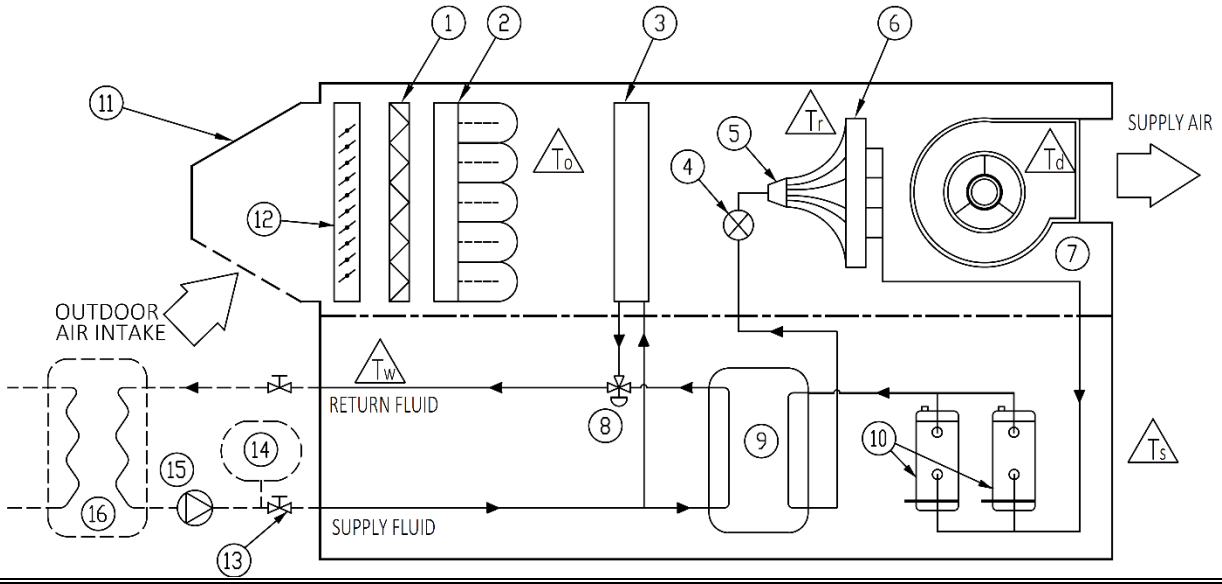
Standard Varipak (VPSA/R) - Sequence of Operation



Legend			
1. Pre Filters	7. Supply Fan	13. Isolation Valves*	T_r Refrigerant temperature sensor
2. Bag Filters	8. Heating Control Valve	14. Expansion Tank*	T_d Discharge air temperature sensor
3. Hydronic Heating Coil	9. Condensers	15. Pump*	T_s Space temperature sensor (Field installed and wired by others)
4. TX Valve	10. Compressors	16. Heat Exchanger*	* Field supplied and mounted by others
5. Distributor	11. Intake Hood - VPSR Only	T_w System fluid temperature sensor	--- Field piping components
6. DX Coil	12. Intake Damper - VPSR Only	T_o Outside air temperature sensor	

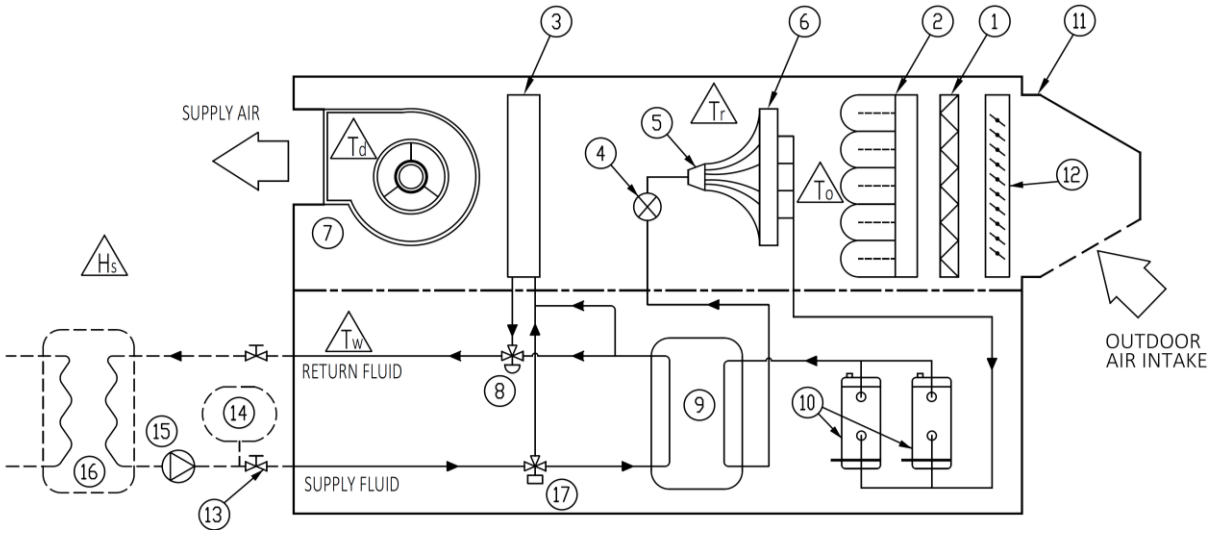
The fan runs continuously when the unit is enabled. The intake damper (when equipped or by others) is signaled to open prior to the fan starting.

The **Heat** mode enables automatically when the Outside Air Temperature is less than 60°F and disables when the Outside Air Temperature is greater than 70°F (these temperature thresholds are adjustable). In Heat mode, the controller modulates the internal valve to maintain the space heat set point by adjusting the discharge air temperature using a PID algorithm and feedback from the space temperature sensor.

The **Cool** mode enables automatically when the Outside Air Temperature is greater than 70 °F and disables when the Outside Air Temperature is less than 60 °F (these temperature thresholds are adjustable). In Cool mode, the controller activates compressor stages to maintain the space cool set point using a PID algorithm and feedback from the space temperature sensor.

When the MUA is in **Emergency Stop/Idle** mode, the compressors are switched off, the fan is shut down, the damper output is disabled, and the interval valve will direct 50% of the inlet water through the heating coil.

Standard Varipak (VPSA/R) with Reheat Option - Sequence of Operation



Legend			
1. Pre Filters	7. Supply Fan	13. Isolation Valves*	T_o Outside air temperature sensor
2. Bag Filters	8. Heating Control Valve	14. Expansion Tank*	T_r Refrigerant temperature sensor
3. Hydronic Heating Coil	9. Condensers	15. Pump*	T_d Discharge air temperature sensor
4. TX Valve	10. Compressors	16. Heat Exchanger*	H_s Humidity &Space temperature sensor (installed and wired by others)
5. Distributor	11. Intake Hood - VPSR Only	17. 3-way On/Off Inlet Valve	* Field supplied and mounted by others
6. DX Coil	12. Intake Damper - VPSR Only	T_w System fluid temperature sensor	--- Field piping components

The fan runs continuously when the unit is enabled. The intake damper (when equipped or by others) is signaled to open prior to the fan starting.

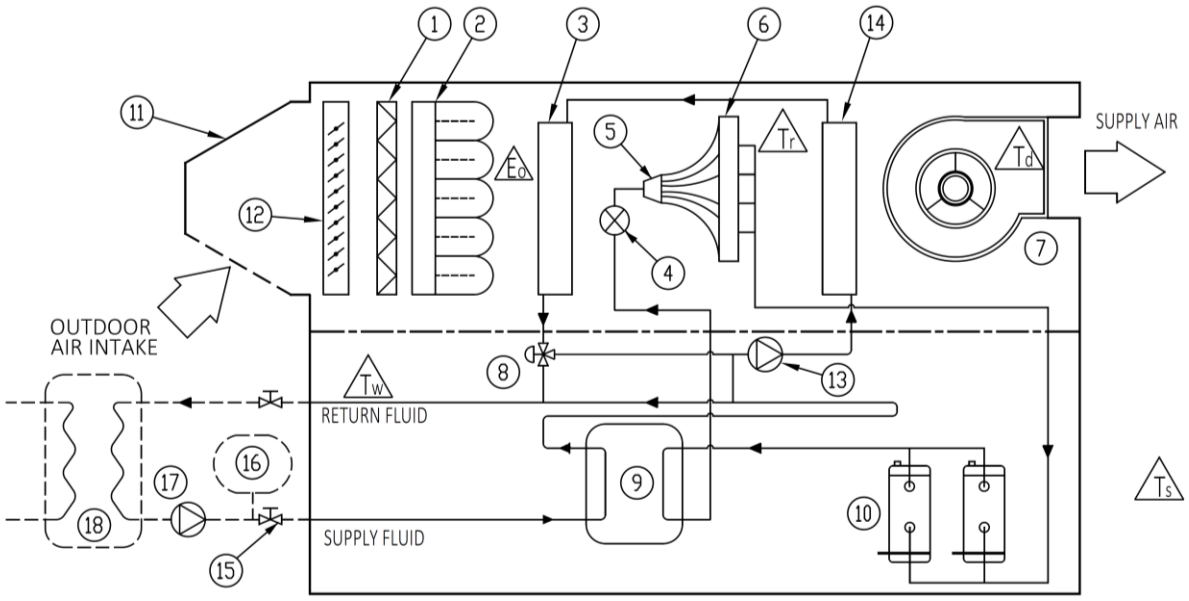
The **Heat** mode enables automatically when the Outside Air Temperature is less than 60°F and disables when the Outside Air Temperature is greater than 70°F (these temperature thresholds are adjustable). In Heat mode, the inlet valve will direct water through the heating coil, and the reheat modulating valve will modulate to maintain the space heat set point by adjusting the discharge air temperature using a PID algorithm and feedback from the space temperature sensor.

The **Cool** mode enables automatically when the Outside Air Temperature is greater than 70 °F and disables when the Outside Air Temperature is less than 60 °F (these temperature thresholds are adjustable). In Cool mode, the inlet valve will direct the water through the condenser and the reheat valve will direct water from the condenser to the water out line. There is no reheat during this mode of operation. The controller activates compressor stages to maintain the space cool set point using a PID algorithm and feedback from the space temperature sensor.

The **Dehumidification** mode is only available if the MUA is already in the cooling mode of operation. If the space temperature drops below the set point, while the space humidity is 5% higher than the space humidity set point (adjustable), the unit will enter dehumidification mode. The inlet valve will direct the water through the condenser, while the reheat valve will modulate to maintain a supply air temperature of 70 °F. The compressors will also become operational during dehumidification to allow for moisture removal. If at any point the temperature rises above the space temperature set point, the MUA will revert back into cooling mode as the space temperature conditions take precedence over dehumidification

When the MUA is in **Emergency Stop/Idle** mode, the compressors are switched off, the fan is shut down, the damper output is disabled, and the inlet and the reheat valves will direct 50% of the inlet water through the heating coil.

Varipak with Runaround Coil (VPEA/R) - Sequence of Operation



Legend			
1. Pre Filters	7. Supply Fan	13. Circulating Pump	E_o Outside air enthalpy sensor
2. Bag Filters	8. Heating Control Valve	14. Re Coil	T_r Refrigerant temperature sensor
3. Pre Coil	9. Condensers	15. Isolation Valves*	T_d Discharge air temperature sensor
4. TX Valve	10. Compressors	16. Expansion Tank*	T_s Space temperature sensor (Field installed and wired by others)
5. Distributor	11. Intake Hood - VPER Only	17. Pump* 18. Heat Exchanger*	* Field supplied and mounted by others
6. DX Coil	12. Intake Damper - VPER Only	T_w System fluid temperature sensor	--- Field piping components

The Run-Around VariPak uses cold evaporator leaving air to cool water in the Re-coil and pumps the cool water to the Pre-coil to cool the incoming air before it enters the evaporator. This reduces the cooling load on the evaporator.

Run-Around mode enables when the outside air enthalpy is above the enthalpy set point. The internal circulating pump activates in Run-Around mode. The controller activates compressor stages to maintain the Cool set point using a PID algorithm and feedback from the space temperature sensor.

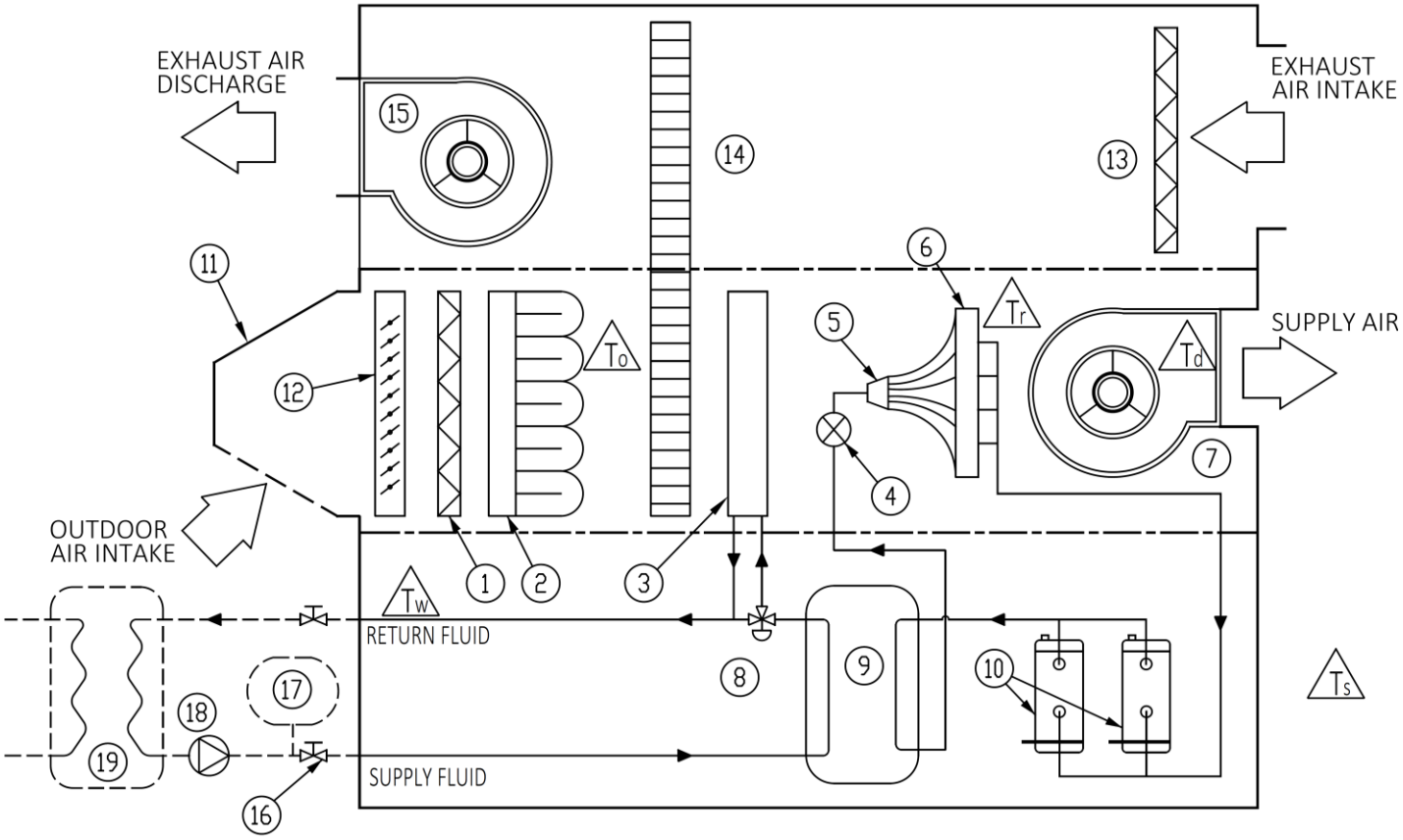
The fan runs continuously when the unit is enabled. The intake damper (when equipped or by others) is signaled to open prior to the fan starting.

The **Heat** mode enables automatically when the Outside Air Temperature is less than 60 °F and disables when the Outside Air Temperature is greater than 70 °F (these temperature thresholds are adjustable). In Heat mode, the controller modulates the internal valve to maintain the space heat set point by adjusting the discharge air temperature using a PID algorithm and feedback from the space temperature sensor.

The **Cool** mode enables automatically when the Outside Air Temperature is greater than 70 °F and disables when the Outside Air Temperature is less than 60 °F (these temperature thresholds are adjustable). In Cool mode, the controller activates compressor stages to maintain the space cool set point using a PID algorithm and feedback from the space temperature sensor.

When the MUA is in **Emergency Stop/Idle** mode, the compressors are switched off, the fan is shut down, the damper output is disabled, and the interval valve will direct 50% of the inlet water through the heating coil.

Varipak with Energy Recovery Wheel (VPWA/R) - Sequence of Operation



Legend			
1. Pre Filters	7. Supply Fan	13. Exhaust Air Filters	T_o Outside air temperature sensor
2. Bag Filters	8. Heating Control Valve	14. Energy Recovery Wheel	T_r Refrigerant temperature sensor
3. Hydronic Heating Coil	9. Condensers	15. Exhaust Fan	T_d Discharge air temperature sensor
4. TX Valve	10. Compressors	16. Isolation Valves* 17. Expansion Tank*	T_s Space temperature sensor (Field installed and wired by others)
5. Distributor	11. Intake Hood - VPWR Only	18. Pump* 19. Heat Exchanger*	* Field supplied and mounted by others
6. DX Coil	12. Intake Damper - VPWR Only	T_w System fluid temperature sensor	--- Field piping components

Both supply air and exhaust air fan runs continuously when the unit is enabled. The supply air intake damper (when equipped or by others) is signaled to open prior to the fan starting. The heat wheel will energize immediately and operate automatically.

The **Heat** mode enables automatically when the Outside Air Temperature is less than 60 °F and disables when the Outside Air Temperature is greater than 70 °F (these temperature thresholds are adjustable). The controller modulates the internal valve to maintain the space heat set point by adjusting the discharge air temperature using a PID algorithm and feedback from the space temperature sensor.

The **Cool** mode enables automatically when the Outside Air Temperature is greater than 70 °F and disables when the Outside Air Temperature is less than 60 °F (these temperature thresholds are adjustable). In Cool mode, the controller activates compressor stages to maintain the space cool set point using a PID algorithm and feedback from the space temperature sensor.

When the MUA is in **Emergency Stop/Idle** mode, the compressors are switched off, the fan is shut down, the damper output is disabled, and the interval valve will direct 50% of the inlet water through the heating coil.