



## OPERATING AND MAINTENANCE INSTRUCTIONS

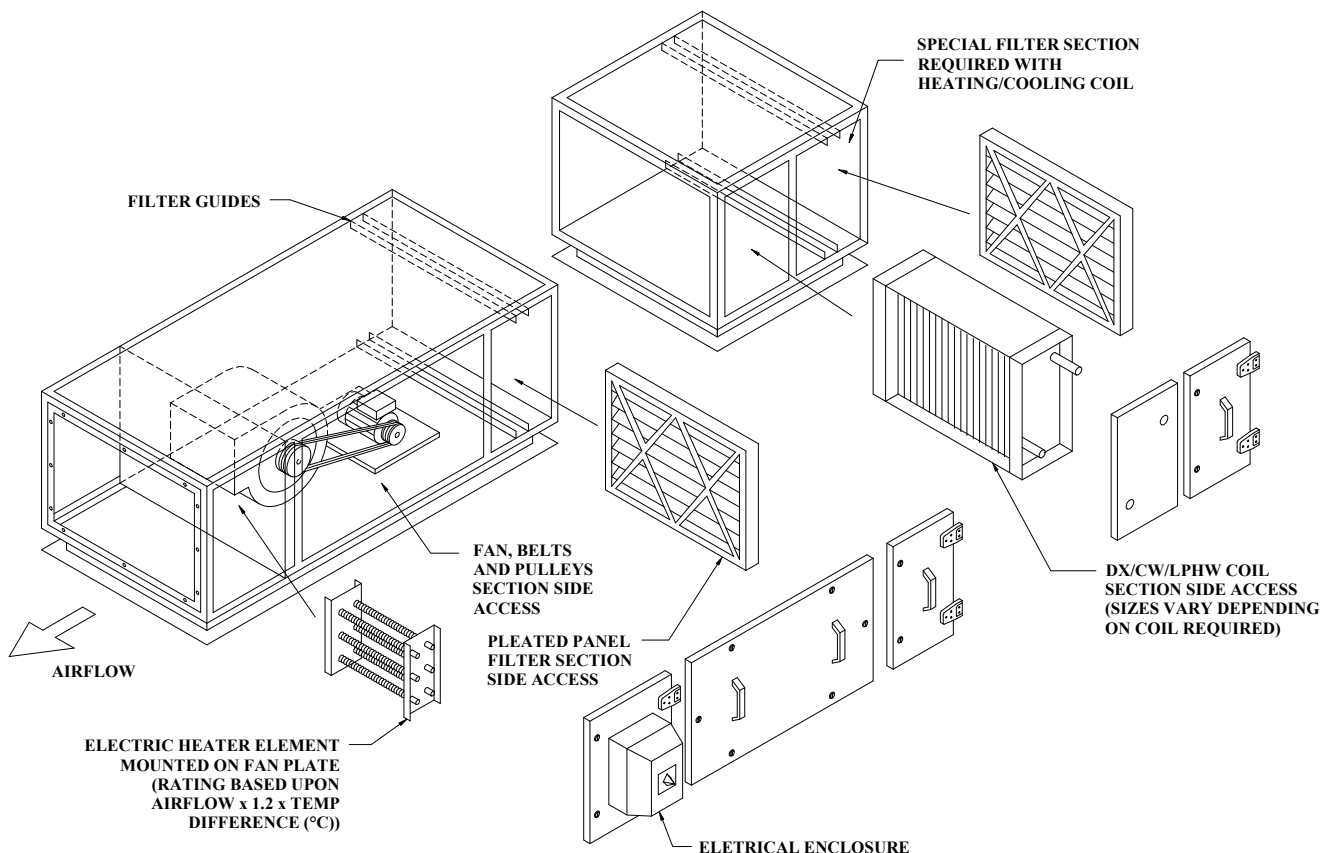
### SUPPLY ONLY UNITS – BELT DRIVEN AHU

#### DESCRIPTION

All units are manufactured to a very high standard.

#### Penta Post 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 left or right hand side as on request. Single Skin Panels (SSK) are lined with 25mm Pyrosorb insulation. Double Skin Panels (DSK) are formed from 20 SWG galvanised steel plate, in-filled with 60kg/m<sup>3</sup> Rockwool 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.



Belt driven, double inlet, forward or backward curve centrifugal fans fitted with three phase motors to class F insulation. They are sized to suit the duty required, with allowances for internal pressure drop within the unit.

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 and external weather louvre.

All filters are manufactured to BS EN 779:2012. G4 grade panel filters are fitted as standard. Medium grade panel filters M5 - M6, Fine grade bag filters F7 - F9 and HEPA filters grade H10-H14 are available on request. Carbon filters are also available.

## **OPERATION**

Belt driven units typically require 380/415 Vac three phase & neutral supply. 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 located in the electrical enclosure mounted on the side of the AHU. This terminal block provides power supply to the fan, controls and heater/s all pre wired at factory. Where specified, heaters and fans may be wired for remote control 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 (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.

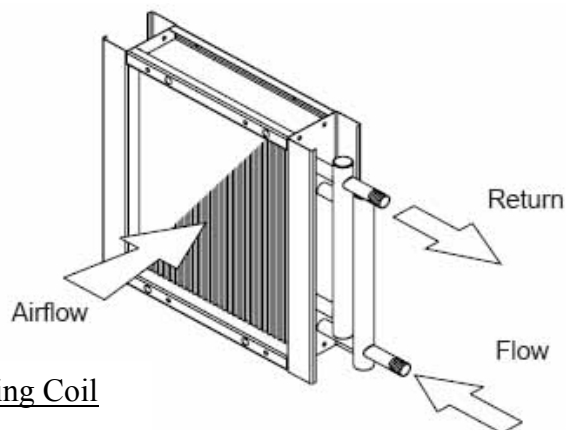
Thyristor Controller (THY) - Close control and constant set point temperature is achieved by pulse switching the heating load via Triac. This device can be supplied with either a duct or room sensor. Remote 0–10V dc Signal available on request. The duct sensor must be fitted into the duct air stream 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.

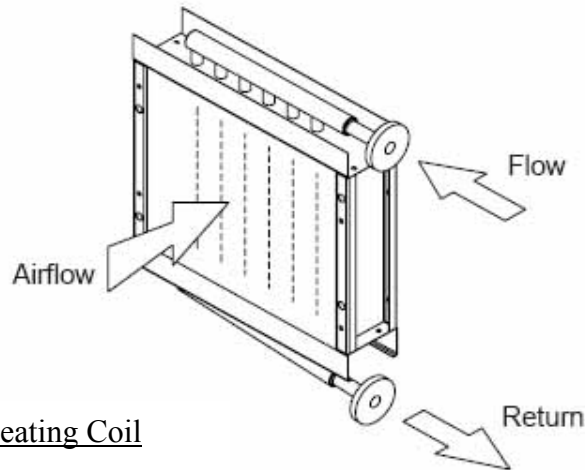
Installation of pipe work and heating valve to the LPHW coil must be carried out by a competent engineer. If the Three Way Valve Controls Package has been supplied by Puma, the valve will be supplied loose and must be fitted with the pipe work installation on-site by others. Attention must be given to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



LPHW Heating Coil

### Steam Heating coils

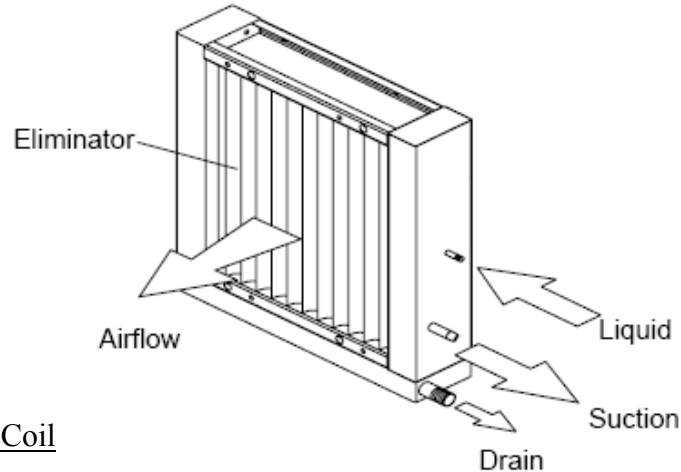
Steam coils are suitable for saturated steam up to 100 psi. All pipe work must be properly lagged and provided with adequate drain lines with strainer and steam trap. Pipe work must be arranged to allow expansion of coil. It is important that the supply (or flow) is connected the top of coil to prevent 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 with refrigeration codes of practice.



DX Coil

## Inverter Speed Controllers

Inverter speed controllers can be fitted to most three phase fans for commissioning purposes. Great care must be taken when reducing airflow when electric 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. Too little airflow can trip the heating fail safe devices as described on 'Electric Heaters' section.

## Mixing Box Operation

The mixing box consists of two or three dampers with two options for operation:

### Option 1 - Manual operation via hand knob control

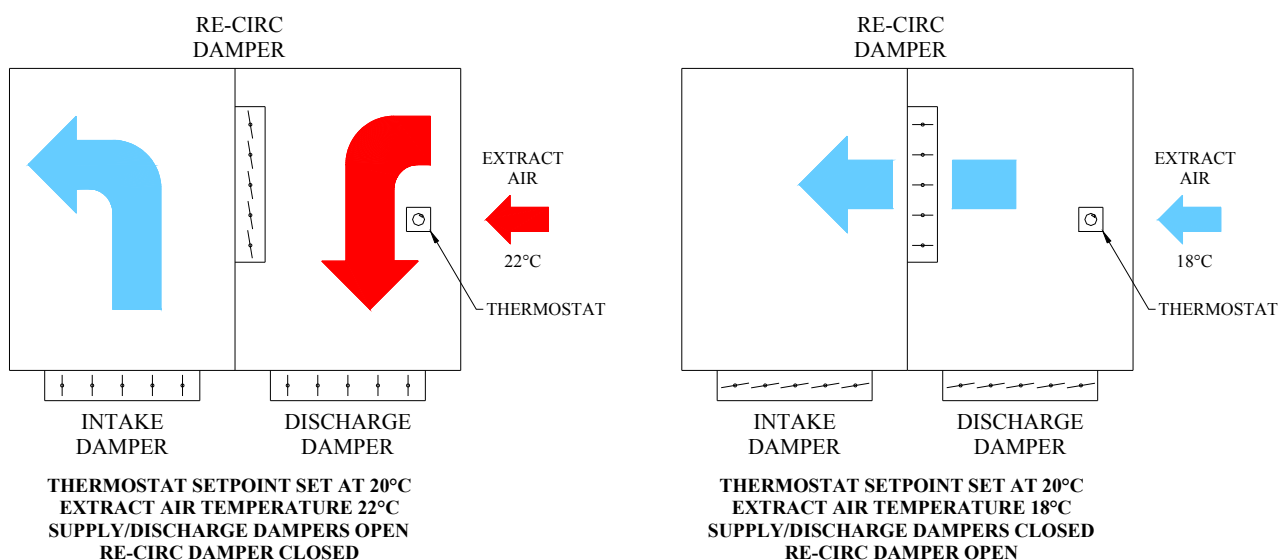
### Option 2 - Motorised operation by open and close actuators via thermostat control:

In *Fresh Air mode*, when the extract room air temperature rises above thermostats desired set point, the inlet and discharge dampers will fully open, and the recirculation damper will fully close.

In *Recirc mode*, the extract room air temperature has fallen below the desired set-point, the thermostat will activate and the inlet and discharge dampers will fully close, and the recirculation damper fully open.

## Mixing Box with Three Damper Operation

For **option 2** only, located inside mixing box section, via an access panel, is an Integral Thermostat with 0-30°C dial. This is thermostat will need to be set to required temperature on commissioning.

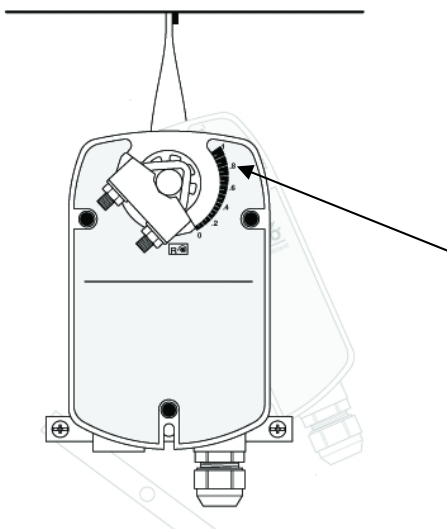


## Damper and Motor Controls

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.

## Damper Blade Adjustment via Actuator

On commissioning of the AHU, the mixing box dampers can be adjusted depending on the amount of air required for re-circulation.



- Make sure damper blades are fully closed and power has been isolated before attempting to adjust actuator
- On the actuator, there is a gauge, (as highlighted), with an end stop. The factory setting on this will be 100%. This end stop can be adjusted between 40-100%.
- To adjust, loosen the screw on the end stop, and move the stop to the required position. Once in position, firmly re-tighten screw
- Power up unit, and test damper operation. If more adjustment is needed, repeat above steps.

## INSTALLATION

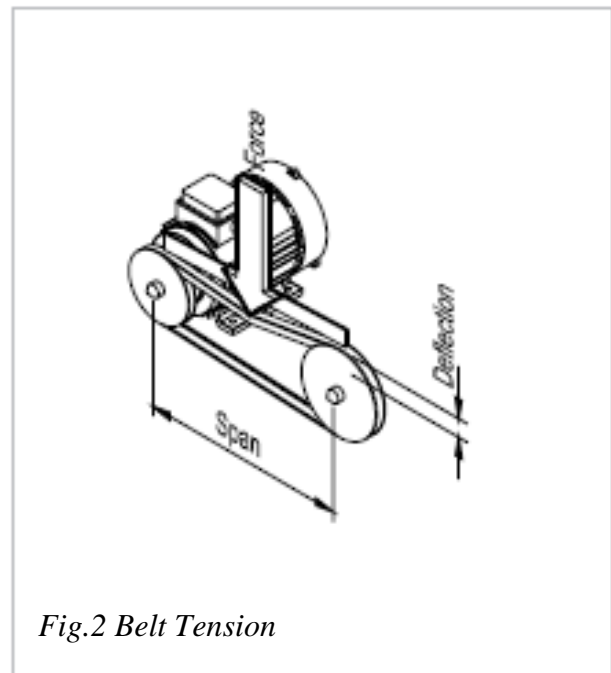
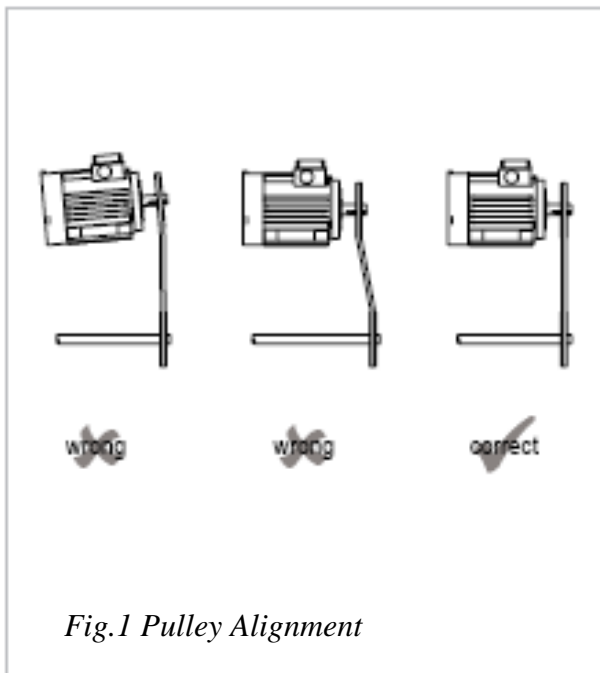
The Puma unit must be installed allowing sufficient access to the removable panels. A given dimension on the certified drawing must be allowed, as access to all serviceable components is via the removable panels. Side access is standard for Pentapost (PP) constructed units. Fresh air Pentapost units are available as weatherproof versions (denoted WFA). Anti-vibration isolators are recommended when installed on flat roofs. If cooling coils are fitted, the condensate tray connection may require trapping, which should be located below the coil.

### Set up for Belt and Pulley Alignment

Belts and pulleys have been pre-set at factory for correct belt tension and pulley alignment. After the unit has been positioned, check that the impeller is smooth running and belts and pulleys have not moved during transit.

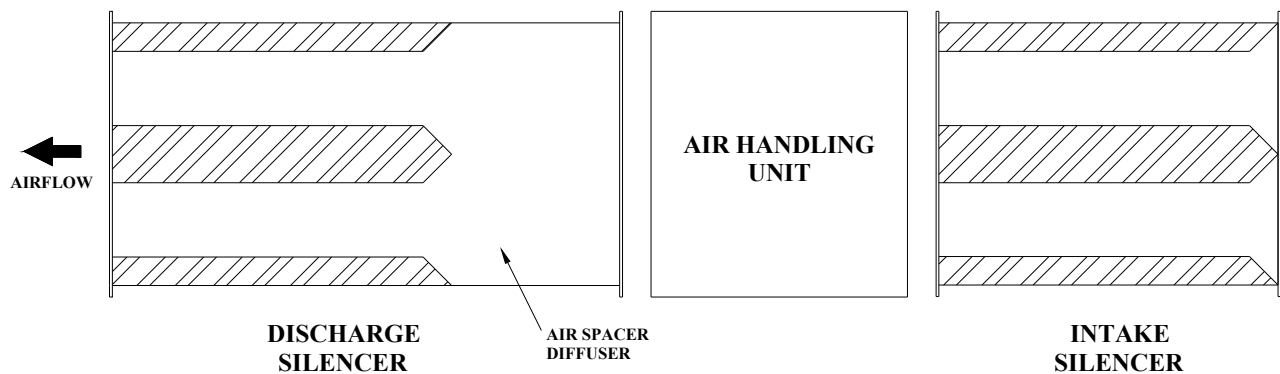
Ensure correct pulley alignment as indicated in *fig.1* below. To check the tension of the drive belt, apply a force perpendicular to the centre of the belt span sufficient to deflect the belt 16mm for every metre of span length, as indicated in *fig.2*. The force required to deflect the belt should be from 0.5 to 0.8kg.

Do not over tighten the belts as this will damage the bearings in both fan and motor. If belts or pulleys need to be replaced or changed, use same procedure as above.



### Silencer Installation

Ducted units are available with Silencers for intake and discharge sections. These are manufactured from 18 SWG Zintec steel plate and 20 SWG 30% free area perforated plates. Sound absorption material is Rockwool lab 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 steady airflow and reduce air turbulence throughout the ductwork.



## **SERVICE AND MAINTENANCE**

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

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 150 pascals. Failure to change the filter/s 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.

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

1. Check the unit is connected correctly, as per the wiring diagram supplied.
2. Check the mains supply and On/Off isolator.
3. Check the control circuit fuse.
4. Is there a voltage at the fan? Yes would indicate motor failure or a neutral/phase problem. If no, follow steps 5-7 below.
5. Check the Shutdown Relay (SR) link (fitted between terminals L1 & L2 or SR1 & SR2)
6. Check the fan fuse, small range located below the isolator, large range inside the electrical enclosure FS2 (single phase fans only)
7. 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)
8. If the motor overload/fuses keep tripping/blowing check the phases are ok. On belt drive units, check the belt tension is correct, and the fan motor overload is set to the rating of the motor. See motor serial plate for size/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 they 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.



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