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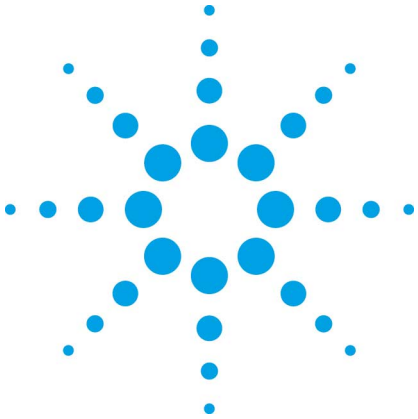
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Agilent SS420x Interface

User's Guide

Agilent Technologies

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1 Using This Guide

Introduction

The SS420x is an intelligent instrument interface box designed to collect analog data, and input and output digital signals. The SS420x attaches to the controlling computer via a standard RS-232C serial interface. It contains the circuitry of the SS420 interface card, along with an additional CPU, one megabyte of RAM for long-term collection of chromatography data and the ability to retain all the settings required by the SS420.

The SS420x provides a seamless interface to the controlling computer that is independent of any specific hardware architecture; e.g., it doesn't require a PC slot or the associated interrupt and I/O address settings. Additionally, by placing these capabilities outside of the PC, the SS420x off-loads the processor power required by the original SS420 card and provides the capability of retaining data and controlling chromatography equipment, regardless of the state of the controlling computer.

Who Should Read This Guide?

This document is designed for the system administrator who will install the SS420x interface..

Documentation Conventions

The following conventions are used in this guide.

Convention	Description
Bold	Database names, table names, column names, menus, commands, dialog box options, and text that must be typed exactly as shown.
Italic	Placeholders for information you must provide. For example, if you are instructed to type *ServerName*,

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	then you must type the actual name of the server instead of the italicized term.
`Monospace`	Programming code samples and display text.
ALL CAPITALS	The keys you press on the keyboard. If combined with a plus sign (+), press and hold the first key while you press the remaining key(s). For example, press SHIFT+TAB.

The following notes may appear in this guide.

 **Caution!**	A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.
 **Note**	Notes contain special information and alert you to effects of an action.
 **Tip**	Tips provide additional information or an alternate method for completing a task.

2 Hardware Overview

The SS420x contains the following hardware features.

CPU – An Intel 80C188EB micro-controller interfaces to the SS420 circuitry, the 4 trigger inputs, the 8 contact closures and the 12 BCD inputs (not currently supported). It archives the

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ADC data obtained from the SS420 circuitry and passes that data back to the PC via the serial interface.

SS420 Circuitry – The SS420x circuitry provides an Intel 8752 micro-controller with 4 associated ADC's.

Battery – The battery provides backup power to the SRAM.

SRAM – The SRAM (Static RAM) provides 1 MB of memory for the 80C188EB CPU (which is used for long-term storage of the ADC samples).

SEEPROM – The SEEPROM (Serial EEPROM) provides 512 by 16 bits of memory of non-volatile storage, which is used, for version, calibration and baud rate data.

FLASH – The 256 KB Flash memory provides non-volatile storage for the 80C188EB firmware.

LED Indicators – The red LED provides the SS420x power status. The four green LED's provides feedback about the SS420x power-up status, error conditions, and data collection cycles.

Analog Inputs – The 4 analog inputs provide input into the SS420 circuitry, which the Analog to Digital converter's (ADC) convert into 24-bit digital data for each of the four channels. The 8752 micro-controller reads the ADC data and stores that data in a 32-byte queue.

Trigger Inputs – The 4 trigger lines provide start inputs to trigger analog data collection.

Contact Closures – The 8 contact closures provide the capability of controlling external devices.

Serial Input – The serial input provides an RS-232C interface to any controlling computer at various baud rates. The SS420x has an additional RS-232C interface port that is currently not used.

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3 Specifications

Dynamic Range: >1,000,000 : 1
Input Signal Range: -5 to +11 Volt
Maximum Input Voltage Without Damage: Continuous: +30V (power off); +45V (power on); Pulsed, <1 ms & <10% duty cycle: +100V
Common Mode Rejection Ratio: 1V range: 96dB min., 10V range: 75dB min.
Normal Mode Rejection Ratio at Line Frequency +2% or Nominal: 100dB min.,
Monotonicity: 20 bits
Zero Drift: 1V range: <2µV/°C, 10V range: <10mV/°C
Full Scale Drift: 0.002%/°C max.
Noise: 2µV RMS, 0.1 to 10 Hz bandwidth
Channel-to-Channel Crosstalk: <1µV
Channels: Simultaneous asynchronous acquisition from up to four analog channels.
Digital Outputs: Four digital trigger inputs to accept a contact closure or TTL-compatible low logic signal.
Dimensions: 4.75" (121 mm) H x 9" (229 mm) L x 2.75" (70 mm) W
Data Acquisition Rates: from 0.1 Hz to 120 Hz depending on the base freq. used.
Input Signal Ranges: 0-1 Volt, 1-10 Volt per channel.
Typical Data Buffer Protection: 100 minutes per channel, at 10Hz acquisition speed.
Environmental: Operating temperature: 0oC to 40oC (32oF to 104oF) Nonoperating temperature: -10oC to 60oC (-14oF to 140oF) Humidity: 0% to 90%
Power Supply: External auto-switching power adapter Input: AC 90V-240VAC, 47Hz~63Hz Output: DC 9VDC

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4 Data Collection

The SS420x archives the 24-bit ADC data into four separate long-term buffers for each of its analog channels. Each channel can retain up-to 102 minutes worth of sample data per channel at a sampling rate of 10 Hz. The buffer for each channel is only cleared before starting a new collection.

The LED's provide information related to the acquisition of data by each channel. Each LED is associated with a channel. If channel one is waiting for a trigger then LED one will be blinking at a rate of approximately 5 Hz. If channel two is acquiring data then LED two will be blinking at a rate of approximately 0.5 Hz. If channel three is inactive, then LED three will be OFF. This provides the user with a visual feedback of the SS420x data acquisition sequence channel-by-channel.

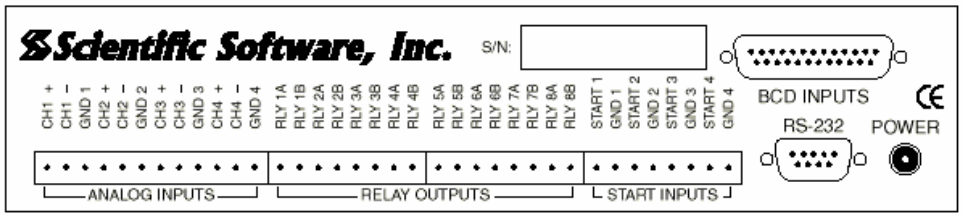
5 SS420x Installation

Connect the SS420x interface to the controlling computer or Agilent Instrument Controller (AIC) using the serial communications cable provided. Connect one end of the cable to the serial port on the back of the SS420x. Connect the other end of the cable to the appropriate serial (Com) port on the AIC, e.g. Com 1. Make sure each connector is tightened fastened. Each installed SS420x (up to 4) needs a separate Com port.

Plug the SS420x power supply into a 120V electrical outlet. Connect the power cord from the power supply into the receptacle on the rear of the SS420x.

The red power LED should light. The four (4) green channel indicator LED's will sequentially light up during the power-up test. When the test is complete, the green LED's will go off and the interface is ready to use. If this sequence does not successfully complete, the SS420x must be powered off and then on again.

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Analog Interface Connector

A twelve-pin snap lock modular connector (AKZ-950-STL12W) provides the analog interface connection. The connector is labeled on the back panel as 'Analog Inputs'. Each pin of the connector is labeled according to the pin's function:

ANALOG INPUTS (J1)

1	**CH1+**
2	**CH1-**
3	**GND1**
4	**CH2+**
5	**CH2-**
6	**GND2**
7	**CH3+**
8	**CH3-**
9	**GND3**
10	**CH4+**
11	**CH4-**
12	**GND4**

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Relay Interface Connector

Two eight-pin snap lock modular connectors (AKZ-950-STL8W) provide the relay interface connection. The connectors are labeled on the back panel as 'Relay Outputs'.



Caution!

The solid-state relays (SSRs) in the SS420x are rated for a maximum of 110mA, and safety considerations limit the maximum switching voltage to 40VDC or 28VRMS AC. The SS420x inputs can detect switch closures or can be driven by TTL compatible logic. The output switches are open collector switches.

Each pin of each connector is labeled according to the pin's function:

RELAY OUTPUTS (J2)

1	RLY1A
2	RLY1B
3	RLY2A
4	RLY2B
5	RLY3A
6	RLY3B
7	RLY4A
8	RLY4B

RELAY OUTPUTS (J3)

1	RLY5A
2	RLY5B
3	RLY6A

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4 RLY6B

5 RLY7A

6 RLY7B

7 RLY8A

8 RLY8B

Trigger/Start Interface Connector

An eight-pin snap lock modular connector (AKZ-950-STL8W) provides the trigger interface connection. The connector is labeled on the back-panel as 'START INPUTS'.



Caution!

The solid-state relays (SSRs) in the SS420x are rated for a maximum of 110mA, and safety considerations limit the maximum switching voltage to 40VDC or 28VRMS AC. The SS420x inputs can detect switch closures or can be driven by TTL compatible logic. The output switches are open collector switches.

Each pin of the connector is labeled according to the pin's function:

START INPUTS (J4)

1 START1

2 GND1

3 START2

4 GND2

5 START3

6 GND3

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7 START4

8 GND4

Serial RS-232 Interface Connector

There is one external RS-232 Serial interface provided by the SS420x via a DB-9S:

RS-232 (J5)

1 NC

2 Transmit

3 Receive

4 NC

5 Signal Ground

6 NC

7 NC

8 NC

9 NC

XX Chassis GND

The SS420x requires the chassis ground be provided from the controlling computer or AIC via the serial interface cable. Furthermore, the computer or AIC is required to supply that ground from the AC ground plug.

Box Power Interface Connector

There is one 2.5mm Power Jack interface connector (PJ-102B):

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POWER (J6)

1	**9 Volts**
2	**Ground**

BCD Inputs Connector

There is one external BCD input interface. This interface is currently not supported.

Transmission Speed vs Distance

Since the SS420x communicates with the AIC by RS-232, it is recommended that the cables used observe the EIA standards for RS-232. Below is a table outlining transmission speed and length of cable between the SS420x and computer or AIC. Cable lengths greater than those listed may be used but may result in a loss of communication.

Baud Rate (bits per second)	Distance	
	Feet	Meters
56000	8.6	2.6
38400	12	3.7
19200	25	7.6
9600	50	15

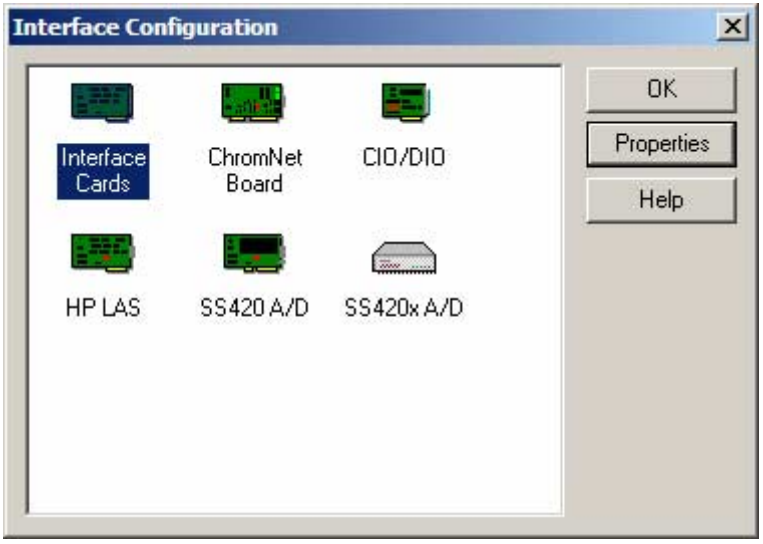
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6 Configuration for EZChrom *Elite*

In order to use an SS420x for data acquisition, you must complete the configuration steps shown below. First, configure the board using the **Tools/Interface Configuration...** command from the Main menu. Then, for each instrument using the SS420x for acquisition, you must configure the detector for using the SS420x interface, as described in the following sections.

SS420x Interface Configuration

From the Main menu, click **Tools/Interface Configuration...**. A dialog will appear with available interfaces shown.

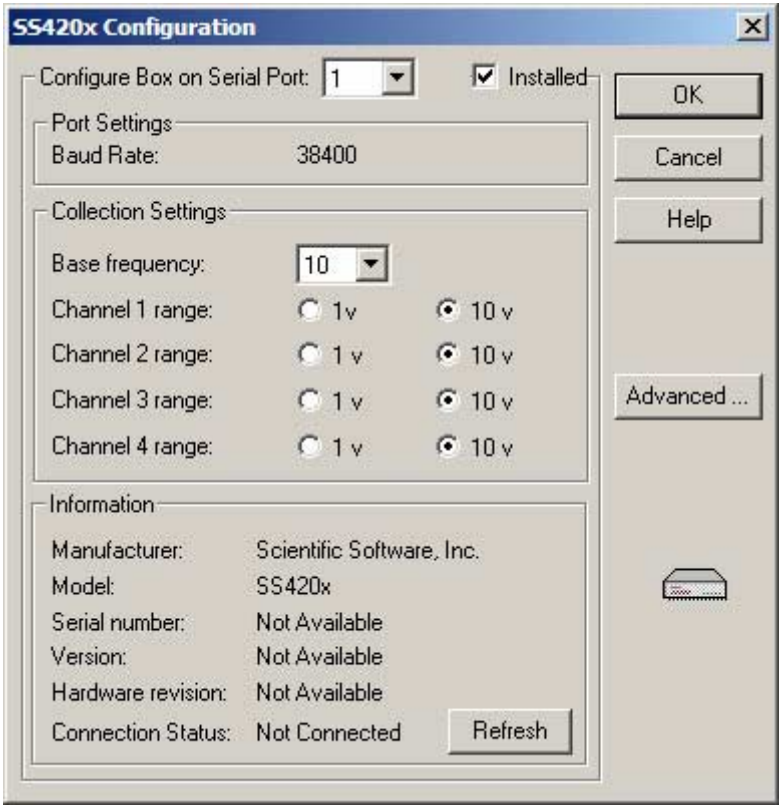


Click on the SS420x icon, then click **Properties**.

SS420x Configuration

From the SS420x configuration dialog, select the Serial port to which the SS420x is connected and then check the **Installed** box to enable the configuration of the interface. Then proceed to select the appropriate settings for the interface.

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Baud Rate

The communication baud rate is displayed here. To change the baud rate, click the **Advanced** button.

Base Frequency

Select the base frequency. The default setting for the SS420x is 10 Hz, which gives optimal signal to noise, and can be used in countries using either 50Hz or 60Hz. The base frequencies available will depend on the baud rate chosen. If the baud rate is less than 38400bps, the base frequencies 100 and 120 will not be available. If you choose a higher base frequency, you must select a base frequency which can be evenly divided into your line frequency (i.e. 30 for 60Hz countries and 25 for 50Hz countries).

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If selected incorrectly, you may see line frequency noise on your chromatogram. For best performance, select a base frequency close to the maximum sampling frequency you will be using to acquire data.

Sampling frequencies available in the Acquisition Setup portion of the method will reflect the Base Frequency selected.

Range

For each channel used, select the button next to the signal range for the detector connected to that channel.

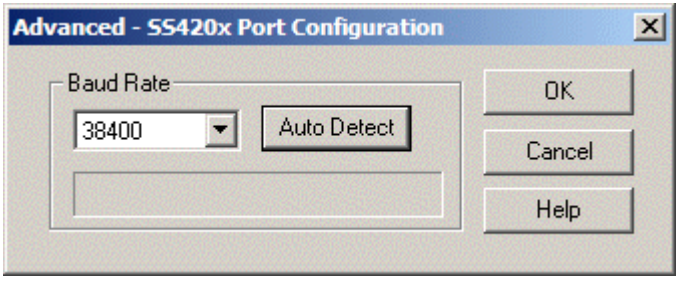
Information

This area is for information only. It contains manufacturing information about the interface box that may be required in service situations. If the box is not recognized, the "Connection Status" field will display "Not Connected". To update this information, click the **Refresh** button.

When the dialog is completed, click OK.

SS420x Advanced Port Configuration

The **Advanced** button enables you to set the baud rate for the SS420x interface. Click the **Auto Detect** button to determine the current baud rate setting.

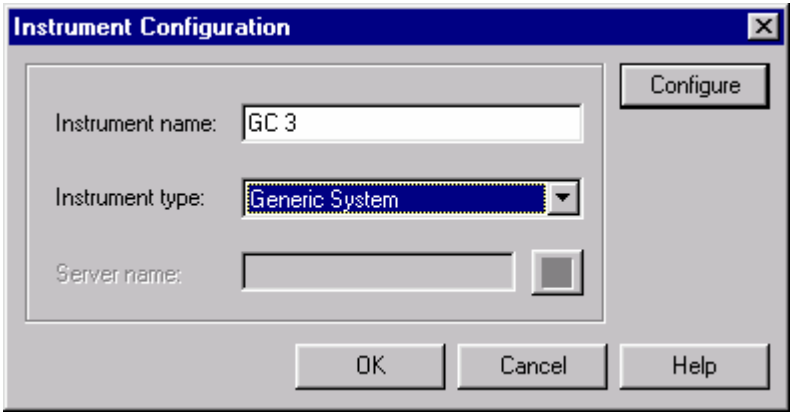


SS420x Acquisition Configuration

Each instrument using the SS420x for acquisition must be configured to use the interface. This is done when configuring

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the instrument and its detectors. To start the configuration of an instrument, do a right mouse click on the instrument from the Main menu, and select **Configure.** The Instrument Configuration dialog will appear.

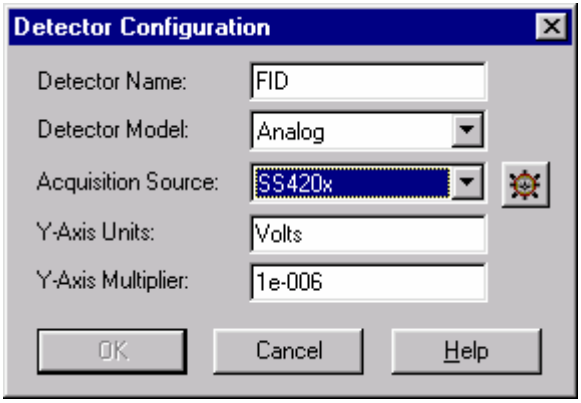


Instruments using SS420x for acquisition may be configured as any available instrument type. If instrument type other than Generic is selected, the detector model must be set to **analog**, with **acquisition source** set to SS420x. When this is selected, click **Configure** to continue.

SS420x Detector Configuration

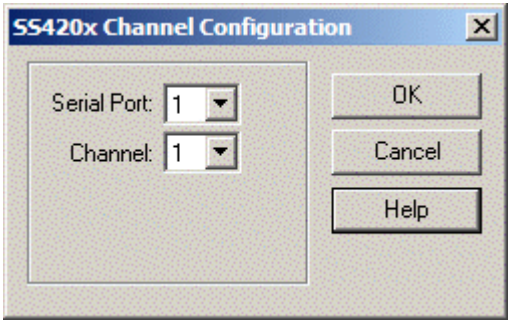
To configure a detector to use SS420x for acquisition, select **SS420x** for **Acquisition Source**. Then click the  button next to the selection to do the Channel Configuration.

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SS420x Channel Configuration

For the detector selected, set the correct Serial Port, and Channel to be used. These should match the way your detector is physically connected to the SS420x interface.

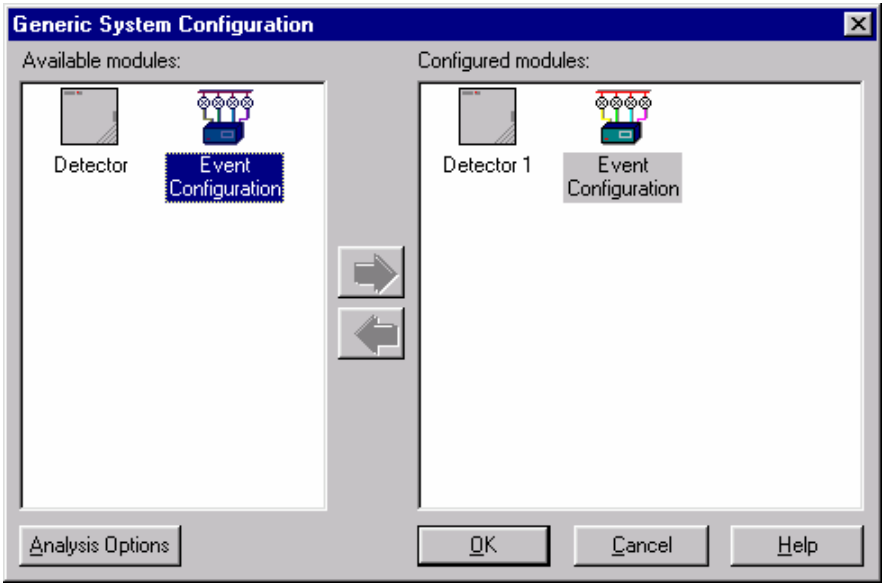


When you have finished this dialog, click OK.

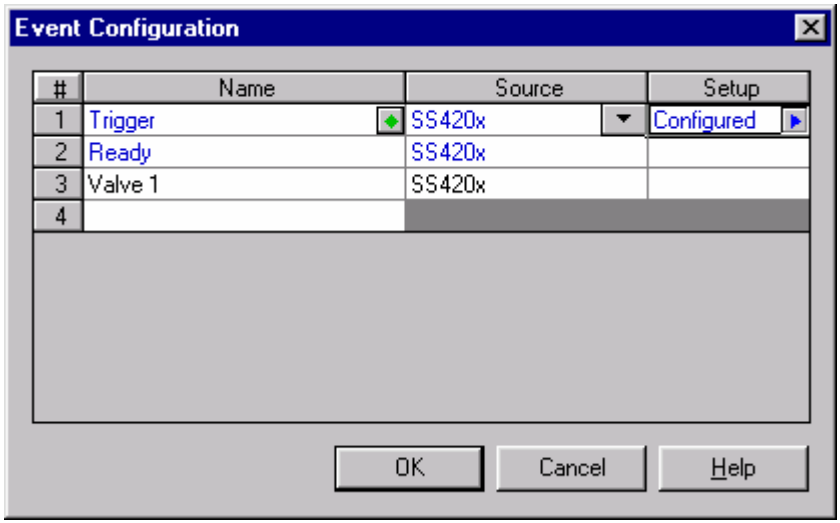
SS420x Event Configuration

If you plan to use event control from the SS420x, you must configure it for each instrument using the SS420x. From the generic system configuration box, make sure the Event Configuration icon is shown in the Configured Modules area. (If not, double-click on the icon to move it over to the Configured Modules area.)

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To start the event configuration, double click on the Event Configuration icon in the Configured modules area.

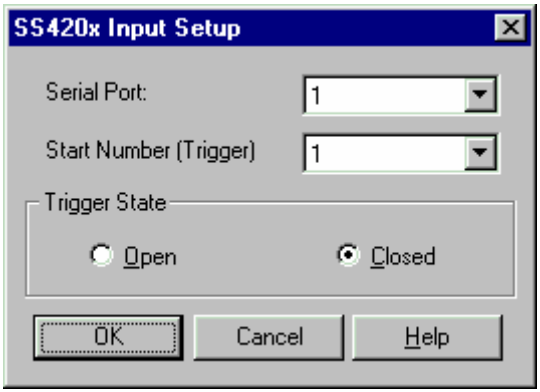


The following events can be configured for control by the SS420x. If an event type is not configured, it will not be available for programming in the method.

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SS420x Trigger Configuration

Select **Trigger** in the Name column. Select SS420x for **Source**. Then click **Setup**. The following dialog will appear.



Select the correct Serial Port, trigger number, and initial trigger state for this trigger. Note: If multiple SS420x boxes being controlled from the same instrument (each box is on its own serial port), and external triggering is desired, each box must have its own trigger configured. When completed, click OK.

SS420x Ready Configuration

To configure a Ready signal, select **Ready** for Name, set SS420x for the Source, and then click **Setup**. The following dialog will appear.

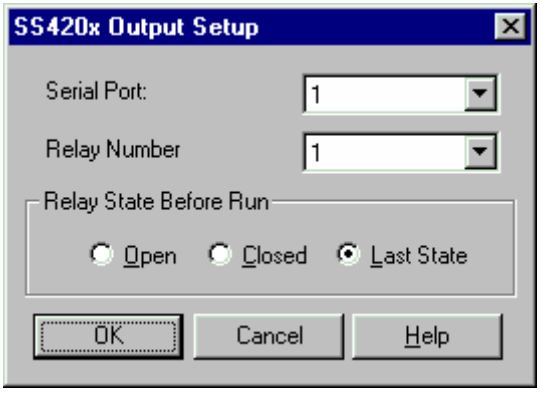


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Select the Serial Port and the relay to be used for the Ready. These should match the physical connections on the SS420x interface for this ready line. Then select the state of the relay when it is in the ready position.

SS420x Valve/External Event Configuration

To configure a Valve or other external event to control from the SS420x, enter a descriptive name in the Name field and set SS420x for the Source. Then click **Setup** and the following dialog will appear.



Select the Serial Port and the Relay to be used for the valve/event control. Then select the Idle State (State of the relay before the run) to be set when it is not in use. Click OK when finished.

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7 Configuration for OpenLAB

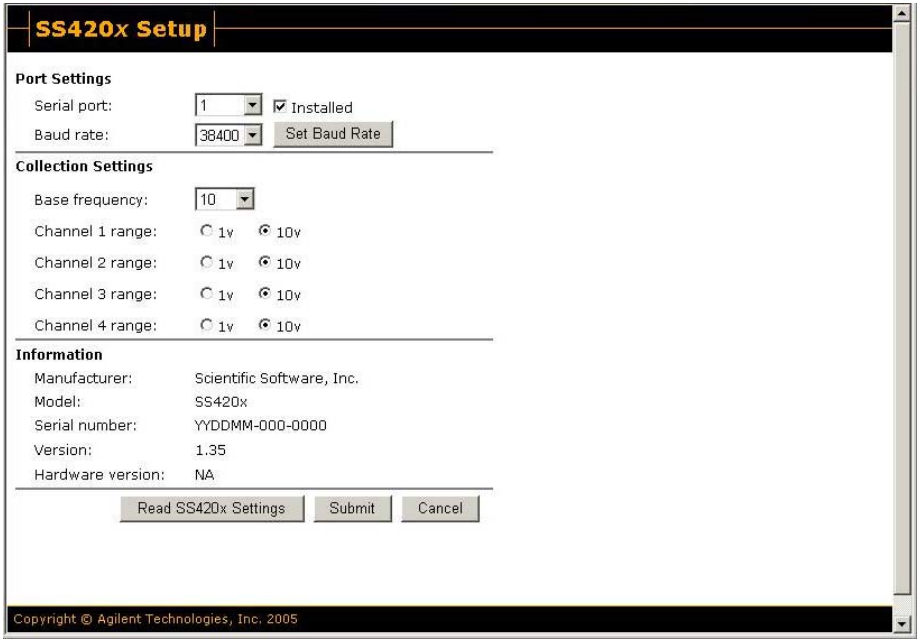
If you will be using an SS420x attached to the Agilent Instrument Controller (required for analog acquisition), it will need to be configured using the OpenLAB software, as described below.

1. From OpenLAB, select the **Administration** tab and then click **Global Administration** followed by **Agilent Instrument Controller Network Appliance**.
2. Double-click the name of the Agilent Instrument Controller where the SS420x is connected and then select the **Hardware** tab.
3. Locate SS420x under **Boards** and then click **Configure**.
4. From the SS420x configuration dialog, select the Serial port to which the SS420x is connected and then check the Installed box to enable the configuration of the interface. Then proceed to select the appropriate settings for the interface.

SS420x Interface Configuration

From the SS420x configuration dialog, select the Serial port to which the SS420x is connected and then check the **Installed** box to enable the configuration of the interface. Then proceed to select the appropriate settings for the interface.

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Baud Rate

Select the communication baud rate you wish to use. To send the updated baud rate to the SS420x, click the **Set Baud Rate** button.

Base Frequency

Select the base frequency. The default setting for the SS420x is 10 Hz, which gives optimal signal to noise, and can be used in countries using either 50Hz or 60Hz. The base frequencies available will depend on the baud rate chosen. If the baud rate is less than 38400bps, the base frequencies 100 and 120 will not be available. If you choose a higher base frequency, you must select a base frequency that can be evenly divided into your line frequency (i.e. 30 for 60Hz countries and 25 for 50Hz countries). If selected incorrectly, you may see line frequency noise on your chromatogram. For best performance, select a base frequency close to the maximum sampling frequency you will be using to acquire data.

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Sampling frequencies available in the Acquisition Setup portion of the method will reflect the Base Frequency selected.

Range

For each channel used, select the button next to the signal range for the detector connected to that channel.

Information

This area is for information only. It contains manufacturing information about the interface box that may be required in service situations. If the box is not recognized, the “Connection Status” field will display “Not Connected”.

Read SS420x Settings

Click this button to read the current SS420x settings and update the current display.

When you have finished changing the SS420x settings, click the **Submit** button.

SS420x Acquisition Configuration

Each instrument using the SS420x for acquisition must be configured to use the interface. This is done when configuring the instrument and its detectors. To start the configuration of an instrument with an SS420x,

1. Select the instrument's location on the Instruments Tab. Icons for all instruments in that location will appear.
2. Click on the instrument's icon. An instrument status screen will appear in the right-hand pane.
3. Select **Configure Instrument** in the **Select Task** section.
4. In the **Instrument name** box, type the name of the instrument (for identification only), and then select the **Instrument type** for this instrument (**Generic** if no instrument control option will be used.)
5. Click the Agilent Instrument Controller button and then select the Agilent Instrument Controller box to which this instrument is attached from the list displayed, followed by the **OK** button.

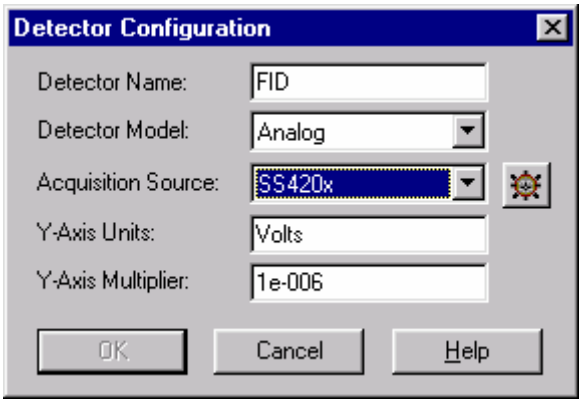
The Instrument Configuration dialog will appear.

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Instruments using SS420x for acquisition may be configured as any available instrument type. If instrument type other than Generic is selected, the detector model must be set to **analog**, with **acquisition source** set to SS420x. When this is selected, click **Configure** to continue.

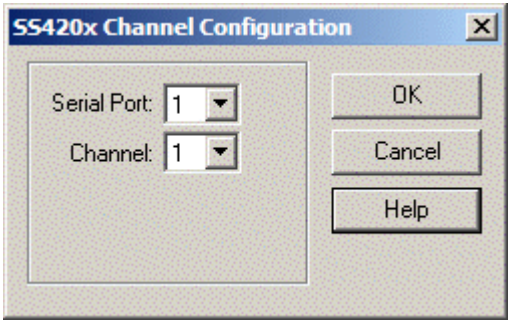
SS420x Detector Configuration

To configure a detector to use SS420x for acquisition, select **SS420x** for **Acquisition Source**. Then click the  button next to the selection to do the Channel Configuration.



SS420x Channel Configuration

For the detector selected, set the correct Serial Port, and Channel to be used. These should match the way your detector is physically connected to the SS420x interface.

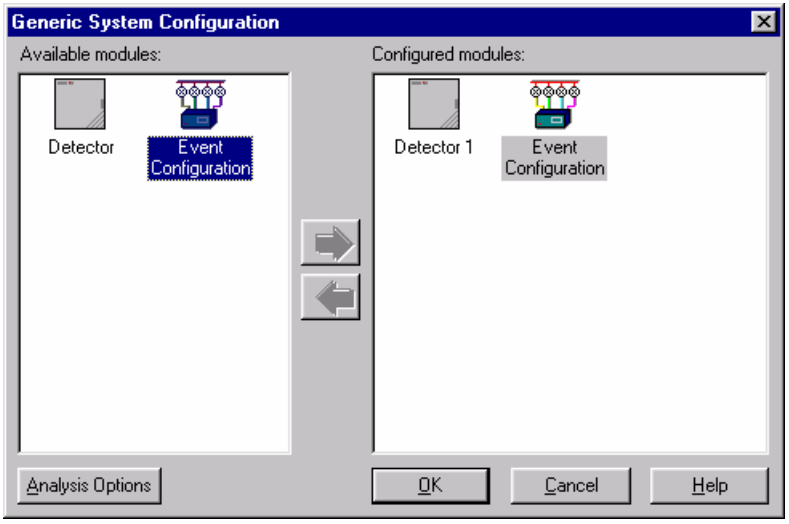


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When you have finished this dialog, click OK.

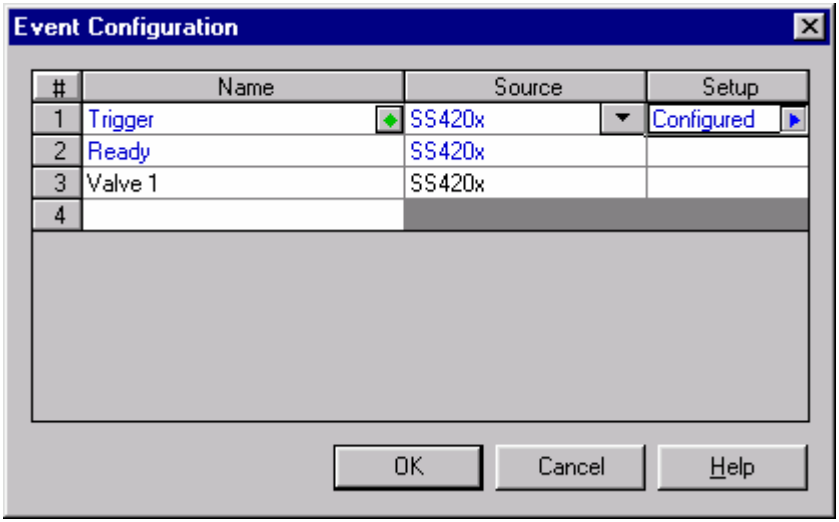
SS420x Event Configuration

If you plan to use event control from the SS420x, you must configure it for each instrument using the SS420x. From the generic system configuration box, make sure the Event Configuration icon is shown in the Configured Modules area. (If not, double-click on the icon to move it over to the Configured Modules area.)



To start the event configuration, double click on the Event Configuration icon in the Configured modules area.

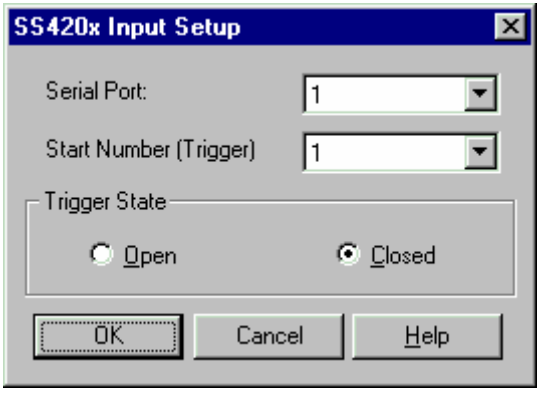
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The following events can be configured for control by the SS420x. If an event type is not configured, it will not be available for programming in the method.

SS420x Trigger Configuration

Select **Trigger** in the Name column. Select SS420x for **Source**. Then click **Setup**. The following dialog will appear.



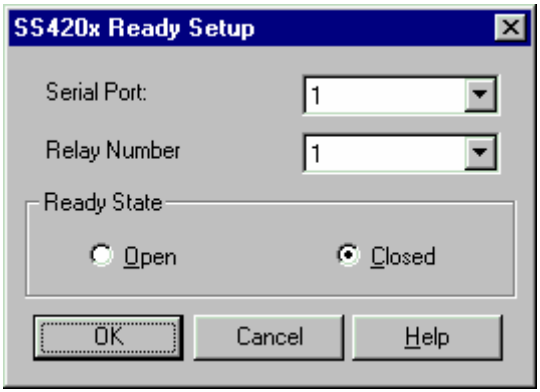
Select the correct Serial Port, trigger number, and initial trigger state for this trigger. Note: If multiple SS420x boxes being controlled from the same instrument (each box is on its own serial port), and external triggering is desired, each box

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must have its own trigger configured. When completed, click OK.

SS420x Ready Configuration

To configure a Ready signal, select **Ready** for Name, set SS420x for the Source, and then click **Setup**. The following dialog will appear.

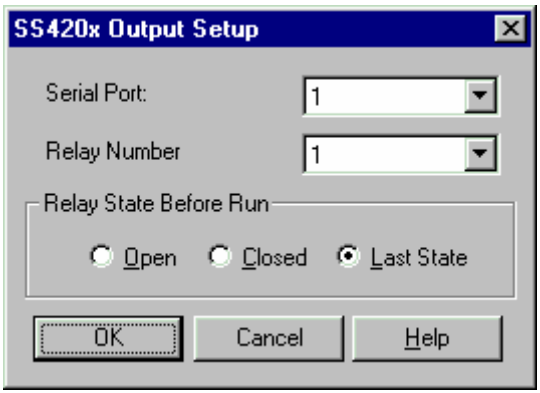


Select the Serial Port and the relay to be used for the Ready. These should match the physical connections on the SS420x interface for this ready line. Then select the state of the relay when it is in the ready position.

SS420x Valve/External Event Configuration

To configure a Valve or other external event to control from the SS420x, enter a descriptive name in the Name field and set SS420x for the Source. Then click **Setup** and the following dialog will appear.

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Select the Serial Port and the Relay to be used for the valve/event control. Then select the Idle State (State of the relay before the run) to be set when it is not in use. Click OK when finished.

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