ACS-30 System

PROGRAMMING GUIDE

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1. SECTION 1 – INTRODUCTION

1.1. ACS-30

1.1.1. PRODUCT OVERVIEW

The nVent RAYCHEM ACS-30 Advanced Commercial Control System is a multipoint electronic control and monitoring system for nVent RAYCHEM and nVent PYROTENAX heating cables. The ACS-30 supports the following applications: hot water temperature maintenance, freezer frost heave prevention, floor heating, pipe freeze protection, fuel oil flow maintenance, greasy waste disposal flow maintenance, roof & gutter de-icing and surface snow melting. The ACS-30 system can control and monitor up to 260 heating circuits with multiple networked nVent RAYCHEM ACS-PCM2-5 panels. Each ACS-PCM2-5 panel can control up to five individual window circuits. The ACS-30 is available with five Electromechanical Relays (EMRs) that allow switching up to 30 amperes at 277 V. Each heating cable circuit can have up to four Resistance Temperature Detector (RTD) sensor inputs allowing for a variety of combinations of temperature control, monitoring and alarming. When single circuit extensions are required the nVent RAYCHEM C910-485 controller can be added the ACS-30 network. The C910-485 will allow for assigning two RTD's (local to the C910-485) to the circuit.

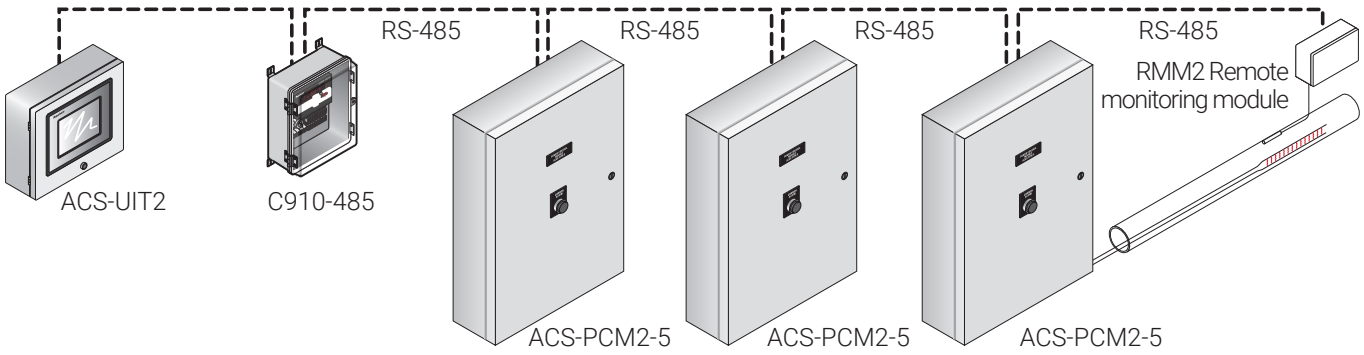

Fig. 1.1 ACS-30 System

1.1.2. CONTROL

The ACS-30 is a commercial control system that measures temperatures with 3-wire, 100-ohm platinum RTDs connected directly to the ACS-PCM2-5, the C910-485 or through optional Remote Monitoring Modules (RMM2). Each ACS-PCM2-5 accepts up to five RTDs, each C910-485 accepts two RTD's, and each RMM2 accepts up to eight RTDs. The RMM2s are typically located near the desired measurement location (RTDs). Multiple RMM2s are networked to the ACS-UIT2, significantly reducing the cost of RTD field wiring. The ACS-30 system supports up to 260 temperature inputs via the PCM boards contained within the ACS-PCM2-5 panel. Using RMM2s, an additional 128 temperature inputs can be supported for a maximum of 388 temperature inputs. The ACS-30 can be configured for On/Off, ambient sensing, and timed duty cycle control modes.

1.1.3. MONITORING AND ALARMING

The ACS-30 can monitor ground-fault, temperature, and current during system operation. Configurable alarm settings provide options for local or remote alarms. Dry contact relays are provided for alarm annunciation back to a local LAN, fire control panel or Building Management System (BMS).

Optional nVent RAYCHEM ProtoNode multi-protocol gateways are available for integrating the ACS-30 controller into a BACnet® or LonWorks® system.

1.1.4. GROUND-FAULT PROTECTION

To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with nVent Building Solutions requirements, agency certifications, and national electrical codes, ground-fault equipment protection must be used on each heating cable branch circuit.

The ACS-30 controller provides this protection. Therefore, additional ground-fault protection is generally not necessary. However, **national electrical codes require that in order to prevent electric shock to personnel, 5-mA, Class A ground-fault protection devices (GFCI's) are installed when electric floor heating is used in kitchens and baths**. The ACS-30 does not provide this level of personnel ground-fault protection. For these applications the appropriate GFCI must be installed in the power distribution panel.

1.1.5. INSTALLATION

The ACS-30 system is programmed using the User Interface Terminal (ACS-UIT2) that has LCD color touch-screen display technology. The ACS-UIT2 provides a user interface for easy and efficient programming without keyboards or cryptic labels. The ACS-UIT2 is mounted remotely in a nonhazardous, indoor or outdoor locations.

Heating cable circuits are connected to the ACS-UIT2 via ACS-PCM2-5 control panels, or C910-485 controllers. The ACS-PCM2-5 panels and C910-485 controller can be distributed throughout the installation to where the heating cable circuits are located. The control panels/controllers should be located adjacent to circuit breaker panels and are connected in series to the ACS-UIT2 with RS-485 cable.

1.1.6. COMMUNICATIONS

The ACS-UIT2 supports the Modbus® protocol and is available with an RS-232, RS-485 or 10/100Base-T Ethernet communication interface. The ACS-30 system may be integrated into BACnet, Metasys N2 and LonWorks Building Management Systems (BMS) using the ProtoNode gateway translators available through nVent Building Solutions.

1.1.7. COMPLETE SYSTEM

A complete ACS-30 system consists of an ACS-UIT2 and up to 52 modular power control panels (ACS-PCM2-5) ready for field connections of power wiring, heat tracing and temperature sensors.

1.1.8. ACS-30 PROGRAMMING GUIDE

This guide assists in the set up and operation of the ACS-30 system.

The ACS-30 software, installed in the ACS-UIT2 (User Interface Terminal), supports the ACS-PCM2-5 power control panels, C910-485 controllers and additional RTD inputs via the RMM2.

The software provides several features to help configure and maintain the nVent RAYCHEM devices. This document is not intended to provide detailed explanations of the specific features of each product, but rather to show how to access various parameters within the devices using the ACS-30 software. Please refer to specific detailed product documentation:

- ACS-PCM2-5 Installation Instructions (H58672)
- ACS-UIT2 Installation Instructions (H58661)
- ACS-UIT2 Modbus Protocol Interface Mapping for ACS-30 Systems (H58685)
- ACS-30 Program Integrator Manual (H58325)
- ProtoNode Installation Instructions (H58622)
- C910-485 Installation, Operation and Maintenance Manual (H58415)

1.2. IMPORTANT INFORMATION

This manual is a guide for the setup and operation of the ACS-30 Advanced Commercial Control System, a multipoint electronic control and monitoring system.

Important: All information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their particular application.

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NVENT THERMAL MANAGEMENT

899 Broadway St.
Redwood City, CA 94063-3104
U.S.A

1.4. USER RESPONSIBILITIES

The performance, reliability and safety of your heating cable system depend on proper design, selection, and installation. The ACS-30 Software will help you configure and monitor a system that meets your requirements, but it is only a tool. It assumes that your input is accurate, that you are familiar with heating system design and configuration, and that you will ensure that all components of the heating system are installed, maintained and used as intended. The configuration of the ACS-30 Software should be reviewed by a knowledgeable engineer to ensure it is appropriate for your application. Additional information relating to safety, design, and installation is contained in Design Guides, Installation Manuals, Data Sheets, and other literature available from nVent. Be sure to consult these documents as needed.

1.5. SAFETY WARNINGS

There are important safety warnings shipped with nVent products and printed in the ACS-UIT2 Installation Instructions (H58661), the ACS-PCM2-5 Installation Instructions (H58672) and in the ACS-30 Program Integrator User Manual (H58325). Be sure to read and follow these safety warnings to reduce the risk of fire, shock, or personal injury. If you have any questions, contact your local representative or contact nVent directly.

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Tel: 800.545.6258
Tel: 650.216.1526 (outside U.S.)
Fax: 800.527.5703
Fax: 650.474.7711
email: ntm-techsupport@nVent.com

1.7. STARTING THE ACS-30

1.7.1. INITIAL SETUP

The ACS-30 software is designed to run only on the ACS-UIT2 hardware platform. Prior to shipment, the ACS-30 software is installed into a nonvolatile area of the ACS-UIT2 memory. During the initial power-up, you will see a blue background “splash” window for approximately 30 seconds as the system software is loaded and initializes.

This V7.0.X program update is compatible only with the ACS-UIT2 User Interface Terminal but will support both ACS-PCM-5 and ACS-PCM2-5 power control modules as well as the C910-485 controller.

1.7.2. SYSTEM REQUIREMENTS

The minimum configuration to use the ACS-30 software is:

- ACS-UIT2
- At least one ACS-PCM2-5

Maximum equipment configuration:

- The ACS-UIT2 can control up to 260 circuits. Each ACS-PCM2-5 handles 5 circuits and the C910-485 is a single circuit controller. There are 99 address that can be assigned to ACS-PCM2-5 control panels, C910-485 controllers and RMM2.
- Up to 16 RMM2 (8 channel RTD multiplexing hubs)

1.8. CONTROL MODE MATRIX

The ACS-30 is designed for nVent commercial heating cable systems and their applications. The programming is focused on eight heating cable applications, and a monitor only mode, with control

parameters embedded in the software to simplify assigning heating cable circuits. The application designs and assumptions are detailed in their associated design guides and installation manuals which can be found on www.nVent.com.

The control mode functions programmed in the ACS-30 for each application are summarized in Table 1.1. These control modes will be discussed in more detail in the configuration section of this programming guide.

TABLE 1.1 ACS-30: HEATING CABLE APPLICATION PROGRAMMING SUMMARY

CONTROL MODE FUNCTIONS			
APPLICATION	**NVENT RAYCHEM HEATING CABLE**	**CONTROL MODE**	**CONTROL SETPOINTS**
Hot Water Temperature Maintenance	• HWAT	• Preset power duty cycle • (HWAT Design Wizard)	• Constant temp • Variable schedule - Maintain - Economy - Off - Heat Cycle (R2 only)
Floor Heating	• RaySol • MI heating cable	• Floor sensing	• Constant temp • Variable schedule - Maintain - Economy - Off • Circuit override through RTD or external device
Greasy Waste Disposal and Temperature Maintenance	• XL-Trace	• Line sensing	• Constant temp • Variable schedule - Maintain - Economy - Off
Pipe Freeze Protection	• XL-Trace	• Ambient, PASC or line sensing	• Constant temp • Circuit override through external device
Fuel Oil Flow Maintenance	• XL-Trace	• Ambient, PASC or line sensing	• Constant temp • Circuit override through RTD or external device
Freezer Frost Heave Prevention	• RaySol • MI heating cable	• Floor sensing	• Constant temp • Variable schedule - Maint
Surface Snow Melting	• ElectroMelt • MI Heating Cable	• Ambient or surface temp • External controller	• Constant temp • External snow controller
Roof & Gutter De-icing	• IceStop • MI Heating Cable	• Ambient or surface temp • External controller	• Constant temp • External snow controller
Temperature Monitor Only Five temperature monitor only channels Low and high temperature alarms		**Variable Schedule** Setpoint calendar with: • 7 days/week calendar • 48 1/2-hr time blocks/day • Daily schedule copy function	

1.9. SOFTWARE ORGANIZATION

The ACS-30 is organized around the concept of heating control circuits connected to relay outputs from the ACS-PCM boards within the ACS-PCM2-5 power control panels. A simple circuit consists of one output relay and one RTD sensor input.

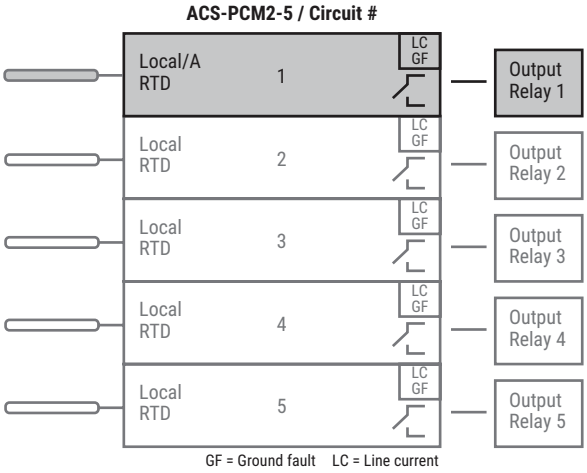


Fig. 1.2 Simple control circuit

Heating control circuits can also be connected to the dry contact output of BMS systems, external monitoring devices or moisture sensing controllers for roof & gutter and snow melting applications. Refer to Appendix 5.3 Connecting External Control Devices on page 130 for more detailed information.

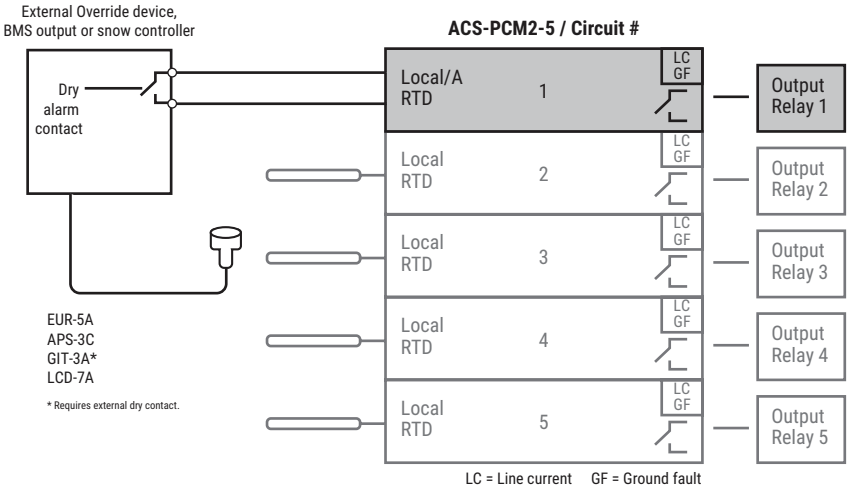


Fig. 1.3 External control circuit

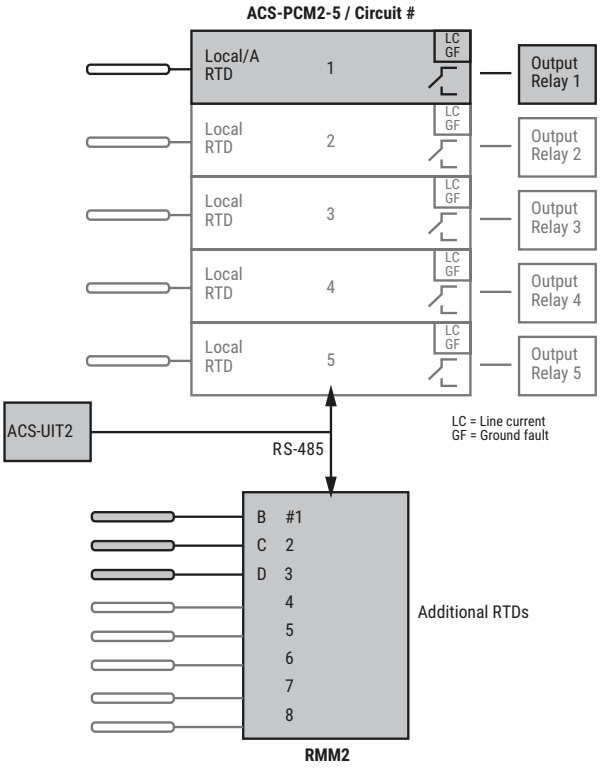


Fig. 1.4 Multiple RTD input control circuit

A circuit may also be controlled by multiple RTD inputs by adding a RMM2 module to the network. Multiple RTDs may be used for control or monitoring of a heating circuit.

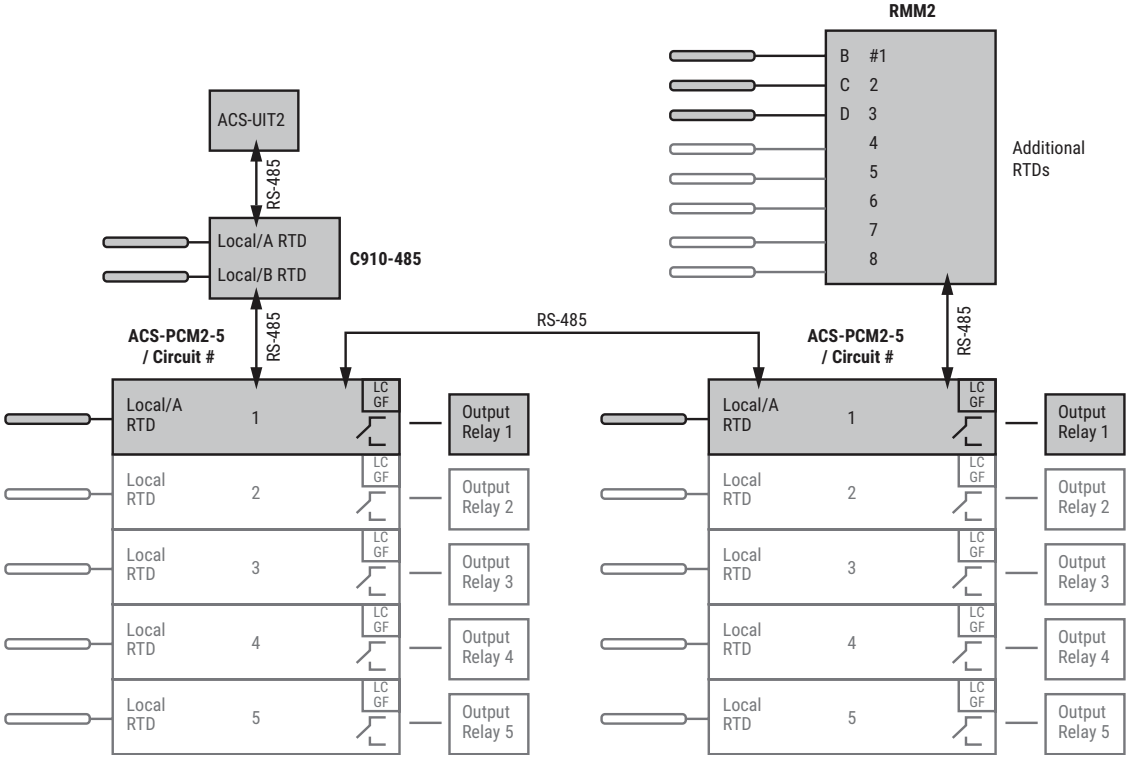


Fig. 1.5 Multiple ACS-PCMs, C910-485 and RMM2

More advanced systems can have multiple heating circuits sharing RTDs for control and monitoring.

1.10. WINDOWS

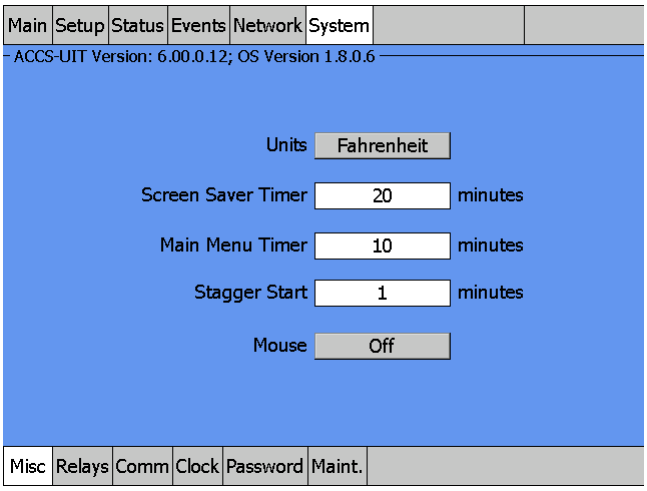


Fig. 1.6 Window layout

The top row of the window contains the main menu buttons, and the bottom row contains subsets of those main menu buttons.

When asked to navigate between windows in this manual, tap the main menu and submenu buttons.

1.10.1. NAVIGATIONAL HEADER

At the top of the Setup and Status windows, a navigational header displays the following data (from left to right):

A. ID tag “Hot water line 1”

B. ACS-PCM2-5 address “01”

C. Relay output number “1”

D. Application control mode “HWAT”

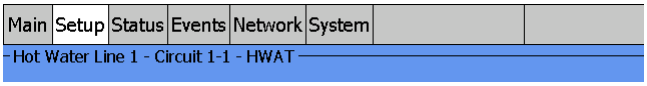


Fig. 1.7 Navigational header

1.10.2. MAIN MENU WINDOW

The main menu window displays the status of all circuits (PCM/relay numbers) that have been set up. The circuits can be accessed from this window by tapping anywhere on the row for the circuit. If the circuit is unassigned tapping on the row will allow you to set the control mode and parameters. If it is already assigned tapping on the row will allow you to edit the control mode and parameters.

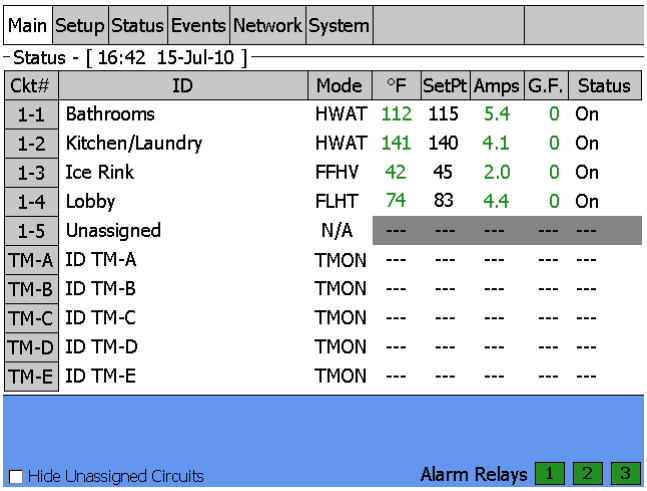


Fig. 1.8 Main window with circuit status

The main window displays:

Status Time and Date: The current time and date is displayed

Ckt# Displays the connected ACS-PCM2-5 power panels and the pre-assigned circuit number for each of their five relays (e.g. 1-1, 1-2, 1-3, 1-5) C910-485 controllers will only show a single circuit number

ID Identification tag for the circuit

Mode Displays the application control mode for the circuit. Refer to keep together on one line and the associated nVent product design guide for further information concerning the application.

- **N/A** Circuit has not been set up and is unassigned
- **HWAT** Circuit has been set up for a hot water maintenance application.
- **Frost heave** Circuit has been set up for a freezer frost heave application.
- **Floor heating** Circuit has been set up for a floor heating application
- **Pipe freeze** Circuit has been set up for a pipe freeze protection application
- **Fuel Oil** Circuit has been set up for a fuel oil flow maintenance application
- **Greasy waste/TM** Circuit has been set up for a greasy waste flow maintenance application or non-freeze protection temperature maintenance applications.
- **RFGT** Circuit has been set up for roof & gutter de-icing.
- **SMLT** Circuit has been set up for snow melting.
- **TMON** Temperature monitoring only has been set up, no relay or circuit is dedicated.

°F or °C The current lowest measured temperature of any RTD assigned to monitor the circuit

SetP Desired maintain/control temperature setpoint

Amps Heating cable circuit current draw (A)

G.F. Heating cable ground-fault current (mA)

Status Relay (on, off or ground-fault trip) and communication status (Com)

Color Coding of Main Window

The data in the °F/°C, Amps, and G.F. columns are displayed in color to identify their current state.

Green When heating cable is energized (status On), within normal range of setup parameters

Red In alarm condition

Orange	Temperature not within setpoint plus deadband range (°F/°C) **Note:** This is not applicable for the HWAT control mode.
Alarm Relay Status	
Green	No alarm
Red	In alarm condition

Note: ACS-30 Program Integrator has been developed to pre-assign the circuits and control variables, see *Appendix 5.6 ACS-30 Program Integrator on page 137*.

Main Window and Events Navigation

Navigation Buttons

At the bottom of the Main window and Events window, the navigation buttons will appear once six circuits are displayed. Use buttons to scroll up and down to view the status of the circuits on the Main window, and on the Events/Alarms on the Events window.

When in the Main or Events windows, tap on anywhere on a row for a circuit to see the Status window for that circuit.

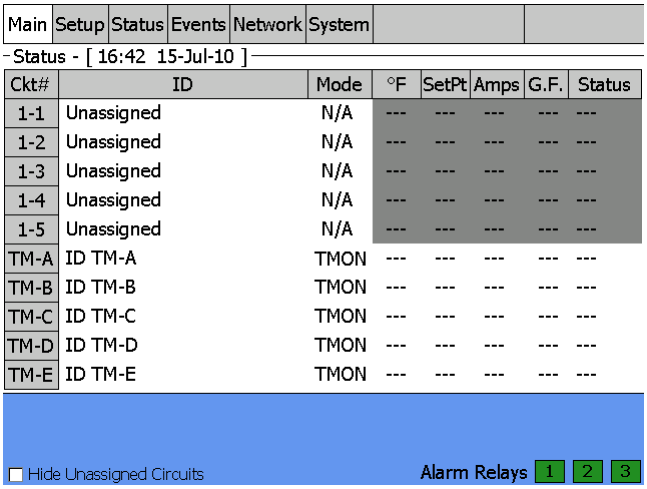


Fig. 1.9 Main window and navigation buttons

TABLE 1.2 NAVIGATION BUTTONS

	Top of list	When selected, displays the first five circuits of the Main and the Events windows.
	Page up	When selected, displays the previous five circuits of the Main and the Events windows.
	Move up one circuit	When selected, displays the previous circuit on the Main and the Events windows.
	Move down one circuit	When selected, displays the next circuit on the Main and the Events windows.
	Page down	When selected, displays the next five circuits of the Main and the Events windows.
	Bottom of list	When selected, displays the last five circuits of the Main and the Events windows.

2. SECTION 2 – SYSTEM CONFIGURATION

2.1. INITIALIZING THE SYSTEM

When the ACS-UIT2 is first powered, it will display the Start-up window showing the program loading progress.

Fig. 2.1 Initial ACS software loading display window

When the ACS-UIT2 is powered on for the first time, date and units will not been assigned. In addition, the ACS-UIT2 has not yet scanned the network for connected external devices such as ACS-PCM2-5 Heat-Trace Control Panels (containing the ACS-CRM card rack modules), C910-485 controllers and RMM2 RTD multiplexing hubs.

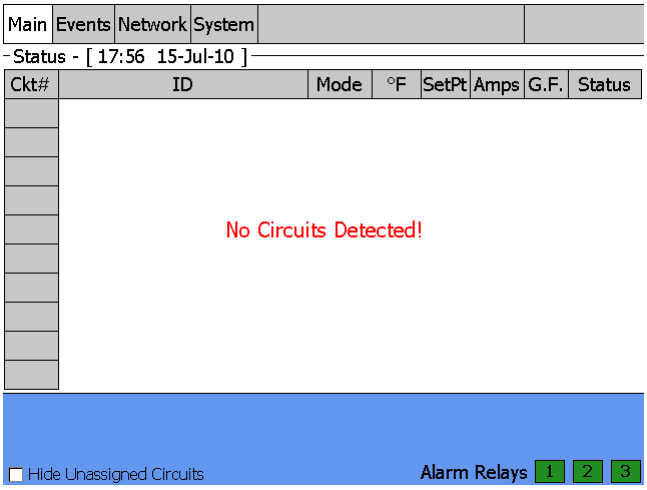


Fig. 2.2 Start-up window with no devices detected

2.1.1. SETTING UP GENERAL SYSTEM PARAMETERS

Tap System|Misc to enter the appropriate units and general system parameters.

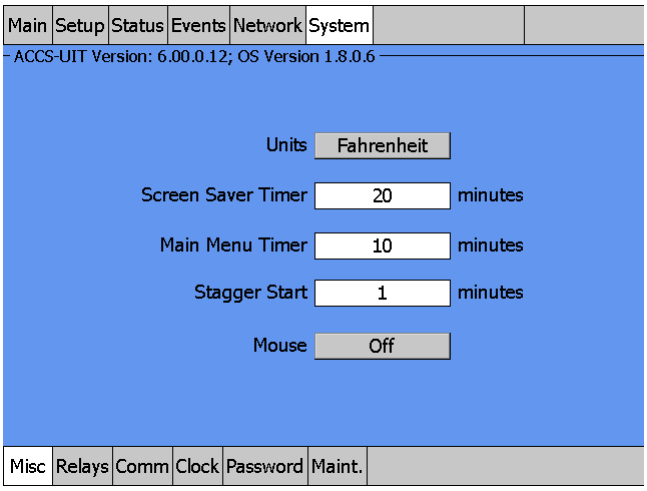


Fig. 2.3 System|Misc window

The System|Misc window provides the following controls:

Units: Select Fahrenheit (ºF) or Celsius (ºC) as temperature units.

Screen Saver Timer: Select the number of minutes the display remains visible with no user activity before moving into Screen Saver mode. The Screen Saver mode turns the screen to black (no backlight) and no alarms will be visible.

If an alarm occurs, a red light on the front of the enclosure illuminates. The window must be touched to show the circuit's alarm status.

IMPORTANT: Using the screen saver enhances the lifetime of the screen.

Range: 1–300 minutes
Default: 20 minutes

Main Menu Timer: Sets the number of minutes before the display automatically reverts to the Main window.

Range: 1–100 minutes
Default: 10 minutes

Note: This time entry also determines how long a password entry will remain valid (see System|Password section)

Mouse: Allows the USB port on the ACS-UIT2 to function with a mouse installed. If enabled, a mouse pointer will be visible on the UIT window and will allow the user to navigate through the windows.

Options: OFF, ON
Default: OFF

Stagger Start: Set the time delay for energizing each relay in a ACS-PCM2-5 panel, C910-485 controllers to reduce the additive start-up current load for the system.

Range: 0–30 minutes
Default: 0 minutes

2.1.2. SETTING TIME AND DATE

Tap System|Clock to set the time and date.

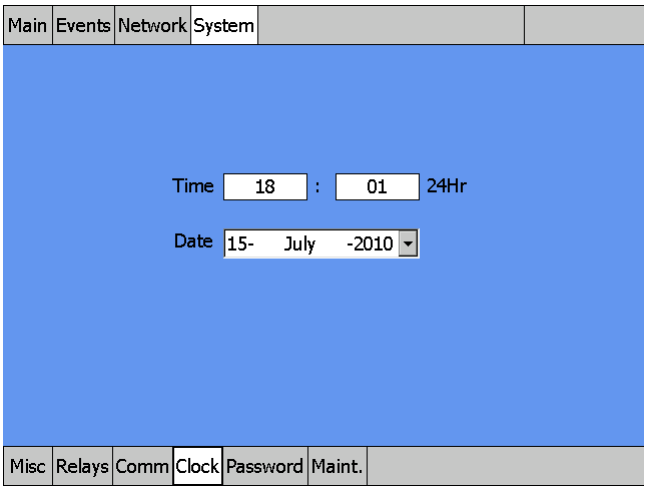


Fig. 2.4 System|Clock window

Time: Enter the current time using 24 hour format

Date: Enter the correct date from the pop-up calendar

2.1.3. SCANNING THE NETWORK

After the ACS-UIT2 is connected to the external ACS-PCM2-5 modular power control panels, C910-485 controllers and any RMMs via the RS-485 network, and all circuits have been installed and commissioning tests completed, the ACS-UIT2 is ready to scan the network for connected devices.

Tap Network|Device. The first time the system is started this list will be empty.

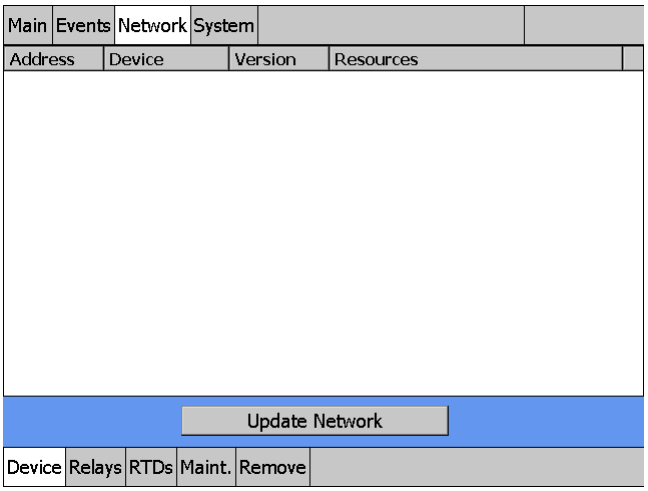


Fig. 2.5 Update Network button

Tap the Update Network button to start the network scan. A progress bar will be displayed as the system scan proceeds

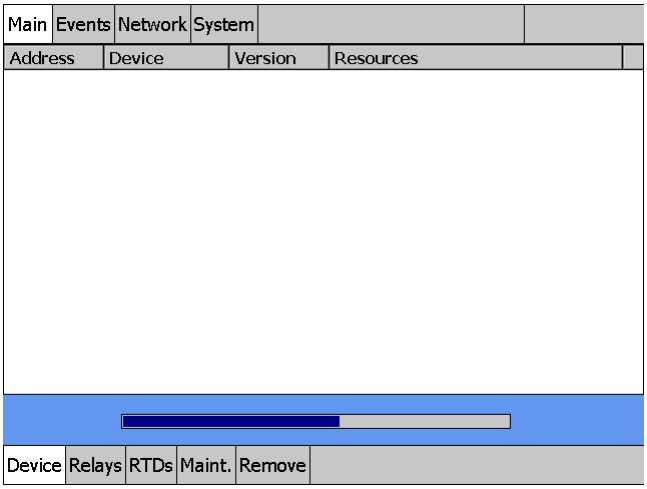


Fig. 2.6 Scanning network

The program scans for Device Addresses for the ACS-CRM board in the ACS-PCM2-5 panels, attached RTDs, C910-485 Controllers, RMM2 modules, and creates a database within the system. Once the database exists, no further scanning is done. A device address is the number assigned via the rotary switches on the ACS-PCM2-5 panel or RMM2 circuit board. Each device must have a unique device address number. For example, if the design requires both an ACS-PCM2-5 and a RMM2, and 32 is chosen for device address number for the ACS-CRM, then the RMM2 cannot also use address 32. (See Table 2.1 Available Device Addresses on page 25). See the ACS-PCM2-5 Installation Instructions (H58238), C910-485 Installation Instructions (H58415) and RMM2 Installation Instructions (H56848) for more information.

To set the modbus address for a C910-485 controller, reference C910-485 Installation Instructions (H58415).

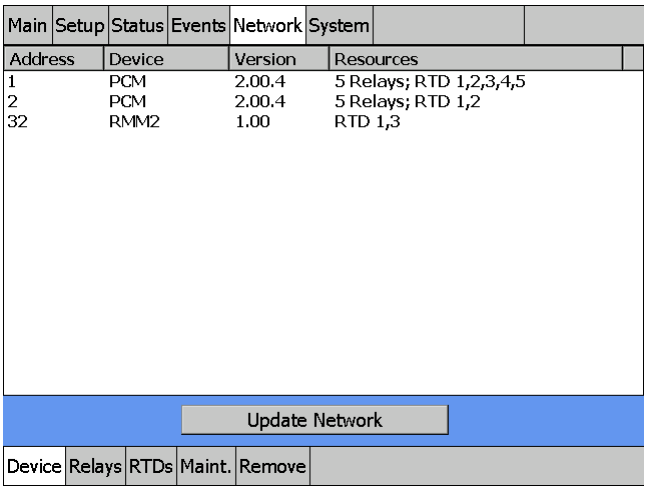


Fig. 2.7 Network|Device window after system scan

Verify that all of the expected hardware devices were found by checking the Network|Device display. If a device appears to be missing, manually initiate a new scan by taping the Update Network button. If an expected device does not appear on the list after several scans, it is most likely physically disconnected from the RS-485 network wiring, or is not powered. Troubleshoot and verify all network and power connections.

Note: If a new external hardware device is added after the initial manual scan, you must initiate a new scan by going to the Network|Device window and tapping the Update Network button.

To add a new device (ACS-PCM2-5, C910-485 or RMM2), make sure it:

- Has a unique address
- Has power
- Is connected to the RS-485 wiring

Then push Update Network to add the device to the list.

Note: Removal of Device: If you remove a device or RTD from the network, using the Update Network button will not remove the device from memory. You must use the Remove Device button found in the Network|Remove window.

Table 2.1 below shows the available device addresses for Relay Outputs and RTDs. If RMM2(s). They must NOT share the same address as the ACS-PCM2-5 (ACS-CRM) or the C910-485.

TABLE 2.1 AVAILABLE DEVICE ADDRESSES

DEVICE	DEVICE TYPE	SWITCH SETTING	DEVICE ADDRESS
ACS-PCM2-5, C910-485	Relay Output/RTD	1–99	1–99
RMM2	RTD	0-9	32-41
RMM2	RTD	A-F	42-47

2.1.4. MAIN WINDOW

After the first system scan has been completed, tap the Main menu button and the main window appears.

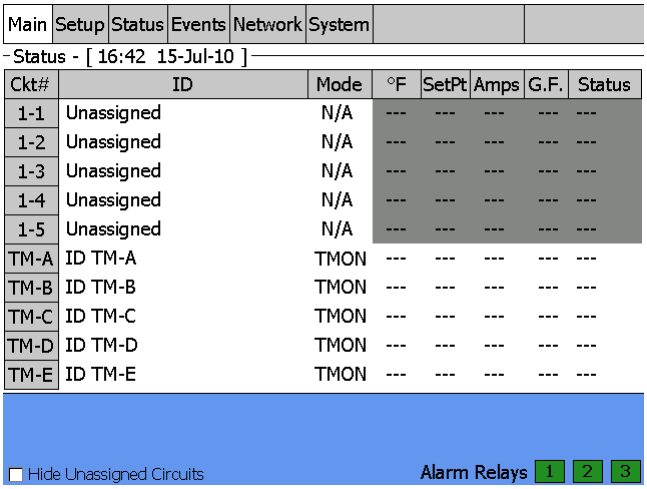


Fig. 2.8 Main window with one CRM board detected

The Main menu window displays the status of all circuits (relays) that are available in the connected system. In addition to all the available circuits that are assigned to ACS-PCM2-5/C910-485 relays there are 5 Monitor Only circuits available (TM-A through TM-E). The monitor only circuits are not assigned to any relays in the ACS-PCM2-5 panels and do not require any additional hardware.

The circuits may be accessed from this window by tapping anywhere on the row for the desired circuit. If the circuit is unassigned, tapping on the row will allow you to set the control mode and parameters. If it is already assigned, tapping the row will allow you to edit the control mode and parameters.

Tap anywhere on the row for the circuit you wish to set up.

2.2. SETUP WINDOW

The Setup window is displayed after tapping the circuit on the Main window you wish to configure, or by tapping the Setup button on the Main menu at the top of the window.

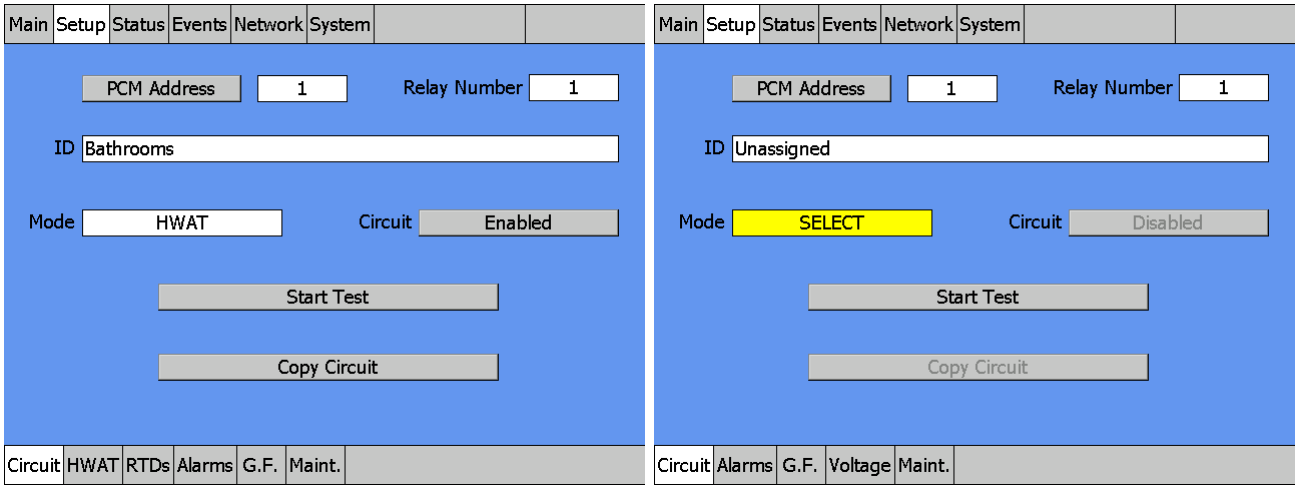


Fig. 2.9 Setup window for unassigned circuit

2.2.1. ASSIGNING CIRCUIT IDENTIFICATION

In this window you will be assigning an ACS-PCM2-5 address and relay number or Temp Monitor address and providing a name for your circuit.

SETUP WINDOW FIELDS

Address Toggle Button:

This button toggles between the PCM Address and the Temperature Channel.

PCM Address: Displays the ACS-PCM2-5/C910-485 address that was detected from the network scan. If you enter the Setup screen without selecting a PCM (circuit), the first PCM-relay detected in your network will be displayed. You may enter the desired PCM and relay number on the setup window to configure the circuit.

Relay Number: The circuit # label is assigned when scanning the network with the ACS-30 program. By default each of the five relays are numbered as the CRM number and relay number (e.g. 1-1, 1-2, 1-3, 1-4 and 1-5). The CRM number and relay number are a primary reference for all windows. Once a circuit is added, you cannot delete it or change its PCM number. To remove the entire PCM, you must go to the Network|Remove window.

Temp Monitor: Displays an entry field to configure a temperature monitor only channel. Tap the entry field and select the temperature monitor channel (TM-A to TM-E) you wish to configure. Refer to Section 4 Temperature Monitor Only Circuits on page 124 for specifics.

ID: A user defined circuit identification text field. The default is “ID X-X” (where X-X is the Circuit number). Before the circuit is assigned the ID tag is set as “unassigned.”

When selected, a text-editing window appears that works similar to cell phone text messaging. There are selection keys for uppercase letters, lowercase letters, and special characters. The keypad portion allows you to enter text by pushing the appropriate keys.

Limit: 40 characters (character strings are truncated on the Main window after 16 characters but displayed in full on Status and Setup windows)

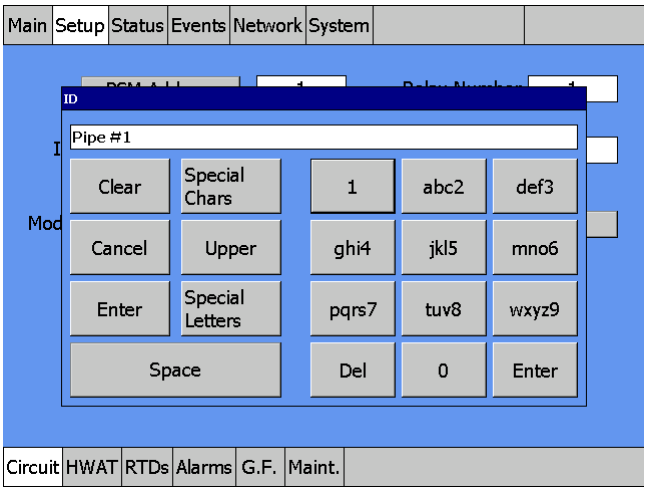


Fig. 2.10 ID pop-up window

Circuit

Enabled: The ACS-UIT2 monitors and generates circuit alarms and the ACS-PCM2-5 or C910-485 controller turns the relay on or off based upon set-up parameters for the selected control mode and/or RTD inputs.

Disabled: The ACS-UIT2 has disabled the circuit, and does **NOT** generate alarms or control the relay assigned to the circuit. The relay remains in the off position. The circuit is grayed out in the Main window to show it is **Disabled**

Force On: The ACS-UIT2 has turned the circuit on, overriding the control mode, but generates alarms and enables high temperature cut out.

Force Off: The ACS-UIT2 has turned the circuit off, but generates low temperature and system alarms.

2.2.2. ASSIGNING CONTROL MODE

In the control mode you will be selecting your application and entering temperature setpoints, assigning RTDs, alarm parameters and ground-fault protection levels.

Mode: Select the desired control mode from the Mode Select window.

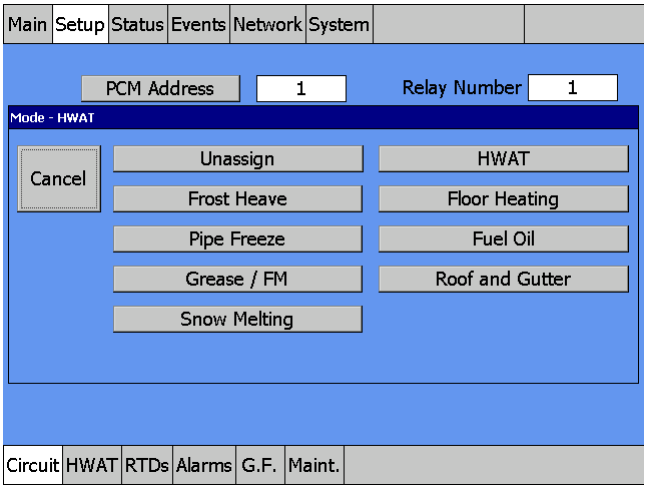


Fig. 2.11 Mode Select window

Follow the window prompts to enter temperature setpoints, assign RTDs, alarm parameters and ground-fault protection levels. Table 2.2 Control Mode Description and Index lists the ten application control modes and references where the programming details are described in Section 3 – Control Mode Configurations

TABLE 2.2 CONTROL MODE DESCRIPTION AND INDEX

CONTROL MODE	DESCRIPTION	NVENT RAYCHEM HEATING CABLES	SECTION NUMBER	PAGE NUMBER
UNASSIGN	Clears all parameters set for a circuit	NA	3.1	52
HWAT	Opens HWAT design wizard Variable temperature settings can be assigned using the 24/7 Scheduler[1]	HWAT	3.2	52
Frost Heave	Freezer frost heave prevention Variable temperature settings can be assigned using the 24/7 Scheduler[1]	RaySol and MI Heating cables	3.3	58
Floor Heating	Floor heating applications Variable temperature settings can be assigned using the 24/7 Scheduler[1]	RaySol, MI Heating Cables and QuickNet Floor Heating Mats	3.4	62
Pipe Freeze	Pipe freeze protection applications	XL-Trace	3.5	66
	Pipe freeze protection with ambient control	XL-Trace	3.5.1	67
	Pipe freeze protection with line control	XL-Trace	3.5.2	71
	Pipe freeze protection with PASC[2] control	XL-Trace	3.5.3	76
Fuel Oil	Fuel oil flow maintenance applications	XL-Trace	3.6	81
	Fuel oil flow maintenance with ambient control	XL-Trace	3.6.1	81
	Fuel oil flow maintenance with line control	XL-Trace	3.6.2	85
	Fuel oil flow maintenance with PASC[2] control	XL-Trace	3.6.3	90
Greasy Waste/TM	Greasy waste and other temperature maintenance control Variable temperature settings can be assigned using the 24/7 Scheduler1	XL-Trace	3.7	95
Roof and Gutter	Roof and gutter de-icing applications	IceStop and MI heating cables	3.8	99
	Roof and gutter de-icing with external device	IceStop and MI heating cables	3.8.1	99
	Roof and gutter de-icing with ambient control	IceStop and MI heating cables	3.8.2	97
	Roof and gutter de-icing with bracketed ambient control	IceStop and MI heating cables	3.8.3	101
	Roof and gutter de-icing with surface temperature control	IceStop and MI heating cables	3.8.4	109
Snow Melting	Surface snow melting applications			113
	Surface snow melting with external device			113
	Surface snow melting with ambient control			116
	Surface snow melting with surface temperature control			120
Temperature Monitor Only	Monitors any critical temperature defined by the user	N/A	4	124

[1] Variable temperature setpoint 24/7 Scheduler is described in Appendix 5.2 24/7 Scheduler.

[2] Proportional Ambient Sensing Control (PASC) described in related control mode section and Appendix 5.1 Proportional Ambient Sensing Control (PASC) Control Mode.

Start Test The Start Test button closes the relay on the ACS-PCM2-5 or C910-485 and energizes the heating cable circuit for 30 minutes to help in commissioning and troubleshooting. When the Start Test button is tapped, it turns red, and is renamed to Stop Test. Within the Stop Test window, a count down timer is displayed showing the progress in the 30 minute test cycle. The relay remains closed for 30 minutes, or until the button is tapped again.

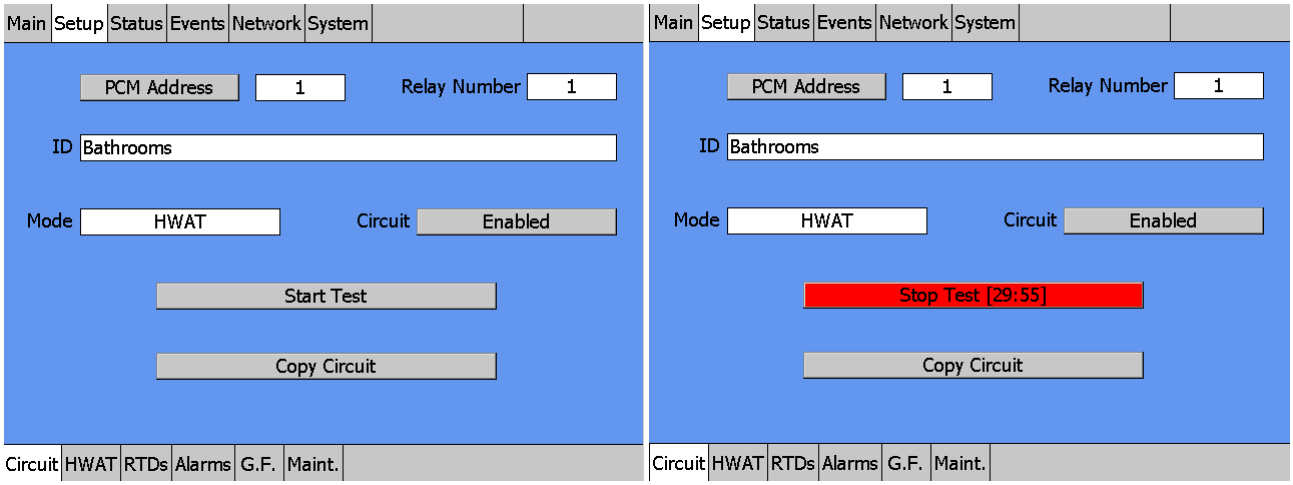


Fig. 2.12 Start/Stop test

Copy Circuit The Copy Circuit button allows you to assign other available circuit number (circuit) with identical control parameters.

- Select the circuit containing parameters you wish to copy from the Main window or Setup window, then tap Copy Circuit
- Highlight the available circuit where you wish to copy the circuit parameters, then tap >>.

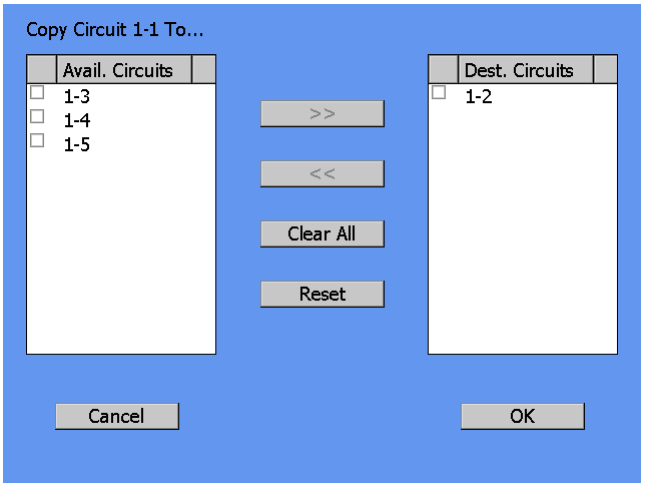


Fig. 2.13 Copy Relay window

Once all intended circuits have been moved to the destination circuit box, tap OK.

Note: When circuits are copied, all parameters except RTD association and ID tag are carried to the new relay position. After the circuit is copied you must associate RTD and enter a new ID tag

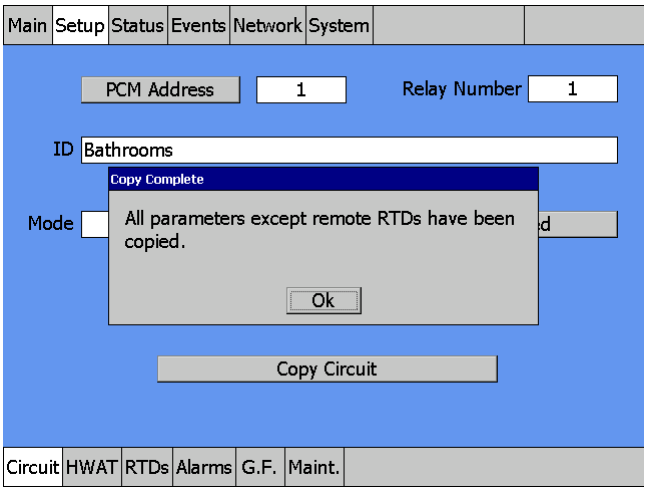


Fig. 2.14 Circuits Copied message

2.2.3. ASSIGNING AND SHARING RTD CONTROL AND MONITORING

By default, each channel of the ACS-PCM2-5 or C910-485 has an associated RTD input. On any ACS-CRM board, the first RTD input is automatically coupled with the first relay output; the second RTD is linked with the second output relay, etc.

The Setup|RTDs window displays the default RTD assignment in the A field. This selection is grayed out because you cannot alter this default selection.

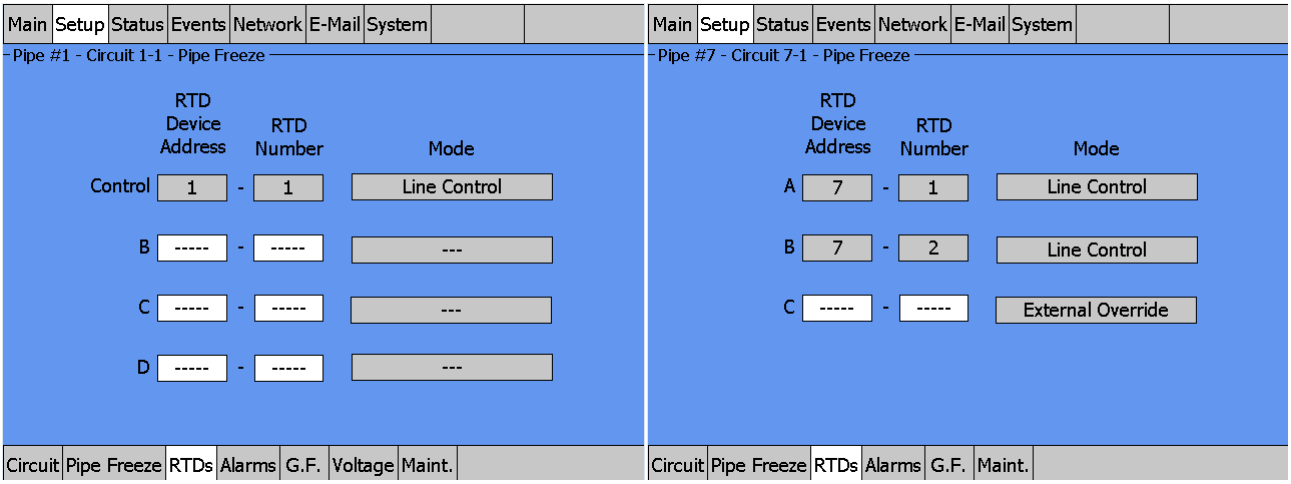


Fig. 2.15 Setup|RTDs window with Line Control

If no RTD is connected to the input terminals for this circuit, then all four lines can be used to assign RTDs from elsewhere in the system. However, in the event of a communications or UIT failure, no RTD input is available and the relay output for this circuit goes to the failsafe mode established in the Setup|Circuit window.

Up to three additional RTDs can be associated with a given circuit. When the system is operating, the lowest temperature value from the array of multiple RTDs will be used as the control temperature.

If no RTD is connected to the input terminals of a given relay, then all four RTD inputs can be used to assign RTDs from elsewhere in the system. However, in the event of a communications or UIT failure, no RTD input will be available and the relay output for this circuit will go into its failsafe mode established in the Setup|Circuit window.

USING RTDS WITH THE DIFFERENT APPLICATION CONTROL MODES

In certain modes, you have an option of choosing if the circuit is controlled by RTDs that are measuring line (pipe, slab or surface) temperature, by RTDs that are measuring the ambient temperature or by using dry contact relays from external moisture controllers (see Table 2.3 RTD and External Control Functions on page 32 for more detail).

Line and Surface Temperature Control:

RTD assignment will be the same as described in the previous section.

Ambient or PASC Control:

RTDs must be assigned for either ambient control or line monitoring

Ambient Control inputs will be used to turn the heating cable on or off. RTDs in this mode will not trigger any temperature alarms.

Line Monitoring with temperature alarms

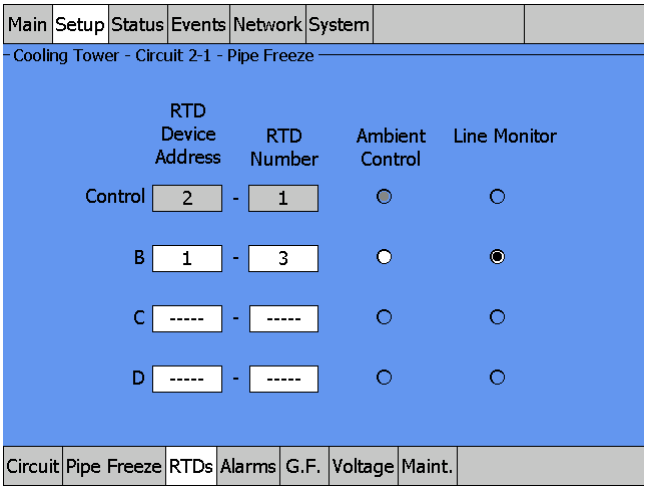


Fig. 2.16 Ambient Control or Line Monitor

HWAT Mode: No RTDs are required or can be used for control. However RTDs can be assigned for line monitoring with temperature alarms.

External Device Control: A controller may be used as external device control in roof & gutter and snow melting applications or as an external override for other applications. The dry contact output of the external device is connected to the RTD input on the ACS-PCM2-5 panel or RMM2. For the C910-485 there are terminals to land the external device, not the RTD input. When the contact is open the circuit is off and when closed the circuit is powered. Refer to Appendix 5.3 for wiring instructions.

RTDs may be associated to the circuit for high temperature override. RTDs in this mode will not trigger any temperature alarms.

External Device Override:

An external device or BMS system with dry contacts may be used to override the local RTD input to force the circuit on or off. All programmed temperature alarms and high temperature cut out values will still be active.

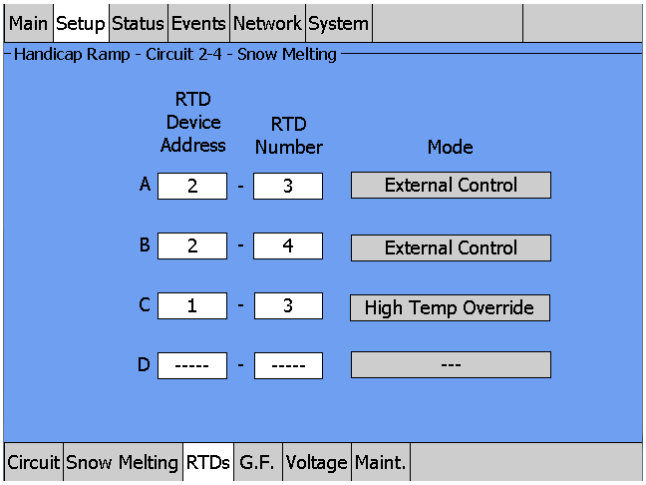


Fig. 2.17 External device RTD window

Note: If an RTD is connected to the PCM address it will be used as primary control for the circuit.

TABLE 2.3 RTD AND EXTERNAL CONTROL FUNCTIONS

APPLICATION	CONTROL	LINE/SLAB RTD		AMBIENT, PASC, OR EXTERNAL CONTROL / OVERRIDE (WIRED TO RTD INPUT)	
Mode	Mode	Control	Monitor	Control	Override
Hot Water Maintenance (HWAT)	Timed duty cycle	—	X	—	—
Freezer Frost Heave	Line/slab sensor	X	X	—	—
Floor Heating	Line/slab sensing	X	X	—	Ext
Pipe Freeze Protection	Line sensing	X	X	—	Ext
	Ambient or PASC1		X	X	Ext
Fuel Oil Flow Maintenance	Line sensing	X	X		Ext
	Ambient or PASC1		X	X	Ext
Greasy Waste Temperature Maintenance	Line sensing	X	X	—	—
Roof and Gutter De-icing	External device	—	X	X	X
	Ambient and Bracketted Ambient sensing	—	X	X	—
	Surface sensing	X	X	—	—
Surface Snow Melting	External Device	—	X	X	—
	Ambient sensing	—	X	X	X
	Surface sensing	X	X	—	—
Temperature Monitoring Only	N/A	—	X	—	—

[1]PASC mode described in Section 3.5.3 Temp Control – PASC Control on page 76

Assigning RTDs in Monitor only mode

The same process is used to assign RTDs to Monitor Only mode. Any RTD in the system can be assigned whether from a ACS-PCM2-5 relay number or from a RMM2 module. Theses RTDs do not have any control function associated with them, however, they can be assigned alarm values.

Assigning additional RTDs to a circuit

RTDs can be assigned to a circuit from ACS-CRM boards or RMM2 modules. To assign the additional RTDs to a circuit enter the device address and RTD number as listed under your Network|Device window.

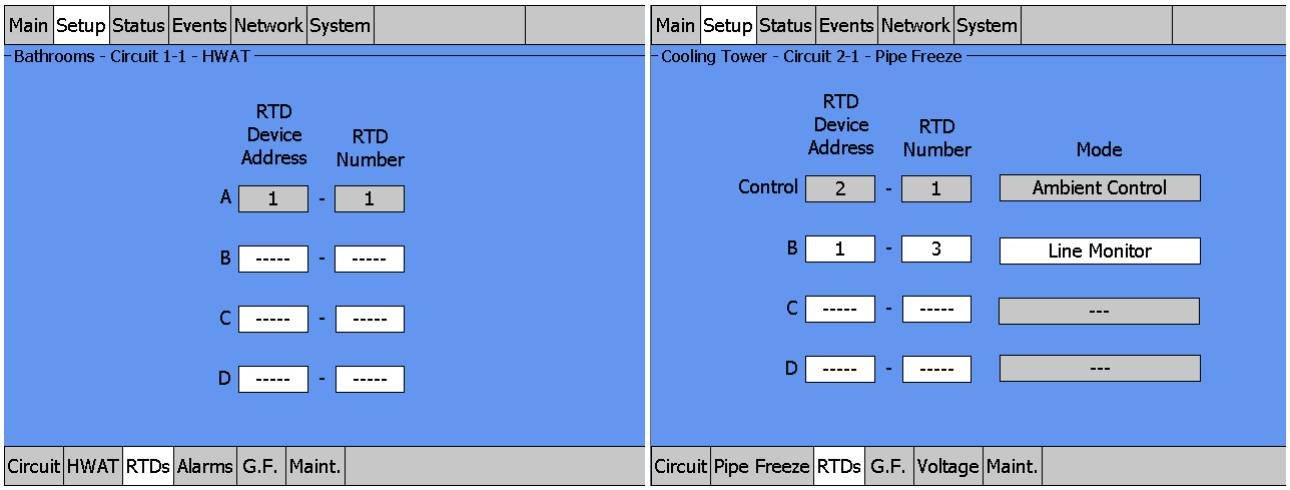


Fig. 2.18 Assigning additional RTDs.

2.2.4. SETUP|ALARM

The Setup|Alarms window lists all of the temperature alarm conditions for line control/monitoring. The minimum and maximum values for each alarm condition are included for each application control mode in Section 3.

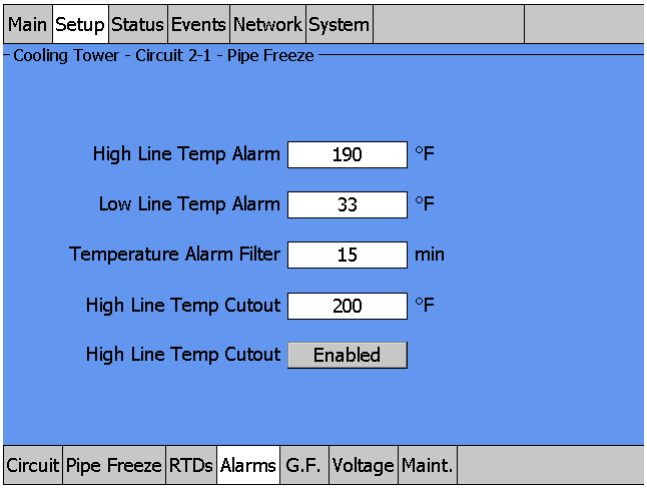


Fig. 2.19 Setup|Alarms window

2.2.5. SETUP|G.F.

The Setup|G.F. window configures ground-fault alarm and trip values for the circuit. The alarm/trip conditions are latching and must be manually reset.

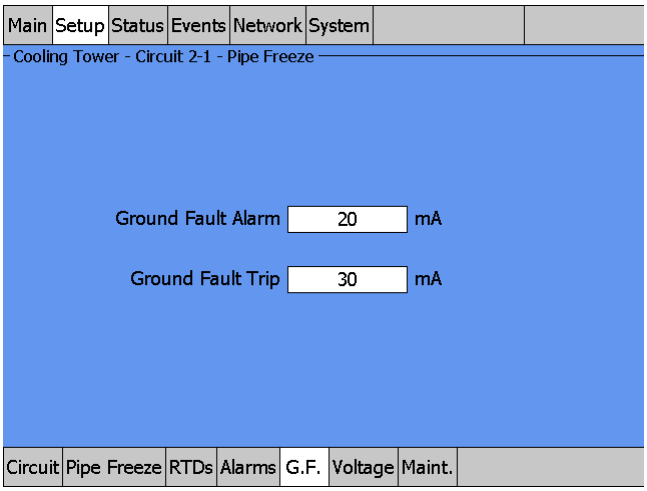


Fig. 2.20 Setup|G.F. window

2.2.6. SETUP|VOLTAGE

The Setup|Voltage windows allows the voltage powering the heating cable to be set. This is the voltage the ACS-30 uses to calculate the energy consumed by the heating cable circuit. The C910-485 measures the applied voltage so this field is not required for energy usage calculations.

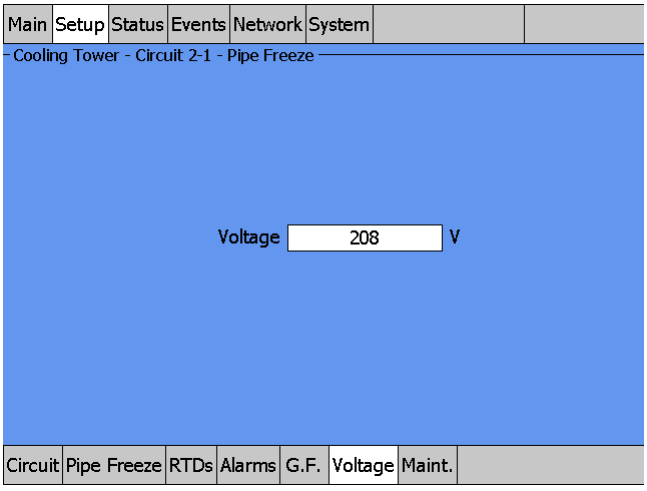


Fig. 2.21 Setup|Voltage window

Tapping the Voltage Field opens a voltage selection screen with choices of 120, 208, 240 or 277 V for standard ACS-PCM2-5 power control panels . The ACS-30 system can also be programmed for 480 V and 600 V single and three phase supply, however, these require custom built PCM panels. The C910-485 cannot be used for applications greater than 277 V or three phase supplies.

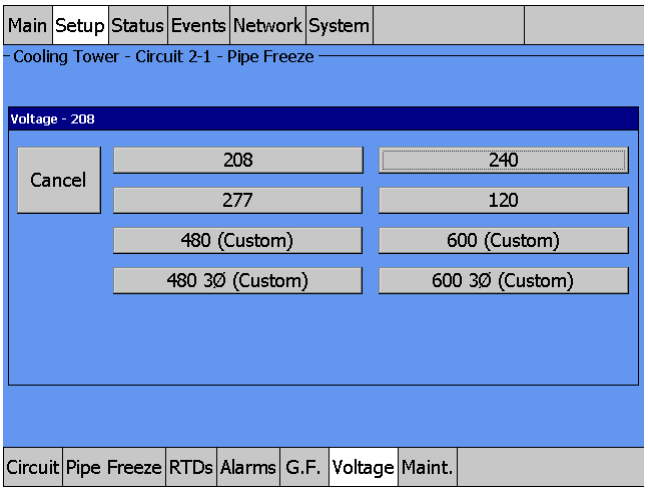


Fig. 2.22 Voltage selection window

2.2.7. SETUP|MAINT.

The Setup|Maint. window enables a heating cable circuit diagnostic feature to be engaged on a automatic schedule. This feature powers the circuit for 2 minutes when not in demand to ensure the circuit, RTD or communications have not been damaged and will be working when needed. The user can select the time of day the test will be conducted.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

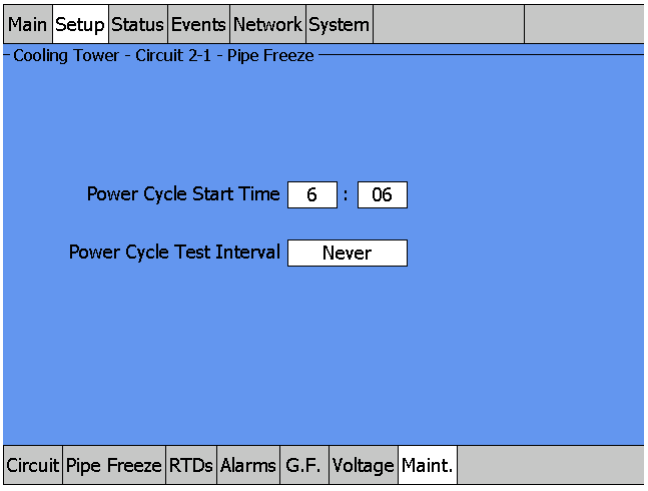


Fig. 2.23 Setup|Maint. window

The interval field opens a window where the timed interval of this diagnostic can be selected.

Range: Never, daily, weekly or monthly
Default: Never

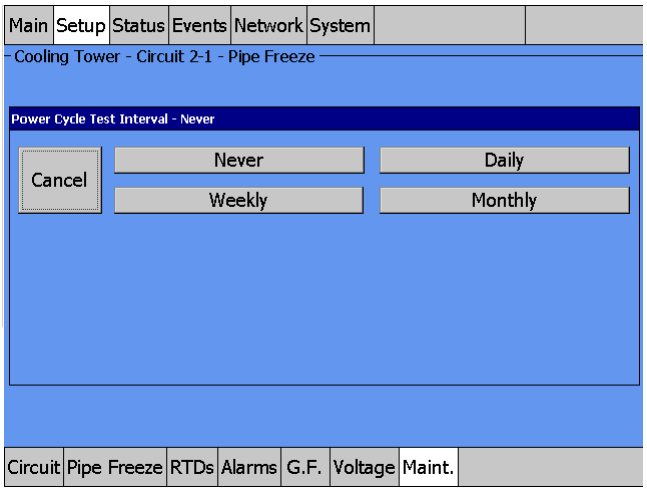


Fig. 2.24 Power Cycle Interval selection window

2.3. STATUS|CIRCUIT WINDOW

The Status|Circuit window displays the status information for individual circuits. Data in the status menus cannot be changed.

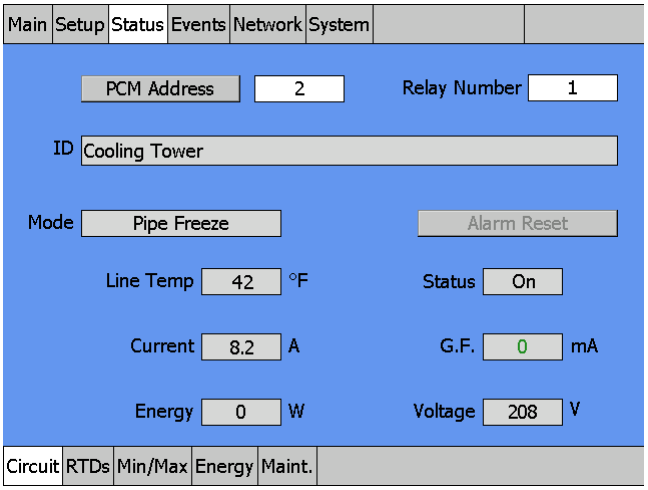


Fig. 2.25 Status|Circuit window

The fields and displays in the Status|Circuit provide the following information:

PCM Address and Relay Number

Enter the PCM Address and Relay Number to view the status of a specific circuit.

ID Displays the ID tag defined in Setup/Circuit window.

Mode Displays the Control Mode selected in Setup|Circuit window.

Alarm Reset In normal state, the Alarm Reset button is grayed out. If a latching alarm occurs, the Alarm Reset blinks orange/red. The alarm cannot be reset until the fault has been cleared.

Line Temp The Line Temp displays the temperature the ACS-UIT2 is currently measuring. If more than one RTD is connected to a circuit, the system displays the lowest Temp of all the RTDs assigned to that circuit.

Status Displays the relay output status (On, Off, or Trip) of the EMR. If communication is lost to the output device, a red COMM appears and alarms.

G.F.	Displays the ground-fault current for the circuit.
Current	Displays the heating cable amperage of the circuit when the relay output is on.
Energy	Displays the power currently consumed by the heating cable (Watts).
Voltage	Display the system voltage entered on the ACS-UIT2 or measured by the C910-485 Controller.

The data in the Control Temp, G.F. and Current windows are displayed in color to identify their state:

Color Code	State
Black	Circuit is off
Green	Within normal range of setup parameters
Red	In alarm condition
Orange	Temperature is not within setpoint plus deadband range
Blinking Red/Orange	A latching alarm event has occurred

2.4. STATUS|RTDs WINDOW

The Status|RTDs window lists the RTD devices and numbers assigned to the selected circuit, along with the last reported temperature from each RTD. Data in this status window cannot be changed.

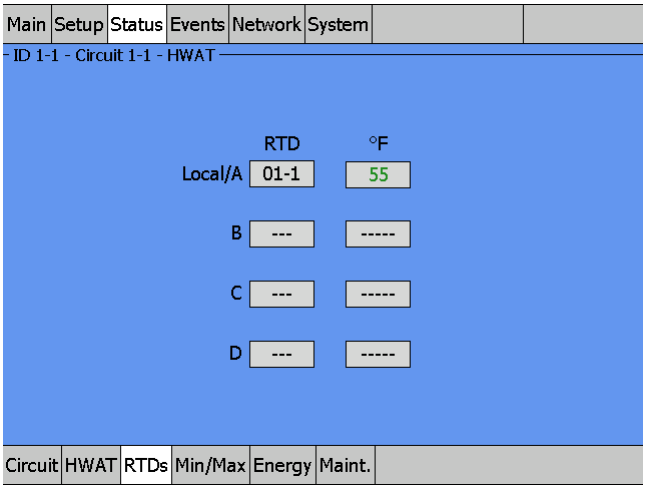


Fig. 2.26 Status|RTDs window

For a circuit in the external device control mode the RTD status screen will indicate whether the dry contact in the device are closed (powering the circuit) or open (turning the circuit off).

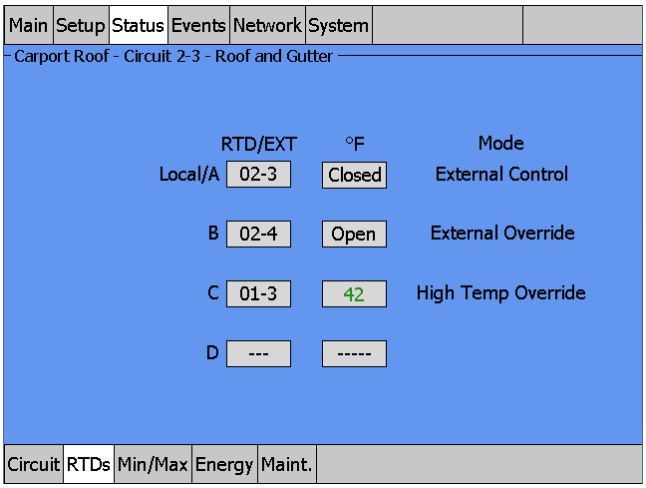


Fig. 2.27 Status|RTDs window - external device

2.5. STATUS|MIN/MAX WINDOW

The Status|Min/Max window displays an historical record of minimum and maximum values recorded since the last reset time.

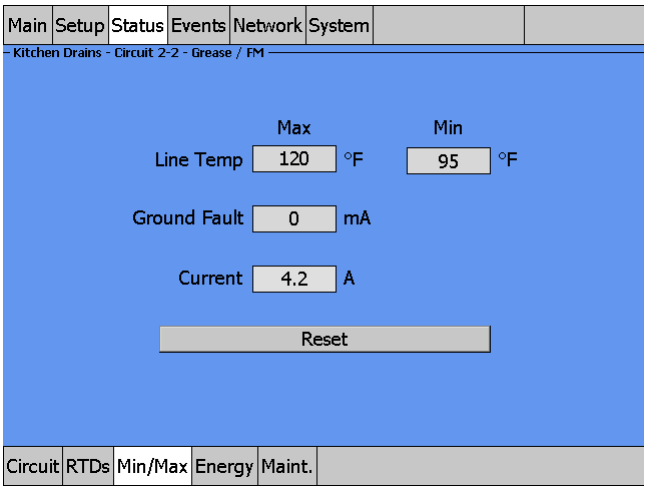


Fig. 2.28 Status|Min/Max window

The Status|Min/Max window provides the following controls:

Control Temp

Max	The highest temperature reported by any line RTD associated with the circuit since the last reset time.
Min	The lowest temperature of any line RTD associated with the circuit since the last reset time.
Max GF Current	The highest ground-fault value recorded for the circuit since the last reset time
Max Current	The highest current recorded for the circuit since the last reset.
Reset Button	Clear all Min/Max values and begins updating Min/Max fields with new values.

2.6. STATUS|ENERGY WINDOW

The Status|Energy window displays the power consumed by the heating cable circuit since the last reset.

The energy consumption is recorded every hour in the ACS-30 system which can store data fora maximum of 5 years. After that time the first year data is deleted from the database.

The energy consumption database can be downloaded as XML file in order store or statistically analyze the data. See Appendix 5.6 for more information.

Different views are available and selectable by a dedicate menu:

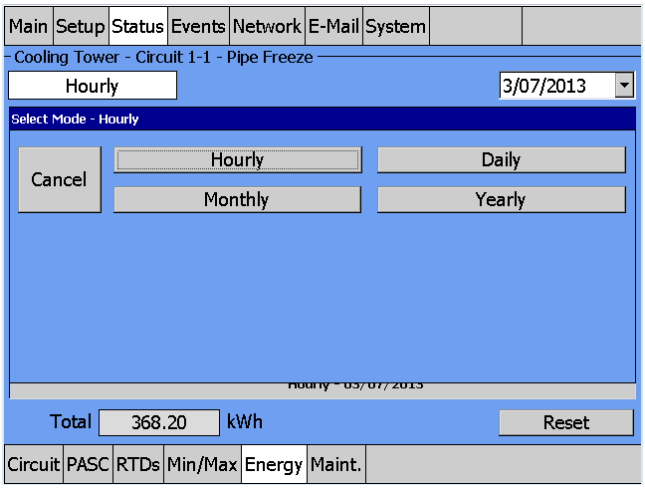


Fig. 2.29 Status|Energy window window View selection

The hourly view plots the energy consumption over the selected day with a time interval of one hour. The actual and the previous 7 days can be selected.

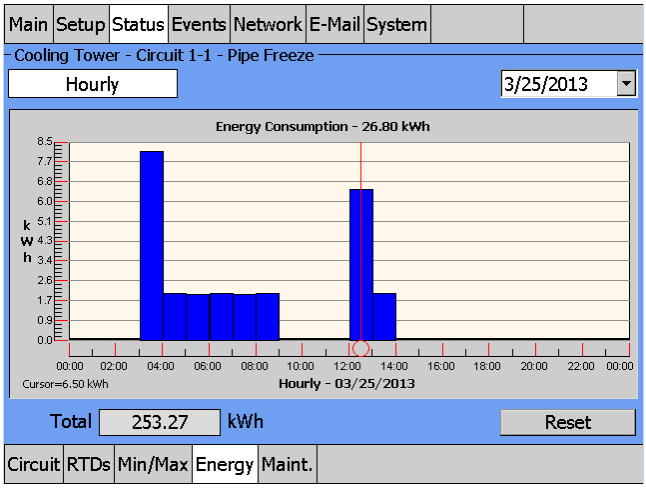


Fig. 2.30 Status|Energy window (Hourly view)

The Total value displayed (bottom/left position) represents the total energy consumption of the circuit since the last reset, while the Energy Consumption value (on the plot's headline) represents the consumption for the shown view.

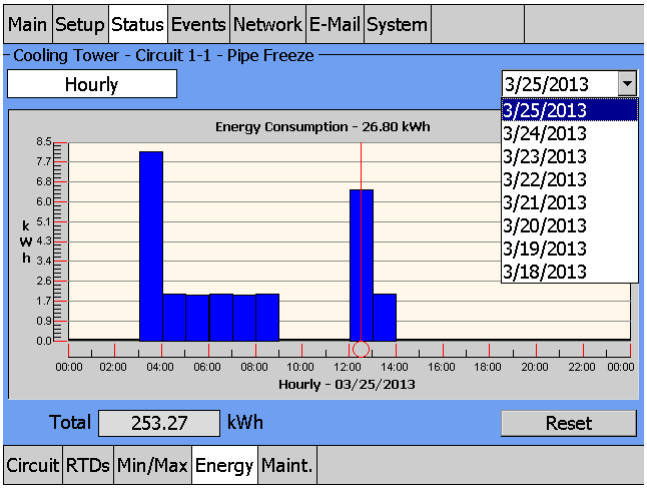


Fig. 2.31 Status|Energy window Day selection (Hourly view)

The daily view plots the energy consumption over the selected month & year with a time interval of one day.

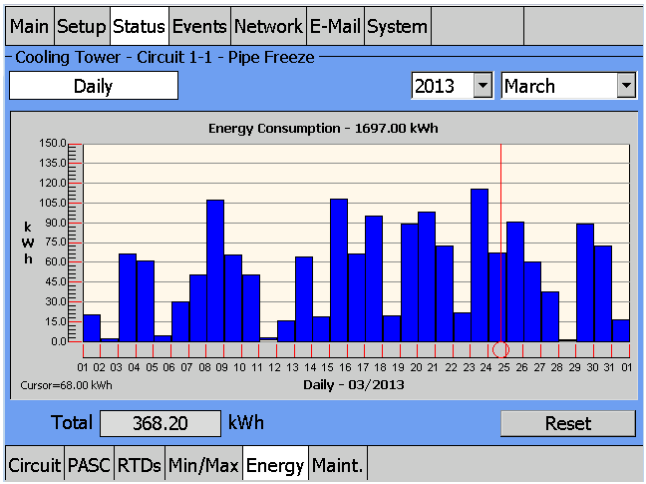


Fig. 2.32 Status|Energy window (Daily view)

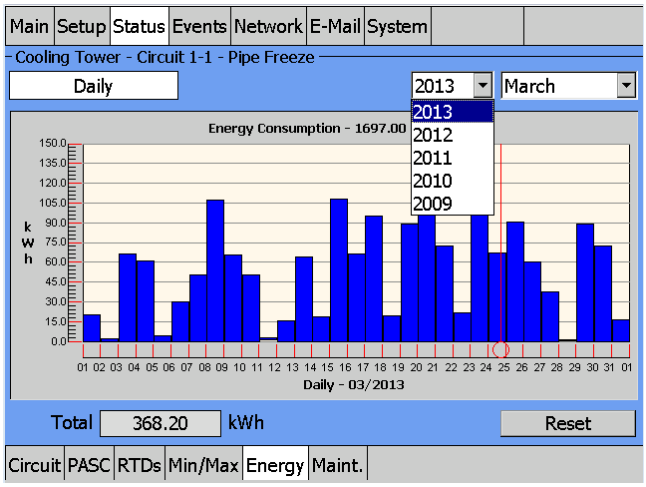


Fig. 2.33 Status|Energy window Year selection (Daily view)

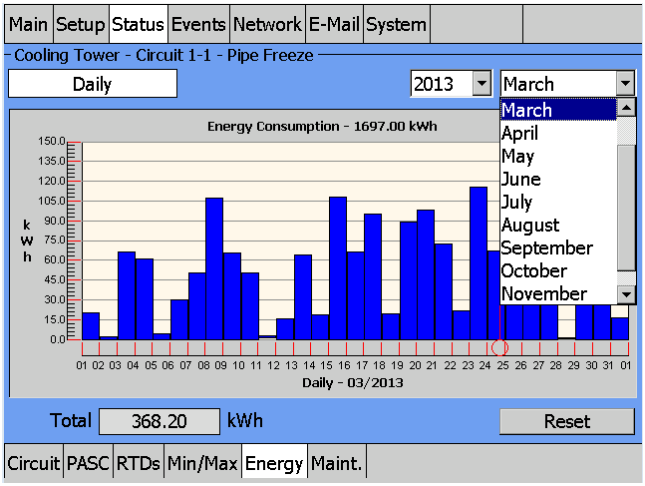


Fig. 2.34 Status|Energy window Month selection (Daily view)

The monthly view plots the energy consumption over the selected year with a time interval of one month.

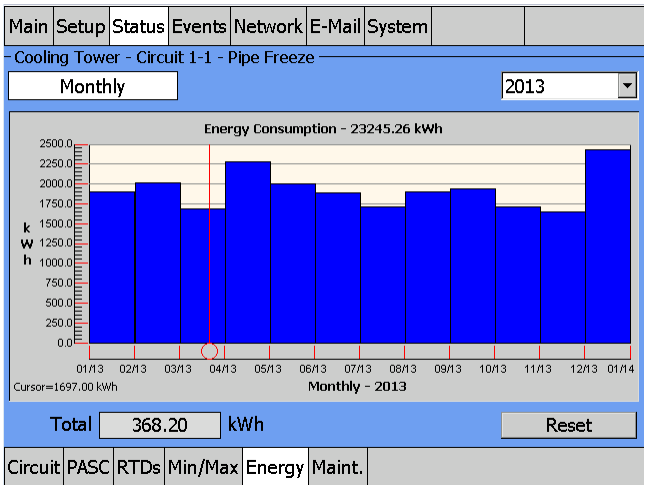


Fig. 2.35 Status|Energy window (Monthly view)

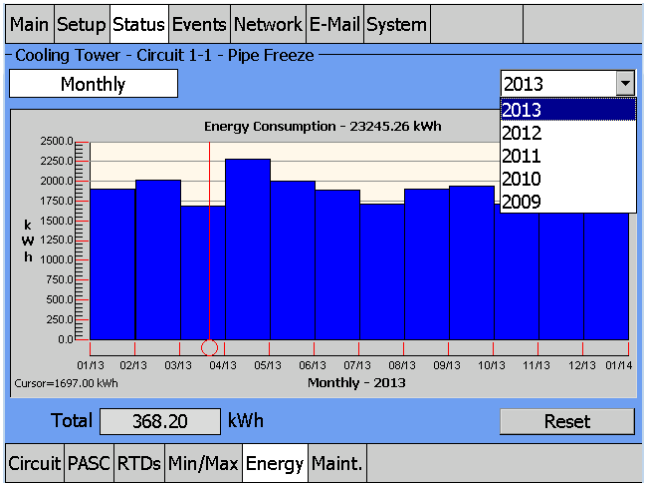


Fig. 2.36 Status|Energy window Year selection (Monthly view)

The yearly view plots the energy consumption over the last 5 years with a time interval of one year.

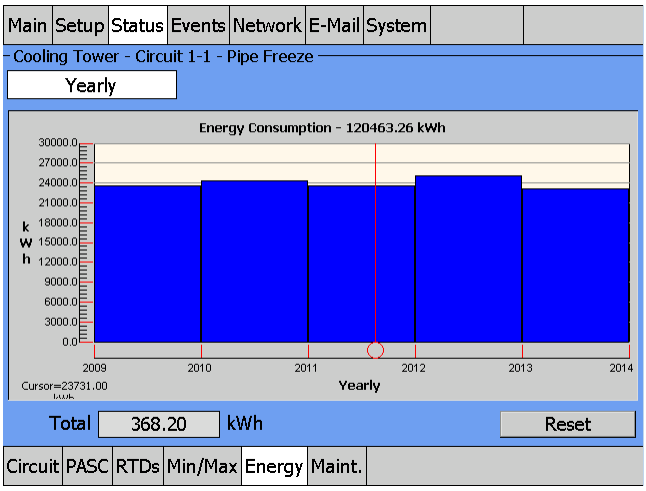


Fig. 2.37 Status|Energy window (Yearly view)

The Status|Energy window provides the Reset Button which clears the logged kWh and begins updating the field with new values.

2.7. STATUS|MAINT. WINDOW

The Status|Maint. window displays the cumulative time in hours the heating cable has been powered and the number of cycles the EMR has turned on and off for the selected circuit. If the Power Cycle feature is turned on the date and time of the last and next power cycle is displayed. The power cycle test energizes the heating cable selected for 2 minutes to verify it is in working order.

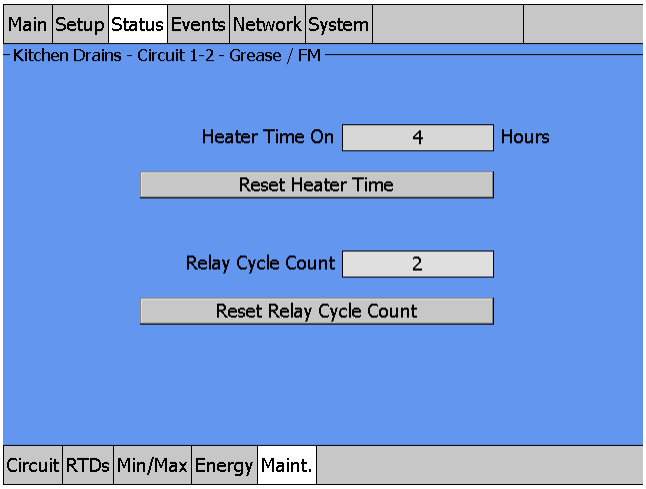


Fig. 2.38 Status|Maint. window

The Status|Maint. window provides the following controls:

Heater Time On	Total time the heating cable has been energized since it was last Reset.
Reset Heater Time	Resets heating cable time to 0, and begins updating the field with new values.
Relay Cycle Count	Total number of times the EMR has switched on since it was last reset.
Reset Relay Cycle Count	Resets the Relay Cycle count to 0, and cycle counts begin again.
Power Cycle Test	Shows the time of the last automatic power cycle test and when the next test will be conducted.

2.8. EVENTS WINDOW

The Events window displays a chronological history of all events and alarms. It retains the most recent 2000 entries; after 2000 entries are recorded, the oldest entries are discarded as new entries are added.

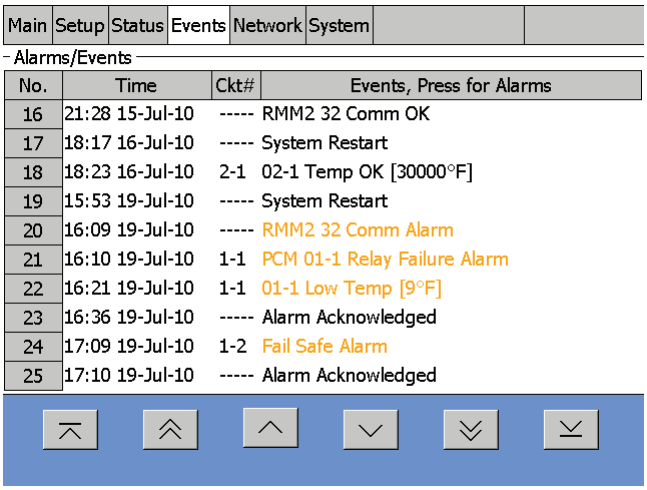


Fig. 2.39 Events window

The Events status listing window provides the following information:

Time — By taping the Time column heading, the display of times of the events or alarms changes to descending or ascending order based on time of occurrence.

Circuit — By taping the circuit heading, the display of events or alarms is sorted by the circuit number. Circuits are first displayed in ascending order. Taping the circuit again toggles between ascending or descending order.

Events, Press for Alarms — By taping the Events heading, the Events display filters events or alarms by type. Time and Circuit column headings can then be used to further sort the selected events or alarms for display.
Note: The program automatically skips an alarm type if no alarms of that type exist).

TABLE 2.4 ALARM TYPE HEADINGS AND DESCRIPTIONS

ALARM TYPE/ HEADINGS	DESCRIPTION
Comm Alarm	ACS-UIT2 display lost communication with an ACS-PCM, C910-485 and/or RMM2 device(s).
Fail Safe Alarm	Control mode of circuit has been switched to Fail Safe control mode.
Ground-Fault Alarm	Heating cable's ground-fault current went above high ground-fault current alarm setting.
Ground-Fault Trip	Heating cable's ground-fault current went above the ground-fault trip setting.
High Temp	RTD temperature went above high temp alarm setting.
High Temp Cut-Out	RTD temperature went above high temp cut-out alarm setting.

TABLE 2.4 ALARM TYPE HEADINGS AND DESCRIPTIONS

Low Temp	RTD temperature went below low temp alarm setting.
Relay Failure Alarm	• EMR was commanded to turn off. However, a heating cable current was still being detected. This condition can indicate a failed contactor (stuck on). • EMR was commanded to turn on. However, a heating cable current was not detected. This condition can indicate a failed contactor (stuck off) or no line voltage.
RTD Failure	Open or shorted RTD detected

TABLE 2.5 EVENTS AND DESCRIPTIONS

EVENT	DESCRIPTION
Alarm Ack	Date and time stamps when an alarm was acknowledged.
Comm Alarm	Communication with a specified nVent RAYCHEM device has been interrupted.
Comm OK	Communication with device/s was restored.
Events Cleared	Date and time stamps when Events menu was cleared in System|Maint. window.
Fail Safe Alarm	Control mode of circuit has been switched to Fail Safe control mode.
Fail Safe OK	At least one valid RTD value was restored, allowing normal control to resume.
Ground-Fault Alarm	Heating cable's ground-fault current has exceeded Ground-Fault Alarm limit for circuit.
Ground-Fault OK	Ground fault returned to acceptable range.
Ground-Fault Trip	Heating cable's ground-fault current has exceeded Ground-Fault Trip limit for circuit and has disabled the contactor or SSR.
Ground-Fault Trip OK	Ground-fault current returned to acceptable range and Alarm Reset Button was pushed.
Heating cable Time Reset	Heating cable hours counter field was reset to 0.
High Temp	RTD temperature has exceeded high temp alarm limit for circuit.
High Temp Cut-Out OK	RTD temperature return to acceptable range.
Low Temp	RTD temperature has dropped below the low temp alarm limit for circuit.
Normal	The alarm condition noted has been cleared.
Relay Cycle Reset	The relay cycles counter field was reset to 0.
Relay Failure Alarm	• EMR was commanded to turn off. However, a heating cable current was still being detected. This condition can indicate a failed contactor (stuck on). • EMR was commanded to turn on. However, a heating cable current was not detected. This condition can indicate a failed contactor (stuck on).
Relay OK	Heating cable current returned to 0 when EMR was commanded to be off. This indicates EMR is working properly.
RTD OK	RTD failure indications (open or short) returned to acceptable range.
RTD Failure	The specified RTD has failed.
System Restart	ACS-30 system has restarted at time noted.
Temp OK	Control Temp returned to acceptable range.

TABLE 2.6 COLOR CODING OF EVENTS AND ALARMS

Color	Description
Black	All events
Orange	Alarm that has been acknowledged.
Red	In alarm condition and has not been acknowledged.
Blinking Red/Orange	Latching alarm condition which requires reset in the Status|Circuit window.

2.9. NETWORK|RELAYS WINDOW

The Network|Relays window lists all the available output devices and relay numbers.

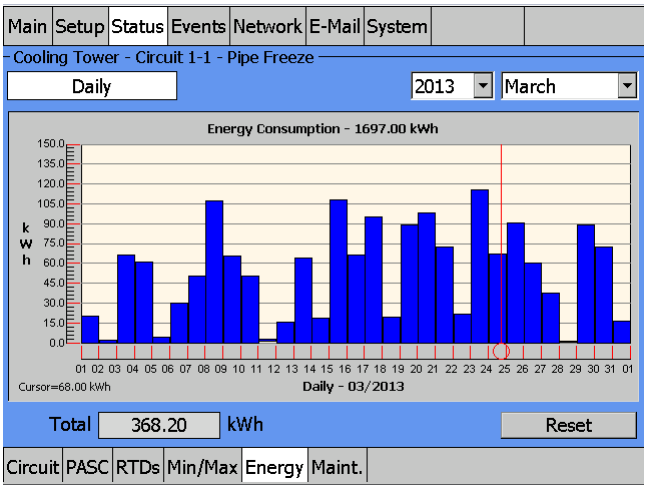


Fig. 2.40 Network|Relays window

2.10. NETWORK|RTDS WINDOW

The Network|RTDs window lists all the available RTD addresses. Tap the desired RTD connected to the system on the left side of the screen and the right side of the window shows where the RTD has been assigned.

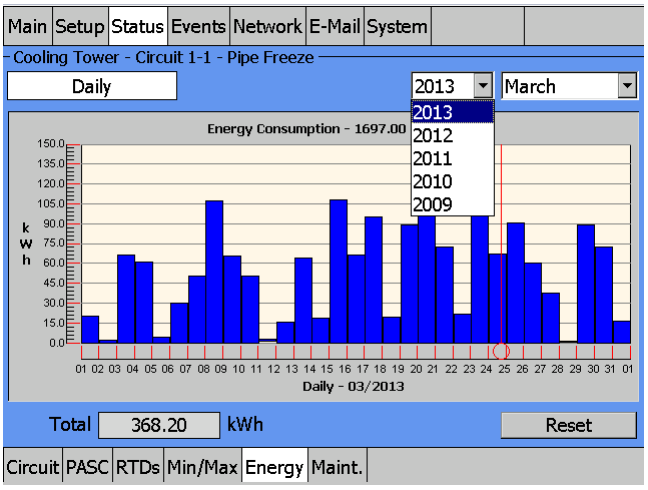


Fig. 2.41 Network|RTDs window

2.11. NETWORK|MAINT. WINDOW

This Network|Maint. window shows the communication success rate with all of the devices connected to the RS-485 network. This is helpful in troubleshooting the RS-485 network.

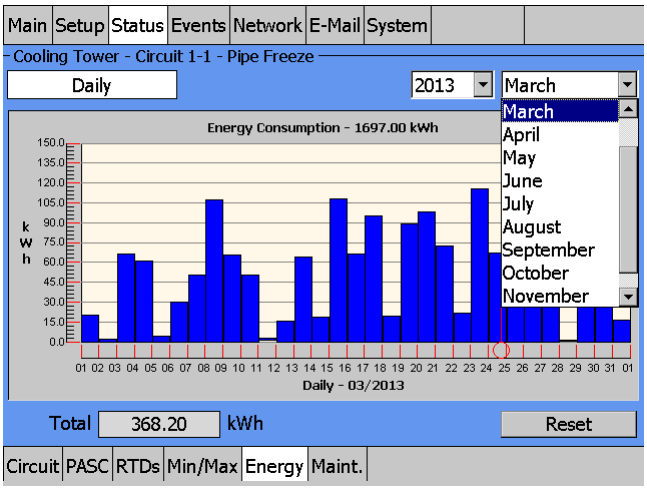


Fig. 2.42 Network|Maint. window

2.12. NETWORK|REMOVE WINDOW

The Network|Remove window is Level 2 password-protected. Once accessed, it allows you to remove device addresses for ACS-PCM2-5, C910-485 and RMM2 from memory.

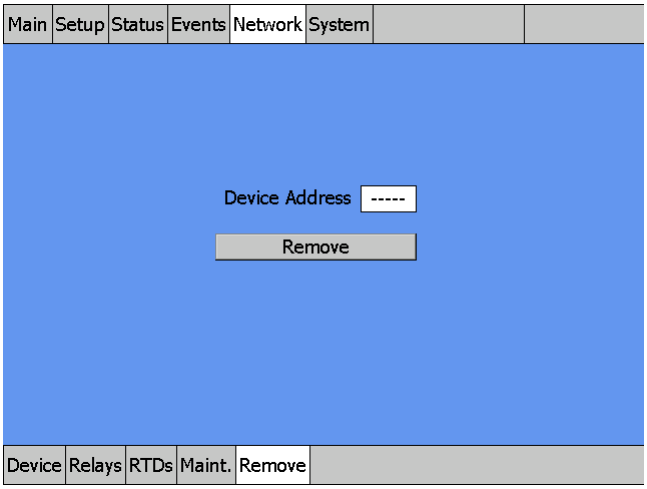


Fig. 2.43 Network|Remove window

The Network|Remove window provides the following controls:

Device Address	Enter the device address you wish to removal from memory.
Remove	Removes entered device address from memory.

2.13. SYSTEM|RELAYS WINDOW

The System|Relays window lets you configure alarm relays.

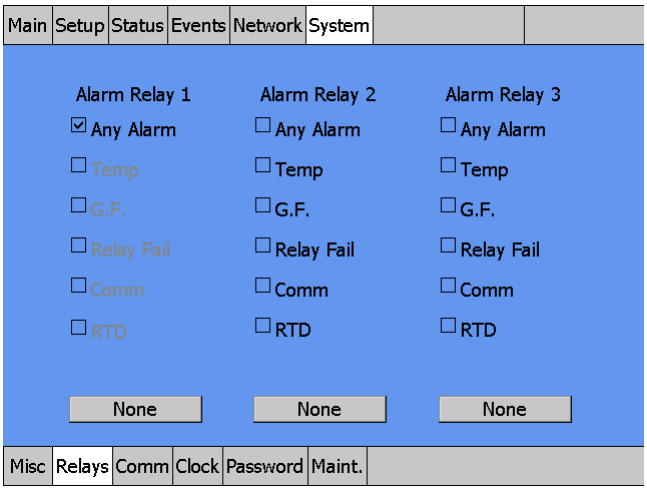


Fig. 2.44 System|Relays window

There are three independent alarm relays in the ACS-UIT2 that can be used for remote annunciation of alarms. Each relay can be programmed for a specific alarm type, multiple alarm types, or none. If "Any Alarm" is chosen for a relay, any alarm condition will activate that relay.

2.14. SYSTEM|COMM WINDOW

The System|Comm window lets you set up communications with host systems.

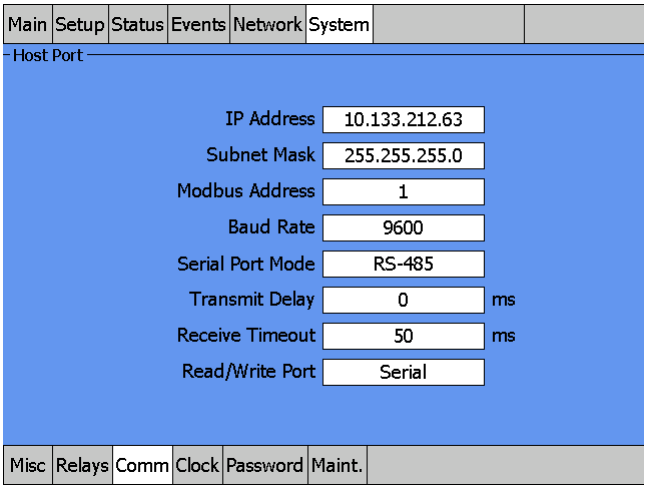


Fig. 2.45 System|Comm window

The ACS-UIT2 can be connected to a Building Management System (BMS) or host computer using an RS-485, RS-232, or 10/100Base-T Ethernet connection. All data and setup options are accessed with communications that follow the Modbus (RTU/Modbus/TCP) protocol. To enable BMS communications, please refer to the ACS-UIT2 Modbus Protocol document (H58685). ProtoNode multi-protocol device servers are available through nVent. The ProtoNode is pre-programmed with the Modbus mapping for ACS-30 and C910-485 controllers for BACnet, MetaSys and LonWorks protocols.

IP Address/Subnet Mask

By default, the IP Address and Subnet Mask are automatically inserted. However, if the IP Address or Subnet Mask needs to be changed, click on the IP Address or Subnet window and then on the LAN91C1111 icon.

To enter an IP address and Subnet Mask manually, click on the IP Address tab, select “Specify an IP Address,” enter the IP Address, the Subnet Mask, and Default Gateway.

Note: The set-up parameters above should be provided by your network administrator. The “Name Server” tab is not applicable for this application.

Modbus Address

Each ACS-UIT2 must have a unique Modbus address which is set by you. The BMS or host computer can communicate with up to 247 separate ACS-UIT2 units by using Modbus protocol.

Range: 1–247

Default: 1

Baud Rate

Allows you to select the baud rate of the external communication port.

Selection: 2400, 4800, 9600, 19200, 38400, 57600

Default: 9600

Serial Port Mode

This activates a window which allows selection of RS-232 or RS-485 ports. This selects the serial communication mode for the host port.

Selection: RS-232, RS-485

Default: RS-485

Transmit Delay

This sets the time the ACS-UIT2 will wait after it receives a message before it replies.

Range: 0–5000 milliseconds

Default: 0

Receive Timeout

This sets the time the ACS-UIT2 waits after last character is received before it determines that the message has ended.

Range: 0–1000 milliseconds

Default: 50

Read/Write Port

Defines which communication protocol (i.e. serial or Ethernet) has BOTH read and write data access capabilities. By default, the communication medium NOT selected has read-only data access capabilities.

Options: Serial, Ethernet

Default: Serial

2.15. SYSTEM|PASSWORD WINDOW

The System|Password window lets you set up passwords for Level 1 and Level 2.

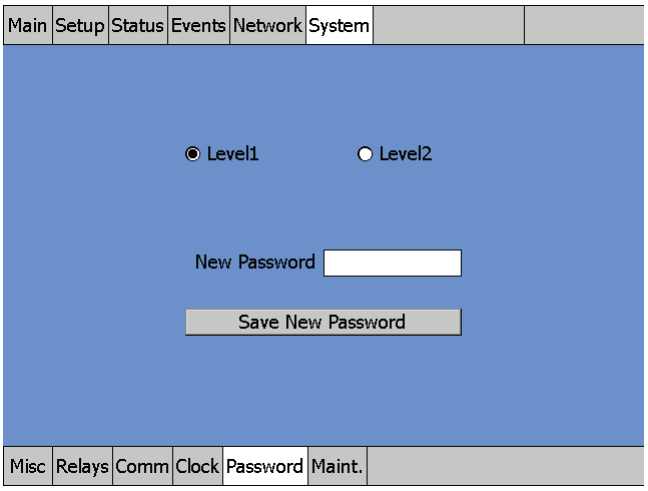


Fig. 2.46 System|Password window

The System|Password window provides the following controls:

Level 1 — Allows setup of all configuration windows except for the System|Maint. window. This Level 1 password is left "blank" from the factory; however, it can be set to a new designated password. If a Level 1 password is chosen, the "Main Menu" timer value determines how long the password remains active before it has to be re-entered. The password is limited to 40 characters.
Default: Level 1 disabled

New Password — Enter the user-defined password.

Save New Password — Confirms password has been saved.

Level 2 — Allows access to System|Maint. window, which permits clearing of Events and program exit.
Default password: 1234
Note: Change the Level 2 password after commissioning.

Old Password — 1234

New Password — Enter your user-defined Level 2 password. The password is limited to 40 characters.

Save New Password — Confirms password has been saved.
Note: Save and protect the Level 2 password in a secure location. Contact a nVent representative for lost password recovery.

2.16. SYSTEM|MAINT. WINDOW

(Level 2 Password Required) This window allows for clearing the Events List and to exit the program.

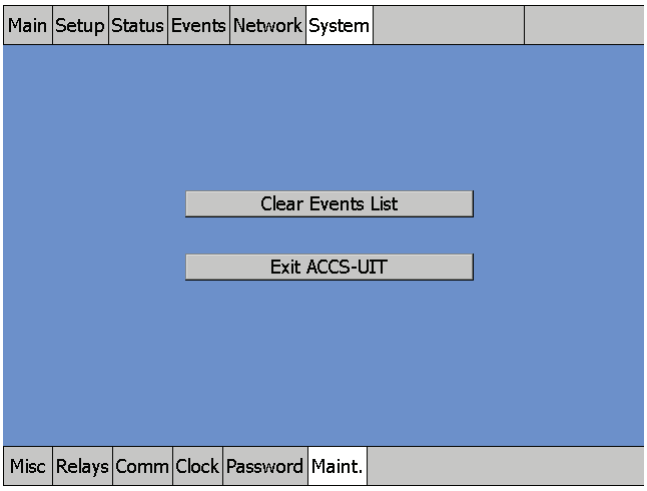


Fig. 2.47 System|Maint. window

The System|Maint. window provides the following controls:

Clear Events List — Clears all events and alarms history.
Note: By clearing the event, all the events and alarms history information for all circuits is lost. If the program exit is chosen, heating cables are no longer monitored.

Exit ACS-UIT2 — Allows user to exit ACS-30 program. This ends the monitoring of all circuits.
Note: Make sure you disable the Watch Dog timer located on the side of the ACS-UIT2. Otherwise, the program will continually attempt to restart the ACS-UIT2 program.

WARNING: Qualified nVent Personnel Only. It is recommended that only nVent personnel exit the ACS-UIT2 program.

3. SECTION 3 - CONTROL MODE CONFIGURATIONS

Depending on Control Mode that was selected, the configuration sub menu windows will query for the necessary inputs required for the circuit to function. Figure 3.1 presents a flow chart to help visualize the programming steps and required input for each of the control modes. This section will present each control mode and guide you through the steps and windows required.

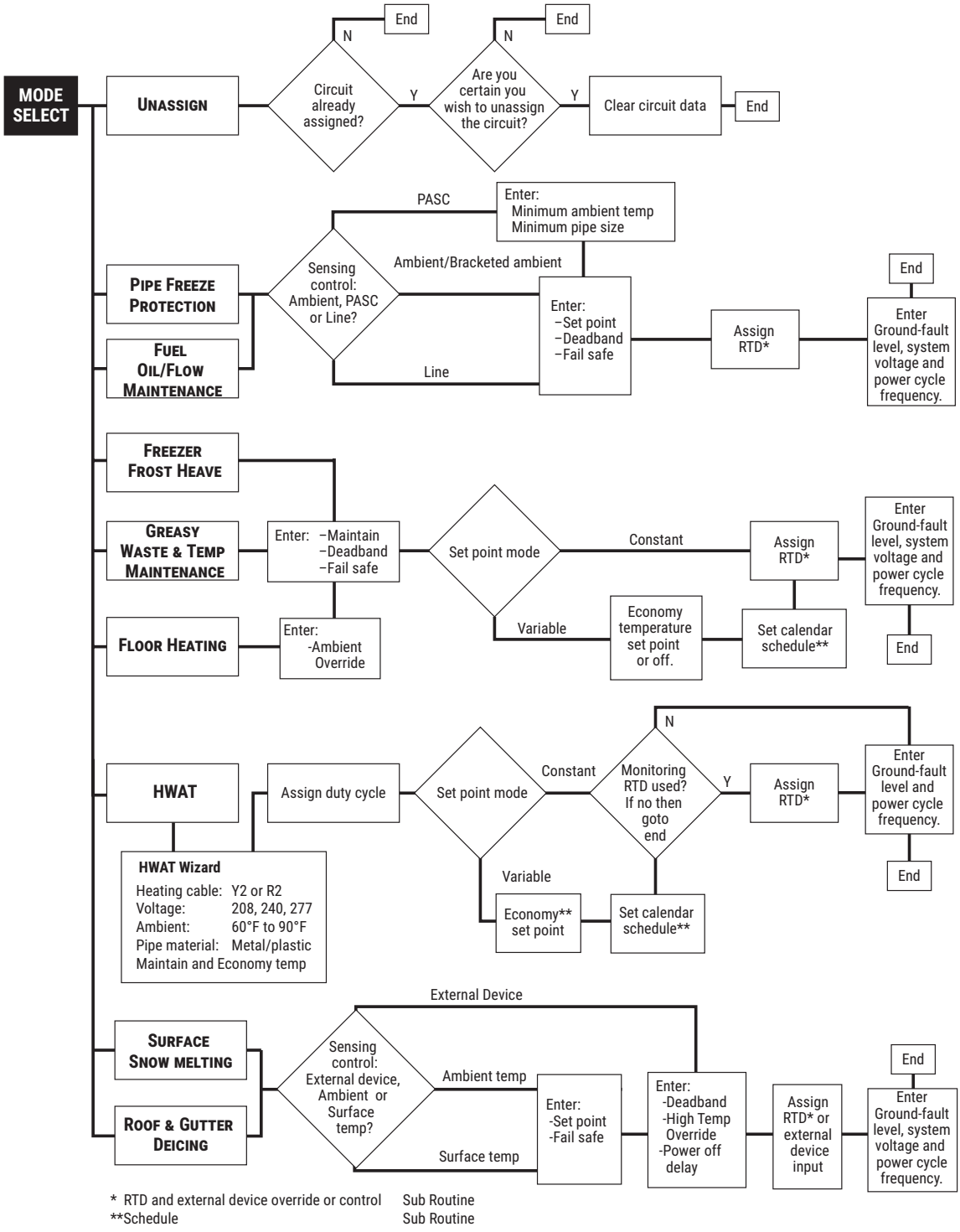


Fig. 3.1 Control Mode Programming flow chart

3.1. UNASSIGN MODE

The **UNASSIGN** mode clears all parameters set for a circuit so that it may be reassigned to a new control mode.

3.2. HWAT MODE

When the HWAT control mode is selected, the HWAT Design Wizard is initiated. The design wizard prompts you for information necessary to maintain the hot water piping system at the desired temperature.

3.2.1. ENTER SYSTEM INFORMATION

Select Cable Type:

Select the heating cable type being used with this circuit: HWAT-Y2 or HWAT-R2

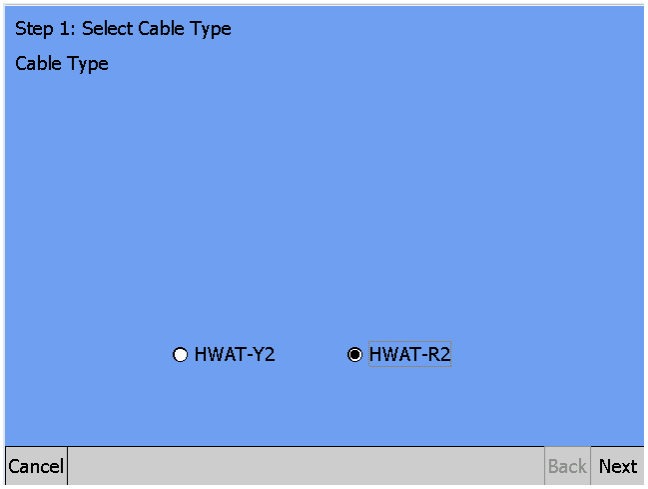


Fig. 3.2 Select cable type

Select Voltage Input:

Select the supply voltage: 208, 240 or 277 V

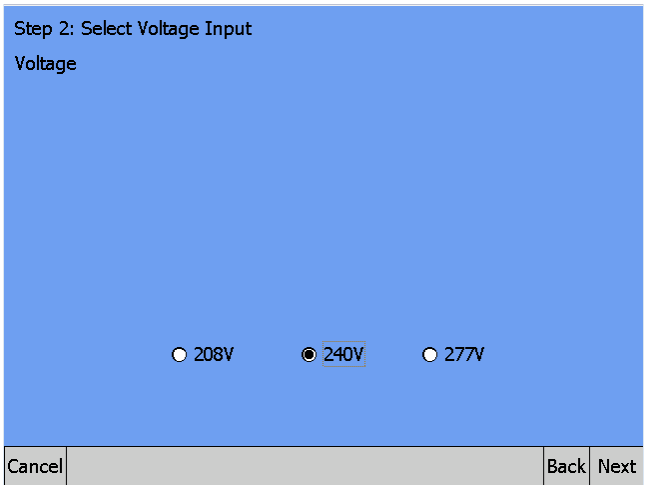


Fig. 3.3 Select voltage input

Enter Ambient Temperature:

Enter the estimated indoor ambient temperature where the pipe is situated.

Ambient Temperature

Range: 60°F (16°C)–90°F (32°C)
Default: 70 (21°C)

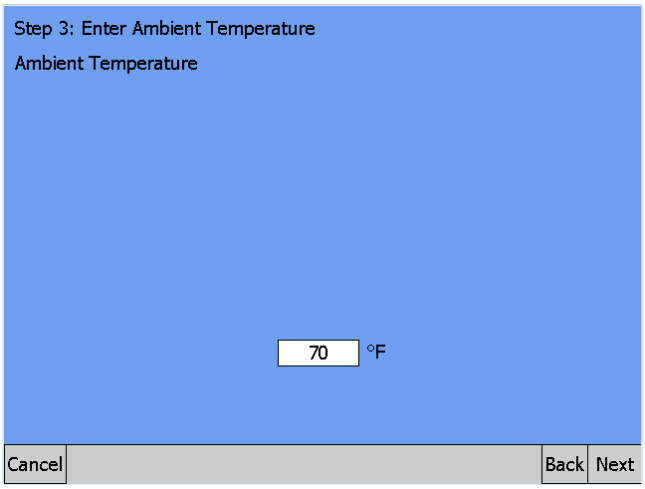


Fig. 3.4 Enter ambient temperature

Select Pipe Type:

Select the pipe type: Metal or Plastic. The material the heated pipe is made of affects the power output of the HWAT self-regulating heating cables. Enter the pipe material.

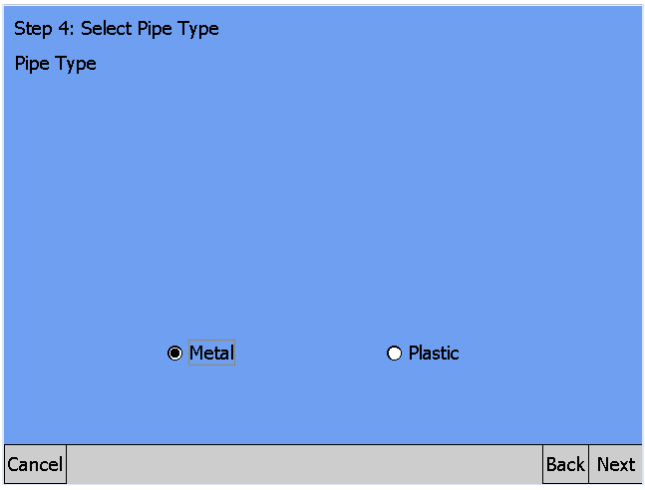


Fig. 3.5 Select pipe type

Select Setpoint Mode:

Select the setpoint: Constant or Variable. Constant will allow a single temperature setpoint for your system. Variable allows you to set different setpoints using the 24/7 Scheduler. Refer to Appendix 5.2 24/7 Scheduler on page 127 for detailed information.

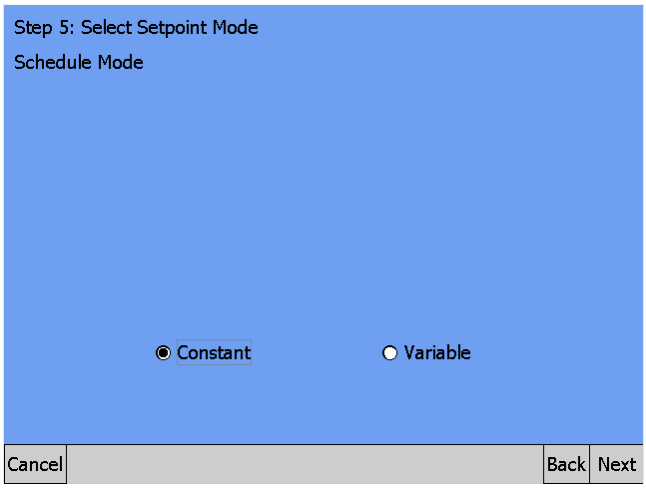


Fig. 3.6 Select setpoint mode

Enter Temperature Setpoints:

Enter the temperature setpoints that you want to maintain the hot water pipe:

- Minimum setpoint temperature: 100°F
- Maximum setpoint temperatures are dependant upon the applied voltage and ambient temperature (Table 3.1)

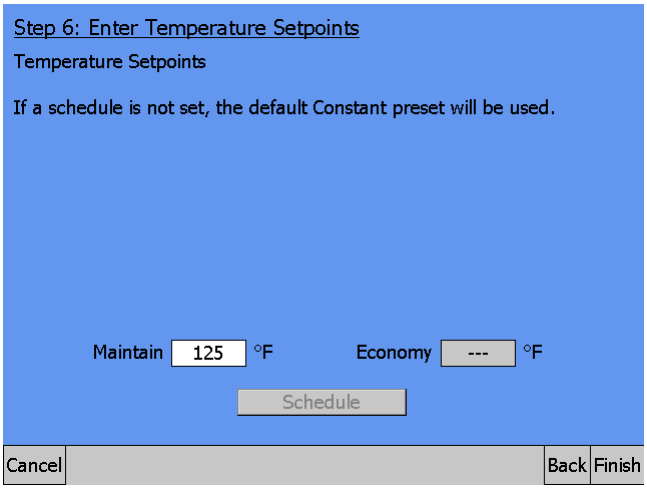


Fig. 3.7 Enter temperature setpoint

TABLE 3.1 MAXIMUM SETPOINT TEMPERATURE FOR HWAT CONTROL MODE

HWAT-Y2			
AMBIENT	**208 V**	**240 V**	**277 V**
60°F	115°F	120°F	120°F
70°F	120°F	125°F	125°F
80°F	125°F	125°F	130°F
90°F	125°F	130°F	135°F
HWAT-R2			
AMBIENT	**208 V**	**240 V**	**277 V**
60°F	135°F	140°F	140°F
70°F	140°F	140°F	145°F
80°F	145°F	145°F	150°F
90°F	145°F	150°F	150°F

Default: HWAT-Y2: 115°F (46°C) HWAT-R2: 125°F (52°C)

At this point the HWAT design wizard is complete and the HWAT circuit configuration window is displayed.

3.2.2. CONFIGURING HWAT

After completing the HWAT design wizard the Setup HWAT window appears where you can adjust the input variables established in the design wizard and enter access additional menu windows.

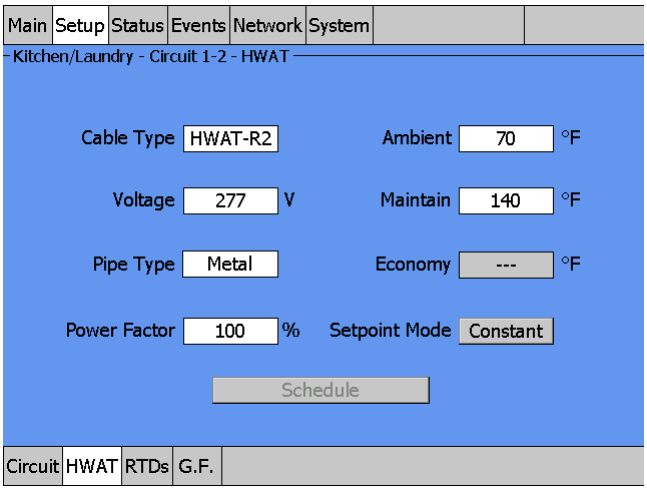


Fig. 3.8 Setup|HWAT window

Economy Temperature (optional):

This value represents the temperature that you want the pipe to maintain when in economy mode. This input is only accessible if the setpoint mode is set to Variable which applies the temperature weekly setpoint 24/7 Scheduler function described in Appendix 5.2 24/7 Scheduler on page 127.

Enter the Economy temperature

Range 100°F (38°C) to less than the maintain temperature

Default 105°F (41°C)

Setpoint Mode:

Allows you to configure how the scheduling is done over a weekly timed calendar with 48 1/2-hour program intervals per day available.

Constant will allow a single temperature setpoint for your system.

Variable allows you to set different setpoints using the 24/7 weekly scheduler

See Appendix 5.2 24/7 Scheduler on page 127.

Setpoint options

HWAT-Y2: Maintain, economy or off

HWAT-R2: Maintain, economy, off or heat cycle over a weekly timed calendar with 48 1/2-hour program intervals per day available.

Schedule:

Opens the weekly scheduler. See Appendix 5.2 24/7 Scheduler **on page 127 for more information.**

Power Factor:

The factor is used to decrease or increase the final pipe temperature. Increasing this value above 100% will result in a longer duty cycle, while adjusting it lower than 100% will decrease the duty cycle.

Range: 40%–160%

Default: 100%

Assigning RTDs

RTDs are not required for HWAT system control. If you wish to use RTDs to monitor pipe or water heater temperatures tap Setup|RTDs window and enter the device address and RTD number. For detailed information on the Setup|RTD window refer to Section 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

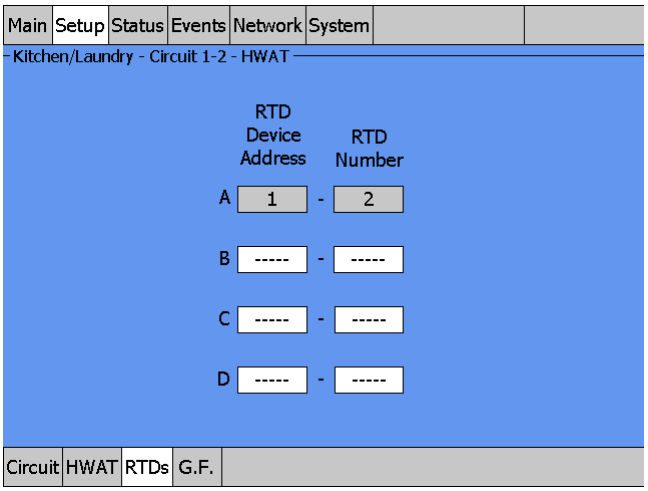


Fig. 3.9 Setup|RTDs window (HWAT)

Assigning Temperature Alarms

Once RTDs have been assigned to the circuit high and low temperature alarms may be set. The alarm button will only appear if a RTD has been assigned to the circuit.

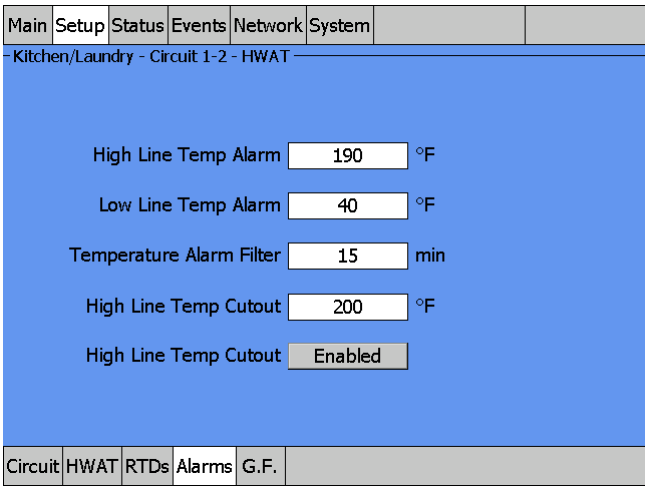


Fig. 3.10 Setup|Alarms window (HWAT)

HIGH LINE TEMP ALARM:

If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: Maintain setpoint plus 10°F (6°C) to 190ºF (88ºC)
Default: 190°F (88°C)

LOW LINE TEMP ALARM:

If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 40ºF (4ºC) to Maintain temperature
Default: 40°F (4°C)

TEMPERATURE ALARM FILTER:

This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

HIGH LINE TEMP CUT-OUT:

If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: High Temperature Alarm value plus 1°F (1°C) to 200ºF (93ºC)
Default: 200°F (93°C)

HIGH LINE TEMP CUT-OUT ENABLE/DISABLE:

Enables or disables the high line cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable

Default: Enable

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels.

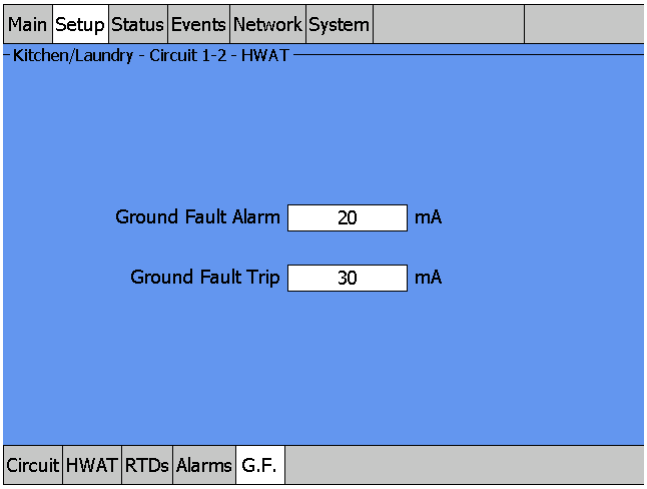


Fig. 3.11 Setup|G.F. window (HWAT)

Input the Ground-Fault Alarm and Ground-Fault Trip:

GROUND-FAULT ALARM:

When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

GROUND-FAULT TRIP:

When the ground-fault current exceeds this level the ACS-PCM2-5 or C910-485 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

3.3. FROST HEAVE MODE

The Frost Heave control mode prompts you to enter the control parameters for your Freezer Frost Heave Prevention application.

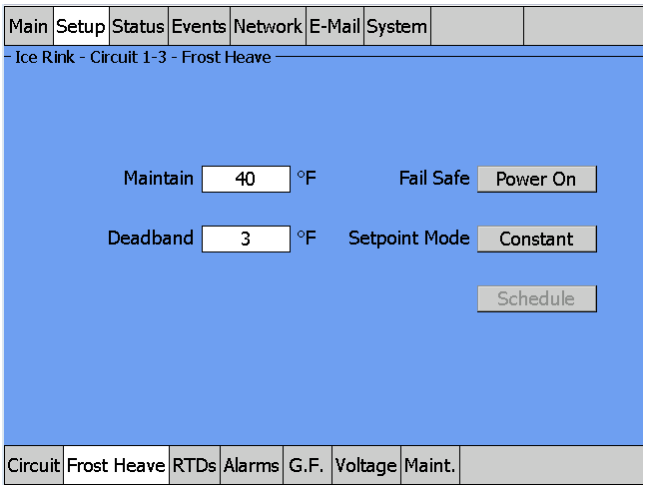


Fig. 3.12 Setup|Frost Heave window

SLAB TEMP SETPOINT:

The slab temp setpoint is the desired maintain temperature for the freezer floor. Based on the measured control temperature, the ACS-UIT2 will switch the relay output to maintain the system at the desired setpoint.

Range: 20°F (-7°C)–50°F (10°C)
Default: 40ºF (4°C)

DEADBAND:

If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)

Default: 5ºF (3°C)

FAIL SAFE:

The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-UIT2 signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Options: Power On or Power Off

Default: Power On

SCHEDULE:

Tapping on this button will bring up the Scheduler. See Appendix 5.2 24/7 Scheduler on page 127 for more information.

ASSIGNING RTDS

In this mode you have the option of setting up to four RTDs with the ACS-PCM2-5, or 2 RTD's with the C910-485, for slab sensing. For detailed information on the Setup|RTD window, see 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

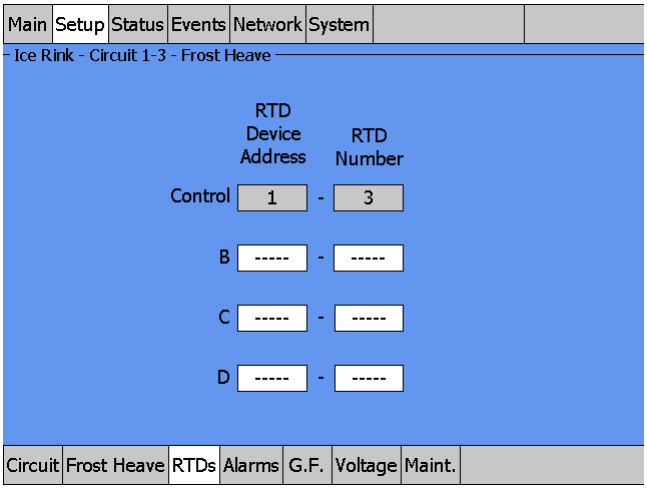


Fig. 3.13 Setup|RTDs window (Frost Heave)

ASSIGNING TEMPERATURE ALARMS

Once RTDs have been assigned to the circuit the alarm button appears then high and low temperature alarms may be set.

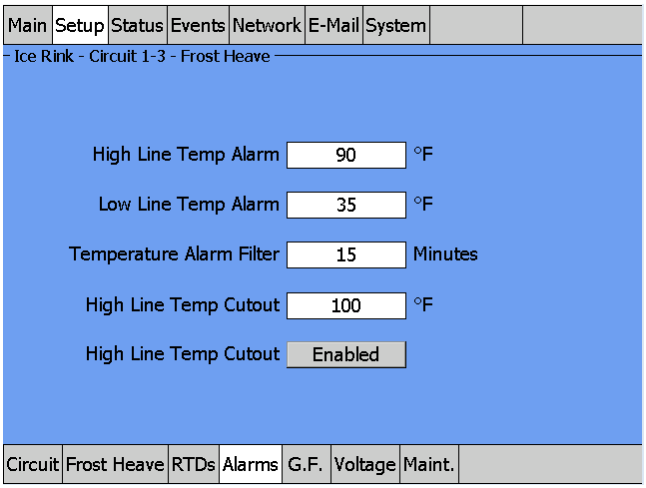


Fig. 3.14 Setup|Alarms window (Frost Heave)

HIGH LINE TEMP ALARM:

If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: Maintain setpoint plus 5°F (3°C) to 90ºF (32°C)
Default: 90°F (32°C)

LOW LINE TEMP ALARM:

If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 0ºF (-18ºC) to Maintain setpoint
Default: 35°F (2°C)

Note: One RTD must be connected to the circuit for this control mode to function or an RTD failure alarm will be announced.

TEMPERATURE ALARM FILTER:

This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

HIGH LINE TEMP CUT-OUT:

If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: High Temperature Alarm value plus 10°F (6°C) to 100ºF (38ºC)
Default: 100°F (38ºC)

HIGH LINE TEMP CUT-OUT ENABLE:

Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

ASSIGNING GROUND-FAULT ALARM AND TRIP LEVELS

The Setup|G.F. window allows you to set the alarm and trip levels.

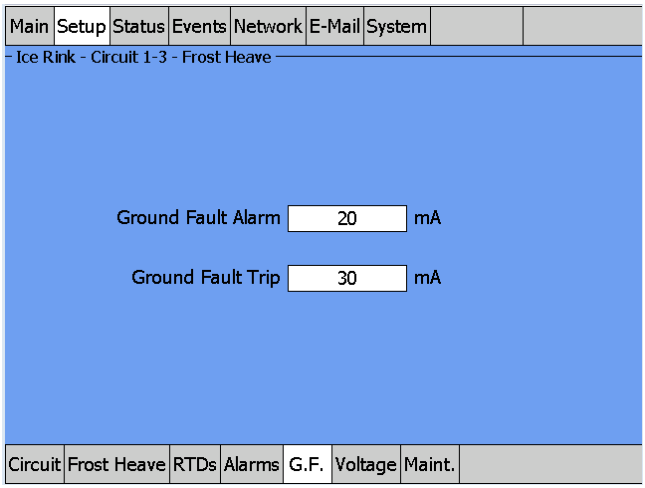


Fig. 3.15 Setup|G.F. window (Frost Heave)

Input the Ground-Fault Alarm and Ground-Fault Trip:

GROUND-FAULT ALARM:

When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

GROUND-FAULT ALARM:

When the ground-fault current exceeds this level the ACS-PCM2-5 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

ASSIGNING CIRCUIT VOLTAGE

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

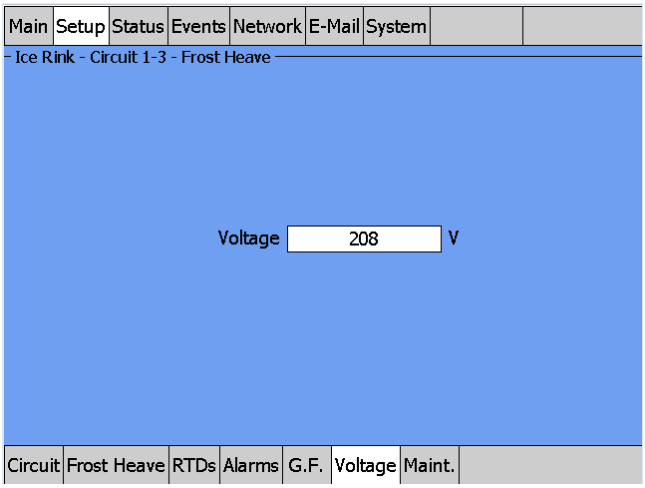


Fig. 3.16 ISetup|Voltage window (Frost Heave)

INPUT THE CIRCUIT VOLTAGE

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures line voltage, this field does not appear.
Default: 208 V

ASSIGNING POWER CYCLE TEST

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

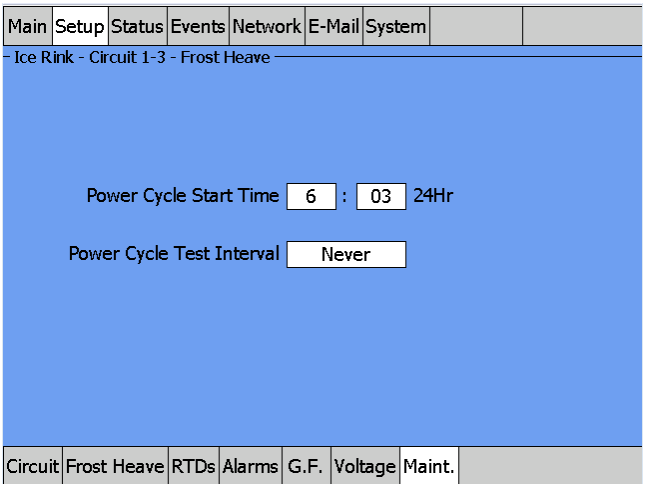


Fig. 3.17 Setup|Maint. window (Frost Heave)

Input the start time and frequency for the Power Cycle test:

POWER CYCLE START TIME: The time of day to start the Power Cycle test

Range: 00:00 to 23:59
Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

POWER CYCLE TEST INTERVAL: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly
Default: Never

3.4. FLOOR HEATING MODE

The Floor Heating control mode prompts you to enter the control parameters for a Floor Heating application.

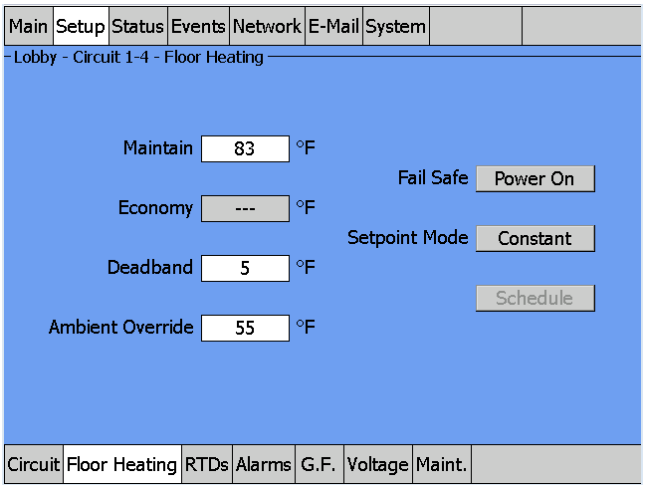


Fig. 3.18 Setup|Floor Heating window

Floor Temperature Setpoint: The slab setpoint is the desired maintain temperature for the floor. Based on the measured control temperature, the ACS-UIT2 will switch the relay output to maintain the system at the desired setpoint.

Range: 60°F (16°C)–110°F (43°C)
Default: 83ºF (28°C)

Economy Temperature (optional): This value represents the temperature that you want the pipe to maintain when in economy mode. This input is only accessible if the Setpoint Mode is set to Variable which applies the temperature setpoint scheduler function described in Appendix 5.2 24/7 Scheduler on page 127.

Enter the Economy temperature

Range: 60°F (16°C)–Maintain
Default: 68°F (20°C)

Deadband: If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5ºF (3°C)

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-UIT2 signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Options: Power On or Power Off
Default: Power On

Ambient Override: The ambient override allows you to turn off the system when the ambient exceeds a pre-established temperature.

Range: 40ºF (13ºC)–100ºF (38ºC)
Default: 55ºF (13ºC)

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active. Refer to Appendix 5.3.

Schedule: Tapping on this button will bring up the Scheduler. See Appendix 5.2 24/7 Scheduler on page 127 for more information.

ASSIGNING RTDS

Tap Setup|RTDs window to assign RTDs after the control mode and parameters have been set.

In this mode you have the option of setting up to four RTDs for floor sensing. For detailed information on the Setup|RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

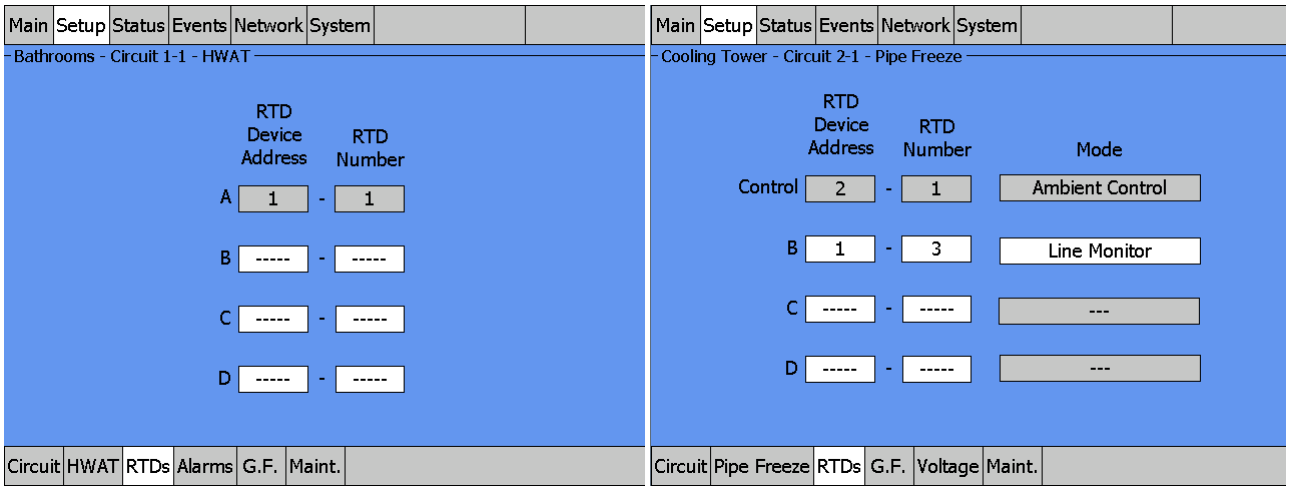


Fig. 3.19 Setup|RTDs window (Floor Heating)

ASSIGNING TEMPERATURE ALARMS

Once RTDs have been assigned to the circuit the alarm button appears then high and low temperature alarms may be set.

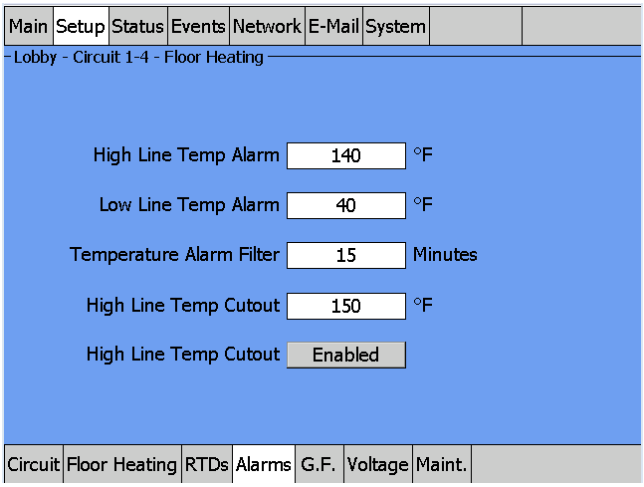


Fig. 3.20 Setup|Alarms window (Floor Heating)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: Maintain setpoint plus 10°F (6°C) to 140°F (60ºC)

Default: 140°F (60°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 40ºF (4ºC)–60°F (16°C)

Default: 40°F (4°C)

Note: One RTD must be connected to the circuit for this control mode to function or an RTD failure alarm will be announced.

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes

Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: Maintain setpoint plus 10°F (6°C) to 150ºF (65ºC)

Default: 150°F (65ºC)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

ASSIGNING GROUND-FAULT ALARM AND TRIP LEVELS

The Setup|G.F. window allows you to set the alarm and trip levels.

WARNING: Shock Hazard. National electrical codes require 5-mA, Class A ground-fault protection devices to be installed when electric floor heating is used in kitchens and baths. The ACS-30 does not provide 5-mA ground-fault protection. For these applications, a 5-mA class A GFCI must be installed in the power distribution panel.

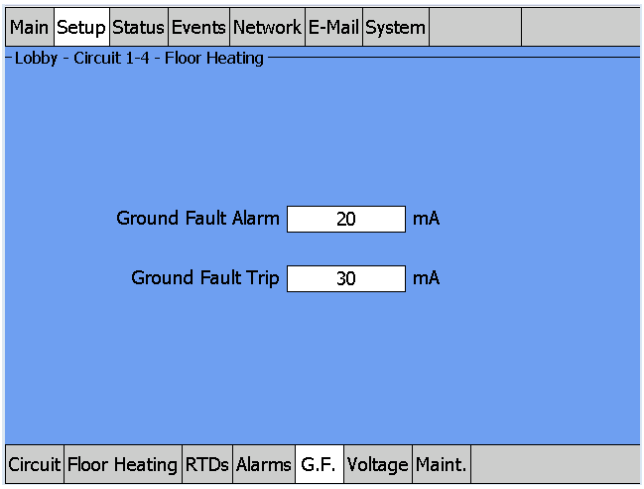


Fig. 3.21 Setup|G.F. window (Floor Heating)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

ASSIGNING CIRCUIT VOLTAGE

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

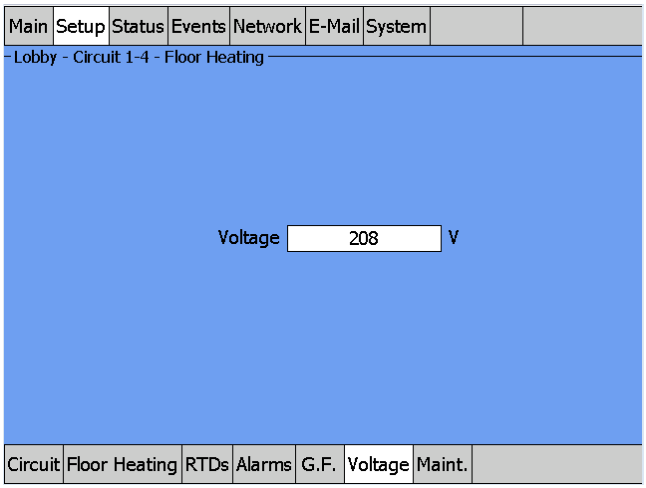


Fig. 3.22 Setup|Voltage window (Floor Heating)

INPUT THE CIRCUIT VOLTAGE

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures line voltage, this field does not appear.

Default: 208 V

ASSIGNING POWER CYCLE TEST

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

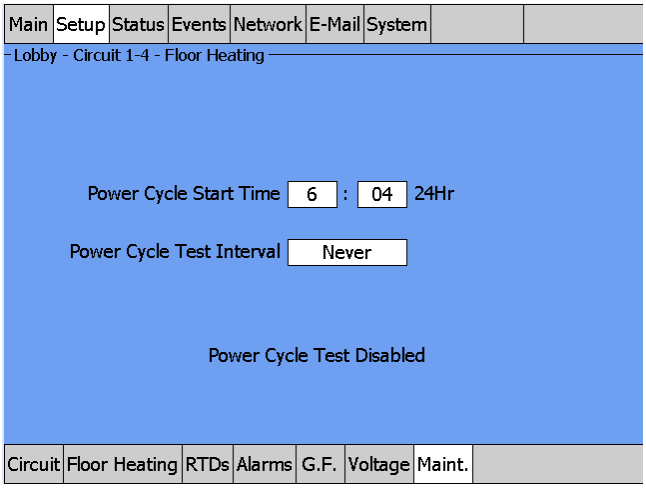


Fig. 3.23 Setup|Maint. window (Floor Heating)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00 to 23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly
Default: Never

3.5. PIPE FREEZE MODE

The Pipe Freeze control mode prompts you to enter the control parameters for a Pipe Freeze Protection application.

In this mode, you will be given three different control method options: Ambient, Line and PASC.

3.5.1. TEMP CONTROL – AMBIENT CONTROL

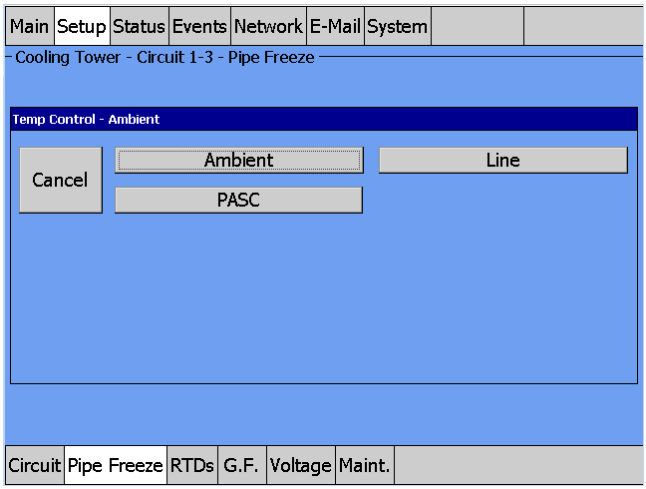


Fig. 3.24 Pipe Freeze Temperature Ambient Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap: Ambient

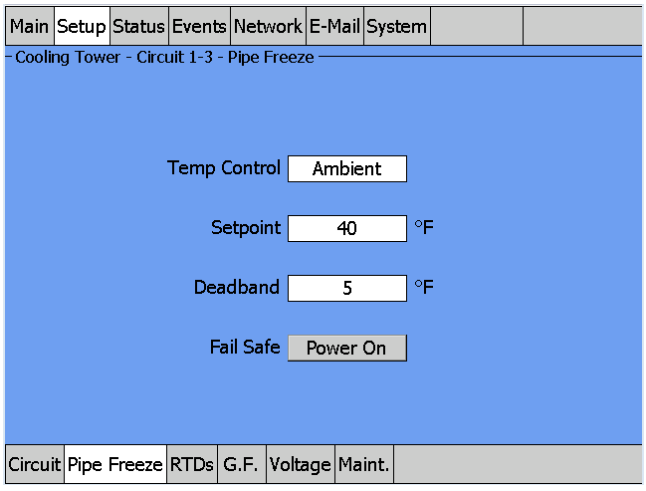


Fig. 3.25 Setup|Pipe Freeze Ambient Control window

Setpoint Temperature: The setpoint temperature is the desired maintain temperature for the water pipe. Based on the measured control temperature, the ACS-PCM2-5 will switch the relay output to maintain the system at the desired setpoint.

Range: 35°F (2°C)–50°F (10°C)
Default: 40°F (4°C)

Deadband: If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5ºF (3°C)

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs.

When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active.

ASSIGNING RTDS

When in Ambient Control mode you must have one RTD assigned as ambient control. The remaining three RTDs may be assigned to ambient control or line monitor. For detailed information on the Setup|RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

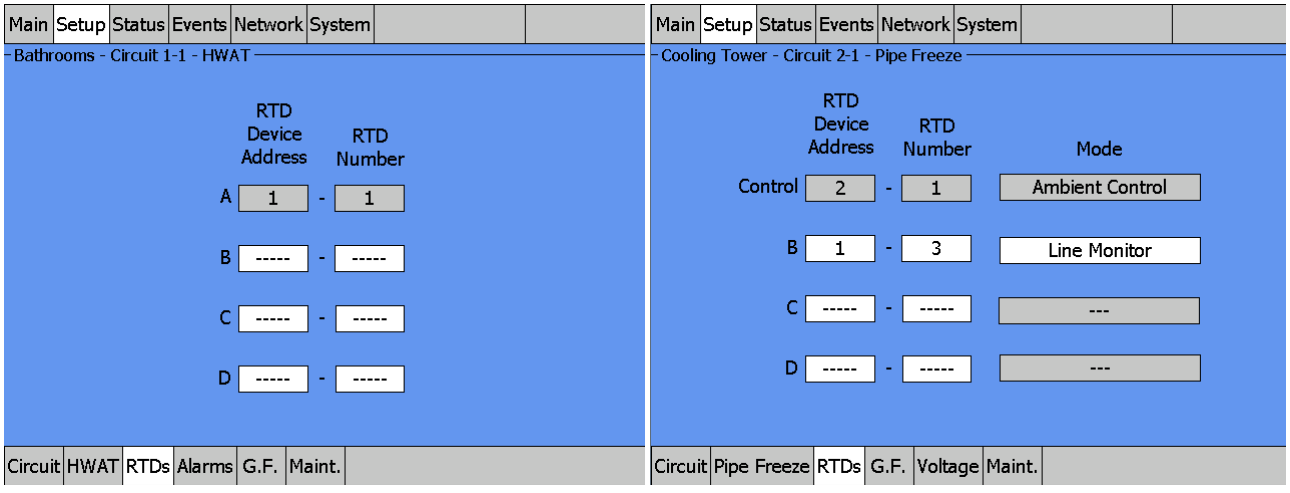


Fig. 3.26 Setup|RTDs window (Pipe Freeze Ambient Control)

ASSIGNING TEMPERATURE ALARMS

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

Note: Temperature alarms can only be associated to line monitoring RTDs.

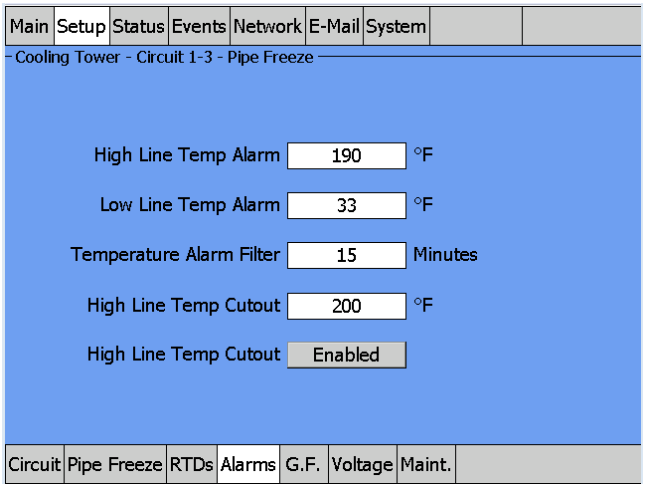


Fig. 3.27 Setup|Alarms window (Pipe Freeze Ambient Control)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C)–190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33°F (1°C) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: 110°F (43°C)–200°F (93°C)
Default: 200°F (93°C)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels.

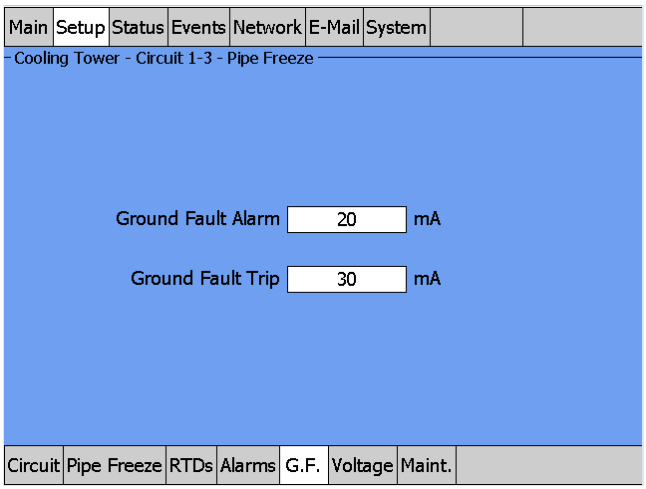


Fig. 3.28 Setup|G.F. window (Pipe Freeze Ambient Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: WHEN THE GROUND-FAULT CURRENT EXCEEDS THIS LEVEL THE ACS-PCM2-5 TURNS OFF THE CIRCUIT RELAY.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

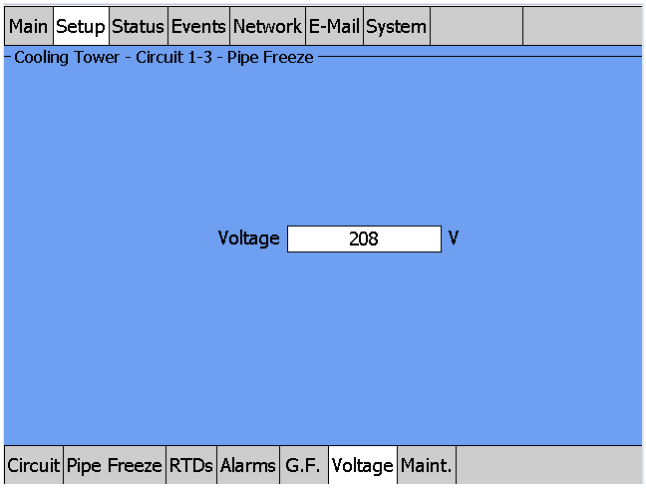


Fig. 3.29 Setup|Voltage window (Pipe Freeze Ambient Control)

INPUT THE CIRCUIT VOLTAGE

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures line voltage, this field does not appear.
Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

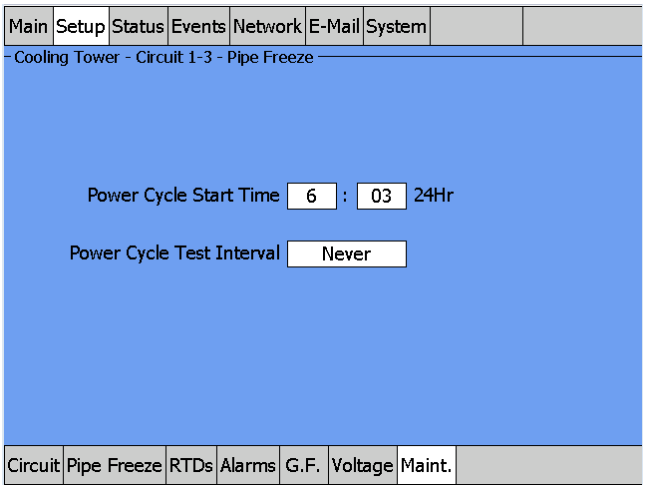


Fig. 3.30 Setup|Maint. window (Pipe Freeze Ambient Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: THE TIME OF DAY TO START THE POWER CYCLE TEST

Range: 00:00 to 23:59
Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: THE FREQUENCY TO RUN THE POWER CYCLE TEST

Range: Never, Daily, Weekly and Monthly
Default: Never

3.5.2. TEMP CONTROL – LINE CONTROL

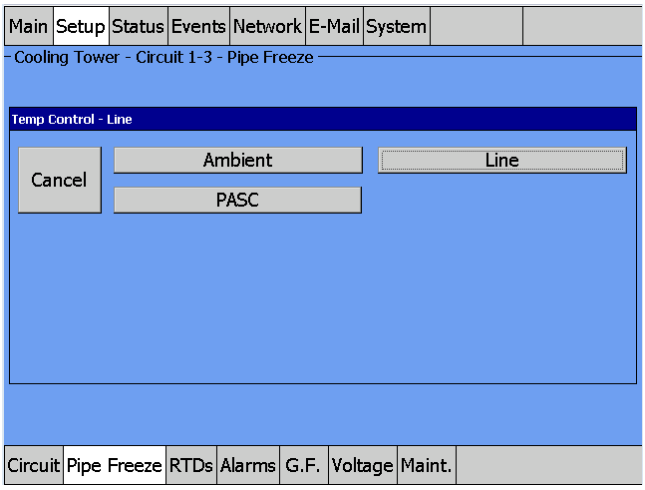


Fig. 3.31 Pipe Freeze Temperature Line Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap: Line

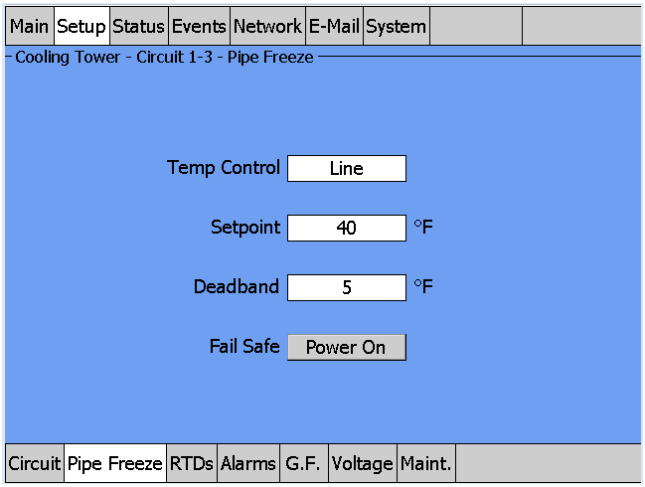


Fig. 3.32 Setup|Pipe Freeze Line Control window

Setpoint Temperature: The setpoint temperature is the desired maintain temperature for the water pipe.

Based on the measured control temperature, the ACS-PCM2-5 will switch the relay output to maintain the system at the desired setpoint.

Range: 35°F (2°C)–50°F (10°C)
Default: 40°F (4°C)

Deadband: If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5°F (3°C)

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active.

ASSIGNING RTDS

After the control mode and parameters have been set tap Setup|RTDs window to assign RTDs to the circuit. When in line control mode you have the option of setting up to four RTDs for pipe line sensing. For detailed information on the Setup|RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

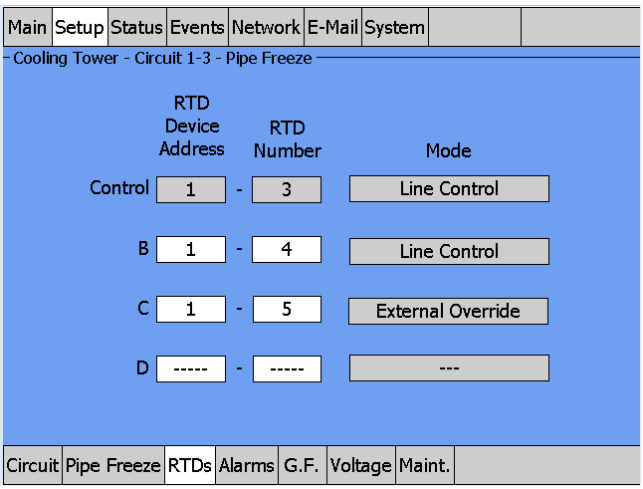


Fig. 3.33 Setup|RTDs window (Pipe Freeze Line Control)

ASSIGNING TEMPERATURE ALARMS

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

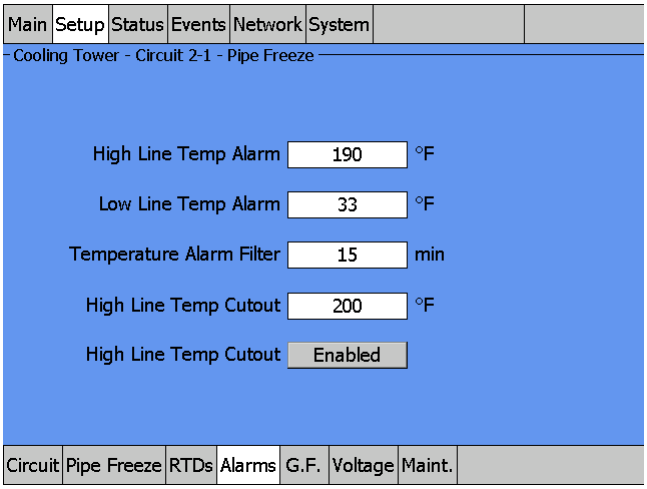


Fig. 3.34 Setup|Alarms window (Pipe Freeze Line Control)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C)–190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33°F (1°C) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: 110°F (43°C)–200°F (93°C)
Default: 200°F (93°C)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels.

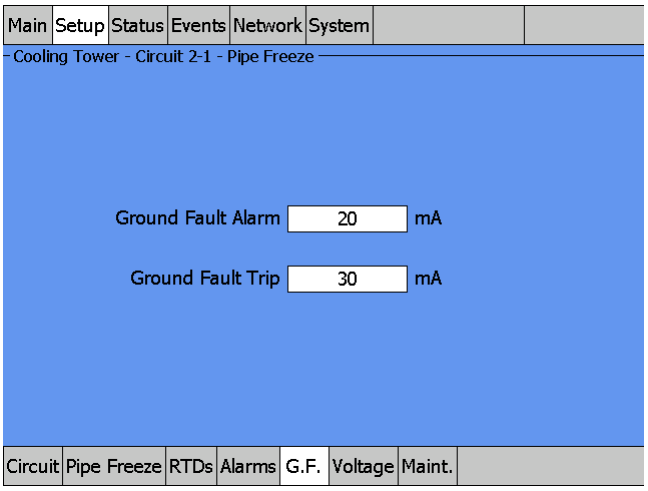


Fig. 3.35 Setup|G.F. window (Pipe Freeze Line Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

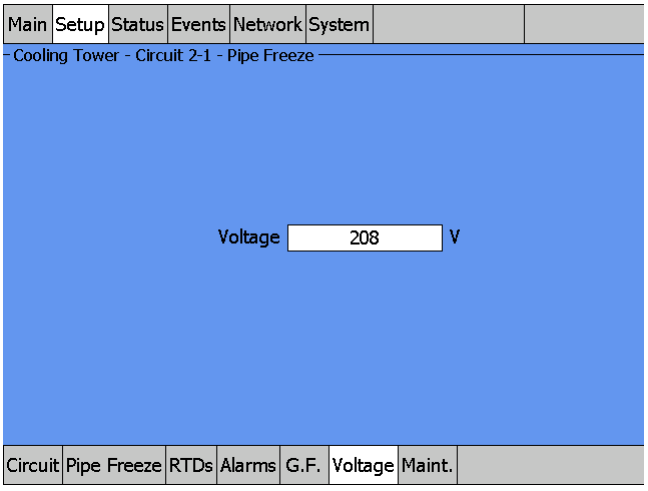


Fig. 3.36 Setup|Voltage (Pipe Freeze Line Control)

INPUT THE CIRCUIT VOLTAGE

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures line voltage, this field does not appear.

Default: 208 V

ASSIGNING POWER CYCLE TEST

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

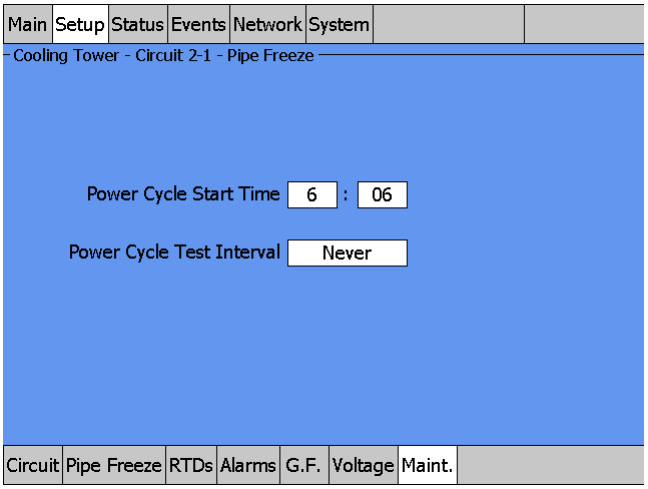


Fig. 3.37 Setup|Maint. (Pipe Freeze Line Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: THE TIME OF DAY TO START THE POWER CYCLE TEST

Range: 00:00 to 23:59
Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: THE FREQUENCY TO RUN THE POWER CYCLE TEST

Range: Never, Daily, Weekly and Monthly
Default: Never

3.5.3. TEMP CONTROL – PASC CONTROL

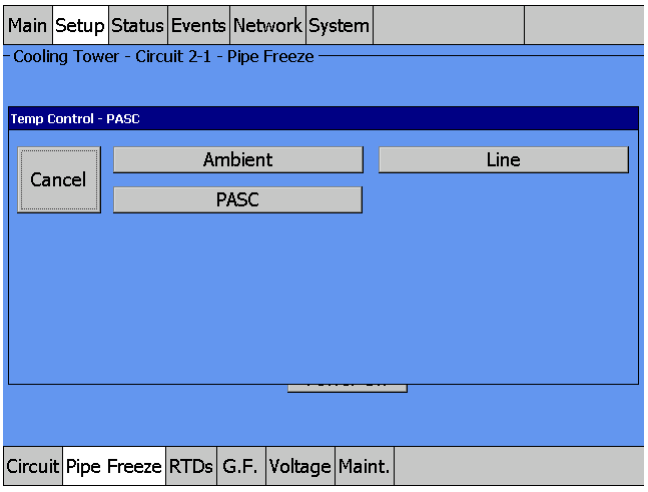


Fig. 3.38 Pipe Freeze Temperature PASC Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap PASC

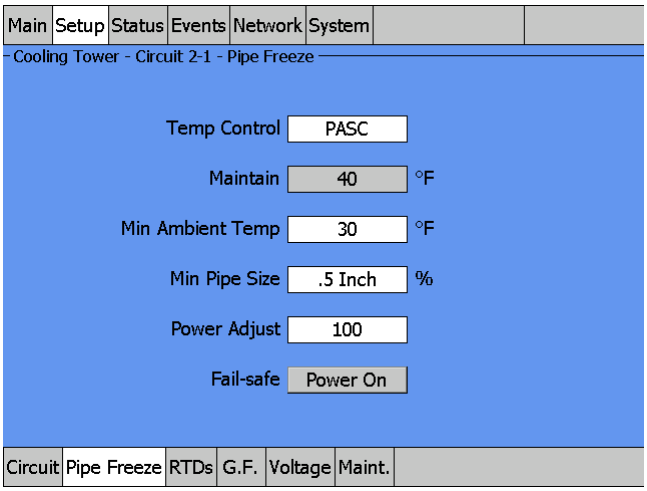


Fig. 3.39 Setup|Pipe Freeze PASC Control window

PASC (Proportional Ambient Sensing Control): PASC takes advantage of the fact that the heat loss from a pipe is proportional to the temperature difference between the pipe and the ambient air. This is true regardless of heater type, insulation type, or pipe size. Once the heat tracing and insulation on a pipe has been designed to balance heat input with heat loss for maintaining a 40°F (4°C) pipe, the main variable in controlling the pipe temperature becomes the ambient air temperature.

The ACS-30 system has a control algorithm that uses the measured ambient temperature, the desired 40°F maintain temperature, minimum ambient temperature assumption used during design, and size of the smallest pipe diameter to calculate how long the heater should be on or off to maintain a near-constant pipe temperature.

Maintain Temperature Setpoint: Fixed design setpoint: 40°F (4°C)

Minimum Ambient: ENTER THE MINIMUM AMBIENT TEMPERATURE FOR YOUR INSTALLATION:

Range: -40°F (-40°C)–40°F (4°C)
Default: 30°F (-1°C)

Min Pipe Size: Min. Pipe Size is the diameter of the smallest heat-traced pipe in the group controlled by this circuit. Small diameter pipes heat up and cool down more rapidly than larger diameter pipe. Therefore, the PASC duty cycle is calculated over a shorter time base. Larger diameter pipes heat and cool less rapidly, so the on/off periods for the heater system can be stretched over a longer period. If electromechanical contactors are being used to control the heater circuit, the longer time base reduces the number of contactor on/off cycles and extends the contactor life.

Select: 0.5, 1, ≥ 2 inches
Default: 0.5 inches

Power Adjust: THIS ALLOWS THE PASC CONTROL TO BE ADJUSTED WHEN THE HEATING CABLE OUTPUT IS GREATER THAN THE DESIGN ASSUMPTION, OR IF THE PIPE INSULATION PROVES TO BE MORE EFFICIENT THAN ASSUMED. PIPE TEMPERATURE MAY RUN HIGHER OR LOWER THAN DESIRED IF THE HEATING CABLE HAS A DIFFERENT OUTPUT THAN REQUIRED TO OFFSET THE HEAT LOSS. THE POWER ADJUST PARAMETER ENABLES A REDUCTION OR AN INCREASE IN THE HEATING EFFECTIVE POWER BY ENTERING A VALUE LESS OR GREATER THAN 100%

Range: 10–200%
Default: 100%

IMPORTANT: If improperly used, the Power Adjust parameter can cause the piping to get too cold or too hot. If unsure, leave at 100%. Do not change this value unless an engineer calculates the temperature impact on the system and determines that it is safe to do so. Be particularly cautious if the circuit has more than one diameter of pipe or type of heat tracing. Contact a nVent representative for assistance with this factor.

Fail Safe: THE FAIL SAFE CONTROL BUTTON TURNS THE POWER ON OR OFF TO THE HEATING CABLE IF THE CIRCUIT LOSES ALL VALID RTDS.

When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: THE DRY CONTACTS FROM A BMS SYSTEM OR EXTERNAL DEVICE MAY BE ASSIGNED TO THE CIRCUIT TO DE-ENERGIZE THE CIRCUIT TO SAVE POWER WHEN IT IS NOT NEEDED. ALL TEMPERATURE AND SYSTEM ALARMS ARE STILL ACTIVE.

ASSIGNING RTDS

After the control mode and parameters have been set tap Setup|RTDs window to assign RTDs to the circuit. When in PASC control mode you have the option of setting up to four RTDs for ambient sensing PASC control. In this mode you can have up to three of the four RTDs set to monitor the pipe. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

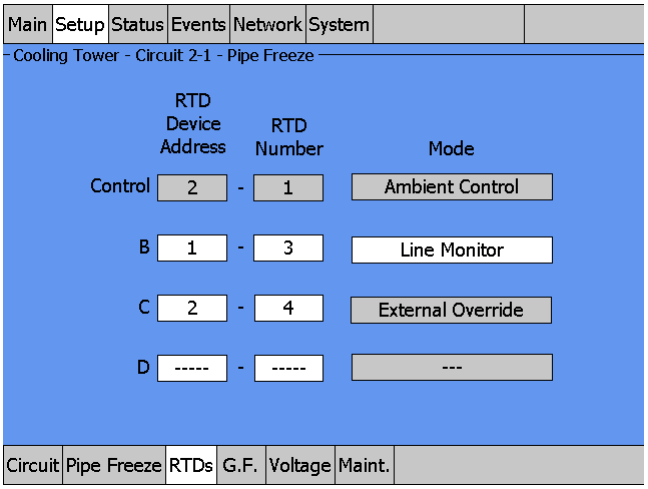


Fig. 3.40 Setup|RTDs window (Pipe Freeze PASC Control)

Assigning Temperature Alarms

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

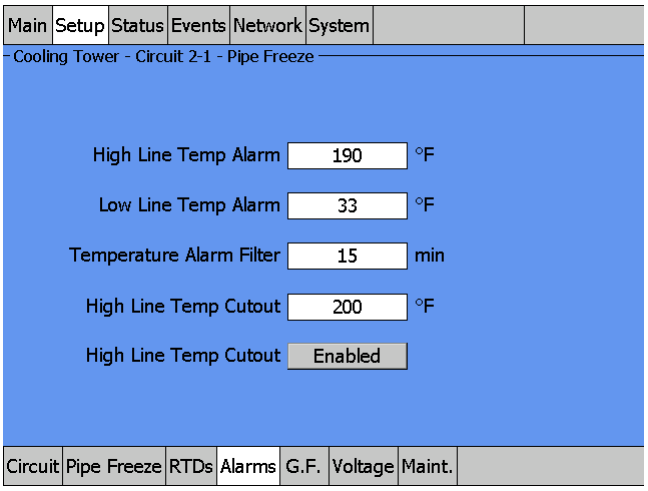


Fig. 3.41 Setup|Alarms window (Pipe Freeze PASC Control)

Note: Temperature alarms can only be associated to line monitoring RTDs.

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C) to 190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33°F (1°C) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: IF ANY RTDS ASSIGNED TO A CIRCUIT MEASURES A TEMPERATURE ABOVE THIS THRESHOLD, THE ACS-UIT2 GENERATES AN ALARM AND THE RELAY OUTPUT IS TURNED OFF. IF THE HIGH LINE TEMPERATURE DROPS BELOW THIS THRESHOLD MINUS THE DEADBAND, THE OUTPUT IS TURNED ON AND NORMAL DUTY CYCLE CONTROL IS RESUMED.

Range: 110°F (43°C)–200°F (93°C)
Default: 200°F (93°C)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable

Default: **Enable**

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels.

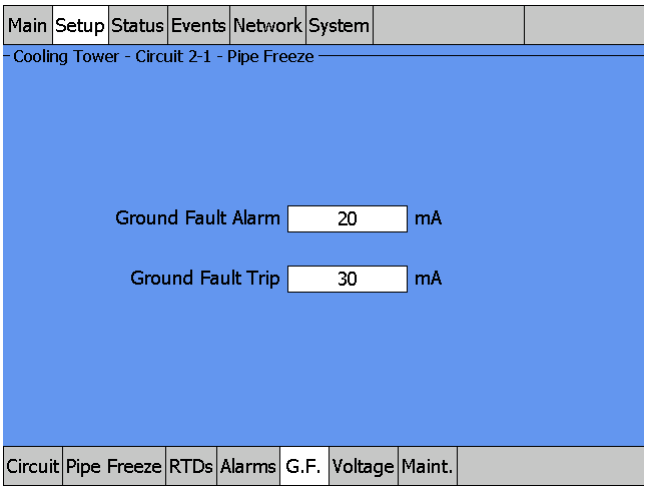


Fig. 3.42 Setup|G.F. window (Pipe Freeze PASC Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: WHEN THE GROUND-FAULT CURRENT EXCEEDS THIS LEVEL THE ACS-UIT2 GOES IN ALARM.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: WHEN THE GROUND-FAULT CURRENT EXCEEDS THIS LEVEL THE ACS-PCM2-5 TURNS OFF THE CIRCUIT RELAY.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

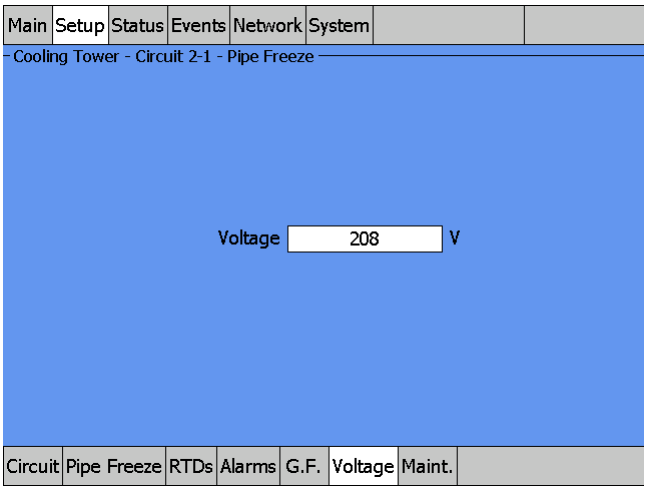


Fig. 3.43 Setup|Voltage (Pipe Freeze PASC Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage this tab does not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

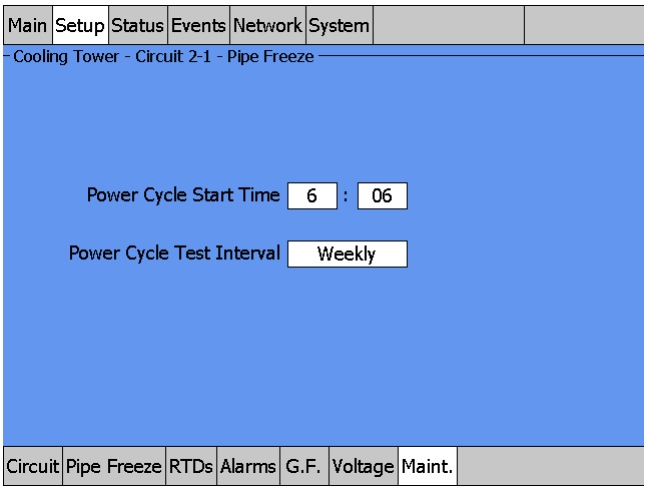


Fig. 3.44 Setup|Maint. window (Pipe Freeze PASC Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: THE TIME OF DAY TO START THE POWER CYCLE TEST

Range: 00:00 to 23:59

Default: Each circuit is assigned a unique default start time calculated from the device ddress and relay number.

Power Cycle Test Interval: THE FREQUENCY TO RUN THE POWER CYCLE TEST

Range: Never, Daily, Weekly and Monthly

Default: Never

3.6. FUEL OIL MODE

The Fuel Oil control mode prompts you to enter the control parameters for a Fuel Oil Flow Maintenance application. In this mode, you will be given three different control method options: Ambient, Line, or PASC.

3.6.1. TEMP CONTROL – AMBIENT CONTROL

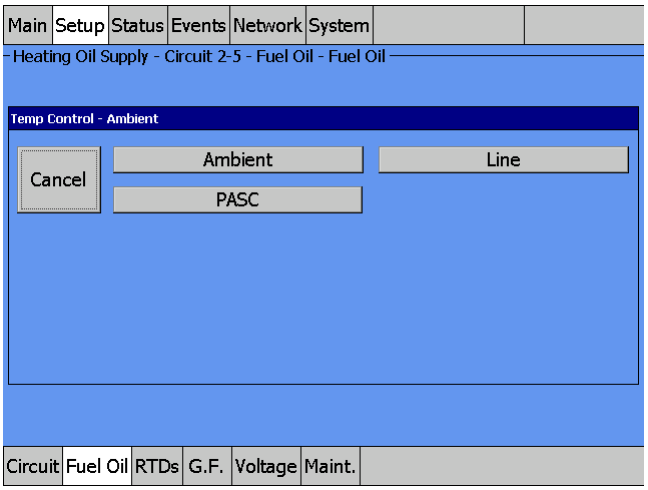


Fig. 3.45 Fuel Oil Temperature Ambient Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap Ambient.

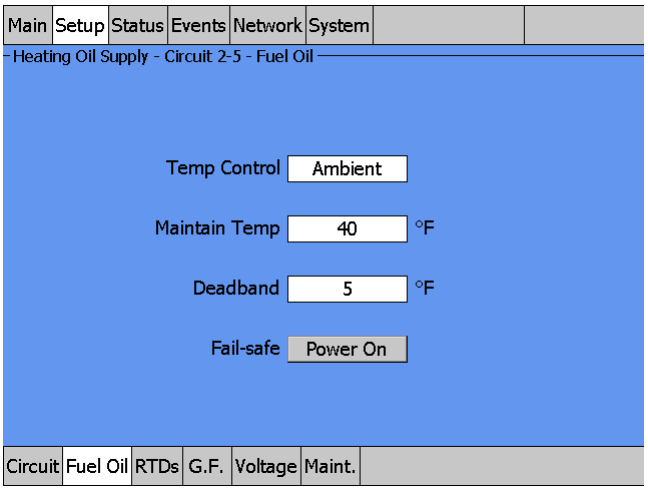


Fig. 3.46 Setup|Fuel Oil Ambient Control window

Maintain Temperature: THE SETPOINT TEMPERATURE IS THE DESIRED MAINTAIN TEMPERATURE FOR THE PIPE.

Based on the measured control temperature, the ACS-PCM2-5, or C910-485, will switch the relay output to maintain the system at the desired setpoint.

Range: 35°F (2°C)–50°F (10°C)
Default: 40ºF (4°C)

If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1ºF (1°C)–10ºF (6ºC)
Default: 5ºF (3ºC)

Fail Safe: THE FAIL SAFE CONTROL BUTTON TURNS THE POWER ON OR OFF TO THE HEATING CABLE IF THE CIRCUIT LOSES ALL VALID RTDS.

When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active. Refer to Appendix 5.3 for further details.

Assigning RTDs

After the control mode and parameters have been set tap Setup|RTDs window to assign RTDs to the circuit. When in line control mode you have the option of setting up to four RTDs for ambient control. In this mode you can have up to three of the four RTDs set to monitor the pipe. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

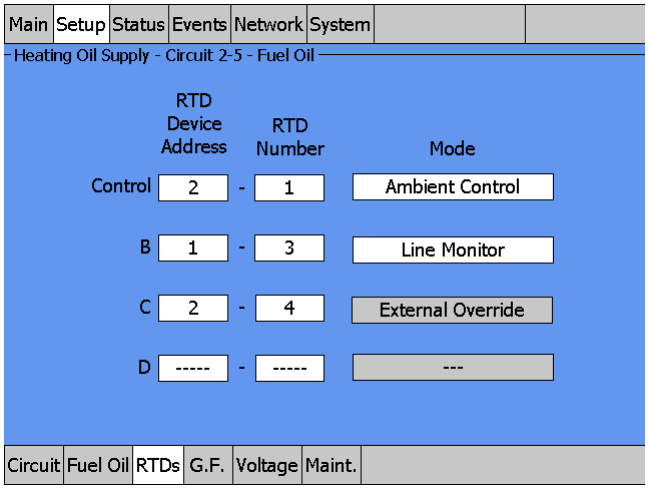


Fig. 3.47 Setup|RTDs window (Fuel Oil Ambient Control)

Assigning Temperature Alarms

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

Note: Temperature alarms can only be associated to line monitoring RTDs.
Tap the Alarms button (only shown when line monitoring RTDs are assigned.)

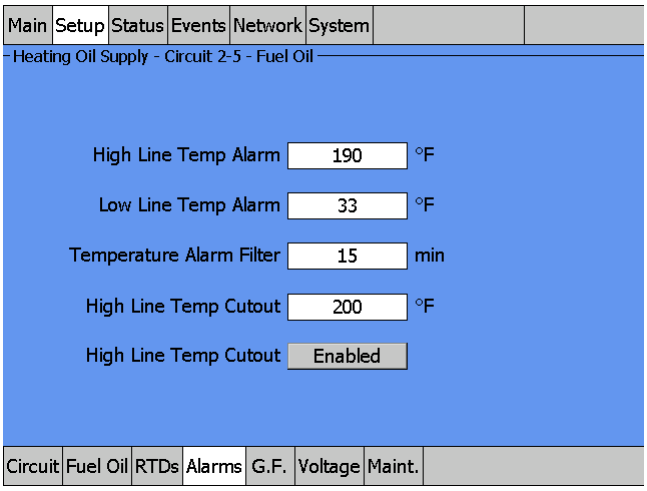


Fig. 3.48 Setup|Alarms window (Fuel Oil Ambient Control)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C)–190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33°F (1°C) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the

output is turned on and normal duty cycle control is resumed.

Range: 110°F (43°C)–200°F (93°C)
Default: 200°F (93°C)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels.

Tap the G.F. button to access the Setup|G.F. window.

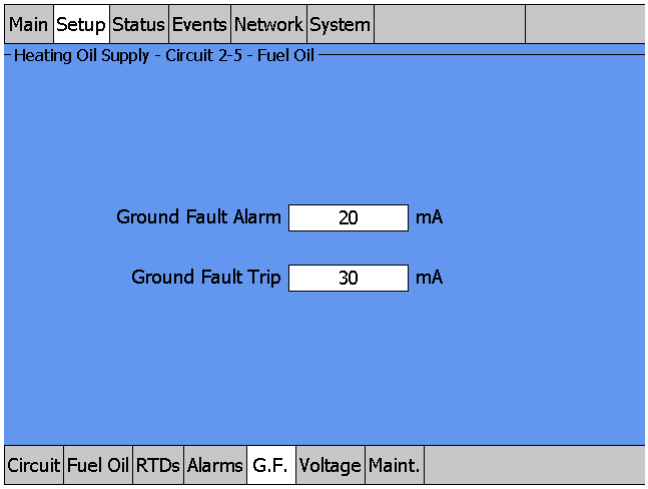


Fig. 3.49 Setup|G.F. window (Fuel Oil Ambient Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-PCM2-5 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

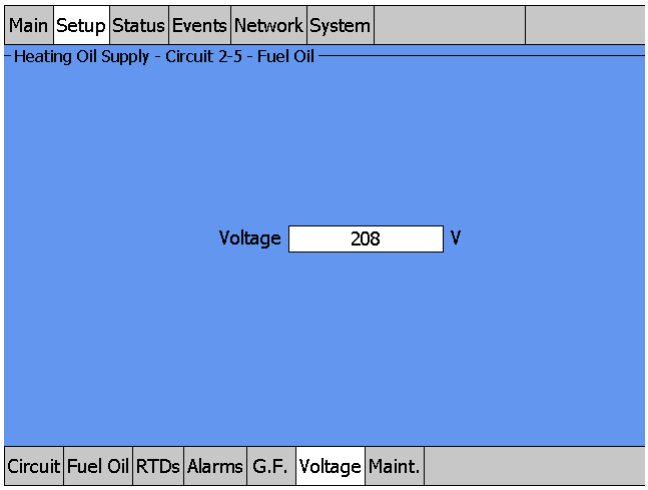


Fig. 3.50 Setup|Voltage (Fuel Oil Ambient Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measure voltage this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

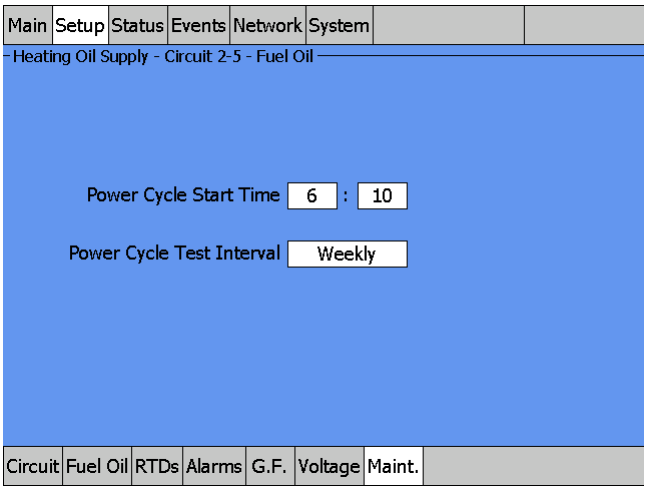


Fig. 3.51 Setup|Maint. window (Fuel Oil Ambient Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00 to 23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.6.2. TEMP CONTROL – LINE CONTROL

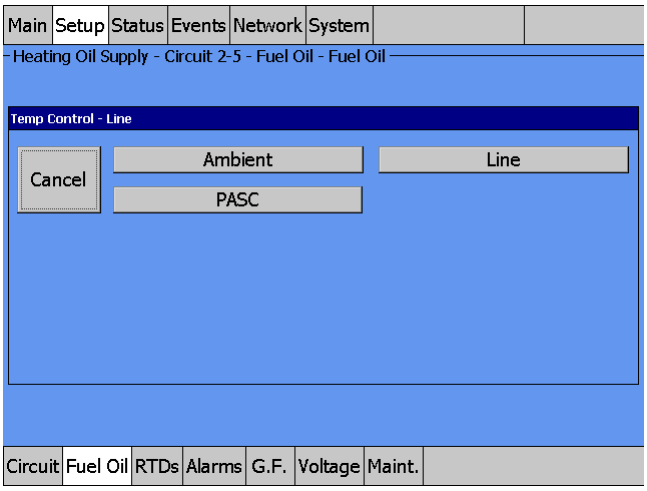


Fig. 3.52 Fuel Oil Temperature Line Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap: Line.

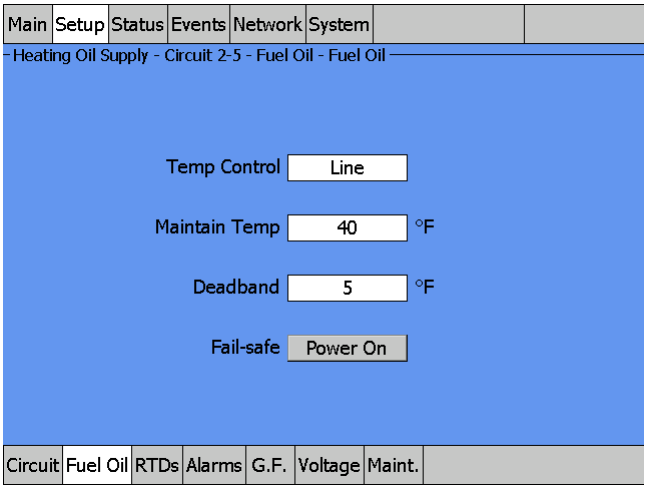


Fig. 3.53 Setup|Fuel Oil Line Control window

Setpoint Temperature: The setpoint temperature is the desired maintain temperature for the fuel oil pipe. Based on the measured control temperature, the ACS-PCM2-5 will switch the relay output to maintain the system at the desired setpoint.

Range: 35°F (2°C)–50°F (10°C)
Default: 40°F (4°C)

Deadband: If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5°F (3°C)

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs.

When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active. Refer to Appendix 5.3 for further details.

ASSIGNING RTDS

After the control mode and parameters have been set tap Setup|RTDs window to assign RTDs to the circuit. When in line control mode you have the option of setting up to four RTDs for pipe line sensing. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

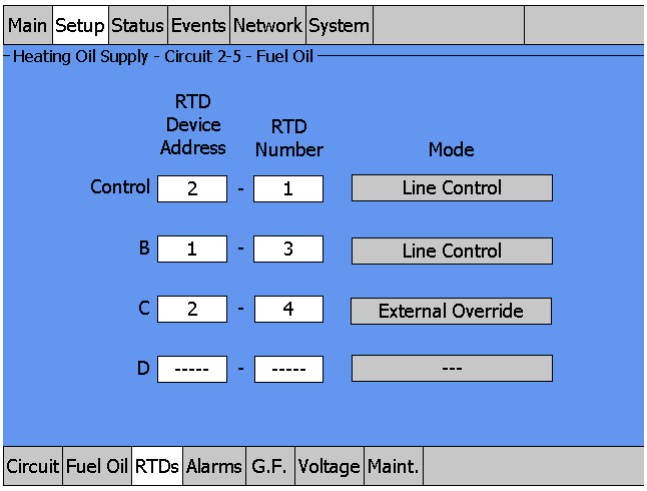


Fig. 3.54 Setup|RTDs window (Fuel Oil Line Control)

Assigning Temperature Alarms

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

Tap the Alarms button

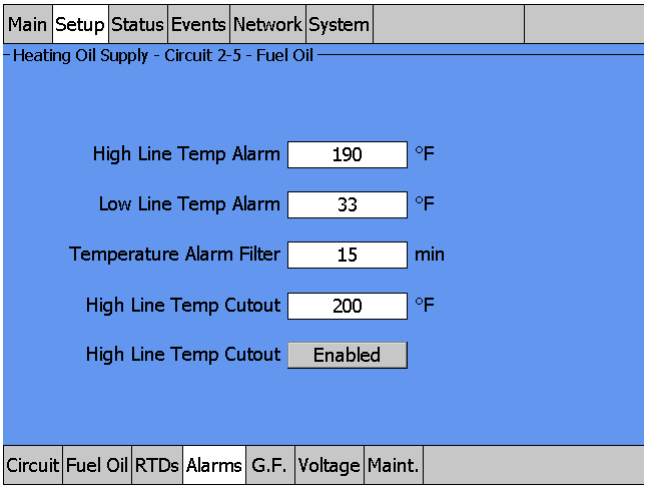


Fig. 3.55 Setup|Alarms window (Fuel Oil Line Control)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C)–190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33°F (1°C) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: 110°F (43°C)–200ºF (93ºC)
Default: 200°F (93ºC)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

Assigning Ground-Fault Alarm and Trip Level

The Ground-fault window allows you to set the alarm and trip levels.

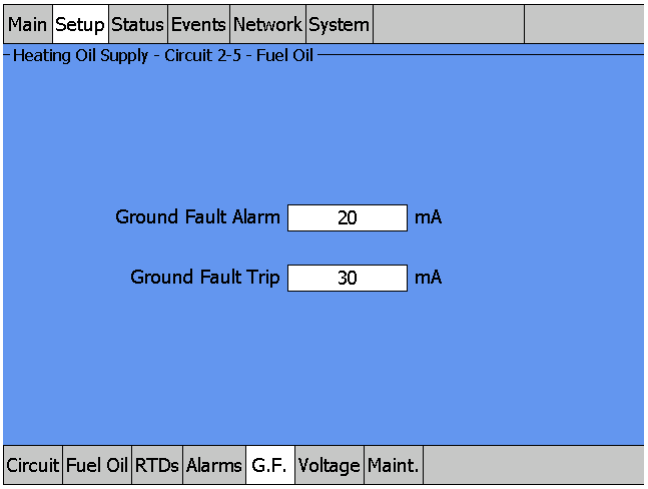


Fig. 3.56 Setup|G.F. window (Fuel Oil Line Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

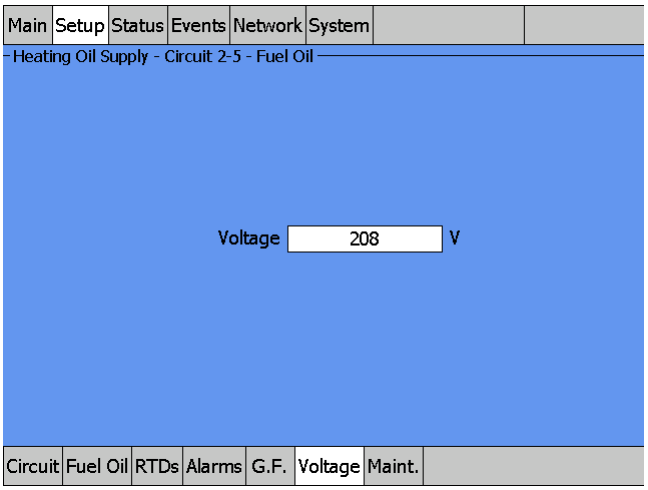


Fig. 3.57 Setup|Voltage window (Fuel Oil Line Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels), Since the C910-485 measures voltage this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

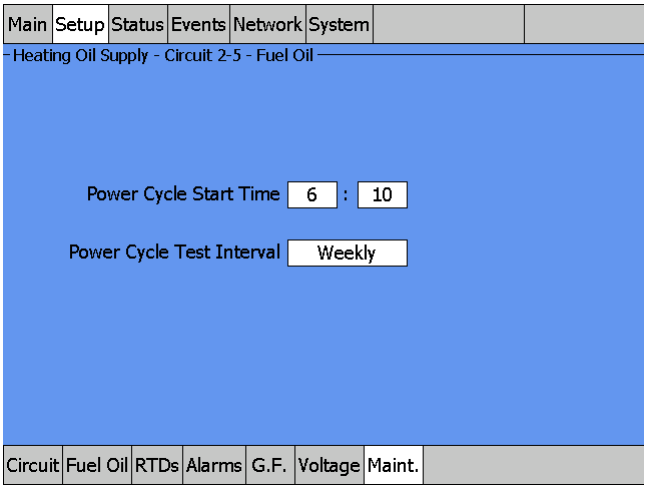


Fig. 3.58 Setup|Maint. window (Fuel Oil Line Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00 to 23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly
Default: Never

3.6.3. TEMP CONTROL – PASC CONTROL

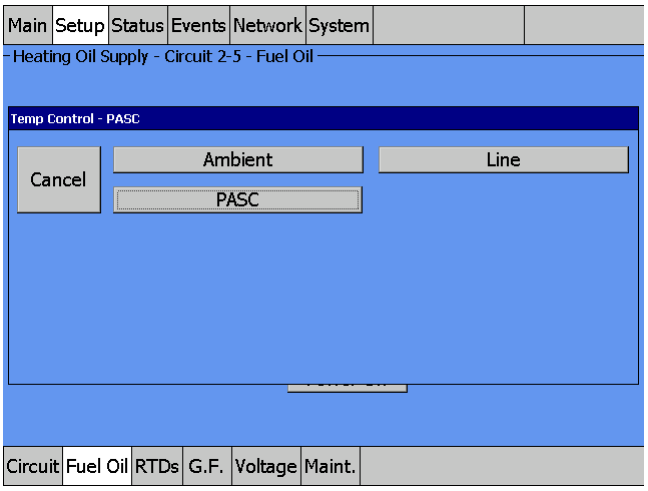


Fig. 3.59 Fuel Oil Temperature PASC Control window

The Temp Control window allows you to select the temperature control mode to Ambient Control, Line Control or PASC. This option depends on where the controlling RTD inputs are situated and utilized: either measuring the temperature of the environment surrounding the pipe (ambient), or directly on the pipe itself (line). Tap PASC

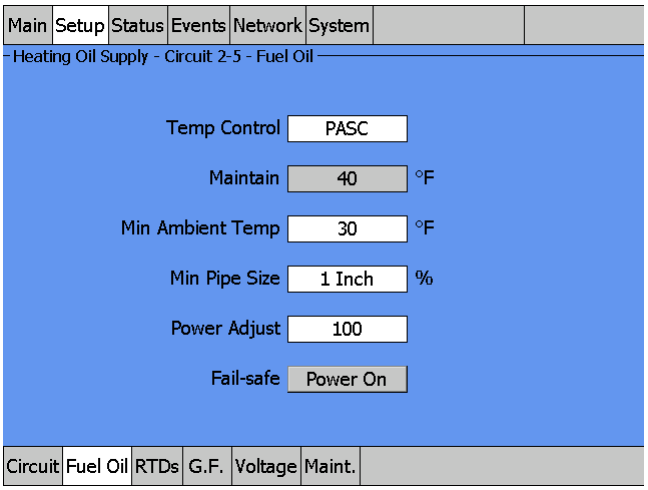


Fig. 3.60 Setup|Fuel Oil PASC Control window

PASC (Proportional Ambient Sensing Control): PASC takes advantage of the fact that the heat loss from a pipe is proportional to the temperature difference between the pipe and the ambient air. This is true regardless of heater type, insulation type, or pipe size. Once the heat tracing and insulation on a pipe has been designed to balance heat input with heat loss for maintaining a 40°F pipe, the main variable in controlling the pipe temperature becomes the ambient air temperature. The ACS-30 system has a control algorithm that uses the measured ambient temperature, the desired 40°F maintain temperature, minimum ambient temperature assumption used during design, and size of the smallest pipe diameter to calculate how long the heater should be on or off to maintain a near-constant pipe temperature.

Min Pipe Size: Min. Pipe Size is the diameter of the smallest heat-traced pipe in the group controlled by this circuit. Small diameter pipes heat up and cool down more rapidly than larger diameter pipe. Therefore, the PASC duty cycle is calculated over a shorter time base. Larger diameter pipes heat and cool less rapidly, so the on/off periods for the heater system can be stretched over a longer period. If electromechanical contactors are being used to control the heater circuit, the longer time base reduces the number of contactor on/off cycles and extends the contactor life.

Select: 0.5, 1, ≥ 2 inches
Default: 0.5 inches

Maintain temperature setpoint:

Fixed design setpoint: 40°F (5°C)

Minimum Ambient: Enter the minimum ambient temperature for your installation:

Range: -40°F (-40°C)–40°F (5°C)
Default: 30°F (-1°C)

Power Adjust: This allows the PASC control to be adjusted when the heating cable output is greater than the design assumption, or if the pipe insulation proves to be more efficient than assumed. Pipe temperature may run higher or lower than desired if the heating cable has a different output than required to offset the heat loss. The Power Adjust parameter enables a reduction or an increase in the heating effective power by entering a value less or greater than 100%

Range: 10–200%
Default: 100%

IMPORTANT: If improperly used, the Power Adjust parameter can cause the piping to get too cold or too hot. If unsure, leave at 100%. Do not change this value unless an engineer calculates the temperature impact on the system and determines that it is safe to do so. Be particularly cautious if the circuit has more than one diameter of pipe or type of heat tracing. Contact a nVent representative for assistance with this factor.

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs.

When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

External Override: The dry contacts from a BMS system or external device may be assigned to the circuit to de-energize the circuit to save power when it is not needed. All temperature and system alarms are still active. Refer to Appendix 5.3 for further details.

Assigning RTDs

After the control mode and parameters have been set tap Setup|RTDs window to assign RTDs to the circuit. When in PASC control mode you have the option of setting up to four RTDs for ambient sensing PASC control. In this mode you can have up to three of the four RTDs set to monitor the pipe. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30. Input from an external dry contact may also be assigned to override the system. Refer to Appendix Section 5.3, page 130 for further details.

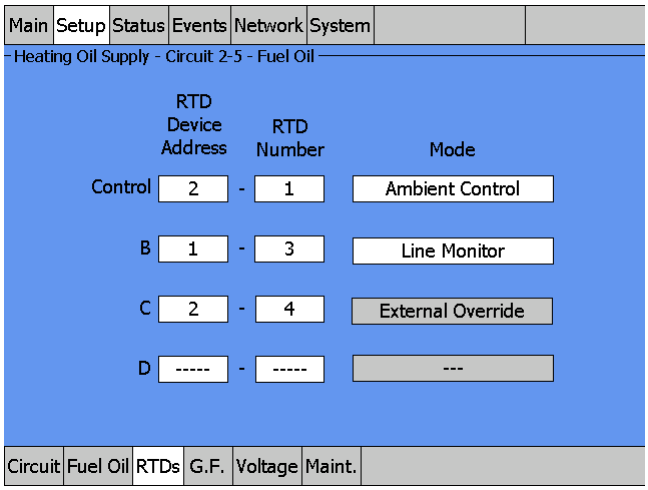


Fig. 3.61 Setup|RTDs window (Fuel Oil PASC Control)

Temperature Alarms

Once RTDs have been assigned to the circuit high and low temperature alarms may be set.

Note: Temperature alarms can only be associated to line monitoring RTDs.

Tap the Alarms button (only shown when line monitoring RTDs are assigned.)

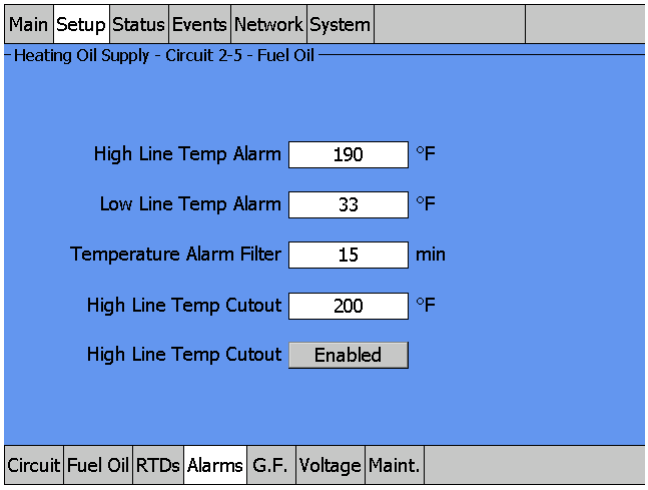


Fig. 3.62 Setup|Alarms window (Fuel Oil PASC Control)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: 100°F (38°C)–190°F (88°C)
Default: 190°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 33ºF (1ºC) to maintain setpoint
Default: 33°F (1°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: 110°F (43°C)–200ºF (93ºC)
Default: 200°F (93ºC)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

Assigning Ground-Fault Alarm and Trip Levels

The Ground-fault window allows you to set the alarm and trip levels. Tap the G.F. button to access the ground-fault window.

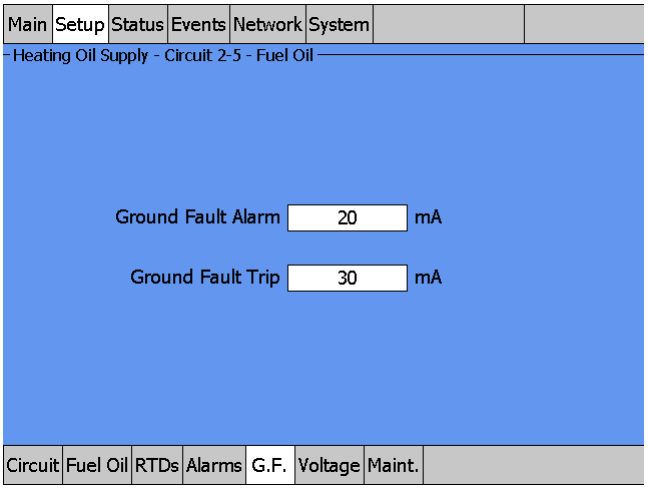


Fig. 3.63 Setup|G.F. window (Fuel Oil PASC Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

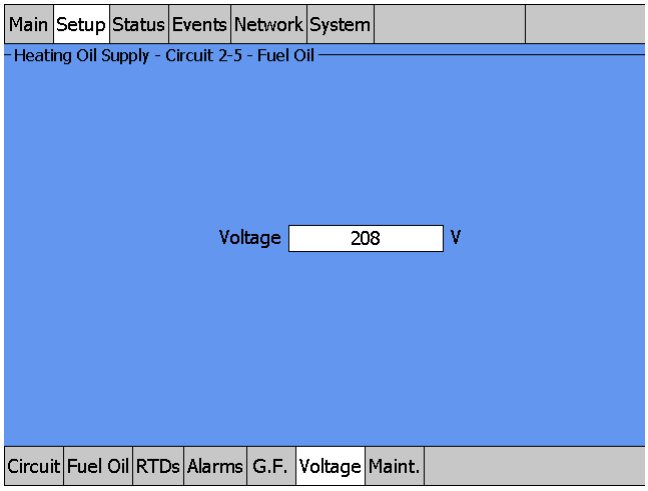


Fig. 3.64 Setup|Voltage window (Fuel Oil PASC Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage this tab will not appear.
Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

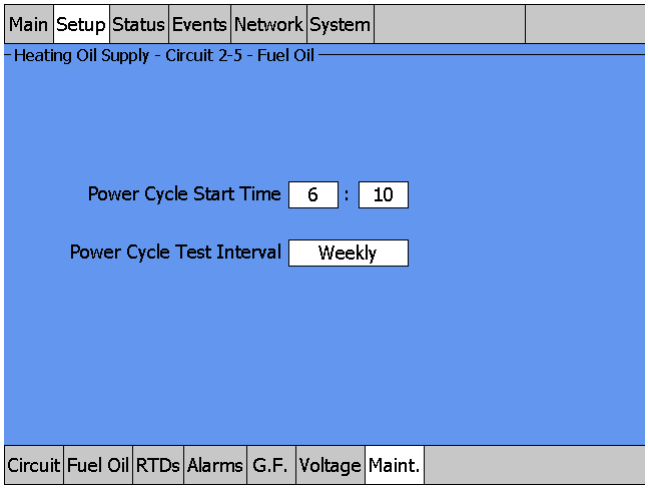


Fig. 3.65 Setup|Maint. window (Fuel Oil PASC Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00 to 23:59
Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly
Default: Never

3.7. GREASY WASTE AND TEMPERATURE MAINTENANCE MODE

The Greasy Waste control mode prompts you to enter the control parameters for a Greasy Waste application and other applications with a maintain temperature greater than 70°F.

Note: Greasy waste mode is also used for XL-Trace applications where line control above 40°F is required.

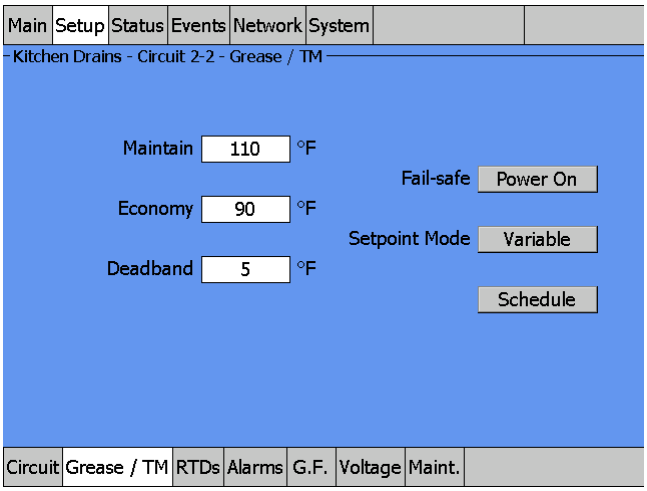


Fig. 3.66 Setup|Greasy Waste/TM window

Temperature Setpoint: The pipe temperature setpoint is the desired maintain temperature. Based on the measured control temperature, the ACS-UIT2 will switch the relay output to maintain the system at the desired setpoint.

Range: 70°F (21°C)–140°F (60°C)
Default: 110ºF (43°C)

Economy Temperature (optional): This value represents the temperature that you want the pipe to maintain when in economy mode. This input is only accessible if the Setpoint Mode is set to **Variable** which applies the temperature setpoint 24/7 scheduler function described in Appendix 5.2 24/7 Scheduler on page 127.

Enter the Economy Temperature

Range: 70°F (21°C) to Maintain temperature
Default: 90°F (32°C)

Deadband: If the control temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5ºF (3°C)

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Options: Power On or Power Off
Default: Power On

Schedule: Tapping on this button will bring up the Scheduler. See Appendix 5.2 24/7 Scheduler on page 127 for more information.

ASSIGNING RTDS

Tap Setup|RTDs window to assign RTDs after the control mode and parameters have been set.

In this mode you have the option of setting up to four RTDs for pipe temperature sensing. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

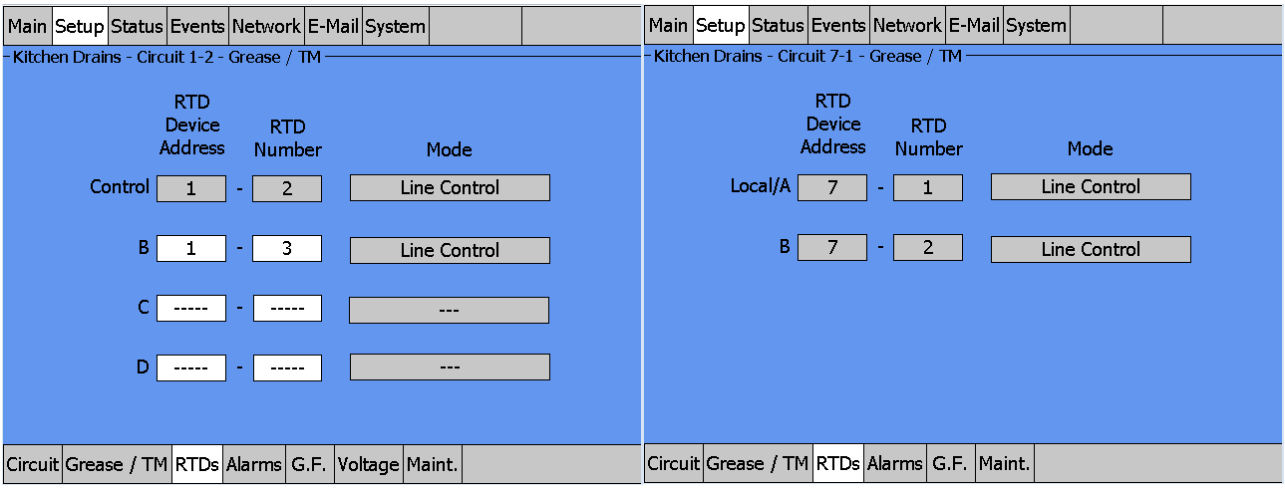


Fig. 3.67 Setup|RTDs window (Grease/TM Waste)

Assigning Temperature Alarms

Once RTDs have been assigned to the circuit the alarm button appears then high and low temperature alarms may be set. Tap the Alarms button

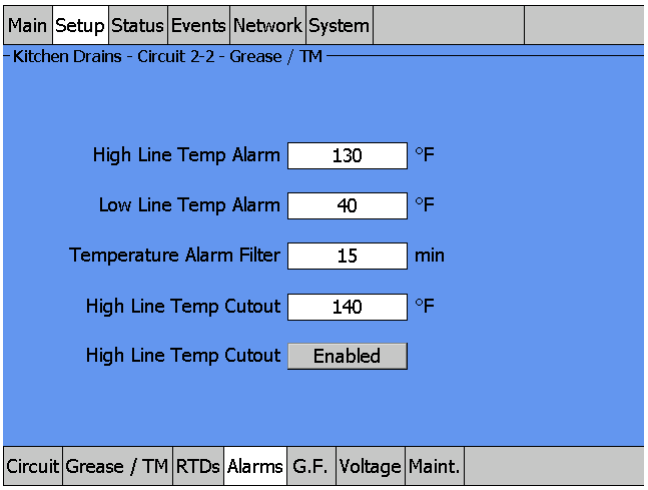


Fig. 3.68 Setup|Alarm window (Grease/TM Waste)

High Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature value you desire for your application within the range allowed.

Range: Maintain temperature plus 10°F (-6°C) to 150°F (88°C)
Default: 130°F (88°C)

Low Line Temp Alarm: If any RTDs assigned to a circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 40°F (4°C) to maintain temperature
Default: 40°F (4°C)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm conditions exist.

High Line Temp Cut-Out: If any RTDs assigned to a circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm and the relay output is turned off. If the high line temperature drops below this threshold minus the deadband, the output is turned on and normal duty cycle control is resumed.

Range: Maintain setpoint plus 20°F (11°C) to 160°F (93 °C)
Default: 140°F (93°C)

High Line Temp Cut-Out Enable/Disable: Enables or disables the high line temp cut-out capability. When enabled, the ACS-UIT2 alarms and the output relay turns OFF if any RTDs exceeds the cut-out value for the alarm filter time period. If the high line temp cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

Options: Enable or Disable
Default: Enable

ASSIGNING GROUND-FAULT ALARM AND TRIP LEVELS

The Ground-fault window allows you to set the alarm and trip levels. Tap the G.F. button to access the ground-fault window.

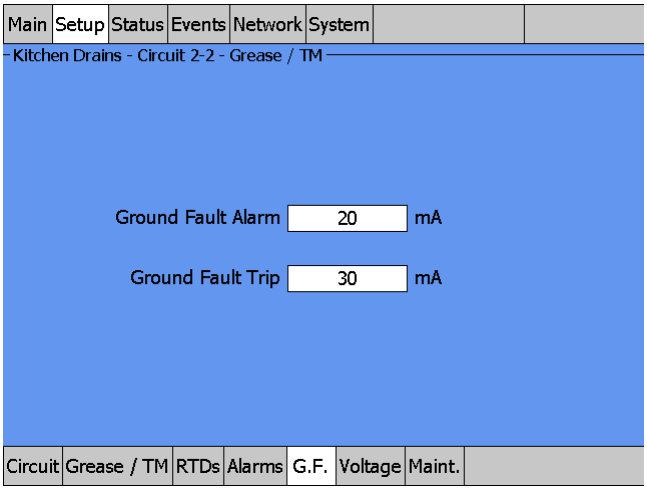


Fig. 3.69 Setup|G.F. window (Grease/TM Waste)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

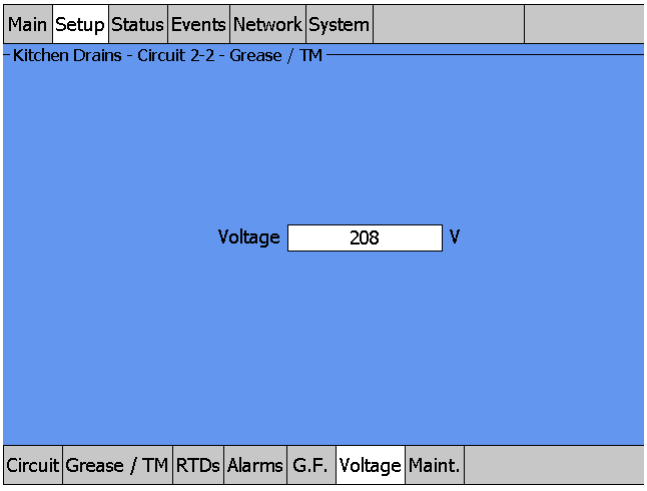


Fig. 3.70 Setup|Voltage window (Grease/TM)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. After the start time and frequency are entered the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

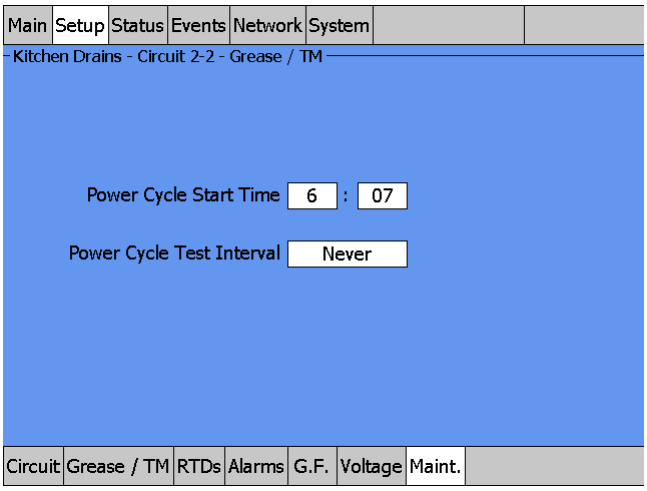


Fig. 3.71 Setup|Maint. window (Grease/TM)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00 to 23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.8. ROOF AND GUTTER DE-ICING MODE

The Roof & Gutter De-icing control mode prompts you to enter the control parameters for a Roof and Gutter De-icing application. In this mode, you will be given three different control method options: External Device, Ambient Temp and Surface Temp.

3.8.1. TEMP CONTROL – EXTERNAL DEVICE CONTROL

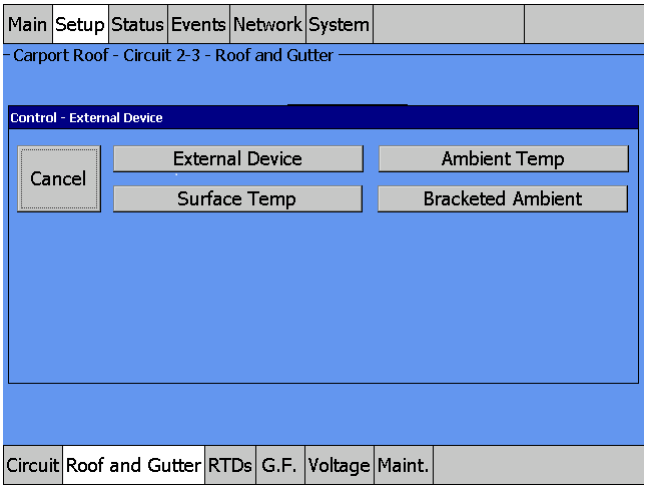


Fig. 3.72 Roof & Gutter External Device Control window

The External Device window allows you to control your Roof & Gutter De-icing application using the dry contacts on a snow controller. Refer to Appendix 5.3 Connecting External Control Devices on page 130 for connection details. Tap External Device.

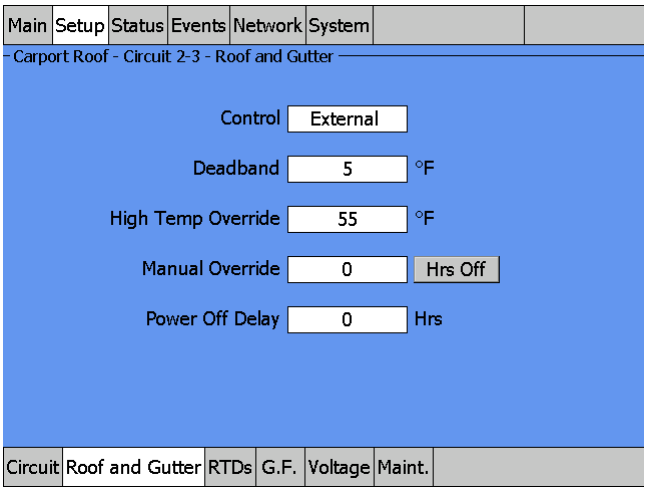


Fig. 3.73 Setup|Roof and Gutter External Device Control window

Control: In the external device mode the dry contacts from a snow controller are connected to a RTD input, or C910-485 external device, terminal. If the contacts are closed the circuit is turned on. If the contacts are open the circuit is turned off.

Deadband: If a RTD is used on the system and the measured temperature is above the high temperature override setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–9°F (5°C)
Default: 5ºF (3C)

High Temperature Override: The high temperature override is the setpoint that will override the external device input.

Range: 40°F (4°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides a manual override to force the circuit on or off for a specified period of time for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

When in external device control mode you have the option of setting up to four inputs through any RTD inputs in your system. You must have a least one External Control device, and for High Temperature Override at least one RTD must be assigned. For detailed information on the RTD window refer to Section 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

Note: If a RTD is connected to the ACS-PCM2-5, or C910-485, relay the heating cable is assigned in this mode it must be assigned to high temperature override.

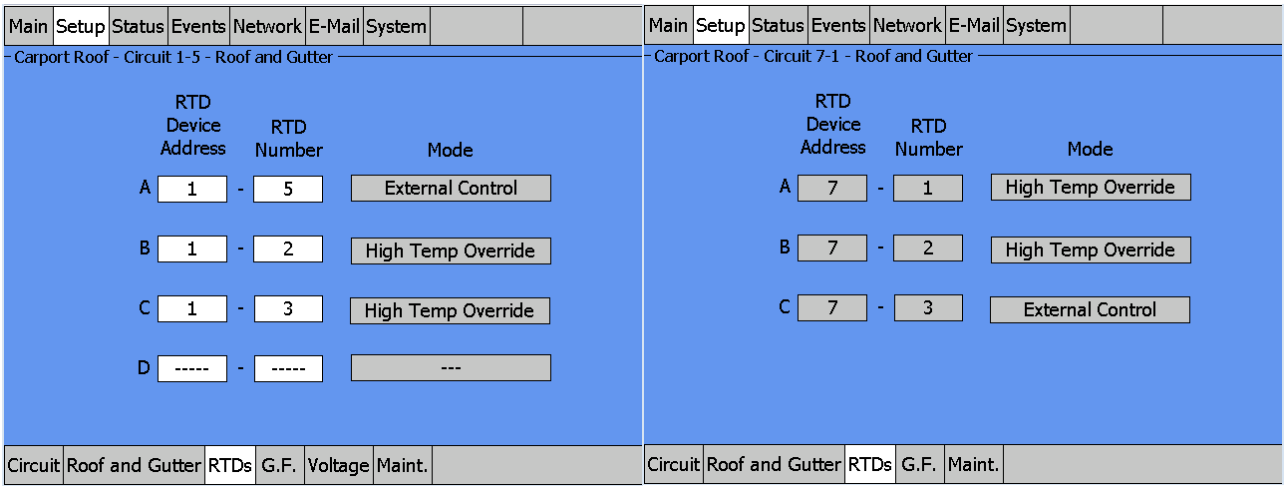


Fig. 3.74 Setup|RTDs window (Roof & Gutter External Control)

In this example a RTD was connected to the ACS-PCM2-5 relay and the External Control input was assigned from a different input.

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels. Tap the G.F. button to access the Setup|G.F. window.

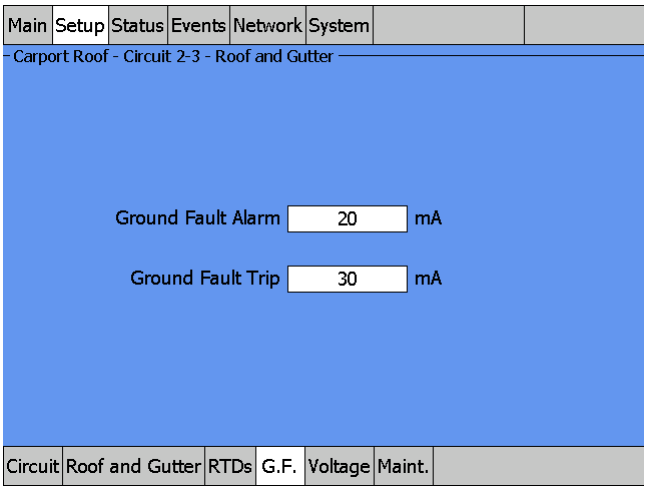


Fig. 3.75 Setup|G.F. Window (Roof & Gutter External Device)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

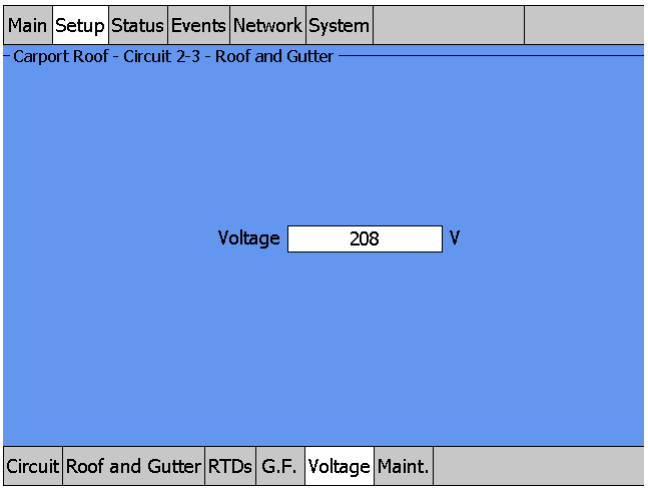


Fig. 3.76 Setup|Voltage Window (Roof & Gutter External Device)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

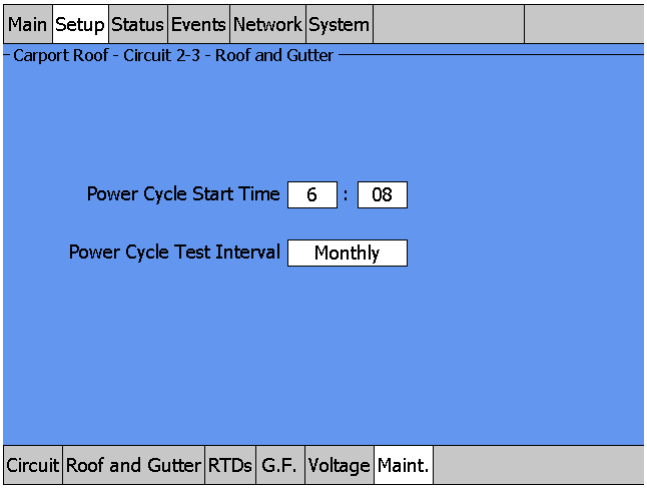


Fig. 3.77 Setup|Maint. Window (Roof & Gutter External Device)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.8.2. TEMP CONTROL – AMBIENT TEMPERATURE CONTROL

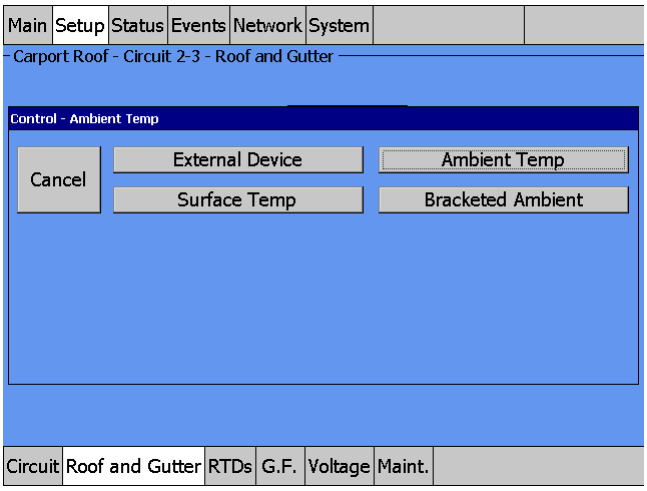


Fig. 3.78 Roof & Gutter - Ambient Temperature Control Window

The Ambient Temperature window allows you to control your Roof & Gutter application using ambient temperature. Tap Ambient Control

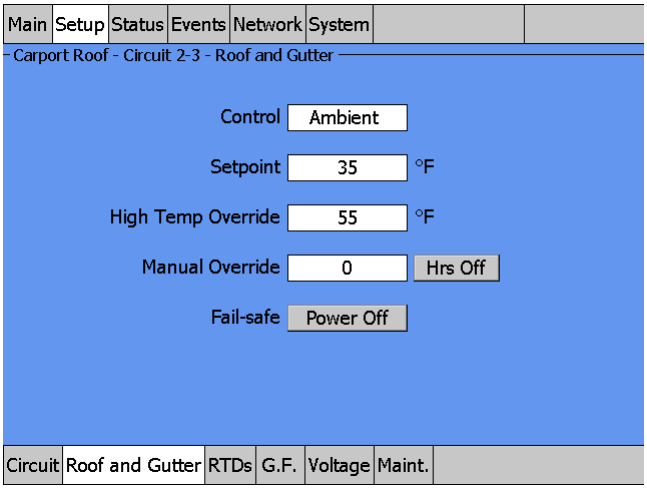


Fig. 3.79 Setup|Roof & Gutter - Ambient Temp Control Window

Setpoint: Enter the temperature setpoint for ambient control

Range: 30°F (-1°C)–50°F (10°C)
Default: 35ºF (2°C)

Deadband: If the measured temperature is above the ambient or high temperature override setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (5°C)
Default: 5ºF (3°C)

High Temperature Override: The high temperature override is the setpoint that will override the ambient control temperature. This is typically used as a gutter sensor.

Range: 40°F (4°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

When in ambient control mode you have the option of setting up to four inputs through any RTD inputs in your system. You must have a least one RTD assigned for Ambient Control, the remaining RTD positions are optional and may be used for either ambient control or High Temperature Override. For detailed information on the RTD window refer 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

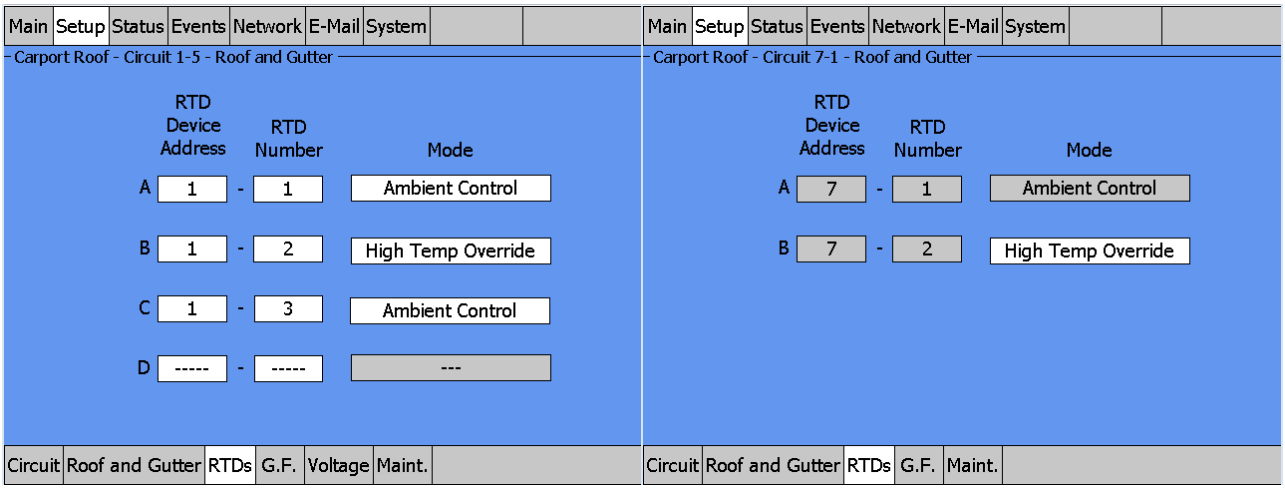


Fig. 3.80 Setup|RTDs window (Roof & Gutter - Ambient Temp Control)

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels. Tap the G.F. button to access the Setup|G.F. window.

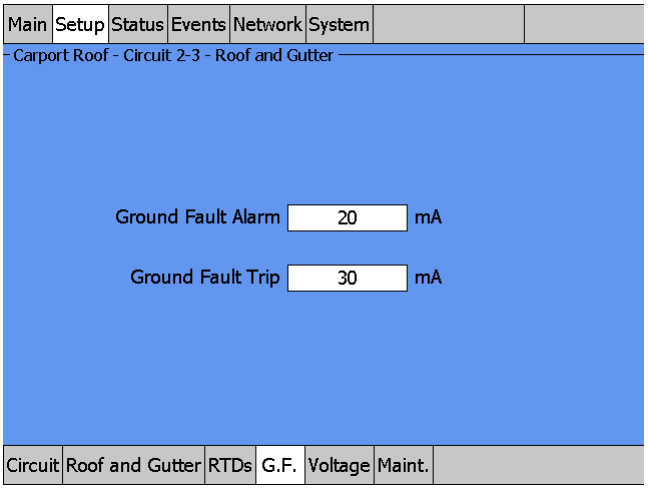


Fig. 3.81 Setup|G.F. Window (Roof & Gutter - Ambient Temp Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

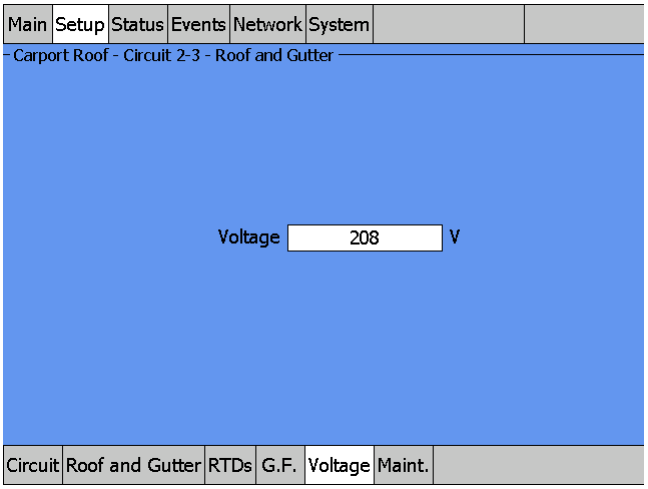


Fig. 3.82 Setup|Voltage Window (Roof & Gutter - Ambient Temp Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

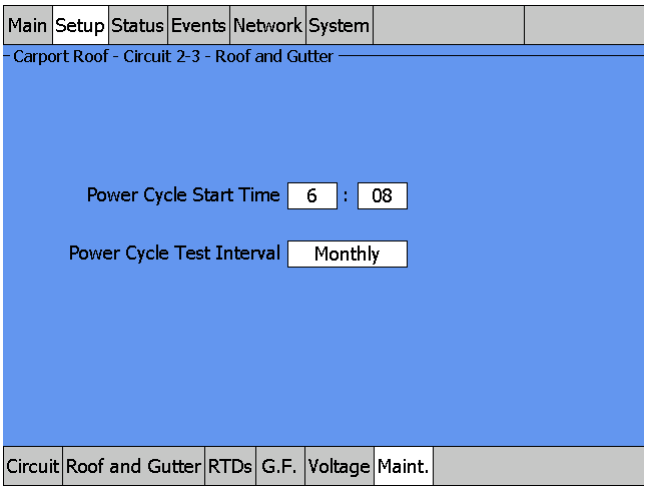


Fig. 3.83 Setup|Maint. Window (Roof & Gutter - Ambient Temp Control)

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.8.3. TEMP CONTROL – BRACKETED AMBIENT TEMPERATURE CONTROL

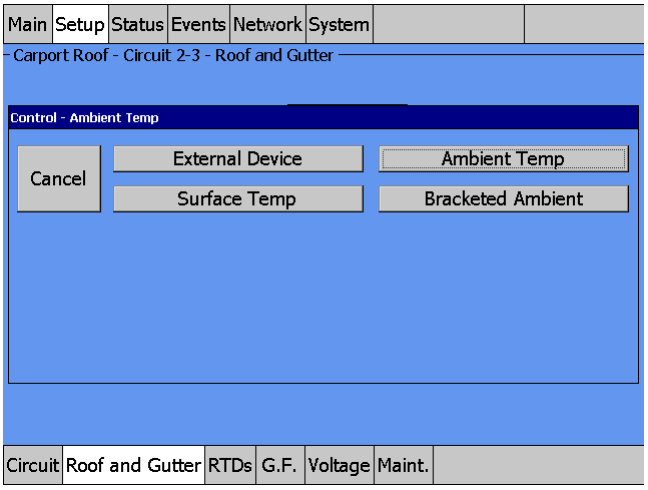


Fig. 3.84 Roof & Gutter - Bracketed Ambient Temperature Control Window

The Bracketed Ambient Temperature window allows you to control your Roof & Gutter application using ambient temperature. This mode saves energy by only powering the cable when potential ice dam formation conditions exist. Tap Bracketed Ambient Control.

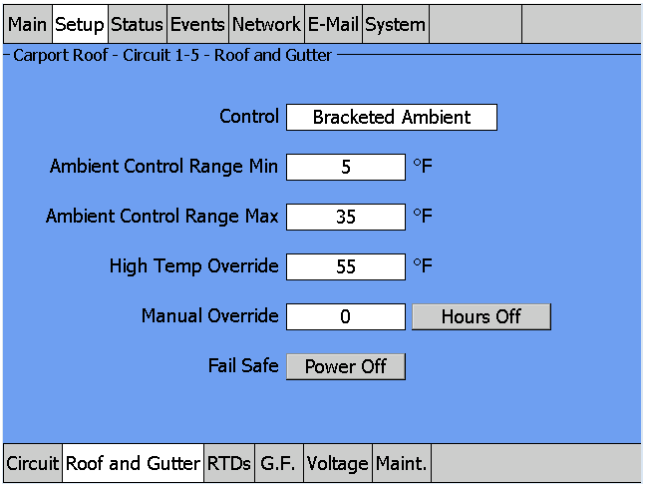


Fig. 3.85 Setup|Roof & Gutter - Bracketed Ambient Temp Control Window

Ambient Control Range: Enter the minimum and maximum ambient control range.

Min Ambient

Range: -40°F (-40°C)–30°F (-1°C)
Default: 5ºF (-15°C)

Max Ambient

Range: 30°F (-1°C)–50°F (10°C)
Default: 35ºF (2°C)

Deadband: If the measured temperature is above the ambient or high temperature override setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (5°C)
Default: 5ºF (3°C)

High Temperature Override: The high temperature override is the setpoint that will override the ambient control temperature. This is typically used as a gutter sensor.

Range: 40°F (4°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

When in ambient control mode you have the option of setting up to four inputs through any RTD inputs in your system. You must have a least one RTD assigned for Ambient Control, the remaining RTD positions are optional and may be used for either ambient control or High Temperature Override. For detailed information on the RTD window refer 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

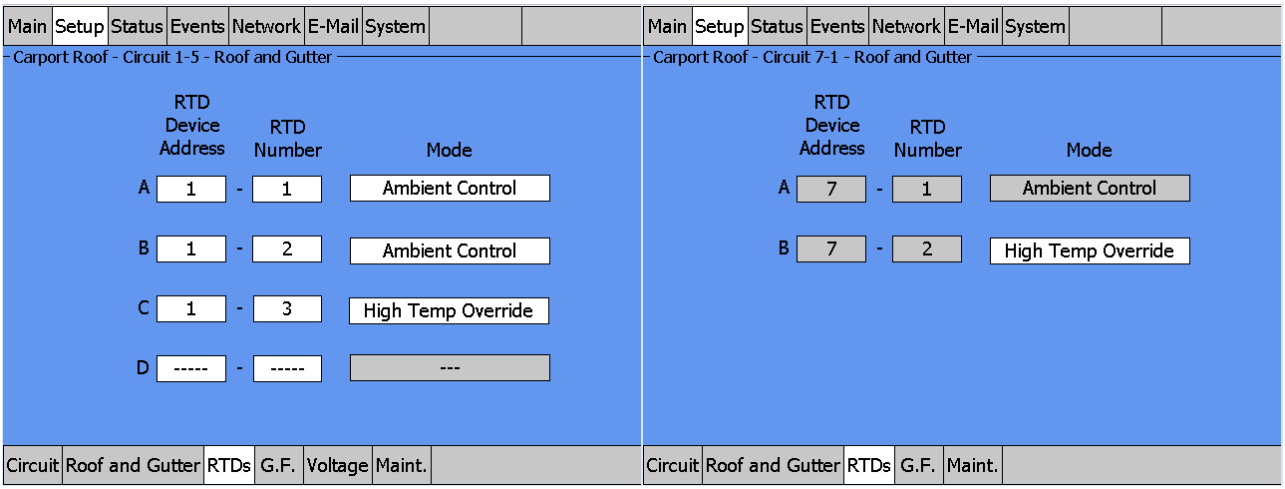


Fig. 3.86 Setup|RTDs window (Roof & Gutter - Bracketed Ambient Temp Control)

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels. Tap the G.F. button to access the Setup|G.F. window.

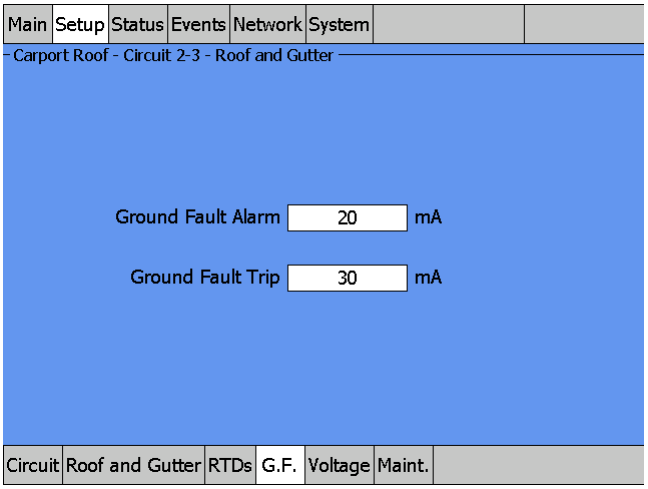


Fig. 3.87 Setup|G.F. Window (Roof & Gutter - Bracketed Ambient Temp Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

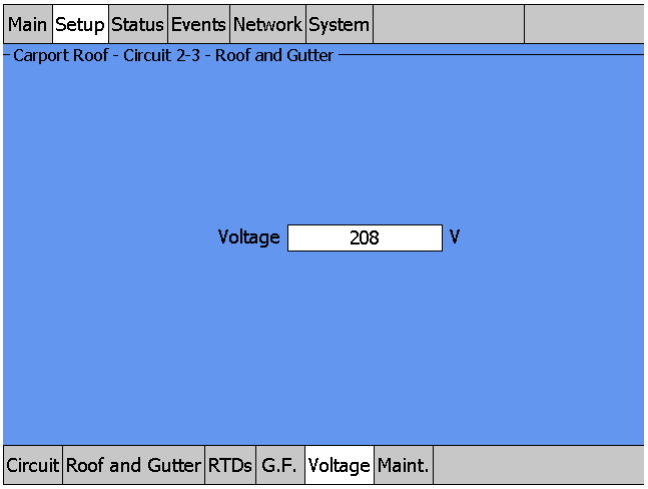


Fig. 3.88 Setup|Voltage Window (Roof & Gutter - Bracketed Ambient Temp Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage, this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

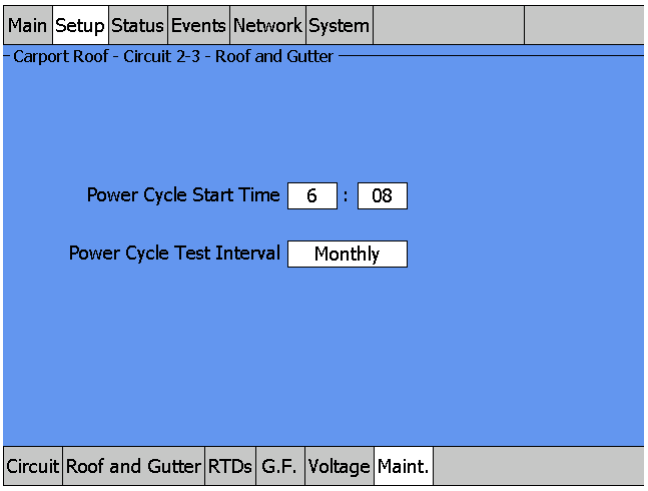


Fig. 3.89 Setup|Maint. Window (Roof & Gutter - Bracketed Ambient Temp Control)

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.8.4. TEMP CONTROL – SURFACE TEMPERATURE CONTROL

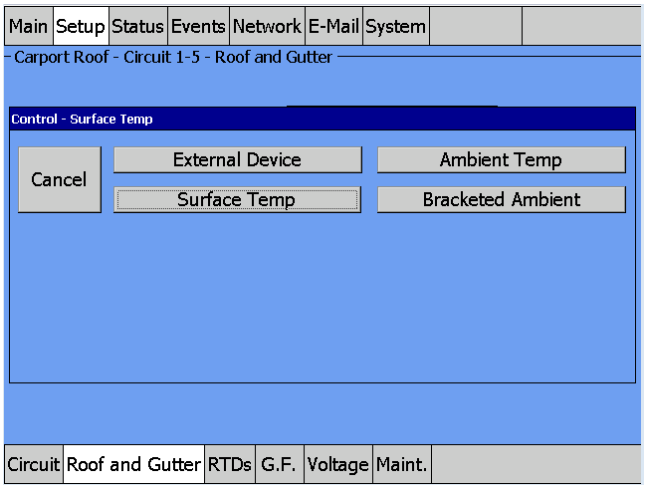


Fig. 3.90 Roof & Gutter - Surface Temp Control Window

The Ambient Temperature window allows you to control your Roof & Gutter application using ambient temperature. Tap Ambient Control

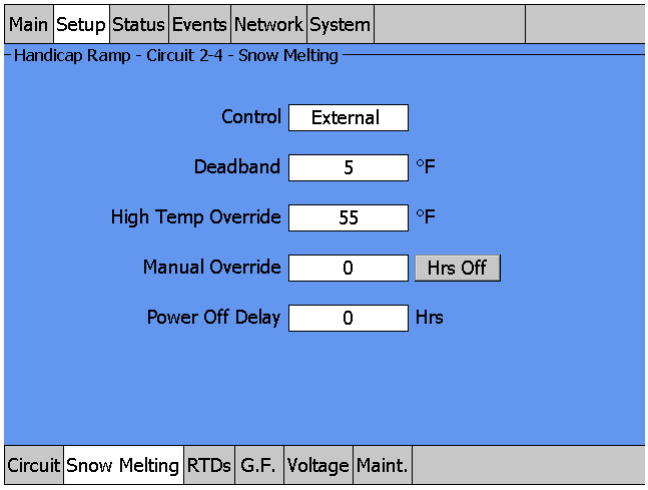


Fig. 3.91 Setup|Roof and Gutter - Surface Temp Control Window

Setpoint: Enter the setpoint temperature for surface temperature control

Range: 30°F (-1°C)–50°F (101°C)
Default: 40ºF (4°C)

Deadband: If the measured temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (5°C)
Default: 5ºF (3C)

High Temperature Override: The high temperature override will override the control temperature when multiple RTD inputs are assigned to a circuit.

Range: 40°F (4°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals that the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

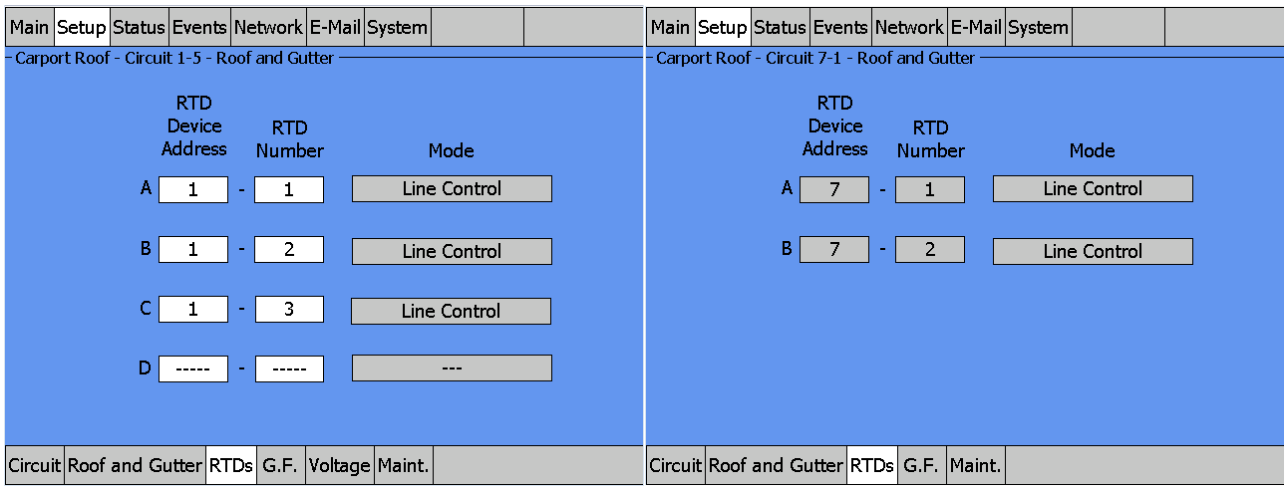


Fig. 3.92 Setup|RTDs Window (Roof & Gutter - Surface Temp Control)

When in Surface temperature control mode you have the option of setting up to four inputs through any RTD inputs in your system. For detailed information on the RTD window refer to section 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30

ASSIGNING GROUND-FAULT ALARM AND TRIP LEVEL

The G.F. window allows you to set the alarm and trip levels.

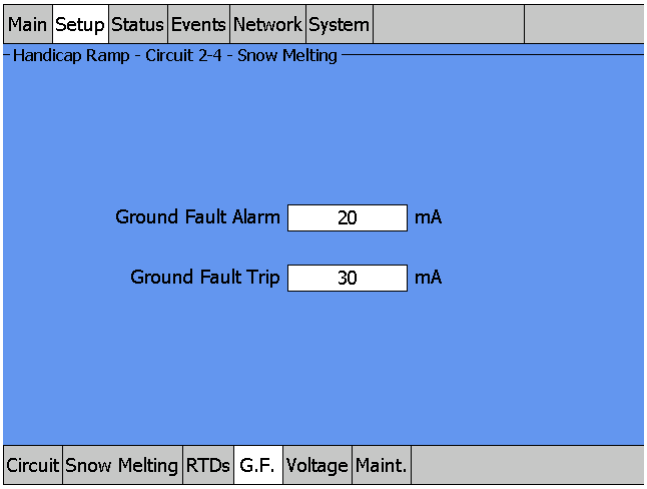


Fig. 3.93 Setup|G.F. Window (Roof & Gutter - Surface Temp Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes into alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5 turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

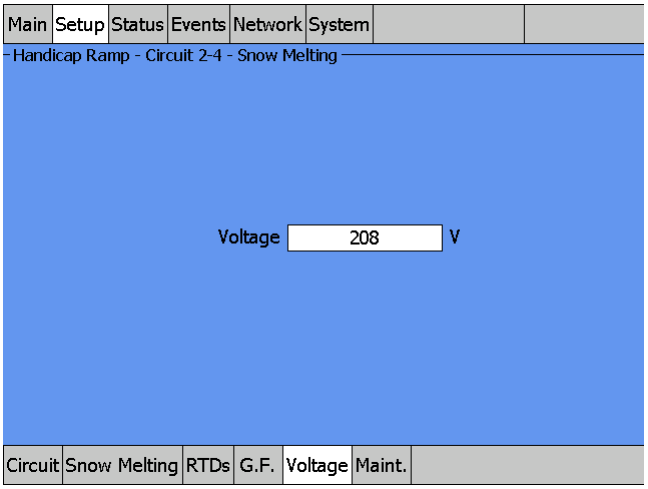


Fig. 3.94 Setup|Voltage Window (Roof & Gutter - Surface Temp Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage, this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

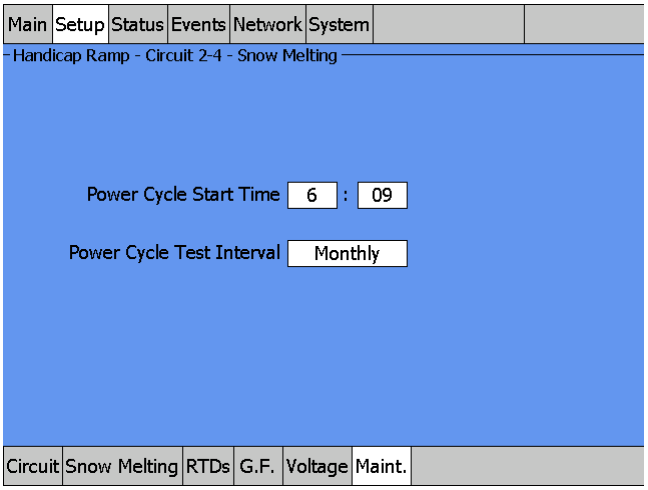


Fig. 3.95 Setup|Maint. Window (Roof & Gutter - Surface Temp Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59
Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly
Default: Never

3.9. SNOW MELTING MODE

The Snow Melting control mode prompts you to enter the control parameters for a Surface Snow Melting application. In this mode, you will be given three different control method options: External Device, Ambient Temperature and Surface Temperature.

3.9.1. TEMP CONTROL – EXTERNAL DEVICE CONTROL

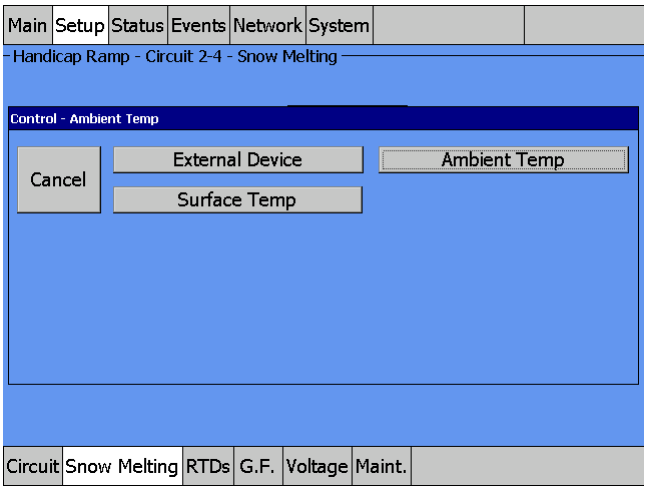


Fig. 3.96 Snow Melting External Device Control window

The External Device window allows you to control your Snow Melting application using the dry contacts on a snow controller. Refer to Appendix 5.3 for connection details. Tap External Device.

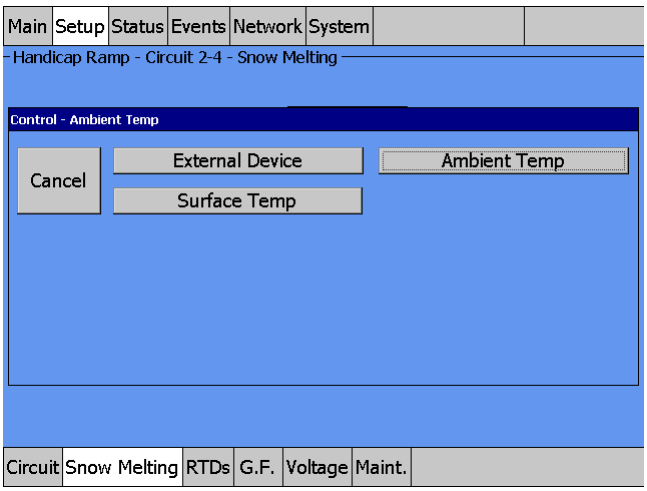


Fig. 3.97 Setup| Snow Melting External Device Control window

Control: In the external device mode the dry contacts from a snow controller are connected to a RTD or external device input terminal. If the contacts are closed the circuit is turned on. If the contacts are open the circuit is turned off.

Deadband: If a RTD is used on the system and the measured temperature is above the high temperature override setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (5°C)
Default: 5ºF (3C)

High Temperature Override: The high temperature override is the setpoint that will override the external device input.

Range: 40°F (4°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

When in external device control mode you have the option of setting up to four inputs through any RTD inputs in your system. You must have a least one External Control device, and for High Temperature Override at least one RTD must be assigned. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

Note: If a RTD is connected to the ACS-PCM2-5 relay the heating cable is assigned in this mode it must be assigned to high temperature override.

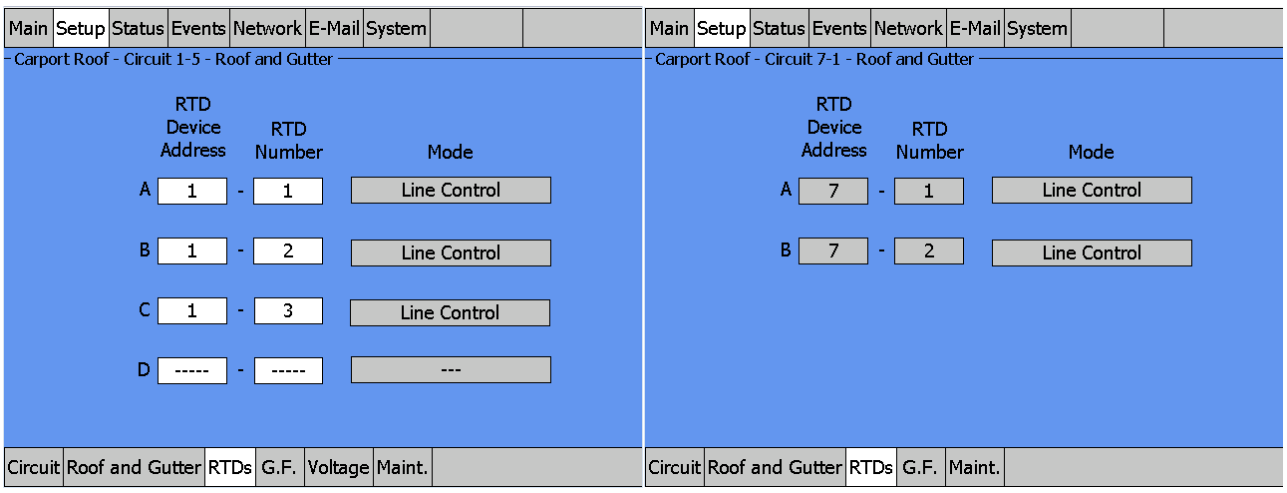


Fig. 3.98 Setup|RTDs Window (Snow Melting External Control)

In this example a RTD was connected to the ACS-PCM2-5 relay and the External Control input was assigned from a different input.

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels. Tap the G.F. button to access the Setup|G.F. window.

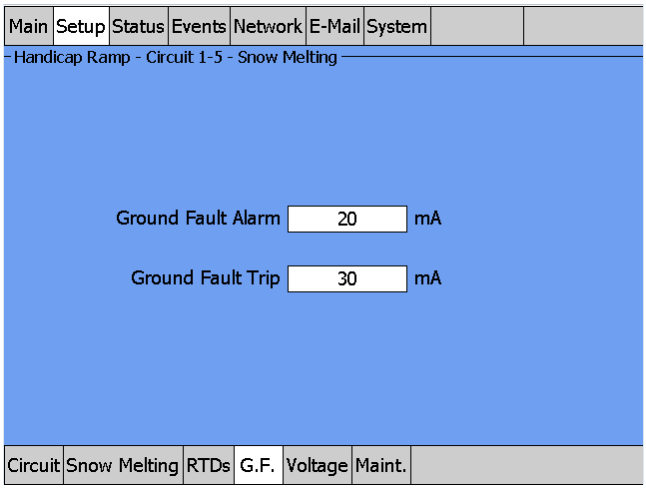


Fig. 3.99 Setup|G.F. Window (Snow Melting External Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

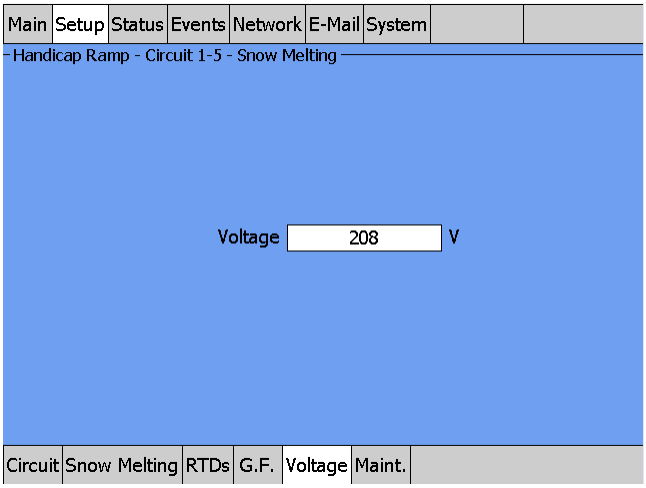


Fig. 3.100 Setup|Voltage Window (Snow Melting External Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage, this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

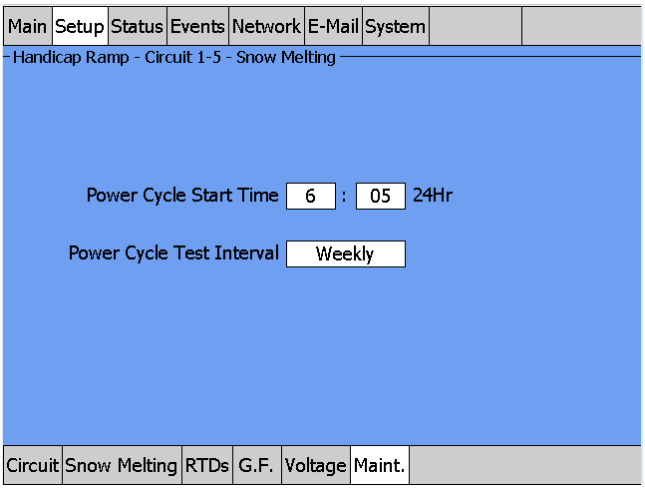


Fig. 3.101 Setup|Voltage Window (Snow Melting External Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.9.2. TEMP CONTROL – AMBIENT TEMPERATURE CONTROL

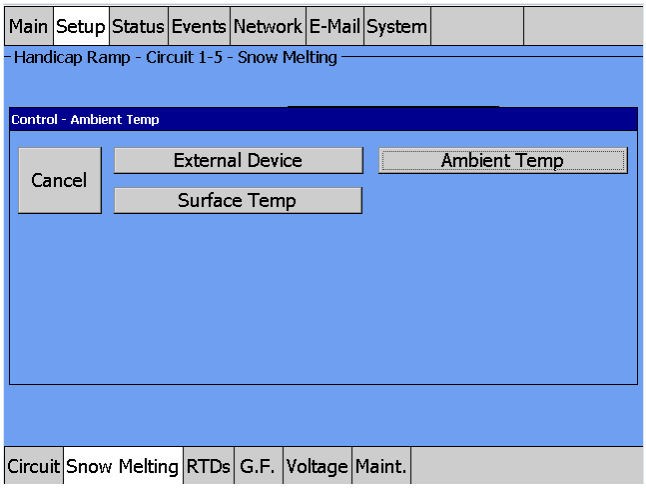


Fig. 3.102 Snow Melting - Ambient Temperature Control

The Ambient Temperature window allows you to control your Snow Melting application using ambient temperature. Tap Ambient Temp.

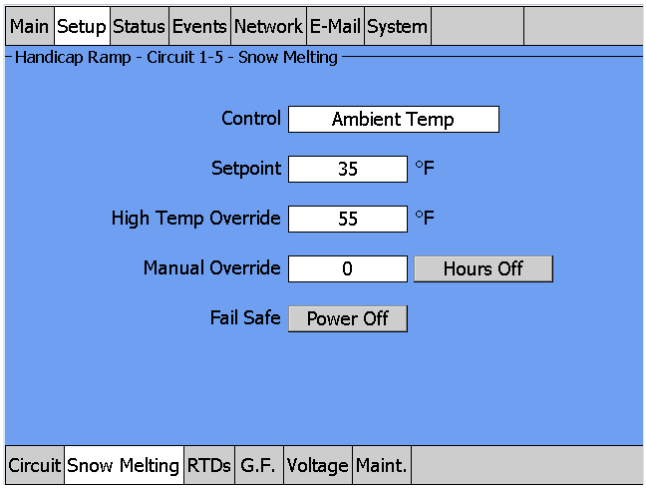


Fig. 3.103 Setup|Snow Melting - Ambient Temp Control Window

Setpoint: Enter the temperature setpoint for ambient control.

Range: 30°F (-1°C)–50°F (10°C)
Default: 35ºF (2°C)

Deadband: If the measured temperature is above the ambient or high temperature override setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (5°C)
Default: 5ºF (3ºC)

High Temperature Override: The high temperature override is the setpoint that will override the ambient control temperature. This is typically used as a gutter sensor.

Range: 40°F (3°C)–90°F (32°C)
Default: 55ºF (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

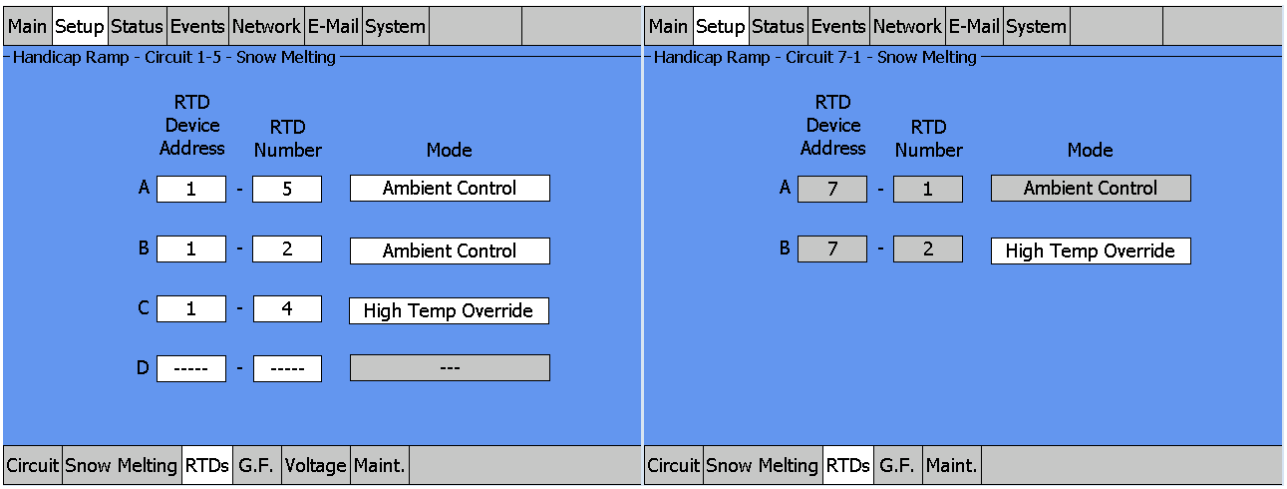


Fig. 3.104 Setup|RTD window (Snow Melting Ambient Temp Control)

When in ambient control mode you have the option of setting up to four inputs through any RTD inputs in your system. You must have a least one RTD assigned for Ambient Control, the remaining RTD positions are optional and may be used for either ambient control or High Temperature Override. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

Assigning Ground-Fault Alarm and Trip Levels

The Setup|G.F. window allows you to set the alarm and trip levels. Tap the G.F. button to access the Setup|G.F. window.

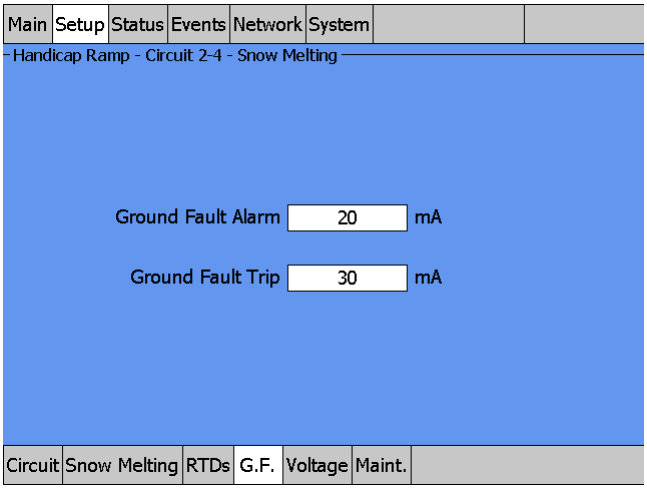


Fig. 3.105 Setup|G.F. window (Snow Melting Ambient Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm:

When the ground-fault current exceeds this level the ACS-UIT2 goes in alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip:

When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

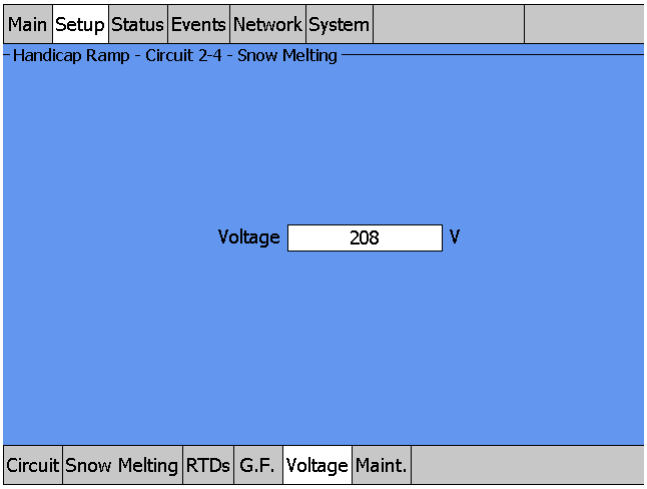


Fig. 3.106 Setup|Voltage Window (Snow Melting Ambient Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage, this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

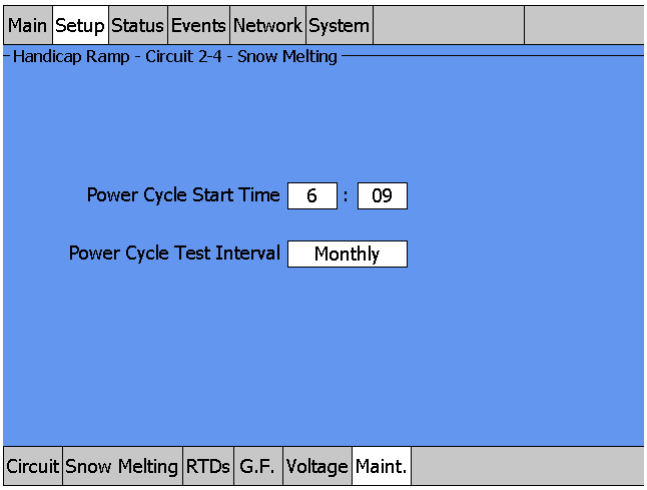


Fig. 3.107 Setup|Maint. Window (Snow Melting Ambient Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle test

Range: Never, Daily, Weekly and Monthly

Default: Never

3.9.3. TEMP CONTROL – SURFACE TEMPERATURE CONTROL

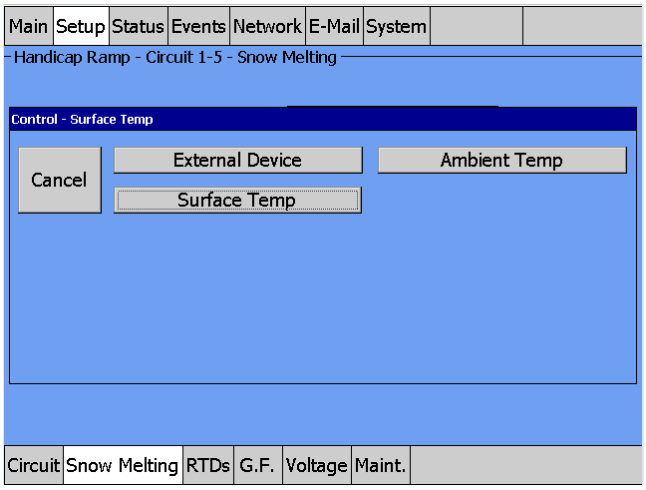


Fig. 3.108 Roof & Gutter Surface Temperature Control Window

The Surface Temperature window allows you to control your Snow Melting application using surface temperature. Tap Surface Temp.

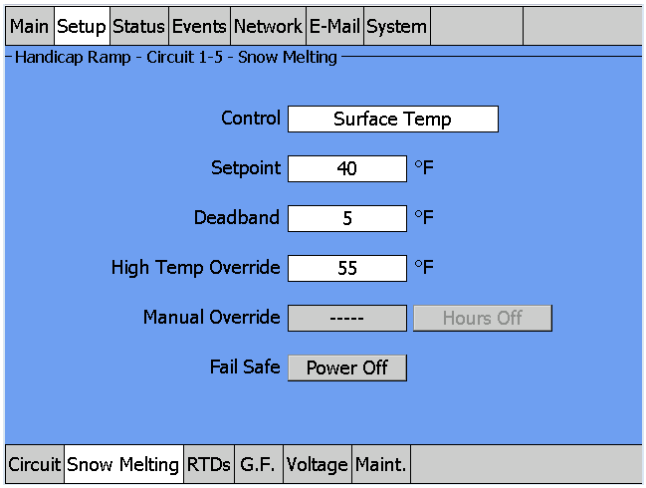


Fig. 3.109 Setup|Snow Melting - Surface Temp Control Window

Setpoint: Enter the setpoint temperature for surface temperature control
Range: 30°F (-1°C)–50°F (10°C)
Default: 40°F (4°C)

Deadband: If the measured temperature is above the setpoint temperature plus deadband, the relay output is turned off. If the control temperature is below the setpoint temperature, the output is turned on.

Range: 1°F (1°C)–10°F (6°C)
Default: 5°F (3°C)

High Temperature Override: The high temperature override will override the control temperature when multiple RTD inputs are assigned to a circuit.

Range: 40°F (4°C)–90°F (32°C)
Default: 55°F (13°C)

Override Manual: This feature provides an additional override capability for the circuit.

Range: 0–10 hours
Default: 0 hours
Hrs: On or off

Power Off Delay: Continue to power the circuit when the external control devices contacts open.

Range: 0–10 hours
Default: 0 hours

Fail Safe: The Fail Safe control button turns the power on or off to the heating cable if the circuit loses all valid RTDs. When the last remaining sensor for control fails (or communication with the sensor is lost), the ACS-UIT2:

- Signals an alarm for the failure of the sensor
- Changes control of the circuit to the fail safe control selected
- Changes the control status display to indicate that control of the circuit is in the fail safe state
- Records the events

When the sensor for control is returned to service, the ACS-30 controller signals that the alarm has been cleared, returns the circuit to its normal control mode, and records both of these events.

Range: Power On or Power Off
Default: Power On

ASSIGNING RTDS

After the control mode and parameters are set, tap Setup|RTDs window to assign RTDs to the circuit.

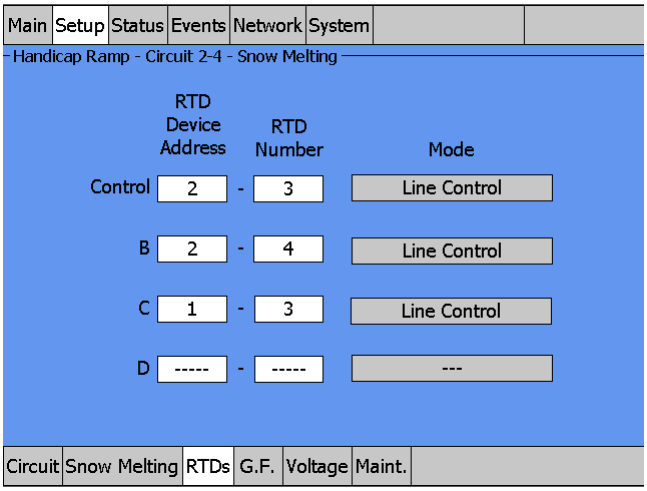


Fig. 3.110 Setup|RTDs Window (Snow Melting Surface Temp Control)

When in Surface temperature control mode you have the option of setting up to four inputs through any RTD inputs in your system. For detailed information on the RTD window refer to 2.2.3 Assigning and Sharing RTD Control and Monitoring on page 30.

Assigning Ground-Fault Alarm and Trip Level

The Ground-fault window allows you to set the alarm and trip levels.

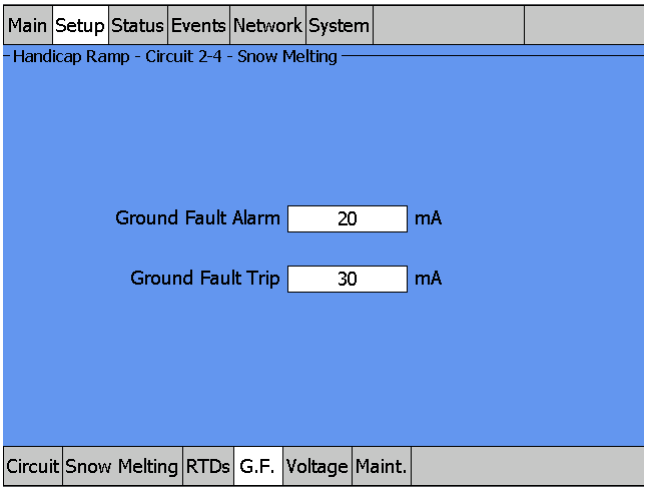


Fig. 3.111 Setup|G.F. Window (Snow Melting Surface Temp Control)

Input the Ground-Fault Alarm and Ground-Fault Trip:

Ground-Fault Alarm: When the ground-fault current exceeds this level the ACS-UIT2 goes into alarm.

Range: 10–200 mA
Default: 20 mA

Ground-Fault Trip: When the ground-fault current exceeds this level the ACS-PCM2-5, or C910-485, turns off the circuit relay.

Range: 10–200 mA
Default: 30 mA

Assigning Circuit Voltage

The Setup|Voltage window allows you to set the circuit voltage used to calculate the energy consumption of the circuit.

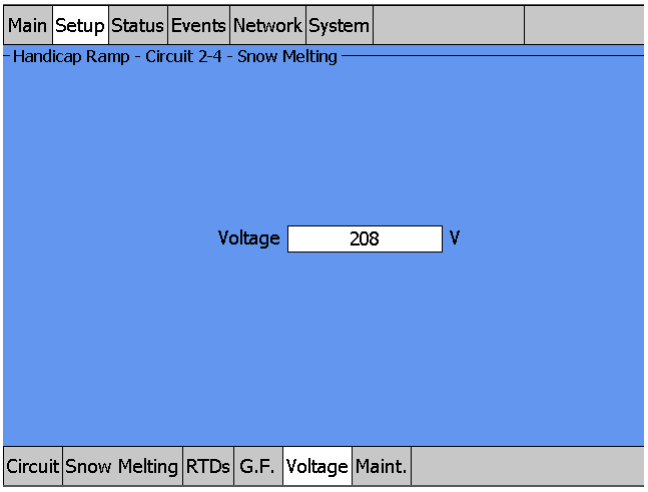


Fig. 3.112 Setup|Voltage Window (Snow Melting Surface Temp Control)

Input the Circuit Voltage

Voltage: 120, 208, 240 or 277 V (Standard ACS-PCM2-5 panels) Since the C910-485 measures voltage, this tab will not appear.

Default: 208 V

Assigning Power Cycle Test

The Setup|Maint. window allows you to enable the Power Cycle test start time and frequency. Once the start time and test frequency are entered, the time of the next test will be displayed on this screen.

Note: If the circuit is disabled, forced on, or forced off, the power cycle test will be disabled until the circuit is enabled.

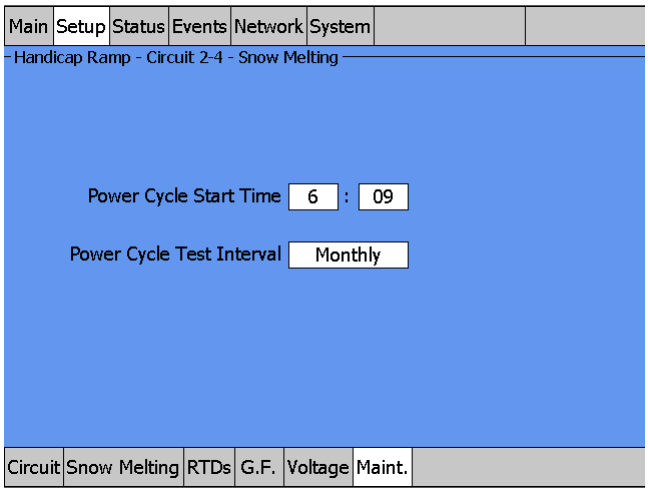


Fig. 3.113 Setup|Maint. Window (Snow Melting Surface Temp Control)

Input the start time and frequency for the Power Cycle test:

Power Cycle Start Time: The time of day to start the Power Cycle test

Range: 00:00–23:59

Default: Each circuit is assigned a unique default start time calculated from the device address and relay number.

Power Cycle Test Interval: The frequency to run the Power Cycle Test

Range: Never, Daily, Weekly and Monthly

Default: Never

4. SECTION 4 - TEMPERATURE MONITOR ONLY CIRCUITS

Five circuits are available for temperature monitoring only. These circuits are not connected to any relays on the ACS-PCM2-5 but can monitor up to four RTDs from your system. These monitoring circuits may be used to watch critical system components.

4.1. ASSIGNING A TEMP MONITOR CIRCUIT

4.1.1. SELECTING THE TEMPERATURE MONITORING CIRCUIT

The Monitor Only circuits are labeled TM-A through TM-E and can be accessed from the main screen or from the set-up window. From the main screen tap anywhere on the line of the circuit you wish to program. From the Set-up screen select Temp Monitor on the radial button and tap field entry box.(TM-A)

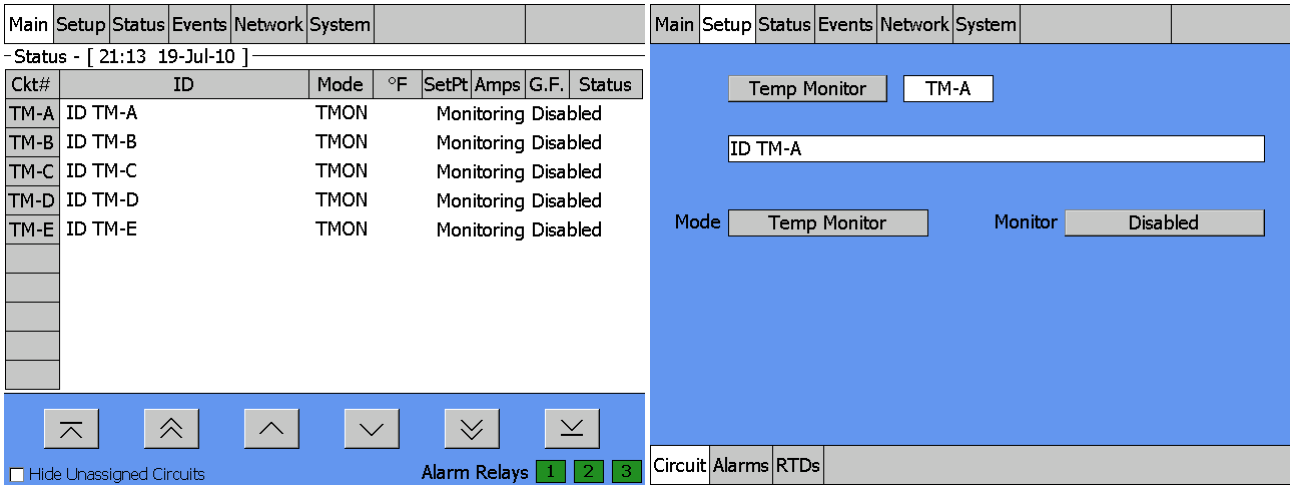


Fig. 4.1 Temperature Monitor - Circuits on Main screen and Setup Window

Select the monitor only circuit from the Temp Monitor screen.

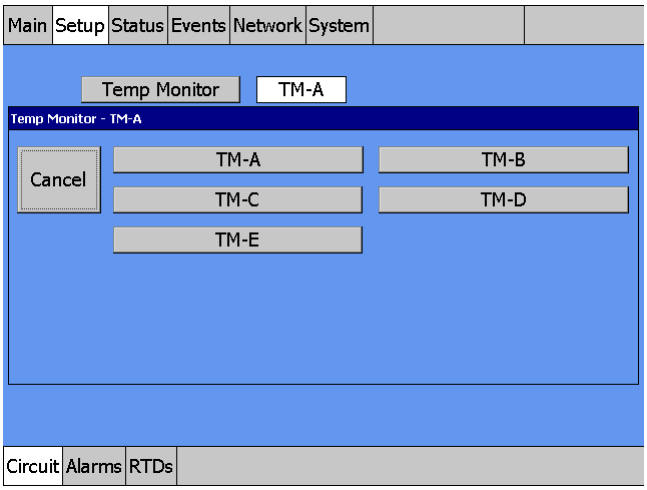


Fig. 4.2 Temp Monitor - Assign Circuit Window

4.1.2. NAMING THE TEMPERATURE MONITORING CIRCUITS

Tap on the ID field and you can enter user defined identification with the text-messaging style keypad.

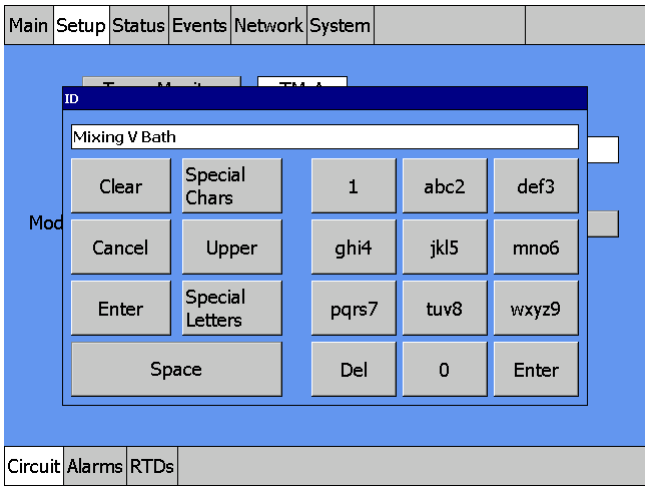


Fig. 4.3 Temperature Monitor - Circuit Identification keypad

ASSIGNING RTDS

Once the Temperature Monitoring circuit has been selected and identified tap Setup|RTD tab to assign RTDs from the system you wish to monitor.

In this mode you may assign up to four RTDs from any location in your system. Enter the Device address and relay number.

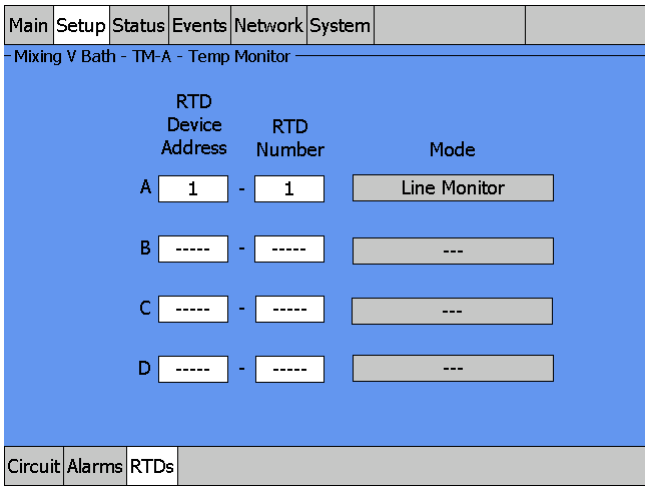


Fig. 4.4 Temperature Monitor - Assigning RTDs

ASSIGNING TEMPERATURE ALARMS

Once RTDs have been assigned to the monitoring circuit high and low temperature alarms may be set. Tap the Alarm tab

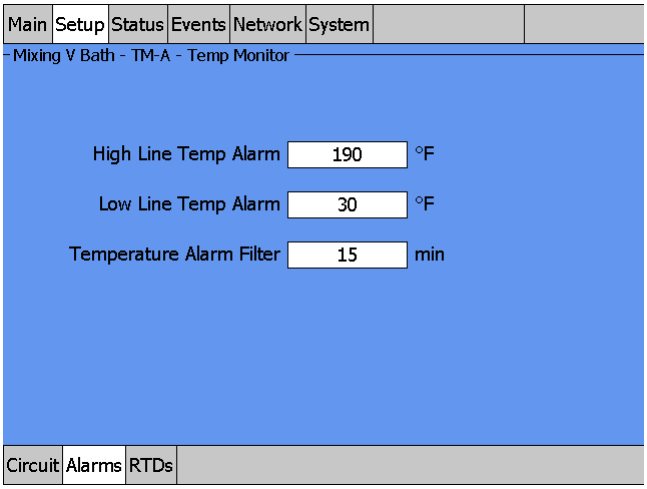


Fig. 4.5 Temperature Monitor - Setup|Alarms

High Temperature Alarm: If any RTD assigned to the temperature monitor circuit measures a temperature above this threshold, the ACS-UIT2 generates an alarm. The limit can be set for any temperature values you desire for your application within the range allowed.

Range: Low Temp–400ºF (204ºC)
Default: 200ºF (88ºC)

Low Temp Alarm: If any RTD assigned to the temperature monitor circuit measures a temperature below this threshold, the ACS-UIT2 generates an alarm.

Range: 99ºF (-40ºC) to High temp alarm
Default: -40ºF (-40ºC)

Temperature Alarm Filter: This minimizes nuisance alarms by forcing the ACS-UIT2 to verify that the alarm condition continually exists for over the selected period of time before alarming.

Range: 0–999 minutes
Default: 15 minutes

Note: Setting the Alarm Filter to 0 minutes is mainly for testing and demonstration purposes. Selecting this option for normal use may cause nuisance alarming since this option may not allow the ACS-UIT2 time to verify that the alarm condition exists.

5. APPENDICES

5.1. APPENDIX 5.1 PROPORTIONAL AMBIENT SENSING CONTROL (PASC) CONTROL MODE

PASC takes advantage of the fact that the heat loss from a pipe is proportional to the temperature difference between the pipe and the ambient air. This is true regardless of heater type, insulation type, or pipe size. Once the heat tracing and insulation on a pipe has been designed to balance heat input with heat loss and maintain a particular temperature, the main variable in controlling the pipe temperature becomes the ambient air temperature.

The ACS-30 system has a control algorithm that uses the measured ambient temperature, desired maintain temperature, minimum ambient temperature assumption used during design, and size of the smallest pipe diameter to calculate how long the heater should be on or off to maintain a near-constant pipe temperature.

The power to the heat tracing is proportioned based upon on the ambient temperature. If the ambient temperature is at or below the "minimum design ambient plus 3°F" the heaters will be on 100%. If the measured ambient is at or above the "maintain temperature –3°F" the heaters will be on 0%. For any measured ambient between "minimum design ambient" and "maintain temperature," the heaters will be on a percentage of the time equal to (maintain temperature – measured ambient) / (maintain temperature – minimum design temperature).

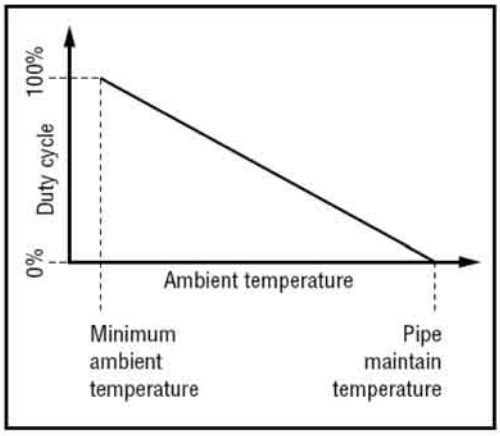


Fig. 5.1 Proportional Ambient Sensing Control (PASC)

5.2. APPENDIX 5.2 24/7 SCHEDULER

SCHEDULER FOR HWAT, FREEZER FROST HEAVE PREVENTION, FLOOR HEATING AND GREASY WASTE

The 24/7 scheduler enables the user to adjust the control setpoint of the commercial heating application depending on the time of day. A prime example would be to change the maintain temperature of an HWAT, freezer frost heave prevention, floor heating and greasy waste system to its economy temperature at night to reduce power consumption.

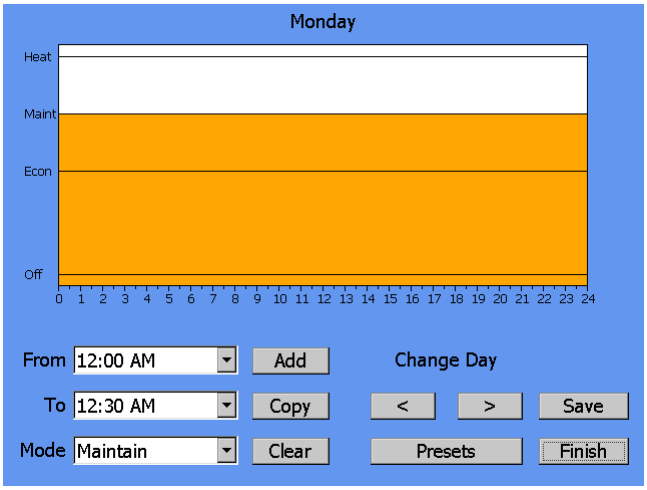


Fig. 5.2 24/7 Scheduler window

This is the main window of the Scheduler displaying all of the tools needed to create a schedule. All of the functions will be described below.

Scheduler Graph

The schedule is represented by a colored bar graph. The X-Axis is labeled by the time of day in 24-hour format starting at 12:00am and ending at 12:00pm. Each intermediate tick mark represents a half-hour in time. On the Y-Axis, each mode is labeled. Each mode is represented by both the height of the bar and the color of the bar. The mode colors are described below.

Scheduler Dropdown Boxes

The dropdown boxes labeled “From”, “To” and “Mode” are used to configure the schedule. A more detailed procedure on how to do this is described in the section called **Configuring a Schedule**.

Add Button

The add button deciphers what is configured in the Scheduler dropdown boxes and places it into the schedule. See **Configuring a Schedule** below for more information.

Copy Button

This button brings you to the Copy window allowing you to copy a day’s schedule to one or more other days. See **Copying a Day** for more information.

Clear Button

Tapping on this button will clear the entire schedule. This will set every day of the week to act in Maintain mode. This would be synonymous to setting the Setpoint Mode to Constant.

Change Day Buttons

Pressing the “<” button will navigate you to the day prior to the one that is currently being displayed. Conversely, pressing the “>” Button will advance you to the next day.

Presets Button	This button is only available in HWAT mode. It is not available in Floor Heating mode or Greasy Waste modes. Tapping on this button will bring you to the Presets configuration window where a list of scheduled presets can be selected and used. See **Presets** for more information.
Save Button	Saves the changes on the current schedule.
Finish Button	Exits the Scheduler. If the schedule changed and was not saved, the scheduler will prompt you asking if you want to save the changes that were made before exiting.

CONFIGURING A SCHEDULE

A schedule can be configured into 48 discrete 30-minute intervals per a 7-day week where each day can be unique.

Circuits can be set to one of four modes at any given 30 minute interval:

Off	The circuit is completely turned off.
Economy	The circuit is set to maintain its temperature at the configured Economy temperature.
Maintain	The circuit is set to maintain its temperature at the configured Maintain temperature.
Heat Cycle	This mode is only available for HWAT circuits utilizing the HWAT-R2 heating cable. The circuit is set to be on 100%, and is used to increase the pipe temperature above the typical maintain setpoint for a desired period of time.

To schedule a block of time to a specific mode:

1. Select the start time from the “From” drop-down menu.
2. Select the end time from the “To” drop-down menu.
3. Select the mode from the “Mode” drop-down menu.
4. Tap on the “Add” button.
5. Repeat as necessary.

COPYING A DAY

Since many times heating is needed at similar times of day, a function was included to allow you to copy a day to one or more other days. This can be accessed by tapping on the “Copy” button on the main window of the scheduler.

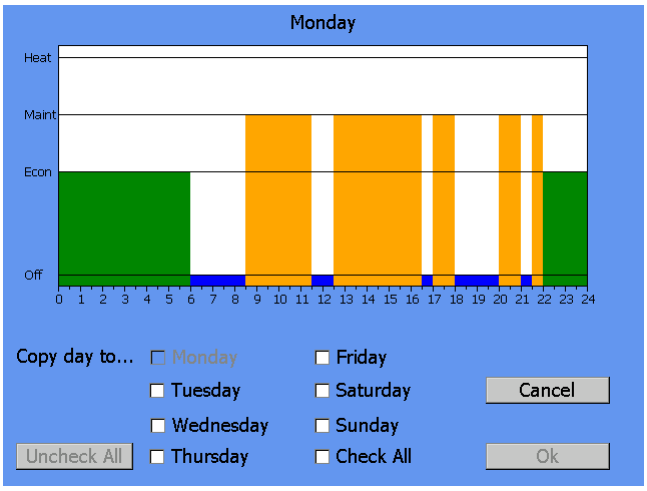


Fig. 5.3 Scheduler - copying a day

To copy a day, navigate to the day that you have already set up and press the “Copy” button on the main window. The bottom portion of the window will change to something similar shown above. Place a check mark next to each day that you the schedule to be copied to. Press OK to finish.

PRESETS

When using the scheduler for an HWAT circuit, the presets option will appear on the main window. Tapping on this button will bring you to the presets configuration window where you can choose out of a list of common presets. After choosing a preset, they can be modified to fit your specific needs.

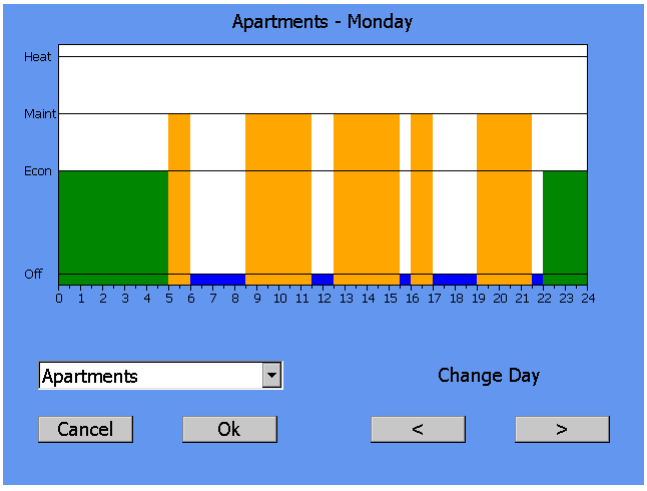


Fig. 5.4 Scheduler - presets

Presets Dropdown Box Tap on the drop down box to view the list of presets available. Selecting a preset will temporarily display it on the Scheduler Graph.

Cancel Button Tapping this button will return you to the main window with the original schedule prior to entering the Presets Configuration.

OK Button Tapping on the OK button will prompt you asking if you would like to overwrite the original schedule with the new preset schedule. After a decision is made, you will be brought back to the main Scheduler window.

Change Day Buttons As with the main window, tapping on these buttons will navigate you throughout.

5.3. APPENDIX 5.3 CONNECTING EXTERNAL CONTROL DEVICES

The ACS-30 system allows the user to connect the dry contact outputs of BMS systems or external devices to control the heating cable circuits. In this manual they consist of two categories; circuit override and circuit control. Both external control modes use the logic that when the contacts are closed the circuit should be energized and when open the circuit should be off.

In the pipe freeze protection, fuel oil flow maintenance and floor heating application modes, dry contact outputs may be connected to the RTD inputs in the ACS-PCM2-5 panel, or the external device input terminals of the C910-485 controller, to provide auxiliary override to the temperature input.

The Roof & Gutter De-icing and Surface Snow Melting control modes include an External Device control option. This option allows a Snow/Moisture sensing controller to be integrated in to the ACS-30 system.

The general approach is that each of the snow controllers has a set of contacts to turn on a heating cable circuit. The contacts can be connected to the RTD input terminals in the ACS-PCM2-5 power panel, or the external device input terminals of the C910-485 controller, that can interpret the open and closed relays as commands to turn on or off the heating cable circuits. Up to four different snow controllers may be mapped to a single circuit or may be shared to many different circuits.

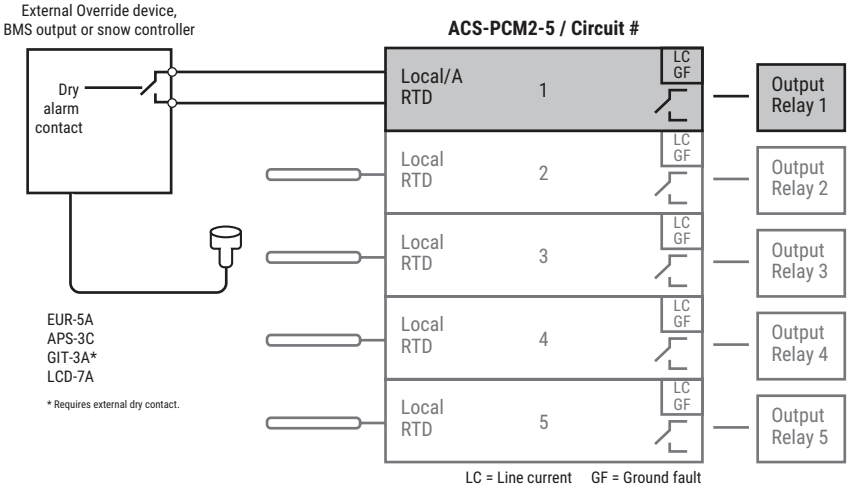


Fig. 5.5 External Device Control

CONNECTING EXTERNAL DEVICE INPUT (SNOW CONTROLLER, OVERRIDE DEVICE)

1. Connect 2-wire shielded cable from the normally open position of the external device dry contacts to the RTD input terminals on the ACS-CRM board located within the ACS-PCM2-5 power control panel, or to the external device input terminals of the C910-485 controller. Refer to ACS-PCM2-5 Installation Instructions (H58672) for further information.
2. For the ACS-PCM2-5 panel, connect the cable to terminals 1 and 3 with a jumper between position 2 and 3 as shown below:

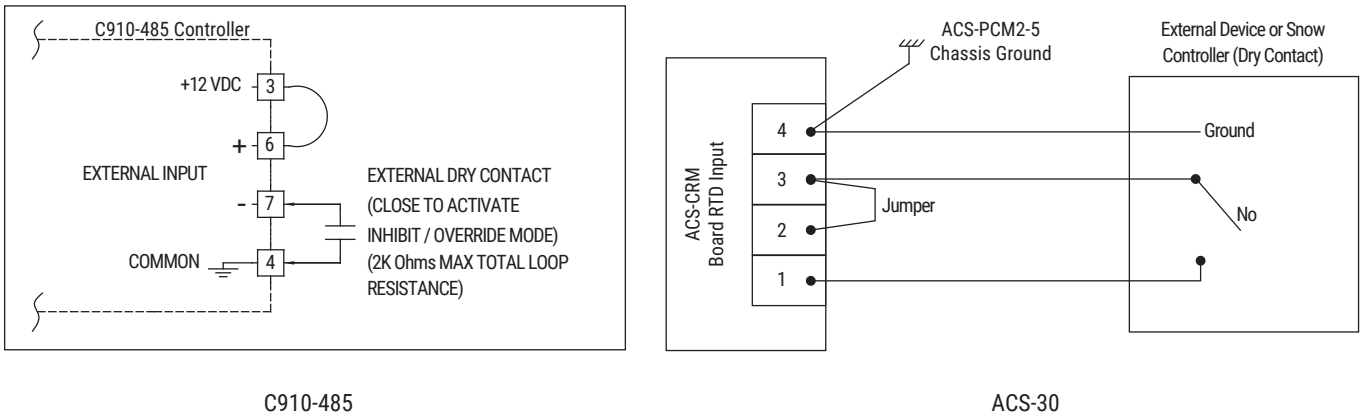


Fig. 5.6 External Device Connection

The following wiring diagrams depict how to connect the different snow controllers to the ACS-PCM2-5 RTD or C910-485 input terminals:

APS-3C

1. Connect a 470KΩ 1/4W resistor across terminals 10 and 11. This resistor simulates the RTD input required for the APS-3C which is now supplied by the ACS-30.
2. Connect 2-wire grounded/shielded cable from terminals 14-15 (normally open position) to the RTD input positions 1 and 3 and jump positions 2-3 on the ACS-PCM2-5, or terminal XXXX on the C910-485.

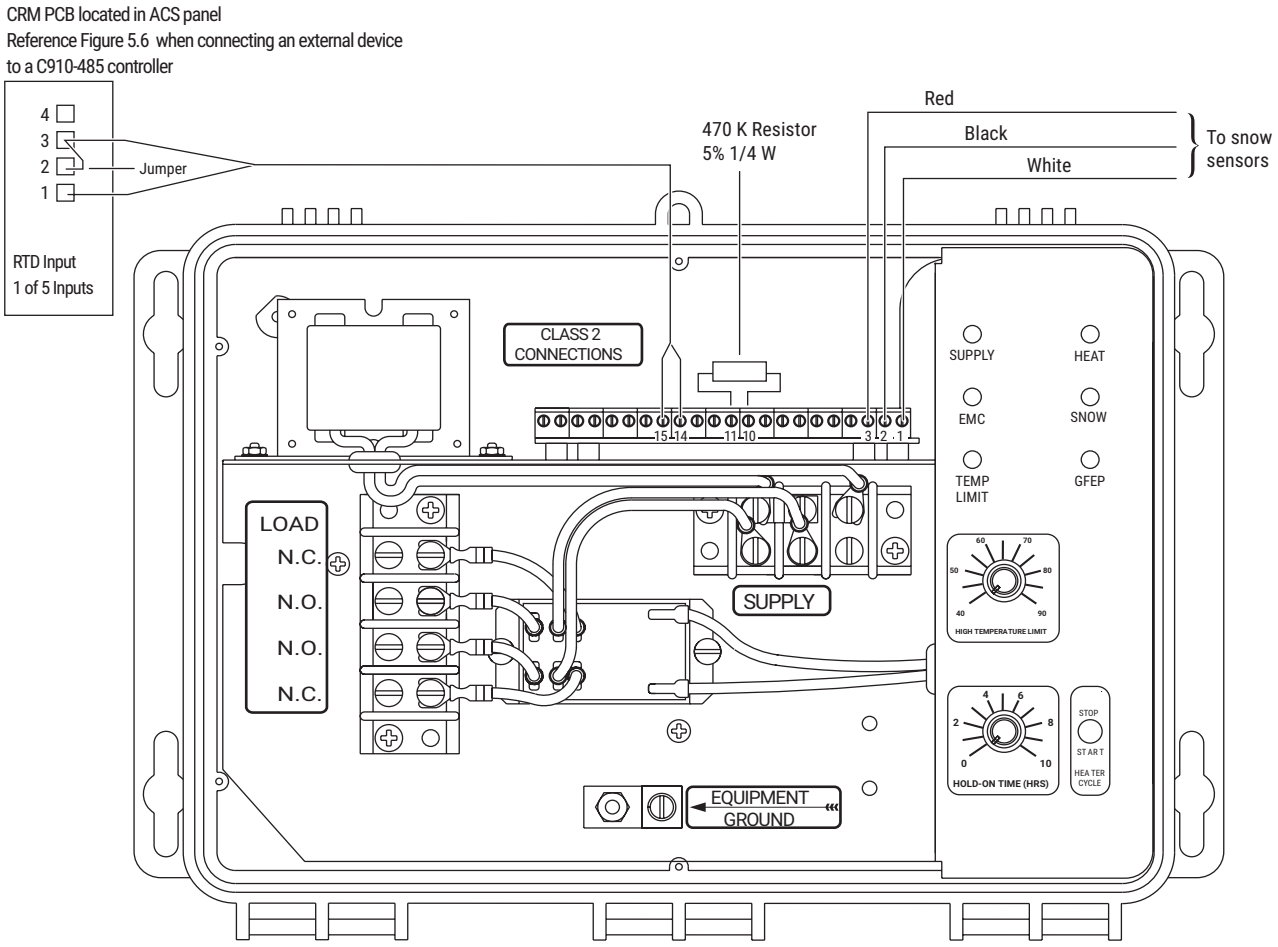


Fig. 5.7 Connecting the APS-3C

EUR-5A

1. Connect a 470KΩ 1/4W resistor across terminals 1 and 2. This resistor simulates the RTD input required for the APS-3C which is now supplied by the ACS-30.
2. Connect 2-wire grounded/shielded cable from terminals 20 and 21 (normally open position) to the RTD input 1 and 3 positions and jump positions 2-3 on the ACS-PCM2-5, or terminal XX on the C910-485.

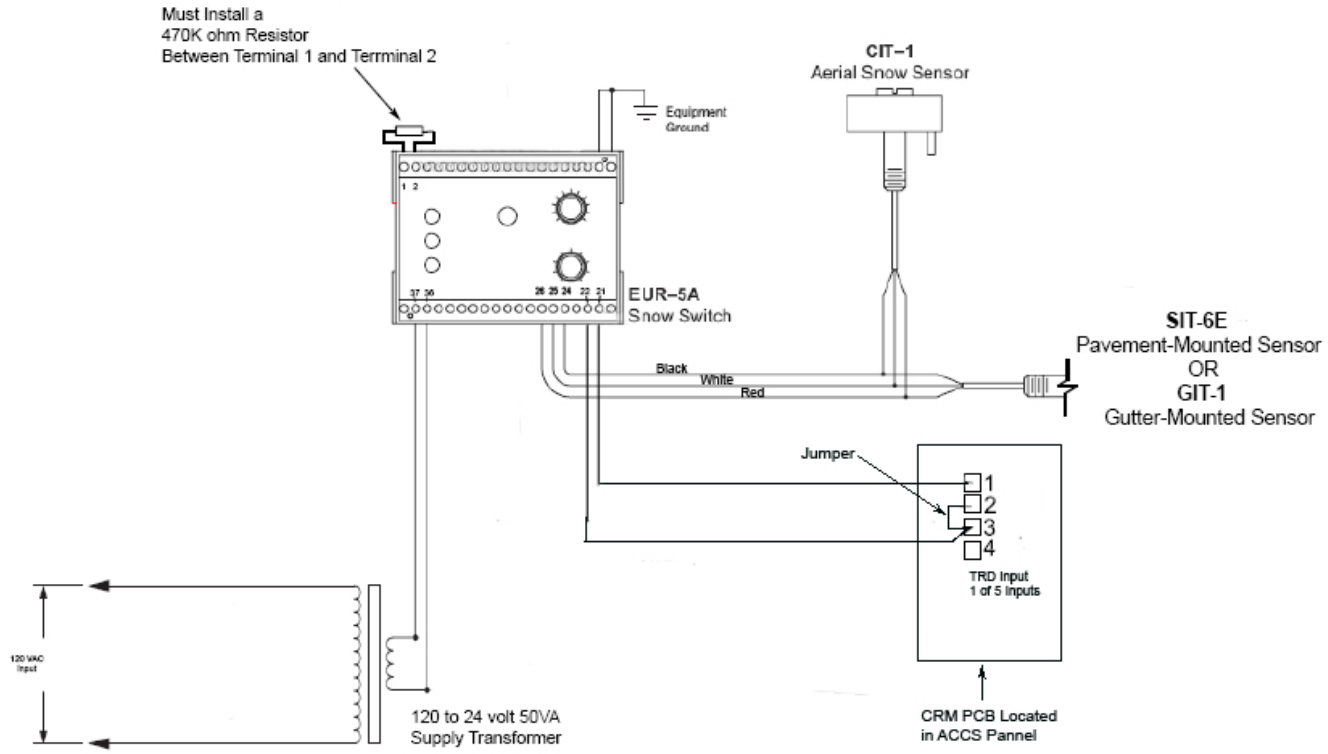


Fig. 5.8 Connecting the EUR-5A

LCD-7A

1. Connect 2-wire grounded/shielded cable from yellow lead wires (normally open position) to the RTD input positions 1 and 3 and jump po-sitions 2-3 on the ACS-PCM2-5.

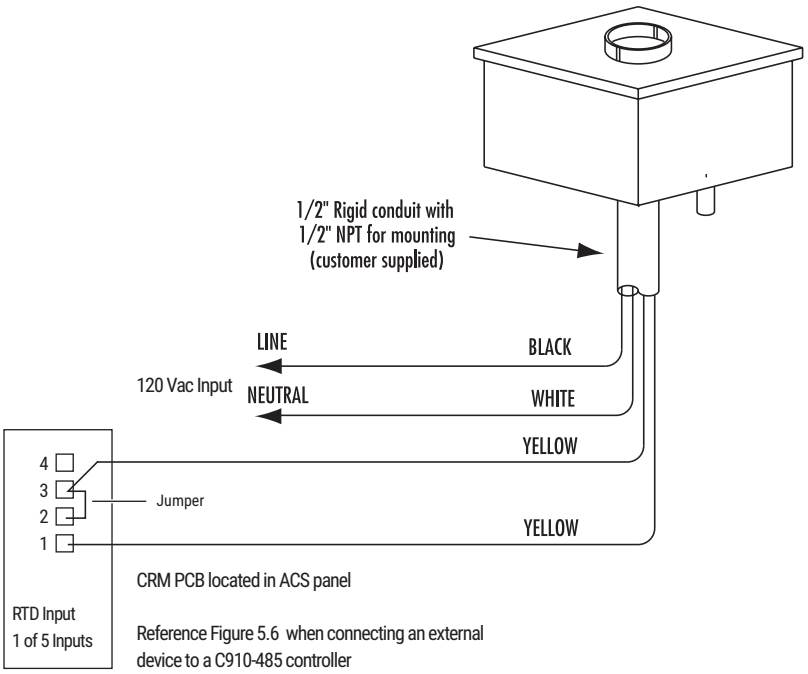


Fig. 5.9 Connecting the LCD-7

GIT-3A

The GIT-3A does not have a set of dry contacts so once must be created from the active output.

1. Connect the power coil leads of an external relay such as the Panasonic Model AHN110X1 (or equivalent) to the yellow active power leads from the GIT-3A.
2. Connect 2-wire grounded/shielded cable from normally open output terminals of the external relay to the RTD input positions 1 and 3 and jump positions 2-3 on the ACS-PCM2-5.

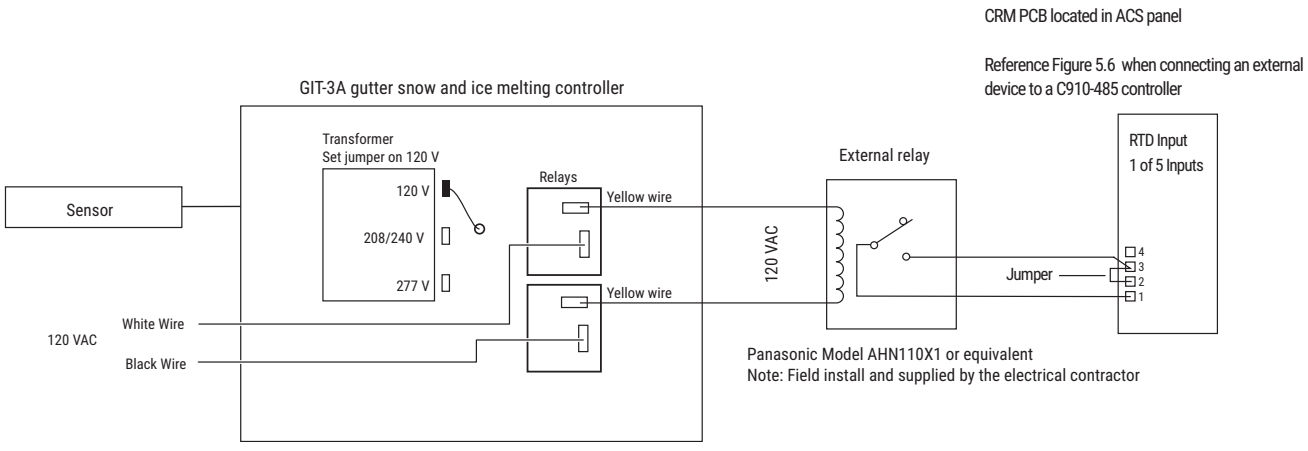


Fig. 5.10 Connecting the GIT-3A

5.4. TERMS AND DEFINITIONS

Amps	Heater current amperes
Line Temperature	The lowest temperature from the RTDs assigned to a circuit
°F or °C	The control temperature
DB	Deadband
Device Address	Network address for specific hardware devices attached to the ACS-UIT2
EMR	Electrical Mechanical Relay
G.F.	Heater ground-fault current
ID	Identification 'tag' for the circuit
Circuit	Short for 'Control Circuit', the basic organizing structure of the ACS-30
RTD	Resistance temperature detectors
RTD Number	The number of the RTD determined by the physical point of connection to a networked device
Set Pt	Setpoint, the desired maintain temperature
Status	Relay (heater on, off or trip) and communication status

5.5. ALARM: E-MAIL NOTIFICATION

When the ACS-UIT2 is connected to the internet through the Ethernet connection, the ACS-30 system can be programmed to send e-mail notification upon alarm events. Specific e-mail addresses may be assigned to each programmed alarm relay, through the main screen under the e-mail tab, as shown in Figure 5.11.

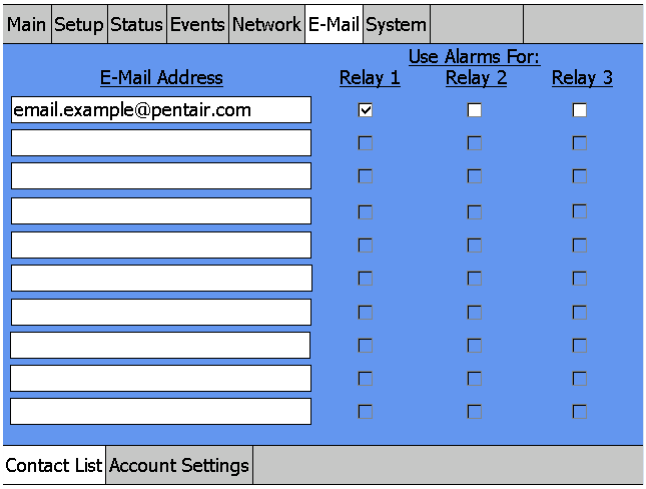


Fig. 5.11 Assigning E-mail Contact List

To enable the ACS-UIT2 to send e-mail to users email account setting must be entered as shown in Figure 5.12.

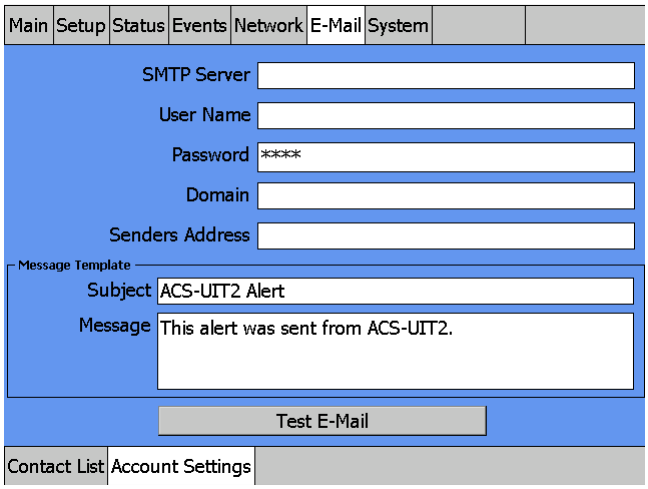


Fig. 5.12 E-mail Account Settings

When the e-mail is received after an alarm event the content of the message will include the circuit number, the actual alarm identification and when the alarm occurred.

5.6. APPENDIX 5.6 ACS-30 PROGRAM INTEGRATOR

The ACS-30 Program Integrator is a stand-alone program for any Windows PC. The program allows for easy remote configuration of an ACS-UIT2 without the limitations of the UIT's display size and its limited modes of data entry.

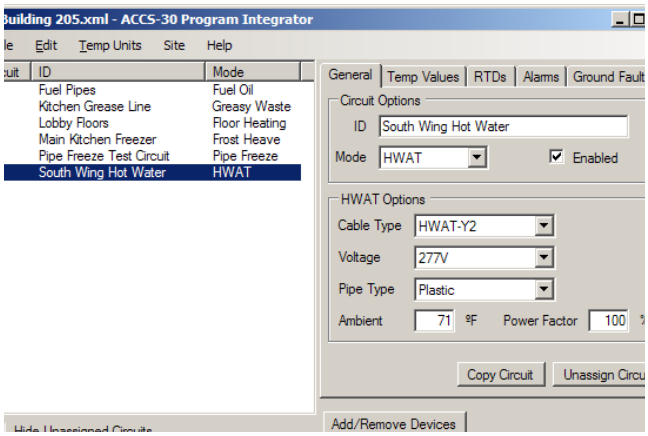
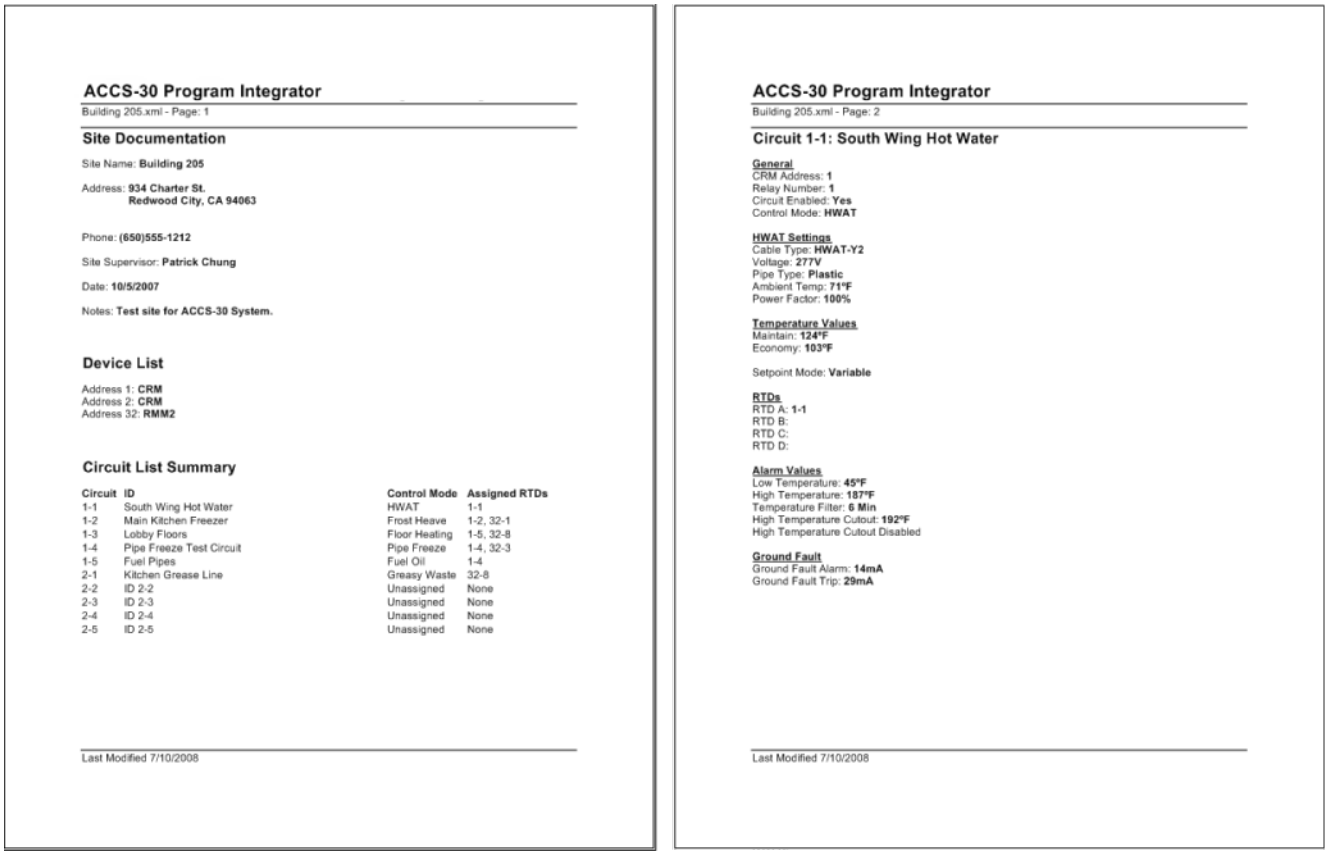


Fig. 5.13 ACS-30 Program Integrator Screen

The XML circuit database created with the Program Integrator can be easily transferred to the UIT via TCP/IP, RS232/485, or through USB. Alternatively, the database that is already on the UIT can also be downloaded and viewed on a PC with the Program Integrator.

The Program Integrator also includes a report generator for creating hard copies of the databases.



ACCS-30 Program Integrator

Building 205.xml - Page: 1

Site Documentation

Site Name: **Building 205**

Address: **934 Charter St.**
Redwood City, CA 94063

Phone: **(650)555-1212**

Site Supervisor: **Patrick Chung**

Date: **10/5/2007**

Notes: **Test site for ACCS-30 System.**

Device List

Address 1: **CRM**
Address 2: **CRM**
Address 32: **RMM2**

Circuit List Summary

Circuit	ID	Control Mode	Assigned RTDs
1-1	South Wing Hot Water	HWAT	1-1
1-2	Main Kitchen Freezer	Frost Heave	1-2, 32-1
1-3	Lobby Floors	Floor Heating	1-5, 32-8
1-4	Pipe Freeze Test Circuit	Pipe Freeze	1-4, 32-3
1-5	Fuel Pipes	Fuel Oil	1-4
2-1	Kitchen Grease Line	Greasy Waste	32-8
2-2	ID 2-2	Unassigned	None
2-3	ID 2-3	Unassigned	None
2-4	ID 2-4	Unassigned	None
2-5	ID 2-5	Unassigned	None

Last Modified 7/10/2008

ACCS-30 Program Integrator

Building 205.xml - Page: 2

Circuit 1-1: South Wing Hot Water

General
CRM Address: **1**
Relay Number: **1**
Circuit Enabled: **Yes**
Control Mode: **HWAT**

HWAT Settings
Cable Type: **HWAT-Y2**
Voltage: **277V**
Pipe Type: **Plastic**
Ambient Temp: **71°F**
Power Factor: **100%**

Temperature Values
Maintain: **124°F**
Economy: **103°F**

Setpoint Mode: **Variable**

RTDs
RTD A: **1-1**
RTD B:
RTD C:
RTD D:

Alarm Values
Low Temperature: **45°F**
High Temperature: **187°F**
Temperature Filter: **6 Min**
High Temperature Cutout: **192°F**
High Temperature Cutout Disabled

Ground Fault
Ground Fault Alarm: **14mA**
Ground Fault Trip: **29mA**

Last Modified 7/10/2008

Fig. 5.14 ACS-30 Program Integrator: Printout

INDEX

INDEX OF FIELDS AND WINDOWS

Greasy Waste Mode	Mode - Select
Ground-Fault (or G.F.)	Main, Setup|G.F., Status|Circuit
Ground-Fault Alarm	Setup|G.F.
Ground-Fault Trip	Setup|G.F.
Heater Time On	Status|Maint.
High Line Temp Alarm	Setup|Alarms
High Line Temp Cutout	Setup|Alarms
High Temp Override	Setup|Roof and Gutter, Setup|Snow Melting
HWAT Mode	Mode - Select
ID	Main, Setup|Circuit, Status|Circuit
IP Address	System|Comm
Level 1 password	System|Password
Level 2 password	System|Password
Line Monitor	Setup|RTDs
Line Temp	Status|Circuit, Status|Min/Max
Local/A RTD	Status|RTDs
Low Line Temp Alarm	Setup|Alarms
Main Menu Timer	System|Misc
Maintain Temp	Setup|HWAT, Setup|Floor Heating, Setup|Pipe Freeze, Setup|Fuel Oil, Setup|Greasy Waste
Manual Override	Setup|Roof and Gutter
Min Ambient Temp	Setup|Pipe Freeze
Min Pipe Size	Setup|Pipe Freeze, Setup|Fuel Oil
Modbus Address	System|Comm
Mode	Main, Setup|Circuit, Status|Circuit, Status|RTDs
Mode Select	Mode Select Popup
Mouse	System|Misc
New Password	System|Password
PASC	Temperature Control - PASC
PCM Address	Setup|Circuit, Status|Circuit
Pipe Freeze Mode	Mode - Select
Pipe Type	Setup|HWAT
Power	Status|Energy
Power Adjust	Setup|Pipe Freeze, Setup|Fuel Oil
Power Cycle Start Time	Setup|Maint.
Power Cycle Test Interval	Setup|Maint.
Power Factor	Setup|HWAT
Power Off Delay	Setup|Roof & Gutter
Read/Write Port	System|Comm
Receive Timeout	System|Comm
Relay	Network|Relays
Relay Cycle Count	Status|Maint.
Relay Fail(ure)	Events (Alarm Heading), System|Relays
Relay Number	Setup|Circuit
Remove (Network Device Address)	Network|Remove
Reset	Status|Min/Max, Status|Energy
Reset Heater Time	Status|Maint.
Reset Relay Cycle Count	Status|Maint.
Resources	Network|Device

Roof & Gutter Mode	Mode - Select
RTD Alarm	System|Relays
RTDs	Status|RTDs, Network|RTDs
RTD Device Address	Setup|RTDs
RTD/EXT	Status|RTDs
RTD Number	Status|RTDs
RTD # Used by Circuit	Network|RTDs
Save New Password	System|Password
Schedule	Setup|HWAT, Setup|Frost Heave, Setup|Floor Heating, Setup|Greasy Waste
Screen Saver Timer	System|Misc
Select Cable Type (HWAT)	HWAT Mode
Select Voltage Input (HWAT)	HWAT Mode
Select Pipe Type (HWAT)	HWAT Mode
Select Setpoint Mode (HWAT)	HWAT Mode
Serial Port Mode	System|Comm
Setpoint (or SetP)	Main, Setup|Temp, Setup|Pipe Freeze, Setup|Snow Melting
Setpoint Mode	Setup|HWAT, Setup|Floor Heating, Setup|Greasy Waste
Slab Temp Setpoint	Setup|Frost Heave
Snow Melting Mode	Mode - Select
Stagger Start	System|Misc
Start Test	Setup|Circuit
State	Network|Relays
Status	Main, Status|Circuit
Stop Test	Setup|Circuit
Subnet Mask	System|Comm
Temp Alarm	System|Relays
Temperature Alarm Filter	Setup|Alarms
Temp Control - Ambient	Pipe Freeze Temp Control, Fuel Oil Temp Control
Temp Control - Line	Pipe Freeze Temp Control, Fuel Oil Temp Control
Temp Control - PASC	Pipe Freeze Temp Control, Fuel Oil Temp Control
Temp Monitor	Setup
Time	System|Clock, Events
Transmit Delay	System|Comm
Units	System|Misc
Update Network	Network|Device
Used by Circuit	Network|Relays
Unassign	Mode - Select
Version	Network|Device
Voltage	Setup|HWAT
Events	
Main	
Network|Device	
Network|Relays	
Network|RTDs	
Network|Maint.	

Network|Remove
Setup
Setup|Alarms
Setup|G.F.
Setup|Circuit
Setup|Floor Heating
Setup|Frost Heave
Setup|Fuel Oil
Setup|Grease/TM Waste
Setup|HWAT
Setup|Maint.
Setup Mode - Select
Setup|Pipe Freeze
Setup|Roof and Gutter
Setup|RTDs
Setup|Snow Melting
Setup|Voltage
Status|Circuit
Status|Energy
Status|Maint.
Status|Min/Max
Status|RTDs
System|Clock
System|Comm
System|Maint.
System|Misc
System|Password
System|Relays
Temperature Control - Ambient
Temperature Control - Line
Temperature Control - PASC

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