Gas Chromatograph

Models: 131S & 132S

Alternative Models: 131S-T4 and 132S-T4

ICE Version 9.1.X.X

Software Manual

Revision 1.1
24 May 2023

Envent
Knowledge by Analysis

Table of Contents

1.0 Introduction

1.1 About This Manual

The 131S/132S Gas Chromatograph uses the Envent ICE software for configuration, calibration, and reporting. To install the ICE Software, refer to the installer which comes in a USB flash drive supplied with the analyzer. If the USB flash drive is missing or damaged, contact Envent Support for access to the software.

This manual will cover only basic operation and configuration of the gas chromatograph. Any advanced configuration items are not covered; if the user wishes to perform an operation not covered in this manual, please contact Envent Support.

This manual will be referring to models 131S and 132S. However, the information applies equally to the 131S-T4 and 132S-T4, unless otherwise stated.

1.2 Warranty and Liability Statements

Products produced and supplied by the manufacturer (Envent Engineering Ltd), unless otherwise stated, are warranted against defects in materials and workmanship for up to 18 months from the shipping date or up to 12 months from the start-up date (whichever comes first). During the warranty period the manufacturer can choose to either repair or replace products which prove to be defective. The manufacturer or its representative can provide warranty service at the buyer's facility only upon prior agreement. In all cases, the buyer has the option of returning the product for warranty service to a service facility designated by the manufacturer or its representative. The buyer shall prepay all shipping charges for products returned to a service facility. The manufacturer or its representative shall pay all shipping charges for the return of products to the buyer. The buyer may also be required to pay round-trip travel expenses and labour charges (at prevailing labour rates) if the warranty has been violated. The warranty may be considered violated for any of the reasons listed below.

1.2.1 Limitation of Warranty

The foregoing warranty shall not apply to defects arising from:

- Improper or inadequate maintenance of the product by the user
- Improper unpacking or installation procedures
- Inadequate site preparation
- Unauthorized modification or misuse of the product
- Operation of the product in unfavorable environments such as at high temperatures, high humidity, or in corrosive atmospheres

- Operation of the product outside of the published specifications

Envent Engineering Ltd carries no responsibility for damage caused during transportation or unpacking, unless otherwise specified in the incoterms.

An extended warranty may be available with certified start-up. Contact Envent Engineering Ltd for details.

Envent Engineering Ltd reserves the right to change the product design and specifications at any time without prior notice.

1.2.2 Disclaimer

No other warranty is expressed or implied. The manufacturer specially disclaims the implied warranties of merchantability and fitness for a particular purpose. The sole remedy of the buyer shall in no case exceed the purchase price of the analyzer. The manufacturer shall not be liable for personal injury or property damage suffered in servicing the product. The product should not be modified or repaired in any manner differing from procedures established by the manufacturer.

1.2.3 Software Revisions

This edition of the software manual deals only with software edition ICE 9.1 or later. For assistance with earlier revisions of the software (Edition 8.8 or 7.3) contact Envent Support.

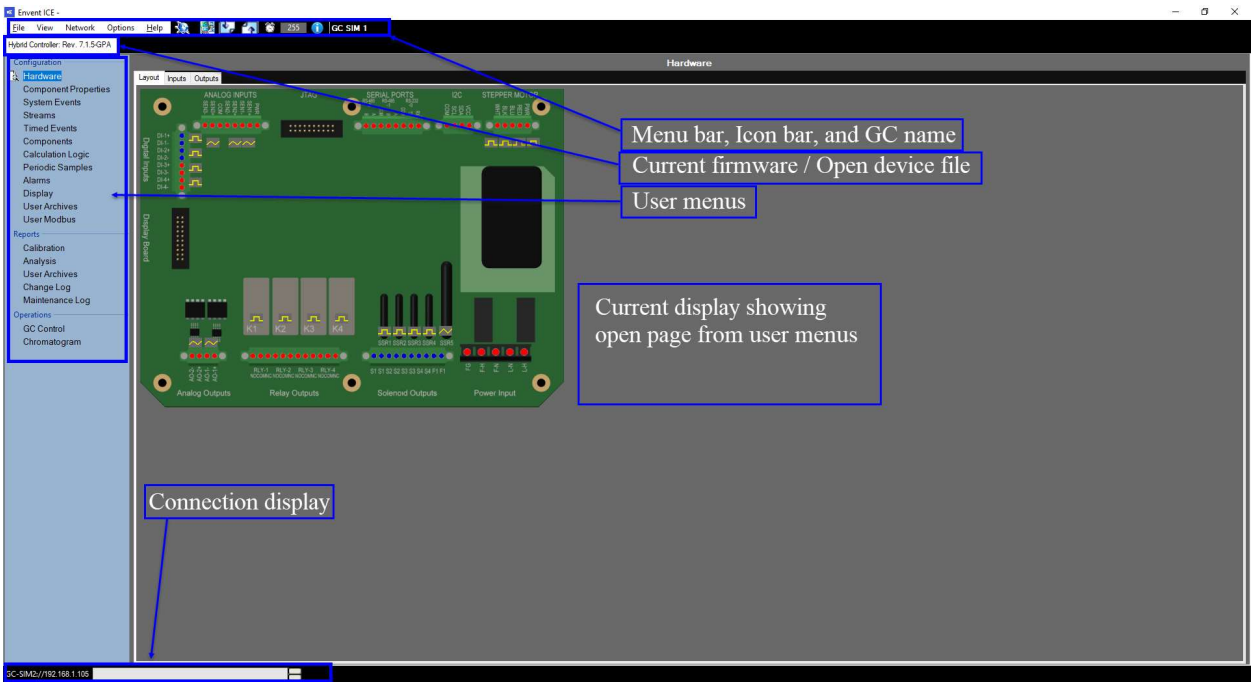
2.0 Using the Software Functions

Most of the functionality in the ICE software will be familiar to users who are already familiar with Microsoft Windows applications and programs. The sections below will describe some of the software functionality.

The menus have underlines on some of the letters, these indicate hot keys which can quickly access menu items. To use the hot keys, use the “Alt” key and press the letter underlined. For example, “Alt + F” will open the file menu, then continuing to hold Alt and pressing “N” will open the new file dialogue.

2.1 Overview

Below is an overview showing all the basic parts of the ICE software. The user should become familiar with these sections and what each does. Each section will have a portion of this manual dedicated to it in more detail.



2.2 File Menu

File

New…	Opens the new device dialogue menu
Open…	Opens a saved ".device" configuration file
Chart…	Opens a saved ".chart" chromatogram file
Close	Closes the current configuration file
Save	Saves the current configuration file to the previously defined save location. If no save location has been defined, this will open the "Save As…" dialogue box
Save As…	Opens the Windows "Save As…" dialogue box. This is used to save a current device file
Import Device Config…	[Advanced use only] this option will allow the user to import an older firmware configuration to a newer firmware configuration
Device Programmer…	[Advanced use only] the device programmer allows the user to upload a firmware revision to the analyzer
Printer Setup…	Opens the Windows printer setup
Page Setup…	Opens the Windows page setup
Exit	Exits the software

2.3 View Menu

View

Preferences…	Allows the user to change software preferences such as the time units, chart preferences, and temperature/pressure units displayed
Serial Port Setup…	Allows the user to adjust the timing on the serial port
Reporting…	Opens a dialogue box which can adjust the various views and reports that the software outputs

2.4 Network Menu

Network

Add New…	Opens a dialogue menu for the user to add a new networked device
Scan Network	Scans the currently connected sub-network for new devices
Clear Scanned List	Clears the below list of previously scanned, or added, devices
[Network List]	Displays a list of all the network devices the software has scanned or added since the last time the list was cleared. Note: these devices may, or may not, be currently connected to the network.

2.5 Options Menu

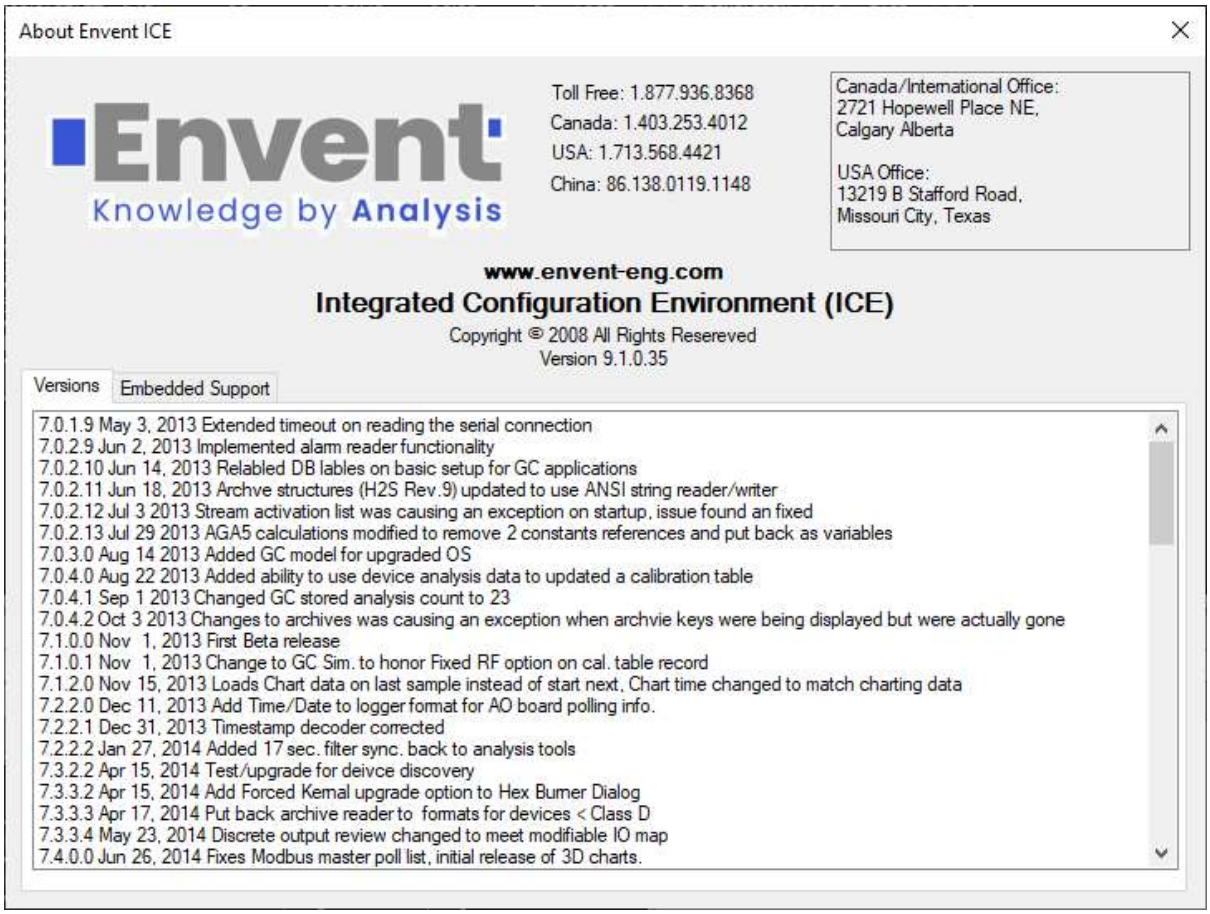
Options

Formatting	Opens the report formatting dialogue – same functionality as the View > Reporting… option
Modcom	[Advanced use] ICE built-in modbus simulation tool
GPA Calculations	[Advanced use] ICE built-in GPA calculation tool
GPA Component Builder	[Advanced use] More advanced GPA component building and calculation tool

2.6 Help Menu

Help

About	Displays the about information for Envent ICE



2.7 Icon Bar

The icon bar contains icons which will be frequently used during operation of the software. Refer to this section of the manual when navigating the software and its functionality.

Select Communication Port 	Opens a drop-down menu which is used to select the port on which to communicate with the analyzer
Connect/Disconnect Device 	Connects or disconnects the currently selected device
Read from device 	Reads the device file from the currently connected device
Write to device 	Writes the currently open device file to the currently connected device
Synchronize Clock with PC 	Clicking this button will immediately synchronize the real-time clock (RTC) on the analyzer with the system clock on the currently connected PC
Address of Connected Device 	Allows the user to define which address to connect to. 255 allows ICE to connect to any device address
Enable/Disable Information Popups 	Clicking this button shows contextual information popups when fields in Envent ICE are pointed at with the mouse cursor

2.8 Saving a Device File

At times it may be necessary to save the current device configuration. These should be stored for future reference, or in the case an Envent Engineering technician requests the device file for diagnostic purposes.

1. Connect to the device using one of the methods described in Section 3 of this manual. Ensure that the device is connected and has been “read” and all parameters are sucessfully in the software. The save function only saves the current “read” state of the analyzer.

2. Click the File menu and click “Save As…”, save the device file to a known location and give the file a descriptive name. The recommended file format is as follows: “YYYY-MM-DD – [SN].device”

2.9 Uploading a Device file to the Analyzer

It may be required to upload an older (or preconfigured) device file to the analyzer.

1. Connect to the device using one of the methods described in Section 3 of this manual. Ensure that the device is connected and has been “read” and all parameters are sucessfully in the software.

2. “Close” the current configuration by navigating to File > Close. The user can also right-click the device tab (below the menu bar) and click “Close”. Closing the device file this way maintains the connection to the device.

3. Open the required configuration file by navigating to File > Open. Select the file needed to be opened.

4. Write the opened configuration to the analyzer by clicking the write icon ().

2.10 Changing System Units

Click the View > Preferences menu. This dialogue menu will allow the user to change the time units as well as the temperature and pressure units displayed in the ICE software. The recommended time units to use are “ss.ss”.

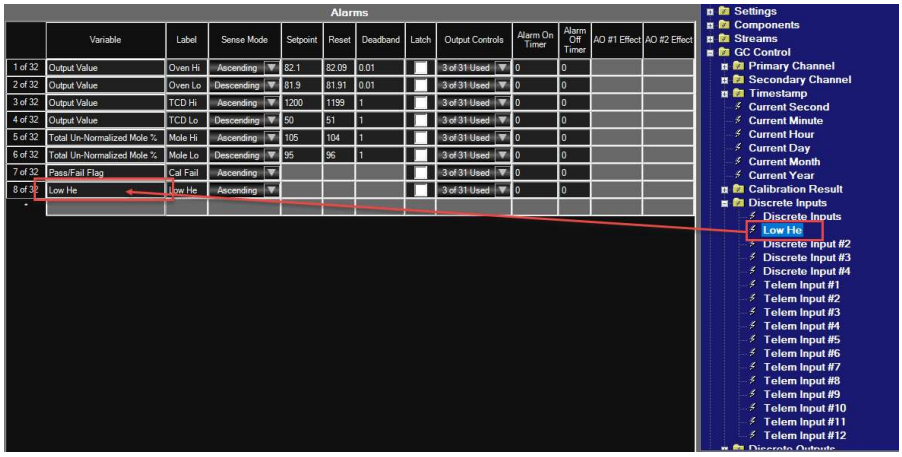
2.11 Using the System Variables (Blue Menu)

System variables are often used for configuration, ranging from setting up alarms to configuring modbus or the display of the analyzer. When a field, which can accept system variables, is opened the system variables menu will become visible. It is easily identified by its blue color.

Each system variable can be “dragged” into a field which accepts it. Some fields (such as modbus configuration) allow system variables to be double-clicked or even entire folders to be dragged.

1. Identify the variable that is needed and locate it in the folders.

2. Drag the variable into the required field (see screenshot below). To remove variables, the variable can often be deleted by highlighting it and pressing the “Delete” key on the keyboard. In the example below, a Discrete Input “Low He” was dragged to create a new alarm point.



Please note: For some variables we must use the “Output Value” of the variable. An example may be the oven temperature. The location “Analog Inputs > Oven Temp” is the *configuration* of the oven temperature input and not the actual variable. For this example, the correct variable would be: “GC Control > Analog Input > Oven Temp > Output Value”.

Please contact Envent Engineering Ltd. for assistance if required.

3.0 Connection Interfaces

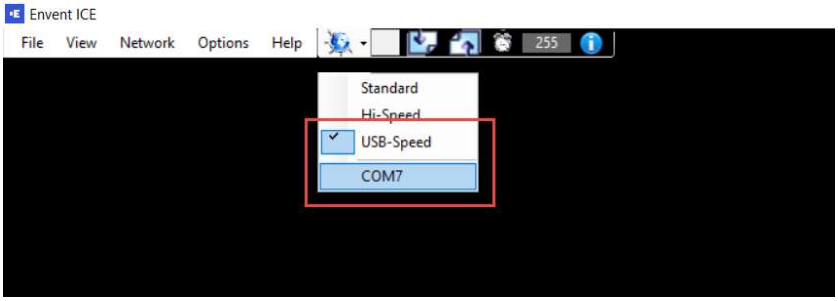
3.1 Connection Via USB

The model 131S/132S gas chromatograph is supplied with a USB-Mini Type “B” connection interface. This interface will be located on the top of the GC below the display (on the model 132S GC) or underneath the explosion proof cap below the display (on the model 131S GC).

Ensure that the driver is installed properly; if the driver has been installed properly, the USB device should show as a comm port in the device manager of the operating system. In Windows 7, 8, or 10 the device manager can be found by navigating to the system’s control panel. For assistance with installing the USB driver, contact Envent Support.

1. Connect the USB cable from the PC to the gas chromatograph’s interface.

2. In Envent ICE click the connection globe on the menu bar (), select “USB-Speed” and the correct communications port (in the screenshot below, COM7 was the selected port).



3. Click the read button () and monitor the connection bar at the bottom of the software’s interface. The connection bar should indicate which port is open as well as a progress bar indicating read progress. Once the connection bar has concluded then the software has successfully read the parameters from the device.

3.2 Connection Via Ethernet

The model 131S/132S gas chromatograph is supplied with an Ethernet interface card which can be used for connection via the Envent ICE Software or for telemetry purposes via modbus. The connection interface port on the ethernet card is a standard 8-pin RJ45 Ethernet connection. All 8 pins are required for communication; thus, a standard Category 5 (or greater) cable is recommended.

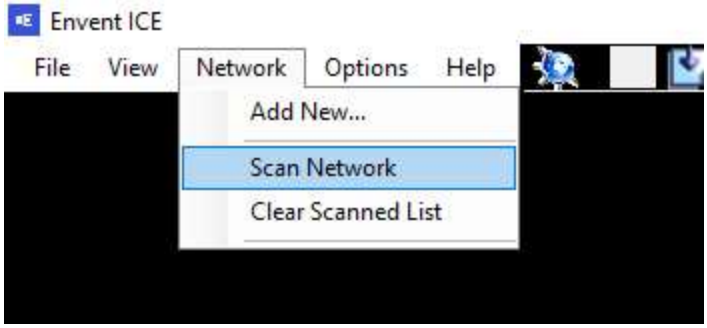
A connection can be established directly connected to the analyzer, or through a network or sub-network. The host PC and Envent Analyzer must be on the same sub-network to communicate. The default connection parameters are as follows:

IP Address:	192.168.1.105
Subnet Mask:	255.255.255.0
Gateway:	192.168.1.1
Host Name:	(Typically SN of the board)
DNS	0.0.0.0 (Windows 11 only)

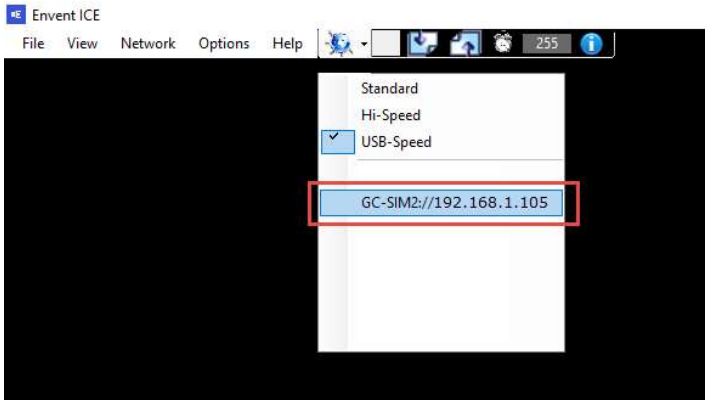
If the default settings are lost, please contact Envent Support for instructions on retrieving the settings.

1. Connect the Ethernet cable from the PC to the gas chromatograph's interface, or connect to the same network as the gas chromatograph. Ensure that the PC is in the same sub-network range as the gas chromatograph.

2. In Envent ICE click the Network menu and select "Scan Network", or click "Add New…" if the network parameters are already known. After a successful scan, the Network menu will display all Envent Analyzers currently connected to the network.



3. Click the connection globe on the menu bar (), select the correct device (please note: the devices in the screenshot may appear different on the user's machine)(the speed selection at the top of this interface does not matter).



4. Click the read button () and monitor the connection bar at the bottom of the software's interface. The connection bar should indicate which port is open as well as a progress bar indicating read progress. Once the connection bar has concluded then the software has successfully read the parameters from the device.

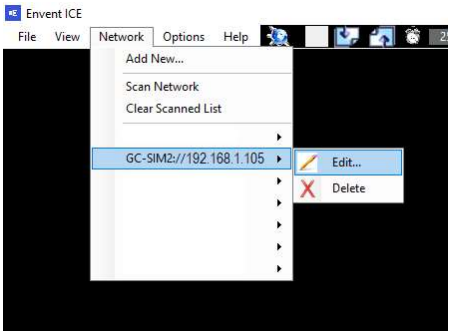
3.3 Configuration of the Ethernet Interface

Envent ICE has a built-in system for configuration of the ethernet interface card. This configuration should be done with the PC directly connected to the interface card and not through a network switch, if possible.

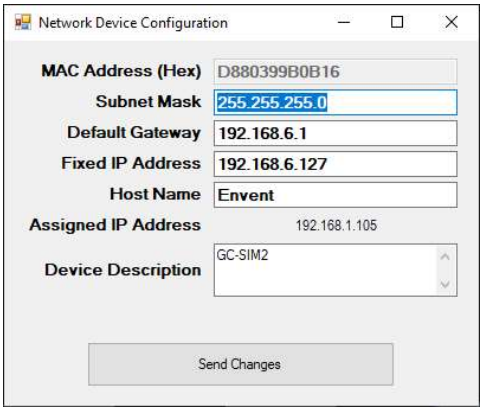
1. Determine the sub-network to which the analyzer is connected, ensure the user's PC is on the same network – even if the device is directly connected.

2. Refer to the previous section to "scan" the network and find the analyzer on the network.

3. In the Network menu, point at the device using the mouse cursor and select the "Edit…" option.



4. A dialogue menu will open, the new parameters of the network interface card can be programmed here, once complete click the "Send Changes" button, this will alter the configuration of the card.



5. Confirm that the change worked by altering the user's PC Network configuration to match the analyzer and use ICE to "scan" the network (refer to the previous section).

4.0 Device Configuration

CAUTION

Before modifying the factory configuration file, make sure to save it on the user's computer first for future retrieval. If the factory configuration file is lost or modified without saving it, a copy is kept in the USB flash drive given with the analyzer. Envent Engineering Ltd can also provide a copy. To save the configuration file, go to File > Save or Save as.

Make the appropriate changes on the factory configuration file through the ICE software. When changes are made, they need to be uploaded to the analyzer to overwrite what is currently on it. Click on the ''Write button'' () and wait until the new configuration is uploaded successfully.

Note that the gas chromatograph relies on parameterization for correct analytical operation. Adjusting values without a proper understanding of their function can have consequences including, but not limited to, loss of measurement; damage to analytical components; and/or injury or loss of life to operators.

Make sure to read, and understand, the contents of this manual fully and consult Envent Engineering Ltd. if there are any concerns or doubts to the operation, maintenance, or parameterization of the gas chromatograph analyzer. This section will use the following symbols, read, and understand their purposes.

WARNING

This symbol indicates that the operation, or parameter change, may cause damage to the analytical components, or inadvertently create a potentially dangerous environment for the operator.

CAUTION

This symbol indicates that the operation, or parameter change, may cause changes in analysis, measurement, and/or outputted values or results.

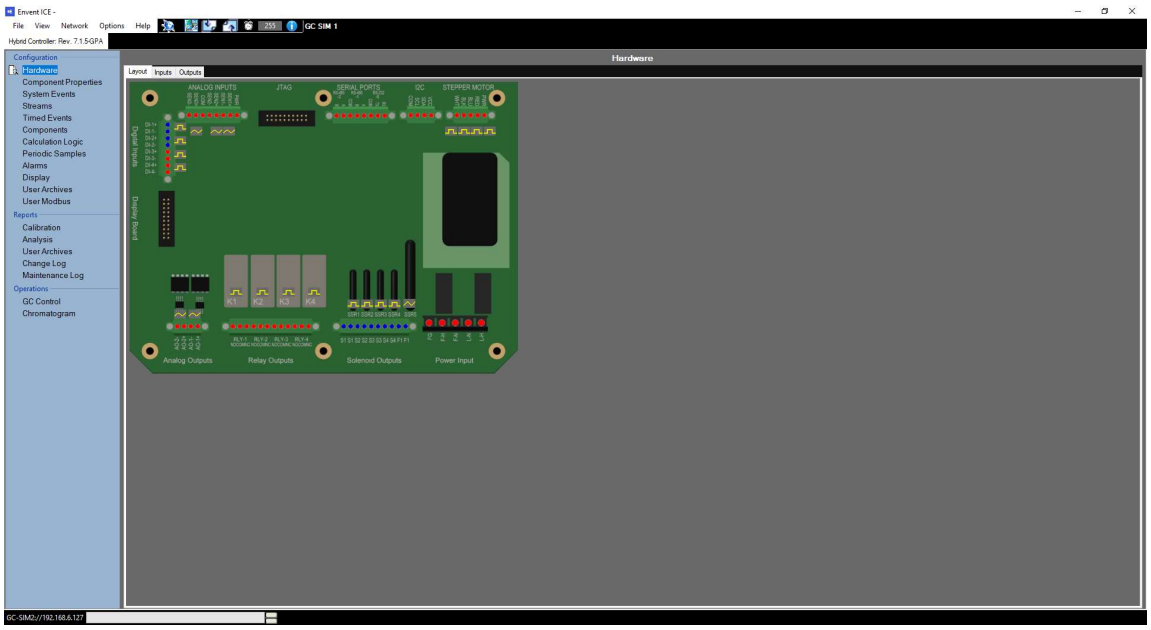
NOTE

This symbol indicates that there is a piece of information the operator should know prior to continuing.

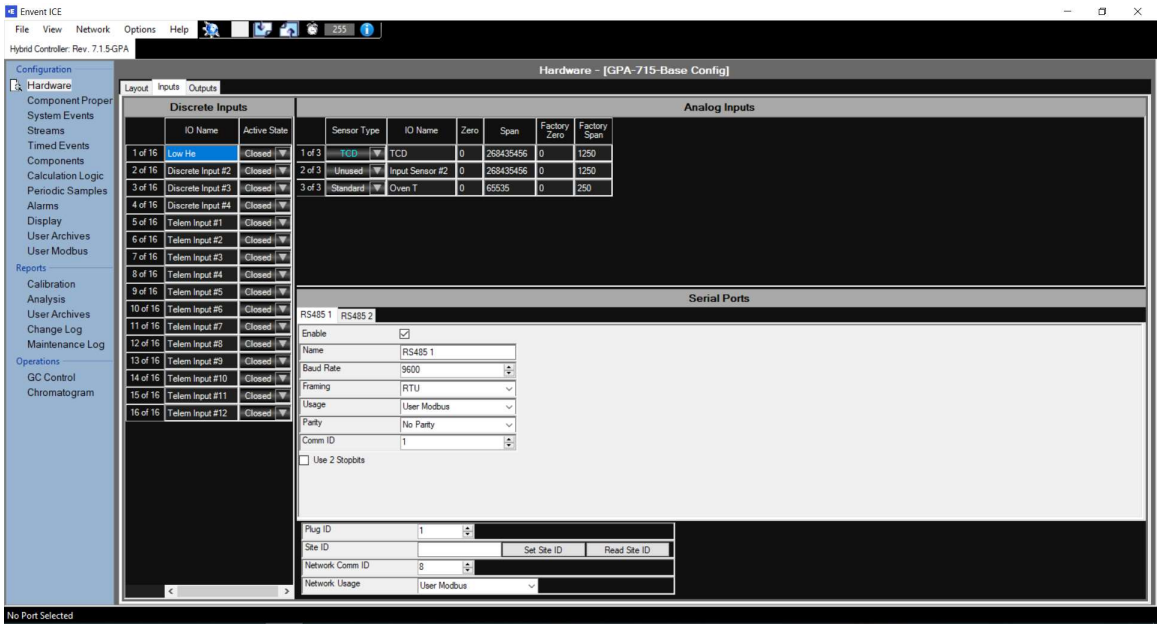
4.1 Hardware

Layout

The layout tab shows a diagram of the Electronics Main board. This tab can be used to visually identify all components.



Inputs



Discrete Inputs

There are 4 discrete inputs available in the gas chromatograph, with an optional 8 telemetry “soft” points. DI 1 to 4 correspond with the discrete input channels on the main board. These inputs are programmed to configure alarm points or switching points. The below table describes the configuration of the discrete inputs.

IO Name	Input the name of the DI (for example: “Low He”)
Active State	Closed: The DI looks for when the signal is “shorted” and outputs a “1” indicating the alarm state Open: The DI looks for when the signal is “open” and outputs a “1” indicating the alarm state

Analog Inputs

Analog inputs are critical to the functionality of the gas chromatograph and should not be adjusted by the end-user. Adjusting the analog input parameters can have serious consequences involving the analytical sensor(s) or the analytical oven and its internals. For assistance with analog inputs, contact Envent Engineering Ltd.

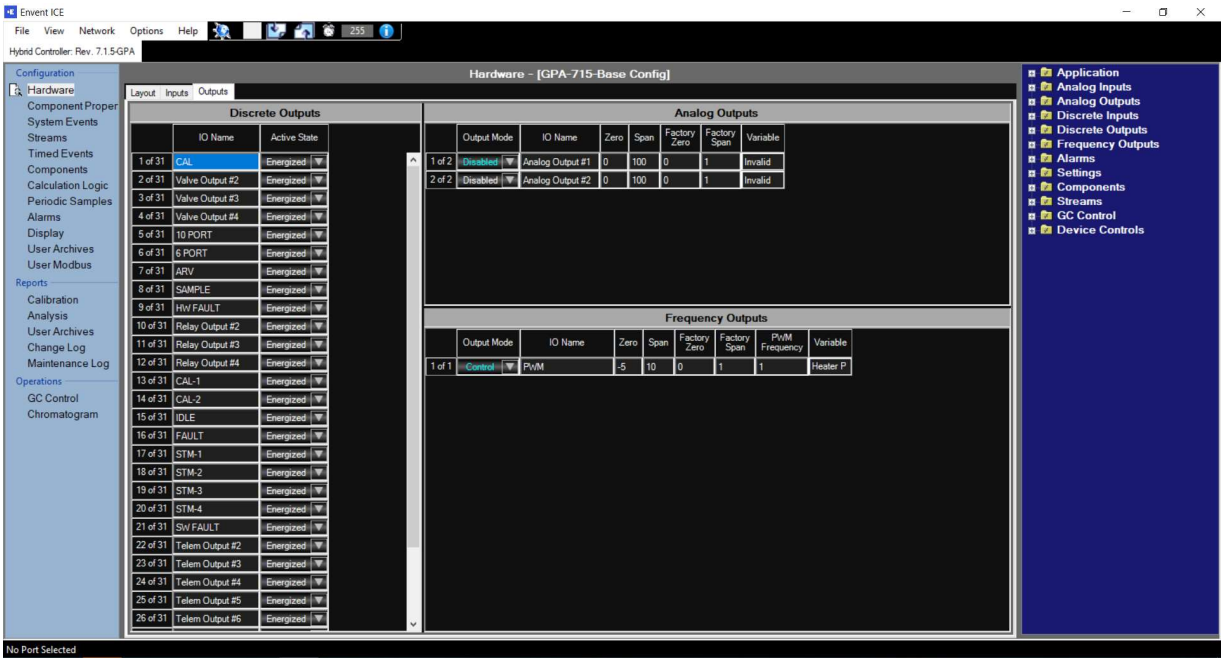
Serial Ports

The serial port configuration can be used to configure the settings for the available two (2) RS485 interfaces, as well as the Ethernet interface, for modbus purposes. A description of each parameter in this section is listed below.

Enable	Checkbox to enable or disable the tab selected RS485 port
Name	Assign a name for the RS485 port
Baud Rate	Select connection speed from 1200 – 115200 baud/s
Framing	None, RTU, or ASCII
Usage	Select between user defined modbus, modbus master mode, or SIM2251* configuration
Parity	No parity, even parity, or odd parity
Comm ID	Comm ID of the RS485 port, must be unique on the network. If this value is set to 0, then Comm ID = Plug ID
Use 2 Stopbits	Check to enable 2 stopbit communication as opposed to 1
Plug ID	When Comm ID or Network Comm ID are set to 0, they use the Plug ID instead
Site ID	User-defined ID number to identify different site locations
Network Comm ID	[Ethernet Setting] If the network Comm ID is set to 0, then Network Comm ID = Plug ID
Network Usage	[Ethernet Setting] Allows the user to select between user defined modbus or SIM2251* output

* = Sim2251 is a pre-set list of variables and uses the Enron (Daniel mode) output

Outputs



Discrete Outputs

The discrete outputs section allows the configuration of the gas chromatograph's 8 solenoid controls, 4 relay outputs (for DCS/Control Room alarms or indication), 8 LEDs (located on the display), and up to 11 telemetry points for other indication or control.

CAUTION

These points are typically configured at the factory and should not be adjusted without consultation of Envent Engineering Ltd. Adjusting the solenoid outputs may inadvertently affect analyzer operation.

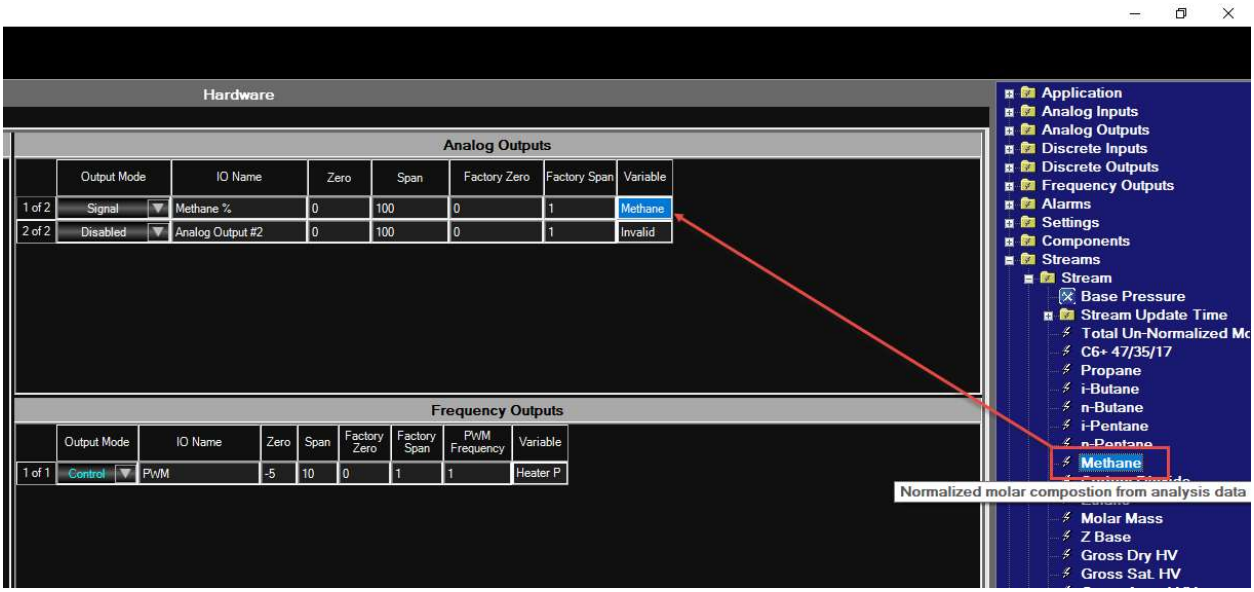
IO Name	Input the name of the DO (for example: "10 PORT")
Active State	Energized: When the state of the DO is active, the circuitry is energized De-Energized: When the state of the DO is active, the circuitry is de-energized

Analog Outputs

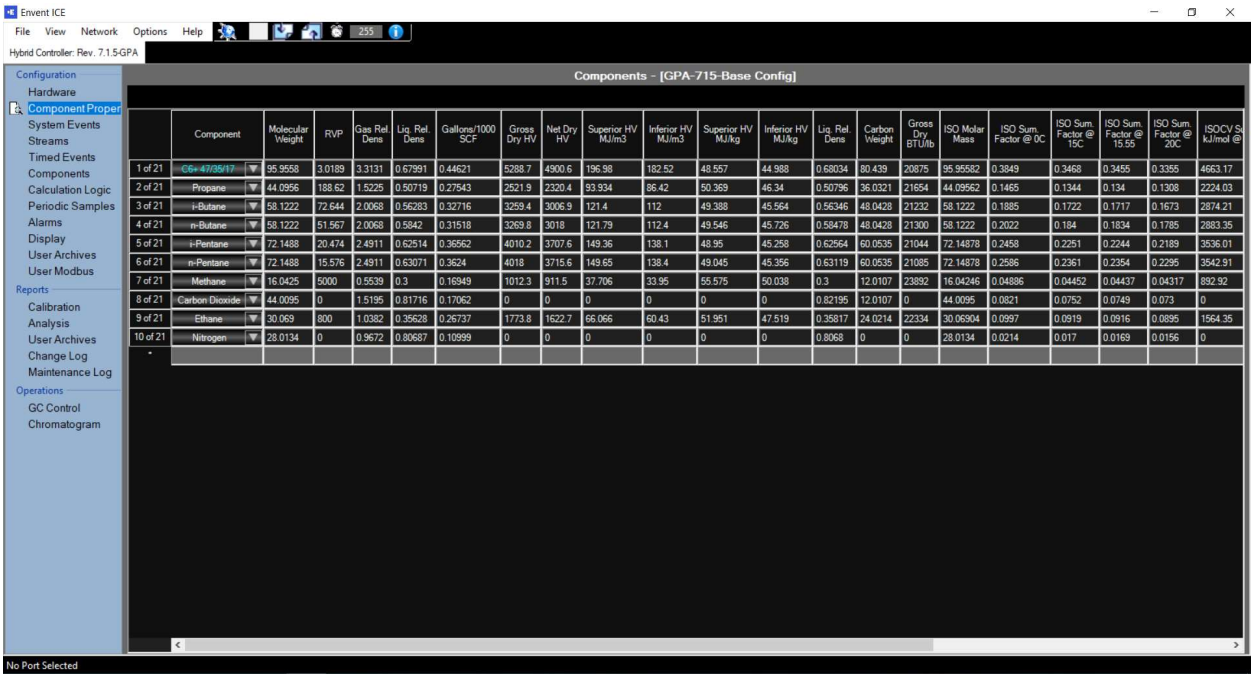
Analog outputs are used when a device must be monitored, or controlled, over a pair of conductors. Two 4-20 mA, loop-powered, analog output connections are available on the gas chromatograph controller.

Output Mode	Disabled = Output not used Control = Output used to control a device Signal = Output used for signal (ex: to DCS)
IO Name	The name of the signal (Ex: “Oven Temp”)
Zero	Value to be output at 4 mA
Span	Value to be output at 20 mA
Factory Zero	Factory set, **do not adjust**
Factory Span	Factory set, **do not adjust**
Variable	The variable to be output (selected by the blue “variable” list to the right

Below is a screenshot showing an example of how a variable has been added to Analog Output #1. The variable must be found in the listing on the right first, and then can be dragged into the position.



4.2 Component Properties



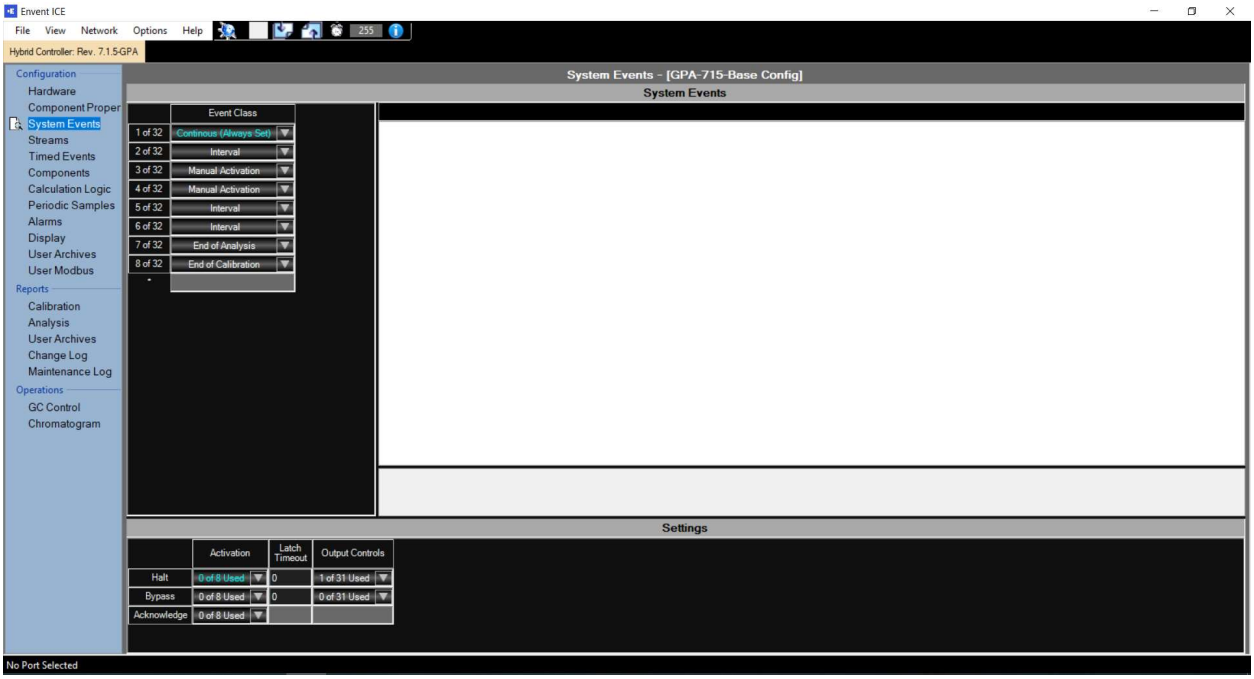
	Component	Molecular Weight	RVP	Gas Rel Dens	Liq. Rel. Dens	Gallons/1000 SCF	Gross Dry HV	Net Dry HV	Superior HV MJ/m3	Inferior HV MJ/m3	Superior HV MJ/kg	Inferior HV MJ/kg	Liq. Rel. Dens	Carbon Weight	Gross Dry BTU/lb	ISO Molar Mass	ISO Sum. Factor @ 0C	ISO Sum. Factor @ 15C	ISO Sum. Factor @ 15.55	ISO Sum. Factor @ 20C	ISOCV S kJ/mol @
1 of 21	C6+ 47/35/17	95.9558	3.0189	3.3131	0.67991	0.44621	5288.7	4900.6	196.98	182.52	48.557	44.988	0.68034	80.439	20875	95.95582	0.3849	0.3468	0.3455	0.3355	4663.17
2 of 21	Propane	44.0956	188.62	1.5225	0.50719	0.27543	2521.9	2320.4	93.934	86.42	50.369	46.34	0.50796	36.0321	21654	44.09562	0.1465	0.1344	0.134	0.1308	2224.03
3 of 21	i-Butane	58.1222	72.644	2.0068	0.56283	0.32716	3259.4	3006.9	121.4	112	49.388	45.564	0.56346	48.0428	21232	58.1222	0.1885	0.1722	0.1717	0.1673	2874.21
4 of 21	n-Butane	58.1222	51.567	2.0068	0.5842	0.31518	3269.8	3018	121.79	112.4	49.546	45.726	0.58478	48.0428	21300	58.1222	0.2022	0.184	0.1834	0.1785	2883.35
5 of 21	i-Pentane	72.1488	20.474	2.4911	0.62514	0.36562	4010.2	3707.6	149.36	138.1	48.95	45.258	0.62564	60.0535	21044	72.14878	0.2458	0.2251	0.2244	0.2189	3536.01
6 of 21	n-Pentane	72.1488	15.576	2.4911	0.63071	0.3624	4018	3715.6	149.65	138.4	49.045	45.356	0.63119	60.0535	21085	72.14878	0.2586	0.2361	0.2354	0.2295	3542.91
7 of 21	Methane	16.0425	5000	0.5539	0.3	0.16949	1012.3	911.5	37.706	33.95	55.575	50.038	0.3	12.0107	23892	16.04246	0.04886	0.04452	0.04437	0.04317	892.92
8 of 21	Carbon Dioxide	44.0095	0	1.5195	0.81716	0.17062	0	0	0	0	0	0	0.82195	12.0107	0	44.0095	0.0821	0.0752	0.0749	0.073	0
9 of 21	Ethane	30.069	800	1.0382	0.35628	0.26737	1773.8	1622.7	66.066	60.43	51.951	47.519	0.35817	24.0214	22334	30.06904	0.0997	0.0919	0.0916	0.0895	1564.35
10 of 21	Nitrogen	28.0134	0	0.9672	0.80687	0.10999	0	0	0	0	0	0	0.8068	0	0	28.0134	0.0214	0.017	0.0169	0.0156	0

Components

This page includes the physical properties tables for each of the selected components in the table. Up to 21 components can be selected from a pre-defined list by clicking the drop-down in the blank area.

The values defined here are critical to the output and operation of the gas chromatograph. Adjusting these values can have a negative impact on measurement. For assistance regarding any changes in components, contact Envent Engineering Ltd.

4.3 System Events



System Events

The system events page allows the user to configure events for manual / automated events to occur. These system events are used elsewhere in the configuration (such as User Archives, Stream control/timing, Auto-Calibration).

Up to 32 events can be added by clicking the drop-down menu for a new event. To remove events, highlight the event by clicking its index number (ex: “5 of 32”) and press the delete key on the keyboard. To access each event’s additional configuration, click the event to highlight it and the white space to the right will become a configuration panel. This allows powerful automation to be added to the gas chromatograph, see the screenshot below for an example of an Auto-Calibration config.

CAUTION

Adjusting the system events can cause the analyzer to stop running sample through the analytical oven. If adjustments need to be made, contact Envent Engineering Ltd.

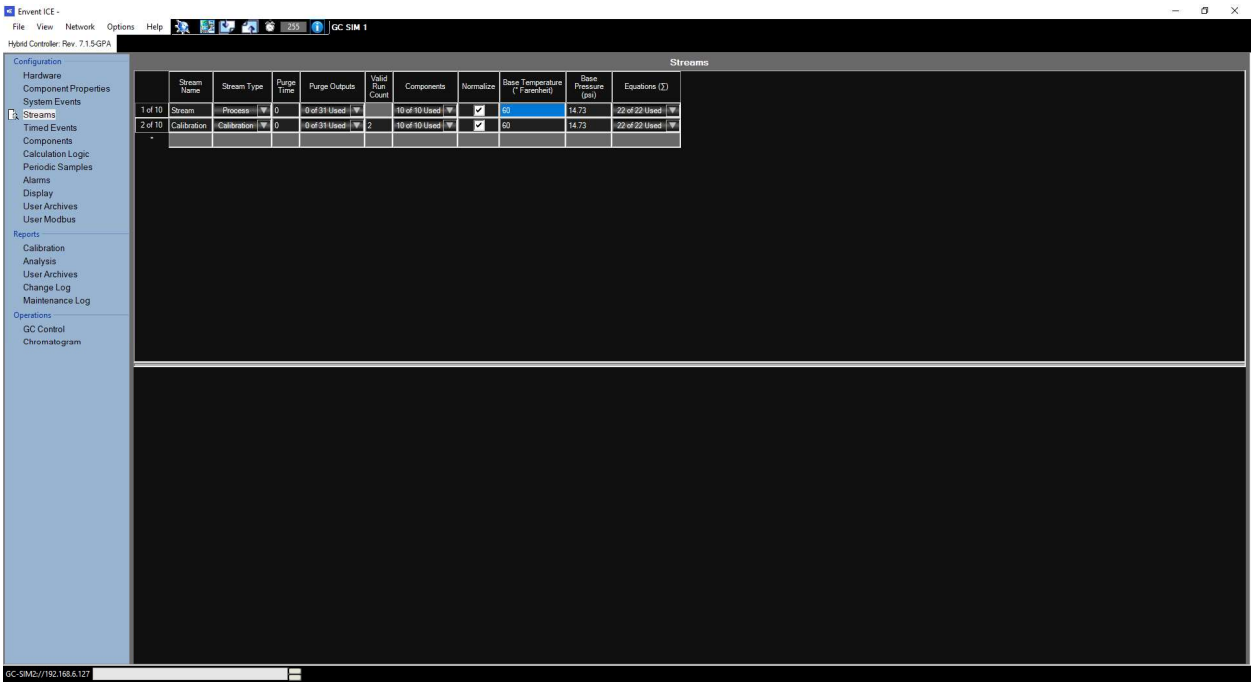
Settings

The settings section allows for additional configuration of the Halt, Bypass, and Acknowledge system states. See the below tables for details on these states and the settings for each.

Halt	System state where the gas chromatograph is idle and does not inject any sample
Bypass	This system state is not used in the gas chromatograph
Acknowledge	This system state acknowledges active alarms

Activation	Allows the user to select from one of the system events (configured above) to activate the system state
Latch Timeout	A timer (in seconds) after which the system state is disabled
Output Controls	Allows the system state to also alter the state of one, or more, of the discrete outputs

4.4 Streams



Streams Configuration

Allows the user to define up to 10 unique streams. These streams can be process (customer), calibration, reference, or baseline streams. See the tables, below, for a description of each of the sections on this page.

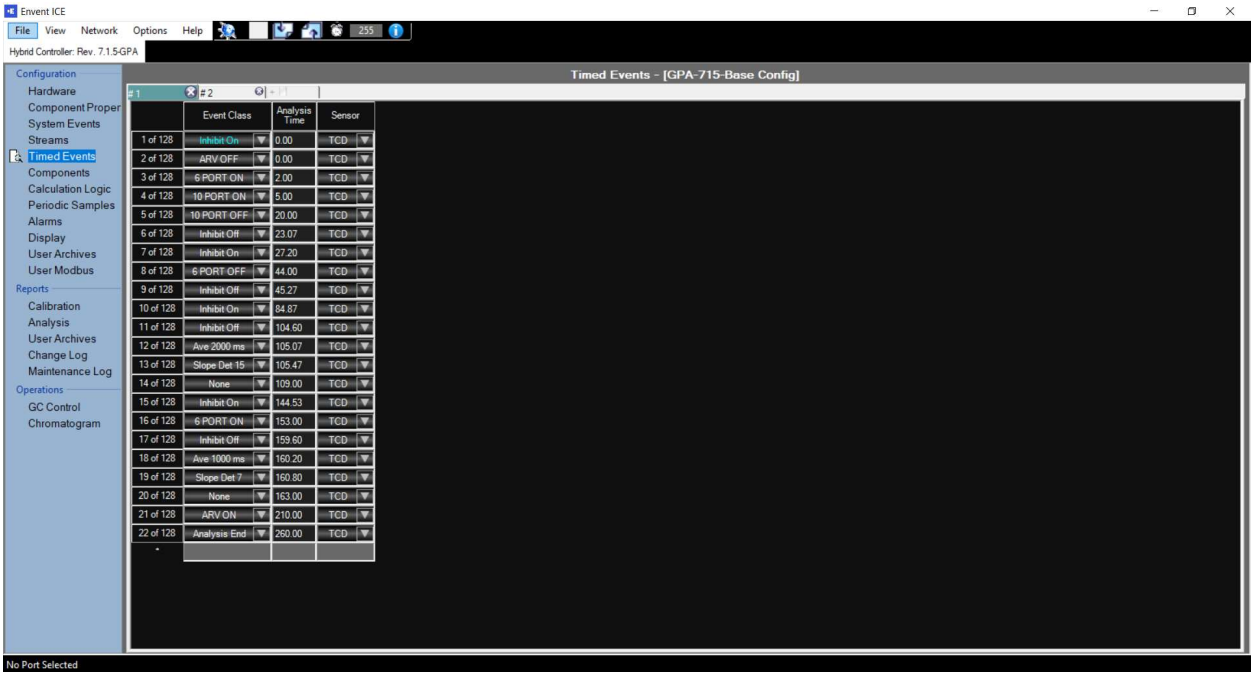
Stream Name	User-defined name (ex: “Sales Gas” or “Sales Cal”)
Stream Type	Process = Process (customer end) stream Reference = Calibration standard as an “unknown” Calibration = Calibration standard, can adjust calibration factors Baseline = Can run without sample
Purge Time	[Optional] time to purge the stream before running
Purge Outputs	[Optional] outputs which will be turned on to purge the stream
Valid Run Count	[Calibration Only] controls the number of runs the calibration will average for the final report
Components	User can select which components are used on the stream (defined in Component Properties)
Normalize	Checked = Values are normalized to 100% Unchecked = Values are not normalized

Base Temperature	Temperature at which property calculations are performed
Base Pressure	Pressure at which property calculations are performed
Equations	User can select which property calculations are performed on the stream (ISO or GPA)

CAUTION

Adjusting the values on this page can have an impact on the measurement, calculations, and output of the gas chromatograph. The user must ensure they read and understand each value before adjusting them. Contact Envent Engineering Ltd. for assistance.

4.5 Timed Events



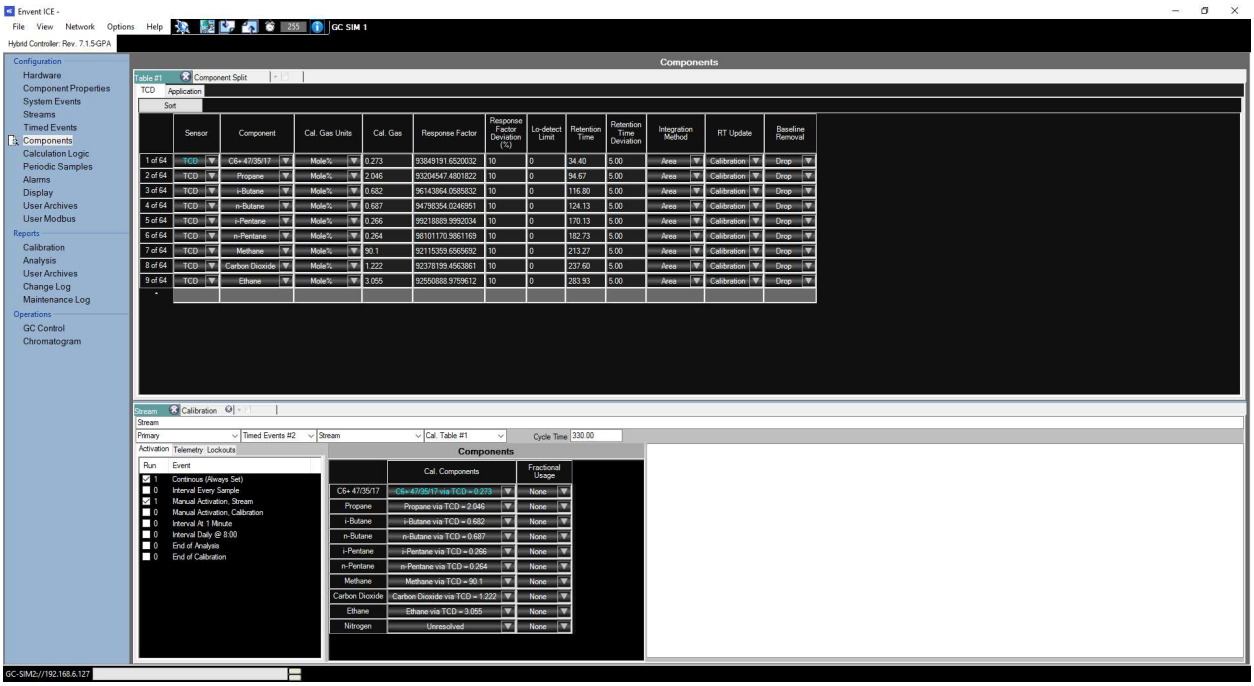
Timed Events

Multiple tables can be configured. Timed events allow the gas chromatograph to automatically control the timing of valves, inhibits, filtering, etc to produce a proper output and chromatogram.

WARNING

The timing is critical to the functionality of the analyzer. Proper care must be taken, when adjusting these values, or damage to the valves or analytical columns can occur. For assistance with the timed events tables, please contact Envent Engineering Ltd.

4.6 Components



The components page contains parameters and configuration vital to the calibration and operation of the gas chromatograph. Adjustment of the values on this page will have an impact on the accuracy and reporting of the analyzer. Proper care must be taken when making manual adjustments to the calibration factors.

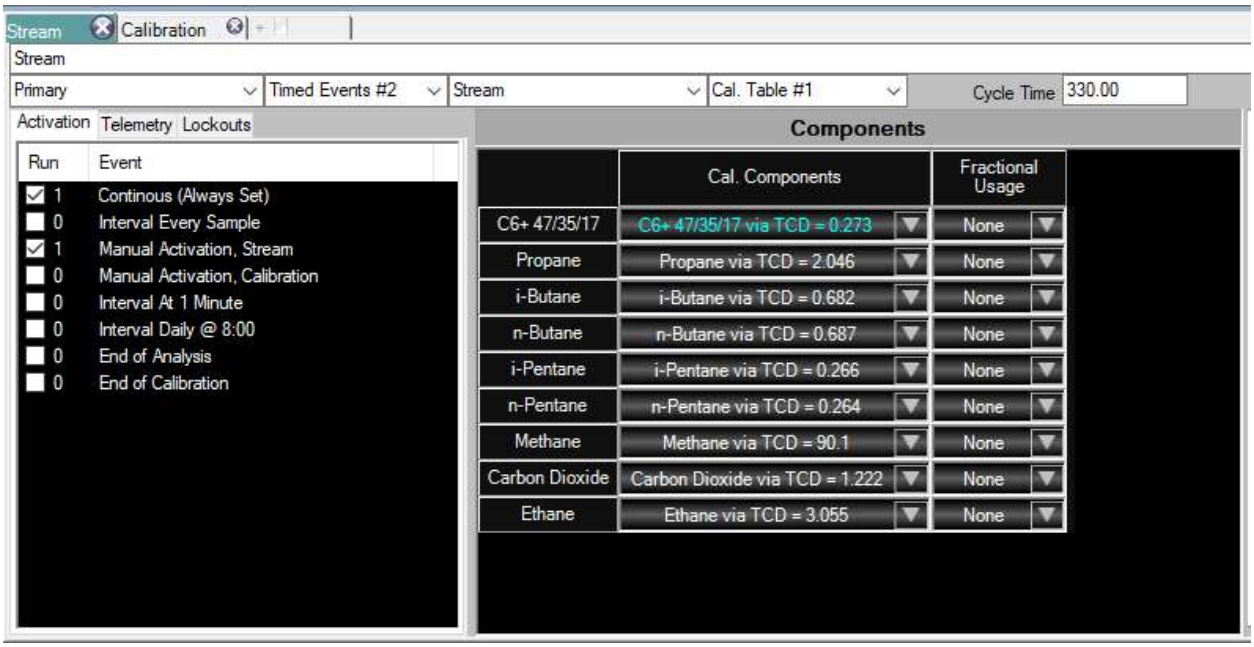
Top Half of Page

The top half of this page is where the calibration tables and component split tables can be defined and configured. See below for a description of each configurable field.

Sensor	Defines on which sensor the component will be measured
Component	Drop-down selecting the component, defined in Component Properties
Cal. Gas Units	Selectable units which appear on the calibration standard
Cal. Gas	Defines the value which appears on the calibration standard
Response Factor	Calibration factor calculated during calibration
Response Factor Deviation	User defined deviation allowance for determining a calibration PASS/FAIL

Retention Time	Time at which the component appears on a chromatogram – determined by calibration
Retention Time Deviation	User defined deviation allowance for determining a calibration PASS/FAIL
Integration Method	Area = Calculates the concentration based on peak area (**recommended**) Height = Calculates concentration based on peak height Fixed Area = Fixes the peak area to the last forced calibration peak area Fixed Height = Fixes the peak height to the last forced calibration peak height
RT Update	Calibration = Uses calibration run to update the retention time (**recommended**) Analysis = Uses analysis run to update the retention time None = Does not update the retention time
Baseline Removal	Drop = Removes the baseline based on the interpolated baseline of the curve Slope = Removes the baseline based on an estimation of the slope of the baseline (**recommended**)

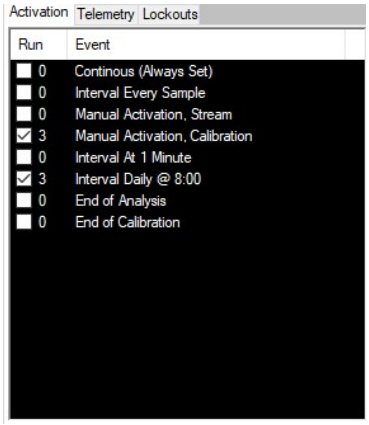
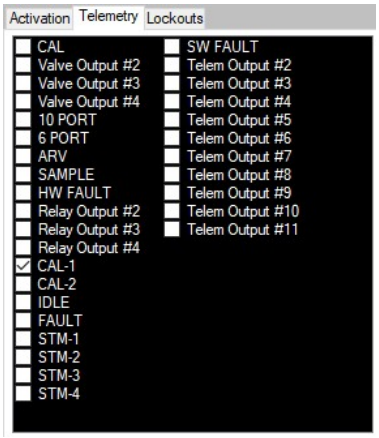
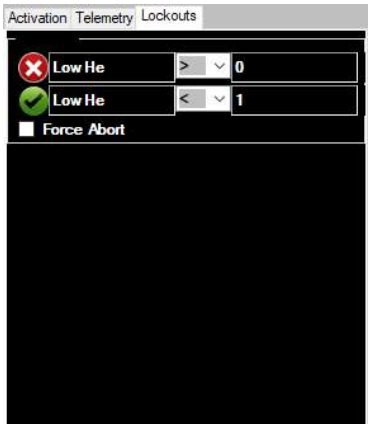
Bottom Half of Page

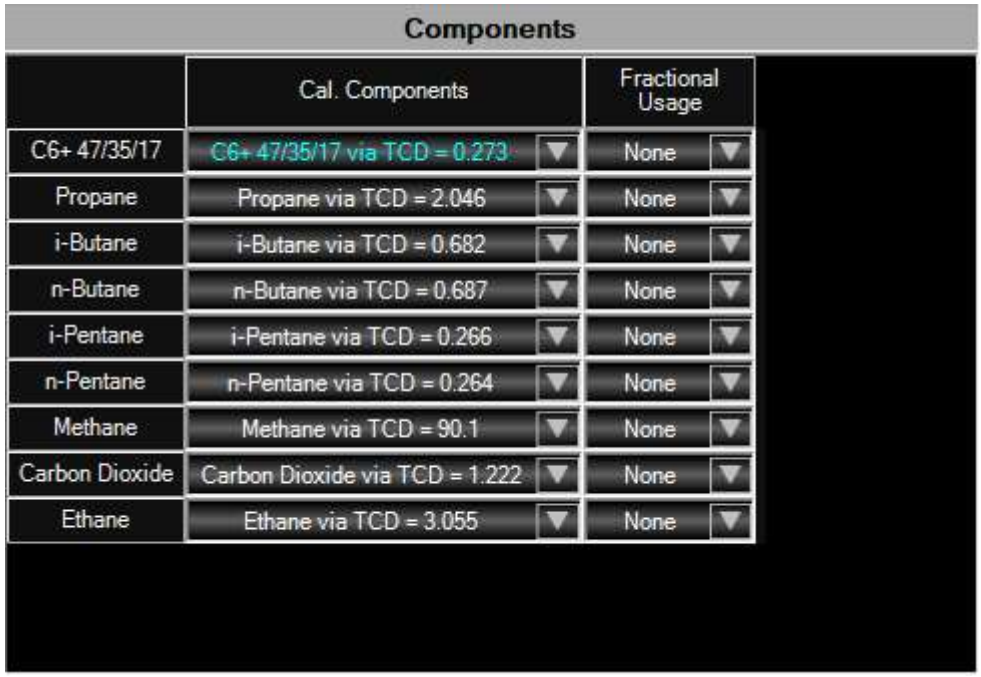


This page is for assigning a stream (configured in the Streams page) to components, events, and configurations. At the top of the section, additional tabs can be added, each tab is for a stream which is configured independently.

There is a blank space under the tabs for the user-entered name of the stream. Below this point there are several drop-down menus, from left-to-right they are: Sensor selection (default is “primary”), timed events table selection, stream selection (streams which are set up in the Streams page), and calibration table selection. The “Cycle Time” box is the time that the stream will run before restarting.

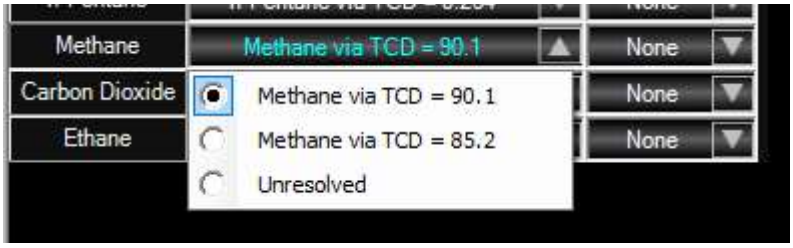
A space in the bottom-left section of this page is used to configure three different properties of the stream.

Activation 	Allows the user to define which system events cause the stream to run. The check box activates the event, and the number next to the check box allows the user to define how many runs the event will do. The example on the left shows a typical calibration configuration, where the manual calibration button runs the stream 3 times. There is also an interval to calibrate daily at 8 AM; again, running 3 times.
Telemetry 	The telemetry section allows the user to define telemetry for the stream. When the stream is running, the selected discrete outputs will be active. In the example to the left, the CAL-1 LED has been checked which will illuminate the CAL-1 LED when the calibration stream is running.
Lockouts 	Lockouts allow the user to specify when to allow the stream to run and when to lock it out. When the Lockouts menu is clicked, the blue device register menu opens on the right-side of the software. An example of a low-helium lockout can be seen to the left.

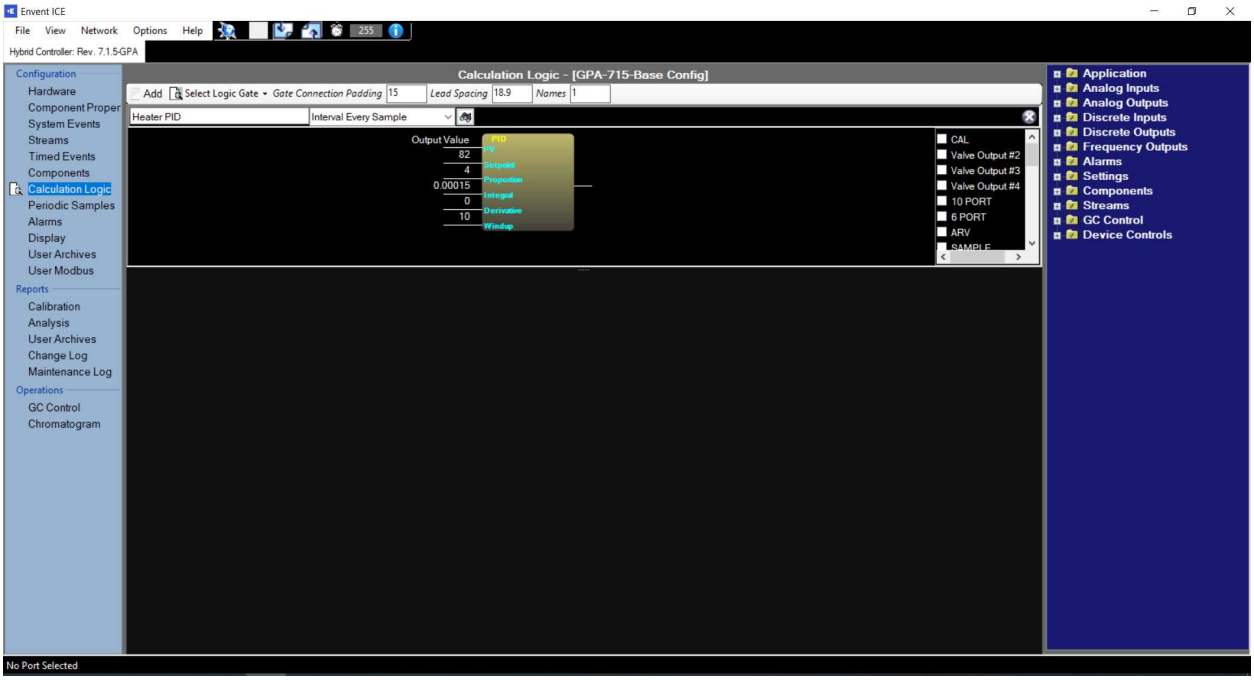


Components

The components section specifies which component in the stream is tied to which component in the calibration tables. This is important to define, as there may be multiple components with the same name, but with different calibration standard values – in the case of an analyzer with multiple streams and multiple calibrations, as seen in the example below.



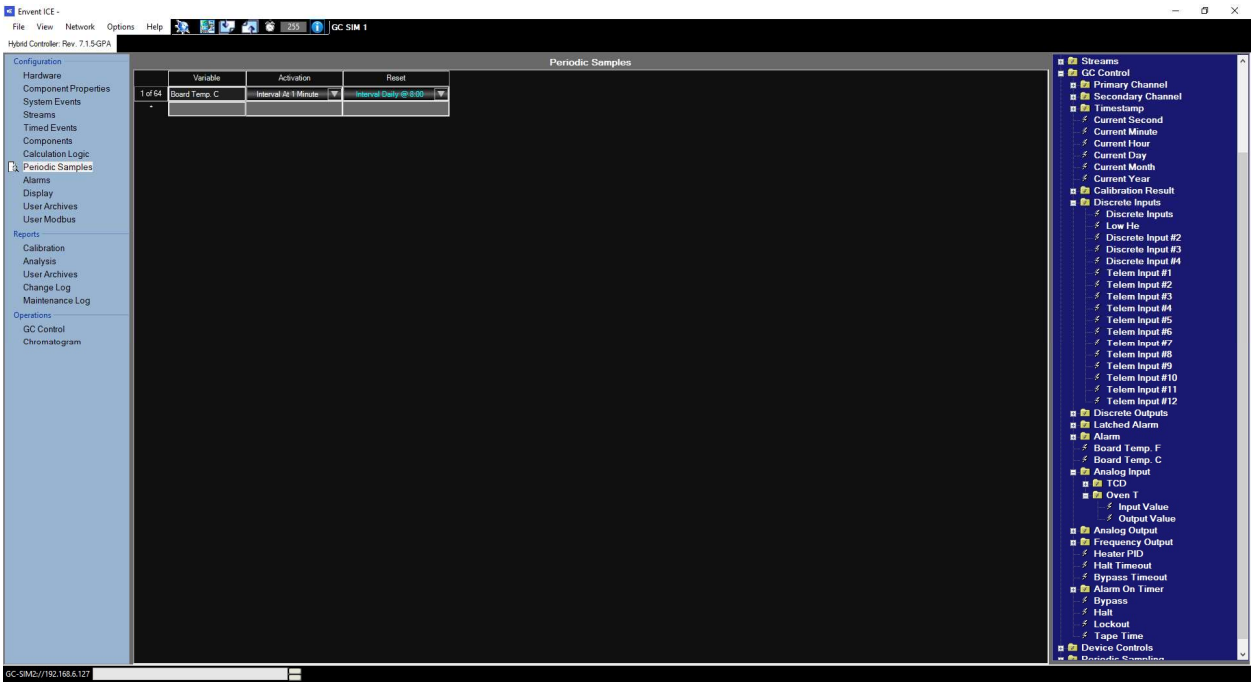
4.7 Calculation Logic



The calculation logic page allows the user to create custom calculations which can be performed at a specified interval.

A calculation is created, in the factory, to control the oven temperature. Please do not adjust any variables on the Heater PID control calculation or significant, and irreparable, damage may occur to the analytical components of the gas chromatograph.

4.8 Periodic Samples



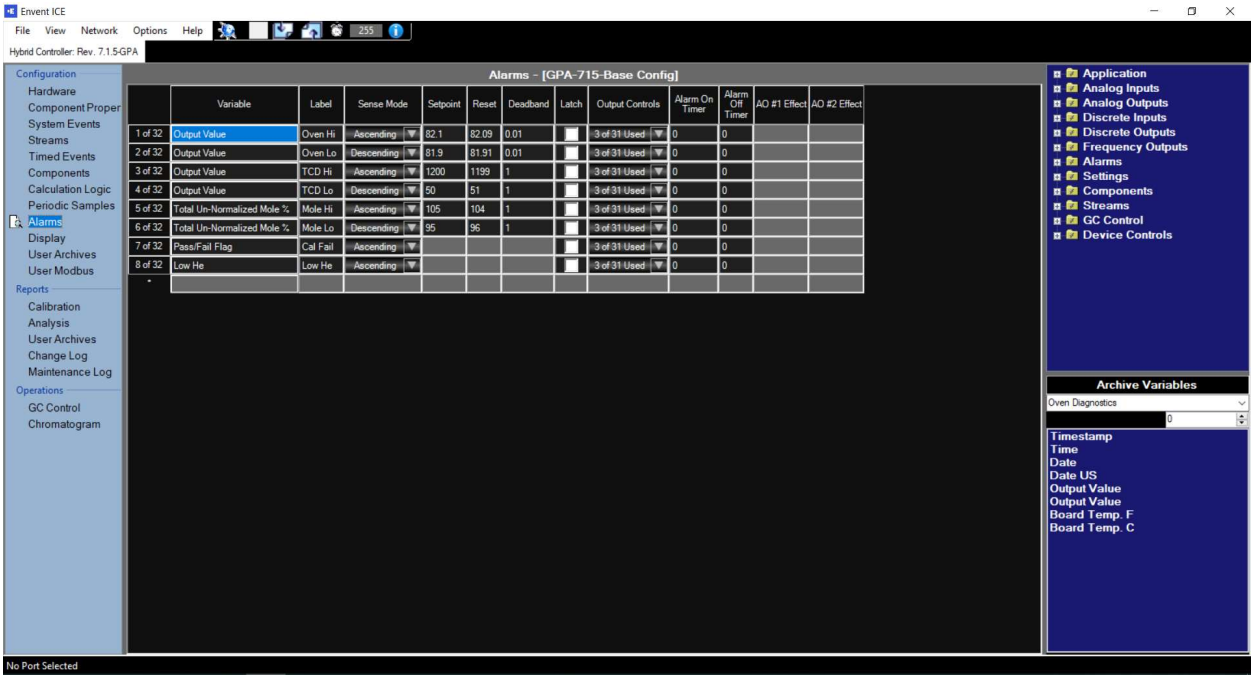
Periodic Samples

This page allows the user to set up periodic averaged samples. Up to 64 calculations can be made. Once these variables are created, they can be used elsewhere in the software for display, alarm points, outputs, etc.

Variable	User can select the variable on which an averaging calculation should be performed
Activation	Select a system event which will begin the averaging
Reset	Select a system event which will stop the averaging – default is “No Reset”

An example is shown below which averages the Board Temperature (°C) on a minute-by-minute basis, resetting daily at 8:00 AM.

4.9 Alarms

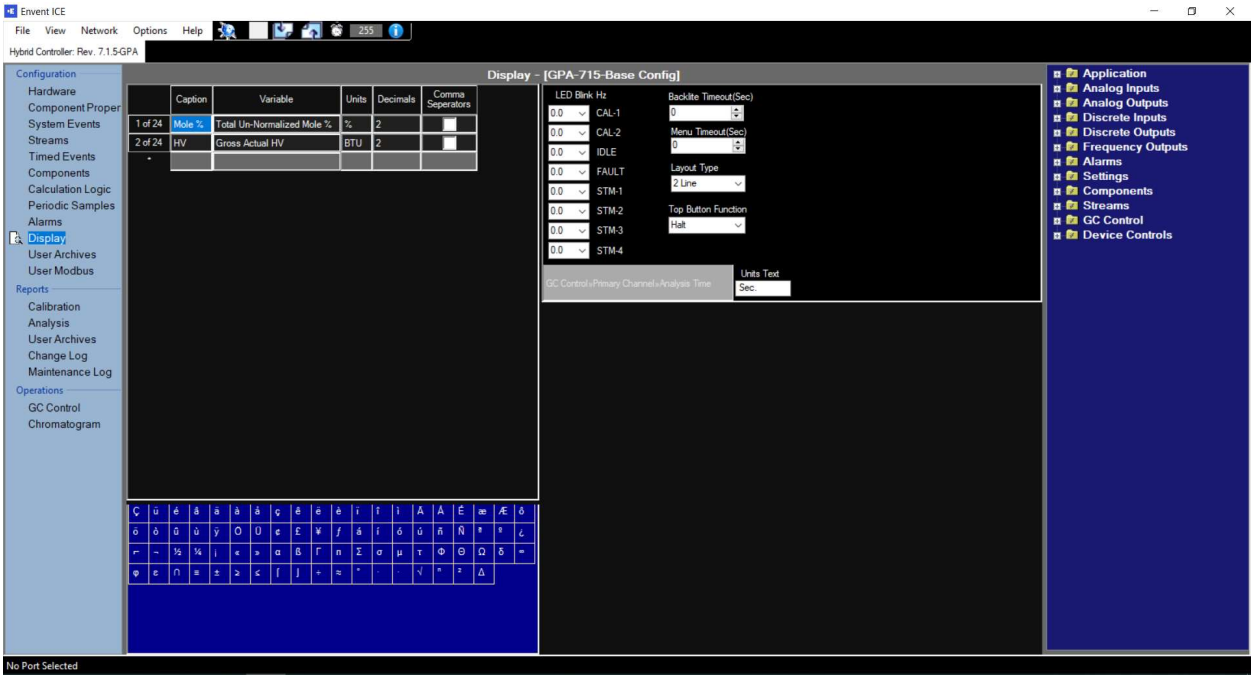


Alarms

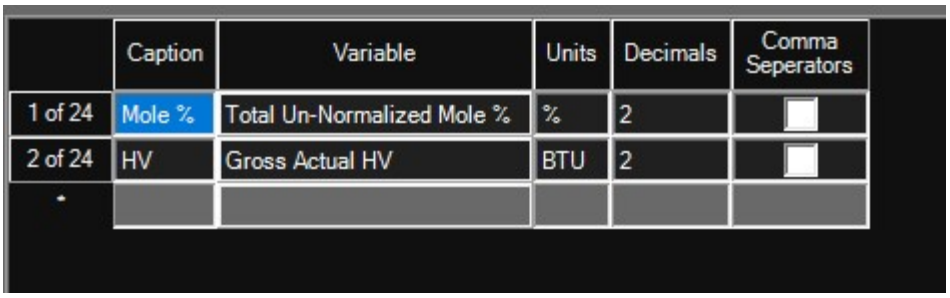
The alarms page allows the user to define points which will trigger certain states. These states may be software or hardware discrete outputs. The table below describes the functionality of each column.

Variable	Variable which is selected from the System Variables on the right
Label	User-defined label for display purposes
Sense Mode	Determines whether the alarm is ascending or descending
Setpoint	User-defined setpoint for the alarm
Reset	User-defined reset point for the alarm
Deadband	Absolute difference between set and reset points
Latch	Checked = Alarm will remain until acknowledged Unchecked = Alarm will clear when the state clears
Output Controls	Select which discrete outputs are changed when the alarm state is true
Alarm On Timer	Allows a “grace period” before the alarm is activated
Alarm Off Timer	Allows a “grace period” before the alarm is deactivated
AO Effect	None = Alarm has no effect on Analog Output Full Scale = When in alarm state, AO goes to 20 mA Below Zero = When in alarm state, AO goes to 3.5 mA

4.10 Display



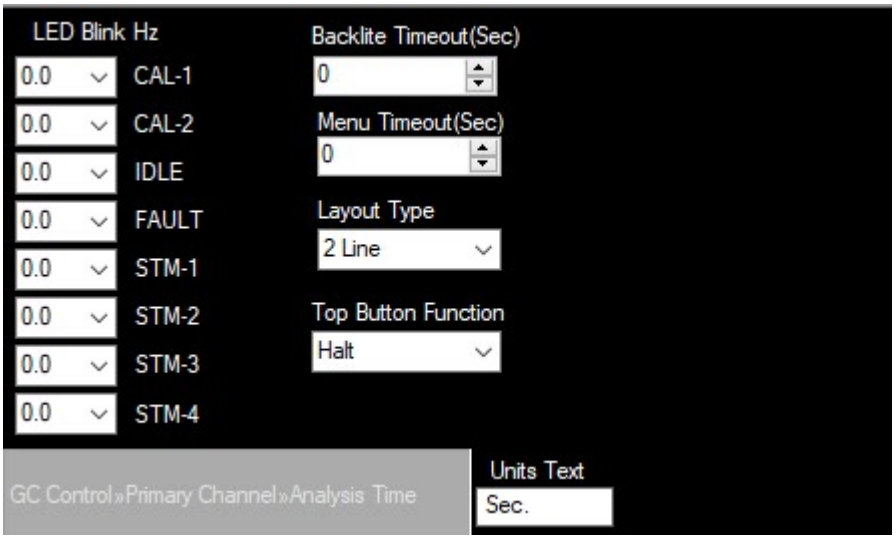
Left Section



The left section of this page allows the user to define which variables will appear on the display.

Caption	User-defined display name of the variable
Variable	Variable selected from the System Variables on the right
Units	User-defined engineering units of the variable
Decimals	User-defined number of decimals to use

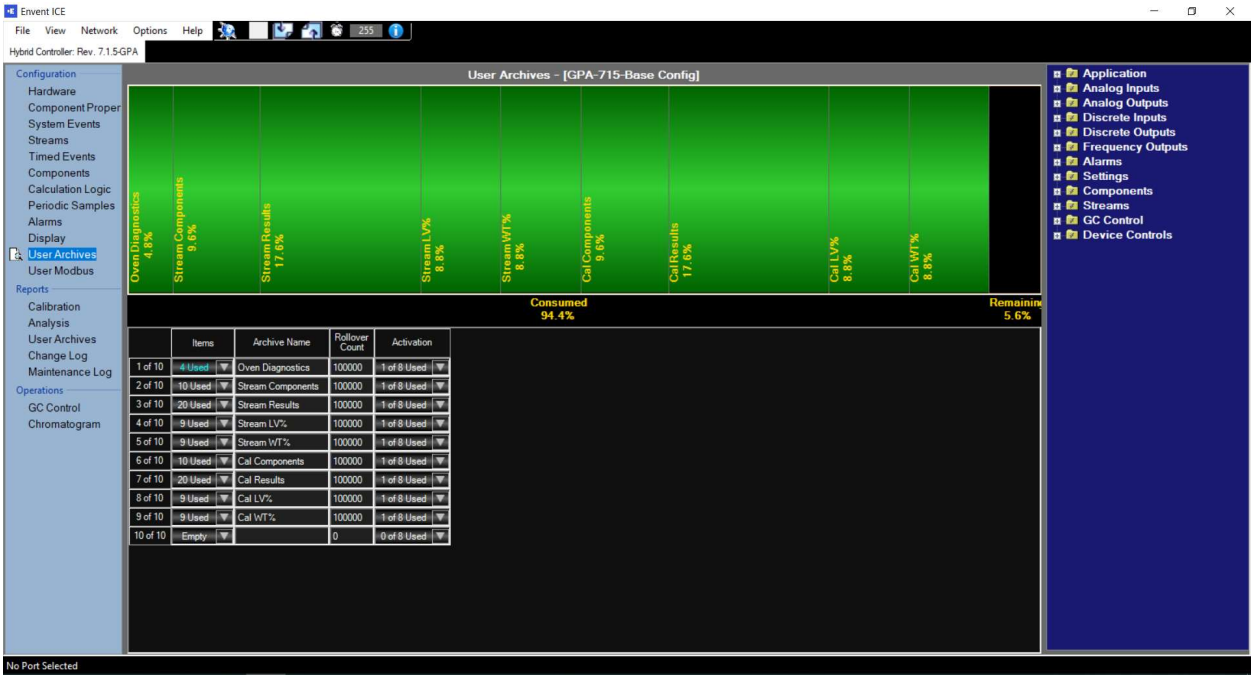
Right Section



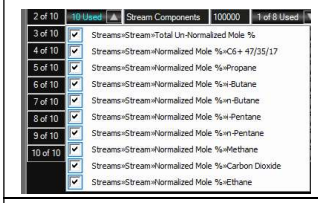
The right section of the page allows for additional configuration of the display. Including the ability to cause the LEDs to blink rather than remain solid when they are illuminated.

LED Blink Hz	Allows the user to set a frequency for the button to blink rather than remain solid
Backlite Timeout (Sec)	Timeout for the back lighting of the display
Menu Timeout (Sec)	Timeout for the additional menu of the display
Layout Type	Allows the user to select between 1-line to 4-line display
Top Button Function	Bypass = Top button makes the analyzer go into bypass (not used on GC) Halt = Top button halts the GC Acknowledge = Top button acknowledges all alarms Disable = Top button does nothing
[Bottom Left Area]	A system variable can be “dragged” to this location for view in the extra space on the display (bottom-right of the display)
Units Text	Text to appear, as units, for the extra space on the display (bottom-right of the display)

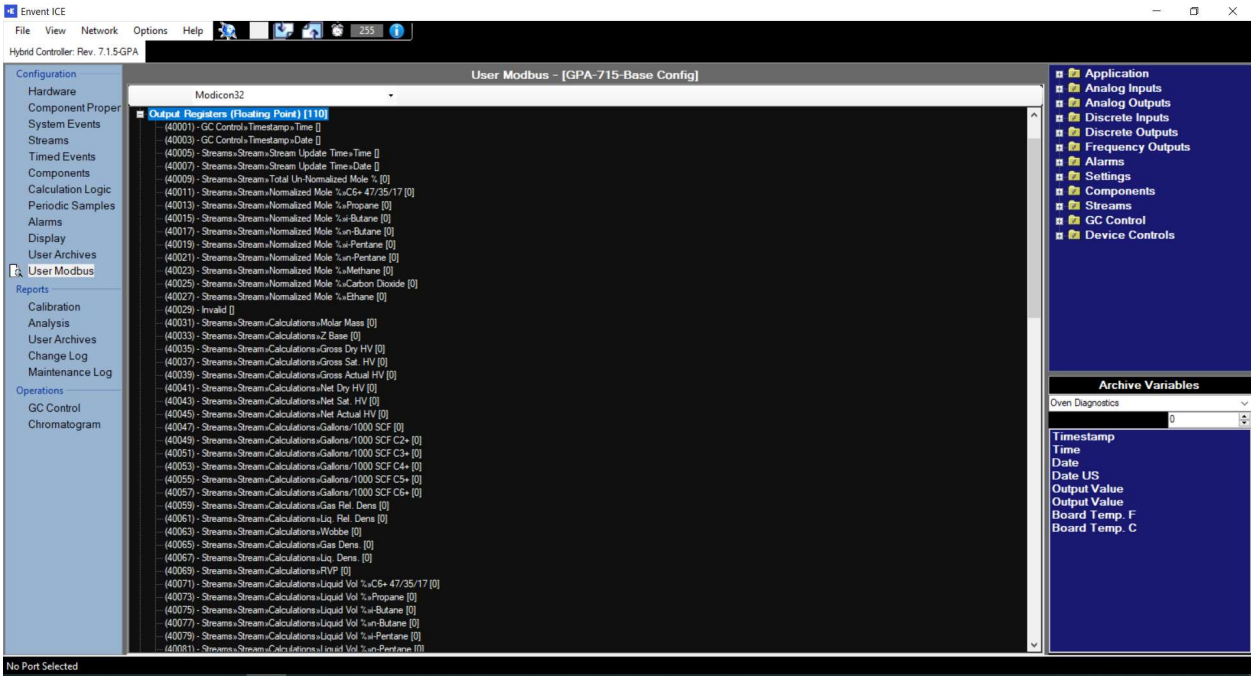
4.11 User Archives (Configuration)



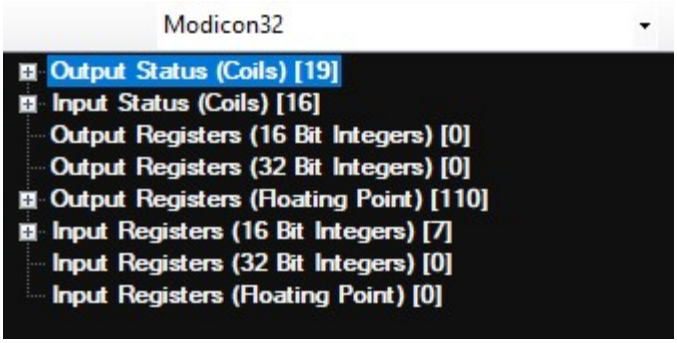
The user archives page allows for the analyzer to record lists of variables in its internal memory for reporting / recall later. The display indicates the amount of memory, which is being reserved for archives, as well as the amount remaining. The lower section is for user-configuration.

Items 	When items are added from the System Variables, they appear in a list format here. Multiple lists can be added into the Items column. Groups of variables are treated as a group, or array.
Archive Name	User-defined name for the archive to appear on reports.
Rollover Count	The number of records before the archive is rolled over. First in, first out.
Activation	The user can define which System Events cause the analyzer to record an archive count. Example: Interval at 1 minute, or End of Analysis.

4.12 User Modbus



The user modbus page allows for user-defined modbus variables to be output on all modbus channels. There are multiple register types that can be configured. Variables must be “dragged” from the System Variables interface on the right side of the screen (variables can also be double-clicked to add them to the modbus table). A default modbus (32-bit) configuration is supplied with every GC analyzer.

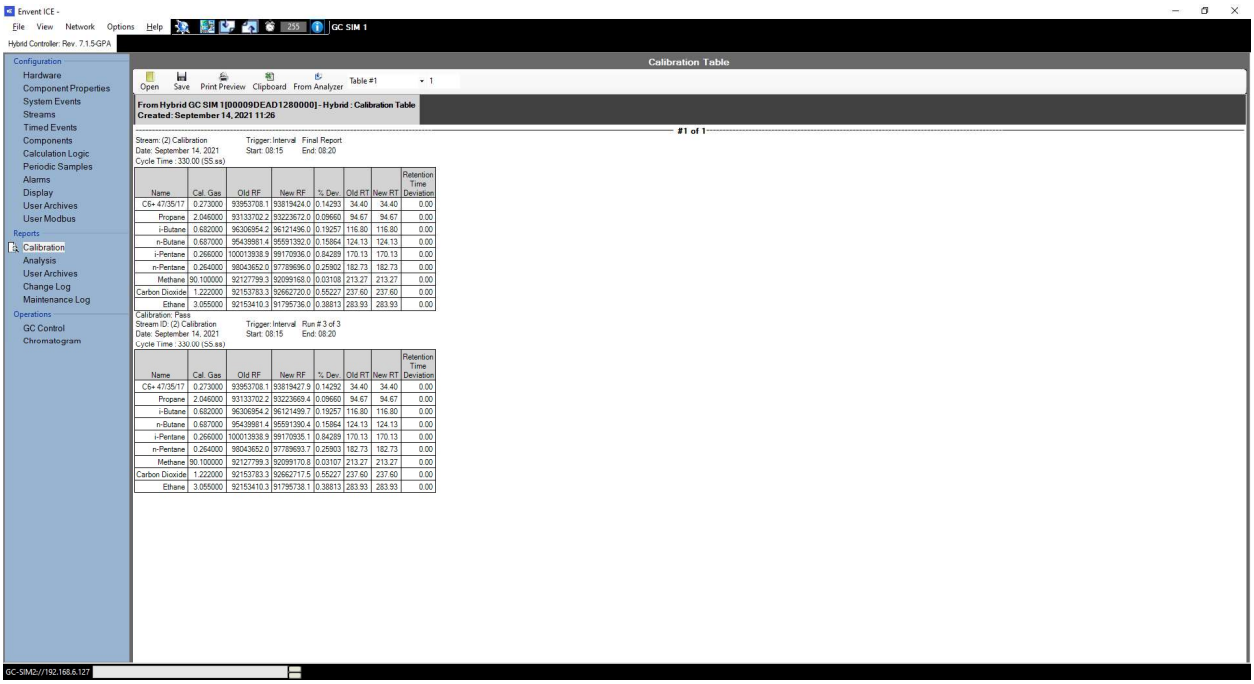


Above the configurable table there are three selectable modbus options.

Enron	Also known as “Daniel” mode. Uses 32-bit registers
Modicon16	Switches the registers to 16-bit registers
Modicon32	Switches the registers to 32-bit registers

5.0 Chromatograph Reporting

5.1 Calibration

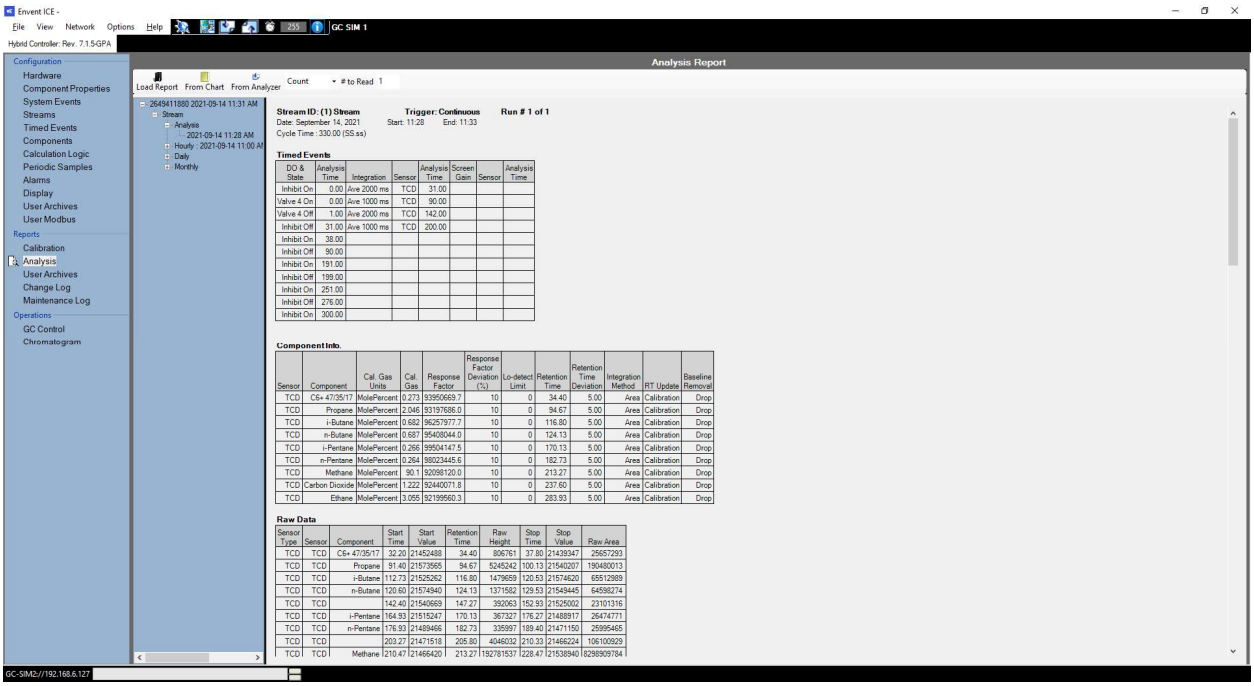


Calibration reports are generated using this page. When the page is opened, it will be blank. To generate a report, select the number of reports required (in the text box) and click the “From Analyzer” button.

There are additional options on the calibration report page.

Open	Opens a report which was saved from the “save” function
Save	Saves the currently open report in a format only readable by ICE
Print Preview	Opens the Windows print dialogue
Clipboard	Copies the report to a tab-separated format for pasting into Excel
From Analyzer	Clicking this button pulls reports from the analyzer
Table #[x]	A drop-down menu to select which calibration table to pull reports from (calibration tables are configured in the Components page under Configuration)

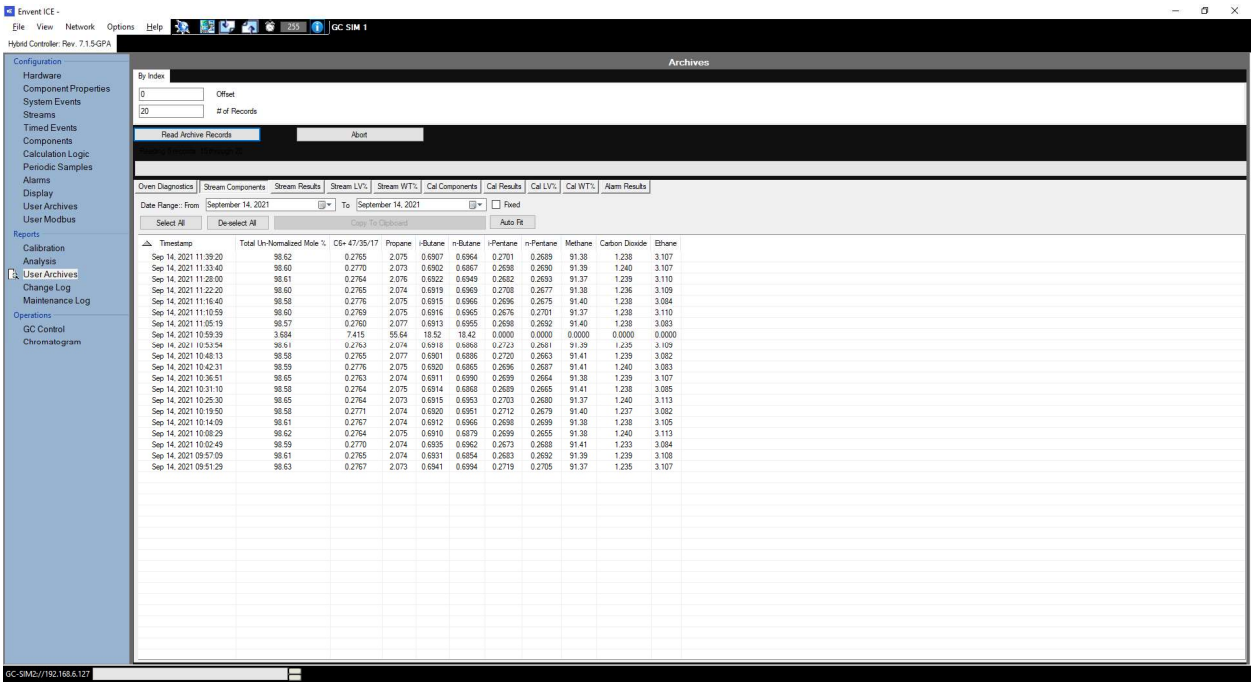
5.2 Analysis



This page allows the user to generate analysis reports. The analysis report contains the raw and analytical data for analytical runs.

Load Report	Loads a report saved in an ICE format
From Chart	Parses data from a chromatogram (.chart) file into a report
From Analyzer	Downloads the selected number of reports from the analyzer

5.3 User Archives (Reports)



The user archives page is split into two sections. The top section allows the user to define which user-defined archives to retrieve and how many. The bottom section displays the information along with some buttons to control the data.

Top Section

The top section contains two text boxes, the first text box is to offset the records and the second is to indicate how many records to retrieve. For example, if 20 "# of records" is selected, the analyzer will send the **previous** 20 records; if an offset of 1 is entered, the analyzer will send 20 previous records beginning with the 2nd most previous. The "Read Archive Records" button begins the operation, the "Abort" button stops the operation. There is a progress bar for indication.

Below the progress bar are several tabs, the number of tabs appearing here depends on the configuration for the user archives. The "Read Archive Records" button must be pressed for each tab to retrieve data from each.

Bottom Section

The bottom section contains all the information that was retrieved from the analyzer's internal memory. There are several buttons available in this section once data has been generated.

Select All	Clicking this button selects all the currently viewed data records
De-select All	Clicking this button de-selects all the currently viewed data records
Copy To Clipboard	Clicking this button copies the selected data to the clipboard, as a tab-separated format, for pasting into Excel
Auto Fit	Clicking this button automatically re-sizes all the data views to fit the information

Additional to the buttons, there is also an option to filter the data based on a date range. Each column can also be filtered based on "largest to smallest" or "smallest to largest" by clicking the column headers.

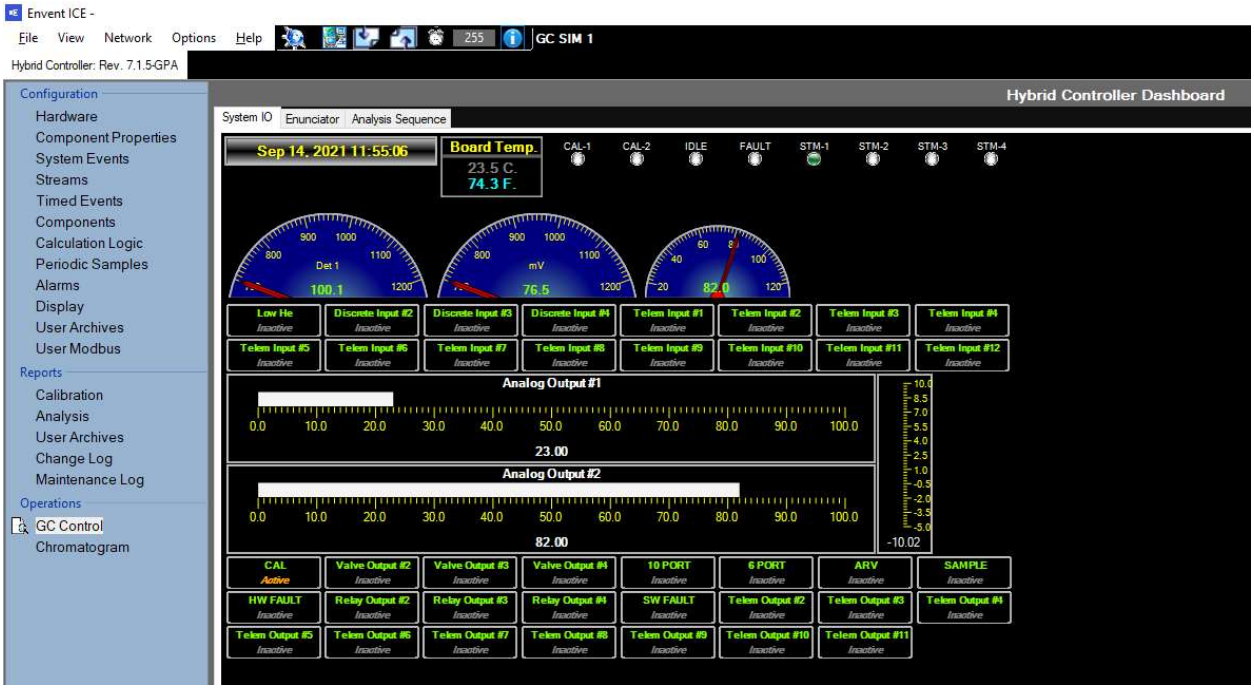
5.4 Change Log / Maintenance Log

The change log page is used to view any changes that the firmware has recorded.

The maintenance log page allows the user to upload custom notes to the analyzer and retrieve the loaded notes.

6.0 GC Operations

6.1 GC Control

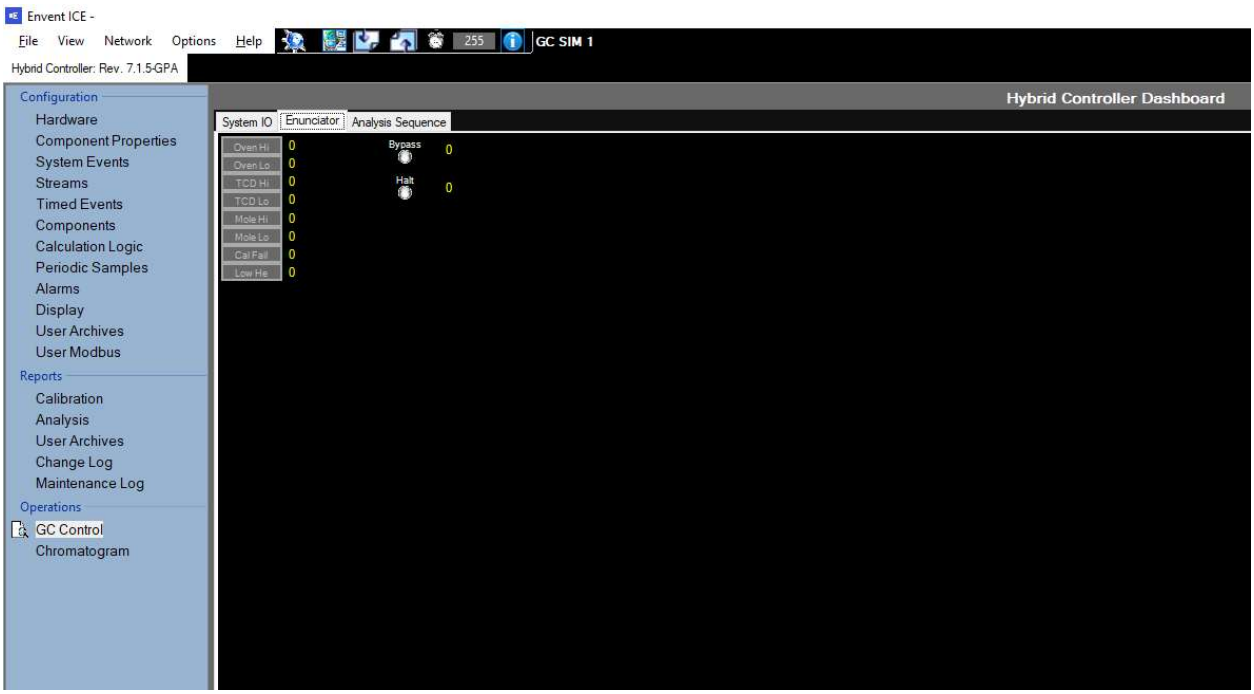


System IO Dashboard

The system IO Dashboard allows the user to view live data from all the inputs/outputs of the device. At the top is the real-time clock, board temperature, and the state of the 8 LEDs. Followed by three “speedometer” graphics indicating the analog inputs and an array of boxes indicating the discrete inputs. At the middle of the page are two bar graphs indicating the analog output readings, as well as a vertical graph indicating the frequency output reading. The bottom of the page has an array of boxes indicating all the discrete output states.

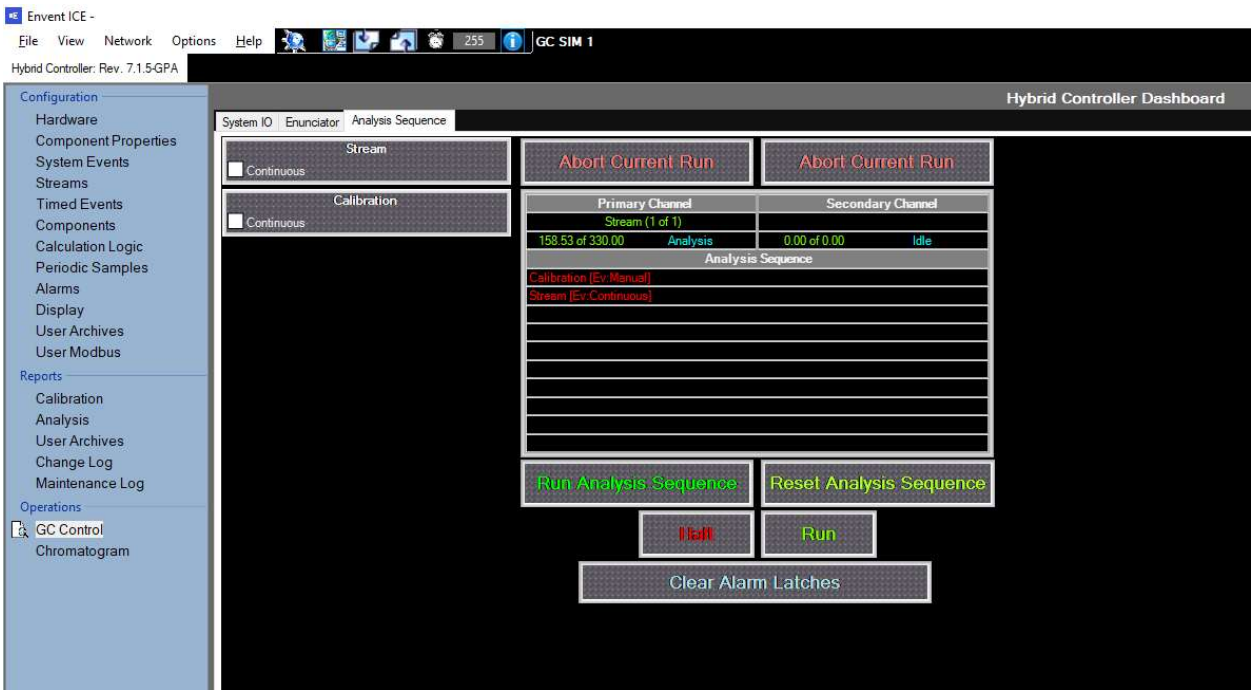
Right clicking the discrete outputs allows the user to manually change the state of the outputs or switch the outputs back to automatic control.

Please note, manually changing the state of discrete outputs may have an impact on measurement. There is no timeout or safety feature to prevent incorrect operation of the valves using this feature. Ensure outputs are back in Auto mode before continuing measurement.



Enunciator Dashboard

The second tab of the GC Control page allows the user to see the state of alarms and active states of the analyzer.



Analysis Sequence Dashboard

This view allows the user to see the sequence of analysis events to occur. The elements on the left side of the screen are buttons with two distinct functions.

Clicking the body of the button (gray area) will queue up the stream in the analysis sequence according to the "Manual" system event for that stream (defined in the Components page of Configuration). Clicking the "Continuous" checkbox will queue up the stream in the analysis sequence but will run indefinitely until the checkbox is unchecked.

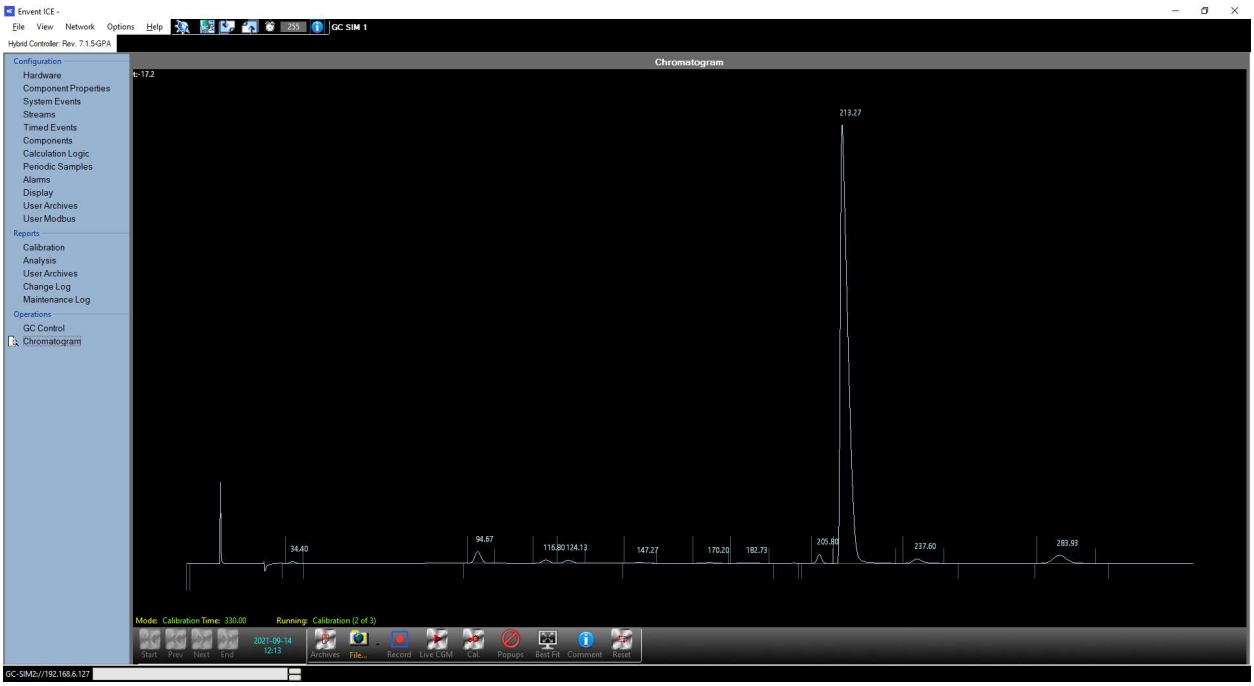
CAUTION

The "Abort Current Run" button (at the top) will immediately cancel the analysis, regardless of the timing of the run, and put the analyzer into idle mode. **Extreme caution must be taken when using this button, as it can harm the operation of the analyzer since components are at an unknown position in the analytical columns/valves when the button is pressed.**

Below the stream timer the analysis sequence can be found. The analysis sequence shows which streams will be run after the current stream has finished. At the bottom of the page are the control buttons, the table below describes the function of each.

Run Analysis Sequence	Starts the GC and runs the current sequence
Reset Analysis Sequence	Resets the analysis sequence to the default state
Halt	Halts the GC after the current run is finished
Run	Brings the GC out of idle mode and runs the current analysis – this button also cancels a halt request
Clear Alarm Latches	Clears all latched alarms if they are out of alarm state

6.2 Chromatogram



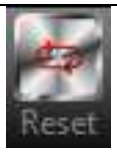
The chromatogram page allows the user to view live or archived chromatograms and all related analytical data.

The main viewer takes up the bulk of the page, with navigational and control buttons at the bottom of the view.

There are some intuitive controls to navigate the chromatogram viewer. The chromatogram can be dragged around by holding left-click and moving the mouse. When the right-click button is held and the mouse is moved, a box is drawn to zoom in on a desired portion of the chromatogram. Double-left-click recenters the view and resets the scaling to the default scale.

Right-clicking anywhere on the chromatogram brings up the context menu for more operations including the ability to convert the chromatogram into an Analysis Report, performing a forced calibration, and turning individual traces on/off (in the case of a multiple detector analyzer).

The table on the next page goes over the controls at the bottom of the chromatogram page.

	Controls that navigate the viewer between previous and next chromatograms. The timestamp indicates the currently viewed chromatogram
	Clicking this button brings up the archive dialogue box, the user can double-click to select a chromatogram to view, from the analyzer's internal archive
	The File button allows the user to open a previously saved chromatogram (.chart) file. Clicking the arrow next to the icon brings up additional options to save the chromatogram file
	Begins recording live chromatograms to the PC's internal memory. If they are not saved using the file dialogue they are lost forever when closed
	Starts the software playing the live chromatogram from the analyzer as it appears real-time
	The Cal. Button enters the currently viewed chromatogram into calibration mode. Which enables more features.
	Clicking the Popups button enables contextual popups on the chromatogram – indicating some data about peaks and timed events when the mouse cursor is pointed at them
	Best Fit automatically scales the view of the chromatogram to the height of the largest peak visible on the screen at the time the button is pressed
	Shows the comment box for the currently viewed chromatogram
	Resets the view to the default view (largest peak scaling)

6.3 Calibration

Calibration should be performed on the Gas Chromatograph at intervals specified in the User's Manual. This section does not cover individual calibration configuration and only covers the calibration methods within the software. For more information on setting up the hardware for calibration, refer to the Gas Chromatograph user's manual.

There are three calibration modes: Automatic calibration, manual calibration, and forced calibration. From the factory, calibration is designed to run 3 times and compare the last 2 runs.

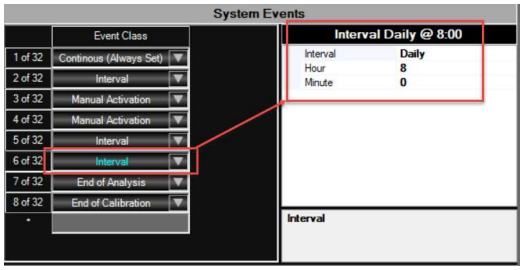
NOTE

Ensure that the correct pressure / flow is set up for the calibration stream that needs verification / calibration. Calibration involves adjusting measurement sensitive factors in the analyzer and will have an impact on the performance and output of the analyzer.

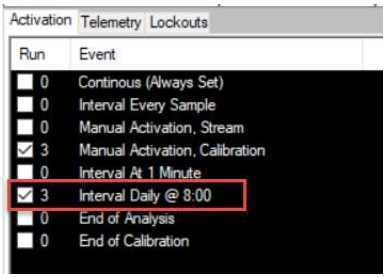
6.3.1 Automatic Calibration

The gas chromatograph can be programmed to run the calibration on a regular basis, automatically. The following steps outline the **general** procedure for setting up automatic calibration. Typically, the analyzer is configured from the factory. For assistance, contact Envent Engineering Ltd.

1. Create a system event (if one is not already in use) for the interval required, the example in the screenshot has an interval Daily at 8:00 AM



2. On the Components page, ensure the proper calibration stream is selected, check the new interval in Activation, and set the number of runs to 3



3. Automatic calibration is configured once written to the analyzer and will run on the interval specified

4. The calibration will automatically do 3 runs at the specified interval and generate a calibration report when finished. If the calibration is a pass, the calibration factors will be updated, if it is a failure, they will not be updated

5. Calibration reports can be pulled from the analyzer as required

6.3.2 Manual Calibration

If the analyzer is not equipped with automatic calibration or a manual calibration is desired, follow these steps.

1. Navigate to the GC Control page under Operations

2. Click the gray button for the calibration stream that needs to be run, this will queue the calibration to be run next – do not click the Continuous check box, that is for forced calibration

3. The calibration automatically does 3 runs and generates a calibration report when finished. If the calibration is a pass, the calibration factors will be updated, if it is a failure, they will not be updated

4. Navigate to the Components screen (Configuration > Components) and read from the device () to ensure that the Response Factors update

5. Calibration reports can be pulled from the analyzer as required

6.3.3 Forced Calibration

During start-up, or when large hardware changes have been made (such as different valves, columns, or calibration standard), the deviation may be too large for an automatic / manual calibration to properly calibrate the analyzer. In these situations, a forced calibration may be necessary.

Please note, a forced calibration is not a solution for poor chromatography. If there is an analytical problem such as, but not restricted to, lack of carrier pressure, poor calibration standard, damaged valves, damaged columns, or a damaged sensor, then the analytical problem must be remedied before a proper calibration can take place. A forced calibration will not fix an analytical hardware error.

General Forced Calibration Process

The process for a forced calibration is as follows:

- Run calibration standard continuously, until chromatograms are stable
- Verify stability of chromatograms
- Verify the positioning of each of the peaks
- Select one chromatogram and enter calibration mode
- Force the calibration factors from the chromatogram into the calibration table
- Write the calibration factors to the analyzer

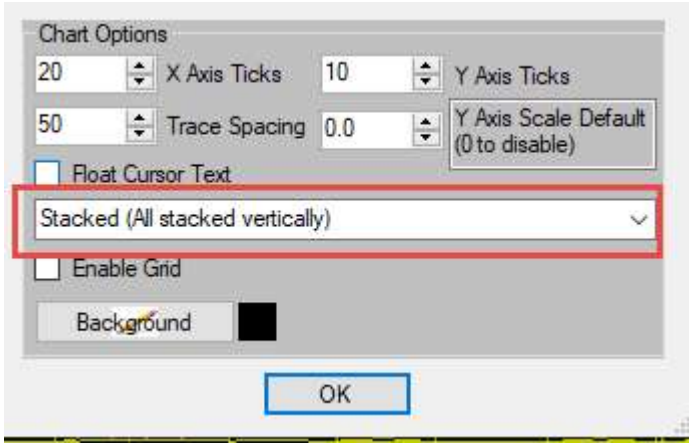
Steps

Follow the steps below to perform a forced calibration.

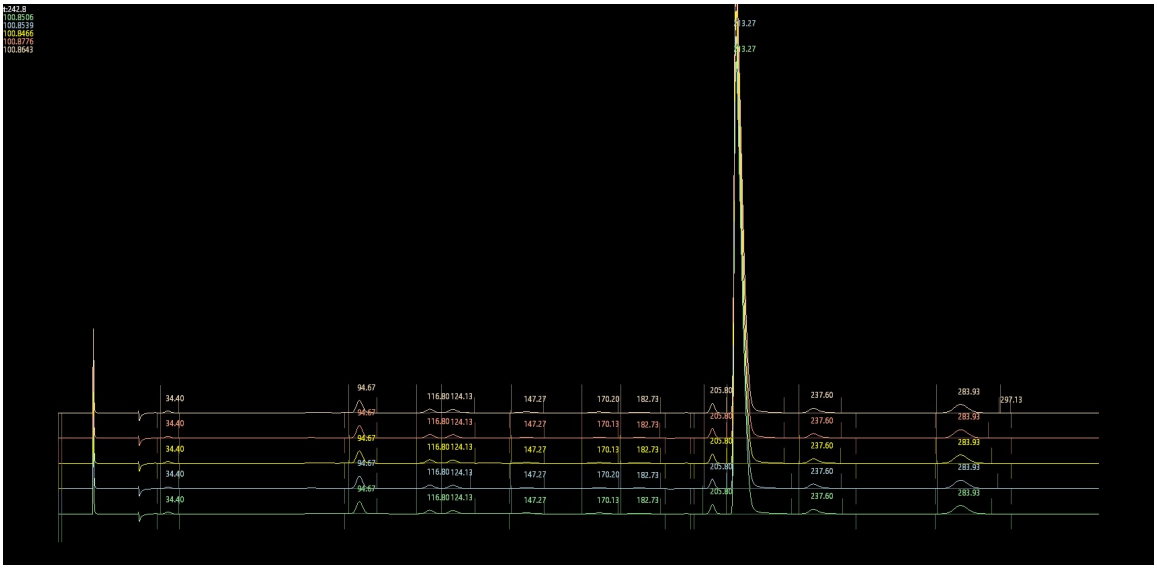
1. Navigate to the GC Control page under Operations and engage the “Continuous” check box for the calibration stream. **This will run the stream indefinitely until the box is unchecked**.

2. Navigate to the Chromatogram page under Operations and either
    a. Pull chromatograms from the archive as they finish (recommended) – click the “Archives” button and the calibration runs should appear at the top of the dialogue box. Pay special attention to the time stamps
    b. Begin trending Live Chromatograms by clicking the “Live CGM” button, and record them to the PC’s memory by clicking the “Record” button

3. Verify chromatogram stability after 5 or 6 runs.
   [OPTIONAL] The most effective method to do this is to record 5 or 6 chromatograms to the viewer, then navigate to View > Preferences, and change the viewer to “Stacked” in the Chart Options. This will stack all the chromatograms, making any differences in them stand out

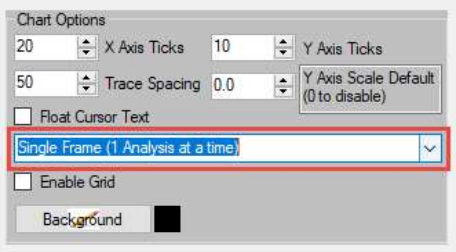


   The screenshot below shows what 5 stacked, and stable, chromatograms could look like. If there are any significant variations between the runs, then there is likely a hardware problem
   Note: the actual chromatogram depicted may be different depending on the analyzer



4. If the chromatograms are stable, continue. If the chromatograms are not stable, contact Envent Engineering Ltd. as more troubleshooting is likely required

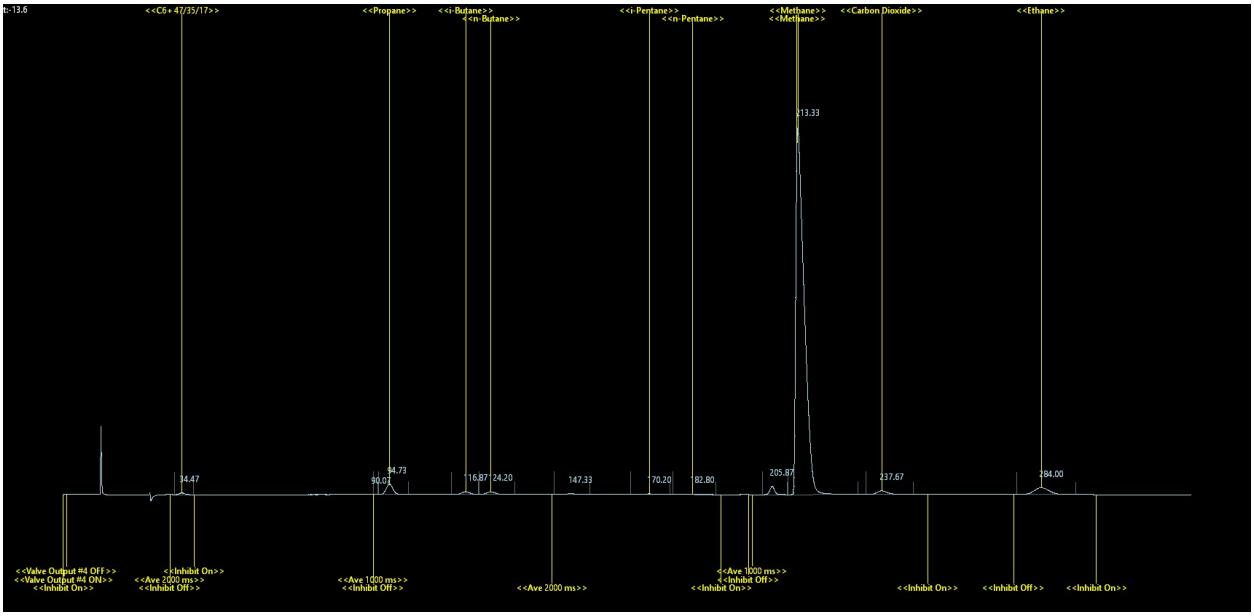
5. Switch the view back to single chromatograms by navigating to View > Preferences and switch the chart options back to “Single Frame”, if required. This makes it easier to work on the chromatogram

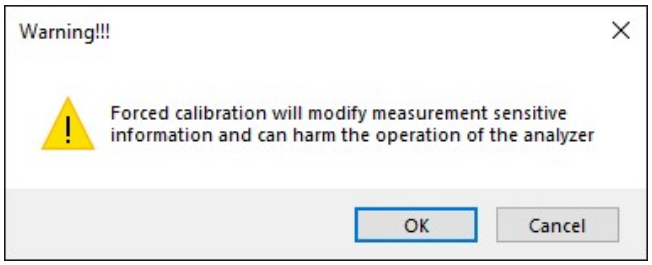


6. Identify, and confirm, the **position** of each of the component peaks on the chromatogram. The retention time (RT) of each peak should be close (but does not need to be exact) to the value listed in the calibration table on the Components page. If needed, make small adjustments to the retention time of each peak's location. The operator must ensure they have properly identified each peak which eluted, and the order that they were detected

   Prior to making any severe adjustments to the Retention Times, contact Envent Engineering Ltd.

7. Select one of the stable chromatograms and enter calibration mode by clicking the "Cal." Button on the toolbar at the bottom of the screen. An interactive system will open showing all the timed events, right-click the chromatogram and click "Forced Cal." Read and acknowledge the dialogue box that pops up to allow the forced calibration to take place





THE ANALYZER IS NOT YET CALIBRATED. The calibration factors have been forced into the calibration table

8. Write the calibration factors into the analyzer by clicking the write () button

9. Take the analyzer out of continuous mode by unchecking the “Continuous” check box on the GC Control page

10. Perform a manual calibration, if desired, to ensure the analyzer has properly calibrated

11. Calibration reports can be pulled from the analyzer as required

Contact Us

In the event that a situation arises that is not covered by this manual, we encourage you to contact us so that we can help you resolve any issues you may have. Please have this manual readily available when calling for assistance.

For further information on our products or to access our most recently updated manuals and product catalogues, please visit our website at www.enventengineering.com.

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