
## Operating Instructions

# Universal Sample Pump

## Cat. No. 224-44XR

**SKC Inc.**
**863 Valley View Road**
**Eighty Four, PA 15330**

*Form 37711 Rev 1303*

# Table of Contents



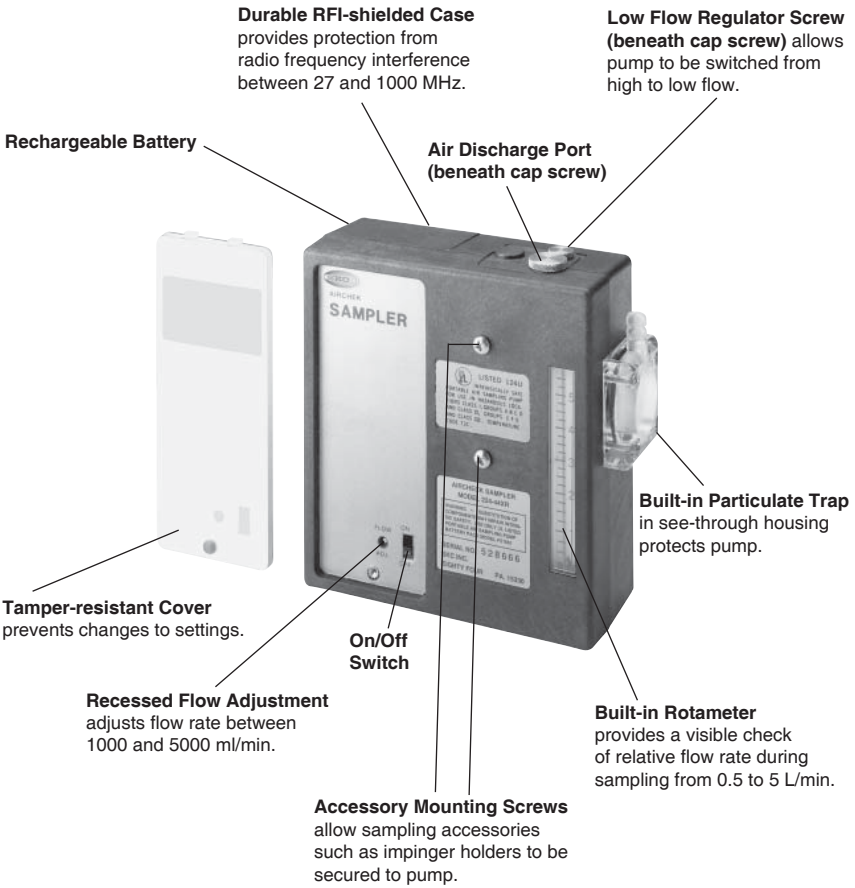
***Indicates a warning or caution***

**Indicates a premier feature of the pump**

Indicates a reminder or note

# Description

The 44XR Universal Sample Pump is a constant flow air sampler suitable for a broad range of applications. It is ideal for industrial hygiene studies as well as environmental testing.




*44XR Universal Sample Pump*

# 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 gm)

**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
3000 ml/min at 35 inches water back pressure
4000 ml/min at 20 inches water back pressure
5000 ml/min at 10 inches water back pressure

**Typical Back Pressure of Sampling Media (*inches water*)**

| **Flow Rate (L/min)** | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |
|---|---|---|---|---|---|
| **Filter/Pore Size (µm)** | | | | | |
| 25-mm MCE, 0.8 | 6 | 9 | 12 | 15 | 18 |
| 25-mm MCE, 0.45 | 14 | 22 | 28 | 35 | 40 |
| 37-mm MCE, 0.8 | 2 | 3 | 4 | 5 | 6 |
| 37-mm PVC, 5.0 | 1 | 1 | 2 | 2 | 2.5 |

*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:** **NiCad Battery:** 8 hrs minimum at 4000 ml/min and 20 inches water back pressure; dependent on media used. *See Table 1 on page 4.*
**NiMH Battery:** 12 hrs minimum at 4000 ml/min and 20 inches water back pressure; dependent on media used. *See Table 2 on page 4.*
**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
A **battery eliminator** is available (*see Optional Accessories*); use voids the UL Listing for intrinsic safety.

**Charging Time:** 6 to 8.5 hrs with PowerFlex charger
*(varies with capacity and level of discharge)*

**Intrinsic Safety:** UL Listed for: Class I, Division 1 and 2, Groups A, B, C, D; Class II, Division 1 and 2, Groups E, F, G; and Class III, Temperature Code T3C
*ATEX-approved models available. Contact SKC.*
*MSHA-approved models available. Contact SKC.*

**Operating Temperature:** 32 to 113 F (0 to 45 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

***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 low flow 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

**CE marked**

**UL Listed**

**ATEX-approved models available**

**MSHA-approved models available**

**Table 1. Pump Run Time in Hours with NiCad Battery**
Following are typical run times achieved when using a fully charged nickel-cadmium (NiCad) 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.

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

| | Filter Diameter | |
|---|---|---|
| **Flow Rate (L/min)** | **37 mm** | **25 mm** |
| **2.0** | 24.1 | 16.3 |
| **2.5** | 21.4 | 14.5 |
| **3.0** | 19.1 | 11.0 |
| **3.5** | 17.8 | 10.7 |
| **4.0** | 15.4 | ** |
| **4.5** | 14.6 | ** |

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

| | Filter Diameter | |
|---|---|---|
| **Flow Rate (L/min)** | **37 mm** | **25 mm** |
| **2.0** | 31.6 | 21.7 |
| **2.5** | 27.7 | 24.0 |
| **3.0** | 27.0 | 18.6 |
| **3.5** | 22.8 | 16.4 |
| **4.0** | 19.4 | 16.2 |
| **4.5** | 19.0 | 14.6 |

*** Filter back pressure exceeded pump capability during testing.*

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

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**Table 2. Pump Run Time in Hours with NiMH Battery**
Following are 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.

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

| | Filter Diameter | |
|---|---|---|
| **Flow Rate (L/min)** | **37 mm** | **25 mm** |
| **2.0** | 37 | 33 |
| **2.5** | 34 | 26 |
| **3.0** | 31 | 21 |
| **3.5** | 29 | 18 |
| **4.0** | 25 | 15 |
| **4.5** | 20 | 14 |

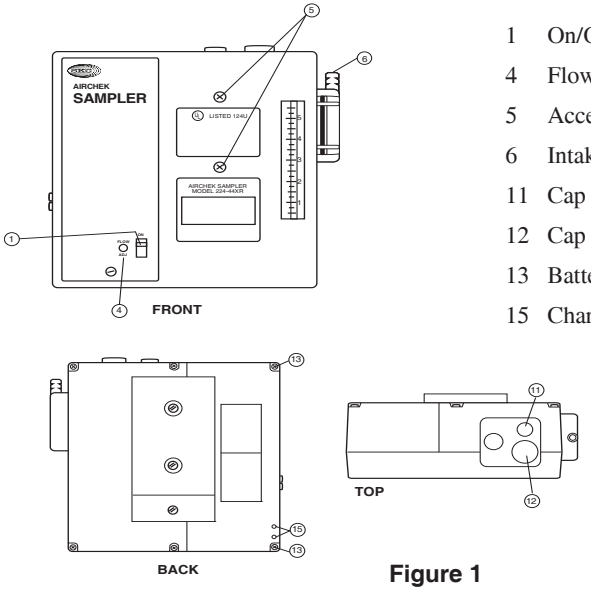
**Polyvinyl Chloride (PVC) filter, 5.0-µm pore size**

| | Filter Diameter | |
|---|---|---|
| **Flow Rate (L/min)** | **37 mm** | **25 mm** |
| **2.0** | 47 | 41 |
| **2.5** | 38 | 33 |
| **3.0** | 35 | 30 |
| **3.5** | 26 | 27 |
| **4.0** | 22 | 25 |
| **4.5** | 21 | 23 |

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

# Operation

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




1 On/Off switch
4 Flow adjustment screw
5 Accessory mounting screws (2)
6 Intake filter housing
11 Cap screw to regulator
12 Cap screw to air discharge port
13 Battery pack screws (2)
15 Charging jack

**Figure 1**
Front, back, and top views of 44XR Sampler
*For additional drawings, see pages 19-21.*

1

### Setup

Install battery (*see Installing the Battery Pack on page 16*). For optimum charge, ensure pump is **not** running. Charge the battery by connecting the charger plug to the sampler charging jack (Figure 1, #15). Ensure that the battery is fully charged before sampling.


*Charger and battery pack connected*

*After charging the battery pack, it is good practice to run the pump for approximately five minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.*

***Do not charge or operate pump from charger in hazardous locations.***

***Use only SKC-approved charger designated for this model to ensure reliable performance. Failure to do so voids any warranty.***

***Ensure proper orientation of charging cable <u>before</u> 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.***

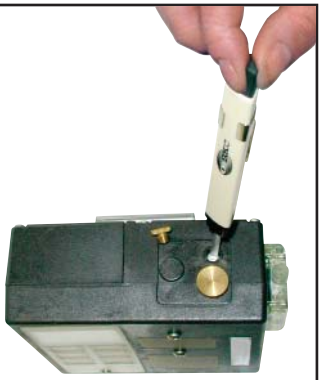
The battery pack may be kept on the SKC-approved charger for an indefinite time.

## 2

## Deactivating the Regulator

To ensure the pump is set for high flow, remove the cap screw (Figure 1, #11) covering the regulator valve and turn the exposed screw clockwise until it stops. (Do not overtighten.)

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



*For high flow, turn valve screw clockwise.*

## 3

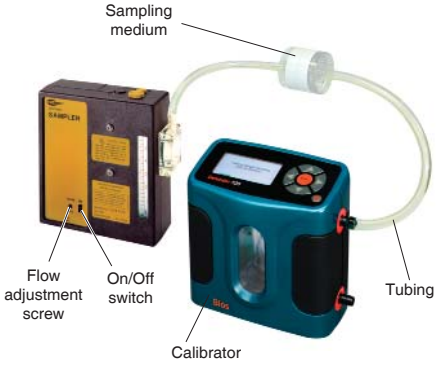
## Setting or Verifying Flow Rate

Ensure pump has run for five minutes before proceeding with calibration.

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

Using 1/4-inch Tygon® tubing, connect the sampling medium to the pump intake (Figure 1, #6).

Connect a calibrator to the intake of the sampling medium.




*Calibration train with filter cassette*

Remove the tamper-resistant cover. Start the pump using the on/off switch (Figure 1, #1), and set the flow rate using the flow adjustment screw (Figure 1, #4).

When the flow rate is set, turn off the pump and disconnect the calibrator.

Replace the sampling medium used for calibration with an unexposed medium for sample collection.

## Sampling

For personal sampling, clip the sample collection medium to the worker in the breathing zone.

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

***Protect sample pump from weather when in use outdoors.***

***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***

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

Start the sampling period by turning on the pump using the on/off switch (Figure 1, #1), and record the start time.

4

At the end of the sampling period, turn off the pump and record the stop time.

### Sampling with Impingers

When using impingers, place an inline trap between the pump and the impinger to protect the sampler from liquid or vapors. The impinger and trap can be mounted to the sampler using the accessory mounting screws (Figure 1, #5) or placed in a holster at the worker's waist.


*Impinger holder on pump with impinger and trap*

***Failure to use the impinger trap voids any warranty.***

***Protect sample pump from weather when in use outdoors.***

***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***

*continued on page 8*

4

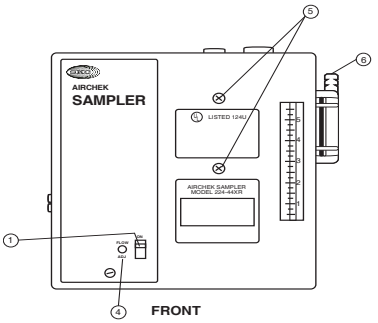
*cont'd*

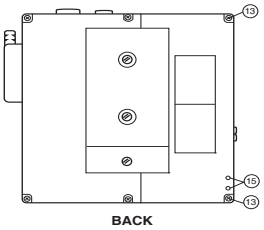
**Pressure Applications (Bag Sampling)**
When using the pump for pressure applications, such as bag sampling, thread the exhaust port fitting supplied with the pump into the air discharge port on top of the pump (Figure 1, #12); hand tighten only. Using PTFE tubing, connect the inlet of the sample medium (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 pump and close inlet on sample medium to stop sampling.

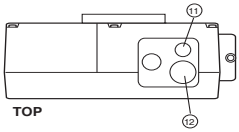
*Thread exhaust port fitting into air discharge port on pump.*

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

## Using Single Adjustable Low Flow Holder




1 On/Off switch
4 Flow adjustment screw
5 Accessory mounting screws (2)
6 Intake filter housing
11 Cap screw to regulator
12 Cap screw to air discharge port
13 Battery pack screws (2)
15 Charging jack

**Figure 2**

Front, back, and top views of 44XR Sampler

*For additional drawings, see pages 19-21.*

## Setup

Install battery (*see Installing the Battery Pack on page 16*). For optimum charge, ensure pump is **not** running. Charge the battery by connecting the charger plug to the sampler charging jack (Figure 2, #15). Ensure that the battery is fully charged before sampling.

*Charger and battery pack connected*

*After charging the battery pack, it is good practice to run the pump for approximately five minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.*

***Do not charge or operate pump from charger in hazardous locations.***

***Use only SKC-approved charger designated for this model to ensure reliable performance. Failure to do so voids 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.***

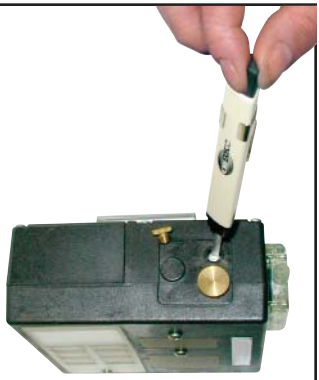
***Failure to follow warnings and cautions voids any warranty.***

The battery pack may be kept on the SKC-approved charger for an indefinite time.

## 2 Activating the Regulator

Remove the tamper-resistant cover. Start the pump using the on/off switch (Figure 2, #1), and adjust the flow rate using the flow adjustment screw (Figure 2, #4) until the built-in rotameter reads approximately 1.5 L/min.

Remove the cap screw covering the regulator valve (Figure 2, #11) and turn the exposed screw four to five turns counterclockwise.



*For low flow, turn valve screw counterclockwise.*

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

## 3 Setting or Verifying Flow Rate

Ensure pump has run for five minutes before proceeding with calibration.

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

Connect a single adjustable low flow holder (Figure 3) to the pump intake (Figure 2, #6) using 1/4-inch Tygon tubing.

Insert an opened sorbent tube (Figure 3, #3) into the rubber sleeve (Figure 3, #2) of the low flow holder with the arrow on the tube pointing toward the holder.


**Figure 3**
*Single Adjustable Low Flow Holder with sample tube*

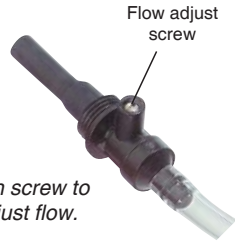
Connect a calibrator to the exposed end of the sorbent tube.

*Calibration train with tube in low flow holder*

*continued on page 10*

3 *cont'd*

Loosen the brass flow adjust screw (Figure 3, #1) on the low flow holder. Activate the pump by using the on/off switch (Figure 2, #1). Adjust the flow rate by turning the flow adjust screw (Figure 3, #1) on the holder until the calibrator indicates the desired flow.



*Turn screw to adjust flow.*

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

Turn off the pump and disconnect the calibrator.

Replace the sorbent tube used for setting the flow with a new unexposed sorbent tube for sample collection.

Place the appropriate size tube cover over the tube, and screw it into place on the low flow holder.

4

## Sampling

For personal sampling, clip the low flow holder to the worker in the breathing zone.

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

***Protect sample pump from weather when in use outdoors.***

***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***


*Clip holder to worker and pump to belt.*

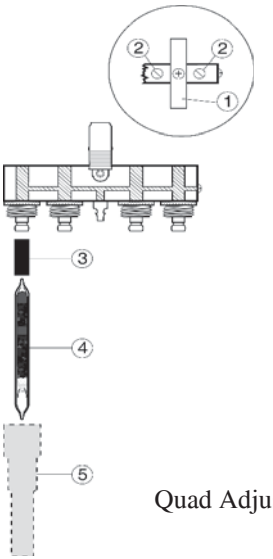
Start the sampling period by turning on the pump using the on/off switch (Figure 2, #1), and record the start time.

At the end of the sampling period, turn off the pump and record the stop time.

To return to high flow, remove the low flow holder and deactivate the regulator. *See page 6.*

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

## Using Multiple-tube Adjustable Low Flow Holder




1 Anti-tamper cover

2 Flow adjust screws

3 Rubber sleeve

4 Sorbent sample tube

5 Protective cover

**Figure 4**
Quad Adjustable Low Flow Holder

## Setup

*For a diagram of the pump, see Figure 2, page 9.*

Install battery (see Installing the Battery Pack on page 16). For optimum charge, ensure pump is **not** running. Charge the battery by connecting the charger plug to the sampler charging jack (Figure 2, #15). Ensure that the battery is fully charged before sampling.

*Charger and battery pack connected*

*After charging the battery pack, it is good practice to run the pump for approximately five minutes before calibrating. This ensures the battery is in more steady-state conditions and improves the agreement in pre and post-sampling calibrations.*

1

***Do not charge or operate pump from charger in hazardous locations.***

***Use only SKC-approved charger designated for this model to ensure reliable performance. Failure to do so voids 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.

## Setting or Verifying Flow Rate

**Note:** ***When performing multiple-tube sampling using an adjustable low flow holder (dual, tri, or quad), ensure the regulator has been activated and the pump flow rate is set at 1.5 L/min. The maximum flow rate through any one tube is 500 ml/min*. Calculate the sum of all tube flow rates. If the sum is ≤ 1000 ml/min, proceed with calibration and sampling without any further adjustment to pump flow rate. If the sum is > 1000 ml/min, set the pump flow rate 15% higher than the sum of tube flow rates.***

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

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

Ensure pump has run for five minutes before proceeding with calibration.

Ensure the pump is set for low flow (*see Activating the Regulator, page 10*).

Connect the adjustable low flow holder (Figure 4, page 12) to the pump intake (Figure 2, #6 on page 9) using 1/4-inch Tygon tubing.

2

Insert an opened sorbent tube into each rubber sleeve of the low flow holder (Figure 4, #3 and 4) with the arrow on the tube pointing toward the holder.

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

*Connect holder to pump intake and tube inlet to calibrator.*

Note the flow rates specified by each sampling method and add them together. If the sum is ≤1000 ml/min, proceed to the next step. If the sum is > 1000 ml/min, multiply the total tube flow rate by 1.15 and set the pump for that flow rate.

Connect the exposed end of a sorbent tube to an external calibrator. Remove the tamper-resistant cover from the face of the pump. Start the pump using the on/off switch (Figure 2, #1). Turn the brass flow adjust screw (Figure 4, #2) for the appropriate port of the low flow holder until the desired flow rate is achieved. Turn clockwise to decrease the flow.

*continued on page 14*

2 *cont'd*

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

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

Remove the calibrator from the tube and connect to the exposed end of the next sorbent tube. Repeat the flow adjustment process until all tubes are flow calibrated. Changing the flow on one tube will not affect the flow rate through the remaining tubes.

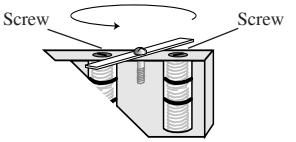



***Figure 5***
*Cut-away of Tri/Quad Low Flow Holder*

For tri and quad models, first rotate each anti-tamper cover (Figures 4 [*on page 12*] and 5) to expose the flow adjust screws, then adjust the appropriate screw until the calibrator indicates the desired flow.

When the flow rate is set for each tube, turn off the pump and disconnect the calibrator.

Replace the sampling media used for calibration with unexposed media for sample collection. Use protective tube covers to prevent tube breakage.

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

3

## Sampling

***Before use, allow pump to equilibrate after moving it from one temperature extreme to another.***

***Protect sample pump from weather when in use outdoors.***

***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***

*Clip holder to worker and pump to belt.*

For personal sampling, clip the low flow holder to the worker in the breathing zone.

Start the sampling period by turning on the pump using the on/off switch (Figure 2, #1), and record the start time.

At the end of the sampling period, turn off the pump and record the stop time.

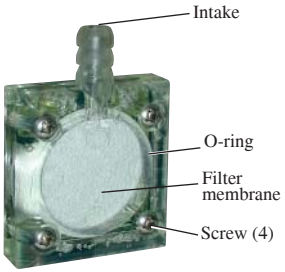
# Maintenance

## Pump Inlet Filter

The 44XR Sampler is fitted with a filter/trap inside a clear plastic intake port housing. This prevents particles from being drawn into the pump mechanism. The filter should be visually checked to assure 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 and discard the filter membrane.
4. Remove O-ring.
5. Clean the filter housing.
6. Insert O-ring* and a new filter membrane. (*See Replacement Parts on pages 20-21*)
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*

## Battery Pack Care

For proper maintenance of battery packs, SKC offers chargers (*see Optional Accessories on page 22*) 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. For more information on SKC pump batteries, visit http://www.skcinc.com/instructions/1756.pdf.

***To comply with intrinsic safety regulations, battery packs should <u>not</u> be charged in hazardous locations.***

***Using a non-approved charger voids any warranty.***

***Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.***

***Ensure proper orientation of charging cable <u>before</u> 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.***

***Use of any device other than the approved battery pack to power the pump voids the UL Listing for intrinsic safety and any warranty.***

***Failure to follow warnings and cautions voids any warranty.***

The battery pack may be kept on the SKC-approved charger for an indefinite time.

## Installing the Battery Pack

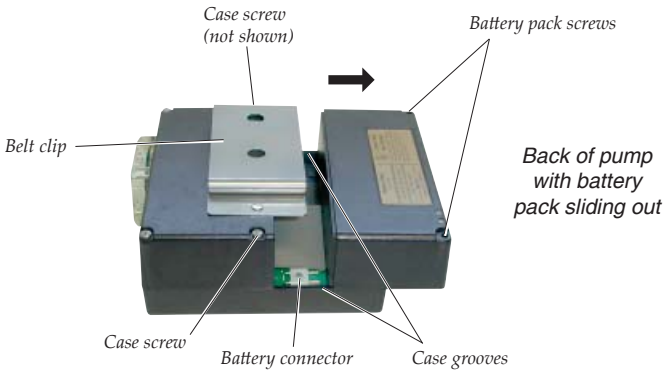
**Note:** *To enhance battery life, SKC ships battery packs separate from the pump. Once installed, completely charge battery pack before operating pump.*

1. Loosen the two case screws above and below the belt clip.
2. Slip the front edge of the battery pack under the belt clip and position battery pack to engage the grooves in the case.
3. Slide battery pack toward the pump until it is flush with the pump case on all sides.
4. Install two battery screws and tighten the case screws loosened in Step 1.
5. Charge battery completely. For optimum charge, ensure pump is not running during charging.

## Replacing the Battery Pack

**Note:** *To enhance battery life, SKC ships battery packs separate from the pump. Once installed, completely charge battery pack before operating 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 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 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 battery screws and tighten the case screws.




***Important Cautions/Warnings on next page***

***Use of a repaired or rebuilt battery pack voids any warranty and the UL Listing for intrinsic safety.***

***Do not charge or operate the pump with charger in hazardous locations!***

***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.***

The battery pack may be kept on the SKC-approved charger for an indefinite time.

*For more information on SKC pump batteries, visit http://www.skcinc.com/instructions/1756.pdf.*

## Pump Service

Pumps under warranty should be sent to SKC Inc. for servicing (*see Limited Warranty and Return Policy on page 23*).

# Parts Descriptions

Use only SKC-approved parts to ensure reliable performance. Failure to do so voids any warranty and UL Listing for intrinsic safety.

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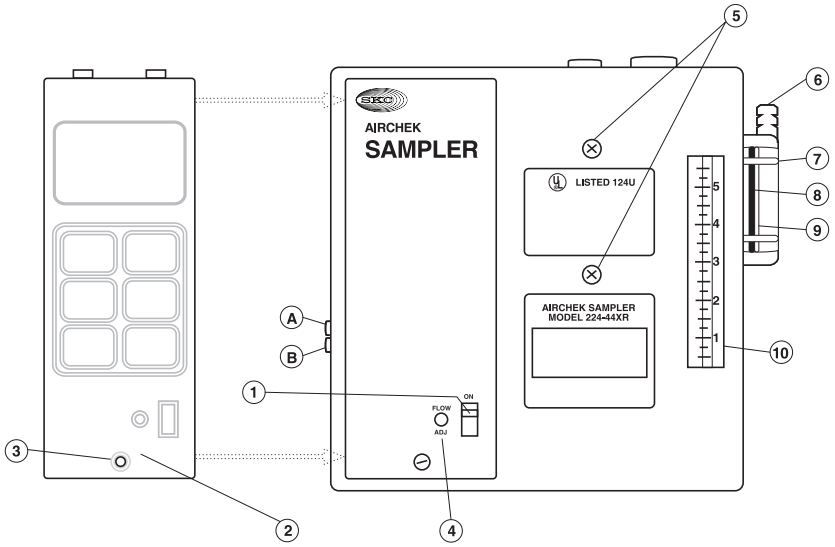
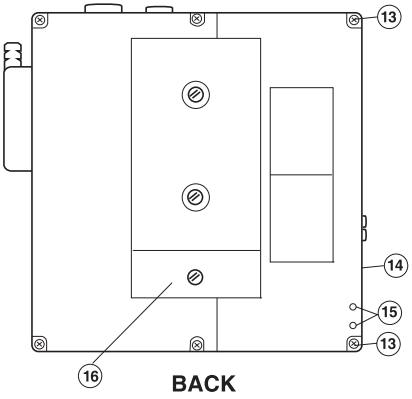
*See page 19 for drawing.*

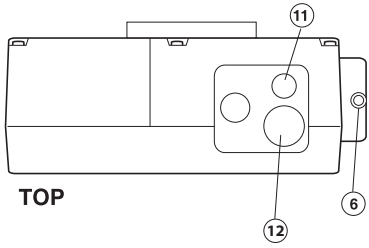
| No. | Description |
|---|---|
| 1 | **On/Off switch** |
| 2 | **Tamper-resistant cover** protects controls from accidental contact or tampering. |
| 3 | **Cover screw** fastens tamper-resistant cover. |
| 4 | **Flow adjustment control** |
| 5 | **Accessory mounting screws (2)** secure accessories such as impinger and trap holders. |
| 6 | **Intake (pump housing),** air intake port and trap |
| 7 | **Filter housing screws (4)** secure filter housing. |
| 8 | **Filter O-ring -** leak seal for filter in housing |
| 9 | **Filter (crimped fiber polyester)** prevents particles from entering pump. |
| 10 | **Built-in rotameter** monitors flow changes. |
| 11 | **Cap screw** accesses regulator. |
| 12 | **Cap screw** accesses air discharge port. |
| 13 | **Battery pack screws (2)** secure pack to pump. |
| 14 | **Battery pack assembly** provides power to pump. |
| 15 | **Charging jack,** connector for battery charger |
| 16 | **Belt clip** secures pump to worker's belt. |
| A | **Compensation Pot A** adjusts pump compensation, which is factory set. Access screw guards against accidental contact or tampering. |
| B | **Compensation Pot B** adjusts pump compensation, which is factory set. Access screw guards against accidental contact or tampering. |

## 224-44XR Sample Pump

*See page 18 for parts listing.*



# Replacement Parts

*See drawings on page 21.*

**Pump Case Parts**

| | |
|---|---|
| P21411 | Case Parts, excluding Battery Case |
| P21661MH | Battery Pack Assembly, NiMH |
| P21661 | Battery Pack Assembly, NiCad |
| P22417BC | Belt Clip with screws |
| P22433Q | Control Board |
| P22433R | Cap Screws, set of 2 |
| P22433RS1 | Replacement Stack - does not include flowmeter and filter housing assemblies or motor |
| P2243001 | Battery Connector, pk/10 |
| P22417C | Exhaust Port Fitting |

**Pump Stack Parts**

| | |
|---|---|
| P22417D | Filter Housing Assembly |
| P22417F | Valve Plate Assembly |
| P22417G | Pump Body |
| P22417HC | Diaphragm/Yoke Assembly |
| P22417J | Regulator Assembly |
| P22417K | Pulsation Dampener Assembly (2) |
| P22417W | Bottom Plate Assembly |
| P22433L | Flowmeter Assembly |

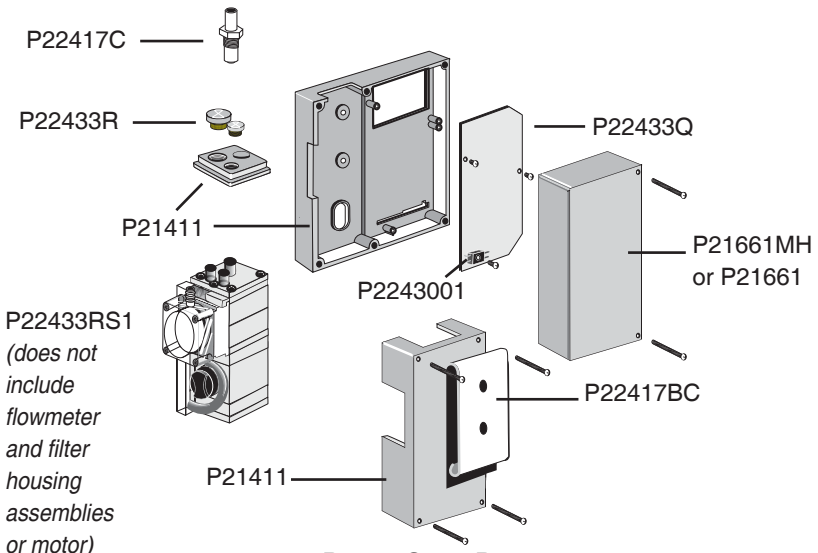
**Parts not indicated in illustration**

| | |
|---|---|
| P21251 | Half Stack, includes pump body, valve plates, diaphragm/yoke, gaskets, and O-rings |
| P2243201 | Charging Jack, pk/5 |
| P22433C | Tamper-resistant Cover |
| P22433ES | External Screws |

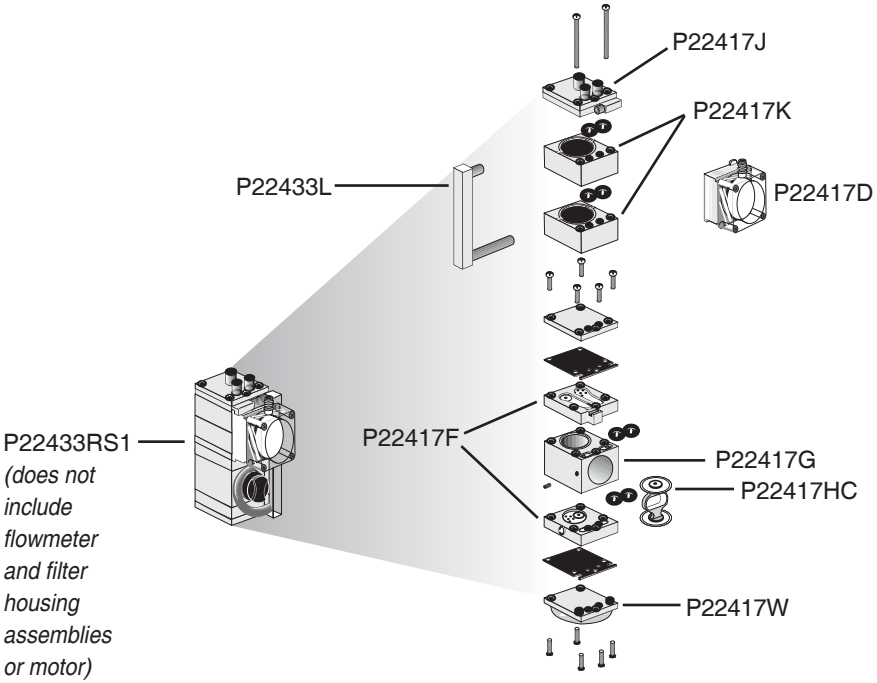
**Replacement Filters**

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

*See page 20 for replacement parts listing.*




**Pump Case Parts**




**Pump Stack (Part #P22433RS1) Exploded**

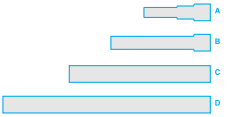
# Optional Accessories

| Calibrator | Cat. No. |
|---|---|
| **Defender Primary Standard Calibrator,** 50 to 5000 ml/min, includes lead-acid battery, charger (100-240 V), software, and 1-m serial cable | **717-510M** |

## Adjustable Low Flow Holders

| | |
|---|---|
| **Single Holder** | **224-26-01** |
| **Dual Holder** | **224-26-02** |
| **Tri Holder** | **224-26-03** |
| **Quad Holder** | **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-station,** 100-240 V | | **223-1000** |
| **Single,** 100-240 V | | **223-2000** |
| **PowerFlex Pump Cable,** for Universal XR models | | **223-1002** |
| **PowerFlex Pump Cable,** for Universal XR MSHA models | | **223-1003** |
| **Replacement Battery Pack,** NiMH for XR models | | **P21661MH** |
| **Replacement Battery Pack,** NiCad for XR models | | **P21661** |
| **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 http://www.skcinc.com/warranty.asp.