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chek-mate Air Flowmeter

Operating Instructions

WE STRONGLY RECOMMEND THAT YOU READ THESE INSTRUCTIONS BEFORE USING THIS PRODUCT
www.skcltd.com

This manual covers the following models:

375-00205 / 375-0550 / 375-50300

Thank you for choosing an SKC product. Your purchase is covered by our warranty, details of which can be found inside the rear cover of this manual.

Product Model Number	Product Serial Number	Date of Purchase

SKC recommends a minimum service interval of one year for this product. The first service is due one year from the date of purchase, and then at yearly intervals on this date. However, it is the responsibility of the user to perform a risk assessment to determine the necessary frequency of servicing that is required.

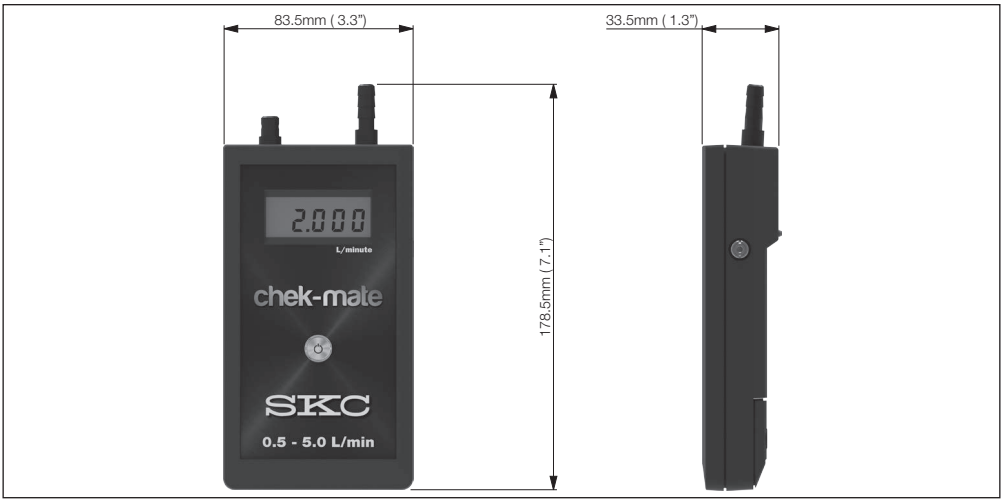
Service	Date	Service	Date	Service	Date
1		5		9	
2		6		10	
3		7		11	
4		8		12	

Please note that SKC Ltd is the only authorised service centre in the UK, guaranteeing you access to the full range of genuine SKC replacement parts. For all other areas a full list of SKC-approved distributors and service centres can be found at www.skcltd.com

SKC UK service centre - Phone: +44 (0)1258 480188 Email: info@skcltd.com

CE

Parameter	Model 375-00205	Model 375-0550	Model 375-50300
Airflow range	20 ml/min to 500 ml/min	0.5 litre/min to 5.0 litre/min	5 litre/min to 30 litre/min
Airflow display resolution	< 100 ml/min : 0.01 ml/min >= 100 ml/min : 0.1 ml/min	0.001 litre/min	0.01 litre/min
Airflow accuracy	20 to 50 ml/min : ±2.5% of reading 50 to 500 ml/min : ±1% of reading	0.5 to 0.75 litre/min : ±2.5% of reading 0.75 to 5.0 litre/min : ±1% of reading	5 to 30 litre/min: ±1% of reading
Weight	232 g (8.2 oz)	236 g (8.3 oz)	244 g (8.6 oz)
Operating temperature range	0 °C to 40 °C (32 °F to 104 °F)		
Operating atmospheric pressure range	700 mbar to 1090 mbar (20.7 inHg to 32.2 inHg)		
Operating altitude	Sea level to approximately 3050 m (10000 ft) above sea level		
Enclosure IP rating	IP40		
Battery	9V alkaline disposable PP3 / 6LR61 / 1604A or equivalent, or 8.4V NiMH rechargeable PP3 / 6HR61 / 8.4H5 or equivalent		
Automatic power off timer	15 minutes		



Note:
SKC Ltd reserves the right to make changes to the specification and design of this product at any time without prior notice to the end user.
The chek-mate flowmeter is manufactured by SKC Ltd under a sole license from Graham Blatchford.

The chek-mate flowmeter is designed specifically for use in the occupational health and safety industry for the purpose of setting and verifying the air flow rate into air sample trains. Its flow range makes it suitable for use across a broad range of air sampling methods and with a broad range of air samplers, sample media and air sample pumps.

Operating Principle

The chek-mate is an orifice type flowmeter. Its reading is determined by measuring the pressure drop across the orifice caused by the flow of air through the orifice, using a differential pressure sensor. This type of flowmeter gives a mass flow reading meaning that the pressure drop across the orifice will be constant for a given mass flow of gas independent of the density of the gas.

The chek-mate also incorporates an ambient temperature sensor and an atmospheric pressure sensor and uses the readings of these sensors to correct the mass flow reading generated by measuring the pressure drop across the orifice to the current ambient temperature and atmospheric pressure. This correction provides an indicated flow reading that is equivalent to a volumetric flow reading when the inlet of the flowmeter is open to atmosphere.

Average Flow Rate Display

The chek-mate flowmeter can also display an average flow rate, based on the calculated average of 10 flow rate readings recorded at 3.5 second intervals. The calculated average reading is held on the display for 7.5 seconds before reverting to the instantaneous flow reading, and the sequence then repeats until the chek-mate is switched off.

CalChek Pump Adjustment and Verification

The 375-0550 and 375-50300 chek-mate models incorporate a CalChek serial interface which enable them to communicate directly with SKC AirChek 2000, AirChek 3000, AirChek Touch and Leland Legacy pumps,

in order to perform automatic flow adjustment and verification of these pumps.

The chek-mate is connected to the pump using a CalChek communication cable (P/No 375-200) which plugs into a socket on the right hand side of the chek-mate, and to the serial interface port on the pump.

The chek-mate automatically outputs its flow rate reading via the CalChek serial interface at 3.5 second intervals when airflow through the chek-mate is present.

Refer also to the specific pump user manual for detailed instructions on performing CalChek adjustment.

Flow Pulsation

The accuracy of the chek-mate flowmeter is affected by pulsating airflow such as that generated by diaphragm type air sample pumps. For applications at flows up to 5 litre/min the pressure drop across the sampler and sample media connected between the chek-mate and air sample pump is enough to reduce the flow pulsations generated by the pump to a level that does not impact on the accuracy of the chek-mate flow reading.

An exception to this is when performing a Full CalChek calibration on SKC AirChek 2000, AirChek 3000 and AirChek Touch pumps using a 375-0550 model chek-mate, when a pulsation dampener (P/No 375-100) is required to be connected between the chek-mate outlet port and pump inlet port. Refer to "4) CalChek Automatic Flow Adjustment and Verification" on page 12 for further details.

High flow air sample pumps (with flow range above 5 litre/min) can exhibit higher flow pulsation, and when used with samplers and sample media with a low pressure drop, the remaining flow pulsations could impact on the accuracy of the chek-mate. It is therefore recommended that a pulsation dampener (P/No 375-150) is always used with the 375-50300 model chek-mate.

1) Care of the chek-mate Flowmeter

- 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.
- Avoid extended use of the flowmeter in areas with high levels of airborne particulates. An external inlet filter (not SKC supply) can be used with the chek-mate flowmeter if this cannot be avoided. Any filter used should have high collection efficiency (collect the majority of all dust particles) and low back pressure.
- Ensure that fluids do not enter the flowmeter inlet or outlet ports.
- If the flowmeter has been stored in a cold location and is immediately taken to a hot, humid location, do not use the flowmeter until it has stabilised to the higher ambient temperature to prevent condensation forming inside the flowmeter.
- The flow meter case is IP40 rated: it is not rated as waterproof or splashproof and, therefore, must not be used where it is possible for water to enter the casing.
- There are no user serviceable parts within the chek-mate flowmeter. Opening of 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 which will identify that the case has been opened.

Warning - Failure to follow these guidelines will void the product warranty.

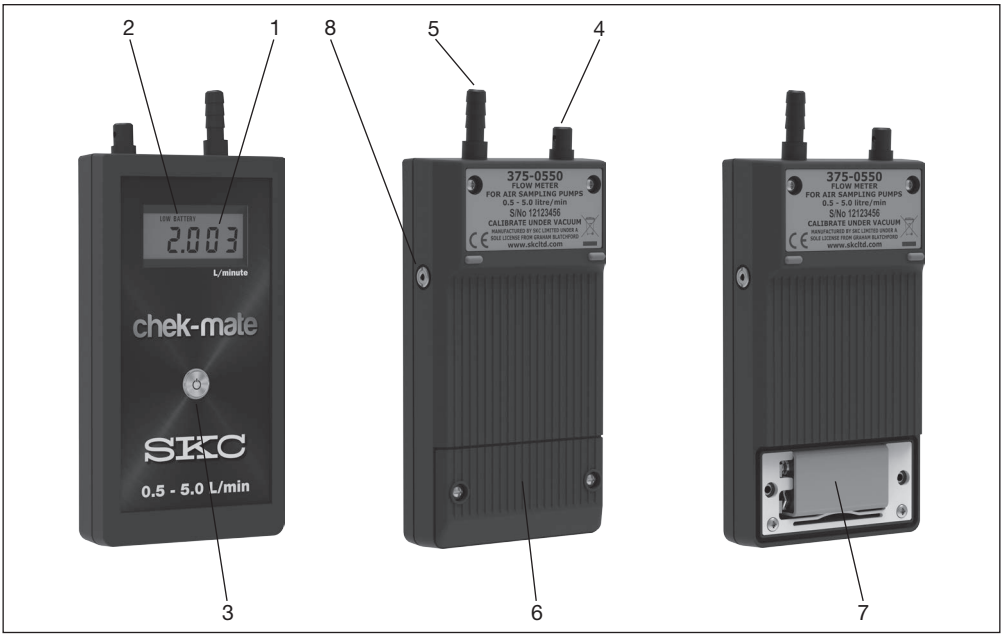
2) Waste Electrical and Electronic Equipment

This product is marked with the crossed out wheelie bin symbol, which identifies that it falls within thescope of the EU Directive 2002/96/EC and the 2013 UK Regulations on waste electrical and electronic equipment (WEEE). At the end of it's useful life, this product must be disposed of in an environmentally sound way as detailed in the Directive / Regulations. Note that the battery must be separated from the product and disposed of as detailed in Waste Batteries below. Please contact your local distributor or SKC Ltd for further details on how to comply with these requirements. SKC Ltd's producer registration number is WEE/KH0054TQ.

3) Waste Batteries

The alkaline disposable battery supplied with this flowmeter and any spare batteries purchased for it, fall within the scope of the European Directive 2006/66/EC and the 2009 UK Regulations on batteries and accumulators and waste batteries and accumulators. At the end of the battery's life it must be disposed of in an environmentally sound way as detailed in the Directive / Regulations. Please contact your local distributor or SKC Ltd for further details on how to comply with these requirements. SKC Ltd's batteries producer registration number is BPRN00454.

Diagram of the chek-mate Flowmeter



1. LCD screen
2. Low battery indicator
3. On/Off button
4. Inlet port
5. Outlet port
6. Battery compartment cover
7. Battery
8. CalChek interface socket (375-0550 and 375-50300 models only)

IMPORTANT NOTE !

Please take special care not to twist the tubing when disconnecting from the outlet port. Twisting of the tubing can unscrew the outlet port from the chek-mate case. The chek-mate case must be opened to refit the outlet port and doing this will invalidate its warranty and/or calibration.

1) Setting and Verifying an Air Sample Train Flow Rate

a. Ensure that the chek-mate flowmeter has been in the location where it is to be used for enough time for its temperature to stabilise to the ambient temperature. A minimum of 10 minutes is recommended. Shield the flowmeter from exposure to direct sunlight to prevent heating of the case by the sunlight.

b. Switch 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 flow meter range ('0.5 L' for the 375-00205 model, '5.0 L' for the 375-0550 model and '30 L' for the 375-50300 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. The minimum display value is dependent on the atmospheric conditions, but at 20 °C and 1013.25 mbar (1atm) the values are 5 ml/min for the 375-00205 model, 0.3 litre/min for the 375-0550 model and 3 litre/min for the 375-50300 model. The minimum display value will be higher when the chek-mate is used at higher altitudes and temperatures.

   Note: The chek-mate flowmeter does not perform a zero of the flow reading at startup therefore it is also possible to switch on the flowmeter with the air sample train already connected and airflow passing through the flowmeter without affecting the accuracy of the flow reading.

c. Connect the flowmeter outlet hosetail to the inlet of the air sample train using a length of flexible tubing (1/4" or 6mm bore tubing for the 375-00205 and 375-0550 models and 3/8" or 10mm bore tubing for the 375-50300 model is recommended) and sampler calibration adapter if required.

Note: When using the 375-50300 model chek-mate it is recommended to connect a pulsation dampener (P/No 375-150) between the chek-mate outlet port and sample train inlet.

d. Start the air sample pump and observe the reading of the flowmeter until it achieves a steady value. The reading may fluctuate by a small amount either side of the steady value (up to ±0.5 ml/min on the 375-00205 model, ± 0.005 litre/min on the 375-0550 model and ± 0.05 litre/min on the 375-50300 model). If the indicated flow rate is fluctuating it is recommended to enable the average flow rate display function.

Note: It is good practice to allow the pump to run for a minimum of 5 minutes to stabilise before adjusting the flow rate.

e. Adjust the air sample pump to give the desired sample airflow rate.

f. Record the the chek-mate flow rate eading, using the average flow rate display (see below) if required.

g. Disconnect the tubing from the flowmeter outlet hosetail taking care to pull the tubing in line with the axis of the hosetail and not to twist the tubing. Switch off the flowmeter using the on/off button.

2) Average Flow Rate Display

a. To enable the average flow rate display function, with the chek-mate already switched on, press and hold the on/off button for four seconds and the display will indicate "AvE" "On".

b. The instantaneous flow rate will continue to be shown on the display whilst 10 flow rate readings are recorded by the chek-mate and the average of the 10 readings is calculated, after which the display will show "AvE" followed by the calculated average flow rate reading.

c. The average flow rate reading is held on the display for 7.5 seconds before reverting to the instantaneous flow rate display.

d. This sequence will repeat indefinitely until the chek-mate is switched off.

e. Should the pump flow rate be adjusted with the chek-mate already in average display mode, the next average flow rate reading will be partly based on the flow rate prior to adjustment and so not representative of the new flow rate. The average calculation sequence can be restarted by pressing and holding the on/off button for four seconds again, the display will indicate "AvE" "0", and the chek-mate will commence recording a new sequence of 10 readings, and then show the average reading.

3) Automatic Power Off Timer

The chek-mate flowmeter will remain on indefinitely provided that an airflow rate above the minimum display value is indicated. With an airflow rate lower than the minimum display value or no airflow ('- - - -' indicated on the screen) the flowmeter will automatically switch off after 15 minutes to preserve battery power.

4) CalChek Automatic Flow Adjustment and Verification

a. To perform automatic flow adjustment and verification of SKC AirChek 2000, AirChek 3000 and AirChek Touch pumps using the 375-0550 chek-mate or the Leland Legacy pump using the 375-50300 chek-mate, a CalChek communication cable (P/No 375-200) is required. Plug one end of the cable into the socket on the right hand side of the chek-mate flowmeter and the other end of the cable into the serial interface socket on the pump (the socket is

mounted on the charging cradle for the AirChek Touch pump and the pump must be fitted to the charging cradle to perform CalChek adjustment).

b. When performing a single point CalChek adjustment of a complete sample train connect the outlet port of the chek-mate to the inlet of the sample train (using a calibration adapter if required).

   Note: When performing a single point CalChek adjustment of a Leland Legacy pump with a 375-50300 model chek-mate a pulsation dampener (P/No 375-150) is required to be connected between the chek-mate outlet port and the sample train inlet.

c. A full CalChek calibration, which automatically calibrates the pump across its entire operating range, is performed with no sample train connected between the chek-mate and the pump. A pulsation dampener (P/No 375-100 for use with the 375-0550 chek-mate model or P/No 375-150 for use with the 375-50300 model) is therefore required to be connected in place of the sample train between the chek-mate outlet port and the pump inlet port.

d. The CalChek function is initiated on the pump. Refer to the specific pump users manual for detailed instructions on this. When airflow through the chek-mate is detected the chek-mate automatically outputs its flow readings via the CalChek interface at 3.5 second intervals.

e. The pump will automatically read in the chek-mate flow readings as required to complete the CalChek process, and completion of the process will be indicated on the pump display.

- SKC recommends the use of quality alkaline primary (disposable) batteries to ensure long battery life and prevent damage due to leaking battery electrolyte. A quality primary battery such as the Duracell Industrial model supplied with the flowmeter should provide as much as 30 hours of operation.
- When the battery voltage drops below 8V as it nears the end of its life, the flowmeter LCD indicates 'LOW BATTERY'. It is recommended to replace the battery at this point to ensure uninterrupted use of the flowmeter. When the battery voltage drops further to below 7V the LCD 'LOW BATTERY' indication will flash on/off and the flowmeter will automatically switch off. If the flowmeter is switched on again with the battery in this condition, the LCD will indicate 'bAtt' 'LO' ten times and then automatically switch off.
- To replace the battery, unfasten the two captive screws securing the battery compartment cover using a Pozi-drive size 1 screwdriver and remove the battery compartment cover. Lift the old battery straight up out of the battery compartment. Fit the replacement battery ensuring the correct orientation of the terminals as detailed on the label at the bottom of the battery compartment. Fit the battery compartment cover and secure with the two captive screws taking care not to overtighten the screws.
- The SKC replacement primary (disposable) battery part number is P37500.
- NiMH secondary (rechargeable) batteries may also be used (not available from SKC), but it must be ensured that the battery used is an 8.4V nominal type, and not a 7.2V nominal type which are also manufactured.

- The European Batteries Directive and equivalent legislation in other countries requires that all batteries are disposed of correctly at the end of their working life. This means that they must be collected and treated separately from other waste.
- It is recommended to remove the battery from the battery compartment if the flowmeter is not to be used for an extended period of time. Deep discharge of alkaline batteries can result in the eventual leakage of battery electrolyte even from quality batteries and can cause corrosion of the battery compartment terminals and potentially the flowmeter printed circuit board.

Calibration Interval

SKC recommend a minimum calibration interval of one year for this product. However, it is the responsibility of the user to determine the most suitable interval in order to meet their quality assurance system requirements. Consideration should also be given to the frequency of use and operating environment when determining the calibration interval.

Calibration Method

The chek-mate is primarily designed to perform flow calibration of air sample trains which 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 recommend 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.

Important notes for third party flow calibrations:

1. It is strongly recommended to send a copy of this instruction manual with the chek-mate unit when sending to a third party calibration laboratory.
2. It is recommended to fit a new battery prior to sending the chek-mate for third party calibration.
3. The chek-mate indicates air flow in ml/min on model 375-00205 and litre/min on models 375-0550 and 375-50300, 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.
4. The factory flow calibration is performed under vacuum therefore the calibration gas used is ambient air with relative humidity of 50% ±20% RH. When performing positive pressure flow calibrations using compressed dry laboratory air or nitrogen gas, the difference in gas density must be corrected for.
5. When performing flow calibration under vacuum with the chek-mate connected in series with the reference flowmeter the chek-mate should be connected with its inlet port open to atmosphere.
6. When performing flow calibration under positive pressure with the chek-mate connected in series with the reference flowmeter the chek-mate should be connected with its outlet port open to atmosphere.

Part No.	Description
Replacement Parts	
P37500	Alkaline replacement battery for 375 series chek-mate flowmeters
Accessories	
375-100	Pulsation dampener for use with 375-07550 & 375-0550 model chek-mate flowmeters
375-150	Pulsation dampener for use with 375-50300 model chek-mate flowmeters
375-200	CalChek cable for use with 375 series chek-mate flowmeters

Important note: The replacement part listed above is available to all customers. There are no other user serviceable parts within the chek-mate flowmeter. Opening of 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 which will identify that the case has been opened.

Limited One Year Warranty

1. SKC warrant this instrument and each of its component parts, provided for occupational health and safety applications, are free from defects in workmanship and materials under normal use for a period of one (1) year. This warranty DOES NOT cover any claims due to abuse, misuse, neglect, alteration, or accident, or use in application for which the instrument was either not designed or not approved by SKC, or, due to the buyer's failure to maintain normal maintenance, improper selection, or misapplication. This warranty shall further be void if changes or adjustments to the instrument are made by a person other than an employee of the seller or, if the operating instructions furnished at the time of installation are not complied with.

2. SKC hereby expressly disclaim all warranties either expressed or implied, including any implied warranties of merchantability or fitness for a particular purpose and neither assumes nor authorises any person to assume for it any liability in connection with the sale of these instruments. No description of the goods being sold has been made a part of the basis of the bargain or has created or amounted to an express warranty that the goods will conform to any such description. Buyer shall not be entitled to recover from SKC any consequential damages: damages to property, damages for loss of use, loss of time, loss of profits or income, or any other incidental damages. Nor shall the Buyer be entitled to recover from SKC any consequential damages resulting from defect of the instrument.

3. This warranty extends only to the original purchaser of the warranted instrument during the term of the warranty. The buyer may be required to present proof of purchase in the form of a paid receipt for the instrument.

4. In the event of a defect, malfunction, or other failure of the instrument not caused by any misuse or damage to the instrument while in the possession of the Buyer, SKC will remedy the failure or defect

without charge to the buyer. The remedy will consist of service or replacement of the instrument or refund of the purchase price, at the option of SKC. However, SKC will not elect refund unless it is unable to provide replacement and repair is not commercially practicable.

5. The terms of this warranty begin on the date the instrument is delivered to the Buyer and continue for a period of one (1) year.

6(a) To obtain performance of any obligation under this warranty, the buyer shall return the instrument, freight prepaid, to SKC at the following address:

SKC Limited
11 Sunrise Park
Higher Shaftesbury Road
Blandford Forum
Dorset DT11 8ST
Phone: +44 (0) 1258 480188

6(b) To obtain further information on the warranty performance contact SKC.

7. This warranty is provided under English law.

8. No other warranty is given by SKC in conjunction with this sale.

The disclaimers and limitations shall not affect the statutory rights of a consumer.

Air Sampling Solutions & Expertise

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