

Hardware Overview



AB SCIEX TripleTOF™ 5600 System

Part Number: 5012938 A

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AB SCIEX

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Laser Safety Information

This section contains safety information for the laser used in the optional NanoSpray® III ion source.

For regulatory and safety information for the mass spectrometer, see the *Safety Guide* (PN 1041490).



Note: The guides and tutorials for the mass spectrometer and Analyst TF 1.5 software are installed automatically with the software and are available from the Start menu: All Programs > AB SCIEX > Analyst® TF 1.5 Software. A complete list of the available documentation can be found in the online Help. To view the Analyst TF software Help, press F1.

Laser Classification (NanoSpray® III Ion Source Illuminator)

The illuminator in the NanoSpray III ion source is a class 3(R) laser.



WARNING! Ocular Hazard: Do not view the laser output with an optical instrument. Class 3(R) lasers can cause acute injury to the eyes.



WARNING! Laser Hazard: Follow all local codes, regulations, standards and internal requirements applicable to laser safety.



WARNING! Laser Hazard: Using equipment and controls or performing procedures in a manner different from that documented in this manual may result in hazardous laser radiation exposure.

Scheduled Maintenance

The illuminator requires no maintenance. Its expected lifetime is 3000 hours (more than 3 years).




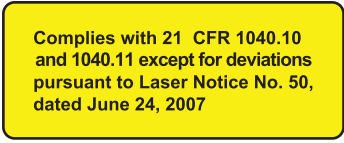


Tip! The laser is designed for continuous operation; however, AB SCIEX recommends that you turn off the laser when not in use, to extend its lifetime.

Specifications

Specification	Range
Laser Beam	
Focused distance	Collimated 37 mm ± 3 mm
Spot size	0.7 mm ± 0.1 mm x 2.5 mm ± 0.2 mm
Divergence	< 0.7 mrad
Output Parameters	
Wavelength	655 nm, -10 nm, + 5 nm
Wavelength stability	0.25 nm/1°C (nominal)
Output power	3 mW ± 0.15 mW
Output power stability (25°C)	< 1% fluctuation over 60 minutes

Labels on the Ion Source

In accordance with regulatory requirements, all laser warning labels displayed on the ion source are documented in this guide. Warnings and labels on the ion source use international symbols.

External Labels	Definition	Location
	CAUTION: Visible and/or invisible laser radiation. Avoid eye or skin exposure to direct or scattered radiation.	External; on the top cover.
	Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007	External; on the top cover.
	Laser Aperture. Identifies the location of the aperture through which the laser beam emerges.	External; on the top cover.
	Laser Radiation: Avoid direct eye exposure. Class 3R laser product. Max power: 5 mW; Wavelength: 650 nm; IEC 60825-1	External; on the top cover.

Hardware Overview

The AB SCIEX TripleTOF™ 5600 system is designed for the qualitative and quantitative analysis of chemical species. The system includes a mass spectrometer, a DuoSpray™ ion source, the optional CDS (calibrant delivery system), and a computer running the Analyst® TF software.

The optional Turbo V™ and NanoSpray® ion sources are available for use with the system.



Note: Before you operate the mass spectrometer, make sure you have read the *TOF Systems Safety Guide*. The *TOF Systems Safety Guide* is installed automatically with the software and is available from the Start menu: All Programs > AB SCIEX > Analyst® TF Software.

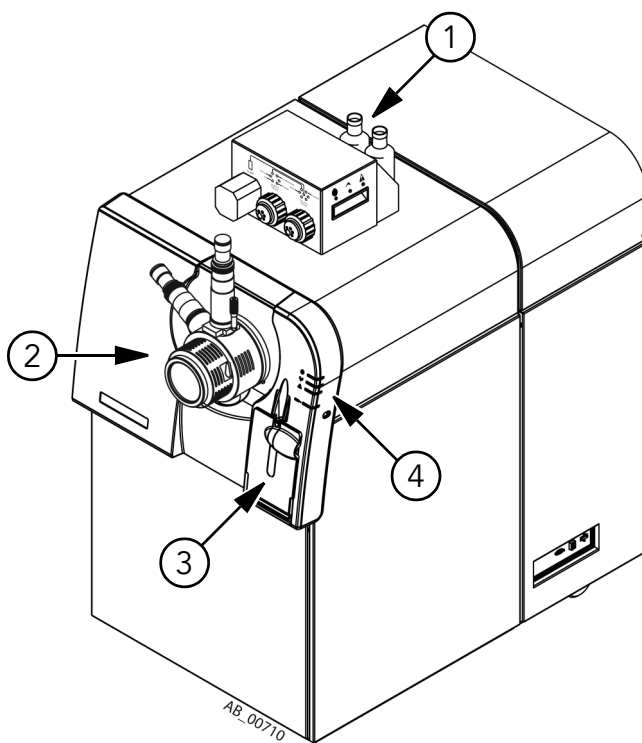


Figure 1-1 Front and right side

Item	Description	For more information see...
1	Optional CDS	<i>CDS Operator's Guide</i>
2	DuoSpray™ ion source	<i>DuoSpray™ Ion Source Operator's Guide</i>

Figure 1-1 Front and right side (cont'd)

Item	Description	For more information see...
3	Syringe pump	To use the integrated syringe pump on page 18.
4	Dress panel LEDs	Dress Panel LEDs on page 11.

Computer Connections

Figure 1-2 to Figure 1-4 show the locations of the mass spectrometer connections.

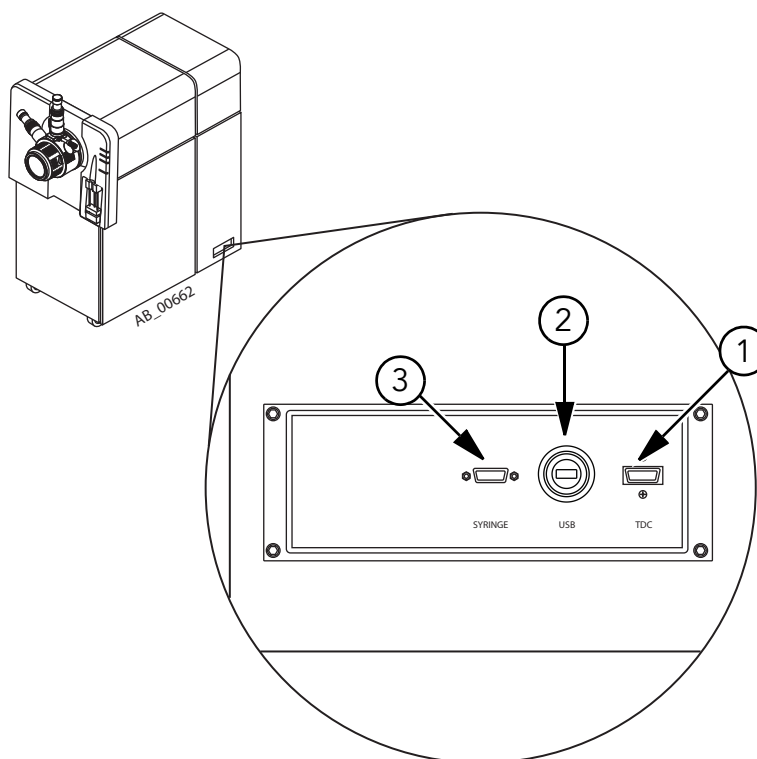


Figure 1-2 Connections on the TDC bulkhead

Item	Description
1	InfiniBand cable connection for the TDC card
2	USB cable connection for the USB-GPIB card
3	Serial (RS-232) cable connection for the syringe pump

Gas and Vacuum Connections

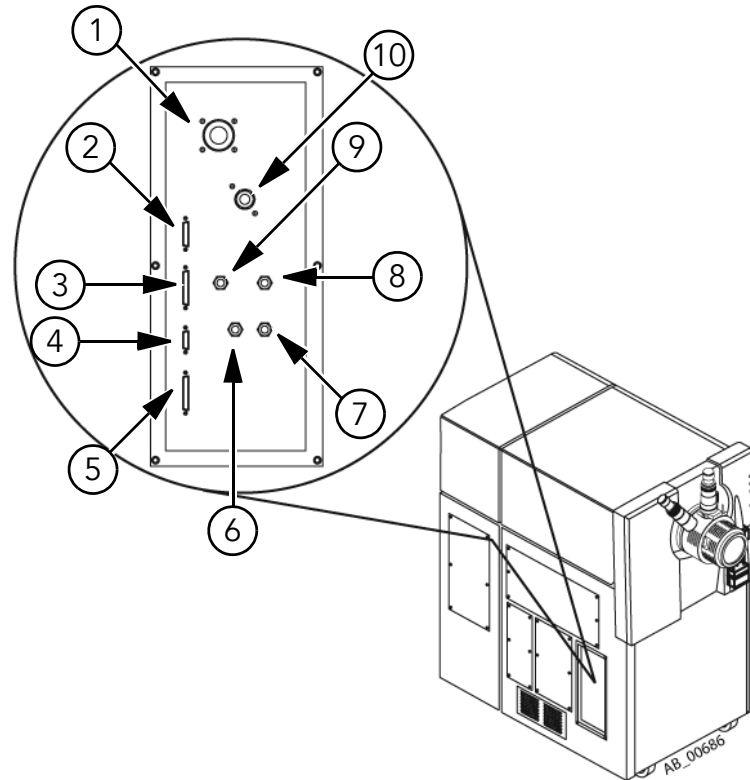


Figure 1-3 Connections on the Gas and Vacuum bulkhead

Item	Description
1	Roughing pump vacuum connection
2	Calibrant control connection
3	AUX IO connection. The optional LC system start signal connects to this port.
4	External control connection. This port is intended for future use.
5	Sources connection. Some ion sources connect to this port.
6	Curtain Gas™ (nitrogen) supply connection. See Gas Connections on page 12 .
7	Gas 1 and Gas 2 (zero air or nitrogen) supply connection. See Gas Connections on page 12 .
8	Source exhaust gas (zero air or nitrogen) supply connection. See Gas Connections on page 12 .
9	CAD gas (nitrogen) supply connection. See Gas Connections on page 12 .
10	Source exhaust waste connection

Electrical Connections

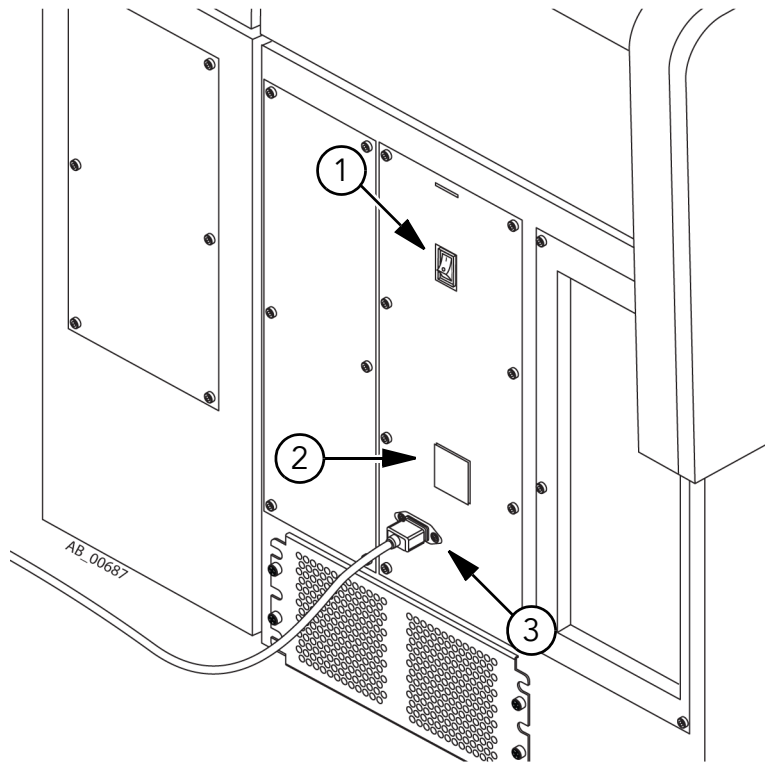






Figure 1-4 Electrical connections

Item	Description	For more information...
1	Instrument power switch	See Turning On and Shutting Down the System on page 15
2	Cover over circuit breaker	See Turning On and Shutting Down the System on page 15 . Do not use the circuit breaker to shut down the system.
3	Mains supply cable	See Turning On and Shutting Down the System on page 15

Dress Panel LEDs

Table 1-1 Dress Panel LEDs

Instrument LED	Color	Name	Description
	Green	Power	Lit when the mass spectrometer is turned on.
	Green	Vacuum	Lit when the proper vacuum has been achieved; and flashing if the system is not at the proper vacuum level (during pumpdown and venting.)
	Red	Fault	Lit when the mass spectrometer encounters a system fault.
	Green	Syringe Pump Status	Lit when the syringe pump is running.

Gas Connections

CAUTION! Potential Instrument Damage: When supplying house gases, make sure each supply is regulated before the mass spectrometer. Overpressure can damage gas controllers.

CAUTION! Potential Instrument Damage: Only use gas generators, regulators, and connectors approved by AB SCIEX. See [Table 1-2](#).

Use high-pressure liquid nitrogen dewars or AB SCIEX-approved gas generators. [Figure 1-5](#) shows the gas connections on the mass spectrometer, and [Figure 1-6](#) shows the recommended configuration. [Table 1-2](#) describes the requirements for gas, regulators, and fittings.

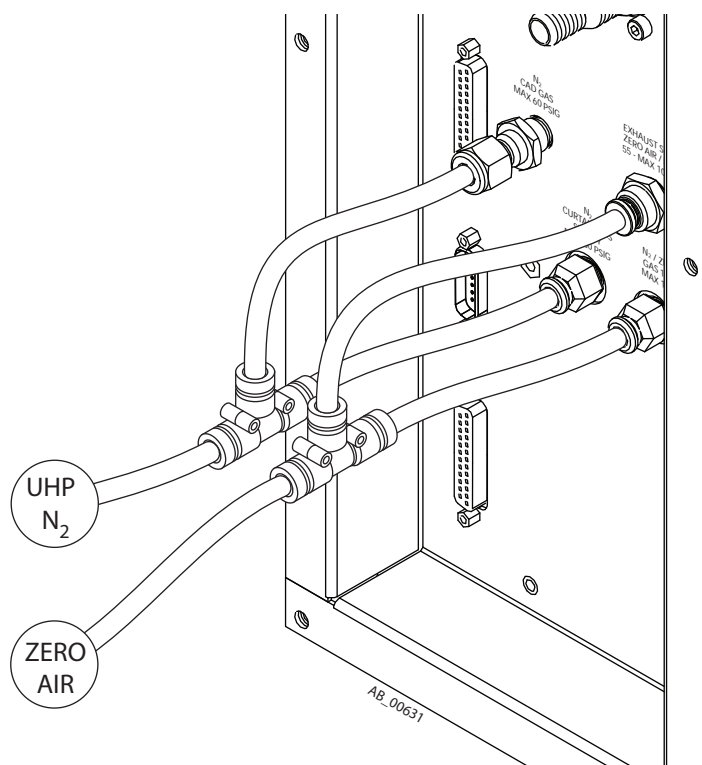


Figure 1-5 Gas connections

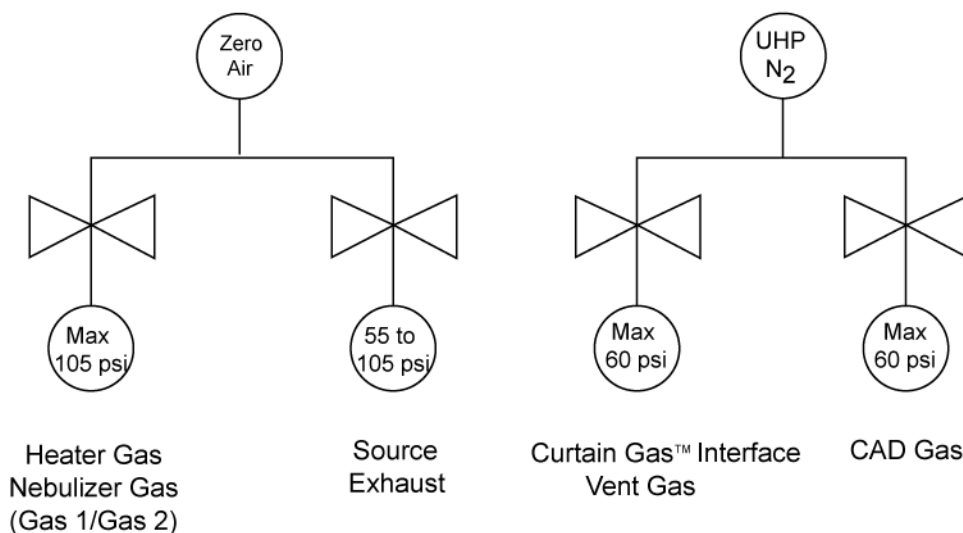


Figure 1-6 Recommended gas connection configuration



Note: The quality of air for the source exhaust can be lower than the quality of air for Gas 1/Gas 2. To reduce cost, you can use a separate source of water- and oil- free air for the source exhaust.



Tip! To save space, gas supplies may be installed outside the laboratory, as long as the required outlet pressures and flow rates can be maintained.

Table 1-2 Required Gas, Regulators, and Fittings

Gas	Gas type	Regulators	Fitting size	Suggested manufacturer	Cylinder/dewar gas regulator PN	House gas regulator PN
Gas 1 and Gas 2	Zero grade air or UHP N ₂	Maximum 105 psi (7.25 bar)	1/4 inch	Matheson	SP-3810-590 (air) or SP-3810-580 (N ₂)	SP-3231
Curtain Gas™ supply	UHP N ₂	Maximum 60 psi (4.13 bar)	1/4 inch	Matheson	SP-3810-580	SP-3231
CAD gas	UHP N ₂	Maximum 60 psi (4.13 bar)	1/4 inch	Matheson	SP-3810-580	SP-3231
Source exhaust	Zero-grade air, oil-free air or UHP N ₂	55 psi to 105 psi (3.79 bar to 7.25 bar) (Do not operate below 55 psi.)	1/4 inch	Matheson	SP-3810-590 (air) or SP-3810-580 (N ₂)	SP-3231



Note: All regulator output fittings are 1/4 inch Swagelok, shown in [Figure 1-7](#). For CAD gas, the input fitting on the Gas and Vacuum bulkhead is 1/4 inch Swagelok. For all other gases, the input fitting is quick-connect, shown in [Figure 1-8](#).

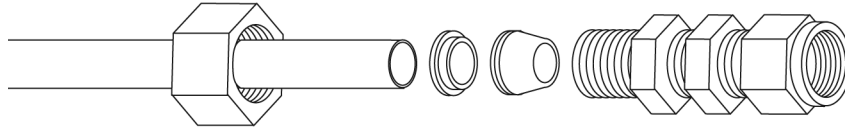


Figure 1-7 Swagelok connection and tubing

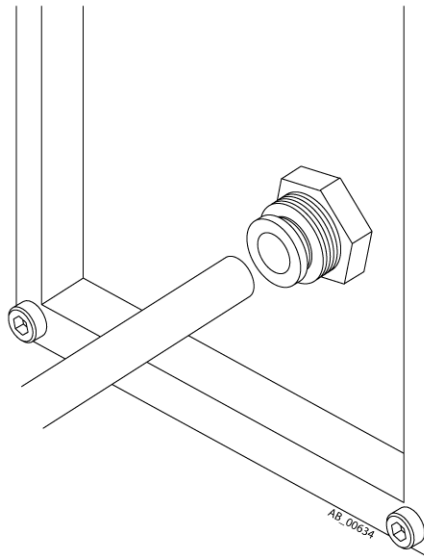


Figure 1-8 Quick-connect fitting on the Gas and Vacuum bulkhead

Turning On and Shutting Down the System

Use the following procedures if you need to turn on or shut down the system. You may need to shut down the system to perform maintenance, or to move it.

To turn on the system

1. Connect the mains supply cable of the roughing pump to the mains supply outlet.
2. Connect the mains supply cable of the mass spectrometer to the mains supply outlet.
3. Turn on the roughing pump switch.
4. Remove the cover on the circuit breaker switch on the left side of the mass spectrometer, when viewed from the front (see [Figure 1-4 on page 10](#)), and then turn on the circuit breaker.
5. Replace the cover over the circuit breaker switch and then tighten the screw holding the cover until it is finger tight.
6. Turn on the instrument power switch, located on the left side of the mass spectrometer. See [Figure 1-4 on page 10](#).
7. Connect the mains supply cables of the computer and monitor to the mains supply outlet and then turn on the computer and monitor.
8. Start the Analyst® TF software.

To shut down the system

1. Complete or stop any ongoing scans. See the *Getting Started Guide* for the Analyst TF software.

CAUTION! Potential Instrument Damage: Shut off the sample flow before you shut down the mass spectrometer.

2. Turn off the sample flow to the mass spectrometer and disconnect the sample lines from the peripheral device to the ion source. Leave the source connected for proper venting.
3. In the Analyst TF software, deactivate the hardware profile, if it is active, and then close the Analyst TF software.
4. Stop the AnalystService.
5. Turn off the instrument power switch on the left side of the instrument (see [Figure 1-4 on page 10](#)).
6. Turn off the roughing pump.
7. Let the vacuum chamber vent naturally through the orifice for 15 minutes, until the mass spectrometer reaches atmospheric pressure.

CAUTION! Potential Instrument Damage: Wait a minimum of 15 minutes for the turbo pumps to slow down. Failure to do so may damage the turbo pumps.

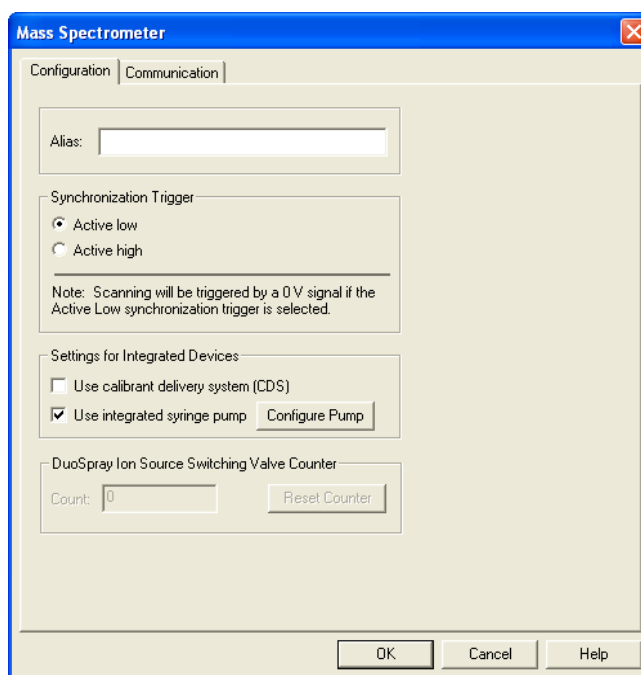
8. Remove the cover on the circuit breaker switch on the left side of the mass spectrometer (see [Figure 1-4 on page 10](#)), and then turn off the circuit breaker.
9. Replace the cover over the circuit breaker switch and then tighten the screw holding the cover until it is finger tight.
10. If you will be moving the instrument, disconnect the mains supply cable of the mass spectrometer from the mains supply outlet.

Configuring and Operating the Integrated Syringe Pump

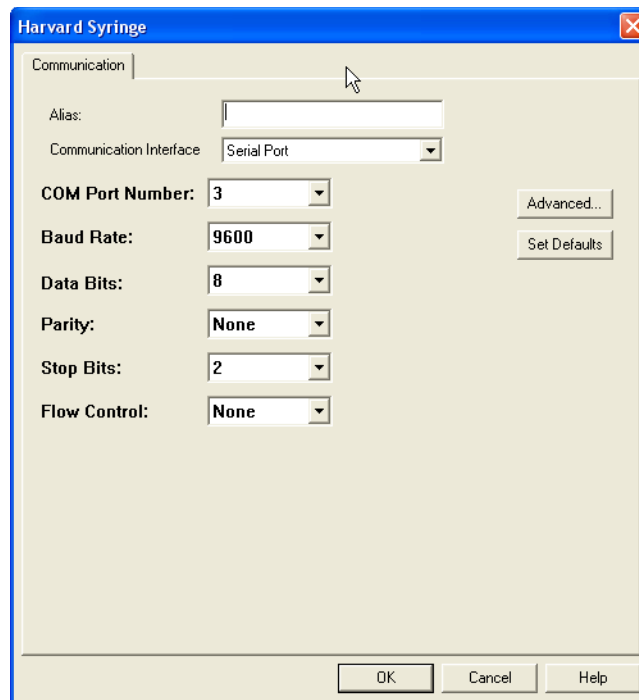
Make sure that the serial (RS-232) cable is connected between the computer and mass spectrometer. To avoid damaging the syringe, make sure that the syringe pump is seated properly. For more information about creating and editing hardware profiles, see the *Getting Started Guide* for the Analyst TF software.

To configure the integrated syringe pump in the hardware profile

1. In the Analyst TF software, on the Navigation bar, double-click **Hardware Configuration**.
2. Create a new hardware profile containing the mass spectrometer, or edit the hardware profile for the mass spectrometer.
3. In the **Devices in current profile** box, select the mass spectrometer and click **Setup Device**.
4. On the Configuration tab, select **Use integrated syringe pump**.



5. Click **Configure Pump**.



6. Select the COM port for the connection to the syringe pump.
7. Click **OK** until the Hardware Configuration Editor dialog box appears.
8. Activate the hardware profile.

To use the integrated syringe pump

1. Press the Release button on the right side of the syringe pump to lower the base and then insert the syringe as shown in [Figure 2-1](#).

Make sure that the end of the syringe is flush against the base and that the shaft of the syringe rests in the cutout.

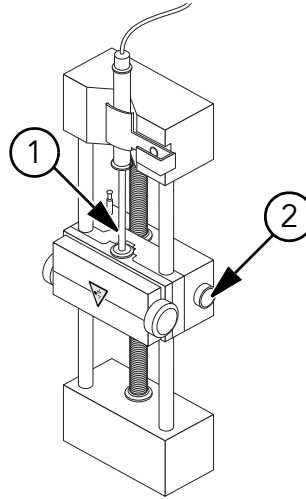


Figure 2-1 Lowering the syringe

Item	Description
1	Syringe plunger.
2	Release button. Press to raise or lower the base.

2. Adjust the post, shown in [Figure 2-2](#), so that it triggers the automatic syringe stop before the syringe plunger hits the glass syringe.

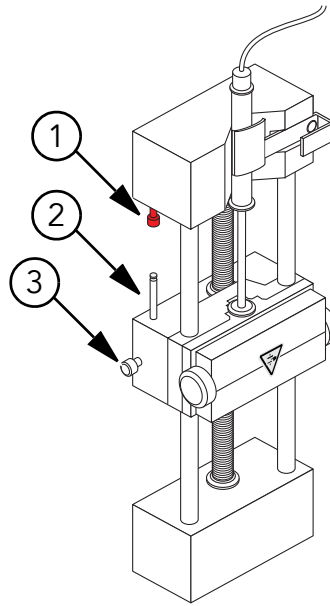


Figure 2-2 Safety stop

Item	Description
1	Automatic syringe stop. After the post hits the automatic syringe stop, the syringe pump stops.
2	Post. Adjust the height to prevent the syringe plunger from hitting the syringe during sample infusion.
3	Post lock screw. Tighten the screw after you have adjusted the height of the post.

3. Turn the side screws as shown in [Figure 2-3](#) to secure the syringe.

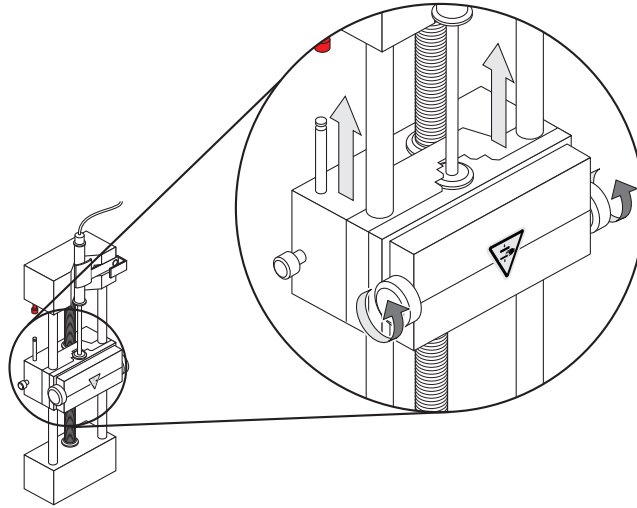


Figure 2-3 Syringe pump

4. In the Analyst TF software, on the Navigation bar, double-click **Manual Tuning**.
5. Click **Start Syringe**.
6. To stop the syringe pump, click **Stop Syringe**.

To reset the syringe pump

If the Analyst TF software stops communicating with the syringe pump, you can reset the syringe pump.

- Use a paper clip or similar tool to press the reset button, shown in [Figure 2-4](#).

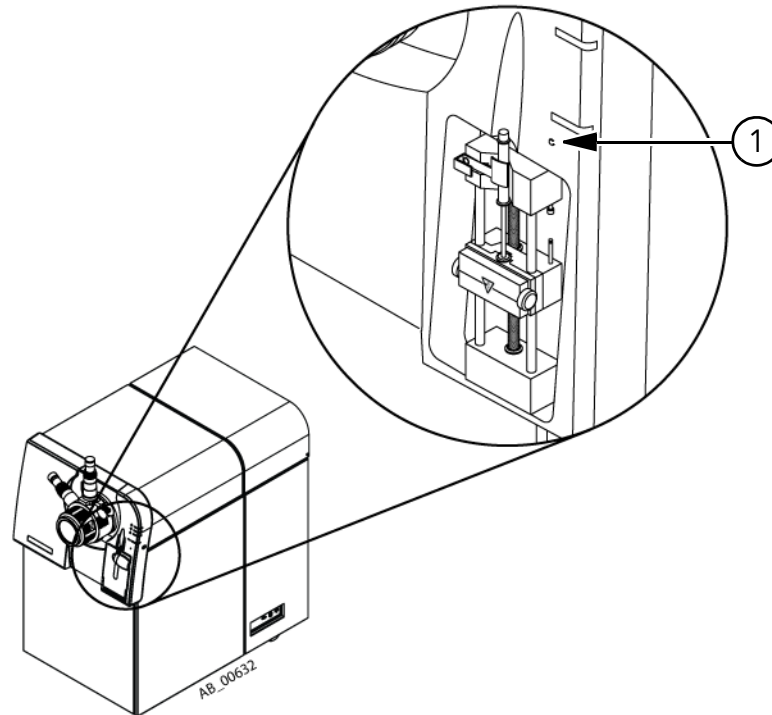


Figure 2-4 Syringe pump reset button

Item	Description
1	Reset button

Instrument Safe Fluids

These fluids can safely be used with the mass spectrometer:

- Methanol (0% to 100%)
- Acetonitrile (0% to 100%)
- Water
- Formic acid (0% to 1%)
- Ammonium acetate (1 mM to 5 mM)
- Ammonium formate (1 mM to 5 mM)
- Acetic acid (0% to 1%)



Note: This list is not complete. If you are uncertain about a specific fluid, do not use the fluid until you receive confirmation from AB SCIEX that the fluid will not present a hazard.

Cleaning up Temp Files

Periodically you should delete temporary files from the acquisition computer to free disk space.

To clean up Temp files

1. Double-click **My Computer**.
2. Right-click the drive that you want to clean up, and then click **Properties**.
3. On the General tab, click **Disk Cleanup**.

Windows calculates the amount of disk space that will be gained by the cleanup process.

4. Select **Temporary files**, and clear all other check boxes.
5. Click **OK**, and then, in the dialog box that appears, click **Yes**.

Defragmenting the Hard Drive

The Disk Defragmenter utility reorganizes the files on the disk so that the computer can access them more quickly. Use the disk defragmenter utility when the system performance is reduced.

To defragment the hard drive

1. Click **Start > Programs > Accessories > System Tools > Disk Defragmenter**.
2. Select the drive that you want to defragment.
3. Click **Analyze**.

If defragmentation is necessary, the Disk Defragmenter dialog box appears. Continue with the next step.

4. Click **Defragment**.



Moving the system entails shutting it down, moving all of the components, and then reinstalling them.



WARNING! Lifting Hazard: Before moving the system or any of its components, check their weight in the *AB SCIEX TripleTOF™ 5600 System Site Planning Guide*. Do not attempt to move the mass spectrometer without the assistance of others, the use of appropriate moving equipment, and proper lifting techniques. The system and its components are heavy. Improper lifting can cause painful and permanent back injury. Depending on the weight, moving or lifting a mass spectrometer may require at least six people.

CAUTION! Potential Instrument Damage: If you are moving the mass spectrometer to a different site, contact your FSE.

To shut down and disconnect the system

1. Shut down the mass spectrometer (see [To shut down the system on page 15](#)) and then unplug the roughing pump.
2. Disconnect the LC system from the ion source or the CDS.
3. If applicable, disconnect the CDS from the Gas and Vacuum bulkhead and the ion source, and remove the CDS from the mass spectrometer.
4. Shut down the computer, turn off the monitor, and disconnect the computer and monitor mains supply cables from the mains supply.
5. Disconnect the Infiniband, USB-GPIB, and serial connections, shown in [Figure 1-2 on page 8](#), from the mass spectrometer.
6. Turn off the gas supplies.
7. Disconnect the Gas 1/Gas 2, CAD gas, Curtain Gas™, and source exhaust gas supply connections, and the source exhaust waste connection (shown in [Figure 1-3 on page 9](#)) from the mass spectrometer.
8. Disconnect the roughing pump vacuum hose from the mass spectrometer.

To move the system

- Move the mass spectrometer, LC system, CDS, computer, and roughing pump to the new location.

To connect the computer to the mass spectrometer

- Connect the cables from the computer to the mass spectrometer.

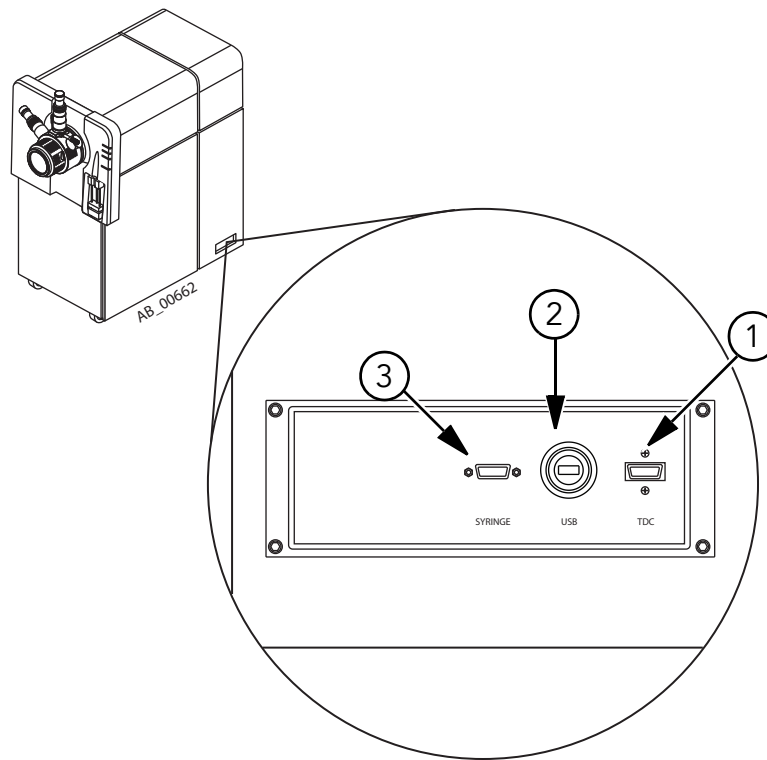


Figure 4-1 TDC bulkhead connections

Item	Description
1	InfiniBand cable connection for the TDC card
2	USB cable connection for the GPIB card
3	Serial (RS-232) cable connection to the syringe pump

To install the gas and vacuum connections

1. Connect the zero air supply line to the Gas 1/Gas 2 inlet and the source exhaust inlet on the gas and vacuum bulkhead. Set the inlet pressure for Gas 1/Gas 2 to a maximum of 105 psi, and the source exhaust gas pressure to between 55 psi and 105 psi.

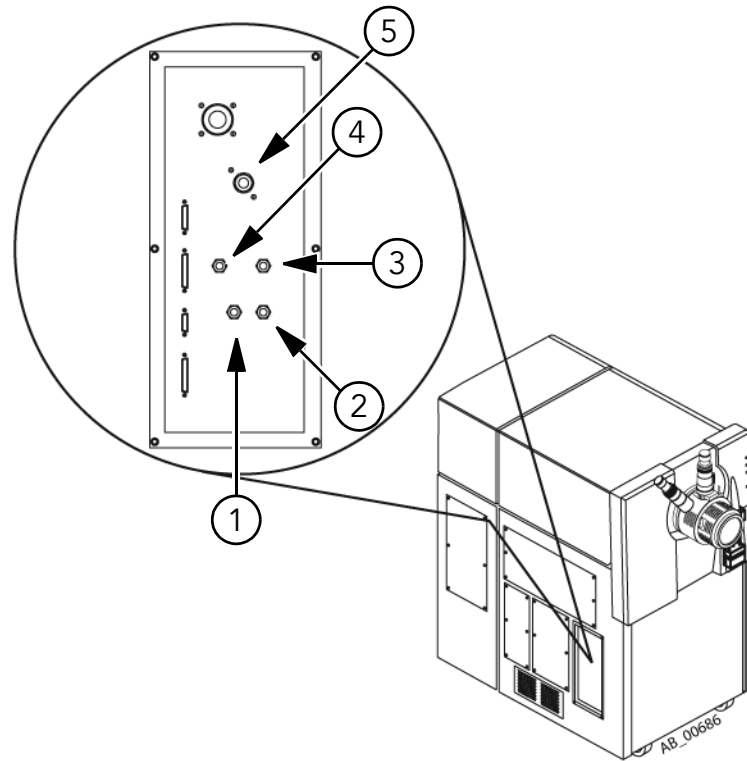


Figure 4-2 Gas and Vacuum bulkhead connections

Item	Description
1	Curtain Gas™ (nitrogen) supply. See Gas Connections on page 12 .
2	Gas 1 and Gas 2 supply (nitrogen or zero air). See Gas Connections on page 12 .
3	Source exhaust gas supply (zero air or nitrogen). See Gas Connections on page 12 .
4	CAD gas supply (nitrogen). See Gas Connections on page 12 .
5	Source exhaust waste connection

2. Connect the UHP nitrogen supply line to the CAD Gas and Curtain Gas supply inlets and then set the inlet pressure to a maximum of 60 psi.
3. Connect the source exhaust waste line to the waste bottle and to the vent.

To install the roughing pump

1. Connect the roughing pump vacuum hose to the Gas and Vacuum bulkhead on the mass spectrometer.
2. Connect the roughing pump exhaust hose to the vent.

To start up the mass spectrometer

- See [To turn on the system on page 15](#).

To install the CDS

- See the *CDS Operator's Guide*.

To connect the LC system

- See the ion source operator's guide.

Figure A-1 shows the parameters you can control in the Analyst® TF software.

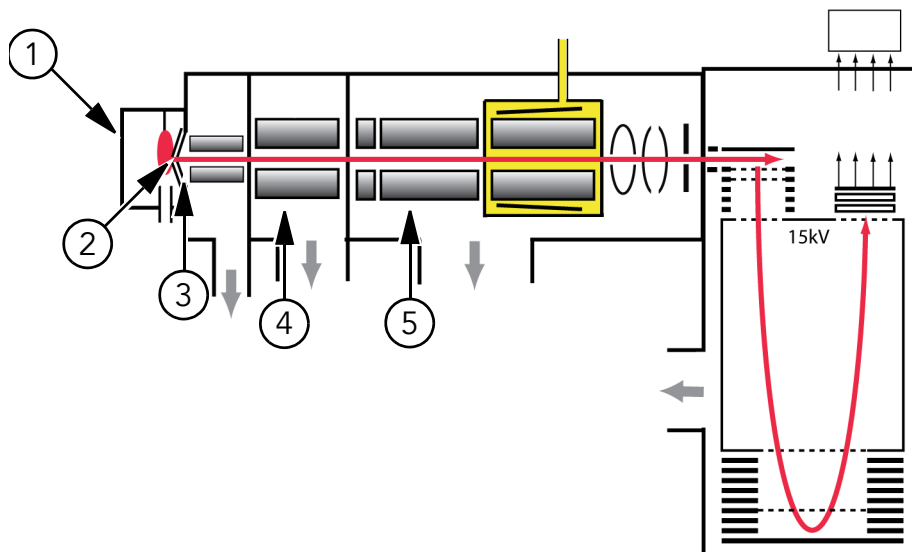


Figure A-1 Voltages

Item	Description
1	<p>GS1 (Ion Source Gas 1)—Controls the nebulizer gas for the TurbolonSpray® probe and the auxiliary gas for the APCI probe. Nebulizer gas helps generate small droplets of sample flow and affects spray stability and sensitivity.</p> <p>GS2 (Ion Source Gas 2)—Controls the heater gas. Heater gas evaporates the spray droplets. The best sensitivity is achieved when the combination of temperature (TEM) and heater gas (GS2) flow rate causes the LC solvent to reach a point at which it is nearly all vaporized.</p> <p>TEM (Temperature)—Controls the heat applied to the sample to vaporize it. The optimal temperature is the lowest temperature at which the sample is vaporized completely.</p> <p>ISVF (IonSpray Voltage Floating)—Controls the voltage applied to the needle that ionizes the sample in the ion source. ISVF can affect the spray stability and sensitivity. The optimal value depends on flow rate, solvent composition, and polarity. The optimal value of the ISVF parameter may decrease as the flow rate increases.</p>

Figure A-1 Voltages (cont'd)

Item	Description
2	CUR (Curtain Gas™ flow)—Controls the flow of gas to the Curtain Gas interface. The Curtain Gas interface is located between the curtain plate and the orifice. It prevents ambient air and solvent droplets from entering and contaminating the ion optics, while permitting direction of sample ions into the vacuum chamber by the electrical fields generated between the vacuum interface and the spray needle. Contamination of the ion entrance optics thus reduces Q0 transmission, stability, and sensitivity, and increases background noise. Maintain the Curtain Gas flow as high as possible without losing sensitivity.
3	DP (Declustering Potential)—Separates the vacuum region from the atmosphere. A voltage applied to the orifice plate aids in ion declustering.
4	CE (Collision Energy)—Controls the potential difference between the Q0 and Q2 (collision cell) regions. CES (Collision Energy Spread)—Controls the spread of collision energy applied to the precursor ion in a Product Ion scan. The collision energy is ramped from low to high collision energy. For example, in positive mode, the collision energy will be ramped from CE – CES to CE + CES. By entering a CES value, you turn on collision energy spread automatically.
5	IE1 (Ion Energy 1)—Controls the difference between the voltage on Q0 and the Q1 rod offset ($IE1 = Q0 - RO1$). It is used for peak shape resolution and sensitivity in Q1 and TOF MS/MS scan types. IE1 should only be adjusted during Q1 calibration.

Source/Gas Parameters

The parameters in [Table A-1](#) are optimized for different LC conditions involving flow rate. For more information about the parameters, see the Analyst TF software Help system.



Note: AB SCIEX recommends that you run the mass spectrometer with the Curtain Gas flow set to the highest value possible without loss of signal.

Table A-1 Typical Source/Gas Parameters for an LC Flow Rate of 200 μ L/min or Greater

Parameter	Value
Curtain Gas (CUR)	25
IonSpray Voltage Floating (ISVF)	5000
Temperature (TEM)	650
Ion Source Gas 1 (GS1)	60
Ion Source Gas 2 (GS2)	60

Compound Parameters

In general, you can use the preset values for most of the parameters in [Table A-2](#). For more information about the parameters, see the Analyst TF software Help system.

Table A-2 Compound Parameters

Parameter	Value
DP (Declustering Potential)	Use the preset value and optimize for your compound. Typically set to 60 to 80.
CE (Collision Energy)	For TOF MS scans, use 10; for Product Ion and Precursor Ion scans, optimize for your compound. Typically set to 60 to 120.
CES (Collision Energy Spread)	(Product Ion and Precursor Ion scans only) Optimize for your compound.
IE1 (Ion Energy 1) — <i>For experienced instrument operators only</i>	Do not adjust.

DuoSpray™ Ion Source Parameters

[Table A-3](#) shows the recommended starting values for the X-axis and Y-axis positions. For more information, see the *DuoSpray™ Ion Source Operator's Guide*.

Table A-3 Vertical and Horizontal Parameters

Parameter	TIS Probe Value	APCI Probe Value
X-axis	5	5
Y-axis	5	5



Numerics

3(R) laser 5

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