



TROX[®] TECHNİK

The art of handling air

TROX UK

Fancoil Unit

Test Rig



Operation and Computation



Example of a FCU in TROX'S BSRIA certified Thermal test chamber.

Schematic Layouts

The layouts of the various components (Air, Water and Chiller circuits) of the test rig can be seen on the proceeding pages.

These schematics indicate where the various measurement and control positions are read and applied.

Water Temperatures

The water supply probes ($T_{wh1} + T_{wc1}$) are measured on the last piece of pipe prior to entry to the FCU.

The water return probes ($T_{wh2} + T_{wc2}$) are measured on the first piece of pipe on the exit of the FCU.

These temperatures are adjusted by the Cold Tank, Hot Tank, Chiller and Balance Tank depending on requirement.

Various other water temperature probes are measured around the system to aid in the control process. (These can be seen on the Chiller and Water circuit layouts.)

Air Temperatures

The four air on (Room Temperature) dry bulb temperature probes (Ta1/1-4) are measured prior to the air entering the FCU. The room air temperature is adjusted by the cooling (water) and heating (heating element) in the main fan coil unit, which is installed in the roof.

The three air off (Plenum Temperature) dry bulb temperature probes (Ta2/1-3) are measured in the plenum.

The Nozzle temperature probes (Tan/1-2) are measured in the nozzle enclosure.

Dew Points & Humidity

The air on dew point probe (Tdp1) is measured in the same location as Ta1/1-4 probes.

The air off dew point probe (Tdp2) is measured in the same location as Ta2/1-3 probes.

The humidity of the chamber is read in the room, this instructs a humidifier if any water is required to be added to the air. The humidifier adds the water via a lance installed in the ductwork of the main fan coil unit.

Pressures

The atmospheric pressure (Patm) is taken from within the thermal chamber.

The external pressure (Px) is read across the ductwork linking the FCU to the plenum, it is adjusted via the blanking off of the nozzles and/or the two actuators (one either side of the area directly above the nozzles) which increase or decrease the pressure.

The plenum pressure (Pb) is measured in the plenum.

The nozzle pressure is measured in the nozzle enclosure.

Flows

The two water flows (Qwc and Qwh) are read via two flow meters on the supply side of the FCU. These are adjusted via actuators and valves prior to the flow meters.

The air volume flow (Qa) is calculated via the data collected from the thermal chamber. Included in this calculation are the number of nozzles and area utilised, Patm, Tdp1, Tdp2, Ta1/1-4, Pn, Pb, Tdp2 and Tan/1-2.

Heat Transfers

The water transfers (Hot – q_{wh} and Cold – q_{wc}) are calculated via the data collected from the thermal chamber. Included in this calculation are the respective supply / return water temperatures (T_{wh1} , T_{wc1} , T_{wh2} , T_{wc2}) and the water flow rates (Q_{wc} and Q_{wh}).

The air heat transfer (q_a) is calculated via the data collected from the thermal chamber. Included in this calculation are the number of nozzles and area utilised, P_{atm} , T_{dp1} , T_{dp2} , $T_{a1/1-4}$, P_n , P_b , T_{dp2} and $T_{an/1-2}$.

Readings

The direct measurement of T_{wh1} , T_{wc1} , T_{wh2} , T_{wc2} , $T_{a1/1-4}$, $T_{a2/1-3}$, $T_{an/1-2}$, T_{dp1} , T_{dp2} , P_{atm} , P_x , P_b , Q_{wc} , Q_{wh} and all electrical data, are all read from their respective instruments in the thermal chamber and sent to the data acquisition unit located in the laboratory office. The data acquisition collects the data every 15seconds whereon it places it in an excel spreadsheet for analysis.

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