9120 Operations Manual

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General Information

The SSi 9120 is a single or dual loop blind controller/signal conditioning/data concentrating device that can be used in carbon, oxygen, millivolt, SSi redundant probe, simple nitriding and universal dual loop applications. The 9120 is supplied with Ethernet communications capability and has a limited web server for thin client control and supports ModbusTCP host communications. Serial I/O includes two (2) RS-232 ports and three (3) RS-485 ports. As a data concentrator, the 9120 is capable of communication to SSi's analog input modules as well as up to 25 slave serial instruments and supports host communications via Modbus over RS232 or RS485 or ModbusTCP communications.

The SSi 9120 Controller is a single or two loop device that can be configured to be used for control of:
% Carbon
Dew Point
Oxygen
Millivolt
Redundant Probe
Simple Nitrider
Dual Loop
Temperature Mode

SSi 9120 Setup

This section will explain how to set the SSi 9120 controller up. The steps required to set up the SSi 9120 through a local computer are:

1. Install Configurator 2.0 on the local computer
2. Connect the SSi 9120 to a network or local computer
3. Configure Configurator 2.0 on the local computer
4. Complete Configurator *Furnace Setup* menu option
5. Complete Configurator *Analog Input Setup* menu option
6. Complete Configurator *Analog Output Setup* menu option
7. Complete Configurator *Alarm Setup* menu option
8. Complete Configurator *Communications Setup* menu option
9. Complete Configurator *PID Loop Setup* menu option

Step 1 – Install Configurator 2.0 on the Local Computer

Configurator 2.0 is a configuration utility developed by SSi that will allow the user to interface with an SSi instrument directly or over a network. The installation file, ConfiguratorSetup.msi, should be included with the installation CD provided by SSi. If this file is not on the CD, contact Super Systems at 513-772-0060.

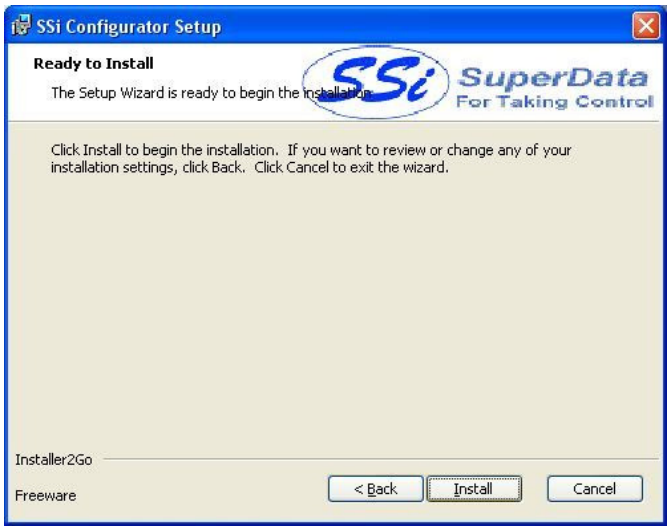
Double-click on the installation file to begin the installation process.

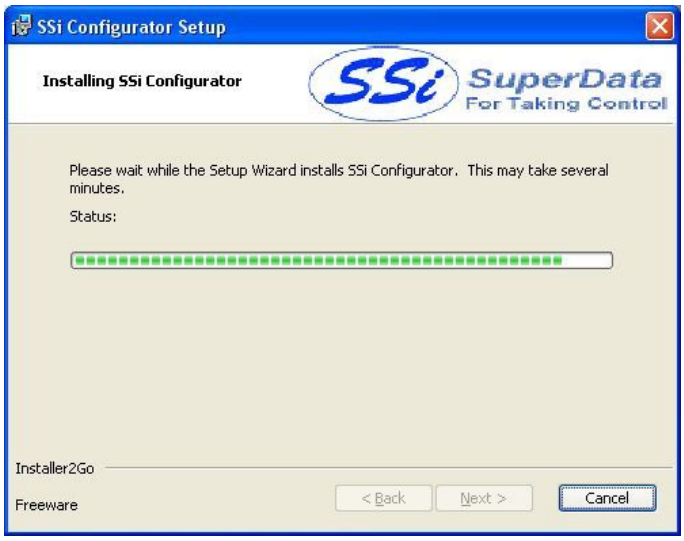
The first page displayed is just for information purposes. Click on the **Next >** button to move to the next page, or press the **Cancel** button to cancel the installation.

The second page is a warning about Configurator 2.0. Since Configurator 2.0 is a Microsoft .Net 2.0 product, the local computer will have to have the .Net 2.0 framework installed before Configurator 2.0 can be used. Click on the **Next >** button to continue or the **Cancel** button to cancel the installation.

Page 3 will allow the user to select the location of the installation. The default location is "C:\SSi\". To change this location, click on the **Browse** button and select a new location from the dialog box that is displayed. The **Disk Usage** button is a utility that will display the available hard drive space on the local computer. Click on the **Next >** button to move to the next page.

Page 4 will allow the user to review the installation settings, if necessary. Click on the Install button to install the software.





Page 5 will display a progress bar as the installation proceeds. *Note: The installation should only take a few minutes*.

Page 6 is the finishing screen, which is displayed after the software has been installed. Click on the **Next >** button to continue.

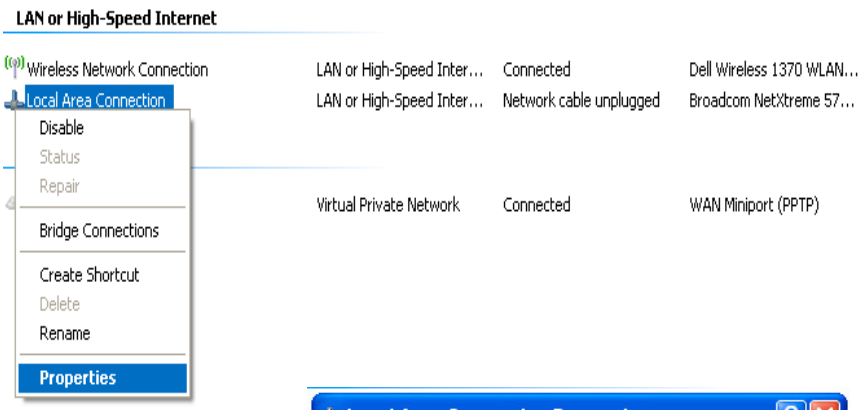
Page 7 is the informational screen about the makers of the installation software. Click on the Finish button to close out this screen.

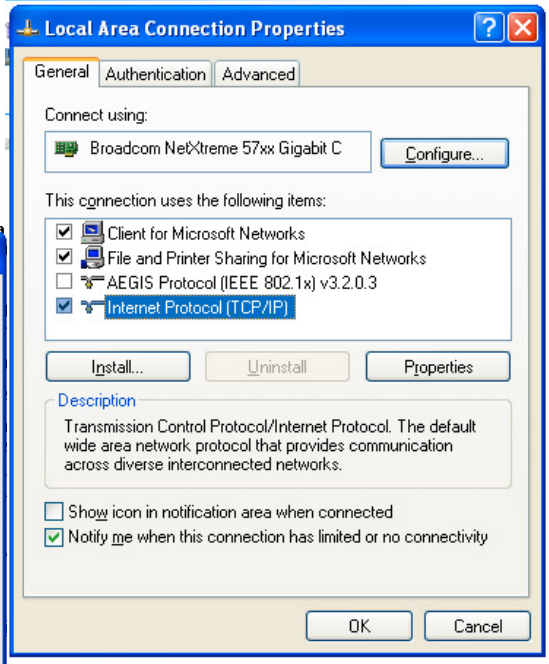
Step 2 – Connect the SSi 9120 to a Network or Local Computer

To connect the instrument to the network, through a wall port or switch, use a regular Ethernet cable. To connect the instrument directly to a computer, use an Ethernet crossover cable. Contact your IT Department for the necessary cables. Once the SSi 9120 is connected to a network, the Configurator 2.0 software will be able to find it during any searches. Connecting the instrument to your network or directly to a PC is accomplished using the Ethernet port on the instrument. If you are connecting the instrument to your network, you will need an Ethernet cable. The cable is plugged into the instrument Ethernet plug and then other end should be plugged into a network hub. If the IP Address of the instrument needs to be changed, this can be done through the Configurator software (see Step 3 below). If you are not putting the instrument on the network, you should use an Ethernet crossover cable. Ethernet crossover cables are most often used when connecting two Ethernet computers without a hub. An Ethernet crossover cable has its send and receive wires crossed. When using a hub or switch, this is automatically done for you. With a crossover cable, you are forming a network between the computer that you are directly plugged into and the SSi 9120. There will be some network settings on the computer that you will have to configure for the 2 devices to communicate. The SSi 9120 will have the network setting already setup with the following default IP address – **192.168.0.200**. This can be modified through the Configurator software.

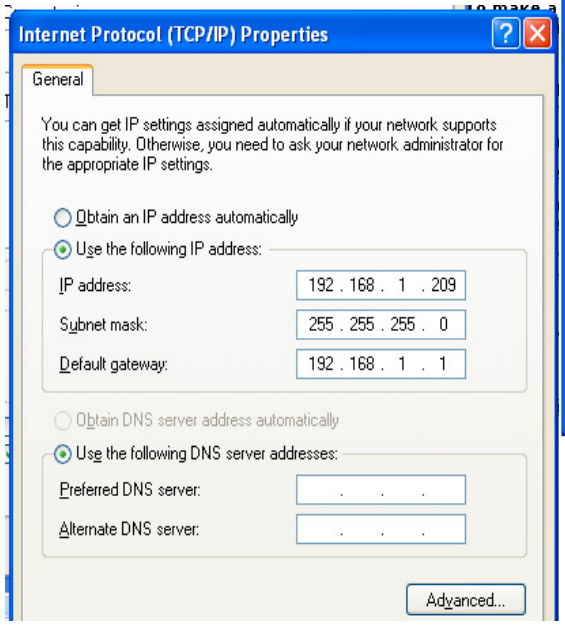
Network settings can be found through the *Control Panel* in Microsoft Windows. By selecting *Network Setting*, the operator will be given a list of the current available connection types. Using the crossover cable will require the "Local

Area Connection" as seen in the diagram to be modified. The Properties can be changed by highlighting the connection and using the right mouse button to click and select the *Properties* tab or by highlighting the connection and clicking on Change setting of this connection. Once the *Local Area Connection Properties* screen is displayed, highlight the Internet Protocol (TCP/IP) option. Click the Properties button to display Internet Protocol (TCP/IP) Properties. On the Internet Protocol (TCP/IP) Properties tab, you will need to select the option for Use The Following IP Address. Enter in the following data on these fields:
IP Address: 192.168.0.209
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1
Note: These fields are suggestions. Contact your IT department to get a valid IP address, Net Mask, and Gateway for the local computer.



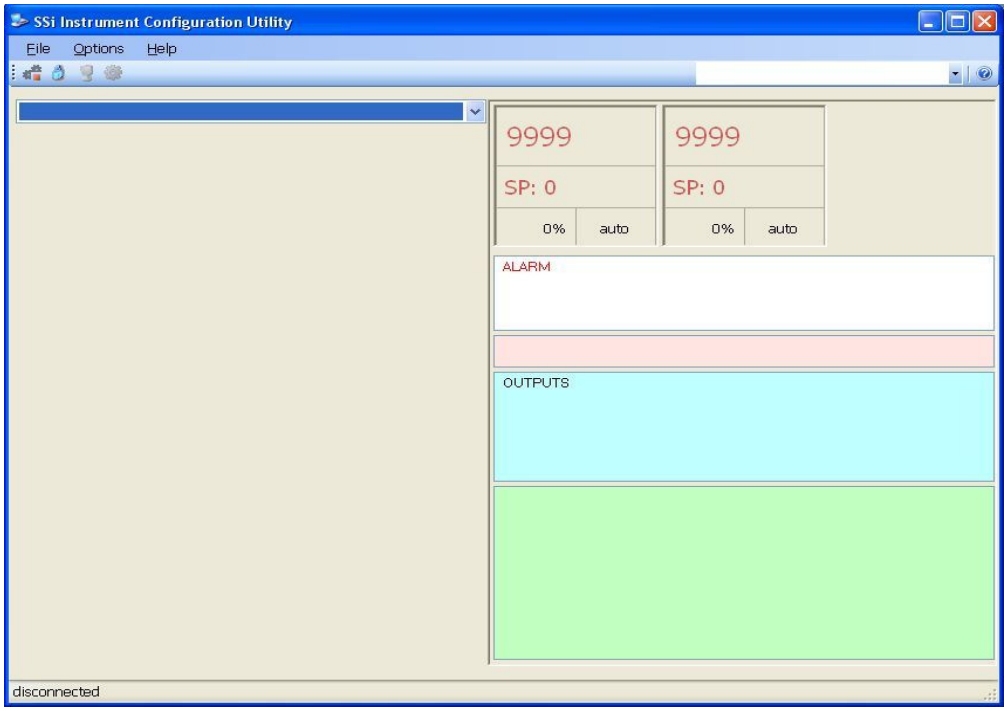


To change the network settings on your computer you may need addition information so please refer to the computer manual.

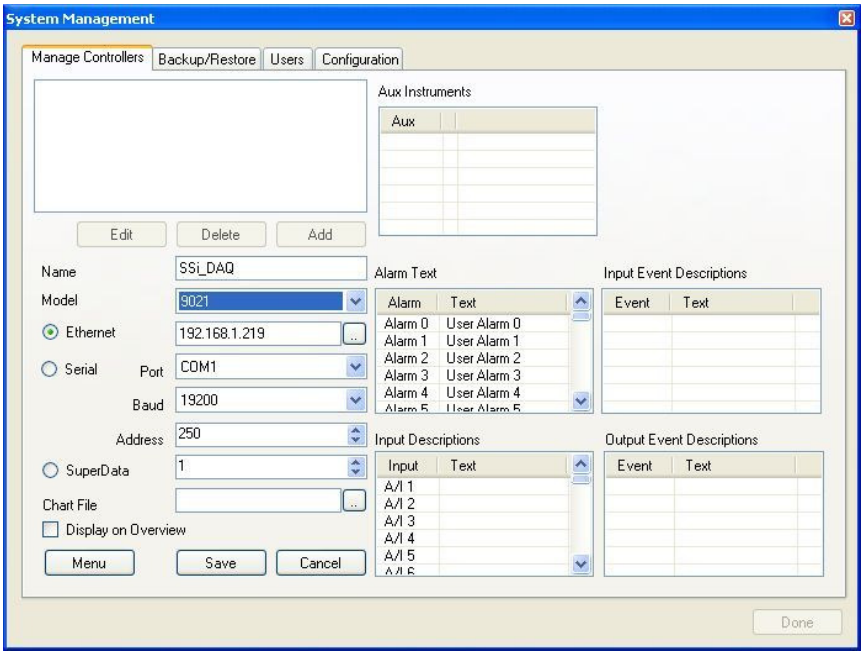


Step 3 – Configure Configurator 2.0 on the local computer

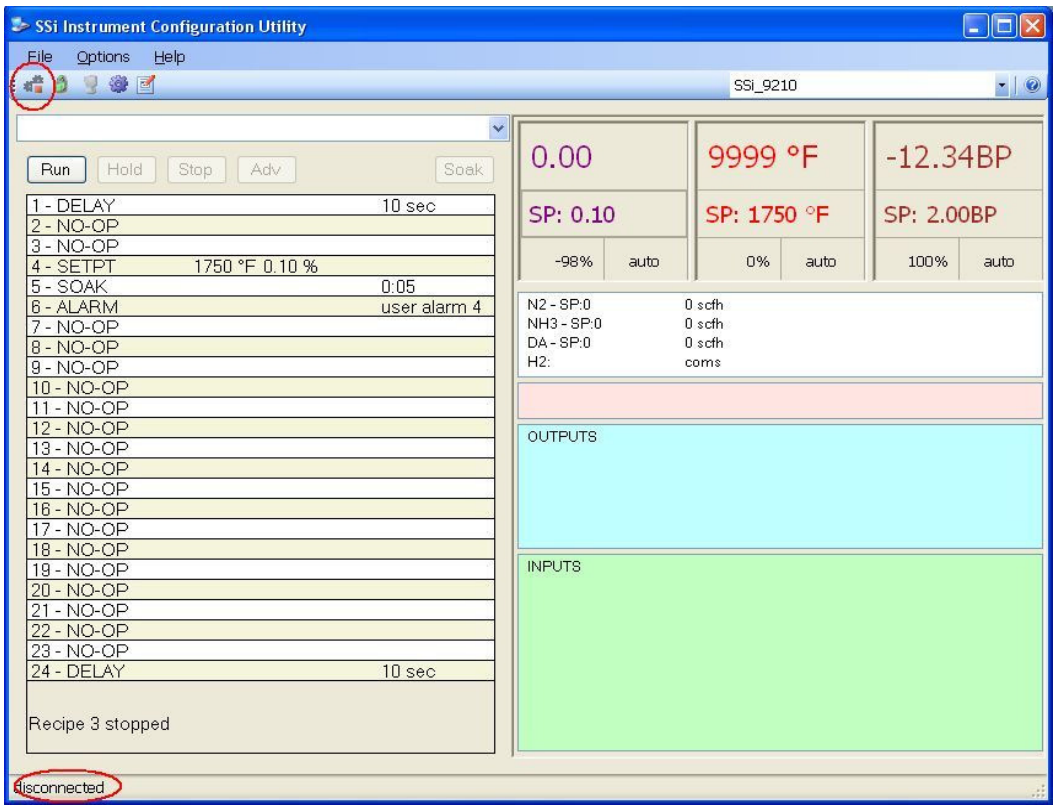
When Configurator starts up for the first time, the user will see the main screen, which will be blank because no instruments have been set up yet. The first step is to set up an instrument in Configurator.



First, the user will need to log in with administrative rights. *Note: The user will need to be logged in with at least administrative rights; Supervisor rights will not allow the user to add an instrument*. The four levels of rights in Configurator are: operator, supervisor, administrator, SSi Special. The lock on the toolbar will let the user know what level is currently logged in. Operators are blue, supervisors are gold, administrators are green, and the SSi Special, which is used for configuration purposes before the unit is shipped, is red. Click on the lock and log in with the following information: username = administrator, password = 2. *Note: The supervisor and administrator passwords can be changed on the* Furnace Setup *menu page*. The lock should now be green. Click on the *Options* menu, then select *Settings*. This will display the *System Management* screen.



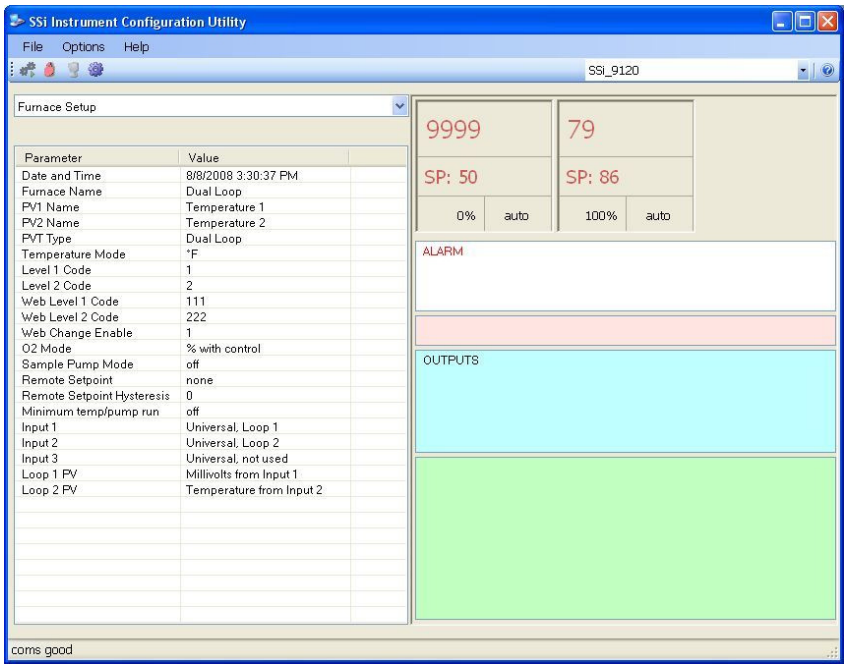
Click on the **Add** button to display the rest of the screen. First, give the instrument a name. The name can be anything the user wants, but it is suggested that the user makes the name descriptive. Next, select the model from the drop-down list. Next, enter the IP address in the "Ethernet" section and make sure the "Ethernet" option is selected. Note: The SSi 9120 is shipped with a default IP address of **192.168.0.200**. This is set this way so that it will not interfere with any other instruments/computers on the network. *Note: even if the local computer is hooked up directly to the instrument through a crossover cable, the IP address will still need to be correct*. The user can also scan the network to find all available SSi instruments by clicking on the search button next to the "Ethernet" IP address box. This will set up Configurator for Ethernet communications. To set it up for serial or SuperData communications, the proper option will need to be selected and filled out. Click on the **Save** button to save the information. Click on the **Done** button to close down this screen.



Click on the Connect button on the left of the toolbar to connect to the device. If the connect button has a red square on it, then the device is disconnected. If the button has a green triangle, then the device is connected. Also, the connection status is displayed along the bottom of the screen.
Once the device is connected, the user can move on to "Step 4 - Complete Configurator *Furnace Setup* menu option".

Step 4 – Complete Configurator *Furnace Setup* Menu Option

Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.



The Furnace Setup menu option is an administrative access only option. Do not make any adjustments on this screen without first contacting Super Systems Inc.

Date and Time
This option will display the current date and time on the 9120 controller. From this menu option, the user can change the date/time *on the 9120 controller*.

Furnace Name
This value will define the name of the furnace. Clicking on the "Value" column will bring up an input box where the user can enter the furnace's name.

PV1 Name
This value will define the name of the first process variable. Clicking on the "Value" column will bring up an input box where the user can enter the PV's name.

PV2 Name
This value will define the name of the second process variable. Clicking on the "Value" column will bring up an input box where the user can enter the PV's name.

PVT Type
The PVT type is the mode the device runs in (Carbon, Dewpoint, etc.). The mode selected determines the calculations and scaling for the Process Variable. *Note: The Simple Nitrider only reads the H2 cell on the female RS232 port and performs a simple calculation based on that input*. Any time this selection is changed it is necessary to reset the factory defaults to ensure all parameters have been changed to the new Process Variable (*Options* menu → *Settings* menu option → **Set Defaults** button or **FD Preserve** button). Clicking on this value will display an input box with a drop-down list from which the user can select a new PVT Type.
The values for the PVT type are:
% Carbon
Dew Point
Oxygen
Millivolt
Redundant Probe
Simple Nitrider
Dual Loop

Temperature Mode
This value determines the specific temperature scale to be used. Clicking on the value will allow the operator to change the value. It can be either Degrees **°F** or degrees **°C**.

Level 1 Code
Typically, operations used by a supervisor require a level 1 code for access. When a supervisor is logged in, the lock on the toolbar will be gold,  . To change the level 1 passcode, click on the "Level 1 Code" value (range is **–32768** to **32767**) and an input box will be displayed where the user can select a new value.

Level 2 Code
Typically, operations used by an administrator require a level 2 code for access. When an administrator is logged in, the lock on the toolbar will be green,  . To change the level 2 passcode, click on the "Level 2 Code" value (range is **–32768** to **32767**) and an input box will be displayed where the user can select a new value.

Web Level 1 Code
This value is the supervisor-level passcode for any web-based operations with the 9120 controller. Clicking on the value will allow the operator to change the value. The range for the passcode is 0 to 9999.

Web Level 2 Code
This value is the administrator-level passcode for any web-based operations with the 9120 controller. Clicking on the value will allow the operator to change the value. The range for the passcode is **0** to **9999**.

Web Change Enable
This will either enable or disable the web change feature, which will allow changes to be made over the web page for the 9120 controller. Clicking on the value will allow the operator to change the value. Select either a **0** (Web Change Disable) or a **1** (Web Change Enable).

O2 Mode
This value will allow the operator to select the oxygen mode.
Clicking on the value will allow the operator to change the value.
The options are:
% with control

Monitor
Offset with control.
Sample Pump Mode
Remote Setpoint
Remote Setpoint Hysteresis

Sample Pump Mode
This menu option will allow the user to turn the sample pump **On** or **Off**. For the HP PVT types (**% Carbon**, **Dewpoint**, **Oxygen**, **Millivolt**, and **Redundant Probe**), there is the option to set a minimum temperature in order for the pump to run. See the "Minimum Temp/Pump Run" description below.

Remote Setpoint
This option will allow the user to select where the remote setpoint will come from. The options are:
None
Slave 1 PV
Slave 2 PV
Slave 1 SP
Slave 2 SP
Input 3 Value

Remote Setpoint Hysteresis
This option will allow the user to enter the remote setpoint hysteresis. The range is **0** to **9999**.

Minimum temp/pump run
This option will set the minimum temperature for the pump to run, if that feature is used. A **0** value will disable the minimum temperature feature. *Note: The furnace that is being sampled must have its temperature connected to input 3 for the pump minimum temperature feature to work*.

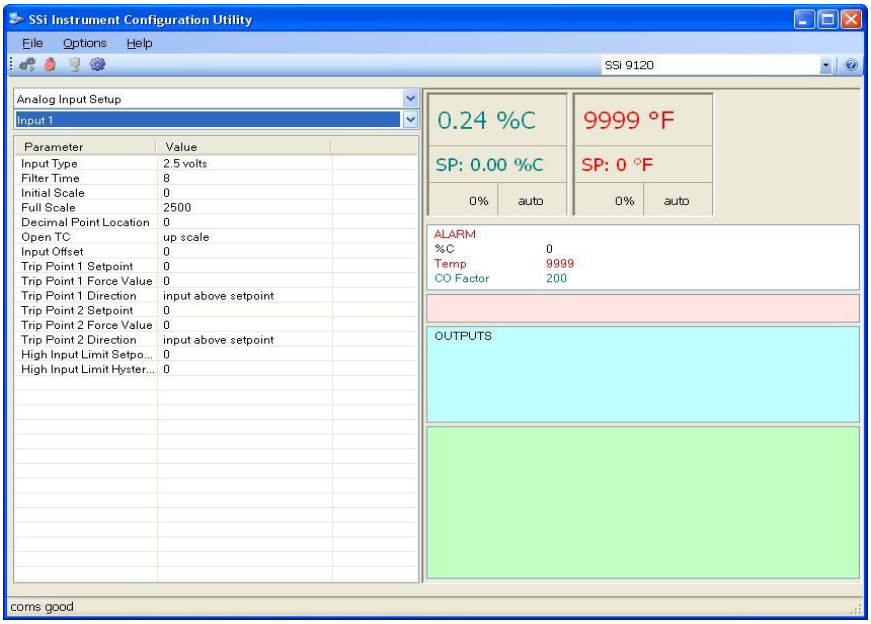
Input 1
This value will display the Input 1 type. This value cannot be changed from this screen.

Input 2
This value will display the Input 2 type. This value cannot be changed from this screen.

Input 3
This value will display the Input 3 type. This value cannot be changed from this screen.

Loop 1 PV
This value will display the Loop 1 PV type. This value cannot be changed from this screen.

Loop 2 PV
This value will display the Loop 2 PV type. This value cannot be changed from this screen.



Step 5 – Complete Configurator *Analog Input Setup* Menu Option

Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.
The 9120 controller has two analog inputs. Each of the inputs comes with a factory default configuration dependent on the application (refer to PVT type under the *Furnace Setup* section). It can be modified prior to shipment to your facility or in the field by a technician or qualified/trained person with the proper security code.

Analog Input Terminals
Analog Input 1 – terminals 31 and 32
Analog Input 2 – terminals 29 and 30

Parameter Definitions
Input Type
The thermocouple type for most applications can be modified depending on your specific needs. Please note that in some applications, some of the inputs DO NOT allow the user to modify the Input type. *Note: Before changing the input type, make sure to set the appropriate jumpers, if necessary*. *The jumper will need to be manually changed on the input board before changing the input type to a 10:1 setting (non-thermocouple types)*. To change the Input type, first select which input you want to change by selecting it in the pull-down menu just below the main menu list. Clicking on the Value will display an input box, and then you can use the pull-down menu to select the desired parameter. Once selected, click *OK* and the displayed Input type under Value will be the current type.

The following is a list of the options:

B	**S**	**12.5 volts**
C	**T**	**781.25mv**
E	**2.5 volts**	**195.3125 mV**
J	**1.25 volts**	
K	**78.125 mV**	
N	**19.53125 mV**	
NNM	**4-20 mA**	
R	**25 volts**	

Filter time
The filter time is a factory applied averaging tool used to help maintain steady control in high EMI environments. The filter time should not be adjusted with consulting SSI. Clicking on this value will display an input box from which the user can select a new value. The range is **0** to **32767**.

Initial Scale
This is the initial scale value. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Full scale
This is the full scale value. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Decimal Point Location
This is the decimal point location value. Clicking on this value will display an input box from which the user can select a new value. The range is **0** to **4**.

Open TC
This is the open TC value. Clicking on this value will toggle between **up scale**, and **down scale**.

Input Offset
The input offset value is algebraically added to the input value to adjust the input curve on read-out. *Note: The input offsets are unscaled*. The range is **–5000** to **5000**.

Trip Point 1 Setpoint
This is the trip point 1 setpoint value. The range is **–32768** to **32768**.

Trip Point 1 Force Value
This is the trip point 1 force value. The range is **–32768** to **32768**.

Trip Point 1 Direction
This is the trip point 1 direction. The options are: **input above setpoint** or **input below setpoint**.

Trip Point 2 Setpoint
This is the trip point 2 setpoint value. The range is **–32768** to **32768**.

Trip Point 2 Force Value
This is the trip point 2 force value. The range is **–32768** to **32768**.

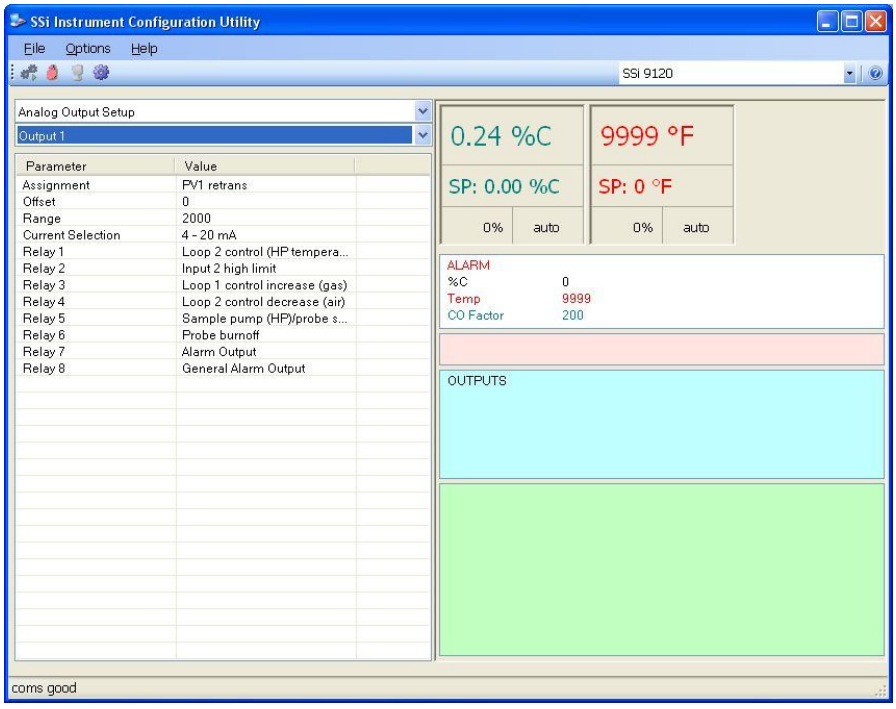
Trip Point 2 Direction
This is the trip point 2 direction. The options are: **input above setpoint** or **input below setpoint**.

High Input Limit Setpoint
This is the setpoint for the high input limit. The range for this can be **–32768** to **32768**.

High Input Limit Hysteresis
This is the hysteresis for the high input limit. The range for this can be **–32768** to **32768**.

Step 6 – Complete Configurator *Analog Output Setup* Menu Option

Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.
The 9120 controller has the option of two analog outputs. The outputs are ranged for a 4 – 20 milliamp signal or a 0 – 20 milliamp signal. Each output comes with a factory default configuration dependent on the application. Each output can be modified prior to shipment to your facility or in the field by a supervisor.



Analog Output Terminals
Analog output 1 – terminals 24 and 25
Analog output 2 – terminals 25 and 26

Assignment
The analog output assignment can be modified depending on your system requirements. To change the Assignment first select which analog output you want to change by selecting it in the pull-down menu just below the main menu list. Clicking on this value will display an input box, and then you can use the pull-down menu to select the desired parameter. Once selected click **OK** and the displayed assignment under Value will be the current assignment type. The following is a list of the options:
PV 1 retrans **Input 1 retrans**

Loop 1 inc	**Input 2 retrans**
Loop 1 dec	**Input 3 retrans**
Loop 1 combo	**PV1 retrans w/ expo range**
PV 2 retrans	**O2 offset log**
Loop 2 inc	**SP1 retrans**
Loop 2 dec	**SP2 retrans**
Loop 2 combo	**DP retrans**
Disassociation	
Nit_Pot	
Hydrogen	

Combo example for carbon – 4 – 12 mA Air
12 – 20 mA Gas

Offset
This is the starting point, the Process Variable value at which you get 4 milliamps. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Range
This is a Process Variable value between 4 and 20 milliamps. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**. *Note: The range, although not displayed with a decimal point, contains a decimal point that is dependent on the process variable selected. For example, If the offset is 20 mV for 4 mA, and you want 100 mV to be 20 mA, then your range should be 80. If the process variable is temperature, then the range will be 80, since temperature PVs do not have a decimal. If the PV is % Carbon, then the range will need to include the two decimal points for % Carbon. So, a range of 80 will be entered as 8000*. See below for more examples.

Current Selection
Provides the option of **4-20 mA** or **0-20 mA** control. Clicking on this value will display an input box with a drop-down list from which the user can select either of the two values listed above.

Offset and Range when assigned to a control loop
Inc -- 0 = 4mA, 100 = 20mA
Dec -- 0 = 4mA, -100 = 20mA

Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is Temperature
Offset = 800 (starting point)
Range = 400

Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is O2
Offset = 800 (starting point)
Range = 4000 (400.0)

Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is % Carbon
Offset = 800 (starting point)
Range = 40000 (400.00)

O2 Exponent Range
This menu option will allow the user to set the Oxygen exponent range. The range is **0** to **10**.

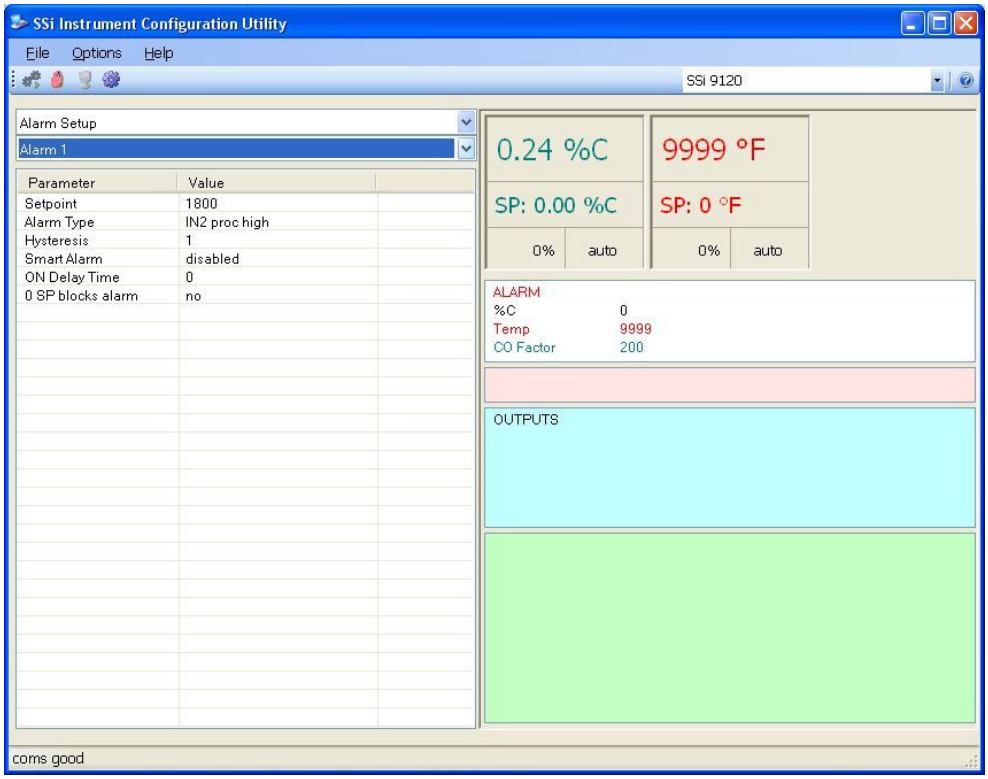
The 9120 controller has the option of using eight relay outputs. All of the relays have a positive common terminal and independent negative terminals. All of the relays are configured in a normally closed position except relay number eight, which has both a normally closed (NC) and a normally open (NO) terminal.

Note: Relay 1 through Relay 8 are display-only and cannot be modified from this screen.

Relay Output Terminals
Relay Output 1 – terminals 7 and 8
Relay Output 2 – terminals 7 and 9
Relay Output 3 – terminals 7 and 10
Relay Output 4 – terminals 7 and 11
Relay Output 5 – terminals 7 and 12
Relay Output 6 – terminals 7 and 13
Relay Output 7 – terminals 7 and 14
Relay Output 8 – terminals 7 and 15 NC
Relay Output 8 – terminals 7 and 16 NO

Step 7 – Complete Configurator *Alarm Setup* Menu Option

Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.



The 9120 controller can be configured to use three different alarms. Each of the alarms consists of an alarm setpoint, alarm type, alarm hysteresis, smart alarm, ON delay time, and a 0 SP blocks alarm value. The alarms come from the factory with a default configuration dependent on the application but also can be modified prior to shipment to your facility or in the field by a supervisor.

Setpoint
This value is the setpoint for the alarm. Clicking on this value will display an input box from which the user can select a new value. The range is from **–9999** to **9999**.

Alarm Type
This value is the type of alarms used. Clicking on this value will display an input box with two (2) drop-down lists from which the user can select a new value.
The values in the first (top) list box are:

PV 1 Value
PV 2 Value
PV 3 Value
Input 1 Value
Input 2 Value
Input 3 Value
PO1 Value
PO2 Value
PO3 Value

The values in the second (bottom) list box are:

Process High
Process Low
Band, Normally Open
Band, Normally Closed
Deviation, Normally Open
Deviation, Normally Closed

Deviation alarm is single sided. i.e. a +10 deviation will alarm when the PV is greater than SP + 10 but not neg. A -10 deviation will alarm when the PV is less than SP -10 but not on the positive side.

When set to deviation, the alarm message shows in Configurator below or above. The actual relay setup with that alarm will only energize depending on the setpoint. For the standard alarms (1, 2, and 3), the user can select if the alarm condition is for above or below. This will dictate when the relay will energize.

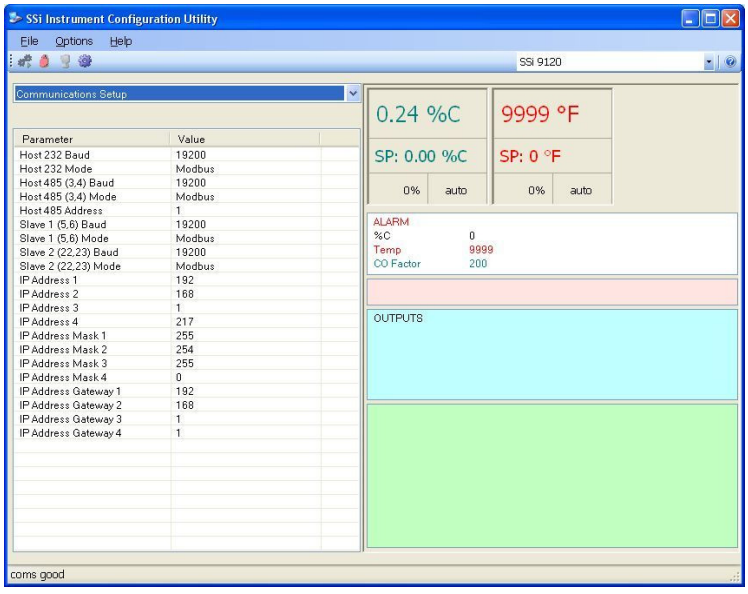
Example: alarm 1 set to plus 10F will alarm 11 degrees above setpoint and pull in the relay. It will show alarm 10 degrees below but not pull in the relay.

A Band alarm will activate and energize the relay on both sides (+) and (-).
Note: some alarm types may be fixed at the current value.

Hysteresis
The hysteresis is in degrees, i.e. 10 hysteresis = 10 degrees.
Alarm hysteresis should not have a decimal place. It is in units. If it is a control loop doing on/off control then the decimal place on the reset (hysteresis) should be ignored. The Hysteresis is a set number that works with the alarm to help control a motor or pump longer to reach a set amount to come back into band before it will shut off motor or pump.

Example: Using quench oil as an example, assume the SP is 200F. The alarm is set as a deviation of +10F. At 210 the alarm is active and the pump will run to cool the oil. With a hysteresis of 8 degrees the alarm and pump will turn off at 202F. It will turn back on when it is 10 degrees above setpoint. If the setpoint is still 200 then at 210 it is on again. Clicking on this value will display an input box from which the user can select a new value. The range is from **0** to **9999**.

Smart Alarm
This value is a display of the Smart Alarm status. A smart alarm is an alarm that works with a Process Variable and when enabled it will not be active until the process variable is within band of the setpoint.



Example: If the SP is 1700 and the band is 10 degrees the alarm will not be active until the PV reaches 1690. The value can be either **disabled** or **enabled**.

ON Delay Time
This value is the ON Delay Time for the Smart Alarm, in seconds. If the timer is utilized the alarm will not be active until in band and the timer has timed out (this is in seconds).

Example: If you select 30, the output will not energize until 30 seconds after the alarm is active.
Clicking on this value will display an input box from which the user can select a new value. The range is from **0** to **9999** seconds.

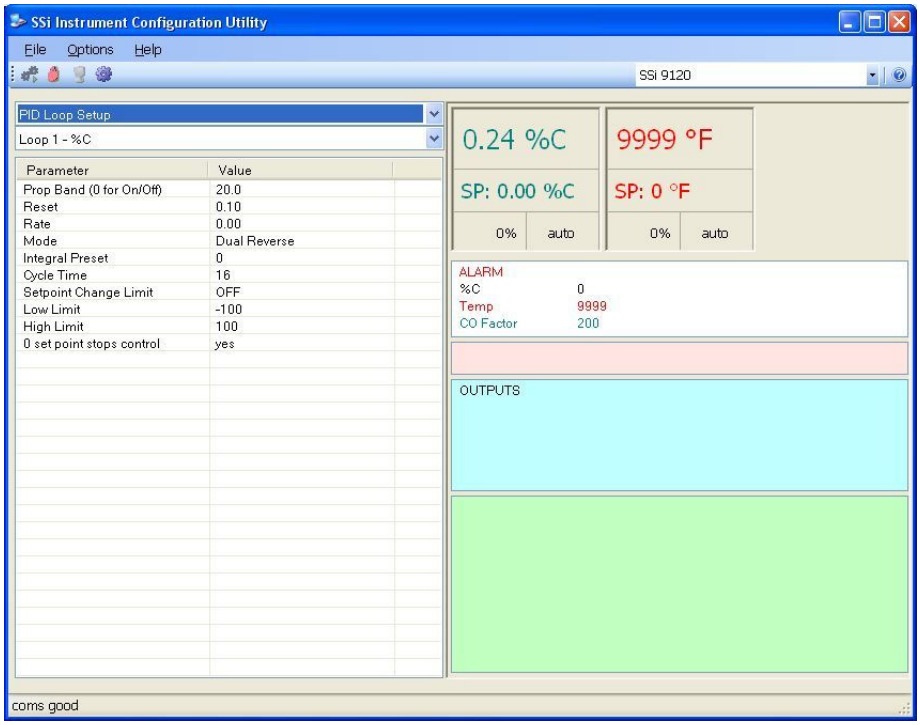
0 SP Blocks Alarm
This value will allow a 0 setpoint to block an alarm. The

options are either **no** or **yes**.

Step 8 – Complete Configurator *Communications Setup* Menu option

Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.
Communications Setup is the communications definitions for the controller. Please contact Super Systems Inc. at 800-666-4330 for more information regarding port setup. It is *strongly recommended* that none of the settings be modified without technical support from Super Systems Inc. Clicking on any of the values will display an input box that will allow the user to modify the current settings.

Step 9 – Complete Configurator *PID Loop Setup* Menu Option



Note: This menu item is also located later in the manual under the Section 1 – 9120 Configurator Menus *section*.
PID is the tuning parameters entered for each Process Variable loop. The loop value can be either **Loop 1**, or **Loop 2**.

Prop Band (0 for On/Off)
This is the proportional band field. This represents the P in PID. P = Proportional. This is a field in which you want the process variable to stay around the setpoint. Clicking on the value will allow the user to change the value. The range for the proportional band value is **0** – **999.0**.

Reset
This is the reset field. This represents the I in PID. I = Integral. This is the actual temperature being monitored over a period of time and then averaged to keep within the Proportional band. The reset is in repeats per minute. This helps to eliminate offset. Clicking on the value will allow the user to change the value. The reset range **0** – **100.00**

Rate
This is the rate field. This represents the D in PID. D = Derivative. This is the sudden change or rate in the temperature. This rate is in minutes. This affects the controller output which is proportional to the rate of change of the measurement and will control the amount of output by time restraints. Thus derivative takes action to inhibit more rapid changes of the measurement than proportional action. Derivative is often used to avoid overshoot. Clicking on the value will allow the user to change the value. The range for the rate is **0** – **100.00**. The rate is not typically used for heating/carbon

Mode
This is the mode of the loop. Clicking on the value will allow the user to change the value.
The following is an explanation of the dual/single and direct/reverse properties:
Dual – This has two output relays which can increase and decrease to achieve your SP.
Single – This has one relay which works in only one direction to achieve your SP.
Direct - If the PV - SP is a positive number and the output would bring the PV down toward setpoint that is direct.
Reverse – If the PV - SP is a negative number and the output would bring the PV up toward setpoint then that is reverse

Example: If a 12 mA output drives a 0 degree F temp. (PV) **up** to a 1200 degree F temp. (SP) this would be REVERSE and since this would take a SINGLE output from the controller the Mode for the Temperature Loop is Single Reverse.

The mode values can be:
Dual Reverse; gas/air or heat/cool
Single Reverse; heat
Dual Direct; Dewpoint gas/air
Single Direct; cool

Integral Preset
This field provides an offset for the starting point for PID control, also referred to as "Load Line" or "Manual Reset". Clicking on the value will allow the user to change the value. The range for the integral preset is **–100** to **100**.

Cycle Time
Clicking on the value will allow the user to change the value. This field is typically set to the valve travel time multiplied by 1.5. The cycle time range can be **0** – **300**.

Setpoint Change Limit
This is a smart time feature that allows the Process Loop to use PB only without Reset until the Process Variable drops below the percent output set under this category.
It is used to eliminate overshoot.
The Output percentage selected under this category ***must*** be above the normal operating output percentage of the furnace at heat.
Clicking on the value will allow the user to change the value.
Example – if the furnace runs at 40% output at heat for the maximum load, the setpoint change limit should be set to 60%.
The value can be:
OFF
80 %
70 %
60 %
50 %
40 %
30 %
20 %

Low Limit
This is the low limit field. Clicking on the value will allow the user to change the value. The range is **–100** to **100**.

High Limit
This is the high limit field. Clicking on the value will allow the user to change the value. The range is **–100** to **100**.

0 Setpoint Stops Control

If the Setpoint is zero, then all outputs are turned off. Clicking on the value will allow the user to change the value. The option is either **Yes** or **No**.

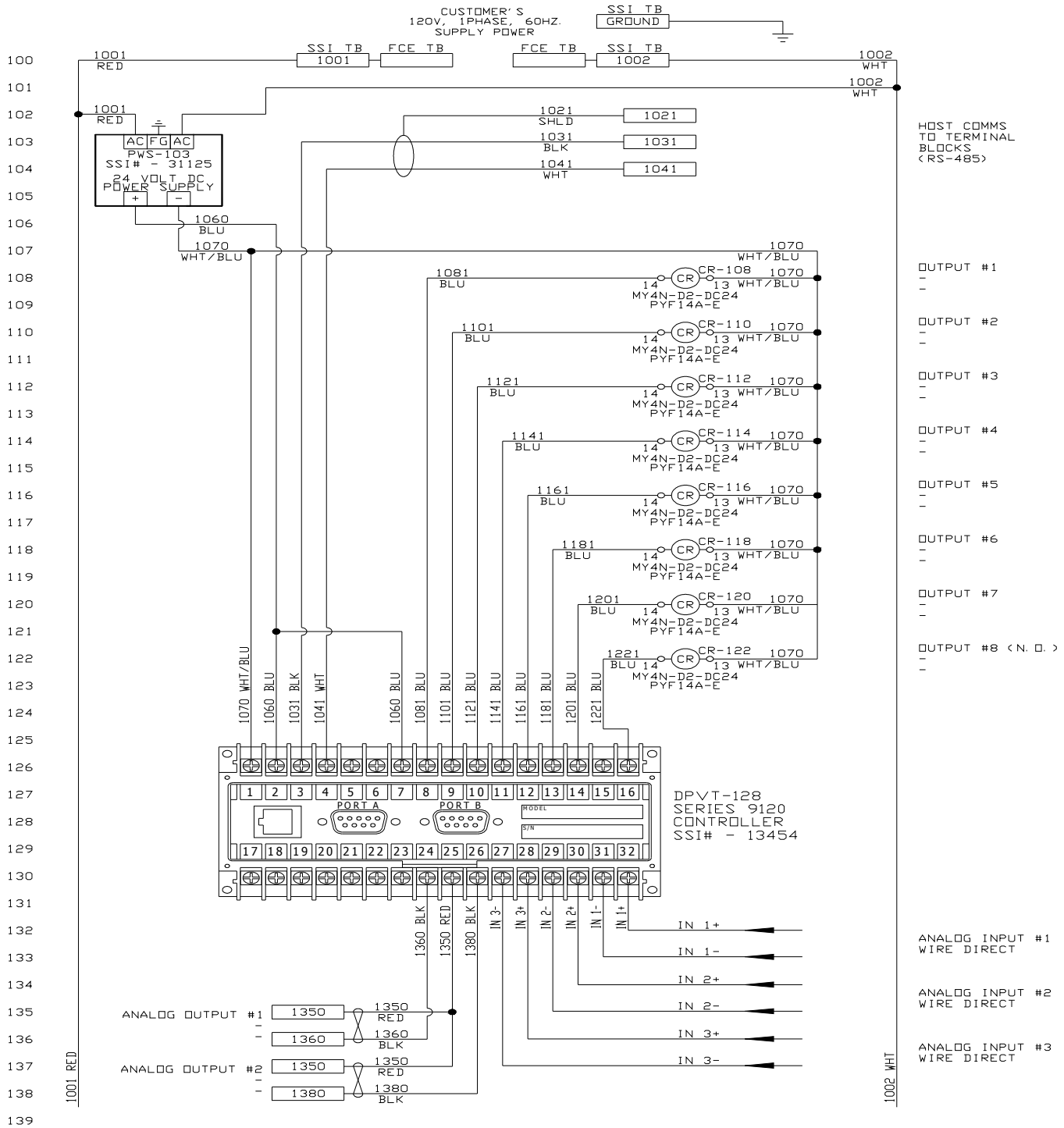
SSi 9120 Pinout Diagram

SUPER SYSTEMS INC.

(800) 666-4330
www.supersystems.com

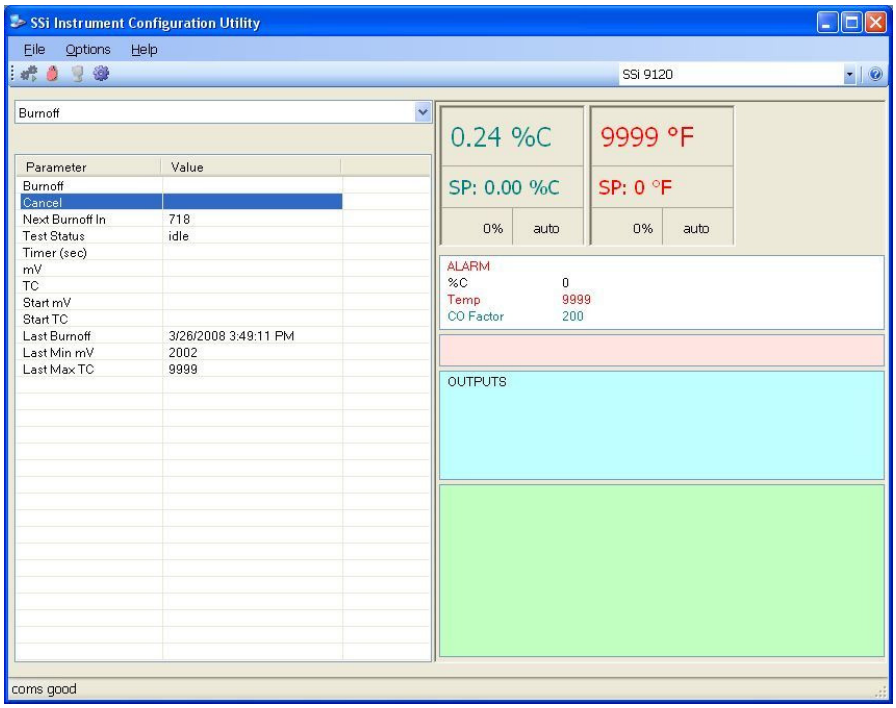
1 - 24VDC (COM)	12 - RELAY OUT 5	22 - SLAVE 2 RS485 (+)
2 - 24VDC (+)	13 - RELAY OUT 6	23 - SLAVE 2 RS485 (-)
3 - RS485 RT (-)	14 - RELAY OUT 7	24 - 4-20mA OUT 1 (-)
4 - RS485 RT (+)	15 - RELAY OUT 8 NC	25 - 4-20mA OUT COM (+)
5 - SLAVE 1 RS485 (-)	16 - RELAY OUT 8 NO	26 - 4-20mA OUT 2 (-)
6 - SLAVE 1 RS485 (+)	17 - DIGITAL IN 1	27 - ANALOG IN 3 (-)
7 - RELAY COMMON	18 - DIGITAL IN 2	28 - ANALOG IN 3 (+)
8 - RELAY OUT 1	19 - DIGITAL IN 3	29 - ANALOG IN 2 (-)
9 - RELAY OUT 2	20 - DIGITAL IN 4	30 - ANALOG IN 2 (+)
10 - RELAY OUT 3	21 - DIGITAL IN COM	31 - ANALOG IN 1 (-)
11 - RELAY OUT 4		32 - ANALOG IN 1 (+)

SSi 9120 Wiring Diagram



Section 1 – 9120 Configurator Menus

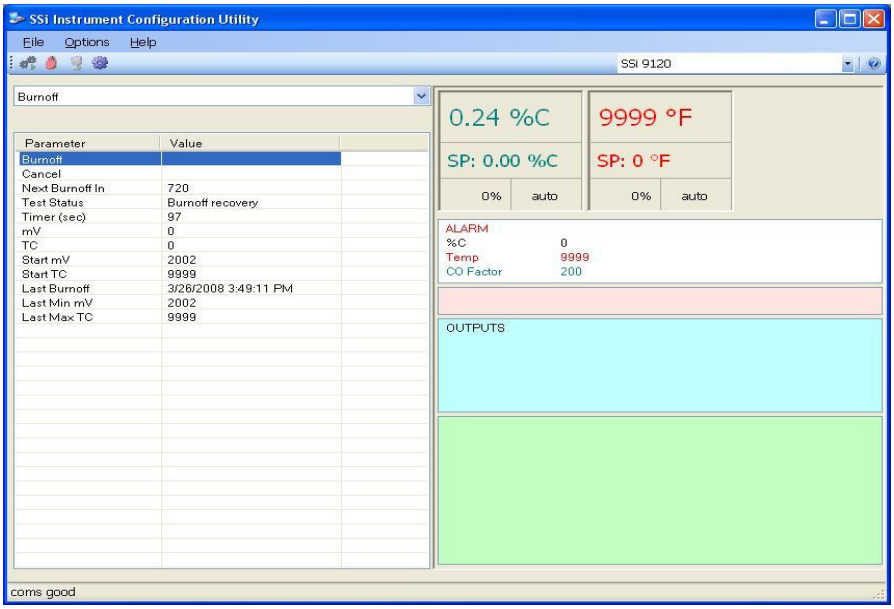
Burnoff



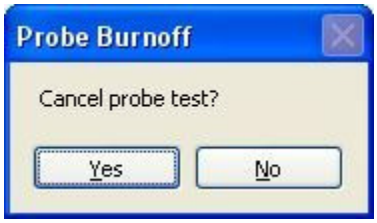
When a probe is in a furnace, soot will collect in the end of the probe, which will have a negative effect on the performance of the probe. Burnoffs are used to clean out the built-up carbon by burning it off of the probe. To manually begin a burnoff, click on the "Value" area next to "Burnoff". To Cancel a burnoff, click on the "Value" area next to "Cancel". *Note: "Burnoff" and "Cancel" are the only two interactive fields on this screen; the rest are read-only.*

Burnoff

Clicking on the "Value" area next to this field will *manually* initiate a probe burnoff. The user will have to confirm the initiation. Once a probe burnoff, has started, the rest of the fields on the screen will be updated with the current values.



Cancel
Clicking on the "Value" area next to this field will *manually* cancel a probe burnoff. The user will have to confirm the cancellation.



Next Burnoff In (shown in minutes)
This value is a displayed calculation based on the burnoff time set in the *Burnoff Setup* menu option. It displays the number of minutes until the next burnoff will be initiated.

Test Status
This value displays the current testing status. The list of possible values are: **Burnoff**, **Burnoff Recovery**, or **Idle**.

Timer (sec)
This value shows the remaining time, in seconds, for the Burnoff / Recoveries.

MV
This value is a display of the current millivolt input value during a burnoff.

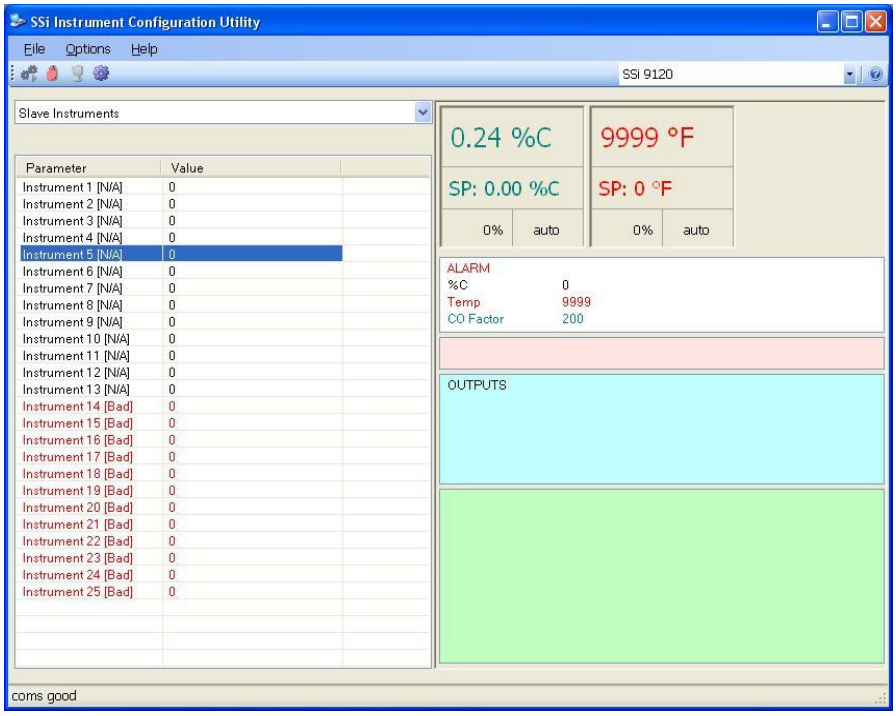
TC
This value is a display of the current probe thermocouple input value during a burnoff.

Start mV
This value is a display of the millivolt input value at the beginning of the Burnoff.

Start TC
This value is a display of the probe thermocouple value at the beginning of the burnoff.

Last Burnoff
This value shows the date and time of the last burnoff.

Last Min mV



This value is a display of the minimum millivolts measured during the last burnoff.

Last Max TC
This value is a display of the maximum measured probe thermocouple input value during the last burnoff.

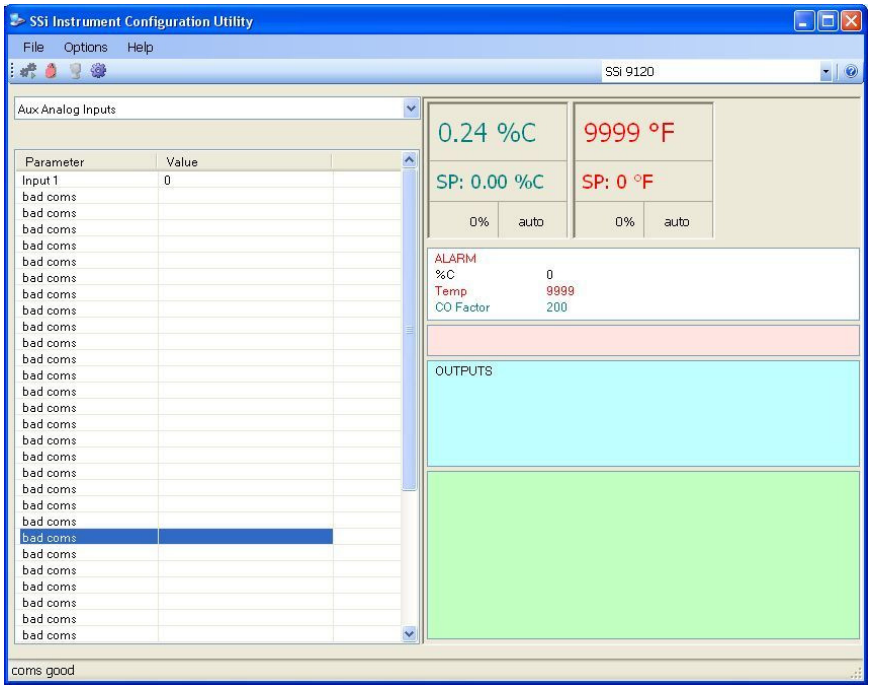
Slave Instruments

This page is a display of the current process variables of each of the slave instruments communicating with the 9120 controller. *Note – None of these values can be modified on this screen.*

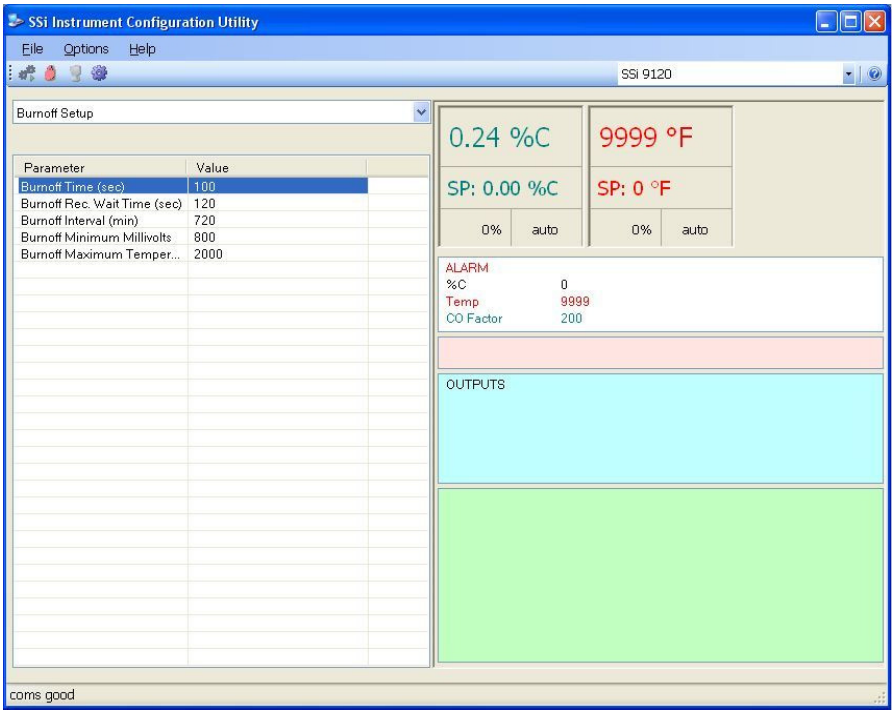
For set-up of the auxiliary instruments go to the menu item *Slave Instrument Setup*.

Aux Analog Inputs

This menu option shows the process variables for the analog inputs of the 9120 controller. It also shows the input types and any information from attached slave analog input modules. *Note – None of these values can be modified on this screen*.



Burnoff Setup



This menu option allows the user to modify the settings that are associated with the probe burnoff (menu option *Burnoff*).

Burnoff Time (sec)
The amount of time from the beginning of the burnoff to the end of the burnoff measured in seconds. Clicking on the value will allow the user to change the value.

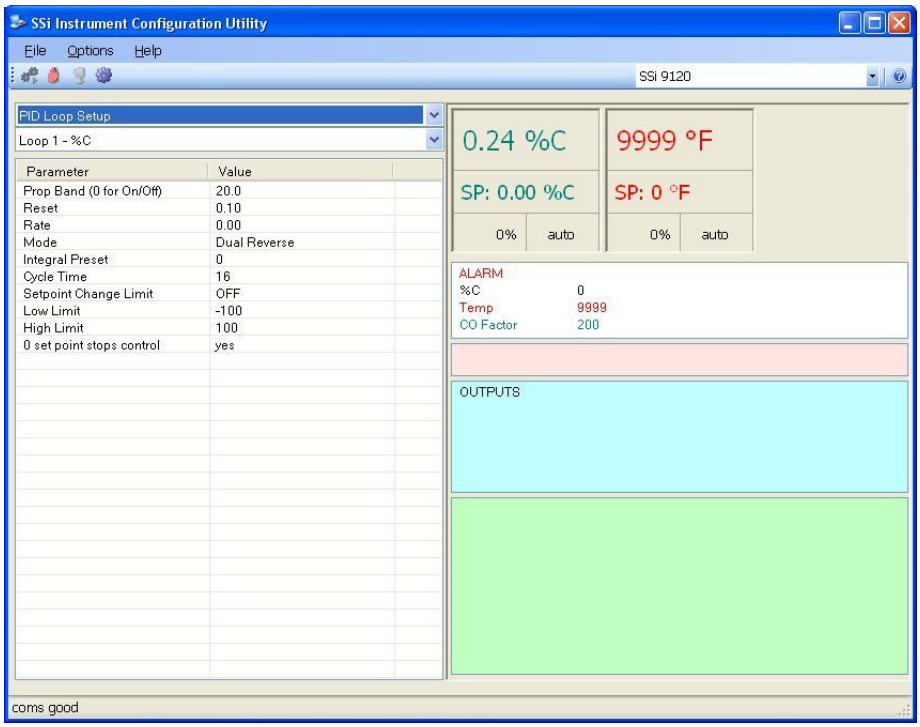
Burnoff Recovery Wait Time (sec)
The amount of time allotted to allow the probe measurements to return to a stable, accurate range after the burnoff is complete. This is measured in seconds. The control output is held until this time is elapsed. Clicking on the value will allow the user to change the value.

Burnoff Interval (min)
The amount of time between the beginning of one burnoff and the beginning of the next scheduled burnoff measured in minutes. Clicking on the value will allow the user to change the value.

Burnoff Minimum Millivolts
The minimum measured millivolt tolerance of the probe required to start a burnoff. If the millivolts value is exceeded ***the burnoff will stop***. This is done to help maintain the life and the accuracy of your probe. Clicking on the value will allow the user to change the value.

Burnoff Maximum Temperature
The maximum measured temperature allowed during a burnoff. If the temperature value is exceeded ***the burnoff will stop***. This is done to help maintain the life and the accuracy of your probe. Clicking on the value will allow the user to change the value.

PID Loop Setup



PID is the tuning parameters entered for each Process Variable loop. The loop value can be either **Loop 1**, or **Loop 2**.

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Reset
This is the reset field. This represents the I in PID. I = Integral. This is the actual temperature being monitored over a period of time and then averaged to keep within the Proportional band. The reset is in repeats per minute. This helps to eliminate offset. Clicking on the value will allow the user to change the value. The reset range **0** – **100.00**

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This is the rate field. This represents the D in PID. D = Derivative. This is the sudden change or rate in the temperature. This rate is in minutes. This affects the controller output which is proportional to the rate of change of the measurement and will control the amount of output by time restraints. Thus derivative takes action to inhibit more rapid changes of the measurement than proportional action. Derivative is often used to avoid overshoot. Clicking on the value will allow the user to change the value. The range for the rate is **0** – **100.00**. The rate is not typically used for heating/carbon

Mode
This is the mode of the loop. Clicking on the value will allow the user to change the value.
The following is an explanation of the dual/single and direct/reverse properties:
Dual – This has two output relays which can increase and decrease to achieve your SP.
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Reverse – If the PV - SP is a negative number and the output would bring the PV up toward setpoint then that is reverse

Example: If a 12 mA output drives a 0 degree F temp. (PV) **up** to a 1200 degree F temp. (SP) this would be REVERSE and since this would take a SINGLE output from the controller the Mode for the Temperature Loop is Single Reverse.

The mode values can be:
Dual Reverse; gas/air or heat/cool
Single Reverse; heat
Dual Direct; Dewpoint gas/air
Single Direct; cool

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This field provides an offset for the starting point for PID control, also referred to as "Load Line" or "Manual Reset". Clicking on the value will allow the user to change the value. The range for the integral preset is **–100** to **100**.

Cycle Time
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Clicking on the value will allow the user to change the value.
Example – if the furnace runs at 40% output at heat for the maximum load, the setpoint change limit should be set to 60%.
The value can be:
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80 %
70 %
60 %

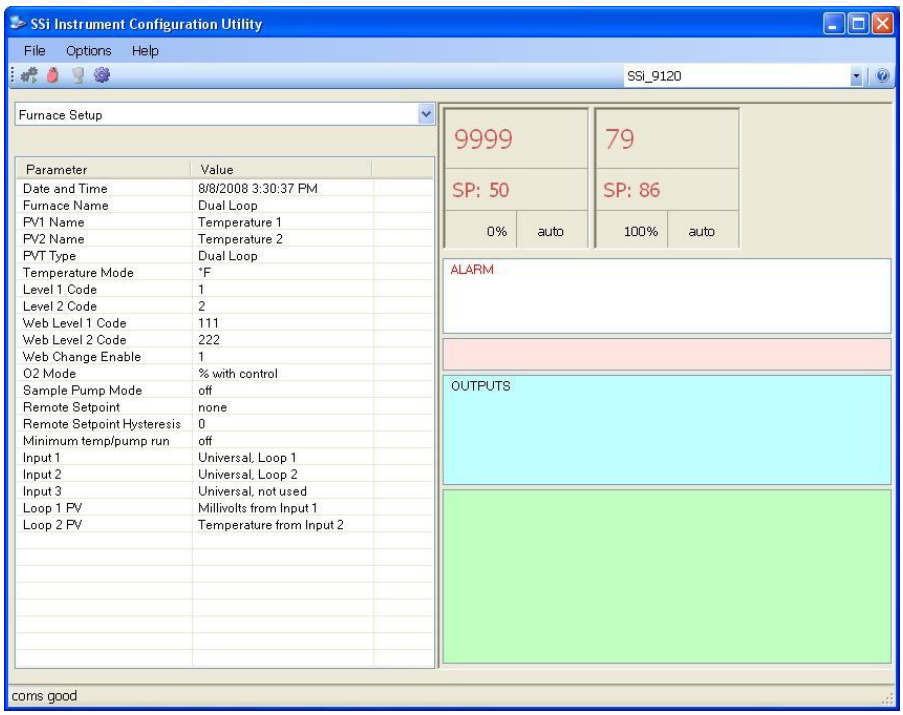
50 %
40 %
30 %
20 %

Low Limit
This is the low limit field. Clicking on the value will allow the user to change the value. The range is **–100** to **100**.

High Limit
This is the high limit field. Clicking on the value will allow the user to change the value. The range is **–100** to **100**.

0 Setpoint Stops Control
If the Setpoint is zero, then all outputs are turned off. Clicking on the value will allow the user to change the value. The option is either **Yes** or **No**.

Furnace Setup



The Furnace Setup menu option is an administrative access only option. Do not make any adjustments on this screen without first contacting Super Systems Inc.

Date and Time
This option will display the current date and time on the 9120 controller. From this menu option, the user can change the date/time *on the 9120 controller*.

Furnace Name
This value will define the name of the furnace. Clicking on the "Value" column will bring up an input box where the user can enter the furnace's name.

PV1 Name
This value will define the name of the first process variable. Clicking on the "Value" column will bring up an input box where the user can enter the PV's name.

PV2 Name
This value will define the name of the second process variable. Clicking on the "Value" column will bring up an input box where the user can enter the PV's name.

PVT Type
The PVT type is the mode the device runs in (Carbon, Dewpoint, etc.). The mode selected determines the calculations and scaling for the Process Variable. Any time this selection is changed it is necessary to reset the factory defaults to ensure all parameters have been changed to the new Process Variable (*Options* menu → *Settings* menu option → **Set Defaults** button or **FD Preserve** button). Clicking on this value will display an input box with a drop-down list from which the user can select a new PVT Type.
The values for the PVT type are:
% Carbon
Dew Point
Oxygen

Millivolt
Redundant Probe
Simple Nitrider
Dual Loop

Temperature Mode
This value determines the specific temperature scale to be used. Clicking on the value will allow the operator to change the value. It can be either Degrees **°F** or degrees **°C**.

Level 1 Code
Typically, operations used by a supervisor require a level 1 code for access. When a supervisor is logged in, the lock on the toolbar will be gold,  . To change the level 1 passcode, click on the "Level 1 Code" value (range is **–32768** to **32767**) and an input box will be displayed where the user can select a new value.

Level 2 Code
Typically, operations used by an administrator require a level 2 code for access. When an administrator is logged in, the lock on the toolbar will be green,  . To change the level 2 passcode, click on the "Level 2 Code" value (range is **–32768** to **32767**) and an input box will be displayed where the user can select a new value.

Web Level 1 Code
This value is the supervisor-level passcode for any web-based operations with the 9120 controller. Clicking on the value will allow the operator to change the value. The range for the passcode is 0 to 9999.

Web Level 2 Code
This value is the administrator-level passcode for any web-based operations with the 9120 controller. Clicking on the value will allow the operator to change the value. The range for the passcode is **0** to **9999**.

Web Change Enable
This will either enable or disable the web change feature, which will allow changes to be made over the web page for the 9120 controller. Clicking on the value will allow the operator to change the value. Select either a **0** (Web Change Disable) or a **1** (Web Change Enable).

O2 Mode
This value will allow the operator to select the oxygen mode.
Clicking on the value will allow the operator to change the value.
The options are:
% with control
Monitor
Offset with control.
Sample Pump Mode
Remote Setpoint
Remote Setpoint Hysteresis

Sample Pump Mode
This menu option will allow the user to turn the sample pump **On** or **Off**. For the HP PVT types (**% Carbon**, **Dewpoint**, **Oxygen**, **Millivolt**, and **Redundant Probe**), there is the option to set a minimum temperature in order for the pump to run. See the "Minimum Temp/Pump Run" description below.

Remote Setpoint
This option will allow the user to select where the remote setpoint will come from. The options are:
None
Slave 1 PV

Slave 2 PV
Slave 1 SP
Slave 2 SP
Input 3 Value

Remote Setpoint Hysteresis
This option will allow the user to enter the remote setpoint hysteresis. The range is **0** to **9999**.

Minimum temp/pump run
This option will set the minimum temperature for the pump to run, if that feature is used. A **0** value will disable the minimum temperature feature. *Note: The furnace that is being sampled must have its temperature connected to input 3 for the pump minimum temperature feature to work*.

Input 1
This value will display the Input 1 type. This value cannot be changed from this screen.

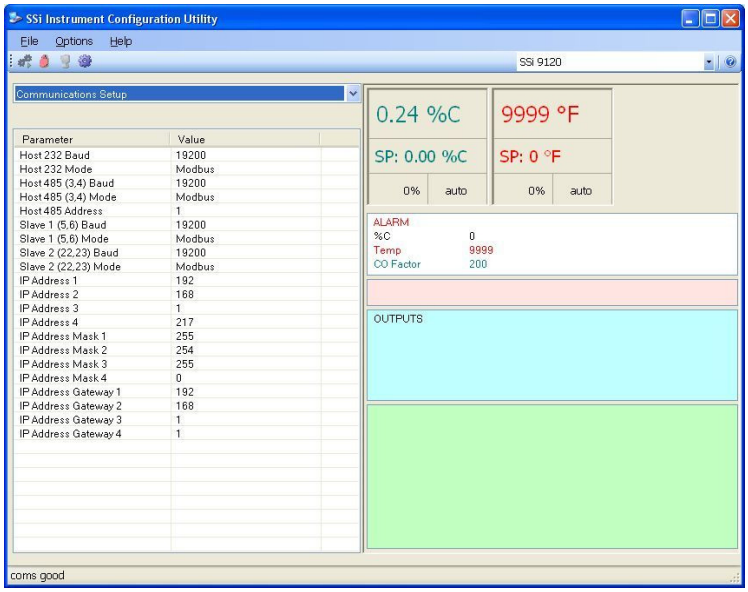
Input 2
This value will display the Input 2 type. This value cannot be changed from this screen.

Input 3
This value will display the Input 3 type. This value cannot be changed from this screen.

Loop 1 PV
This value will display the Loop 1 PV type. This value cannot be changed from this screen.

Loop 2 PV
This value will display the Loop 2 PV type. This value cannot be changed from this screen.

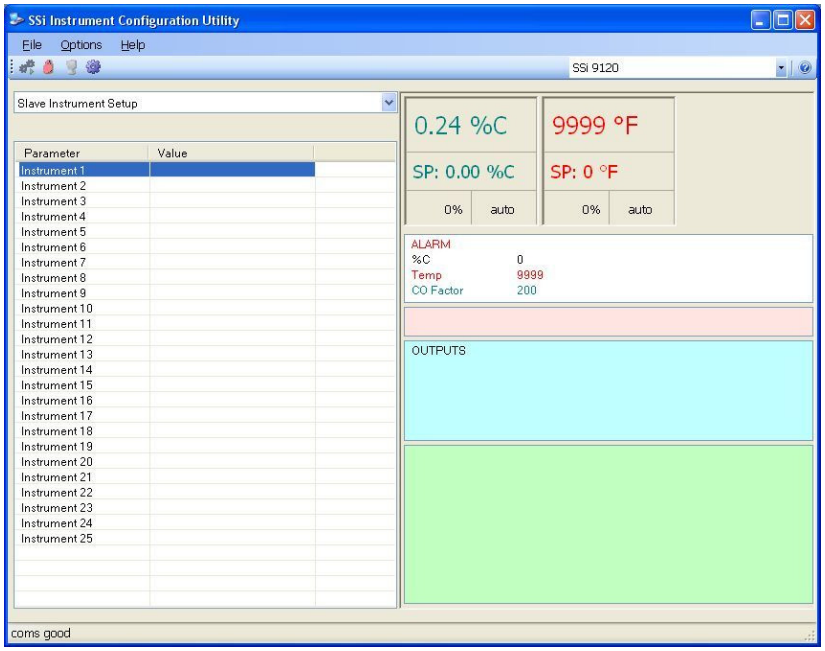
Communications Setup



Communications Setup is the communications definitions for the controller. Please contact Super Systems Inc. at 800-666-4330 for more information regarding port setup. It is *strongly recommended* that none of the settings be modified

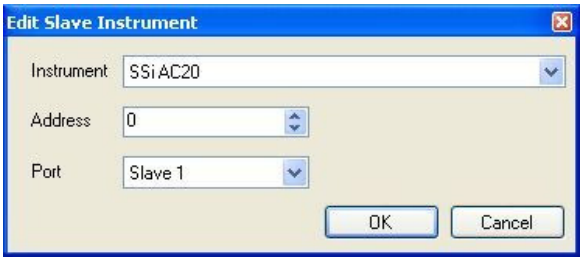
without technical support from Super Systems Inc. Clicking on any of the values will display an input box that will allow the user to modify the current settings.

Slave Instrument Setup



This menu option will allow the user to set up the slave instruments for the 9120.
** All devices on the same slave port must utilize the same protocol
** An address of zero (0) will disable the instrument**
Some controllers (AC20, for example) can provide dual functions (atmosphere and events) and must have the same address assigned for both.

Clicking on the "Value" field for any instrument will allow the user to select the slave instrument.



Instrument
This value will allow the user to select the slave instrument type.
The following is the list of instruments available as slave instruments:

SSi AC20	**Eurotherm 2500 (temp)**	**SSi Quad AO2**
Yokogawa 750 (atm)	**Unipro v3.5**	**SSi Quad AO3**
Honeywell UDC3300 (atm)	**Unipro v3.0**	**SSi Quad AO4**
Dualpro LP1 Modbus (atm)	**Carbpro v3.5 Slave (temp)**	**Yokogawa UT350**
Dualpro LP2 Modbus (atm)	**Carbpro v3.0 Slave (temp)**	**Yokogawa 750 Lp 2**
Dualpro LP1 MMI (atm)	**10Pro**	**Yokogawa UP350**
Dualpro LP2 MMI (atm)	**Dualpro IN C**	**Honeywell DCP551**
Eurotherm 2404 (atm)	**9200 LP1 (temp)**	**Ascon 08**
Eurotherm 2500 (atm)	**9200 LP2 (temp)**	**SSi AC E**
Cabpro v3.5 (atm)	**9200 LP3 (temp)**	**Yokogawa 750E**
Cabpro v3.0 (atm)	**9100 LP2**	**Mod Mux**
CarbPC	**Eurotherm 2704 LP1**	**Dualpro E Modbus**
9200 LP1 (atm)	**Eurotherm 2704 LP2**	**Dualpro E MMI**
IR Base	**Eurotherm 2704 LP3**	**Carbpro E v3.5**
MGA	**VC Base 1**	**Carbpro E v3.0**
SSi 7EK	**VC Base 2**	**Eurotherm 2500**
Yokogawa 750 (temp)	**VC Base 3**	**SSi 8-8**
Honeywell UDC3300 (temp)	**VC Base 4**	**SSi 9200 E**
Dualpro LP1 Modbus (temp)	**AIPC**	**Micrologix PLC**
Dualpro LP2 Modbus (temp)	**SSi 7SL**	**MCM Module**
Dualpro LP1 MMI (temp)	**AEC Flow Board**	**PLC5 DF1**
Dualpro LP2 MMI (temp)	**UMC800 LP1**	**SLC DF1**
Eurotherm 2404 (temp)	**SSi Quad AO1**	

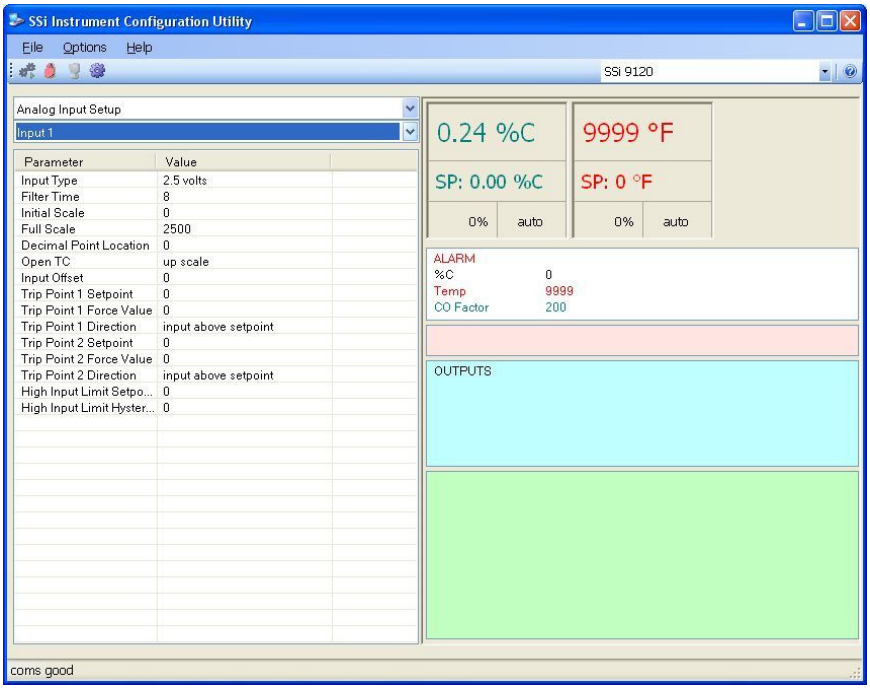
Address

This value allows the user to select the address that corresponds with the controller selected, with a range of **0** to **249**.

Port
Currently, the option for this field is **Slave 1**.
Slave 1 – terminals 5(-), 6(+)
Slave 2 – terminals 22(+), 23(-).

Analog Input Setup

The 9120 controller has two analog inputs. Each of the inputs comes with a factory default configuration dependent on the application (refer to PVT type under the *Furnace Setup* section). It can be modified prior to shipment to your facility or in the field by a technician or qualified/trained person with the proper security code.
Analog Input Terminals
Analog Input 1 – terminals 31 and 32
Analog Input 2 – terminals 29 and 30



Parameter Definitions
Input Type
The thermocouple type for most applications can be modified depending on your specific needs. Please note that in some applications, some of the inputs DO NOT allow the user to modify the Input type. *Note: Before changing the input type, make sure to set the appropriate jumpers, if necessary. The jumper will need to be manually changed on the input board before changing the input type to a 10:1 setting (non-thermocouple types).* To change the Input type, first select which input you want to change by selecting it in the pull-down menu just below the main menu list. Clicking on the Value will display an input box, and then you can use the pull-down menu to select the desired parameter. Once selected, click *OK* and the displayed Input type under Value will be the current type.

The following is a list of the options:

B	**S**	**12.5 volts**
C	**T**	**781.25mv**
E	**2.5 volts**	**195.3125 mV**
J	**1.25 volts**	
K	**78.125 mV**	
N	**19.53125 mV**	
NNM	**4-20 mA**	
R	**25 volts**	

Filter time
The filter time is a factory applied averaging tool used to help maintain steady control in high EMI environments. The filter time should not be adjusted with consulting SSI. Clicking on this value will display an input box from which the user can select a new value. The range is **0** to **32767**.

Initial Scale

This is the initial scale value. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Full scale
This is the full scale value. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Decimal Point Location
This is the decimal point location value. Clicking on this value will display an input box from which the user can select a new value. The range is **0** to **4**.

Open TC
This is the open TC value. Clicking on this value will toggle between **up scale**, and **down scale**.

Input Offset
The input offset value is algebraically added to the input value to adjust the input curve on read-out. *Note: The input offsets are unscaled*. The range is **–5000** to **5000**.

Trip Point 1 Setpoint
This is the trip point 1 setpoint value. The range is **–32768** to **32768**.

Trip Point 1 Force Value
This is the trip point 1 force value. The range is **–32768** to **32768**.

Trip Point 1 Direction
This is the trip point 1 direction. The options are: **input above setpoint** or **input below setpoint**.

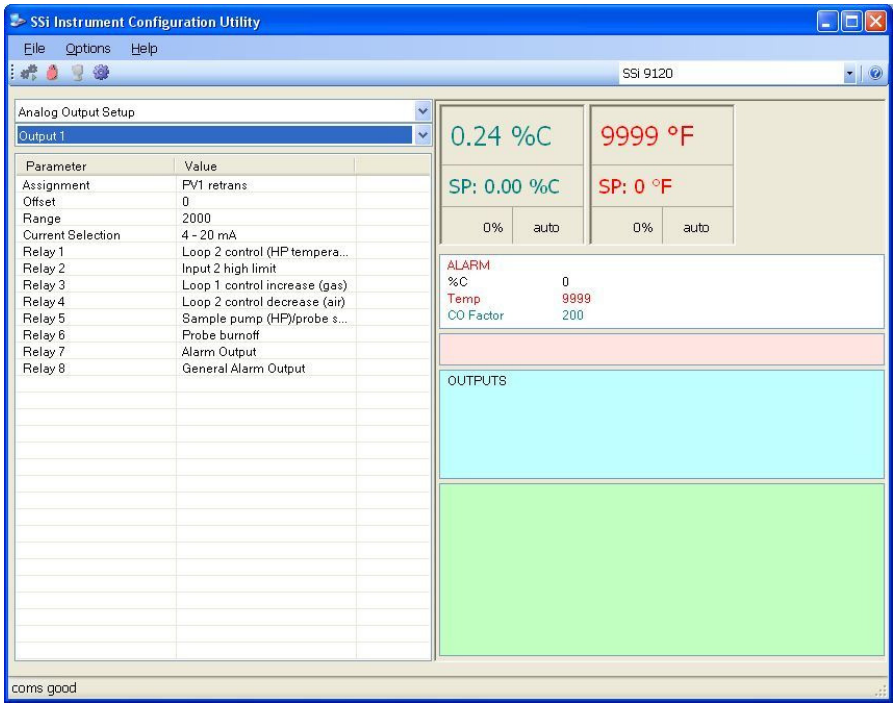
Trip Point 2 Setpoint
This is the trip point 2 setpoint value. The range is **–32768** to **32768**.

Trip Point 2 Force Value
This is the trip point 2 force value. The range is **–32768** to **32768**.

Trip Point 2 Direction
This is the trip point 2 direction. The options are: **input above setpoint** or **input below setpoint**.

High Input Limit Setpoint
This is the setpoint for the high input limit. The range for this can be **–32768** to **32768**.

High Input Limit Hysteresis
This is the hysteresis for the high input limit. The range for this can be **–32768** to **32768**.



Analog Output Setup

The 9120 controller has the option of

two analog outputs. The outputs are ranged for a 4 – 20 milliamp signal or a 0 – 20 milliamp signal. Each output comes with a factory default configuration dependent on the application. Each output can be modified prior to shipment to your facility or in the field by a supervisor.

Analog Output Terminals
Analog output 1 – terminals 24 and 25
Analog output 2 – terminals 25 and 26

Assignment
The analog output assignment can be modified depending on your system requirements. To change the Assignment first select which analog output you want to change by selecting it in the pull-down menu just below the main menu list. Clicking on this value will display an input box, and then you can use the pull-down menu to select the desired parameter. Once selected click **OK** and the displayed assignment under Value will be the current assignment type. The following is a list of the options:

PV 1 retrans	**Input 1 retrans**
Loop 1 inc	**Input 2 retrans**
Loop 1 dec	**Input 3 retrans**
Loop 1 combo	**PV1 retrans w/ expo range**
PV 2 retrans	**O2 offset log**
Loop 2 inc	**SP1 retrans**
Loop 2 dec	**SP2 retrans**
Loop 2 combo	**DP retrans**
Disassociation	
Nit_Pot	
Hydrogen	

Combo example for carbon – 4 – 12 mA Air
12 – 20 mA Gas

Offset
This is the starting point, the Process Variable value at which you get 4 milliamps. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**.

Range
This is a Process Variable value between 4 and 20 milliamps. Clicking on this value will display an input box from which the user can select a new value. The range is **–32768** to **32767**. *Note: The range, although not displayed with a decimal point, contains a decimal point that is dependent on the process variable selected. For example, If the offset is 20 mV for 4 mA, and you want 100 mV to be 20 mA, then your range should be 80. If the process variable is temperature, then the range will be 80, since temperature PVs do not have a decimal. If the PV is % Carbon, then the range will need to include the two decimal points for % Carbon. So, a range of 80 will be entered as 8000*. See below for more examples.

Current Selection
Provides the option of **4-20 mA** or **0-20 mA** control. Clicking on this value will display an input box with a drop-down list from which the user can select either of the two values listed above.

Offset and Range when assigned to a control loop
Inc -- 0 = 4mA, 100 = 20mA
Dec -- 0 = 4mA, -100 = 20mA

Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is Temperature
Offset = 800 (starting point)

Range = 400

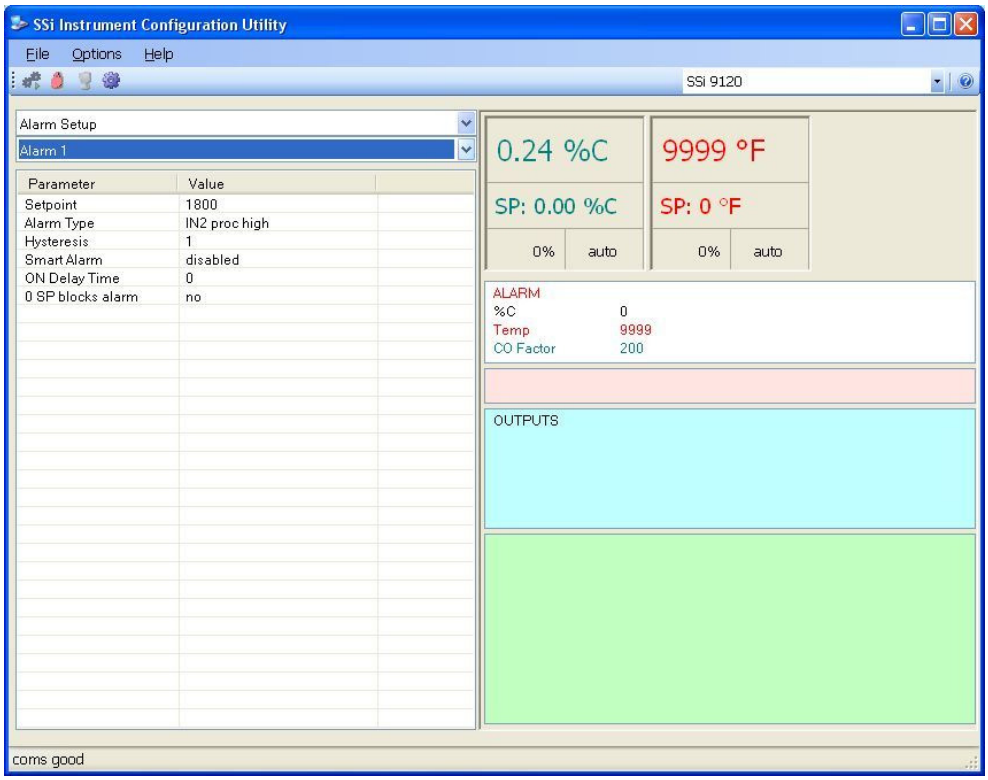
Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is O2
Offset = 800 (starting point)
Range = 4000 (400.0)

Example: if 4 – 20 mA = 800 mV - 1200 mV and PV is % Carbon
Offset = 800 (starting point)
Range = 40000 (400.00)

O2 Exponent Range
This menu option will allow the user to set the Oxygen exponent range. The range is **0** to **10**.

The 9120 controller has the option of using eight relay outputs. All of the relays have a positive common terminal and independent negative terminals. All of the relays are configured in a normally closed position except relay number eight, which has both a normally closed (NC) and a normally open (NO) terminal.
Note: Relay 1 through Relay 8 are display-only and cannot be modified from this screen.

Relay Output Terminals
Relay Output 1 – terminals 7 and 8
Relay Output 2 – terminals 7 and 9
Relay Output 3 – terminals 7 and 10
Relay Output 4 – terminals 7 and 11
Relay Output 5 – terminals 7 and 12
Relay Output 6 – terminals 7 and 13
Relay Output 7 – terminals 7 and 14
Relay Output 8 – terminals 7 and 15 NC
Relay Output 8 – terminals 7 and 16 NO



Alarm Setup

The 9120 controller can be configured to use three different alarms. Each of the alarms consists of an alarm setpoint, alarm type, alarm hysteresis, smart alarm, ON delay time, and a 0 SP blocks alarm value. The alarms come from the factory with a default configuration dependent on the application but also can be modified prior to shipment to your facility or in the field by a supervisor.

Setpoint
This value is the setpoint for the alarm. Clicking on this value will display an input box from which the user can select a new value. The range is from **–9999** to **9999**.

Alarm Type
This value is the type of alarms

used. Clicking on this value will display an input box with two (2) drop-down lists from which the user can select a new value.
The values in the first (top) list box are:

PV 1 Value
PV 2 Value
PV 3 Value
Input 1 Value
Input 2 Value
Input 3 Value
PO1 Value
PO2 Value
PO3 Value

The values in the second (bottom) list box are:

Process High
Process Low
Band, Normally Open
Band, Normally Closed
Deviation, Normally Open
Deviation, Normally Closed

Deviation alarm is single sided. i.e. a +10 deviation will alarm when the PV is greater than SP + 10 but not neg. A -10 deviation will alarm when the PV is less than SP -10 but not on the positive side.

When set to deviation, the alarm message shows in Configurator below or above. The actual relay setup with that alarm will only energize depending on the setpoint. For the standard alarms (1, 2, and 3), the user can select if the alarm condition is for above or below. This will dictate when the relay will energize.

Example: alarm 1 set to plus 10F will alarm 11 degrees above setpoint and pull in the relay. It will show alarm 10 degrees below but not pull in the relay.

A Band alarm will activate and energize the relay on both sides (+) and (-).
Note: some alarm types may be fixed at the current value.

Hysteresis
The hysteresis is in degrees, i.e. 10 hysteresis = 10 degrees.
Alarm hysteresis should not have a decimal place. It is in units. If it is a control loop doing on/off control then the decimal place on the reset (hysteresis) should be ignored. The Hysteresis is a set number that works with the alarm to help control a motor or pump longer to reach a set amount to come back into band before it will shut off motor or pump.

Example: Using quench oil as an example, assume the SP is 200F. The alarm is set as a deviation of +10F. At 210 the alarm is active and the pump will run to cool the oil. With a hysteresis of 8 degrees the alarm and pump will turn off at 202F. It will turn back on when it is 10 degrees above setpoint. If the setpoint is still 200 then at 210 it is on again. Clicking on this value will display an input box from which the user can select a new value. The range is from **0** to **9999**.

Smart Alarm
This value is a display of the Smart Alarm status. A smart alarm is an alarm that works with a Process Variable and when enabled it will not be active until the process variable is within band of the setpoint.

Example: If the SP is 1700 and the band is 10 degrees the alarm will not be active until the PV reaches 1690. The value can be either **disabled** or **enabled**.

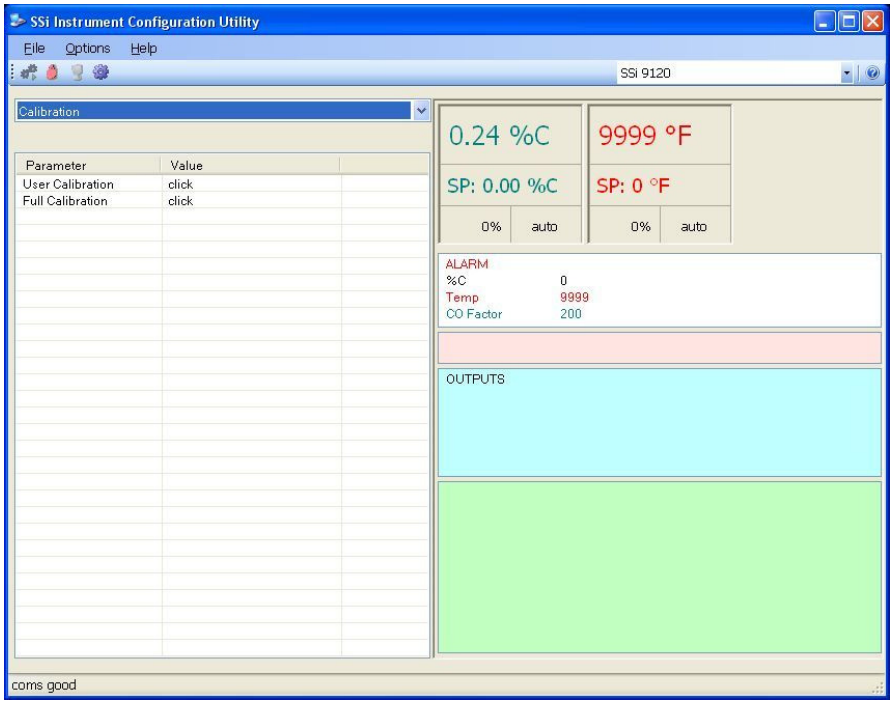
ON Delay Time

This value is the ON Delay Time for the Smart Alarm, in seconds. If the timer is utilized the alarm will not be active until in band and the timer has timed out (this is in seconds).

Example: If you select 30, the output will not energize until 30 seconds after the alarm is active.
Clicking on this value will display an input box from which the user can select a new value. The range is from **0** to **9999** seconds.

0 SP Blocks Alarm
This value will allow a 0 setpoint to block an alarm. The options are either **no** or **yes**.

Calibration



Overview

The series 9120 controller can be calibrated using the operator interface Configurator software, usually supplied with the system. Before performing this procedure on a newly installed controller, the unit needs to be powered on for at least thirty (30) minutes for a warm up period to allow the inputs/outputs to stabilize with the environment.
The series 9120 has two analog inputs. Each range has a zero and span calibration value. A cold junction trim value must be calibrated for thermocouple inputs. There are two analog outputs each with a zero and span value. When using the User Calibration procedure this will allow for the user to only calibrate the input ranges being used in the controller for which ever specific PVT is selected under furnace setup. The Full Calibration will calibrate all of the input ranges regardless of what is selected for PVT.

Equipment needed

A certified calibrator(s) with the ability to input and read millivolts, milliamps and thermocouples is required. The appropriate connection leads are also required. A 24VDC 75-watt power supply is required. The operator interface method requires a PC with the Configurator software loaded. An Ethernet crossover cable is required.

Calibration Procedure

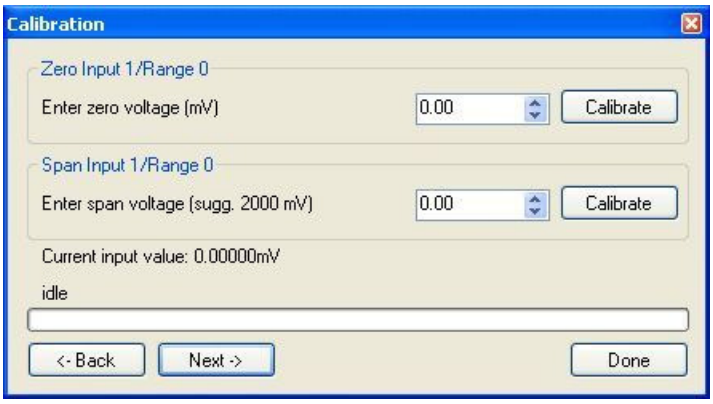
The calibration procedure for an input or output will be the same regardless of which operation is being performed.
Zero Input: Source a zero mV value to the terminals. Press the **Calibrate** button.
Span Input: Source a specific mV value to the terminals and enter the value in the box. Press the **Calibrate** button.
Zero Output: Press the **Prep for Zero** button, which will set the output to 0%. Measure the current at the terminals and output the measured value. Enter the value in the box. Press the **Calibrate** button.
Span Output: Press the **Prep for Span** button, which will set the output to 100%. Measure the current at the terminals and output the measured value. Enter the value in the box. Press the **Calibrate** button.

User Calibration

Cold Junction Offset

Note: The cold junction offset should be performed after the inputs/outputs have been calibrated.
If adjusting the input by a preset amount for all temperature points, calibrate the cold junction by entering a new value - positive or negative – that would be the difference of the value indicated. Wait 120 seconds and verify with a source calibration device with the correct T/C type. In the "Calibrate Cold Junction" section, enter the temperature of the terminals and click on the **Calibrate** button. This will calibrate the cold junction value.

Zero/Span Input 1 / Range 0



Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 / Range 3

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. Press the **Done** button to close the calibration screen down.

Zero/Span Input 3 / Range 3

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. Press the **Done** button to close the calibration screen down.

Zero/Span Output 1

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. Press the **Done** button to close the calibration screen down.

Zero/Span Output 2

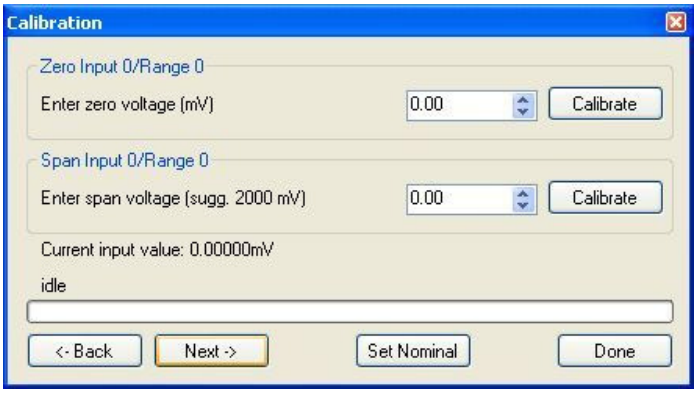
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. Press the **Done** button to close the calibration screen down.

Full Calibration

Cold Junction Offset

Note: The cold junction offset should be performed after the inputs/outputs have been calibrated.
Note: These steps should only be performed if the User Calibration procedure did not calibrate the inputs and outputs.
If adjusting the input by a preset amount for all temperature points, calibrate the cold junction by entering a new value - positive or negative – that would be the difference of the value indicated. Wait 120 seconds and verify with a source calibration device with the correct T/C type. In the "Calibrate Cold Junction" section, enter the temperature of the terminals and click on the **Calibrate** button. This will calibrate the cold junction value. The **Set Nominal** button will set nominal values for the cold junction value.

Zero/Span Input 0 / Range 0



Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 0 / Range 1

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 0 / Range 2

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 0 / Range 3

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 1 / Range 0

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 1 / Range 1

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the

previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 1 / Range 2
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 1 / Range 3
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 / Range 0
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 / Range 1
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 / Range 2
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 / Range 3
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 1 Range Jumper
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 2 Range Jumper
Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Input 3 Range Jumper

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Output 1

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Zero/Span Output 2

Note: The inputs should be zeroed and spanned before adjusting the cold junction offset. Perform the *Calibration Procedure* (listed above) to calibrate the zero and span value for the input. Press the **Back** button to return to the previous screen or press the **Next** button to view the next screen. The **Set Nominal** button will set nominal values for the inputs. Press the **Done** button to close the calibration screen down.

Appendix 1 – Standard Configurations for PVT Types

PVT Type	**Standard Configuration**
% Carbon	Input 1 is sensor millivolts, and is set to 2.5 volts (fixed) Input 2 is HP/sensor temperature and will only allow TC types Input 3 is universal and is set to control loop 2 Control loop 1 PV is %C calculated from inputs 1 and 2 Control loop 2 PV is temperature from input 2 *Note: All of these values can be viewed from the* Furnace Setup *menu option*
Dew Point	Input 1 is sensor millivolts, and is set to 2.5 volts (fixed) Input 2 is HP/sensor temperature and will only allow TC types Input 3 is universal and is set to control loop 2 Control loop 1 PV is Dew Point calculated from inputs 1 and 2 Control loop 2 PV is temperature from input 2 *Note: All of these values can be viewed from the* Furnace Setup *menu option*
% Oxygen	Input 1 is sensor millivolts, and is set to 1.25 volts (fixed) Input 2 is HP/sensor temperature and will only allow TC types Input 3 is universal and is set to control loop 2 Control loop 1 PV is %O2 calculated from inputs 1 and 2 Control loop 2 PV is temperature from input 2 *Note: All of these values can be viewed from the* Furnace Setup *menu option*
Millivolts	Input 1 is sensor millivolts, and is set to 2.5 volts (fixed) Input 2 is HP/sensor temperature and will only allow TC types Input 3 is universal and is set to control loop 2 Control loop 1 PV is millivolts from input 1 Control loop 2 PV is temperature from input 2 *Note: All of these values can be viewed from the* Furnace Setup *menu option*
Probe Redundancy	Input 1 is probe #1 millivolts, and is set to 2.5 volts (fixed) Input 2 is probe #2 millivolts, and is set to 2.5 volts (fixed) Input 3 is universal and is set to control loop 1 Control loop 1 PV is universal from input 3 *Note: All of these values can be viewed from the* Furnace Setup *menu option*
Simple Nitrider	Input 1 is not used Input 2 is not used Input 3 is not used No control loops Analog output 1 is H2 0 – 100% Analog output 2 is DA 0 – 100% *Note: All of these values can be viewed from the* Furnace Setup *menu option*
Dual Loop	Input 1 is universal and assigned to control loop 1 Input 2 is universal and assigned to control loop 2 Input 3 is universal and is not used Control loop 1 PV is millivolts from input 1 Control loop 2 PV is temperature from input 2 *Note: All of these values can be viewed from the* Furnace Setup *menu option*

Outputs
Analog output 1 defaults as Loop 1 PV retrans except when PVT = Simple Nitrider (output 1 is H2 0 – 100%)
Analog output 2 defaults as Loop 1 control except when PVT = Simple Nitrider (output 2 is DA 0 – 100%)
Relay 1 is always loop 2 control (HP temperature)
Relay 2 is always input 2 high limit
Relay 3 is loop 1 control increase (gas) except when PVT = %Oxygen (Relay 3 is loop 1 control decrease)
Relay 4 is loop 2 control decrease (air) except when PVT = %Oxygen (Relay 4 is loop 2 control increase)
Relay 5 is always sample pump for HP except when PVT = Probe Redundancy (Relay 5 is probe select)
Relay 6 is always probe burnoff
Relay 7 is selectable alarm output (any combination)
Relay 8 is always general alarm output (any alarm)

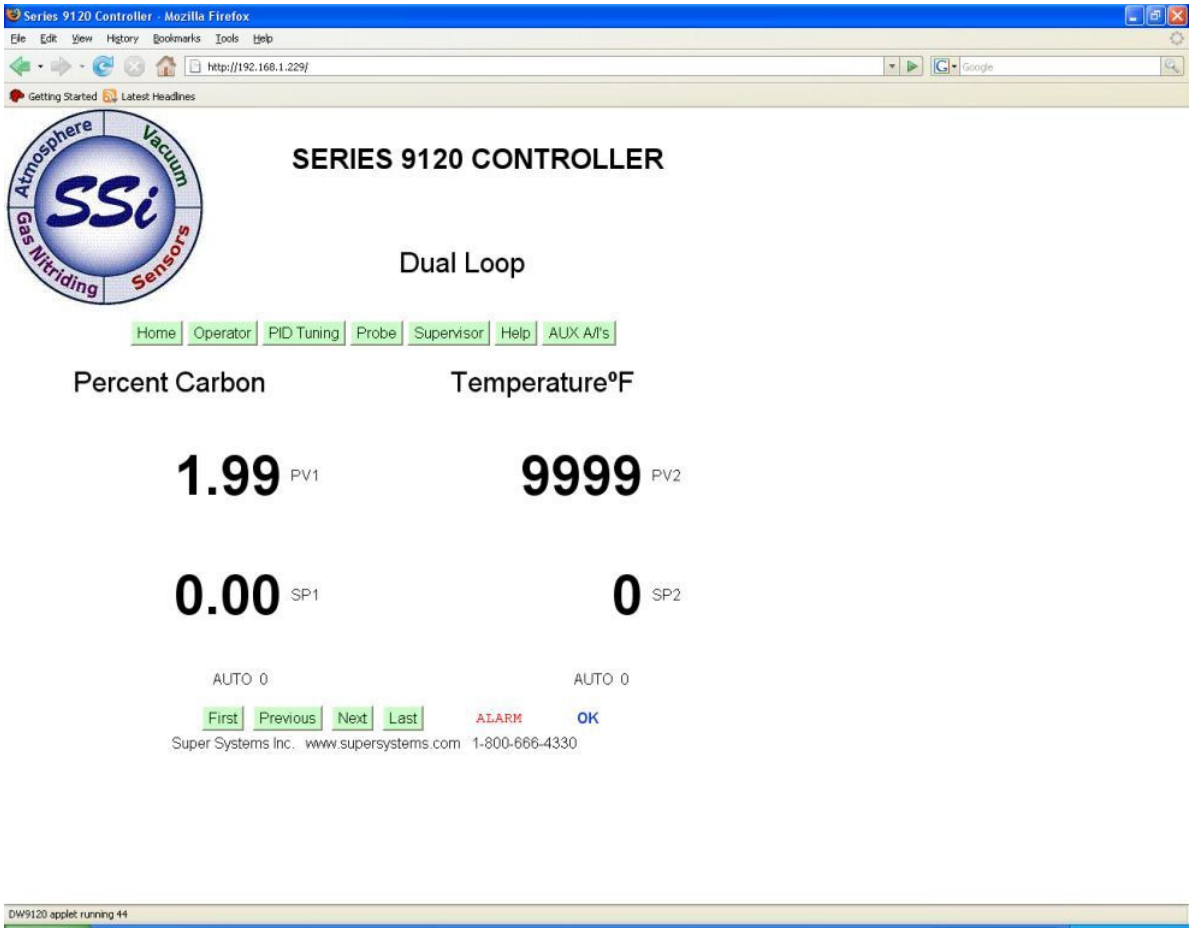
Alarms
Alarm 1 is always process high on input 2
Alarm 2 is fully assignable
Alarm 3 is fully assignable

Digital Inputs (Event Inputs)
Digital Input 1 (event In 0) selects probe 1 when PVT = Probe Redundancy only
Digital Input 2 (event In 2) selects probe 2 when PVT = Probe Redundancy only
Digital Input 3 (event In 2) inhibits sample pump for HP only
Digital Input 4 (event In 3) starts probe burnoff when PVT = % Carbon, Dew Point, % Oxygen, or Millivolts

*Note: Probe burnoff is available only for PVT types: **% Carbon**, **Dew Point**, **% Oxygen**, and **Millivolts**. No impedance test.*

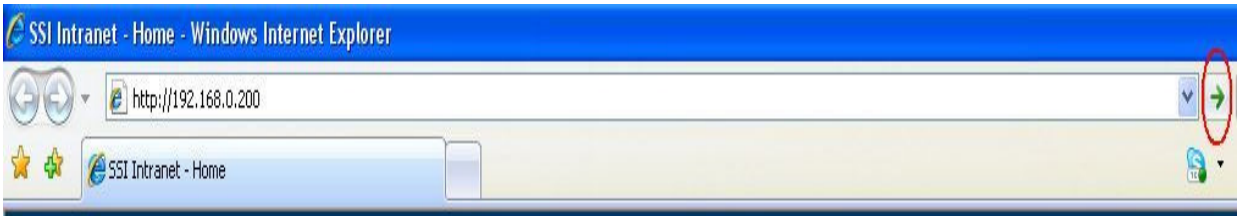
*Note: Dew Point is calculated only for PVT types: **% Carbon**, **Dew Point**, **% Oxygen**, and **Millivolts**.*

Appendix 2 – Accessing the SSi 9120 Web Page



Each SSi 9120 comes equipped with a small webpage that can be accessed over a company's network, or through a local computer hooked up to the 9120 with a crossover cable. To access the web page, enter the IP address of the SSi 9120 instrument into the address bar of any Internet browser. *Note: Viewing the web page requires the Java platform to be installed on the local computer. Also, some security settings in Internet Explorer 7 may cause the website to not be displayed, even if Java is installed*. Contact your company's IT department for more information on downloading Java onto a local computer, and the required Internet Explorer 7 settings.

Once the IP address of the instrument is entered, press the **Enter** button on the keyboard, or press the "Go" button next to the address bar. The user can navigate through the web page by using the buttons along the top of the screen, or the buttons along the bottom of the screen. The first page shown is the *Home* page. This page will display the two process variables and the two setpoints. This page is mainly a display-only page. The next page is the *Operator* page. This page will allow the user send down a setpoint (Setpoint 1 or Setpoint 2) for either loop as well as set the loops to auto or manual(Auto/Man 1 or Auto/Man 2). If the loops are in manual mode, the user will also be able to set the control percentage as well (Output PWR 1 and Output PWR 2). The **Set Value** button will set the setpoints and manual control percentages. *Note: The user will need to be logged in as a*



supervisor or administrator to make any changes. The supervisor and administrator passwords can be changed from Configurator's *Furnace Setup* menu option (supervisor = web level 1 code; administrator = web level 2 code). The next page is the *PID Tuning* page. This page is similar in function to the *Operator* page, but it will entail more information. Also, the user will need to be logged in as an administrator (web level 2 code from Configurator *Furnace Setup* menu) to make any changes. From this screen, the user can change the following for each loop: Setpoint, manual control percentage, Proportional Band (P), Reset (I), Rate (D), Cycle time, Integral preset, High limit, and low limit. The next page is the *Probe* page. This screen will allow the user to view the probe burnoff settings and progress, if a burnoff or impedance test is in progress. The user will also be able to start a burnoff or impedance test from this page. *Note: The user will need to be logged in as an administrator (web level 2 code from Configurator* Furnace Setup *menu) to make any changes*. The next page is the *Supervisor* page. This page is similar to the PID Tuning page, but it will allow the user to make even more changes to the instrument. *Note: The user will need to be logged in as an administrator (web level 2 code from Configurator* Furnace Setup *menu) to make any changes*. From this screen, the user can change the following for each loop: Setpoint, manual control percentage, CO Factor, Proportional Band (P), Reset (I), Rate (D), Cycle time, Integral preset, High limit, low limit, alarm setpoint, alarm hysteresis, Burnoff interval, burnoff time, burnoff recovery time, burnoff minimum mV, and burnoff maximum TC. This page will also display information about the two loops, alarm information, and input information. The next page is the *Help* page. This page displays some general help topics that should help the user to navigate and use the web page. The last page is the *AUX A/I* page. This page will display any auxiliary analog inputs, if any.

Revision History

Rev	Description	Date	MCO #
-	Initial Release	6/23/2008	N/A
A	Updated "Analog Output Setup" section; Added minimum temp pump run in "Furnace Setup" section	8/18/2008	2065