



# Positive Pressure Manifold

## Positive Pressure Manifold 96 SPE



SPE 144



SPE 48

### System 96 Positive Pressure Manifold

Athena 96 Positive Pressure Manifold for 96 well plates arrayed in the 8 x 12 micro-plate pattern.

### System 48 Positive Pressure Manifold

Athena48 Positive Pressure Manifold can accommodate 1 - 48 columns, of 1cc, 3cc or 6cc columns.

### Positive Pressure Solid Phase Extraction:

SPE cartridge are used in a broad variety of labs, hospitals and toxicology service labs performing medicolegal drug testing, CRO's for bio analytical / bio equivalence studies and food contaminants testing labs. The manual process is very labour intensive and makes operators prone to RSI. Human errors lead to lower TAT, more repeat tests and therefore higher costs and overall lowered lab efficiency. Moreover, operators are exposed to hazardous solvents posing health risks. 144 positive pressure processor for solid phase extraction columns 48 positive pressure processor for solid phase extraction columns uniform flow across all columns uniform flow across all columns high end positive pressure manifold higher pressure. Up to 80 PSI more effective on difficult matrices such as oral fluid, viscous urines or whole blood active drying of the SPE bed to facilitate complete dryness

### Features:

- Decreased variation in column processing, improved analyte recovery reproducibility formatted for SPR ware microparticulate sorbents
- Vacuum manifolds max out at 1 atmosphere
- Further improves ruggedness of methods and produces more reproducible methods
- Increased flexibility in method optimization
- Manifold available in 48, 96 place formats
- Reduced run to run variability, reduced operator variability
- More reproducible methods with reduced risk of errors
- Programmable pressure profiles
- Electronic, programmable flow control

- Positive Pressure manifold provides uniform flow for all extraction steps.
- All positions are individually restricted to provide even pressure to each column.
- Even flow can be maintained if you are using one or all positions.
- Dual pressure regulators.
- Allows users to set 2 different pressures for extraction and column drying.
- Uniform drying of extraction column bed is achieved by flowing nitrogen or air at 25 psi.
- Optional Heated Manifold

### Features and Advantages

- Highly uniform flow from sample to sample for SPE, Protein Precipitation and Supported Liquid Extraction
- Improved reproducibility, accuracy and extraction efficiency, even with viscous samples
- Parallel processing for increased sample throughput
- Easy to set-up and use with just a gas source
- Universal designs accommodate all 96 well plates, or 1 mL, 3 mL and 6 mL SPE columns
- Built-in safety features ensure ease of use and safe operation

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### Manufacturer of Positive Pressure Manifolds

#### Modular Rack System

By using stackable collection racks and extraction racks on the Athena SPE 48 96 manifold, many combinations are possible to accommodate varying methodologies. Racks only fit the system in one direction, ensuring consistent processing throughout.

#### Ease of Use

The intuitive SPE is easily incorporated into laboratory work flow. Simply stack 96 well plates and collection plates or column rack and collection racks on the platform tray using the positioning markers and slide the tray under the gasket until it hits the stop. Rocker switches pressed simultaneously on the side/front of the unit lowers the gasket and compress it onto the plates/columns.



## Positive Pressure Manifold 144 SPE

- No of position: 144 individually regulated
- No of Rows : 12
- SPE cartridge size : 1 mL, 3mL
- Standard with equipment : 1 mL
- SPE sizes can be switched between each size by changing the adapter plate
- # Dual setting allow users to set different pressure for extraction and column drying.
- # 2 Collection Rack for specific test tubes size
- # Includes waste reservoir with stopcock assembly to allow for direct drainage of waste.
- # Single switch raises and lowers the sample racks and creates an airtight seal.

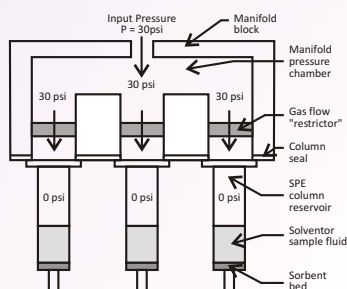
## Positive Pressure SPE Manifold

The ATHENA 48, 96 & 144 Positive Pressure SPE Manifold provides a means to batch process solid phase extraction columns in the 48, 96 & 144-position format. Using positive pressure to push liquid samples through SPE columns is a more efficient process than using vacuum. Positive pressure provides more even flow and flow control of liquids going through a SPE column.

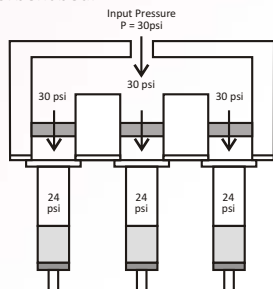
Each of the 48, 96 & 144 holes in the Processor manifold are restricted in order to maintain the manifold pressure even if all of the positions are not filled by columns. In addition there are valves located on top of the manifold that shut off individual rows of 12. With no column in place, there is approximately 0.75 +/- .05 scfh of flow through a hole at 25 psig. The principle of the restrictor manifold design is discussed in the following diagrams.

### Positive Pressure control "with flow restrictors"

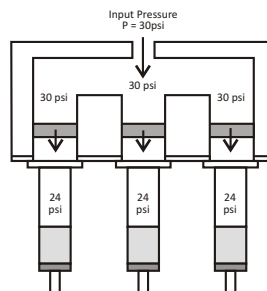
**Fig. A:** Initial state. Manifold pressure builds to controller set pressure. The effect of the restrictors is minimal in limiting flow from manifold to column reservoir. Reservoirs start at atm ospheric pressure.



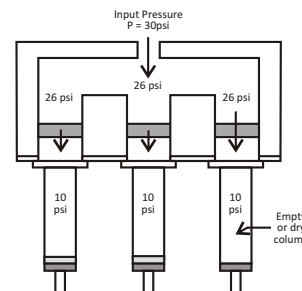
**Fig. B:** Shortly after the initial state, the pressure builds in the column reservoir due to the fluid being held up by the flow characteristics of the column sorbent bed. Restriction still has minimal effect. Eventually the pressure builds enough to overcome the fluid flow resistance and the fluid begins to pass through the sorbent bed.



**Fig. C:** Depending on flow characteristics of column sorbent bed, pressure in column reservoir stabilizes.



**Fig. D:** When fluid passes through (one or more columns) completely, and there is minimal pressure drop across the column bed, the effect of the restrictor is maximized. The restrictor becomes the primary flow inhibitor of the gas as it passes through the column to the atm osphere.

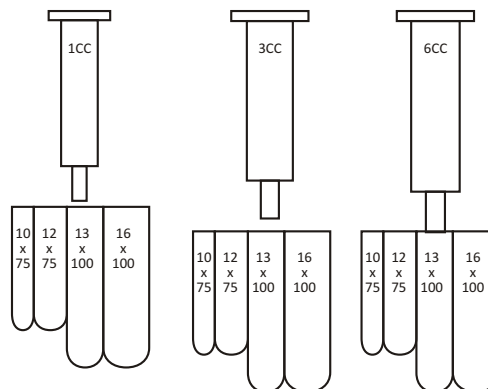


Inhibiting the flow with the constrictors at this time is helpful in two ways: (1) *the amount or gas* used is minimized as compared to system with no inhibitors. (2) *the pressure remains high* in the columns containing liquid as compared to the empty or dry columns.

The ATHENA column racks interface to several collection tube racks which are also in the 48, 96 & 144 position format. Depending upon the volume of the effluent, the appropriate collection rack can be selected from the ancillary products available with the Pressure Processor.

The processor collection tube racks are optimally designed for 75mm or 125mm high collection tubes. Ancillary collection racks are available to accommodate common collection tube sizes (Auto sampler vial racks, 10x75, 12x75, 16 x 100 and 16x125).

### Standard SPE Column & Collection Tube Combinations...



The waste bin and tube racks are physically keyed to the platform by three elevated pins on the platform that recess into the bottom of the rack. When installed appropriately, the racks should sit level on the platform.

ATHENA 48,96 & 144 column racks are keyed to the collection racks so that sample position is preserved throughout the SPE sequence. The column rack is then positioned directly on top of the waste bin or collection tray. Note that when appropriately placed, the stack should sit level on the platform. For each extraction step, slide the platform toward the back until it stops on the guides.

All collection racks are compatible with the system 48, 96 & 144 sample concentrator, allowing for samples to be placed in the concentrator without the timely transfer of samples from rack to rack.

### COLUMN COMPRESSION & DECOMPRESSION

The Processor is designed to accept up to 48, 96 & 144 columns installed in the column rack. Because of the unique manifold design, each column will be pressurized to the same level even if columns are omitted. Refer to "Manifold Operation" in the following section.

Assemble the appropriate collection rack and SPE column rack and position the assembly on the System 48 Pressure Processor slide platform. Slide the platform to the rear of the processor until it reaches the stop locating it under the manifold.

The two blue push buttons used to activate the compression mechanism are located on opposite sides of the front panel. Both push buttons must be pressed at the exact same time to open or close the compression mechanism. Activate the column compression mechanism by depressing the push buttons until the manifold has stopped moving (2 to 3 seconds). If you let go too soon the manifold mechanism will automatically open. This is a safety feature designed to keep your hands clear of moving parts during the compression and decompression cycle.

Decompression of the rack assembly is activated similarly. Both push buttons must be depressed simultaneously until the manifold has stopped moving. Slide the rack assembly forward until it reaches the stop and proceed with the next step of the SPE method.

The compression speed is pre-set and is not adjustable. The pressure applied to the compression system is pre-set and is not adjustable.

## SPE Processor

Solid Phase Extraction is today's chosen method of sample Preparation across all Bio-Analytical and Bio-Equivalence studies Laboratories and even Food Assay Laboratories, Toxicological Testing Laboratories.

Modular rack design, allowing quick interchangeability between 1 ml, 3 ml and 6 ml columns, eluting into 12 x 75 mm, 13 x 100 mm, and 16 x 100 mm test-tube racks respectively.

Several Techniques of speeding the Sample Preparation work have been designed and implemented, however the Positive Pressure Manifold for Solid Phase Extraction remains unmatched in speed, uniformity, ease of operation and convenience to the user.

Improved Processing of Viscous Samples: Our machine is capable of processing analyte samples with varying viscosities by allowing for gas pressures of 30 psi and providing a greater motive force for the samples. Based on the sample viscosity, the applied pressure can be easily adjusted using the dual pressure regulators on the front of the machine to provide smooth flow response and control.

SPE Sample processing by positive pressure significantly improves the flow of viscous samples like plasma/serum through SPE packed bed by providing highly uniform flow from tube to tube which will ultimately improve the reproducibility of analytes SPE recoveries.

## Positive Pressure Manifold 144 SPE



**144 SPE Processor  
Rack Compatible to  
144 N2 Evaporator  
SPE-144 Rack Fit to  
144 Evaporator**

### SPE MANIFOLD POSITIVE PRESSURE 144 POSITION

- Dual settings allow users to set different pressure for extraction and column drying.
- 2 Collection Rack for specific test tubes size
- Includes waste reservoir with stopcock assembly to allow for direct drainage of waste.
- Single switch raises and lowers the sample racks and creates an airtight seal.
- Waste bin rack with 2 waste bin inserts
- 12 x 75mm tube collection rack (Same Rack compatible to 144 N2 Evaporator)
- Wiki pressure gauges for high & Low Pressure
- Positive Pressure manifold provides uniform flow for all extraction steps.
- Allows users to set 2 different pressures for extraction and column drying.
- Uniform drying of extraction column bed is achieved by flowing nitrogen or air at 25 psi.



SPE 144 Rack is compatible and easily fit to 144 Nitrogen Evaporator

The 12 x 75 mm 4ml vial collection tube same can be fit to Nitrogen Evaporator to save time and process will be faster.

#### Other Details:

SPE sizes can be switched between each size by changing the adapter plate

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Athena SPE Positive Pressure Solid Phase Extraction Unit is the new addition to our systems designed for Clinical Research Units. Working seamless with our 144 position Athena's Nitrogen Evaporator, users can have higher productivity and uniform batch



## ATHENA TECHNOLOGY

141, Lodha Boulevard Mall, Lodha Paradise, Majiwada, Thane (W)-400 601. Mumbai, INDIA  
Mob: +91 - 97690 47445 / 81693 92733 / 98214 88400 / 88795 53181 / 88799 02481  
Email: [info@athenatechnology.co.in](mailto:info@athenatechnology.co.in) / [technology.athena@gmail.com](mailto:technology.athena@gmail.com)  
Web: [www.athenatech.in](http://www.athenatech.in) • [www.athenatechnology.co.in](http://www.athenatechnology.co.in) • [www.athenatechs.in](http://www.athenatechs.in)  
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