



VARIABLE AIR VOLUME / TERMINAL REHEAT SINGLE DUCT SYSTEM

The Variable Air Volume (VAV) / Terminal Reheat Single Duct Central HVAC System is commonly used on larger yachts where a single duct central system is more practical than a fan coil system yet individual room temperature control is required.

The central air handler is usually comprised of the following main components:

1. Mixing box
2. Filter section
3. Heating coil (water or electric)(optional)
4. Cooling coil
5. Humidifier section (optional)
6. Fan section

An illustration of this unit and the VAV/Reheat system is shown on the following page.

COOLING MODE

Air enters the mixing box of the air handler from both the cabins (return air, RA) and from the outside (fresh air makeup, OA). The volume of each air supply is determined by the amount of fresh air required by the customer and the practicalities of running return air duct through the yacht. This air mixture then passes through a bank of air filters that removes any particles in the air. The air then passes through the heating coil (which is deactivated at this point) and enters the cooling coil. In the cooling coil the air mixture is both cooled and dehumidified. The air temperature leaving the cooling coil is usually around 55° F (12° C). On the outlet of the cooling coil (depending upon the face area of the coil and the volume of air passing through the coil) a mist eliminator may be used to remove any condensation that may blow off of the cooling coil. The air then passes the deactivated humidification section to the unit fan. The fan then discharges the air from the unit into the supply air (SA) ducting. The air is routed through the supply air ducting to the VAV / Reheat unit for each area. The air then passes through the VAV / Reheat unit into the room.

The VAV / Reheat unit is comprised of an air damper that is electrically opened and closed by an electronically controlled modulating motor and an electric heating element that is modulated by a SCR type solid state controller. Normally the air damper is in the open position and the heater element is off. As the room temperature approaches the temperature that has been set on the room thermostat (set point) the air damper begins to close to a predetermined position thereby reducing the air flow and cooling capacity to

the room . If the room temperature decreases below the cooling setpoint the reheat coil is energized to warm the air entering the room and maintain the room set point. Because both the damper and heating element are electronically modulated the room temperature can usually be maintained to within +/- 1° F of the room set point.

HEATING MODE

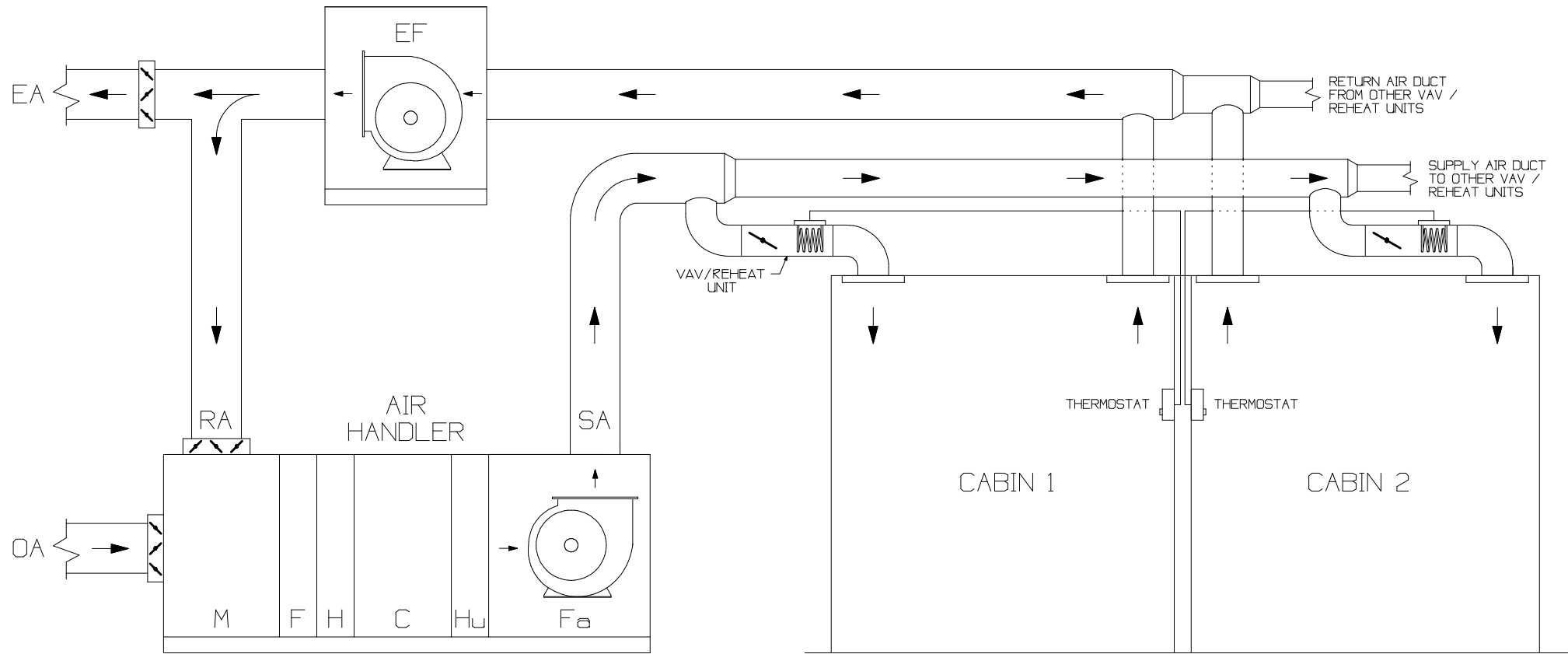
Air enters the mixing box of the air handler from both the cabins (return air, RA) and from the outside (fresh air makeup, OA). The volume of each air supply is determined by the amount of fresh air required by the customer and the practicalities of running return air ductwork through the yacht. This air mixture then passes through a bank of air filters that removes any particles in the air. The air then passes through the heating coil where the air mixture is warmed to a temperature suitable for delivery to the room. This temperature is dependant on the outside air temperature, outside air volume and reheat coil sizes. The air then passes through the humidification section where steam is added to maintain the design humidity level. The conditioned air then enters the unit fan. The fan then discharges the air from the unit into the supply air (SA) ducting. The air is routed through the supply air ducting to the VAV / Reheat unit for each area. The air then passes through the VAV / Reheat unit into the room.

Normally in the heating mode the damper is in the minimum position and the heater element is modulating from maximum output to its minimum output (off). As the room temperature approaches set point the reheat element output is decreased. If the room temperature continues to increase above set point the air damper begins to open from its minimum setting and supply more cool air into the room to maintain the room set point. Because both the damper and heating element are electronically modulated the room temperature can usually be maintained to within +/- 1° F of the room set point.

For further information on the VAV / Terminal Reheat system please contact the applications engineering department at Aqua-Air.

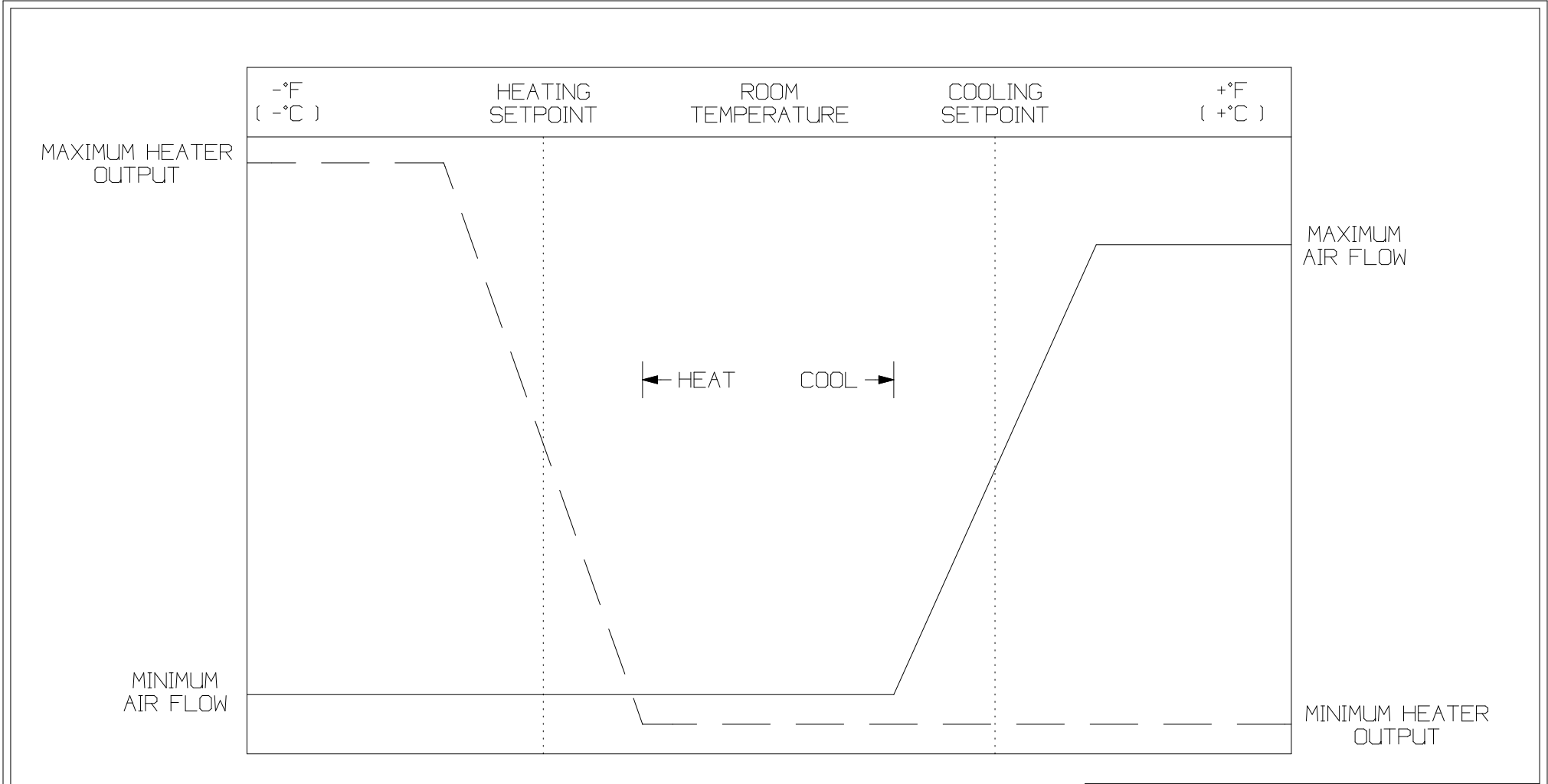
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- C COOLING COIL
- EA EXHAUST AIR
- EF EXHAUST FAN
- F FILTER ASSEMBLY
- F_a FAN
- H HEATING COIL (opt)
- Hu HUMIDIFIER (opt)
- M MIXING BOX
- OA OUTSIDE AIR
- RA RETURN AIR
- SA SUPPLY AIR
- AIR FLOW

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| AQUA-AIR | | MARINE AIR CONDITIONING SYSTEMS | |
| TYPICAL VAV / TERMINAL REHEAT CENTRAL AIR HANDLER SYSTEM | | | |
| DRAWING NUMBER | VAVRHTX | DRAWN BY | DN |
| SCALE | NONE | DATE | 2-2-96 |
| APPROVED BY | | REVISION DATE | |
| REV | A | | |



_____ SUPPLY AIR VOLUME
 - - - - - REHEAT HEATER ELEMENT

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| AQUA-AIR | | MARINE AIR CONDITIONING SYSTEMS | |
| VARIABLE AIR VOLUME (VAV) / TERMINAL REHEAT CONTROL SCHEDULE | | | |
| DRAWING NUMBER | VAVRHTEX | DRAWN BY | DN |
| | | DATE | 2-2-96 |
| SCALE | NONE | APPROVED BY | REVISION DATE |
| | | | REV A |