

1 YEAR
WARRANTY



User's Guide



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PPP-700 Hydraulic Pressure Pump



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WARNING: These products are not designed for use in, and should not be used for, human applications.

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1 DESCRIPTION

The PPP-700 hydraulic pressure pump is designed to manually generate up to 700 bar (70 MPa, 10 000 psi) for quick and accurate calibration of pressure gauges, transducers and other pressure measurement instruments.

Recommended test fluids to be used with the pump are: Low viscosity mineral based hydraulic oils or distilled water. Do not use solvents or synthetic fluids that will adversely affect the operation of the pump.

1.1 Standard Accessories

The standard accessories are as follows:

- * Carrying case
- * G 3/8 (3/8" BSP) plug to blank off the connection for an optional pressure gauge or module.
- * G 3/8 (3/8" BSP) to G 1/4 (1/4" BSP) adapter for connecting the optional pressure gauge or module.
- * A Pressure Measurement Hose for PPP-700 with two 1215 Special female connectors.
- * A G 1/4 (1/4" BSP) male / 1215 Special male connector to connect the Pressure Measurement Hose to the PPP-700.
- * A 1/4" NPT male / 1215 Special male connector to connect the Pressure Measurement Hose to the instrument to be calibrated.
- * A filling bottle.

1.2 Optional Accessories

The optional accessories are as follows:

- * Service kit containing a set of seals, code 8003200
- * Relief valves for over-pressure protection
 - max. pressure 10 to 50 bar, code 7230600
 - max. pressure 50 to 200 bar, code 7231600
 - max. pressure 200 to 400 bar, code 7232500
 - max. pressure 300 to 700 bar, code 7236000

2 OPERATION

1. Connect the optional external pressure module or gauge to the pump (refer to the picture on page 1) using the appropriate seals. Ensure the measurement range of the connected module is appropriate.
2. Remove filling plug and fill reservoir with the appropriate fluid (don't exceed the maximum level) and replace plug.
3. Connect the instrument to be tested to the Pressure Measurement Hose and attach it to the pump. Be sure that all the output connectors are properly plugged or connected to an instrument to avoid leakage.
4. Adjust the fine control to "fully-out". Make sure the stroke selector is set to **prime**. If not, squeeze handles fully in and turn the selector counterclockwise.
5. Ensure that PPP-700's vent valve is open (turn fully clockwise then one turn counterclockwise).
6. Operate handles several times to expel air from the pump (ensure that the liquid inlet tube remains immersed in fluid at all times).
7. 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 gas is removed or temporarily connect a vacuum pump to remove gas from the measurement system. Remember to remove the vacuum pump from the system before increasing the pressure.
8. Close PPP-700's vent valve fully clockwise.
9. Prime the system by squeezing handles together and then releasing, allowing the fluid to enter the pump cylinder. Repeat as necessary until system is fully primed and low pressure is indicated on either a calibrator or the test instrument.
10. Test how much pressure increase can be done using the fine control. If it is enough, continue to step 12.
11. With handles fully squeezed in, select the **high** pressure position on the stroke selector and operate handles to generate approximate pressure. The rate of the pressure increase depends on the volume of the measurement system. Carefully follow the reading of the pressure indicator in order to avoid exceeding the maximum pressure of the measurement system. **NOTE:** Smaller handle strokes enable easier pressure generation at high pressures.
12. Adjust pressure to required value using the fine control. Immediately after pressure generation, the pressure may fall slightly due to the stretching of the pressure measurement hose. Thermodynamic effects may also cause pressure variation. In that case, adjust the pressure back to required value using the fine control.
13. The principal tool for releasing pressure from the measurement system is

PPP-700's fine control. Use of PPP-700's vent valve is also possible, but requires caution in order to avoid pressure shocks to the measurement system.

14. To totally release pressure from the system, turn PPP-700's vent valve one turn counterclockwise. Return the stroke selector to **prime** position after first squeezing handles fully in.

WARNINGS!

Do not exceed the max. operating pressure of the pump and the hose. Also observe the pressure limit set by environmental conditions and the used pressure medium.

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.

The glass reservoir does not withstand high pressure but it is not pressurized when PPP-700 is used correctly. Do not add fluid to the glass reservoir when increasing pressure. The reservoir may overflow and explode when the pressure is released and all the excess fluid returns from system to the reservoir.

A full list of warnings is on page 11.

2.1 Reservoir Fluid Level

If the fluid level in the reservoir falls considerably during use, a partial vacuum can be created in the reservoir which may affect the pump performance. To avoid this, simply allow air to enter reservoir by partly unscrewing the filling plug.

3 TROUBLESHOOTING/MAINTENANCE

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

- The pump unit may have been mistakenly opened by rotating the handles counterclockwise. Correction: Squeeze the handles fully in and rotate clockwise to retighten the pump unit.
- Check to assure that the connections between the pump, the hose end and the attached instrument(s) are tight and repeat operating instructions items 6 and 7. Check to assure that all the unused output connectors are properly plugged.

If a pressure increase still cannot be obtained, it's possible that one or more of the seals in the Pressure Pump is leaking and needs to be replaced.

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

3.1 About Bonded Seals

Bonded seals are metallic rings with an elastic material attached to the inner side of the ring. They are used in several places in PPP-700. When tightening a connection sealed with a bonded seal, keep in mind that firm hand tightening is recommended. Other tightening methods may result in leakage, and possibly broken seals or threads.



3.2 Seal Replacement

Depending on the frequency of use, the Main Piston Seal (and others) will eventually need replacing. Although the replacement seals are an optional accessory, the same instructions for fitting the seals are included in this manual as in the replacement package.

3.2.1 Main Piston Seal

Withdraw handle/piston assembly from cylinder by removing the two M5 socket head screws shown in the picture.

Clean the piston and the cylinder and remove the old piston seal and the backup ring.

Fit the new piston seal (o-ring) and the backup ring. Lightly grease piston seal and the piston using silicone grease. Reassemble.

3.2.2 Fine Control Seal

Place a 19 mm A/F spanner on the flats (see the picture on the adjacent page) and a 27 mm A/F spanner on the large nut and unscrew the piston assembly.

Clean the piston and the cylinder and remove the old piston seal and backup ring.

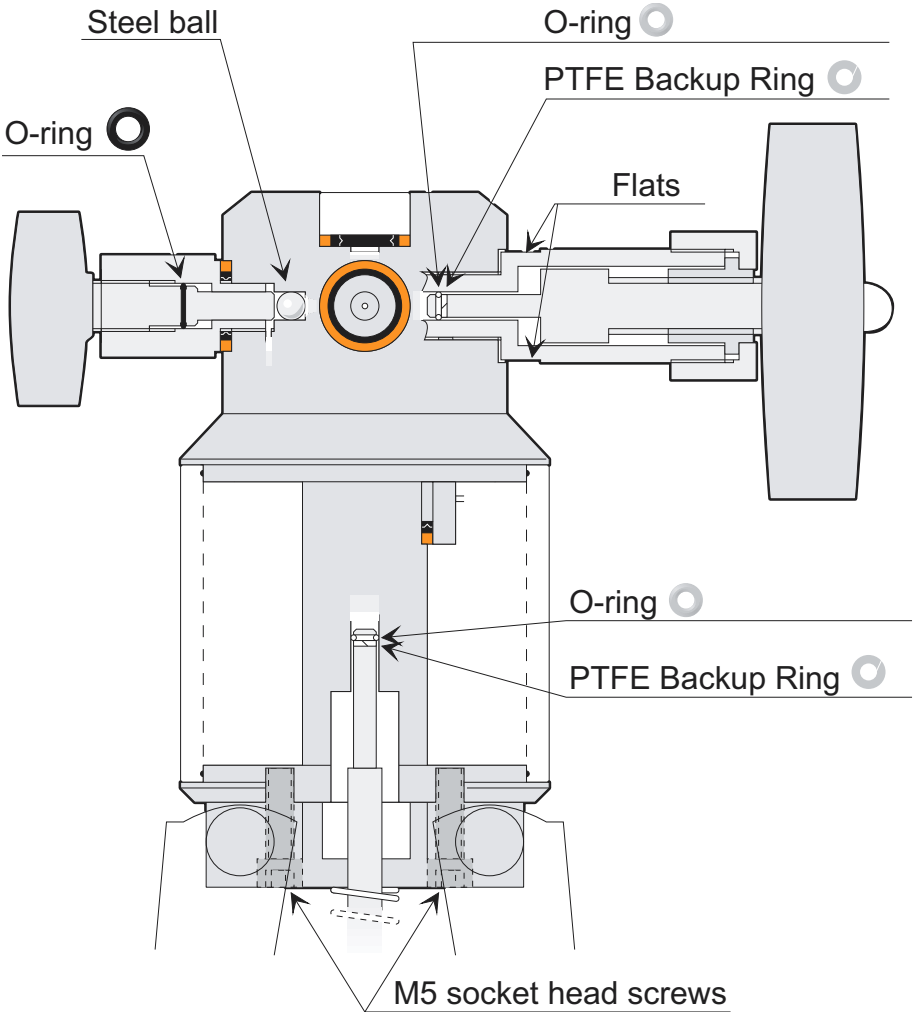
Fit the new piston seal (o-ring) and the backup ring. Lightly grease the piston seal and backup ring using silicone grease. Reassemble.

3.2.3 PPP-700 Vent Valve Seal

Turn vent valve knob fully counterclockwise and pull out the valve screw from its body. Take care not to loose the steel ball that lies beneath the screw.

Remove the old seal from its groove in the valve screw and replace with a new one.

Lightly grease the seal with silicone grease and reassemble ensuring the steel ball is correctly in place.



4 SPECIFICATIONS

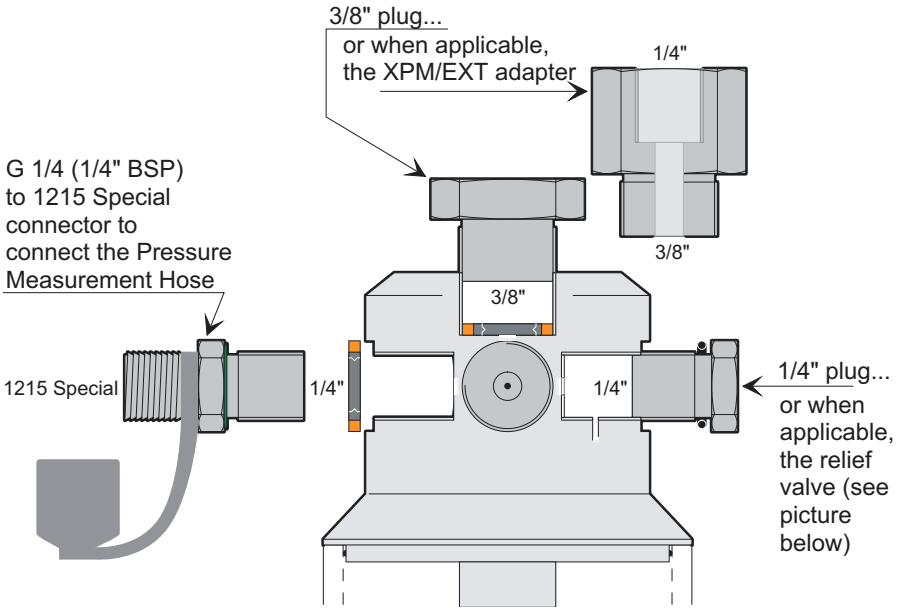
4.1 The Pump Unit

Weight		1.6 kg	3.53 lb
Dimensions	Height	236 mm	approx. 9.3"
	Width	159 mm	approx. 6.3"
	Depth	70 mm	approx. 2.8"
Pressure range*		0 to 700 bar / 0 to 70 MPa /	0 to 10 000 psi
Pressure media		Low viscosity Mineral based Hydraulic Oil or Distilled water	
Glass reservoir for pressure media		100 cc, not to be pressurized	
Output connectors		<ul style="list-style-type: none"> • G 1/4 (1/4" BSP) female connector for Pressure Measurement Hose • G 3/8 (3/8" BSP) female (for External Pressure Measurement Module, or gauge) • G 1/4 (1/4" BSP) female for overpressure protection valve use only. Blanked off unless the optional relief valve is installed. 	

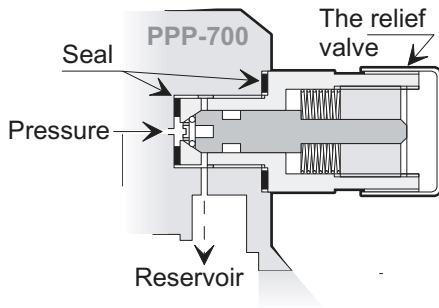
4.1 The Pressure Measurement Hose

Length		1 m	3 ft 3.3"	
Connectors (both ends)		1215 Special, female		
Internal diameter		2 mm	0.08"	
External diameter		5 mm	0.2"	
Operating pressure*	• 0°C (+32°F)	768 bar	76.8 MPa	11148 psi
	• 30°C (+86°F)	693 bar	69.3 MPa	10051 psi
	• 50°C (+122°F)	630 bar	63 MPa	9137 psi
	• 80°C (+176°F)	535 bar	53.5 MPa	7767 psi
	• 100°C (+212°F)	485 bar	48.5 MPa	7036 psi
	• 120°C (+248°F)	428 bar	42.8 MPa	6213 psi
Bursting pressure in	20°C (68°F)	1950 bar	195 MPa	28200 psi
Operable temperature range		-20°C to +100°C		
		-4°F to +212°F		
Smallest bending radius		20 mm	0.78"	
	• below -20°C (-4°F)	30 mm	1.18"	

* The environmental conditions and the used pressure medium may restrict the allowable maximum pressure to a lower level than the pump and the hose enables. In that case please consider using a relief valve.



PPP-700's output connectors viewed from the Fine Control side.



5 NOTES.

The pump is tested using water. Small amounts of water may still be inside the pump when you receive it. Flush the pump with the pressure media to be used before connecting any instruments to it.

Ensure that the process media is compatible with the pressure media used in the pump. Make sure that impurities are removed from the measurement system. From time to time the pressure media used in the pump should be renewed.

The maximum total volume of the measurement system may not exceed 100 ml (6.1 cubic inches). The volume inside PPP-700 is less than 1 ml (on the pressurized side, not the reservoir, with maximum volume in the fine control). The volume of the unpressurized Pressure Measurement Hose is 3.5 ml per meter.

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

If the pump is accidentally dropped, it may be damaged. Do not use the pump before it is inspected at Omega's service.

Please include information on used pressure media when sending the pump for service.

6 WARNINGS

Read the instruction manual carefully prior to setting up and using the pressure pump. The pressure built up internally during use can be extremely high.

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

Use protective goggles. The use of a relief valve for over-pressure protection is recommended. If a relief valve is used, remember to occasionally check its functionality.

Do not connect the pump to an external pressure source.

The glass reservoir does not withstand high pressure, but it is not pressurized when PPP-700 is used correctly.

Do not overfill the glass reservoir. Also: do not refill it while increasing pressure. The reservoir may overflow and explode when the pressure is released and all the excess fluid returns from system to the reservoir.

The measurement system must only contain the measurement fluid and no gas. See chapter 2 OPERATION for guidance on how to remove the gas from the measurement system.

Vent external systems before connecting to the pump. Do not use pump if the reservoir is damaged.

Ensure that all connections are made correctly and that the hose and the connectors are undamaged. Do not use faulty hoses or connectors.

Use only the measuring hose provided by Omega. Observe the effect of the operational conditions to the maximum pressure allowed in the hose. The specifications can be found on page 8 in the manual.

The environmental conditions and the used pressure medium may restrict the allowable maximum pressure to a lower level than the pump and the hose enable. In that case please consider using a relief valve.

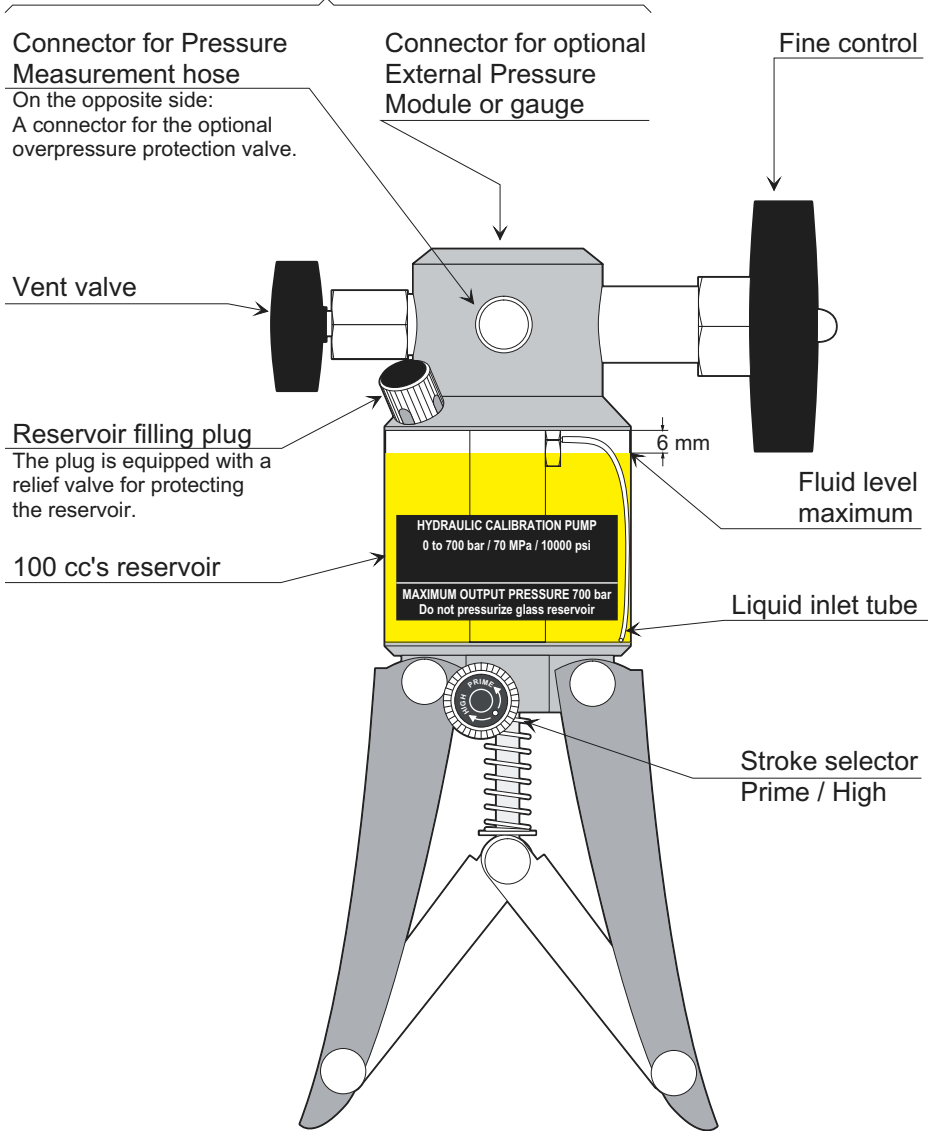
Always depressurize PPP-700 when it is left on its own.

If you use water as the pressure medium, make sure that the you store PPP-700 in temperatures above the freezing point.

Use only the connectors provided with the pump. Impurities from wrong materials may plug the pump.

Do not use PPP-700 in any other way than as described in this manual.

Output connectors



A more detailed picture of PPP-700's output connectors is on page 9.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

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1. Purchase Order number under which the product was PURCHASED,
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