the beam, must be protected by tube shroud.

The volumes of grease that lube points require and correspondence between distribution lines and colors.

The volumes of grease that lube points require and correspondence between distribution lines and colors

| | | |
|--|-----|--------|
| Brake pedal axle | 0.1 | White |
| Door axle | 0.2 | Yellow |
| Shock absorber | 0.1 | White |
| Propeller shaft bracket bearing | 0.4 | Red |
| Speed change drag link universal joint | 0.2 | Yellow |
| Camshaft neck-stock | 0.1 | White |
| Camshaft tailstock | 0.2 | Yellow |
| Adjustable arm | 0.4 | Red |
| Steel spring pin | 0.4 | Red |
| Steering knuckle kingpins | 0.4 | Red |
| Transverse ball pin of drag link | 0.2 | Yellow |
| Straight ball pin of drag link | 0.2 | Yellow |

5、System Debugging

5.1 When the system are being debugged, terminals of mainlines must keep open (i.e. don't screw on choke plug and pressure sensor). Pressing the C key in the remote control will make the pump module work 20 seconds, and then do it again after the pause for 20 seconds. The discontinuous running can exhausts air from mainlines. Afterwards the terminals that are bleeding should be blocked by choke plug or connected up the pressure sensor.

5.2 Press C key in the remote control makes the pump module work. Then press it again after the pump stops for 120 seconds. Repeat it several times until every friction pairs is overflowing.

5.3 If some lube points are not overflowing,a manual operated reservoir-fill gun must be full of grease that is also used in the system to clear the blockage. And then see if the workingcondition is in accord with requirements.

[Note]: Opening and shutting methods of the reservoir housing

- Opening method: Pressing the semicircular bulges on both sides of the reservoir cap with both thumbs, and then propping the earlike parts on both sides of the housing with your bent index finger. Squeezing and then pulling upward the parts sharply can remove the housing easily. Single-hand operation is also available at your inconvenience.

- Shutting method: Taking the housing, and making its ear-holes on the both side level at the semicircular bulges on both sides of the reservoir cap. Then pressing the top of the housing can make the housing and the reservoir cap locked.

6、Filling the Reservoir

6.1 Please inject greaserecommended in the instructions into reservoir timely every two month or in the second level service.

6.2 The filling volumes that AJ260 reservoir- fill gun does each time is 200ml. Punching two round orifices on the position near the edge of the top head of grease can before use, and then inserting the bottom of the reservoir-fill gun and its refuelling coupling into the orifices respectively.

6.3 Please open the reservoir housing, adjust the direction of the fill valve and remove the dirt-proof boot of the fill valve at the time of injecting the grease. Then insert the refuelling coupling into the fill valve slot so as to fasten the slot and the buckle. The grease can be injected quickly. After injection, please install the dirt-proof boot and fasten the housing for fear that the dust get in.

6.4 Make sure not to inject unclean and bad grease to the reservoir, and cleanaway impurity in the gauze filter of the fill valve regularly.

6.5 Filling the reservoir should not exceed the upper limit marked in the reservoir. Do not inject excessive grease in order to avoid plugging up respiratory tube.

7、System Maintenance

7.1 The first level service of the vehicle:

7.1.1 After ignition being turned on, press C key in the monitor and verify that LCD screen is working correctly.

7.1.2 Check if mainlines and distribution lines are leaking or bended and if every lube point can get grease. If there are lube points in the engine, please check if distribution lines in the engine are ruptured and if each lube point can be lubricated.

7.1.3 Check if pipe bundles are fastened firmly and if wiring harness are connected firmly. Then check if some movable distribution lines are tied firmly.

7.1.4 Clear away the dirt from each part of system and grease dirt leaked from lube points.

7.1.5 Check remaining grease in the reservoir and refill the reservoir in time. Note: Some customers say that sometimes the grease cannot be injected to the reservoir smoothly. The problem is caused by blockage in the gauze filter. Cleaning or changing the gauze filter will solve the problem. Moreover, it should be noted that the process of filling the reservoir and storage of grease (grease can) should be in a sanitary condition.

7.2 The second level service of the vehicle

7.2.1 To do the all items that should be done in the first level service.

7.2.2 Check remaining grease in the reservoir and make sure that the reservoir should be filled to the upper limit in the second level service.
Cautions:

- Centralized lubrication system is controlled by the monitor automatically, so the driver should not perform any operation but monitor the LCD screen. If adjusting discharge frequencies is necessary, this should be performed by the maintenance and management department.
- Grease recommended for the system is NLGI 0# or NLGI 00# . Storage of grease and the process of filling the reservoir should be kept clean. Filling the reservoir should not exceed the upper limit and should not be performed on the condition that the reservoir is empty, which can ensure smooth filling in the second level service.
- If some tubes need to be moved or dismantled temporarily from the system in maintenance, the original installation state must be remembered. After maintenance being accomplished, these tubes must be back to their original state, or else they will be broken.

8、Diagnosis and Clearing of the Fault

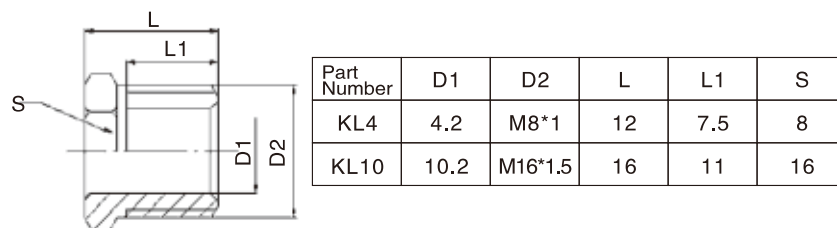
| Symptom of fault | Cause of fault | Methods for removing fault |
|--|---|---|
| When the system begins to lubricate, the motor stops working. The monitor alarms and at the meantime , the OFF pressure and the fault code EE-1 occurs on the screen and the "grease Pressure" twinkles. | 1.The monitor is connected mistakenly | Please connect as wiring diagram of the monitor shown |
| | 2.The monitor is damaged | Replace the monitor |
| | 3.Wires of the pump module are broken | Connect the wires properly |
| | 4.The motor is defective | Replacing |
| | 5.The gear pump seizes up | Clean and repair the gear pump |
| When the system begins to lubricate, the motor works. The monitor alarms and at the meantime, the OFF pressure and the fault code EE-1 occurs on the screen and the Grease Pressure twinkles. | 1.There is air in the inlet port of the gear pump | Shake the reservoir so as to expel the air |
| | 2.Mainlines are broken and joints are loose | Overhauling and Replacing |
| | 3.The consistency of grease injected into reservoir is higher | Change the grease according to the instructions |
| | 4.The overflow valve of pump module is defective | Replacing |
| | 5.Pressure sensor is damaged or the wire is disconnection | Replacing and Repair |

| Symptom of fault | Cause of fault | | Methods for removing fault |
|---|--|---|---|
| When the system begins to lubricate, the motor works. The monitor alarms and at the meantime, the OFF pressure and the fault code EE-1 occurs on the screen and the Grease Pressure twinkles. | 6. There is debris in reservoir | The holes of unloading valve core are blocked off | Remove it and clean it with diesel, otherwise clean the reservoir and change the grease |
| | | The inlet port of gear pump is blocking. | |
| | 7. Several sealing cups in drainage ports of distributors are damaged or seized up | | Replace the related distributor |
| | 8. The monitor is defective | | Replace |
| | 9. The spiracle is blocked | | Pressurize air from the reservoir to the spiracle so as to clear out the blockage |
| When the system begins to lubricate, the motor works. But the ON pressure reverts to the OFF one takes longer time than normal. | 10. There is a lack of grease in the reservoir | | Fill the reservoir to prescriptive scale mark |
| | 1. Mainlines leak | | Overhaul and Connect the mainlines |
| | 2. Several sealing cups of drainage ports of injectors are damaged or seized up | | Change corresponding joints |
| | 3. The consistency of grease injected into reservoir is higher | | Change the grease according to the instructions |

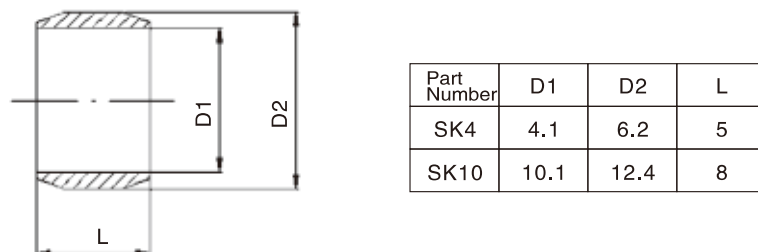
| Symptom of fault | Cause of fault | Methods for removing fault |
|---|---|--|
| The monitor detect that pressure is normal. The OFF pressure occurs on the screen, but there are not time counting in the pause interval. | 1. The monitor is defective | Replace the monitor |
| | 2. Pressure unloading valve seizes up and do not return in order to that it cannot relieve the pressure | Dismount the cups, and then clean them with diesel fuel or change them |
| | 3. A blue line and a green line in pressure sensor are short-circuited. | Check wiring harness, find the short-circuited point, then separate the two lines and wrap up them respectively with black tape. |
| Grease cannot be delivered to several friction pairs (grease fitting) | 1. The injectors connected to them are defective | Cleaning or Replacing |
| | 2. The distribution lines connected to them are broken or blocked (main cause) | Connect distribution lines rapidly with quick change coupler or change them |
| | 3. Hard lumps of grease, which is turned from the grease that had existed in friction pairs before the vehicle was installed, block the friction pairs. | Grease gun, which is injected with the grease that is also used in the system, is used to clear out grease tubes. |
| LCD screen doesn't work or works anomalously | 1. Electromagnetic or static interference | Turn off and subsequently turn on the power |
| | 2. Wires are connected mistakenly or loose | Check the wires and connect it correctly |
| | 3. The monitor is defective | Replacing |

9、Common Service Accessories

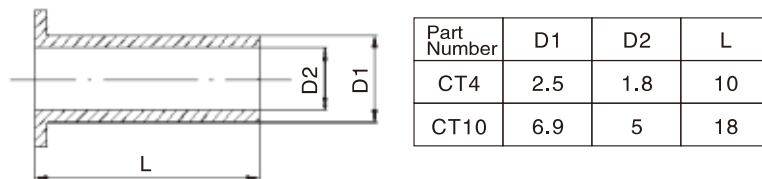
Hollow screw



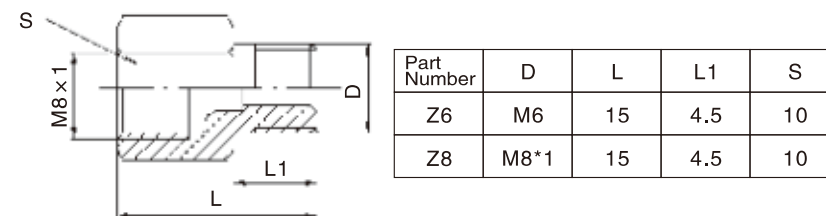
Biconical Cutting Ferrule



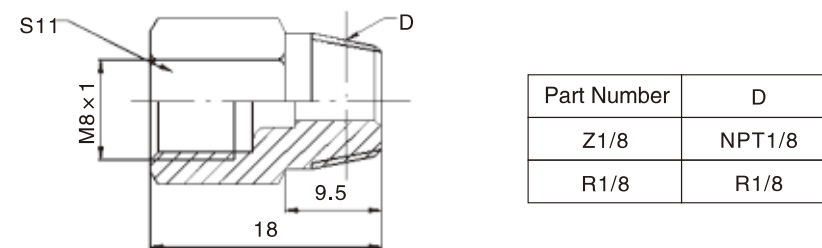
Bushing



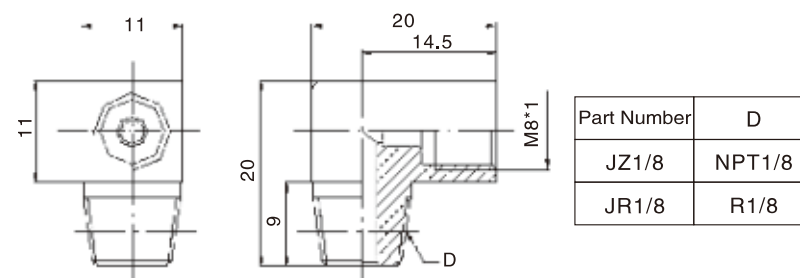
Straight Thread Connector



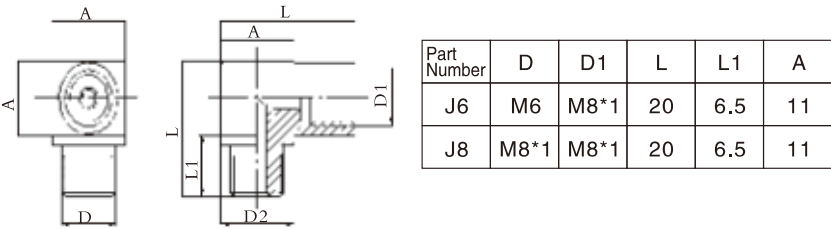
Male Connector



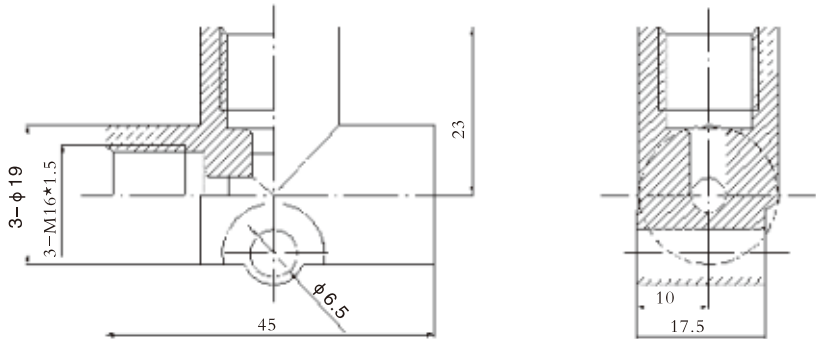
Male Elbow



Straight Thread Elbow



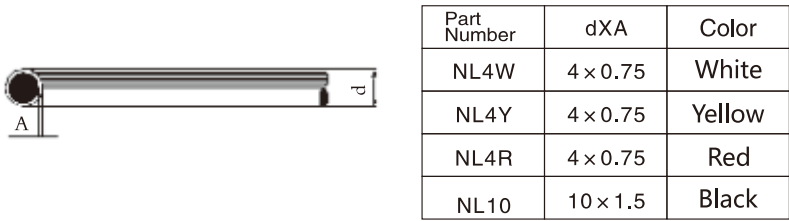
ST10 Tee Coupling ST10



Nylon Cable Tie



Nylon Tube;



Quick Change Coupler

