

Backpacker Pressure Test Units

CJ-175-60

AIR DRIVEN PUMP UNIT



OPERATIONS MANUAL

Backpacker Industrial Equipment B.V.

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FOREWORD

This manual is intended as a general guide for operating of the Backpacker Pump Units.

Before the equipment is put to use, it is recommended that the information contained within this manual be studied carefully. By following the suggested procedures, the equipment should give a trouble-free service life.

The equipment covered in this manual, and information within, includes features that are proprietary to Backpacker and is covered by more patents. Nothing within this document shall be construed to be a license or permission for the disclosure of such proprietary information to third parties nor the use of this information for the purposes other than the operation, maintenance, inspections, and servicing of the covered equipment.

Improvements may be made from time to time, therefore the text and illustrations may differ to some extent with respect to the subject of equipment. In any reference to the unit for which this manual is used, it is essential that the equipment serial number is noted.

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Operations Manual CJ-175-60 Backpacker Pump Unit.

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1 - SAFETY

This manual starts with a section on safety. This shows the importance of taking care of safety regarding you, the mechanic, your surroundings, people working in your vicinity, your environment and the equipment you work on and with.

Service and repairs of the Backpacker Pump Unit can only be carried out by a trained mechanic, repairs require special know-how.

For example the air powered pump contain pre-loaded seals and various non-standard constructions making a standard technical training not sufficient to perform repairs.

To make you aware of the dangers we mention a few examples of fellow mechanics who thought they knew it all but had to pay for their mistake.

1* Event: Breaking a hydraulic connection with the pressure still on.

Result : A small jet of fluid started to escape and penetrated an eye-ball.

The eye was removed and replaced by a glass one due to an infection.

Result : An equal jet of oil escaped on another occasion and penetrated a hand. The hand was removed due to blood-poisoning.

2* Event : Removing the bowl of an air filter/separator without taking the air supply off first.

Result : The bowl was launched by the air pressure, one hand carved and bleeding, the other got smashed between the bowl and the frame and was broken.

Would you like us to go on ???? we won't !!.

If you don't take care and follow instructions you will create the next event and play the leading part in your own horror show.

1.1 - General Safety Instructions

General instructions for safe operation ;

01: Consider work area.

- Only work on a flat, horizontal and steady floor.
- Only work in a well lit area, with clean air.
- Do not work in presence of flammable liquid or gas.
- Do not use the unit in an under-ground environment.
- Seal-off work area and post warning signs when testing.

02: Stay on the job.

- Never leave pressurized equipment unattended.

03: Keep children, visitors and laymen away.

- Do not let children, visitors or laymen contact the unit, air supply lines, hoses and fittings or the test object.
- Keep them away from the work area.

04: Only test objects or the system in a sealed-off area.

- As parts become pressurized and object contain moving parts during testing all personnel must be outside the sealed off area. Only the mechanic is in the area performing the testing.

05: Only use components, hoses, quick disconnects and fittings with a Maximum Working Pressure equal or higher than the rated pressure of the system they are used in.

06: Disconnect air supply and release hydraulic pressure.

- When not in use, when a leak occurs, when changing connections, when servicing or when moving the equipment or parts of it.

07: Avoid unintentional start.

- Do not connect the air-supply before preparing the equipment.
- Do not move the equipment when under pressure.

08: Do not pressure objects with gas-cushions or large air-locks.

- Nor use a test unit to pressurize objects filled with gas.

Cont. 1.1 Safety, General Instructions.**09: Check equipment for damaged parts.**

- When a piece of equipment is damaged first release the pressure and disconnect the air-supply and hydraulic supply. Before further action replace the damaged part and return it to an authorized service centre for inspection. If the damaged part is an item of the unit return the unit to your supplier for repair.

10: Do not use malfunctioning or worn equipment.

- Return the equipment to your supplier for check and, if possible, repair.

11: Dress properly.

- Do not wear loose clothing or jewellery. They can be caught in moving parts or result in unwanted operations of the equipment.
- Wear a proper fitting coverall, gloves, safety boots, goggles and helmet.

12: Wear safety mask.

- Preferred is a safety mask covering the face over only safety glasses.

13: Don't abuse hoses and fittings.

- Never move the equipment by the hoses or yank to connect or disconnect under pressure.
- Never hit quick connector internal valves to release locked-in pressure.
- Use proper torque values and seal materials when making connections
- Keep hoses and fittings from being run-over, heat and sharp edges.
- Do not kink hoses.

14: Stay alert.

- Watch what you are doing. Use common sense. Do not operate the equipment when you are tired or ill.
- Do not operate, or take any other action with the equipment when under the influence of alcohol, drugs or medicine.

15: Do not remove any markings or moving-parts protectors.

- All markings must be in place and readable at all time.
- Protectors must be in place and fixed before use of equipment.

16: Don't overreach.

- Keep proper footing and balance at all time.

Cont. 1.1 Safety, General Instructions.**17: Maintain equipment with care.**

- Keep the equipment clean for better and safer performance. Follow instructions for maintenance, storage and transport.
- Inspect the equipment before use and, if damaged or leaking, have repaired by an authorized mechanic. Keep handles and measurement instruments dry, clean and free from oil or grease.

18: Remove adjusting keys, spanners and wrenches.

- Make it a habit of checking to see that keys, spanners, wrenches etc. are removed from the object before testing and or running it.

19: Cleaning

- Clean your equipment only with water and soap. Never use a pressure-cleaner or detergents.

20: Only lift the equipment by the purpose build handles and carrying points.**21: Testing, setting and resetting instructions only valid when testing with the proper fluids.**

- The instructions in this manual only apply to testing, setting and resetting of safety valves and other components with a calibrated, purpose build test unit and only apply when testing with fluids.

22: Store idle equipment.

- When not in use: tools, hoses, fittings etc. should be stored in a tool-box, a container, on a pallet or in a locker.

23: Don't force and use right equipment and tools.

- Don't force small tools or attachments to do the job of a heavy tool.
- Don't use tools, attachments or test-equipment for purposes not intended.

24: Understand instruction.

- If the instructions given either in this booklet or in any other way presented to you are not fully understood, don't do it. Ask for additional information and only when you are clear start full filing your task.

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Cont. 1.1 Safety, General Instructions.

25: Lock and Secure Tools or Machinery.

- If there are tools or machinery being operated by the Pump Unit that may move or act when flow or pressure are turned on or off, lock and/or block these parts in position before running or shutting down the unit.

26: High Pressure Hydraulics are Dangerous.

- The CJ-175-60 Backpacker Pump Unit is designed to supply up to 500 bar / 7,200 psi hydraulic pressure. Leaking at high pressure appears as innocent mist. This very small jet however is capable of penetrating the human body. Hydraulic fluids cause major damage and to avoid the loss of life sometimes amputations are needed.

27: Check Fluid in Equipment.

- Make sure your equipment is empty, tank, fluid lines, etc. when starting a job. Equipment must be labelled with last used fluid to check if it is compatible with the fluid you want to pump. If not matching, flush with an intermediate fluid compatible with the previous and new fluid.

28: Never Mix Fluids.

- Mixing fluids can result in unexpected chemical reactions from toxic fumes to explosions. If fluids were intended to be mixed they would have already been mixed at the factory. Also keep to this rule with the exposure of fluids.

29: Last Warning.

- The use of any accessory or attachment not mentioned in this manual is not allowed. Use of the equipment other than its purpose as described in this manual is strictly forbidden. Follow the instructions in this manual, all other actions or use present a risk of personal injury or cause major accidents.

Memorize the above instructions and warnings, there are many but still they make you perform a secure job for you, your fellow workers and your environment.

2 - The CJ-175-60 Backpacker Pump Unit



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2.1 - Introduction

The CJ-175-60 Backpacker Pump Units are designed to pump water into an object to create a pressure high enough to determine the integrity, strength or leak tightness, of the object.

Maximum output pressure of the unit is:

CJ-175-60 Backpacker Pump Unit 500 bar / 7200 psi.

Most wetted parts are stainless steel.

Seals are a mix of NBR and PE.

Plain water is the only suitable test fluid for the Backpacker Pump unit.

NEVER USE SALT WATER! It will result in major damage.

The Backpacker Pump unit is powered by compressed air, 120 psi / ½”.

The compressed air needs to be free from moisture, dirt and particles.

Dew point of the compressed air must be minimal -21 Degree Celsius to prevent the pump exhaust from freezing. This will cause the pump to slow down and reduce the amount of fluid displaced.

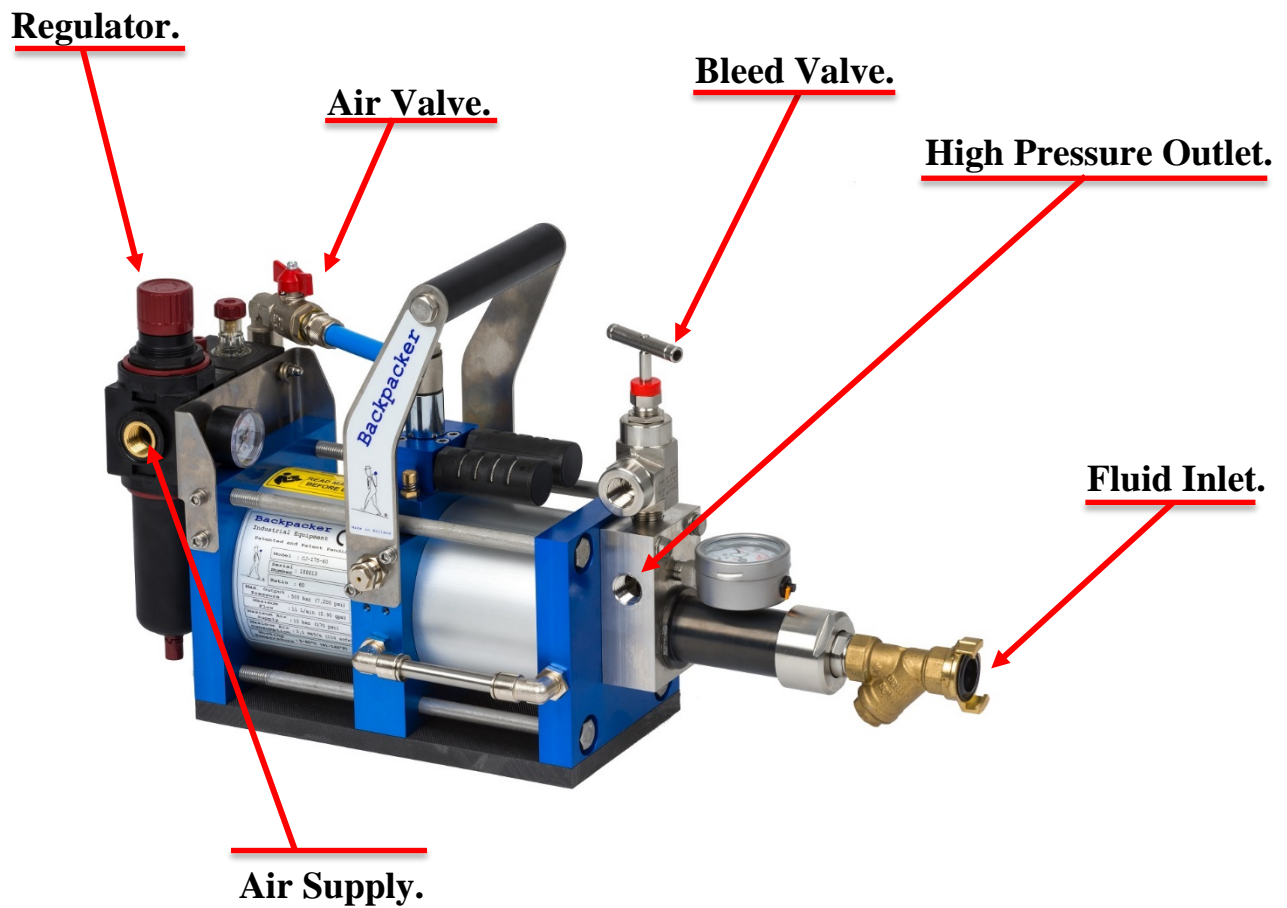
The Backpacker Pump unit will pump up the test pressure in the object tested related to the air drive pressure set by the operator.

By adjusting the air drive pressure upwards the test pressure will increase to a higher level and the pump will automatically stall until the air drive pressure is increased again. Continue this procedure till the pressure will end at the desired test pressure.

In case of a leak the pump will continue pumping without a test pressure increase.

2.2 Rig-Up

The Backpacker Pump unit needs to be connected to the high pressure hose, the air supply needs to be connected and the system flushed.



Continued 2.2 Rig-up.

Connect the High Pressure Hose to the Backpacker unit's High Pressure Outlet.



Continued 2.2 Rig-up.**Connect the Water and Air Supply to the Backpacker unit's Fluid Inlet.**

As mentioned the unit is powered by compressed air. The air needs to be clean, free from particles and dirt and dry. Dew point should be -21 degree Celsius minimum. The dew point determines when ice is forming at the air exhaust of the pump. When heavy ice is building the unit will eventually malfunction. A solution is given in by putting the lubricator into action.

Required Air Supply: 100 psi (7 bar) minimum and ½" in size.



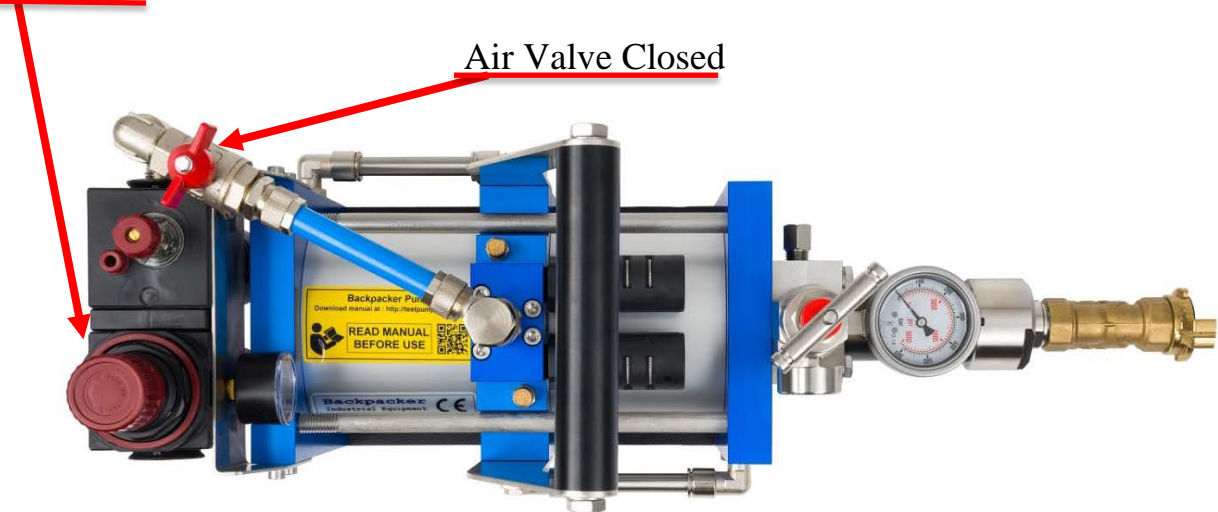
Continued 2.2 Rig-up.

Place the open end in a tray to catch fluid expeling when flushing the system.



Prior to opening the air supply check if the controls are positioined as shown below.

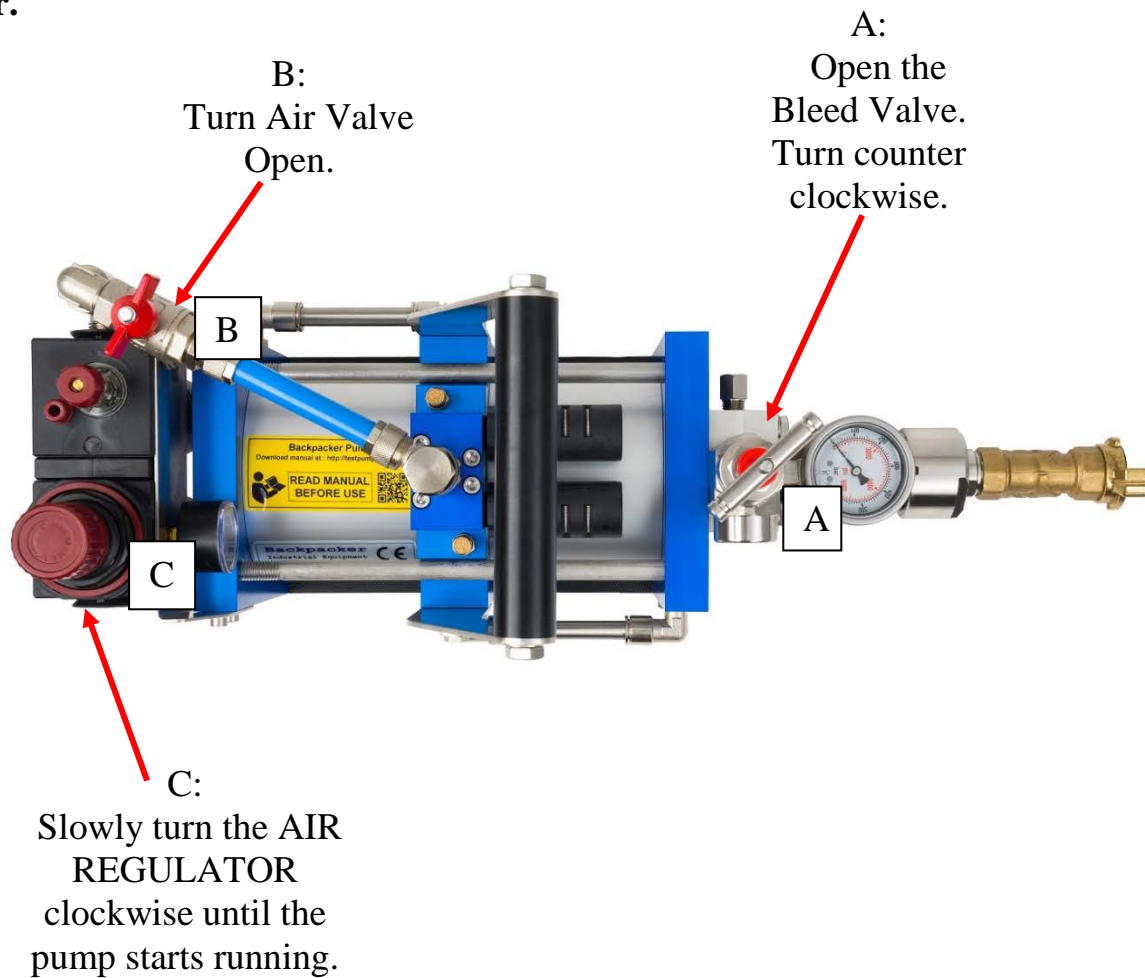
Regulator turned back, counter clockwise.



NOW OPEN THE AIR SUPPLY.

Continued 2.2 Rig-up.**Open the Water Supply**

The system needs to be flushed to fill it with the test fluid and remove trapped air.

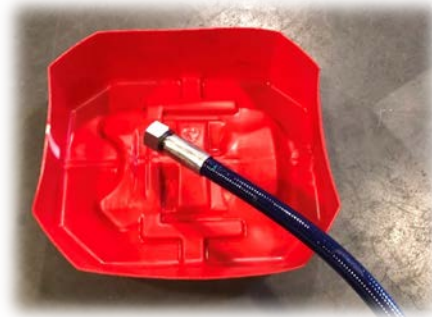


Continued 2.2 Rig-up.

Watch the pump start pumping followed by a **return flow** from the Bleed Valve. Close the Air Valve and close the Bleed Valve, turn clockwise, tighten slightly, **NOT heavily!**

Flush the High Pressure Hose.

Make sure the open end of the hose is still positioned in the tray to catch expelling fluid.



Again run the pump by turning the Air Valve open.

Wait for a clean and constant flow of water running from the open end into the tray.

Close the Air Valve.

Close/Stop the Fluid Supply.

Open the Bleed valve to drain the pressure and close it again.

The time has come to connect to the Object to be tested.

2.3 - Perform the Pressure Test

This part outlines the test-procedure with the test unit driven by compressed air.

A: Preset the unit.

Read the test-protocol of the test-object to find the test pressure.
The pump of the test unit has a fixed ratio, meaning a certain applied Air Pressure will result in a related Test Pressure.

For example:

The ratio of the CJ-175-60 Backpacker Pump unit = 60

Example : When applying 3 bar (44 psi), the unit will build-up pressure to about $60 \times 3 = 180$ bar ($60 \times 44 = 2,640$ psi) and stall.

Some Units are fitted with a Pressure Safety Valve (PSV) that bleed of the pressure when the test pressure exceeds the setup of the PSV. If the unit has an PSV fitted check the setup of the PSV, this is often written on the PSV.

If this Pressure is lower than the test pressure, first contact you supervisor if the PSV can be adjusted before going any further.

When the unit hasn't got a PSV or the setup is greater than the test pressure you can make the calculation: $\text{Air Pressure} = \text{Test pressure Object} / \text{RATIO}$.

- * Check if the Bleed Valve is closed. (Turn clockwise until it blocks, do not overturn or tighten with force).
 - * Make sure the main valve of the Fluid Supply is open.
 - * Check if Air Valve is closed.
- Turn the Air Regulator clockwise until the Air Pressure Gauge indicates 2.5 bar (36 psi).

Continued 2.3 Perform the Pressure Test.**B : Pressurizing**

- Open the Air Valve.
(The pump starts pumping).

- Increase the Air Pressure to calculated Air Pressure, by turning the Air Regulator clockwise.
(The pump will speed-up).

- Keep track of the test pressure by monitoring the Test Pressure Indication Gauge
 - * The pump will slow down and stall at the Air Pressure x RATIO.

- Increase the Air Pressure by turning the Air Regulator slowly clockwise. Take steps of a quarter turn at the time and wait for the pump to stall. Repeat until the Test Pressure Indication Gauge indicates the wanted test pressure.

- * If during the process of increasing the air pressure, turning the Air Regulator, the Air Pressure Gauge does not show an increase your air supply system has not enough pressure to reach the final test pressure. Increase the pressure in your system or quit the test by closing the Air Valve and proceed with
E : End of test.

- Close the Air Valve.

Continue with the stabilizing procedure.

!!!!!!! **If during the above pressurizing procedure a sudden pressure-drop occurs or the pump continues pumping without stalling you could have a large leak.**

- **If this happens Close the Air Valve.**
And continue with: E: End of test.

It can also be possible that the test pressure is greater than the setup of the Pressure Safety Valve (PSV). In this case contact your supervisor if it is allowed to adjust the PSV.

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Continued 2.3 Perform the Pressure Test.

C: Stabilize the test pressure.

- * As the system is put on pressure some items, like hoses, have the tendency to settle. This normally results in a small, slow pressure-drop followed by stabilization of the test pressure.
- Monitor the Test Pressure Indication Gauge.
 - * If the pressure keeps falling you have a leak !!!!!. Stop the procedure and continue with step: **E : End of test.**
- Open the Air Valve.
- Monitor the Test Pressure Indication Gauge as the pump builds-up pressure to the wanted test pressure.
- Close the Air Valve again.
 - * Repeat the above stabilizing procedure until the test pressure remains steady.
- Close the Air Valve and turn the Air Regulator back, counter-clockwise, until stop and the Air Pressure Gauge indicates “ 0 “ pressure.

The pump is now fully cut-off. The system and the object are on Test Pressure without any support to compensate for pressure-loss due to a leak (if it leaks).

D: Pressure Hold.

- Make a note of the Test Pressure Indication Gauge reading at this moment.
 - * In the test-protocol of the object a pressure hold time is given.
- Keep the Test Pressure Indication Gauge in sight and wait for the duration of the pressure hold time. If a sudden pressure drop or increase occurs immediately end the test, see: **E: End of test.**
 - * Never leave the equipment or area unattended and maintain the safety.
- When the hold time is due, again note the Test Pressure Gauge reading.
- Continue with: **E: End of test.**

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Continued 2.3 Perform the Pressure Test.

E: End of test.

- * Make sure Air Valve is closed.
- Turn the Bleed Valve slowly counter-clockwise until the test-pressure, Test Pressure Gauge, drops at about 100 bar (1,500 psi) / second.
- * An overturn could result in a too rapid pressure drop damaging the object, recorder or test pressure gauge.

- When the test pressure is fully released, Test Pressure Indication Gauge indicating “ 0”, turn the Bleed Valve one full turn counter-clockwise to give free passage for the test fluid to drain.

- If the **End of test** is reached other than through the complete procedure, turn the Air Regulator back, counter-clockwise, until stop and the Air Pressure Gauge indicates “ 0” pressure.

- Wait for a few minutes for the equipment and object to relax.

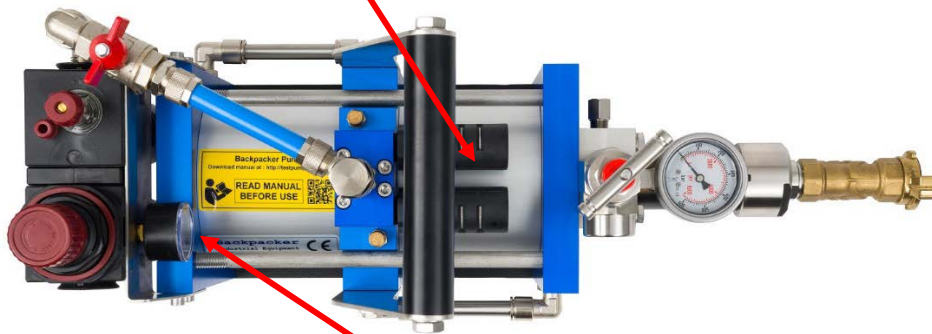
F: Disconnect the test-object.

- Turn off warning signals and remove the “Warning Signs”.
Inform your fellow-workers about the ending of the test.
Retrieve the test-object from the test container, disconnect the Test hose.

2.4 In Operation

It is important to check the system during operations. Freezing of the pump exhaust or timely changes in settings require regular attention.

Check Pump Exhaust Mufflers for ice.



Air Pressure Gauge

As soon as moisture from the compressed air starts blocking the exhaust of the pump it will slow down. If the air quality can't be improved the only way to keep going is to put the unit's Air Line Lubricator into use.

Once in use it must be kept going, requiring filling regularly.

To activate the Lubricator the bowl needs to be filled with Air Tool Lubricator. We advise to only use our GO-TOOL air tool lubricator.

GO-TOOL is a mixture of full synthetic oils, with anti-corrosion and anti-wear additives. It has an anti-ice effect down to -60 °C, absorbs water without loss of lubrication properties and reduces tool wear and downtime.

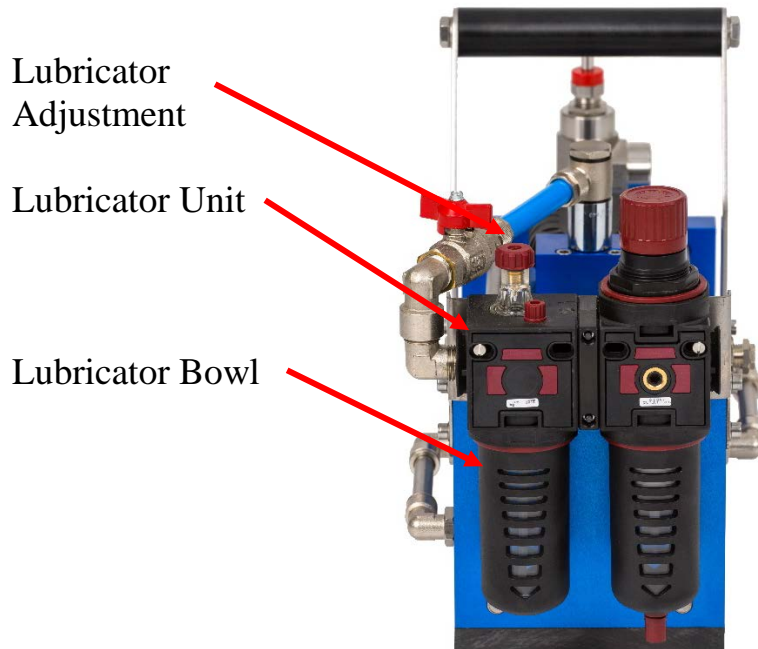
First the unit needs to be shut down, close the Air Valve, the Air Supply Pressure taken off and the Air Supply Hose disconnected.

To make sure that there isn't any Air Pressure in the lubricator, check it by turning the Air Regulator clockwise, the Air Pressure Gauge on the Air Regulator should indicate "0" Pressure.

When you see pressure on the Air Pressure Gauge on the Air Regulator never try to open the lubricator.

Continued 2.4 In Operation.

Lubricator is Located on the rear of the Backpacker Pump Unit.



Remove the Lubricator Bowl to fill:

Push up the Lock Ring

Turn Counter Clockwise and Pull Down.



Mind the “O”-ring in top of the bowl! Fill the bowl and replace, allow the Lock Ring to drop making sure it is mounted properly.

Now adjust the lubricator:

To achieve a constant adding of lubricant to the Compressed Air Flow the Lubricator needs to be set when put to use for the first time:

Continued 2.4 In Operation.

After replacing the bowl re-connect the air supply and turn the air on.
Restart the system by opening the Air Valve.
Now, while running, adjust the Lubricator:



Turn the knob counter-clockwise to increase.

Watch drops of lubricant falling from the tip inside the clear top.

Adjust to 1 drop every 15 Pump strokes.

In case you cannot see a drop falling, often the right setup is:
Close completely and then open $\frac{3}{4}$ turn.

Keep track of the Lubricant level from now on and re-full if needed.
Don't forget to first take the air supply / pressure off and bleed the pressure.

2.5 - Rig-Down

At the end of the job the Backpacker Pump needs to be rigged down in a controlled manner.

First close the Air Valve to stop operations.

Open the Bleed Valve of the pump unit to drain any remaining pressure.

Close the water supply. The water supply hose can now be removed from the GEKA connector.

Shut down or close the Air Supply to the unit. Let the pump run for a while till it automatically stops. The pressure of the Air Pressure Gauge should be '0'.



When there is no pressure left the Air Supply Hose can now be safely removed from the unit.

Disconnect the High Pressure Hose from the Test Object.

Disconnect the High Pressure Hose from the unit.

3 - TROUBLESHOOTING

3.1 Introduction

3.2 TROUBLESHOOTING

3.1 - Introduction

Troubleshooting needs to be done in controlled manner. When troubleshooting is started by running around like a headless turkey followed by flipping pages in this section and trying whatever is written the solution will definitely not be found.

First start by attempting to rule out as much as possible. First check the most obvious, please do, because most problems are caused by things like someone disconnecting your air supply or changing the setting on the pump unit.

If in trouble contact the certified mechanic as he or she has more and better understanding of the pump unit and might be able to help you solve the problem quicker and above all safer.

Never start taking anything apart. Only a certified mechanic is allowed to. All items in the System, the Backpacker Pump Unit and the Connecting Hoses contain pressure and/or moving parts.

Even if you only have the slightest impression something is not working properly, or when the equipment malfunctions, or you run into a not solvable problem, using this section of this book, quit and contact the Certified Mechanic !!!!!.

3.2 - TROUBLESHOOTING

The general instructions below mentioned can be the solution to a problem showing when starting, during or at the end of a job.

GENERAL

CHECK IF YOU HAVE SUFFICIENT AIR SUPPLY AND THAT YOU HAVE A STEADY FLUID SUPPLY.

AIR SUPPLY FAILURE:

| PROBLEM | SOLUTION |
|---|---|
| The Backpacker Pump unit does not respond . | Check the Air Pressure Supply is connected and valves are open. Make sure supply is at least 7 bar / 100 psi. Check the supply line and check when the pressure is too low. |

HYDRAULIC FAILURE:

| PROBLEM | SOLUTION |
|---|---|
| Pump doesn't start to run when Opening the Air Valve. | Is the Air Regulator turned down? Go to section 2.2 Rig-up and perform the start-up. |

Cont. 3.2 Troubleshooting

| PROBLEM | SOLUTION |
|--|---|
| The Pump doesn't start. No hydraulic pressure build-up when turning the AIR REGULATOR clock wise, up. | Is the AIR VALVE open? Go to section 2.2 Rig-up for details. |


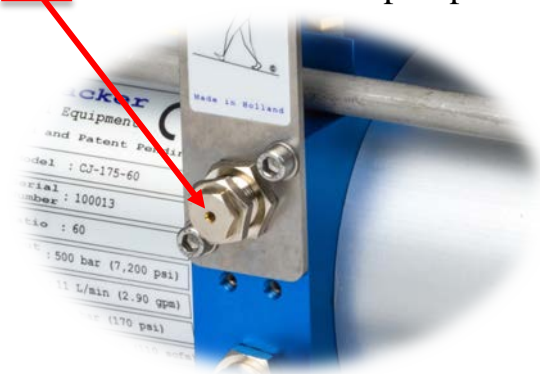
| PROBLEM | SOLUTION |
|--|---|
| The Backpacker Pump Unit builds up hydraulic pressure but the fluid will not enter the Object. | Is the Hydraulic Pressure sufficient? Turn up the Air Regulator to increase. |

| PROBLEM | SOLUTION |
|--|--|
| The Pump is running at a given pressure, but when turning up the air regulator the pump keeps running but the pressure doesn't increase. | Check all the connection towards your testing object, is any of these connection leaking? Stop the pump, Release the pressure and Fix the Leak, then try again. When the unit has a Pressure Safety Valve (PSV) check the pressure of the PSV. |

| PROBLEM | SOLUTION |
|--|--|
| The Pump slows down after a while in operation and fails to deliver sufficient hydraulic flow. | The mufflers freeze. Put the Lubricator into operation or readjust the setting. See section 2.4, In Operation. |

Cont. 3.2 Troubleshooting

| PROBLEM | SOLUTION |
|--|--|
| <p>The Backpacker Pump unit has been running at a given pace. The pump starts speeding up without an obvious reason.</p> | <p>Check all the connection towards your testing object, is any of these connection leaking? Stop the pump, Release the pressure and Fix the Leak, then try again.</p> |

| PROBLEM | SOLUTION |
|---|--|
| <p>The Backpacker Pump unit is blowing air out one of the exhaust mufflers and doesn't run.</p> | <p>Close the Air Valve and turn the Air regulator up till at least 4 bar, then open the Air Valve again.</p> <p>When this doesn't help you can reset the cycling valve. First Close the Air Valve.</p> <p>On the air maintenance support there should be a reset tool.</p>  <p>This is made out of a Ø2.5mm wire. This tool you can push inside a small hole on both sides of the pump.</p>  <p>With this action you push the cycling valve in his starting position.</p> <p>Take the tool out of the hole an open the Air Valve with the regulator turned up till at least 4 bar.</p> |

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NOTES: