9 Anexos

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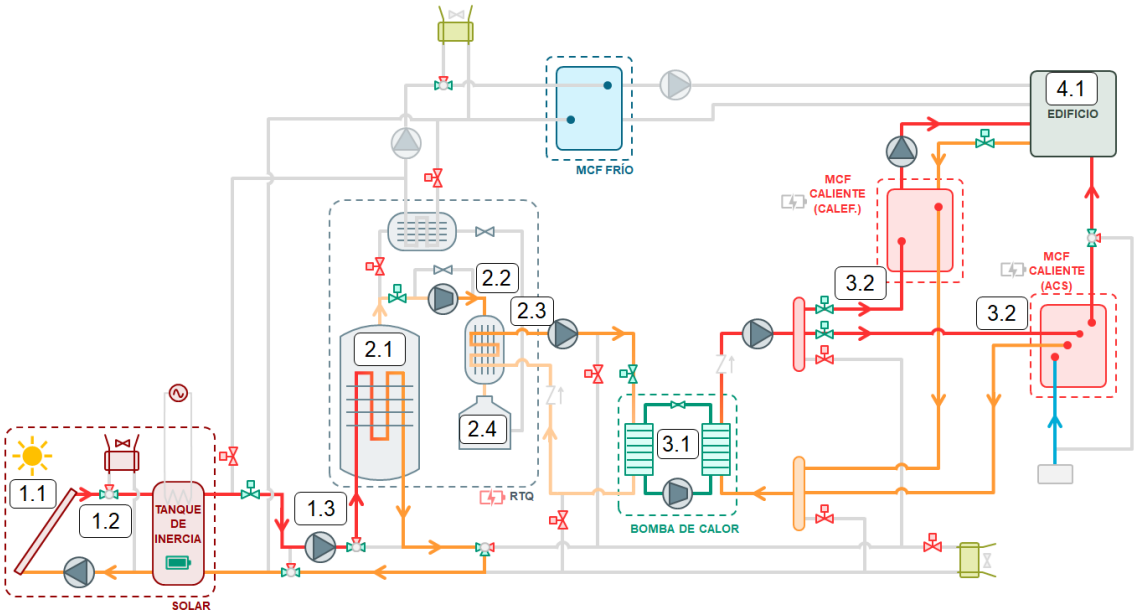


Figura 1: Esquema de operación Carga RTQ con componentes

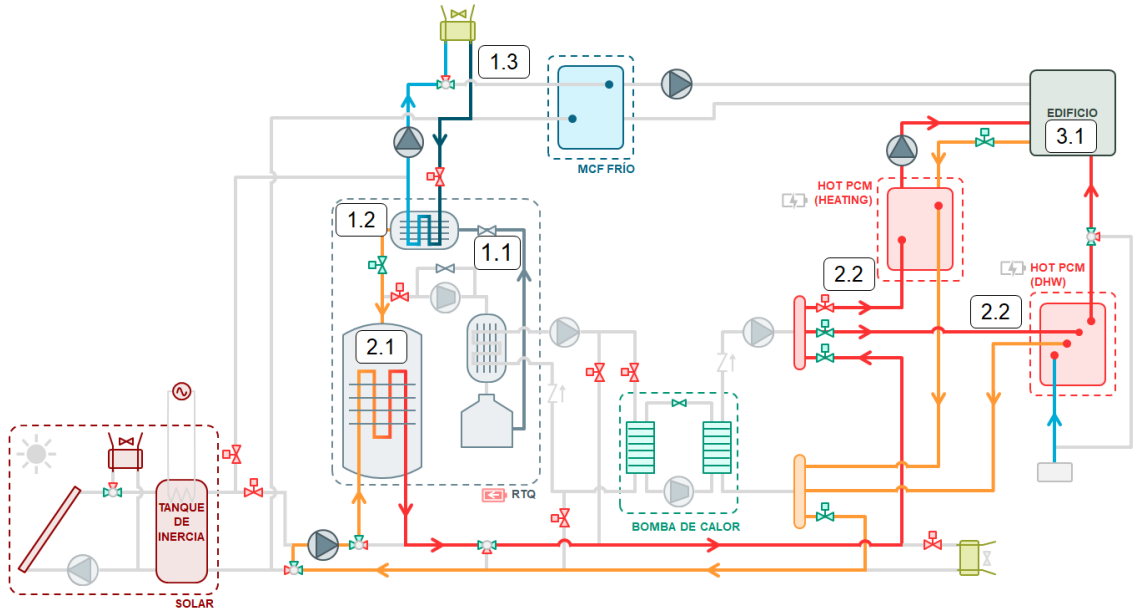


Figura 2: Esquema de operación Desarga RTQ con componentes

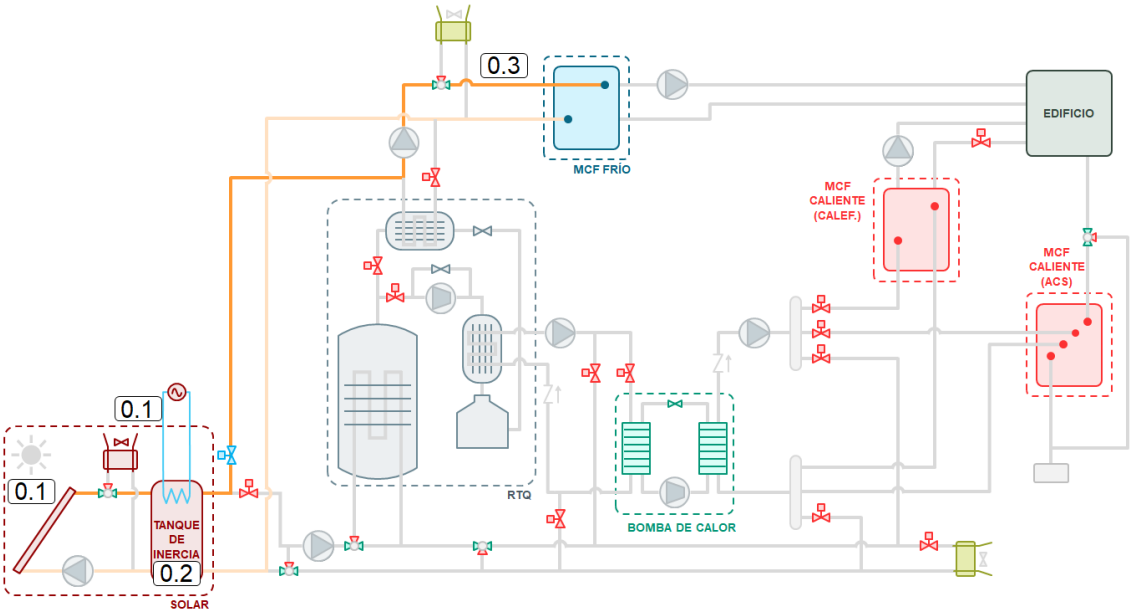


Figura 3: Esquema de operación Descarga RTQ en períodos muy fríos componentes

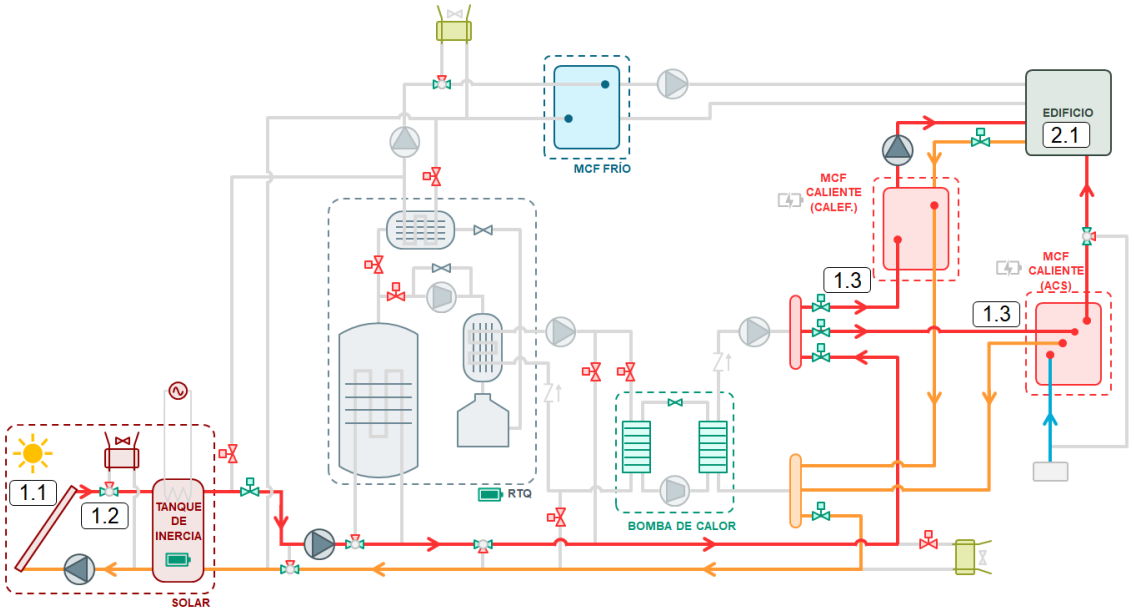


Figura 4: Esquema de operación Demanda cubierta por energía solar con componentes

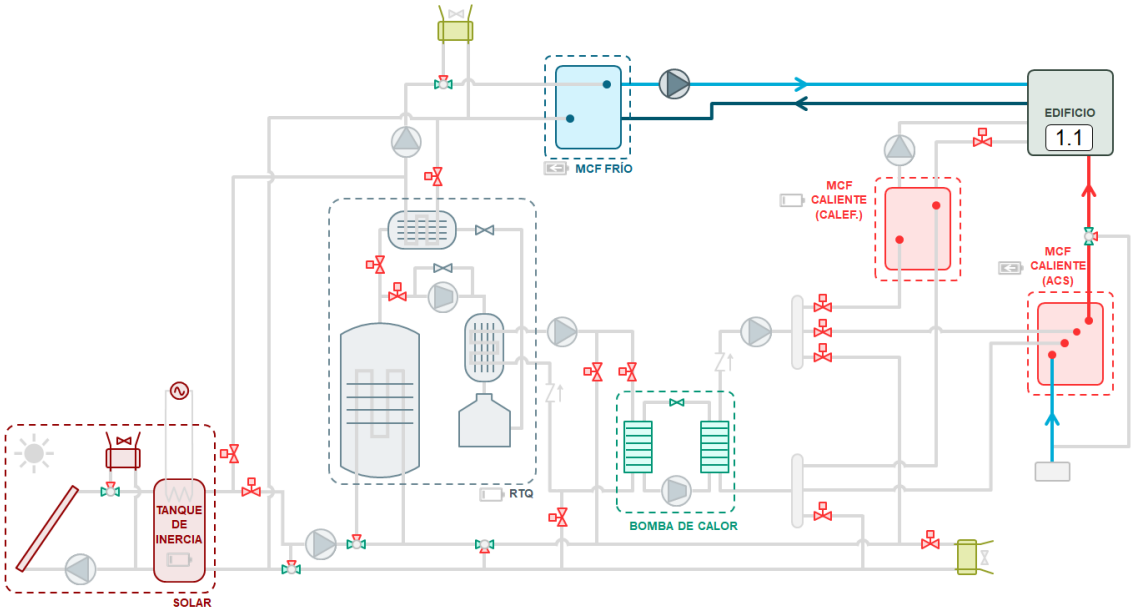


Figura 5: Esquema de operación Demanda cubierta por baterías con componentes

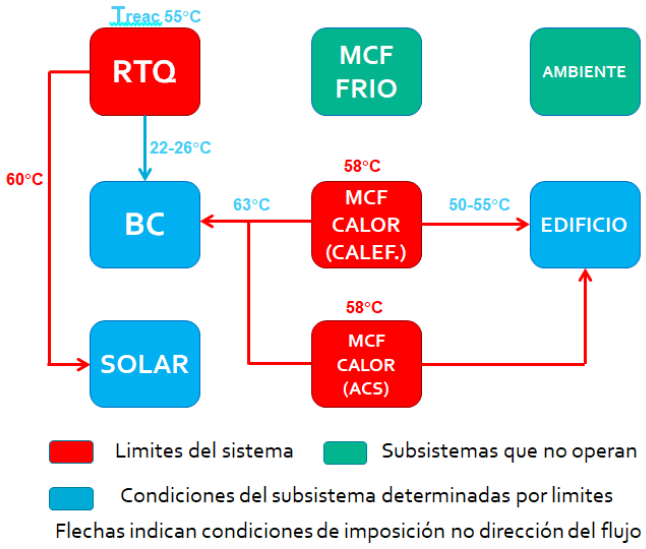


Figura 6: Condiciones de funcionamiento modo carga RTQ en invierno

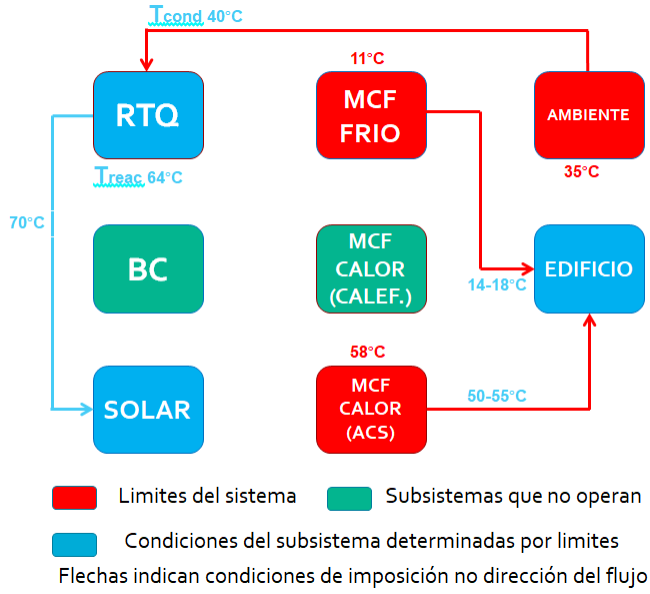


Figura 7: Condiciones de funcionamiento modo carga RTQ en verano

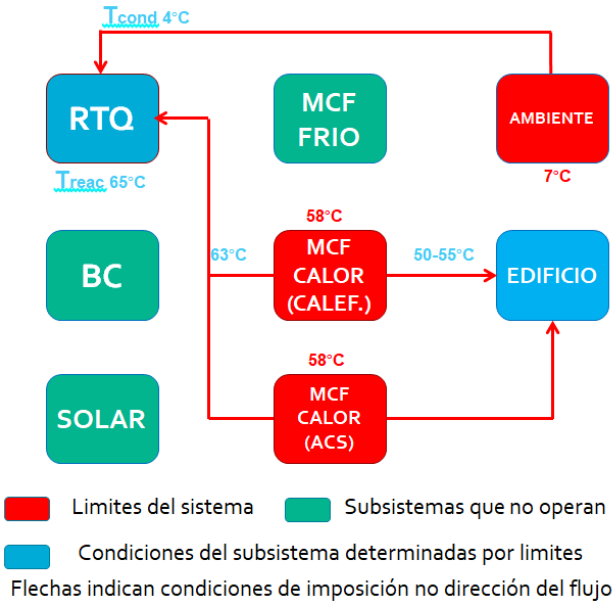


Figura 8: Condiciones de funcionamiento modo descarga RTQ en invierno

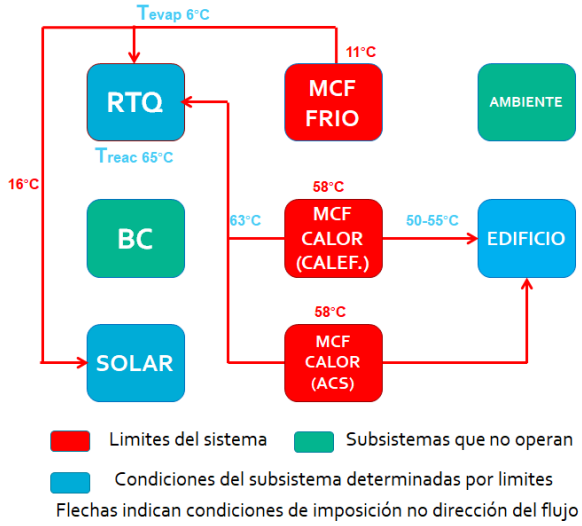


Figura 9: Condiciones de funcionamiento modo descarga RTQ en periodos muy fríos

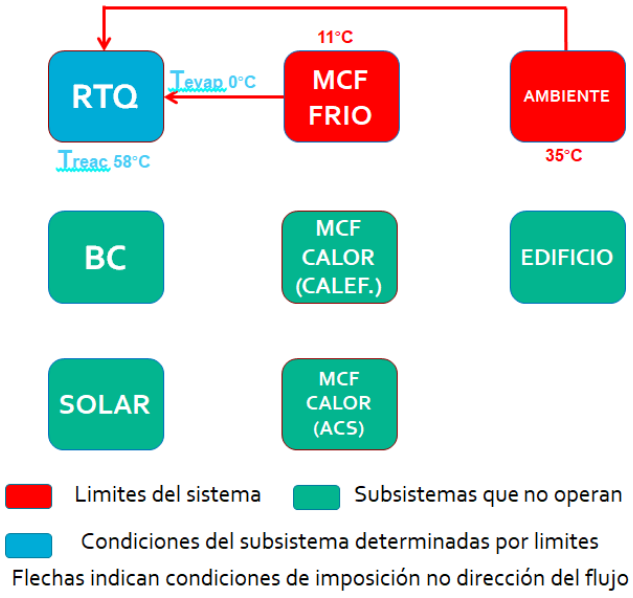


Figura 10: Condiciones de funcionamiento modo descarga RTQ en verano

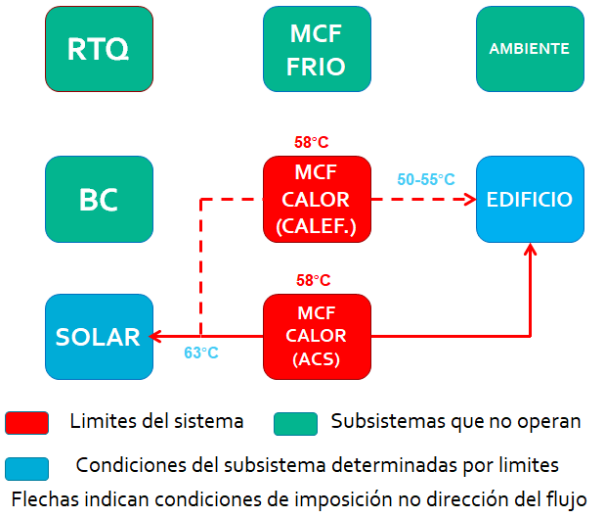


Figura 11: Condiciones de funcionamiento demanda cubierta por solar

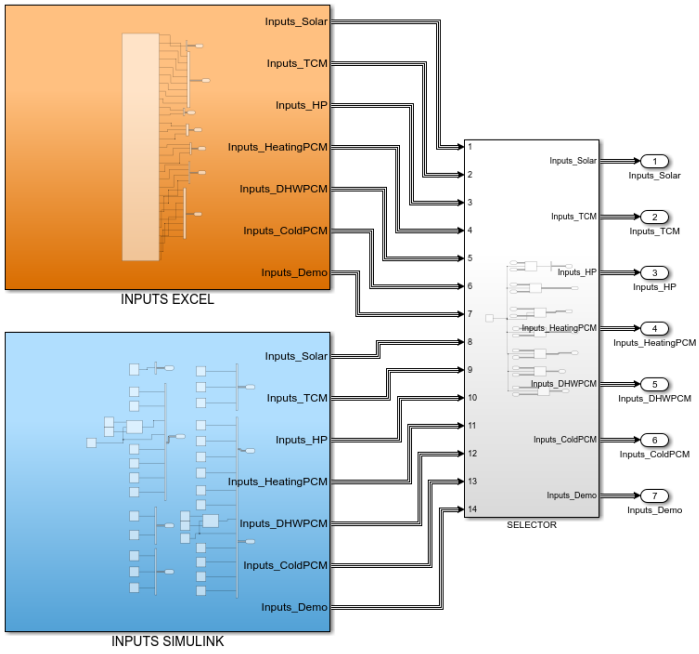


Figura 12: Vista subsistemas de entradas del Modelado Matlab/Simulink

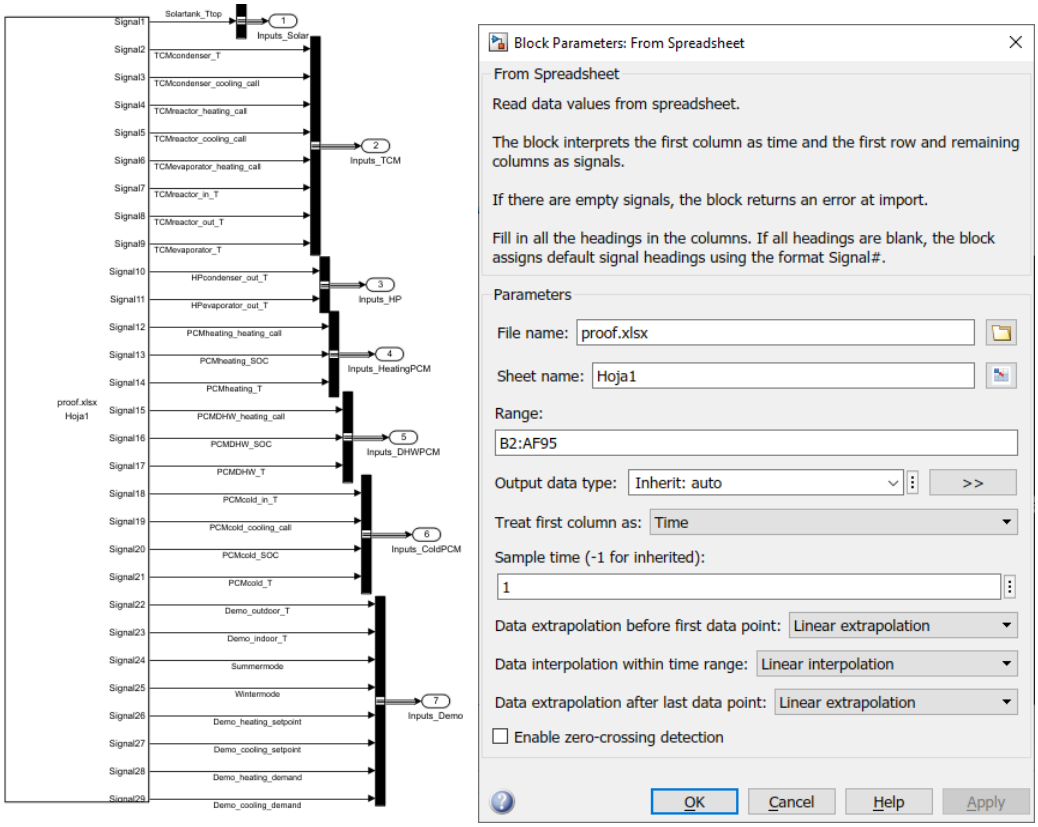


Figura 13: Vista bloques de entrada Excel e inicialización

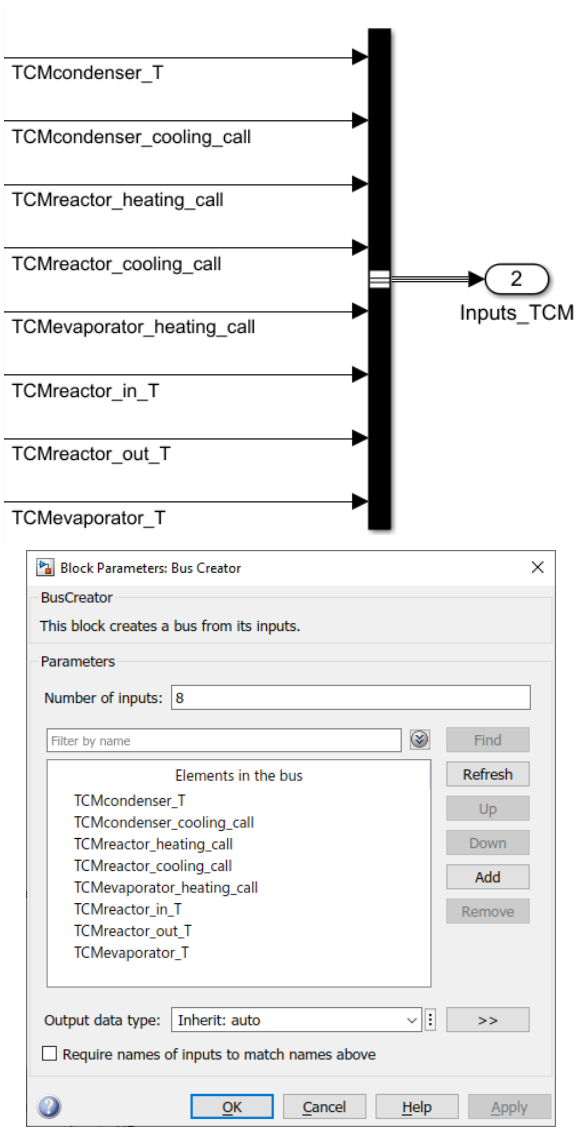


Figura 14: Vista bloque “Bus Creator” e inicialización

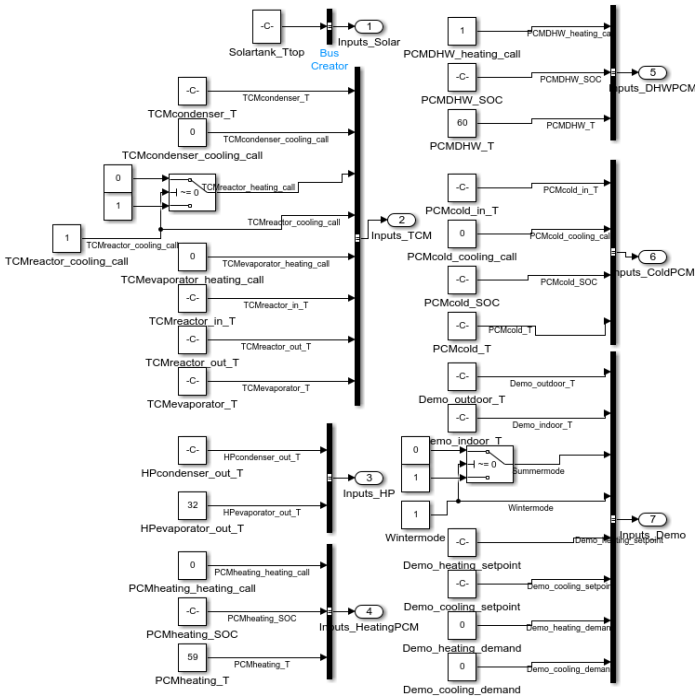


Figura 15: Vista bloques de entrada Simulink

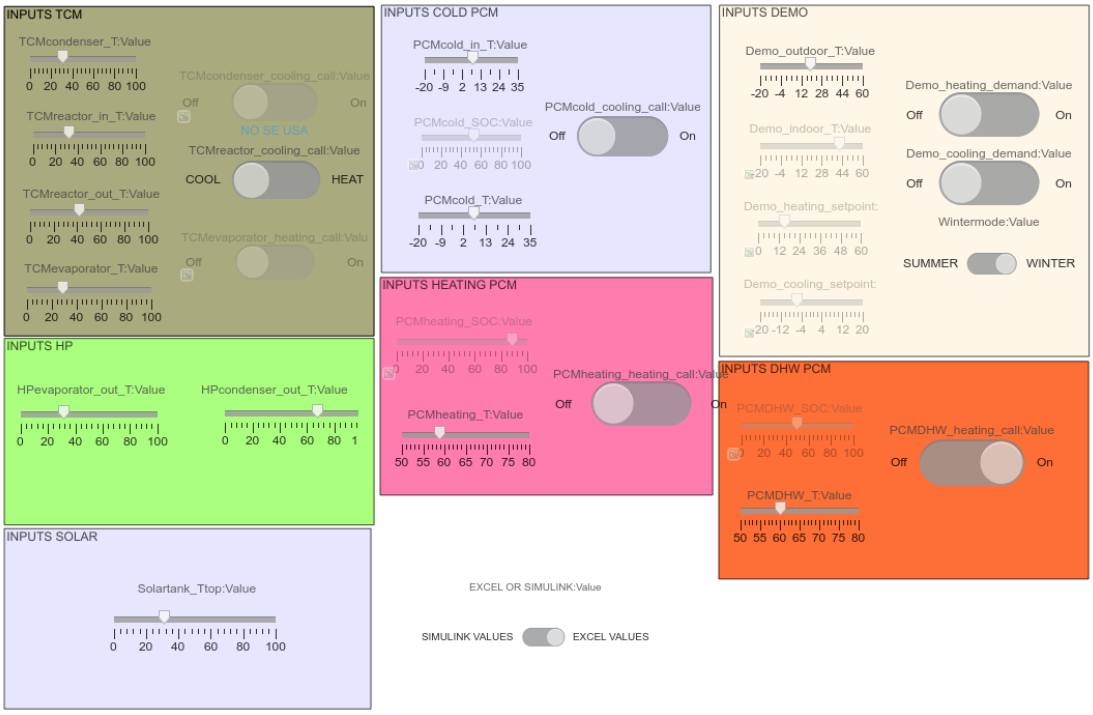


Figura 16: Vista de laconsola de control del sistema

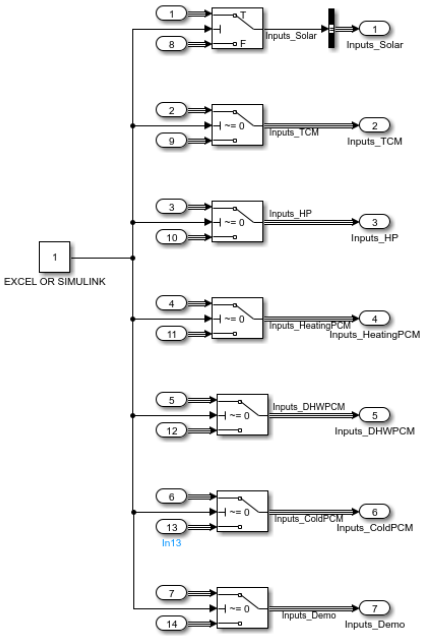


Figura 17: Vista bloque selector de entrada

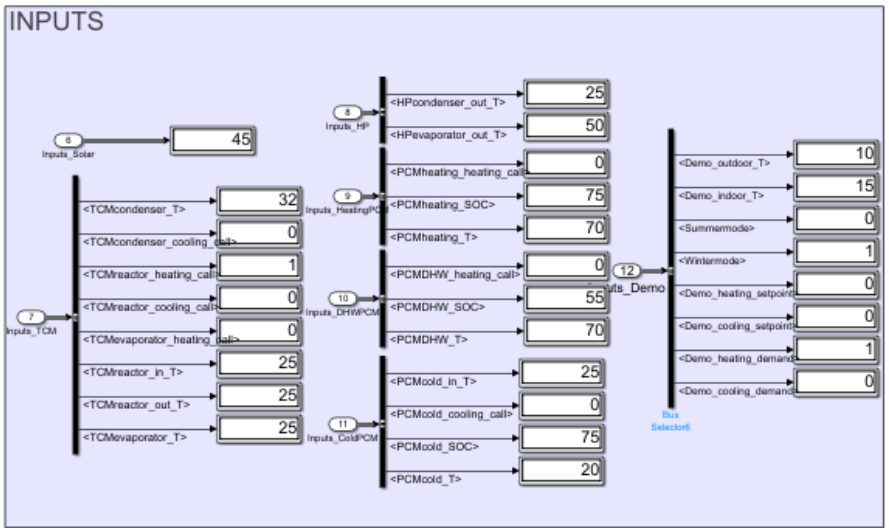


Figura 18: Vista consola valor entradas introducidas

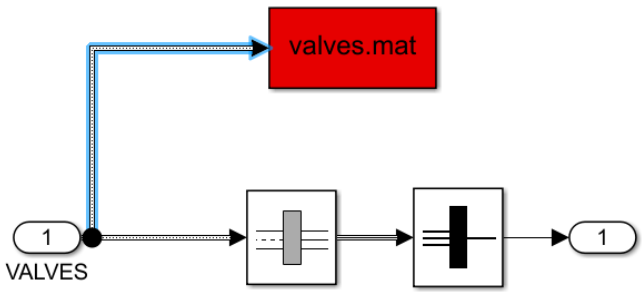


Figura 19: Vista bloque válvulas para salidas .mat

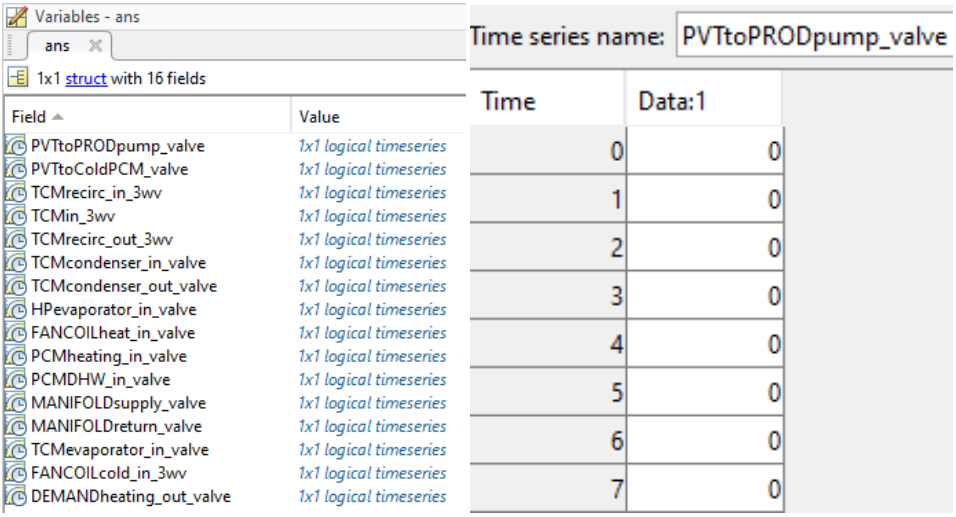


Figura 20: Archivo valves.mat

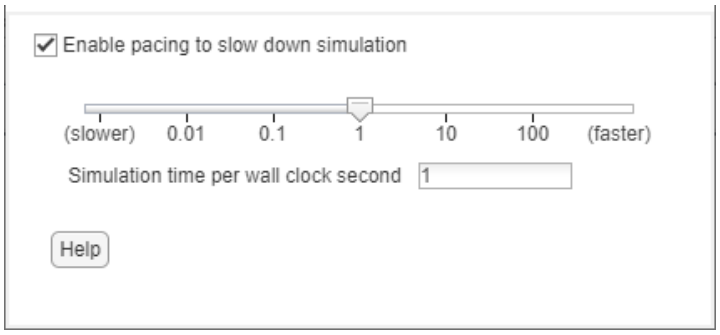


Figura 21: Configuración representación tiempo simulación - tiempo real

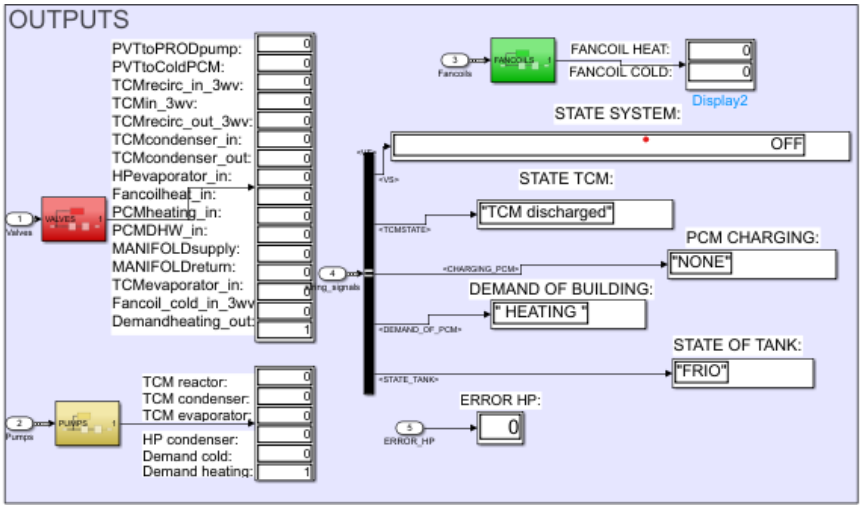


Figura 22: Vista consola valor salidas resultantes del control

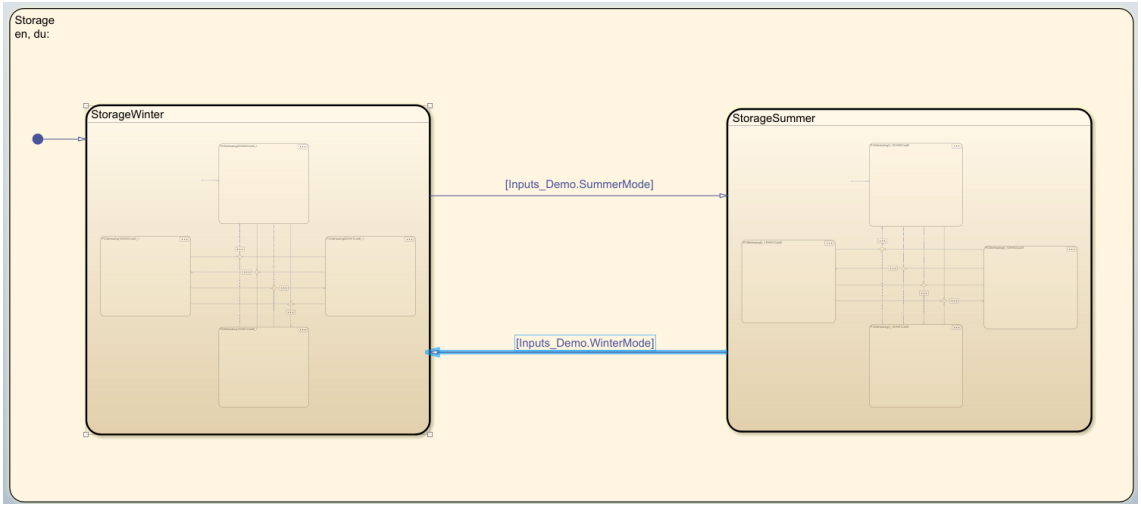


Figura 23: Vista interna del sub-cuadro Storage

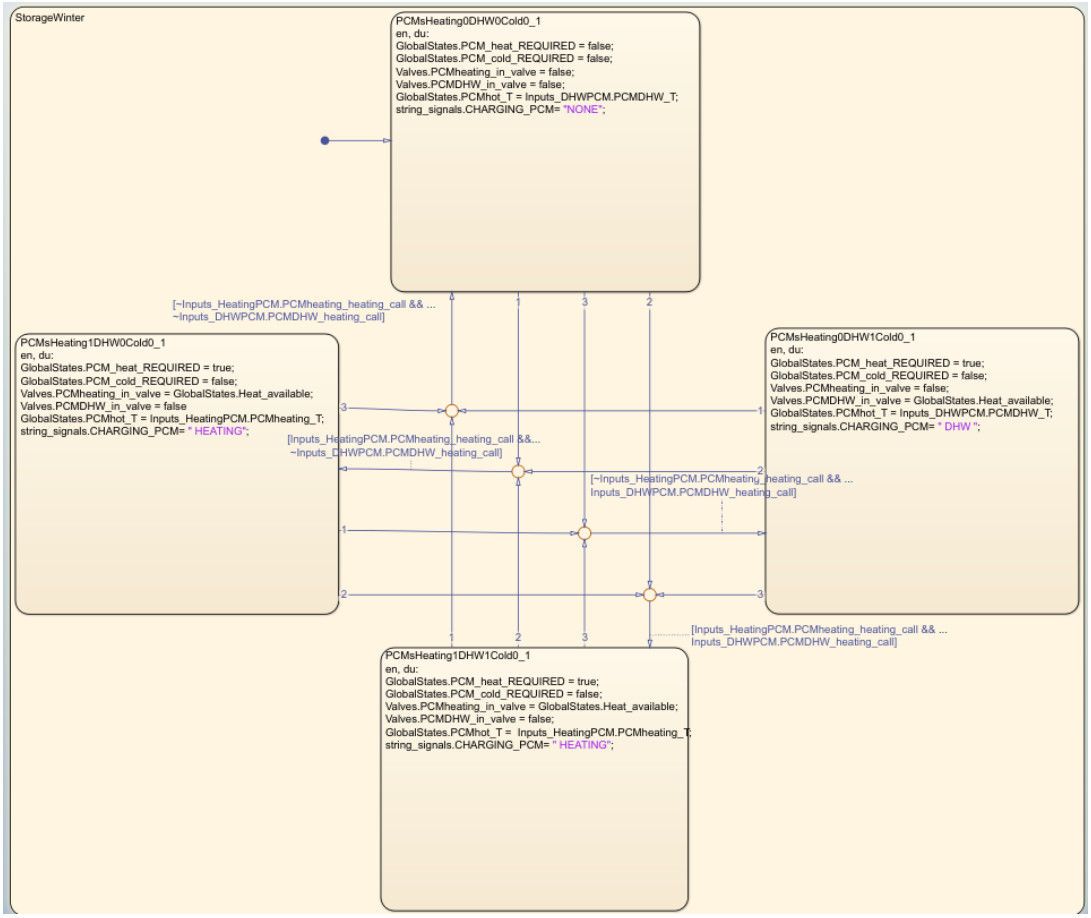


Figura 24: Vista interna del sub-cuadro StorageWinter

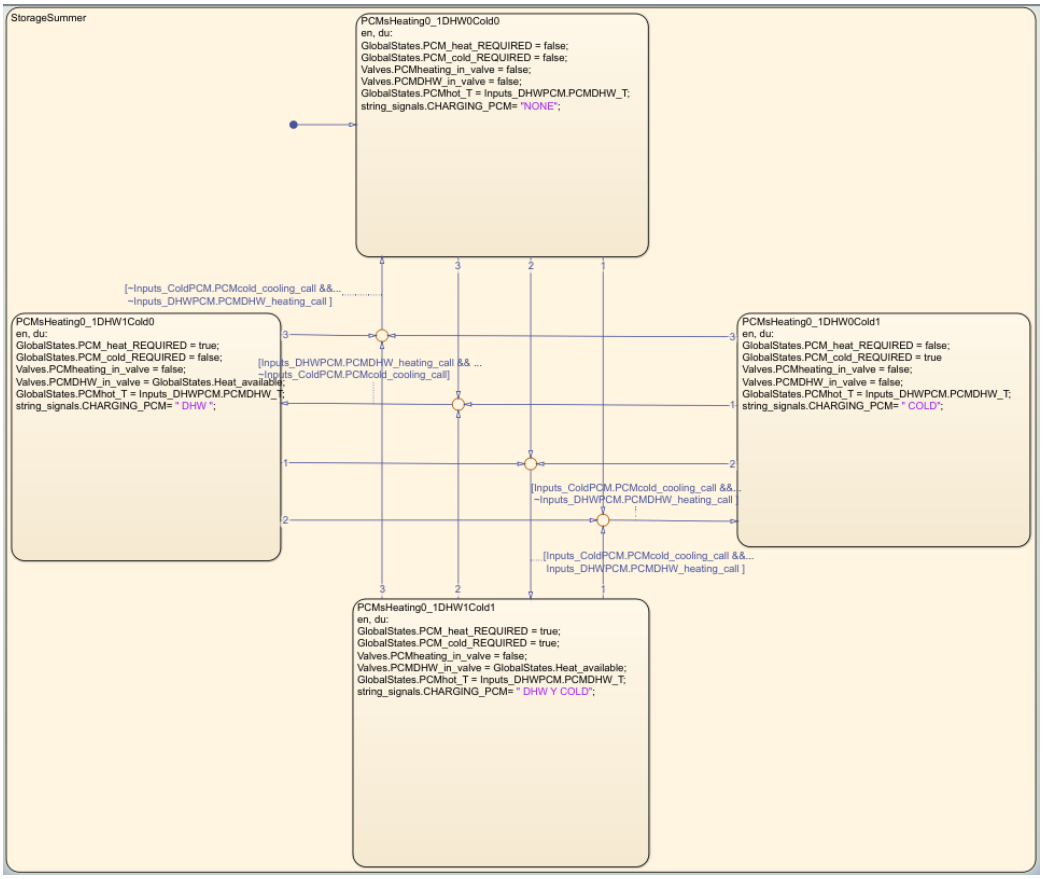


Figura 25*: Vista interna del sub-cuadro StorageSummer*

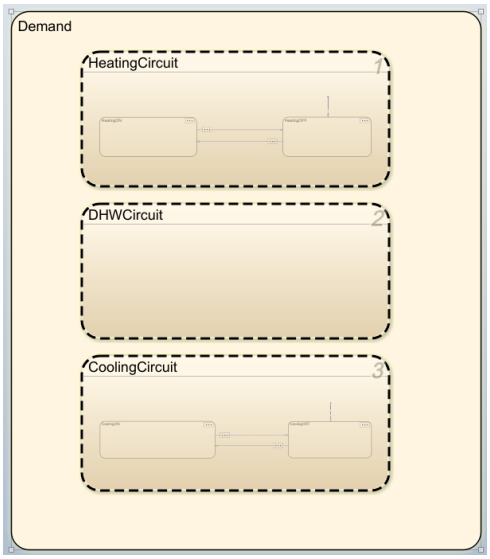


Figura 26*: Vista interna del sub-cuadro Demand*

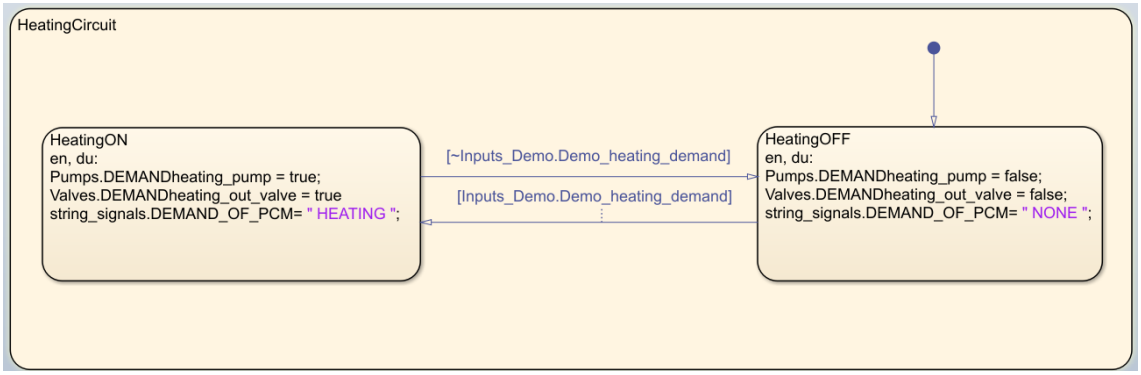


Figura 27*: Vista interna del sub-cuadro HeatingCircuit*

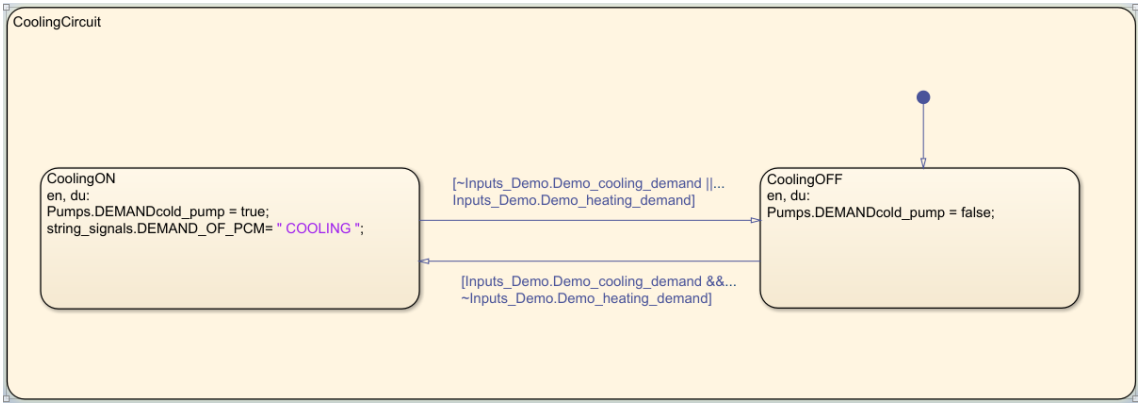


Figura 28:*Vista interna del sub-cuadro CoolingCircuit*

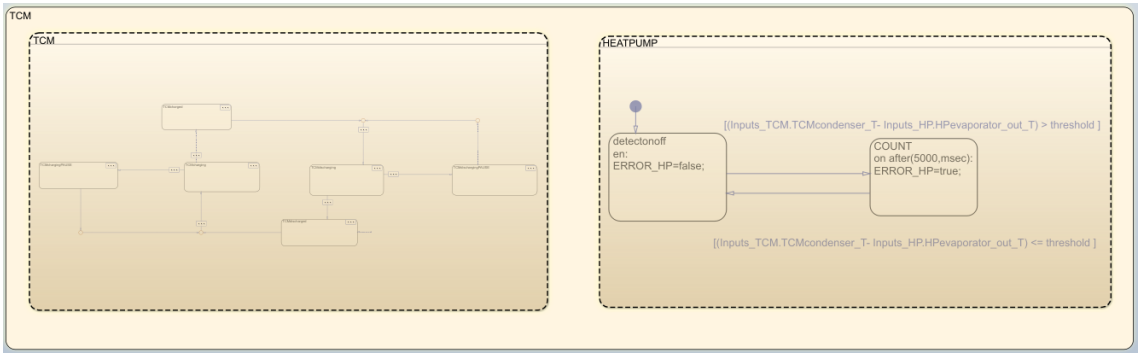


Figura 29*: Vista interna del sub-cuadro TCM*

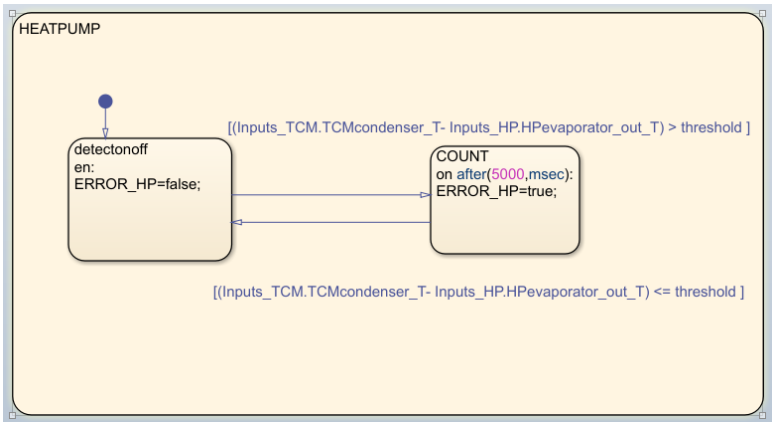


Figura 30*: Vista interna del sub-cuadro HEATPUMP*

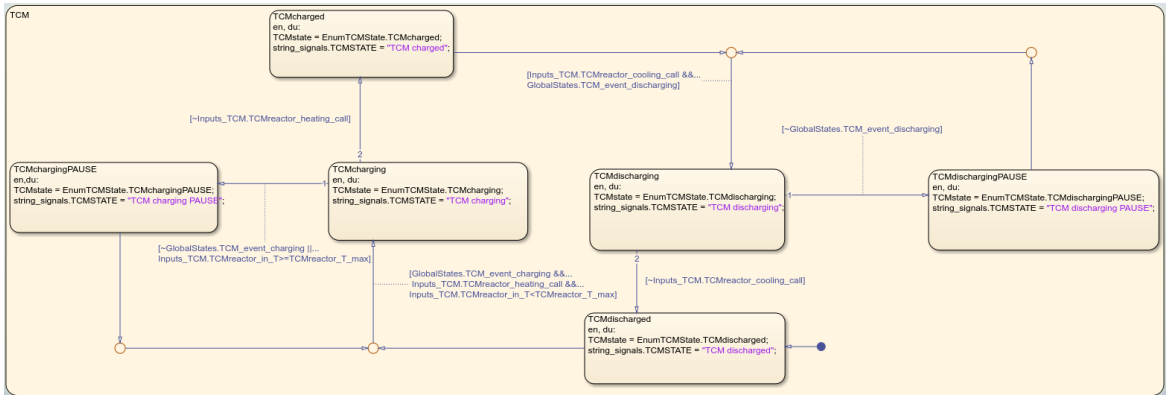


Figura 31*: Vista interna del sub-cuadro TCM*

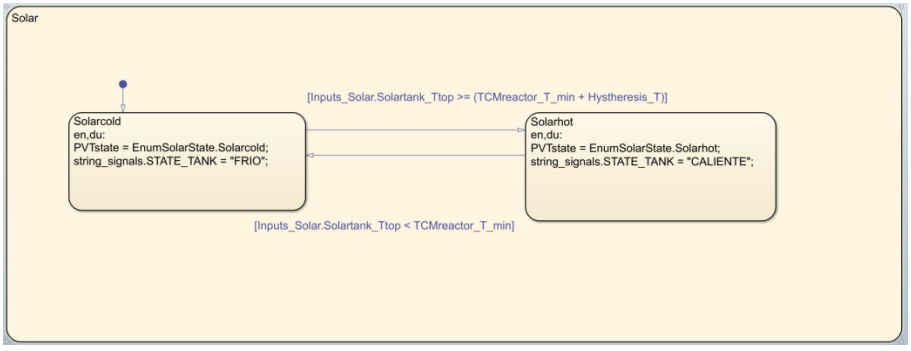


Figura 32*: Vista interna del sub-cuadro Solar*

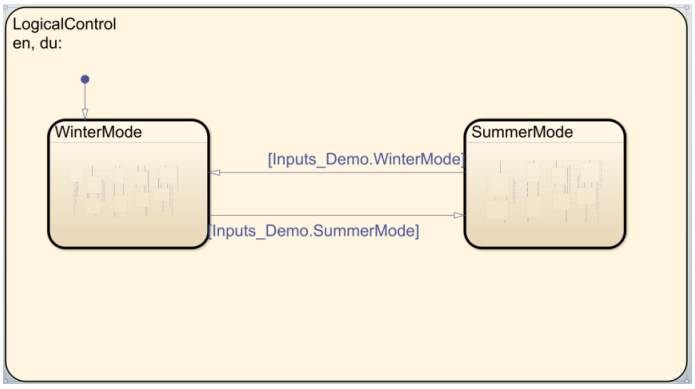


Figura 33*: Vista interna del sub-cuadro LogicalControl*

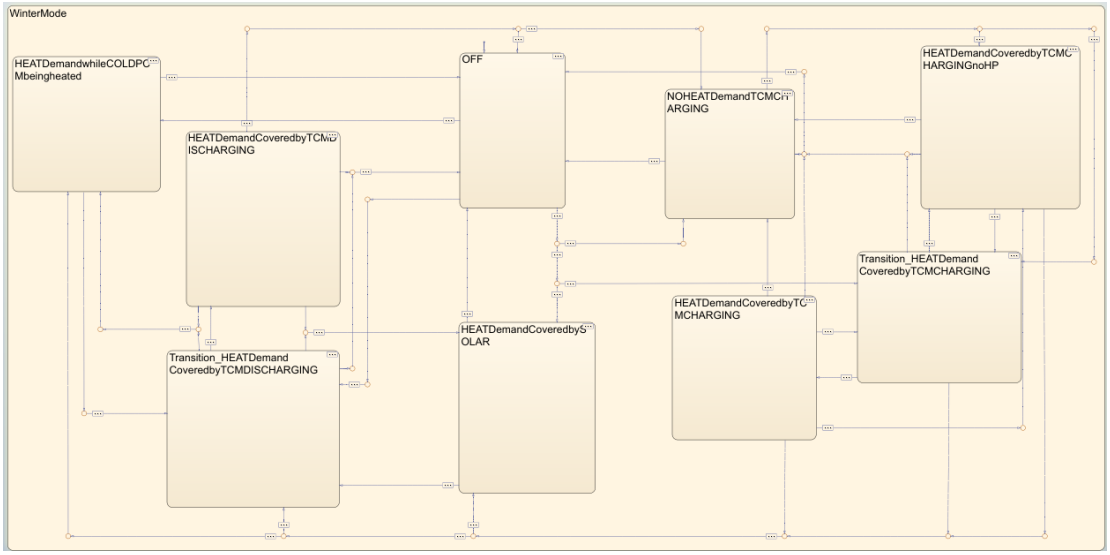


Figura 34: *Vista interna del sub-cuadro WinterMode*

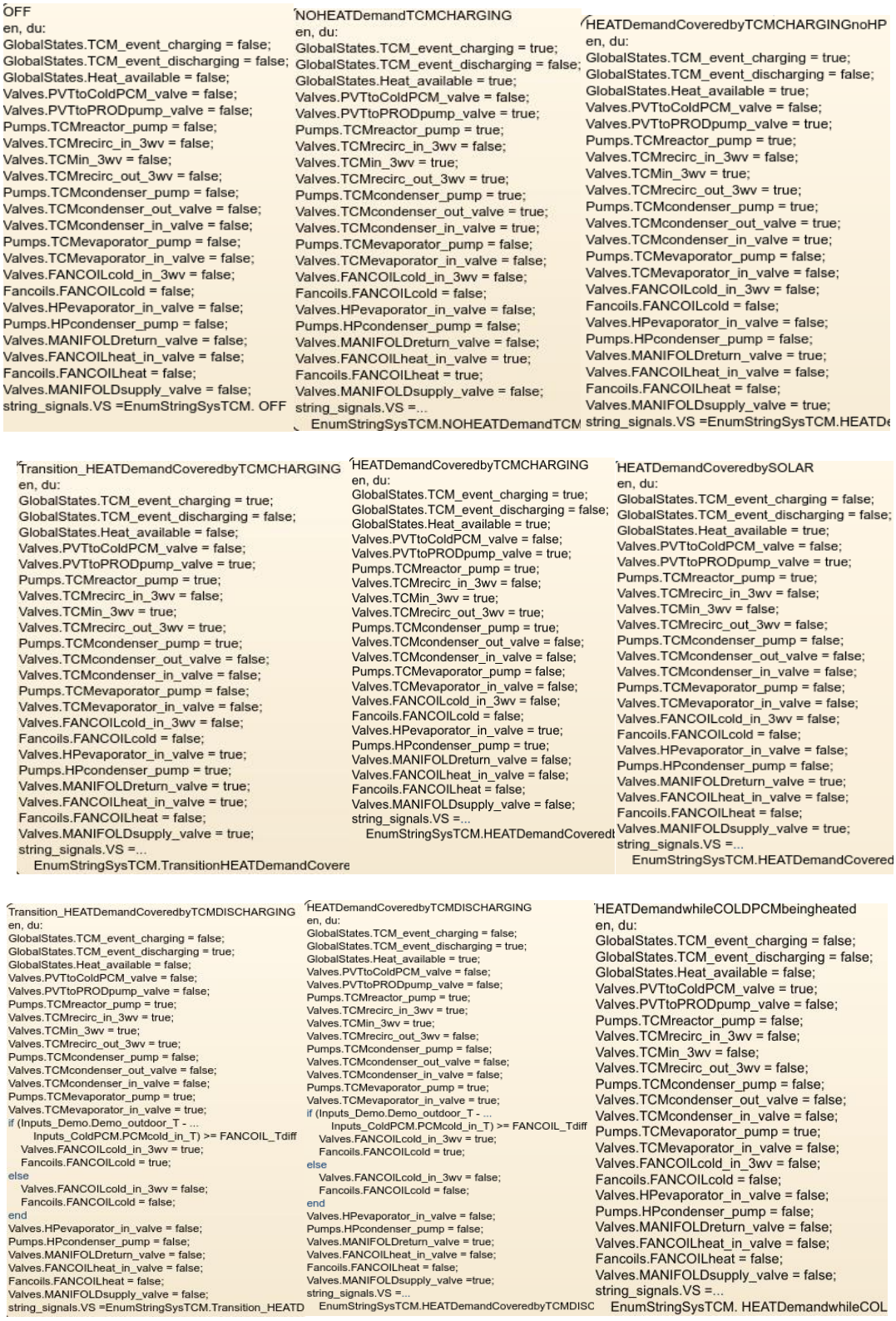


Figura 35: Vista de estados del modo Invierno

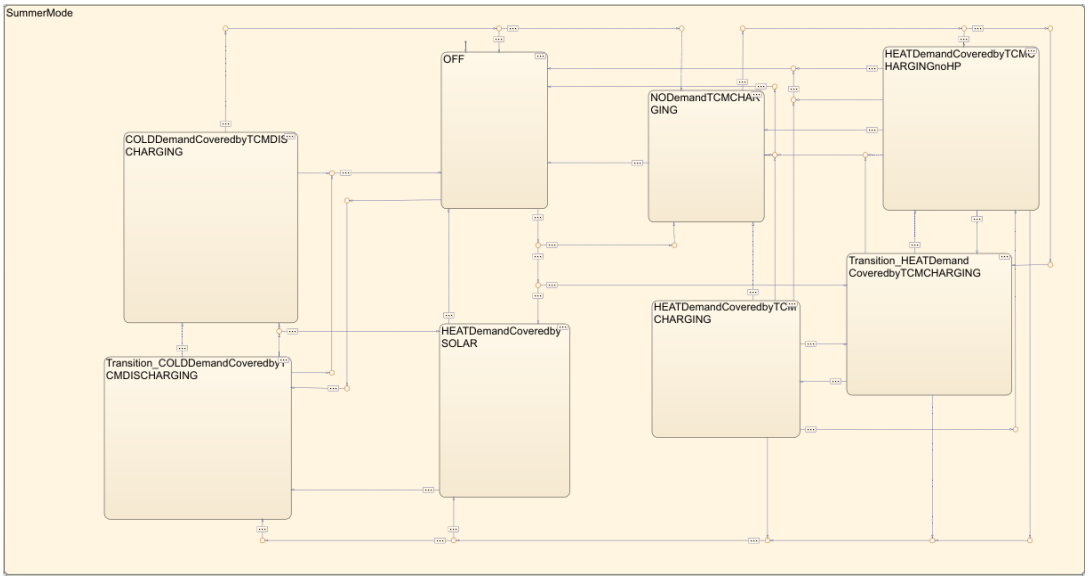


Figura 36*: Vista interna del sub-cuadro SummerMode*

```
OFF
en, du:
GlobalStates.TCM_event_charging = false;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = false;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = false;
Pumps.TCMreactor_pump = false;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = false;
Valves.TCMrecirc_out_3wv = false;
Pumps.TCMcondenser_pump = false;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = false;
Valves.FANCOILheat_in_valve = false;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = false;
string_signals.VS =EnumStringSysTCM.OFF;
```

```
NODemandTCMCHARGING
en, du:
GlobalStates.TCM_event_charging = true;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = true;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = true;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = true;
Pumps.TCMcondenser_pump = true;
Valves.TCMcondenser_out_valve = true;
Valves.TCMcondenser_in_valve = true;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = false;
Valves.FANCOILheat_in_valve = true;
Fancoils.FANCOILheat = true;
Valves.MANIFOLDsupply_valve = false;
string_signals.VS =EnumStringSysTCM.NODe
```

```
HEATDemandCoveredbyTCMCHARGINGnoHP
en, du:
GlobalStates.TCM_event_charging = true;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = true;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = true;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = true;
Pumps.TCMcondenser_pump = true;
Valves.TCMcondenser_out_valve = true;
Valves.TCMcondenser_in_valve = true;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = true;
Valves.FANCOILheat_in_valve = false;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = true;
string_signals.VS =EnumStringSysTCM.HEATDe
```

```
Transition_HEATDemandCoveredbyTCMCHARGING
en, du:
GlobalStates.TCM_event_charging = true;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = false;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = true;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = true;
Pumps.TCMcondenser_pump = true;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = true;
Pumps.HPcondenser_pump = true;
Valves.MANIFOLDreturn_valve = true;
Valves.FANCOILheat_in_valve = true;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = true;
string_signals.VS =EnumStringSysTCM.TransitionHE
```

```
HEATDemandCoveredbyTCMCHARGING
en, du:
GlobalStates.TCM_event_charging = true;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = true;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = true;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = true;
Pumps.TCMcondenser_pump = true;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = true;
Pumps.HPcondenser_pump = true;
Valves.MANIFOLDreturn_valve = false;
Valves.FANCOILheat_in_valve = false;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = false;
string_signals.VS =EnumStringSysTCM.HEAT
```

```
HEATDemandCoveredbySOLAR
en, du:
GlobalStates.TCM_event_charging = false;
GlobalStates.TCM_event_discharging = false;
GlobalStates.Heat_available = true;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = true;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = false;
Valves.TCMin_3wv = false;
Valves.TCMrecirc_out_3wv = false;
Pumps.TCMcondenser_pump = false;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = false;
Valves.TCMevaporator_in_valve = false;
Valves.FANCOILcold_in_3wv = false;
Fancoils.FANCOILcold = false;
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = true;
Valves.FANCOILheat_in_valve = false;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = true;
string_signals.VS =EnumStringSysTCM.HEAT
```

```
Transition_COLDDemandCoveredbyTCMDISCHARGING
en, du:
GlobalStates.TCM_event_charging = false;
GlobalStates.TCM_event_discharging = true;
GlobalStates.Heat_available = false;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = false;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = true;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = true;
Pumps.TCMcondenser_pump = false;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = true;
Valves.TCMevaporator_in_valve = true;
if Inputs_TCM.TCMevaporator_T <= ...
      (Inputs_ColdPCM.PCMcold_T - Hystheresis_T)
   Valves.FANCOILcold_in_3wv = false;
   Fancoils.FANCOILcold = false;
else
   Valves.FANCOILcold_in_3wv = true;
   Fancoils.FANCOILcold = false;
end
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = false;
Valves.FANCOILheat_in_valve = false;
Fancoils.FANCOILheat = false;
Valves.MANIFOLDsupply_valve = false;
string_signals.VS =EnumStringSysTCM.Transition_COLD
```

```
COLDDemandCoveredbyTCMDISCHARGING
en, du:
GlobalStates.TCM_event_charging = false;
GlobalStates.TCM_event_discharging = true;
GlobalStates.Heat_available = true;
Valves.PVTtoColdPCM_valve = false;
Valves.PVTtoPRODpump_valve = false;
Pumps.TCMreactor_pump = true;
Valves.TCMrecirc_in_3wv = true;
Valves.TCMin_3wv = true;
Valves.TCMrecirc_out_3wv = false;
Pumps.TCMcondenser_pump = false;
Valves.TCMcondenser_out_valve = false;
Valves.TCMcondenser_in_valve = false;
Pumps.TCMevaporator_pump = true;
Valves.TCMevaporator_in_valve = true;
if Inputs_TCM.TCMevaporator_T <= ...
      (Inputs_ColdPCM.PCMcold_T - Hystheresis_T)
   Valves.FANCOILcold_in_3wv = false;
   Fancoils.FANCOILcold = false;

else
   %To pause state
end
Valves.HPevaporator_in_valve = false;
Pumps.HPcondenser_pump = false;
Valves.MANIFOLDreturn_valve = false;
Valves.FANCOILheat_in_valve = true;
Fancoils.FANCOILheat = ( Inputs_TCM.TCMreactor_out_T-
   Inputs_Demo.Demo_outdoor_T ) >= FANCOIL_Tdiff;
Valves.MANIFOLDsupply_valve =false;
string_signals.VS =EnumStringSysTCM.COLDDemandCove
```

Figura 37: Vista de estados del modo Verano

```
classdef EnumSolarState < Simulink.IntEnumType

    enumeration
        Solarhot(1)
        Solarcold(0)
    end
end
```

Figura 38: Captura EnumSolarState

```
classdef EnumStringSysTCM < Simulink.IntEnumType

    enumeration
        OFF(0)
        NOHEATDemandTCMCHARGING (1)
        TransitionHEATDemandCoveredbyTCMCHARGING (2)
        HEATDemandCoveredbyTCMCHARGING(3)
        HEATDemandCoveredbyTCMCHARGINGnoHP(4)
        Transition_HEATDemandCoveredbyTCMDISCHARGING(5)
        HEATDemandCoveredbyTCMDISCHARGING(6)
        HEATDemandCoveredbySOLAR(7)
        HEATDemandwhileCOLDPCMbeingheated(8)
        COLDDemandCoveredbyTCMDISCHARGING(9)
        Transition_COLDDemandCoveredbyTCMDISCHARGING(10)
        NODemandTCMCHARGING (11)
    end
end
```

Figura 39: Captura EnumStringSysTCM

```
classdef EnumTCMState < Simulink.IntEnumType

    enumeration
        TCMdischarged(0)
        TCMcharging(1)
        TCMchargingPAUSE(2)
        TCMcharged(3)
        TCMdischarging(4)
        TCMdischargingPAUSE(5)
    end
end
```

Figura 40: Captura EnumTCMState

Figura 41: Vista de la ventana Controles en ENVYSION

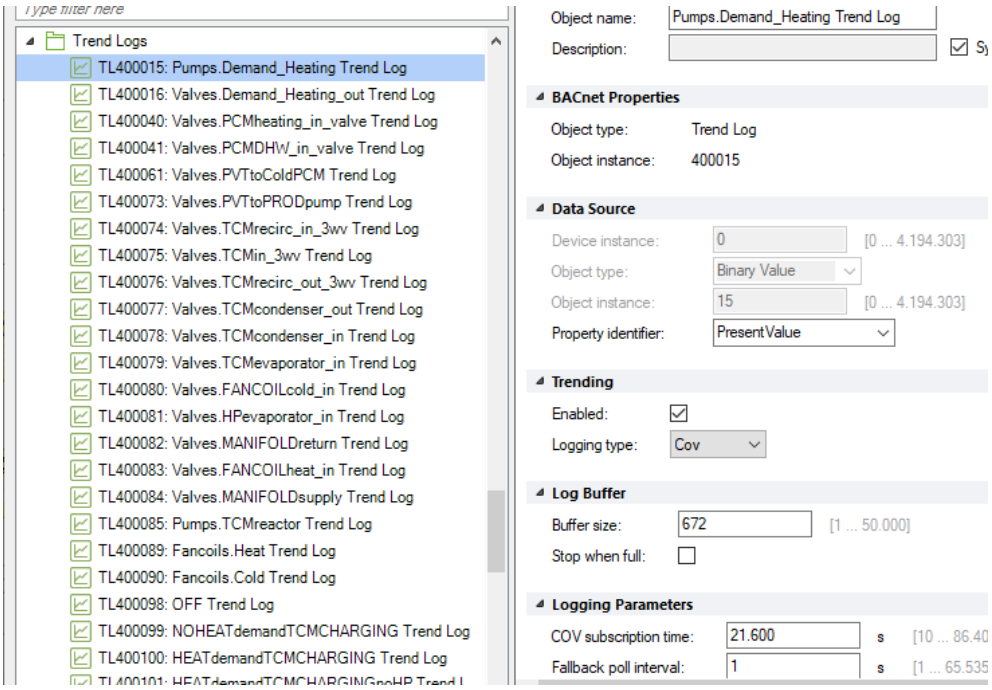


Figura 42: Vista de ventana de configuración trends en EC-GFX

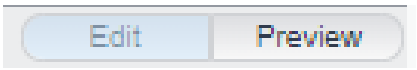


Figura 43: Vista pestaña de edición y Vista

Figura 44: Vista controles del sistema

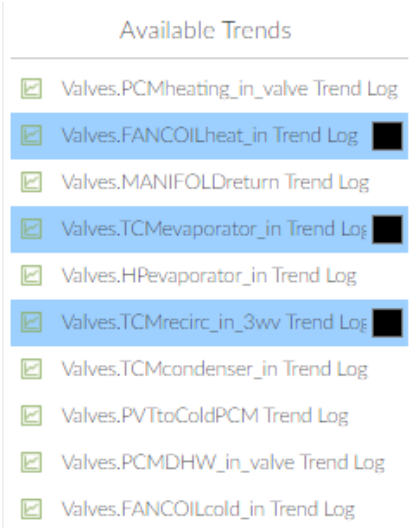


Figura 45: Vista pestaña de selección de Grafica

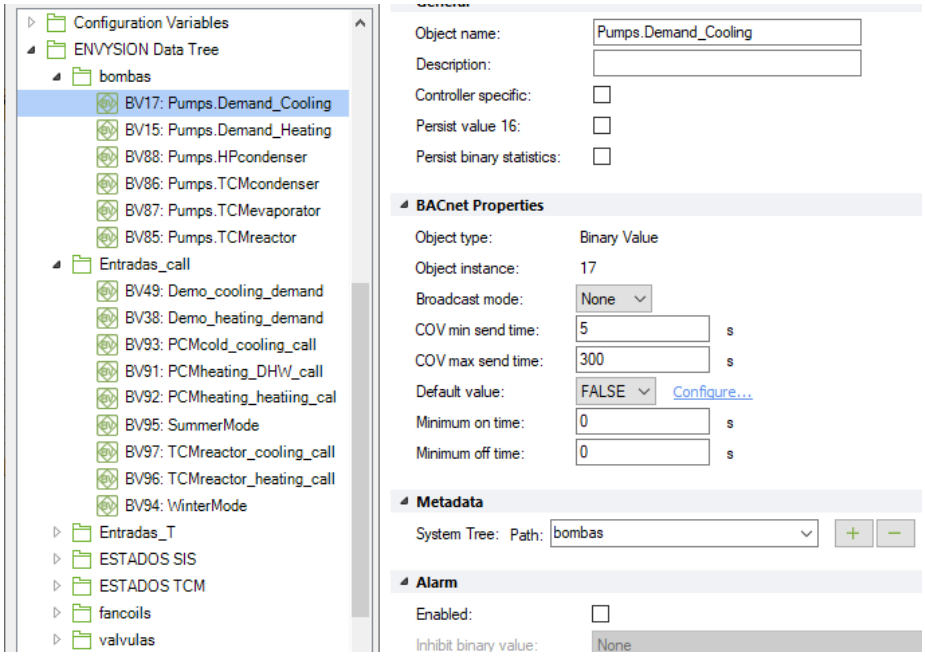


Figura 46: Configuración intercambio de variables EC-GFX y ENVYSION

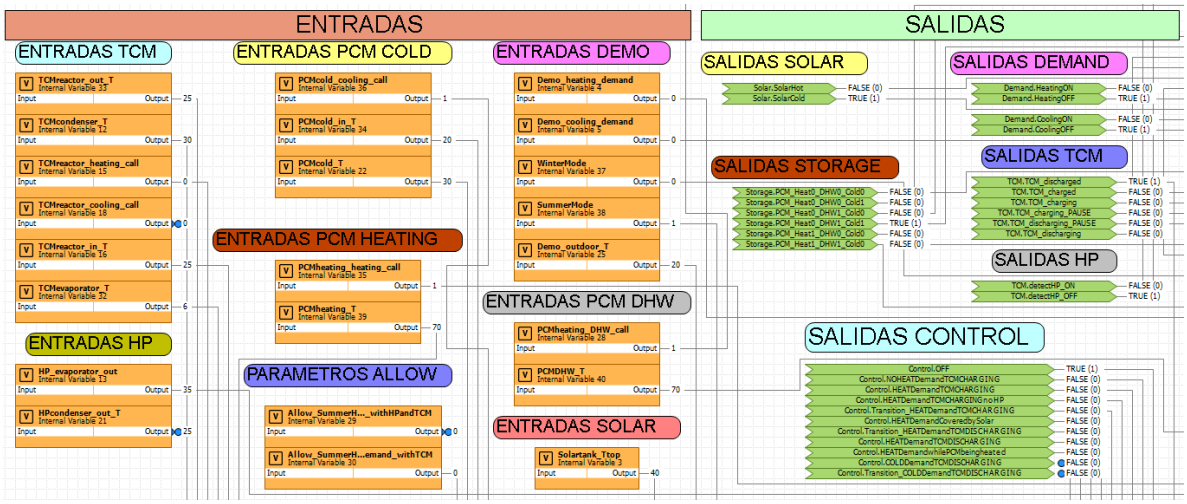


Figura 47: Vista interfaz de entradas y salidas en EC-GFX

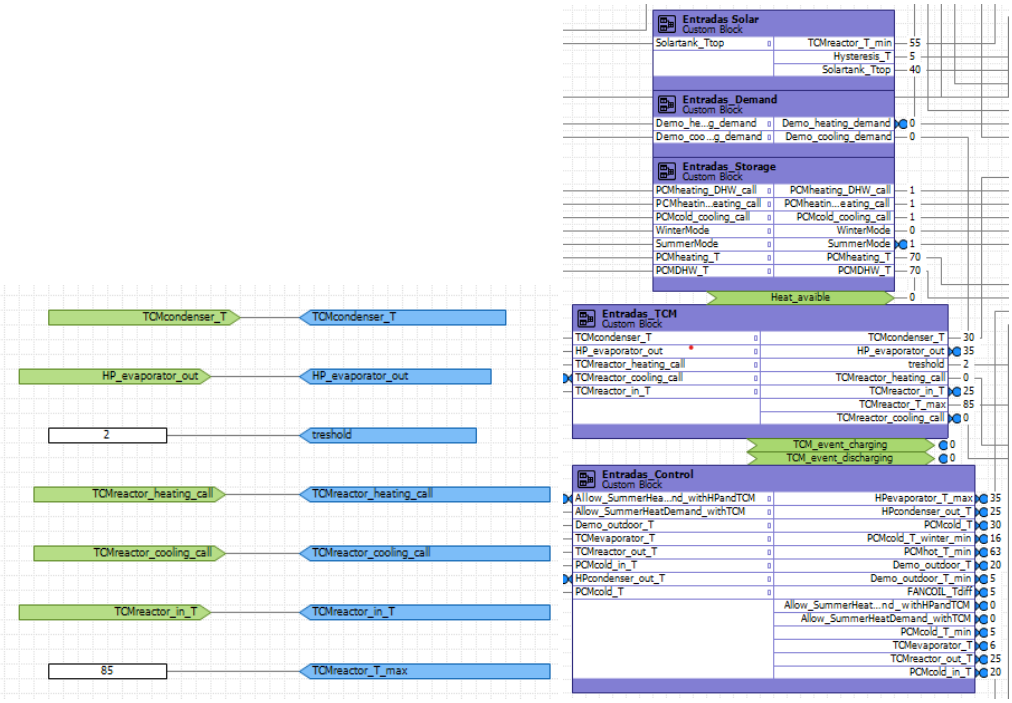


Figura 48: Vista bloque de parámetros y Vista interna del bloque Entradas RTQ

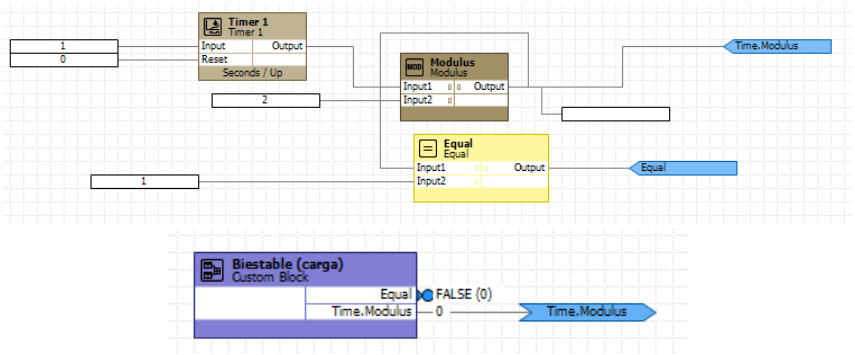


Figura 49: Vista bloque biestable Vista externa e interna

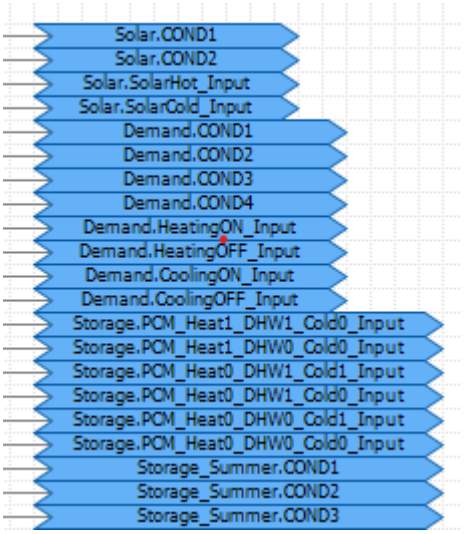


Figura 50: Vista salidas del bloque central de entradas

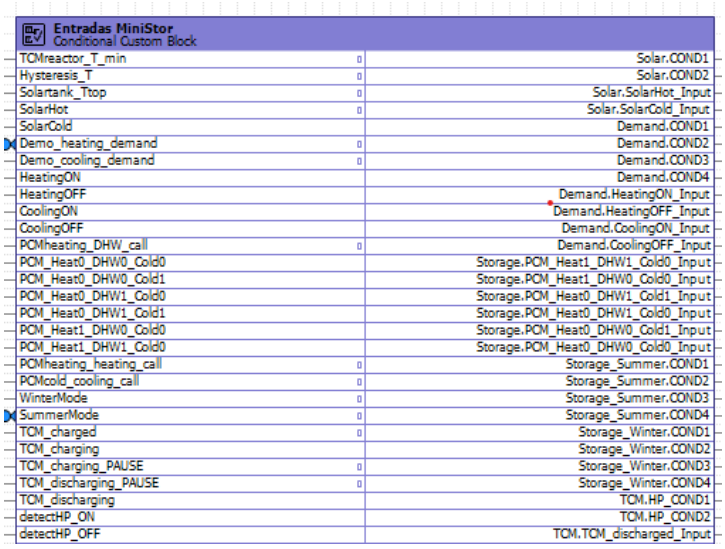


Figura 51:Vista bloque central de entradas

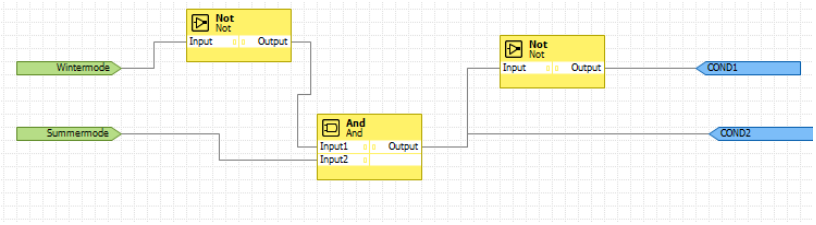


Figura 52Vista general del interior del sub-bloque Modo

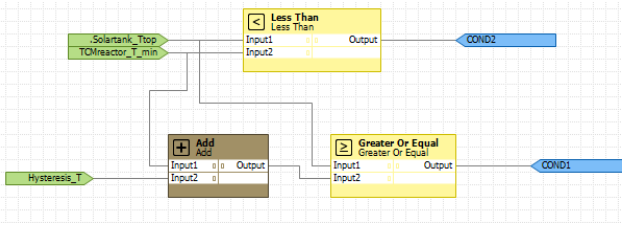


Figura 53Vista general del interior del sub-bloque Solar

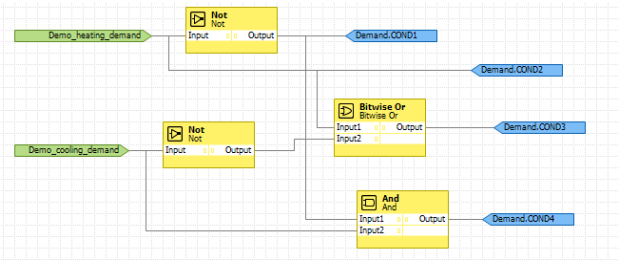


Figura 54: Vista general del interior del sub-bloque Demand

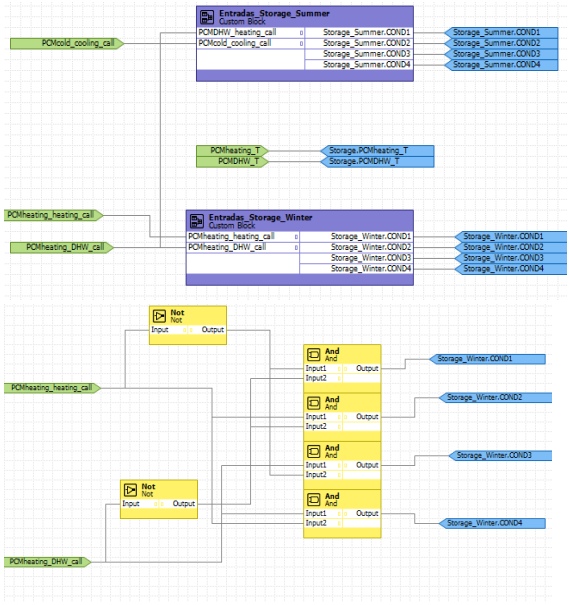


Figura 55: Vista general del interior del sub-bloque Storage y del interior del sub-bloque Storage Winter

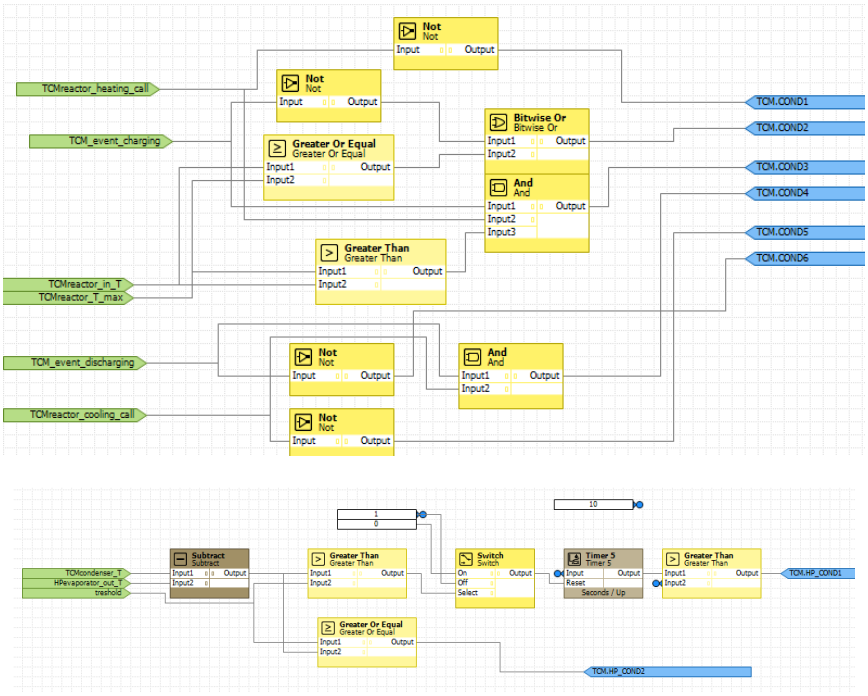


Figura 56:Vista general del interior del sub-bloque RTQ

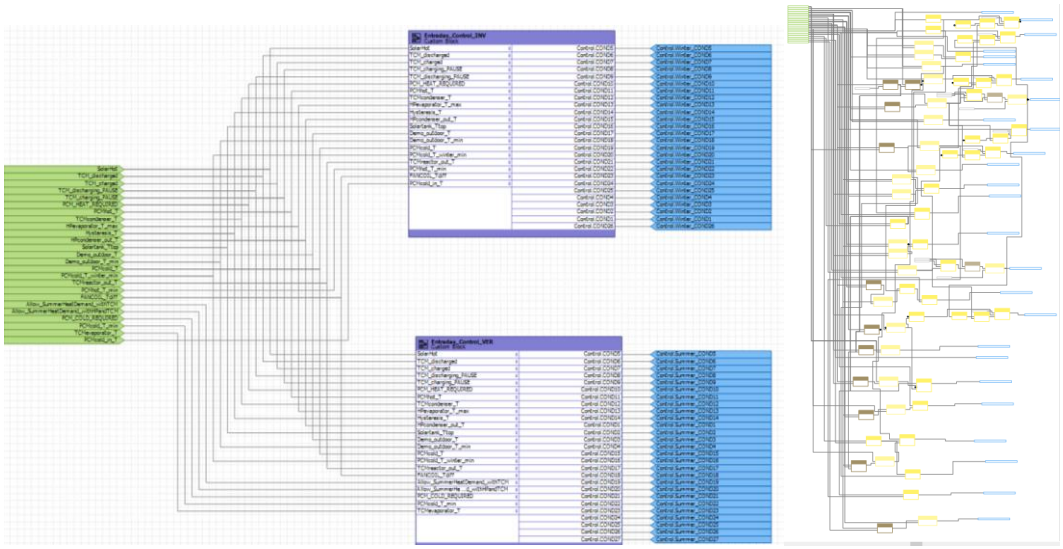


Figura 57: Vista general del interior del sub-bloque Control y del interior del sub-bloque Control Winter

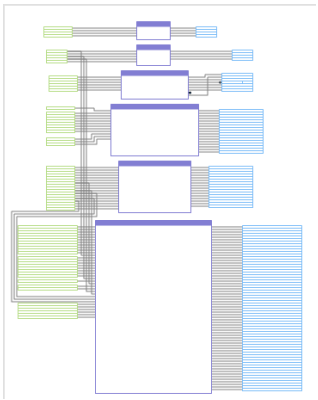


Figura 58: Vista general del interior del bloque entradas

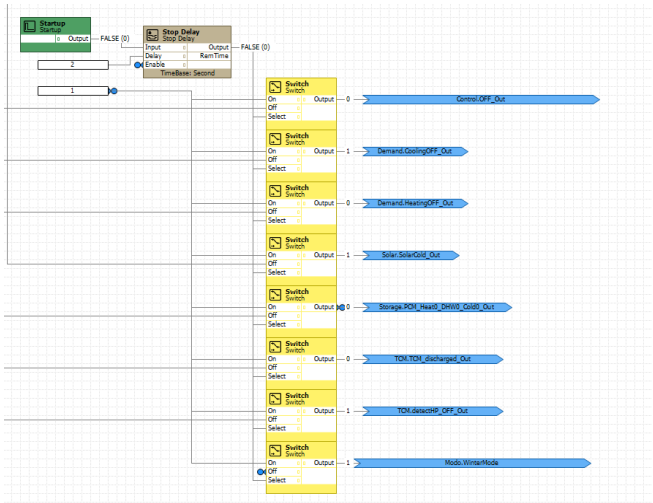


Figura 59Vista de la programación del reseteo o primer arranque

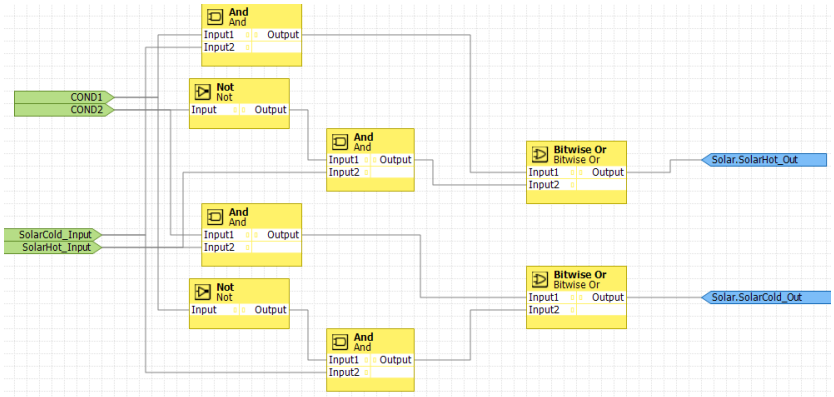


Figura 60: Vista interna del sub-bloque Solar

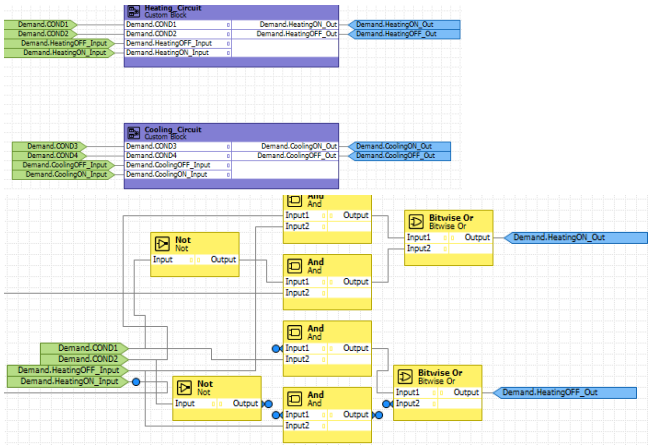


Figura 61:Vista interna sub-bloque Demand y Vista interna sub-bloque heatingcircuit

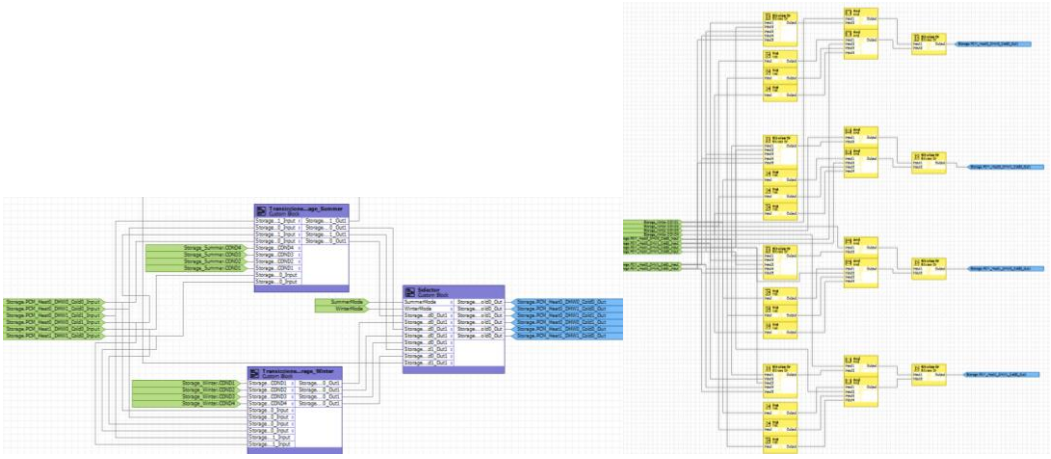


Figura 62:Vista interna sub-bloque Storage y Vista interna sub-bloque WinterStorage

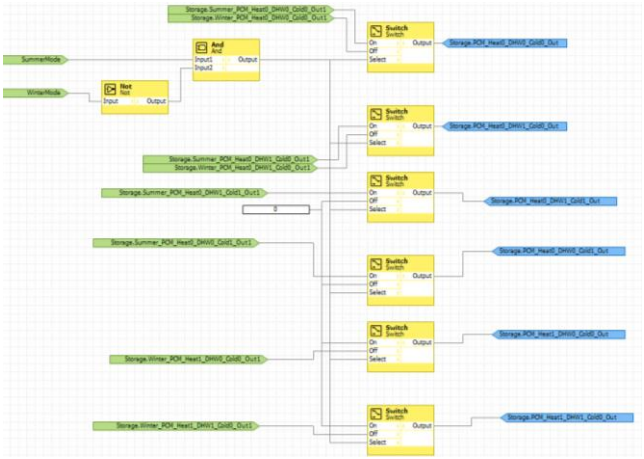


Figura 63: Vista interna sub-bloque Selector

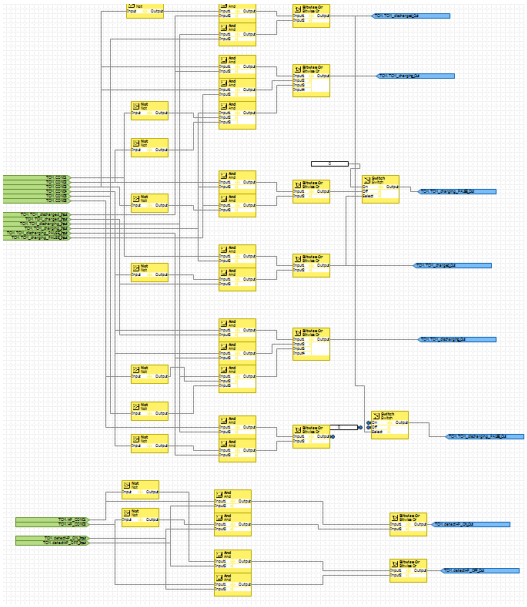


Figura 64: Vista interna sub-bloque RTQ

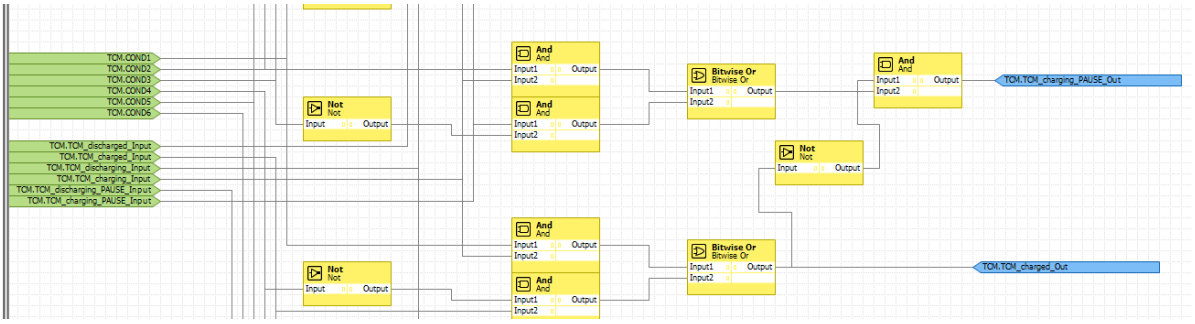


Figura 65: Vista de la programación de dos estados con prioridad

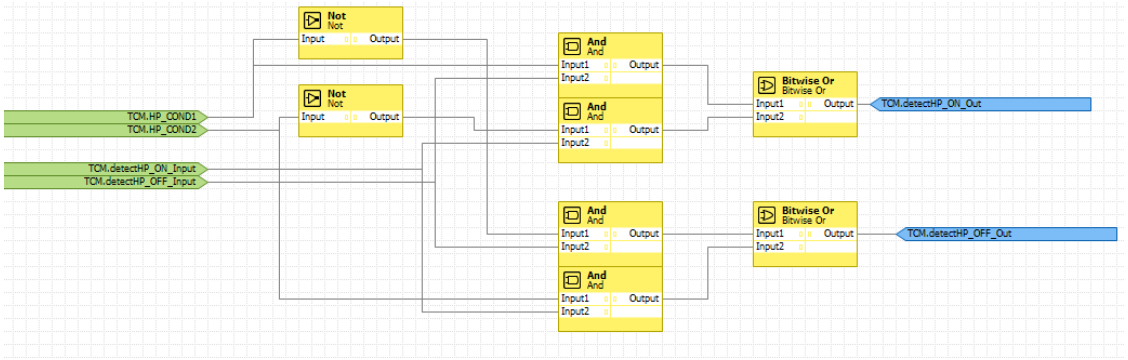


Figura 66:Vista de la programación de la alarma del BC

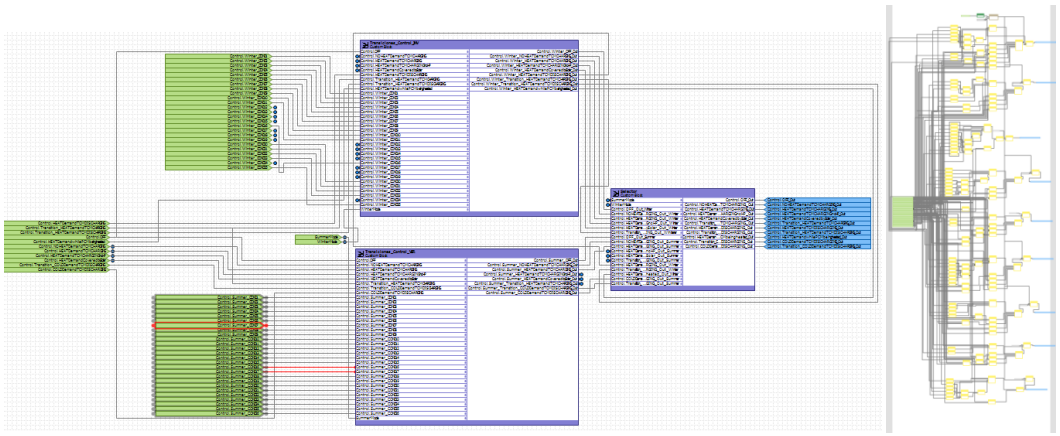


Figura 67: Vista interna sub-bloque Control y Vista interna sub-bloque Control Winter

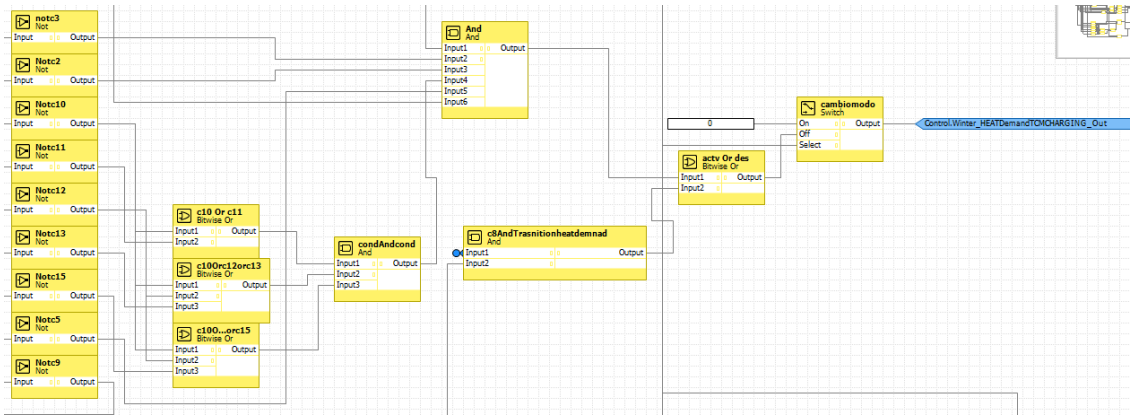


Figura 68Vista del estado HEATDemandTCMCHARGING

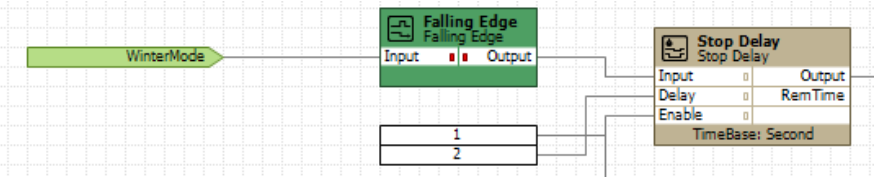


Figura 69Vista de la programación de cambio de modo

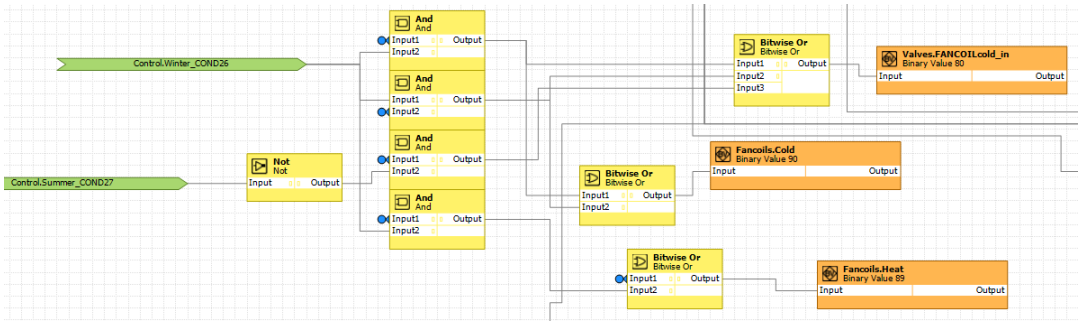


Figura 70: Vista de las condiciones en salidas para activar salidas no estados

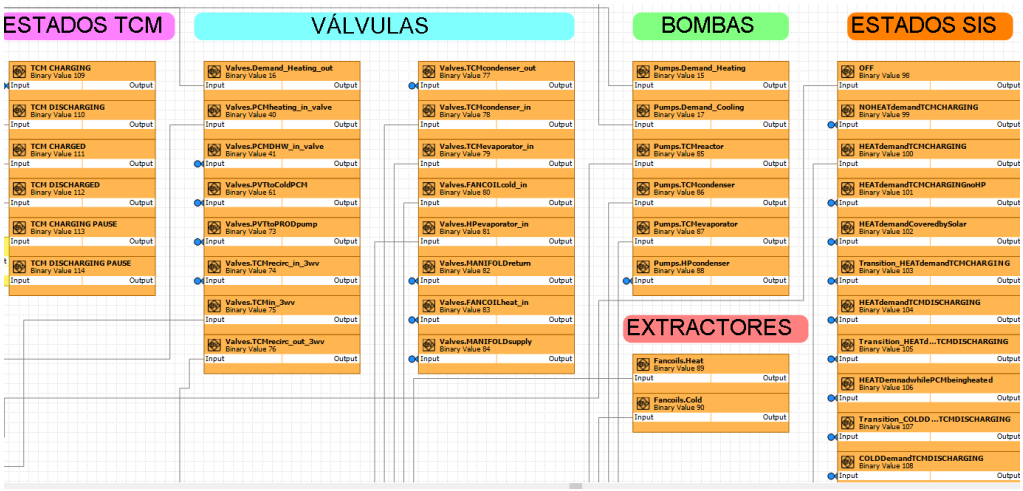


Figura 71Vista de bloques Internal variable en las salidas

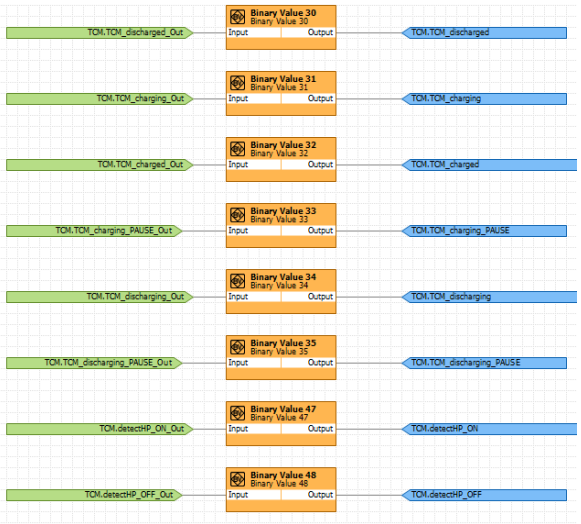


Figura 72Vista de bloques Internal variable en las salidas

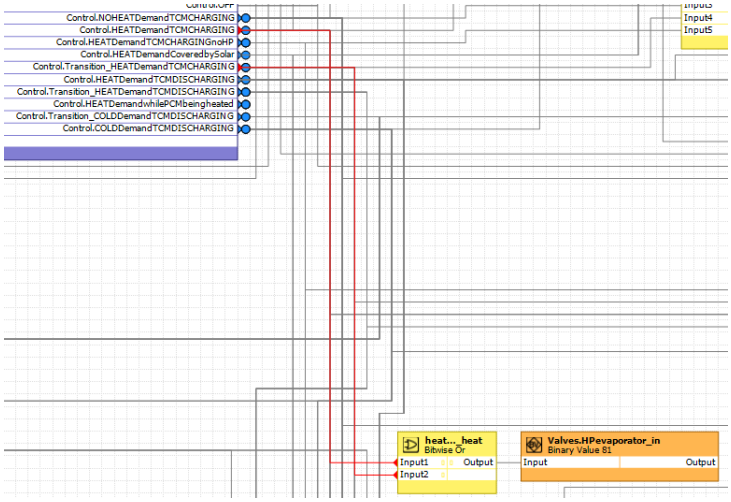


Figura 73: Vista activación de una válvula

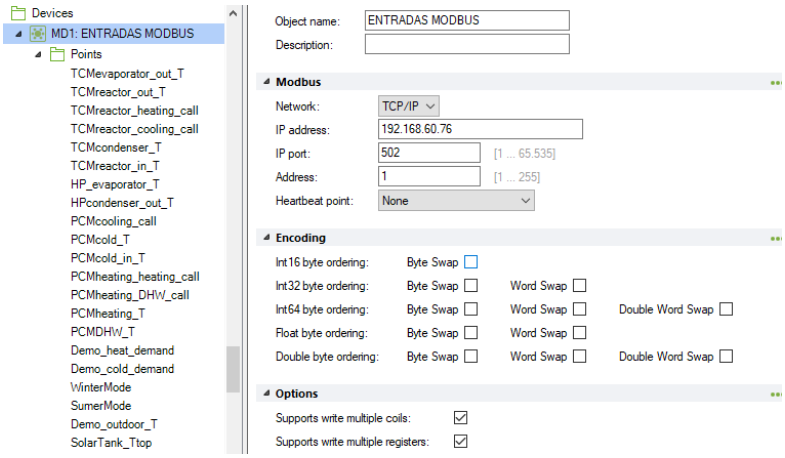


Figura 74: Configuración del ModbusDevice

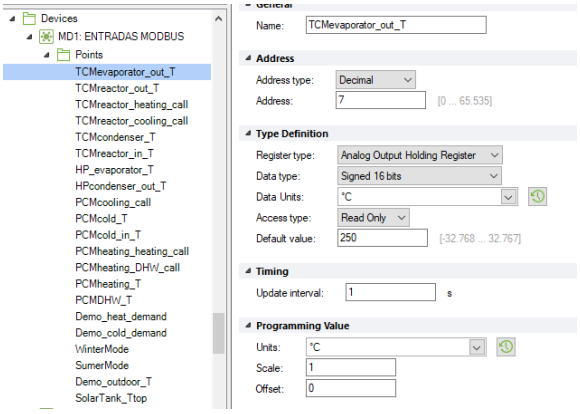


Figura 75: Configuración del registro Modbus

```
from pyModbusTCP.server import ModbusServer
s=ModbusServer("192.168.60.76",502,1,False)
s.start()
```

Figura 76: Captura código Servidor

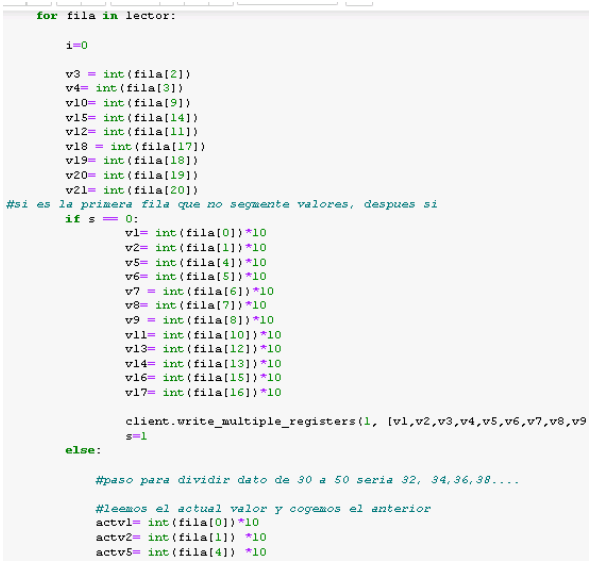
```
import csv
import time
UNIT = 0x1
 # Leemos y mandamos cada 10 seg
TIME = 10
paso =10

#segmentamos la espera para que lo mande en el tiempo establecido
newtime=TIME/paso

from pyModbusTCP.client import ModbusClient
client=ModbusClient("192.168.60.76" , port=502, unit_id=1, auto_open=False)
client.open()

nombre_archivo = "proof_on_csv.csv"
with open(nombre_archivo, "r") as archivo:
    lector = csv.reader(archivo, delimiter=",")
```

Figura 77: 1º Captura del código Cliente



```
    for fila in lector:

        i=0

        v3 = int(fila[2])
        v4= int(fila[3])
        v10= int(fila[9])
        v15= int(fila[14])
        v12= int(fila[11])
        v18 = int(fila[17])
        v19= int(fila[18])
        v20= int(fila[19])
        v21= int(fila[20])
#si es la primera fila que no segmente valores, despues si
        if s == 0:
                v1= int(fila[0])*10
                v2= int(fila[1])*10
                v5= int(fila[4])*10
                v6= int(fila[5])*10
                v7 = int(fila[6])*10
                v8= int(fila[7])*10
                v9 = int(fila[8])*10
                v11= int(fila[10])*10
                v13= int(fila[12])*10
                v14= int(fila[13])*10
                v16= int(fila[15])*10
                v17= int(fila[16])*10

                client.write_multiple_registers(1, [v1,v2,v3,v4,v5,v6,v7,v8,v9
                s=1
        else:

            #paso para dividir dato de 30 a 50 seria 32, 34,36,38....

            #leemos el actual valor y cogemos el anterior
            actv1= int(fila[0])*10
            actv2= int(fila[1]) *10
            actv5= int(fila[4]) *10
```

Figura 78: 2º Captura del código Cliente

```
else:

    #paso para dividir dato de 30 a 50 seria 32, 34,36,38....

    #leemos el actual valor y cogemos el anterior
    actv1= int(fila[0])*10
    actv2= int(fila[1]) *10
    actv5= int(fila[4]) *10
    actv6= int(fila[5])*10
    actv7 = int(fila[6])*10
    actv8= int(fila[7])*10
    actv9 = int(fila[8])*10
    actv11= int(fila[10])*10
    actv13= int(fila[12])*10
    actv14= int(fila[13])*10
    actv16= int(fila[15])*10
    actv17= int(fila[16])*10

    vant1= v1
    vant2= v2
    vant5= v5
    vant6= v6
    vant7= v7
    vant8= v8
    vant9= v9
    vant11= v11
    vant13= v13
    vant14= v14
    vant16= v16
    vant17= v17


    #bucle para mandar los valores segmentados
    for i in range(paso):

            v1= vant1 +(((actv1-vant1)/paso)*(i+1))
            v1= int (v1)
            v2= vant2 +(((actv2-vant2)/paso)*(i+1))
```

```
#bucle para mandar los valores segmentados
for i in range(paso):

        v1= vant1 +(((actv1-vant1)/paso)*(i+1))
        v1= int (v1)
        v2= vant2 +(((actv2-vant2)/paso)*(i+1))
        v2= int (v2)
        v5= vant5 +(((actv5-vant5)/paso)*(i+1))
        v5= int (v5)
        v6= vant6 +(((actv6-vant6)/paso)*(i+1))
        v6= int (v6)
        v7= vant7 +(((actv7-vant7)/paso)*(i+1))
        v7= int (v7)
        v8= vant8 +(((actv8-vant8)/paso)*(i+1))
        v8= int (v8)
        v9= vant9 +(((actv9-vant9)/paso)*(i+1))
        v9= int (v9)
        v11= vant11 +(((actv11-vant11)/paso)*(i+1))
        v11= int (v11)
        v13= vant13 +(((actv13-vant13)/paso)*(i+1))
        v13= int (v13)
        v14= vant14 +(((actv14-vant14)/paso)*(i+1))
        v14= int (v14)
        v16= vant16 +(((actv16-vant16)/paso)*(i+1))
        v16= int (v16)
        v17= vant17 +(((actv17-vant17)/paso)*(i+1))
        v17= int (v17)
        client.write_multiple_registers(1, [v1,v2,v3,v4,v5,v
        time.sleep(newtime)
```

Figura 79: 3º Captura del código Cliente

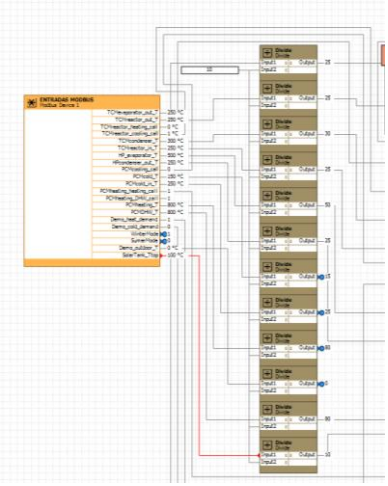


Figura 80:Vista conexión Modbus programada

NUMERO	MODO	ENTRADA/S MODIFICADA /S	ESTADO ESPERADO
1	INV	**Solartank_Ttop:**40->65 **TCMcondenser_T:**30->90 **TCMreactor_heating_call:**0->1	NOHEATDemandTCMCHARGING
2	INV	**PCMheating_heating_call:**0->1 **PCMheating_T:**70->80	HEATDemandCoveredbyTCMCHARGINGnoHP
3	INV	**TCMcondenser_T:**40->30 **Demo_heating_demand:**1->0 **Demo_cooling_demand:**0->1	TransitionHEATDemandCoveredbyTCMCHARGING
4	INV	**TCMreactor_in_T:**25->83 **TCMreactor_out_T:**25->80 **HPcondenser_out_T:**25->90 **Demo_cooling_demand:**1->0	HEATDemandCoveredbyTCMCHARGING
5	INV	**TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25 **TCMreactor_heating_call:**1->0 **TCMreactor_cooling_call:**0->1 **Demo_heating_demand:**0->1 **Demo_cooling_demand:**0->1	Transition_HEATDemandCoveredbyTCMDISCHARGING
6	INV	**TCMreactor_in_T:**25->70 **TCMreactor_out_T:**25->70 **TCMreactor_cooling_call:**1->0	HEATDemandCoveredbyTCMDISCHARGING
7	INV	**Solartank_Ttop:**65->50 **Demo_cooling_demand:**1->0	OFF
8	INV	**Solartank_Ttop:**50->40	OFF

9	INV	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING
10	INV	**TCMreactor_in_T:**25->83 **TCMreactor_out_T:**25->80 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMCHARGING
11	INV	**Solartank_Ttop:**60->80 **TCMreactor_heating_call:**1->0 **TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25 **HPcondenser_out_T:**90->25	HEATDemandCoveredbySOLAR
12	INV	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	OFF
13	INV	**Solartank_Ttop:**80->50 **TCMreactor_cooling_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	Transition_HEATDemandCoveredbyTCMDISCHARGING
14	INV	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **PCMcold_T**:20->10 **Demo_outdoor_T:**10->0	HEATDemandwhileCOLDPCMbeingheated
15	INV	**Solartank_Ttop:**50->10 **TCMreactor_cooling_call:**1->0 **PCMcold_T**:10->15	OFF
16	INV	**TCMreactor_cooling_call:**0->1 **PCMheating_heating_call:**0->1 **PCMheating_T:**70->80 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	Transition_HEATDemandCoveredbyTCMDISCHARGING
17	INV	**TCMreactor_in_T:**25->83 **TCMreactor_out_T:**25->80 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMDISCHARGING
18	INV	**TCMreactor_cooling_call:**1->0 **PCMheating_heating_call:**1->0 **PCMheating_T:**80->70 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	OFF
19	INV	**Solartank_Ttop:**10->40 **TCMreactor_heating_call:**1->0 **TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25 **HPcondenser_out_T:**90->25 **PCMcold_T**:15->20 **Demo_outdoor_T:**0->10	OFF
20	INV	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING

21	INV	**TCMcondenser_T:**30->40	HEATDemandCoveredbyTCMCHARGINGnoHP
22	INV	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	NOHEATDemandTCMCHARGING
23	INV	**TCMcondenser_T:**40->24 **Demo_outdoor_T:**10->20	OFF
24	INV	**TCMcondenser_T:**24->30 **Demo_outdoor_T:**20->10 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING
25	INV	**TCMreactor_in_T:**25->83 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMCHARGING
26	INV	**PCMDHW_heating_call:** 1->0 **PCMcold_T**:20->15 **Demo_outdoor_T:**10->3	HEATDemandwhileCOLDPCMbeingheated
27	INV	**TCMreactor_cooling_call:**0->1 **PCMcold_T**:15->20 **HPcondenser_out_T:**90->80	Transition_HEATDemandCoveredbyTCMDISCHARGING
28	INV	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	OFF
29	INV	**TCMreactor_out_T:**25->80 **HPcondenser_out_T:**80->90 **PCMcold_T**:20->10	HEATDemandwhileCOLDPCMbeingheated
30	INV	**PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **PCMcold_T**:10->20	Transition_HEATDemandCoveredbyTCMDISCHARGING
31	INV		HEATDemandCoveredbyTCMDISCHARGING
32	INV	**Solartank_Ttop:**40->60 **TCMreactor_cooling_call:**1->0 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	OFF
33	INV	**TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25 **HPcondenser_out_T:**90->25	OFF
34	INV	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1	NOHEATDemandTCMCHARGING
35	INV	**PCMheating_heating_call:**0->1 **PCMheating_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING
36	INV	**TCMreactor_in_T:**25->83 **TCMreactor_out_T:**25->80 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMCHARGING
37	INV	**TCMcondenser_T:**30->40	HEATDemandCoveredbyTCMCHARGINGnoHP
38	INV	**TCMcondenser_T:**40->30 **TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25	TransitionHEATDemandCoveredbyTCMCHARGING

		HPcondenser_out_T:90->25	
39	INV	**TCMreactor_in_T:**25->83 **TCMreactor_out_T:**25->80 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMCHARGING
40	INV	**PCMheating_heating_call:**1->0 **PCMheating_T:**80->70	NOHEATDemandTCMCHARGING
41	INV	**TCMreactor_heating_call:**1->0	OFF
42	INV	**Solartank_Ttop:**60->50 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **TCMreactor_cooling_call:**0->1 **TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25 **HPcondenser_out_T:**90->25	Transition_HEATDemandCoveredbyTCMDISCHARGING
43	INV	**Solartank_Ttop:**50->60 **TCMreactor_in_T:**25->70 **TCMreactor_out_T:**25->70 **HPcondenser_out_T:**25->90 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **PCMheating_heating_call:**0->1 **PCMheating_T:**70->80	HEATDemandCoveredbyTCMDISCHARGING
44	INV	**Solartank_Ttop:**60->50 **TCMreactor_cooling_call:**1->0	OFF
45	INV	**Solartank_Ttop:**50->40 **TCMreactor_in_T:**70->25 **TCMreactor_out_T:**70->25 **HPcondenser_out_T:**90->25	OFF
46	INV	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING
47	INV	**Solartank_Ttop:**60->80 **TCMreactor_in_T:**25->70 **TCMreactor_out_T:**25->70 **HPcondenser_out_T:**25->90	HEATDemandCoveredbyTCMCHARGING
48	INV	**TCMreactor_heating_call:**1->0 **TCMreactor_in_T:**83->25 **TCMreactor_out_T:**80->25	HEATDemandCoveredbySOLAR
49	INV	**Solartank_Ttop:**80->70 **TCMreactor_cooling_call:**0->1 **HPcondenser_out_T:**90->25	Transition_HEATDemandCoveredbyTCMDISCHARGING
50	INV	**TCMreactor_cooling_call:**1->0 **PCMDHW_T:**80->65	HEATDemandCoveredbySOLAR
51	INV	**Solartank_Ttop:**70->80 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**65->70	OFF

52	INV	**PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	HEATDemandCoveredbySOLAR
53	INV	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70	OFF
54	INV	**PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **Solartank_Ttop:**80->50 **TCMreactor_cooling_call:**1->0	Transition_HEATDemandCoveredbyTCMDISCHARGING
55	INV	**Solartank_Ttop:**50->60 **TCMreactor_in_T:**25->70 **TCMreactor_out_T:**25->70 **HPcondenser_out_T:**25->90 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **PCMheating_heating_call:**0->1 **PCMheating_T:**70->80	HEATDemandCoveredbyTCMDISCHARGING
56	INV	**Solartank_Ttop:**60->50 **TCMreactor_cooling_call:**1->0	OFF
57	VER	**Solartank_Ttop:**50->40 **TCMreactor_in_T:**70->25 **TCMreactor_out_T:**70->25 **HPcondenser_out_T:**90->25 **PCMheating_heating_call:**1->0 **PCMheating_T:**80->70 **Demo_outdoor_T:**10->30 **MCFcold_in_T**:25->20 **Demo_heating_demand:**1->0 **Demo_cooling_demand:**0->1	OFF
58	VER	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **Demo_outdoor_T:**30->20	NODemandTCMCHARGING
59	VER	**PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 -Parametro: **Allow_SummerHeatDemand_withHPandTCM=1**	TransitionHEATDemandCoveredbyTCMCHARGING
60	VER	**HPcondenser_out_T:**25->86	HEATDemandCoveredbyTCMCHARGING
61	VER	**Solartank_Ttop:**60->90 **PCMDHW_heating_call:**1->0	HEATDemandCoveredbySOLAR
62	VER	**Solartank_Ttop:**90->70 **TCMreactor_cooling_call:**0->1 **TCMevaporator_T:**25->10 **MCFcold_in_T**:20->14 **Demo_outdoor_T:**20->25	Transition_COLDDemandCoveredbyTCMDISCHARGING
63	VER	**TCMevaporator_T:**10->3 **MCFcold_in_T**:14->20 **Demo_outdoor_T:**25->20	COLDDemandCoveredbyTCMDISCHARGING
64	VER	**Solartank_Ttop:**70->50	OFF

		TCMreactor_cooling_call:1->0	
65	VER	**Solartank_Ttop:**50->40 **TCMreactor_cooling_call:**1->0 **HPcondenser_out_T:**86->25 **TCMevaporator_T:**3->10 **Demo_outdoor_T:**20->30 **PCMcold_T**:20->26 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **Demo_cooling_demand:**1->0 -Parametro: **Allow_SummerHeatDemand_withTCM =1**	OFF
66	VER	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	TransitionHEATDemandCoveredbyTCMCHARGING
67	VER	**TCMcondenser_T:**30->40	HEATDemandCoveredbyTCMCHARGINGnoHP
68	VER	**TCMcondenser_T:**40->30	TransitionHEATDemandCoveredbyTCMCHARGING
69	VER	**TCMreactor_heating_call:**1->0 **TCMreactor_cooling_call:**0->1 **TCMevaporator_T:**10->20	Transition_COLDDemandCoveredbyTCMDISCHARGING
70	VER	**Demo_outdoor_T:**30->36	OFF
71	VER	**Solartank_Ttop:**60->40 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **Demo_outdoor_T:**36->28 **MCFcold_cooling_call:**0->1	Transition_COLDDemandCoveredbyTCMDISCHARGING
72	VER	**Solartank_Ttop:**40->90 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **MCFcold_cooling_call:**1->0	HEATDemandCoveredbySOLAR
73	VER	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **PCMcold_T**:26->20	OFF
74	VER	**Solartank_Ttop:**90->40 **MCFcold_cooling_call:**0->1 **PCMcold_T**:20->26	Transition_COLDDemandCoveredbyTCMDISCHARGING
75	VER	**Solartank_Ttop:**40->70 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **MCFcold_cooling_call:**1->0 **PCMcold_T**:26->20 **TCMevaporator_T:**20->3 **Demo_outdoor_T:**28->20 **HPcondenser_out_T:**25->86	COLDDemandCoveredbyTCMDISCHARGING
76	VER	**Solartank_Ttop:**70->50 **TCMreactor_cooling_call:**1->0	OFF

77	VER	**Solartank_Ttop:**70->50 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **HPcondenser_out_T:**86->25 **TCMevaporator_T:**3->25 **Demo_outdoor_T:**20->30	OFF
78	VER	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **Demo_outdoor_T:**30->20 **TCMcondenser_T:**30->40	NODemandTCMCHARGING
79	VER	**PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 -Parametro: **Allow_SummerHeatDemand_withTCM =1**	HEATDemandCoveredbyTCMCHARGINGnoHP
80	VER	-Parametro: **Allow_SummerHeatDemand_withHPandTCM=0**	OFF
81	VER	**PCMDHW_heating_call:**1->0 **PCMDHW_T:**80->70 **TCMcondenser_T:**40->30	NODemandTCMCHARGING
82	VER	**TCMreactor_heating_call:**1->0	OFF
83	VER	**TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->60	HEATDemandCoveredbySOLAR
84	VER	**Solartank_Ttop:**60->90 **PCMDHW_heating_call:**1->0 **PCMDHW_T:**60->70 **TCMreactor_heating_call:**1->0 **TCMreactor_cooling_call:**0->1 **TCMevaporator_T:**25->20 **Demo_outdoor_T:**20->24	OFF
85	VER	**Solartank_Ttop:**90->40 **MCFcold_cooling_call:**0->1 **Demo_outdoor_T:**24->28 **PCMcold_T**:20->26	Transition_COLDDemandCoveredbyTCMDISCHARGING
86	VER	**PCMcold_T**:26->20 **Solartank_Ttop:**40->70 **HPcondenser_out_T:**25->86 **TCMevaporator_T:**20->3 **Demo_outdoor_T:**28->20 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80	COLDDemandCoveredbyTCMDISCHARGING
87	VER	**Solartank_Ttop:**70->50 **MCFcold_cooling_call:**1->0	OFF
88	VER	**Solartank_Ttop:**50->40 **HPcondenser_out_T:**86->25 **TCMevaporator_T:**3->25 **PCMDHW_heating_call:**1->0	OFF

		PCMDHW_T:80->70 **Demo_outdoor_T:**20->30	
89	VER	**Solartank_Ttop:**40->60 **TCMreactor_heating_call:**0->1 **PCMDHW_heating_call:** 0->1 **PCMDHW_T:**70->80 **Demo_outdoor_T:**30->20	TransitionHEATDemandCoveredbyTCMCHARGING
90	VER	**HPcondenser_out_T:**25->86	HEATDemandCoveredbyTCMCHARGING
91	VER	**TCMcondenser_T:**30->40	HEATDemandCoveredbyTCMCHARGINGnoHP
92	VER	-Parametro: **Allow_SummerHeatDemand_withHPandTCM=0**	OFF

Tabla 1: Batería de pruebas del modelo