Preparation

Please refer to warnings and operation section of HB3294 (Issue 02 or above)before using I.S versions of Apex pumps.

The default settings used by the pump (such as menu language and temperature units) can be specified from within the pump's Configuration Mode.

Control Keys

- \bigcirc Switches the instrument ON/OFF. Press to switch ON, press and hold a moment to cancel a command, press and hold down to switch OFF.
- \bigcirc Scrolls up through options or increases a value, has a hold-down to repeat function.
- \bigcirc Scrolls down through options or decreases a value, has a hold-down to repeat function.
- \bigcirc Press to accept a value or option (for example start the pump). Hold down to stop the pump.

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.
- & I together indicate that the pump is paused, but will start again automatically, for example during TWA or user prepared programs.
- Warning indicates flow outside permitted limits or other error conditions
- Battery condition. The symbol empties as the power is drained.
- °C/°F Instrument temperature (user selectable units). **Indicators & Display Messages**

Green LED Flashes when the motor is running.

- Red LED Flashes when unable to maintain the required flow due to restriction.
- Displayed when the pump has successfully PROGEnd completed a programmed sample

- **BATTFAIL** Warning that the voltage from the battery pack is pelow minimum operating level
- SERV dUE Warning after 2500 hours of operation that the instrument should be serviced.
- When activated sounds warnings and indicates Buzzer kevstrokes

Switch Instrument On / Off

To switch the instrument ON, press and hold O until the instrument display is activated. The display starts to test its segments, shows the pump ID and finally the firmware version number before entering Hold Mode.

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

If the display is too bright or dim, shows messages in an unexpected language or unexpected measurement units, make changes as described in the Configuration Mode section.

To switch OFF, press and hold O. The display will show a count down in seconds until the instrument switches off and the screen becomes blank.

If O is released before the countdown has finished, the instrument returns to its previous mode

Hold Mode

When the instrument is switched ON but the pump is not operating, nor a program being executed, it is in Hold Mode where the display cycles between: **TIME** Accumulated sample time since the instrument was last

reset VOL Accumulated volume sampled since it was last reset.

TEMP Current air temperature.

Manual Reset (Clear Current Sample)

To clear any accumulated sample duration and volume, the instrument must be in Hold Mode. Press \bigcirc or \bigcirc sufficient times to make \bigstar blink on the

display

Press and hold Θ until **CLR** and the countdown disappear, to clear the accumulated values

Set Flow (Single Point Calibration)

Attach a sampling head and flow tube or other flow-measuring device to the pump's inlet nozzle to measure the actual flow. In Hold Mode, press \bigcirc or \bigcirc several times until **FLOW SEt** blinks on the display. Press Θ to select.

Use O and O to set the flow required at this calibration

point, then press Θ to accept the setting. The pump will start.

A soon as **CAL SEt** is displayed, use \bigotimes and \bigotimes to adjust the actual flow measured by the flow tube to match the set point, then press Θ to accept the value.

This calibration point will be saved and used by the pump in all future samples made at this flow.

To return to Hold Mode without setting a new flow, press igodotand hold for a moment.

If the calibration is not completed within 30 seconds, the pump will revert to Hold Mode automatically.

When basic settings are acceptable, proceed directly to the Manual Sampling section, if not acceptable, go to Configuration Mode

Configuration Mode

This mode allows basic settings to be changed. It can be activated only while switching the instrument on

Press O to switch on, then immediately hold both O and Odown. After a brief display test, the first configuration option is displayed.

LANG Sets the display language (the currently set language blinks

Use O or O to change then press O to accept. TEMP Sets temperature display (current units blink). Use \bigcirc or \bigcirc to change between Centigrade and Fahrenheit, then press Θ to accept.

VOL Sets volume display mode (current mode blinks). Use \bigcirc or \bigcirc to change between Auto or m³.

Set Flow (Single Point Calibration)

blinks on the display. Press Θ to select.

then press \bigcirc to accept the value.

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If the calibration is not completed within 30 seconds, the pump

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Press O to switch on, then immediately hold both O and Odown. After a brief display test, the first configuration option is

LANG Sets the display language (the currently set language

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Fahrenheit, then press 😔 to accept.

VOL Sets volume display mode (current mode blinks).

Use \bigcirc or \bigcirc to change between Auto or m³.

Use \bigcirc or \bigcirc to change then press \bigcirc to accept.

Use \bigcirc or \bigcirc to change between Centigrade and

activated only while switching the instrument on

device to the pump's inlet nozzle to measure the actual flow.

Use \bigotimes and \bigotimes to set the flow required at this calibration

Auto displays volumes below 1000 litres in litre this the display changes to m³

- m³ always displays volumes in m³. BUZZEr Allows an audible alarm to be set.
 - Use \bigotimes or \bigotimes to change between:
 - OFF, no buzzer,

Err, any error sounds an alarm, On, any error or key press sounds an alarm.

PROG Mode Determines whether the program feature Apex Pro are to be made available Use \bigcirc or \bigcirc to change between: ON with the program features available, OFF with the program features hidden.

Press \varTheta to accept.

LIFE Is read-only and shows total run time for the pu This can be used to determine suitable mainte schedules for the instrument. Press 🕀 to move on.

LCD Sets LCD contrast (current level blinks). Use to increase the value (make darker) and decrease it (make lighter). Press \varTheta to accept.

CAL SET Activates Calibration Mode, allowing the pu calibrated range to be reset. Use \bigcirc or \bigcirc to change between

> $\ensuremath{\text{NO}}$ - do not recalibrate the pump, then press revert to Hold Mode,

YES - recalibrate the pump, press Θ to enter calibration Mode and proceed to Calibrating Th

Manual Sampling

While in Hold Mode, press Θ to start sampling and ϵ Mode

In Run Mode the display cycles between, current dura the sample, volume sampled, and air temperature

Preparation

Please refer to warnings and operation section of HB3294 (Issue 02 or above) before using I.S versions of Apex pumps

The default settings used by the pump (such as menu language and temperature units) can be specified from within the pump's Configuration Mode.

Control Keys

- \bigcirc Switches the instrument ON/OFF. Press to switch ON, press and hold a moment to cancel a command, press and hold down to switch OFF.
- \bigcirc Scrolls up through options or increases a value, has a hold-down to repeat function
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- \bigcirc Press to accept a value or option (for example start the pump). Hold down to stop the pump.

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.
- & I together indicate that the pump is paused, but will start again automatically, for example during TWA or user prepared programs.
- Warning - indicates flow outside permitted limits or other error conditions.
- Battery condition. The symbol empties as the power is drained
- °C/°F Instrument temperature (user selectable units). **Indicators & Display Messages**

Green LED Elashes when the motor is running

- Red LED Flashes when unable to maintain the required flow due to restriction.
- **PROGEnd** Displayed when the pump has successfully completed a programmed sample

- **BATTFAIL** Warning that the voltage from the battery pack is below minimum operating level SERV dUE Warning after 2500 hours of operation that the
- instrument should be serviced Buzzer When activated sounds warnings and indicates keystrokes.

Switch Instrument On / Off

To switch the instrument ON, press and hold igodot until the instrument display is activated. The display starts to test its segments, shows the pump ID and finally the firmware version number before entering Hold Mode.

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

If the display is too bright or dim, shows messages in an unexpected language or unexpected measurement units, make changes as described in the Configuration Mode section

To switch OFF, press and hold O. The display will show a count down in seconds until the instrument switches off and the screen becomes blank.

If \bigcirc is released before the countdown has finished, the instrument returns to its previous mode.

Hold Mode

clear the accumulated values.

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

- TIME Accumulated sample time since the instrument was last reset
- VOL Accumulated volume sampled since it was last reset. TEMP Current air temperature.

Manual Reset (Clear Current Sample)

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

Press \bigcirc or \bigcirc sufficient times to make \bigstar blink on the

Press and hold Θ until **CLR** and the countdown disappear, to

es, above	To stop sampling while the pump is in Run Mode, press and hold until the symbol stops blinking and disappe The instrument will save the accumulated duration and volu sampled until manually reset.	
	Flow Restriction	
ures of an	If the input flow is restricted, both A and the Red LED will flash (and when activated the buzzer sound) to indicate a problem. If 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. If the problem remains for another eight seconds, the pump will switch off	
	and remain off.	
ump.	If the output flow is restricted, both (25) and the Red LED will flash (and when activated the buzzer sound) to indicate a problem. If the problem lasts for three or more seconds, the pump motor will switch itself off and remain off.	
enance	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.	
nd 🛇 to	Use With Low Flow Adaptor	
	This enables the instrument to be used with sorbent tubes at flows down to 5 millilitres/min	
ump's	Connect the inlet of an Apex unit to a flowmeter such as the Dry Cal and calibrate the flow rate to 1.5 litre/min.	
to	Storp the pump and discommettine nowineter. 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.	
r	Break both ends off a sorbent tube and put it in the holder with the arrow pointing towards the pump.	
ne Pump.	Start the pump and adjust the flow to the required rate using the screw on the side of the low flow adaptor.	
antar Dun	Perform the measurements using a fresh sorbent tube.	
enter hun	Bag Mode	
ation of	This allows the pump to fill a gas bag and stop automatically when the bag is full. Connect the gas bag to the pump outlet.	

BUZZ	Auto displays volumes below 1000 litres in litres, above this the display changes to m ³ . m ³ always displays volumes in m ³ . Er Allows an audible alarm to be set.	To stop sampling while the pump is in Run Mode, press and hold \bigoplus until the \prod symbol stops blinking and \blacktriangleright disappears. The instrument will save the accumulated duration and volume sampled until manually reset.
Use \bigotimes or \bigotimes to change between:		Flow Restriction
PROG	OFF , no buzzer, Err , any error sounds an alarm, On , any error or key press sounds an alarm. Mode Determines whether the program features of an Apex Pro are to be made available. Use \bigcirc or \bigcirc to change between: ON with the program features available,	If the input flow is restricted, both \triangle and the Red LED will flash (and when activated the buzzer sound) to indicate a problem. If 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. If the problem remains for another eight seconds, the pump will switch off and remain off.
LIFE	OFF with the program features hidden. Press ⊕ to accept. Is read-only and shows total run time for the pump. This can be used to determine suitable maintenance schedules for the instrument. Press ⊕ to move on. Sets LCD contrast (current level blinks).	If the output flow is restricted, both A and the Red LED will flash (and when activated the buzzer sound) to indicate a problem. If the problem lasts for three or more seconds, the pump motor will switch itself off and remain off. 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.
	Use ⇔ to increase the value (make darker) and ♥ to decrease it (make lighter). Press ⊕ to accept.	Use With Low Flow Adaptor This enables the instrument to be used with sorbent tubes at flows down to 5 millilitres/min.
CALS	 SET Activates Calibration Mode, allowing the pump's calibrated range to be reset. Use or to change between: NO - do not recalibrate the pump, then press to revert to Hold Mode, Or, YES - recalibrate the pump, press to enter calibration Mode and proceed to Calibrating The Pump. 	Connect the inlet of an Apex unit to a flowmeter such as the Dry Cal and calibrate the flow rate to 1.5 litre/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. Break both ends off a sorbent tube and put it in the holder with the arrow pointing towards the pump. Start the pump and adjust the flow to the required rate using the percent of the flow flow adaptor.
Man	ual Sampling	Perform the measurements using a fresh sorbent tube
While Mode.	in Hold Mode, press 🕀 to start sampling and enter Run	Bag Mode
In Run the sar	Mode the display cycles between, current duration of mple, volume sampled, and air temperature.	I his allows the pump to fill a gas bag and stop automatically when the bag is full. Connect the gas bag to the pump outlet.

Select Set Flow then set the flow to less than 0.8 litre/min to activate the mode

In Bag Mode, the display shows **BAG**. The speed of the pump motor is fixed and the display shows only percentage flow, with no volume or time information.

Once the pump has started, \bigotimes or \bigotimes may be used to change the flow rate to a different percentage.

Fixed Duration Sampling (DUR)

The duration of a sample can be selected from the instrument keypad. On the Apex Pro it can also be selected via Pump

This mode allows the pump to sample for a fixed period and switch off automatically when the period has ended. This is useful when a stated volume of air must be sampled over a long period.

In Hold Mode press \bigcirc or \bigcirc several times until **DUR** blinks on the display. Press Θ to select.

The programmed duration blinks to indicate it can be changed by O and O. Run durations between 3 minutes and 1 hour can be set in 1-minute steps, and durations between 1 and 25 hours in 10-minute steps.

Press 🕀 to accept a 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 sample time, volume sampled, air temperature, and programmed duration. Once completed, the pump will switch off and the display show and a **PROGEnd** message.

Press any key to return the pump to Hold Mode.

Locking The Keypad

The keypad may be partially or fully locked to prevent unauthorised tampering with instrument settings.

Press 🖤 three times within 2 seconds to activate Partial Lock

Mode at any time. The *symbol* is displayed, the counters and flow cannot be changed but the following options remain available: start/stop sampling, switch the pump off, unlock



Select Set Flow then set the flow to less than 0.8 litre/min to activate the mode

In Bag Mode, the display shows **BAG**. The speed of the pump motor is fixed and the display shows only percentage flow, with no volume or time information

Once the pump has started, \bigotimes or \bigotimes may be used to change the flow rate to a different percentage.

Fixed Duration Sampling (DUR)

The duration of a sample can be selected from the instrument keypad. On the Apex Pro it can also be selected via Pump Manager software

This mode allows the pump to sample for a fixed period and switch off automatically when the period has ended. This is useful when a stated volume of air must be sampled over a long period.

In Hold Mode press \bigcirc or \bigcirc several times until **DUR** blinks on the display. Press Θ to select.

The programmed duration blinks to indicate it can be changed by \bigotimes and \bigotimes . Run durations between 3 minutes and 1 hour can be set in 1-minute steps, and durations between 1 and 25 hours in 10-minute steps.

Press \varTheta to accept a 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 sample time, volume sampled, air temperature, and programmed duration. Once completed, the pump will switch off and the display

show and a **PROGEnd** message.

Press any key to return the pump to Hold Mode

Locking The Keypad

The keypad may be partially or fully locked to prevent unauthorised tampering with instrument settings.

Press O three times within 2 seconds to activate Partial Lock

Mode at any time. The is symbol is displayed, the counters and flow cannot be changed but the following options remain available: start/stop sampling, switch the pump off, unlock

Partial Lock, and select Full Lock. (Press D three times within 2 seconds to unlock.

Only when the PUMP IS RUNNING, press O three times again within 2 seconds while in Partial Lock Mode to activate Full Lock Mode. The is symbol is displayed, the pump cannot be switched off and the only option available is to release Full Lock Mode by pressing O three times within 2 seconds.

TWA Sampling (Apex Pro only)

This feature is available only when the Apex Pro Program Mode has been enabled from within Configuration Mode. This allows the pump to operate for a fixed percentage of a specified sample time. The instrument calculates the required on/off cycle automatically to spread the total exposure time over the entire sample time (as shown).

In Hold Mode press O or O several times until **TWA** blinks on the display. Press 🕀 to select.

RUN is displayed and the sample time blinks to indicate that it can be changed by \bigotimes and \bigotimes . Run times between 3 minutes and 1 hour can be set in 1-minute steps, and times between and 25 hours in 10-minute steps.

Press Θ to accept a sample time.

EXP is displayed, and the exposure time blinks to show it can be changed by \bigotimes and \bigotimes .

The available range is 2 minutes to 1-minute-less-than-the-runtime, in 1-minute steps.

Press Θ to accept an exposure time and start sampling. In addition to the usual and II symbols the display shows PROG. to indicate that a program is active.

The pump exposure (on) times are fixed at 1 minute, and the instrument calculates the necessary off-times to spread these 1 minute intervals throughout the sample time. While the program is running, the display cycles through current accumulated sample time, volume sampled, air temperature and calculated TWA (as percentage of run time)

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



Once the sample is completed, the pump will switch off and the display show the **I** symbol and a **PROGEnd** message Press any key to return to Hold Mode.

User Program Modes (Apex Pro only)

This feature is available only when the Apex Pro Program Mode has been enabled from within Configuration Mode. For more comprehensive information, please refer to the User Handbook. This allows complex sampling schedules (created by the user in Pump Manager PC software and downloaded via the infrared link) to be run by the pump. The programs are stored in two user program areas **Pr1** and **Pr2**.

In Hold Mode_ repeatedly press \bigcirc or \bigcirc until **Pr1** or **Pr2** blink. Press 🕑 to select the program.

The various steps in the program can be viewed using \bigotimes and . Press $igodoldsymbol{\Theta}$ 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 operating) and are displayed to show the unit is paused. Once the run is completed, the display will show the

symbol and a **PROGEnd** message

Press any key to return the pump to Hold Mode

To terminate the program early, press and hold Θ to show the STOP option, keep pressed until the pump reverts to Hold Mode

Calibrating The Pump

This procedure changes the basic calibration for the entire flow range of the pump.

As the pump will have been accurately calibrated at the factory, DO NOT undertake this procedure without first referring to the Users Handbook

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

Casella CEL

Regent House Wolselev Road Kempston Bedford MK42 7JY U.K. Phone: +44 (0)1234 844 100 +44 (0)1234 841 490 Fax: E-Mail: info@casellacel.com Web[.] www.casellacel.com

Casella USA

17 Old Nashua Road #15 Amherst NH 03031 U.S.A. Toll Free:+1 800 366 2966 Phone: +1 603 672 0031 Fax: +1 603 672 8053 E-mail: info@casellaUSA.com Web: www.casellaUSA.com

www.casellagroup.com Think environment Think Casella

Partial Lock, and select Full Lock. (Press O three times within 2 seconds to unlock.)

Only when the PUMP IS RUNNING, press O three times again within 2 seconds while in Partial Lock Mode to activate Full Lock Mode. The symbol is displayed, the pump cannot be switched off and the only option available is to release Full Lock Mode by pressing O three times within 2 seconds.

TWA Sampling (Apex Pro only)

This feature is available only when the Apex Pro Program Mode has been enabled from within Configuration Mode This allows the pump to operate for a fixed percentage of a specified sample time. The instrument calculates the required on/off cycle automatically to spread the total exposure time over the entire sample time (as shown).

In Hold Mode press \bigcirc or \bigcirc several times until **TWA** blinks on the display. Press \varTheta to select.

RUN is displayed and the sample time blinks to indicate that it can be changed by \bigotimes and \bigotimes . Run times between 3 minutes and 1 hour can be set in 1-minute steps, and times between 1 and 25 hours in 10-minute steps.

Press Θ to accept a sample time.

EXP is displayed, and the exposure time blinks to show it can be changed by \bigotimes and \bigotimes .

The available range is 2 minutes to 1-minute-less-than-the-runtime, in 1-minute steps.

Press Θ to accept an exposure time and start sampling. In addition to the usual and II symbols the display shows **PROG.** to indicate that a program is active.

The pump exposure (on) times are fixed at 1 minute, and the instrument calculates the necessary off-times to spread these 1 minute intervals throughout the sample time. While the program is running, the display cycles through current accumulated sample time, volume sampled, air temperature and calculated TWA (as percentage of run time).

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



Once the sample is completed, the pump will switch off and the display show the symbol and a **PROGEnd** message Press any key to return to Hold Mode

User Program Modes (Apex Pro only)

This feature is available only when the Apex Pro Program Mode has been enabled from within Configuration Mode. For more comprehensive information, please refer to the User Handbook This allows complex sampling schedules (created by the user in Pump Manager PC software and downloaded via the infrared link) to be run by the pump. The programs are stored in two user program areas Pr1 and Pr2

In Hold Mode, repeatedly press O or O until Pr1 or Pr2 blink. Press 🕀 to select the program.

The various steps in the program can be viewed using \bigotimes and \odot . Press Θ to accept the program and start it running.

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

During off-times (when the motor is not operating) and are displayed to show the unit is paused. Once the run is completed, the display will show the

symbol and a **PROGEnd** message. Press any key to return the pump to Hold Mode

To terminate the program early, press and hold Θ to show the

STOP option, keep pressed until the pump reverts to Hold Mode

Calibrating The Pump

This procedure changes the basic calibration for the entire flow range of the pump.



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Regent House Wolseley Road Kempston Bedford MK42 7.JY U K Phone: +44 (0)1234 844 100 +44 (0)1234 841 490 Fax: E-Mail: info@casellacel.com Web: www.casellacel.com

Casella USA

17 Old Nashua Road #15 Amherst NH 03031 U.S.A. Toll Free:+1 800 366 2966 Phone: +1 603 672 0031 Fax: +1 603 672 8053 E-mail: info@casellaUSA.com Web: www.casellaUSA.com



Anex & Anex Pro Sampling Pumps HB3295 -02/Jan 05





FIELD GUIDE for Apex & Apex Pro Personal Air Sampling Pumps (I.S & non I.S versions)



Apex & Apex Pro Sampling Pumps HB3295-02/Jan 05