

# **Apex FREQUENTLY ASKED QUESTIONS**

# **FEATURES**

# What advanced features and design improvements does the Apex personal sampler family offer over the Vortex series?

The new A pex personal sampling range has been entirely re-designed from the ground up to offer one of the most reliable, high performance and 'pleasure to use' personal air sampling pump systems available. A number of new and unique technologies have been incorporated to produce peaks in all areas of performance, hence our new name.

- ? **All new space saving pump design**, An extremely compact double acting pump design providing excellent efficiency and reliability at high flow and pressure drop specifications. Injection moulded design using inert Delrin material.
- ? Wide operating flow range 5ml/min to 5L/min.
- ? A completely new 'all digital' control circuit with large, clear **custom LCD display**. Displays real time flow rate, volume sampled, elapsed sample time, ambient temperature, current operating mode and program details.
- ? Another first for Casella- the unit has **on board datalogging capability**. Advanced 'Apex Pro' variants record all sampling events and conditions to maintain full traceability of sampling data.
- ? Industry first- Fuss free, cable free and connector free downloading via Infra Red communications – simply point the pump at your P.C and sit back. A supporting software package 'Pump Manager' has been designed in close co operation with users and provides comprehensive management of sampling data, impressive sample report generation but with total ease of use.

# ? New patented (pending) method of volumetric flow control based on exhaust pressure control:-

- ? Direct volumetric flow control with real time direct flow indication.
- ? Excellent flow accuracy, control response and calibration stability.
- ? Allows long durations between calibrations
- ? The most compact 5l/min pump on the market
- ? **Drop in intelligent fast charger** for user convenience. Intelligent charge termination based on cell temperature rise with safety timer. A pex samplers can

remain seated in the charger indefinitely on standby trickle charge – always ready to use.

- ? Ergonomically designed case, attractive, slim and robust, with hard coated polycarbonate LCD window. Case includes a belt clip designed to suit its purpose !.
- ? **Dry cell batt ery pack option.** Allows emergency operation of pump in remote areas.
- ? **Gas bag outlet** ideal for grab sampling of gases, adds to pumps versatility in different sampling applications.
- ? **Duration mode** allows the user to start the pump and it will automatically stop after the required duration has been reached.

# **GENERAL QUESTIONS**

# How many models are there in the Apex range?

There will ultimately be 4 pumps in the range, the Apex, the Apex Pro will be followed by intrinsically safe variants, the Apex I.S. and the Apex Pro I.S at some stage in the future.

# Which Pump do I want?

	Apex	Apex Pro
5ml-5000ml/min range	Ŕ	Ŕ
LCD Display	Ŕ	Ľ
Real time flow rate display	Ŕ	Ľ
Fast charge via base	Ŕ	Ŕ
Bag Mode	Ŕ	Ŕ
Duration Mode	Ŕ	Ľ
TWA mode	Ŕ	Ŕ
Program Mode	Ŕ	Ŕ
Internal Datalogging	Ŕ	Ŕ

# Can I upgrade from Apex to a Pro version?

Yes. The facility will be available for customers and distributors to upgrade from the A pex to a Pro version by obtaining a special password key from the UK office. The original serial number of the unit will be entered into a special database which will generate a password to unlock the expanded features. In this way a track can be kept on serial numbers for servicing and ISO purposes, and allows us to retain control of the upgrading. There will be only one key generation program available in the software lab to create keys. This program will need to retain a track of which serial numbers have been updated.

# What standards and legislative limits do the pumps comply with?

### EN1232/ MDHS 14/3/NIOSH0600.

### How can the pump be worn?

The new pump has a re-designed belt clip that is designed to provide secure connection to standard belt sizes. Harnesses can also be purchased as accessories, and a protective rubber boot is also planned for future release.

# How easy is the Apex to use?

One of the most important features that users ask for is a unit that is easy to operate and programme. Casella has spent considerable time in developing a user interface that meets this criteria. It has a very simple menu configuration. The A pex has only 3 keys and therefore makes the pump very simple to use, the menu has been built around this in order to make the users life as simple as possible.

A power up configuration mode enables users to select operation parameters such as language, volume and temperature units etc. Extended programming functions can be disabled to suit users who simply want to Select flow rate, start sampling, stop sampling and clear the elapsed time and volume counters. A consistent user interface methodology has been employed giving total simplicity – stress free – try some competition models!

### How do you sample for gases and vapours using tubes?

You will require a low flow adapter and a tube holder as the Apex can only sample down to 0.8 litres/min. Flow can then be adjusted down to 5ml/min.

# Can the units operation be locked?

Yes. The keys can be locked by the operator, which will bar the user from turning the unit on/off, or entering into the program or menu structures. Two lock modes are provided:-

**Partial Lock:**- The user can start and stop pump, say when going on and off shift or into a certain work area. They can not change the selected flow rate or clear the sample counters. Press the off button 3 times in 2 seconds to toggle the lock mode.

**Full Lock:**- Press off button 3 more times and all keys are locked, user cant do anything to pump until lock is disabled.

# Does the unit have audible / visual alarms?

Yes. The unit has red LED and audible sounder which are activated in the event of a flow or battery failure. If the flow is blocked for more than 8 seconds, the pump is halted. The unit will then try to start again after 1 minute. If the fault remains present, the unit will shut down.

A 'key Press' buzzer can also be activated if required.

A green LED flashes during normal run mode to indicate no problems. LEDs are mounted on the top of the pump housing in order for the operator to monitor the sampling status.

# WHAT KITS ARE AVAILABLE?

# Off the shelf dust sampling standard kit:

Includes: IOM sampling head and cassette (for Total Inhalable dust sampling.) Plastic cyclone with pack of 5 cassettes. Tweezers, Pack 100 GF/A Whatman filters, Rotameter 0.3-3.0l/min,tripod stand, adaptor for cyclone head, Sampling accessories guide. Accessories case. Complete in attaché style carrying case. **Apex pump, charger and base must be ordered separately.** 



Please note that rotameter calibration equipment is included in the kit. If other sampling heads or adaptors for low flow sampling are also required, please order these from the accessories list.

# **Other Kit options:**

A 5 way pump kit and charger are planned for future release.

# How do I assemble my own kit of sampling equipment?

Many people who are already familiar with sampling may choose to assemble the kit/s they require on a piecemeal basis, choosing the individual items they require. Ensure the following items are covered during this process.

In order to assemble the best sampling kit and accessories for your application, follow the following steps:

- 1. Choose your preferred sampling pump.(see selection table)
- 2. Do you require the charger and base? (several pumps could share a charger)
- 3. Do you require download software and interface (only if chosen Pro)
- 4. Do you want the emergency dry cell battery pack?
- Pick the sampling heads you require for dusts/ relevant cassettes Respirable Total Inhalable PM fractions Other
- 6. Do you need to sample for gases and vapours? If yes, choose the low flow adaptor assembly and choice of sampling tubes from accessories section.
- 7. Which type of calibrator do you require: Dry Cal,Dryflow meter Rotameter (With rotameters, ensure you have the correct flow range and stand.)
- 8. Do you require filters? Pre weighed filters GFA Other
- 9. Do you require an attaché carry case?

# **PUMP/FLOW CONTROL AND CALIBRATION**

### What flow rate capability does the new Apex provide?

The Apex ranges from 0.8 litres/min to 5 litres/min. Using the low flow adaptor enables sample flows to be taken right down to 5 ml/min.

### Accuracy:

<5% over all working conditions.

<3% after calibration at selected flow.

### What are run times with different filter types?

	Typical filter pressure load in cm H2O, Typical battery life in Hours for Non I.S models				
Filter Type	1.0 Ltr/min	2.0 Ltr/min	2.2 Ltr/min	3.5 Ltr/min	4.0 Ltr/min
25mm GFA	5cm, 34Hrs	9cm, 22 Hrs	9.5cm, 20 Hrs	16cm,12 Hrs	18cm, <i>Marginal</i>
25mm 0.8 ?m	18cm, 21 Hrs	31cm, 14 Hrs	34cm, 13 Hrs	56cm, NA	64cm, NA
25mm 1.2?m	11cm, 27 Hrs	21cm, 16 Hrs	23cm, 15 Hrs	37cm, <i>N/A</i>	42cm, NA
37mm GFA	3cm, 40 Hrs	5cm, 25 Hrs	6cm, 23 Hrs	9cm, 14 Hrs	11cm, 12 Hrs
37mm 0.8 ?m	7cm, 33 Hrs	13cm, 20 Hrs	14cm, 18 Hrs	23cm, 11 Hrs	26.5cm, NA

### How does the Apex keep a constant flow rate?

The Apex series provide an exceptionally accurate and stable inlet volumetric flow rate using a patented (pending) method of Exhaust pressure control. The back pressure created by air exiting the pump to atmosphere is measured across a small orifice. Internal electronics convert this pressure signal to a volumetric flow rate.



Apex samplers provide direct volumetric flow control with a real time flow indication. An 'all digital' motor control drive circuit offers excellent flow control response (pump quickly settles at the selected flow even following sudden inlet pressure changes. Calibration stability is exceptional over changes in working temperature, atmospheric pressure and long term ageing. Accuracy is <5% over range, <3% after calibration at selected flow

# How has the pump been designed?

The unit has been designed for easy and rapid assembly, this aids manufacture, routine maintenance tasks (filter cleaning) and service. A fine stainless steel mesh filter protects the pump from the ingress of fibres, dust and larger particles. Filter is easily cleaned by the user and should not require replacement during life of pump.

All dampers are connected to pump assembly using silicone gaskets to provide a simple push fit air tight seal.



# How long does the pump run for?

>20 hrs through a GFA filter at 2 Ltrs/min. (See above table) using the supplied rechargeable NiMh battery pack. With alkaline dry cells this drops to approx 11 hrs.

Dry cells will also provide 3.5l/min for 4 hrs through a 25mm GFA.

To allow the user to undertake a full 8hour sample at this flow rate using dry cells, simply stop the pump after 4 hours, remove and change the batteries, then continue with the run. All the data file will still be collated as one single run.

### What is so important about the internal damper?

The internal flow damper is used to remove pump pulsations and smooth the sample airflow. Smooth airflow is essential to ensure correct operation of size selective sampling heads such as cyclones. Any pulses in airflow (ie velocity changes) alter the size cut and can cause significant sampling errors. Monitioring 'pulsey' airflow using a traditional rotameter can result in large flow errors.

BS1232 asks for a pulsation ratio of 10% @ 2L/min, the NIOSH 0600 spec in the USA demands a 20% pulsation ratio at any useable flow point. Both of these standards are satisfied by the Apex series.

Some of our competitors pumps do not incorporate a flow damp er, others also struggle to meet this specification. This therefore gives us another good selling feature.

### Does the Apex have a gas outlet?

Yes. This is another new feature not seen on any Casella higher flow personal samplers until now. The outlet enables users to collect a representative sample of gas in a gasbag. This facility is offered by all Apex pump models.

When setting the required flow rate to <400ml/min, the Apex automatically enters a 'Bag Fill' mode and will then allow connection to a gas bag. When the pressure in the bag reaches a set level (ie it is full) the pump will automatically stop.

### How is the Apex calibrated?

A pex pumps are provided with in built factory calibration settings across the entire flow range. This will allow the user to use sampler without calibration if required. It is however normal and good practice to confirm and optimise the actual sampling flow prior to any sampling task. With the A pex's direct flow control system, the need for any minor 'trimming' of the selected flow is almost eliminated.

The Apex can either be calibrated using the DryCal Calibrator, a simple rotameter or other calibration device. Rotameters may be UKAS calibrated if so required. The user firstly sets the required flow rate corresponding to the selected sampling regime. The pump turns on such that the user can confirm or adjust the provided flow rate against a calibration device. Any optimising of the calibration setting for a given flow is retained in memory for future sampling tasks.

A more fundamental calibration routine is included within the hidden power up configuration mode. This is used to set all flow points but is primarily required for say annual maintenance or repair operations and is not used on a day to day basis.





# After setting the calibration at one flow rate, can I set the pump to operate at another?

The flow calibration algorithm and control circuitry provide a very predictable and accurate response across the entire flow range. It is stable with temperature, inlet and ambient pressure changes and also with ageing.

This enables the operator to set the flow at say 1ltr/min and then change for another application at say 3.5ltrs/min, without having to check the calibration again. If the calibration of a given flow is adjusted this will be remembered the next time this flow rate is selected. This allows operator to quickly select the required flow and minimises the time and need to calibrate a given flow point.

(We still recommend that users do check the flow rate on a regular basis with a calibrator to verify this process is still functioning correctly.)

# **CHARGING AND POWER**

# How long does the Apex take to charge?

The A pex has a rapid 3 hour charge time from completely discharged. This is an attractive feature for many to users who may require a very quick turnaround – no overnight charging needs. The charging system is so effective that even if the unit is only charged for 1 hour, this should provide enough charge to operate the pump for at least 8 hours with most common sample regimes. The units are charged from the convenient drop in charger base.



### Can I run it off the charger while sampling?

Yes but this would not be the normal way of operating the pump as it would be worn by user. Charger will time out after 3 hours as a safety shutdown. Long term static sampling in the charger base would demand modifications to charger.

# How do I change the batteries?

A screw is removed to allow the removal of the battery compartment cover. A new NimH battery pack can then be inserted via a simple connector.



# What other battery options are there?

The Apex is unique in the market place in that the operator can replace the rechargeable battery pack with a **dry cell pack** if required. This will allow operation of the units for emergency situations when for instances the re-charging process has been forgotten!

The rechargeable cell pack is carefully un plugged and replaced with 4 AA cell pack. (Note this unit if plugged into the charging base- it will not charge.)

# **DATA LOGGING & SOFTWARE**

# How do you start the datalogging?

The programmable 'Pro' versions have a datalogging facility and stores up to 100 sets of data which include Start & stop times, flow rate, average sample temperature, volume sampled and any error events. Every time the unit is started and stopped, datalogging is enabled. When the clear option is used, this closes off that particular run and all accumulated data is stored.

# How many events can the pump memory hold?

Can hold up to **100** events. An event represents a point in time when the pump starts or stops sampling, typically this would follow a user request but could also represent other flow blockage or error conditions. The last 100 events are always retained, oldest data will be overwritten if memory is full.

The Apex will measure the internal operating temperature as well as its real time sample flow rate, elapsed run time, and total volume sampled.

# **Pump Manager Software**





Pump manager is a customised software package used with the Apex Proto programme the pump and to download run data . This software has been designed and structured to simplify the routine management of all sampling data and results. It is used to configure and download data from the Apex Pro and Apex ProI.S advanced programmable models. A unique feature of the package is that communication between the pump and P.C is made via an infra-red wireless interface. Simply place the pump in front of the transducer and all stored data will be downloaded automatically in a number of seconds.

# How do I communicate with the Apex?

Communication with the Apex is done through the infrared interface connected to the P.Cs RS232 port. Once the program is running in Windows background (indicated by a small pump symbol on the taskbar), and the wireless IR interface has been installed, the system is ready to be used. If any pump is the brought into the beam of the IR (approx 0.5m), the software recognises that a pump is present and any data stored on the pump is automatically downloaded.



### What can the software do?

The software is capable of providing a profile of the sampling period, set up timers etc.

It can look at the downloaded data, by pump detail, or via individual pump user identifications. All the basic data like start & stop times and sampled volumes can be seen.



In the above, there are 2 pumps identified: Office and workshop. The user would always allocate the pumps to these areas. If the user had lots of different individuals using say one or two pumps then he would set up "people".

### How do you programme the Apex?

Three types of programs can be pre-programmed into the pump (ApexPro version), via the software, these are Program, TWA & Duration.(Programmable duration is also available on the standard Apex version – program mode must be enabled in the config menu.

### What programme options are there?

### **Duration:**

The duration programme is available for both the A pex standard and Programmable version, and a sampling duration can be entered via the pump keypad. This allows the supervisor or user to issue the pump in the knowledge that it will cease sampling at the end of the duration set.

### TWA:

This is where the operator needs to sample a set volume but possibly needs this to be a representitive sample over a whole sampling period. Some NIOSH methods work on this principle. The required sample duration is entered into the software and then the required on sample time is calculated by the user and entered in. The pump will switch on and off throughout the sampling duration.

#### **Time Schedule Programmes**

These are two real-time scheduling programmes which allow the operator to pre programme the pump with start & stop times. Up to 9 on/off routines can be made for each programme.

Pr	ogram Times 🛛 🗙	]
	▼ Enabled	
	Start day: Monday 💌 Start time (HH:MM): 8 🚎 : 0 🚎	
	End day: Monday End time (HH:MM): 15 🎰 : 0 🚔	

# **Report Generation:**

A report which contains all relevant data such as process notes, substance details, customer details etc be made and printed. This is an excellent tool for the managing sampling data and results which have to be kept for legislative purposes.

Pump Samplir	Manager <b>CASELLAT</b> ng Report
Client: Name: Location:	Contract Ref: Report No:
Process Notes:-	
Substances:-	
Pump Data:- Pump: 00000000 Run Data:- Start: 08:49:11 30/0-End: 09:- Set flow rate: 0.8 LAve. tem	I.D.: Workshop 9:11 30/04/(Period: 5 minutes perature: 21.Sample volume: 4 Ltrs
Volume sampled: 4 Ltrs	
Sample data:-	Sample number:
Analyte 1: chromium Sample mass: 0.3 mg Concentration: 75 mg/m* TWA / STEL: 75 mg/m*	
Notes:-	
Sampled by:	Audited by:
Date:	Date:

All the customer details and sampling data / analytes can also be entered and stored as part of the report.

Sample Properties   Overview Process Sample data Calibration Analysis Analytes Miscellaneous
Client Client: Doodle Industries
Contract ref.: 12345 Report Number: 123456
Pump ID: JSN. 00000000 Serial number: 00000000
Name: mike 🔽 Location: London
OK Cancel Apply

# **SERVICE & REPAIR**

### How often will it need a service?

The pump has an MTBF of 2500hrs, and we also recommend a service is performed when this time has been reached. The Apex will automatically warn the user when this time has elapsed. (The message '*Serv due*' will appear at power up). The pump also stores the total amount of hours that the pump has been used, and displays this in configuration mode. Items typically replaced during routine service include pump diaphragm rubbers, bearings and motor.

### Can I suck liquid or corrosive gasses through the pump.?

### **NO!** For several reasons:-

The control system uses an internal pressure sensor. Any water getting into the system or sensor is likely to corrode the sensitive sensing element. Should water get in the pump, Stop immediately, quickly disconnect battery, dismantle case and pump assembly and thoroughly dry all components and insides of tubes.

If corrosive gasses are present in the atmosphere, a suitable trap (charcoal tube etc) should be placed upstream of the pump inlet.

### Testing

Our test facility in Bedford has a special computer test programme that allows the calibration of the unit to be tested and configured in under 5 minutes. This allows faster service turn round and assembly times.

#### What spare parts will I need?

The only consumable part that we recommend people to buy is a spare battery pack. We also recommend users to return their pump for servicing when the unit displays the "serv due" display after the 2500 hrs has elapsed.

Should dampers rupture or become damaged, spares can easily be sold and replaced by the user. New items are simply a push fit replacement.

Spares: (are listed in the handbook):

182012C -Control pcb 182031B -Outlet damper 182034B -Inlet nozzle 182035B -Inlet damper 182042C -Pump s/a 182048A -Pump Diaphragm 182049A -Pump airway gasket 182051A -Pump Valve 182073B Battery Pack NimH