

# PGHS

## Hydraulic Calibration Pump

### 0 ... 1000 bar (0 ... 14,500 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 Beamex PGHS Hydraulic Calibration Pump 0 ... 1000 bar (0 ... 14,500 psi), please contact the manufacturer.

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# Prologue

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

The PGHS Hydraulic Calibration Pump 0 ... 1000 bar (0 ... 14,500 psi) is a hand-operated, hydraulic, high-pressure calibration pump that generates reference pressure for pressure calibration applications in workshops or laboratories. The pump is equipped with an adjustable three-arm handle for generating and fine-tuning the pressure. The pump is operated with mineral-based hydraulic oil (RENOLIN MR 5 VG 22) or distilled water.

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## Typographical Conventions

The following typographical conventions apply to the PGHS User Manual:

**Bold** text is typically used in cases like:

- User manual sections
- PGHS related keywords



**Note:** This is a note. Notes typically provide important information to consider and remember.



**Tip:** This is a tip. Tips offer useful advice or practical information related to the current topic.



**Caution:** This is a caution. Cautions highlight situations that could result in damage to the product if not observed. Always read cautions carefully and follow the instructions.



**Warning:** This is a warning. Warnings indicate situations that could cause serious injury or damage if not followed. Always read warnings carefully and comply with them to ensure safety.

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# Unpacking and Inspection

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

If you need to return the device to the factory for any reason, use the original packing whenever possible. Be sure to include a detailed description of the reason for the return.

## **The standard delivery includes:**

- PGHS pump
- Pressure fitting G 1/2" male to G 1/4" B female for Beamex EXT1000 External Pressure Module
- Copper washers for G1/4" B fittings (10 pcs, to seal the connection between EXT1000 and Pressure fitting G 1/2" male to G 1/4" B female)
- Pressure blanking plug G 1/2" male
- Hydraulic reservoir filling and draining tool
- User manual

## **Options, Accessories and Spare Parts**

All accessories, spare parts, and a wide range of fittings for Devices Under Test (DUTs) with a pressure port other than G 1/2" male are available at <https://shop.beamex.com/>.

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# 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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Address: **Beamex Oy Ab**

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Quality Feedback

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Website: <https://www.beamex.com>

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# Safety Precautions and Warnings



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

Do not exceed the maximum operating pressure of the device.



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



**Warning:** Only use the device for the purposes and in the environments specified in the user manual.



**Warning:** Always wear protective glasses.



**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 original Beamex pressure fittings. Impurities from incompatible materials may clog the pump.



**Note:** Final testing of the PGHS at the factory is carried out with distilled water.



**Warning:** Always depressurize the system before opening or connecting any pressure fittings or connectors. Use the correct valves to vent the system safely. Ensure that all connections are properly made and that the hose, connectors, and pressure fittings are intact.



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



**Caution: Do not use** with any type of brake fluid.

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, for example 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 PGHS is used with the distilled water, remember to empty the reservoir and let the pump dry out after each use. As soon as first cloudiness, particles or dirt become visible, change the fluid.

The product warranty may be voided if these instructions are not followed.



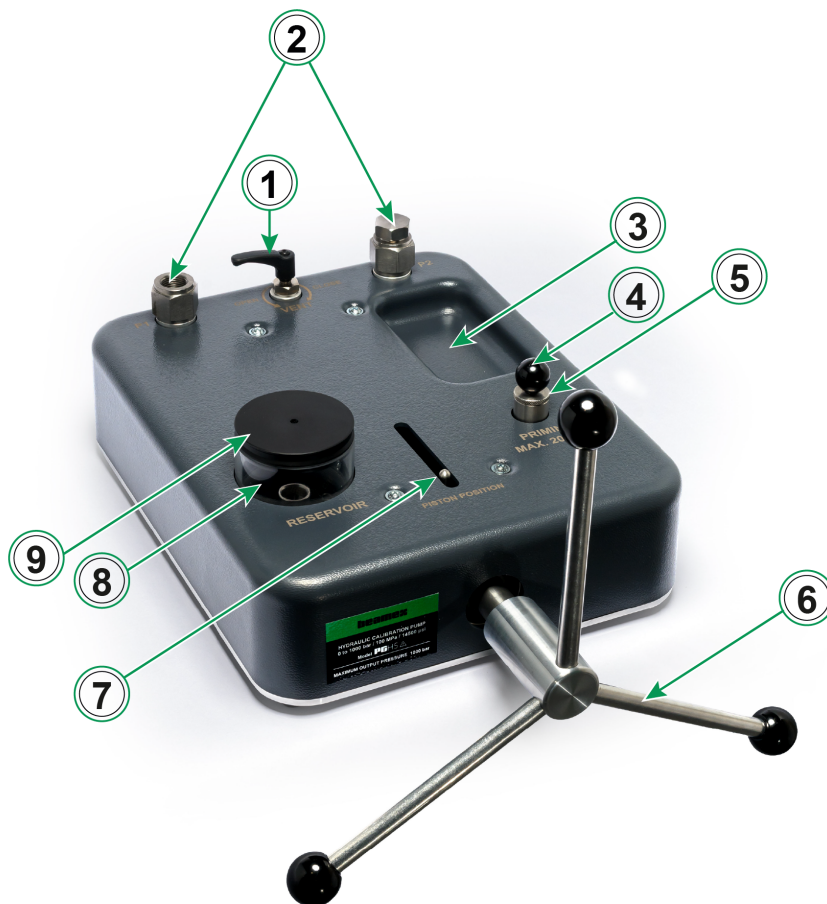
**Warning:** Do not use the PGHS in any other way than as described in this user manual.

# Specifications

Pump specifications	
<b>Pressure Range</b>	0 ... 1000 bar / 0 ... 100 MPa / 0 ... 14,500 psi
<b>Pressure Connections</b>	Two hand-tightened quick-connect G1/2" female pressure ports
Filter Elements	
Sinter filter (stainless steel)	Located in the base of the reservoir ( <b>must be removed</b> if the pump is used with mineral-based hydraulic oil)
Dirt collectors (stainless steel)	Located in pressure ports P1 and P2
<b>Pressure Medium</b>	Low-viscosity mineral-based hydraulic oil (RENOLIN MR 5 VG 22) or distilled water
<b>Weight</b>	10.5 kg / 23.15 lb
Dimensions	
Height	Without three-arm handle: 167 mm / 6.57" Including three-arm handle: 337 mm / 13.27"
Width	322 mm / 12.68"
Depth	Without three-arm handle: 388 mm / 15.28" Including three-arm handle: 490 mm / 19.29"
Distance between pressure ports	181 mm / 6.86"

<b>Pump specifications</b>	
<b>Pressure Medium Reservoir</b>	200 ml / 12.2 in <sup>3</sup>
<b>Required torque</b>	
At 250 bar / 3626 psi	2.0 Nm
At 500 bar / 7252 psi	4.0 Nm
At 1000 bar / 14,500 psi	8.0 Nm
<b>Materials</b>	
Wetted parts	Stainless steel, aluminum, Viton, NBR
Reservoir base	PA66GF30
Glass reservoir	PMMA (acrylic)
Reservoir lid	POM
Device housing	ABS
<b>Storage conditions</b>	-10 to 50 °C / 14 to 122 °F, in 35...85% relative humidity
<b>Operating temperature</b>	0 ... 50°C / 32 ... 122°F

# About PGHS



**Figure 1: PGHS overview**

Legend:

1. Vent lever
2. Pressure ports P1 and P2 for the reference unit and the DUT (Device Under Test)
3. Recess for gaskets and fittings
4. Priming pump knob
5. Knurled screw of the priming pump
6. Three-arm handle for operating the PGHS pump
7. Piston position indicator
8. Reservoir for pressure medium
9. Reservoir lid

# Operating instructions

## Preparation



**Note:** For the best possible performance from your PGHS, place it on a stable, vibration-free tabletop. Choose a location with a consistent temperature, away from drafts and any heat or cold sources.



**Caution:** With threaded fittings, always tighten the fitting onto the DUT first. After that, tighten the DUT with the mounted fitting into pressure port P1 or P2. Otherwise, you may break the pressure ports.

### Pressure Media Selection

PGHS can be used with the following pressure media:

- Distilled water
- Low-viscosity mineral-based hydraulic oil (RENOLIN MR 5 VG 22)

Using other liquids may damage the pump. If you use low-viscosity mineral-based hydraulic oil, remove the sinter filter from the reservoir base:

1. Remove the reservoir lid (#4 in [Figure 1](#)).
2. Using pliers, grip the edge of the metal cylinder at the bottom of the reservoir and carefully turn it counterclockwise. Once loosened, you can unscrew it by hand to remove it.



Reservoir metal cylinder

- Use a flat-head screwdriver to unscrew the sinter filter from the bottom of the reservoir.



### Bleeding Air From the Priming Pump

Before you use the PGHS for the first time, bleed the priming pump to remove trapped air:

- Rotate the three-arm handle (#6 in [Figure 1](#)) counterclockwise until the piston is fully out.



**Figure 2: Piston position indicator - fully out**

- Seal pressure ports P1 and P2 by attaching the reference instrument and the DUT, or by using a G 1/2" male blanking plug.
- Open the Vent lever (#1 in [Figure 1](#)) by turning it about half a turn counterclockwise.

4. Rotate the three-arm handle (#6 in Figure 1) clockwise until the piston is fully in.



**Figure 3: Piston position indicator - fully in**

5. Remove the reservoir lid (#9 in Figure 1).
6. Use the Hydraulic Reservoir filling/draining tool to fill the reservoir (#8 in in Figure 1). Do not fill above a level slightly below the bottom surface of the reservoir lid.



**Caution: Do not use** with any type of brake fluid.

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, for example 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.

Maximum amount



7. Rotate the knurled screw (#5 in Figure 1) located below the priming pump knob (#4 in Figure 1) counterclockwise until it is fully open. Then carefully lift out the priming pump piston (#5 in Figure 1) to allow the air inside the priming pump to bleed out.
8. Install the priming pump piston back in place and tighten the knurled screw (#5 in Figure 1) by turning it clockwise.



**Note:** Light hand tightening is sufficient.

9. Close the reservoir (#8 in Figure 1) by reinstalling the reservoir lid (#9 in Figure 1).

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## Using PGHS

1. Make sure the gaskets and seals in pressure ports P1 and P2 are clean, in perfect condition, and properly in place. Replace them if necessary.
2. Connect the pressure measurement reference and DUT to pressure ports P1 and P2.



**Note:** Tighten the connections by hand only. Do not use tools such as a wrench or key.



**Caution:** When using the Beamex EXT External Pressure Module as the pressure measurement reference, first attach the EXT module to the G1/2" male to G1/4" female fitting using the copper washer included in the delivery. Then tighten the reference with the mounted fitting into the pressure port. (It is strongly recommended to use the bonded seal only below 600 bar / 8702 psi and the copper washer above 600 bar / 8702 psi.). Ensure that the measurement range of the connected module is suitable.



**Caution:** When using threaded fittings, first tighten the fitting to the DUT. Then tighten the DUT with the mounted fitting into pressure port P1 or P2. Failure to follow this order may damage the pressure ports.



**Caution:** Flush the DUT before connecting it to the PGHS. Otherwise, contamination may enter the pump and cause malfunction.

3. If the reservoir is empty, fill it as follows:
  - a. Rotate the three-arm handle (#6 in Figure 1) clockwise until the piston is fully in.
  - b. Remove the reservoir lid (#9 in Figure 1).
  - c. Use the Hydraulic Reservoir filling/draining tool to fill the reservoir (#8 in Figure 1). Do not fill above a level slightly below the bottom surface of the reservoir lid.



**Caution: Do not use** with any type of brake fluid.

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, for example 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.

- d. Close the reservoir (#8 in Figure 1) by reinstalling the reservoir lid (#9 in Figure 1).
4. Bleed air from the calibration setup as follows:
  - a. Open the Vent lever (#1 in Figure 1) by turning it about half a turn counterclockwise.
  - b. Lift and press the priming pump knob (#4 in Figure 1) about ten times to bleed air from the setup.



**Tip:** Monitor the liquid in the reservoir during pumping. Stop pumping when no air bubbles are seen entering the reservoir.

- c. Close the Vent lever (#1 in Figure 1) by turning it clockwise.



**Note:** Light hand tightening is sufficient.

- d. Lift and press the priming pump knob (#4 in Figure 1) while rotating the three-arm handle counterclockwise until the piston is fully out. During this phase, the pressure chamber is filled with the pressure media.
  - e. Open the Vent lever (#1 in Figure 1) by turning it about half a turn counterclockwise.
  - f. Rotate the three-arm handle (#6 in Figure 1) clockwise until the piston is fully in.

- g. Repeat steps **c – f** at least three times, or until no air bubbles are visible in the pressure media.
- h. Before calibration, it is advisable to wait approximately 15–30 minutes to allow the temperature of the pressure media and the pump structures to equalize. Excessive temperature differences can result in long stabilization times at a setpoint, which may appear as a leak.

5. Generate pressure as follows:



**Note:** Before starting, ensure that the piston is fully in.

- a. Check that the Vent lever (#1 in [Figure 1](#)) is closed.
- b. Lift and press the priming pump knob (#4 in [Figure 1](#)) while rotating the three-arm handle counterclockwise until the piston is fully out.
- c. Open the Vent lever (#1 in [Figure 1](#)) by turning it about half a turn counterclockwise to vent the system and zero the reference module before starting calibration.
- d. Close the Vent lever (#1 in [Figure 1](#)) by turning it clockwise.



**Note:** Light hand tightening is sufficient.

- e. Lift and press the priming pump knob (#4 in [Figure 1](#)) until the output pressure reaches 5–10 bar / 73–145 psi (maximum 20 bar / 290 psi).
- f. Increase the output pressure by rotating the three-arm handle clockwise. As you approach the desired setpoint, slow the rotation to fine-adjust the output pressure to the target value.
- g. After reaching the setpoint, the output pressure usually drops slightly. Wait 30–60 seconds for the output pressure to stabilize, and then fine-tune if necessary.



**Note:** At higher setpoints, stabilization may take significantly longer, especially if air remains in the system.

- h. To reach the next higher setpoint, continue rotating the three-arm handle clockwise.
- i. Repeat steps **f – h** until you have reached the highest setpoint.
- j. To decrease the pressure and generate lower setpoints, rotate the three-arm handle counterclockwise.

- k. After reaching the setpoint, the output pressure usually increases slightly. Wait 30–60 seconds for the output pressure to stabilize, and then fine-tune if necessary.
  - l. Repeat steps j – k until you have reached the lowest setpoint.
6. Vent the system and remove the DUT as follows:
- a. Rotate the three-arm handle (#6 in Figure 1) counterclockwise until the piston is fully out.
  - b. Open the Vent lever (#1 in Figure 1) by turning it about half a turn counterclockwise.
  - c. Rotate the three-arm handle (#6 in Figure 1) clockwise until the piston is fully in.
  - d. Close the Vent lever (#1 in Figure 1) by turning it clockwise.



**Note: Tighten by hand only.**



**Note:** If the Vent lever (#1 in Figure 1) is not closed when removing the DUT or reference instrument, pressure media may flow out of pressure ports P1 and P2.

- e. Remove the DUT from the pressure port.
- f. If you have other instruments to calibrate, continue from step 1. Otherwise, leave the pump ready for the next use.

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## Draining the Reservoir



**Note:** If the PGHS is used with the distilled water, remember to empty the reservoir and let the pump dry out after each use. As soon as first cloudiness, particles or dirt become visible, change the fluid.

The product warranty may be voided if these instructions are not followed.

If you need to empty the reservoir, follow these steps:

1. Check that the Vent lever (#1 in Figure 1) is closed and the piston the piston is fully in.
2. Remove the reservoir lid (#9 in Figure 1).
3. Use the Hydraulic Reservoir filling/draining tool to drain the reservoir (#8 in Figure 1).

4. When the reservoir is almost empty, Open the Vent lever (#1 in Figure 1) by turning it about half a turn counterclockwise.
5. Close the reservoir (#8 in Figure 1) by reinstalling the reservoir lid (#9 in Figure 1).
6. Lift and press the priming pump knob (#4 in Figure 1) about ten times to pump the pressure media out of the pressure chamber.
7. Remove the reservoir lid (#9 in Figure 1)
8. Use the Hydraulic Reservoir filling/draining tool to drain the remaining fluid from the reservoir (#8 in Figure 1).
9. Finally, dry the reservoir (#8 in Figure 1), for example with a hand towel and close the reservoir (#8 in Figure 1) by reinstalling the reservoir lid (#9 in Figure 1).
10. Close the Vent lever (#1 in Figure 1) by turning it clockwise.



**Note: Light hand tightening is sufficient.**

# Troubleshooting

<b>PGHS does not generate pressure</b>	
CAUSE	SOLUTION
There is not enough pressure media in the reservoir, priming pump or inside the system.	Fill the reservoir if necessary. See the following sections: <ul style="list-style-type: none"> <li>• <a href="#">Using PGHS, step 3</a></li> <li>• <a href="#">Bleeding Air From the Priming Pump</a></li> <li>• <a href="#">Using PGHS, step 5</a></li> </ul>
The Vent lever is open.	Close the Vent lever.
The Vent lever assembly is damaged.	Order a spare part ( <a href="https://shop.beamex.com/">https://shop.beamex.com/</a> ) and replace the assembly or send the PGHS to Beamex for service.
The DUT volume is too large.	Refilling the reservoir is not a safe solution, because when the pressure decreases, the reservoir may overflow or be damaged due to overfilling.
Missing or damaged gaskets cause leaks.	Inspect the O-rings and copper washers and replace them if required.

<b>PGHS generates pressure, but it drops to zero</b>	
CAUSE	SOLUTION
Missing or damaged gaskets cause leaks.	Inspect the O-rings and copper washers and replace them if required.
The Vent lever assembly is damaged.	Order a spare part ( <a href="https://shop.beamex.com/">https://shop.beamex.com/</a> ) and replace the assembly or send the PGHS to Beamex for service.
Cause cannot be identified.	Send the PGHS to Beamex for service.

<b>PGHS generates pressure but, but it decreases to a lower value and then remains stable</b>	
CAUSE	SOLUTION
There is not enough pressure media in the reservoir.	Fill the reservoir if necessary. See the following sections: <ul style="list-style-type: none"> <li>• <a href="#">Using PGHS, step 3</a></li> </ul>
Air is present in the system.	See the following section: <ul style="list-style-type: none"> <li>• <a href="#">Bleeding Air From the Priming Pump</a></li> </ul>
Cause cannot be identified.	Send the PGHS to Beamex for service.

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## Leak Test

If you suspect that the pump is leaking, you can verify it by performing the following test.

Before starting, ensure that the pump has been carefully bled (see [Bleeding air from the calibration setup](#)). Air bubbles remaining in the pump can cause unstable pressure at the setpoint. Instead of stabilizing, the pressure will decrease steadily and the stabilization time will become very long. If, during the test, the pressure at a setpoint decreases slowly and steadily below the defined limit values, bleed the pump again and repeat the test.

1. Connect the pressure measurement reference to pressure port P1. Seal pressure port P2 with a G 1/2" male blanking plug.
2. Follow the instructions in chapter [Using PGHS](#), step 3 to step 5.
3. Increase the output pressure by rotating the three-arm handle clockwise to each of the setpoints below, one after another. At each setpoint, wait for 30 seconds. During this time, the output pressure may drop by a maximum of 4 bar / 58 psi.

300 bar / 4350 psi

500 bar / 7250 psi

800 bar / 11,600 psi

1000 bar / 14,500 psi

If the output pressure drops more than this and the cause is unknown, the PGHS is leaking and must be sent to Beamex for service.

4. After reaching the 1000 bar / 14,500 psi setpoint, decrease the output pressure by rotating the three-arm handle counterclockwise to each of the setpoints below, one after another. At each setpoint, wait for 30 seconds. During this time, the output pressure increases by 1–2 bar / 14.5–29 psi.

800 bar / 11,600 psi

500 bar / 7250 psi

300 bar / 4350 psi

If the output pressure drops and the cause is unknown, the PGHS is leaking and must be sent to Beamex for service.

If the pump is leaking or damaged and the cause is known, you can repair it yourself or send it to Beamex for service. Spare parts are available at <https://shop.beamex.com/>.



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



**Warning:** Make sure to empty any fluid from the reservoir and inside the system before sending the pump for service. Otherwise, an additional waste handling fee may be charged.

# Maintenance

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## Regular Maintenance

The only periodic maintenance required for the PGHS is cleaning and checking the level and quality of the pressure media. Under normal operating conditions, no further maintenance should be required.

If any parts of the PGHS require cleaning, use a cloth dampened with a water-based or an alcohol-based solvent. Alternatively, use a low-concentration hydrogen peroxide solution or a mild soap-water solution. Never use strong detergents.

If necessary, the PGHS can be returned to Beamex service for repair.

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## Replacing the Dirt Collectors (Filters) and O-rings in Pressure Ports

Required parts and tools:

- PGHS service kit (8003160)
- 8 mm hex torque wrench
- Tweezers

Follow these steps:

1. Use tweezers to remove the 10 x 2.5 mm O-ring from pressure port.
2. Remove the dirt collector with tweezers.
3. Unscrew the connecting part by turning it counterclockwise with an 8 mm hex wrench.
4. Remove the 3.17 × 1.78 mm O-ring from the bottom of the connecting part using tweezers and replace it with a new one.
5. Reinstall the connecting part using an 8 mm hex torque wrench and tighten it to 45 Nm.
6. Insert a new dirt collector on top of the pressure port.
7. Place a new 10 × 2.5 mm O-ring on top of the dirt collector and carefully press it down until it sits in the O-ring groove.



**Figure 4: Replacing the dirt collectors and O-rings in pressure ports**

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## Replacing the O-ring of the Priming Pump Piston

Required parts and tools:

- PGHS service kit (8003160)
- Tweezers

Follow these steps:

1. Rotate the knurled screw (#5 in Figure 1) located below the priming pump knob (#4 in Figure 1) counterclockwise by hand until it is fully open. Then carefully lift out the priming pump piston (#5 in Figure 1)
2. Use tweezers to remove the 5 × 2.5 mm O-ring from the bottom of the piston and replace it with a new one.

3. Install the priming pump piston carefully back in place and tighten the knurled screw (#5 in [Figure 1](#)) by turning it clockwise.



**Note: Light hand tightening is sufficient.**



***Figure 5: Replacing the O-ring of the priming pump piston***

# Disposal

Incorrect disposal may pose a risk to the environment. Follow country-specific regulations when disposing of instrument components and packaging materials.