

**APEX SERIES
PERSONAL AIR SAMPLING PUMPS
& PUMP MANAGER SOFTWARE**
(I.S. and Non I.S. Versions)
User Handbook
HB 3294-04

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WARNINGS !

All Versions:

Apex and Apex Pro air sampling pumps are designed to be robust, however they should not be dropped or subjected to mechanical shock. DO NOT suck in water, or highly saturated or corrosive gases. Failure to comply will render the warranty invalid.

These instruments are designed as personal sampling units operating from internal batteries. They MUST NOT be powered for prolonged periods from external supplies.

They contain no user serviceable parts and if a fault is suspected the instrument must be returned immediately to Casella CEL or to a Casella CEL Approved Agency for repair.

The warranty DOES NOT extend to cleaning or general servicing of the instrument.

Intrinsically Safe Versions:

DO NOT ATTEMPT TO DOWNLOAD data via the IR port in a hazardous area.

Use only a CASELLA APPROVED Intrinsically Safe battery pack. Part Number 182013C (4.8 V, 1.7 Ah Nickel metal-hydride). Battery packs for the non intrinsically safe versions MUST NOT be connected to the intrinsically safe versions.

DO NOT use the battery charger in a hazardous area.

DO NOT use the equipment if the outer case of the instrument , or the battery pack is cracked or damaged in any way as this invalidates the intrinsically safe certification.

The user MUST ENSURE that the I.S. rating of the pump to be used is suitable for the I.S. rating of the intended hazardous area.

To prevent ignition of flammable or combustible atmospheres, DISCONNECT POWER before servicing.

DO NOT service while in a hazardous area.

Instructions specific to hazardous area installations (reference European ATEX Directive 94/9/EC, Annex II, 1.0.6.):

The equipment may be used with flammable gases and vapours with apparatus Groups IIA, IIB and with temperature classes T1, T2, T3 and T4.

The equipment is certified only for use in ambient temperatures in the range +5°C to +40°C and should not be used outside this range.

The certificate marking are detailed in the rear of the handbook.

Repair of this equipment shall be carried out by the manufacturer or in accordance with the applicable code of practice.

The certification of this equipment relies on the following materials used in its construction:

High Impact PC- ABS/ Clear Polycarbonate/Acrylic.

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised. (Aggressive substances e.g. solvents that may affect polymeric materials.)

Suitable precautions e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, when it is used for applications that specifically require group II, category 1 equipment, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the equipment shall only be cleaned with a damp cloth.

SICHERHEITSHINWEISE

Apex und Apex pro Luftprobenpumpen sind robust konstruiert, sie sollten jedoch keinen mechanischen Belastungen, Stuerzen unterworfen werden, und duerfen nicht mit Wasser in Beruehrung kommen. Auch nicht mit aggressiven und aetzenden Fluessigkeiten. Die Nichtbeachtung hat den Verfall der Garantie zur Folge.

Die Sammelpumpen wurden fuer den Batteriebetrieb entwickelt. VERMEIDEN SIE es die Instrumente laengere Zeit über einen Netzanschluss zu betreiben.

Geraete nicht oeffnen! Senden sie bei einer Stoerung das Instrument an Casella oder einen der autorisierten Casella Handler zurueck.

Die Garantie erstreckt sich nicht aufReinigung und allgemeine Wartungsarbeiten.

Vergewissensie sich vor jedem geplanten Einsatz von der Funktionsfaehigkeit des Geraetes.

LADEN SIE KEINE DATEN in kontaminierter Umgebung über die IR-Schnittstelle herunter.

Benutzen sie ausschliesslich den Casella Batteriesatz (Artikel Nr. 182013C), 4,8V, 1,7 Ah, Nickelhydrid, Cadmium frei, schnell aufladbar. Die Batteriesaeetze duerfen nicht getauscht oder durch Fremdfabrikate ersetzt werden.

Benutzen sie das Ladegeraet NICHT in kontaminierten Bereichen.

Das Geraet darf nicht bei aeusserlichen Beschaedigungen oder schadhaften Batteriesaeetzen in Betrieb genommen werden. Die Sicherheit des Geraetes wird dadurch beintraechtigt.

Anweisungen zur Installation in Gefahrenbereichen (Europaeische ATEX Direktive 94/9/EC, Anhang II, 1.0.6.):

Die Geraete koennen mit brennbaren Gasen und Daempfen, mit Apparaten der Gruppen IIA, IIB und bei Temperaturen der Klassen T1, T2, T3 und T4 betrieben werden.

Die Geraete sind für den Einsatz bei einer Umgebungstemperatur von +5°C bis +40°C freigegeben und sollten nicht ausserhalb dieses Bereiches betrieben werden.

Die Zertifikate sind am Ende des Handbuchs detailliert aufgelistet.

Reparaturen sollten nur vom Hersteller oder autorisierten Händlern durchgeführt werden.

Die Zertifizierung der Geräte basiert auf den folgenden Konstruktionsmaterialien:

Hoch stossfestes PC-ABS/reines Polykarbonat/Acrylic

Wenn das Gerät mit aggressiven Substanzen in Berührung kommt, ist der Anwender dafür verantwortlich die erforderlichen Schutzmassnahmen zu treffen um das Gerät vor Schäden zu bewahren. (Aggressive Substanzen, z.B. Lötlösungen können PC angreifen.)

Entsprechende Vorkehrungen wie z. B. Routineinspektionen und die Auswirkungen spezifischer chemischer Substanzen sind zu treffen, bzw. zu beachten.

Unter bestimmten extremen Bedingungen können sich nichtmetallische Teile innerhalb des Gehäuses elektrostatisch aufladen. Bei Anwendung des Gerätes nach Gruppe II, Kategorie 1 darf das Gerät nicht in Bereichen betrieben werden in denen die Möglichkeit des Aufbaus einer elektrostatischen Aufladung besteht. Zusätzlich ist das Gerät mit einem feuchten Tuch zu reinigen

AVERTISSEMENTS !

Toutes les Versions:

Les pompes de prélèvement d'air Apex et Apex Pro sont conçues pour être robustes, toutefois elles ne doivent pas être jetées ou soumises au choc mécanique. Ne pas utiliser dans l'eau, dans des lieux fortement saturés ou à des fortes expositions de gaz corrosif. Le non-respect de ces instructions rendra la garantie nulle.

Ces instruments sont conçus car des unités d'échantillonnage individuel fonctionnant à partir de batteries. NE DOIVENT PAS ÊTRE actionnées pendant des périodes prolongées des approvisionnements externes.

Si l'utilisateur suspecte un défaut, l'instrument doit être retourné immédiatement à Casella CEL ou à une agence approuvée par Casella pour la réparation. La garantie ne concerne que les pièces détachées hors maintenance des appareils.

Versions de sécurité intrinsèques:

N'essayez pas de télécharger des données par l'intermédiaire du port IR dans une aire dangereuse.

Utilisez seulement les batteries intrinsèques validées par Casella. Numéro de la pièce: 182013C (norme universelle 4,8 V, 1,7 Ah nickel-metal hydride). est chargé in situ. Les batteries non intrinsèques ne peuvent être utilisées avec des pompes intrinsèques.

Le chargeur de batterie ne doit pas être employé dans un secteur dangereux.

L'équipement ne doit pas être employé si le couvercle externe de la batterie est endommagé car la sécurité intrinsèque de l'instrument ne sera pas forcément assurée.

Les utilisateurs doivent toujours s'assurer que les pompes de prélèvement conviennent aux règles de sécurité intrinsèque pour l'emplacement prévu avant l'emploi.

Instructions spécifiques à l'installation dans des zones dangereuses (reference European ATEX Directive 94/9/EC, Annex II, 1.0.6.):

L'équipement peut être utilisé avec les gaz et les vapeurs inflammables avec les groupes d'appareils IIA, IIB et avec une température de classe T1, T2, T3 et T4.

L'équipement est seulement certifié pour l'utilisation dans des températures comprises entre +5°C à +40°C et ne doit pas être utilisé en dehors de cette gamme.

L'inscription du certificat est détaillée à l'arrière du manuel.

La réparation de cet équipement sera effectuée par le fabricant ou conformément aux règlements et aux usages appropriés.

La certification de cet équipement se fonde sur les matières suivantes employées dans sa fabrication :

High Impact PC- ABS/ Clear Polycarbonate/Acrylic.

Si l'équipement est susceptible d'entrer en contact avec des substances agressives, alors il est de la responsabilité de l'utilisateur de prendre les précautions nécessaires pour empêcher la dégradation de l'appareil, et de ce fait s'assurant que le type de protection n'est pas compromis.

Des substances agressives comme les solvants peuvent affecter des matériaux polymères

Des contrôles réguliers doivent être effectués par des inspections courantes ou par l'établissement d'une fiche technique du matériel spécifiant sa résistance à certains produits chimiques.

Dans certaines circonstances extrêmes, les pièces non métalliques incorporées dans la fermeture de cet appareil peuvent produire un seuil explosif de charge électrostatique. Par conséquent, quand il est employé pour des applications qui exigent spécifiquement le groupe II, appareil de la catégorie 1, l'équipement ne sera pas installé dans un endroit où les conditions externes favorisent le développement de la charge électrostatique. De plus, l'équipement sera seulement nettoyé avec un tissu humide.

ADVERTENCIAS !

Versión con standard:

Los muestreadores personales Apex y Apex Pro están diseñados para ser robustos, sin embargo no deben ser sometidos a impactos o ser golpeados. No sumergir en agua o gases altamente saturados o corrosivos. El incumplimiento de estas recomendaciones puede invalidar la garantía.

Estos equipos están diseñados como unidades de muestro personal que funcionan con baterías internas. NO DEBEN utilizarse conectadas a red eléctrica.

Los equipos no contienen componentes susceptibles de cambio por parte del usuario. En caso de detectar cualquier fallo o avería se deberá enviar el equipo directamente a Casella.

La garantía no incluye la limpieza del equipo ni cualquier otra tarea de mantenimiento general del mismo.

Versión con seguridad intrínseca:

No intente descargar datos vía el puerto IR en área peligrosa.

Utilice solamente baterías con seguridad intrínseca de Casella. Número de Referencia: 182013C (estándar universal 4,8 V, 1,7 Ah níquel-meta-hidruro). Se carga in situ. Las baterías para las versiones sin seguridad intrínseca no se pueden utilizar con las versiones con seguridad intrínseca.

El cargador de batería no se debe utilizar en un área peligrosa.

El equipo no debe ser utilizado si la carcasa externa de la batería está rota o dañado de cualquier manera ya que esto puede invalidar la seguridad intrínseca del instrumento.

Los usuarios deben asegurarse siempre antes de su utilización que el grado de protección del equipo en las bombas del muestreo sea el adecuado en relación con el grado de protección requerido del sitio previsto para realizar el muestreo.

Instrucciones específicas sobre instalaciones en áreas peligrosas (referencia Directiva Europea ATEX 94/9/CE, Anexo II, 1.0.6.):

Este equipamiento puede utilizarse con gases y vapores inflamables pertenecientes a los grupos IIA y IIB, y con temperaturas superficiales máximas clases T1, T2, T3 y T4.

Este equipamiento únicamente está certificado para su uso a temperatura ambiente en el rango de temperaturas de +5°C a +40°C y no debe utilizarse fuera de este rango.

El certificado de marcado del equipo se encuentra detallado al final del manual de instrucciones.

La reparación del equipo debe llevarse a cabo por el fabricante o de acuerdo con el código de prácticas aplicable.

La certificación de este equipo está basada en los siguientes materiales utilizados en su construcción:

Carcasa de alto impacto de policarbonato PC- ABS

Si es probable que el equipo entre en contacto con sustancias agresivas, entonces es responsabilidad del usuario tomar las precauciones pertinentes para prevenir efectos adversos que pudieran afectarlo, de forma que se asegure que el tipo de protección no quede comprometido.

Sustancias agresivas: disolventes que pueden afectar a los materiales polímeros.

Precauciones adecuadas: comprobar regularmente como parte de la rutina de inspección o establecer en la ficha de datos del material que es resistente a compuestos químicos específicos.

Bajo ciertas circunstancias extremas, las partes no metálicas incorporadas en la envolvente de este equipo pueden generar una ignición del orden de una carga electrostática. Por consiguiente, cuando se use para aplicaciones que específicamente requieren equipamiento categoría 1, grupo II, el equipo no deberá colocarse en una zona en la que las condiciones externas contribuyan a la generación de carga electrostática en su superficie. Adicionalmente, el equipo solo deberá limpiarse con un paño húmedo.

AVVERTIMENTI !

Pumpe standard:

Le pompe di campionamento aria Apex e Apex Pro sono state progettate e costruite per essere robuste e resistenti; tuttavia non devono venire a contatto con acqua o subire colpi / urti meccanici. NON devono essere immerse in acqua, nè utilizzate in ambienti saturi e in presenza di gas corrosivi. In questi casi, cade ogni diritto di garanzia.

Gli strumenti sono stati progettati per essere campionatori personali, funzionanti con batterie interne. Pertanto NON DEVONO ESSERE ALIMENTATE dall'esterno per periodi di tempo prolungati.

Apex e Apex Pro non contengono parti sostituibili dall'utente e se un difetto è ritenuto sospetto lo strumento deve essere restituito immediatamente a Casella CEL o ad un distributore autorizzato Casella CEL per la riparazione.

La garanzia non può essere estesa alle operazioni di pulizia o all'assistenza generale dello strumento.

Versioni a Sicurezza Intrinseca (I.S.):

Non si devono scaricare i dati via porta IR in zona pericolosa.

Utilizzare soltanto il pacco batteria CASELLA a Sicurezza Intrinseca, codice: 182013C (Standard 4,8 V, 1.7 Ah NiMH) caricata in situ. I pacchi batteria per versioni non I.S., non possono essere usati con campionatori I.S.

I caricabatteria non devono essere usati in una zona pericolosa.

Il campionatore non deve essere usato se lo chassis esterno o il pacco batteria è fessurato o risulta danneggiato in qualche modo, poichè questo invalida la Sicurezza Intrinseca dello strumento.

Prima dell'uso, gli utenti devono accertarsi sempre che il tipo di classificazione dei campionatori I.S. sia adatto al tipo di zona pericolosa.

Istruzioni specifiche per installazioni in aree pericolose (con riferimento alla Direttiva Europea ATEX 94/9/EC, All. II, 1.0.6.):

L'apparecchiatura può essere utilizzata con gas e vapori infiammabili con apparati di Gruppo IIA e IIB, e con temperature di classe T1, T2, T3 e T4.

L'apparecchiatura è certificata solo per l'uso con temperature ambientali comprese tra +5°C e +40°C, e non deve essere impiegata al di fuori di questi limiti.

I dettagli relativi alla certificazione si trovano sul retro del manuale di istruzioni.

Ogni intervento di riparazione sulla presente attrezzatura deve essere effettuato dal produttore o in accordo con il relativo codice di pratica.

La certificazione della presente attrezzatura si basa sui seguenti materiali utilizzati per la sua costruzione:

**Policarbonato ad impatto elevato PC- ABS/
trasparente**

Nel caso probabile in cui l'apparecchiatura possa venire a contatto con sostanze aggressive (ad esempio: solventi che possono danneggiare i materiali polimerici), è responsabilità dell'utilizzatore prendere adeguate precauzioni (ad esempio: controlli regolari effettuati come parte integrante delle ispezioni di routine o l'accertarsi, attraverso la scheda tecnica del materiale, della sua resistenza a specifici agenti chimici), che la proteggano da eventuali danni, in modo da assicurare che la protezione non venga compromessa.

In particolari condizioni estreme, le parti non metalliche incorporate nella cassa della presente apparecchiatura potrebbero generare livelli di carica elettrostatica che potrebbero portare a fenomeni di ignizione. Perciò, quando usata in applicazioni che richiedono specificamente attrezzature di Gruppo II, categoria 1, l'apparecchiatura non deve essere installata in luoghi nei quali le condizioni esterne sono favorevoli all'accumulo di cariche elettrostatiche sulle superfici. Inoltre, l'apparecchiatura deve essere pulita unicamente con un panno umido.

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Improved Features

- ✘ Small size due to space-saving pump design
- ✘ Real-time display of flow rate on large LCD
- ✘ Direct flow control via keypad
- ✘ Multi language display
- ✘ Programmable run timer
- ✘ Data downloading via Infrared link
- ✘ Set up and data download of Advanced Models controlled by Pump Manager Software
- ✘ Two I.S. Versions available

Using the Keypad

Manual control is exercised via a simple four key pad.

-  Press once to switch the instrument ON,
Press and hold a moment to cancel a command,
Press and hold down to switch OFF.
-  Scroll up through available options or increase a displayed value.
Hold-down to use repeat function.
-  Scroll down through available options or decrease a displayed value.
Hold-down to use repeat function.
-  Press to accept a value or option, for example to start the pump,
Press and hold-down to stop the pump.

Contents

*Apex Personal Air Sampling Pumps &
Pump Manager Software - Users Handbook*

1. INTRODUCTION

For many years, the name Casella has been associated with the design and manufacture of personal air sampling pumps for the occupational health and hygiene market. The Apex series of pumps is an improved replacement for models in the highly successful Vortex range.

These instruments use an efficient diaphragm pump whose flow rate is precisely maintained using automatic flow control circuitry (Patent pending). The pump draws contaminated air through a sampling head at a rate determined by the head design or sampling strategy. Four models are available. Check model identity by referring to the the label on the rear panel.

- Apex (standard model),
- Apex Pro (can be downloaded and programmed by a PC),
- Apex I.S. (Intrinsically Safe version of the standard model),
- Apex Pro I.S. (Intrinsically Safe version of the Apex Pro).

Please consult Casella CEL for information about upgrading a standard model to an Apex Pro or an Apex I.S. to an Apex Pro I.S. The instrumentation is available as individual pumps or as complete kits with the appropriate accessories to suit particular applications and is supported by our training and service facility at Bedford. The Casella group also offers consultancy and analysis support services for personal air sampling.

The Apex was developed to provide sampling capabilities between 5 ml/min and 5 l/min (4 l/min for I.S. versions), suitable for a wide range of

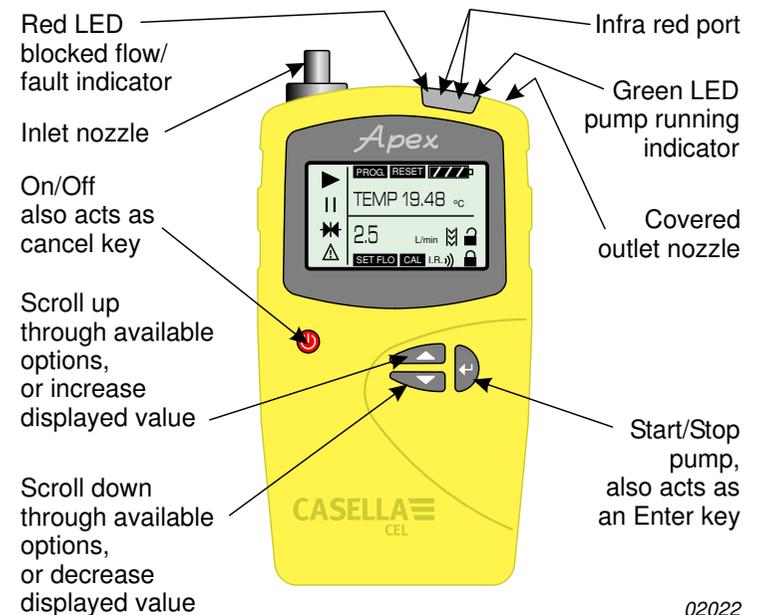


Figure 2: The Apex personal air sampling pump

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applications including solvent fumes, asbestos clearance and personal sampling of dusts. Apex pumps are ideally suited to many of the "Total" and "Respirable" dust sampling techniques detailed in the U.K. Health and Safety Executive's publication MDHS14, and in other reference methods.

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

The layout of the Apex personal air sampling pump is shown in Figures 1 and 2. The display is shown in Figure 3.

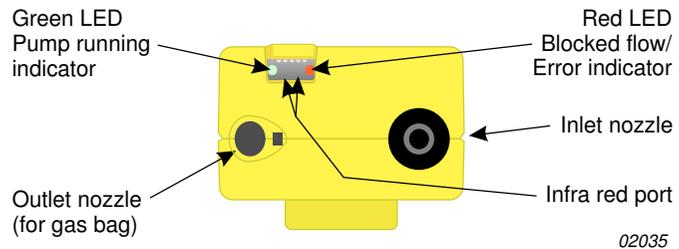


Figure 2: The top panel

1.1 Control Keys



Switches the instrument ON/OFF, also acts as a cancel key.
Hold the key down to switch OFF.



Scrolls up through available options or increases a value.
Has a hold-down to repeat function.



Scrolls down through available options or decreases a value.
Has a hold-down to repeat function.



Accepts a value or option, starts/stops the pump.
Hold the key down to stop the pump.

1.2 Display Symbols



Halt - shows when pump is in Hold Mode, or blinks when halt option available.



Run - shows when pump motor is running.



Flow - indicates real flow monitoring is in progress.



plus together indicates that the pump is paused but will start again automatically, for example during TWA (time weighted average) or user prepared programs.

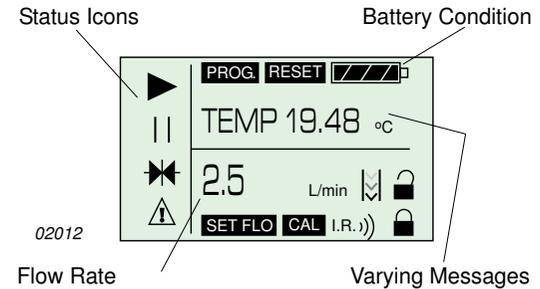


Figure 3: Display layout

-  Indicates that all accumulated values displayed can be cleared back to zero (i.e. reset sample volume and run time). Resetting the store in this way ends the current sample run.
-  Warning - indicates flow outside permitted limits or other error conditions. This warning will be stored with the associated data on Apex Pro versions.
-  Battery condition - The symbol empties as the power is drained and blinks when the output approaches the minimum operating voltage.
- °C/°F** Instrument temperature (user selected units).
-  Key pad is partially locked, the user can only start or stop the pump.
-  Key pad is fully locked.

1.3 Indicators & Display Messages

- Green LED** Flashes when the pump motor is running.
- Red LED** Flashes when the pump is unable to maintain the required flow due to a restriction, or due to some other error.
- PROGEnd** Displayed when the pump has successfully completed a programmed run.
- BATTFAIL** Warning when the voltage from battery pack falls below the minimum operating level.
- SERV dUE** Warning after 2500 hours of operation that the instrument should be serviced.
- BUZZEr** When activated, sounds warnings and indicates key strokes.

2. PREPARATION FOR USE

The following steps are required before the instrument can be operated.

- Charge the Battery,
- Perform a Calibration,
- Connect the Sampling Head.

Manual operation is described in Chapter 4.

2.1 Charging the Battery

Three types of battery pack are available: two non-I.S. and one I.S. The battery pack connectors for non-I.S. and I.S. are not compatible.

Standard 4.8 V, 2.7 Ah nickel-metal hydride pack that is charged in situ. Depending on loading, a fully charged battery pack can provide up to 20 hours of continuous operation.

Non-rechargeable pack for emergency use only that takes four AA Alkaline dry cells. Depending on battery type and flow rate, this can give up to approximately 8 hours of continuous operation. This pack must not be used with I.S. Versions.

I.S. version 4.8 V, 1.7 Ah nickel-metal hydride battery pack that is charged in situ. Depending on loading, a fully charged pack can provide up to 20 hours of continuous operation.

DO NOT open the battery compartment of I.S. versions in a hazardous area.

DO NOT charge I.S. battery packs in a hazardous area.

The battery pack is installed in a compartment located at the bottom rear of the instrument (Figure 4) A captive screw locks the compartment cover.

There are two types of charger for non I.S and two types of charger for I.S units. The single-way Fast Charger (Part No. 182052B) and the 5-way chargers for non I.S. use listed in Section 8.3 can be used only for non I.S. versions. It will not charge I.S. versions.

I.S. versions must be charged only with the

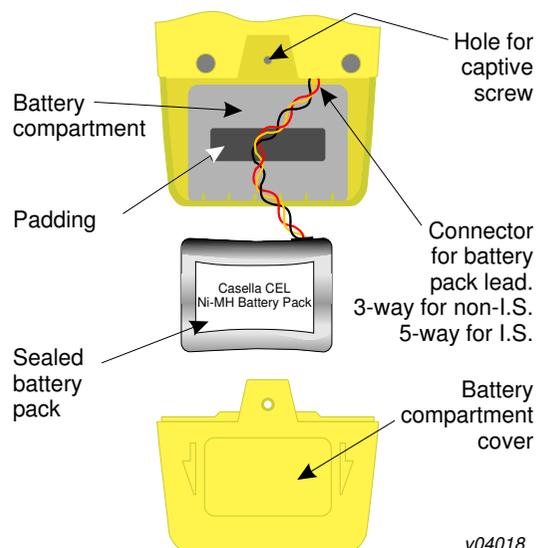


Figure 4: The battery compartment

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single-way I.S. Charger (Part no. 182261B) or the 5-way chargers for I.S. use listed in Section 8.3. For compliance reasons, these chargers accurately control current during charging, so take a slightly longer time to charge the battery pack. These chargers can be used with non I.S. versions, but will take longer to achieve a full charge.

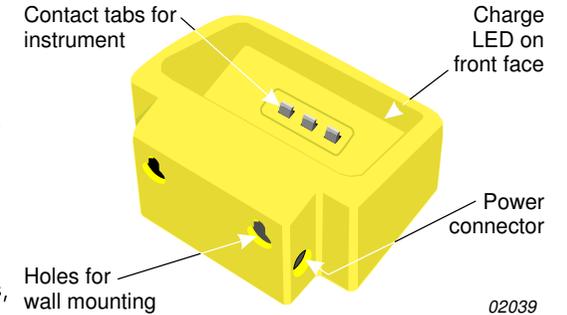


Figure 5: Drop-in charger for Apex units

Charging is accomplished by inserting the complete Apex unit into a drop-in charger (see Figure 5). All battery chargers for Apex sampling pumps are intelligent units with a safety time-out and standby trickle charge mode to keep the pump ready for use.

The use of modern fast charge technology enables a discharged non I.S. pack to be fully recharged within 3 hours. Depending on filter type, a 1 hour charge can give a non I.S. pack sufficient power for 8 hours operation. Similarly, a discharged I.S. pack can be fully recharged within 4.5 hours and depending on filter type, a 1.5 hour charge can give it sufficient power for 8 hours operation.

A two colour LED on the charger shows the charging state. A constant red indicates that charging is taking place while a constant green indicates that the full charge is being maintained by a trickle charge. (If neither colour is shown while the pump is in the charger, a fault condition exists.)

When an Apex unit is initially placed in the charger unit, the LED will flash red for a few seconds before changing to constant red. If the battery has been deeply discharged, it is possible that the LED will continue to flash red for a longer period as the charger unit tries to condition the battery before entering the fast charge state. If the flashing red continues for a prolonged period (e.g. a few hours) then a fault condition exists. If when an Apex unit is placed in the charger, a constant green LED is shown, remove the Apex for at least five seconds, then re-insert it. Faster replacement may have caused a false status indication.

To ensure the maximum life expectancy of rechargeable battery packs, DO NOT allow them to remain in a fully discharged condition for extended periods of time.

When changing dry-cells in a non-rechargeable pack, it is recommended not to unplug the connector for the battery pack lead.

2.2 Switching the Instrument On / Off

1. Press  until the instrument display is activated to switch the instrument ON.

The display shows all segments, followed by the model name and firmware version number before entering Hold Mode.

On Apex Pro versions only, the day-of-the-week and the time-of-day are also displayed during the start up cycle.

If the display has incorrect contrast, shows messages in an unwanted language or offers unexpected measurement units, make changes as described in Section 2.4.

2. Press and hold  to switch OFF.

While the key is pressed, the display shows a count down in seconds, until the instrument switches off and the screen becomes blank.

If  is released before the countdown has finished, the instrument remains ON.

2.2.1 Hold Mode

When the instrument is ON, but the pump is not running nor a program being executed, it is in Hold Mode, where the display cycles between:

TIME Accumulated run time since the instrument was last reset.

VOL Accumulated volume sampled since it was last reset.

TEMP Current internal air temperature.

2.2.2 Manual Reset (Clear Current Sample)

To clear any accumulated sample duration and volume, the instrument must be in Hold Mode.

1. Press  or  sufficient times to make  blink on the display.
2. Press and hold .
3. Hold the key down until the countdown is complete and **CLR** disappears.

On the standard unit, all accumulated values will be cleared.

On the Apex Pro, data from any current event is stored and the sample (run) terminated ready for a new run to be started.

2.3 Perform Single Point Calibration (Set Flow)

Attach a sampling head and flow tube or other flow-measuring device to the pump's inlet nozzle to measure the actual flow as shown in Figures 6 - 8.

1. In Hold Mode, press  or  several times until **FLOW SET** blinks on the display.
2. Press  to select it.

- Use  and  to set the required sampling flow rate.
As a general rule, the pump should be calibrated to the flow required for the proposed task.

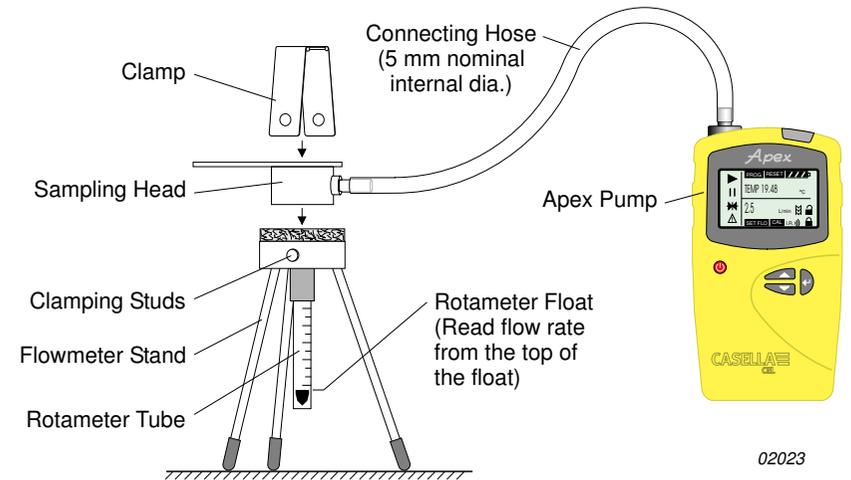


Figure 6: Calibration arrangement with Rotameter

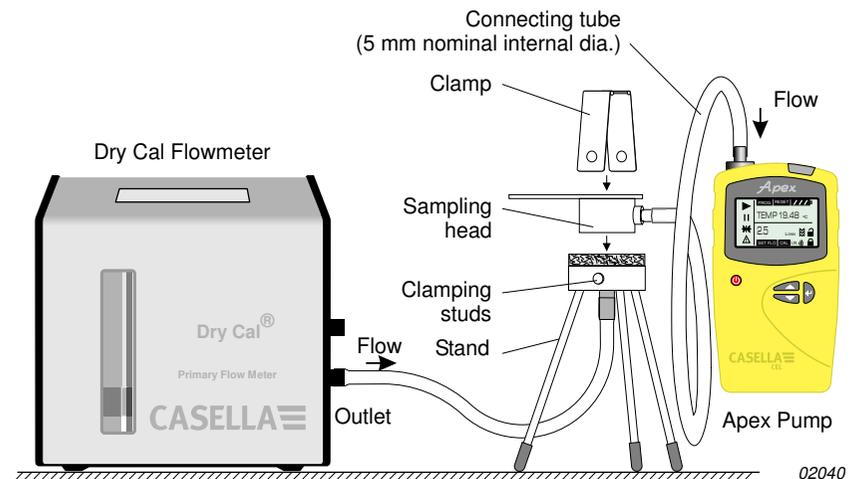


Figure 7: Calibration arrangement with Dry Cal flowmeter

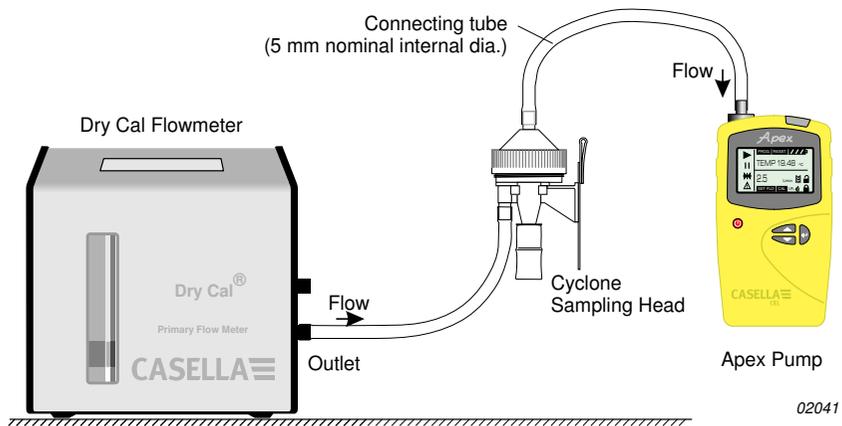


Figure 8: Calibration arrangement for Cyclone type sampling heads
(a Rotameter may also be used)

3. Press  to accept the setting. The pump will start.
4. As soon as **CAL SET** is displayed, use  and  to adjust the actual flow measured by the flowmeter to match the set point.
5. When the flow rate is acceptable, press  to accept the value.
This calibration point will be saved and used by the pump in all future samples made at this flow.
If no control key is pressed within 30 seconds, the pump will revert to Hold Mode automatically.
6. If it is decided not to save this calibration, press  and hold for a moment to abort and return to Hold Mode.

The combination of automatic flow control and intelligent internal calibration procedures can substantially reduce the number of calibration points required.

When a more comprehensive calibration is required, the basic calibration can be fine-tuned during normal operation by making further single-point flow calibrations at specific flows as described above.

For information about recalibrating the whole range of an Apex or Apex Pro unit, refer to Chapter 5.

2.4 Configuration Mode

This allows basic settings such as display language and measurement units to be changed, gives access to Calibration and Duration modes, plus the additional modes available to an Apex Pro. When the current configuration settings are acceptable, proceed directly to Chapter 3.

Configuration Mode can be activated only while switching the instrument on.

1. Press  to switch the instrument ON.
2. Immediately hold both  and  down.

The following series of configuration options is displayed. The settings that are adjustable will blink.

LANG	Sets the display language from: ENG English, FRA French, DEU German, ITA Italian, ESP Spanish, DAN Danish.
TEMP	Sets the temperature display units as Centigrade or Fahrenheit.
VOL	Sets the volume display mode to Auto or m ³ . Auto displays volumes below 1000 litres in litres and above this as m ³ . m ³ always displays volumes in m ³ .
BUZZER	Sets an audible alarm to: OFF No alarm, Err Any error sounds the alarm, On Any error or key press sounds the alarm.
PROG Mode	Gain access to program features, including programmable run times on the standard unit and all programmable features on the Apex Pro. ON Makes any advanced program features available, OFF Hides any advanced program features.
LIFE	Read-only message that shows the total run time for the pump. It can be used to determine maintenance schedules.
LCD	Sets the LCD contrast. Use  to increase the value (make darker) and  to decrease (make lighter).
CAL SET	Activates Calibration Mode, which allows the entire calibration for the pump to be reset, based on a two point calibration. The instrument will have been accurately calibrated at the factory prior to delivery.

Therefore it is recommended that this operation be performed only as part of a routine service or when specific fine tuning is required to ensure that any selected flow rate will be as close to the true flow as possible.

NO Do not recalibrate the pump.

YES Recalibrate the pump.

For information about recalibrating the whole range of an Apex or Apex Pro unit, refer to Chapter 5.

3. Use  or  to make a change, then press  to accept it and move to the next option.

3. MANUAL OPERATION

3.1 Run Mode

1. To start sampling and enter Run Mode, press  while in Hold Mode. In Run Mode the display will cycle between, current duration of the sample, volume sampled, and internal air temperature.
2. To stop sampling while in Run Mode, press and hold  until the  symbol stops blinking and  disappears. The instrument will display and save the accumulated duration and sample values until manually reset. Clearing values by a manual reset to close the run sample upon completion of an event ensures that all downloaded data will be conveniently arranged to correspond with the sample result.

3.2 Flow Restriction

If the input flow becomes restricted, both  and the Red LED will flash to indicate a problem and if enabled, the buzzer will sound. When the problem lasts for eight or more seconds, the pump motor will switch itself OFF. After one minute, the pump will switch ON again in an attempt to determine whether the problem has gone. When the problem remains for a further eight seconds, the pump will switch OFF and remain off with the instrument still ON and  displayed.

If the output flow is restricted, both  and the Red LED will flash to indicate a problem and if enabled, the buzzer will sound. When the problem lasts for three or more seconds, the pump motor will switch itself OFF and remain OFF with the instrument still ON and  displayed.

Normal operation cannot be resumed until the flow restriction has been removed. When the restriction is removed, the pump may start again automatically; if it does not, switch the Apex unit OFF then ON again.

3.3 Bag Mode

This allows the pump to fill a gas bag and stop automatically when it is full.

1. Use a suitable length of 5 mm (nominal internal diameter) tubing to connect the gas bag to the pump outlet shown in Figure 2.
2. In Hold Mode, press  or  several times until **FLOW SET** blinks on the display.
3. Press  to select it.
4. Use  to set the flow to less than 0.8 litres/min. The pump enters Bag Mode.

- Press  to start the pump.
The display will show **BAG** and a percentage flow, with no volume or time information.
- Once the pump has started,  and  may be used to change the flow rate to a different percentage.
When the back-pressure from the bag indicates that it is full, a **FULL** message will be displayed and the pump stops automatically.

3.4 Use With Low Flow Adaptor

This enables the instrument to be used with sorbent tubes at flows down to 5 millilitres/min.

- Connect the inlet of an Apex unit to a flowmeter such as the Dry Cal and calibrate the flow rate to 1.5 litres/min.
- Stop the pump and disconnect the flowmeter.
- Starting from the Apex inlet, connect the following: constant pressure regulator, low flow adaptor, sorbent tube holder and a low flow flowmeter such as the Dry Flow or Dry Cal shown in Figure 9.

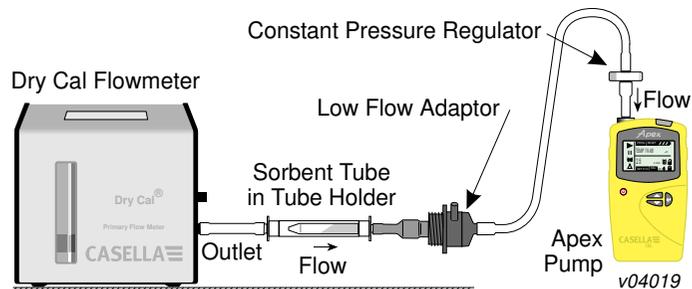


Figure 9: Arrangement using low flow adaptor

- Break both ends off a sorbent tube and put it in the holder with the arrow pointing towards the pump.
- Start the Apex pump and adjust the flow to the required rate using the screw on the side of the low flow adaptor.
- Perform the measurements using a fresh sorbent tube.

3.5 Fixed Duration Sampling (DUR)

This mode is available on both Apex and Apex Pro models to allow the pump to sample for a fixed period, then switch off automatically when the period has elapsed. This feature is useful where a stated flow rate must be sampled for a long period. The duration of the run can be set from the instrument keypad. On Apex Pro, the duration can also be set via Pump Manager software.

- Switch Program Mode ON and accept it as described in Section 2.4.
The instrument reverts to Hold Mode.

2. Press  or  several times until **DUR** blinks on the display.
3. Press  to select it.
The programmed duration blinks to indicate it can be changed by  and .

Run durations between 3 minute and 1 hour can be set in 1-minute steps and durations between 1 and 25 hours in 10-minute steps.

4. Make changes to the duration as necessary.
5. Press  to accept the duration and start sampling.
In addition to the  symbol, the display shows **PROG.** to indicate that a program is active.
While the program is running, the display cycles through current run time, volume sampled, air temperature, and programmed duration.
Once completed, the pump will switch OFF and the display show  and a **PROGEnd** message.
6. Press any key to return the pump to Hold Mode.

3.6 Locking the Keypad

The keypad may be partially or fully locked to prevent unauthorised tampering with the instrument settings. The keypad can also be locked in the Program Modes.

1. Press  three times within 2 seconds to activate Partial Lock Mode.
The  symbol is displayed, the counters and flow rate cannot be changed, so the only keypad options available are:
Start/stop sampling,
Switch the pump OFF,
Unlock Partial Lock (Press  three times within 2 seconds),
Select full lock.
2. While the pump is running (sampling), press  three times again within 2 seconds to activate Full Lock Mode.
The  symbol is displayed, the pump cannot be switched OFF and the only available keypad option is to release Full Lock.
3. Press  three times within 2 seconds while in Full Lock Mode to fully release the control keys.
(Similarly, while the pump is not running (sampling) in Partial Lock Mode, press  three times within 2 seconds to fully release the control keys.)

**4. ADDITIONAL SAMPLING MODES
AVAILABLE ONLY TO THE APEX PRO
AND APEX PRO I.S.**

These modes are available when Program Mode on an Apex Pro or Apex Pro I.S. has been enabled from within Configuration Mode as described in Section 2.4.

4.1 TWA Sampling Mode

Time weighted average (TWA) mode allows the pump to sample for a fixed percentage of a specified run time. The instrument calculates the required ON/OFF cycle automatically to spread the total sample time evenly over the entire run time as shown in Figure 10.

This feature is useful when the requirement is to sample a stated volume of air over the course of a long period.

For example, when 10 litres must be sampled over an 8-hour work shift, the pump flow can be set to run at a flow rate of:

$$\frac{10}{8 \times 60} = 0.021 \text{ litres / min} = 21 \text{ millilitres / min}$$

For the whole shift, which is a very low flow.

Alternatively, the TWA mode can be used to run the pump for short periods at a higher rate, for example 1 l/min, with the pump actually running for only:

$$\frac{10}{1} = 10 \text{ minutes during 8 hour shift}$$

Using TWA mode, the sampling (**RUN**) time should be set to 8 hours and the pump-on exposure (**EXP**) time to 10 minutes, as follows.

1. Enter Configuration Mode, select Program Mode / ON and accept it as described in Section 2.4.

The instrument reverts to Hold Mode.

2. Press  or  several times until **TWA** blinks on the display.

3. Press  to select it.

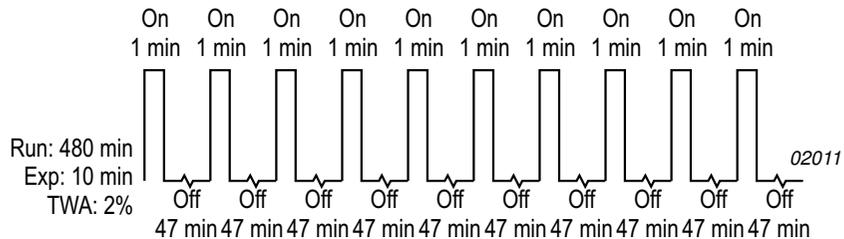


Figure 10: TWA ON / OFF cycle for the example

- RUN** is displayed and the run time blinks to indicate that it can be changed.
4. Use  or  to select a run time.
Sampling (**RUN**) durations between 3 minute and 1 hour can be set in 1-minute steps and durations between 1 and 25 hours in 10-minute steps.
 5. Press  to accept the selected run time.
EXP is displayed, and the exposure time blinks to show it can be changed.
 6. Use  or  to select an exposure time.
The available range is from 2 minutes to "1 minute less than the run time", in 1-minute steps.
 7. Press  to accept an exposure time and start sampling.

In addition to the usual  and  symbols, the display shows **PROG.** to indicate that a program is active.

The pump ON-times are fixed at 1 minute, and the instrument calculates the necessary OFF-times to spread these 1 minute intervals evenly throughout the run time.

While the program is running, the display cycles through current accumulated run time, volume sampled, air temperature and calculated TWA (as a percentage of run time).

During OFF-times (pump not running) the  and  symbols are displayed to show the instrument is paused.

Once the run is completed, the pump will switch OFF and the display show the  symbol and a **PROGEnd** message.

8. Press any key to return to Hold Mode.
The whole duration is stored as a single "sample" (run) with each ON / OFF sequence of the pump included as a discrete "event".

4.2 User Program Modes

This allows complex sampling schedules (created using the Pump Manager PC software and downloaded via the infrared transducer) to be run by the pump. Two user programs can be stored: **Pr1** and **Pr2**.

This mode is ideal for taking samples where an operator spends time working in different parts of the site and a separate exposure at each location must be determined. For example, an operator may spend 4 hours working in a quarry, take 1 hour for lunch, work 3 hours near a crusher and a final 1 hour in a workshop. The work schedule can be set as a user program, with samples taken and stored for the separate periods.

1. Enter Configuration Mode, select Program Mode / ON and accept it as described in Section 2.4.
The instrument reverts to Hold Mode.
2. Press  or  several times until the required program, **Pr1** or **Pr2** blinks on the display.
3. Press  to select the program.
4. If required press  and  to view the various steps in the program.
5. Press  again to accept the program and start it running.

In addition to the usual  and  symbols the display shows **PROG.** to indicate that a program is active.

During OFF-times (when the motor is not running)  and  are displayed to show the unit is paused.

Once the run is completed, the display will show the  symbol and a **PROGEnd** message.

6. Press any key to return the pump to Hold Mode.
7. When it is required to terminate the program early, press and hold  to show the **STOP** option, then keep the key pressed until the pump reverts to Hold Mode.

The whole duration is stored as a single "sample" (run) with each ON / OFF sequence of the pump included as a discrete "event".

5. CALIBRATION MODE

This mode is intended primarily for factory use during manufacture and servicing. This is a two point calibration which ensures that any selected flow rate will be as close as possible to the true value.

It is suggested that this procedure might be employed by the user ONLY when it is suspected that the primary calibration has been disturbed. Therefore only a brief description of the procedure will be given.

Caution !

Use this procedure with caution, it changes the basic calibration for the ENTIRE flow range of the pump.

Attach a sampling head and flowmeter to the pump's inlet nozzle to measure the actual flow as shown in Figures 6 - 8 in Section 2.3.

1. Enter **CAL SET** from Configuration Mode.
A display message asks for the lower calibration point to be set.
2. Use  and  to set the flow required at the calibration point.
The instrument will restrict the actual range in which the lower calibration can be set.
3. Press  to accept the setting. The pump will start.
4. Use  and  to adjust the actual flow measured by the flowmeter to match the set point.
5. Press  to accept the lower setting. The pump will stop.
A display message asks for the upper calibration point to be set.
6. Use  and  to set the flow required at the calibration point.
The instrument will restrict the actual range in which the upper calibration can be set.
7. Press  to accept the setting. The pump will start.
8. Use  and  to adjust the actual flow measured by the flowmeter to match the set point.
9. Press  to accept the upper setting.

The instrument uses these points to recalibrate the entire flow range. This calibration can then be fine-tuned during normal use by making single point flow calibrations at specific flows as in Set Flow.

6. PUMP MANAGER SOFTWARE

6.1 Pump Manager Introduction

Casella CEL Pump Manager application software is designed to be used with the Casella Apex Pro and Apex Pro I.S. range of personal air sampling pumps and offers a convenient way to store, manage and present sample data.

This software allows the Duration, TWA and User Program Modes of Apex Pro pumps to be programmed. In addition, it saves sample results together with extra information related to the sample, and prints comprehensive reports.

Communication between the PC and pump is via an infrared transducer. Once the infrared transducer has been connected to a PC's serial (RS232) port there will be no need to connect (and disconnect) cables between instrument and PC to facilitate communication. This eliminates wear and tear on any connectors and cables. All infrared communication is fully error checked to prevent data corruption.

The software must be installed (Section 6.2) and infrared communication established (Section 6.3) before data can be downloaded from an Apex Pump to a PC.

Pump Manager can be left running in the background on the Windows system as an icon. When a pump comes within range of the infrared computer link, the application will wake up and download data from the pump and store it in a database. It is possible to configure Pump Manager to start up in background scanning mode when Windows starts, thus minimising the amount of user intervention required.

All data is stored in a database and identified according to the Apex pump from which it was downloaded, and optionally by details of the person who used the pump. This helps to maintain traceability of data. All data is automatically stored when it is changed, so if you have a system failure (e.g. power failure) you should not lose any data.

6.2 Software Installation / Un-installation on Windows™ 95, 98, ME, NT 4, XP & 2000

System Requirements

- IBM™ compatible PC with Pentium II or better processor,
- At least 8 MB of free RAM space,
- Microsoft Windows 98/ME/2000/XP and NT 4/95 with IE4 or later,
- Hard drive with at least 5 MB of free space,
- 3¹/₂" high density (1.4 MB) floppy disk drive for program installation,
- Super VGA colour monitor (1024 x 768 16 M colours recommended),
- Mouse or other Windows compatible pointing device,
- Printer - optional.

Pump Manager is supplied on two 3¹/₂" floppy disks. Before installation, it is recommended that a back-up copy be made of the program disks. Keep the originals in a safe place and use the copies to install the software. It is also advisable to ensure that no other applications are running while installation

takes place. The Setup program for Pump Manager will install files in the specified program directory and the Windows\System directory. It will also add an icon to the desktop and a new folder and item to your Programs menu, either of which can be used to start Pump Manager.

If installing on Windows 95, first run the program TapiUpdate.exe placed in the installation folder. This updates the version of TAPI on the PC to the version required by Pump Manager. When installing on Windows 98, Windows NT or later systems, this update is not required and SHOULD NOT be performed.

To install:

1. Start Windows.
2. Insert Pump Manager Disk 1 into the floppy disk drive.
Pump Manager software automatically detects the language of the operating system during the installation. Languages supported include: English, French, German, Spanish, Italian.
3. Click the **Start** button on the task bar, then click the **Run...** option.
4. Type **a:\setup**, where "a" identifies the floppy disk drive, then press **Enter**.
5. Wait for the Casella welcome screen to be displayed, then follow the on-screen instructions.

Once installation is complete, you will find the Pump Manager icon



on your Windows desktop.

To un-install:

1. Click the **Start** button on the task bar.
2. Select the **Settings...** option and click on the **Control Panel** option.
3. Double click on **Add/Remove Programs** icon.
4. In the list of installed software, select **Pump Manager** and click the **Add/Remove** button.
5. Follow the on-screen instructions.

6.3 Establishing Infrared (IR) Communication

DO NOT attempt to install or use the IR communication link for I.S. versions while in the hazardous area.

When used with Windows 2000, the IR transducer supplied by Casella CEL is plugged into one of the PC COM ports, where it acts as a plug and play unit. For other versions of Windows, please follow the installation instructions supplied with the transducer.

Once installed, Windows will assume the IR transducer is a Windows managed device and take over complete control of it, preventing

control by Pump Manager. To avoid this conflict, Windows control must be disabled in the PC as follows.

1. Click the **Start** button at bottom left of the PC display.
2. Select the **Control Panel** option from the **Settings** menu.
A **Control Panel** window is displayed.
3. Select the **Wireless Link** option and display the **Wireless Link** dialog.
4. Select the **Hardware** tab.
The **Devices** field should include:
"ACTiSYS IR-220L Serial Infrared Device".
5. If the **Device Status** is shown as "This device is working properly", it is being controlled by Windows and must be disabled. Click the **Properties** key.
6. Open the **Device Usage** menu.
7. Select **Do not use this device (Disable)** and click **OK**.
The Device Status should now be shown as "This Device is Disabled" so that it can be controlled by Pump Manager software.

Now configure the IR link in Pump Manager as follows.

1. Start Pump Manager by double clicking on its desktop icon, by entering its name in the **RUN** menu obtained via the **Start** button **Run** option, or using **Start - Programs...** option.

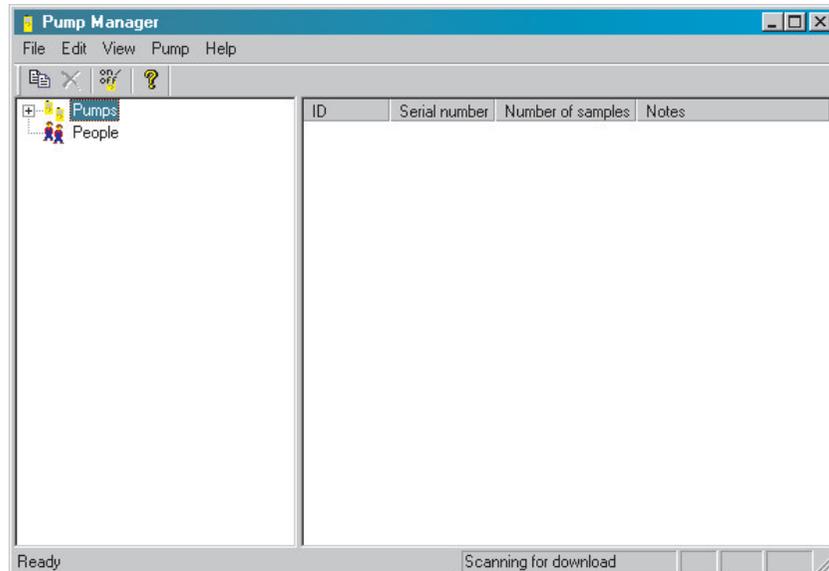


Figure 11: The top level window

The top level window shown in Figure 11 will be displayed.

As the cursor is moved to each button, the relevant function will be displayed on the message line at the bottom left of the display.

2. Click the **Pump** button and select the **Communications...** option. A **Communication Port** dialog is displayed.
4. Specify the port used by the IR link, then click **OK** to confirm the choice.



An active IR link icon  should be shown in the System Tray to the right of the Status Bar at the bottom of the PC display. This indicates that the device is waiting to communicate with an Apex Pump.

Best communication with the pump is achieved when the IR link is positioned in line with the IR interface window of the pump, with the two devices no more than 60 cm (2 ft) apart.

The fold out sheet at the back of this book shows a diagram of the main menus and options available from Pump Manager software. A Help menu offers on-line help via Contents, Index and Find options.

6.4 Configuring the Software and Adding a Pump

Select a communication port then add pump and person identities to the software as follows.

1. Select the **Pump** menu and see the following options.

Communications	Specifies the communication port to be used by the IR Transducer.
Program	Allows the TWA and the two user defined programs available to the Apex Pro to be edited and sent to the pump as described in Section 6.5.
2. Select the **Communications** option, then choose the port to be used from the **Communications Port** dialog, normally COM1 or COM2.
3. Select the **File** menu and see the following options.

New	This option allows pump and person details to be added to the Directory field in the top level window.
Print Setup	Standard dialog.
Minimise to System Tray	Use this option to remove the Pump Manager button from the Status Bar, but leave the IR link icon in the System Tray (bottom right of the display) to show that the software is active in background.

Run on Startup Enable (√) this option to start Pump Manager automatically whenever Windows is started.

Exit Standard dialog.

All data will be identified by the serial number of the pump from which it was downloaded. The serial number is set at the factory and cannot be edited by the software. However, further information can be added via a **New Pump** dialog, and via the similar **Pump Properties** dialog obtained by right clicking on the pump name.

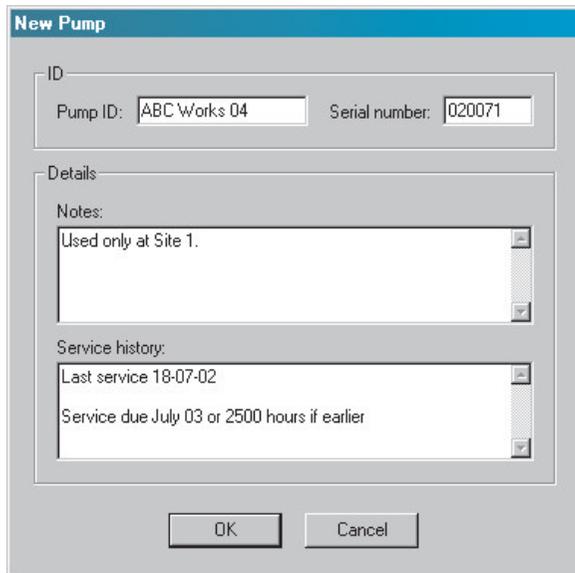
Downloaded results can also be identified by user (person), with details added via a **New Person** dialog.

4. On the **File** menu, select **New** followed by **Pump** to add a new pump, (or right click on the name of an existing pump) to display its details.

(A New Pump dialog is displayed automatically whenever the software detects an unknown pump within range of the IR Transducer.)

The **New Pump** dialog has the following options.

Delete Standard dialog.



Properties Offers the following options.

ID Alphanumeric characters can be entered to identify a specific sampling pump.

Serial Number (set by the factory) Seven numeric characters

Notes/Service History

Allows separate notes to be included about the pump and its service history.

5. Add a pump ID, Notes and Service History (such as date of last service, or date of next service) as required.
6. When data is also to be identified by user, select **New** followed by **Person** to add a new person, (or right click on the name of an existing person) to display their details on the **New Person** dialog.
Delete Standard dialog.

The screenshot shows a 'New Person' dialog box with the following fields and values:

- Personal details:**
 - Name: John Smith
 - ID: W1-018
 - Job title: Warehouseman
 - Department: S1
- Other details:**
 - Notes: Fork Lift Truck Driver

Buttons: OK, Cancel

Properties

Offers the following options.

- Name Alphanumeric characters of the person's name can be entered.
- ID Alphanumeric characters to identify the person can be entered.
- Job Title Additional information.
- Department Additional information.
- Notes Allows separate notes to be included about the person.

7. Add a person's Name, ID (for example a payroll number), Job Title, Department and Notes as required.
8. Select the View menu and see the following options.
Toolbar Standard dialog.

Status Bar Standard dialog.
Units Offers options to:
Display temperature in °C or °F,
Display volume in ml, Ltrs or m³.

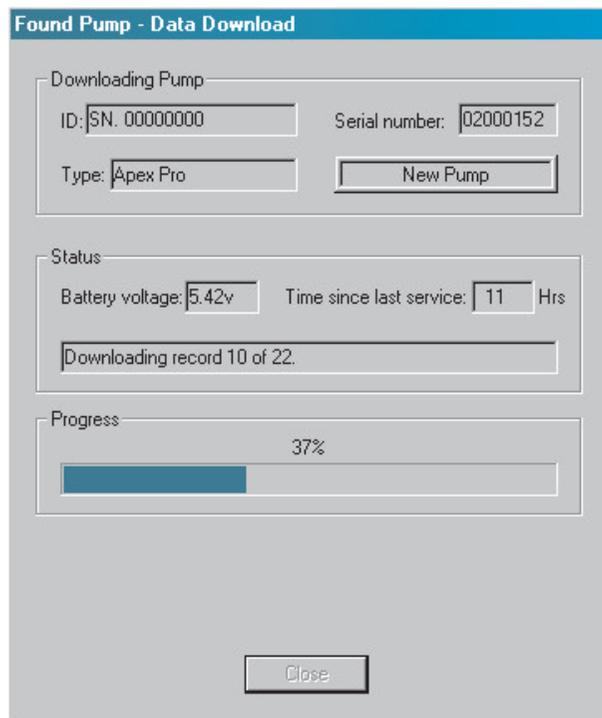
9. Choose temperature and volume units to suit the task.

6.5 Downloading Data

DO NOT use the IR communication link for I.S. versions while in a hazardous area.

Data is downloaded from pump to PC automatically, with a minimum of user intervention. When Pump Manager is running (showing the active IR link icon), it transmits a request every second via the transducer, asking for data from any Apex Pro within range.

If no pump containing data is within range, there will be no response, and the software continues transmitting the request and listening for a reply. However, when a pump containing data is within range, it will be detected and the download process started automatically.



A **Data Download** status dialog will be displayed which identifies the pump and displays progress messages for the download operation.

Once all data has been downloaded, the software clears the data from the pump memory.

When any Apex pump is actively sampling or running a program, they MUST BE KEPT AWAY from the IR Transducer. This prevents the Transducer from trying to empty the pump of any saved data and interrupting the current data sample.

If a pump is detected that has not been configured by the software, i.e. is not included in the Pump Manager Directory field, a "New Pump" message will be displayed and the new pump added automatically to the application. The operator should add the remaining pump properties as soon as possible. (An Apex Standard model will be shown as a pump with no data.)

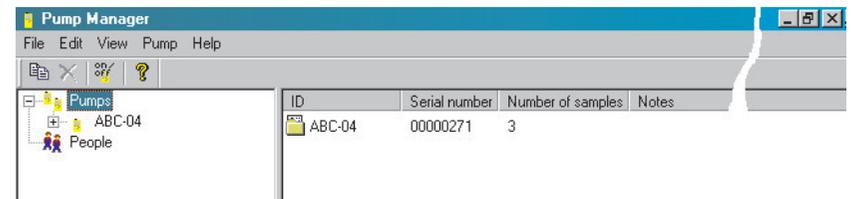
If **People** have been defined, the option will be offered to select the person who has been using the pump, or to select **No pump user**.

The downloaded data is stored in the application database where it is identified by pump, and when defined, also by person. The display is updated to include the new data in a "sample" (run) folder that shows each time the pump was switched ON and OFF as a separate "event".

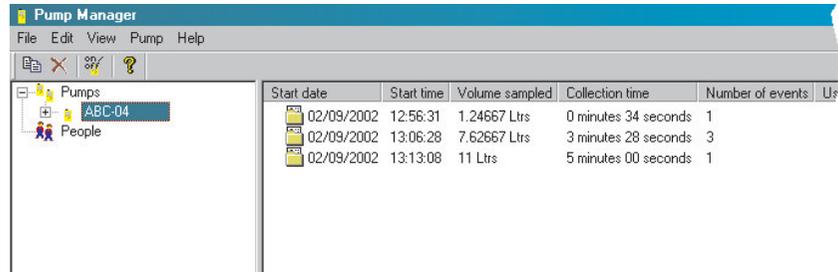
6.6 Inspecting Data, Adding Supplementary Information and Printing a Report

Stored data can be inspected, supplementary information added and a report displayed and printed. All reports can be exported to other software for further processing.

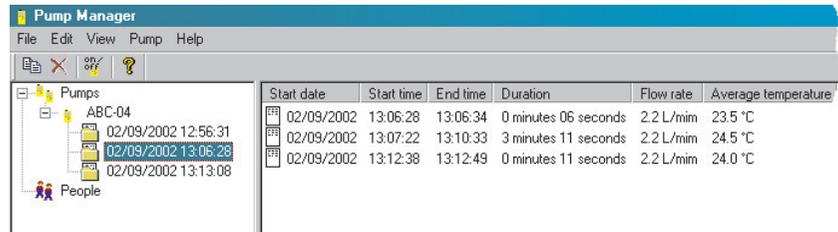
1. Display data by highlighting the name of the relevant pump or person in the Directory.



2. A directory containing all samples from the selected pump or person will be shown in the Data area of the top level window. Headings identify the pump and show the number of samples included.
2. Click on the pump or person name to show the samples in the Directory.

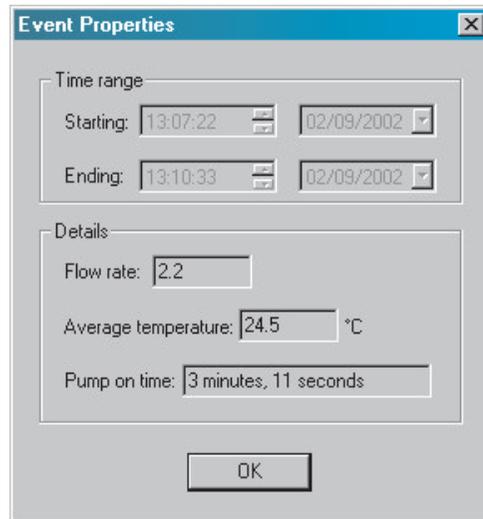


3. Highlight the required sample folder.



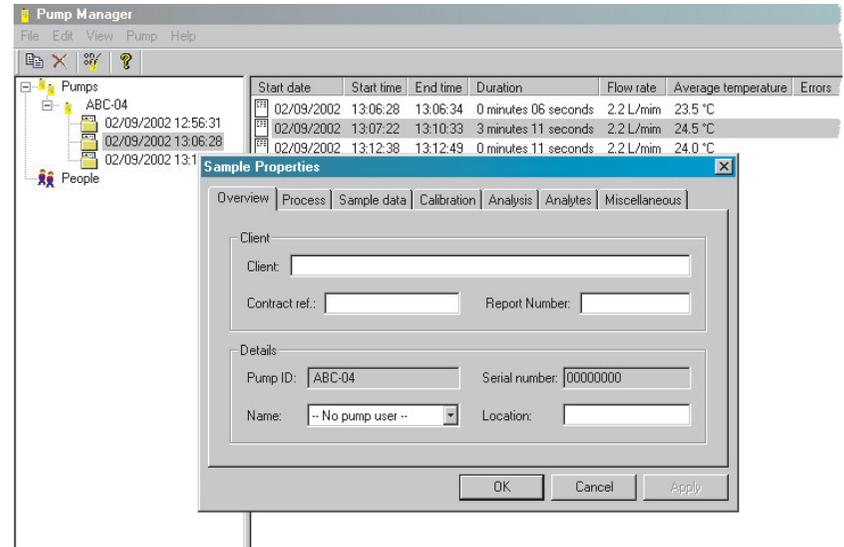
Each event contained in the sample is shown in the Data area, with headings that give a summary of information from the event.

4. To inspect further data from any event, double click on the sample.



An Event Properties dialog is displayed that contains additional information.

5. To inspect further data from any sample, or to add supplementary information, highlight the sample folder then right click.



6. Use the **Properties** option.

A multi-page Sample Properties dialog is displayed, which allows the user to inspect the data and add additional information to the sample folder. There are seven pages, where the pages contain additional information as follows.

Overview Page adds identifying information to the sample folder.

Client	A name can be added,
Contract ref.	A reference can be added,
Report Number	A number can be added,
Pump ID	Data from the pump,
Name	A person name can be selected,
Serial Number	Data from the pump,
Location	A location can be added.

Process Page adds details of the process and substances involved to the sample folder.

Process notes	Field for adding detailed information about the process,
Substances	Field for adding detailed information about the substances involved.

Sample data Page contains data downloaded from the pump.

Starting time	Downloaded data,
Starting date	Downloaded data,
Ending time	Downloaded data,
Ending date	Downloaded data,
Sample period	Downloaded data,
Set flow rate	Downloaded data,

Average temp. Downloaded data,
Sample volume Downloaded data.

Calibration Page allows calibration information to be added and applied to the data.

Use calibration data Tick to use the displayed information,
Calibrator S/N Allows a serial number to be added,
Initial flow Field for a flow rate to be entered,
Final flow Field for a flow rate to be entered,
Sample period Field for a measurement period to be entered.

Analysis Page adds analysis information to the sample folder.

Sample number A sample identity can be added,
Sample data Sample analysis information can be added.

Analytes Page adds details of up to 9 analytes to the sample folder.

Analyte1 Etc. Analyte identities can be added,
Exposure time Allows an exposure time to be added.

Miscellaneous Page adds further information to the sample folder.

Notes General notes can be added,
Sampled by The user / report author can be identified,
Date The date of the sample or of the report can be entered,
Audited by The data / report checker can be identified,
Date The date of checking can be entered.

7. Enter information into these dialogs as relevant to the particular sample folder or report.

8. When all required additional information has been added to the sample folder, highlight the sample folder, then right click.

6. Use the **Report** option. A dialog is displayed with four options.

Company Logo Allows a bitmap image file to be selected to be printed in the top right corner of reports.

Print Prints a report based on data downloaded from the pump that includes information entered via the Sample Properties dialog. The layout of a Pump manager report is shown in Figure 12.

Print Preview Displays a preview of the printed report.
Copy Copies the report to the PC clipboard, so it can be pasted into a word processor and customised.
The pasted report has minimal formatting and may require minor layout work such as font sizes and tab setting.

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Pump Manager Sampling Report

Client: _____ **Contractor Ref:** _____
Name: _____ **Report No:** _____
Location: _____

Process Notes:

Substances:

Pump Data:-
Pump: _____ **I.D.:** _____
Run Data:-
Start: _____ **End:** _____ **Period:** _____
Set flow rate: _____ **Ave. temperature** _____ **Sampled volume** _____

Volume sampled: _____ **Sample number:** _____

Sample data:- _____ **Sample data:-** _____

Notes:-

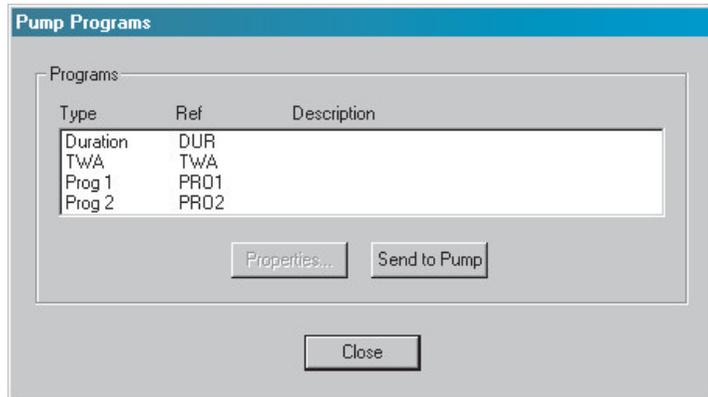
Sampled by: _____ **Audited by:** _____
Date: _____ **Date:** _____

Page 1

Figure 12: The report page layout from Pump Manager

6.7 Creating and Loading Pump Programs

All operations to create and load pump programs for the Apex Pro are controlled via the **Pump Programs** dialog.



The following different types of programs are available.

Duration	(DUR) the pump samples for a fixed period and switches off automatically when finished,
TWA	(Time weighted average) the pump samples for a fixed percentage of the run, calculating the required ON/OFF cycle automatically,
Prog 1 / 2	(Pr1 / Pr2) samples to complex schedules created in Pump Manager.

The properties for all four programs can be edited then sent to the pump at the same time as follows.

1. Select the **Pump** menu.
2. Select the **Program** option.

The **Pump Programs** dialog will be displayed showing program types: Duration, TWA, Prog 1 and Prog 2, plus the following option.

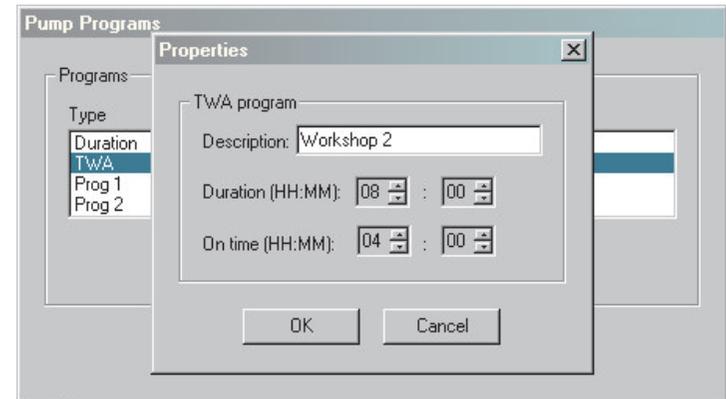
Send to Pump This sends the complete package of four programs to the pump.

3. Select a pump program to edit.
This enables the **Properties** button.
4. Click the **Properties** button.

As shown on the fold out sheet at the back of this book, each program has its own individual **Properties** dialog for information specific to the program.

5. To set **Duration**, go to step 6,
For **TWA**, go to step 8,
For **Prog 1** and **Prog 2**, go to step 10.
6. Display the **Duration Properties** dialog which has the following options.

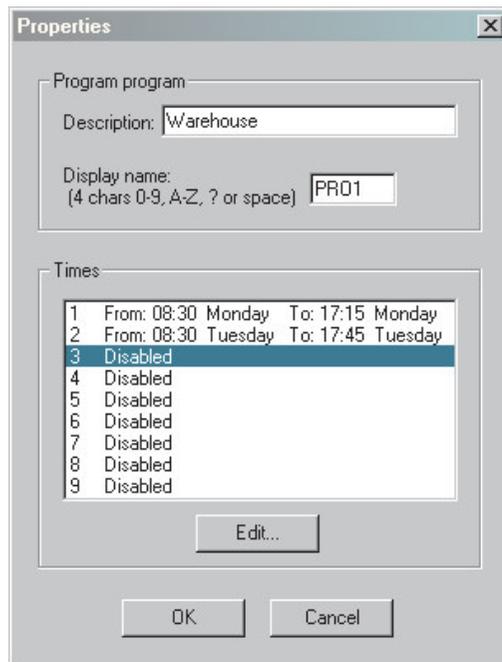
Description	Requires alphanumeric characters to identify the program.
Duration	Specifies a run time that can be set in 1 minute steps up to 1 hour, and 10 minute steps from 1 hour to 24 hours and 50 minutes.
7. Enter a **Description** to identify the program and a **Duration** (total sample = run time), then click **OK** to confirm the selection and go to step 16.
8. Display the **TWA Properties** dialog which has the following options.



- | | |
|-------------|--|
| Description | Requires alphanumeric characters to identify the program. |
| Duration | Specifies a run time that can be set in 1 minute steps up to 1 hour, and 10 minute steps from 1 hour to 24 hours and 50 minutes. |
| On Time | Specifies a pump ON time that can be set in 1 minute steps up to 1 hour, and 10 minute steps from 1 hour to 24 hours and 50 minutes. |
9. Enter a **Description** to identify the program, a **Duration** (total sampling = run time), the **On Time** for the pump, then click OK to confirm the selection and go to step 16.
 10. Display the **Prog 1 Properties** or **Prog 2 Properties** (Pr1 or Pr2) dialog which has the following options.

Description	Requires alphanumeric characters to identify the program.
Display name	Four characters as a display name.
Times	9 sets of times to define start and stop days and times for the run. A day of the week can be specified, where "All days" allows the instrument to be used on any day. Start and end times can be specified in 1 minute steps up to 24 hours and 59 minutes.

11. Enter a **Description** to identify the program and a four character **Display Name** that will appear on the pump display.
12. Select one of the program **Times** and use the **Edit** button.
13. Specify **Start** and **End** dates and times on the **Program Times** dialog.
14. **Enable** the selected **Time** (√) so it will be used by the program. (See opposite.)
15. Select and enable further start and end times, then click **OK** to confirm the selection.



16. To send the complete package of four programs to the Apex Pro, place the unit in range of the infrared transducer, and click the **Send to Pump** button.

Please note: It is not possible to send an individual program to the pump.

The four current programs will be transferred to the pump, while a **Pump Programming Status** dialog gives progress information.

The PC takes this opportunity to synchronise the clock in the Apex unit to the same time and date as the PC.

17. Once the program has been sent to the Apex unit, the unit can be removed from the transceiver.

6.8 Error Messages

The following error messages may be displayed by Pump Manager.

"ERROR: Unable to get status record from the pump."

"ERROR: Unable to download record %i."

"ERROR: Pump changed during download."

"ERROR: Unable to verify the pump's serial number."

"ERROR: Unable to clear the pump's memory."

"ERROR: No pump found to program."

"ERROR: Cannot set pump's time."

"ERROR: Cannot set pump's date."

"ERROR: Could not send program to the pump."

"ERROR: Could not get the pump's serial number."

"ERROR: The pump has changed during programming."

"ERROR: Could not find a pump."

"ERROR: Could not open communications."

"Invalid serial number"

"Pump shut down but restarted following a temporary inlet blockage."

"Pump terminated the event due to a fatal inlet blockage or flow control problem."

"Pump event terminated due to a discharged battery condition."

7. TECHNICAL INFORMATION

7.1 Pump Model Specification

	Non I.S. versions	I.S. versions
Flow range	0.8 to 5 L/min, 5 to 850 ml/min with low flow adaptor,	0.8 to 4 L/min 5 to 850 ml/min with low flow adaptor,
Flow control accuracy	<±5% for selected flow, ±3% for calibrated point,	<±5% for selected flow ±3% for calibrated point,
Flow performance (Flow, max vacuum pressure)	1.0 L/min @ 80 cm H ₂ O 2.0 L/min @ 80 cm H ₂ O 3.5 L/min @ 32 cm H ₂ O 4.0 L/min @ 18 cm H ₂ O 5.0 L/min open flow	1.0 L/min @ 80 cm H ₂ O 2.0 L/min @ 55 cm H ₂ O 3.5 L/min @ 16 cm H ₂ O 4.0 L/min open flow
Battery voltage and capacity	4.8 V NiMH /2.7 Ah	4.8 V NiMH / 1.7 Ah
Inlet pulsation ratio	< 10% using Dewell Higgins Cyclone @ 2 L/min approx. 7.5 cm H ₂ O. Satisfies EN1232 , NIOSH 0600	
Displayed values	Real flow rate, volume sampled, elapsed sample time, temperature, operating mode, program details	
Service interval	Typically 2500 hrs	
Operating temperature	5°C to 45°C	5°C to 40°C
Storage temperature	-10° to + 50°C	
Charging technique	Drop-in Intelligent fast charger employing dT/dt termination with safety time out. Standby trickle charge mode to keep pump ready for use.	Drop-in Intelligent fast charger employing dV/dt termination with safety time out. Standby trickle charge mode to keep pump ready for use.
Typical charge time	3 hours for full charge	4.5 hours for full charge
External PSU (for drop-in charger)	Output 12 VDC, 0.8 A, Universal input voltage	
Memory protection time with main battery pack removed	Approximately 20 minutes	Approximately 5 minutes
Communications	Infrared transducer (via RS232-infrared computer link)	
Recorded values	Start & stop times, flow rate, average sample temperature, volume sampled and errors.	
Dimensions	Approximately 136 x 78 x 46 mm	
Weight (including battery)	Approximately 460 g	Approximately 500 g

7.2 Pump Performance

Filter Type	Typical filter pressure load in cm H ₂ O, Typical battery life in hours Non I.S., (I.S.)				
	1.0 l/min	2.0 l/min	2.2 l/min	3.5 l/min	4.0 l/min
25 mm GFA	5 cm, 34 hrs (34 hrs)	9 cm, 22 hrs (20 hrs)	9.5 cm, 20 hrs (17 hrs)	16 cm, 12 hrs (10 hrs)	18 cm, Marginal (NA)
25 mm 0.8 µm	18 cm, 21 hrs (19 hrs)	31cm, 14 hrs (10 hrs)	34 cm, 13 hrs (9 hrs)	56 cm, NA	64 cm, NA
25 mm 1.2 µm	11 cm, 27 hrs (24 hrs)	21cm, 16 hrs (13 hrs)	23 cm, 15 hrs (11 hrs)	37 cm, N/A	42 cm, NA
37 mm GFA	3 cm, 40 hrs (40 hrs)	5 cm, 25 hrs (22 hrs)	6 cm, 23 hrs (19 hrs)	9 cm, 14 hrs (12 hrs)	11 cm, 12 hrs (NA)
37 mm 0.8 µm	7 cm, 33 hrs (30 hrs)	13 cm, 20 hrs (16 hrs)	14 cm, 18 hrs (15 hrs)	23 cm, 11 hrs (NA)	26.5 cm, NA

Note: NA represents a flow rate and pressure loading combination beyond the pump capability.

7.3 CE Compliance

APEX Personal Sampling Pumps are designed to comply with the EMC Directive 89/336/EEC of the European Union. They have been tested according to the standard delivery schedule and comply with the following standards.

EN 50081-1 : 1992, EN 50081-2 : 1993:

Generic emission standards for residential, commercial, light industry and industrial environments.

EN 50082-1 : 1992, EN 50082-2 : 1995:

Generic immunity standards (for both RF fields and electrostatic discharge) for residential, commercial, light industry and industrial environments.

EN 61000-4-2 : 1995, IEC 61000-4-2 : 1995:

Electromagnetic compatibility (EMC).
 Testing and measurement techniques.
 Electrostatic discharge immunity test.

7.4 Intrinsically Safe (I.S.) Versions Approvals

This I.S. Equipment is covered by Certificate:
DEMKO 05 ATEX 0439469X.

I.S. Versions comply with:

ATEX: 94/9/EC Directive to EEx ia IIB T4 (pending),
Rating: Equipment Group II 1 G (For use in Zones 0, 1 & 2).

UL Classification USL to UL 913:
Class 1, Groups C & D.

CNL to CAN/CSA C22.2 No 157-92

They also comply with the following standards.

EN 50020: 1995	Electrical apparatus for potentially explosive atmospheres. Intrinsic safety i.
EN 50014: 1995	Electrical apparatus for potentially explosive atmospheres. General requirements.
EN 50284: 1995	Electrical apparatus for explosive gas atmospheres. Construction, test and marking of Group II Zone 0 electrical apparatus.

7.5 I.S. Certification

[1] **EC-TYPE EXAMINATION CERTIFICATE** 

[2] Equipment or Protective System intended for use
in Potentially Explosive Atmospheres
Directive 94/9/EC

[3] EC-Type Examination Certificate Number: DEMKO 05 ATEX 0439469X

[4] Equipment or Protective System: Models APEX and APEX Pro air sampling pump

[5] Manufacturer: Casella Group Ltd

[6] Address: Regent House, Wolsley Road, Kempston, Bedford MK42 7PY, UK

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

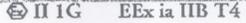
[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 0439469

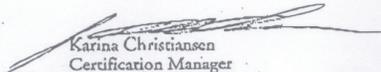
[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 50014: 1997 E incl. A1+A2 EN 50020: 2002 E incl.

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:


On behalf of UL International Demko A/S Herlev, 2005-04-19


Karina Christiansen
Certification Manager

UL International Demko A/S
Lyskær 8, P.O. Box 514 Certificate: 05 ATEX 0439469X

 A Subsidiary of Underwriters P

7.6 EC Declarations of Conformity

	
EC Declaration of Conformity	
Casella CEL Ltd Regent House, Wolsley Road Kempston, Bedford, MK42 7JY, UK	
Instrument Type:- APEX and APEX Pro Series of Personal Sampling Pumps	
EMC IMMUNITY and EMISSION Standards Applied:-	
Performance in compliance to EN61326:1997, A1:1998. (EMC Emission and Immunity Standard for Industrial environment)	
Also compliant to :-	
<i>EN50081-1</i>	EMC Emission Standard Residential, commercial and light industry
<i>EN 50082-1</i>	EMC Immunity Standard Residential, commercial and light industry
Test Equipment- EMO Automation GTEM Cell Test System, EMC Hire, Shefford, Beds	
LVD Standards Applied:-	
Instrument contains no hazardous voltages. Power supplies conform to the requirements of the following safety standards:-	
Harmonised Standard:	<i>EN60950</i> Safety of IT equipment <i>EN60335-2-29</i> Safety of Electrical Appliances
Product Specific Standards:-	
<i>EN1232 :1997</i>	Workplace Atmospheres, Pump for personal Sampling, Requirements and Test methods. For Type 'P' Pumps.
This is to certify that the above product(s) have been designed, tested and built to comply with the requirements of identified product specific standards, and also general protection requirements of the EMC Directive.	
Stephen Tearle Technical Director	Date of Issue: 27/9/02



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EC Declaration of Conformity

Casella CEL Ltd.
Regent House, Wolseley Road,
Kempston, Bedford, MK42 7JY, UK.

**Instrument Type:- APEX I.S. and APEX Pro I.S. Series of
Personal Sampling Pumps**

Intrinsic Safety Standards Applied:-

<i>EN 50014</i>	Electrical apparatus for potentially explosive atmospheres. General requirements.
<i>EN 50020</i>	Electrical apparatus for potentially explosive atmospheres. Intrinsic safety 'i'.
<i>Certificate number:</i>	DEMKO 05 ATEX 0439469X
<i>Notified body:</i>	DEMKO A/S P.O. Box 514, Lyskaer 8, 2730 Herlev, Denmark
<i>Notified body number:</i>	0539

EMC IMMUNITY and EMISSION Standards Applied:-

Performance in compliance to **EN61326:1997, A1:1998**. (EMC Emission and Immunity Standard for Industrial environment)

Also compliant to :-

<i>EN50081-1</i>	EMC Emission Standard Residential, commercial and light industry.
<i>EN 50082-1</i>	EMC Immunity Standard Residential, commercial and light industry.

LVD Standards Applied:-

Instrument contains no hazardous voltages. Power supplies conform to the requirements of the following safety standards:-

Harmonised Standard:	<i>EN60950</i>	Safety of IT equipment.
	<i>EN60335-2-29</i>	Safety of Electrical Appliances.

Product Specific Standards Applied:-

<i>EN1232:1997</i>	Workplace Atmospheres, Pump for personal Sampling, Requirements and Test methods. For Type 'P' Pumps.
--------------------	---

This is to certify that the above product(s) have been designed, tested and built to comply with the requirements of identified product specific standards, and also general protection requirements of the EMC Directive.

Stephen Tearle
Technical Director

Date of Issue: 22/02/05

8. SERVICING

All servicing on I.S. versions MUST be undertaken by returning the unit to the Casella CEL Service Department.

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 our 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 and send to the Casella CEL Service Department at Bedford.

For service outside the United Kingdom, please return to our appointed distributor.

8.1 Maintenance

Your Apex Personal Air Sampling Pump is designed to provide long and reliable service. Routine maintenance is minimal.

- ✘ Make sure the battery pack never stays in a discharged condition.
- ✘ Keep the instrument body clean and free from dirt.
- ✘ DO NOT operate without a filter connected to the inlet. Ingested dirt and dust particles may cause internal damage, malfunction or erratic flow.
- ✘ DO NOT unplug the connector lead when changing cells in the emergency dry cell battery pack .

8.2 Fault Finding

The following table outlines some possible fault conditions.

Symptom	Fault	Suggested Remedy
Failure to switch ON	Battery not charged. Does the red charger LED come on ?	Check that the battery is plugged in internally, Clean the battery connectors on the Apex unit, Clean the battery connectors on the charger, Push the Apex unit firmly into the charger. Charger fault - return for repair, Keypad fault - return for repair.
	Software locked up ?	Disconnect the battery for a minimum of 20 minutes, then reconnect. If this fails, return for repair

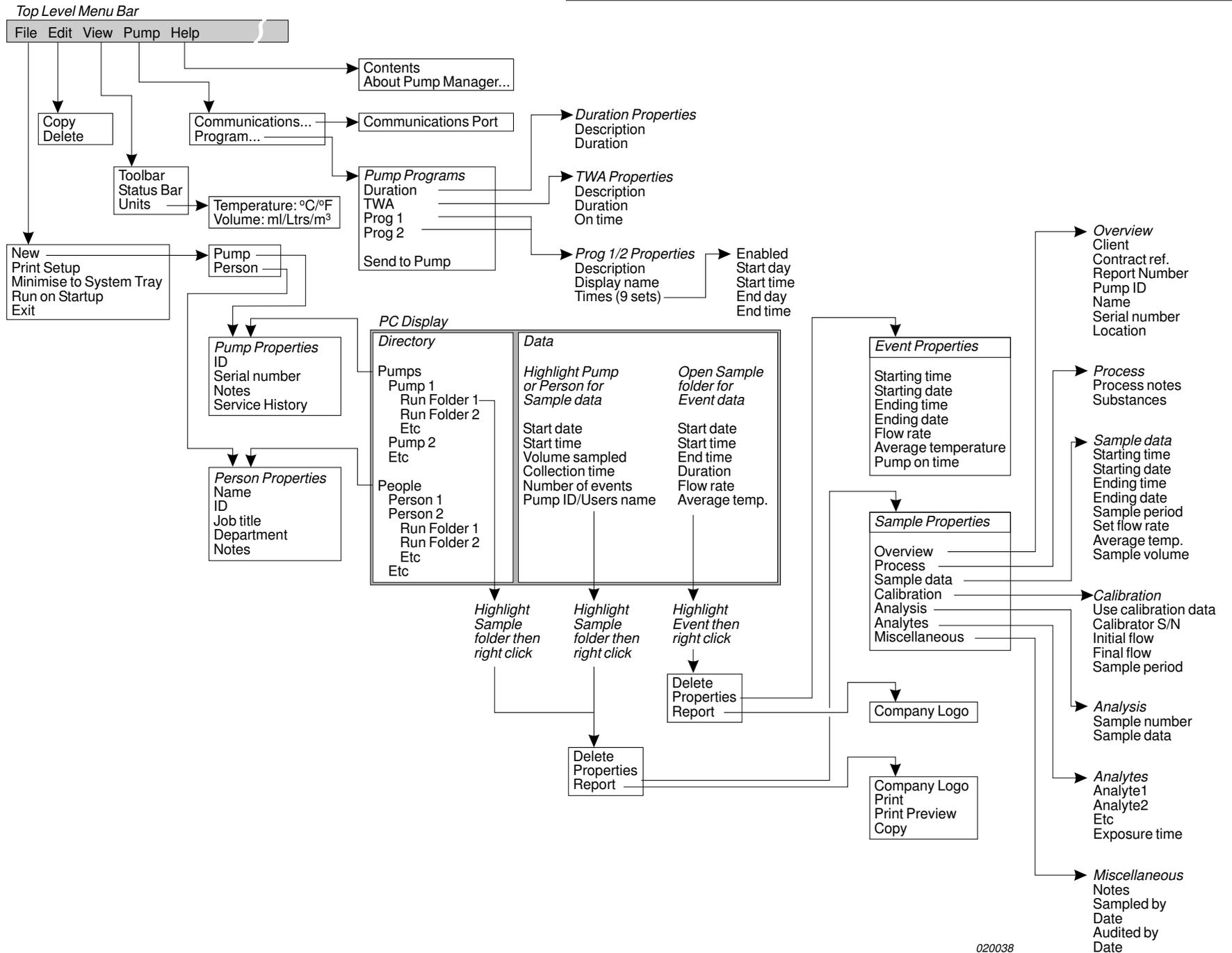
Symptom	Fault	Suggested Remedy
Pump runs fast	Control error	Damaged flow pressure sensor - return for repair, Water ingress - clean or return for repair, Tubes to sensor squashed or damaged - return for repair, Electrical fault - return for repair, Calibration error - perform fundamental calibration in Config Mode.
Poor control response, Non-repeatable flow settings	Leakage	Contamination or damage to valves - return for repair Check all connections, If internal leakage is suspected - return for repair.

8.3 Ordering Information

182000B	Apex Personal Air Sampling Pump.
182150B	I.S. Apex Personal Air Sampling Pump conforming with both ATEX and UL standards.
182063B	Apex Pro Programmable Personal Air Sampling Pump.
182160B	I.S. Apex Pro Programmable Personal Air Sampling Pump conforming with both ATEX and UL standards.
182091A	Pump Manager Kit, which includes Infrared Communication Transducer that uses existing Windows software.
182073B	Spare Rechargeable Battery Pack for non-I.S. versions.
182013C	Spare I.S. Rechargeable Battery Pack for I.S. versions.
182094A	Dry-Cell Battery Pack for use only with non-I.S. versions.
P104104	Standard Starter Kit, includes standard carry case with foam and accessories box, 0.3 to 3 L/min flowmeter, flowmeter stand, IOM head and cassette (1 off), plastic cyclone and cassette (pack of 5), tweezers. Please order the sampling pump and charger separately.

Chargers for non IS versions		Chargers for IS versions	
182052B	Single-way Charger	182261B	Single-way Charger
182108A	5-way Charger (UK)	182264A	5-way Charger (UK)
182109A	5-way Charger (Euro)	182265A	5-way Charger (Euro)
182110A	5-way Charger (USA)	182266A	5-way Charger (USA)
182111A	5-way Charger (Australisia)	T.B.A	5-way Charger (Australisia)

Casella Instrumentation and Software is designed, manufactured and serviced by:
Casella CEL.



PC Display

Directory	Data
Pumps Pump 1 Run Folder 1 Run Folder 2 Etc Pump 2 Etc	Highlight Pump or Person for Sample data Start date Start time Volume sampled Collection time Number of events Pump ID/Users name
People Person 1 Person 2 Run Folder 1 Run Folder 2 Etc Etc	Open Sample folder for Event data Start date Start time End time Duration Flow rate Average temp.

Event Properties

- Starting time
- Starting date
- Ending time
- Ending date
- Flow rate
- Average temperature
- Pump on time

Sample Properties

- Overview
- Process
- Sample data
- Calibration
- Analysis
- Analytes
- Miscellaneous

Overview

- Client
- Contract ref.
- Report Number
- Pump ID
- Name
- Serial number
- Location

Process

- Process notes
- Substances

Sample data

- Starting time
- Starting date
- Ending time
- Ending date
- Sample period
- Set flow rate
- Average temp.
- Sample volume

Calibration

- Use calibration data
- Calibrator S/N
- Initial flow
- Final flow
- Sample period

Analysis

- Sample number
- Sample data

Analytes

- Analyte1
- Analyte2
- Etc
- Exposure time

Miscellaneous

- Notes
- Sampled by
- Date
- Audited by
- Date

Highlight Sample folder then right click

Highlight Sample folder then right click

Highlight Event then right click

Delete Properties Report

Delete Properties Report

Company Logo

Company Logo
Print
Print Preview
Copy