



## OPERATING AND MAINTENANCE INSTRUCTIONS

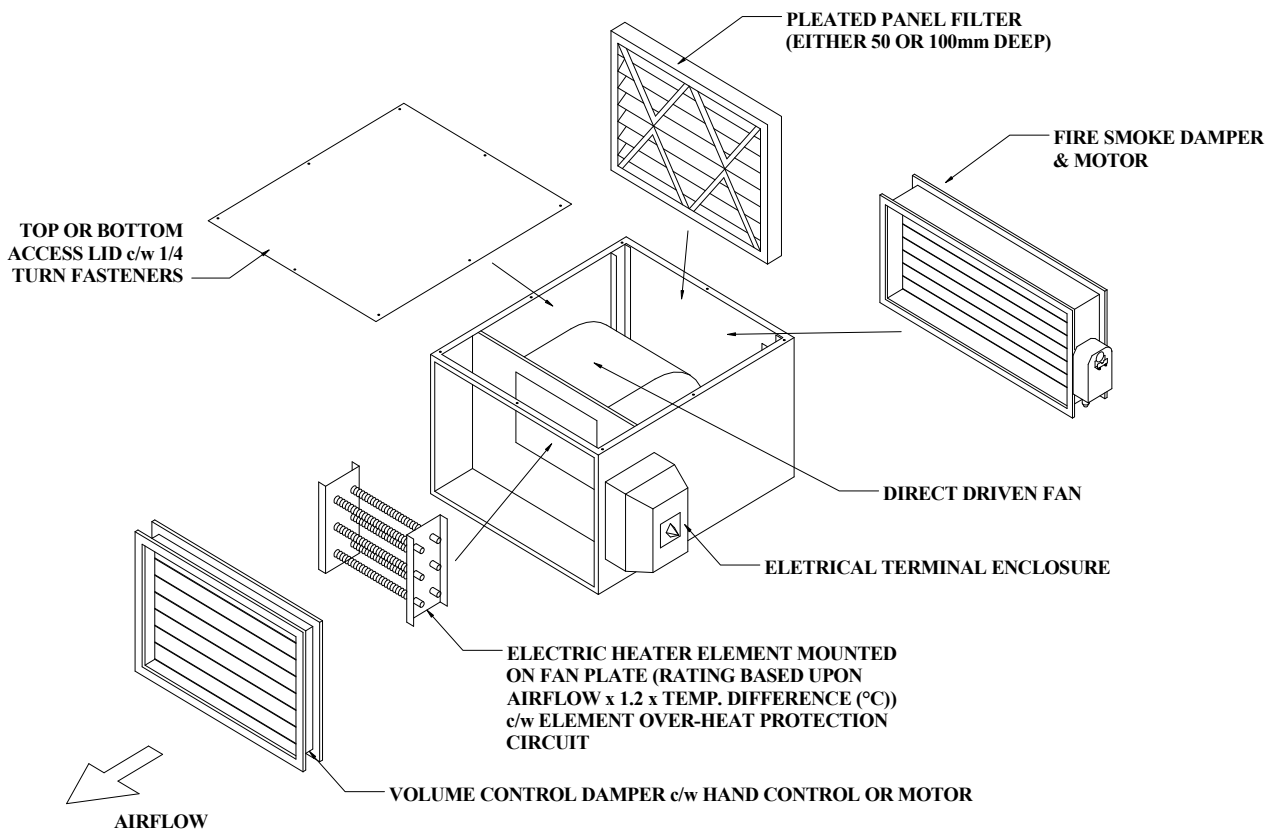
### SUPPLY ONLY - DIRECT DRIVEN – AIR HANDLING UNITS MO – CT - PP

#### DESCRIPTION

All units are manufactured to a very high standard, and are built in three styles:

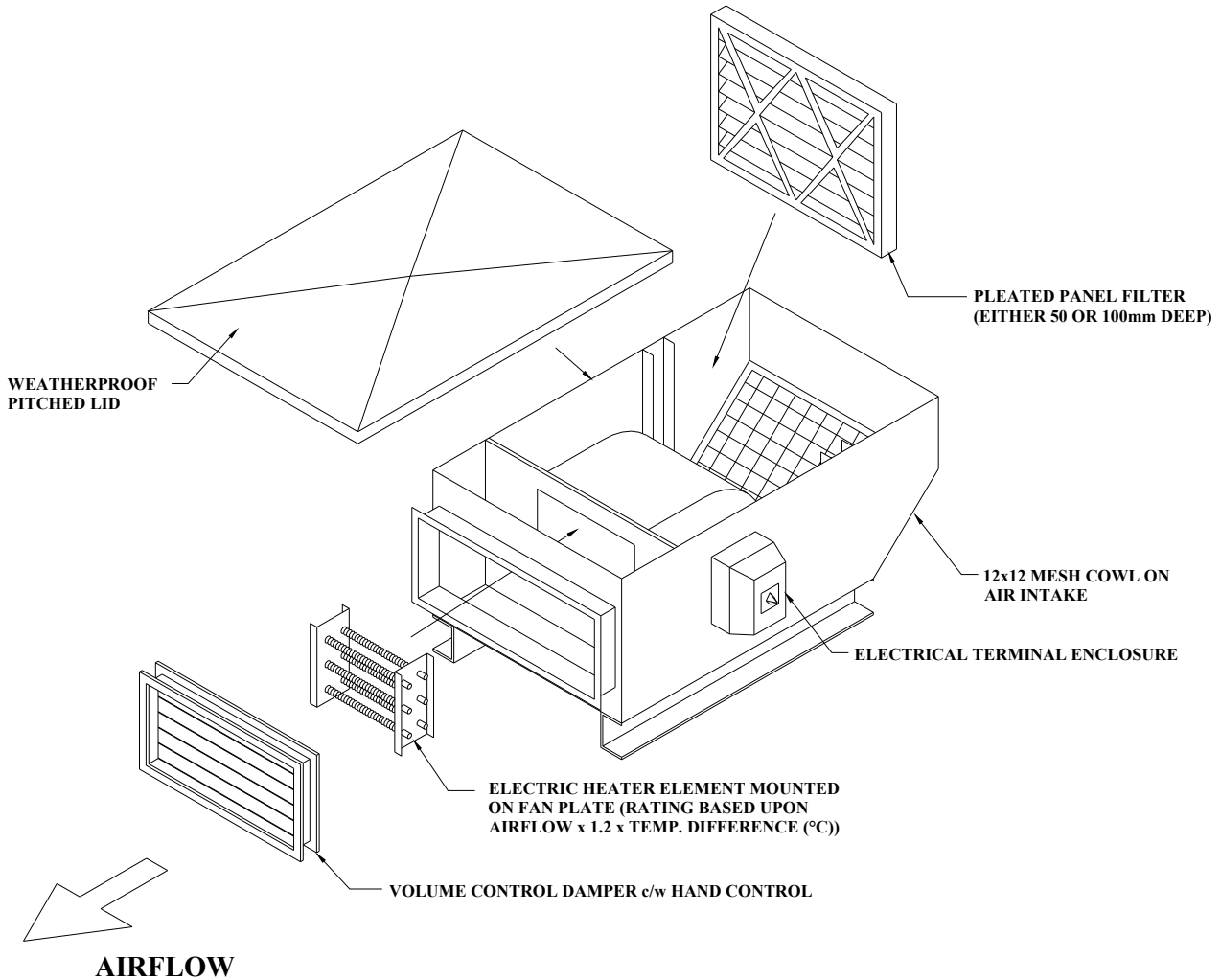
#### Monocoque Construction (Top or Bottom Access Internal Ducted Unit – MO)

Punched and folded from one sheet of 18, 16 or 14 SWG zintec mild steel, lined with 25mm Pyrosorb insulation for anti-condensation purposes and some minor sound proofing. Access is available top or bottom only via a flat lid. The units are finished in satin black, polyester powder coat paint to RAL 9005 as standard. Also available in a channel and tray construction with double skin panels.



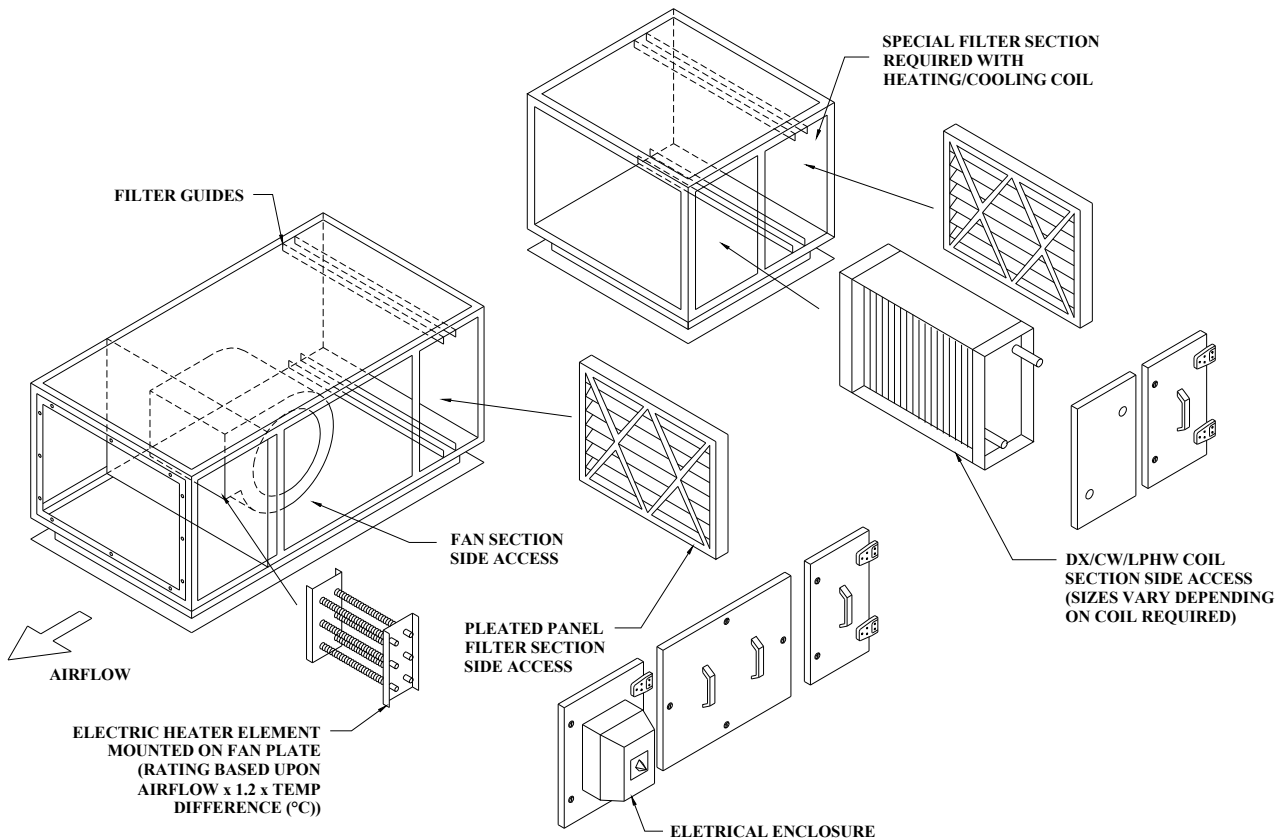
**Weatherproof Roof Mounted Unit (Channel & Tray Construction – CT)**

The Channel & Tray (CT) series is used for the single skin only weatherproof units using folded 18 or 16 SWG zintec mild steel panels. Access is available top, (via pitched lid), only. Weatherproof roof mounted units are finished in mid blue to RAL 5017 as standard.



### **Pentapost Construction – PP**

The frame is pre-formed from aluminium extrusion and moulded corners forming a versatile box section frame which allows panel access and coil connections from top, bottom, left or right hand side as on request. Single Skin Panels (SSK) are lined with 25mm Pyrosorb insulation. Double Skin Panels (DSK) are manufactured from 20 SWG galvanised steel plate, in-filled with 60kg/m<sup>3</sup> Rockwool slab insulation for additional noise reduction. Galvanised panels for internal duct mounted units, (optional powder coat finish available on request). Mid blue polyester powder coat to RAL 5017 for weatherproof roof mounted units as standard.



### **Fan Type and Selection**

Fresh Air Units are fitted with a single or three phase, double inlet, direct drive centrifugal fan. Heater batteries of the correct size are fitted as required. All filters are manufactured to BS EN 779:2012. G4 grade panel filters are fitted as standard. Medium grade M5-M6, Fine grade bag filters F7 - F9 and HEPA filters grade H10 – H14 are available on request. (carbon filters are also available).

Units are internally flanged, and fitted with M6 nutserts. These are for connection to a suitable duct or optional Puma telescopic wall sleeve and duct with optional external weather louvre.

### **Fire / Smoke Damper & Motor**

Units fitted with a Fire Smoke Damper (FSD) or Volume Control Damper (VCD) are generally situated on the air intake side. The FSD should be located as close as possible to the wall cut-out. This will then ensure the fire integrity of the wall is maintained. The fire rating of the FSD is 2 hours tested to BS EN 1634-1:2008.

### **OPERATION**

The fan unit may require 220/240 Vac single phase supply, or 380/415 Vac three phase & neutral where specified (check serial plate on side of unit). This supply will normally be interlocked with the air-conditioning system in relation to power shutdown in the event of fire detection.

The incoming mains supply must be connected to the terminal block supplied inside electrical enclosure mounted on side of fan unit. The mains supply to the fan and heater/s is from this terminal block. Where specified, heaters may be wired for remote control and mains supply for connection by others.

### **Electric Heaters**

All electric heater batteries are fitted with an Element Over-heat Protection Circuit (EOPC). The circuit incorporates two heater element protective functions:

The primary heating protection comes from the Airflow Indication Switch (AFS). If very low or no airflow passes the AFS, the electric heater will be turned off. The AFS also provides volt free contacts for fan run / fail indication, wired to terminals located inside the electrical enclosure.

The secondary protection comes from the Element Overheat Thermal Protection Device (EOT), if the electric heater element exceeds a certain temperature, the EOT will trip. This device has a manual reset push button, located on or adjacent to the electric heater. All Puma units with heating controls will include heater fuses, heater relays or contactor and element overheat thermostat.

There are three options for heating controls:

*Integral Thermostats* – One thermostat is supplied for each stage of heating required. These are located inside fan unit sensing air intake temperature. Each Thermostat switches up to 4kW per stage. Adjustable 0-30° C dial, factory set at 5° C steps per thermostat. Switching differential + or - 2° C.

*Electronic Multistage Thermostat (EMT)* - The EMT is supplied with a Duct Sensor that is pre-wired to terminals inside the Electrical Enclosure (located on the outside of the AHU). This device turns the heating load on in 3 or 4 steps until required temperature is achieved. The Duct Sensor must be fitted into the duct air stream on the discharge side, (Preferably 1 metre or more in front), in order to read the 'Off Coil' temperature and achieve the programmed set point temperature.

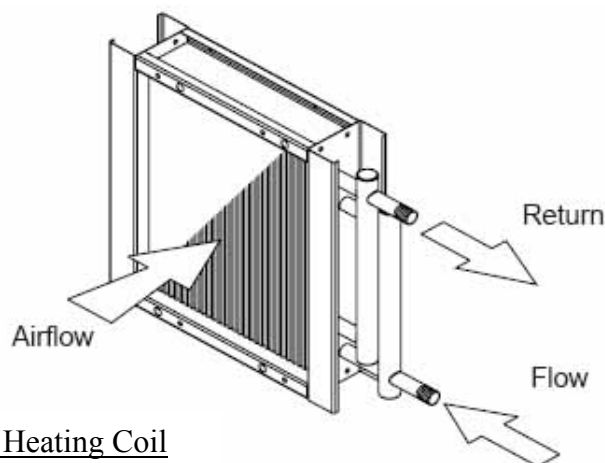
*Thyristor Controller (THY)* - Close Control and Constant Set Point Temperature is achieved by Pulse switching the heating load via Triac. This device can be supplied with either a duct or room sensor. Remote 0–10V dc Signal available on request. The Duct Sensor must be fitted into the duct air stream on the discharge side, (preferably 1 metre or more in front), in order to read the 'Off Coil' temperature.

### LPHW Heating Coils

Low Pressure Hot Water (LPHW) coils are constructed from galvanised casing, copper tubes and aluminium fins, and either 1 or 2 row depending on selection. They are suitable for typical water temperatures at 82°C flow and 72°C return, but can vary on design selection, (consult Sales Office for details). Low Temperature Hot Water (LTHW) coils are also available.

It is important that LPHW coils are protected in the winter season against damage from water freezing. A safety thermostat is recommended to open the heating valve and start up the boiler, if the water temperature falls below 5°C.

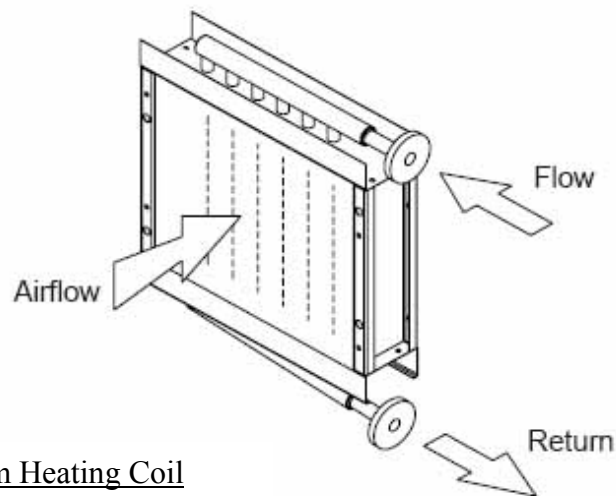
Installation of pipe work and heating valve to the LPHW coil must be carried out by a competent engineer. If the Three Way Valve Controls Package has been supplied by Puma, the valve will be supplied loose and must be fitted with the pipe work installation on-site by others. Attention must be given to positioning of the Duct Sensor from the temperature controller (see document '3WV 001' for details). Consideration must be given to pipework not interfering with AHU access panels for maintenance purposes.



LPHW Heating Coil

### Steam Heating coils

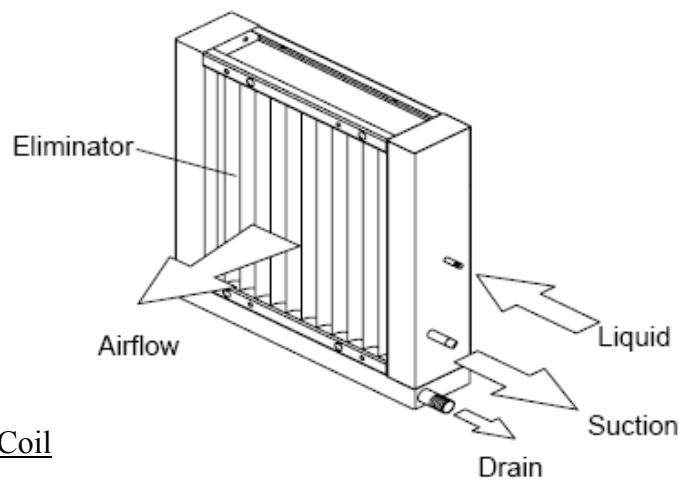
Steam coils are suitable for saturated steam up to 100 psi. All pipework must be properly lagged and provided with adequate drain lines with strainer and steam trap. Pipework must be arranged to allow the expansion of the coil. It is important that the supply, (or flow) is connected the top of coil to prevent moisture or air forming inside.



Steam Heating Coil

### DX Coil Connections

DX coils must be connected to a system by a qualified refrigerant engineer and fitted in accordance to refrigeration codes of practice.



DX Coil

### Speed Controllers

Speed Controllers can be fitted to most single phase fans for commissioning purposes. It is generally accepted that great care must be taken when reducing airflow when electronic heater batteries are fitted. A sufficient amount of air should pass across the elements to prevent overheating. This is normally 30 to 40% of maximum fan speed.

Speed Controllers (SC) are generally internal mounted type, located on individual fan casings. Remote Wall Mounted Speed Controller (WMSC) types are available on request.

Three phase speed control can be provided by inverters. (Details on request)

### **Single Phase Internal Speed Controller**

When Internal Fan Speed Controllers are supplied loose or as a retrofit please refer to data sheet OSI 002 which gives details of onsite installation.

Factory fitted devices are normally located on the fan casing, the device is approximately 85mm wide and 150mm long with a dial on the front to adjust the speed.

**Warning:** Care must be taken when adjusting fan speed as this device is live 240Vac when the unit is running.

Considerations for heating must also be given when setting speed, sufficient airflow across the elements must be maintained to prevent the element from overheating.

### **Damper and Motor Controls**

If a damper and motor is fitted to the fan unit, the motor, (or actuator), is factory wired in parallel with the fan start controls and proceeds to open when power is switched on to the fan unit. The motor takes approximately 40-75 seconds to fully open and will then 'Spring Return' on power failure in approximately 20 seconds.

## **INSTALLATION**

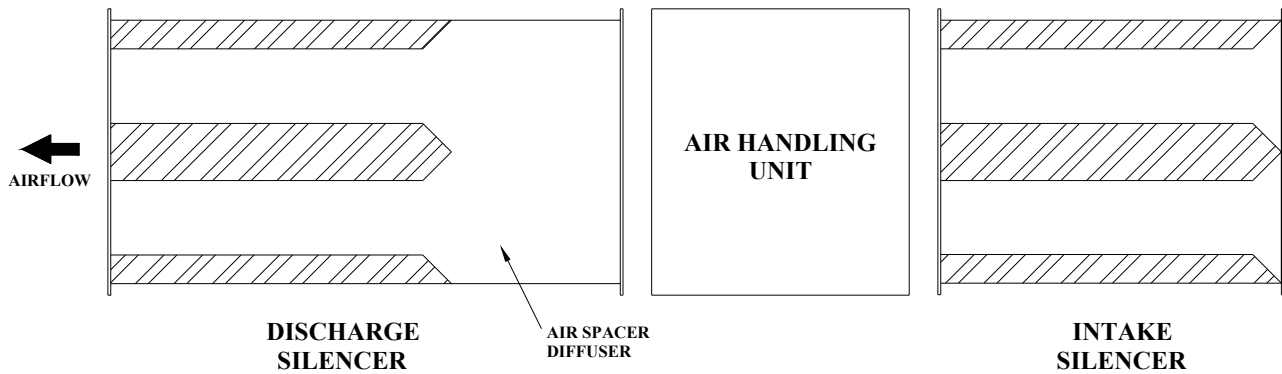
The Puma unit must be installed allowing sufficient access to the removable panels, as access to all serviceable components is via these panels. Top/bottom access is standard on channel & tray (CT) and monocoque (MO) units. Side access is available on pentapost (PP) units as standard.

The clearance height for top/bottom access is not necessary when the units are located underneath raised modular floors, as it is assumed that the appropriate floor tile/s are accessible and removable. The unit may be suspended or supported by correctly sized anti-vibration isolators, if required (supplied by others).

### **Installing Silencers**

Ducted units are available with silencers for intake and discharge sections. These are manufactured from 18 SWG zinc steel plate and 20 SWG 30% free area perforated plates. Sound absorption material is Rockwool slab to a density of 60Kg/m<sup>3</sup>, tissue faced to eliminate fibre shedding.

If unit is supplied with silencers, please be aware that discharge silencers are different to intake silencers. All of our discharge silencers are fitted with Air Spacer Diffusers (ASD), these are 300mm sections added to the silencer to help establish static regain, improve airflow and reduce air turbulence through the silencer.



## **COMMISSIONING**

Assuming all necessary power supplies, fuses and inter-connecting cable have been installed to the standard of the current edition of the IEE wiring regulations, then commissioning / start up of the equipment can be carried out.

## **SERVICE AND MAINTENANCE**

The mains supply to all units must be disconnected at source before removing the lid.

The main panel filter in the fresh air section must be replaced as frequently as is necessary, depending on ambient conditions. This should coincide with a three monthly visit for a standard service for the main air conditioning plant or, if manometers are fitted, when the pressure difference exceeds 0.3" wg (75 Pascals).

Failure to change the filter/s at the recommended intervals will invalidate the warranty. The AFS should be checked for free movement and electrical conductance. These fans are fitted with direct drive motors with 'sealed for life' bearings that require no maintenance.

Refer to Puma technical sales leaflet for further information regarding dimensions, weights and unit performance and fan curves.



## **FAULT FINDING**

### **FAN/MOTOR FAILS TO RUN**

Check the unit is connected correctly, as the wiring diagram supplied.

1. Check the mains supply and mains isolator.
2. Check the control circuit fuse.
3. Is there a voltage at the fan? Yes would indicate motor failure or a neutral/phase problem. If no follow steps 5-7 below.
4. Check the Shutdown Relay link (SR), (fitted between terminals L1 & L2 or SR1 & SR2)
5. Check the fan fuse, small range located below the isolator, large range inside the electrical enclosure FS2(single phase fans only)
6. Three phase fans and belt driven units check the fuses are ok (located in the electrical enclosure on the side of the unit), and the fan overload is on by pushing the manual reset button,(red), on the fan contactor,(usually situated to the side of the fan on the fan plate left or right depending on handing of the unit).
7. If the motor overload or fuses keep tripping or blowing check the phases are ok, on belt drive units, check the belt tension is correct and that the fan motor overload is set to the correct rating. See motor serial plate for rating.

### **ELECTRIC HEATING NOT RUNNING**

Is the airflow being restricted stopping the airflow switch from operating, i.e. a clogged or dirty filter.

1. Check the overheat thermostat, press the manual reset button (located next to the heater battery).
2. Check the heating supply fuses.
3. Check the heating contactor for correct operation.
4. Check the airflow switch, (located on the side of the fan body), for correct operation and electrical continuity. (An audible click should be heard when operating the switch.)
5. Check the individual thermostats are set to the desired temperature/s and are working correctly. Again, an audible click should be heard when turning the dial up or down.
6. Where an electronic thermostat is used, check the supply to the thermostat and the display is on.
7. Check the sensor. A resistance of approx 10k $\Omega$  should be measured across the sensor, (disconnected).

If a 4/8 stage electronic thermostat is fitted, check the parameters are correct. Refer to the electronic thermostat set up document.

Most faults/problems can be resolved by following the above. If the unit still fails to work correctly, please contact Puma Products Limited for technical assistance.



ISO 9001:2008  
Certificate Number: 1206 Issue: 01