SCO ID: 3930-24C0014

STATE OF CALIFORNIA - DEPARTMENT OF GENERAL SERVICES

STANDARD AGREEMENT

STD 213 (Rev. 04/2020)

AGREEMENT NUMBER	PURCHASING AUTHORITY NUMBER (If Applicable)
24-C0014	

1. This Agreement is entered into between the Contracting Agency and the Contractor named below:

CONTRACTING AGENCY NAME
Department of Pesticide Regulation

CONTRACTOR NAME
Santa Barbara County

2. The term of this Agreement is:

START DATE
July 1, 2024

THROUGH END DATE
June 30, 2027

3. The maximum amount of this Agreement is:
$149,375.47, One hundred forty-nine thousand, three hundred seventy-five dollars and forty seven cents.

4. The parties agree to comply with the terms and conditions of the following exhibits, which are by this reference made a part of the Agreement.

Exhibits	Title	Pages
Exhibit A	Scope of Work	3
Exhibit B	Budget Detail and Payment Provisions	3
Exhibit C *	General Terms and Conditions (GTC 04/2017)	
Exhibit D	Special Terms and Conditions	2
Attachment 1	Standard Equipment Operating Procedures	109

Items shown with an asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto.
These documents can be viewed at https://www.dgs.ca.gov/OLS/Resources

IN WITNESS WHEREOF, THIS AGREEMENT HAS BEEN EXECUTED BY THE PARTIES HERETO.

CONTRACTOR

CONTRACTOR NAME (if other than an individual, state whether a corporation, partnership, etc.)
Santa Barbara County Agricultural Commissioner's Office

CONTRACTOR BUSINESS ADDRESS	CITY	STATE	ZIP
624 W. Foster Road	Santa Maria	CA	93455

PRINTED NAME OF PERSON SIGNING	TITLE
Steve Lavagnino	Chair
CONTRACTOR AUTHORIZED SIGNATURE	DATE SIGNED
	7-9-24

STATE OF CALIFORNIA

CONTRACTING AGENCY NAME
Department of Pesticide Regulation

CONTRACTING AGENCY ADDRESS	CITY	STATE	ZIP
1001 I Street, 4th Floor	Sacramento	CA	95814

PRINTED NAME OF PERSON SIGNING	TITLE
Leslie Ford	Branch Chief
CONTRACTING AGENCY AUTHORIZED SIGNATURE	DATE SIGNED
CALIFORNIA DEPARTMENT OF GENERAL SERVICES APPROVAL	EXEMPTION (If Applicable)
	Exemption Letter 7.47

EXHIBIT A
STANDARD AGREEMENT

SCOPE OF WORK

1. This Agreement is between the Department of Pesticide Regulation, hereinafter referred to as DPR, and the Santa Barbara County, hereinafter referred to as Contractor.

2. This Agreement will commence on the start date July 1, 2024, as presented herein or upon approval by the State, whichever is later, and no work will begin before that time. This Agreement is of no effect unless approved by the State. Contractor will not receive payment for work performed prior to approval of the Agreement and before receipt of notice to proceed by the Contract Manager. This Agreement will expire on June 30, 2027.

3. The Project Representatives during the term of this Agreement will be:

   A. All official communications, except invoices, from the Contractor to DPR, shall be directed to the attention of the DPR Contract Manager or designee at:

   Department of Pesticide Regulation
   Environmental Monitoring Branch, MS 3B
   1001 I Street
   P.O. Box 4015
   Sacramento, CA 95812-4015
   Phone: (916) 445 3677
   E-mail: Alexander.Gomez@cdpr.ca.gov

   B. All invoices from the Contractor to DPR shall be directed to:

   Department of Pesticide Regulation
   Attn: Accounts Payable
   P.O. Box 4015, MS 4A
   Sacramento, CA 95812-4015
   Accounts_Payable@cdpr.ca.gov

   C. All administrative and programmatic communications, except payments, from DPR to the Contractor shall be directed to:

   Santa Barbara County Agricultural Commissioner's Office
   Attn: Noah Beyeler
   624 W. Foster Road
   Santa Maria, CA 93455-3623
   Phone: (805) 934-6200 FAX: (805) 934-6202
   E-mail: nbeyeler@countyofsb.org

   D. All payments from DPR to the Contractor shall be directed to:

   Santa Barbara County Agricultural Commissioner's Office Weights & Measures
   Attn: Kendra Stites
   263 Camino del Remedio
   Santa Barbara CA 93110
   Phone: (805) 681-5600
   E-mail: kstites@countyofsb.org

E. The Project Representatives during the term of this Agreement may be changed by mutual written agreement of the parties without the necessity of an amendment to the agreement.

4. Background

Santa Maria is one of the communities included in DPR's Air Monitoring Network (AMN) due to the amount of reported fumigant use in the area. Santa Maria is over 260 miles from the nearest DPR sampling personnel and as such, it is a difficult sampling location to travel to and back on a weekly basis from Sacramento.

To still sample in this high pesticide-use community, DPR will rely on the services of the Contractor to follow DPR detailed procedures to collect weekly ambient air samples and ship them to DPR for analysis on a bi-weekly basis.

5. Goals and Objectives

The goals and objectives of this agreement are as follows:

- Collect weekly ambient air samples as instructed and scheduled by DPR Contract Manager,
- Maintain proper sample integrity during and after sample collection,
- Maintain proper sample collection documentation procedures as provided by DPR, and
- Make bi-weekly shipments of collected ambient air samples to DPR following procedure provided by DPR.

6. Work to be Performed

The following are the steps to be taken by the Contractor during air sample collection, sample transport, and shipment of collected ambient air samples to DPR:

A. DPR staff will travel to Santa Maria to provide ambient air sampling training as needed to Contractor to successfully complete the tasks required under this agreement.

   1) Additionally, DPR Contract Manager or designee will be available to provide any technical assistance to Contractor personnel throughout the duration of this agreement.
   2) Any issues with sampling equipment or sampling materials are expected to be raised by Contractor with DPR Contract Manager as they arise.

B. DPR personnel will provide required procedural documentation.

C. DPR will provide Contractor with a monthly sampling schedule at least one month prior to sample collection. Any divergence from the received schedule will be discussed with and approved by DPR Contract Manager prior to date change.

D. Contractor will collect four individual ambient air samples per week:
   1. one multi-residue cartridge;
   2. one Methyl Isothiocyanate (MITC) sorbent tube;
   3. one chloropicrin sorbent tube;
   4. one Volatile Organic Compound (VOC) canister.

E. Once the ambient air samples are collected, samples are to be capped or valves are to be closed (VOC Canister), placed in an insulated storage container containing dry ice (sorbent tubes) or in a DPR-supplied aluminum storage container for the VOC canisters during transport from sampling location to Contractor's storage facility. Once at Contractor's storage facility, samples that were transported on dry ice will need to be placed in a freezer and remain frozen until shipped to DPR's Bradshaw facility. The VOC Canister air samples will be stored at ambient conditions and will not be placed with the other collected samples.

1) Insulated storage containers will be provided by DPR.
2) Shipping Boxes with pre-paid postage will also be provided to the Contractor by DPR.

F. At the conclusion of two weeks of collection of ambient samples, the Contractor will place the collected cartridges and sorbent tubes in DPR-supplied insulated storage containers filled with enough dry ice to assure sample integrity. Contractor will need to obtain dry ice before shipment to DPR. Additionally, the canisters collected will be placed in a separate shipping container provided by DPR. All samples are to be shipped via group transportation to:

Department of Pesticide Regulation
Attn: Alexander Gomez
3077 Fite Circle
Sacramento, CA 95827

7. Project Timeline

Ambient air sample collection by the Contractor will start July 1, 2024. The project ends June 30, 2027. One set of ambient air samples will be collected weekly by the Contractor. Two one-week sample sets will be mailed to DPR's warehouse on a bi-weekly basis starting two weeks from first sample collection by the Contractor and will continue until the conclusion of this agreement.

8. DPR Responsibilities

A. DPR will provide all required air sample collection materials including sorbent tubes, cartridges, canisters, air sampling instruments (air pumps, air flow meters, etc.), tools required to perform simple troubleshooting (if needed), sample labels, required documentation, shipping containers, pre-paid shipping labels, sampling operating procedures, and will provide any needed sample collection training to Contractor.

B. Provide needed ambient sample collection training and sample collection documentation to the Contractor.

C. Make procedural documentation readily available to the Contractor.

D. Provide sampling schedule at least one month prior to weekly sampling.

E. Provide guidance, technical support, and troubleshoot instructions to Contractor should any sampling or equipment issues arise.

F. Inspect received ambient air samples and report back to Contractor any issues, if any, are observed.

G. Maintain an open dialogue with Contractor to assure project integrity.

EXHIBIT B
STANDARD AGREEMENT

Budget Detail and Payment Provisions

1. Invoicing

A. In no event shall the Contractor request reimbursement from the State for obligations entered into or for costs incurred prior to the commencement date or after the expiration of this Agreement.

B. For services satisfactorily rendered and approved by the Contract Manager and upon receipt and approval of the invoices, DPR agrees to compensate Contractor for actual allowable costs incurred as specified herein and in accordance with the rates specified herein or attached hereto. Incomplete or disputed invoices shall be returned to Contractor, unpaid, for correction.

C. The Contractor shall submit each invoice and all supporting documentation, not more frequently than monthly or less frequently than quarterly in arrears, to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015
Sacramento, CA 95812-4015 **or**
Accounts_Payable@cdpr.ca.gov

D. All invoices shall contain the name of the Contractor, the Contractor's address as specified on the first page of this Agreement (Std 213), the Agreement #24-C0014, the date of the invoice, the Contractor's invoice number, the invoice period, the cost of services provided, and a description of the services provided.

2. Budget Contingency Clause

A. It is mutually understood between the parties that this Agreement may have been written before ascertaining the availability of congressional or legislative appropriation of funds, for the mutual benefit of both parties, in order to avoid program and fiscal delays that would occur if the Agreement were executed after that determination was made.

B. This Agreement is valid and enforceable only if sufficient funds are made available to the State by the United States Government or the California State Legislature for the current year and/or any subsequent years covered under this Agreement. In addition, this Agreement is subject to any additional restrictions, limitations, or conditions enacted by the Congress or any statute enacted by the Congress or the California State Legislature which may affect the provisions, terms or funding of this Agreement in any manner.

C. If funding for any fiscal year is not appropriated, reduced or deleted by the United States Government or the California State Legislature for purposes of this program, DPR shall have the option to either cancel this Agreement with no liability occurring to DPR, or offer an Agreement Amendment to Contractor to reflect the reduced amount.

3. Payment

A. Payment will be made in accordance with, and within the time specified in, Government Code Chapter 4.5, commencing with Section 927.

B. Contractor will be reimbursed for direct costs, other than salary costs, that are identified in the Contractor's rates. Contractor will bill in arrears for costs incurred during the billing period. If applicable, salary costs will be itemized and billed by position classification. Documentation supporting specific salary costs will be presented if requested by DPR. Non-wage costs will be billed, in summary, according to general expense categories. A detailed report of transactions will support the billing. Individual expenditures exceeding $500.00 will be supported by a photocopy of the original documentation. Documentation in support of expenditures less than $500.00 will be presented if requested by DPR.

4. Rates

Table 1 – Details Budget

Personnel	*Hourly Wage*	*Hourly Benefit Amount*	*2024-2025 Estimated Amount*	*2025-2026 Estimated Amount*	*2026-2027 Estimated Amount*	*Total Amount*
Agriculture/Weights & Measures Inspector I	$37.72	$33.94	$4,514.49	$4,514.49	$4,514.49	*$13,543.46*
Agriculture/Weights & Measures Inspector I Overtime Rate	$56.57	$50.92	$752.41	$752.41	$752.41	*$2,257.24*
Agriculture/Weights & Measures Inspector II	$43.22	$38.90	$8,047.75	$8,047.75	$8,047.75	*$24,143.25*
Agriculture/Weights & Measures Inspector II Overtime Rate	$64.83	$58.35	$1,293.39	$1,293.39	$1,293.39	*$3,880.17*
Agriculture/Weights & Measures Inspector III	$47.42	$42.68	$15,135.83	$15,135.83	$15,135.83	*$45,407.48*
Agriculture/Weights & Measures Inspector III Overtime Rate	$71.13	$64.01	$2,364.97	$2,364.97	$2,364.97	*$7,094.92*
Supervising Agriculture/Weights & Measures Inspector	$52.16	$46.94	$4,955.20	$4,955.20	$4,955.20	*$14,865.60*
Supervising Agriculture/Weights & Measures Inspector Overtime Rate	$78.24	$70.42	$594.62	$594.62	$594.62	*$1,783.87*
Administrative Office Professional - Senior	$42.60	$38.34	$971.33	$971.33	$971.33	*$2,913.98*
Total Personnel and Benefits			**$38,629.986**	**$38,629.986**	**$38,629.986**	***$115,889.959***
General supplies including but not limited to transportation[1], dry ice, sampling equipment, etc.			$4,000.00	$4,000.00	$4,000.00	*$12,000.00*
Total Supplies			**$4,000.00**	**$4,000.00**	**$4,000.00**	***$12,000.00***
Total Direct Cost			**$42,629.986**	**$42,629.986**	**$42,629.986**	***$127,889.959***
Indirect Cost[2] (16.8%)			**$7,161.838**	**$7,161.838**	**$7,161.838**	***$21,485.513***
Total Budget			**$49,791.824**	**$49,791.824**	**$49,791.824**	***$149,375.472***

①Maximum mileage reimbursement rate will be set at $0.67/mile. Mileage reimbursement covers: gasoline, cost of vehicle maintenance, insurance, licensing and registration, depreciation and all other costs associated with operation of the vehicle.

②Indirect Cost: 16.8% indirect cost rate includes: depreciate of buildings and equipment, utility consumption, operations, and maintenance costs, administrative services provided at the departmental and central level, and library costs.

Table 2 – Itemized table for salary and benefits

Job Title	*Hourly Wage*	*Hourly Benefit Amount*	*Total Production Rate*	*Estimated Hours Worked/12 Months*	*Estimated Hours Worked/36 Months*	*Total Cost*
Agriculture/Weights & Measures Inspector I	$37.72	$33.94	$71.66	63.00	189.00	$13,543.46
Agriculture/Weights & Measures Inspector I Overtime Rate	$56.57	$50.92	$107.49	7.00	21.00	$2,257.24
Agriculture/Weights & Measures Inspector II	$43.22	$38.90	$82.12	98.00	294.00	$24,143.25
Agriculture/Weights & Measures Inspector II Overtime Rate	$64.83	$58.35	$123.18	10.50	31.50	$3,880.17
Agriculture/Weights & Measures Inspector III	$47.42	$42.68	$90.09	168.00	504.00	$45,407.48
Agriculture/Weights & Measures Inspector III Overtime Rate	$71.13	$64.01	$135.14	17.50	52.50	$7,094.92
Supervising Agriculture/Weights & Measures Inspector	$52.16	$46.94	$99.10	50.00	150.00	$14,865.60
Supervising Agriculture/Weights & Measures Inspector Overtime Rate	$78.24	$70.42	$148.66	4.00	12.00	$1,783.87
Administrative Office Professional - Senior	$42.60	$38.34	$80.94	12.00	36.00	$2,913.98
			TOTAL	**430**	**1290**	**$ 115,889.959**

Assumes 2 days of sampling per week, 52 weeks a year, with 10 sampling days falling on a Saturday or Sunday

Based on FY 23/24 SB County salary ranges

EXHIBIT D
STANDARD AGREEMENT

Special Terms and Conditions

1. Termination

A. Either Party reserves the right to terminate this agreement without cause upon 30 days written notice to the other Party, or immediately in the event of a material breach. In the event of termination, Contractor shall be paid for all allowable costs incurred up to the date of termination and upon receipt of the final invoice.

B. In the event that the total Agreement amount is expended prior to the expiration date, DPR may, at its sole discretion, terminate this Agreement with 30 days written notice to contractor.

2. Subcontracting

Contractor shall perform the work contemplated with resources available within its own organization and no portion of the work shall be subcontracted.

3. Harassment Free Workplace

The Department of Pesticide Regulation (DPR) is committed to providing a safe, secure environment, free from sexual misconduct. It is policy of the Department that employees have the right to work in an environment that is free from all forms of discrimination, including sexual harassment. This policy specifically speaks to freedom from a sexually harassing act that results in the creation of an intimidating, hostile or offensive work environment or that otherwise interferes with an individual's employment or work performance. As a Contractor with DPR, you and your staff are expected to comply with a standard of conduct that is respectful and courteous to DPR employees and all other persons contacted during the performance of this Agreement. Sexual harassment is unacceptable, will not be tolerated; and may be cause for prohibiting some or all of the Contractor's staff from performing work under this Agreement.

4. Retention of Records/Audits

For the purpose of determining compliance with Public Contract Code Section 10115, *et seq.* and Title 21, California Code of Regulations, Chapter 21, Section 2500 *et seq.*, when applicable, and other matters connected with the performance of the Agreement pursuant to Government Code Section 8546.7, the Contractor, subcontractors and the State shall maintain all books, documents, papers, accounting records, and other evidence pertaining to the performance of the Agreement, including but not limited to, the costs of administering the Agreement. All parties shall make such materials available at their respective offices at all reasonable times during the Agreement period and for three years from the date of final payment under the Agreement. The State, the State Auditor, FHWA, or any duly authorized representative of the Federal government having jurisdiction under Federal laws or regulations (including the basis of Federal funding in whole or in part) shall have access to any books, records, and documents of the Contractor that are pertinent to the Agreement for audits, examinations, excerpts, and transactions, and copies thereof shall be furnished if requested.

5. Resolution of Disputes

A. DPR reserves the right to issue an order to stop work in the event that a dispute should arise, or in the event that DPR gives the performing agency a notice that his Agreement will be terminated. If DPR exercises this right, the stop-work order will be in effect until the dispute has been resolved or this Agreement has been terminated.

B. Any dispute concerning a question of fact arising under the terms of this Agreement which is not disposed of within a reasonable period of time by agency employees normally responsible for the administration of this agreement, shall be brought to the attention of the Executive Officer or designated representative of each agency for joint resolution.

C. Contractor shall continue with the responsibilities under this agreement during any dispute until the expiration of this Agreement or notified to stop work.

6. Insurance Requirements

A. Coverage needs to be in force for complete term of contract. If insurance expires during the term of the contract, a new certificate must be received by the State at least 10 days prior to the expiration of this insurance. This new insurance must still meet the terms of the original contract.

B. Insurance policies shall contain a provision that states that coverage will not be cancelled without 30 days prior written notice to the State.

C. Any insurance required to be carried shall be primary, and not excess, to any other insurance carried by the State.

D. Contractor shall maintain general liability with limits of not less than $1,000,000 per occurrence for bodily injury and property damage liability combined. The policy shall include coverage for liabilities arising out of premises, operations, independent contractors, products, completed operations, personal & advertising injury, and liability assumed under an insured contract. This insurance shall apply separately to each insured against whom claim is made or suit is brought subject to Contractor's limit of liability.

E. Contractor shall maintain motor vehicle liability with limits of not less than $1,000,000 per accident. Such insurance shall cover liability arising out of a motor vehicle including owned, hired, and non-owned motor vehicles.

F. Contractor shall maintain statutory workers' compensation and employer's liability coverage for all its employees who will be engaged in the performance of the contract, including special coverage extensions where applicable. Employer's liability limits of $1,000,000 shall be required.

G. The policy must include the State of California, its officers, agents, employees and servants as additional insured's, but only insofar as the operations under the contract are concerned.

Attachment 1

California Department of Pesticide Regulation
Environmental Monitoring Branch
1001 I Street, Sacramento CA 95814-2828
P.O. Box 4015, Sacramento CA 95812-4015

STANDARD OPERATING PROCEDURE
Instructions for Use of SKC AirChek Connect Sample Pump

KEY WORDS

air sampling, SKC AirChek Connect Sample Pump

APPROVALS Original SOP signed by following

APPROVED BY: _____ DATE: _____
Maziar Kandelous
Environmental Monitoring Branch Management

APPROVED BY: _____ DATE: _____
Aniela Burant
Environmental Monitoring Branch Senior Scientist

APPROVED BY: _____ DATE: _____
Vaneet Aggarwal
Environmental Monitoring Branch Quality Assurance Officer

PREPARED BY: _____ DATE: _____
Hamed Madaeni
Environmental Monitoring Branch Scientist

Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.01.

STANDARD OPERATING PROCEDURE
Instructions for Use of SKC AirChek Connect Sample Pump

1.0 INTRODUCTION

1.1 Purpose

This Standard Operating Procedure (SOP) discusses the calibration and use of the SKC AirChek Connect Sample Pump (Cat. No. 220-4000) for collection of ambient air samples.

1.2 Scope

This document provides specific instructions for the calibration and use of a SKC AirChek Connect Sample Pump for the collection of air samples as part of the Department of Pesticide Regulation (DPR) Air Monitoring Network.

2.0 MATERIALS

2.1 SKC AirChek Connect Sample Pump

- 2.1.1 Charging cradle(s)
- 2.1.2 Single cradle power supply
- 2.1.3 Multi cradle power supply
- 2.1.4 All-in-One Adjustable Tube Holder
- 2.1.5 Small flat-head screwdriver

2.2 High ALICAT flow meter (MB-20SLPM)
2.3 Low ALICAT flow meter (MB-100SCCM)
2.4 Flexible vinyl tubing
2.5 Calibration tubing
2.6 Sorbent Tubes
2.7 Field Data Sheet (FDS) and Chain of Custody (COC) forms
2.8 Sealable polyethylene bag
2.9 Dry ice and ice chest
2.10 Red caps to seal sorbent tubes

3.0 PROCEDURES

3.1 General

The SKC AirChek Connect Sample Pump is a touch screen pump that operates at air flows from 5 to 5,000 ml/min. An overview of the pump is presented in Figure 1.

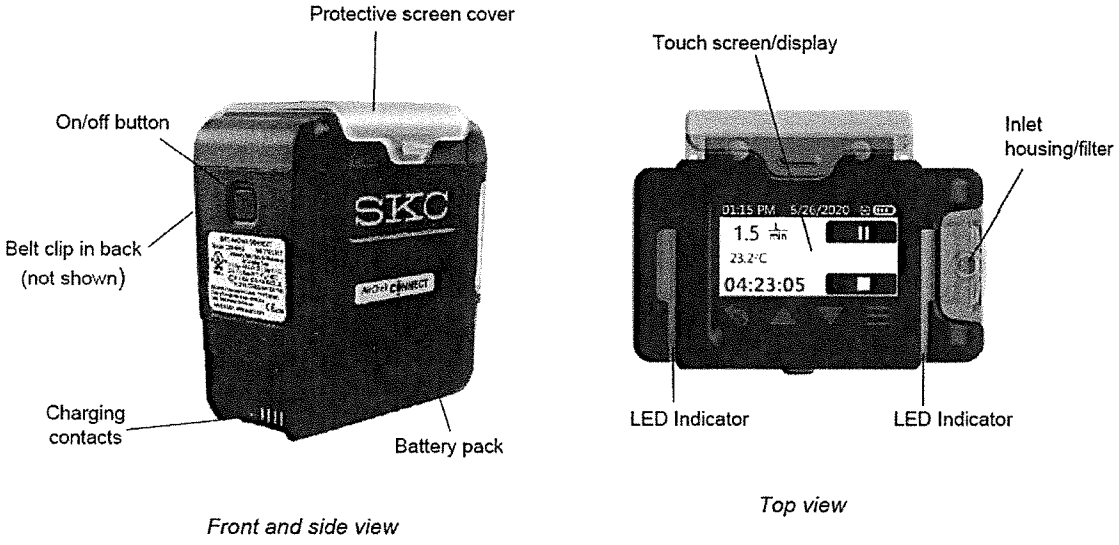


Figure 1. SKC AirChek Connect Sample Pump overview.

Flow rate is determined by the chemical being monitored, equipment, and duration of the sampling period. The determination of the appropriate flow rate is study dependent; therefore, it is recommended to refer to the study's protocol. With the constant flow mode, the SKC AirChek Connect Sample Pump can be adjusted to sample air flow for high volume flow (1 to 5 L/min), and low volume flow (5 to 500 ml/min) with All-in-One Adjustable Tube Holder (Figure 24).

3.1.1 Touch Screen

There are four touch screen activated buttons in the active zone (Figure 2).

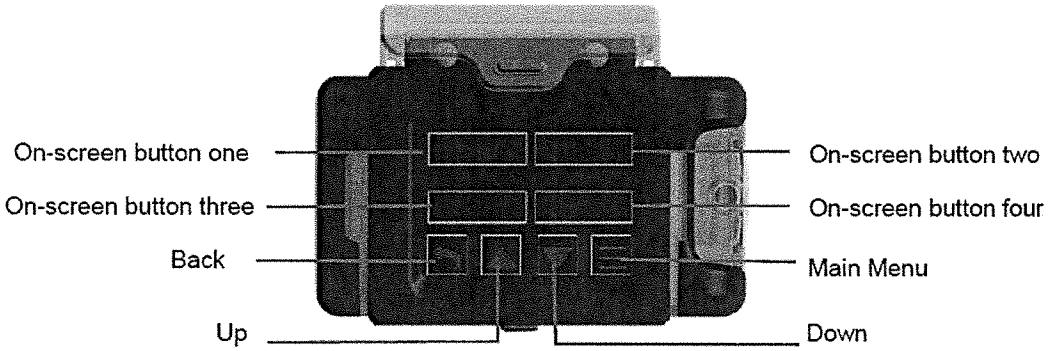


Figure 2. Touch Screen and navigation buttons from top view

3.1.2 Navigation buttons

Immediately below the display are four navigation buttons that access previous screens, Main Menu, and to increase/decrease values (Figure 3).

Back button	**Up Arrow button**	**Down Arrow button**	**Main Menu button**
Returns to previous screen 	Increases selected value or moves up a list/range/display  Touch and hold to speed increment of flow or pressure settings.	Decreases selected value or moves down a list/range/display  Touch and hold to speed decrement of flow or pressure settings.	Returns to Main Menu, from which you can access all options. 

Figure 3. Navigation buttons

4.0 Air Sampling

4.1 General

Air sampling studies are usually conducted for the purpose of determining the flux rate of a chemical following an application or estimating ambient air concentrations from off-site movement. The chemical being monitored will determine the sample media and tube type.

4.1.1 Turning Pump Power On/Off

- To power on the pump, press the recessed power on/off button on the side of the pump (Figure 1). The screen will light up and the flow screen will be displayed.
- To power off the pump, press the recessed power on/off button on the side of the pump.
- To conserve battery power, a non-running pump will power off automatically after 5 minutes of inactivity.
- The power on/off button also locks/dims and unlocks/undims the touch screen while the pump is running.

4.2 Setting up a sample with higher flow rate (MITC samples)

4.2.1 Setting Pump Flow Rate

Setting a flow rate, calibrating a flow rate, and sampling are done through the **Sample Menu**.
For the higher flow rate (MITC samples), the flow rate on the pump is set to 1.5 L/min.

4.2.1.1 Break open the sorbent tube and attach the sorbent tube via vinyl tubing affixed to the SKC AirChek Connect Sample Pump inlet and turn on the pump.
Note: The pumps and the tubing may already be set up at some stations.

4.2.1.2 If the flow rate is not already set on the pump, follow these steps to set the flow rate at 1.5 L/min.
Note: If the flow rate is already set to 1.5 L/min go to section *4.2.1.3*

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 4).

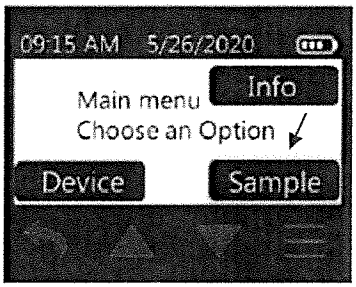


Figure 4. Sample Button

2. Touch Flow (Figure 5).

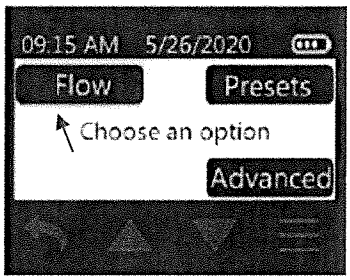


Figure 5. Flow Button

3. Touch flow display (Figure 6).

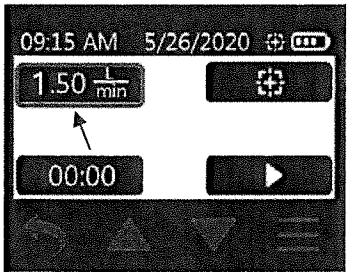


Figure 6. Flow Display

4. To toggle flow settings; Touch the left or right arrow buttons; flow changes by increments of 0.5 L/min. Touch up/down arrow buttons to fine-tune setting (Figure 7).

   Note: A sustained touch on the up/down arrow buttons will speed up increment/decrement of flow setting.

   Touch check mark to accept selection and return to Flow Menu with new flow setting displayed.

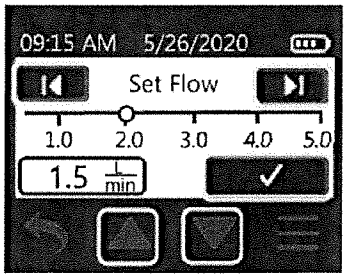


Figure 7. Left/Right and Up/Down Buttons

4.2.1.3 Power on the High ALICAT flowmeter and "Tare" flow.

4.2.1.4 Connect the other end of the sorbent tube to ALICAT flowmeter using calibration tubing (Figure 8).

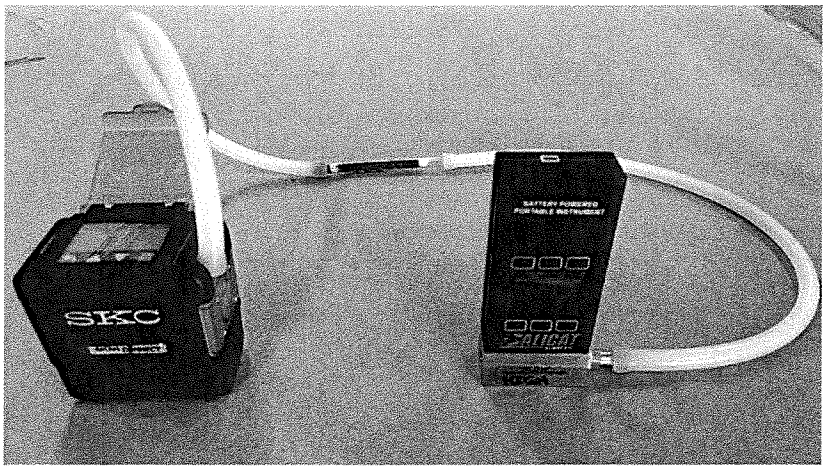


Figure 8. Calibration Set up (1 to 5 L/min)

4.2.1.5 Touch the Run button to start the pump (Figure 9).

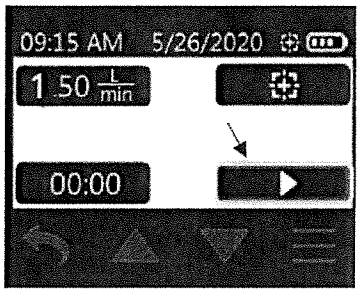


Figure 9. Run Button

4.2.1.6 Wait at least 1 minute for the flow to be stabilized.

- If the flow reading on the ALICAT flowmeter does not show the desired flow (1.5 L/min or within 10% of desired flow, 1.35 - 1.65 L/min), the pump needs to be calibrated as follows.
- If the pump does not need to be calibrated go to section 4.2.2.2

4.2.2 Calibration

4.2.2.1 While the ALICAT flowmeter is still connected and powered on, stop the pump and press the main menu button (three Horizontal lines below the display) to get to the Main Menu.

1. From the Main Menu, touch Sample (Figure 10).

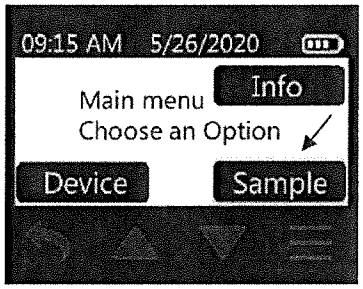


Figure 10. Sample Button

2. Touch Flow (Figure 11).

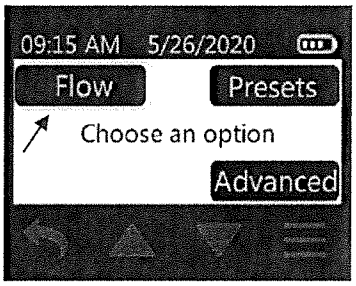


Figure 11. Flow Button

3. Touch calibration icon (Figure 12).

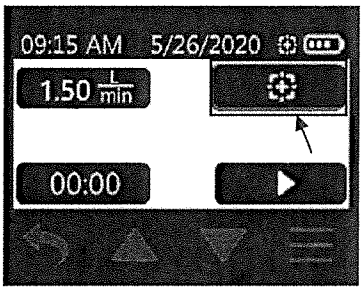


Figure 12. Calibration Button

4. Pump will start running when you touch the calibration icon. Touch up/down arrow buttons to increment/decrement the calibration adjustment (Figure 13).

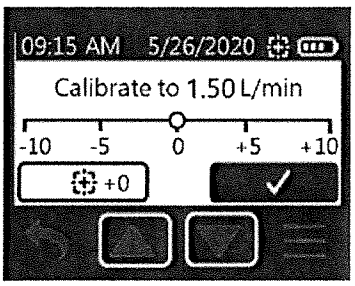


Figure 13. Up/Down Buttons

5. The calibration adjustment value will display beside the calibration icon. The flow rate on the ALICAT flowmeter will change because of this adjustment. When the method-specified flow rate (1.5 L/min) is reached, touch the check mark to accept the calibration adjustment value and return to the Flow Menu (Figure 14).

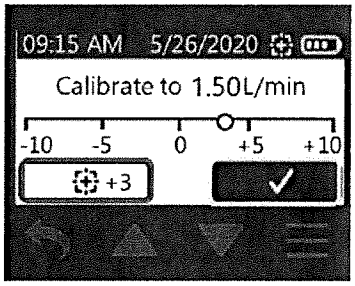


Figure 14. Accept Button

6. The flow rate displayed on the pump will remain unchanged (Figure 15).

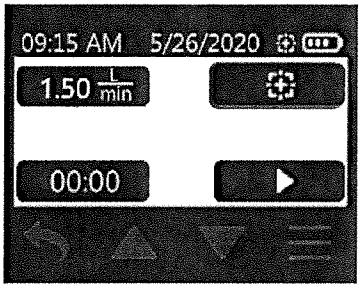


Figure 15. Main Display

4.2.2.2 Record the flow rate on the ALICAT flowmeter as the "Starting Flow" on the Field Data Sheet (FDS).

4.2.2.3 After setting/calibrating flow rate, ensure that ALICAT flowmeter and calibration tubing have been removed.

4.2.3 Duration

After setting up the samples, set the duration from the Main Menu as follows:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 16).

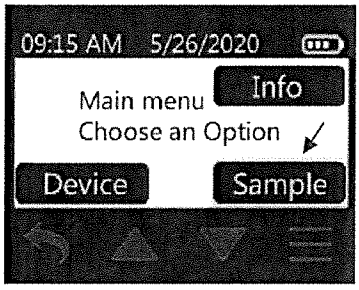


Figure 16. Sample Button

2. Touch Flow (Figure 17).

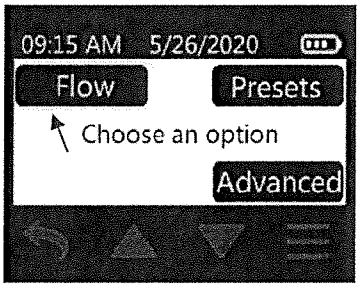


Figure 17. Flow Button

3. Touch Time button (00:00) in Flow Menu to set sample duration (Figure 18).

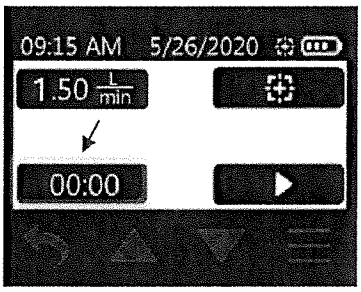


Figure 18. Time Button

4. Hour digit 1 will flash. Touch up/down arrow buttons to increment/decrement hour. Touch right arrow to advance to hour digit 2 (will flash) and up/down arrow buttons to adjust hour digit 2. Repeat through minutes (Figure 19). Note: The duration for Air Monitoring Network (AMN) samples should be 24 hours, but the time should be set for 25 hours in case anything happens in the field.

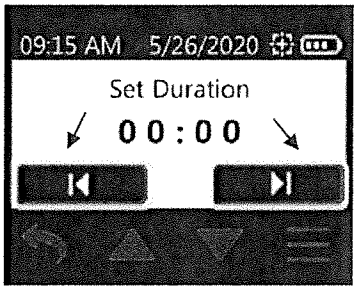


Figure 19. Left/Right and Up/Down Buttons

5. Touch check mark to accept new time and return to Main Display. New time setting will display (Figure 20).

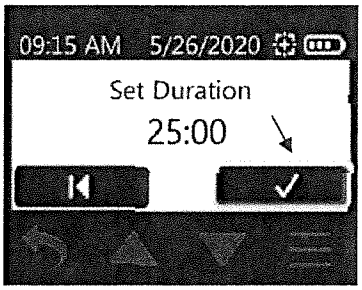


Figure 20. Accept Button

4.2.4 Sample Run

From the Main Menu Run the sample as follows:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 21).

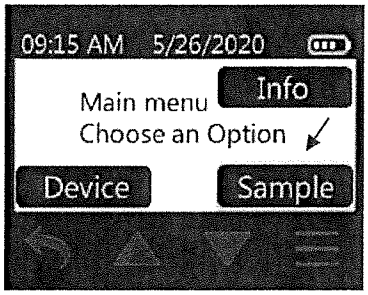


Figure 21. Sample Button

2. Touch Flow (Figure 22).

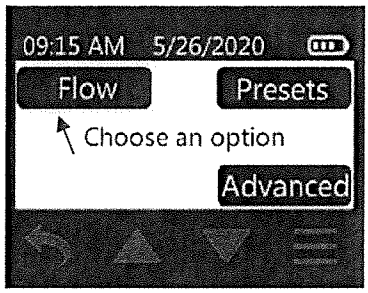


Figure 22. Flow Button

3. Touch Run button in Flow Menu to run pump in constant flow (Figure 23).

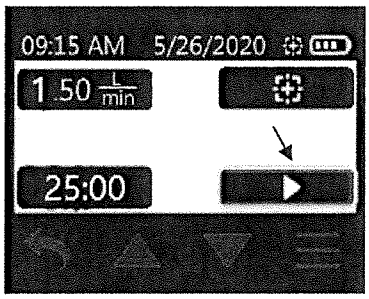


Figure 23. Run Button

4. While the pump is running the screen should be locked to prevent accidental tap errors or tampering. Use the power button to lock and unlock the touch screen during sampling.

4.2.5 Sample Collection

Before stopping the pump at the end of sampling period the "Ending Flow" needs to be measured.

4.2.5.1 Turn on the High ALICAT flowmeter and "Tare" flow.

4.2.5.2 Connect the other end of the sorbent tube to ALICAT flowmeter using calibration tubing (Figure 8).

4.2.5.3 Record the flow rate on the ALICAT flowmeter, as the "Ending Flow" on the FDS.

4.2.5.4 Remove the ALICAT flowmeter and the calibration tubing.

4.2.5.5 At 24 hours, stop the pump. Remove the sorbent tube and cap both ends. Place the sorbent tube into the designated sealable polyethylene bag. Place bag on dry ice.

4.2.5.6 Record "Sample end time", "Duration" and "Total Volume" on the FDS.

4.2.5.7 Turn off the pump.

4.3 Setting up a sample with a lower flow rate (Chloropicrin samples)

4.3.1 Setting Pump Flow Rate

Setting a flow rate, calibrating a flow rate, and sampling are done through the **Sample Menu**. For the lower flow rate (Chloropicrin samples), the flow rate on the pump is still set to 1.5 L/min and the All-in-One Adjustable Tube Holder (Figure 24) is used to adjust the flow to 50.0 mL/min.

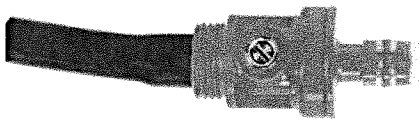


Figure 24. All-in-One Adjustable Tube Holder

4.3.1.1 Break open the sorbent tube and attach the sorbent tube and the All-in-One Adjustable Tube Holder (Figure 24) via vinyl tubing to the SKC AirChek Connect Sample Pump inlet and turn on the pump.

Note: The pumps and the tubing may already be set up at some stations.

4.3.1.2 If the flow rate is not already set on the pump, follow these steps to set the flow rate to 1.5 L/min.

Note: If the flow rate is already set to 1.5 L/min go to section *4.3.1.3*

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 25).

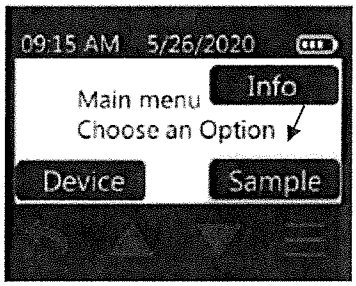


Figure 25. Sample Button

2. Touch Flow (Figure 26).

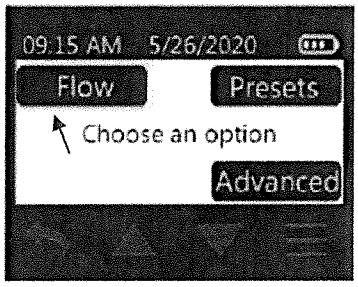


Figure 26. Flow Button

3. Touch flow display (Figure 27).

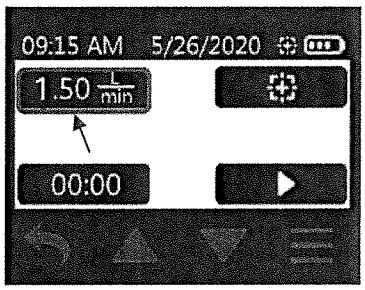


Figure 27. Flow Display

4. To toggle flow settings; touch the left or right arrow buttons. Flow changes by increments of 0.5 L/min. Touch up/down arrow buttons to fine-tune setting (Figure 28).

   Note: A sustained touch on the up/down arrow buttons will speed up increment/decrement of flow setting.

   Touch check mark to accept selection and return to Flow Menu with new flow setting displayed.

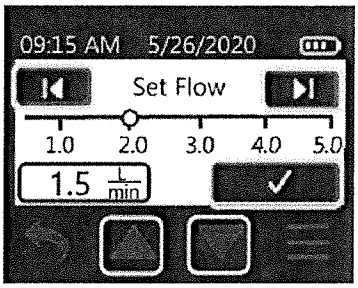


Figure 28. Left/Right and Up/Down Buttons

4.3.1.3 Power on the Low ALICAT flowmeter and "Tare" flow.

4.3.1.4 Connect the other end of the sorbent tube to ALICAT flowmeter using calibration tubing (Figure 29).

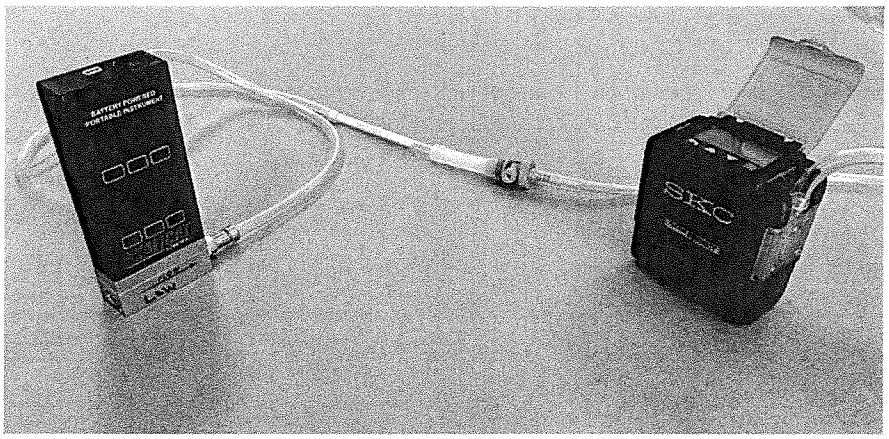


Figure 29. Calibration Set up (50.0 mL/min)

4.3.1.5 Touch the Run button to start the pump (Figure 30).

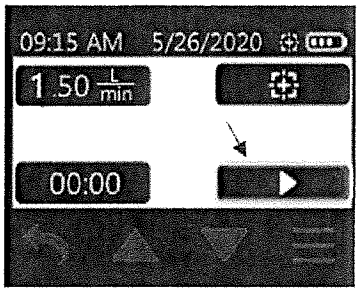


Figure 30. Run Button

4.3.1.6 Wait at least 1 minute for the flow to be stabilized.

- If the flow reading on the ALICAT flowmeter is not showing the desired flow (50.0 mL/min or within 10% of desired flow 45-55 mL/min), the pump needs to be calibrated as follows.
- Note: If the pump does not need to be calibrated go to section 4.3.2.2

4.3.2 Calibration

4.3.2.1 While the ALICAT flowmeter is connected, powered on, and the pump is still running, using a small flat-head screwdriver, turn the flow adjust screw on the All-in-One Adjustable Tube Holder clockwise to decrease flow or counterclockwise to increase flow until the method-specified flow rate is indicated on the ALICAT flowmeter (adjust to within 10% of desired flow, 45 – 55 mL/min).

4.3.2.2 Record the flow rate on the ALICAT flowmeter, as the "Starting Flow" on the FDS and stop the pump.

4.3.2.3 After setting/calibrating flow rate, ensure that ALICAT flowmeter and calibration tubing have been removed.

4.3.3 Duration

After setting up the samples, set the duration from the Main Menu as follows:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 31).

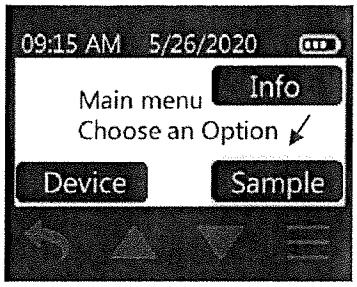


Figure 31. Sample Button

2. Touch Flow (Figure 32).

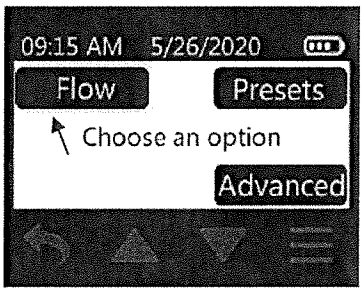


Figure 32. Flow Button

3. Touch Time button (00:00) in Flow Menu to set sample duration (Figure 33).

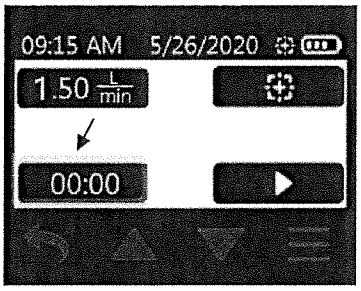


Figure 33. Time Button

4. Hour digit 1 will flash. Touch up/down arrow buttons to increment/decrement hour. Touch right arrow to advance to hour digit 2 (will flash) and up/down arrow buttons to adjust hour digit 2. Repeat through minutes (Figure 34). Note: The duration for Air Monitoring Network (AMN) samples should be 24 hours, but the time should be set for 25 hours in case anything happens in the field.

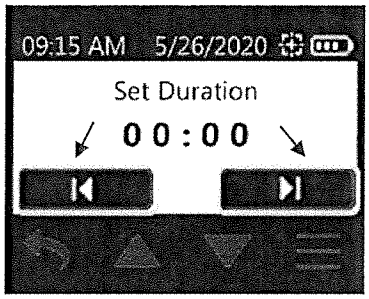


Figure 34. Left/Right and Up/Down Buttons

5. Touch check mark to accept new time and return to Main Display. New duration setting will display (Figure 35).

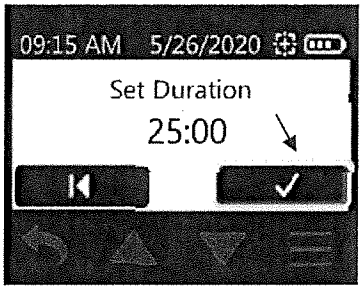


Figure 35. Accept Button

4.3.4 Sample Run

From the Main Menu Run the sample as follows:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 36).

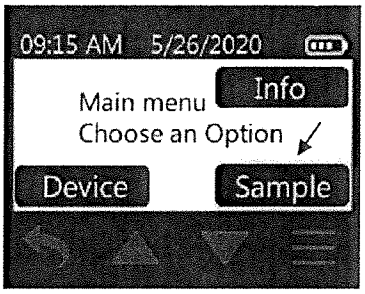


Figure 36. Sample Button

2. Touch Flow (Figure 37).

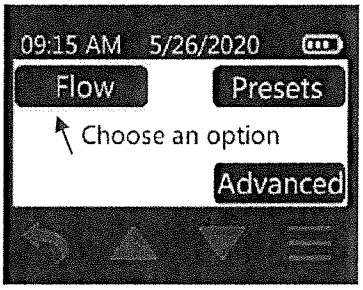


Figure 37. Flow Button

3. Touch Run button in Flow Menu to run pump in constant flow (Figure 38).

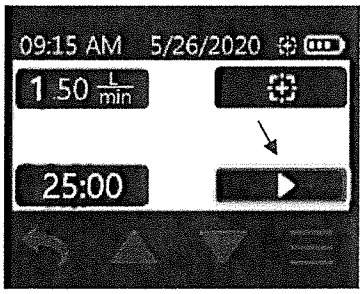


Figure 38. Run Button

4. While the pump is running the screen should be locked to prevent accidental tap errors or tampering. Use the power button to lock and unlock the touch screen during sampling.

4.3.5 Sample Collection

Before stopping the pump at the end of sampling period the "Ending Flow" needs to be measured.

4.3.5.1 Turn on the Low ALICAT flowmeter and "Tare" flow.

4.3.5.2 Connect the other end of the sorbent tube to ALICAT flowmeter using calibration tubing (Figure 29).

4.3.5.3 Record the flow rate on the ALICAT flowmeter, as the "Ending Flow" on the FDS.

4.3.5.4 Remove the ALICAT flowmeter and the calibration tubing.

4.3.5.5 At 24 hours, stop the pump. Remove the sorbent tube and cap both ends. Place the sorbent tube into the designated sealable polyethylene bag. Place bag on dry ice.

4.3.5.6 Record "Sample end time", "Duration" and "Total Volume" on the FDS.

4.3.5.7 Turn off the pump.

4.4 Reporting Requirement

4.4.1 Field Data Sheet

A Field Data Sheet (FDS) and Chain-Of-Custody (COC) form should be completed for each sample according to SOP ADMN006.02. The following information should be recorded on the FDS:

1. Site name
2. Location code
3. Station operator
4. Operator agency
5. Study number
6. Flow meter serial number
7. Sample start date

8. Sample end date
9. Sample start time
10. Sample end time
11. Duration
12. AMN sample type
13. Equipment type
14. Sampler ID
15. AMN sample number
16. Starting flow
17. Ending flow
18. Total Volume
19. Local conditions
20. Field notes / comments
21. Sample loaded by / date and time
22. Sample retrieved by / date and time
23. Sample transported or shipped to DPR warehouse by / date and time
24. Mode of transport

4.5 Study-Specific Decisions

The following study-specific decisions are the responsibility of the study project leader and should be made in consultation with the study field coordinator, senior scientists, and Quality Assurance Officer.

4.5.1 Sampling location
4.5.2 Flow rate
4.5.3 Sampling frequency
4.5.4 Sampling interval duration
4.5.5 Sampling media

5.0 Troubleshooting

If you have any issues with operation and maintenance of the pump, you can contact relevant staff or you can refer to the SKC AirChek Connect Sample Pump Manual.

Appendix

This Appendix provides information on how to charge the battery pack(s), check the charging status, how to navigate through different Screens and the Manus, and how to set up the Time and Date on the SKC AirChek Connect Sample Pump.

The items described here have already been set up at most of the Sampling Stations and therefore presented here as an Appendix.

Charging the Battery Pack

In case you need to charge the battery pack(s), it can be done by using a single or multiple cradle and through the following steps.

Single cradle

Insert the connector on a single cradle power supply into the power port on the side of a standard charging cradle. Insert the wall cube into a 100-to-240-volt wall outlet (Figure 39).

Multiple cradle

Press together the connector on the side of the first cradle with the connector on the side of the next cradle. Repeat the connection to chain up to five standard charging cradles. Insert the connector of multiple cradle power supply into the power port on the side of the last cradle in the chain. Insert the wall cube into a 100-to-240-volt wall outlet (Figure 39).

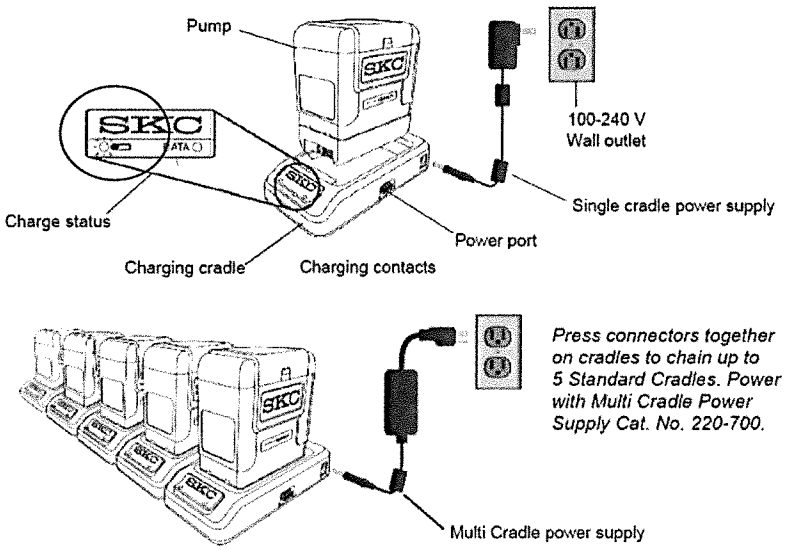


Figure 39. Charging Train, Single and Multiple Cradles

Charging status

After charging the battery completely (approximately 3 hours). The left LED on the cradle will indicate charging status (Figure 40).

LED Action			Charge Status
Red ● steady			Charge in progress
Red ● 3 sec	Green ● 1 sec	(Pattern repeats)	Approximately 75% charged
Green ● steady			Charge completed/trickle charge

Figure 40. Charging status

Display

There is a constant display at top of every screen which shows the time in 12 or 24-hour format, date in 3 format options, and battery status icon (Figure 41).

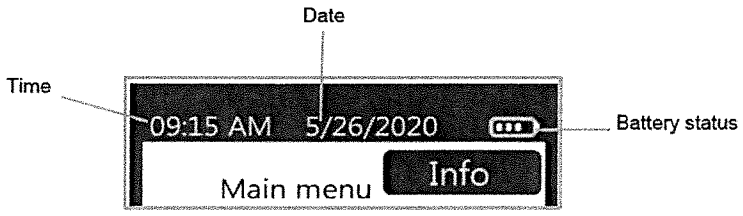


Figure 41. Constant Display

Figure 42 shows what the display will look like when the pump is running, and the screen lock is not activated.

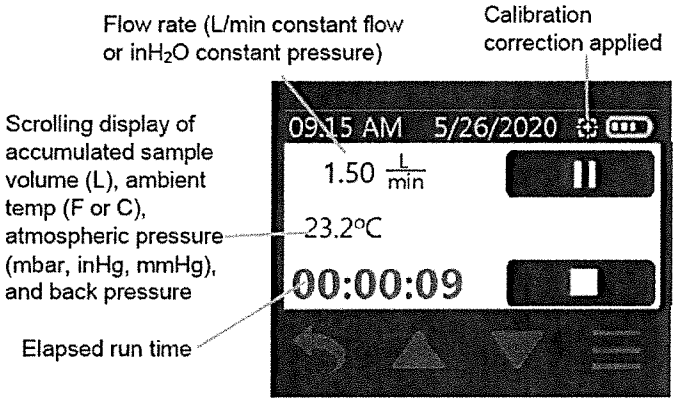


Figure 42. Display while pump is running

While the pump is running the screen should be locked to prevent accidental tap errors or tampering (Figure 43). Use the power button to lock and unlock the touch screen during sampling.

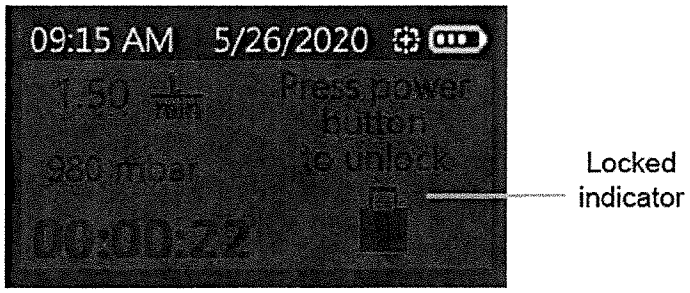


Figure 43. Locked Display

Menus and Screens

Menu overview

The main menu can be accessed by pressing the Main Menu button (three Horizontal lines below the display) to get to the Main Menu and touch Sample (Figure 44).

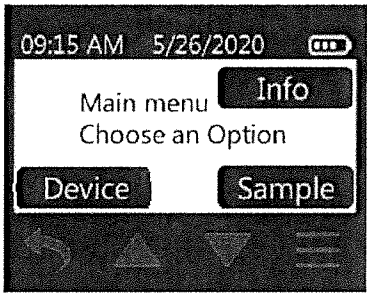


Figure 44. Main Menu

An overview of the Device, Info and Sample menu are presented in Figure 45.

Device	Info	Sample
History Menu • List of sample runs/summaries **Clock Menu** • Set Time • Set Date • Select Clock display • Select Date display **Units Menu** • Select Temp display • Select ATM display **Screen Menu** • Select Dim • Select Secure Lock • Select Auto Lock	• Firmware version number • Lifetime run time and volume • Pump serial number • Pump manufacture date	**Flow Menu** • Set Flow • Calibrate (constant flow mode) • Set Duration (timer) • Run button **Presets** • Select presets P1 – P4 (created in DataTrac® Pro, uploaded to pump) **Advanced Menu** • Set Pressure • Set Duration (timer) • Run button

Figure 45. Menu overview

Navigational touch buttons

Menus and screens contain other navigational touch activated buttons which are explained in Figure 46.

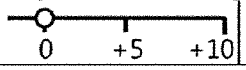
Button	General Function
Check mark 	Saves a selected item
Left and right movement 	Allows horizontal movement on a scale (see below) or moves left or right through fields, activating each for entry of value 
Calibration/flow adjustment 	Allows selection of an adjustment to flow during calibration
Run (start) 	Runs the pump for sampling
Pause 	Pauses a running pump. Elapsed time and volume accumulation pause. When Run is touched, time and volume will continue to accumulate.
Stop 	Stops a running pump and resets elapsed time and volume to zero. Run time information will be available in Sample Summary and History.

Figure 46. Navigational touch buttons

Clock Menu

To change time on the pump from the main menu:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Device (Figure 47).

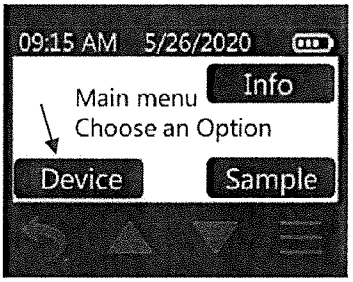


Figure 47. Device Button

2. Touch Clock (Figure 48).

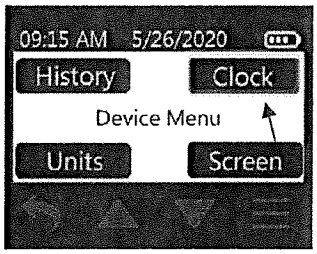


Figure 48. Clock Button

3. Touch the current displayed time (Figure 49).

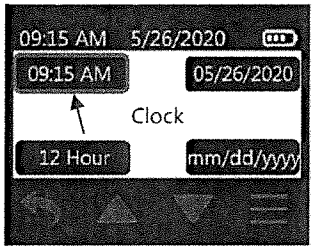


Figure 49. Time Display

4. Hour digits will flash. Toggle the up or down arrow buttons to increase/decrease hours. Touch the right arrow to advance to minutes (will flash) and up/down arrow buttons to toggle AM/PM (Figure 50).

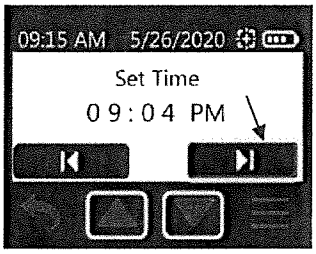


Figure 50. Left/Right and Up/Down Buttons

5. Touch the check mark to accept new time and return to Clock Menu. The updated time setting will display (Figure 51).

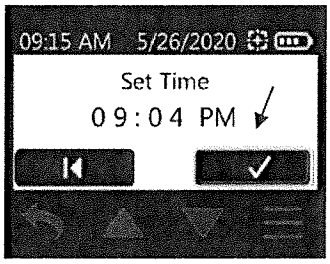


Figure 51. Accept Button

Date Menu

To change the date on the pump from the main menu:

1. Press the main menu button (three Horizontal lines below the display) to get to the Main Menu and touch Device (Figure 52).

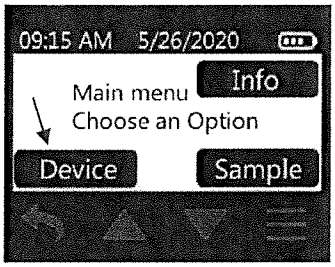


Figure 52. Device Button

2. Touch Clock (Figure 53).

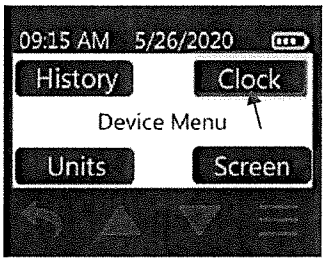


Figure 53. Clock Button

3. Touch date (Figure 54).

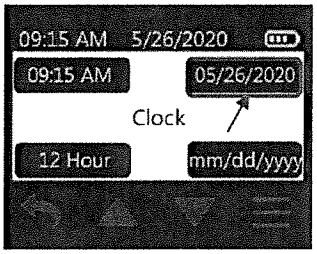


Figure 54. Date Button

4. Month digits will be flashing. To toggle, Touch the up/down arrow buttons to select the month.
   When month is set, touch the right arrow to advance to the day digit (will be flashing) and use up/down arrow buttons to increment/decrement day. Then touch right arrow to advance to year (will flash) and use up/down arrow buttons to increment/decrement year (Figure 55).

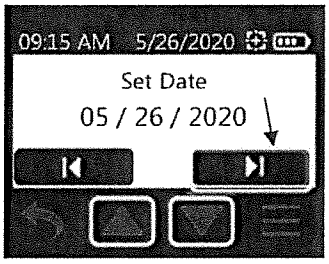


Figure 55. Left/Right and Up/Down Buttons

5. Touch check mark to accept new date and return to Clock Menu. The updated date will be displayed (Figure 56).

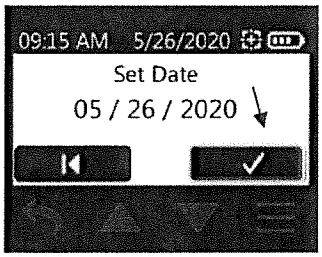


Figure 56. Accept Button

Options on pump screen during sample run are presented in figure 57.

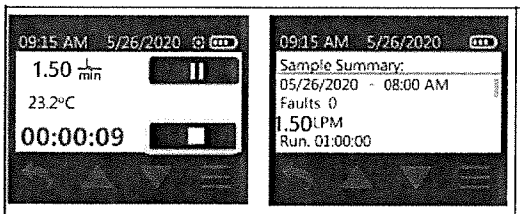
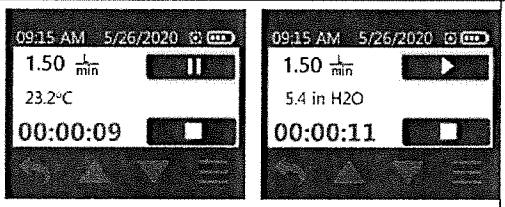
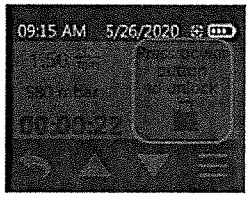
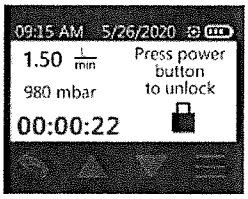
	**Touch the Stop button** to stop sampling, reset accumulated data display, and view Sample Summary.
	**Touch the Pause button** to pause sampling and retain accumulated data display. When touched, pause changes to Run button. **Touch Run button** to resume sampling and data accumulation.
	**Dim (set to On)** dims a screen that has been locked when you press the power on/off button on a running pump or through Auto Lock as soon as the pump starts running. **To resume normal backlighting,** press the power on/off button on the side of the pump (*Figure 1*). *See Modify Device Settings, Screen Menu.* This feature may be used concurrently with Auto Lock and Secure Lock
	**Auto Lock (set to On)** locks (inactivates) the pump touch screen when the pump starts running. A lock icon and "Press power button to unlock" message appears on the screen. **If Auto Lock is set to Off,** the screen remains inactive. The screen may be locked (made inactive) at any time during sampling by pressing the power on/off button on the side of the pump. **To unlock and reactivate the screen,** press the power on/off button on the side of the pump. This feature helps to reduce tap errors during sample runs.

Figure 57. Options during sample run

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STANDARD OPERATING PROCEDURE
Instructions for Use of ALICAT Flow Meter (MB Series)

KEY WORDS

air sampling, ALICAT flow meter

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Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.01.

1.0 INTRODUCTION

1.1 Purpose

This Standard Operating Procedure (SOP) discusses the use of the ALICAT flow meter (MB Series) for collection of ambient air samples.

1.2 Scope

This document provides specific instructions for the use of ALICAT flow meters: MB-100SCCM (Low), MB-2SLPM (Medium), and MB-20SLPM (High) in measuring volumetric flow rates when collecting air samples using various sampling devices (e.g., regulators, Met-One, SKC Pumps and AirChek Pumps).

2.0 MATERIALS

2.1 ALICAT flow meters
- 2.1.1 MB-100SCCM (Low)
- 2.1.2 MB-2SLPM (Medium)
- 2.1.3 MB-20SLPM (High)

2.2 Calibration Tubing

2.3 Calibration Tubing Adaptor (for regulators)

3.0 PROCEDURES

3.1 General

The ALICAT standard battery-powered volumetric/mass flow meter (MB series) can simultaneously measure mass flow, volumetric flow, gas pressure, and gas temperature for 98+ gases. Please note that volumetric flow rate is used for the collection of ambient air samples (Appendix 2).

3.1.1 Connectors and Buttons

The drawings below (Figure 1) represent typical configurations of a standard ALICAT flow meter.

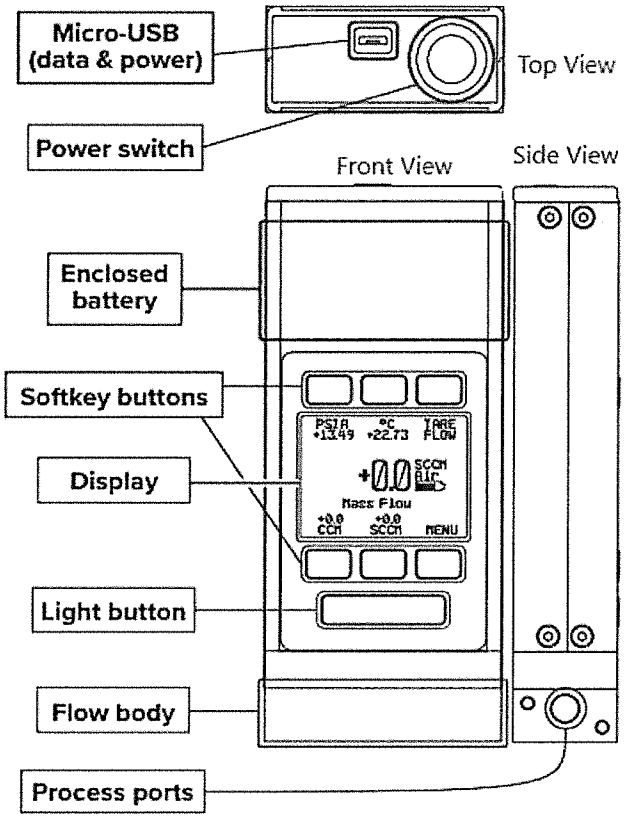

Figure 1. Flow meter Connectors and Buttons

3.1.2 Backlight

The ALICAT monochrome display comes equipped with a backlight. To activate, turn on the device by pressing the power switch on top and press the center of the ALICAT logo on the front of the device (Figure 1). To turn the backlight off press the button again.

3.1.3 Main Display

The main display has two primary functions:

- Collecting real time temperature, pressure, and flow data (Figure 2)
- Changing engineering units (Appendix 1) for temperature, pressure, and flow.

This screen displays real time data for all flow parameters simultaneously. Flow parameters are:

- PSIA - pounds per square inch absolute for pressure
- Temperature in Celsius
- SLPM/SCCM - standard liter per minute or standard cubic centimeters per minute is used for measuring mass flow rate
- LPM/CCM - liters per minute or cubic centimeters per minute is a volumetric flow rate of a gas

Please note that volumetric flow rate is used for the collection of ambient air samples (Appendix 2).

By pressing the button next to any of the four flow parameters, you can highlight its value in the center of the screen. For example, if you press the button next to LPM, the LPM value will be displayed in the center of the screen.

The main display is slightly different in the older (2021) and newer (2022) versions of the ALICAT flow meter. The differences in other screens will be explained in the relative sections.

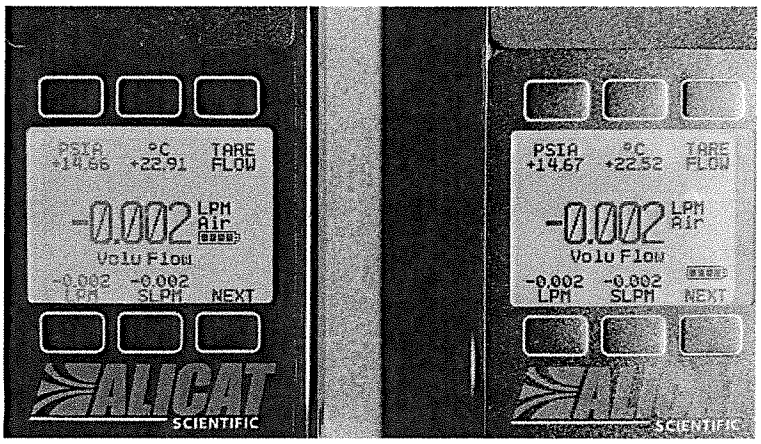

Figure 2. Main Display

The 6 buttons on the main display have the following functions (Figure3):

1. Highlights *pressure* in the center of the meter.
2. Highlights *temperature* in the center of the device.
3. *Tares* the device's flow measurement (section 3.6.2).
4. Highlights *volumetric flow* rate in the center of the device (default).
5. Highlights standard *mass flow* rate in the center of the device.
6. "Next" enters the optional *flow totalizer* and the menu system (section 3.6).

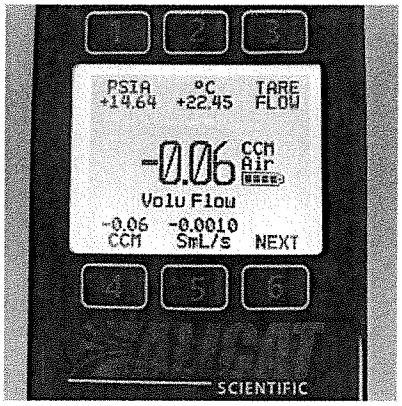

Figure 3 Main Display Functions

3.2 Calibration

Calibrations are performed by the manufacturer. ALICAT recommends that the flow meter is calibrated every year to ensure the certainty of the readings.

3.3 Charging the Battery

3.3.1 Typical battery life of a fully charged battery is 18 hours with a monochrome display when the backlight is set to full brightness. Dimming the backlight will increase battery life.

3.3.2 The battery indicator on the right side of the main display reflects the relative battery level (Figure 4). When the battery indicator is completely empty, approximately 15 minutes of battery life remains. Please charge the flow meter as soon as possible to maintain full device performance.

3.3.3 Charge the flow meter using the supplied USB cable or any micro-USB cable. You may charge the flow meter using any USB outlet on a computer or portable power supply, but charging will be fastest (approximately 3.5 hours) when connected to the supplied 2.0A power supply. The red indicator LED on top of the device lights up red to indicate that the unit is charging. The red LED turns off when the battery is charged. The flow meter may be used while it is charging. A small lightning bolt symbol (⚡) will appear to the right of the battery symbol while the device is charging. If the battery has been fully depleted, you may need to charge the flow meter for a full minute before the device can be turned on. The device can also be used while plugged to the charger.

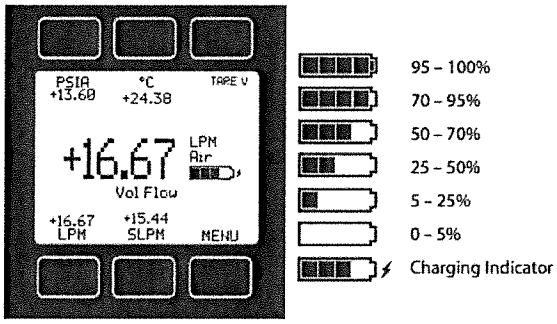

Figure 4. Battery Indicator

3.4 Mounting

You can mount or hold the meter in any position, because the flow meter internally compensates for any changes to its orientation during use. Since the flow meter uses media-isolated sensors, it must be tared (section 3.6.2) after changing the orientation. The flow meter is also minimally affected by vibrations, so it can be rested on top of a vibrating instrument with little impact to measurement accuracy.

3.5 Totalized Flow Data

The optional flow totalizer displays the total amount of mass or volume that has flowed through the instrument since its last reset (Figure 5) You can access the totalizer screen by pressing Next on the main display.

1. V AVG (volume average) shows totalizer averaging, which displays average volumetric flow rate since last reset.
2. LPM or CCM displays the real time volumetric flow rate.
3. V PEAK (volume peak) displays the maximum volumetric flow rate since last reset.
4. TOTAL/TIMER displays totalized flow and elapsed time since last reset.
5. RESET clears all totalized data and immediately resets the timer to 0.
6. MENU enters the main menu.

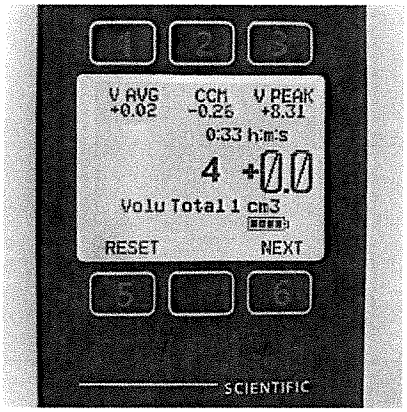

Figure 5. Totalized flow data

Please note the screen above is from the newer version (2022) of the ALICAT flow meter. The flow totalizer display in the older version (2021) is slightly different. The displays are compared below (Figure 6).

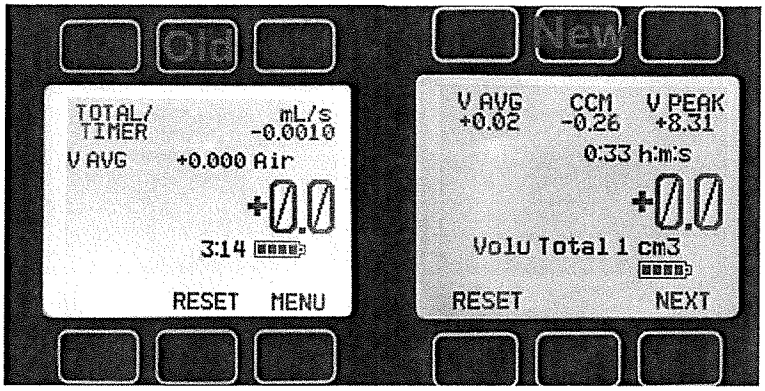

Figure 6. The Flow Totalizer Display in the new and old Version

3.6 Menu

By pressing the **NEXT – MENU** button from the main display, you can enter the MENU system (Figure 7).

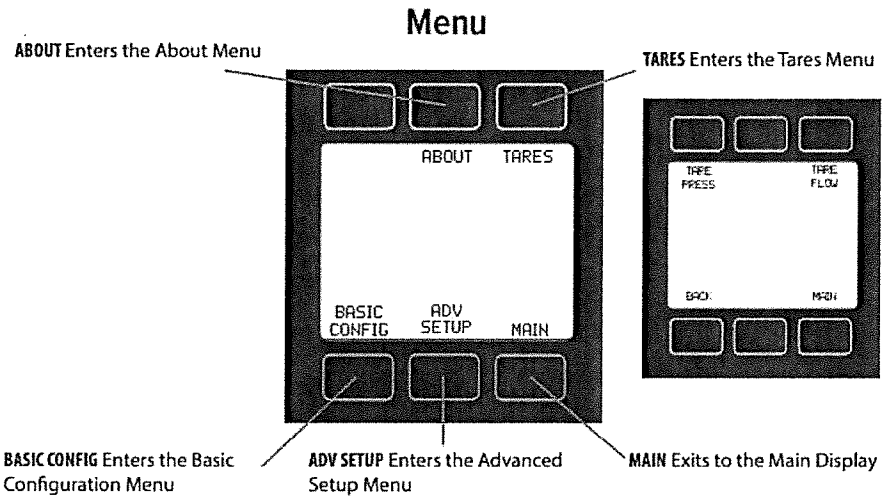

Figure 7. Menu

3.6.1 About

About contains useful information for setup, configuration, and troubleshooting (Figure 8). For more information and instructions on "About" functions please refer to the ALICAT MB Series User Manual.

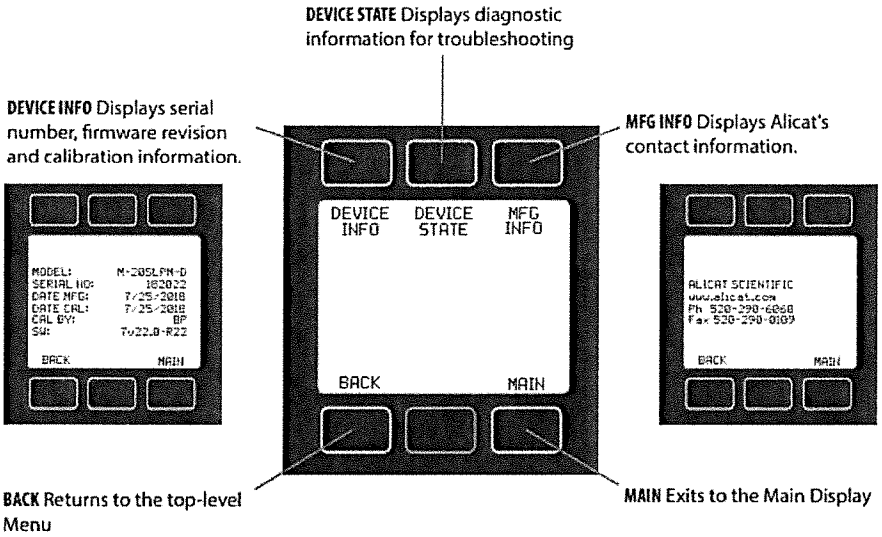

Figure 8. About Menu

3.6.2 Tares

Taring ensures the flow meter provides its most accurate measurements. This function gives the flow meter a zero reference for flow measurements. The flow can be tared from the main display (recommended) by clicking the button next to "TARE FLOW".

3.6.2.1 How to Tare

Ensure that nothing is flowing through the device. Plastic plugs can be used to cover the flow ports, or the flow ports can be simply covered by fingers to stop the flow.

3.6.2.2 When to Tare

- Before every new flow measurement cycle
- After dropping or bumping the flow meter
- After changing the device's orientation

3.6.3 Basic Configuration

The basic configuration menu contains options for choosing the gas calibration, device engineering units and STP/NTP flow references (Figure 9).

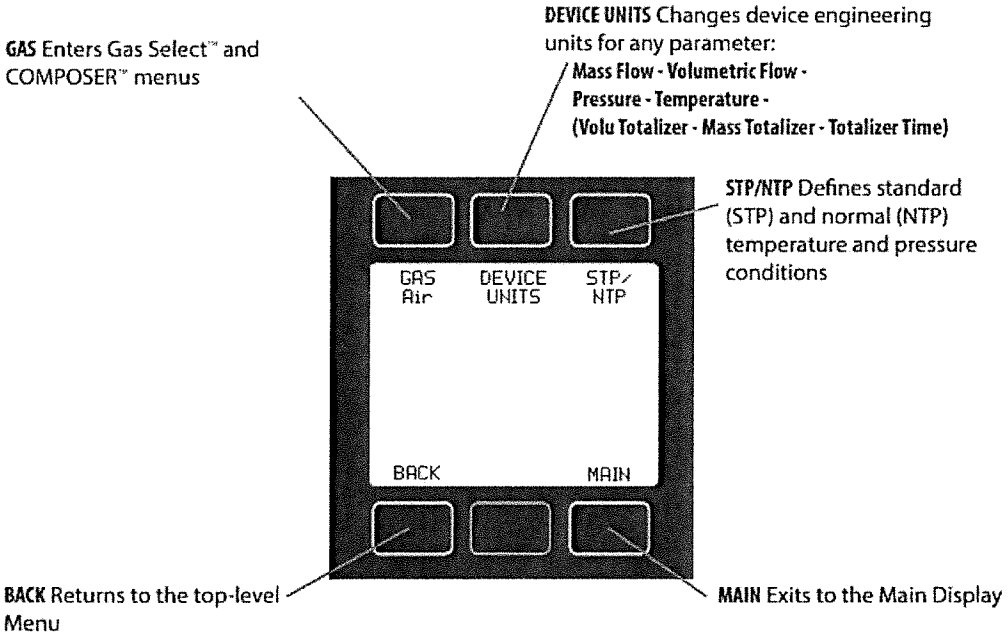

Figure 9. Basic Configuration

For more information and instructions on basic configuration and changing these parameters please refer the ALICAT MB Series User Manual.

3.6.4 Advance Setup

The advanced setup menu lets you configure the display, zero band, averaging (for flow and pressure) and serial communications (Figure 10).

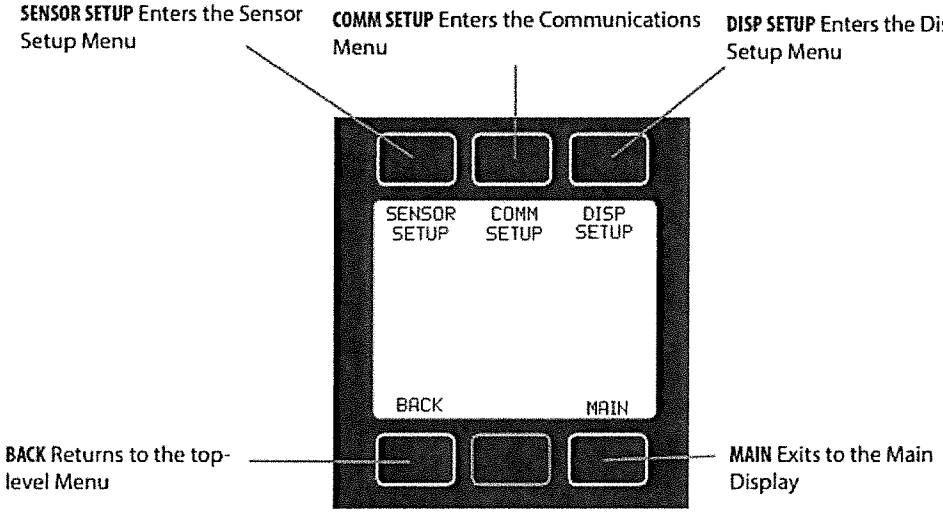

Figure 10. Advance Set up Menu

For more information and instructions on advance set up and changing these parameters please refer to the ALICAT MB Series User Manual.

4.0 Air Sampling

4.1 General

Air sampling studies are usually conducted for the purpose of determining the flux rate of a chemical following an application or estimating ambient air concentrations from off-site movement. The chemical being monitored will determine the sample media and tube type.

4.2 Met One

The Met One 3-Channel Pesticide Sampler, which is based on a Speciation Air Sampling System (P-SASS) sampler, is a portable integrated ambient particulate sampling system designed to collect ambient air samples on three separate sampling media

4.2.1 Initial Sampler Set Up

For detailed information on Sampler set up please refer to **"Instructions for Calibration and Use of a Met-One 3-Channel Pesticide Sampler",** SOP Number EQAI006.01.

4.2.2 Flow Measurement and Calibration

The Met-One 3-channel pesticide sampler has three sampling channels, each at different flow rates. The first channel is designed to operate at 15 liters per minute (LPM), the second channel is designed to operate at 1.5 LPM, and the third channel is designed to operate at 50 cubic centimeters per minute (ccm). The sampler's flow must be calibrated if initial flow reading falls outside of acceptable flow range. If flow calibration is required, the calibration procedure described in Met One SOP should be performed.

4.2.2.1 Attach Calibration Tubing to the sampling media (Figure 11)

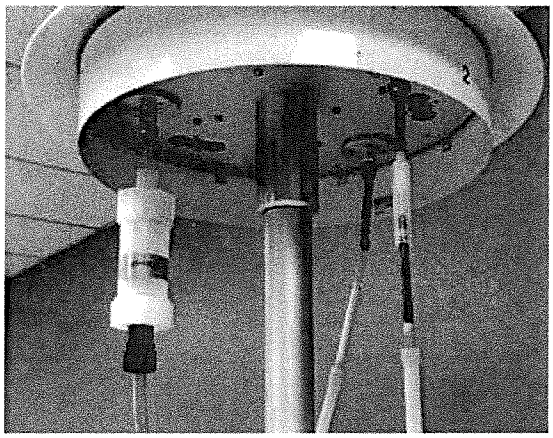

Figure 11. Calibration Tubing

4.2.2.2 Turn on the flow meters and while ensuring there is no Flow, "Tare" the flow meters (Section 3.6.2). If the flow meter's orientation is changed during the process, the flow meter needs to be tared again.

4.2.2.3 Connect ALICAT "High" flow meter (MB- 20SLPM) to channel 1 (multi-residue cartridge).

4.2.2.4 Connect ALICAT "High" flow meter (MB-20SLPM) to channel 2 (MITC sorbent tube).

4.2.2.5 Connect ALICAT "Low" flow meter (MB-100SCCM) to channel 3 (chloropicrin sorbent tube).

4.2.2.6 From the main system display, press "Calibrate".

4.2.2.7 Press "F1" to reach the "System Test" window.

4.2.2.8 Press "Pump" then "Continue" to start the pump.

4.2.2.9 After waiting 5 minutes for the flow to stabilize, then read the ALICAT flow meters for the flow on all 3 channels on the sampler.

4.2.2.10 Compare measured flows to the acceptable starting flow criteria.

4.2.2.11 Press "Exit" twice to leave "System Test" display and get to the main system display.

4.2.2.12 If all measured flows are within acceptable starting flow range, procced to schedule sampling event and if any of the measured flows are out of the acceptable starting flow ranges, conduct the calibration procedure (Met-One SOP).

4.3 AirChek/SKC PUMPS

The SKC / AirChek HV30 pump and the SKC Personal Sampler Pumps are used to collect ambient air samples on multi-residue cartridges, MITC sorbent tube and chloropicrin sorbent tube.

4.3.1 Initial Sampler Set Up

For detailed information on Sampler set up please refer to "**Instructions for Calibration and Use of an SKC AirChek HV30 Environmental Air Sampler**" SOP Number EQAI004.00 and "**Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps**" SOP Number EQAI001.00.

4.3.2 Flow Measurement and Calibration

After following the above instruction, attach the multi-residue cartridge to the AirChek pump, the MITC sorbent tube to the High Flow SKC pump and the chloropicrin sorbent tube to the Low Flow SKC Pump.

4.3.2.1 Attach calibration tubing to the sampling media

4.3.2.2 Turn on the flow meters and while ensuring there is no flow, "Tare" the Flow Meters (Section 3.6.2). If the flow meter's orientation is changed during the process, the flow meter needs to be tared again.

4.3.2.3 Connect ALICAT "High" flow meter (MB-20SLPM) to the multi-residue cartridge.

4.3.2.4 Connect ALICAT "High" flow meter (MB-20SLPM) MITC sorbent tube.

4.3.2.5 Connect ALICAT "Low" flow meter (MB-100SCCM) to the chloropicrin sorbent tube.

4.3.2.6 From the ALICAT flow meters record the flow on all 3 samplers.

4.3.2.7 Compare measured flows to the acceptable starting flow criteria.

4.3.2.8 If the flow on AirChek Pump needs to be adjusted, use the small flat head screwdriver located in the toolbox. Flow can be adjusted by placing the screwdriver in the small valve directly above the word "flow" on the top of the sampler (Figure 12). Make small adjustments until the flow has hit the desired range.

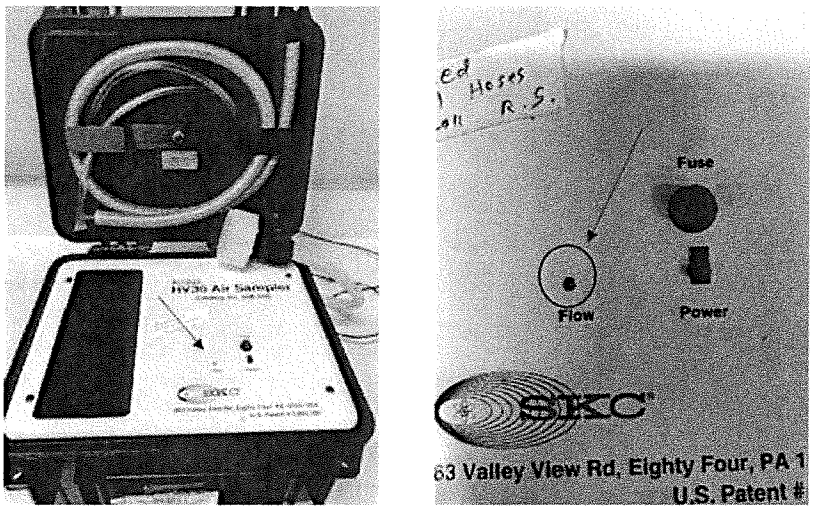

Figure 12. AirChek Pump

4.3.2.9 To adjust flow on MITC sampler, place the screwdriver in the valve directly below the word "flow" (Figure 13). Make small turns until the flow has hit its desired range.

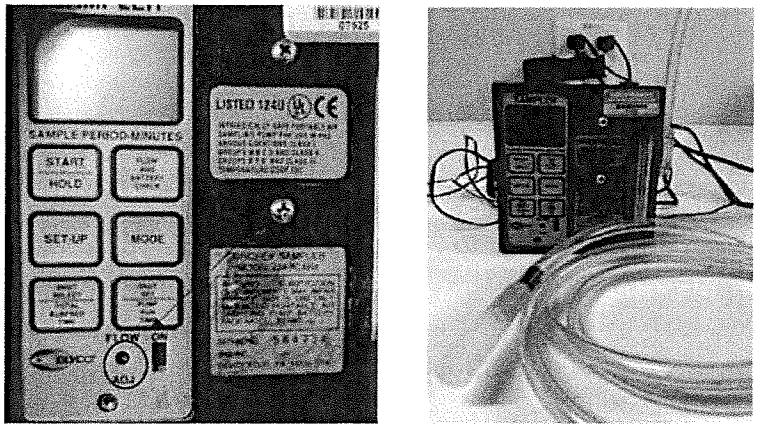

Figure 13. High Flow SKC Pump

4.3.2.10 Adjusting flow on the chloropicrin sampler is done on the tubing directly above where the sorbent tube is placed. Place the screwdriver in the location shown below (Figure 14) and adjust flow. Make small turns with the screwdriver until flow has reached its desired range.

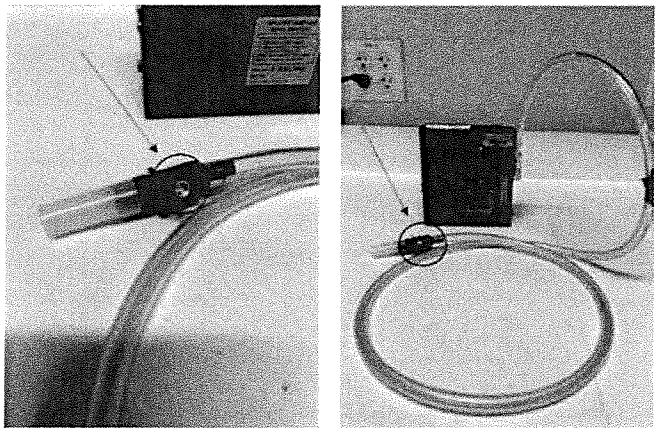

Figure 14. Low Flow SKC Pump

4.4 Regulator

Passive sampling refers to air pulled through a flow controller (regulator) into an evacuated canister over a given time interval ranging from five minutes to 24 hours. Regulator samples are set up for 24 hours by the Air Program.

4.4.1 Initial Sampler Set Up

For detailed information on the regulator set up please refer to "**Instructions for Calibration and Use of a SilcoCan® Canister",** SOP Number EQAI005.00.

4.4.2 Flow Measurement and Calibration

4.4.2.1 Turn on the "Low" ALICAT flow meter (MB-100SCCM) and while ensuring there is no flow, "Tare" the flow meters (Section 3.6.2). If the flow meter's orientation is changed during the process, the flow meter needs to be tared again.

4.4.2.2 Attach the calibration tubing adaptor to the sampling inlet.

4.4.2.3 Connect the flow meter. Once the flow has stabilized, record the initial flow on the field data sheet (FDS).

4.4.2.4 If the flow is not within this range, the flow needs to be adjusted, to do this you will need to look on the back side of the regulator. Take the cap off with an Allen wrench. Once the cap is removed you can adjust the flow with the same Allen wrench you used to take the cap off. If you turn the Allen wrench clockwise you will decrease the flow (Figure 15).

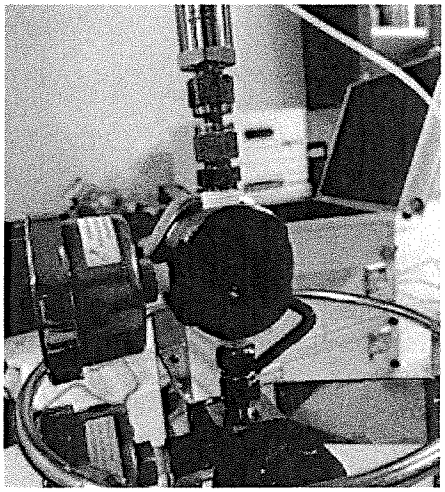

Figure 15. Adjusting the Flow on a Regulator

4.4.2.4 Prior to the sample being collected, flow must be measured again to assure it is within the acceptable range.

5.0 Troubleshooting

If you have any issues with operating the flow meter, please refer to the ALICAT MB Series User Manual.

STANDARD OPERATING PROCEDURE
Instructions for Use of ALICAT Flow Meter (MB Series)

Appendix 1

Engineering Units

Pressure Units

Absolute or Barometric	Gauge	Notes
PaA	PaG	Pascal
hPaA	hPaG	Hectopascal
kPaA	kPaG	Kilopascal
MPaA	MPaG	Megapascal
mbarA	mbarG	Millibar
barA	barG	Bar
g/cm²A	g/cm²G	Gram force per square centimeter[1]
kg/cm²A	kg/cm²G	Kilogram force per square centimeter*
PSIA	PSIG	Pound force per square inch
PSFA	PSFG	Pound force per square foot
mTorrA	mTorrG	Millitorr
torrA	torrG	Torr
mmHgA	mmHgG	Millimeter of mercury at 0°C
inHgA	inHgG	Inch of mercury at 0°C
mmH_2OA	mmH_2OG	Millimeter of water at 4°C (NIST conventional)[1]
mmH_2OA	mmH_2OG	Millimeter of water at 60°C[1]
cmH_2OA	cmH_2OG	Centimeter of water at 4°C (NIST conventional)[1]
cmH_2OA	cmH_2OG	Centimeter of water at 60°C[1]
inH_2OA	inH_2OG	Inch of water at 4°C (NIST conventional)[1]
inH_2OA	inH_2OG	Inch of water at 60°C[1]
atm		Atmosphere
m asl		Meter above sea level
ft asl		Foot above sea level
V		Volt
count	count	Setpoint count, 0–64000
%	%	Percent of full scale

Temperature Units

Label	Notes
°C	Degrees Celsius
°F	Degrees Farenheit
K	Kelvin
°R	Degrees Rankine

* *Displayed as kg/cm²A and kg/cm²G.*

† *Superscript and subscript numerals are displayed as lining (normal) numerals.*

‡ *Instances of µ are displayed as a lower-case u.*

Flow Units

Volumetric	Standard	Normal	Notes
µL/m	SµL/m	NµL/m	Microliter per minute[1]
mL/s	SmL/s	NmL/s	Milliliter per second
mL/m	SmL/m	NmL/m	Milliliter per minute
mL/h	SmL/h	NmL/h	Milliliter per hour
L/s	SL/s	NL/s	Liter per second
LPM	SLPM	NLPM	Liter per minute
L/h	SL/h	NL/h	Liter per hour
USGPM			US gallon per minute
USGPH			US gallon per hour
CCS	SCCS	NCCS	Cubic centimeter per second
CCM	SCCM	NCCM	Cubic centimeter per minute
cm^3/h	Scm^3/h	Ncm^3/h	Cubic centimeter per hour[1]
m^3/m	Sm^3/m	Nm^3/m	Cubic meter per minute[1]
m^3/h	Sm^3/h	Nm^3/h	Cubic meter per hour[1]
m^3/d	Sm^3/d	Nm^3/d	Cubic meter per day[1]
in^3/m	Sin^3/m		Cubic inch per minute[1]
CFM	SCFM		Cubic foot per minute
CFH	SCFH		Cubic foot per hour
CFD	SCFD		Cubic foot per day
	kSCFM		1000 cubic feet per minute
count	count	count	Setpoint count, 0–64000
%	%	%	Percent of full scale

True Mass Flow Units

Label	Notes
mg/s	Milligram per second
mg/m	Milligram per minute
g/s	Gram per second
g/m	Gram per minute
g/h	Gram per hour
kg/m	Kilogram per minute
kg/h	Kilogram per hour
oz/s	Ounce per second
oz/m	Ounce per minute
lb/m	Pound per minute
lb/h	Pound per hour

Time Units

Label	Notes
h:m:s	Hours:Minutes:Seconds
ms	Milliseconds
s	Seconds
m	Minutes
hour	Hours
day	Days

Total Units

Label	Notes
µL	MicroLiter[1]
mL	MilliLiter
L	Liter
USGAL	US gallon
cm^3	Cubic centimeter[1]
m^3	Cubic meter[1]
in^3	Cubic Inch[1]
ft^3	Cubic foot[1]
µP	Micropoise, a measure of viscosity*
mg	Milligrams
g	Grams
kg	Kilograms
oz	US ounces
lb	US pounds

Appendix 2

Department of Pesticide Regulation

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Director

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Secretary for Environmental Protection

MEMORANDUM

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STANDARD OPERATING PROCEDURE
Instructions for Use of ALICAT Flow Meter (MB Series)

DATE: October 5, 2022

SUBJECT: INVESTIGATION OF FLOW RATE UNIT DURING FLOW RATE VERIFICATION AND CALIBRATION.

In 2011, the California Department of Pesticide Regulation (DPR) established a long-term statewide Air Monitoring Network (AMN) to monitor ambient air concentrations of 35 pesticides and 5 pesticide breakdown products. The four operational AMN monitoring sites were in the communities of Oxnard (Ventura County), Santa Maria (Santa Barbara County), Shafter (Kern County), and Watsonville (Monterey County). DPR also established a targeted study to monitor 1,3-dichloropropene (1,3-D) air concentrations at two sites in the Central Valley agricultural communities of Delhi (Merced County) and Parlier (Fresno County) as study 309.

The operation of the AMN and Study 309 sites requires the use of specialized equipment and supplies for field operations. Basic considerations for sampler selection include flow control and measurement systems, maintenance requirements, reliability, and ease of operation (US EPA, 2016). DPR uses different types of samplers from various manufacturers to accommodate its air sampling needs.

One of the most important goals for air sampling is to maintain the specified (or target) ambient air flow rates through the sampling inlet. To ensure maintenance of the target flow rate, air samplers require staff to regularly perform a quality control procedure to verify that target flow rates fall within a sampler's calibration tolerances. These tolerances are typically ±10% of the target flow rate. If the procedure indicates that the target flow rate is out of range, a calibration procedure should be followed. The calibration involves adjusting the instrument based on a standard (i.e., a calibrated reference flow meter). However, there is a lot of confusing information in the literature on which flow rate units should be used to verify or calibrate the flow rate of the instruments. These standards vary by industry, application, and what is being monitored.

This document aims to clarify and establish a standard flow rate unit for use in the verification and calibration of air sampling instruments used in the AMN, Study 309, and future ambient air studies.

Current Air Samplers

Current air samplers used in DPR's AMN and 1,3-D sites by manufacturers and their target flow rates are given in Table 1. These instruments are actively in use in DPR's ambient air monitoring studies. The equipment indicated as a legacy is the first generation of instruments procured for air sampling projects. They are simple and contain basic operational capabilities. The other instruments are more complex and possess digital and multi-parameter operational capabilities with software. Parameters may include 5-minute flow rate averaging, flow rate averages, total volume, temperature, and pressure readings.

Table 1. Air samplers used in AMN and 1,3-D monitoring with their target flow rates.

Air Sampler	Target Flow Rates	Manufacturer
AirChek HV30 Air Sampler - Legacy	15 L/min	SKC Inc
AIRCHEK sampler - Legacy	1.5 L/min	SKC Inc
AIRCHEK sampler - Legacy	50 mL/min	SKC Inc
Flite4	15 L/min	SKC Inc
AirCheck CONNECT	1.5 L/min	SKC Inc
AirCheck CONNECT	50 mL/min	SKC Inc
Xonteck model 901	7.5 mL/min	Xonteck, Inc.
Passive Air Sampler (Regulator) - Legacy	3.1 mL/min	Restek Corporation
Nutech 2703 Automatic Air Sampler	3.1 mL/min	Nutech Instruments, Inc
MetOne SASS	50 mL/min 1.5 L/min 15 L/min	Met One Instruments, Inc.

Which flow rate unit should be used?

There are two main types of flow rate units: mass flow rate and volumetric flow rate. The mass flow rate is the measure of the number of molecules in a flowing gas, whereas the volumetric flow rate is a measure of space that those molecules occupy without any consideration given to the number of molecules within that space. As gases are compressible and widely affected by temperature, mass flow rates can change depending on pressure and/or temperature changes. Mass flow is sometimes converted to a type of unit that may be referred to as "standard volumetric flow", which uses the ideal gas law to adjust flow rate volume under one set of temperature and pressure conditions to those of a "standard" set of temperature and pressure conditions (e.g., 25° C and 760 mmHg pressure), thereby scaling the target volumetric flow rate up or down in an effort to sample an equivalent mass of air as would be obtained by the target volumetric rate under standard temperature and pressure. This distinction between "actual" and "standard" volumetric flow rates is one of the main points of confusion regarding the calibration of sampling instruments, as calibration tools will require the user to select one of these two units.

All instruments include a sample flow rate control system which controls the air velocity passing through the system. These velocities are determined by the actual volumetric flow rate through the sampler's inlet and sampling media. The actual flow rate must be maintained at a constant value that is as close as possible to the target flow rate specified for the air sampler. The flow units on the verification and calibration flow meter need to be selected based on the requirements of the equipment being verified or calibrated. According to the Met-One SASS, Xonteck 901, SKC AirConnect instrument manuals, the verification and calibration of flow rates require the use of actual volumetric units. Use of "standard" volumetric flow (i.e., mass flow) would therefore be inappropriate because, as shown by the ideal gas

law, the actual flow rate volume would then vary in response to the ambient temperature and pressure at the time of calibration and would not correlate well with the fixed volumetric flow rates expected by the sampling instruments.

US EPA (2016) also indicates that the verification and calibration of the air sampler's flow rate measurement system must be performed in terms of actual volumetric units. However, US EPA (2016) pointed out that the standard volume flow rate should not be confused with the actual volumetric flow rate. The standard volumetric flow rates which have been adjusted to EPA-standard conditions of temperature and pressure (25 °C or 298 K and 760 mmHg or 101 kPa), are often used by engineers and scientists because they represent mass flow rates.

In conclusion, a volumetric flow rate is more appropriate for use in the calibration of DPR's ambient air monitoring equipment. The typical units of volumetric flow are mL/min, L/min (LPM), or cm^3/min (CCM), and program staff should use these units in our Alicat flow meters in verification and calibration procedures. Units prefaced with an "S" in the Alicat interface (i.e., SCCM, SLPM) are in the form of "standard" volumetric flow and should not be used. The use of "actual" volumetric flow conforms to the needs of the sampling instrumentation, and the units are more consistent with the project goal of quantifying the mass of pesticides in a volume of air under ambient temperature and pressure conditions.

References

USEPA. 2016. Quality Assurance Guidance Document 2.12. Monitoring PM2.5 in Ambient Air Using Designated Reference or Class I Equivalent Methods. U.S. Environmental protection Agency Office of Air Quality Planning and Standards Air Quality Assessment Division, RTP, NC.

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STANDARD OPERATING PROCEDURE
Flite4 High Volume Air Sampling Pump

KEY WORDS

Air Sampling, Flite4 Pump

APPROVALS Original SOP signed by the following

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Environmental Monitoring Branch Management

APPROVED BY: _____ DATE: _____
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APPROVED BY: _____ DATE: _____
Auxilio Henda
Environmental Monitoring Branch Scientific Aid

Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.01.

1.0 INTRODUCTION

1.1 Purpose

This document provides instructions for the use of the SKC Flite4 High Volume Air Sampling Pump for the collection and estimation of pesticide levels in ambient air.

1.2 Scope

This Standard Operating Procedure (SOP) describes the calibration and use of SKC Flite4 Pump for collection of air samples.

2.0 MATERIALS

2.1 SKC Flite4 Pump (Figure 1)

Figure 1: SKC Flite4 Pump model 901-4011.

2.1.1 Power supplies (Mains adapter 100-240V ~ 50/60Hz – 12Vdc 2A with UK/EU/US/AUS mains plugs) Part No. 901-411.

2.2 Energy source: AC power or 12V lead/acid battery
2.3 Flow meter: i.e., ALICAT Flow Meter MB-20SLPM (High Flow)
2.4 Hand packed multi-residue cartridge (XAD-4)
2.5 Calibration Tubing
2.6 Black rubber O-ring

3.0 PROCEDURES

3.1 Initial Set-up

3.1.1 Locate the Flite4 Pump inside the enclosure. ***Note:*** *The Flite4 Pump should be inside the enclosure with T shape sampling ports on top (Figure 2).*

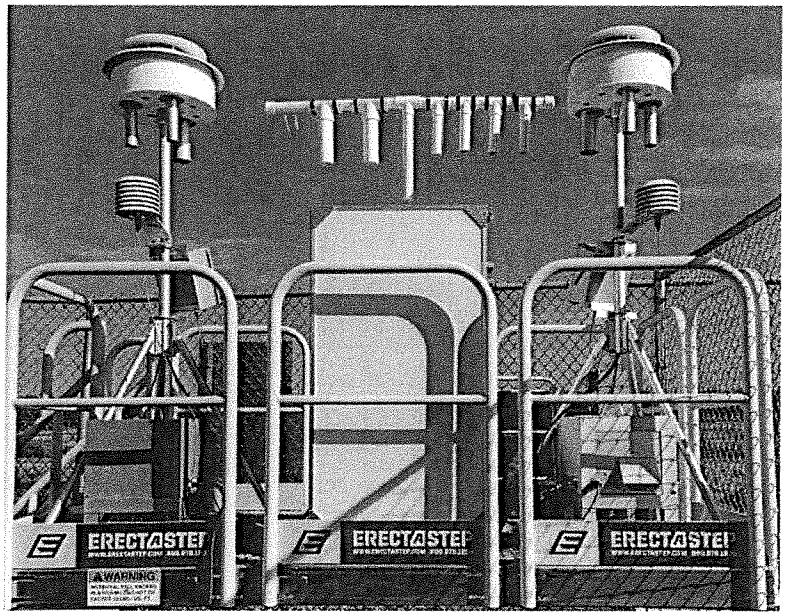

Figure 2: Two Met-One instruments and an enclosure on-site.

3.1.1.1 Identify the sampling port that is connected to the Flite4 Pump. ***Tip:*** *The number taped on the flexible tubing attached to the inlet hosetail (see Figure 1 to identify inlet hosetail) should match the number on the channel (Figure 3).*

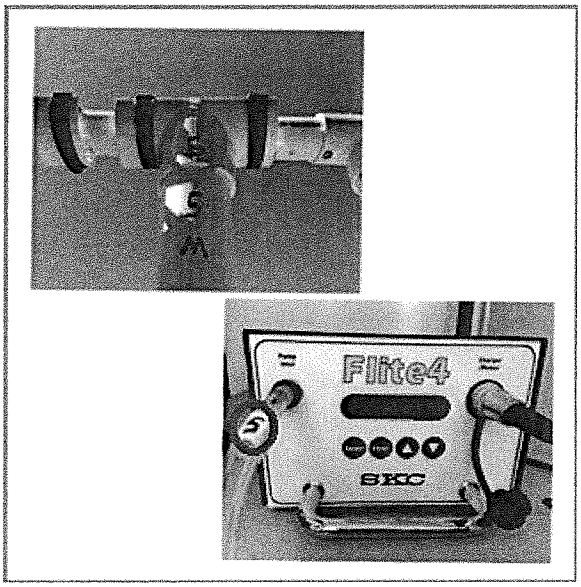

Figure 3: Identifying which sampling port to use.

3.1.1.2 Release the VELCRO tape bands and remove the solar radiation shield cover to reveal the sample inlet. Remove the rubber stopper from plastic threaded fitting of the inlet (Figure 4).

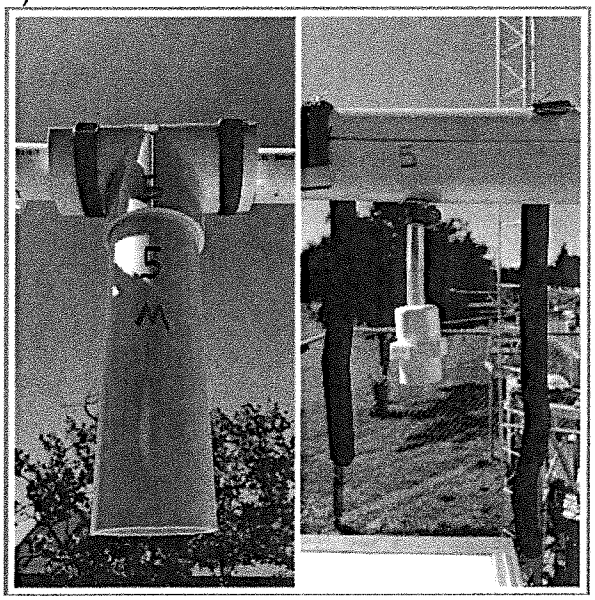

Figure 4: Removing the radiation shield cover.

3.1.1.3 Unscrew multi-residue cartridge end caps. Place black rubber O-ring over the inlet port of cartridge and screw in the top (smaller) part of cartridge to the plastic threaded fitting (Figure 5).

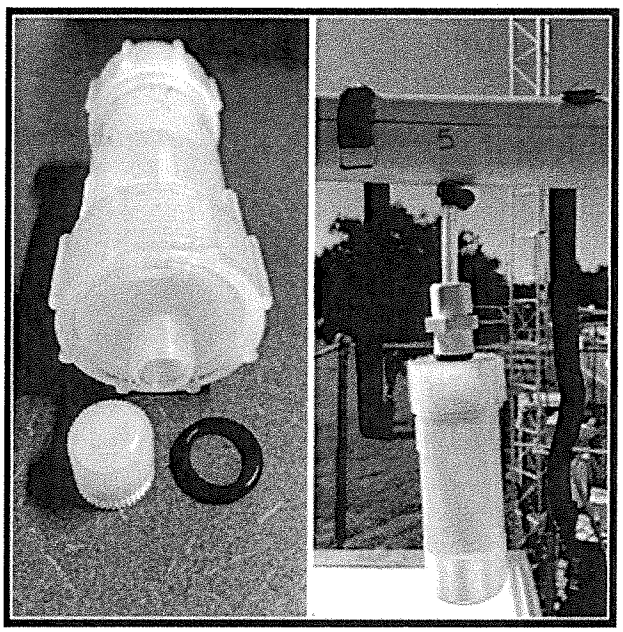

Figure 5: Multi-Res cartridge attached to the sample inlet.

3.2 Calibrating and Setting Up a Timed Sample Run

3.2.1 The SKC Flite4 Pump's flow ranges from 2 to 20 liters per minute (LPM) free flow. ***Note:*** *As long as the Flite4 Pump remains plugged in and there's no power outage, the Flite4 Pump saves the last air flow setting. Staff will need to check the air flow when setting up the multi-residue cartridge but may not have to adjust the flow if it is within acceptable range.*

3.2.2 Plug the pump in to an AC power source (if not already plugged in).

3.2.2.1 When not in use the pump will be in sleep mode. The pump needs to exit the sleep mode before use.

3.2.2.2 To wake the pump from sleep mode press the keypad keys in the sequence – **Enter**, **Select**, **Enter**. The pump will display the 'SELECT' main menu screen (Figure 6).

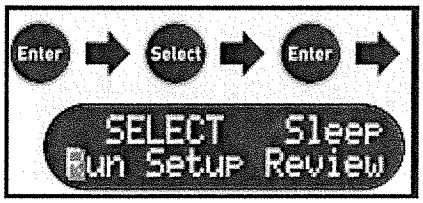

Figure 6: Exiting the sleep mode.

3.2.3 **Checking the air flow rate:**

3.2.3.1 Turn on the ALICAT Flow Meter (High) and tare. ***Note:*** *Please see the Instructions for Use of ALICAT Flow Meter (MB Series) SOP steps 3.6.2.1 on how to tare.*

3.2.3.2 Connect the calibration tubing to the multi-residue cartridge and to the ALICAT Flow Meter (High) (Figure 7).

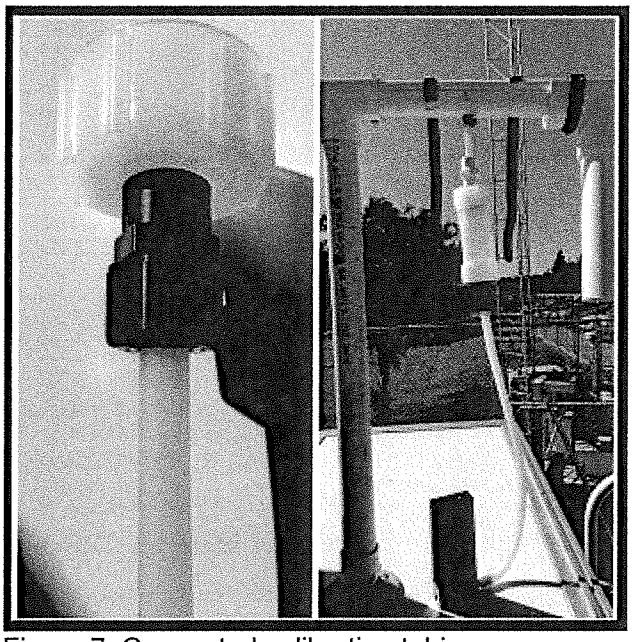
Figure 7: Connected calibration tubing.

3.2.3.3 On the 'SELECT' main menu screen of the Flite4 Pump, press **Select** once to highlight 'Setup' and press **Enter** to display 'Setup' menu screen (Figure 8).

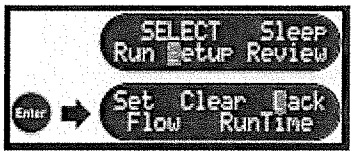

Figure 8: Checking air flow sequence (1)

3.2.3.4 On the 'Setup' menu screen press **Select** once to highlight 'Flow' option and press **Enter** to check the flow rate (Figure 9).

Figure 9: Checking air flow sequence (2)

3.2.3.5 If no calibration is needed (measured flow is within the acceptable flow range of 15 LPM ±10%) record the initial flow reading on the FDS and proceed to step 3.2.5 after completing step 3.2.3.7. ***Note****: Staff will need to complete section 3.2.4 if flow is out of the acceptable flow range.*

3.2.3.6 'Back' is highlighted. Press **Enter** to go to the 'SELECT' main menu screen (Figure 10).

Figure 10: Checking air flow sequence (3)

3.2.3.7 Disconnect the calibration tubing from the ALICAT Flow Meter and the multi-residue cartridge.

3.2.4 **Calibration:**

3.2.4.1 Press **Select** once to highlight the 'Setup" option in the 'SELECT' main menu screen and press **Enter** to display the 'Setup' menu screen (Figure 11).

Figure 11: Calibration sequence (1)

3.2.4.2 On the 'Setup" menu screen press **Select** once to highlight the 'Flow' option and press **Enter**. The pump will start to run at a very low flow rate and the 'SET FLOW' screen will be displayed (Figure 12).

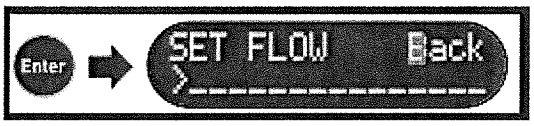

Figure 12: Calibration sequence (2)

3.2.4.3 Press and hold the **Up** button on the keypad of the Flite4 Pump to increase the pump flow rate (Figure 13) until the ALICAT Flow Meter displays 15 LPM ±10%. If you go over the acceptable range press the **Down** button of the Flite4 Pump until you reach a value within the valid range. ***Note:*** *Pressing and holding the* ***Up/Down*** *button will rapidly increase/decrease the pump flow rate.*

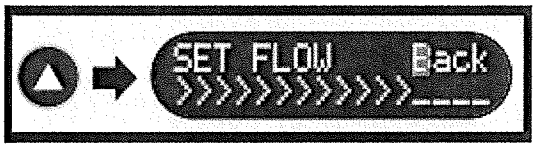

Figure 13: Calibration sequence (3)

3.2.4.4 When the pump is running at the required flow rate of 15 LPM ±10%, record measured flow on the Field Data Sheet and press **Enter** to save the flow rate setting. The pump will turn off and return to the 'SELECT' main menu screen (Figure 14).

Figure 14: Calibration sequence (4)

3.2.4.5 Disconnect the calibration tubing from the ALICAT Flow Meter and the multi-residue cartridge.

3.2.4.6 Turn off ALICAT Flow Meter and reattach the solar radiation shield cover (Figure 15).

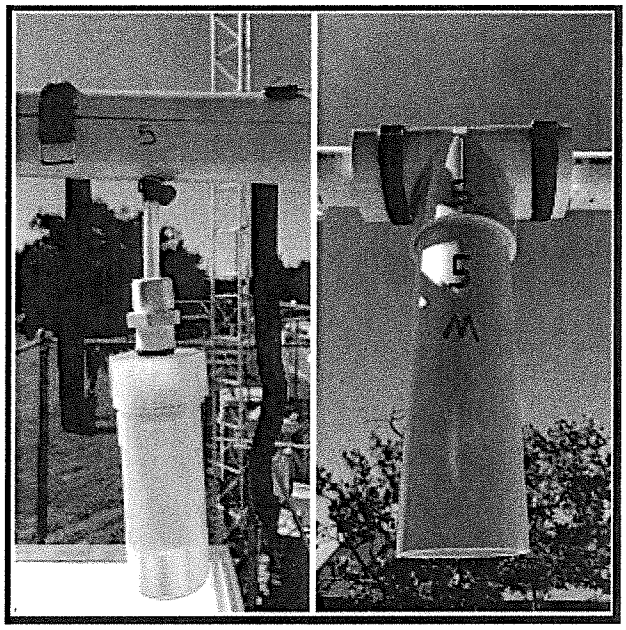

Figure 15: Solar radiation shield reattached.

3.2.5 From the 'SELECT' main menu screen press **Select** once to highlight the 'Setup' option, and press **Enter** to display the 'Setup' menu screen (Figure 16).

Figure 16: Timed run sequence (1)

3.2.6 On the 'Setup' menu screen press **Select** twice to highlight the 'RunTime' option, and press **Enter** to display the 'RunTime' menu screen (Figure 17).

Figure 17: Timed run sequence (2)

3.2.7 On the 'RunTime' menu screen press **Select** once to highlight the 'RunTime' option, and press **Enter** (Figure 18).

Figure 18: Timed run sequence (3)

3.2.8 Use the **Select**, **Up**, and **Down** keys to enter the required sample runtime in hours and minutes (Figure 19). ***Tip:*** *To set it to run for 25 hours, press* ***Select*** *twice to highlight the first hour and use the* ***Up*** *arrow to set it to 5. Then press* ***Select*** *again to highlight the second hour and use the* ***Up*** *arrow to set it to 2.*

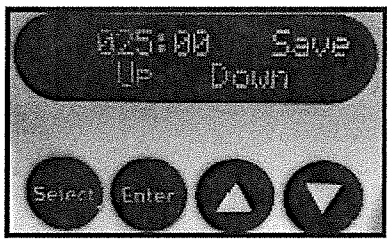

Figure 19: Timed run sequence (4)

3.2.9 Press **Select** twice to highlight 'Save' and press **Enter** (Figure 20).

Figure 20: Timed run sequence (5)

3.2.10 'Back' is highlighted. Press **Enter** to go to the 'SELECT' main menu (Figure 21).

Figure 21: Timed run sequence (6)

3.2.11 'Run' is highlighted. Press **Enter**. The pump will run, and the elapsed runtime will be displayed in hours, minutes, and seconds (Figure 22).

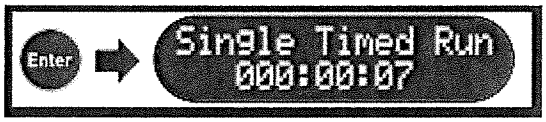

Figure 22: Timed run sequence (7)

3.2.12 **At 24 hours (Day 2):**

3.2.12.1 Release VELCRO tape bands and remove the solar radiation shield cover.

3.2.12.2 Turn on ALICAT Flow Meter (High) and tare.

3.2.12.3 Connect the calibration tubing to the multi-residue cartridge and to the ALICAT Flow Meter (High).

3.2.12.4 Record the ending flow on the FDS.

3.2.12.5 Disconnect the calibration tubing from the ALICAT Flow Meter and the multi-residue cartridge.

3.2.12.6 Press **Enter**, **Select**, **Enter** to stop the pump (Figure 23).

Figure 23: Timed run sequence (8)

3.2.12.7 Record runtime on the FDS.

3.2.12.8 'Reset' is highlighted on the LCD screen. Press **Enter** to go back to the 'SELECT' main menu (Figure 24).

Figure 24: Timed run sequence (9)

3.2.12.9 Press **Select** three times to highlight 'Sleep' and press **Enter** to put the pump back into sleep mode (Figure 25).

Figure 25: Timed run sequence (10)

3.2.12.10 Disconnect the multi-residue cartridge from the sample inlet.

3.2.12.11 Remove the O-ring from the multi-residue cartridge.

3.2.12.12 Put the end cap on both ends of the multi-residue cartridge.

3.2.12.13 Immediately place the multi-residue cartridge in a sealable polyethylene bag and on dry ice. Retain the O-ring in sampling supply box.

3.2.12.14 Record Flite4 serial number on the FDS.

3.2.12.15 Re-insert the rubber stopper into the plastic threaded fitting and reattach the solar radiation cover.

3.3 Sampler Location

3.3.1 Sample locations will be specific to the experimental plot and the study objective. However, at a minimum the following media criteria must be met:

3.3.1.1 The sampler should be in an area with no restriction of airflow. It should be positioned to avoid exposure to engine exhaust, running motors or other sources of non-target air contaminants that may interfere with sample collection and

chemical analysis.

3.3.1.2 The sampler should be accessible to electrical outlets or a generator. If using a generator for a power source, make sure to place the sampler a sufficient distance away to avoid drawing exhaust fumes into sample container.

3.3.1.3 When conducting ambient monitoring in an area of multiple pesticide applications, the sampler inlet should be 2 to 15 meters above ground and at least 1 meter horizontal and vertical distance from supporting structure.

3.3.1.4 The sampler should be placed in an area where the equipment will be secured and access is available when necessary.

3.4 Troubleshooting

3.4.1 The Flite4 pump's control board monitors the pump motor speed while running. If the motor speed signal is not detected, for example due to a disconnected wiring connection to the motor or a failure of the motor, the pump will display a motor fault warning message and retain the elapsed runtime in memory (Figure 26).

3.4.1.1 Press the **Select** and **Enter** keys simultaneously to clear the message and return to the 'SELECT' main menu screen.

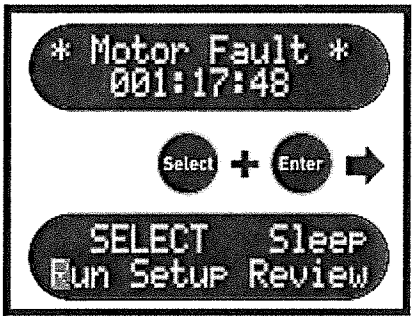

Figure 26: Troubleshooting.

4.0 REPORTING REQUIREMENTS

4.1 Field Data Sheet

A Field Data Sheet (FDS) form should be completed for each sample according to SOP ADMN006.01. The following information should be recorded on the COC and FDS.

- 4.1.1 Site name
- 4.1.2 Location code
- 4.1.3 Station operator
- 4.1.4 Operator agency
- 4.1.5 Study number
- 4.1.6 Flow meter serial number
- 4.1.7 Sample start date
- 4.1.8 Sample end date
- 4.1.9 AMN sample type
- 4.1.10 Equipment type
- 4.1.11 AMN sample number
- 4.1.12 Starting flow
- 4.1.13 Ending flow
- 4.1.14 Local conditions
- 4.1.15 Field notes / comments
- 4.1.16 Sample loaded by / date and time
- 4.1.17 Sample retrieved by / date and time
- 4.1.18 Sample transported or shipped to DPR warehouse by / date and time
- 4.1.19 Mode of transport
- 4.1.20 Exact start and end time of sampling
- 4.1.21 Exact run time for sampler

5.0 STUDY-SPECIFIC DECISIONS

The following study-specific decisions are the responsibility of the study project leader and should be made in consultation with the study field coordinator, senior scientists, and Quality Assurance Officer.

- 5.0.1 Sampling location
- 5.0.2 Flow rate
- 5.0.3 Sampling frequency
- 5.0.4 Sampling interval duration
- 5.0.5 Sampling media

STANDARD OPERATING PROCEDURE
Instructions for Use of Nutech 2703 Auto Air Sampling Device

KEY WORDS

air sampling, Nutech 2703 air sampler

APPROVALS Original SOP signed by the following

APPROVED BY: _____ DATE: _____

Maziar Kandelous
Environmental Monitoring Branch Management

APPROVED BY: _____ DATE: _____

Aniela Burant
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APPROVED BY: _____ DATE: _____

Vaneet Aggarwal
Environmental Monitoring Branch Quality Assurance Officer

PREPARED BY: _____ DATE: _____

Kelly Heal
Environmental Scientist

Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.

1.0 Purpose

This standard operating procedure describes how to collect passive air canister samples with the Nutech 2703 auto air sampling device for the Department of Pesticide Regulation's Air Program. These procedures are written for taking a 24-hour sample using a 6-L SUMMA canister. However, these procedures can be adjusted based on the needs of the study.

For additional information on the Nutech 2703, please refer to the Nutech 2703 Operational Manual.

2.0. Software Installation

- Laptop
  - The Nutech 2703 controller requires specific software that can be installed on your work issued laptop by a DPR staff member. Contact your supervisor, study lead, or field coordinator for further instructions on the required software installation for field use.
- Mobile Application
  - iPhone
    - The Nutech 2703 mobile application is available for Apple products through the App Store. For iPhone users, go to the App Store and search for the Nutech 2703 application and download.
  - Android Nutech App:
    - Download the Dropbox app. If you do not have a Dropbox account, make one using your DPR email address.
    - Contact your supervisor, study lead, or field coordinator for the link to the Android Nutech App. The link will be texted to you.
    - Click the link. You will be asked to SAVE or EXPORT the .zip file. Choose EXPORT.
    - Choosing export will prompt you to pick an app to export to. Choose your Dropbox app.
    - Sign into your Dropbox app (if asked) and you should see your zip file as shown below (Figure 1).

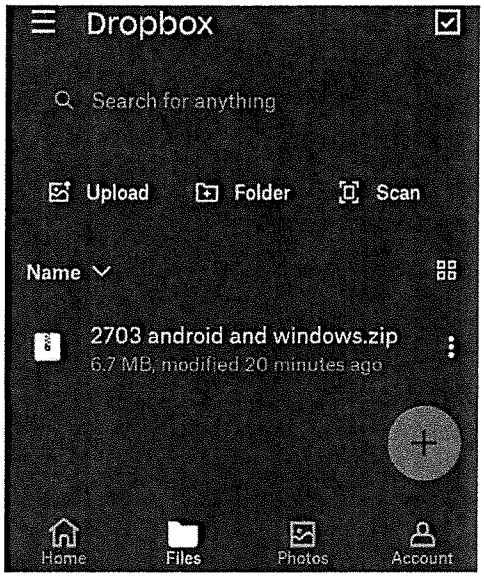

Figure 1: Exporting the Nutech app using Dropbox.

- Note: If you cannot access Dropbox to unzip your file you can find your downloaded zip file in the My Files app within Android.
- Download the WinZip app to unzip your file.
- Using Dropbox click on the file and extract (Figure 2).

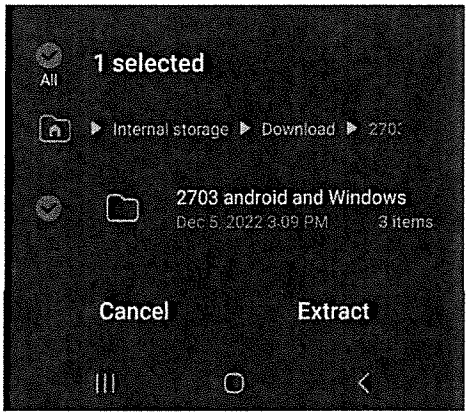

Figure 2: Extracting the Nutech 2703 app.

- Once extracted, your files now sit in the My Files app. Click on the file and you should see three items (Figure 3).

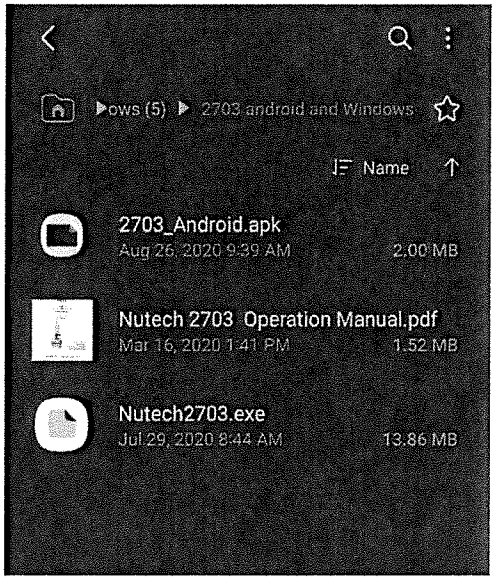

Figure 3: Extracted files. Choose the "2703.Android.apk" for download.

- Click on the 2703_Android.apk file to initiate downloading of the Nutech 2703 app to your phone app collection. Application set up is now complete.

Note: You may need to allow permissions to download the 2703_Android.apk app. In this case you should allow permissions for the app managing the download. Your Android phone may automatically use the "My Files" app to do so. Keep in mind if you are using Dropbox, the Dropbox app only held the zip file, My Files app, and the extracted contents so be aware of where you are putting your extracted files.

3.0. Materials

The following materials are needed:

- 6-L SUMMA canister
- Nutech 2703 controller (located at sampling site in a Shelter One enclosure shown in Figure 4)
- DPR or County Agricultural Commissioner (CAC)-issued laptop with Nutech 2703 installed software, or the Nutech 2703 mobile app for iPhone and Android devices.
- ALICAT Scientific low flow meter

- Calibration tubing and tip (silicone tubing with a series of smaller reducing tubing to connect to 1/8-inch outer diameter PTFE tubing)
- Two 9/16" wrenches
- Field Data Sheets (FDS)

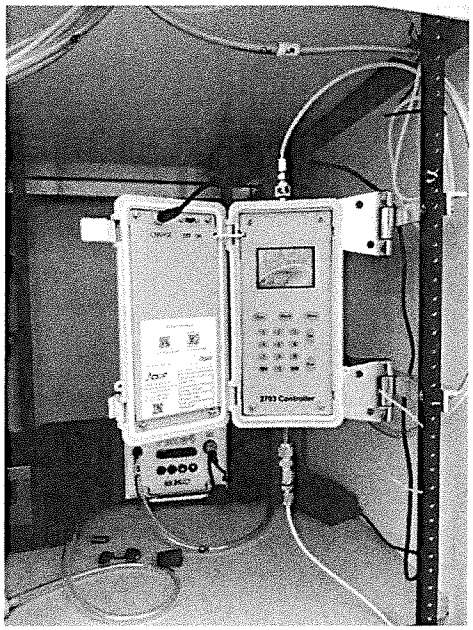

Figure 4: Nutech 2703 controller inside of the Shelter One enclosure.

3.1 Nutech 2703 Touch Panel and Display Window

- The Nutech 2703 touch panel (Figure 5) is used to set up a manual sampling event. The display window will show the specific details related to the sampling event such as, but not limited to, date/time, flow rate, and duration (Figure 6). The display window will show sampling details whether you set it up on a laptop, iPhone/Android, or manually.

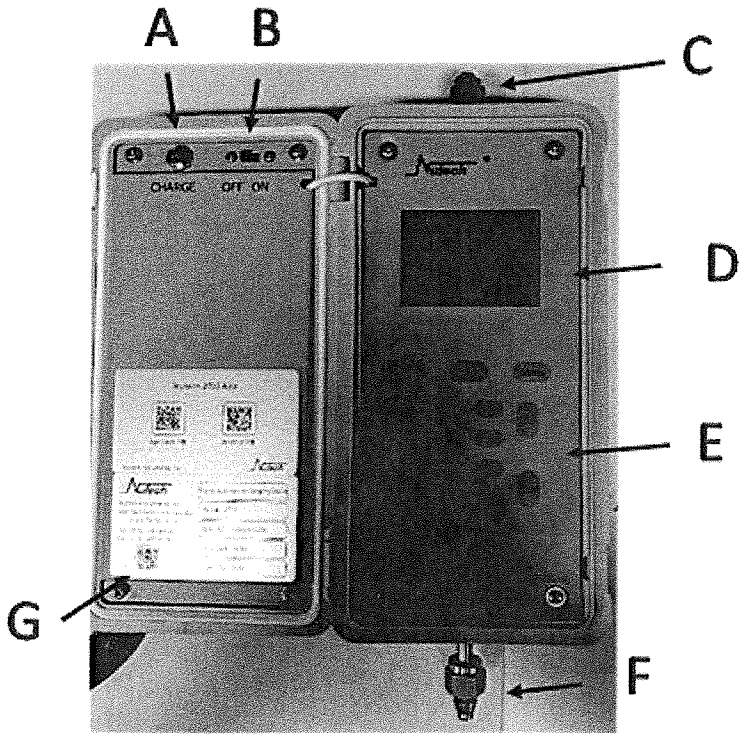

Figure 5: Nutech 2703 controller touch panel.

A. Power charge port
B. Power switch [ON/OFF]
C. Air inlet
D. LCD screen
E. Digital (Numeric) keypad
F. Air outlet
G. QR code

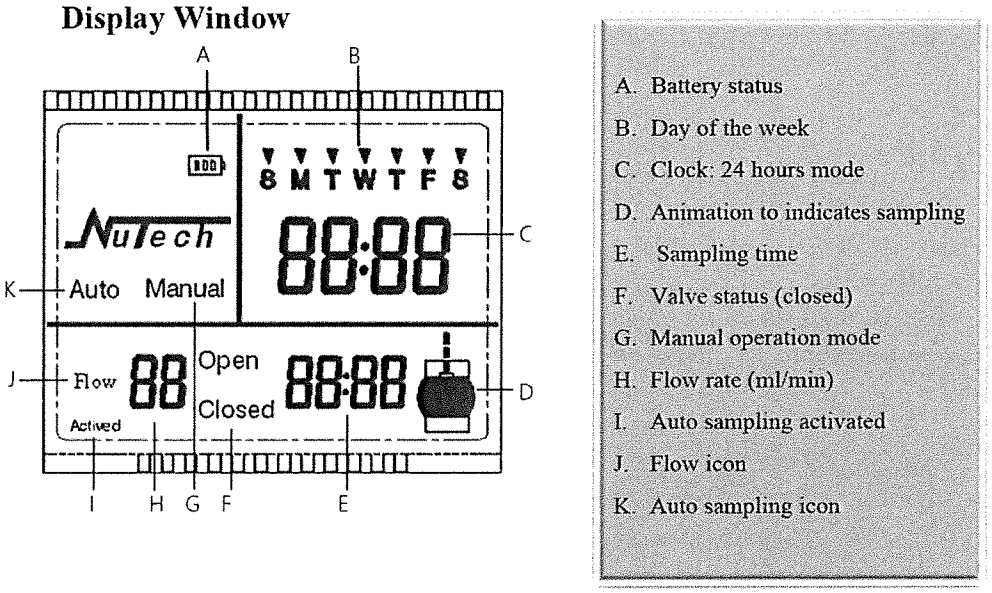

Figure 6: Display window of the Nutech 2703 controller.

3.2 Charging the Nutech 2703 Controller

- Nutech 2703 controllers are housed in a Shelter One and should be plugged in and left in the [ON] position to remain fully charged between sampling events.
- If the controller requires charging, plug the provided power supply into the power charge port on the top left side of the Nutech 2703 controller's open cover. Turn the [ON/OFF] power switch to the [ON] position (Figure 7).
- The power switch must be [ON] to enable charging. A RED light on the AC power adapter indicates the controller is charging. When the light on the AC adapter turns GREEN, the controller has indicated it is fully charged. The instrument must always be connected to a power source when sampling.

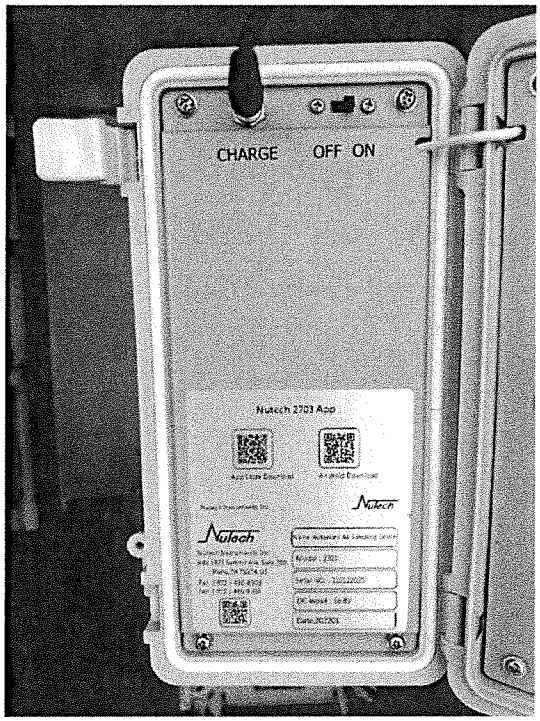

Figure 7: The Nutech 2703 controller is connected to a power source and is turned ON.

4.0. Setting Up a 6-L SUMMA Canister

4.1. Canister Set-Up

- Remove the brass cap nut from the canister valve using a 9/16" combination wrench to attach the Nutech 2703 controller's tubing with nut to the 6-L SUMMA canister.
- Connect the Nutech 2703 controller tubing with nut to an evacuated 6-L SUMMA canister (Figure 8 – Left Image) and manually tighten the nut with your fingers to ensure the threading is lined up correctly. Use two 9/16" combination wrenches to tighten down (in opposite directions) the Nutech 2703 tubing with nut to the canister. One wrench should be used on the nut of the Nutech 2703 tubing, and the other on the Swagelok fitting below the pressure gauge (Figure 8 – Right Image).

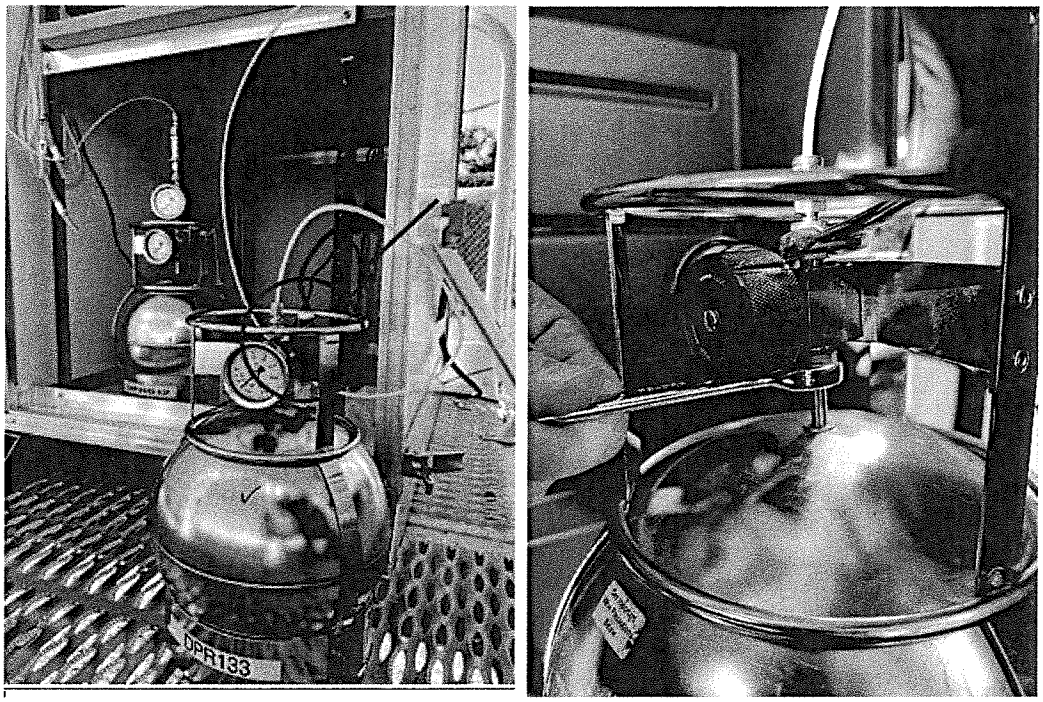

Figure 8: Nutech 2703 tubing with nut connected to a 6-L SUMMA canister.

- Once the Nutech 2703 tubing is securely attached to the canister, open the canister valve by hand by turning the blue or green knob on the 6-L SUMMA canister counterclockwise.

- The Nutech 2703 controller may be programmed for a sampling event after it has been attached to a canister. The Nutech 2703 controller can be programmed three ways: Nutech 2703 software installed on a laptop (Section 5.0), Nutech 2703 application on your iPhone or Android (Section 6.0), and the Nutech 2703 manual touch screen panel (Section 7.0).

5.0 Auto Sampling Operation Procedures with Computer Control – Preferred Method for Set Up

- The Nutech 2703 computer software should be installed prior to a sampling event. Contact the study lead/ field coordinator, or designated equipment staff member to arrange for installation.
- Follow instructions in Section 4.1 on how to connect the Nutech 2703 controller to a 6-L SUMMA canister.

5.1 Turning on the Nutech 2703 Controller

- On the open cover of the device, turn on Nutech 2703 controller (if not already on) by moving the [ON/OFF] switch to the [ON] position. From that point, the Nutech 2703 timer will stay on for approximately 120 seconds. After that, the Nutech 2703 controller defaults to sleep mode and will not be accessible to put in parameters unless the ENTER key is pressed to wake the Nutech 2703 controller out of sleep mode.

5.2 Wi-Fi Connection

- A wireless connection must be made between your laptop and the Nutech 2703 controller. The Nutech 2703 controller has a built-in Wi-Fi router. On your laptop, search among Wi-Fi sources for the Nutech 2703 Wi-Fi connection. The connection name will be the serial number of the Nutech 2703 controller (available on the open cover of the device e.g., "N2703-00XX" or a serial number such as "110122013"). Connect to the Nutech 2703 Wi-Fi (Figure 9). The required password is N2703888. All Nutech 2703 controllers have the same password.

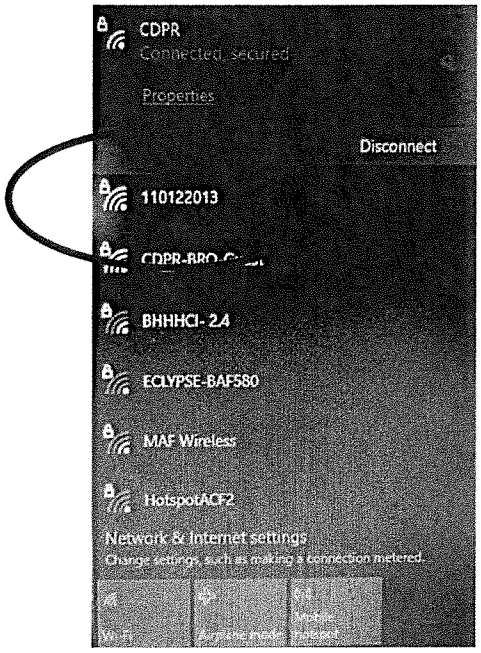

Figure 9: Wi-Fi connection for the Nutech 2703 controller.

- Once the connection starts between the Nutech 2703 controller and your laptop, double-click on Nutech 2703 application installed on the laptop. After the software application is opened, if the Wi-Fi connection has linked successfully then "Unlinked" (to the right of the date and time) on your computer application will change to "Linked" (Figure 10). Note: Once you start to make the Wi-Fi connection you can open the application.

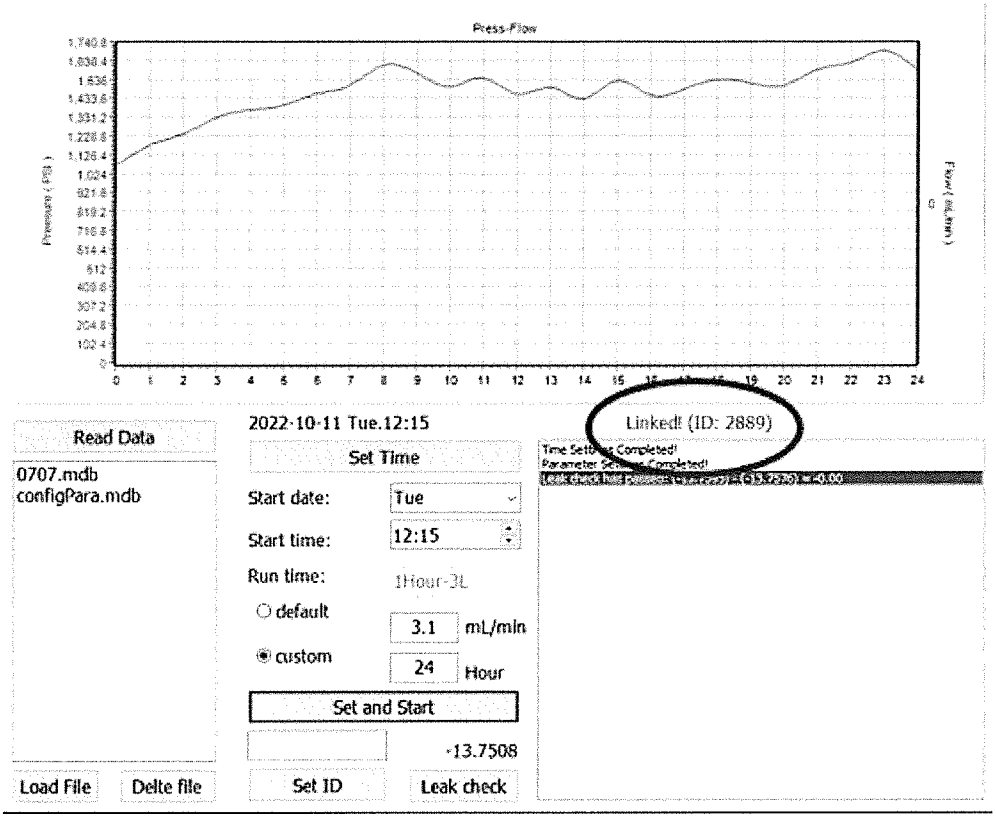

Figure 10: Linked home screen on the software application of the Nutech 2703 controller.

5.3 Obtaining the Initial Flow Rate and/or Adjusted Flow Rate

To get the target flow rate of 3.3 mL/min the following steps should be completed to start a sample run.

- Open the canister valve (if not already open).
- From the Nutech 2703 controller's home screen select Set Time, which synchronizes the time between the field computer and the Nutech 2703.
- Select Start date and Start time. Select Today and a time two to three minutes from the current time.
- In the Run time box Select Custom. Enter parameters: (3.3 ml/min, 24 Hour).
- Select Set and Start.

Based on the time you selected the Nutech 2703 controller will start running at a flow rate of 3.3 mL/min for 24 hrs. Once the controller starts, a leak check will automatically run. Please allow 2 – 3 minutes for the leak check to finish and the flow to stabilize before taking a flow reading.

- Using an ALICAT Scientific low flow meter measure the flow rate. If the flow rate is 3.3 ml/min +/- 10% (2.97 – 3.63 ml/min) the sample is now set up. Continue to Section 8.0.
- If the flow is out of the acceptable range, follow the steps below to adjust flow.
    - On the Nutech 2703 controller's home screen the box next to mL/min you will enter the adjusted flow rate based on Table 1. For example, if the initial flow rate was 2.8 mL/min measured using the ALICAT low flow meter, you will enter the flow rate of 3.9 in the box next to mL/min on the Nutech 2703 controller's home screen.
    - Once the adjusted flow rate has been entered select Set and Start.
    - Based on the current time the sample has now started over. The elapsed minutes on the Nutech 2703 controller's touch panel will start over at 00:00.
    - Before taking a new flow reading a leak check will be performed automatically. When one minute has passed, the sample will begin taking a flow. Please wait 2 – 3 minutes for the flow to stabilize before taking a new flow reading.
    - If the flow is within a valid range continue to Section 8.0. If not, repeat until a valid flow range is obtained.
- See Section 8.0 on how to record data on the field data sheet (FDS) at the beginning and end of a sampling event.

Table 1. Adjusted Flow Rates

Initial Measured Volumetric Flow Rate Using ALICAT Flow Meter (mL/min)	Adjusted Volumetric Flow Rate to be Set on the Regulator (mL/min)
2.0	5.4
2.1	5.2
2.2	5.0
2.3	4.7
2.4	4.5
2.5	4.4
2.6	4.2
2.7	4.0
2.8	3.9
2.9	3.8
3.0	3.6
3.1	3.5
3.2	3.4
3.3	3.3
3.4	3.2
3.5	3.1
3.6	3.0
3.7	2.9
3.8	2.9
3.9	2.8
4.0	2.7

6.0 Auto Sampling Operation Procedures with your iPhone or Android.

Follow instructions in Section 4.1 on how to connect the Nutech 2703 controller to a 6-L SUMMA canister prior to set up.

6.1 Wi-Fi Connection

Open the Wi-Fi settings on your iPhone or Android device and connect the Nutech 2703 controller to the Nutech 2703 Wi-Fi network (for example: 27032106294). Your phone should automatically connect to the Wi-Fi. The password is N2703888. All Nutech 2703 controllers have the same password. Once connected to the Wi-Fi, open the Nutech 2703 controller's application on your phone.

Note: If the Wi-Fi in your settings shows you are connected and the application does not, you will need to close out the application and reopen it again.

6.2 Obtaining the Initial Flow Rate and/or Adjusted Flow Rate

To get the initial flow rate/ adjusted flow rate of 3.3 mL/min, the following steps should be completed to start a sample run.

- Open the canister valve (if not already open).
- From the Nutech 2703 application's home screen select Set Time, which synchronizes the time between the application and the Nutech 2703 controller (Figure 12).
- Select Choose Start Time. Select Today and a time two to three minutes from the current time.
- In the Run time box select Custom. Enter parameters: (3.3 ml/min (flow), 24 Hour).
- Select Send Parameter.
- Select Leak Check. An automatic leak check will be performed.

Based on the date and time you selected, the Nutech 2703 controller will begin running at a flow rate of 3.3 mL/min, 24 hrs. Once the controller starts, a leak check will automatically run. Please allow 2 – 3 minutes for the leak check to finish and the flow to stabilize before taking a flow reading.

- Using an ALICAT Scientific low flow meter, measure the flow rate. If the flow rate is 3.3 ml/min +/- 10% (2.97 – 3.63 ml/min) the sample is now set up. Continue to Section 8.0.
- If the flow falls out of the acceptable range, follow the steps below to adjust flow.
    - On the Nutech 2703 controller's phone application's home screen press the Select Running time box and select Custom, then Yes. Next enter the adjusted flow rate based on Table 1 followed by 24hrs, then select Yes. For example, if the initial flow rate was 2.8 mL/min on the ALICAT low flow meter you will enter the rate of 3.9 mL/min in the box followed by 24 hrs. on the Nutech 2703 controller's phone application's home screen.

- Once the adjusted flow rate has been entered select Send Parameter, followed by Leak Check.
- Based on the current time the sample has now started over. The elapsed minutes on the Nutech 2703 controller's touch panel will start over at 00:00.
- Before taking a new flow reading a leak check will be performed automatically. When one minute has passed, the sample will begin taking a flow. Please wait 2 – 3 minutes for the flow to stabilize before taking a new flow reading.
- If the flow is within a valid range continue to Section 8.0. If not, repeat until a valid flow range is obtained.

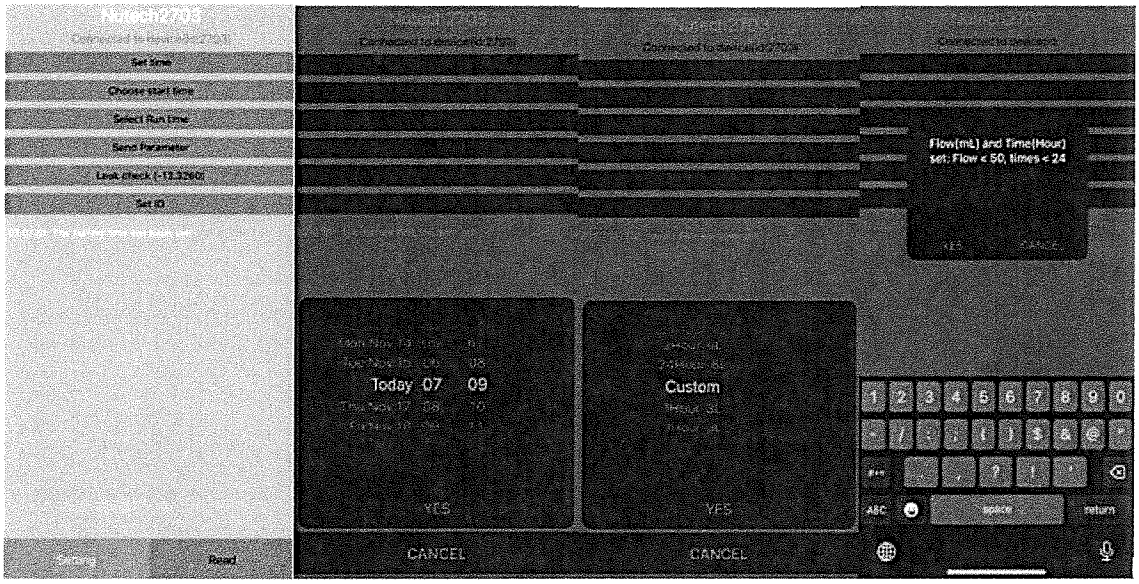

Figure 11: Set-up process for linking the phone application to the Nutech 2703 controller, setting the date/time, and setting the Custom flow rate/Adjusted Flow rate.

- The left picture in Figure 12 shows how the Nutech 2703 application will look when the sample has started to run. When returning 24 hours later, the Nutech 2703 application will look like the picture on the right. Note the difference in sampler canister pressures (located in parentheses next to Leak Check) from the left picture to the right.

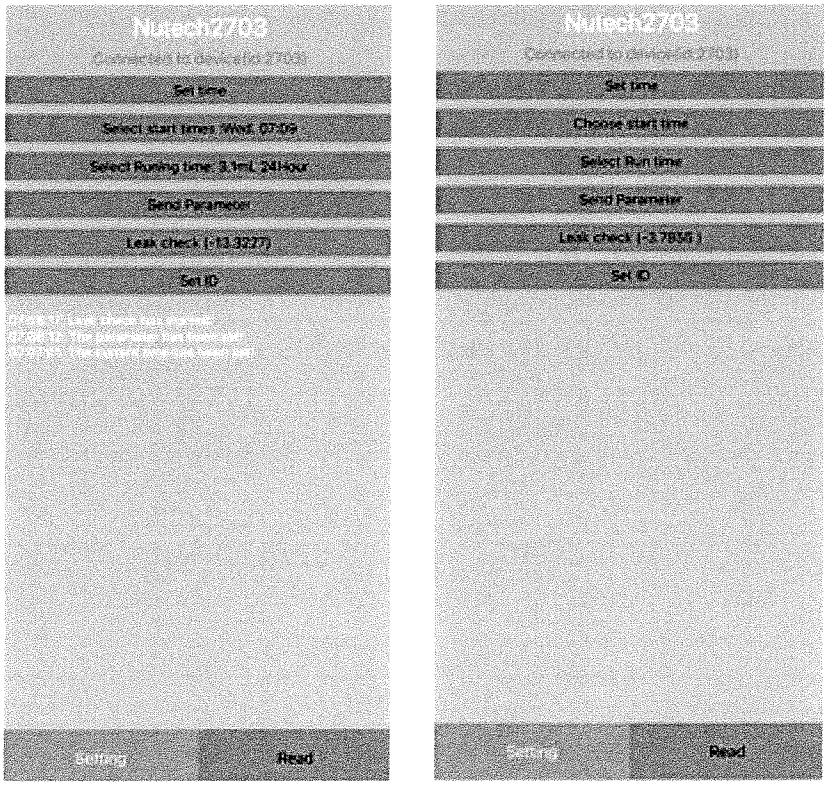

Figure 12: Starting and ending screens on the Nutech 2703 controller's phone application.

Record all required information on the FDS. See Section 8.0 for the required information for the FDS.

7.0 Manual Auto Sampling Operation Procedures using the Controller's Touch Panel.

Follow instructions in Section 4.1 on how to connect the Nutech 2703 controller to a 6-L SUMMA canister.

- Open the canister valve (if not already opened) and turn on the Nutech 2703 controller by turning the [ON/OFF] switch to the [ON] position located on the front cover panel (Figure 13). The controller will stay on for approximately 120 seconds. After that, the Nutech 2703 controller defaults to sleep mode, and can be wakened only be pressing the Enter key.

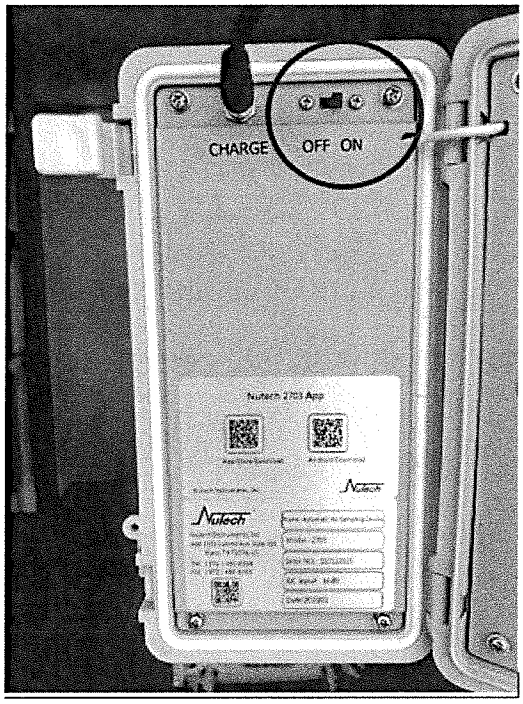

Figure 13: ON/OFF button on the Nutech 2703 controller.

7.1 Setting the Real-Time/ Clock

- Press the Set key TWICE to set the current time and day of the week. The digits on the screen will start flashing.
- Using the numeric keys, set the clock to military time. If necessary, the left or right arrow keys can be used to make a correction.
- Once the minutes are entered, the day of the week will start flashing. Use the left or right arrow key and move the cursor to the desired day.
- Press the Enter key to complete the day and time settings (Figure 14).

Note: During the setup another way to make corrections is by turning the Nutech 2703 controller off and back on to start over (this is the easiest way to correct mistakes in the input settings). The time and day of the week needs to be set each time the Nutech 2703 controller is turned on.

Figure 14: Manually programming the Nutech 2703 controller with the date and time.

7.2 Obtaining the Initial Flow Rate/ Adjusted Flow Rate

An initial flow rate and/or adjusted flow rate will need to be obtained to start a scheduled sampling event. Follow the setup process from Sections 7.3 – 7.6 to program a scheduled run. Once the run has begun, use an ALICAT Scientific low flow meter to measure the flow rate. If the initial flow at the end of the setup is 3.3 +/- 10% (2.97 – 3.63 ml/min), set up is now complete. If the flow rate is not 3.3 +/- 10% (2.97 – 3.63 ml/min) make a note of the reading and use Table 1 to obtain the adjusted flow rate. This will be the value used when setting up the Small Flow Rate in Section 7.6 (during the adjusted flow rate set-up).

7.3 Setting the Start Time (Valve OPEN)

- Press the Set key ONCE to begin setting the flow rate.
- When taking a 24-hour sample with a 6-L SUMMA canister, the flow should be initially set to 3.0 ml/min. To do so, enter "0" followed by "3" on the touch panel. The Nutech 2703 controller recognizes number "03" as a value of 3.0 ml/min flow rate (Figure 15).

Figure 15: Manually setting the flow rate on the Nutech 2703 controller.

- Once the flow rate is set, the word Open will begin flashing, indicating that we are setting the time to open the valve and setting the opening flow rate. Press Enter to confirm open valve function and flow rate.
- The time will start flashing, indicating that the time is ready to be set. Using the numeric keys, enter the sampling start time. Then use the left and right arrow keys to select the desired start day, followed by Enter to finish setting up the sampling start time. The display will return to the clock setting.

7.4 Setting the Stop Time (Valve CLOSED)

- Press the Set key ONCE to begin setting the flow rate again for the stop time (we need to set the Flow Rate for both steps of Start and End time).
- Set the flow rate to 3.0 ml/min by entering "0" followed by "3" on the screen. Once the flow rate is set, the word Open will begin flashing indicating to set the valve function.
- Use the left arrow key to switch to the Closed status. Once the word Closed appears, Press Enter to confirm this function.

- Next, the time will start flashing, indicating the time is ready to be set. Using the numeric keys, enter the sampling stop time (Figure 16). Use the left and right arrow keys to select the desired day, followed by Enter to confirm the stop time for the sampling event. The display will return to the clock setting.

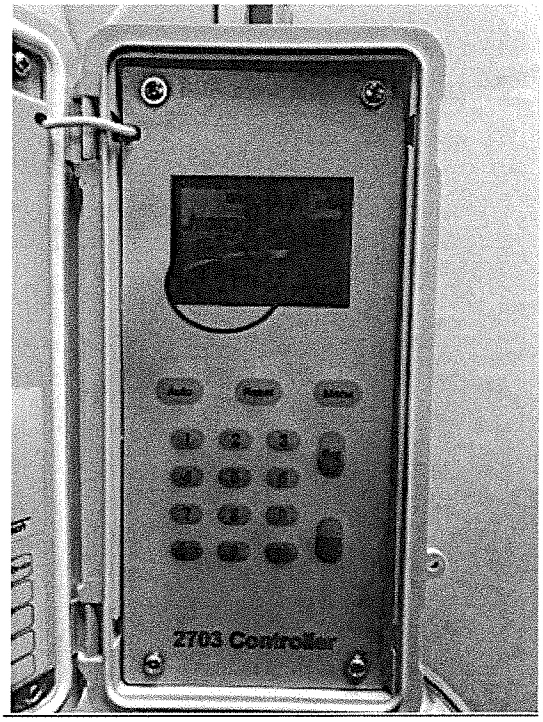

Figure 16: Manually setting the stop time and flow rate.

7.5 Starting and Stopping a Sampling Event

- Next, press Auto ONCE to start the auto operation.
- The word Activated will be displayed in the bottom left-hand corner of the display panel (See red circle in Figure 17) indicating that at the set start time and day the valve will open, and sampling will begin. At the set stop time and day, the valve will close automatically, and sampling will end.

Note: Text "Activated" is quite small.

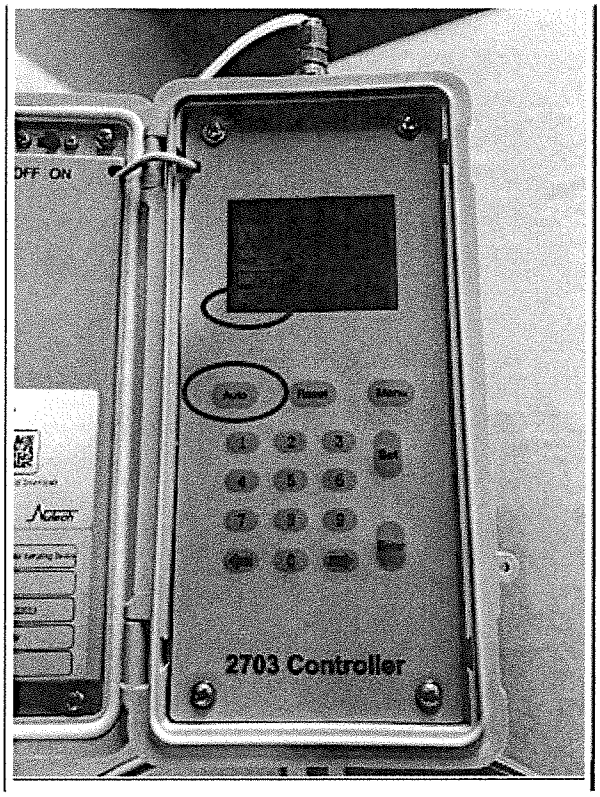

Figure 17: Activated Nutech 2703 controller.

7.6 Setting a Small Flow Rate (<10ml/min)

This step is very important to follow. A manual set-up requires this additional step to accurately set the correct flow rate. If you do not set the small flow rate, the sample will not start.

- Press Set once to begin setting the flow rate. Then, **press the left arrow key once** to enter the small flow rate setting (if you do not press the left arrow you will need to start over).
- The FLOW icon will start flashing, which indicates you have successfully entered the small flow rate setting. Now, 00 means 0.0 ml/min. If you want to set the flow rate to 3.3 ml/min, you will enter 33, which means 3.3 ml/min for the flow rate.
- Once you set the flow rate the word Open will start flashing for you to set the valve function. Press Enter to confirm this function. The time will begin flashing, indicating that it is ready. Using the digital keys, enter the sampling start time. Use the right and left arrow keys to select the

desired day, followed by Enter to finish the sampling start time. The display will return to the clock setting. Then press Auto. Set Up is now complete (Figure 18).

Figure 18: Nutech 2703 controller has started a scheduled sampling event.

Based on the date and time you selected, the Nutech 2703 controller will begin running at a flow rate of 3.3 mL/min for 24 hrs. Once the controller starts, a leak check will automatically run. Please allow 2 – 3 minutes for the leak check to finish and the flow to stabilize before taking a flow reading.

- Using an ALICAT Scientific low flow meter, measure the flow rate. If the flow rate is 3.3 ml/min +/- 10% (2.97 – 3.63 ml/min) the sample is now set up.
- If the flow falls out of the acceptable range, make a note of the flow reading and continue with the steps below.
- Stop the sample by turning the Nutech 2703 controller's [ON/OFF] switch to [OFF]. The canister valve does not need to be closed.
- Use Table 1 to determine the new flow rate. The Initial Measured Flow Rate Using ALICAT Flow Meter (mL/min) column is the one measured with the low flow meter, and the Adjusted Flow Rate to be Set on the Regulator (mL/min) column is the flow rate you will set on the Nutech 2703 controller.
    - For example: If the initial flow rate is reading 2.7 mL/min, the adjusted flow rate should be 4.0 mL/min.

After the adjusted flow rate has been determined the parameter settings should be made in the following order:

- Turn the Nutech 2703 controller to the [ON] position, reset the date and time following the process in Section 7.1.
- Follow the set-up process in 7.3 thru 7.6. Use the adjusted flow rate that was determined in the previous set up when setting up the small flow rate in Section 7.6. Once the small flow rate has been entered set up is now complete.
- Once the leak check is complete and the flow has stabilized a new flow reading can be obtained using the ALICAT low flow meter.

Note: See Section 8.1 and Section 8.2 on how to collect starting and ending flow rates, and other required information for the FDS.

Do not press any key on the panel once the controller is activated. It may interfere with the parameters you have provided. Once the sampling event has begun and the valve is in the open position (sampling is in progress), the Auto sign will be locked until the event is completed and the valve closes. **Please note that it can take several minutes for the flow to increase to the desired levels.**

8.0 Recording Information on the Field Data Sheet (FDS)

8.1 Sample Set Up

- Record Site Name, Crew, Start Date, Sample Number, Location Code, Time On, Machine ID #, DPR Canister Number, and Flow Meter Serial Number on the field data sheet.
- Record Starting Pressure on the Canister (should be -30" Hg on the canister's pressure gauge).
- Record Starting Sampler Pressure from the laptop or phone application. Record the pressure in psi. The starting pressure must be recorded on the FDS in psi. You can also convert the pressure on the FDS to inHg. Starting pressure values will vary. This value is located above the Leak Check box on the laptop application, or in parentheses next to Leak Check on the phone application. If a manual set up occurred, you will not have a starting sampler pressure.

Note: To convert psi you can multiply the ending psi by 2.036 inHg (for example: -13.3227 x 2.036 = -27.12 inHg). This value will be your starting sampler pressure.

- Connect an ALICAT scientific low flow meter affixed with a flow measurement adapter to the inlet of the PTFE tubing (Figure 19). Use the ALICAT low flow meter to Record Initial Flow. A valid

flow range should be +/- 10% of 3.3 ml/min (2.97 – 3.63 ml/min) (Remember that a flow of 3.3 ml/min will appear in the LCD screen as a "33".

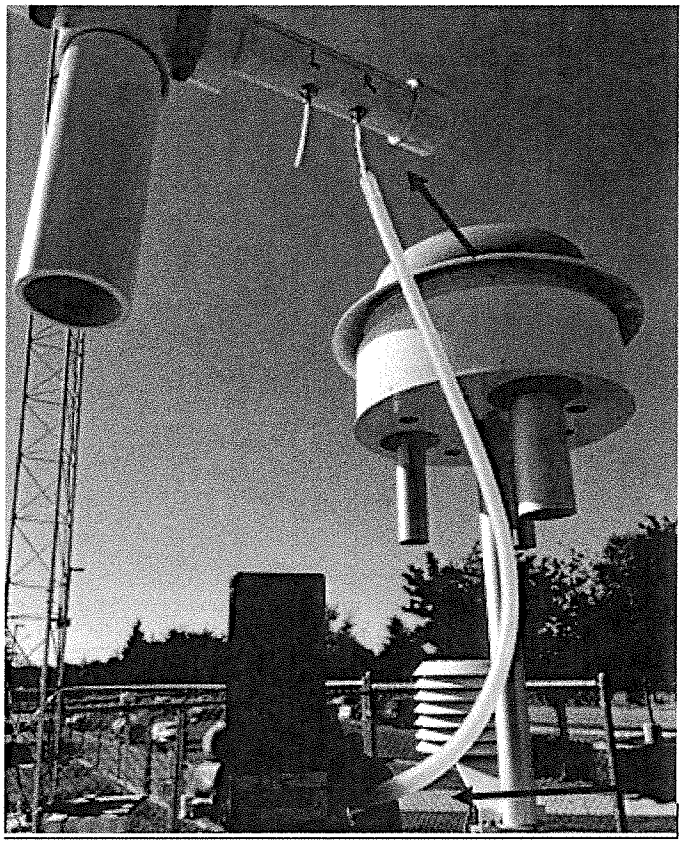

Figure 19: Connection of the ALICAT Scientific low flow meter to take initial and ending flow rates.

- Sign your name in the Sample Started box along with the Date and Time the sample was started. Place the canister inside the enclosure and securely close the door to the Shelter One.

8.2 Sample Collection

- Return to the site prior to the end of sample period. Using the ALICAT Scientific low flow meter record the final flow reading on the FDS in the same manner that you measured the initial flow reading. Perform the final reading five to 10 minutes prior to the sample period ending.

- At the end of the sampling period, the Nutech 2703 controller will shut off automatically at 24 hours. The Open status will change to Closed (Figure 20). Note: The Nutech 2703 will instantly go into a sleep mode once the sample has stopped. To wake the controller, press Enter.
- Record the final pressure reading from the 6-L SUMMA canister's flow controller vacuum gauge on the FDS. A valid pressure reading should fall in the range of -4 and -10 inHg.
- To record the final sampler pressure, use your laptop or phone to connect to the Nutech 2703 software. Right above the Leak Check box (or in parentheses on the phone application) the pressure will be displayed in psi. Record the pressure in psi that is displayed on the sampler on the FDS. The pressure must be recorded in psi. A valid pressure reading should fall in the range of -2 and -5 psi (or -4 and -10 inHg for reference if converting to inHg).
- Close the canister valve by turning the blue or green knob clockwise.
- Record any other remaining information required on the FDS (End Date, any applicable Notes related to the sampling event, Sample Finished (date and time), and Sample Transport (date and time). If the sample was set up manually, please note that in the Field Notes section.
- Leave the Nutech 2703 controller powered on by keeping the [ON/OFF] switch to the [ON] position. Keep the Nutech 2703 controller connected to power.
- Remove the Nutech 2703 controller tubing with nut from canister with two 9/16" combination wrenches and reattach the canister brass cap nut with two 9/16" wrenches.
- Return all material not housed in the Shelter One to Bradshaw Regional Office, Ventura County Agricultural Commissioner's Office, or Santa Barbara County Agricultural Commissioner's Office.

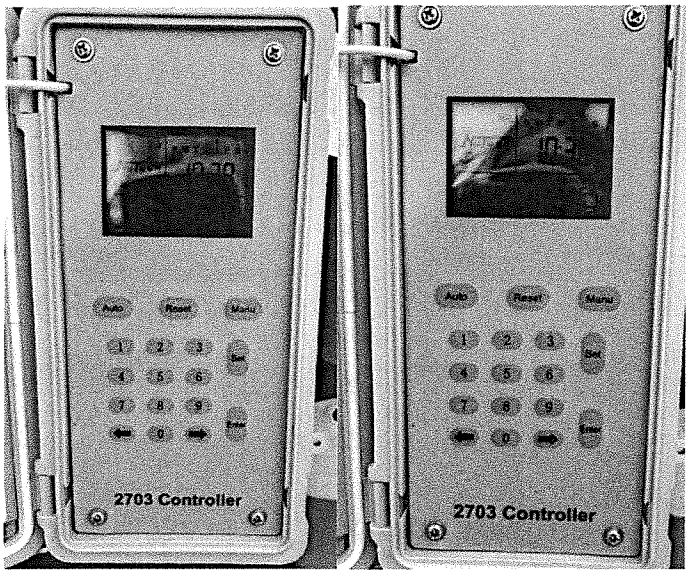

Figure 20: Open and closed screens of the Nutech 2703 controller.

9.0 Downloading the Data using a Laptop

After a sampling event is complete you may be required to download the data, to do so select Read Data (Figure 21) on your laptop.

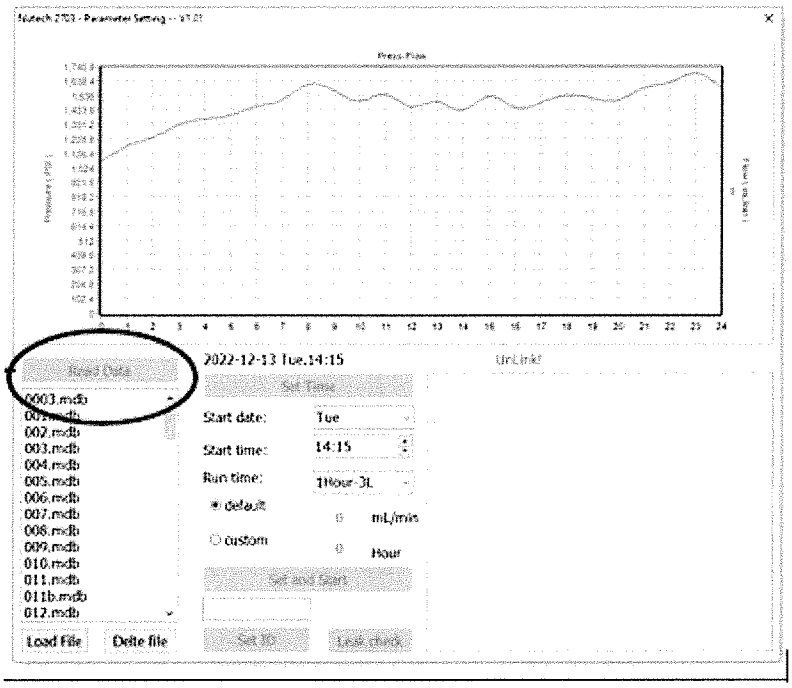

Figure 21: Downloading the flow rate and pressure data.

Next, give the data a file name. It can only be four characters. The chart in the software will update as the data is downloaded. Data can be viewed later with the regulator software or opened in Microsoft Access (Figure 22).

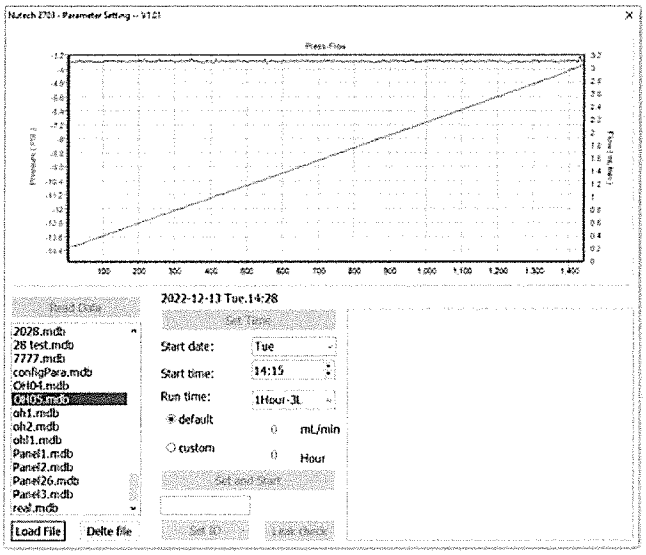

Figure 22: Successful download of flow rate and pressure data.

Sometimes there will be an error in the download (Figure 23). If this occurs the download will need to be redone and a new file name given.

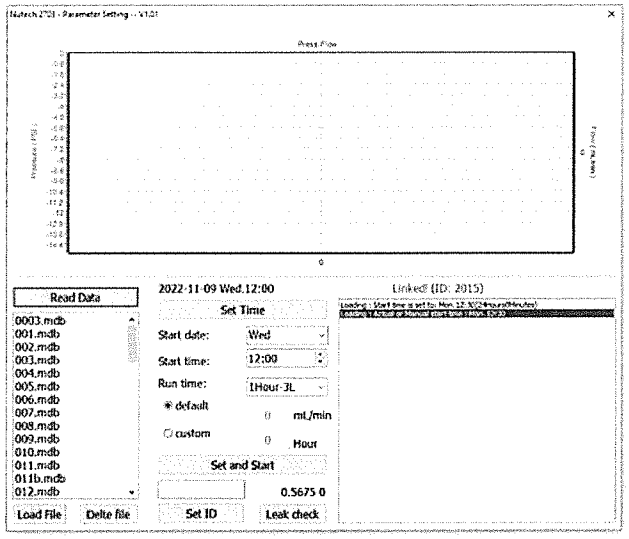

Figure 23: Unsuccessful download of flow rate and pressure data.

Once the data is successfully downloaded it can be opened in Access (Figure 24). This file will need to be sent to the designated data custodian after your sampling trip is complete.

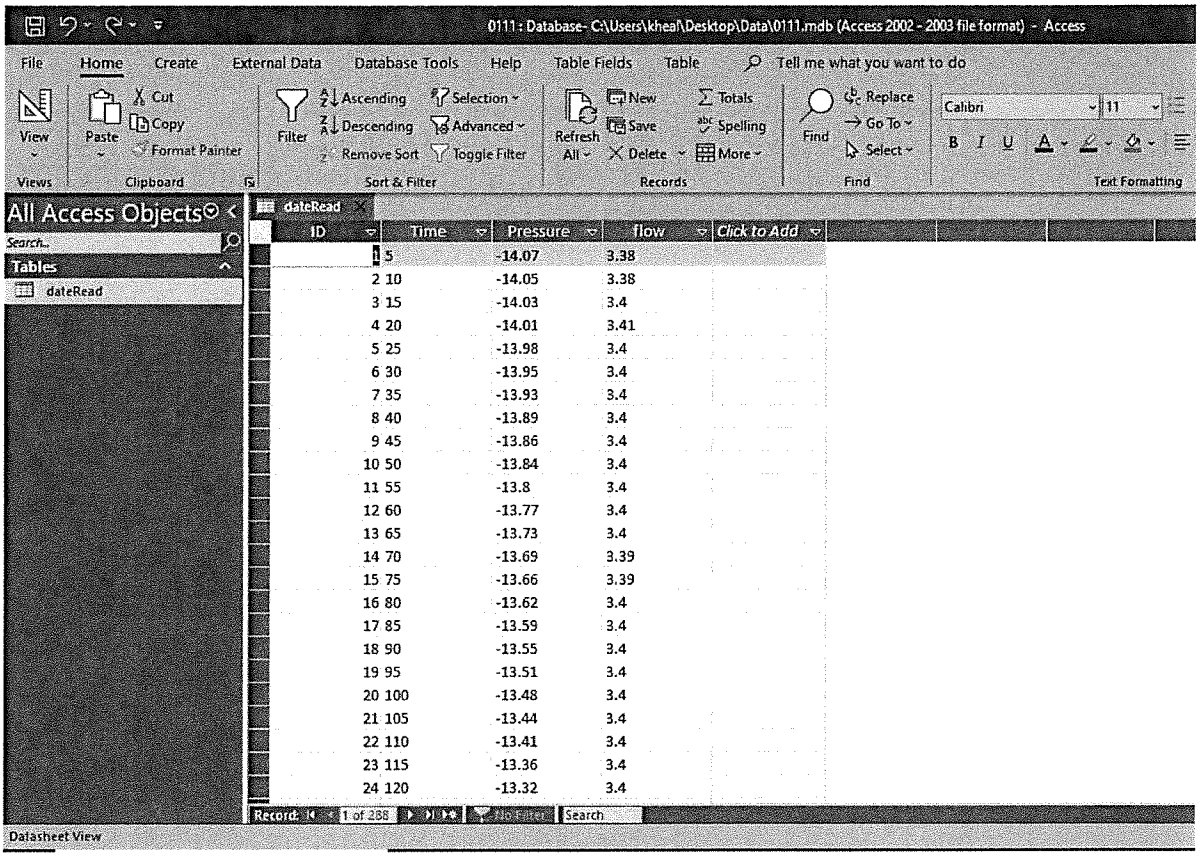

Figure 24: Downloaded data opened in Access.

10.0 Troubleshooting Guides

- If the power switch is on and you do not see the time on the panel screen, the Nutech 2703 controller is in sleep mode. Press the Enter key and the time will appear on the Nutech 2703 controller's screen.
- If the Nutech 2703 controller freezes, there is no response to the keys, or the clock on the display stops, press the reset button to restart.
- If the screen of the Nutech 2703 controller is entirely dark, it may be due to a lack of power in the battery and it needs to be charged.

- If Wi-Fi cannot be connected, restart the Nutech 2703 controller, or close out the window and re-open it. If the connection still fails, the Wi-Fi module may be damaged. Please contact the study lead or designated equipment staff member to arrange for repair and/or further troubleshooting.
- If the canister has reached the normal atmospheric pressure before the set time, the interface between the canister and the flow controller may be leaking air. You should check whether the interface is connected correctly. If there is no air leakage at the interface, it may be an air leakage inside the instrument. Please contact the study lead or designated equipment staff member to arrange for repair.

STANDARD OPERATING PROCEDURE

Instructions for Calibration and Use of a Mechanical Regulator with a Summa Canister

KEY WORDS

Air sampling, Summa, Canister, VOC, Silonite, SilcoCan, TO-Can, Restek, Rasmussen, AeroSphere, Regulator, Flow controller

APPROVALS

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Original signed by [DATE]

SENIOR SCIENTIST: _____ DATE: _____
Aniela Burant
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Original signed by [DATE]

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Environmental Monitoring Branch organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in Standard Operating Procedure (SOP) ADMN002.

STANDARD OPERATING PROCEDURE
Instructions for Calibration and Use of a Mechanical Regulator with a Summa Canister

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1.0 INTRODUCTION

1.1 Purpose

This standard operating procedure (SOP) describes the methods used for collecting 24-hour passive air canister samples for the Air Monitoring Network and 1,3-Dichloropropene Air Monitoring (Study #309) using Veriflo® flow controller assemblies known as mechanical regulators. Mechanical regulators may be required when collecting samples for both the Air Monitoring Network (Study #257) and Study #309. The mechanical regulators are typically reserved for back-up sampling in case the primary equipment does not operate as expected in the field. Therefore, it is important to understand how to set-up, operate, and calibrate a mechanical regulator.

1.2 Scope

1.2.1 Passive sampling using a mechanical regulator for air monitoring requires air to be pulled through a flow controller into an evacuated Summa canister over a 24-hour period.

1.2.2 A flow controller on the mechanical regulator assembly maintains a constant sample flow over the sampling period, despite changes in the canister vacuum or changes in environmental conditions.

1.2.3 Mechanical regulator assembly consists of PTFE inlet tubing, a metal particle filter, a critical orifice, a flow controller, and a Summa canister.

1.3 Definitions

FDS – A Field Data Sheet used during sampling to record sampling data.

COC – Chain of Custody form used to check-in samples after collection.

Summa Canister – An electrochemical coated canister that is used for air sampling.

2.0 MATERIALS

2.1 Canister Sampling Equipment

2.1.1 6-L Summa canister

2.1.2 Veriflo® flow controller (mechanical regulator)

2.1.3 SilcoSteel® in-line filter (7µm)

2.1.4 1/8" PTFE tubing, 1/16" I.D.

2.1.5 Alicat low-rate mass flow meter

2.1.6 Calibration tubing and tip

2.1.7 Two 9/16" wrenches

2.1.8 Allen Hex key wrench, 3mm

2.1.9 Field data sheets (FDS) and Chain of custody forms (COC)

3.0 PROCEDURES

3.1 General

3.1.1 Label the Summa canister with the appropriate sample number for the study and site it will be set-up at.

3.1.2 Ensure that the Summa canister's valve is closed. Remove brass cap nut from canister valve using a 9/16" combination wrench.

3.1.3 Attach mechanical regulator assembly to canister.

3.1.4 The flow controller has been seated properly when the nut spins freely during finger tightening (Figure 1).

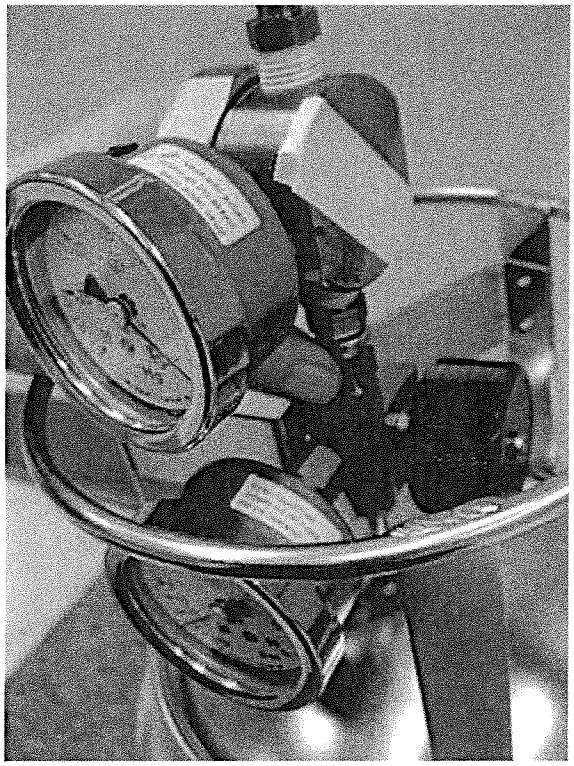

Figure 1. Mechanical regulator properly seated on Summa canister.

3.1.5 Using the 9/16" wrench, tighten the nut ¼ turn past finger tight. Do not over-tighten as this can cause leakage or damage to the canister.

3.1.6 Use two wrenches when tightening nut to prevent torquing the sample train. (Figure 2).

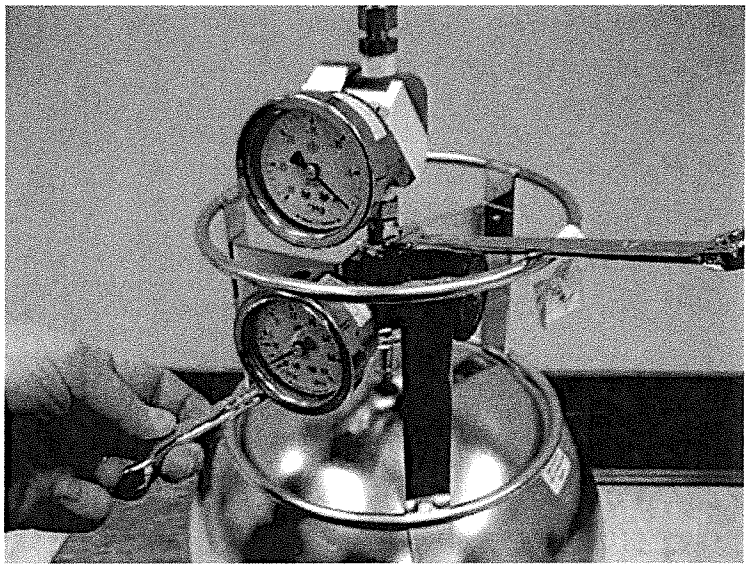

Figure 2. Proper technique to use when tightening the regulator onto the Summa canister.

3.1.7 Verify that the canister gauge and regulator gauge are in agreement. Record the initial vacuum reading (usually between -28" Hg and -30" Hg) from the regulator gauge, which has greater resolution. Also record canister # and regulator # on the field data sheet.

3.1.8 If the pressure readings from the regulator and canister are **not** in agreement, disconnect the regulator and connect it to a backup canister. Make a note of the canister that wasn't in agreement and set aside at the warehouse for inspection. Please let your supervisor and any of the field coordinators know of the problematic canister.

3.1.9 If the gauges are not in agreement or if the pressure readings are out of desired range, use a spare canister to conduct the sampling event. If both gauges continue to have issues, contact the field coordinator or your supervisor.

3.1.10 Open the canister valve by turning the knob counterclockwise. Record the starting time on the field data sheet.

3.1.11 Attach the flow meter tubing to the sample inlet.

3.1.12 Turn on the Alicat low-rate mass flow meter (Figure 3) and press the "TARE" key to zero the display.

Figure 3. Low-flow Alicat flow meter

3.1.13 Connect the Alicat flow inlet to the flow meter tubing and wait for the flow to stabilize. Once the flow has stabilized, record the initial flow on the field data sheet. This can be achieved by selecting the "NEXT" button on the flow meter and will take you to a screen that measures the average volumetric flow. Press the "RESET" button and take a one-minute average.

3.1.14 Alternatively, if the flow is stable enough, a live reading may also be recorded.

3.1.15 The flow should be between 2.8 to 3.4 ml/min (a target of 3.1 ml/min +/- 10%) for a 24-hour, 6-L canister sample. If the flow is not within this range, attempt to adjust the flow via the regulator (Section 3.2).

3.1.16 Return to the site approximately 15-20 minutes prior to the end of sampling period. Take a final flow reading approximately 5 minutes prior to sample completion. Record the final flow reading on the FDS.

3.1.17 At the end of the sample period, record the final pressure reading from the mechanical regulator's vacuum gauge on the FDS **(both the initial and final readings should be taken from the regulator's gauge)**. Close the canister valve by turning the valve's knob clockwise and record the ending time and the run time on the FDS. Fill out the relevant sample information onto the COC as well.

3.1.18 **Acceptable ending pressures range from -10 inHg to -4 inHg**. If a sample pressure falls outside this range, another sample must be set-up to replace the invalid canister. This replacement sample should be started immediately. Inform your supervisor about the invalid sample.

3.1.19 Remove flow controller (with the tubing attached) from the canister and replace the brass cap nut on the canister.

3.1.20 Place the regulator with PTFE tubing inside the shelter and loosely coil the tubing, making sure not to kink the tubing (Figure 4).

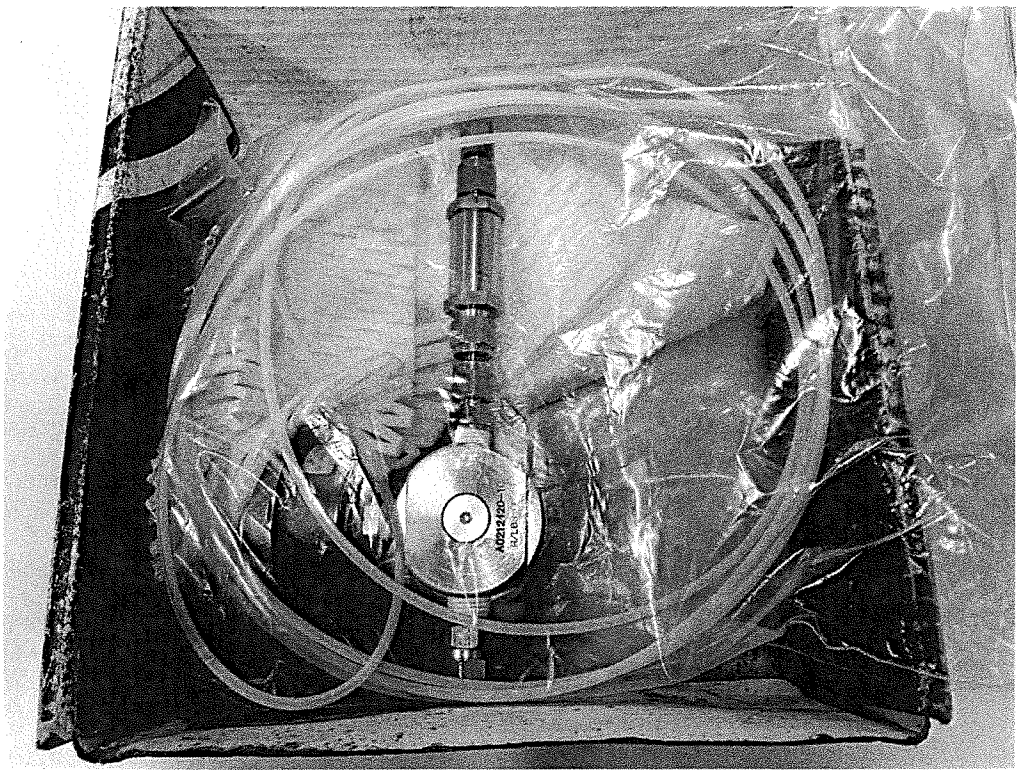

Figure 4. Properly stored mechanical regulator

3.1.21 Return to the warehouse with all collected samples. Place valid canisters in proper canister storage cabinets (Figure 5) and set aside invalid canisters for future cleaning.

Figure 5. Study 257 and 309 canister sample cabinets. Cabinet 3 is used for study 309 and cabinet 4 is used for study 257.

3.2 Setting the flow rate on the mechanical regulator [Skip these steps if the regulator's flow rate is within range].

3.2.1 Remove the dust cover on the side of the mechanical regulator using a 3 mm hex key wrench (Figure 6).

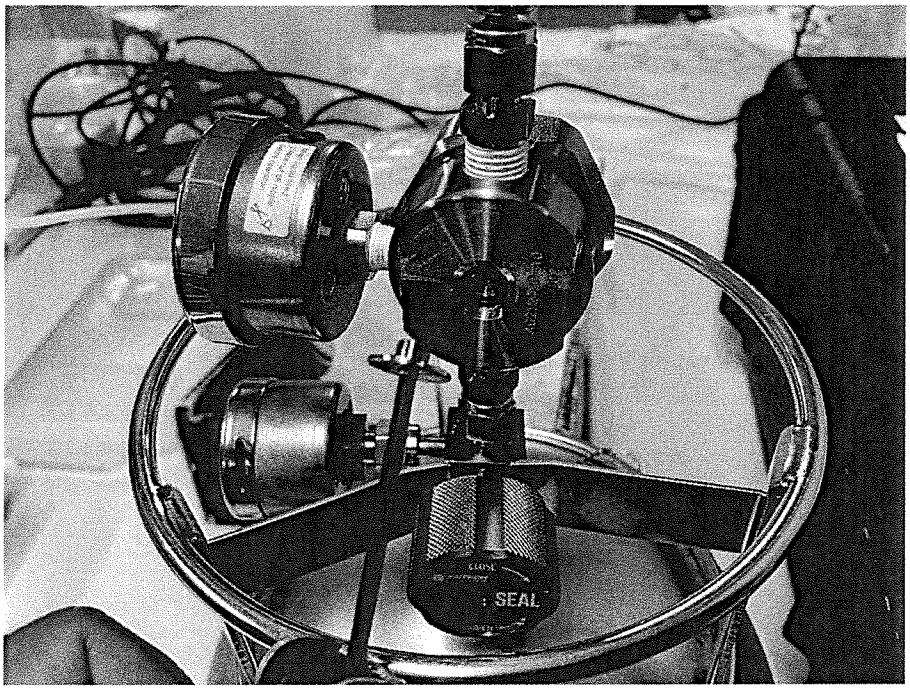

Figure 6. Flow controller with dust cover removed to expose piston gap screw.

3.2.2 Connect the mechanical regulator to an evacuated canister and tighten the nut with a 9/16" combination wrench. Use two wrenches, one as a brace to prevent torquing the sample train.

3.2.3 Open canister valve by hand, turning the blue knob counterclockwise.

3.2.4 Tare the Alicat low-rate mass flow meter to zero out the display. Connect the flow meter to the inlet of the PTFE tubing.

3.2.5 Use the 3 mm hex key wrench to adjust the piston gap screw to achieve the desired flow rate (Figure 7). **Turn the hex key wrench clockwise to reduce flow and counterclockwise to increase flow.** Allow the flow to stabilize between adjustments.

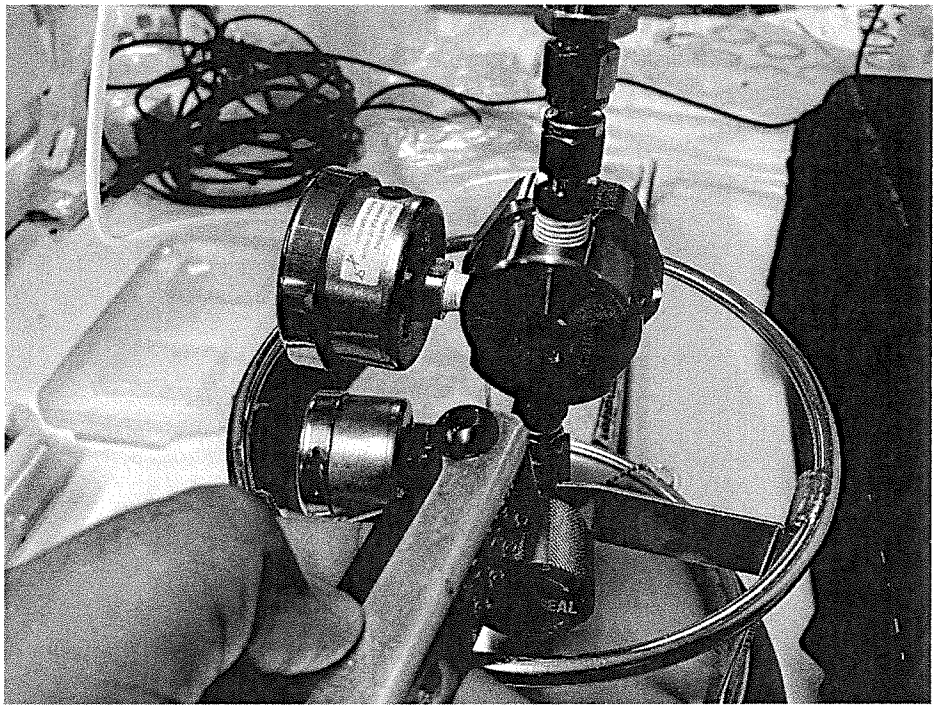

Figure 7. Using a 3mm hex key wrench to adjust piston gap screw.

3.2.6 If the measured flow rate is within +/- 10% of the desired flow rate, the flow controller is ready for use in field sampling. When taking a 24-hour sample with a 6-L canister, flow should be 2.8 to 3.4 ml/min.

3.3 Reporting Requirements

A field data sheet (FDS) and Chain of custody (COC) form should be completed for each sample according to SOP ADMN006.01. The following information should be recorded on the FDS and COC at the start and conclusion of the air sampling event when a mechanical regulator is used:

3.3.1 Study #

3.3.2 Sampling Dates

3.3.3 Sample Number

3.3.4 Site Name

3.3.5 Location Code

3.3.6 Station Operator(s)

3.3.7 Operator(s) Agency

3.3.8 Sample Type

3.3.9 Equipment Type

3.3.10 Canister Number

3.3.11 Flow Meter Serial Number

3.3.12 Start/End Time

3.3.13 Total Run Time

3.3.14 Sampler/Machine ID/Serial #

3.3.15 Starting Flow

3.3.16 Ending Flow

3.3.17 Starting Canister Pressure

3.3.18 Ending Canister Pressure