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

chek-mate Flowmeter
Cat. No. 375 Series
Operating Instructions

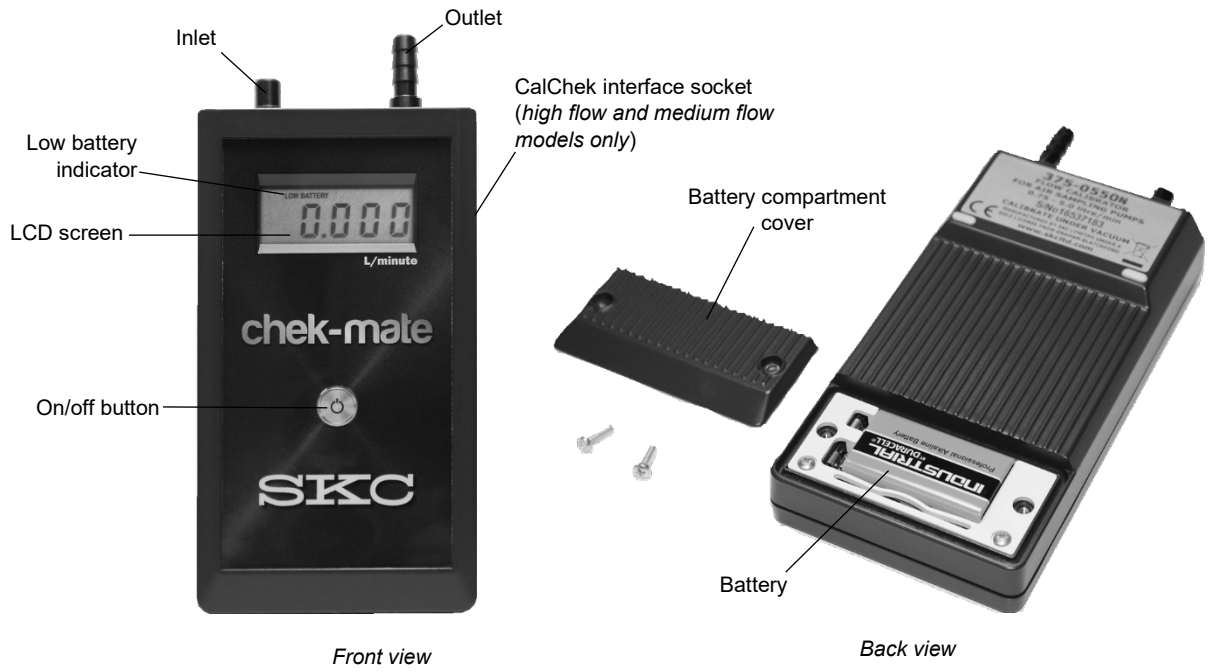


Figure 1. chek-mate Flowmeter Overview

INTRODUCTION

Description

The chek-mate® Flowmeter *(Figure 1)* is designed specifically for use with air sample pumps and is available in high flow, medium flow, and low flow models as described below.

- **High Flow chek-mate Flowmeter with CalChek** Cat. Nos. 375-50300N, 375-50300, and 375-50300S – Flow measurement range of **5 to 30 L/min** and CalChek capability. Volumetric accuracy is 1% of reading for 5 to 30 L/min. The CalChek serial interface enables direct communication with CalChek-ready pumps in the chek-mate flow range for automatic single-point (single) flow rate verification and multiple-point (full) calibration.
- **Medium Flow chek-mate Flowmeter with CalChek** Cat. Nos. 375-0550N, 375-0550, and 375-0550S – Flow measurement range of **0.5 to 5 L/min** and CalChek capability. Volumetric accuracy is 1% of reading for 0.75 to 5 L/min and 2.5% of reading for 0.5 to 0.75 L/min. The CalChek serial interface enables direct communication with CalChek-ready pumps in the chek-mate flow range for automatic single-point (single) flow rate verification and multiple-point (full) calibration.

- **Low Flow chek-mate Flowmeter** Cat. Nos. 375-00205N, 375-00205, and 375-00205S – Flow measurement range of **20 to 500 ml/min**. Volumetric accuracy is 1% of reading for 50 to 500 ml/min and 2.5% of reading for 20 to 50 ml/min.

Checking Flowmeter/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 800-725-8472 (U.S. only) or 724-941-9701.

If You Ordered Cat. No.	Your Package Should Contain
375-50300N	Flowmeter, 5 to 30 L/min, with 9-volt alkaline battery and NIST standard traceable calibration certificate
375-50300	Flowmeter, 5 to 30 L/min, with 9-volt alkaline battery and UK standard traceable calibration certificate
375-50300S	Flowmeter, 5 to 30 L/min, with 9-volt alkaline battery and ISO standard traceable calibration certificate
375-0550N	Flowmeter, 0.50 to 5 L/min, with 9-volt alkaline battery and NIST standard traceable calibration certificate
375-0550	Flowmeter, 0.50 to 5 L/min, with 9-volt alkaline battery and UK standard traceable calibration certificate
375-0550S	Flowmeter, 0.50 to 5 L/min, with 9-volt alkaline battery and ISO standard traceable calibration certificate
375-00205N	Flowmeter, 20 to 500 ml/min, with 9-volt alkaline battery and NIST standard traceable calibration certificate
375-00205	Flowmeter, 20 to 500 ml/min, with 9-volt alkaline battery and UK standard traceable calibration certificate
375-00205S	Flowmeter, 20 to 500 ml/min, with 9-volt alkaline battery and ISO standard traceable calibration certificate
375-50300-KN	High Flow chek-mate Kit, 5 to 30 L/min, includes flowmeter, 9-volt alkaline battery, NIST standard traceable calibration certificate, and Pulsation Dampener Cat. No. 375-150
375-50300-KNS	High Flow chek-mate Kit, 5 to 30 L/min, includes flowmeter, 9-volt alkaline battery, ISO standard traceable calibration certificate, and Pulsation Dampener Cat. No. 375-150
375-0550-KN	Medium Flow chek-mate Kit, 0.50 to 5 L/min, includes flowmeter, 9-volt alkaline battery, NIST standard traceable calibration certificate, and Pulsation Dampener Cat. No. 375-100
375-0550-KNS	Medium Flow chek-mate Kit, 0.50 to 5 L/min, includes flowmeter, 9-volt alkaline battery, ISO standard traceable calibration certificate, and Pulsation Dampener Cat. No. 375-100

Required Equipment

- ✓ ¼-inch ID tubing for Low and Medium Flow chek-mate Flowmeters
- ✓ 3/8-inch ID tubing for High Flow chek-mate Flowmeter

GETTING STARTED

Notes and Cautions

- Allow chek-mate to equilibrate for at least 10 minutes after moving it from one temperature extreme to another before use.
- The chek-mate case is rated IP40, not as waterproof or splashproof; do not use it where water can enter the case.
- Ensure that fluids do not enter either the inlet or outlet.
- Protect the chek-mate from direct exposure to sunlight to prevent it from heating the case.
- Avoid extended use of the chek-mate in areas with high levels of airborne particulates. If this cannot be avoided, use an external inlet filter with high collection efficiency (i.e., one that collects the majority of all dust particles) and low back pressure. SKC does not supply this.
- Use only the specified disposable or rechargeable battery types.
- Ensure that discharged batteries are not left in the battery compartment for long periods to prevent damage caused by electrolyte leakage.
- There are no user-serviceable parts in the chek-mate flowmeter. Opening the chek-mate case will void the product warranty and could affect the instrument calibration. An anti-tamper warning label is fitted to the case to indicate that the case has been opened.
- Failure to follow these guidelines will void the warranty.

Turn On/Off

Allow the chek-mate to equilibrate for at least 10 minutes in the location where it will be used to ensure that it has stabilized to ambient temperature.

To turn the chek-mate on or off, press the on/off button on the front. *See Figure 1.*

Read Battery Status on LCD

When the battery voltage drops below 8 volts as it nears the end of its life, “LOW BATTERY” will be displayed in the upper left corner of the LCD *(Figure 1)*. Replace the battery. *See Maintenance.*

When the battery voltage drops below 7 volts, the “LOW BATTERY” message displayed on the LCD will flash on and off and the chek-mate will turn off automatically. If the chek-mate is turned on again with the battery still in this condition, the LCD will display "bAtt LO” 10 times and then turn off automatically.

OPERATION

Set/Verify Flow Rate

- *Allow the chek-mate to equilibrate for at least 10 minutes after moving it from one temperature extreme to another.*
- *Protect the chek-mate from direct exposure to sunlight to prevent it from heating the case.*
- *Ensure that fluids do not enter either the inlet or outlet.*
- *Avoid extended use of the chek-mate in areas with high levels of airborne particulates. See Notes and Cautions.*
- *The chek-mate does not zero the flow reading at startup, so you can turn it on with the sample train already connected and airflow passing through the flowmeter without affecting the accuracy of the flow reading*.
- *To achieve the highest possible accuracy when verifying the flow rate of pumps with flow rate ≥ 5 L/min, Pulsation Dampener Cat. No. 375-150 is always required in line between the flowmeter outlet and the flow rate verification train inlet.*
- *Set flow rate on pump per pump operating instructions.*

1. Turn on the flowmeter. The LCD screen will cycle through startup messages, “On” followed by the upper limit of the flowmeter range (“30 L” for **high flow model, “**5.0 L” for **medium flow model,** or “0.5 L” for **low flow model**) and will then indicate the current flow rate or “ ” if there is no airflow or the flow rate is below the minimum display value. ***Note*****:** *Minimum display value depends on the atmospheric conditions, but at 68 F (20 C) and 1 atm (1013.25 mbar), values are* ***5 ml/min for low flow model, 0.3 L/min for medium flow model,*** *and* ***3 L/min for high flow model.*** *Minimum display values will be higher when the flowmeter is used at higher altitudes and temperatures.*
2. Prepare the flow rate verification train. Connect the flowmeter outlet to the train inlet (*Figures 2 and 3*):
    a. **For medium flow and low flow models**, use flexible 1/4-inch ID tubing, and if required by the sampler, a calibration adapter. *See Figure 2.*

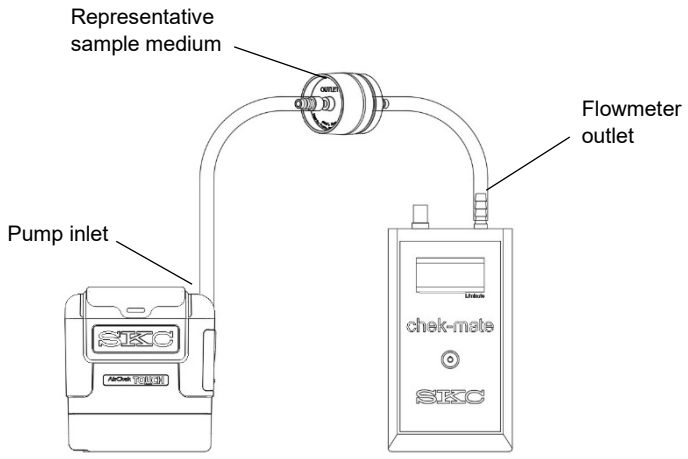


Figure 2. Medium and Low Flow Rate Verification Train
(Medium Flow Pump Shown)

b. **For high flow model,** use flexible 3/8-inch ID tubing and place Pulsation Dampener Cat. No. 375-150 in line between the flowmeter outlet and representative sample medium inlet. If required by the sampler, use a calibration adapter. *See Figure 3.*

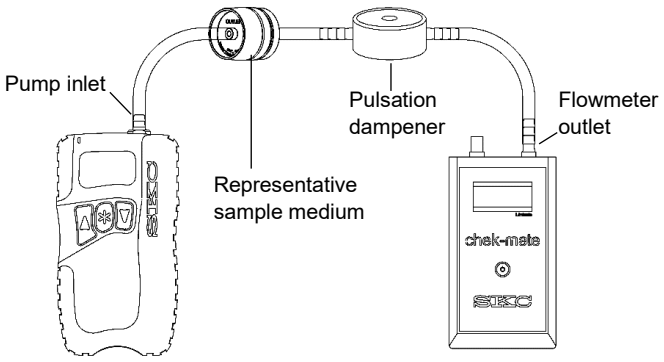


Figure 3. High Flow Rate Verification Train

***Note:** If a cyclone or similar size-selective sampler does not have a calibration adapter, see optional Jarless Flow Rate Verification Method below.*

3. Start the sample pump and observe the flowmeter LCD until it shows a steady value. The reading may vary around the steady value by up to ± 0.05 L/min on the **high flow model**, ± 0.005 L/min on the **medium flow model,** and ± 0.5 ml/min on the **low flow model**. If the flow is fluctuating, calculate and display the average flow value by activating the Average Display function*****:
    a. Press and hold the on/off button for several seconds. “AVE” and then “On” will be displayed on the LCD screen. The current flow rate will be recorded every 3.5 seconds for 10 readings. “AVE” will appear briefly on the LCD screen followed by the average flow value of those 10 readings. The average will be displayed for 7.5 seconds and then a new cycle of readings will begin. This sequence takes approximately 45 seconds.
    b. Reset the average reading at any time during a cycle, press and hold the on/off button for several seconds. The **next 10 readings** will be used to calculate the average flow.
    c. To cancel the Average Display function, turn off the flowmeter by briefly pressing the on/off button and then turn it on again.

    ✋ *Run the pump for a minimum of 5 minutes to stabilize before adjusting the flow rate.*
4. Adjust the sample pump to reach the desired sample flow rate.
5. Disconnect the tubing from the flowmeter outlet, taking care not to twist the tubing.
6. Turn off the flowmeter.

** For older models without Average Display function, determine the average flow value in one of two ways: observe the highest and lowest readings and calculate the average of these two readings **OR** record ten flowmeter readings and calculate the average of the readings.*

Automatic Power Off Timer — chek-mate will remain on indefinitely provided that a flow rate higher than the minimum display value (*see Step 1 above*) is indicated. With a flow rate lower than the minimum display value or no airflow (“ ” indicated on the LCD), the flowmeter will automatically turn off after 15 minutes to preserve battery power.

Jarless Flow Rate Verification Method (Optional)

If a cyclone or similar size-selective sampler does not have a calibration adapter, attach the sample pump to the chek-mate outlet (suction port) **with Pulsation Dampener Cat. No. 375-100 for medium flow chek-mate or Cat. No. 375-150 for high flow chek-mate in line between the pump and flowmeter.** Attach the sampler/media to the chek-mate inlet using the shortest length of tubing possible. Proceed with flow rate verification per the instructions above and pump operating instructions.

Use CalChek Feature for Automatic Flow Rate Verification/Calibration (*Medium Flow and High Flow chek-mate Models Only*)

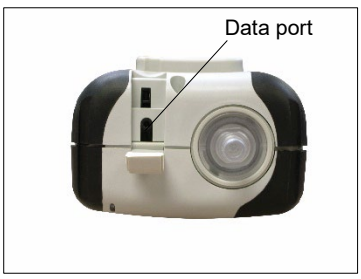
The CalChek feature allows direct communication between the Medium Flow and High Flow chek-mate Flowmeters and CalChek-ready AirChek TOUCH and Leland Legacy pumps for automatic single flow rate verification or automatic full calibration. Full calibration verifies and, if needed, adjusts the pump's flow rate across its entire operating range. CalChek operation requires the following items in the verification/calibration train:

- CalChek Communication Cable Cat. No. 375-200
- CalChek single flow verification: sampling media and, if using high flow chek-mate, Pulsation Dampener Cat. No. 375-150 in line
- CalChek full calibration: **no** sampling media in line, instead install Pulsation Dampener Cat. No. 375-100 for medium flow chek-mate or Cat. No. 375-150 for high flow chek-mate between flowmeter and pump

1. Prepare the pump per pump operating instructions. ***Note****: For AirChek TOUCH pump, ensure that the appropriate power supply is installed on the pump charging cradle and the pump is seated correctly in the cradle.*
2. Turn on the flowmeter.
3. Connect the CalChek Communication Cable to the flowmeter and the pump.
    a. Install one connector end of cable into CalChek interface socket on flowmeter.

    b. Install other connector end of cable into CalChek port on back of charging cradle (or e-Cradle) for AirChek TOUCH pump or into data port on top of Leland Legacy pump.

AirChek TOUCH charging cradle CalChek port



Leland Legacy data port

4. Prepare appropriate CalChek train (*see Figures 4 and 5*). ***Note***: *Use 1/4-inch ID flexible tubing for AirChek TOUCH and 3/8-inch ID flexible tubing for Leland Legacy; use a calibration adapter if required.*

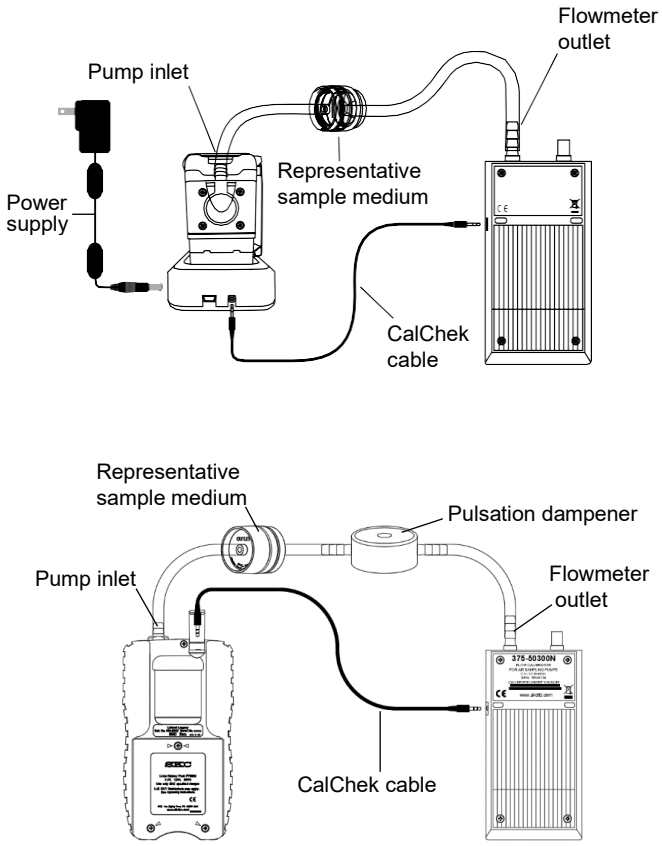


Figure 4. CalChek Single Flow Rate Verification Train (AirChek TOUCH and Leland Legacy Pumps)

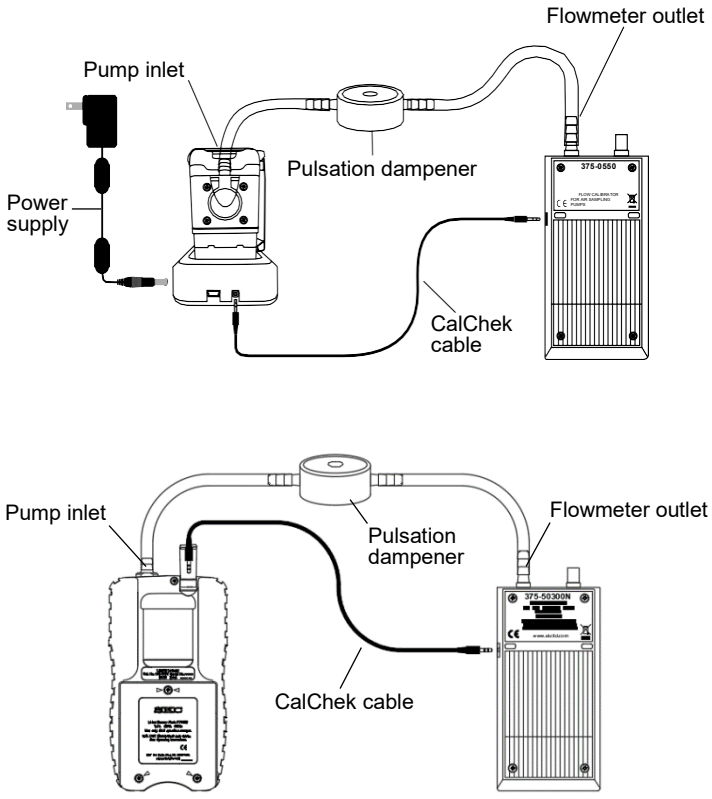


Figure 5. CalChek Full Calibration Train
(AirChek TOUCH and Leland Legacy Pumps)

5. Initiate CalChek function from the pump per pump operating instructions.
6. When airflow through the flowmeter is detected, it automatically produces its flow rate reading via the CalChek serial interface at 3.5-second intervals. The pump will automatically read in the flow readings as required to complete the CalChek process and will indicate completion on its screen display.

MAINTENANCE

If the chek-mate is not going to be used for an extended period, remove the battery from the battery compartment. Deep discharge of alkaline batteries can result in the eventual leakage of battery electrolyte even from quality batteries and can corrode the battery compartment terminals and potentially the flowmeter printed circuit board.

Replace the Battery

- *SKC recommends using quality alkaline batteries to ensure long battery life and prevent damage due to leaking battery electrolyte. A quality battery such as the Duracell Industrial model supplied with the chek-mate should provide as many as 30 hours of operation.*
- *If using a rechargeable battery, it must be 8.4-volt NiMH. See Performance Profile for specifications.*
- *Failure to follow these guidelines will void the warranty.*

When the battery voltage drops below 8 volts as it nears the end of its life, “LOW BATTERY” will be displayed in the upper left corner of the LCD. Replace the battery as follows:

1. Unscrew the two captive screws securing the battery compartment cover using a small Phillips head screwdriver and remove the cover.
2. Lift the old battery straight up and out of the battery compartment.
3. Insert the replacement battery into the compartment, ensuring that the terminals are oriented correctly as shown on the label at the bottom of the compartment.
4. Insert the battery compartment cover and secure it with the two captive screws. **Do not overtighten the screws.**

When the battery voltage drops below 7 volts, the “LOW BATTERY” message displayed on the LCD will flash on and off and the chek-mate will switch off automatically. If the chek-mate is turned on again with the battery still in this condition, the LCD will display “bAtt LO” 10 times and then turn off automatically.

Calibrate the Flowmeter

SKC recommends a minimum calibration interval of one year, however, users are responsible for determining the most suitable interval to meet their quality assurance system requirements; they should also consider the frequency of use and operating environment.

Calibration Method

The chek-mate is designed primarily to perform flow rate verification of air sample trains that incorporate an air sample pump to provide the airflow, therefore the airflow is pulled through the chek-mate by the vacuum generated by the air sample pump.

To ensure that the SKC factory flow calibration is representative of how the chek-mate is actually used, the flow calibration is performed under vacuum. Factory calibrations are performed with the chek-mate connected in series with the reference flowmeter.

SKC recommends that subsequent flow calibrations of the chek-mate flowmeter are also performed under vacuum and with the chek-mate connected in series with the reference flowmeter. However, positive pressure flow calibration using compressed laboratory air or nitrogen gas is also acceptable, with the chek-mate connected in series with the reference flowmeter.

SKC CAL Service offers calibration and documentation for the chek-mate and other flowmeters. The SKC Calibration Laboratory will calibrate the chek-mate at predefined flow rates. NIST-traceable and ISO/IEC 17025:2017 services are available. *Order SKC CAL Service at www.skcinc.com/skccal.*

Important notes/recommendations for third-party flow calibrations:

- Install a new battery in the chek-mate before sending it for third-party calibration.
- Enclose a copy of these instructions with the chek-mate when sending it to a third-party calibration laboratory.
- Airflow is indicated in ml/min on Cat. Nos. 375-00205N, 375-00205S, and 375-00205 and in L/min on Cat. Nos. 375-0550N, 375-0550, 375-0550S, 375-50300N, 375-50300, and 375-50300S at the current ambient temperature and atmospheric pressure, therefore, the reference flow measurement must be corrected to these conditions for comparison with the chek-mate indicated flow reading.
- Factory flow calibration is performed under vacuum, therefore, the calibration gas used is ambient air with relative humidity of 50 ± 20%. When performing positive pressure flow calibrations using compressed dry laboratory air or nitrogen gas, correct for the difference in gas density.
- When performing flow calibration under vacuum with the chek-mate connected in series with the reference flowmeter, connect the chek-mate with its inlet open to atmosphere.
- When performing flow calibration under positive pressure with the chek-mate connected in series with the reference flowmeter, connect the chek-mate with its outlet open to atmosphere.

Clean and Disinfect the Flowmeter

The chek-mate can be cleaned and disinfected by wiping it thoroughly with a non-bleach disinfectant wipe.

1. Ensure that the instrument is powered off.
2. Wipe the instrument thoroughly with a non-bleach disinfectant wipe.
3. Allow the surface to remain wetted for 2 minutes or until dry. This will aid in the disinfection process.

Non-bleach disinfectant wipes will not harm the instrument's plastic/rubberized case and window and are a safe alternative to disinfecting with IPA. ***Note:*** *SKC does* ***not*** *recommend IPA or other solvents for cleaning and decontamination as they will degrade case components.*

ACCESSORIES/REPLACEMENT PARTS

	Cat. No.
CalChek Communication Cable, *required for CalChek flow verification and full calibration of AirChek TOUCH and Leland Legacy Sample Pumps*	**375-200**
Pulsation Dampener, *required for use with Cat. Nos. 375-0550N, 375-0550, and 375-0550S for CalChek full calibration of AirChek TOUCH Sample Pumps*	**375-100**
Pulsation Dampener, *required for use with Cat. Nos. 375-50300N, 375-50300, and 375-50300S for manual flow verification of high flow pumps and CalChek flow verification and full calibration of Leland Legacy Sample Pumps*	**375-150**
Battery, 9-volt alkaline	**P37500**

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.

APPENDIX

Performance Profile

Flow Measurement Range	**High flow:** 5 to 30 L/min **Medium flow:** 0.5 to 5 L/min **Low flow:** 20 to 500 ml/min
Airflow Display Resolution	**High flow:** 0.01 L/min **Medium flow:** 0.001 L/min **Low flow:** 0.01 up to 100 ml/min and 0.1 above 100 ml/min
Airflow Accuracy	± 1% of reading for 5 to 30 L/min (*high flow*), 750 to 5000 ml/min *(medium flow),* and 50 to 500 ml/min *(low flow)* 2.5% outside of above ranges for medium flow and low flow models
Operating Temperature Range	32 to 104 F (0 to 40 C)
Operating Atmospheric Pressure Range	20.7 to 32.2 in Hg (700 to 1090 mbar)
Operating Altitude	Sea level to approximately 10,000 ft (3050 m) above sea level
Dimensions	7.1 x 3.3 x 1.3 in (18 x 8.3 x 3.3 cm)
Weight	**High flow:** 8.6 oz (244 gm) **Medium flow:** 8.3 oz (236 gm) **Low flow:** 8.2 oz (232 gm)
Tubing	**Medium and low flow***: Requires 1/4-in ID tubing* **High flow***: Requires 3/8-in ID tubing*
Enclosure IP Rating	IP40
Power Supply	9-V alkaline (disposable) PP3/6LR61/1604A or equivalent - should provide 30 hours of operation; or 8.4-V NiMH (rechargeable) PP3/6HR1/8.4H5 or equivalent
Low Battery	When battery voltage drops below 8 V, LCD displays LOW BATTERY.
Low Battery Fault	When battery voltage drops below 7 V, flowmeter shuts down.
Automatic Power Off Timer	15 min
Certifications	CE