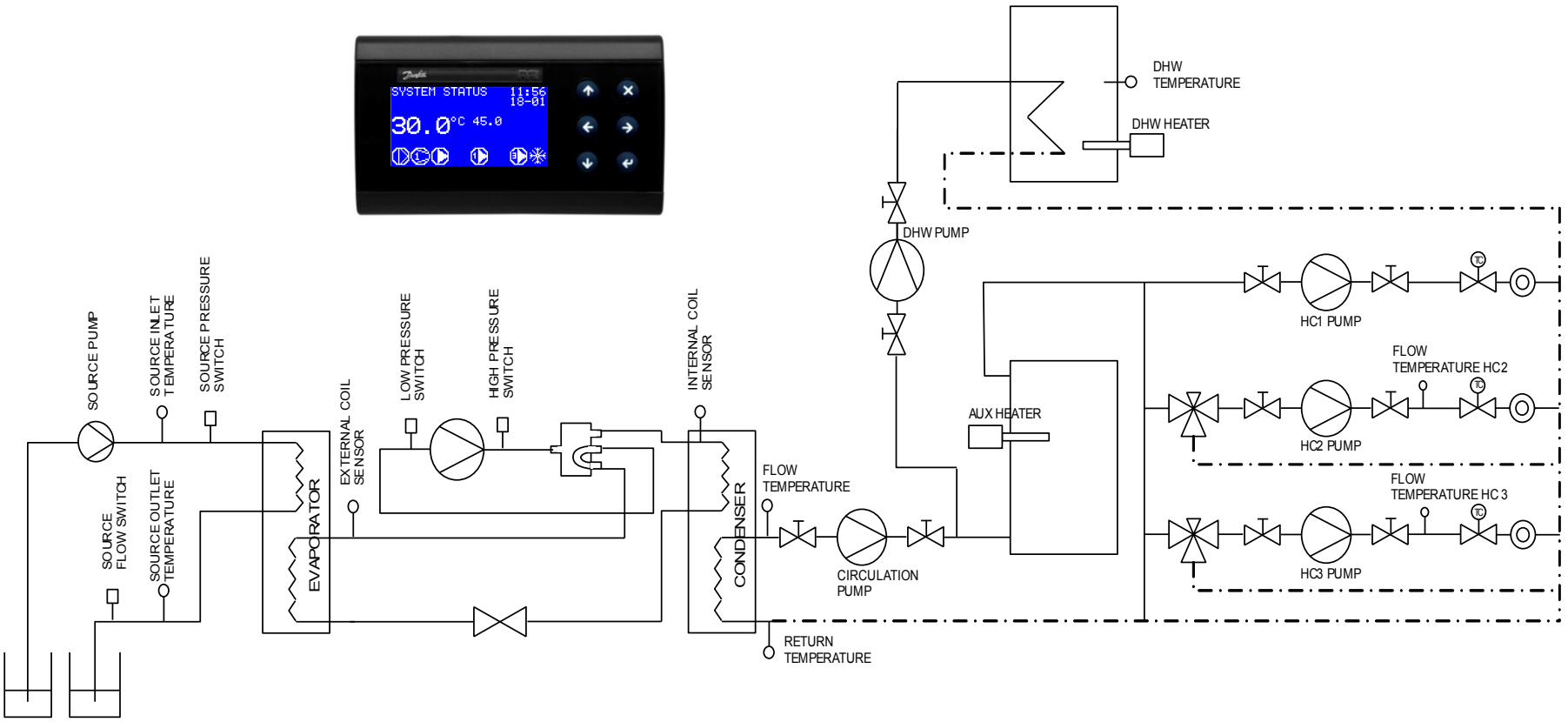
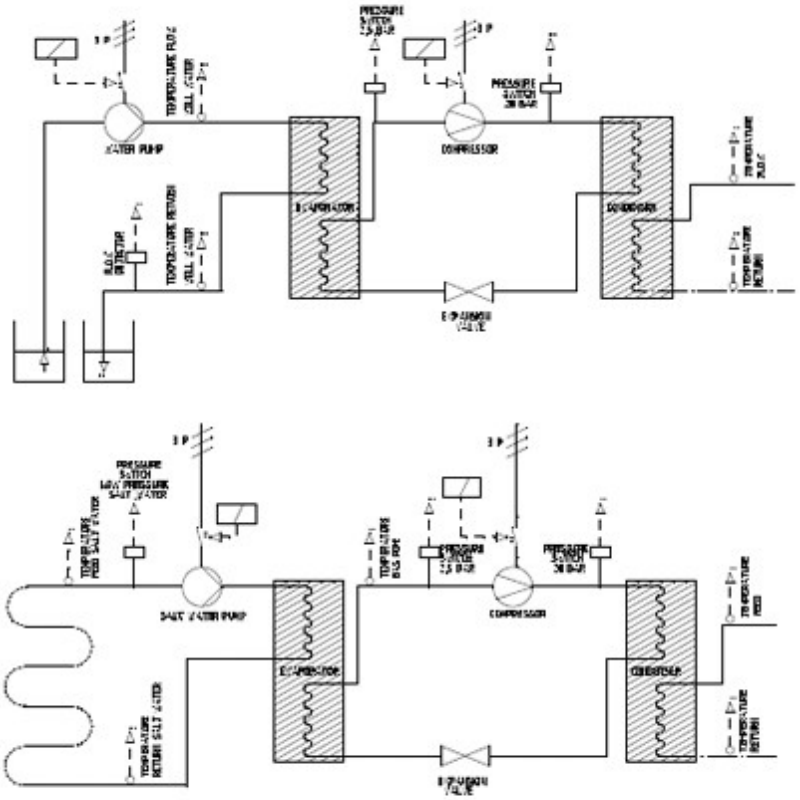
Heat Pump general diagram



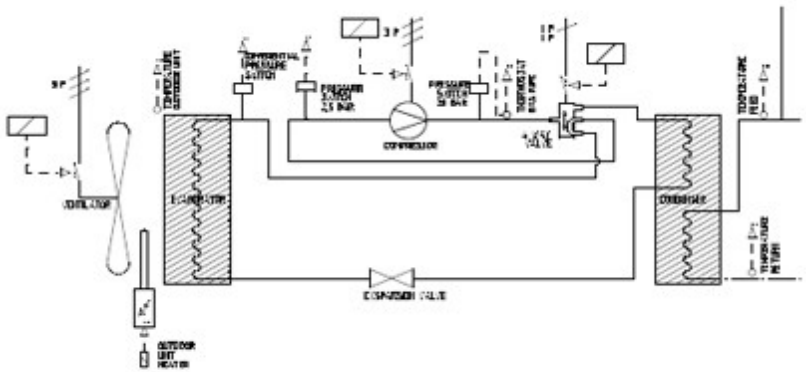
Heat pump control

- Water/Water and Brine/Water
  - Heat source. Control of
    - Water Pump + overload switch
    - Source Inlet and Outlet Temperature
    - Source Flow Switch
    - Pressure Switch Source
  - Gas circuit. Control of
    - 2 Compressors + 2 overload switch
    - High and Low Pressure Transmitter
    - High and Low Pressure Switch
  - Heat sink. Control of
    - Circulation Pump + overload switch
    - Circuit Flow Switch
    - Return Temperature
    - Flow Temperature



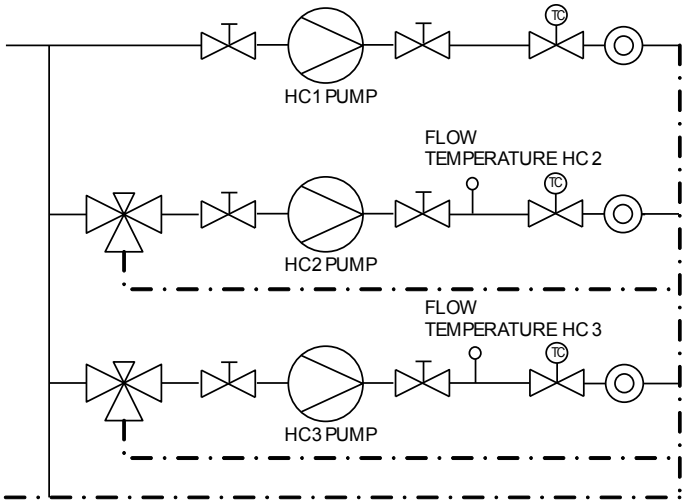
Heat pump control

- Air/Water
  - Heat source. Control of
    - Outdoor Fans: 2 steps
    - Fan 1 and 2 overload switch
  - Gas circuit. Control of
    - 2 Compressors + 2 overload switch
    - Reversing valve
    - High and Low Pressure Transmitter
    - High and Low Pressure Switch
  - Heat sink. Control of
    - Circulation Pump + overload switch
    - Circuit Flow Switch
    - Return Temperature
    - Flow Temperature



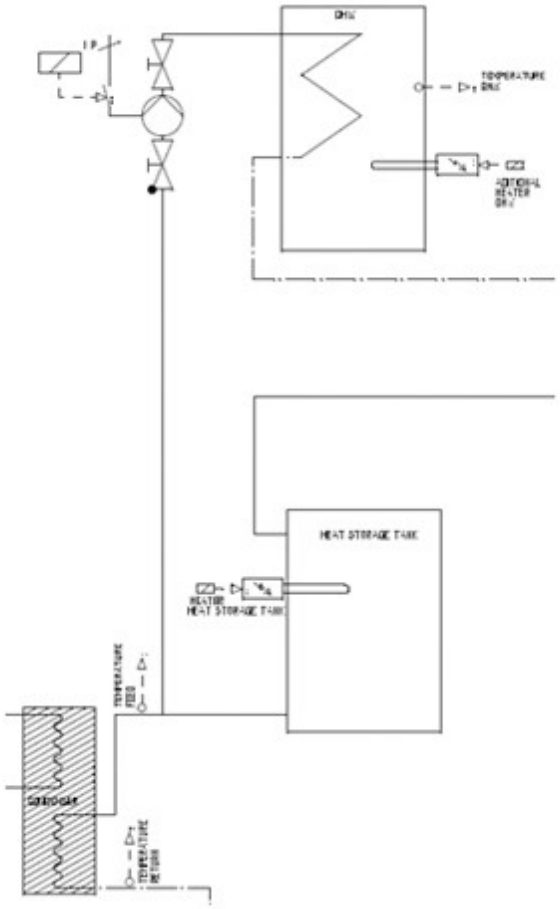
Circuit control

- 3 heating circuits
  - Control of
    - Flow Temperature Heat Circuit 2,3
    - Pump HC1,2,3
    - Mixing valve HC 2,3
      - 2 position
      - 3 position
      - stepless (0/10V)
- Room Control
  - Room 1,2,3 Temperature
  - Room thermostat 1,2,3
  - Presence Switch



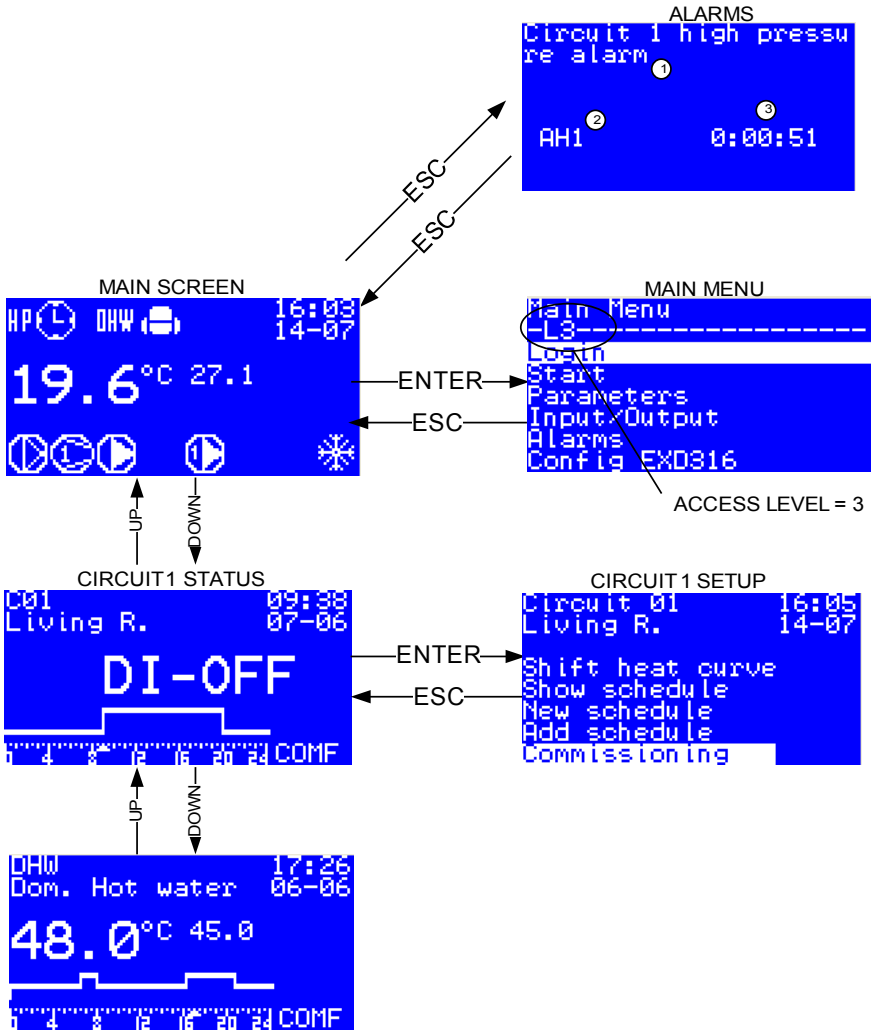
DHW Preparation – Storage Tank Management

- DHW. Control of
  - DHW Pump
  - DHW Heater
  - DHW Temperature
- Storage Tank. Control of
  - Storage Tank Heater



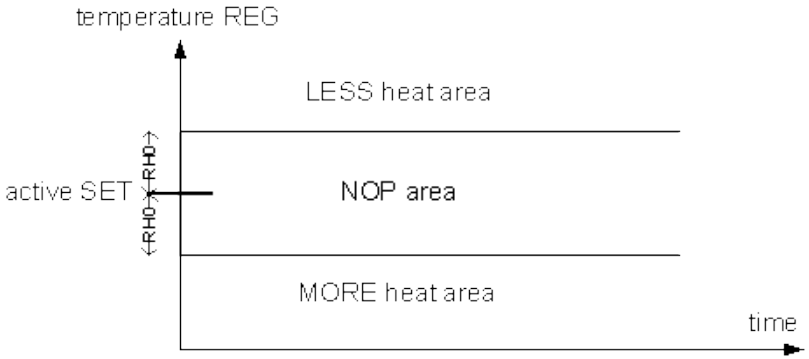
User Interface

- Main screen
  - Return Temperature
  - Actuator status
  - HP and DHW control mode
- Alarm screen
  - Description, code
  - Time since activation
- Status screens
  - Circuit and room status
  - Weekly timer

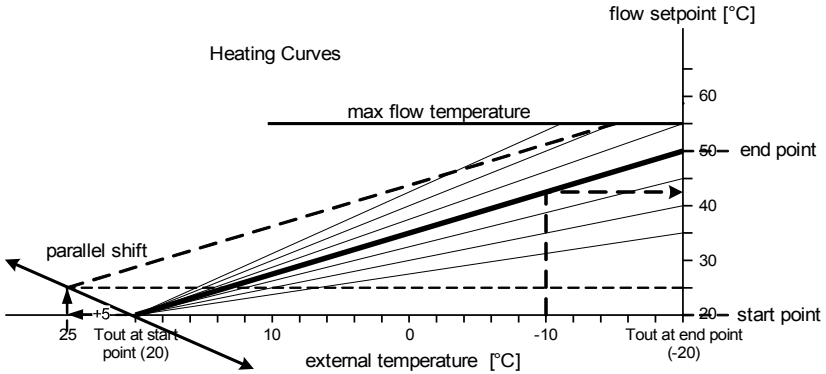


Strategy: circuit hot water production

- HP Activation
  - Circulation pump periodically starts
  - Return or Flow Temperature into the More Heat Area
  - Room/DHW request



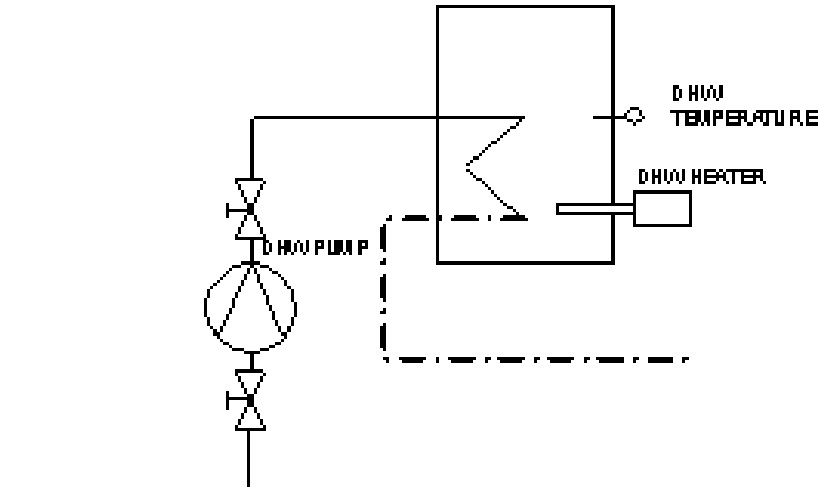
- HP Setpoint
  - Weather compensation (heating curves)
  - 3 types of heating curves

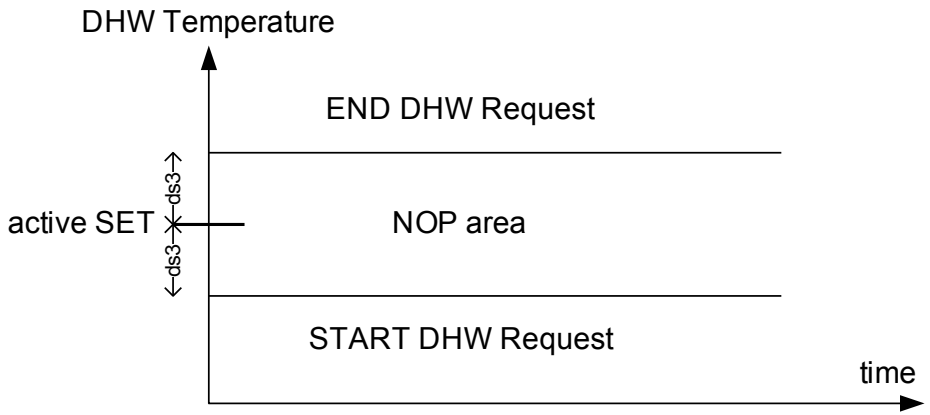


- Compressors & Storage Tank Heater
  - Heat Request: 3 actions based on Treg
    - C1: Treg inside More Heat Area
    - C1+C2 after time
    - C1+C2+STH after time and Tout<limit

Strategy: DHW preparation

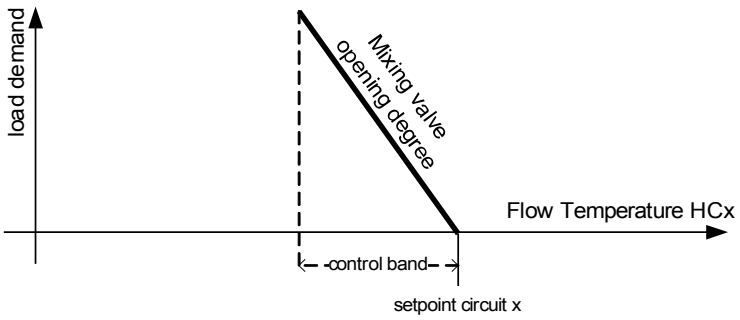
- DHW Request
  - Based on DHW Temp and Setpoint
  - Setpoint eco or comfort
  - Action
    - C1
    - C1+C2 if Tout<limit
    - DHWHeater if SET>HP MaxTemp
- DHW Pump
  - DHW Request
  - if DHW Request, HCPump OFF





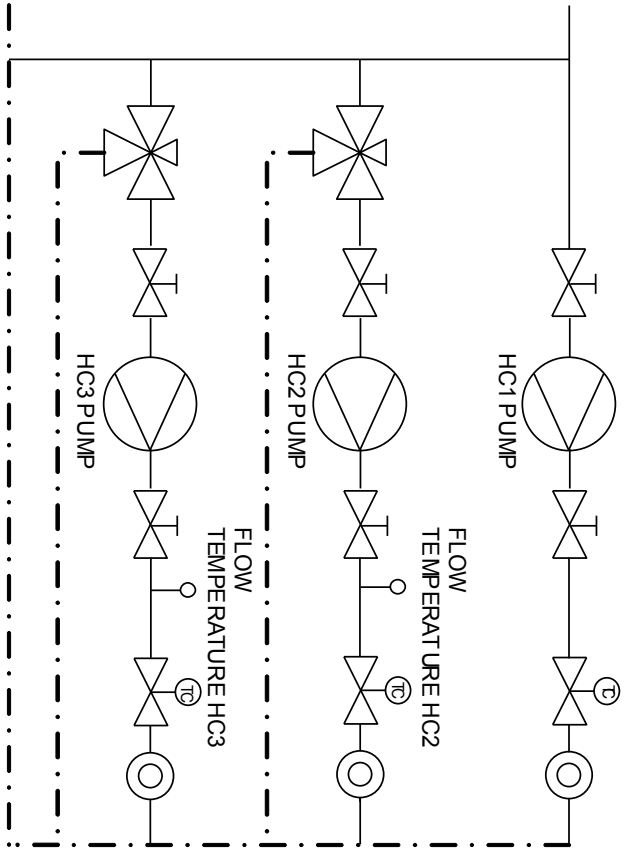
Strategy: circuits control

- Mixing valve
  - PID control on flow temperature



  - Eco/Comfort setpoint
  - Heating curves
  - Graphic Schedulers

- Heat circuit Pumps
  - Activated by room request

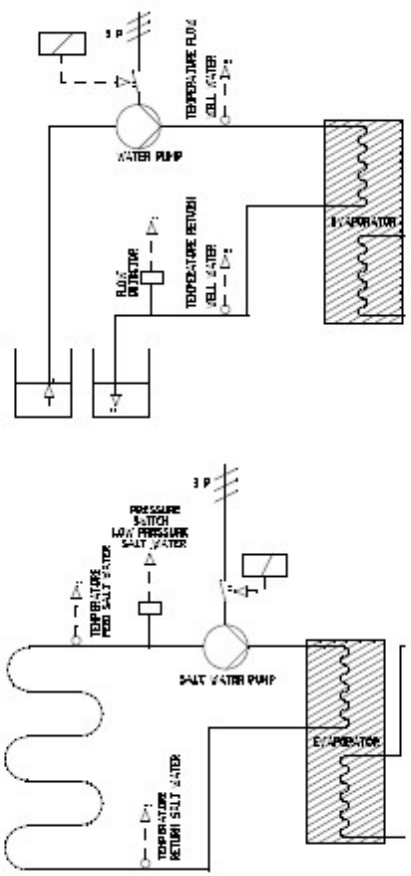


Strategy: Heat Source (water or brine)

- Water Pump
  - ON when compressors are ON
  - delay ON time and OFF time (respect to compressors)
- Evaporator frost protection

  If, during operation, the source outlet or inlet temperature drops below the source frost protection temperature, the second compressor is stopped.

  After an adjustable time the heat pump is stopped and an alarm is generated



Strategy: Heat Source (air)

- Defrost
  - Defrost types
    - Reversing the cycle
      - cycle is reversed through a 4 ways valve
      - the system cooling power is brought at its maximum
      - the way of working of the involved fan is managed by parameter
    - Fan only defrost
      - If the outdoor temperature allows to do it defrost can be performed only turning OFF compressors and turning ON fans
  - Defrost conditions
    - Start = temperature or pressure sensor
      Stop = temperature or pressure sensor
    - Start = temperature or pressure sensor
      Stop = time
    - Start = pressure sensor + temperature
      Stop = pressure sensor + temperature
    - If the "Defrost" digital input is present, it can be used to start or stop defrost