CONVIRON®

CMP6060

Operator's Manual
Software Version 6.06

300264-ENG R00

CMP6060

Operator's Manual

SOFTWARE VERSION 6.06

Please read these instructions carefully and completely before operating the control system.

PREFACE

Welcome to the CMP6060 Operator's Manual, software version 6.06. This manual has been developed to assist with the setup and daily operation of the CMP6060. The manual is provided to all clients who have purchased a chamber(s) containing the new CMP6060 control system.

This manual is 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 CMP6060 has a security feature to manage the users' levels 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 three user ID passwords can be assigned). This is to ensure that any 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 CMP6060 offers three password-protected security levels:

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

Security Access levels associated with various features are identified throughout this manual and listed in Section 8.4.2, starting on page 90.

Refer to Section 8.4.5 Default Administrator Account, starting on page 92 for information on the administrator and user accounts.

> It is recommended that a security Administrator be assigned to administer user login authority and that security features be added as soon as possible.

This equipment is to be used only 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 the CMP6060 control system version 6.06.

SERVICE & 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 CMP6060 control system. Before contacting Conviron, please check the following:

- Read this document, *CMP6060 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 CMP6060, 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 cabinet, located on the rating plate at the side of the chamber and at the ⬤ icon

  - The software version of the CMP6060

  - Instructions for obtaining the CMP6060 software version number are provided in Section 4.1 Top Banner using the About Icon or the Conviron zone in the Top Banner

  - A description of the problem

  - A description of what you were doing before the problem occurred

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Document Conventions

Conviron maintains a policy of continual improvement and reserves the right to change the product without prior notice. Therefore, the images used throughout this manual may differ slightly from the actual configuration due to updates and product changes.

- Wherever possible, textual descriptions are accompanied by photographs or images of the CMP6060 to assist the reader in understanding the material.
- Frequent reference is made to left and right sides throughout this manual. Left is considered the left-hand side while facing the equipment.
- Italicized text is used to introduce instructions.

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1   PRECAUTIONS

The following symbols in Table 1-1 are used throughout Conviron manuals and on Conviron equipment to draw your attention to important warnings, guidelines, and product information. Please take note of their respective meanings.

Table 1-1   Hazard Identification Symbols

Symbol	Description
⚠️	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, 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 that 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 the Conviron 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 control system and therefore, both the Central Management™ manual and the CMP6060 Operators Manual must be read and understood in their entirety prior to operation.

Symbol	Description
	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.
	The control system 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 CMP6060 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.
	The "**IMPORTANT INFORMATION**" symbol is used to identify operating procedures that must be followed to ensure smooth and efficient equipment information.
	The "**PLEASE NOTE**" symbol is used to draw attention to additional information, which may assist in the operation of the equipment.
	The "**PROTECTIVE EARTH-GROUND-MANDATORY**" action symbol is used to identify the protective earth connection.
	The "**MOVING PARTS**" symbol is used to identify a potential hazard from moving parts inside the machine compartment.

2 INTRODUCTION TO THE CMP6060 CONTROL SYSTEM

2.1 An Overview of the CMP6060

The CMP6060 control system is configured at the factory and offers a wide array of setup, control, and alarm features to fine-tune the configuration on site. The scalability of the CMP6060 accommodates additional Input/Output ports if necessary. This flexibility allows you to add sensors, allowing the CMP6060 to adapt when changing or modifying experiments.

The CMP6060 control system consists of three primary components:

- Controller
- Display
- Control System Software

To access the CMP6060 control system version number, tap the **About** icon or the Conviron logo on the top banner. Tapping the Conviron logo provides additional information regarding the control system and the display version numbers.

2.1.1 Controller

The controller is mounted inside the chamber control cabinet and comprises the actual Programmable Logic Controller (PLC). The controller monitors the control parameters and adjusts the outputs to correspond with the programs and/or schedules. The controller also sends notifications with alarms, when parameters, for any number of reasons, deviate outside of the specified limits.

2.1.2 Display

The display (Figure 2-1) provides the interface to the control system using an LCD (Liquid Crystal Display) touch screen.
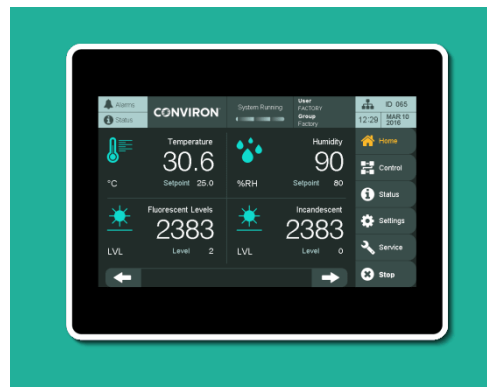
Figure 2-1   CMP6060 Display

The touch screen display provides access to the following functions:

- Programming and Scheduling
- Alarm
- Security
- Logging
- Graphing
- Service
- Settings and Control Parameters

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

2.1.3 Software

Prior to shipping, the control system software is pre-installed into the controller to facilitate interaction with, and control of, the chamber.

2.2 General Specification

The CMP6060 controller is a robust industrial grade PLC designed for a wide range of controlled environment applications:

- The display uses a 7-inch high color, high resolution touch-screen LCD.
- Alarms are color-coded directly on the top banner of the screen, visible at all times, making alarm conditions easy to identify and resolve.
- Temperature setpoint changes can be set in either STEP or global RAMP (gRAMP) mode. Humidity, light, and CO_2 setpoint changes can be set in STEP mode only.
- A default **Home** screen merges setpoints and actual conditions into a single, concise dashboard for easy viewing and improved chamber management. Up to 18 processes can be displayed on the **Home** screen.

2.3 Local Control Interface – Programming & 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 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 & Management

Log data for the CMP6060 can be accessed locally at the control system interface, or remotely via a network-connected PC.

2.4.1 Local Access to Data

- The data available at the local control interface includes the seven main chamber variables: temperature, humidity, lighting, CO_2 (if applicable), and three more.
- Parameters are all logged automatically by the control system every 30 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 setpoint and actual values (only inputs).
- The Zoom and Pan functions provide additional viewing tools to let you precisely and accurately view and assess the data.

2.4.1.1 Downloading Local Data to USB

Local data from **History Trends** can also be downloaded to a USB memory stick. There are two ways to access this tool:

1. Tap the **Settings** button on the main menu, and then tap the **Download Trend Data to USB** icon (Figure 2-2).

Figure 2-2   Settings Menu

2. Tap the **Download** button on any **Trend Graph** screen (Figure 2-3). The **Download Trend Data to USB** screen (Figure 2-4) appears.
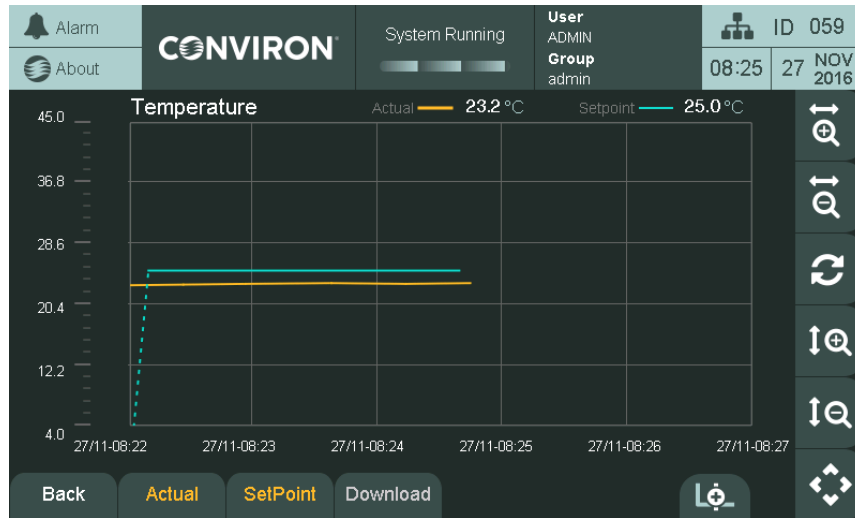
Figure 2-3   Trend Graph Screen
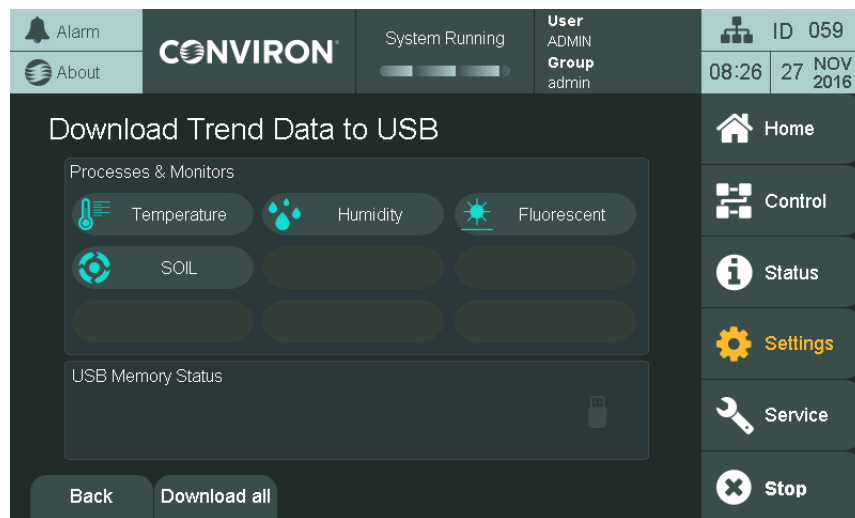
Figure 2-4   Download Trend Data to USB Screen

The screen is divided into two sections:

- The available **Processes** from which to download data are represented by buttons with the name of the process and its characteristic icon. The number of processes will vary based on the factory configuration. They are the same ones as seen on the **Home** screen.

- The second section shows the **USB Memory Status**. When there is no USB memory stick plugged in, the message "Please insert USB Memory" appears. When a USB memory

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stick is connected, the section will show the total capacity of memory, free space, and used space (Figure 2-5).

Notes:

- The external drives plugged into the USB port of the panel must be formatted as FAT or FAT32. The NTFS format is not supported.
- If the size of the data selected for download is greater than the available memory space of the USB Memory stick, a dialog appears, informing that the action cannot be completed.
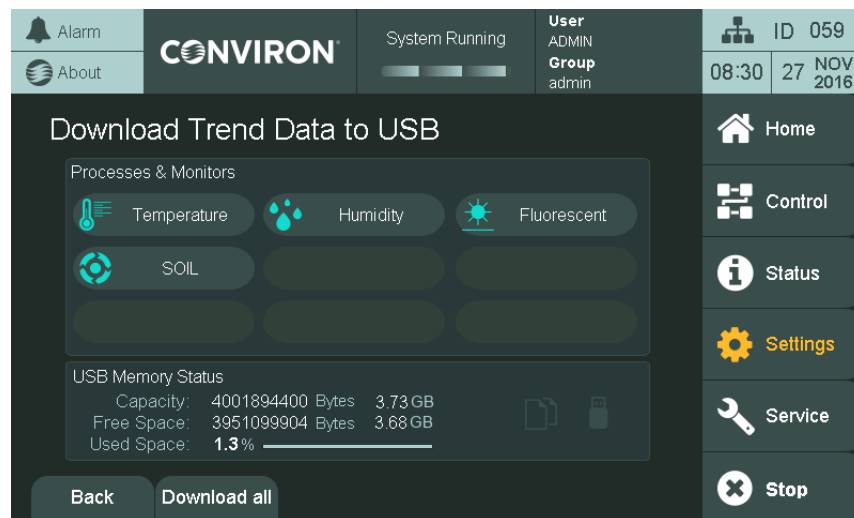
Figure 2-5   Download Trend Data to USB Screen with USB Memory Status

2.4.1.2   How to download data

When the USB Memory stick is plugged in, the trend data can be downloaded to the USB by tapping the button of the process of interest. The process area will show the message "Copying data, please wait." During the wait time, the system creates a folder on the root of the USB memory stick with the name of the selected process. Inside the folder are the **actual reading** and **setpoint** of the selected process saved in comma-separated value format (csv), which can be opened with Microsoft Excel.

Data downloaded to the USB Memory stick will still be present in the system, which can store up to fifteen days of data (Figure 2-6).
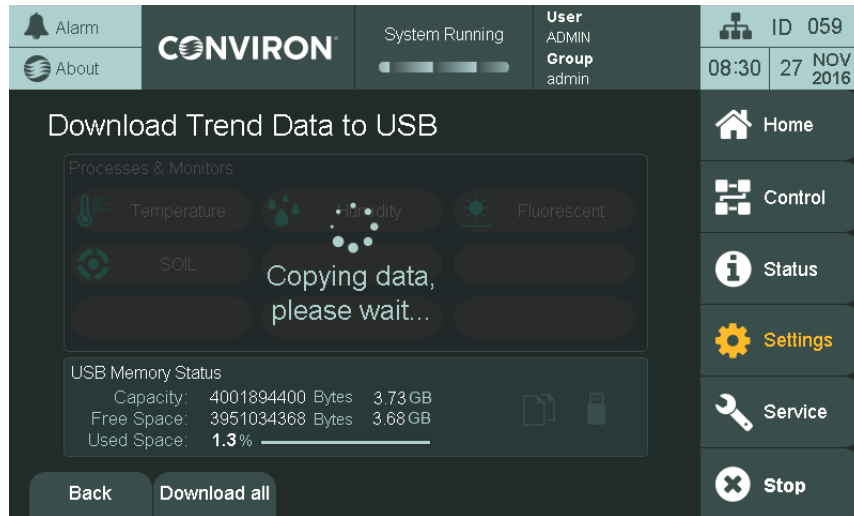
Figure 2-6   Download Trend Data to USB Screen with Copying Status

Data Type

The downloaded files are in Comma-Separated Value (*.csv) format, which can be opened with any text or table editors.

Data Structure

The resulting CSV file has 5 columns: **Data Type**, **Value**, **Timestamp**(UTC), **Sampling Time** (ms), and **Quality** (Table 2-1).

Table 2-1   Information in the CSV File

Column Name	Description
Data Type	Table 2-2 lists the code numbers, which provide information about the data type of the downloaded sample.

Table 2-2   Code Number and Data Type

Code	Type
0	Empty
1	Boolean
2	Byte
3	Short
4	Int
5	Unsigned Byte
6	Unsigned Short

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Column Name	Description
	7 Unsigned Int
	8 Float
	9 Double

Value	Value of the sample
Timestamp (UTC)	Timestamp in UTC format
Sampling Time (ms)	Sampling interval time in milliseconds
Quality	Table 2-3 lists the Quality Code numbers and their corresponding description.

Table 2-3   **Quality Code and Description**

Quality Code	Quality	Description
0	BAD	The value is bad, but no specific reason is known.
8	BAD	This quality may reflect that no value is available at this time, for reasons such as the value may not have been provided by the data source.
12	BAD	A device failure has been detected.
16	BAD	Timeout occurred before device was able to respond.
24	BAD	Communications have failed.
28	BAD	There are no data found to provide upper or lower bound value (trend interface specific tag).
32	BAD	No data have been collected. Usually occurs when returning online after a reboot or from a condition where sampling stopped, a sample with quality value 32 is added to indicate this temporary offline status.
64..87	UNCERTAIN	There is no specific reason why the value is uncertain.
192	GOOD	Data can be trusted.

2.4.2   Remote Access to 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 control system every 18 seconds by default, regardless of the number of parameters. This provides unprecedented data resolution and also benefits service personnel.

Remote Data log rate can be changed through the HMI in multiples of 6 seconds (from every 6 seconds to every 5 minutes).

Log data is accessed in several ways:

- A network-connected PC
- An internet-enabled PC
- Conviron Central Management (Optional)

2.5   Alarms

Color-coded visual alarms are provided and visible on all screens. If an alarm occurs, the LED light on the upper-left corner of the control system display becomes red and flashes intermittently.

The following options are available from the **Alarms** screen:

- Set absolute alarms for all controlled processes.
- Set process tracking alarms for temperature (in gRAMP or vRAMP mode) to determine how tightly to monitor the experiment.
- Set a process for disabling a controlled process (and its corresponding alarms) at any time while a program is running.

2.6   Security

Table 2-4   Security Level Summary

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 8.4.2. CMP6060 Level Access, starting on page 90.

Refer to Section8.4.5 Default Administrator Account, starting on page 92 for information on the administrator and user accounts.

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2.7   Start-up Delay

At start-up, the CMP6060 control system randomly select delay times between 0 and 999 seconds (by default) to reduce start-up loads after a power failure. Adjust the start-up delay accordingly if more than two chambers are installed in the same facility.

To configure the delay time, refer to Section 8.2, General Settings, on page 86.

2.8   Communications

Ethernet connectivity is delivered with every control system. The control system is shipped communications-ready and requires set-up at the facility by the network administrator, or other qualified personnel.

2.9   Auxiliary Contacts

The control system has 13 auxiliary outputs that can be used for basic control of additional equipment.

2.10 Central Alarm Contact

A normally closed dry contact is energized by the control system 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 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 send notification when there is a chamber alarm. Note that this requires Conviron Central Management, 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, CO2) transition between setpoints. 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 CO2) in either STEP or variable ramp (vRAMP) mode – called VAR.

2.12 Process Control Modes: BASIC & VAR

Programs are lists of timelines, with each timeline specifying target setpoints for all controlled processes (temperature, light, humidity, and CO_2, if equipped). There are three different ways the

chamber can transition between target setpoints: 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 (Figure 2-7 and Figure 2-8). Further information about setting transition modes can be found in Section 5.5 Control Parameters.

Figure 2-7   Process Control Modes
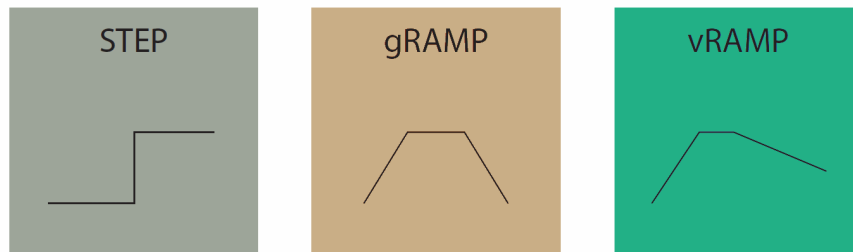
Figure 2-4: Process Transition Modes

Figure 2-8   Process Transition Modes

To determine the process control mode, tap the **Control** tab on the right side of the screen, and then tap the **Parameters** tab at the bottom of the **Control** screen (see Figure 2-9).

Each process is represented by an icon. Tap the process icon to see and change the control mode for that process (Figure 2-10). Changing the control mode requires administrator privileges (see Section 8.4, Security Settings).

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Figure 2-9   Control Parameters Screen
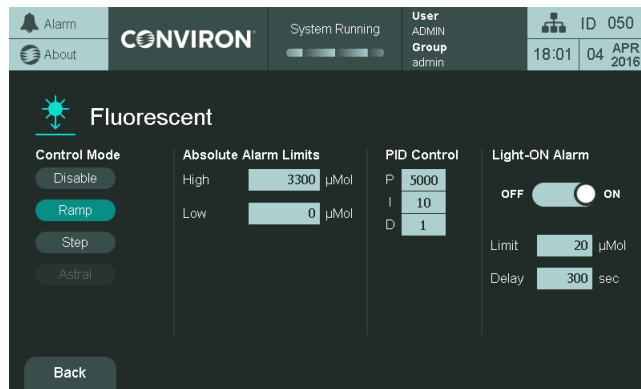
Figure 2-10   Control Parameters Screen for a Process

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 (Figure 2-11).

Timeline	Time	Temp
1	00:00	10°C
2	9:00	20°C
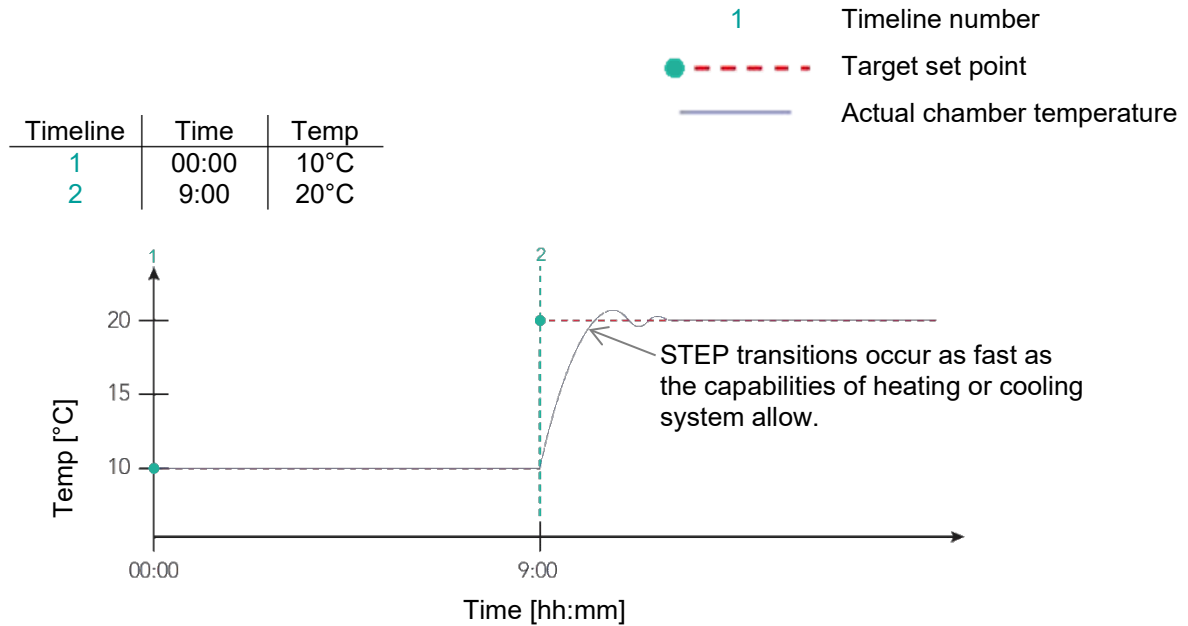
Figure 2-11   STEP Transition Example

2.12.2 Global Ramp Transition (gRAMP):

The gRAMP transitions are only available for temperature (Figure 2-7). 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 (Figure 2-12).

Only one global ramp rate is possible at any time. This rate may be changed, but all temperature transitions in all programs in the schedule will occur at this global rate.

To set the global ramp rate, navigate to the **Schedule** screen, and then tap **Parameters**. For more information, refer to Section 5.5, Control Parameters, on page 49.

- 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 setpoint, temperature begins to change until it reaches that target setpoint temperature, encounters another timeline with a different target setpoint temperature, or the program ends.

- In order to ensure the temperature achieves its target setpoint at a specific time, the operator must calculate the amount of time required for the temperature to reach that target setpoint from its previous setpoint 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 setpoint 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 setpoint value must occur at 8:20.

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Timeline	Time	Temp
1	00:00	10°C
2	8:20	20°C
3	9:20	25°C

1 Timeline number

● ─ ─ ─ ─ ─ Target set point

─────── Actual chamber temperature
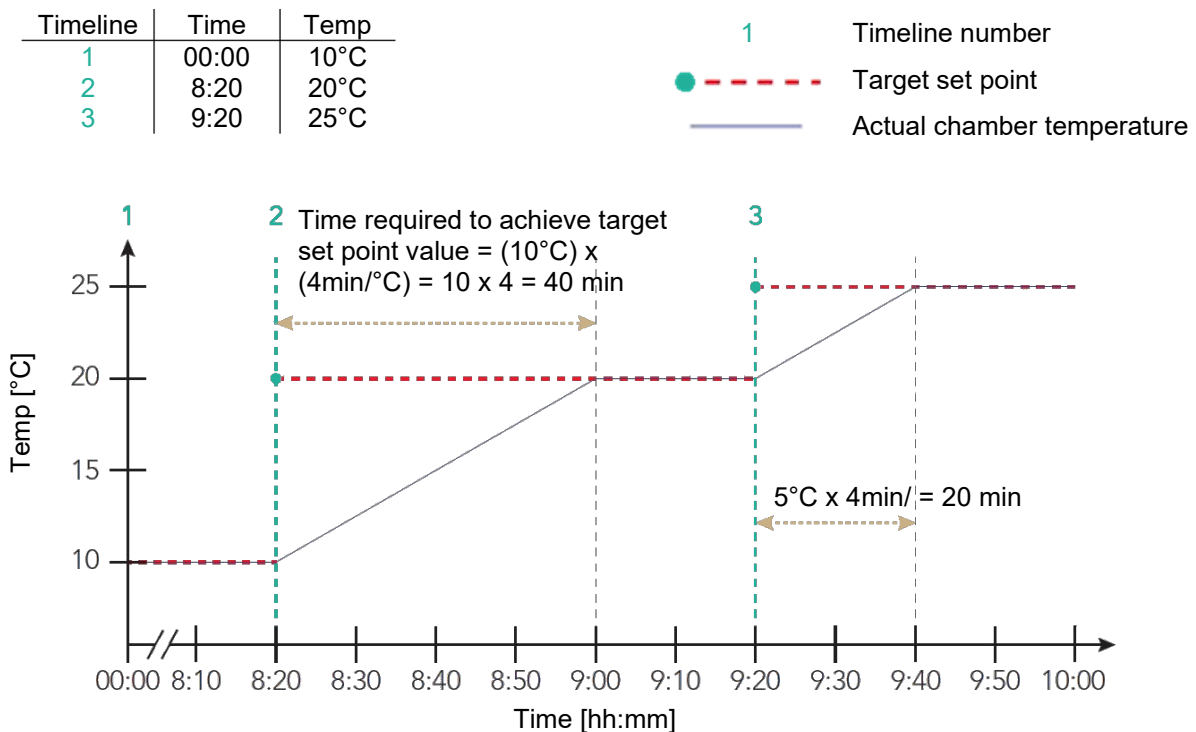
Figure 2-12   Global RAMP Transition Example

2.12.3 Variable Ramp Transition (vRAMP):

The vRAMP transitions are available for temperature, humidity, light, and CO_2 processes (see Figure 2-7). In this mode, the chamber changes the process at a linear rate between timeline target setpoints. This lets you program ramp transitions with many different ramp rates in the same program (see Figure 2-13).

The ramp rate is determined automatically by the control system, based on the amount of time between timelines and the magnitude of change between process setpoints specified by those timelines.

Each transition requires two timelines: One to specify the start of the transition, and one to specify the end. When the control system reaches the last timeline in the program, it will maintain setpoint conditions specified by that timeline until the program ends at midnight.

As with gRAMP, the maximum (fastest) variable ramp rate = 4min/°C. If the programmed timelines with target setpoints exceed this maximum rate, the control system will default to the maximum ramp rate of 4min/°C for those timelines.

Timeline	Time	Temp
1	00:00	10°C
2	7:40	10°C
3	8:20	20°C
4	9:10	25°C

1   Timeline number

●- - - - -   Target set point

─────────   Actual chamber temperature
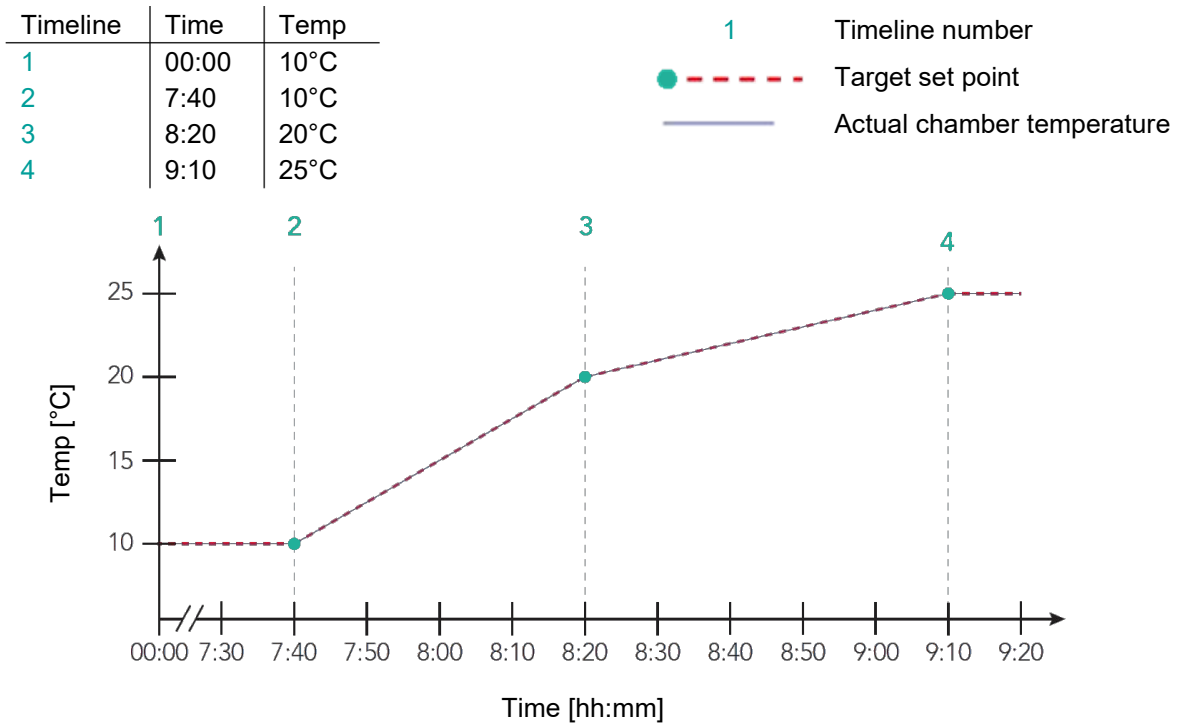
Figure 2-13   **Variable RAMP Transition Example**

2.12.4 Dash

When a process setpoint is set to Dash, the control system will ignore that particular setpoint in the program. The process will still trigger corresponding alarms.

For example: if a Humidity setpoint is set to Dash, and the low limit alarm had previously been set to 20% RH, humidity values below that limit will still trigger a warning alarm (see Section 6, Alarm Screen for more information on alarms).

> A process cannot contain a Dash entry for the first timeline. Entering a Dash in the first timeline will not allow the program to be saved.

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3 INITIAL START-UP & NAVIGATIONAL OVERVIEW

This section provides instructions on start-up procedures and general navigation of the CMP6060 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 operation of the equipment, and to ensure the equipment meets the requirements for your experiments.

3.1 Turning the Display On

The CMP6060 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 bootup screen and then the **Home** screen (Figure 3-1).

3.2 Setting the Time & 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 five years).
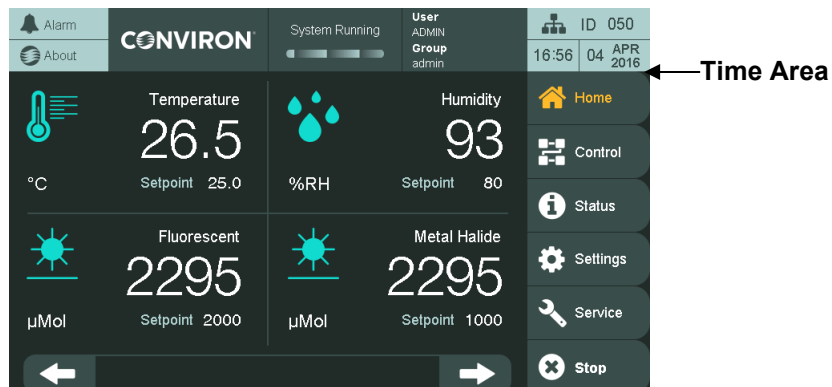
Figure 3-1   Time Area in the Top Banner

> The Time and Date set-up can be accessed in two ways – from any screen by pressing the top banner Time area (Figure 3-1) and from the **Settings** screen, **Time & Date** thumbnail. For this section of the Manual, instructions are provided for accessing these parameters from the Time Area only. Section 8 Settings Screen covers these features via access from the **Settings** screen.

Figure 3-2 illustrates the Top Banner located on all screens. Although this Banner presents six (6) active areas, at this stage of the set-up, it is only necessary to set up the proper Time and Date.
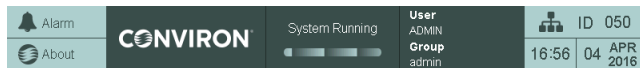
Figure 3-2   Top Banner

3.2.1   Setting the Time & Date

Access Level 1   Access Level 1 is required to access the Time & Date Settings.

The Time and Date values 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 month-day-year format (mm-dd-yyyy).

Tap either the time or date in the **Time** area 23:30 | MAR 09 2016 to access the following screen (Figure 3-3) and edit the time and date.
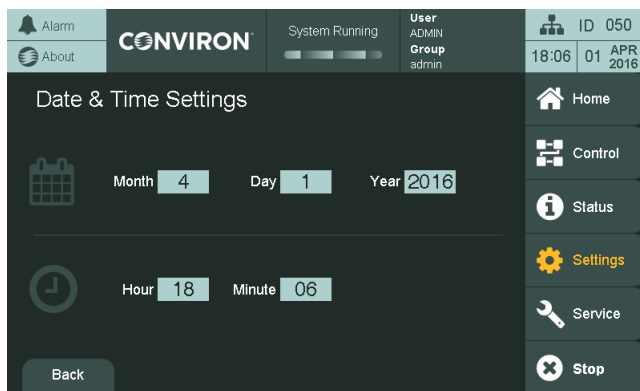
Figure 3-3   Time & Date Set-up

1.   Tap any of the **Month**, **Day**, **Year**, **Hour**, or **Minute** numbers with the gray background to invoke the keypad (Figure 3-4).

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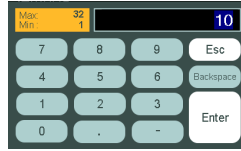
Figure 3-4   Keypad

2.   Enter the desired value using the keypad, and then tap **Enter**. The valid range is indicated in the left orange area (Figure 3-5). If an invalid value is entered, the system rejects the entry.

Figure 3-5   Valid Range Area

3.   Repeat for all the Time and Date fields.

It is essential to follow this process because it locks in the values entered into the control system. *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.

3.3   Other Initial Start-up Parameters

The Top Banner also includes five other active areas – Alarms, General Status, About, Security Settings, and System Status. These parameters and statuses are not yet discussed in this section of the Manual because they are more advanced features that are not required to begin using the chamber. The objective of this section is to provide sufficient information to operate the chamber 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 Settings Screen.

3.4   Navigational Overview

The CMP6060 display was developed to be intuitive, while also accounting for a vast array of interactive options and display features. To accomplish this, the display uses touch technology for system interaction and intuitive workflows and screen designs.

Figure 3-6   Interactive Touch Screen

The Touch-Screen has two functions – to display information and to facilitate interaction. Several primary and secondary screens are used to provide all the necessary information required to fully interact with the control system. Sections 4 through 10 of this Manual describe each screen in detail. The main primary (default) screen is the **Home** screen.

3.5   Battery

The CMP6060 runs off the building power supply; however, the control system has a rechargeable battery backup to maintain the internal clock. The internal clock can run on battery power for six months and the typical recharge time for the battery is less than eight hours.

3.6   Ambient Conditions

The operating conditions of the main controller and the irrigation and dual evaporation add-on controllers (optional) are 0°C to 55 °C, 80% 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. The operating conditions for this controller are -10 °C to 60 °C, 90% RH non-condensing, and storage conditions are -20 °C to 70 °C, 90% RH non-condensing.

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4   HOME SCREEN

Before starting an experiment in the chamber, it is necessary to become familiar with the **Home** screen. This section provides an overview of this primary screen including:

- Top Banner
- Main Menu Bar
- Controlled Processes and Monitored Sensors
- Home Screen Navigation

The CMP6060 control system uses five 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 **Home** screen. Subsequent sections cover the details of each of the remaining screens.

> The Top Banner stays constant for all screens and can be used for quick visual status (alarm status, chamber running, remote connection in progress, current date/time, current user, chamber ID) as well as navigation shortcuts (alarm screen, about screen, security screen, system status, setting time/date).
>
> The Main Menu Bar, which is located at the right hand side of the screens, stays constant for most screens for quick access and navigation to the five primary screens and to easily start or stop the chamber.

The main (default) control screen is the **Home** screen (Figure 4-1). This screen essentially acts as home base for the display.
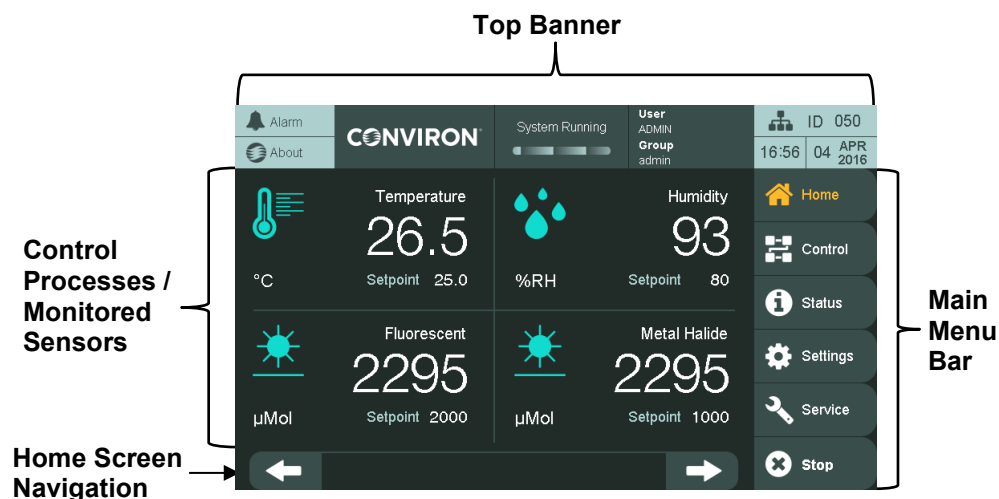
Figure 4-1   Home Screen – Key Area Layout

4.1 Top Banner

The Top Banner (Figure 4-2) is constant for all screens and can be used for quick visual status checks (alarm status, chamber running, remote connection in progress, current date/time, current user, chamber ID) as well as navigation shortcuts (alarm screen, about screen, security screen, system status, setting time/date).

Figure 4-2   Top Banner

There are seven sections in the Top Banner area (Table 4-1). Some are information only and some are information and navigation shortcut.

Table 4-1   Sections in the Top Banner Area

Name	Icon	Description
Alarm		This icon provides information related to the alarm conditions. The icon changes color according to the alarm conditions. Each color has a defined meaning, which graphically represents the alarm conditions. Tapping the icon navigates to the Alarm screen. Refer to Section 6. Alarm Screen, on page 67 for more details on alarm functionality.
About	Or	These two active sections provide access to the About screen (Figure 4-3). **Figure 4-3 Sample About Screen** The **About** screen provides information required when contacting Conviron support: the control system software

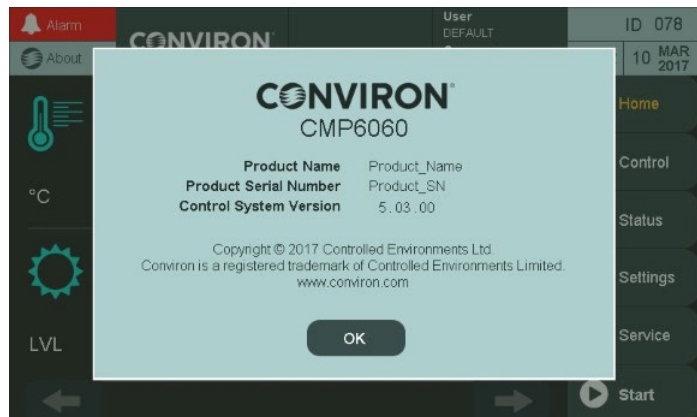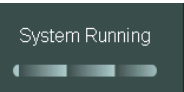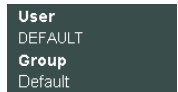| Name	Icon	Description
		version, chamber serial number, and contact information for Conviron's technical assistance. The information is important for determining, for example, the version of controller and the version of software loaded on the control system.
		This information is not necessarily required on a daily basis but rather during service and/or troubleshooting activities.
		Use the Top Banner or the Main menu bar to navigate away from the About screen.
Argus Connection		This icon indicates that someone is accessing the chamber remotely using an Argus control system. Direct access to the chamber is limited.
VNC Connection		This icon indicates that access to the chamber is being managed remotely through a third party connection.
System Running	System Running	This section displays when the system is running (chamber is powered and running a schedule). All information regarding schedules, programs, and control parameters is described in Section 5, Control Screen, on page 37.
Current User & Group	User DEFAULT Group Default	This section displays the current logged-in user. It is useful to know if the current logged-in user has special elevated privileges as a reminder to log out after the task has been accomplished. This section is also a shortcut to the **Security** Screen. Refer to Section 8, Settings Screen, on page 85 for more details on system settings including Security Settings.
Chamber ID	ID 050	This section displays the chamber ID used to identify the chamber in the Central Management software (optional). It is a shortcut to the **System Status** screen. The **System Status** screen can also be accessed through the **Status** Main Menu, **System** thumbnail. Information about the **Status** screen is covered in Section 7, Status Screen, on page 76.

Name	Icon	Description
Time	23:30 MAR 09 2016	This section displays the current date and time, and is also a shortcut to the **Date & Time Setting** screen. Refer to Section 3.2, Setting the Time & Date, on page 27 for more information.

> ⚠️ The Time and Date icons were already used to set the Time and Date in Section 3.2. Instructions for setting the ID and Security are covered in Section 8.

4.2   Main Menu Bar

The Main menu bar remains constant on almost all HMI screens for easy navigation and quick access to the CMP6060 principal screens. This Main menu bar contains a total of six icons.

Table 4-2   Icons on the Main Menu Bar

Icon	Description
🏠 Home	**Home** Screen (Refer to Section 4 Home Screen for more information.)
Control	**Control** Screen (Refer to Section 5 Control Screen for more information.)
ℹ Status	**Status** Screens (Refer to Section 7 Status Screen for more information.)
⚙ Settings	**Settings** Screen (Refer to Section 8 Settings Screen for more information.)
🔧 Service	**Service** Screen (Refer to Section 10 Service Screen for more information.)
▶ Start	**Start/Stop** Schedule button. This functionality is described in Section 5 Control Screen but can be accessed from any screen where the Main menu bar is present. The **Start/Stop** Schedule button is available on the Main menu bar for easy access to stop the chamber in case of emergency.

The currently selected screen is orange colored 🏠 Home .

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4.3   Controlled Processes and Monitored Sensors

This area of the **Home** screen shows the controlled processes (e.g. Temperature, Humidity, Lighting, and CO_2) and monitored sensors. Up to 18 processes can be controlled and displayed on the **Home** screen (the number of controlled processes depends on the chamber configuration).

The processes actually displayed on the control system depend on several factors, including the chamber design and the configuration set-up of the control system. For example, only some chambers come equipped with CO_2 control, and therefore, not all chambers will display CO_2 as a Controlled Process. Up to 10 monitored sensors can be displayed on the Home screen.

Figures displayed in the **Control Processes** area of the screen (Figure 4-4) include the actual value and the current program setpoint value for each process. The actual value is in large font and the setpoint at the bottom of the process zone. However, if a chamber does not have a light sensor, then in the Fluorescent (or Light) control process area, the actual and setpoint readings will both display the setpoint.

If more than four processes have been configured for the chamber, use the navigation arrows at the bottom of the screen to navigate to the different **Control Processes** screens.
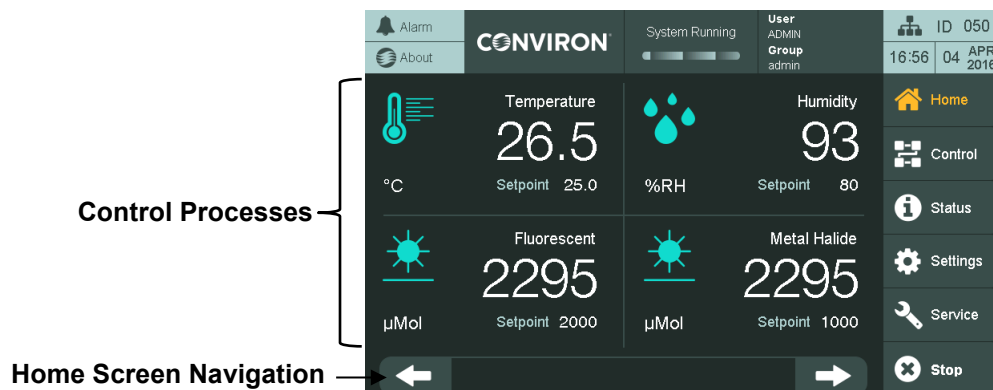

Figure 4-4   Control Processes

Monitored sensors (Figure 4-5) include the actual value of the sensor reading. The monitored sensors are also available on the **Service** screen.
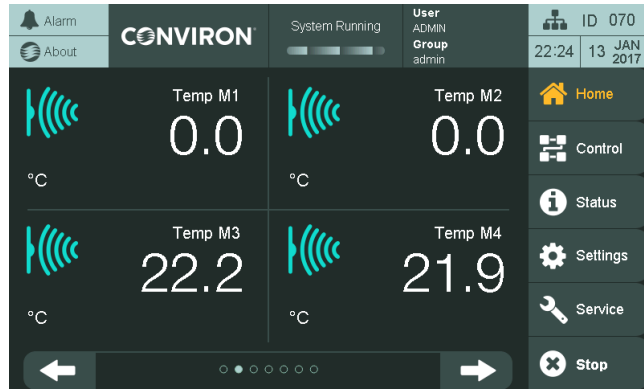
Figure 4-5   Monitored Sensors

5   CONTROL SCREEN

This chapter details the procedures for programming the CMP6060 control system using the **Control** screen (Figure 5-1).

The settings entered in the **Program** screen control the conditions in the plant growth chamber.

A program is defined as a user-specified experimental setpoint 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 CMP6060 control system 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 control system 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 eight programs where each program can be repeated from 1 to 99 times, or set to infinity.

5.1   Control Screen Icons & Locations
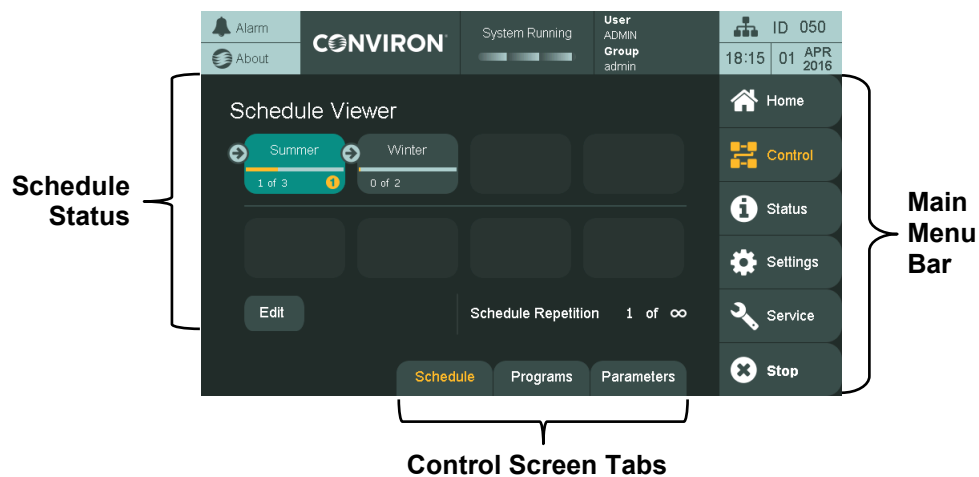
Figure 5-1   Control Screen – Schedule Status

5.2   Control Screen Bottom Menu

The **Program** screen contains three sub-screens:

- Schedule Viewer/Edit
- Programs List/Program Editor
- Control Parameters

These sub-screens can be accessed using the tabs at the bottom of the **Control** screen.

5.3   Programs Screen

Access Level 1   Access Level 1 is required to access the **Program** screen.

5.3.1   Create, Edit, or Delete a Program

Tap the **Programs** tab Programs at the bottom of the screen to access the **Programs** sub-screen (Figure 5-2).
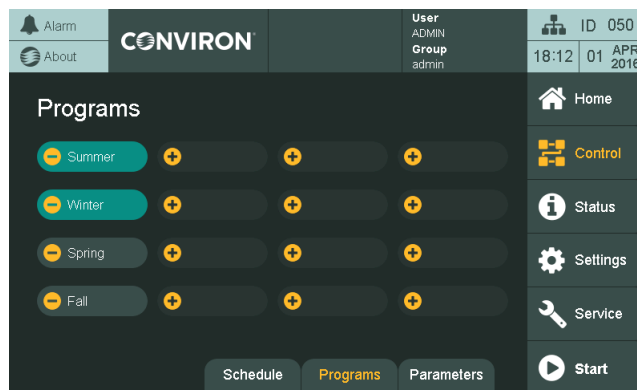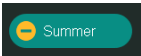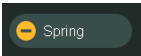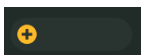
Figure 5-2   Programs Sub-screen

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Table 5-1 describes the different slots on the Programs sub-screen.

Table 5-1   Slots in the Programs Sub-screen

Slot	Function
Summer	This slot contains an existing program. The blue background indicates that it is being used in the schedule and cannot be deleted until it has been removed from the schedule. To edit the program, tap the program name.
Spring	This slot contains an existing program. The grey background indicates that it is not being used in the schedule and can be deleted. To delete the program, tap the **Minus** icon. A confirmation dialog appears to remind that a deleted program cannot be recovered. To edit the program, tap the program name.
+	This slot is empty. To create a program in this slot, tap the slot or the plus icon.

5.3.2   Edit Program

Access Level 1   Access Level 1 is required to create a program.

Either create a new program or edit an existing program to access the **Program Edit** screen (Figure 5-3).
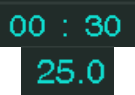
Figure 5-3   Creating a Timeline

A program can be edited while the chamber is in operation.

Table 5-2 describes the functionality of the elements on the screen.

Table 5-2   Elements on the Program Edit Screen

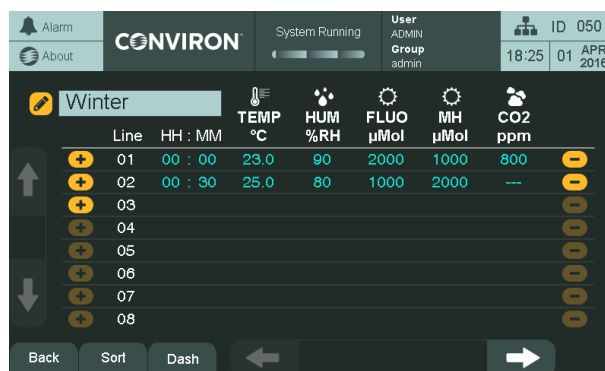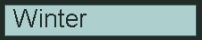| Element	Function
Winter	Tap the title to edit it. Enter the program name on the keypad, and then tap **Enter** to accept the new name or **Esc** to discard it.
01	Timeline number. This field is useful when your program has more than 8 timelines and you navigate between screens.
➕	To insert a new timeline before the timeline, tap the **Plus** sign to insert a new timeline before the timeline. For example, press the plus on line 02 to insert a line between 01 and 02. To insert a new line, tap the **Plus** sign on the last line (e.g. line 03 in Figure 5-3). Greyed-out plus signs are disabled.
➖	Tap the **Minus** sign to delete the timeline. Greyed-out minus signs are disabled. A minimum of one line is required for the program, and the system will prevent you from deleting the last line. To delete a program entirely, tap the **Back** button, and then follow the instructions in Section 5.3.1 Create, Edit, or Delete a Program.
00 : 30 25.0	1. Tap on any of the values in the timeline to enter a new value. A keypad appears (Figure 5-4). **Figure 5-4 Numeric Keypad** 2. Enter the desired value using the keypad (valid range is in the left orange area). 3. Tap **Enter** to save your change, or **Esc** to cancel. If an invalid value is entered, the system rejects the entry.
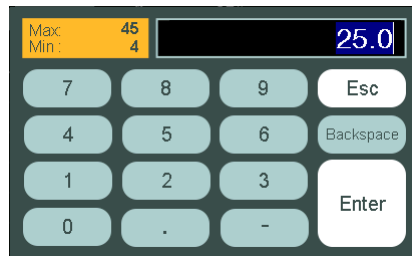
When entering the time field, you are *not* entering the time duration in hours and minutes, but rather the actual clock-time when you want the chamber to change to the new setpoint parameters. For more information, see Section 3.2, Setting the Time & Date on page 27. Also, remember that the time field format is 24-hour.

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To disable control for a process on a timeline:

1. Tap the **Dash** button [Dash].

    The Dash Request dialog box appears (Figure 5-5).

Dash Request
Select a setpoint you want to
replace with a dash ("---").
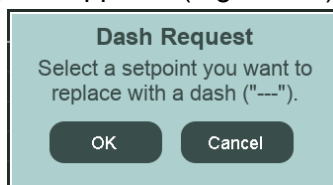
OK   Cancel

Figure 5-5   Dash Request Dialog

2. Tap **OK** to select the setpoint you want to disable, or tap **Cancel** to cancel the operation.

3. Tap any of the process setpoints to change them to a dash.

    The resulting setpoint [---] will have three dashes, indicating that it has been disabled for that timeline.

> Tapping a field that contains a --- will invoke a dialog box asking the user to confirm re-enabling the setpoint (Figure 5-6).

Setpoint Disabled
Process is currently set to remain
unchanged ("---") for this timeline.
Add a new entry?

OK   Cancel
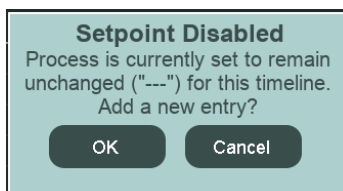
Figure 5-6   Enable Setpoint Confirmation

To sort the programs by time:

If the timelines are not in chronological order, you can sort the programs by time.

1. Tap the **Sort** button [Sort] at the bottom of the screen.

    Five processes are displayed at a time.

2. If more than five processes have been configured for your chamber, tap the navigation arrows [→] or [←] at the bottom of the screen to navigate between the processes.

    The arrows are grayed-out when you are at the first or last screen of the processes. Eight timelines are displayed on the screen and up to 48 timelines can be entered.

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3.   If more than eight timelines have been entered, tap the navigation arrows ⬇ or ⬆ on the left of the screen to navigate between the timelines.

The arrows are grayed-out when you are at the first or last screen of the timelines.

> Temperature is the only setpoint parameter that is provided on every control system. All other parameters are optional based on the configuration or application of the chamber.

> There are many different lighting configurations for the CMP6060 and it is beyond the scope of this manual to define every one.
>
> Generally speaking, every control system 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 setpoint is accomplished in the same manner as other setpoint. Tap the **Light** field and use the keypad screen to select the desired setpoint. If there are multiple lighting columns for your configuration, then repeat this procedure for each column.

> A maximum of 48 timelines (rows) can be entered for each program. Each program covers a 24-hour period.

To return to the Programs screen:

1.   Once all the timelines have been entered into the program, tap the **Back** button [Back] at the bottom left corner of the screen.

A popup window appears, asking to confirm saving the program (Figure 5-7)
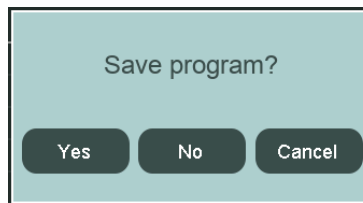
Figure 5-7   Save Changes Confirmation

2.   Tap **Yes** to save and return to the **Program** screen.

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Tap No to cancel all entries made to the specific program and return to the Programs screen.

Tap Cancel to go back into the Program Editor, and then modify any required changes to the timelines.

5.4 Schedule Viewer Screen

Access Level 1   Access Level 1 is required to access the **Schedule** screen.

The CMP6060 scheduling system lets you enter a sequence of Programs used to run chamber experiments (Figure 5-8). When the schedule sequence is complete, the chamber stops automatically.

To access the Schedule sub-screen:

Tap the **Schedule** tab Schedule at the bottom of the screen (Figure 5-8).
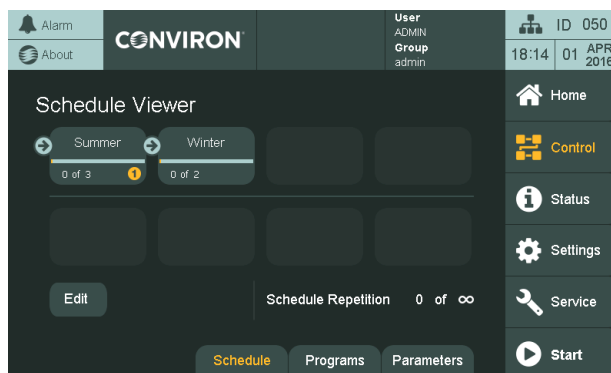
Figure 5-8   Schedule Screen

5.4.1 Schedule Editor Screen

To create or edit a schedule:

1.   Verify that a program, to which a schedule will connect, is already created.

For information about creating a program, refer to Section 5.3.1, Create, Edit, or Delete a Program, on page 38.

2.   Tap the **Edit** button Edit on the **Schedule Viewer** screen.

If the Program List is empty, a dialog box appears, prompting you to create the first program.

If the Program List is already populated with a program or programs, then the Schedule Editor screen appears (Figure 5-9).
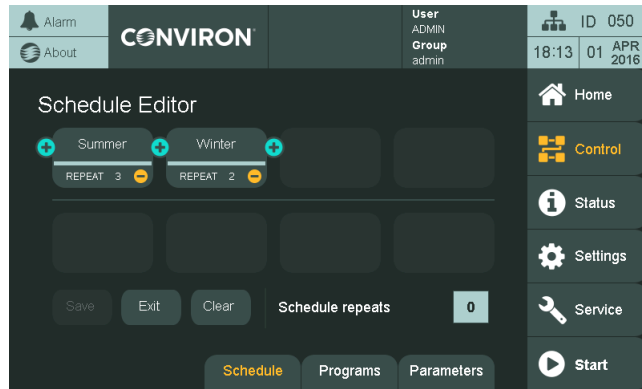
Figure 5-9   Schedule Screen Editor

Programs can be modified or edited while the Schedule is running. However, you cannot edit a Schedule while it is running. In this scenario, when you tap **Edit Schedule**, a pop-up box appears informing that a Schedule is running. If this occurs, tap **Stop** from the Main menu bar, and then edit the Schedule.

To insert a new program in the schedule:

1.   Tap the **Plus** icon .

A dialog box appears, showing the list of available programs (Figure 5-10).

Figure 5-10   Schedule Program Selector Dialog

2.   Tap a program name to select it for that schedule slot, or tap to cancel the operation

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Control Screen

To change the program in a schedule slot:

1. Tap the program you want to change.

    A dialog box appears, showing the list of available programs (Figure 5-11).
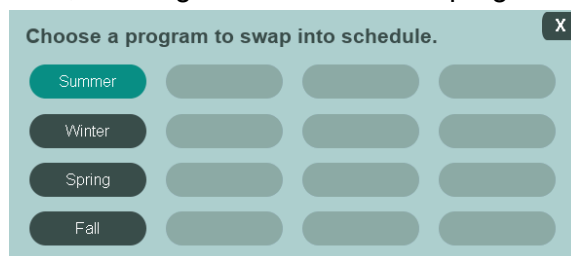
Figure 5-11   Schedule Program Selector Dialog

The current program in the slot is highlighted in blue.

2. Tap a program name to select it for that schedule slot, or tap [X] to cancel the operation.

To change the number of repetitions of a program:

1. Tap **REPEAT #** at the bottom of the schedule slot.

    A keypad appears (Figure 5-12).
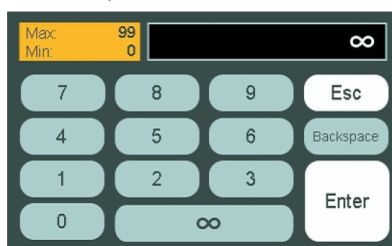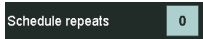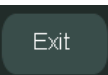
Figure 5-12   Keypad

2. Enter the number of repetitions for the program:

    *   Enter a value from **1** to **99**, and then tap **Enter**.
    *   To enable infinite repetitions for the program, tap ∞ or **0**, and then tap **Enter**.

To select other functions:

Table 5-3 describes the other functions on the **Schedule Editor** sub-screen (Figure 5-9).

Table 5-3   Elements on the Schedule Editor Screen

Element	Function
Schedule repeats 0	Tap the number of overall schedule repeats to change its value. A keypad appears. • Enter a value from **1** to **99**, and then tap **Enter**. • To enable infinite repetitions for the program, tap ∞ or **0**, and then tap **Enter**.
Clear	Tap Clear to clear the schedule. A dialog box appears to confirm clearing, as the schedule cannot be recovered after it has been cleared.
Save	Tap Save to save the schedule and continue editing. When the program does not need to be saved, the Save button is greyed out.
Exit	Tap Exit after all the programs have been entered. If the schedule has been modified since the last save, a pop-up window appears, asking whether to save the schedule, discard the changes, or return to editing the schedule (Figure 5-13).
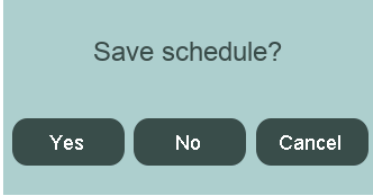
Figure 5-13   Save Schedule Change Confirmation

For the **Schedule Status** screen displayed in Figure 5-8, the schedule will run 3 days of Winter and 2 days of Summer and will repeat this sequence in an infinite loop.

Processes can be set to run in either RAMP or STEP mode. Refer to the Control Screen Control Parameters section, starting on page 49. The default setting is for the process to run in RAMP mode.

5.4.2 Start/Stop

Access Level 1   Access Level 1 is required to Start the Schedule.

To start or stop the chamber and the schedule:

Tap the **Start** button ▶ Start or **Stop** button ✕ Stop on the Main menu bar (left of the screen).

A pop-up window appears to confirm stopping (Figure 5-14) or running (Figure 5-15) the schedule, depending on whether a schedule is running.

Stop schedule?

OK   Cancel

Start schedule?

OK   Cancel
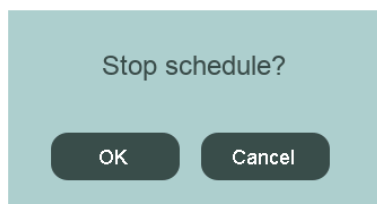
Figure 5-14   Stop Schedule Confirmation   **Figure 5-15   Run Schedule Confirmation**
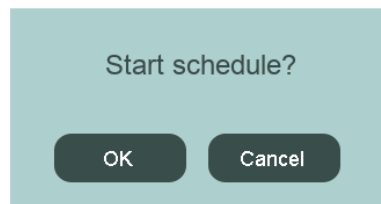
To select the first run program:

1. If you want to start the schedule of a program other than the first slot, first verify that there is no schedule running on the control system.

    If there is a schedule running, then tap Stop on the Main menu bar to stop the schedule.

2. Navigate to the **Schedule Status** screen (**Control** screen > **Schedule** tab).

3. Tap and hold the program slot that you want to run first.

    A number 1 **1** symbol appears on the lower-right corner of the program slot.

4. Start the schedule, and the schedule will start at the selected program.

5.4.3 Schedule Viewer

While the schedule is running, the Top Banner displays a "System Running" message. The Top Banner is visible on all screens.

The **Schedule Viewer** screen displays information about the running schedule (Figure 5-16).
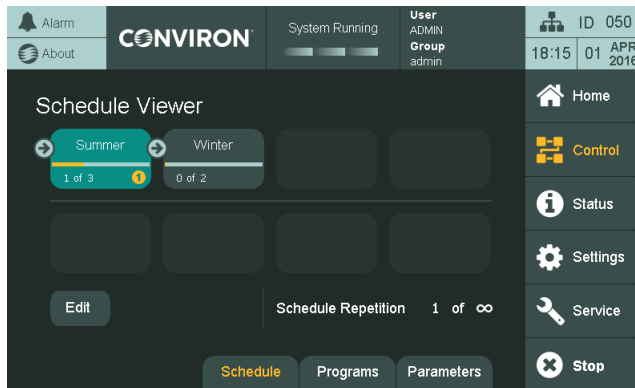
Figure 5-16   Schedule Status while Running a Schedule

Table 5-4 describes the buttons on the **Schedule Viewer** screen while a schedule is running.

Table 5-4   Elements on the Schedule Viewer Screen
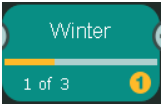
Element	Description
	The currently running program has a blue background. Tapping the program name launches Program Editor screen for that specific program, whether or not a schedule is running. From the Program Editor screen, you can make changes to the program, and then tap Back to navigate back to the Schedule Viewer screen.
	The number of repetitions executed and total number of repetitions are illustrated by a progress bar and text (x of y). The overall schedule repetitions are shown at the bottom of the screen.

Figure 5-17 shows the schedule execution order, which is left to right, and then down.
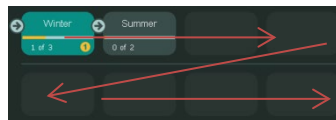
Figure 5-17   Execution Order

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In the case of a power outage and a chamber is shut down while running a schedule, upon starting up, the chamber resumes running the schedule at the point where it left off and continues at the actual chronological time. During an operation, to quickly stop a schedule, tap the **Stop** button.

When the schedule sequence is complete, the chamber stops automatically.

5.5   Control Parameters

To access the Control Parameters:

Tap the **Parameters** tab at the bottom of the **Control** screen to access the **Control Parameters** sub-screen. (Figure 5-18).

Figure 5-18   Control Parameters Screen

Each icon on the **Control Parameters** screen represents a control process (e.g. temperature, relative humidity, lights). An additional **Other** icon contains **Fan Speed Control** (optional feature), **Monitoring Sensor Alarms** (optional feature) and **Incoming Water Temperature** (optional feature). Control Parameters for optional features such as Lamploft and Irrigation can also be accessed through this screen.

For each process, the control mode, alarm limits, and PID control parameters can be set. Some processes have unique parameters and will be described in their own section.

5.5.1 Common Control Parameters

The control parameters common to all processes are:

- Control mode
- Alarm limits
- PID control parameters

For illustrative purposes, the Relative Humidity process is used.
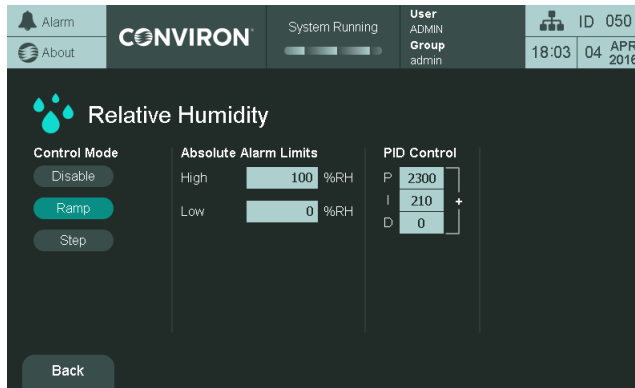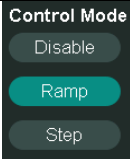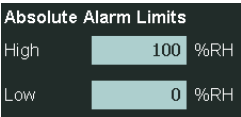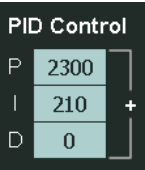
Figure 5-19 **Control Parameters – Relative Humidity Screen**

Table 5-5 lists the different functions on the **Relative Humidity** screen (Figure 5-19).

Table 5-5 **Elements on the Relative Humidity Screen**

Element	Function
	Control modes are explained in Section 2.12 Process Control Modes: BASIC & VAR. Tap on the desired control mode button. In BASIC mode, the ramp rate is defined on the **Temperature Control Parameter** screen.
	1. To enter the high and low alarm limits for this process, tap the number (light grey background), and then enter a value using the screen keypad. 2. The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored. 3. Tap **Enter** to accept the new value or **Esc** to cancel the entry.
	1. To enter the PID control values, tap the number (light grey background), and then enter a value using the screen keypad. 2. The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored. 3. Tap **Enter** to accept the new value or **Esc** to cancel the entry.
	Tap the **Back** button to return to the **Control Parameters** main screen.

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> ⚠️ For shock testing, use STEP mode. Do not modify RAMP mode values.

> ⚠️ When STEP mode is selected, the tracking alarm feature is disabled.

5.5.2   Unique Control Parameters

To set the relative humidity unique parameters screen:

Tap the **Relative Humidity** icon (Figure 5-20) to access the **Relative Humidity** screen.
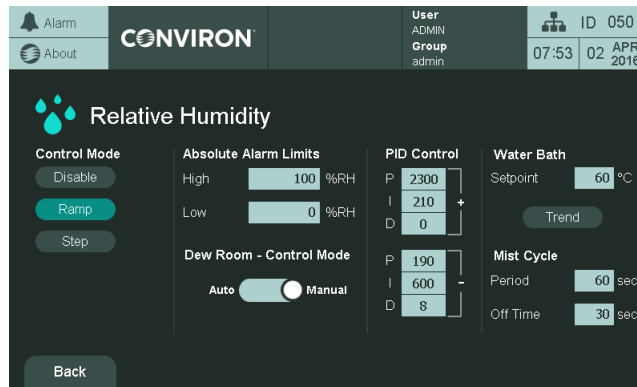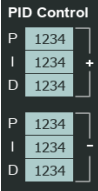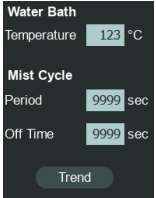
Figure 5-20   Relative Humidity Control Parameters Screen

Other than the common process control parameters (see Section 5.5.1), the Relative Humidity process also has the following parameters, as listed in Table 5-6.

Table 5-6   Parameters in the Relative Humidity Process

Parameter	Description
	Additive and subtractive control loops and thus additive and subtractive PID control parameters
	Automatic or manual dew room control (for the Dew room chambers)
	Water bath temperature control and trend graph Mist cycle Period and Off Time

To set the light unique parameters:

Tap the **Lights** icon to access the **Lights Control** parameters screen (Figure 5-21).
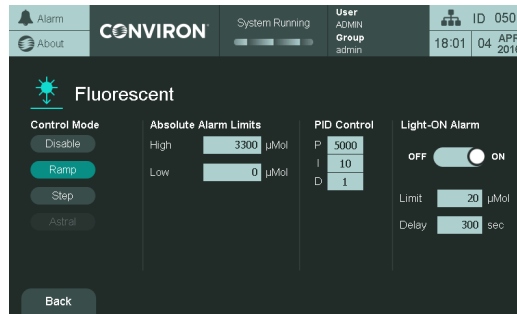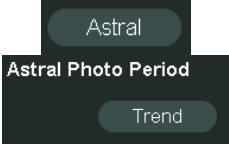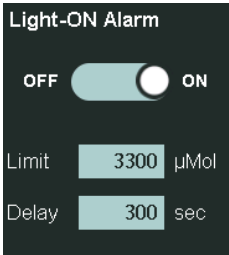
Figure 5-21   Light 1 Control Parameters Screen

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Other than the common process control parameters (see Section 5.5.1), the Lights process also has the following parameters, as listed in Table 5-7:

Table 5-7   Parameters in the Light Process

Parameter	Description
	An astral photoperiod control mode with settings and trend
	Light-On alarm to detect and alarm when the light are on even when they have been commanded off

To set the carbon dioxide unique parameter:

Tap the **Carbon Dioxide** icon to access the **Carbon Dioxide Control** parameters screen (Figure 5-22).
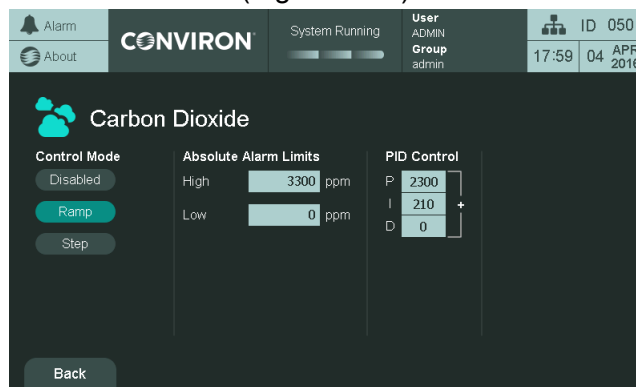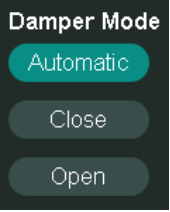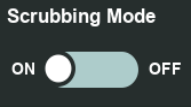
Figure 5-22   Carbon Dioxide Control Parameters Screen

Other than the common process control parameters (see Section 5.5.1), the Carbon Dioxide process also has the following parameters, as listed in Table 5-8.

Table 5-8   Parameters in the Carbon Dioxide Process

Parameter	Description
Damper Mode Automatic Close Open	The CO2 Exhaust Damper Control has the following three modes: • Automatic — the position of the exhaust damper is based on the CO2 setpoint • Open (override) — the damper remains open • Closed (override) — the damper is closed
Scrubbing Mode ON ⬤ OFF	Scrubbing mode on or off

5.5.3   Other Control Parameters

Optional features lets you manipulate fan speed, monitoring sensor alarms, temperature supply high alarm, and irrigation control by configuring the Fan Speed Setting, Temperature Supply, and Irrigation Control on the **Other** control parameters screen (Figure 5-23).

The fan speed can be adjusted between 0% and 100% within a factory preset minimum and maximum allowable fan rpm range. The fan speed is set to 100% by default.

> ⚠️ Prior to servicing, ensure that the fan is off to prevent injury.
> When the fan speed is set to 0%, it does not mean that the fan is no longer active.
> A 0% setting reduces the fan speed to the minimum allowable rpm, set to factory specifications.
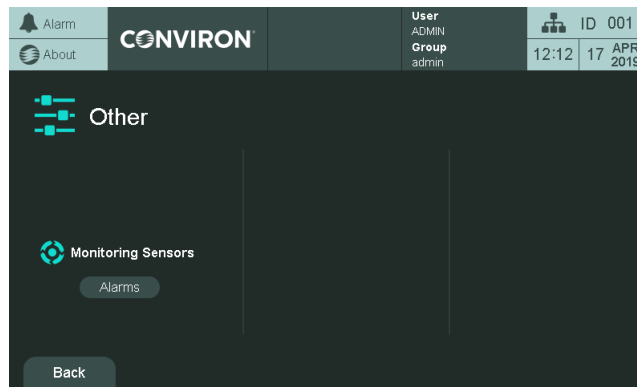
Figure 5-23   Other Control Parameters Screen

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To change the fan speed:

1. Tap the number in the **Speed** field 100 %.

2. Enter a value between 0% and 100% for the fan speed parameter using the keypad.

    The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored.

3. Tap **Enter** to accept the new value or **Esc** to cancel the entry.

To change the monitoring sensor alarm limits:

1. To enter the high and low alarm limits for the monitoring sensor, tap the number (light grey background in Figure 5-24), and then enter a value using the screen keypad.
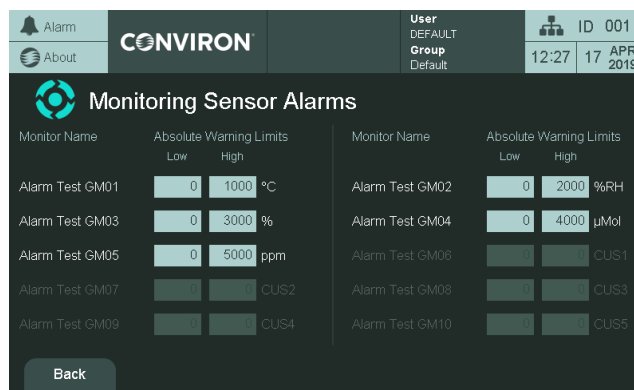
Figure 5-24   **Monitoring Sensor Alarms Screen**

2. The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored.

3. Tap **Enter** to accept the new value or **Esc** to cancel the entry.

Note that monitoring sensors with a dark grey background do not have alarm limit settings.

To change the temperature supply high limit alarm:

1. Tap the number in the Temperature Supply High Limit field.

2. Enter a value between -100°C and +100°C for the Temperature Supply High Limit using the keypad.

    The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored.

3. Tap Enter to accept the new value or Esc to cancel the entry.

5.5.4   Add-Ons Control Parameters

Two optional add-ons control parameters can be set up through the **Control** parameter screen:

- Lamploft
- Irrigation

To set the Lamploft control parameters:

Tap the **Lamploft** icon to access the **Lamploft Control** parameters screen (Figure 5-25).
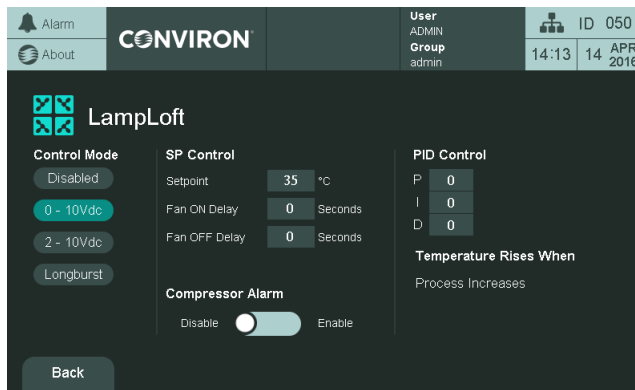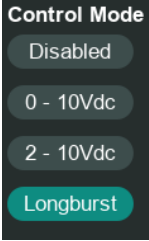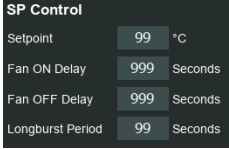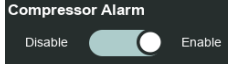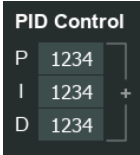
Figure 5-25   Lamploft Control Parameters Screen

All the parameters on this page are read-only, with the descriptions listed in Table 5-9:

Table 5-9   Lamploft Control Parameters Screen

Parameter	Description
	Control mode
	Setpoint control parameters
	Compressor alarm enable/disable
	PID Control parameters

To set the irrigation control parameters:

Tap the **Irrigation** icon to access the **Irrigation** control parameters screen (Figure 5-26).
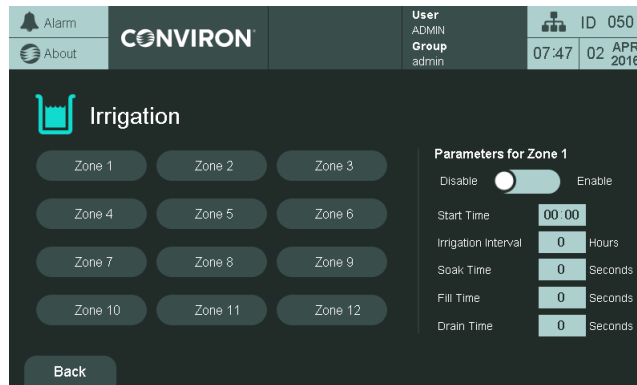

Figure 5-26   Irrigation Control Parameters Screen

To modify the parameters of an irrigation zone:

Tap the zone button to be modified (**Zone 1** in this example).

When the zone is selected, toggle it to Enable or tap on any of the parameter value to change them using the keypad.

5.6 Astral Photo Period Screen

The Astral Photo Period option controls the lighting system inside the chamber so that the lighting matches the reception of sunlight from a specific region on Earth.

Two conditions manage the Astral Photo Period option:

- The location of the region on Earth, which is specified in the **Latitude** field on the **Astral Photo Period** screen. Values entered in the **Latitude** field determine which specific region will be based by the lighting system to stimulate the distribution and period of sunlight.
- The date and time on the control system display. In particular, the date on the control system display determines the season (winter, spring, summer, or autumn) with which to stimulate sunlight.

5.6.1 Customizing the Astral Photo Period Settings

Before proceeding with the following steps, decide first the region to simulate the sunlight, and then determine its geographic coordinate in terms of latitude degrees.

1. On the control system display, tap **Control**, and tap **Parameters**. The Control Parameters screen appears (Figure 5-27).
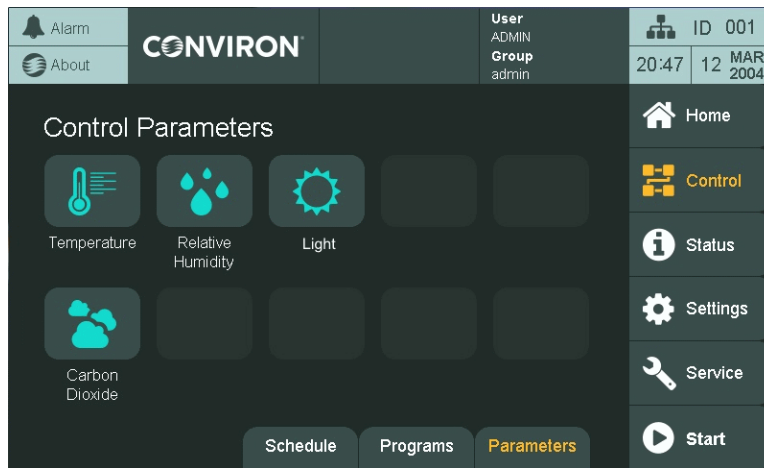
Figure 5-27   Control Parameters Screen

2. Tap the **Light** icon .

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Depending on the type of light used in the chamber, the label of the Light icon may vary, such as Fluorescent, Incandescent, or Metal Halide. The Light screen appears (Figure 5-28).
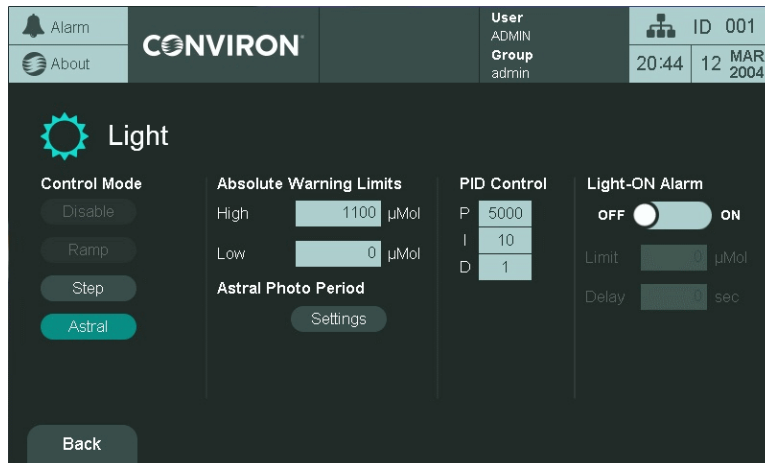
Figure 5-28   Light Screen

3.   In the **Control Mode** column, check that the **Astral** button is selected.

4.   In the **Astral Photo Period** section, tap **Settings**. The Astral Photo Period screen appears (Figure 5-29).
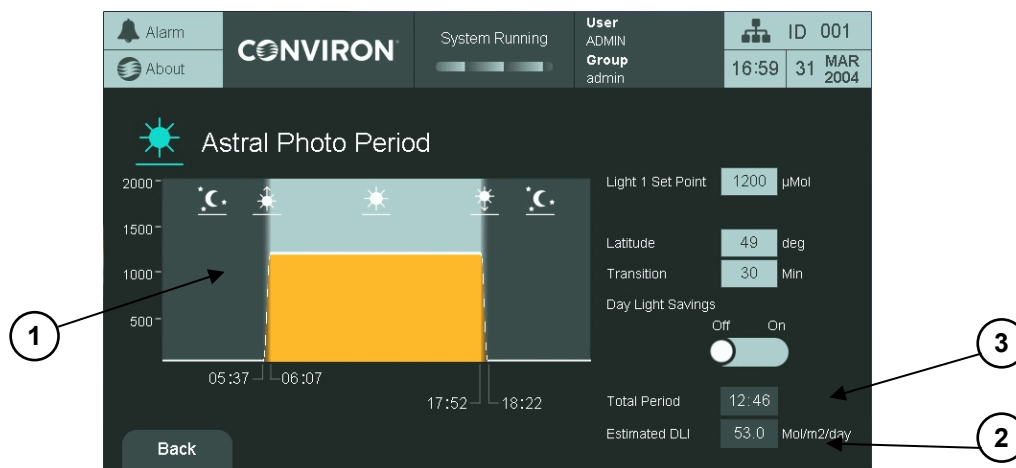
Figure 5-29   Astral Photo Period Screen

5.   In the **Light 1 Set Point** field, enter a value for the light intensity. If the chamber has two types of light, then in the **Light 2 Set Point** field, enter a value for the light intensity of the second type of light.

6. In the **Latitude** field, enter a geographic coordinate, in latitude degrees, to simulate the photo period or sunlight.

7. In the **Transition** field, enter the number of minutes to transition from night to day and from day to night.

8. To advance the photo period by one hour, toggle the **Day Light Savings** button to **On**. Depending on the values entered in steps 5 through to 8, the following information is displayed (Figure 5-29 and Table 5-10).

Table 5-10   Information on the Astral Photo Period Screen

No.	Name	Description
1	Chart Viewer	Presents a graphical illustration of the distribution of sunlight throughout the day.
2	Estimated DLI	The estimated **Daily Light Integral** value.
3	Total Period	The total number of hours of sunlight in a day, presented in hh:mm format.

5.6.2 Viewing a Summary of the Light Settings from the Home Screen

If a Schedule is running and the Astral Photo Period option is enabled, then the **Home** screen will show a summary of the **Light** settings (Figure 5-30 and Table 5-11).
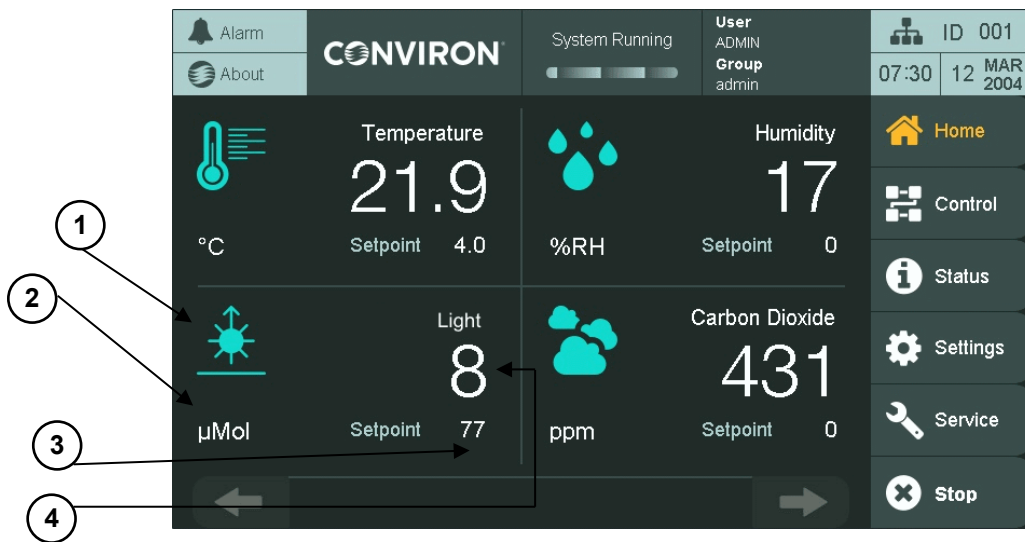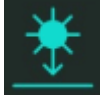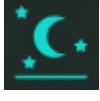
Figure 5-30   Home Screen with Astral Photo Period Enabled

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Table 5-11   Astral Photo Period Summary on the Home Screen

No.	Name	Description
1	Period of the Day	The icon changes as the day progresses, starting from sunrise to nighttime (Table 5-12).

Table 5-12   Periods of the Day

Period of the Day	Icon
Sunrise	
Daytime	
Sunset	
Nighttime	

2	µMole	Unit of measurement for the light intensity
3	Intended Setpoint	Intended setpoint for the period of the day
4	Actual Setpoint	Actual setpoint measured inside the chamber

5.7   Understanding Program Transitions

Programs entered in the CMP6060 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 control system will load the program file for the next day and look to the first timeline of that program to determine process setpoints. Those setpoints are implemented at 00:00, regardless of the time specified by the first timeline.

Figure 5-31 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 setpoint conditions are excluded for simplicity.

Timeline	Time	Light
1	00:00	OFF
2	6:00	ON
3	18:00	OFF
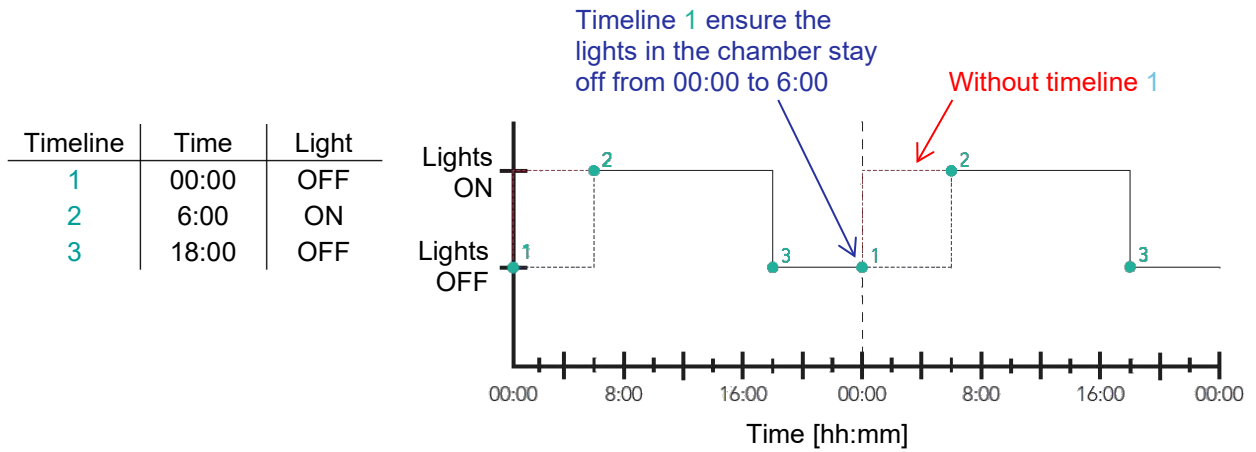
Figure 5-31   Midnight Transition Requiring Zero Timeline

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 setpoint conditions as were running until 23:59. In Figure 5-32, no timeline is necessary at 00:00 as the first and last timelines of the program specify identical setpoint temperatures.

Timeline	Time	Temp
1	00:00	10°C
2	6:00	20°C
3	18:00	20°C
4	20:00	10°C
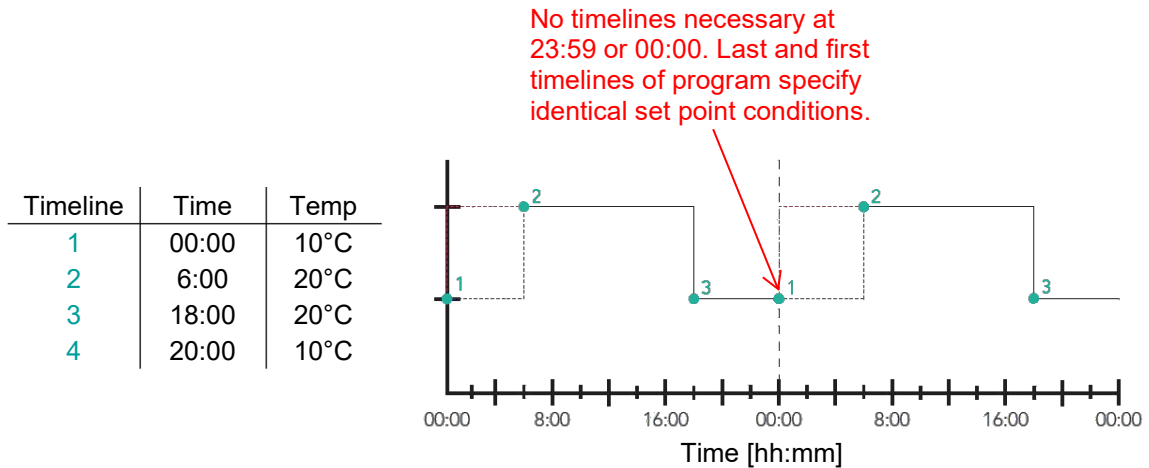
Figure 5-32   Midnight Transition Not Requiring Zero Timeline

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5.8 When Ramping across Midnight is Necessary

The control system 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, then add necessary additional setpoints to ensure the desired ramp occurs as intended. The amount of additional setpoints required depends 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.

5.8.1 gRAMP

Figure 5-33 and Figure 5-34 demonstrate how to add a timeline to a program so that it is possible to ramp temperature across midnight in gRAMP transition mode.
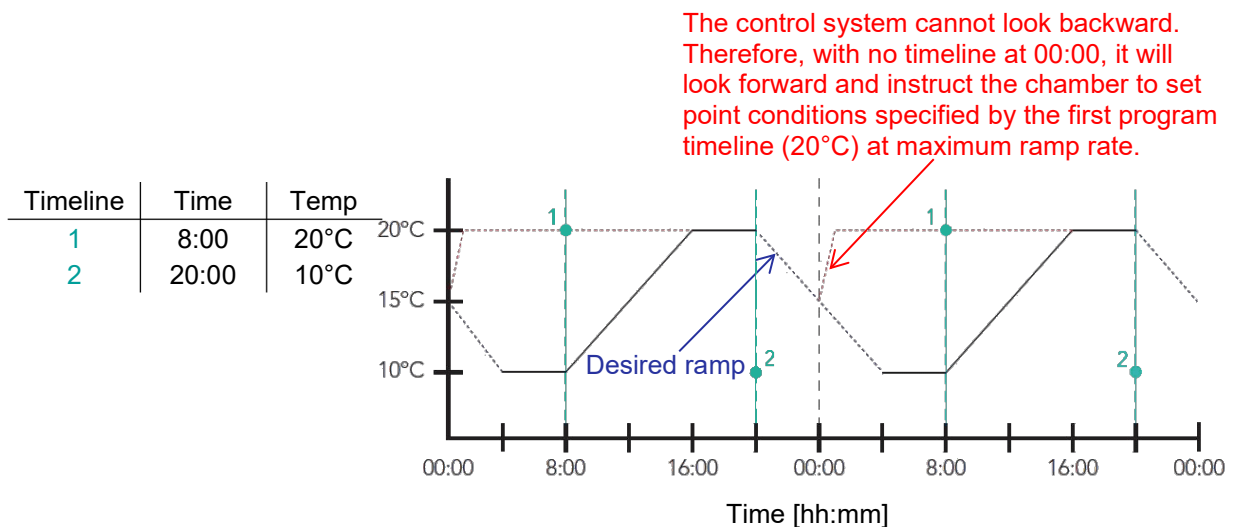
Figure 5-33   gRAMP Across Midnight - Incorrect

By adding a timeline at 00:00 with a set point of 10°C, the desired ramp continues as intended at the global ramp rate.

Timeline	Time	Temp
1	0:00	10°C
2	8:00	20°C
3	20:00	10°C
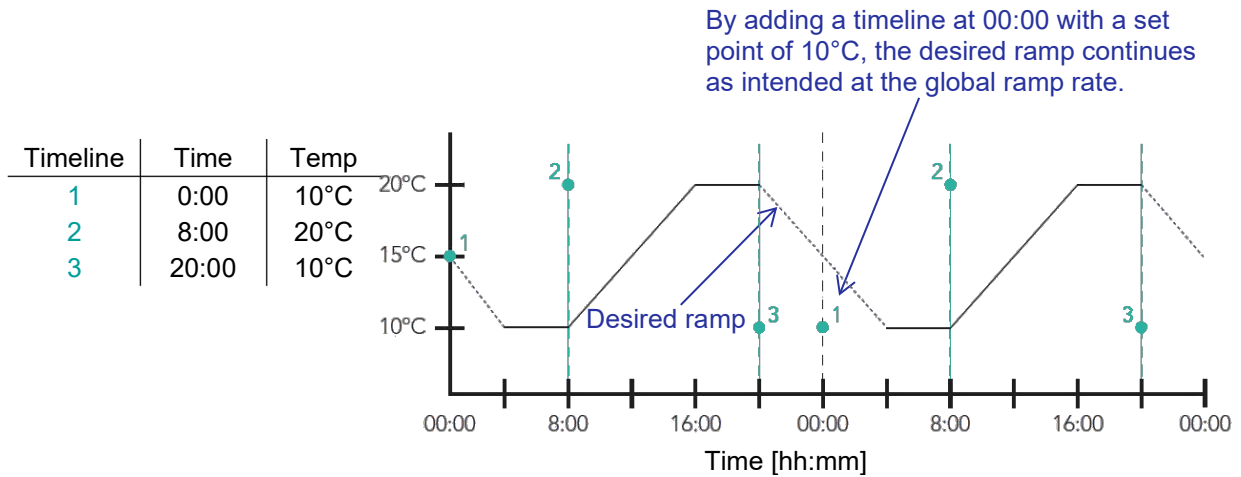
Figure 5-34   gRAMP Across Midnight - Correct

5.8.2 vRAMP

Figure 5-35 and Figure 5-36 demonstrate how to add timelines to a program so that it is possible to ramp processes across midnight when in vRAMP transition mode.

At 20:00, the control system will maintain temperature specified by the last timeline in the program (15°C), as there is no further set point from which to calculate ramp rate.

At 0:00, the control system will instruct the chamber to set point conditions specified by the first program timeline (10°C), at maximum ramp speed.

Timeline	Time	Temp
1	4:00	10°C
2	8:00	20°C
3	16:00	10°C
4	20:00	15°C
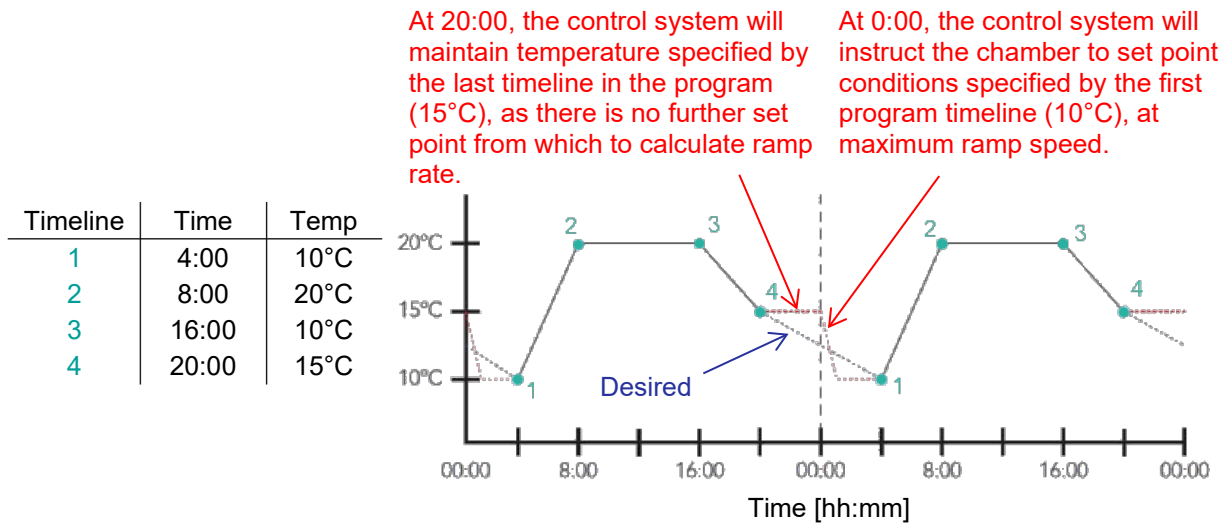
Figure 5-35   vRAMP Across Midnight - Incorrect

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With the addition of timelines 1 and 6, the ramp proceeds as intended, spending only one minute at steady temp.

Timeline 6 exaggerated to properly illustrate transition.

Timeline	Time	Temp
1	0:00	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

Time [hh:mm]
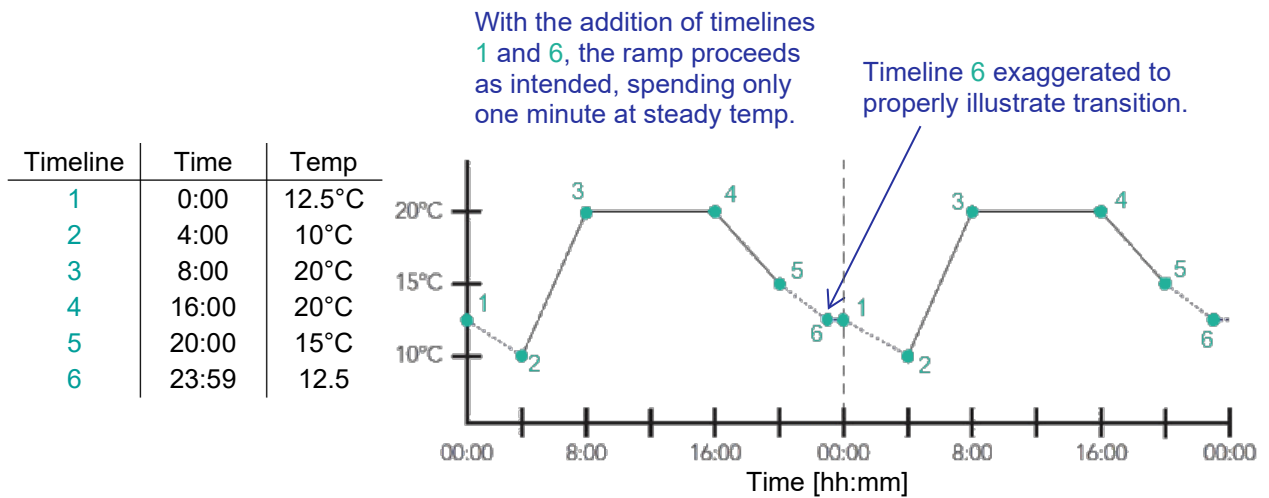
Figure 5-36   vRAMP Across Midnight – Correct

Ensure the first and last timelines of programs use the same setpoint to *avoid undesirable or unintended conditions* as the chamber transitions from chamber parameters set for 23:59 and those taking over at 00:00 (midnight).

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 setpoint conditions to avoid undesirable or unintended conditions.

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6 ALARM SCREEN

Customize the settings in the **Alarm** screen to manage alarm conditions. Alarms send notifications when actual controlled parameters move outside of the setpoint conditions and their respective limits. With the ability to program alarms, receive error messages, and manage reporting, experimental research specimens can be effectively protected. Alarm limits setup is described in Section 5.5 Control Parameters. This section of the manual provides information on managing alarms effectively, including:

- Alarm History
- Acknowledge Alarms
- Clear Alarm History

6.1 Alarm Overview

Alarm limits setup is described in Section 5.5 Control Parameters.

The CMP6060 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 alarm in the CMP6060 is 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. Shutdown – 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.

    a. Latching – The chamber does not recover and requires user intervention. This alarm stops the schedule, and the chamber has to be manually restarted.
    Example: High/low pressure.

    b. Non-latching – The chamber automatically recovers without user intervention when the alarm conditions are corrected and/or no longer active.
    Example: temperature limits.

6.2   RAMP & STEP Mode

6.2.1   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 & VAR, for more information about gRAMP, vRAMP, and STEP transitions.

The Tracking feature lets you specify a warning limit. This limit (e.g. ±2°C) is the tolerance around the setpoint temperature that is deemed acceptable, before the control system triggers a warning alarm. If the actual temperature exceeds the setpoint 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 setpoint temperature during ramping that is deemed acceptable, before the control system triggers a shutdown alarm. If at any time throughout the ramping phase the actual temperature set in the shutdown limit differs from the setpoint temperature by more than 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.

> In gRAMP or vRAMP mode, the actual conditions must exceed the warning limit for five minutes before a warning alarm is triggered, and exceed shutdown limit for five minutes before a shutdown (for temperature only) is triggered. This is to prevent nuisance alarms where the warning limit is exceeded for only a brief period.

6.2.2   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.

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6.2.3 RAMP & STEP Mode – Alarms & Shutdown

Table 6-1 summarizes the warning alarms and user-defined shutdown settings available for gRAMP, vRAMP, and STEP Mode for all processes.

Table 6-1   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
	High	Low		High	Low	
Temperature	Yes		Yes*	No		Yes**
Humidity	N/A		N/A	Yes		No
Light						No
CO$_2$						No

*Actual temperatures must exceed the alarm limit value for five minutes before the shutdown will occur.

** Shutdown will occur immediately when actual temperature exceeds the alarm limit value

- **gRAMP** or **vRAMP** mode—During steady state or ramping phase to different temperature setpoints, the tracking alarm feature is always enabled, which lets you define the allowable tolerance to trigger an alarm. This tracking feature is applicable to temperature only. While in gRAMP or vRAMP mode for temperature, you can also define the shutdown tolerance to 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. The 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 gRAMP, vRAMP, or STEP mode is described in further detail in Section 5.5 Control Parameters.

6.3 Alarm Status Indicators

Table 6-2 summarizes the alarm status indicators.

Table 6-2   Alarm Status Indicators

Status Indicator	Definition
🔔 Alarm	No alarms
🔔 Alarm	Inactive Unacknowledged alarm
🔔 Alarm	Active Acknowledged alarm
🔔 Alarm	Active Unacknowledged alarm

If an alarm occurs, the LED light on the upper-left corner of the control system display becomes red and flashes intermittently.

Tapping the Status Indicator launches the **Alarm Status** dialog, which indicates the currently active alarm (Figure 6-1).

Tap **OK** to acknowledge this specific alarm, tap **Ack All** to acknowledge all alarms, or tap **History** to view the **Alarm History** screen.
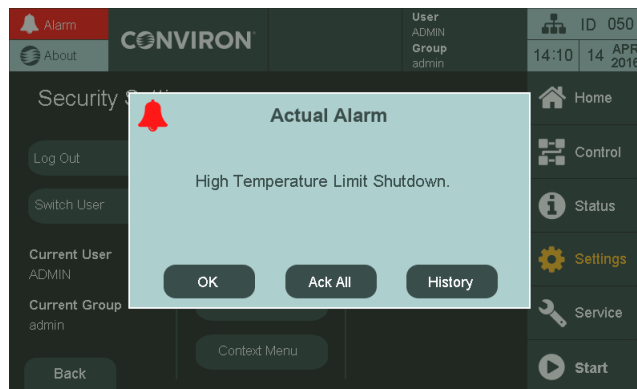
Figure 6-1   Alarm Status Dialog

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6.4   Alarm Corrective Action

For any of the above alarm conditions, tap the Alarm Status indicator, and then tap the **History** button to access the Alarm History and:

- Adjust the alarm settings if necessary (Section 5.5 Control Parameters).
- Repair the fault where necessary.
- 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.

6.5 Alarm Types

Table 6-3 summarizes the alarm types and provides a brief description of each.

Table 6-3   Alarm Types

Alarm Type	Description
Warnings	
Boot up Alarm	A message that is generated each time the control system reboots.
Temperature Tracking Warning Alarm	A message that is generated when the temperature drifts beyond the tolerance around the setpoints.
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 message that is generated when the humidity drifts above the high alarm limit.
Low Humidity Warning Alarm	A message that is generated when the humidity drifts below the low alarm limit.
High CO_2 Warning Alarm	The amount of CO_2 in the chamber is above the high alarm limit.
Low CO_2 Warning Alarm	The amount of CO_2 in the chamber is below the low alarm limit.
High Light Warning Alarm	The lighting intensity (in uMOL) is above the high alarm limit.
Low Light Warning Alarm	The lighting intensity (in uMOL) is below the low alarm limit.
Lights are ON	A message warning that lights are ON during a dark cycle.
Open Door Warning Alarm	A message warning that the chamber unit door is open for more than 60 seconds. If the door remains open after 5 minutes, the Chamber will shut down. (Available in just a few schedules)
High Pressure Warning Alarm	A message warning that the refrigeration unit has run above the high-pressure limit value for more than 30 seconds.
Low Pressure Warning Alarm	A message warning that the refrigeration unit has run below the low-pressure limit value for more than 30 seconds.

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Alarm Type	Description
Loft Pressure Warning Alarm	A message warning that the lamp loft temperature has exceeded the setpoint.
Plenum Temperature Warning Alarm	A message warning that the plenum temperature is above or below the setpoint.
Shutdown Latching	
High Pressure Count Alarm	A message warning that the high-pressure switch has been tripped off three times within the last 30 minutes.
Low Pressure Count Alarm	A message warning that the low-pressure switch has been tripped off three times within the last 30 minutes.
High Pressure Time Alarm	A message warning that the high-pressure switch has tripped off for more than 30 seconds.
Low Pressure Time Alarm	A message warning that the low-pressure switch has tripped off for more than 30 seconds.
Shutdown Non-Latching	
Independent Temperature Shutdown Alarm	The chamber has shut off because the temperature exceeded the ir33 temperature settings.
Temperature Tracking Shutdown Alarm	The chamber has shut down because the temperature exceeded the user-defined tracking tolerance, which is a higher tolerance than the warning limit.
Circulating Fan Failure	The chamber has shut down because the circulating fans are not operating.

6.6   Alarm History

Access Level 1

Access Level 1 is required to Acknowledge and Clear the alarm history. Viewing does not require any access.

The alarm history feature lets you view the alarm information stored in the CMP6060. The information provides a history of up to 16 alarms that the chamber has encountered.

Table 6-4   Elements on the Alarm History screen

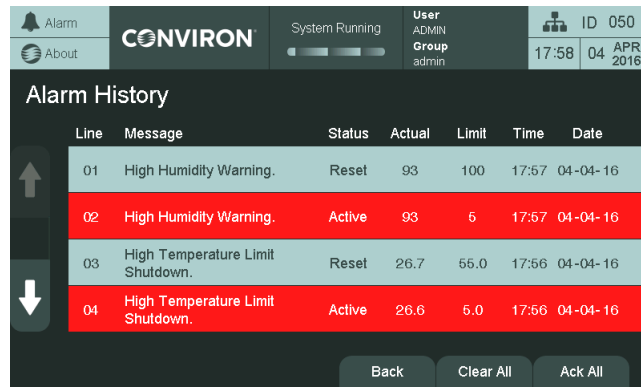| Element	Function
	From the Top Banner on any screen, tap the **Alarm** icon to access the **Alarm History** screen (Figure 6-2).
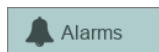
Figure 6-2   Alarm History Screen

Alarms	
IR33 Temperature Warning.	The alarm history is a chronological list of alarms. A red background indicates when the alarm was active, and a grey background when it was reset.
Line	The line column is an alarm count. This field is useful when navigating several screens of alarm history.
Message	The message column is the description of the alarm (see Section 6.5 Alarm Types for a description of all the alarm types and their meaning).
Status	Alarm status: Active or Reset.
Actual	Sensor reading that tripped the alarm. In case of a digital alarm, the actual is ---.
Limit	Limit that the sensor reading tripped. In case of a digital alarm, the limit is ---.

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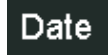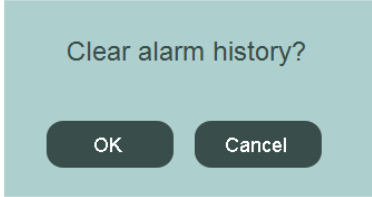| Element	Function
Time	Indicates the time the alarm was set-off.
Date	Indicates the date the alarm was set-off.
Ack All	Tap the **Ack All** button to acknowledge all the historical and current active alarms.
Clear All	Tap the **Clear All** button to clear the alarm history. A dialog appears (Figure 6-3) to confirm clearing the alarm history. Once the alarm history is cleared, the information can no longer be recovered.

Figure 6-3   Clear Alarm History Confirmation

Tap **OK** to clear the history or **Cancel** to cancel the operation.

The alarm history can only be cleared if all alarms have been acknowledged first (see the **Ack All** button).

Home	Tap the **Home** button to return to the **Home** screen. Because the Main menu bar is not present on this screen, the Top Banner and this button are used to navigate away from this screen.
↓ ↑	Four historical alarms are displayed on the screen. Up to 16 alarms can be stored. If more than four alarms have been triggered, tap on the navigation arrows on the left of the screen to navigate between the alarm screens. The arrows are grayed out when the first or last screen of timelines has been reached.

6.7   Alarm Delay

Access Level 2   Access Level 2 is required to set or edit the chamber alarm delay.

The Alarm Delay functions allows a user to briefly open the chamber door, for example to add to or remove something from the chamber, without triggering a chamber alarm. The alarm delay can be set from 0 to 540 minutes (9 hours).

Alarms for Temperature, both Ramp and Step; Humidity; Light; CO_2; Generic PID; and Generic Monitors 1 to 10 are ignored when the Alarm Delay feature is active.

To set the alarm delay:

1.   Log in as Administrator

2.   Tap the **Settings** tab ⚙ Settings on the Main menu at the right of the screen to access the **Settings** screen (Figure 6-4).

3.   Tap the **General** icon 📲 to access the **General Settings** screen (Figure 6-5).

Figure 6-4   **Settings Screen**
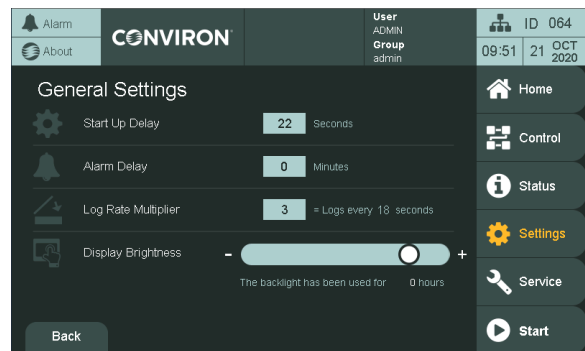
Figure 6-5   **General Settings Screen**

4.   Tap on the "0" minutes field beside Alarm Delay.

A numeric keypad pops up where the user can set the alarm delay value between 0 and 540 minutes.

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To activate the alarm delay:

The Alarm Delay can be activated in two ways;

1. Press the **Alarm** icon [🔔 Alarm] on the top left corner of the HMI, the **Active Alarm** pop-up appears (Figure 6-6 . Press the **Alarm Delay** icon to activate the alarm delay (Figure 6-7).

    Once the alarm delay is active, press the Delay icon again to activate the delay.
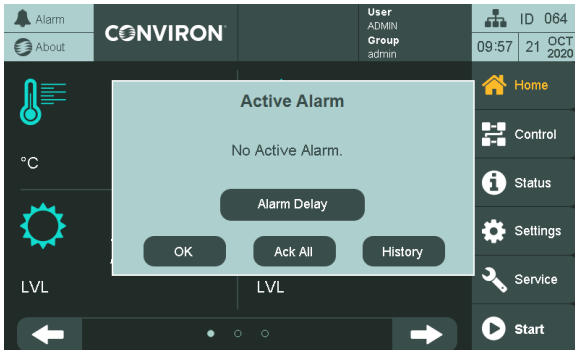
Figure 6-6   Active Alarm
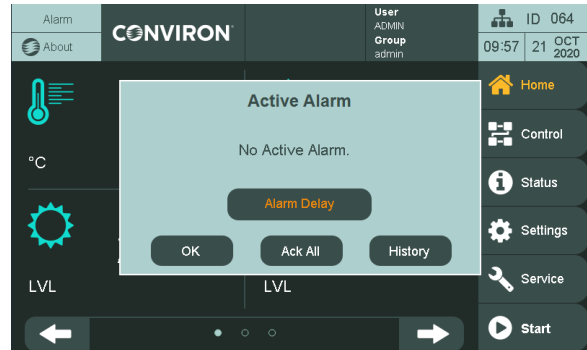
Figure 6-7   Alarm Delay

2. From the **Alarm History** screen, press the **Delay** icon (Figure 6-8) to activate the alarm delay.
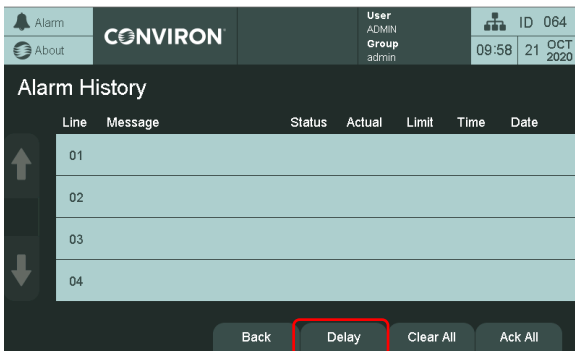
Figure 6-8   Active History Screen
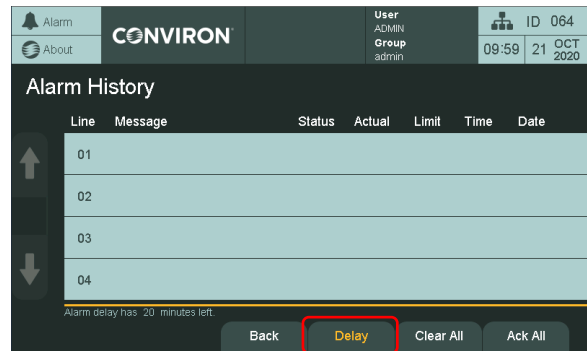
Figure 6-9   Alarm Delay Active

    When the alarm delay feature is activated, the **Delay** icon on the **Alarm History** screen changes color and the screens contains a countdown timer showing how much time remains in the delay (Figure 6-9).

    The alarm will remain active until the countdown time expires or the user deactivates the delay.

    Once the alarm delay is active, press the Delay icon again to deactivate the delay.

When not on the **Alarm History** screen, the bell in the **Alarm** icon at the top left corner of the screen flashes to indicate that **Alarm Delay** is active (Figure 6-10).
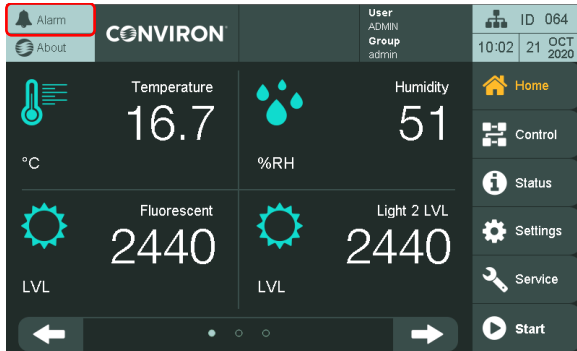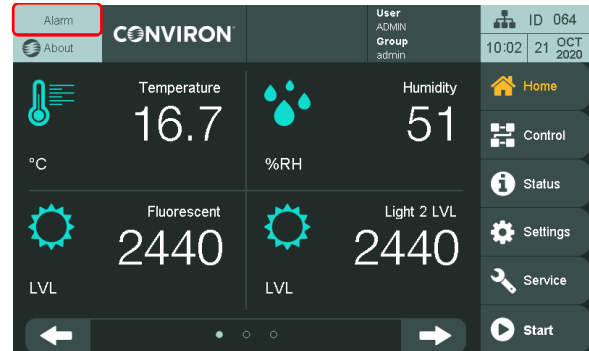
Figure 6-10   Flashing Bell Icon

7 STATUS SCREEN

The **Status** screen provides information about the system as well as current status information of various systems. This screen is mostly useful when contacting support to provide troubleshooting information.

To view the Status screen:

Tap the **Status** tab [ⓘ Status] on the Main menu bar at the right of the screen to access the **Status** screen (Figure 7-1).
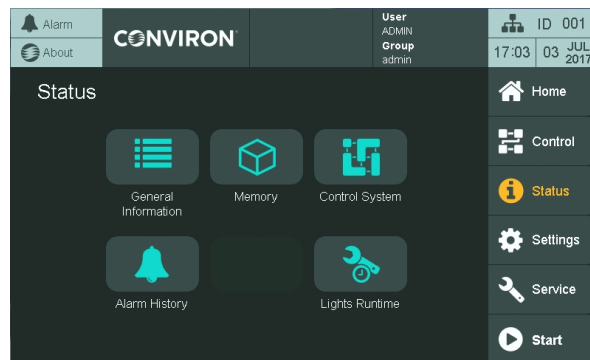
Figure 7-1   Status Screen

7.1 General Status

To view the general status:

Tap the **General** icon [General] to access the **General Information** screen (Figure 7-2).

Figure 7-2   General Information Screen

Tap the **Back** button to return to the **Status** screen or use the navigation in the Top Banner of the Main menu bar.

Only the Administrator account can edit the values in the **Customer Name**, **Product Name**, **Product Serial Number**, and **Control System Name** fields (Figure 7-3).
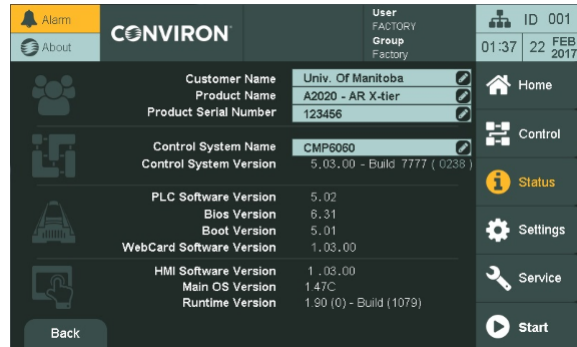
Figure 7-3   **Editable General Information Screen**

> ⚠️ Unless specifically instructed by Conviron, do not edit the values in the **Product Name**, **Product Serial Number**, and **Control System Name** fields. These values are unique identifiers used for service and warranty tracking information.

7.2   Memory Status

To view the memory status:

Tap the **Memory** icon to access the **Memory Status** screen (Figure 7-4).
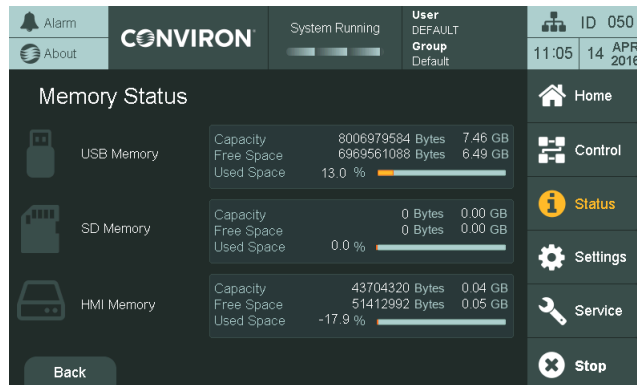
Figure 7-4   **Memory Information Screen**

Tap the **Back** button to return to the **Status** screen or use the navigation in the Top Banner or the Main menu bar.

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7.3 Control System Status

To view the system status:

Tap the **System** icon to access the **System Status** screen (Figure 7-5).
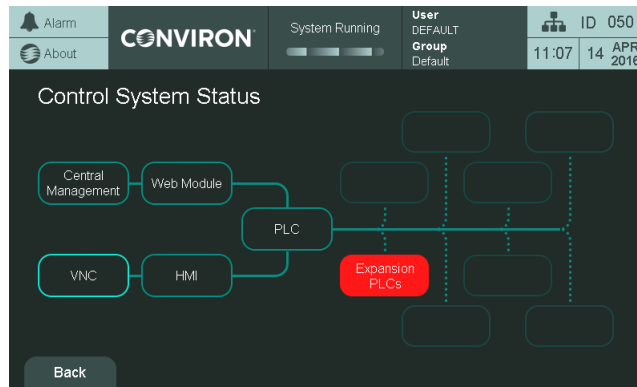
Figure 7-5   **Control System Status Screen**

Tap the buttons that only have an outline (no solid background) to get information on that sub-system. An example is the PLC button .

If there is a problem with the sub-system, the outline of the button will turn red. Tap the button for information on the issue.

The icons with a solid background represent a group of items.

1.   Tap the button to navigate to a sub-screen with details about each item of the group. An example is the USH Modules button .

2.   Tap the **Back** button to return to the **System Status** screen.

If there is a problem with any items in the group, the background of the button will turn red. Tap the button to see which item is in error.
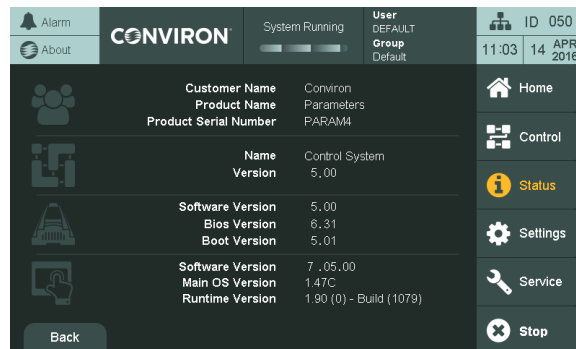
Tap the **Back** button to return to the **Status** screen or use the navigation in the Top Banner.

7.4 Alarm History

To access the alarm history:

1.   Tap the **Alarm History** icon to access the **Alarm History** screen.

2.   See Section 6.6 for a description of the screen.

3.   Tap the **Back** button to return to the **Status** screen or use the navigation in the Top Banner or the Main menu bar.

7.5   Lights Runtime

The **Lights Runtime** screen allows you to view the number of hours that the lamps have been switched on.

To view the Lights Runtime status:

On the control system display, tap **Status** (Figure 7-6), and then tap the **Lights Runtime** icon [icon].
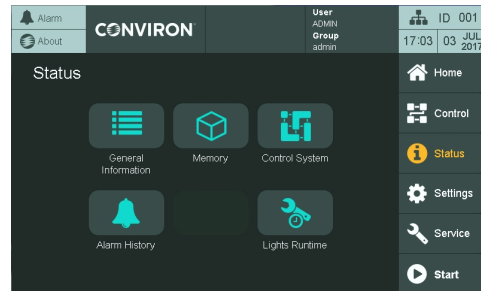
Figure 7-6   Status Screen

The **Lights Runtime** screen (Figure 7-7) appears.
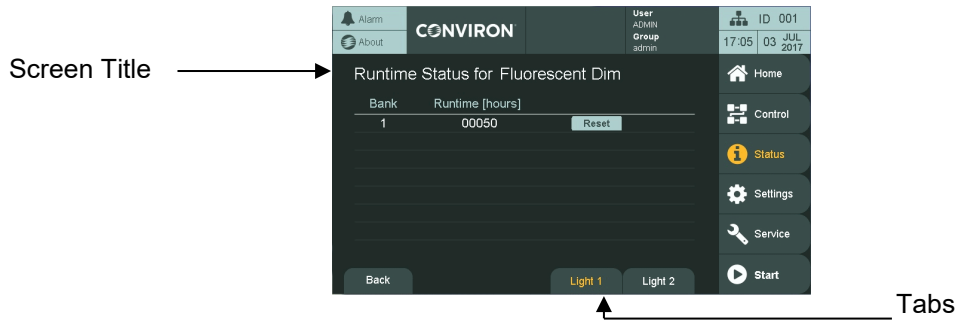
Figure 7-7   Lights Runtime Screen, First Tab Selected

Depending on the configuration of the chamber, the elements on the Lights Runtime screen may vary (Table 7-1).

Table 7-1   Elements on the Lights Runtime Screen

Element	Configuration
Screen Title	Shows the Runtime Status for the specific type of light used in the chamber
Bank	Shows the number of Banks in the chamber. A chamber can accommodate a maximum of up to eight Banks for each type of light used.

Element	Configuration
Runtime [hours]	Shows the number of hours that the lamps are active in each Bank.
	The system saves the runtime hours to its memory in increment of 3 hours. For example, a particular Bank has an actual runtime of hours, and consequently, the Runtime column will show 7 hours. However, if the chamber is switched off or becomes disconnected from a power source and then switched on again, the Runtime column will show 6 hours.
Tabs	If there are two types of light used in the chamber, then the **Lights Runtime** screen will display two tabs, named **Light 1** for the first type and **Light 2** for the second type.
	To determine the type of light used, check the screen title.

Before resetting the number of runtime hours, first replace the old lamps inside the chamber with new lamps, and then note down the Bank number where the newly installed lamps belong.

To reset the number of runtime hours:

1. On the control system display, tap **Status**, and then tap **Lights Runtime**.

2. If there are two tabs on the **Lights Runtime** screen (Figure 7-8), then verify that you are on the correct tab, which is highlighted in yellow text.
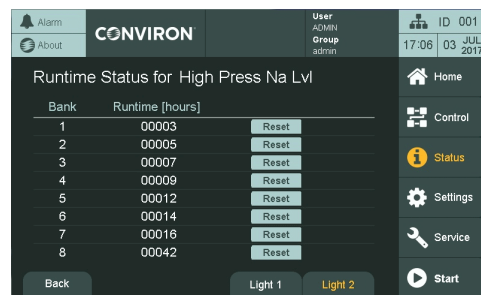
Figure 7-8   **Lights Runtime Screen, Second Tab Selected**

3. Locate the row of the Bank number that has the new lamps installed, and then tap the **Reset** button in the same row.

4. In the same row, verify that the value in the **Runtime [hours]** column is reset to **00000**.

5. Tap **Back** to return to the **Status** screen.

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8   SETTINGS SCREEN

In previous sections of this Manual, instructions are provided to enable starting up and begin using the CMP6060 to control the chamber. Those instructions addressed only the basics of what was required to begin operating the control system.

In this section, the rest of the features and settings are presented. These new features provide enhanced control over system operation. Some of the settings and features presented in this section affect the logged data, and therefore, it is important that the additional variables be appropriately set.

To access the Settings screen:

Tap the **Settings** tab [⚙ Settings] on the Main menu bar at the right of the screen to access the **Settings** screen (Figure 8-1).
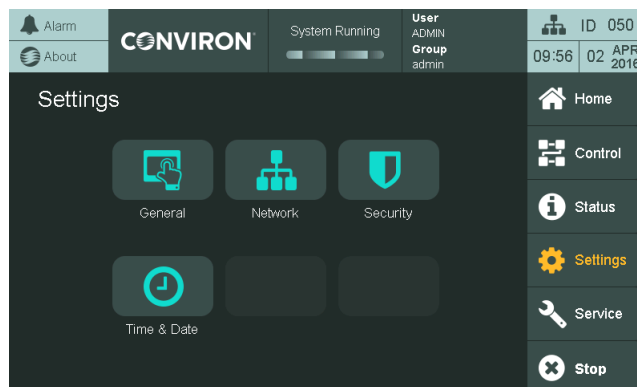
Figure 8-1   **Settings Screen**

8.1   Time/Date

> **Access Level 1**   Access Level 1 is required to change the time and date.

To view the Time & Date screen:

Tap the **Time & Date** icon [🕐 Time & Date] to access the **Time & Date Settings** screen.

This screen can also be accessed by pressing the Time Information/Navigation [23:30 | MAR 09 2016] on the Top Banner from any screen in the system.
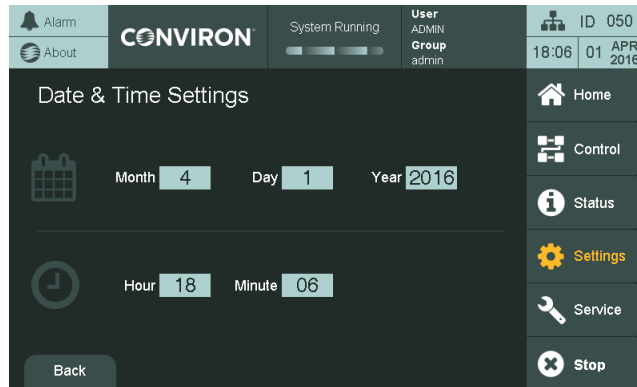
Figure 8-2   Time & Date Set-up

> ⚠️ The Time / Date parameters were already set up in Section 3 Initial Start-up & Navigational Overview. The process does not need to be repeated.

8.2   General Settings

To view the General Settings screen:

Tap the **General** icon to access the **General Settings** screen (Figure 8-3).
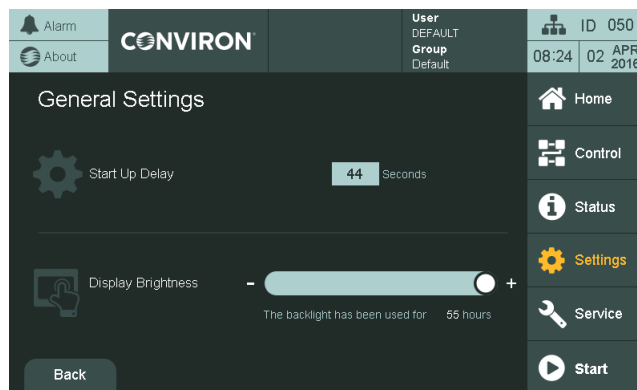
Figure 8-3   General Settings Screen

For facilities that house multiple chambers, the CMP6060 offers a valuable feature called **Startup 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.

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Configuring each chamber to start several seconds after the previous chamber is a wise precautionary step. Conviron configures a random start-up delay value between 1 and 59 seconds by default.

To modify the default (chamber) start-up delay value:

1. Tap the **Start Up Delay** value [Start Up Delay] (with a light grey background) [33 Seconds], and then enter a new value using the keypad.

The valid range is in an orange box on the top left of the keypad, and invalid values will be ignored.

2. Tap **Enter** to accept the new value or **Esc** to cancel the entry.

To modify other general settings:

- Adjust the display brightness by using the brightness slider [The backlight has been used for 28 hours].
- Tap the **Back** button to return to the **Status** screen or use the navigation in the Top Banner.

8.3 Network Settings

To view the Network Settings screen:

Tap the **Network Settings** icon [Network] to access the **System Settings** screen (Figure 8-4).

This screen can also be accessed by tapping the Chamber ID/System Status Navigation [ID 050] on the Top Banner from any screen in the system.
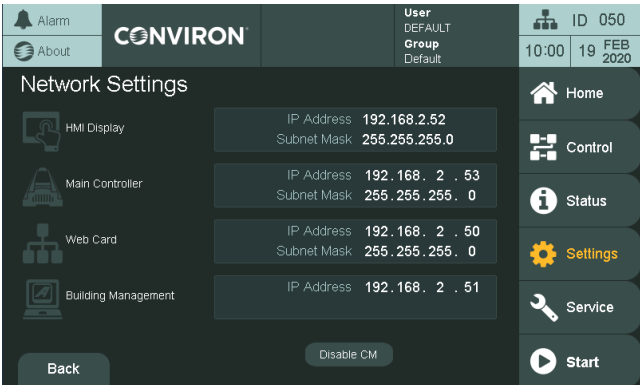
Figure 8-4   Network Settings Screen

To edit the settings, tap on any of the values to bring up a dialog box.

There are two dialog boxes: one for the **HMI** settings (Figure 8-5) and one for the **PLC/WEB Card/BMS** Settings (Figure 8-6).

> ⚠️ The **HMI Network Setting** dialog will reboot the HMI when the **Apply** button is tapped.
> To discard any changes and restrict the HMI from rebooting, tap **Cancel**.
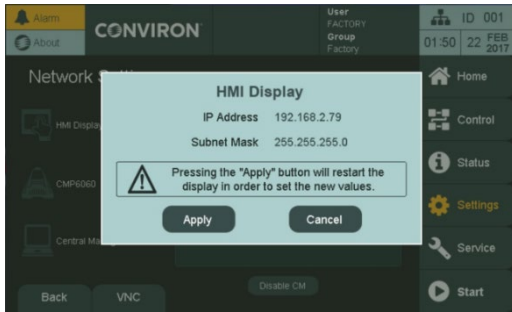
Figure 8-5   **HMI Network Settings**
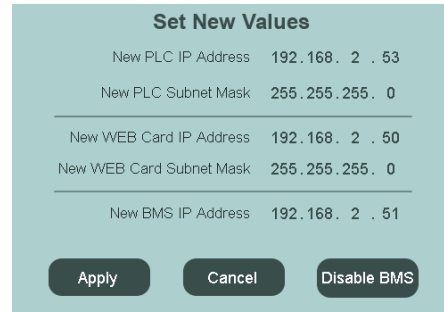
Figure 8-6   **PLC, WEB Card, and BMS Network Settings**

8.4 Security Settings

The CMP6060 has a security feature to manage users by managing their level of access. The feature requires users to be set up (a maximum of three user ID passwords can be assigned). When this is completed (and provided Security is turned On), users are required to log in – 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.

By default, the CMP6060 control system is shipped with security features turned off, allowing any user to start the chamber and become familiar with the controls without having to enter a password.

> ⚠️ It is recommended that a security administrator be assigned to administer user login authority and that security features be added as soon as possible.

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To view the Security Settings screen:

Tap the **Security Settings** icon [icon] to access the **Security Settings** screen (Figure 8-7). This screen can also be accessed by pressing the current **User** & **Group**/Security screen navigation [icon] on the Top Banner from any screen in the system.
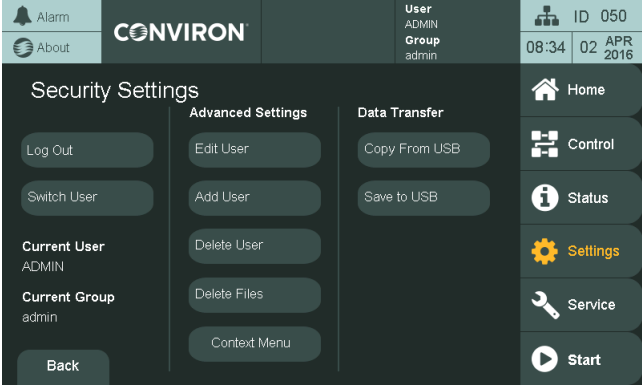
Figure 8-7   Security Settings Screen

8.4.1   Security Overview

With security enabled, there are three types of users in the CMP6060 including:

- **Default** — Not logged in (or log in with username DEFAULT and no password). Corresponds to Level 0 access.

- Users — Users have Level 1 access with access to the basic features such as Programming, Alarms, Trend Graphs, and some of the Option features.

- Administrators — Administrators have Level 2 access, which includes Level 1 access plus additional Service and Option features.

- Factory — Factory and Service personnel have Level 3 access, which includes Level 2 access plus other Service and configuration features. Section 8.4.5 provides details on setting up the users and enabling the security feature.

> It is recommended that a security administrator be assigned to administer user login authority and that security features be added as soon as possible.

8.4.2 CMP6060 Level Access

Table 8-1 lists CMP6060 password enabled access levels available to the User, Administrator, or Service/Factory personnel, which is only available to Conviron personnel. In this manual, access level codes are also shown at the beginning of every section.

Table 8-1 CMP6060 Access Levels

Menu	Section	Sub-Menu	Access Level
Settings	8	General	1
		Time & Date	2
		Network	2
Security	8.4	Login	0
		Logout / Switch User	1
		User Management	2
Service	10	I/O Status	0
		Input Offset	2
		O/P Override	2
Control	5	Parameters	1
		Program Edit	1
		Schedule Edit	1
Alarms	6	History / Current View	0
		Acknowledge	1
		Clear Alarms	2
Home	4 / 9.1	Trend Graph	0
		Process View	0

0 = Default (not logged in)　　1 = User　　2 = Administrator

8.4.3 Security Dialog

When a higher access level is required to perform a function, a dialog box appears (Figure 8-8), stating that a higher access level is required.

Tap the **Login** button to log in as an advanced user, or tap **OK** to return to the previous screen.

To log out, tap the **Log Out** button.
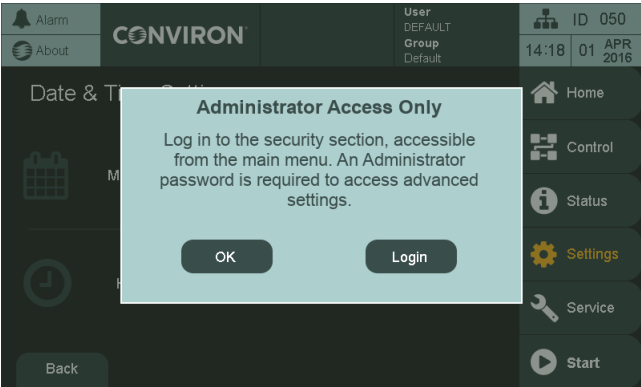
Figure 8-8   Security Dialog

8.4.4   Log In, Switch User Account, or Log Out

To log in or switch to another account:

1.   To log in, tap the **Log In** button [Log In]

To switch to another user account, tap the Switch User button [Switch User].

The User Login screen appears (Figure 8-9).
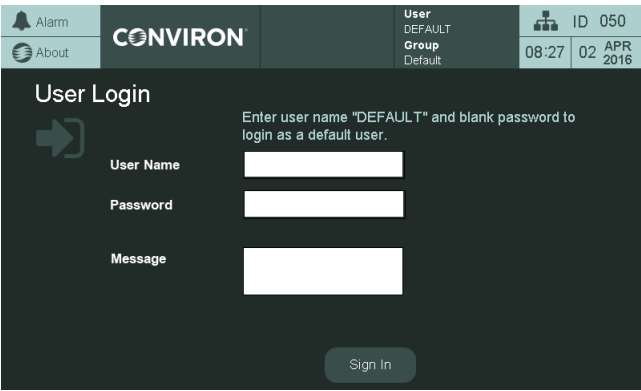
Figure 8-9   Log In Screen

2.   Tap the **User Name** field, and then enter the user name.

3.   Tap **Enter** on the keypad.

The user name DEFAULT is a read-only account and does not need a password.

4.   Tap the **Password** field, and then enter the password.

5.   Tap **Enter**, and then tap the **Sign In** button.

8.4.5   Default Administrator Account

The CMP6060 Control System is shipped with a default administrator account, with the user name "ADMIN" and a pre-set password "admin". Using "admin" as the current password, assign an administrator and assign a new password to the new administrator.

> Do not delete the ADMIN account. If the ADMIN account is deleted the Administrator will no longer be able to access and edit process parameters, system settings, and programs/schedule contents, and user accounts. The HDMI will also have to be reloaded to restore functionality.

> It is recommended to set up the administrator account first. Once the administrator account is set up, up to three user accounts can be created. An administrator can change Level 1 and Level 2 passwords; however, a user may only change their own Level 1 password.

> The administrator and all users should record their passwords for reference. Forgotten passwords can be reset by the Administrator. If the administrator forgets the password, then contact Conviron Technical Services.

The ADMIN account can be used to create additional user accounts under the umbrella of the "admin" group using the following structure:

- User Name: "ADMIN"
- Password: "admin"
- Group: "admin"

For example:

- User Name: "Admin2"
- Password: "Admin2pass"
- Group: "admin"

This new user "Admin2" has the same permissions and access as the Administrator because the user belongs to the "admin" group. This new user can also create, add, edit, and delete users.

8.4.6   Audit Trails

Access Level 2   Access Level 2 is required to access the Audit Trails feature.

The new feature we have added is Audit Trails. When a user interacts with the chamber, the HMI keeps a record of actions that were performed and an audit report can be generated.

To generate an audit report:

1.   Log in as an Administrator.

2.   Once logged in as an administrator, the **Audit Trail** icon will be available in the **Security Settings** screen (Figure 8-10).
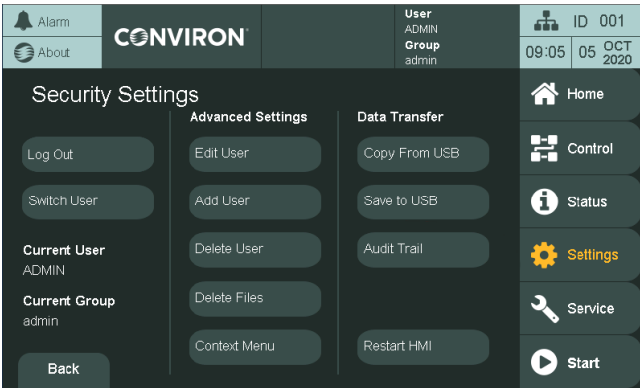
Figure 8-10   Audit Trails Icon

3.   Insert a USB storage device into the chamber USB port (located next to the HMI) and press the **Audit Trail** icon. This will save the audit trail to the USB as a .csv file.

4.   Remove the USB storage device and open the audit trail .csv file (Figure 8-11) on a PC using the appropriate software.
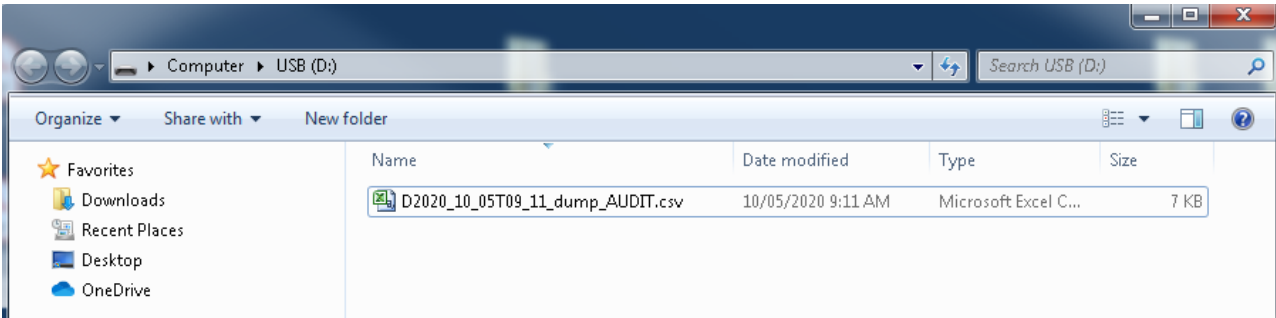
Figure 8-11   Audit File Name Example

A new audit file will be generated and saved to the USB storage device each time the **Audit Trail** icon is pressed. The audit trail will record who has logged in and what changes they have made to the system.

For example, if changes are made to the web card IP address by the administrator, the audit trail will be shown as in Figure 8-12 and Figure 8-13.

Figure 8-14 shows an example of collected data.
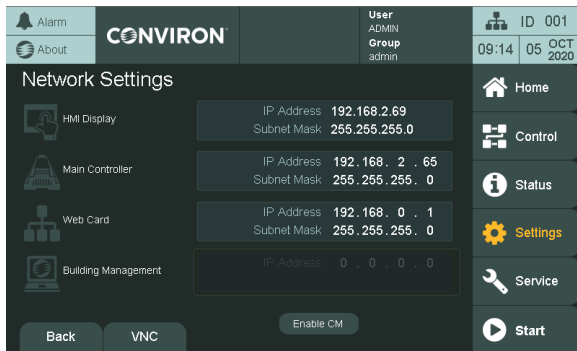
Figure 8-12   IP Before Change
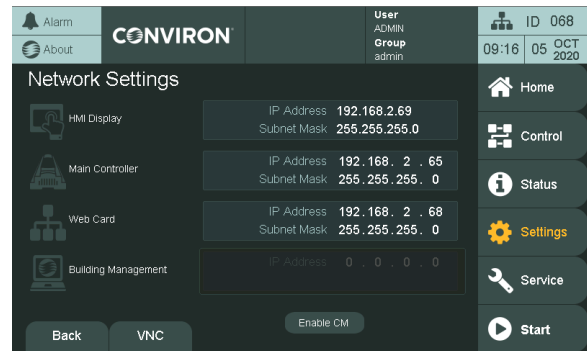
Figure 8-13   IP After Change

EventType	SubType	TimeStamp	Interface	Action	Information
18	1	2020-10-05T09:11:11.956-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_IP_OCT_1;192;
18	1	2020-10-05T09:11:12.096-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_IP_OCT_2;168;
18	1	2020-10-05T09:11:12.212-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_IP_OCT_3;2;
18	1	2020-10-05T09:11:12.321-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_IP_OCT_4;68;
18	1	2020-10-05T09:11:12.436-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_MASK_OCT_1;255;
18	1	2020-10-05T09:11:12.654-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_MASK_OCT_2;255;
18	1	2020-10-05T09:11:12.759-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_MASK_OCT_3;255;
18	1	2020-10-05T09:11:12.825-07:00	LOCAL	WRITE_TAG	Status:1(S_OK); User:ADMIN; Data:WEB_MASK_OCT_4;0;
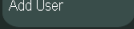
Figure 8-14   Audit Data Example

8.4.7 Add, Edit, or Delete a User Account

Access Level 2   Access Level 2 is required to add, edit, or delete a user account.

To add a user account:

1. Tap the **Add User** button [Add User] to access the **Add New User** screen (Figure 8-15).
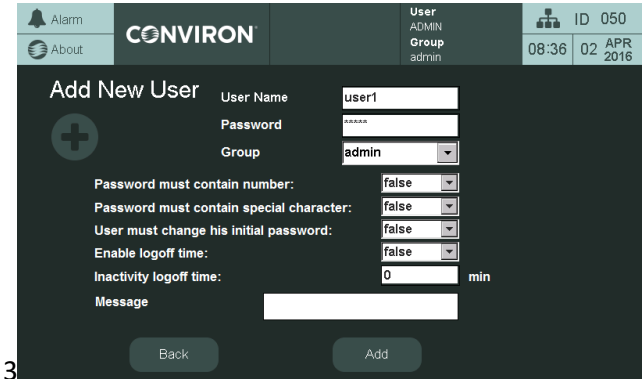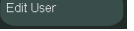
Figure 8-15   Add User Screen Example

2. Edit the user information (including changing the password) by either tapping on the fields or using the dropdown menus.

3. Tap the **Add** button [Add] to add the new user account or the **Back** button [Back] to discard the changes.

To edit an existing user account:

1. Tap the **Edit User** button [Edit User] to access the **User Editor** screen (Figure 8-16).
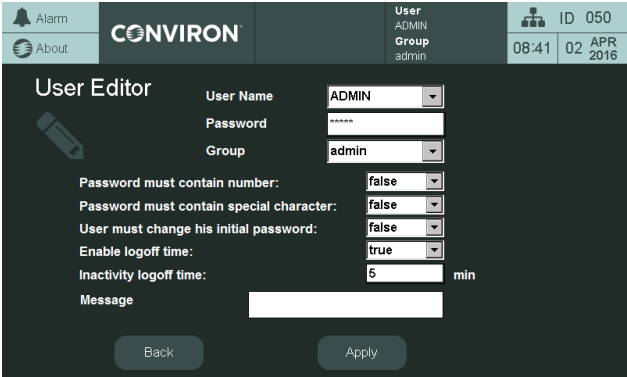
Figure 8-16   User Editing Screen Example

2. From the **User Name** dropdown menu, select the user account to edit.

3. Edit the user account information (including changing the password) by either tapping on the fields or using the dropdown menus.

4. Tap the **Apply** button [Apply] to apply the changes or the **Back** button [Back] to discard the changes.

To delete a user account:

Do not delete the ADMIN account. If the ADMIN account is deleted the Administrator will no longer be able to access and edit process parameters, system settings, and programs/schedule contents, and user accounts. The HDMI will also have to be reloaded to restore functionality.

A deleted user account cannot be recovered. A new user account will have to be created if the user account was deleted by accident.

1. Tap the **Delete User** button [Delete User] to access the **Delete User** screen (Figure 8-17).
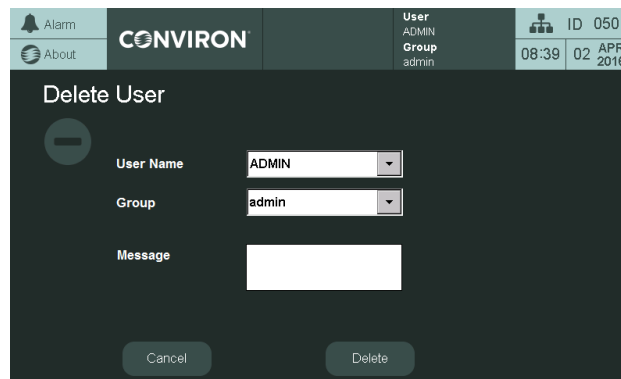
Figure 8-17   Delete User Screen Example

2. Tap the **User Name** dropdown menu, and then select the user name to delete.

3. Tap the **Delete** button [Delete] to delete the user account or the **Cancel** button [Cancel] to cancel the operation.

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9 TREND SCREEN

This section of the manual is about data management. Key topics include

- On-screen trend data
- Log data downloadable over a network

Data management is an important aspect of controlled environment systems. Researchers usually need to be able to view and assess their log data. In some cases, this is a critical requirement.

The CMP6060 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 30 seconds and includes the first eight configured processes (the first four are most commonly Temperature, Humidity, Light, and CO_2). The data is viewed in the form of trend graphs as a charted history on the display (Figure 9-1). The control system has sufficient memory capacity to store fifteen days of data, after which it overwrites 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. The control system 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 control system 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 control system memory, it is recommended to extract the log data on a weekly basis. Refer to Section 9.2 Remote Data for more information.
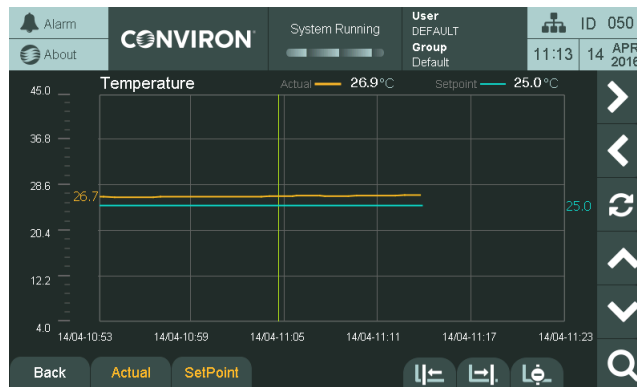
Figure 9-1   Trend Graph Screen

9.1 Local Display Data

Access Level 1   Access Level 1 is required to access the **Trend** screen.

9.1.1 Trend Screen – Key Area Layout

When the memory of the control system 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 connecting the unit to a LAN system and using the CM software.

To access the Trend screen:

Tap the desired parameter on the **Home** screen to access the **Trend** screen. Figure 9-2 shows the **Trend** screen for **Temperature**.
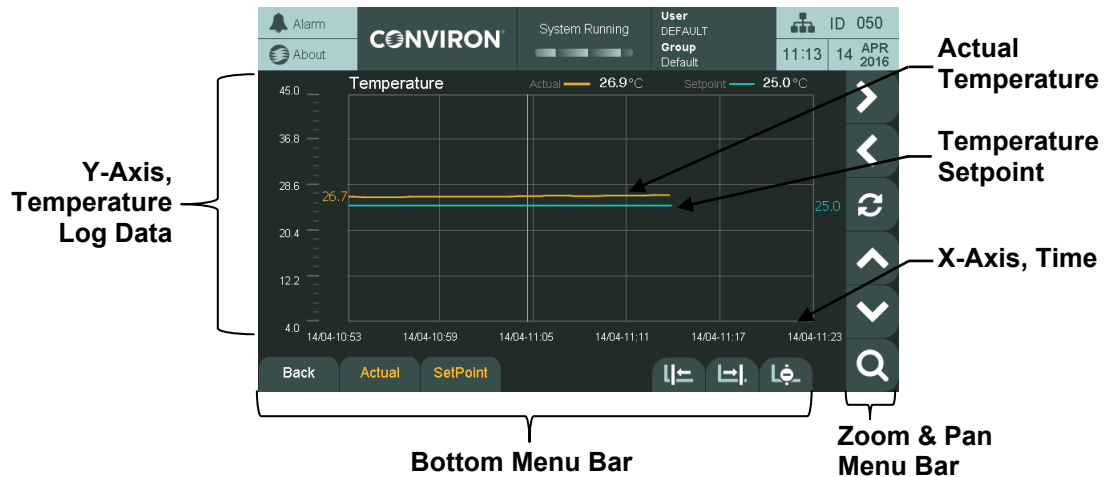
Figure 9-2   **Trend Screen Key Layout – Pan Mode**

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9.1.2 Zoom & Pan

Table 9-1   Zoom & Pan Buttons

Button		Function
Zoom & Pan Menu Bar		Zoom in or out in both axes and pan left, right, up, or down and reset to default view.
Zoom Mode	Q	Tap this icon to access magnification menus for the current trend screen.
Pan X-Axis	‹ ›	Tap the inner left or right icons to view the trend graph horizontally at specific intervals.
Pan Y-Axis	⌃ ⌄	Tap the up or down arrows to pan the trend graph vertically.
Reset View	⟳	Reset the view with the current value in the center of the screen and the zoom and pan to default.
Pan Mode	✛	Tap this icon to access the pan menu for the current trend screen
Zoom X Axis	⊖ ⊕	Tap the plus zoom icon to zoom in the X axis. Tap the minus zoom icon to zoom out in the X Axis.
Zoom Y Axis	⊖ ⊕	Tap the plus zoom icon to zoom in the Y axis. Tap the minus zoom icon to zoom out in the Y Axis.
Toggle Cursor	⌖ ⌖	. Tap to toggle the cursor on/off. The cursor is used to read the current value where the cursor intersects the curves (actual and setpoint). The values at the cursor are in orange and blue on the left and right of the graph.
Move Cursor	⇐ ⇒	Tap to move the cursor left or right. Tap and hold to increase the cursor movement speed.
Hide/Show Curve	Actual SetPoint	Hide/Show Curve Tap the Actual and SetPoint buttons to hide or show the curves.

Button		Function
Exit	Back	Tap the Back button to return to the Home screen.

9.2 Remote Data

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

9.2.1 Logged Data – Change Data Log Rate

You can change the Data Log Rate from the default 18 seconds to a multiple of 6 seconds between 6 seconds to 5 minutes.

To change the log rate:

1. From the **Home** screen, tap **Settings** > **General Settings**.

2. In the **Log Rate Multiplier** field (Figure 9-3), enter `1` to change the log rate to every 6 seconds, `10` for every 60 seconds, or any other applicable value.
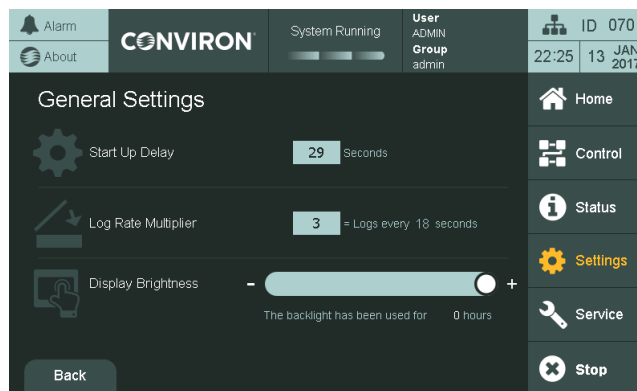
Figure 9-3   Log Rate Multiplier

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9.2.2   Logged Data – Network

Read and understand the following instructions entirely before proceeding.

The CMP6060 can be accessed with a network-connected PC from an FTP client to retrieve log data or Conviron Central Management (Optional).

To access the CMP6060 logged data from a PC without a Central Management System:

1.   Set up the PC address.

2.   Set the address of the CMP6060 control system.

3.   Issue the FTP command in a web browser.

Accessing data remotely typically requires assistance from your IT department. Your computer may or may not be appropriately equipped to access the CMP6060 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.

Be aware that setting a TCP/IP address to the same value as another PC on the network will disable both systems from network access. Firewall security settings on your computer may inhibit or impair the performance of the computer connection. Consult the local facility IT department for assistance.

To access the controller, first ensure that the control system is 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 IP address of the control system must be set up — at the control system and at the connecting PC. If a Central Management System (CMS) is used, the CMS address must also be defined.

9.2.2.1 Setting the IP Address at the PC (Windows 7 only)

To set an IP address:

1.   Click **Star**t > **Control Panel** > **Network and Internet** > **Network and Sharing Center**.

2.   Click the **Local Area Connection** where the control system is connected (Figure 9-4).
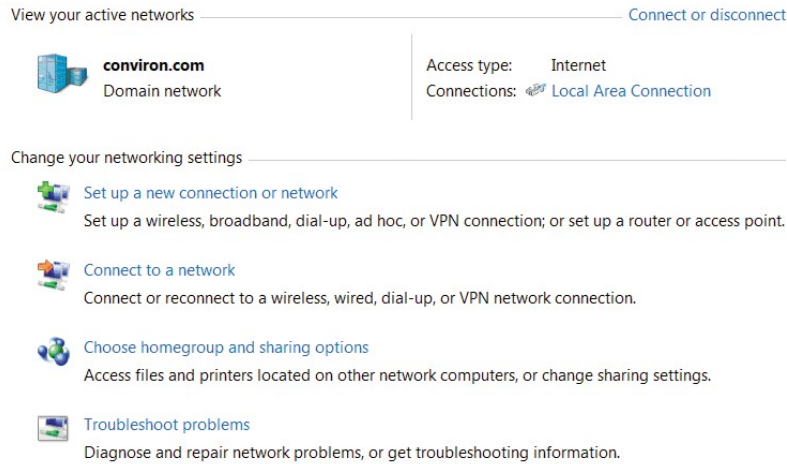
Figure 9-4   Local Area Connection

3.   Click **Properties**, and then scroll down to select **Internet Protocol (TCP/IPv4)**.

4.   Click **Properties** (Figure 9-5).
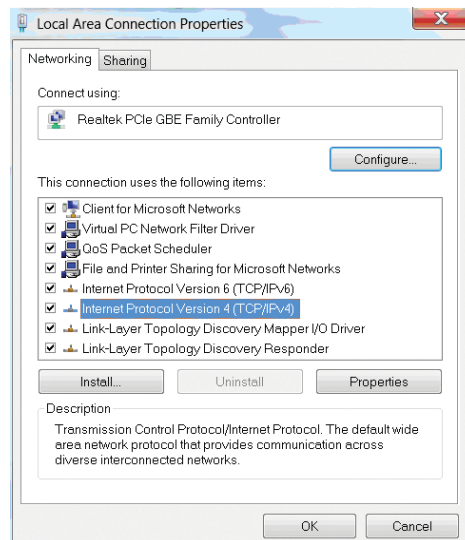
Figure 9-5   Local Area Properties

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5. Proceed as follows:

    a. The system has an IP that was automatically assigned by a DHCP server. In this case, the Properties screen appears like Figure 9-6, and the IP address is automatically assigned.

    b. If the IP was not automatically assigned, then configure the IP address as in Figure 9-7.
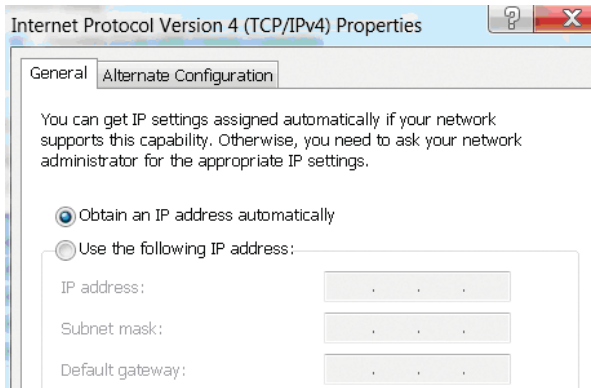
Figure 9-6 **Internet Protocol (TCP/IP) Addressing**
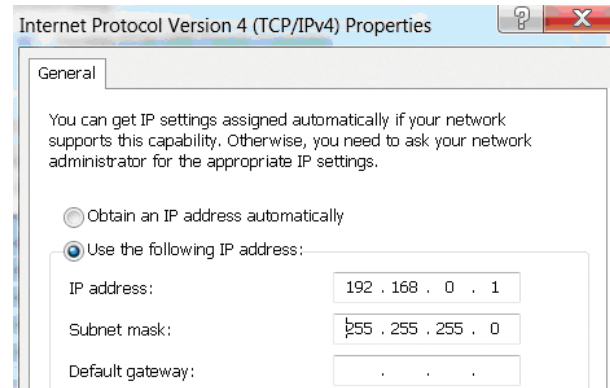
Figure 9-7 **Internet Protocol (TCP/IP) Static Addressing**

With either option, if you are connecting to a **shared** local area network, contact your onsite IT administrator for a TCP/IP address suitable for the CMP6060. This ensures your PC and the CMP6060 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. Click the **Use the Following IP address** button, and then enter the suggested address for the PC listed in Table 9-2.

> 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 recommends the following configuration, as shown in Table 9-2.

Table 9-2   Recommended Configuration

PC		CMP6060 Control System
TCP/IP Address: 192.168.0.1 **Netmask:** 255.255.255.0	#1	TCP/IP Address: 192.168.0.2 Netmask: 255.255.255.0
	#2	TCP/IP Address: 192.168.0.3 Netmask: 255.255.255.0
	#3	TCP/IP Address: 192.168.0.4 Netmask: 255.255.255.0
		Etc.

9.2.2.2   Selecting an IP Address for the Control System

Set the IP address of the control system 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 a PC: Use an Ethernet cross-over cable to connect to the PC.
> To connect to a network: Use a standard Ethernet cable.

9.2.3   Setting the IP address at the Control System

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

There are two network addresses to set up in the CMP6060 as follows:
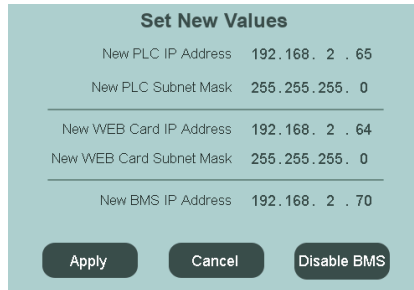
- Web Card Address: Defines the identity of the control system within the network
- Netmask: Divides an IP address into subnets
- CM Address: The IP Address of Conviron Central Management

> 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.

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To set the chamber and HMI addressing:

1. Tap the **Settings** tab [⚙ Settings] on the Main menu bar at the right of the screen to access the **Settings** screen.

2. Tap the **Network Settings** icon [Network] to access the **System Settings** screen.

3. Tap the Web Card/CM address to launch the **Set New Values** dialog box (Figure 9-8).

Set New Values

New PLC IP Address	192.168. 2 . 65
New PLC Subnet Mask	255.255.255. 0
New WEB Card IP Address	192.168. 2 . 64
New WEB Card Subnet Mask	255.255.255. 0
New BMS IP Address	192.168. 2 . 70

[Apply]   [Cancel]   [Disable BMS]

Figure 9-8   PLC and CM Network Settings

4. To change the address numbers, tap each individual numerical field [192].

A pop-up keypad will appear each time a field is accessed.

If CM is disabled, tap the Enable CM button to allow access to Central Management.

If CM is enabled, tap the Disable CM button to block access to Central Management.

5. Tap **Apply** to apply the changes or **Cancel** to discard the changes.

> ⚠ Once the Web Card Addressing has been set, the Chamber ID displays the last three digits of the Web Card 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 IDs (last 3 digits) will also display in each of the respective chamber thumbnails on the CM dashboard.

9.2.3.1 Downloading Logged Data via FTP (Windows 7 only)

1. Open an internet browser and type
   ftp://guest:fguest@xxx.yyy.www.zzz/usr/local/root/http/ in the address bar where
   xxx.yyy.www.zzz is the address of the control system.

   The browser will display a long list of files, from which the one containing data is
   generically called XX.YYY.WWW.ZZZ Year-month-day.log

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

3. 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.

4. To graph the variables, sort the table, remove the unneeded titles, and then 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 control system, as addresses must
be unique. Use the suggested Conviron address, 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 log files of the individual chamber.

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10 SERVICE SCREEN

> This manual covers only the I/O Status area of the Security screen. All other areas are restricted to Access Level 3 personnel.

Tap the **Service** tab [Service] on the Main menu bar at the right of the screen to access the **Service** screen (Figure 10-1).
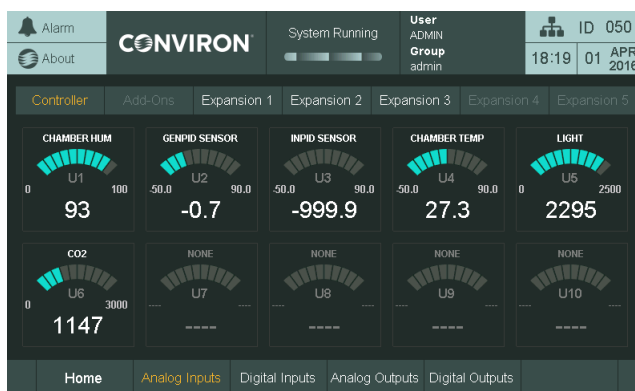
Figure 10-1   Service Screen

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 CMP6060 control system extends the service capabilities of previous control systems by providing features accessible to users (minimum security level required is Access Level 1). With the CMP6060, savvy users can, with the support of Conviron 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.

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 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 Central Management system. As such, in order to manipulate any output parameters from within the **I/O Status** screen, a user must physically be present at the chamber to witness the chamber reactions. The feature will also be disabled locally when a remote connection is active.

> ⚠️ Alarms are disabled when a Schedule is *not* running.
>
> Only one designated on-site service technician should be operating the chamber at any time. Altering the 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*. Any manipulation of output parameters must be performed either with a qualified service technician on-site or by way of telephone support with the Conviron Technical Services group.

10.1 I/O Status

Access Level 1   Access Level 1 is required to access the **I/O Status** screen.

Figure 10-2 illustrates a sample I/O screen (schedule not running) showing several of the configured analog input parameters for a particular chamber.
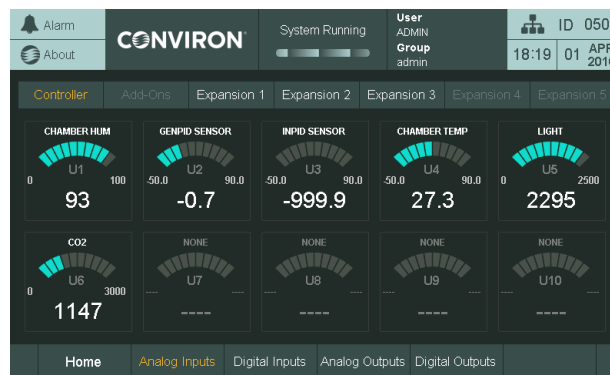
Figure 10-2   I/O Screen Analog Input Example

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To access the I/O Status screen:

1. Tap the unit navigation buttons (Main Controller, Add-On's, Expansion 1) to display the I/O status of different control system units.

2. Tap the I/O type buttons (Analog Inputs, Digital Inputs, Analog Outputs, Digital Outputs) to display the different I/O type status for a given control system unit.

3. Tap the **Home** button to return to the **Home** screen or use the navigation in the Top Banner.

The information shown for each parameter type and the corresponding interactivity available depends on whether or not a schedule is running.

Table 10-1 summarizes the **I/O Status** screen information and interactivity.

Table 10-1   I/O Status Screen Parameter Summary

Schedule Running (Read-only mode)		
I/O Type	**Display**	**Interactivity**
Analog Inputs	Actual Value	Read-only when schedule running. No interactivity allowed.
Analog Outputs	Actual Value	
Digital Inputs	Current Status	
Digital Outputs	Current Status	
Schedule Not Running (Troubleshooting mode)*		
Analog Inputs	Actual Value	No
Analog Outputs	N/A	Yes
Digital Inputs	Current Status	No
Digital Outputs	N/A	Yes

Note: Refer to the following warning message.

⚠ Alarms are disabled when a Schedule is *not* running.

Only one designated on-site service technician should be operating the chamber at any time. Altering the 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*. Any manipulation of output parameters must be performed either with a qualified service technician on-site or by way of telephone support with the Conviron Technical Services group.

From Table 10-1, 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.
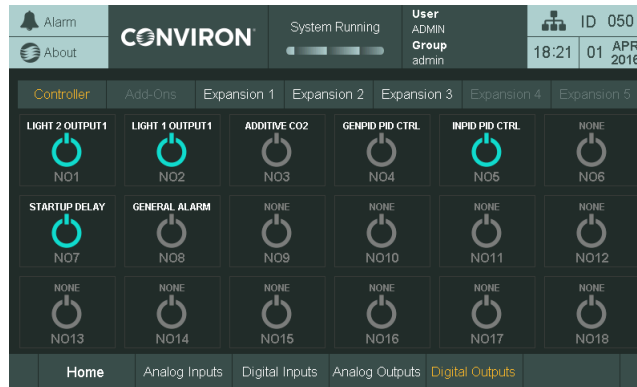
Figure 10-3   I/O Screen Digital Outputs Example

To exit the **I/O Status** screen, tap the **Home** button in the lower-left corner of the screen.

10.2 Input Offset (Sensor Calibration)

Access Level 1   Access Level 1 is required to change the input offset.

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 highly accurate and produces a slightly different reading than the CMP6060 reading.

For example, if the chamber is running at 25°C, and an independent temperature sensor placed into the chamber 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 humidity sensor of the control system every two years.

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To change the offset:

1. Tap the unit for which you want to adjust the offset, and then tap the **Add-On's** button
    Add-On's .

2. Tap the **Analog Inputs** button Analog Inputs .

Only analog inputs have offset correction capability.

3. Tap on any analog input zone. **The Analog Offset** screen appears (Figure 10-4).

Figure 10-4   Input Offset Screen

4. Tap on the **Offse**t value (white numbers), and then adjust the offset value using the
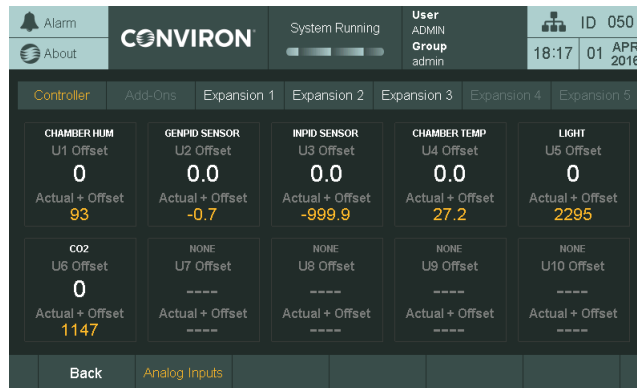   keypad.

Once entered, the **Actual + Offset** section displays the value in orange after the offset is
applied to the sensor reading.

5. Tap the **Back** button on the bottom left-hand side to store the values and return to the
    I/O Status screen.

10.3 Scalable Options

One of the many impressive features of the CMP6060 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
  control system. 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 CMP6060 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) controller, 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.

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11 TECHNICAL INFORMATION

11.1 Glossary

Table 11-1   Terms & Definitions

Term	Definition
Plant Growth Area	The environmentally controlled section of the chamber interior
Process	Physical value that the Environmental Chamber controls such as temperature, relative humidity, carbon dioxide, lighting
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 control system. 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 CMP6060 works in RAMP mode.
STEP Mode	When conditions are set to change dramatically between timelines, the CMP6060 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.

11.2 Abbreviations

Table 11-2   Specific Abbreviations

Term	Definition
%RH	Humidity level expressed as a percentage of the maximum humidity level
∅	Greek letter Phi – SI prefix for electrical phase
μ	Greek letter Mu – SI prefix for micro
°C	Degrees Celsius
A	Amperes
AC	Air cooled condenser unit
AR	Arabidopsis
ATC	Argus Titan Controller
CFC	Chlorofluorocarbon
CM	Central management system
CMH	Ceramic Metal Halide lamp
COMM	Connection to LAN
DXRAC	Direct expansion compressor with remote air cooling
DX	Direct expansion compressor
EMI	Electro Magnetic interference
ESD	Electrostatic Discharge
EU	European Union
FLEX	Flexible canopies for use with either tall or short plants
gph	gallons per hour
GR	Ground
HYD	Hydronic/glycol coolant tied into a central chiller system
Hz	Hertz
ID	Inside Diameter
l/hr	Liter per hour
lpm	Liter per minute
LT	Low temperature
MH	Metal Halide
mm	millimeter
MT	Multi-tier, for use with short plants
OACU	Outdoor Air-cooled Condensing Unit
OD	Outside Diameter
PE	Protective Earth – mandatory ground connection
PG	Plant growth, for use with tall plants

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Term	Definition
ppm	Parts per million - used a unit of measurement for CO_2 concentration
psi	Pounds per square inch
PVC	Polyvinyl Chloride
RAC	Remote outdoor air-cooled condenser
RoHS	Restriction of Hazardous Substances Directive
SCD	Separate Coil Dehumidifier
TC	Tissue Culture
ULT	Ultra-low temperature
UPS	Uninterruptable Power Supply
USH	Ultrasonic humidifier
V	Volt
WC	Water cooled condenser unit
WEEE	Waste Electrical and Electronic Equipment

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