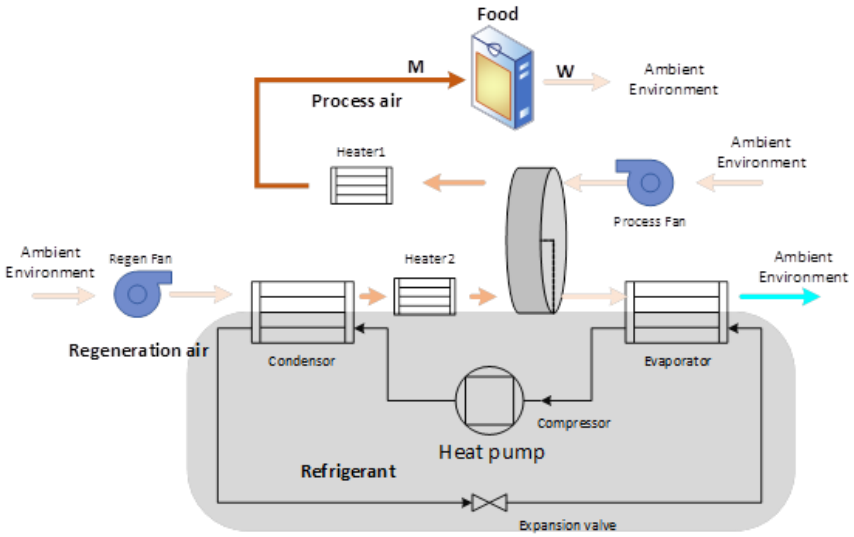
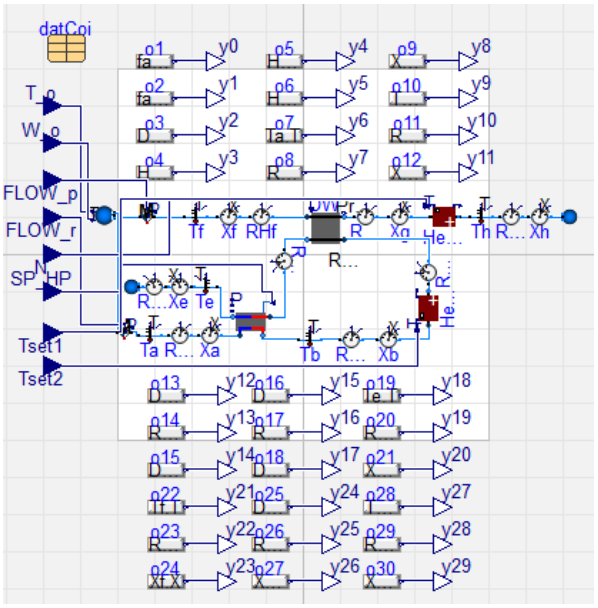
Model description

Date: 07/01/2024 Created by TAMU Dr. O'Neill's team

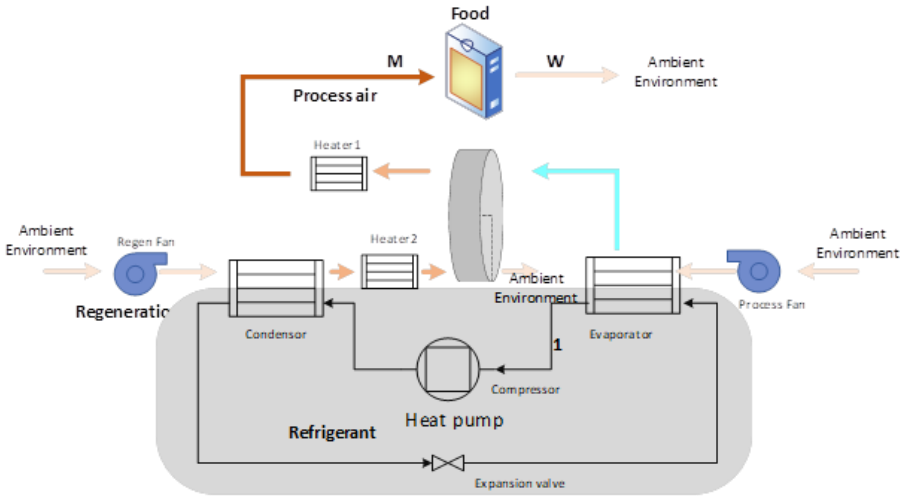
1 System diagram

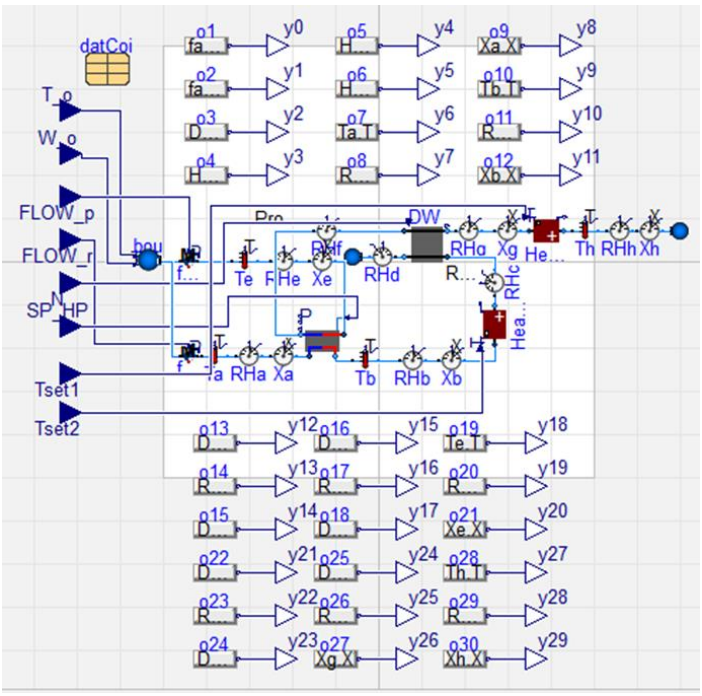
1.1 DWHP1





1.2 DWHP2





2 Variables

Input variables

Variables	Meanings	Range
FLOW_p	Process air flowrate(kg/s)	0.25~0.8
FLOW_r	Regeneration air flowrate(kg/s)	0.25~0.8
N	Rotation speed of Desiccant wheel	0-100
SP_HP	Speed ratio of heat pump	0.3~0.6
Tset1	Temperature setpoint of Heater 1(K)	273.15~333.15(0~60℃)
Tset2	Temperature setpoint of Heater 2(K)	273.15~353.15(0~80℃)

Output variables

Variables	Meanings in DWHP1	Meanings in DWHP2
y0	Power consumption of Process fan(W)	

y1		Power consumption of Regen fan(W)	
y2		Power consumption of Desiccant wheel(W)	
y3		Power consumption of Heat pump(W)	
y4		Power consumption of Heater 1(W)	
y5		Power consumption of Heater 2(W)	
y6	Temperature	Condenser inlet	Condenser inlet
y7	Relative humidity		
y8	Moisture content		
y9	Temperature	Condenser outlet	Condenser outlet
y10	Relative humidity		
y11	Moisture content		
y12	Temperature	Regen inlet	Regen Inlet
y13	Relative humidity		
y14	Moisture content		
y15	Temperature	Regen outlet (evaporator inlet)	Regen Outlet
y16	Relative humidity		
y17	Moisture content		
y18	Temperature	Evaporator outlet	Evaporator Inlet
y19	Relative humidity		
y20	Moisture content		
y21	Temperature	Desiccant wheel process inlet	Process Inlet (Evaporator Outlet)
y22	Relative humidity		
y23	Moisture content		
y24	Temperature	Desiccant wheel process outlet	Desiccant wheel process outlet
y25	Relative humidity		
y26	Moisture content		
y27	Temperature	Food chamber	Food chamber
y28	Relative humidity		
y29	Moisture content		

3 Settings

In FMU file, there are 48 data points in the weather data. Each data point is set to 3600 seconds. If needed, time scale can be modified.

In Python environment, some of inputs variables can be set to constant:

Variables	Meanings	Range
FLOW_p	Process air flowrate(kg/s)	0.4
SP_HP	Speed ratio of heat pump	0.4
Tset1	Temperature setpoint of Heater 1(K)	273.15+46(46℃)

In terms of control variables, the moisture content of the air entering the food chamber, that is “y29”, can be set to 0.012 kg/kg.