nVent

RAYCHEM

TOUCH 1500

Configuration Guide

Software Version 2.x.x

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1.1 NVENT RAYCHEM NGC-40 SYSTEM OVERVIEW

1.1.1 Product Overview

The nVent RAYCHEM NGC-40 is a multipoint electronic control, monitoring and power distribution system with unique single-point controller architecture for heat tracing used in process temperature, maintenance and freeze protection applications. By taking advantage of innovative modular packaging techniques, the nVent RAYCHEM NGC-40 system provides configuration and component flexibility so that it may be optimized for a customer's specific needs. This manual provides information pertaining to the configuration and maintenance of all the components of the nVent RAYCHEM NGC-40. For information on installation, operation, testing, and adjustments, please see the NGC-40 Installation Manual (North American, H58268/Europe, IMO0708).

Figure 1.1 TOUCH 1500 mounted in the NGC-40 panel

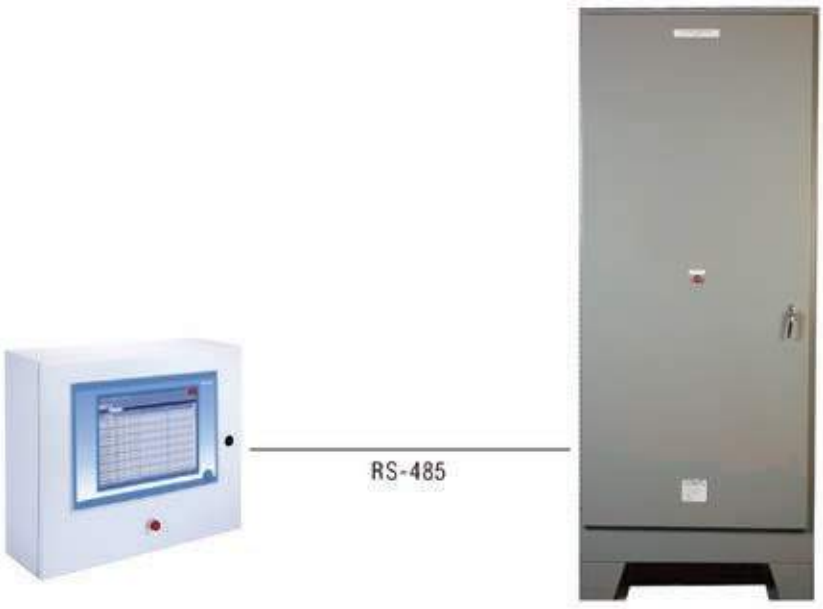

Figure 1.2 TOUCH 1500 mounted remotely from NGC-40 panel

1.1.2 Control

The nVent RAYCHEM NGC-40 modules measures temperatures with 3-wire, 100-ohm platinum or 2-wire Nickel/Nickel iron RTDs. The temperature information may come from a single, direct RTD hard-wired to the NGC-40 HTC/HTC3 Module, from a local NGC-40 I/O module, or from a remote source such as an RMM module (feature available in 2011). When configured with Electro-Mechanical Relays (EMRs) the nVent RAYCHEM NGC-40 can be configured for the following control modes:

- On/Off (Deadband)
- PASC Contactor (Proportional Ambient Sensing Control)
- Always ON
- Always OFF

When configured with SSRs, the panel can be configured for the following control modes:

- On/Off (Deadband)
- Proportional
- PASC SSR (Proportional Ambient Sensing Control)
- Always ON
- Always OFF

The nVent RAYCHEM NGC-40 also supports load shedding. This mode overrides temperature control and forces the output of the control module off. The load-shedding command can be issued by Distributed Control System (DCS) or nVent RAYCHEM Supervisor (DTS).

1.1.3 Monitor

The nVent RAYCHEM NGC-40 system measures a variety of parameters including ground fault, temperature and load current(s) to ensure system integrity. In the case of three-phase heaters, the current of each phase can be separately measured and monitored. The system can be set to periodically check the heating cable for faults, alerting maintenance personnel of a pending heat-tracing problem. All alarms can be individually enabled or disabled depending on customer preference. They can be also separately defined as latching or non-latching by the customer to meet their needs. The latching alarms need to be reset before they will disappear from the alarm list. A dry contact relay is available for alarm annunciation back to a Distributed Control System (DCS). Alternatively, the nVent RAYCHEM NGC-40 system can report alarm and monitoring data directly to the DCS via Modbus®.

1.1.4 Ground-Fault Protection

Electrical codes require ground-fault equipment protection on all heat-tracing circuits. nVent RAYCHEM NGC-40 systems incorporate ground-fault monitoring and trip features within the individual controllers. Where electrical codes allow the nVent RAYCHEM NGC-40 system to perform the ground-fault protection function, the need for specialized ground-fault circuit interrupting circuit breakers can be eliminated. This can help reduce overall system cost.

1.1.5 Installation

The nVent RAYCHEM TOUCH 1500 heat-tracing controller configuration and monitoring software provides a graphical user interface for the nVent RAYCHEM NGC-40 Control & Monitoring System. The software allows the user to configure and monitor the nVent RAYCHEM NGC-40 heat-tracing controller, Bridge and I/O modules.

The nVent RAYCHEM NGC-40 system is configured with a touch screen User Interface Terminal (TOUCH 1500 or TOUCH1500R) that has LCD color touch-screen display. This display provides an intuitive user interface for easy and efficient programming without keyboards or cryptic codes.

TOUCH 1500 Installed in Nonhazardous (Unclassified) Indoor Panel Locations

If the panel is located in a nonhazardous (unclassified) indoor location, the TOUCH 1500 can be installed locally on the nVent RAYCHEM NGC-40 panel door.

TOUCH 1500 Installed in Outdoor Panel Locations

If the panel is located in an outdoor, nonhazardous location, the TOUCH 1500 can be installed locally on the nVent RAYCHEM NGC-40 panel door. However, the TOUCH 1500 will require a protective cover over the display to shield it from the environment and a space heater/thermostat to ensure operation if ambient temperatures below 32°F (0°C) are expected.

TOUCH 1500 Installed in Hazardous/Outdoor Panel Locations

If the panel is located in a hazardous/outdoor location, the TOUCH 1500 can be installed locally on the nVent RAYCHEM NGC-40 panel door. However, the panel must have a Z Purge system, a protective cover over the display to shield it from the environment and a space heater/thermostat to ensure operation if ambient temperatures below 32°F (0°C are expected). In this configuration, a hazardous area mouse will be provided on the panel door to interface with the TOUCH 1500.

TOUCH 1500 Installed Separately from the Panel Locations

If the TOUCH 1500 needs to be mounted separately from the nVent RAYCHEM NGC-40 control panel, such as when the panel is in a hazardous or difficult to access location, the TOUCH 1500R provides a wall-mount alternative for remote mounting in a nonhazardous (unclassified) indoor location.

1.1.6 Communications

The nVent RAYCHEM NGC-40 system can be networked to host PC running Windows®- based nVent RAYCHEM Supervisor client-server software (DTS) and/or to a TOUCH 1500 for central programming, status review, and alarm annunciation. Information access for external devices is through the NGC-40-BRIDGE communications module, which supports the Modbus protocol and provides RS-232/RS-485 and 10/100Base-T Ethernet communication interfaces.

The current software in the TOUCH 1500 does not allow the user to network from the TOUCH 1500 to a host PC running Windows-based nVent RAYCHEM Supervisor. If this feature is required, the PC must be connected directly to the NGC-40-BRIDGE.

1.1.7 Complete System

The nVent RAYCHEM NGC-40 is supplied as a complete system ready for field connection of heat-tracing power wiring and temperature sensor input. Optional Power Distribution further enhances the reduction of field wiring and labor to install.

1.2 VITAL INFORMATION

This manual is a guide for the setup and operation of the nVent RAYCHEM NGC-40 Control & Monitoring system using the TOUCH 1500 user interface.

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nVent
7433 Harwin Drive
Houston, TX 77036
USA
Tel: 800-545-6258
Tel: 650-216-1526
Fax: 800-527-5703
Fax: 650-474-7711
thermal.info@nVent.com
nVent.com

1.4 NVENT RAYCHEM TOUCH 1500 CONFIGURATION/MONITORING SOFTWARE – IMPORTANT INFORMATION

1.4.1 Product Overview

The nVent RAYCHEM TOUCH 1500 heat-tracing controller configuration and monitoring software provides a graphical user interface for the nVent RAYCHEM NGC-40 control &monitoring system. The software allows the user to configure and monitor the nVent RAYCHEM NGC-40 heat-tracing controller, Bridge and I/O modules.

1.4.2 Vital Information

IMPORTANT: All information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their particular application. nVent makes no warranties as to the accuracy or completeness of the information, and any liability regarding its use. nVent's only obligations are those in the nVent Standard Terms and Conditions of Sale for this product, and in no case will nVent or its distributors are liable for any incidental, indirect, or consequential damages arising from the sale, resale, use, or misuse of the product. Specifications are subject to change without notice. In addition, nVent reserves the right to make changes—without notification to Buyer—to processing or materials that do not affect compliance with any applicable specification.

1.4.3 User Responsibility

The performance, reliability and safety of your heat-tracing system depend on proper design, selection and installation. The nVent RAYCHEM TOUCH 1500 program 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 nVent RAYCHEM TOUCH 1500 program should be reviewed by a knowledgeable engineer to ensure it is appropriate for your application. Additional information relating to safety, design and installation is contained in Design Guides, Installation Manuals, Data Sheets, and other literature available from nVent. Be sure to consult these documents as needed.

1.4.4 Safety Warnings

There are important safety warnings shipped with our products and printed in our literature. Be sure to read and follow them to reduce the risk of fire, shock or personal injury. If you have any questions, contact your local or nVent directly.

1.4.5 Technical Support

In North America, contact nVent directly at:
nVent
7433 Harwin Drive
Houston, TX 77036
USA
Tel: 800-545-6258
Tel: 650-216-1526
Fax: 800-527-5703
Fax: 650-474-7711
thermal.info@nVent.com
nVent.com

SECTION – 2 NAVIGATING AND SETTING UP THE MENUS

This section provides information on how to use nVent RAYCHEM NGC-40 software to configure, monitor and maintain a heat-tracing circuit in an NGC-40 system. It starts with Getting Familiar with the nVent RAYCHEM NGC-40 program. In the remaining sections, there are instructions on Managing Alarms, Identifying NGC-40 Modules, Comparing the NGC-40 Module List, Loading NGC-40 Module Configurations, and Changing the NGC-40-BRIDGE Communication Settings.

2.1 GETTING FAMILIAR WITH NVENT RAYCHEM TOUCH 1500

The nVent RAYCHEM TOUCH 1500 Main window has several functional areas, as illustrated in Figure 2.1. The window below is the Circuit List of a NGC-40 system with a BRIDGE, two HTCs, one HTC3 and one I/O Module:

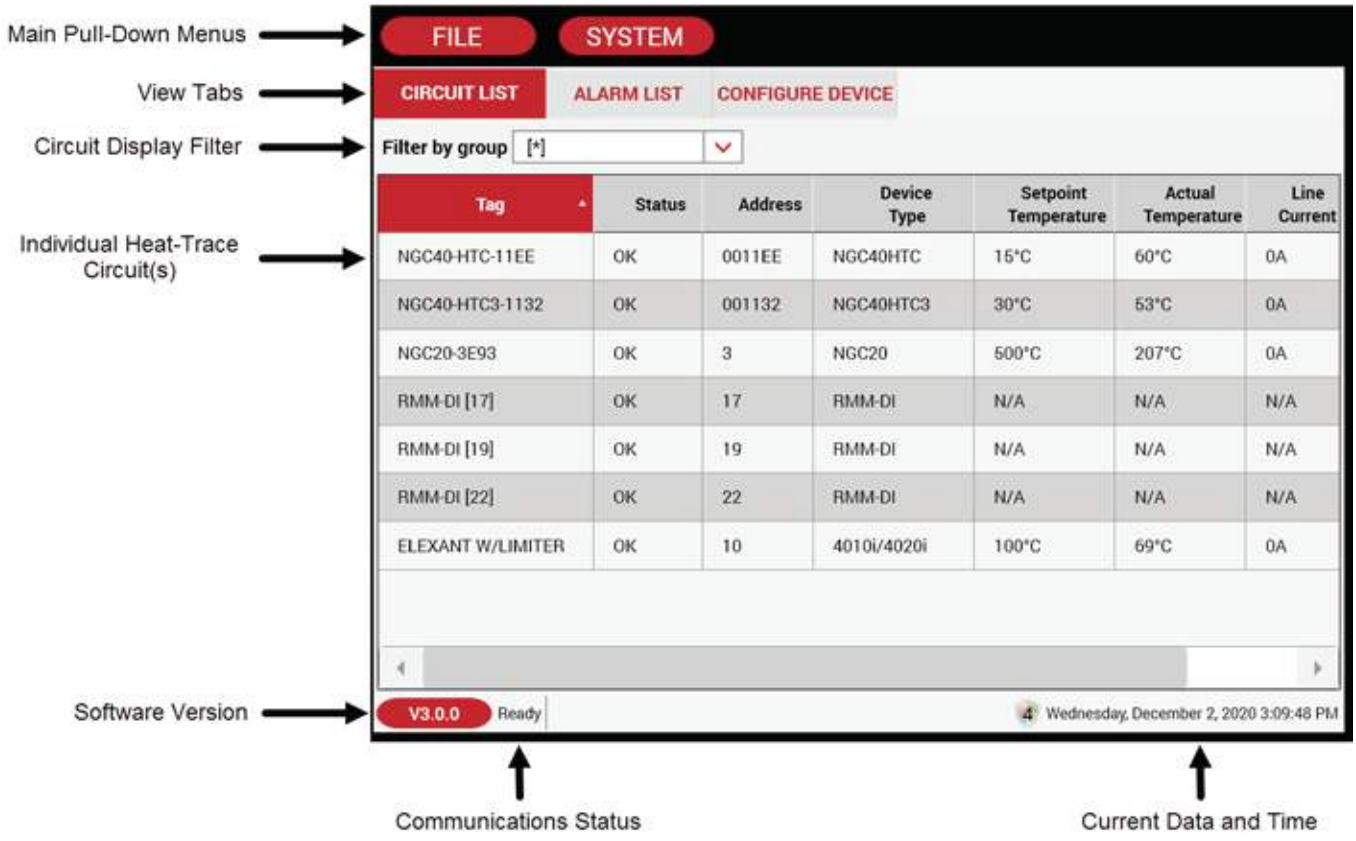


Figure 2.1 nVent RAYCHEM TOUCH1500 main window

2.2 FILE AND SYSTEM MENUS

Below is a Menu Map of the File and System buttons shown at the top of the window. The information you learn in this section will help you navigate through the menus and become more proficient in using all the features of the TOUCH 1500

Figure 2.2 Menu map of file and system buttons

Functional Window Area	Functionality	Security Level Required
File Menu		
Backup Database	Allows the User to create a backup database of the NGC-40 modules settings and configuration onto a memory stick.	3, 4
Restore Database	Allows the User to restore the NGC-40 modules settings from a backup database via a memory stick into the TOUCH 1500 program.	3, 4
Export Event Log	Allows the User to export the Event Log onto a memory stick.	3, 4
Exit	Exit the program to Windows desktop.	4
System Menu		
Device Manager	Allows the User to load or remove the modules, (HTC, HTC3 and I//O modules) from the database, configure each module, and set the modules online or offline.	3, 4
User Level	Allows the user to set passwords for each of the four security levels available in the TOUCH 1500.	3, 4
Group	Allows the User to assign a name to a group of circuits that can be used in the “Filter by Group” in the Circuit List.	3, 4
Common Alarms	Allows the user to set up the TOUCH 1500 common alarms .	3, 4
Communications	Allows the user to set up the Field Communication ports: Com1 (RS-232), COM 3 (RS-485) or Ethernet from the TOUCH 1500 to the Bridge Module.	3, 4
Preferences	Allows the User to select; language, units (°F or °C), number of minutes before reset to the default security level and bring you back to the Circuit List window and update time/date.	3, 4
DCS Gateway	Allows the user to setup and enable the DCS Gateway, which enables remote access of Heat Trace information using the Modbus protocol.	3, 4

The following gives an overview of how to configure an NGC-40 circuit using the TOUCH 1500. For greater detail, please go to Section – 4 Full Configuration on page 21.

3.1 AN EXAMPLE OF A SIMPLE CIRCUIT SETUP

This section will explain how to set up an NGC-40 heat-tracing circuit using the TOUCH 1500.

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

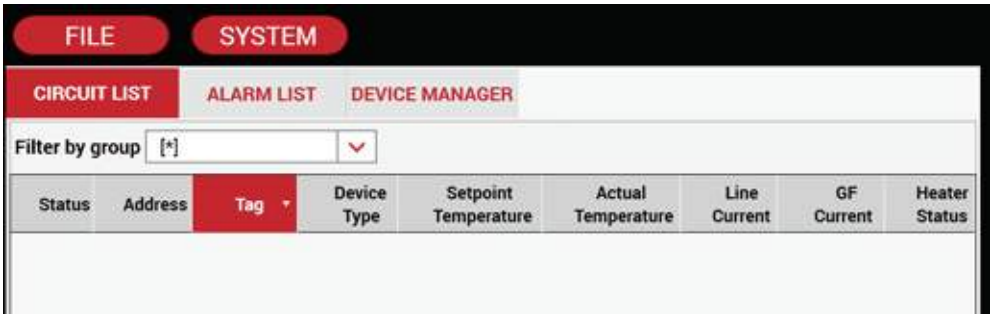


Fig. 3.1 Circuit List window

Step 1: Setting up Units, Language, Time and Date.

Touch the System button and then select Preferences. The Preferences window will appear. Touch the white area after each option to enter the appropriate Language, Units and Timeout delay.

Touch the Set Date Time button to enter your local time and date.

IMPORTANT: Local time and date is controlled by Windows. The user must exit the TOUCH 1500 to customize.

When finished, touch the OK button to save the settings.

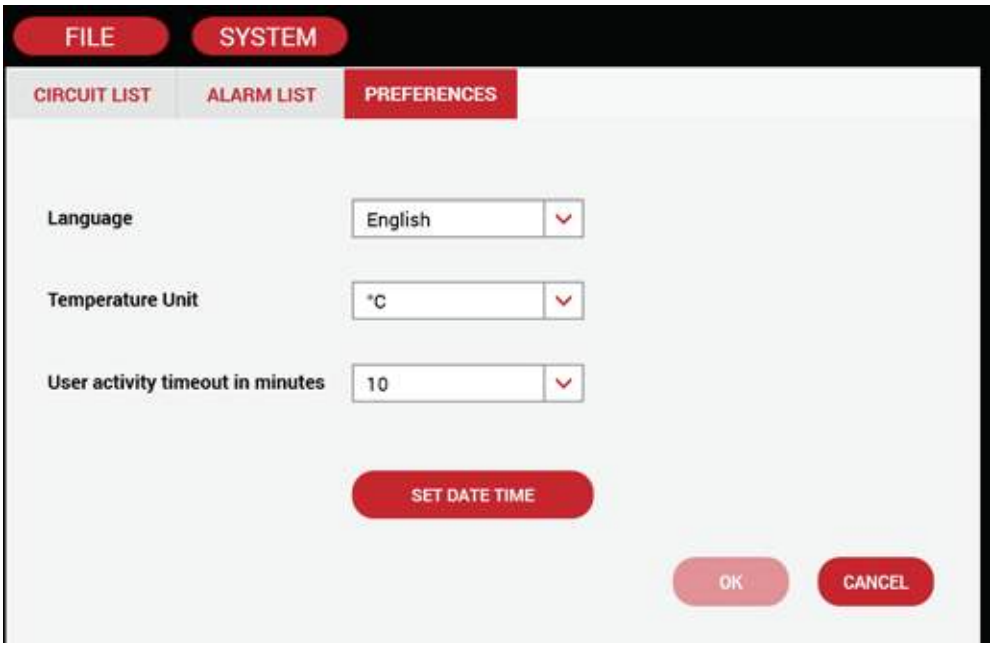


Fig. 3.2 System | Preferences window

IMPORTANT: If your NGC-40 system has a TOUCH 1500 installed on the panel door, then the TOUCH 1500 will have been factory configured to communicate with the NGC-40-BRIDGE modules in the panel and you may skip to Step 5.

Step 2: Setting Up the Network for NGC-40 Modules

If you are installing a new TOUCH 1500 or TOUCH 1500R or connecting additional NGC-40 panels to an existing TOUCH 1500 or TOUCH 1500R then you should start here at Step 2.

To connect NGC-40 panels to the TOUCH 1500, you must first scan the network using the Device Manager. Touch the System button and select Device Manager from the menu list. This will open the Device Manager Tab. Under the Scan for Device tab, select which network type to scan. Select the Scan Field Port tab if connecting via RS-232 or RS-485.

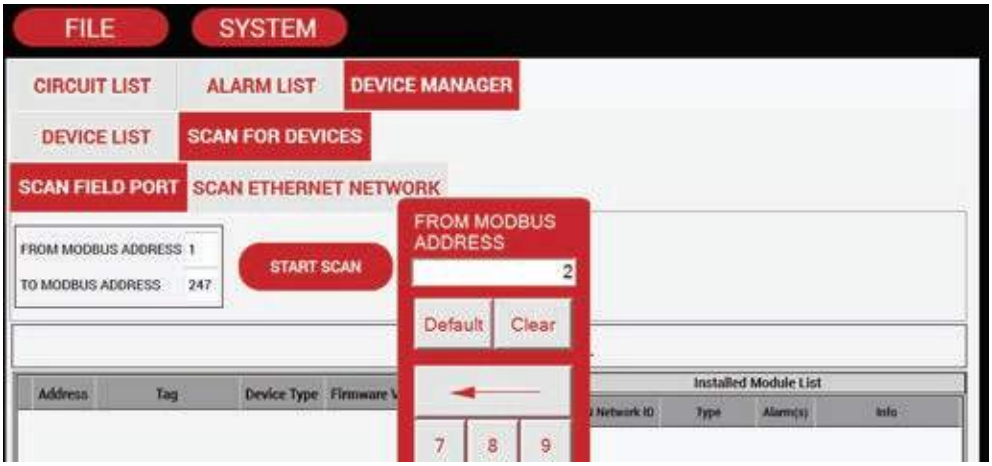


Fig. 3.3 System | Device window

The NGC-40-BRIDGE module has been set to Modbus address 1 at the factory.

IMPORTANT: If you wish to connect the TOUCH 1500 to more than one NGC-40-BRIDGE, you must first assign different Modbus addresses to each of the Bridge Modules. If this is not already done, you will need to contact your nVent representative to schedule a Tracer Field Support or Services person to come out and make the necessary changes. The Bridge Modbus address cannot be changed via the TOUCH 1500.

If you know the Bridge Modbus address you may enter it in the From or To Modbus Address boxes on the Scan for Devices window. Simply touch the data entry box and a numeric keypad will appear which will allow you to enter a new Modbus address number. Touch OK to close the keypad and enter the number.

Step 3: Scanning the Network

Click on the Start Scan button. The below window will appear showing that TOUCH 1500 is now scanning the modules connected to the NGC-40-BRIDGE. At the end of the SCAN click on the OK button to add the modules to the database.

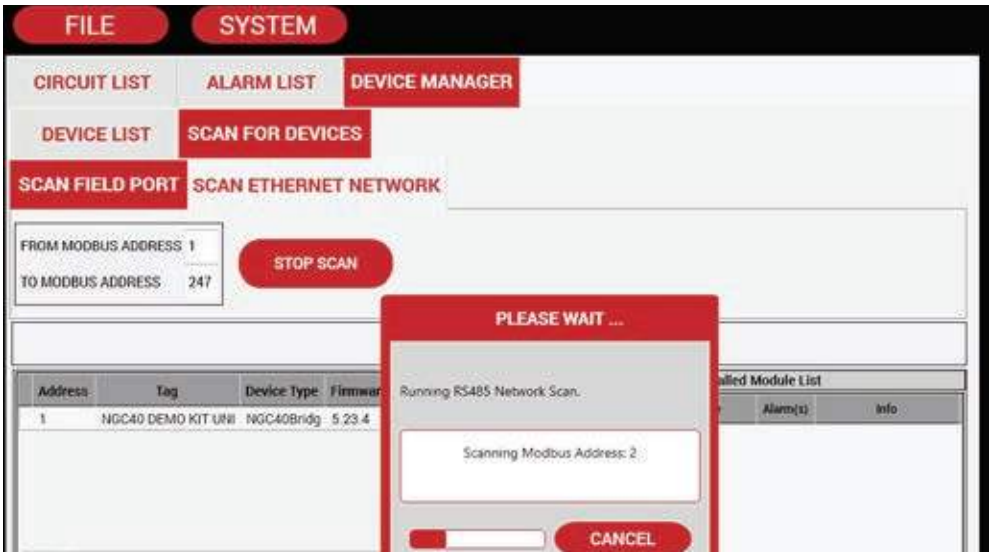


Fig. 3.4 System | Device window during scan process

At the end of the scan, the TOUCH 1500 software will display the modules that are connected to the NGC-40-BRIDGE. The information shown on the right hand side is the CAN bus ID's, type of module, alarms and the modules that have been installed. Information regarding the Bridge is shown on the left hand side.

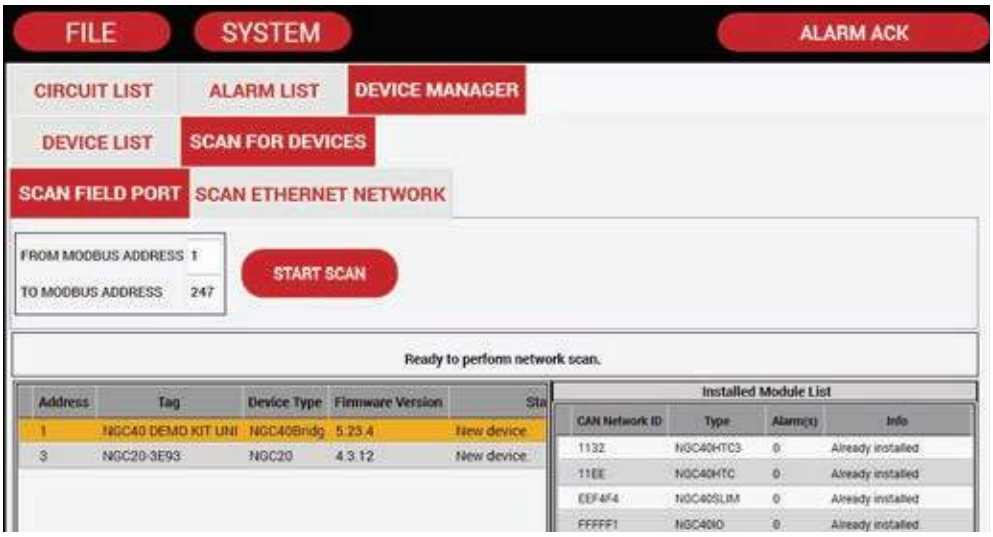


Fig 3.5 System | Device window after scan process

IMPORTANT: Scan need to be run only once unless the COMM ports of the PC is changed or additional modules are added on the NGC-40.

Step 4: Reviewing Connected Devices, Click on the SYSTEM | Device Manager

Touch the Device List tab. The window below will appear. This window shows all the modules that were scanned along with their tag name and status.

Fig 3.6 Device List window

Column 1 lists the Modbus address of the NGC-40 Modules. If the device type is NGC-40-BRIDGE, then the address is a Modbus address and it can only be changed by using the NGC-40 Hardware Manager Program. For all other devices types, the address is a CAN ID which are factory set and cannot be changed.

Column 2 lists the default Tag names of each module.,

Column 3 shows the Device Type

Column 4 shows the status; is the device online and active or has it been taken offline. A device that is offline will not be included in the normal system monitoring activity.

Step 5: HTC/HTC3 Module Options

Touch one of the HTC modules shown in the Device List. A dialog box will open up with options to Configure, Remove, Set Online or Set Offline the selected module.

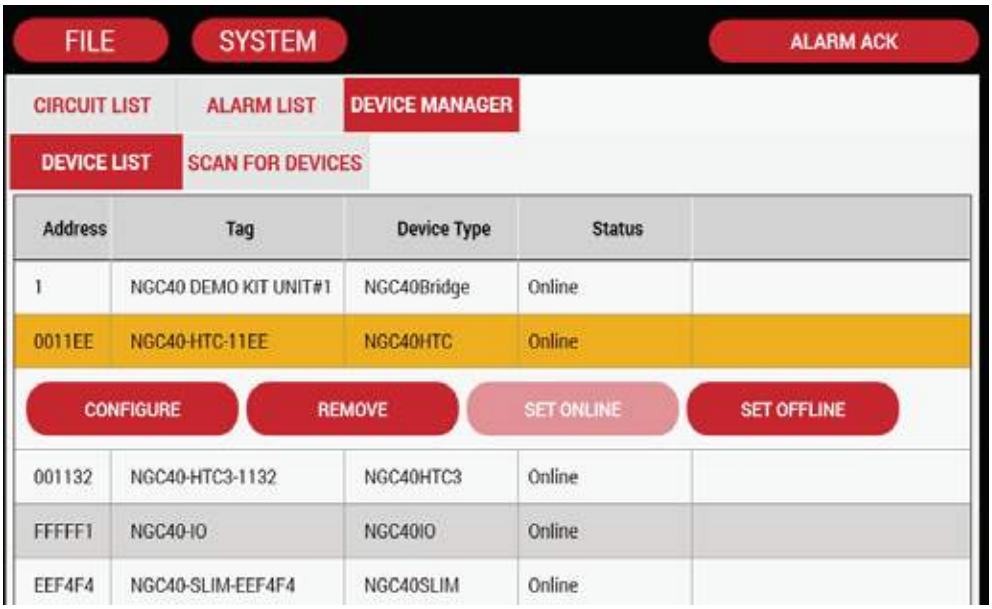


Fig 3.7 Drop down buttons on Device Manager

Step 6: Configure the Module

Touch the Config button and the window shown below with Basic Settings for Temperature, Control Modes, Local RTD (TS1) and Electrical will appear. The Temperature window is displayed by default.

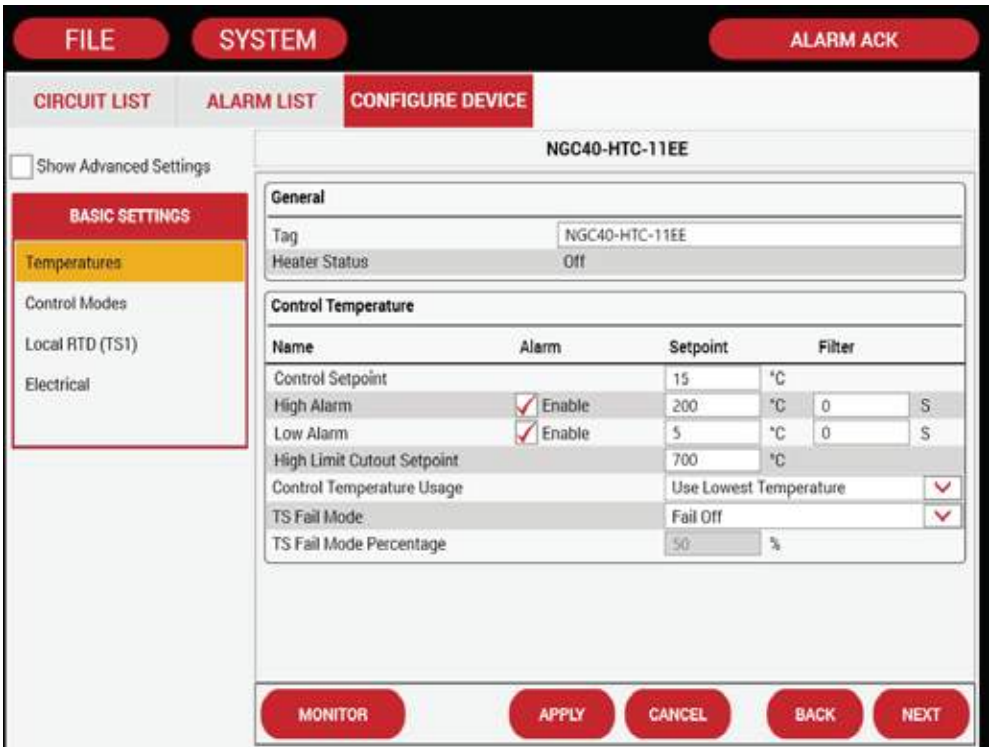


Fig 3.8 Configuration window for temperature settings

Step 7: Entering Device Tag Name and Temperature Settings

To enter a tag name, click the white box where the default tag name is shown. This will open the keyboard for entering the new tag name. Type the new tag name as you would with a normal keyboard and then touch the OK button on the keyboard.

Figure 3.9 Configuration window for device tag name

To program the Control Setpoint temperature, touch the white box on the Control Setpoint row. A numeric keypad will open allowing you to change the Setpoint. Touch OK when done.

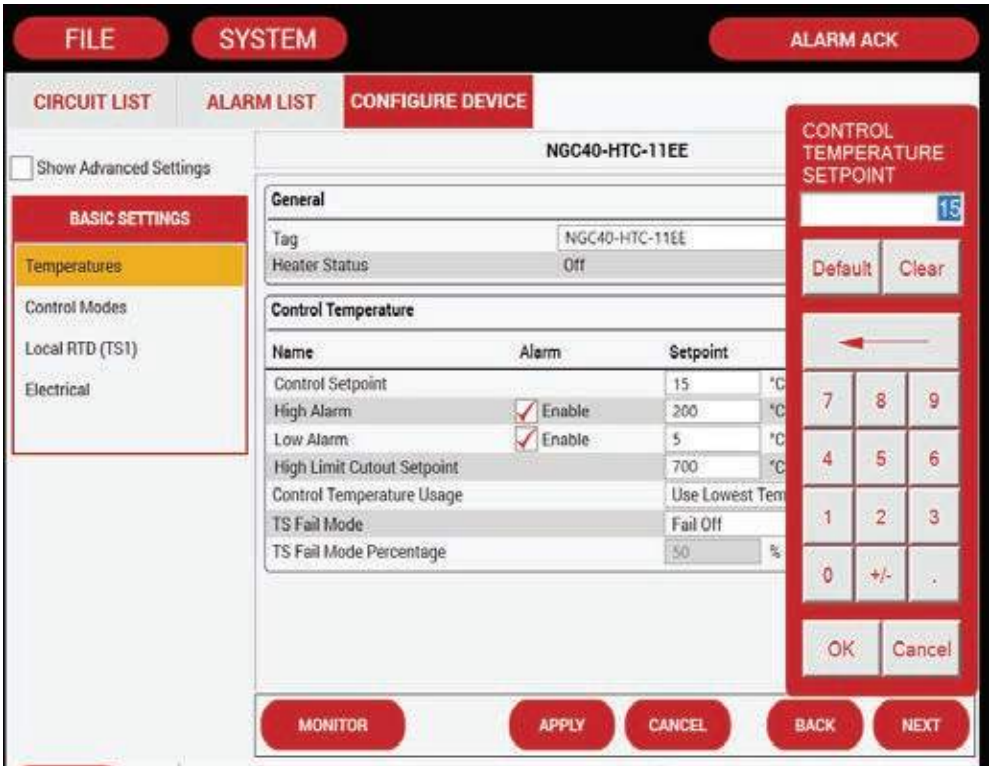


Figure 3.10 Configuration window for control setpoint temperature

The HIGH temperature alarm is disabled by default. Enable the high alarm by touching the white box. A check will appear in the box when enabled. Change the high temperature alarm to the desired value in the same way the Control Temperature was set.

The LOW temperature alarm is enabled by default. Change the low temperature alarm to the desired value in the same way the Control Temperature was set. The HIGH Limit Cutout setpoint is set at 700. Change if required.

The Control Temperature Usage can be determined by three methods, 'Monitor Only', 'Use Lowest Temp' or 'Use Average Temp'. These selections allow the temperature setpoint to be determined if multiple RTD inputs are used for a single heat-tracing circuit. Touch the drop down selection box to select the desired Control Temperature Usage method.

The Temperature Sensor Fail Mode can be defined via the TS fail Mode setting. The options are:

1. Fail Off – turns the heat-tracing circuit off when all control RTDs input fails
2. Fail On – turns the heat-tracing circuit on when all control RTDs input fails.
3. Fail to % sets the control duty cycle to a pre-defined percentage when all control RTDs input fails.
4. Fail to Lowest – if multiple RTDs are assigned to a circuit, when any one RTD input fails, the controller will use the lowest of the remaining RTD input temperatures to determine whether the heat tracing circuit should be turned on or off.

Touch the drop down selection box to select the desired response.

Save the changes by clicking on the Apply button.

IMPORTANT: Any setting changes made within the TOUCH 1500 require you to touch the Apply button to save settings in the TOUCH 1500 database and simultaneously transmit the settings to the NGC-40 module. If you try to exit the Configuration window without clicking on the Apply button a warning message will appear asking you if these changes are to be saved.

Step 8: Set Control Modes

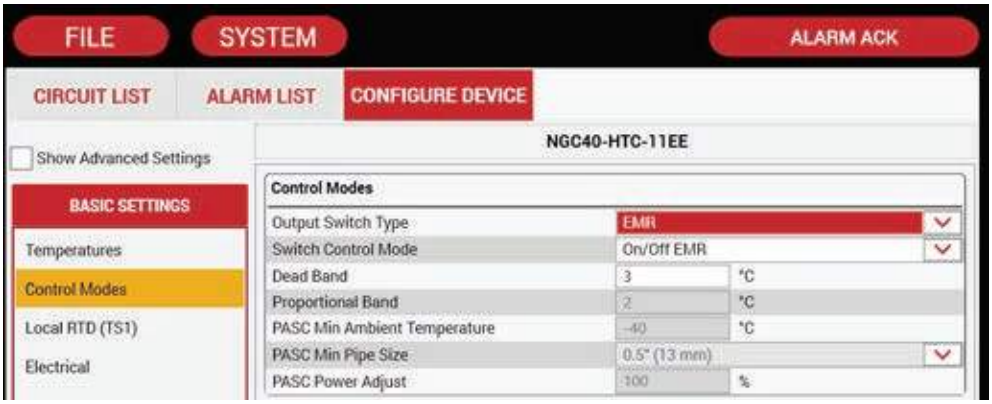


Figure 3.11 Configuration window for control modes

Touch the Control Modes button in the left hand menu list to display the Basic Control Modes window. This window allows the user to select:

Output Switch Type: SSR (Solid State Relay) or EMR (Electro Mechanical Relay)

Switch Control Mode: Both SSR and EMR - Always On, Always off, On/Off, PASC, SSR only: Proportional

- Touch the drop down selection boxes to select the desired Output Switch Type and Switch Control Mode
- Touch the white box to enter the Deadband based upon the Output Switch Type chosen.

IMPORTANT: If PASC is selected as your Switch Control Mode, the shaded areas will become un-shaded, allowing the user to change PASC setup parameters.

Step 9: Set Local RTD (TS1)

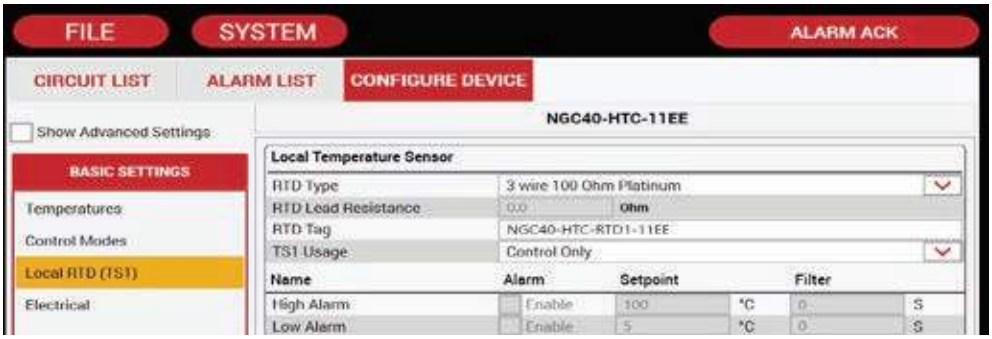


Figure 3.12 Configuration window for local RTD (TS1)

Touch the Local RTD (TS1) button in the left hand menu list to display the Local Temperature Sensor window. This window allows the user to select:

RTD Type: 3-Wire 100-Ohms Platinum or 2-Wire 100-Ohms Nickel Iron or 2-Wire 100-Ohms Nickel

Change RTD Tag: Define Tag names for the RTDs

Define TS1 Usage: Monitor Only / Control Only / Monitor with High Temp Cut out / Control with High Temp Cut out. On Selection of 'Monitor' options the dimmed area will allow user entry, enable the High & Low Alarms, and enter alarm set point and set filter if required.

IMPORTANT: This window is used to enter the settings only for an RTD wired directly to the selected HTC or HTC3 module. It is not used to set up RTDs wired to I/O modules. Those instructions will be provided in Section 5.7 Configuration of the NGC-40 I/O Module on page 62.

Step 10: Electrical – Setting Low and High Line Current Alarms, Ground-Fault Current, Voltage & Frequency

Touch the Electrical button in the left hand menu list to display the Basic Electrical Settings window. The window below is the HTC (Single Phase) module.

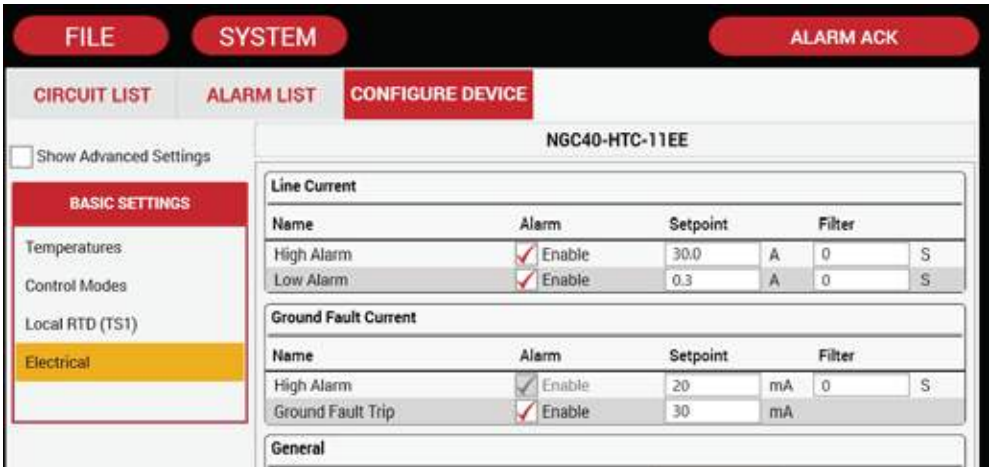


Figure 3.13 Configuration window for electrical (HTC)

This window below is the settings for the 3-phase HTC3 Module.

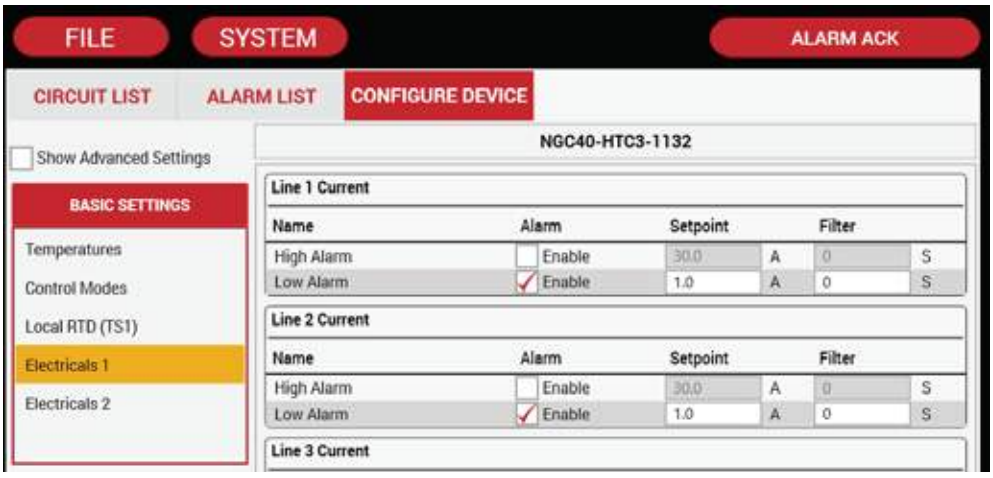


Figure 3.14 Configuration window for electrical (HTC3)

The High Alarm current is disabled by default. To enable the High Alarm, the box next to the alarm must be checked. Touch the white box to enable/disable this alarm.

- Set the High alarm to the appropriate value by touching the white box and entering the value with the keypad.
- Set the Low Alarm to the appropriate value by touching the white box and entering the value with the keypad.

The Ground-Fault Current High Alarm is enabled and GF Trip is disabled by default. To enable GF Trip, the white box next to the alarm must be checked.

- Set the High Alarm Setpoint to the appropriate value and set Filter if required by touching the white box and entering the value with the keypad.
- Set the Ground-Fault Trip to the appropriate value by touching the white box and entering the value with the keypad.

General Settings

The Voltage & Frequency entries are required only for Power Calculations. Enter the nominal values which will exist at the NGC-40 panel to use this feature.

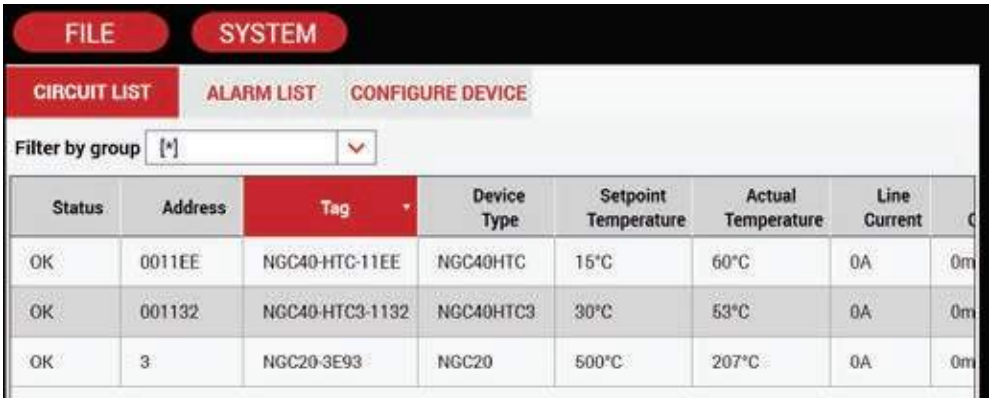
IMPORTANT: For HTC3, Electrical 1 allows Line Current Data entry & Electrical 2 contain Ground-Fault Current & General options.

3.2 SETTING UP ADDITIONAL CIRCUITS

Follow Steps 5 through 10 above to set-up each additional circuit.

3.3 CIRCUITS 1–3 SETUP COMPLETE CONFIRMATION

After completing the circuit set up go to the Circuit List window to confirm all circuits are activated and working properly.



3.15 Circuit list window

3.4 STARTING THE NGC-40

3.4.1 System Requirements

The minimum configuration to use the nVent RAYCHEM TOUCH 1500 software

- nVent RAYCHEM TOUCH 1500 hardware
- At least one each of the following
  - NGC-40-BRIDGE
  - NGC-40-PTM Module
  - 24 V DC Power Supply
  - NGC-40-HTC or HTC3
  - RTDs

Maximum optional equipment configuration:

- Up to 500 NGC-40-HTC, HTC3 or I/O modules

IMPORTANT: Module numbers depend on actual system requirement.

3.4.2 Initial Setup

The nVent RAYCHEM TOUCH 1500 software is designed to run only on the TOUCH 1500 hardware platform. Prior to shipment, the nVent RAYCHEM TOUCH 1500 is installed into Compact Flash card. During the initial power-up, you will see a blue background “splash” window for approximately
10 seconds as the system software is loaded and initializes.

This section describes the full configuration and monitoring capabilities and options available on all NGC-40 modules. Refer to the following subsections for information on the individual Modules:

Section 4.2 Configuration of NGC-40-BRIDGE Module on page 26

Section 4.3 Configuration of NGC-40 HTC Modules on page 28

Section 4.4 Configuration of NGC-40 HTC3 Modules on page 38

Section 5.7 Configuration of the NGC-40 I/O Module on page 62

4.1 ADDING A NGC-40-BRIDGE TO NVENT RAYCHEM TOUCH 1500

Before you can use the nVent RAYCHEM TOUCH 1500 to configure and maintain your NGC-40 system, you must connect to the NGC-40-BRIDGE module in each panel that the nVent RAYCHEM TOUCH 1500 will interface with. The communication ports must first be set in order for the TOUCH 1500 computer to talk to the NGC-40-BRIDGE.

IMPORTANT: If your NGC-40 system has a TOUCH 1500 installed on the panel door, then the TOUCH 1500 will have been factory configured to communicate with the NGC-40-BRIDGE modules in the panel and you may skip this section. Alternatively, if the TOUCH 1500 or TOUCH 1500R was installed and connected to the NGC-40 by Tracer Field Support or Service personnel then installation of the NGC-40-BRIDGE modules will have been completed during commissioning and you may skip this section.

4.1.1 Communication Ports

The TOUCH 1500 can be connected to an NGC-40-BRIDGE via RS-485 or Ethernet ports.

Although the NGC-40 Hardware Manager allows the user to change the following settings on

NGC-40-BRIDGE, in general, the default settings should be used. The user is allowed to change these settings in those cases where an external device is added which have already blocked the ports.

4.1.2 RS-485 Communication ports

If the TOUCH 1500 is connected to the NGC-40-BRIDGE via RS-485, the Field Port Communication must first be configured. Please note that the RS-485 port is internally configured to COM3 of the Touch Hardware. Retain the default settings.

- Go to System | Communications | Field Port window

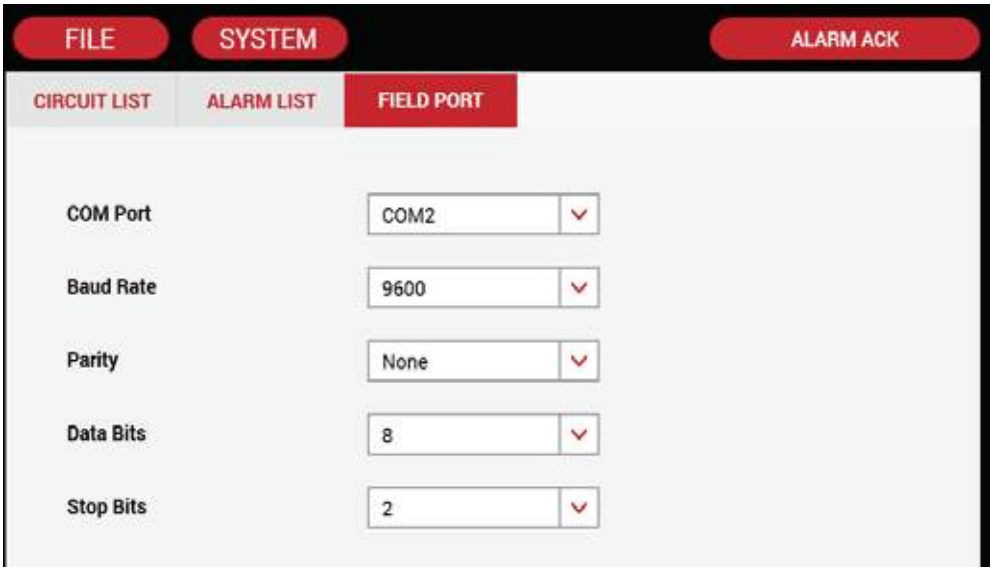


Figure 4.1 System | Communication Setup | Serial Port (Field) window

COM Port Entry Field

COM 3 is the default port and need not be changed, select the COM3 port if it is not displayed.

Selection: COM 3 (RS-485)

Default: COM3

Although the NGC-40 Hardware Manager allows the user to change the following settings on NGC-40-BRIDGE, in general, the default settings should be used. The user is allowed to change these settings in those cases where an external device is added (i.e. radio modem).

Baud Rate

Purpose: Defines the data rate at which communications occur on the serial communications ports.

Options: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Default: 9600

Parity

Purpose: Defines the type of parity bit to be used with any of the three serial communications ports.

Range: None, Odd, Even

Default: None

Data Bits

Purpose: Defines the number of data bits used with any of the three serial communications ports.

Range: 7 or 8

Default: 8

Stop Bits

Purpose: Defines the number of stop bits used with any of the three serial communications ports.

Options: 1 or 2

Default: 2

4.1.3 Communication via Ethernet Port

The NGC-40-BRIDGE module/s can be connected to a TOUCH 1500 using an Ethernet connection. Two examples on how to make these connections and program the NGC-40-BRIDGE module and TOUCH 1500 are detailed in Appendix A on 104.

- Go to System | Device Manager
- Click on Scan For Device tab
- Click on Scan Ethernet Network tab

Ethernet Port – IP Address

Purpose: Defines the Ethernet Port IP Address. If the IP Address needs to be changed, click on the IP Address window. By default, the IP Address of the TOUCH 1500 & Subnet is automatically inserted

Range: From IP Address xxx.xxx.xxx.xxx. To IP Address ---.---.---.xxx (xxx= 1- 255)

Procedure: Click on the From IP address and change the address to 192.168.1.99 and change the To IP address to 192.168.1.101

Default: Both the From & To IP address will show the TOUCH 1500 IP address at 192.168.1.200

Figure 4.2 System | Device Manager | Scan for Devices window

4.1.4 Scanning the Network for Devices

There are two methods of scanning the NGC-40-BRIDGE and its associated NGC-40 modules into the TOUCH 1500 database. Method 1 is scanning through the TOUCH 1500 RS-485 port and Method 2 is scanning through the TOUCH 1500 Ethernet connection.

Scanning through the RS-485 port

- Go to System | Device Manager

For the very first time, the Device List window will be blank. See below:

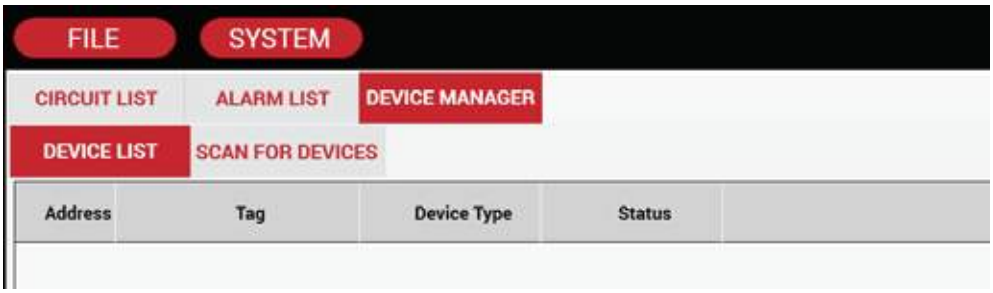


Figure 4.3 System | Device Manager window

Modbus Address

Press "Scan for Device" tab. A window opens up giving a range of the NGC-40-BRIDGE's Modbus address to scan.

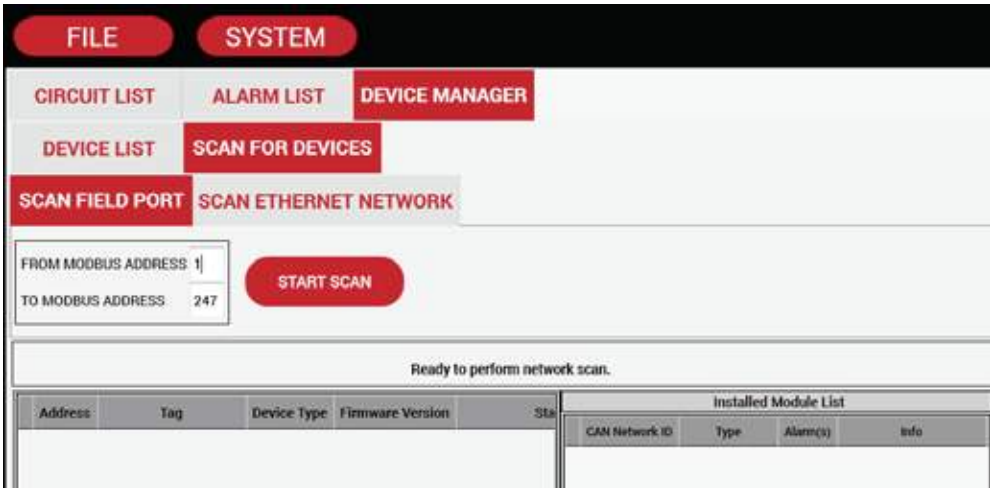


Figure 4.4 System | Device Manager | Scan for Devices window before scan

Purpose: The Modbus Address defines the communications address to be used by the NGC-40-BRIDGE when using the Modbus protocol to communicate with a Modbus compatible device. If the HT system incorporates a single NGC-40-BRIDGE, then the Modbus address of all the 4 Ports on the Bridge will be set at 1. If there is more than one Bridge, then the Modbus addresses will be set sequentially 1,2,3,4, etc.

Range: 1 to 247

Procedure: Click on the To Modbus address and change the address to the highest NGC-40-BRIDGE Modbus address + 1. This is done to shorten the scan time

Default: 1 to 247

IMPORTANT: If the TOUCH 1500 is to monitor multiple NGC-40-BRIDGE modules and their associated NGC-40-HTC/HTC3/I/O modules, each NGC-40-BRIDGE must have a unique Modbus address. To change the Modbus address in a NGC-40-BRIDGE, the user must use the NGC-40 Hardware Manager.

4.1.5 Start Scan

- Press the Start Scan button.

The TOUCH 1500 program will scan the network for all NGC-40-BRIDGE(s) having Modbus addresses in the range specified.

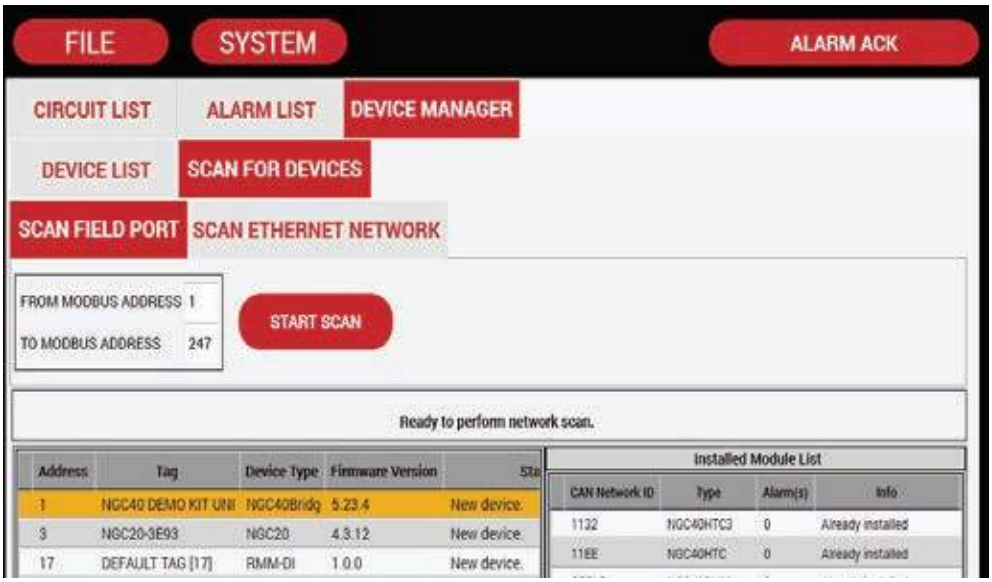


Figure 4.5 System | Device Manager | Scan for Devices window after scan

4.1.6 Scanning Through the Ethernet Port

Scanning through the Ethernet port is the same as RS-485 port except:

- Click on the “Scan Ethernet Network” tab
- Set Modbus address as per Section 4.1.4
- Press the “Start Scan” Button

Additional information on connecting TOUCH 1500 via Ethernet port can be found on Appendix A on page 104.

4.1.7 Discover Devices

The Discover Devices button makes use of the discovery and detection feature in the NGC-40 and Elexant systems. As long as these systems are connected on the Ethernet network, they can be found by the Discover Devices button. When devices are found, a list is displayed in a Discover Devices popup window. Select 1 or more device to add to the Touch 1500 system by checking the Select column. Use the Select All and Deselect All if all devices are required. Click OK to proceed with the add or exit the window.

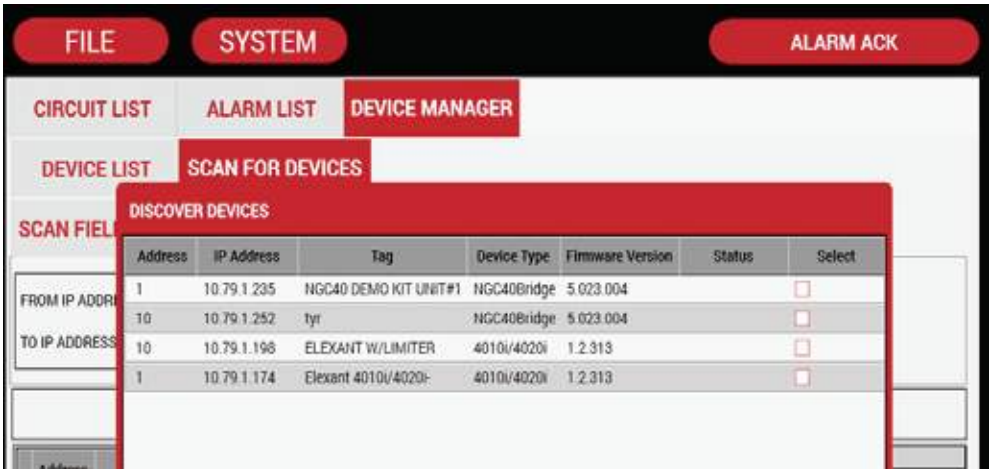


Figure 4.5a Discover Devices popup window

4.1.8 Configuration of System Preferences

The System Preference window allows the user to configure the language, units, window time out, time and date that will affect the entire system.

- Go to System | Preferences

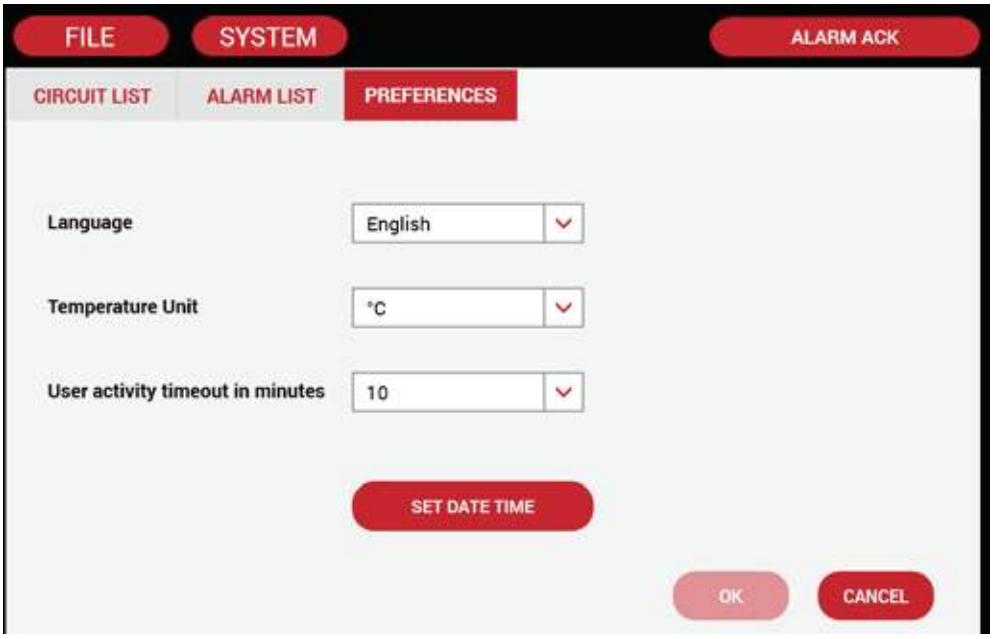


Figure 4.6 System | Preferences window

4.1.9 Language Entry List

This entry specifies the language used on the TOUCH 1500 display windows.

Options: English, French, German, Russian and Chinese

Procedure: Select the preferred language from the dropdown list.

Default: English

4.1.10 Temperature Units

Options: Fahrenheit, Celsius

Procedure: Select the preferred Temp Unit from the dropdown list.

Default: Celsius

4.1.11 User Activity Timeout (minutes)

This entry sets the number of minutes before the display automatically reverts to the Circuit List Window. Any user interaction with the TOUCH 1500 screen will reset the timer.

IMPORTANT: This time entry also determines how long a password entry will remain valid

Selection: 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100 minutes

Procedure: Select duration from the dropdown list.

Default: 10 minutes

4.2 CONFIGURATION OF NGC-40-BRIDGE MODULES

4.2.1 General - Tags and Alarms

- Go to System | Device Manager
- Click on NGC-40-BRIDGE
- Click on Config.

Figure 4.7 Device Manager window for NGC-40-BRIDGE

Bridge Tag

Purpose: A 40-character tag may be assigned to the NGC-40-BRIDGE to allow it to be easily associated with a pipe, vessel, process, circuit, drawing name, number.

Range: Alpha-numeric characters

Procedure: To enter a tag name, click where the default tag name is shown. This will open the keyboard for entering the new tag name.

Default: Default-tag

Figure 4.8 Device Manager | Configure Device window for NGC-40-BRIDGE

Bridge Alarms

Purpose: The Device Reset Alarm is used to indicate:

1. Power to the Bridge has been interrupted and subsequently restored.
2. A transient has caused the Bridge's program to restart.
3. An internal condition has caused the Bridge's program to restart.

Options: ENABLE or DISABLE

Procedure: Check box to enable alarm

Default: DISABLE

IMPORTANT: Normally the Device Reset Alarm is left disabled since powering the Bridge off and on for maintenance or trouble-shooting would require the user to reset this alarm every time.

4.2.2 Communication Ports – Serial (COM Ports 1, 2 & 3) and Ethernet

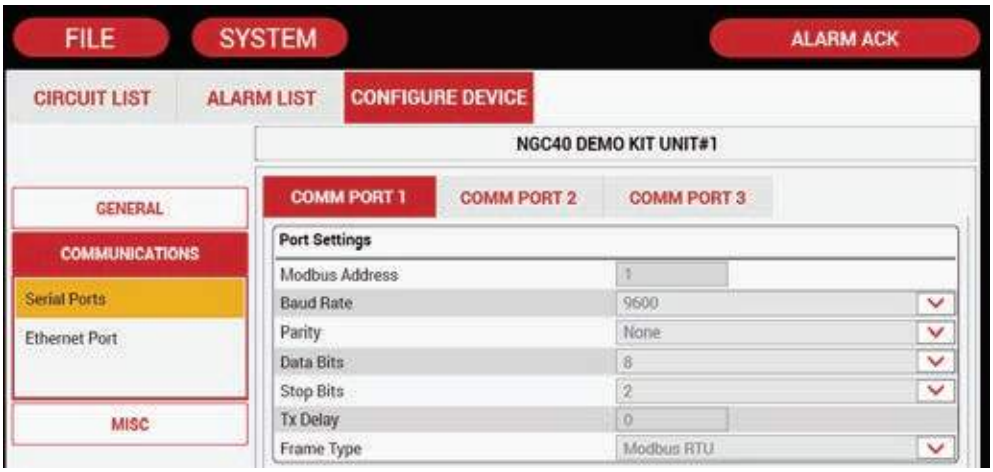


Figure 4.9 Device Manager | Configuration Device | Communication Ports window for NGC-40-BRIDGE

Purpose: Allows the user to review the communication ports settings (Serial and Ethernet) on the NGC-40-BRIDGE module. The NGC-40-BRIDGE module has the following communication ports.

1. COM 1: RS-485 – Two wire RS 485 port to communicate with TOUCH 1500
2. COM 2: RS-485 – Two wire RS 485 port to communicate with Field devices like RMM
3. COM 3: RS-232 – Local RS 232 port to communicate with TOUCH 1500 Hardware Manager or nVent RAYCHEM Supervisor
4. Ethernet: 10/100 LAN for communicating with Remote devices which many include TOUCH 1500, DTS or DCS running on Host PCS

Default Settings: Modbus address is set at 1 for the first Bridge on a HT panel and sequentially addressed for multiple bridges. The IP address is set at 192.168.1.100. These settings can only be changed by using the NGC-40 Hardware Manager.

4.2.3 Miscellaneous Device Information

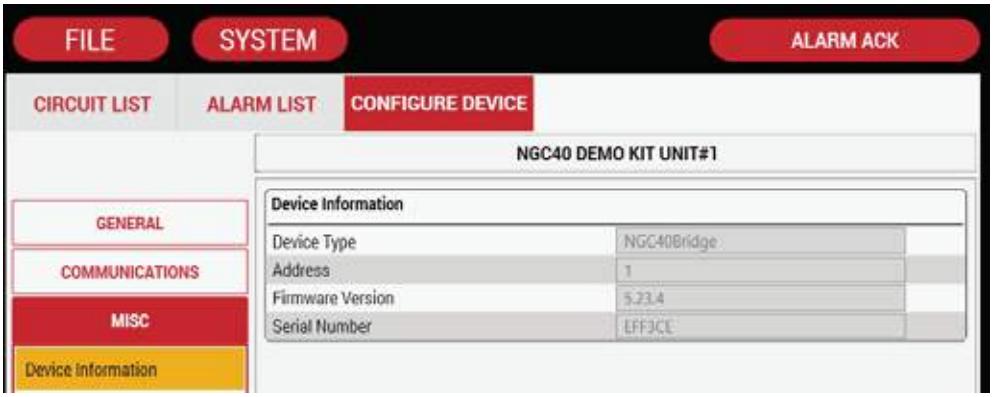


Figure 4.10 Device Manager | Configuration Device | Miscellaneous window

Purpose: Allows the user to review the Device Information current set-up in the NGC-40-BRIDGE. The Device Type, Firmware Version and Serial Number are factory configured and cannot be changed. The Modbus address can be changed using the NGC-40 Hardware Manager.

Load Configuration Defaults

Purpose: Loads the default settings that are stored in the NGC-40-BRIDGE

Procedure: Click on the Load Configuration Defaults button to erase the data and bring back the factory settings.

IMPORTANT: In order to identify the NGC-40-BRIDGE, the Tag Name will not change if the configuration defaults are loaded. The current Tag Name will not be altered until it is manually changed (Section 4.2.1 Bridge Tag).

4.3 CONFIGURATION OF NGC-40 HTC MODULES

This section provides complete programming instructions for the NGC-40 HTC Heat-Tracing Controllers for single-phase heaters, for HTC3 modules, please follow the procedures for the HTC module except for the Electrical settings which are detailed under Section 5.3 Electrical on page 52. All the NGC-40 HTC functions are logically grouped based on their functionality. For each function, an explanation of its Purpose, Range over which it may be set and its Default setting is described. Finally any Important information or Cautions that pertain to the particular function are provided.

4.3.1 Basic Settings

The Basic Settings tabs allow the user to review and change only those inputs which are necessary to set up an HTC module.

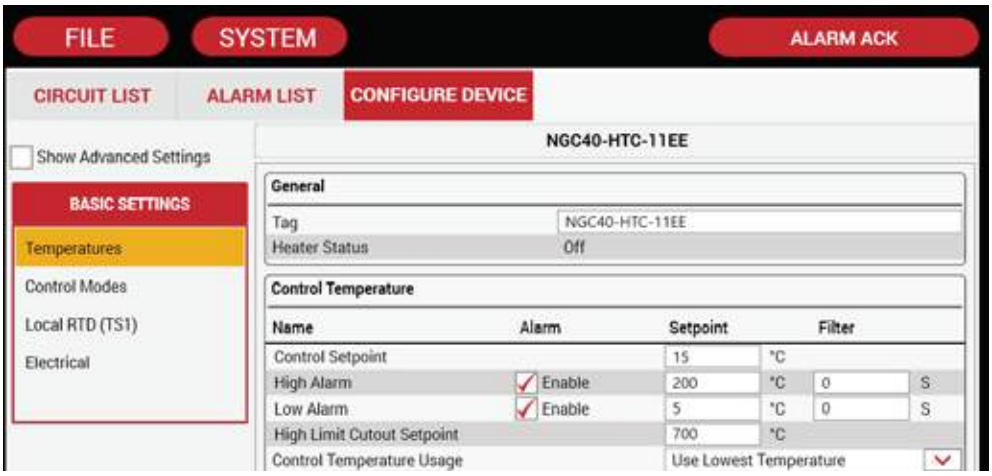


Figure 4.11 Basic Settings –Temperatures window

4.3.1.1 General

HTC Tag

Purpose: A 40-character tag may be assigned to the NGC-40-HTC to allow it to be easily associated with a pipe, vessel, and process, circuit, drawing name or number.

Procedure: To enter a tag name, touch where the default tag name is shown. This will open the keyboard for entering the new tag name.

Range: Alpha-numeric characters

Default: NGC-40-HTC-(last 4 characters of CAN ID)

Heater Status

Purpose: Indicates whether the heat tracing is powered On or Off

Procedure: N/A. this is not a programmable function. It is status only.

Range: On or Off

Default: N/A

4.3.1.2 Control Temperature

Control Setpoint

Purpose: The Control Temperature Setpoint temperature is the value at which the Heat Trace Controller maintains the circuit temperature using one of the Switch Control Modes. The Control Temperature Setpoint temperature is compared to the measured pipe or ambient temperature. A decision is then made to turn on or turn off the output to control power to the heat trace cable.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad.

Range: -80°C to 700°C (-112°F to 1292°F)

Default: 10°C (50°F)

IMPORTANT: The HTC will switch the output ON and OFF in an attempt to maintain this temperature.

High Alarm

Purpose: This alarm is used to indicate when the measured temperature goes above a defined threshold. It can be used to indicate when the pipe temperature has risen above a temperature which may have a negative effect on process efficiency or operation. When enabled, this alarm will appear when the Control Temperature exceeds the Control Temperature High Alarm Setpoint. This alarm can be user selectable to be latching or non-latching (refer to Section 5.2.3) if set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: To enable Alarm, touch the Check box (a check mark will appear in the box when enabled.) To enter a new set point value, touch the data area to bring up the numerical keypad

Range: -80°C to 700°C (-112°F to 1292°F)

Options: ENABLE or DISABLE

Default Alarm Selection: DISABLED

Default Alarm Temperature: 100°C (212°F)

IMPORTANT: If your application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the HTC for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the HTC should be configured for latching temperature alarms.

High Alarm Filter

Purpose: The Control Temperature High Alarm Filter will prevent Control Temperature High Alarm from being indicated until the corresponding alarm condition has existed for the duration of the Control Temperature High Alarm Filter time.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Range: 0 to 59940 seconds (0 to 999 minutes)

Default: 0 second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Low Alarm

Purpose: This alarm is used to indicate when the measured temperature goes below a defined threshold. It can be used to indicate when the pipe temperature has dropped below a temperature which may have a negative effect on process efficiency or operation. When enabled, this alarm will appear when the Control Temperature decreases below the Control Temperature Low Alarm Setpoint.

Procedure: To enable Alarm, touch the Check box (a check mark will appear in the box when enabled.) To enter a new set point value, touch the data area to bring up the numerical keypad

Range: -80°C to 700°C (-112°F to 1292°F)

Options: ENABLE or DISABLE

Default Alarm Selection: ENABLE

Default Alarm Temperature: 5°C (40°F)

NOTE 1: This alarm can be user selectable to be latching or non-latching as explained under Section 5.2.3. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to Latching the alarm must be cleared by the user. The default alarm latching/non-latching setting for this alarm is latching.

NOTE 2: If your application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the HTC for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the HTC should be configured for latching

Low Alarm Filter

Purpose: The Control Temperature Low Alarm Filter will prevent Control Temperature Low Alarm from being indicated until the corresponding alarm condition has existed for the duration of the Control Temperature Low Alarm Filter time.

Range: 0 to 59940 seconds (0 to 999 minutes)

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Default: 0 second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

High Limit Cutout Setpoint

Purpose: This parameter defines the High Limit Cutout Setpoint for each of the 8 Temperature Sources where the Temperature Source configuration has High Limit Cut-out enabled. This feature will override the Control Temperature Setpoint temperature and force the controller output off if any one of the 8 Temperature Sources temperature exceeds the High Limit Cut-Out temperature setting.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Range: -80°C to 700°C (-112°F to 1292°F)

Default: 700°C (1292°F)

NOTE 1: The High Limit Cutout feature overrides an auto-cycle test. A pending auto-cycle will be initiated immediately after the Temperature Source x temperature drops below the High Cutout Setpoint.

NOTE 2: If a Temperature Source Failure occurs and the High Limit Cutout feature is enabled, the switch output will latch off regardless of the Temperature Control Mode setting or the Temperature Fail Mode setting.

Control Temperature Usage

Purpose: Allows the selection of one of three possible temperature control modes used by the control module. The different modes are Monitoring, averaging, or minimum maintain temperature control.

Procedure: Touch the drop down selection box to select Control Temperature Usage

Options: Monitor Only/Use Lowest Temp/Use Average Temp

Default: Use lowest temp

TS Fail mode

Purpose: Allows the selection of one of four Fail Safe modes, Fail On, Fail Off, Fixed %, Last %

Touch the drop down selection box to select TS Fail modes

Options: Fail On/Fail Off/ Fixed %/ Last %

Default: Fail Off

TS Fail mode %

Purpose: Allows the Entry of Fail mode % on Fixed % mode (only)

Procedure: Touch the Entry box and enter %

Range: 0 to 99%

Default: Grayed out until enabled

4.3.1.3 Control Modes

Allows to user to select various control modes

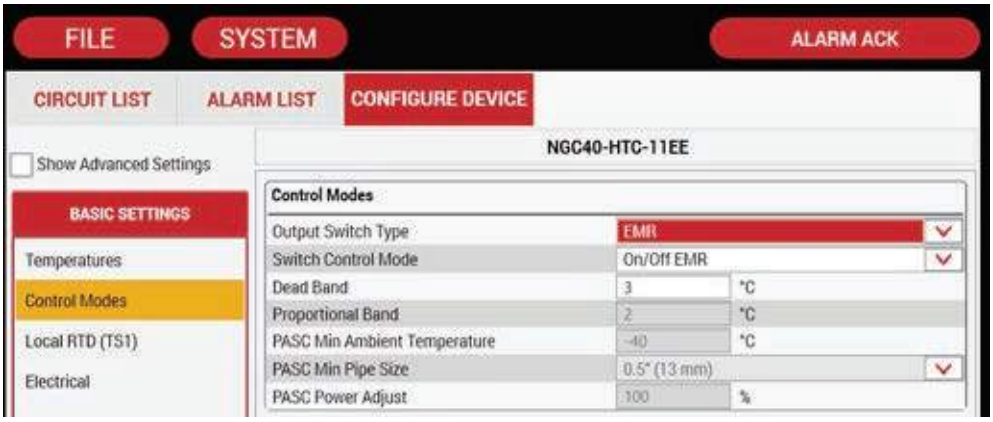


Figure 4.12 Basic Settings - Control Mode window

Output Switch Type

Purpose: Select the type of switching device connected to this HTC

Procedure: Select the type from the drop down list

Options: Electro-Magnetic Relay (EMR) or Solid State Relay (SSR)

Default: EMR

Switch Control Mode

Purpose: This allows selection of the type of algorithm to be used by the HTC to maintain the Control Setpoint temperature. There are five different control algorithms available. For detail explanation of the different Switch Control Modes, please refer to Appendix B on page 111.

Procedure: Select the type from the drop down list

Options: On/Off, PASC, Always On, Always Off, Proportional (SSR Switch Type only)

Default: On/Off EMR

Dead Band—Available only when On/Off Control Mode is selected

Purpose: The controller monitors the temperature of the heating circuit and compares it to the Control Temperature. If the control temperature is above the Control Temperature Setpoint by more than the deadband value, the output is turned off. If the control temperature falls below the Control Temperature Setpoint, the output is turned on.

Procedure: Click on the box to enter date using the numerical keypad

Range: 1 to 50°C (2 to 90°F)

Default: 3°C (5°F)

IMPORTANT: Adjust the DEADBAND setting to the desired level above the Control Setpoint temperature. When the control temperature is above the setpoint + deadband value, the controller will turn off the output to the tracer. If the control temperature drops down below the setpoint, the output will be turned back on. Note that the smaller the deadband setting, the more often the contactor will cycle on and off, decreasing its operational life.

Proportional Band — Available only when Proportional Control Mode is selected

Purpose: The controller monitors the temperature of the heating circuit and compares it to the Control Temperature Setpoint. If the Control Temperature is at or below the Control Temperature Setpoint the power is applied to the trace with a duty cycle of 100% minus the controller output is full on. If the Control Temperature is equal to or greater than the Control Setpoint temperature plus the Proportional Band setting, then the controller output will have a duty cycle of 0%, the output will be off. The temperature of the control sensor is constantly monitored and the output duty cycle is adjusted proportionally according to where the temperature falls within the 0% to 100% band.

Proportional Control Temperature Band Table

Control Sensor Temperature	Duty Cycle
Setpoint + proportional band	0%
Setpoint + proportional band / 2	50%
Setpoint	100%

IMPORTANT: The Proportional Band is use with the three proportional control modes only (EMR PASC, SSR PASC, SSR Proportional).

Procedure: Click on the box to enter date using the numerical keypad

Range: 1 to 50°C (2 to 90°F)

Default: 2°C (4°F)

PASC Min. Ambient Temperature

Purpose: The PASC 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 heat tracing system was sized correctly.

Procedure: Click on the box to enter date using the numerical keypad

Range: -73°C to 51°C (-99°F to 124°F)

Default: -40°C (-40°F)

PASC Min Pipe Size

Purpose: PASC 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 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.

Procedure: Click on the box to enter date using the numerical keypad

Options: .50 in (15 mm), 1.0 in (25 mm), >=2.0 in (50 mm)

Default: .50 in (15 mm)

PASC Power Adjust

Purpose: 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 nVent representative for assistance with this factor.

Procedure: Touch the box to enter date using the numerical keypad

Range: 10 to 200%

Default: 100%

4.3.1.4 Local RTD (TS1)

This section discusses setting up an RTD that is hard-wired into an HTC or HTC3 module. If no RTD is connected directly to the HTC module, (i.e. RTD input is provided form an I/O or other HTC/ HTC3 modules) then you may skip this section.

Local Temp Sensor (TS1)

This window allows the user to set-up the RTD wired directly to the heat-tracing controller

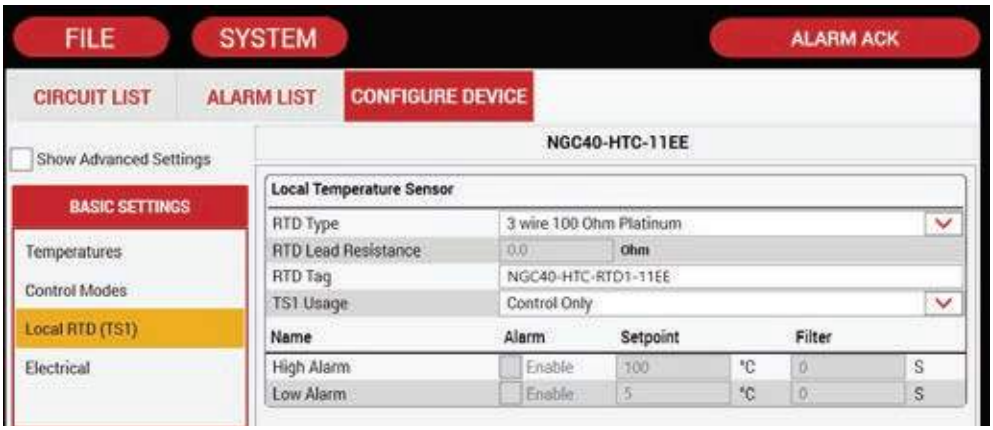


Figure 4.13 Basic Settings - Local RTD (TS1) window

RTD Type

Purpose: This allows selection of the type of RTD used

Procedure: Select the type from the drop down list

Options: 3-wire 100-Ohms Platinum or 2-wire 100-Ohms Nickel Iron or 2-wire 100-Ohms Nickel

Default: 3-wire 100-Phms Platinum

RTD Lead Resistance

Purpose: This allows the lead wire resistance to be set when using 2-wire 100-Ohms Nickel Iron. The lead resistance must be entered to ensure accurate temperature measurement.

Procedure: Touch the data area and enter the resistance value using the keypad.

Range: 0 to 20 Ohms

Default: 0 Ohms

Change RTD Tag

Purpose: This allows the RTD name to be set to the preferred text

Procedure: To enter a tag name, touch where the default tag name is shown. This will open the keyboard for entering the new tag name.

Range: Alpha-numeric characters.

Default: NGC-40-HTC-RTD1-(last 4 characters of CAN ID)

TS1 Usage

Purpose: This allows selection of how the controller will react if RTD1 fails. If High Temp Cut out options is selected, the Controller will cut off power when the temp exceeds the values.

Procedure: Select the type from the drop down list

Options: Monitor Only / Control Only / Monitor with High Temp Cut out / Control with High Temp Cut out. On Selection of Monitor options the grayed area will allow data entry.

Default: Control Only

High Alarm - TS1

Purpose: This setting is exclusively for TS1 when set to the Monitor Only or Monitor with High Limit Cutout modes. The high alarm will activate when the temperature exceeds the set value. Procedure: Touch the check box to enable the alarm. When enabled, enter the setpoint by touching the white box and using the numerical keypad. If required set filter in the range in the same way.

Temperature Range: –80°C to 700°C (–112°F to 1292°F)

Filter Range: 0 to 12 seconds

Default Setting: DISABLED

Default Temperature: 100°C

Default Filter: 0 seconds

Low Alarm - TS1

Purpose: This setting is exclusively for TS1 when set to the Monitor Only or Monitor with High Limit Cutout modes. The low alarm will activate when the temperature goes below the set value.

Procedure: Touch the check box to enable the alarm. When enabled, enter the setpoint by touching the white box and using the numerical keypad. If required set filter in the range in the same way.

Temperature Range: –80°C to 700°C (–112°F to 1292°F)

Filter Range: 0 to 12 seconds

Default Setting: DISABLED

Default Temperature: 5°C

Default Filter: 0 seconds

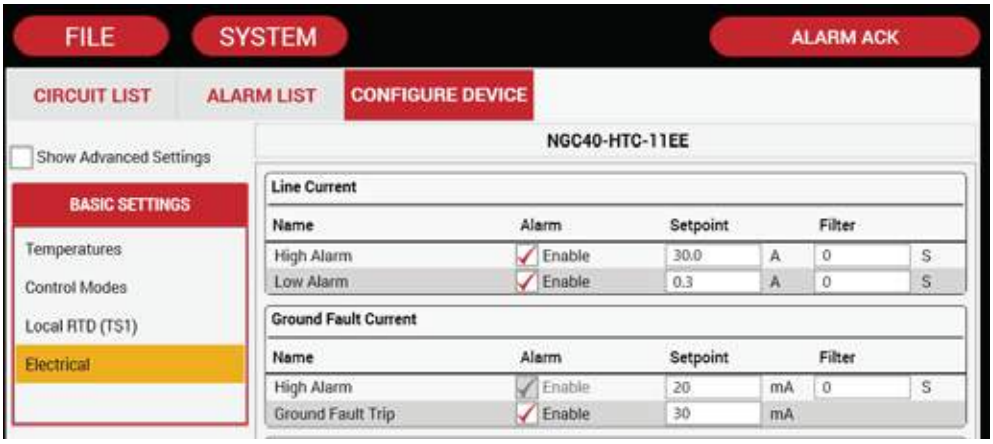


Figure 4.14 Basic Settings - Electrical - HTC window

4.3.1.5 Electrical

This section describes the electrical setting options for the HTC/HTC3 modules.

Line Current

High Alarm

Purpose: Alarms at current levels which are higher than the High Line Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: DISABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is LATCHING.

High Alarm Setpoint

Purpose: Sets the high alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.3 to 60.0 A

Default: 30.0 A

High Alarm Filter

Purpose: The Line Current High Alarm Filter will prevent high load current alarms from being indicated until a high current condition has existed for the duration of the high current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Low Alarm

Purpose: Alarms at current levels which are lower than the Line Current Low Alarm Setpoint. Monitoring for lower than expected current levels may be an effective means of continuity monitoring. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

NOTE 1: The default alarm latching/non-latching setting for this alarm is latching.

IMPORTANT: to minimize nuisance low current alarms, the HTC must detect a current level less than the low current alarm setpoint for a period longer than approximately 20 consecutive seconds.

NOTE 2: For series type heating cables, adjusting the low line current alarm to 50% of full load current will properly alarm a problem and reduce nuisance alarms due to voltage dips. Parallel heaters should be adjusted to a level as close as possible to full load current but lower than the current at worst case voltage. The low current setting as a percentage of full load current will vary depending on the facility and its power system.

NOTE 3: A low line current alarm may also result from a switch failed open. The controller cannot detect a switch failure due to no current. A no current condition would be identified by a low line current and the latched low line current alarm value reported with the alarm will be 0.0 A.

NOTE 4: It may be advantageous to consider using the high tracing resistance alarm to indicate a cable fault when using certain types of heaters.

Low Alarm Setpoint

Purpose: Sets the low alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.3 to 60.0 A

Default: 1.0 A

Low Alarm Filter

Purpose: The Low Line Current Alarm Filter will prevent low load current alarms from being indicated until a low current condition has existed for the duration of the low current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Ground-Fault Current

High Alarm

Purpose: Alarms at ground-fault current levels which are higher than the High GF Current Alarm Setpoint. This alarm can be used to give pre-warning on a circuit whose ground-fault current is increasing but not yet at the point where it will trip and shut down the heat-tracing circuit. It is user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is latching.

High Alarm Setpoint

Purpose: Sets the high alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 10 mA to 250 mA

Default: 20 mA

High Alarm Filter

Purpose: The high ground-fault current alarm filter will prevent high ground-fault current alarms from being indicated until a high GF current condition has existed for the duration of the high GFI alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Ground-Fault Trip Alarm

Purpose: This alarm is activated when the ground-fault leakage current exceeds the Ground-Fault Trip Current Setpoint. Exceeding this limit will result in the output switch being latched off.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

NOTE 1: National Electrical Codes may require that all legs of non-neutral based power sources be opened upon detection of a ground fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

NOTE 2: When the Ground-Fault Trip alarm is disabled, ground-fault tripping is disabled as well.

Ground-Fault Trip Setpoint

Purpose: Sets the Ground-Fault Trip threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 10 to 250 mA

Default: 30 mA

IMPORTANT: National Electrical Codes may require that all legs of non-neutral based power sources be upon detection of a ground fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

General

Fixed Voltage

Purpose: Provides the line voltage data for power calculations.

Procedure: Touch the white box and enter the Line Voltage using the numerical keypad.

Range: 80 to 700 V

Default: 120 V

Fixed Frequency

Purpose: Provides the line frequency data required for power calculations

Procedure: Enter the frequency using the numerical keypad

Range: 45 to 65 Hz

Default: 60 Hz

4.4 CONFIGURATION OF NGC-40 HTC3 MODULES

This section provides complete programming instructions for the NGC-40 HTC3 Heat-Tracing Controllers for three-phase heaters. For HTC3 modules, please follow the procedures for the HTC module since the all parameters except the electrical settings are identical for both HTC and HTC3. Refer to Section 4.3 Configuration of NGC-40 HTC Modules on page 28 for instructions on the other parameters.

4.4.1 Electricals 1 for HTC3

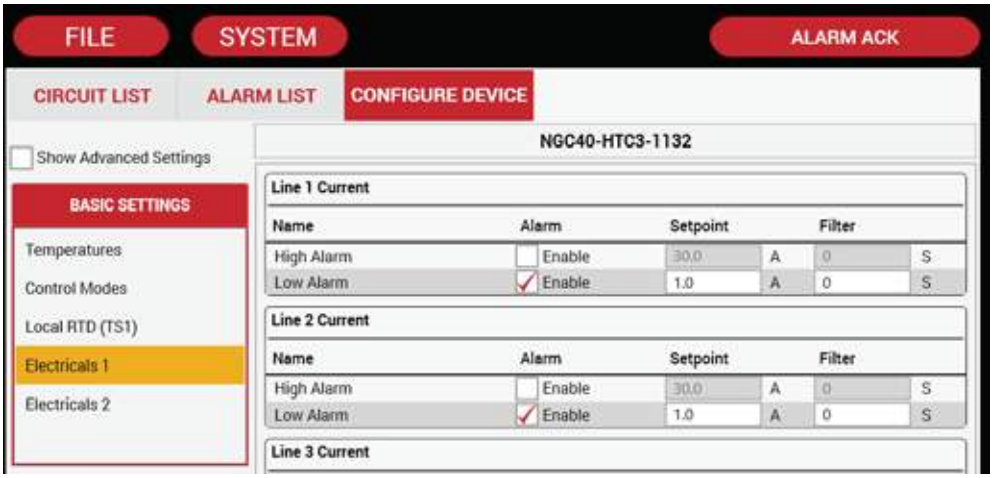


Figure 4.15 Basic Settings - Electrical - HTC3 window

4.4.1.1 Line Current 1 (Phase 1)

High Alarm

Purpose: Alarms current levels which are higher than the High Line Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: DISABLE

NOTE 1: The default alarm latching/non-latching setting for this alarm is latching.

NOTE 2: As the HTC3 automatically protects itself from overload, it would not normally be necessary to enable this alarm. It can be used effectively to guard against accidental paralleling of heating circuits. In-rush, or cold start currents typically associated with self-regulating cables may cause nuisance HIGH CURRENT ALARMS. If this is undesirable this alarm should be disabled.

High Alarm Setpoint

Purpose: Sets the high alarm threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.3 to 60.0 A

Default: 30.0 A

High Alarm Filter

Purpose: The line current high alarm filter will prevent high load current alarms from being indicated until a high current condition has existed for the duration of the high current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Low Alarm

Purpose: Alarms current levels which are lower than the Line Current Low Alarm Setpoint. Monitoring for lower than expected current levels may be an effective means of continuity monitoring. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: DISABLE

NOTE 1: The default alarm latching/non-latching setting for this alarm is latching.

IMPORTANT: to minimize low current alarms, the HTC must detect a current level less than the low current alarm setpoint for a period longer than approximately 20 consecutive seconds.

NOTE 2: For series type heating cables, adjusting the low line current alarm to 50% of full load will properly alarm a problem and reduce nuisance alarms due to voltage dips. Parallel heaters should be adjusted to a level as close as possible to full load current but lower than the current at worst case voltage. The low current setting as a percentage of full load current will vary depending on the facility and its power system.

NOTE 3: a low line current alarm may also result from a switch failed open. The controller detects a switch failure due to no current. A no current condition would be identified by a low line current and the latched low line current alarm value reported with the alarm will be 0.0 A.

NOTE 4: It may be advantageous to consider using the high tracing resistance alarm to indicate a cable fault when using certain types of heaters.

Low Alarm Setpoint

Purpose: Sets the low alarm threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.3 to 60.0 A

Default: 1.0 A

Low Alarm Filter

Purpose: The low line current alarm filter will prevent low load current alarms from being indicated until a low current condition has existed for the duration of the low current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

4.4.1.2 Line Current 2 (Phase 2)

Procedure: Repeat settings for Line Current 1

4.4.1.3 Line Current 3 (Phase 3)

Procedure: Repeat settings for Line Current 1

4.4.1.4 Electricals 2

Ground-Fault Current

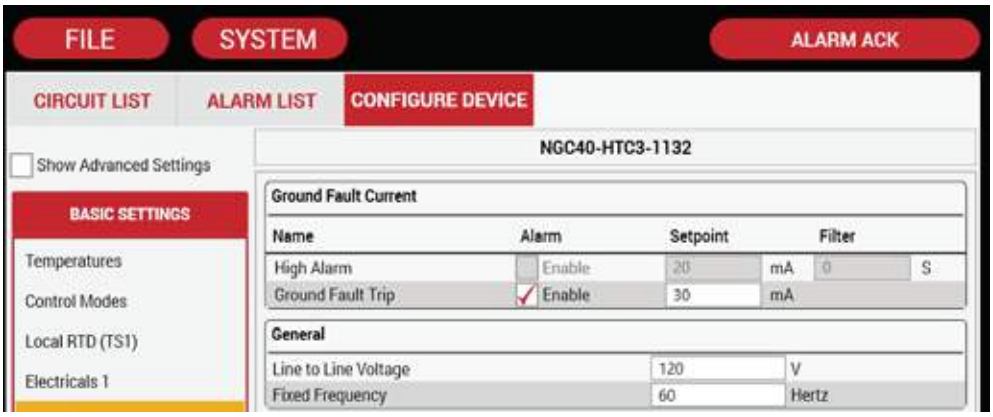


Figure 4.16 Basic Settings - Electrical - HTC3 window

The ground-fault current measurement is made for all three phases in a single measurement. If the ground-fault current in any of the phases exceeds the alarm thresholds, an alarm will be generated.

High Alarm

Purpose: Alarms ground-fault current levels which are higher than the High GF Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is latching.

High Alarm Setpoint

Purpose: Sets the High Alarm threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 10 mA to 100 mA

Default: 20 mA

Ground-Fault Current- High Alarm Filter

Purpose: The high GF current alarm filter will prevent high GF current alarms from being indicated until a high GF current condition has existed for the duration of the high GFI alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 12 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Ground-Fault Trip Alarm

Purpose: This alarm is activated when the ground-fault leakage current exceeds the Ground-Fault Trip Current Setpoint. Exceeding this limit will result in the output switch being latched off. A ground-fault alarm may mean the heating cable has been damaged or improperly installed and must not be ignored. Sustained electrical arcing or fire can result. To minimize the risk of fire if the alarm has tripped, shut off the power to the heating cable and repair the system immediately

CAUTION: IN ORDER TO IMPLEMENT A GROUND-FAULT TRIP FUNCTION, ALL NON-GROUNDED POWER CONDUCTORS MUST BE OPENED UPON DETECTION OF A GROUND-FAULT CONDITION.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

NOTE 1: National Electrical Codes may require that all legs of non-neutral based power sources be opened upon detection of a ground fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

NOTE 2: When the ground-fault trip alarm is disabled, ground-fault tripping is disabled as well.

Ground-Fault Trip Setpoint

Purpose: Sets the Ground-Fault Trip threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

CAUTION: IN ORDER TO IMPLEMENT A GROUND-FAULT TRIP FUNCTION, ALL NON-GROUNDED POWER CONDUCTORS MUST BE OPENED UPON DETECTION OF A GROUND-FAULT CONDITION.

Range: 10 to 250 mA

Default: 30 mA

IMPORTANT: National Electrical Codes may require that all legs of non-neutral based power sources be opened upon detection of a ground fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

4.5 CONFIGURATION OF RMM MODULE

This section provides complete programming instructions on how to assign an RMM and associated RTD's to an HTC or HTC3.

4.5.1 Configure the NGC-40 Bridge to utilize the RMM(s) using the Touch1500 interface

Step 1: On the Touch 1500, tap on System > Device Manager. The Device Manager tab should open.

Figure 4.17 System menu

Step 2: In the Device List, tap on the NGC-40-Bridge that the RMM is physically connected to.

Step 3: Tap on the Config button under the NGC-40-Bridge that the RMM is physically connected to.

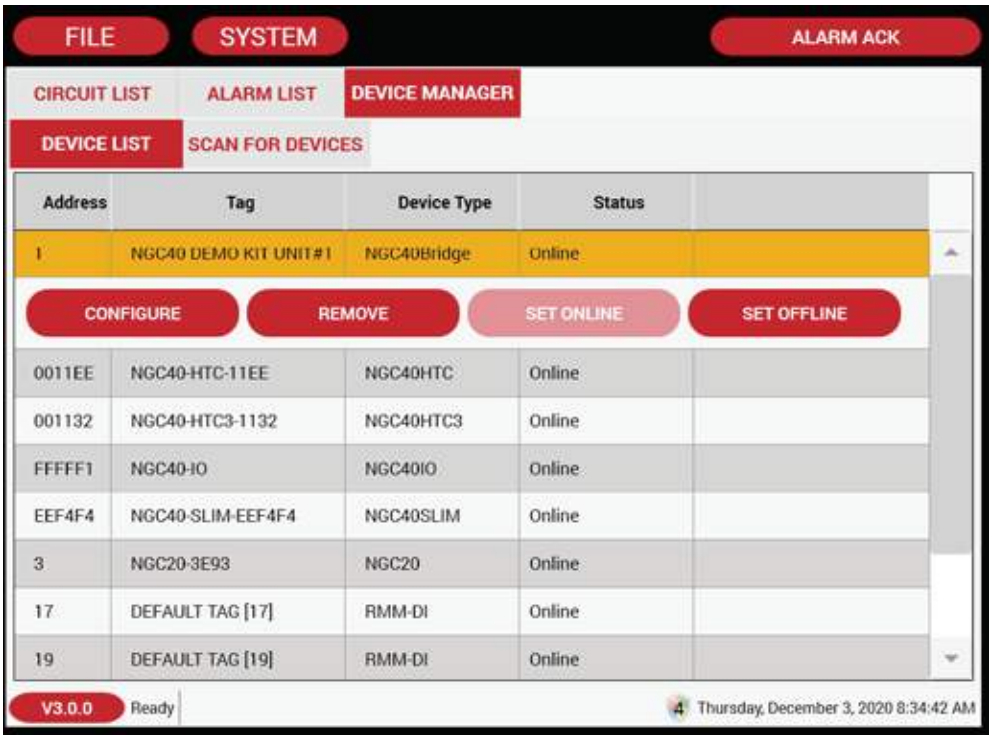


Figure 4.18 Device Manager

Step 4: Under General, tap RMM.

Step 5: Place a check mark next to the RMM(s) that will be used.

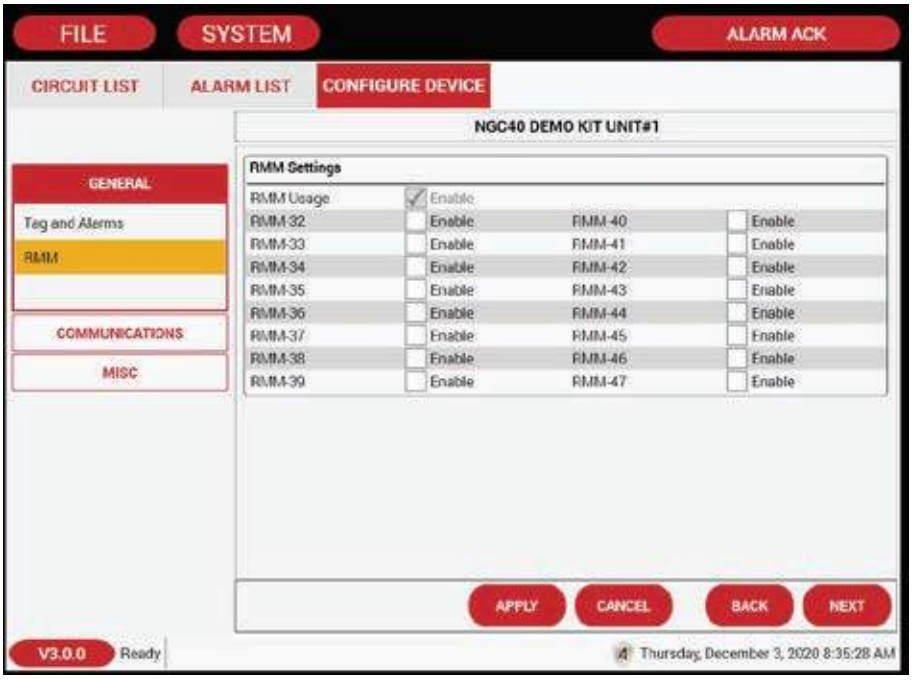


Figure 4.19 RMM list

Step 6: Tap on Apply, and the Cancel to close the Config screen. The RMM(s) will now be available for use on any circuit connected to that NGC-40-Bridge module.

4.5.2 Assign an RMM RTD to a circuit.

Step 1: Tap on a circuit on the Circuit List.

Step 2: Tap on the Overview button.

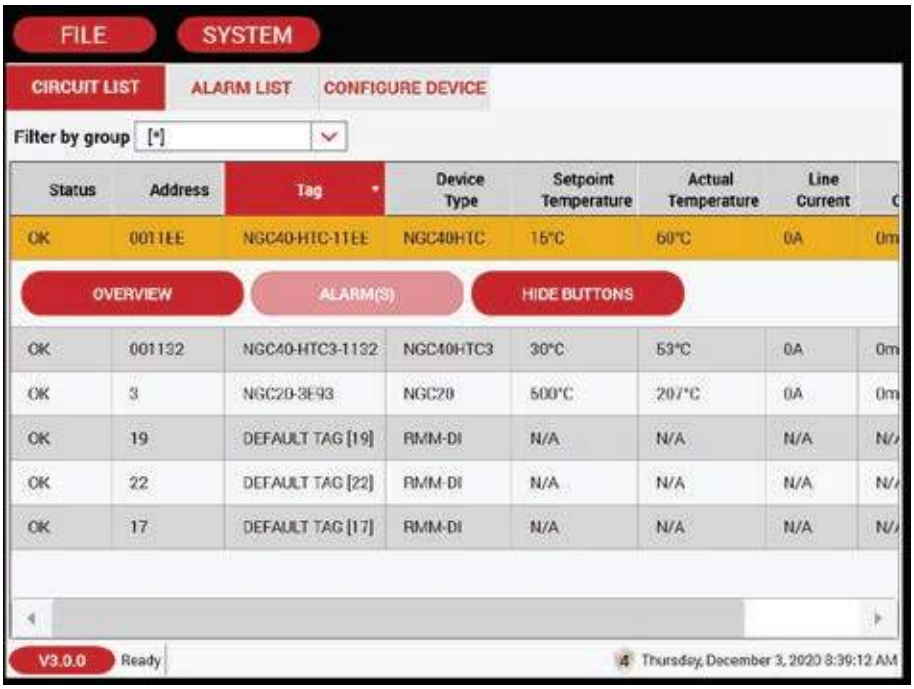


Figure 4.20 Circuit list overview

Step 3: Tap on the Config button near the bottom of the screen.

Figure 4.21 Configure

Step 4: Place a check mark on the Show Advanced Settings option.

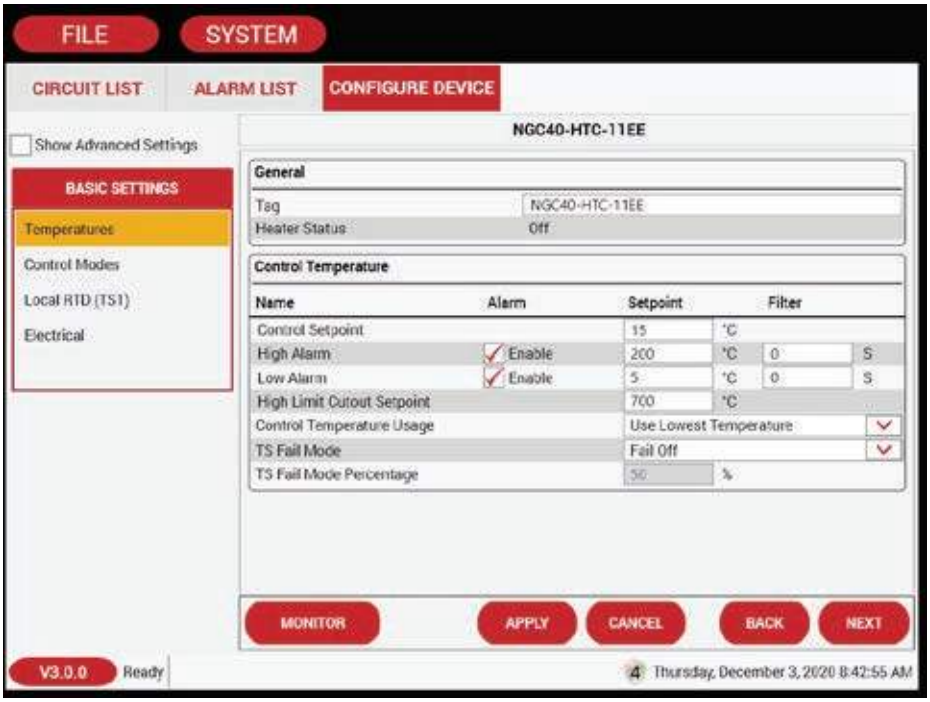


Figure 4.22 Show advanced settings

Step 5: Tap on the Temperatures sub-menu button in the menu on the left.

IMPORTANT: This is not the “Temperatures” sub-setting under the Basic Settings section

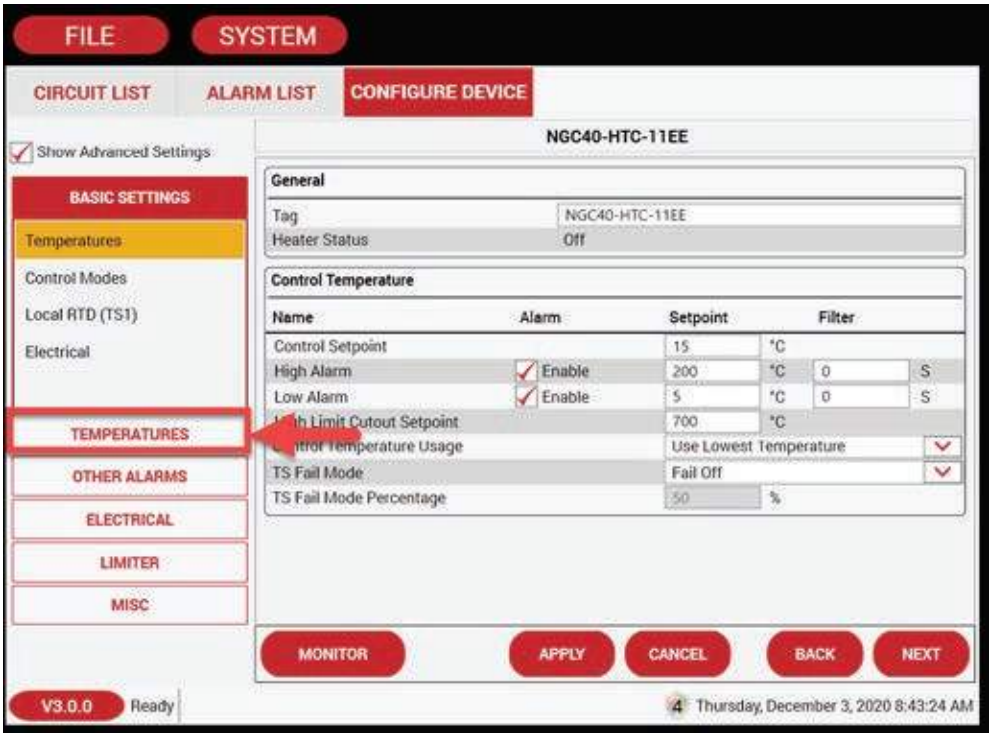


Figure 4.23 Temperatures sub-menu

Step 6: Choose a Temperature Source to assign an RMM RTD (TS2-TS8).

Step 7: Under the Temperature Source, tap on the Source drop-down menu and choose Remote.

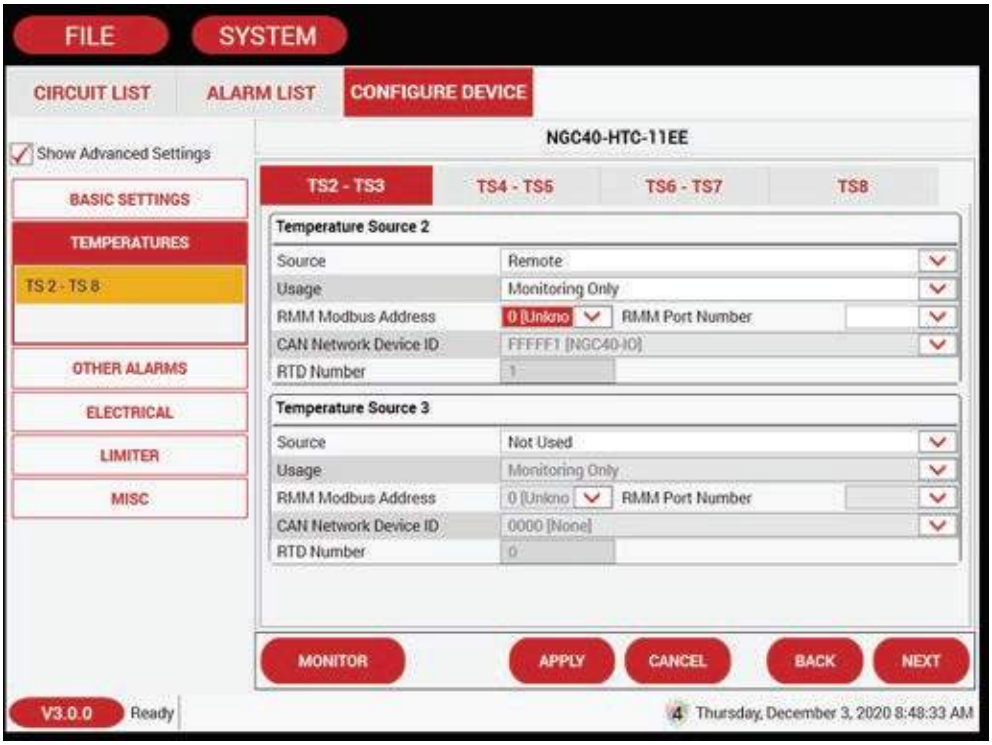


Figure 4.24 Temperature source

Step 8: Under RMM Modbus Address, choose the Modbus address of the RMM. Refer to the table below Step 11 for the RMM address switch settings conversions.

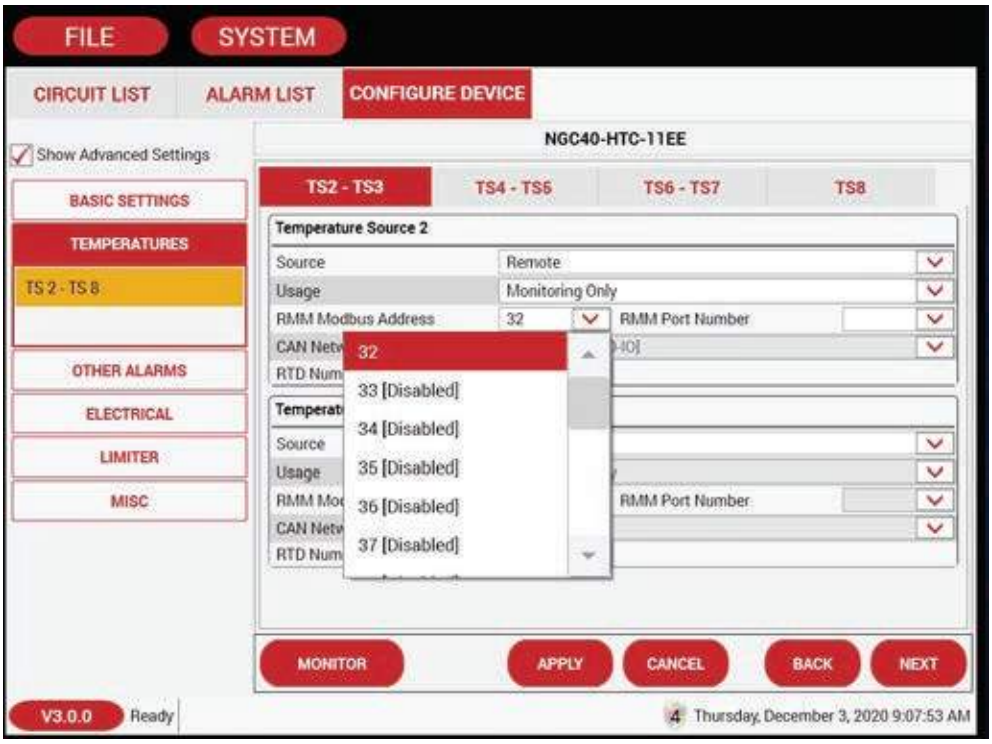


Figure 4.25 RMM address

Step 9: Under RMM Port Number, choose the RTD connected to the RMM from the list.

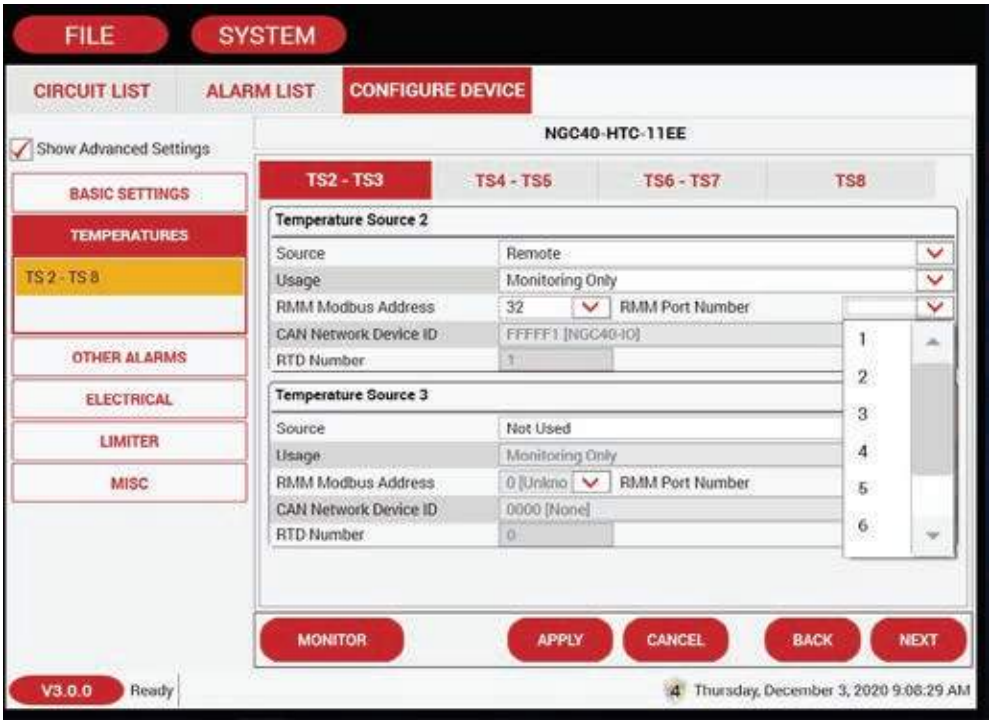


Figure 4.26 RMM port number

Step 10: Repeat steps 6 through 9 for any additional RMM RTDs for this circuit.

Step 11: Repeat steps 1 through 10 for any additional RMM RTDs for any other circuits.

RMM Switch Settings

RMM Switch Setting	Actual Modbus Address
0	32
1	33
2	34
3	35
4	36
5	37
6	38
7	39
8	40
9	41
A	42
B	43
C	44
D	45
E	46
F	47

When the Show Advance Settings box is checked, additional tabs are enabled allowing more programming options. Touch the Show Advanced Setting box to enable the advanced settings mode and display the additional menus.

5.1 TEMPERATURES

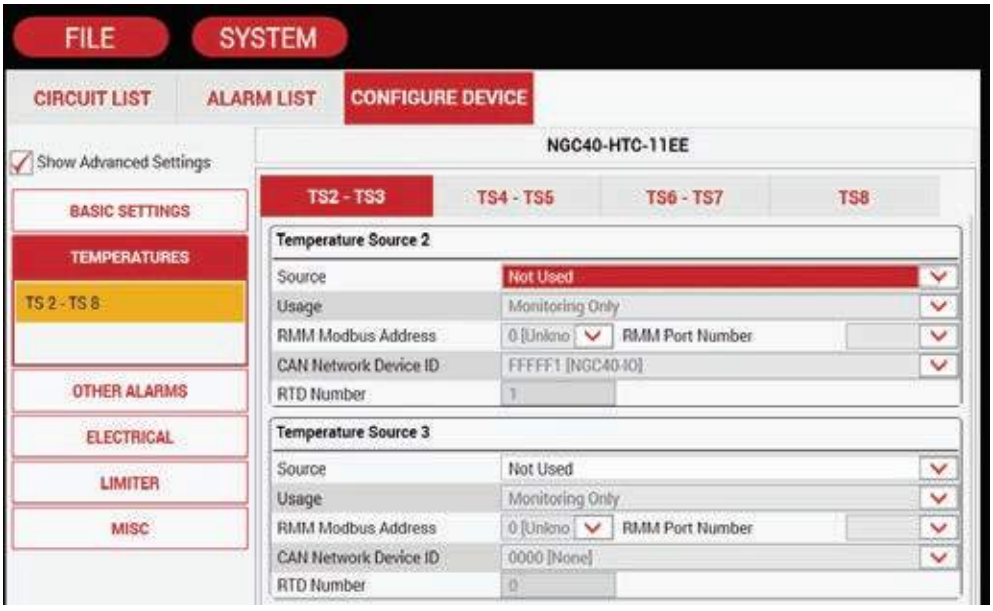


Figure 5.1 Advance Settings - Temperatures TS2 to TS8 for HTC or HTC3 window

5.1.1 Set Temperature Sources 2 Though 8 (TS2 to TS8)

This section describes how to map additional RTD sensors to an HTC or HTC3 from other sensors connected to NGC-40 HTCs and I/O modules in the panel. Up to 7 additional RTD inputs can be assigned to each heat-tracing control module. The Temperatures tab displays the options available to configure sensors TS2 through TS8.

IMPORTANT: TS1 represents the RTD input to the individual HTC or HTC3 module and is by default assigned to the sensor connected to the HTC modules. If no RTD is hardwired to the HTC or HTC3 module, then TS1 is left unconfigured.

Source

Purpose: Identifies the source of the RTD being mapped to the control module.

Procedure: Touch the drop down box to select the RTD source.

Range: Not Used and 'CAN NETWORK'

Default: Not Used

Usage

Purpose: Defines how the RTD input will be used relative to control of the heat-tracing circuit.

Procedure: Touch the drop down box to select the RTD source.

Range: Monitor Only / Control Only / Monitor with High Temp Cut out / Control with High Temp Cut out.

Default: Monitor Only

CAN Network ID

Purpose: Identifies the Module where the RTD temperature sensor is physically connected within the NGC-40 panel. You will need to know the CAN ID of the module where the desired RTD is connected. The CAN ID for each module can be determined from the Address column in the Circuit List menu (Section 3.3).

Procedure: Touch the drop down box to display the list of available RTD sources. Select the desired CAN ID.

Default: (0000) None

RTD Number

Purpose: This is applicable only if the prior selection is an I/O module. It identifies which of the possible four RTDs connected to the I/O modules will be assigned to the HTC or HTC3 module.

Range: 1 to 4

Default: 1

IMPORTANT: Repeat the above steps for Temperature Source 3 to 8

5.2 OTHER ALARMS

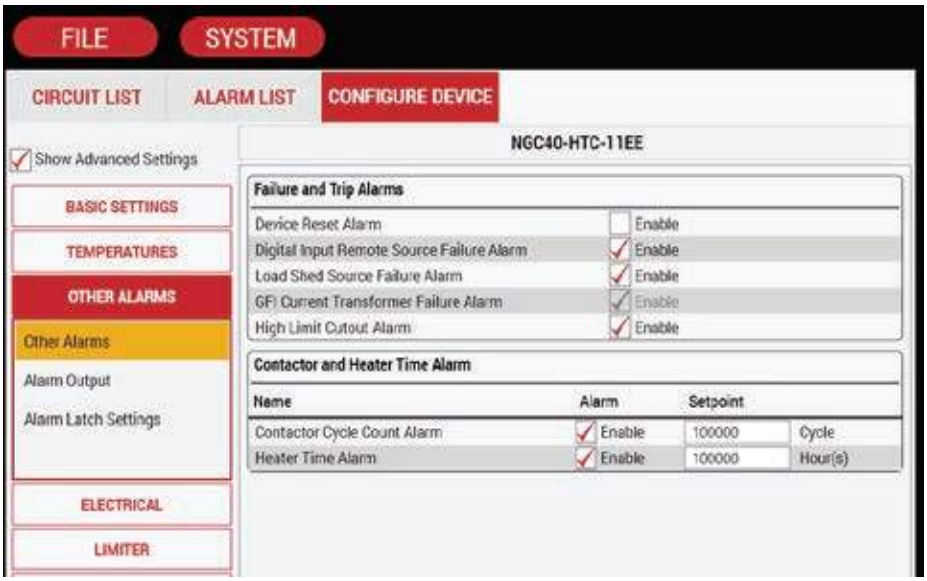


Figure 5.2 Advance Settings | Other Alarms window

5.2.1 Other Alarms

5.2.1.1 Failure and Trip Alarms

The advanced failure and trip alarms allow users to set alarms for the more advanced features and capabilities of the NGC-40 Control & Monitoring system.

Device Reset Alarm

Purpose: Sets an alarm flag whenever an NGC-40 module is reset.

Procedure: Touch the check box to enable or disable

Range: ENABLE or DISABLE

Default: DISABLED

Digital Input Remote Source Failure Alarm

Purpose: Registers an alarm when the NGC-40-BRIDGE is unable to communicate wit the I/O module specified to provide the remote digital input.

Procedure: Touch the Check box to enable or disable

Range: ENABLE or DISABLE

Default: ENABLED

Load Shed Source Failure Alarm

Purpose: Registers an alarm when the Load Shed input source goes to the defined “alarm” state.

Procedure: Touch the check box to enable or disable

Range: ENABLE or DISABLE

Default: ENABLED

Ground-Fault Current Transformer Failure Alarm

Purpose: Indicates if there has been a failure of the GFC sensing transformer in the NGC-40 HTC/ HTC3 module

Procedure: Option unavailable

Range: ENABLED

Default: ENABLED

High Limit Cutout Alarm:

Purpose: Alarms on high limit cutouts conditions

Procedure: Touch the check box to enable or disable

Range: ENABLE or DISABLE

Default: ENABLED

5.2.1.2 Contactor and Heater time Alarms

Contactor Cycle Count Alarm

Purpose: Generates an alarm if the number of off-to-on transitions of a mechanical contactor reaches or exceeds the contactor count alarm setting. This serves as a method to perform preventative maintenance on the contactor when it reaches the manufacturer's recommended maximum number of cycles.

Procedure: Touch the check box to enable or disable this alarm. Touch the white data area under Setpoint to set the desired number of contactor cycles.

Range: 0 to 999,999 cycles.

Default: ENABLED and set at 100,000 Cycles

Heater Time Alarm

Purpose: Generates an alarm if the heater ON time reaches or exceeds the set number of operational hours. This serves as a method to perform preventative maintenance on the Heaters.

Procedure: The check box to enable or disable this alarm. Touch the white data area under Setpoint to set the desired number of operational hours

Range: 0 to 999,999 cycles

Default: ENABLED and set at 100,000 Hrs

5.2.2 Alarm Output

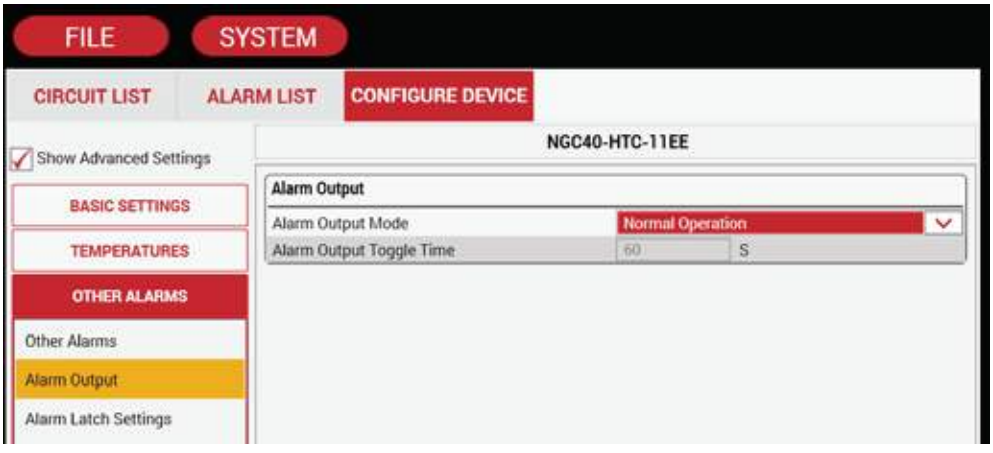


Figure 5.3 Advance Settings | Other Alarms | Alarm Output window

The alarm outputs can be set to indicate with a steady, signal, or in a flashing mode if desired. The flashing mode may be useful when the module alarm is driving an indicator light.

Alarm Output Mode

Purpose: Offers the option to generate different hard wired alarm signals.

Procedure: Select from the drop down list the appropriate alarm mode. Options are Normal Operation, Toggle and Flash. When the alarm output mode Toggle is chosen then set the Toggle time in the Alarm Output Toggle Time box

Default: Normal Operation

5.2.3 Alarm Latch Settings

Purpose: The alarm latching settings allows the user for the selection of automatic clearing (non-latching) of alarms when an alarm condition no longer exists or permanent alarming (latching) of such a condition until the alarm is manually reset.

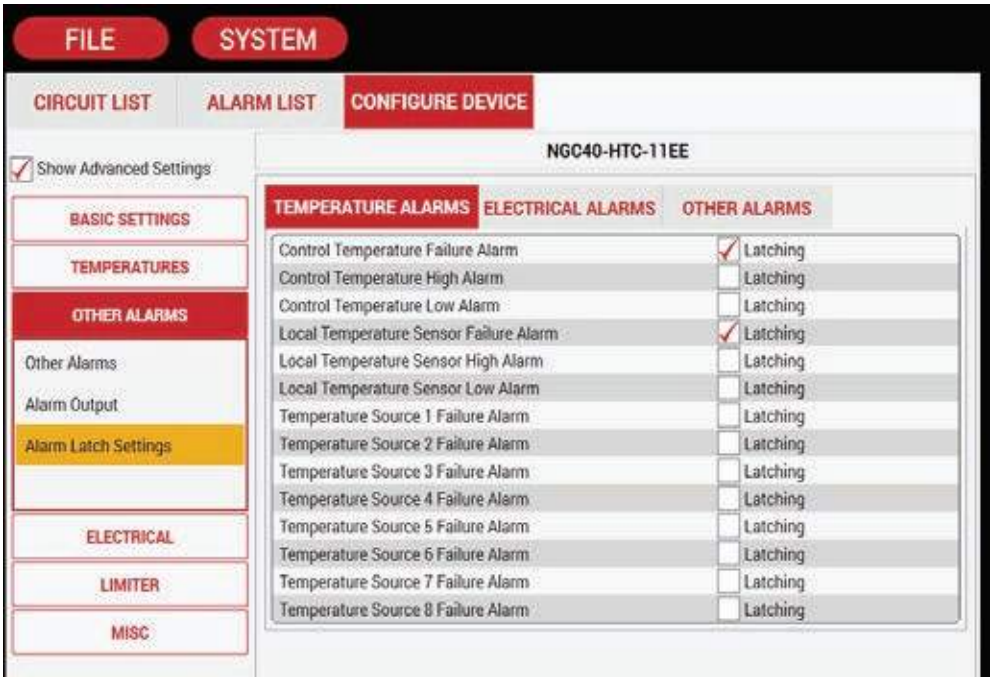


Figure 5.4 Advance Settings | Other Alarm | Alarm Latch Settings window

IMPORTANT: when the heat-tracing application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the HTC/HTC3 modules with non-latching temperature alarms to avoid nuisance alarms. When it's important to be aware of any temperature alarm conditions that may have existed in a pipe, then the control module temperature alarms should be configured as latching.

Temperature Alarms

The temperature alarm can be set latched/unlatched by selecting/unselecting the latching selection box. When enabled, the alarm will remain until the Reset button is pressed on the TOUCH 1500 Window.

Default: Latching is enabled for Control Temperature Failure Alarm and Local Temperature Sensor Failure Alarm.

Electrical Alarms

The electrical alarms can be set latched/unlatched by selecting/unselecting the latching selection box. When enabled, the alarm will remain until Reset button is pressed on the TOUCH 1500 Window.

Default: Latching is enabled for High Line Current, High GF, GFI Transformer Failure and switch Failure Alarms.

Other Alarms

Other alarms can be set latched/unlatched by selecting/unselecting the latching selection box. When enabled, the alarm will remain until Reset button is pressed on the TOUCH 1500 Window.

Default: Latching is enabled for Digital Input Source Failure and Safety Limiter Communication Failure Alarms.

5.3 ELECTRICAL

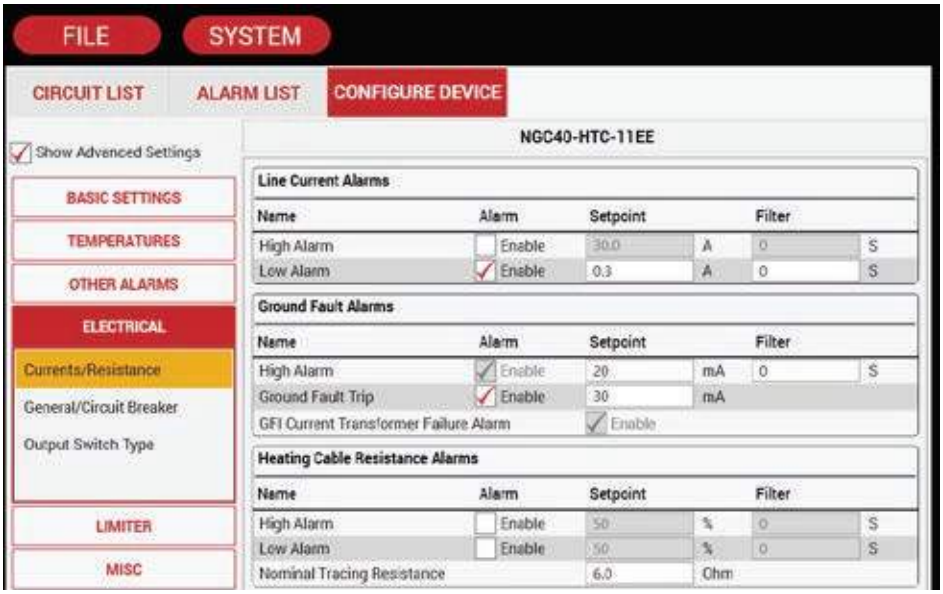


Figure 5.5 Advance Settings | Electrical | Current/Resistance window

5.3.1 Currents/Resistance Settings

Line Current Alarms

Purpose: Current level alarms can be set to monitor the behavior of the electrical heat-tracing. Low current level alarm can be an effective means of monitoring the continuity of the electrical heat-tracing cable.

High Alarm: Check box to enable the alarms. When enabled, enter the Setpoint between

0.3 to 60 A. If required set filter in the range 1 to 12 seconds. This can be useful to suppress high inrush current alarms.

Default: DISABLED

NOTE 1: The High Current Alarm does not necessarily have to be enabled for control modules using proportional or proportional ambient SSR control modes, since they will attempt to automatically protect themselves from overload.

NOTE 2: The High Current Alarm can be used effectively to guard against accidental installation mistakes. In-rush, or cold start currents typically associated with self-regulating cables may cause nuisance High Current Alarms. If this is undesirable this alarm should be disabled or the filter time should be set.

Low Alarm: Check the selection box to disable the alarms. When enabled, enter the setpoint between 0.3 to 60 A. If required set the Filter time to a value between 1 to 12 seconds.

Default: ENABLED

Ground-Fault Alarms

Purpose: The high ground-fault alarm warns for potential earth leakage in the electrical heat-tracing cable. The earth leakage indication can be an effect of the behavior of the cable (capacitor effect) or from damage on the cable due to water ingress etc. The ground-fault alarm is by default set at 20 mA and enabled.

High Alarm

Procedure: Enter setpoint between 10 to 250 mA. If required set the filter time in the range

1 to 12 seconds.

Default: ENABLED

Ground-Fault Trip

Purpose: the Ground-Fault Trip enables the option to stop the electrical heat-tracing when the ground fault goes above the of allowable ground-fault leakage current. Exceeding this limit will result in the output relay / SSR being latched off and the GFI Trip Alarm activated to indicate a ground-fault condition.

Procedure: If ground-fault tripping is desired, enable the GFI Trip Alarm and adjust the G.F. trip current to the desired value. To disable ground-fault tripping, disable the alarm. Note that the GFI Trip Alarm must be enabled in order to adjust the G.F. Trip Current level. When enabled, enter the setpoint between 10 to 250 mA.

Default: ENABLED

WARNING: Fire Hazard

A ground-fault alarm may mean the heating cable has been damaged or improperly installed and must not be ignored. Sustained electrical arcing or fire can result. To minimize the risk of fire if the alarm has tripped, shut off the power to the heating cable and repair the system immediately.

IMPORTANT: In order to implement a ground-fault trip function, all non-grounded power conductors must be opened upon detection of a ground-fault condition. National Electrical Codes may require that all legs of non-neutral based power sources be opened upon detection of a Ground-Fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

Heating Cable resistance Alarms

High Alarm: Check the box to enable the alarms. When enabled, enter the setpoint between 1 to 250%. If required set Filter in the range 1 to 12 seconds.

Default: DISABLED

Low Alarm: Check the box to enable the alarms. When enabled, enter the setpoint between 1 to 250 %. If required set Filter in the range 1 to 12 seconds.

Default: DISABLED

Nominal Tracing Resistance: Set value between 0.8 to 2500 Ohms as per design calculations.

5.3.2 Electrical General/ Circuit Breaker Settings

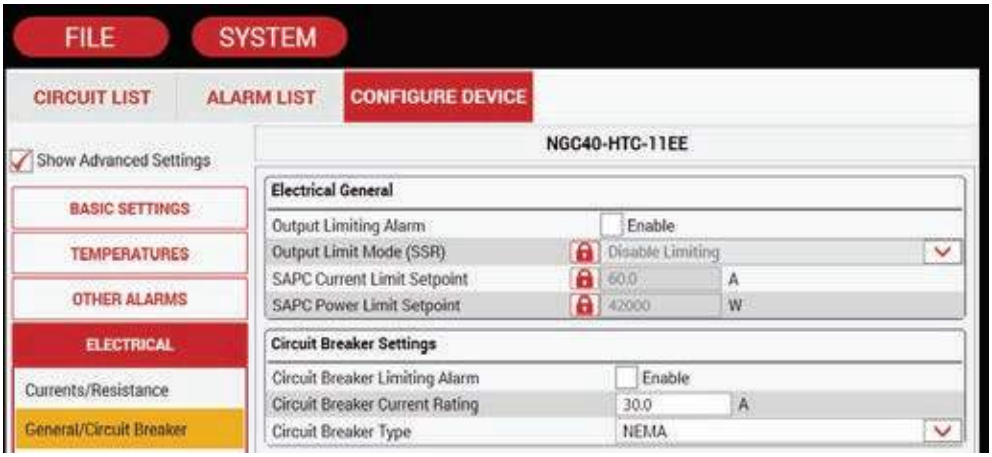


Figure 5.6 Advance Settings | Electrical | General | Circuit Breaker window

5.3.2.1 Electrical General

Output Limiting Alarms - SSR Only

Purpose: The output limiting function is to set a high current / power output to a heat-tracing circuit. This can be to reduce the heat output of the electrical heat-tracing cable or to maximize the life time expectancy of the SSR. The functionality will only be available when the heat-tracing circuit is equipped with a SSR as switching mechanism.

Procedure: To enable the output limiting functionality check the output limiting alarm selection box. **Default:** DISABLED

5.3.2.2 Circuit Breaker Settings

Circuit Breaker Limiting Alarm

Purpose: The circuit breaker current rating setting helps prevent in-rush induced nuisance tripping of the circuit breaker immediately upstream of the control module. The control module evaluates the square of the current related to time (I2t) and adjusts the output duty cycle accordingly,

limiting the amount of current to an acceptable level. The functionality will only be available when the heat=tracing circuit is equipped with a SSR as a switch mechanism.

Procedure: Check box to enable the alarms and adjust the Circuit Breaker Current Rating setting to match the heating circuit breaker size (i.e. 30.0 A).

Range: 0.3 to 60 A

Default: 60 A

IMPORTANT: This feature SHOULD NOT be used to reduce the size of a circuit breaker or increase the maximum heating cable length. It can be quite effective in preventing nuisance trips due to incorrect design or factors outside those considered by the design.

Circuit Breaker Type

Procedure: Select options from drop down list with options, NEMA, TYPE B, TYPE C, TYPE D

Default: NEMA

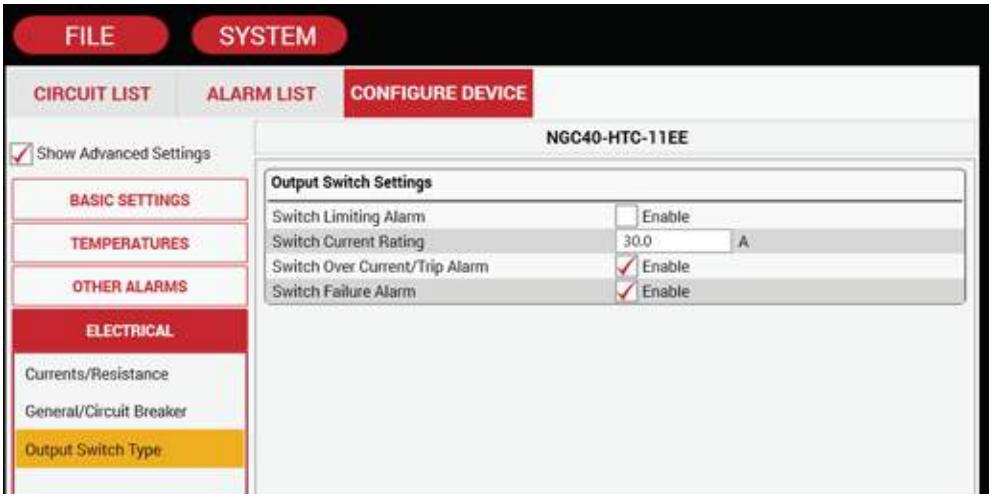


Figure 5.7 Advance Settings | Electrical | Output Switch window

5.3.3 Output Switch Settings – SSR Only

Switch Limiting Alarms

Procedure: Check box to enable the alarms.

Default: DISABLED

Switch Current Rating: Default value 30.0 A.

Switch Over Current/Trip Alarm

Purpose: This feature is used to provide protection for the output switch. Enabling this alarm will only inform the user of an excessively high current condition and that the output switch has been latched off. During a high current condition, the control module attempts to soft start a heating cable using a technique involving measured in-rush current and the switch current rating. If the control module is unable to start the cable, it will eventually trip its output switch off and will not retry or pulse its output switch again.

Procedure: Check box to enable the alarms. Adjust the switch current rating setting to the actual current rating of the SSR. Enable or disable the alarm as required. Note that the Overcurrent Trip Alarm does not have to be enabled in order to adjust the switch current rating setting. The current setting is grayed out when EMR is selected.

Default: DISABLED

NOTE 1: It is highly recommended to enable this alarm as an overcurrent trip condition would normally represent a potentially serious problem.

NOTE 2: This is a factory set alarm value and disabling the alarm does not disable the overcurrent trip function. In some applications the use of self-regulating cable will produce very high in-rush currents during cold startup. These currents may exceed the overcurrent trip limit and the control module will not be able to soft start the heating circuit. If this condition persists please contact your nearest nVent sales office for recommendations and solutions to this problem.

Switch Failure Alarm

Purpose: The purpose of the Switch Failure Alarm is to indicate that an output switch failure has occurred. The control module HTC/HTC3 checks via current measurement if the SSR/ EMR has switched correctly. If the controller measures a current while the SSR /EMR should be switched off the switch failure alarm will go on. The alarm will go on as well when the controller switches on the SSR / EMR and measures no current going to the electrical heat-tracing cable.

Procedure: Check box to enable the alarms

Default: DISABLED

IMPORTANT: The SWITCH FAILURE Alarm should always be enabled. A high temperature condition, as a result of a failed heating circuit, can only be caused if the output switch fails closed. When an output switch fails closed, the control module cannot turn the power to the heating circuit off, therefore no protection features are available (ground-fault trip, power limiting, etc.). If a SWITCH FAILURE ALARM is detected, the heat-tracing panel should be serviced immediately.

5.4 MISCELLANEOUS SETTINGS

Figure 5.8 Advance Settings | Miscellaneous | Load Shedding window

5.4.1 Load Shedding

Purpose: The load shedding function allows the control module output to be forced off by a load shedding command issued from DCS or other Process Control Systems. The load shedding feature may be used to turn off the output of one or more control modules in order to reduce energy consumption, this to avoid peak demand surcharges.

Procedure: Check box to enable load shedding as desired.

Default: DISABLED

Load Shedding Fail Safe Alarm: Check box to enable the options.

Default: DISABLED

Broadcast Timeout: Enter timeout in 1 to10 minutes

Check boxes to enable zones 1 to16

5.4.2 Digital Input | Auto-Cycle

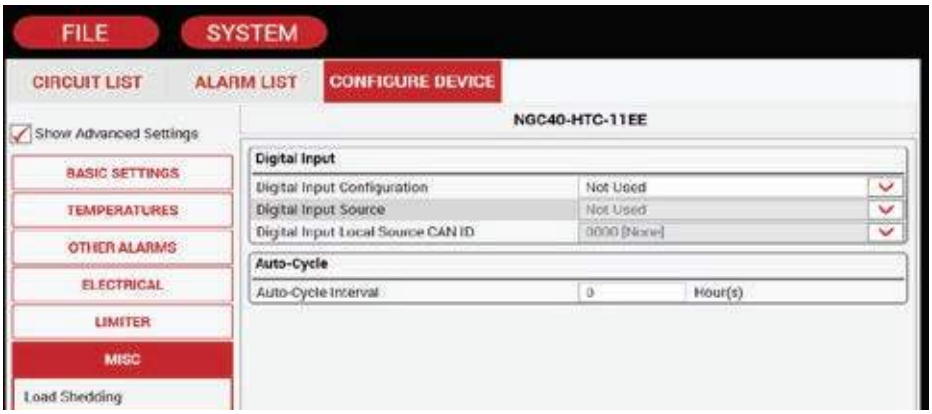


Figure 5.9 Advance Settings | Miscellaneous | Digital Input /Auto-Cycle window

5.4.2.1 Digital Input

Purpose: The digital input offers the option to alarm or override the electrical heat-tracing mode from an external device. The digital input can be configured in different ways. These are:

- None: no action taken
- Alarm when input is closed
- Alarm when input is open
- Force Off when input is closed
- Force Off when input is open
- Force On when input is closed
- Force On when input is open

Default: None

Digital Input Source: When selections other than 'Not used' is made, the drop down list will enable selection of appropriate input source.

5.4.2.2 Auto Cycle

Purpose: The auto-cycle function momentarily (approximately 10 seconds) applies power to the heating circuit at the selected interval. It is used to test the integrity of the heating circuit. Alarms generated at the time of auto-cycle are latched and remain active after the completion of the auto-cycle function until they are reset. Auto-cycling effectively eliminates the need for preventive maintenance by automatically verifying the integrity of the heating circuit. Auto-Cycle Interval is the number of hours between successive heating circuit integrity tests depending on the Auto-Cycle Units specified

Auto Cycle Interval: Can be set from 0 to 750 hrs. The function is disabled when set at 0.

NOTE 1: Auto-cycling should always be enabled for normal operation. This feature should only be disabled if the control module's heating circuit is being monitored or exercised by some other device or means. Although this function defeats temperature control and forces output on, the control module will continue to adjust the output for protection purposes or power limiting (SSR option only).

NOTE 2: Auto-cycling is inhibited if the control module is in load shedding mode, see Section 5.4.1 Load Shedding on page 55 for more details.

NOTE 3: The NGC-40 HTC/HTC3 module will always auto-cycle for 6 seconds when power is initially applied to the control module and load shedding mode is disabled. However, the HTC/HTC3 module will only auto-cycle for 10 seconds when power is initially applied to the control module if auto-cycling is enabled and it is not in load shedding mode.

NOTE 4: If auto-cycling is enabled, and all the control temperature sensors have failed, the control module will still perform an auto-cycle.

NOTE 5: When using proportional ambient contactor mode, the Cycle Time setting should be less than the Auto-Cycle Interval otherwise auto-cycling could affect the duty-cycle.

NOTE 6: For the earliest possible alarming of heating circuit problems, the Auto-Cycle Interval should be set to a small value.

NOTE 7: This feature is only available if Auto-Cycle is enabled.

5.5 DEVICE INFORMATION

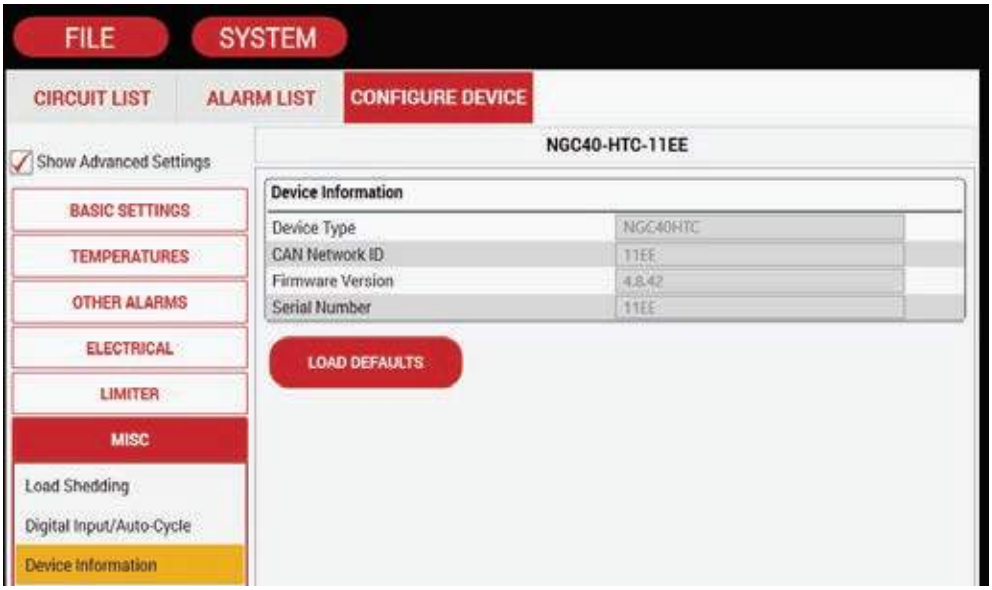


Figure 5.10 Advance Settings | Miscellaneous | Device Information window

Purpose: Allows the user to review the Device Information of the NGC-40-HTC. The Device Type, Firmware Version and Serial Number are factory configured and cannot be changed.

Load Configuration Defaults

Purpose: Loads the default settings that are stored in the NGC-40-HTC. On hitting the button, all user input data will be erased and the device will be set to factory defaults. An alarm will be raised when Device Reset Alarm option is enabled.

5.6 CONFIGURE AN HTC3 MODULE ON ADVANCED SETTINGS

To configure an HTC3 module please follow the steps for HTC as per Section 4.4 Configuration of NGC-40 HTC3 Modules. The Buttons on the TOUCH 1500 Windows will expand as below to include additional data.

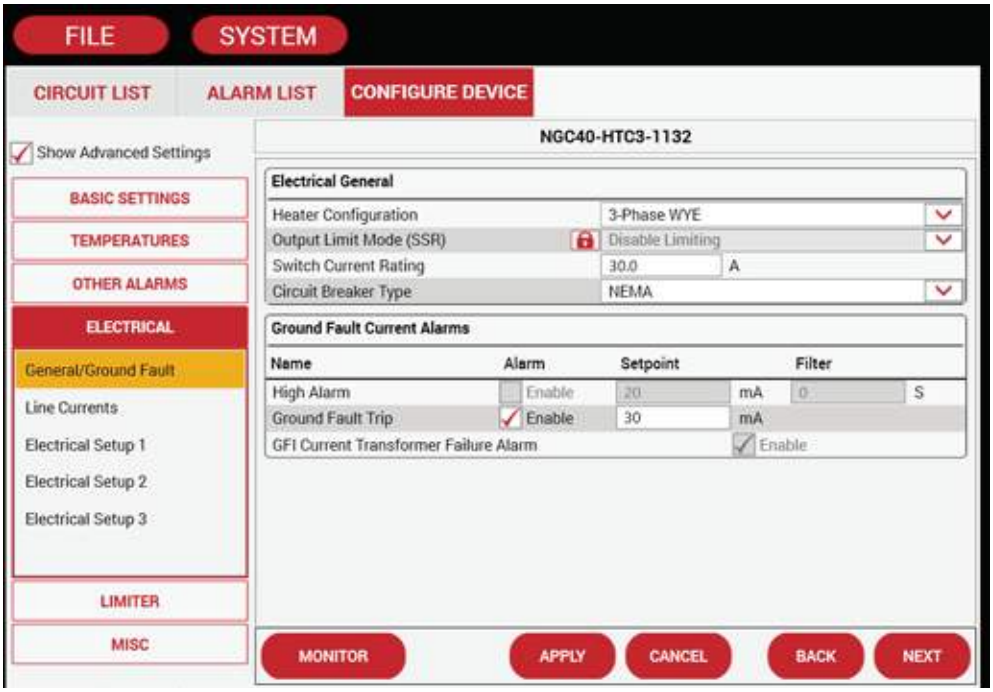


Figure 5.11 Advance Settings | Electrical | General | Ground-Fault window

5.6.1 Set up General/GF on HTC3

5.6.1.1 Electrical General

Heater Configuration

Purpose: Set the electrical heat-tracing configuration as installed in the field.

Options: Single-phase, 3-phase WYE, 3-phase DELTA

Procedure: Select the desired setting from the drop down options

Line to Line Voltage: Enter the design voltage within the limits of 80 to 750 V

Fixed frequency: Enter the value based on transformer data

Output Limit Mode

Purpose: This user selectable mode limits the maximum amount of power applied to a heating circuit. This is an average power calculated by the control module using the average current and applied voltage. The control module switches the output on and off rapidly to limit the average current to an appropriate level. The maximum power level may be adjusted to eliminate step-down transformers, lower the effective output wattage of a cable, or implement energy management of the heating circuit. Grayed out for when switch mode is EMR.

Options: Disable Limiting, Power Limiting, Current Limiting

Procedure: Select the desired setting from the drop down options

Switch Current Rating

Purpose: This feature is used to provide protection for the output switch. Enabling this alarm will only inform the user of an excessively high current condition and that the output switch has been latched off. During a high current condition, the control module attempts to soft start a heating cable using a technique involving measured in-rush current and the switch current rating. If the control module is unable to start the cable, it will eventually trip the output switch off and will not retry or pulse its output switch again.

Procedure: Adjust the Switch Current Rating setting to the actual current rating of the SSR. Note that the Overcurrent Trip Alarm does not have to be enabled in order to adjust the switch current rating setting. The current setting is grayed out when EMR is selected.

Default: Set at 30.0 A

IMPORTANT: This function may be set within reasonable limits for the particular tracer being powered. The effective resolution of the setting is limited to 1/30th of the calculated full on power. Do not set the maximum power level below the full output level for applications that do not require power limiting.

Circuit Breaker Type

Procedure: Select options from drop down list with options, NEMA, TYPE B, TYPE C, TYPE D

Default: NEMA

Ground-Fault Current Alarms

The data in this section is the same that was entered in the BASIC settings at Settings for Ground Fault, Section 4.3.1.5

5.6.2 Line Current Alarms

The data in this section is the same that was entered in the BASIC settings at Settings for Phase 1 Line Current, Section 4.4.1.1.

5.6.3 Electrical Setup 1

5.6.3.1 Line 1 Circuit Breaker and Output Switch Settings

Output Limiting Alarms

Purpose: Alarms current levels which are higher than the High Line Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Check box to enable the alarms

Default: DISABLED

Max Line Current Alarm Setpoint

Procedure: Enter the value at which the High Current Alarm will go off.

Default: 60 A

IMPORTANT: As the HTC automatically protects itself from overload, it would normally not be necessary to enable this alarm. It can be used effectively to guard against accidental paralleling of heating circuits. In-rush, or cold start currents typically associated with self-regulating cables may cause nuisance High Current Alarms. If this is undesirable this alarm should be disabled.

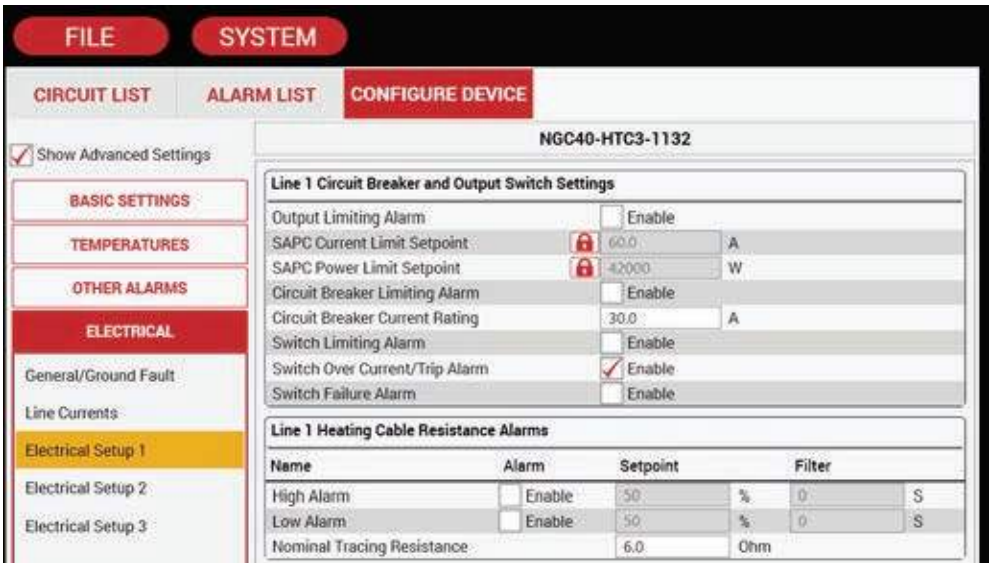


Figure 5.12 Configure Device | Electrical for HTC3 Setup 1 window

Maximum Power Setpoint: Active Only When Switch Mode Is SSR

Purpose: This user selectable level limits the maximum amount of power applied to a heat-trace circuit. This is an average power calculated by the controller using the average current and the fixed voltage setting. The HTC switches the output on and off rapidly to limit the average current to an appropriate level. The maximum power level may be adjusted to eliminate step-down transformers, lower the effective output wattage of a cable, or implement energy management of the heat trace circuit.

Range: 3 to 42000 Watts

NOTE 1: This function may be set within reasonable limits for the particular tracer being powered. The effective resolution of the setting is limited to 1/30th of the calculated full on power.

NOTE 2: Do not set the maximum power setpoint below full output for applications that do not require control of power.

Circuit Breaker Limiting Alarm

Purpose: This alarm will only inform the user that switch limiting is currently active and an excessively high current condition is present. The HTC3 will pulse its output switch for a small interval and read the resulting current. If the measured current exceeds the Switch Current Rating setting, then the duty-cycle of its output switch will be varied so that an average current not exceeding the Switch Current Rating setting is maintained.

IMPORTANT: This alarm should normally be left enabled. Currents in this range cannot be considered normal and should be investigated. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Default: DISABLE

Circuit Breaker Current Rating: Set the current to the desired value within the CB limits.

Switch Limiting Alarms: Check box to enable the alarms.

Default: DISABLED

Switch Over Current/Trip Alarm

Purpose: This feature is used to provide protection for the output switch. Enabling this alarm will only inform the user of an excessively high current condition and that the output switch has been latched off. During a high current condition, the control module attempts to soft start a heating cable using a technique involving measured in-rush current and the switch current rating. If the control module is unable to start the cable, it will eventually trip its output switch off and will not retry or pulse its output switch again.

Procedure: Check box to enable the alarms. Adjust the switch current rating setting to the actual current rating of the SSR. Enable or disable the alarm as required. Note that the Overcurrent Trip Alarm does not have to be enabled in order to adjust the switch current rating setting. The current setting is grayed out when EMR is selected.

Default: DISABLED

NOTE 1: It is highly recommended that this alarm be enabled since an overcurrent trip condition would normally represent a serious problem.

NOTE 2: This is a factory set alarm value and disabling the alarm does not disable the overcurrent trip function. In some applications the use of self-regulating cable will produce very high in-rush currents during cold startup. These currents may exceed the overcurrent trip limit and the control module will not be able to soft start the heating circuit. If this condition persists please contact your nearest nVent sales office for recommendations and solutions to this problem.

Switch Failure Alarm

Purpose: The purpose of the Switch Failure Alarm is to indicate that an output switch failure has occurred. The control module HTC/HTC3 determines that if the output switch is turned off and there is load current present, then the output switch has failed closed and the alarm is latched on.

Procedure: Check box to enable the alarms

Default: DISABLED

IMPORTANT: The SWITCH FAILURE Alarm should always be enabled. A high temperature condition, as a result of a failed heating circuit, can only be caused if the output switch fails closed. When an output switch fails closed, the control module cannot turn the power to the heating circuit off, therefore no protection features are available (ground-fault trip, power limiting, etc.). If a Switch Failure Alarm is detected, the unit should be serviced immediately.

5.6.3.2 Line 1 Heating Cable Resistance Alarms

High Alarm

Purpose: Alarms heater resistance levels which have increased from the nominal resistance setting by more than the High Tracing Resistance Deviation setting. The High Resistance Alarm may be used to indicate an open or a high resistance connection or, when using constant wattage parallel cables, may indicate the failure of one or more heating zones. It may also be used to monitor a failed series-type cable or connection in 3-phase applications while minimizing nuisance alarms created by voltage fluctuations.

Procedure: Check box to enable the alarms. When enabled, enter the Setpoint between

1 to 250%. If required set Filter in the range 1 to 12 seconds.

Default: DISABLED

IMPORTANT: High Resistance Alarms will only be generated if the output switch is on.

Low Alarm

Purpose: Alarms heater resistance levels which have decreased from the nominal resistance setting by more than the Low Tracing Resistance Deviation setting.

Procedure: Check box to enable the alarms. When enabled, enter the Setpoint between

1 to 100 %. If required set Filter in the range 1 to 12 seconds.

Default: DISABLED

Nominal Tracing Resistance

Purpose: This parameter defines the nominal expected heater resistance. A value must be entered by the user to allow the High and Low Tracing Resistance Alarms to be used. Once the controller and the heating cable have been installed, the following procedure should be used to determine the nominal resistance setting.

Procedure: Adjust the Control Setpoint temperature to turn on the output switch. Allow the load to come up to design temperature and its power consumption to stabilize. Monitor the resistance reading and record its value. Return the Control Temperature Setpoint temperature to its proper setting. Enter the recorded resistance value as the nominal resistance setting.

Range: Value between 0.8 to 2500 Ohms as per design calculations.

5.6.4 Electrical Setup 2

Line 2 Circuit Breaker and Output Switch settings

Repeat step Line 1 Circuit Breaker and Output Switch Settings, Section 5.6.3.1.

Line 2 Heating Cable Resistance Alarms

Repeat step Line 1 Heating Cable Resistance Alarm, Section 5.6.3.2.

5.6.5 Electrical Setup 3

Line 3 Circuit Breaker and Output Switch settings

Repeat step Line 1 Circuit Breaker and Output Switch Settings, Section 5.6.3.1.

Line 3 Heating Cable Resistance Alarms

Repeat step Line 1 Heating Cable Resistance Alarms, Section 5.6.3.2.

5.7 CONFIGURATION OF THE NGC-40 I/O MODULE

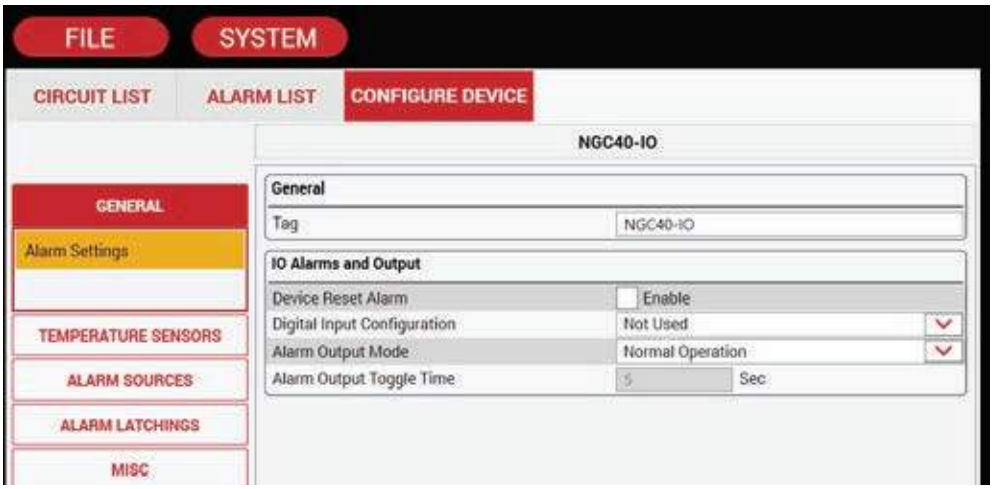


Figure 5.13 Configure Device | Alarm Setting window for I/O module

5.7.1 General

5.7.1.1 Alarm Settings

General

Tag: A 40-character tag may be assigned to the NGC-40-I/O Module to allow it to be easily associated with a pipe, vessel, process, circuit, drawing name, number.

Range: Alpha-numeric characters.

Default: NGC-40-I/O-xxxx (xxxx=last four characters of the CAN ID)

I/O Alarms and Output

Device Reset Alarm

Purpose: The Device Reset Alarm is used to indicate:

1. Power to the module has been interrupted and subsequently restored.
2. A transient has caused the module's program to restart.
3. An internal condition has caused the module's program to restart.

Procedure: Check box to enable

Default: DISABLED

Digital Input Configuration: From the drop down list select options None/Alarm when input is Closed/ Alarm when input is open.

Default: None

Digital Input Source: When selections other than None is made, the drop down list will enable selection of appropriate input source

Alarm Output Mode: From the drop down list select the appropriate Alarm Mode. Options are Normal Operation, Toggle & Flash. Set the Alarm Output Toggle Time.

Default: Normal Operation

5.7.2 Temperature Sensors

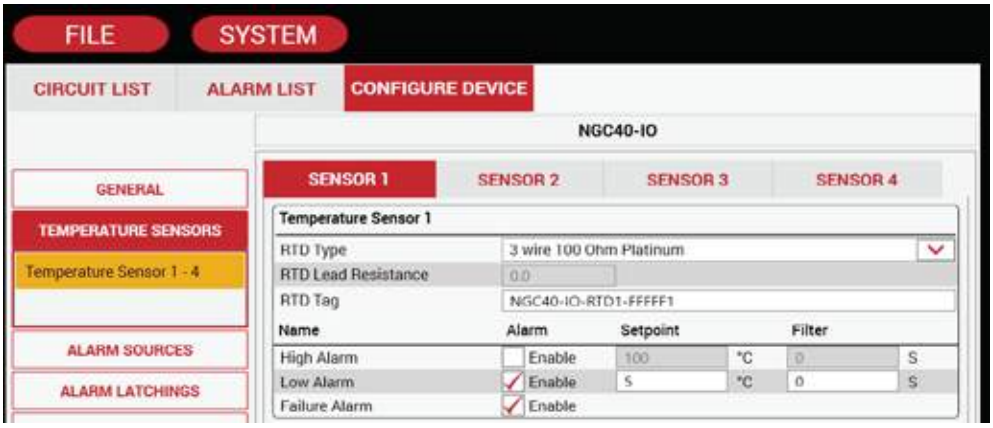


Figure 5.14 Configure Device | Temperature Sensor 1 to 4 window for I/O module

5.7.2.1 Tab - Sensor 1

Purpose: This screen allows the user to select the appropriate RTDs and set the parameters.

RTD Type

Procedure: Use the dropdown menu to select either 3-wire 100-Ohms Platinum or 2-wire 100-Ohm nickel iron or 2-wire 100-Ohm nickel

Default: 3-wire 100-Ohms platinum

RTD Lead Resistance

Purpose: Applicable only for 2-wire 100-Ohm nickel iron.

Procedure: Enter the appropriate value using the popup keypad

Range: 0 to 20 Ohms

Default: 0 Ohms - Grayed out

RTD Tag

Purpose: A 40-character tag may be assigned to the RTD for easy identification.

Procedure: Click on the default tag name to bring up the keyboard for entering the new tag name.

Range: Alpha-numeric characters.

Default: NGC-40-IO-RTD1-(last 4 characters of the IO Module CAN ID)

High Alarm

Procedure: Check box to enable the alarms

High Alarm Setpoint: Using the keypad enter the setpoint between -80°C to 700°C.

Default: 100°C – Data Entry is possible when alarm is enabled

Filter: If required set filter in the range of 1 to 12 seconds.

Default: 0 Seconds – Grayed out when alarm is not enabled

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is non-latching

Low Alarm

Procedure: Uncheck box to disable the alarms.

Low Alarm Setpoint: Using the keypad enter the setpoint between –80°C to 700°C.

Default: 5°C

Filter: If required set Filter in the range 1 to 12 seconds.

Default: 0 Seconds

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is non-latching

Failure Alarm: Uncheck box to disable the alarms

Default: ENABLED

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is latching

5.7.2.2 Tab - Sensor 2, 3, 4

Follow steps against Sensor 1 above.

5.7.3 Alarm Sources

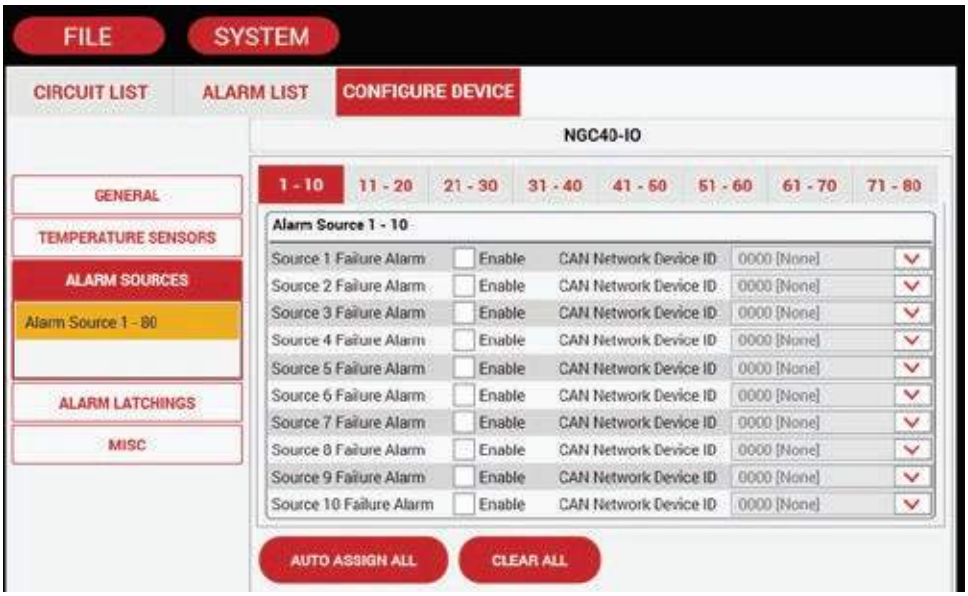


Figure 5.15 Configure Device | Alarm Source window for I/O module

Alarm Source 1 to 80

Purpose: The NGC-40-I/O module is capable of monitoring the alarm points of all the 80 modules connected to a Bridge. Mapping the HTC modules on to the I/O module will result in reproducing the alarms on the alarm contacts of the I/O module.

Source "x" Failure Alarm: Check the boxes individually or press Auto Assign All button to map the HT modules. Clear All button will remove the mappings.

5.7.4 Alarm Latchings

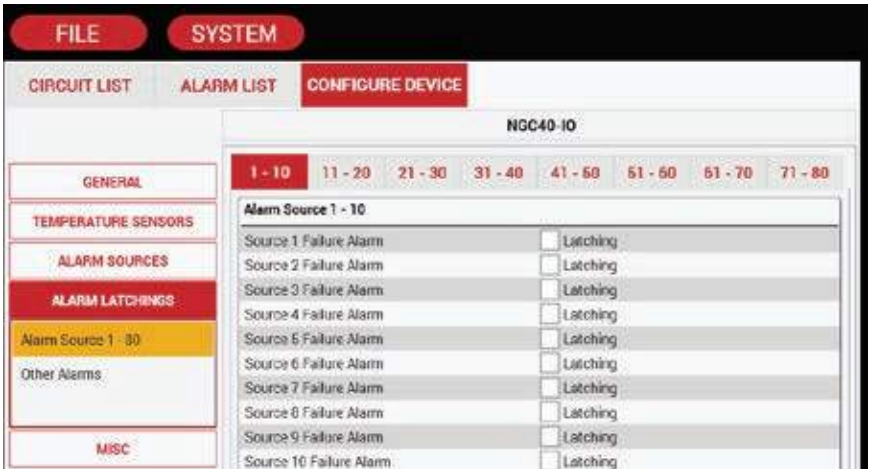


Figure 5.16 Configure Device | Alarm Latching window for I/O module

Alarm Source 1 to 80

Purpose: Checking the box will enable the alarms to latch.

Default: Disabled

Other Alarms

Purpose: Checking the box will enable the alarms to latch.

Default: Alarm latching is enabled for sensor 1/2/3/4 failures.

Figure 5.17 Configure Device | Alarm Latching | Other Alarm window for I/O module

5.7.5 Miscellaneous

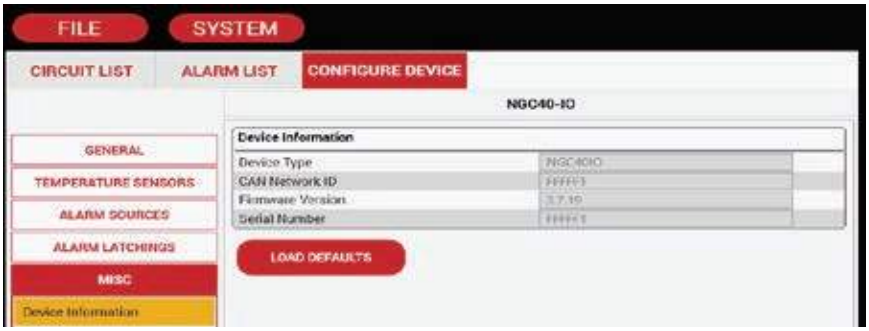


Figure 5.18 Configure Device | Miscellaneous window for I/O module

Purpose: Allows the user to review the Device Information current set-up in the NGC-40-I/O. The Device Type, CAN ID and Serial Number are factory configured and cannot be changed. However the Firmware Version will change whenever the same is upgraded using Hardware Manager

Load Configuration Defaults: On hitting the button, all user input data will be erased and the device will be set to factory defaults. An alarm will occur if Device Reset Alarm option is enabled.

5.8 SAFETY LIMITER MODULE NGC-40-SLIM

The NGC-40-SLIM modules use temperature data to control an external contactor providing protection against over-temperature of heating cables. If the measured temperature exceeds the user defined trip setting then the SLIM will open its output relay. If the output is switched OFF the external contactor will isolate the heating cable from the main supply. The unit will remain tripped until it has been manually reset. Resetting the unit will only be possible after the normal operating conditions have been returned to a safe level. The NGC-40-SLIM module has three temperature sensor inputs, one form C alarm output, one normally closed relay output used to control an external contactor and a external switch input use to reset the a tripped SLIM.

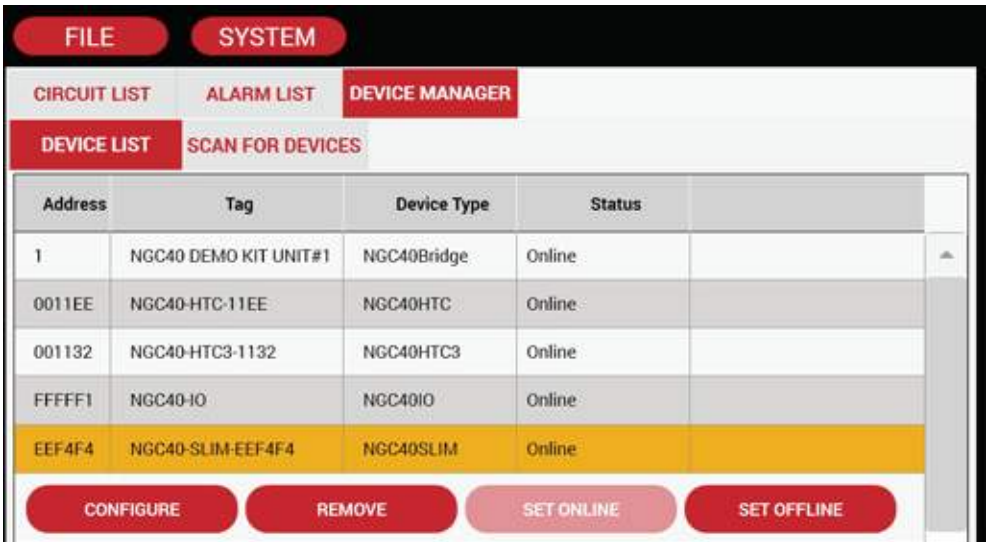


Figure 5.19 Device Manager window

The TOUCH 1500 program will automatically sense the presence of SLIM(s) and activate the menus. The screen above shows the presence of a Safety Limiter Module in the Device List. To configure the SLIM please click on Config.

Figure 5.20 Configure Device | Limiter Settings window

5.8.1 General – Limiter Settings

General – Tag

Purpose: A 40-character tag may be assigned to the NGC-40-SLIM to allow it to be easily associated with a pipe, vessel, process, circuit, drawing name, number etc.

Range: Alpha-numeric characters.

Procedure: Click on the Tag Entry and an alpha numerical keyboard will drop down for data entry.

Default: NGC-40-SLIM-(last few characters of the CAN ID)

General – Safety Temp Limiter Trip Setpoint

Purpose: The lock out temperature (setpoint) of the safety temperature limiter must be set in such a way that maximum T-class temperature cannot be exceeded. The surface temperature of the heat-tracing cables is limited to the temperature applicable in this T class -5 K for temperatures below or equal to 200°C or -10 K for temperatures greater than 200°C.

Options: Data entry via the dropdown keypad

Procedure: Enter the desired temperature and click Apply. A pop up dialogue box will appear with instructions. Press the Set Config button on the SLIM within 60 seconds to record the new entry.

Default: Previous data

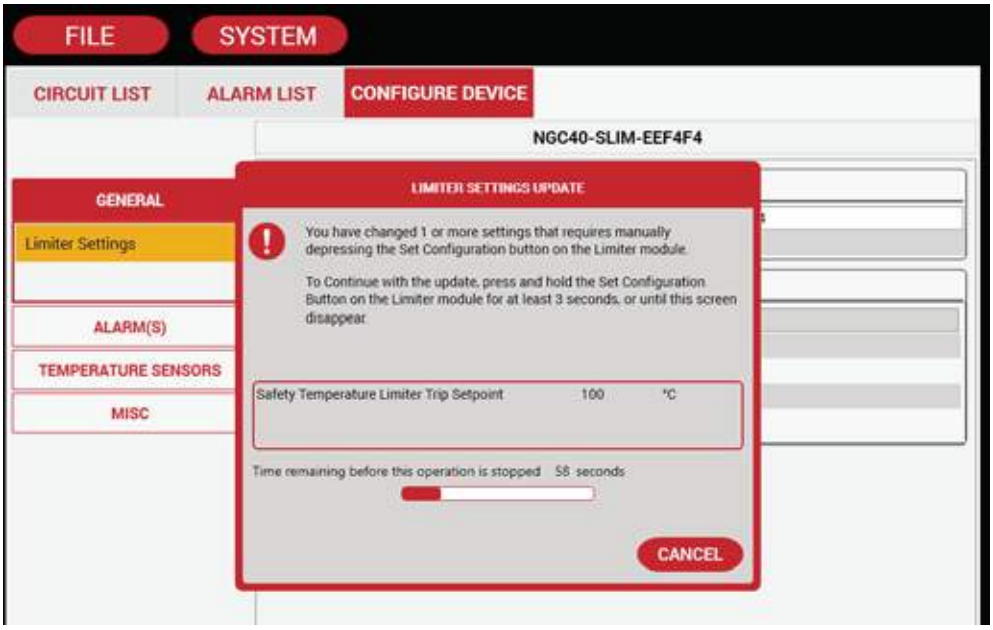


Figure 5.21 Limiter Settings Pop-up Dialogue box

5.8.2 Alarms – Alarm Settings

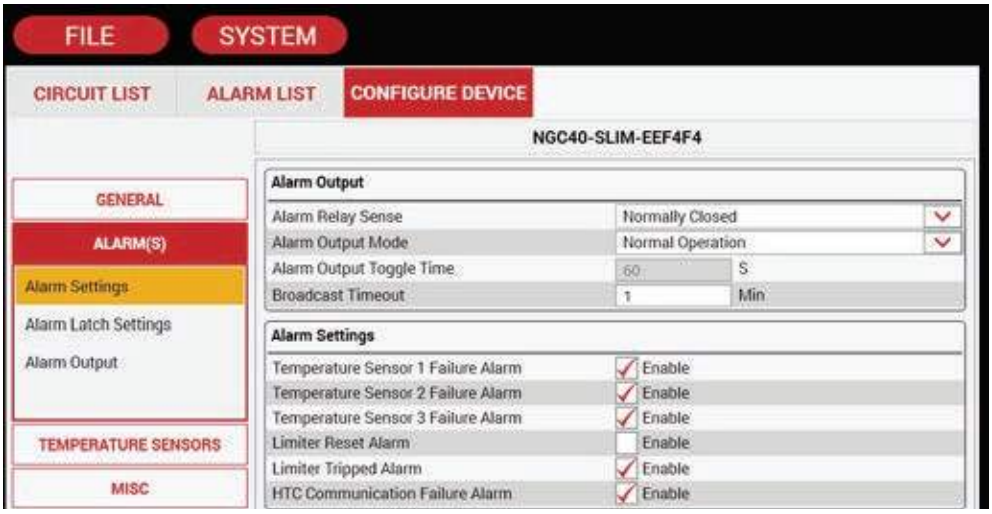


Figure 5.22 Configure Device | Alarm Settings window

5.8.2.1 Alarm Output

Alarm Output – Alarm Output Relay Sense
Purpose: To assign the output option for the Relay.
Options: Drop down list Normally Closed/Normally Open
Procedure: Select the desired option
Default: Normally Closed

Alarm Output – Alarm Output Mode
Purpose: To assign the output mode option for the Relay..
Options: Drop down list Normal Operation/Toggle/Flash
Default: Normal

Alarm Output – Alarm Output Toggle Time
Procedure: Data Entry is possible only when Toggle Mode is selected in the previous operation
Options: Enter the desired value using the keypad
Range: 1 to 240 seconds

Alarm Output – Broadcast Timeout
Procedure: To fix the broadcast time out
Options: Enter the desired value using the keypad
Range: 1 to 10 minutes

5.8.2.2 Alarm Settings

Temperature Sensor 1 Failure Alarm
Purpose: Enabling the TS 1 FAILURE alarm will provide an indication of an open or shorted failure of the temperature sensor connected to the RTD1 input.
Options: ENABLE/DISABLE
Procedure: Check box to disable
Default: ENABLED

Temperature Sensor 2 & 3 Failure Alarm

Follow procedure outlined for Sensor 1 above

Limiter Reset Alarm

Purpose: The Slim Reset Alarm is used to indicate:

1. Power to the control module has been interrupted and subsequently restored.
2. A transient has caused the control module's microprocessor to restart its program.
3. An internal condition has caused the control module's microprocessor to restart its program.

Options: ENABLE/DISABLE

Procedure: Check Box to Enable

Default: DISABLED

Alarm Settings – Limiter Tripped Alarm

Purpose: Enabling the SLIM Trip alarm will provide an indication of a trip on account of high temperature as per Figure 5.22.

Options: ENABLE/DISABLE

Procedure: Check Box to Disable

Default: ENABLED

HTC Communication Failure Alarm

Purpose: Enabling the Communication Failure Alarm will provide an indication of a Communication loss with the HTC/HTC3 (s) to which the SLIM is associated

Options: ENABLE/DISABLE

Procedure: Check box to disable

Default: ENABLED

5.8.3 Alarms – Alarm Latchings

Figure 5.23 Configure Device | Alarm Latch Settings window

Temp Sensor 1 Failure

Purpose: Enabling latching option for Sensor 1 Failure Alarm will result in the alarm being displayed till the Reset button is pressed on the TOUCH 1500 Screen.

Options: ENABLE/DISABLE

Procedure: Check box to disable

Default: ENABLED

Temp Sensor 2 Failure

Refer to Procedure detailed above for Sensor 1

Temp Sensor 3 Failure

Refer to Procedure detailed above for Sensor 1

Controller Reset Alarm

Purpose: Enabling latching option for Control Reset Alarm will result in the alarm being displayed till the Reset button is pressed on the TOUCH 1500 Screen.

Options: ENABLE/DISABLE

Procedure: Check box to disable

Default: ENABLED

Safety Temperature Limiter Trip Alarm

Purpose: Disabling Latching option for Control Reset Alarm will result in the alarm disappearing when the Alarm condition is nonexistent, without the need of the Reset button being pressed on the TOUCH 1500 Screen.

Options: ENABLE/DISABLE

Procedure: Check box to enable

Default: DISABLED

HTC Communication Failure Alarm

Purpose: Disabling Latching option will result in the Alarm disappearing when the Alarm condition is nonexistent, without the need of the Reset button being pressed on the TOUCH 1500 Screen.

Options: ENABLE/DISABLE

Procedure: Check box to enable

Default: DISABLED

5.8.4 Alarms – Alarm Output

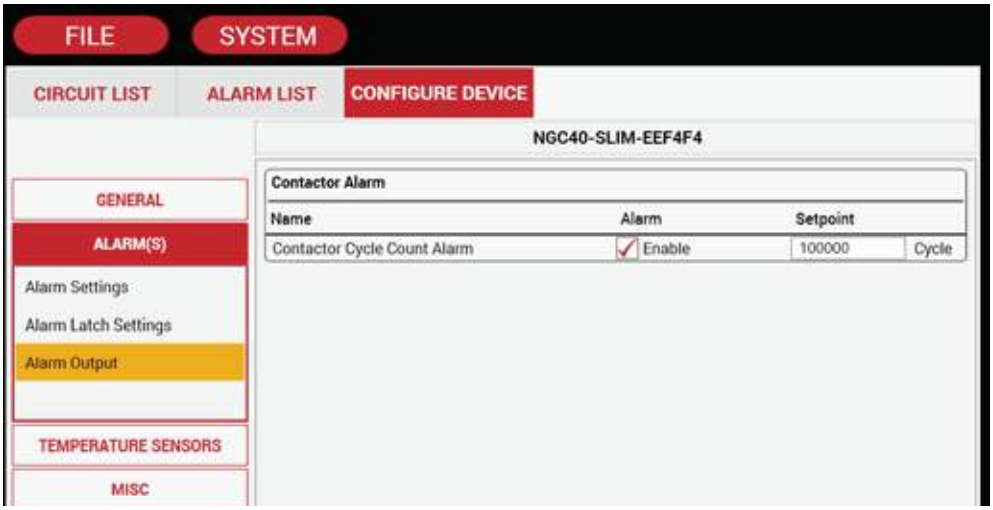


Figure 5.24 Configure Device | Alarm Output window

Contactor Alarm Settings

Contactor Cycle Count Alarm

Purpose: Generates an alarm if the number of off-to-on transitions of a contactor reaches or exceeds the Contactor Count Alarm setting. This serves as a method to perform preventative maintenance on the contactor before a failure is likely to occur.

Procedure: Adjust the Contactor Alarm setting to the desired value. Note that the Contactor Alarm must be enabled in order to adjust the Contactor Alarm setting. Uncheck box to disable the alarms. When enabled, enter the setpoint between 0-999999 cycles

Default: ENABLED and set at 100000 Cycles

5.8.5 Temperature Sensors

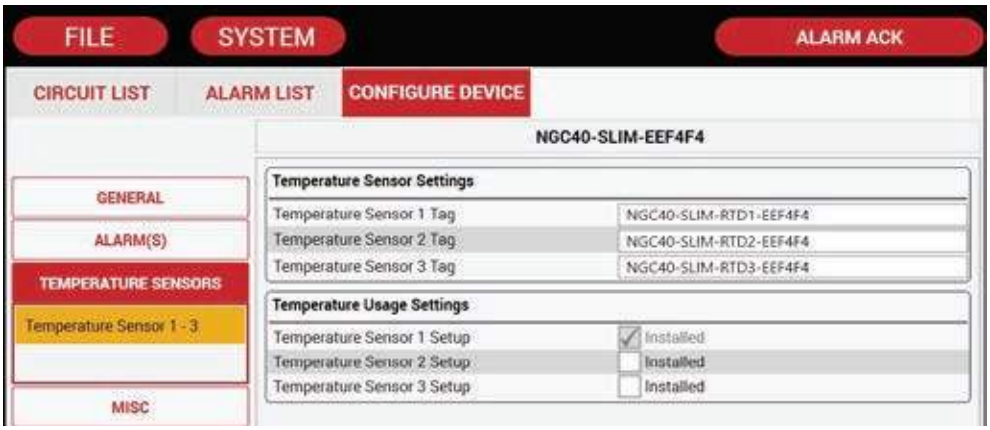


Figure 5.25 Configure Device| Temperature Sensor 1- 3 Window

Temperature Sensors – Temperature Sensors 1 to 3

5.8.5.1 Temperature Sensor Settings – Temperature Sensor 1 Tag

Purpose: A 40 character tag may be assigned to the local RTD connected directly to the SLIM to allow it to be easily associated with a pipe, vessel, process, circuit, drawing name or number

Range: Alpha-numeric characters.

Procedure: Click on the Tag Entry and an alpha numerical keyboard will drop down for data entry.

Default: NGC-40-SLIM-RTD1-(last two characters of the CAN ID)

Temperature Sensor Settings – Temperature Sensor 2 Tag

Follow the same procedure defined above for Sensor 1

Temperature Sensor Settings – Temperature Sensor 3 Tag

Follow the same procedure defined above for Sensor 1

5.8.5.2 Temperature Usage Settings – Temperature Sensor 1 Setup

Temperature Sensor 1 is always enabled. This Sensor cannot be disabled.

Temperature Usage Settings – Temperature Sensor 2 Setup

Purpose: To Install the Connected RTDs into SLIM.

Options: Installed/Not Installed

Procedure: Check box to Install. After selecting / deselecting sensor click Apply. A pop up box will appear with instructions. Press the Set Config button on the SLIM within 60 seconds to record the new entry.

Default: Box unchecked

Temperature Usage Settings – Temperature Sensor 3 Setup

Purpose: To Install the Connected RTDs into SLIM.

Options: Installed / Not Installed

Procedure: Check box to Install. After selecting / deselecting sensor click Apply. A pop up box will appear with instructions. Press the Set Config button on the SLIM within 60 seconds to record the new entry.

Default: Box unchecked

5.8.6 Miscellaneous – Device Information

Purpose: Allows the user to review the Device Information current set-up in the NGC-40-SLIM. The Device Type, CAN ID and Serial Number are factory configured and cannot be changed. However the firmware version will change whenever the same is upgraded using Hardware Manager

Figure 5.26 Configure Device | Device Information window

Load Configuration Defaults

Purpose: Loads the default settings that are stored in the NGC-40-SLIM.

On hitting the button, all user input data will be erased and the device will be set to factory defaults. An alarm will occur if Device Reset Alarm option is enabled.

5.8.7 Assign a NGC-40-SLIM to HTC/HTC3 Module

Purpose: Allows the user to assign a NGC-40-SLIM to a HTC or HTC3 module. The assignment is performed at the HTC/HTC3 module configuration window, under Advance Settings (Safety Temperature Limiter).

IMPORTANT: A NGC-40-SLIM must be listed in the device manager in order for it to be assigned to a HTC/HTC3 module.

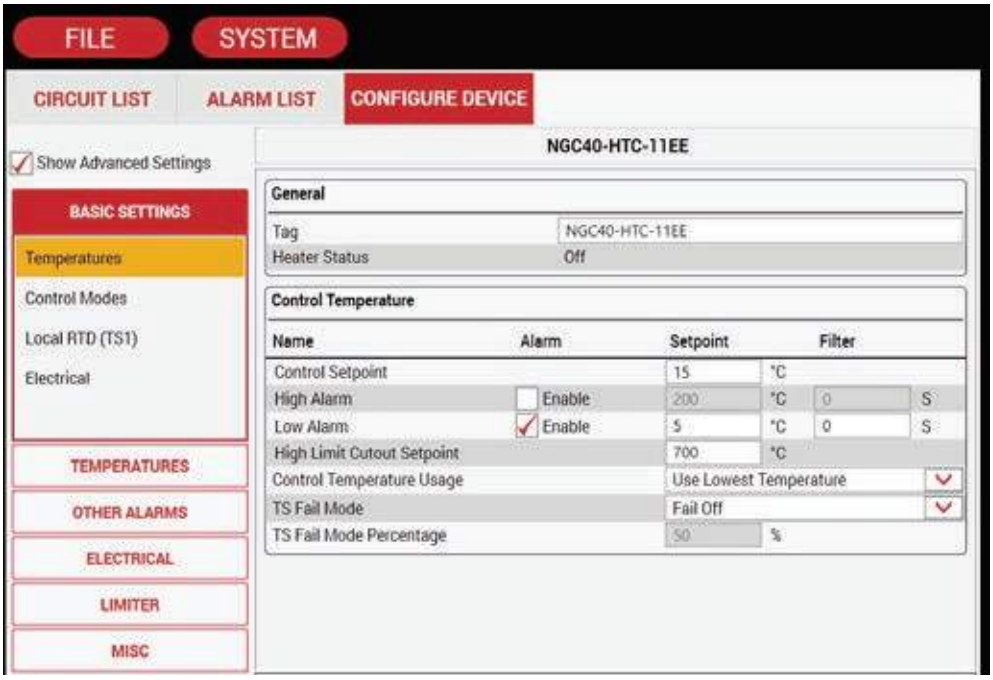


Figure 5.27 Configure Device for HTC-1096 (Advance Settings window)

At the Device Manager window select the HTC/HTC3 module that requires a NGC-40-SLIM assigned.

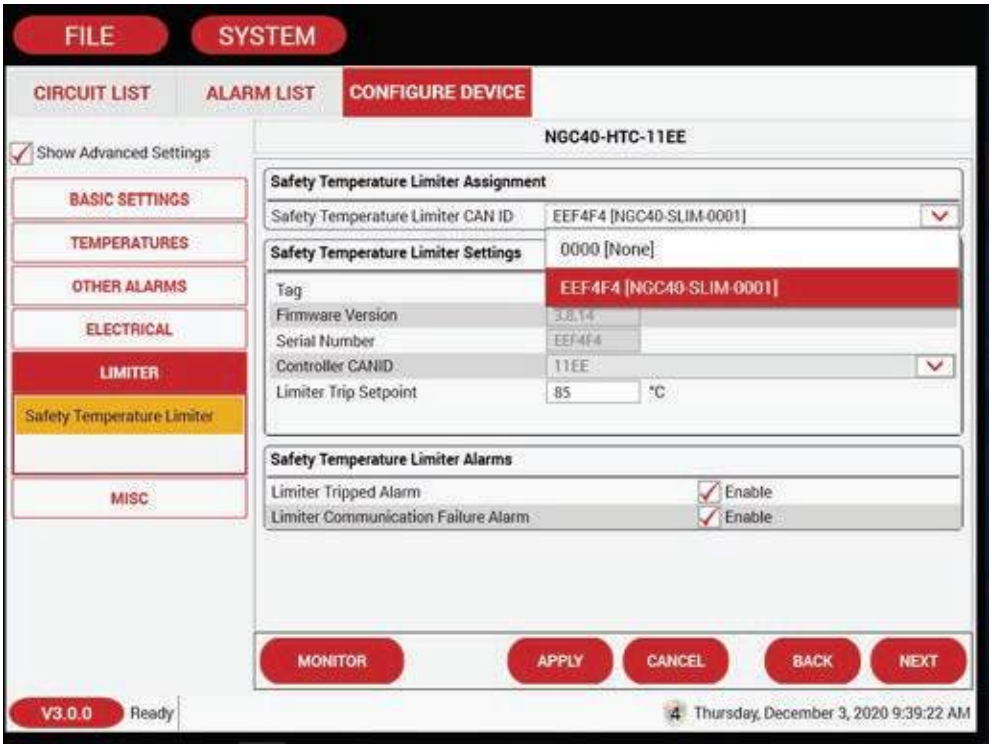


Figure 5.28 Configure Device | Safety Temperature Limiter window

- Select Safety Temperature Limiter from the menu
- Select Safety Temperature Limiter CAN ID from the drop down box

A list of available NGC-40-SLIM will be listed.

- Select the appropriate NGC-40-SLIM
- Select Apply

5.8.8 Safety Temperature Limiter Assignment Confirmation

Once a NGC-40-SLIM has been assigned to a HTC/HTC3 module, you can go to the NGC-40-SLIM and confirm the HTC/HTC3 assignment.

Figure 5.29 Configure Device for NGC-40-SLIM

6.1 ADDING A NGC-20/ ELEXANT 5010i TO NVENT RAYCHEM TOUCH 1500

Before using the nVent RAYCHEM TOUCH 1500 software to configure and maintain the NGC-20/ Elexant 5010i system, the same must be added manually to nVent RAYCHEM TOUCH 1500. The communication ports must first be set in order for the TOUCH 1500 computer to talk to the NGC-20/ Elexant 5010i Controller. If an NGC-40-BRIDGE already resides on the system, please ensure that the NGC-20/ Elexant 5010i Controller has a unique Modbus address which is different than the existing address of the connected BRIDGE modules.

6.1.1 Communication Ports

The TOUCH 1500 can be connected to the NGC-20/ Elexant 5010i only via the RS-485 port.

Although the NGC-20/ Elexant 5010i CMA (Handheld Programmer) allows the user to change the following settings, in general, the default settings should be used. The user is allowed to change these settings in those cases where an external device is added which has already blocked the Modbus address(s) or ports.

6.1.2 Communication via RS-485 ports

The Field Port Communication must first be configured in order to connect the NGC-20/ Elexant 5010i via RS-485. It is important to note that the RS-485 port is internally configured to COM 3 of the TOUCH Hardware. Retain the default settings.

Go to System | Communications | Field Port Window.

6.1.3 Communication Port Settings

For details on Com port settings please refer Section 4.1.2 to Section 4.4.

6.1.4 Scanning through the RS-485 port

Go to System | Device Manager

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

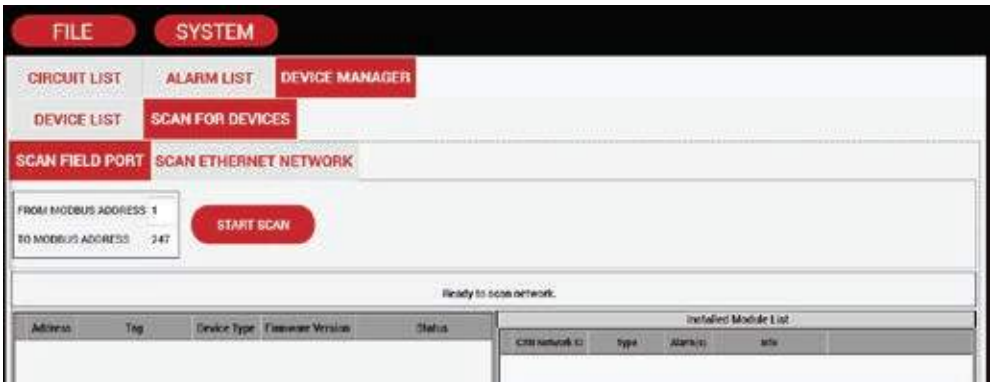


Figure 6.1 Scan for Device | Scan Field Port window

Modbus Address

Press Scan for Device tab. A window opens up giving a range of the NGC-20/ Elexant 5010i Modbus address to scan.

Purpose: The Modbus Address defines the communications address to be used by the NGC-20/ Elexant 5010i Controller when using the Modbus protocol to communicate with a Modbus compatible device **Range:** 1 to 247

Procedure: Click on the 'From Modbus address' to bring up on-screen keypad and change the address to the lowest Modbus address on the NGC-20/ Elexant 5010i network. Select 'To Modbus Address" and enter the highest address +1 on the NGC-20/ Elexant 5010i network. This is done to shorten the scan time.

Default: From address = 1, to address = 247

Start Scan

Press the Start Scan button.

The TOUCH 1500 program will scan the network for all NGC-20/ Elexant 5010i Controller(s) having Modbus addresses in the range specified.

Click OK to accept the same.

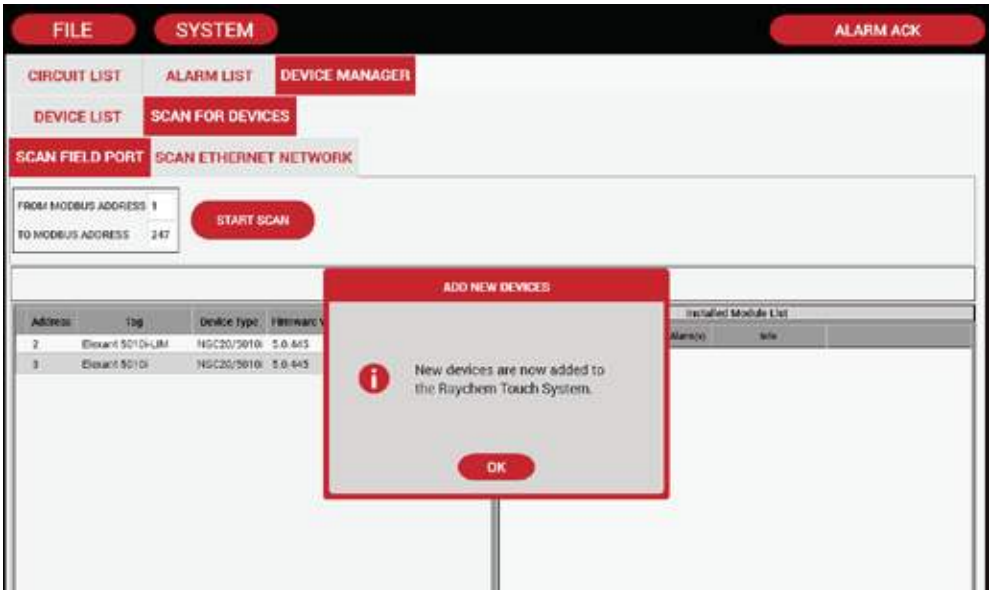


Figure 6.2 Scan for Devices | Scan Field Port window after scan

6.1.5 Configuration of System Preferences

For setting System Preferences please refer Section 4.1.7 to 4.1.10.

6.2 CONFIGURATION OF NGC-20/ ELEXANT 5010I CONTROLLERS

This Section provides complete programming instructions for the NGC-20/ Elexant 5010i Controller for single phase heaters.

6.2.1 Identifying and Selecting the NGC-20/ Elexant 5010i Controller

Go to System | Device Manager

Click on the desired NGC-20/ Elexant 5010i Controller to bring up the option buttons.

Click on the Config button.

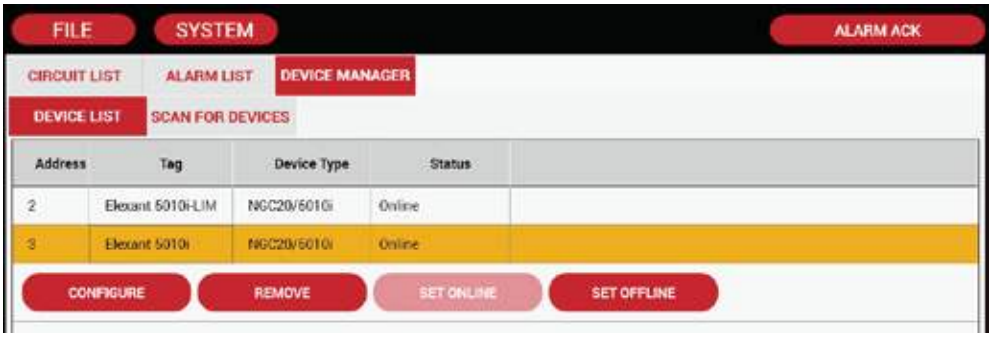


Figure 6.3 System | Device Manager window

6.2.2 Basic Settings

The Basic Setting tabs allow the user to review and change only those inputs which are necessary to set up the controller

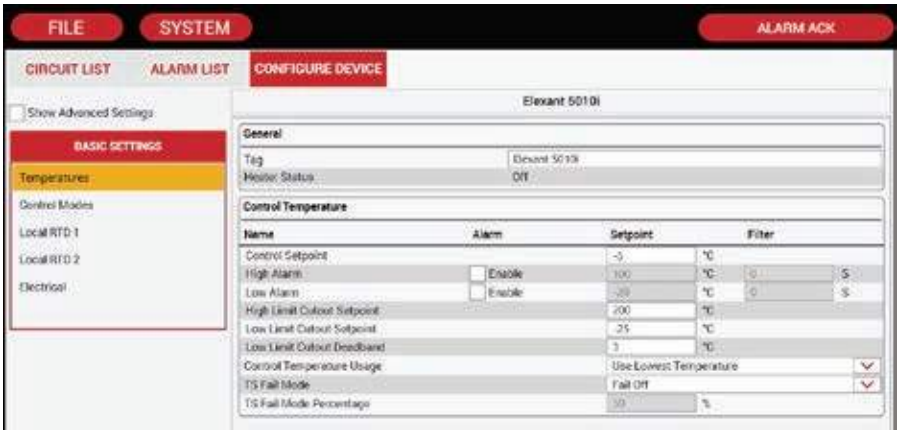


Figure 6.4 Configure Device | Temperature window

6.2.2.1 Basic Settings - Temperature

For Basic Temperature Settings on NGC-20/ Elexant 5010i Controllers please refer to Section 4.3.1.

6.2.2.2 Control Modes

Allows to user to select various Control Modes

For Control Mode Settings of NGC-20/ Elexant 5010i Controllers please refer Section 4.3.1.2 (Omit Settings against “Output Switch Type”)

Figure 6.5 Configure Device | Control mode window

6.2.2.3 Set Local RTD 1 & RTD 2

Allows to user to select RTDs and assign functions. Please note that editing local RTD2 is only possible if an RTD is wired directly on the controller

Figure 6.6 Configure Device | Local RTD 1 window

For settings on Local RTD 1 & 2 of NGC-20/ Elexant 5010i Controllers please refer Section 4.3.1.4.

6.2.2.4 Set Electrical Parameters

For Electrical settings of NGC-20/ Elexant 5010i Controllers please refer Section 4.3.1.5, 4.3.1.6, & 4.3.1.7.

6.2.3 Advanced Settings

When the Show Advance Settings box is checked, additional tabs are enabled.

6.2.3.1 Other Alarms

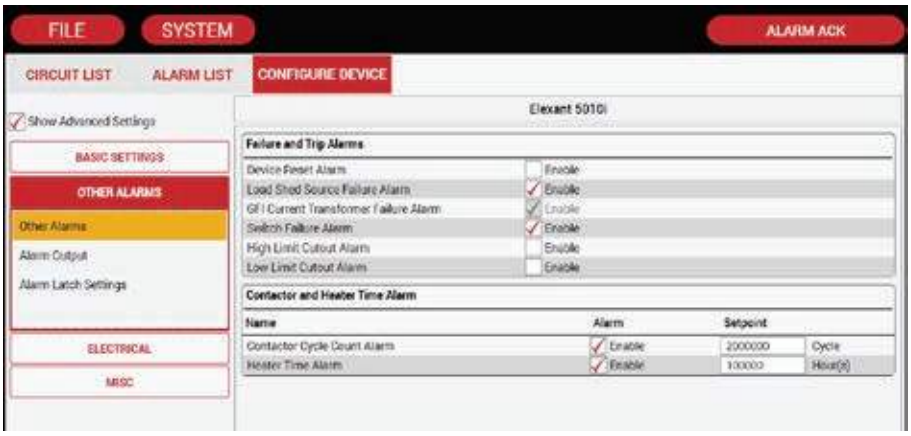


Figure 6.7 Configure Device | Other Alarm window

Failure and Trip Alarms

Purpose: To set advanced Alarm options.

Devise Reset Alarm

Purpose: The Device Reset Alarm is used to indicate:

1. Power to the Module has been interrupted and subsequently restored.
2. A transient has caused the Module's program to restart.
3. An internal condition has caused the Module's program to restart.

Procedure: Check box to enable.

Default: DISABLED

Load Shed Source Failure Alarm

Purpose: To indicate failure of Load Shed Sources

Procedure: Uncheck box to disable the alarms.

Default: ENABLED

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is LATCHING.

Ground Fault Current Transformer Failure Alarm

Option unavailable..

Default: ENABLED

Switch Failure Alarm

Purpose: The purpose of the Switch Failure Alarm is to indicate that an output switch failure has occurred. The control module HTC/HTC3 determines that if the output switch is turned off and there is load current present, then the output switch has failed closed and the alarm is latched on.

Procedure: Uncheck Box to Disable the Alarms.

Default: Enabled

IMPORTANT: The Switch Failure alarm should always be enabled. A high temperature condition, as a result of a failed heating circuit, can only be caused if the output switch fails closed. When an output switch fails closed, the control module cannot turn the power to the heating circuit off, therefore no protection features are available (ground fault trip, power limiting, etc\

High Limit Cutout Alarm

Purpose: To control the Alarm status in the event of a High Current Cut Out

Procedure: Uncheck box to disable the alarms

Default: ENABLED

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is latching.

6.2.4 Contactor and Heater Time Alarms

Contactor Cycle Count Alarm

Purpose: Generates an alarm if the number of off-to-on transitions of a contactor reaches or exceeds the Contactor Count Alarm setting. This serves as a method to perform preventative maintenance on the contactor before a failure is likely to occur.

Procedure: Adjust the Contactor Alarm setting to the desired value. Note that the Contactor Cycle Count Alarm must be enabled in order to adjust the Contactor Alarm setting. Uncheck box to disable the Alarms. When enabled, enter the setpoint between 0-999999 cycles

Default: ENABLED and set at 100000 cycles

Heater Time Alarm

Purpose: Generates an alarm if the Heater ON time reaches or exceeds the count setting. This serves as a method to perform preventative maintenance on the Heaters before a failure is likely to occur.

Procedure: Adjust the Contactor Alarm setting to the desired value. Note that the Heater Time Alarm must be enabled in order to adjust the Heater Time Alarm setting. Uncheck box to disable the alarms. When enabled, enter the setpoint between 0-999999 cycles

Default: ENABLED and set at 100000 Hrs

Alarm Output Mode

Purpose: To assign the output mode option for the Relay.

Options: Drop down list Normal Operation/Toggle/Flash

Default: Normal

Alarm Output – Alarm Output Toggle Time

Procedure: Data Entry is possible only when Toggle Mode is selected in the previous operation

Options: Enter the desired value using the keypad

Range: 1 to 240 seconds

Alarm Latch Settings

Purpose: This screen allows for the selection of automatic clearing (non-latching) of alarms when an alarm condition no longer exists or permanent alarming (latching) of such a condition until the alarm is manually reset.

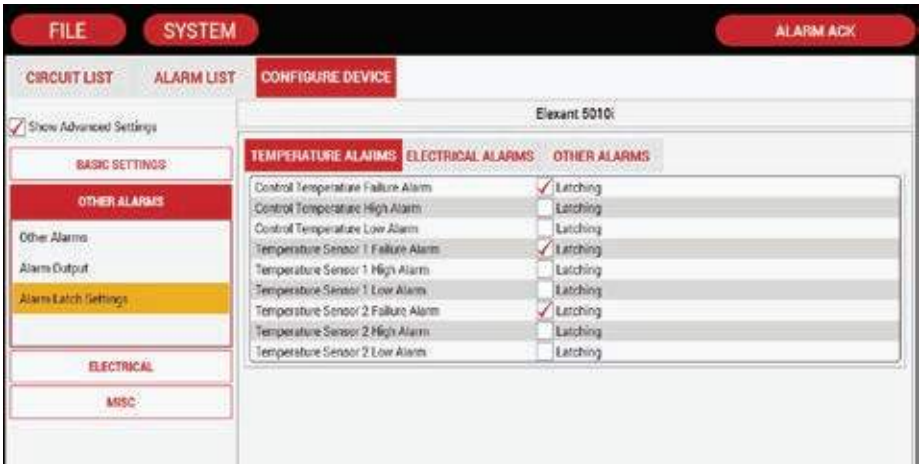


Figure 6.8 Configure Device | Alarm Latch Settings window

IMPORTANT: If the application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the NGC-20/ Elexant 5010i for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the control module should be configured for latching temperature alarms

Tab – Temperature Alarms

Check/Uncheck boxes to enable/disable latching. When enabled, the alarm will remain untill the Reset button is pressed on the TOUCH 1500 Screen.

Default: Latching is enabled for all temperature alarms

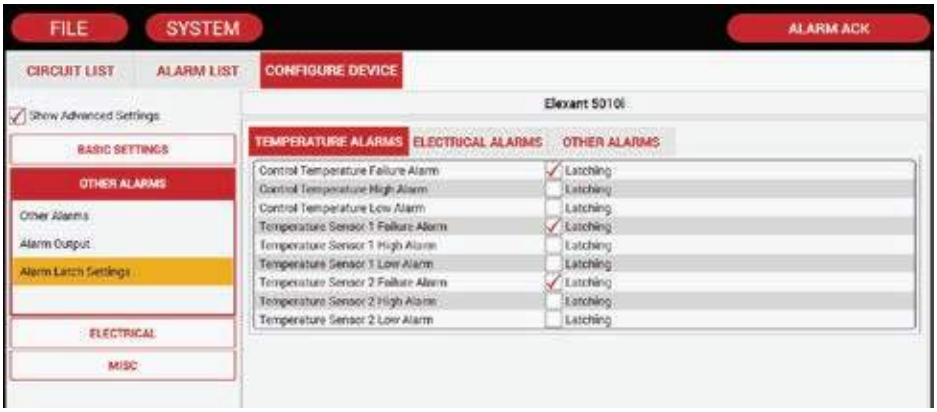


Figure 6.9 Alarm Latching Settings | Temperature Alarm window

Tab – Electrical Alarms

Default: Latching is ENABLED for all Electrical Alarms

Figure 6.10 Alarm Latch Settings | Electrical Alarm window

Tab – Other Alarms

Default: Latching is ENABLED for Switch Failure, Limiter Communication Failure, Limiter Temp sensor Failure & load shed Source Failures.

Figure 6.11 Alarm Latch Settings | Other Alarm window

6.2.4.1 Electrical

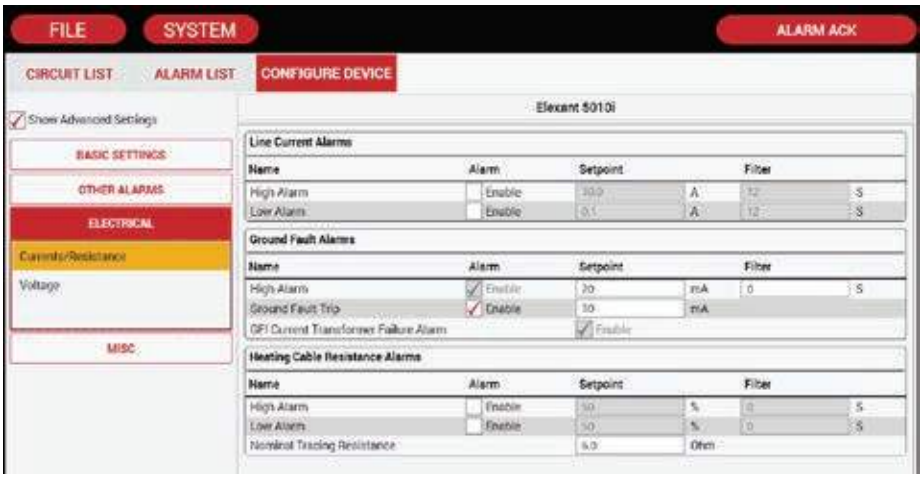


Figure 6.12 Configure Device | Currents/Resistance window

Currents/Resistance

For Electrical settings of NGC-20/ Elexant 5010i Controllers please refer Section 5.3.

Electrical – Voltage

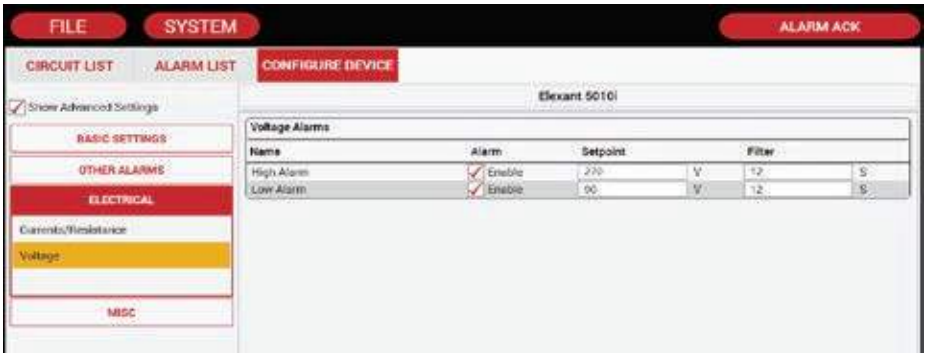


Figure 6.13 Configure Device | Voltage window

Voltage Alarms

Purpose: Alarms voltage levels, which are higher/lower than a preset limit for the application

High Alarm – Alarm

Purpose: To Alarm when the measured voltage is more than the specified value.
Procedure: Check box to enable the alarms.
Options: Enable/Disable
Default: Disabled

High Alarm – Setpoint

Procedure: When alarm is enabled, enter the setpoint using the onscreen keypad
Range: 50 to 305 V
Default: Grayed out; when enabled, set at 270 V.

High Alarm Filter

Purpose: The Voltage High Alarm Filter will prevent alarms from being indicated until a high voltage condition has existed for the duration of the Alarm Filter time.

Procedure: Use the keypad to enter the desired time in seconds

Range: 0 to 12 Seconds

Default: 0 Second

IMPORTANT: The default alarm latching/non-latching setting for this alarm is latching

Low Alarm – Alarm

Purpose: To Alarm when the measured voltage is less than the specified value.

Procedure: Check box to enable the alarms.

Options: Enable/Disable

Default: Disabled

Low Alarm – Setpoint

Procedure: When alarm is enabled, enter the setpoint using the onscreen keypad

Range: 50 to 305 V

Default: Grayed out; when enabled, set at 90 V.

Low Alarm Filter

Purpose: The Voltage Low Alarm Filter will prevent alarms from being indicated until a low voltage condition has existed for the duration of the Alarm Filter time.

Procedure: Use the keypad to enter the desired time in seconds

Range: 0 to 12 Seconds

Default: 0 Second

IMPORTANT: The default alarm latching/non-latching setting for this alarm is latching

6.2.4.2 Safety Temperature Limiter

The NGC-20/ Elexant 5010i Controllers are available in 2 models NGC-20/ Elexant 5010i-C-E comes without a Safety Temperature Limiter circuit while NGC-20/ Elexant 5010i-CL-E controllers use temperature data to TRIP the HT circuit thereby providing protection against over-heating of heating cables. If the measured temperature exceeds the user defined trip setting then the Limiter TRIP circuit will open the output relay. The unit will remain tripped until it is been manually reset. Resetting the unit will only be possible after the normal operating conditions have been returned to a safe level. The NGC-20/ Elexant 5010i-CL-E module has three temperature sensor inputs, two for regular control while the third one is for exclusive use of the Limiter Circuit.

This section explains configuring of the Limiter circuit equipped in the NGC-20/ Elexant 5010i-CL-E model. Users of NGC-20/ Elexant 5010i C-E Controllers should skip this section.

Figure 6.14 Configure Device | Safety Temperature Limiter window

Safety Temperature Limiter Information & Alarm settings are Read Only Parameters.

Safety Temperature Limiter Trip Setpoint

Purpose: The lock out temperature (setpoint) of the safety temperature limiter must be set in such a way that maximum T-class temperature cannot be exceeded. The surface temperature of the heat-tracing cables is limited to the temperature applicable in this T class -5 K for temperatures below or equal to 200°C or -10 K for temperatures greater than 200°C.

Options: Data Entry via the dropdown keypad

Procedure: Enter the desired temperature and click Apply. A pop up dialogue box will appear with instructions as below. Before this operation, please remove the Front Cover of the NGC-20/ Elexant 5010i Controller to access the Limiter SET button. Keep this button pressed for 3 seconds within 60 seconds to record the new entry.

Default: Previous data

Figure 6.15 Safety Limiter Trip Setpoint update

6.2.4.3 Miscellaneous – Load Shedding

Load Shedding settings for NGC-20/ Elexant 5010i Controllers are detailed under Section 5.4.1.

6.2.4.4 Miscellaneous – Auto Cycle

Purpose: The auto-cycle function momentarily (approximately 10 seconds) applies power to the heating circuit at the selected interval. It is used to test the integrity of the heating circuit. Alarms present at the time of auto-cycle then become latched and remain active after the completion of the auto-cycle function. Auto-cycling effectively eliminates the need for preventive maintenance by automatically verifying the integrity of the heating circuit. Auto-Cycle Interval is the number of hours/minutes between successive heating circuit integrity tests depending on the Auto-Cycle Units specified

Figure 6.16 Configure Device | Auto-Cycle window

Auto Cycle Interval

Range: 0 to 750 Hours

Procedure: Using the pop up keypad enter the desired value. The function is disabled when 0 is entered

Default: 8 hours

Miscellaneous – Console Temperature Unit

Purpose: To set the temperature units

Display Units In

Options: Celsius / Fahrenheit

Procedure: Select the temp unit from the drop down box

Default: C

6.2.4.5 Device Information

Purpose: Allows the user to review the Device Information of NGC-20/ Elexant 5010i which are read only parameters. Device Type, Firmware Version and Serial Number are factory configured and cannot be changed.

Load Configuration Defaults

Purpose: Loads the default settings that are stored in the NGC-20/ Elexant 5010i Controller. On hitting the button, all user input data will be erased and the device will be set to factory defaults. An alarm will occur if Device Reset Alarm option is enabled.

7.1 ADDING AN ELEXANT 4010i/ 4020i TO NVENT RAYCHEM TOUCH 1500

Before using the nVent RAYCHEM TOUCH 1500 software to configure and maintain the Elexant 4010i/ 4020i system, the same must be added manually to nVent RAYCHEM TOUCH 1500. The Communication ports must first be set in order for the TOUCH 1500 computer to talk to the Elexant 4010i/ 4020i Controller. If an Elexant 4010i/ 4020i Controller already resides on the system, please ensure that the Elexant 4010i/ 4020i Controller has a unique Modbus address which is different than the existing address of the connected controllers. An Elexant 4010i/ 4020i can also be connected on the Ethernet network, in that case ensure it has a valid IP address. Please refer to the Elexant 4010i/ 4020i user's manual on Elexant 4010i/ 4020i Network Settings.

7.1.1 Communication Ports

The TOUCH 1500 can be connected to the Elexant 4010i/ 4020i via RS-485 or Ethernet port.

Although the Elexant 4010i/ 4020i allows the user to change the communication settings, in general, the default settings should be used. The user is allowed to change these settings in those cases where an external device is added which has already blocked the Modbus address(s) or ports.

7.1.2 Communications via RS-485 Ports

The Field Port Communication must first be configured in order to connect the Elexant 4010i/ 4020i via RS-485. It is important to note that the RS-485 port is internally configured to COM 3 of the TOUCH Hardware. Retain the default settings.

Go to System | Communications | Scan Field Port window

7.1.3 Communication Port Settings

For details on Com port settings please refer Section 4.1.2.

7.1.4 Communication via Ethernet Port

The Elexant 4010i/ 4020i can be connected to a TOUCH 1500 using an Ethernet connection.

For details on Ethernet port settings please refer Section 4.1.3. For details on Scanning the Network for Devices refer Section 4.1.4 to 4.1.6.

Fig 7.1 Scan for Devices | Scan Field Port window

Modbus Address

Press Scan for Device tab. A Window opens up giving a range of the Elexant 4010i/ 4020i Modbus address to scan.

Purpose: The Modbus Address defines the communication address to be used by the Elexant 4010i/ 4020i Controller when using the Modbus protocol to communicate with a Modbus compatible device

Range: 1 to 247

Procedure: Click on the 'From Modbus address' to bring up on-screen keypad and change the address to the lowest Modbus address on the Elexant 4010i/ 4020i network. Select 'To Modbus Address' and enter the highest address+1 on the Elexant 4010i/ 4020i network. This is done to shorten the scan time.

Default: From address = 1, to address = 247

Start Scan

Press the Start Scan button.

The TOUCH 1500 program will scan the network for all Elexant 4010i/ 4020i Controller(s) having Modbus addresses in the range specified.

Click OK to accept the same.

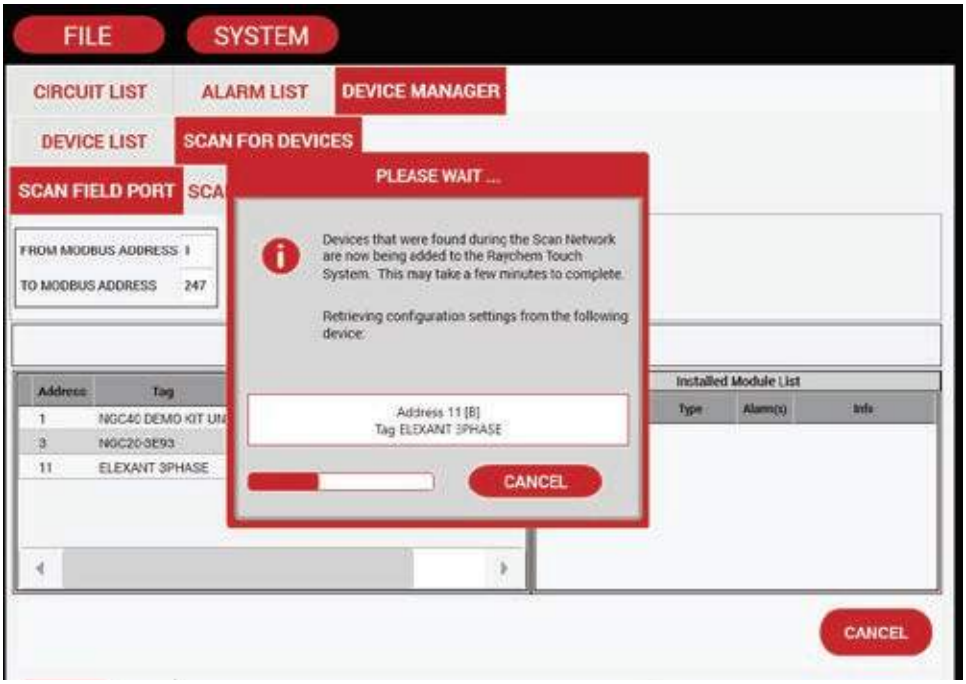


Figure 7.2 Scan for Devices | Scan Field Port window during scan

7.1.5 Scanning Through the Ethernet Port

Scanning through the Ethernet port is the same as RS-485 port. For details on Scanning Through the Ethernet Port please refer Section 4.1.6 to 4.1.7.

Fig 7.3 Scan for Devices | Scan Ethernet Network window

Additional information on connecting TOUCH 1500 via Ethernet port can be found on Appendix A ETHERNET CONNECTION TO THE BRIDGE.

7.1.6 Configuration of System Preferences

For setting System Preferences please refer Section 4.1.8 to 4.1.10.

7.2 CONFIGURATION OF ELEXANT 4010i/4020i CONTROLLERS

This Section provides complete programming instructions for the Elexant 4010i/ 4020i Controller for single and three phase heaters.

7.2.1 Identifying and Selecting the Elexant 4010i/ 4020i Controller

Go to System | Device Manager

Click on the desired Elexant 4010i/ 4020i Controller to bring up the option buttons.

Click on the Configure button.

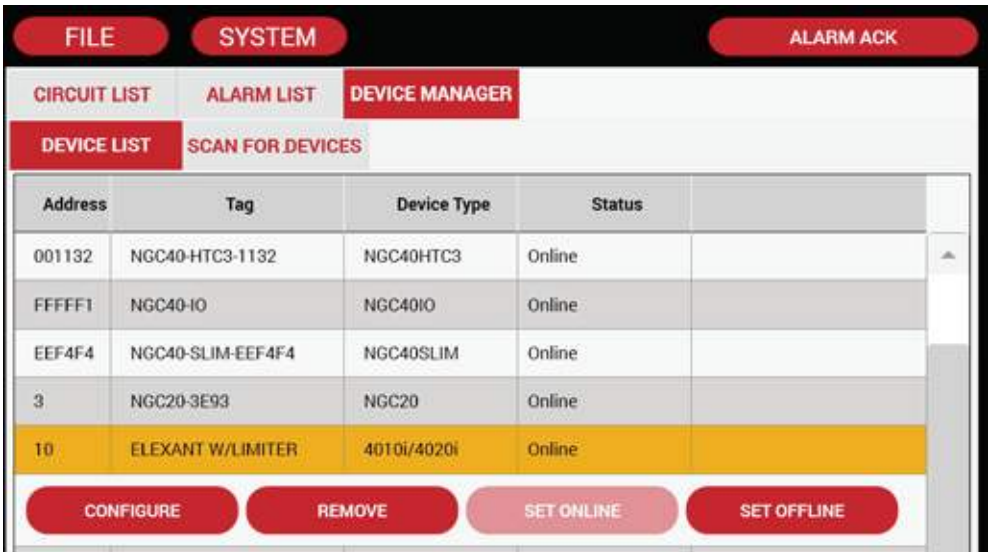


Figure 7.4 System | Device Manager window

7.2.2 Basic Settings

The Basic Setting tabs allow the user to review and change only those inputs which are necessary to setup the controller.

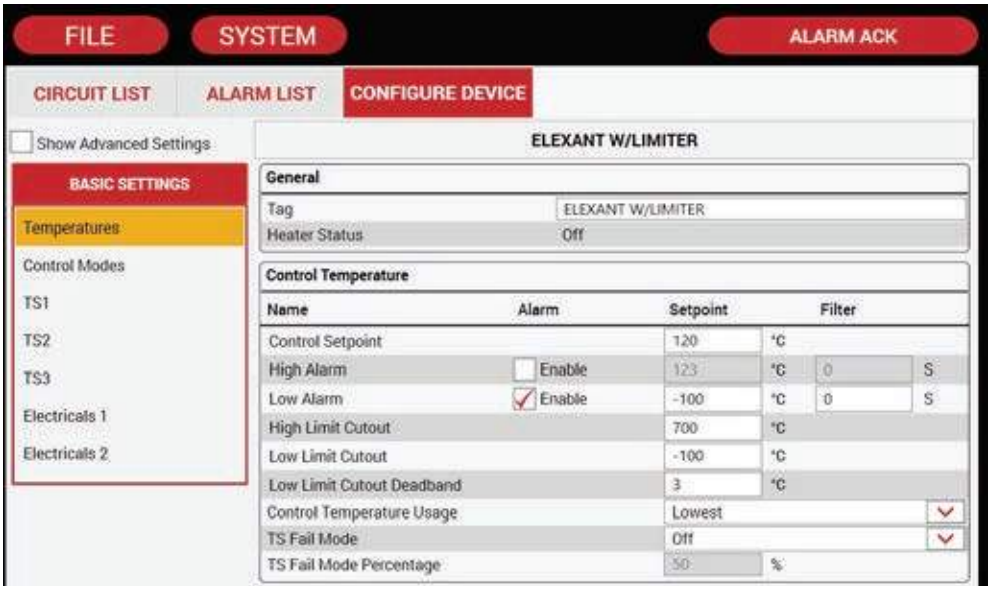


Figure 7.5 Configure Device | Temperatures window

7.2.2.1 Basic Settings– Temperatures

4010i/ 4020i Tag

Purpose: A 40-character tag may be assigned to the Elexant 4010i/ 4020i to allow it to be easily associated with a pipe, vessel, and process, circuit, drawing name or number.

Procedure: To enter a tag name, touch where the default tag name is shown. This will open the keyboard for entering the new tag name.

Range: Alpha-numeric characters

Default: Elexant 4010i/ 4020i-999999

Heater Status

Purpose: Indicates whether the heat tracing is powered On or Off

Procedure: N/A. this is not a programmable function. It is status only.

Range: On or Off

Default: N/A

7.2.2.2 Control Temperature

Control Setpoint

Purpose: The Control Temperature Setpoint temperature is the value at which the Heat Trace Controller maintains the circuit temperature using one of the Switch Control Modes. The Control Temperature Setpoint temperature is compared to the measured pipe or ambient temperature. A decision is then made to turn on or turn off the output to control power to the heat trace cable.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad.

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

Default: 10°C (50°F)

IMPORTANT: The 4010i/ 4020i will switch the output ON and OFF in an attempt to maintain this temperature.

High Alarm

Purpose: This alarm is used to indicate when the measured temperature goes above a defined threshold. It can be used to indicate when the pipe temperature has risen above a temperature which may have a negative effect on process efficiency or operation. When enabled, this alarm will appear when the Control Temperature exceeds the Control Temperature High Alarm Setpoint. This alarm can be user selectable to be latching or non-latching (refer to Section 7.2.3) if set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: To enable Alarm, touch the Check box (a check mark will appear in the box when enabled.) To enter a new set point value, touch the data area to bring up the numerical keypad

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

Options: ENABLE or DISABLE

Default Alarm Selection: DISABLED

Default Alarm Temperature: 100°C (212°F)

IMPORTANT: If your application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the 4010i/ 4020i for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the 4010i/ 4020i should be configured for latching temperature alarms.

High Alarm Filter

Purpose: The Control Temperature High Alarm Filter will prevent Control Temperature High Alarm from being indicated until the corresponding alarm condition has existed for the duration of the Control Temperature High Alarm Filter time.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Range: 0 to 59940 seconds (0 to 999 minutes)

Default: 0 second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Low Alarm

Purpose: This alarm is used to indicate when the measured temperature goes below a defined threshold. It can be used to indicate when the pipe temperature has dropped below a temperature which may have a negative effect on process efficiency or operation. When enabled, this alarm will appear when the Control Temperature decreases below the Control Temperature Low Alarm Setpoint.

Procedure: To enable Alarm, touch the Check box (a check mark will appear in the box when enabled.) To enter a new set point value, touch the data area to bring up the numerical keypad

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

Options: ENABLE or DISABLE

Default Alarm Selection: ENABLE

Default Alarm Temperature: 5°C (40°F)

NOTE 1: This alarm can be user selectable to be latching or non-latching as explained under Section 5.2.3. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to Latching the alarm must be cleared by the user. The default alarm latching/non-latching setting for this alarm is latching.

NOTE 2: If your application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the 4010i/ 4020i for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the 4010i/ 4020i should be configured for latching.

Low Alarm Filter

Purpose: The Control Temperature Low Alarm Filter will prevent Control Temperature Low Alarm from being indicated until the corresponding alarm condition has existed for the duration of the Control Temperature Low Alarm Filter time.

Range: 0 to 59940 seconds (0 to 999 minutes)

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Default: 0 second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

High Limit Cutout Setpoint

Purpose: This parameter defines the High Limit Cutout Setpoint for each of the 3 Temperature Sensors where the Temperature Sensor configuration has High Limit Cut-out enabled. This feature will override the Control Temperature Setpoint temperature and force the controller output off if any one of the 3 Temperature Sensors temperature exceeds the High Limit Cut-Out temperature setting.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

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

Default: 700°C (1292°F)

NOTE 1: The High Limit Cutout feature overrides an auto-cycle test. A pending auto-cycle will be initiated immediately after the Temperature Source x temperature drops below the High Cutout Setpoint.

NOTE 2: If a Temperature Source Failure occurs and the High Limit Cutout feature is enabled, the switch output will latch off regardless of the Temperature Control Mode setting or the Temperature Fail Mode setting.

Low Limit Cutout Setpoint

Purpose: This parameter defines the Low Limit Cutout Setpoint for each of the 3 Temperature Sensors where the Temperature Sensor configuration has Low Limit Cut-out enabled. This feature will override the Control Temperature Setpoint temperature and force the controller output off if any one of the 3 Temperature Sensors temperature exceeds the Low Limit Cut-Out temperature setting.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

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

Default: -70°C (-94°F)

Low Limit Cutout Deadband

Purpose: This parameter defines the Deadband value used with the Low Limit Cutout Setpoint. If the Control temperature falls below the Low Limit Cutout setpoint plus the Deadband value, the output is turned off.

Procedure: To enter a new set point value, touch the data area to bring up the numerical keypad

Range: 1°C to 50°C (2°F to 90°F)

Default: 3°C (5°F)

Control Temperature Usage

Purpose: Allows the selection of one of two possible temperature control modes used by the control module. The different modes are Averaging, or minimum maintain temperature control.

Procedure: Touch the drop down selection box to select Control Temperature Usage

Options: Use Lowest Temp/Use Average Temp

Default: Use lowest temp

TS Fail mode

Purpose: Allows the selection of one of four Fail Safe modes, Fail On, Fail Off, Fixed %, Last %

Touch the drop down selection box to select TS Fail modes

Options: Fail On/Fail Off/ Fixed %/ Last %

Default: Fail Off

TS Fail mode %

Purpose: Allows the Entry of Fail mode % on Fixed % mode (only)

Procedure: Touch the Entry box and enter %

Range: 0 to 99%

Default: Grayed out until enabled

7.2.2.3 Control Modes

Allows user to select various Control Modes.

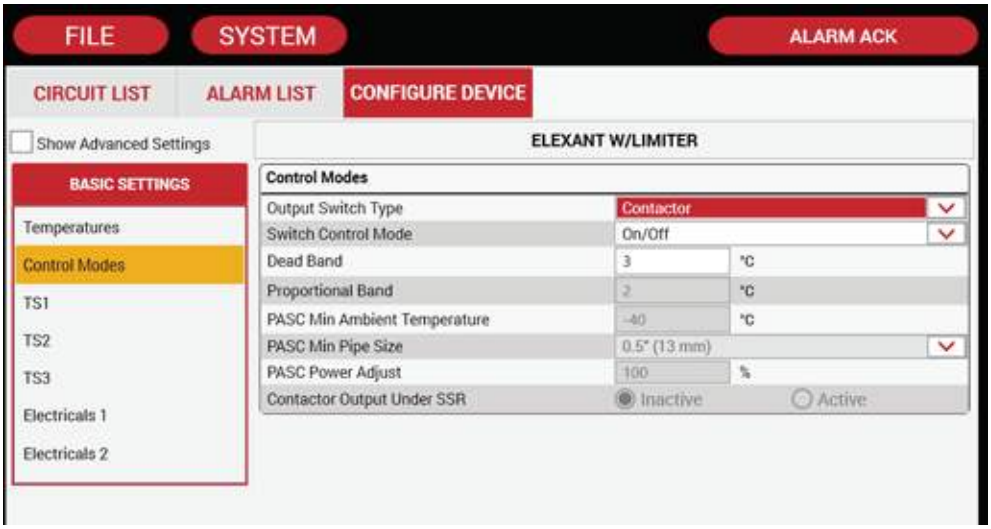


Figure 7.6 Configure Device | Control Modes window

Output Switch Type

Purpose: Select the type of switching device connected to this 4010i/ 4020i

Procedure: Select the type from the drop down list

Options: Electro-Magnetic Relay (Contactor), Solid State Relay (SSR) or Analog SSR

Default: Contactor

Switch Control Mode

Purpose: This allows selection of the type of algorithm to be used by the 4010i/ 4020i to maintain the Control Setpoint temperature. There are five different control algorithms available. For detail explanation of the different Switch Control Modes, please refer to Appendix B SWITCH CONTROL MODES.

Procedure: Select the type from the drop down list

Options: On/Off, PASC, Always On, Always Off, Proportional (SSR Switch Type only)

Default: On/Off Contactor

Dead Band—Available only when On/Off Control Mode is selected

Purpose: The controller monitors the temperature of the heating circuit and compares it to the Control Temperature. If the control temperature is above the Control Temperature Setpoint by more than the deadband value, the output is turned off. If the control temperature falls below the Control Temperature Setpoint, the output is turned on.

Procedure: Click on the box to enter date using the numerical keypad

Range: 1 to 50°C (2 to 90°F)

Default: 3°C (5°F)

IMPORTANT: Adjust the DEADBAND setting to the desired level above the Control Setpoint temperature. When the control temperature is above the setpoint + deadband value, the controller will turn off the output to the tracer. If the control temperature drops down below the setpoint, the output will be turned back on. Note that the smaller the deadband setting, the more often the contactor will cycle on and off, decreasing its operational life.

Proportional Band — Available only when Proportional Control Mode is selected

Purpose: The controller monitors the temperature of the heating circuit and compares it to the Control Temperature Setpoint. If the Control Temperature is at or below the Control Temperature Setpoint the power is applied to the trace with a duty cycle of 100% minus the controller output is full on. If the Control Temperature is equal to or greater than the Control Setpoint temperature plus the Proportional Band setting, then the controller output will have a duty cycle of 0%, the output will be off. The temperature of the control sensor is constantly monitored and the output duty cycle is adjusted proportionally according to where the temperature falls within the 0% to 100% band.

Proportional Control Temperature Band Table

Control Sensor Temperature Duty Cycle

Setpoint + proportional band 0%

Setpoint + proportional band / 2 50%

Setpoint 100%

IMPORTANT: The Proportional Band is use with the two proportional control modes only (SSR PASC and Analog SSR Proportional).

Procedure: Click on the box to enter date using the numerical keypad

Range: 1 to 50°C (2 to 90°F)

Default: 2°C (4°F)

PASC Min. Ambient Temperature

Purpose: The PASC 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 heat tracing system was sized correctly.

Procedure: Click on the box to enter date using the numerical keypad

Range: -73°C to 51°C (-99°F to 124°F)

Default: -40°C (-40°F)

PASC Min Pipe Size

Purpose: PASC 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 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.

Procedure: Click on the box to enter date using the numerical keypad

Options: .50 in (15 mm), 1.0 in (25 mm), >=2.0 in (50 mm)

Default: 0.50 in (15 mm)

PASC Power Adjust

Purpose: 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 nVent representative for assistance with this factor.

Procedure: Touch the box to enter date using the numerical keypad

Range: 10 to 200%

Default: 100%

Contactor Output Under SSR

Purpose: This setting affects the behavior of the Contactor output whether it is active or not active when the Output Switch Type is SSR.

Options: Inactive or Active

Default: Inactive

7.2.2.4 Set TS1, TS2 & TS3

This section discusses setting up a TS that is hard-wired into a Elexant 4010i/ 4020i Controller. If no TS is connected directly to the Elexant 4010i/ 4020i Controller, then you can skip this section.

Figure 7.7 Configure Device | TS1 window

TS Type

Purpose: This allows selection of the type of RTD used

Procedure: Select the type from the drop down list

Options: 3-wire 100-Ohms Platinum, 2 or 3-wire 100-Ohms Nickel Iron, 2 or 3-wire 100-Ohms Nickel, 4-20 mA Loop or Not Used.

Default: 3-wire 100-Phms Platinum

TS Lead Resistance

Purpose: This allows the lead wire resistance to be set when using 2 or 3 wire 100-Ohms Nickel Iron. The lead resistance must be entered to ensure accurate temperature measurement.

Procedure: Touch the data area and enter the resistance value using the keypad.

Range: 0 to 20 Ohms

Default: 0 Ohms

Change TS Tag

Purpose: This allows the RTD name to be set to the preferred text

Procedure: To enter a tag name, touch where the default tag name is shown. This will open the keyboard for entering the new tag name.

Range: Alpha-numeric characters.

Default: Elexant 4010i/ 4020i-TS1-999999 (TS1 may also be TS2 or TS3 depending on the selected TS)

TS Usage

Purpose: This allows selection of how the controller will react if an TS fails. If High Temp Cutout or Low Temp Cutout options is selected, the Controller will cut off power when the temp exceeds the limit values.

Procedure: Select the type from the drop down list

Options: Monitor Only / Control Only / Monitor with High Temp Cut out / Control with High Temp Cut out / Monitor with High and Low Temp Cut out / Control with High and Low Temp Cut out. On Selection of Monitor option, the grayed area will allow data entry.

Default: Control Only for TS1, Monitor Only for TS2 and TS3

High Alarm - TS

Purpose: This setting is exclusively for a TS when set to the Monitor Only option is selected. The high alarm will activate when the temperature exceeds the set value.

Procedure: Touch the check box to enable the alarm. When enabled, enter the setpoint by touching the white box and using the numerical keypad. If required set filter in the range in the same way.

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

Filter Range: 0 to 12 seconds

Default Setting: DISABLED

Default Temperature: 100°C

Default Filter: 0 seconds

Low Alarm - TS

Purpose: This setting is exclusively for a TS when set to the Monitor Only option selected. The low alarm will activate when the temperature goes below the set value.

Procedure: Touch the check box to enable the alarm. When enabled, enter the setpoint by touching the white box and using the numerical keypad. If required set filter in the range in the same way.

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

Filter Range: 0 to 12 seconds

Default Setting: DISABLED

Default Temperature: 5°C

Default Filter: 0 seconds

7.2.2.5 Set Electrical 1 Settings

This section describes the electrical setting for Trace Current(s) for the Elexant 4010i/ 4020i Controllers.

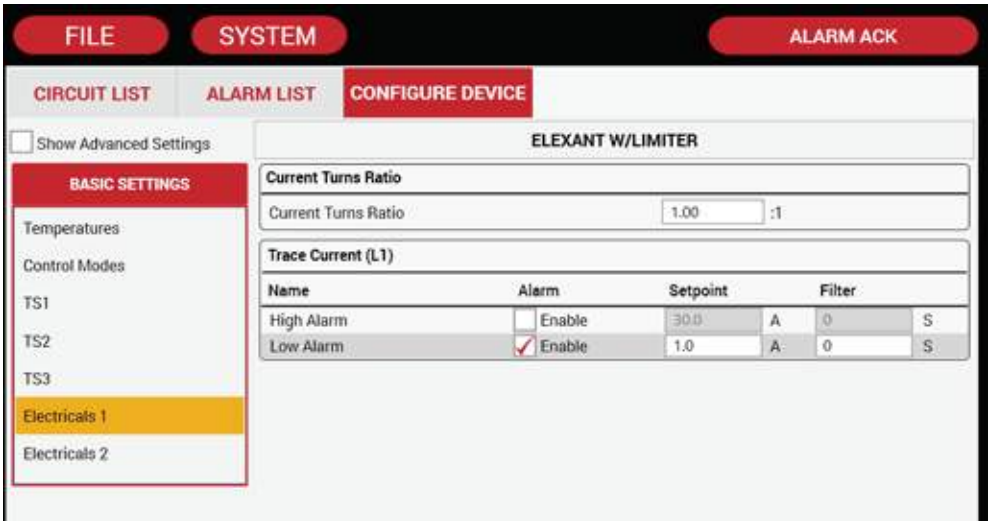


Figure 7.8 Configure Device | Electricals 1 window

Trace Current

Current Turns Ratio

Purpose: The Current Turns Ratio is the setting used to match the ratio between the primary input and secondary output of the Current Transformer (CT).

Procedure: Enter the current turns ratio by touching the white box and using the numerical keypad.

Ratio Range: 0.10 to 10.00

Default: 1.00

High Alarm

Purpose: Alarms at current levels which are higher than the High Trace Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: DISABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is LATCHING.

High Alarm Setpoint

Purpose: Sets the high alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.1 to 100.0 A (for turn's ratio of 1:1)

Default: 30.0 A

High Alarm Filter

Purpose: The Trace Current High Alarm Filter will prevent high Trace current alarms from being indicated until a high current condition has existed for the duration of the high current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 28 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Low Alarm

Purpose: Alarms at current levels which are lower than the Trace Current Low Alarm Setpoint. Monitoring for lower than expected current levels may be an effective means of continuity monitoring. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

NOTE 1: The default alarm latching/non-latching setting for this alarm is latching. To minimize nuisance low current alarms, the 4010i/ 4020i must detect a current level less than the low current alarm setpoint for a period longer than approximately 20 consecutive seconds.

NOTE 2: For series type heating cables, adjusting the low Trace current alarm to 50% of full load current will properly alarm a problem and reduce nuisance alarms due to voltage dips. Parallel heaters should be adjusted to a level as close as possible to full load current but lower than the current at worst case voltage. The low current setting as a percentage of full load current will vary depending on the facility and its power system.

NOTE 3: A low trace current alarm may also result from a switch failed open. The controller cannot detect a switch failure due to no current. A no current condition would be identified by a low line current and the latched low Trace current alarm value reported with the alarm will be 0.0 A.

NOTE 4: It may be advantageous to consider using the high tracing resistance alarm to indicate a cable fault when using certain types of heaters.

Low Alarm Setpoint

Purpose: Sets the low alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0.1 to 100.0 A (for turn's ratio of 1:1)

Default: 1.0 A

Low Alarm Filter

Purpose: The Low Trace Current Alarm Filter will prevent low trace current alarms from being indicated until a low current condition has existed for the duration of the low trace current alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 28 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Balance 3 Phase

Purpose: This setting is for Elexant 4010i/ 4020i controllers for three phase heaters. If Balanced 3 Phase is enabled, the controller will automatically update any 3 phased settings to use the settings from the 1st phase (L1). If the Balanced 3 Phase is disabled, the settings for each phase can be different.

Procedure: Touch the check box to enable or disable Balanced 3 Phase

Options: ENABLE or DISABLE

Default: ENABLE

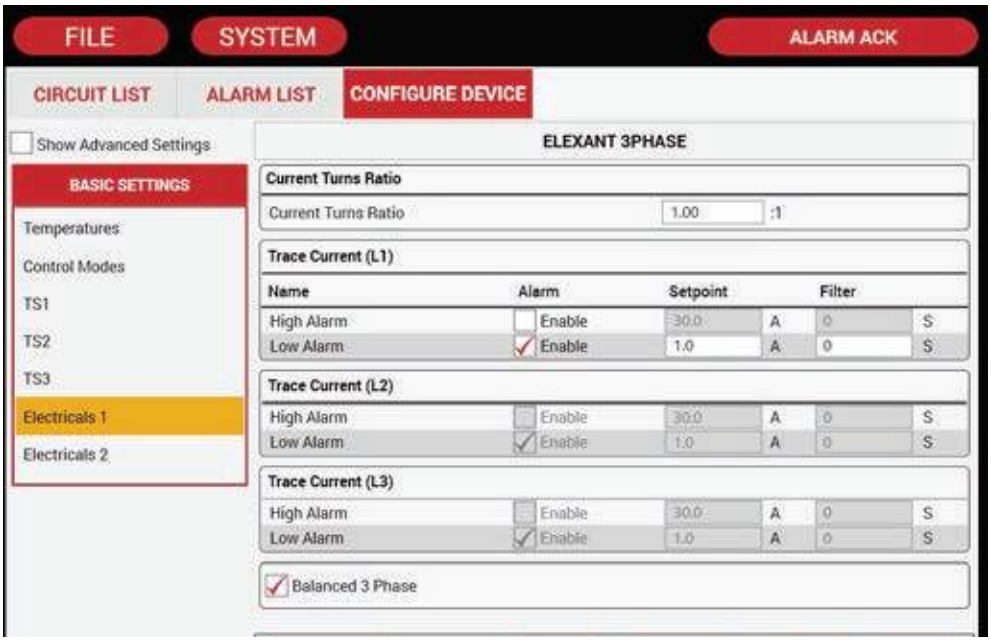


Figure 7.9 Elexant 4010i/ 4020i controller for 3 phase heaters

7.2.2.6 Set Electrical 2 Settings

This section describes the electrical setting for Ground Fault and Trace Voltage for the Elexant 4010i/ 4020i Controllers.

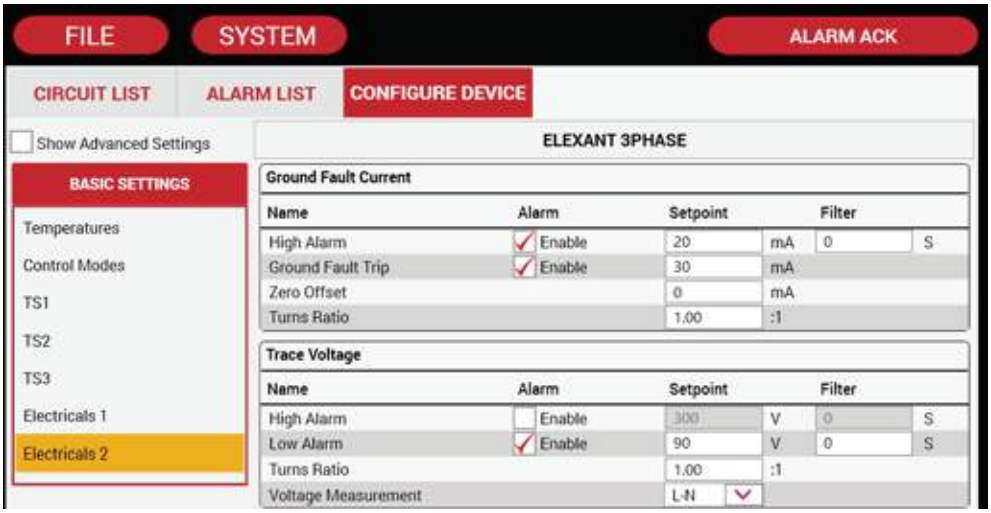


Figure 7.10 Configure Device | Electricals 2 window

Ground-Fault Current

High Alarm

Purpose: Alarms at ground-fault current levels which are higher than the High GF Current Alarm Setpoint. This alarm can be used to give pre-warning on a circuit whose ground-fault current is increasing but not yet at the point where it will trip and shut down the heat-tracing circuit. It is user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is latching.

High Alarm Setpoint

Purpose: Sets the high alarm currents threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 10 mA to 500 mA (for turn's ratio of 1:1)

Default: 20 mA

High Alarm Filter

Purpose: The high ground-fault current alarm filter will prevent high ground-fault current alarms from being indicated until a high GF current condition has existed for the duration of the high GFI alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 28 Seconds

Default: 0 Second

NOTE 1: If an alarm condition appears and then disappears before the alarm filter time has expired, the filter timer is reset and the alarm condition must exist again for the entire alarm filter time before the corresponding alarm will be indicated.

NOTE 2: If the user resets an alarm while the alarm condition is still exists, then the alarm will not be indicated again until the entire alarm filter time has expired.

Ground-Fault Trip Alarm

Purpose: This alarm is activated when the ground-fault leakage current exceeds the Ground-Fault Trip Current Setpoint. Exceeding this limit will result in the output switch being latched off.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

NOTE 1: National Electrical Codes may require that all legs of non-neutral based power sources be opened upon detection of a ground fault. Multi-pole switch configurations should be used on non-neutral based power systems. Check the requirements with your local Electrical Authority.

NOTE 2: When the Ground-Fault Trip alarm is disabled, ground-fault tripping is disabled as well

Ground-Fault Trip Setpoint

Purpose: Sets the Ground-Fault Trip threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 10 to 500 mA (for turn's ratio of 1:1)

Default: 30 mA

Zero Offset

Purpose: Allow for zero offset adjustment of Ground Fault current.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 100 mA (for turn's ratio of 1:1)

Default: 0 mA

Ground Fault Current Turns Ratio

Purpose: The Ground Fault Current Turns Ratio is the setting used to match the ratio between the primary input and secondary output of the Current Transformer (CT).

Procedure: Enter the current turns ratio by touching the white box and using the numerical keypad.

Ratio Range: 0.10 to 10.00

Default: 1.00

Trace Voltage

High Alarm

Purpose: Alarms at trace voltage levels which are higher than the High Trace Voltage Alarm Setpoint. It is user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is non-latching.

High Alarm Setpoint

Purpose: Sets the high alarm voltage threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 80 V to 300 V (for turn's ratio of 1:1)

Default: 300 V

High Alarm Filter

Purpose: The high trace voltage alarm filter will prevent high trace voltage alarms from being indicated until a high trace voltage condition has existed for the duration of the high trace voltage alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 28 Seconds

Default: 0 Second

Low Alarm

Purpose: Alarms at trace voltage levels which are lower than the Low Trace Voltage Alarm Setpoint. It is user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Touch the check box to enable or disable this alarm.

Options: ENABLE or DISABLE

Default: ENABLE

IMPORTANT: The default alarm latching/non-latching setting for this alarm is non-latching.

Low Alarm Setpoint

Purpose: Sets the low alarm voltage threshold.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 80 V to 300 V (for turn's ratio of 1:1)

Default: 90 V

Low Alarm Filter

Purpose: The low trace voltage alarm filter will prevent low trace voltage alarms from being indicated until a low trace voltage condition has existed for the duration of the low trace voltage alarm filter time. This filter helps eliminate nuisance alarms while maintaining the alarm function.

Procedure: Touch the data area to display the keypad. Enter the desired value.

Range: 0 to 28 Seconds

Default: 0 Second

Voltage Turns Ratio

Purpose: The Voltage Turns Ratio is the setting used to match the ratio between the primary input and secondary output of the Voltage Transformer.

Procedure: Enter the current turns ratio by touching the white box and using the numerical keypad.

Ratio Range: 0.10 to 10.00

Default: 1.00

Voltage Measurement

Purpose: The Voltage Measurement is the settings used to identify the source of the voltage input.

Procedure: Touch the pull down box and select an option.

Options: Line to Neutral (L-N) or Line to Line (L-L)

Default: L-N

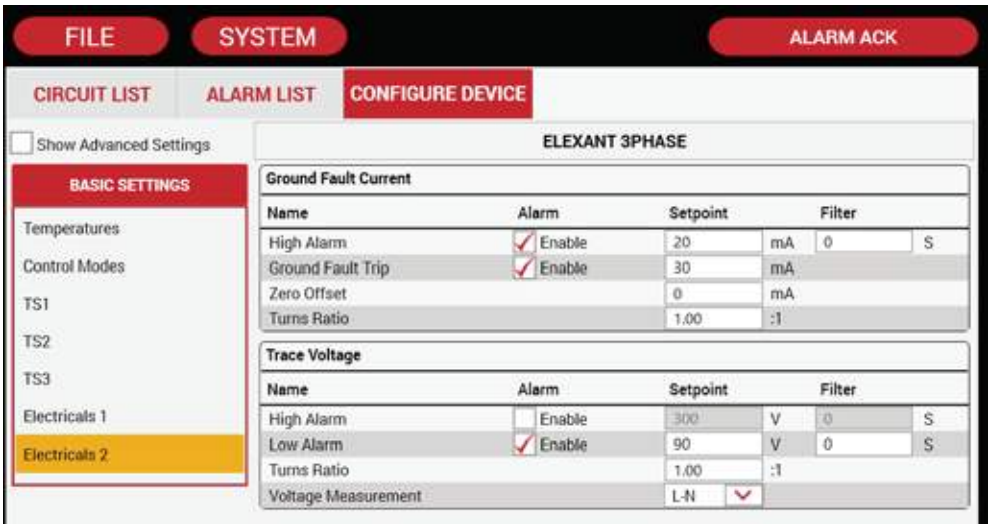


Figure 7.11 Voltage Measurement for Elexant 4010i/ 4020i with 3 phase heaters

7.2.3 Advanced Settings

When the Show Advance Settings box is checked, additional tabs are enabled allowing more programming options. Touch the Show Advanced Setting box to enable the advanced settings mode and display the additional menus.

7.2.3.1 Other Alarms

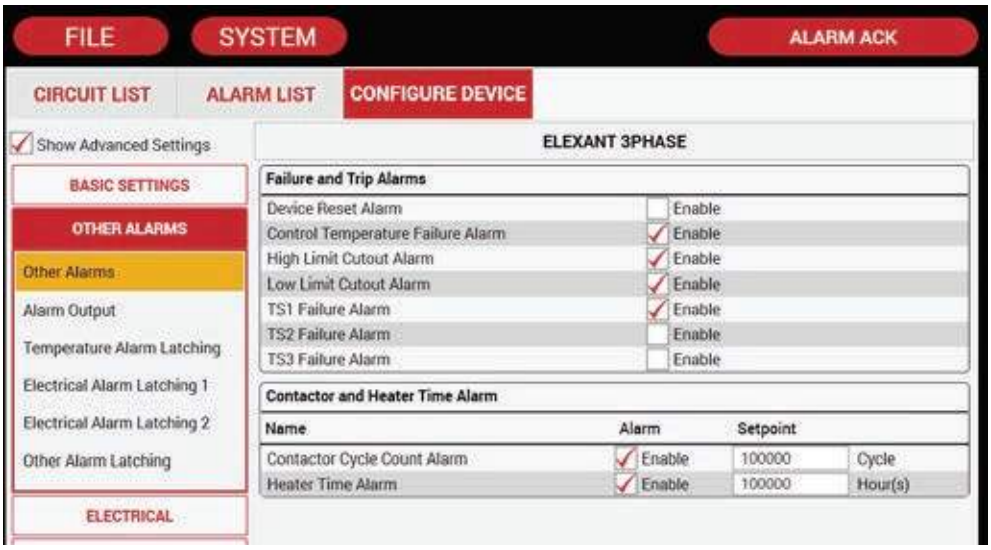


Figure 7.12 Configure Device | Other Alarms window

7.2.3.1.1 Other Alarms

7.2.3.1.1a Failure and Trip Alarms

Purpose: To set advanced Alarm options.

Devise Reset Alarm

Purpose: The Device Reset Alarm is used to indicate:

1. Power to the Controller has been interrupted and subsequently restored.
2. A transient has caused the Controller's program to restart.
3. An internal condition has caused the Controller's program to restart.

Procedure: Check box to enable.

Default: DISABLED

Control Temperature Failure Alarm

Purpose: To indicate failure of one of more Temperature Sensors used for control

Procedure: Uncheck box to disable the alarms.

Default: ENABLED

Load Shed Source Failure Alarm

Purpose: To indicate failure of Load Shed Sources

Procedure: Uncheck box to disable the alarms.

Default: ENABLED

IMPORTANT: The default Alarm Latching/Non-Latching setting for this alarm is LATCHING.

Ground Fault Current Transformer Failure Alarm

Default: ENABLED

High Limit Cutout Alarm

Purpose: To control the alarm status in the event that the control temperature has exceeded the high temp cutout temperature.

Procedure: Uncheck Box to Disable the Alarms.

Default: Enabled

Low Limit Cutout Alarm

Purpose: To control the Alarm status in the event that the control temperature has exceeded the low temp cutout temperature.

Procedure: Uncheck box to disable the alarms

Default: ENABLED

TS1 to TS3 Failure Alarm

Purpose: To indicate failure of the Temperature sensor.

Procedure: Uncheck box to disable the alarms

Default: ENABLED

7.2.3.1.1b Contactor and Heater Time Alarms

Contactor Cycle Count Alarm

Purpose: Generates an alarm if the number of off-to-on transitions of a contactor reaches or exceeds the Contactor Count Alarm setting. This serves as a method to perform preventative maintenance on the contactor before a failure is likely to occur.

Procedure: Adjust the Contactor Alarm setting to the desired value. Note that the Contactor Cycle Count Alarm must be enabled in order to adjust the Contactor Alarm setting. Uncheck box to disable the Alarms. When enabled, enter the setpoint between 0-999999 cycles

Default: ENABLED and set at 100000 cycles

Heater Time Alarm

Purpose: Generates an alarm if the Heater ON time reaches or exceeds the count setting. This serves as a method to perform preventative maintenance on the Heaters before a failure is likely to occur.

Procedure: Adjust the Contactor Alarm setting to the desired value. Note that the Heater Time Alarm must be enabled in order to adjust the Heater Time Alarm setting. Uncheck box to disable the alarms. When enabled, enter the setpoint between 0-250000 Hrs.

Default: ENABLED and set at 100000 Hrs

7.2.3.2 Alarm Output

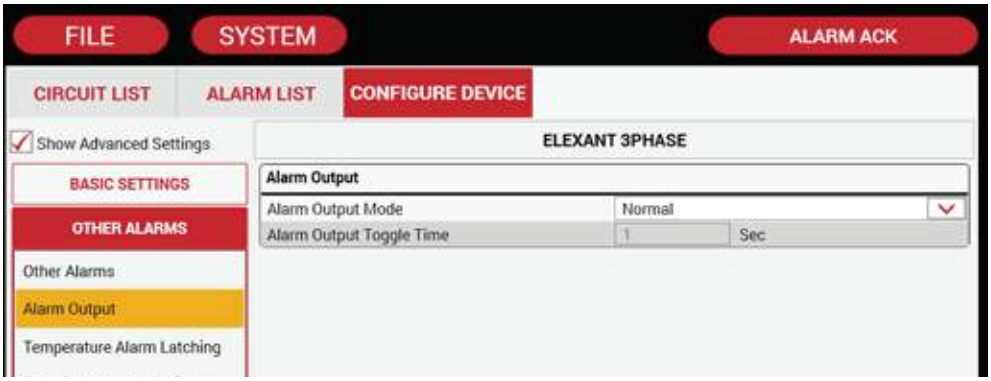


Figure 7.13 Configure Device | Alarm Output window

7.2.3.2.1 Alarm Output

Purpose: To assign the output mode option for the Relay.

Options: Drop down list Normal Operation/Toggle/Flash

Default: Normal

Alarm Output – Alarm Output Toggle Time

Procedure: Data Entry is possible only when Toggle Mode is selected in the previous operation

Options: Enter the desired value using the keypad

Range: 1 to 240 seconds

7.2.3.3 Temperature Alarm Latching

IMPORTANT: If the application is subject to periodic situations where cold or hot product is part of the process, it may be appropriate to configure the NGC-20/ Elexant 5010i for non-latching temperature alarms to avoid nuisance alarms. If it is important to be aware of any temperature alarm conditions that may have existed in a pipe, then the control module should be configured for latching temperature alarms.

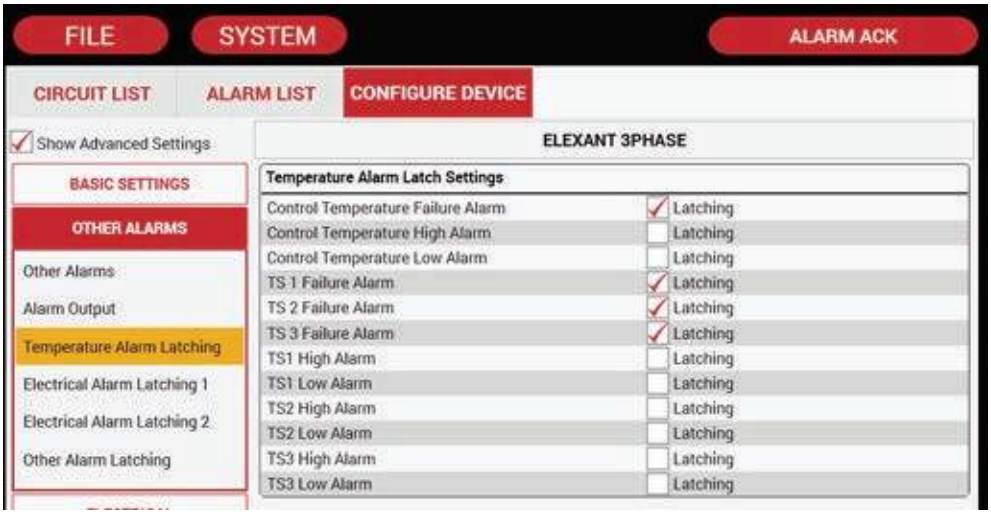


Figure 7.14 Configure Device | Temperature Alarm Latching window

7.2.3.3.1 Temperature Alarm Latch Settings

Default: Latching is ENABLED for all TS Failure alarms.

7.2.3.4 Electrical Alarm Latching 1

Figure 7.15 Configure Device | Electrical Alarm Latching 1 window

7.2.3.4.1 Electrical Alarm Latch Settings 1

Default: Latching is ENABLED for all High Trace current alarms, High Trace resistance alarms, and High Ground fault current alarm. If the Balanced 3 phase setting is disabled, the alarms for L2 and L3 will be also be disabled.

7.2.3.5 Electrical Alarm Latching 2

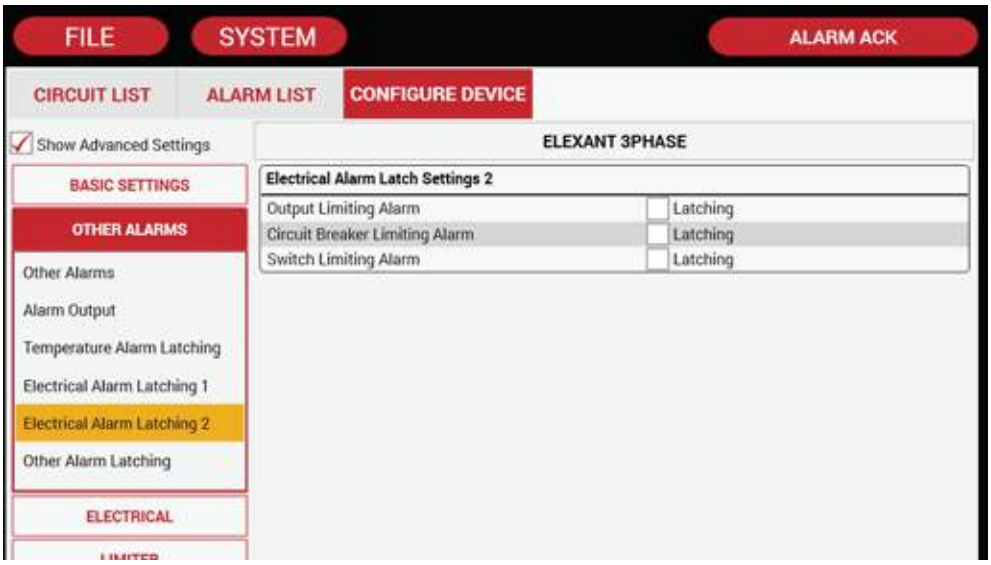


Figure 7.16 Configure Device | Electrical Alarm Latching 2 window

7.2.3.5.1 Electrical Alarm Latch Settings 2

Default: Latching is NOT ENABLED for the limiting alarms.

7.2.3.6 Other Alarm Latching

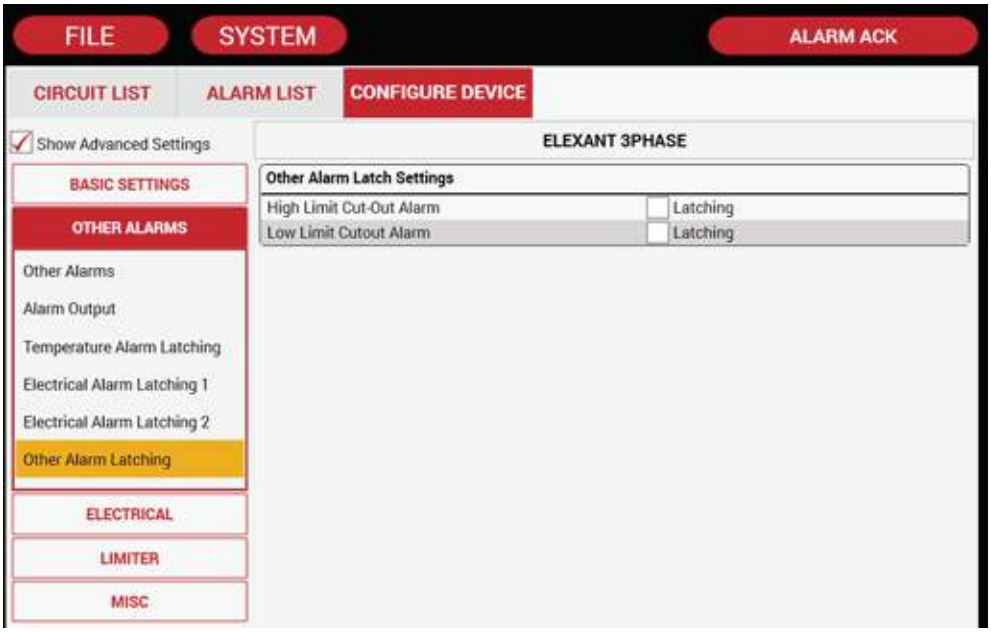


Figure 7.17 Configure Device | Other Alarm Latching window

7.2.3.6.1 Other Alarm Latch Settings

Default: Latching is NOT ENABLED for both High and Low Limit cutout alarms.

7.2.3.3 Electrical

7.2.3.3.1 Voltage/Ground Fault

For Ground Fault Current and Trace Voltage settings of Elexant 4010i/ 4020i please refer Section 7.2.2.6

7.2.3.3.2 Trace Current

For Trace Current settings of Elexant 4010i/ 4020i please refer Section 7.2.2.5

7.2.3.3.3 Circuit Breaker/Output Switch

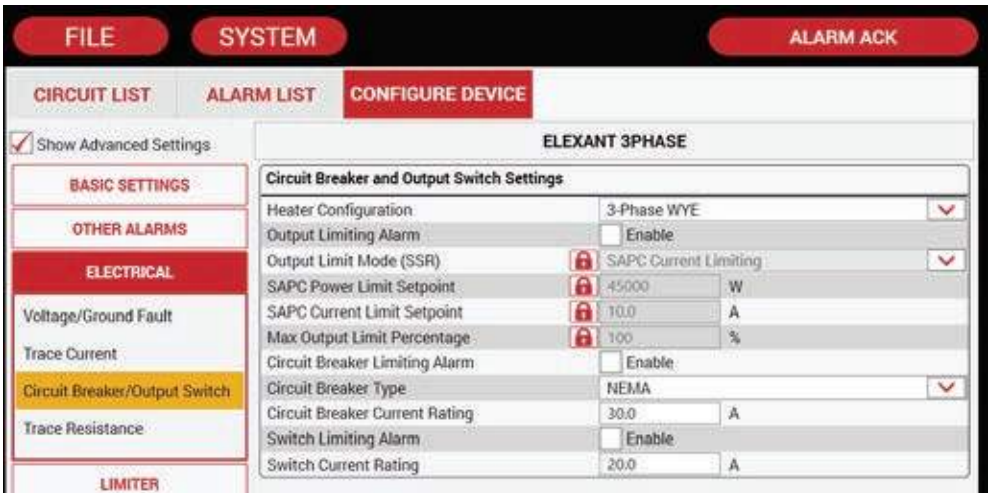


Figure 7.18 Configure Device | Circuit Breaker/Output Switch window

Heater Configuration

Purpose: Set the electrical heat-tracing configuration as installed in the field.

Options: Single-phase, 3-phase WYE, 3-phase DELTA

Procedure: Select the desired setting from the drop down options. Note the Single-phase option is reserved for Elexant 4010i/ 4020i for single phase heaters.

Output Limiting Alarm

Purpose: Alarms current levels which are higher than the High Trace Current Alarm Setpoint. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Procedure: Check box to enable the alarms

Default: DISABLED

Output Limit Mode

Purpose: This user selectable mode limits the maximum amount of power applied to a heating circuit. This is an average power calculated by the control module using the average current and applied voltage. The control module switches the output on and off rapidly to limit the average current to an appropriate level. The maximum power level may be adjusted to eliminate step-down transformers, lower the effective output wattage of a cable, or implement energy management of the heating circuit. Grayed out for when switch mode is Contactor or Analog SSR.

Options: Disable Limiting, Power Limiting, Current Limiting, %

Procedure: Select the desired setting from the drop down options

SAPC Power Limit Setpoint: Active Only When Switch Mode Is SSR

Purpose: This user selectable level limits the maximum amount of power applied to a heat-trace circuit. This is an average power calculated by the controller using the average current and the fixed voltage setting. The HTC switches the output on and off rapidly to limit the average current to an appropriate level. The maximum power level may be adjusted to eliminate step-down transformers, lower the effective output wattage of a cable, or implement energy management of the heat trace circuit.

Range: 1 to 45000 Watts (with Current Turns ratio of 1:1 and Voltage turns ratio of 1:1)

NOTE 1: This function may be set within reasonable limits for the particular tracer being powered. The effective resolution of the setting is limited to 1/30th of the calculated full on power.

NOTE 2: Do not set the SAPC power limit setpoint below full output for applications that do not require control of power.

SAPC Current Limit Setpoint: Active Only When Switch Mode is SSR

Purpose: This user selectable level limits the maximum amount of current applied to a heat-trace circuit. The HTC switches the output on and off rapidly to limit the average current to an appropriate level.

Procedure: Enter the value at which the High Current Alarm will go off.

Default: 100 A (with Current Turns ratio of 1:1)

IMPORTANT: As the 4010i/ 4020i automatically protects itself from overload, it would normally not be necessary to enable this alarm. It can be used effectively to guard against accidental paralleling of heating circuits. In-rush, or cold start currents typically associated with self-regulating cables may cause nuisance High Current Alarms. If this is undesirable this alarm should be disabled.

Max Output Limit Percentage: Active Only When Switch Mode is SSR

Purpose: This user selectable level limits the maximum amount of power applied to a heat-trace circuit to a percentage of the maximum that are applied to the circuit for the current settings.

Procedure: Enter the desired value.

Default: 100 %

Circuit Breaker Limiting Alarm

Purpose: This alarm will only inform the user that switch limiting is currently active and an excessively high current condition is present. The Elexant 4010i/ 4020i will pulse its output switch for a small interval and read the resulting current. If the measured current exceeds the Switch Current Rating setting, then the duty-cycle of its output switch will be varied so that an average current not exceeding the Switch Current Rating setting is maintained.

IMPORTANT: This alarm should normally be left enabled. Currents in this range cannot be considered normal and should be investigated. This alarm can be user selectable to be latching or non-latching. If set to non-latching, the controller will automatically clear the alarm when the condition no longer exists. If set to latching, the alarm must be cleared by the user.

Default: DISABLE

Circuit Breaker Current Rating: Set the current to the desired value within the CB limits.

Switch Limiting Alarms: Check box to enable the alarms.

Default: DISABLED

Switch Current Rating

Purpose: This feature is used to provide protection for the output switch. Enabling this alarm will only inform the user of an excessively high current condition and that the output switch has been latched off. During a high current condition, the control module attempts to soft start a heating cable using a technique involving measured in-rush current and the switch current rating. If the control module is unable to start the cable, it will eventually trip the output switch off and will not retry or pulse its output switch again.

Procedure: Adjust the Switch Current Rating setting to the actual current rating of the SSR. Note that the Overcurrent Trip Alarm does not have to be enabled in order to adjust the switch current rating setting. The current setting is grayed out when SSR is selected.

Default: Set at 30.0 A

IMPORTANT: This function may be set within reasonable limits for the particular tracer being powered. The effective resolution of the setting is limited to 1/30th of the calculated full on power. Do not set the maximum power level below the full output level for applications that do not require power limiting.

Circuit Breaker Type

Procedure: Select options from drop down list with options, NEMA, TYPE B, TYPE C, TYPE D

Default: NEMA

7.2.3.2.4 Trace Resistance

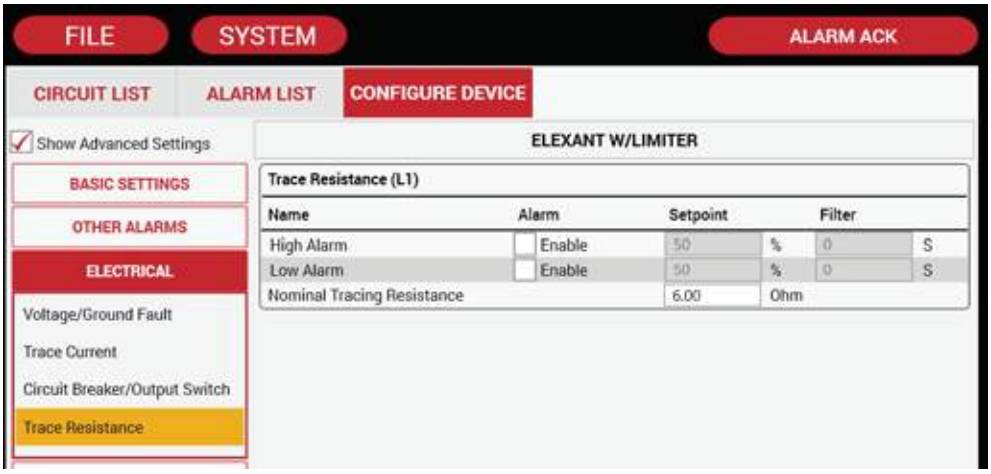


Figure 7.19 Configure Device | Trace Resistance window

7.2.3.2.4.1 Trace Resistance Alarm Settings

High Alarm

Purpose: Alarms trace resistance levels which have increased from the nominal resistance setting by more than the High Tracing Resistance Deviation setting. The High Resistance Alarm may be used to indicate an open or a high resistance connection or, when using constant wattage parallel cables, may indicate the failure of one or more heating zones. It may also be used to monitor a failed series-type cable or connection in 3-phase applications while minimizing nuisance alarms created by voltage fluctuations.

Procedure: Check box to enable the alarms. When enabled, enter the Setpoint between

1 to 250%. If required set Filter in the range 0 to 28 seconds.

Default: DISABLED

IMPORTANT: High Resistance Alarms will only be generated if the output switch is on.

Low Alarm

Purpose: Alarms heater resistance levels which have decreased from the nominal resistance setting by more than the Low Tracing Resistance Deviation setting.

Procedure: Check box to enable the alarms. When enabled, enter the Setpoint between

1 to 100 %. If required set Filter in the range 0 to 28 seconds.

Default: DISABLED

7.2.3.2.4.2 Nominal Tracing Resistance

Purpose: This parameter defines the nominal expected heater resistance. A value must be entered by the user to allow the High and Low Tracing Resistance Alarms to be used. Once the controller and the heating cable have been installed, the following procedure should be used to determine the nominal resistance setting.

Procedure: Adjust the Control Setpoint temperature to turn on the output switch. Allow the load to come up to design temperature and its power consumption to stabilize. Monitor the resistance reading and record its value. Return the Control Temperature Setpoint temperature to its proper setting. Enter the recorded resistance value as the nominal resistance setting.

Range: Value between 1.0 to 3000 Ohms as per design calculations.

Balance 3 Phase

Purpose: This setting is for Elexant 4010i/ 4020i controllers for three phase heaters. If Balanced 3 Phase is enabled, the controller will automatically update any 3 phased settings to use the settings from the 1st phase (L1). If the Balanced 3 Phase is disabled, the settings for each phase can be different.

Procedure: Touch the check box to enable or disable Balanced 3 Phase

Options: ENABLE or DISABLE

Default: ENABLE

7.2.3.3 Safety Temperature Limiter

The Elexant 4010i/ 4020i Controllers are available in various models. A model that comes with a Safety Temperature Limiter is available. The Elexant 4010i/ 4020i controller with Safety Temperature Limiter uses temperature data to TRIP the HT circuit thereby providing protection against over-heating of heating cables. If the measured temperature exceeds the user defined trip setting, then the Limiter TRIP circuit will open the output relay. The unit remains tripped until it is manually reset. Resetting the unit will only be possible after the normal operating conditions have returned to a safe level.

This section explains configuring of the Limiter circuit equipped in the Elexant 4010i/ 4020i model with Safety Temperature limiter. Users with Elexant 4010i/ 4020i models without Safety Temperature Limiter should skip this section.

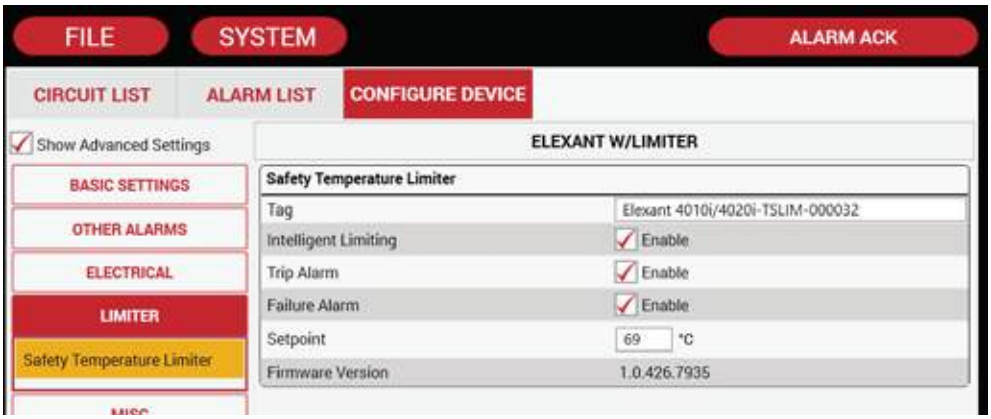


Figure 7.20 Configure Device | Safety Temperature Limiter window

Tag

Purpose: A 40-character tag may be assigned to the Safety Temperature Limiter to allow it to be easily associated with a pipe, vessel, process, circuit, drawing name, number etc.

Range: Alpha-numeric characters.

Procedure: Click on the Tag Entry and an alpha numerical keyboard will drop down for data entry.

Default: Elexant 4010i/ 4020i

Intelligent Limiting

Purpose: Under some conditions, such as when pipes are steam cleaned, the temperature exceeding the limiter cutout setpoint does not indicate a malfunction. The user has the option of letting the limiter reconnect the output automatically upon return to a safe temperature level, under the condition that the main output is turned off for the entire duration of the unsafe temperature level.

Options: ENABLE/DISABLE

Procedure: Check Box to Disable

Default: ENABLED

Trip Alarm

Purpose: Enabling the trip alarm will provide an indication of a trip on account of high temperature as per Figure 7.20.

Options: ENABLE/DISABLE

Procedure: Check Box to Disable

Default: ENABLED

Failure Alarm

Purpose: Enabling the Communication Failure Alarm will provide an indication of a Communication loss between the controller and the Safety Temperature Limiter

Options: ENABLE/DISABLE

Procedure: Check box to disable

Default: ENABLED

General – Safety Temp Limiter Trip Setpoint

Purpose: The lock out temperature (setpoint) of the safety temperature limiter must be set in such a way that maximum T-class temperature cannot be exceeded. The surface temperature of the heat-tracing cables is limited to the temperature applicable in this T class -5 K for temperatures below or equal to 200°C or -10 K for temperatures greater than 200°C.

Options: Data entry via the dropdown keypad

Procedure: Enter the desired temperature and click Apply. A pop up dialogue box will appear with instructions. Press the Set Config button on the SLIM within 60 seconds to record the new entry.

Default: Previous data

Firmware Version

Purpose: Identifies the current Safety Temperature Limiter firmware version

Procedure: N/A

7.2.3.4 Miscellaneous

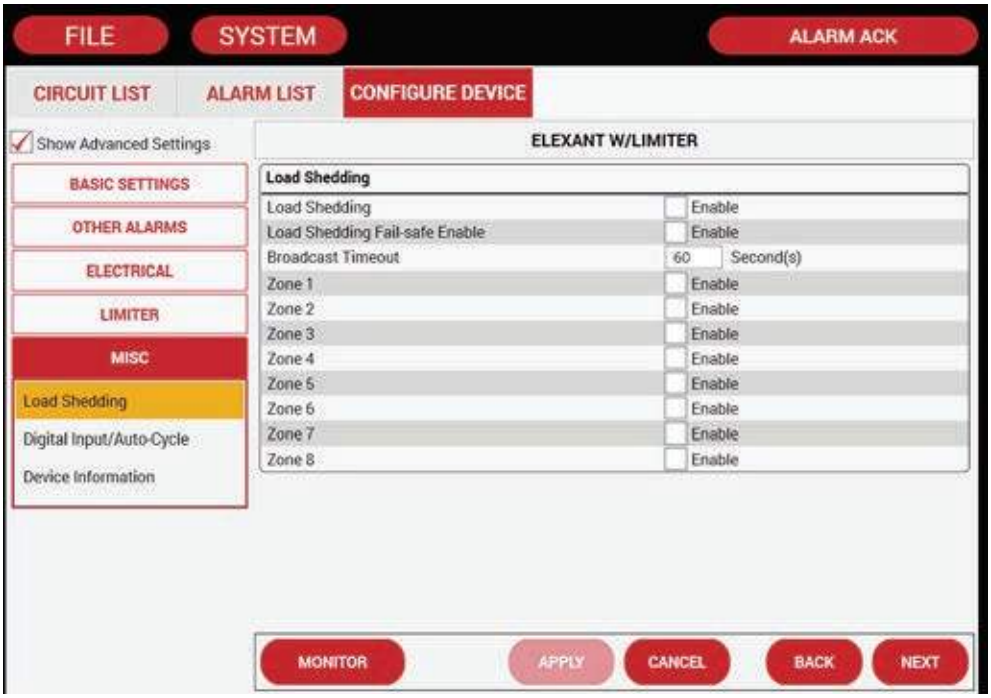


Figure 7.21 Configure Device | Load Shedding window

7.2.3.4.1 Load Shedding

Load Shedding settings for Elexant 4010i/ 4020i Controllers are detailed under Section 5.4.1.

7.2.3.4.2 Digital Input/Auto Cycle

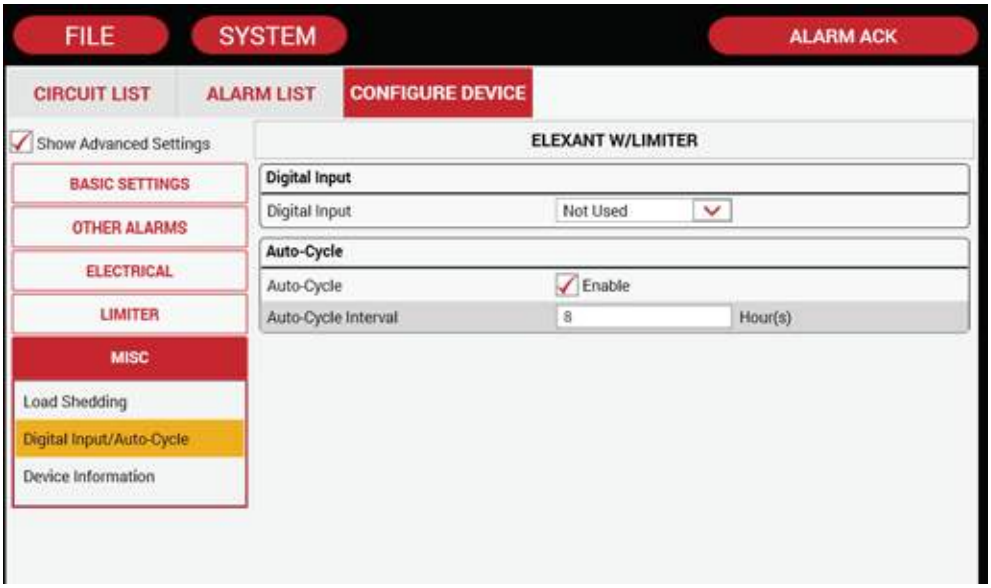


Figure 7.22 Configure Device | Digital Input/Auto-Cycle window

7.2.3.4.2.1 Digital Input

Purpose: The digital input offers the option to alarm or override the electrical heat-tracing mode from an external device. The digital input can be configured in different ways. These are:

- None: no action taken
- Alarm when input is closed
- Alarm when input is open
- Force Off when input is closed
- Force Off when input is open
- Force On when input is closed
- Force On when input is open
- Hand/Off/Auto

Default: None

Digital Input Source: When selections other than 'Not used' is made, the drop down list will enable selection of appropriate input source.

7.2.3.4.2.2 Auto Cycle

Purpose: The auto-cycle function momentarily (approximately 10 seconds) applies power to the heating circuit at the selected interval. It is used to test the integrity of the heating circuit. Alarms present at the time of auto-cycle then become latched and remain active after the completion of the auto-cycle function. Auto-cycling effectively eliminates the need for preventive maintenance by automatically verifying the integrity of the heating circuit. Auto-Cycle Interval is the number of hours/minutes between successive heating circuit integrity tests depending on the Auto-Cycle Units specified

Auto Cycle Interval

Range: 0 to 750 Hours

Procedure: Using the pop up keypad enter the desired value. The function is disabled when 0 is entered

Default: 8 hours

7.2.3.5 Device Information

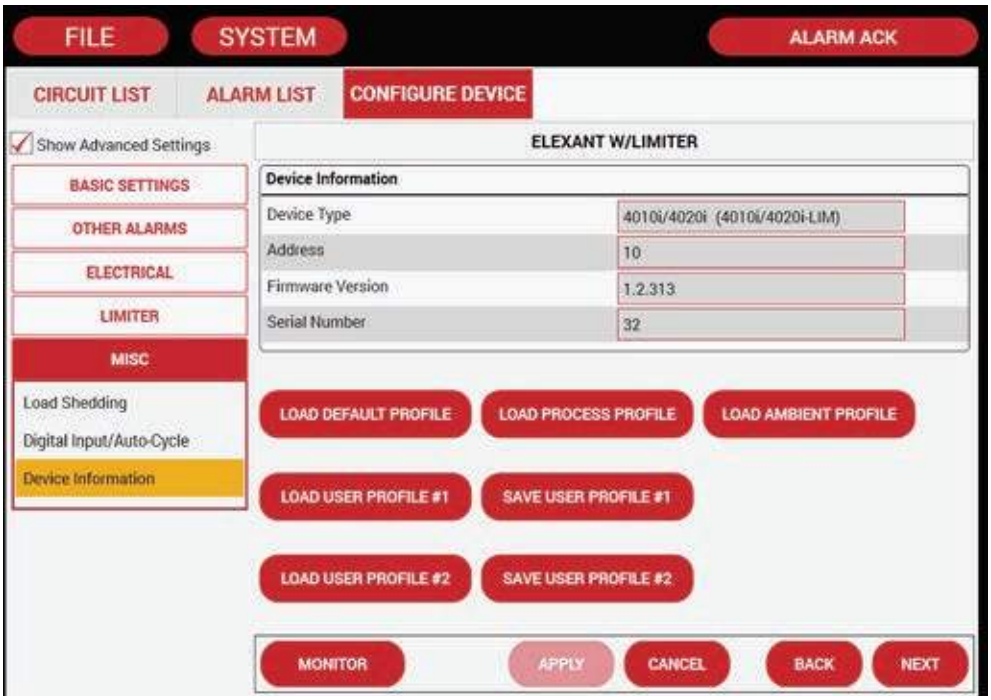


Figure 7.23 Configure Device | Device Information window

Purpose: Allows the user to review the Device Information of Elexant 4010i/ 4020i which are read only parameters. Device Type, Firmware Version and Serial Number are factory configured and cannot be changed.

Load Configuration Profiles

Purpose: A set of default settings are stored in the Elexant 4010i/ 4020i Controller. In addition, users can save custom configuration settings that can be loaded into the Elexant 4010i/ 4020i at a later time. When one of the Load profile button is clicked, all user input data will be erased and the device will be set to the settings of the selected profile.

This section describes the system settings and utilities to configure the TOUCH 1500 to communicate with other devices, security control, and data backup/restore.

8.1 FILE MENU | BACKUP | RESTORE DATABASE, EXPORT EVENT LOG & EXIT PROGRAM

8.1.1 File – Back up Database

Purpose: The TOUCH1500 offers the option to make a backup of the device and settings database to a USB connected flash drive

Figure 8.1 File | Backup Database menu

Procedure: Ensure that a Flash Drive is available in the USB slot. Select File Menu and click on the dropdown menu button Backup Database. Enter drive letter & file name and click OK.

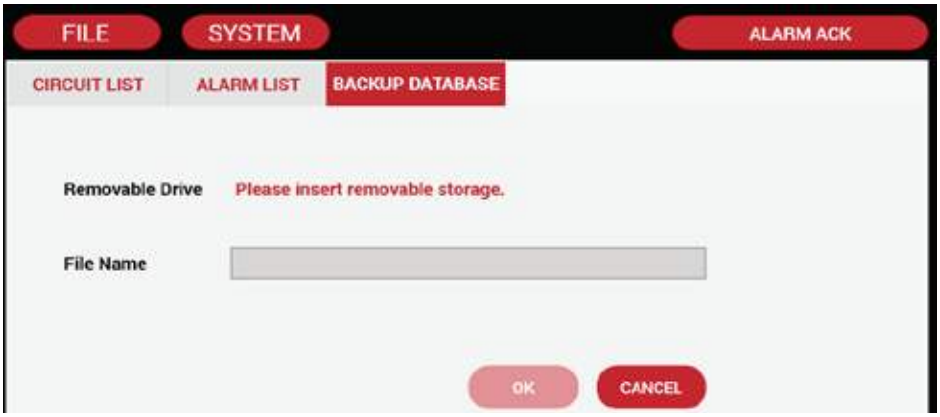


Figure 8.2 File | Backup Database window

8.1.2 File – Restore Database

Purpose: To restore the previously backed up database to the TOUCH1500

Procedure: Ensure that a Flash Drive is available in the USB slot. Select File Menu and Click on the dropdown menu button Restore Database. Enter drive letter & file name and click OK

Figure 8.3 File | Restore Database window

8.1.3 File – Export Event Log

Purpose: To export the event Log such that it can be viewed remotely

Procedure: Ensure that a Flash Drive is available in the USB slot. Select File Menu and click on the dropdown menu button Export Event Log. Enter drive letter & file name and click OK.

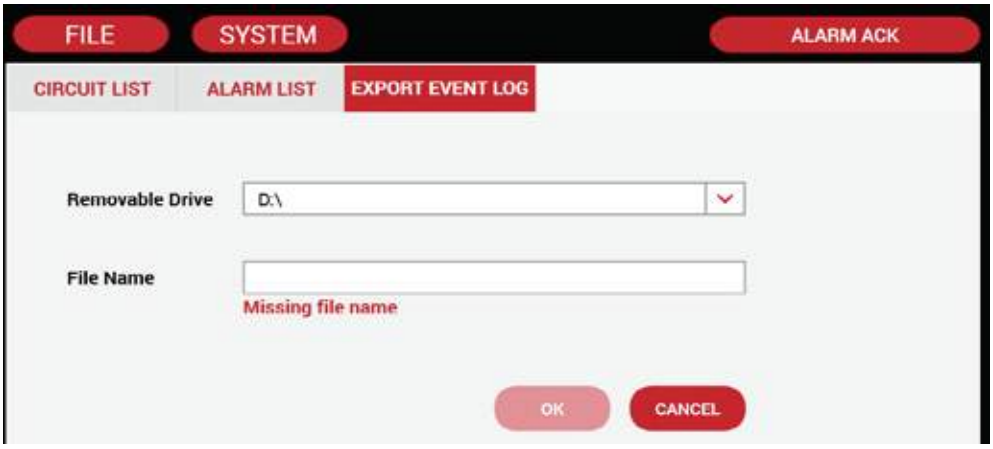


Figure 8.4 File | Export Event Log window

8.1.4 File – Exit Program

Purpose: To exit the TOUCH 1500 software.

Procedure: Click on Exit to exit the program.

8.2 SYSTEM SETTINGS

8.2.1 System | Device Manager Settings

Figure 8.5 System | Device Manager menu

Procedure: Refer to Section 4.2 Configuration of NGC-40-BRIDGE Modules, Section 4.3 Configuration of NGC-40 HTC Modules, Section 4.4 Configuration of NGC-40 HTC3 Modules, Section 5.7 Configuration of the NGC-40 I/O Module, and Section 6.1 for NGC-20/ Elexant 5010i Controllers

8.2.2 System | User Level settings

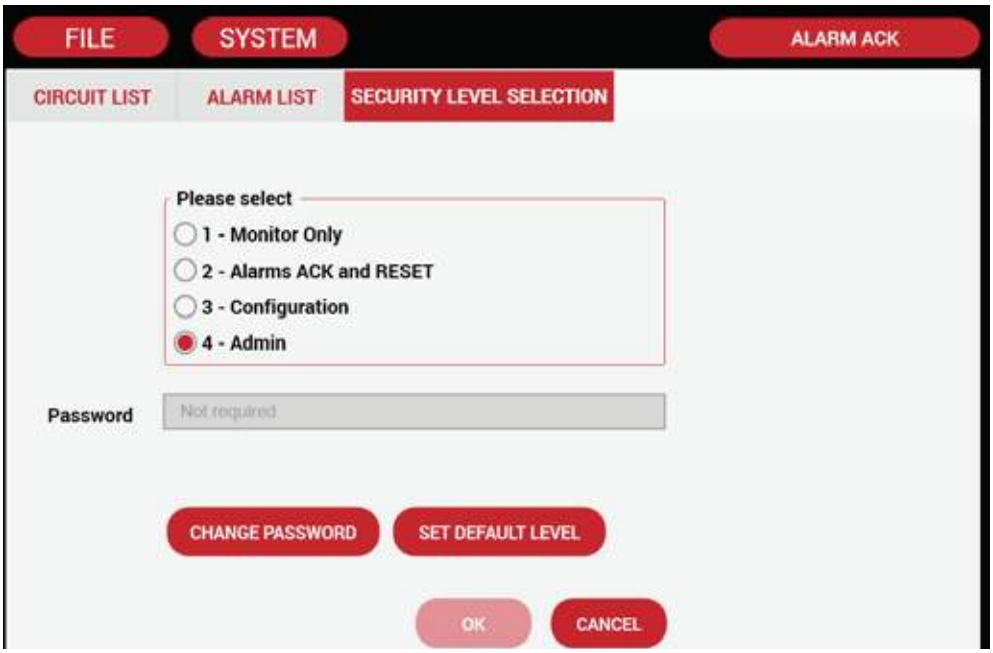


Figure 8.5a System | User Level | Security Level Selection window

Security Level selection

The Security Level selection window allows the user to access the security level and assign passwords for all levels.

The security levels are

1. Monitor Only – Allows the user to monitor all parameters, export event log, change preferences and has access to the user level option to enable the other users to make changes. This option does now allow user to exit the program.
2. Alarms Ack & Reset. – Allows all of the above plus options to acknowledge & reset alarms.
3. Configuration – This level allows the user to all options except to change passwords and exit the program.
4. Admin – All options are enabled at this level.

Change Password: Change password

Purpose: To set password for Level 1 to 4

Procedure: Click Change Password button which will bring up the window as shown below. Select the Security Level from the dropdown list. Options are security level 1, 2, 3, 4. Enter Old Password (blank for a new system) followed by the new password. Confirm new password and click OK to save and exit. Repeat these steps for all levels.

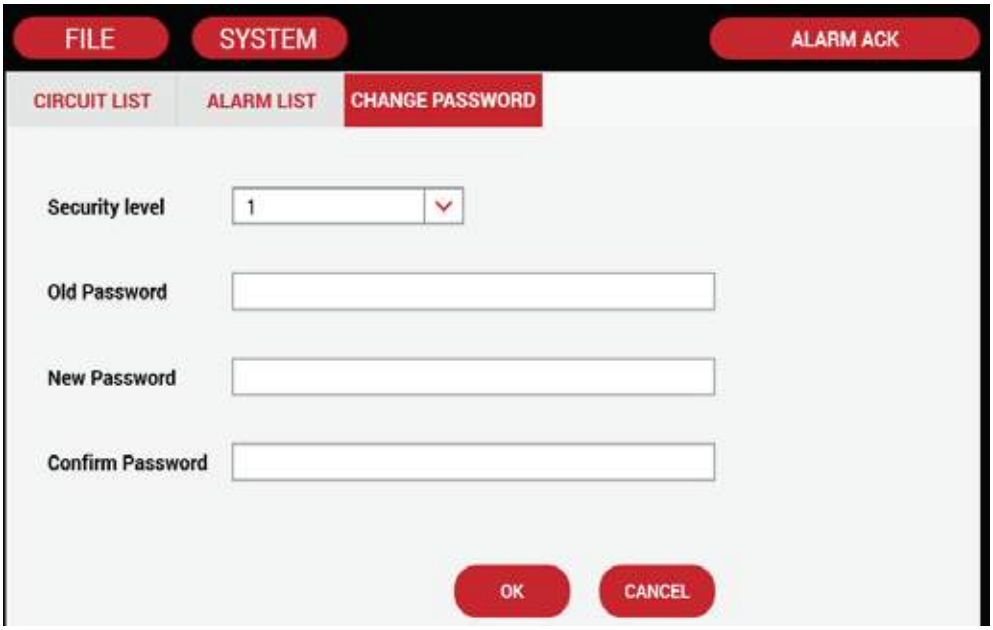


Figure 8.6 System | User Level | Change Password window

Set Default Level: The admin user can set the default level at which the TOUCH 1500 Program will operate on start up.

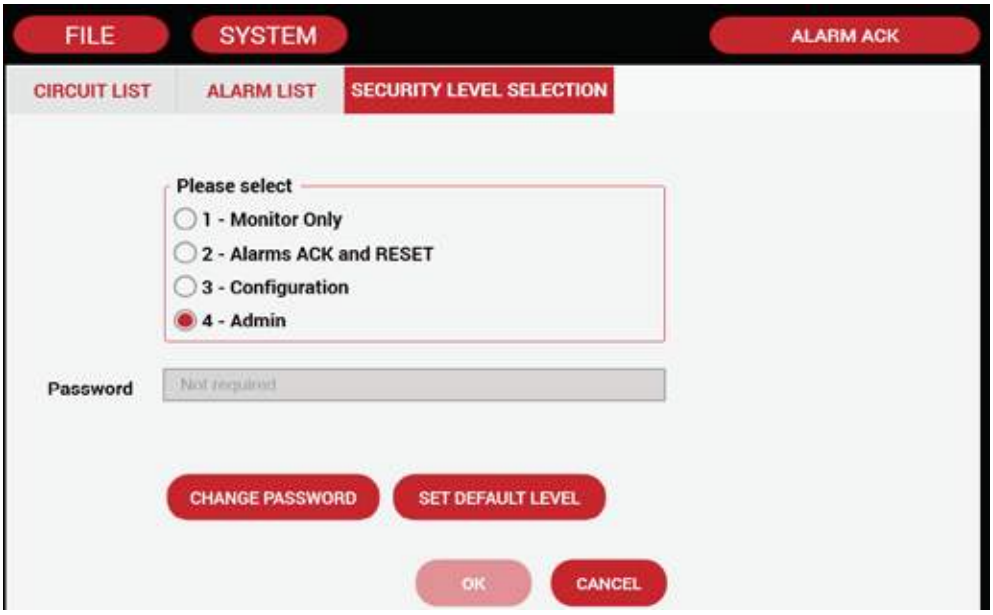


Figure 8.7 System | User Level | Security Level Selection window

8.2.3 System | Group settings

Purpose: To create a GROUP so that devices in a particular area, process etc. can be viewed together.

Figure 8.8 System | Group menu

Procedure: From the drop down menu, select System | Group and enter name and description. Create as many groups as needed and when done click OK to continue.

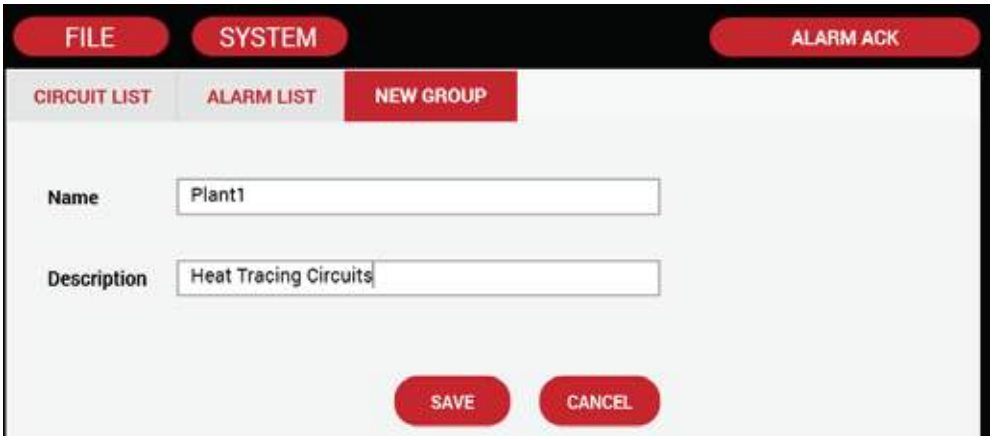


Figure 8.9 System | Group | New Group window

On the next window, select the Group and click on the desired option from the drop down buttons.

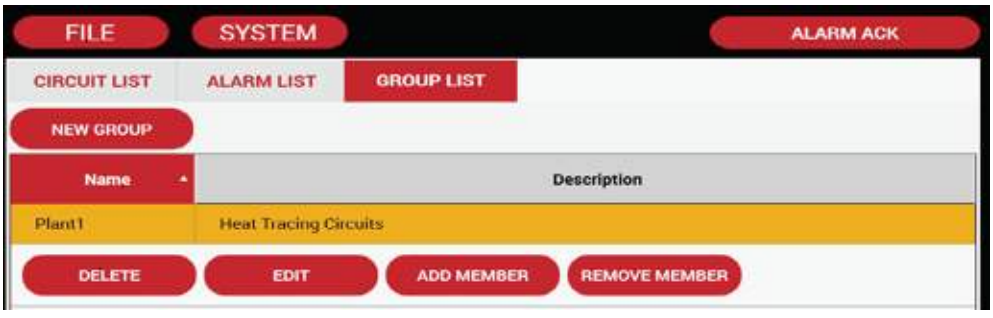


Figure 8.10 System | Group | Group List window

The Delete button on the dropdown menu allows the user to delete the selected group

The Edit button allows editing the group name & description.

Procedure: Click on the Edit button and make the necessary changes in the window below and click Save.

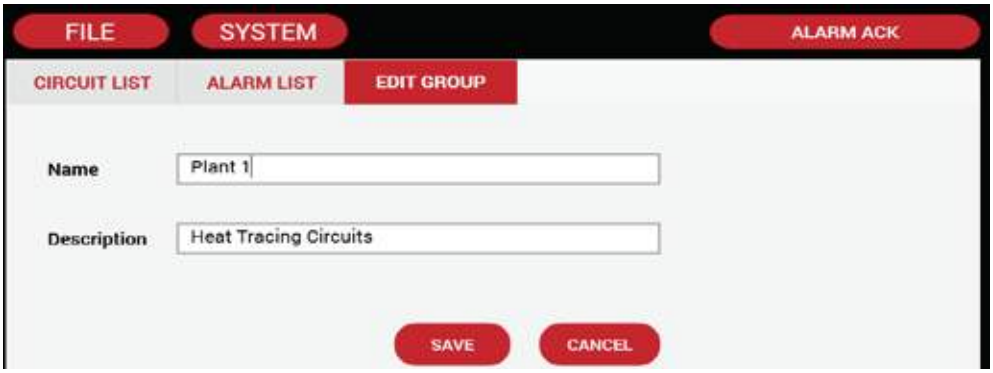


Figure 8.11 System | Group | Group List | Edit Group window

The Add Group Member button allows the heat-tracing circuits to be added into the selected group.

Procedure: Check the boxes against individual circuits or check Select All to include all circuits in that group.

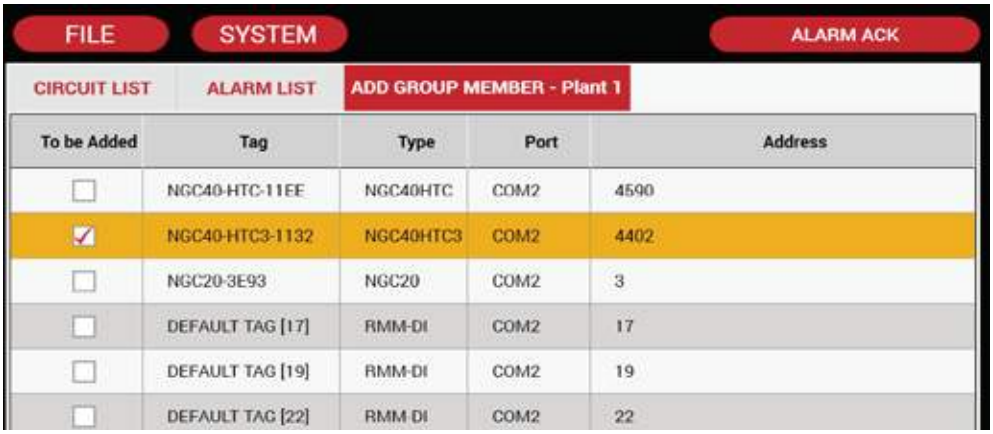


Figure 8.12 System | Group | Group List | Add Member window

The Remove Group Member button allows the Heat Tracing circuits to be removed from the group.

Procedure: Check the boxes on the subsequent window to remove the circuits in that group or check Select All to remove all circuits.

Figure 8.13 System | Group | Group List | Remove Member window

8.3 SYSTEM | SYSTEM ALARM SETTINGS

Purpose: To indicate alarm from either the TOUCH 1500 or from other control panels connected to the TOUCH 1500.

Procedure: From the drop down menu, select System | System Alarms

Figure 8.14 System | System Alarms window

Enter the Modbus address of the External ADAM Module connected to the TOUCH 1500 and select the relay from the drop down list. Check Normally Open/Closed options. By default the alarms are set to turn off when the same is acknowledged on the Touch Window. Uncheck to disable this option. Clicking on Test button will activate the relay and the alarm.

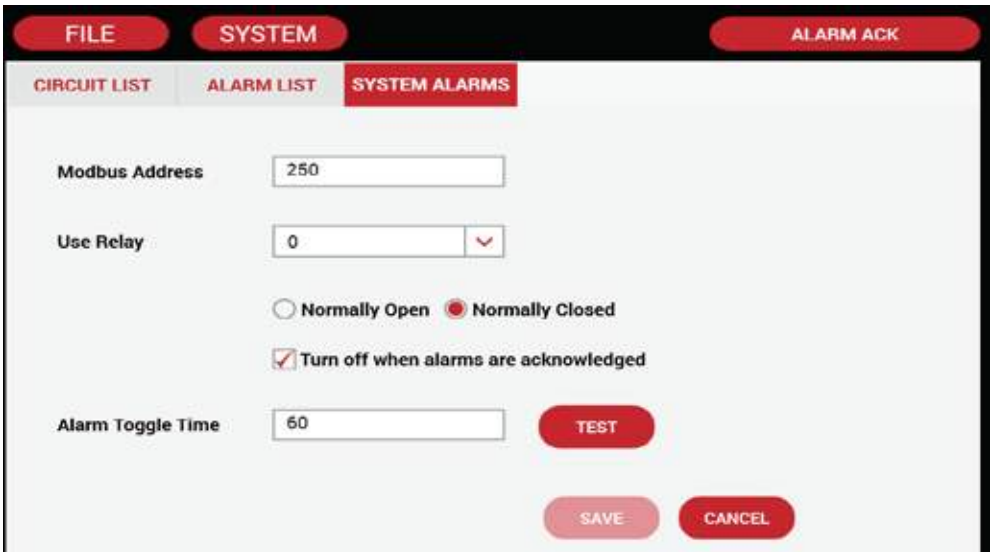


Figure 8.15 System | System Alarms window

8.4 SYSTEM | COMMUNICATION SETTINGS

Purpose: To set the Serial port and other settings so that the TOUCH 1500 can communicate with the Bridge and other devices

Procedure: Please refer to Section 4.2.2 Communication Ports – Serial (COM Ports 1, 2 & 3) and Ethernet on page 27.

Figure 8.16 System | Communication Setup Serial Port menu

8.5 SYSTEM | PREFERENCES

Purpose: To set the Language, Temperature Units, User activity timeout & Time/Date

Procedure: Please refer to Section 4.1.7 Configuration of System Preferences on page 25.

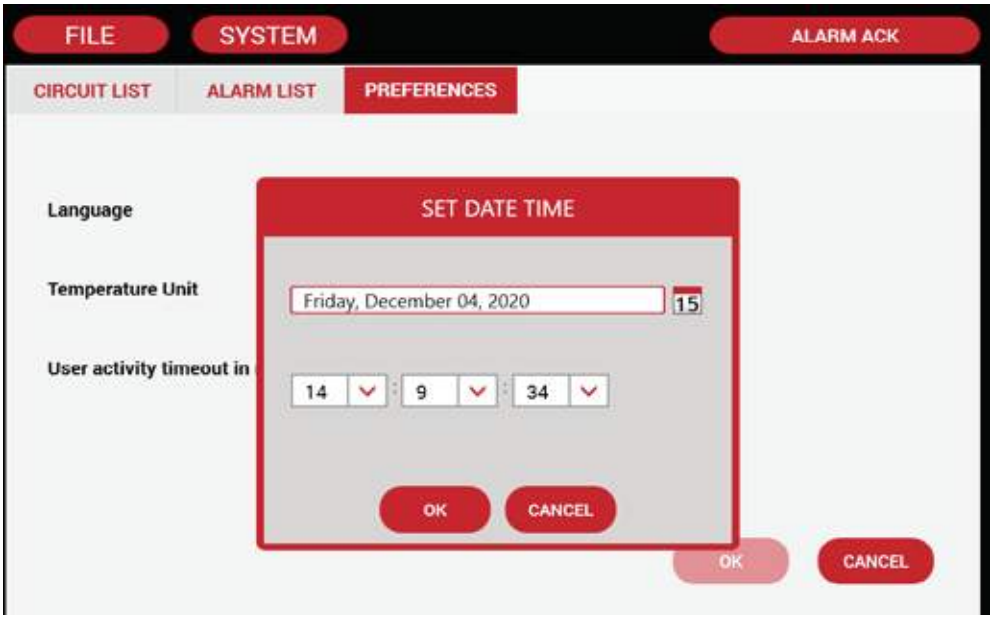


Figure 8.17 System | Preference window

8.5.1 Operations

The default window is shown below. Individual circuits can be accessed by selecting the same and clicking on the Overview button.

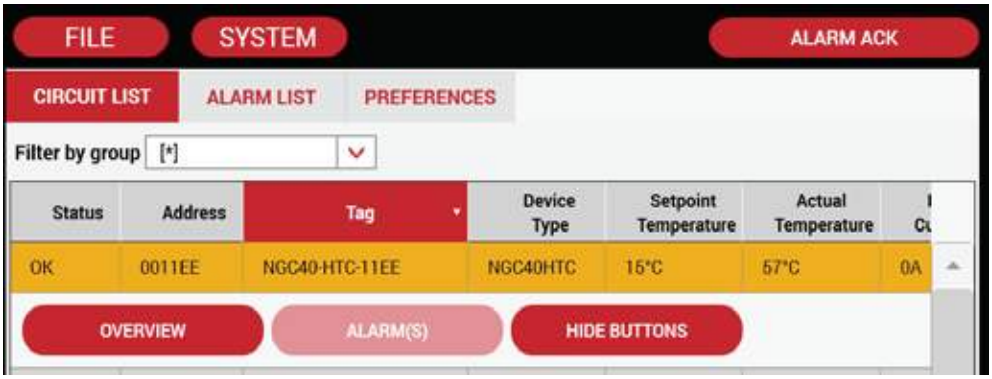


Figure 8.18 Circuit List window (default window)

8.5.2 Circuit Overview of HTC

Purpose: To get an overview of the heat-tracing circuit which brings up all the parameters and also make the following minor changes directly on this page;

1. Control Temperature Setpoint
2. Low Alarm Setpoint
3. High Alarm Setpoint
4. Ground-Fault Trip Setpoint
5. Ground-Fault High Alarm
6. Line Current Low Alarm Setpoint

Procedure: As explained under Section 3.

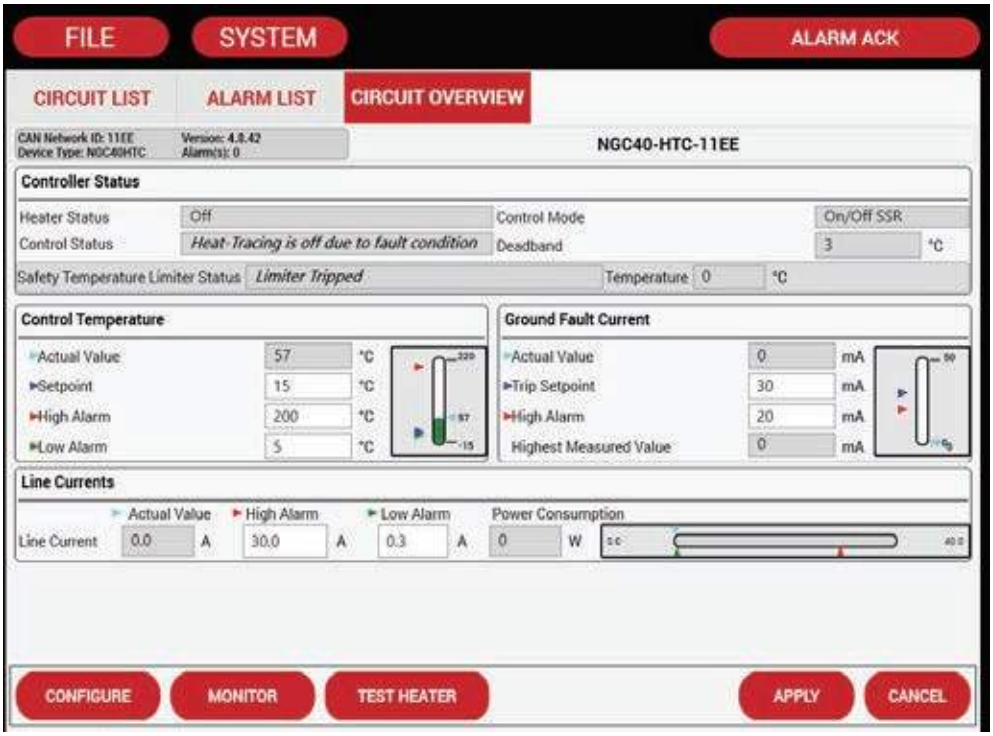


Figure 8.19 Circuit List | Circuit Overview window

Test Heater: The Test Heater feature provides an easy method of temporarily overriding the temperature control, without having to modify the Control Temperature Setpoint or any other configuration parameter. The function will force the output switch on for the specified interval. After the test time has expired, the HTC will automatically revert back to normal operation.

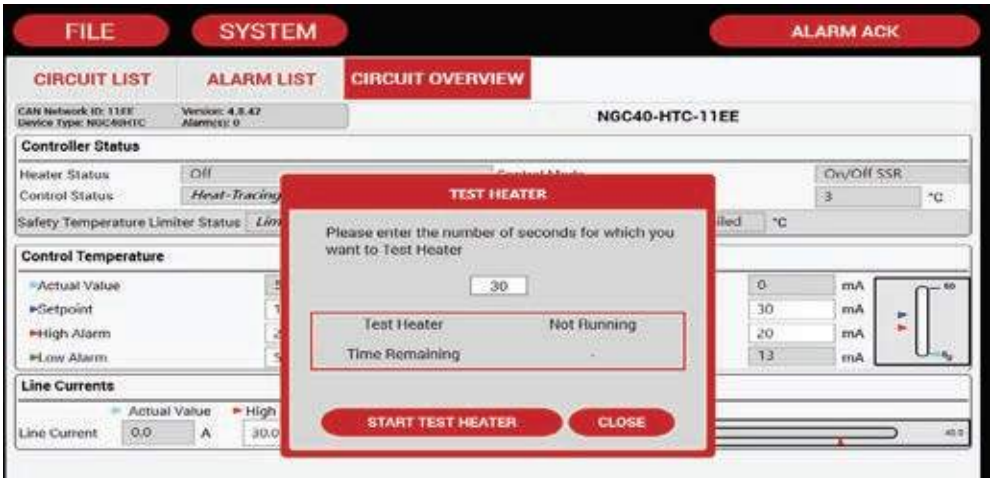


Figure 8.20 Circuit Overview Test Heater window

IMPORTANT: This feature only overrides temperature control, it does not override other control parameters such as power limiting.

Config: On clicking the Config button, the user will be directed to the Configuration menu as explained under Section 3.

Monitor: On clicking the Config button, the user will be directed a sequence of windows showing various parameters

Monitor Device – Monitor Data – Control temperature: The default Monitor window shows Control Temp and other Temp settings and readings.

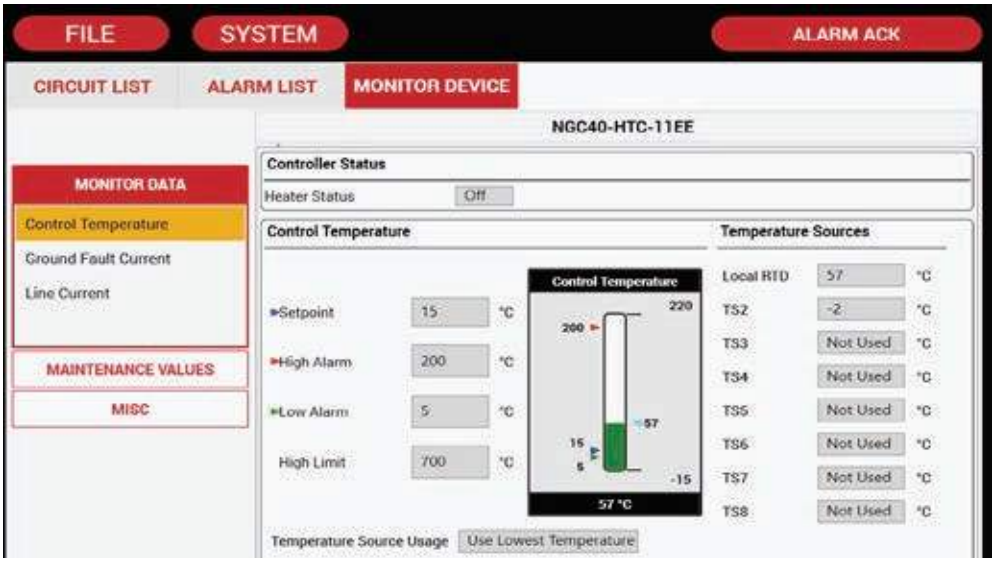


Figure 8.21 Monitor Device | Control Temperature window

Monitor Device – Monitor Data – Ground-Fault Current: This selection allows the user to monitor GF settings and current levels.

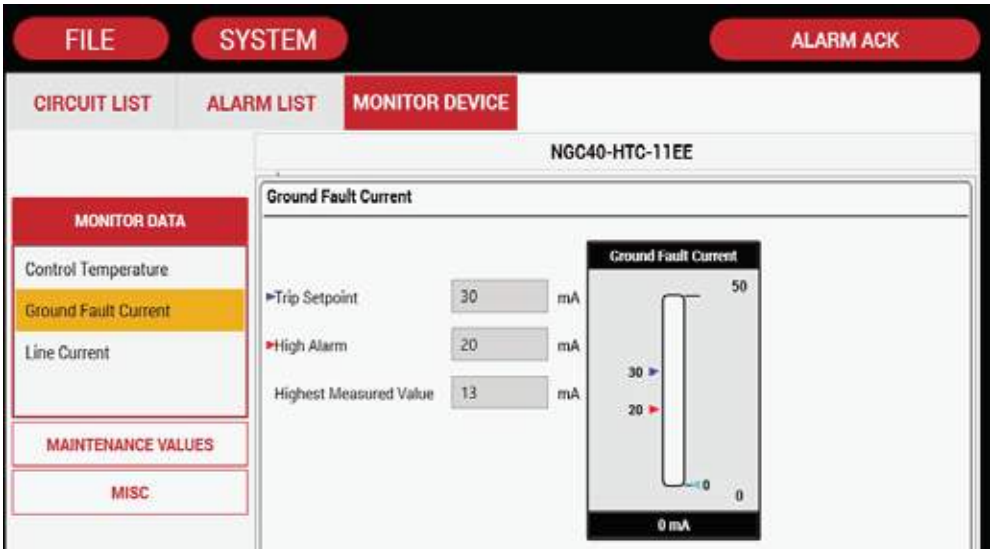


Figure 8.22 Monitor Device | Ground-fault Current window

Monitor Device – Monitor Data – Line Current: This selection allows the user to monitor Line Current Settings and current levels.

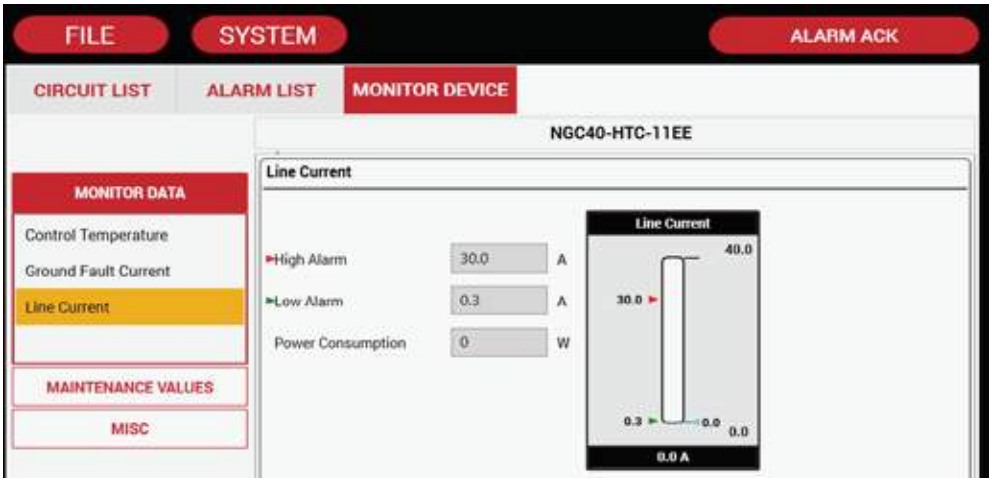


Figure 8.23 Circuit List | Monitor Device | Line Current window

8.5.3 Monitor Device – Maintenance Values 1

Maintenance Information 1

Power Accumulator

Purpose: This feature indicates the total power consumption of the heat-tracing circuit since the last time the Power Accumulator was reset. It may be useful to log the amount of power consumed on a particular heat-tracing circuit for the purposes of energy management or gathering of data for future design criteria. The value of this accumulator is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user.

Heater On Time

Purpose: Represents the number of hours that the trace has spent energized

Procedure: The In Use hours accumulator can be reset to zero using Reset Maintenance Information.

Contactor Cycle Count

Purpose: This feature indicates the total number of off-to-on transitions an EMR has done since the last time the Contactor Cycle Counter was reset. This serves as a method to do preventative maintenance on the EMR according to the manufacturer's specifications. This count value is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user.

IMPORTANT: Once the Contactor Cycle Counter reaches 999,999,999 it will stop counting.

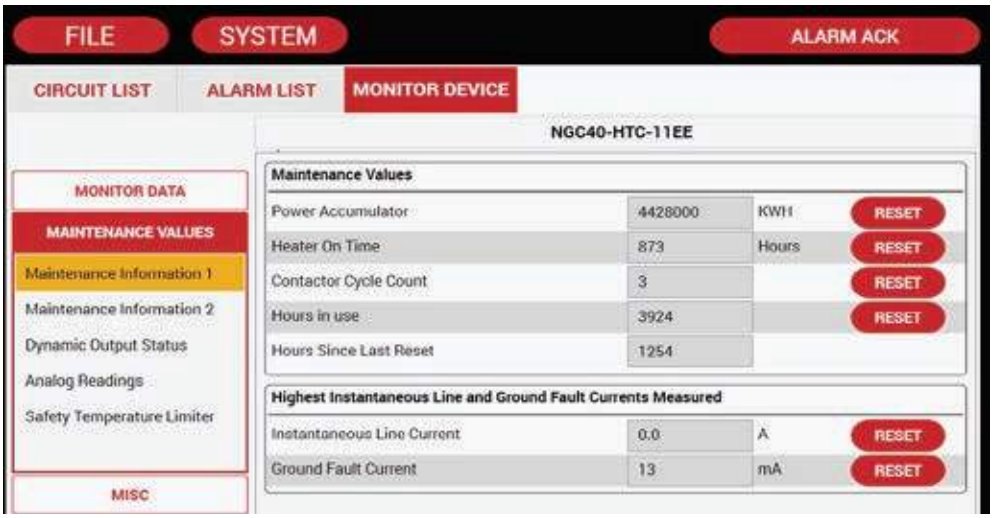


Figure 8.24 Monitor Device | Maintenance Information window

Number of Hours In

Purpose: The purpose of this feature is to indicate the total hours of use of the controller since its initial operation. It may be useful to log the amount of time a particular controller has been in operation for the purposes of maintenance planning or reliability testing. The value of this accumulator is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user.

Procedure: The In Use hours accumulator can be reset to zero using the Reset Hours in Use button.

Number of Hours Since Last Reset

Purpose: This feature indicates the total hours of use of the controller since the last reset. It may be useful to log the amount of time a particular controller has been in operation since the last time the controller's power was cycled for trouble-shooting purposes.

Procedure: The Time Since Last Reset hours accumulator can only be reset by cycling the controller's power.

Highest Instantaneous Line Current Measured

Purpose: This feature indicates the highest instantaneous load current measured since the last time the Peak Line Current was reset. This value is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user

Procedure: The highest Instantaneous Line Current Measured can be reset via the Reset Line Current button.

Highest Instantaneous Ground Fault Ever Measured

Purpose: This feature indicates the highest instantaneous ground-fault current measured since the last time the Peak Ground- Fault Current was reset. This current value is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user.

Procedure: The highest Instantaneous Ground Fault Ever Measured can be reset via the Reset Ground-Fault Current button.

8.5.4 Monitor Device – Maintenance Values 2

Maintenance Information 2

Purpose: This feature indicates the maximum and minimum temperatures ever recorded by the HTC since the last time the values were reset. It may be useful to log the maximum/minimum temperatures ever experienced on a particular trace circuit for the purposes of trouble shooting or gathering data for future design criteria. The temperature values are written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user. Max/min temperatures are recorded for the local RTD and Control Temperatures. Temperature measurements can be reset via the buttons on the window.

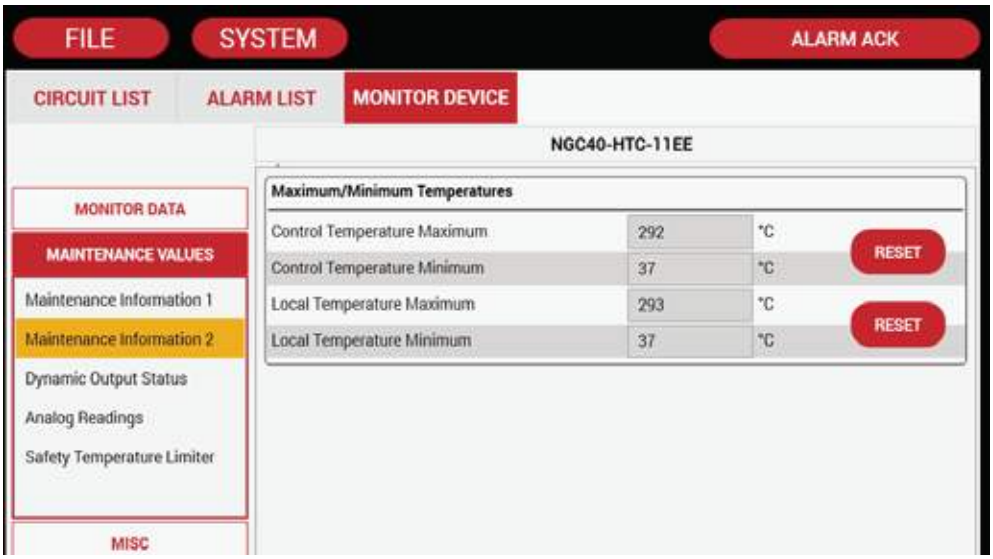


Figure 8.25 Monitor Device | Maintenance Information 2 window

8.5.5 Monitor Device – Maintenance Values - Dynamic Output

Dynamic Output Status

Control Output Duty Cycle: 0 to 100% 0 = Full Off, 100 = Full On

Switch Status: The current state of the trace switch

PASC Values

PASC On Count: The number of seconds of on-time during the currently calculated PASC cycle

PASC Off Count: The number of seconds of off-time during the currently calculated PASC cycle

PASC Next Switch Action: The number of seconds until the next switch-state change.

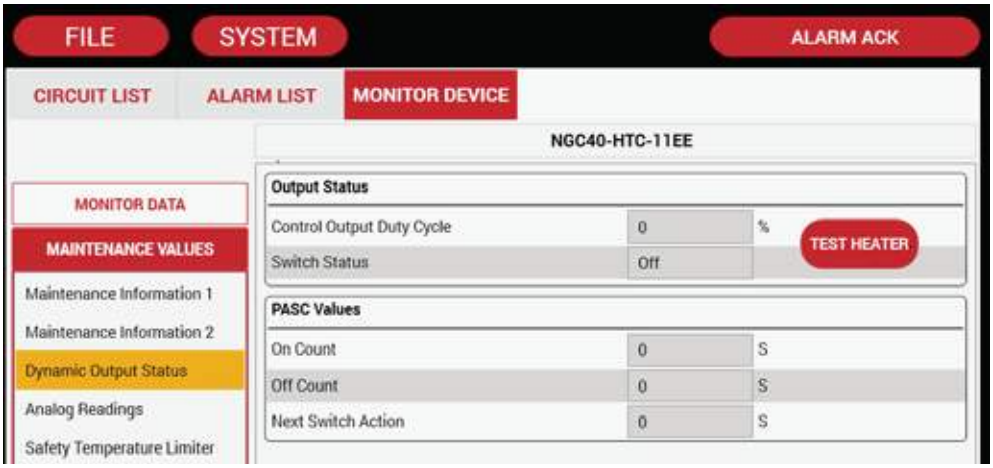


Figure 8.26 Monitor Device | Dynamic Output Status window

8.5.6 Analogue Readings

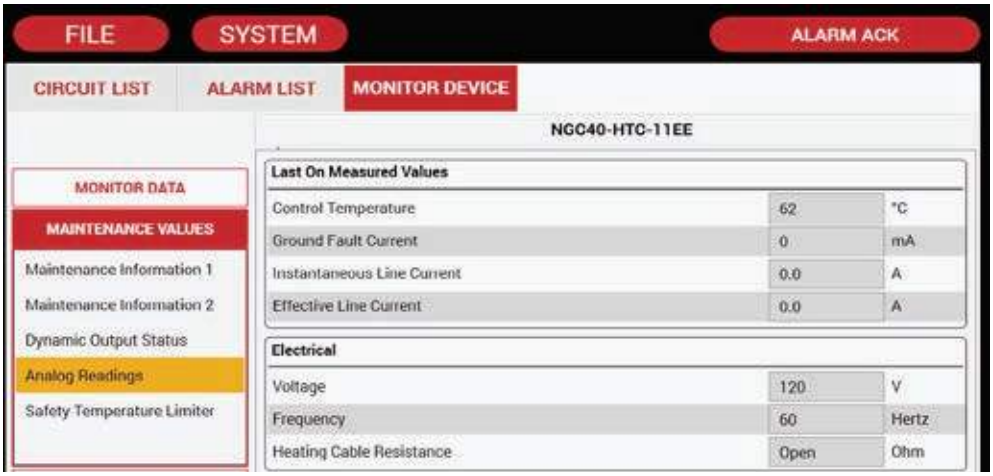


Figure 8.27 Monitor Device | Analog Readings window

Last On Measured Values

Control Temperature

Purpose: This is the temperature that the controller uses to determine whether its output switch should be on or off. It is derived from a combination of the 8 configurable temperature sources.

Ground-Fault Current in milliamps.

Line Current: This is the instantaneous current (equals full Line Current) in A.

Effective Line Current: This is the effective current (equals full Line Current multiplied by the output duty cycle) in A.

Monitor Device – Maintenance Values

Safety Temperature Limiter

Purpose: This option provides information on the Safety Temperature Limiter settings, the present Temperature values and the status of the Safety Temperature Limiter. If the Status reads Tripped, then the limiter can be reset by clicking on the Reset Tripped Safety Temperature Limiter button.

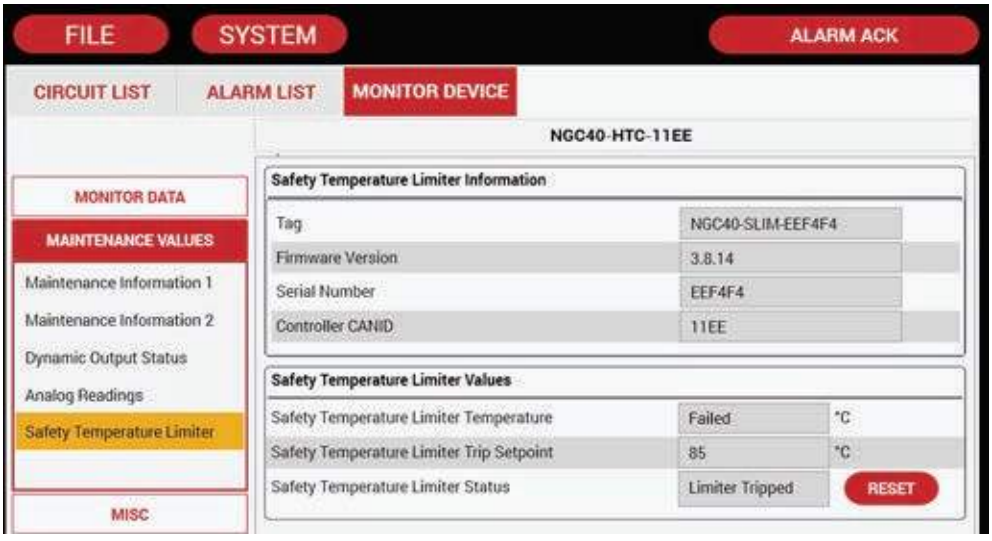


Figure 8.28 Monitor Device | Safety Temperature Limiter window

Procedure: Click on Reset Tripped Safety Temperature Limiter button and a dialogue box will appear as below. On selecting Yes, another dialogue box will provide an unique 3 digit number (this number is dynamic and will change on subsequent tries/operations). Enter the number using the dropdown keypad and click OK to reset the limiter.

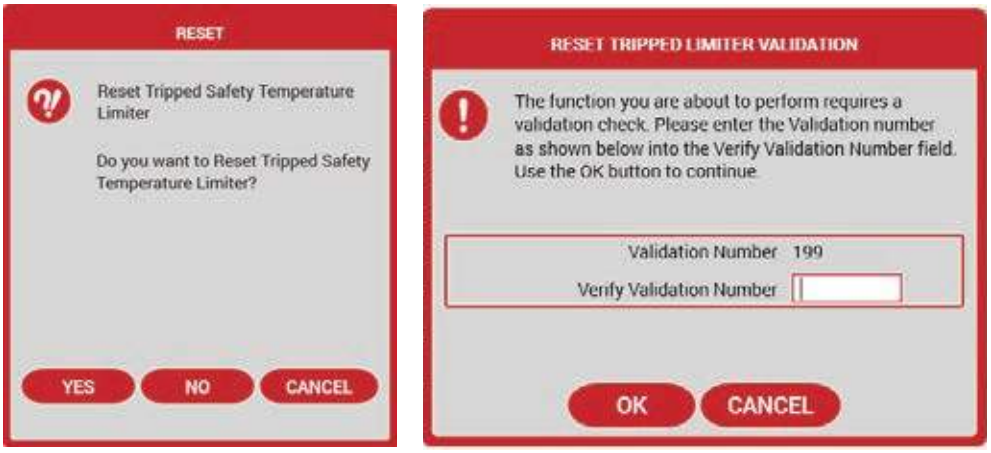


Figure 8.29 Monitor Device | Safety Trip Limiter Reset Limiter window

8.5.7 Monitor Device – Maintenance Values

Device Information

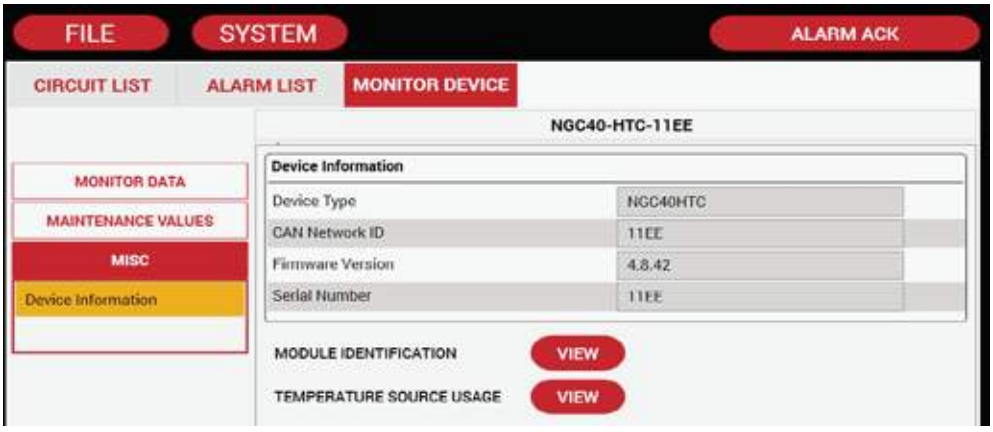


Figure 8.30 Monitor Device - Miscellaneous window

Purpose: To provide details of the device, identify the same in HT panel and to look up the temperature source usage

Procedure: Click on Module Identification button and select the test duration from the pop up menu. Options are 1 to 5 minutes. Click Start and observe the modules inside the panel. The LEDs on the appropriate module will flash. This will help identify the module. Once identified either wait to complete the identification process or Click Stop to stop the same.

Figure 8.31 Monitor Device | Miscellaneous - Module Identification window

Procedure: Click on Temperature Source Usage button to bring up the window which will show the Temperature Sensor Source Usage. If an RTD is connected to the HTC, it will always show up as Source 1.

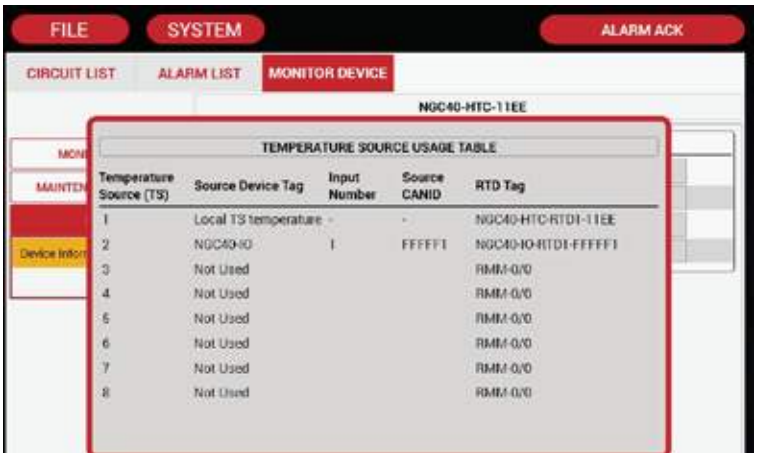


Figure 8.32 Monitor Device | Miscellaneous - Temperature Source Usage window

8.5.8 Circuit Overview of HTC3

Purpose: To get an overview of the heat-tracing circuit which brings up all the parameters and also make the following minor changes directly on this page the information is TYP to single phase HTC except for Line Current

Line Currents: Low Alarm Setpoint for Phase 1 (Line 1), 2, 3

Procedure: Click on the values to be changed and input new values as explained under Section 3.

Test Heater: Follow the procedures as described for the NGC-40-HTC module.

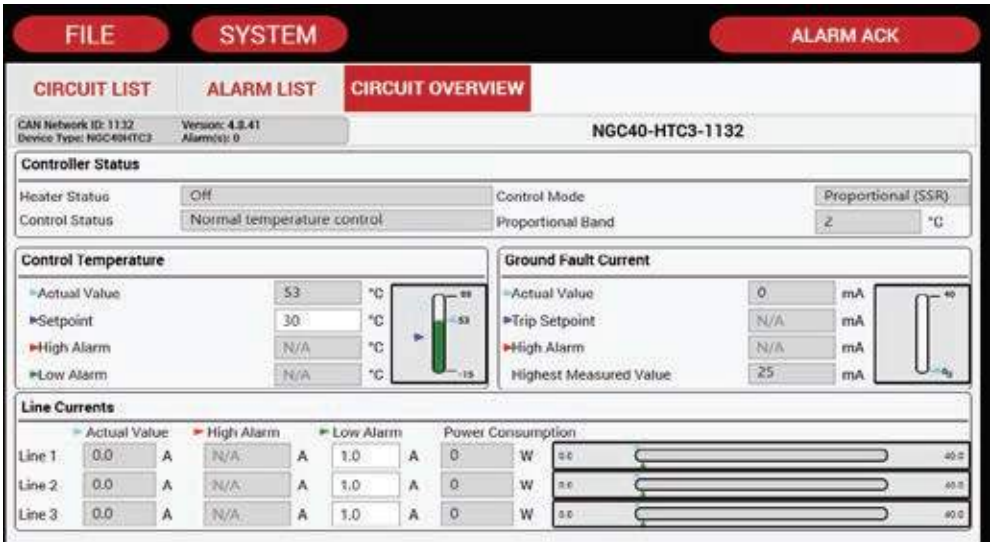


Figure 8.33 Circuit List | Current Overview window for HTC3

Config: On clicking the Config button, the user will be directed to the Configuration menu as explained under Section 3.

Monitor: On clicking the Monitor button, the user will be directed a sequence of windows showing various parameters

Monitor Device – Monitor Data – Control temperature: The default Monitor window shows Control Temp and other Temp settings and readings TYP to Single phase HTC, Figure 8.33.

Monitor Device – Monitor Data – Ground-Fault Current: This selection allows the user to monitor GF settings and current levels TYP to Single phase HTC, Figure 8.33.

Monitor Device – Monitor Data – Line Current: This selection allows the user to monitor Line Current settings and current levels of all the three phases, Figure 8.33 and 8.34.

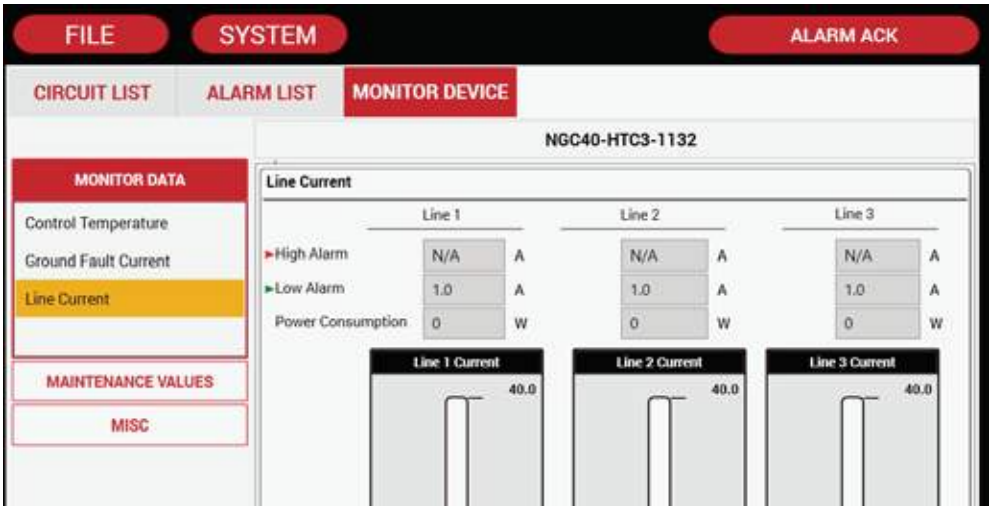


Figure 8.34 Monitor Device | Line Current window for HTC3

8.5.9 Monitor Device – Maintenance Values 1

Maintenance information 1

Line 1, 2, 3 Power Accumulator

Purpose: This feature indicates the total power consumption of the trace circuit since the last time the Power Accumulator was reset. It may be useful to log the amount of power consumed on a particular trace circuit for the purposes of energy management or gathering of data for future design criteria. The value of this accumulator is written to the controller's non-volatile memory once every 24 hours or whenever any maintenance data is reset by the user.

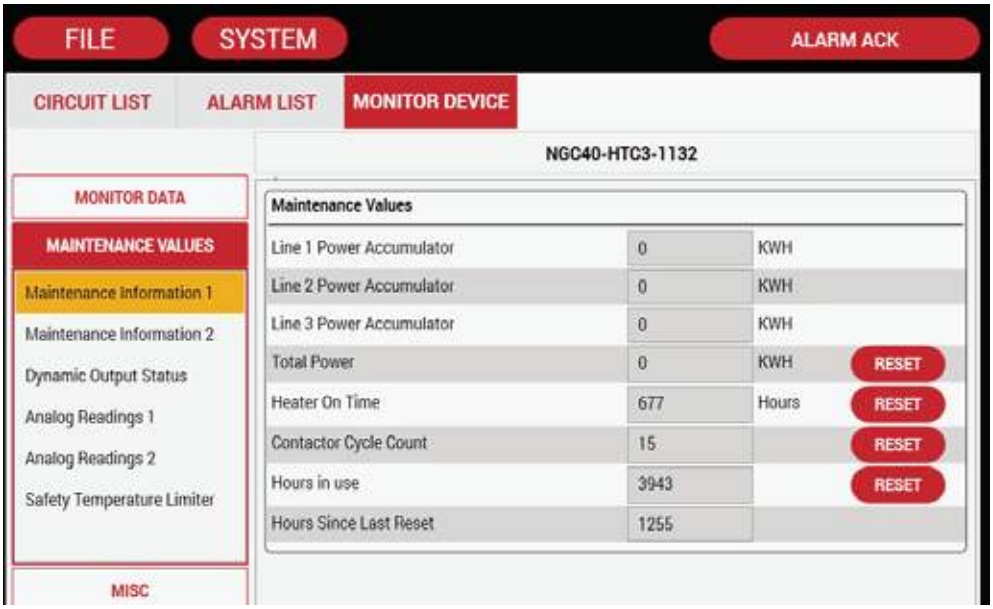


Figure 8.35 Monitor Device | Maintenance Information 1 for HTC3

8.6 SYSTEM | DCS GATEWAY

The DCS Gateway option if enabled in the Touch 1500 will allow remote data access of Heat Trace Circuit information for upstream devices such as DCS system and other systems that can communicate with the Touch 1500 using the Modbus communication protocol. For more information on how to setup and enable the DCS Gateway in the Touch 1500, please see Section – 8 Remote Data Access With the DCS Gateway.

SECTION – 9 REMOTE DATA ACCESS WITH THE DCS GATEWAY

The DCS Gateway was introduced in nVent RAYCHEM Touch 1500 version 2.2. It is a feature that must be enabled before it can be used. If there is a need for remote data access of Heat Trace information directly from the Touch 1500 system, the DCS Gateway in the Touch system provides this capability. This section explains what the DCS Gateway is, how to set it up and how to use it for every day operation. For more detail information of the DCS Gateway, please see Appendix C DCS Gateway.

9.1 OVERVIEW

Remote Data Access (RDA) can be used to link one or more central control systems for continuous monitoring, control and data acquisition. For example in many industrial applications, devices such as PLC(s), remote IO(s), Sensors, Actuators, etc. are continuously being monitored and controlled via SCADA and DCS Systems. With the addition of the DCS Gateway functionality in the Touch 1500, nVent Heat Trace systems can now be an integral part of the overall control systems in the plant.

In order to setup the Touch 1500 with the DCS Gateway functionality enabled for remote data access, some knowledge of the overall system architecture is beneficial. An example would be how the Touch 1500, the NGC heat trace systems and the DCS systems are connected together. In addition there are a specific set of instructions that must be followed to make everything work together. This is described in more detail in Section 9.2 General Work Flow Required for Setup and Operation. The rest of this section explains how to setup and use the DCS Gateway. For details on the overall system architecture, please see Appendix C.2 System Architecture.

9.2 GENERAL WORK FLOW REQUIRED FOR SETUP AND OPERATIONS

In order to take full advantage of the remote data access capability provided by the DCS Gateway, please follow the work flow presented in this section.

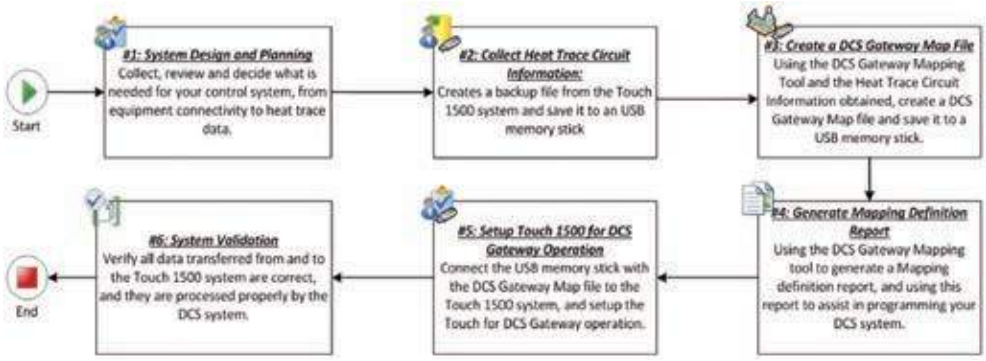


Figure 9.1 Work Flow for Touch 1500 Setup with DCS Gateway Operations

Step	Name	Description
1	System Design and Planning	It is generally a good idea to do some preplanning before the start of any project. This step is to collect, review and decide on what is needed for your control system, from equipment connectivity to heat trace circuit data requirements.
2	Collect Heat Trace Circuit Information	In most cases it is simpler to obtain the heat trace circuit information from the database in the Touch 1500 system. This information is necessary for the creation of the DCS Gateway Map file. A DCS Gateway Map file is a file that contains mapping definitions. Each Mapping definition associates a Modbus register or coil to a parameter/ field of a Heat Trace controller (i.e. control setpoint, or control temperature, or High Current alarm for circuit with tag Id LINE2A_ CIRCUIT). The circuit tag Id is used to associate the device and it must be correct in order for the DCS Gateway to locate the circuit in the system. In addition, the DCS system that will be remotely accessing the heat trace information must know about this mapping definition.

3	Create a DCS Gateway Map File	A separate tool named DCS Gateway Mapping Tool is used to create the customized DCS Gateway Map file. The Heat trace circuit information obtained in Step #2 will be used to help to define the mapping definitions.
4	Generate Mapping Definition Report	With the DCS Gateway Mapping Tool the DCS Gateway Map report will be generated. With the mapping definitions in the report the connection in DCS System can be created.
5	Setup Touch 1500 for DCS Gateway Operation	With the DCS Gateway Map File created in Step #3, Touch 1500 communication can be setup and enables the DCS Gateway for operation.
6	System Validation	The final step is to perform data validation to ensure everything is working as expected. The data for the DCS Gateway needs to be reviewed and verified that it's correctly processed for both reading and writing from and to the Touch 1500.

9.3 CREATING THE DCS GATEWAY MAP FILE

A DCS Gateway Map file is needed to setup and enable the DCS Gateway for operation. A DCS Gateway Map File is a file containing the mapping definitions of Heat Trace circuit data and their Modbus register/coil assignments. A Heat Trace circuit data is the name to identify a particular field/parameter for a circuit/device. For example, if the DCS System requires read/write access to the Control Setpoint of a Circuit with the tag 'LINE2A_CIRCUIT', a Heat Trace Circuit data that include this information needs to be created, followed by assigning the heat trace circuit data to a Modbus register; for example to holding register starting at address 40001. In a typical DCS Gateway Map file, there will be many of these mapping definitions. In order to make the task of creating and editing the mapping definitions as simple as possible, the DCS Gateway Mapping Tool has been created for that purpose. Please contact you nVent representative for more information. For more information on mapping definitions see Appendix C.2 DCS Gateway Map.

9.4 SETTING UP THE DCS GATEWAY FOR OPERATION

The DCS Gateway is disabled by default and must be enabled to be in operation. Users that DO NOT require the DCS Gateway functionality please skip this section. This section explains how to setup and enable the DCS Gateway for operation. Before starting the setup, ensure a DCS Gateway Map file is available. For more information on creating a DCS Gateway Map File, please see section 9.3 Creating the DCS Gateway Map File.

9.4.1 Setting up the DCS Gateway

Go to System | DCS Gateway | Load Gateway File

For the very first time, the DCS Gateway Map field will be blank and the Gateway Enabled is default to No, as shown below:

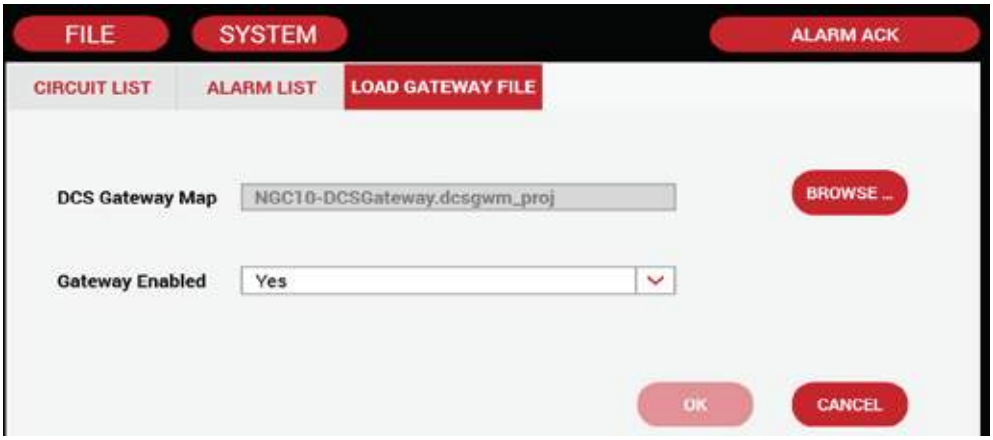


Figure 9.2 Load Gateway File screen

DCS Gateway Map

Purpose: A DCS Gateway Map is required in order for the DCS Gateway to be in operation. A DCS Gateway Map needs to be created with the DCS Gateway Mapping Tool as describes in section 9.2 Creating DCS Gateway Map File. A DCS Gateway Map holds the mapping definitions of the Modbus data register/coil associated with the Heat Tracing circuit data of the Touch 1500 system.

Procedure: This field displays the current DCS Gateway Map File used by the DCS Gateway. This field is read only. In order to select or change the DCS Gateway Map File, use the Browse button located to the right of this field (i.e. See Section 9.3.2 Selecting and Viewing a DCS Gateway Map File). When finished, touch the OK button to save the settings.

Default: Blank for the very first time or the current DCS Gateway Map File the next time around.

Gateway Enabled

Purpose: This field is used to enable or disable the DCS Gateway. If the DCS Gateway functionality is not required set this to No. If the DCS Gateway functionality is required, then set this to Yes.

Note: More computer memory and processing power is required to run the DCS Gateway. If the DCS Gateway function is not required in the control application, leave the setting as default.

Procedure: Touch any part of the Gateway Enable selection area. A drop down list displaying Yes and No appears. Make the selection. When finished, touch the OK button to save the settings. Please note the DCS Gateway Map field must NOT be blank otherwise the OK button will not be not accessible.

Default: No.

9.4.2 Selecting and Viewing a DCS Gateway Map File

This section describes how to select or view a DCS Gateway Map File.

Go to System | DCS Gateway | Load Gateway File

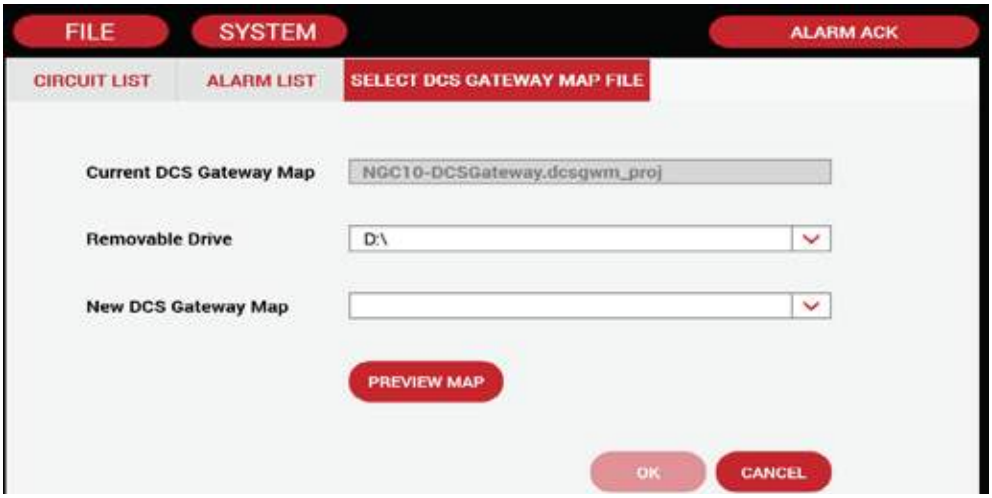


Figure 9.3 Select DCS Gateway Map File screen

Purpose: The Select DCS Gateway Map File screen allows the user to select a DCS Gateway Map to be used by the DCS Gateway, or to select a different DCS Gateway Map to use.

Procedure: Ensure that a Flash Drive is available in the USB slot. Select System menu and click on the dropdown menu button DCS Gateway. The Load Gateway File screen will appear. On the Load Gateway File screen touch the Browse button to bring up the Select DCS Gateway Map File screen. Select a removable drive then select the DCS Gateway Map file. Click OK to save. This will return you to the Load Gateway File screen with the selected DCS Gateway Map file displayed in the DCS Gateway Map field.

Preview Map Button

Purpose: To view the contents of a DCS Gateway Map File.

Procedure: The 1st step is to select a DCS Gateway map file to view. Then touch the Preview Map button to display the contents of the selected DCS Gateway Map file. The Preview DCS Gateway Map screen has 2 tabs, a General and Map Region tab. The General tab displays the name and description of the selected DCS Gateway map file. The Map Region tab displays map region information for 1 map region. To view a different Map Region, touch the Name field to select a different Map Region. If there are errors with a Map Region, it will be highlighted in Red text. The actual error message will be displayed on the screen after this map region is selected.

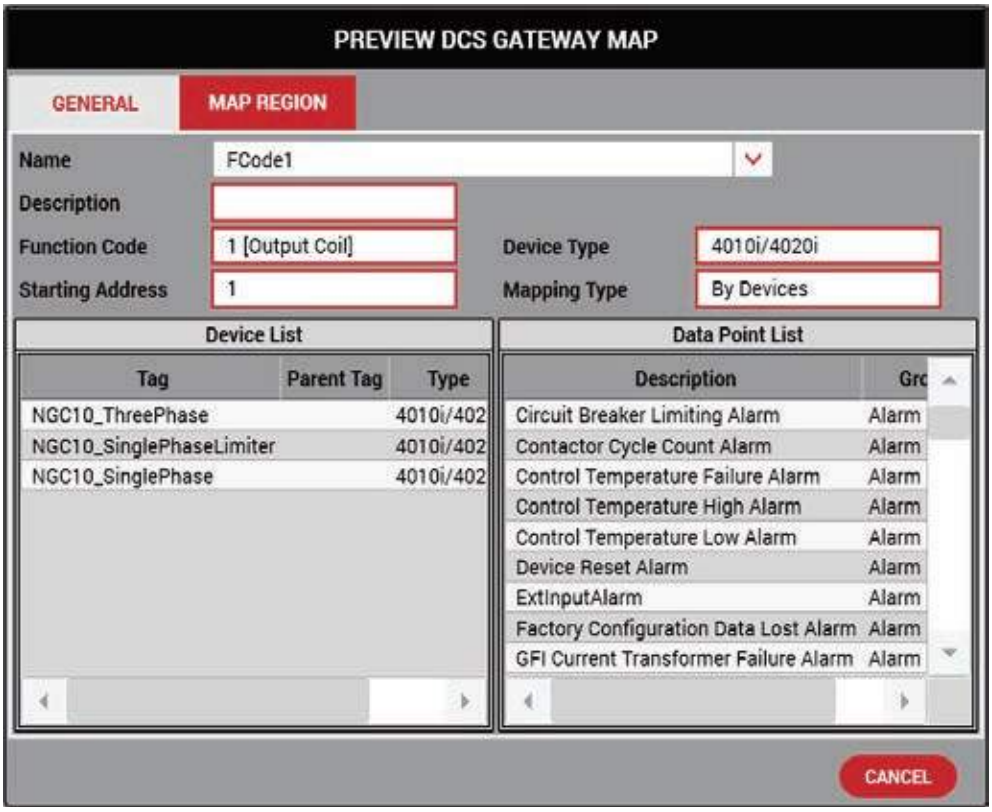


Figure 9.4 Preview DCS Gateway Map

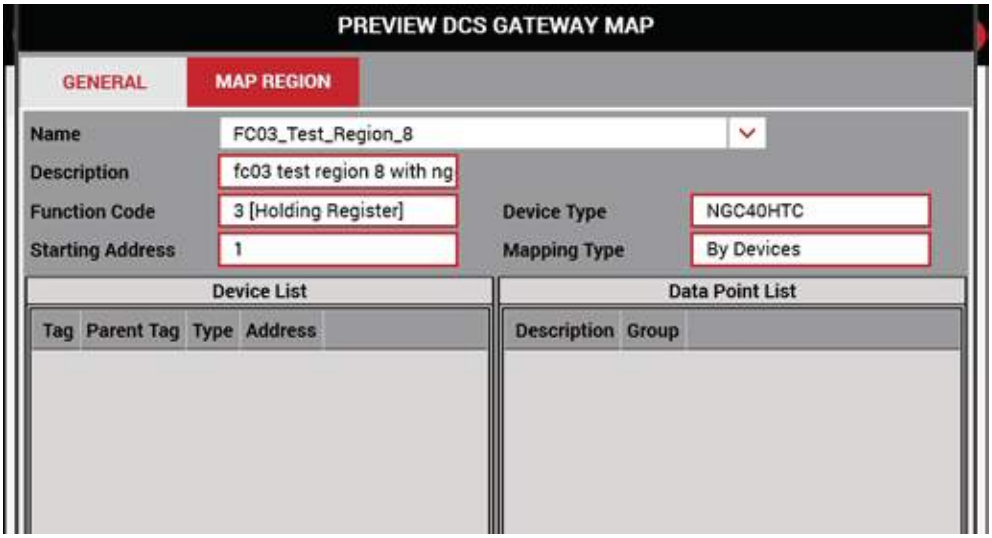


Figure 9.5 Map region with Errors

9.4.3 Creating a DCS Gateway Port

A DCS Gateway Port provides the communication channel required for communications between the DCS Gateway and the DCS System. A DCS Gateway Port will make use of a communication port such as COM1, COM2,COMxx or a TCP/IP connection on the Touch 1500. If it is necessary to add more communication ports or TCP/IP connections to the Touch unit, a USB hub can be used which allows for more USB to Serial or USB to Ethernet devices to be connected. The maximum number of DCS Gateway Ports supported by the DCS Gateway is 3. There must be at least 1 DCS Gateway port created in the Touch 1500 system before any remote data access is possible.

Go to System | DCS Gateway | Communications Setup

For the very first time, the screen will show an empty list of DCS Gateway Ports. See below:

Figure 9.6 DCS Gateway Communication Setup screen

Touch the Add button to bring up the New DCS Gateway Port screen. If you are creating a DCS Gateway port that will use RS-485 communication please see section 9.3.3.1 Communication via Serial RS-485 or RS-232. If you are creating a DCS Gateway Port that will use TCP/IP communication, please see section 9.3.3.2 Communication via Ethernet TCP/IP.

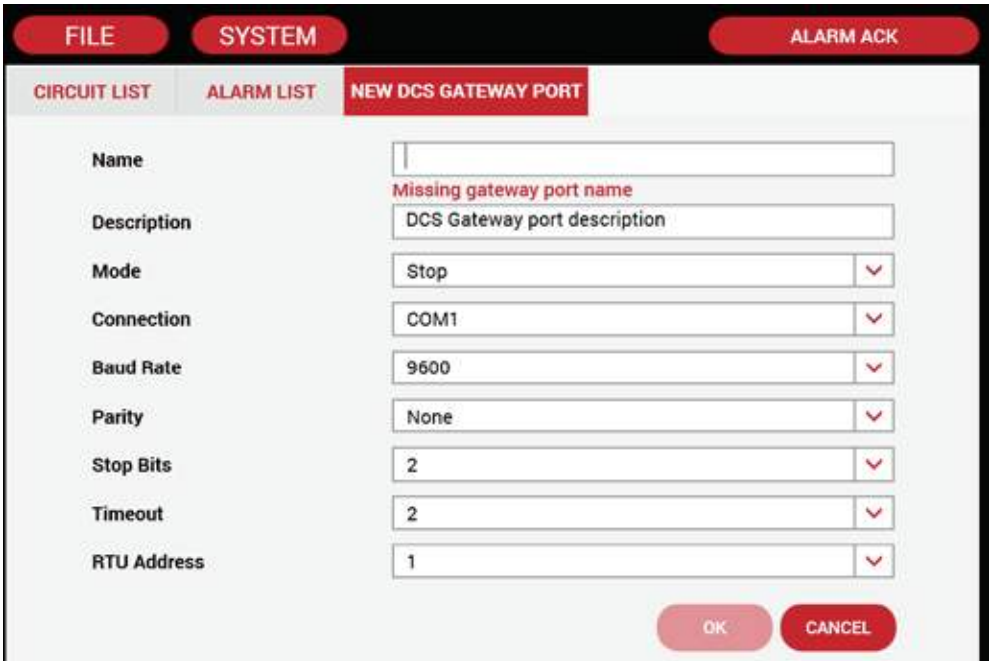


Figure 9.7 New DCS Gateway Port using Serial connection

9.4.3.1 Communication via Serial RS-485 or RS-232

For communications with a DCS system, a DCS Gateway Port can use a Serial COM port that is available on the Touch 1500. Note that Serial ports COM3 and COM4 are already used by the Touch 1500 therefore they are not available for selection.

Name

Purpose: Up to a 50 character name can be assigned to a DCS Gateway Port. The name is used for identification purpose.

Range: Alpha-numeric characters

Default: Empty field

Description

Purpose: A 255 character description can be assigned to a DCS Gateway Port. The description can be used to provide more details about the DCS Gateway map file.

Range: Alpha-numeric characters

Default: DCS Gateway port description

Mode

Purpose: The Mode defines if a DCS Gateway port is enabled or disabled. The DCS Gateway Port is enabled if Run is selected, and is disabled if Stop is selected.

Note: If a DCS Gateway Port is disabled, a DCS system connected to this port will not be able to perform remote data access with the Touch 1500. If there is another DCS Gateway Port used and is in Run mode, all activities for this port continue to run.

Options: Stop or Run

Default: Stop

Connection

Purpose: The connection defines the type of communication port used by the Gateway Port. This can either be a Serial port or TCP/IP. User can choose from a list of available serial port as well as TCP/IP.

Options: Available Serial ports (COM1, COM2, .etc.) or TCP/IP

Default: The first available port in the list.

Baud Rate

Purpose: Defines the data rate at which communications occur on the serial communication port.

Options: 9600, 19200, 38400, 57600, 115200

Default: 9600

Parity

Purpose: Defines the type of parity bit to be used on the serial communication port.

Options: None, Odd, Even

Default: None

Stop Bits

Purpose: Defines the number of stop bits used on the serial communication port.

Options: 1 or 2

Default: 2

Timeout

Purpose: The Timeout defines the maximum time in seconds the DCS Gateway Port will wait for a communication response before a communication timeout error is issued.

Options: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Default: None

RTU Address

Purpose: The RTU address defines the Modbus address for the DCS Gateway Port. The Modbus address identifies the DCS Gateway Port as a Modbus device on the Modbus network. A DCS system can access the Gateway port remotely once it knows the DCS Gateway Port's Modbus address.

Note: On a Modbus network, the Modbus address of devices connected must be unique, otherwise communication errors and data lost will occur.

Options: 1 to 247

Default: 1

9.4.3.2 Communication via Ethernet TCP/IP

A DCS Gateway Port can use the TCP/IP connection available on the Touch 1500.

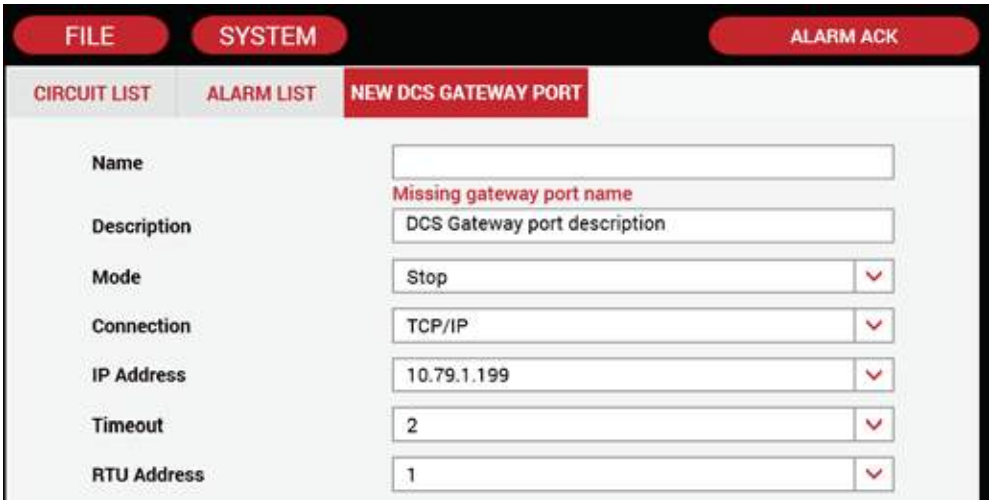


Figure 9.8 New DCS Gateway Port using TCP/IP connection

Name

Purpose: Up to a 50 character name can be assigned to a DCS Gateway Port. The name is used for identification purpose.

Options: Alpha-numeric characters

Default: Empty field

Description

Purpose: A 255 character description can be assigned to a DCS Gateway Port. The description can be used to provide more details about the DCS Gateway map file.

Range: Alpha-numeric characters

Default: DCS Gateway port description

MODE

Purpose: N/A

Range: N/A

Default: N/A

Connection

Purpose: The connection defines the type of communication port used by the Gateway Port. This can either be a Serial port or TCP/IP. User can choose from a list of available serial port as well as the TCP/IP selection.

Options: Available Serial ports (COM1, COM2, .etc.) or TCP/IP

Default: The first available port in the list.

IP Address

Purpose: The TCP/IP Address defines the address that will be used by the DCS Gateway Port. Normally a TCP/IP address exists for each Ethernet Network adapter installed in the Touch 1500 system. The IP Address selection list will show all available TCP/IP addresses and the user can select the one to use.

Note: TCP Port number 502 is automatically used by the DCS Gateway port if a TCP/IP connection is used. Port 502 is generally the accepted port used for Modbus TCP communications.

Options: Available TCP/IP addresses

Default: The first TCP/IP address on the list.

Timeout

Purpose: The Timeout defines the maximum time in seconds the DCS Gateway Port will wait for a communication response before a communication timeout error is issued.

Options: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Default: 2

RTU Address

Purpose: The RTU address defines the Modbus address for the DCS Gateway Port. The Modbus address identifies the DCS Gateway Port as a Modbus device on the Modbus network. A DCS system can access the Gateway port remotely once it knows the Gateway Port's Modbus address.

Note: On a Modbus network the Modbus address of devices connected must be unique, otherwise communication errors and data lost will occur.

Options: 1 to 247

Default: 1

9.4.4 Starting and Stopping the DCS Gateway

To start the DCS Gateway, go to System | DCS Gateway | Load Gateway File. The Load Gateway File screen will be displayed. Touch the white area for the Gateway Enabled field and select Yes from the drop down list. Use the OK button to save the changes.

Note: A DCS Gateway Map must be already selected otherwise the OK button is disabled.

To stop the DCS Gateway, go to System | DCS Gateway | Load Gateway File. The Load Gateway File screen will be displayed. Touch the white area for the Gateway Enable field and select No from the drop down list. Use the OK button to save the changes.

Note: A warning will appear whenever the DCS Gateway is stopped or disabled. This is to confirm your action since this will stop all DCS Gateway Port communications with DCS systems.

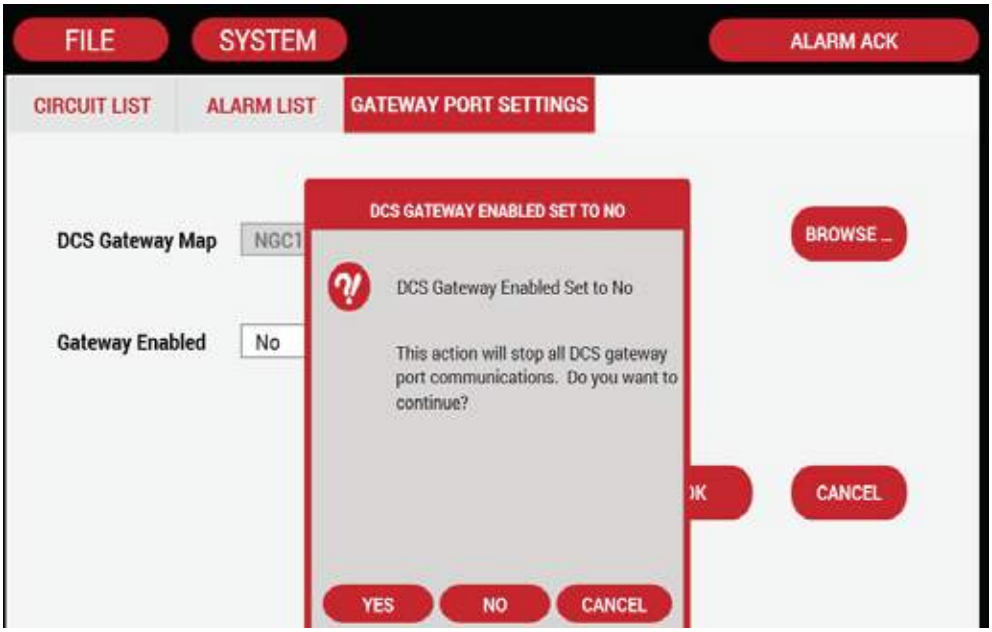


Figure 9.9 Stopping the DCS Gateway Warning

9.4.5 Editing a DCS Gateway Port

To change a DCS Gateway Port settings, go to System | DCS Gateway | Communication Setup. The Communication Setup screen with a list of available Gateway Port will be displayed. Select the desired DCS Gateway Port to bring up the Edit button. Touch the Edit button to begin your edit. Use the OK button to save the changes.

Figure 9.10 Communication Setup screen

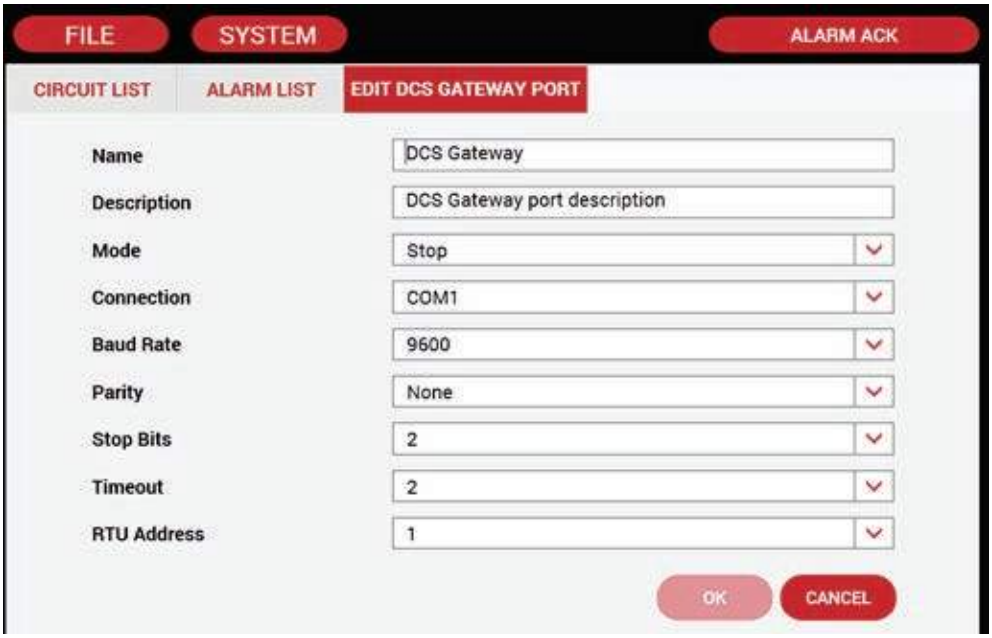


Figure 9.11 Edit DCS Gateway Port Screen

9.4.6 Starting and Stopping a DCS Gateway Port

To start a DCS Gateway Port, go to System | DCS Gateway | Communication setup. The communication Setup screen with a list of available Gateway Port will be displayed. Select the desired DCS Gateway Port and this row will expand to show the Edit button. Touch the Edit button to bring up the Edit DCS Gateway Port screen. Touch the Mode field and select Run from the drop down list. Use the OK button to save your changes.

To Stop a DCS Gateway Port, follow the same procedure as described above and for the Mode field, select Stop from the drop down list. Use the OK button to save your changes.

Note: Starting or Stopping a DCS Gateway Port does not affect the operation of the other DCS Gateway Ports.

9.5 SETTING UP THE DCS GATEWAY FOR VLINX AND PROFIBUS GATEWAY OPERATION

For users that are using Profibus devices and would like to remotely access heat trace information from the Touch 1500, a solution is to use a Profibus to Modbus converter or gateway. A suggested choice is the Vlinx ConnectPro Protocol Converter (VFG1000, VFG2000, and VFG3000). The Vlinx ConnectPro purchased along with the VFG9000-PBDP Profibus expansion card provides the Profibus to Modbus conversion solution needed for communication with the DCS Gateway. This

section describes a recommended approach on how to setup your VLINX and DCS Gateway Map for Profibus access to Heat Trace information on the Touch 1500.

On a Profibus network, in order to achieve fast and deterministic response times small packets of data are used for data exchange. This restricts the amount of data that can be read and write for a single Profibus device. This limitation restricts how much Heat Trace information a Vlinx unit can transfer from Modbus to Profibus and vice versa. If more data transfer is required, then more Vlinx units are required.

The recommended approach is to use a pre-programmed configuration file that is to be loaded into a Vlinx unit.

9.5.1 Pre-programmed Vlinx configuration file

This custom configuration file (i.e. DCS_GW_Config.vxd) is included with the DCS Gateway Mapping Tool. Use the Connect Pro Manager software to download the custom configuration file into the Vlinx unit. The following two tables show the preconfigured Profibus input/output areas in the Vlinx custom configuration file.

Function Code	Address range to be used
1	Address 1 – 144
2	Address 1 - 72
3	Not used
4	Address 1 – 108
2; system alarms	Will be picked up automatically

Table 1: Available addresses in Modbus map for transfer via standard Vlinx configuration file to Profibus Master device

Block	Address range
1	Address 0 - 108
2	Address 9 – 13
3	Address 14 - 144

Table 2: Profibus addresses to be used by Profibus master device

9.5.2 The Vlinx Custom Configuration File

The custom configuration file included with the DCS Gateway Mapping Tool can be used as a starting point to create a user specific setup for the Vlinx unit. After loading the custom configuration file into your Vlinx unit, the Network Protocol setting needs to match the Touch 1500 system. The Profibus Interface settings for the Profibus adapter also needs to be updated as well. Once both settings are updated then the unit is then ready for operation.

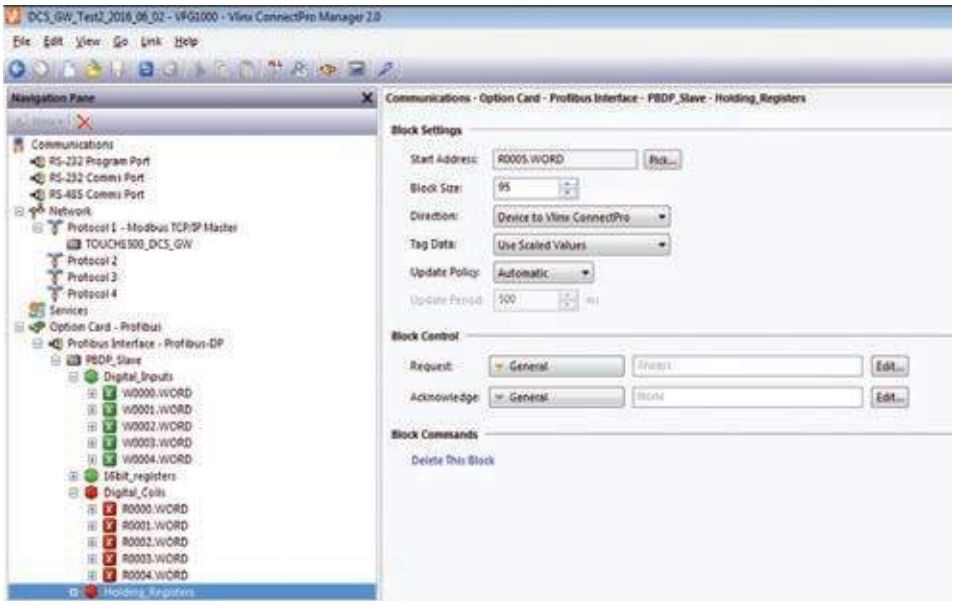


Figure 9.12 Custom Vlinx Configuration

9.6 VIEWING DCS GATEWAY DATA

Once the DCS Gateway has been setup and the system is up and running, it is necessary to test and verify the connectivity between the Touch 1500 and the DCS Systems. Once the remote data access capability is confirmed with the DCS Systems, the next step is to validate the data retrieved and data written to the Touch 1500 system. This section explains the available screens in the Touch 1500 system that can help you perform these validations. The 2 screens are the View Data Points and View Port Status screen.

Note: In this section, there are references to the DCS Gateway Map and the data within the map. To get a better insight in the data type, please see Appendix C DCS Gateway Map for more information.

9.6.1 View Data Points

To bring up the View Data Points screen go to System | DCS Gateway | View Data Points. The View Data Points screen will be displayed.

Figure 9.13 View Data Points Screen

Map Region

Purpose: The Map Region selection box allows you to selectively view data points for a Map Region. The selection box will have all the Map Regions that are in the current DCS Gateway Map File. In addition there are 6 special Map Region selections that can provide more viewing capabilities. These special map regions include the selections to view all Map Region for a particular Function Code, for example [*] 4 [Input Register]. When this selection is selected, all available Map Regions that are assigned to Function Code 4 will be displayed in the data list. Amongst the 6 special map regions there are 2 System Map Regions. The System Map Regions are appended to the end of the selection list. These regions occupy Modbus data address 65000 and above and they are reserved for system use only.

Start Address

Purpose: The Start Address is the 1st Modbus data address for the selected Map Region. The Start Address button has the purpose of displaying the Find Address Window. The Find Address Window can be used to locate a row of data based on the Modbus data address. The lowest Modbus data address assigned is 1. Please see Section 9.6.1.1 Find Window for more information on the Find Address Window.

End Address

Purpose: The End Address is the last Modbus data address for the selected Map Region. The largest Modbus data address is 65000.

Note: An address can be assigned a number up to 65535 for a regular Modbus data address, however in the DCS Gateway, address 65000 and up are reserved for system information.

Function Code

Purpose: The Function Code is the Function Code assigned to the selected Map Region. The Function Code can be one of the following:

- 1 for accessing the Output Coil data
- 2 for accessing the Input Discrete data
- 3 for accessing the Holding Register data
- 4 for accessing the Input Register data

Mapping Type

Purpose: The Mapping Type is the Mapping Type assigned to the selected Map Region. This can be either By Devices or By Data Points. Please note if the selected Map Region is a View All Regions for a Function Code then you may see By Devices/Data Points text if there are both types of Map Regions assigned to the same Function Code. For more information on Mapping Type see Appendix D.5 Mapping Type by Devices vs by Data Points.

Value Display Option

Purpose: The Value Display Option determines how the data is presented on the screen. The following options are available: Show Unsigned Values, Show Signed Values, and Show Engineering Values.

Use Modbus Addressing Option

Purpose: The Use Modbus Addressing Option determines the address format for the address column. If the Use Modbus Addressing option is checked, then addresses are displayed in 0xxxxx, 1xxxxx, 3xxxxx, 4xxxxx format, where xxxxx is a number from 1 to 65535. This type of format is well recognized and accepted in the control and monitoring industries. If the Use Modbus Addressing is not checked, then the addresses are just numbers representing the offset within a Function code memory table (i.e. from 1 to 65535).

Refresh Time

Purpose: The Refresh Time is the time required to collect data for all rows in the current data list. This is an estimated time determined by the system and it is dependent on the number of things such as the number of devices that are in the current list, the number of devices/circuits installed in the system, the current activities such as alarms, and the current user actions.

Note: The value -30000 is used as an invalid value indicator. The following conditions can cause this to happen:

1) The Device for the data point is not found or not available
2) The Device for the data point is in communication failure
3) The Data point is not available for the current device
4) DCS Gateway is in Communication failure
5) The device is offline

Note: The column headers can be sorted and the column width and column orders can be changed as well. When you change the column width and column order, these settings are saved the next time you come back to this screen. Also these settings are shared by both the View Data Points and View Port Status screens. If you change them in one screen, it will apply to the other screen automatically.

9.6.1.1 Find Address Window

Alt there are many rows in the data list displayed in the View Data Points or View Port Status screen, it may be difficult to scroll through the list to find the item you are looking for. In that situation, the Find Address Window may be helpful, as you can use it to locate a row more quickly.

When the View Data Points or View Port Status screen is displayed, touch the Start Address button to bring the Find Address window.

Figure 9.14 Find Address Window

Enter the address you would like to search by touching the number entry area. A numeric key pad will appear. Enter the address and touch the Search button. If the address is found, the row that contains this address will be visible on the screen. If the address is not found, the content of the list remains the same.

9.6.2 View DCS Gateway Port Status

The View Port Status screen can display the DCS Gateway data the same as in the View Data Points screen. However you can find information on the communication activities on a DCS Gateway Port as well. These communication activities may help you to understand the state of your control system and if any optimization is necessary.

To bring up the View Port Status screen, you must first go to the Communication Setup screen by selecting System | DCS Gateway | Communication Setup. On the Communication Setup screen, select a DCS Gateway Port by touching the row it is on. The row will expand and show the View Port Status button. Touch the View Port Status button to bring up the View Port Status screen.

There are 3 tabs on the View Port Status screen; Gateway Port Data, Port Diagnostic Data and Close View Port Status tab.

Figure 9.15 Comm unication Setup Screen

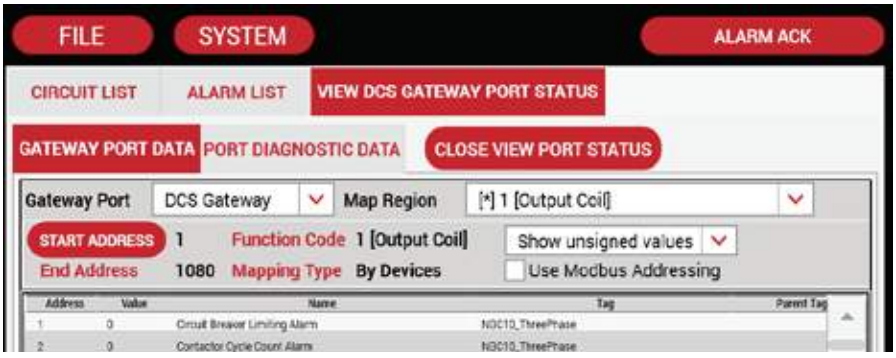


Figure 9.16 View DCS Gateway Port Status Screen

9.6.2.1 Gateway Port Data Tab

The Gateway Port Data tab screen is basically the same as the View Data Points screen. It's slightly smaller since it is within a Tab window. The description of the contents and the available user interactions on the screen are described in section 9.5.1 View Data Points. Please see section 9.5.1 for more information.

9.6.2.2 Port Diagnostic Data Tab

The DCS Gateway is designed to run silently in the background. When unexpected errors occurred during operation, the system will convert them to system alarms. The Touch will show these system alarms in the Alarms list similar to other alarms. The following system alarms are managed and handled by the Touch 1500 system.

Note: If these alarms do appear on your Touch 1500 system, please check your system and correct them as soon as possible.

- Missing DCS Gateway Map
- Corrupted DCS Gateway map File
- DCS Gateway system Failure occurred
- DCS Gateway communication failure occurred
- There are overlapping Map Region in the DCS Gateway Map File
- There are Invalid Map Region settings in the DCS Gateway Map File

In addition to the system alarm management, the system keeps statistics of communication activities while the DCS Gateway is running. To view this statistics, go to the Port Diagnostics Data tab.

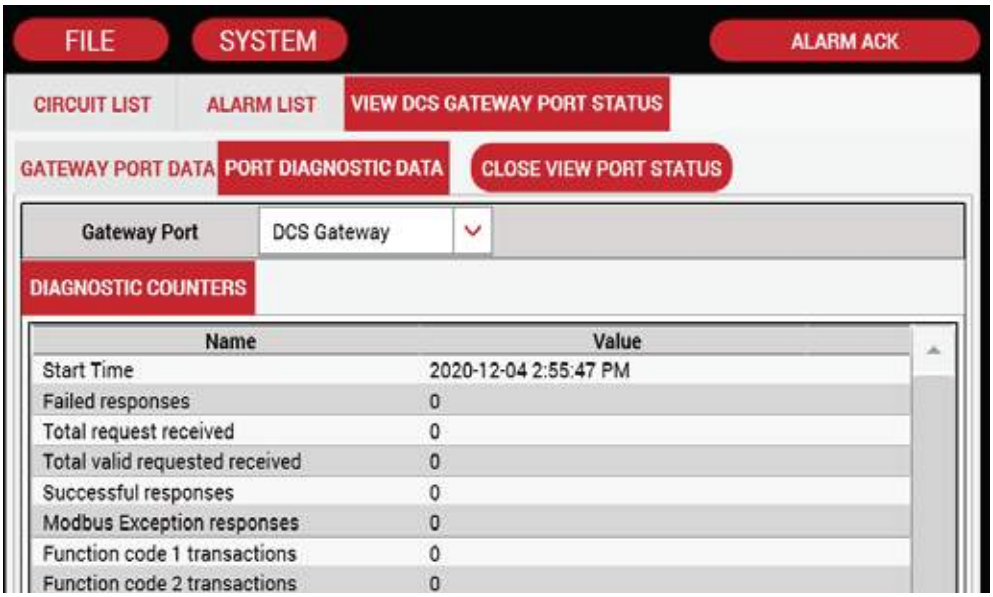


Figure 9.17 View DCS Gateway Port Status Screen

Start Time

Purpose: The Start Time is the time the DCS Gateway is started.

Failed Response

Purpose: The Failed Response count is the number of failed Modbus responses. Typically if a Modbus transaction results in a Modbus Exception response the count would increase by 1.

Total Request Received

Purpose: The Total Request Received count is the number of Modbus query messages received.

Total Valid Request Received

Purpose: The Total Request Received count is the number of Modbus query messages received. A query message received must be a valid Modbus query message.

Successful Response

Purpose: The Successful Response count is the number of successful responses sent to the Modbus Master or DCS System.

Modbus Exception Responses

Purpose: The Modbus Exception Responses count is the number of Modbus Exception responses send to the Modbus Master or DCS System.

Function Code 1 Transactions

Purpose: The Function Code 1 Transactions count is the number of Modbus queries received that uses Function Code 1. Function Code 1 is for reading Output Coil statuses.

Function Code 2 Transactions

Purpose: The Function Code 2 Transactions count is the number of Modbus queries received that uses Function Code 2. Function Code 2 is for reading Discrete Input statuses.

Function Code 3 Transactions

Purpose: The Function Code 3 Transactions count is the number of Modbus queries received that uses Function Code 3. Function Code 3 is for reading Holding Register values.

Function Code 4 Transactions

Purpose: The Function Code 4 Transactions count is the number of Modbus queries received that uses Function Code 4. Function Code 4 is for reading Input Register values.

Function Code 5 Transactions

Purpose: The Function Code 5 Transactions count is the number of Modbus queries received that are using Function Code 5. Function Code 5 is for changing the status of 1 Output Coil.

Function Code 6 Transactions

Purpose: The Function Code 6 Transactions count is the number of Modbus queries received that uses Function Code 6. Function Code 6 is for setting the value of 1 Holding Register.

Function Code 15 Transactions

Purpose: The Function Code 15 Transactions count is the number of Modbus queries received that uses Function Code 15. Function Code 15 is for setting the status of 1 or more Output Coils.

Function Code 16 Transactions

Purpose: The Function Code 16 Transactions count is the number of Modbus queries received that uses Function Code 16. Function Code 16 is for setting the value of 1 or more Holding Registers.

9.6.2.3 Close View Port Status Window

Touch the Close View Port Status tab to close the current screen and return to the Communication Setup screen.

APPENDIX A ETHERNET CONNECTION TO THE BRIDGE

A.1 INTRODUCTION

This appendix describes two examples on how to connect and program the nVent RAYCHEM TOUCH 1500R and NGC-40-BRIDGE using Ethernet. Before you proceed with the description below, a keyboard is required. If a keyboard is not available, a virtual keyboard can be accessed. Go to Start | All Programs | Accessories | Accessibility | On-Screen Keyboard.

Example 1: Connection Directly from the NGC-40-BRIDGE to the TOUCH 1500R using a Static IP Address.

Below are two diagrams on how the NGC-40-BRIDGE can connect directly to the TOUCH 1500R:

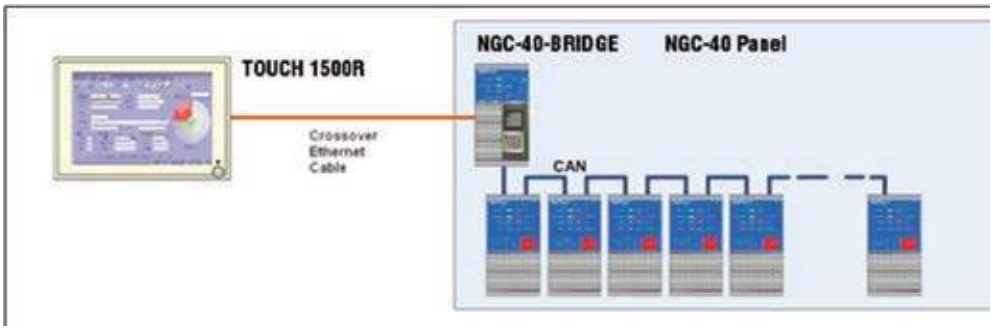


Figure A.1 Connecting directly to NGC-40-BRIDGE using Ethernet crossover cable

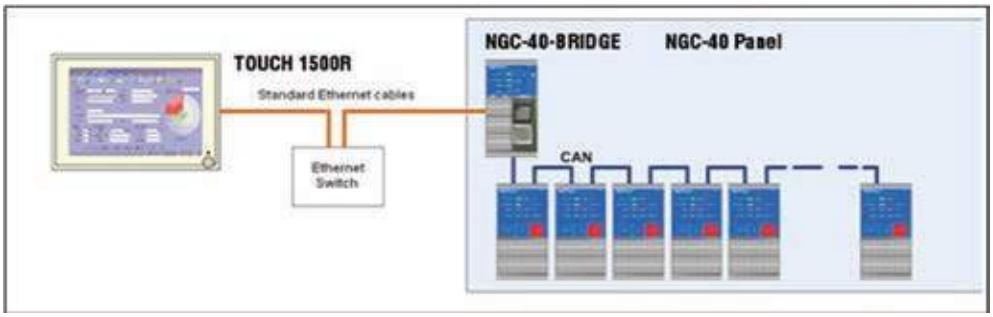


Figure A.2 Connecting to NGC-40-BRIDGE using Ethernet switch and standard Ethernet cable

A.2 SETTING A STATIC IP ON THE TOUCH 1500R

Step 1: Exit from the TOUCH 1500 software.

The TOUCH 1500 Desktop should now be displayed

Step 2: Click on Start | Control Panel | Network Connections

Step 3: Double click on the Local Area Connection or Local Area Connection 2 depending on which Ethernet port is connected to the NGC-40-BRIDGE.

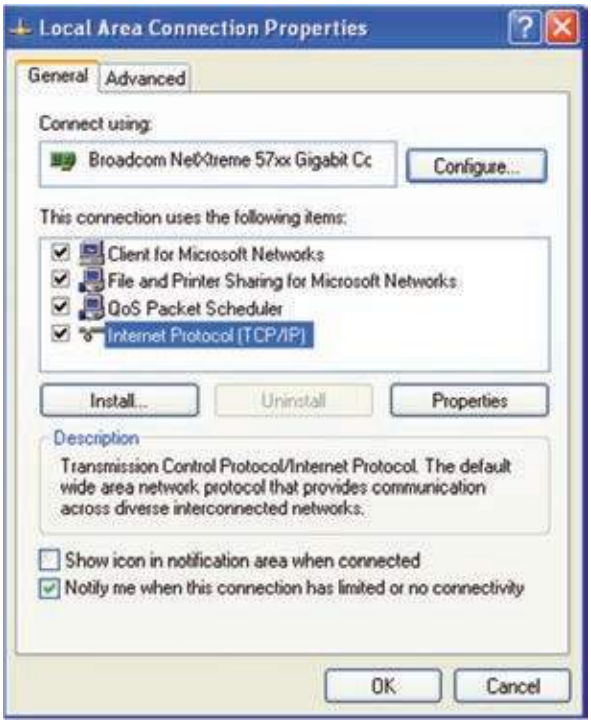


Figure A.3 Local Area Connection Properties window

Step 4: Double click on Internet Protocol (TCP/IP)

Step 5: Click on Use the following IP address you should see the below window:

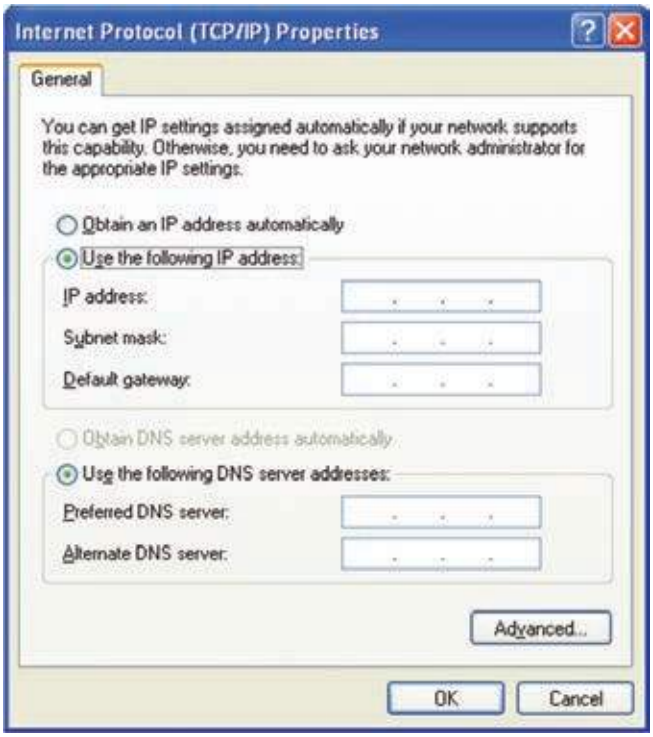


Figure A.4 Internet Protocol Properties window

Step 6: Enter the first 3 blocks of the NGC-40-BRIDGE's IP address. The default IP address for the NGC-40-BRIDGE is 192.168.1.100. For the last block, choose a number between 1 and 255, but it cannot be the same address being used by the NGC-40-BRIDGE.

IMPORTANT: Once the IP address is entered, the Subnet Mask will automatically be entered. No change is required. Press OK.

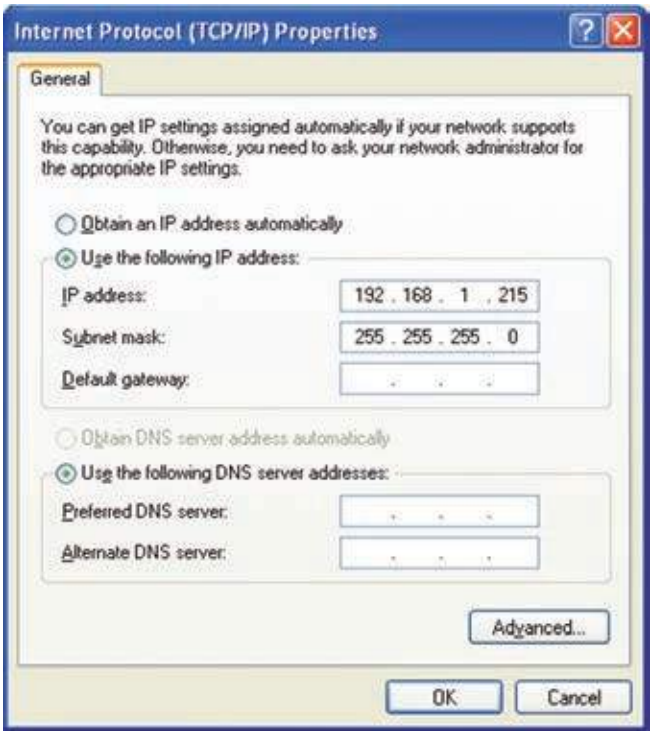


Figure A.5 Internet Protocol Properties window

Step 7: Start the TOUCH 1500 program and go to the System | Device Manager | Scan for Devices | Scan Ethernet Network. You should see the below window:

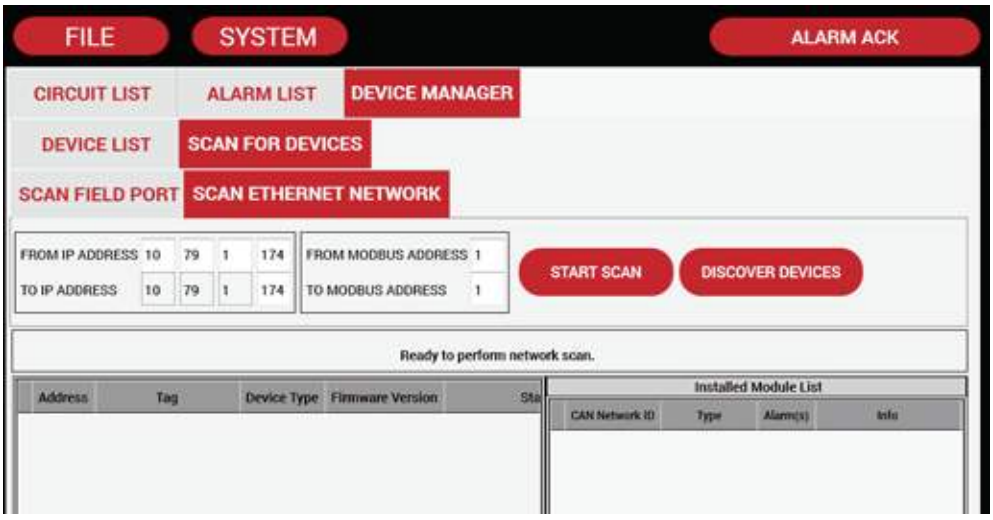


Figure A.6 Device Manager | Scan Ethernet Network window

Step 8: Enter in the IP address of the Bridge (default IP 192 168 1 100) and change the To Modbus Address to 1.

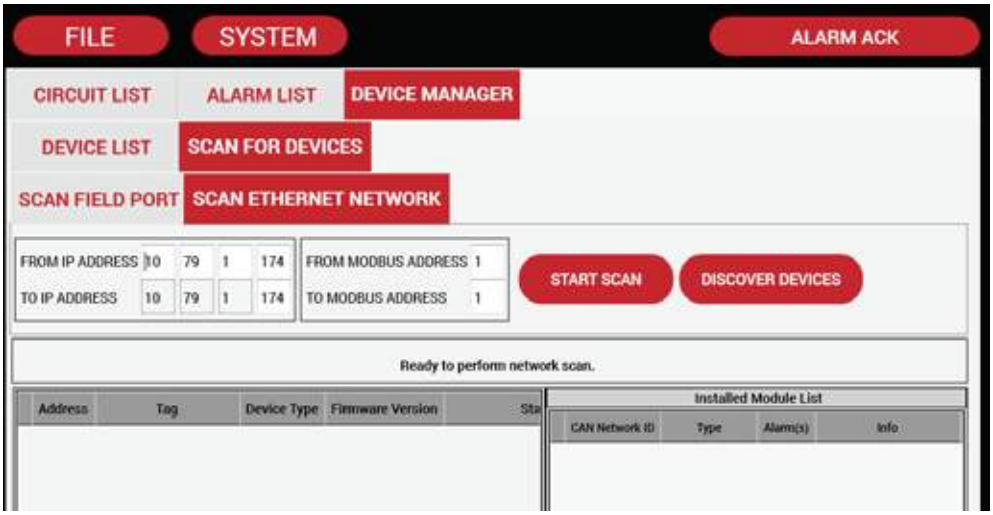


Figure A.7 Device Manager | Scan Ethernet Network window

Step 9: Press the Start Scan button to load the modules

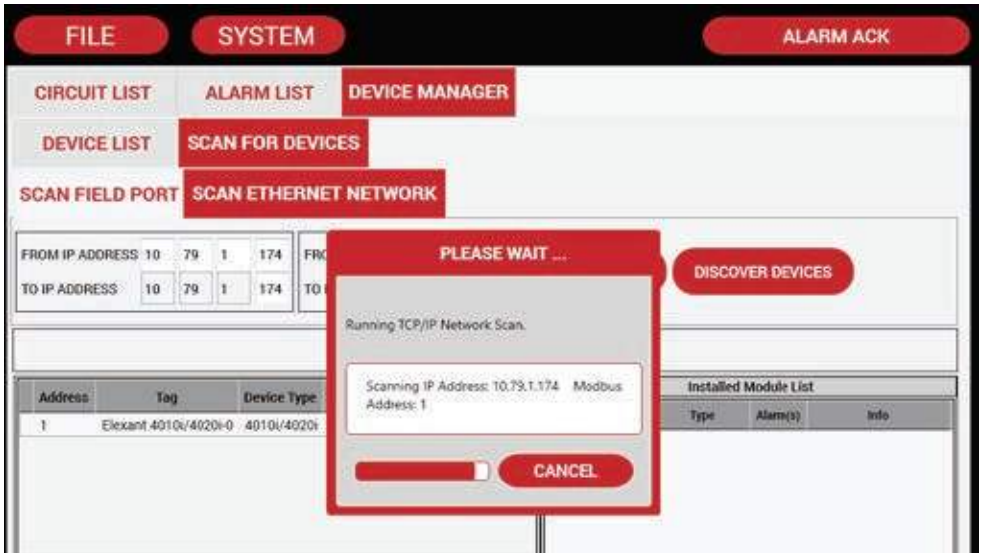


Figure A.8 Device Manager | Scan Ethernet Network | Start Scan window

Example 2: Connecting NGC-40-BRIDGE and the TOUCH 1500R together via the Ethernet network using DHCP

Below is diagram on how the NGC-40-BRIDGE and the TOUCH 1500R can be connected via the Ethernet network. You may require the assistance from IT to complete the following steps. Before you proceed with the below, a keyboard is required. If a keyboard is not available, a virtual keyboard can be accessed. Go to Start | All Programs | Accessories | Accessibility | On-Screen Keyboard.

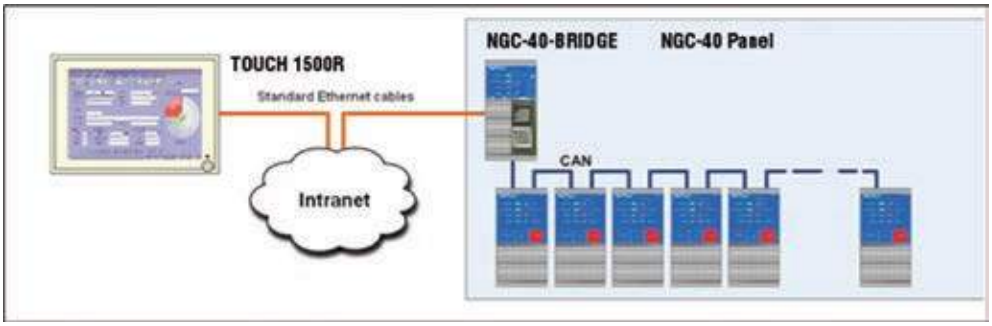


Figure A.9 Connecting to NGC-40-BRIDGE via the intranet

The following only addresses local networks with DHCP. If your network does not have DHCP, you may need to manually setup an IP address in the TOUCH 1500 which is explained in the previous example.

Step 1: Connect the TOUCH 1500R and the NGC-40-BRIDGE to the Ethernet network.

Step 2: Exit the TOUCH 1500R program and go to Start | All Programs | Accessories | Command Prompt.

Step 3: Type ipconfig and press enter. Especially take note of the IP Address and Subnet Mask

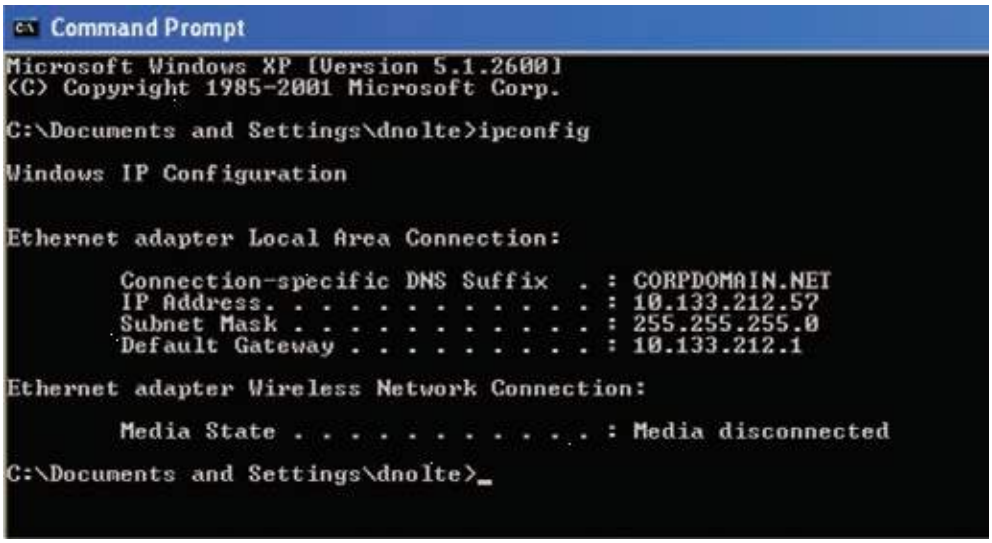


Figure A.10 Command prompt on TOUCH 1500

Step 4: Using a laptop computer, connect to the NGC-40-BRIDGE via RS-232. Start the nVent RAYCHEM Hardware Manager program and connect to the NGC-40-BRIDGE.

Step 5: Change the NGC-40-BRIDGE from RUN to SET by moving the switch located on the front of the NGC-40-BRIDGE module. This will allow you to edit the NGC-40-BRIDGE settings.

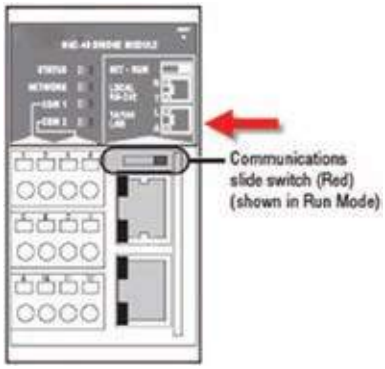


Figure A.11 NGC-40-BRIDGE communication slide switch

Step 6: Enter the first 3 blocks of the TOUCH 1500R's IP address and Subnet Mask that was assigned by the DHCP server in step 3. For the last block of the IP address, choose a number between 1 and 255, but it cannot be the same as the TOUCH 1500R or any other device on the network. Press OK.

Figure A.12 NGC-40-BRIDGE settings using the HGC-40 Hardware Manager

Step 7: Change the switch on the NGC-40-BRIDGE from SET to RUN

Step 8: Start the TOUCH 1500R program and go to the System | Device Manager | Scan for Devices | Scan Ethernet Network. You should see the below window:

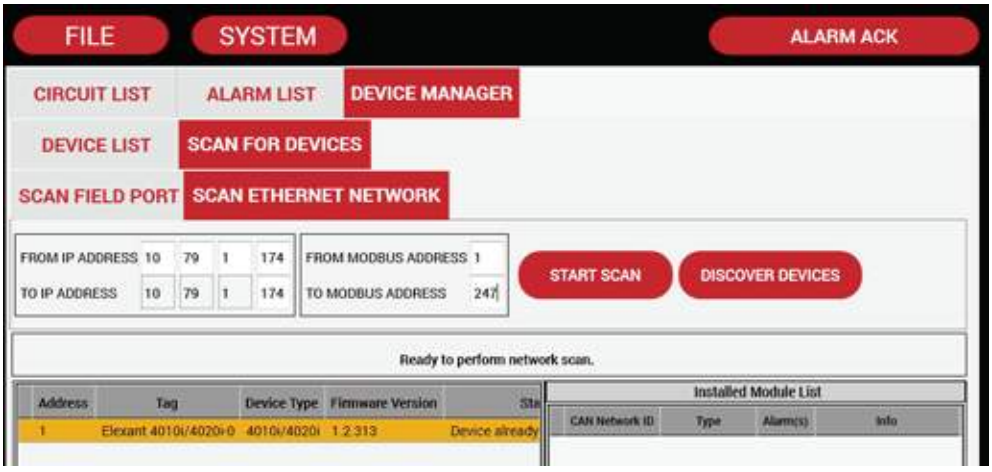


Figure A.13 Device Manager | Scan Ethernet Network window

Step 9: Enter in the IP address of the BRIDGE (step 6) and change the To Modbus Address to 1.

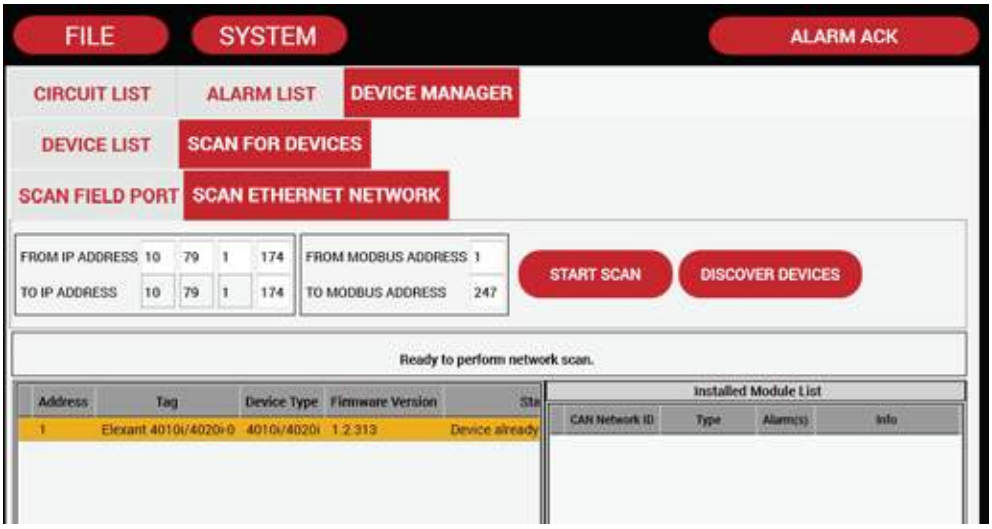


Figure A.14 Device Manager | Scan Ethernet Network window

Step 10: Press the Start Scan button to load the modules

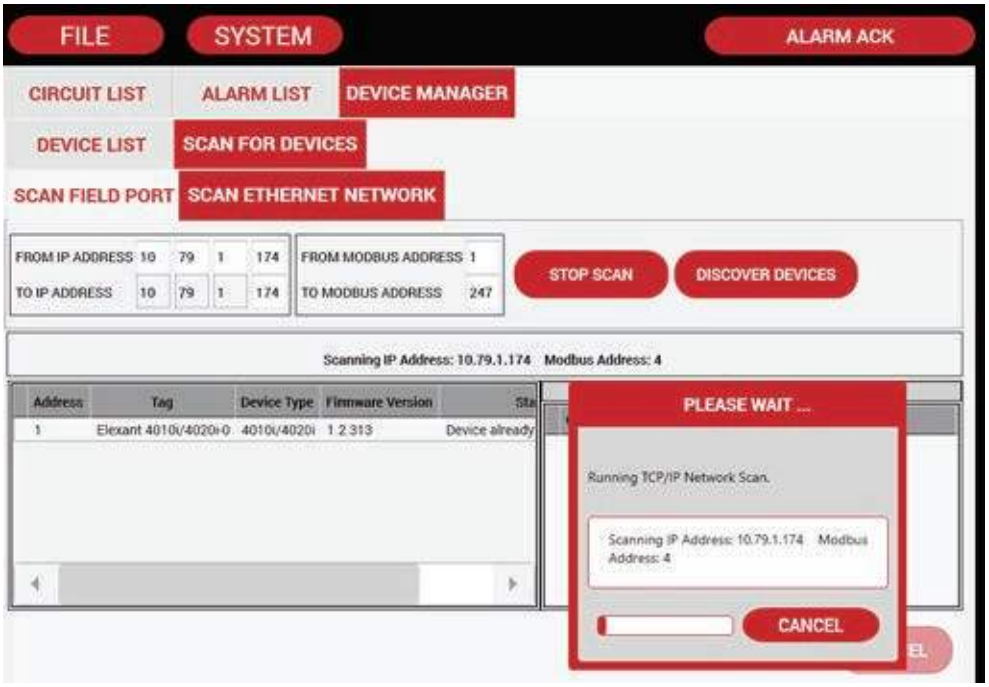


Figure A.15 Device Manager | Scan Ethernet network | Start Scan window

APPENDIX B SWITCH CONTROL MODES

B.1 INTRODUCTION

There are several types of control modes in the controller. Some of these modes require further explanation in order to fully understand and implement their operation. This section describes the Switch Control Modes available in the HTC/HTC3 and how to set their associated parameters, as well as the Load Shedding Control mode.

B.2 SWITCH CONTROL MODES

There are five Switch Control modes associated with the HTC/HTC3. The following is an explanation of their implementation in the controller and the differences between them.

B.2.1 Proportional Control

When using SSRs to directly control the power applied to a trace circuit, the output may be switched on/off very rapidly. The controller implements proportional temperature control on a cycle by cycle basis (50 or 60 Hz power line cycle). This algorithm monitors the temperature of the heating circuit and compares it to the Control Setpoint temperature. If the temperature of the control sensor is at or below the Control Setpoint temperature, then power is applied to the trace with a duty cycle of 100% — the controller output is full on. If the temperature sensed by the control sensor is equal to or greater than the Control Setpoint temperature + the PROPORTIONAL BAND setting, then the controller output will have a duty cycle of 0% — the output will be off. The temperature of the control sensor is constantly monitored and the output duty cycle is adjusted proportionally according to where the temperature falls within the 0% to 100% band.

Proportional Control	**Temperature Band**
Control Sensor Temperature	Duty Cycle
Setpoint + proportional band	0%
Setpoint + proportional band/2	50%
Setpoint	100%

B.2.2 On/Off Control

When using the HTC/HTC3 in an application where the controller is used to open and close a contactor, proportional control cannot be used. In these cases a On/Off control algorithm is used. The output duty cycle is not controlled, instead the output is either fully on or completely off. The user can set the deadband value. The controller monitors the temperature of the trace circuit and compares it to the Control Setpoint temperature as in the proportional control. If the control sensor temperature is above the Control Setpoint temperature by more than the deadband value, the output is turned off. If the control sensor temperature falls below the Control Setpoint temperature the output is turned on. This is a very simple control algorithm but it works very effectively in heat trace applications where the temperature of a traced system changes relatively slowly.

Deadband Control	**Temperature Band**
Control Sensor Temperature	Output State
Setpoint + deadband	Off
Setpoint	On

When the control sensor temperature is within the deadband, the output does not change its state. Also, when using On/Off control a contactor is not allowed to toggle faster than every 2 seconds. If an AC alarm with an alarm filter time greater than 0 is detected, the contactor will not toggle until the alarm filter time has expired.

B.2.3 PASC (Proportional Ambient Sensing Control) SSR

When using SSRs to directly control the power applied to a heating circuit, the output may be switched on/off very rapidly. The controller implements PASC-SSR temperature control on a cycle by cycle basis (50 or 60 Hz power line cycle). This algorithm monitors ambient temperature and compares it to the Control Setpoint temperature. If the temperature of the control sensor is at or below the Control Setpoint temperature minus the Proportional Band setting, then power is applied to the trace with a duty cycle of 100% — the controller output is fully on. If the temperature sensed by the control sensor is equal to or greater than the Control Setpoint temperature, then the output will have a duty cycle of 0% — the controller output will be off. The temperature of the control sensor is constantly monitored and the output duty cycle is adjusted proportionally according to where the temperature falls within the 0% to 100% band.

PASC SSR Control Temperature Band

Control Sensor Temperature	Duty Cycle
Setpoint	0%
Setpoint+proportional band/2	50%
Setpoint+proportional band	100%

NOTE 1: The load shedding “fail safe mode” is not supported when using PASC SSR control, since ambient temperature is being monitored rather than pipe temperature.

When an HTC/HTC3 using a SSR is used to control the output based on the ambient temperature this control mode should be used.

NOTE 2: The load shedding “fail safe mode” is not supported when using proportional ambient contactor control, since ambient temperature is being monitored rather than pipe temperature.

Also note that if an AC alarm, with an alarm filter time greater than 0, is detected the contactor will not toggle until the alarm filter time has expired.

B.2.4 PASC (Proportional Ambient Sensing Control) EMR

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. Since 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-40 HTC/HTC3 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.

IMPORTANT: The power to the heat tracing is proportioned based on the ambient temperature. If the ambient temperature is at or below the “minimum design ambient” +1 2/3°C the heaters will be on 100%. If the measured ambient is at or above the “maintain temperature” –1 2/3°C 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).

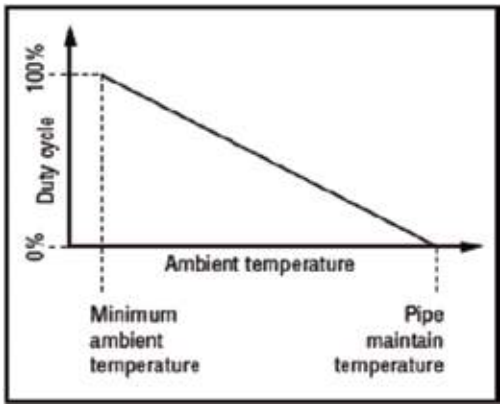


Figure B.1 PASC chart

B.2.5 Always On/Off

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

APPENDIX C INSTALLATION PROCEDURE FOR NVENT RAYCHEM TOUCH 1500 SOFTWARE

C.1 INTRODUCTION

The section describes the procedures on how to install nVent RAYCHEM Touch 1500 Software on a desktop or laptop computer.

C.1.1 Setup

For the installation of the nVent RAYCHEM Touch 1500, you will need the Touch 1500 installation setup file. The naming convention used for the setup file is nVent RAYCHEM_Touch_1500_???_ Setup.exe.

The computer that the Touch 1500 will be installed to should be running Windows 7 or higher, the software will work under Win-XP, however Microsoft .NET Framework 3.5 or higher may need to be installed.

C.1.2 Installing the nVent RAYCHEM Touch 1500 (to a computer with no previous versions of nVent RAYCHEM Touch 1500 installed)

Begin the installation by running the nVent RAYCHEM Touch 1500 setup file. Due to company security policy, you will be prompted to provide your credentials in order to continue with the installation.

The installation begins with the **Welcome** screen. Click next to proceed to the next screen.

Figure C.1 Welcome Screen

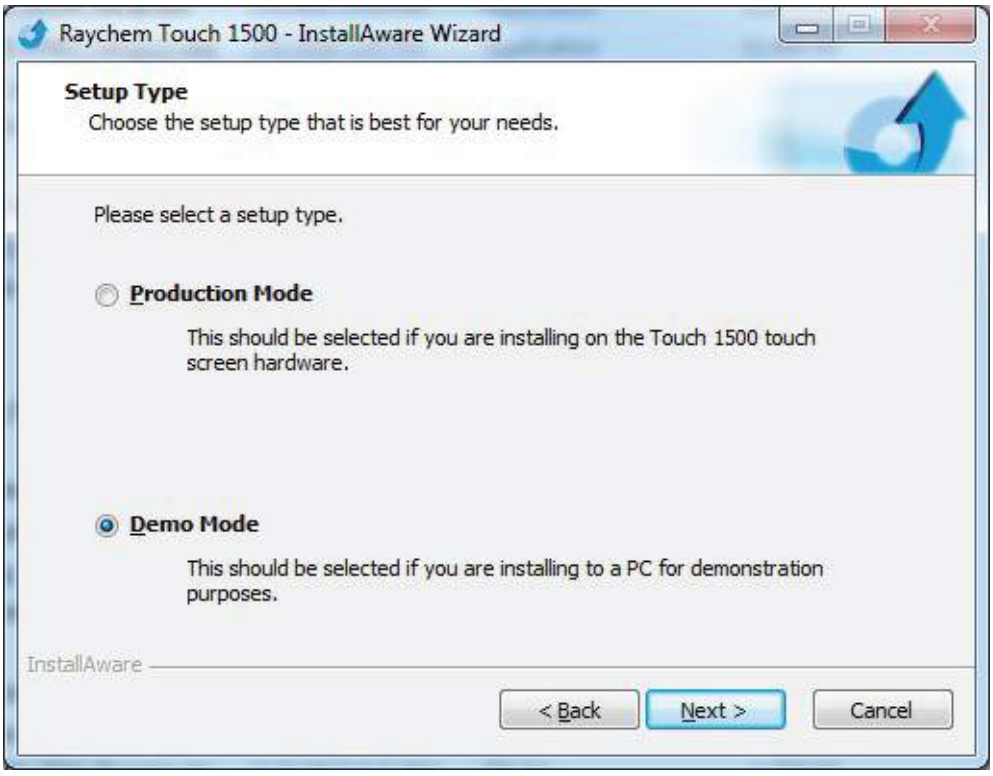


Figure C.2 Setup Installation Type

For the remaining setup screens, it is recommended to use the default settings, therefore continue using the Next button till the installation is completed.

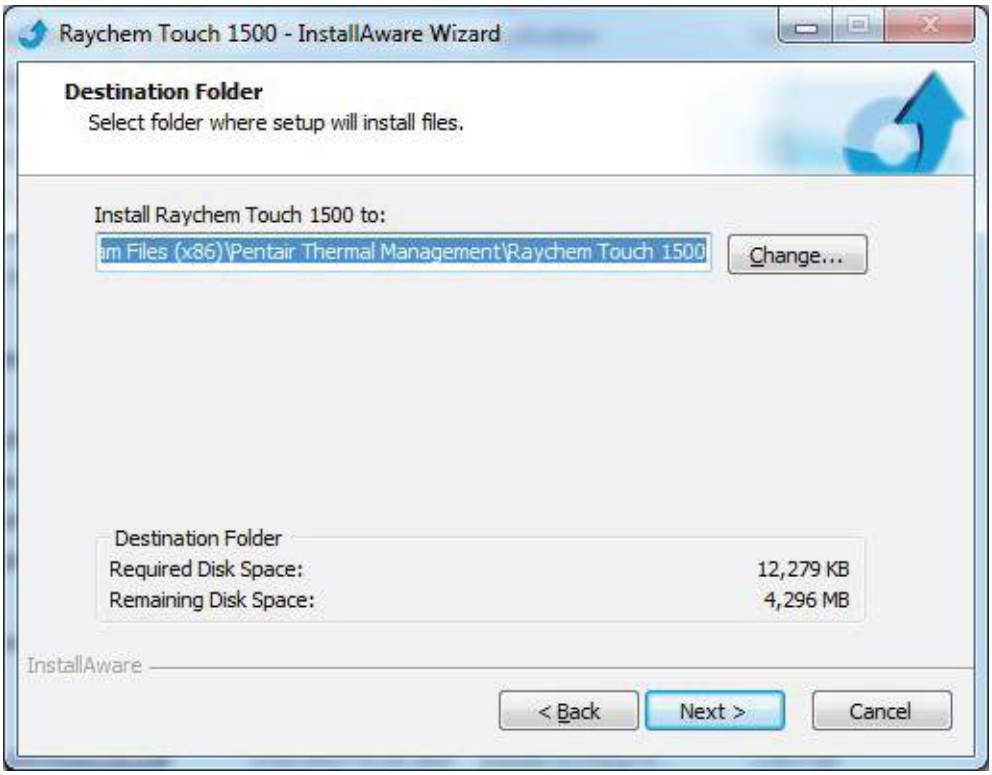


Figure C.3 Destination Folder Setting

Figure C.4 Completing the Installation

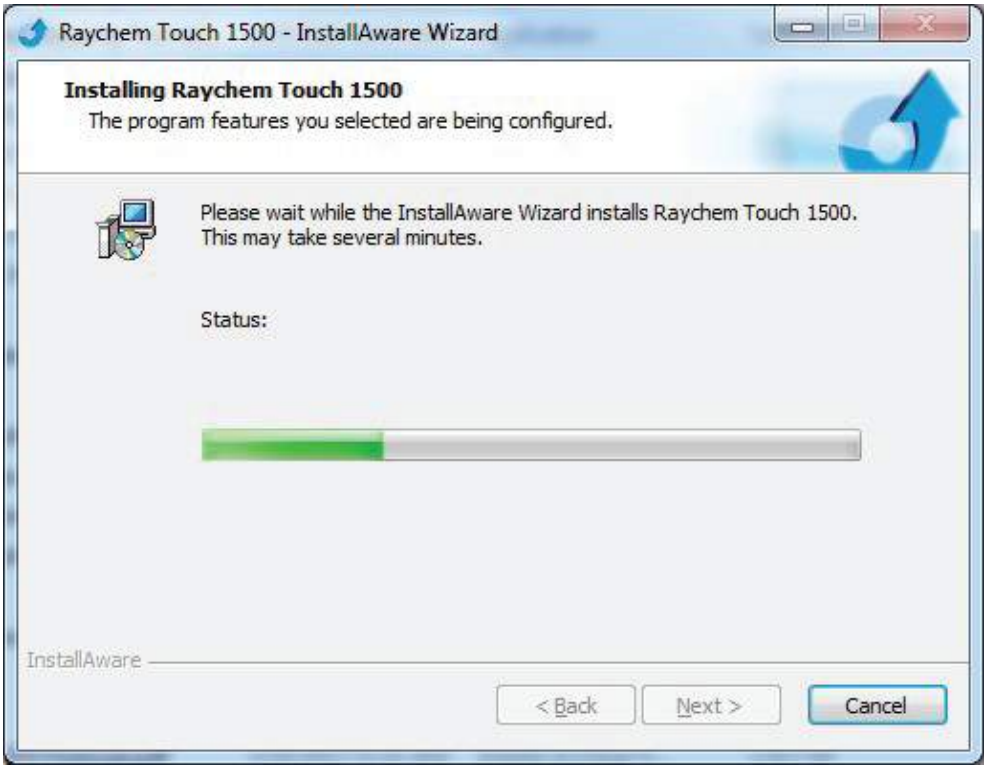


Figure C.5 Installation in Progress

Figure C.6 Installation Completed

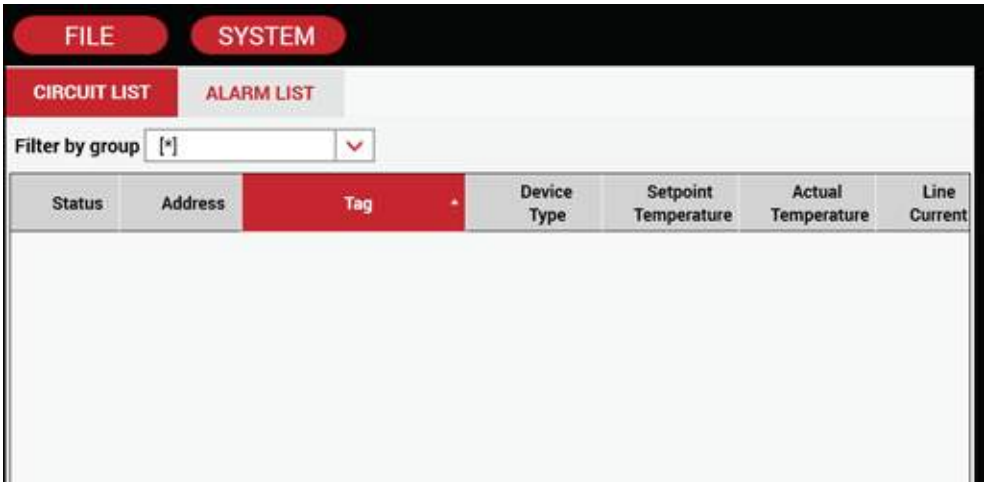


Figure C.7 nVent RAYCHEM Touch 1500 running

C.1.3 Installing nVent RAYCHEM Touch 1500 over an existing version

If you are updating a computer or laptop with the latest nVent RAYCHEM Touch 1500 (i.e. installing on a computer or laptop that has an installation of nVent RAYCHEM Touch 1500 or nVent RAYCHEM Touch 1500), the procedure is nearly the same as described in Section C.1.2 Installing the nVent RAYCHEM Touch 1500 (to a computer with no previous versions of nVent RAYCHEM Touch 1500 installed).

To begin the update, run the latest nVent RAYCHEM Touch 1500 setup file. The setup file will notify you that an existing Touch 1500 already exists. Select the Uninstall option then click the Next button. The setup will proceed with uninstalling the old version before starting with the new installation.

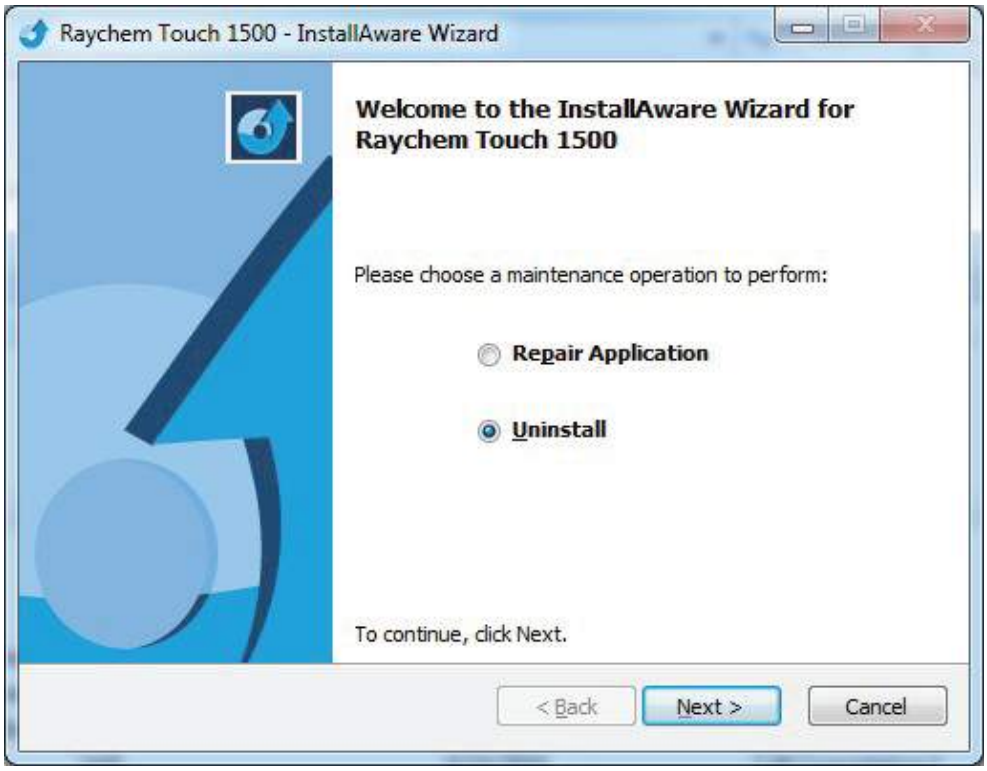


Figure C.8 Uninstall screen

Once the old version is uninstalled, you will be presented with the same set of screens as in Section 2.2 Installing the nVent RAYCHEM Touch 1500 (to a computer with no previous versions of nVent RAYCHEM Touch 1500 installed).

You can follow the same steps as detailed in Section 2.2 to complete the installation, typically clicking the Next button till the installation completes.

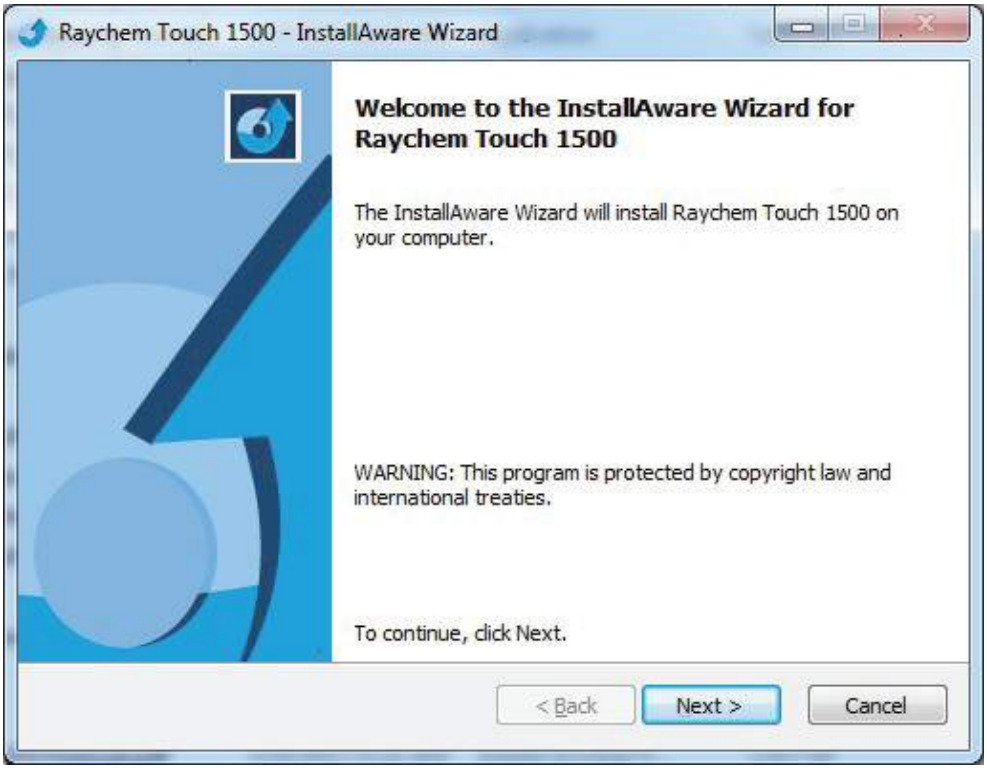


Figure C.9 Welcome Screen

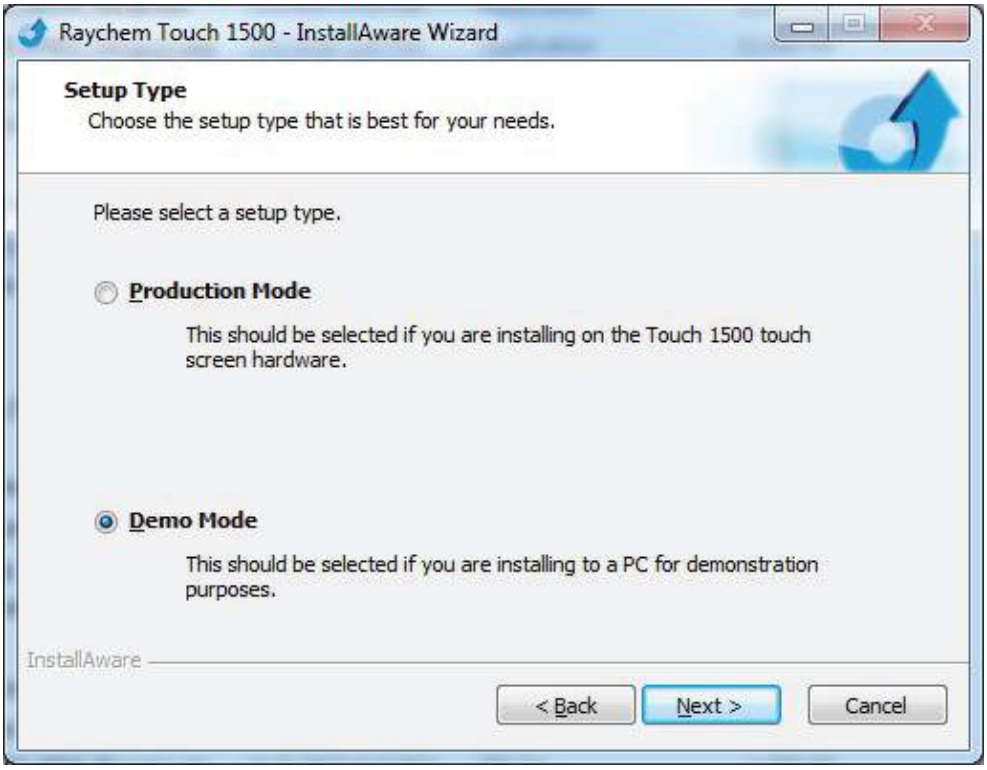


Figure C.10 Setup Installation Type

C.2 TROUBLESHOOTING

This section includes troubleshooting tips for issues that has been reported in the past with the Touch 1500 Installation Setup.

Symptom/Problem	Resolution
The Screen menus are disabled and exiting the software is not possible.	When this occurs, the only choice is to use the Task Manager to end the **DTSUIT.exe *32** application since you cannot shutdown the software through its menus.
	There are several possible causes: 1) You did not start the software as an Administrator. Check the Properties in Touch 1500 short cut and make sure under the Compatibility tab the Run as Administrator is enabled. Note: This is because the Touch 1500 database resides in the c:\Program files folder and the software requires read/write access in this folder. As a work around you can copy the entire Touch installation folder to a different folder, then try running the DTSUIT.exe from that folder. 2) The Touch cannot connect to the Microsoft SQL Compact database. It appears at times the SQL Compact is not installed correctly or perhaps in conflict with other components installed. By uninstalling and reinstalling the SQL Compact 3.5 will resolve this issue. You can download a copy of the Microsoft SQL Compact SP2 from the Web if one is not available. 3) If the Touch database is corrupted in any way, this problem will occur. You will need to uninstall and reinstall the Touch to create a new database. The database that is corrupted may or may not be recoverable.

APPENDIX D DCS GATEWAY

D.1 OVERVIEW

The nVent RAYCHEM TOUCH 1500 system provides a graphical user interface for our nVent RAYCHEM NGC-40, NGC-20/ Elexant 5010i, and Elexant Heat Tracing Control & Monitoring System. The Touch 1500 system allows the user to configure and monitor NGC-40 HTC, NGC-20/ Elexant 5010i, and Elexant heat-tracing controllers, as well as NGC-40 Bridge, NGC-40 SLIM, and NGC-40 I/O modules. The information that exists in the Touch 1500 can be access via Remote Data Access provided by the DCS Gateway. The DCS Gateway is a running process within the Touch 1500 and is dedicated to manage the Remote Data Access operations. A Touch 1500 system can support up to 3 physical connections from remote devices such as a DCS system, SCADA systems, and others. The physical connections can be either RS-485/RS-232 or Ethernet or both. The communication protocol used for Remote Data Access is Modbus and Modbus TCP.

The DCS Gateway will manage data access with DCS systems based on a user defined mapping definitions file (i.e. DCS Gateway Map file). The user defined mapping definitions translates Heat Tracing information into addressable tables that the DCS Gateway can understand. Please see Appendix D.3 DCS Gateway Map for more information on user defined mapping definitions.

D.2 SYSTEM ARCHITECTURE

The diagram below shows an example of the different hardware and how they can be connected together for remote data access of Heat Tracing information.

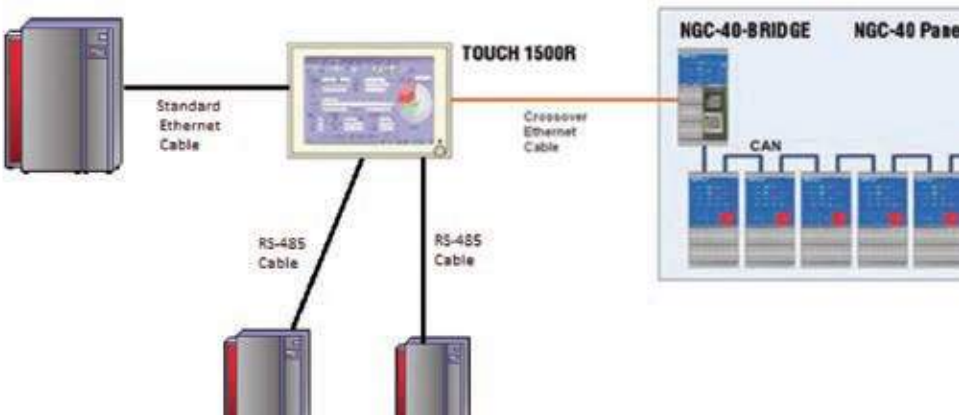


Figure D.1 System Architecture of Touch 1500 system and DCS Gateway systems connected for Remote Data Access

D.3 DCS GATEWAY MAP FILE

A DCS Gateway Map File contains a set of user defined mapping definitions. These mapping definitions provide information on what data point, from what circuit and how it can be access remotely through remote data access. An example of a data point is the Control Setpoint or Control Temperature of a circuit. A circuit can be any Heat Tracing circuit currently being controlled and monitor by the Touch 1500 system. Since the DCS Gateway is using the Modbus communication Protocol, a data point will be mapped to a Modbus data address within any of the 4 basic Modbus data type memory tables. The 4 basic Modbus data types used in Modbus communications are the Output Coils, Input Discretes, Holding Registers and Input Registers. Each Modbus data type exists in a virtual memory table that holds 65535 data items.

A set of predefined data points are made available for our user, please see the DCS Gateway Mapping Tool for more information. Below is a diagram showing the data structures within a DCS Gateway Map.

Note: This section refers to a mapping region configured for Mapping by Devices. Please see Appendix D.5 Mapping By Device vs By Data Points for an explanation of the Mapping By Data Points option.

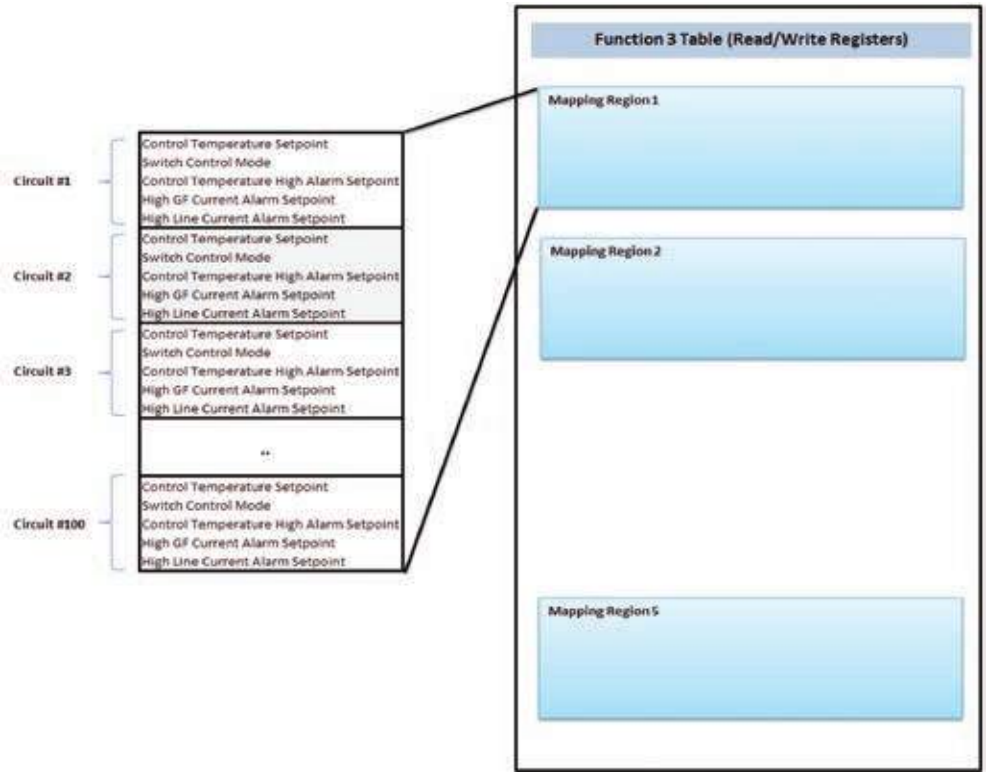


Figure D.2 DCS Gateway Map Data Representation

In a DCS Gateway Map, devices and data points are assigned to a Mapping Region. Typically there will be more than 1 Mapping regions used in a DCS Gateway Map. A Mapping Region can only exist within the boundaries of a Modbus data type memory table. Since there are 4 basic Modbus data type memory tables available to use, it's likely at least 4 Mapping Regions are needed.

For setup and maintenance of the DCS Gateway Map, a standalone Windows application called the DCS Gateway Mapping Tool is used. The tool allows to create Mapping regions and assigning devices and data points to any of the 4 basic Modbus data type memory tables. By using Modbus communications, the Modbus data type memory tables can be accessed with the equivalent Function code and offset. A DCS system can then be programmed to remotely access the mapped data.

D.4 MAPPING REGION DEFINITION

A Mapping Region by definition contains a set of data points, a list of devices, a region device type and a mapping type setting. From this definition, a Mapping Region can be translated to an area within a Function Code (Modbus data type memory) Table. Within this area, data points for different devices are available for access by upstream devices such as DCS systems. For example if a Mapping Region is assigned 10 data points, and there are 100 devices in the device list, then this Mapping Region will occupy 10 x 100 or 1000 rows in a Function Code (Modbus data type memory) Table. See Figure D.2 Gateway Map Data Representation. If one has experience using the NGC-30 UIT Modbus map, this follows the same principle. By having a fixed block size for the data points; it would be quite simple to locate the data for a particular device once you know the order of the device. For example, the devices are added to a Map region in the order determined by the user. The user can determine the starting location of the data for the device using a formula such as (block size) x (device order -1). The user can then use this information to program their DCS system. The block size is the total number of data points assigned to a Mapping Region.

When creating a Mapping Region, the user needs to know the device type. The device type will determine the types of data point selectable for this region. Once the Device type is selected, the user selects a set of data points and devices based on the device type for this region. The order of the data points and devices are important as they are grouped and layout in the format as shown in Figure D.2. DCS Gateway Map Data Representation. A device's Tag Id is used for device identification. Once a Mapping region has been filled with the appropriate data, it can then be saved to a DCS Gateway Map file.

Name	Description	Comment
Description	System Design and Planning	
Device Type	The following types are available: • Circuit • Elexant • NGC-20/ Elexant 5010i • NGC-40 HTC2 • NGC-40 HTC3 • NGC-40 IO • NGC-40 SLIM	A Circuit type is used as generic Heat trace controller type. This type has a basic set of data points which applies to all Heat Trace circuits. For example Control Setpoint, Control Temperature, High Ground Fault Setpoint, .etc.
Region Type	4 Modbus data types are available: • Read Write Coil (Function Code 1) • Read Only Coil (Function Code 2) • Read Write Register (Function Code 3) • Read Only Register (Function Code 4)	
Starting Address	The starting address in the Function Code Table this Mapping Region will occupy.	
List of Data Points	A list of data points. The order of the data points in the list are in affect for this Mapping Region.	
List of Devices	A list of devices. Each device has a device tag, a parent tag, and a device type. The parent Tag and device type is optional. The orders of the devices in the list are in affect for this Mapping Region.	

Table: Mapping Region Definition

D.5 MAPPING TYPE BY DEVICES VS BY DATA POINTS

Each DCS Gateway Mapping region has a Mapping Type setting. There are 2 mapping types available, Map by Devices and Map by Data Points. When the DCS Gateway creates a virtual Gateway Map in memory it will take into consideration this Mapping type and pre-arrange the Modbus address within the Gateway Map accordingly. The following example illustrates the format of each Mapping type.

#1) Example of the Modbus addresses generated with the 2 different mapping types; By Device and By Data Point. As shown below, the resulting Function Code table on the right shows the same Modbus data addresses.

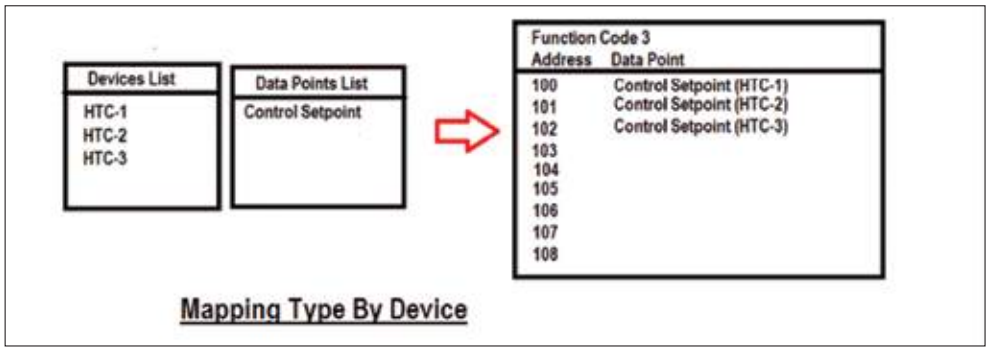


Figure D.3 Two mapping types part 1

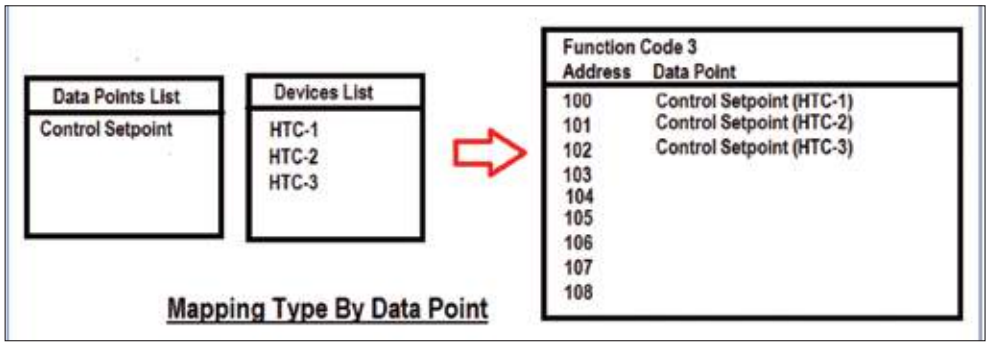


Figure D.4 Two mapping types part 2

#2) In this example there is more than 1 Data point and the results are different as illustrated.

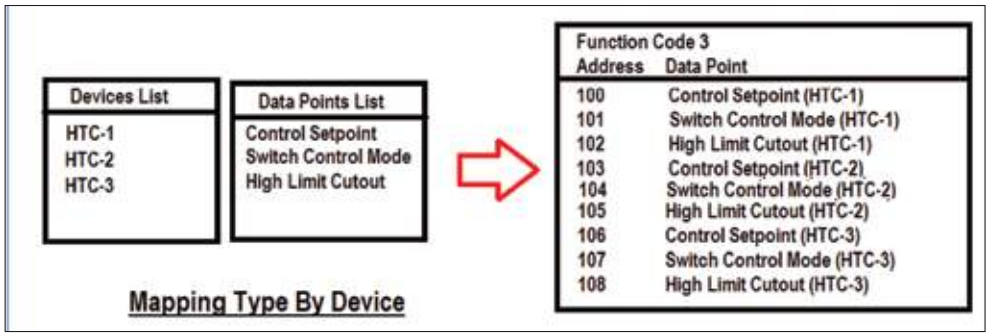


Figure D.5 Two mapping types part 3

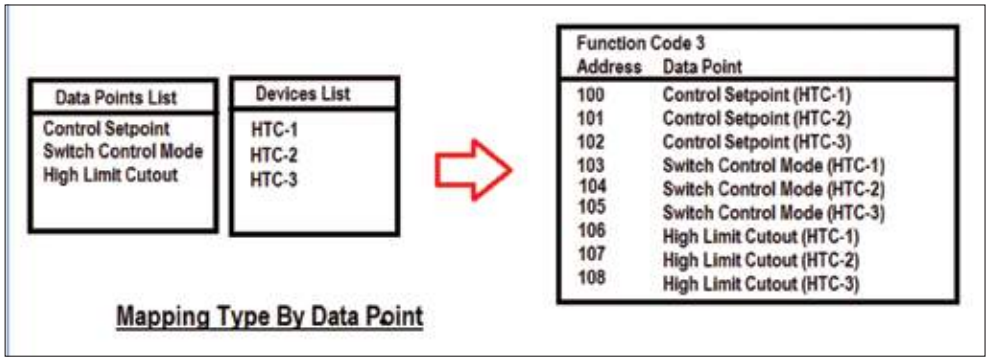
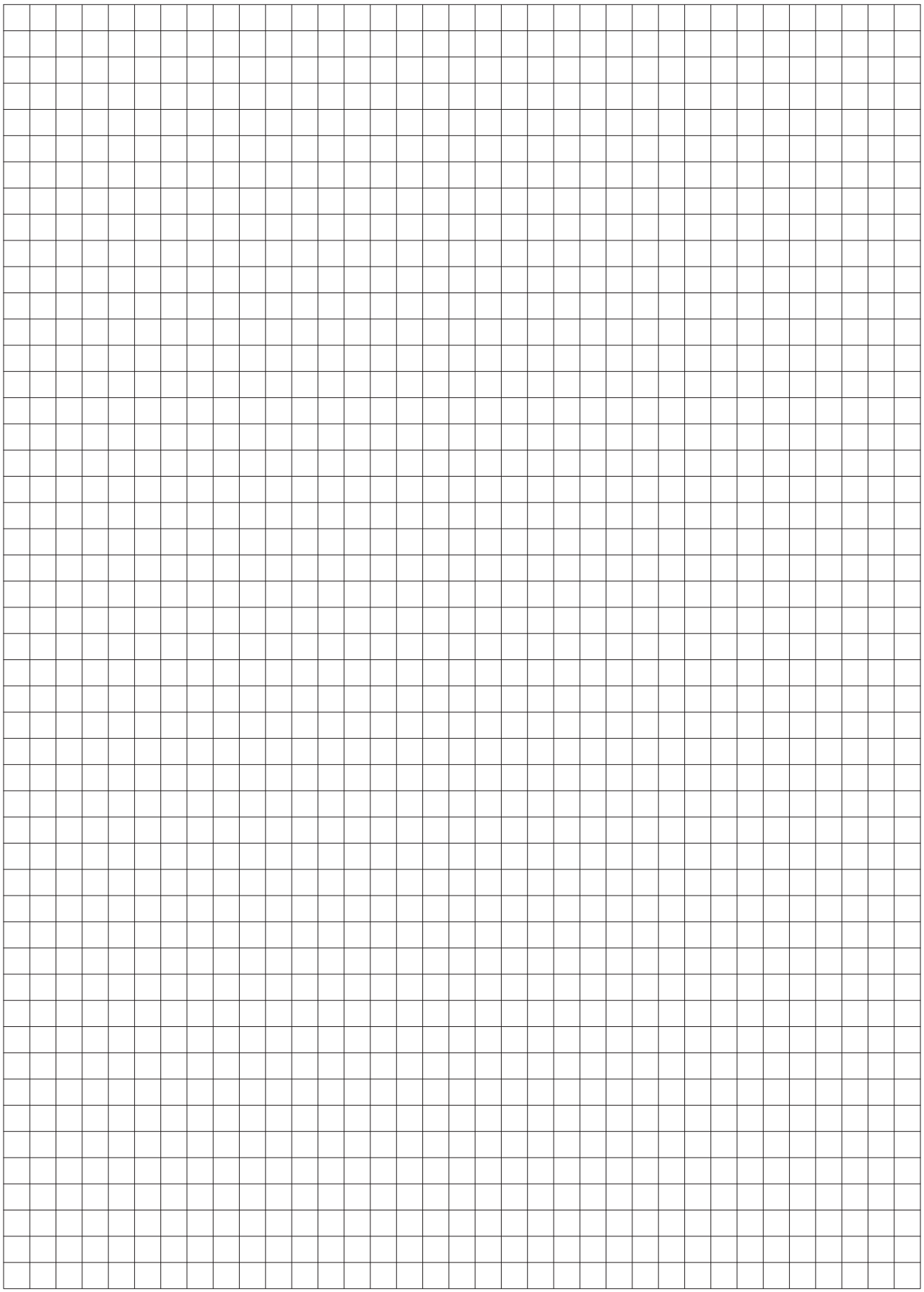


Figure D.6 Two mapping types part 4



North America
Tel +1.800.545.6258
Fax +1.800.527.5703
thermal.info@nVent.com

Europe, Middle East, Africa
Tel +32.16.213.511
Fax +32.16.213.604
thermal.info@nVent.com

Asia Pacific
Tel +86.21.2412.1688
Fax +86.21.5426.3167
cn.thermal.info@nVent.com

Latin America
Tel +1.713.868.4800
Fax +1.713.868.2333
thermal.info@nVent.com

nVent.com/RAYCHEM

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