# PCXR8 Universal Sample Pump
## Cat. No. 224-PCXR8
## Operating Instructions

863 Valley View Road, Eighty Four, PA 15330 • 724-941-9701 • skcinc.com

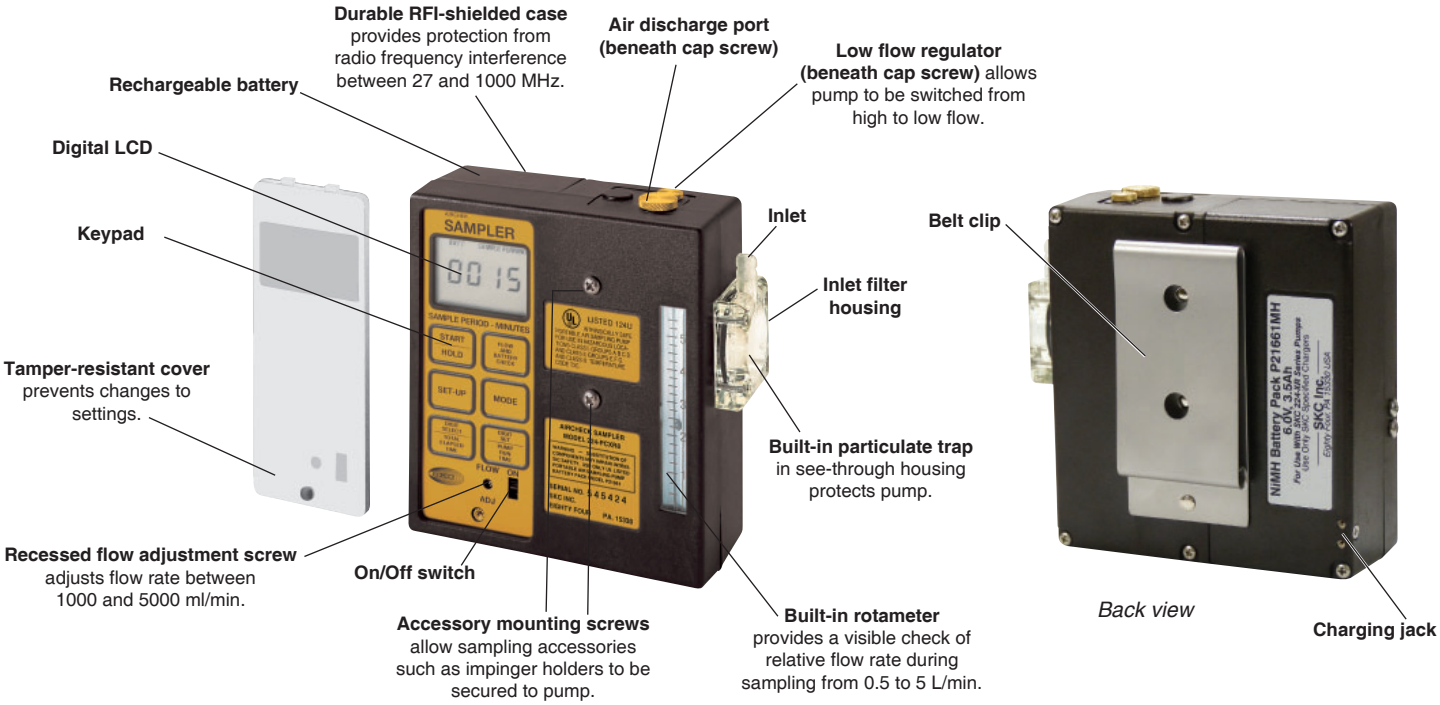



***Figure 1.*** *Front and Back Views of PCXR8 Universal Sample Pump*

# Introduction

## Description

The PCXR8 Universal Sample Pump (*Figure 1)* is a constant flow (from 5 to 5000 ml/min) air sampler suitable for a broad range of applications. It is ideal for industrial hygiene studies as well as environmental testing.

## Checking Pump/Kit Contents

Use the table below to verify that you received all items associated with the Cat. No. ordered. If you are missing items, contact SKC at 800-752-8472 (U.S. only) or 724-941-9701.

| If You Ordered Cat. No. | Your Package Should Contain |
|---|---|
| **224-PCXR8** | Universal PCXR8 Sample Pump with NiMH battery pack and screwdriver set |
| **224-PCXR8KD** | Single Universal PCXR8 Pump Kit with pump, NiMH battery pack, screwdriver set, single charger, filter cassette holder, adjustable tube holder with Type A protective tube cover, exhaust port fitting, and nylon carry case |
| **224-PCXR8K5D** | 5-pack Universal PCXR8 Pump Kit with 5 each: pumps with NiMH battery pack, screwdriver sets, 100-240 V single chargers, filter cassette holders, adjustable tube holders with Type A protective tube covers, exhaust port fittings, and hard-sided carry case |

## Required Equipment/Media

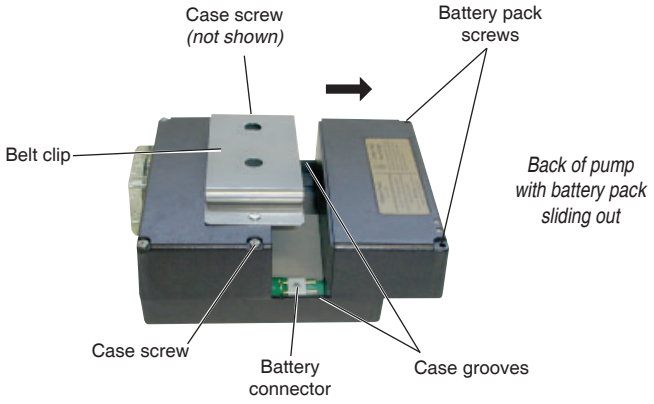
- ☑ **1/4-inch ID tubing**
- ☑ **PowerFlex® Charger**
- ☑ **Low flow accessories** if sampling at 5 to 500 ml/min. *See Accessories.*

# Getting Started

## Install the Battery Pack

**To enhance battery life, SKC ships battery packs separately from the pump. Once installed, completely charge the battery pack before operating the pump.**

1. Remove the two screws that secure the battery pack and loosen the two case screws above and below the belt clip.
2. Carefully slide the battery pack out from under the belt clip. Ensure that the battery is kept level.
3. Slip the front edge of the new battery pack under the belt clip and position the battery pack to engage the grooves in the case.
4. Slide the battery pack toward the pump until it is flush with the pump case on all sides.
5. Reinstall two battery screws and tighten the case screws loosened in Step 1.
6. Charge the battery completely. *See Charge the Battery Pack.*
   ***Note:*** *For optimum charge, ensure the pump is not running during charging.*

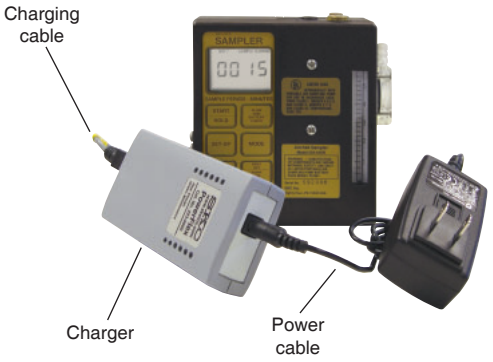



## Charge the Battery Pack

1. Activate the charger. *Follow PowerFlex Operating Instructions 37783.*

**For optimum charge, ensure that the pump is not running.**

2. Insert the charging cable connector into the charging port on the charger.
3. Insert the charging plug end of the cable into the jack on the back of the pump's battery pack *(Figure 1).*
4. Charge the battery completely (the LED at the port connected to the pump is a steady green) before using the pump.
5. Disconnect the charging cable from the back of the pump's battery pack.




*Charging train with single PowerFlex charger*

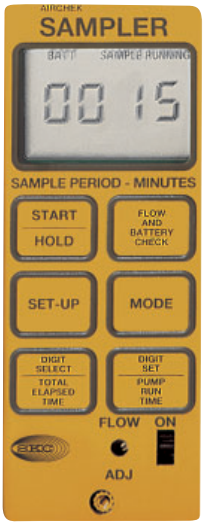
## Notes and Cautions

- To comply with intrinsic safety regulations, do not charge or operate the pump from the charger in hazardous locations.
- Using a non-approved charger voids any warranty.
- Using a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.
- Using any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.
- Ensure proper orientation of charging cable before plugging it into the charging jack. Improper orientation/contact will short-circuit the battery and voids any warranty.
- Short-circuiting the battery pack will render it immediately inoperative.
- Failure to follow warnings and cautions voids any warranty.
- The battery pack may be kept on the SKC-approved charger for an indefinite time.

***For more information on SKC pump battery packs, visit the Knowledge Center at www.skcinc.com.***

## Use the Keypad to Program Delayed Sampling

| Setting | Press Keys in this Sequence to Set Up | Press to Advance | Press to Stop | To Clear Setting |
|---|---|---|---|---|
| **Delayed Start** (Counts down to sample start) | *With pump turned on at the switch:* Hold, Set-up, Digit Set/ Digit Select (set time length) | Mode (advances to Sample Period) | Automatically ends and sampling starts | Turn pump off and then on |
| **Sample Period** (Total elapsed time from start to stop, including Pump Period, Delayed Start, Hold, and/or Flow Fault) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/Digit Select (set time length) | Mode (advances to Pump Period) | N/A | Turn pump off and then on |
| **Pump Period** (only the time the pump is actively running, does **not** include Hold or Flow Fault) | Hold (if pump is running), Set-up, Mode until Pump Period displays, Digit Set/Digit Select (set time length) | Mode (returns to Delayed Start) | N/A | Turn pump off and then on |



*PCXR8 Keypad*

## Turn Pump Power On/Off *(Figure 1)*

**Turn on:** Remove the tamper-resistant cover. Move the on/off switch to ON.

**Turn off:** Move the on/off switch to OFF.

## Use the Pump with AC Power (Power option in non-hazardous locations)

**Do not use the pump with the Battery Eliminator in hazardous locations. UL Listing for intrinsic safety is not in effect during pump operation with Battery Eliminator.**

The Battery Eliminator is an accessory that converts alternating current (AC) to direct current (DC) from which the pump can be operated for extended runs. **The Battery Eliminator should be used in non-hazardous locations only.** *See Accessories.*

1. Remove the battery pack from the pump. *See Replace the Battery Pack.*
2. The Battery Eliminator is comprised of two pieces, a wall cube and a power adapter. Plug the wall cube into a standard wall outlet and insert its plug end into the power adapter.
3. Fit the power adapter on the pump in place of the battery pack.

# Operation

## High Flow Applications (1000 to 5000 ml/min)

### Deactivate the Regulator for High Flow

1. To ensure the pump is set for high flow, remove the cap screw *(Figure 1)* covering the regulator valve and turn the exposed screw **clockwise** until it stops. Do not overtighten. *See right.*

2. Replace the cap screw. The pump is now set for high flow.

*For high flow, turn regulator valve screw clockwise.*

### Set/Verify Flow Rate

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *Verify flow rate through sampling train using procedure below before and after each sampling operation.*

1. Ensure that the battery is fully charged and that the pump has run for five minutes before verifying flow rate. Leave the pump running.

2. Press Start/Hold and then press Flow and Battery Check.

3. Adjust flow using the flow adjustment screw until the built-in rotameter indicates 2 L/min. The LCD should show BATT OK in the upper left corner. If it does not, recharge the battery.

4. Press Flow and Battery Check again to place the pump in Hold.

5. Prepare the flowmeter *(see flowmeter instructions)*.

6. Set up a flow rate verification train (*Figure 2*): Using flexible tubing, connect the flowmeter outlet (suction port) to the representative sampling medium inlet. Using 1/4-inch Tygon tubing, connect the representative sampling medium outlet to the pump inlet.

7. Press Flow and Battery Check to start the pump. Set the flow rate using the flow adjustment screw *(Figure 1)* until the flowmeter indicates the method-specified flow rate. Take a minimum of three readings and record the average flow rate, as per OSHA/NIOSH instructions.

8. When flow rate verification is complete, press Flow and Battery Check to place the pump in Hold and disconnect the flowmeter.


***Figure 2.*** *Flow Rate Verification Train with Filter Cassette*

## Set Up/Sample

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Protect sample pump from weather when in use outdoors.*
- *Powering the pump with any device other than the approved battery pack voids the UL Listing for intrinsic safety.*
- *Do not use the pump with the Battery Eliminator in hazardous locations. UL Listing for intrinsic safety is not in effect during pump operation with Battery Eliminator.*
- *Use of any device other than the approved battery pack or Battery Eliminator to power the pump voids any warranty.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *Verify flow rate through sampling train (see Set/Verify Flow Rate) before and after each sampling operation.*
- *For delayed sampling, see Use the Keypad to Program Delayed Sampling.*
- *See User Options During Sampling and Programming Intermittent Sampling table.*

*Clip sampling medium to worker and pump to belt.*

1. Replace the representative sampling medium used for flow rate verification with an unexposed medium for sample collection.

2. Place the sampling medium where appropriate for sampling.
   a. **For personal sampling,** clip the sampling medium to the worker in the breathing zone. *See above right.*
   b. **When using impingers, an in-line trap (SKC Cat. No. 225-22 or 225-22-01) is required to prevent fumes from accidentally being drawn into the sampler.** Place the in-line trap between the pump and the impinger. Mount the impinger and trap to the face of the sampler using the accessory mounting screws *(Figure 1)* or place them in a holster at the worker's waist.

*Impinger holder on pump with impinger and trap*

**Failure to use an appropriate in-line trap during impinger sampling voids any warranty.**

   c. **When using the pump for pressure applications such as bag sampling,** thread the exhaust port fitting supplied with the pump into the air discharge port on top of the pump *(Figure 1)*; hand-tighten only. Using PTFE tubing, connect the inlet of the sample medium (e.g., sample bag) to the exhaust port fitting on the pump. Turn on the pump to collect the appropriate volume of air. Shut off the pump and close inlet on sample medium to stop sampling.

*Thread exhaust port fitting into air discharge port on pump.*

3. With the LCD displaying HOLD, start sampling by pressing Start/Hold *(Figure 1)*. If a delayed start has been programmed, DELAYED START will flash on the LCD and the amount of time remaining until sampling starts will count down. SAMPLE RUNNING will be displayed when the delay sequence ends. Record the start time. The elapsed sampling time will be shown on the LCD.

4. At the end of the sampling period, press Start/Hold and record the stop time.

5. Seal the sample and send it with blanks and pertinent sampling information to a laboratory for analysis.

6. Verify the flow.
   a. Press Start/Hold to turn on the pump and reinstate the flow rate verification train (*Figure 2*).
   b. Take three readings and record the average value as the post-sample flow rate. **Do not adjust the pump flow rate during this step.**
   c. Compare the pre and post-sample flow rates. Note in sampling documentation if the values differ by more than ± 5%.

**Programming Intermittent Sampling**

| Program Option | Press Keys in this Sequence to Set Up | Press to Activate | Pump Display During Program | Press to Stop | To Cancel Program | Notes |
|---|---|---|---|---|---|---|
| **Continuous Run** (No setting required; may be used with Delayed Start) | None | Start (if pump is in Hold or Delayed Start is programmed) or turn pump on at switch | If Delayed Start: Countdown to start | Hold | N/A | Not a program |
| **Timed Run** (Set Sample Period to **equal to or less than** Pump Period; may be used with Delayed Start) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/Digit Select to a value **equal to or less than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **equal to or greater** than Sample Period | Start | | Automatically goes to Hold when timed run is completed, LCD will display "Sample Over" | Turn pump off and then on | Runs for the set Sample Period |
| **Intermittent Run*** (Set Sample Period to **greater than** Pump Period; may be used with Delayed Start; Hold is **not** an option) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/ Digit Select to a value **greater than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **less than** Sample Period | Start | | Automatically goes to Hold when intermittent run is completed, LCD will display "Sample Over" | | Calculates "on" and "off" cycles over the Sample Period beginning with first "on" for a total pump "on" time equaling the set Pump Period |

* For intermittent sampling, elapsed time maximum is 9999 minutes (6.8 days), at which time sample pump will shut down.

**User Options During Sampling**

**Pause -** Pause (shutdown) the pump by pressing Start/Hold. All timing data will freeze. To resume sampling, press Start/Hold; timing data will resume.

**Flow or Battery Fault Shutdown -** If the pump is unable to compensate due to excessive back pressure or a low battery condition exists, the sampler will shut down. HOLD will display on the LCD and timing functions will pause but continue to display elapsed time. LO BATT or FLOW FAULT will display on the LCD depending on the cause of the shutdown. Fifteen seconds after flow fault shut down, the pump will attempt to restart up to five times. To restart from flow fault, correct the blockage and press Start/Hold. If LO BATT is displayed, recharge the battery before sampling.

**Display Times -** Elapsed sampling period is continuously displayed on the LCD. Press and hold Pump Run Time *(Figure 1)* to display pump run time. Press and hold Total Elapsed Time *(Figure 1)* to display total elapsed time, including delayed start time.

## Low Flow Applications (5 to 500 ml/min)

### Activate the Regulator for Low Flow

1. Start the pump using the on/off switch. Press Start/Hold and then press Flow and Battery Check. Adjust the flow rate by turning the flow adjustment screw *(Figure 2)* until the built-in rotameter reads approximately 1.5 L/min. The LCD should show BATT OK in the upper left corner. If it does not, recharge the battery. Press Flow and Battery Check to place the pump in Hold.

2. Remove the cap screw covering the regulator valve and turn the exposed screw four to five turns **counterclockwise.**

3. Replace the cap screw. The pump is now set for low flow.

*For low flow, turn regulator valve screw counterclockwise.*

### *Using Single Adjustable Tube Holder (Figure 3)*

### Set/Verify Flow Rate for Single Tube

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *Verify flow rate through the sampling train using the procedure below before and after each sampling operation.*

1. Ensure that the battery is fully charged and that the pump has run for five minutes before verifying flow rate. Leave the pump running.

2. Ensure that the regulator has been activated for low flow and the pump flow rate is set at 1.5 L/min.

3. Prepare the flowmeter per flowmeter instructions.

4. Set up a flow rate verification train (*see below*).
   a. Connect the single adjustable tube holder to the pump inlet *(see below)* using 1/4-inch Tygon tubing.
   b. Insert an opened representative sorbent tube into the rubber sleeve *(Figure 3)* of the tube holder **with the arrow on the tube pointing toward the tube holder.**
   c. Using flexible tubing, connect the exposed end of the sorbent tube to the flowmeter outlet (suction port).

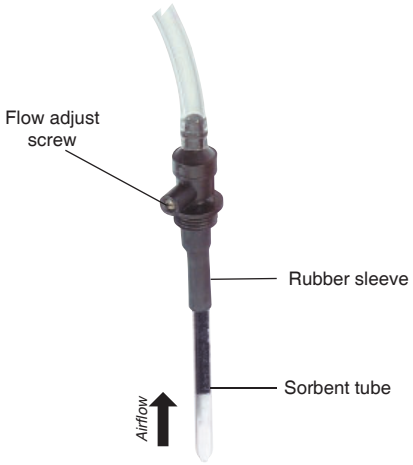
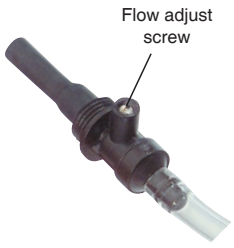



***Figure 3.*** *Single Adjustable Tube Holder with Sample Tube*

5. Loosen the brass flow adjust screw *(Figure 3)* on the tube holder. Adjust the flow rate by turning the flow adjust screw (**counterclockwise to increase, clockwise to decrease**) until the flowmeter indicates the desired flow. Take a minimum of three readings and record the average flow rate, as per OSHA/NIOSH instructions.

**Do not adjust the flow on the pump. Adjust the flow only by using the flow adjust screw on the low flow tube holder. Observe the flow rate on the flowmeter.**

6. When flow rate verification is complete, place the pump in Hold by pressing Flow and Battery Check and disconnect the tubing from the sorbent tube.




*Turn screw to adjust flow.*


*Flow rate verification train with tube in low flow tube holder*

## Set Up/Sample

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Protect sample pump from weather when in use outdoors.*
- *Powering the pump with any device other than the approved battery pack voids the UL Listing for intrinsic safety.*
- *Do not use the pump with the Battery Eliminator in hazardous locations. UL Listing for intrinsic safety is not in effect during pump operation with Battery Eliminator.*
- *Use of any device other than the approved battery pack or Battery Eliminator to power the pump voids any warranty.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *For delayed sampling, see Use the Keypad to Program Delayed Sampling.*
- *See Programming Intermittent Sampling table for options.*
- *Verify flow rate through sampling train (see Set/Verify Flow Rate for Single Tube) before and after each sampling operation.*

*Clip sample medium to worker and pump to belt.*

1. Replace the sorbent tube used to set the flow with a new unexposed sorbent tube for sample collection.
2. Place the appropriate size protective tube cover over the tube, and screw it into place on the tube holder. **For personal sampling,** clip the tube holder to the worker in the breathing zone. *See above right*.
3. While the LCD displays HOLD, start sampling by pressing Start/Hold. If a delayed start has been programmed, DELAYED START will flash on the LCD and the amount of time remaining until sampling starts will count down. SAMPLE RUNNING will be displayed when the delay sequence has ended. The elapsed sampling time will be shown on the LCD.
4. At the end of the sampling period, press Start/Hold and record the stop time.
5. Seal the sample and send it with blanks and pertinent sampling information to a laboratory for analysis.
6. Verify the flow.
   a. Press Start/Hold to activate the pump and reinstate the flow rate verification train and sampling media.
   b. Take three readings and record the average value as the post-sample flow rate. **Do not adjust the pump flow rate during this step.**
   c. Compare the pre and post-sample flow rates. Note in sampling documentation if the values differ by more than ± 5%.
7. To return to high flow, remove the tube holder and deactivate the regulator. *See Deactivate the Regulator for High Flow.*

***Note:*** *See User Options During Sampling under High Flow Applications - Set Up/Sample.*

### Programming Intermittent Sampling

| Program Option | Press Keys in this Sequence to Set Up | Press to Activate | Pump Display During Program | Press to Stop | To Cancel Program | Notes |
|---|---|---|---|---|---|---|
| **Continuous Run** (No setting required; may be used with Delayed Start) | None | Start (if pump is in Hold or Delayed Start is programmed) or turn pump on at switch | If Delayed Start: Countdown to start | Hold | N/A | Not a program |
| **Timed Run** (Set Sample Period to **equal to or less than** Pump Period; may be used with Delayed Start) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/Digit Select to a value **equal to or less than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **equal to or greater** than Sample Period | Start | | Automatically goes to Hold when timed run is completed, LCD will display “Sample Over” | Turn pump off and then on | Runs for the set Sample Period |
| **Intermittent Run*** (Set Sample Period to **greater than** Pump Period; may be used with Delayed Start; Hold is **not** an option) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/ Digit Select to a value **greater than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **less than** Sample Period | Start | | Automatically goes to Hold when intermittent run is completed, LCD will display “Sample Over” | | Calculates “on” and “off” cycles over the Sample Period beginning with first “on” for a total pump “on” time equaling the set Pump Period |

* For intermittent sampling, elapsed time maximum is 9999 minutes (6.8 days), at which time sample pump will shut down.

## Low Flow Applications (5 to 500 ml/min)

***Using Multiple-tube Adjustable Tube Holder (Figure 4)***

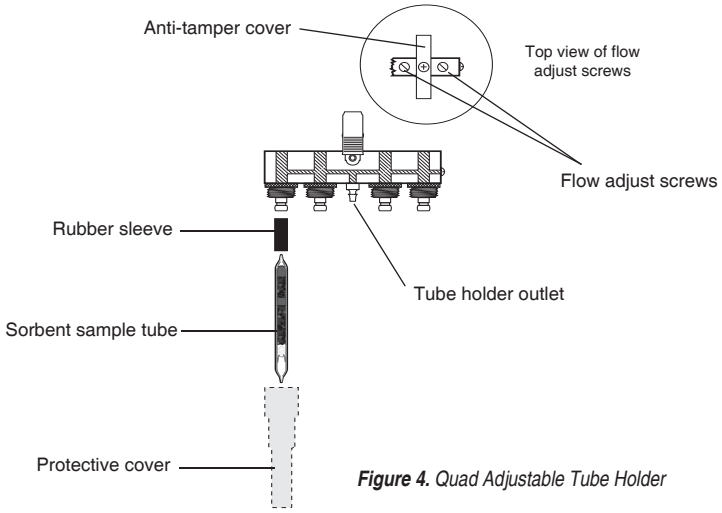



***Figure 4.*** *Quad Adjustable Tube Holder*

### Activate the Regulator for Low Flow

1. Start the pump using the on/off switch *(Figure 1)*. Press Start/Hold and then press Flow and Battery Check. Adjust the flow rate by turning the flow adjustment screw *(Figure 1)* until the built-in rotameter reads approximately 1.5 L/min. The LCD should show BATT OK in the upper left corner. If it does not, charge the battery. Press Flow and Battery Check to place the pump in Hold.
2. Remove the cap screw covering the regulator valve *(Figure 1)* and turn the exposed screw four to five turns counterclockwise. *See right.*
3. Replace the cap screw. The pump is now set for low flow.

*For low flow, turn regulator valve screw counterclockwise.*

### Set/Verify Flow Rate for Multiple Tubes

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *Verify flow rate through sampling train using the procedure below before and after each sampling operation.*

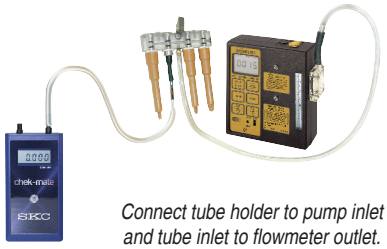
**Follow these important steps before proceeding:**

1. Ensure that the battery is fully charged and that the pump has run for five minutes before verifying flow rate. Leave pump running.
2. Ensure that the regulator has been activated for low flow and the pump flow rate is set at 1.5 L/min.
3. Calculate the sum of all tube flow rates. The maximum flow rate through any one tube is 500 ml/min.*
   a. If the sum is ≤ 1000 ml/min, set the pump flow rate to 1.5 L/min.
   b. If the sum is > 1000 ml/min, multiply that number by 0.15 and total the two numbers. Set the pump flow rate for the resulting new sum. (**Example:** Sampling with three sorbent tubes, each with a flow rate of 500 ml/min.* The sum of the tube flow rates is calculated as 3 x 500 = 1500. Determining a 15% higher flow rate is calculated as 1500 x 0.15 = 225. Calculating the final pump flow setting would be 1500 + 225 = 1725 ml/min.)

** Back pressure across some sample tubes can be higher than average. In these instances, the maximum flow rate of 500 ml/min may not be achieved.*

4. Prepare the flowmeter per flowmeter instructions.
5. Set up the flow rate verification train (*see right*).
   a. Connect the adjustable tube holder *(Figure 4)* to the pump inlet *(Figure 1)* using the attached 1/4-inch Tygon tubing. *See right*.
   b. Insert an opened sorbent tube into each rubber sleeve of the tube holder *(Figure 4)*. **Ensure that the arrow on each tube points toward the tube holder.**

**If sampling with fewer tubes than number of ports, insert unopened sorbent tubes in the empty ports to seal them.**




*Connect tube holder to pump inlet and tube inlet to flowmeter outlet.*

## Low Flow Applications, Multiple Tubes (Cont)

c. Using flexible tubing, connect the exposed end of the first sorbent tube to the flowmeter outlet (suction port).

6. Loosen and turn the brass flow adjust screw *(Figure 4)* on the port of the appropriate tube holder (**counterclockwise to increase, clockwise to decrease**) until the desired flow rate is achieved. ***Note:*** *For tri and quad models, first rotate each anti-tamper cover (Figures 4 and 5) to expose the flow adjust screws, then adjust the appropriate one until the flowmeter indicates the desired flow.*

**Do not adjust the flow on the pump. Adjust the flow only by using the flow adjust screw on the tube holder.**

**Do not exceed 500 ml/min flow rate per tube.**

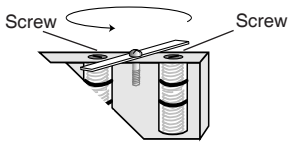



***Figure 5.***
*Cut-away of Tri/Quad Tube Holder*

7. Place the pump in Hold by pressing Flow and Battery Check. Disconnect the flowmeter from the tube and connect it to the next sorbent tube. Press Flow and Battery Check and repeat the flow adjustment process until all tubes are flow-verified. Changing the flow on one tube will not affect the flow rate through the remaining tubes.

8. When the flow rate is set for each tube, press Flow and Battery Check to place the pump in Hold and disconnect the flowmeter.

## Set Up/Sample

- *Allow pump to equilibrate after moving it from one temperature extreme to another.*
- *Protect sample pump from weather when in use outdoors.*
- *Powering the pump with any device other than the approved battery pack voids the UL Listing for intrinsic safety.*
- *Do not use the pump with the Battery Eliminator in hazardous locations. UL Listing for intrinsic safety is not in effect during pump operation with Battery Eliminator.*
- *Use of any device other than the approved battery pack or Battery Eliminator to power the pump voids any warranty.*
- *Charge pump battery completely before flow rate verification and sampling.*
- *Verify pump flow rate before and after each sampling operation using the tube holder and pump to be used for sampling.*
- *See Programming Intermittent Sampling table for options.*

*Clip holder to worker and pump to belt.*

1. Replace the sampling media used for flow rate verification with unexposed media for sample collection. Use protective tube covers to prevent tube breakage.

2. Place the sampling medium where appropriate for sampling. For personal sampling, clip the tube holder to the worker in the breathing zone. *See above right.*

3. While the LCD displays HOLD, start sampling by pressing Start/Hold. If a delayed start has been programmed, DELAYED START will flash on the LCD and the amount of time remaining until sampling starts will count down. SAMPLE RUNNING will be displayed when the delay sequence has ended. The elapsed sampling time will be displayed on the LCD.

4. At the end of the sampling period, press Start/Hold and record the stop time.

5. Seal the sample(s) and send with blanks and pertinent sampling information to a laboratory for analysis.

6. Verify the flow.
   a. Press Start/Hold and reinstate the flow rate verification train (*see Set/Verify Flow Rate for Multiple Tubes*).

   b. Take three readings and record the average value as the post-sample flow rate. **Do not adjust the pump flow rate during this step.**

   c. Compare the pre and post-sample flow rates. Note in sampling documentation if the values differ by more than ± 5%.

7. To return to high flow, remove the tube holder and deactivate the regulator. *See Deactivate the Regulator for High Flow.*

***Note:*** *See User Options During Sampling under High Flow Applications.*

### Programming Intermittent Sampling

| Program Option | Press Keys in this Sequence to Set Up | Press to Activate | Pump Display During Program | Press to Stop | To Cancel Program | Notes |
|---|---|---|---|---|---|---|
| **Continuous Run** (No setting required; may be used with Delayed Start) | None | Start (if pump is in Hold or Delayed Start is programmed) or turn pump on at switch | If Delayed Start: Countdown to start | Hold | N/A | Not a program |
| **Timed Run** (Set Sample Period to **equal to or less than** Pump Period; may be used with Delayed Start) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/Digit Select to a value **equal to or less than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **equal to or greater** than Sample Period | Start | | Automatically goes to Hold when timed run is completed, LCD will display “Sample Over” | Turn pump off and then on | Runs for the set Sample Period |
| **Intermittent Run*** (Set Sample Period to **greater than** Pump Period; may be used with Delayed Start; Hold is **not** an option) | Hold (if pump is running), Set-up, Mode until Sample Period displays, Digit Set/ Digit Select to a value **greater than** Pump Period, Mode until Pump Period displays, Digit Set/Digit Select to value **less than** Sample Period | Start | | Automatically goes to Hold when intermittent run is completed, LCD will display “Sample Over” | | Calculates “on” and “off” cycles over the Sample Period beginning with first “on” for a total pump “on” time equaling the set Pump Period |

* For intermittent sampling, elapsed time maximum is 9999 minutes (6.8 days), at which time sample pump will shut down.

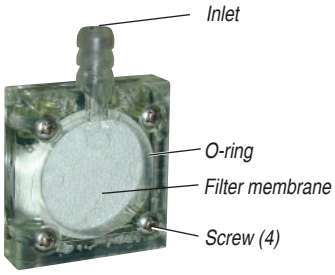
# Maintenance

## Clean the Pump Inlet Filter

The PCXR8 Universal Sample Pump is fitted with a filter/trap inside a clear plastic inlet port housing. This prevents particles from being drawn into the pump mechanism. Visually check the filter to ensure that it does not become clogged. If maintenance is necessary, follow this procedure:

1. Clean dust and debris from around the filter housing.
2. Remove the four screws and the front filter housing.
3. Remove the O-ring.
4. Remove and discard the filter membrane.
5. Clean the filter housing.
6. Insert a new filter membrane and the O-ring.* *See Replacement Parts.*
7. Reattach the front filter housing and cross-tighten the four screws.

* *Replace with new O-ring only as needed.*



*Close-up of inlet filter housing*

## Maintain the Battery Pack

For proper maintenance of battery packs, SKC offers chargers (*see Accessories*) that condition the battery for optimum performance in 6 to 8.5 hours. For optimum charge, ensure pump is not running during charging. Follow charger instructions.

Fully charge packs before use. *See Charge the Battery Pack. For more information on SKC pump batteries, visit the Knowledge Center at www.skcinc.*

**To comply with intrinsic safety regulations, battery packs should not be charged or operated in hazardous locations.**

**Ensure proper orientation of charging cable before plugging it into the charging jack. Improper orientation/contact will short-circuit the battery and voids any warranty.**

**Short-circuiting the battery pack will render it immediately inoperative.**

## Replace the Battery Pack

*See Install the Battery Pack.*

## Notes and Cautions

- Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.
- Use only SKC-approved charger and battery pack designed for the Universal Sample Pump to ensure reliable performance. Failure to do so voids any warranty and UL Listing for intrinsic safety.
- Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.

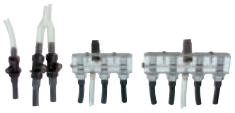
***For more information on SKC pump batteries, visit the Knowledge Center at www.skcinc.com.***

## Pump Service

Pumps under warranty should be sent to SKC Inc. for servicing. *See SKC Limited Warranty and Return Policy.*

# Accessories/Replacement Parts

| Accessories | Cat. No. |
|---|---|
| **Medium Flow check-mate,** 0.5 to 5 L/min, includes 9-volt battery | |
| with NIST standard traceable calibration certificate | **375-0550N** |
| with UK standard traceable calibration certificate | **375-0550** |
| with ISO standard traceable calibration certificate | **375-0550S** |
| **Low Flow (5 to 500 ml/min) applications** | |
| **Adjustable Tube Holders** | |
| **Single** | **224-26-01** |
| **Dual** | **224-26-02** |
| **Tri** | **224-26-03** |
| **Quad** | **224-26-04** |
| **Protective Sample Tube Covers** | |
| **A -** 70 mm, standard charcoal | **224-29A** |
| **B -** 110 mm, large charcoal | **224-29B** |
| **C -** 150 mm | **224-29C** |
| **D -** 220 mm | **224-29D** |
| **Battery Maintenance** | |
| **PowerFlex Charging System for SKC Personal Pumps** | |
| **5 Stations,** 100-240 V | **223-1000** |
| **Single,** 100-240 V | **223-2000** |
| **PowerFlex Pump Cable,** for Universal XR models | **223-1002** |
| **Battery Eliminator,*** connects pump to line power for extended sampling | |
| 115 V | **223-325** |
| 230 V | **223-325B** |
| **Pump Accessories** | |
| **Screwdriver Set,** included with pump | **224-11** |
| **Protective Nylon Pouch** with belt and shoulder strap | |
| Black | **224-87** |
| Red | **224-95A** |



*Protective Nylon Pouch*

** Not UL Listed for intrinsic safety*

## SKC Limited Warranty and Return Policy

SKC products are subject to the SKC Limited Warranty and Return Policy, which provides SKC's sole liability and the buyer's exclusive remedy. To view the complete SKC Limited Warranty and Return Policy, go to www.skcinc.com/warranty.

## Replacement Parts

### Pump Case Parts

| | |
|---|---|
| P21411 | Case Parts, excluding Battery Case |
| P21661MH | Battery Pack Assembly, NiMH |
| P22417BC | Belt Clip with screws |
| P22433P | Keyboard Assembly |
| P22433U | Control Board |
| P22433R | Cap Screws, set of 2 |
| P22433RS2 | Replacement Stack (with pressure switch), does not include flowmeter and filter housing assemblies or motor |
| P22417C | Exhaust Port Fitting |

### Pump Stack Parts

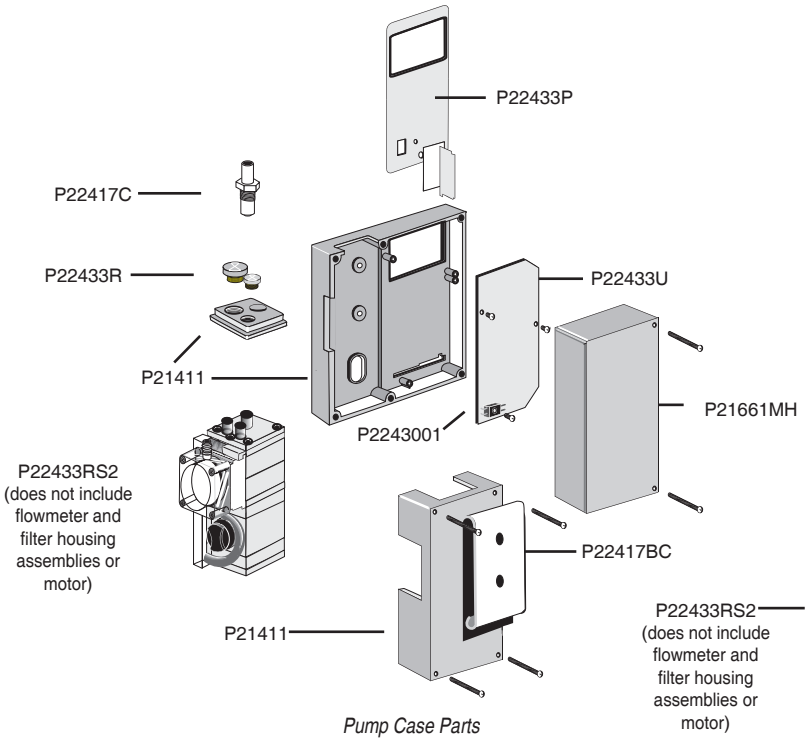
| | |
|---|---|
| P22417D | Filter Housing Assembly |
| P22417E | Pressure Switch Assembly |
| P22417F | Valve Plate Assembly |
| P22417G | Pump Body |
| P22417HC | Diaphragm/Yoke Assembly |
| P22417J | Regulator Assembly |
| P22417K | Pulsation Dampener Assembly (2) |
| P22417M | Motor/Eccentric Assembly |
| P22433L | Flowmeter Assembly |

### Parts Not Shown in Illustration

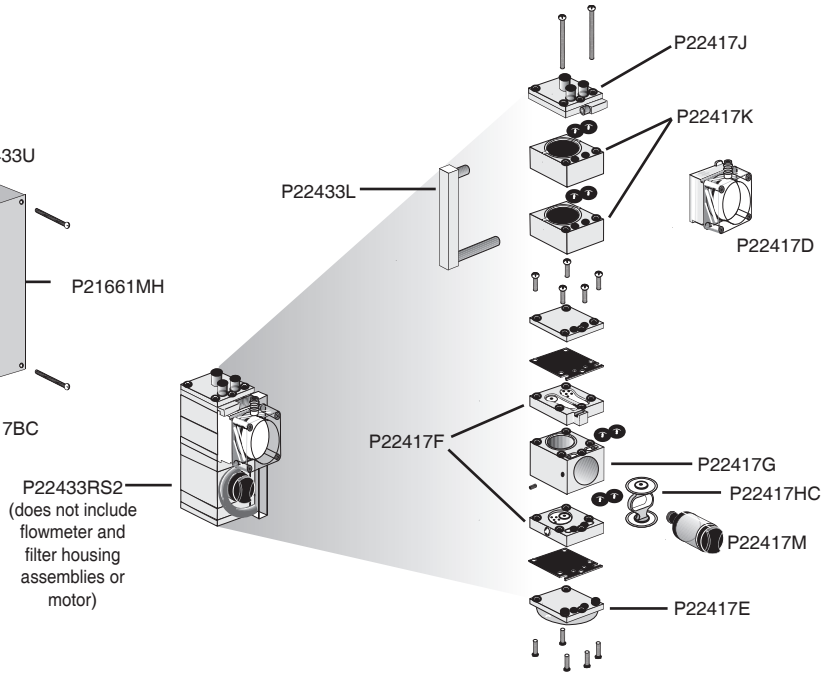
| | |
|---|---|
| P22433C | Tamper-resistant Cover |
| P22433ES | External Screw Kit |
| P72392 | LCD |
| P5187 | Foam Cover for control board, pk/5 |

### Replacement Filters

| | |
|---|---|
| P22409 | Replacement Filter/O-ring Set, 3 filters/3 O-rings |
| P2240901 | Filters only, pk/10 |
| P2240902 | Filter/O-ring Set, 100 filters/10 O-rings |




*Pump Case Parts*




*Pump Stack (Cat. No. P22433RS2) Exploded*

# Appendix

## Performance Profile

| | |
|---|---|
| **Flow Range** | 1000 to 5000 ml/min (UL Listed) *(5 to 500 ml/min requires adjustable low flow holder)* |
| **Weight** | 34 oz (964 grams) |
| **Dimensions** | 5.1 x 4.7 x 1.9 in (13 x 11.9 x 4.8 cm) |
| **Compensation Range** | 1000 to 2500 ml/min at 40 inches water back pressure<br>3000 ml/min at 35 inches water back pressure<br>4000 ml/min at 20 inches water back pressure<br>5000 ml/min at 10 inches water back pressure |
| **Typical Back Pressure of Sampling Media *(inches water)*** | <table><tr><th>Flow Rate (L/min)</th><th>1</th><th>1.5</th><th>2</th><th>2.5</th><th>3.0</th></tr><tr><th>Filter/Pore Size (µm)</th><th></th><th></th><th></th><th></th><th></th></tr><tr><td>25-mm MCE/0.8</td><td>6</td><td>9</td><td>12</td><td>15</td><td>18</td></tr><tr><td>25-mm MCE/0.45</td><td>14</td><td>22</td><td>28</td><td>35</td><td>40</td></tr><tr><td>37-mm MCE/0.8</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>37-mm PVC/5.0</td><td>1</td><td>1</td><td>2</td><td>2</td><td>2.5</td></tr></table><br>*Compare the information in this table to pump compensation range to determine appropriate applications.* |
| **Flow Control** | Holds constant flow to ± 5% of the set point |
| **Run Time** | **NiMH Battery:** 12 hrs minimum at 4000 ml/min and 20 inches water back pressure; dependent on media used. *See Table 1.*<br>**Battery Eliminator:** Pump provides extended runs. |
| **Flow Indicator** | Built-in rotameter with 250-ml division; scale marked at 1, 2, 3, 4, and 5 L/min |
| **Power Supply** | **6.0-V plug-in NiMH battery pack,** rechargeable, 3.5-Ah capacity or 6.0-V plug-in NiCad battery pack, rechargeable, 2.0-Ah capacity<br>A **Battery Eliminator** is available (*see Accessories*); use voids the UL Listing for intrinsic safety. |
| **Charging Time** *(varies with capacity and level of discharge)* | 6 to 8.5 hrs with PowerFlex charger |
| **Intrinsic Safety** | UL Listed for: Class I, Divisions 1 and 2, Groups A, B, C, D; Class II, Divisions 1 and 2, Groups E, F, G; and Class III, Temperature Code T3C<br>*ATEX-approved models available. Contact SKC.* |
| **Operating Temperature** | 32 to 104 F (0 to 40 C) |
| **Storage Temperature** | -4 to 113 F (-20 to 45 C) |
| **Charging Temperature** | 50 to 113 F (10 to 45 C) |
| **Operating Humidity** | 0 to 95% non-condensing<br>***Protect sample pump from weather when in use outdoors.*** |
| **Multiple-tube Sampling** | Built-in constant pressure regulator allows user to take up to four simultaneous tube samples at different flow rates up to 500 ml/min each using optional adjustable tube holder. |
| **RFI/EMI Shielding** | Complies with requirements of EN 55022, FCC Part 15 Class B, EN 50082-1; frequency range of the radiated susceptibility test was 27 to 1000 MHz |
| **Tubing** | *Requires 1/4-inch ID tubing* |
| **Flow Fault** | If the pump is unable to compensate for longer than 15 seconds due to excessive back pressure, the pump enters flow fault. During flow fault, the pump stops, displays FLOW FAULT, pauses timing functions, and displays elapsed time or pump time. Auto-restart is attempted up to five times. |
| **Low Battery Fault** | Pump stops, displays LO BATT, pauses timing functions, and displays elapsed time or pump time. |
| **Battery Test** | LCD shows battery condition prior to sampling. |
| **Time Display** | LCD displays up to 9999 minutes (6.8 days) at which point the display rolls over to 0. Displays include sampler run time in minutes for sampling period elapsed time, pump run time, or total elapsed time including delayed start. |
| **Timing Accuracy** | ± 0.05% (± 45 seconds per day) |
| **Timed Shutdown** | Allows user to select minutes of operation before automatic shutdown. Maximum setting is 9999 minutes (6.8 days). |
| **Sampling Pause (Hold)** | Allows user to temporarily halt sampling without loss of timing data. Restart does not require resetting time. |
| **Delayed Start** | Allows user to select minutes to delay test up to 9999 minutes (6.8 days) |
| **Intermittent Sampling** | Programmable to allow user to extend short-term samples over an extended period of time to meet time-weighted average (TWA) requirements with a reduced number of samples. Elapsed time maximum setting is 9999 minutes (6.8 days), at which time the pump shuts down. |
| **Certifications** | • UL Listed<br>• CE, UKCA marked<br>• ATEX-approved models available |

## Typical Run Times*

Table 1 contains the typical run times achieved when using a fully charged nickel-metal hydride (NiMH) battery pack. Data is sorted by type of sample media. All run times are listed in hours. Results obtained using a new pump and new fully charged battery. Pump performance may vary.

**Table 1. Pump Run Time in Hours with NiMH Battery**

**Mixed Cellulose Ester (MCE) filter, 0.8-µm pore size**

| | Filter Diameter | |
|---|---|---|
| Flow Rate (L/min) | 37 mm | 25 mm |
| 2 | 37 | 33 |
| 2.5 | 34 | 26 |
| 3 | 31 | 21 |
| 3.5 | 29 | 18 |
| 4 | 25 | 15 |
| 4.5 | 20 | 14 |

**Polyvinyl Chloride (PVC) filter, 5.0-µm pore size**

| | Filter Diameter | |
|---|---|---|
| Flow Rate (L/min) | 37 mm | 25 mm |
| 2 | 47 | 41 |
| 2.5 | 38 | 33 |
| 3 | 35 | 30 |
| 3.5 | 26 | 27 |
| 4 | 22 | 25 |
| 4.5 | 21 | 23 |

* *Increases in back pressure during sampling due to buildup of sample on the filter can decrease battery life.*