

HTAS/HTLS
Series 8000/12000/24000



Welcome to Chromalox® intelliTRACE™— a complete heat trace control solution with industry-best price and performance.

For more than 80 years, customers have relied on Chromalox for the utmost in quality and innovative solutions for industrial heating applications. Chromalox manufactures the world's largest and broadest line of electric heat and control products.

intelliTRACE provides the user with an easy touch-screen interface, continuous built-in monitoring, line (HTLS) or ambient (HTAS) sensing, scalability, and customization.

intelliTRACE™ specifications include:

- Color Touchscreen Operator Panel with Global Programming
- Temperature, Current, Output and Alarm Display for Each Control Loop
- 8/12/24 Points of Power Control
- HTAS – Ambient Sensing or Line Sensing Controllers
- HTLS – Line Sensing Includes Independent On/Off Control for Each Loop With Adjustable Deadband and Open Sensor Alarm with Programmable Output
- Auto-Cycle Feature, Programmable to 720 Hours
- HTLS – High/Low Temperature Alarms Included in Line Sensing Version
- Programmable Low Current Alarm for Each Loop
- Ground Fault Alarm/Trip, Adjustable from 30 to 300 mA
- Common Alarm Output
- Three-Phase Supply Options of 120/208, 240, 277/480
- Load Management: 15 sec. Non-Overlap to Reduce Inrush
- RS-485 Network Communications MODBUS Slave
- NEMA 4 Enclosure
- Operating Environment: 32-120°F



We think you'll be satisfied with the high quality product Chromalox has shipped to you. If you have application questions, refer to the Engineering Resource section of our website at www.chromalox-heating.com, to find the answer you're looking for, or call one of our application engineers at 1-888-996-9258 for personal assistance.

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Safety Precautions

Important Safeguards



Throughout the intelliTRACE™ Setup Guide, these symbols will alert you to potential hazards. Safety precautions should always be followed to reduce the risk of fire, electrical shock, and injury to persons.

Please read all instructions before operating your intelliTRACE™ HTLS/HTAS Control Panel.

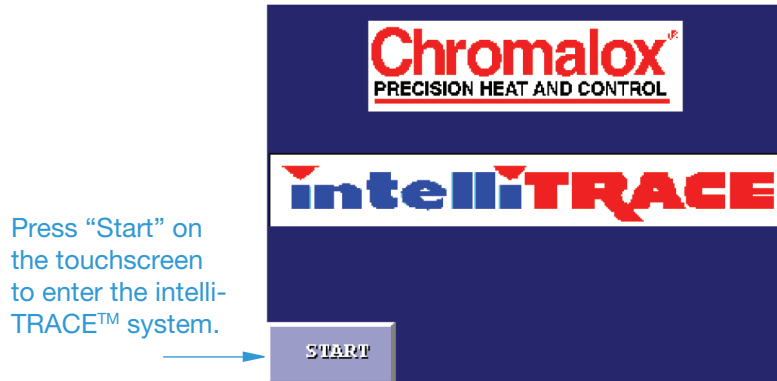
To avoid electrical shock or injury, always remove power before servicing a circuit.

Personnel working with or near high voltages should be familiar with modern methods of resuscitation. Contact an area supervisor or safety personnel for more information.

intelliTRACE™ Main Menu

intelliTRACE™ provides users with an easy-to-use touchscreen interface. Getting into the system is as simple as touching the “start” button on the initial screen, as seen below.

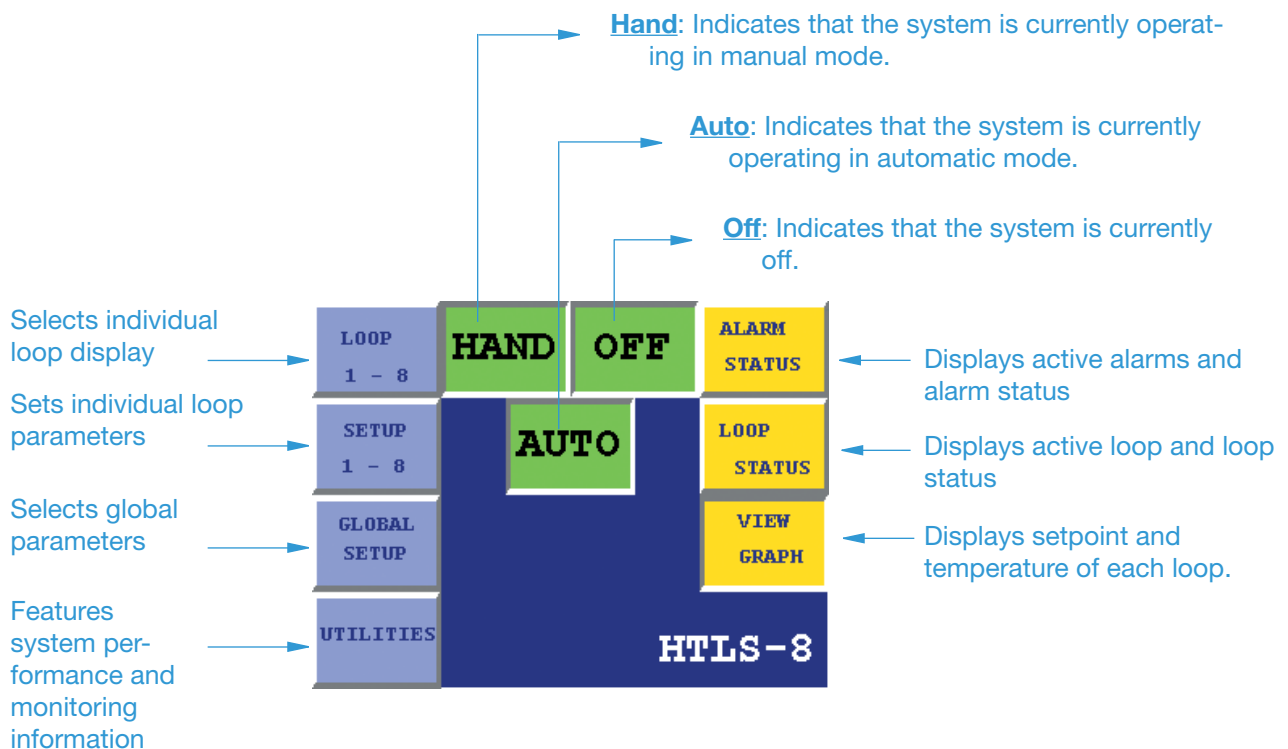
The Start button takes the user to the Main Menu of intelliTRACE™, where the user can choose



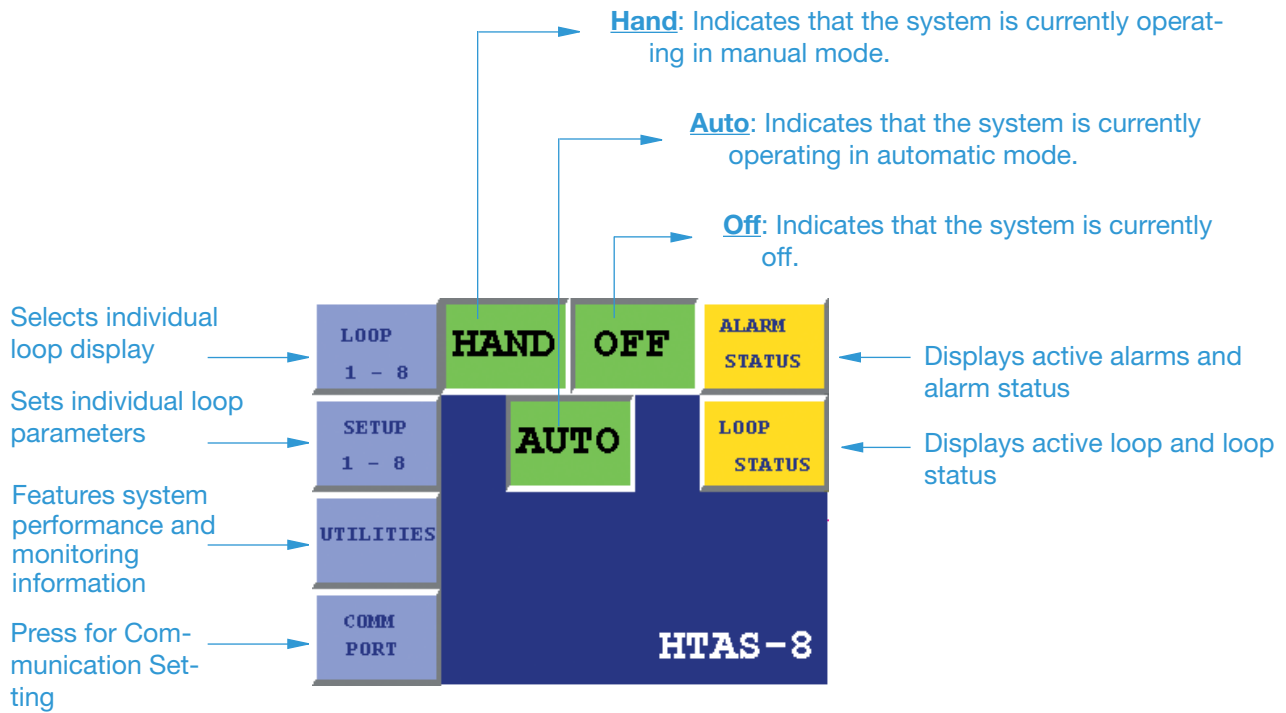
from several function buttons (displayed in purple), including loop setup options, loop parameter options, global setup options, and utilities options. The main menu also includes status buttons (displayed in yellow) which allow the user the option to view alarm status, loop status, and graphs depicting system performance.

Three indicating pushbuttons (displayed in green) show the current system status:

Setting User Preferences with Global Process Settings



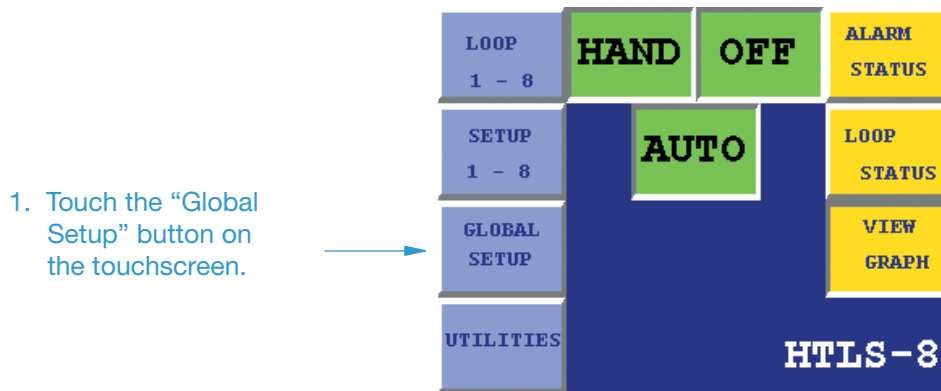
intelliTRACE™ Main Menu



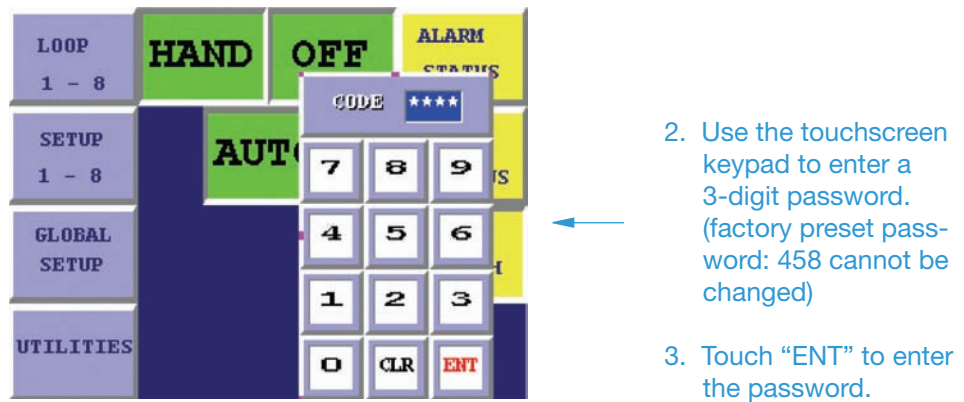
I. Global Process Settings

The Global Process Settings panel establishes setpoint, deadband, high and low temperatures, alarm settings, communications settings, and graphic display for temperature.

Settings made on the Global Process Settings screens provide operating ranges for the entire system, and define the parameters in which the system will operate. The system will not allow the user to set temperatures on individual loops outside the limit of the temperatures set forth in the Global Process Settings. Please use caution when applying the Global Process Settings. On the main menu, press the “Global Setup” area of the touchscreen:



intelliTRACE™ has built-in security settings that require a password for access to the Global Setup screen. A keypad is displayed, requiring the user to enter a password:



Upon entering the correct password, the user is permitted to access the Global Setup screen.



Setting Temperature Preferences

The IntelliTRACE™ system supports both Celsius and Fahrenheit temperatures, and will automatically convert from C to F and vice versa if the temperature units are changed. Before proceeding with the setup of Global Process Settings, first choose a temperature unit by choosing either C (Celsius) or F (Fahrenheit) for the preferred unit of measure.



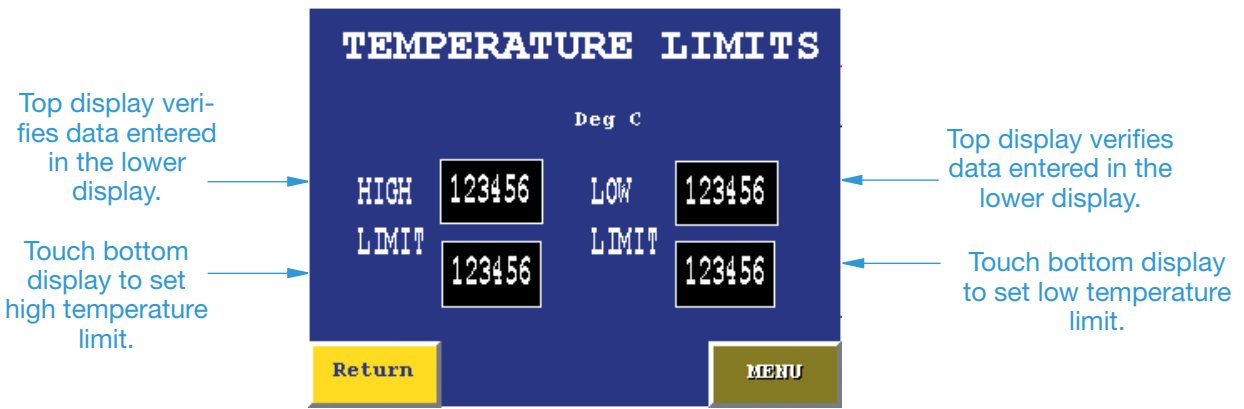
The temperature unit chosen and entered will automatically convert all existing temperatures accordingly.

Applying Temperature Limits

High and low temperature limits are set in the global settings section. This provides a limited range for temperature and setpoint. To change the limits for high and low temperature parameters in the IntelliTRACE™ system, press the “Set Limits” button.



1. Press the “Set Limits” button on the touch-screen



The “Temperature Limits” screen defines the values for the high and low temperature that the system will work within. Global temperature limits set the high and low temperatures under which the entire system will operate. The system will not allow the user to set temperature setpoints on individual loops outside the range set forth in the global temperature limits. Temperatures for Celsius begin at 0°C, but cannot exceed 500°C. Temperatures for Fahrenheit begin at 32°F, but cannot exceed 950°F.

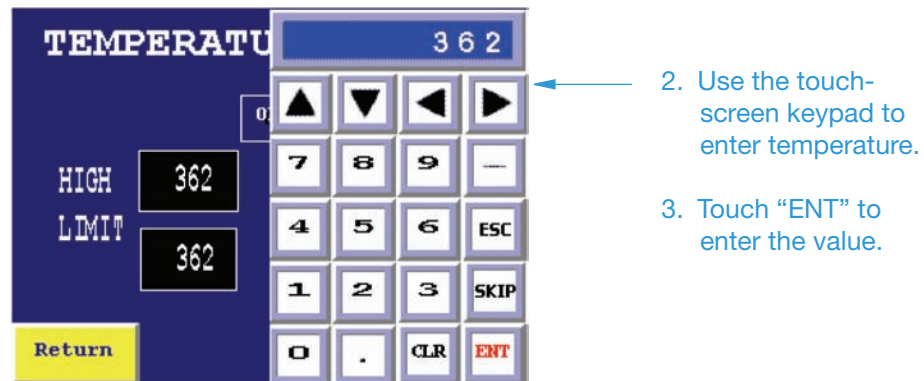
Maximum Span of Temperature

	<i>Celsius</i>	<i>Fahrenheit</i>
<i>Low</i>	0°	32°
<i>High</i>	500°	950°



IMPORTANT: High and low temperatures defined in loops may not exceed the high and low temperatures defined in the Global Settings!

1. Press the lower display on the High Limit and Low Limit settings, and a keypad will display:



Press “Return” to return to the main Global settings screen.

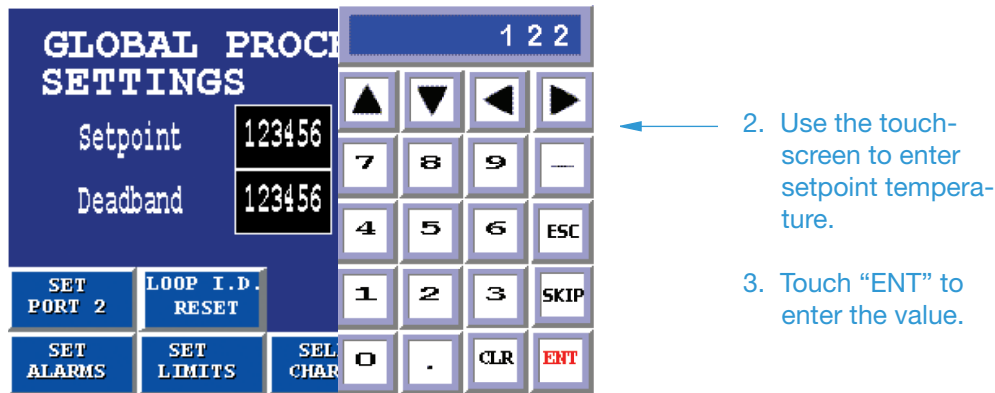
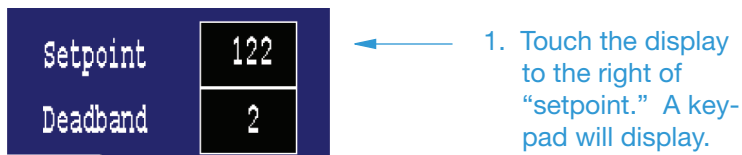
Global Setpoint and Deadband

Setpoint

Setpoint temperature is the control temperature to be maintained throughout the process and is set by the operator.

Global Setpoint, Deadband, and High/Low Alarms are the common settings available to be used throughout the process.

To apply a global setpoint, press the display to the right of “Setpoint” on the Global Process Settings screen:




The setpoint temperature chosen (122° in the above example) will be used if/when the system is in “auto” mode, and an individual loop is changed to accept global settings.

Deadband

Deadband settings allow for a small area of fluctuation between the point when the system activates and when the system reaches the control temperature. It is a range of the variable in which no corrective action is taken by the system. For example, if the setpoint temperature is at 100°, and deadband is set at 2, the heat output will activate when the temperature drops below 100°, and deactivate when the temperature reaches 102°. Deadband is measured in units ranging from 0-10.

1. Touch the display to the right of the word “Deadband.”



2. Use the touchscreen to enter the number of deadband units.

3. Touch “ENT” to enter the value.

Deadband 2

The entered Deadband units will be displayed.


Global Alarm Setpoints

The IntelliTRACE™ system provides global setpoints for high/low temperature alarms.

Setting High and Low Temperature Alarms

To set Global Alarm Parameters, press the “Set Alarms” button on the touch-screen in the main Global Process Settings menu.


1. Press the “Set Alarms” button on the touchscreen



The “Set Alarms” screen defines the global high and low temperature alarm setpoints. Any temperature that exceeds these setpoints will result in an alarm activation.

2. Touch display to the right of “High Temp” to set High Temp Alarm.

3. Touch display to the right of “Low Temp” to set Low Temp Alarm.

 **IMPORTANT:** High and low temperatures defined in loops may not exceed the high and low temperatures defined in the global limits!

1. Touch the display to the right of “High Temp” and “Low Temp,” and a keypad will display.

2. Use the touch-screen keypad to enter temperature.

3. Touch “ENT” to enter the value.

The entered high and low alarm temperatures will be displayed.

Press “Return” to return to the main Global Process Settings screen.

Chart Range

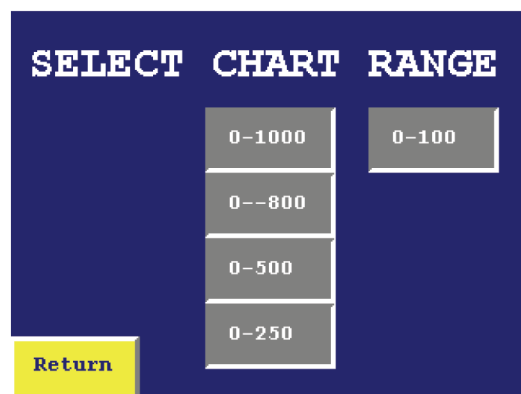
One of the features of the IntelliTRACE™ system is a visual display of system performance. Depending upon the temperatures your particular process requires, there are a variety of temperature ranges to choose from. For instance, if your process has high temperatures of 400°F, the most appropriate chart would be the 0°-500°F chart range. Choosing a range of 0-1000°F would offer less resolution.

On the main Global Process Settings page, touch the “Select Chart” button.



1. Press the “Select Chart” button on the touchscreen.

Use the touchscreen to choose the temperature range that is most appropriate for your process.



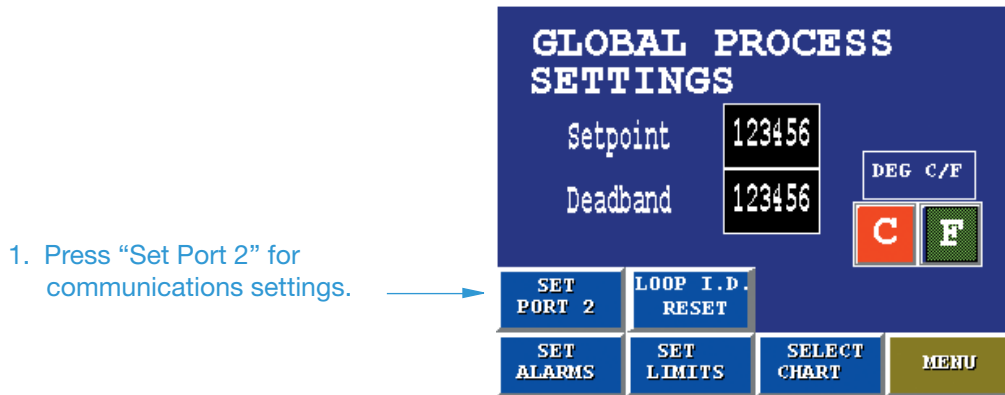
2. Choose the most appropriate temperature range for your process.

Note: This selection is the default display. Other chart ranges can be selected while on the default chart display.

Press “Return” to return to the main Global Process Settings screen.

Applying Communication Settings

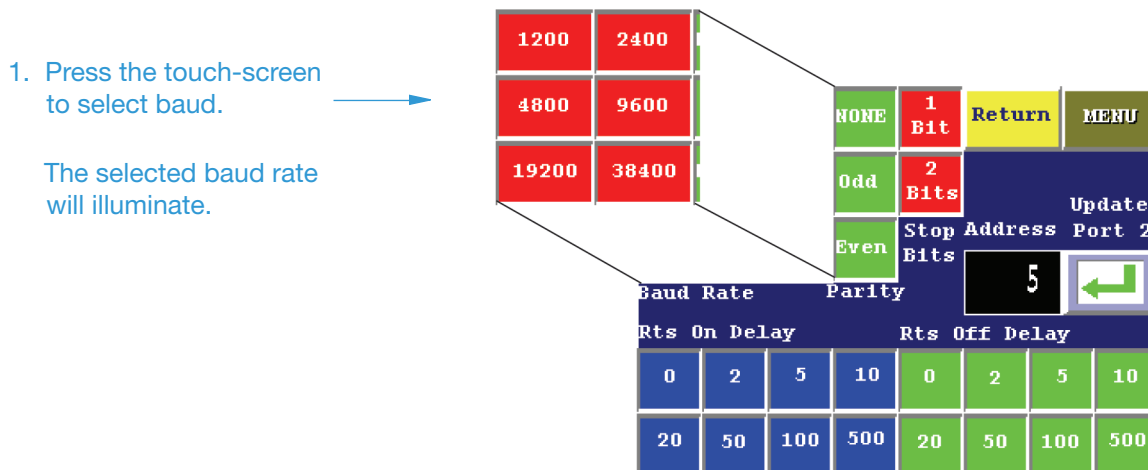
The HTLS/HTAS Control Panel can be programmed and monitored by connecting it with a personal computer, PLC or DCS. intelliTRACE™ features RS485 ModBus Network Communications and operates as a ModBus slave. Baud Rate, Parity, Stop Bits, and Station address must be set in accordance with the type of software being used. We suggest you check with information system professionals regarding the type of hardware and communications settings your hardware requires. To access the communications settings, press the “Set Port 2” button on the Global Process Settings screen.



Setting Baud Rate

The data format and communications format are easily set by the Port 2 Setup screen.

Select the corresponding baud rate on the “Set Port 2” screen.



Selecting Parity

Press the touch-screen to select stop bit.

1200	2400	1 Bit	Return	MENU			
4800	9600	2 Bits	Update				
19200	38400	Stop Address	Port 2				
Baud Rate		Parity	5	←			
Rts On Delay		Rts Off Delay					
0	2	5	10	0	2	5	10
20	50	100	500	20	50	100	500

NONE
Odd
Even

1. Press the touch-screen to select parity.

The selected parity will illuminate.

Address

The address is the station address for the ModBus Communications. The station must be a unique address. (1-247, default is 1)

RTS On/Off Delay

The RTS On/Off Delay portion of the Comm screen is not applicable, and does not require any action on the part of the user.

II. Setting Loop Parameters

intelliTRACE™ HTLS/HTAS features three different models with either 8, 12 or 24 programmable loops in which the user can program deadband, setpoint, high and low temperature alarm, RTD fault percent of output, and override individual loops settings with global settings.



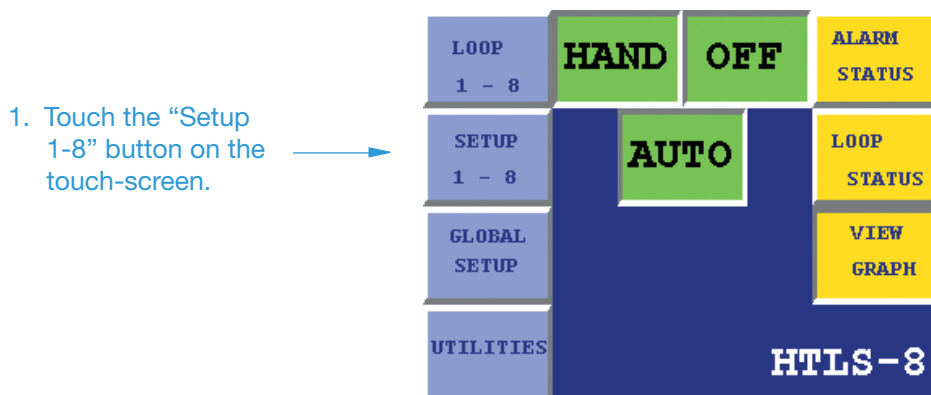
The intelliTRACE system features continuous monitoring of the entire system and activates alarms when potential trouble spots are reported.

The “Setup 1-8” option also provides status monitoring and alarms for high/low temperature, continuity, ground fault leakage and sensor faults. Monitoring is controlled by an auto-cycle function that periodically checks each loop for problems.

Operators have the choice of using the global setup values or setting individual loop parameters (see “Global Settings,” pg. 7).

To set up individual loop parameters, touch the “Setup 1-8” button on the touchscreen.

The loop setup function requires the user to enter a password and a keypad will display.

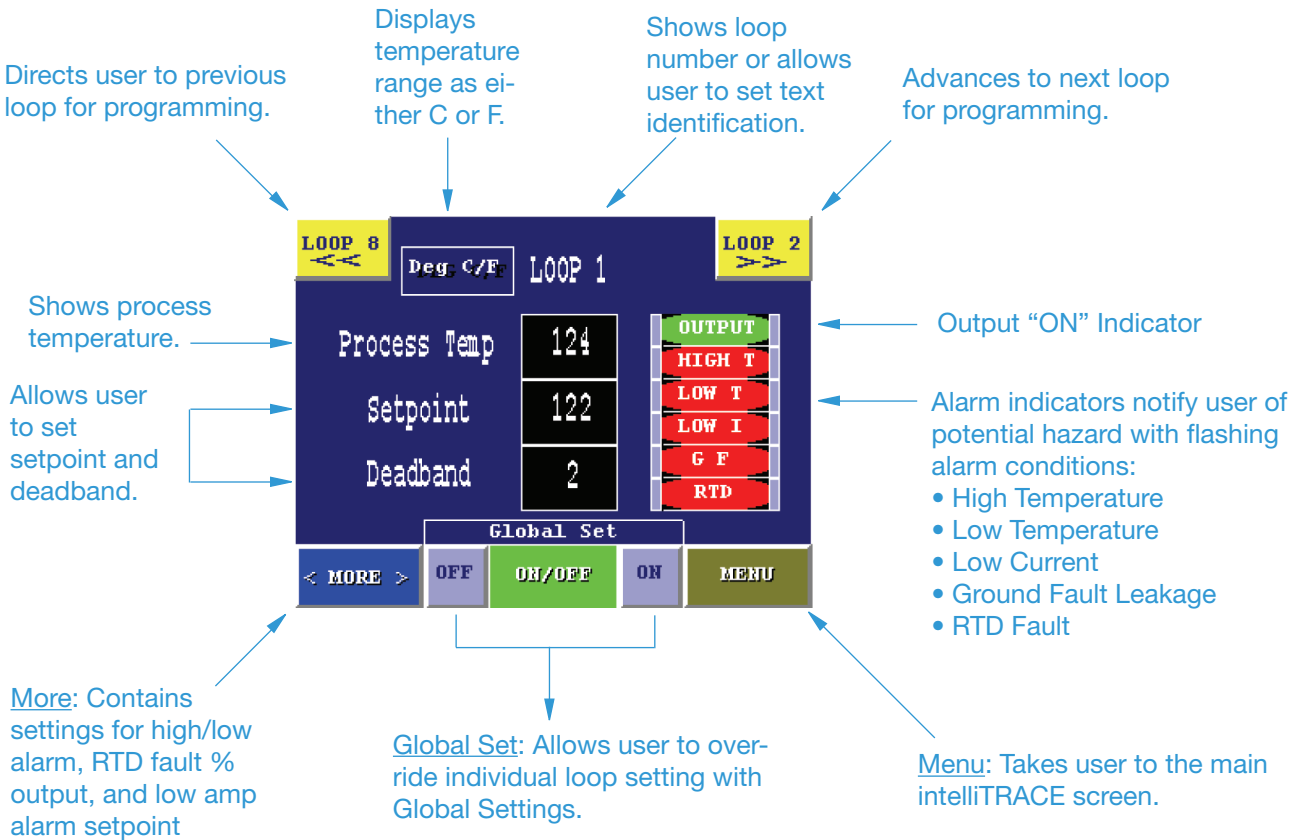


2. Use the touchscreen keypad to enter the 3-digit factory preset password 458 (cannot be changed).

3. Touch “ENT” to enter the password.

The main screen on “Setup 1-8” features process temperature, setpoint, deadband, and loop/text values.

The main screen also indicates High/Low temp, current, ground fault, and open sensor alarm conditions.



Global ON/OFF

The Global ON/OFF portion of the main “Setup 1-8” screen allows the user to override individual loop settings with Global Settings previously applied in the Global Process Settings section (see “Global Process Settings, p. 5).

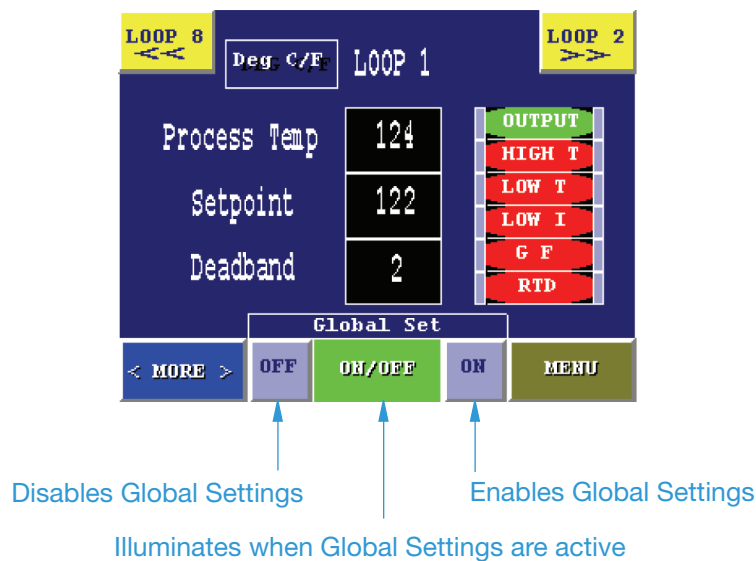


Global Settings can override individual loop settings by touching the “ON” button.

Touching the “OFF” button allows individual loop settings to be made.

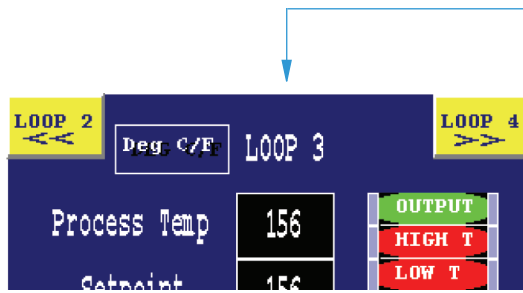
The “ON” display will illuminate if Global settings are active.

To override loop settings, press the “ON” button (far right) under “Global Set.” To disable global settings, press the “OFF” button (far left) under Global Set.



The “ON/OFF” display in the middle of “Global Set” shows the status of the global settings. If global settings are active, the “ON” display will illuminate. If global settings are inactive, the “OFF” display will illuminate.

Applying Setpoint for an Individual Loop



Loop number (i.e., “LOOP 3”) or loop identification text is displayed above the process temperature.



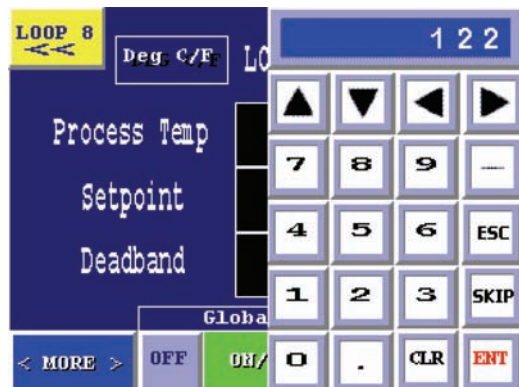
IMPORTANT: The system displays “LOOP _” above the process temperature box so the user knows which loop is being set. Please ensure that you are in the correct loop screen before making any changes!

Setpoint is the temperature at which the user wants the loop to operate. A temperature is set by touching the display to the right of “setpoint.”



1. Press the display to the right of “setpoint.”

A keypad will display.



2. Use the keypad to enter the setpoint temperature.

3. Touch “ENT” to enter the value.



The setpoint will be displayed.



IMPORTANT: Be sure to check temperature unit (Celsius or Fahrenheit) before entering temperature!

Setting Deadband for an Individual Loop

To set deadband for an individual loop, press the display to the right of “Deadband.”

Process Temp	124
Setpoint	122
Deadband	2

1. Press the display to the right of “deadband.”

A keypad will display.



2. Use the keypad to enter the deadband units.
3. Touch “ENT” to enter the value.

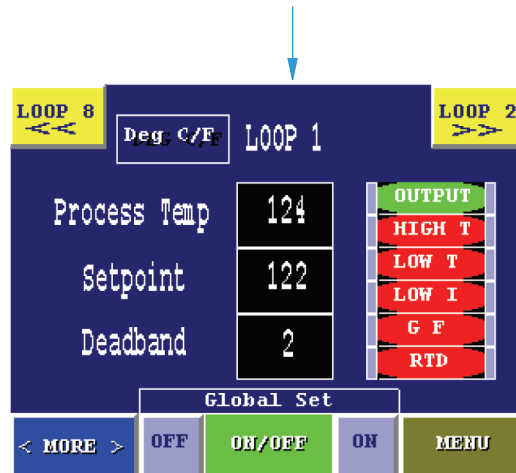
Deadband	2
----------	---

The deadband units will be displayed.

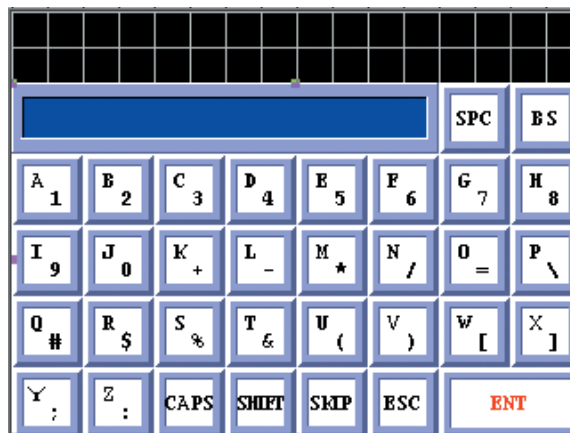
Applying Loop Identification Text

IntelliTrace™ provides users a feature to label each loop with a unique name or identification tag in lieu of the factory default settings of loop 1 through loop 24. Text identification has a maximum character length of fourteen characters and is left justified. You can use spaces (SPC) to center text.

Touch “Loop 1” on the touch screen to enter the text identification feature

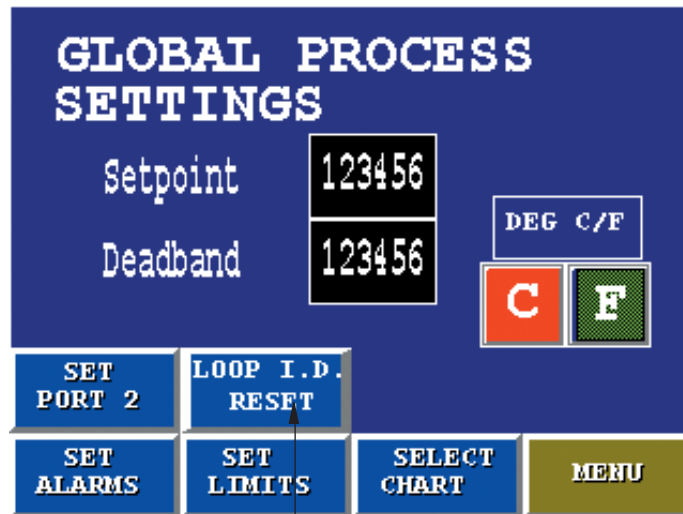


A keyboard is displayed. Enter the text. Touch “ENT” to enter the text.



Resetting Loop Identification Text to factory Defaults

This function overrides all loop identification text with “Loop 1, Loop 2”, etc.

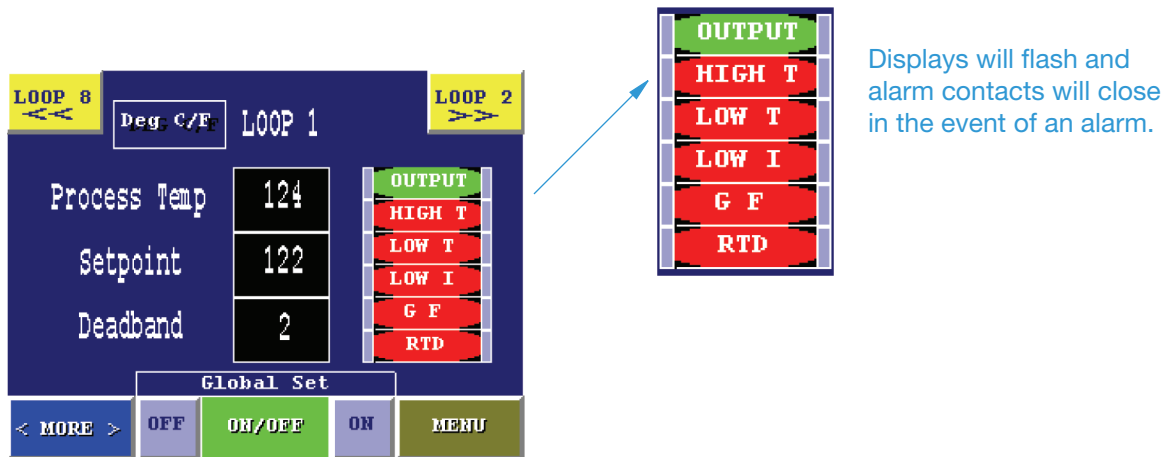


Touch to reset Loop I.D to Loop 1, etc.

Alarm Indicators

Alarm indicators exist in the Setup 1-8, Loop 1-8, and Alarm Status screens, and alert the user to potential problems within the IntelliTRACE™ system such as high and low temperature, low current, ground fault, and RTD (resistance temperature detection) fault. If the system detects an alarm, it alerts the operator with both visual display and alarm contact.

The alarm indicators in both the Setup 1-8 and Loop 1-8 screens have a series of displays on the right side of the screen that will flash in the case of a problem.



The output indicator alerts the user when the system is running, i.e., when the heat is on. The output indicator will let the operator know when output is occurring in each loop. For instance, if loops 5 and 8 have active output, the Output display on loops 5 and 8 will be illuminated. The display in other loops, however, will not be illuminated.



The high temperature display will flash if the system detects that a high temperature has been reached or exceeded.

For instance, if the operator is running an individual loop setting on Loop 4, and the high temperature for the loop is set at 100°F, and the temperature reaches 100°F, the alarm will flash and the common alarm contact will close.



Corrective action must be taken in the event that an alarm sounds. Check with the Supervisor in your area to review emergency plans.



LOW T

Much like the high temperature display, the low temperature display will flash if the system detects that a low temperature has been reached or exceeded.

For instance, if the operator is running an individual loop setting on Loop 2, and the low temperature for the loop is set at 100°F, and the temperature reaches 100°F, the alarm will flash and the common alarm contact will close.



LOW I

The low current display flashes when a low current is detected within the system. If the system detects a low current when conducting regular maintenance testing, the display will flash and the common alarm contact will close. Corrective action must be taken.



G F

The ground fault display flashes when a ground fault condition is detected within the IntelliTRACE™ system. If the system is idle (no outputs on), ground fault tests are conducted regularly as defined by the operator in the Utilities screen (see *“IntelliTRACE™ Utilities,”* p. 32).



RTD

Indicates RTD (Resistance Temperature Detection) fault. If the system detects a fault in the RTD sensor, the display will flash and the common alarm contact will close.

Additional Loop Settings



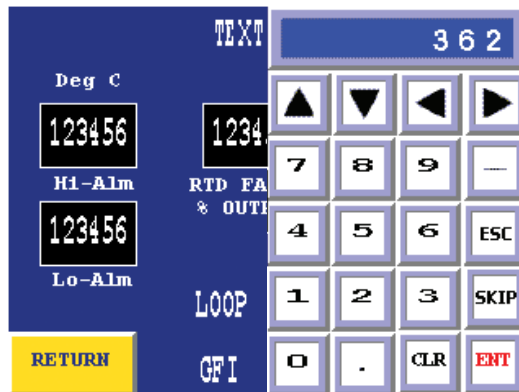
< MORE >

The “More” button directs the user to an additional screen that allows high and low alarm temperatures to be set for the current loop. High and low temperatures can be set for individual loops, however, the temperatures cannot exceed the high and low temperatures set forth in the global process limits (see *“Global Process Settings,”* p. 5).

To set the high and low temperature alarms, press the display to the right of “Hi-Alarm” or “Lo-Alarm.”

1. Press the display to the right of “Hi-Alarm” and “Lo-Alarm” to set the maximum and minimum temperature the loop will allow before activating an alarm.

A keypad will display.



2. Use the keypad to enter the alarm temperature.

3. Touch “ENT” to enter the value.

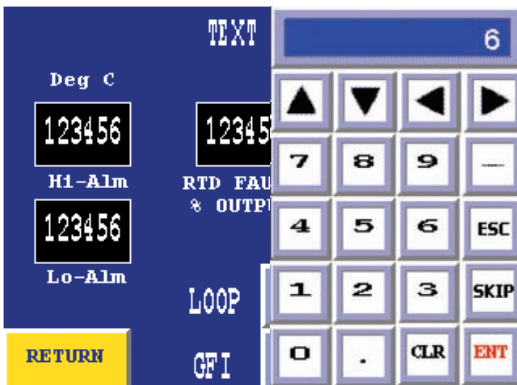
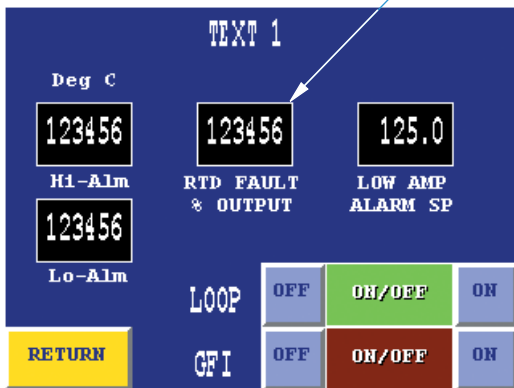


The alarm temperature will be displayed.

RTD Fault - Percent of Output

In the event of an RTD fault the output will automatically revert to a selected value (factory set at 0%). The output of the loop can be programmed to any level between 0% and 100%. This is based on what is appropriate for the process. To set the RTD fault % output, touch on “MORE” on the Setup 1-8 main screen.

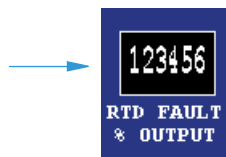
1. Touch the RTD Fault % Output display to enter the percentage of output the system will default to in the event of a RTD fault.



2. Enter the percentage of output at which the system should operate in the event of an RTD fault.

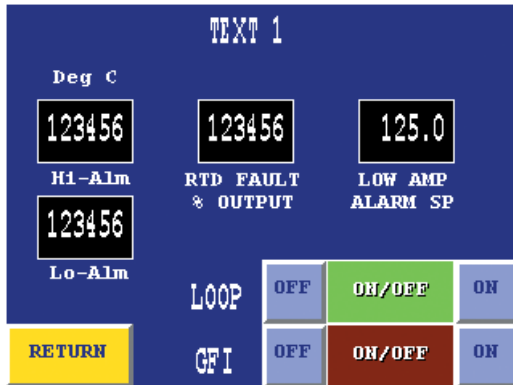
3. Press “ENT” to enter the value.

The percentage of RTD fault output will be displayed.

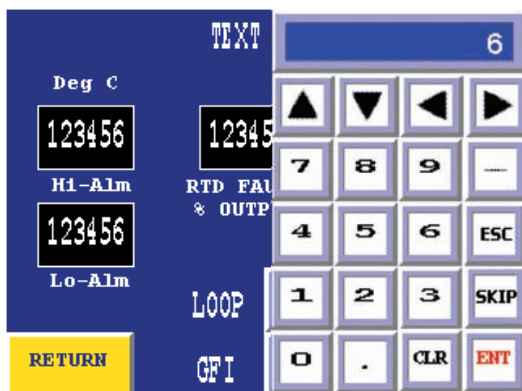


Applying a Low Amp Alarm Setpoint for an Individual Loop

The low amp alarm actuates when the current is equal to or less than the alarm setpoint. The low amp setpoint can be programmed to any value between .3 - 24.0 amps. To set the low amp alarm setpoint, touch on "MORE" on the setup 1-8 main screen.



1. Touch the "Low Amp Alarm SP" display to enter the low amp setpoint. A keypad will display



2. Use the keypad to enter the low amp setpoint.

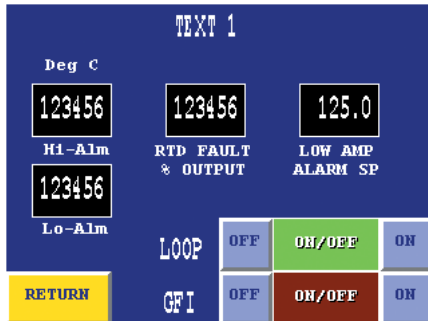
3. Touch "ENT" to enter the value

Ground Fault Isolation Button

The IntelliTRACE Panel in a normal operations mode conducts a “standard ground fault and current measurement” every 20 minutes. In the “Standard Test” each loop is tested for 5 seconds. In the event a ground fault is detected the “Standard Test” is performed and the faulted circuit is isolated. In isolation mode no power is applied to that loop. To reset isolation the fault must be cleared and the “Standard Test” must be run (see Utilities pg. 30).

If the ground fault isolation button is turned “OFF” while a ground fault exists, a “Ground Fault Only Test” is performed every 2.5 minutes. Each loop is tested for one second.

HTLS Screen



Returns user to previous screen.

Overrides the ground fault isolation

Display illuminates “GFI ON” when ground fault is being conducted and “GFI OFF” when off. (Red)

HTAS Screen



Display illuminates “GFI ON” when ground fault is being conducted and “GFI OFF” when off. (Red)

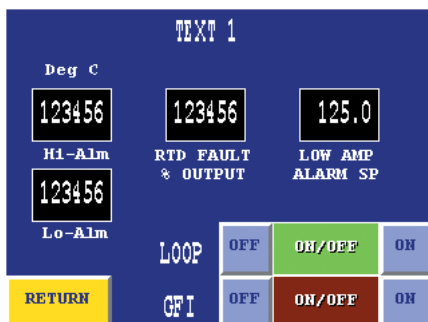


IMPORTANT: To change settings on additional loops, press the “Loop” buttons in the upper right and left corners of the Setup 1-8 Screen! Always check to make sure you are making changes to the correct loop!



Loop Active Button

HTLS Screen



Display illuminates “ACTIVE” when loop is active and “IN-ACTIVE” when loop is off.

To enable or disable a control loop the “Loop” switch is used to turn “OFF” or “Activate” the loop.

HTAS Screen



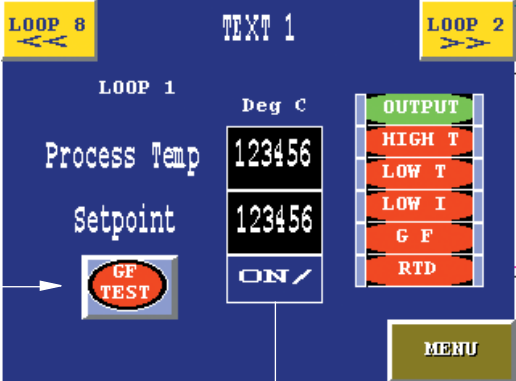
Display illuminates “ACTIVE” when loop is active and “IN-ACTIVE” when loop is off.

III. Operating the Loops

Once the loops have been setup in "Setup" (see "Setting Loop Parameters," p. 14), you can program individual loops (HTLS only), which only involves entering a setpoint.

Setpoint is the only programmable area on the "Setup" screen. All other areas of the screen are informational.

Indicates "Ground Fault Test" in process.

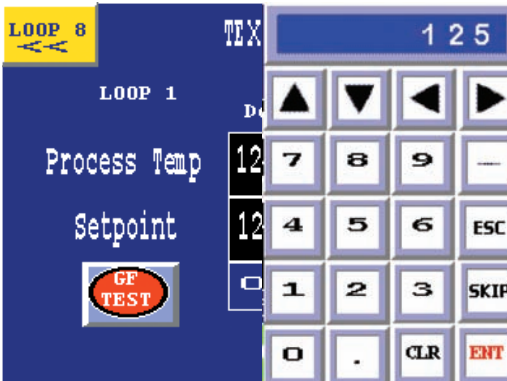


Indicates "Active" or "Inactive" loop.



1. Press the display to the right of "Setpoint."

A keypad will display.



2. Use the keypad to enter the setpoint temperature.
3. Touch "ENT" to enter the value.



The entered setpoint will be displayed.

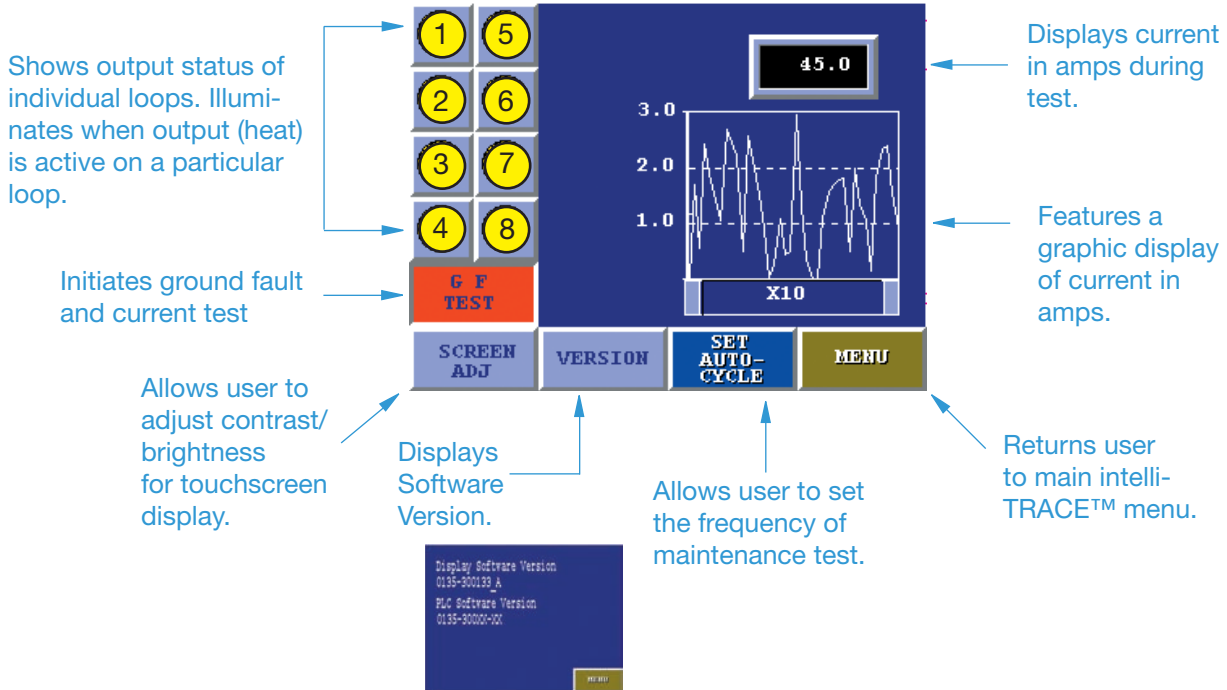
intelliTRACE™ Utilities

intelliTRACE™ features utilities that allow the user to obtain a visual indication of how the system is performing at any given time. Here, the user can conduct a manual ground fault test, set the auto cycle for intermittent ground fault testing, check loop status for output, and adjust the contrast for screen appearance. There is also a digital and graphic display of electrical current.

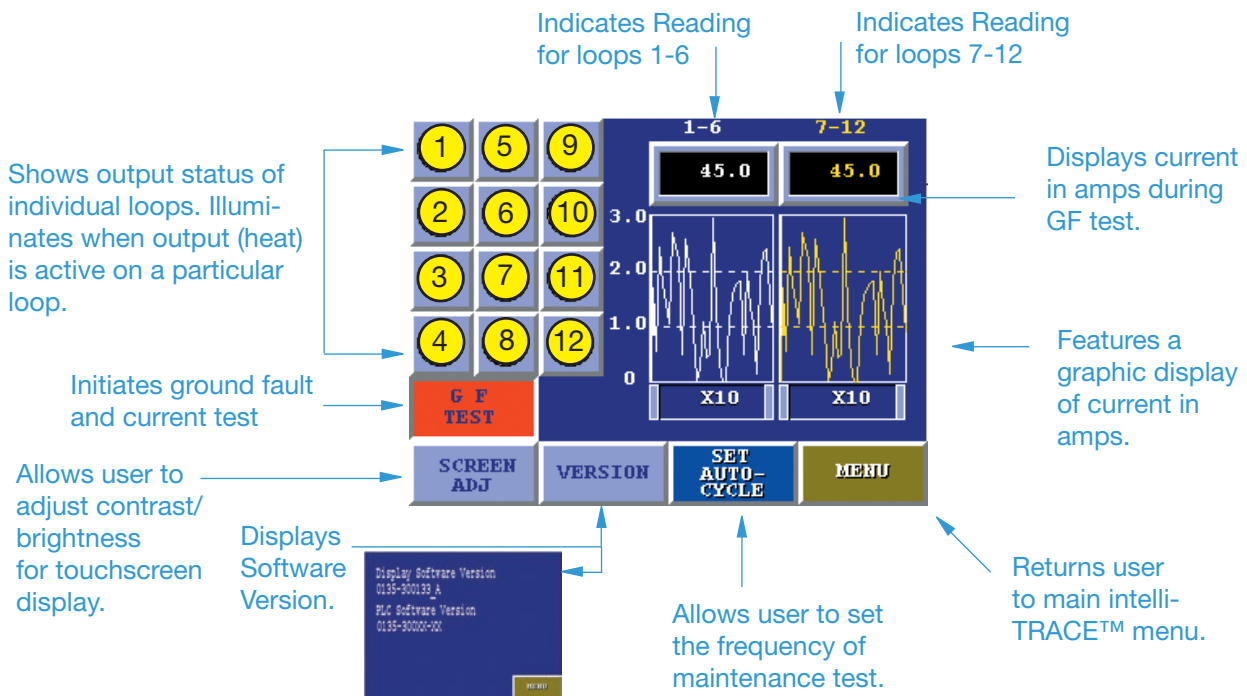


The intelliTRACE™ system provides utilities that allow the user to increase productivity by spending less time conducting routine maintenance on the system.

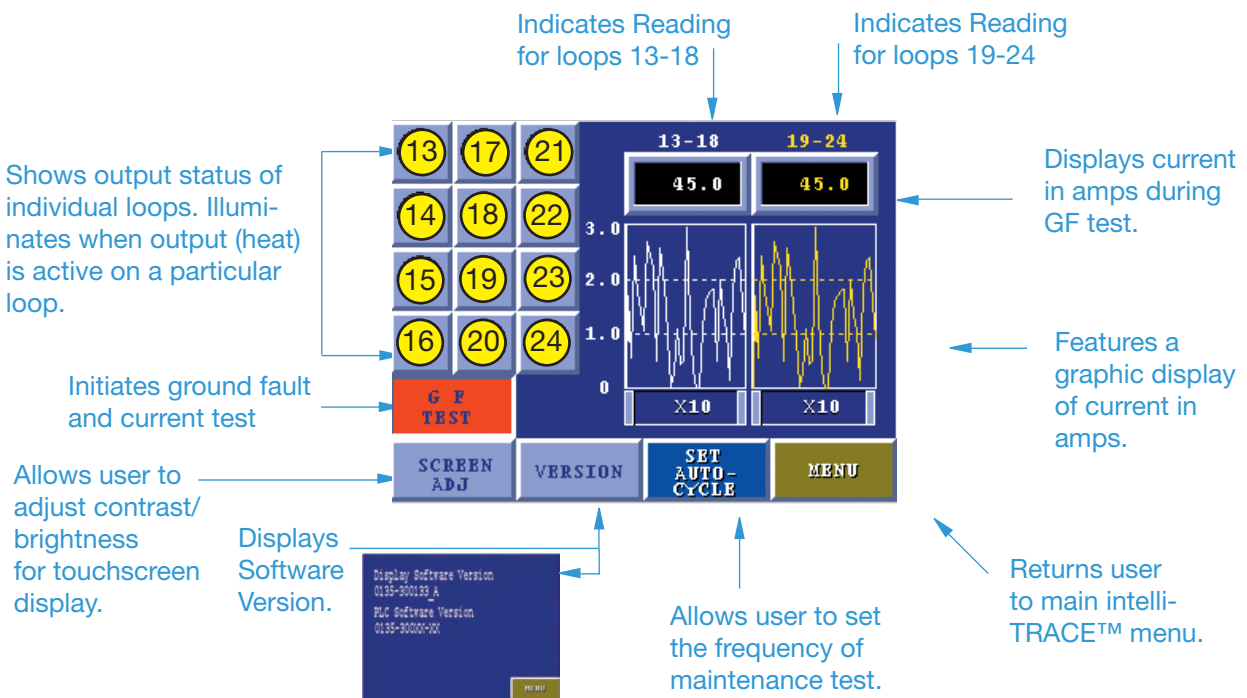
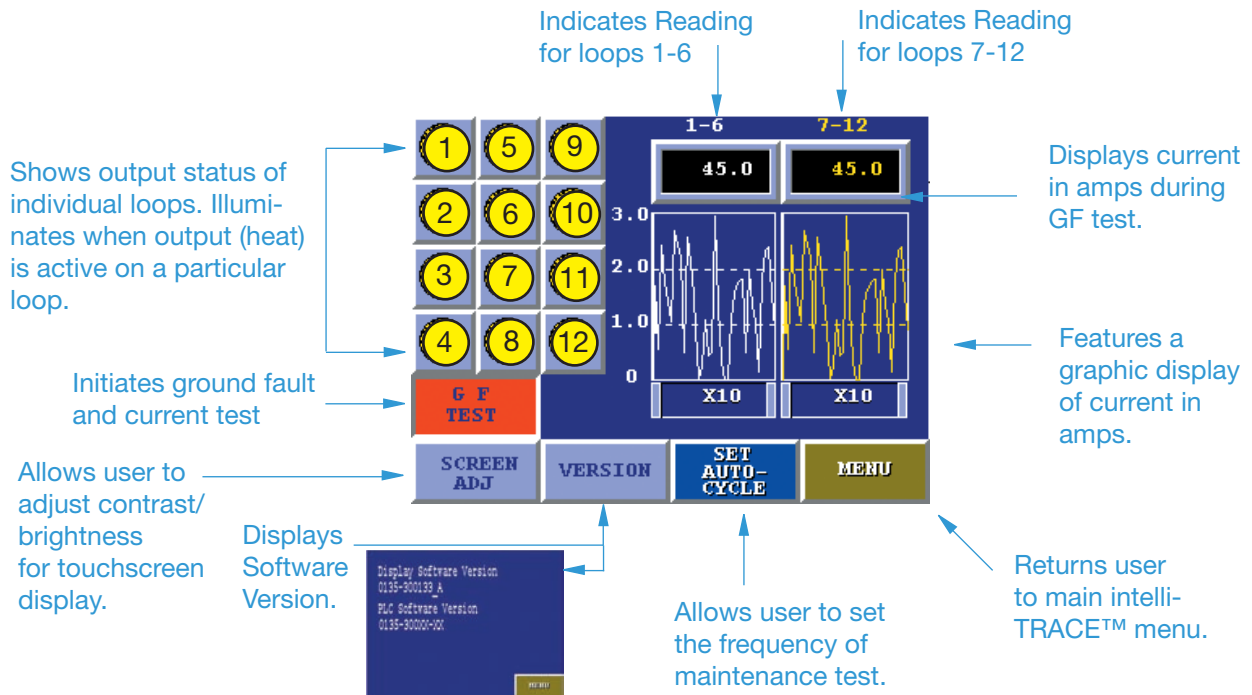
Eight Loop Utility Screen



Twelve Loop Utility Screen

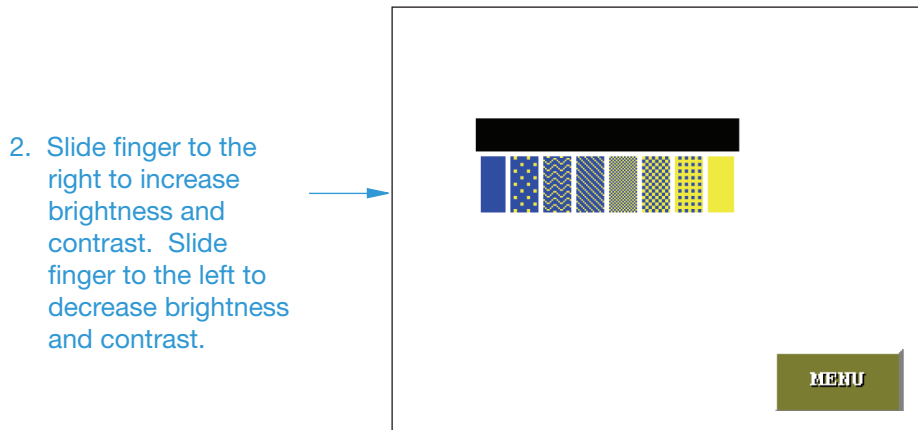
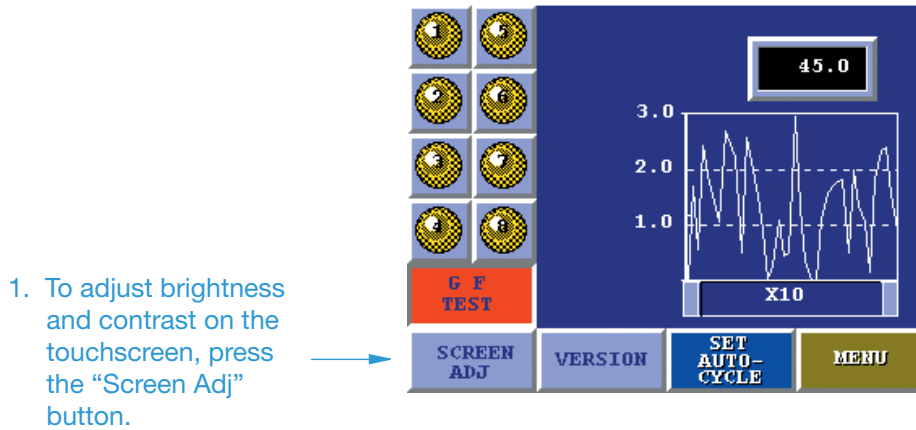


Twenty-Four Loop Utility Screen



Adjusting Brightness/Contrast for the Touchscreen

The touchscreen can be adjusted for contrast and brightness according to the user's individual preference. Touch the "Screen Adj" button on the Utilities main screen.



Setting Auto Cycle

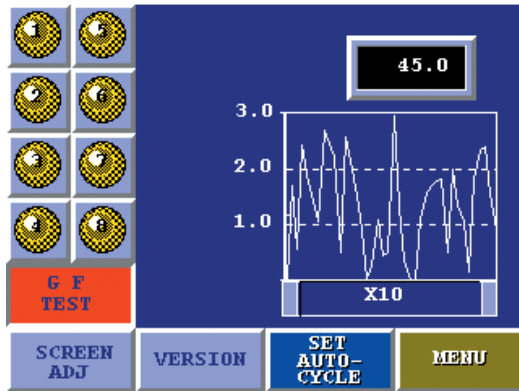
Auto Cycle Testing is intended to provide maintenance information during extended idle periods.

At test time each loop is run for 1 minute. During this test, ground fault and current measurements are made.



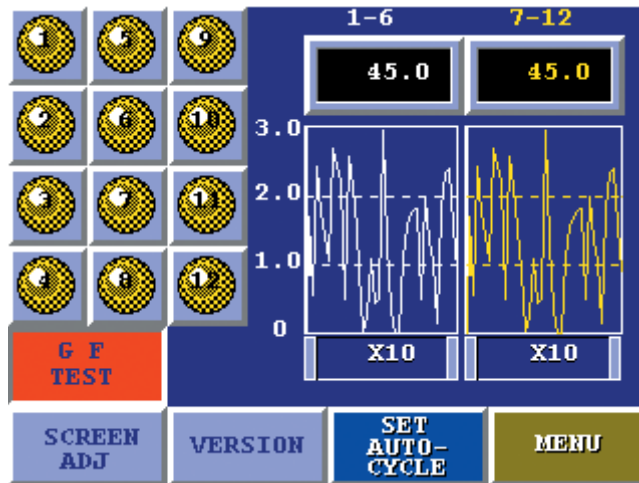
Auto Cycle Testing will occur only when all outputs are "OFF".

To set the schedule for automatic ground fault and current testing, click on the “Set Auto Cycle” button.



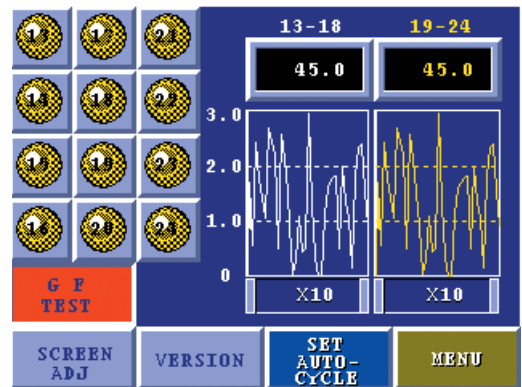
Typical Eight Loop Display

1. Press on “Set Auto Cycle” to enter the number of hours.



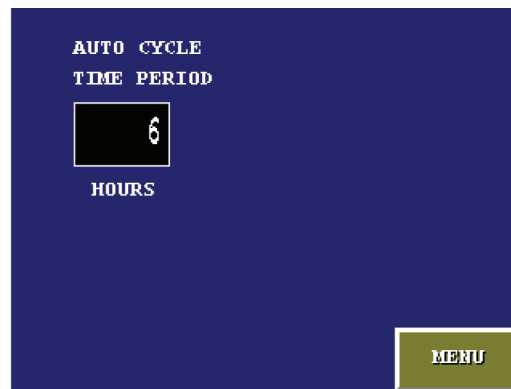
Typical Twelve Loop Display

Typical Twenty-four Loop Display



2. Press on the display above “hours” to enter the number of hours between each automatic ground fault and current test.

A keypad will display.



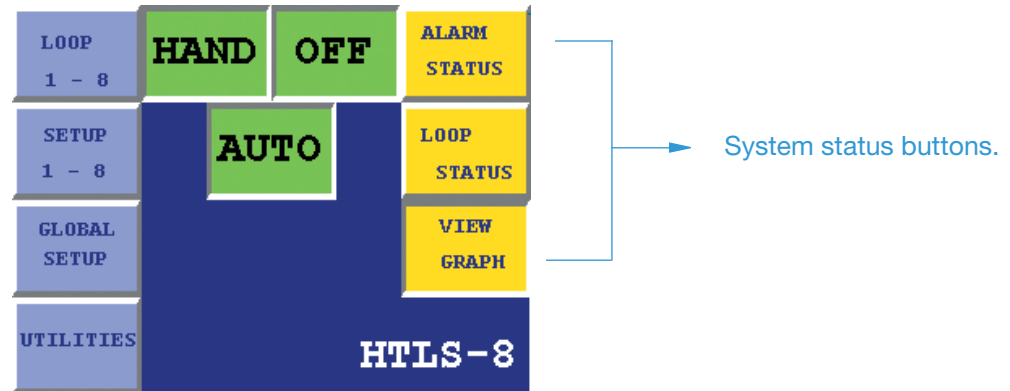
2. Enter the auto cycle time period.
Press “ENT” to enter the value.



The auto cycle time period will be displayed.

V. IntelliTRACE™ Alarm Status Indicators

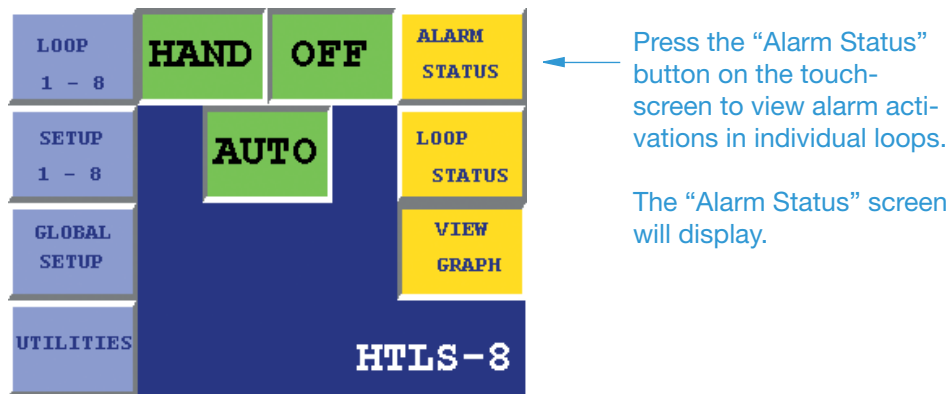
The “MAIN” IntelliTRACE™ screen has several buttons that allow the user to view system status.



Alarm Status

The Alarm Status button allows the user to view the status of alarms in each loop. Any active alarm will flash in red. The Alarm Status screen is informational only, and allows the user to view at-a-glance, any active alarms.

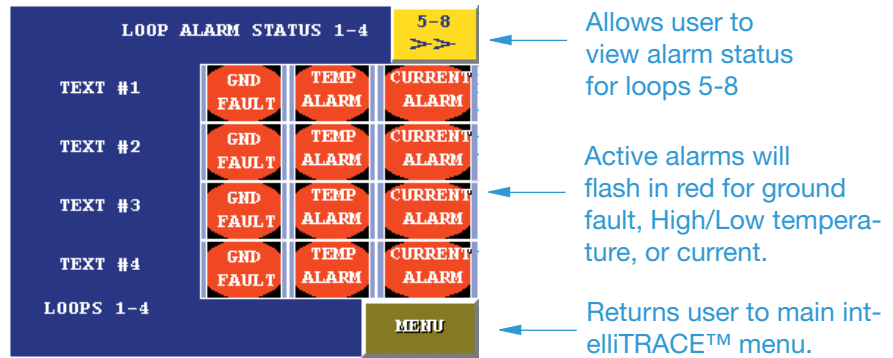
To view the alarm status screen, touch the “Alarm Status” button.



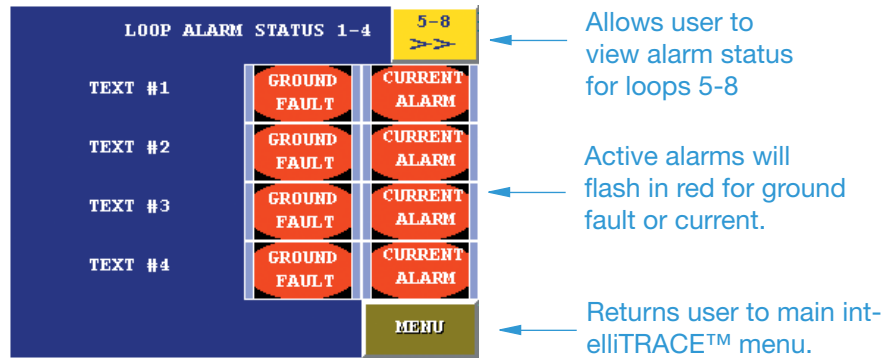
The Loop Alarm Status screen is informational only!

The alarm status screen shows individual loops on the left side of the screen. In the event of an alarm activation, the type of alarm will flash in red. This screen is informational only, and is intended to give the user an overview of IntelliTRACE™ system status.

8 Loop HTLS Screen



8 Loop HTAS Screen

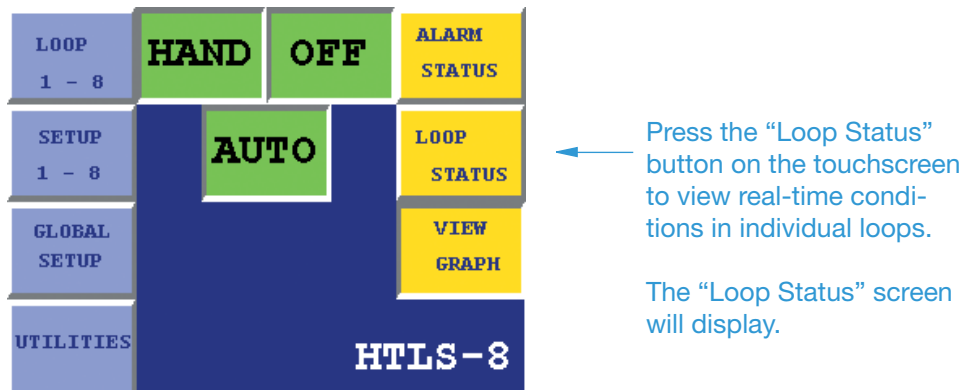


To view loops 5-8, press the “5-8” button in the upper right portion of the screen.

Loop Status

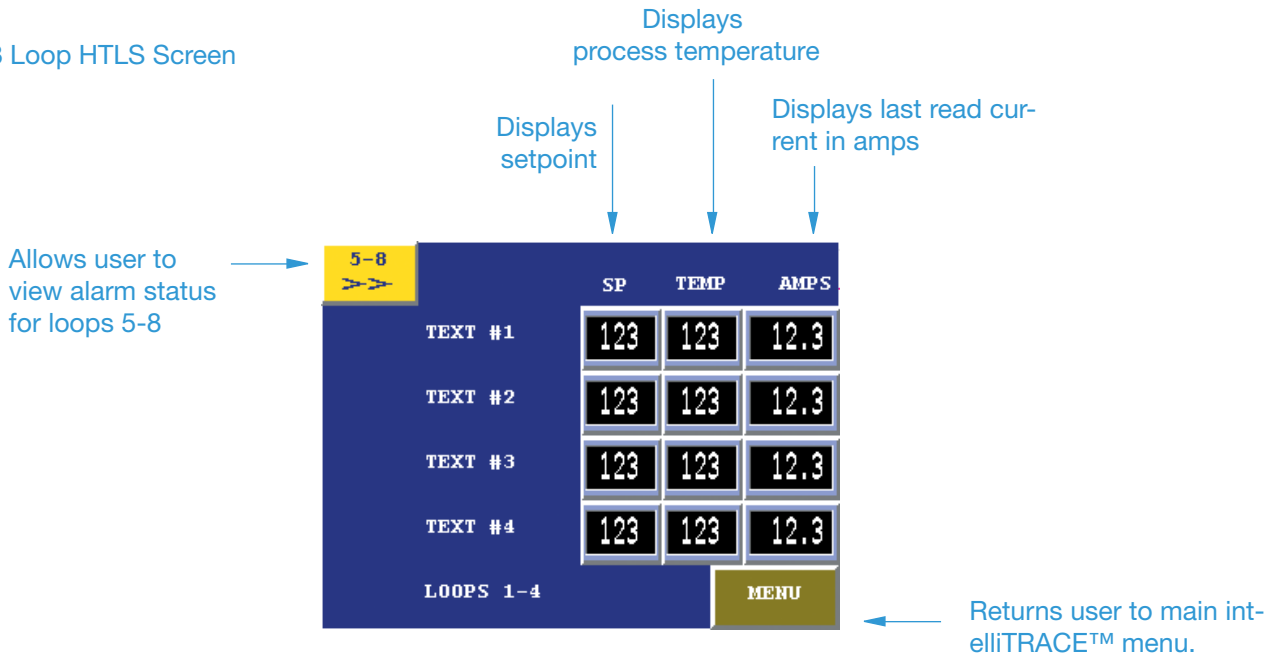
The Loop Status Screen allows the IntelliTRACE™ user to see a real-time display of temperature readings in each loop for setpoint, process temperature, and last current reading.

To view the Loop Status Screen, press “Loop Status” on the main IntelliTRACE™ menu.

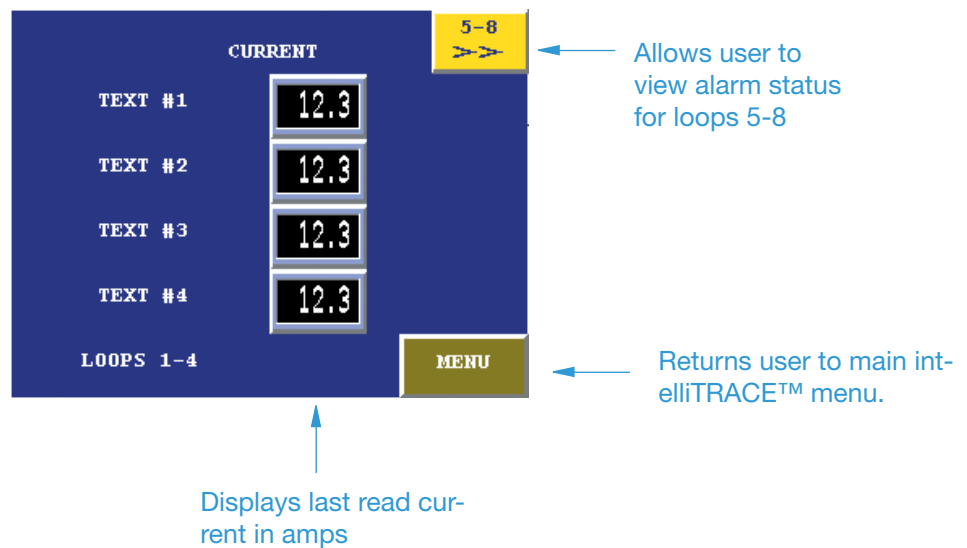


All of the information displayed on the Loop Status screen is informational only. Loop information is displayed in “real-time” — up-to-the-minute, accurate information.

8 Loop HTLS Screen



8 Loop HTAS Screen

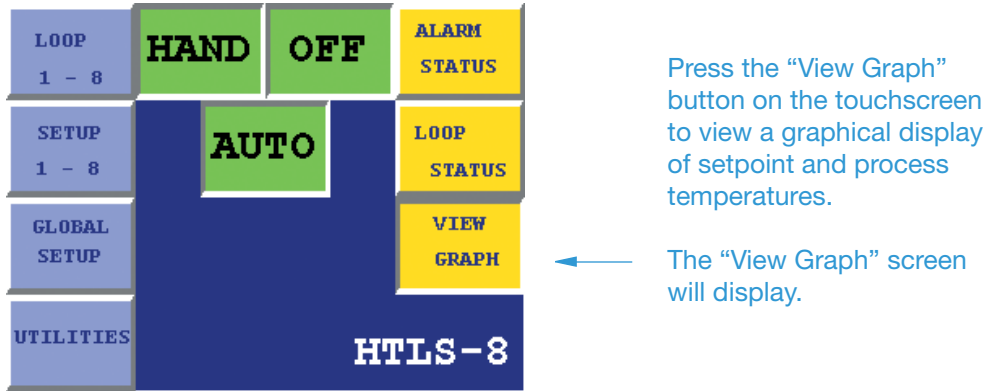


The Loop Alarm Status screen is informational only!
 Note: Current readings are updated only after a standard ground fault test.

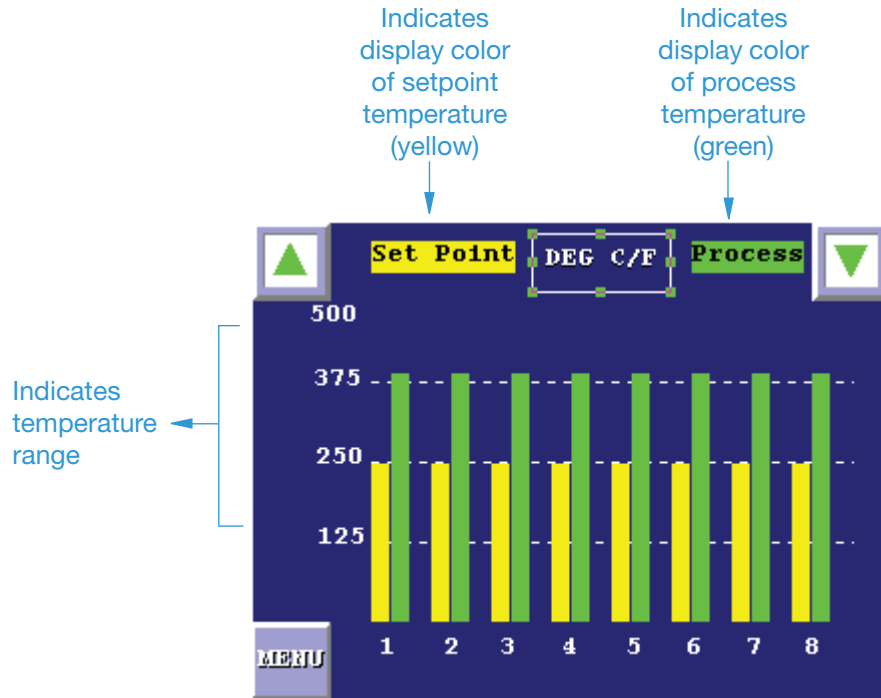
View Graph

The “View Graph” screen on the IntelliTRACE™ main menu, allows users to view both setpoint and process temperatures in the form of a bar graph.

To view a graph, press the “View Graph” button.

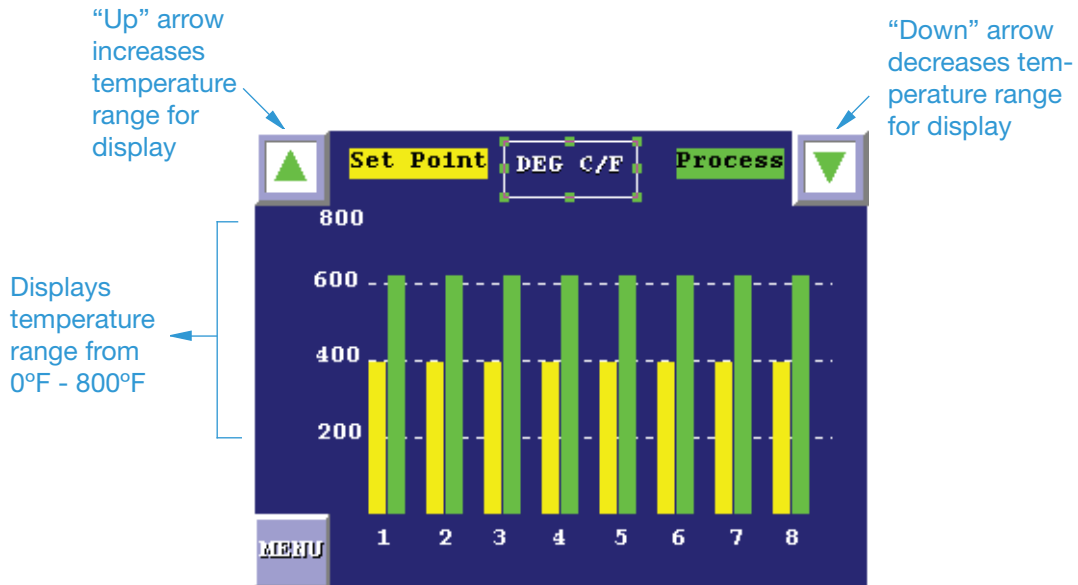


The View Graph screen displays both setpoint and process temperatures in color-coded bar chart format. Setpoint temperatures are displayed in yellow, and process temperatures are displayed in green.

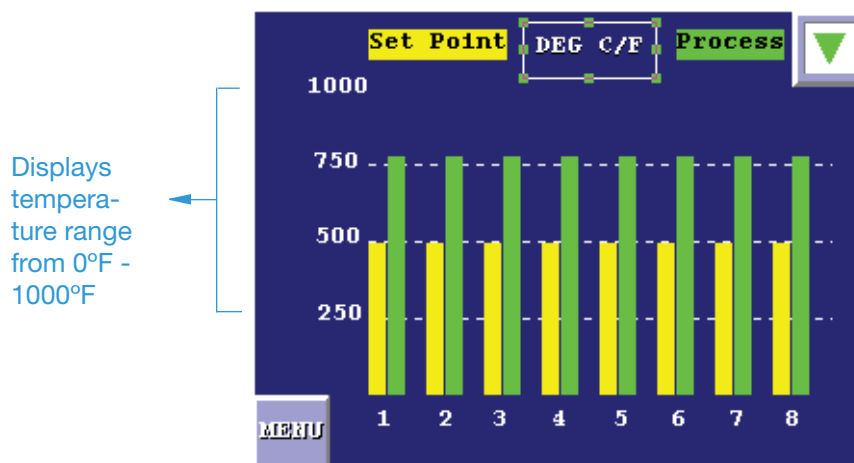


Changing the Temperature Range

The temperature range seen on the left side of the graph can be easily increased or decreased, depending on user preference. Press the up or down arrow in the upper corners of the screen to increase or decrease the temperature range on the left side of the screen. Notice that by touching the “up” arrow, the temperature range on the left has increased from 0°F-500°F to 0°F-800°F.



Pressing the “UP” arrow again increases the range to 0°F to 1000°F.



VI. Service Information

Chromalox is a global supplier, providing the highest level of customer support. If you should have questions concerning your IntelliTRACE™ HTLS/HTAS control panel, or need information, you may contact Chromalox at:

**Corporate Headquarters
Chromalox, Inc.**
103 Gamma Drive
Pittsburgh, PA 15238
Phone: (412) 967-3800
Fax: (412) 967-5148

**Controls Division
Chromalox, Inc.**
1382 Heil-Quaker Blvd
LaVergne, TN 37086
Phone: (615) 793-3900
Fax: (615) 793-3563

For application questions, you can:

1. Call one of our application engineers for personal assistance at 1-888-996-9258.
2. Visit the technical reference section of our website at www.chromalox.com for downloadable manuals in .pdf format.

MODBUS ADDRESS TABLE

12-Loop

COIL READ/WRITE

	Loop 1	Loop 2	Loop 3	Loop 4	Loop 5	Loop 6	Loop 7	Loop 8	Loop 9	Loop 10	Loop 11	Loop 12
Output	3329	3345	3361	3377	3393	3409	3425	3441	3841	3857	3873	3889
Hi_temp Alm	3330	3346	3362	3378	3394	3410	3426	3442	3842	3858	3874	3890
Lo-Temp Alm	3331	3347	3363	3379	3395	3411	3427	3443	3843	3859	3875	3891
Lo-I Alm	3333	3349	3365	3381	3397	3413	3429	3445	3845	3861	3877	3893
Temp-Alm	3334	3350	3366	3382	3398	3414	3430	3446	3846	3862	3878	3894
I-Alm	3335	3351	3367	3383	3399	3415	3431	3447	3847	3863	3879	3895
GF-Alm	3336	3352	3368	3384	3400	3416	3432	3448	3848	3864	3880	3896
Mark	3585	3587	3589	3591	3593	3595	3597	3599	3649	3651	3653	3655
G F Isolate	3586	3588	3590	3592	3594	3596	3598	3600	3650	3652	3654	3656
On/Off	3601	3602	3603	3604	3605	3606	3607	3608	3665	3666	3667	3668

DISCRETE INPUT READ

OPEN RTD	12097	12098	12099	12100	12129	12130	12131	12132	12161	12162	12163	12164
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REGISTER READ/WRITE

	Loop 1	Loop 2	Loop 3	Loop 4	Loop 5	Loop 6	Loop 7	Loop 8	Loop 9	Loop 10	Loop 11	Loop 12
Set Point	40993	40995	40997	40999	41001	41003	41005	41007	41009	41011	41013	41015
Process	40994	40996	40998	41000	41002	41004	41006	41008	41010	41012	41014	41016

REGISTER READ/WRITE

	Loop 1	Loop 2	Loop 3	Loop 4	Loop 5	Loop 6	Loop 7	Loop 8	Loop 9	Loop 10	Loop 11	Loop 12
Process Var	41089	41090	41091	41092	41093	41094	41095	41096	41601	41602	41603	41604
Current	41097	41098	41099	41100	41101	41102	41103	41104	41609	41610	41611	41612
Set Point T	41105	41121	41137	41153	41169	41185	41201	41217	41617	41633	41649	41665
Hi-Alm SP T	41106	41122	41138	41154	41170	41186	41202	41218	41618	41634	41650	41666
Lo-Alm SP T	41107	41123	41139	41155	41171	41187	41203	41219	41619	41635	41651	41667
Ctrl Hyst	41108	41124	41140	41156	41172	41188	41204	41220	41620	41636	41652	41668
P V deg F	41233	41234	41235	41236	41237	41238	41239	41240	41745	41746	41747	41748
P V deg C	41241	41242	41243	41244	41245	41246	41247	41248	41753	41754	41755	41756

Use the proper command based on your software eg:
 Read Multiple coils 01 with address 0xxxx
 Read Multiple discrete inputs: 02 with address 1xxxx
 Read multiple Registers: 03 with address 4xxxx

The underlined portion of the address is often generated by the software when the command code is entered.

Theory of Operation

The set up of the individual and global loop parameters is explained in each section of the manual. This overview is intended to give a quick summary of how it all works together.

Each loop of the system can be enabled (active) or disabled (inactive). A disabled loop will have no output and will not map into the common alarm. It will display temperature and temperature alarms if a sensor is connected.

Each loop of the system may use unique individual control parameters or the control parameters maybe common parameters (Global Settings).

All active loops are individually tested for 5 seconds every 20 minutes. During the test load current value is displayed on the graph located on the Utility page. The load current value is also stored. The stored value is updated during the next 20-minute test. When power is applied to the panel the unit performs the initial standard 5-second per loop ground fault and current test.

If a ground fault is detected during normal operation all active loops are immediately individually tested for 5 seconds. The test will detect which loop has faulted and isolate the defective loop.

If a faulted loop has the isolation bypassed the system will provide a ground fault test every 2.5 minutes. In this test each active loop is energized for 1 sec. Load current data is not taken during this test.

During extended periods where the output of all loops are off the special maintenance timer is in effect. This extended period timer will initiate a ground fault and current test. Each output is tested for one minute. The timer function may be disabled by setting the time to "0".

To limit inrush current on the overall system we enforce a 15-second delay between the turn on of a pair of outputs (pairs are 1&2, 3&4, etc.). If loop 1 is ON loop 2's turn on cannot occur until 15 seconds after loop 1's turn on.

The power on indicator light on the front of the panel will indicate when you are in Automatic Control Mode. It will be steady on when the unit is in Automatic and flash when Hand or Off mode is selected.

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