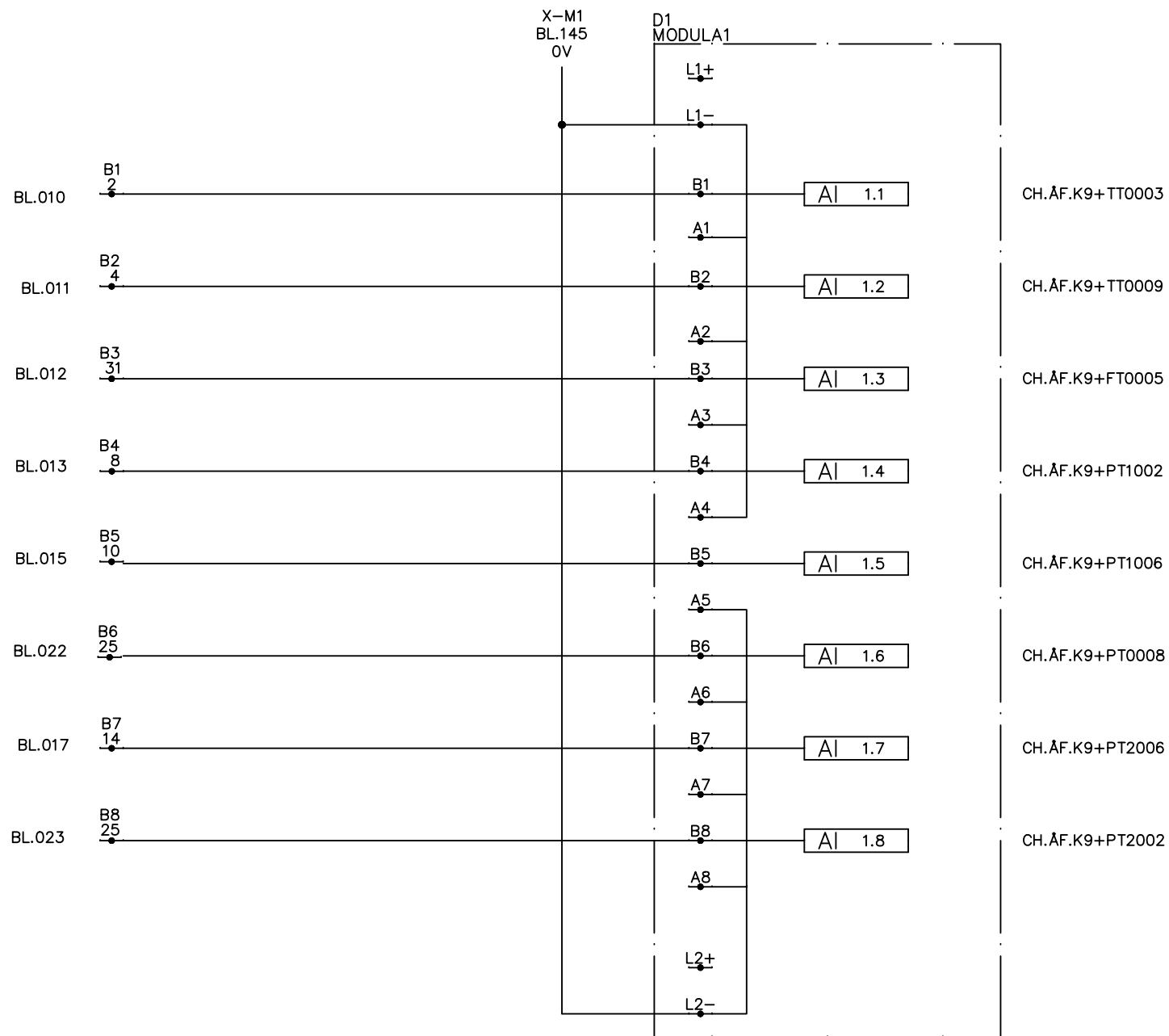
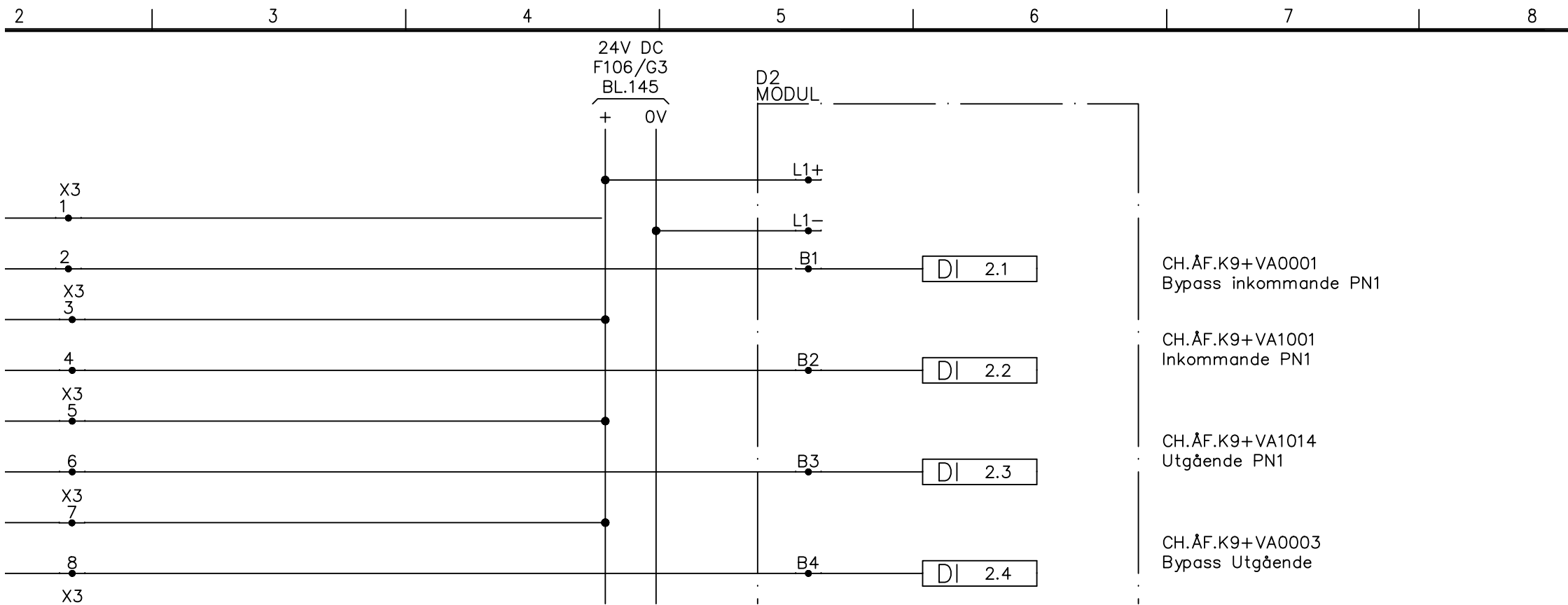
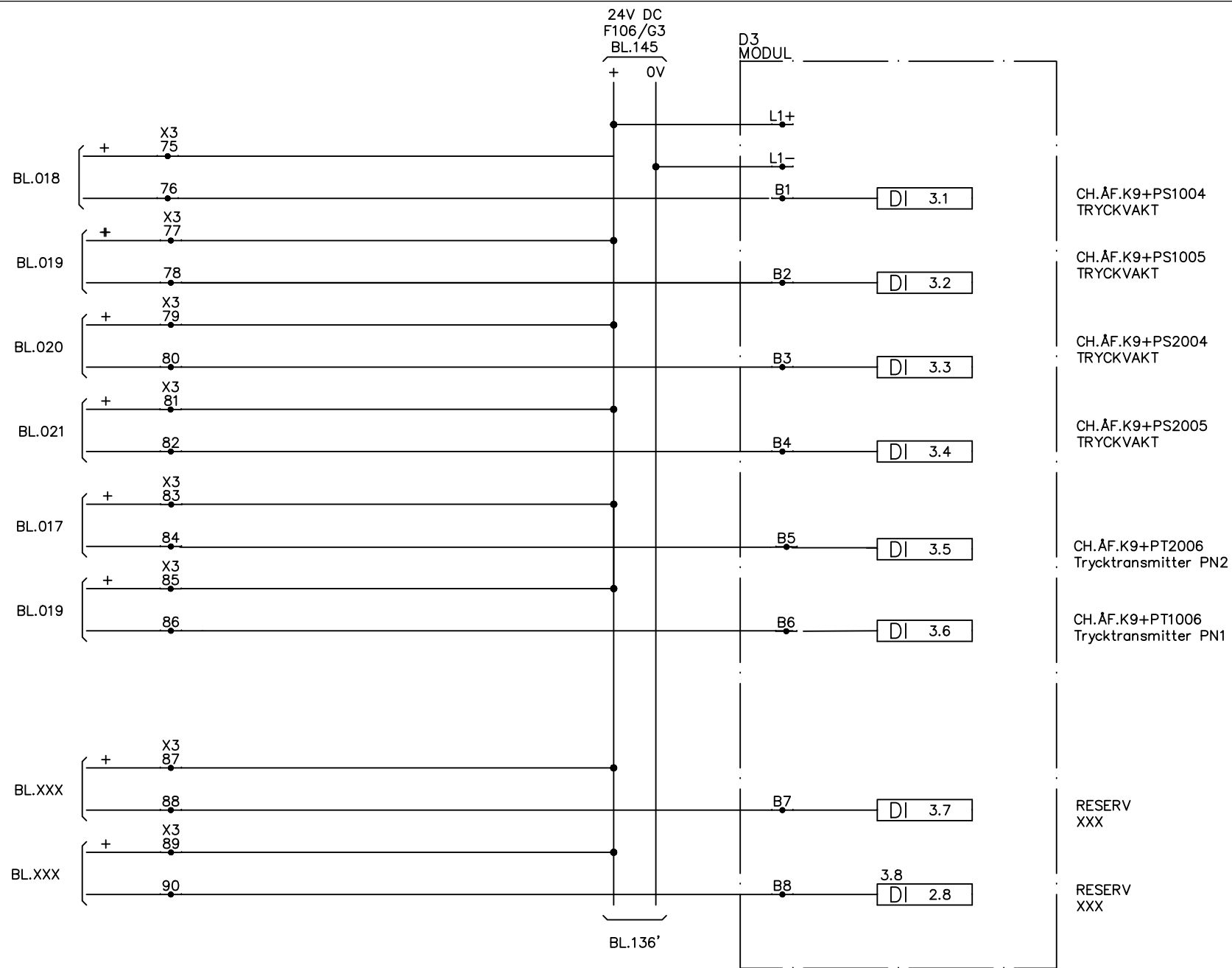


						PUMPSTATION ULLEVI K9 CH.ÅF.K9 ALARM KRETSSCHEMA	Proj.nr:	6044199	Blad nr:	145
							Filnamn:	alarm.dwg	Forts bl:	148
	Rev	Rit	Dat	Revidering avser			Ritn.nr:	10145		
	Pärm	Konst	Rit	Godk	Dat					
						</				

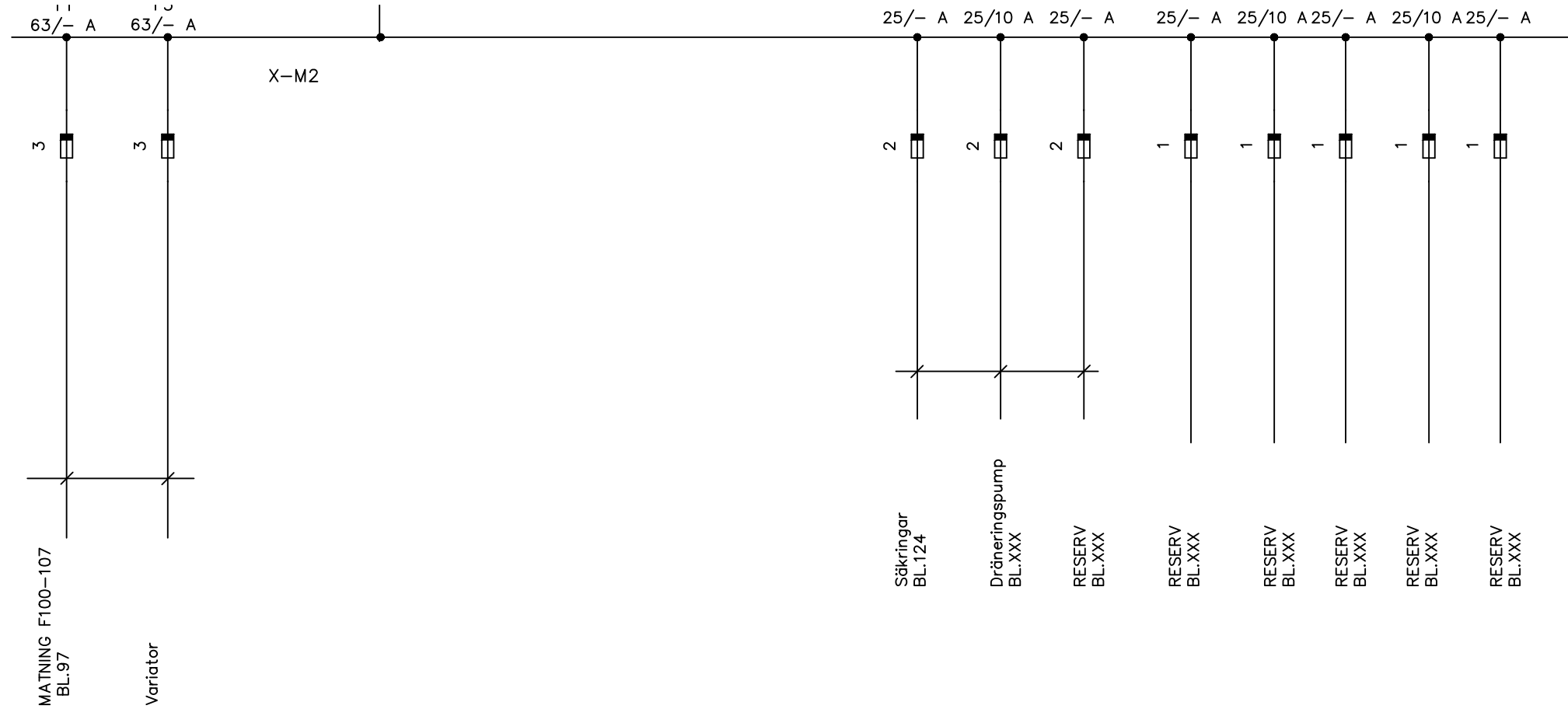


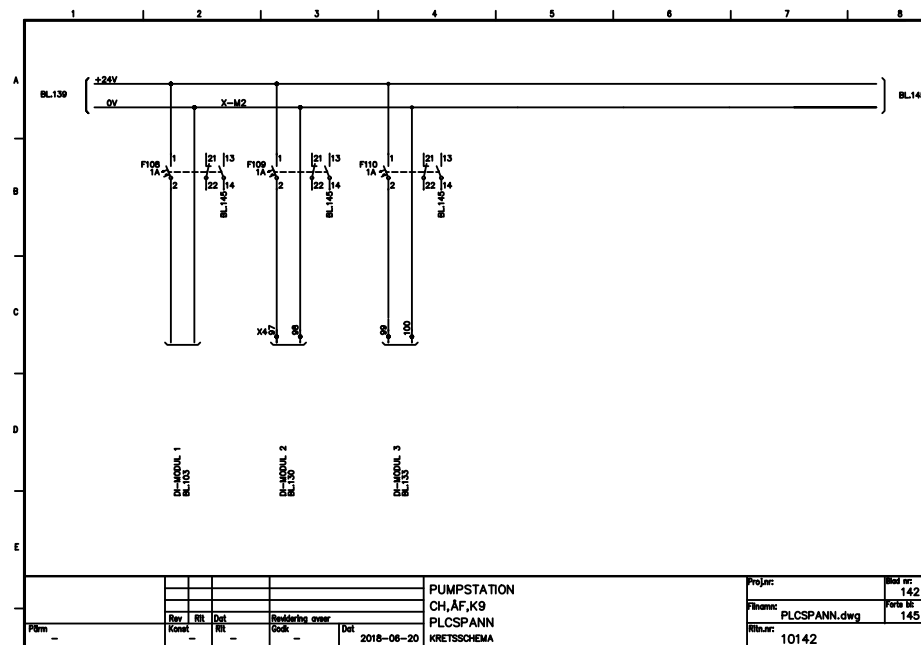
						PUMPSTATION CH,ÅF,K9: D1MOD ANALOG KRETSSCHEMA	Proj.nr: —	Blad nr: 103
							Filnamn: D1CARD.dwg	Forts bl: 106
	Rev	Rit	Dat	Revidering avser			Ritn.nr: 30103	
	Konst	—	—	Godk	Dat 2018-06-20			



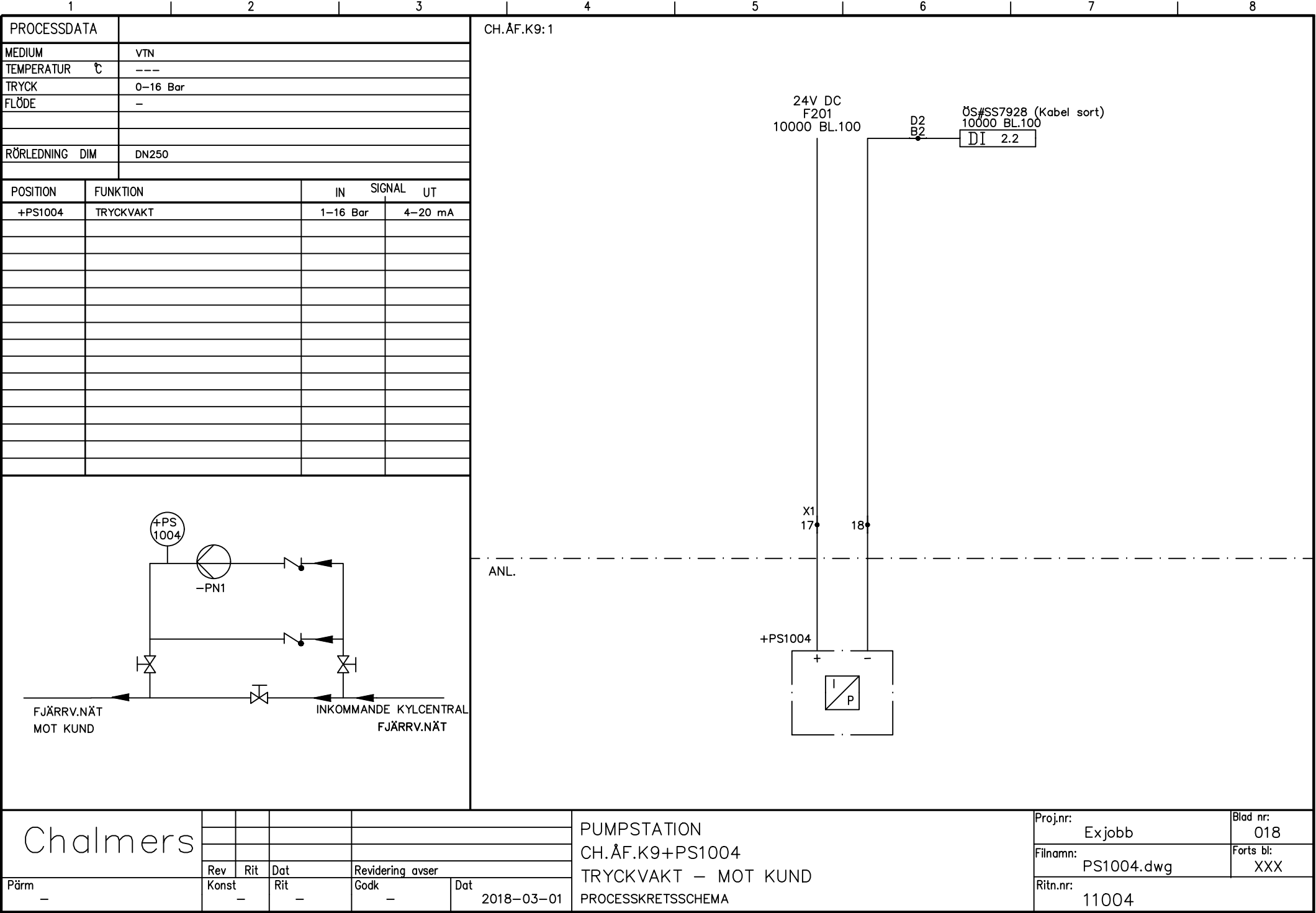


						PUMPSTATION CH.ÅF.K9 Digital KRETSSHEMA	Proj.nr: —	Blad nr: 133
							Filnamn: D3CARD.dwg	Forts bl: 136
	Rev	Rit	Dat	Revidering avser			Ritn.nr: 30133	
	Pärm —	Konst —	Rit —	Godk —	Dat 2018-06-20			





				PUMPSTATION		Proj.nr.	Mod.nr.
				CH,ÄF,K9		PLCSPANN.dwg	142
				PLCSPANN		145	
				KRETS SCHEMA		10142	



1

2

3

PROCESSDATA

MEDIUMVTN

TEMPERATUR- $^{\circ}$ C

TRYCK0 – 16 Bar

FLÖDE-

RÖRLEDNING DIMDN250

POSITIONFUNKTIONIN SIGNAL UT

+PS1005TRYCKVAKT1–16 Bar4–20 mA

CH.ÅF.K9:1

24V DC
F201
10000 BL.100

D2
B3

ÖS#SS7928 (Kabel sort)
10000 BL.100
DI 2.3

X1
18

19

+PS1005

+

-

I
P

ANL.

+PS1005

-PN1

FJÄRRV.NÄT
MOT KUND

INKOMMANDE KYLCENTRAL
FJÄRRV.NÄT

Chalmers

RevKonst

Rit

Dat

Revidering avser

Godk

Dat

PUMPSTATION

CH.ÅF.K9+PS1005

TRYCKVAKT – MOT KUND

PROCESSKRETSSHEMA

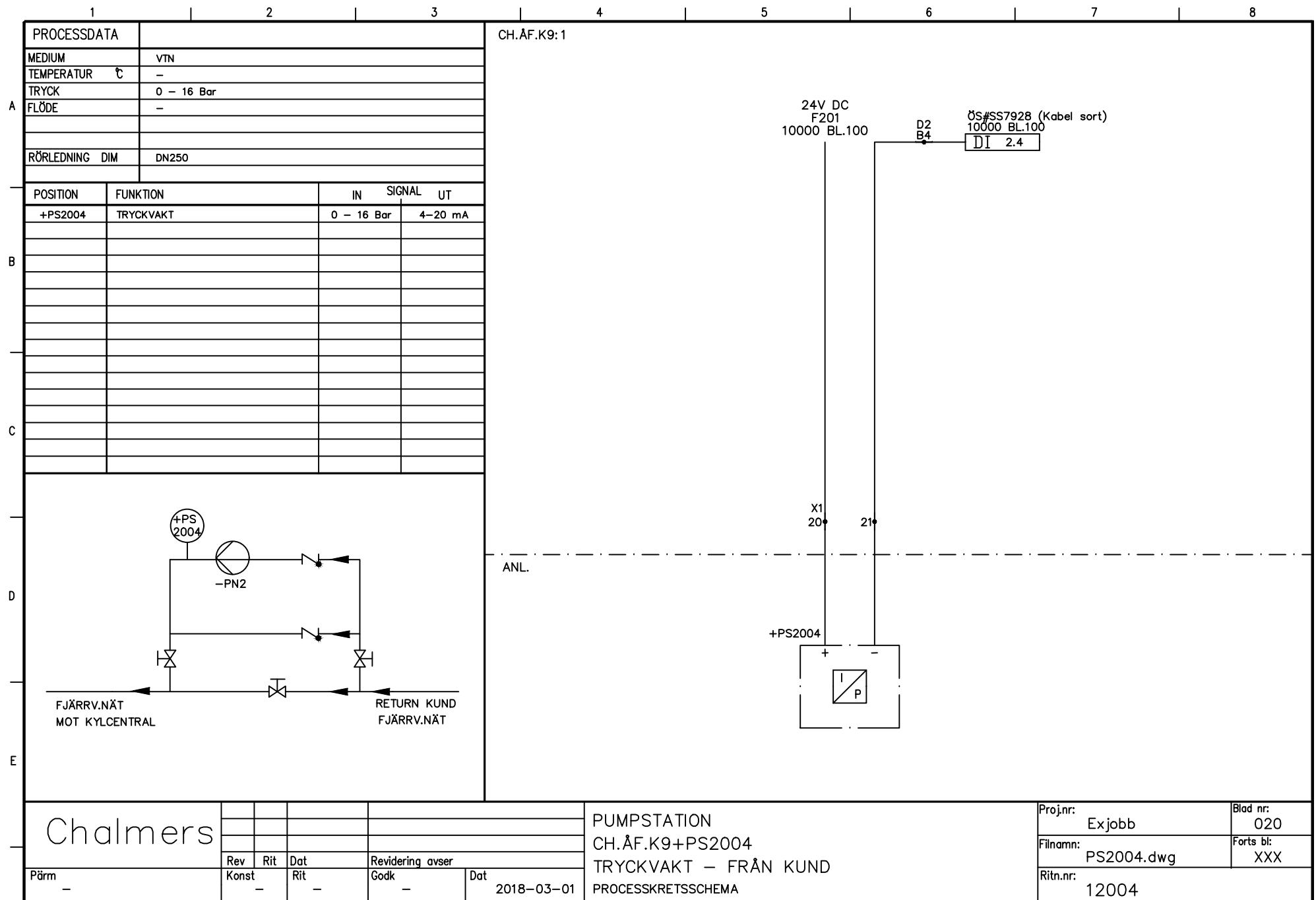
Proj.nr:Exjobb

Filnamn:PS1005.dwg

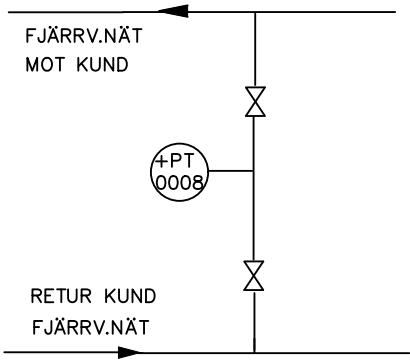
Ritn.nr:11005

Blad nr:019

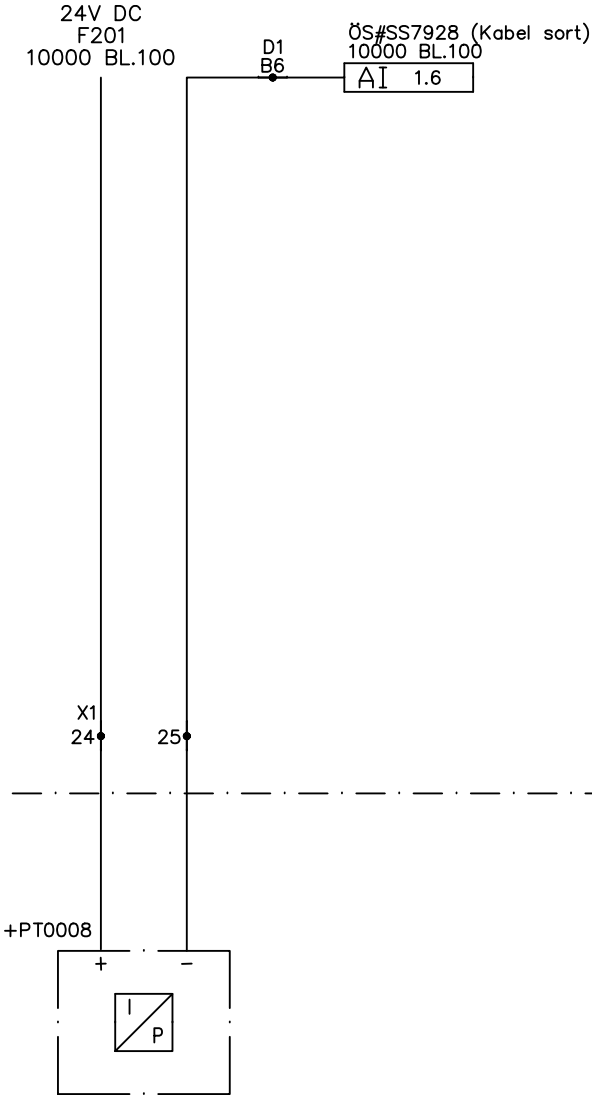
Forts bl:XXX



PROCESSDATA			
MEDIUM		VTN	
TEMPERATUR	°C	85	
TRYCK		0 till 16 Bar	
FLÖDE		---	
RÖRLEDNING	DIM	DN400	
POSITION	FUNKTION	IN	SIGNAL UT
+PT0008	DIFFTRYCK	0– 16 Bar	4–20 mA



CH.ÅF.K9: 1



Chalmers

Pärm	Rev	Rit	Dat	Revidering avser	Dat
—	Konst	—	Rit	Godk	2018–03–01

PUMPSTATION
CH.ÅF.K9+1000
TRYCK VTN – MOT KUND
PROCESSKRETSSCHEMA

Proj.nr:	Ex jobb	Blad nr:	022
Filnamn:	PT0008.dwg	Forts bl:	XXX
Ritn.nr:	10008		

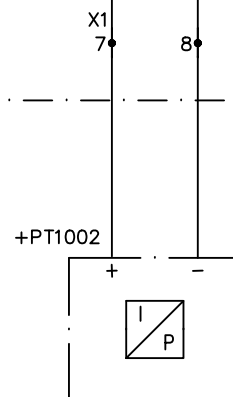
CH.ÅF.K9:1

24V DC
F201
10000 BL.100

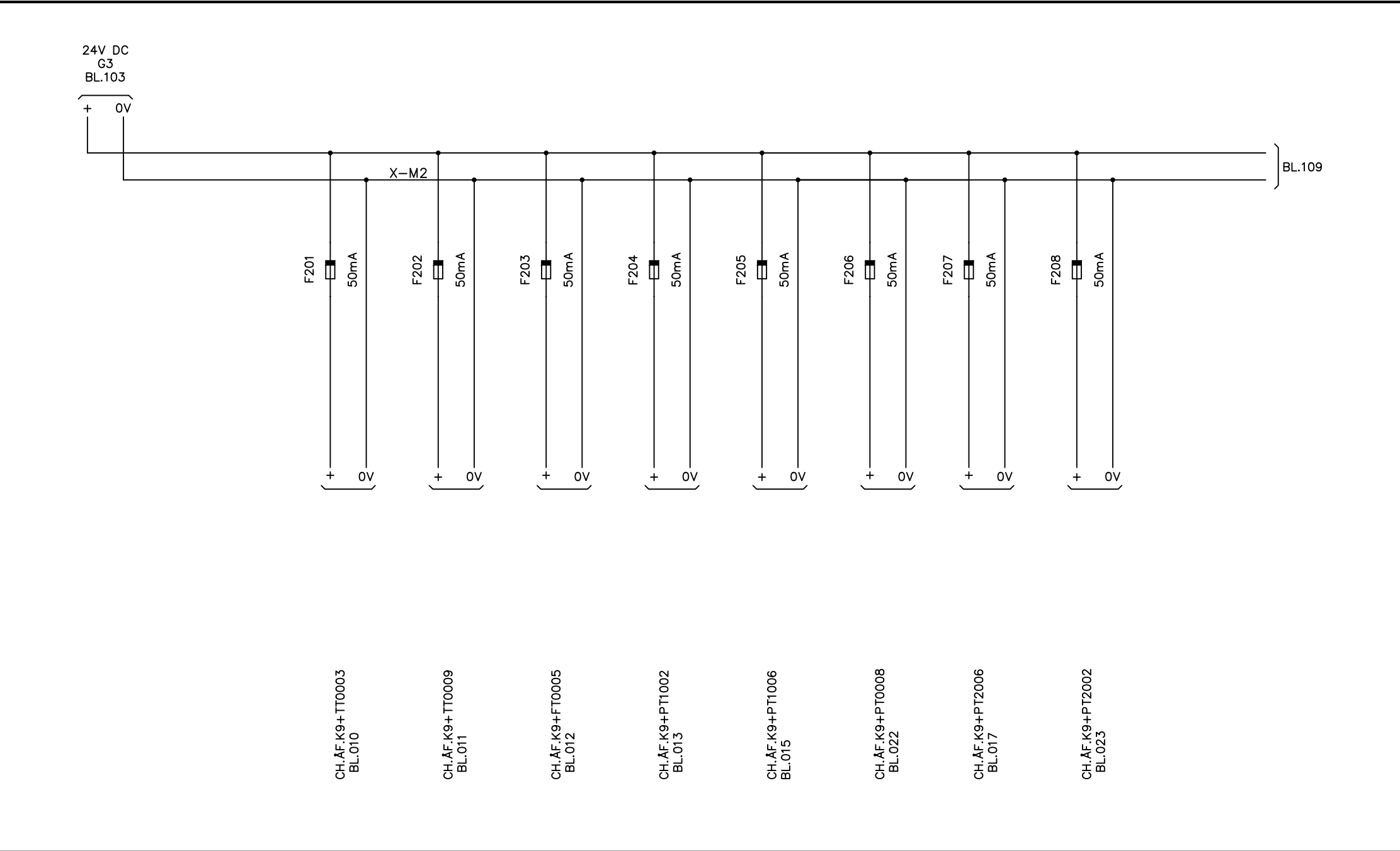
D1
B5

ÖS#SS7928 (Kabel sort)
10000 BL.100

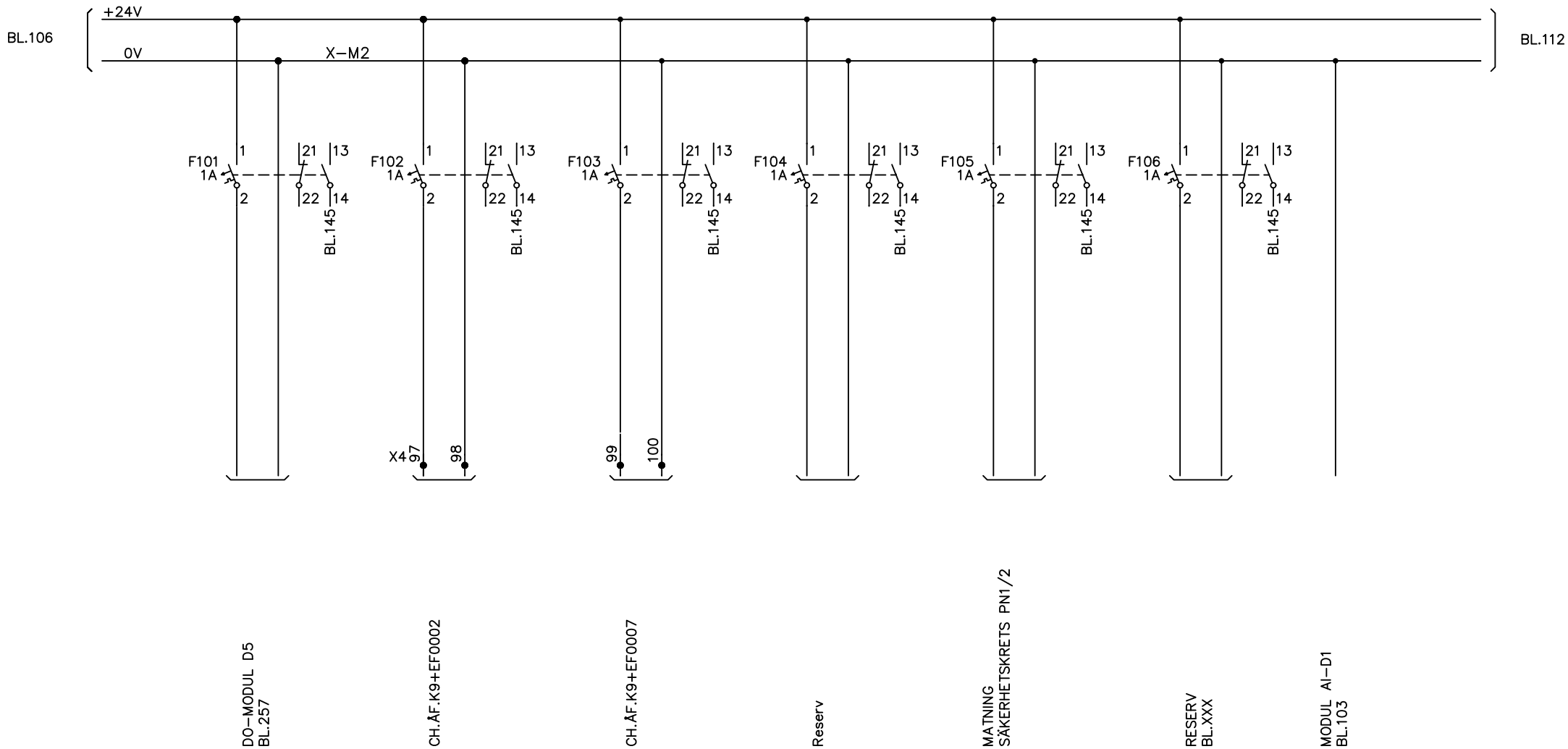
AI 1.4



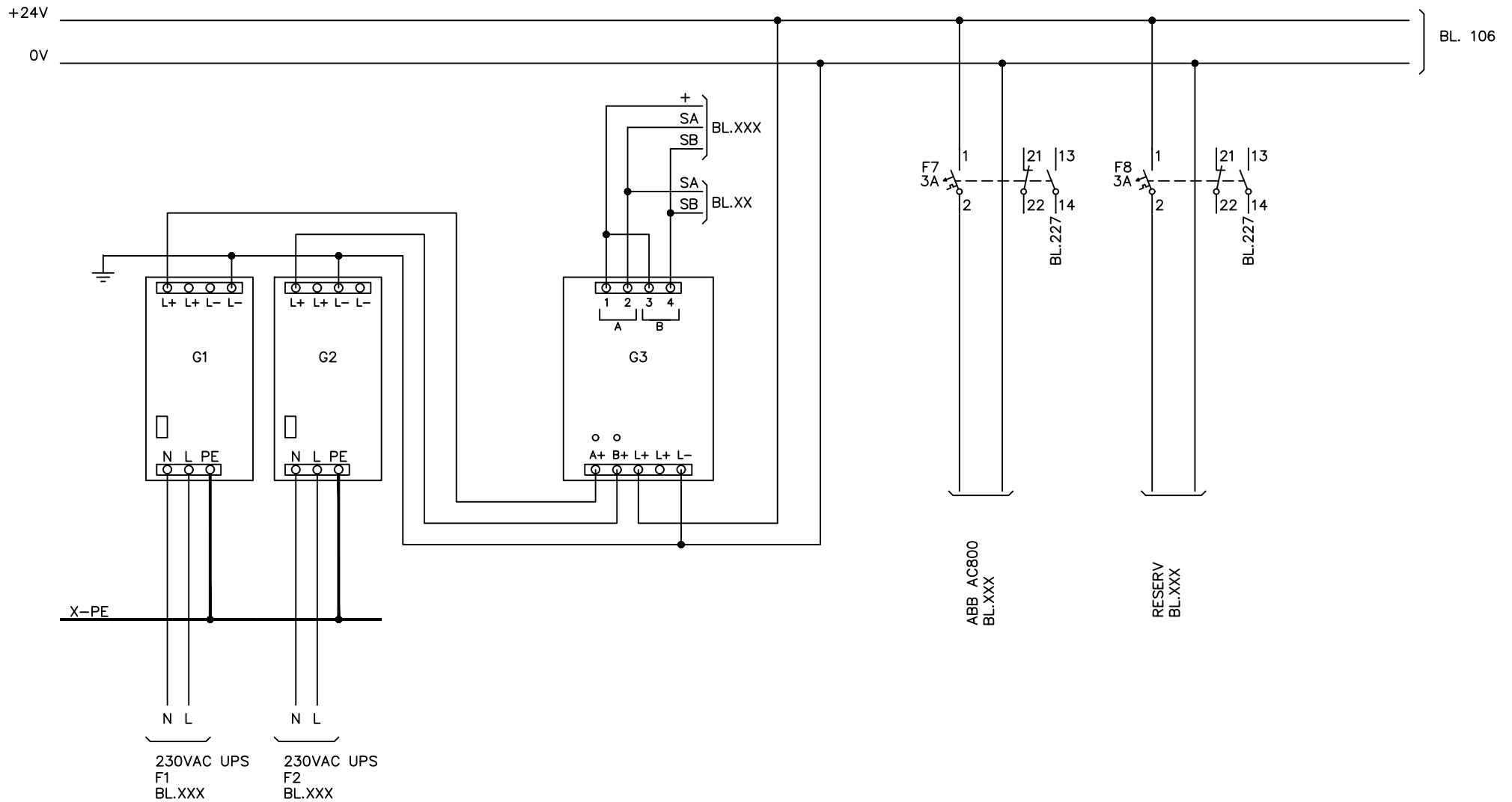
Chalmers						PUMPSTATION CH.ÅF.K9+1000 TRYCK VTN – MOT KUND PROCESSKRETSSCHEMA	Proj.nr:	Exjobb	Blad nr:	013
							Filnamn:	PT1002	Forts bl:	XXX
	Rev	Rit	Dat	Revidering avser			Ritn.nr:	11002		
Pärm	Konst	Rit	Godk	Dat						
–	–	–	–	2018-03-01						

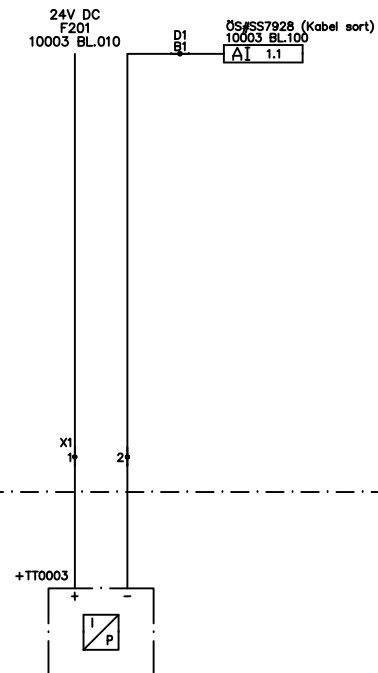
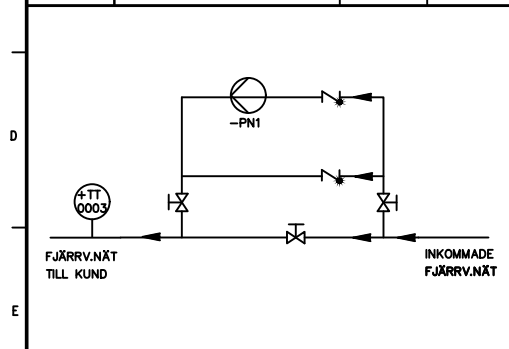


Pärm —				PUMPSTATION CH.ÅF.K9 SÄKRINGSPLINT KRETSSCHEMA		Proj.nr: 6044199	Blad nr: 106
						Filnamn: SAKERPLINT1.dwg	Forts bl: 109
	Rev	Rit	Dat	Revidering avser		Ritn.nr: 30106	
	Konst	—	Rit	Godk	Dat		
				—	2018-06-20		

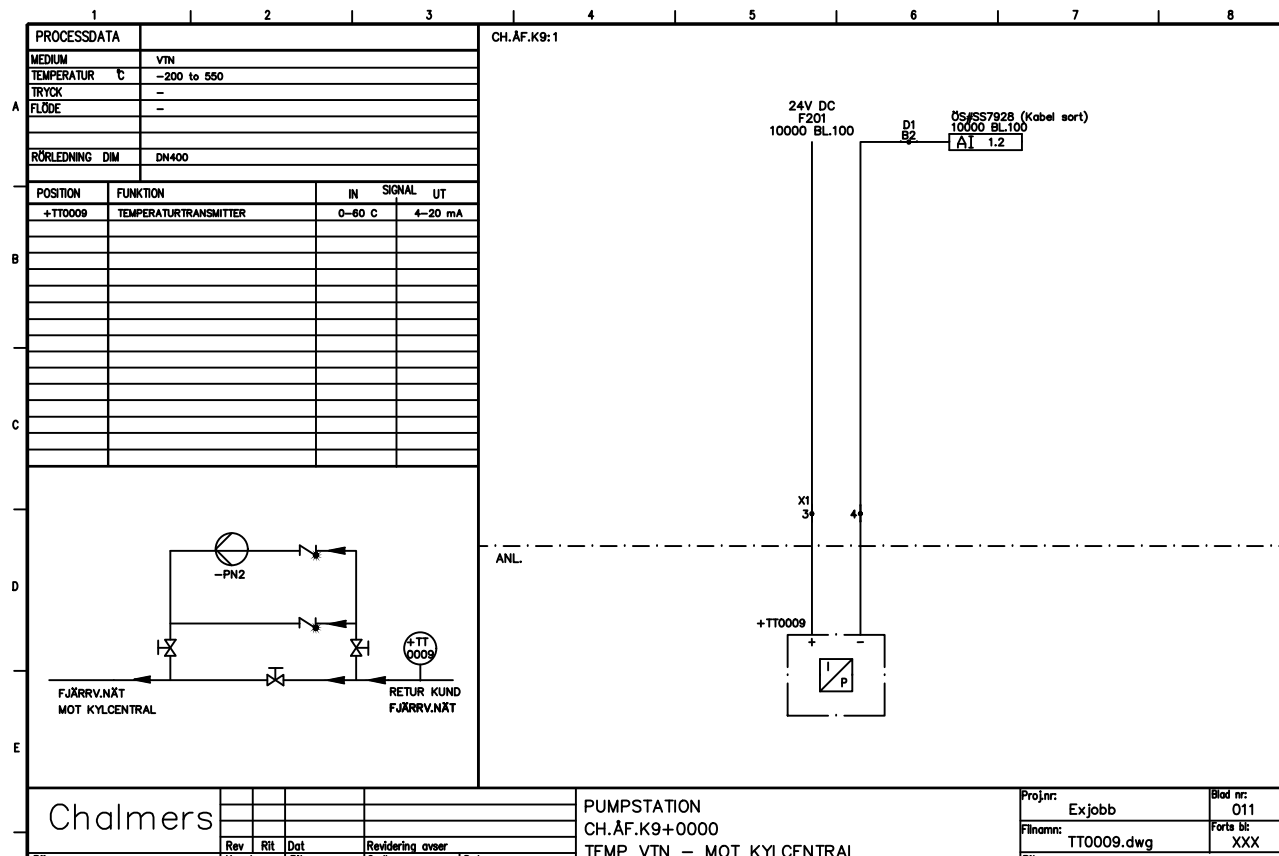


Pärm —						PUMPSTATION CH,ÅF,K9 Spänningsfördelning 24VDC KRETSSCHEMA	Proj.nr:	Blad nr: 109
							Filnamn: Spanndel24.dwg	Forts bl: 112
	Rev	Rit	Dat	Revidering avser			Ritn.nr: 10112	
	Konst	—	Rit	Godk	Dat 2018-06-20			



[illegible]

Chalmers						PUMPSTATION CH.ÅF.K9+0000 TEMP VTN – MOT KUND PROCESSKRETSSHEMA	Proj.nr:	Ex.jobb	Blad nr:	010
							Filnamn:	TT0003.dwg	Forts bl:	XXX
	Rev	Rit	Dat	Revidering over			Ritn.nr:	10003		
Pårm	Konst	Rit	Godek	Dat	2018-03-01					
-	-	-	-							



Chalmers

Rev	Rit	Dat	Revidering över

PUMPSTATION
CH.AF.K9+0000
TEMP VTN - MOT KYLCENTRAL

Proj.nr:	Exjobb	Blad nr:	011
Filnamn:	TT0009.dwg	Forts. bl:	XXX

Globala variabler

(*-----Regler-----*)

Man_Reg_PN1: REAL; (* Manuell reglering, pumpar*)

Man_Reg_PN2: REAL;

Enable_Man_Reg_PN1: BOOL;

Enable_Man_Reg_PN2: BOOL;

Enable_Man_Reg: BOOL;

MAN_Reg: REAL;

Res_Reg: BOOL;

OnOff_Pump: BOOL; (*MAIN sätter av eller på pump startprocedur*)

Forsok_start_PN2 : BOOL;

Forsok_start_PN1: BOOL;

Kund_last: REAL; (*styrbar variabel för simulering *)

(*-----Larm-----*)

Kvittera_alla: BOOL;

H_PT1: BOOL;

H_PT2: BOOL;

H_Effekt_PN1: BOOL;

H_Effekt_PN2: BOOL;

HT_filter_PN1 : BOOL;

HT_filter_PN2: BOOL;

HT_filter: BOOL; (*Om båda är trippade*)

DP_L: BOOL;

DP_LL: BOOL;

DP_H: BOOL;

DP_HH: BOOL;

Larm_Not_closingOrOpening_V_IN_KUND_Bp_PN1: BOOL; (*över 30s *)

Larm_Not_closingOrOpening_V_IN_KUND_Bp_PN2: BOOL;

Larm_Not_closingOrOpening_V_IN_Kyl_Bp_PN1: BOOL;

Larm_Not_closingOrOpening_V_IN_Kyl_Bp_PN2: BOOL;

Larm_Not_closingOrOpening_V_IN_KUND_PN1: BOOL;

Larm_Not_closingOrOpening_V_IN_KUND_PN2: BOOL;

Larm_Not_closingOrOpening_V_IN_Kyl_PN1: BOOL;

Larm_Not_closingOrOpening_V_IN_Kyl_PN2: BOOL;

Larm_PN1_Fel_vid_start: BOOL; (*över 2s*)

Larm_PN2_Fel_vid_start: BOOL;

(*-----Konstanter-----*)

Km: REAL := 54.4804550464044; (*pump reg (1 och 2)*)

Ti: REAL:= 0.938225331121534;

Td: REAL:= -306.70296350338;

N: REAL:= 0.154760647715579;

Km1: REAL := 5.29594573570136; (*DP reg*)

Ti1: REAL:= 0.126701723221041;

Td1: REAL:= -216.421629504745;

N1: REAL:= 0.0244699090478084;

SET_REG_DP: REAL:=2;

SET_REG_DP_Reserv: REAL:=5;

Max_Value_HT_filter_PN1 : REAL:=0.5;

Max_Value_HT_filter_PN2 : REAL:=0.5;

Max_Value_H_Effekt_PN2 :REAL:=45000;

Max_Value_H_Effekt_PN1 :REAL:=45000;

TT_ink_H: BOOL;

TT_ink_LL: BOOL;

TT_ink_L: BOOL;

TT_ink_HH : BOOL;

TT_re_L: BOOL;

TT_re_H: BOOL;

TT_re_LL : BOOL;

TT_re_HH: BOOL;

Globala port variabler

(*-----Analog IN-----*)

TT_inkommande: REAL;
TT_retur: REAL;
FT: REAL;
DPT_Filter_PN1: REAL;
PT_PN1: REAL;
Reserv_DPT_motkund: REAL;
PT_PN2: REAL;
DPT_Filter_PN2: REAL;

DPT_Hoskund: REAL;

Y_PN1: REAL; (*pumpvarvtal. Från frekvensomriktare*)
Y_PN2: REAL;
Effekt_PN1: REAL; (*pump effekt. Från frekvensomriktare*)
Effekt_PN2: REAL;

(*-----Analog UT-----*)

X_PN1: REAL;
X_PN2: REAL;

(*-----Digital IN-----*)

V_IN_Kyl_Bp_PN1: BOOL;
V_IN_Kyl_PN1: BOOL;
V_IN_Kund_PN1: BOOL;
V_IN_KUND_Bp_PN1: BOOL;
V_IN_Kund_PN2 : BOOL; (*Pump 2*)
V_IN_Kund_Bp_PN2: BOOL;
V_IN_Kyl_Bp_PN2 : BOOL;
V_IN_Kyl_PN2 : BOOL;

Freq_On_IN_1 : BOOL;
Freq_On_IN_2 : BOOL;
Freq_ERR_IN_1 : BOOL;
Freq_ERR_IN_2 : BOOL;

Pump_1_on: BOOL;
Pump_2_on: BOOL;

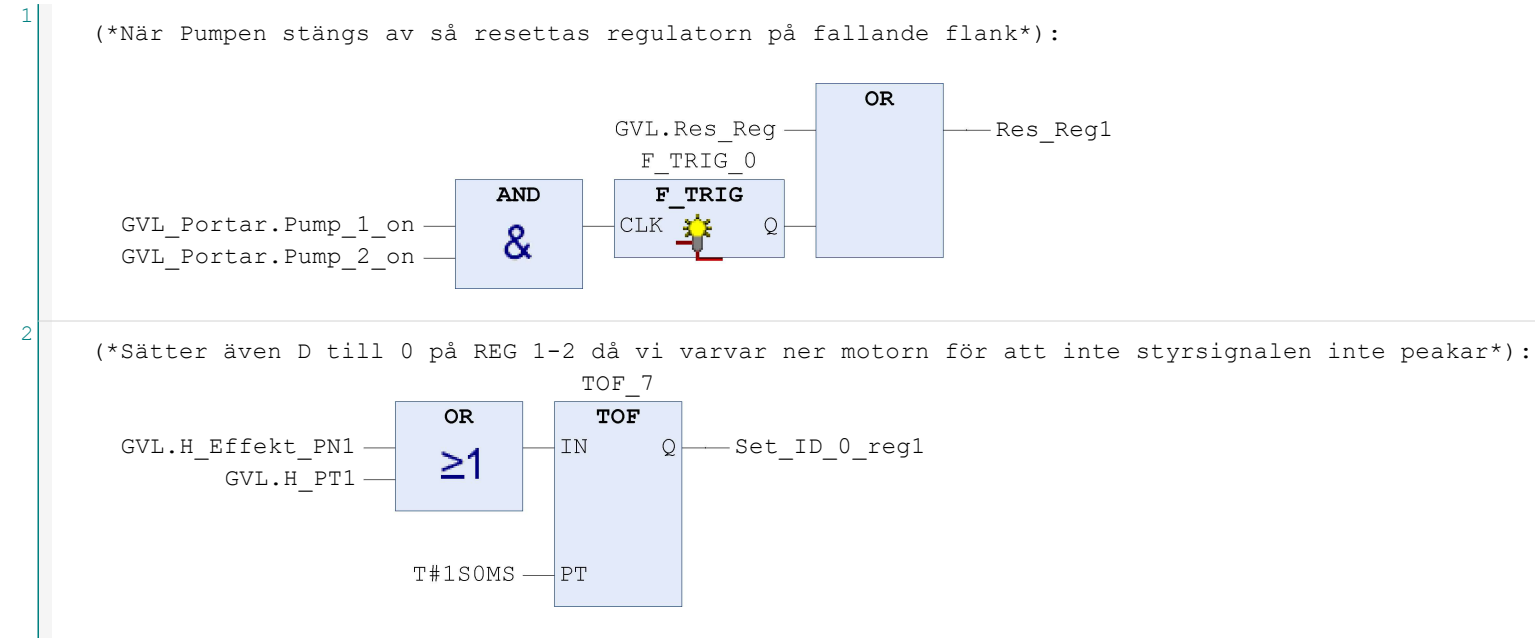
Brytare_IN_PN1	:BOOL;	(*Pump 1*) (*lokal brytare*)
Driftklar_IN_PN1	: BOOL;	
Kontaktor_IN_PN1	: BOOL;	
Brytare_IN_PN2	:BOOL;	(*Pump 2*) (*lokal brytare*)
Driftklar_IN_PN2	: BOOL;	
Kontaktor_IN_PN2	: BOOL;	
Pluto_GivFel_IN_PN1:	BOOL;	
Pluto_HT_IN_PN1	:BOOL;	(*Högt tryck pn 1*)
Pluto_GivFel_IN_PN2:	BOOL;	
Pluto_HT_IN_PN2	:BOOL;	
Brytare_IN_PND	:BOOL;	(*Dränering*)
H_Niva_IN_PND	:BOOL;	
Larm_sakring_T :	BOOL;	
Larm_sakring_V :	BOOL;	
Larm_PowerS_1 :	BOOL;	(*Effekt larm*)
Larm_PowerS_2 :	BOOL;	

(*-----Digital UT-----*)

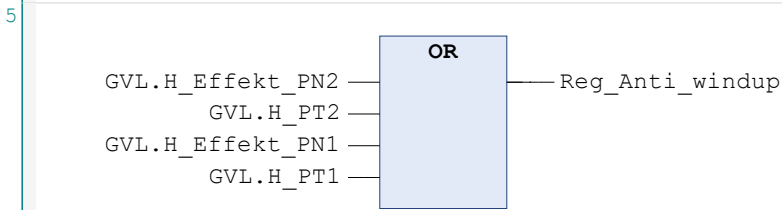
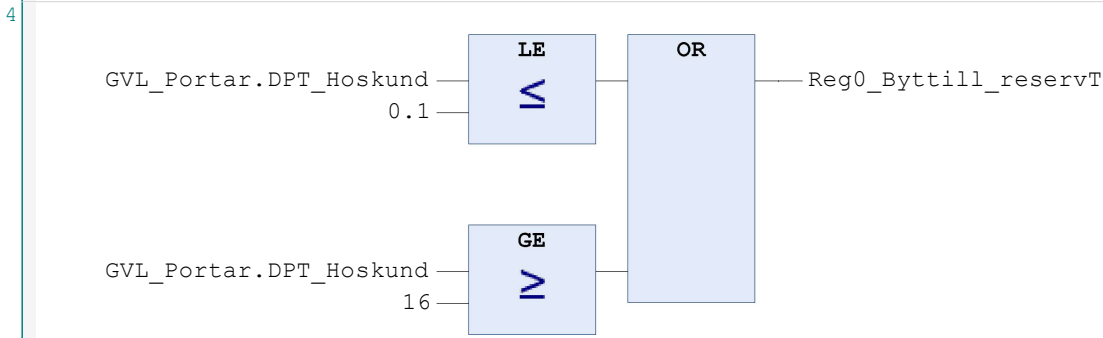
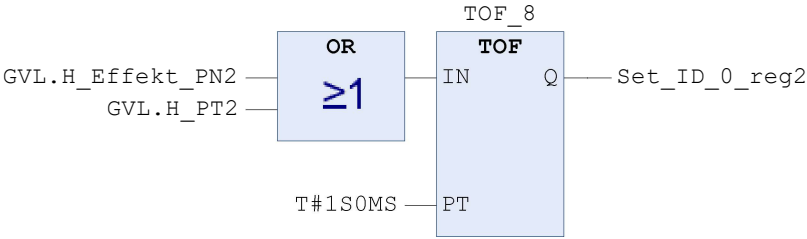
Start_PN1 :	BOOL;	
Start_PN2 :	BOOL;	
Kontaktor_PN1 :	BOOL;	
Kontaktor_PN2 :	BOOL;	
Pluto_aterstallning :	BOOL;	
V_Ut_Kyl_Bp_PN1:	BOOL;	(*Pump 1*)
V_Ut_Kyl_PN1:	BOOL;	
V_Ut_Kund_PN1:	BOOL;	
V_Ut_KUND_Bp_PN1:	BOOL;	
V_Ut_Kund_PN2 :	BOOL;	(*Pump 2*)
V_Ut_Kund_Bp_PN2:	BOOL;	
V_Ut_Kyl_Bp_PN2 :	BOOL;	
V_Ut_Kyl_PN2 :	BOOL;	

```
1  PROGRAM REG
2  VAR
3      (*-----Konstanter-----*)
4      Delay_C : INT := 10 ;      (*antal cyklar, se main task*)
5
6      Delay_P : TIME := T#2S0MS ;
7      Delay_PN_off : TIME := T#30m0S0MS ;
8      Uppdatering : TIME := T#1S0MS ;
9      (*bös för pumpar för att kunna simulera*)
10     runtime : UDINT := 1 ;
11     Cycles : UDINT := 1 ;
12     (*-----*)
13
14     ACTUATOR_PUMP_0 : OSCAT_BUILDING . ACTUATOR_PUMP ;
15     Styr_reg2 : REAL ;
16     Styr_reg1 : REAL ;
17
18     PID_Y1 : REAL ;
19     PID_Y1_Sel : REAL ;
20     H_PT1 : BOOL ;
21     Lutning_tryck1 : REAL ;
22     RPM1 : REAL ;
23     Pump_on : BOOL ;
24
25     Low_larm_DP : BOOL ;
26     High_larm_DP : BOOL ;
27     Stack_start1_full : BOOL ;
28
29     PID_tryck1 : REAL ;
30     Reg_Beg_HT1 : REAL ;
31
32     CTRL_PID_1 : OSCAT_BASIC . CTRL_PID ;
33     CTRL_PID_0 : OSCAT_BASIC . CTRL_PID ;
34     CTRL_PID_2 : OSCAT_BASIC . CTRL_PID ;
35     F_TRIG_0 : F_TRIG ;
36     Reg_Beg_HT2 : REAL ;
37     PID_Y : REAL ;
38     H_PT2 : REAL ;
39     PID_RPM_1 : REAL ;
40     PID_RPM_2 : REAL ;
41     RPM_1_vid_start : OSCAT_BASIC . STACK_16 ;
42     Frekvensomriktare_1 : OSCAT_BASIC . CTRL_PWM ;
43     Pump_1 : OSCAT_BUILDING . ACTUATOR_PUMP ;
44     RPM : OSCAT_BASIC . STACK_16 ;
45     RPM_vid_H_effekt : OSCAT_BASIC . STACK_16 ;
46     Sel_E_PN1 : REAL ;
47     Sel_E_PN2 : REAL ;
48     RAMP_INT_1 : RAMP_INT ;
49     Stack_start2_full : BOOL ;
50     Pump_2 : OSCAT_BUILDING . ACTUATOR_PUMP ;
51     Frekvensomriktare_2 : OSCAT_BASIC . CTRL_PWM ;
52     T_2 : TON ;
53     T_1 : TON ;
54     Process_0 : Process ;
55     RS_0 : RS ;
56     RPM_2_vid_start_ : OSCAT_BASIC . STACK_16 ;
57     DELAY_0 : OSCAT_BASIC . DELAY ;
```

```
58     DELAY_3 : OSCAT_BASIC . DELAY ;
59     CLK_PRG_0 : OSCAT_BASIC . CLK_PRG ;
60     delay_4 : OSCAT_BASIC . DELAY ;
61     delay_5 : BOOL ;
62     TOF_0 : TOF ;
63     Delay_6 : TON ;
64     Res_Reg1 : BOOL ;
65     TON_7 : TON ;
66     RAMP_INT_5 : RAMP_INT ;
67     TON_0 : TON ;
68     TON_1 : TON ;
69     Set_ID_0_reg1 : BOOL ;
70     Set_ID_0_reg2 : BOOL ;
71
72     TOF_1 : TOF ;
73     Pump_2_ : OSCAT_BUILDING . ACTUATOR_PUMP ;
74     TOF_7 : TOF ;
75     TOF_8 : TOF ;
76     ACTUATOR_PUMP_1 : OSCAT_BUILDING . ACTUATOR_PUMP ;
77     Reg_Anti_windup : BOOL ;
78     Reg0_Byttill_reservT : BOOL ;
79 END_VAR
80
```



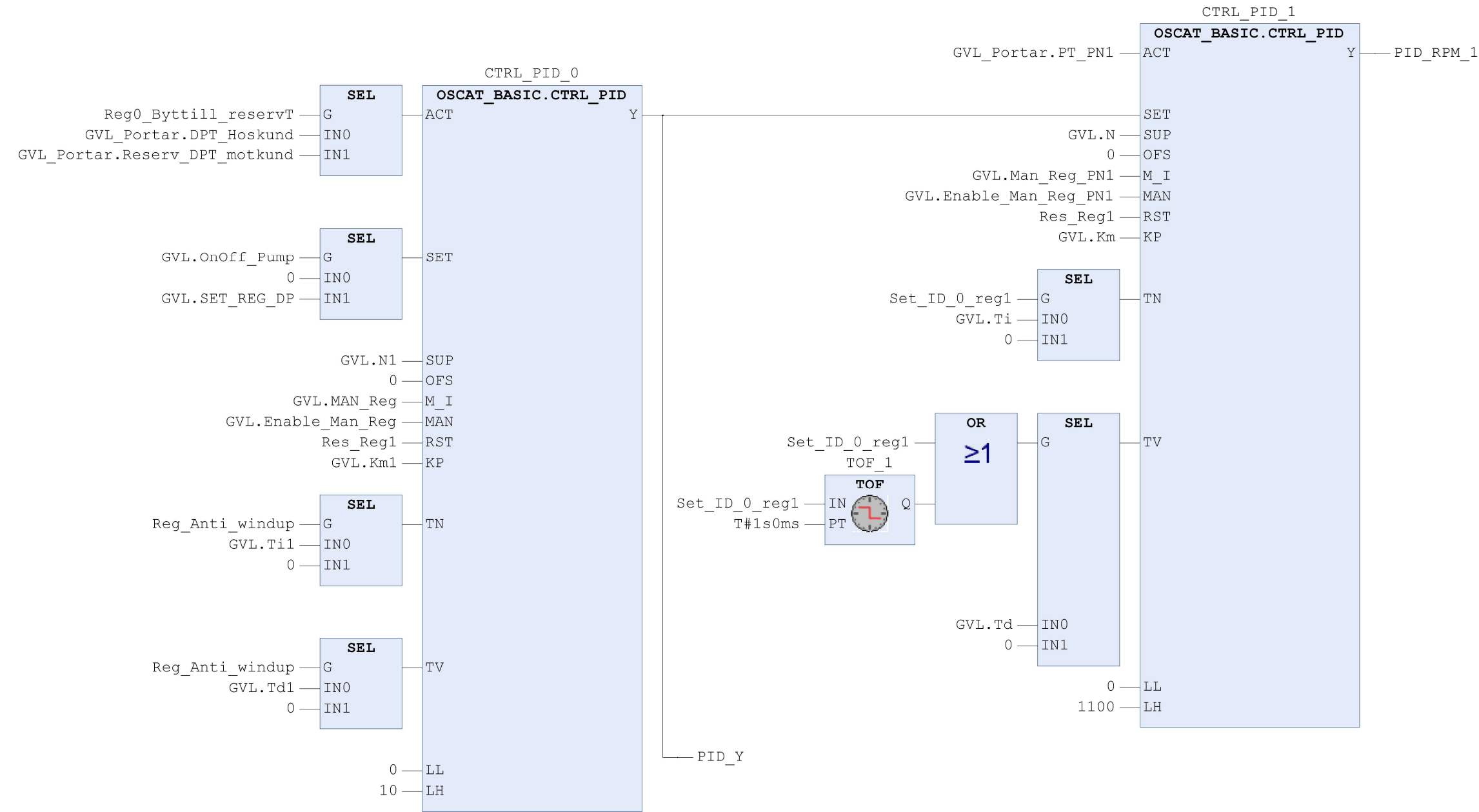
3 (*Men bara på en i taget då den andra skall kompensera för difftrycket så att *):



6

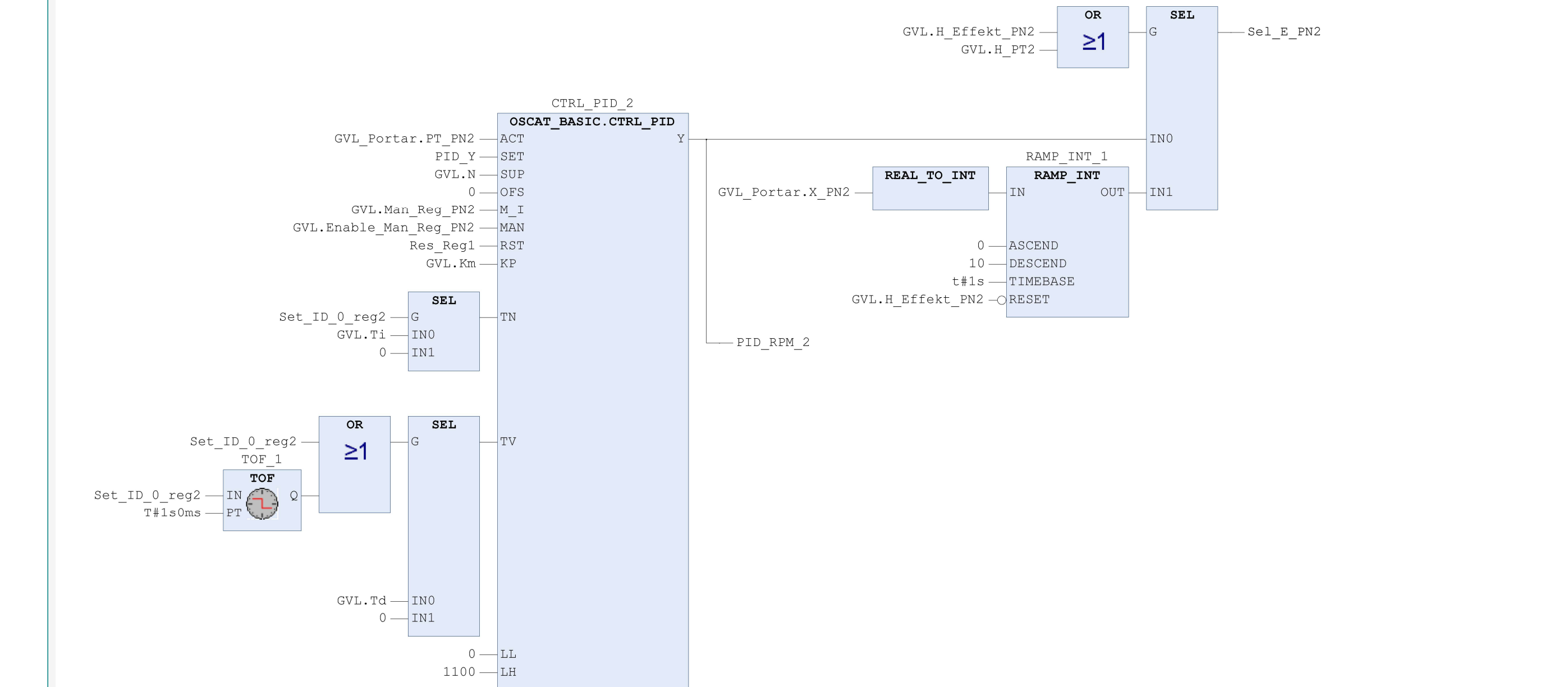
(* OBS: siffror är Deras verkliga värden och inte 4-20mA signaler :

Regulatorn begränsar MIN & MAX varvtalet på pumpen *) :



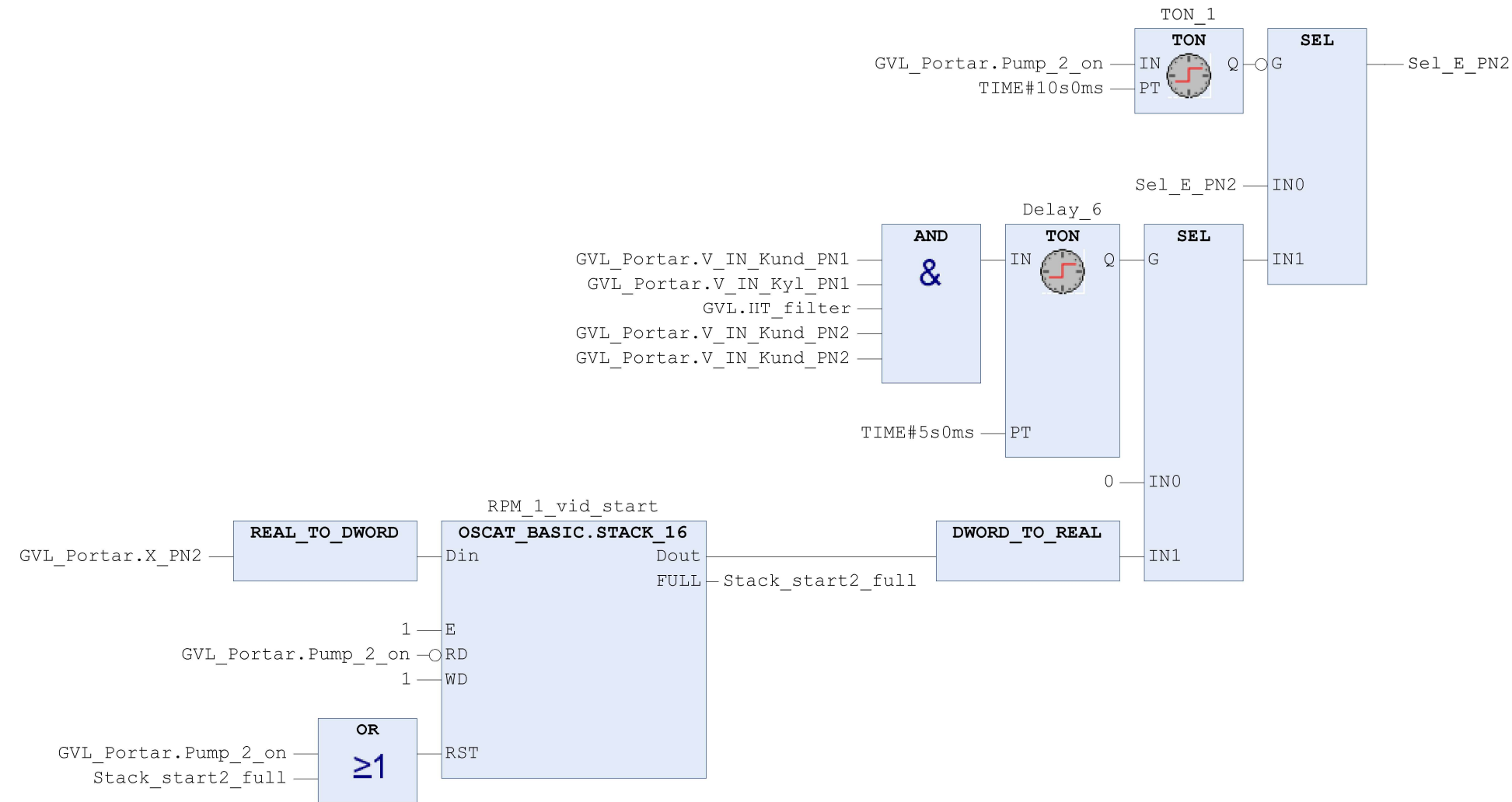
7

(*När pumpen är av så sätts start rpm till mätt varvtal av rotorn som det genomflödande vattnet genererar PN2 *) :

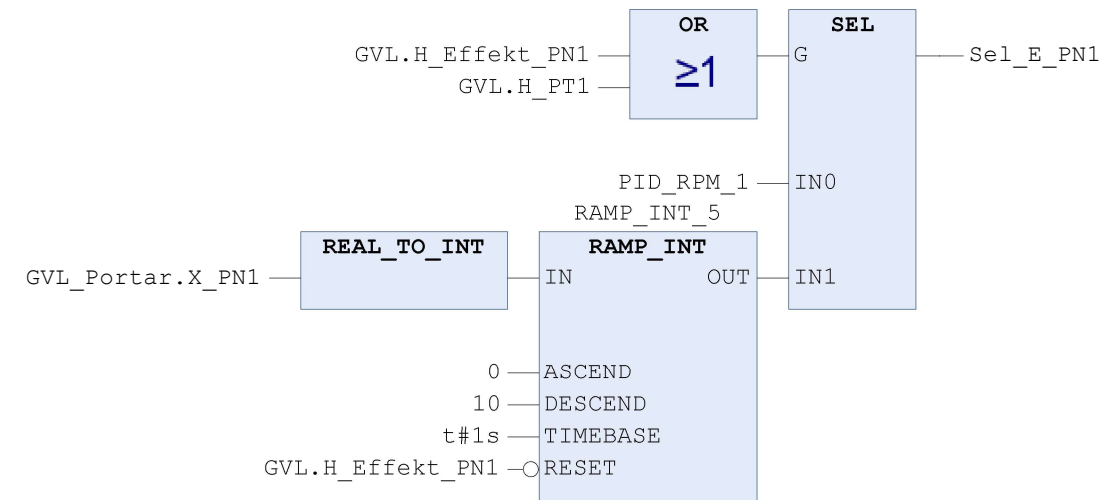


8

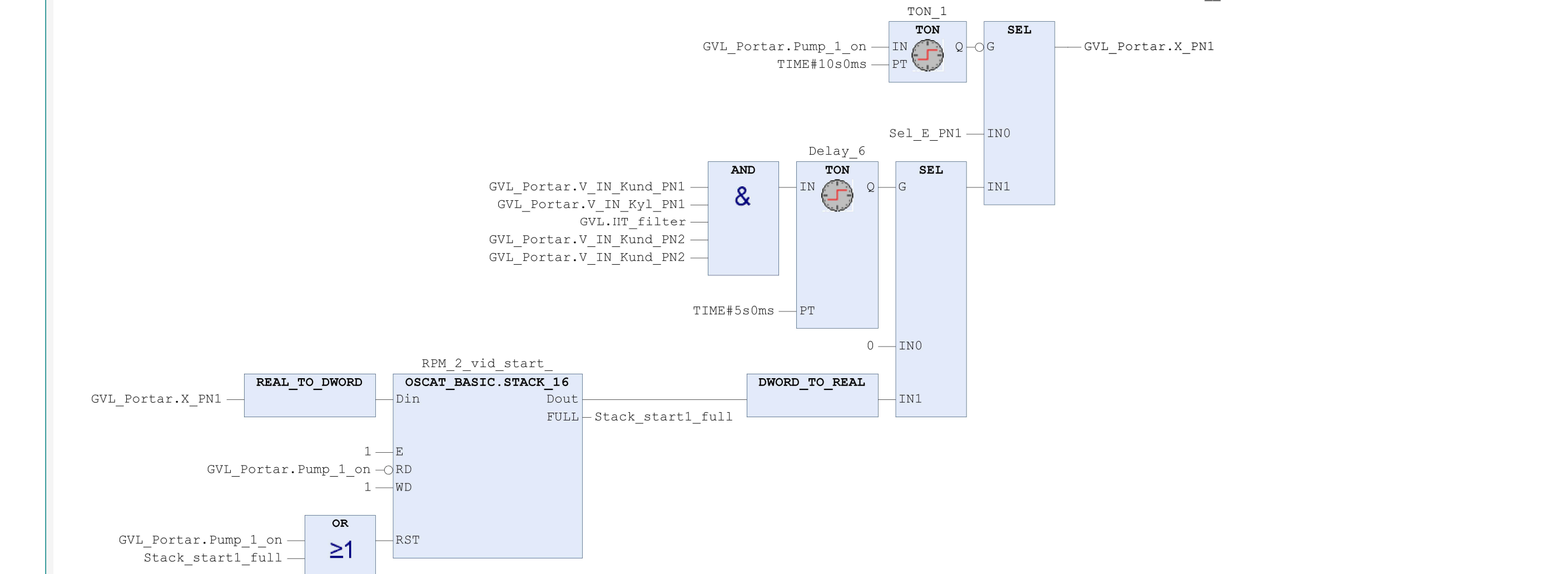
(*När pumpen är av så sätts start rpm till mätt varvtal av rotorn som det genomflödande vattnet genererar PN2 *):

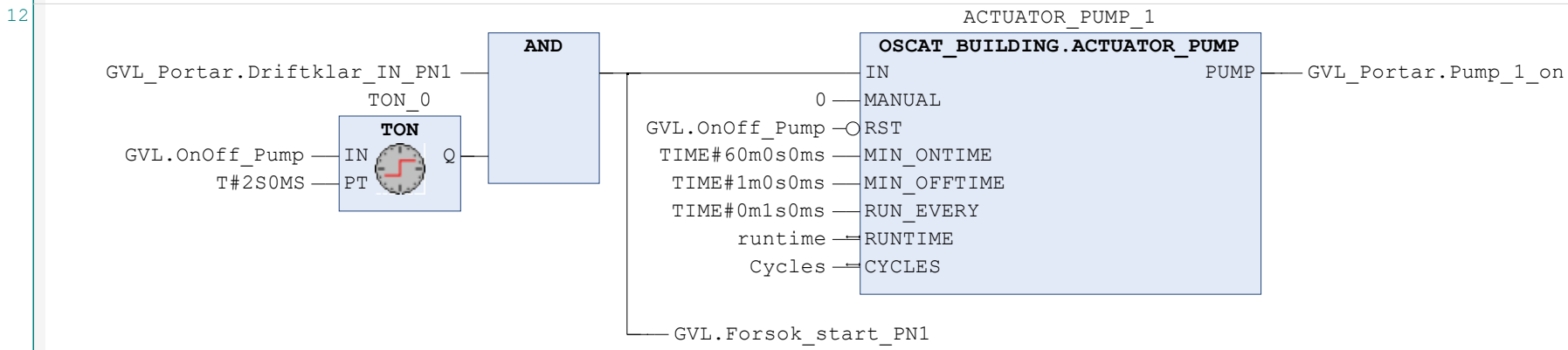
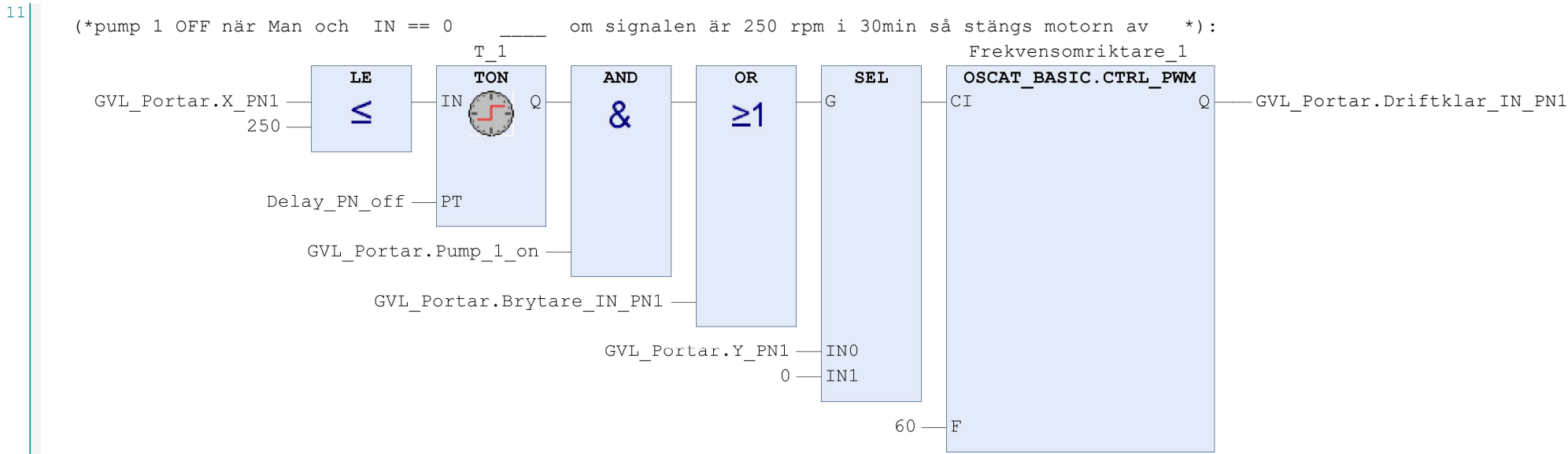


9 (*rampa ner RPM vid För hög effektförbrukning ____ den rampar ner 10 RPM per sec oavsätt vad *):

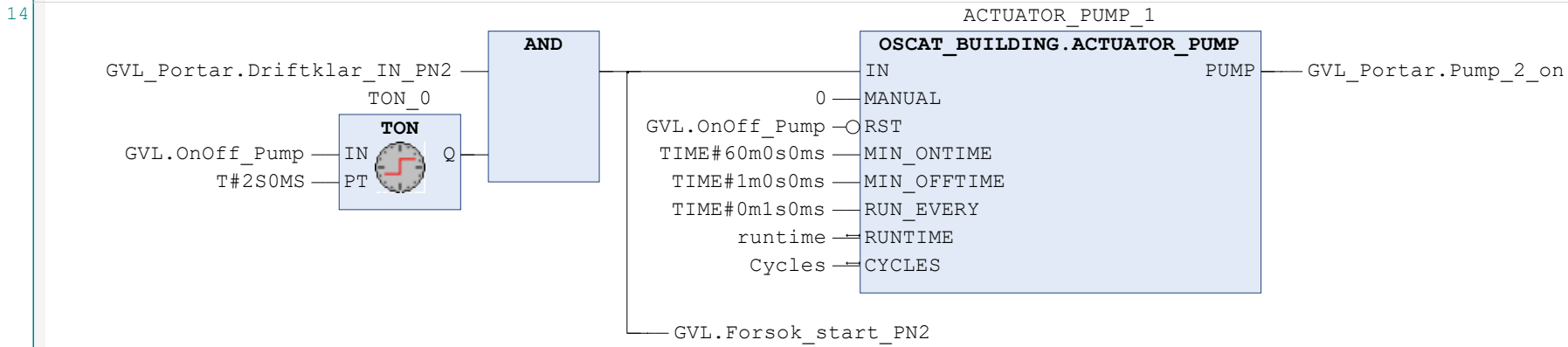
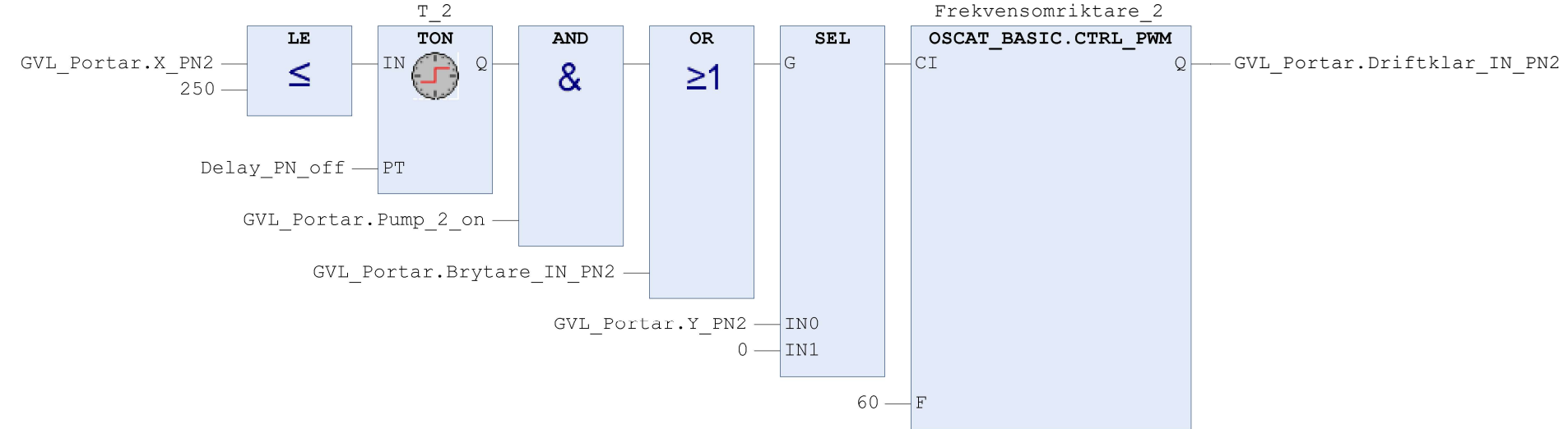


10

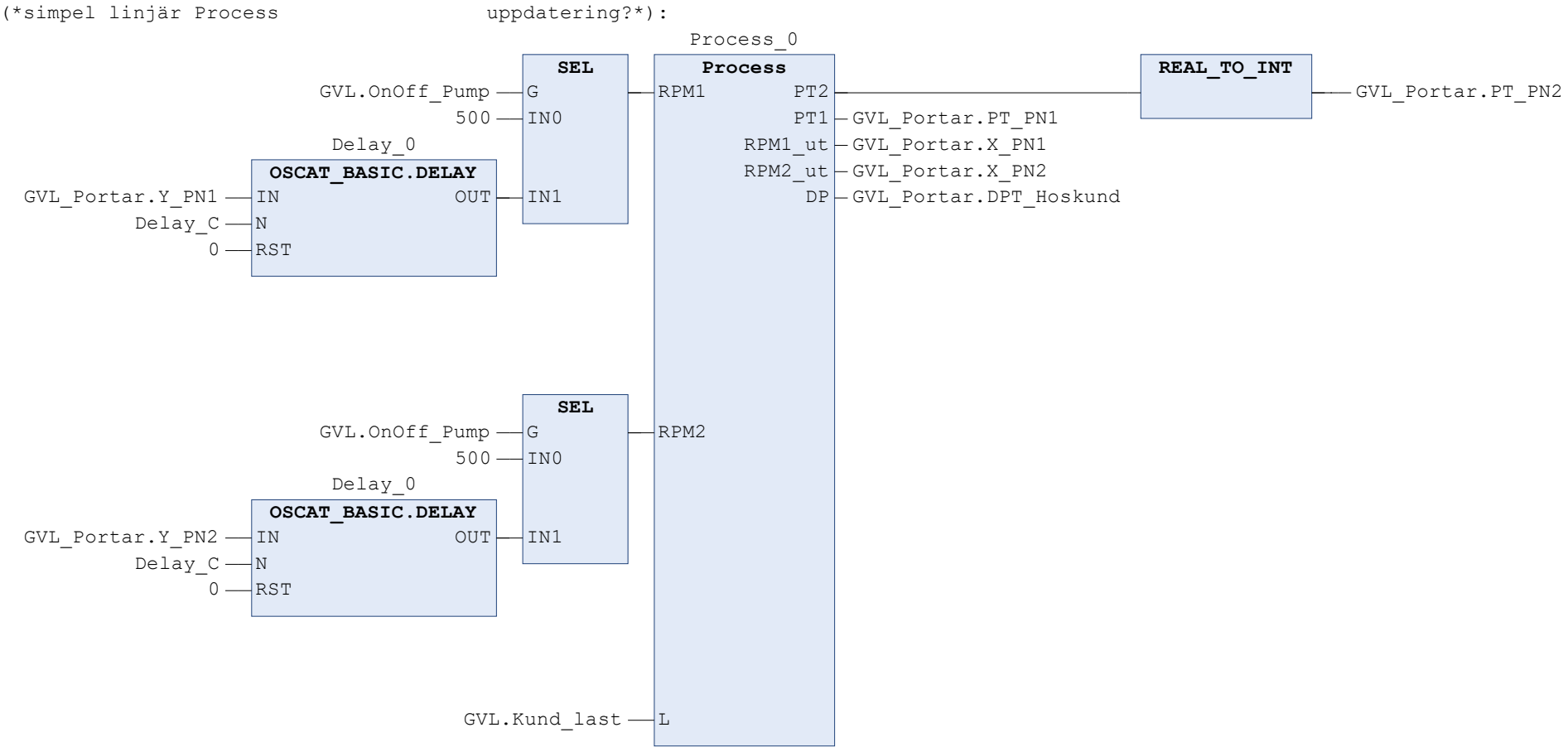




13 (*pump 2 OFF när Man och IN == 0 om signalen är 250 rpm i 30min så stängs motorn av TON resetas vid fallande flank För att inte starta pumpen innan *):

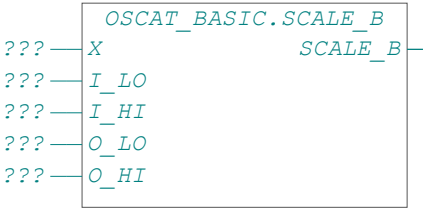


15

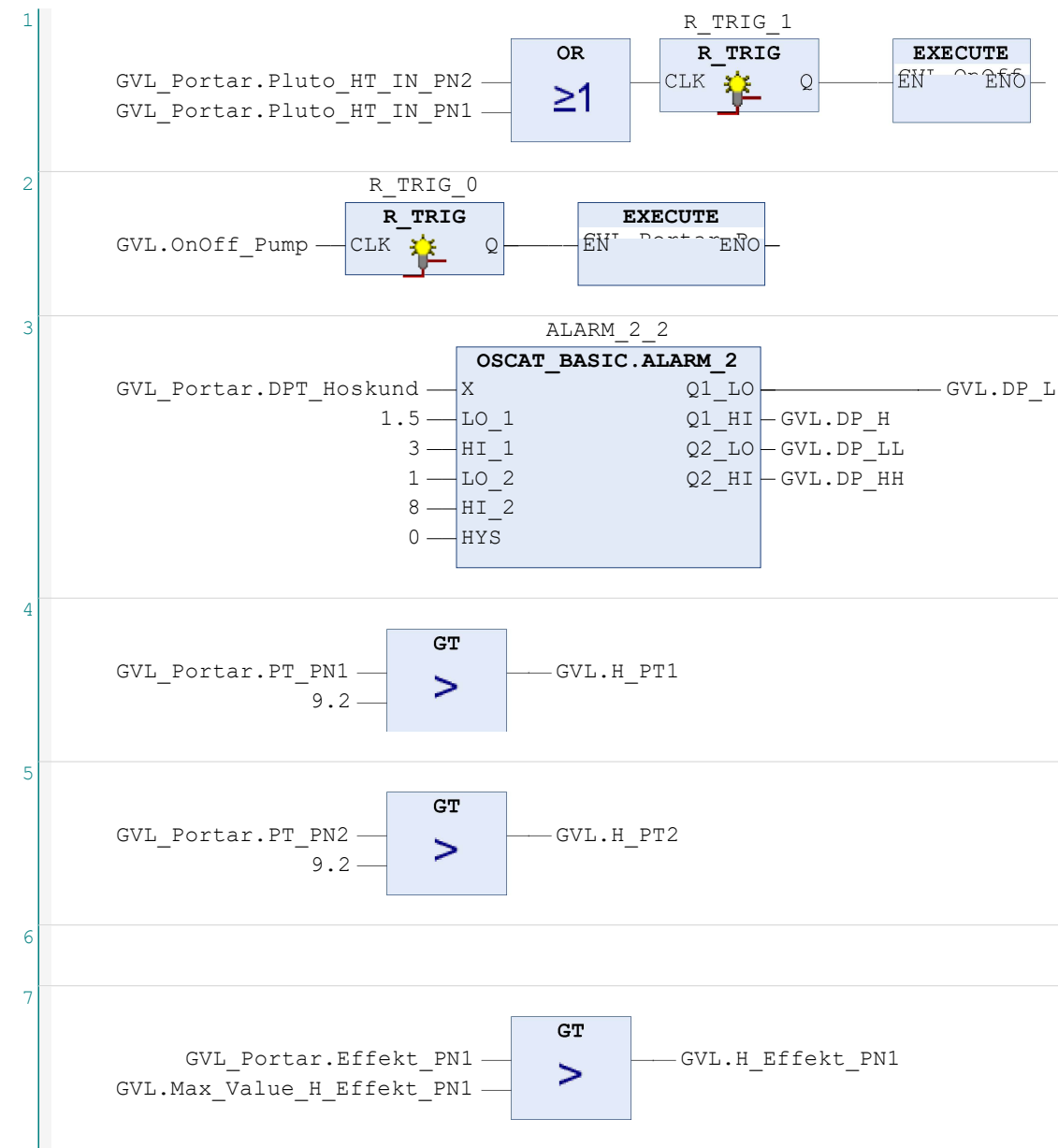


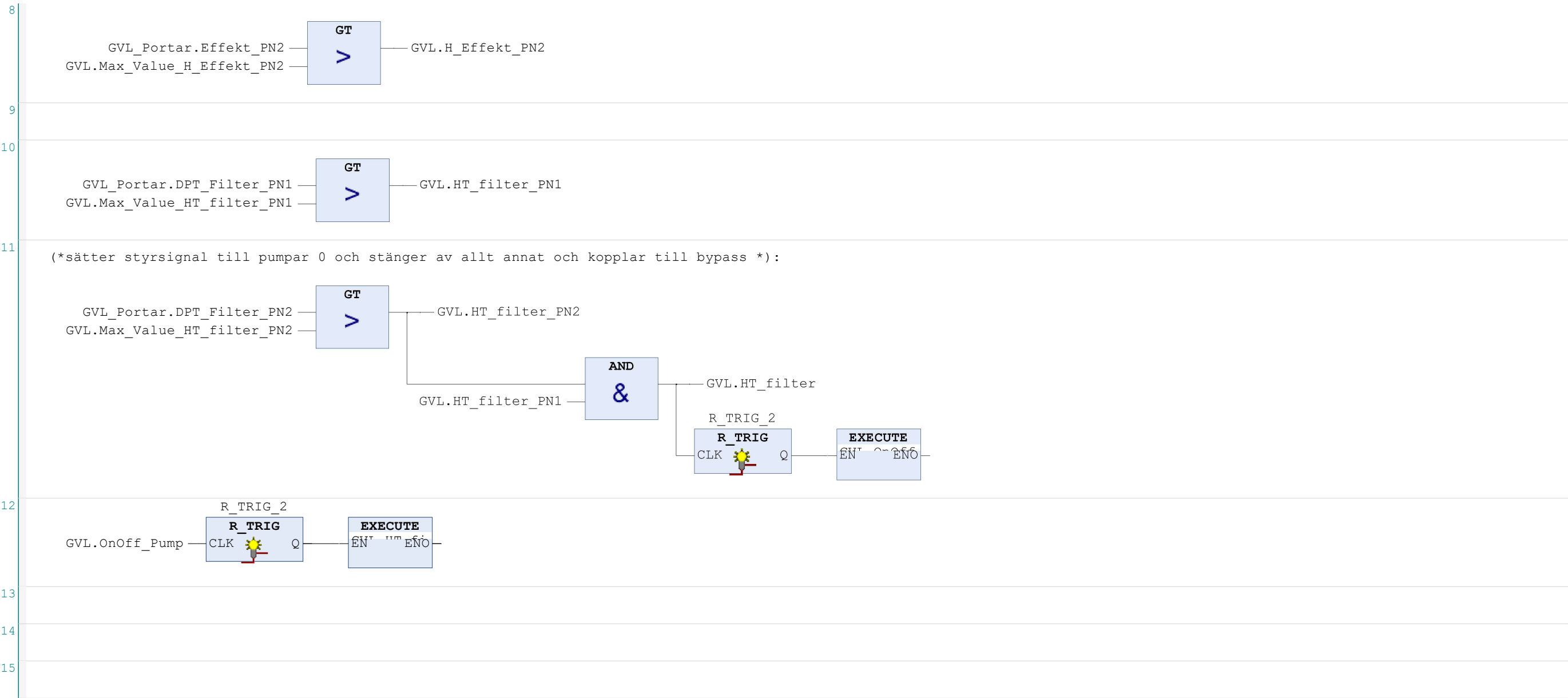
16

(*för transmitttrar, / 4-20mA till tryck bar eller vadsom *):

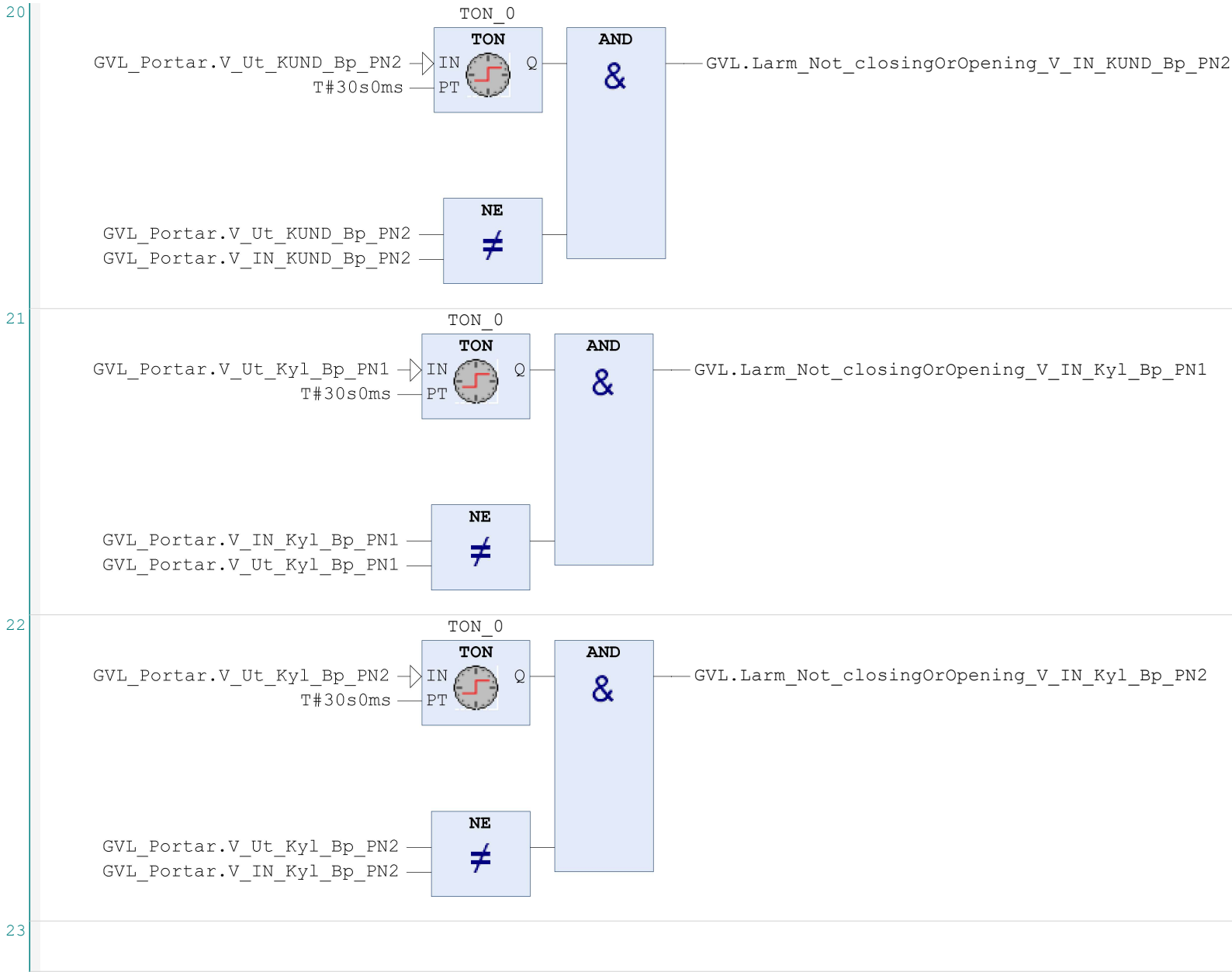


```
1  PROGRAM Larm
2  VAR
3      ALARM_2_2 : OSCAT_BASIC . ALARM_2 ;
4      TON_0 : TON ;
5
6
7      R_TRIG_0 : R_TRIG ;
8      R_TRIG_1 : R_TRIG ;
9      R_TRIG_2 : R_TRIG ;
10 END_VAR
11
```

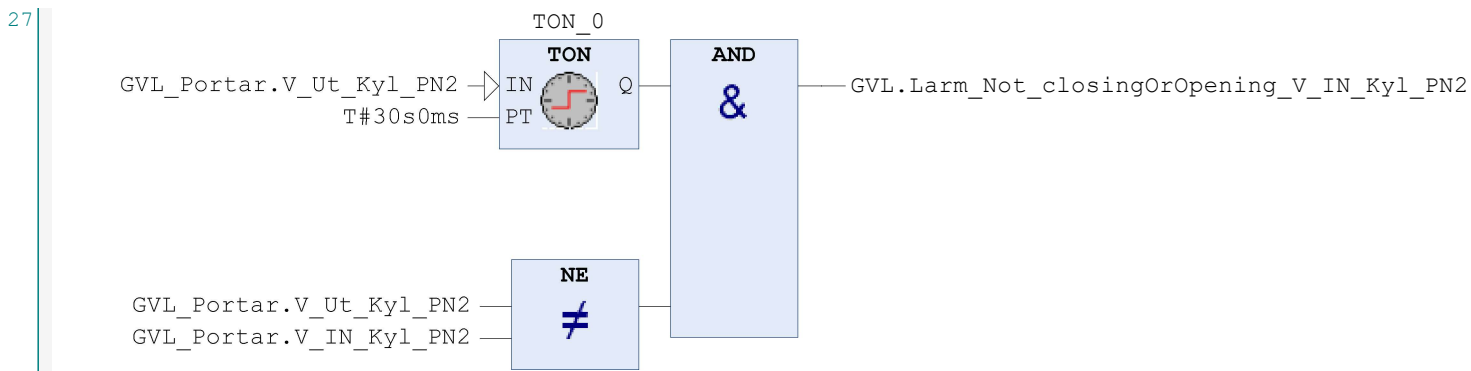




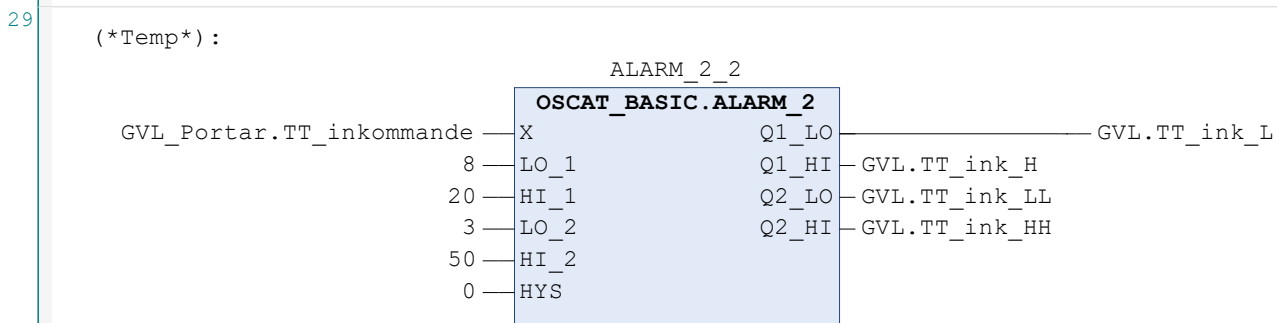




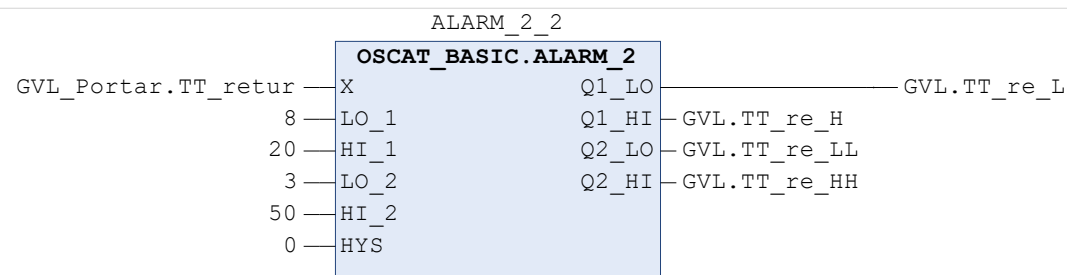




28

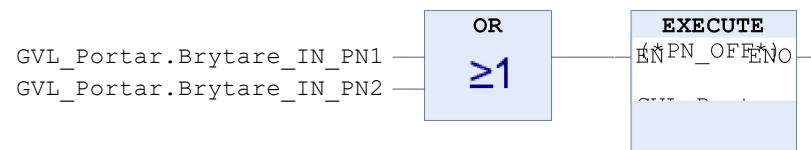


30

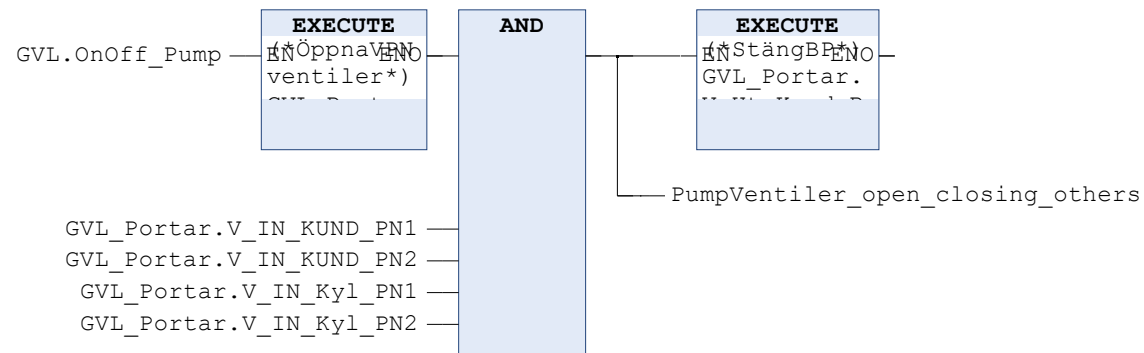


```
1  PROGRAM PLC_PRG
2  VAR
3
4      A : BOOL ;
5      B : BOOL ;
6      TON_0 : TON ;
7      open_for_start : BOOL ;
8      TON_1 : TON ;
9
10     BpVentiler_open_closing_others : BOOL ;
11     PumpVentiler_open_closing_others : BOOL ;
12 END_VAR
13
```

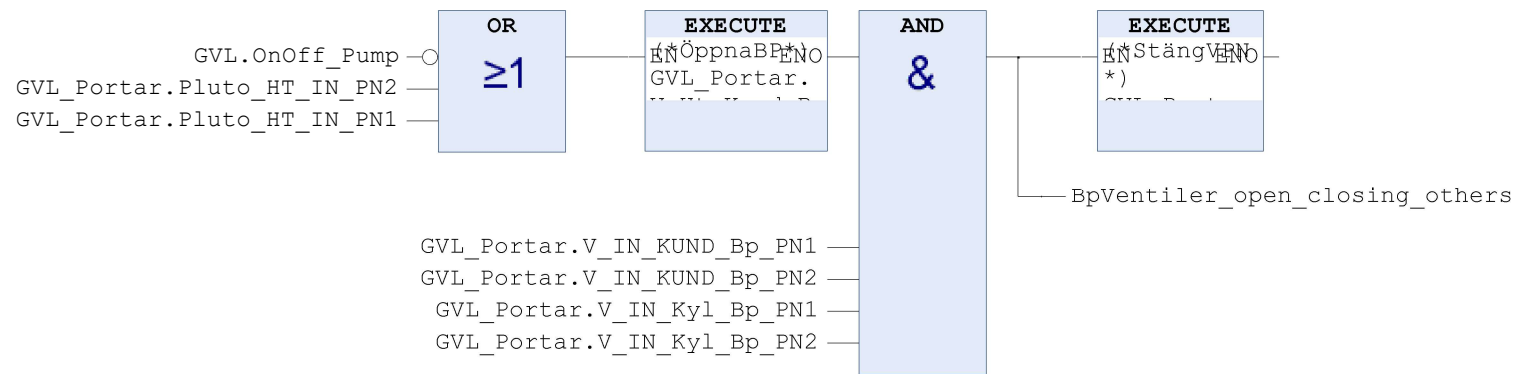
1 (*när brytaren sätts på så stängs även regleringen och pumpen av i "REG" programmet*):



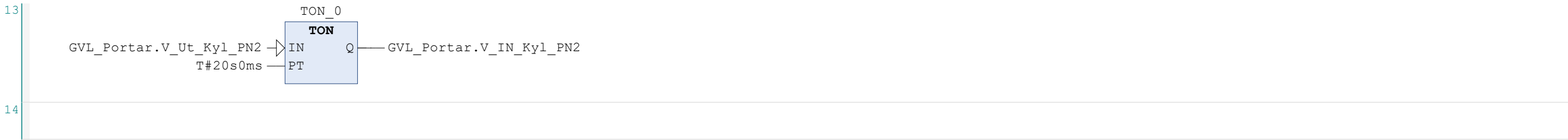
2 (*stäng bypass när ventilerna till pumparna är öppna*):

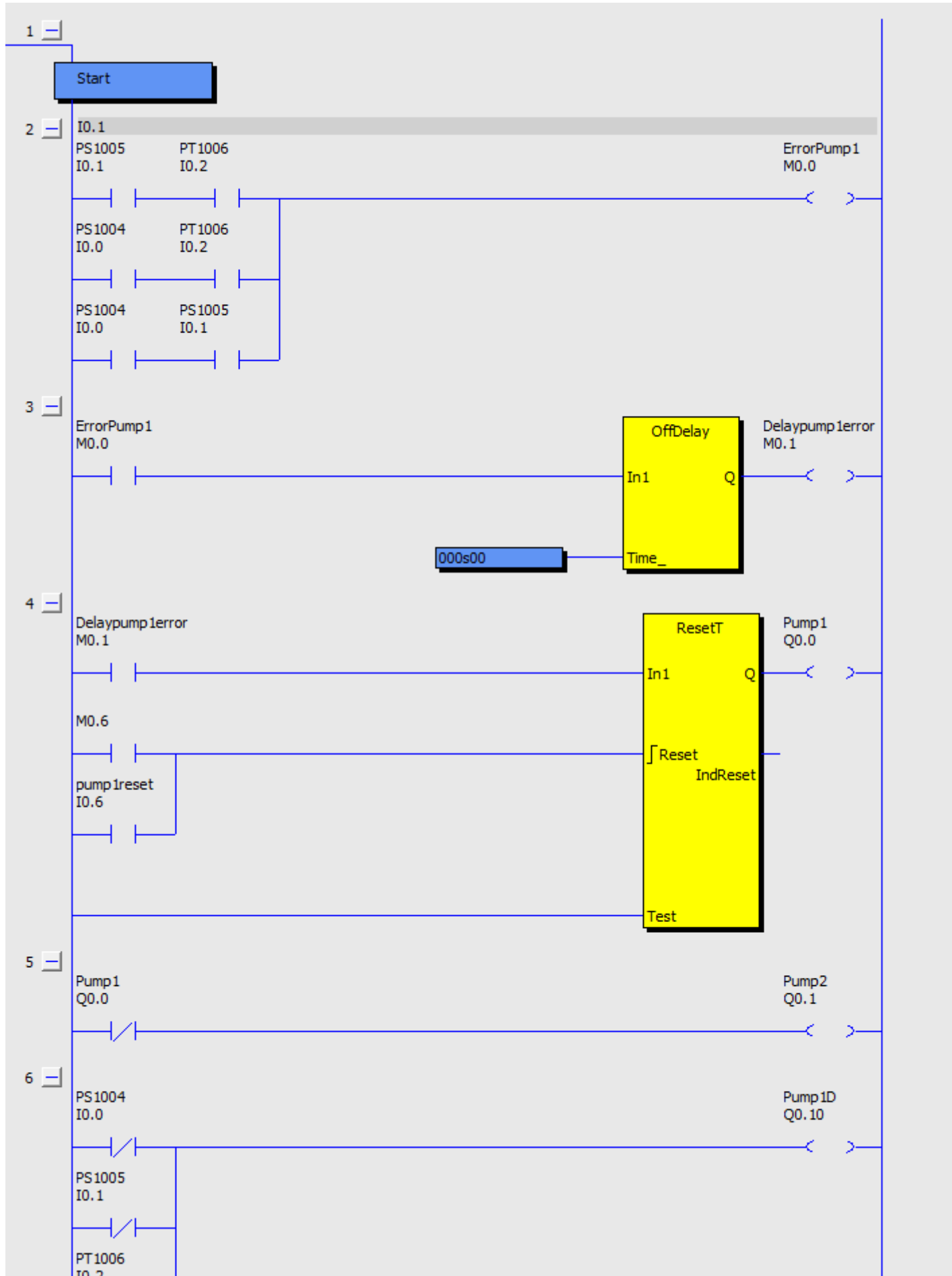


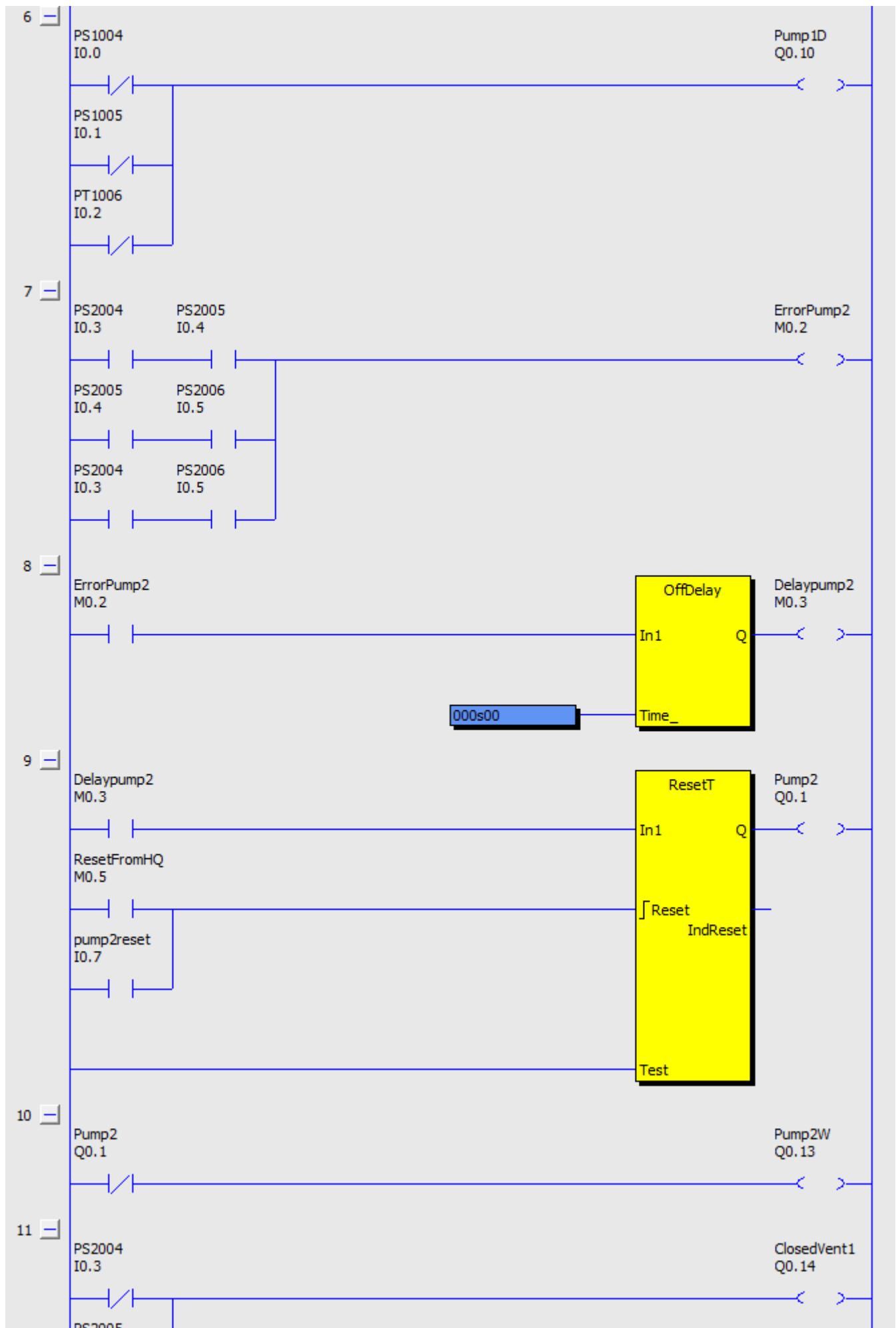
3 (*Stänger ventilerna till pumparna när bypass är öppna*):

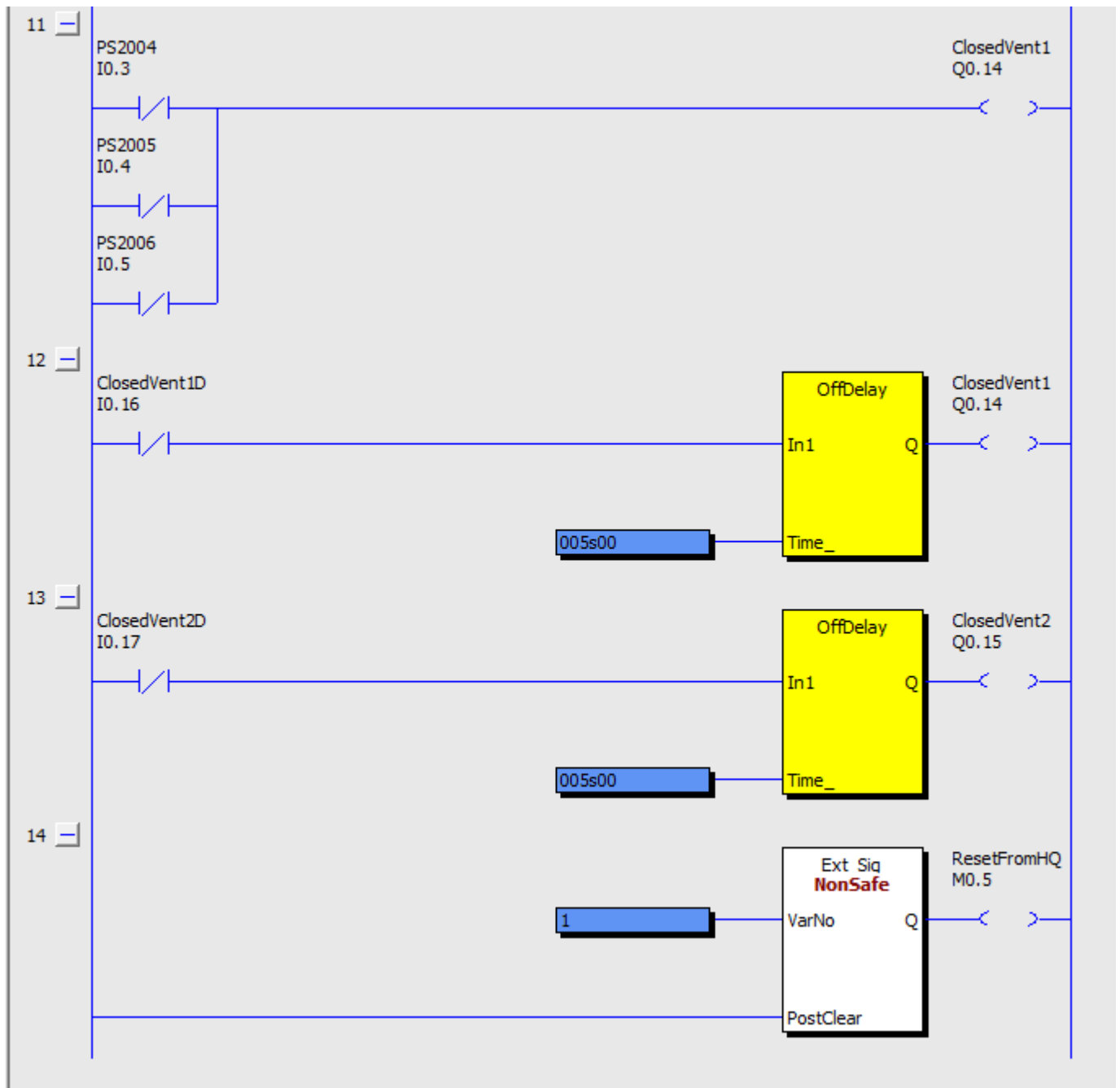


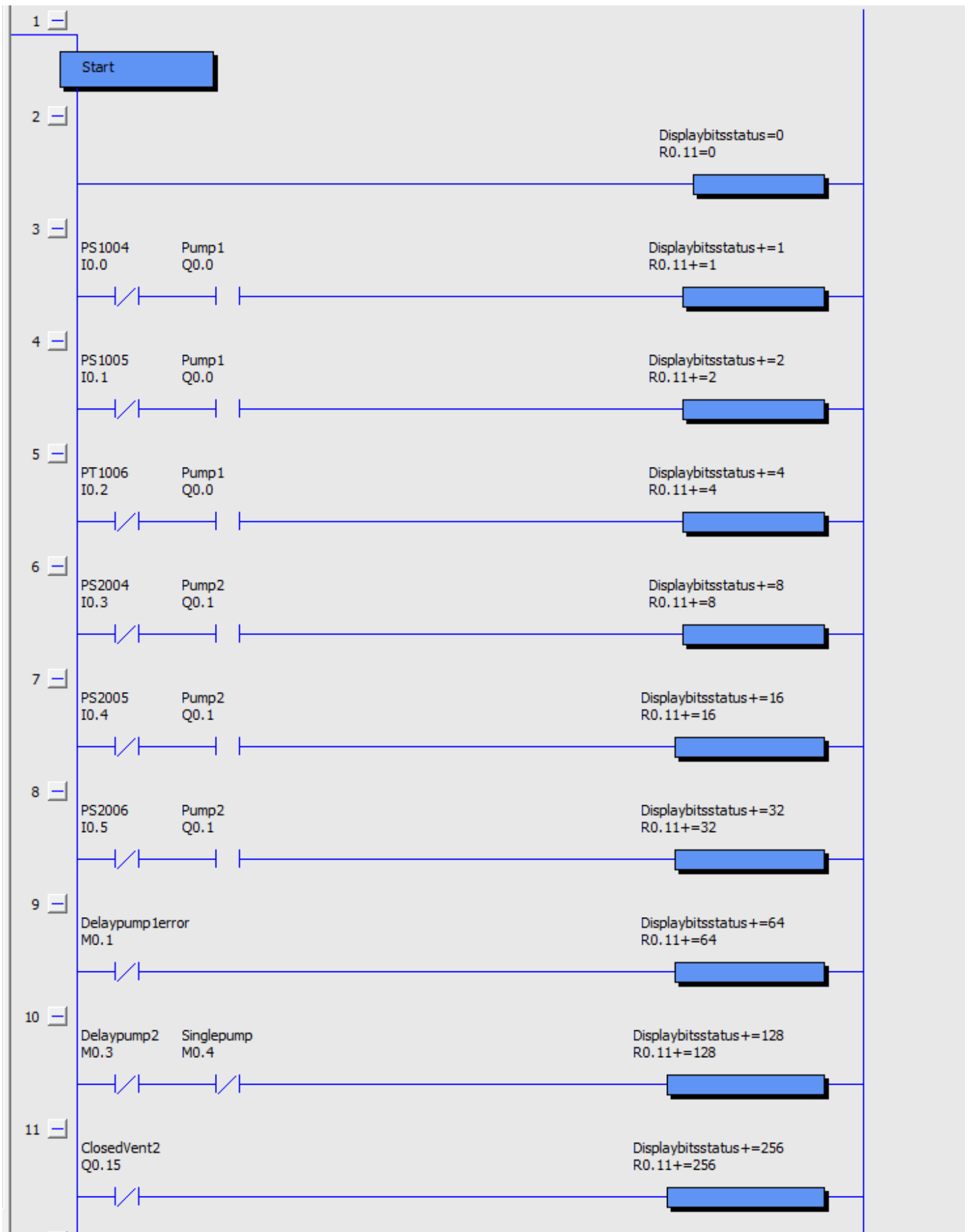


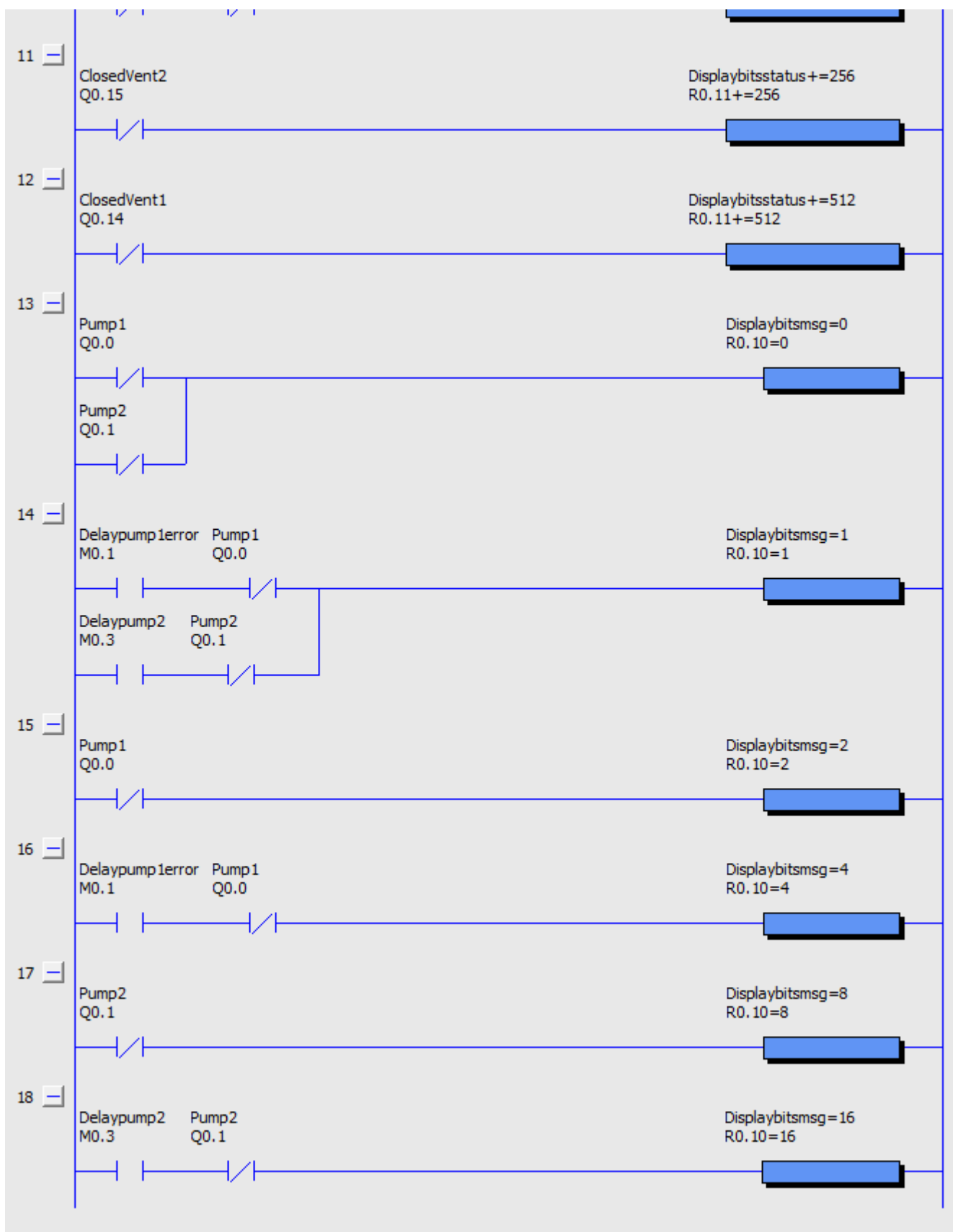












Status	Variable	Symbolic Name	Description
	I0.0 [G]	PS1004	TryckVakt Pump 1
	I0.1 [G]	PS1005	TryckVakt Pump 1
	I0.2 [G]	PT1006	TryckVakt Pump 1
	I0.3 [G]	PS2004	TryckVakt Pump 2
	I0.4 [G]	PS2005	TryckVakt Pump 2
	I0.5 [G]	PS2006	TryckVakt Pump 2
	I0.6 [G]	pump1reset	Local reset för pump 1
	I0.7 [G]	pump2reset	Local reset för pump 2
	I0.10 [G]		
	I0.11 [G]		
	I0.12 [G]		
	I0.13 [G]		
	I0.14 [G]		
	I0.15 [G]		
	I0.16 [G]	ClosedVent1D	Ventil signal
	I0.17 [G]	ClosedVent2D	Ventil signal

Failsafe inputs

Signal	Type of signal	Shape/Level	Options	
I0.0	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.1	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.2	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.3	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.4	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.5	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.6	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
I0.7	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt

Failsafe inputs / Non failsafe outputs

Signal	Type of signal	Shape/Level	Options	
IQ0.10	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.11	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.12	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.13	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.14	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.15	<input type="text" value="Output"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.16	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt
IQ0.17	<input type="text" value="Input"/>	<input type="text" value="Static"/>	<input type="checkbox"/> Non_inv	<input type="checkbox"/> No_filt

Failsafe outputs

Signal	Options
Q0.2	<input type="checkbox"/> No_Test_Pulse
Q0.3	<input type="checkbox"/> No_Test_Pulse