

UNITY 2™

MFC Series 2 Installation Manual

Version 1.6 (Changes: Sections 1,2.1, 2.2, 3 & 4)

June 2009

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1. Introduction

The Mass Flow Control accessory module(s) offer automatic adjustment and closed loop control of gas flow during UNITY 2 operation, this means different split and/or trap flows can be set for the different phases of operation. Two types of MFC are available to order depending on the flow range required.

Part number	Flow range
U-MFC100-2S	2 – 100 ml/min
U-MFC200-2S	5 – 200 ml/min

Ordinarily the gas flows are controlled by needle valves which allows the user to adjust the flow prior to running a sample tube. However, this flow rate will then remain fixed throughout the run. The MFC provides the user with the option of setting various split/trap flow rates at different stages of the desorption process, providing greater method flexibility and reproducibility. It is particularly useful in combination with UNITY 2-ULTRA systems where different samples in a sequence can be run with varying spit ratios. The MFC(s) are controlled by the UNITY 2 thermal desorption software. Note that every series 2 Air Server option includes one 2-100 ml/min MFC as standard

A summary of the number of MFCs that can be used with Markes TD systems and the respective flow control options are shown below.

No. of MFCs	Which flow is controlled?	Notes
1	a) Split only. b) In series 2 UNITY-Air Server systems, the MFC can be T'd to control both split and sampling flow.	The MFC supplied with Air Server, can be T'd to control both the air/gas sampling flow and the split flow during trap desorption. T'd connections to a single MFC are only recommended for Air Server operation.
2	Split and desorb (sampling) flow controlled separately.	Ideal set up for most tube-based configurations. Also compatible with Air Server operation – Remember all Air Servers include one MFC as standard.
3	Split, desorb (trap flow) and dry-purge/re-collection flow controlled independently.	Only useful for systems including an ULTRA 50:50 autosampler. 3 MFCs gives independent control of all three outlet flows.

If 2 MFCs are used and one is a 2-100 ml/min and the other is a 5-200 ml/min the location of the MFCs will depend on the expected sample concentration (as higher split flows will be need for high concentration samples).

	Split flow	Desorb (sampling) flow
Low concentration	2-100 ml/min MFC	5-200 ml/min MFC
High concentration	5-200 ml/min MFC	2-100 ml/min MFC

Instrument	Recommended number of MFCs	Setup
UNITY 2 standalone	1 or 2	Figures 1 and 3
UNITY 2 Air Server	1	Figure 2
UNITY 2 ULTRA (2)	1 or 2	Figures 1 and 3
UNITY 2 ULTRA 50:50	1,2 or 3	Figures 1,4 and 5

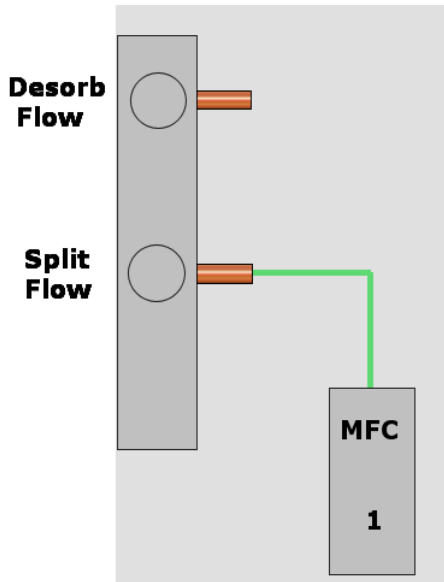


Figure 1. Single MFC controlling the Split flow

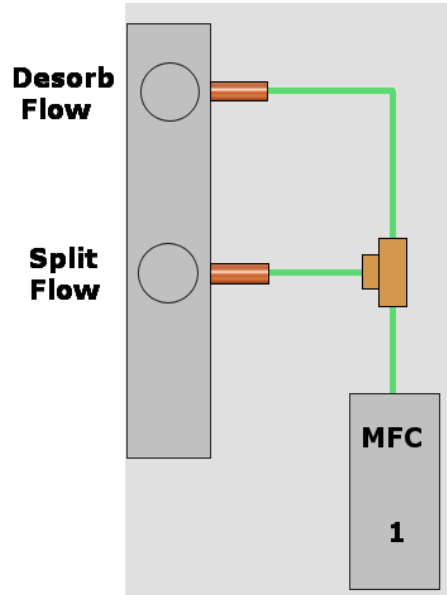


Figure 2. Single MFC controlling the Split + sampling flow T'd together (Air Server only)

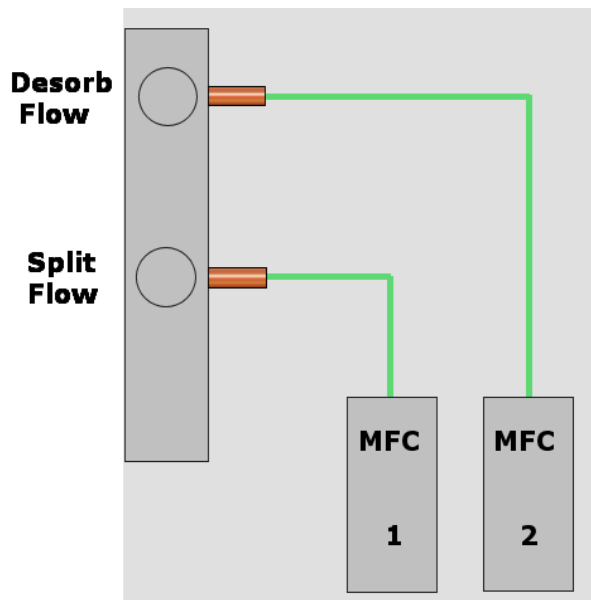


Figure 3. Twin MFCs on UNITY 2 controlling the Split flow and desorb (sampling) flow independently

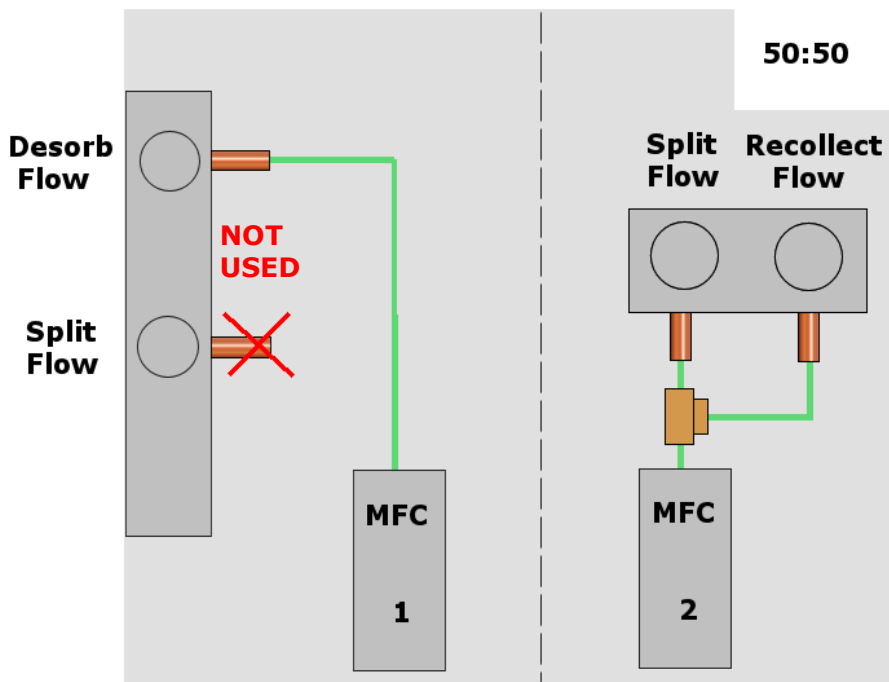


Figure 4. Two MFCs, one controlling the UNITY 2 sampling flow the other controlling the split and re-collection flows (T'd) on ULTRA 50:50

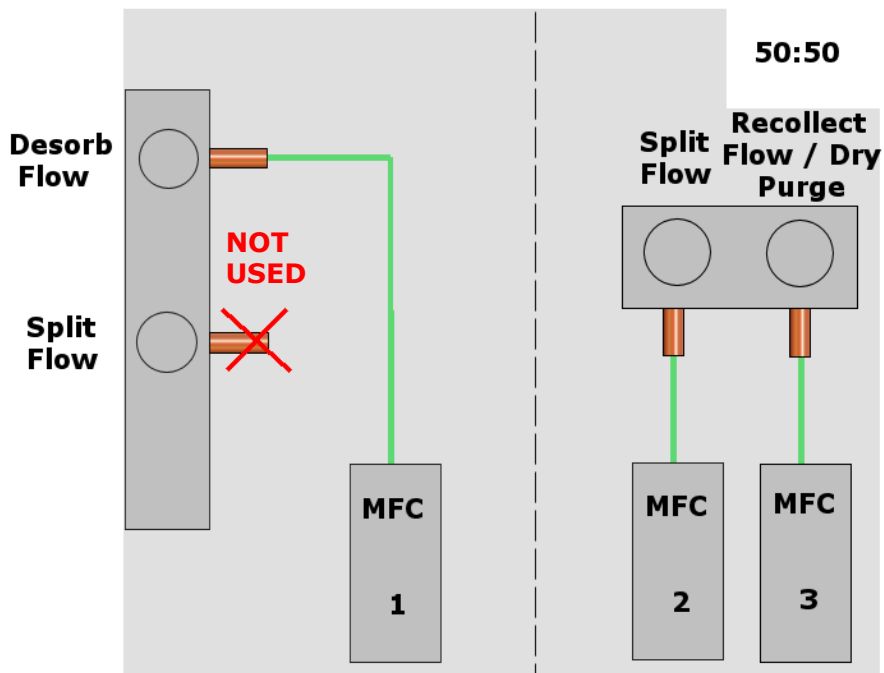


Figure 5. Three MFCs controlling the Split, desorb (sampling), re-collection and dry purge flow on ULTRA 50:50

2. Installation

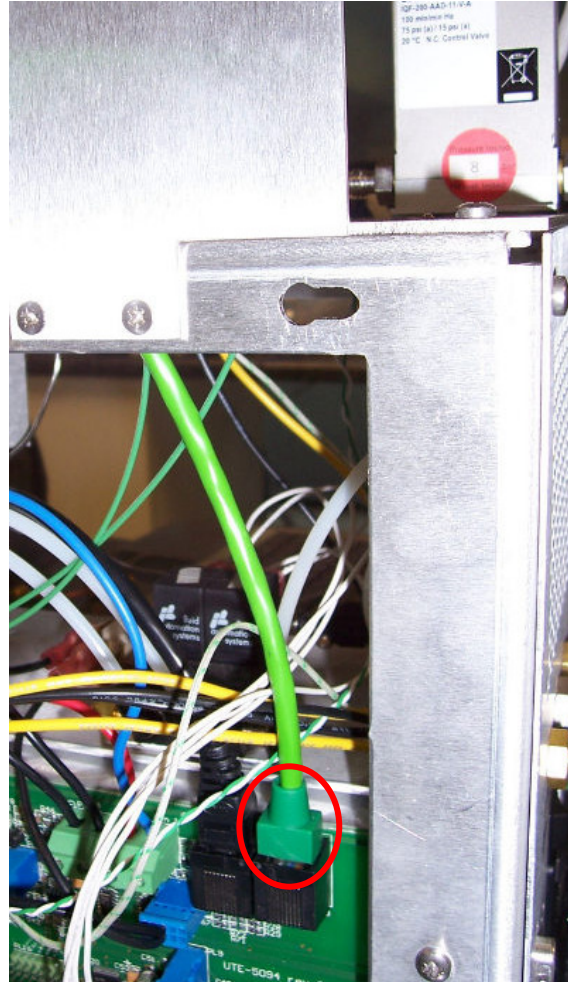
2.1. UNITY 2

Switch off UNITY 2 and move to an area of open bench.

Remove the top front, top rear, front and right hand side covers of UNITY 2.

Attach one end of the green RJ45 cable supplied in the MFC kit to the UNITY 2 control PCB as shown.

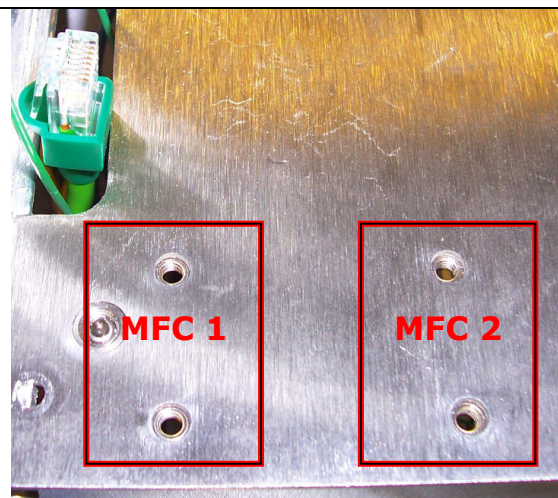
Route the other end of the cable through the hole in the top panel.



Attach the MFC(s) in the positions highlighted.



Never plug an MFC in while UNITY 2 is switched on.

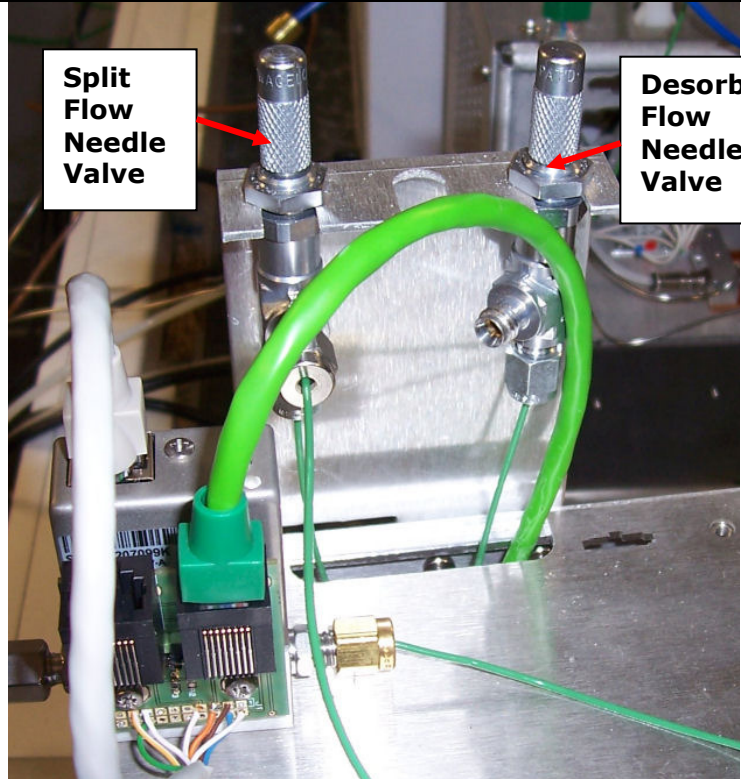


Remove the 1/8" copper tube vents and connect the flow in side of the MFC and split / desorb needle valve with 1/16" PEEK tubing (SERZ-0108).

For Air Server only - If you wish to control the split + desorb (with same flow value) you will need to use a 1/8" tee to connect the split and desorb needle valves.

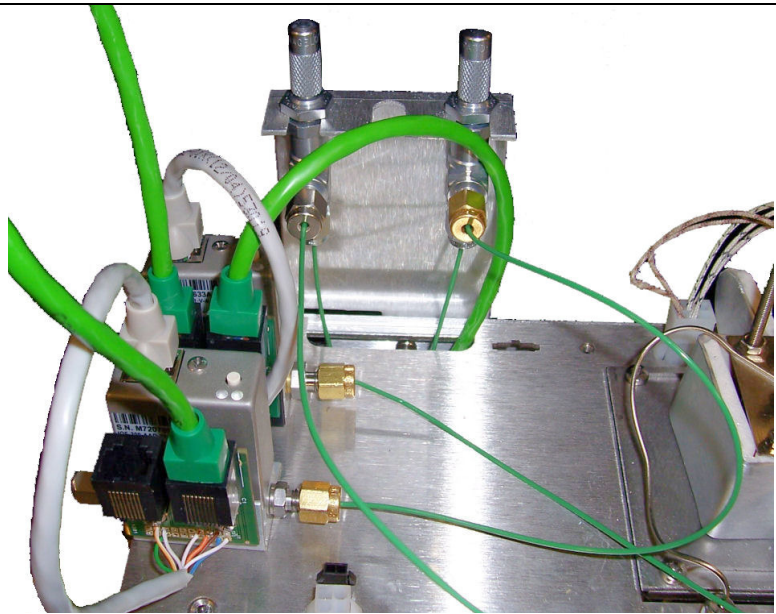


Never plug an MFC in while UNITY 2 is switched on



If you have two MFCs then they are attached next to each other. Mount MFC 2 first then MFC 1.

A connection cable bridges the two MFCs as shown.



Jumper Settings

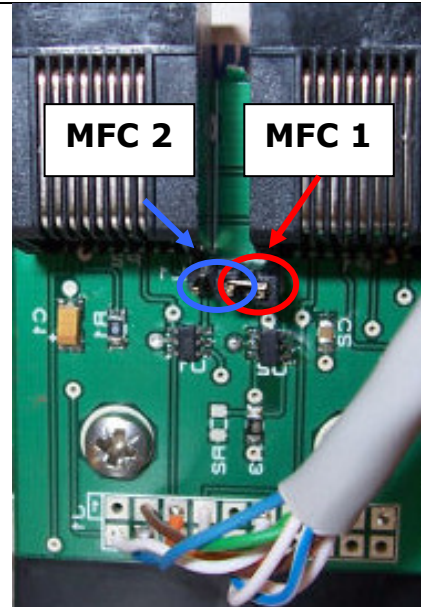
The jumper must be fitted on the pins located in the centre of the PCB

123 – no jumper, MFC will not be detected in software

123 – jumper covering right hand pins, assigned as MFC 1



123 – jumper covering left hand pins, assigned as MFC 2 (only use when two MFCs are present)



2.2. ULTRA 50:50

Note: MFC installation is only possible on 50:50 systems with serial number higher than (GB00)M-20472

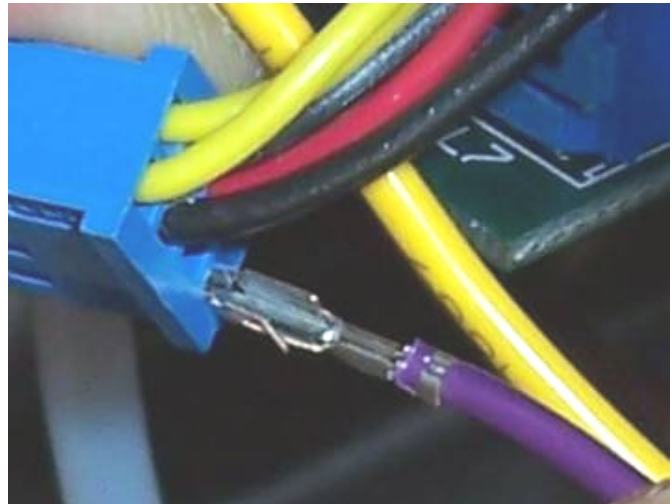
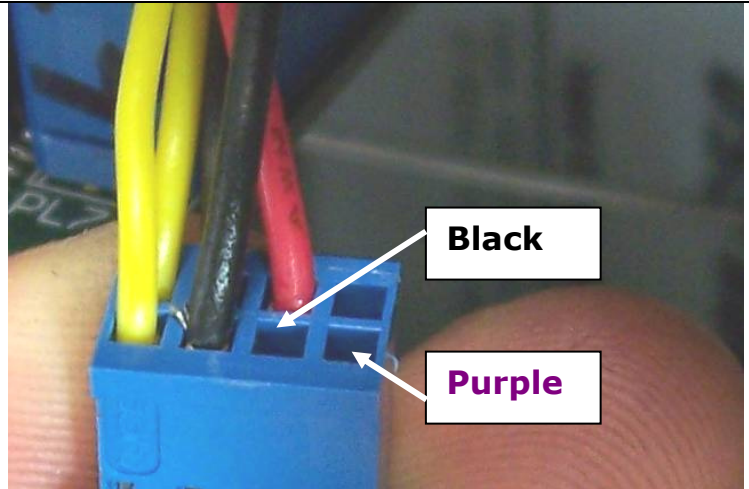
Remove the left hand side covers from 50:50.

Locate the Control PCB at the rear of the 50:50 and remove the PL4 connector.

Insert the purple and black wires provided as indicated.

Insert wires with the barb facing the outside of the connector.

Ensure the wires are firmly secured.

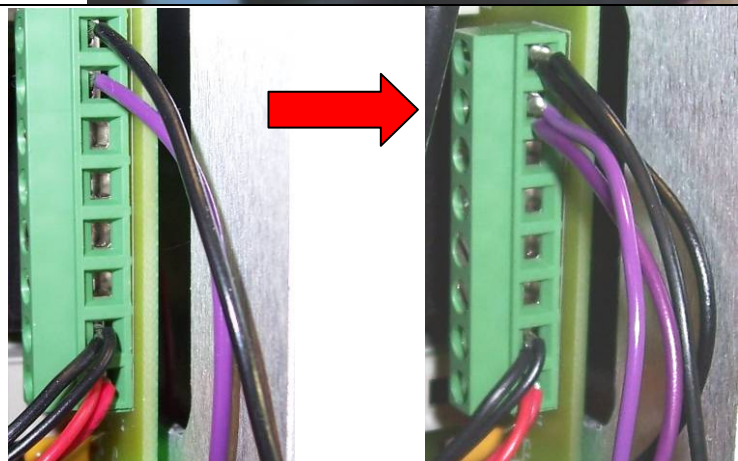


Route the black and purple wires to the DC convertor.

Combine the black and purple wires from the PL4 connector and re-insert.

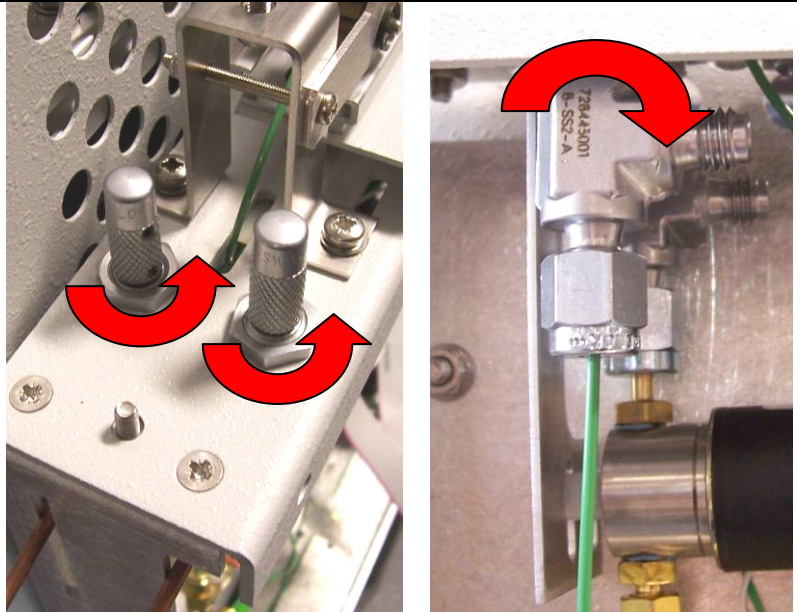
Reconnect the PL4 connector on the Control PCB.

Secure the wires with the supplied zip-ties.



Rotate the needle valve connectors.

- 1) Remove the top nuts
- 2) Lower and move the recollect needle valve to one side
- 3) Loosen the 1/8" nut attached to the split needle valve so the t-piece can be rotated to face the rear of the 50:50
- 4) Retighten the 1/8" nut
- 5) Replace the recollect needle valve so that it also faced rearwards
- 6) Retighten the securing nuts



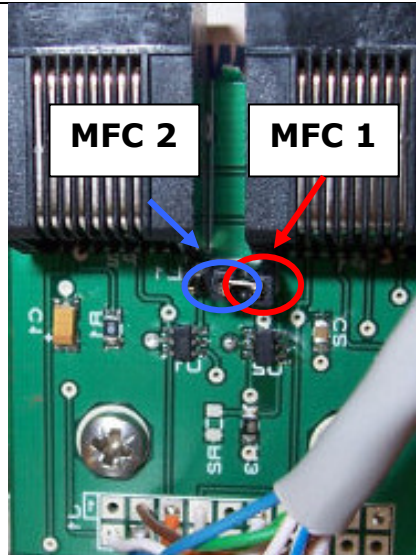
Check the MFC jumper settings. The jumper must be fitted on the pins located in the centre of the PCB.

123 – no jumper, MFC will not be detected in software

123 – jumper covering right hand pins, assigned as MFC 1

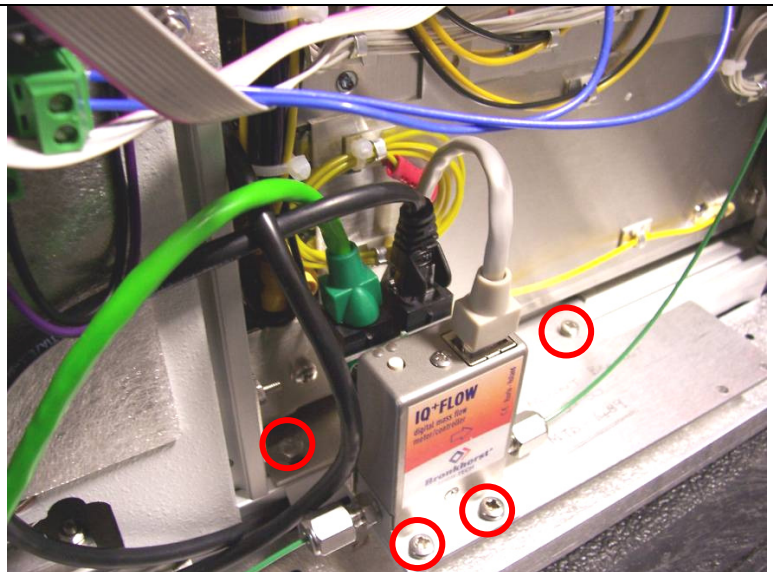


123 – jumper covering left hand pins, assigned as MFC 2 (only use when two MFCs are present)



Secure the MFC mounting bracket with 2 M4 screws and stones.

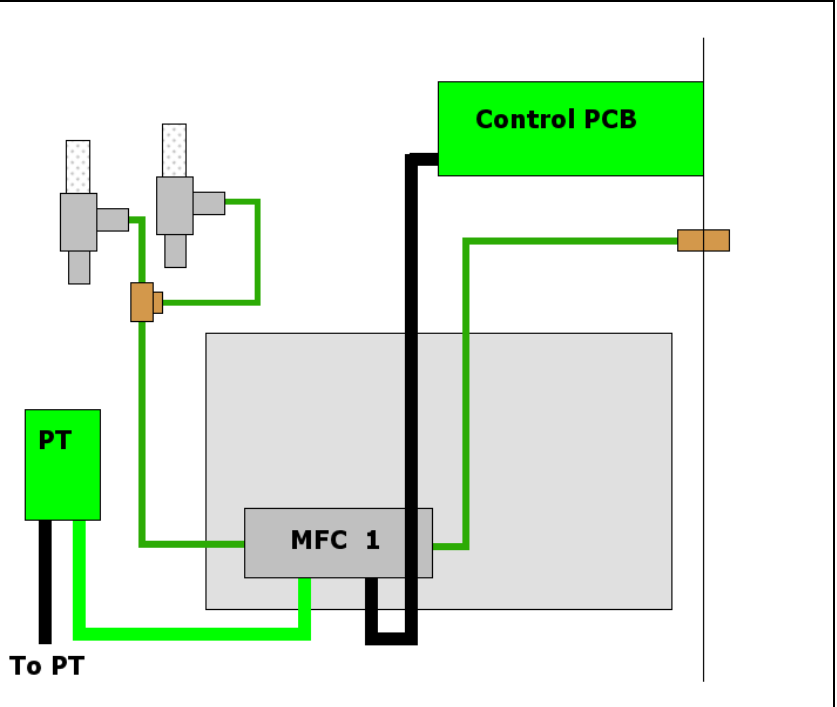
Mount the MFC onto the bracket with 2 M4 screws.



Remove one of the black cables from the pressure transducer board and connect it to the MFC. Connect the other port on the MFC to the free port on the pressure control board with the supplied cable.

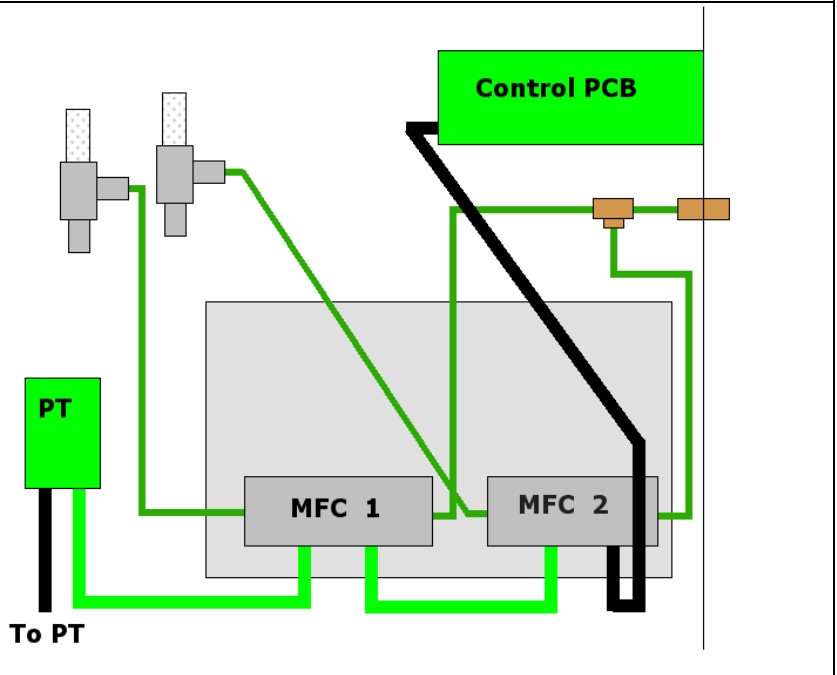
Tee the output from both 50:50 needle valves and connect to the MFC.

Connect the MFC flow out and a 1/8" bulkhead union on the rear panel of ULTRA 50:50



When installing 2 MFCs install as above then connect as shown.

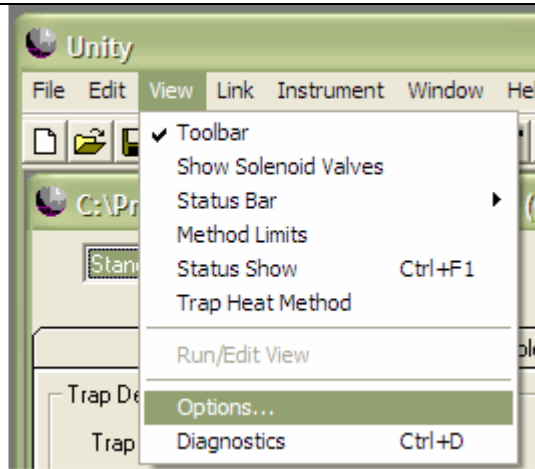
Ensure the MFC jumper settings are correct.



3. Software setup

Once the MFC(s) have been installed switch the UNITY 2 on and start the thermal desorption software.

Go to '**View-Options**'

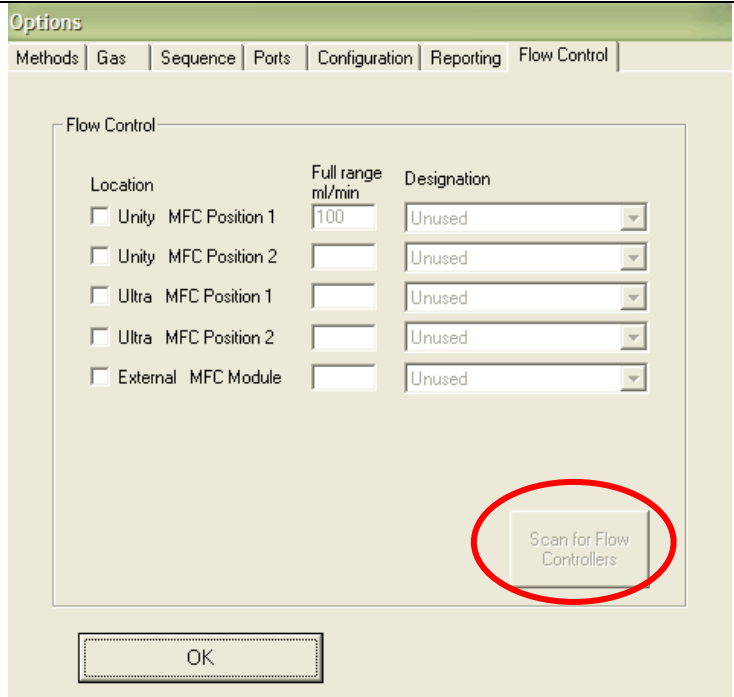


Select the '**Flow Control**' tab.

Click '**Scan for Flow Controllers**' (password is **davinci**) to automatically detect all MFCs present.

Enter the maximum flow for each of the MFCs detected into the '**Full range ml/min**' box.

Note '**External MFC Module**' refers to an MFC not installed on UNITY 2, such as ASIS 8 and Air Server series 1.



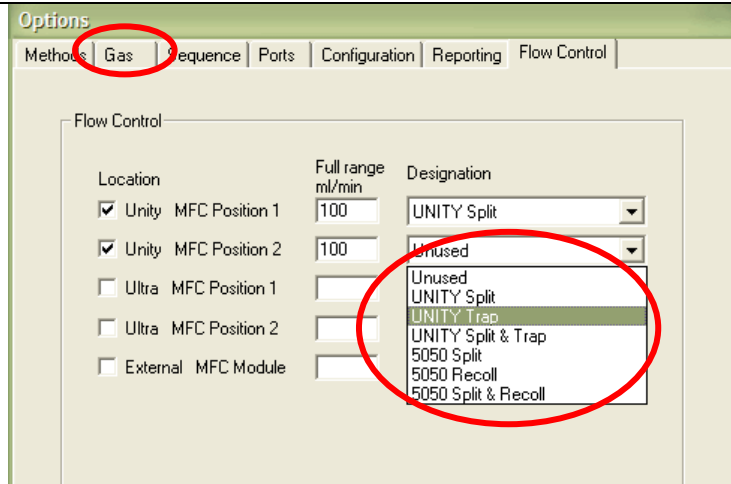
MFC(s) on UNITY 2

It is now possible to designate each MFC to control a specific flow. See Section 1 for schematics.

Note: The MFC and the correct needle valve must be connected in order to control the flow.

i.e for MFC 1 to control the Split Flow MFC 1 must be connected to the Split flow needle valve.

Under the 'Gas' tab select the correct Carrier Gas type.



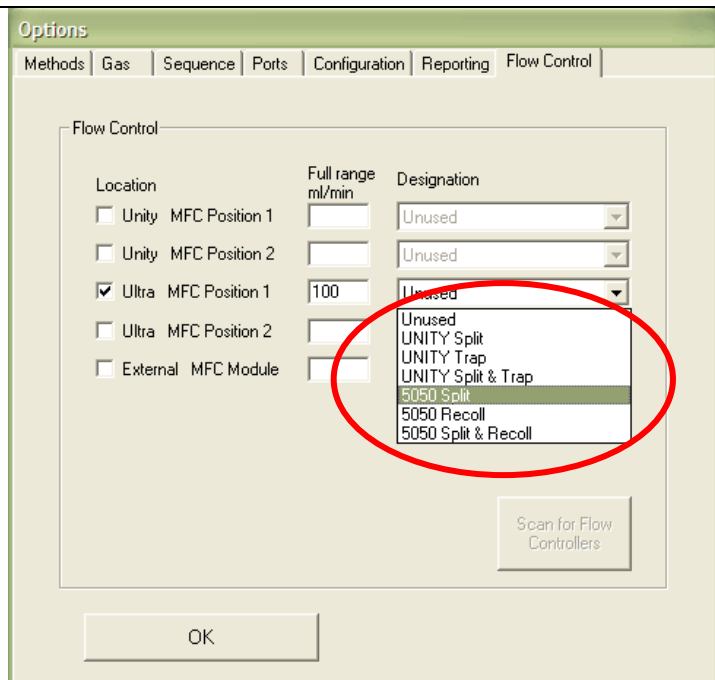
MFC(s) on 50:50

1 MFC - Assign as '5050 Split & Recoll'

2 MFCs - Assign one as '5050 Split' and the other as '5050 Recoll'

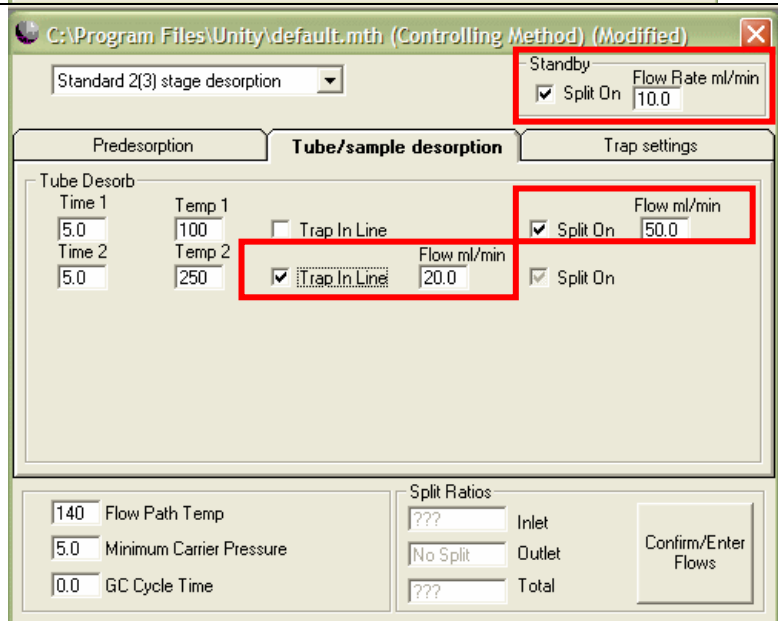
3 MFCs - When combining with MFCs on UNITY 2 set as for 2 MFCs above but have the UNITY MFC control 'UNITY Trap' (see Section 1)

NOTE: When controlling a flow the MFC must be connected to that flow's needle valve.



The method window will now display flow values next to the thermal desorption steps relevant to your MFC setup.

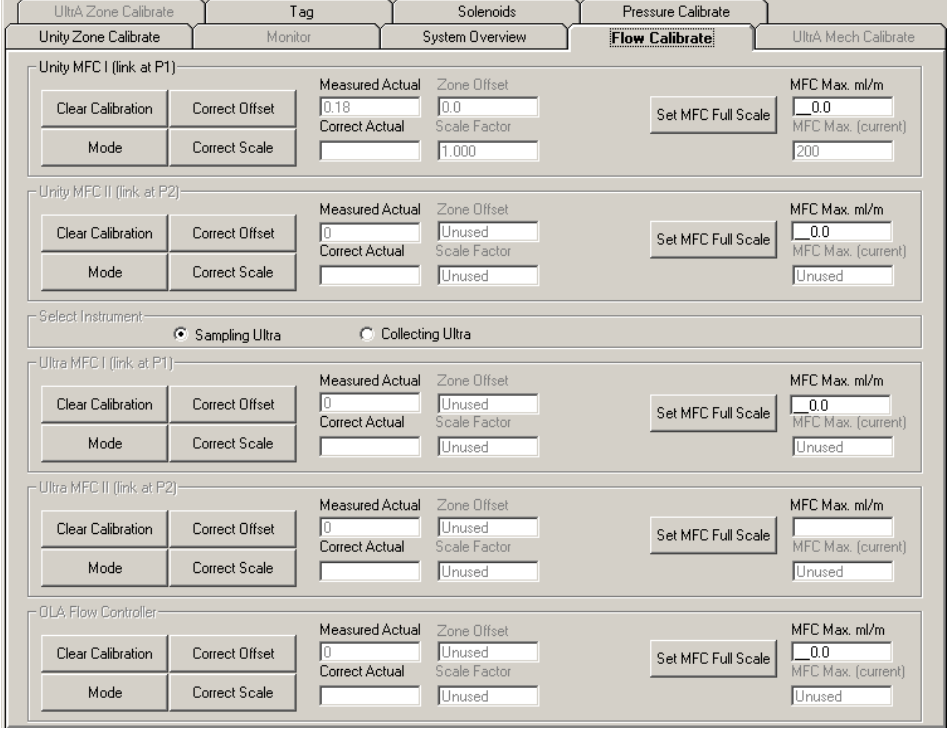
The status of the MFC module(s) are displayed in the status bar.



<p>Setting Needle Valves</p> <p>It is important to adjust the needle valves to allow the correct flow to the MFCs. This can be done once the software is downloaded.</p> <p>Ideally this should be at least 10 – 20 ml/min above the maximum flow used during the UNITY 2 run.</p>	
<p>Leak Testing</p> <p>The connections between the needle valves and MFC(s) should be tested for leaks using a electronic He leak tester.</p>	

4. Calibrating the MFC

The MFC must be calibrated prior to use to ensure the correct flow is reported. This should be carried out by a trained engineer.

<p>Enter diagnostics using the appropriate password and go to the 'Flow Calibrate' tab.</p> <p>The MFC(s) detected and assigned in Section 3 will have values present in the 'Zone Offset' and 'Scale Factor' box.</p> <p>The correct 'Zone Offset' and 'Scale Factor' for the MFC is provided on a label attached to the MFC. To enter the values click on 'Mode' to highlight the Zone Offset and Scale Factor boxes and type in the values.</p>	 <p>The screenshot shows the 'Flow Calibrate' tab in a software interface. It features a navigation bar with tabs: 'Ultra Zone Calibrate', 'Tag', 'Solenoids', 'Pressure Calibrate', and 'Ultra Mech Calibrate'. The 'Flow Calibrate' tab is active, showing a 'Monitor' sub-tab. Below this, there are sections for 'Unity MFC I (link at P1)', 'Unity MFC II (link at P2)', 'Ultra MFC I (link at P1)', 'Ultra MFC II (link at P2)', and 'OLA Flow Controller'. Each section contains a 'Clear Calibration' button, a 'Correct Offset' button, a 'Correct Actual' button, a 'Mode' button, and a 'Set MFC Full Scale' button. Input fields for 'Measured Actual', 'Zone Offset', 'Correct Actual', and 'Scale Factor' are present for each MFC. The 'Unity MFC I' section shows 'Measured Actual' as 0.18 and 'Scale Factor' as 1.000. The 'MFC Max. ml/m' field is set to 200. The 'Select Instrument' section has 'Sampling Ultra' selected. The 'OLA Flow Controller' section shows 'Measured Actual' as 0 and 'Scale Factor' as Unused.</p>
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