

STANDARD OPERATING PROCEDURE
Flite4 High Volume Air Sampling Pump

KEY WORDS

Air Sampling, Flite4 Pump

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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.

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- 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).*

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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.

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- 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.

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- 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).

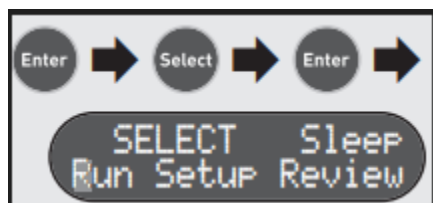


Figure 6: Exiting the sleep mode.

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.

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- 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).

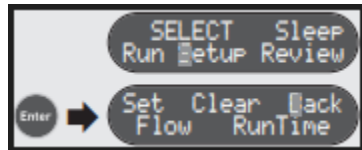


Figure 8: Checking air flow sequence (1)

- 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 \pm 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).

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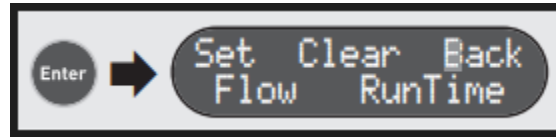


Figure 11: Calibration sequence (1)

- 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 $\pm 10\%$. 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 $\pm 10\%$, 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).

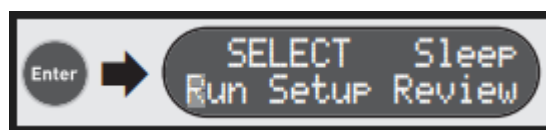


Figure 14: Calibration sequence (4)

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- 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).

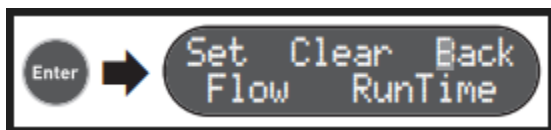


Figure 16: Timed run sequence (1)

- 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).

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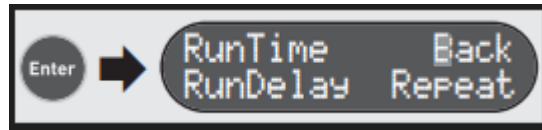


Figure 17: Timed run sequence (2)

- 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).

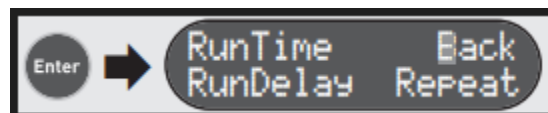


Figure 20: Timed run sequence (5)

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

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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).

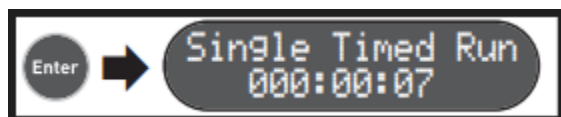


Figure 22: Timed run sequence (7)

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).

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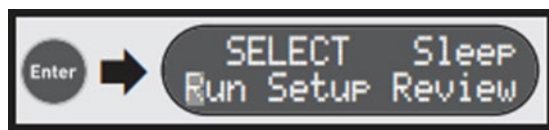


Figure 24: Timed run sequence (9)

- 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

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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.

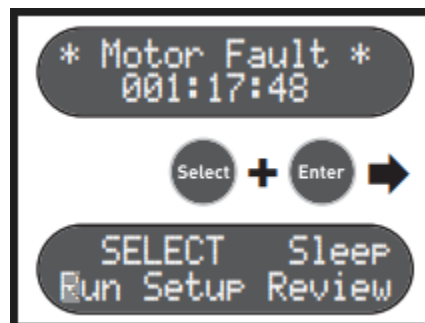


Figure 26: Troubleshooting.

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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