

PGHH

Hydraulic Calibration Pump

0 ... 700 bar (0 ... 10,000 psi)



Dear user,

We have made every effort to ensure the accuracy of the contents of this User Manual. Should any errors be detected, we would greatly appreciate to receive suggestions to improve the quality of the contents of this User Manual.

For more detailed technical data about the Beamex PGHH Hydraulic Calibration Pump 0 ... 700 bar (0 ... 10,000 psi), please contact the manufacturer.

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Prologue

Thank you for buying Beamex **PGHH** Hydraulic Calibration Pump.

Beamex **PGHH** Hydraulic Calibration Pump 0 ... 700 bar (0 ... 10,000 psi) is a hand-operated, hydraulic, high-pressure calibration pump to generate the reference pressure in the pressure calibration applications. The pump is equipped with an adjustable volume (called Fine adjust) for fine-tuning the generated pressure. The pump is operated with mineral based hydraulic oils or distilled water.

Typographical Conventions

The following typographical conventions apply to the **PGHH** User Manual:

Bold text is used in following situations:

- References to User Manual topics and parts
- **PGHH** keywords, i.e. terms shown in the User Interface



Note: This is a note. Notes typically inform you of something useful concerning the current topic.



Caution: This is a caution. Whenever you see a caution, read it carefully and take it seriously. By not observing cautions, you may damage the pump.



Warning: This is a warning. Whenever you see a warning, read it carefully and take it seriously. By not observing warnings, you may -at worst- damage the pump and/or get personal injury.

Unpacking and Inspection

At the factory, each new **PGHH** passes a careful inspection. It should be free of scrapes and scratches and in proper operation condition upon receipt. The receiver should, however, inspect the unit for any damage that may have occurred during transportation. If there are signs of obvious mechanical damage, package contents are incomplete, or **PGHH** does not operate according to specifications, contact the purchasing sales office as soon as possible.

If you have to return the device to the factory for any reason, use the original packing whenever possible. Include a detailed description of the reason for the return.

The standard delivery includes:

- **PGHH** pump
- 630 bar / 9,100 psi Pressure Hose, 1.0 m / 39.37"
- Bx 1215 male to 1/4" NPT male pressure fitting for the Pressure Hose to be connected to the DUT (Device Under Test)
- Bonded seals for EXT/**PGHH**
- Copper gaskets for G1/4" B fittings
- A filling bottle with a cap
- This user manual
- Hard Case for **PGHH**

Options, Accessories and Spare Parts

All accessories and spare parts (with video instructions) are available at <https://shop.beamex.com/>.

Feedback

We want to improve our products and services constantly. Therefore we'd like to know your opinion of the product you use. Please spend a moment of your valuable time by giving us feedback about the product.

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Safety Precautions and Warnings



Warning: Read and fully understand this user manual and all other safety instructions before operating the **PGHH** pump. The pressure inside the pump built-up during use can be extremely high.



Warning: Only personnel with good experience and knowledge of pressure media, pressure instruments and connections are allowed to work with the **PGHH** pump. Incorrect use may result in damage to the pump, the instrument connected to the pump and/or personal injury.



Warning: Wear protective glasses.



Warning: Use only the Pressure Hose delivered by Beamex, marked with "Max. 630 bar". Other hoses may not withstand the pressure generated by the **PGHH**.



Warning: Never exceed the maximum pressure of the connected devices. The maximum pressure of Beamex EXT External Pressure Module is stated on the module's sticker.



Caution: Only use the original Beamex pressure fittings. Impurities from wrong materials may clog the pump.



Note: The pump is tested using WACKER® AK 10 Silicone Fluid. There may still be small residues of fluid inside the pump when you receive it. Before connecting any instruments to the **PGHH** pump, flush the pump with the pressure media to be used.



Warning: Always depressurize the system before opening or connecting any pressure fittings or connectors. Use proper valves for venting the system. Ensure that all connections are made correctly and that the hose, the connectors and the pressure fittings are intact.



Caution: If possible, flush the DUT (Device Under Test) before connecting **PGHH** to it. Impurities and other process residues accumulated in the instrument can get into the **PGHH** and damage the seals, O-rings and the Reservoir. As soon as first cloudiness, particles or dirt become visible, change the fluid.



Caution: Recommended test fluids to be used with the pump are low viscosity mineral based hydraulic oil (RENOLIN MR 5 VG 22) or distilled water. Any other fluid, e.g. synthetic hydraulic oil, can damage the seals and the Reservoir and will adversely affect the operation of the pump, which will show as a leak.



Caution: If the **PGHH** is used with the distilled water, remember to empty the Reservoir and let the pump dry out after each use (see [the note](#) in the step 11 of the operating instructions). As soon as first cloudiness, particles or dirt become visible, change the fluid.

Please notice, that the product warranty may be voided if these instructions are not followed.



Warning: Do not use **PGHH** in any other way than as described in this user manual.

Specifications

The Pump	
Pressure Range	0 ... 700 bar / 0 ... 10,000 psi
Pressure Connectors	<u>On the side:</u> G1/4" female port with pre-installed Bx 1215 male fitting for connecting a Beamex 630 bar / 9,100 psi hose <u>At the top:</u> Pre-installed G1/4" B female fitting for connecting a Beamex EXT External Pressure Module EXT60...1,000, blanked off with a PGHH pressure plug G1/4" male
Pressure Media	Low viscosity mineral based hydraulic oil (RENOLIN MR 5 VG 22) or distilled water
Weight	1.3 kg / 2.87 lb
Dimensions	
Height	265 mm / 10.4"
Width	160 mm / 6.3"
Depth	120 mm / 4.7"
Glass reservoir (acrylic) for pressure media	200 ml / 12.2 in ³ , not to be pressurized
Storage Temperature	-10 to 50 °C / 14 to 122 °F
Operating Temperature	0 to 50 °C / 32 to 122 °F

The 630 bar Pressure Hose	
Length	1 m / 39.37"
Internal diameter	2 mm / 0.08"
Outer diameter	5 mm / 0.2"
Working pressure	630 bar / 9,100 psi
Bursting pressure	2,000 bar / 29,000 psi
Smallest bending radius	20 mm / 0.78"
Connectors (both ends)	Bx 1215 female
Operable temperature range	-35 °C to 100 °C / -31 °F to 212 °F

About PGHH

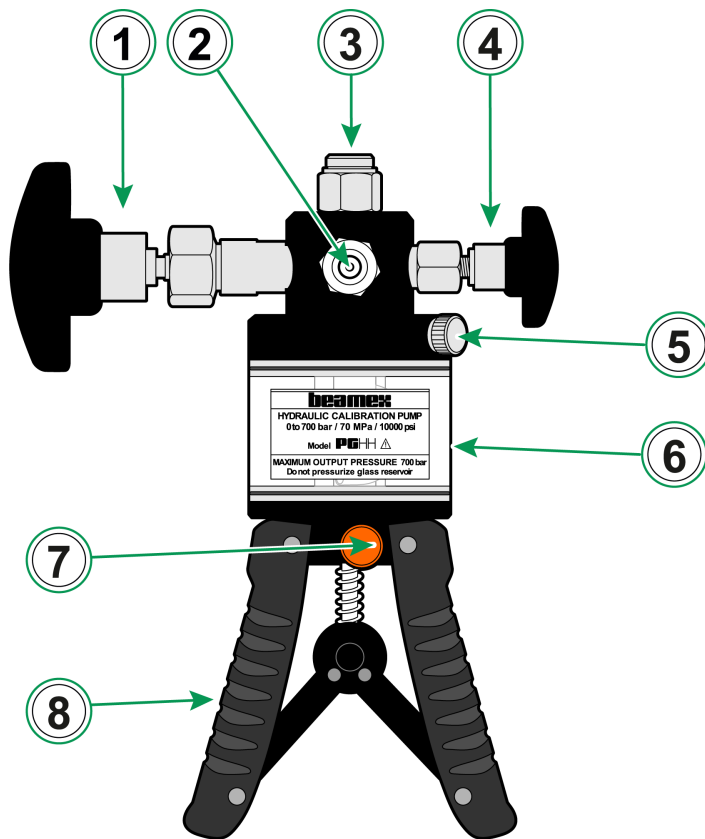


Figure 1: PGHH overview

Legend:

1. Fine adjust
2. Fitting for the Pressure Hose
3. Fitting for the optional Beamex EXT External Pressure Module
4. Vent valve
5. Reservoir filling plug
6. 200 ml / 12.2 in³ Reservoir
7. Stroke selector Prime/High
8. Pump handles

For detailed picture of the fittings see [Figure 3: PGHH, detailed top view](#).

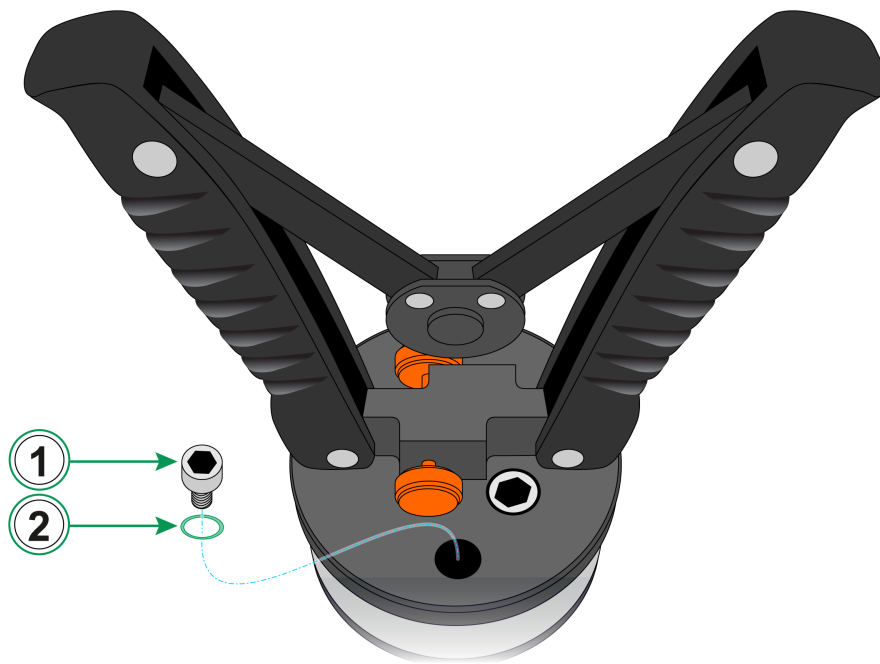


Figure 2: PGHH, bottom view

Legend:

1. Reservoir drain screw DIN 912, M5 x 6
2. O-ring 4 x 2 mm

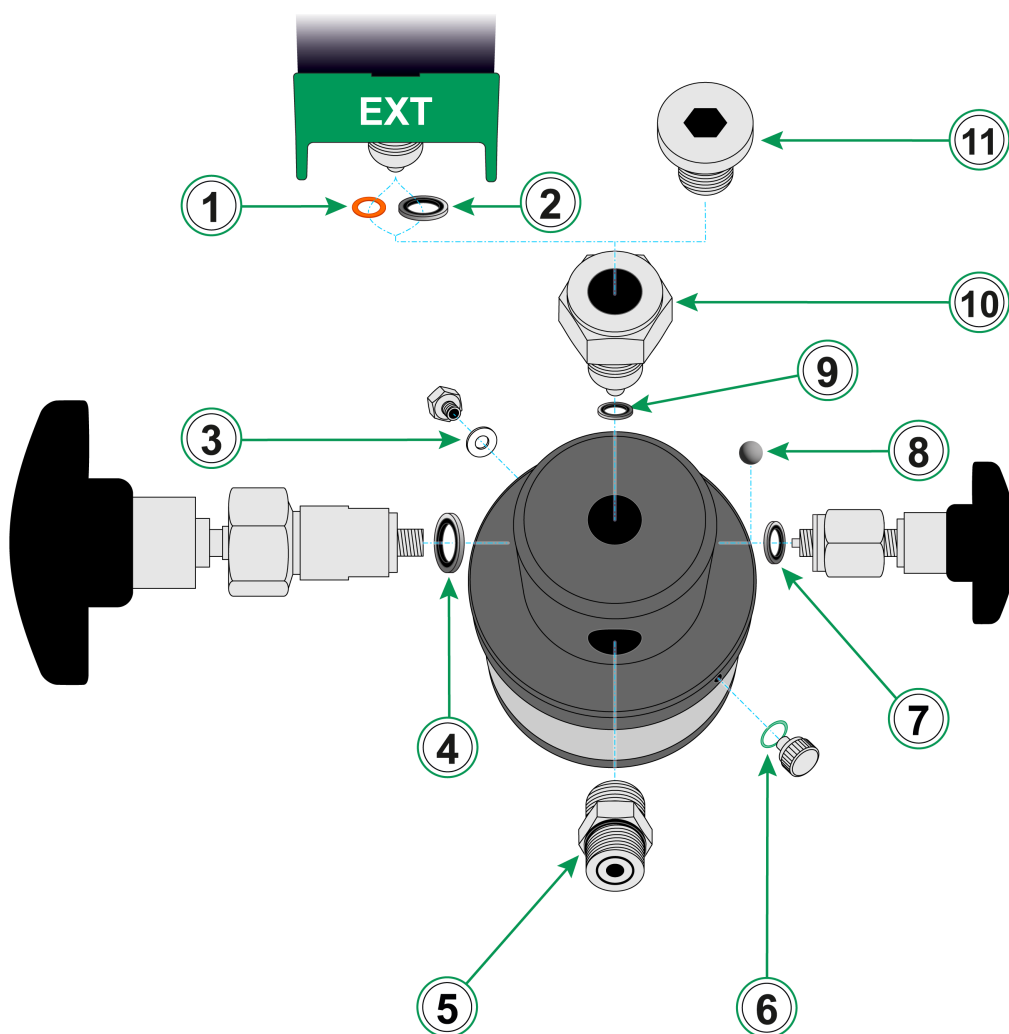


Figure 3: PGHH, detailed top view

Legend:

1. Copper gasket for G1/4" B fittings
2. Bonded seal for Beamex EXT External Pressure Module
3. Pressure compensation screw and PVC gasket
4. 1/4" bonded seal (usit) for volume
5. Pressure fitting Bx 1215 male to G1/4" male
6. O-ring 8 x 2 mm for the Reservoir filling plug
7. 1/8" bonded seal (usit) for the Vent valve
8. Release valve ball
9. M8 bonded seal (usit)
10. G1/4" B female fitting for connecting a Beamex EXT External Pressure Module
11. **PGHH** pressure plug G1/4" male with an O-ring

Operating instructions

1. Remove the **PGHH** G1/4" male pressure plug from the pressure fitting (3 in [Figure 1: PGHH overview](#)) on top of the pump.
2. Connect the optional Beamex EXT External Pressure Module, other pressure measurement device or indicator to the pump using the appropriate seals that are included in the maintenance kits (it is strongly recommended that the bonded seal is used under 600 bar / 8,702 psi and the copper gasket above 600 bar / 8,702 psi). Ensure that the measurement range of the connected module is appropriate.



Warning: The pump is made out of an anodized aluminium. If you need to change the pressure fittings, avoid using too much strength while tightening them. The maximum torque is 15 Nm.

3. Remove the Reservoir filling plug (5 in [Figure 1: PGHH overview](#)). Fill the reservoir (to at least 2/3 and max. 3/4) with the appropriate fluid (don't exceed the maximum level) and fasten the plug.



Note: Ensure that the process media is compatible with the pressure media used in the pump. If possible, flush the DUT (Device Under Test) before connecting the **PGHH** pump to that device. As soon as first cloudiness, particles or dirt become visible in the reservoir, change the fluid.



Warning: The maximum total volume of the measurement system may not exceed 200 ml / 12.2 in³. Do not overfill the glass reservoir (acrylic). Do not add liquid into the Reservoir when increasing pressure. The Reservoir may overflow and break down when the pressure is released and all the excess fluid returns from system to the Reservoir.

The volume inside the **PGHH** is less than 1 ml / 0.06 in³ (on the pressurized side, not the reservoir).

The volume of the unpressurized Pressure Hose is 3.5 ml per 1 m / 0.21 in³ per 3.28 ft.



Warning: The Reservoir is not pressurized when generating the pressure. Do not use any seals or similar to clog the Pressure compensation screw or its threads. Otherwise you may break the Reservoir. If small amounts of liquid leaks through the Pressure compensation screw while using the pump, position the pump upright during your calibration procedure.

4. Connect the Pressure Hose to the Bx 1215 fitting (2 in [Figure 1: PGHH overview](#)) and leave the other end loose. Adjust the Fine adjust (1 in [Figure 1: PGHH overview](#)) to the bottom (fully clockwise). Close the Vent valve (4 in [Figure 1: PGHH overview](#)) by turning it fully clockwise.

Pump by squeezing the handles until drops of water/oil come out of the end of the hose to expel the air from the pump and hose. Connect the hose to the DUT (Device Under Test).



Warning: Vent the external systems before connecting to the pump. Make sure no gas is left in the measurement system during the calibration procedure. Keep for example a valve connected to the measurement system open, while priming the system, until all the gas is removed. Alternatively, temporarily connect a vacuum pump to remove the gas from the measurement system. Remember to remove the vacuum pump from the system before increasing the pressure.



Note: When generating the pressure, make sure that the intake hose in the Reservoir is always below the fluid level.

5. To expel the air from the whole system increase the pressure (for example up to 50 bar / 725 psi) and after that open the Vent valve. Repeat that procedure 2-3 times. Increase the pressure up to 100-150 bar / 1,450-2,176 psi and open the Fine adjust by turning it slowly counterclockwise. Monitor the pressure reading at the same time and when the pressure drops close to 5 bar / 72.5 psi, generate more pressure. Repeat until the Fine adjust is adjusted to the middle and then open the Vent valve.

Now you are ready to start the calibration procedure.



Note: The measurement system must only contain liquid and no gas.

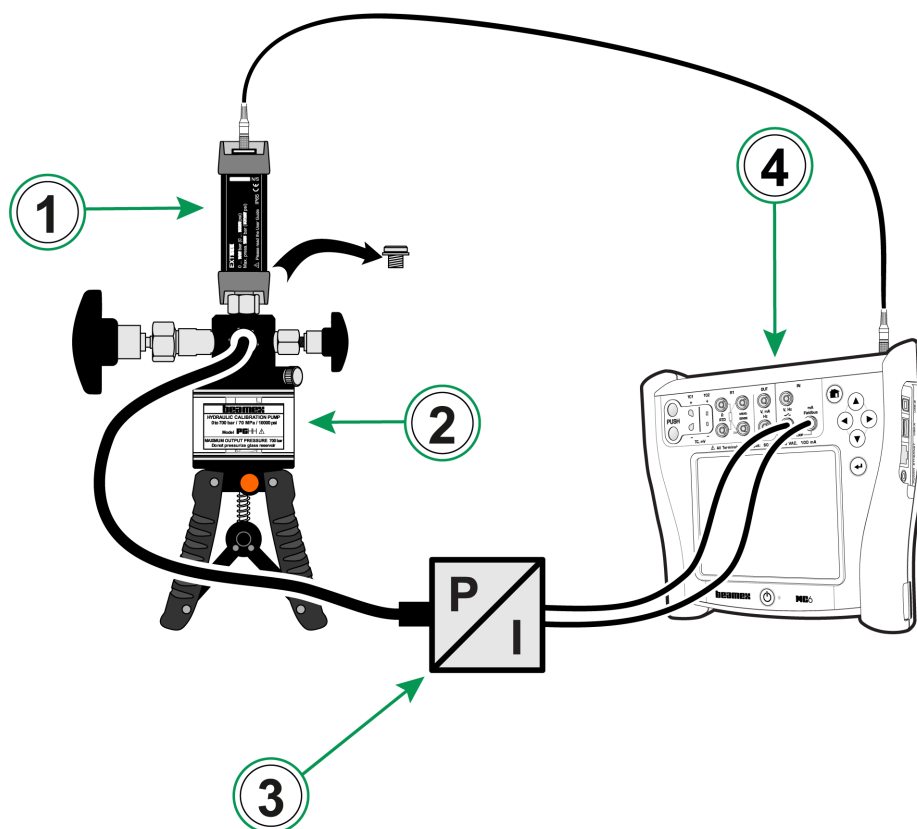


Figure 4: An example of the connections

Legend:

1. Beamex EXT External Pressure Module
2. **PGHH** pump
3. DUT (Device Under Test)
4. Calibrator

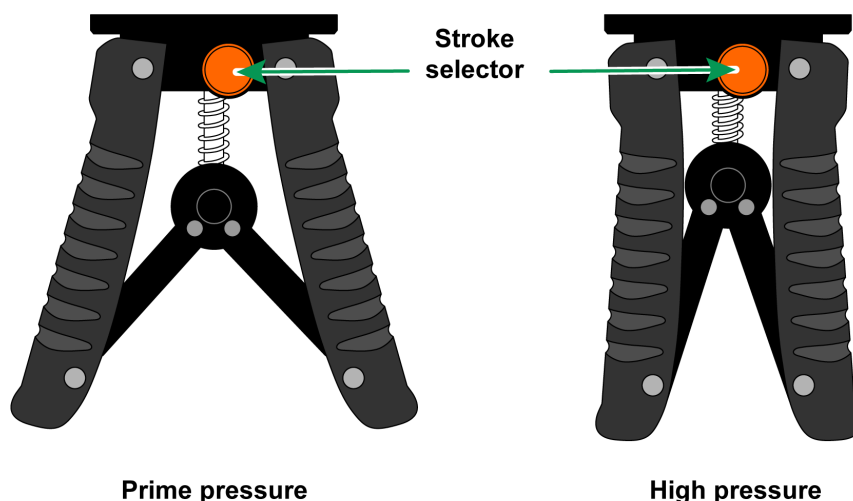


Figure 5: Selecting prime pressure versus high pressure mode with Stroke selector

6. Make sure the Stroke selector (7 in [Figure 1: PGHH overview](#)) is set to prime (fully out). If not, squeeze the handles fully and press the Stroke selector (see [Figure 5: Selecting prime pressure versus high pressure mode with Stroke selector](#)).



Warning: If there is a strong counterforce while operating the handles, but no pressure increase is indicated, stop pumping and locate the fault. Always keep a reliable indicator connected to the measurement system.

7. Close the Vent valve by turning it fully clockwise.



Warning: Do not overtighten the Vent valve (4 in [Figure 1: PGHH overview](#)). If overtightened, the Release valve ball (8 in [Figure 3: PGHH, detailed top view](#)) or top of the pump may get damaged or even the whole Vent valve may break.

8. Start generating the pressure. When squeezing starts to feel heavy with handles fully pressed, select the high pressure position on the stroke selector and operate the handles to generate the approximate pressure. For high pressures, smaller handle strokes enable easier pressure generation. The rate of the pressure increase depends on the volume of the measurement system.



Note: Carefully follow the reading of the pressure indicator in order to avoid exceeding the maximum pressure of the measurement system.



Warning: Ensure that there is always a reliable pressure indicator connected to the pump when the pump is used.

9. Adjust the pressure to the required value using the Fine adjust. Immediately after the pressure is generated, it may drop slightly due to the thermodynamic effects or the Pressure Hose stretching. Wait for 2-5 minutes and adjust the pressure back to the required value using the Fine adjust.



Warning: If the pressure continues to drop steadily, vent the system and check that all the connections are made correctly. Additionally, check the seal 9 and seal 1 or 2 (see [Figure 3: PGHH, detailed top view](#)). Change them, if they look worn or damaged.



Warning: Keep the **PGHH** in an upright position during your entire calibration procedure. Upright position will ensure that the replacement air gets in and out of the Reservoir through the Pressure Compensation Screw (3 in [Figure 3: PGHH, detailed top view](#)) during generating and releasing the pressure (when the fluid level is decreasing and increasing inside the Reservoir). If the airflow is blocked, the Reservoir may break.

10. The main tool for releasing the pressure from the measurement system is **PGHH's** Fine adjust. Using the **PGHH's** Vent valve is also possible but requires caution in order to avoid any pressure shocks to the measurement system.
11. To fully release the pressure from the system, turn the **PGHH's** Vent valve counterclockwise. Squeeze the handles fully and only then return the Stroke selector to the prime position.



Caution: Never fully unscrew the Vent valve. The Release valve ball placed inside the pump may fall out and be lost.



Note: If the **PGHH** is used with the distilled water, remember to empty the Reservoir and let the pump dry out after each use. To empty the Reservoir unscrew the Reservoir filling plug (5 in [Figure 1: PGHH overview](#)) and the Reservoir drain screw at the bottom of the Reservoir (1 in [Figure 2: PGHH, bottom view](#)).

Troubleshooting

If the pump assembly fails to indicate a pressure increase after considerable pumping action of the handle, the following should be examined:

- Check to ensure that the connections between the pump, the hose end and the attached instrument(s) are tight and repeat operating instructions step 7;
- Check to ensure that all the unused pressure fittings are properly plugged.

If a pressure increase still cannot be obtained, it is possible that one or more of the seals in the pump is leaking and needs to be replaced. To perform the leak test see subchapter [Leak Test](#).



Note: Do not continue pumping if the functionality of the pump is not normal. Locate the fault before you continue using the pump.



Note: Avoid exposure to the following factors:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (putting it down hard)
- Soot, vapour, dust and corrosive gases
- Potentially explosive environments, flammable atmospheres
- Corrosive liquids



Warning: The environmental conditions and the used pressure medium may restrict the allowable maximum pressure to a lower level than the pump and the hose allow.

Leak Test

If you suspect that the pump is leaking, you can easily test it by following these steps:

1. Connect the optional Beamex EXT External Pressure Module to the pump (on top) or use the hose to connect the pump to calibrator's internal high pressure module.



Note: If Beamex EXT External Pressure Module is connected on top of the pump, you don't need the hose to perform the test and you have to remove it from the fitting for the Pressure Hose (see 2 in [Figure 1: PGHH overview](#)).

2. Fill the Reservoir with the appropriate fluid.
3. Adjust the Fine adjust to the bottom and close the Vent valve.
4. **If you are using the hose:** before connecting the hose to the pump, expel the air from the pump by squeezing the handles until drops of water/oil come out of the end of the hose.
Otherwise: skip this step and continue with step 5.
5. To expel the air from the whole system increase the pressure (for example up to 50 bar / 725 psi) and after that open the Vent valve. Repeat that procedure 2-3 times.
6. Increase the pressure up to 100-150 bar / 1,450-2,176 psi and open the Fine adjust by turning it slowly counterclockwise. Monitor the pressure reading at the same time and when the pressure drops close to 5 bar / 72.5 psi, generate more pressure. Repeat until the Fine adjust is adjusted to the middle.
7. Start generating the pressure up to the maximum pressure of the measurement module.
8. Wait for 5 minutes. During this time pressure reading decreases fast at first, but slows down all the time.
9. After 5 minutes adjust the pressure back to the original set point using the Fine adjust. Wait for additional 2 minutes. During this waiting time the pressure should decrease to less than ($<$) 5 bar (if the set point was 700 bar / 10,153 psi). If the pressure decreases more, the pump is leaking.



Note: If you are using the pressure hose during the test, the waiting time in step 8 may be longer.

Maintenance

Cleaning the units and checking the liquid's levels and quality belong to some of the most important periodic maintenances required. With normal use no further maintenance should be necessary. If used with distilled water, the pump including the Reservoir must be emptied and made dry after each use.

Additionally, check the condition of the Pressure compensation screw (3 in [Figure 3: PGHH, detailed top view](#)). It is important that it works properly and that the replacement air can flow into and out of the Reservoir through the Pressure compensation screw when generating the pressure. If the screw is stuck or clogged, the Reservoir may break. You can check the screw's condition by unscrewing it and blowing compressed air through it from the bottom side. At the same time check with your fingers whether the top part of the Pressure compensation screw is moving slightly, due to the pressure. Otherwise, replace the Pressure compensation screw with a new one.

If the pump is leaking or it is damaged, you can perform the repairs yourself or you can send it to Beamex Service. All spare parts (with video instructions) are available at <https://shop.beamex.com/>.



Note: When sending the **PGHH** for service or reconditioning, place it in its original package, as received upon the delivery from Beamex.



Caution: Never use any chemicals for cleaning the Reservoir, just a wet and free of lint cloth. If necessary, flush the Reservoir with distilled water or low viscosity mineral based hydraulic oil (RENOLIN MR 5 VG 22).



Note: The O-rings must be coated with a very small amount of the silicone grease/lubricant.

Tightened connections must be fastened with a torque of 25 Nm (Drain screw max. 15 Nm).



Warning: If the pump is accidentally dropped, it may get damaged.



Warning: Please remember to empty any fluid from the Reservoir before sending the pump for service! Otherwise additional waste handling fee may be charged.



Caution: Always depressurize the **PGHH** when it is left unsupervised.

Disposal

Incorrect disposal can put the environment at risk. Dispose the instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.