



Vapor Delivery System VDS3 User's Manual



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VDS3

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Safety

The manufacturer has designed this equipment to be safe when operated using the procedures detailed in this manual. The user must not use this equipment for any other purpose than that stated. Do not apply values greater than the maximum value stated.

This manual contains operating and safety instructions, which must be followed to ensure the safe operation and to maintain the equipment in a safe condition. The safety instructions are either warnings or cautions issued to protect the user and the equipment from injury or damage. Use qualified personnel and good engineering practice for all procedures in this manual.

Electrical Safety

The instrument is designed to be completely safe when used with options and accessories supplied by the manufacturer for use with the instrument. The input power supply voltage limits are 220 to 240 V AC OR 100 to 120 V AC 50/60Hz.

Pressure Safety

DO NOT permit pressures greater than the safe working pressure to be applied to the instrument. The maximum safe inlet pressure is 4.8 barg (70 psig).

Toxic Materials

The use of hazardous materials in the construction of this instrument has been minimized. During normal operation it is not possible for the user to come into contact with any hazardous substance which might be employed in the construction of the instrument. Care should, however, be exercised during maintenance and the disposal of certain parts.

Repair and Maintenance

The instrument must be maintained either by the manufacturer or an accredited service agent. Refer to www.michell.com for details of Michell Instruments' worldwide offices contact information.

Safety Conformity

This product meets the essential protection requirements of the relevant EU directives.

Abbreviations

The following abbreviations are used in this manual:

AC	alternating current
atm	pressure unit (atmosphere)
barg	pressure unit (=100 kP or 0.987 atm) (gauge)
°C	degrees Celsius
°F	degrees Fahrenheit
dp	dew point
EU	European Union
Hz	Hertz
IEC	International Electrotechnical Commission
NI/min	normal liters per minute
mm	millimeters
lb	pound
psig	pound(s) per square inch (gauge)
ppb _v	parts per billion (volume)
scfh	standard cubic feet per hour
USB	Universal Serial Bus
V	Volts
W	Watts
"	inches

Warnings

The following general warnings listed below are applicable to this instrument. They are repeated in the text in the appropriate locations.



Where this hazard warning symbol appears in the following sections, it is used to indicate areas where potentially hazardous operations need to be carried out.

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1 INTRODUCTION

1.1 Overview

The Michell VDS3 Vapor Delivery System is designed for use as part of a hygrometry calibration system. It is capable of repeatable generation of set dew-point levels over the range -100 to +20°C (-148 to +68°F) dew point.

The system is assembled within a small floor-mounted 19" equipment rack enclosure fitted with castors for ease of movement. The system requires a supply of high quality dry gas with a moisture content of better than 1 ppb_v (-100°C (-148°F) atmospheric dew point) to enable the maximum range of dew points to be generated. The supply of high quality dry gas can be provided by a Michell PSD4 Pressure Swing Dryer.

The vapor delivery system divides the dry gas into three controllable gas streams. One of these streams passes through a controlled evaporator mixer and is then mixed by volumetric ratios with the other streams to produce different factory pre-set dew point values over the range -100 to +20°C (-148 to +68°F) (user configurable). These dew points are selected remotely via a PC.

2 INSTALLATION

2.1 Enclosure

The instrument enclosure is designed for floor mounting (19" equipment mini-rack). Castors are fitted for ease of movement.

Access at the front, left hand side and rear is required for operation. Front and side panels are removable for maintenance & servicing.

2.2 Gas Connections

2.2.1 Dry Air Inlet

The system must be supplied with high quality (oil free) dry compressed air to the same specification as used during its calibration/setup (< 1ppb_v (-100°C (148°F) moisture content).

The generator was calibrated/set-up using compressed air supplied from a Michell PSD4 Pressure Swing Dryer.

The input gas pressure is further regulated and controlled by an factory set pressure regulator, located internally. **NOTE: This regulator MUST NOT be adjusted!**

The gas inlet connection is a stainless steel ¼" Swagelok VCR face seal bulkhead union fitting located on the rear panel of the unit marked **GAS INLET**.

2.2.2 Dew-Point Outlet

The gas outlet connection is a stainless steel ¼" Swagelok VCR face seal bulkhead union fitting located on the rear panel of the unit marked **GAS OUTLET**.

2.2.3 Compressed Air

The system requires a separate supply of oil-free compressed air for operating pneumatic valves and pressurizing the water supply. The compressed air supply can be a normal industrial compressed air quality (i.e. 5 to 7 barg (72 to 101 psig) @ -40°Cdp (-40°Fdp).

The compressed air inlet connection is a stainless steel 6mm Swagelok® bulkhead union tube fitting located on the rear panel of the unit marked **COMPRESSED AIR INLET**.

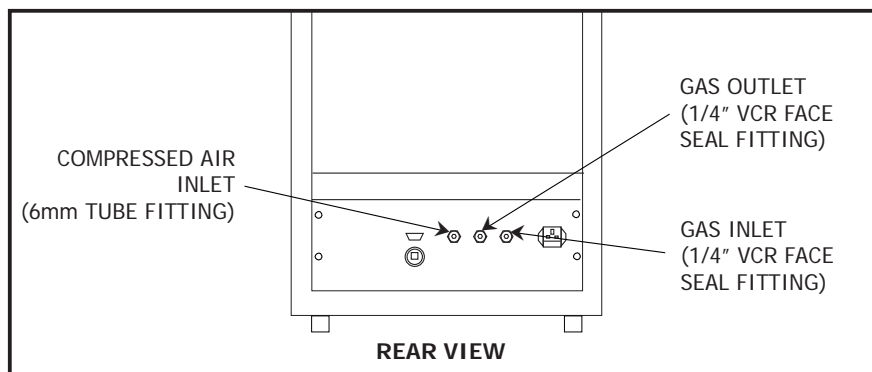


Figure 1 Gas Connections

2.3 Electrical Connections

2.3.1 Power Supply

100 to 120 V AC OR 220 to 240 V AC 50/60Hz power supply is required to operate this instrument. Refer to the yellow label located on the rear panel of the unit for the correct supply voltage required.

The power supply connection is via the 3-pin IEC fused plug located on the rear panel of the unit. A 3 core power cable is provided, the free end of which should be wired to a suitable earthed plug or directly via a fused power spur.

Power cable conductors are colored according to the convention:

Brown	L (Live)
Blue	N (Neutral)
Green/Yellow	E (Earth/Ground)

2.3.2 PC Control Connection

Connect the host PC to the VDS via a USB connector located on the rear panel of the unit marked **PC (CONTROL)**. A 3 meter USB cable assembly is provided and should be connected as shown below:

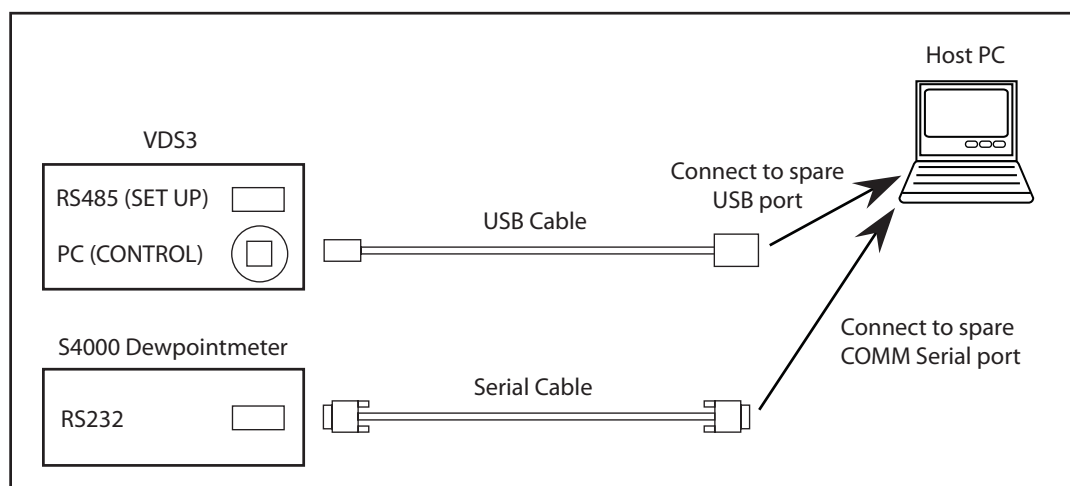


Figure 2 *PC Control Connection*

NOTE: Ensure that the S4000 Dewpointmeter is connected to the host PC to enable the software to read and record dew points. If it is not connected the software will not operate correctly.

3 OPERATION

Before operation, the system needs to be filled with distilled water.

3.1 Filling the Water Container



This unit operates under pressure. Safety goggles should be worn when filling the water container.

NOTE: Before attempting filling and subsequent top-ups, while the unit is in operation, ensure that the water container is isolated by turning off the water pressure valve (¼-turn clockwise) located alongside the display on the front panel.

1. Remove the side panel to access the water container.
2. Slowly turn the big blue valve handle (¼-turn anti-clockwise) to release the air pressure within the container.
3. Fill with clean distilled water to the level of the filler port (water capacity is approximately 1 liter (1 quart)).
4. Turn the big blue valve handle back to seal-off the water container.
5. Slowly turn on the water pressure valve (¼-turn anti-clockwise) located alongside the display on the front panel to repressurize the water container.

NOTE: When filling for the first time, or if the water was allowed to run out, slowly unscrew the tube nut on top of the CEM (Controlled Evaporation Mixer) to remove any airlock in the system and re-tighten the nut.

6. Replace the side panel.

3.2 'Start-Up' Procedure

NOTE: If a sequence of dew points is required it is important to start at the driest and select progressively through the range, moving from dry to wet.

1. Ensure that the water container is filled with distilled water as described above and that the compressed air and dry air supplies are present.
2. Switch on the system via the front panel **POWER** on/off switch. The front panel display should show **VDS Vx.x mm/yy cal mode** (where Vx.x is the firmware version and mm/yy is the date) and **Set dewpoint: -100.0**.
3. Allow the system to operate for a minimum of 1 hour so that the system pipework can purge and stabilize.
4. When operating for the first time, or after a long period without use, the system should be purged for longer, ie a minimum of 8 hours/overnight.

A 5-day purge is required before using the system below -80°Cdp (-112°Fdp).

NOTE: When the sequence is complete ALWAYS return the unit to the -100.0 setting and allow the system to run for several minutes to purge out any moist gas before shut down.

3.3 Operating Software

3.3.1 Dew-Point Control

Before starting up the PC, ensure that the dew-point control USB cable and the reference hygrometer serial cable are both connected to it. Start up the PC and the VDS interface software will load automatically.

Dew points may be selected manually via a keypad, or a sequence of user-defined dew points (for user-defined durations) may be run automatically via a profile table.

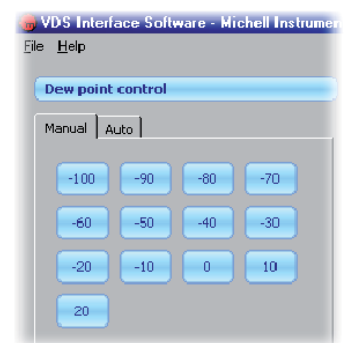
NOTE: The VDS interface software does not control the reference hygrometer sensor head temperature. The head temperature must be controlled manually.

NOTE: On launch the software will be in manual mode.

Manual Control (keypad):

Click the buttons to select a dew point.

NOTE: The VDS display shows the currently selected dew point.



Automatic Control (profile table):

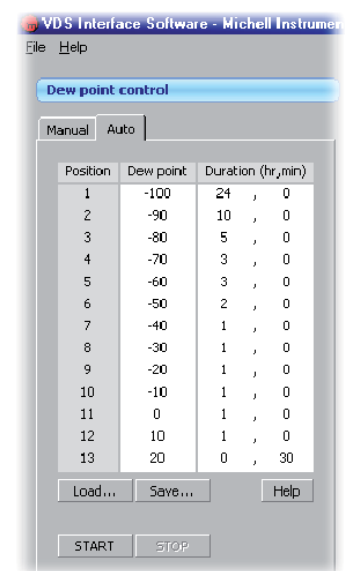
In automatic mode the software will step through the profile table starting at position 1 and ending at position 13.

The table is fully customizable. Dew points and durations may be changed as required.

Table profiles may be saved and loaded.

NOTE: Dew points must be between -100 and +20 in 10 degree steps.

NOTE: If a duration is entered as 0 hours and 0 minutes, the position will be skipped.




3.3.2 Readings

The Readings Section displays both the current set dew point and the actual dew point as read from the reference hygrometer.

NOTE: The reference hygrometer is read approximately every second.

Readings Section:

<p>Actual dew point as measured by the reference hygrometer.</p> <p>Set dew point displays the dew point as set through either manual or automatic dew-point selection.</p>	
---	---

3.3.3 Recording

The Recording Section contains a real-time chart recorder and a history canvas.

The chart recorder plots both set and actual dew points, plotting new readings approximately every 5 seconds.

Above the chart are four chart controls, namely; **Plot**, **Scroll-X**, **Scroll-Y** and **Zoom box**.

- **Plot** puts the chart into plot (normal) mode
- **Scroll-X** puts the chart into a mode which allows the X axis to be scrolled left and right
- **Scroll-Y** puts the chart into a mode which allows the Y axis to be scrolled up and down
- **Zoom box** puts the chart into a mode which allows zooming in on an area of the chart

To use these modes, click the desired control button then click and drag the mouse on the chart area.

To use the Zoom box, click the left mouse button on the chart area. Keeping the left mouse button held down, drag a box around the area to be zoomed.

NOTE: After using any mode, click Plot to resume normal plotting.

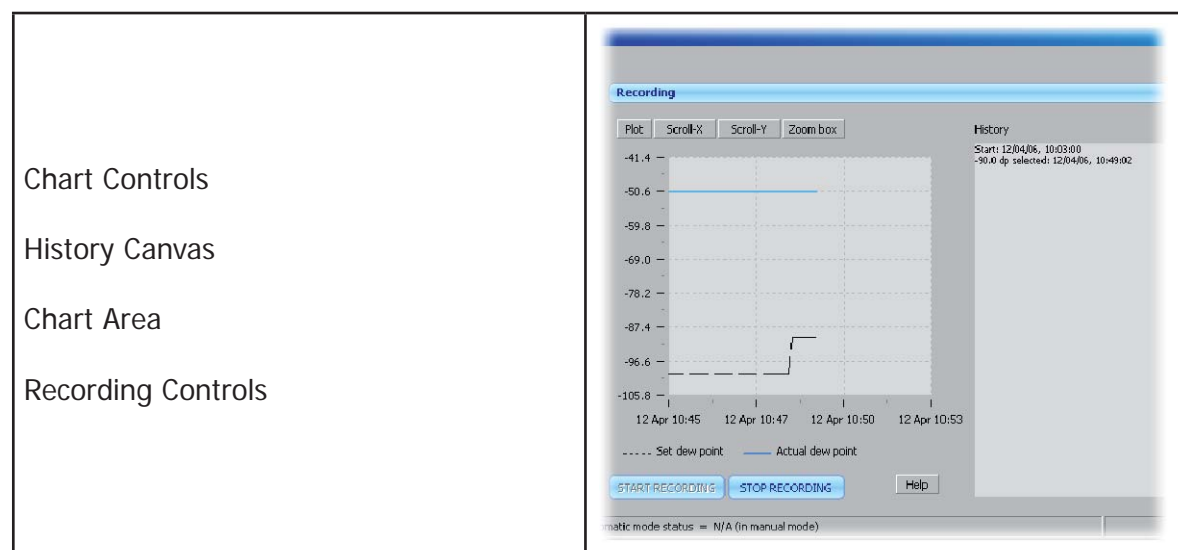
The history canvas records and displays the following events:

- Any set dew-point changes that take place (either manually or automatically). Automatic changes are prefixed with the text **(Auto)** and Manual changes do not have a prefix.
- When an automatic profile is started and finished.

NOTE: On launch the software will not be recording.

To record, click the **START RECORDING** button. To stop recording, click the **STOP RECORDING** button.

Recording Section:



4 MAINTENANCE

**WARNING:**

This unit operates under pressure. It is recommended that safety goggles are worn.

4.1 Routine

Routine maintenance of the Michell VDS3 Vapor Delivery System is limited to checking that the water container is always filled with distilled water (refer to Section 3.1).

This should be checked weekly (or more frequently if high dew points are generated for long periods).

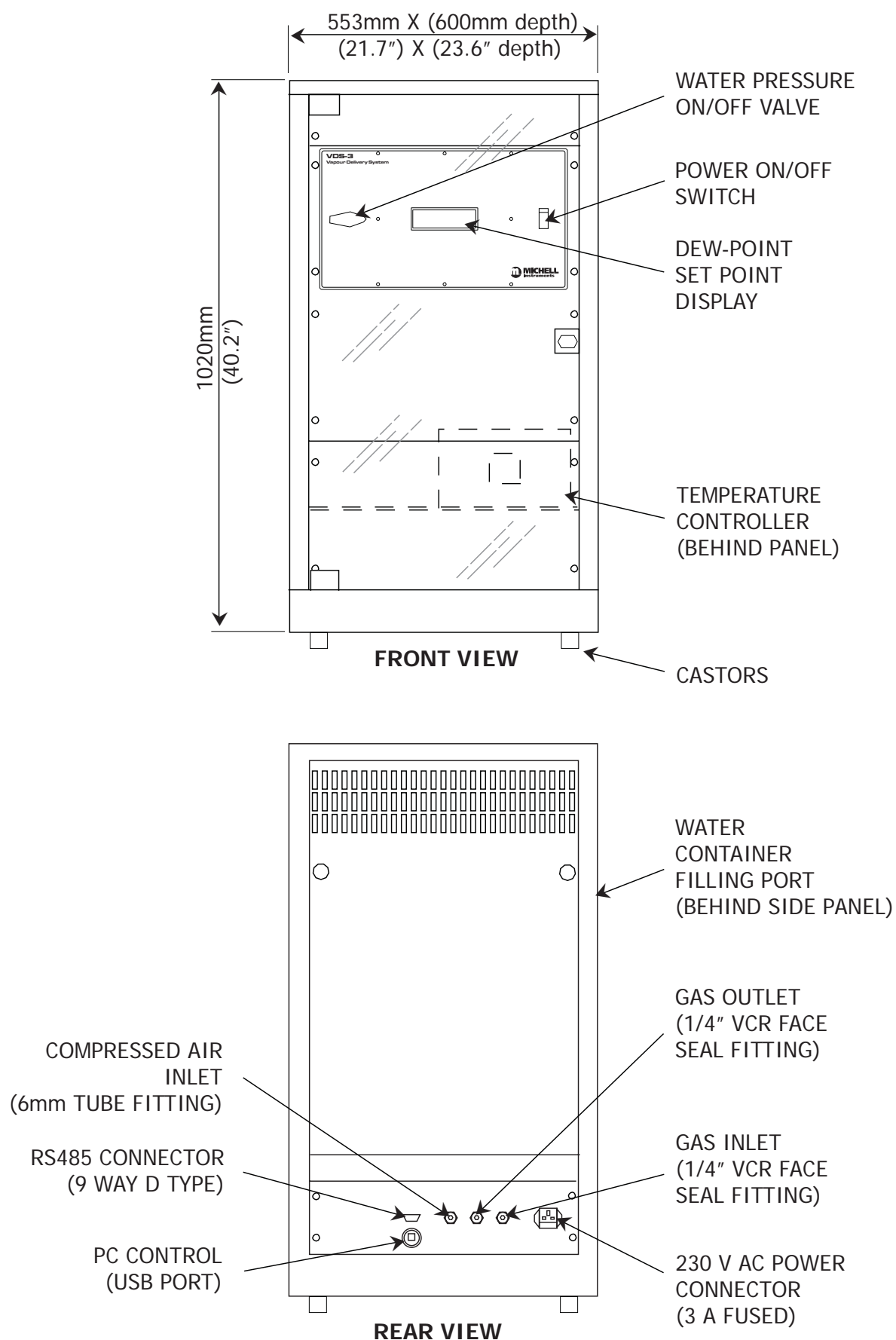
Appendix A

Technical Specifications

Appendix A Technical Specifications

General	
Dew-Point Range	-100 to +20°C (factory default pre-set values: -100, -90, -80, -70, -60, -50, -40, -30, -20, -10, 0, +10 and +20°C)
Output Stability	±0.5°C (±0.9°F)
Gas Supply	30 NI/min @ 4.8 barg (70 psig) pressure and less than 13.8ppb _v (-100°C (-148°F) atmospheric dew point) moisture content
Gas Output	10 NI/min @ 0.4 barg
Cable Connection	USB (type B) for PC Control RS485 (9 way D plug) for set-up
Water Container	Material: ABS Water capacity: 1 liter (1 quart)
Power Supply	220 to 240 V AC OR 100 to 120 V AC, 50/60Hz
Power Consumption	500 W maximum
Power Connector	3 pin IEC
Power Supply Fuse	3A (F) quick blow
Operating Temperature	+10 to +40°C (+50 to +104°F)
Construction	Painted diecast aluminum enclosure with smoked glass door
Dimensions	1020 x 555 x 600mm (40 x 21.8 x 23.6") (h x w x d)
Weight	65kg (143lbs) maximum

A.1 General Arrangement



A.2 Flow Diagram

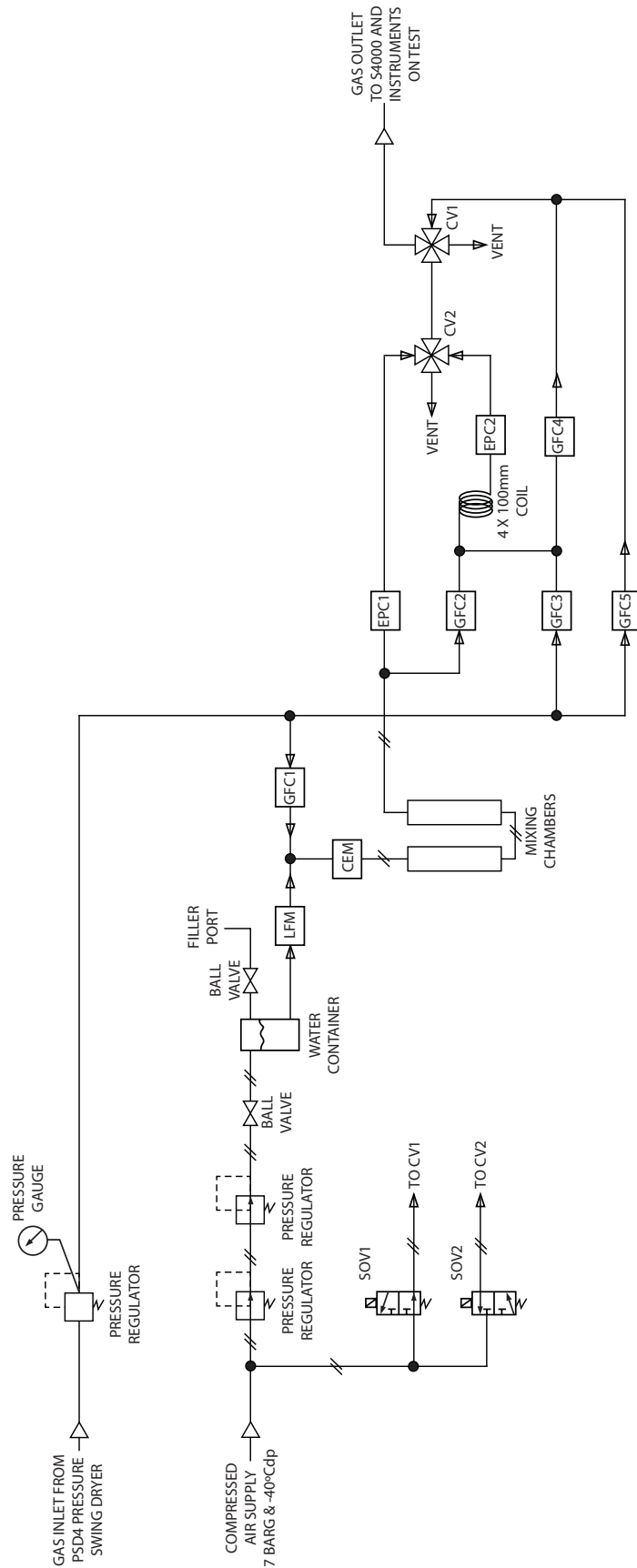


Figure 3 Flow Diagram

Appendix B

Set-Up Software / Adjustment of Setpoints

Appendix B Set-Up Software / Adjustment of Setpoints

The system is supplied pre-set with 13 setpoints between -100 and +20 at 10 degree intervals. However, if different setpoints are required, please follow the instructions below.

B.1 Set-Up Connection

Connect the host PC to the VDS via the 9-way D type connector located on the rear panel of the unit marked **RS485 (SETUP)**. A 2 meter grey serial cable assembly, along with a digital interface converter, is provided and should be connected as shown below:

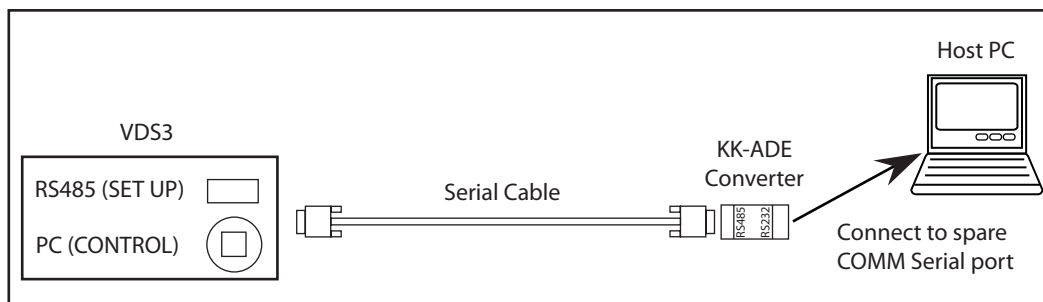


Figure 4 Set-Up Connection

B.2 About the Software

Before launching the set-up software, the VDS system must be placed in set-up mode by following the steps below:

1. Shut down all software(s) running on the host PC.
2. Launch the VDS utility program (found in the host PC desktop VDS folder).
3. Enter **1** as the comm port number and then click the **Connect** button.
4. Click the **Setup mode** button.

The VDS display should now show **Setup mode**.

If not, click the **Setup mode** button again. When the VDS display shows **Setup mode** close the utility program.

Launch the set-up software through **START > Programs > Michell Instruments > VDS Setup software > VDS Setup software Vx.x**.

The software is used to establish fixed, repeatable dew points through on-screen, manual adjustments of all system controllers. Once dew points have been established, the settings are uploaded to, stored and used by the VDS control unit in dew-point generation mode.

Up to 13 fixed dew points may be stored by the VDS control unit, normally -100 to +20 in 10 degree steps.

The software provides:

1. A manual settings window

Where individual controller positions & valve states may be set manually in order to establish dew points.

2. A system diagram window

Where manual controller settings (targets) and actual controller settings (read back from the controllers) may be viewed simultaneously (useful for diagnostic purposes).

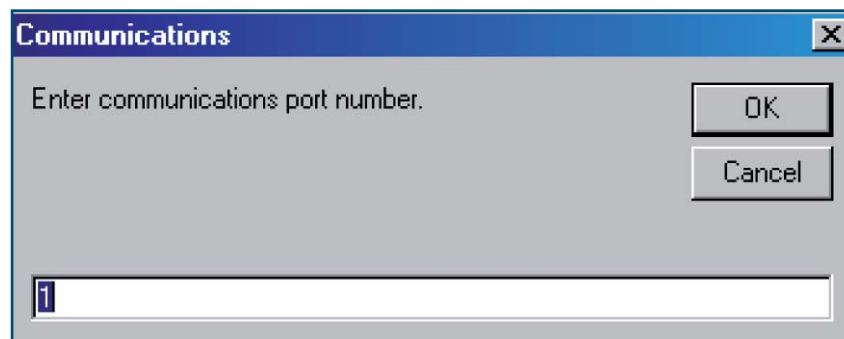
3. A system settings window

This window has 3 purposes, namely:

- i. It contains the table of settings stored within the control unit (these settings are stored in a text file at c:/Massflow.dat) and may be saved / loaded at any time.
- ii. Settings may be transferred from the table into the manual settings window.
- iii. The control unit is programmed with the table of settings through this window.

B.2.1 Initialization

On launching the software, a communications port input box appears as shown below:

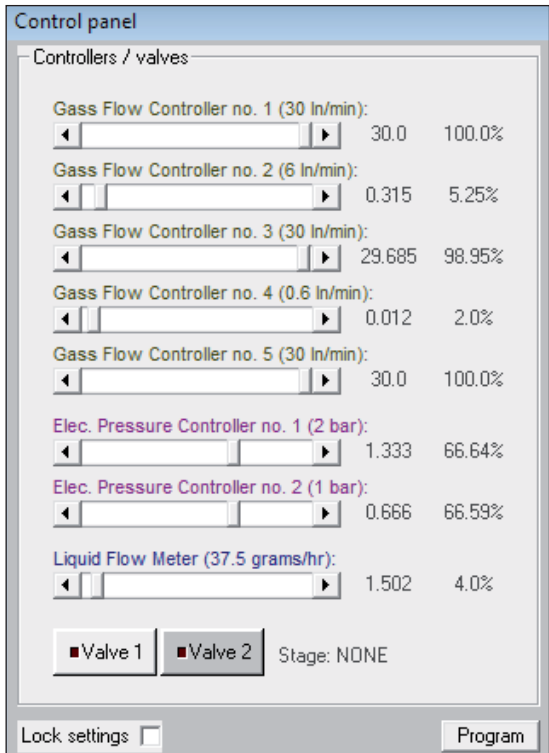


Enter **1** (for COMM port number 1) and click **OK**.

B.2.2 Manual Setting of Controllers

Use the **Control panel** window to manually set all gas, pressure and liquid flow controller inputs.

This enables a specific dew point to be generated if required, e.g. to generate -25°C, load the -30°C preset and adjust the values as appropriate.

<p>Position the scroll bars to the desired levels and set the valves to on/off by toggling the valve buttons.</p> <p>Combinations of valve positions make up 3 stages (Stage 1, 2 and 3) as shown next to the buttons.</p> <p>Once the desired settings are made, click the Program button to upload the settings to the VDS controller. The software will prompt for programming confirmation.</p> <p>NOTE: These are live settings only and are NOT stored by the VDS control unit.</p>	 <p>Control panel</p> <p>Controllers / valves</p> <table border="1"> <thead> <tr> <th>Controller</th> <th>Value</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Gas Flow Controller no. 1 (30 l/min):</td> <td>30.0</td> <td>100.0%</td> </tr> <tr> <td>Gas Flow Controller no. 2 (6 l/min):</td> <td>0.315</td> <td>5.25%</td> </tr> <tr> <td>Gas Flow Controller no. 3 (30 l/min):</td> <td>29.685</td> <td>98.95%</td> </tr> <tr> <td>Gas Flow Controller no. 4 (0.6 l/min):</td> <td>0.012</td> <td>2.0%</td> </tr> <tr> <td>Gas Flow Controller no. 5 (30 l/min):</td> <td>30.0</td> <td>100.0%</td> </tr> <tr> <td>Elec. Pressure Controller no. 1 (2 bar):</td> <td>1.333</td> <td>66.64%</td> </tr> <tr> <td>Elec. Pressure Controller no. 2 (1 bar):</td> <td>0.666</td> <td>66.59%</td> </tr> <tr> <td>Liquid Flow Meter (37.5 grams/hr):</td> <td>1.502</td> <td>4.0%</td> </tr> </tbody> </table> <p>Valve 1 Valve 2 Stage: NONE</p> <p>Lock settings <input type="checkbox"/> Program</p>	Controller	Value	Percentage	Gas Flow Controller no. 1 (30 l/min):	30.0	100.0%	Gas Flow Controller no. 2 (6 l/min):	0.315	5.25%	Gas Flow Controller no. 3 (30 l/min):	29.685	98.95%	Gas Flow Controller no. 4 (0.6 l/min):	0.012	2.0%	Gas Flow Controller no. 5 (30 l/min):	30.0	100.0%	Elec. Pressure Controller no. 1 (2 bar):	1.333	66.64%	Elec. Pressure Controller no. 2 (1 bar):	0.666	66.59%	Liquid Flow Meter (37.5 grams/hr):	1.502	4.0%
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Elec. Pressure Controller no. 2 (1 bar):	0.666	66.59%																										
Liquid Flow Meter (37.5 grams/hr):	1.502	4.0%																										

After a few seconds, the status bar at the bottom of the screen should indicate that the VDS control unit has been programmed successfully. Also, the **System Diagram** window will appear showing the manually set values next to each controller.

NOTE: The VDS front panel display will show Set dewpoint: USER on the display while manual settings are being made.

Control panel

Controllers / valves

Gas Flow Controller no. 1 (30 l/min): 30.0 100.0%

Gas Flow Controller no. 2 (6 l/min): 0.315 5.25%

Gas Flow Controller no. 3 (30 l/min): 29.685 98.95%

Gas Flow Controller no. 4 (0.6 l/min): 0.012 2.0%

Gas Flow Controller no. 5 (30 l/min): 30.0 100.0%

Elec. Pressure Controller no. 1 (2 bar): 1.333 66.64%

Elec. Pressure Controller no. 2 (1 bar): 0.666 66.59%

Liquid Flow Meter (37.5 grams/hr): 1.502 4.0%

Valve 1 Valve 2 Stage: NONE

Lock settings Program

Mass flow controller system

Dry air supply

Comp. air supply

Generator output

Vent

Stage 1: Vent

Stage 2: Vent

Stage 3: Vent

L.F.M. Target: 1.502 Reads: 1.447

E.P.C.1 Target: 1.333 Reads: 1.342

E.P.C.2 Target: 0.666 Reads: 0.658

G.F.C.1 Target: 30.0 Reads: 29.736

G.F.C.2 Target: 0.315 Reads: 0.337

G.F.C.3 Target: 29.685 Reads: 29.48

G.F.C.4 Target: 0.012 Reads: 0.016

G.F.C.5 Target: 30.0 Reads: 29.634

Evaporator mixer

Note: All readings are in l/min except for the liquid flow meter which is in grams / hr.

☐ Continuously read system Hide

ADC Values read successfully

Status Bar

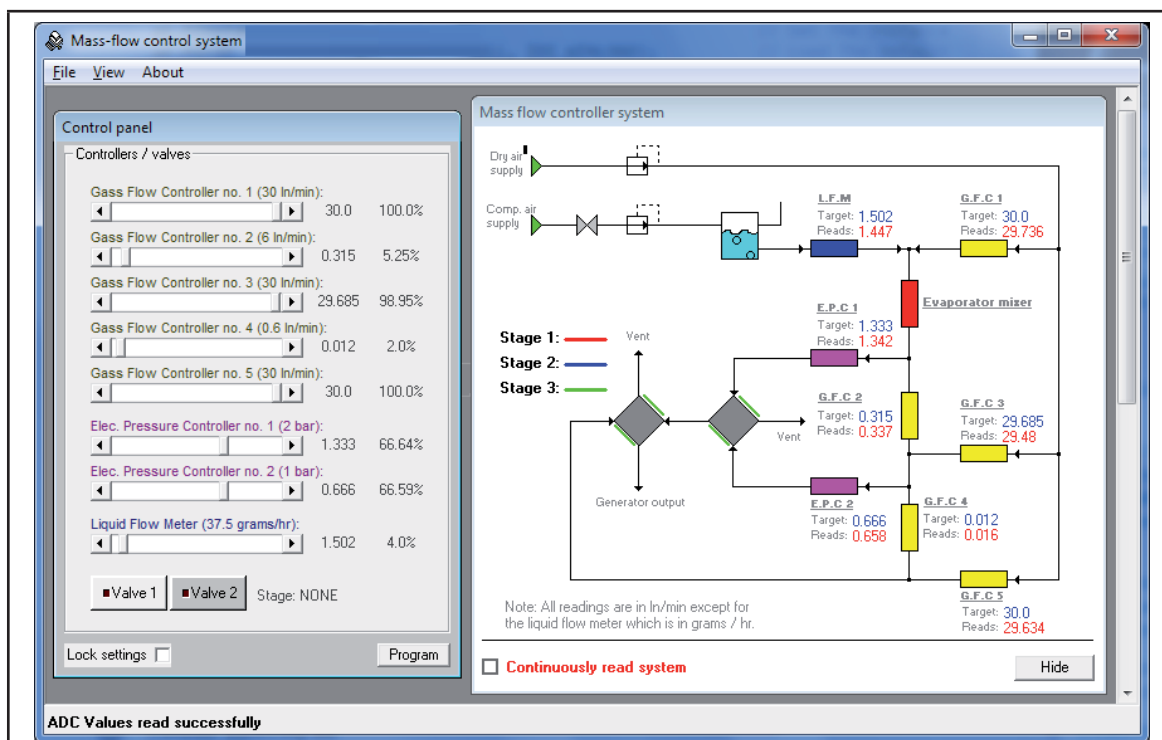
A success message on the bottom of the screen shows that the controller inputs have been set as per the manual settings.

System Diagram Window

Target values map the manually-set values in the control panel. Both the system diagram and the Controller input are updated with these values by clicking the **Program** button in the **Control panel** window.

To read back from the controller's outputs, tick the **Continuously read system** check box (bottom left of the system diagram window). The controller readings will update every few seconds.

NOTE: This is a useful visual tool for diagnostics purposes of the system, confirming that all components of the system are functioning properly.



Feedback

Values alongside **Reads** text are values being read back from the controllers. If functioning correctly, these values should match the target values.

(The screen shot shows random numbers for illustration purposes only).

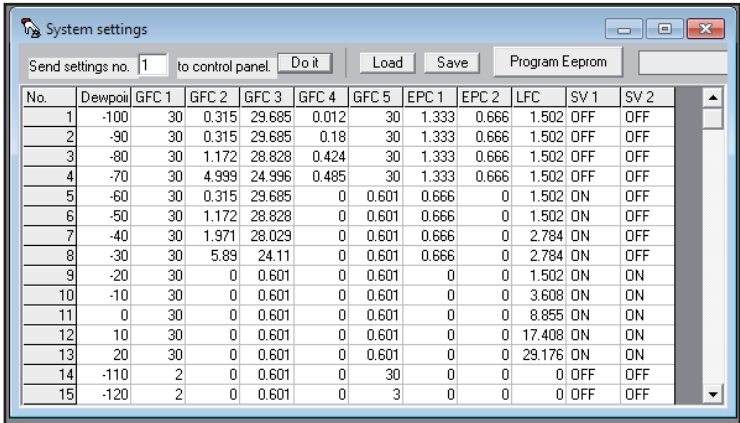
NOTE: If the target EPC is set to 0 then a slight deviation may be observed due to back-pressure in the system.

B.2.3 Programming the VDS

NOTE: The settings have been factory set at Michell Instruments prior to shipment. However, if you want to change them proceed as follows:

Once all dew points have been established, the controller settings must be entered into the System settings table and then programmed into the control unit.

The screen shot below is an example of a full 13 point table from -100 to +20 in 10°C steps.



System Settings

The table shows example dew points and associated controller settings by row.

Values may be edited by clicking on a cell and typing. Use back-space to erase digits.

Toggle valve states by double-clicking the valve cells.

No.	Dewpoint	GFC 1	GFC 2	GFC 3	GFC 4	GFC 5	EPC 1	EPC 2	LFC	SV 1	SV 2
1	-100	30	0.315	29.685	0.012	30	1.333	0.666	1.502	OFF	OFF
2	-90	30	0.315	29.685	0.18	30	1.333	0.666	1.502	OFF	OFF
3	-80	30	1.172	28.828	0.424	30	1.333	0.666	1.502	OFF	OFF
4	-70	30	4.999	24.996	0.485	30	1.333	0.666	1.502	OFF	OFF
5	-60	30	0.315	29.685	0	0.601	0.666	0	1.502	ON	OFF
6	-50	30	1.172	28.828	0	0.601	0.666	0	1.502	ON	OFF
7	-40	30	1.971	28.029	0	0.601	0.666	0	2.784	ON	OFF
8	-30	30	5.89	24.11	0	0.601	0.666	0	2.784	ON	OFF
9	-20	30	0	0.601	0	0.601	0	0	1.502	ON	ON
10	-10	30	0	0.601	0	0.601	0	0	3.608	ON	ON
11	0	30	0	0.601	0	0.601	0	0	8.855	ON	ON
12	10	30	0	0.601	0	0.601	0	0	17.408	ON	ON
13	20	30	0	0.601	0	0.601	0	0	29.176	ON	ON
14	-110	2	0	0.601	0	30	0	0	0	OFF	OFF
15	-120	2	0	0.601	0	3	0	0	0	OFF	OFF

Click **Save** to save the table to disk or **Load** to load it from disk. The file is located at: c:/Massflow.dat.

To program the VDS with the table, click **Program Eeprom**. This process takes about a minute. (The software will inform whether the programming has been successful or not). Once programmed, the VDS control unit is ready to run in calibration mode on next power down / power up.

The dew points are mapped in order as per the settings table, i.e. a binary value of 0000 on the D.C.L. input will select the dew point at position 1 (-100 in the above example), 0001 at position 2 (-90) to 1101 at position 13 (+20) and so on.

NOTE: Adjusting the values in this table will not change the keypad labels shown in Section 3.3.1, but will change the generated dew-points.

Appendix C

Quality, Recycling & Warranty Information

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C.1 Recycling Policy



Michell Instruments is concerned with the protection of the environment. It is our commitment to reduce and eliminate from our operations, wherever possible, the use of substances which may be harmful to the environment. Similarly, we are increasingly using recyclable and/or recycled material in our business and products wherever it is practical to do so.

To protect natural resources and to promote material reuse, please separate batteries from other types of waste and recycle responsibly. If batteries are not properly disposed of, these substances can cause harm to human health and the environment

The product that you have purchased may contain recyclable and/or recycled parts and we will be happy to provide you with information on these components if required.

C.2 WEEE And RoHS Compliance

The Waste Electronic and Electrical Equipment (WEEE) Directive, and the Restriction of Hazardous Substances (RoHS) Directive place rules upon European manufacturers of electrical and electronic equipment. The directives' aim is to reduce the impact that electronic devices have on the environment.

Michell products are currently exempt from the RoHS directive, however all future products will be developed entirely using compliant materials. Furthermore, Michell is taking active steps to remove non-compliant materials and components from existing products wherever possible.

Michell is in full compliance with the WEEE Directive (Registration No. WEE/JB0235YW). Customers may be required to return certain instruments for treatment at the end of their working life.

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C.3 Manufacturing Quality

Michell Instruments is registered with the British Standards Institute for Quality Assurance to:

BS EN ISO 9001: 2008

Rigorous procedures are performed at every stage of production to ensure that the materials of construction, manufacturing, calibration and final test procedures meet the requirements laid down by our BSI approved Quality System.

Please contact Michell Instruments (www.michell.com) if the product does not arrive in perfect working order.

C.4 Calibration Facilities

Michell Instruments' calibration facilities are among the most sophisticated in the world and have been recognized for their excellence.

Traceability to the National Physical Laboratory (NPL) UK is achieved through our UKAS Accreditation (Number 0179). This covers dew point over the range -90 to +90°C (-130 to +194°F) and also Relative Humidity.

Dew-point calibrations are also traceable to the National Institute for Standards & Technology (NIST) USA over the range -75 to +20°C (-103 to +68°F).

NOTE: Standard traceable calibration certificates for instruments and sensors are not issued under our UKAS accreditation. UKAS certificates are usually to special order and are clearly identified.

C.5 Return Policy

If a Michell Instruments' product malfunctions within the warranty period, the following procedure must be completed:

1. Notify a Michell Instruments' distributor, giving full details of the problem, the model variant and the serial number of the product.
2. If the nature of the problem indicates the need for factory service then the instrument should be returned to Michell Instruments, carriage prepaid, preferably in the original packaging, with a full description of the fault and the customer contact information.
3. Upon receipt, Michell Instruments will evaluate the product to determine the cause of the malfunction. Then, one of the following courses of action will be taken:
 - If the fault is covered under the terms of the warranty, the instrument will be repaired at no cost to the owner and returned.
 - If Michell Instruments determines that the fault is not covered under the terms of the warranty, or if the warranty has expired, an estimate for the cost of the repairs, at standard rates, will be provided. Upon receipt of the owner's approval to proceed, the product will be repaired and returned.

C.6 Warranty

Unless otherwise agreed, the Supplier warrants that as from the date of delivery for a period of 12 months the goods and all their component parts, where applicable, are free from any defects in design, workmanship, construction or materials.

The Supplier warrants that the services undertaken shall be performed using reasonable skill and care, and of a quality conforming to generally accepted industry standards and practices.

Except as expressly stated all warranties whether express or implied, by operation of law or otherwise, are hereby excluded in relation to the goods and services to be provided by the Supplier.

All warranty services are provided on a return to base basis. Any transportation costs for the return of a warranty claim shall reside with the Customer.

Appendix D

Return Document & Decontamination Declaration

Appendix D Return Document & Decontamination Declaration

Decontamination Certificate

IMPORTANT NOTE: Please complete this form prior to this instrument, or any components, leaving your site and being returned to us, or, where applicable, prior to any work being carried out by a Michell engineer at your site.

Instrument			Serial Number	
Warranty Repair?	YES	NO	Original PO #	
Company Name			Contact Name	
Address				
Telephone #			E-mail address	
Reason for Return /Description of Fault:				
Has this equipment been exposed (internally or externally) to any of the following? Please circle (YES/NO) as applicable and provide details below				
Biohazards	YES		NO	
Biological agents	YES		NO	
Hazardous chemicals	YES		NO	
Radioactive substances	YES		NO	
Other hazards	YES		NO	
Please provide details of any hazardous materials used with this equipment as indicated above (use continuation sheet if necessary)				
Your method of cleaning/decontamination				
Has the equipment been cleaned and decontaminated?	YES		NOT NECESSARY	
Michell Instruments will not accept instruments that have been exposed to toxins, radio-activity or bio-hazardous materials. For most applications involving solvents, acidic, basic, flammable or toxic gases a simple purge with dry gas (dew point <-30°C) over 24 hours should be sufficient to decontaminate the unit prior to return. Work will not be carried out on any unit that does not have a completed decontamination declaration.				
Decontamination Declaration				
I declare that the information above is true and complete to the best of my knowledge, and it is safe for Michell personnel to service or repair the returned instrument.				
Name (Print)			Position	
Signature			Date	

NOTES:



<http://www.michell.com>