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HEAVY DUTY PRECISION HAND PUMP

PN 3750-011-001 AND 3750-011-011



OPERATOR'S MANUAL FOR MODEL 3750 & MODEL 3750-HPDX

KNC PUB NO. 3750-175-001 Rev A

WARRANTY

The King Nutronics Model 3750 and 3750-HPDX Heavy Duty Precision Hand Pumps are warranted against defects in material and workmanship for a period of 25 months from the date of shipment. During the warranty period King Nutronics Corporation will repair or replace the hand pump or hand pump components that are defective.

Contact King Nutronics' Customer Service to obtain a Returned Materials Authorization (RMA) number prior to shipping your hand pump (freight prepaid) to King Nutronics Service Center. Shipping instructions and fees will be quoted when RMA number is issued.

CUSTOMER SERVICE

Email: support@kingnutronics.com

Phone: 818-887-5460

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by user, user-supplied fixtures and adapters, unauthorized modifications, misuse, or operation outside the environmental specifications.

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CHAPTER 1:

GENERAL INFORMATION



Fig. 1-1 Model 3750 and 3750-HPDX Heavy Duty Hand Pump

1.1 INTRODUCTION AND SPECIFICATIONS

This publication contains operating instructions for the King Nutronics Model 3750 and 3750-HPDX Heavy Duty Hand Pump. Fig.1-1, above, depicts the hand pump assembly (without the optional hydraulic reservoir). Table 1-1 on the following page lists the technical and performance specifications.

Table 1-1 Model 3750 and 3750-HPDX
Technical Specifications

SPECIFICATIONS

Hand Pump Assembly:

Discharge pressure, pneumatic	0 to 500 psig
Discharge pressure, hydraulic	0 to 6,600 psig
Vacuum	28.5 in-Hg @ atmos. pressure 29.92 in-Hg
HPDX Model discharge pressure, hydraulic	0 to 10,000 psig
Pressure relief valve adjustable range	150 to 10,100 psi
Pneumatic pressure control resolution	+/- 0.001 psi
Hydraulic pressure control resolution	+/- 0.1 psi

Inlet/Outlet Ports:

Master Pressure Gauge (qty. 1)	Quick-Disconnect Female Fitting
Test hose connection (qty. 1)	AN-4 Male
Hydraulic reservoir port (qty. 1)	¼" BSP Female, Parallel

Dimensions & Weight:

Dimensions	13.25" x 8" x 5.25" (33.7 x 20.3 x 13.3 cm)
Hand pump weight	2.90 lbs. (1.32 kg)
Weight with Hydraulic Reservoir	3.5 lbs. (1.59 kg)

Included Accessories:

Quick Disconnect, PN 3460-7-1
Dust Plug, PN 3460-135-3
Neck Strap, PN 3731-200-1
Spanner Tool, Dual Pin, P/N 3750-861-001

Optional Accessories (see Chapter 6 for details and complete listing):

Hydraulic Reservoir	
Operating capacity	4.0 oz. (118 cc)
Connection	¼" BSP Male, Parallel
Exception Fluid Trap P/N 3731-33-1	
Bowl material	Polyurethane
Capacity	1.5 oz. (44 cc)
Maximum operating pressure	59 psig (4.0 bar)
Operating temperature range	40°F to 125°F (4°C to 52°C)
High Pressure Test Hose (P/N 3731-161-0360)	
Construction	Stainless steel capillary tube in Teflon lined braided stainless steel hose
Length	36" (91.4 cm)
Max working pressure	10,000 psig
Minimum burst pressure	40,000 psig
High Pressure Test Hose (P/N 3731-161-0720)	
Construction	Stainless steel capillary tube in Teflon lined braided stainless steel hose
Length	72" (182.9 cm)
Max working pressure	10,000 psig
Minimum burst pressure	40,000 psig

1.2 PRODUCT DESCRIPTION

The Model 3750 Heavy Duty Hand Pump is a portable, self-contained pressure generator capable of producing and controlling calibration test pressures into pneumatic and hydraulic gauges. Calibration is achieved by comparing the device under test with a connected reference pressure indicator. The reference pressure or vacuum is manually generated by squeezing the scissor-action handles on the pump and making pressure adjustments using the coarse and fine volume adjuster knobs. If the hand pump is purchased with the hydraulic reservoir, then hydraulic gauges and instruments can be calibrated hydraulically up to 6,600 psig using the Model 3750 or up to 10,000 psig with the Model 3750-HPDX.

1.2.1 HAND PUMP CONTROLS OVERVIEW

There are four primary hand pump controls. The blue Mode Selector switches output between vacuum or pressure. The black Volume Adjuster knob is used for coarse pneumatic pressure adjustments and to increase/decrease hydraulic pressure. The green Fine Adjuster knob, located within the Volume Adjuster knob, permits fingertip-precise increase and decrease of test pressures. The red Bleed Valve is used to vent test pressure when opened fully, or to gradually bleed down pneumatic or hydraulic test pressure. A ratcheting clutch protects the Bleed Valve's precision seat and stem assembly from being over-tightened. A factory-set pressure relief valve can be adjusted by removing the Bleed Valve knob and using the included spanner tool.

1.2.2 HYDRAULIC RESERVOIR OVERVIEW

The hydraulic reservoir assembly is a clear acrylic chamber that holds calibration fluid (typically distilled water) for operating the hand pump hydraulically. The hydraulic reservoir threads onto the inlet port on top of the hand pump (see Fig. 3-1). No tools are needed. The reservoir lid is secured with a knurled nut, and a check valve keeps fluid from leaking out the inlet when removed. If the reservoir becomes over-pressurized during use, the lid will vent pressure automatically. **When using the hand pump for both pneumatic and hydraulic work, use only distilled water in the hydraulic reservoir. Use oil as a hydraulic calibrating fluid ONLY if the hand pump is going to be dedicated for hydraulic oil use.**

1.3 SAFETY AND MAINTENANCE

The following safety items and consumables are not included with the Model 3750 Heavy Duty Hand Pump. These items are recommended for proper use and care of the hand pump.

1.3.1 EYE AND HAND PROTECTION

Wear safety glasses when using the hand pump. Lightweight gloves are recommended to protect the hands and provide grip when operating the hand pump scissor-action handles and control knobs.

1.3.2 HYDRAULIC CALIBRATION FLUID

When the hand pump will be used for both pneumatic and hydraulic pressure calibration, use distilled water only. Oils are difficult to clean from the hand pump's internal passages and may transfer into pneumatic gauges and instruments. **Use hydraulic oil as a calibrating fluid ONLY if the hand pump is going to be dedicated for hydraulic oil use.**

CHAPTER 2:

INSPECTION, STORAGE AND SHIPMENT

2.1 INITIAL INSPECTION

Inspect the shipping packaging for damage. If the packaging material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the condition of the hand pump and other components have been inspected. The enclosed parts list indicates the components that are included.

If the contents of the shipment are incomplete, or if mechanical damage is found upon inspection, notify King Nutronics immediately.

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2.2 STORAGE

When the hand pump is not in use, store in a suitable storage case or container. Never store hand pump or accessories for prolonged periods with water remaining in the pump passages or the hydraulic reservoir. See Chapter 6 for transit cases, backpacks and accessories for your hand pump.

NOTE: King Nutronics recommends flushing the pump with clean, dry compressed air after use (not to exceed 60 psi) to ensure the passages are completely dry prior to storage.

2.3 SHIPMENT

To return a hand pump or accessory to King Nutronics, contact Customer Support to obtain a RMA/Service Call ID number. Email support@kingnutronics.com and include the model number, part description and serial number if applicable. Include information regarding the issue you are having, your return address, and contact phone number.

Package and ship the hand pump or accessory in accordance with acceptable commercial practices for delicate instruments. Mark the container "FRAGILE" to ensure careful handling. **Please do not use Styrofoam™ packing peanuts.**

CHAPTER 3: COMPONENTS AND CONTROLS

3.1 OVERVIEW

This section identifies the components and controls of the 3750 and 3750-HPDX Heavy Duty Precision Hand Pump. The figures in this chapter show the operating components and controls, while the tables describe the operating functions.

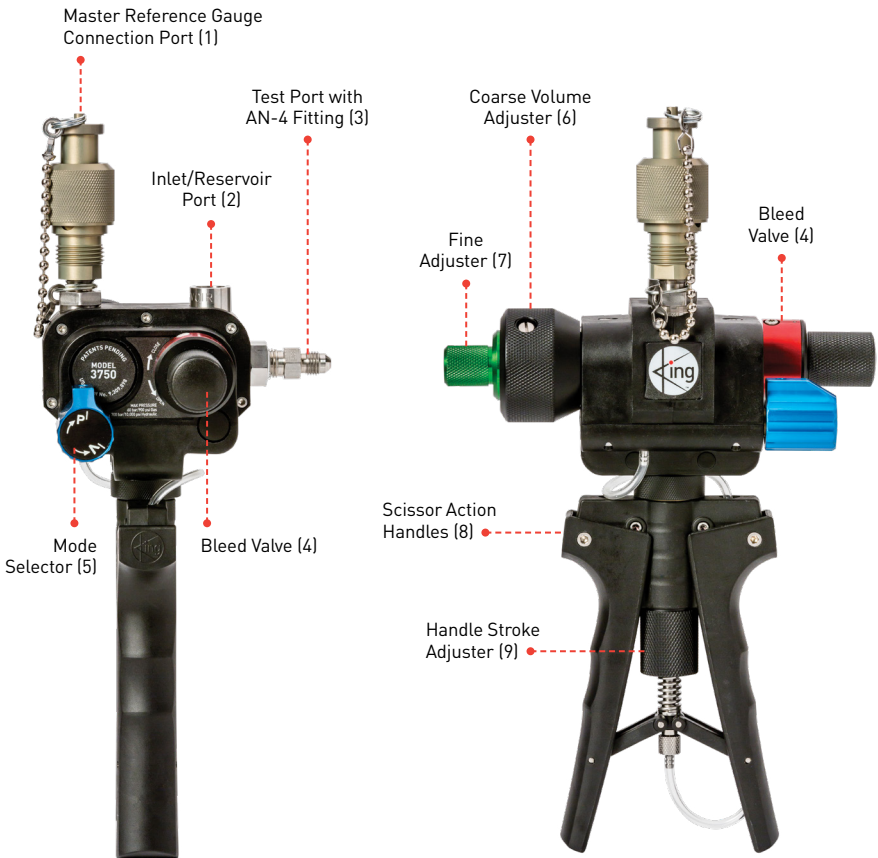


Fig. 3-1 Hand pump components and controls

TABLE 3-1

Hand Pump Components and Controls

Control or Equipment	Operating Function
Hand Pump	Used to pressurize a pneumatic or hydraulic test circuit. Scissor-action handles generate pneumatic pressure up to 500 psig and low hydraulic pressure to 200 psig. For higher hydraulic pressures, the fine and coarse Volume Adjuster knobs are used.
Master Reference Gauge Connection Port (1)	A quick-disconnect fitting for connecting the King Nutronics MDPI (Master Digital Pressure Indicator) or similar pressure indicator to the hand pump.
Inlet/Reservoir Port (2)	Functions as an inlet and vent for pneumatic pressure when the hand pump is in pneumatic mode. For hydraulic calibrations, the hydraulic reservoir is threaded onto the Inlet/Reservoir Port.
Test Port with AN-4 Fitting (3)	Transfers the test pressure generated from the hand pump to the device under test.
Bleed Valve [Red] (4)	Gives precise control over the release of pressure in both pneumatic and hydraulic modes. An adjustable pressure relief valve is incorporated into the valve design. A ratcheting clutch prevents over-tightening and damage to the valve seat.
Mode Selector [Blue] (5)	Used to select between pressure or vacuum modes by turning the P (pressure) or V (vacuum) to 12 o'clock. NOTE: The Mode Selector can act as an EMERGENCY VENT knob by rotating it between P and V positions. Use the Bleed Valve for non-emergency venting.
Coarse Volume Adjuster [Black] (6)	Functions as a coarse-adjustment vernier during pneumatic and hydraulic calibrations by turning clockwise to increase pressure and counterclockwise to decrease pressure.

CHAPTER 3

Fine Adjuster [Green] (7)	Functions as a fine-adjustment vernier during pneumatic and hydraulic calibrations by turning clockwise to increase pressure and counterclockwise to decrease pressure.
Scissor Action Handles (8)	Generates pneumatic pressure to 500 psig, vacuum, or low hydraulic pressure to 200 psig by squeezing the handles.
Handle Stroke Adjuster (9)	Adjusts the travel of the scissor-action handles. To generate maximum pneumatic pressure, turn counterclockwise until handles are at their widest stroke setting.

TABLE 3-2

Hydraulic Reservoir Components

Control or Equipment	Operating Function
Hydraulic Reservoir	Holds calibration fluid used when performing hydraulic calibrations.
Reservoir Lid Thumb Nut (1)	Allows the lid to be removed for filling or draining the calibration fluid.
Reservoir Lid (2)	Seals the reservoir chamber.
Bleed Holes (3)	Vents hydraulic fluid and trapped air in the test circuit.
Reservoir Stem O-ring (4)	Seals, from inside the Inlet/Reservoir Port, the Hydraulic Reservoir to the hand pump for leak-free operation. A spare o-ring is included in Reservoir Packing Kit, P/N 3731-53-1.
Inlet/Reservoir Port (5)	Functions as an inlet and vent for pneumatic pressure when the hand pump is in pneumatic mode. For hydraulic calibrations, the hydraulic reservoir is threaded onto the Inlet/Reservoir Port.

COMPONENTS AND CONTROLS

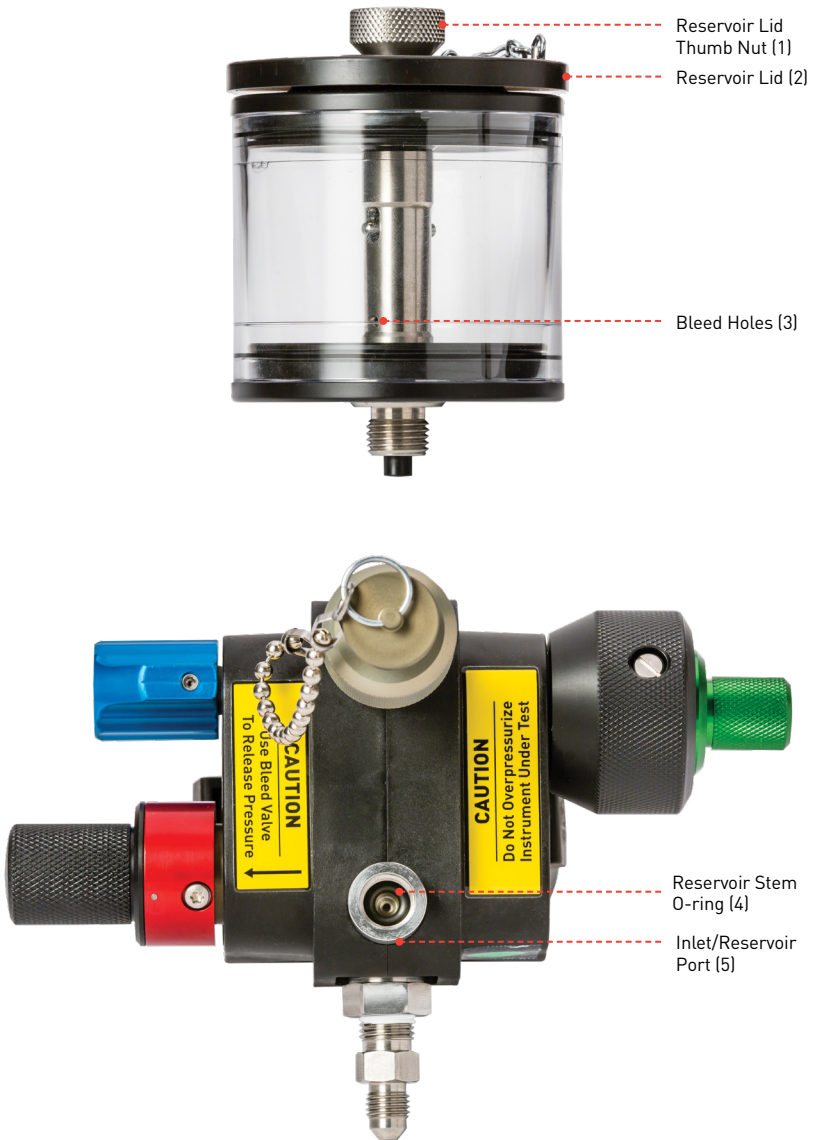


Fig. 3-2 Detail of Hydraulic Reservoir components

CHAPTER 4:

USING THE HAND PUMP

4.1 OVERVIEW

The Model 3750 and 3750-HPDX can generate precise pressure and vacuum into a variety of test circuits. This section explains how to generate pneumatic and hydraulic test pressures using the hand pump.

The blue **Mode Selector** is used to select between the **PRESSURE** or **VACUUM** modes of the hand pump. The active mode is indicated when either the “**V**” indicating **VACUUM** or “**P**” indicating **PRESSURE** is in the 12-o’clock position.

The red **Bleed Valve** vents pressure and performs precise pressure adjustments. To vent pneumatic or hydraulic test pressure, open the red Bleed Valve counterclockwise. To gradually bleed down test pressure, gradually open the Bleed Valve counterclockwise 1/8 to 1/4 turn. To slow the bleed rate or to stop releasing pressure, close the Bleed Valve clockwise. A ratcheting clutch prevents the Bleed Valve from overtightening. **DO NOT force the Bleed Valve beyond its mechanical stop.**



WARNING: To prevent eye injury, wear safety glasses when using the hand pump. Wear gloves to protect hands and provide grip when operating the scissor-action handles and control knobs.



WARNING: Severe injury or damage can occur through improper use of pressure instruments. Do not exceed the recommended pressure limits of tubing and fittings under test. Ensure that all pressure connections are secured.

4.2 BEST PRACTICE OPERATING PROCEDURES

For best results follow these guidelines:

- 1) During hydraulic pressure calibrations, air must not be trapped in the test circuit. Follow the procedures in Section 4.3 to Vacuum Prime the hand pump and test circuit prior to performing hydraulic pressure calibrations. Vacuum priming is not necessary for pneumatic operation.
- 2) Prior to generating vacuum, pneumatic or hydraulic pressure, tighten the red **Bleed Valve** by turning clockwise until the knob clutch clicks, indicating that the valve is closed.
- 3) The blue **Mode Selector** must indicate the desired mode, either **P** or **V** at the 12-o'clock position.
- 4) Do not generate test pressure too rapidly. For hydraulic pressure, keep pressure generation to about 100 psi per second upscale and downscale. Increasing or decreasing the pressure too rapidly will introduce heat into hydraulic test circuits, causing longer stabilization times.
- 5) Test circuits must be leak free at the test hose connections, hand pump fittings, and pressure indicators.

4.3 VACUUM PRIMING FOR HYDRAULIC TESTING

Trapped air must first be eliminated in hydraulic test circuits. Use the following procedure to evacuate air and backfill hydraulic test circuits with fluid (typically distilled water). Figures 3-1 and 3-2 identify the parts by their reference numbers.

CAUTION: Fluids found in some hydraulic systems, including but not limited to JP Fuels, Phosphates Ester-based oils, and seawater, are incompatible and will damage materials in the hand pump. Evacuate test circuits that contain such fluids prior to performing pressure calibrations. King Nutronics recommends the optional Exception Fluid Trap, PN 3731-33-1 to safely evacuate non-compatible fluids. See Table 6-1 or contact King Nutronics for more information.

CHAPTER 4

4.3 Vacuum Priming For Hydraulic Testing (continued)

- 1) Open the red **Bleed Valve** counterclockwise to relieve any residual pressure in the pump.
- 2) Turn the blue **Mode Selector** (Fig. 3-1, Item 5) to the **VACUUM** position **V**.
- 3) Fully close the red **Bleed Valve** by turning it clockwise until the clutch clicks.
- 4) Connect the test hose between the hand pump the device under test as follows:
 - a) Connect the test hose to the Test Port with AN-4 Fitting (Fig. 3-1, Item 3) on the hand pump. Use a wrench to tighten; use a second wrench to prevent the test port fitting from turning in the hand pump body. (See the optional Wrench Set, PN 3731-63-1, Table 6-1.)
 - b) Connect the open end of the test hose to the device or circuit under test. An adapter may be required between the AN-4 end of the test hose and the fitting on the device under test. (See the optional Adapter Fittings Kit, PN 3750-040-001, in Table 6-1.)
 - c) Securely tighten the hose connections.
- 5) Fill the Hydraulic Reservoir 1/2 to 3/4 full with the appropriate calibration fluid and replace the reservoir lid. Attach the reservoir to the Inlet Reservoir Port on the hand pump. Hold the pump upright during operation to keep the fluid level above the reservoir bleed holes (Fig. 3-2, Item 3).
- 6) Attach a master reference gauge for the appropriate calibration test range to the hand pump connection port (Fig. 3-1, Item 1). See MDPI, Table 6-1, for available King Nutronics gauges.
- 7) Open the black Volume Adjuster knob counterclockwise until it stops. Do not force past its mechanical stop. Open the green **Fine Adjuster** knob counterclockwise; an indicator pin will project from the knob end when it has reached the full travel of the knob.
- 8) Loosen the Reservoir Lid Thumb Nut (Fig 3-2, Item 1) and lift the lid slightly to allow air into the reservoir.

NOTE: If the reservoir lid is not loosened, vacuum can build in the reservoir and prevent the calibration fluid from completely filling the system.

USING THE HAND PUMP

- 9) Squeeze the pump handles while observing air bubbles escaping through the fluid reservoir bleed holes, Fig. 3-2, Item 3. Continue pumping until no air bubbles escape from the bleed holes and sufficient vacuum is generated (about 25 – 27 in-Hg).
- 10) Open the red **Bleed Valve** slowly counterclockwise 2 to 3 turns to release the vacuum and draw the calibration fluid into the test circuit.
- 11) Repeat steps 9 and 10 three times to remove all air and completely fill the test circuit with calibration fluid.

NOTE: If pressure readings do not stabilize, there may be air trapped in the test circuit. Repeat Steps 9 and 10 to purge air from the test circuit.

- 12) Close the red **Bleed Valve** clockwise until the knob clutch clicks.
- 13) Turn the blue **Mode Selector** to the **PRESSURE** position **P**. The hand pump is now ready for generating hydraulic test pressure.

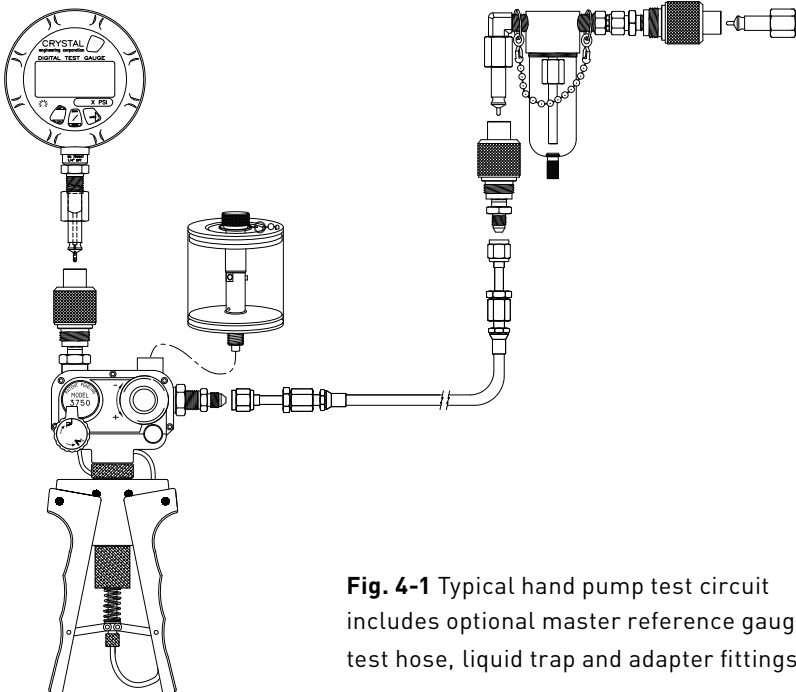


Fig. 4-1 Typical hand pump test circuit includes optional master reference gauge, test hose, liquid trap and adapter fittings.

CHAPTER 4

4.4 PERFORMING A HYDRAULIC TEST

The hand pump, test circuit and device under test must be prepared for hydraulic test mode by first following the procedures for Vacuum Priming, Section 4.3, to remove trapped air that can cause pressure fluctuations and increase pressure stabilization time.

CAUTION: Fluids found in some hydraulic systems, including but not limited to JP Fuels, Phosphates Ester-based oils, and seawater, are incompatible and will damage materials in the hand pump. Evacuate test circuits that contain such fluids prior to performing pressure calibrations. King Nutronics recommends the optional Exception Fluid Trap, PN 3731-33-1 to safely evacuate non-compatible fluids. See Table 6-1 or contact King Nutronics for more information.

Follow the steps below to ensure accurate test results:

- 1) **Vacuum Prime** the system to prepare for hydraulic testing as described in Section 4.3. As a result of Vacuum Priming, the test connections are made, the black **Volume Adjuster** and green **Fine Adjuster** are open, the red **Bleed Valve** is closed, and the blue **Mode Selector** is in the **PRESSURE** position **P**.
- 2) Adjust the scissor-action handles to a moderate-to-low stroke.
- 3) Squeeze the scissor-action handles to generate pressure into the test circuit.

NOTE: Because liquid is not easily compressed, it will be difficult to generate more than 200 psig by operating only the hand pump handles. Use the black **Volume Adjuster** to make hydraulic pressure adjustments throughout the hand pump's range. Use the green **Fine Adjuster** to make precision, incremental adjustments upscale or down. Use the red **Bleed Valve** to slowly relieve pressure for downscale adjustments.

- 4) Slowly close the black **Volume Adjuster** knob clockwise to generate the desired test pressure to within 25 to 50 psi of the target pressure.

CAUTION: Changing pressure rapidly will generate heat into the test circuit, causing fluctuation on the gauge display and prolonging stabilization times. Turn the **Volume Adjuster** knob slowly, increasing or decreasing pressure at a rate of approximately 100 psi per second.

USING THE HAND PUMP

- 5) Allow the pressure indicated on the device under test and the reference gauge to stabilize to a leak rate (pressure decreasing) of 20 to 25 psi per minute or less.
- 6) Use the green **Fine Adjuster** knob to increase gradually to the target pressure.
- 7) To downscale pressure, slowly open the black **Volume Adjuster** knob counterclockwise or, for finer adjustments, open the green **Fine Adjuster** counterclockwise. Additionally, the red **Bleed Valve** can be opened by turning it counterclockwise to bleed down pressure.

NOTE: The blue **Mode Selector** can act as an EMERGENCY VENT knob. To quickly vent test pressure, rotate the **Mode Selector** between P and V positions. Use the red **Bleed Valve** for non-emergency venting.

- 8) Log the readings shown on the master reference gauge and device under test. The difference between these two values is the amount of measurement error for the device under test.
- 9) To increase or decrease to the next test point, repeat Steps 4 through 8.
- 10) When testing is complete, vent test pressure by opening the black **Volume Adjuster** knob counterclockwise until it stops. Then open the red **Bleed Valve** knob with several counterclockwise turns.

CAUTION: Rapid release of hydraulic pressure may damage the device under test. Always relieve test circuit pressure by first turning the black **Volume Adjuster** knob counterclockwise to the stop. Release any remaining pressure by turning the red **Bleed Valve** counterclockwise 2 to 3 turns.

CHAPTER 4

4.5 PNEUMATIC PRESSURE AND VACUUM TESTING

This section describes how to perform pneumatic pressure and vacuum measurements to calibrate a pneumatic pressure gauge.

CAUTION: Hand pump passages, hoses, fittings, and master reference gauge must be clean and free from hydraulic fluid prior to making connections to the pneumatic test circuit. If any liquid is present or possibly trapped in the hand pump or other system components, follow the cleaning procedures in Section 5. Remove the hydraulic reservoir from the hand pump for pneumatic operation.

4.5.1 GENERATING VACUUM

To generate vacuum, follow this procedure:

- 1) Open the red **Bleed Valve** counterclockwise to release any residual pressure in the pump.
- 2) Turn the blue **Mode Selector** to the **VACUUM** position **V**.
- 3) Fully close the red **Bleed Valve** by turning it clockwise until the clutch clicks.
- 4) Attach a master reference gauge for the appropriate calibration test range to the Master Reference Gauge Connection Port (Fig. 3-1, Item 1).
- 5) Close the black **Volume Adjuster** knob clockwise until it stops. Close the green **Fine Adjuster** knob clockwise until it stops.
- 6) Connect the hand pump to the test circuit as follows:
 - a) Connect the test hose to the Test Port with AN-4 Fitting (Fig. 3-1, Item 3) on the hand pump. Use a wrench to tighten; use a second wrench to prevent the test port fitting from turning in the hand pump body. [See the optional Wrench Set, PN 3731-63-1, Table 6-1.]
 - b) Connect the open end of the test hose to the device or circuit under test. An adapter may be required between the AN-4 end of the test hose and the fittings on the device under test. [See the optional Adapter Fittings Kit, PN 3750-040-001, Table 6-1.]
 - c) Securely tighten the hose connections.
- 7) Squeeze the scissor-action handles to generate vacuum to within 105%

of the target pressure. For example, if the target vacuum is 20 in-Hg, squeeze the scissor handles until vacuum indicates approximately 21 in-Hg on the device under test.

NOTE: Make sure that the stroke adjustment on the scissor-action handles is appropriate for the subject pressure range and test volume. The wider the handles, the more pressure generated per stroke.

- 8) Allow the vacuum reading to stabilize, then decrease the vacuum to the target point by slowly opening the red **Bleed Valve** knob counterclockwise. When the target vacuum is reached on the device under test, turn the red **Bleed Valve** knob clockwise until it ratchets closed.
- 9) Log the readings shown on the master gauge and on the device or circuit under test. The difference between these two values is the amount of measurement error for the device under test.
- 10) When testing is complete, vent the vacuum in the device or circuit by opening the red **Bleed Valve** counterclockwise. The release rate can be precisely controlled by tightening and loosening the red **Bleed Valve**. Leave the red **Bleed Valve** open to prevent any residual pressure from being trapped inside the pump and to extend the life of the seals inside the pump.

4.5.2 GENERATING PRESSURE

To generate pressure, follow this procedure:

- 1) Open the red **Bleed Valve** counterclockwise to release any residual pressure in the pump.
- 2) Turn the blue **Mode Selector** clockwise to the **PRESSURE** position **P**.
- 3) Fully close the red **Bleed Valve** by turning it clockwise until the clutch clicks.
- 4) Connect the hand pump to the test circuit as follows:
 - a) Connect the test hose to the Test Port with AN-4 Fitting (Fig. 3-1, Item 3) on the hand pump. Use a wrench to tighten; use a second wrench to prevent the test port fitting from turning in the hand pump body. (See the optional Wrench Set, PN 3731-63-1, Table 6-1.)

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- b) Connect the open end of the test hose to the device or circuit under test. An adapter may be required between the AN-4 end of the test hose and the fittings on the device under test. (See the optional Adapter Fittings Kit, PN 3750-040-001, Table 6-1.)
 - c) Securely tighten the hose connections.
- 5) Attach a master reference gauge for the appropriate calibration test range to the Master Reference Gauge Connection Port (Fig.3-1, Item 1).
 - 6) Adjust the Handle Stroke Adjuster (Fig. 3-1, Item 9) on the scissor-action handles as appropriate for the subject pressure range and test volume. The wider the handles, the more pressure generated per stroke.
 - 7) Squeeze the scissor-action handles to generate the test pressure to within a few psi of the target pressure. For example, if the target pressure is 300 psig, actuate the scissor handles until approximately 298 psig is indicated on the device under test.
 - 8) Allow the readings on the device under test and master reference gauge to stabilize, then slowly increase or decrease the pressure to the target point by turning the black **Volume Adjuster** knob. Turn the green **Fine Adjuster** knob for precise pressure adjustments. In the event of an overshoot, use the red **Bleed Valve** to vent off pressure; the black **Volume Adjuster** and green **Fine Adjuster** can also be used.

NOTE: For a test pressure of 300 psig, the volume adjuster set at the middle position will provide approximately 5 to 10 psig of pressure control upwards or downwards depending on test circuit volume.
 - 9) Log the readings shown on the master gauge and the device or circuit under test. The difference between these two values is the amount of measurement error for the device under test.
 - 10) When testing is complete, release the pressure in the device or circuit by slowly opening the red **Bleed Valve** counterclockwise. The release rate can be precisely controlled by tightening and loosening the red **Bleed Valve**. Leave the red **Bleed Valve** open to prevent any residual pressure from being trapped inside the pump and to extend the life of the seals inside the pump.

4.6 RELEASING PRESSURE OR VACUUM

Release pressurized test circuits slowly under normal operating conditions. Rapid release of test pressure or vacuum may damage instruments connected to the test circuit.

However, if an emergency dictates that the pressure or vacuum be dumped quickly, the hand pump and test circuit can be vented by quickly opening the red **Bleed Valve** counterclockwise, or by turning the blue **Mode Selector** between the **P** and **V** positions.

CAUTION: Due to the high pneumatic and hydraulic pressures that can be generated using the hand pump, items connected to the test circuit may be damaged if over-pressurized or vented too rapidly. Do not exceed the range of the device under test. Always vent in a controlled manner.

4.6.1 RELEASING UNDER NORMAL CONDITIONS

The procedures in this section should be used to release pressure in the device or circuit under test under normal operating conditions. See Section 4.6.2 for emergency venting instructions.

To release PNEUMATIC pressure or vacuum, do the following:

NOTE: Pneumatic test pressure is vented through the Inlet/Reservoir Port on the hand pump (Fig.3-1, Item 2). Do not block this port during pneumatic operation.

- 1) Slowly open the red **Bleed Valve** knob counterclockwise.
- 2) Observe the rate of change on the reference gauge, which should be approximately 50 psig per second when releasing pressure, and 5 in-Hg per second for releasing vacuum.
- 3) To increase the rate of change, open the red **Bleed Valve** further counterclockwise. To decrease the rate, close the red **Bleed Valve** clockwise. The **Bleed Valve** is fully closed when the clutch clicks.

CHAPTER 4

- 4) After all test pressure or vacuum has been released, leave the red **Bleed Valve** open to prevent residual pressure or vacuum from being trapped inside the pump and to extend the life of the seals inside the pump.

NOTE: King Nutronics recommends drying the pump with clean, dry compressed air (not to exceed 60 psi) after use to ensure the passages are completely dry prior to storage.

To vent HYDRAULIC pressure, do the following:

- 1) Slowly open the black **Coarse Volume Adjuster** knob fully counterclockwise to lower the pressure in the test circuit.
- 2) Slowly open the red **Bleed Valve** knob counterclockwise to release remaining pressure in the test circuit.
- 3) To increase the rate, turn the red **Bleed Valve** further counterclockwise to relieve all hydraulic pressure and to empty the system. Leave the red **Bleed Valve** open to prevent any residual pressure from being trapped inside the pump and to extend the life of the seals inside the pump.

NOTE: King Nutronics recommends drying the pump with clean, dry compressed air (not to exceed 60 psi) after use to ensure the passages are completely dry prior to storage.

4.6.2 EMERGENCY VENTING PROCEDURE

In an emergency it may be necessary to rapidly vent the test circuit. Follow this procedure:

- 1) Rotate the blue **Mode Selector** between **P** and **V** settings.
- 2) Open the red **Bleed Valve** counterclockwise. Test pressure should now be fully vented.

NOTE: Pneumatic test circuit pressure will be released through the inlet/reservoir port on the hand pump. In hydraulic operation, hydraulic fluid will return rapidly to the hydraulic reservoir.

CHAPTER 5:

CLEANING

This chapter contains the procedures for cleaning the components in the Model 3750 and 3750-HPDX Heavy Duty Precision Hand Pump.

King Nutronics recommends the use of non-ionic water-soluble detergent conforming to MIL-D-16791 or equivalent for flushing the hand pump and hoses, and for cleaning the hydraulic reservoir, exception trap and fittings. Approximately 8 oz. of cleaning solution is required to flush the hand pump. Simple Green®, diluted with water, is also suitable.

A special cleaning tube can be purchased from King Nutronics for this purpose. See Cleaning Tube PN 3731-52-1, Table 6-1 or contact King Nutronics for information.

King Nutronics recommends 3M NOVEC® HFE71DE cleaning solvent for **heavy-duty cleaning and degreasing of METAL COMPONENTS ONLY.** Allow solvent to evaporate from the cleaned parts completely before use, or dry using clean, compressed air or dry nitrogen.

CAUTION: Do not use petroleum-based solvents, such as Isopropyl Alcohol (IPA), to clean the hand pump assembly, the acrylic hydraulic fluid chamber, or other plastic parts. Petroleum-based solvents may fog, weaken, or damage plastics.

5.1 HYDRAULIC RESERVOIR DISASSEMBLY AND CLEANING

The hydraulic reservoir may be disassembled for cleaning using the following procedure:

- 1) Remove the reservoir from the hand pump by turning it counterclockwise.
- 2) Remove the reservoir cap by turning the Reservoir Lid Thumb Nut (Fig 3-2, Item 1) counterclockwise until fully loosened. Remove cap and set aside.

CHAPTER 5



Fig. 5-1 Disassembly of hydraulic reservoir

- 3) Empty the reservoir fluid into a suitable container or dispose in accordance with local regulations.
- 4) Using the supplied Spanner Tool, loosen the Spanner Nut by turning it counterclockwise (Fig. 5-1). Remove the Spanner Nut and set it aside.
- 5) Remove the top of the reservoir by applying upward pressure, using both thumbs to break the O-ring seal.

NOTE: The center stem of the reservoir contains loose parts: a spring, a stem and a fixture pin. Remove these parts, clean, and set aside.

- 6) Clean all parts using a mild water-soluble detergent solution.
- 7) Dry all parts thoroughly using compressed air (not to exceed 60 psi) or dry nitrogen.
- 8) Apply a thin film of silicone grease (Dow Corning Compound No. 111 or equivalent) to the O-ring surfaces.
- 9) Assemble the reservoir by reversing this procedure.

5.2 HYDRAULIC FLUID FLUSHING INSTRUCTIONS FOR PUMP AND HOSES

To flush hydraulic fluid from the hand pump internal passages and test hoses, do the following:

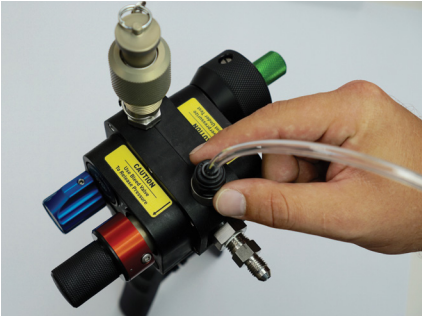


Fig. 5-2 Attaching the cleaning tube to the reservoir inlet

- 1) Connect the optional King Nutronics Cleaning Tube, PN 3731-52-1, to the Reservoir Inlet Port as shown above in Fig. 5-2. The plastic fitting should only be finger-tight. Over-tightening or using a wrench will damage the fitting.
- 2) Seal the quick-disconnect fitting with the attached dust plug.
- 3) Connect a test hose to the Test Port with AN-4 fitting (see Fig. 3-1, Item 3) on the pump.
- 4) Turn the **Mode Selector** to the **PRESSURE** position **P**.
- 5) With the end of the cleaning tube submerged in a soap-and-water solution and the free end of the test hose positioned in a catch basin, squeeze the scissor-action pump handles to draw the cleaning solution through the cleaning tube, the hand pump internal passages and out of the test hose.
- 6) Repeat as necessary to flush all debris and fluid from the pump passages and hoses.
- 7) Using clean distilled water, rinse out the passages in the hand pump and hoses per Step 5.
- 8) Remove the cleaning tube from the hand pump.
- 9) Turn the **Mode Selector** to the **VACUUM** position **V**.
- 10) While holding the hand pump upside-down and covering the Inlet Reservoir Port with a rag, squeeze the scissor-action handles to expel any remaining fluid.

NOTE: King Nutronics recommends drying the pump with clean, dry compressed air (not to exceed 60 psi) after use to ensure the passages are completely dry prior to storage.

CHAPTER 6: OPTIONAL ACCESSORIES

Optional accessories are available. For a complete list see Table 6-1.
To order, contact King Nutronics Corporation.

Phone: +1 (818) 887-5460
FAX: +1 (818) 887-2766

www.kingnutronics.com
sales@kingnutronics.com



Model 3750 Transit Case

PN 3750-074-001

Shown with optional components



Carry Bag

PN 3750-095-001



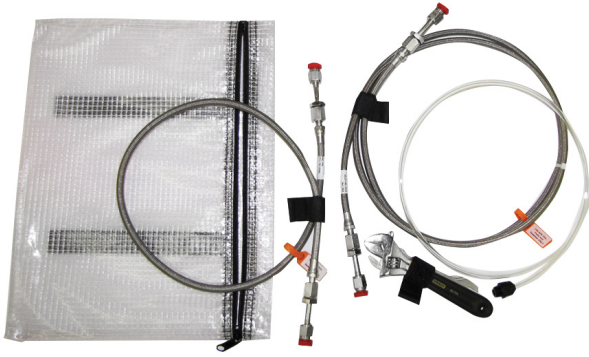
Backpack

PN 3731-90-1



**Master Digital Pressure
Indicator Gauges**

See Table 6-1



Hose Kit
PN 3731-60-1



Exception Fluid Trap
PN 3731-33-1



**Exception Fluid Trap
Adapter Kit**
PN 3731-35-1



Adapter Fittings Kit
PN 3750-040-001



Accessory Kit Components
PN 3731-50-1

Table 6-1 Optional Accessories

CARRY CASES	
Transit Case	3750-074-001
Backpack	3731-90-1
Carry Bag	3750-095-001

MASTER DIGITAL PRESSURE INDICATOR GAUGES	
MDPI Gauge, 0 – 30 psig	3731-31-30
MDPI Gauge, 0 – 300 psig	3731-31-300
MDPI Gauge, 0 – 3000 psig	3731-31-3000
MDPI Gauge, 0 – 6000 psig	3731-31-6000
MDPI Gauge, 0 – 10,000 psig	3731-31-10000
Probe 7/16"–20 MP	3731-871-1
Dust Cover Assembly	3460-49-5

HOSE KIT	
Hose Kit includes	3731-60-1
Test Hose, 3-foot	3731-161-0360
Test Hose, 6-foot	3731-161-0720
Polyethylene Cleaning Tube	3731-52-1
Wrench Set	3731-63-1
Hose Kit Pouch	3731-62-1

EXCEPTION FLUID TRAP (LIQUID TRAP)	
Exception Fluid Trap (or Liquid Trap)	3731-33-1
Exception Fluid Trap Adapter Fittings Kit Includes	3731-35-1
Elbow, 1/4" AN Swivel Adapter, 90°	3731-41-29
Elbow, 1/4" AN Swivel Adapter, 45°	3731-41-31
ADAPTER FITTINGS KIT	
Adapter Fittings Kit Includes	3750-040-001
Ships Gage Adapter, AN-4 Male to 9/16-18	3731-41-1
Elbow, AN-4 Male to AN-4 Male, Union	3731-41-3
Union, AN-4 Male to AN-4 Male, Straight	3731-41-5
Straight, AN-4 Male to 9/16-18, O-ring Seal	3731-41-7
Straight, AN-4 Male to 1/4" Flareless Tube Fitting	3731-41-9
Elbow, AN-4 Male to 1/4" Male NPT	3731-41-11

ADAPTER FITTINGS KIT (continued)	
Elbow, AN-4 Male to 1/4" Flareless Tube	3731-41-13
Blanking Cap AN-4	3731-41-15
Elbow, AN-4 Male to 7/16-20, O-Ring Seal	3731-41-17
Elbow, AN-4 Male to 1/4" NPT Female	3731-41-19
Straight Connector, AN-4 Male to 1/4" Male NPT	3731-41-21
Straight, AN-4 Male to 1/4" NPT Female	3731-41-23
Straight, AN-4 Male to 7/16-20, O-Ring Seal	3731-41-25
Elbow, AN-4 Male to 9/16-18, O-Ring Seal	3731-41-27
Tube Adapter 1/4-inch Tube to Male AN-4	3750-041-045
Spanner Nut Tool	3750-860-001
Adapter Fittings Case	3750-085-001

ACCESSORIES	
Reservoir Assembly	3731-15-1
Fill Bottle for Distilled Water	3734-190-010
Accessory Kit includes	3731-50-1
RS-232 Cable, 6-ft. DB9 Male x DB9 Female	3731-82-1
External Power Supply Kit includes	3731-83-1
International power supply	
DB9 powered pass-through adapter	
Set, international power adapters	
Screwdriver, 2-in-1	3731-84-1
Tape, PTFE Teflon Roll, 1/2"	3731-50-5
Tape, Labeling Roll, 3/4"	3731-50-7
Lanyard with Swivel Hook	3731-34-1
Nylon Tubing Kit	3731-51-1
Reservoir Packing Kit	3731-53-1
Tube Fittings O-Ring Packing Kit	3731-54-1
Exception Fluid Trap Packing Kit	3731-55-1
Accessory Case	3731-86-1

PACKING KITS AND REPAIR PARTS	
Hand Pump Tubing Kit	3731-51-1
Reservoir Packing Kit	3731-53-1
Tube Fittings O-Ring Packing Kit	3731-54-1
Exception Fluid Trap Packing Kit	3731-55-1



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