

SI-140-GIST

DART Thermo Ion Max Vapor Interface User Manual

Manual Revision 2
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Scope of Delivery:

This chapter lists the components of the DART Thermo Ion Max Vapur Interface.



Figure 1: Scope of Delivery

Standard System Components

- | | |
|-----------------------|---|
| 1. SI-140-A-SVP | Thermo IonMax interface assembly for DART SVP |
| 2. SI-999-14 | VAPUR Pump Kit - 1/4" |
| 3. JG10019 | Graphite Vespel Ferrule |
| 4. SI-140-CC-A | Contact Closure Cable |
| 5. SHSH_SS188_M6_12mm | M6 x 12 Socket Cap Screws |

Configuration Dependent Components

- | | |
|------------------|----------------------------------|
| 1. SI-9xxx-47* | Ceramic Tubes |
| 2. SI-140-INT-E2 | Thermo Interlock Plug Exactive 2 |

***NOTE:** See *VAPUR Interface_Ceramic Tubes Reference Sheet 7.5.038* for ceramic tube lengths (available on ionsense.com).

Functional Description

The DART Thermo Ion Max Vapur Interface transfers the ions created by the DART source to the mass spectrometer and allows the DART source to mount on the mass spectrometer.

Safety

Refer to the SVP Hardware and Network manual for safety warnings regarding operating the DART.

Installation

Removing the Thermo Ion Max Source

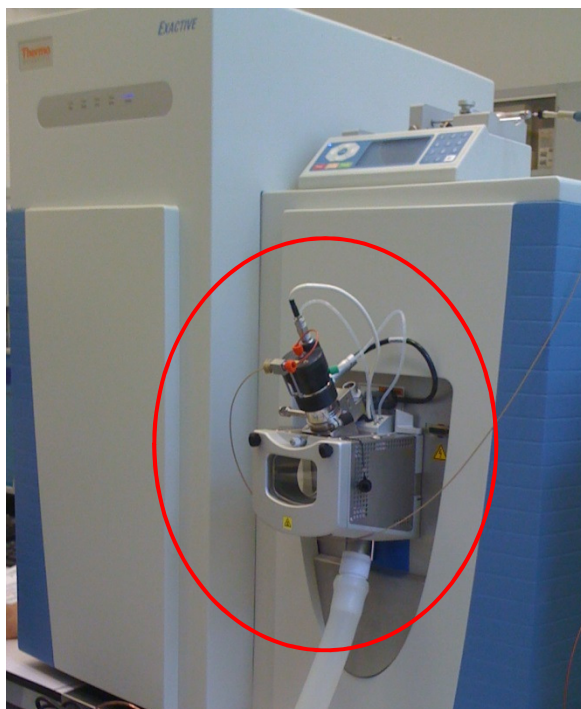


Figure 2: Ion Max Source

Before removing the source, lower the set point on the capillary temperature. The temperature cannot be adjusted without a source connected.

Disconnect the waste hose from the bottom of the Ion Max source, as well as all gas, syringe, and voltage connections.

Carefully remove the Ion Max source from the mass spectrometer interface and place it aside in a safe place.

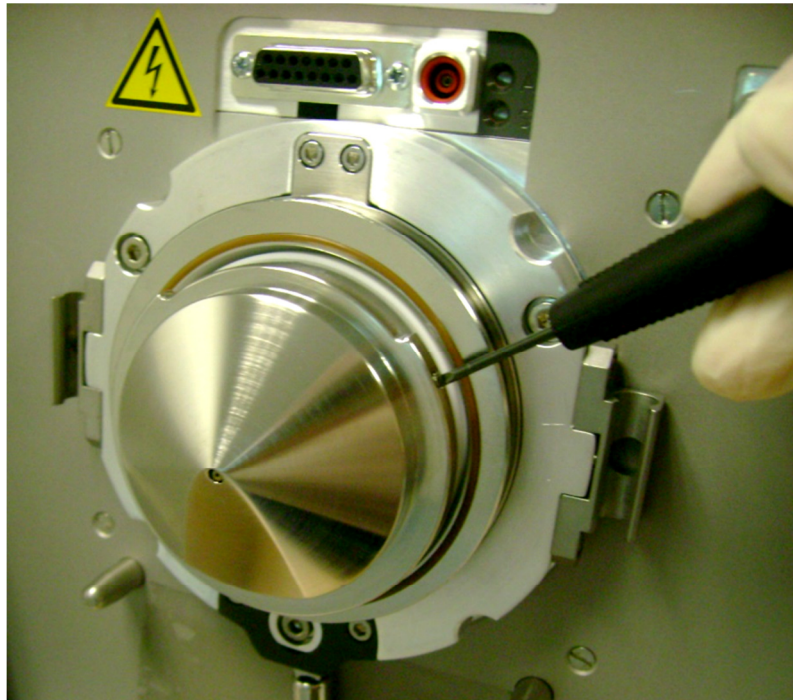


Figure 3: Thermo ion sweep cone

Once the ion sweep cone is cool enough to handle, use a small flat-head screw driver to loosen the set screws on the sides of the spray shield. Remove the Thermo ion sweep cone as show in the photo above.



Figure 4: source region with the Thermo ion sweep cone removed

Adjusting the Mounting Brackets

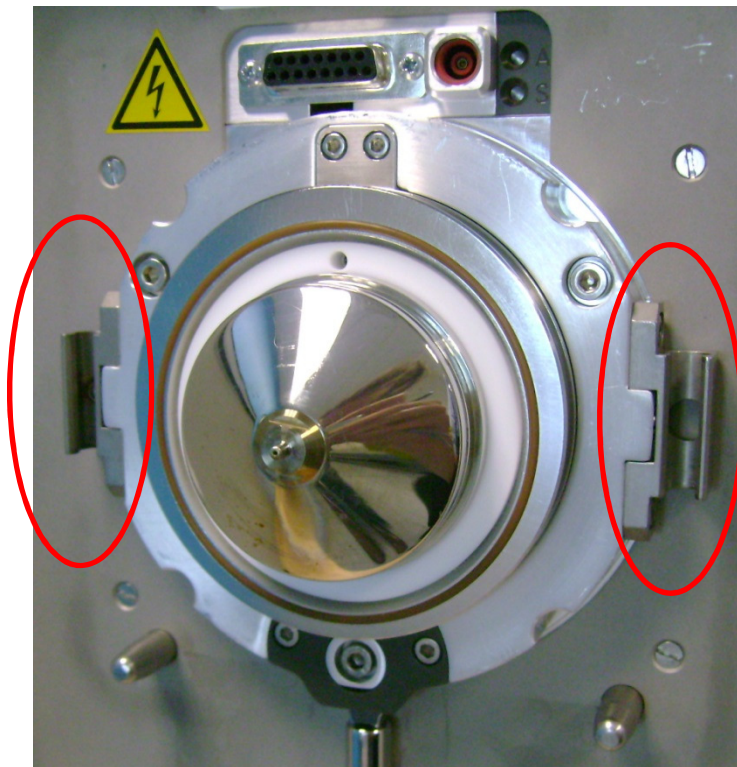


Figure 5: side brackets

The side brackets (circled in red in the photo to the left) need to be adjusted before mounting the interface flange.

The Thermo Ion Max source will fit properly even with the changed positioning of the side brackets.

The side brackets are generally set flush with the metal surface around the API inlet as their default factory position.

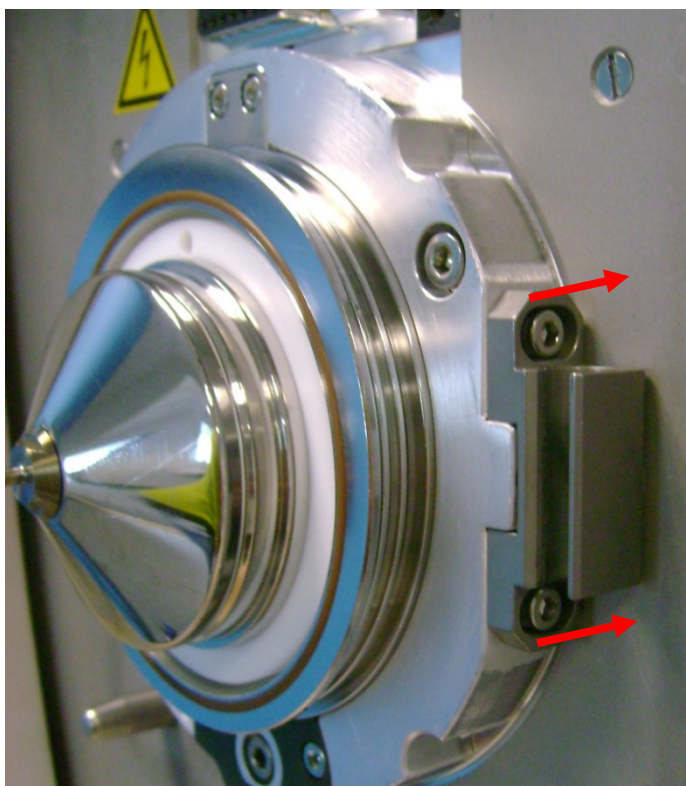


Figure 6: side bracket adjustment

Use a 7/64 inch Allen wrench to adjust the side brackets so that they sit just slightly towards the mass spectrometer.

The front surface of the brackets should be 0.2 – 0.3 mm back from the front metal surface around the API inlet.

NOTE: Remove the Thermo ion sweep cone before mounting the Vapur interface.

Attaching the Vapur Interface



Figure 7: Vapur interface attached to Thermo Ion Max

Attach the Vapur interface to the mass spectrometer as the Thermo Ion Max source mounts.

Lock the interface in place by turning the thumb latches on the top of the interface until they are at least 45 degrees from the open position. See the image below for detail of the thumb latches circled in red.



Figure 8: thumb latches locked in place

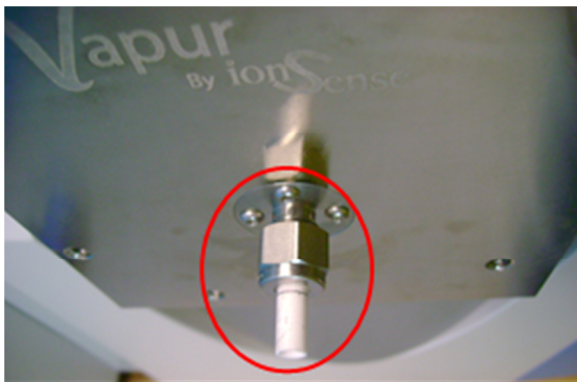


Figure 9: ceramic ion transfer tube

Inserting the Ceramic Ion Transfer Tube into the Vapur Interface

Remove the Swagelok nut from the front of the Vapur Interface and insert the ceramic ion transfer tube into the interface. Secure the ceramic tube with one of the provided graphite Vespel ferrules making sure to set a **2 mm gap** between the tube and the APC Inlet.

NOTE: To easily set the 2 mm gap, push the ceramic tube against the Thermo capillary, secure the Swagelok fitting with ferrule and then mark the tube with a pencil. Pull the tube out as shown in Image 3 above so that a 2 mm gap is created inside the interface.



Figure 10: pumping line

Attach the black rubber pumping line from diaphragm pump over the barbed pumping port fitting on the side of the Vapur Interface.

Attaching the DART SVP source to the Vapur Interface



Figure 11: DART SVP source attached to Vapur Interface

Attach the base of the source directly to the bottom of the flange with the two M6 x 12 mm Socket Cap Screws provided with the flange.

Operation

Monitoring UHV Readback on Orbitrap Systems

Use of the DART source with helium will increase the Ultra High Vacuum (UHV) pressure readback in your Orbitrap instrument due to helium entering the highest vacuum region where the Orbitrap lies. The increase in the Orbitrap pressure will not harm the mass spectrometer or cause it to function differently. Below is a screenshot showing what the Thermo Orbitrap's UHV pressure readback level normally would be.

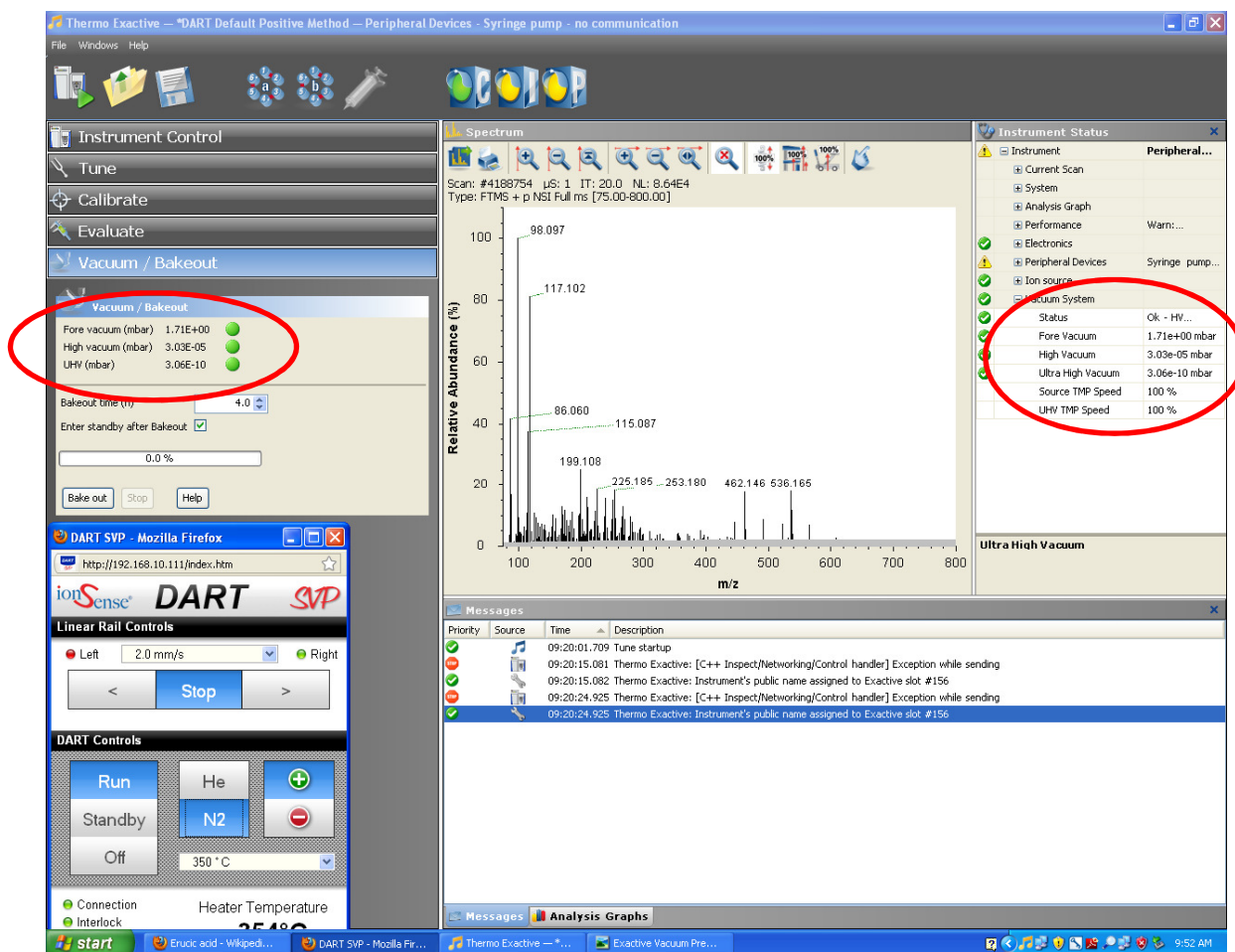


Figure 12: UHV pressure readback levels

Ultra High Vacuum (UHV) pressure readback values for the Orbitrap:

- Nitrogen is running through the DART source during this screen shot, showing a low UHV pressure reading of 3.06 E-10 mbar.
- UHV reading will rise to approximately 9.0 E-10 to 1.1 E-9 mbar when operating the DART with helium, but the system will still be stable.
- The threshold where the UHV will trigger a warning message is at 1.26 E-9 mbar.

Suggested Tune File Parameters with DART

IonSense recommends using the following operational settings:

- Scan Parameters:**

- Scan Settings:** 1 μ -scan by 250 ms max inject time

- AGC Target:** Balanced (1e6) for Full MS

- Inlet Parameters:**

- Capillary Temp:** 200 ° C 200 ° C

- Capillary Voltage:** 25 V - 50 V

- Tube Lens Voltage:** 120 V -120 V

- Skimmer Voltage:** 26 V -25 V

- For newer systems with the **S-lens** design, a setting of **50** is generally used.

NOTE: *On the Exactive Plus and Q Exactive, only set the Capillary Temp the other parameters are not editable.*

- The following **Source Parameters are set to zero:**

- Sheath Gas Flow, Aux Gas Flow, Sweep Gas Flow.

Enabling Contact Closure

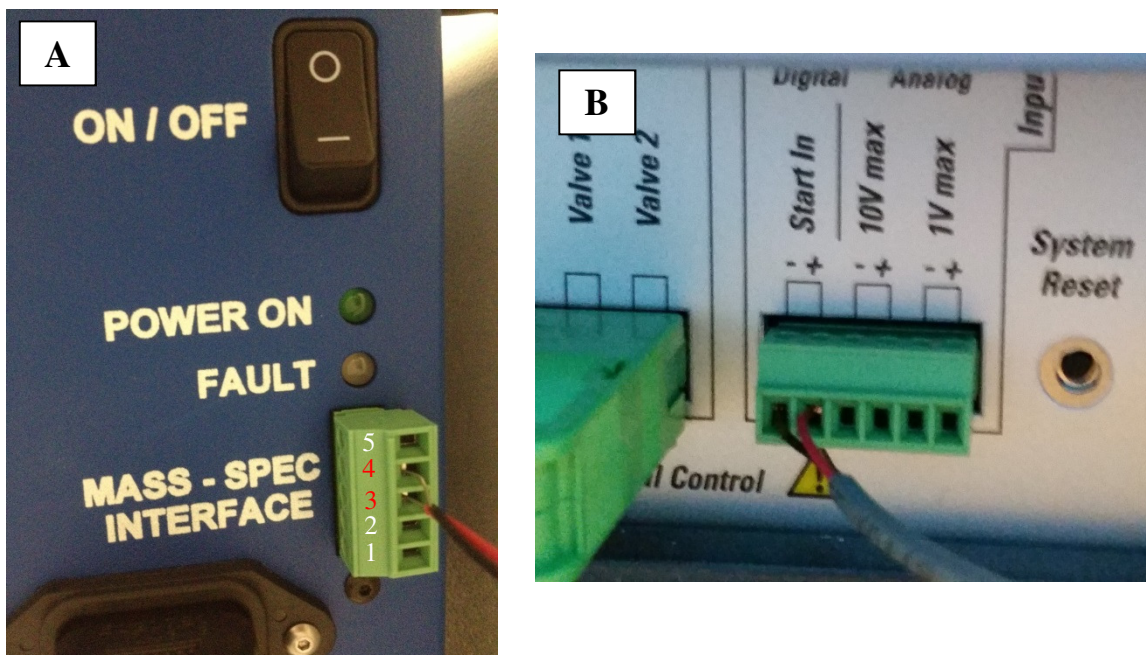


Figure 13A and 13B: contact closure connections

Contact Closure Connections:

A) DART SVP - contact closure cable end.

NOTE: The two wires must be positioned in **positions 3 and 4** as pictured above, the polarity (red vs. black) is not critical.

B) Thermo mass spectrometer - contact closure cable end.

NOTE: The two wires must be positioned in the **"Start In"** location under **"Digital"** signal input. The polarity (red vs. black) orientation is not critical.

Xcalibur Sequence Set-up:

1. Select a single line or highlight the whole sample queue for submission.
2. Click on the “**Run Sample**” or “**Run Sequence**” button in the Sequence view to begin the MS instrument data collection set-up.
3. Click on “**Change Instruments**” in the Run Sequence dialog box in order to check that the mass spectrometer is not selected to initiate the data acquisition.
4. The mass spectrometer setting must be as shown here. “**Start Instrument**” should not be selected by any installed device.

NOTE: Deselect a device by clicking over the “Start Instrument” zone for any devices that are selected “Yes” for “Start Instrument” and it will no longer be selected.

5. Leave this setting to “On”. If you select “Standby” you may experience issues with sequence hang-ups.
6. Click “Ok” to submit your sequence.
7. After clicking “OK” in the “Run Sequence” dialogue box, you will see that under the instrument name in the “**Status**” panel that the instrument will read “**Waiting for Contact Closure**”. At this point the mass spectrometer is ready and waiting for an input signal. Navigate to the DART SVP control software to begin the analyses.

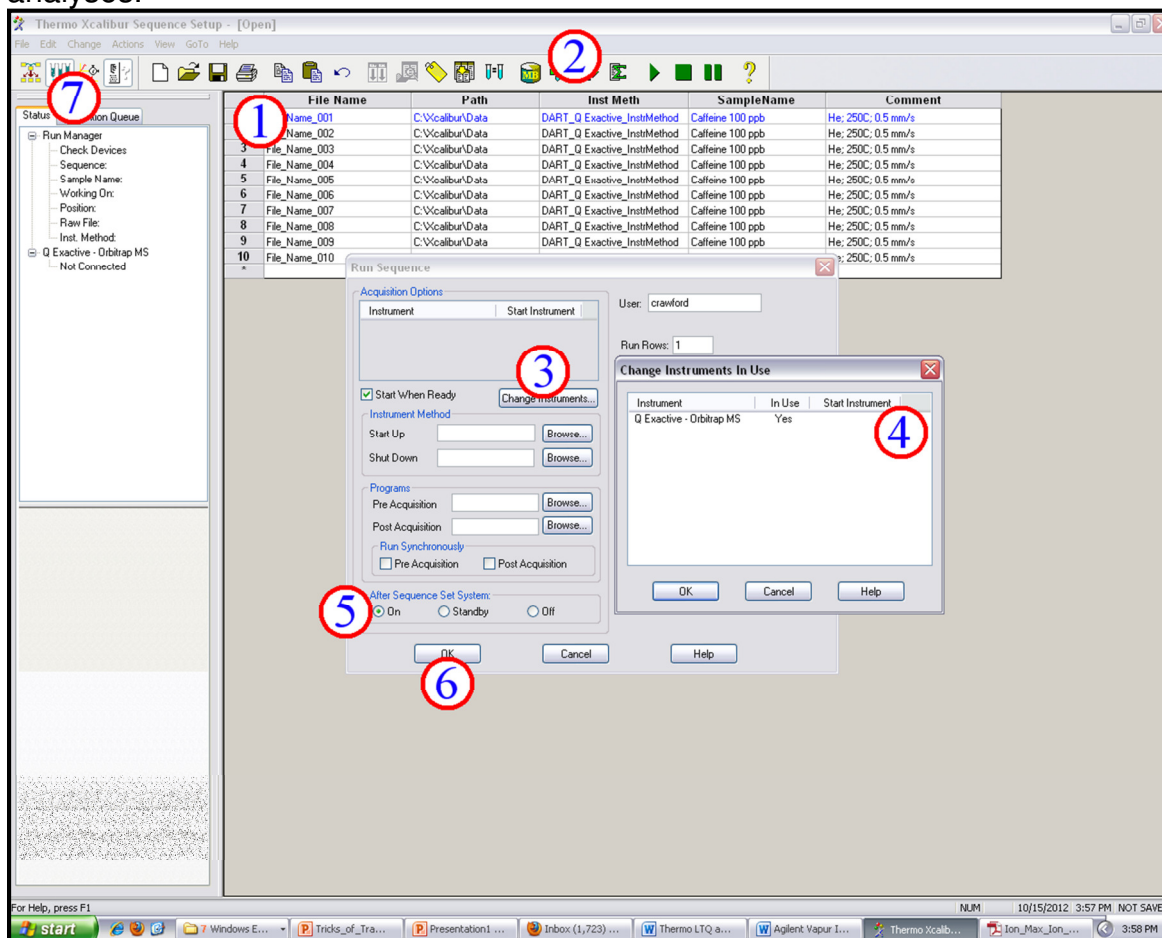
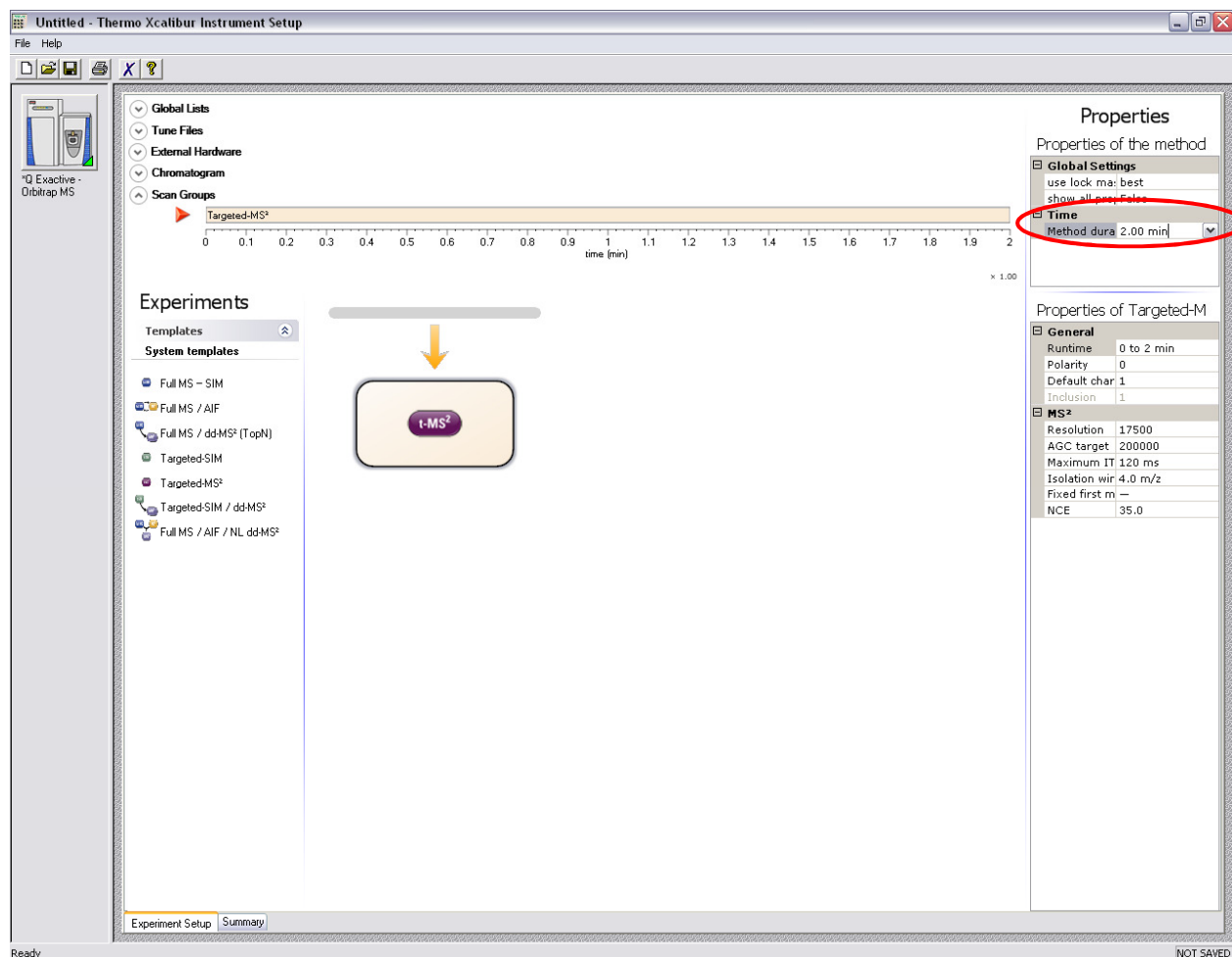


Figure 14: Xcaliber sequence view

Xcalibur Instrument Method Set-up:



NOTE: During the mass spectrometer instrument set-up, take care to set the “**Method Duration**” to a **length of time matching** the amount of time required to execute the **DART sampling method**. If the “Method Duration” time remains at the default of 10 minutes, the data acquisition will not be correct.

Troubleshooting

Issue	Solution
Pressure is too high.	1. Check the vapor pump settings. See the DART Vapor Pump Optimization Protocol 7.5.052 for details (available on ionsense.com). 2. Check the ceramic tube spacing to ensure a 2 mm gap. See page 8 for further details.
“Source is open” error message.	Check the mounting bracket alignment. See page 7 for further details.

Maintenance

No special maintenance is required for the DART Thermo Ion Max Vapor Interface.

Replacement Parts

SI-999-14	VAPUR Pump Kit - 1/4"
JG10019	Graphite Vespel Ferrule
SI-140-CC-A	Contact Closure Cable
SI-9xxx-47*	Ceramic Tubes

***NOTE:** See *VAPUR Interface_Ceramic Tubes Reference Sheet 7.5.038* for ceramic tube lengths (available on ionsense.com).

Revision History

Template Revision: 1

Revision History			
REV	DCR #	Description of Change	Effective Date
1	43	Initial Release	11/11/2013
2	218	-Changed to Manual Template Rev 1 -Removed MS Instruments and flange revision from front page. -Added SI-140-GIST part number to front page -Updated copyright date -Deleted disclaimer on page 3 -Deleted footer referencing part number and rev of flange -Page 5 deleted 3 bullet points at the top of the page that were redundant with the text in red boxes below -Deleted bolded 2mm gap comment box on page 6 -Page 7 updated picture to SVP not SVP-A -Deleted reference and image to SVP hardware manual -Updated Xcaliber Sequence set up page picture and instructions to be clearer.	5/4/2015