# CMP6050

## OPERATOR'S MANUAL

Software Version 4.06

At Conviron we develop and implement innovative and reliable controlled environment solutions.

CMP6050

CONVIRON®

229245R06

# CMP6050

## OPERATOR'S MANUAL

**PLEASE READ THESE INSTRUCTIONS CAREFULLY AND COMPLETELY BEFORE OPERATING.**

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# PREFACE

Welcome to the Operator's Manual for Conviron's CMP6050 Control System. This Manual has been developed to assist with the setup and daily operation of the CMP6050. The Manual is provided to all clients who have purchased a chamber(s) containing the new CMP6050 control system.

The Manual has been designed to provide sufficient detail for the majority of chamber configurations, including a structured format that provides step-by-step instructions. Clients will find sufficient detail for a typical installation including figures, diagrams, and graphics to operate the chamber without issue. However, given that many installations are specific to each facility and that facilities may have unique requirements, additional information or assistance from Conviron may be required. In such cases, contact information is provided on the following page.

The CMP6050 has a security feature to manage Users' level of access. This feature requires all Users to be set-up with the appropriate access as determined by the facility manager/ security administrator (up to 3 User ID passwords can be assigned). Once this is completed (and provided Security is turned on), Users are required to login. This is to ensure that Program modifications are made by authorized personnel only. The Administrator can override all Users and can access all programming functionality with the exception of features set at the factory.

The CMP6050 offers three password-protected security levels:

- Users (Access Level 1)
- Administrators (Access Level 2)
- Factory (Access Level 3)

Security Access levels associated with various features are identified throughout this manual and listed in Section 7.0. The CMP6050 is shipped with security features turned Off. This enables any User to start the chamber and become familiar with the chamber controls without having to enter a password.

It is recommend that a security Administrator be assigned to administer User login authority and that security features be added as soon as possible.

This equipment is only to be used by authorized personnel – that is, personnel who have been trained on the proper use of the equipment and who have read this manual.

The manual incorporates CMP6050 software version 4.06.

# SERVICE AND TECHNICAL SUPPORT

Conviron welcomes the opportunity to provide assistance and to answer any technical questions related to the start-up, use and general technical support and troubleshooting of the CMP6050 control system. Before contacting Conviron, please check the following:

- Read this Operator's Manual in its entirety for information about the feature(s) with which you are experiencing trouble.
- If you are having a problem using your CMP6050, pay particular attention to the relevant section and the pertinent information in this manual, and use the information to diagnose and correct the problem. If the problem persists and/or you require additional assistance, please collect the following information prior to contacting Conviron:
    - The serial number of the chamber which is located on the rating plate on the side of the chamber and at the  icon.
    - The software version number of the CMP6050. Instructions for obtaining the CMP6050 software version number are provided in Section 4.0 Main Status Screen under the Information Icon.
    - A description of the problem.
    - A description of what you were doing before the problem occurred.


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# 1.0 PRECAUTIONS

The following symbols are used throughout this manual to draw your attention to important warnings, guidelines and product information. Please take note of their respective meanings.

 Hazard Warning

 Important Information

 Dangerous Electrical Current

 Please Note

 Hot Surface

 Grounding Mark

 Slippery Surface

 Caution, Moving Parts

Please note the following Hazard warnings before operating this equipment:

- This equipment is only to be operated and maintained by authorized personnel - that is, personnel who have been trained on the proper operation and/or maintenance of the equipment and who have read this manual.
- If in doubt about safe operation and/or maintenance of the equipment, contact the responsible party immediately.
- Prior to operating, users should conduct a visual inspection of the equipment and surrounding area by walking around the unit and checking both inside and outside to ensure no debris or obstacles are present that could pose a safety hazard. If operators see a potential hazard (e.g. water accumulating on the floor which could be slippery, an obstruction that would prevent the door from opening/closing properly) they should take appropriate steps such as alerting service personnel.
- Before starting, the operator should ensure that all electrical boxes are in the closed position and that no one is present in the chamber – either servicing or working within/on the unit.
- Ensure that no one is using or could activate the room remotely during operation or maintenance activities.
- Avoid water coming in contact with the electrical components, as it presents a risk of water damage to both high and low voltage electrical components. If you have any doubt of safe watering practices, contact Conviron.
- When a Schedule is **not** running, Alarms are disabled! No one other than a single, designated on-site service technician should be operating the chamber. Altering output parameters to troubleshoot a chamber, while others are handling mechanical or electrical systems within the chamber, COULD BE HAZARDOUS AND MAY RESULT IN PERSONAL INJURY. As such, manipulation of output parameters must be performed with either a qualified service technician present or via phone support with Conviron's Technical Services group.

- Qualified trades-people such as electricians, plumbers, refrigeration mechanics, etc. should perform all work as required by local codes and regulations.
- Central Management™ (CM) is an optional feature. If CM is being used it becomes inextricably linked to the use of the Controller and therefore, both the Central Management manual and the Controller Operators Manual must be read and understood in their entirety prior to operation.

- Working with high voltage will be required when installing this equipment. Do NOT attempt this work unless you have the appropriate knowledge and experience. Take appropriate safety precautions and ensure that the building power supply to the chamber is off prior to installation.
- The main terminal in the control panel has live voltage unless the external breaker is OFF. Use extreme caution when working in the control panel to prevent injury.
- Water that could come in contact with the electrical components presents a high voltage hazard. Avoid these conditions. If you have any doubt of safe watering practices, contact Conviron.
- Controller may come equipped with an optional Uninterrupted Power Supply (UPS) such that power will remain live for a period of time even if the power supply is turned OFF. Use extreme caution when working on the control panel to prevent injury. If you have any doubts as to whether your unit comes equipped with a UPS, contact Conviron.
- Inside the control panel is an independent temperature shut-off device called the ir33. This ir33 acts as a secondary fail-safe protector that shuts off the chamber if its temperature limits are exceeded. The ir33 is set by Conviron and is factory protected (requires Access Level 3). The factory default setting for the ir33 temperature limit is ten degrees beyond the chamber operating range. The standard operating range of a chamber is +4˚C to +45˚C while the standard ir33 shut down settings are -6˚C to +55˚C depending on the size of the chamber, size of the compressor and other factors. Always verify, when changing the (Alarm) Temperature within the 6050 setup, that the limits are still within the minimum and maximum operating limits for the Chamber. This will ensure that the ir33 only triggers in the event that the actual temperature exceeds the Chamber's minimum or maximum temperature limit by 10 degrees. It will also ensure that the ir33 does not trigger before a high or low temperature tracking alarm. The ir33 is located inside the control panel where there is live high voltage. Contact Conviron Client Services for more information or help if necessary.

- Surfaces and lighting may become hot during operation. Always take appropriate precautions and do not operate if users will remain inside the chamber for more than a few minutes unless adequate shielding or other safety precautions are taken. NOTE: HID lamps can cause serious skin burn and eye inflammation from short-wave ultraviolet radiation if the lamp envelope is punctured or broken.

- Operators should note that water may accumulate on the floor which could be slippery and pose a safety hazard. Always ensure floors remain dry and wear non-slip footwear.

# 2.0 INTRODUCTION TO THE CMP6050 CONTROL SYSTEM

## 2.1 An Overview of the CMP6050

The CMP6050 is configured at the factory and offers a wide array of set-up, control and alarm features to fine tune the configuration on site. The scalability of the CMP6050 accommodates additional Input/Output ports if necessary. This flexibility enables users to add sensors allowing the CMP6050 to adapt when changing or modifying experiments.

The CMP6050 control system consists of three primary components:

- **Controller**
- **Display**
- Control system **Software**.

### 2.1.1 Controller

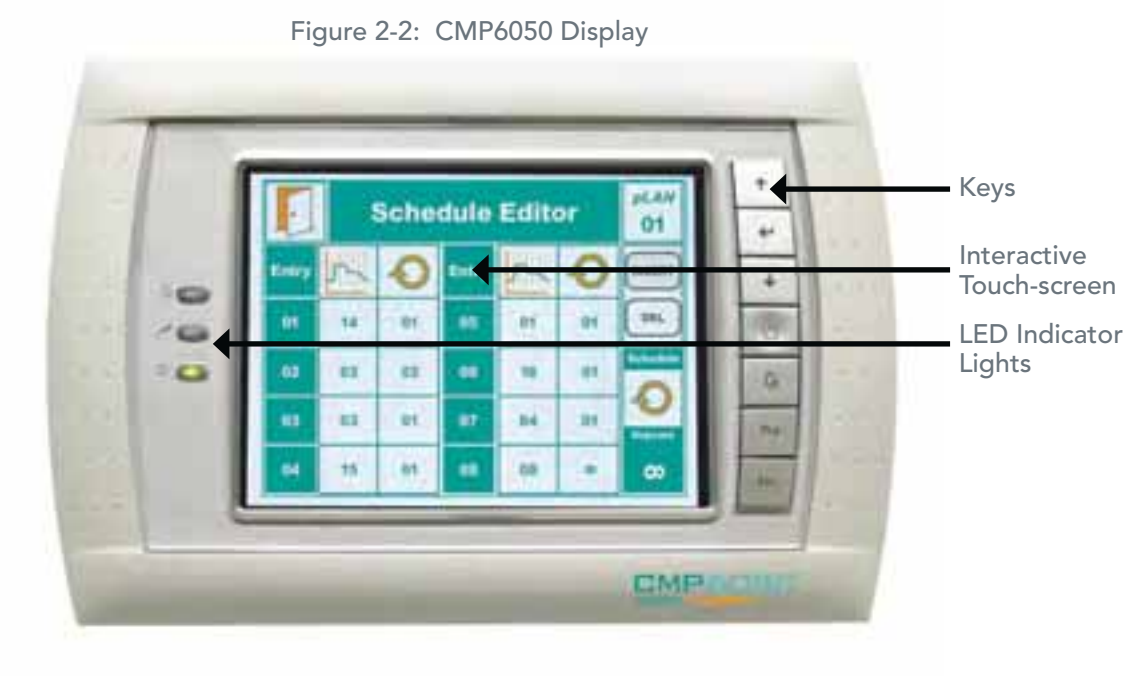
The **Controller** (Figure 2-1: CMP6050 Controller) is mounted inside the chamber's control cabinet and comprises the actual Programmable Logic Controller (PLC). The controller's job is to monitor the control parameters and adjust the outputs to coincide with the User's programs/ schedule. The controller also notifies the User with alarms when parameters, for any number of reasons, deviate outside of specified limits.


Figure 2-1: CMP6050 Controller

### 2.1.2 Display

The **Display** (Figure 2-2) provides the interface to the control system using a LCD (Liquid Crystal Display) touch screen and push-button keys. There are also three LED indicator lights on the Display which are used for notifying the User of various conditions.

Figure 2-2: CMP6050 Display




The touch-screen Display provides access to the following functions:

- Programming and Scheduling
- Alarm
- Security
- Logging
- Graphing
- Service

Information on the touch screen is easy to read because the screen is backlit. Icons are touch-activated and initiate a controller action when they are tapped (or activated with the stylus).

### 2.1.3 Software

The controller **Software** is installed into the controller by Conviron prior to shipping and facilitates interaction with, and control of, the chamber. Like other software products, CMP6050 software carries a version number. Accessing the installed software version number for the controller is described in Figure 3-2, under the Information Icon.

## 2.2 General Specifications

CMP6050 control system is a robust industrial grade PLC control system designed for a wide range of controlled environment applications:

- The display uses a 6-inch touch-screen LCD
- Alarms are color-coded directly on the screen making alarm conditions quick to identify and resolve
- Temperature set-point changes can be set in either STEP or global RAMP (gRAMP) mode. Humidity, light, and $CO_2$ set-point changes can be set in STEP mode only
- A default Status screen amalgamates set points and actual conditions into a single, concise dashboard for easy viewing and improved chamber management.

## 2.3 Local Control Interface - Programming and Scheduling

- Touch-screen LCD
- Real-time clock programming of control variables
- Can store a maximum of 16 real-time, user-entered programs
- Can store up to 48 timelines per program (with one minute resolution)
- Programs are then entered into the schedule (a sequence of up to 8 program entries) to create a single day, multi day, seasonal or infinite schedule
- Temperature transitions set as either STEP or gRAMP mode
- Humidity, light and $CO_2$ transitions are set on STEP mode.

## 2.4 Data Logging and Management

Log data for the CMP6050 can be viewed two ways: locally at the control system interface, or remotely via a network-connected PC.

### 2.4.1 Local Data

- The data available at the local control interface includes main chamber variables – temperature, humidity, lighting, and $CO_2$ (if applicable).
- Parameters are all logged automatically by the controller every 18 seconds.
- Data can be accessed with up to five days of history.
- Trend graphs can be viewed directly on the local control interface for both set-point and actual values (only inputs).
- Zoom and Pan functions provide additional visualization tools allowing the User to precisely and accurately view and assess the data.

### 2.4.2 Remote Data

- The data available remotely is more substantial and includes every input and output parameter being monitored and controlled.
- Data is logged automatically by the controller every 18 seconds regardless of the number of parameters. This provides unprecedented data resolution for the User while it also benefits service personnel.
- Log data is accessed in several ways:
  a. A network-connected PC
  b. An internet-enabled PC
  c. Conviron's Central Management system (Optional)

## 2.5 Alarms

- Audible and color-coded visual alarms are provided.
- User-settable absolute alarms for all controlled processes.
- User-settable process tracking alarms for temperature (in gRAMP or vRAMP mode) are available for the User to determine how tightly to monitor the experiment.
- User-settable process for disabling a controlled process, and thus alarms, at any time while a program is running.

## 2.6 Security

CMP6050 security is divided into three password-protected levels:

| | |
|---|---|
| **Users** | Access Level 1 |
| **Administrators** | Access Level 2 |
| **Factory** | Access Level 3 |

## 2.7 Start-up Delay

At start-up, CMP6050 controllers randomly select delay times between 0 and 59 seconds (by default) to reduce start-up loads after a power failure. This delay time can also be programmed by the User (reference Section 8-3: (Chamber) Start-up Delay).

## 2.8 Communications

Ethernet connectivity is delivered with every controller. The controller is shipped communications-ready and requires set-up at the facility by a network administrator or other qualified personnel. (Note: Connectivity is optional on the Adaptis product family).

## 2.9 Auxiliary Contacts

The controller has 13 auxilliary hi/low digital outputs that can be used to for basic control of additional equipment.

## 2.10 Central Alarm Contact

A normally closed dry contact energized by the controller alarm output for connection to a Building Management System (BMS) or optional auto dialer. When an alarm condition occurs, the normally closed contact opens, interrupting the circuit from the BMS (or other system) to indicate an alarm. Only triggered by shut-down alarms (see Section 6.0 Alarm Screen).

## 2.11 Optional Accessories

AUX: Programmable Output provides an auxiliary switch, terminated in the control panel, for timed control of automatic watering, nutrient dosing, etc. Auxiliary outputs can be binary (on/off) and/or time based (01-9999 seconds).

SEN: Thermistor temperature sensors available in 10ft (3m), 30ft (10m) and 50ft (15m) lengths. Consult Conviron for more information.

ADIAL: An automatic telephone dialing system (autodialer) to notify the User of a chamber alarm. Note that this requires Conviron's Central Management™ system, which is sold as a separate product. Consult Conviron for more information.

VAR: There are two process control modes which govern the way in which chamber processes (temperature, humidity, light, $CO_2$) transition between set points. The default process control mode set at the factory – called BASIC – is to control temperature in STEP or global ramp (gRAMP) mode while all other processes are controlled in STEP mode. Clients do have the option to independently control chamber processes (humidity, light and $CO_2$) in either STEP or variable ramp (vRAMP) mode – called VAR.

## 2.12 Process Control Modes: BASIC and VAR

Programs are lists of timelines, with each timeline specifying target set points for all controlled processes (temperature, light, humidity, and $CO_2$, if equipped). There are three different ways the chamber can transition between target set points: step (STEP), global ramp (gRAMP) and variable ramp (vRAMP). The control mode (BASIC or VAR) determines which of these transition modes (step, gRAMP, vRAMP) are available to the User (Figure 2-3: Process Control Modes, Figure 2-4: Process Transition Modes). Further information about setting transition modes can be found in Section 5.4.4.1 Process Transition Mode – RAMP vs STEP.

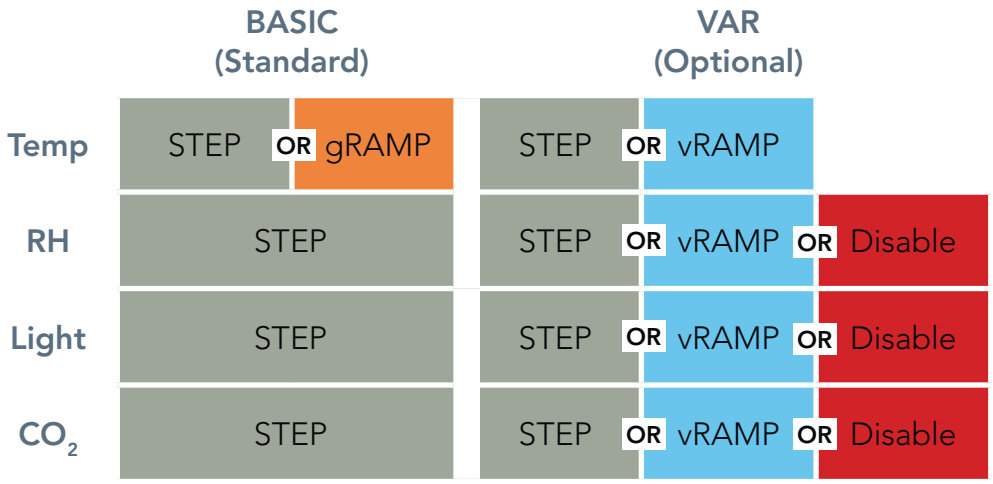



Figure 2-3: Process Control Modes

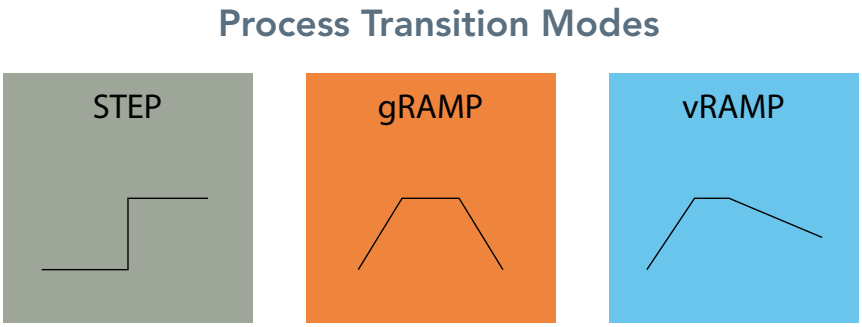



Figure 2-4: Process Transition Modes

To determine the process control mode, tap the information icon in the upper left corner of the Main Status screen (see Figure 4-1) to access the Information screen (Figure 2-5).

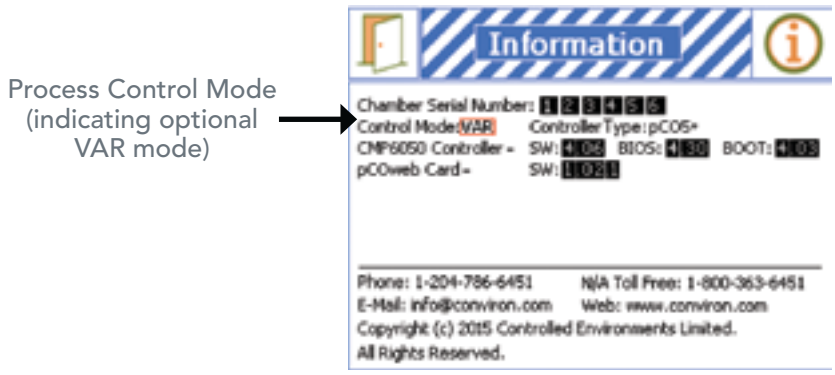



Figure 2-5: Information Screen

### 2.12.1 STEP Transition

- STEP transitions are available for all temperature, humidity, light, and $CO_2$ in both BASIC and VAR control modes. In this transition mode, the chamber increases or decreases the process as fast as the chamber is mechanically capable (see Figure 2-6).

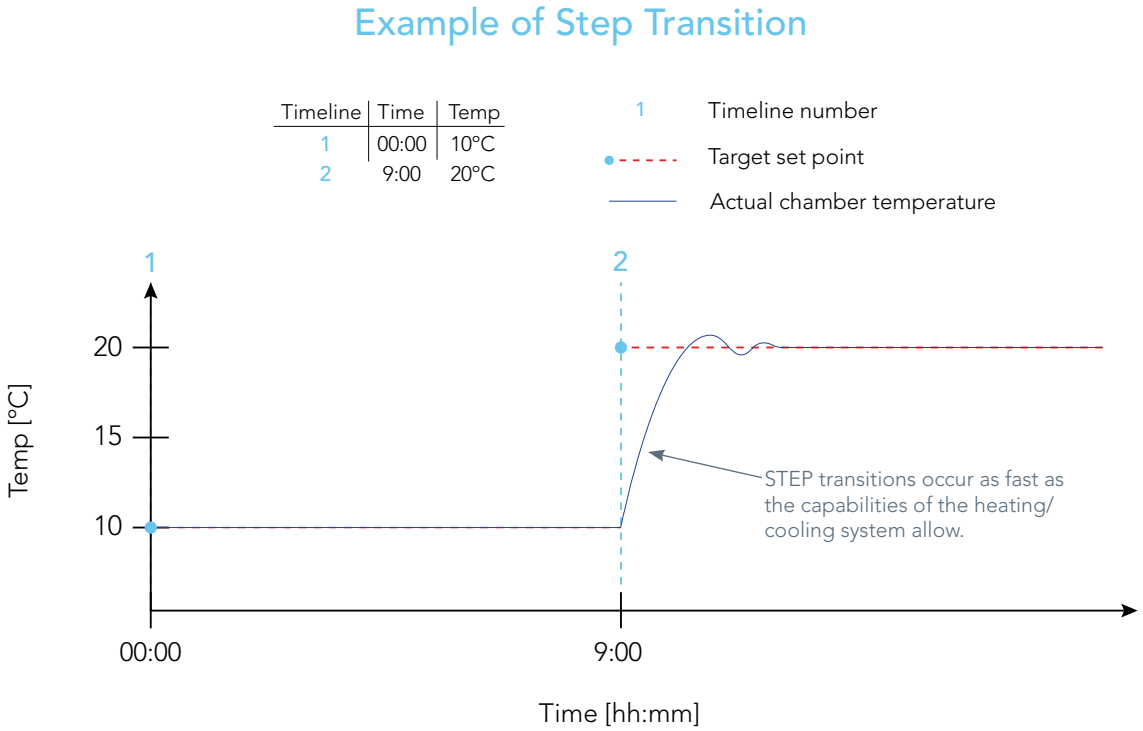



Figure 2-6: Example of Step Transition

### 2.12.2 Global Ramp Transition (gRAMP):

- gRAMP transitions are only available for temperature (see Figure 2-3). In this mode the chamber increases or decreases temperature at a defined rate selected by the operator ([x]min/[1°C]), referred to as the global ramp rate (see Figure 2-7).
- Only one global ramp rate is possible at any time. This rate may be changed by the User, but all temperature transitions in all programs in the schedule will occur at this global rate. The global ramp rate is set by the operator in the **Schedule --> Preferences** screen (see Section 5.4.4 Preferences)
- The default ramp rate set at the factory is 4min/°C, which is the maximum (fastest) global ramp rate possible.
- When a timeline specifies a new target set point, temperature begins to change until it reaches that target set point temperature, encounters another timeline with a different target set point temperature, or the program ends.
- In order to ensure the temperature achieves its target set point **at a specific time**, the operator must calculate the amount of time required for the temperature to reach that target set point from its previous set point based on the global ramp rate.

  In the example below, the transition from 10°C to 20°C at 4min/°C requires: (magnitude of change in process set point values) x (ramp rate in mins per degree) = (20 - 10) * (4) = **40min**. This means that to arrive at 20°C by 9:00, the time line specifying the 20°C target set point value must occur at 8:20.

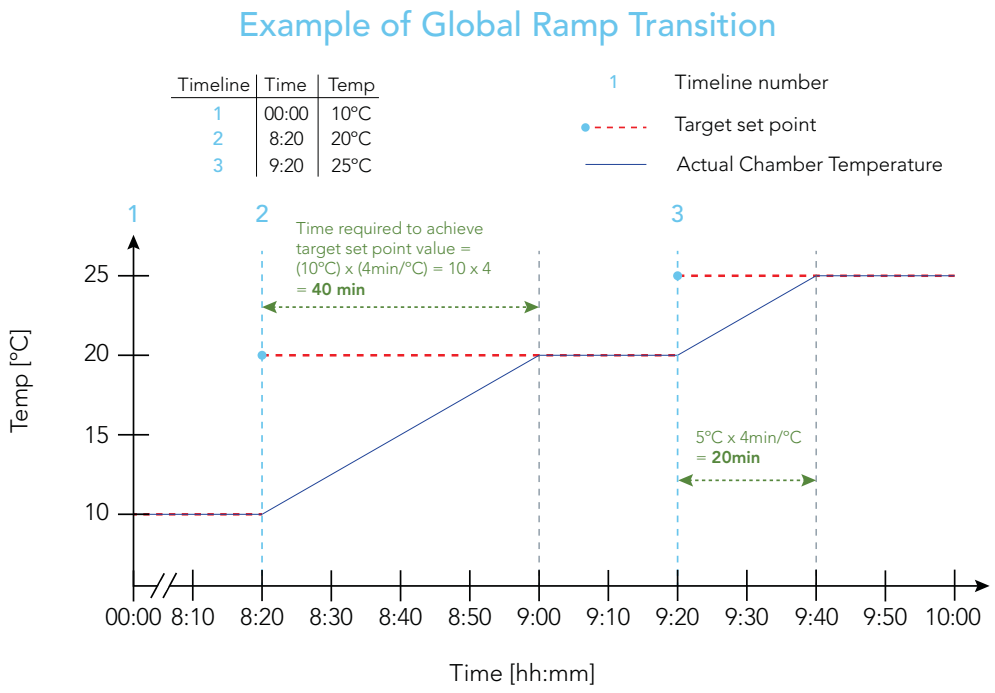



Figure 2-7: Example of Global Ramp Transition

### 2.12.3 Variable Ramp Transition (vRAMP):

- vRAMP transitions are available for temperature, humidity, light, and $CO_2$ processes (see Figure 2-3). In this mode the chamber changes the process at a linear rate between timeline target set points. This allows the User to program ramp transitions with many different ramp rates in the same program (see Figure 2-8).
- The ramp rate is determined automatically by the controller based on the amount of time between timelines and the magnitude of change between process set points specified by those timelines, eliminating the need for the User to set the ramp rate.
- Each transition requires two timelines: One to specify the start of the transition, and one to specify the end. When the controller reaches the last timeline in the program, it will maintain set point conditions specified by that timeline until the program ends at midnight.
- As with gRAMP, the maximum (fastest) variable ramp rate = 4min/°C. If the User programs timelines with target set points that exceed this maximum rate, the controller will default to the maximum ramp rate of 4min/°C for those time lines.

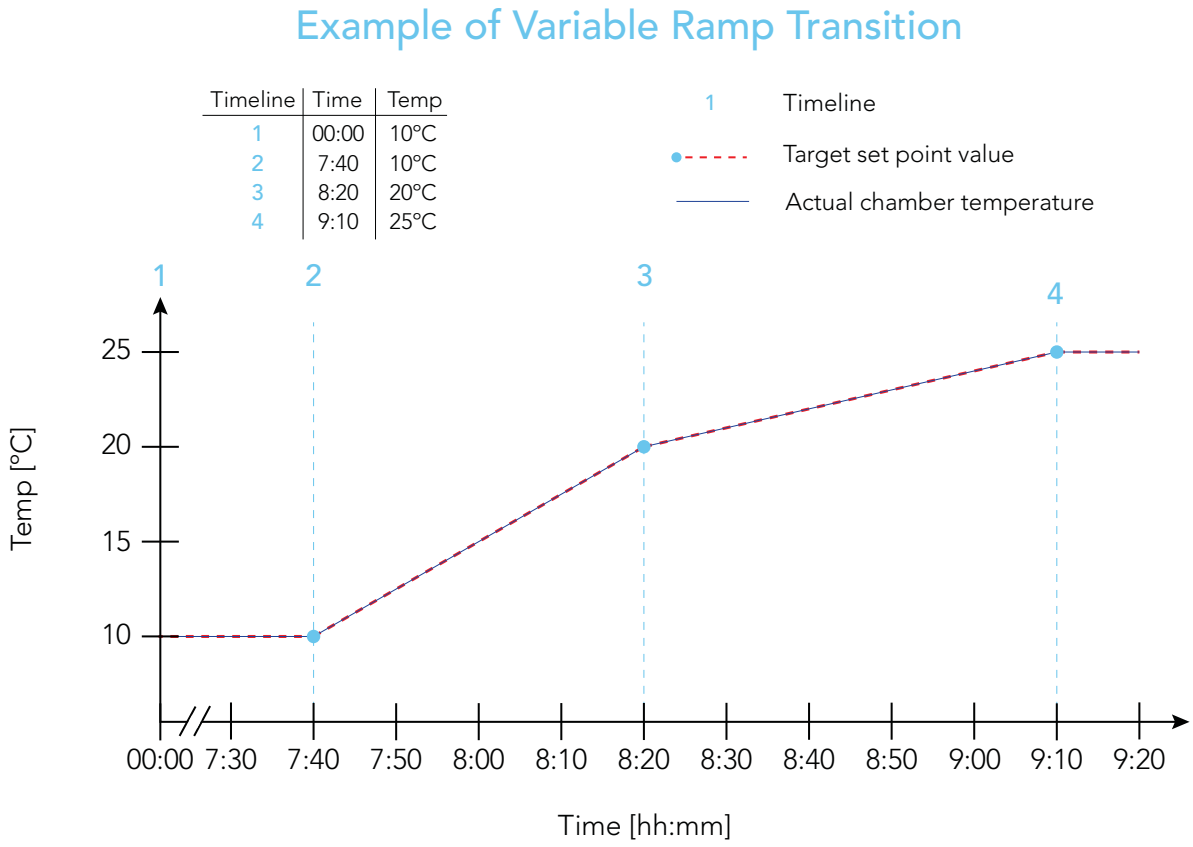



Figure 2-8: Example of Variable Ramp Transition

### 2.12.4 Disable

When a process is set to Disable in control mode VAR, the controller will disable control of the process and ignore all set points for that process in all programs in the schedule. This does not affect the values entered in any saved programs, and the process will still trigger corresponding alarms.

For example: if Humidity is set to Disable, and the low limit alarm had previously been set to 20% RH, humiditiy values below that limit will still trigger a warning alarm (see Section 6.0 Alarm Screen for more information on alarms).

# 3.0 INITIAL START-UP AND NAVIGATION OVERVIEW

Now that a general overview of the capabilities of the CMP6050 Control system have been presented, it's time for the initial start-up. This section provides instructions on start-up procedures and general navigation of the CMP6050 control system. Where appropriate, diagrams, actual screen-shots, and step-by-step instructions are provided.

Do not touch the screen with sharp or pointed objects. Use only the stylus provided. Use of any other objects on the display screen may damage the screen and void the warranty.

Operate your CONVIRON equipment for a few days before introducing any plant material to acquaint yourself with the equipment's operation and to ensure the equipment meets the requirements for your experiments.

## 3.1 Turning the Display On

Figure 3-1: Chamber Selector Screen


The CMP6050 is shipped from Conviron with the latest software installed and with the control system configured for each specific application. Whenever the chamber is turned on, the first screen to be displayed is the Chamber Selector screen shown in Figure 3-1: Chamber Selector Screen. The Conviron wave icon displayed in this screen represents the chamber(s) that is (are) controllable from the display. Each display can control up to ten (10) chambers. If the display has been configured to control more than one chamber, then the Chamber Selector screen will show additional Icons to represent the additional chambers. The blinking Icon with the red border represents the chamber currently active with the display.

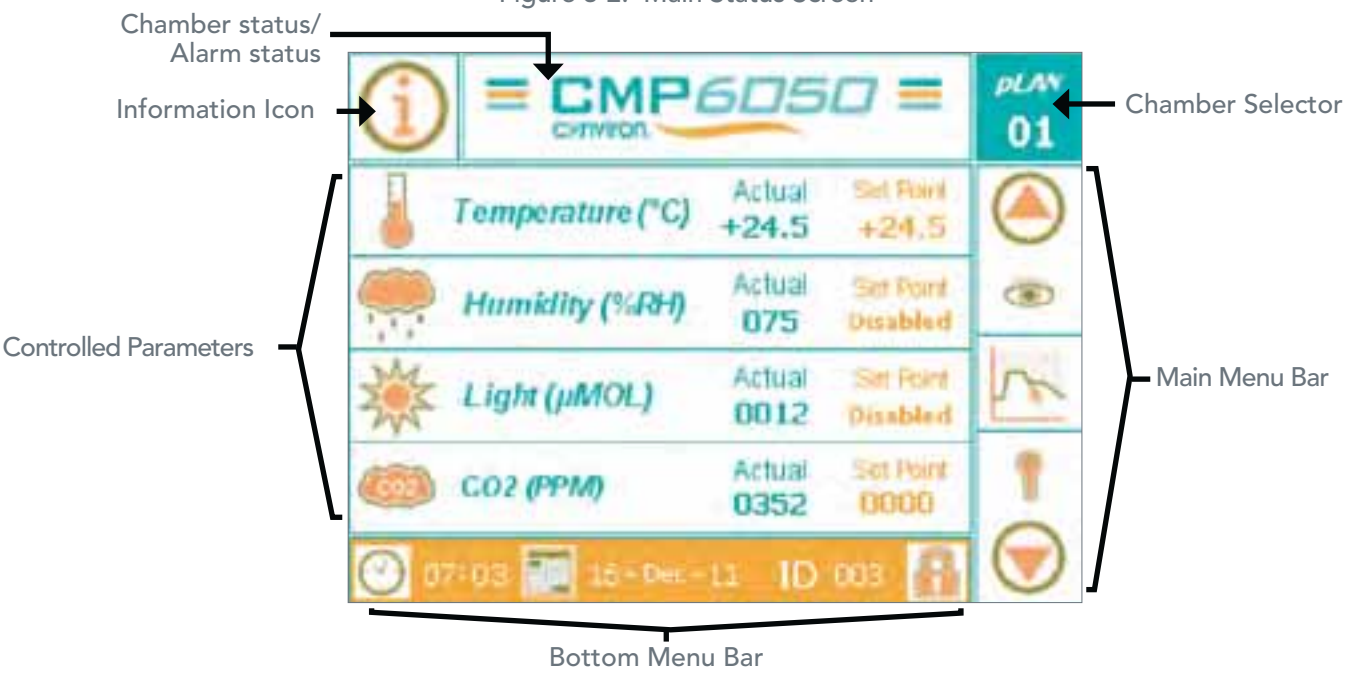
For example, Figure 3-1: Chamber Selector Screen illustrates that the Display is set up to control two chambers with chamber number 1 being the currently selected chamber. To select a different chamber, simply tap the Next tab at the bottom left of the screen with the stylus and then tap the Select option at the bottom-right of the screen. (To configure additional chambers to be controlled from the same Display, refer to Section 9-4: Logged Data-Network in this Manual.)

Once the desired chamber number has been selected, the main Status Screen is displayed. (Figure 3-2: Main Status Screen).

## 3.2 Setting the Time and Date

The next step required during the initial start-up is to set the Time and Date. Generally speaking, these steps are required the first time the control system is used, and thereafter only if/when these parameters require changing. They will also be required at times of battery replacement (battery life is approximately 5 years).

Figure 3-2: Main Status Screen




The Time and Date set-up can be accessed in two ways – from the main Status Screen and also from the Options Screen. For this Section of the Manual, instructions are provided for accessing these parameters from the Status Screen only. Section 8.0: Option Screen Icons and Locations covers these features via access from the Options Screen.

Figure 3-2: Main Status Screen illustrates the Bottom Menu Bar located along the bottom of the Status Screen. Although this Menu Bar presents four (4) functional Icons, at this stage of the controller set-up, it is only necessary to set up the proper Time and Date.


Figure 3-3: Bottom Menu Bar

### 3.2.1 Time/Date

**Access Level 1**

Time and Date are essential to the chamber experiment and it is recommended that they be viewed periodically (daily) to prevent experimental error.

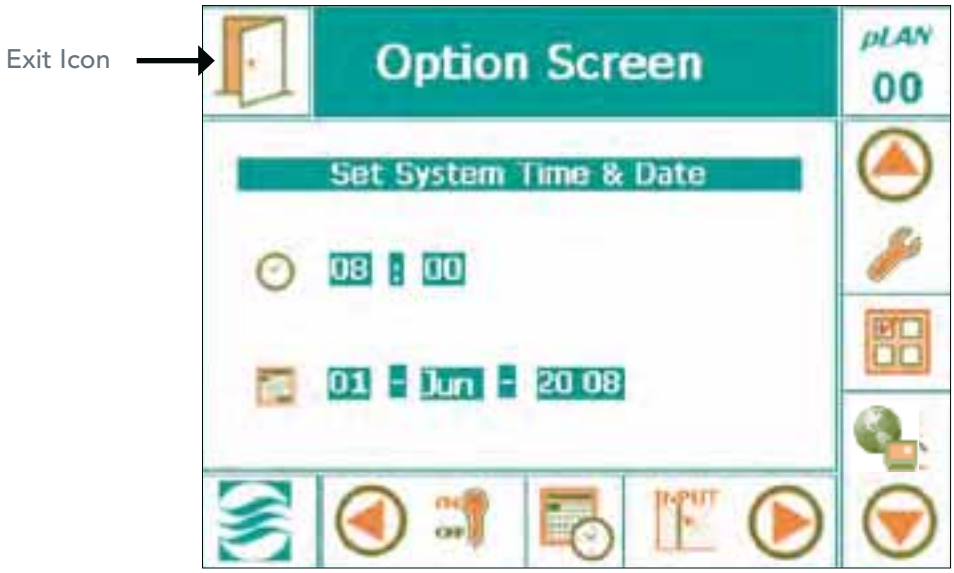
The time is displayed in a 24-hour format (00:00).

The date is displayed in day-month-year format (dd-mmm-yy).

Tap either the Time or Date icon to access the following screen (Figure 3-4: Time and Date Set-up) and enable editing of the time and date.

1. Press the ENTER key on the right side of the display to activate the Hour field box. (There should be a blinking cursor.)

Figure 3-4: Time and Date Set-up

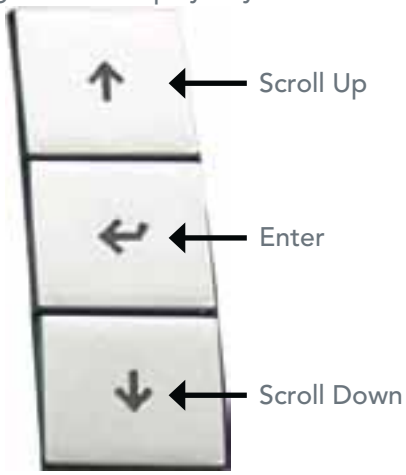



2. Press the UP or DOWN keys to edit the hour.
3. Press the ENTER key to activate the Minute field box.
4. Repeat Steps two and three for the other field boxes.
5. Press the ENTER key after entering every field box when editing the time and date.

It is essential to follow this process because it locks in the values entered into the controller. THIS IS MANDATORY.

All values entered are in real-time. Ensure that the time and date are correct and checked daily to ensure proper experiment processing.

Figure 3-5: Display Keys




You can also edit time and date by using the stylus and tapping on the appropriate numbers on the keypad. Then press the "exit" icon to lock the values entered into the calendar.

## 3.3 Other Initial Start-Up Parameters

The Bottom Menu Bar at the bottom of the Main Status screen also includes two other icons – ID Set-Up and Security Set-Up. These parameters are not discussed in this section of the Manual because they are more advanced features that are not critical to the initial basic chamber set-up. That is, they are not required in order for the User to begin using the chamber. The objective for this section is to provide sufficient information to allow the User to get the chamber operating with the bare essentials. Note however, that security at this stage is still disabled.

For information related to the advanced features and options, refer to Section 8.0: Option Screen of this Manual.

## 3.4 Navigation Overview

The CMP6050 Display was developed to be intuitive for the User, while also accounting for a vast array of interactive options and display features. To accomplish this, the Display uses:

- Passive LED Indicator Lights to display various conditions
- An Interactive LCD Touch-Screen
- A set of interactive Keys

Figure 3-6: CMP6050 Display


### 3.4.1 LED Indicator Lights

There are three LED indicator lights on the CMP6050 Display. Their functions are as follows:

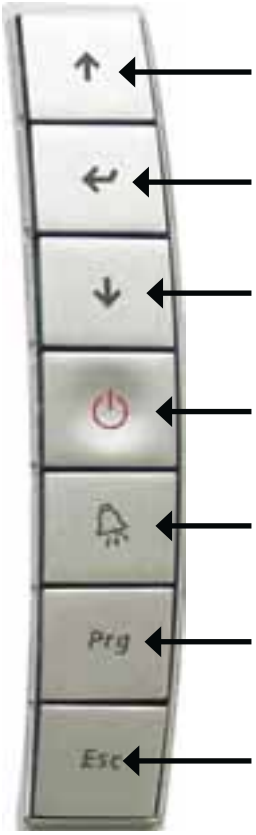
- Top LED – Alarm Condition – Active
- Centre LED – Communication Error (connection between display & controller is lost)
- Bottom LED – Controller On (flashes when running a schedule)

### 3.4.2 LCD Touch-Screen

The Touch-Screen has two functions – to display information and to facilitate interaction with the Users. Here, a host of primary and secondary screens are used to provide all the necessary information required to fully interact with the controller. Sections 4 through 10 of this Manual describe each Screen in detail. Note that the main Primary (default) Screen is the Main Status screen.

### 3.4.3 Interactive Keys

As an alternative to using the stylus with the touch screen, the User can also use the Keys at the right of the display for many of the interactive functions. Below, a short description is provided for each Key.




Up navigation Key

Enter Key

Down navigation Key

OFF Key – This key provides a shortcut to stopping the schedule, when pressed and held for 3 seconds.

Alarm Key – When an alarm is present, pressing this key will provide a shortcut to alarm information and acknowledgement.

Program Key – Pressing this key provides a shortcut to the program screen.

Exit Screen Key – Available on certain screens.

## 3.5 Battery

The CMP6050 will run off the building power supply, however the controller does have a rechargeable battery backup to maintain the internal clock. The estimated life of the battery is 6 months and the typical recharge time is < 8 hours.

## 3.6 Component Stability

The generating conditions of the controller are -25 ˚C to 70 ˚C, 90% RH non-condensing. Storage conditions are -40 ˚C to 70 ˚C, 90% RH non-condensing. For certain models a separate controller for the lamp loft is required. Operating conditions for this controller is -10 ˚C to 60 ˚C, 90% RH non-condensing and storage conditions -20 ˚C to 70 ˚C, 90% RH non-condensing.

# 4.0 MAIN STATUS SCREEN

At this point in the Manual, instructions have not yet been provided to inform the User how to start an experiment in the chamber. Before that can be done, it is necessary to become familiar with the Main Status screen. This section provides an overview of this important primary screen. Topics covered include:

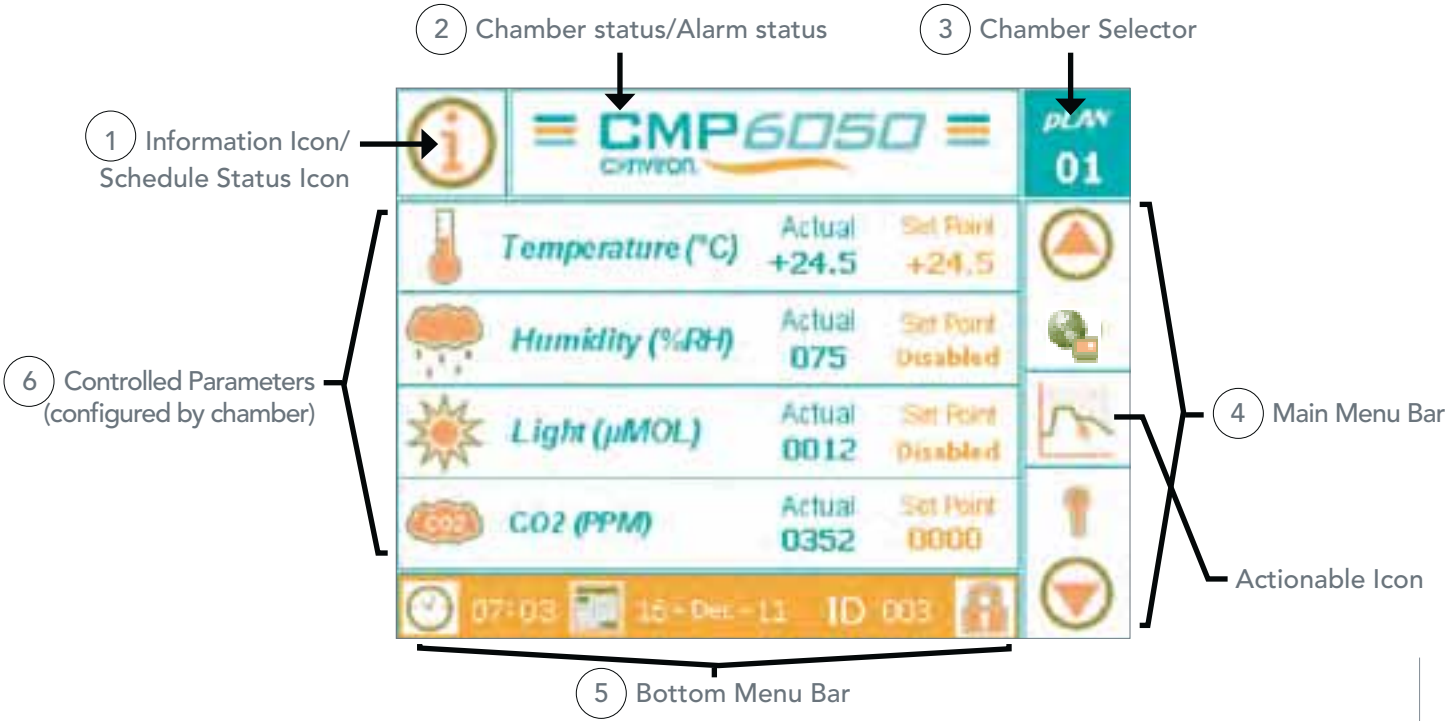
- Information Icon
- Chamber Status / Alarm Status
- Chamber Selector
- Main Menu Bar
- Bottom Menu Bar
- Controlled Parameters

The CMP6050 control system uses seven (7) primary screens to interact with the various features of the control system. This Section of the Manual provides an overview of the first of those screens – the Main Status Screen. Subsequent sections cover the details of each of the remaining screens.

The Main Menu Bar, which is located at the right hand side of the each of the seven primary screens, stays constant for each of the seven screens while the Bottom Menu Bar changes for each of the seven screens.

As mentioned earlier, the main (default) control screen is the Status Screen. This is the screen that essentially acts as 'home base' for the Display. The main areas of the Status Screen are illustrated in the Figure below:

Figure 4-1: Main Status Screen - Key Area Layout

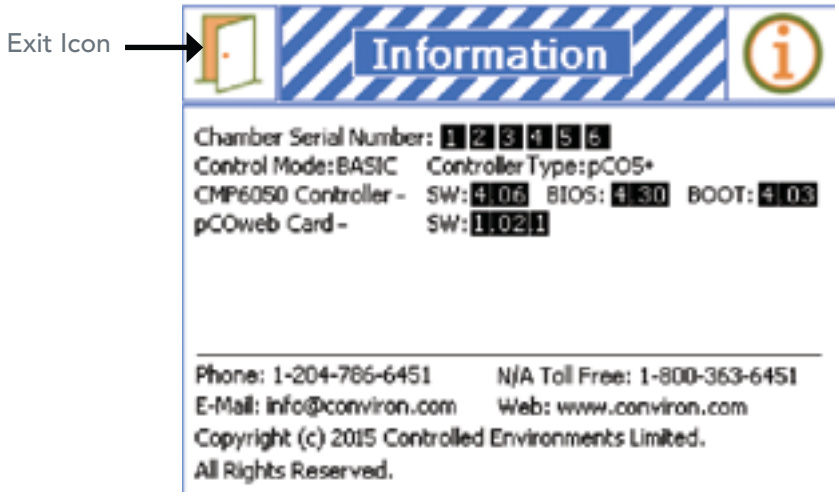


## 4.1 Information Icon

This Icon provides access to two areas of information depending on whether a schedule is running or not. If there is no schedule running, this Icon provides access to information related to the controller software, chamber serial number, and contact information for Conviron's technical assistance. The information is important for knowing, for example, what version of controller and what version of software is loaded on the controller or what ramping style your chamber is running (BASIC or VAR, see section 2.10 Optional Accessories). This information is not necessarily required on a daily basis but rather during service and/or troubleshooting activities. Activating this Icon using the stylus launches the following screen of information. Tap the

Exit icon (top left corner) to return to the Main status screen.

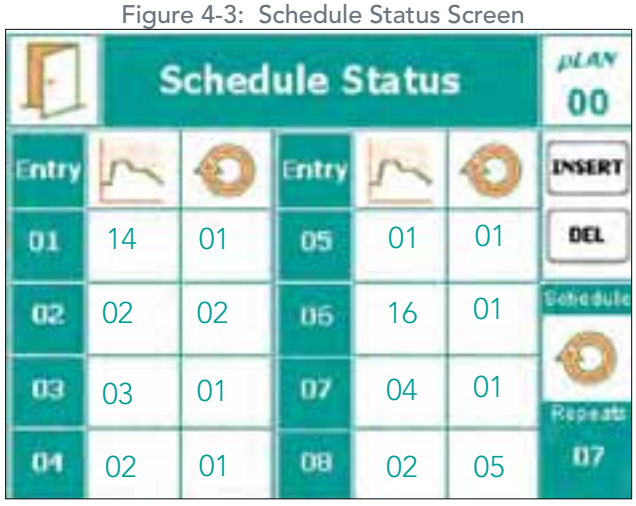
Figure 4-2: Information Icon Screen




If a schedule is running, then the icon launches a Schedule Status screen which provides details about the running schedule. See below.

## 4.2 Chamber Status/Alarm Status

Figure 4-3: Schedule Status Screen




This Icon provides information related to the chamber status and the alarm status. Under certain conditions, this Icon will blink with certain color combinations. Each color combination has a defined meaning which graphically represents the status of the chamber and alarm conditions. Refer to Section 6.0 Alarm Screen for more details on alarm functionality.

## 4.3 Chamber Selector Icon

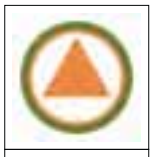

The CMP6050 control system was designed to enable a single Display to control up to ten (10) chambers. This Icon allows the User to select which of the chambers to control with the Display. Note that each additional chamber requires set-up and configuration. Adding chambers to the Display is covered in Section 9.4 Logged Data – Network of this Manual. The Figure below presents the screen image displayed when the Chamber Selector Icon is activated.

To return to the Main Status Screen, tap the Select at the bottom of the screen. Note that in Figure 4-4: Chamber Selector Screen, the Display has been configured to control 2 chambers. Chamber no. 1 is the active chamber (red border around icon). To activate a different chamber, simply tap the Next tab and then tap Select.

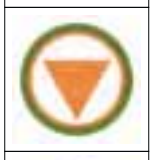
Figure 4-4: Chamber Selector Screen

## 4.4 Main Menu Bar

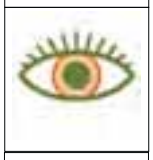
The Main Menu Bar remains constant on all seven of the Primary Screens. This Main Menu Bar contains a total of nine (9) Icons, seven of which represent the seven Primary Screens and two of which represent Navigation Icons – one for scrolling up and one for scrolling down. Note that the Main Menu Bar displays only three (3) Primary Screen Icons at a time. The centre Icon is actionable, while the other two (non-actionable) Icons displayed on either side of the actionable Icon are simply there to indicate the next and previous consecutive Icons. The Up and Down Icons are used for scrolling through the seven Primary Screen Icons.



Navigation Icon – Scroll Up

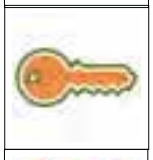


Navigation Icon – Scroll Down



Status Screen (Refer to Section 4 for greater detail)

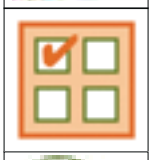
Program Screen (Refer to Section 5 for greater detail)



Security Screen (Refer to Section 7 for greater detail)

Alarm Screen (Refer to Section 6 for greater detail)

Service Screen (Refer to Section 10 for greater detail)



Options Screen (Refer to Section 8 for greater detail)

Optional add on screen for increased functionality. Contact Conviron for additional information.

## 4.5 Bottom Menu Bar


The Bottom Menu Bar is dynamic which means it changes depending on the screen being displayed. The Icons displayed in the Bottom Menu Bar for each primary screen duplicate the Icons displayed in the main interactive area for each screen. They are duplicated simply for ease of use allowing Users to choose their preference. Because this section of the Manual pertains to the Main Status Screen, the Bottom Menu Bar for that screen only will be described here.

There are a total of four (4) Icons used in the Bottom Menu Bar for the Main Status Screen. These are described as follows:


Time Icon – used to display the current time. Tapping the Icon launches the Set System Time and Date screen. (Refer to Section 3.2 Setting Time and Date for greater detail on this subject)


Date Icon – used to display the current date. Tapping the Icon launches the Set System Time and Date screen. (Refer to Section 3.2 Setting Time and Date for greater detail on this subject)


ID – used to display the Network Configuration for the controller. (Refer to Section 9.4 Logged Data – Network for greater detail on this subject.)

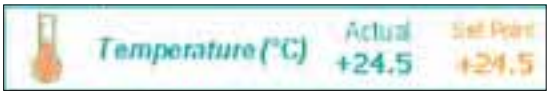
Security Login Icon – used to display the Security Screen for the controller. (Refer to Section 7.5 Login Security Screen for greater detail on this subject)

The Time and Date icons were already used to set the Time and Date in Section 3.2 of this Manual. Instructions for setting the ID and Security are covered in Section 7.

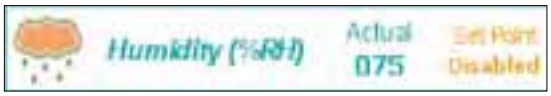
## 4.6 Controlled Parameters


This area of the Main Status Screen is reserved for displaying the controlled parameters (i.e. Temperature, Humidity, Lighting, and $CO_2$). The parameters actually displayed depend on several factors including the chamber design and the configuration set-up of the controller. For example, only some chambers come equipped with $CO_2$ control and therefore not all chambers will display $CO_2$ as a Controlled Parameter.

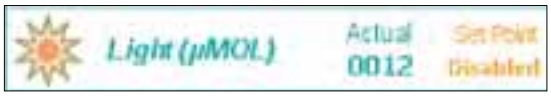
Figures displayed in the Controlled Parameters area of the screen include the actual value and the current program set-point value for each parameter. These figures are displayed in two columns – one for the actual values (green font) and one for the set-point values (orange font).




The Temperature parameter displays the temperature in degrees Celsius only.




The Relative Humidity parameter (if applicable) displays the relative humidity in %RH. This parameter is valid only if the chamber is equipped with humidity control.




The Lighting parameter displays the light intensity in one of several ways – banks; percentage of full power; or unit micromoles.


The $CO_2$ / Auxiliary parameter displays the parameter in one of several ways – For $CO_2$ concentration - in PPM: For an Auxiliary on/off event – On or Off.

# 5.0 PROGRAM SCREEN

This chapter details the procedures for programming the CMP6050 using the Program Screen (Figure 5-1). Upon completion of this chapter, the User will be ready to start the chamber and run a schedule. The settings entered in the Program Screen control the conditions in the plant growth chamber.

A Program is defined as User specified experimental set-point data (in real time) that establishes the desired operating conditions of the chamber. Each Program defines a single 24-hour period and each Program starts at midnight. A time of 00:00 therefore denotes a midnight setting. The CMP6050 controller can store up to a maximum of 16 Programs while each Program can have up to 48 timelines. Regardless of the number of timelines, the total period encompassed by all timelines within a single Program is 24 hours.

Furthermore, the controller does not run individual Programs – it runs a Schedule. A Schedule is defined as a User specified sequence of Programs linked together to form a Schedule. A Schedule can have up to a maximum of 8 Programs where each Program can be repeated from 1 to 99 times, or set to infinity.

## 5.1 Program Screen Icons and Locations

Figure 5-1: Program Screen – Key Area Layout

## 5.2 Program Screen Main Menu

The Program Screen-Main Menu contains four Sub-menus including

- Schedule
- Create Program
- Edit Program
- Delete Program

These sub-menus can be accessed in two ways – either directly on the main screen area or via the Bottom Menu Bar. Both methods contain the same information and options. User preference will determine the access method. If using the main screen area, simply tap the desired sub-menu. If using the Bottom Menu Bar, use the right and left navigation arrows until the desired sub-menu is displayed in the centre field and then tap that sub-menu icon.

## 5.3 Accessing the Program Screen

**Access Level 1**

Tap the Create Program icon to access the Create Program sub-menu screen. (Figure 5-2: Program Screen: Save New Program As...)

- By default, the first program number will show as 01. If a program already exists, then the CMP6050 will automatically show the next program number available.

Figure 5-2: Program Screen: Save New Program As...


- If another program number is required, use the UP or DOWN buttons to select the program. (Programs do not have to be saved in numerical sequence.)

- Tap the ENTER  button once a program number has been selected.

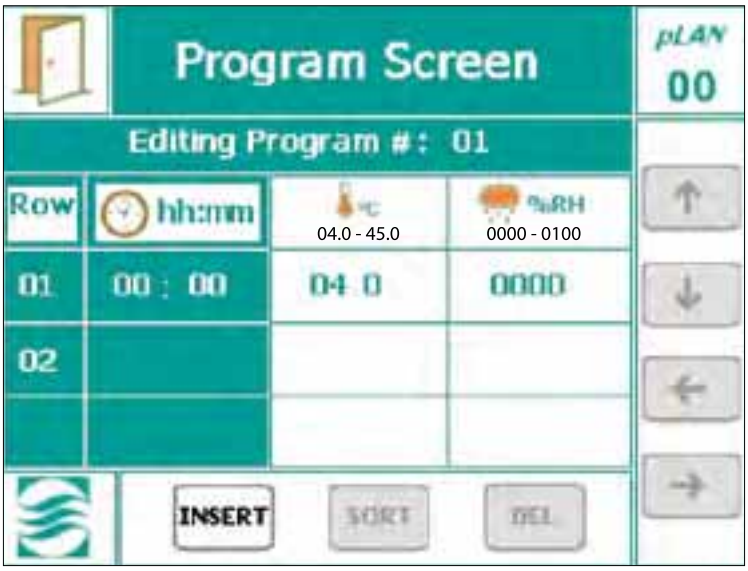
### 5.3.1 Create Program

Access Level 1

1. To activate the first timeline (Row) number, tap the INSERT button. The INSERT button will turn black INSERT once tapped and will return to its original state once you have selected the timeline row number

2. Tap the timeline row number 01 in the program to create the first timeline (Figure 5-3: Creating a Timeline).

Figure 5-3: Creating a Timeline



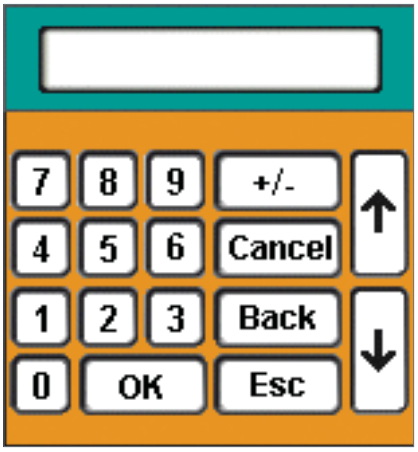

- All the default values will appear in the first timeline.
- All the program timeline icons will now be activated. (i.e. INSERT, SORT, DEL, and all arrow buttons)

3. To change time, tap the hours and/or minutes 00 : 00 field in the first timeline (Row 01).

- Hours and minutes must be entered separately.
- Touch the 00: field for hours.
- Touch the :00 field for minutes.
- A standard pop-up keypad will appear allowing for numerical data entry. (Figure 5-4: Numeric Keypad)

When entering the time field, you are NOT entering a time duration in hours and minutes but rather the actual clock-time at which point you would like the chamber to change to the new set-point parameters. This is why setting the actual Time and Date in Section 3.2 was important. Also, remember that the time field format is 24-hour.

Figure 5-4: Numeric Keypad




4. Tap the OK [OK] button once data has been entered.
5. Tap the temperature value [04.0] to set the desired Temperature.
   - Temperature value is the only parameter with a decimal point. Therefore, always enter 3 digits and a negative sign if the chamber is low temp. Note: set-point parameters have specified ranges. The controller will only allow values to be entered that are within the range.

Temperature is the only Set-point parameter that is provided on every controller. All other parameters are optional based on the configuration/ application of the chamber.

6. Tap the humidity value [0000] to set the desired Humidity percentage. (If available).
   - The program screen can only display two set-point columns in a single display frame. To access additional parameters press [→]
   - If more than two parameters are controllable, the [→] will be displayed white. Otherwise, the [→] will be displayed grey, indicating no other parameters are available.
7. There are many different lighting configurations for the CMP6050 and it is beyond the scope of this Manual to define every one. Generally speaking, every controller is configured by Conviron for each application. When creating a Program, and provided that Lighting is an available controlled parameter with your chamber configuration, the lighting set-point is accomplished in the same manner as other set-points. Tap the Light field and use the keypad screen to select the desired set-point. If there are multiple Lighting columns for your configuration, then repeat this procedure for each column.
8. If equipped with $CO_2$, tap the $CO_2$ value [0000] and/or the Auxiliary value to set the desired levels.
   - To view/modify the $CO_2$/Auxiliary values, touch the right [→] arrow button to navigate to the field box.
   - To add more programs, repeat the above steps in order.

9. To add another Timeline to the program, tap the INSERT field and then the 02 Timeline Row. Default values will be displayed. Repeat steps 3 – 8 above to complete the new Timeline. Insert additional Timelines as required.

A maximum of 48 Timelines (Rows) can be entered for each Program. Each Program covers a 24-hour Period.

If Timelines are not in chronological order, press the Sort button at the bottom of the screen to automatically sort the rows of the program by time.

10. Program Editor Entry Removal

The program editor now allows entry of a "---" for each process at a given timeline. The "---" entry tells the process to remain unchanged by the timeline. When a user enters a timeline into a program, the value for each column will be initially set to the default value for the corresponding process. The user can then touch the set point field to change the value of one process without affecting other environmental conditions within the chamber:

Figure 5-5: Program Editor Screen


Figure 5-6: Add Entry dialog box


Touching a valid entry will bring up a key pad containing a "- - -" button as in Figure 5-4. This button will disable the entry for that process at that particular timeline.

Touching a field that contains a non-entry or "- - -" will bring up a dialog box asking to confirm adding an entry (Figure 5-6: Add Entry dialog box).

11. Once all the Timelines have been entered into the program, tap the EXIT  button at the top, left hand side of the display screen.

Figure 5-7: Pop-up window to confirm saving the program

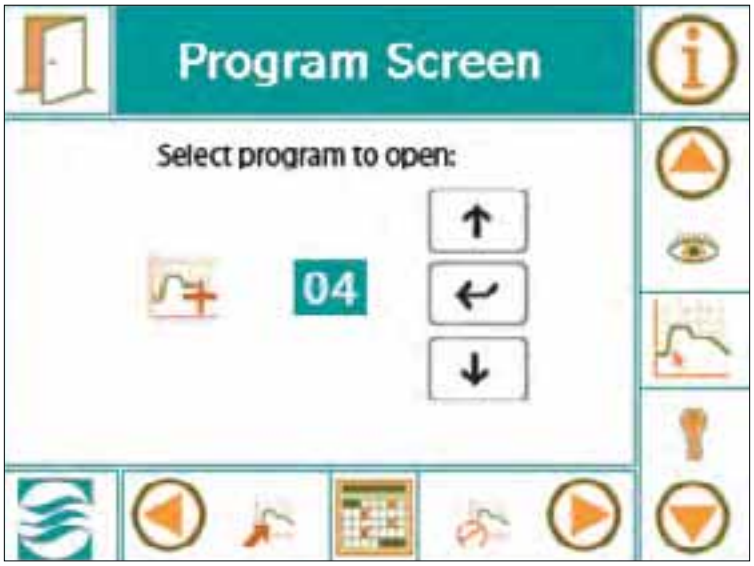

- A pop-up window will appear to confirm saving the program. (Figure 5-7)
- Tap the YES button to save and return to the Program Screen.
- Tap the NO button to cancel all entries made to the specific program and return to the Program Screen.
- Tap the CANCEL button to go back into the program editor and modify any required changes to the Timelines.

### 5.3.2 Edit Program

Access Level 1

Tap the edit program icon  to access the following screen (Figure 5-8: Program Screen: Select the program to edit). The default value is program 01. If more than one program has been stored, the User may select the program to open. Use the scroll and enter tabs to open the select Program.

Figure 5-8: Program Screen: Select the program to edit




- Editing a program has the same procedure as creating a program.
- Touch the necessary field box to modify the Timeline values.

1. To delete a Timeline in the program, tap the DEL button 

   - The DEL button will turn black 

2. Now tap the desired Timeline row number to be deleted.

   Note that the 

tab turns back to its original state.
3. To add additional Timelines to the program, repeat step 9 from the previous section.
4. Once all modifications have been entered, tap the EXIT icon on the top, left hand side of the display screen. A pop-up window will appear to confirm saving the edited program.

A program can be edited while the unit is in operation ( CMP6050 Software Version 2.10 or greater).

### 5.3.3 Delete Program

**Access Level 1**

Tap the Delete Program icon to access the following screen (Figure 5-9: Program Screen: Select a program to delete).

Figure 5-9: Program Screen: Select a program to delete


A program cannot be deleted while the unit is in operation.

1. To delete a program, tap the UP or DOWN buttons to select the desired program to delete.
2. Tap the ENTER button. 

Figure 5-10: Confirmation message


### 5.4.1 Edit Schedule

Tap the Edit Schedule icon to create or edit a schedule on the schedule editor screen. Refer to Figure 5-12 for an overview of the schedule editor screen.

- A pop-up window will appear to confirm program deletion (Figure 5-10: Confirmation message).

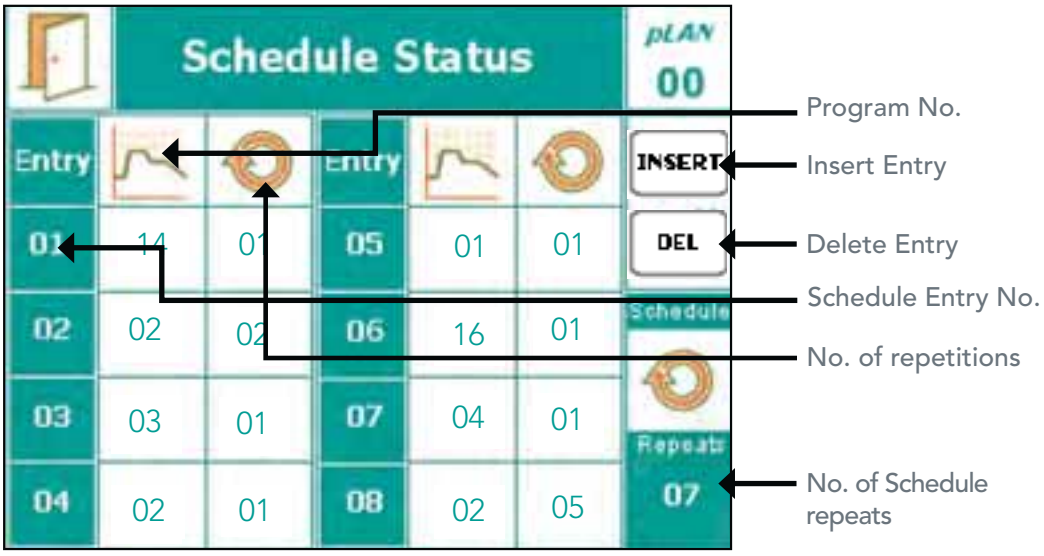
## 5.4 Schedule Screen

**Access Level 1**

The CMP6050 scheduling system allows the User to enter a sequence of Programs used to run chamber experiments (Figure 5-11: Schedule Screen). When the schedule has run through in its entirety, the chamber stops automatically.

Figure 5-11: Schedule Screen


Figure 5-12: Schedule Editor Screen Overview.



Programs can be modified/edited while the chamber is running. However, you cannot create or edit a Schedule while a Schedule is running. As such, when you tap Edit Schedule, a pop-up box will appear to notify the User that a Schedule is running. If this occurs, exit to the Schedule Screen and tap the Stop/Start tab to stop the chamber. Now you can edit the Schedule.

1. Tap the INSERT button.

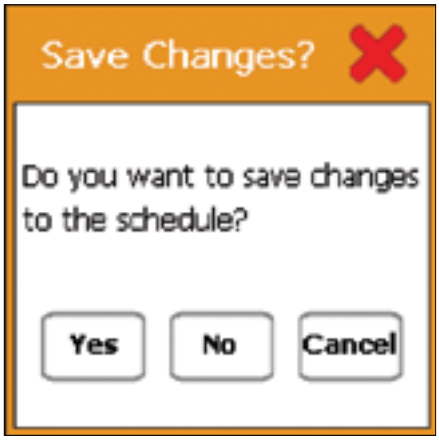
2. Tap the first Entry of the schedule, which is 01. The lowest program number will appear with ∞ (infinite) repetitions.

3. Tap the Program Number field to toggle between available programs until the program to run is displayed.

4. Tap the Number of Repetitions field and select the desired number of repetitions for the program.

    - Enter 1 to 99, or
    - To enter ∞ press "0"

Figure 5-13: Confirmation to save changes.




5. Repeat steps 1-4 to enter additional programs into the Schedule.

    - Once all programs have been entered, and prior to saving the new/edited Schedule, select the number of Schedule repetitions by tapping the "repeats" box at the bottom right corner.

6. To delete any entry, touch the DEL button followed by the desired entry row.

7. Once all programs have been entered into the schedule editor, touch the Exit button. A pop-up window will appear to confirm saving the schedule. (Figure 5-13)

For the Schedule Status screen displayed in Figure: 5-12, the schedule will run a variety of 6 programs over 13 days and will repeat this sequence 7 times for a total duration of 91 days.

Schedules can be set to run in either RAMP or STEP mode. Refer to Section 5.4.4 Preferences. The default setting is for parameters to run in RAMP mode.

### 5.4.2 Start/Stop

After setting up a schedule in the program screen, tap the schedule icon and then the start/stop icon to run the chamber. A pop-up window appears to confirm stopping (Figure 5-14) or running (Figure 5-15) the chamber depending on whether a schedule is already running or not.

If you are starting to run a new schedule, then a new screen entitled Select Start Point will appear (Figure 5-16). Review the Schedule for correctness and then select the Schedule entry number at which point you would like to begin the Schedule. A small white arrowhead along the left side of the Entry Number Column indicates the start point. Tap the Run tab to start the Schedule.

Figure 5-14: Confirmation to stop schedule.

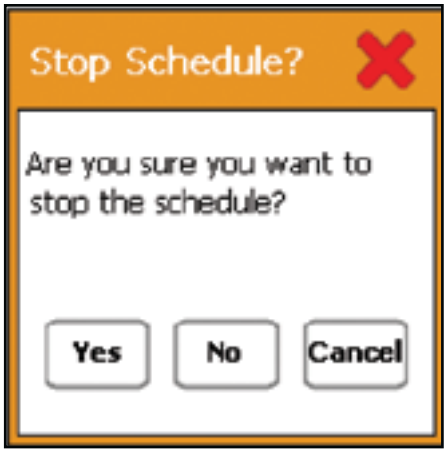



Figure 5-15: Confirmation to run schedule.

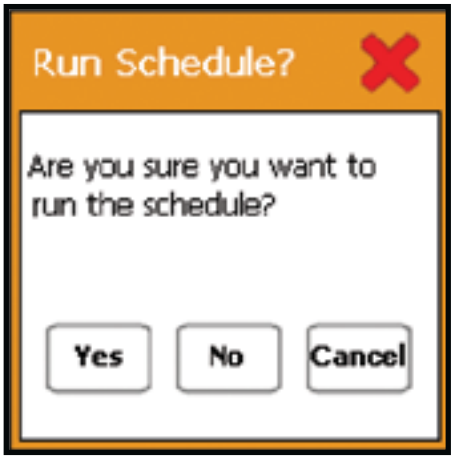
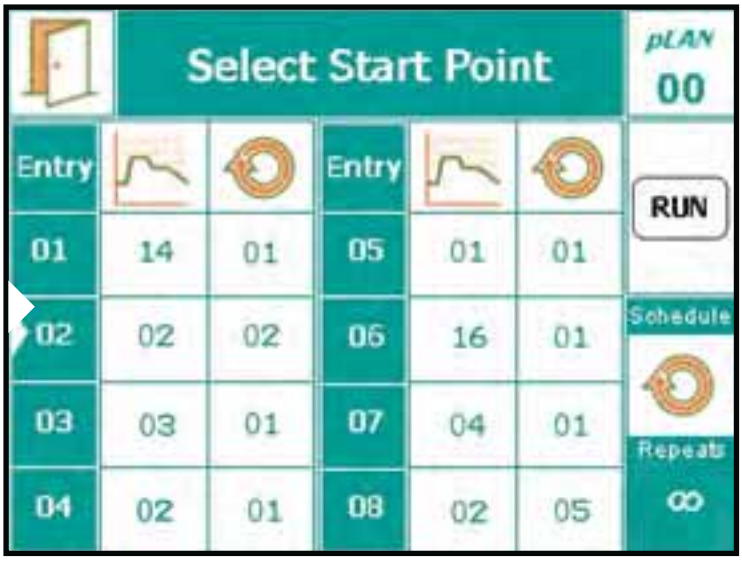
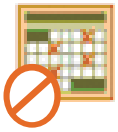



Figure 5-16: Select Start Point screen



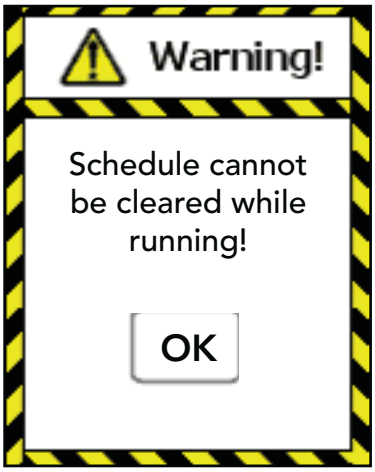

If a chamber is shut down while running a schedule (power outage only) upon starting up the chamber will resume running the schedule at the point where it left off and continues at the actual chronological time. Once in operation, to quickly stop a schedule, press the ON - OFF button.

### 5.4.3 Clear Schedule



To clear the Schedule the chamber must first be stopped (refer to Section 5.4.2: Start/Stop). If you attempt to clear the Schedule while a Schedule is running, a pop-up Warning window appears as in Figure 5-17.

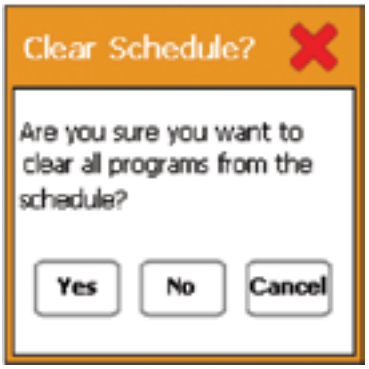
Figure 5-17: Warning Window




Once the Schedule has been stopped, tap this icon to clear all the programs within the schedule. The following pop-up window displays. (Figure 5-18)

The display now returns to the Schedule Screen view (Figure 5-19). A new schedule can now be created per Section 5.4.1: Edit Schedule.

Figure 5-18: Confirmation to clear schedule.




- To see the schedule status while a schedule is running, touch the information icon from the Schedule Screen (Figure 5-19).

Figure 5-19: Schedule Screen


Once a schedule has run through completely, the unit will automatically shut off.

### 5.4.4 Preferences

#### 5.4.4.1 Setting the Process Transition Mode – RAMP vs. STEP

1. Tap the Program icon  to access the Program Screen.
2. Tap the Schedule icon  to activate the Schedule Screen.
3. Tap the Preferences icon  to activate the Schedule Preferences screen and manipulate RAMP and STEP options.
4. Select either RAMP or STEP as in Figure 5-20 or Figure 5-21. If in VAR process control mode (see Section 2.12 for more information), there is an additional transition mode available called Disable. The Disable feature allows the User to disable active control for all processes individually (except temperature) without deleting the process from a program. Note: The ability to RAMP non-temperature processes may not be enabled on your software version.

Figure 5-20: RAMP vs. STEP mode for Temperature)

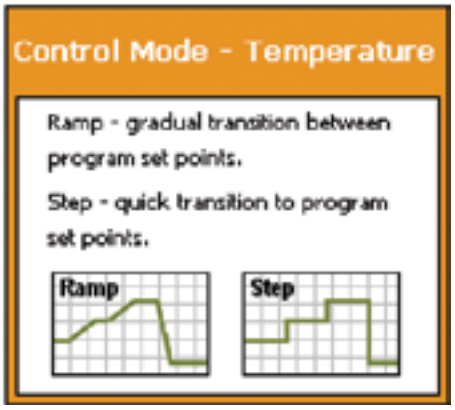
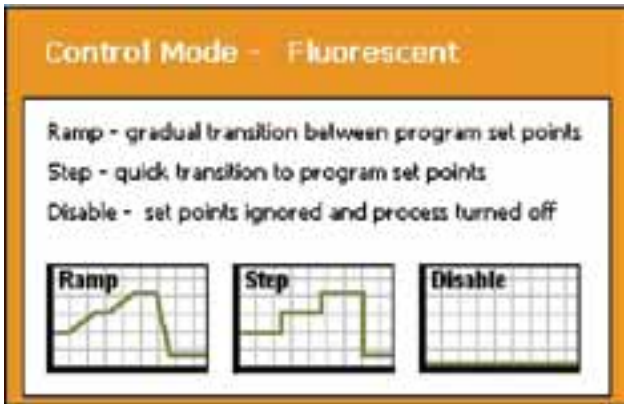



Figure 5-21: RAMP vs. STEP mode for Fluorescent (only available in VAR mode)




5. Tap the Exit icon to save values and exit the setup.

When STEP Mode is selected, the tracking alarm feature (discussed in Section 6.4 Setting Alarms) is disabled.

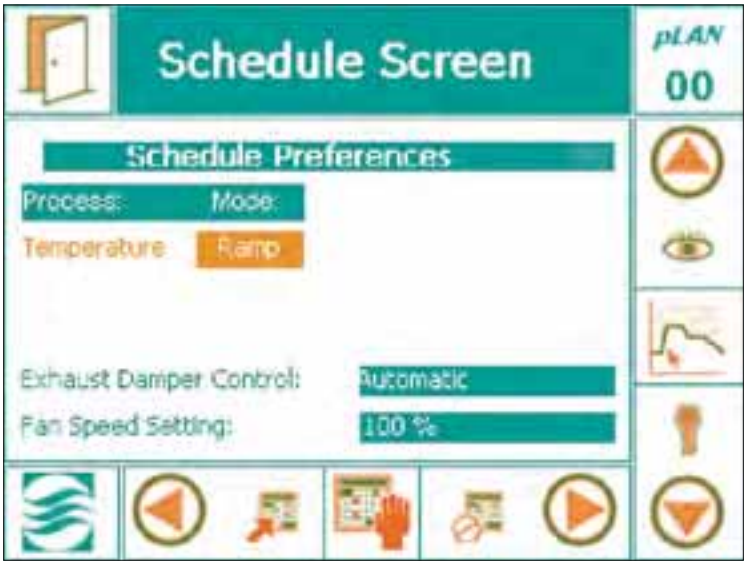
For shock testing, use STEP mode. Do not modify Ramp mode values.

### 5.4.4.2 Fan Speed Control and Exhaust Damper Control

As an optional feature, clients can manipulate fan speed and $CO_2$ exhaust by configuring the Fan Speed Setting and the Exhaust Damper. Fan speed can be user adjusted between 0% and 100% within a factory preset minimum and maximum allowable fan rpm range. By default the fan speed is set to 100%. The $CO_2$ Exhaust Damper Control has three modes, Automatic, Open (override), and Closed (override). In Automatic mode, the position of the exhaust damper is based on the $CO_2$ set-point. In Open (override) mode the damper remains open while in Closed (override) mode the damper is closed.

When the fan speed is set to 0% it does not mean that the fan is no longer active. A 0% setting by the User reduces the fan speed to the minimum allowable rpm as per factory specifications. Take precautions to ensure that the fan is off prior to servicing to prevent injury.

Figure 5-22: Fan Speed and $CO_2$ Exhaust Damper Setting




To change the Fan Speed Setting and Exhaust Damper Control (see Figure 5-22):

1. Tap the Program Screen icon  to access the Process Control Mode options.
2. Tap the schedule icon  to activate the field.
3. Tap the Preferences icon  to activate the schedule screen and manipulate fan speed settings.

4. Tap the 100% next to Fan Speed Setting or the Automatic next to Exhaust Damper Control.

5. Enter a value of between 0% and 100% for the Fan Speed Setting using the keypad. Tap the OK button once finished. An alternative to using the electronic keypad is to use the Keys on the right side of the display (Figure 5-24). For the Exhaust Damper Control, tap Automatic then use the controller keys to display Open (override) or Closed (override) and Enter to set.

Figure 5-23: Keypad

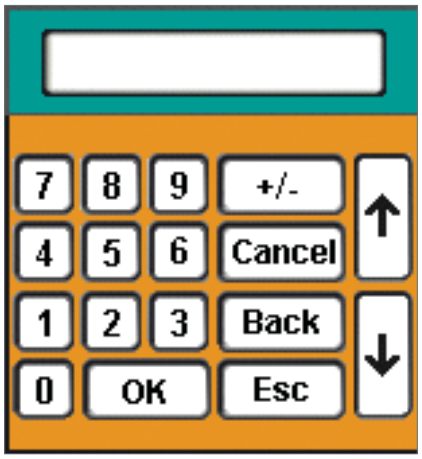
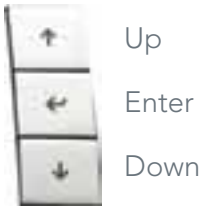



Figure 5-24:
Controller Keys



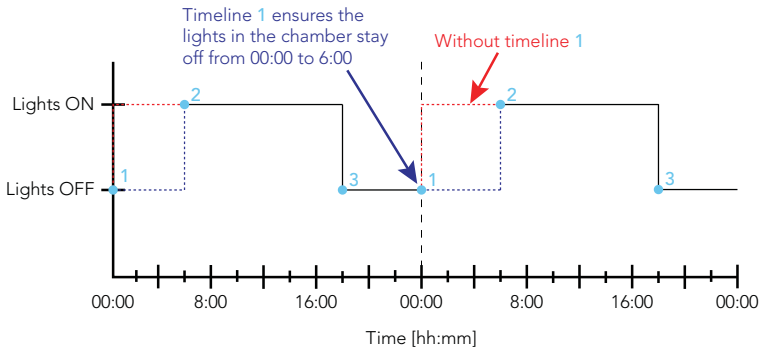
## 5.5 Understanding Program Transitions

Programs entered in the CMP6050 begin at 00:00 and end at 23:59. Conditions defined by the last timeline of a program will run until 23:59, at which point the controller will load the program file for the next day and look to the first timeline of that program to determine process set points. Those set points are implemented at 00:00, regardless of the time specified by the first timeline.

Figure 5-25 represents a transition from one day to the next for a program which turns the chamber lights on at 6:00, and off at 18:00 (in STEP mode). Other set point conditions are excluded for simplicity.

Figure 5-25: Midnight transition requiring 00:00 timeline

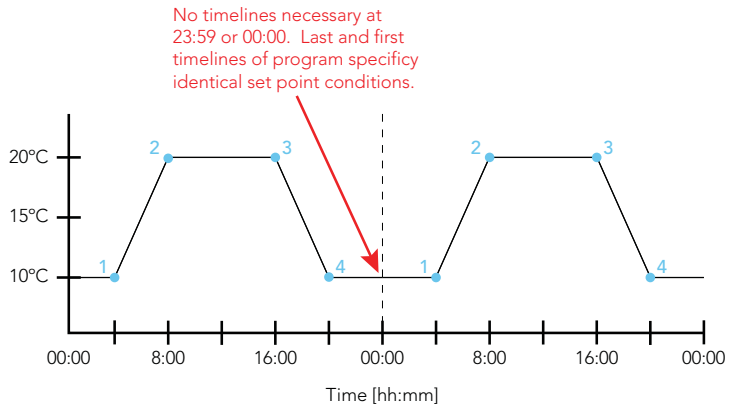
| Timeline | Time | Light |
|---|---|---|
| 1 | 00:00 | OFF |
| 2 | 6:00 | ON |
| 3 | 18:00 | OFF |




In order to maintain the same conditions in the chamber from 23:59 through 6:00 of the following day, timeline 1 must be present at 00:00 with the same set point conditions as were running until 23:59. In Figure 5-26 below, no timeline is necessary at 00:00 as the first and last timelines of the program specify identical set point temperatures.

Figure 5-26: Midnight transition not requiring 00:00 timeline

| Timeline | Time | Temp |
|---|---|---|
| 1 | 4:00 | 10°C |
| 2 | 8:00 | 20°C |
| 3 | 16:00 | 20°C |
| 4 | 20:00 | 10°C |



## 5.6 When Ramping Across Midnight is Necessary

The controller cannot automatically ramp across midnight. For this reason Conviron recommends avoiding ramping across midnight if possible. However, if an experiment requires the chamber to ramp one or more parameters across the transition at midnight, the User must add necessary additional set points in order to ensure the desired ramp occurs as intended. The amount of additional set points required will depend on whether or not the process transition mode is gRAMP (control mode BASIC) or vRAMP (control mode VAR). See Section 2.12 for more information on process control modes and corresponding transition modes.

### 5.6.1 gRAMP

Figure 5-27 and Figure 5-28 demonstrate how to add a timeline to a program so that it is possible to ramp temperature across midnight in gRAMP transition mode.

Figure 5-27: gRAMP across midnight: INCORRECT

| Timeline | Time | Temp |
|---|---|---|
| 1 | 8:00 | 20°C |
| 2 | 20:00 | 10°C |

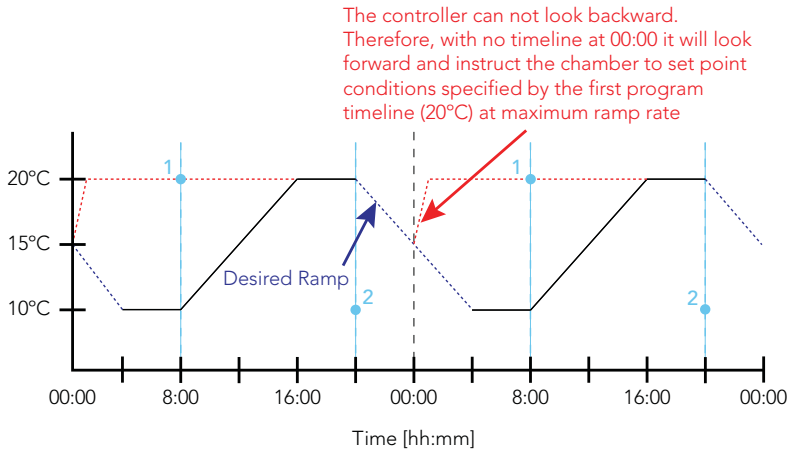
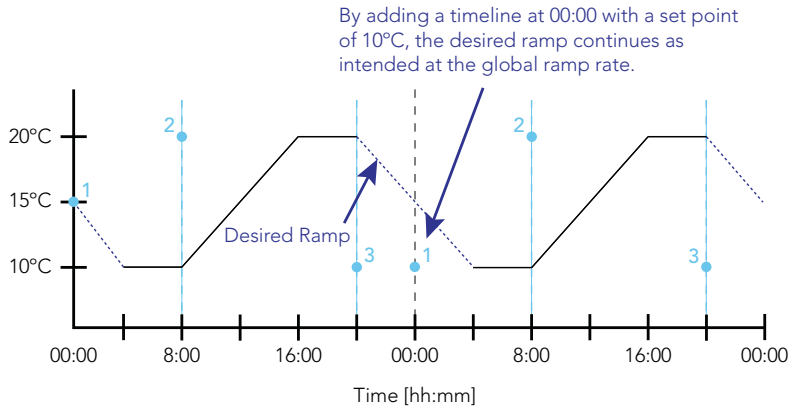



Figure 5-28: gRAMP across midnight: CORRECT

| Timeline | Time | Temp |
|---|---|---|
| 1 | 00:00 | 10°C |
| 2 | 8:00 | 20°C |
| 3 | 20:00 | 10°C |



### 5.6.2 vRAMP

Figure 5-29 and Figure 5-30 demonstrate how to add timelines to a program so that it is possible to ramp processes across midnight when in vRAMP transition mode.

Figure 5-29: vRAMP across midnight: INCORRECT

| Timeline | Time | Temp |
|---|---|---|
| 1 | 4:00 | 10°C |
| 2 | 8:00 | 20°C |
| 3 | 16:00 | 20°C |
| 4 | 20:00 | 15°C |

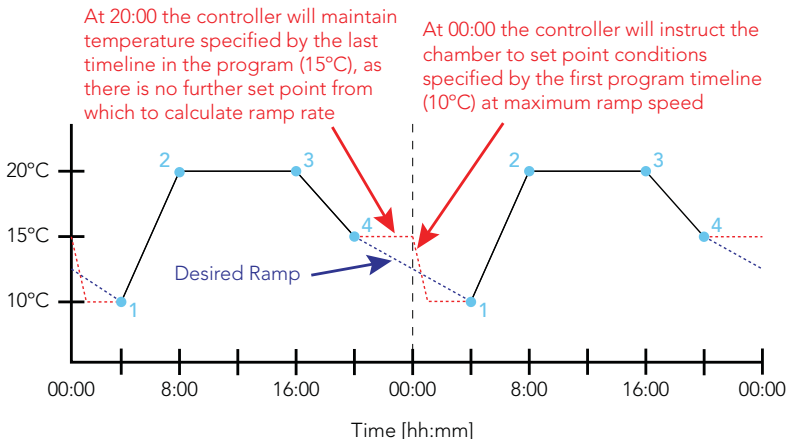
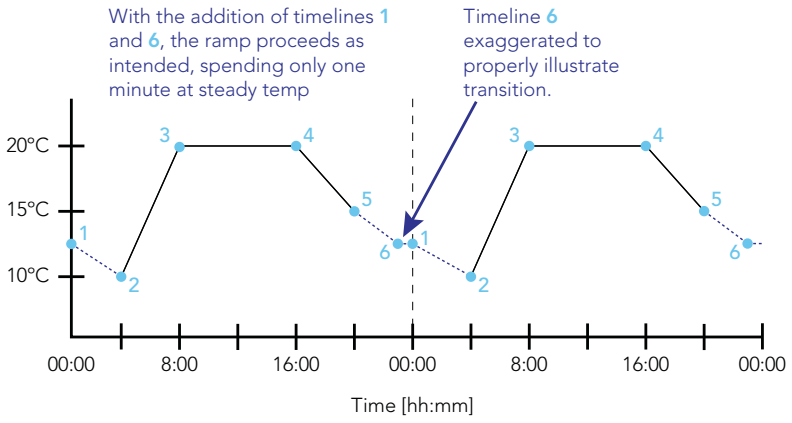



Figure 5-30: vRAMP across midnight: CORRECT

| Timeline | Time | Temp |
|---|---|---|
| 1 | 00:00 | 12.5°C |
| 2 | 4:00 | 10°C |
| 3 | 8:00 | 20°C |
| 4 | 16:00 | 20°C |
| 5 | 20:00 | 15°C |
| 6 | 23:59 | 12.5°C |




To avoid unexpected conditions in the chamber, take care when planning programs. Pay particular attention to program transitions. Ensure they are well defined so that the controller interprets the settings as intended. When possible, designate the first timeline of a program as 00:00 and the last timeline as 23:59. Ensure the first and last timelines of programs use the same set point conditions to avoid unexpected behavior.

# 6.0 ALARM SCREEN

The alarm screen allows the User to set-up and manage alarm conditions for each chamber. Alarms are used to notify the User when actual controlled parameters move outside of the set-point conditions and their respective limits. With the ability to program alarms, receive error messages and manage reporting, experimental research specimens can be effectively protected. This section of the Manual provides information on setting-up and managing alarms effectively. Topics covered include:

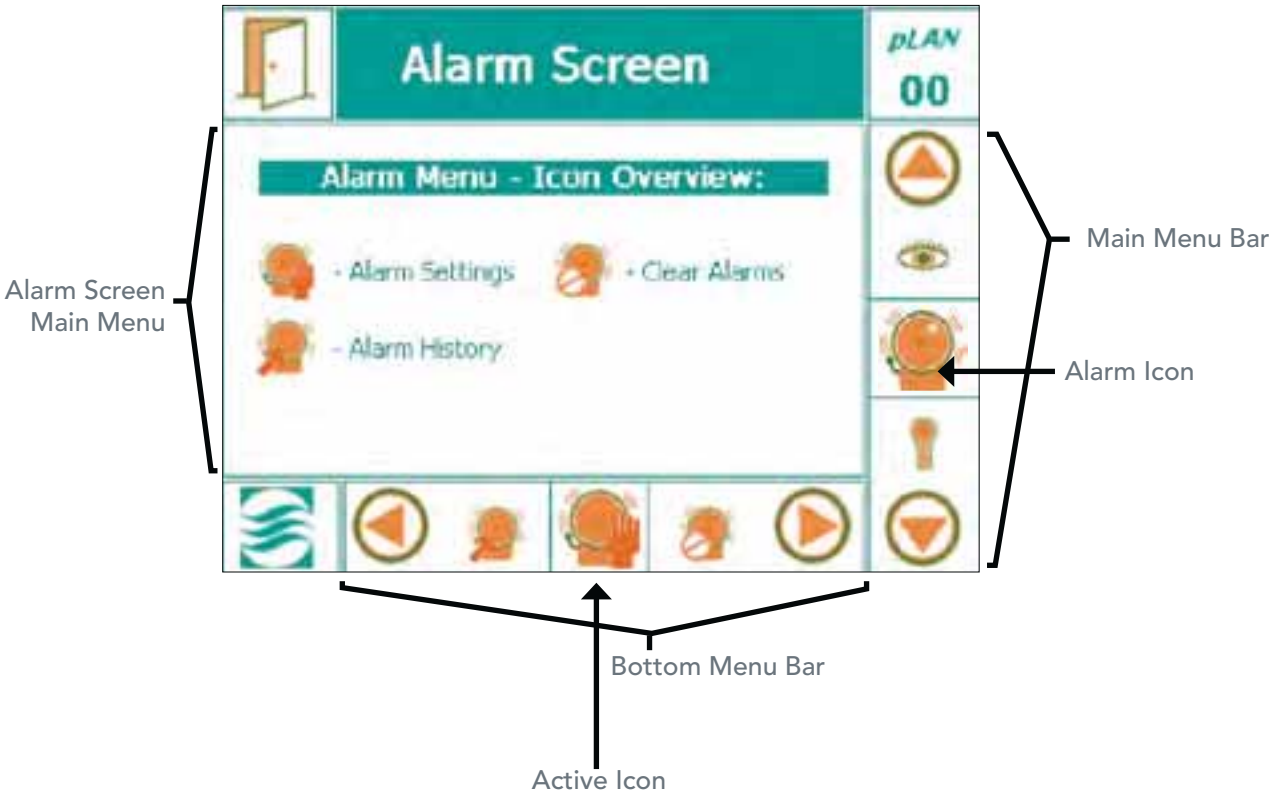
- Alarm Settings
- Alarm History
- Clear Alarms

## 6.1 Alarm Screen Icons

From the Main Menu Bar on the Main Status Screen, tap the Alarm Icon to access the Alarm Screen. The Figure below illustrates the key areas of the Alarm Screen.

## 6.2 Alarm Overview

Figure 6-1: Alarm Screen – Overview




The CMP6050 contains a total of 20 alarm types. Based on the configuration of the unit, these alarms will be either enabled or disabled by Conviron at the time of manufacture.

Each of the alarms in the CMP6050 are identified by two main alarm classifications – Warnings and Shutdowns.

1. **Warning**

   Notification of a non-critical alarm condition. The chamber will continue to operate under the alarm condition(s). Examples of this type of alarm include humidity, light, open-door, etc.

2. **Shutdowns**

   Notification of a critical alarm condition. The chamber will deactivate to prevent damage to the chamber and/or experiment. Examples of this type of alarm include temperature, refrigeration system malfunction, circulating fan malfunction, etc. Shutdown alarms are further classified by Latching and Non-Latching as follows:

   a) **Latching**

   The chamber does not recover and user intervention is required. This alarm will stop the schedule and force the user to manually re-start the chamber.

   Example: High/low pressure.

   b) **Non-latching**

   The chamber automatically recovers without human intervention when the alarm conditions are corrected and/or no longer active.

   Example: temperature limits.

## 6.3 RAMP and STEP Mode

### 6.3.1 RAMP Mode Temperature Tracking Alarms

When temperature is set in RAMP mode (either gRAMP or vRAMP), an additional User-specified alarm setting called Tracking is available. The Tracking alarm functions identically in both gRAMP and vRAMP transition modes (see Section 2.12 Process Control Modes: BASIC and VAR, for more information about gRAMP, vRAMP, and STEP transitions).

With Tracking, the User specifies a warning limit. This limit (e.g. ±2°C) is the tolerance around the set point temperature that the User is willing to accept before the controller triggers a Warning alarm. If the actual temperature exceeds the set point throughout the ramping phase by more than the specified tolerance, a warning alarm is triggered. Tracking alarms are available for temperature only.

In either gRAMP or vRAMP mode, the temperature parameter also has a shutdown limit. This shutdown limit is similar to the Warning limit, however it represents a higher tolerance (e.g. ±5°C) than the Warning limit. The Shutdown limit is the tolerance around the set point temperature during ramping that the User is willing to accept before the controller triggers a Shutdown Alarm. If at any time throughout the ramping phase the actual temperature set in the shutdown limit differs from the set-point temperature by more that the specified

tolerance, the chamber will be shut down and it will trigger a shutdown alarm. Automatic shutdown is available only for the temperature parameter.

For the Warning limit in gRAMP or vRAMP mode, the actual conditions must exceed the warning limit for 5 minutes before a warning alarm is triggered and exceed shutdown limit for 5 minutes before a Shutdown (for temperature only) is triggered. The reason for this is to prevent nuisance alarms where the warning limit is exceeded for only a brief period.

### 6.3.2 STEP Mode - Limit Alarms

When the process transition mode is set to STEP, additional User-specified settings called "low" and "high" limits are available for each parameter. When the low or high limits are exceeded, a warning alarm is triggered. In the case of temperature, when the low or high limit is exceeded, the chamber shuts down and a shutdown alarm is triggered.

### 6.3.3 RAMP and STEP Mode - Alarms and Shutdown

See Figure 6-2 for a summary of the warning alarms and user defined shutdown settings available for gRAMP, vRAMP and STEP Mode for all processess:

Figure 6-2: RAMP and STEP Mode - Alarm and Shutdown

| Parameter | RAMP Mode (gRAMP or vRAMP) | | | STEP Mode | | |
|---|---|---|---|---|---|---|
| | User Defined Warning Alarm | | User Defined Shutdown Alarm Possible | User Defined Warning Alarm | | User Defined Shutdown Alarm Possible |
| | High | Low | | High | Low | |
| Temperature | Yes | | Yes* | No | | Yes** |
| Humidity | n/a | | n/a | Yes | | No |
| Light | | | | | | No |
| $CO_2$ | | | | | | No |

*gRAMP or vRAMP mode: During steady state or ramping phase to different temperature set points, the tracking alarm feature is always enabled. That is, users can define the allowable tolerance that would trigger an alarm. This tracking feature is applicable to temperature only. While in gRAMP or vRAMP mode for temperature, the user can also define the shutdown tolerance that would trigger an automatic shutdown (and a shutdown alarm).

**STEP mode: When in STEP mode the tracking alarm feature is always disabled. However, automatic shutdown is still possible by setting the absolute temperature limits. temperature limits to trigger a shutdown are user defined and should not exceed factory set limits. Any temperature exceeding the user defined limits in STEP mode for the temperature parameter triggers a shutdown. Shutdown cannot be triggered for other control parameters while in STEP Mode. However, exceeding defined limits will trigger warning alarms for all other parameters.

Setting the process transition mode as either gRAMP, vRAMP, or STEP mode is described in further detailin Section 5.4.4.1 Process Transition Mode – RAMP vs. STEP.

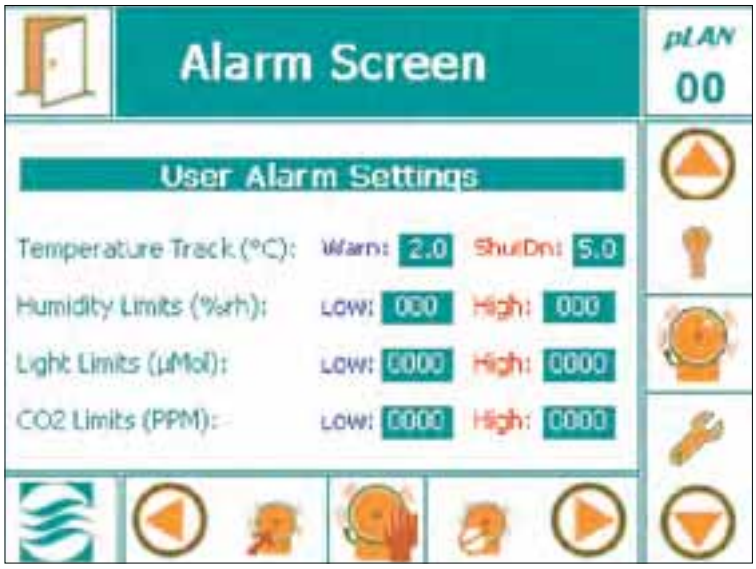
## 6.4 Setting Alarms

**Access Level 1**

1. Tap the alarm icon to access the alarm screen.
2. Tap the Alarm Settings icon to access one of the following screens, depending on whether the controller is set for RAMP (gRAMP or vRAMP) or STEP mode – Figure 6-3: Alarm Screen in RAMP mode or Figure 6-4: Alarm Screen in STEP mode (default values shown).

At this point, the actual screen will vary depending on the unit chamber configuration – that is, whether in RAMP (gRAMP or vRAMP) or STEP mode.

Figure 6-3: Alarm Screen in RAMP mode




### 6.4.1 When in RAMP Mode (gRAMP or vRAMP)

1. **Set the Warning (low) tracking alarm tolerance.**

   Tap the Warn field box to display a keypad and enter the low tracking alarm value.

   - The value entered cannot be lower than the factory set minimum 2.0°C.

2. **Set the Shutdown (high) tracking alarm tolerance.**

   Tap the shutdown field box to display a keypad and enter the high tracking alarm value.

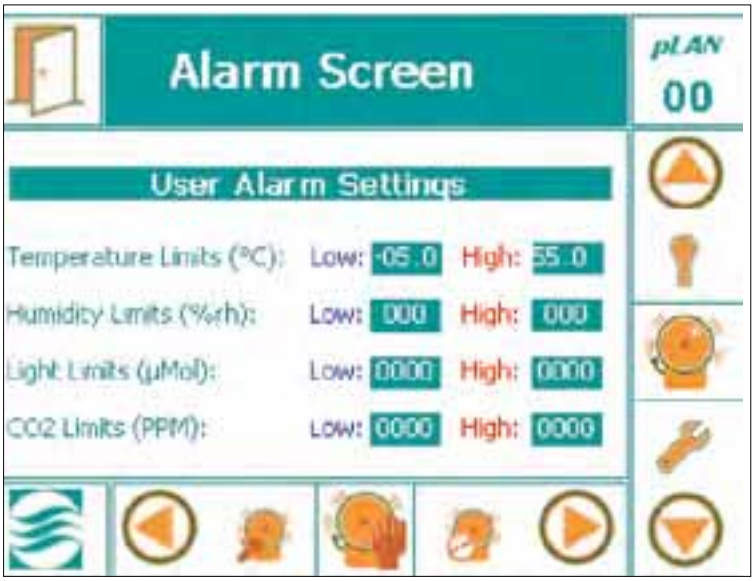
   - The value entered must be in the range of 2.0° to 9.9°C

Setting the Low and High limits for the remaining parameters are independent of RAMP or STEP Mode. Factory default values are set by Conviron and depend on the chamber configuration. The User is able to change the default settings using the same general instructions for setting the temperature limits.

### 6.4.2 When in STEP Mode

When in STEP Mode, Temperature Tracking alarms are disabled. Tracking alarms are based on the set point at any particular time in the program, including during ramping.

Figure 6-4: Alarm Screen in STEP mode (default values shown)




1. **Set the low alarm limit.**

   Tap the low field box to display a keypad and enter the low limit alarm.

2. **Set the high alarm limit.**

   Tap the high field box to display a keypad and enter the high limit alarm.

With Conviron CMP6050 software, the values entered in the limit fields are saved and do not have to be re-entered when the system is re-booted. Always verify when changing the temperature alarm limits that they are within the minimum and maximum operating limits of the chamber. This will ensure that the ir33 does not trigger shutdown before a high or a low temperature alarm.

## 6.5 Alarm Status Indicators

The following Table provides a summary of alarm status indicators and their corresponding pop-up windows.

| Status Indicator | | | | Definition & Corresponding Pop-up Window |
|---|---|---|---|---|
| CMP6050 | | | = | No program running/ No alarms |
| CMP6050 | + | CMP6050 | = | Program running/No alarms |
| CMP6050 | + | CMP6050 | = | No program running/Inactive Unacknowledged alarm (Figure 6-5) |
| CMP6050 | + | CMP6050 | = | No program running/Active Acknowledged alarm (Figure 6-6) |
| CMP6050 | + | CMP6050 | = | No program running/Active Unacknowledged alarm (Figure 6-7) |
| CMP6050 | + | CMP6050 | = | Program running/Inactive Unacknowledged alarm (Figure 6-5) |
| CMP6050 | + | CMP6050 | = | Program running/Active Acknowledged alarm (Figure 6-6) |
| CMP6050 | + | CMP6050 | = | Program running/Inactive Unacknowledged alarm (Figure 6-7) |

Tapping the Status Indicator while any of the alarms states are active will provide details of the alarm condition and additional options.

Figure 6-5:

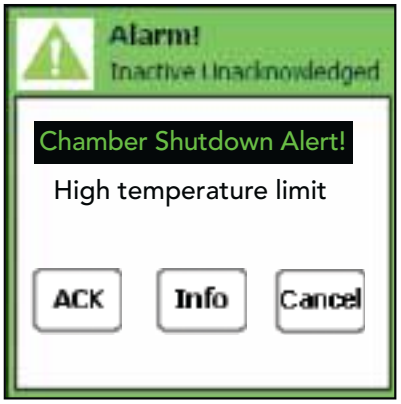



Figure 6-6:

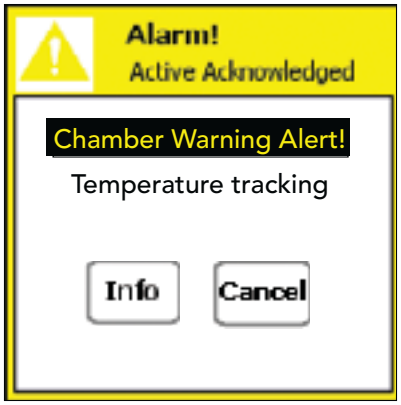
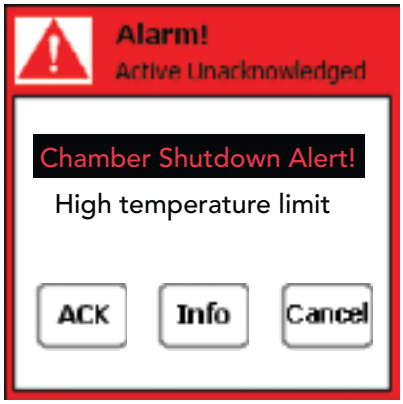



Figure 6-7:



## 6.6 Alarm Corrective Action

For any of the above alarm conditions, tap the CMP6050 logo to access the corresponding pop-up Alarm Screen.

1. Adjust the alarm settings if necessary.

2. Repair the fault where necessary.

3. Shut down and restart the chamber.

Inside the control panel is an independent temperature shut-off device called the ir33. This ir33 acts as a secondary fail-safe protector that shuts off the chamber if its temperature limits are exceeded. The ir33 is set by Conviron and is factory protected.

The factory default setting for the ir33 temperature limit is 10˚C beyond the chamber operating range. The standard operating range of a chamber is +4˚C to +45˚C while the standard ir33 shutdown settings are -6˚C to +55˚C depending on the chamber size, size of the compressor and other factors. Always ensure, when changing the (Alarm) temperature limits, that the limits are still within the minimum and maximum operating limits for the Chamber. This will ensure that the ir33 only triggers in the event that the actual temperature exceeds the Chamber's minimum or maximum temperature limit by 10˚C. It will also ensure that the ir33 does not trigger before a high or low temperature tracking alarm.

The ir33 is located inside the control panel where there is live high voltage. Contact Conviron Client Services for more information or help if necessary.

## 6.7 Alarm Types

Following is a list of the 21 alarm types along with a description of each.

**Warnings:**

| | |
|---|---|
| Bootup Alarm | A message that is generated each time the controller re-boots. |
| Temperature Tracking Warning Alarm | A warning message when the temperature drifts beyond the tolerance around the set-points. |
| Chamber Off Alarm | Chamber power shuts off while a program is running as a result of the main contactor open. |
| High Humidity Warning Alarm | A warning message that the humidity has drifted above the high alarm. |
| Low Humidity Warning Alarm | A warning message that the humidity has drifted below the low alarm. |
| High $CO_2$ Warning Alarm | The amount of $CO_2$ in the chamber is above the alarm. |
| Low $CO_2$ Warning Alarm | The amount of $CO_2$ in the chamber is below the alarm. |
| High Light Warning Alarm | The lighting intensity (in uMOL) is above the alarm. |
| Low Light Warning Alarm | The lighting intensity (in uMOL) is below the alarm. |
| Lights are ON | A warning message that lights are ON during dark cycle. |
| Open Door Warning Alarm | A warning message that the chamber unit door is open for more than 60 seconds. The Chamber will shut down after 5 minutes if the door remains open after that time. (Available in just a few schedules) |
| High Pressure Warning Alarm | A warning message that the refrigeration unit has run above the high pressure limit value for more than 30 seconds. |
| Low Pressure Warning Alarm | A warning message that refrigeration unit has run below the low pressure limit value for more than 30 seconds. |
| Loft Temperature Warning Alarm | A warning message that the lamp loft temperature has exceeded the set-point |
| Plenum Temperature Warning Alarm | A warning message that the plenum temperature is above or below the set-point. |

**Shutdown Latching:**

| | |
|---|---|
| High Pressure Count Alarm | A warning message that the high pressure switch has been tripped off 3 times within the last 30 minutes. |
| Low Pressure Count Alarm | A warning message that the low pressure switch has been tripped off 3 times within the last 30 minutes. |
| High Pressure Time Alarm | A warning message that the high pressure switch has tripped off for more than 30 seconds. |
| Low Pressure Time Alarm | A warning message that the low pressure switch has been tripped off for more than 30 seconds. |

**Shutdown Non-Latching:**

| | |
|---|---|
| ir33 Temperature Shutdown Alarm | Chamber shut off as a result of exceeding the ir33 temperature settings. |
| Temperature Tracking Shutdown Alarm | Chamber shut down as a result of the temperature exceeding the user defined tracking tolerance, which is a higher tolerance than the warning limit. |

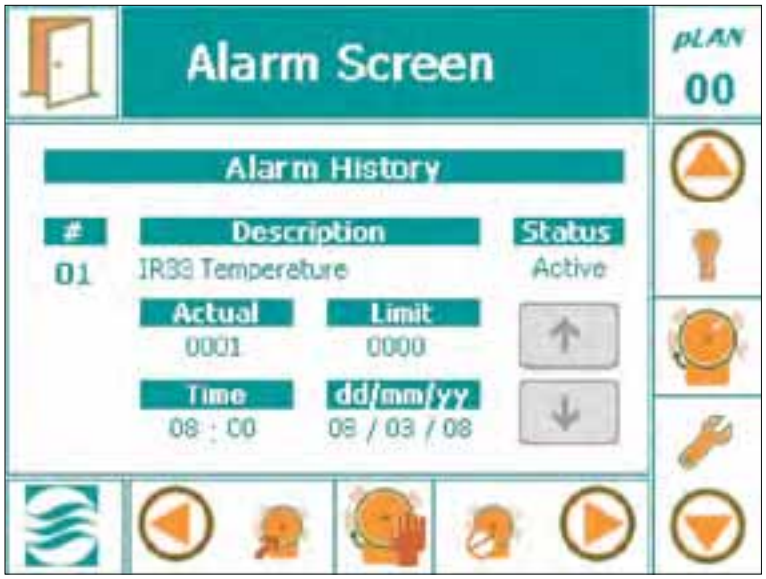
## 6.8 Alarm History

**Access Level 1**

The Alarm History provides alarm information stored in the CMP6050 for the User to view. The information provides a history of every alarm that the chamber encountered.

Tap the Alarm History icon  to access the following screen. (See Figure 6-10)

Figure 6-10: Alarm History Screen



| | |
|---|---|
| **#** | Indicates the alarm in sequence of alarm events. |
| **Description** | Indicates the alarm cause or malfunction. |
| **Status** | Presents the Alarm Indicator (Ref. Section 6-5 Alarm Status Indicators) |
| **Actual** | Actual value achieved of the parameter. |
| **Limit** | Set-point limit of the parameter. |
| **Time** | Indicates the time of the alarm set-off. |
| **DD/MM/YY** | Indicates the date of the alarm set-off. |

- Use the UP or DOWN arrow buttons to view the alarm history

## 6.9 Clear Alarms

**Access Level 1**

Touch the Clear Alarms icon  to access the following pop-up window:

Touch the Yes, No, or the Cancel button to confirm (Figure 6-11).

Figure 6-11: Confirmation to clear alarm.

# 7.0 SECURITY SCREEN

Access Level 1

The CMP6050 has a security feature to manage Users by managing their level of access. The feature requires Users to be set-up (a maximum of 3 User ID passwords can be assigned). Once this is completed (and provided Security is turned On), Users are required to login – this is to ensure that Program modifications are made by authorized personnel only. The Administrator can override all Users and can access all programming functionality.

The default for security features is to be turned Off (the CMP6050 is shipped with security features turned Off). This enables any User to start the chamber and become familiar with the chamber controls without having to enter a password.

It is recommend that a security Administrator be assigned to administer User login authority and that security features be added as soon as possible.

## 7.1 Security Overview

With security enabled, there are three types of Users in the CMP6050 including:

- Users (Access Level 1)
- Administrators (Access Level 2)
- Factory (Access Level 3)

**Users** have Level 1 access which means they have access to the basic features such as Programming, Alarms, Trend Graphs, and some of the Option features. **Administrators** have Level 2 access which includes Level 1 access plus additional Service and Option features. **Factory** has Level 3 access which includes Level 2 access plus other Service and configuration features. Section 7-4: Edit User Screen provides details on setting up the Users and enabling the Security feature. A step-by-step instruction is provided.

When Security is turned OFF, anyone can access the Level 1 and 2 features. For this reason, it is recommended to setup the Administrator and User login authorities as soon as possible.

## 7.2 CMP6050 Level Access

The following table provides CMP6050 access levels available to the User, Administrator, or Service/Factory personnel. Access level is password enabled. In this manual, access level codes are presented at the beginning of every chapter to inform the user of specific access required.

| Menu | Sub-Menu | Location (Page) | Access Level |
|---|---|---|---|
| Status Options | Input Offset | 8-1 | 1 |
| | Time & Date | 8-3 | 1 |
| | Security On/Off | 8-4 | 2 |
| | Startup Delay | 8-2 | 1 |
| | Setup | 8-4 | 1 |
| Security | Login | 7-5 | 1 |
| | Logout | 7-6 | 1 |
| | Change Password | 7-3 | 1, 2 |
| Service | I/O Status | 10-2 | 1 |
| | CONVIRON Access | n/a | 3 |
| | User Reset | n/a | 2 |
| | O/P Runtimes | n/a | 2 |
| | PID Settings | n/a | 2 |
| Alarms | Settings | 6-4 | 1 |
| | History | 6-9 | 1 |
| | Clear Alarms | 6-10 | 1 |
| Trend Graph | N/A | 9-1 | 1 |
| Program | Create | 5-3 | 1 |
| | Edit | 5-6 | 1 |
| | Schedule | 5-8 | 1 |
| | Delete | 5-7 | 1 |

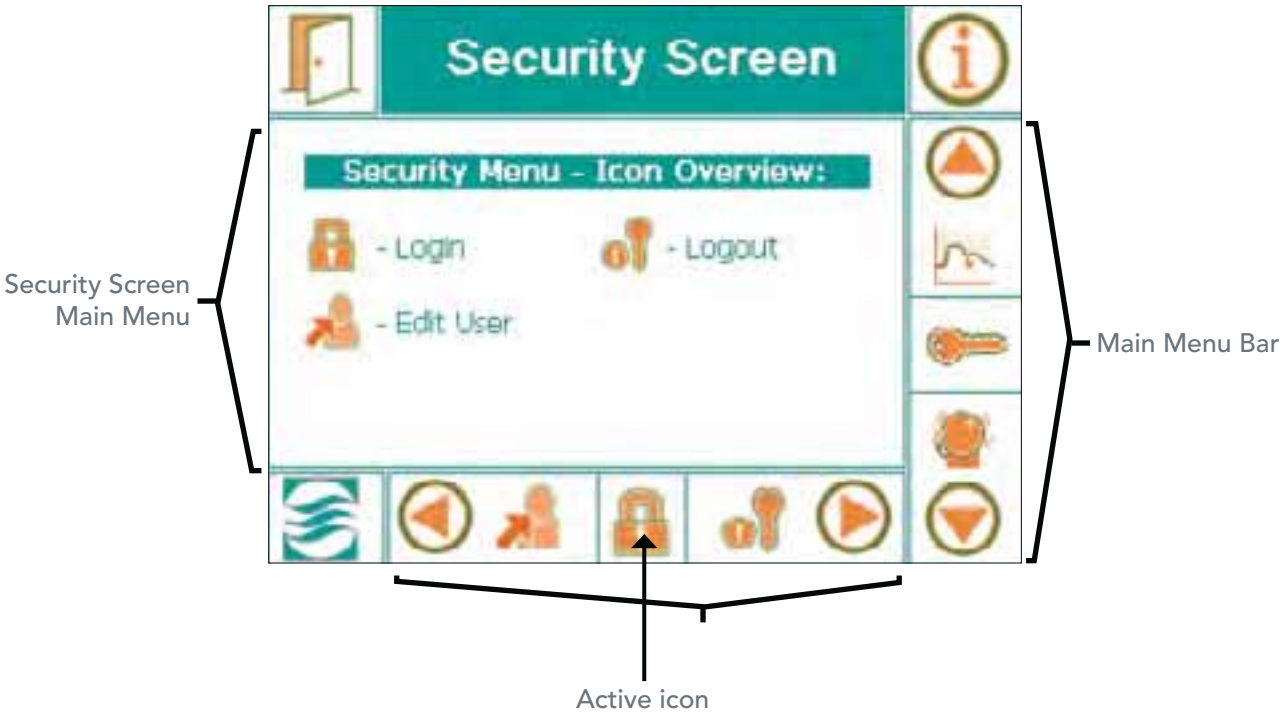
Legend
1 = User access 2 = Administrator access 3 = Factory access

Factory login is only available to Conviron personnel.

## 7.3 Security Screen Icons and Locations

The figure below (Figure 7-1: Security Screen Layout) presents the key features and layout of the Security Screen. This is the screen used to setup Administrator and User passwords.

Figure 7-1: Security Screen Layout




## 7.4 Edit User Screen - Change Password

**Access Level 1, 2**

The first step to setting up the Security feature is to setup the Administrator. The CMP6050 comes from the factory with a default Administrator password already set up. Note, this password must be changed as soon as possible. The default password is 72343. Using this as the current password, assign an Administrator and change the Administrator password. This is accomplished as follows:

On the Main Menu Bar, scroll up or down until the Key icon  appears as the active Icon. Tap the Icon to launch the Security Screen (Figure 7-1: Security Screen Layout).

Tap the Edit User icon  in the bottom menu bar to access the Edit User screen (Figure 7-2).

To navigate through this screen, use the three (3) Keys on the right side of the display (Figure 7-3).

Figure 7-2: Edit User screen.


1. Press the ENTER key to navigate to the Select User field. A blinking white cursor will appear in the field box.

2. Press either the UP or DOWN Key to scroll through the available users. The options include Users 1-3 plus Administrator.

3. Press the ENTER Key once you have selected the desired user.

It is recommended that the first user to be setup be the Administrator. Once the Administrator has been setup, other Users (up to 3) can be setup. An Administrator can change their own (Level 2) password or a user (Level 1) password, however, a user may only change their own (Level 1) password.

4. a) In the initial setup for the Administrator, insert the default password (72343) in the Enter Current Password field.

   b) In the initial setup for each User, the Current Password is 00000. Press the ENTER Key five (5) times to skip through this field.

5. In the Enter New Password section, a blinking white cursor is displayed in the 1st digit field. Use the UP/DOWN Keys to toggle the digit and press the ENTER Key to confirm.

6. Repeat Step 5 for every digit until completed. A notice will appear in the lower portion of the screen: Password Change Successful.

7. Press the ENTER key again to return to the Security menu screen.

The Administrator and all Users should record their passwords for reference. If a User forgets/loses his/her password, it can be reset by the Administrator. If the Administrator forgets/loses his/her password, Conviron Technical Services must be contacted.

Figure 7-3: Display – Right Side Keys

## 7.5 Login Security Screen

**Access Level 1**

Now that passwords have all been set up, Security should be turned ON. If passwords are all set up and Security is not turned ON, anyone can access Level 1 and 2 functions. When Security is turned ON, Users can only access Level 1 functions while Administrators can access Level 1 and 2 functions.

Turning Security ON is accomplished from the Option Screen. Note however that the Option Screen has not yet been covered at this point in the Manual. Please refer to Section 8.6: Security On/Off for instructions on how to turn the Security ON. Once Security has been turned ON, proceed with the following instructions regarding logging in.

Touch the Login icon  to access the following screen. (Figure 7-4: Login screen)

To navigate through this screen, use the three (3) Keys on the right side of the display (Figure 7-3).

1. Press the ENTER key to navigate to the Select User field. A blinking white cursor will appear in the field.
    - **Factory is inaccessible to the User. It requires Access Level: 3**.
2. Press either the UP or DOWN keys to scroll through the available users.
3. Press the ENTER key after selecting the desired user.
4. There should now be a blinking white cursor in the Enter Password (1st digit) field box. Press the UP or DOWN key to enter the code.
5. Once the last digit of the password has been entered, press the ENTER key. An unlocked padlock icon and the text Login Successful are displayed when finished at the bottom of the login screen.
    - Authorized access to various Level-dependent sections of the CMP6050 is now enabled.
    - If a mistake is made entering a password, tap the Exit Icon. This will move you back to the previous screen. You'll then have to re-enter the Login Screen.

Figure 7-4: Login screen


## 7.6 Logout Security Screen

Access Level 1

Touch the Logout icon  to access the following pop-up window. (Figure 7-5)

Touch the Yes, No, or the Cancel button.

After selecting the desired button, by default, it will return to the Main Status Screen.

- After five (5) minutes of inactivity, the CMP6050 will automatically Logout all Users, including the Administrator. (Figure 7-6)
- A pop-up window will appear and inform the User to Log in again.
- Follow the same procedure as in Section 7.5 Login Security Screen to re-gain access.

Figure 7-5: Log out confirmation.


Figure 7-6: Login timeout.

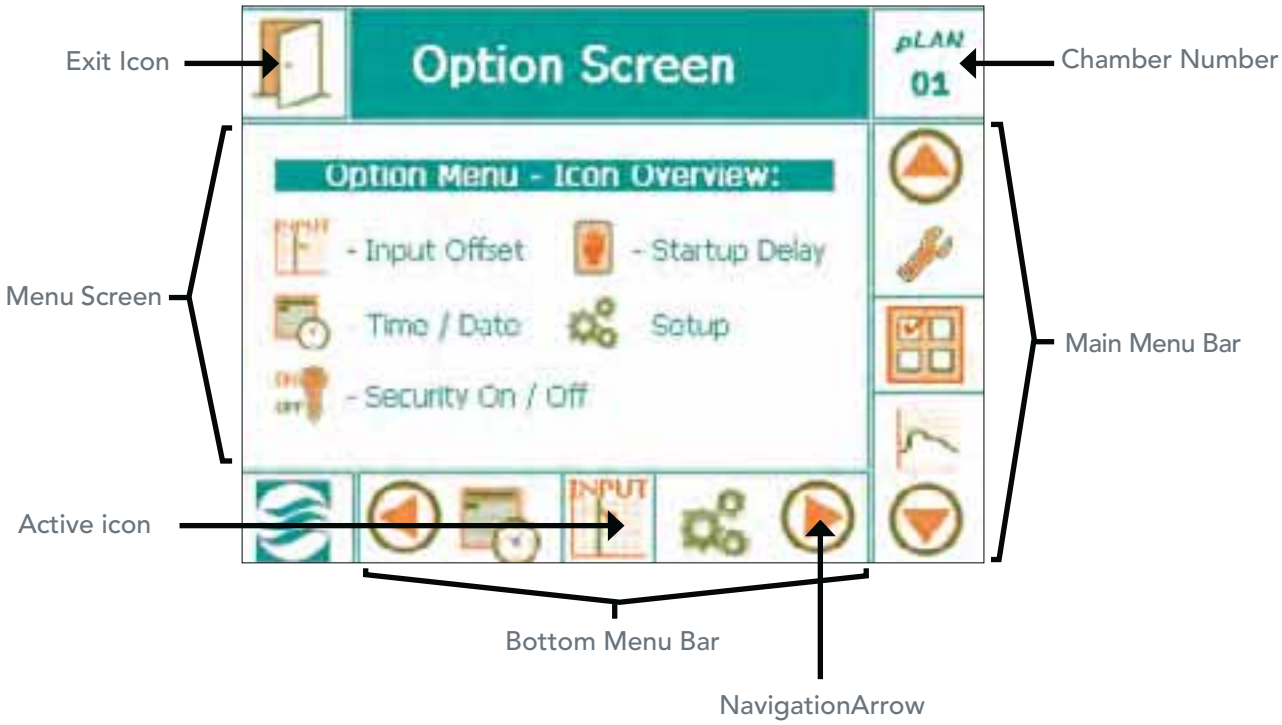
# 8.0 OPTION SCREEN

In previous sections of this Manual, instructions were provided to enable the User to start-up and begin using the CMP6050 to control the Chamber. Those instructions comprised the basics of what was required to begin operating the control system. In this section, an expanded palette of features and options are presented. These new features provide the User enhanced control over system operation. Some of the options and features presented in this section affect the logged data, and as such it is important that the additional variables be appropriately set.

## 8.1 Option Screen - Layout

The Option Screen presents five key menu options as illustrated below.

Figure 8-1: Option Screen Layout




## 8.2 Input Offset (Sensor Calibration)

**Access Level 1**

Input offset refers to sensor calibration which is a feature that allows the User to apply an offset correction to the actual sensor reading. This is particularly useful when the User has an independent sensor device that is considered to be highly accurate and that produces a slightly different reading than the CMP6050 reading.

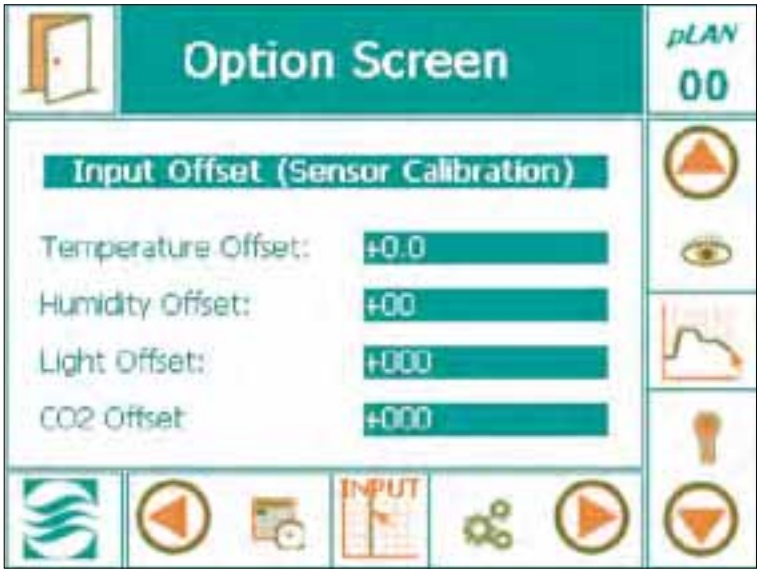
For example, if the chamber is running at 25°C and an independent temperature sensor is placed into the chamber and it reads 24.3°C, provided the independent sensor is deemed to be more accurate, a 0.7°C offset correction can be applied to the chamber sensor.

Offset correction is also useful since humidity sensors have a tendency to drift over time. In such circumstances, the User can increase the offset correction to compensate for this. Conviron recommends replacing the controller humidity sensor every two years.

To change the offset, tap the Input Offset 

icon in the main Option Screen to access the Input Offset screen (Figure 8-2):

Figure 8-2: Input Offset (sensor calibration)




There are typically three (3) basic sensors installed in a chamber including Temperature, Humidity, and Light. The $CO_2$ sensor is an optional component that appears below the light sensor field.

1. Tap the desired field to modify the numerical data using the pop-up keypad (Figure 8-3). Tap the OK button on the keypad when finished.
2. Repeat the process until all required offsets have been entered in the appropriate fields.
3. Tap the EXIT icon on the top, left hand side to store the values and exit to the Main Status Screen.

If negative values are entered, there may be conflict with alarm set-points, specifically with light and $CO_2$, since they could reach values below 0.

## 8.3 (Chamber) Start-up Delay

**Access Level 1**

For facilities that house multiple chambers, the CMP6050 offers a valuable feature called Start-up Delay. This feature allows for the configuration of a power-on delay for each chamber which staggers their start-up sequence. In the event of a power failure, once power is resumed, chambers would start sequentially as opposed to all at once – an event that could cause an

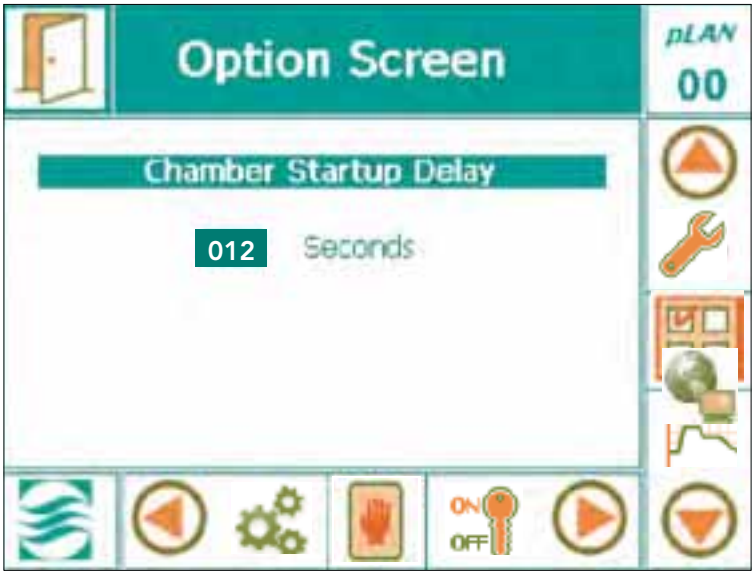
undesirable power surge or, worse yet, another power failure. Configuring each chamber to start several seconds after the previous chamber is a wise precautionary step.

Figure 8-3: Keypad


Conviron by default configures a random start-up delay value between 1 and 59 seconds. To modify the default value, tap the Start-up Delay icon in the Main Option Screen to access the following screen (Figure 8-4: Chamber Start-up Delay):

1. Tap the digit field to access the pop-up numerical keypad. (Figure 8-3)
2. Tap the desired number of seconds on the numerical keypad. Conviron recommends a number between 10 and 59 seconds. When multiple chambers are present, Conviron suggests setting this parameter 2 seconds apart.
3. Tap the OK button once finished. An alternative to using the electronic keypad is to use the Keys on the right side of the display.

Figure 8-4: Chamber Start-up Delay




## 8.4 Time/Date

**Access Level 1**

The Time / Date parameters were already setup in Section 3.0 Initial Start-up And Navigation Overview. The operation does not need to be repeated here.

## 8.5 Setup

Access Level 1

The Setup option screen designates the Data Storage Location for controller log data. This option is factory set to Network and does not require modification by the User.

## 8.6 Security On/Off

Access Level 2

Security features of the CMP6050 were already covered to some extent in Section 7: SECURITY SCREEN, of this Manual. The focus in Section 7 was getting the Administrator and Users set up with passwords, which is more of an infrequent (set-up) requirement. Security instructions provided in this section of the Manual pertain more to daily security interactions with the controller. Note that some instructions provided in this section may be redundant with those of Section 7.

The Security on/off feature is only available to the Administrator. When Security is turned OFF, all users have access to all Level 1 and 2 features. When Security is turned ON, features are limited by the access level (Level 1 for Users; Level 2 for Administrator).

With Security ON, anyone attempting to access a Level 1 or Level 2 screen will need to enter a password (this is referred to as "logging in"). If a User (not the Administrator) is logged in and s/he tries to access a Level 2 screen, a pop-up warning window appears (Figure 8-5) referencing the need to login as an Administrator. Tapping the OK field automatically brings up the Security Login screen (Figure 8-6).

The Security icon located at the right side of the Bottom Menu Bar of the Main Status Screen provides a shortcut to the Security Login Screen.

Figure 8-5: Warning Pop-Up Window

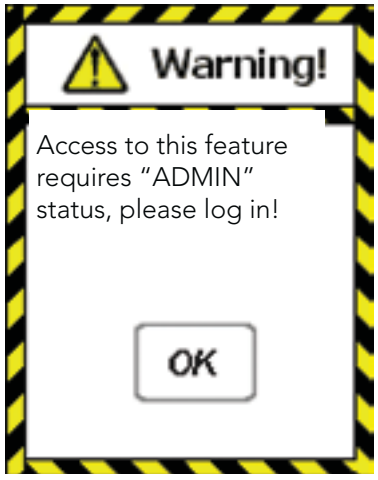



Figure 8-6: Security Login Screen


1. Login per instructions in Section 7.5: Login Security Screen.

# 9.0 TREND SCREEN

**Access Level 1**

Data management is an important aspect of controlled environment systems. Common is the need for researchers to be able to view and assess their log data. In some cases, this is a critical requirement. This section of the Manual is about Data Management. Key topics covered include;

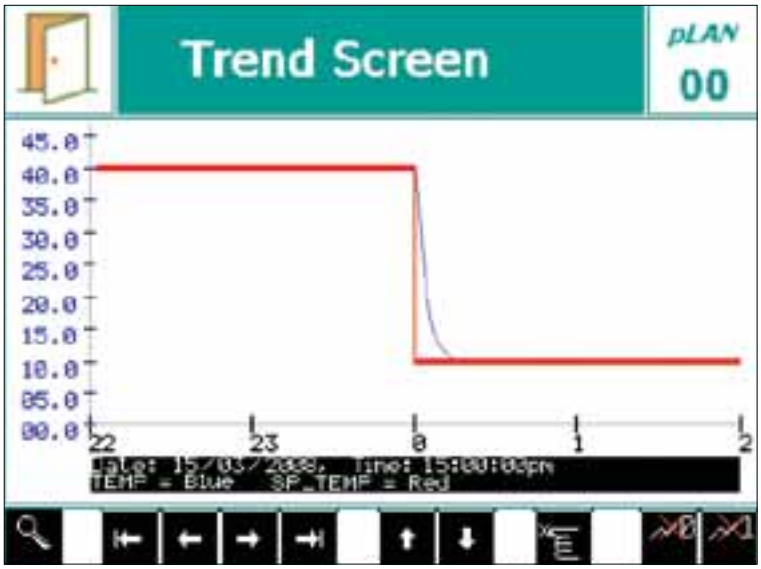
- on-screen trend data, and
- log data downloadable over a network.

The CMP6050 employs a data logging feature that logs two data sets. One set of data is viewable locally directly on the Display while the other set is viewable remotely via a network-connected PC. The local data, viewable on the Display, is automatically logged every 18 seconds and includes Temperature, Humidity, Light, and $CO_2$ (where applicable). The data is viewed in the form of Trend Graphs (a charted history) on the Display (Figure 9-1: Trend Graph screen). The controller has sufficient memory capacity to store 5 days worth of data after which it over-writes the oldest data.

The remote data, viewable on a network-connected PC, is more substantial and includes the log data for all I/O parameters. Again, the controller stores a package of data every 18 seconds, regardless of the number of parameters being logged. The data is stored in memory as a text file with each file representing a 24-hour period. The file name used has the format: ###.###.###.### YYYY-MM-DD.log which provides for convenient data retrieval and management. The controller has sufficient storage capacity to store up to approximately 20 days of data, depending on how many parameters are being stored for a particular chamber configuration.

Given the capacity of the controller's memory, it is recommended to extract the log data on a weekly basis (Reference: Section 9.4 – Log Data – Network).

Figure 9-1: Trend Graph screen



To access the Trend Screen for any of the four (4) Key parameters (Temperature, Humidity, Light, $CO_2$) tap the desired parameter on the Main Status Screen. The example below (Figure 9-2) shows the Trend Screen for Temperature.

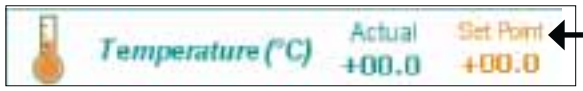
# LOCAL DISPLAY DATA

## 9.1 Trend Screen – Key Area Layout

When the controller memory has reached full capacity, by default, it will overwrite the oldest data stored in the memory, without issuing a warning to the User. To avoid losing data, Conviron strongly recommends to connect the unit to a LAN system and utilize the CM Software.

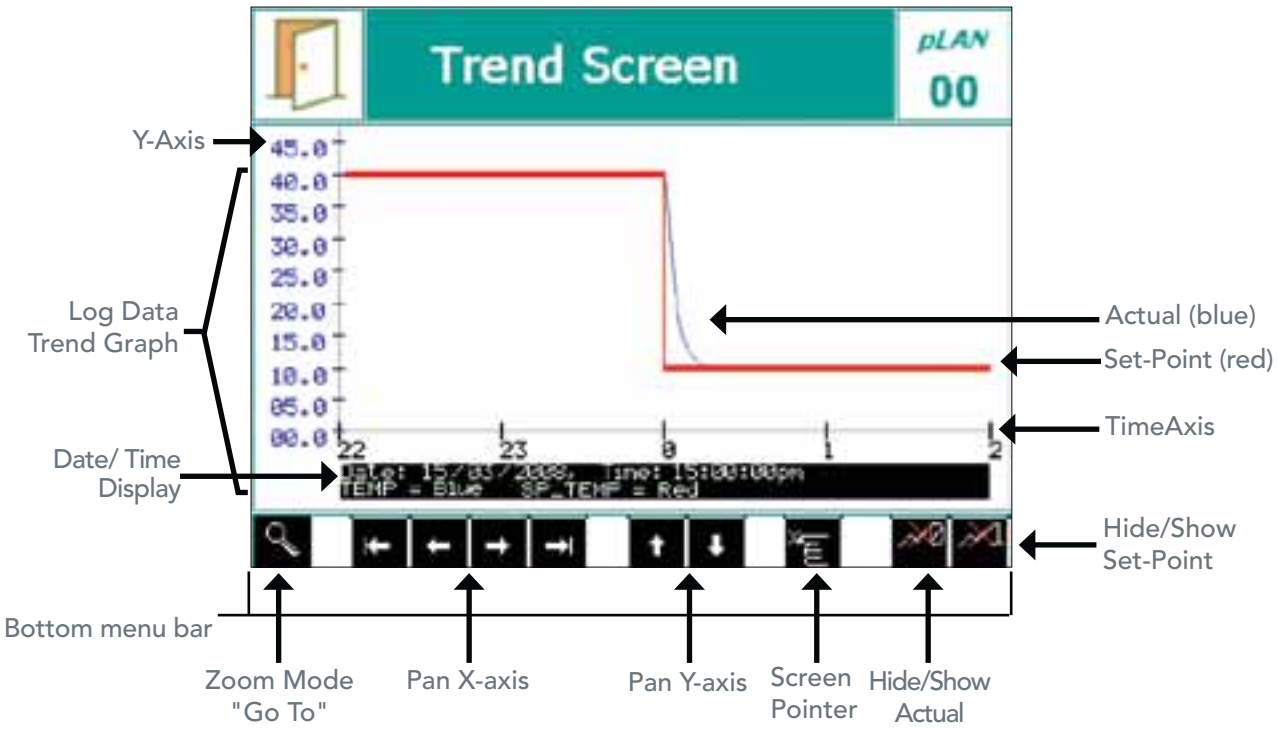
To activate the Trend Screen, tap the Actual (green font) value of the desired parameter.

To update the graph press




Temperature Parameter on Main Status Screen

Figure 9-2: Trend Screen – Key Area Layout for Pan Mode



### 9.1.1 Pan Mode Screen Fields

| | |
|---|---|
| **Bottom Menu Bar** | The Bottom Menu Bar displays all of the functions available with Pan Mode. |
| **Zoom Mode** | Tap this icon to access magnification menus for the current trend screen. |
| **Pan X-axis** | Tap the outer left/right icons to move horizontally to the beginning or end of the experimental data. Tap the left or right icons to view the trend graph horizontally at specific intervals. |
| **Pan Y-axis** | Tap to pan the trend graph vertically. |
| **Screen Pointer** | Tap to activate – now tap anywhere on the trend graph screen to view the data information with the tapped point moved to the screen centre. |
| **Hide/Show Actual** | Tap this icon to hide or show the Actual data trend line. |
| **Hide/Show Set-Point** | Tap this icon to hide or show the Set-Point data trend line. |
| **Actual** | Actual trend line that the CMP6050 is showing (blue coloured line). |
| **Set-Point** | The trend line that the CMP6050 is programmed to follow per the user's program (red coloured line). |
| **Axis** | Depending on the trend graph, these values will change. For example, temperature will indicate units in degrees Celsius while relative humidity will indicate units measured as a %. |
| **Time Axis** | The Time Axis shows integers in units of time, and these units change as you Pan. |

To know what units the Time Axis is displaying ensure you are viewing the Trend Screen in Pan Mode (Figure 9-2) and then compare the Time display (in the Date/Time field) with the left-most integer on the Time Axis. If the left-most integer matches (for example) the minutes field in the Date/Time display, then the Time Axis is being display in minutes. Notice that as you Pan to the right, both the Date/Time display AND the left-most integer on the Time Axis change simultaneously.[1]

| | |
|---|---|
| **Date/Time Display** | Depending on the trend graph being displayed, this display field shows the exact time and date synchronized to the trend displayed.[1] |

[1] When using magnification (zoom), these values are adjusted automatically and in - sync with the Trend graph display.

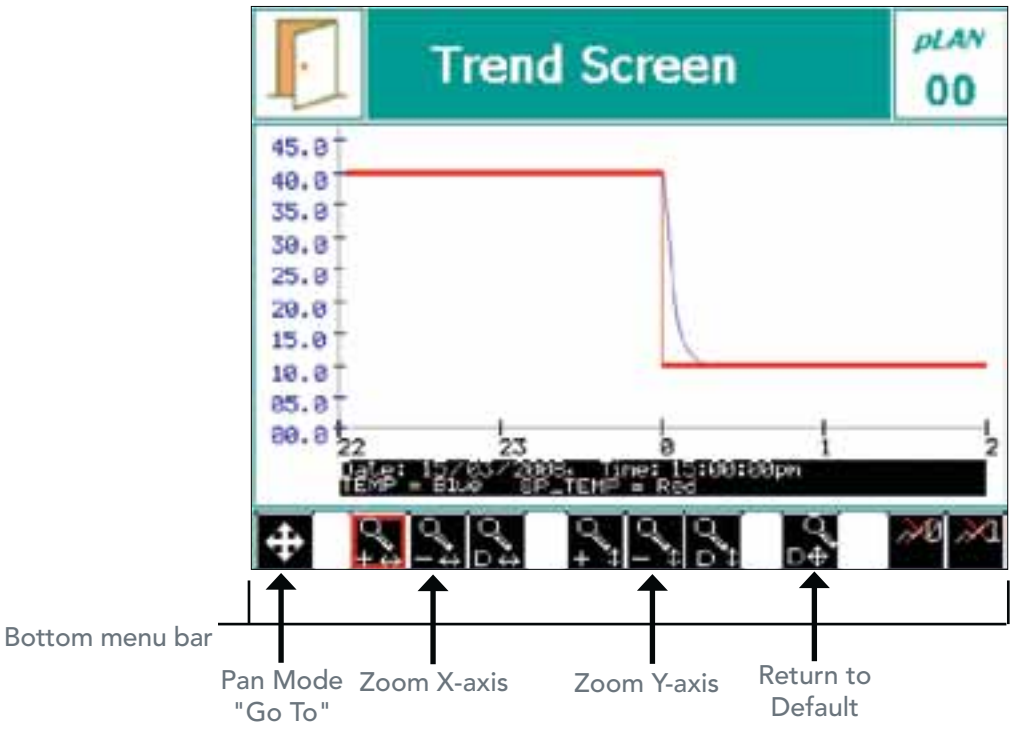
## 9.2 How to Pan on the Trend Screen

The Trend graph display can be panned left/right and up/down. To Pan right/left, tap the Pan X-Axis buttons. To Pan up/down, use the Pan Y-Axis buttons.

## 9.3 How to Zoom on the Trend Screen

Tap the zoom mode button  from the Pan Mode Screen to access the following Zoom Mode screen: (same trend graph as Figure 9-1, but a different bottom menu bar)

Figure 9-3: Trend Screen - Key Area Layout for Zoom Mode




### 9.3.1 Zoom Mode Screen Fields

**Bottom Menu Bar** — The bottom menu bar displays all the functions for Zoom Mode.

**Zoom X-axis** — Tap the  button to zoom in along the x-axis.

Tap the  button to zoom out along the x-axis.

Tap the  button to return to default zoom x-axis.

**Zoom Y-axis**

Tap the  button to zoom in along the y-axis.

Tap the  button to zoom out along the y-axis.

Tap the  button to return to default zoom y-axis.

**Return to Default**

Tap the  button to return to default trend screen.

**Pan Mode**

Tap the  button to return to Pan Mode.

The last button to be tapped will display a red perimeter

Example:  to 

# REMOTE DATA

## 9.4 Logged Data – Network

The data available remotely is more detailed than on-screen data and includes every input and output parameter being monitored and controlled. Data is automatically logged every 18 seconds regardless of the number of parameters. This provides exceptional data resolution for the user and also benefits service personnel.

The CMP6050 can be accessed with a network-connected PC from an FTP client to retrieve log data or Conviron's Central Management™ System (Optional).

Three steps must be completed to access the CMP6050 logged data from a PC other than a Central management system:

1. Setup the PC address
2. Set the CMP6050 controller address
3. Issue the FTP command in a Browser

Accessing data remotely typically requires assistance from the client's IT department. Your computer may or may not be appropriately equipped to access the CMP6050 remotely. [A computer requires a network card, an ethernet cable (to connect via a network) or a cross-over cable (to connect directly to a PC)]. Caution, if you set a TCP/IP address to the same value as another PC on the network, you will disable both systems from network access. Firewall security settings on your computer may inhibit or impair the performance of the computer connection. Please consult your IT department for assistance.

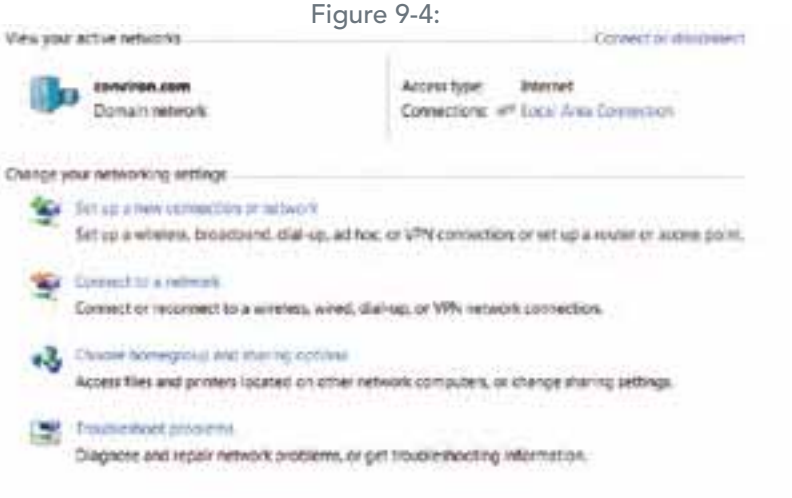
Read the following instructions entirely before proceeding.

To access the controller, it must be connected to a network. The network can be as simple as connecting to a single PC or to a Local Area Network. There are two places where the controller IP addresses must be setup - at the controller and at the connecting PC. If a Central Management™ (CM) system is used, the CM address must also be defined.

### 9.4.1 Setting the IP address at the PC (for Windows 7 only)

1. Click on Start> Control Panel> Network and Internet > Network and Sharing Center. Click on the Local Area Connection where the controller is connected (Figure 9-4).

Figure 9-4:



2. After clicking on Local Area Connection, click on Properties and scroll down and select Internet Protocl (TCP/IPv4). Then click on Properties again. See Figure 9-5.

Figure 9-5:

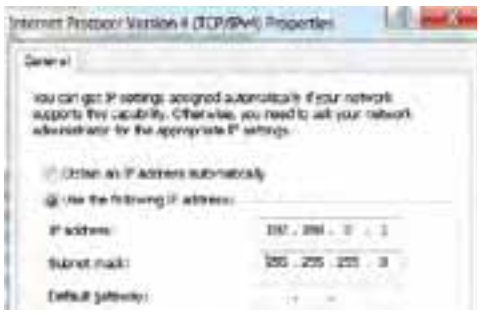
3. Proceed as follows:

Step 1: The system has an IP that was automatically assigned by a DHCP server. In this case, the property screen should look like the screen below and would automatically be assigned. (Figure 9-6).

Step 2: If the IP was not automatically assigned the next step will be to configure the IP address as in the screen below (Figure 9-7).

Figure 9-6: Internet Protocol (TCP/IP) DHCP Addressing

Figure 9-7: Internet Protocol (TCP/IP) Static Addressing



With either Option, if you are connecting to a "shared" local area network you must contact your site's IT Administrator for a TCP/IP address that will be suitable to assign to the CMP6050. This will ensure your PC and the CMP6050 are "address compatible".

If you are connecting directly to the chamber from the PC, you can safely set both TCP/IP addresses without affecting other systems. Select the "Use the Following IP address" button and type in the suggested address for the PC from the example below.

If you set a TCP/IP address to the same value as another PC on the network, you will disable both systems from network access. You may have firewall security settings on your computer that could inhibit or impair the performance of this computer connection.

Conviron suggests the following basic configuration;

| PC: | CMP6050 Controller | |
|---|---|---|
| **TCP/IP Address:** 192.168.0.1<br>**Netmask:** 255.255.255.0 | #1 | **TCP/IP Address**: 192.168.0.2<br>**Netmask:** 255.255.255.0 |
| | #2 | **TCP/IP Address:** 192.168.0.3<br>**Netmask:** 255.255.255.0 |
| | #3 | **TCP/IP Address:** 192.168.0.4<br>**Netmask:** 255.255.255.0 |
| | Etc. | |

### 9.4.2 Selecting an IP for the Controller

Set the controller address to the example on the previous page, if you are connected directly to a PC or in the situation of a network connected PC, use the address supplied by your IT network administrator.

**To connect to PC:** Use an ethernet cross-over cable to connect to the PC

**To connect it to a network:** Use standard ethernet cable

### 9.4.3 Setting the IP address at the Controller

There are two network addresses to set up in the CMP6050 as follows:

- **CMP Address:** Defines the identity of the controller within the network
- **Netmask:** Divides an IP address into subnets
- **CM Address:** Conviron's Central Management ™ IP Address

A valid IP address is needed for the CM Address value only when there is a Central Management system present. If there is no Central Management system present, the CM Address should be set to Disabled.

This Section typically requires assistance from the client's IT department.

The following feature will give you a "Warning!" pop-up window if the communication card on the controller is not working. (Figure 9-8)

To set the Chamber Addressing:

1. From the Main Status Screen, tap the ID button 

in the Bottom Menu Bar to access the network configuration as shown below:

Figure 9-8: Warning pop-up window.

Figure 9-9: Option Screen

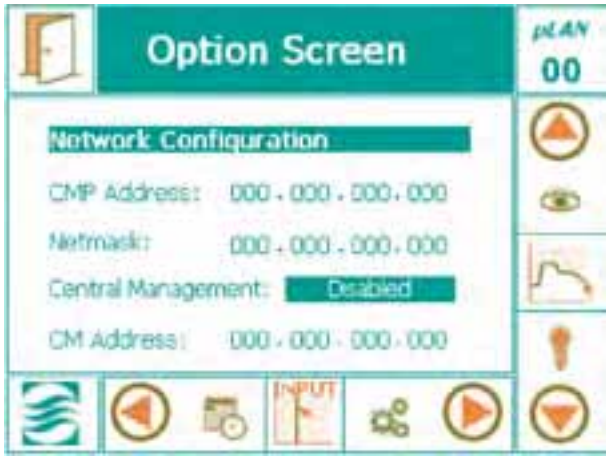
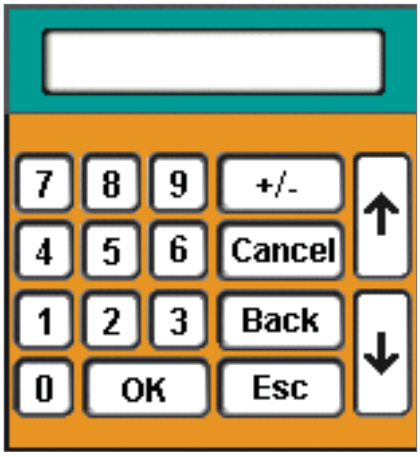



Figure 9-10: Pop-up Keypad




Up

Enter

Down

Figure 9-11: Controller Keys

2. To change the address numbers, tap each individual numerical field. A pop-up Keypad will appear each time a field is accessed (Figure 9-10). To enable the Central Management™ setting, tap Disabled then use the ↑ Up controller key as in Figure 9-11, to display Enabled and ← Enter to set.
3. Once all the addresses have been entered, tap the EXIT button and a pop-up warning window will appear to confirm the numerical entries (Figure 9-12).

4. Tap the Yes or No button to return to the Status Screen. Tap the Cancel button to re-enter any numerical address errors.

Once the Chamber Addressing has been set, the Chamber ID displays the last three digits of the CMP Address. If a Central Management system is installed, the Chamber ID identifies the Chamber to the CM system. Duplicate IDs on the CM system cannot be used, and no warning is issued. The Chamber ID's (last 3 digits) will also display in each of the respective chamber thumbnails on the CM dashboard.

Figure 9-12: Confirmation Pop-Up


To configure additional Chambers operating from the same controller, tap the pLAN icon, select the chamber number, and repeat steps 1-4 above.

### 9.4.4 Downloading logged data via FTP (for Windows 7 only)

1. Open an internet browser

2. Type in the address bar:

   ftp://guest:fguest@xxx.yyy.www.zzz/usr/local/root/http/

   Where xxx.yyy.www.zzz is the address of the controller.

3. The browser will display a long list of files, from which the one containing data is generically called:

   XXX.YYY.WWW.ZZZ Year-month-day.log

4. Copy the file into the folder where data is to be stored.

5. Using Microsoft® Excel or any similar application, search the file and open it.

   The file was automatically saved as a .log (text) file which can be rapidly converted into a .xls or . xlsx file for use in Microsoft® Excel.

6. To graph the variables, simply sort the table, remove the unneeded titles, and proceed with the graph feature.

The text of XXX.YYY.WWW.ZZZ in the above filename and address is actually a TCP/IP addresses. These will be different in each controller, as addresses must be unique. Using the suggested Conviron address you would substitute 192.168.0.1 for XXX.YYY.WWW.ZZZ.

Chambers should have the "ID" set, if the network log access is required. The chamber ID identifies (makes unique) the individual chamber's log files.

# 10.0 SERVICE SCREEN

Service features have been available on Conviron control systems since the CMP4000 generation and have provided a powerful, valuable, and effective tool. Primarily intended for interaction with the control system by Conviron factory personnel and Conviron authorized service personnel, the Service area provides the status of all controlled inputs and outputs of the chamber. Most importantly, however, the Service area permits service personnel to override output variables allowing for quick and effective troubleshooting in the field.

The CMP6050 controller extends the Service capabilities of previous control systems by providing features accessible to Users (minimum security level required is Access Level 1). With the CMP6050, savvy Users can, with the support of Conviron's service personnel, navigate the Service Screen to determine why a unit is under-performing or malfunctioning. This, together with the ability to manipulate output parameters, facilitates efficient and effective troubleshooting which results in minimum chamber downtime and repair costs.

This Manual covers only the I/O Status area of the Security Screen. All other areas are beyond the scope of this Manual and are restricted to Access Level 3 personnel.

The Input and Output (I/O) parameters are configured for each chamber at the time of manufacture based on the product model, design configuration, and client options. As such, the I/O Status screen provides a list of the analog and digital input and output parameters configured for the particular chamber.

The following section provides greater detail regarding the I/O Status Screen, specifically as it pertains to service/troubleshooting.

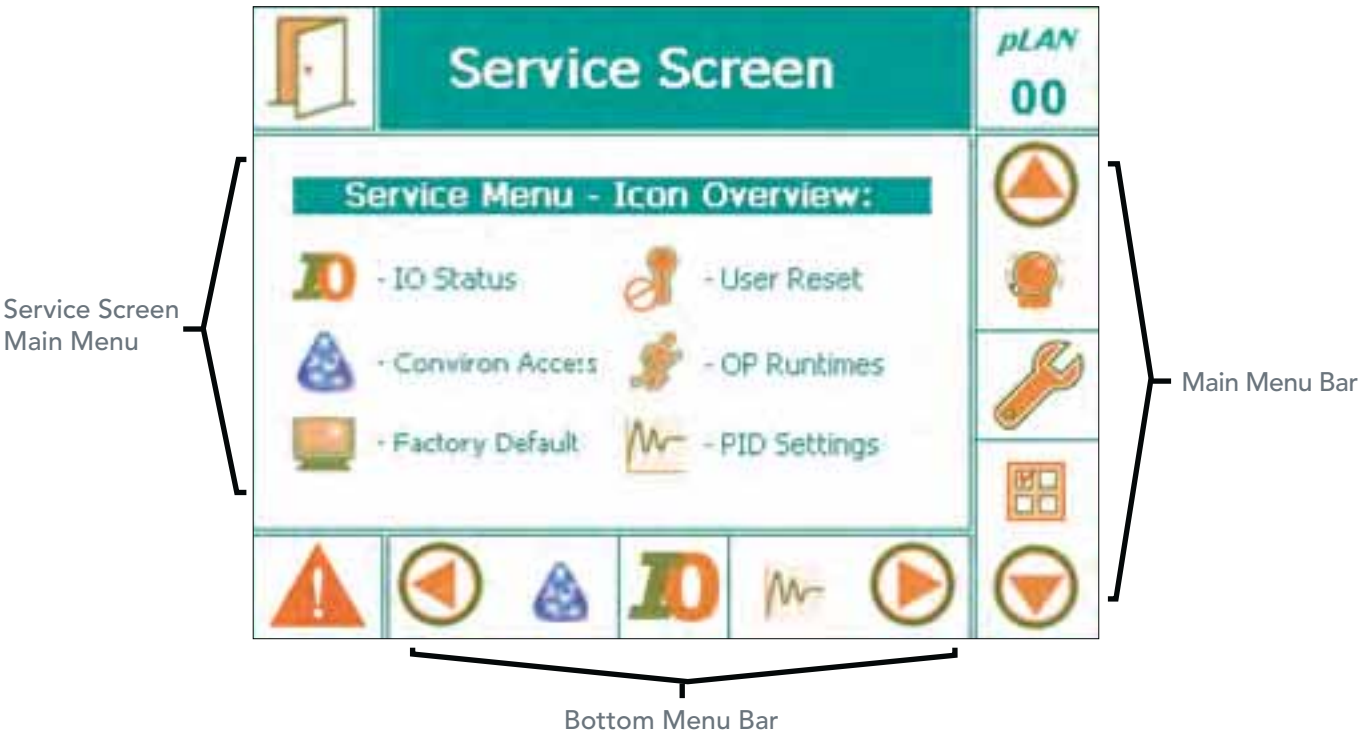
For safety reasons, interaction with the I/O Status screen is not available remotely using Conviron's Central Management system (previously named CCS – Central Control System). As such, in order to manipulate any of the output parameters from within the I/O Status screen, someone needs to be physically present at the chamber to witness the chamber reactions.

When a Schedule is **not** running, Alarms are disabled! No one other than a single, designated on-site service technician should be operating the chamber. Altering output parameters to troubleshoot a chamber, while others are handling mechanical or electrical systems within the chamber, COULD BE HAZARDOUS AND MAY RESULT IN PERSONAL INJURY. As such, manipulation of output parameters must be performed with either a qualified service technician present or via phone support with Conviron's Technical Services group.

## 10.1 Service Screen Icons

From the Main Status screen, scroll through the icons on the Main Menu Bar until the Service icon appears in the active location. Tap the icon to launch the Service Screen (Figure 10-1: Service Screen).

Figure 10-1: Service Screen




The Service Menu shows six interactive icons. Of these, the ***I/O Status*** is the only one accessible with User - Level 1 access. Tap the I/O Status icon to launch a series of screens that present the status of all configured I/O parameters.

## 10.2 I/O Status

**Access Level 1**

Figure 10-2 illustrates a sample I/O screen (schedule not running) showing several of the configured Analog Input parameters for a particular chamber. Using the up and down navigation Keys at the right of the display, scroll through the various screens to view the status of all I/O parameters configured for that particular chamber. Only those parameters that have been configured (at the Factory) for a particular chamber will be displayed. The parameters are always displayed in the following order:

- Analog Inputs
- Analog Outputs
- Digital Inputs
- Digital Outputs

The information presented for each parameter type and the corresponding interactivity available depends on whether or not a schedule is running. The following table summarizes the I/O Status Screen information and interactivity.

Figure 10-2: Sample I/O Screen - Analog Inputs ( Schedule not running)

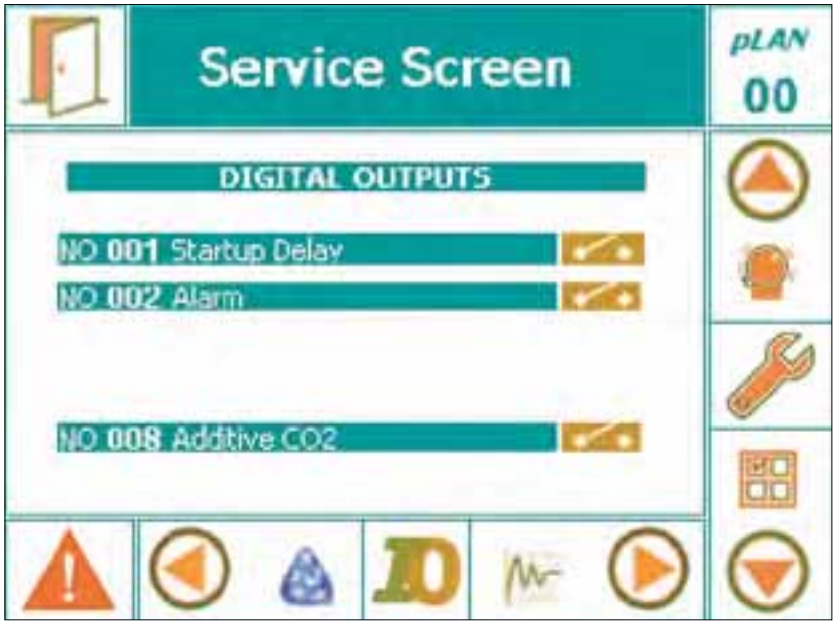

Table 10-1: Summary of I/O Status Screen Parameters

| SCHEDULE RUNNING (Read-only mode) | | | |
|---|---|---|---|
| **I/O Type** | **Display** | | **Interactivity** |
| | **(Green)** | **(Orange)** | |
| Analog Inputs | Actual Value | Set Point | Read-only when schedule running.<br>No interactivity allowed. |
| Analog Outputs | Actual Value | N/A | |
| Digital Inputs | Current Status | N/A | |
| Digital Outputs | Current Status | N/A | |
| **SCHEDULE NOT RUNNING (Troubleshooting mode)*** | | | |
| Analog Inputs | Actual Value | N/A | No |
| Analog Outputs | N/A | Current Condition | Yes |
| Digital Inputs | Current Condition | N/A | No |
| Digital Outputs | N/A | Current Condition | Yes |

*Note: See Warning message – next page.

When a Schedule is **not** running, Alarms are disabled! No one other than a single, designated on-site service technician should be operating the chamber. Altering output parameters to troubleshoot a chamber, while others are handling mechanical or electrical systems within the chamber, COULD BE HAZARDOUS AND MAY RESULT IN PERSONAL INJURY. As such, manipulation of output parameters must be performed with either a qualified service technician present or via phone support with Conviron's Technical Services group.

Figure 10-3: Sample I/O Screen - Digital Outputs (Schedule not running)




From the table above, note the following:

- When a program is running, the I/O Status screen provides Read-only information regarding the status of the I/O parameters – no interactivity is allowed.
- When a program is not running, the I/O Status screen allows analog and digital output signals to be altered. This interactivity enables qualified service technicians to troubleshoot the chamber. Refer to Figure 10-3 for a sample screenshot of Digital Outputs. Note that the orange fields (when a Schedule is not running) can be altered. **(Note: Warning message above.)**

To exit the I/O Status screen, tap the exit icon in the upper-left corner of the screen. When the unit is running a Schedule (Read-only mode), this action simply returns to the Main Status Screen. When the unit is not running a Schedule (Troubleshooting mode), this action will stop the unit.

## 10.3 Scalable Options:

One of the many impressive features of the CMP6050 is its scalability – that is, the ability to expand the I/O capacity, configure optional devices, and add secondary controllers that communicate with the main (primary) controller and the same (main) display. The following represent available options also displayed on the I/O Status screen, where configured.

SENSORS – additional sensors can be added to the chamber and configured in the controller. The (parameter) value of the additional sensors can be viewed at the I/O Status screen.

ADDITIONAL MODULES – For chambers that require the control of additional parameters, expansion modules are added to the CMP6050 to increase the I/O capacity. In such circumstances, the communication status and value of each additional parameter is displayed in the I/O Status screen (appropriately as input/output, analog/digital) without differentiation from those variables controlled by the main controller.

LAMP LOFT CONTROL - Units that require lamp loft control are equipped with a secondary controller. The secondary controller communicates with the main (primary) control system which records all lamp loft parameters as well. The status of the communication (On Line or Disabled) and the variables being controlled are displayed in the I/O Status screen as well, in a single screen.

CONTINUOUS DEFROST - As with the lamp loft control, this feature is also controlled by a secondary controller. Communication status and parameter values are displayed in the I/O Status screen.

IRRIGATION CONTROL - Automated watering of plants.

# GLOSSARY

| | |
|---|---|
| **Cell** | The individual entry points in the program table defined by the intersection of any row (timeline) and any column (zone). |
| **CCS** | Acronym for Central Control System. Now called Central Management (CM). |
| **Central Control System (CCS)** | A remote control and monitoring system available for chambers with CMP6050 controllers. Contact Conviron Client Services for more information. |
| **Central Management System (CM)** | A remote control and monitoring system available for chambers with CMP6050 controllers. Contact Conviron Client Services for more information. Formerly called CCS. |
| **Chamber** | The entire unit is called the chamber. Parts of the chamber include the control screen, the electrical panel, the refrigeration system and the plant growth area. |
| **Controller** | The device that sets and records the conditions in the plant growth area according to a user created program. The CMP6050 is the latest generation controller. |
| **Field box** | A specified area on the screen where data is displayed and/or is entered. |
| **Host** | Another term for the central control system. It is more commonly used in alarm messages and technical documentation. |
| **Inputs** | User defined parameters that enable controllers' activity. |
| **Ir33** | Acts as a secondary fail-safe protector that shuts off the chamber if its temperature limits are exceeded. The ir33 is set by Conviron and is factory protected. |
| **Latching** | The chamber does not recover and user intervention is required. The alarm will stop the schedule and force the user to manually re-start the chamber. |
| **Non-Latching** | The chamber automatically recovers without human intervention when the alarm conditions are corrected and/or no longer active. |
| **Outputs** | Switches that control specific devices or conditions within the chamber. |

# GLOSSARY

| | |
|---|---|
| **Plant growth area** | The environmentally controlled section of the chamber interior. |
| **Program** | One or more timelines that create conditions in the growth area during a 24-hour period. The timelines entered into the Program Table indicate program conditions to the controller. A multi-day program is a series of different programs, scheduled together. |
| **Program table** | The series of columns and rows used for entering program timelines on the Program screen. |
| **RAMP mode** | When conditions change gradually and steadily between timelines, the CMP6050 works in RAMP mode. |
| **RHS display buttons** | Right hand side (RHS); Use these keys for entering controller information and for navigational purposes. |
| **STEP mode** | When conditions are set to change dramatically between timelines, the CMP6050 works in STEP mode. |
| **Time line** | Also referred to as "Lines", this is any single row in the program table that contains a setting or settings that define conditions in the plant growth area. For example, temperature and relative humidity. |
| **Schedule** | One or more programs make up a schedule. |
| **Menu bar/Tool bar** | A series of buttons that usually displays at the bottom of the screen. The buttons provide shortcuts to specific functions such as on-line help, security and exit. |

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