

QUICKLY PROCESS UP TO
48 SAMPLES AT ONE TIME



POSITIVE PRESSURE MANIFOLD

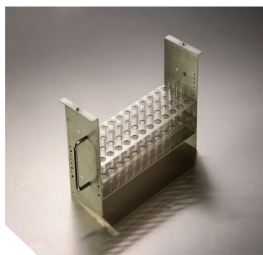
POSITIVE PRESSURE MANIFOLD

- All 48 positions are individually regulated to provide even pressure to each column.
- There are four rows of 12 positions each. The user can control flow to each row.
- Accommodates 1 to 48 columns of either 1mL, 3mL, 6mL, 10mL or 15mL. Switch between column sizes by using the appropriate adaptor plate. A 10/15mL plate is included with the standard system and adaptor plates are available for separate purchase.
- Gas Supply: N₂ or compressed air regulated to 80-120 psi and filtered to 10µm.
- Dual pressure regulators allow users to set different pressures for extraction and column drying.
- Includes waste reservoir that is equipped with a stopcock assembly to allow for direct drainage of waste.
- Single switch raises and lowers the sample racks and creates an airtight seal.

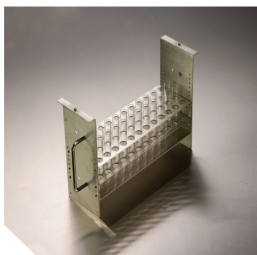


Complete Positive Pressure Manifold System Includes:

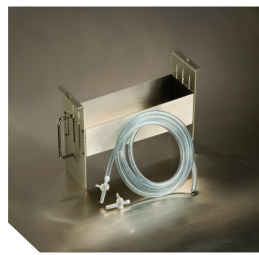
Part Number	Description	Unit
VMFPPM13	10mL/15mL SPE tube rack, 13 x 100 collection rack, pre-drilled waste container and collection rack of choice	1
VMFPPM16	10mL/15mL SPE tube rack, 16 x 100 collection rack, pre-drilled waste container and collection rack of choice	1



**Collection rack for
13 x 100mm test tubes**
Part#: VMFPPMCRKG13



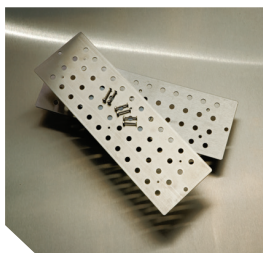
**Collection rack for
16 x 100mm test tubes**
Part#: VMFPPMCRKG16



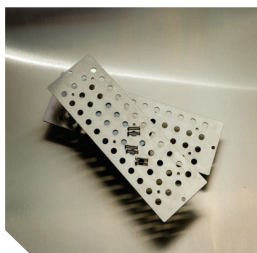
**Pre-drilled waste
container**
Part#: VMFPPMWBND



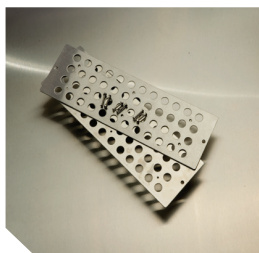
**PPM Waste tray draining
kit; 10 ft tube and stopcock**
Part#: VMFPPMWTDK



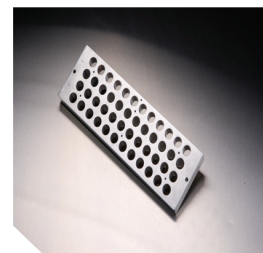
**Adaptor extraction plates
for 1mL columns**
Part#: VMFPPMRKA1



**Adaptor extraction plates
for 3mL columns**
Part#: VMFPPMRKA3



**Adaptor extraction plates
for 6mL columns**
Part#: VMFPPMRKA6



**10mL / 15mL
extraction plates**
Part#: VMFPPMRK10



Brown PPM Gasket
Part#: VMFPPMGSKBL



Orange PPM Gasket
Part#: VMFPPMGSKOR



Restrictor Plate
Part#: VMFPPMFRPLT



Installation kit
25' x 1/4" O.D. tubing,
In-line air filter with bracket,
2 quick connect fittings, and
2 screws
Part#: VMFPPMIK



In-line air filter
Part#: VMFPPMRAF



POSITIVE PRESSURE MANIFOLD

POSITIVE PRESSURE EXTRACTION OPERATION INSTRUCTION



Theory of Operation

The Positive Pressure Extraction Manifold (PPM) is a mechanical workstation that is used to facilitate the process of sample preparation using solid phase extraction (SPE) cartridges. The PPM utilizes pressurized gas (i.e. compressed nitrogen or air) to move sample solvent through SPE cartridges at a controlled rate of flow. The PPM has two (2) adjustable regulators designed with restrictors to allow a fine (lower) (Regulated Flow) and a coarse (higher) (Dry / Full Flow) adjustment during the extraction procedure.

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SHIPPING CONTENTS

- (1) 4 x 12 position Positive Pressure Manifold
- (1) Waste collection rack, stopcock and tubing
- (1) Elution rack (16 mm or 13 mm collection tubes)
- (1) 3/4" 4 x 12 position Solid Phase Extraction plate (Standard 10 mL/15 mL rack included with each system. See page 10 for available adaptor plates).

ACCESSORIES REQUIRED FOR OPERATION

- 1/4" O.D. plastic rigid tubing rated for a minimum of 80 to 100 psi.
- Gas source (Nitrogen or Air).
- 1/4" compression fitting for attachment to gas source.
- In-line gas filter (optional - suggested if using unfiltered compressed gas.)

DESCRIPTION OF PPM UNIT & CONTROLS

Dimensions of unit: The positive pressure manifold is 16.25" wide, 13" deep, and 20" high.

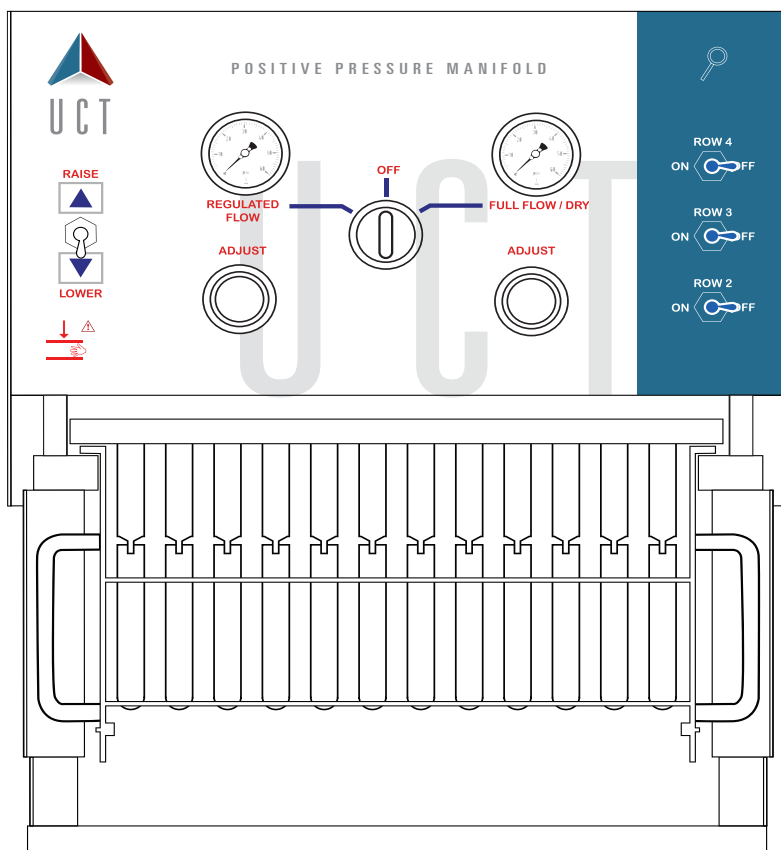
The 'Raise and Lower' switch is used to put the extraction rack into proper position during sample preparation. The pressurized gas will move the solid black plastic extraction rack up or down depending on the switch position.

3-Position Toggle Switch – This switch is used to adjust the flow mechanism to one of the three (3) desired positions (Regulated, Off, or Dry/Full). By turning the knob to each position, the PPM will allow the rate of flow through the manifold plate as adjusted and shown on the pressure gauge.

Regulated Flow Adjustment – This gauge is considered a 'fine adjustment' because it has a restrictor, which will not allow excessive flow through the manifold plate. The adjustment knob is used to regulate the flow during the extraction procedure.

To adjust, pull the knob out and turn clockwise to increase and counter-clockwise to decrease the gas flow to the desired rate. Push the knob in to lock the adjustment knob into position. By turning the center toggle switch to 'Regulated Flow' the gas will begin to flow at the rate in relation to the pressure gauge under the adjustment dial. (It is recommended to use 80-100 psi gas flow from the main gas source to maximize the PPM efficiency. The regulated flow should be adjusted to approximately 10-20 psi to obtain a rate of flow between 1-2 ml/ minute.)

(Note: This is a guideline; an actual flow setting must be made since the rates through the columns could change based on source gas pressure, sorbent type, sorbent amount, extraction fluid, sample matrix, etc.)



POSITIVE PRESSURE MANIFOLD MANUAL

Dry/ Full Flow Adjustment – This gauge is used to maximize the amount of gas flow through the PPM and extraction tubes. There is a wider range flow restrictor associated with this gauge that allows a larger volume of gas to flow at a higher rate through the PPM. This setting is used during the drying step or when higher flow rates are required for samples due to sample matrix or procedure requirements. The adjustment knob is used to regulate the flow during the extraction procedure. To adjust, pull the knob out and turn clockwise to increase and counterclockwise to decrease the gas flow to the desired rate. Push the knob in to lock the adjustment knob into position. By turning the center toggle switch to 'Dry/ Full Flow' the gas will begin to flow at the rate in relation to the pressure gauge under the adjustment dial.

Row Toggle Switches – These switches are used to turn On/Off the flow to rows 2-4. The rows 2-4 can be turned On/Off as desired during the extraction procedure. The switch for row 1 is mounted on the back of the unit. This allows for on / off control for row 1. The rows are counted 1-4 starting from front to back facing the PPM. The rate flow through each row is determined by the toggle switch set to Regulated, Dry/Full or Off.

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USING THE MANIFOLD FOR EXTRACTION

- After connecting the $\frac{1}{4}$ inch gas line to the back of the manifold (quick hose connect), adjust the pressure to between 80-100 psi from the gas source. Before putting on the manifold racks and plates, test the manifold's support arms by switching the 'Raise / Lower' toggle switch. The black support arms should raise and lower as the toggle switch is adjusted. There will be a low hissing sound from the pneumatic piston system.
- The manifold waste rack is fitted with a drain and stopcock / hose assembly to be used to collect waste during the extraction procedure. The waste container has two pin connects on the underside that fit into the two screw tops on the manifold rack. This will ensure the stability of the waste rack when the rack is moved during the extraction process. The column plate (e.g. $\frac{3}{4}$ " metal plate with 4 x 12 drilled openings) is placed on the top portion of the rack. These reversible plates are also pre-drilled to fit onto the top of either the extraction or collection rack with the position pins.

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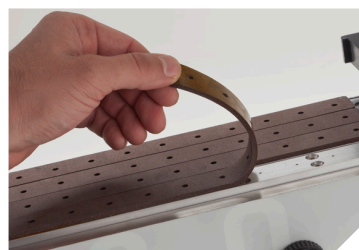
- With the waste container and top plate in place, position the rack on top of these black support arms and easily slide into and out of the working manifold position. There are also two pins on the front of the black support arms. These pins are positioned so as to not allow the rack to come off the support arms during the extraction procedure.
- An important point regarding the manifold rack: There are handles on either side of the extraction / collection rack for gripping the racks for positioning and removal. These racks will only fit properly into the working manifold if the handle positions are forward to the front of the manifold. It becomes obvious if it is incorrectly placed on the black support arms because the 4 x 12 frit openings on the underside of the chassis will not align properly with the extraction columns.

MAINTENANCE OF MANIFOLD

- The manifold requires regular upkeep to preserve the full functionality of the unit.
- Daily cleaning of any solvent or spills (as needed) on any of the manifold surfaces is suggested. Use solvents such as Methanol, Water, or Iso-propanol to wash the surface of the manifold. It is recommended to use water first followed by an alcohol to help dry the unit.
- Ensuring clean air (free of oil, water, and particulates) is important to the manifolds proper function. The in line air filter (Part Number VMFPPMRAF) attached to the back of the manifold should be monitored for condensation or other contamination issues. If the filter looks worn or filled with water, replacement may be required.
- The brown rubber gaskets (VMFPPMGSKBL) on the underside of the manifold are recommended to be replaced at least two (2) times a year. (A)
 - o (B) To replace these gaskets simply peel back the old gasket from the bottom of the manifold. Then continue by removing the plastic peel from the bottom of the gasket and attaching the gasket to the bottom of the frit plate.



(A)



(B)

- If any position on the manifold becomes clogged it may be necessary to replace the restrictor plate.
 - o To replace the restrictor plate, turn the manifold upside down and remove the base plate. Peel back the brown gasket from the frit plate.
 - o Loosen the 12 screws with a Phillips screw driver or power drill.
 - o Remove the restrictor plate by simply pulling it off of the manifold. (Note – it may be necessary to use a flat head screw driver to pry up the plate if it is not separating from the manifold).
 - o Replace the orange gasket on the top of the new restrictor plate. Clean as much of the remaining adhesive with a razor to get a good seal of the orange gasket. It is best to attach this directly to the frit plate before re-securing it to the manifold.
 - o Place the restrictor plate back on the unit by replacing the 12 screws. (Do not over tighten screws).
 - o Replace the brown rubber gasket on the bottom of the restrictor plate making sure the holes on the gasket line up with the holes on the manifold.

If the lift arms are hesitating or not moving freely, lubricate the piston inside the back of the unit with either silicone grease, or some other type of metal lubricant. This will help insure proper movement of the lift arms.

REPLACEMENT PARTS AND ACCESSORIES

Description	Part Number
Adapter extraction plate to accommodate 1 mL extraction tubes.	VMFPPMRKA1
Adapter extraction plate to accommodate 3 mL extraction tubes.	VMFPPMRKA3
Adapter extraction plate to accommodate 6 mL extraction tubes.	VMFPPMRKA6
Installation kit (25 ft ¼" O.D. tubing, in line air filter, 2 - ¼" compression fittings	VMFPPMIK
Waste container (pre-drilled)	VMFPPMWBND
16 x 100 mm elution rack	VMFPPMCRKG16
13 x 100 mm elution rack.	VMFPPMCRKG13
Replacement in line air filter	VMFPPMRAF
Replacement column sealing gasket (brown)	VMFPPMGSKBL
Replacement column sealing gasket (orange)	VMFPPMGSKOR
Arm	VMFPPMARM
Restrictor Plate	VMFPPMFRPLT
Lift Plate	VMFPPMLPLT
PPM Waste tray draining kit: 10 ft tube and stopcock	VMFPPMWTDK

POSITIVE PRESSURE MANIFOLD

A complete Positive Pressure Manifold (PPM) System consists of the PPM base, a rack for holding either 10 mL or 15 mL SPE columns, a test tube holder collection rack and a pre-drilled waste container. The PPM can be ordered with either a 13 x 100 mm collection rack or a 16 x 100 mm collection rack.

All 48 positions of the PPM System are individually regulated to provide even pressure to each column. There are 4 rows of 12 positions. Each row has a switch to control flow. The PPM System can accommodate 1 – 48 columns. Acceptable column sizes include: 1 mL, 3 mL, 6 mL, 10 mL or 15 mL. Dual pressure regulators allow different pressure settings for the extraction step and the column drying step. Each PPM comes with a waste reservoir that can be emptied between waste steps if desired. A single switch raises and lowers the sample racks creating an airtight seal. The PPM requires a supplied pressure of 75 psi with either nitrogen or compressed air. The compressed air must be filtered to 10 µm.



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Description	Part Number
Complete Positive Pressure Manifold System with collection rack for 13 x 100 mm sized test tubes, 10mL/15mL SPE Tube Rack, and Pre-Drilled Waste Container	VMFPPM13
Complete Positive Pressure Manifold System with collection rack for 16 x 100 mm sized test tubes, 10mL/15mL SPE Tube Rack, and Pre-Drilled Waste Container	VMFPPM16

*For use of complete Positive Pressure Manifold System, PPM installation kit must also be purchased.

POSITIVE PRESSURE MANIFOLD ACCESSORIES

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Description	Units	Part Number
PPM Installation Kit – 25' x 1/4" O.D. tubing, In-line air filter with bracket, 2 quick connect fittings, 2 screws, and regulator & gauge	1	VMFPPMIK
10 & 15 mL SPE Rack – Plate used to hold 10 mL and 15 mL SPE columns	1	VMFPPMRK10
Adapter Extraction Plate for 1 mL Columns – Conversion plate designed to hold 1 mL SPE Columns	1	VMFPPMRKA1
Adapter Extraction Plate for 3 mL Columns – Conversion plate designed to hold 3 mL SPE Columns	1	VMFPPMRKA3
Adapter Extraction Plate for 6 mL Columns – Conversion plate designed to hold 6 mL SPE Columns	1	VMFPPMRKA6
Collection Rack for 13 x 100 mm Test Tubes – Rack designed to hold test tubes that are 13 mm in diameter and 100 mm in length	1	VMFPPMCRKG13
Collection Rack for 16 x 100 mm Test Tubes – Rack designed to hold test tubes that are 13 mm in diameter and 100 mm in length	1	VMFPPMCRKG16
Waste Container – Pre-drilled for optional tubing attachment	1	VMFPPMWBND
Frit (Restrictor) Plate – Fritted plate that controls air flow, note there is one plate per row	1	VMFPPMFRPLT
Brown PPM Gasket – Seal used in contact of PPM to the extraction columns	1	VMFPPMGSKBL
Orange PPM Gasket – Seal used for frit plate	1	VMFPPMGSKOR
Hood to Tubing Adaptor – Designed to accommodate fume hood air source connection with provided PPM tubing.	1	VMFPPMHADP



PPM Installation Kit



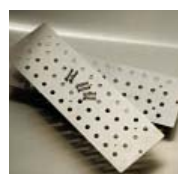
Collection Rack for 16 x 100 mm Test Tubes



10 & 15 mL SPE Rack



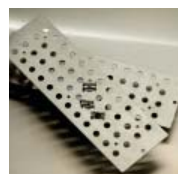
Waste Container



Adapter Extraction Plate for 1 mL Columns



Frit (Restrictor) Plate



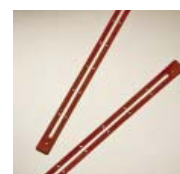
Adapter Extraction Plate for 3 mL Columns



Brown PPM Gasket



Adapter Extraction Plate for 6 mL Columns



Orange PPM Gasket



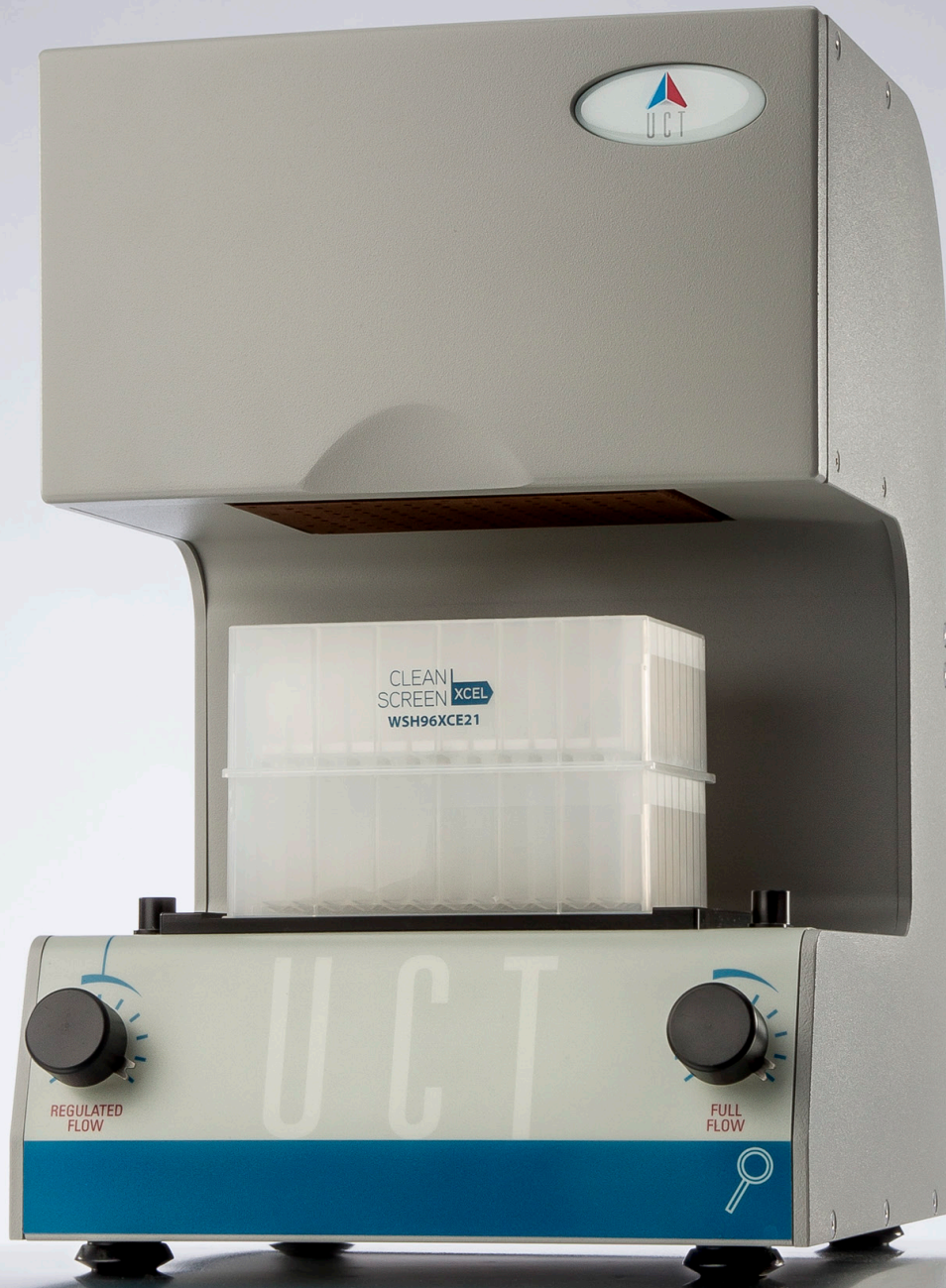
Collection Rack for 13 x 100 mm Test Tubes



Hood to Tubing Adaptor



Quickly process up to
96 samples at one time



96 WELL PLATE POSITIVE PRESSURE MANIFOLD

96 WELL PLATE POSITIVE PRESSURE MANIFOLD

- Small instrument footprint (9" x 9" x 14") does not take up valuable bench space
- Accommodates a wide range of commercially available 96 well plates
- Works with both 96 and 48 well plates
- Restrictor plate allows even gas flow across all 96 wells – even when some positions are empty
- Two gas flow regulators on the front panel – one high flow regulator used for sorbent bed drying and one low flow regulator used for sample loading, washing, and eluting
- Positive pressure is well suited for viscous sample matrices
- Instrument gas regulator on the back can be set and locked into place
- Gas Supply: N₂ or compressed air regulated to 40 – 45 psi and filtered to 10µm
- All pneumatic – only a gas supply is needed, there are no electrical connections

PPM		
Part Number	Description	Unit
VMF96PPM	96 Well Plate Positive Pressure Manifold	Ea

Accessories		
Part Number	Description	Unit
VMFPPMIK	Installation kit (25' of ¼" O.D. tubing; 2 x ¼" compression fittings; 1 in-line air filter)	Kit
VMF96PPMGSK	Replacement Brown Gasket – 96 well plate manifold	Ea
WSH96WT	96 well waste collection plate	Ea
WSH96CP	96 well sample collection plate	Ea

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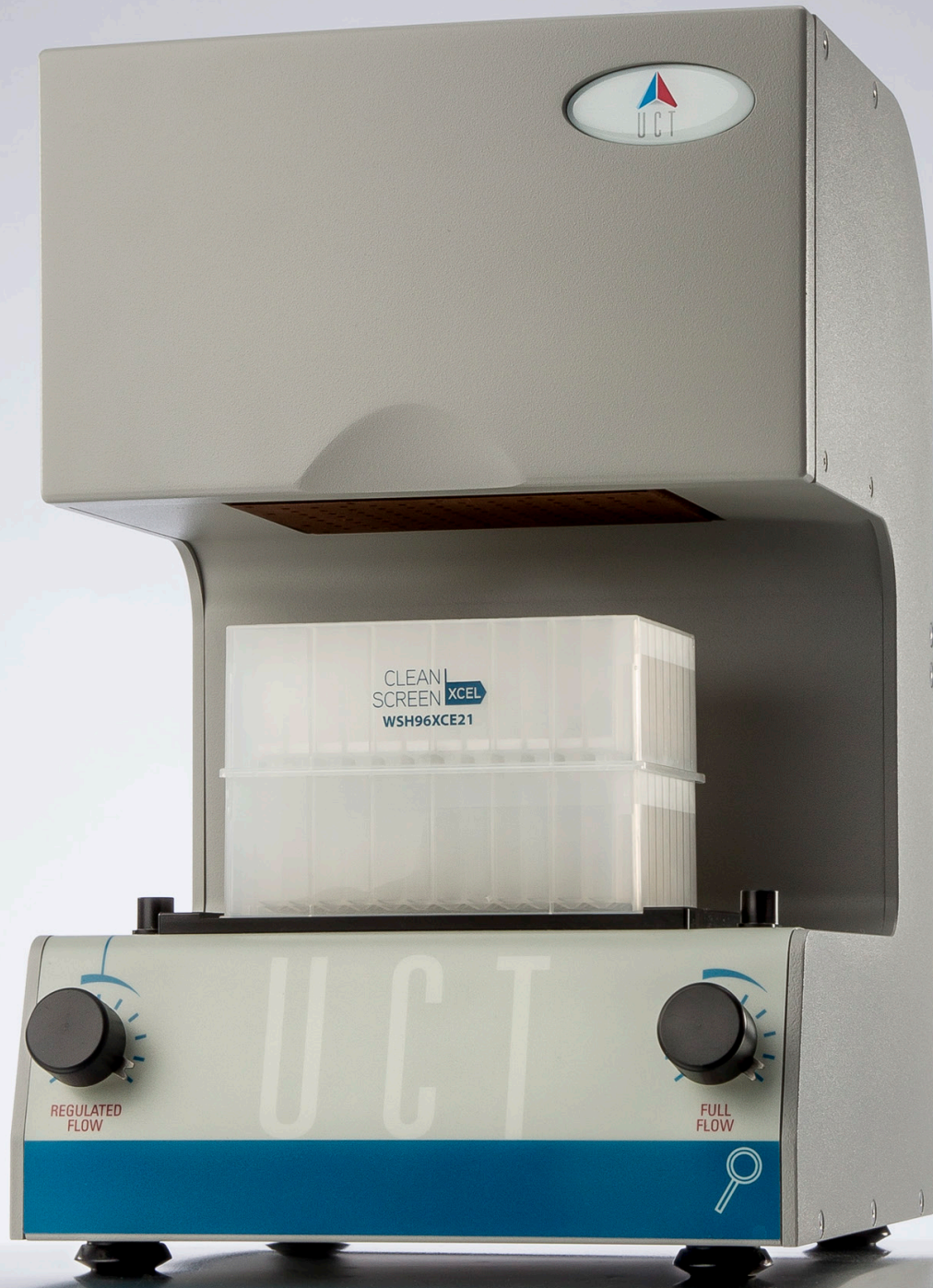


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96 WELL PLATE
POSITIVE PRESSURE MANIFOLD
OPERATING INSTRUCTIONS



96 WELL PLATE POSITIVE PRESSURE MANIFOLD OPERATING INSTRUCTION

Theory of Operation

The 96 Well Plate Positive Pressure Extraction Manifold (PPM) is a mechanical workstation that is used to facilitate the process of sample preparation using a 96 well plate. The PPM utilizes pressurized gas (i.e. compressed nitrogen or air) to move sample solvent through each SPE well at a controlled rate of flow. The PPM has two (2) adjustable regulators designed with restrictors to allow a fine (lower) (Regulated Flow) and a coarse (higher) (Dry / Full Flow) adjustment during the extraction procedure.

SHIPPING CONTENTS

(1) 96 well plate Positive Pressure Manifold (UCT Part#: VMF96PPM)

ACCESSORIES REQUIRED FOR OPERATION

- ¼" O.D. plastic rigid tubing rated for a minimum of 80 to 100 psi.
- Clean Gas source (Nitrogen or Air) available at 40 to 60 psi.
- ¼" compression fitting for attachment to gas source.
- In-line gas filter (optional - suggested if using unfiltered compressed gas.)

DESCRIPTION OF PPM UNIT & CONTROLS

Dimensions of unit: The positive pressure manifold is 9" wide, 9" deep, and 14" high.

Regulator – This knob is located on the back of the system. It regulates the total flow of gas entering the unit. The regulator should be set between 40 and 45 psi. Excess pressure is vented out of the instrument in order to avoid damage to the equipment.

Raise and Lower switch - This switch is located on the right hand side of the sample shelf. It is used to lower and raise the restrictor plate into proper position during sample preparation. Pressurized gas moves the plate up and down depending on the switch position.

Dry / Full Flow Adjustment Knob – This knob is located on the front of the base on the right hand side. This knob can generally be set between the 5th & 8th hash marks. This allows a generous flow of gas from the regulator to flow through the well plate. This function is used for drying the sorbent prior to sample elution. To adjust the gas flow turn the right hand knob counterclockwise to increase flow and clockwise to decrease the gas flow.

Fine Flow Adjustment – This knob is located on the front of the unit on the left hand side. This gauge is considered a 'fine adjustment' because it has a restrictor which will not allow excessive flow through the manifold plate. The adjustment knob is used to regulate the flow during the sample load and analyte extraction portions of the procedure. To adjust, turn the knob counterclockwise to increase and clockwise to decrease the gas flow to the desired rate.

The fine flow should be adjusted to obtain a flow rate between 1-2 mL/ minute. A flow rate of 1 mL/min is about 1 drop per minute. You can determine the drip rate looking at the base of the collection plate. You should be able to see the splash as each drip hits the bottom. With an aqueous sample solution this flow is generally achieved with the dial set between the 5th and 7th hash marks.

On-Off Switch - This switch is located on the left hand side of the sample shelf. The on and off switch cuts off pressure to the regulated flow. The pressure is always on when the restrictor plate is lowered.

USING THE MANIFOLD FOR EXTRACTION

- After connecting the ¼" gas line to the back of the manifold (quick hose connect), adjust the pressure to between 35-45 psi from the gas source. Test the manifold's restrictor plate lift and lowering mechanism by switching the 'Raise / Lower' toggle switch. The plate should lower and raise as the toggle switch is adjusted. There will be a low hissing sound from the pneumatic piston system.
- A 96 well plate should be placed on top of a 96 well waste collection plate. The unit should then be placed into the black holder on the base of the PPM. The collection plate and 96 well plate should be pushed back until it bumps into the back wall of the plate holder. This will ensure that the reservoirs are lined up over the holes in the PPM.
- With the 96 well plate and waste container in place, the restrictor plate can be lowered onto the 96 well plate. This will create a seal.
- After the sample load and wash step are completed the 96 well waste plate is replaced with a 96 well sample collection plate. With the sample collection plate installed the 96 well plate set up is ready for sample elution.
- All reservoir conditioning, sample loading, wash solvents, and elution solvents are applied off-line from the unit.

MANIFOLD MAINTENANCE

- The manifold requires regular upkeep to preserve the full functionality of the unit.
- Daily cleaning of any solvent or spills (as needed) on any of the manifold surfaces is suggested. Use solvents such as Methanol, Water, or Iso-propanol to wash the surface of the manifold. It is recommended to use water first followed by an alcohol to help dry the unit.
- Ensuring clean air (free of oil, water, and particulates) is important for the manifolds proper function. The in-line air filter (UCT Part#: **VMFPPMRAF**) should be monitored for condensation or other contamination issues. If the filter looks worn or filled with water, replacement is required.
- It is recommended that the brown gasket (UCT Part#: **VMF96PPMGSK**) at the bottom of the restrictor plate be replaced every 6 months. Gasket Replacement:
 1. Lower the restrictor plate
 2. Turn off the gas to the manifold unit
 3. Using a 7/64" Allen Wrench loosen the 2 set screws on the right hand side of the restrictor plate. Turn the screws clockwise to loosen.
 4. Slide the entire restrictor plate forward until it comes free of the manifold.
 5. Ensure that the black o-ring on the top of the restrictor plate does not come loose or fall out.
 6. Peel the old gasket from the bottom of the restrictor base.
 7. Remove the backing from the new gasket.
 8. Line up the holes in the gasket with the holes in the base of the restrictor plate and stick the new gasket to the base; ensure that there are no wrinkles in the gasket.
 9. Slide the restrictor plate back into position. The black o-ring should be towards the rear of the manifold. Tighten the set screws.
 10. Turn the gas flow to the manifold back on.
 11. The manifold is now ready for use.

96 WELL PLATE POSITIVE PRESSURE MANIFOLD



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- Small instrument footprint (9" x 9" x 14") does not take up valuable bench space
- Accommodates a wide range of commercially available 96 well plates
- Works with both 96 and 48 well plates
- Restrictor plate allows even gas flow across all 96 wells – even when some positions are empty
- Two gas flow regulators on the front panel – one high flow regulator used for sorbent bed drying and one low flow regulator used for sample loading, washing, and eluting
- Positive pressure is well suited for viscous sample matrices
- Instrument gas regulator on the back can be set and locked into place
- Gas Supply: N₂ or compressed air regulated to 40 – 45 psi and filtered to 10 μm
- All pneumatic – only a gas supply is needed, there are no electrical connections

96 WELL PLATE PPM		
Part Number	Description	Unit
VMF96PPM	96 Well Plate Positive Pressure Manifold	1
Accessories		
Part Number	Description	Unit
VMFPPMIK	Installation kit: 25' x 1/4" O.D. tubing, In-line air filter with bracket, 2 quick connect fittings, and 2 screws	Kit
VMF96PPMGSK	Replacement Brown Gasket – 96 well plate manifold	1
WSH96WT	96 well waste collection plate	1
WSH96CP	96 well sample collection plate	1