NGC-UIT3

Raychem

Programming Guide

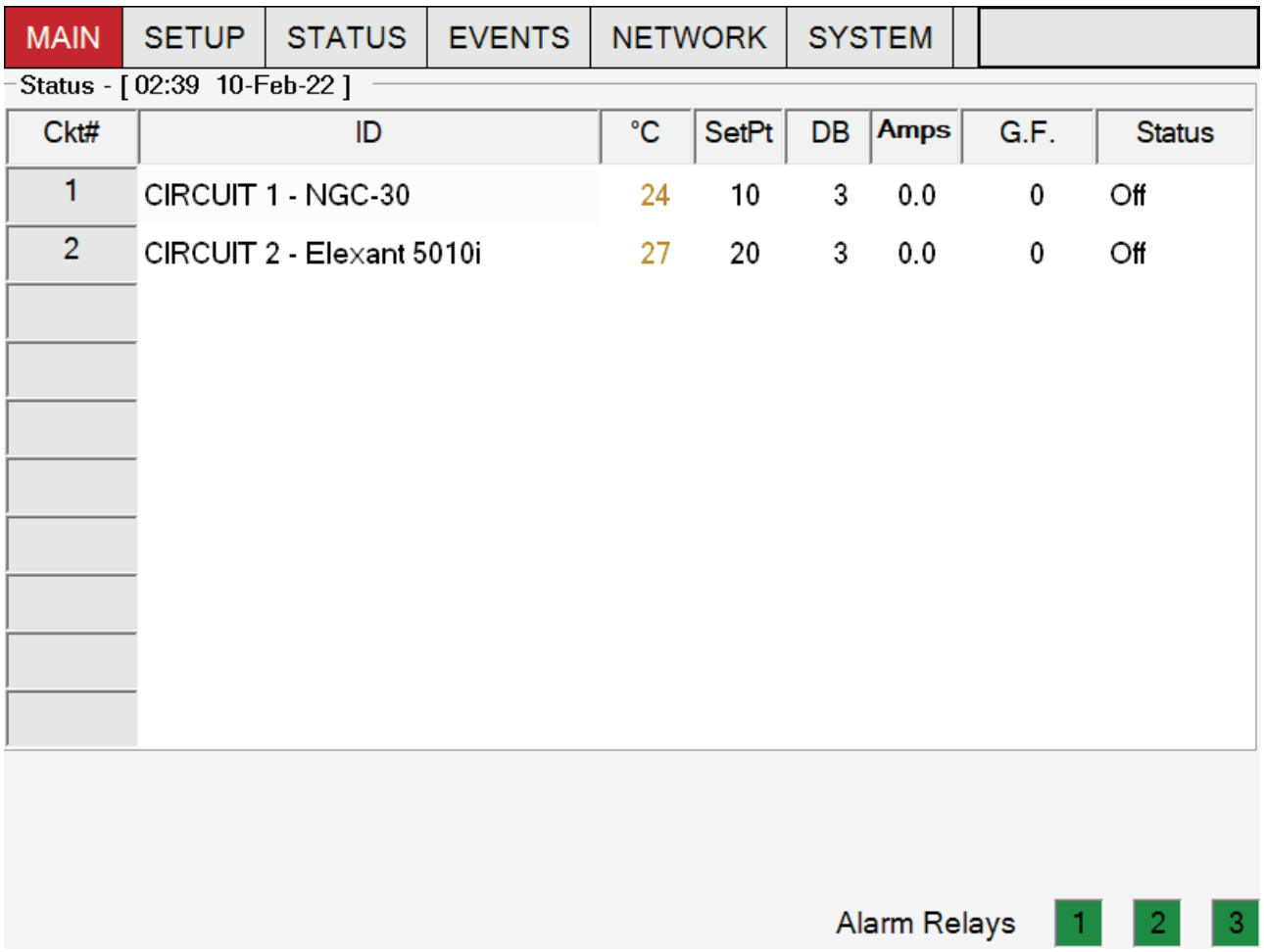


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SECTION 1 INTRODUCTION

1.1 Raychem NGC-30

1.1.1 Product Overview

This Chemelex manual describes how both the Raychem Elexant 5010i, Raychem NGC-20 and Raychem NGC-30 can be programmed via the User Interface Terminal (Raychem NGC-UIT3). The Elexant 5010i, NGC-20 and NGC-30 are part of the same family of controllers.

The Elexant 5010i and NGC-20 is a compact networked single point heat-trace controller with an approved integral safety temperature limiter (SIL 2). The controllers are approved for use in Zone 1 and Zone 2 hazardous areas and can be mounted directly on the heat-traced pipe. Up to 247 individual controllers can be connected in a single RS-485 multi drop "daisy chained" network and communicate to a central user interface, the NGC-UIT3-EX. Up to two temperature sensors can be connected directly to the controller. The limiter has its own temperature sensor.

The NGC-30 is a multipoint electronic control, monitoring and power distribution system for heat-tracing used in process-temperature maintenance and freeze-protection applications. The NGC-30 system can control up to 260 heat-tracing circuits with multiple networked panels. Each panel can control up to 40 individual heat-tracing circuits and monitor up to 128 temperature inputs, with optional power distribution. The NGC-30 is available with two output types: Electromechanical Relays (EMRs) or Solid-State Relays (SSRs). Both types allow switching up to 60 amps at 600 Vac with single or three-phase power. Up to four Resistance Temperature Detector (RTD) sensor inputs for each heat-tracing circuit allows for a variety of combinations of temperature control, monitoring, and alarming. Systems can be configured for nonhazardous and hazardous locations. The ability to monitor and configure the controller is available both locally and remotely with the Raychem Supervisor software.

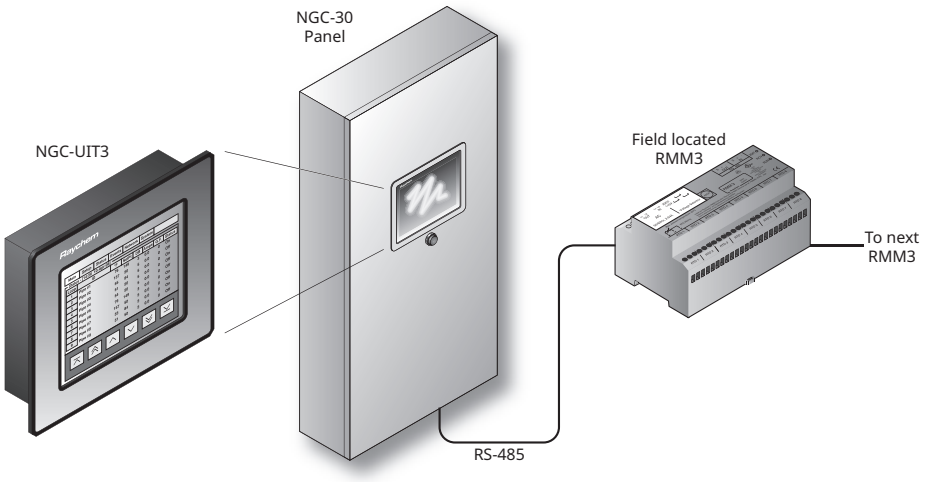


Fig. 1.1 NGC-30 system, system example

1.1.2 Control NGC-30

The NGC-30 measures temperatures with 3-wire, 100-ohm platinum RTDs connected directly to the unit, or through optional Remote Monitoring Modules (RMM3 module). Each RMM3 module accepts up to eight RTDs. The RMM3 modules are typically located near the desired measurement location (RTDs). Multiple RMM3 modules are networked over a single cable to the NGC-30, significantly reducing the cost of RTD field wiring. The NGC-30 system supports 260 temperature inputs via the CRM/CRMS boards. Using RMM3 modules, an additional 128 temperature inputs can be supported for a maximum of 388 temperature inputs. With EMRs and SSRs, the NGC-30 can be configured for On/Off, ambient sensing, and proportional ambient sensing modes. Additionally, with SSRs, the panel can be configured for proportional, power limiting, and soft start modes.

1.1.3 Monitoring

The controllers can monitor multiple independent Electrical Heat-Tracing (EHT) parameters. The controllers monitor continuously temperature, voltage, current and ground fault current leakage and report the values including alarms to the UIT. An automated self-check feature is available where the systems periodically checks the heating cables for faults and report the result to the UIT. This helps to avoid costly downtime. Dry contact relays are provided for alarm annunciation back to a Distributed Control System (DCS).

1.1.4 Ground-Fault Protection According To North American Electrical Code (NEC) Standard

National electrical codes (NEC - North America) require ground-fault equipment protection on all heat-tracing circuits. Heat-tracing circuits equipped with NGC-30 controllers do not require additional ground-fault detection equipment, simplifying installation and reducing costs. When applying the IEC standards, additional RCD circuit breaker is required.

1.1.5 Installation

The NGC-30 system is configured with a User Interface Terminal (NGC-UIT3) that has LCD color touch-screen display technology. The NGC-UIT3 provides a user interface for easy and efficient programming without keyboards or cryptic labels. There are multiple NGC-UIT3 variants such as the NGC-UIT3 and NGC-UIT3M-EX, and while there are minor hardware differences between each variant described in the installation manual for each model, the NGC-UIT3 program as described in this operating manual is the same across all NGC-UIT3 variants.

Common Raychem NGC-UIT3 Interface and Programming

The term "NGC-UIT3" in this document refers to any of the available NGC-UIT3 models, regardless of which model is actually installed. All NGC-UIT3s interface to the NGC-30-CRM, NGC-30-CRMS (Card Rack Relay Control Modules), PLI (Power Line carrier Interface), and the RMM3 module (Remote Monitoring Module).

NGC-UIT3 Installed in Hazardous and Non-hazardous Indoor or Outdoor Panel Locations

If the panel is located in a hazardous/non-hazardous indoor or outdoor location, the NGC-UIT3-EX or NGC-UIT3M-EX model is required. These models are specifically designed for these types of environments and meet all applicable standards. The NGC-UIT3-EX and NGC-UIT3M-EX model is installed locally on the NGC-30 panel door.

NGC-UIT3 Installed Separately from the Panel Locations

If the user interface terminal needs to be mounted separately from the NGC-30 control panel, such as when the panel is in a hazardous or difficult to access location, the NGC-UIT3-ORD-R provides a wall-mount alternative for remote mounting in a nonhazardous (unclassified) indoor or outdoor location.

Table 1.1 NGC-30 User Interface Terminals (UIT3s)

UIT3 type	Area classification	Usage
NGC-UIT3-EX	Nonhazardous (Unclassified) Locations Hazardous* Locations Class 1 Div. 2, Groups A, B, C & D ATEX / IECEx Zone 2	Type 4 • (Indoors or Outdoors)
NGC-UIT3-ORD-R	Nonhazardous (Unclassified) Locations • The NGC-UIT3-ORD-R must be installed in a nonhazardous, indoor or outdoor location. • The NGC-UIT3-ORD-R connects to NGC-30 panels using RS-485 communication wiring.	
NGC-UIT3M-EX	Nonhazardous (Unclassified) Locations Hazardous* Locations Class 1 Div. 2, Groups A, B, C & D ATEX / IECEx Zone 2	

*Hazardous locations are defined by Article 500 of the National Electrical Code and Section 18 of the Canadian Electrical Code.

1.1.6 Communications

The NGC-UIT3 units can be networked to a host PC running Windows®-based Supervisor client-server software for central programming, status review, and alarm annunciation. NGC-UIT3s support the Modbus® protocol and are available with an RS-232, RS-485 or 10/100Base-T Ethernet communication interface.

1.1.7 Complete System

The NGC-30 is supplied as a complete system ready for field connections of power wiring and temperature sensor input. Optional Power Distribution further enhances the reduction of field wiring and labor to install.

1.1.8 The Raychem NGC-UIT3 Programming Guide

This NGC-UIT3 Programming Guide (EU2032) assists in the set up and operation of the Elexant 5010i, NGC-20 and NGC-30 system.

The NGC-UIT software (version 46.x and higher), installed in the NGC-UIT3 (User Interface Terminal), is designed to configure various Raychem devices.

This software version supports the:

1. Elexant 5010i controllers
2. NGC-20 controllers
3. NGC-30 Heating-Tracing Panels using:
   a. NGC-30-CRM/-CRMS card rack modules with or without multiplexed RTD inputs via the Raychem RMM3 module or RTD inputs via the Raychem PLI module.
   b. MONI-RMC and RMM-DI modules for digital input and relay output signals.

It supports the RMC modules and RMM-DI for digital inputs and outputs as well.

The software provides several features to help configure and maintain the 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 Raychem NGC-30 software. Please refer to specific detailed product use documentation:

NGC-30 Installation Manual (H57878)

NGC-UIT3 Modbus Protocol Interface Mapping for NGC-30 Systems (H57880).

1.1.9 User Interface Terminal (NGC-UIT3) Languages

The languages supported by the NGC-UIT3 display are - and not limited to -: English, Spanish, French, German, Russian, Chinese, Italian and Czech. The display language is selected by accessing the System|Misc. screen. Refer to section 3.3.31 System | Misc Window on page 60 for additional information.

1.2 Vital Information

This manual is a guide for the setup and operation of the Elexant 5010i, NGC-30 and NGC-20 in combination with the NGC-UIT3 user interface.

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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15375 Memorial Dr,
Houston, TX 77079,
U.S.A

1.4 User Responsibilities

The performance, reliability and safety of your heat-tracing system depend on proper design, selection, and installation. The NGC-UIT3 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 heat-tracing system design and configuration, and that you will ensure that all components of the heat-tracing system are installed, maintained and used as intended. The configuration of the NGC-UIT3 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 Chemelex. Be sure to consult these documents as needed.

1.5 Safety Warnings

There are important safety warnings which are shipped with Chemelex products and that are also printed in the Elexant 5010i, NGC-20 Installation Manual (RAYCHEM-IM-INSTALL130-NGC20CLE-ML) and NGC-30 Installation Manual. 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 Chemelex directly.

1.6 Warning, Error and Alarm Messages

Under certain conditions, the NGC-30 program will alert the user with a warning or an error message. These are typically either because the program cannot find an acceptable answer based on user input, or because the user may need to take some additional action to ensure the design requirements are completely met. These warnings and error messages are detailed on page 52.

1.7 Technical Support

For technical support, contact your local representative, or contact Chemelex directly:

Chemelex
15375 Memorial Drive
Houston, TX 77079
USA

USA
Tel: 800-545-6258
Tel: 650-216-1526 (outside U.S.)
Email: Thermal.TechSupport@chemelex.com

1.8 Navigation

1.8.1 Navigating Between Windows

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, simply press a combination of a Main Menu | Submenu buttons.

For example in Step 1, the System | Misc window must be accessed. To perform this action, press the System button on the top row. On the bottom row, press the Misc button.

On Setup and Status windows, a Status legend displays. This information shows what Device address and Relay address have been assigned to a particular Circuit.

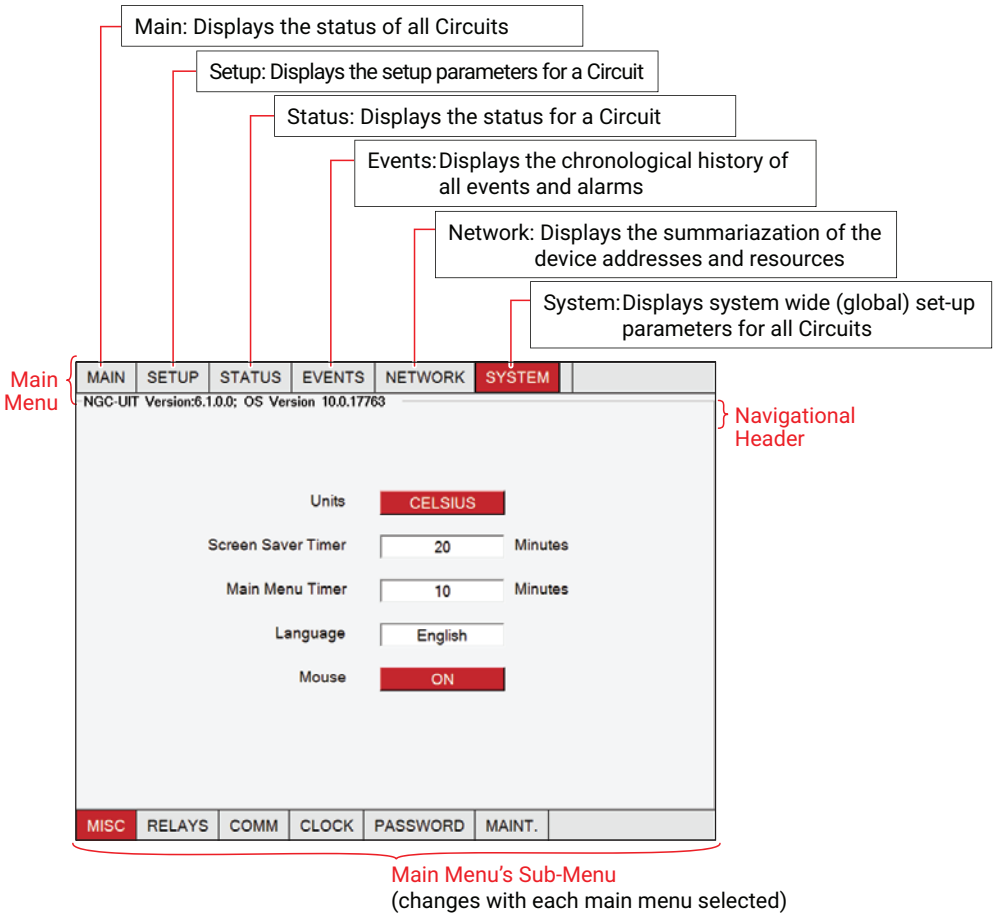


Fig. 1. Navigation

Main Window and Events/Alarms Navigation

Navigation Buttons

At the bottom of the Main Window and Events Window, the navigation buttons will appear once six events have occurred. 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.

Shortcut: If a Circuit number is associated with an Event or Alarm, selecting it automatically sends you to that circuit's Status/Circuit window. This will help in troubleshooting.

When in the Main or Events|Alarms windows, press on any data field for a Circuit to see the Status window for that Circuit.

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.

SECTION 2 BASIC CONFIGURATION QUICK START

The following gives an overview of how to implement a simple 4 Circuit system. For greater detail and PLI module configuration, please go to Section 3 – Full Configuration on page 25.

2.1 An Example of a Simple 4 Circuit Setup

IMPORTANT: A Configuration Spreadsheet has been developed to assist in the collection of specific circuit (Circuit) details. This spreadsheet is located in Appendix E.

The following is a typical heat-tracing system for a four (4) Circuit Setup:

- Four (4) pipes (Pipe #1, Pipe #2, Pipe #3, Pipe #4)
- Four (4) heaters (one per pipe: Heater #1, Heater #2, Heater #3, Heater #4)
- Four (4) output relays (Relay #1, Relay #2, Relay #3, Relay #4) which control the heater's contactors
- Four (4) RTD temperature sensors (RTD #1, RTD #2, RTD #3, RTD #4)
- Four (4) On/Off control modes

This is the first window that appears when the program loads.

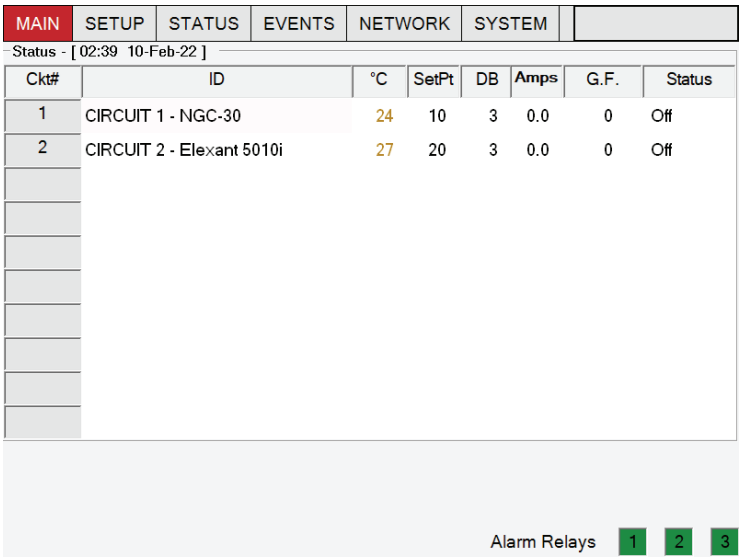


Fig. 2.1 Main window

Step 1: Setting up Units and Language

Go to the System | Misc window and enter the appropriate Units and Language.

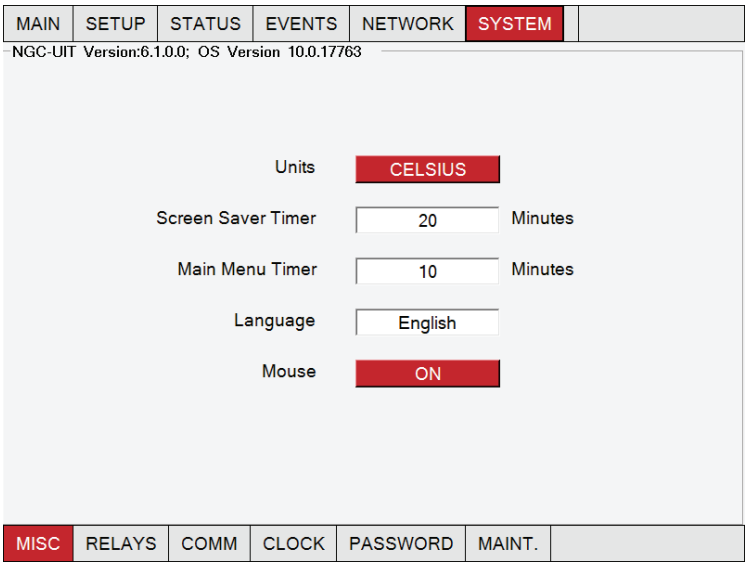


Fig. 2.2 System | Misc window

Step 2: Setting Time and Date

Go to the System | Clock window and set the time and date

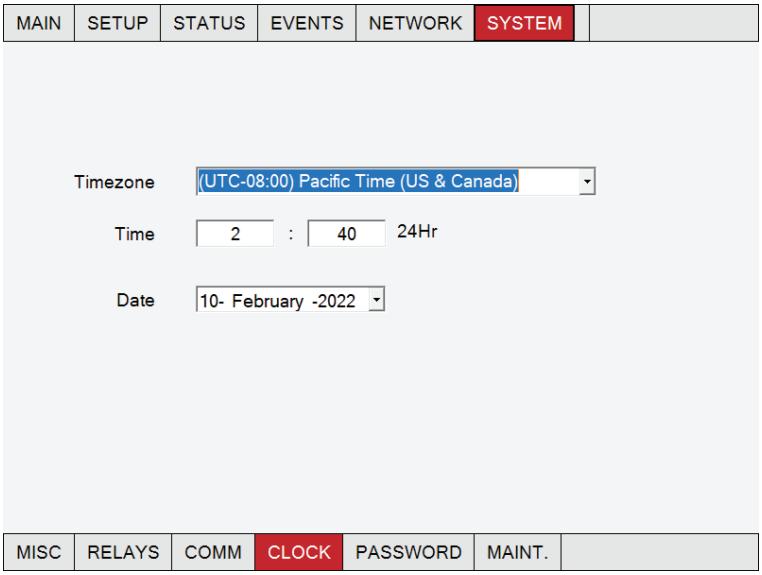


Fig. 2.3 System | Clock window

Step 3: Setting Up the Network for Device(s)

Go to the Network | Devices window

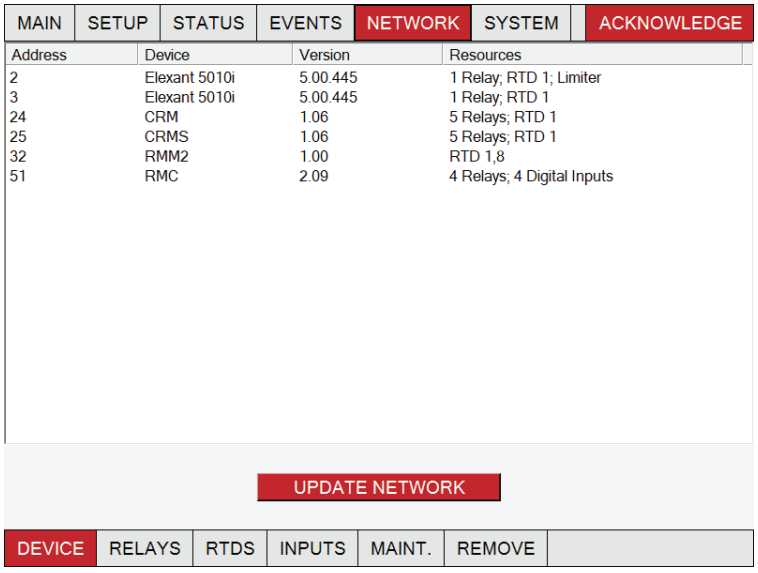


Fig. 2.4 Network | Devices window

Press “Update Network”. The NGC-UIT3 will scan all NGC-30-CRMs/-CRMSs, PLI modules, NGC-20 controllers, RMC modules, RMM-DI modules and/or RMM3 modules into the network database.

Once the database exists, no further scanning is done. A device address is the number assigned via the rotary switches on the NGC-30-CRM-CRMS, PLI, RMC, RMM-DI modules or RMM3 module circuit board. See the NGC-30 Installation Manual for more information.

In this example the system found 6 devices. These are:

1. An Elexant 5010i with one sensor for control and limiter
2. An Elexant 5010i with one sensor
3. A CRM board with one RTD connected
4. A CRMS board with one RTD connected
5. RMM3 with two sensors connected
6. RMC module with 4 Relay outputs and 4 digital inputs

IMPORTANT: See page 56 for additional information.

Step 4: Setting up a Circuit

In this manual we set up a circuit on the NGC-30-CRMS controller. For the Elexant 5010i controller the same steps can be followed. As the Elexant 5010i controller is not identical to the NGC-30 controller, it is possible that the screens differ.

Step 4A: Go to Fig. 2.6 | ID pop-up window

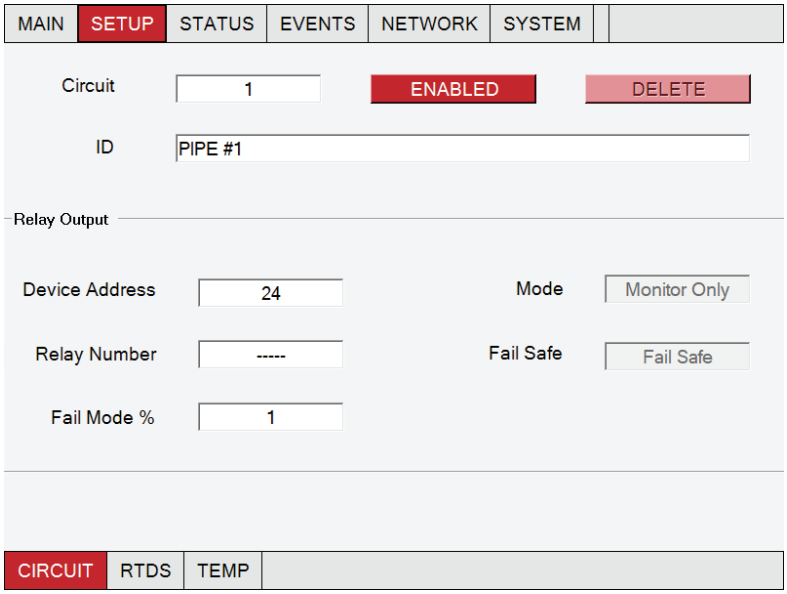


Fig. 2.5 Setup | Circuit window

At initial start-up, the Setup|Circuit window automatically displays Circuit 1.

Step 4B: Press on the ID field and a pop-up window appears

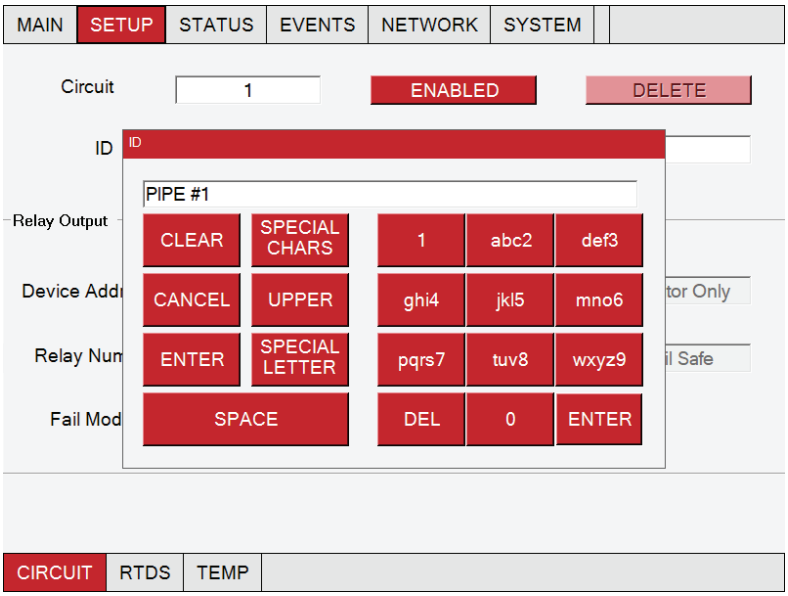


Fig. 2.6 ID pop-up window

- The pop-up window is a text-editing window that works similar to cell phone text messaging. There are selection keys for Upper Case Letters, Lower Case Letters, and Special Characters
  The keypad portion allows you to enter text by pushing the appropriate keys
- For this example, Pipe #1 was entered for the ID tag
- Press Enter when done

Step 4C: Press on the Device Address field

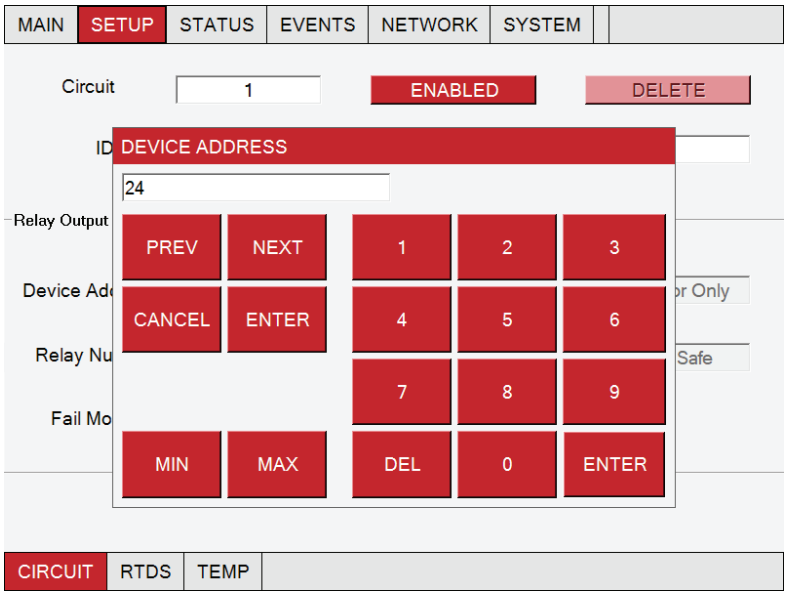


Fig. 2.7 Device Address window

- A numeric entry pop-up window appears. Type in the device address (in this case, 1) for this Circuit and press Enter. (See page 56 for more on device addresses.)

Step 4D: Press on the Relay Number field

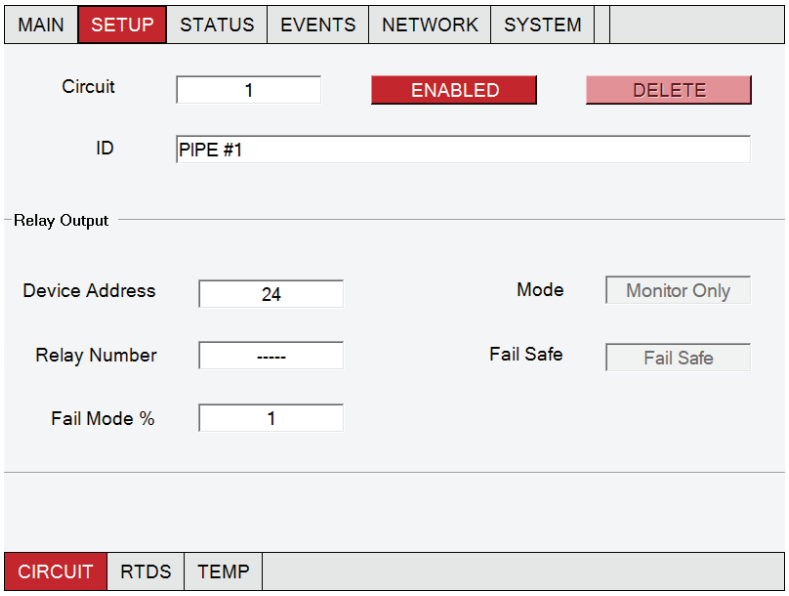


Fig. 2.8 Relay number window

Step 4D (continued): This window shows the pop-up window prior to any Relay assignment

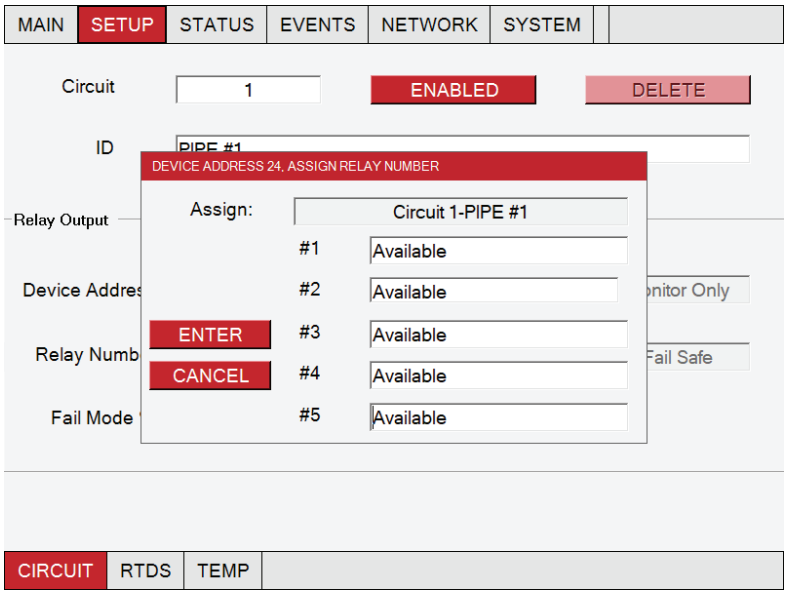


Fig. 2.9 Pop-up window prior to any Relay Assignment

- Press on the word "Available" to the right of #1 to assign Relay 1 as the output device for Circuit 1

IMPORTANT: The window will always display which Relays are still available on this device for Circuit assignment.

Step 4D (continued): Press Enter after Relay assignment to return to the Setup window

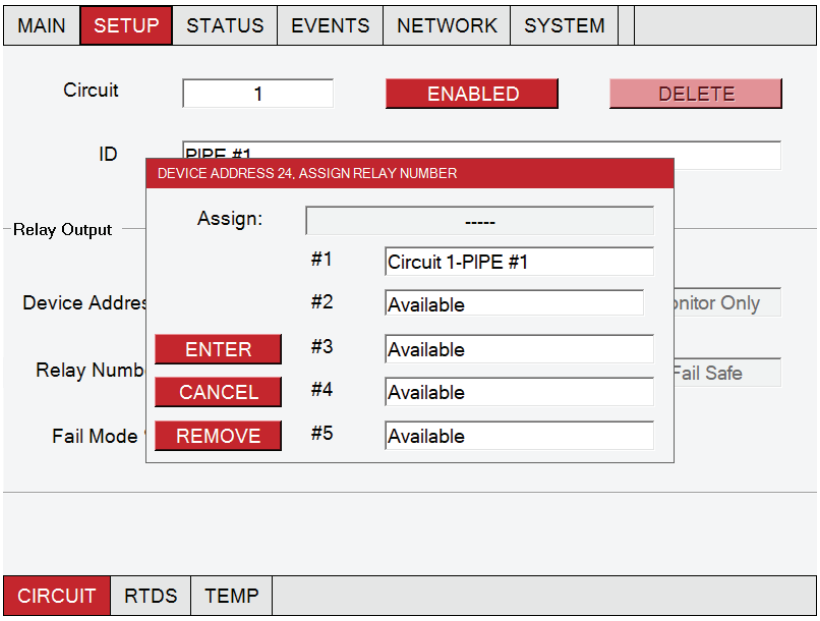


Fig. 2.10 Device Address, Assign Relay Number window

- Press Enter

Step 4E: Press on the Mode field and a pop-up window appears, showing all available control modes

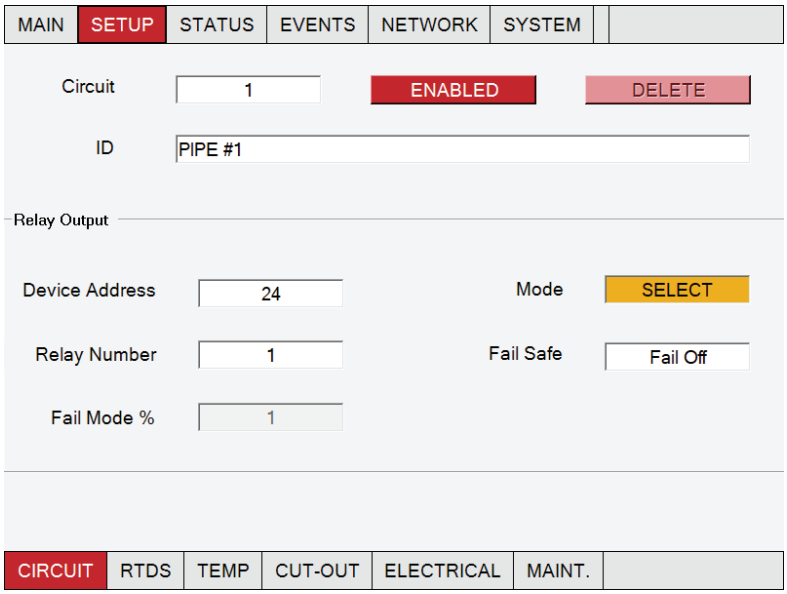


Fig. 2.11 Mode window pop-up

Step 4E (continued): Pop-up window for control mode appears

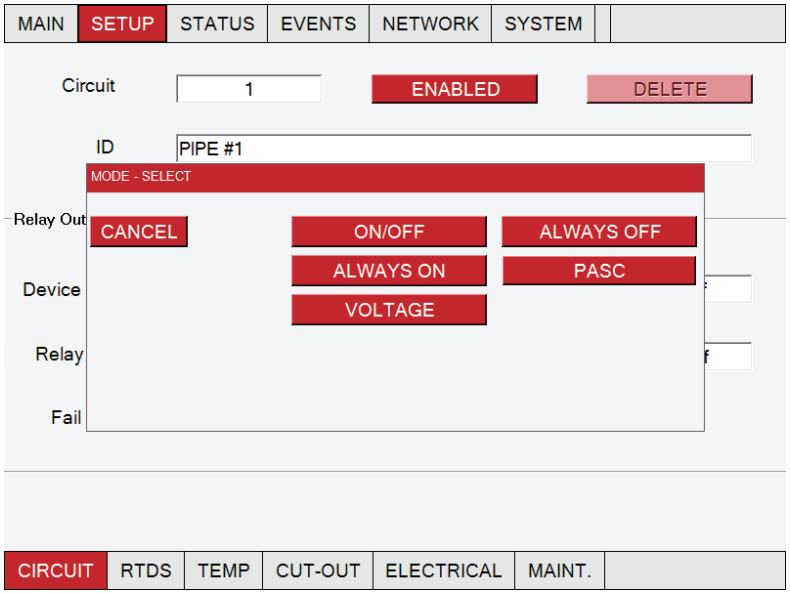


Fig. 2.12 Mode - Select window

At the Mode - SELECT window:

- This pop-up window lets you select a Circuit's basic operating mode. The NGC-30-CRM, used in this example, has the following Control modes available: On/Off, Always On, Always Off, PASC and Voltage
- The On/Off mode is a simple setpoint/dead band operation
- Press On/Off to select this control mode and return to the Setup Circuit window

Step 5: Review the Fail Safe Setting

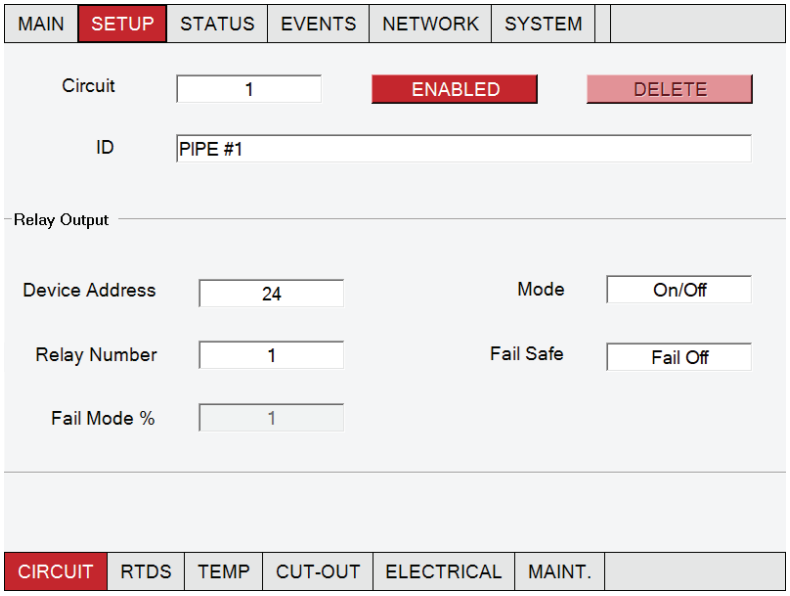


Fig. 2.13 Setup | Circuit window and Fail Safe button

At the Setup | Circuit window:

Pressing the Fail Safe toggle button alternates the Fail Safe mode between Power Off and Power On. This selection tells the NGC-30-CRM/-CRMS if the heater should be turned on or off if all of the RTD(s) for this Circuit fail.

If the main concern is to prevent pipes from freezing, then Power On is a good choice. However, if the heater is oversized and overheating is a concern, then Power Off could be a better choice.

Step 6: Go to Setup | RTDs window

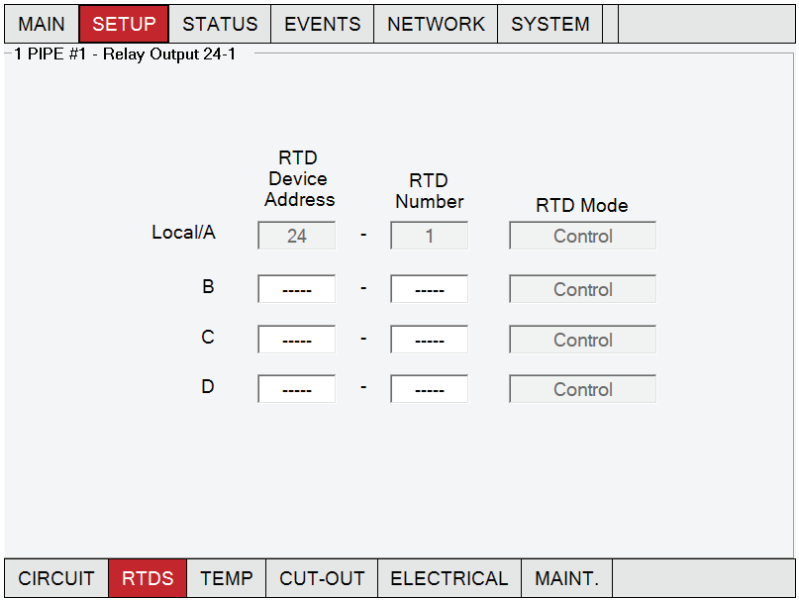


Fig. 2.14 Setup | RTDs window

At the Setup | RTD window:

- The NGC-30 program first checks to see if the default RTD is available. On any NGC-30-CRM/-CRMS board, the first RTD input is automatically coupled with the first relay output; the second RTD is linked with the second output relay, etc. (In the case an RMC - RMM3 combination is chosen, then the user must define himself which RTD Device address is coupled with the RMC output.)
- Here an RTD has been connected to the RTD 1 terminal block, so the RTD set-up window indicates the default assignment is already completed

- There are three blank slots available so you can assign additional RTDs to this output relay. You may desire additional RTDs if you need a more exact temperature sampling for a temperature-sensitive fluid. If you assign additional RTDs, the lowest RTD value from the list will be used for control temperature
- Each of the four RTDs can be independently set as Control or Monitoring only sensor. If you are using a PLI module with SES-CONT sensors, an additional Continuity mode will be available. See Section 3 for more details
- See page 33 for information on how to set up additional RTDs. For this simple Circuit Quick Start example, the default set-up RTD is used

Step 7: Go to the Setup | Temp window

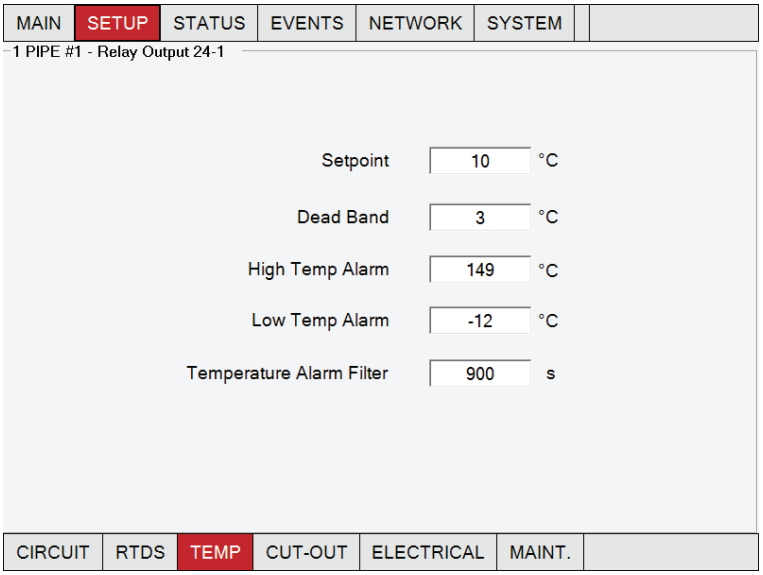


Fig. 2.15 Setup | Temp window

At the Setup | Temp window:

- Input the Setpoint, Dead Band, High Temp Alarm, and Low Temp Alarm by pressing on each of the four numeric fields in turn
- For this example, the Setpoint temperature is 10°C, a dead band of 3°C and high and low temperature alarms at 149°C and –12°C respectively
- Use the default value of 900 seconds (15 minutes) for the Temperature Alarm Filter (time delay before the NGC-30 reports any temperature alarm) and the default value of Disable for the High Temp Cut-Out. To implement the High Temp Cut-Out feature. See “High Limit Cut-Out Entry Field” on page 36

Step 8: Go to Setup | Electrical

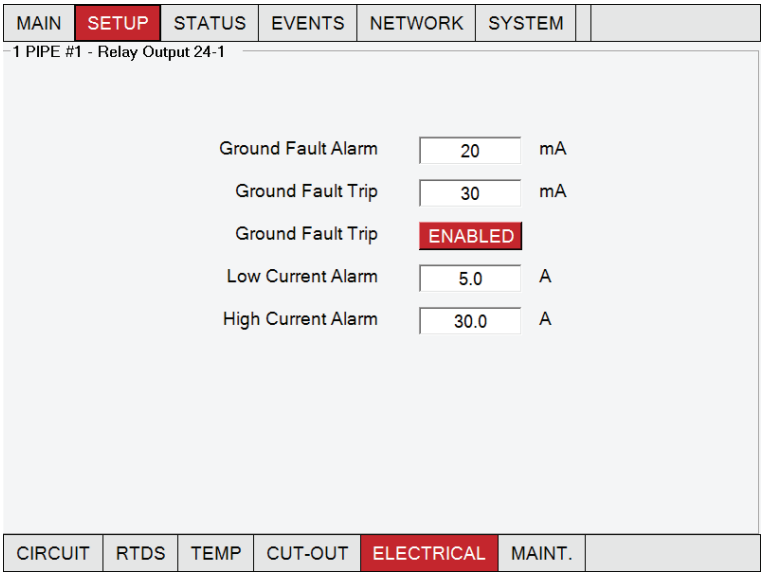


Fig. 2.16 Setup | Electrical

At the Setup | Electrical:

- Input the Ground-Fault Current Alarm and Ground-Fault Current Trip by pressing each of the two numeric fields in turn
- For this example, the Ground-Fault Current Alarm and Ground-Fault Current Trip levels are set to 20 mA and 30 mA respectively
  - At less than 20 mA, the NGC-30 program takes no action. At 20 mA or more leakage, an alarm is indicated and logged to the Events List
  - At 30 mA the output relay assigned to this Circuit is tripped off

High Voltage Alarm Entry Screen

If the voltage monitoring module measures line voltage above this threshold, the NGC-UIT3 generates an alarm.

Range: 50 – 305 V

Default: 270 V

Low Voltage Alarm Entry Screen

If the voltage monitoring module measures line voltage below this threshold, the NGC-UIT3 generates an alarm.

Range: 50 – 305 V

Default: 90 V

- Input the High Current Alarm and Low Current Alarm by pressing each of the two numeric fields in turn. For this example, High Current Alarm is set to 30 A, and Low Current Alarm is set to 5 A

⚠ WARNING:

Fire Hazard. A ground-fault alarm means the heating cable has been damaged or improperly installed and must not be ignored. Disabling the ground-fault trip function reduces safety and could result in sustained electrical arcing or fire. To minimize the risk of fire if the alarm activates, shut off the power and repair the system immediately

IMPORTANT: Setting 0 for both High and Low Current Alarms completely deactivates the Current Alarm function.

- Power Limit – This is enabled only when SSR control devices are detected (NGC-30-CRMS panel). A Power Limit setting less than 100% will limit the "on-time" of a constant wattage heater to the percentage indicated in the entry field. This has the effect of lowering the amount of power that the heater can produce

IMPORTANT: Power Limiting is not recommended if self-regulating heaters are installed

Step 9: Enable or Disable the Circuit

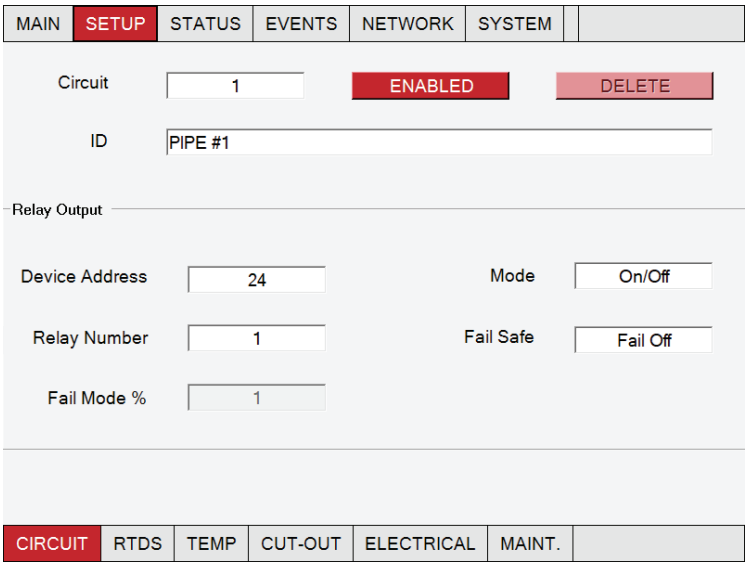


Fig. 2.17 Circuit 1 enabled

At the Setup | Circuit window with Circuit #1 selected:

- By default, once you program a Circuit, it immediately begins to control the heater based on the input information
- If you do not want this Circuit to activate until all Circuits are programmed, go to Setup | Circuit window and press the Enabled toggle button once, which disables the Circuit. To re-Enable, press the Enable/Disable button again

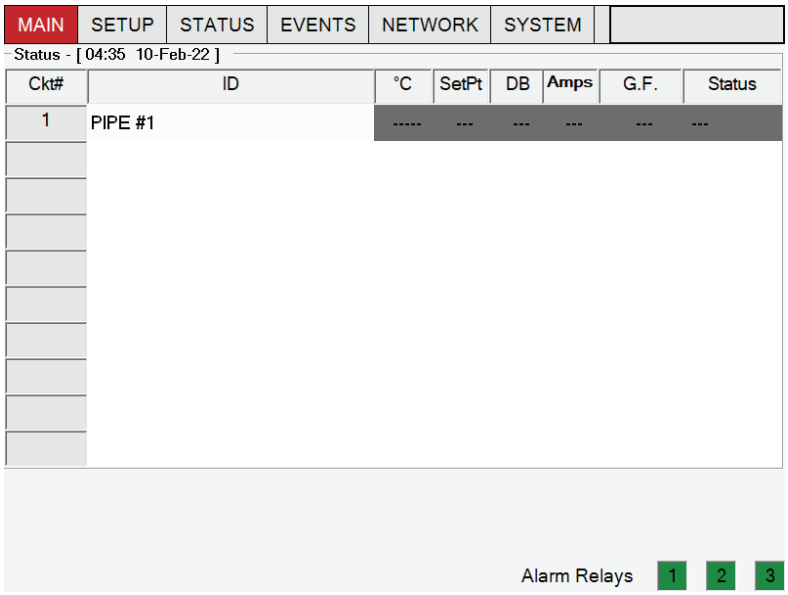


Fig. 2.18 Circuit 1 disabled

At the Main status display with Circuit #1 disabled:

- On the Main menu window, any Disabled Circuit is grayed out as above

2.2 Setting Up Additional Circuits

Follow Steps 4 through 10 above to set-up each additional Circuit.

2.3 Circuits 1–4 Setup Complete Confirmation

After completing the Setup for Circuits 1, 2, 3, and 4, and Circuits are Enabled, go to the Main window to confirm all Circuits are activated and working properly.

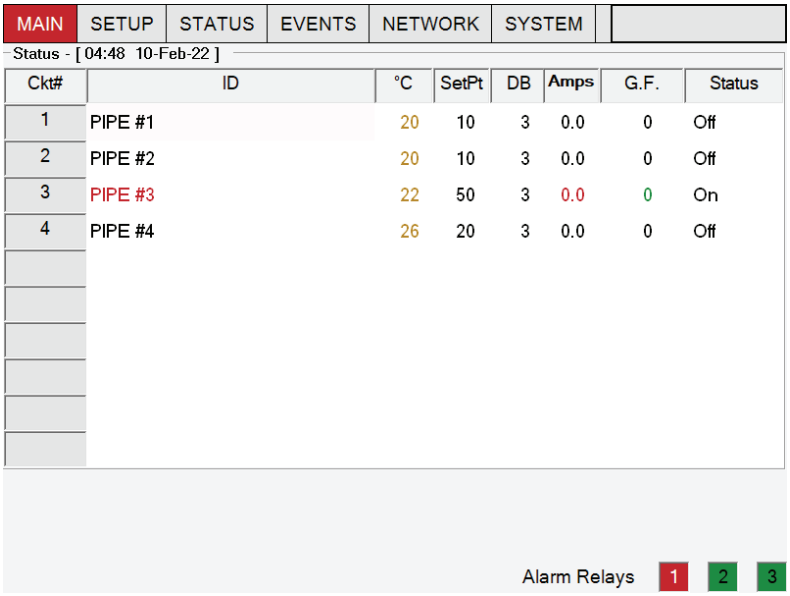


Fig. 2.19 Main status window for confirmation

2.4 Starting the NGC-30

2.4.1 System Requirements

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

- NGC-UIT3 hardware
- At least one of the following:
  - NGC-30-CRM/-CRMS
  - RMM3 Remote Monitoring Module
  - RMC Module
  - Elexant 5010i and/or NGC-20 Controller

Maximum optional equipment configuration:

- Up to 52 Heat Trace Controller Boards (total count in any combination)
  - NGC-30-CRM
  - NGC-30-CRMS
- Up to 16 RMM3 modules (8 channel RTD multiplexing hubs)
- Up to 4 PLI modules (127 RTDs if SES/SPC transmitters are used, or 255 RTDs if 700-TT transmitters are used)
- Up to 247 Elexant 5010i / NGC-20 controllers
- Up to 247 RMM-DI modules

Total combination of output devices including NGC-30-CRM/-CRMS, NGC-20 and RMC DO cannot exceed 260 circuits.

2.4.2 Initial Setup

The software is designed to run only on the NGC-UIT3 hardware platform. Prior to shipment, the software is installed into a nonvolatile area of the NGC-UIT3 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.

3.1 Setting the Network for Device(s)

Go to the Network|Device window.

For the very first time, the Network screen will be blank. See below:

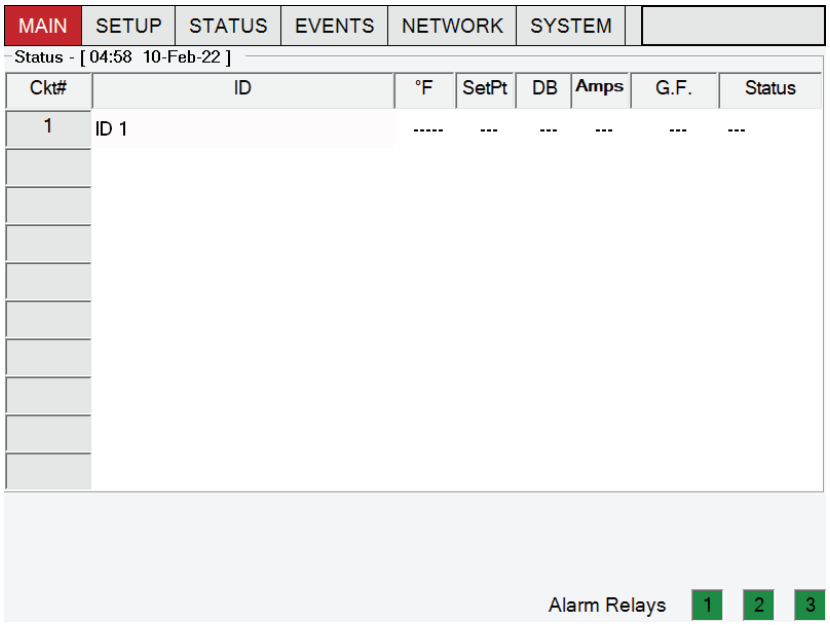


Fig. 3.1 Initial Network | Device window

Press "Update Network" and scan all NGC-30-CRM/-CRMS boards, RMM3 module and others into the Network database. The Device Addresses for these modules will be scanned and a database will be created. A device address is the number assigned via the rotary switches on the NGC-30-CRM/-CRMS board, RMM3 module, PLI Module, RMC module and RMM-DI module. If an expected device does not appear on the list after the scan is complete, it is most likely physically disconnected from the RS-485 network wiring, or is not powered. Troubleshoot and verify all network and power connections.

Once the database exists, no further scanning is done unless the system is forced to update the network by activating the "Update Network" button.

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

If a PLI (Power Line Carrier Interface) module is detected in the scanning process, a pop-up window will open, asking whether the PLI Mode should be changed from the default mode of PLI-SES/SPC to the PLI-TT. If a SES or SPC Transmitter is connected to the PLI module, the option "NO" should be selected. The NGC-UIT3 indicates this PLI as PLI-SES/SPC. If a 700-TT Transmitter is connected to the PLI module, the option "YES" should be selected. The NGC-30 UIT3 indicates this PLI as PLI-TT.

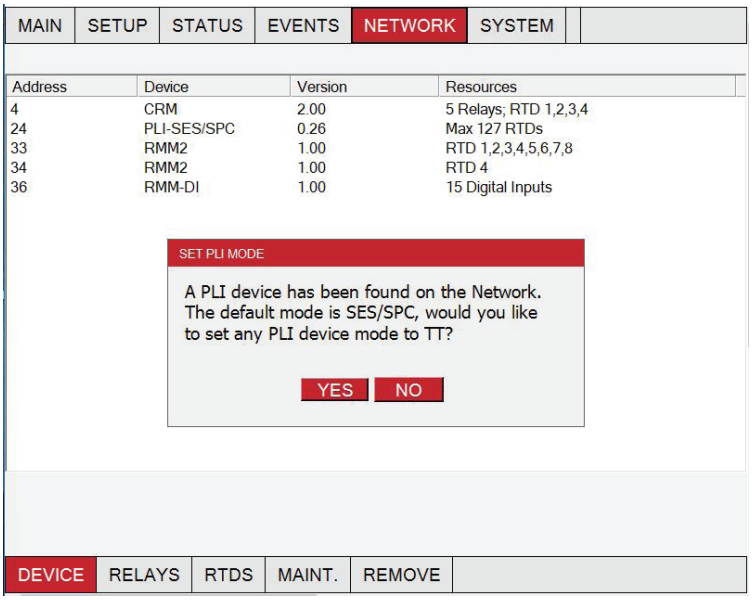


Fig. 3.2 Set PLI Mode

IMPORTANT: The NGC-30 Control System can support up to 4 PLI Modules. Each PLI module can support up to 127 SES or SPC transmitters and up to 255 700-TT transmitters. The SES/SPC and 700-TT transmitters are not compatible and can not be connected to the same PLI module

The Network will then be updated with the connected devices, in this case with one NGC-30-CRMS board, one RMM3 and one PLI-SES/SPC modules.

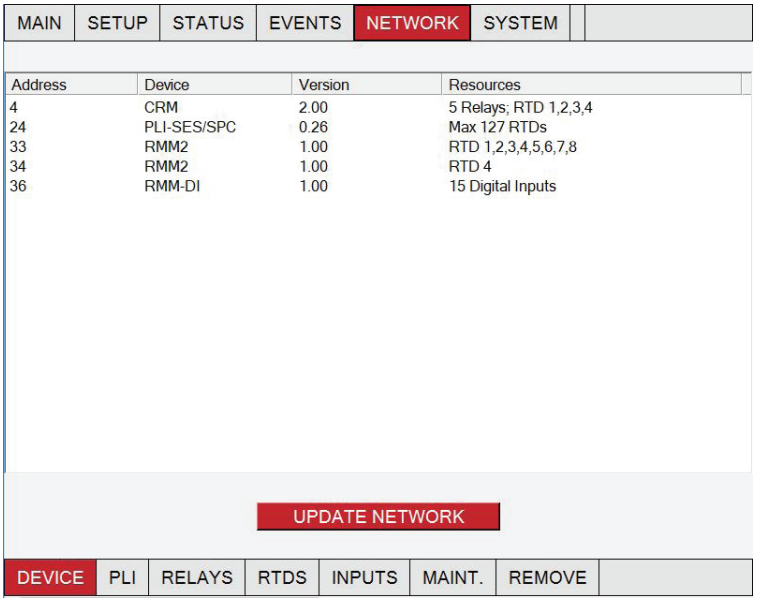


Fig. 3.3 Connected Network | Devices window

When a PLI module is detected in the Update Network process, the PLI tab will be added to the Network and Setup Sub-Menus.

IMPORTANT: For CRM/CRMS boards and RMM3 modules, the Resources Column indicates the RTDs that are available for use in the Setup|RTD Screen. However, the Resources Column for PLI-SES/SPC or PLI-TT indicates the maximum number of RTDs that could be used. Please refer to heater isometric drawings for each circuit for the assigned transmitters/RTD addresses to each circuit.

3.1.1 Main window

After the first system scan

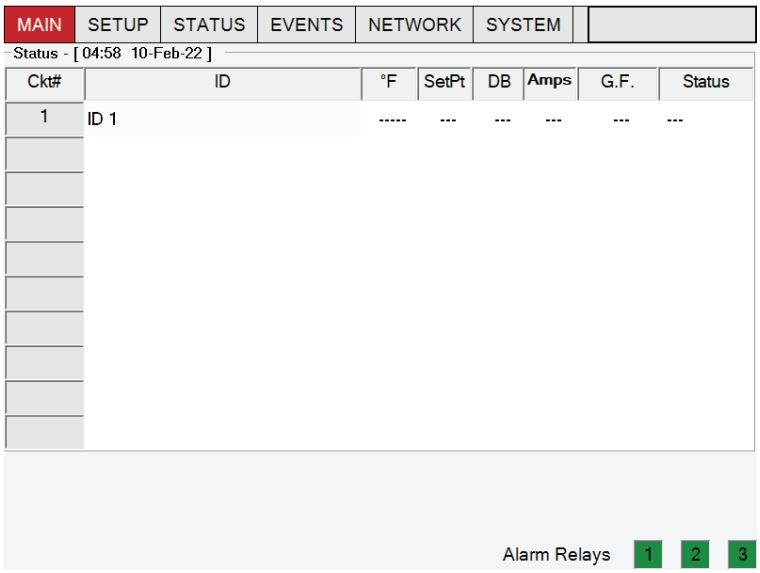


Fig. 3.4 Main status window

3.2 Software Organization

The NGC-30 is organized around the concept of control circuits, or simply “Circuits” as they are called in the UIT3 windows. A typical Circuit consists of one output relay device, one RTD sensor input, and one set of control parameters as shown below.

has been completed, the main window appears.

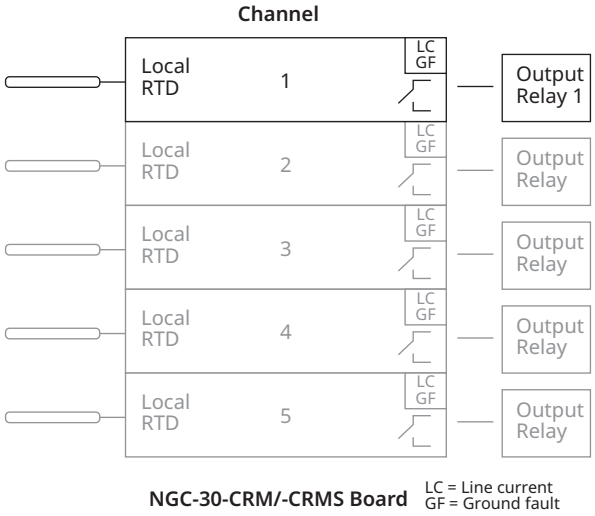


Fig. 3.5 Simple control circuit

The NGC-30 software can manage up to 260 Circuits similar to that depicted above. The control Circuit concept is not limited to the simple arrangement shown above. Multiple input circuits and “monitor only” circuits are possible as depicted on the following page.

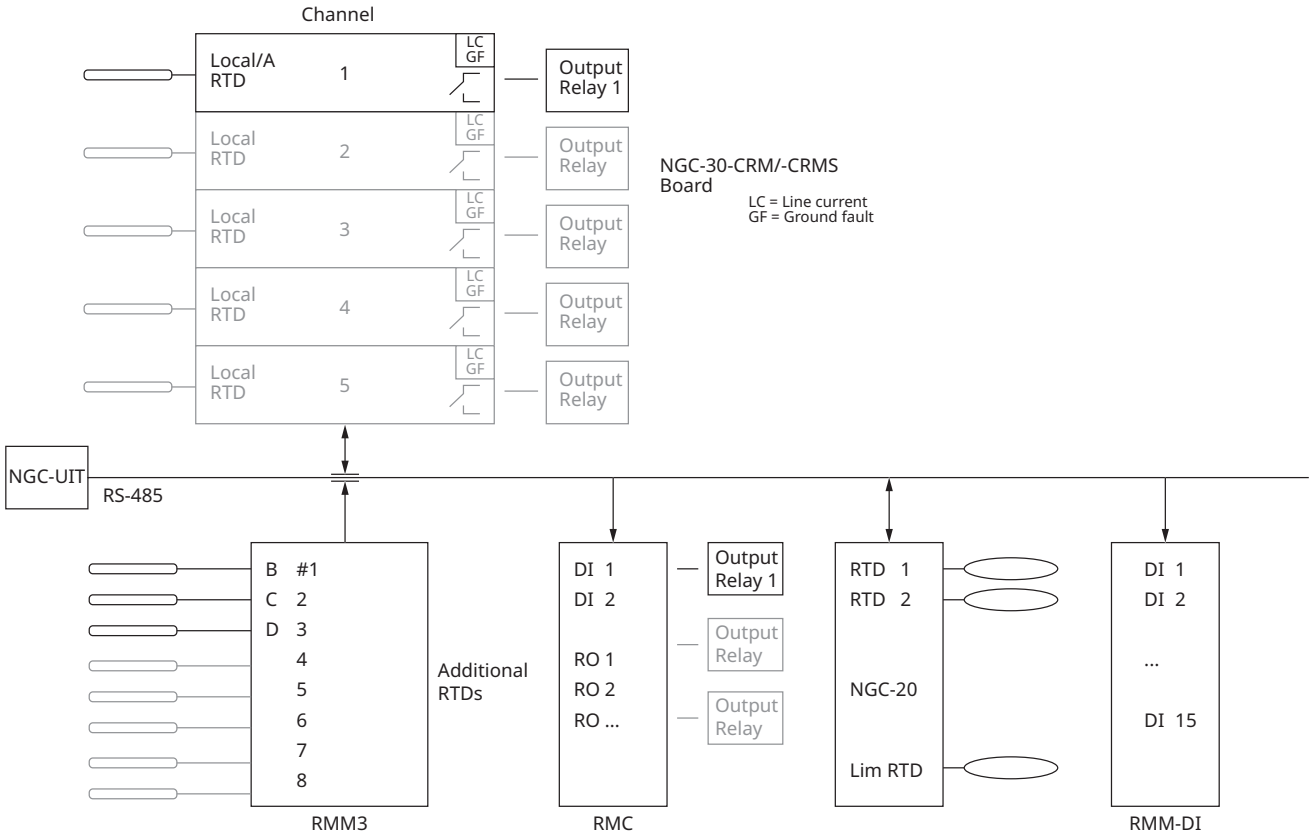


Fig. 3.6 Multiple input control circuit

3.3 NGC-30 Windows – Detailed Descriptions

3.3.1 Setup window

To input any device address, the modules must be connected and powered during startup of the NGC-UIT3 program. The program scans for the device number(s) on the network during the update network process. The Network|Devices window lists all the device address(es) found. The addresses listed are the only device addresses that the program recognizes as valid.

If a device is added after the NGC-UIT3 program has scanned the network, go to the Network window and select “Update Network.”

Each device must have a unique device address number. For example, if the design requires both a NGC-30-CRM and a RMM3 module, and 32 is chosen for device address number for the NGC-30-CRM, then the RMM3 module cannot also use address 32. This also applies to the other modules. (See Available Device Address Table on page 56 for device address restrictions).

3.3.2 Main Status window

The main status window displays the status of all circuits that have been setup. For each circuit, the main window displays:

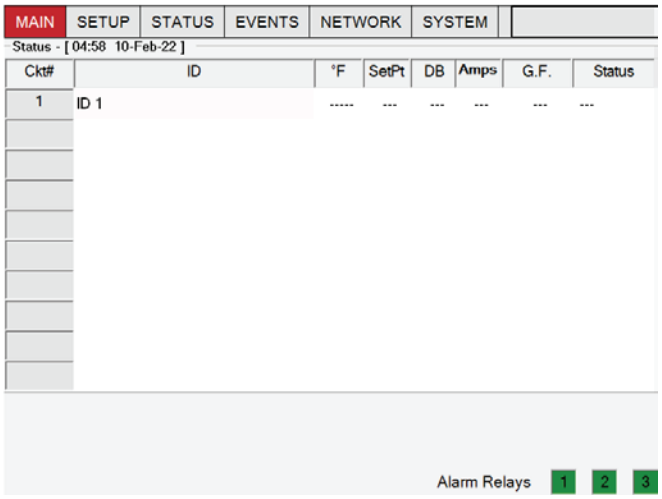


Fig. 3.7 Main window with circuit status

Ckt# - Circuit number

ID - Identification tag for the Circuit

°C or °F - The control temperature

SetPt - Desired maintain temperature

DB - Dead Band

Amps - Heater current amperes

G.F. - Heater ground-fault current

Status - Relay (heater on, off or trip) and communication status

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 heater is energized (status On), within Normal range of setup parameters

Red - In Alarm condition

Orange (°F/°C only) - Temperature not within setpoint + dead band range

Alarm Relay Status

Green - No alarm

Red - In Alarm condition

IMPORTANT: A Configuration Spreadsheet has been developed to assist in the collection of specific circuit details. This spreadsheet is located in Appendix F.

3.3.3 Setup | Circuit window

The Setup | Circuit window is the first window of the Setup sequence.

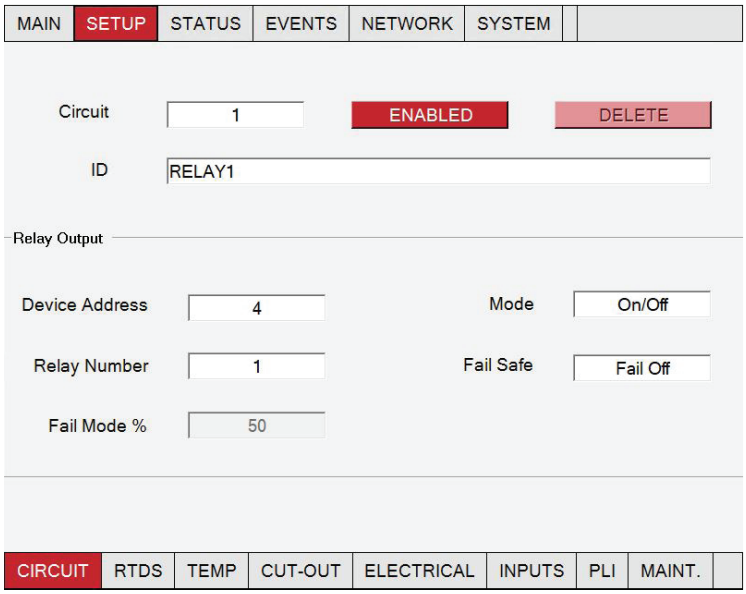


Fig. 3.8 Setup | Circuit window

Circuit Entry Field

The Circuit # is assigned when setting up a Circuit in the NGC-30 program. It is the primary reference for all windows. Once a Circuit is added, you cannot change its Circuit number; however you can delete the Circuit (except for Circuit 1). This Setup|Circuit window is also where you can select an existing Circuit.

Enabled/Disabled Toggle Button

When **Enabled**, the NGC-UIT3 monitors and generates Circuit alarms.

If a relay output has been assigned to the Circuit, the relay output turns on or off based upon set-up parameters and RTD inputs, and the selected control mode.

When **Disabled**, the NGC-UIT3 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**.

Delete Button

Deletes the Circuit that is currently being displayed and removes it from the main window. Any Circuit can be deleted EXCEPT for Circuit 1. The program asks for confirmation before deleting.

ID Entry Field

The Circuit ID is user-definable name tag. The default is "ID XXX" (where XXX is the Circuit number).

Limit: 40 characters (character strings are truncated on the Main Window after 16 characters but displayed in full on Status and Setup win-dows)

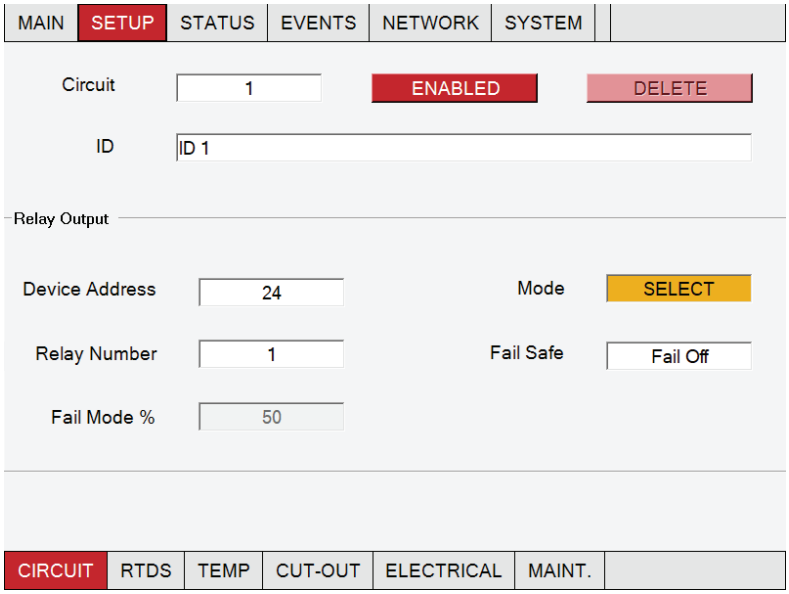


Fig. 3.9 Setup | Circuit window mode

Relay Output Section

This section defines the device/relay and the operating mode assigned to the Circuit.

Device Address Entry Field

The device address is the number assigned to a NGC-30-CRM/-CRMS board via the rotary selector switches. Each NGC-30-CRM/-CRMS must be assigned a unique number (no other device can share a device address whether it's a Relay Output device or RTD input device). All device addresses are scanned on initial startup. If devices are added after initial startup, the user must perform a system re-scan. (For more information on scanning for devices, see section 3.3.24 Network | Devices Window on page 56.)

Device Address Range: 0–99 (For available device addresses and specific limits, see Table 3.5 Available Device Addresses on page 54.)

IMPORTANT: If no device address is entered (0), the Circuit is limited to temperature-monitoring and temperature- alarming only.

Relay Number Entry Field

The relay number defines which of the 5 control channels on the NGC-30-CRM/-CRMS board controls the heater's switching device. When the display shows dashes (---) rather than an address, no switching device has been assigned to the Circuit. For NGC-20 controllers, the relay number will always be 1.

Mode Entry List

The modes are the various control schemes that control a Circuit. There are four different control modes associated with a NGC-30-CRM panel plus one voltage monitoring mode, and five with a NGC-30-CRMS panel plus one voltage monitoring mode.

Table 3.1 Control Modes

Modes	NGC-30-CRM	NGC-30-CRMS*	RMC	Elexant 5010i / NGC-20
On/Off	X	X	X	X
Proportional		X		
PASC	X	X	X	X
Always On	X	X	X	X
Always Off	X	X	X	X
Voltage	X	X		X
Monitor Only	X	X		

*Soft Start always active with CRMS (See Soft-Start Feature information below)

3.3.4 Control Modes Definitions

On/Off

The NGC-UIT3 monitors the control temperature and compares it to the setpoint. If the control temperature is above the setpoint by more than the Dead Band value (see page 35) the relay output is turned off. If the control temperature falls below the setpoint temperature, the output is turned on. The control temperature is defined as the lowest RTD temperature input value for that Circuit.

Proportional

This algorithm monitors the control temperature of the Circuit and compares it to the setpoint temperature. If the control temperature is at or below the setpoint temperature, then power is applied to the heater with a duty cycle of 100%. If the control temperature is equal to or greater than the control setpoint temperature –15.5°C (+4°F), then the relay output will have a duty cycle of 0%. The control temperature is constantly monitored, and the output duty cycle is adjusted proportionally once per second. See Appendix A for additional information on Proportional Control.

Soft-Start Feature

This feature is a time-ramped soft start that reduces surge current produced by heaters at startup. When a solid state output relay is first turned on, the duty cycle is ramped from 0 to 100% in 2.5% (25 millisecond) increments over a 40 second period. The update rate for each step is fixed at 1 second.

This automatic feature is included only when using SSRs as an output device. It is incorporated into all control modes (On-Off, Proportional, PASC, Always On). If an output has been off for more than 10 minutes, the soft-start algorithm will reset and be activated the next time the SSR turns on. The soft-start algorithm will also reactivate whenever the NGC-30-CRMS boards loses power or is reset.

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 and maintain a particular temperature, the main variable in controlling the pipe temperature becomes the ambient air temperature.

The NGC-30-CRM/-CRMS 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.

Always On

The relay output is switched on (user override), turns on the power to the heater and leaves it on.

IMPORTANT: Monitor the pipe temperatures to avoid overheating. Alarms are still active.

Always OFF

The relay output is switched off (user override), turns off the power to the heater, and leaves it off.

IMPORTANT: Monitor the pipe temperatures for low temperature alarms. Alarms are still active.

Voltage

Voltage mode allows the NGC-UIT3 to monitor line voltage from the NGC-30-CRM/-CRMS boards. The NGC-30-CRM/-CRMS must have an NGC-30-CVM connected to the line current sensor input when selecting voltage mode. As a result, this channel of the NGC-30-CRM/-CRMS cannot be used to control an output device. But an RTD can be connected to this channel's input to set up an additional temperature monitoring Circuit. For an Elexant 5010i / NGC-20 controller, the voltage mode is not an option since this is a standard feature.

Monitor Only

This is the default mode that allows temperature monitoring for the Circuit. This means no output device has been selected.

Fail Safe toggle button

The Fail Safe control button turns the power on or off to the heater if the Circuit loses all valid RTDs.

When the last remaining sensor for control fails (or communication with the sensor is lost), the NGC-UIT3:

- 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 controller signals the alarm has been cleared, returns the Circuit to its normal control mode, and records both of these events.

IMPORTANT: Default is OFF

3.3.5 Setup | RTDs window

In order to assign an RTD to a Circuit, it must be shown in the Network|Devices table.

By default, each NGC-20 controller and each channel of the NGC-30-CRM/-CRMS has an associated RTD input.

The NGC-30 program first checks to see if the default RTD is available. On any NGC-30-CRM/-CRMS (5GF-C) board, the first RTD input is automatically coupled with the first relay output; the second RTD is linked with the second output relay, etc. When a control layout is chosen with an RMC and RMM3 then, by default, no RTD will be associated with the RMC output channel. The users decide themselves which temperature input is linked to which output channel.

Fig. 3.11 indicates an RTD connected to the RTD 1 terminal block, so the RTD set-up screen indicates the default assignment is already completed. This selection is grayed out because you cannot alter this default selection. In the event of a communications failure or UIT3 failure, the circuit reverts to this default RTD for control purposes.

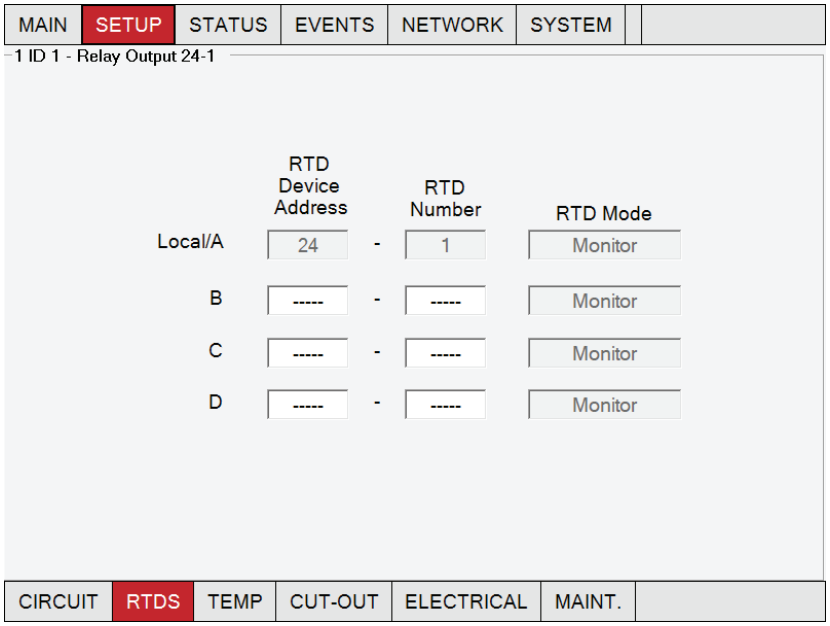


Fig. 3.10 Setup | RTDs window - Default RTD, hard-wired to CRM/-CRMS board

In general, up to three additional RTDs can be associated with this Circuit. When the system is fully functional, the lowest RTD value from the list of four will be used for control temperature. 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 UIT3 failure, no RTD input is available and the relay output for this Circuit goes to the failsafe mode established in the Setup | Circuit window.

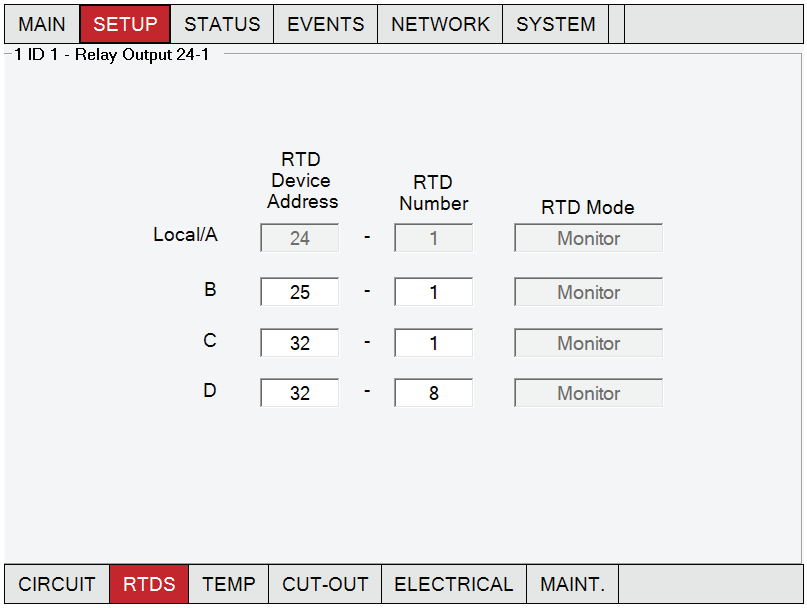


Fig. 3.11 Setup | RTDs window- Four RTDs are assigned to the circuit

Each RTD can be set to operate in two modes: Control or Monitoring. If an SES is used as a Continuity sensor, a third option for Continuity is also selectable. If an RTD is set to Control, the output of the Circuit will be based on this RTD in conjunction with any other Control RTDs in Auto On/Off mode. These RTDs will also trigger temperature alarms and cutouts. However, if an RTD is set to Monitoring, its temperatures will not be used to control the circuit's relay output. RTDs set to Monitor will trigger temperature alarms but not high temp cutout. A RTD mode set to Continuity will only report that power has reached the SES module.

The table below indicates the RTD Mode (RTD application) options for each RTD device.

Table 3.2 RTD Mode Options

Connection Type	RS-485 Device	RTD Device	RTD Modes		
			Control	Monitor	Continuity
Hard-wired, local	CRM/CRMS the same circuit	Direct	X	--	--
Hard-wired, not local	CRM/CRMS				
another circuit	Direct	X	X	--	
Hard-wired, local	Elexant 5010i / NGC-20	Direct	X	--	--
Serial	RMM3	Direct	X	X	--
Serial	PLI-SES/SPC	via SES-RTD	X	X	--
Serial	PLI-SES/SPC	No RTD	--	--	X
Serial	PLI-SES/SPC	via SES-SPC	X	X	--
Serial	PLI-TT	via 700-TT	X	X	--

IMPORTANT: The SES-CONT device does not have any RTDs, thus can not control or monitor the temperature. Therefore, the only RTD Mode that can be selected is Continuity. In Continuity Mode, the integrity of the heat-tracing system is monitored.

3.3.6 Setup | Temp window

This window contains all temperature parameters for control and monitoring of Circuits.

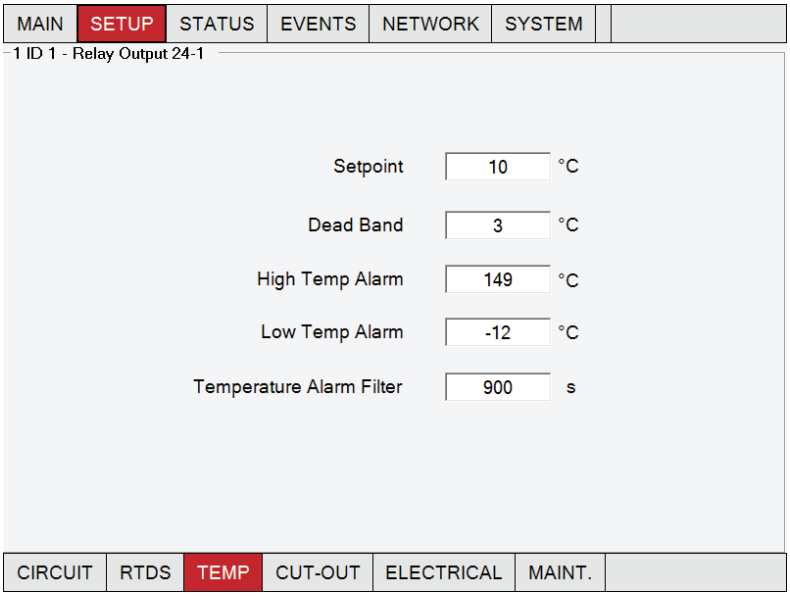


Fig. 3.12 Setup | Temp window

Setpoint Entry Field Use with On/Off, Proportional, and PASC control modes. The Setpoint is the desired maintain temperature for the circuit.

Based on the measured control temperature, the NGC-20 and NGC-30 switches the relay output to maintain the system at the desired set point.

Range Elexant 5010i / NGC-20: –200°C (–328 °F) to 700°C (1292 °F)

Default: 10°C (50°F)

Range NGC-30: –73°C (–99°F) to 482°C (900°F)

Default: 10°C (50°F)

Dead Band Entry Field Use with On/Off Control.

If the control temperature is above the Setpoint temperature plus Dead Band, the relay output is turned off. If the control temperature is below the Setpoint temperature, the output is turned on.

Range Elexant 5010i, NGC-20, NGC-30: 1°C (1°F) to 50°C (50°F)

Default: 3°C (5°F)

High Temp Alarm Entry Field Use with all modes.

If any RTDs assigned to a Circuit measures a temperature above this threshold, the NGC-UIT3 generates an alarm.

Range Elexant 5010i / NGC-20: –200°C (–328°F) to 700°C (1292°F)

Default: 10°C (50°F)

Range NGC-30: –73°C (–99°F) to 482°C (900°F)

Default: 149°C (300°F)

Low Temp Alarm Entry Field Use with all modes.

If any RTDs assigned to a Circuit measures a temperature below this threshold, the NGC-UIT3 generates an alarm.

Range Elexant 5010i / NGC-20: –200°C (–328°F) to 700 °C (1292°F)

Default: 10°C (50°F)

Range NGC-30: –73°C (–99°F) to 482°C (900°F)

Default: –12°C (–10°F)

Temperature Alarm Filter Entry List

This minimizes nuisance alarms by forcing the NGC-UIT3 to verify that the alarm condition continually exists over the selected period of time before alarming.

Range: 10 to 59,940 seconds

Default: 900 seconds (15 minutes)

IMPORTANT: The 15 second option is for testing and demostration purposes. Choosing this option for normal use may cause nuisance alarming since this option may not allow the NGC-UIT3 time to verify that the alarm conditions exist.

3.3.7 Setup | Limit Cut-Out window

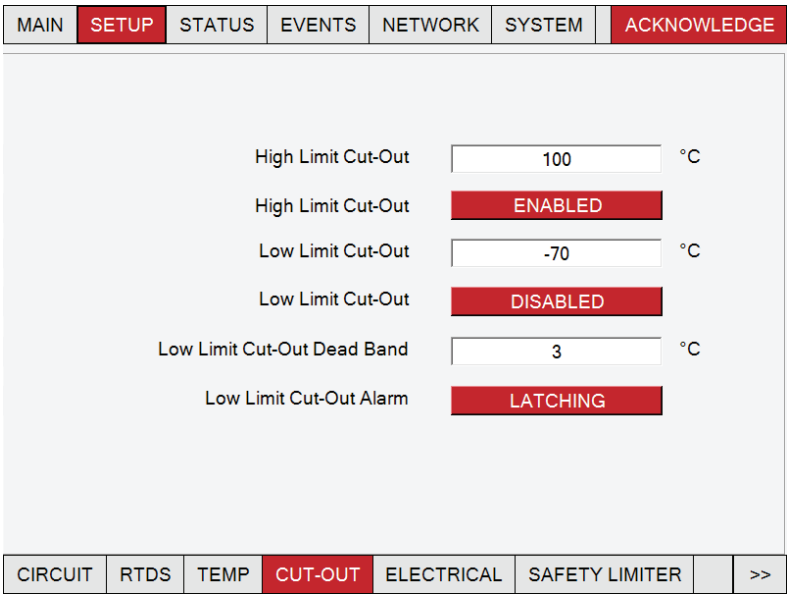


Fig. 3.13 Setup | Limit Cut-Out window

High Limit Cut-Out Entry Field

High Limit Cut-Out feature is triggered depending on Control and RTD Modes. The Table below indicates which RTD Modes will initiate a High Limit Cut-Out for each Control Mode. If these RTDs are assigned to a Circuit and measure a temperature above the High Limit Cut-Out threshold, the NGC-UIT3 generates an alarm and the relay output is turned off. If he High Limit temperature is below this threshold minus the Deadband, the output is turned on.

Table 3.3 Control Modes and RTD Modes That Trigger High Limit Cut-Out

Control Modes	RTD Modes		
	Control	Monitor	Continuity
On/Off	X	--	--
Proportional	X	--	--
PASC	--	X	--
Always On	X	--	--
Always Off	--	--	--

These are the general settings for the NGC-30:

Range: –73°C (–99°F) to 482°C (900°F)

Default: 482°C (900°F)

For Elexant 5010i, NGC-20:

Range: –200°C (–328°F) to 700°C (1292°F)

Default: 700°C (1292°F)

Low Limit Cut-Out Entry Field - Elexant 5010i, NGC-20 Only

Low Limit Cut-Out feature is triggered depending on Control and RTD Modes of the Elexant 5010i, NGC-20. Table 3.3 indicates which RTD Modes will initiate a Low Limit Cut-Out for each Control Mode. If these RTDs are assigned to a Circuit and measure a temperature above the Low Limit Cut-Out threshold, the NGC-UIT3 generates an alarm and the relay output is turned off. If the Low Limit temperature is above this threshold plus the variable Deadband, the output is turned on.

Limit Cut-Out Enable/Disable Toggle Buttons

Enables or disables the high limit cut-out capability. When enabled, the NGC-UIT3 alarms and the output relay turns OFF if any RTDs exceed the cut-out value. If the high limit cut-out is disabled, the relay output will continue to function normally without the high temperature cut-out feature.

3.3.8 Setup | Electrical window

This window configures ground fault alarm and trip values for the Circuit. (This feature is only supported when used with CRM/CRMS or Elexant 5010i / NGC-20 controller boards. This feature is not supported with RMC controller output modules. Ground fault alarm is a latching alarm and must be reset.) These alarms are latching alarms and must be reset.

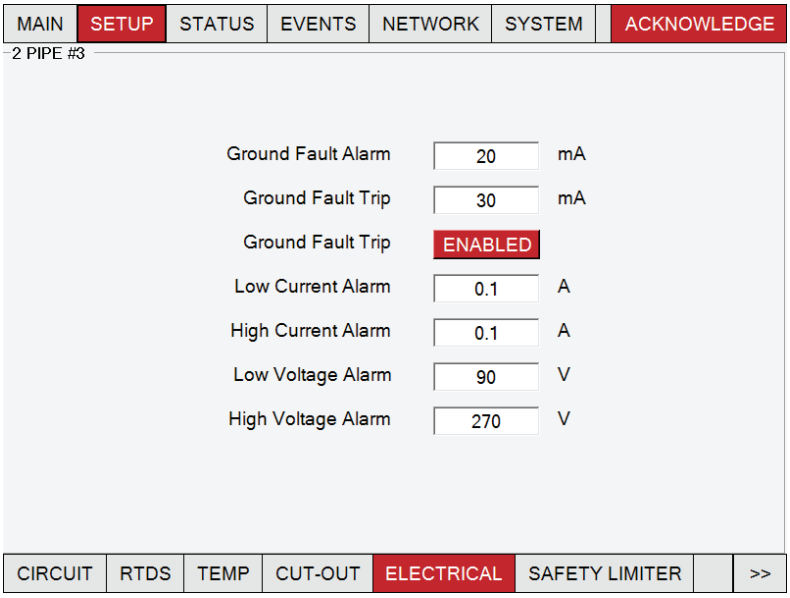


Fig. 3.14 Setup | Electrical window

Ground-Fault Alarm Entry Field

Set the Ground-Fault Alarm threshold to the desired level. The ground-fault alarm may not be disabled.

Range Elexant 5010i / NGC-20: 10 mA to 250 mA

Range NGC-30: 10 mA to 200 mA

Default: 20 mA

Ground-Fault Trip Entry Field

Set the Ground-Fault Trip value to the desired level. If a Ground-Fault Trip condition occurs, the relay output is turned off and will not turn on until the fault has been cleared, and the Circuit is reset in Status | Circuit window.

Range NGC-20: 10 mA to 250 mA

Range Raychem NGC-30: 10 mA to 200 mA

Default: 30 mA

Ground-Fault Trip Toggle Button

Enables or disables the ground-fault trip capability. When enabled, the output relay turns OFF if the ground-fault current exceeds the trip value. An alarm is created in the Events window. The output relay is not functional until the ground-fault problem is fixed and the alarm is reset. If the Ground-Fault Trip is disabled, the relay output will continue to function normally but without ground-fault safeguards.

⚠ WARNING:

Fire Hazard. A ground-fault alarm means the heating cable has been damaged or improperly installed and must not be ignored. Disabling the ground-fault trip function reduces safety and could result in sustained electrical arcing or fire. To minimize the risk of fire if the alarm activates, shut off the power and repair the system immediately.

Low Current Alarm Entry Field

If the relay output currents fall below Low Current Alarm, the NGC-UIT3 will alarm.

Range Elexant 5010i / NGC-20: 0-30 A, where 0 = Alarm Disabled
Default Elexant 5010i / NGC-20: 30 A
Range NGC-30: 0-100 A, where 0 = Alarm Disabled
Default: 30.0 A

High Current Alarm Entry Field

If the relay output current is above the High Current Alarm, the NGC-UIT3 alarms and stays in alarm until the high current is cleared, and the alarm is reset in the Status | Circuit window.

Range Elexant 5010i / NGC-20: 0-30 A, where 0 = Alarm Disabled
Default Elexant 5010i / NGC-20: 1.0 A
Range Raychem NGC-30: 0–100 A, where 0 = Alarm Disabled
Default: 5.0 A

Power Limit Entry Field Use with SSR (NGC-30-CRMS) only

This feature limits the average power available at the output, by allowing the user to set a maximum duty cycle for the Circuit.

IMPORTANT: The heater is switched on and off over a time base of several seconds. For example, an 80% power output is achieved by switching the heater on at 100% for 800 milliseconds and then off for 200 milliseconds. Instantaneous power consumption is not limited when the heater is on.

Range: 10–100%
Default: 100%

High Voltage Alarm Entry Screen

If the voltage monitoring module measures line voltage above this threshold, the NGC-UIT3 generates an alarm.

Range: 50 – 305 V
Default: 270 V

Low Voltage Alarm Entry Screen

If the voltage monitoring module measures line voltage below this threshold, the NGC-UIT3 generates an alarm.

Range: 50 – 305 V
Default: 90 V

3.3.9 Setup | PASC window

This window configures the PASC setup if the PASC control mode is selected for a Circuit.

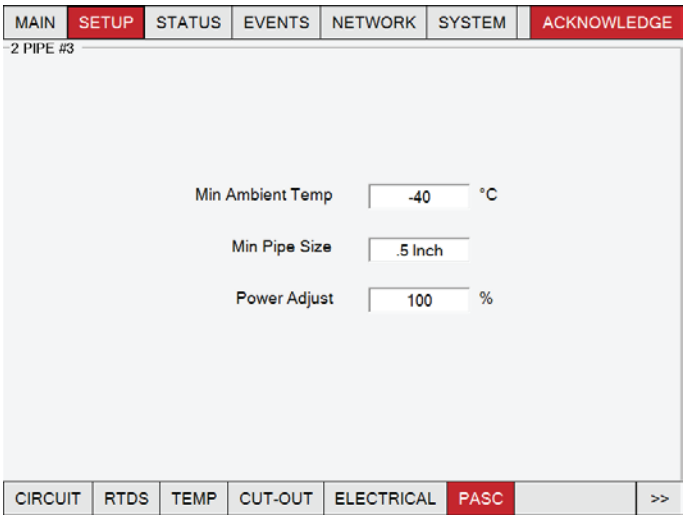


Fig. 3.15 Setup | PASC window

Min Ambient Temp Entry Field

The Min Ambient Temp is the "lowest ambient temperature" that was used when the heat-tracing system was designed. The entered value should agree with the value used by the design engineer to ensure that the heating-tracing system was sized correctly.

Range Elexant 5010i / NGC-20: –73°C (–99°F) to 51°C (124°F)
Range NGC-30: –73°C (–99°F) to 51°C (125°F)
Default: –40°C (–40°F)

Min Pipe Size Entry List

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.

List: 0.5, 1, >= 2 inches
Default: 0.5 inches

Power Adjust Entry Field

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 heat-tracing effective power by entering a value less or greater than 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 Chemelex representative for assistance with this factor.

Range: 10–200%
Default: 100%

3.3.10 Setup | PLI window

This window allows you to set the update time when using an PLI. The update time, in minutes, is used as the time that is waited before polling the sensor(s) for a new temperature on a circuit after the circuit has turned off. The sensors are continuously polled while the circuit is on.

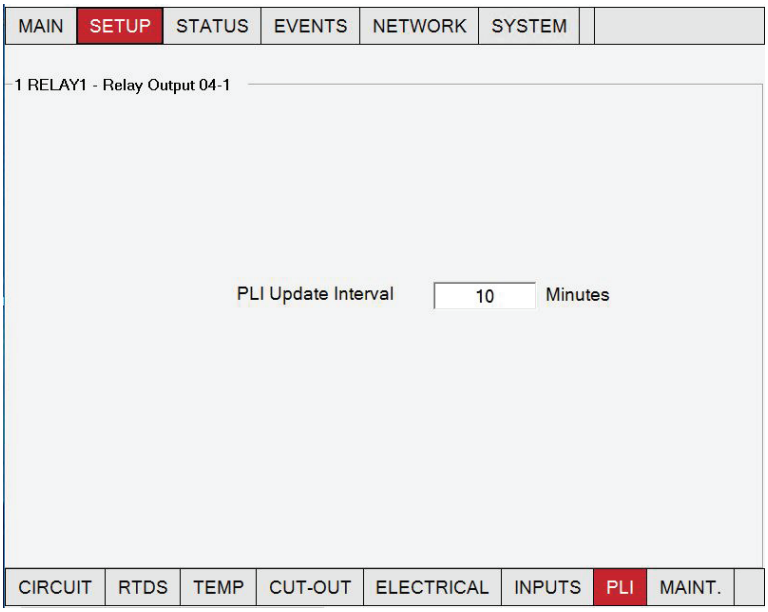


Fig. 3.16 Setup | PLI window

Heater On - When the heating cable is ON, the temperature measurements will be transmitted from the SES and SPC transmitters to the PLI module/NGC-30 controller approximately every 5 to 11 minutes depending on the SES address. When using 700-TT transmitters, the temperature data will be polled periodically. The time interval is within minutes and depends on the number of 700-TT transmitters and the number of connected circuits.

Heater OFF - When the heating cable is OFF, the temperature measurements will be transmitted from the SES, SPC and 700-TT transmitters to the PLI module/NGC-30 controller based on the configured PLI Update Interval time. The NGC-30 system turns the heater on in the time intervals defined in the field PLI Update Interval and reads the temperature measurements. Based on these temperature measurements and the Setpoint, NGC-30 Control System determines whether to leave the heater On or turn it Off.

If the Update Interval time is set to 10 minutes, the NGC-30 control system turns ON the heater every 10 minutes.

On time intervals when no additional heat is required is as follows:

- For 700-TT Transmitter ..... 5 seconds
- For SES Transmitter .....Highest SES Address Number for that circuit / 2 + 5 = in seconds
  Range: 1-255 Minutes
  Default: 10 Minutes

3.3.11 Setup | Maint. window

This window configures the maintenance schedule.

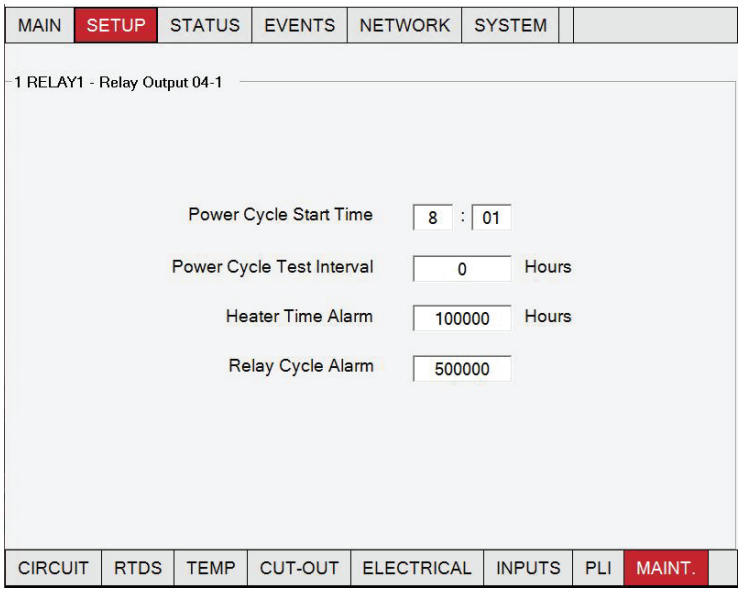


Fig. 3.17 Setup | Maint. window

Power Cycle Start Time Entry Field

After entering a start time, the Power Cycle test feature turns on the heat tracing for a one-minute period each day starting at the indicated time. If the heater system is damaged during a season when the system would normally be turned off, the daily Power Cycle test can help detect the problem within 24 hours. This is particularly helpful in warm months when heat tracing may not be energized.

Range: vAny time selected from the 24-hour clock (00:00–23:59, where 00:00 is off)

Power Cycle Test Interval Entry Field

The default interval is 24 hours. The example in the window above schedules a one-minute test every morning at 6:00 a.m. Other entries are possible, but multiples of 24 hours are recommended to preserve the predictable start-time. For instance, 48 hours will run the test at 6:00 a.m. every other day. 168 hours will run the test once a week starting with the first occurrence of 8:01 a.m. after the set-up procedure and once a week thereafter. To run the test twice a day, enter 12 hours etc.

Range: v1–1000 hours

Default: 24 hours

Heater Time Alarm Entry Field

This entry is used to create a heater inspection maintenance schedule. Enter the number of hours the heater can be energized before inspection and testing is due. The NGC-UIT3 tracks the accumulated “on” time for each heater circuit and generates an alarm message and advises that heater maintenance is due.

Range: 1–1,000,000

Default: 100,000

Relay Cycle Alarm Entry Field (For EMR type devices only)

This entry is used to create a contactor inspection maintenance schedule. Enter the number of times that contactors can be cycled on/off before inspection and testing is desired. The NGC-UIT3 tracks the accumulated number of on/off switches for each contactor and generates an alarm message to advise that contactor maintenance is due.

Range: 1–2,000,000

Default: 500,000

3.3.12 Setup | Inputs

This window configures the Digital Inputs (if available) for a Circuit.

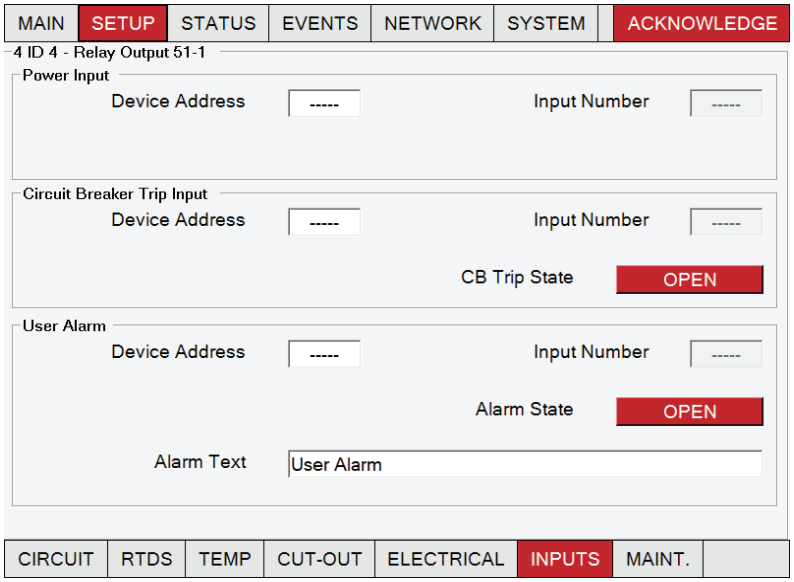


Fig. 3.18 Setup | Inputs window

Power Input

This window is initially displayed with the empty boxes for Device Address and Input Number. If an "Auxiliary Contact" is available for the Circuit output device (an optional set of contacts on a mechanical contactor or from an auxiliary relay in parallel with the heater circuit) then this window allows those contacts to be associated with the circuit for power monitoring purposes. If the NGC-UIT has attempted to turn a contactor ON, and the contactor fails to energize the circuit, then this digital input can be used to detect the abnormal situation. Selecting Device Address and Input Number provide numerical input windows and lists of available input locations. There is not default association of Input Number so Circuit 1 can be monitored from a set of relay contacts connected to DI 53-1 as in this example.

Circuit Breaker Trip Input

This window is initially displayed with the empty boxes for Device Address and Input Number. If the Branch Circuit Breaker for this Circuit is equipped with "bell alarm contacts" that change state when the circuit breaker has tripped, then those contacts can be monitored by the NGC-UIT. If the branch circuit breaker trips for high current or high ground fault, then the abnormal condition will be detected by the UIT and displayed as an alarm condition. Selecting Device Address and Input Number provide numerical input windows and lists of available input locations. There is not default association of Input Number so circuit breaker providing power to Circuit 1 can be monitored by connecting its bell alarm contacts to DI 50-2 as in this example.

Trip State (Toggle)

Pushing this button allows the user to define the relay condition that signals the alarm condition.

User Alarm

This window is initially displayed with the empty boxes for Device Address and Input Number. The Alarm text will show "User Alarm". The user can link a digital input to this user alarm. The user can define per circuit a user definable alarm text. In case the Digital Input goes into alarm state ("Open" or "closed" depending upon the Alarm State selection) the alarm text will appear in the alarm summary.

3.3.13 Setup | Safety Limiter window (Raychem NGC-20 Only)

This window configures the Safety Limiter (if available) temperature.

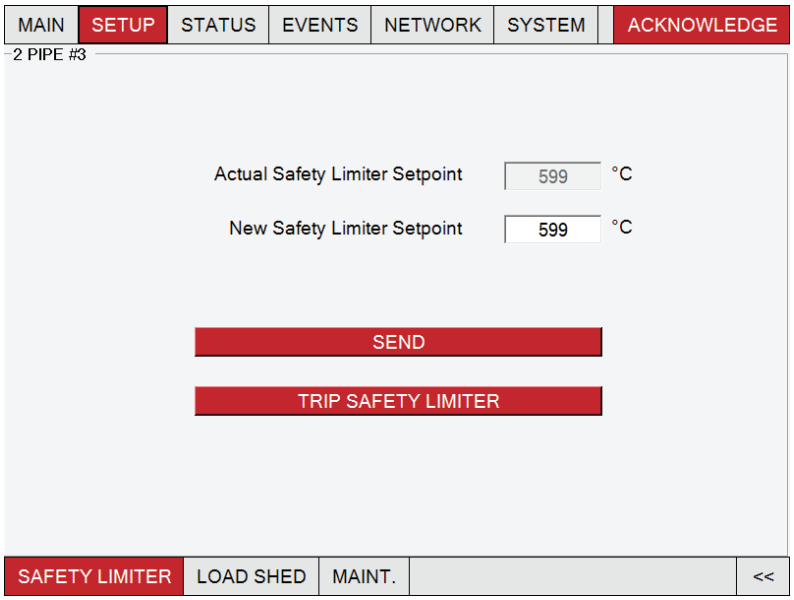


Fig. 3.19 Setup | Safety Limiter window

Actual Safety Limiter Setpoint Status Field

The Safety Limiter temperature setpoint that the NGC-20 is currently configured.

New Safety Limiter Setpoint Entry Field

Set the New Safety Limiter Setpoint to the desired value. If the Limiter's RTD temperature exceeds this value, the relay output is turned off and will not turn on until the Limiter's RTD temperature is below this setpoint and the alarm is cleared.

Range: –60°C (–76°F) to 599°C (1110°F)

Default: 300°C (572°F)

Safety Limiter Setpoint Timeout Entry Field

For the NGC-20 to accept the New Safety Limiter Setpoint, the black limiter button on the display board must be pressed and held down until the new value is successfully sent. A message will pop up stating "Safety Limiter Setpoint has been updated successfully". The Safety Limiter Timeout entry is the amount of time that the UIT will allow the user to complete the above.

Range: 1 second to 3600 seconds

Default: 60 seconds

Send Action Button

Initiates the process of updating the Safety Limiter Setpoint. When pressed, a countdown timer will display, counting down the time remaining to complete the New Safety Limiter Setpoint process.

Trip Safety Limiter Action Button

When pressed, this will manually force the Safety Limiter to trip.

3.3.14 Setup | Load Shed window (Elexant 5010i and NGC-20 Only)

This window enables or disables the various load shed zones. The actual configuration and implementation of these zones are done in Supervisor.

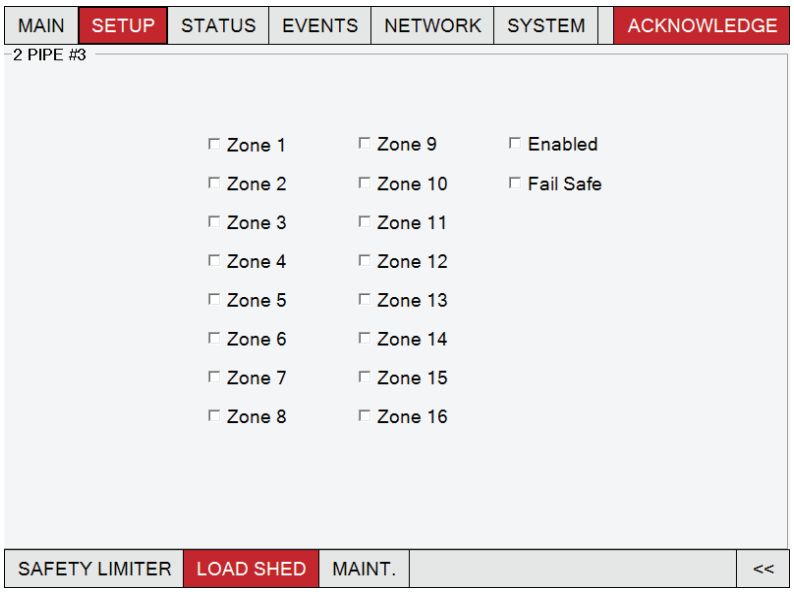


Fig. 3.20 Setup | Load Shed window

Each independent controller can be assigned to none, some or all of the 16 independent zones. Those zones that have been assigned to the controller requires the Enable box to be checked for the Load Shedding process to activate.

If the Failsafe box is checked, the controller will revert to the failsafe mode configured in the Setup|Circuit window if the NGC-20 controller loses communication with Supervisor.

3.3.15 Status | Circuit window

The status Circuit window displays the status information for individual Circuits. Data in the status menus cannot be changed; it is informational only.

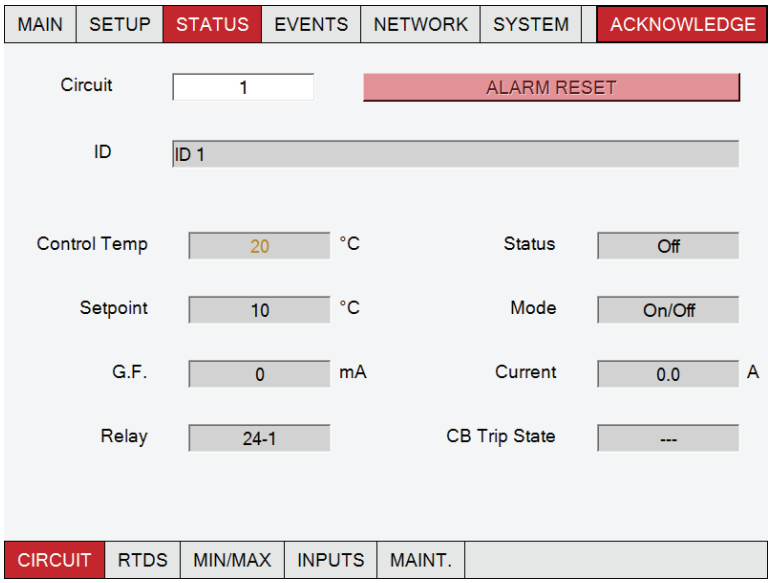


Fig. 3.21 Status | Circuit window

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

- **Black** - Circuit is off
- **Green** - Within Normal range of setup parameters
- **Red** - In alarm condition
- **Orange** - Control Temp only. Temperature not within setpoint + Dead Band range
- **Blinking Red/Orange** - Alarm Reset button only. A latching alarm event has occurred

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

- **Circuit Entry Field** - Enter the Circuit number to view the status of a specific Circuit
- **Alarm Reset Action Button** - 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
- **ID Field** - Displays the ID tag defined in Setup/Circuit window
- **Control Temp Field** - The Control Temp is the temperature the NGC-UIT3 is using for the control algorithm. If more than one RTD is connected to a Circuit, the system displays the lowest Control Temp of all the RTDs assigned to that Circuit
- **Setpoint** - The Setpoint is the desired maintain temperature for the circuit
- **G.F. Field** - Displays the ground-fault current for the Circuit
- **Relay Field** - Displays the Relay device and number defined in the Setup/Circuit window
- **Status Field** - Displays the relay output status (on, off, or trip) of the EMR or SSR. If communication is lost to the output device, a red COMM appears and alarms
- **Mode Field** - Displays the Control Mode selected in Setup | Circuit window
- **Current Field** - Displays the heater amperage of the Circuit when the relay output is on
- **CB Trip State** - Give the input status of the CB signal. In case of a circuit breaker trip it will display in RED the text "Tripped"

3.3.16 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 and the assigned RTD Mode.

Data in this status window cannot be changed.

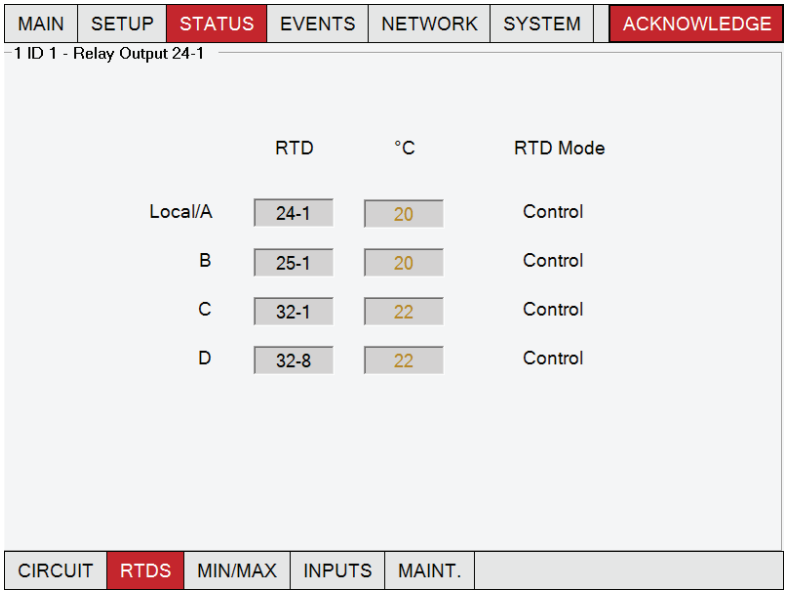


Fig. 3.22 Status | RTDs window

3.3.17 Status | PASC window

The Status | PASC window displays the current status of Circuit switching PASC algorithm. Data displayed in this status window cannot be changed.

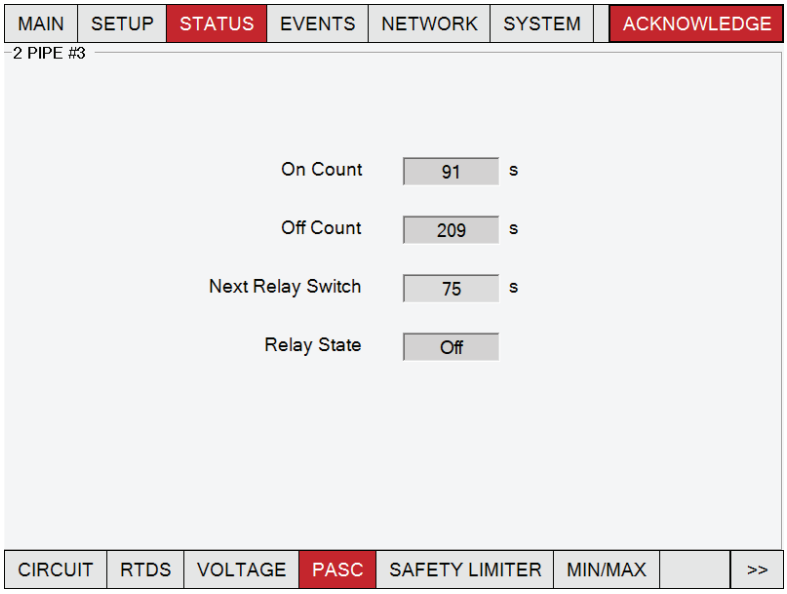


Fig. 3.23 Status | PASC window

The Status|PASC window provides the following controls:

- **On Count Field** - The duration (in seconds) an EMR or SSR is on during one on/off cycle
- **Off Count Field** - The duration (in seconds) an EMR or SSR is off during one on/off cycle
- **Next Relay Switch Field** - The time (in seconds) until the EMR or SSR changes state. This value counts down to zero for each on or off cycle
- **Relay State Field** - Current state (off or on) of the EMR or SSR assigned to this Circuit

3.3.18 Status | Voltage window

The Status | Voltage window displays the measured line voltage from the NGC-30-CRM/CRMS.

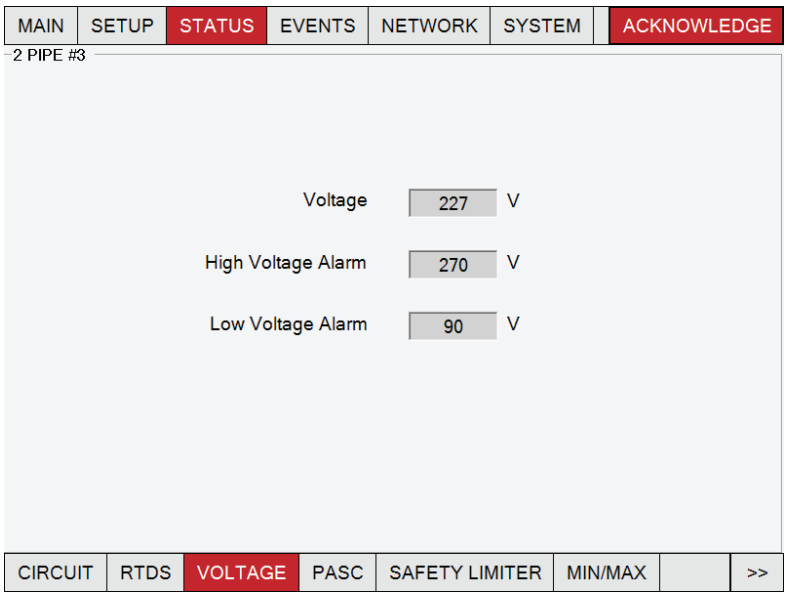


Fig. 3.24 Status | Voltage window

3.3.19 Status | PLI window

This window displays information regarding the update times for a PLI system when the heater is off for the selected circuit.

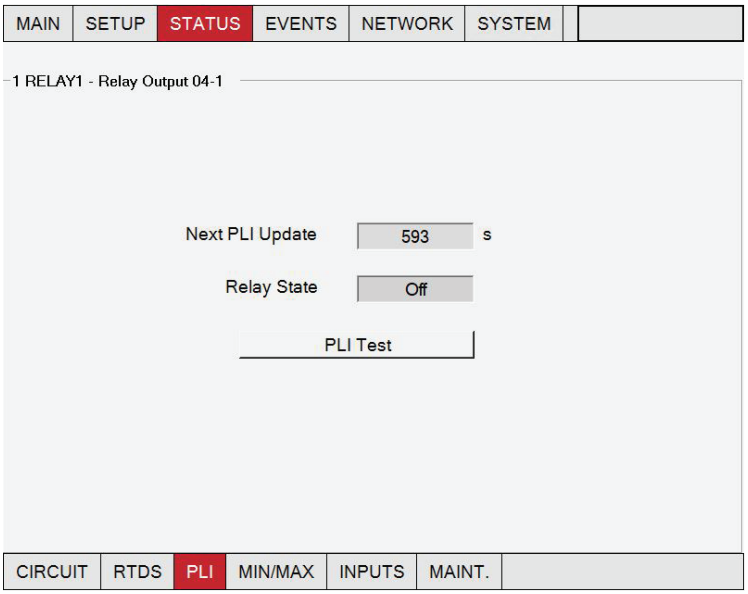


Fig. 3.25 Status | PLI window

The Next PLI Update displays the number of seconds until the next poll.

When the timer reaches zero, the UIT3 will turn the circuit on for a specified amount of time based on the sensor address and update the temperature. At this point, the circuit will either remain on or turn off again based on the new temperature.

Relay state field shows the current relay state.

IMPORTANT: The timer will stay at zero while it's updating. If the circuit is on because the temperature is below the setpoint, the timer will remain at zero until the circuit turns off.

IMPORTANT: The value on the screen may not update every second while on this window.

3.3.19.1 PLI Test Utility

The PLI Test utility allows you to test the communication between the UIT3 and the PLI module. You can use this to test and diagnose any issues you may be having receiving temperatures from the SES/SPC and TT temperature sensors.

IMPORTANT: This utility only tests communications between the UIT3 and the PLI module. The purpose of this test is to force the SES/SPC/TT temperature sensors to report temperatures to the PLI in a timely manner. The UIT3 does not directly communicate to the temperature sensors

The PLI Test utility can be launched from the Status|PLI screen. The circuit that is being viewed must have a PLI RTD assigned to it for this screen to appear. Tapping on the Start PLI Cycle Test button on this screen will launch the tester.

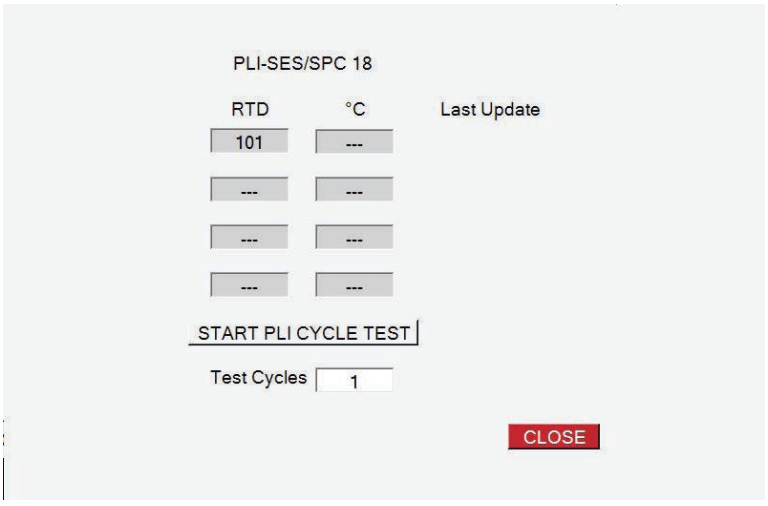


Fig. 3.26 The PLI Test Utility (Shown using PLI-TT)

In the PLI test utility, all of the PLI RTDs assigned to the current circuit will be displayed on this screen. The temperatures will appear as the values are being read during the test process. Along with the temperature, the last update will appear to the right. This timestamp shows the time when the last communication occurred between the UIT3 and the PLI module.

Below the temperatures is the Start button which will initiate the test. After the test has started, pressing this button again will stop the test.

Below the button is an input box for the number of test cycles the utility will perform. You can change this to what is required for your specific test.

3.3.19.2 Unswitched Circuits

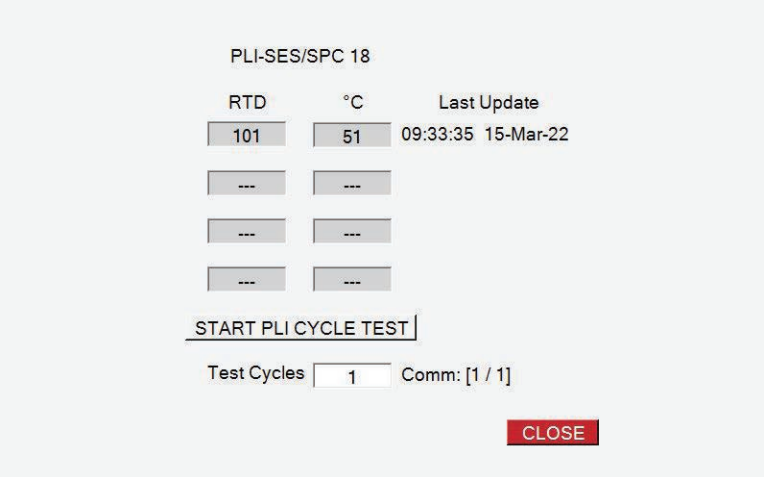


Fig. 3.27 An unswitched PLI-TT Circuit Test in Progress

Using this utility on an unswitched circuit will configure the UIT3 to continuously poll the PLI approximately every second. With a theoretical maximum time of 11 minutes between SES/SPC transmission times, 660 test cycles should result in SES/SPC temperatures being reported if there are no errors or issues with communication.

TT sensors, on the other hand, will each sequentially report their temperatures to the PLI. Therefore, TTs should always report a temperature for each test cycle.

3.3.19.3 Switched Circuits

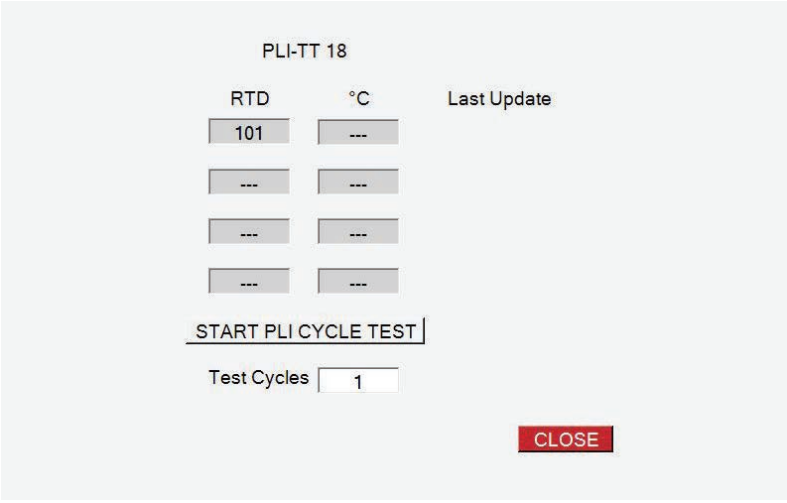


Fig. 3.28 A PLI-SES Switched Circuit Test in Progress

If the tester utility is used on a switched circuit, the UIT3 will force the controlling relay on to power the sensors.

If the circuit is using SES/SPC sensors and is already on, the UIT3 will switch the circuit off and then immediately back on to force the SES/SPC sensors to report their temperatures. This will occur every test cycle. The time required for each cycle will depend on the SES/SPC address numbers on the circuit since each sensor will report their temperatures at a specific time after power up based on

its address. A countdown timer will be displayed to indicate when the next test cycle will occur.

If TT sensors are being used, temperatures will be updated on the UIT3 every second after the circuit is forced on.

3.3.20 Status | Safety Limiter window (Elexant 5010i and NGC-20)

The Status|Safety Limiter window displays the current Safety Limiter's temperature and a historical record of minimum and maximum values recorded since the last Reset time. Data in this status window is "read only" information. Pressing reset releases all min./max. values and starts another period of accumulation for minimum and maximum values.

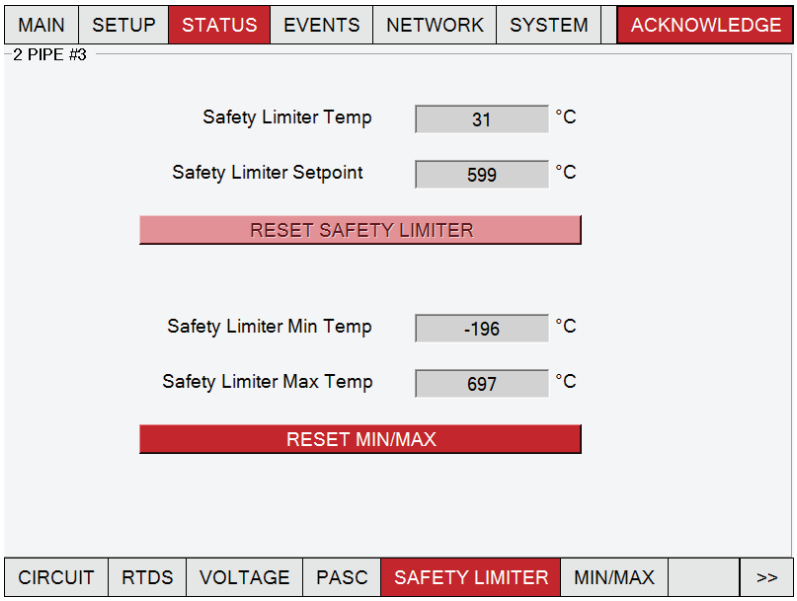


Fig. 3.29 Status | Safety Limiter window

The Status|Safety Limiter window provides the following controls:

- **Safety Limiter Temp Field** - Displays the last reported temperature from the Safety Limiter's RTD
- **Safety Limiter Setpoint Field** - The temperature that the controller is using for the Safety Limiter alarm
- **Reset Safety Limiter Action Button** - In normal state, the Reset Safety Limiter button in grayed out. If a latching alarm occurs, the Reset Safety Limiter button blinks orange/red. The alarm cannot be reset until the Safety Limiter's temperature is below the Safety Limiter's Setpoint.
- **Safety Limiter Min Temp** - The lowest temperature reported by the Safety Limiter's RTD since the last reset time
- **Safety Limiter Max Temp** - The highest temperature reported by the Safety Limiter's RTD since the last reset time

3.3.21 Status | Min / Max Window

This window displays an historical record of minimum and maximum values recorded since the last Reset time. Data in this status window is “read-only” information. Pressing reset releases all values and starts another period of accumulation for minimum or maximum values.

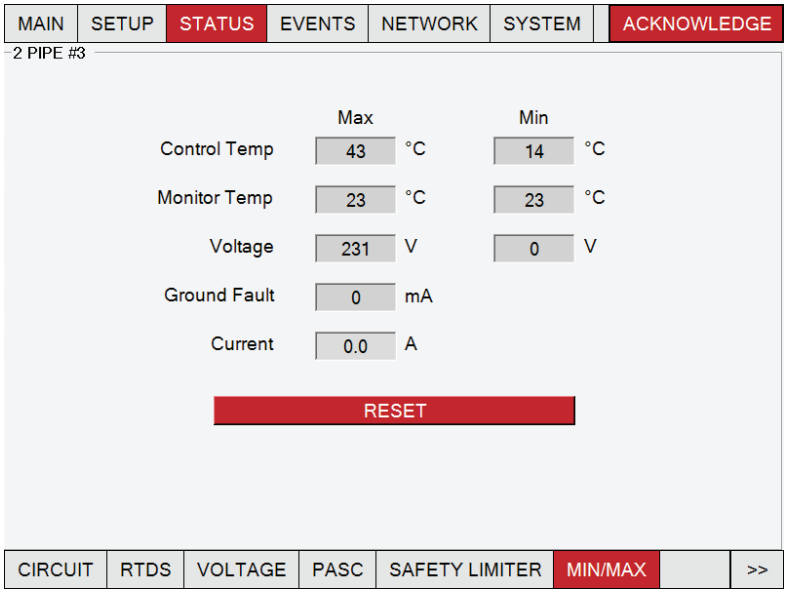


Fig. 3.31 Status | Min/Max window

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

- **Min Control Temp Field** - The lowest measured temperature used for control reported by any RTD associated with the Circuit since the last Reset time
- **Max Control Temp Field** - The highest monitored temperature used for control reported by any RTD associated with the Circuit since the last Reset time
- **Min Monitor Temp Field** - The lowest temperature measured used for monitoring purposes reported by any RTD associated with the Circuit since the last Reset time
- **Max Monitor Temp Field** - The highest temperature measured used for monitoring purposes reported by any RTD associated with the Circuit since the last Reset time
- **Max Voltage Field** - The highest voltage recorded for the circuit since last Reset
- **Min Voltage Field** -The lowest voltage recorded for the circuit since last Reset
- **Max GF Current Field** - The highest ground-fault value recorded for the Circuit since the last Reset time
- **Reset Button** - Immediately resets all Min/Max values and begins updating Min./Max. fields with new values
- **Max Current Field** - The highest current recorded for the Circuit since the last Reset

3.3.22 Status | Maint. window

This window displays the cumulative time in hours the heater has been On and the number of cycles the EMR has turned on and off for the selected Circuit. Data displayed in the counter windows is read only. Pressing the Reset buttons resets the appropriate counter.

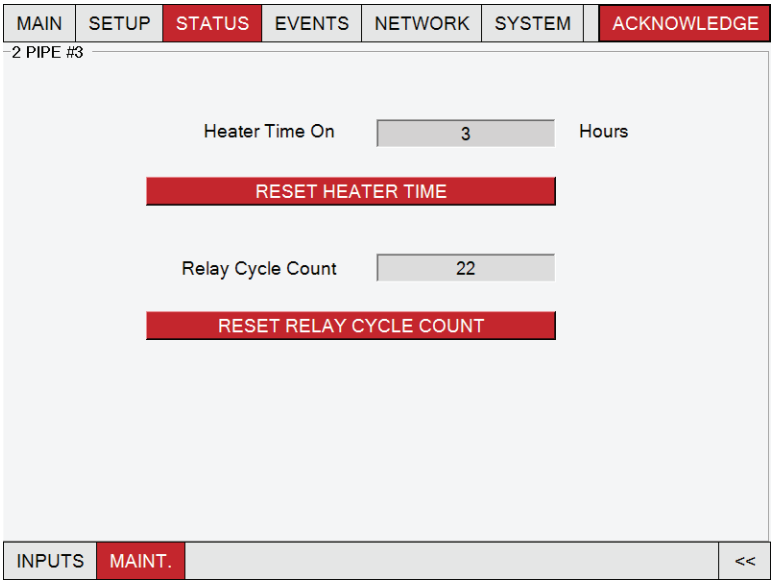


Fig. 3.32 Status | Maint. window

The Status|Maint. window provides the following controls:

- **Heater Time On Field** - Total time the heater has been energized since it was last Reset
- **Reset Heater Time Action Button** - Resets heater time to 0, and begins updating the field with new values
- **Relay Cycle Count Field** - Total number of times the EMR has switched on since it was last Reset
- **Reset Relay Cycle Count Action Button** - Resets the Relay Cycle count to 0, and cycle counts begin again **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.

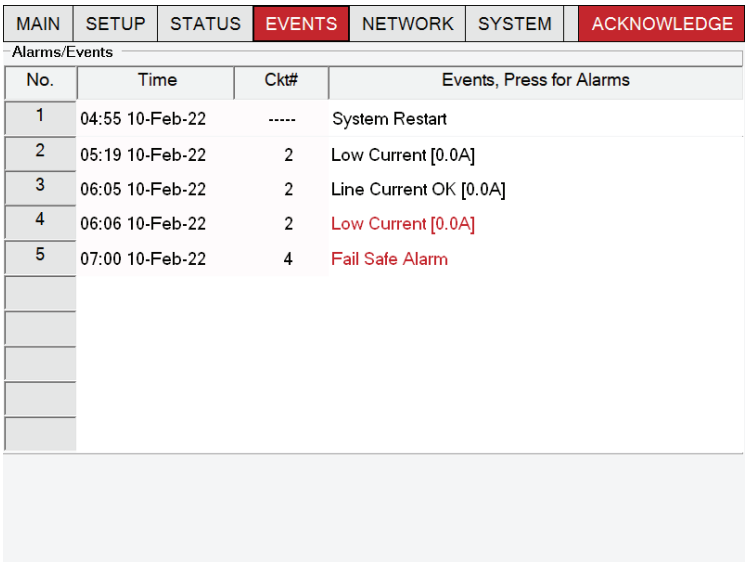


Fig. 3.33 Events window

The Events status listing window provides the following information:

- **Time Toggle Button** - By pressing 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 Toggle Button** - By pressing the Circuit heading, the display of events or alarms is sorted by the Circuit number. Circuits are first displayed in ascending order. Pressing the Circuit again toggles between ascending or descending order

- **Events, Press for Alarms Toggle Button**
  - By pressing the Events, Press for Alarms 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. (Important: The program automatically skips an alarm type if no alarms of that type exist)

Table 3.4 Alarm Type Headings and Descriptions

Alarm Type/Headings	Description
Any Alarm	
Comm Alarm	NGC-UIT3 display lost communication with an NGC-30-CRM/-CRMS, PLI module, and/or RMM3 module(s)
Fail Safe Alarm	Control mode of Circuit has been switched to Fail Safe control mode
CB Trip Alarm	Circuit Breaker Trip Alarm occurs when the Digital Input matches the Circuit Breaker Trip state
Ground-Fault Alarm	Heater's ground-fault current went above high ground-fault current alarm setting
Ground-Fault Trip	Heater's ground-fault current went above the ground-fault trip setting
Heater Time Alarm	Heater's energized time went above the heater's alarm threshold
High Current	Heater's current went above high current alarm 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
High Voltage	Line voltage went above high voltage alarm setting
Low Current	Heater's current went below low current alarm setting
Low Temp	RTD temperature went below low temp alarm setting
Low Voltage	Line voltage went below low voltage alarm setting
Power Input Alarm	Power Input state does not match the Relay Output State
Relay Cycle Alarm	EMR cycle count went above relay cycle alarm setting
Relay Failure Alarm	EMR or SSR was commanded to turn off. However, a heater current was still being detected. This condition can indicate a failed contactor or SSR (stuck on)
RTD Failure	Open or shorted RTD detected
User Alarm	User configurable alarm
Safety Limiter Comm Alarm	NGC-20 Safety Limiter sub-system cannot communicate with NGC-20 processor
Safety Limiter Sensor Failure	NGC-20 Safety Limiter RTD fails
Safety Limiter Trip Alarm	NGC-20 Safety Limiter temperature above Safety Limiter setpoint

Table 3.5 Events and Descriptions

Event	Description
Alarm Ack	Date and time stamps when an Alarm was acknowledged
CB Trip OK	Circuit Breaker is no longer tripped.
Comm Alarm	Communication with a specified device has been interrupted
Comm OK	Communication with device/s was restored.
Date/Time Error	Date or time information is not correct and must be updated
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	Heater's ground-fault current has exceeded Ground-Fault Alarm limit for Circuit
Ground Fault OK	Ground fault returned to acceptable range
Ground-Fault Trip	Heater's ground-fault current has exceeded Ground-Fault Trip limit for Circuit and has disabled the contactor or SSR

Table 3.6 Events and Descriptions

Event	Description
Ground-Fault Trip OK	Ground-fault current returned to acceptable range and Alarm Reset Button was pushed
Heater Time Alarm	Heater has reached the alarm threshold for the heater time on
Heater Time Reset	Heater hours counter field was reset to 0
High Current	Heater's Current has exceeded High Current Alarm limit for Circuit
High Temp	RTD temperature has exceeded High Temp Alarm limit for Circuit
High Temp Cut-Out OK	RTD temperature return to acceptable range
Line Current OK	Heater's Line Current returned to acceptable range
Circuit Deleted	Date and time stamps when Circuit was deleted in Setup|Circuit window
Low Current	Heater's current has dropped below Low Current Alarm limit for Circuit
Low Temp	RTD temperature has dropped below the Low Temp Alarm limit for Circuit
Normal	The alarm condition noted has been cleared
Power Input OK	Power Input state matches relay output state
Relay Cycle Alarm	Number of contact closures has exceeded alarm threshold for Circuit
Relay Cycle Reset	The relay cycles counter field was reset to 0
Relay Failure Alarm	Heater current was greater than 0 when EMR or SSR was commanded to be off
Relay OK	Heater current returned to 0 when EMR or SSR was commanded to be off. This indicates EMR or SSR is working properly
RTD OK	RTD failure indications (open or short) returned to acceptable range
RTD Failure	The specified RTD has failed
Safety Limiter Comm OK	Elexant 5010i / NGC-20 Safety Limiter sub-system can communicate with the Elexant 5010i / NGC-20 processor
Safety Limiter Reset	Elexant 5010i / NGC-20 Safety Limiter has been reset and Safety Limiter temperature is below Safety Limiter setpoint
Safety Limiter Sensor OK	NGC-20 RTD is working properly
System Restart	NGC-30 system has restarted at time noted
Temp OK	Control Temp returned to acceptable range
User Alarm OK	User alarm has been cleared
Voltage OK	Line voltage returned to acceptable range

Table 3.7 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

3.3.23 Network | Devices window

This window summarizes the device addresses and resources (output devices/ relays and RTD inputs) that have been found by the system and can be used for setup.

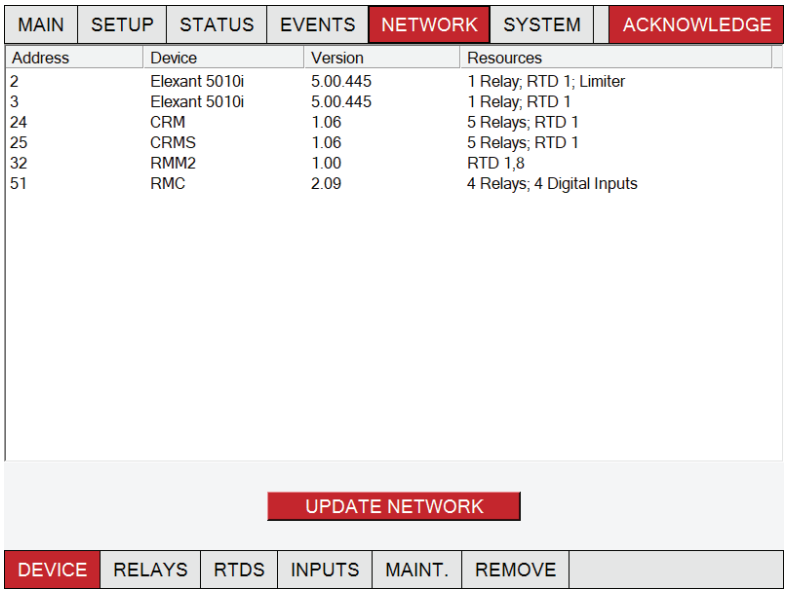


Fig. 3.34 Network | Devices window

Update Network Action Button

Pressing this button starts a search/scan for all connected peripheral devices. When the scan is completed, the window displays all devices and RTDs found connected to the NGC-UIT3.

IMPORTANT: If expected devices or RTDs are not discovered on the first scan, Update Network may be pressed a second time. If a known device or RTD is not discovered, check for proper connection to the RS-485 wiring, power at the peripheral device, and possible address conflicts (no two peripheral devices can have the same address setting).

Use the Update Network button whenever a new device or RTD is added to the system.

To add a new device or RTD, make sure it:

1. Has a unique address
2. Has power
3. Is connected to the RS-485 wiring

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

IMPORTANT: 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.

The table below shows the available device addresses for Relay Outputs and RTDs. If module(s) are installed either in the field or in the NGC-30 panel, they must NOT share the same address as the NGC-30-CRM/CRMS.

Table 3.8 Available Device Addresses

Device	Device Type	Switch Setting	Device Address
NGC-30-CRM/-CRMS	Relay Output/RTD	1–99	1–99
PLI	RTD	1–99	1–99
NGC-20	Relay Output/RTD	Via Software	1-247
RMM-DI	Digital Input	1-247	1-247
Elexant 5010i	Relay Output/RTD	Via Software	1-247
RMM3	RTD	0	32
RMM3	RTD	1	33
RMM3	RTD	2	34
RMM3	RTD	3	35
RMM3	RTD	4	36
RMM3	RTD	5	37
RMM3	RTD	6	38
RMM3	RTD	7	39
RMM3	RTD	8	40
RMM3	RTD	9	41
RMM3	RTD	A	42
RMM3	RTD	B	43
RMM3	RTD	C	44
RMM3	RTD	D	45
RMM3	RTD	E	46
RMM3	RTD	F	47

3.3.24 Network | PLI window

This window allows you to set the PLI module's mode: either SES transmitter or TT transmitter. This screen will only be displayed if the NGC-30 detects any PLI modules on the network.

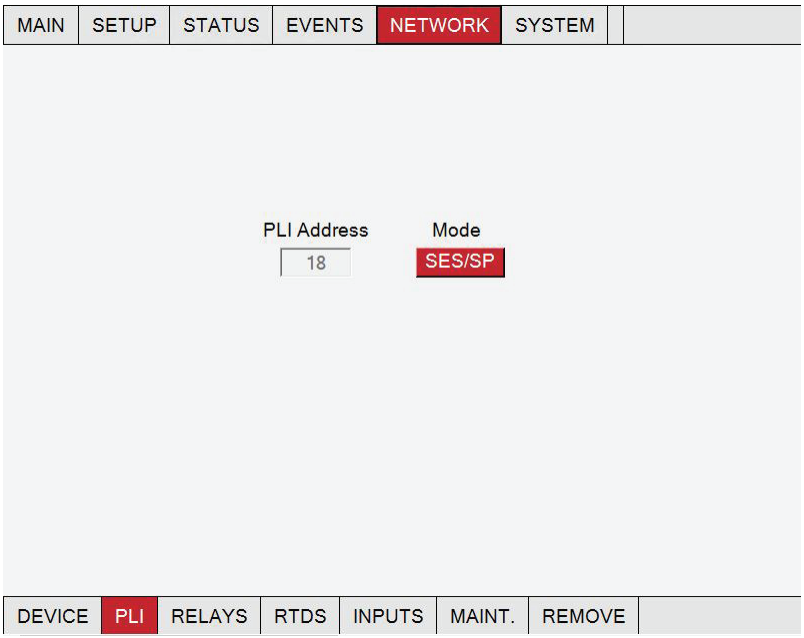


Fig. 3.35 Network | PLI window

Individual PLI module can only operate in one mode and can only be used in conjunction with one type of sensor at one time. Tapping on the Mode button next to the PLI Address will toggle between SES transmitter and TT transmitter.

3.3.25 Network | Relays Window

This status window lists all the available output devices and relay numbers, as well as the relays that have already been setup.

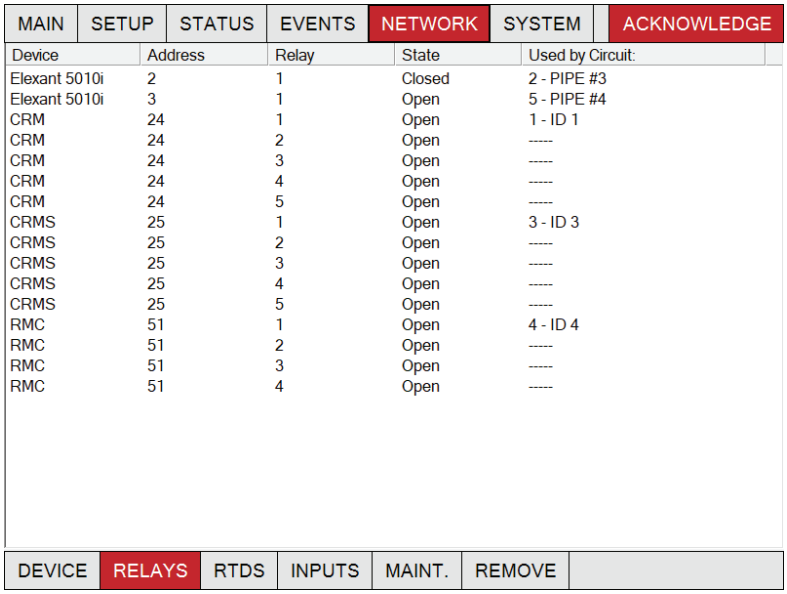


Fig. 3.36 Network | Relays window

3.3.26 Network | RTDs window

This window lists all the available RTD addresses. If an RTD has been assigned to a Circuit, the right side of the window shows where the RTD has been used.

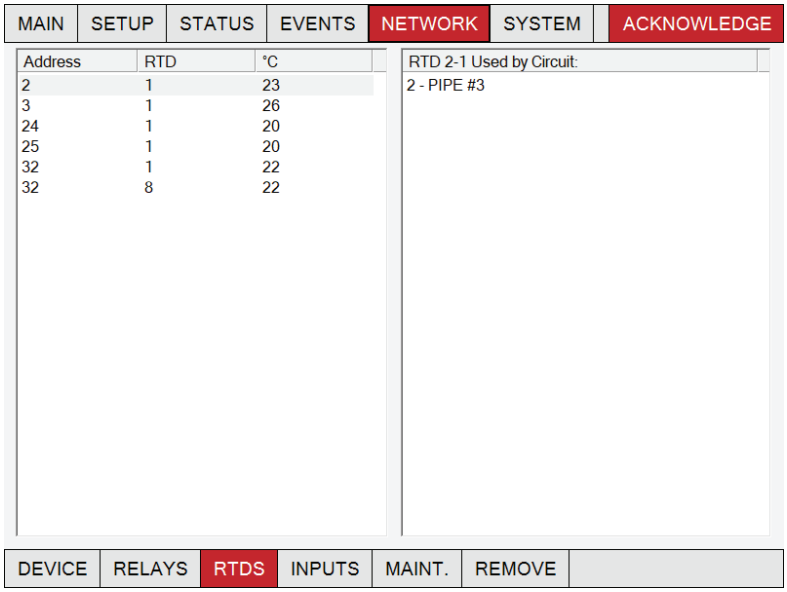


Fig. 3.37 Network | RTDs window

3.3.27 Network | Inputs window

This window lists all the digital inputs from the available RMC and RMM-DI, their current state and the circuit that is assigned to it.

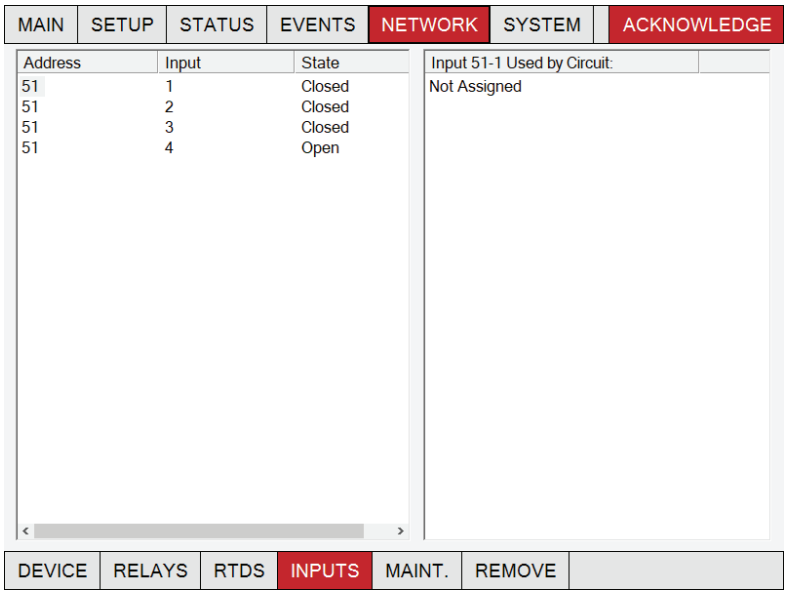


Fig. 3.38 Network | Inputs window

3.3.28 Network | Maint. window

This status window shows the communication success rate with all of the devices connected to the RS-485 network. This is helpful in debugging the RS-485 network.

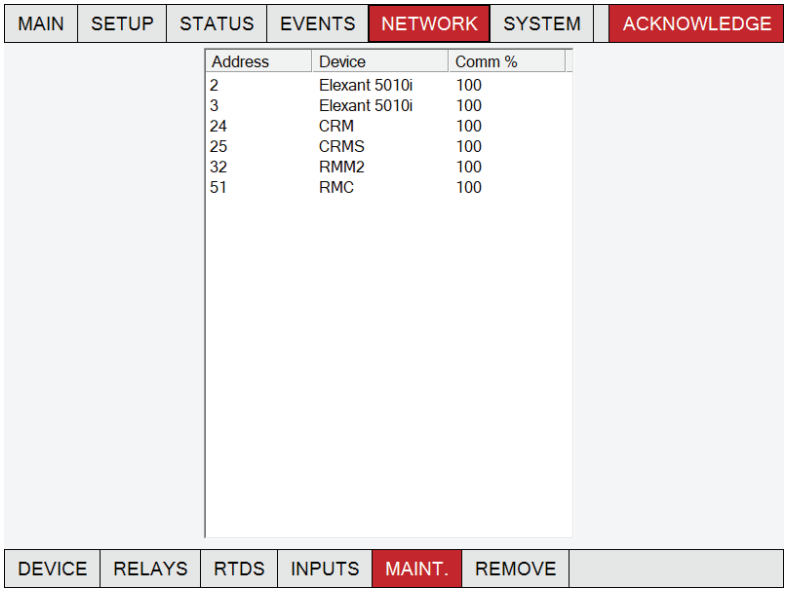


Fig. 3.39 Network | Maint. window

3.3.29 Network | Remove window

This Level 2 password-protected window allows you to remove Device Addresses for all types of modules from memory.

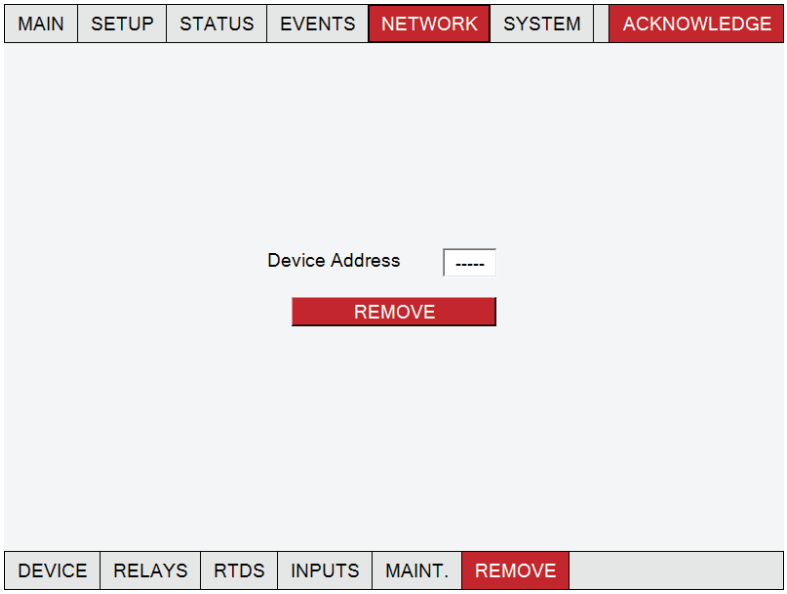


Fig. 3.40 Network | Remove window

The Network|Remove window provides the following controls:

Device Address Entry Field - Enter the Device Address that requires removal from memory.

Remove Action Button - Removes entered Device Address from memory.

3.3.30 System | Misc window

This window lets you create system-wide global parameters for all Circuits.

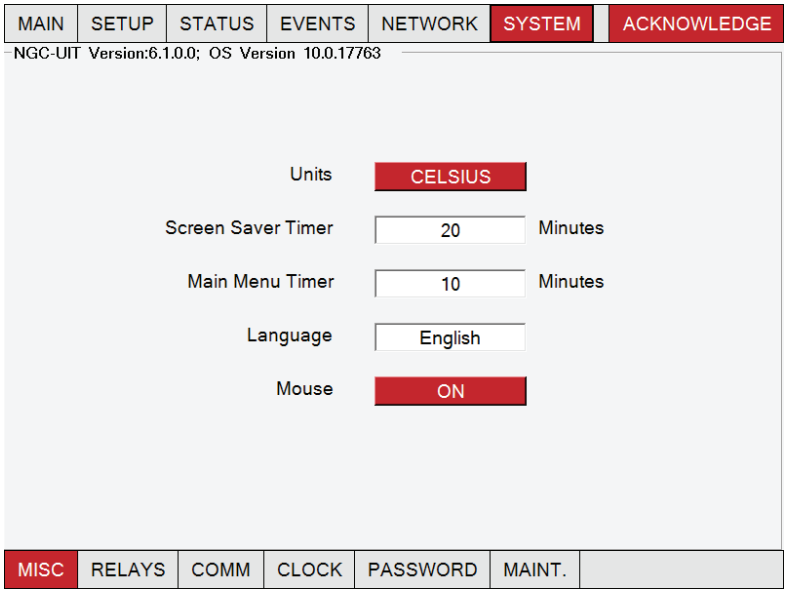


Fig. 3.41 System | Misc window

The System|Misc window provides the following controls:

- **Units Toggle Button** - Select Fahrenheit for °F or Celsius for °C as temperature units
- **Screen Saver Timer Entry Field** -Select the number of minutes the display remains visible with no user activity before moving into Window Saver mode. The Window 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 screen must be touched to show the Circuit's alarm status.

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

Range: 1–300 minutes

Default: 20 minutes

Main Menu Timer Entry Field

This entry sets the number of minutes before the display automatically reverts to the Main Window. Pushing any button re-starts the timer.

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

Range: 1–100 minutes

Default: 10 minutes

Language Entry List

This entry specifies the language used on the NGC-UIT3 display windows.

Options: Chinese, English, French, German, Russian, Spanish and others

Default: English

Mouse Toggle Button

This entry allows the USB port on the NGC-UIT3 to function with a mouse installed. If enabled, a mouse pointer will be visible on the UIT3 screen and will allow the user to navigate through the screens.

Options: OFF, ON

Default: OFF

3.3.31 System | Relays window

This window lets you set up alarm relays.

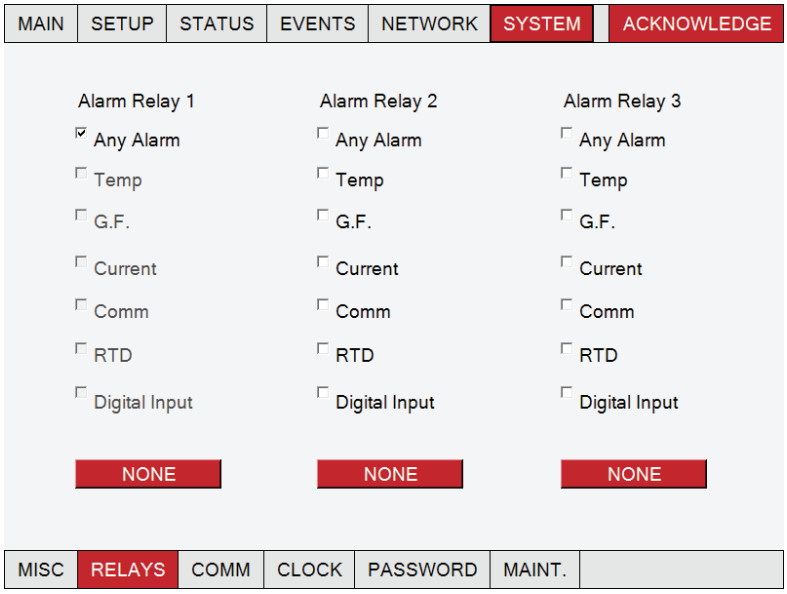


Fig. 3.42 System | Relays window

There are three independent alarm relays in the NGC-UIT3 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.

3.3.32 System | Comm window

This window lets you set up communications with host systems.

The NGC-UIT3 can be connected to a distributed control system (DCS) or host computer using an RS-485, RS-232, or a standard Ethernet connection. All data and setup options are accessed with communications that follow the Modbus (RTU/Modbus/TCP) protocol. To enable DCS communications, please refer to the NGC-UIT3 Modbus Protocol document (H57880).

Selecting the Port

The NGC-UIT3 will allow you to independently configure all available ports. The "Select Port" entry field indicates which port is being configured on the screen at the moment. Tapping on the box will allow you to select the port you wish to configure.

Selection: RS-485 Host, RS-232 Host, Ethernet Host, RS-485 Field Bus. Depending on the port selected, options for that port will appear.

Changing Modbus Address

The Modbus address of the NGC-UIT3 can be changed on the bottom of this screen. This Modbus address will be used for all three of the selectable host ports. The Modbus address of the individual ports cannot be independently set.

RS-485 Host and RS-232 Host

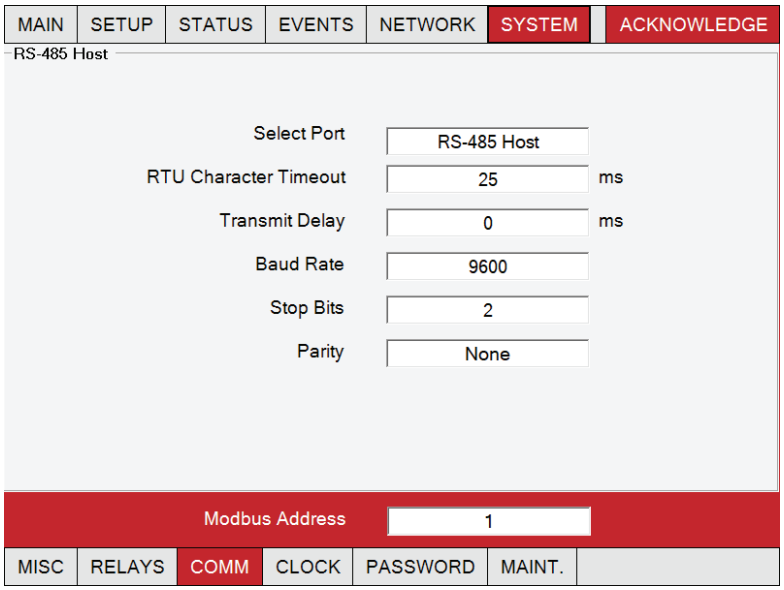


Fig. 3.43 System | Comm window (RS-485 Host Configuration)

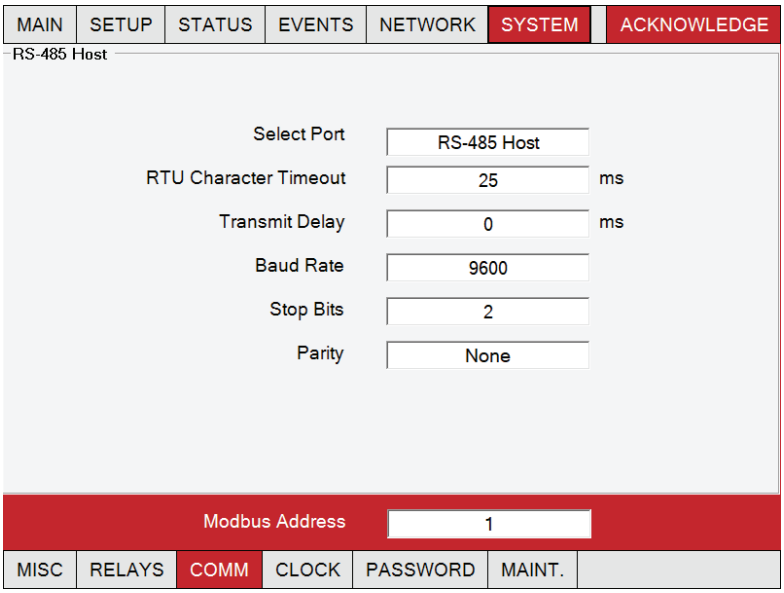


Fig. 3.44 System | Comm window (RS-232 Host Configuration)

RTU Character Timeout Entry Field

This sets the time the NGC-UIT3 waits after last character is received before it determines that the message has ended.

Range: 0–1000 milliseconds
Default: 25

Transmit Delay Entry Field

This sets the time the NGC-UIT3 will wait after it receives a message before it replies.

Range: 0-5000 milliseconds
Default: 0

Baud Rate Entry List

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

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

Stop Bits

Allows you to select the number of stop bits used.

Range: 1–2
Default: 2

Parity

Allows you to select what type of parity will be used.

Selection: None, Odd, Even
Default: None

Ethernet Host

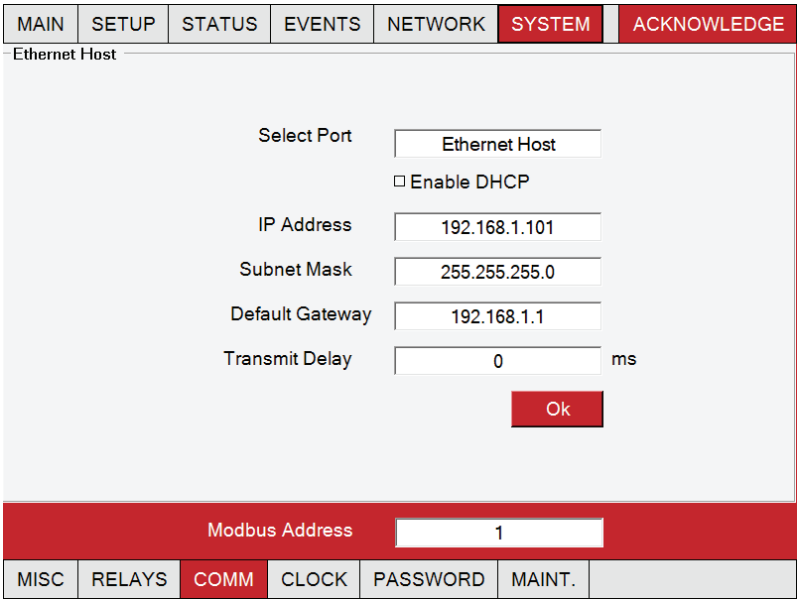


Fig. 3.45 System | Comm window (Ethernet Host Configuration)

IP Address/Subnet Mask Entry Field

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 EMACB1 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.

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

Transmit Delay Entry Field

This sets the time the NGC-UIT3 will wait after it receives a message before it replies.

Range: 0–5000 milliseconds
Default: 0

RS-485 Field

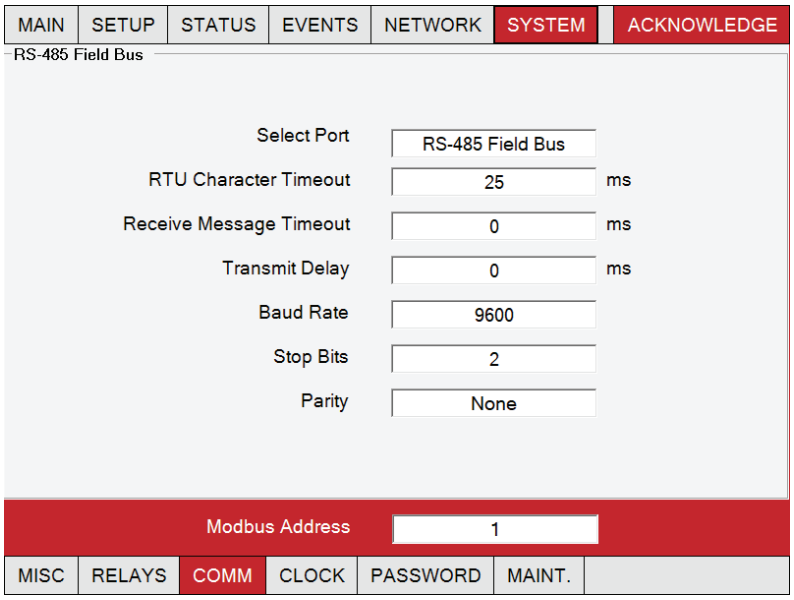


Fig. 3.46 System | Comm window (RS-485 Field Configuration)

RTU Character Timeout Entry Field

This sets the time the NGC-UIT3 waits after last character is received before it determines that the message has ended.
Range: 0–1000 milliseconds
Default: 25

Receive Message Timeout Entry Field

The received message timeout is used to extend the previously computed message timeout which is computed automatically by the NGC-UIT3. This timeout is mainly used for extending message timeouts in modems etc.
Range: 0–1000 milliseconds
Default: 0

Transmit Delay Entry Field

This sets the time the NGC-UIT3 will wait after it receives a message before it replies.
Range: 0–5000 milliseconds
Default: 0

Baud Rate Entry List

Allows you to select the baud rate of the external communication port.
Selection: 2400, 4800, 9600, 19200, 38400, 57600
Default: 9600

Stop Bits

Allows you to select the number of stop bits used.
Range: 1–2
Default: 2

Parity

Allows you to select what type of parity will be used.
Selection: None, Odd, Even
Default: None

3.3.33 System | Clock window

This window lets you set time and date

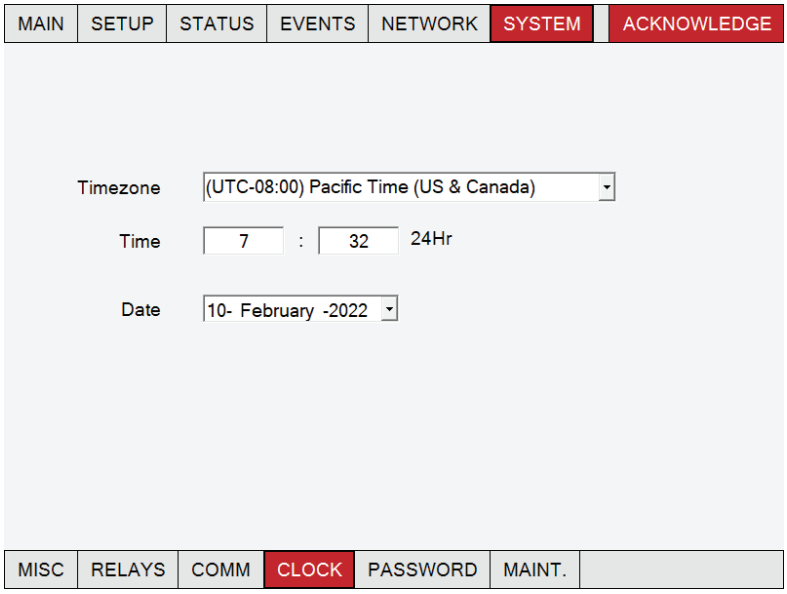


Fig. 3.47 System | Clock window

The System | Clock window provides the following controls:

- **Time Entry Field** - For entering the current time using 24 hour format
- **Date Entry Field** - Allows entry of correct date from the pop-up calendar

3.3.34 System | Password window

This window lets you set up passwords for Level 1 and Level 2.

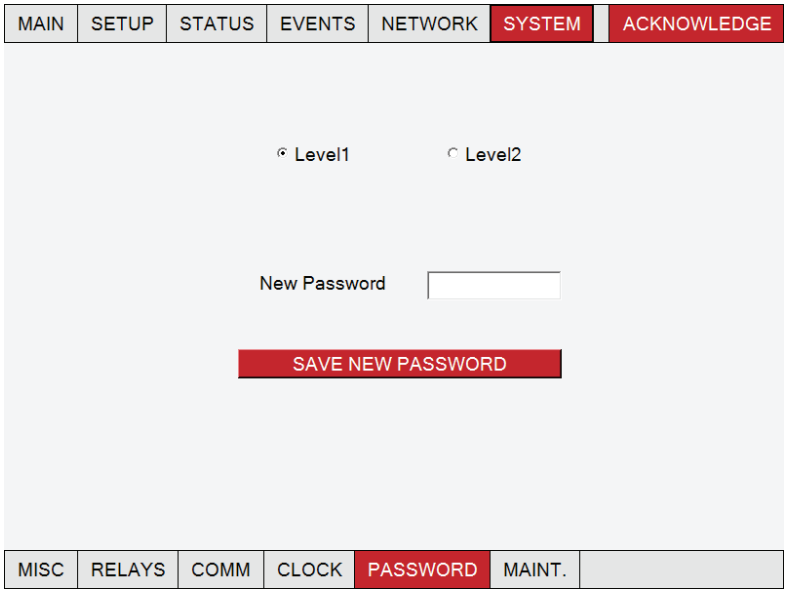


Fig. 3.48 System | Password window

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.
- New Password Entry Field - Enter the user-defined password.

- Save new Password Action Button - Confirms password has been saved.
  - Default: Level 1 disabled
- **Level 2** - Allows access to System | Maintenance window, which permits clearing of Events and program exit.
  - The default password is 1234.

IMPORTANT: Change the Level 2 password after commissioning.

Old Password Entry Field

1234

New Password Entry Field

Enter your user-defined Level 2 password.

Save new Password Action Button

Confirms password has been saved.

IMPORTANT: Save and protect the Level 2 password in a secure location. Contact a Chemelex representative for lost password recovery.

3.3.35 System | Maint. window

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

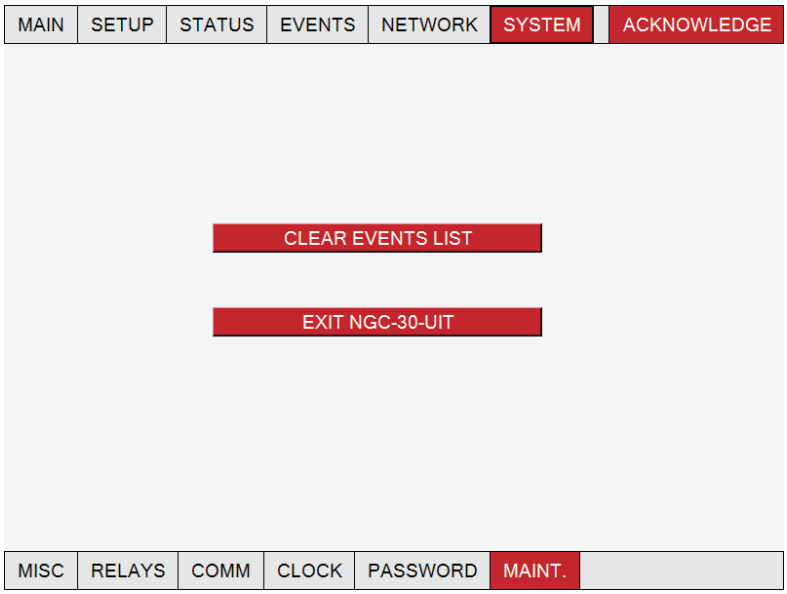


Fig. 3.49 System | Maint window

The System | Maint. window provides the following controls:

- Clear Events List Action Button - Clears all Events and Alarms history

IMPORTANT: By clearing the event, all the Events and Alarms history information for all Circuits is lost. If the program exit is chosen, heaters are no longer monitored.

SECTION 4 APPENDICES

⚠ WARNING:

Qualified Chemelex Personnel Only. It is recommended that only Chemelex personnel exit the NGC-UIT3 program.

Appendix A. NGC-UIT3 Backup Process

With a USB drive, you can back up the current configuration of a UIT3. All of the configuration settings will be saved in an XML format so that it is easily read and edited on a computer. This includes the following:

- Circuit Database
  - The currently configured circuits on the UIT3
- Events Database
  - The last 2000 events that have occurred.
- Network List
  - All of the devices that appear in the Network|Device screen
- Preferences
  - The user preferences, which include parameters such as Temperature Units, Language and Screen Timeout

Step 1

Insert a USB drive into the UIT3 and wait for the USB Service Panel to appear on the screen.

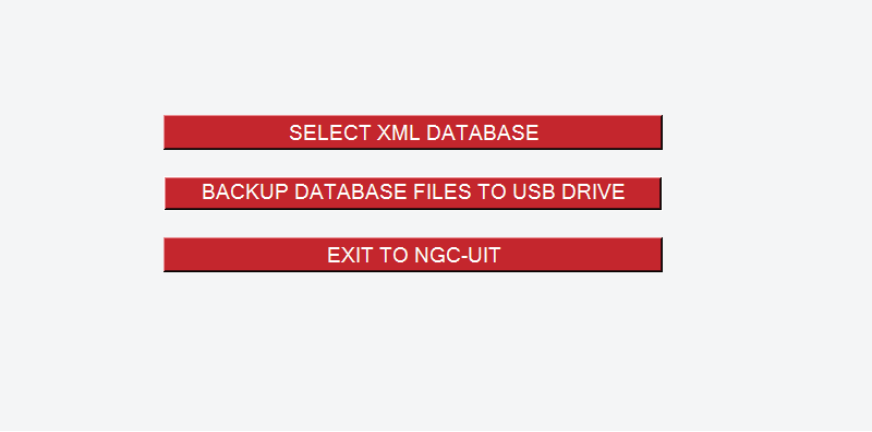


Fig. A.1 The USB service panel

Step 2

Choose the Backup Database Files to USB Drive option. An input panel will appear allowing you to choose the directory to save the backup files. If you wish, change the default directory to fit your needs.

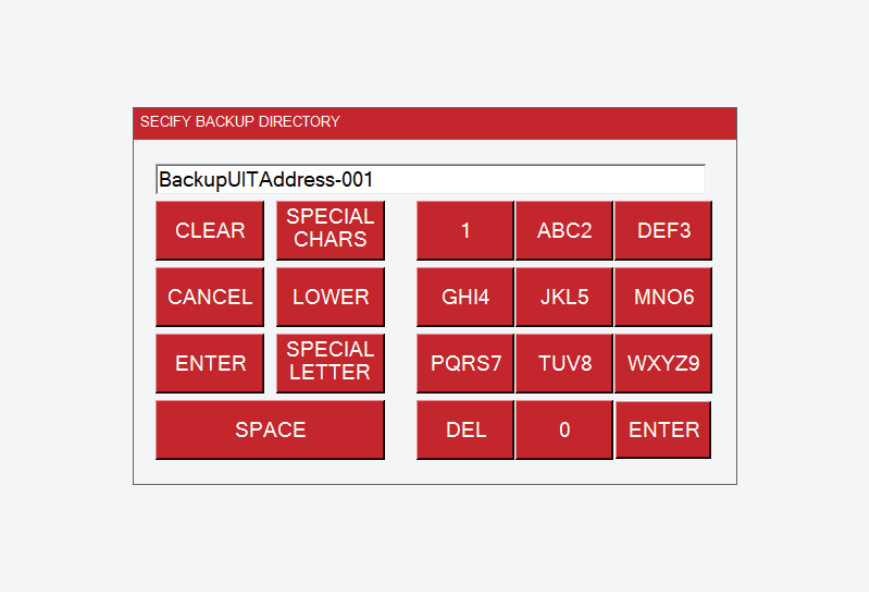


Fig. A.2 Backup directory prompt

Step 3

Wait for the UIT3 to generate the backup files. A prompt will appear when the UIT3 has successfully created the files.

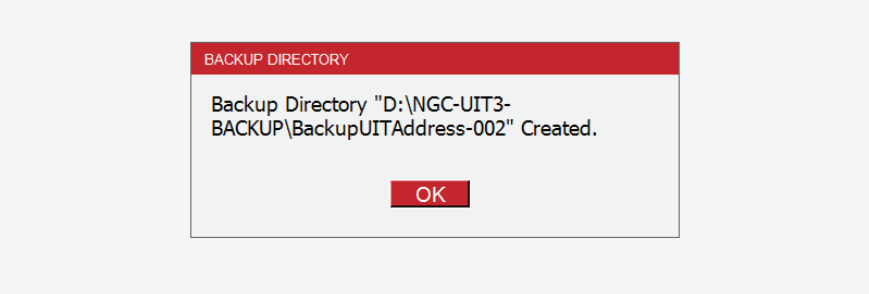


Fig. A.3 Backup directory prompt

Appendix B. Proportional Control

Table B.1 Proportional Control Temperature Band

Control Sensor Temperature	Duty Cycle
Setpoint + 2.22°C	0%
Setpoint + 1.11°C	50%
Setpoint	100%

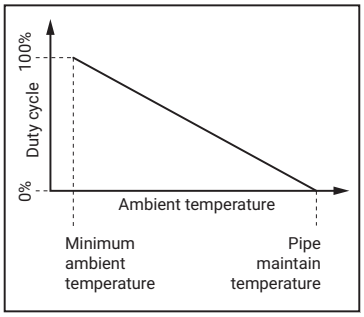
Table B.2 Approximate Time On/Off for 50/60 Hz Frequencies

Temperature	On Time/ Second (ms)	Off Time/ Second (ms)	Temperature	On Time/ Second (ms)	Off Time/ Second (ms)
Set Point + 2.22°C	0	1000	Set Point + 1.06°C	525	475
Set Point + 2.17°C	25	975	Set Point + 1.00°C	550	450
Set Point + 2.11°C	50	950	Set Point + 0.94°C	575	425
Set Point + 2.06°C	75	925	Set Point + 0.89°C	600	400
Set Point + 2.00°C	100	900	Set Point + 0.83°C	625	375
Set Point + 1.94°C	125	875	Set Point + 0.78°C	650	350
Set Point + 1.89°C	150	850	Set Point + 0.72°C	675	325
Set Point + 1.83°C	175	825	Set Point + 0.67°C	700	300
Set Point + 1.78°C	200	800	Set Point + 0.61°C	725	275
Set Point + 1.72°C	225	775	Set Point + 0.56°C	750	250
Set Point + 1.67°C	250	750	Set Point + 0.50°C	775	225
Set Point + 1.61°C	275	725	Set Point + 0.44°C	800	200
Set Point + 1.56°C	300	700	Set Point + 0.39°C	825	175
Set Point + 1.50°C	325	675	Set Point + 0.33°C	850	150
Set Point + 1.44°C	350	650	Set Point + 0.28°C	875	125
Set Point + 1.39°C	375	625	Set Point + 0.22°C	900	100
Set Point + 1.33°C	400	600	Set Point + 0.17°C	925	75
Set Point + 1.28°C	425	575	Set Point + 0.11°C	950	50
Set Point + 1.22°C	450	550	Set Point + 0.06°C	975	25
Set Point + 1.17°C	475	525	Set Point + 0.00°C	1000	0
Set Point + 1.11°C	500	500			

Appendix C. Proportional Ambient Sensing Control (PASC)

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 –16.1°C (3°F)” the heaters will be on 100%. If the measured ambient is at or above the “maintain temperature –19.4°C (–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).



Appendix D. RTD Device / RTD Number Entry windows

Monitor-Only Mode

Select one to four RTDs to monitor the temperature of a pipe, vessel etc. An RTD can be used from another Relay/RTD or from a RMM3 module mounted in the panel or remotely.

Control Mode With Local RTD Installed

If the local RTD is installed, up to three additional RTDs can be used to monitor the temperature of the pipe, vessel, etc. An RTD can be used from another Relay/RTD or from a RMM3 module mounted in the panel or remotely. If more than one RTD is assigned to a Circuit, the NGC-UIT3 will display the lowest temperature detected on the main window. However, it will alarm (high and low temperature) based upon all RTDs assigned to that Circuit.

Control Mode Without Local RTD Installed

If the local RTD is not installed, up to four additional RTDs can be used to monitor the temperature of the pipe, vessel, etc. An RTD can be used from another Relay/RTD or from a RMM3 module mounted in the panel or remotely. If more than one RTD is assigned to a Circuit, the NGC-UIT3 will display the lowest temperature detected on the main window. However, it will alarm (high and low temperature) based upon all RTDs assigned to that Circuit.

IMPORTANT: If an address entered is lower than any NGC-30-CRM/-CRMS board found on the system, the NGC-30 software defaults to 0. Since 0 is not a valid address for any board, selecting 0 tells the program that this Circuit will not be used for any output control; by default, it will be a "Monitoring Only" Circuit. This is the method for setting up a Circuit as an "Alarm Only" channel.

IMPORTANT: The NGC-UIT3 displays the parameters of heaters. It also is a means to input information to the NGC-30-CRM/-CRMS. Once the system is set up, the NGC-30-CRM/-CRMS controls the heater Circuits, and even if the NGC-UIT3 display loses communications between the NGC-30-CRM/-CRMS and the NGC-UIT3, the heaters are still being controlled by the NGC-CRM/-CRMS. A feature of the -CRM/-CRMS is that if it is hardwired to the system, the system still continues to work.

Appendix E. Terms and Definitions

- **Amps** - Heater current amperes
- **Control Temperature** - The lowest temperature from the RTDs assigned to a Circuit
- **°C or °F** - The control temperature
- **DB** - Dead Band
- **Device Address** - Network address for specific hardware devices attached to the NGC-UIT3
- **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 NGC-30
- **RTD** - Resistance Temperature Detectors
- **RTD Number** - This is the number of the RTD determined by the physical point of connection to a networked device
- **Set Pt** - Set Point is the desired maintain temperature
- **SSR** - Solid State Relay
- **Status** - Relay (heater on, off or trip) and communication status

Table E.1

Data Entry Type	Description
Entry Window	In Setup Windows, any white entry box will populate via a pop-up entry window
Entry List	Allows choices from a list of data
Action Button	Prompts before performing a task
Toggle Button	Toggles between two actions

IMPORTANT: When a button's word(s) is grayed out, no action can be taken

Appendix F. Configuration Spreadsheet

An electronic version of the NGC-30 Configuration Spreadsheet is available on our web site, Chemelex.com on the NGC-30 product page under Heat Tracing. Select "NGC-30 Configuration Spreadsheet" from the list to download.

A printed copy of the spreadsheet is available for use on the following 3 pages. However, information will have to be manually entered into the NGC-UIT3.

Regardless of which medium you use, retain a copy for future reference or backup.

NGC-UIT3 Circuit Setup Worksheet (page 1 of 4)

	Setup | Ciruit Screen						**SETUP | RTDs Screen**											
	Input Required						Local/A			Local/B			Local/C			Local/D		
Circuit #	Circuit ID (Up to 40 Char)	Circuit Enable	Relay Address	Relay Number	Control Mode	FailSafe State (Power Off / Power On)	RTD Device Address	RTD No.	RTD Mode	RTD Device Address	RTD No.	RTD Mode	RTD Device Address	RTD No.	RTD Mode	RTD Device Address	RTD No.	RTD Mode
Input Required	Default = ID circuit#	Input Required	Default = 0	Default = 0	Input Required	Default = Power Off	Default = 0	Default = 0	Default = Control	Default = 0	Default = 0	Default = Control	Default = 0	Default = 0	Default = Control	Default = 0	Default = 0	Default = Control
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Device	Device Type	Switch Setting	Device Address
NGC-30-CRM/CRMS	Relay Output / RTD	1 – 99	1 – 99
RMM3	RTD	0 – F	32 – 47
PLI	RTD	1 – 99	1 – 99

NGC-UIT3 Circuit Setup Worksheet (page 2 of 4)

	Setup | Temp Screen											Setup | G.F. Screen			Setup | Current Screen			Setup | Voltage	
	Setpoint	Dead-band	High Temp Alarm	Low Temp Alarm	High Limit Cut-Out Enable	High Limit Cut-Out Temp	Low Limit Cut-Out Enable	Low Limit Cut-Out Temp	Low Limit Cut-Out Dead-band	Low Limit Cut-Out Latching	Tem-perature Alarm Filter	G.F. Current Alarm	G.F. Current Trip	G.F. Trip (Enable/ Disable	Low Current Alarm	High Current Alarm	Power Limit	Low Voltage Alarm	High Voltage Alarm
	Default = 50°F	Default = 5°F	Default = 300°F	Default = 10°F	Default = Disable	Default = 900°F	Default = Disable	Default = –94°F	Default = 5°F	Default = Non-Latching	Default = 900 Seconds	Default = 20 mA	Default = 30 mA	Default = Enable	Default = 5.0 A	Default = 30.0 A	Default = 100	Default = 90 V	Default = 270 V
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Device	Device Type	Switch Setting	Device Address
NGC-30-CRM/CRMS	Relay Output / RTD	1 – 99	1 – 99
RMM3	RTD	0 – F	32 – 47
PLI	RTD	1 – 99	1 – 99
RMM-DI	Digital Input	0 – F(High), 0 – F(Low)	1 – 247
RMC	Digital Input / Relay Output	1 – 255	1 – 247

NGC-UIT3 Circuit Setup Worksheet (page 3 of 4)

	PLI	Setup | PASC Screen			Setup | Maintenance Screen					Setup | Input Screen								
		Used only in PASC Control Mode																
	PLI Update Interval	Min. Ambient Temp.	Min. Pipe Size	Power Adjust	Power Cycle Start Time		Power Cycle Test Interval	Heater Time Alarm	Relay Cycle Alarm	Power Input Address	Power Input Number	CB Trip Input Address	CB Trip Input Number	CB Trip Input State	User Alarm Input Address	User Alarm Input Number	User Alarm Input State	User Alarm Input Text
	Default - 10 Min	Default = –40°F	Default = 0.5 Inch	Default = 100%	Hour Default = 06	Minute Default = 00	Default = 0 Hrs	Default = 100,000 hrs	Default = 500,000	Default = 0	Default = 0	Default = 0	Default = 0	Default = Close	Default = 0	Default = 0	Default = Open	Default= User text
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Device	Device Type	Switch Setting	Device Address
NGC-30-CRM/CRMS	Relay Output / RTD	1 – 99	1 – 99
RMM3	RTD	0 – F	32 – 47
PLI	RTD	1 – 99	1 – 99
RMM-DI	Digital Input	0 – F(High), 0 – F(Low)	1 – 247
RMC	Digital Input / Relay Output	1 – 255	1 – 247

NGC-UIT3 Circuit Setup Worksheet (page 4 of 4)

	Setup | Load Shed		
	European Version Only (NGC-20)		
Circuit #	Load Shed Enable	Load Shed Fail Safe	Load Shed Mask
Input Required	Default = Disable	Default = Disable	Default = 0
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Device	Device Type	Switch Setting	Device Address
NGC-30-CRM/CRMS	Relay Output / RTD	1 – 99	1 – 99
RMM3	RTD	0 – F	32 – 47
PLI	RTD	1 – 99	1 – 99
RMM-DI	Digital Input	0 – F(High), 0 – F(Low)	1 – 247
RMC	Digital Input / Relay Output	1 – 255	1 – 247

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Raychem Tracer Pyrotenax Nuheat

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