



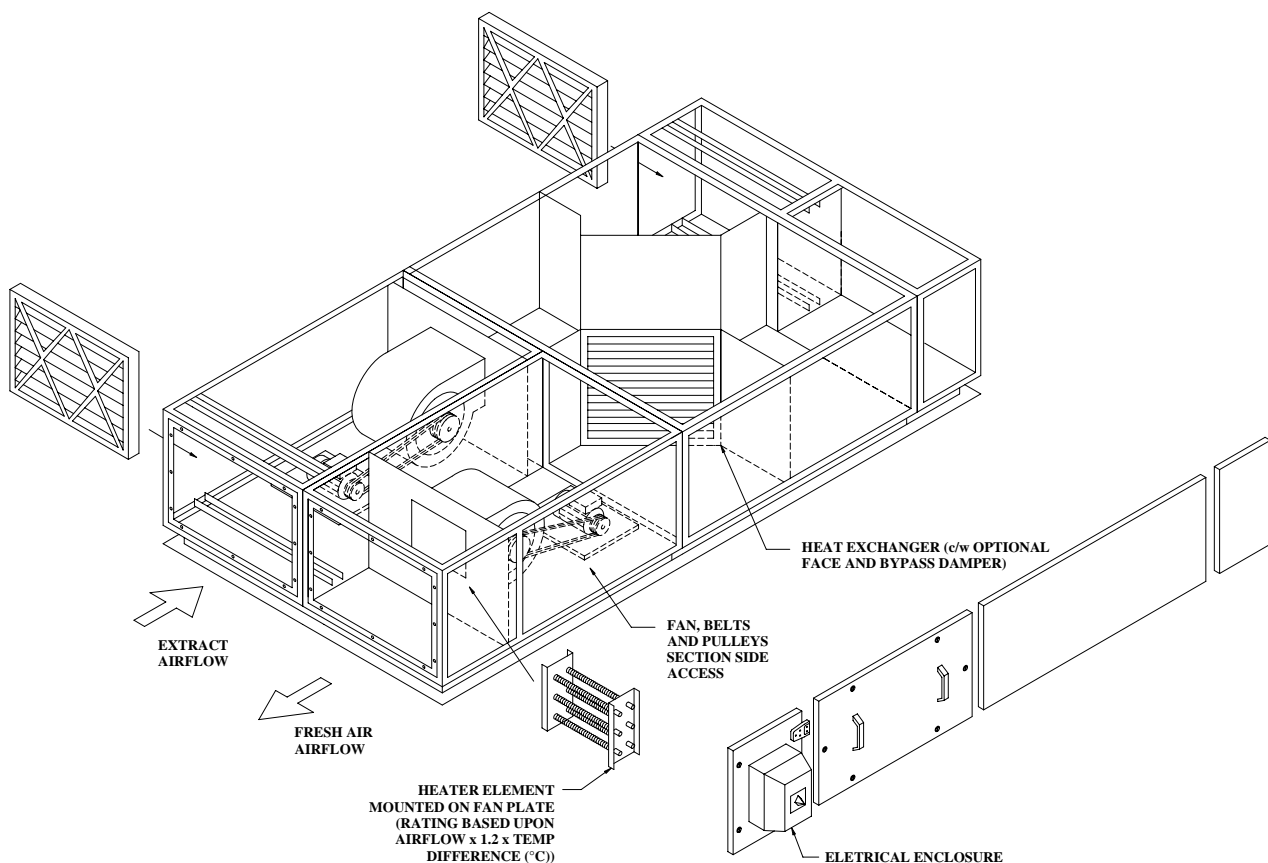
**OPERATING AND MAINTENANCE INSTRUCTIONS**  
**SUPPLY AIR AND PERMANENT EXTRACT WITH HEAT RECOVERY**

**SAPER UNITS SERIES BELT DRIVEN PENTA POST**

**DESCRIPTION**

All Units are manufactured to a very high standard of construction.

The frame is pre-formed from Aluminium Extrusion and Moulded Corners which form a versatile box section. This modular construction allows single or double panels to be fitted. The panels, internal fan plates, and spigots are formed from 18 SWG or 16 SWG mild steel plate. The units are then finished in an attractive Mid Blue polyester powder coat to RAL 5017 as standard for weatherproof units or natural galvanised panels for indoor plant room units (Optional powder coat finish available on request).



Supply and extract sections are fitted with Double inlet, Forward or Backward Curved Centrifugal Fans. Single or Three Phase Motors are supplied with Automatic Reset Overload Protection, 2 or 4 Pole Motors are used depending upon the speed of the Fan. They are sized to suit the duty required with allowances for internal pressure drop within the Unit. Fan Circuit Breakers, Overloads and Contactors fitted as standard.

Power Transmission Drive arrangements are via Single or Twin Groove Pulleys with appropriate Belt Section and Taperlocks.

The Heat Exchanger fitted is manufactured from 100% composite materials, generally sized to give at least 45% Heat Recovery at the following conditions - Extract Air + 21°C 50% RH, Ambient Air - 1°C saturated. Heat Exchangers must operate within -15° to 60°C working temperatures. A Face and Bypass Damper can be supplied to bypass the heat exchanger during warmer weather. This would prevent the warm air, which is being extracted, from warming the cool incoming air. This is controlled via a thermostat and a damper motor.

An Electric Heater Battery is fitted if required to either 'Top Up' the Heating requirement or provide Tempered Air if the internal and external temperatures dictate a low efficiency through the Heat Exchanger.

The Heater Batteries are controlled by adjustable On/Off Thermostats located on the suction side of the supply Fan after the Heater Exchanger. Thyristor Controllers and Duct Mounted Sensors are also available.

All heater batteries are fitted with an Element Over-heat Protection Circuit (EOPC). The circuit incorporates an element overheat switch (manual reset) & Airflow switch together with an appropriate Relay or Contactor, when low or no airflow occurs the coil of the Relay/Contactor is de-energised. The overheat switch provides protection against the heater elements overheating in the event of fan/airflow switch failure. The Airflow switch also provides volt free contacts via a Relay (AFR) or (HR) wired to Terminals located inside the Electrical Enclosure.

Two Disposable Panel Filters are fitted to Supply Air In and Extract Air In Sections, these provide an arrestance of 86.4% when tested to EUROVENT 4/5 EU4 standard. EU6 High Efficiency Filters are available on request but will affect airflow performance due to increased pressure drop. Please consult sales department.

The supply and extract sections are insulated with 25mm thick Pyrosorb Class O Insulation, this has excellent noise absorption qualities and anti-condensation properties.

Optional square or circular ducting is available on request for appropriate applications.

## **OPERATION**

The SAPER 'belt driven' units generally require a 380/415V ac 3 Phase Supply & Neutral, where specified a 220/240V ac Single Phase and Neutral Supply may be required (check serial plate on side of unit or sales literature).

Each Unit is provided with M25 SWA Gland and suitable Terminal Block. This is wired to the Mains Isolator which electrically isolates both Supply and Extract Fans and the Heater Battery where fitted. Internal Speed Control Devices for each Fan are available to commission fan airflow duties when required. Fan Fuses are fitted to each Fan.

All SAPER Units require a suitable Fused Switched Spur or Isolator sized to suit the individual running current. This must be located within 1½ metres of the Unit and comply with the latest edition of the IEE Regulations.

When the supply is connected switching the Fitted Mains Isolator to the 'On' position, will energise both Fans to run. Heater operation is entirely automatic. Filter Pressure Switches are available when required.

## **Electric Heaters**

All heater batteries are fitted as standard with an Element Over-heat Protection Circuit (EOPC). The circuit incorporates an Element Overheat Switch (with manual reset) & Airflow switch together with an appropriate Relay or Contactor, when low or no airflow occurs the coil of the Relay/Contactor is de-energised. The overheat switch provides protection against the heater elements overheating in the event of fan/Airflow Switch failure. The Airflow Switch also provides volt free contacts via a Relay (AFR) or (HR) wired to Terminals located inside the Electrical Enclosure.

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** - 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** - 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, DX and CW Coils**

LPHW heating coils and DX or CW cooling coils can be added to any Penta Post Puma unit. These will be mounted on the intake of the AHU and would incorporate a separate section which would be bolted to the Fan Section (see layout diagram). With this separate section, a panel filter would be added to protect the coil.

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).

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 air intake temperature inside the AHU falls below 5°C.

Installation of pipework 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 pipework installation on-site by others. Attention must be given to positioning of the Duct Sensors from the Puma Controller (see document '3WV 001' for details on Puma controller).

DX and CW coils will have Eliminators fitted if the airflow is above 3m<sup>3</sup>/s. A drain pan will be included as standard with the coil with a condensate connection, which will require trapping at time of installation.

The coils will be fabricated from copper piping fitted around aluminium fins (unless otherwise stated) constructed within a galvanised steel case. The coil will have threaded male BSP connections, the water flow connection at the bottom, and the outlet is at the top.

## **Inverter Speed Controllers**

Inverter Speed Controllers can be fitted to most three 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. Safety is provided by the Airflow Failure Switch (A.F.S.) which will drop out the Heating Relay/Contactor when the airflow is too low. The element overheat thermostat will act as a fail safe.

### **Damper and Motor**

When a Damper and Motor is fitted to the Puma Unit, the damper motor is wired lieu with the fan controls and proceeds to open when power is supplied to the Fan Unit. The motor takes approximately 40-75 seconds to fully open and will then 'Spring Return' on power failure at approximately 20 seconds.

### **INSTALLATION**

The unit must be situated in a position with sufficient space for access to removable panels. A dimension given on the certified drawing of the unit must be allowed for access to the serviceable components i.e. filters, belts and pulleys.

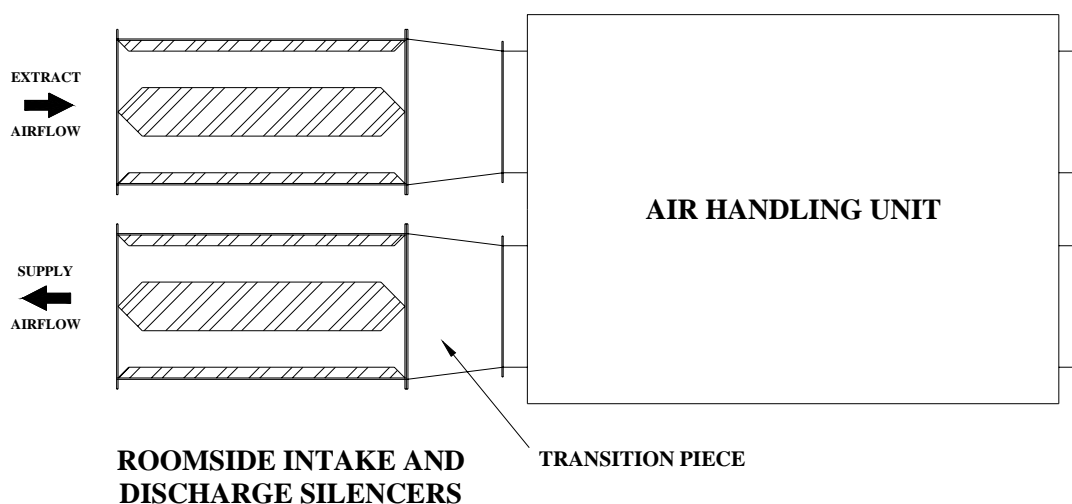
When unit is delivered, it will come in sections (see diagram above), usually the fan section (which incorporates controls), Heat exchanger section and panel filter section.. If the heat exchanger has a face and bypass damper, the fan unit will require simple wiring into the heat exchanger unit. This will require wiring a red and black cable into the terminals located on the base of the heat exchanger section.

Pentapost units are available as weatherproof versions (denoted WP). Anti-vibration isolators are recommended when installed on flat roofs.

### **Silencers**

Ducted Units are available with Silencers for intake and discharge sections. These are formed from 18 SWG Mild 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. The SAPER unit will be fitted with either circular or square silencers depending on duct connections required. As standard, silencers would be room side. With SAPER units 250-400, a transition piece would be required with the silencers. This is used to increase the open area of the silencer to take into account the sizes of the inner pods and to make sure the free area is the same as that of the AHU.

If unit is supplied with silencers, please be aware that there are different discharge silencers 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 steady airflow and reduce air turbulence throughout the ductwork.



### **Face and Bypass Damper**

If Face and Bypass Dampers are fitted to the Heat Exchanger inside a SAPER unit, this will require setting up on installation. The thermostat will be located after the heat exchanger on the fresh air intake side. This needs to be set at a temperature from which the heat recovery does not need to be used (hence bypassing the heat exchanger). For example, if the thermostat is set at 20°C, and the Fresh Air input temperature is at 22°C, the louvres on the heat exchanger will close, and the louvres on the bypass duct will open, and the extract air will bypass the heat exchanger.

### **SERVICE & MAINTENANCE**

The mains supply to all units must be disconnected at source before removing access panels.

The Panel Filter 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). Airflow Failure Switches should be checked for free movement and electrical conductance. Failure to change the filters at the recommended intervals will invalidate the warranty.

The airflow failure switch should be checked for free movement and electrical conductance.

These fans are fitted with belt driven motors with sealed for life bearings up to a frame size of 132 (11kW) that require no maintenance.

Motors of frame size 160 (15kW) and above have open bearings with "flush through" regreasing facilities. It is recommended these motors are checked and regreased every 3 months.

### **FUSE & FAULT FINDING**

See separate sheet attached.

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