



# chek-mate Flowmeter

## Cat. No. 375 Series

### Operating Instructions

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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 medium flow and low flow models:

- **Medium flow chek-mate Flowmeters with CalChek** Cat. Nos. 375-0550N and 375-0550 have a flow measurement range of 0.5 to 5 L/min and provides 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. This model has a CalChek serial interface that enables direct communication with CalChek-ready pumps in the chek-mate flow range for single-point (Single) and multiple-point (Full) automatic flow calibration.
- **Low Flow chek-mate Flowmeters** Cat. Nos. 375-00205N and 375-00205 have a 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 Package Contents

See 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
375-0550N	Flowmeter with 9-volt alkaline battery and NIST-traceable calibration certificate
375-0550	Flowmeter with 9-volt alkaline battery and UKAS-traceable calibration certificate
375-00205N	Flowmeter with 9-volt alkaline battery and NIST-traceable calibration certificate
375-00205	Flowmeter with 9-volt alkaline battery and UKAS-traceable calibration certificate

### Required Equipment

- 1/4-inch ID tubing

## 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 chekmate 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 on the chek-mate, 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 ten times and then turn off automatically.**

## Operation

### Set/Calibrate 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.

1. Turn on the flowmeter by pressing the on/off button on the front. The LCD screen will cycle through the startup messages, "On" followed by the upper limit of the flowmeter range ("5.0 L" for the **medium flow model** or "0.5 L" for the **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:** The minimum display value is dependent on the atmospheric conditions, but at 68 F (20 C) and 1 atm (1013.25 mbar), the values are 5 ml/min for the **low flow chek-mate** or 0.3 L/min for the **medium flow chek-mate**. Minimum display values will be higher when the flowmeter is used at higher altitudes and temperatures.

**Note:** The chek-mate does not zero the flow reading at startup, so it is also possible to turn it on with the sample train already connected and airflow passing through the flowmeter without affecting the accuracy of the flow reading.

2. Connect the flowmeter outlet to the inlet of the calibration train using a length of flexible 1/4-inch ID tubing, and if required by the sampler, a calibration adapter. See Figure 2.

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



Figure 2. Calibration Train

3. Start the sample pump and observe the LCD on the flowmeter until it achieves a steady value. The reading may vary around the steady value by up to  $\pm 0.005$  L/min on the **medium flow model** and  $\pm 0.5$  ml/min on the **low flow model**. If the flow is fluctuating, there are two options for determining the average flow value:
  - a. Observe the highest and lowest readings and calculate the average of these two readings **or**
  - b. Record ten flowmeter readings and calculate the average of the readings.

*Note: 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. Turn off the flowmeter using the on/off button.

#### Automatic Power Off Timer

The 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 Calibration Method

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 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 calibration per the instructions above and pump operating instructions.

#### Set Up/Initiate CalChek Calibration (chek-mate Flowmeter Cat. Nos. 375-0550N and 375-0550 Only)

- The CalChek Communication Cable Cat. No. 375-200 is required for automatic flow calibration of AirChek TOUCH pumps.
  - CalChek Single Calibration requires sampling media in line.
  - CalChek Full Calibration automatically calibrates the pump across its entire operating range, and so it is performed without sampling media in line; instead, Pulsation Dampener Cat. No. 375-100 must be installed between the flowmeter and pump.
1. Prepare the pump charging cradle and pump per pump operating instructions. *Note: Ensure that the appropriate power supply is installed on the charging cradle and the AirChek TOUCH pump is seated in the charging cradle.*
  2. Turn on the flowmeter by pressing the on/off button. *See Figure 1.*
  3. Connect the CalChek Communication Cable to the flowmeter and the pump charging cradle. *See below.*



- a. Install one connector end of cable into CalChek interface socket on flowmeter.



- b. Insert other connector end of cable into CalChek port on back of charging cradle (e-Cradle shown).

4. Prepare the calibration train:

a. **For Single Calibration**, use flexible 1/4-inch ID tubing to connect the flowmeter outlet to the representative sampling medium inlet and the representative sampling medium outlet to the pump inlet. Use a calibration adapter if required. See Figure 3.

b. **For Full Calibration**, use two lengths of flexible 1/4-inch ID tubing to connect the Pulsation Dampener to the flowmeter outlet and to the pump inlet. Do not place any sampling media in line. See Figure 4.

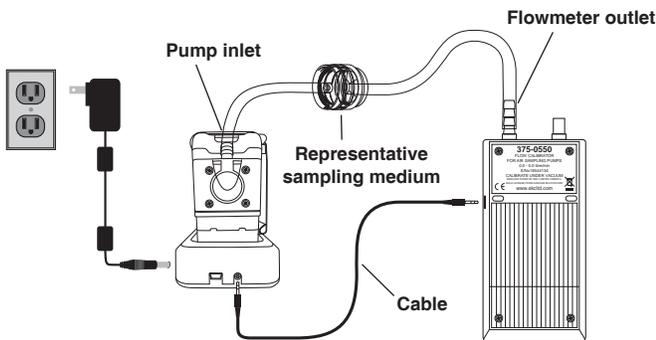


Figure 3. CalChek **Single** Calibration Train

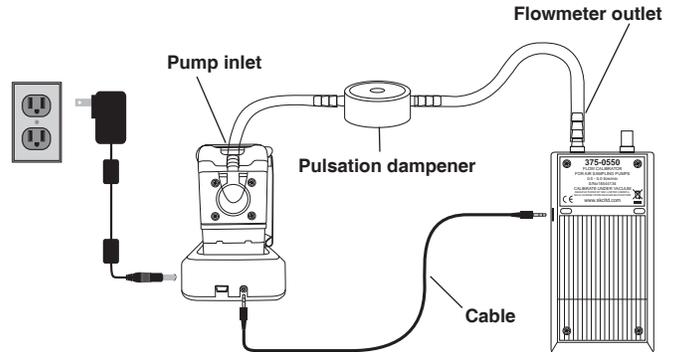


Figure 4. CalChek **Full** Calibration Train

5. Initiate the CalChek function from the pump. See 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 of the process 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 ten times and then turn off automatically.

## Calibrate the chek-mate 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 calibration of air sample trains that incorporate an air sample pump to provide the airflow, which 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 by applying the airflow alternately to the chek-mate and reference flowmeters.

SKC recommends that subsequent flow calibrations of the chek-mate flowmeter are also performed under vacuum and by applying the airflow alternately to the chek-mate and reference flowmeters. However, positive pressure flow calibration using compressed laboratory air or nitrogen gas is also acceptable, and series connection of the chek-mate and reference flowmeters under either vacuum or positive pressure is also acceptable.

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 17025:2005 services are available. Order SKC CAL Service at [www.skcinc.com](http://www.skcinc.com).

### Important notes/recommendations for third-party flow calibrations:

- Before sending the chek-mate for third-party calibration, install a new battery in it.
- 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 and 375-00205 and in L/min on Cat. Nos. 375-0550N and 375-0550 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  $50 \pm 20\%$ . 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.

## Accessories/Replacement Parts

<b>CalChek Communication Cable</b> , for use with Cat. Nos. 375-0550N and 375-0550, <i>required for automatic flow calibration of AirChek TOUCH Sample Pump</i>	<b>375-200</b>
<b>Pulsation Dampener</b> , for use with Cat. Nos. 375-0550N and 375-0550, <i>required for CalChek Full Calibration of AirChek TOUCH Sample Pump</i>	<b>375-100</b>
<b>Battery</b> , 9-volt alkaline	<b>P37500</b>

## 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>.

# Appendix

## Performance Profile

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