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Annex

"**Annex:** Algoritme."

PFC presentat per optar al títol d'Enginyería Tècnica Industrial especialitat mecànica

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CAPÍTOL 1: ALGORITME

1.1. Variables.

```
PROGRAM PLC_PRG
VAR
        TEMP1 AT %IW1  : WORD ;
        HUM1 AT %IW0  : WORD;
        TEMP2 AT %IW3  : WORD ;
        HUM2 AT %IW2  : WORD;
        HUM2B AT %IW11 : WORD;
        TEMP3 AT %IW5  : WORD ;
        HUM3 AT %IW4 : WORD;
        TEMP5 AT %IW7  : WORD ;
        HUM5 AT %IW6  : WORD;
        POSEV1 AT %IW8 : WORD;
        POSEV2 AT %IW9 : WORD;
        PRESDIF AT %IW10 : WORD;
        OBREV1 AT %QW0 : WORD;
        OBREV2 AT %QW1 : WORD;
        TEMP1R : REAL;
        HUM1R : REAL;
        TEMP2R : REAL;
        HUM2R : REAL;
```

```
HUM2BR : REAL;
TEMP3R : REAL;
HUM3R : REAL;
TEMP5R : REAL;
HUM5R : REAL;
POSEV1R : REAL;
POSEV2R : REAL;
PRESDIFR : REAL;
T1 : REAL;
HR1 : REAL;
T2 : REAL;
HR2 : REAL;
T2_TEORICA : INT;
HR2_TEORICA : INT;
T2_TEORICAR : REAL;
HR2_TEORICAR : REAL;
HRB2 : REAL;
T3 : REAL;
HR3 : REAL;
T5 : REAL;
HR5 : REAL;
OBREV1R : REAL;
OBREV2R : REAL;
POBREV1 : INT;
POBREV1R : REAL;
POBREV2 : INT;
POBREV2R : REAL;
PPOSEV1 : REAL;
PPOSEV2 : REAL;
H1: REAL;
H2: REAL;
H3: REAL;
H5: REAL;
AP : REAL;
CAUDAL : REAL;
CAUDALVENT : REAL;
```

CAUDALRECIRC : REAL;

QS: REAL;

QL: REAL;

FCS: REAL;

QSE: REAL;

QLE: REAL;

FCSE: REAL;

W1 : REAL;

W2 : REAL;

W2_TEORICA : REAL;

PWS2_TEORICA : REAL;

W3 : REAL;

W5 : REAL;

PWS1 : REAL;

PWS2 : REAL;

PWS3 : REAL;

PWS5 : REAL;

VPD : REAL;

CLIMATITZACIO : INT;

CICLE: STRING;

SENYAL_CORRECTORA_EST_TEMP : REAL;

SENYAL_CORRECTORA_EST_HUM : REAL;

SENYAL_CORRECTORA_HIV_TEMP : REAL;

SENYAL_CORRECTORA_HIV_HUM : REAL;

PID_TEMPERATURA_ESTIU : PID;

PID_HUMITAT_ESTIU : PID;

PID_TEMPERATURA_HIVERN : PID;

PID_HUMITAT_HIVERN : PID;

START : INT;

T5_TEORICA : REAL;

W5_TEORICA : REAL;

FCSM_TEORIC : REAL;

MA_TEORIC : REAL;

MAV_TEORIC_TEMP : REAL;

MAV_TEORIC_HUM : REAL;

T3_TEORICA : REAL;

```
        W3_TEORICA : REAL;
        W3_TEORICA_SUP : REAL;
        W3_TEORICA_INF : REAL;
        MAV_TEORIC_HUM_SUP : REAL;
        MAV_TEORIC_HUM_INF : REAL;
        MAV_TEORIC: REAL;
        T3_TEORICA_INF : REAL;
        T3_TEORICA_SUP : REAL;
        MAV_TEORIC_TEMP_SUP : REAL;
        MAV_TEORIC_TEMP_INF : REAL;
        MAR_TEORIC : REAL;
        TON_ESTAB : TON;
        TON_REINICI : TON;
        ESTABLE : BOOL;
        REINICI : BOOL;
        POBREV2R_TEORICA : REAL;
        POBREV1R_TEORICA : REAL;
        BOTO_START : BOOL;
        ESTAT : BOOL;
        QS_TEORIC: REAL;
        QL_TEORIC : REAL;
END_VAR
```

1.2. Programa.

```
{ADQUISICIÓ DE DADES}

TEMP1R:=TEMP1;
HUM1R:=HUM1;
T1:=50*TEMP1R/32767;
HR1:=100*HUM1R/32767;
PWS1:=EXP(14.2928-(5291/(T1+273.15)));
W1:=0.62198*PWS1*(HR1/100)/(1.01325-PWS1*(HR1/100));
H1:=1.025*T1+W1*(2500.6+1086*T1);

TEMP2R:=TEMP2;
HUM2R:=HUM2;
```

```
        HUM2BR:=HUM2B;
T2:=TEMP2R*50/32767;
HR2:=100*HUM2R/32767;
        HRB2:=100*HUM2R/32767;
PWS2:=EXP(14.2928-(5291/(T2+273.15)));
W2:=0.62198*PWS2*(HR2/100)/(1.01325-PWS2*(HR2/100));
H2:=1.025*T2+W2*(2500.6+1086*T2);

TEMP3R:=TEMP3;
HUM3R:=HUM3;
T3:=TEMP3R*50/32767;
HR3:=100*HUM3R/32767;
PWS3:=EXP(14.2928-(5291/(T3+273.15)));
W3:=0.62198*PWS3*(HR3/100)/(1.01325-PWS3*(HR3/100));
H3:=1.025*T3+W3*(2500.6+1086*T3);

TEMP5R:=TEMP5;
HUM5R:=HUM5;
T5:=TEMP5R*50/32767;
HR5:=100*HUM5R/32767;
PWS5:=EXP(14.2928-(5291/(T5+273.15)));
W5:=0.62198*PWS5*(HR5/100)/(1.01325-PWS5*(HR5/100));
H5:=1.025*T5+W5*(2500.6+1086*T5);

PRESDIFR:=PRESDIF;
VPD:=10*PRESDIFR/32767;
AP:=VPD*10/1000;
CAUDAL:=0.1836*SQRT(AP*2/1.225)*1.225;

CAUDALVENT:=CAUDAL*(POSEV1R/(POSEV1R+POSEV2R));
CAUDALRECIRC:=CAUDAL-CAUDALVENT;

QS:=CAUDAL*1.025*(T2-T5);
QL:=CAUDAL*2478*(W2-W5);
FCS:=QS/(QS+QL);
```

```
QSE:=QS+CAUDALVENT*0.2*1.025*(T1-T2);
QLE:=QL+CAUDALVENT*0.2*2478*(W1-W2);
FCSE:=QSE/(QSE+QLE);


{AUTOMATITZACIÓ}

IF T1>T2_TEORICA THEN
        CLIMATITZACIO := 1;
        CICLE := 'ESTIU';
ELSE
        CLIMATITZACIO :=2;
        CICLE := 'HIVERN';
END_IF;

T2_TEORICAR:=T2_TEORICA;
HR2_TEORICAR:=HR2_TEORICA;

PWS2_TEORICA:=EXP(14.2928-(5291/(T2_TEORICAR+273.15)));
W2_TEORICA:=0.62198*(HR2_TEORICAR/100)*PWS2_TEORICA/(1.01325-
(HR2_TEORICAR/100)*PWS2_TEORICA);



IF BOTO_START    THEN
        ESTAT:=TRUE;
ELSE
        ESTAT:=FALSE;
        START:=0;
END_IF;

        IF ESTAT=FALSE THEN
                POBREV2R:=0;
                POBREV1R:=0;
        END_IF;
```

```
IF ESTAT = TRUE AND START= 0 THEN
    POBREV2R:=90;
    POBREV1R:=10;
END_IF;

IF (T2_TEORICA-0.1)<=T2 AND T2<=(T2_TEORICA+0.1) AND ESTAT AND
START = 0 AND CICLE='ESTIU' THEN
    FCSM_TEORIC := CAUDAL*1.025*(T3-T5)/(CAUDAL*1.025*(T3-
T5)+CAUDAL*2470.3*(W3-W5));
    MA_TEORIC := CAUDAL;
    T5_TEORICA:= T2_TEORICA-(QSE/(MA_TEORIC*1.025));
    W5_TEORICA:=W2_TEORICA-(QLE/(MA_TEORIC*2470.3));

T3_TEORICA:=19.77*FCSM_TEORIC/(MA_TEORIC*1.025)+T5_TEORICA;
    W3_TEORICA:=(19.77-MA_TEORIC*1.025*(T3_TEORICA-
T5_TEORICA))/(MA_TEORIC*2470.3)+W5_TEORICA;
    START:=2;
END_IF;

IF (T2_TEORICA-0.1)<=T2 AND T2<=(T2_TEORICA+0.1) AND ESTAT AND
START = 0 AND CICLE='HIVERN' THEN
    FCSM_TEORIC := CAUDAL*1.025*(T3-T5)/(CAUDAL*1.025*(T3-
T5)+CAUDAL*2470.3*(W3-W5));
    MA_TEORIC := CAUDAL;
    T5_TEORICA:= T2_TEORICA-(QS/(MA_TEORIC*1.025));
    W5_TEORICA:=W2_TEORICA-(QL/(MA_TEORIC*2470.3));

T3_TEORICA:=22.7*FCSM_TEORIC/(MA_TEORIC*1.025)+T5_TEORICA;
    W3_TEORICA:=(22.7-MA_TEORIC*1.025*(T3_TEORICA-
T5_TEORICA))/(MA_TEORIC*2470.3)+W5_TEORICA;
    START:=2;
END_IF;

IF START=1 AND CICLE='ESTIU' THEN
    FCSM_TEORIC := CAUDAL*1.025*(T3-T5)/(CAUDAL*1.025*(T3-
T5)+CAUDAL*2470.3*(W3-W5));
    MA_TEORIC := CAUDAL;
    T5_TEORICA:= T2_TEORICA-(QSE/(MA_TEORIC*1.025));
    W5_TEORICA:=W2_TEORICA-(QLE/(MA_TEORIC*2470.3));
```

```
        T3_TEORICA:=19.77*FCSM_TEORIC/(MA_TEORIC*1.025)+T5_TEORICA;
            W3_TEORICA:=(19.77-MA_TEORIC*1.025*(T3_TEORICA-
T5_TEORICA))/(MA_TEORIC*2470.3)+W5_TEORICA;
            START:=2;
        END_IF;

        IF START=1 AND CICLE='HIVERN' THEN
            FCSM_TEORIC := CAUDAL*1.025*(T3-T5)/(CAUDAL*1.025*(T3-
T5)+CAUDAL*2470.3*(W3-W5));
            MA_TEORIC := CAUDAL;
            T5_TEORICA:= T2_TEORICA-(QS/(MA_TEORIC*1.025));
            W5_TEORICA:=W2_TEORICA-(QL/(MA_TEORIC*2470.3));

        T3_TEORICA:=22.7*FCSM_TEORIC/(MA_TEORIC*1.025)+T5_TEORICA;
            W3_TEORICA:=(22.7-MA_TEORIC*1.025*(T3_TEORICA-
T5_TEORICA))/(MA_TEORIC*2470.3)+W5_TEORICA;
            START:=2;
        END_IF;

        IF START = 2 THEN

            MAV_TEORIC_TEMP := MA_TEORIC*((T3_TEORICA-
T2_TEORICA)/(T1-T2_TEORICA));
            MAV_TEORIC_HUM := MA_TEORIC*((W3_TEORICA-
W2_TEORICA)/(W1-W2_TEORICA));
            W3_TEORICA_SUP := W3_TEORICA + 0.02;
            W3_TEORICA_INF := W3_TEORICA - 0.02;
            MAV_TEORIC_HUM_SUP := MA_TEORIC*((W3_TEORICA_SUP-
W2_TEORICA)/(W1-W2_TEORICA));
            MAV_TEORIC_HUM_INF := MA_TEORIC*((W3_TEORICA_INF-
W2_TEORICA)/(W1-W2_TEORICA));
            T3_TEORICA_INF:= T3_TEORICA - 0.5;
            T3_TEORICA_SUP:= T3_TEORICA + 0.5;
            MAV_TEORIC_TEMP_SUP := MA_TEORIC*((T3_TEORICA_SUP-
T2_TEORICA)/(T1-T2_TEORICA));
            MAV_TEORIC_TEMP_INF := MA_TEORIC*((T3_TEORICA_INF-
T2_TEORICA)/(T1-T2_TEORICA));
        END_IF;
```

```
            IF MAV_TEORIC_HUM_SUP>=MAV_TEORIC_TEMP AND
MAV_TEORIC_TEMP>=MAV_TEORIC_HUM_INF AND START =2 THEN
                  MAV_TEORIC := MAV_TEORIC_TEMP;
                  START:=3;
            END_IF;

            IF MAV_TEORIC_TEMP>MAV_TEORIC_HUM_SUP AND
MAV_TEORIC_HUM_SUP>MAV_TEORIC_TEMP_INF AND START = 2 THEN
                  MAV_TEORIC := MAV_TEORIC_HUM_SUP;
                  START := 3;
            END_IF;

            IF MAV_TEORIC_TEMP_INF>MAV_TEORIC_HUM_SUP AND START =
2 THEN
                  MAV_TEORIC := MAV_TEORIC_TEMP_INF;
                  START := 3;
            END_IF;

            IF MAV_TEORIC_TEMP<MAV_TEORIC_HUM_INF AND
MAV_TEORIC_HUM_INF<MAV_TEORIC_TEMP_SUP AND START = 2 THEN
                  MAV_TEORIC := MAV_TEORIC_HUM_INF;
                  START := 3;
            END_IF;

            IF MAV_TEORIC_TEMP_SUP<MAV_TEORIC_HUM_INF AND START =
2 THEN
                        MAV_TEORIC := MAV_TEORIC_TEMP_SUP;
                        START := 3;
                  END_IF;

      IF START = 3 THEN
            MAR_TEORIC := MA_TEORIC - MAV_TEORIC;
            POBREV2R_TEORICA := MAR_TEORIC/MA_TEORIC;
            POBREV1R_TEORICA := MAV_TEORIC/MA_TEORIC;
            POBREV2R := POBREV2R_TEORICA;
            POBREV1R := POBREV1R_TEORICA;
```

```
        TON_ESTAB(IN:=START=3 , PT:=T#10s , Q=> ESTABLE, ET=> );
END_IF;

IF ESTABLE THEN
        START :=4;
        TON_REINICI(IN:=ESTABLE , PT:=T#60S , Q=> REINICI, ET=> );
END_IF;

IF REINICI THEN
        START:=1;
        ESTABLE:=FALSE;
        REINICI:=FALSE;
END_IF;

        PID_TEMPERATURA_ESTIU(
                ACTUAL:= T2,
                SET_POINT:= T2_TEORICA,
                KP:= 1,
                TN:= 1,
                TV:= 1,
                Y_MANUAL:= 0,
                Y_OFFSET:= 0,
                Y_MIN:= -100,
                Y_MAX:= 100,
                MANUAL:= FALSE,
                RESET:= FALSE,
                Y=> SENYAL_CORRECTORA_EST_TEMP,
                LIMITS_ACTIVE=> ,
                OVERFLOW=> );

        PID_HUMITAT_ESTIU(
                ACTUAL:= T2,
                SET_POINT:= T2_TEORICA,
                KP:= 1,
                TN:= 1,
                TV:= 1,
```

```
        Y_MANUAL:= 0,
        Y_OFFSET:= 0,
        Y_MIN:= -100,
        Y_MAX:= 100,
        MANUAL:= FALSE,
        RESET:= FALSE,
        Y=> SENYAL_CORRECTORA_EST_HUM,
        LIMITS_ACTIVE=> ,
        OVERFLOW=> );

PID_TEMPERATURA_HIVERN(
        ACTUAL:= T2,
        SET_POINT:= T2_TEORICA,
        KP:= 1,
        TN:= 1,
        TV:= 1,
        Y_MANUAL:= 0,
        Y_OFFSET:= 0,
        Y_MIN:= -100,
        Y_MAX:= 100,
        MANUAL:= FALSE,
        RESET:= FALSE,
        Y=> SENYAL_CORRECTORA_HIV_TEMP,
        LIMITS_ACTIVE=> ,
        OVERFLOW=> );

PID_HUMITAT_HIVERN(
        ACTUAL:= T2,
        SET_POINT:= T2_TEORICA,
        KP:= 1,
        TN:= 1,
        TV:= 1,
        Y_MANUAL:= 0,
        Y_OFFSET:= 0,
        Y_MIN:= -100,
        Y_MAX:= 100,
```

```
                    MANUAL:= FALSE,
                    RESET:= FALSE,
                    Y=> SENYAL_CORRECTORA_HIV_HUM,
                    LIMITS_ACTIVE=> ,
                    OVERFLOW=> );


      IF START = 4 AND CLIMATITZACIO = 1 AND (T2_TEORICA+0.5>T2 OR
T2_TEORICA-0.5< T2) THEN
            POBREV2R:= POBREV1R_TEORICA
+SENYAL_CORRECTORA_EST_TEMP;
            POBREV1R:=100-POBREV2R;
      END_IF;


      IF START = 4 AND CLIMATITZACIO = 1 AND (T2_TEORICA+0.5<=T2 OR
T2_TEORICA-0.5>= T2) THEN
            POBREV2R:= POBREV1R_TEORICA
+SENYAL_CORRECTORA_EST_HUM;
            POBREV1R:=100-POBREV2R;
      END_IF;


      IF START = 4 AND CLIMATITZACIO = 1 AND (T2_TEORICA+0.5>T2 OR
T2_TEORICA-0.5< T2) THEN
            POBREV2R:= POBREV1R_TEORICA
+SENYAL_CORRECTORA_HIV_TEMP;
            POBREV1R:=100-POBREV2R;
      END_IF;


      IF START = 4 AND CLIMATITZACIO = 1 AND (T2_TEORICA+0.5<=T2 OR
T2_TEORICA-0.5>= T2) THEN
            POBREV2R:= POBREV1R_TEORICA
+SENYAL_CORRECTORA_HIV_HUM;
            POBREV1R:=100-POBREV2R;
      END_IF;


{PASICIONAMENT VALVULES}


POBREV1:=REAL_TO_INT(POBREV1R);
POBREV2:=REAL_TO_INT(POBREV2R);
```

```
OBREV1:=POBREV1*32767/100;
OBREV2:=POBREV2*32767/100;


POSEV1R:=POSEV1;
PPOSEV1:=POSEV1R*100/32767;
POSEV2R:=POSEV2;
PPOSEV2:=POSEV2R*100/32767;
```