VORTEX Ultra Flow & VORTEX Ultra Flow *lite* SAMPLING PUMPS

User Manual

HB 3269-05

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1. INTRODUCTION

This handbook is designed to introduce you to the basic operation and features of the VORTEX Ultra Flow and VORTEX Ultra Flow *lite* sampling pumps.

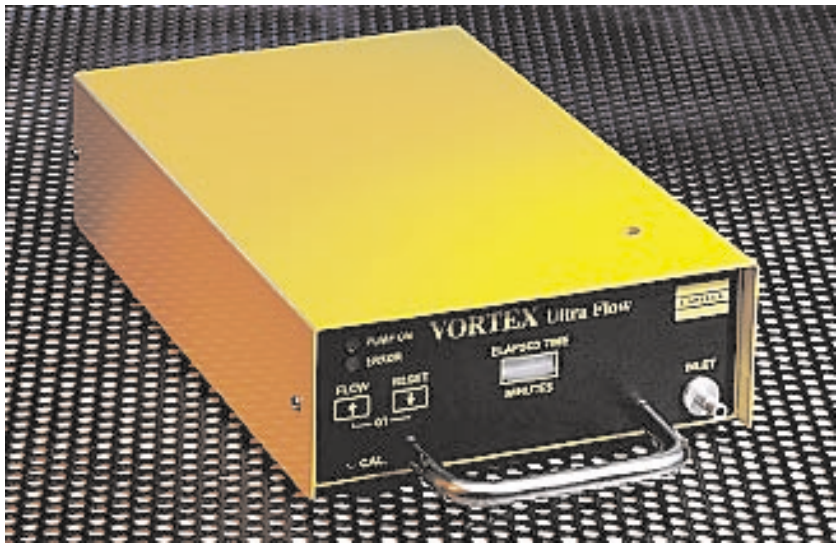
These pumps provide up to 20 litres/min and are intended primarily for asbestos clearance monitoring, however, both units are also suited to many applications including PM10/2.5.

The increased performance of the standard Ultra Flow can provide a flow rate of 12 litres/min through a 0.8 µ filter.

The Ultra Flow *lite,* with a reduced specification and lower price, is ideally suited to asbestos clearance monitoring at 8 litres/min.

The information contained in this handbook relates to the operation of Casella sampling equipment only, and is not intended to advise or influence your adopted sampling strategy. For information regarding appropriate sampling methods, reference should be made to local legislation and guidelines as dictated by the relevant national health and safety organisations.

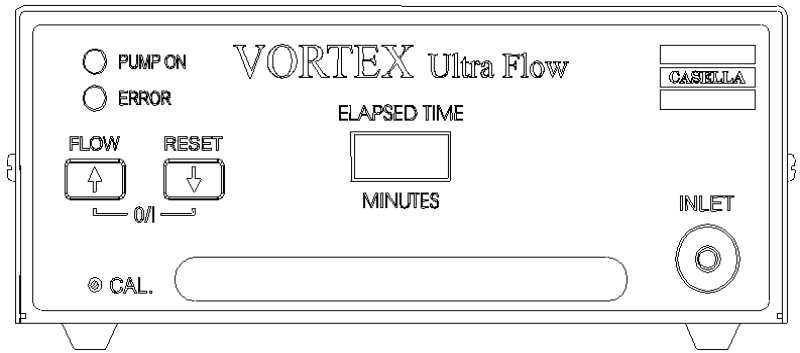
CASELLA CEL are able to offer a wide range of training courses and analytical services specifically suited to users of air sampling equipment. Please contact CASELLA CEL for further information.



2. OPERATION

Both designs utilise a twin diaphragm pump to reduce pulsations in airflow and maintain high efficiency. Precise control of the sample flow rate is achieved using a current proportional feed back technique.

Both pumps have similar front panels as shown below.



2.1 Battery

The battery is a sealed lead acid type, giving 7 Ah at 12 volts.

The run time is dependent upon flow and pressure conditions, for example:

Asbestos clearance
8 litres/min using a 0.8 μ, 25 mm filter the run time is typically 5 hours.

PM10/2.5
16.7 litres/min using a 47 mm GFA filter the run time is typically in excess of 4 hours.

The charging socket is located at the back of the pump. Using the charger provided, the battery can be fully charged in 12-14 hours. The three-stage charger provided prevents overcharging.

To ensure maximum life expectancy of the battery pack, it is recommended that the battery is not left in a fully discharged condition for extended periods of time.

2.2 Battery Low Shutdown

A battery low cut-off facility will turn the pump off once the internal battery pack becomes fully discharged. This will prevent “deep discharge” damage

and ensures maximum life of the battery pack. Should the pump be switched on with a discharged battery, battery low warning bleeps will be given prior to the pump shutting itself down.

2.3 Switching the Pump ON and OFF

To switch the pump ON, press the "FLOW" and "RESET" keys at the same time. The buzzer will bleep twice and the green "PUMP ON" LED will be lit, indicating that the pump is switched on and running.

To switch the pump OFF, press the "FLOW" and "RESET" keys at the same time.

2.4 Indicator LEDs

There are two light emitting diodes (LED's) located on the front panel of the instrument.

PUMP ON

Green Indicator: used to indicate that the pump is switched ON and is running. The LED flashes when in flow adjustment mode.

ERROR

Red indicator: used to identify one of two potential error conditions.

Battery Low Warning
When the battery approaches a discharged condition, the red "ERROR" LED flashes slowly. Sampling should be terminated and the battery recharged.

Flow Fault Shut Down
The red "ERROR" LED flashes rapidly whenever the pump's loading exceeds a pre-set value. This may be due to excessive back pressure from a tube restriction, filter blockage, or pump fault.

Should the fault condition remain for 8 seconds then the pump will automatically shut down and the "ERROR" LED will remain lit. The timer display will retain the present value enabling a valid sample volume to be calculated from the indicated elapsed time and the initial flow rate.

Pressing both keys will cancel the error warning.

2.5 Flow Adjustment

Adjust the pump flow to the desired rate while the pump is running.

1. Press the "FLOW" key for 3 seconds, the green "PUMP ON" LED will flash.

2. Temporarily release the key, the green LED will continue to flash while the pump is in this mode.

3. Adjust the flow rate, either up or down, by holding down the appropriate key, the adjustment is slow to start then picks up speed.

4. If there is no key press after 4 seconds, the pump will return to normal run mode and the green "PUMP ON" LED will stop flashing.

For optimum stability of flow, it may be necessary to allow the pump to run for a few minutes before use.

2.6 Flow Compensation

Both versions of the Ultra Flow are factory calibrated to maintain stable flow at 8 litres/min. At different flow rates it may be necessary to adjust the front panel "CAL" control to ensure stable flow rate over varying pressure conditions.

If the flow drops as pressure increases, increase the flow using the "CAL" adjustment and then reduce the flow back to the desired flow rate using the front panel keys.

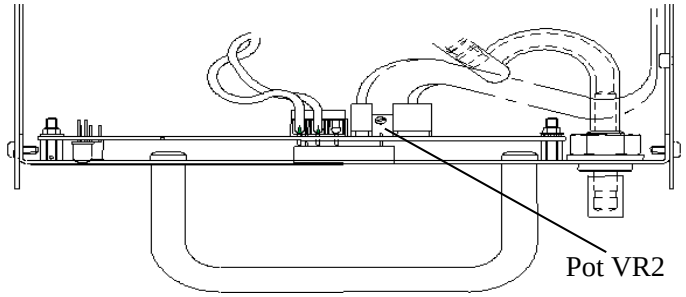
If an increase in applied pressure drop causes the sample flow rate to increase, decrease the flow using the "CAL" adjustment and then increase the flow back to the desired flow rate using the front panel, up/down, keys. Repeat the "CAL" adjustments until the sample flow rate remains constant over the operating pressure range.

2.7 Flow "Shut Down" Adjustment

Sometimes it is necessary to adjust the flow shut down level to suit the sampling flow rate and pressure drop conditions.

1. With the pump switched off, undo the four retaining screws and remove the lid.

2. Adjust the potentiometer VR2, in the middle at the bottom of the circuit board (see figure opposite), fully clockwise, until it "clicks".



The location of the potentiometer VR2

3. Connect a clean filter to the pump and adjust to the required flow rate using the front panel keys.

4. With the pump running and the filter connected, adjust the potentiometer anti-clockwise until the error LED flashes, then back the adjustment off half a turn.

5. Replace the cover.

2.8 Timer

The LCD timer display situated on the front panel indicates the sample run elapsed time in whole minutes. The timer can be reset to zero by holding down the "RESET" key for 3 seconds. This can be carried out while the pump is on or off.

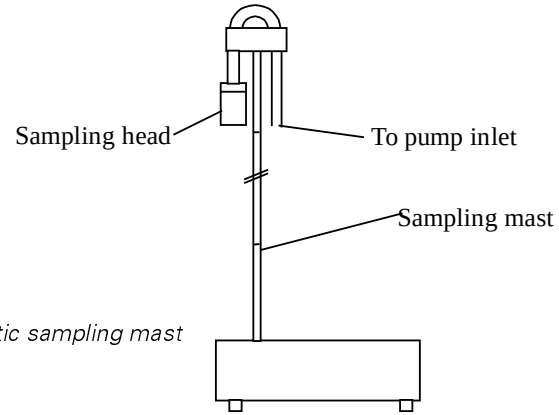
2.9 Table of Functionality

Function	Required Key Press	LED	Buzzer
Switch ON	Press both keys together.	Green "PUMP ON" LED lit.	Double bleep.
Switch OFF	Press both keys together.	No LEDs lit.	
Flow adjustment mode	Press "FLOW" key for 3 seconds.	Green "PUMP ON" LED flashes.	
Exit flow adjust-ment mode	No key press for 4 seconds.	Green "PUMP ON" LED stops flashing.	
Reset timer	Press "RESET" key for 3 seconds.		

3. SAMPLING

Asbestos clearance procedures can be found in MDHS 39.

Guidelines suggest that static monitoring should be carried out at 1 - 2 metres above ground level, an appropriate mast is available from CASELLA CEL, as shown in the diagram.



Pump with static sampling mast

Note :- The sampler should never be run without a filter on the inlet.

3.1 Check List Before Sampling

1. Make sure the battery has been fully charged.

2. Ensure that the sampling head is correctly fitted with no leaks.

3. If the flow rate cannot be obtained with similar conditions to previous occasions, a leakage may be present.

4. SERVICING

CASELLA CEL's in house service department offers a comprehensive range of repair and calibration services, designed to effect a fast and efficient back-up for all our products. The Service Department is operated under the scope of our BSI registration for products manufactured by us. We will however, undertake the repair of other manufacturers equipment.

For further information please contact the CASELLA CEL Service Department at our Bedford headquarters. We will be happy to provide quotations for individual repairs or provide annual maintenance under contract.

We recommend factory service by technicians trained and equipped to repair your instrumentation. Should you wish factory repair assistance, send your equipment in a package equivalent to the original packaging.

Insure to full value and ship pre-paid. Include a letter giving full details with your packing list.

Send to:

CASELLA CEL LIMITED
(Service Department)
Regent House
Wolseley Road
Kempston
Bedford
MK42 7JY
United Kingdom

If purchased outside of the United Kingdom, please return to your distributor.

5. FAULT FINDING

Typical problems are shown in the following table.

Symptom	Possible Cause	Service Hint
Pump does not switch ON or run (Green LED not lit).	Battery fully discharged or unserviceable.	Recharge for 14 hours.
	Wiring loom disconnected at some point / Fault on joint.	Locate & resolder.
	Circuit / Keypad failure.	Return for repair.
Pump does not run (Green LED lit).	Pump or motor seizure.	Replace pump / motor.
	Broken wire or worn brushes.	Repair connection.
Pump runs but no air drawn.	Diaphragm rubber split.	Replace.
	Tubes between pump and outlet split or disconnected.	Replace.
Pump runs but cannot achieve desired flow rate.	Leak on pump assembly.	Locate & Correct.
	Dirty or damaged valves.	Clean / Replace.
	Inlet filter clogged.	Remove & Clean.
	Excessive pressure drop.	Check sample filter.
Red error LED lit or flashing.	Battery voltage too low.	Recharge battery.
	Excessive pressure drop or high pump current.	Remove pressure load / Repair pump.
Flow rate not maintained through full working shift.	Incomplete charge.	Re-charge.
	Battery below capacity.	Fully charge & check voltage which should be 13 - 15 V. If below this range, check the output from the charger. It is typically 14 V at full charge. If this is correct, replace the battery.
	High current consumption due to mechanical defect in pump.	Locate & correct.
	Filter disc clogged.	Replace.
	Calibration adjustment required.	Adjust the "CAL" control

6. TECHNICAL SPECIFICATIONS

6.1 VORTEX Ultra Flow

Flow Range:	6 - 20 litres/min (free air)
Flow Control Accuracy:	± 5% of selected flow
Max pressure drop:	12 litres/min, 0.8 µ, 25 mm filter, typically 200 cm H_2O 16.7 litres/min, 47 mm GFA, typically 35 cm H_2O
Nominal Battery Voltage:	12 volt
Nominal Battery Capacity:	7 Ah
Run Time:	5 hours (8 litres/min, 0.8 µ filter)
Operating Temperature:	0 to +40°C
Timer accuracy:	±2 minutes/month
Dimensions:	180 x 75 x 285 mm
Weight:	5.7 kg

6.2 VORTEX Ultra Flow *lite*

Flow Range:	6 - 20 litres/min (free air)
Flow Control Accuracy:	± 5% of selected flow
Max pressure drop:	8 litres/min, 0.8 µ, 25 mm filter, typically 200 cm H_2O 16.7 litres/min, 47 mm GFA, typically 35 cm H_2O
Nominal Battery Voltage:	12 volt
Nominal Battery Capacity:	7 Ah
Run Time:	5 hours (8 litres/min, 0.8 µ filter)
Operating Temperature:	0 to +40°C
Timer accuracy:	± 2 minutes/month
Dimensions:	180 x 75 x 285 mm
Weight:	5.25 kg

6.3 Additional Features

- Six digit elapsed timer in minutes (resolution 1 minute).
- Low battery indication.
- Low battery shut down.
- Automatic flow fault shutdown (due to excessive pressure drops or blockages).
- 3 stage lead acid charger (2.7 amps).

7, OPTIONAL ACCESSORIES

B111	Spare Battery,
CF35	Battery charger European 2 pin,
CF36	Battery charger U.K. 3 pin,
CF37	Battery charger U.S.A. 2 pin,
171006A	Extension kit - for sampling at the recommended height.

Alteration Without Notice

Please note that the contents of this manual are subject to change without prior notice.