

Technical Fact Sheet – How viable are Airside Fan Coils in 2020s?



TFS No. 015 Issue 2

Date: August 2022

Airside fan coil unit control their cooling and heating outputs by adjusting the flow rate of air passing through either the cooling or heating heat exchanger. There are no water-side control valves used with Airside fan coils.

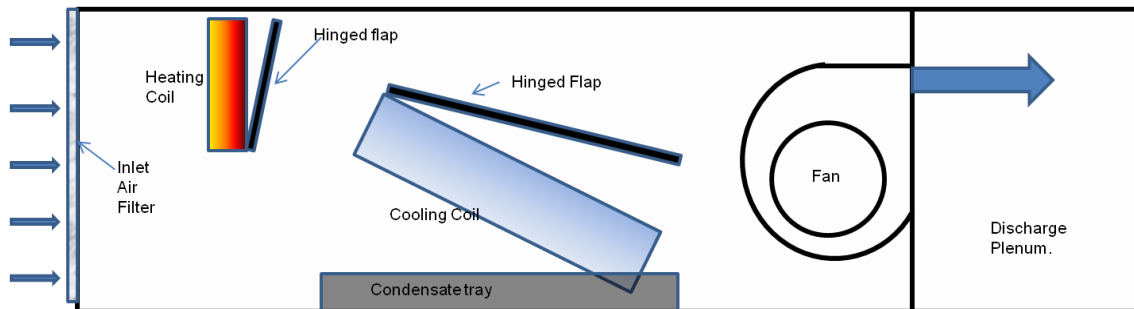


Figure 1. General arrangement of Airside FCU.

How do Airside fan coils work? As shown Hinged flaps divert the air flow or close off coil faces.

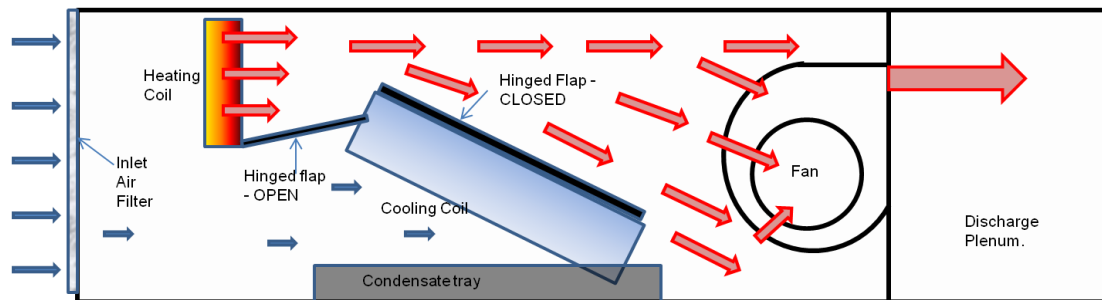


Figure 2. Heating Mode.

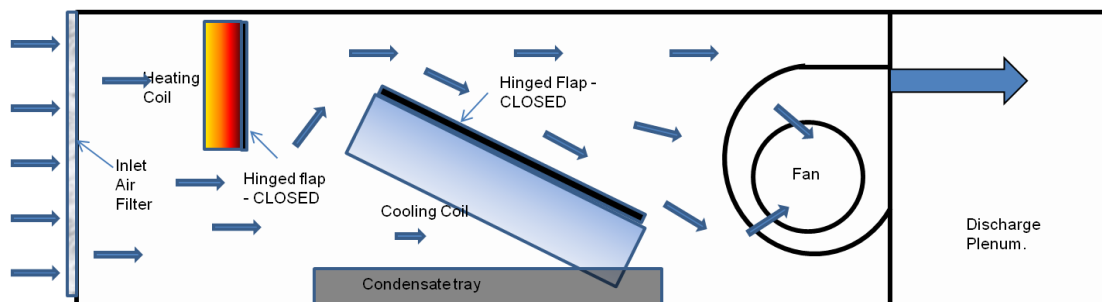


Figure 3. Bypass.

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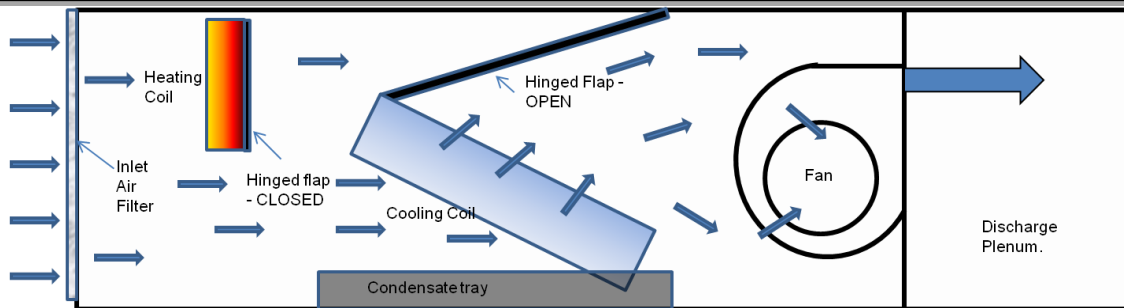


Figure 4. Cooling Mode

The main disadvantage with using airside fan coils is the energy wasted (up to 25%¹) within the unit by the inevitable pick-up or crossover of heating and cooling between coils with both operating at full duty.

There are 3 methods of heat transfer – convection, conduction and radiation.

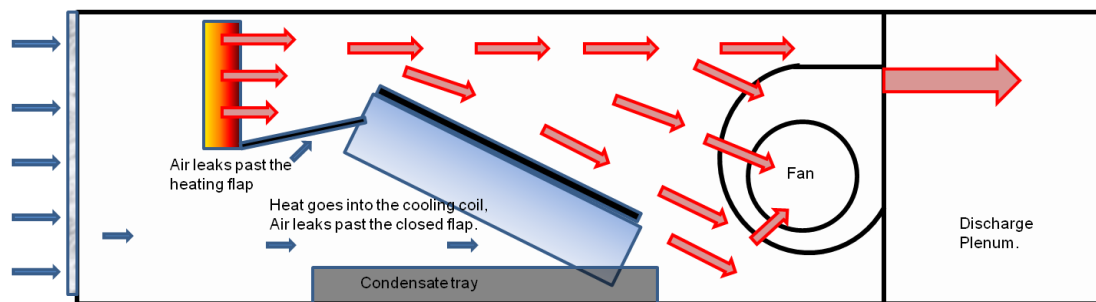


Figure 5. Waste Energy in Heating Mode.

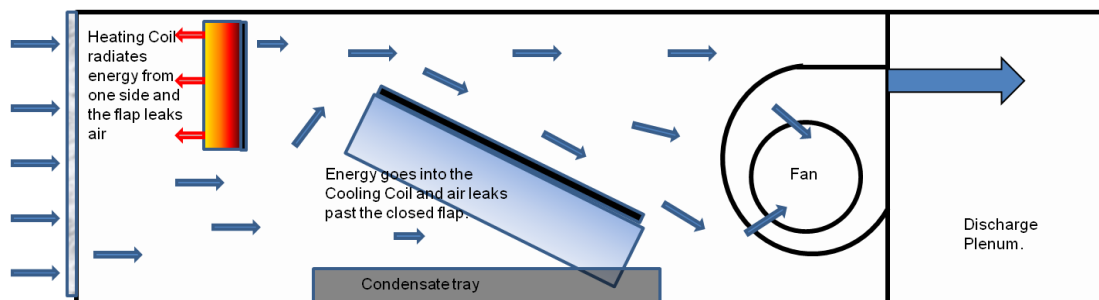


Figure 6. Waste Energy in Bypass mode

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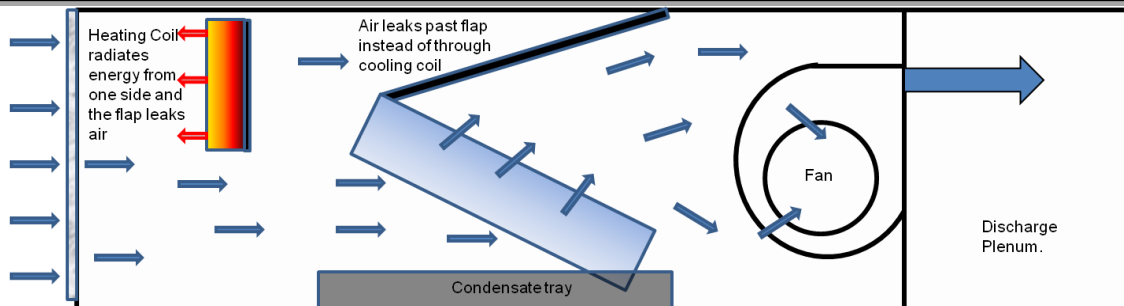


Figure 7. Energy Waste in Cooling Mode

It is difficult to seal the flaps, especially as the width increases.

For a given output Airside fan coils are typically larger than Waterside fan coils due to the energy lost between the coils in airside fan coil units reducing their output.

The choice of motors does not address any of the above issues.

With the focus on energy efficiency, airside fan coils are not normally used. Waterside fan coils are the energy efficient alternative.

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Converting an Airside FCU Control system to Waterside Control.

Most Airside control systems are now coming to the end of their operational life. This is either due to the availability of spare parts, for example fans, coils and damper arrangements or due to the high energy consumption that these systems suffer from, especially in Spring and Autumn.

Airside systems work on a constant flow CHW and LTHW system with possibly some weather compensation control installed in the LTHW circuit. Waterside control FCU utilise a variable flow System, therefore the Pump will either have to be replaced or fitted with an Inverter Drive or Variable Frequency Drive to give modulating flow output.

When it comes to the selection of the replacement Waterside FCU, this is an opportunity to recheck the thermal model and adjust for change of use. The new waterside units can be supplied with the latest BMS controls as well as 2 port pressure independent control valves (PICV's) that give very accurate water and temperature control. The units will also have EC fans with variable output, reducing fan energy consumption by at least 50% compared to the original AC powered Airside units.

An inspection of the existing pipework and commissioning valves should be undertaken to check if they require replacement.

References

1 CIBSE TM43: 2008 Fan Coil Units.