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AD51 Dry Air Unit

# Operation & Instruction Guide

AD51 DRY AIR UNIT

# Operation & Instruction Guide 1.3

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## **SPECIFICATION**

<b>DRY AIR</b>	Up to 25 litres / minute at less than -60°C dewpoint
<b>DIMENSIONS</b>	Width: 660mm Depth: 300mm Height: 420mm (incl. feet)
<b>WEIGHT</b>	41.5 kg
<b>POWER</b>	<b>Specified at time of purchase:</b> 220-240V ac, 50 Hz, 5A  <b>or</b> 100-115V ac, 50/60 Hz, 11A

## **INTRODUCTION**

The AD51 is a development of the AD41 Dry Air Unit that has seen a total service life of millions of hours. The new benefits are:

### ***EVEN QUIETER RUNNING***

A brand-new quiet compressor has been fitted to almost eliminate any of the operating noise level from the unit.

### ***REDUCED AND IMPROVED MAINTENANCE***

The new compressor has significantly improved maintenance intervals due to the new and better quality lifetime of the compressor components. The new compressor design means that service parts can be changed extremely easily and quickly without the need to remove the compressor.

A new internal pipe work design has been fitted to improve the lifetime of some of the components.

## **BEFORE STARTING**

Make sure any transit material inside the AD51 has been removed before switching on. It may also be necessary to plug the compressor back in inside the unit.

## **MODE OF OPERATION**

This stand-alone unit draws in atmospheric air and converts it to dry air. The dry air has a dewpoint of better than  $-60^{\circ}\text{C}$  and a variable flowrate up to a maximum of 25 litres/minute.

The AD51 Flow Scheme (Fig 1) shows the air is compressed to 3.5 bar pressure and passed, via a particle filter, to a factory-sealed, twin-column pressure-swing adsorption dryer. An oil-free compressor is employed to avoid contamination of the molecular sieve drying agent by lubricating oil.

At any one time, pressurised air is dried by passing it up one of the columns. Simultaneously, a fraction of this dry air is bled back down the other column at low pressure to purge it of water vapour. After a pre-set time, the action of the two columns is reversed by means of electrically operated change over valves.

The pressurised dry air passes through a filter/regulator to remove pressure pulses during column switching and limit the maximum output pressure. The output flowrate is controlled by the user with a built-in needle valve and flowmeter.

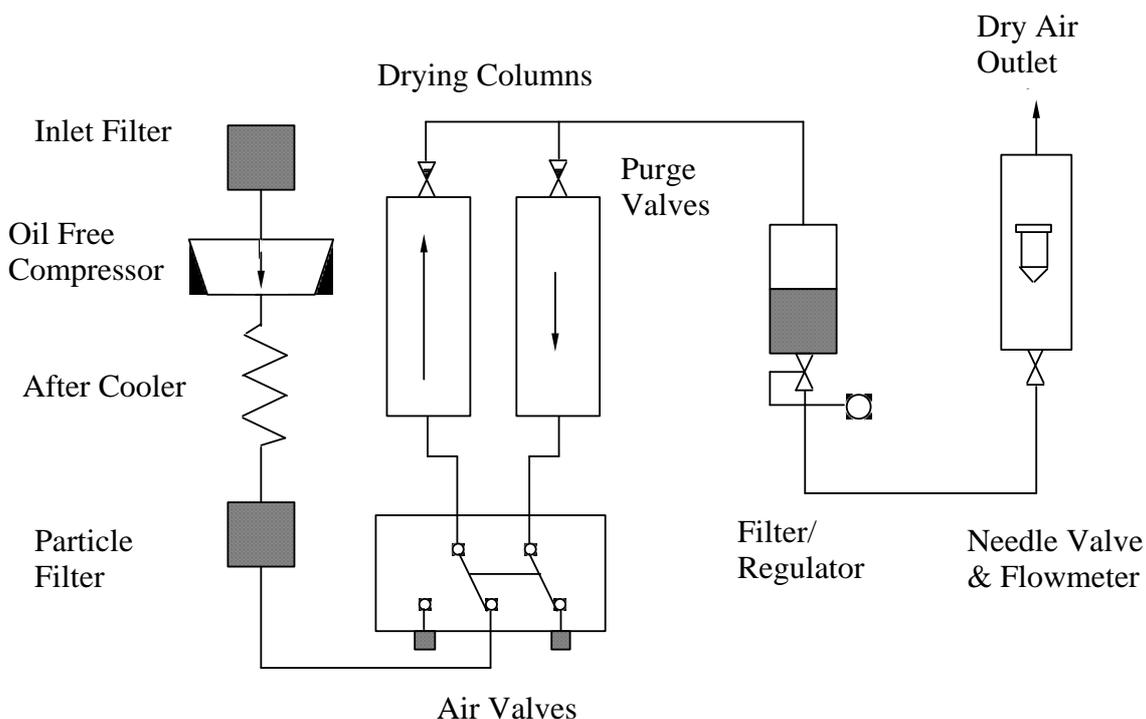


Fig 1 - AD51 Flow Scheme

## USING THE AD51

If the AD51 has not been used for some time it is advisable to run the unit overnight to establish the correct moisture gradient within the drying columns. This should be done before connecting any moisture-sensitive equipment to the DRY AIR output.

To avoid overheating, the AD51 should be located away from sources of heat and in a position where it can draw a supply of cool air through the high level inlet at the end of the quiet box. DO NOT OBSTRUCT THE COOLING AIR GRILLS AT EACH END OF THE UNIT.

1. Connect the DRY AIR output to your equipment using 8mm OD nylon tube to minimise pressure drop in the connecting tube. In Cryostream Cooler applications use the reducing coupling supplied to connect 8mm tube to 6mm tube: the total length of 6mm OD tube should be limited to 3 metres.
2. To obtain dry air, connect the AD51 to the appropriate electricity supply - the POWER lamp should light.
3. Switch on the AD51. At this point, the RUN lamp should flash for 4 seconds after which you will hear the compressor start and the RUN lamp will light continuously.
4. Set the required dry air flowrate with the needle valve on the flowmeter.

Note: As the AD51 warms up from cold the flow-rate may require adjusting. Once the unit is warm the flow-rate will stay constant.

## **MAINTENANCE AND TROUBLE SHOOTING**

The AD51 is designed to be a low-maintenance unit. A useful indication that the unit is functioning correctly is that a brief hiss can be heard at regular (one minute) intervals as the air valves switch the action of the columns.

When the AD51 is used with the Cryostream Cooler to provide the dry air shroud for the nitrogen gas stream, a deterioration in the dryness of the dry air will show up as frost forming evenly all around the cold nitrogen stream delivery nozzle.

### ***PRECAUTIONS***

If you have not used the AD51 for some time it may be necessary to run the unit overnight to dry down the columns.

### ***ROUTINE MAINTENANCE***

The AD51 is designed to run for more than 15,000 hours before needing any maintenance. However, local conditions may accelerate wear of components or clogging of filters. Routine or preventative maintenance may be carried out by users, utilising a qualified technician. The following items may require attention.

#### **Compressor Delivery Filter**

Eventually the Compressor Delivery Filter will become clogged with the finer particles of room dirt and the wear products from the compressor. This large capacity filter element is designed to last 15,000 hours and should normally be replaced at the same time as the compressor is serviced. Do not be surprised if the filter element is wet – the compressed air has not been dried at this point.

For details of the filter replacement see Appendix 3.

#### **Compressor**

At some stage (usually longer than 15,000 hours) the carbon impregnated plastic cup seal in the compressor will wear out. The eventual failure of the cup seal is a very sudden process and the dryness of the dry air will deteriorate rapidly, also the maximum flowrate of dry air will drop below 25 litres/minute (perhaps less than 10 litres/minute).

This situation requires the compressor to be serviced.

### ***CHECKING THE DRY AIR OUTPUT***

Note: Make sure to run the AD51 overnight before checking the dry air output, this will give the drying columns a chance to dry down.

The residual water vapour content of the AD51 dry air output may be measured with a suitable hygrometer calibrated down to  $-70^{\circ}\text{C}$  dewpoint. Allow at least 10 minutes for the reading to reach equilibrium.

## **FAULTS**

Note: If any trips are activated the cause should be determined, preferably by a qualified technician, before restarting the unit.

A rear panel fuse (T1A, 220-240V or T2A, 100-115V) protects the transformer that drives the power supply, control board, indicator lamps, cooling fan and solenoid valves.

A fuse (T2A) mounted internally on the control board protects the low voltage supply to the control logic circuits.

A rear panel circuit breaker operates if the compressor draws excessive current – push the black button in to reset.

A manual reset thermal switch operates if the temperature inside the quiet box rises excessively for any reason. If an overheat occurs the **HOT!** lamp will flash until the thermal switch is reset. The thermal switch is mounted in the compressor compartment (see Fig 4 (M)) - press the red button to reset.

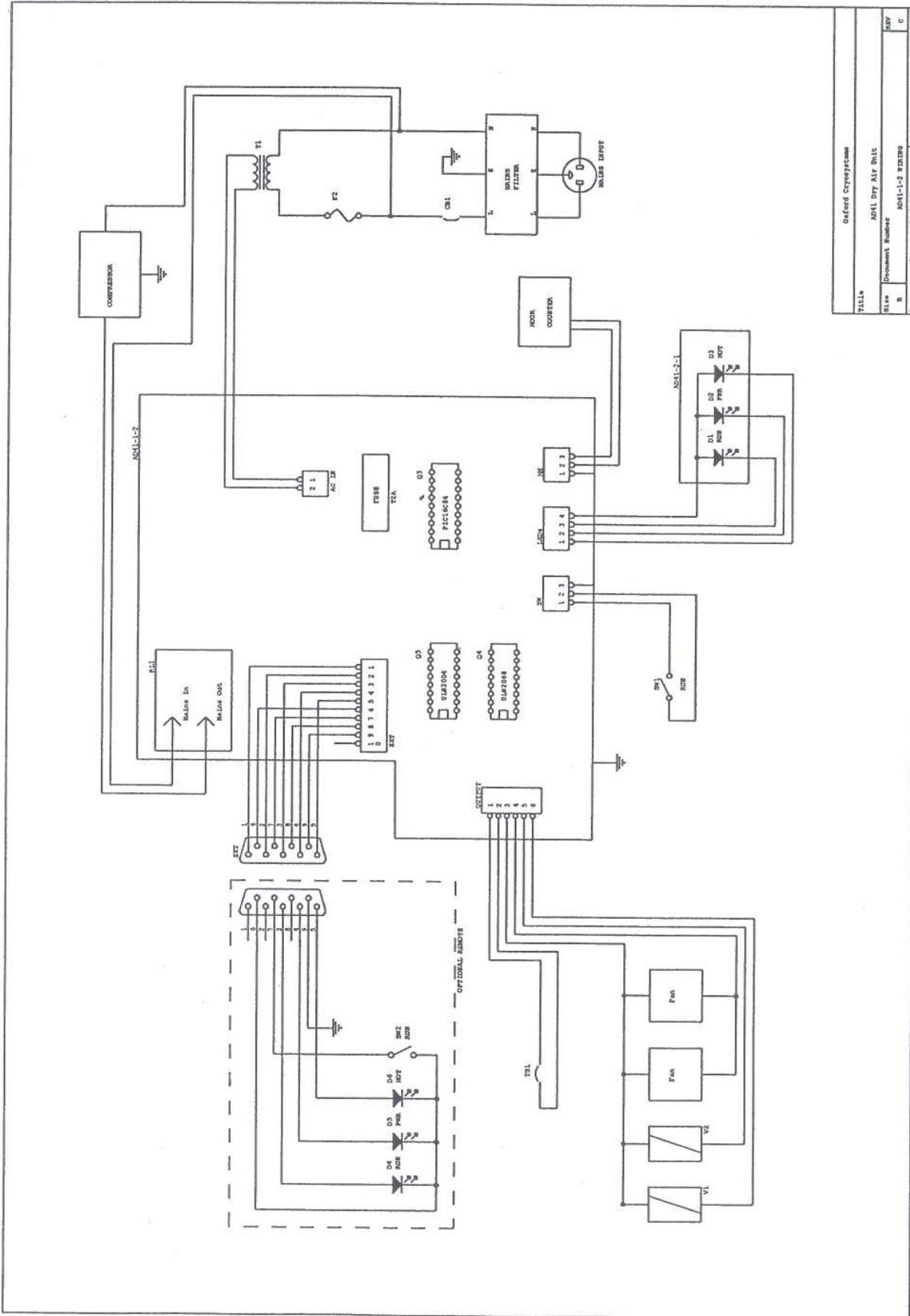
## **FACTORY OVERHAUL/SERVICE**

After extended running you may consider it desirable for the AD51 to have a complete factory service and full recommissioning procedure. Please contact your agent or Oxford Cryosystems to discuss this type of service if required.

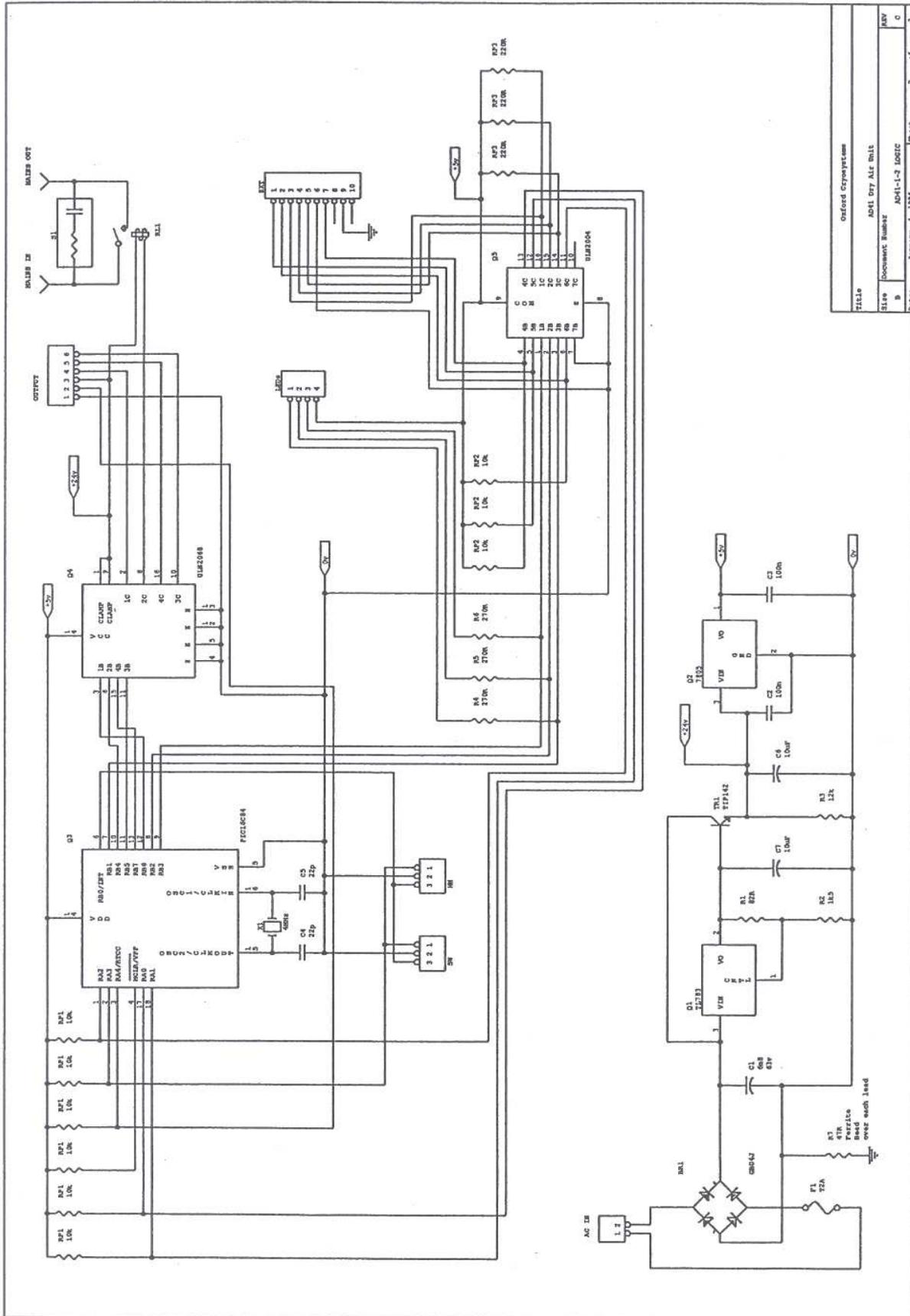
**LIST OF APPENDICES**

<b>APPENDIX 1</b>	General Circuit Diagram
<b>APPENDIX 2</b>	Control Board Circuit Diagram
<b>APPENDIX 3</b>	Compressor Delivery Filter Replacement

APPENDIX 1 - GENERAL CIRCUIT DIAGRAM



APPENDIX 2 - CONTROL BOARD CIRCUIT DIAGRAM



### **APPENDIX 3 - COMPRESSOR DELIVERY FILTER REPLACEMENT**

1. Switch off the AD51 and disconnect the electrical power.
2. Remove the AD51 top cover by lifting the four white plastic plugs and unscrewing the four M5 socket caphead screws with the 4mmA/F hexagon balldriver provided.
3. The Compressor Delivery Filter (A) is a square grey unit mounted just under the top cover near the control panel end of the AD51. Unscrew the four M6 socket caphead screws on the lid of the filter with the 5mmA/F hexagon key provided.
4. Lift off the lid and disconnect the 8mm nylon tube if necessary. Lift out the top anodised aluminium mesh (B), the filter disc (C) and the bottom anodised aluminium mesh (B).
5. Discard the dirty filter disc and clean the meshes.
6. Clean the sealing 'O' ring on the lid and the part of the body on which it seals.
7. Fit one mesh into the filter body, lay a new filter disc on top of the mesh with an equal overlap all round and fit the second mesh on top. Re-connect the 8mm nylon tube, replace the filter lid and tighten down the four M6 socket caphead screws evenly in sequence.
8. Run the AD51 overnight to dry down the columns.