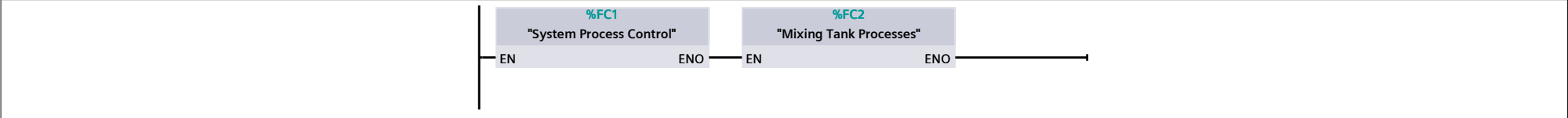


Main [OB1]

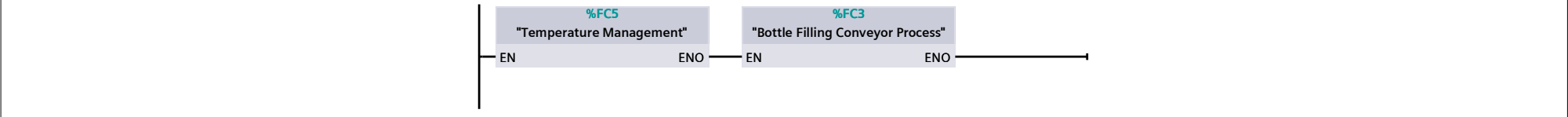
Main Properties							
General							
Name	Main	Number	1	Type	OB	Language	LAD
Numbering	Automatic						
Information							
Title	"Main Program Sweep (Cycle)"	Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Temp			
Constant			

Network 1:



Network 2:



Program blocks

Cyclic interrupt [OB30]

Cyclic interrupt Properties

General

Name	Cyclic interrupt	Number	30	Type	OB	Language	LAD
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Temp			
Constant			

Network 1: Temperature Control



Network 2:



Program blocks

RunMode_Selection [FB1]

RunMode_Selection Properties							
General							
Name	RunMode_Selection	Number	1	Type	FB	Language	SCL
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Fault	Bool	false	Non-retain	True	True	True	False		Fault detected
AutoMan_Select	Bool	false	Non-retain	True	True	True	False		Auto Mode Selected
▼ Output									
Forced_Manual	Bool	false	Non-retain	True	True	True	False		Forced Manual Mode Con-firmed
Manual	Bool	false	Non-retain	True	True	True	False		Manual Mode Confirmed
Automatic	Bool	false	Non-retain	True	True	True	False		Automatic Mode Confirmed
InOut									
▼ Static									
state	Int	1	Retain	True	True	True	False		
Temp									
Constant									

```
0001 // The function creates an interlock between the various run mode of the process.
0002 CASE #state OF
0003   1: //Forced Manual State.
0004     IF (#AutoMan_Select = 0 AND #Fault = 0) THEN
0005       #state := 2; // Manual Mode Validated.
0006     END_IF;
0007     IF (#AutoMan_Select = 1 AND #Fault = 0) THEN
0008       #state := 3; //Automatic Mode Validated.
0009     END_IF;
0010     #Forced_Manual := 1; //Machine Mode Outputs.
0011     #Manual := 0;
0012     #Automatic := 0;
0013   2: //Manual State.
0014     IF #Fault = 1 THEN
0015       #state := 1; //Forced Manual Validated.
0016     END_IF;
0017     IF (#AutoMan_Select = 1 AND #Fault = 0) THEN
0018       #state := 3; //Automatic Mode Validated.
0019     END_IF;
0020     #Forced_Manual := 0; //Machine Mode Outputs.
0021     #Manual := 1;
0022     #Automatic := 0;
0023   3: //Automatic State.
0024     IF #Fault = 1 THEN
0025       #state := 1; //Force Manual Validated.
0026     END_IF;
0027     IF (#AutoMan_Select = 0 AND #Fault = 0) THEN
0028       #state := 2; //Manual Mode Validated
0029     END_IF;
0030     #Forced_Manual := 0; //Machine Mode Outputs
0031     #Manual := 0;
0032     #Automatic := 1;
0033 END_CASE;
0034
0035
```

Symbol	Address	Type	Comment
#AutoMan_Select		Bool	Auto Mode Selected
#Automatic		Bool	Automatic Mode Confirmed
#Fault		Bool	Fault detected
#Forced_Manual		Bool	Forced Manual Mode Confirmed
#Manual		Bool	Manual Mode Confirmed
#state		Int	

Program blocks

Vol_Cyl_Tank [FB2]

Vol_Cyl_Tank Properties							
General							
Name	Vol_Cyl_Tank	Number	2	Type	FB	Language	SCL
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Diameter	Real	2.0	Non-retain	True	True	True	False		
Height	Real	10.0	Non-retain	True	True	True	False		
Level	Real	0.0	Non-retain	True	True	True	False		
▼ Output									
Contents	Real	0.0	Non-retain	True	True	True	False		
▼ InOut									
Area	Real	0.0	Non-retain	True	True	True	False		
Volume	Real	0.0	Non-retain	True	True	True	False		
Capacity	Real	0.0	Non-retain	True	True	True	False		
Static									
Temp									
▼ Constant									
Pi	Real	3.1416							
Conv	Real	1000.0							

```
0001 #Area := ((#Diameter / 2.0) ** 2.0) * #Pi; // Area in m^2
0002 #Volume := #Area * #Height; //Volulme in m^2
0003 #Capacity := #Volume * #Conv; //Capacity in L
0004 #Contents := (#Area * #Level) * #Conv; //current content in L
0005
```

Symbol	Address	Type	Comment
#Area		Real	
#Capacity		Real	
#Contents		Real	
#Conv	1000.0	Real	
#Diameter		Real	
#Height		Real	
#Level		Real	
#Pi	3.1416	Real	
#Volume		Real	

Totally Integrated Automation Portal

Program blocks

Low_Pass_Filter [FB3]

Low_Pass_Filter Properties

General

Name	Low_Pass_Filter	Number	3	Type	FB	Language	SCL
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Xf	Real	0.0	Non-retain	True	True	True	False		Input to filter
Tc	Real	2.0	Non-retain	True	True	True	False		Time Constant in seconds (default 2.0s)
Ts	Real	0.1	Non-retain	True	True	True	False		Sample Time (default 100ms)
▼ Output									
Output	Int	0	Non-retain	True	True	True	False		
▼ InOut									
Yn_1	Real	0.0	Non-retain	True	True	True	False		Previous Filter Output Value
Kf	Real	0.0	Non-retain	True	True	True	False		Filter Gain = Ts/(Ts+Tc)
Yf	Real	0.0	Non-retain	True	True	True	False		Filter output
Static									
Temp									
Constant									

0001 // This function block is low pass filter.

0002 // The filter blocks higher frequency to allow a smoother signal.

0003

0004 //Filter Constant.

0005 #Kf := #Ts / (#Ts + #Tc);

0006 //Filter Output.

0007 #Yf := #Yn_1 + (#Kf * (#Xf - #Yn_1));

0008 #Yn_1 := #Yf;

0009 #Output := REAL_TO_INT(#Yn_1);

0010

Symbol	Address	Type	Comment
#Kf		Real	Filter Gain = Ts/(Ts+Tc)
#Output		Int	
#Tc		Real	Time Constant in seconds (default 2.0s)
#Ts		Real	Sample Time (default 100ms)
#Xf		Real	Input to filter
#Yf		Real	Filter output
#Yn_1		Real	Previous Filter Output Value

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Program blocks

Valve [FB4]

Valve Properties

General

Name	Valve	Number	4	Type	FB	Language	SCL
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Valve_Sens_Open	Bool	false	Non-retain	True	True	True	False		Valve Sensor State: Open
Valve_ Sens_ Closed	Bool	false	Non-retain	True	True	True	False		Valve Sensor State: Closed
Level_Ok	Bool	false	Non-retain	True	True	True	False		Tank Sensor: Level OK
Valve_Opn_Req	Bool	false	Non-retain	True	True	True	False		Valve Open Request Input
Manual_mode	Bool	false	Non-retain	True	True	True	False		Manual Mode requested
▼ Output									
Valve_Control	Bool	false	Non-retain	True	True	True	False		Valve Control. (True=Open ; False=Close)
Valve_Error	Bool	false	Non-retain	True	True	True	False		Valve Error Status
InOut									
▼ Static									
OpenTimer	DInt	0	Non-retain	True	True	True	False		
CloseTimer	DInt	0	Non-retain	True	True	True	False		
Temp									
Constant									

```
0001 // Valve Control and Error Management Function
0002 // If Valve is Requested and no error:
0003 IF #Valve_Opn_Req = 1 AND #Valve_Error=0 THEN
0004     //Turn OpenTimer ON and Reset Closetimer
0005     #OpenTimer := #OpenTimer + 1;
0006     #CloseTimer := 0;
0007     //If Valve_Control is OFF and Timer>=3 then Valve Error.
0008     IF #Valve_Control = 0 AND #OpenTimer >= 3 THEN
0009         #Valve_Error := 1;
0010         //If Sensors and Level Ok then Output ok.
0011     ELSIF #Level_Ok = 1 THEN
0012         #Valve_Control := 1;
0013     END_IF;
0014 END_IF;
0015
0016 //If Valve off requested and no error:
0017 IF #Valve_Opn_Req = 0 AND #Valve_Error = 0 THEN
0018     //Reset OpenTimer and Start CloseTimer.
0019     #CloseTimer := #CloseTimer + 1;
0020     #OpenTimer := 0;
0021     //If Valve_Control is ON and CloseTimer>=3 then valve error
0022     IF #Valve_Control = 1 AND #CloseTimer >= 3 THEN
0023         #Valve_Error := 1;
0024     //Else Close Valve
0025     ELSE
0026         #Valve_Control := 0;
0027     END_IF;
0028 END_IF;
0029 //Sensor Error: If Sensors both open or both closed then error
0030 IF #Valve_Sens_Open = 0 AND #"Valve_ Sens_ Closed" = 0 OR #Valve_Sens_Open = 1 AND #"Valve_ Sens_ Closed" = 1 THEN
0031     #Valve_Error := 1;
0032 ELSIF #Valve_Sens_Open = 0 AND #"Valve_ Sens_ Closed" = 1 OR #Valve_Sens_Open = 1 AND #"Valve_ Sens_ Closed" = 0 THEN
0033     #Valve_Error := 0;
0034 END_IF;
0035 //If Manual Mode is engaged and valve is on then valve error is overridden.
0036 IF #Manual_mode = 1 AND #Valve_Control = 1 THEN
0037     #Valve_Error := 0;
0038 END_IF;
```

Symbol	Address	Type	Comment
#"Valve_ Sens_ Closed"		Bool	Valve Sensor State: Closed
#CloseTimer		DInt	
#Level_Ok		Bool	Tank Sensor: Level OK
#Manual_mode		Bool	Manual Mode requested
#OpenTimer		DInt	
#Valve_Control		Bool	Valve Control. (True=Open ; False=Close)
#Valve_Error		Bool	Valve Error Status
#Valve_Opn_Req		Bool	Valve Open Request Input
#Valve_Sens_Open		Bool	Valve Sensor State: Open

Program blocks

Recipe Selection [FB5]

Recipe Selection Properties							
General							
Name	Recipe Selection	Number	5	Type	FB	Language	SCL
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Bottle_Size_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Bottle_Number_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Product_A_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Product_A_Tol_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Product_B_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Product_B_Tol_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Mix_Temp_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Mix_Temp_Tol_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Mixing_Time_Rec1	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 1
Bottle_Size_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Bottle_Number_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Product_A_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Product_A_Tol_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Product_B_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Product_B_Tol_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Mix_Temp_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Mix_Temp_Tol_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Mixing_Time_Rec2	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 2
Bottle_Size_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Bottle_Number_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Product_A_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Product_A_Tol_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Product_B_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Product_B_Tol_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Mix_Temp_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Mix_Temp_Tol_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Mixing_Time_Rec3	Int	0	Non-retain	True	True	True	False		Parameter Input Rec 3
Recipe 1	Bool	false	Non-retain	True	True	True	False		Recipe 1 Selection
Recipe 2	Bool	false	Non-retain	True	True	True	False		Recipe 2 Selection
Reset	Bool	false	Non-retain	True	True	True	False		Reset Function Input
Recipe 3	Bool	false	Non-retain	True	True	True	False		Recipe 3 Selection
▼ Output									
Bottle_Size	Int	0	Non-retain	True	True	True	False		Parameter output
Bottle_Number	Int	0	Non-retain	True	True	True	False		Parameter output
Product_A	Int	0	Non-retain	True	True	True	False		Parameter output
Product_A_Tol	Int	0	Non-retain	True	True	True	False		Parameter output
Product_B	Int	0	Non-retain	True	True	True	False		Parameter output
Product_B_Tol	Int	0	Non-retain	True	True	True	False		Parameter output
Mix_Temp	Int	0	Non-retain	True	True	True	False		Parameter output
Mix_Temp_Tol	Int	0	Non-retain	True	True	True	False		Parameter output
Mixing_Time	DInt	0	Non-retain	True	True	True	False		Parameter output
Batch_Size_A+B	Int	0	Non-retain	True	True	True	False		Parameter output
InOut									
▼ Static									
State	Int	1	Retain	True	True	True	False		Case state
Temp									
Constant									

```
0001 // This Function allows to create an interlock between different recipes.
0002 // The function will input all recipes parameters and output a single set of parameters
0003
0004 CASE #State OF
0005     1: //Recipe Selection
0006         IF ("Recipe 1" = 0 AND #"Recipe 2" = 0 AND #"Recipe 3" = 0) THEN
0007             #State := 2; //Recipe 1 parameters passed.
0008         END_IF;
0009         IF ("Recipe 1" = 0 AND #"Recipe 2" = 1 AND #"Recipe 3" = 0) THEN
0010             #State := 3; //Recipe 2 parameters passed.
0011         END_IF;
0012         IF ("Recipe 1" = 0 AND #"Recipe 2" = 0 AND #"Recipe 3" = 1) THEN
0013             #State := 4; //Recipe 3 parameters passed.
0014         END_IF;
0015         IF (#Reset) THEN
```

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<pre>0016 #State := 5; //Recipe Reset. 0017 END_IF; 0018 2: //Recipe 1. 0019 #Bottle_Size := #Bottle_Size_Rec1; 0020 #Bottle_Number := #Bottle_Number_Rec1; 0021 #Product_A := #Product_A_Rec1; 0022 #Product_A_Tol := #Product_A_Tol_Rec1; 0023 #Product_B := #Product_B_Rec1; 0024 #Product_B_Tol := #Product_B_Tol_Rec1; 0025 #Mix_Temp := #Mix_Temp_Rec1; 0026 #Mix_Temp_Tol := #Mix_Temp_Tol_Rec1; 0027 #Mixing_Time := #Mixing_Time_Rec1; 0028 #"Batch_Size_A+B" := #Product_A + #Product_B; 0029 3: //Recipe 2 0030 #Bottle_Size := #Bottle_Size_Rec2; 0031 #Bottle_Number := #Bottle_Number_Rec2; 0032 #Product_A := #Product_A_Rec2; 0033 #Product_A_Tol := #Product_A_Tol_Rec2; 0034 #Product_B := #Product_B_Rec2; 0035 #Product_B_Tol := #Product_B_Tol_Rec2; 0036 #Mix_Temp := #Mix_Temp_Rec2; 0037 #Mix_Temp_Tol := #Mix_Temp_Tol_Rec2; 0038 #Mixing_Time := #Mixing_Time_Rec2; 0039 #"Batch_Size_A+B" := #Product_A + #Product_B; 0040 4: //Recipe 3 0041 #Bottle_Size := #Bottle_Size_Rec3; 0042 #Bottle_Number := #Bottle_Number_Rec3; 0043 #Product_A := #Product_A_Rec3; 0044 #Product_A_Tol := #Product_A_Tol_Rec3; 0045 #Product_B := #Product_B_Rec3; 0046 #Product_B_Tol := #Product_B_Tol_Rec3; 0047 #Mix_Temp := #Mix_Temp_Rec3; 0048 #Mix_Temp_Tol := #Mix_Temp_Tol_Rec3; 0049 #Mixing_Time := #Mixing_Time_Rec3; 0050 #"Batch_Size_A+B" := #Product_A + #Product_B; 0051 5: //Reset 0052 #Bottle_Size := 0; 0053 #Bottle_Number := 0; 0054 #Product_A := 0; 0055 #Product_A_Tol := 0; 0056 #Product_B := 0; 0057 #Product_B_Tol := 0; 0058 #Mix_Temp := 0; 0059 #Mix_Temp_Tol := 0; 0060 #Mixing_Time := 0; 0061 #"Batch_Size_A+B" := #Product_A + #Product_B; 0062 END_CASE;</pre>			
Symbol	Address	Type	Comment
#"Batch_Size_A+B"		Int	Parameter output
"Recipe 1"		Bool	Recipe 1 Selection
"Recipe 2"		Bool	Recipe 2 Selection
"Recipe 3"		Bool	Recipe 3 Selection
#Bottle_Number		Int	Parameter output
#Bottle_Number_Rec1		Int	Parameter Input Rec 1
#Bottle_Number_Rec2		Int	Parameter Input Rec 2
#Bottle_Number_Rec3		Int	Parameter Input Rec 3
#Bottle_Size		Int	Parameter output
#Bottle_Size_Rec1		Int	Parameter Input Rec 1
#Bottle_Size_Rec2		Int	Parameter Input Rec 2
#Bottle_Size_Rec3		Int	Parameter Input Rec 3
#Mix_Temp		Int	Parameter output
#Mix_Temp_Rec1		Int	Parameter Input Rec 1
#Mix_Temp_Rec2		Int	Parameter Input Rec 2
#Mix_Temp_Rec3		Int	Parameter Input Rec 3
#Mix_Temp_Tol		Int	Parameter output
#Mix_Temp_Tol_Rec1		Int	Parameter Input Rec 1
#Mix_Temp_Tol_Rec2		Int	Parameter Input Rec 2
#Mix_Temp_Tol_Rec3		Int	Parameter Input Rec 3
#Mixing_Time		DInt	Parameter output
#Mixing_Time_Rec1		Int	Parameter Input Rec 1
#Mixing_Time_Rec2		Int	Parameter Input Rec 2
#Mixing_Time_Rec3		Int	Parameter Input Rec 3
#Product_A		Int	Parameter output
#Product_A_Rec1		Int	Parameter Input Rec 1
#Product_A_Rec2		Int	Parameter Input Rec 2
#Product_A_Rec3		Int	Parameter Input Rec 3
#Product_A_Tol		Int	Parameter output
#Product_A_Tol_Rec1		Int	Parameter Input Rec 1
#Product_A_Tol_Rec2		Int	Parameter Input Rec 2
#Product_A_Tol_Rec3		Int	Parameter Input Rec 3
#Product_B		Int	Parameter output
#Product_B_Rec1		Int	Parameter Input Rec 1
#Product_B_Rec2		Int	Parameter Input Rec 2
#Product_B_Rec3		Int	Parameter Input Rec 3
#Product_B_Tol		Int	Parameter output
#Product_B_Tol_Rec1		Int	Parameter Input Rec 1
#Product_B_Tol_Rec2		Int	Parameter Input Rec 2

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Symbol	Address	Type	Comment	
#Product_B_Tol_Rec3		Int	Parameter Input Rec 3	
#Reset		Bool	Reset Function Input	
#State		Int	Case state	

Program blocks

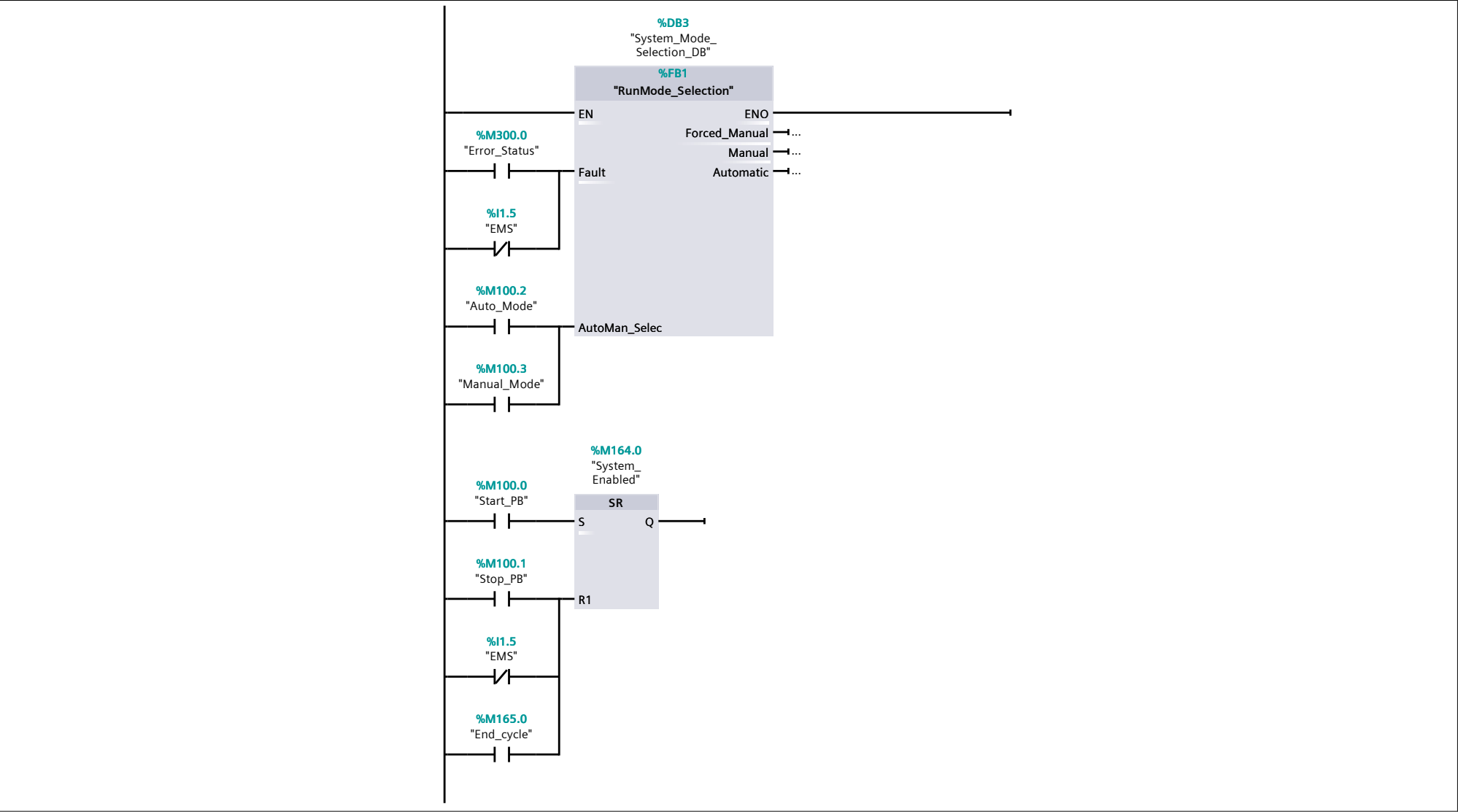
System Process Control [FC1]

System Process Control Properties							
General							
Name	System Process Control	Number	1	Type	FC	Language	LAD
Numbering	Automatic						
Information							
Title	System Process Control.	Author		Comment	The Sytem Process Control manages: - System Enable (ON/OFF) - Process Mode: Automatic, Manual or Forced Manual. - Recipe Selection: Recipe 1, Recipe 2 or Recipe 3. - Process Sequence.	Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
System Process Control	Void		

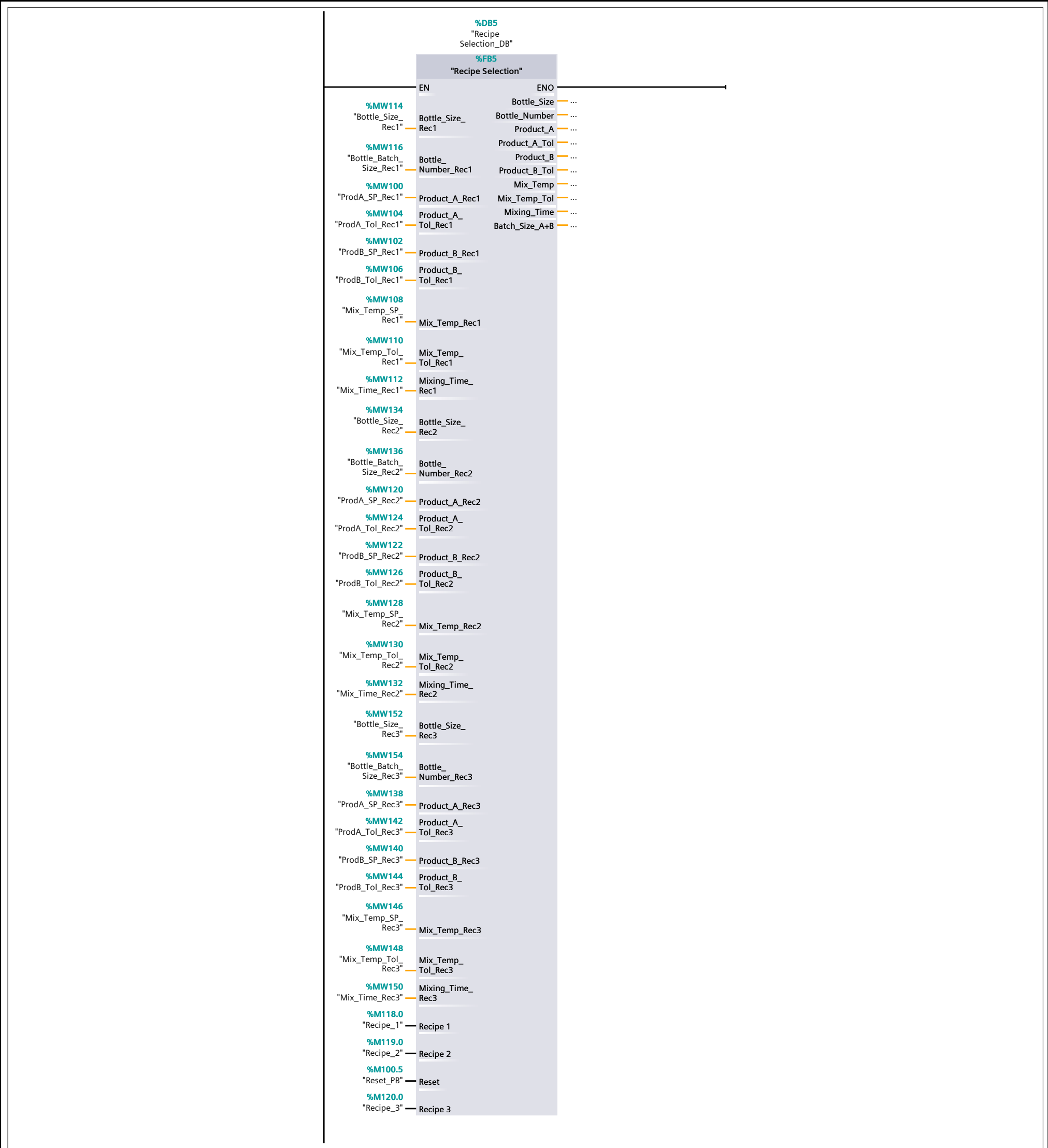
Network 1: System Enable and Process Mode Selection

Creates an interlock between the different run modes of the system.



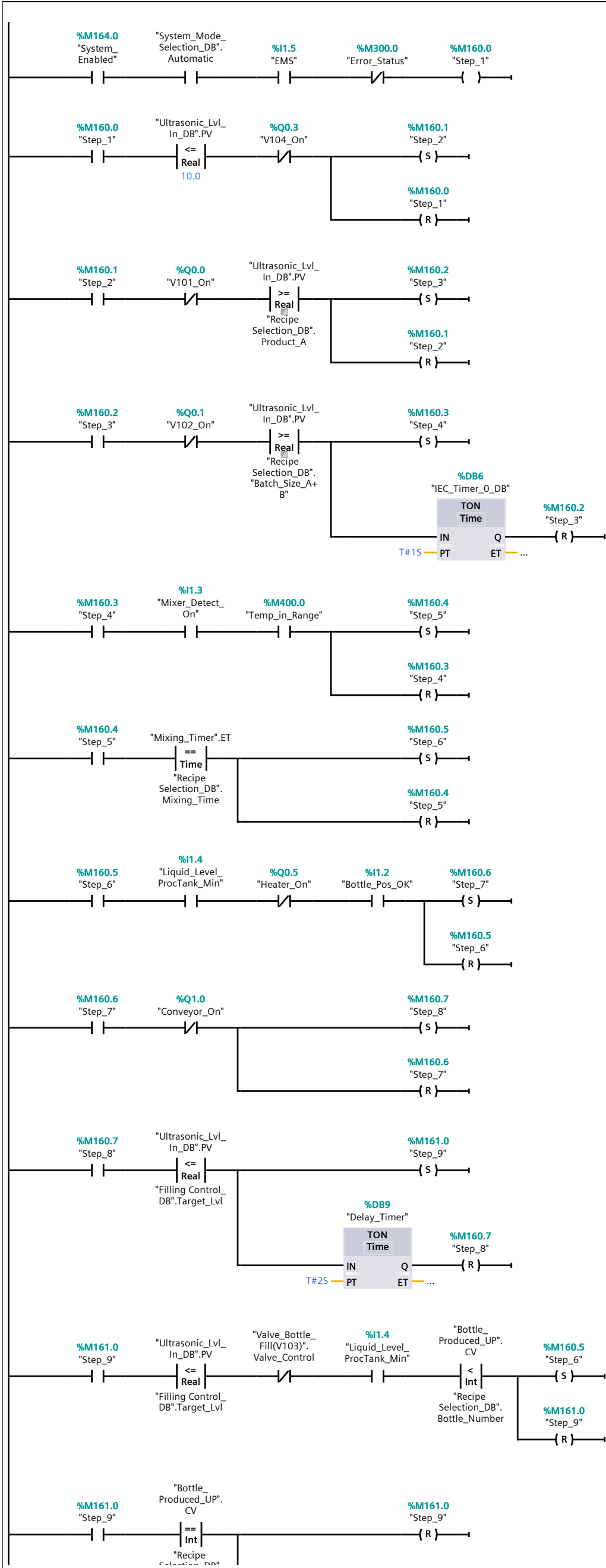
Network 2: Recipe Selection Function

Passes the recipe parameters when a recipe is selected.

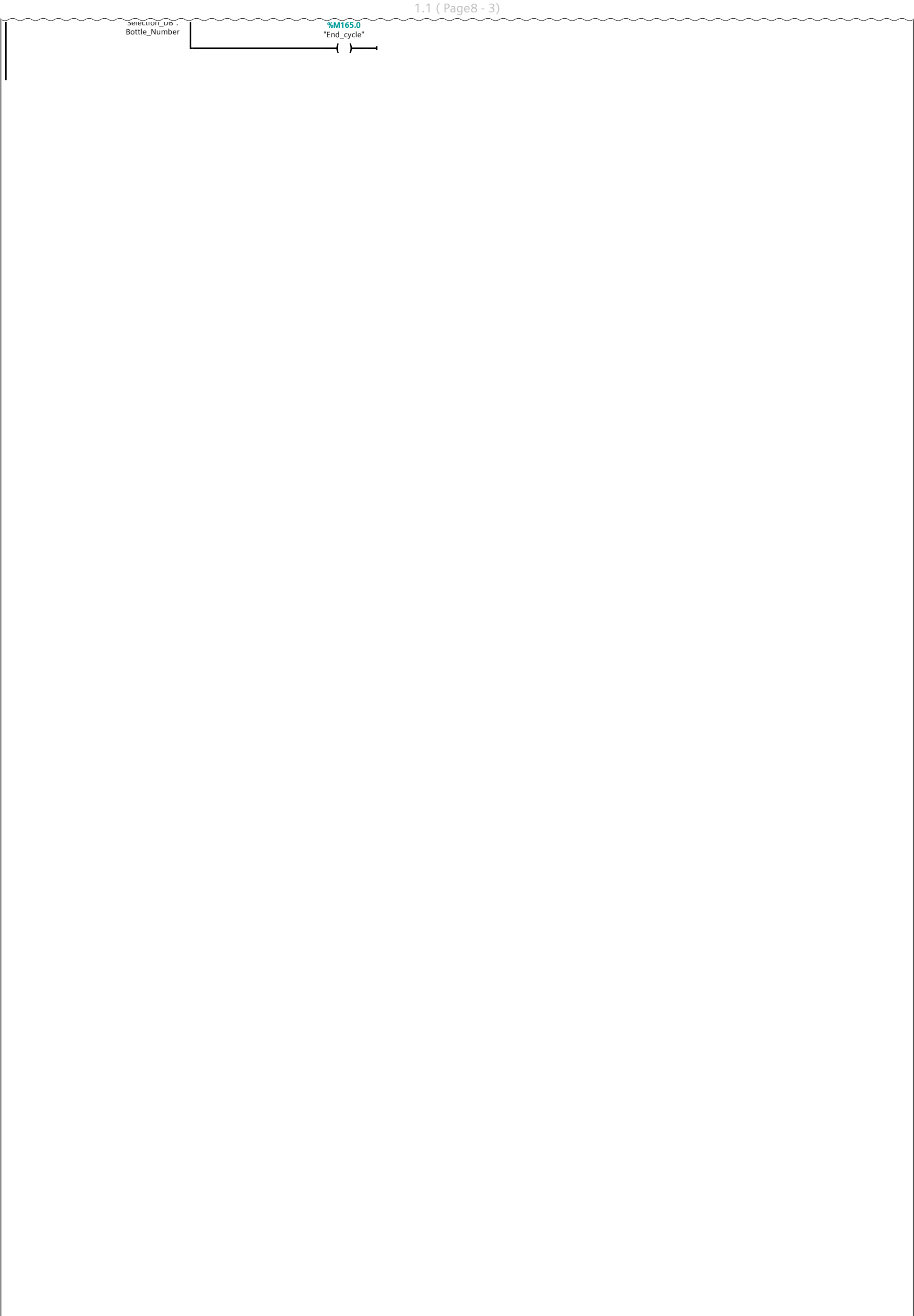


Network 3: Process Sequence Diagram
 Overview of the Automatic Mode process with conditions required for confirm the steps.

Network 3: Process Sequence Diagram (1.1 / 2.1)



Network 3: Process Sequence Diagram (2.1 / 2.1)



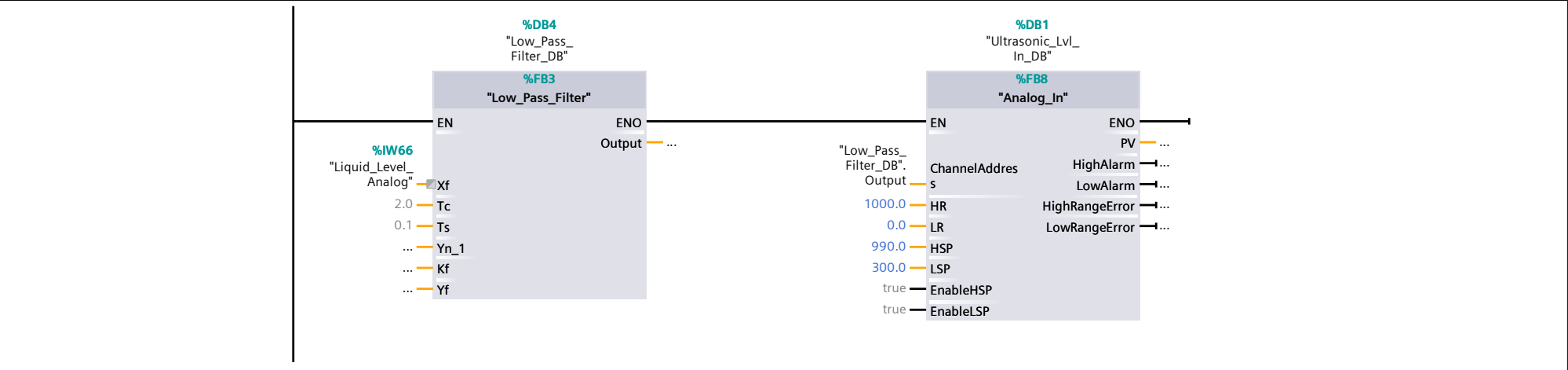
Program blocks

Mixing Tank Processes [FC2]

Mixing Tank Processes Properties							
General							
Name	Mixing Tank Processes	Number	2	Type	FC	Language	LAD
Numbering	Automatic						
Information							
Title		Author		Comment	This function manages the processes relating to the Mixing Tank: - Filling in Mixing Tank with Product A and B. - Liquid Management in the Mixing Tank. - Purging Mixing Tank.	Family	
Version	0.1	User-defined ID					
Name		Data type	Default value		Comment		
Input							
Output							
InOut							
Temp							
Constant							
▼ Return							
Mixing Tank Processes		Void					

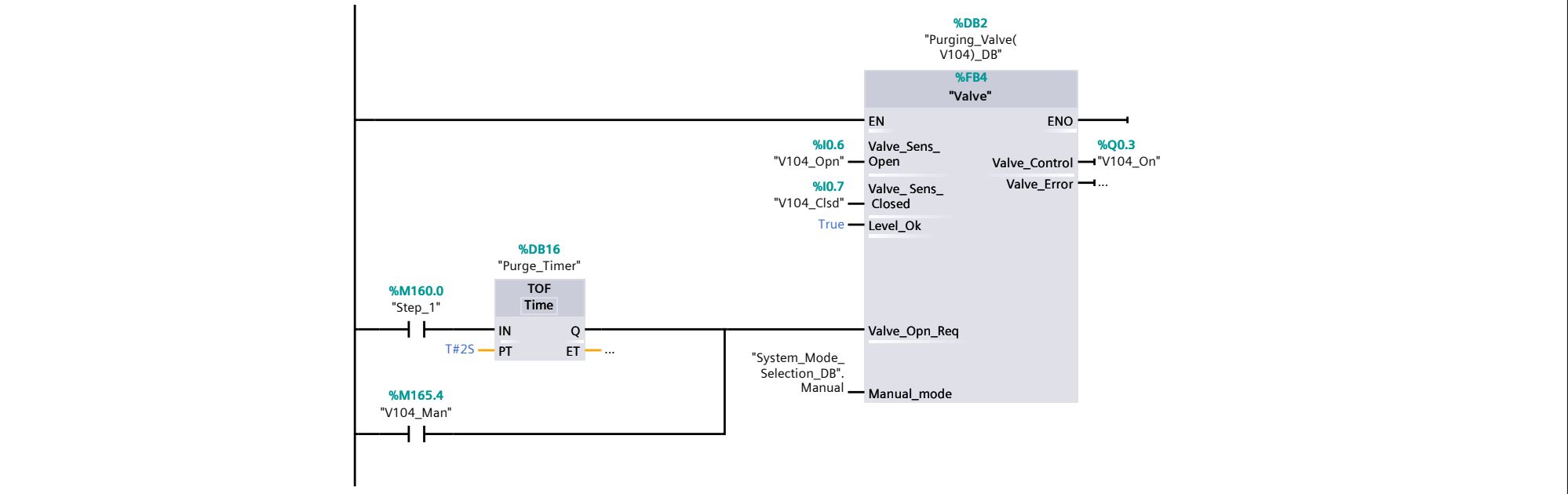
Network 1: Ultrasonic Analogue Sensor.

Reading and Scaling Analogue values from the Ultrasonic level Sensor.



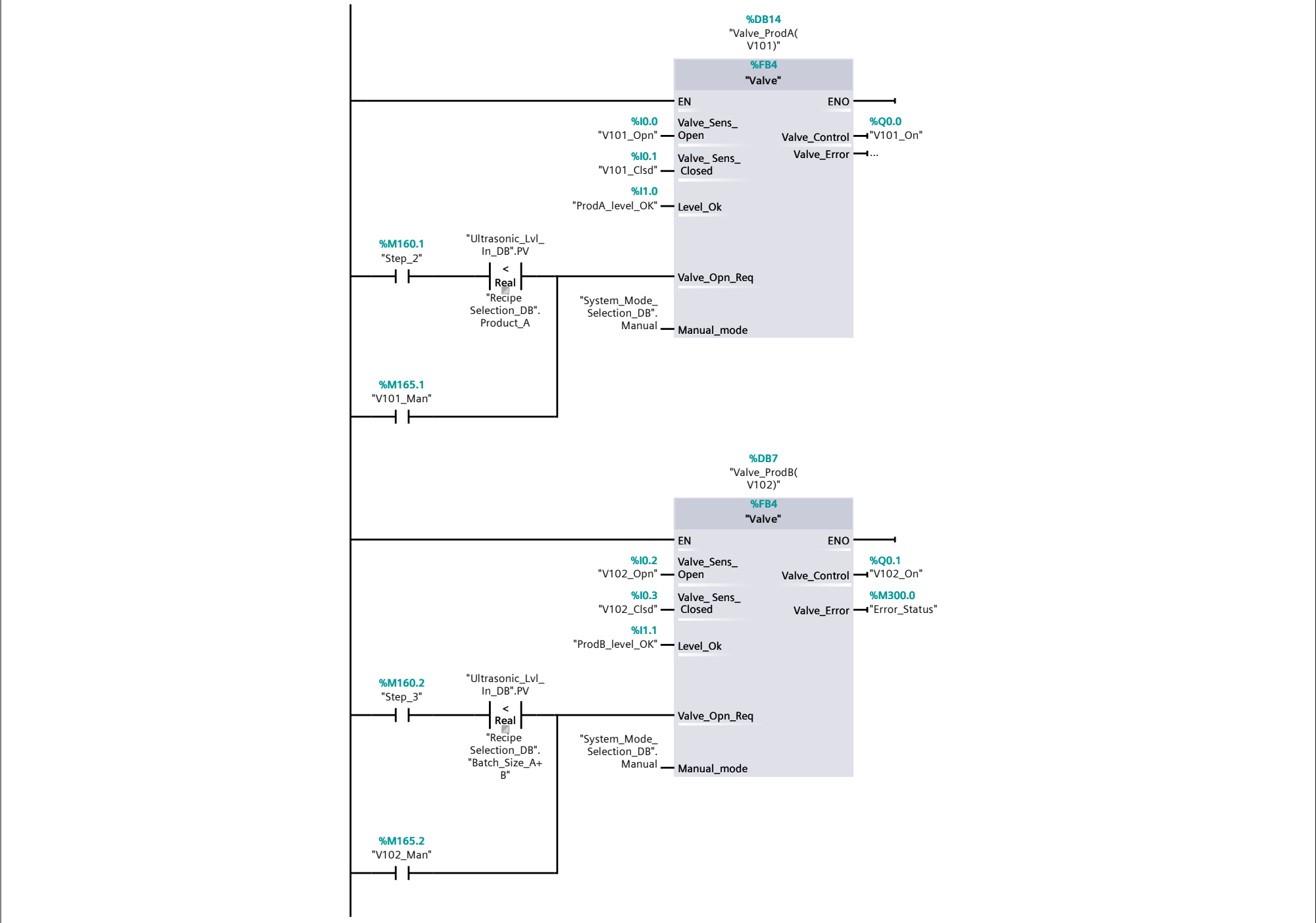
Network 2: Mixing Tank Purging.

Tank Purge = Open Purge Valve until reading from level sensor = 0. (Level input = True)



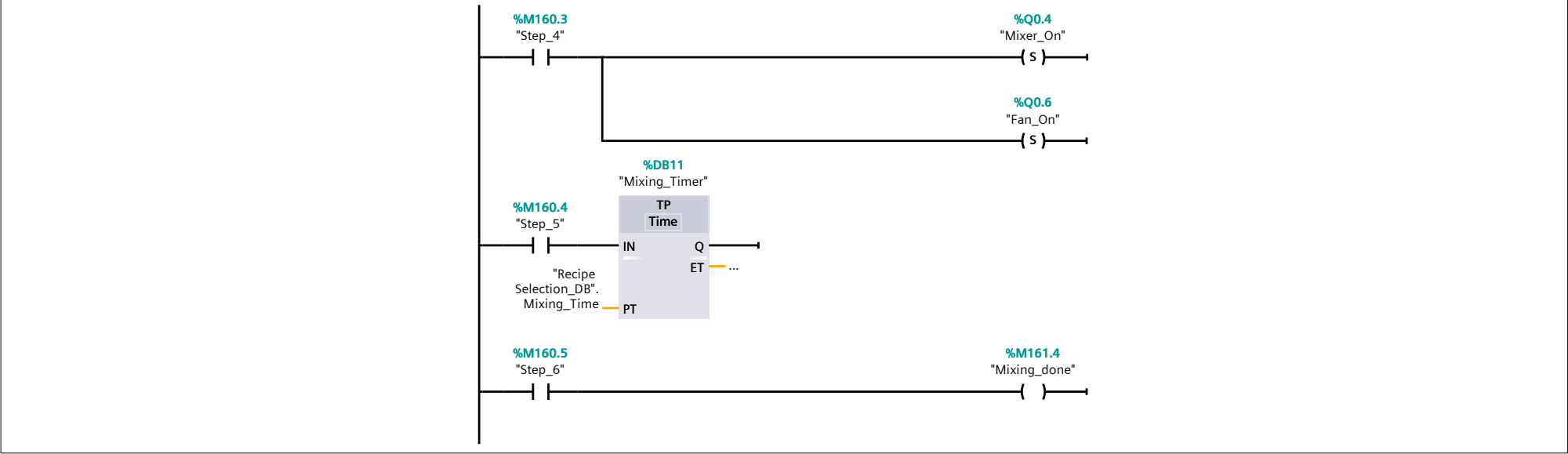
Network 3: Preparing Product Mix.

Adding Product A then Product B; Once desired Level reached and Minimum Level Ok = Products Ready. // UPDATE TO TAKE TOLERANCE INTO ACCOUNT (IN_RANGE).



Network 4: Mixing and Heating

Mixer and heating ON. Temperature OK = Mixing Timer ON. Mixing Timer Finished = Heating OFF and Mixing-Heating Complete.



Program blocks

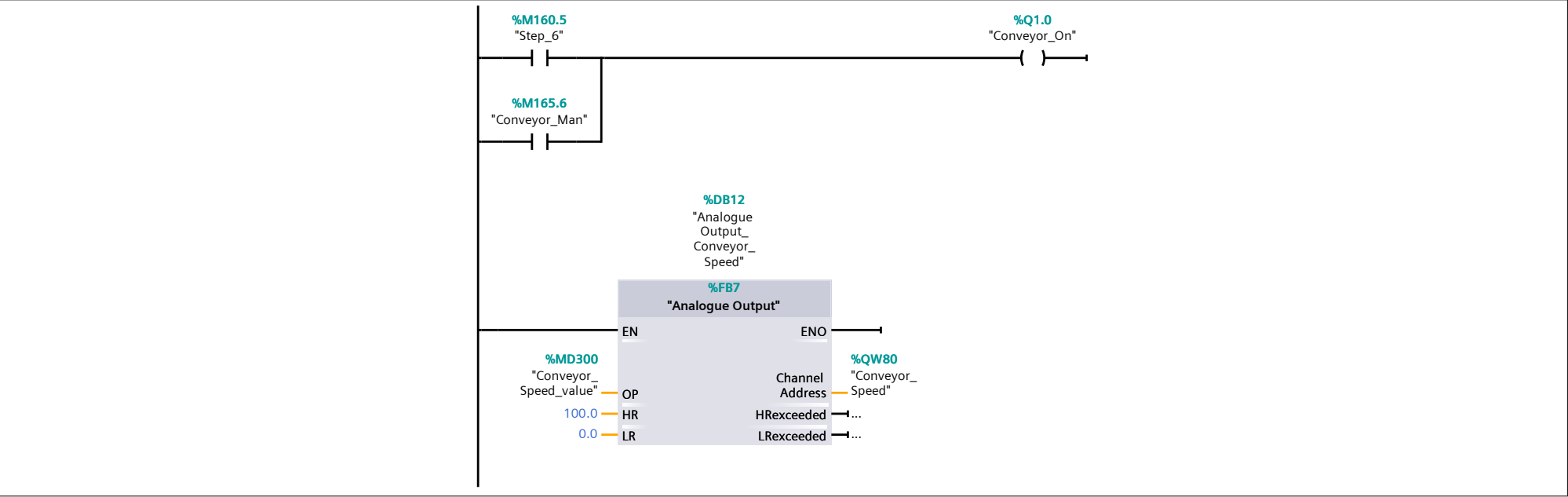
Bottle Filling Conveyor Process [FC3]

Bottle Filling Conveyor Process Properties							
General							
Name	Bottle Filling Conveyor Process	Number	3	Type	FC	Language	LAD
Numbering	Automatic						
Information							
Title	Conveyor and Bottle Filling Processes	Author		Comment	This Function manages the conveyor and bottle filling process: - Conveyor Control. - Bottle filling.	Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
Bottle Filling Conveyor Process	Void		

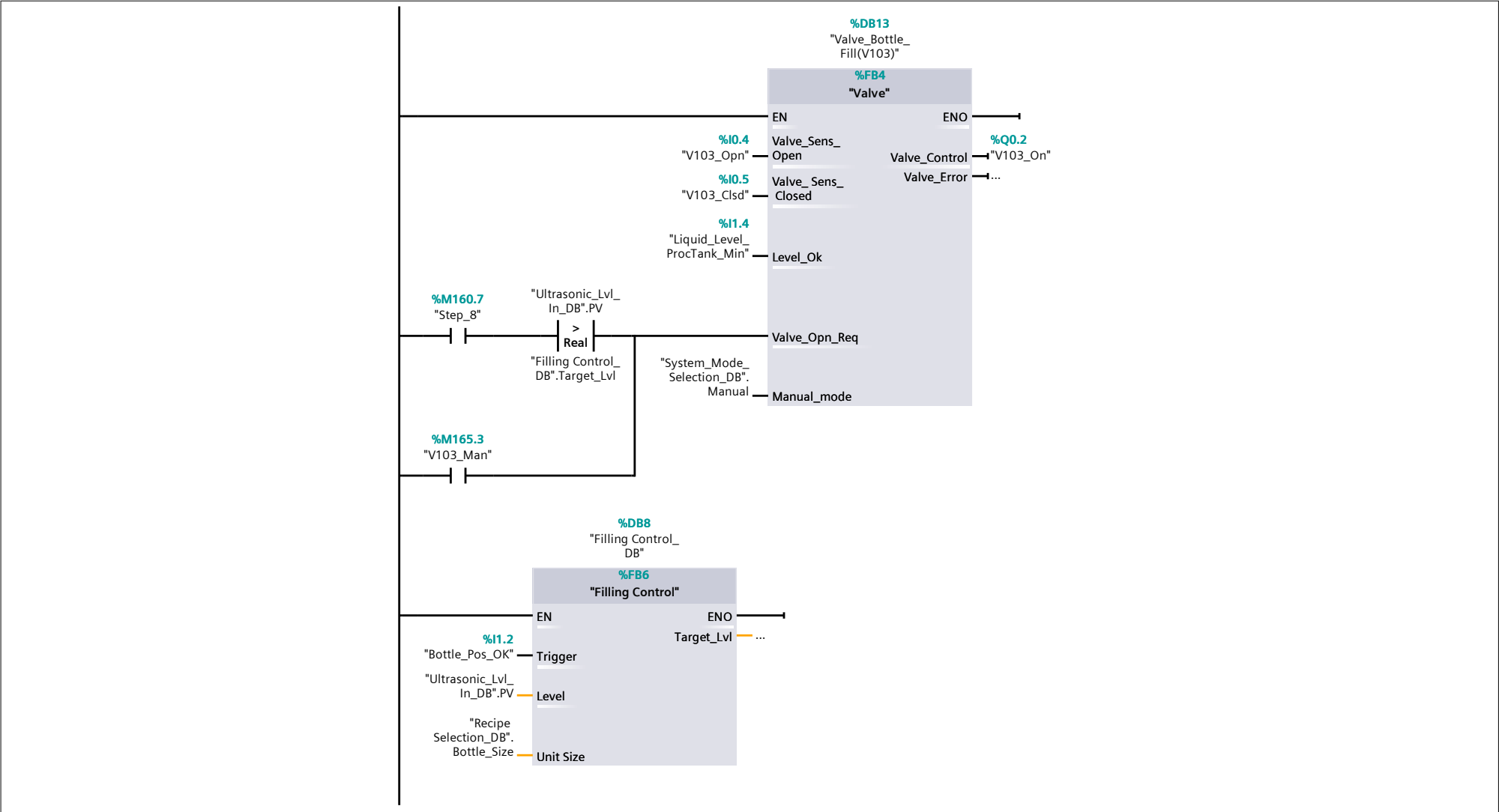
Network 1: Conveyor Control

Conveyor Control: The conveyor is activated by the end of the mixing cycle or by the end of a bottle filling. The speed of the conveyor is set by by the analogue output. The conveyor is stopped by the bottle being in position.



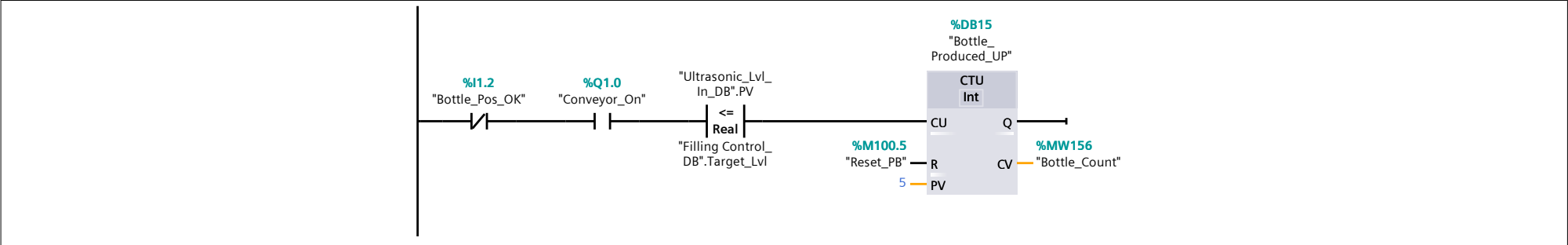
Network 2: Bottle Filling.

Valve control for the bottle filling: The valve will stay open until the sensor reading is equal to the previous level reading - bottle size (Calculated by FB Filling Control).



Network 3: Bottle Produced Counter.

This counts the number of bottles filled, once a bottle leaves the fill in position and the liquid left is equal or less than the liquid left targeted (liquid in the tank - liquid in the bottle).



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Program blocks

Analog_In [FB8]

Analog_In Properties

General

Name	Analog_In	Number	8	Type	FB	Language	SCL
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
ChannelAddress	Int	0	Non-retain	True	True	True	False		
HR	Real	100.0	Non-retain	True	True	True	False		
LR	Real	-100.0	Non-retain	True	True	True	False		
HSP	Real	90.0	Non-retain	True	True	True	False		
LSP	Real	10.0	Non-retain	True	True	True	False		
EnableHSP	Bool	true	Non-retain	True	True	True	False		
EnableLSP	Bool	true	Non-retain	True	True	True	False		
▼ Output									
PV	Real	0.0	Non-retain	True	True	True	False		
HighAlarm	Bool	false	Non-retain	True	True	True	False		
LowAlarm	Bool	false	Non-retain	True	True	True	False		
HighRangeError	Bool	false	Non-retain	True	True	True	False		
LowRangeError	Bool	false	Non-retain	True	True	True	False		
InOut									
Static									
Temp									
Constant									

```
0001 // This function block reads analogue input channel and scales
0002 // between HR (High Range) and LR (Low Range) values
0003 // Sets Low and High alarm values against HSP and LSP
0004 // If the A/D converter values are below 0 or over 27648 an error
0005 // will be generated
0006
0007 #PV := ((INT_TO_REAL(#ChannelAddress) * (#HR - #LR)) / 27648) + #LR; // Read and scale A/D Values
0008 IF #EnableHSP = 1 THEN // If High Alarm Enabled
0009     IF #PV > #HSP THEN // Drive High Alarm
0010         #HighAlarm := 1;
0011     ELSIF #PV < #HSP THEN
0012         #HighAlarm := 0;
0013     END_IF;
0014 END_IF;
0015
0016 IF #EnableLSP = 1 THEN // If Low Alarm Enabled
0017     IF #PV < #LSP THEN // Drive Low Alarm
0018         #LowAlarm := 1;
0019     ELSIF #PV > #LSP THEN
0020         #LowAlarm := 0;
0021     END_IF;
0022 END_IF;
0023 IF #ChannelAddress > 27648 THEN // If A/D Values over 27648
0024     #HighRangeError := 1; // Out of high limit
0025     #PV := #HR; // Limit output to maximum value
0026 END_IF;
0027 IF #ChannelAddress < 0 THEN // if A/D Values below 0
0028     #LowRangeError := 1; // Out of low limit
0029     #PV := #LR; // Limit output to minimum value
0030 END_IF;
0031 IF (#ChannelAddress > 0) AND (#ChannelAddress < 27648) THEN
0032     #HighRangeError := 0;
0033     #LowRangeError := 0;
0034 END_IF;
0035
0036 //Revision History
0037 //Tested
0038 //REV 1.0
0039
```

Symbol	Address	Type	Comment
#ChannelAddress		Int	
#EnableHSP		Bool	
#EnableLSP		Bool	
#HighAlarm		Bool	
#HighRangeError		Bool	
#HR		Real	
#HSP		Real	

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Symbol	Address	Type	Comment	
#LowAlarm		Bool		
#LowRangeError		Bool		
#LR		Real		
#LSP		Real		
#PV		Real		

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Program blocks

Analogue Output [FB7]

Analogue Output Properties

General

Name	Analogue Output	Number	7	Type	FB	Language	SCL
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
OP	Real	0.0	Non-retain	True	True	True	False		Value to be output to D/A
HR	Real	4.0	Non-retain	True	True	True	False		Maximum Value of Output
LR	Real	8.0	Non-retain	True	True	True	False		Minimum Value of Output
▼ Output									
Channel Address	Int	0	Non-retain	True	True	True	False		D/A Channel Address
HRexceeded	Bool	0	Non-retain	True	True	True	False		Input Signal Out of Upper Range
LRexceeded	Bool	0	Non-retain	True	True	True	False		Input Signal Out of Lower Range
InOut									
Static									
Temp									
Constant									

```
0001 // Function Scales a Real Analogue Value to an integer
0002 // Between 0 and 27648 for driving the output card
0003 IF (#LR < #OP) AND (#OP < #HR) THEN
0004     #HRexceeded := 0;
0005     #LRexceeded := 0;
0006 END_IF;
0007 //
0008 // Range Real Value
0009 #"Channel Address" := DINT_TO_INT(ROUND((#OP * 27648.0) / (#HR - #LR)));
0010 //
0011 //Range Checking
0012 IF #OP > #HR THEN
0013     #"Channel Address" := 27648;
0014     #HRexceeded := 1;
0015 END_IF;
0016 IF #OP < #LR THEN
0017     #"Channel Address" := 0;
0018     #LRexceeded := 1;
0019 END_IF;
```

Symbol	Address	Type	Comment
#"Channel Address"		Int	D/A Channel Address
#HR		Real	Maximum Value of Output
#HRexceeded		Bool	Input Signal Out of Upper Range
#LR		Real	Minimum Value of Output
#LRexceeded		Bool	Input Signal Out of Lower Range
#OP		Real	Value to be output to D/A

Program blocks

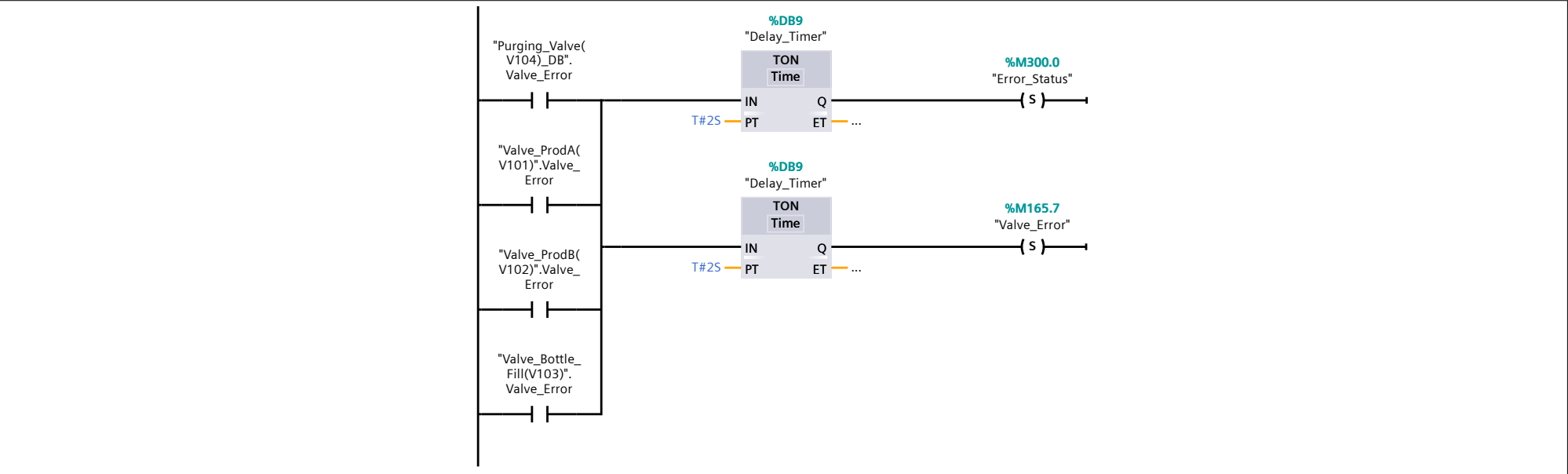
Error Management [FC4]

Error Management Properties							
General							
Name	Error Management	Number	4	Type	FC	Language	LAD
Numbering	Automatic						
Information							
Title	Error Management and Machine Reset.	Author		Comment	This Block Manages the error cases and Reset function: - If Stop, EMS or Reset are hit the machine will stop and reset. - If the heating element is on and the liquid level is below 300L or the level switch is off an error will be triggered. - At the bottling stage if the conveyor is on for a minute with no bottles the machine will stop. - If the level for each product A and B goes above or below the levels of tolerances an error will be triggered.	Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
Error Management	Void		

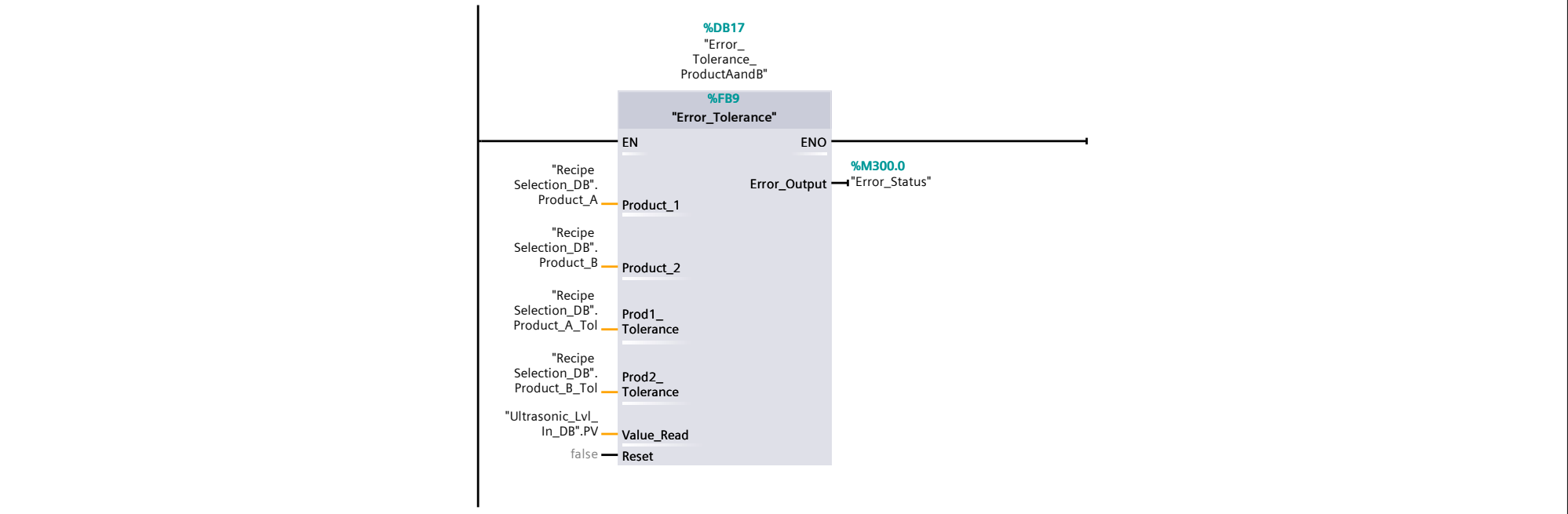
Network 1: Error Management Valves

If any of the valve control functions return an error the error_status is set.



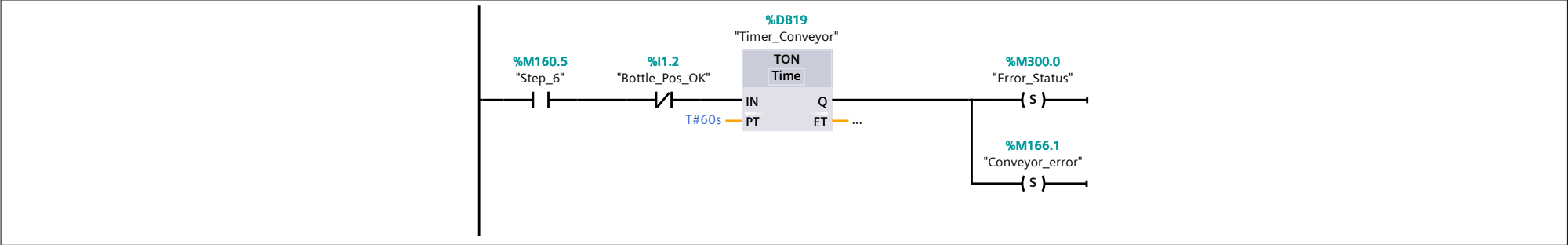
Network 2: Liquid Level Tolerance error

Function block managing the liquid tolerance error levels for product A and B.



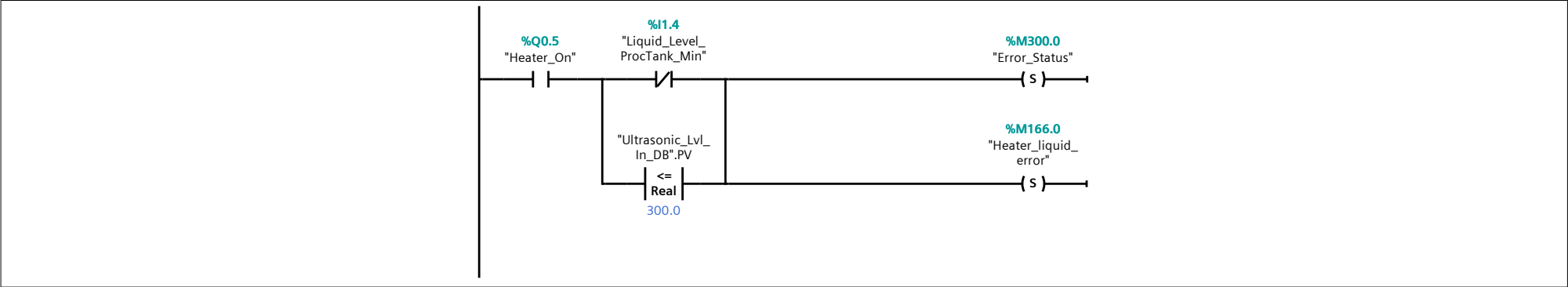
Network 3: Conveyor Error

If bottling process ON and no bottle detected for 30 seconds and error will be triggered



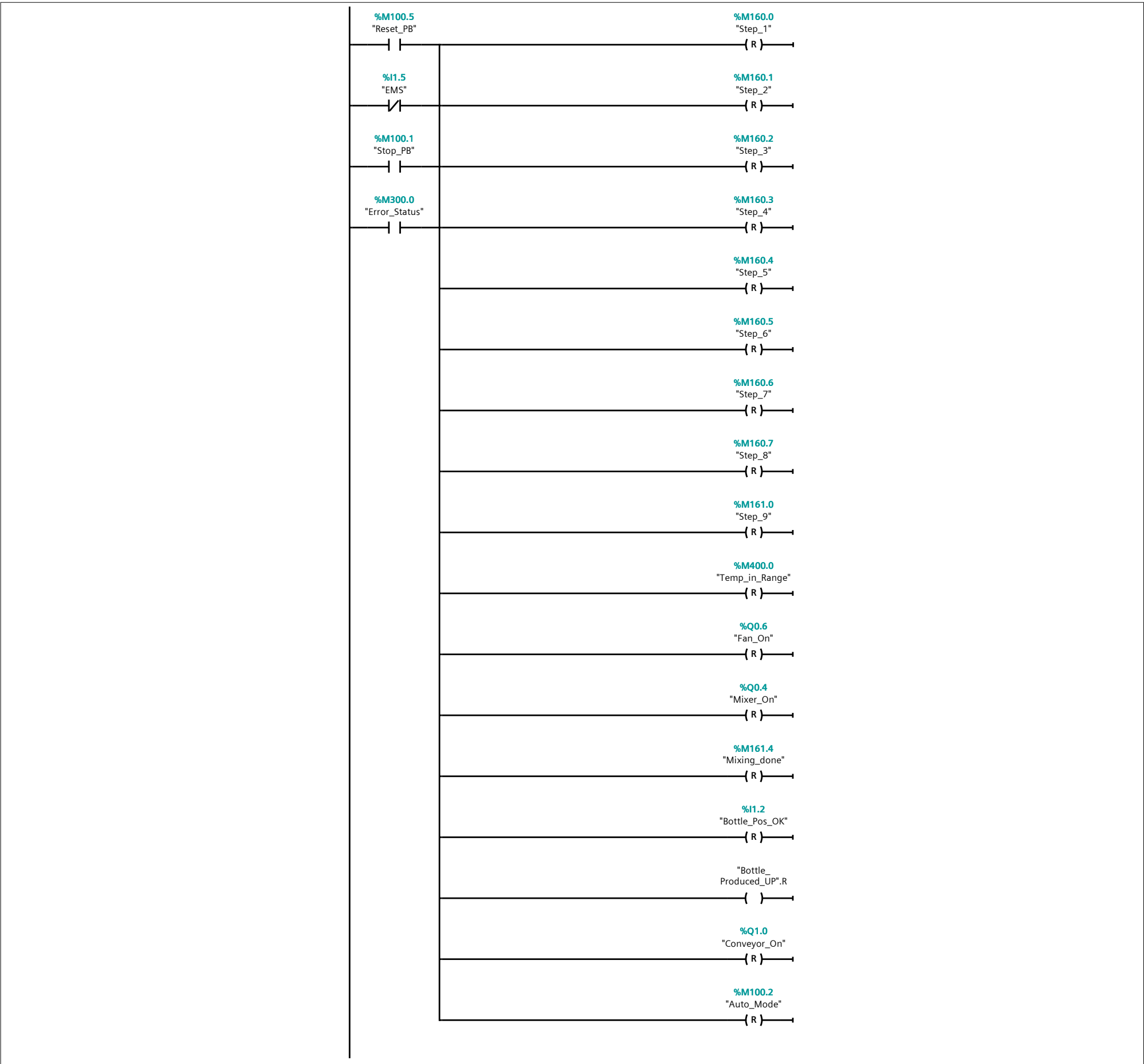
Network 4: Heating Element Protection

If the heating element is ON or triggered when the minimum liquid level in the mixing tank is too low an error will be triggered.



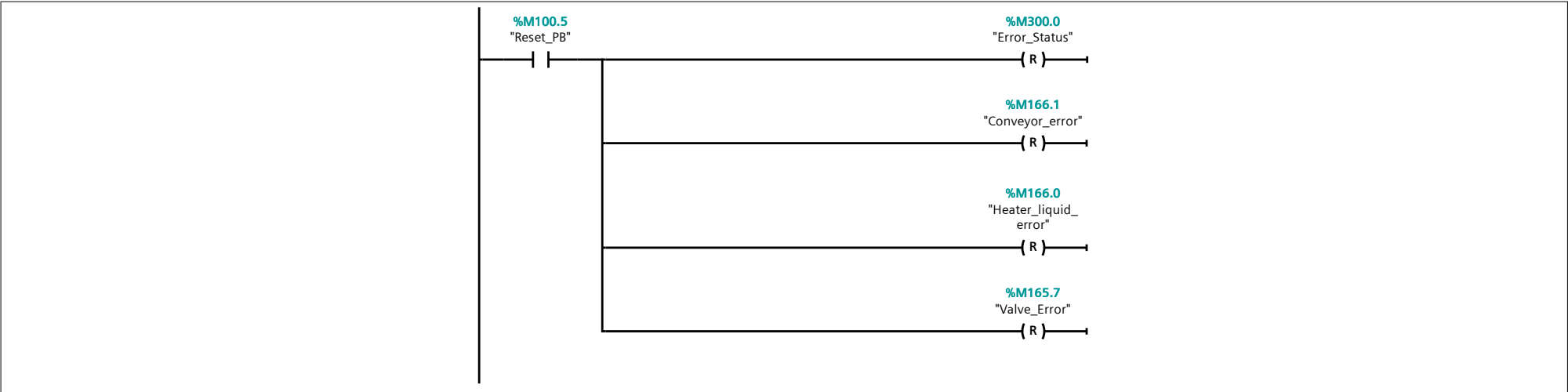
Network 5: System Reset

System can be reset by: Reset_PB, EMS and Stop_PB.



Network 6: Error Reset

Error Status can be reset using the Reset button.



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Program blocks

Purging_Valve(V104)_DB [DB2]

Purging_Valve(V104)_DB Properties

General

Name	Purging_Valve(V104)_DB	Number	2	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Valve_Sens_Open	Bool	false	False	True	True	True	False		Valve Sensor State: Open
Valve_Sens_Closed	Bool	false	False	True	True	True	False		Valve Sensor State: Closed
Level_Ok	Bool	false	False	True	True	True	False		Tank Sensor: Level OK
Valve_Opn_Req	Bool	false	False	True	True	True	False		Valve Open Request Input
Manual_mode	Bool	false	False	True	True	True	False		Manual Mode requested
▼ Output									
Valve_Control	Bool	false	False	True	True	True	False		Valve Control. (True=Open ; False=Close)
Valve_Error	Bool	false	False	True	True	True	False		Valve Error Status
InOut									
▼ Static									
OpenTimer	DInt	0	False	True	True	True	False		
CloseTimer	DInt	0	False	True	True	True	False		

Program blocks

System_Mode_Selection_DB [DB3]

System_Mode_Selection_DB Properties										
General										
Name	System_Mode_Selection_DB	Number	3	Type	DB			Language	DB	
Numbering	Automatic									
Information										
Title		Author		Comment				Family		
Version	0.1	User-defined ID								
Name		Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input										
Fault		Bool	false	False	True	True	True	False		Fault detected
AutoMan_Select		Bool	false	False	True	True	True	False		Auto Mode Selected
▼ Output										
Forced_Manual		Bool	false	False	True	True	True	False		Forced Manual Mode Confirmed
Manual		Bool	false	False	True	True	True	False		Manual Mode Confirmed
Automatic		Bool	false	False	True	True	True	False		Automatic Mode Confirmed
InOut										
▼ Static										
state		Int	1	True	True	True	True	False		

Program blocks

Ultrasonic_Lvl_In_DB [DB1]

Ultrasonic_Lvl_In_DB Properties							
General							
Name	Ultrasonic_Lvl_In_DB	Number	1	Type	DB	Language	DB
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
ChannelAddress	Int	0	False	True	True	True	False		
HR	Real	100.0	False	True	True	True	False		
LR	Real	-100.0	False	True	True	True	False		
HSP	Real	90.0	False	True	True	True	False		
LSP	Real	10.0	False	True	True	True	False		
EnableHSP	Bool	true	False	True	True	True	False		
EnableLSP	Bool	true	False	True	True	True	False		
▼ Output									
PV	Real	0.0	False	True	True	True	False		
HighAlarm	Bool	false	False	True	True	True	False		
LowAlarm	Bool	false	False	True	True	True	False		
HighRangeError	Bool	false	False	True	True	True	False		
LowRangeError	Bool	false	False	True	True	True	False		
InOut									
Static									

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Program blocks

Low_Pass_Filter_DB [DB4]

Low_Pass_Filter_DB Properties

General

Name	Low_Pass_Filter_DB	Number	4	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Xf	Real	0.0	False	True	True	True	False		Input to filter
Tc	Real	2.0	False	True	True	True	False		Time Constant in seconds (default 2.0s)
Ts	Real	0.1	False	True	True	True	False		Sample Time (default 100ms)
▼ Output									
Output	Int	0	False	True	True	True	False		
▼ InOut									
Yn_1	Real	0.0	False	True	True	True	False		Previous Filter Output Value
Kf	Real	0.0	False	True	True	True	False		Filter Gain = Ts/(Ts+Tc)
Yf	Real	0.0	False	True	True	True	False		Filter output
Static									

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Program blocks

Recipe Selection_DB [DB5]

Recipe Selection_DB Properties

General

Name	Recipe Selection_DB	Number	5	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/ OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Bottle_Size_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Bottle_Number_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Product_A_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Product_A_Tol_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Product_B_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Product_B_Tol_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Mix_Temp_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Mix_Temp_Tol_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Mixing_Time_Rec1	Int	0	False	True	True	True	False		Parameter Input Rec 1
Bottle_Size_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Bottle_Number_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Product_A_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Product_A_Tol_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Product_B_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Product_B_Tol_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Mix_Temp_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Mix_Temp_Tol_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Mixing_Time_Rec2	Int	0	False	True	True	True	False		Parameter Input Rec 2
Bottle_Size_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Bottle_Number_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Product_A_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Product_A_Tol_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Product_B_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Product_B_Tol_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Mix_Temp_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Mix_Temp_Tol_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Mixing_Time_Rec3	Int	0	False	True	True	True	False		Parameter Input Rec 3
Recipe 1	Bool	false	False	True	True	True	False		Recipe 1 Selection
Recipe 2	Bool	false	False	True	True	True	False		Recipe 2 Selection
Reset	Bool	false	False	True	True	True	False		Reset Function Input
Recipe 3	Bool	false	False	True	True	True	False		Recipe 3 Selection
▼ Output									
Bottle_Size	Int	0	False	True	True	True	False		Parameter output
Bottle_Number	Int	0	False	True	True	True	False		Parameter output
Product_A	Int	0	False	True	True	True	False		Parameter output
Product_A_Tol	Int	0	False	True	True	True	False		Parameter output
Product_B	Int	0	False	True	True	True	False		Parameter output
Product_B_Tol	Int	0	False	True	True	True	False		Parameter output
Mix_Temp	Int	0	False	True	True	True	False		Parameter output
Mix_Temp_Tol	Int	0	False	True	True	True	False		Parameter output
Mixing_Time	DInt	0	False	True	True	True	False		Parameter output
Batch_Size_A+B	Int	0	False	True	True	True	False		Parameter output
InOut									
▼ Static									
State	Int	1	True	True	True	True	False		Case state

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Program blocks

Temperature_Measurement_In [DB10]

Temperature_Measurement_In Properties

General

Name	Temperature_Measure-ment_In	Number	10	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
ChannelAddress	Int	0	False	True	True	True	False		
HR	Real	100.0	False	True	True	True	False		
LR	Real	-100.0	False	True	True	True	False		
HSP	Real	90.0	False	True	True	True	False		
LSP	Real	10.0	False	True	True	True	False		
EnableHSP	Bool	true	False	True	True	True	False		
EnableLSP	Bool	true	False	True	True	True	False		
▼ Output									
PV	Real	0.0	False	True	True	True	False		
HighAlarm	Bool	false	False	True	True	True	False		
LowAlarm	Bool	false	False	True	True	True	False		
HighRangeError	Bool	false	False	True	True	True	False		
LowRangeError	Bool	false	False	True	True	True	False		
InOut									
Static									

Program blocks

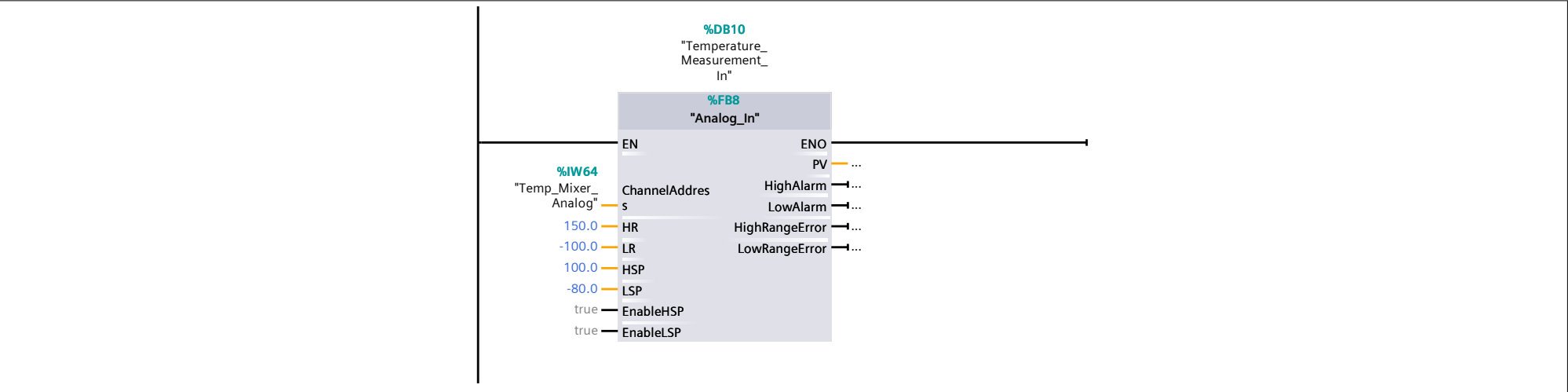
Temperature Management [FC5]

Temperature Management Properties							
General							
Name	Temperature Management	Number	5	Type	FC	Language	LAD
Numbering	Automatic						
Information							
Title		Author		Comment	This function manages the Temperature Functionalities of the programme: - Reading and Scaling an Analogue Value. - Temperature in range check.	Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Comment
Input			
Output			
InOut			
▼ Temp			
Temp_Limit_Low_Range	Real		
Temp_Limit_High_Range	Real		
Constant			
▼ Return			
Temperature Management	Void		

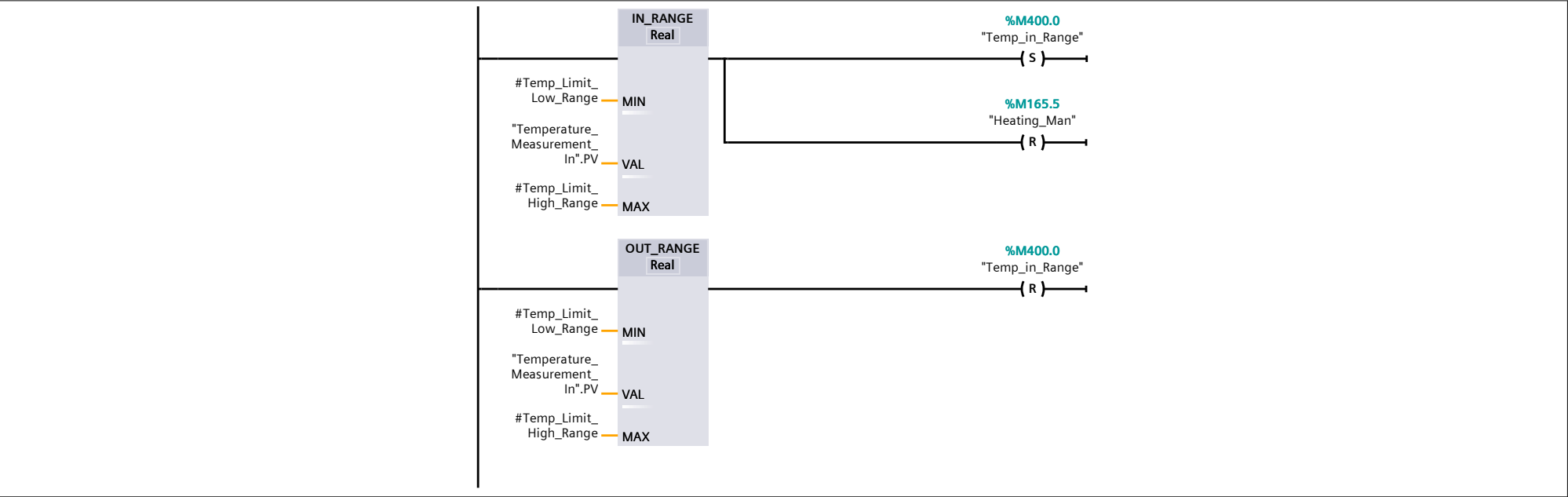
Network 1: Analogue Temperature Input

The Function Block reads and Scales the analogue values between -200 and 200°C. Also Provides alarms when reading exceed 150°C or goes below -100°C.



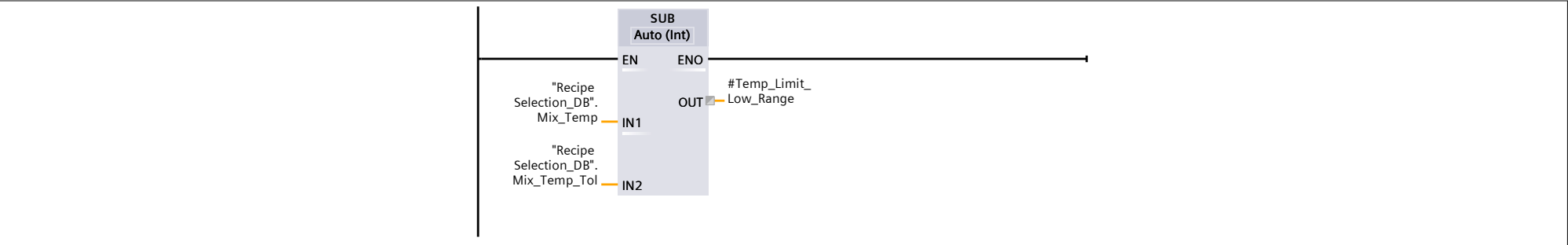
Network 2: Temperature in Range Confirmation

IF PV (Temp Reading in) (SetPoint-Tolerance°C) < Temperature IN < (SetPoint+Tolerance°C) == Temperature is in range.



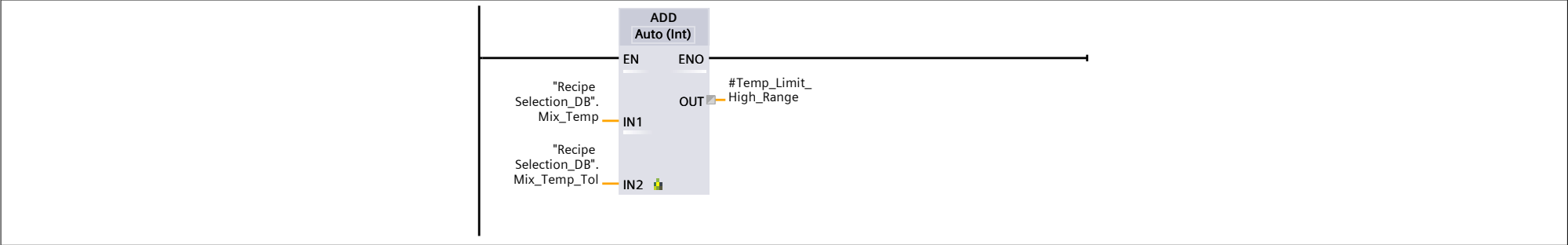
Network 3:

Temperature Min calculation == SetPoint - Tolerance



Network 4:

Temperature Max Calculation == SetPoint + Tolerance



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Program blocks

Analogue Output_Conveyor_Speed [DB12]

Analogue Output_Conveyor_Speed Properties

General

Name	Analogue Output_Conveyor_Speed	Number	12	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
OP	Real	0.0	False	True	True	True	False		Value to be output to D/A
HR	Real	4.0	False	True	True	True	False		Maximum Value of Output
LR	Real	8.0	False	True	True	True	False		Minimum Value of Output
▼ Output									
Channel Address	Int	0	False	True	True	True	False		D/A Channel Address
HRexceeded	Bool	0	False	True	True	True	False		Input Signal Out of Upper Range
LRexceeded	Bool	0	False	True	True	True	False		Input Signal Out of Lower Range
InOut									
Static									

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Program blocks

Valve_Bottle_Fill(V103) [DB13]

Valve_Bottle_Fill(V103) Properties

General

Name	Valve_Bottle_Fill(V103)	Number	13	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Valve_Sens_Open	Bool	false	False	True	True	True	False		Valve Sensor State: Open
Valve_Sens_Closed	Bool	false	False	True	True	True	False		Valve Sensor State: Closed
Level_Ok	Bool	false	False	True	True	True	False		Tank Sensor: Level OK
Valve_Opn_Req	Bool	false	False	True	True	True	False		Valve Open Request Input
Manual_mode	Bool	false	False	True	True	True	False		Manual Mode requested
▼ Output									
Valve_Control	Bool	false	False	True	True	True	False		Valve Control. (True=Open ; False=Close)
Valve_Error	Bool	false	False	True	True	True	False		Valve Error Status
InOut									
▼ Static									
OpenTimer	DInt	0	False	True	True	True	False		
CloseTimer	DInt	0	False	True	True	True	False		

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Program blocks

Valve_ProdA(V101) [DB14]

Valve_ProdA(V101) Properties

General

Name	Valve_ProdA(V101)	Number	14	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Valve_Sens_Open	Bool	false	False	True	True	True	False		Valve Sensor State: Open
Valve_Sens_Closed	Bool	false	False	True	True	True	False		Valve Sensor State: Closed
Level_Ok	Bool	false	False	True	True	True	False		Tank Sensor: Level OK
Valve_Opn_Req	Bool	false	False	True	True	True	False		Valve Open Request Input
Manual_mode	Bool	false	False	True	True	True	False		Manual Mode requested
▼ Output									
Valve_Control	Bool	false	False	True	True	True	False		Valve Control. (True=Open ; False=Close)
Valve_Error	Bool	false	False	True	True	True	False		Valve Error Status
InOut									
▼ Static									
OpenTimer	Dint	0	False	True	True	True	False		
CloseTimer	Dint	0	False	True	True	True	False		

Totally Integrated Automation Portal

Program blocks

Valve_ProdB(V102) [DB7]

Valve_ProdB(V102) Properties

General

Name	Valve_ProdB(V102)	Number	7	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Valve_Sens_Open	Bool	false	False	True	True	True	False		Valve Sensor State: Open
Valve_Sens_Closed	Bool	false	False	True	True	True	False		Valve Sensor State: Closed
Level_Ok	Bool	false	False	True	True	True	False		Tank Sensor: Level OK
Valve_Opn_Req	Bool	false	False	True	True	True	False		Valve Open Request Input
Manual_mode	Bool	false	False	True	True	True	False		Manual Mode requested
▼ Output									
Valve_Control	Bool	false	False	True	True	True	False		Valve Control. (True=Open ; False=Close)
Valve_Error	Bool	false	False	True	True	True	False		Valve Error Status
InOut									
▼ Static									
OpenTimer	Dint	0	False	True	True	True	False		
CloseTimer	Dint	0	False	True	True	True	False		

Program blocks

Filling Control [FB6]

Filling Control Properties

General

Name	Filling Control	Number	6	Type	FB	Language	SCL
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Trigger	Bool	false	Non-retain	True	True	True	False		
Level	Real	0.0	Non-retain	True	True	True	False		
Unit Size	Int	0	Non-retain	True	True	True	False		
▼ Output									
Target_Lvl	Real	0.0	Non-retain	True	True	True	False		
InOut									
Static									
Temp									
Constant									

```
0001 // Filling Process Control - The Function will calculate the new tank level target
0002 // according to to the size per unit for every trigger.
0003
0004 IF #Trigger= 1 THEN
0005     #Target_Lvl := #Level;
0006     #Target_Lvl := #Target_Lvl - #"Unit Size";
0007 END_IF;
```

Symbol	Address	Type	Comment
#"Unit Size"		Int	
#Level		Real	
#Target_Lvl		Real	
#Trigger		Bool	

Program blocks

Filling Control_DB [DB8]

Filling Control_DB Properties							
General							
Name	Filling Control_DB	Number	8	Type	DB	Language	DB
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Trigger	Bool	false	False	True	True	True	False		
Level	Real	0.0	False	True	True	True	False		
Unit Size	Int	0	False	True	True	True	False		
▼ Output									
Target_Lvl	Real	0.0	False	True	True	True	False		
InOut									
Static									

Program blocks

Error_Tolerance [FB9]

Error_Tolerance Properties							
General							
Name	Error_Tolerance	Number	9	Type	FB	Language	SCL
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/ OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Product_1	Int	0	Non-retain	True	True	True	False		
Product_2	Int	0	Non-retain	True	True	True	False		
Prod1_Tolerance	Int	0	Non-retain	True	True	True	False		
Prod2_Tolerance	Int	0	Non-retain	True	True	True	False		
Value_Read	Real	0.0	Non-retain	True	True	True	False		
Reset	Bool	false	Non-retain	True	True	True	False		
▼ Output									
Error_Output	Bool	false	Non-retain	True	True	True	False		
InOut									
▼ Static									
TimerError	DInt	0	Non-retain	True	True	True	False		
▼ Temp									
Error_level	Bool								
Temp_Value	Int								
Constant									

```
0001 // Function manages the tolerance level error between two products.
0002 //Product 1 Tolerance Level Error Management.
0003 IF #Value_Read > #Product_1 + #Prod1_Tolerance THEN
0004     #Temp_Value := #Product_1 + #Prod1_Tolerance;
0005     #Error_level:=1;
0006 ELSIF #Value_Read < #Product_1 - #Prod1_Tolerance THEN
0007     #Temp_Value := #Product_1 + #Prod1_Tolerance;
0008     #Error_level := 1;
0009 END_IF;
0010 //Product 2 Tolerance Level Error Management.
0011 IF #Value_Read > #Temp_Value + #Product_2 + #Prod2_Tolerance THEN
0012     #Error_level := 1;
0013 ELSIF #Value_Read < #Temp_Value + #Product_2 - #Prod2_Tolerance THEN
0014     #Error_level := 1;
0015 END_IF;
0016 //If and Error in the level is triggered the system has 30s to stabilise or reach level
0017 //IF #Error_level = 1 AND #Reset=0 THEN
0018     // #TimerError := #TimerError + 1;
0019 // IF #TimerError >= 30 THEN
0020     // #Error_Output := 1;
0021     //If Reset triggered then reset timer.
0022 // ELSIF #Reset = 1 OR #Error_level = 0 THEN
0023     // #TimerError := 0;
0024 // END_IF;
0025 // END_IF;
```

Symbol	Address	Type	Comment
#Error_level		Bool	
#Prod1_Tolerance		Int	
#Prod2_Tolerance		Int	
#Product_1		Int	
#Product_2		Int	
#Temp_Value		Int	
#Value_Read		Real	

Totally Integrated Automation Portal

Program blocks

Error_Tolerance_ProductAandB [DB17]

Error_Tolerance_ProductAandB Properties

General

Name	Error_Tolerance_ProductAandB	Number	17	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Product_1	Int	0	False	True	True	True	False		
Product_2	Int	0	False	True	True	True	False		
Prod1_Tolerance	Int	0	False	True	True	True	False		
Prod2_Tolerance	Int	0	False	True	True	True	False		
Value_Read	Real	0.0	False	True	True	True	False		
Reset	Bool	false	False	True	True	True	False		
▼ Output									
Error_Output	Bool	false	False	True	True	True	False		
InOut									
▼ Static									
TimerError	DInt	0	False	True	True	True	False		

PID_Compact [FB1130]

Name	Data type	Default value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Input									
Setpoint	Real	0.0	Non-retain	True	True	True	False		controller setpoint input
Input	Real	0.0	Non-retain	True	True	True	False		actual value of process as REAL
Input_PER	Word	16#0	Non-retain	True	True	True	False		actual value of process from periphery
ManualEnable	Bool	false	Non-retain	True	True	True	False		activate manual input to overwrite output
ManualValue	Real	0.0	Non-retain	True	True	True	False		input for manual value
Reset	Bool	false	Non-retain	True	True	True	False		reset the controller
▼ Output									
ScaledInput	Real	0.0	Non-retain	True	True	True	False		scaled peripheral input value from process
Output	Real	0.0	Non-retain	True	True	True	False		output value in REAL format
Output_PER	Word	16#0	Non-retain	True	True	True	False		output value in peripheral format
Output_PWM	Bool	false	Non-retain	True	True	True	False		pulse width modulated out-put value
SetpointLimit_H	Bool	false	Non-retain	True	True	True	False		setpoint is limited at highest level
SetpointLimit_L	Bool	false	Non-retain	True	True	True	False		setpoint is limited at lowest level
InputWarning_H	Bool	false	Non-retain	True	True	True	False		input value exceeded high warning level
InputWarning_L	Bool	false	Non-retain	True	True	True	False		input value exceeded low warning level
State	Int	0	Non-retain	True	True	True	False		status of controller (0=Inactive,1=SUT,2=TIR,3=Auto-matic,4=Hand)
Error	DWord	16#0	Non-retain	True	True	True	False		error message from control-ler
InOut									
▼ Static									
sd_VersionID	DWord	DW#16#01020002	Non-retain	True	True	True	False		version of controller
sb_ResOld	Bool	false	Non-retain	False	False	False	False		internal
sb_TMBeginExec	Bool	false	Non-retain	False	False	False	False		internal
sb_GetCycleTime	Bool	true	Non-retain	True	True	True	False		start automatic estimation of call cycle time
sb_EnCyclEstimation	Bool	true	Non-retain	True	True	True	True		enable estimation of call cy- cle time
sb_EnCyclMonitoring	Bool	true	Non-retain	True	True	True	True		enable monitoring of call cy- cle time
sb_Startup	Bool	false	Non-retain	False	False	False	False		internal
sb_RunModeByStartup	Bool	true	Non-retain	True	True	True	True		enable running last state be- fore reset or startup
sby_EsData_1	Byte	16#0	Non-retain	False	False	False	True		internal
sby_EsData_2	Byte	16#0	Non-retain	False	False	False	True		internal
si_TMCnt	Int	0	Non-retain	False	False	False	False		internal
si_Unit	Int	0	Non-retain	True	True	True	True		unit of actual value
si_Type	Int	0	Non-retain	True	True	True	True		type of controller
si_SveModeByRes	Int	0	Non-retain	False	False	False	False		internal
sd_Warning	DWord	16#0	Non-retain	True	True	True	False		warning message from control- ler
st_TMEnd	Time	T#0MS	Non-retain	False	False	False	False		internal
sr_TMDiff	Real	0.0	Non-retain	False	False	False	False		internal
sr_TMDiffMax	Real	0.0	Non-retain	False	False	False	False		internal
sr_TMDiffMaxMed	Real	0.0	Non-retain	False	False	False	False		internal
sr_TMDiffSum	Real	0.0	Non-retain	False	False	False	False		internal
▼ sBackUp	Struct		Non-retain	True	True	True	False		saved parameter set
r_Gain	Real	1.0	Non-retain	True	True	True	True		saved proportional gain
r_Ti	Real	20.0	Non-retain	True	True	True	True		saved integration time
r_Td	Real	0.0	Non-retain	True	True	True	True		saved derivative time
r_A	Real	0.0	Non-retain	True	True	True	True		saved filter coefficient for derivative part

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Program blocks / System blocks / Program resources

Mixing_Timer [DB11]

Mixing_Timer Properties

General

Name	Mixing_Timer	Number	11	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	IEC_TMR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
PT	Time	T#0ms	False	True	True	True	False		
ET	Time	T#0ms	False	True	False	True	False		
IN	Bool	false	False	True	True	True	False		
Q	Bool	false	False	True	False	True	False		

Program blocks / System blocks / Program resources

Bottle_Produced_UP [DB15]

Bottle_Produced_UP Properties							
General							
Name	Bottle_Produced_UP	Number	15	Type	DB	Language	DB
Numbering	Automatic						
Information							
Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	CNTR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
CU	Bool	false	True	True	True	True	False		
CD	Bool	false	True	True	True	True	False		
R	Bool	false	True	True	True	True	False		
LD	Bool	false	True	True	True	True	False		
QU	Bool	false	True	True	True	True	False		
QD	Bool	false	True	True	True	True	False		
PV	Int	0	True	True	True	True	False		
CV	Int	0	True	True	True	True	False		

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Program blocks / System blocks / Program resources

Purge_Timer [DB16]

Purge_Timer Properties

General

Name	Purge_Timer	Number	16	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	IEC_TMR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
PT	Time	T#0ms	False	True	True	True	False		
ET	Time	T#0ms	False	True	False	True	False		
IN	Bool	false	False	True	True	True	False		
Q	Bool	false	False	True	False	True	False		

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Program blocks / System blocks / Program resources

IEC_Timer_0_DB [DB6]

IEC_Timer_0_DB Properties

General

Name	IEC_Timer_0_DB	Number	6	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	IEC_TMR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
PT	Time	T#0ms	False	True	True	True	False		
ET	Time	T#0ms	False	True	False	True	False		
IN	Bool	false	False	True	True	True	False		
Q	Bool	false	False	True	False	True	False		

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Program blocks / System blocks / Program resources

Timer_Conveyor [DB19]

Timer_Conveyor Properties

General

Name	Timer_Conveyor	Number	19	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	IEC_TMR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
PT	Time	T#0ms	False	True	True	True	False		
ET	Time	T#0ms	False	True	False	True	False		
IN	Bool	false	False	True	True	True	False		
Q	Bool	false	False	True	False	True	False		

Totally Integrated Automation Portal

Program blocks / System blocks / Program resources

Delay_Timer [DB9]

Delay_Timer Properties

General

Name	Delay_Timer	Number	9	Type	DB	Language	DB
Numbering	Automatic						

Information

Title		Author	Simatic	Comment		Family	IEC
Version	1.0	User-defined ID	IEC_TMR				

Name	Data type	Start value	Retain	Accessible from HMI/OPC UA	Writ-able from HMI/OPC UA	Visible in HMI engi-neering	Setpoint	Supervi-sion	Comment
▼ Static									
PT	Time	T#0ms	False	True	True	True	False		
ET	Time	T#0ms	False	True	False	True	False		
IN	Bool	false	False	True	True	True	False		
Q	Bool	false	False	True	False	True	False		