

Operation & Maintenance Manual For AC1 & AC2

This Manual is applicable to AC lubrication Kits only. For professional use only.

Applicable Kit(s):

AC1 & AC2

Maximum Working Pressure: 1740 psi (120 bar, 12 MPa)

Maximum operating temperature: 140°F/60°C

(Note that operating close to maximum temperature will effect life of the pump)

Minimum operating temperature: -31°F/-35°C (with grade 000 grease), 10°F/-12°C (with grade 2 grease).

IP Rating: IP67



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WARNING

INSTALLATION



Only install the Timken ILS KP System if you are suitably qualified. Read installation instructions before commencing installation. If in doubt contact Timken ILS on +44 (0)1752 676000



PERSONAL PROTECTIVE CLOTHING

You must wear appropriate protective equipment when operating and servicing the equipment, this is to protect you from serious injury.



This equipment includes but is not limited to:



- Protective eyewear.
- Respirators, protective clothing and gloves as recommended by the Lubricant manufacturer.



CAUTION HEAVY UNBALANCED LOAD WHEN LIFTED

To avoid muscle strain or back injury, use lifting aids and proper lifting techniques when removing or replacing.



PLASTIC PART CLEANING SOLVENT HAZARD

Many solvents can damage plastic parts and cause them to fail, which could cause serious injury or property damage.

- Use only compatible cleaning products.



PRESSURISED EQUIPMENT HAZARD

Over-pressurisation can result in equipment rupture and serious injury.

- Ensure that the pressure relief valve is not obstructed.



ENVIRONMENT

Ensure that all Lubricants are responsibly disposed of in accordance with the manufacturers MSDS sheets and local regulations.

- Timken ILS operates an equipment take back scheme, please contact us for further details.



EC Declaration of Conformity

In accordance with ISO/IEC 17050-1:2010

We Timken ILS Ltd
Of 85a St Modwen Rd, Parkway Industrial Estate,
Plymouth, Devon, United Kingdom, PL6 8LH.

I hereby declare that:

Equipment: AC1XXX & AC2XXX Multi-Line Lubrication System

In accordance with the following Directive (s):

2004/108/EC	The Electromagnetic Compatibility Directive
2006/42/EC	Machinery Directive
95/54/EC	Vehicle Electromagnetic Compatibility Directive
2002/95/EC	Restriction of Certain Hazardous Substances

Has been designed and manufactured to the following specifications:

97/23/EC Pressure Equipment Directive

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

Signed:

A handwritten signature in black ink, appearing to be "Richard Butler".

Richard Butler FCMI
Divisional Managing Director

Name:	Richard Butler	Position:	Divisional Managing Director
Done at:	Plymouth, UK	Date:	04/01/2016

Document Ref: ISF 336 Issue 3

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Preface

This Operation and Maintenance Manual has been prepared as an aid to improve the quality of operating, maintaining, installing and servicing the Interlube AC2 Lubrication System.

Because of the importance of providing the correct lubricant amount to the moving parts of the equipment, read this manual to become familiar with your AC2 Lubrication System.

Technical illustrations are provided to aid in giving an accurate understanding of the product and showing the correct way to perform operations and make the relevant judgments needed. Note:- Illustrations may not be entirely accurate to the specific system setup, but is merely a guide or representation.

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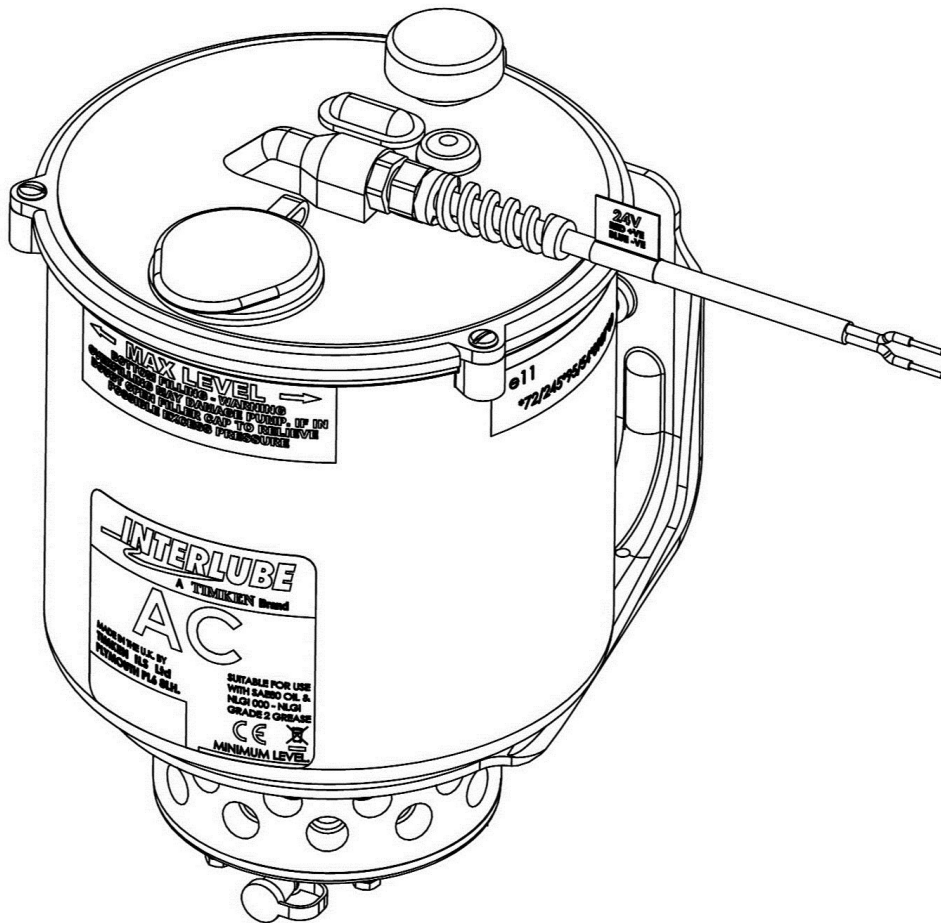
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Safety

- Safety Notice
- Symbols & Marks
- General Safety Information
- Safety During Installations



Safety Notice

Proper installation techniques are extremely important for the safety of any personnel involved during the installation and the operation of the equipment prior to any installation taking place.

The Installation techniques recommended and described in this throughout this guide are proven by our team of specialist engineers to be both effective and safe methods of operation.

We advise that to perform some of these operations may require the use of tools and equipment specially designed for the purpose.

In order to prevent any injury to those attempting an installation of one of our systems, the warning symbol above is used to mark safety precautions in this guide. The cautions that accompany these symbols should always be followed carefully to prevent any harm to yourself or others.

If a dangerous situation arises or is likely to arise, make safety your first priority, and take the necessary actions required to deal with the situation in a safe and responsible manner.

Improper use of machinery and equipment can cause serious injury or death. Before operating any equipment, or performing an installation, you must read and understand entire manual relating to the machine you are going to be installing the system to.

Any installation or maintenance procedures which do not follow safety guidelines stated within this guide could cause serious injury or death. Please respect the importance of taking responsibility for your own safety, and that of others around you who may be affected by your actions.

Keep this guide in a safe place within the workshop of your maintenance department. We advise that all personnel involved in working on the equipment read this guide periodically to familiarise themselves with the product installed.

Some actions involved in servicing and maintenance of the system can cause a serious accident, if they are not done in a manner described in this guide.

The procedures and precautions given in this guide apply only to intended uses on a factory specified product.

Timken ILS supplies products worldwide that adhere to all applicable regulations and standards of the country to which it has been sent.

If this equipment included in this kit has been purchased in another country or purchased from a third party in another country, it may lack certain safety features and specifications that are necessary for use in your country.

If you are unsure about whether your product adheres with the standards and regulations applicable to your country, consult Timken ILS or your nearest Timken ILS distributor before installing the equipment on any machinery.

In no event should you or others engage in prohibited uses or actions as described throughout this guide.

Symbols & Marks

TIMKEN ILS products may have one or more of the following markings on the product label or product itself.

Due to differences and conflicts in national regulations, not all marks are applied to every version of a product.



CSA mark

TIMKEN ILS products with a CSA mark meet the United States and Canadian regulations for product safety. The products have been evaluated, tested, and certified by CSA-International. Alternatively, the product may have a mark by one of the other Nationally Recognized Testing Laboratories (NRTL) accredited in both the United States and Canada, such as Underwriters Laboratories, Incorporated (UL) or TÜV.



CE mark

The CE marking signifies the manufacturer's declaration of conformity to applicable European directives and standards. Only those versions of TIMKEN ILS products with a CE marking located on or near the data plate have been tested for compliance with the European Low Voltage Directive and the European Electromagnetic Compatibility (EMC) Directive. EMC filters needed to comply with the European EMC Directive are incorporated within versions of the product with a CE marking.



Eurasian Customs Union (CU) mark

CE versions of TIMKEN ILS products that include an EAC mark of conformity meet the product safety and EMC requirements for export to Russia, Belarus, and Kazakhstan.



GOST-TR mark

CE versions of TIMKEN ILS products that include a GOST-TR mark of conformity meet the product safety and EMC requirements for export to the Russian Federation.



C-Tick mark

CE versions of TIMKEN ILS products with a C-Tick mark comply with the EMC regulations required for sale in Australia and New Zealand.



CCC mark

The China Compulsory Certification (CCC) mark indicates that the product has been tested and found compliant with product safety regulations required for sale in China.



UkrSEPRO mark

The CE versions of TIMKEN ILS products that include a UkrSEPRO mark of conformity meet the product safety and EMC requirements for export to the Ukraine.



Serbian AAA mark

CE versions of TIMKEN ILS products that include a AAA Serbian mark meet the product safety and EMC requirements for export to Serbia.

General Safety Information

Safety Rules

Follow all precautions, instructions and safety rules, when operating or performing an installation . Only trained and authorised personnel that operate and perform operations during an installation.

When working alone on an installation, be sure that all personnel know the nature of the work to be carried out and make sure you are visited regularly in an attempt to reduce any fatalities that could arise from an accident.

Never Operate Machinery if :

- You are feeling unwell.
- You are taking medication that has drowsy side effects.
- You are under the influence of alcohol.
- You are under the influence of an illegal substance
- You are suffering from emotional problems.

Problems stated above will interfere with your sense of judgment in a case of an emergency and may cause accidents.

Personal Protective Equipment

When carrying out an installation secure long hair, avoid wearing jewellery and loose clothing. These items have the tendency to catch on controls or protrude into parts and cause serious injury or death.

We recommend that for every installation full eye protection, a hard hat, safety shoes, tight fitted overalls and gloves should be worn, even if it may not be required at the work site.

Some risks to your health may not be immediately apparent. Air and noise pollution may not be visible, but these hazards can cause disabling or permanent injuries.

Sounds of less than 75 decibels, even after long exposure, are unlikely to cause hearing loss. However, long or repeated exposure to sounds at or above 85 decibels can cause hearing loss. The louder the sound, the shorter the amount of time it takes for hearing loss to happen.

Work Site Precautions

Before starting an installation, thoroughly check the area for any unusual conditions that could cause a dangerous situation.

Check the terrain surrounding and condition of the ground at the installation site, make sure the ground surface is as hard and level as possible before carrying out an installation.

There may also be regulations related to performing certain kinds of work. If there is any doubt about whether the work you are carrying out complies with the applicable standards and regulations of the installation site, contact the sites area / maintenance manager.

Working in mines, tunnels, deep pits or on loose or wet surfaces could produce danger of falling rock, landslides or hazardous flying objects.

Only trained personnel with a good knowledge and awareness of safety procedures, may or perform an installation.

Fuel, Oil and Hydraulic Fluid Fire Hazards

All fuels, most lubricants and some coolant mixtures are flammable. Leaking fuel or fuel that is spilled onto hot surfaces or onto electrical components can cause a fire.

To prevent fire hazards, observe following precautions:

- Store all fuels and all lubricants in properly marked containers and away from all unauthorized persons.
- Store oily rags and other flammable material in a protective container.
- Remove all flammable materials before they accumulate in the working area.
- Do not weld on pipes or on tubes that contain flammable fluids.
- Do not smoke while you refill the system.
- Do not smoke in battery charging areas or in areas that contain flammable material.

Do not flame cut on pipes or on tubes that contain flammable fluids. Before you weld on pipes or on tubes or before you flame cut on pipes or on tubes, clean the pipes or tubes thoroughly with a non-flammable solvent.

Disposal of Oil and Grease Products

Due to additives and detergents added to oil based products physical contact with used lubricants may pose a health risk. Wipe any lubricant from your skin promptly and wash off any remaining residue using warm soapy water.

Used lubricants are an environmental contaminant and may only be disposed of at approved collection facilities.

To prevent any pollution of the environment, always do the following:

- Never dump waste lubricants in a sewer system, rivers, etc.
- Always put waste lubricant removed from your system in containers.
- To prevent slips and trips never leave lubricant lying around on the ground.
- Obey appropriate laws and regulations when disposing of harmful materials.

Safety during Installations

Precautions When Working on System

If checks are not carried out properly after starting the engine, it may result in a delay in discovering abnormalities in the machine, and this may lead to personal injury or damage to the machine. Carry out the checks in an open area where there are no obstructions. Do not let anyone near the machine when carrying out the checks.

To prevent an accidents when working on the machine, always do the following:

- Disconnect the battery by removing leads. ALWAYS remove the negative lead from the terminal first.

You should always have at least two people working together if the engine must be run during the installation. One person needs to remain in the operator's seat, ready to work the controls or stop the machine and shut off the engine.

Never attempt adjustments while the machine is moving or while the engine is running. Stay clear of all rotating parts and moving parts.

Prevention of Crushing and Cutting

When operating machine or performing an installation, never allow personnel not carrying out the installation in the operational area of the machine. Installation personnel must be careful when working around the machine, especially around large moving parts. An unexpected fall of the front the machine could cause injuries or death.

When carrying out any part of the installation with the inspection cover open, lock the cover securely in position with the lock bar.

When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole as this could result in decapitation.

Do not enter or put your hand, arm or any other part of your body between movable parts, such as between the work equipment and cylinders, or between the machine and work equipment.

While working on the machine, never use inadequate tools. They could break or slip, causing injury, or they may not adequately perform intended functions.

When performing an installation on the machine, if the front structure is raised in the air, firmly support the front structure.

When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing pipework for high pressure circuits. Also check that all connecting fittings are correctly installed.

Use Proper Tools and Tightening Torques

Use only tools suited to the task. Using damaged, low quality, faulty, or makeshift tools could cause personal injury. There is a danger that pieces from, chisels with crushed heads, or hammers, may get into your eyes and cause blindness.

Refer to the "Specifications" section of this manual of the machine for information on the correct tightening torques specific to the machine you are working on. Poor or incorrect fastener connections can dangerously weaken assemblies.

When removing components, be careful not to break or damage the wiring, damaged wiring may cause electrical fires.

When removing piping, stop the oil or grease from spilling out. If any oil / grease drips on to the floor, clean it up immediately. Oil / grease on the floor can cause you to slip, or can even start fires.

When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly to ensure they do not become free during operation.

Be sure to assemble all parts again in their original places. Replace any damaged part with new parts. When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.

Precautions with Tubes, Hoses and High-Pressure Lines

When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spurting out.

When inspecting or replacing high-pressure piping or hoses, check to verify that pressure has been released from the circuit. Failure to release the pressure may lead to serious injury.

Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but pressurized oil has enough force to pierce the skin and cause serious injury. Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers. Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install lines, tubes or hoses that are bent or damaged.

Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.

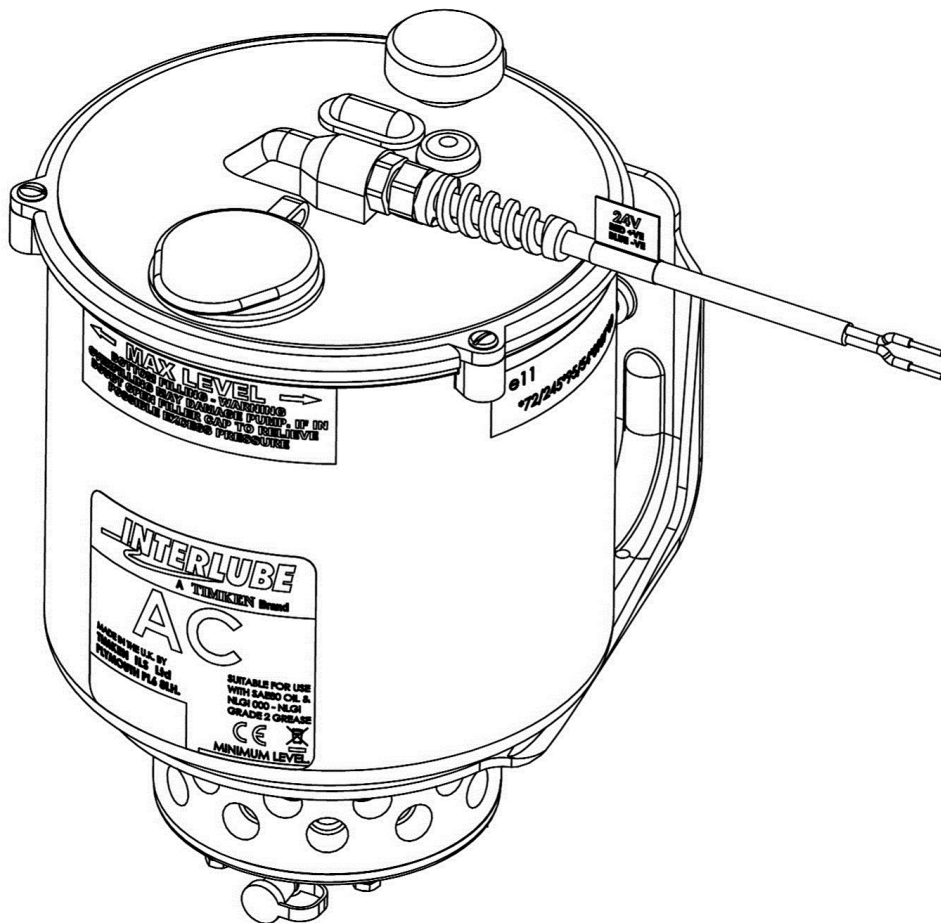
If any of the following conditions are found, report it to the owner of the machine, do not continue the installation until they replace the part:

- Damage or leakage from hose end.
- Wear, damage, cutting of covering, or exposure of strengthening wire layer.
- Cover portion is swollen in places.
- There is twisting or crushing at movable parts of hose.
- Foreign material is embedded in the covering.
- Hose end is deformed.

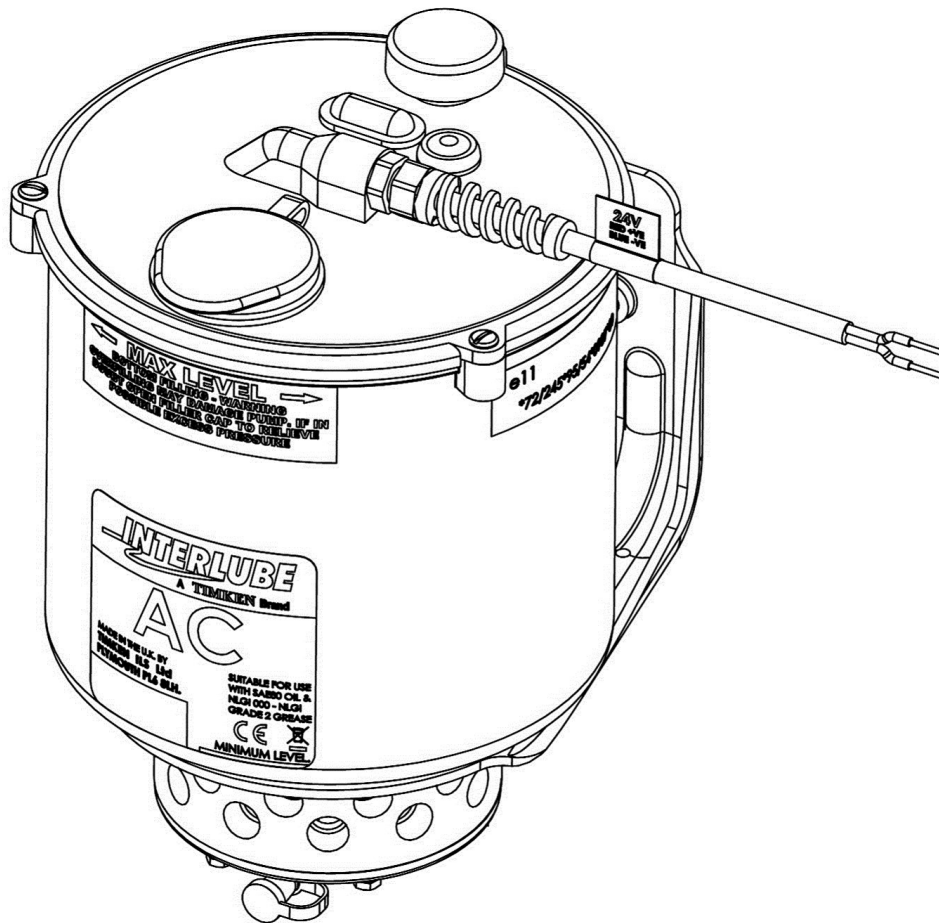
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Overview

- Product Description
- Product Identification



Product Description



The Interlube AC range of multi-line lubrication system pumps are all electrically operated with two reservoir sizes (1.25kg and 2kg). Available in 12 & 24V variants the AC is perfectly suited for chassis and industrial applications.

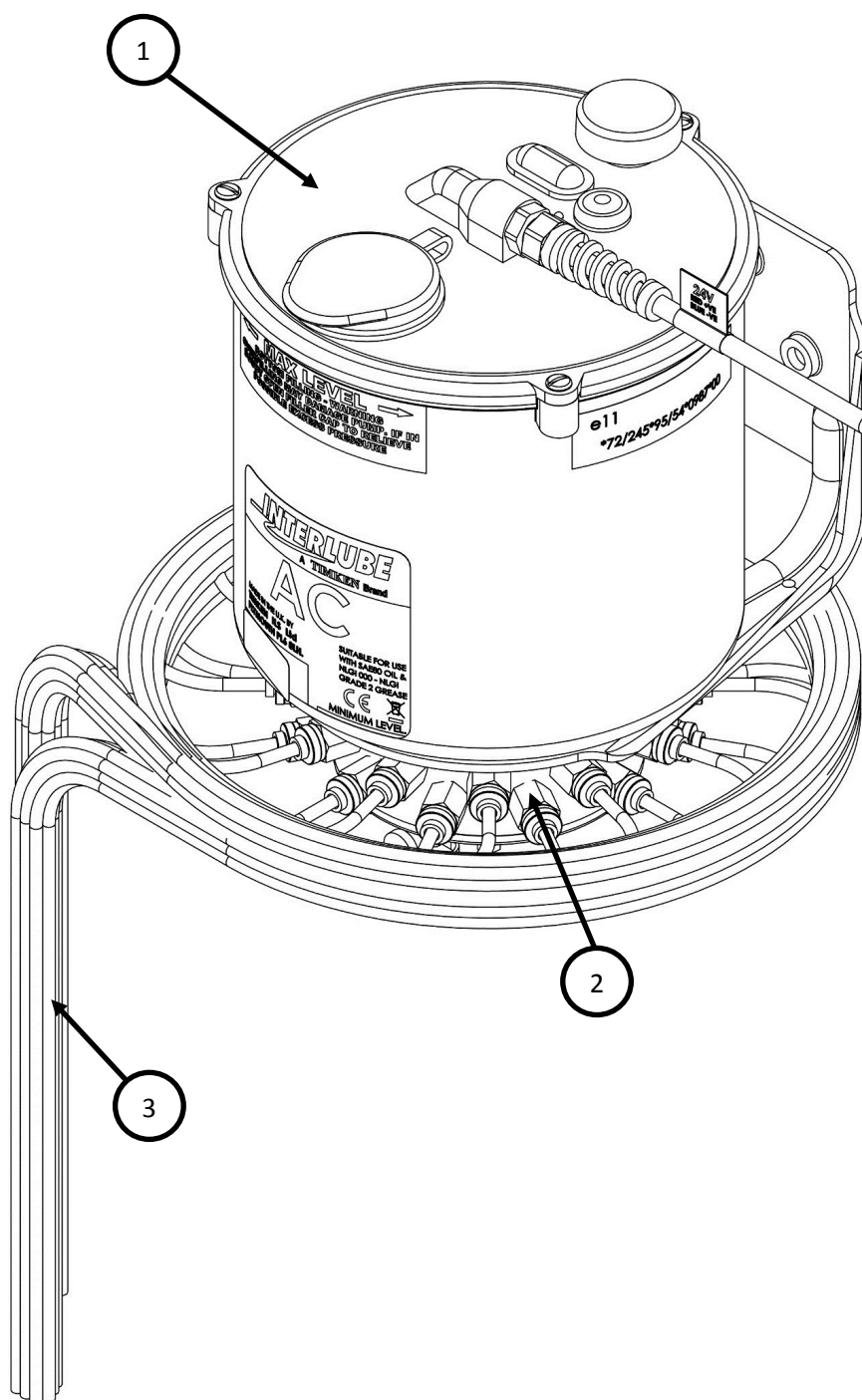
The range of AC pumps have been designed with the ability to out perform in the most demanding and arduous of operating conditions. The multi-line concept enables each bearing to be lubricated independently and precisely. It also means that if there is accidental damage to one of the feed lines the entire system is not rendered inoperable.

The AC1 & AC2 family of pumps have a range of 12 to 36 outlets, each outlet can be fitted with an individual pumping element or a blanking plug. There are six elements to choose from, each having different output capacities (see page 16).

Each pumping element feeds directly to a lubrication point via a $\varnothing 4$ mm, UV stabilised, nylon pipe which is numbered at both the pump and at the bearing to ensure accurate lubrication and identification.

Pumps can be supplied ready calibrated and (if pre-measured) supplied with suitable pipe work, cut to the appropriate lengths, as required.

Product Identification



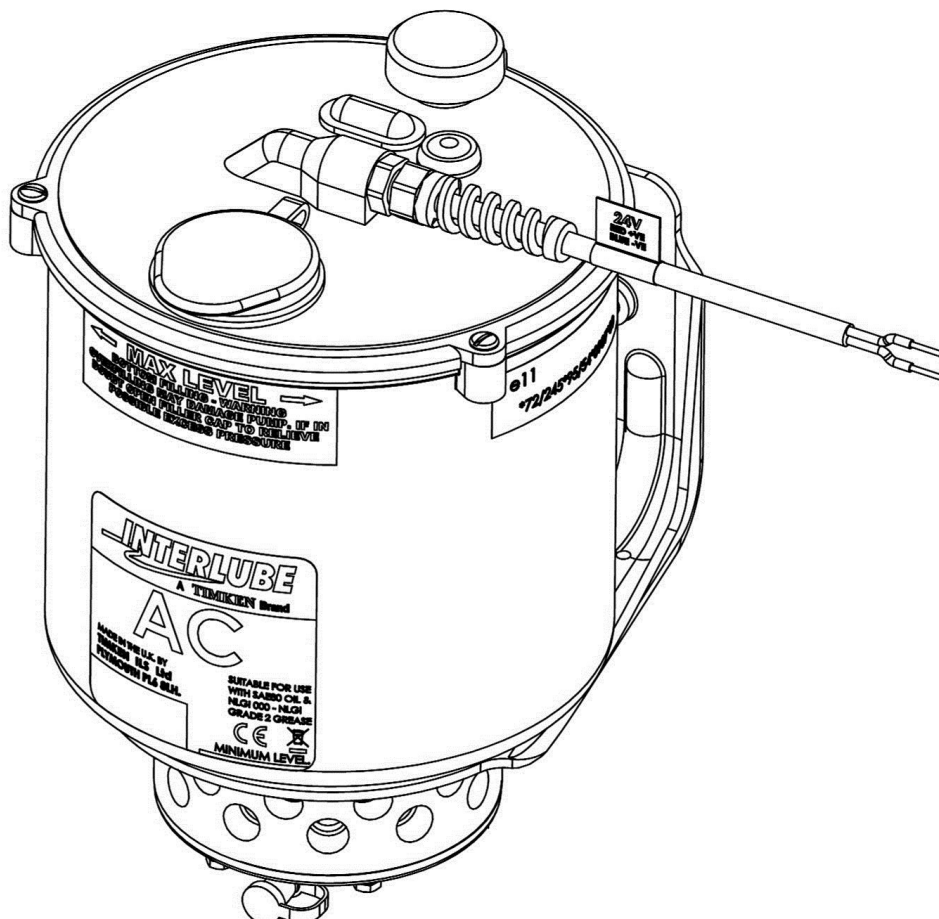
Bill of Materials:

1. AC2 CALIBRATED PUMP
2. PUMPING UNIT
3. Ø4mm GREASE FILLED NYLON TUBE, LOOM ASSEMBLY.

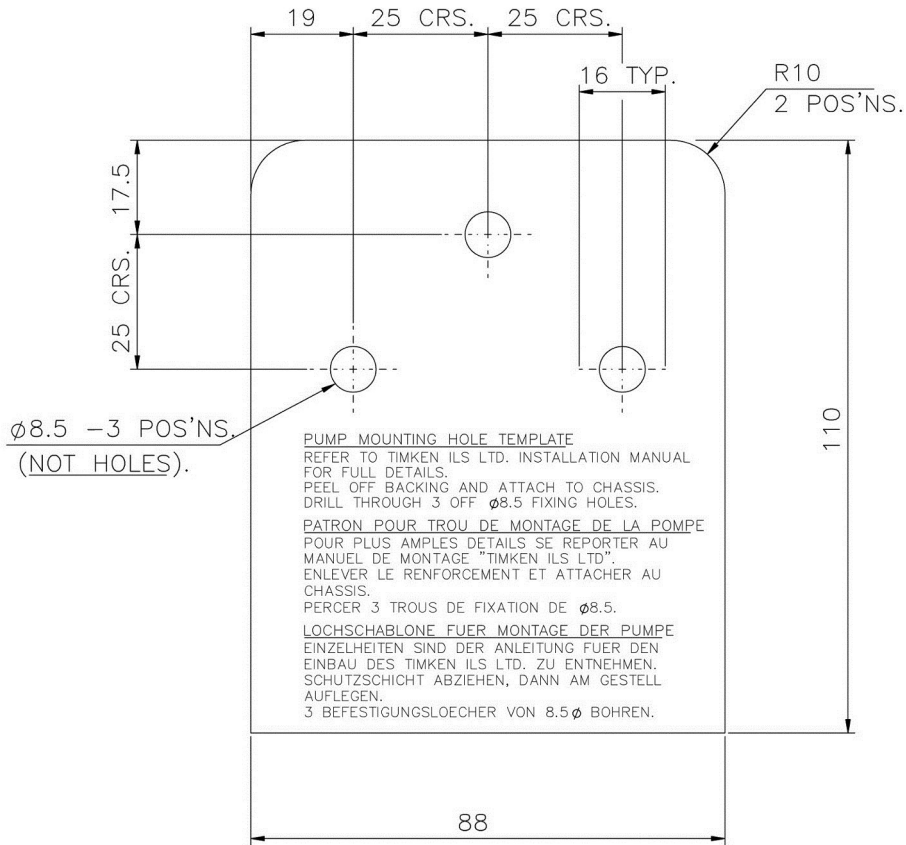
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Installation

- Mounting Hole Dimensions
- AC1 and AC2 Clearance Requirements
- Typical System Layout
- Pumping elements
- Making the Looms
- Wiring Information
- PCB adjustment

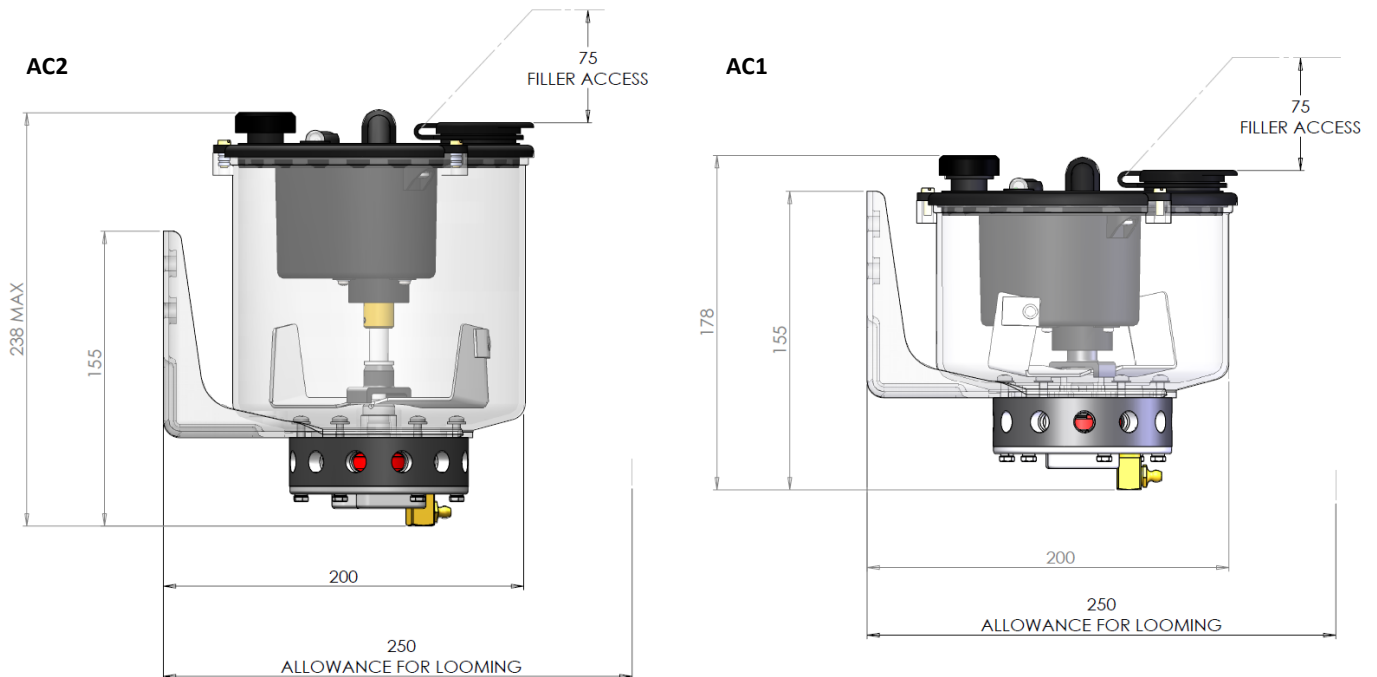


Mounting Hole Dimensions



Select a suitable mounting point for the pump on the chassis, preferably in a position where it is protected from debris. Ensure adequate clearance for the looming and re-filling is made (see images below). Do not mount the pump on to ancillary equipment, such as the battery housing or cover. Using the pump mounting adhesive template, supplied, position and drill the bracket holes (mounting positions detailed as above). Use bolts, nuts and spring washers supplied to securely mount the pump in position.

Pump Clearance Requirements



Typical System Layout

In the case of a chassis fitment (TILT CAB when applicable):

- Flush out all bearings to be connected to the system and clean the bearing surfaces.
- Remove grease nipples and insert connectors to establish the number of bearings being lubricated.
- Note the list of bearings to be connected to and choose the relevant pumping element to directly feed that point.

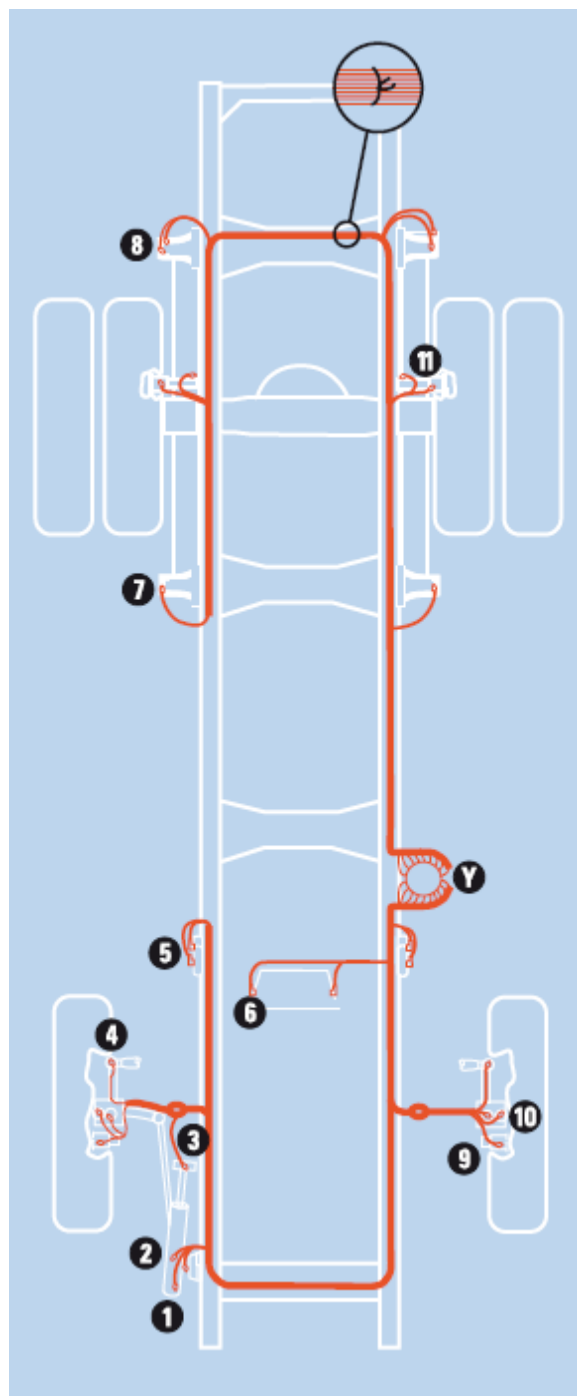
Typical Bearing Chart:

Typical Bearing Chart:	Pumping Unit:
1. Power Steering Cylinder Front	78035 (0.025cc)
2. Power Steering Cylinder Intermediate	78035 (0.025cc)
3. Power Steering Cylinder Rear	78035 (0.025cc)
4. Track Rod End	78036 (0.040cc)
5. Shackle Pins Front	78036 (0.040cc)
6. Clutch operating Shaft (*Split feed)	78034 (0.015cc)
(*Split Feeds are only permitted on <u>oil</u> lubrication systems)	
7. Spring Pins	78035 (0.025cc)
8. Shackle Pins Rear	78036 (0.040cc)
9. Brake Cam Shaft Front	78034 (0.015cc)
10. King Pins	78036 (0.040cc)
11. Brake Cam Shaft Rear	78034 (0.015cc)
Y. AC1 or AC2 Pump	12 Outputs - (1 Blanking Plug)

*Other Bearings usually connected to the lubrication system:

Balance Beam Bearings (2 feeds)	2 x 78036 (0.04cc)
Drag Link Ball Joint	78036 (0.040cc)
Gear Lever Linkage	78034 (0.015cc)
Accelerator Cross Shaft	78034 (0.015cc)
Pedal Linkages	78034 (0.015cc)
Brake Slack Adjusters	78035 (0.025cc)
Tipping Body Hinges	78035 (0.025cc)
Fifth Wheel Coupling Pivot Point	78035 (0.025cc)
Fifth Wheel Coupling Jaws	78035 (0.025cc)
Tipping Body Hinges	78035 (0.025cc)
Fifth Wheel Coupling Pivot Point	78035 (0.025cc)
Fifth Wheel Coupling Jaws	78035 (0.025cc)

*This setup would require a pump with 24 outlets (AC1XX2 or AC2XX2).



Pumping elements

Standard Pump Elements for AC1 & AC2 pumps.			
Part No.	Output/stroke	Colour	Outlet Size
78033	0.010 cc	Red	4mm OD Push Type
78034	0.015 cc	Green	
78035	0.025 cc	Yellow	
78036	0.040 cc	Blue	
78037	0.060 cc	Grey	
78038	0.10 cc	Black	

Output pressure	
Maximum Output pressure from each Pump Element	1740PSI / 120 Bar



Making the Looms

The 'lubricant distribution lines' is the term given to the pipe assemblies (looms) running from the outlet ports of the pumping units to the bearing inlets/ lubrication points.

This lubricant distribution line should be made up of Interlube ø4mm, semi-rigid, nylon tubing. It is recommended that the tubing is pre-filled with grease. This is to save on the requirement to prime the system once installed.

From the pump position, ascertain the most convenient, favorable route for the looms. The number of looms required will depend on pump location and quantity and positioning of the grease points. Using looming stands, if available, form individual tubes into a loom allowing sufficient length for connection to pump and bearings and allowing for chassis movements (e.g. springs, steering, lifts, etc.). In conjunction with the installation record sheet fit number identification sleeves to tubing at pump and bearing ends. The loom should be protected along its length with the conduit/ spiral binding/ sleeving and/or tape (for part numbers see **Accessories** on page 32). The loom can consist of tubes of varying lengths which can leave the loom at the required point (see image below).

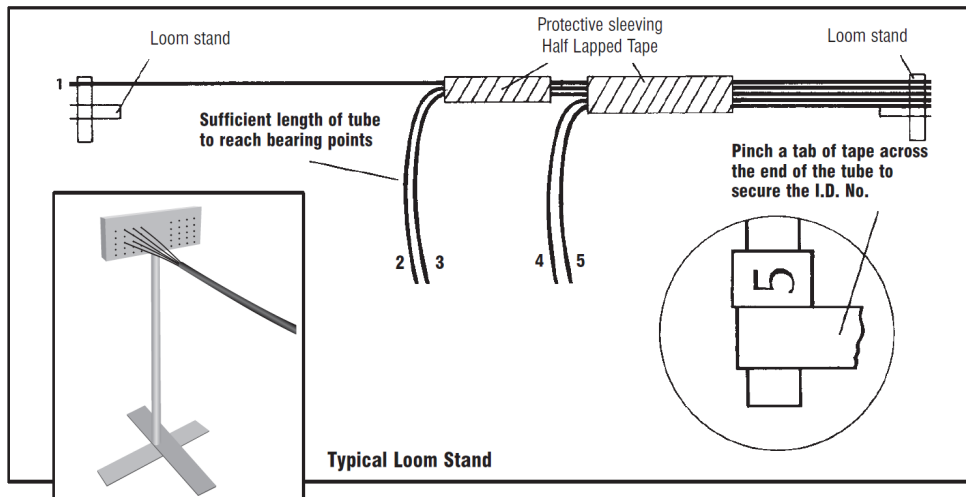
Fitting:

Working from the furthest point from the pump, feed the loom through the chassis following existing vehicle services where possible. Ensure tubes are positioned to fit bearing connectors. Where bearing is on a moving part, ensure tube length is sufficient to allow for full movement. To avoid rubbing or friction with chassis, grommets or protective sleeving should be used.

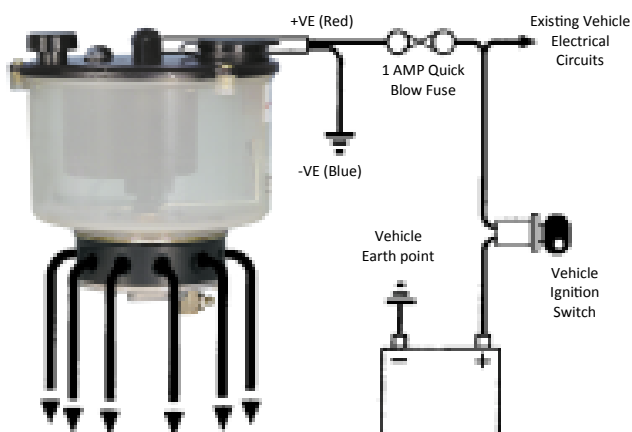
Connecting the looms:

Cut each tube to length ensuring a clean, square cut is achieved and connect to the bearing using push fit connectors. ENSURE TUBING IS PUSHED FIRMLY INTO CONNECTOR. TEST ASSEMBLY BY PULLING FIRMLY ON THE TUBE AFTER FITMENT. Using System Specification Sheet connect the loom to corresponding numbered pumping units. When running the tubing into the pumping units, to give the loom strength and rigidity, the tubes should be clipped together to form an arrangement (as shown on page 11) with an offset from the pump of 50 to 60mm. The starting point for the loom can be as required. On the underside of the AC1 and AC2 a mark indicates a suggested starting point, "1" and the direction. Starting with the bottom row of outlets and pumping unit "1", the loom should then run around the pump as indicated by the marker, then on to connect with the next row of pumping units so that the loom takes the form of a spiral, and so on until all pumping units are connected. Alternatively the pumping units in all rows can be connected by working around the pump ring, but the loom should still be formed as shown on page 11. Tubes should be kept together with tie-clips at intervals of every 6 pumping units. The loom, or looms, can then be routed on to the chassis as required.

Note: All damaged pipework should be replaced using genuine spare parts, failure to do so can cause system malfunctions and major safety issues.



Wiring Information

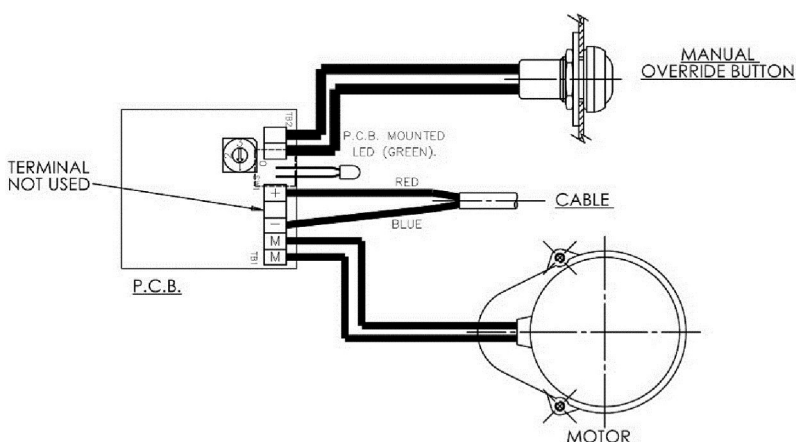
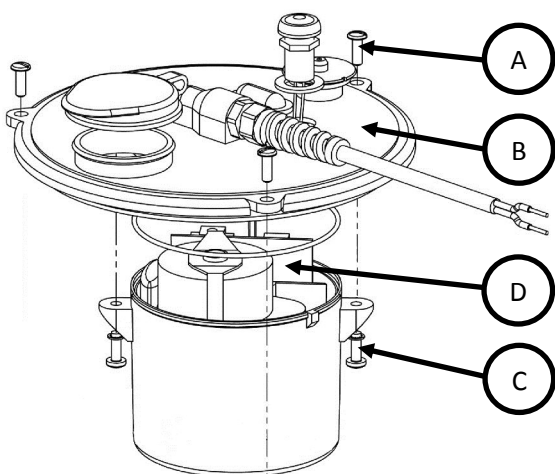


Installation of the AC range of pumps should ideally incorporate direct connections to the vehicle ignition system. This provides automatic lubrication whenever the ignition is switched on.

A memory, built into the pumps printed circuit board, removes the possibility of over-lubrication on a short trip/multi-drop operation.

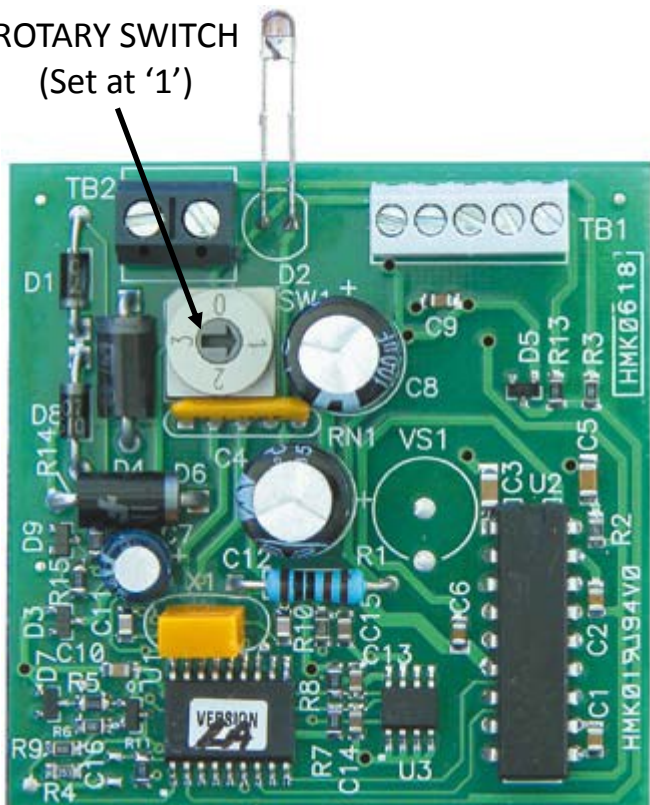
Below left: To access the internal PCB and adjust the run settings, via the rotary switch.

- 1) Remove lid screws x3 ('A')
- 2) Remove lid ('B')
- 3) Remove motor housing screws x4 ('C')
- 4) Access PCB ('D')



PCB Adjustments

ROTARY SWITCH
(Set at '1')



PCB 83344-101

PCB 83344-101 settings table:

Rotary Switch Position	Cycle Time
0	Continuous / 3 mins
1	9 minutes
2	12 minutes
3	15 minutes

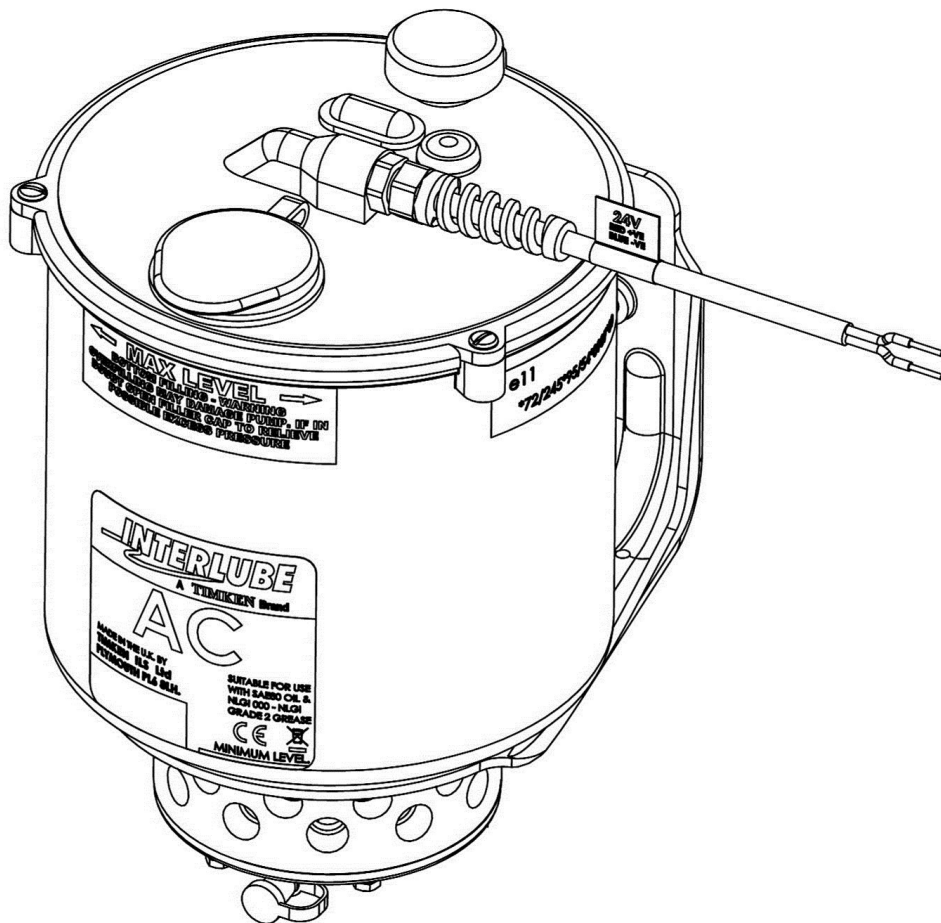
The Pump cycle time can be changed from the factory set option, if required. The above table shows the settings available via setting of the rotary switch on the PCB (see left hand image).

- Switch Position '0' indicates continuous operation at a standard speed of 0.4rpm.
- Switch positions 1-3, cycle times *include* 3 minutes run time and the delay period.
- Other PCB's are available with longer cycle times, on request (with a maximum of a 60 minute cycle time).
- Two other motor speeds are available, at request, with a speed of 0.08rpm and 0.75rpm.

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Operation

- System Operation and Testing
- Typical System Outputs



System Operation and Testing

The lubrication process starts after either the ignition is switched on (if set to continuous run mode and the pump is only powered when the ignition is on) or after the allotted dwell time (of the already programmed pump) has elapsed. The pump will run for 3 minutes and dwell for the allotted remaining time as programmed (6 minutes dwell, if 9 minute program, 9 minutes dwell if 12 minute program and 12 minutes dwell if 15 minute program).

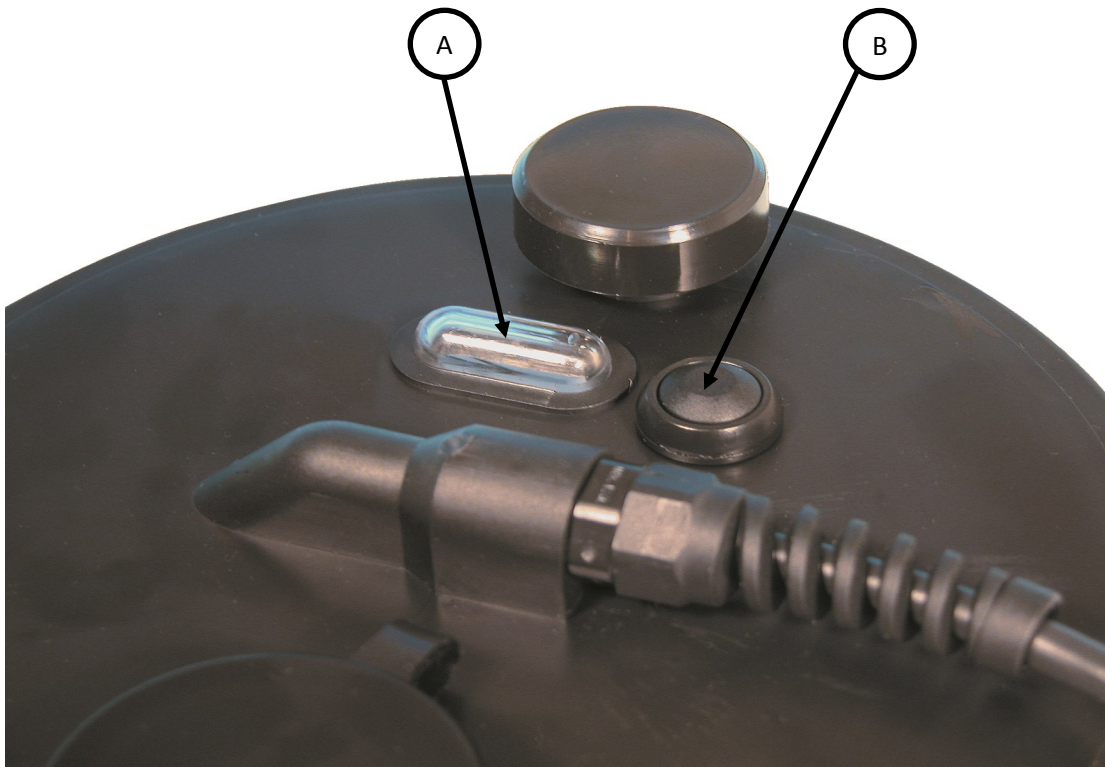
If the power drops out at any time to the pump the dwell counter will be stopped and will retain its value, thus remembering its position within the dwell cycle. The system will then continue from that point when the power / run signal resumes.

An indication lamp is located on the top of the pump, within a viewing window (see below image 'A'). The indication light will be lit when there is a continuous supply to the circuit and pump. The indication light will flash slowly when the motor is in operation.

Pressing the manual override button ('B') will operate the pump for one complete cycle (3 minutes).

The following inspection procedures are recommended to help ensure proper operation of the AC chassis lubrication system. Once the reservoir refill has been determined—every 3 days, once a week, once a month, etc.—make certain that the interval is part of your scheduled maintenance.

- A. Inspect all lubrication points for signs of FRESH grease,
- B. Check the condition of all fittings and connections. Tighten or replace loose or damaged fittings.
- C. Check all lubrication lines; make certain that there are not any breaks. Check for wear or chaffing that may lead to leakage.
- D. Confirm pump operation by pressing Manual Override button ('B') and checking the indication light flashes ('A').



Typical System Outputs

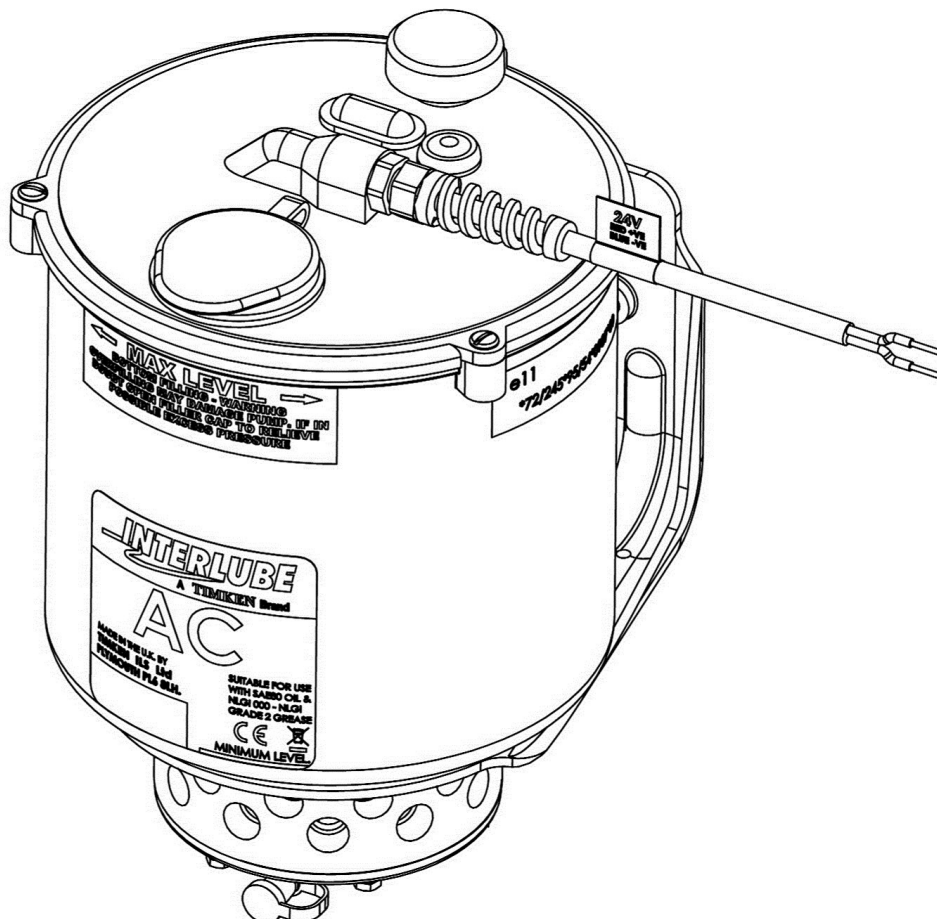
AC 1 & AC2 delivered grease quantity per pumping unit in a 10 hour period (based on PCB board 83344-101).

Pumping unit / system configuration	9 min cycle time 2.5min/rev motor	15 min cycle time 2.5min/rev motor	Continuous running 2.5min/rev motor	9 min cycle time 12min/rev motor	15 min cycle time 12min/rev motor	Continuous running 12min/rev
78033 RED 0.010cc/stroke	0.67cc	0.04cc	2.4cc	0.13cc	0.008cc	0.5cc
78034 GREEN 0.015cc/stroke	1.0cc	0.06cc	3.6cc	0.2cc	0.012cc	0.75cc
78035 YELLOW 0.025cc/stroke	1.67cc	1.0cc	6.0cc	0.33cc	0.2cc	1.25c
78036 BLUE 0.04cc/stroke	2.67cc	1.6cc	9.6cc	0.53cc	0.32cc	2.0cc
78037 GREY 0.06cc/stroke	4.0cc	2.4cc	14.4cc	0.8cc	0.48cc	3.0cc
78038 BLACK 0.10cc/stroke	6.67cc	4.0cc	24cc	1.33cc	0.8cc	5.0cc
Typical 6 point system 4-off YELLOW 2-off GREEN	5.2cc	1.78cc	31.2cc	1.10cc	0.38cc	6.5cc
Refill Period	3846 hrs	11236 hrs	641 hrs	18181 hrs	52632 hrs	3076 hrs
Typical 12 point system 8-off YELLOW 4-off GREEN	10.4cc	3.56cc	62.4cc	2.2cc	0.76cc	13.0cc
Refill Period	1932 hrs	5617 hrs	320 hrs	9090 hrs	26316 hrs	1538 hrs

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Maintenance

- Periodic System Testing
- System Testing
- Recommended Lubricants
- Typical Refill Periods
- Pump Refill Procedure
- Servicing and Replacing Parts
- Warranty



Periodic System Inspection

A program of visual checks, regular inspections and servicing should be incorporated in accordance to the assets existing maintenance schedule. Maintenance staff should be encouraged to check automatic lubrication on a periodic basis and report any defects.

System Testing

The system has been designed to be maintenance free, but testing the system is always recommended to diagnose any faults or to check the general working condition of the system. Details on how to test the system can be found under the "Operation" section of this manual under "System Testing".

Recommended Lubricants

The AC Pump has been developed specifically to run with NLGI Grade 000, 1, 2 grease and FG3,0 fluid grease. Oils to a minimum viscosity of SAE80 are also acceptable.

Do not use heavy tackified greases or Bentone.

Pump Type	Recommended Lubricants					
	Oils SAE 80/90	000 Fluid	00 Semi Fluid	0 Soft	1 Stiff	2 Hard
AC2XX1	-40°C	-35°C	-30°C	-25°C	-20°C	-15°C
AC2XX2	-30°C	-25°C	-20°C	-15°C	-10°C	-5°C
AC2XX3	-20°C	-15°C	-	-	-	-
AC1111	-40°C	-35°C	-30°C	-25°C	-20°C	-15°C
Upper Temp Limit	+40°C for all pumps					

Typical Refill Periods

The AC1 & AC2 refill periods range greatly, dependent on the number of pumping units as well as output quantities, motor RPM and cycle times. Due to the accuracy of output quantities and the reliability of pump functionality refill periods can be simply calculated to ensure that the pump and the bearing points don't run dry. Use the following to calculate refill periods:

Calculation:

Key:

N = Number of Pumping Units (P.U.) 1-36.

O₁ = Red P.U. with Output 0.01cc

O₂ = Green P.U. with Output 0.015cc

O₃ = Yellow P.U. with Output 0.025cc

O₄ = Blue P.U. with Output 0.04cc

O₅ = Grey P.U. with Output 0.06cc

O₆ = Black P.U. with Output 0.10cc

A = Total Output Amount per 1 revolution

E = Number of revolutions until Empty

R₁ = 1250cc AC1 Reservoir
 R₂ = 2000cc AC2 Reservoir
 } Select only one

M₁ = 1 cycle = 1rev (motor 0.4RPM)
 M₂ = 5 cycles = 1rev (motor 0.083RRM)
 M₃ = 0.5 cycles = 1rev (motor 0.75RPM)
 } Select only one

P = Programmed cycle time (9, 12 or 15 minutes)

$$(NxO_1) + (NxO_2) + (NxO_3) + (NxO_4) + (NxO_5) + (NxO_6) = A$$

$$E = \frac{R_1 \text{ or } R_2}{A}$$

$$E \times P \times (M_1 \text{ or } M_2 \text{ or } M_3) = \text{Total Runtime in minutes (T)}$$

$$T / 60 = \text{Total Runtime in hours (H)}$$

$$H / 24 = \text{Total Runtime in days (D)}$$

Example:

An AC1 (R1) with a 0.083RPM motor (M₂) calibrated with 2 Red P.U. (O₁), 4 Yellow P.U. (O₃) & 6 Grey P.U. (O₅) programmed for a 15minute cycle time.

$$(2 \times 0.01) + (4 \times 0.025) + (6 \times 0.06) = 0.48cc$$

$$1250cc / 0.48cc = 2604.16 \text{ Revs}$$

$$2604.16 \times 15 \times 5 = 195312.5 \text{ minutes until empty}$$

$$19531.25 / 60 = 3255.2 \text{ hours until empty}$$

$$325.52 / 24 = 135.6 \text{ days between refills}$$

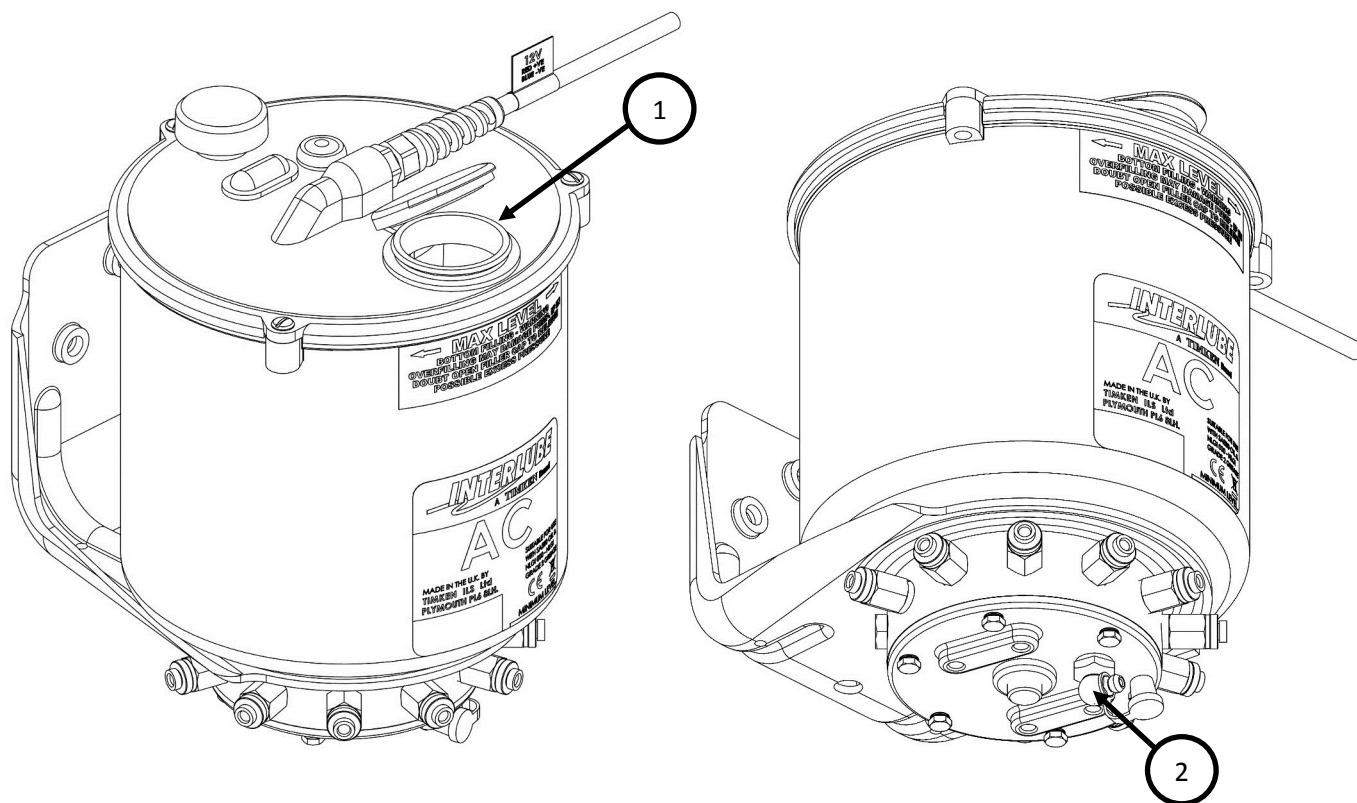
Note that this calculation is based on the pump having an uninterrupted power supply and being in continuous operation

Pump Refill Procedure

All Interlube Systems' multiline pump options are fitted with both a bulk, top fill (see '1' below), which is suitable for oil and fluid grease up to NGLI '000' only and a bottom fill adaptor, for filling with grease (see '2' below, right) NGLI to Grade 2 - this avoids the possibility of air entrapment. Initial filling, with any lubricant variant, should be through the grease nipple to prevent against air pockets forming in the pump chamber or reservoir.

Bulk fill adaptors are also available on special request.

NOTE: If the reservoir is filled through the reservoir cap moulding ensure the cap '1' is secured to the reservoir lid when finished.

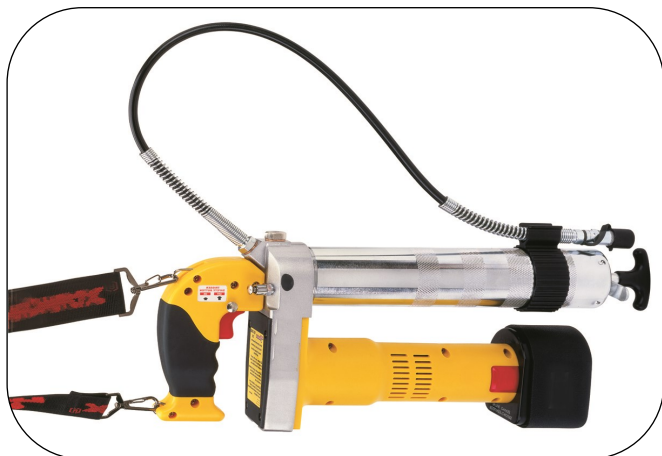


Battery Operated Grease Gun (Part No. LX-1163-E)

12VDC Grease gun suitable for bulk fill or cartridge fill.

Case and strap, two 220-240V batteries and charger.

Output pressure up to 518 bar (7500PSI).



Hand Operated Grease Gun (Part No. IL-356PK)

Heavy duty side level grease gun, suitable for bulk fill or 400gm cartridges. Grease gun fitted with air bleed valve and supplied with a 6" rigid stem and 4 jaw hydraulic connector.



Servicing and Replacing Parts

The rugged design and simple construction of the AC lubrication system assures the operator of a long and trouble-free service. If service is necessary, use the following procedures to ensure proper disassembly and assembly of components. Refer to the exploded diagram on page 30 for the location of the components referenced in the following procedures and refer to the 'Pump Assembly Spares' on page 31 for ordering information.

Because of the critical nature of supplying clean lubricant to the lubrication points, the AC must be serviced in a clean area without potential of contamination.

Caution

At any time the AC is disassembled for service, the exposed components should be cleaned and checked for wear or damage. **DO NOT USE ACETONE-BASED SOLVENTS TO CLEAN.** Solvents will harm the reservoir. Use clean towels to wipe the

Unless otherwise noted, whenever servicing any AC lubrication system component, disconnect electrical power from the system before starting. Observe appropriate safety procedures to prevent any accidents whilst servicing the AC system.

Warning

1. Lid assembly replacement:

- 1A. Use a screwdriver to remove the three pan head screws from the reservoir lid ('1').
- 1B. Remove the lid assembly from the reservoir ('5'). Make certain the O-ring is removed from the lid and discard.
- 1C. Carefully remove any old lubricant from the upper lip of the reservoir.
- 1D. Place the new O-ring in the lid.
- 1E. Place the lid assembly on to the reservoir and align the mounting holes.
- 1F. Install the three pan head screws and **torque to 6Lb.-In / 0.7 Nm. Do not overtighten.**

2. Reservoir Paddle assembly replacement:

- 2A. Refer to 'A' above and remove the reservoir lid assembly. Remove the lubricant from the reservoir.
- 2B. Remove one blanking plug ('9') and insert the screw driver to prevent the cams from rotating.

The camshaft must be secured to prevent rotation. Ensure the drive adaptor is located correctly over the new paddle.

- 2C. Unscrew the paddle assembly ('7') from the camshaft by hand.
 - 2D. Screw new paddle assembly onto camshaft ('8'), hand tight.
 - 2E. Follow steps **1C**, **1E** and **1F** above.
- ##### 3. Reservoir replacement:
- 3A. Refer to steps **1A** to **2C**, remove the lid and paddle blade assemblies ('1' & '7').
 - 3B. Remove the six screws and washers from the bottom of the reservoir ('5'). Discard the old washers.
 - 3C. Carefully remove the reservoir ('5') from the carcass ring ('11'). The AC mounting bracket ('6') and the O-ring must be separated from the reservoir and carcass ring. Discard the reservoir.
 - 3D. Remove any old lubricant from the lid moulding ('1'). Wipe the carcass ring and the AC mounting bracket clean.
 - 3E. Set the reservoir on the mounting bracket. Install the O-ring onto the flange of the reservoir. Align the mounting - holes.
 - 3F. Install the reservoir, mounting bracket and O-ring onto the carcass ring. Align the mounting holes of all three pieces.

4. Replacement of Motor Assembly AC1 & AC2:

- 4A. Refer to steps **1A** and **1B** (except retain the lid assembly O-ring) to remove the lid assembly ('1').
- 4B. Remove the four screws that secure the motor housing to the lid. Retain the O-ring seal for reuse.
- 4C. Remove the two screw that hold the motor ('3') in place.
- 4D. Loosen the wire on the PCB ('2') connector, noting the location of the two wires on the connector (see page 17).
- 4E. Pull the motor off the 'D' drive on the motor drive shaft.
- 4F. Position the replacement motor in the motor housing and fix in position with the two original screws. Ensure that the drive adaptor fits over the 'D' flat on the motor drive shaft.
- 4G. Reconnect the motor wires to the PCB.
- 4H. Fix motor back in place, inside the motor housing.
- 4i. Fix the motor housing back onto the lid, ensure the O-ring is correctly positioned, **torque to 7.5 Lb.-In / 0.85Nm**.

Note: Look at the locational features and "fixing ident", to ensure the correct positioning of the motor housing onto the lid.

- 4J. See steps **1E** and **1F**.

5. Replacement of PCB:

- 5A. Refer to steps **4A** to **4B** to remove the lid assembly ('1') and motor housing ('4').
- 5B. Loosen and disconnect the **RED** and **BLUE** power cable from the PCB ('2').
- 5C. Loosen and disconnect the manual override, if fitted, from the PCB connector.
- 5D. Remove existing PCB, insert new one (having ensured the rotary switch is set to the correct setting required).
- 5E. Reconnect wires from step 5B.
- 5F. Reassemble following steps **4i** and **4J**.

6. Cam Assembly replacement:

- 6A. Refer to steps **1A** and **1B** to remove the lid assembly ('1'), except retain the lid assembly O-ring. Remove lubricant from the reservoir ('5').
- 6B. Refer to steps **2A** and **2C** to remove the paddle blade assembly ('1').
- 6C. Refer to steps **3B** to **3D** (except retain the washers).

Note: If the pumping units must be removed from the carcass ring ('11'), be certain to mark the location for each one. Place the pumping units in a clean container to prevent contamination.

- 6D. Loosen each pumping unit to allow the cams ('8') enough clearance to be easily removed from the pump.

Note: Ensure that the replacement cam assembly has the same number of cams as the old ones.

- 6E. Insert the new cam assembly through the manifold and onto the bottom of the reservoir.
- 6F. Refer to steps **3E** to **3H** (except re-use the reservoir washers and lid assembly O-ring) for re-assembly.

Warranty

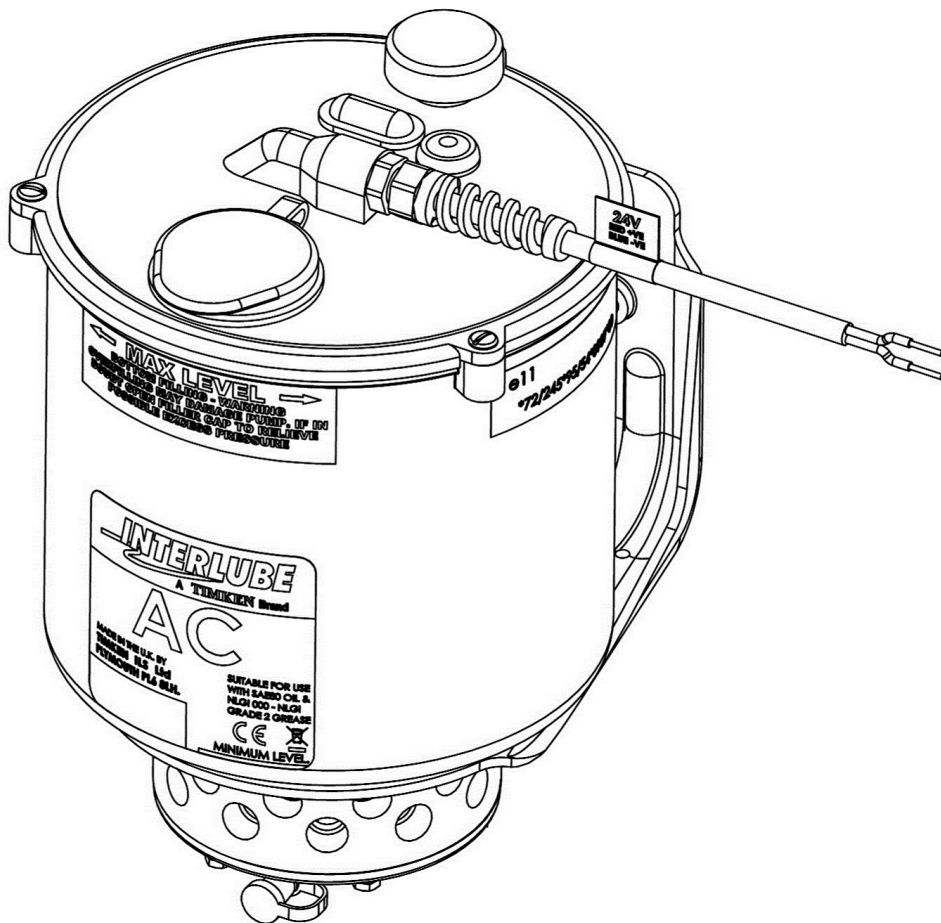
Pumps: The Interlube AC range carries a 2 year warranty on ALL parts (subject to normal terms and conditions of sale), in line with completion of the Interlube 'System Warranty Registration Card.'

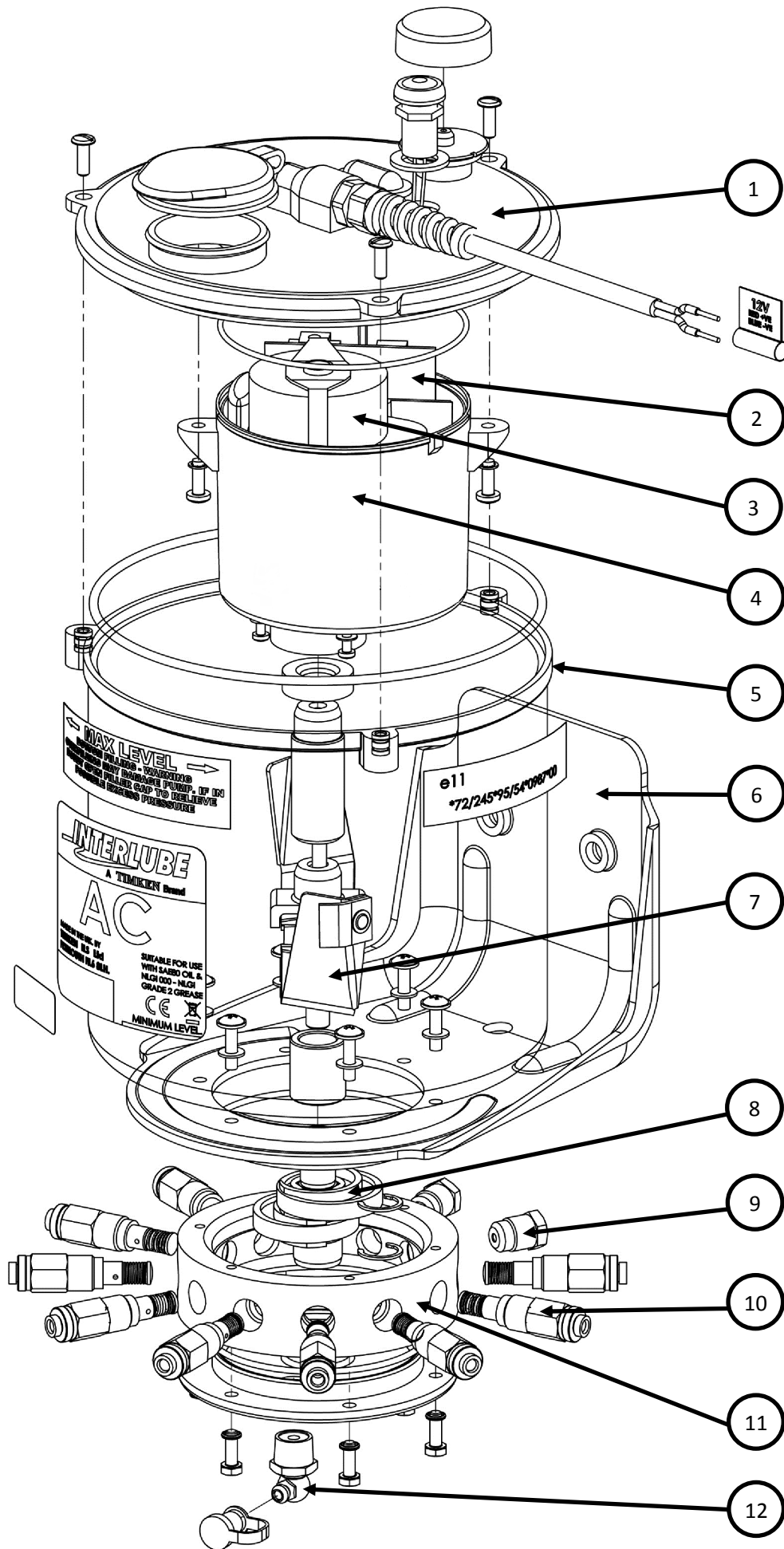
Tube: The feed lines are 4mm OD semi rigid Black Nylon Tube, UV stabilised and rated to 140 Bar (14MN/m²). The tube is covered by a ten year guarantee, however Interlube can not guarantee the pipe work if damaged. The pipe work must be inspected as part of the vehicle maintenance program and any loose pipe work are to be made good during those inspections to ensure that the pipe in situ does not wear or catch on any moving parts.

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Parts and Pump assembly

- AC Pump Assembly
- Spares and Accessories



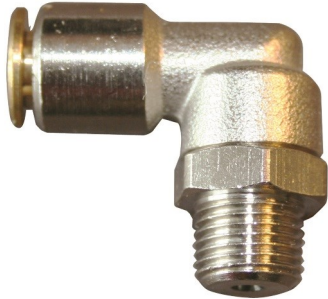


AC1 & AC2 Pump Assembly Spares

Item No.	Part No.	Description	Qty.
1	AC/SP1	LID ASSEMBLY	1
2	AC/SP2	PCB ASSEMBLY 83344-101	1
3	AC/SP8/12V AC/SP8/24V	ELECTRIC MOTOR	1
4	AC/SP15 (12V) AC/SP16 (24V)	LID, MOTOR & PCB ASSEMBLY	1
5	AC/SP4/P (AC1) AC/SP9/P (AC2)	RESERVOIR	1
6	83341-803	BRACKET	1
7	AC/SP7 AC/SP10/P	PADDLE ASSEMBLY PADDLE ASSEMBLY WITH DRIVE ADAPTOR	1
8	AC/SP5/1—12 OUTLET AC/SP5/2—24 OUTLET AC/SP5/3—36 OUTLET	CAMSHAFT ASSEMBLY	1
9	34237-402	BLANKING PLUG	1-35
10	78033—0.010cc 78034—0.015cc 78035—0.025cc 78036—0.040cc 78037—0.060cc 78038—0.10cc	PUMPING UNIT	1-36
11	32478-202 32478-203 32478-204	CARCASS RING (12 OUTPUTS) CARCASS RING (24 OUTPUTS) CARCASS RING (36 OUTPUTS)	1
11	25471-122	GREASE NIPPLE FILL POINT	1

Accessories

Elbow Connectors



Part Number	Thread Size
PM90412	1/8" PTF SAR
PM90484	1/4" x 28UNF
PM90485	5/16" x 24UNF
PM90487	1/8" BSPT
PM90489	M6 x 1
PM90490	M8x1.
PM90491	M8 X 1.25
PM90492	M10 X 1
PM90493	M10 x 1.5

Straight Connectors



Part Number	Thread Size
PM80412	1/8" NPT
PM80484	1/4" x 28UNF
PM80485	5/16" x 24UNF
PM80487	1/8" BSPT
PM80489	M6 x 1
PM80490	M8x1.
PM80491	M8 X 1.25
PM80492	M10 X 1
PM80493	M10 x 1.5

Conduit / Spiral Binding



Part Number	Description
1837-001	Spiral binding 6mm ID 1-2 tubes
1837-002	Spiral binding 8mm ID 3-4 tubes
1837-003	Spiral binding 10mm ID 5-3 tubes
1837-004	Spiral binding 14mm ID 8-12 tubes
1837-005	Spiral binding 20mm ID 12-18 tubes
27315-907	Split Conduit 7mm
27315-910	Split Conduit 10mm
27315-912	Split Conduit 12mm
27315-917	Split Conduit 17mm

Grease Filled Nylon Tube



Part Number	Description
152823/25	Ø4mm OD Primed with 000 grade grease (25m coil)
15283/50	Ø4mm OD Primed with 000 grade grease (50m coil)
152821/25	Ø4mm OD Primed with NLGI 2 grease (25m coil)
27233-507	Cable Tie (10" Length)
1755-830	Black electrical tape (1" Width)

Numbered Sleeve



Part Number	Description
OA50397/1	For up to 12 point system
OA50397/2	For up to 24 point system
OA50397/3	For up to 36 point system

Grease



Part Number	Description
25717-284	12 x 1 Litre Bottles
25717-284/12.5K	12.5Kg Pail
25717-284/25K	25Kg Pail
25717-284/50K	50Kg Pail
25717-284/180K	180Kg Pail
NLGI Grade 2 Grease	
25717-270/12.5K	12.5Kg Pail
25717-270/25K	25Kg Pail



Grease Specification:

NLGI 000/FG3,0

Colour	Amber
Texture	Fluid, Tacky
NLGI	000
Soap Type	Calcium
Penetration @25°C	445-475
Base Viscosity @ 40°C	35 to 45CST
Drop Point	N/A

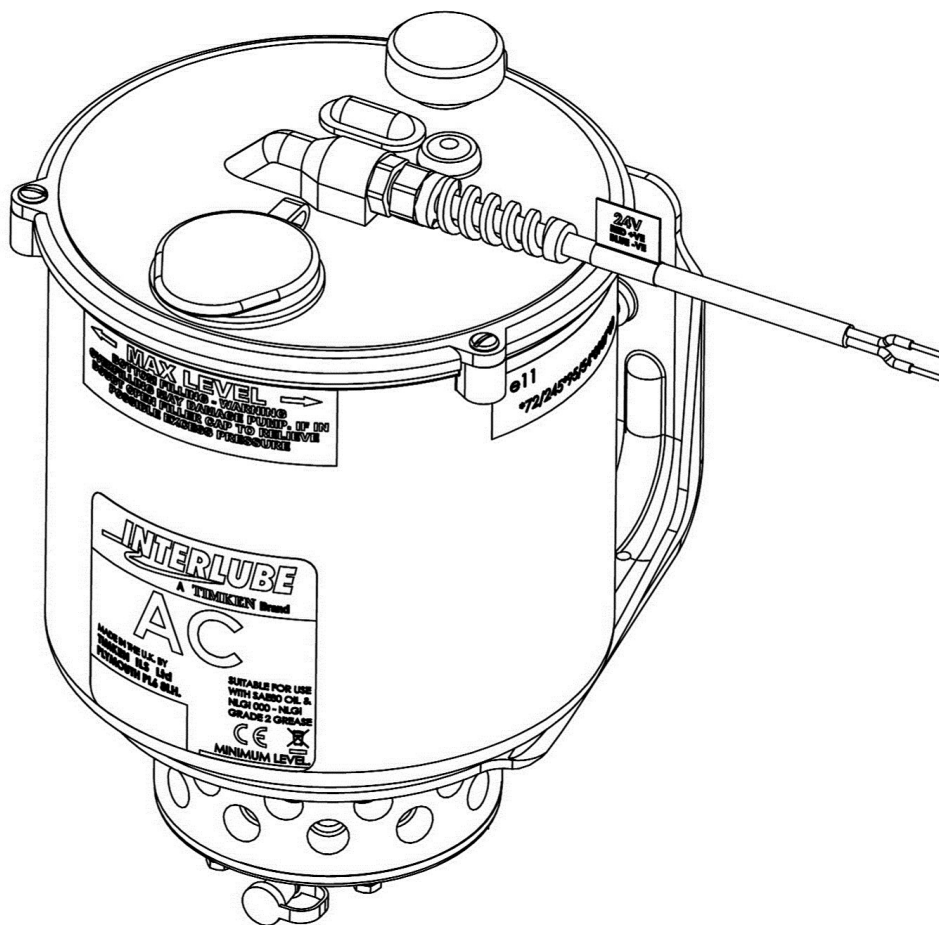
NLGI Grade 2

Colour	Pale Amber
Texture	Slightly Fibrous
NLGI	2
Soap Type	Lithium
Penetration @25°C	265-295
Base Viscosity @ 40°C	125CST
Drop Point	185°C

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Troubleshooting

- Lubrication Troubleshooting Chart
- Electrical Troubleshooting Chart



Lubrication Troubleshooting Chart

Problem	Cause	Solution
1. Inoperative Pumping Element.	<ul style="list-style-type: none"> a) Inoperative Pump b) No Grease flow 	<ul style="list-style-type: none"> a) Refer to “Problem A” in ‘Electrical—Troubleshoot’ b) Replace pumping unit
2. All lubrication points appear dry.	<ul style="list-style-type: none"> a) Empty reservoir b) Inoperative pump c) Time between lube cycles is too long. d) Reservoir filled with an unsuitable lubricant. e) Inoperative Pumping Unit f) Reservoir vent blocked from over filling. 	<ul style="list-style-type: none"> a) Refill the reservoir, using the correct lubricant. b) Refer to “Problem A.” c) Adjust pump CYCLE TIME setting. d) Remove the lubricant and replace with correct grade of lubricant. e) Replace Pumping Unit f) Clear vent and only fill to max level.
3. Pump is working, but does not supply lubrication.	<ul style="list-style-type: none"> a) Grease level dropped below minimum level b) Defective pumping element 	<ul style="list-style-type: none"> a) Bleed the pump & refill the reservoir b) Replace the pump element
4. No grease at all points of lubrication	<ul style="list-style-type: none"> a) Pump does not work. b) Dwell time is too long or c) Lubrication quantity is too little. d) System is blocked. 	<ul style="list-style-type: none"> a) Refer to “Problem A.” b) Reduce the system dwell time. c) Change the pumping unit with an increased output. d) Refer to “Problem A.”
5. No grease at some points of lubrication	<ul style="list-style-type: none"> a) Some pipes are burst or leakage at pumping unit unions to pipework. b) Blocked or broken pumping unit. 	<ul style="list-style-type: none"> a) Renew the pipes. b) Determine defective pumping unit and replace.
6. No grease at one point of lubrication	<ul style="list-style-type: none"> a) The lubrication pipe is burst or leaking b) Leakage at union point 	<ul style="list-style-type: none"> a) Renew the pipe b) Retighten or renew the screwed union
7. Lubrication points are over-lubricated.	<ul style="list-style-type: none"> a) Incorrect pumping unit output. 	<ul style="list-style-type: none"> a) Re-configure pumping unit for lower output quantity.
8. Excessive pressure of the System.	<ul style="list-style-type: none"> a) Excessive pressure in the system caused by blockage in the system. b) Defective valve spring c) One or more lubrication points are blocked and will not accept grease. 	<ul style="list-style-type: none"> a) Check the system b) Replace the pressure relief valve c) Remove pipe from fitting and flush bearing through with grease gun.
9. All lubrication points are over lubricated.	<ul style="list-style-type: none"> a) Incorrect setting of “on-time” or “Delay Time”. 	<ul style="list-style-type: none"> a) Reduce “On Time” or increase Delay Time”, or both.

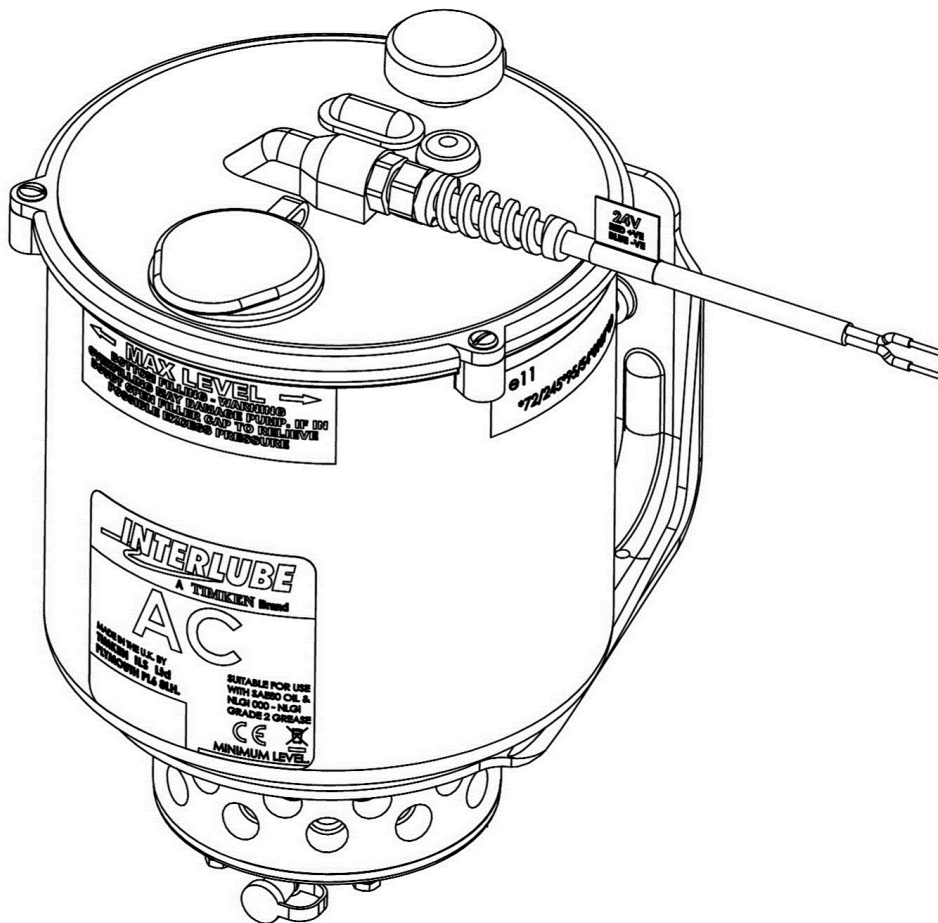
Electrical Troubleshooting Chart

Problem	Cause	Solution
A.) Pump Does Not Work.	a) No input power.	a) Check for power to the pump and controller.
	b) Fuse is blown.	b) Check in-line fuse. Replace if necessary.
	c) Loose / broken wire connection inside the pump.	c) Check all wires and connections in the pump.
	d) Defective PLC.	d) Replace Controller Assembly.
	e) Defective Motor.	e) Replace Motor.
B.) Reduced Pump Speed.	a) High pressure in the system	a) Check the system / bearing points
	b) Low ambient temperature	b) Not a defect(1 or 2 manual override lubrication cycles may be required)
C.) Override Switch Does Not work.	a) Bad wiring.	a) Check all wires and connections to the switch.
	b) Pump does not work.	b) Refer to "Problem A."

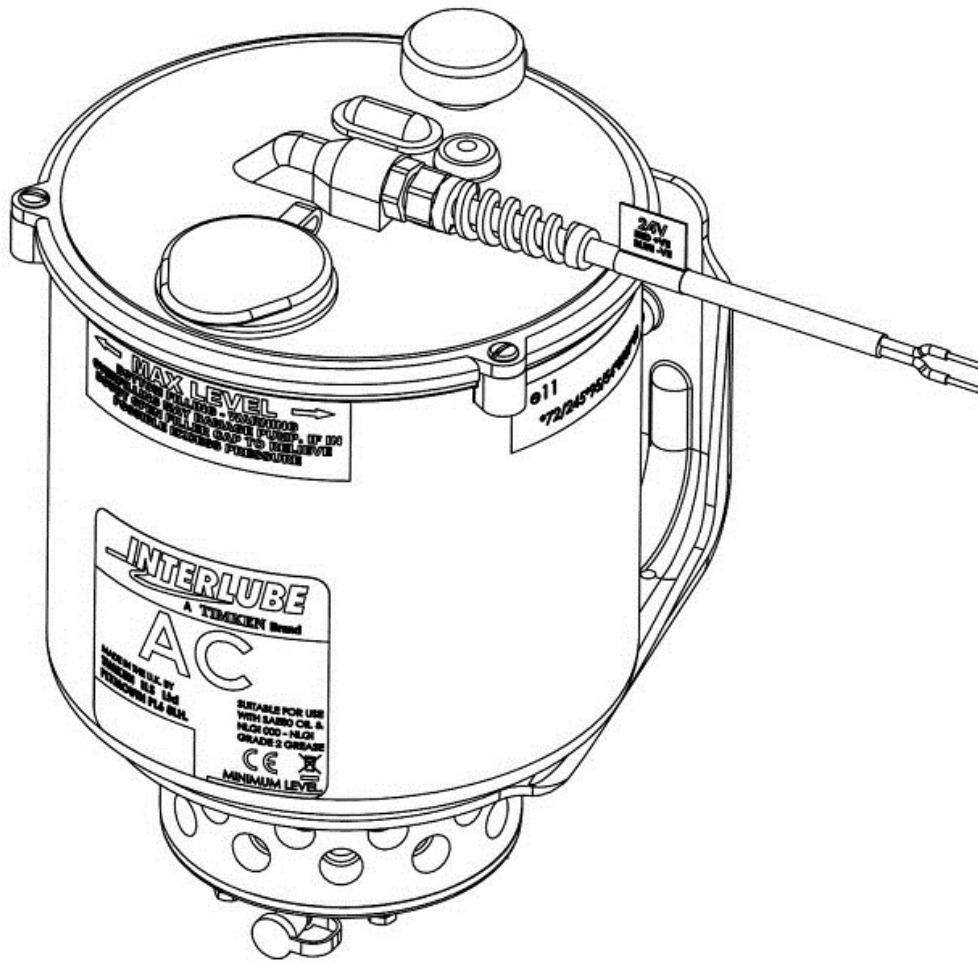
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Technical Data

- Pump Specifications
- Optional Float Switch Specifications
- Pump Ordering Method



Pump Specifications



Lubricator Data	
Reservoir Capacity	1.25 Kg / 2.0 Kg
Number of Outlets	1 - 36
Output Volume	Between 0.001g/min to 3.6g/min
Operating Temperature Range °C (with SAE 80/90 Oil)	-40 to +40
Operating Temperature Range °F (with SAE 80/90 Oil)	-40 to +104
Maximum Operating Pressure	120 Bar / 1740PSI
Minimum Viscosity	SAE 80 Oil
Maximum Viscosity	NLGI Grade 2
Protection Class	IP57
Lubricant Outlet Port	M12x1
Motor Data	
Operating Voltage / Rating	12 or 24 VDC
Power	48 or 96W
Maximum Current Draw	4 VA
Motor Type	Geared
Motor R.P.M	0.08, 0.4 (standard) or 0.75 RPM
Gear Ratio	7200:1, 1500:1 (standard) or 800:1

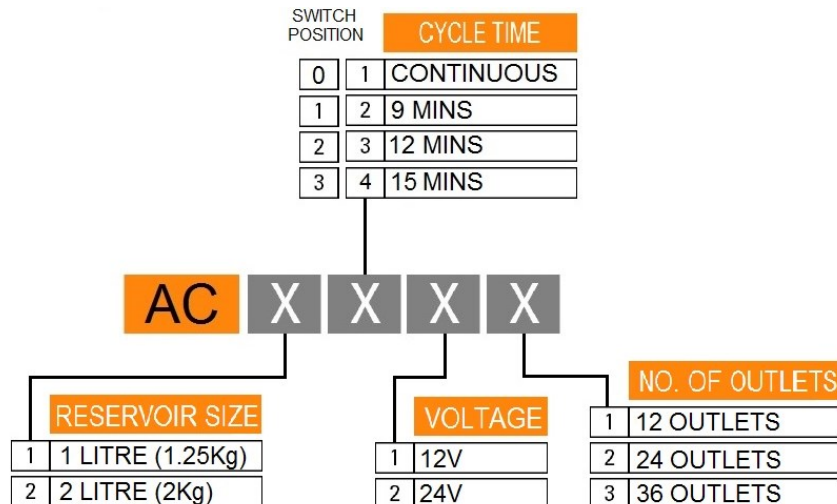
Pipe Specifications

Ø4 Outer Nylon Piping	
Maximum working pressure	120 Bar / 1740 PSI
Material	Nylon PA11 or PA12
Outside diameter	3.9624 – 3.8862mm
Inside diameter	2.1082 – 2.1844mm
Wall thickness	0.889mm
Volume per metre	3.5cc/m
Colour	Black

Optional Float Switch Specifications

AC1 or AC2 Float Switch Pump Variant	
Connector	Hirschmann DIN Connector
State	Normally closed (N/C)
IP Rating	IP65
Rated Voltage	AC/DC 250V
Rated Current	16A

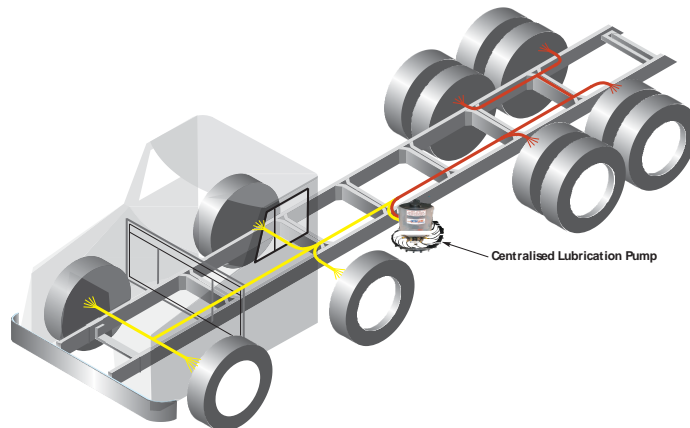
Pump Ordering Method



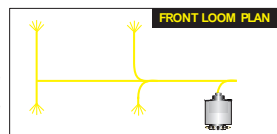
Installation Record

Vehicle Type Pump No.....
 Customer..... Voltage.....
 Timer Setting.....

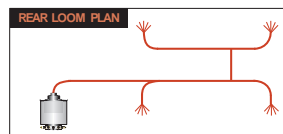
Unit No.	Bearing location	Col. Code	Cal. CC	Unit No.	Bearing Location	Col. Code	Cal. CC
1				19			
2				20			
3				21			
4				22			
5				23			
6				24			
7				25			
8				26			
9				27			
10				28			
11				29			
12				30			
13				31			
14				32			
15				33			
16				34			
17				35			
18				36			



Front Loom
feeding grease points at front of vehicle



REAR LOOM PLAN



Rear Loom
feeding grease points at rear of vehicle

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets high-performance mechanical components, including bearings, gears, chain and related mechanical power transmission products and services.



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