|--|

Program blocks

Main [OB1]

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

Name	Data type	Default value
▼ Input		
Initial_Call	Bool	
Remanence	Bool	
Temp		
Constant		

Network 1: Block Start or Stop all process

```
#FC1

"Start-Stop"

EN ENO

"E_Stop" = E_Stop

%40.2

"Pb_Start" = Pb_Start

%40.1

"Pb_Stop" = Pb_Stop

%40.3

"Tank_Empty_
Level" = Empty_Level

"HM_Data".Stop_HMI

"HMI_Data".Stop_HMI
```

Network 2: Block fill tank

```
%FC2
                         "Fill_Tank"
               EN
                                        ENO -
                                               %Q0.1
        %10.3
"Tank_Empty_
Level" — Empty_Level
                                     Valve_A → "Valve_A"
                                               %Q0.2
       %10.4
    "Level_A" — Level_A
                                               %Q0.0
                                 Motor_Mixer → "Motor_Mixer"
       %10.5
    "Level_B" — Level_B
                                               %Q0.4
                                 Temp_Relay → "Temp_Relay"
       %10.7
  "Temp_Alm" — Temp_Alm
    %I0.0
"E_Stop" — E_Stop
   "Pb_Start" — Pb_Start
```

Network 3: Block emergency stop discharge

```
*FC4

"E_Discharge"

EN ENO

"E_Stop" E_Stop Valve_C TValve_C"

*Q0.5

"Pb_Start" Pb_Start

%10.3

"Tank_Empty__
Level" Empty_Level
```

Network 4:

```
#PC5
"Activate_Valve_C"

— EN

ENO

#Q0.5

Valve_C → "Valve_C"
```

|--|

Program blocks / FC

Start-Stop [FC1]

Start-Stop Properties								
General								
Name Start-Stop Number 1 Type FC Language LAD								
Numbering	Automatic							
Information								
Title	Start stop process	Author	Stiven Perez Mora	Comment	Conditions to active or deactive all process	Family		
Version	0.1	User-defined ID						

Name	Data type	Default value
▼ Input		
E_Stop	Bool	
Pb_Start	Bool	
Pb_Stop	Bool	
Empty_Level	Bool	
Start_HMI	Bool	
Stop_HMI	Bool	
Output		
InOut		
Temp		
Constant		
▼ Return		
Start-Stop	Void	

Network 1: Start Process

Conditions to start all process, initial conditions are, tank must be empty and operator must set the time for mixing, if mix time is equal to 0, the process will dont start

```
#Pb_Start #Empty_Level | Start_#Empty_Level | Start_#Empty_Level | Start_#Empty_Level | Start_#Empty_Level | Start_#Empty_Evel | Start_#Empty_Evel | Start_#Empty_Field_Time | T#1MS | Start_#Empty_Field_Time | T#1MS
```

Network 2: Stop Process

Conditions to reset all proces

```
#E_Stop "DATA".Start_Stop

#Pb_Stop

#Stop_HMI
```

|--|

Program blocks / FC

Fill_Tank [FC2]

Fill_Tank Properties								
General								
Name	ame Fill_Tank Number 2 Type FC Language LAD							
Numbering	Automatic							
Information								
Title	Fill Tank for mixing process	Author	Stiven Perez Mora	Comment		Family		
Version	0.1	User-defined ID						

Name	Data type	Default value	
▼ Input			
Empty_Level	Bool		
Level_A	Bool		
Level_B	Bool		
Temp_Alm	Bool		
E_Stop	Bool		
Pb_Start	Bool		
▼ Output			
Valve_A	Bool		
Valve_B	Bool		
Motor_Mixer	Bool		
Temp_Relay	Bool		
InOut			
Temp			
Constant			
▼ Return			
Fill_Tank	Void		

Network 1: Convert time from mixing timer

Convert elapsed time millisenconds to seconds and preset time

```
%FC3
"Math_Function_Timers"

EN ENO
```

Network 2: Activate Valve A

Network 3: Active Valve B

```
"DATA".Start_Stop Valve_C #Level_A #Level_B #Valve_B

"HML_Data".
Valve_B

"HMI_Data".Level_
#Level_B

"HMI_Data".Level_
```

Network 4: Active Motor Mixer and Wam Up

Totally Integrated **Automation Portal %DB2**"TimeToWamUp" TON Time "DATA".Active_ Valve_C "DATA".Start_Stop #Level_B #Temp_Relay #Temp_Alm \leftarrow T#2S — PT ET — T#0ms "HMI_Data". Temp_Relay \prec \succ %DB5
"MixingTime" **%DB3**"TimeToMixing" "DATA".Q_Time Discharge TON TON Q· "HMI_Data".ET_ ET — T#0ms "HMI_Data".PT_M_ Mxing — PT "DATA".Q_Time Discharge #Temp_Alm #Motor_Mixer -1/1--1/1-"HMI_Data". Motor_Mixer \leftarrow Network 5: "DATA".Q_Time Discharge "DATA".Active_ Valve_C "DATA".Start_Stop #Empty_Level **→**)— "DATA".Active_ Valve_C **Network 6: Empty Level HMI Indicator** "HMI_Data". Empty_Level #Empty_Level

Totally Integrated

Program blocks / FC

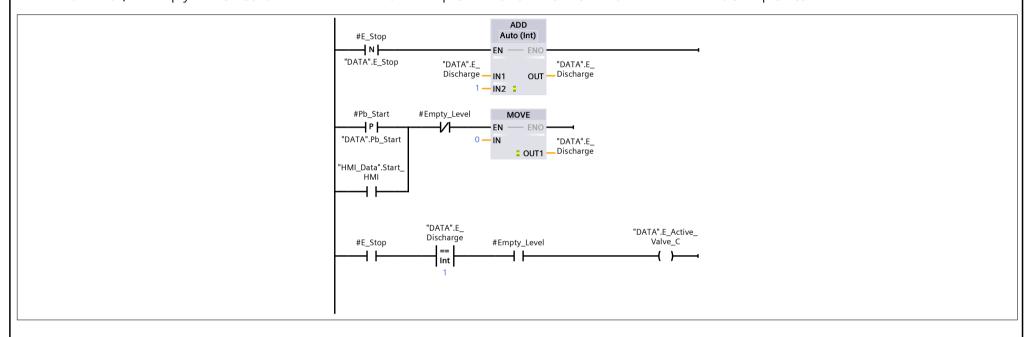
E_Discharge [FC4]

E_Discharge Properties								
General								
Name	Name E_Discharge Number 4 Type FC Language LAD							
Numbering	Automatic							
Information								
Title		Author		Comment		Family		
Version	0.1	User-defined ID						

Name	Data type	Default value	
	Data type	Delault value	
▼ Input			
E_Stop	Bool		
Pb_Start	Bool		
Empty_Level	Bool		
▼ Output			
Valve_C	Bool		
InOut			
Temp			
Constant			
▼ Return			
E_Discharge	Void		

Network 1: Counter emergency stop pushed

if emergency stop has been pushed, the counter variable discharge increase 1, if counter variable is equal to 1 the valve C will activate but the tank must be filled, when the level decrease, the empty level sensor deactivate valve C and enable push button start for restart counter variable and start process



Totally Integ Automation	rated Portal									
Program	hlocks	/ FC								
		mers [FC3]								
Math_Function General	_Timers Pro	operties								
Name Numbering	Math_Fur	nction_Timers	Number	3		Туре	FC		Language	LAD
Information Title	Convert ti	ime from mixing	Author			Comment			Family	
Version	0.1		User-defined II)						
Name Input					Data typ	e		Default value		
Output InOut										
Temp Constant										
▼ Return Math_Fur	nction_Time	ers			Void					
Network 1: I	nput mili	seconds time f	from HMI con	vert to Minutes						
input field fron from HMI field	n HMI is ed per 60.00	qual to millisecon 0	ids, in this netw	ork millisencond ar	e conver	t to minutes, the	e formula	for convert millis	seconds to minu	es is multiply the data type
				MUL Dint						
				HMI Data".PT	"HMI Da	ata".PT_M_				
				Mixing — IN1 OU 60000 — IN2 =	JT — Mxing					
Naturals 2. 6	Commont F	lanced Times M	 C to C of disal							
		lapsed Time M liseconds to seco								
				DIV Dint						
			n	HMI Data".ET	"HMI_Da "Mixing_	ata".ET_ S				
				1000 — IN2	JI — WIANIG_	3				
			<u> </u>							
										_

ne Activate_Valve_C Number 5 Type FC Language LAD mbering Automatic primation e Author Comment Family	tivate_Valve_C [FC5] vate_Valve_C Properties teral ne		Interded 150									
vate_Valve_C Properties teral me	vate_Valve_C Properties teral ne											
here Activate_Valve_C Number 5 Type FC Language LAD mbering Automatic Secondarian Secondarian	nee Activate_Valve_C Number 5 Type FC Language LAD mbering Automatic Author Comment Family											
mbering Automatic promation a	Automatic Important Important Imput Output Valve_C Inempt Comment Data type Default value Imput Output Valve_C Inempt Constant Return Activate_Valve_C Void Total's_Active_Valve_C Total's_Active_Va	neral		Mumbau	E		Type	ГС		I ammunan	LAD	
Author User-defined ID Ser-defined	Author User-defined ID Ser-defined I	mbering	Activate_Valve_C Automatic	Number	5		Туре	FC		Language	LAD	
Data type Default value	Data type Default value	ormation e		Author			Comment			Family		
Input Output Valve_C Bool InOut Temp Constant Return Activate_Valve_C twork 1: Discharge Valve The para and the para an	Input Output Valve_C Bool InOut Temp Constant Return Activate_Valve_C **DATA*-Active_Valve_C **DATA*-Active_Valve_C **DATA*-Active_Valve_C **Valve_C	sion	0.1		ID					,		
Valve_C Bool InOut Temp Constant Return Activate_Valve_C **DATA**Active_Valve_C **DATA**Active_Valve_C **DATA**E.Active_Valve_C	Valve_C Bool InOut Temp Constant Return Activate_Valve_C **DATA**Active_Valve_C **DATA**Active_Valve_C **DATA**E.Active_Valve_C					Data typ	е		Default value			
InOut Temp Constant Return Activate_Valve_C **DATA**Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C	InOut Temp Constant Return Activate_Valve_C **DATA**Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **DATA**E_Active_Valve_C **TOUTH											
Temp Constant Return Activate_Valve_C twork 1: Discharge Valve "DATA".Active_Valve_C	Temp Constant Return Activate_Valve_C twork 1: Discharge Valve "DATA".Active_Valve_C					Bool						
Constant Return Activate_Valve_C twork 1: Discharge Valve DATA".Active_Valve_C #Valve_C #	Constant Return Activate_Valve_C twork 1: Discharge Valve DATA".Active_Valve_C #Valve_C #Valve_C #Valve_C #Valve_C Valve_C #Valve_C #Valve_C Valve_C #Valve_C #Valve_C Valve_C #Valve_C #Valve_C Valve_C Valve_C Valve_C Valve_C *Valve_C											
Activate_Valve_C twork 1: Discharge Valve "DATA".Active_ Valve_C "DATA".E.Active_ Valve_C "DATA".E.Active_ Valve_C "DATA".E.Active_ Valve_C	Activate_Valve_C twork 1: Discharge Valve "DATA".Active_ Valve_C "DATA".E.Active_ Valve_C "DATA".E.Active_ Valve_C "DATA".E.Active_ Valve_C	Constant										
"DATA".E_Active_ Valve_C "DATA".E_Active_ Valve_C "BATA".E_Active_ Valve_C "BATA".E_Active_ Valve_C	"DATA".Active		v_Valve_C			Void						
"DATA".Active_ Valve_C	"DATA".Active_ Valve_C "DATA".E_Active_ Valve_C "HMI_Data". Valve_C					71-5			-			
"DATA".E_Active_ "HMI_Data". Valve_C Valve_C	"DATA".E_Active_ "HMI_Data". Valve_C Valve_C	.	gc valve									
"DATA".E_Active_ "HMI_Data". Valve_C Valve_C	"DATA".E_Active_ "HMI_Data". Valve_C Valve_C			<u> </u>	"DATA".Active							
"DATA".E_Active_ Valve_C "HMl_Data".	"DATA".E_Active_ Valve_C "HMI_Data".							#V	alve_C			
whe, C vote ()				"1				"HM	I_Data".			
					Valve_C							
				I								

Totally Integrated Automation Portal		
Program blocks DATA [DB1]	/ DB	
DATA Properties		

DATA Properties	;						
General							
Name	DATA	Number	1	Type	DB	Language	DB
Numbering	Automatic						
Information							
Title	Data blocks for functions	Author	Stiven Perez Mora	Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain
▼ Static			
Start_Stop	Bool	false	False
Q_TimeDischarge	Bool	false	False
E_Discharge	Int	0	False
Active_Valve_C	Bool	false	False
E_Active_Valve_C	Bool	false	False
E_Stop	Bool	false	False
Pb_Start	Bool	false	False

•

Program blocks / DB

HMI_Data [DB4]

HMI_Data Prope	erties						
General							
Name	HMI_Data	Number	4	Туре	DB	Language	DB
Numbering	Automatic						
Information							
Title		Author		Comment		Family	
Version	0.1	User-defined ID					

Name	Data type	Start value	Retain
▼ Static			
Start_HMI	Bool	false	False
Stop_HMI	Bool	false	False
Valve_A	Bool	false	False
Level_A	Bool	false	False
Valve_B	Bool	false	False
Level_B	Bool	false	False
Valve_C	Bool	false	False
Motor_Mixer	Bool	false	False
Temp_Relay	Bool	false	False
PT_Mixing	Time	T#0ms	False
PT_M_Mxing	Time	T#0ms	False
ET_Mixing	Time	T#0ms	False
ET_Mixing_S	Time	T#0ms	False
Empty_Level	Bool	false	False
Empty_Field_Time	Bool	false	False

VamUı	Properties						
	Т						
	TimeToWamUp	Number	2	Type DB		Language	DB
ing	Automatic						
tion							
		Author	Simatic	Comment		Family	IEC
	1.0	User-defined	ID IEC_TMR				
			Data type	Start va	lue		Retain
:							
			Time	T#0ms			False
			Time	T#0ms			False
			Bool	false			False
			Bool	false			False

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ne I oMixin eneral	g Properties								
me	TimeToMixing	Number	3		Туре	DB	Language	DB	
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	1.0	oser-defined i	•						
me				Data type		Start value		Retain	
Static									
PT				Time		T#0ms		False	
ET				Time		T#0ms		False	
IN Q				Bool Bool		false false		False False	

lixingTime Pi ieneral		N11.	E		50		DP
ame umbering	MixingTime Automatic	Number	5	Тур	e DB	Language	DB
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rsion	1.0	User-defined ID	Simatic IEC_TMR	Con	nment	Family	IEC
me			Data	type	Start value		Retain
Static				•			
PT			Time		T#0ms		False
ET			Time		T#0ms		False
IN			Bool Bool		false false		False False
Q			R 001		idise		raise