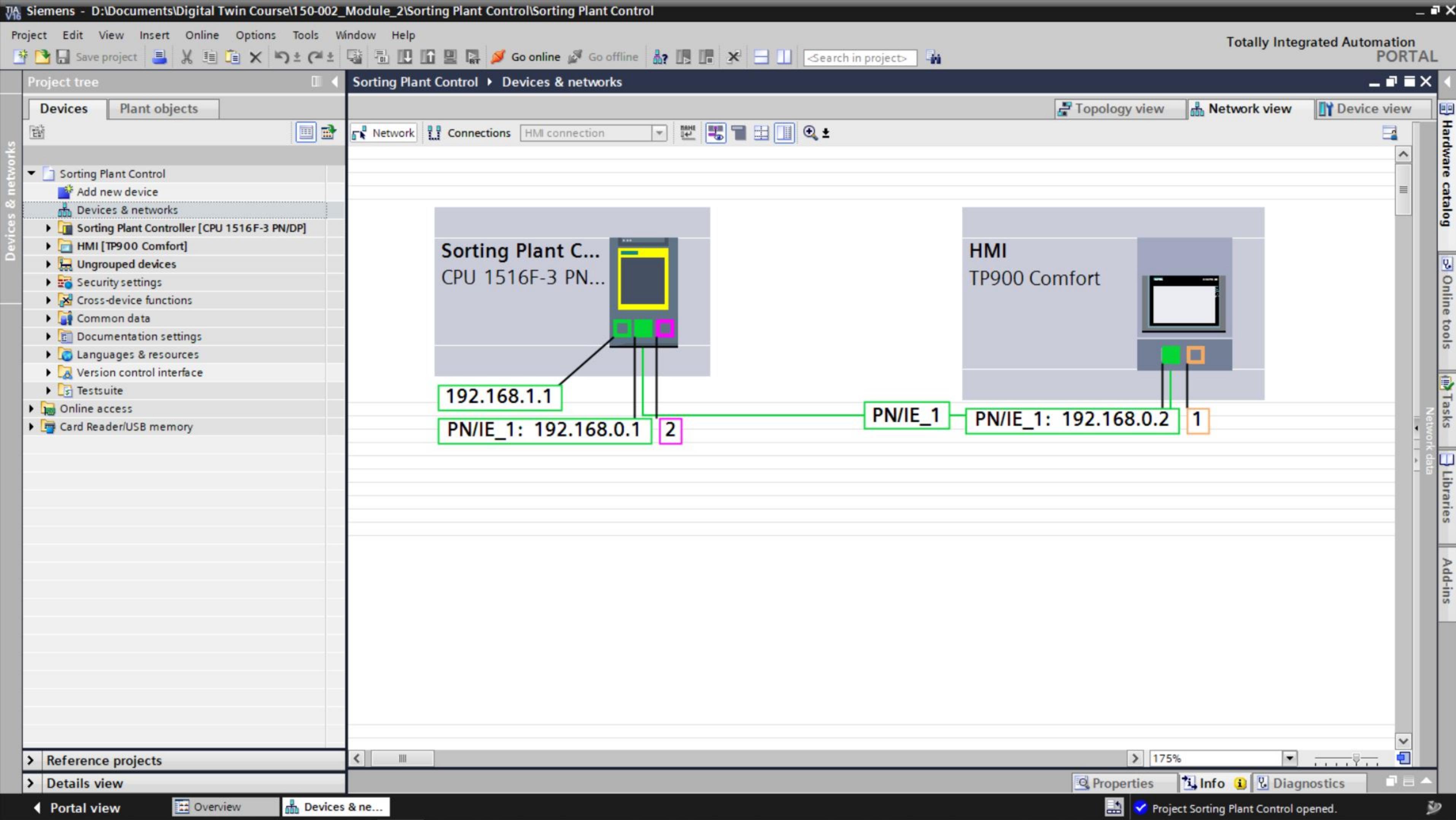


# Navigation

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**Sorting Plant Controller [CPU 1516F-3 PN/DP]**

**Topology view** **Network view** **Device view**

**Hardware catalog** **Online tools** **Tasks** **Device data** **Libraries** **Add-ins**

**PM 190W 120/230V** **Sorting Plant Cont...** **DI 32x24VDC HF-1** **DQ 32x24VDC 0.5A** **AI 8xUI/RTD/TC ST...** **AQ 4xUI ST...**

**Rail\_0**

100	0	1	2	3	4	5	6	...14	...22	...31
		<b>SIEMENS</b>						7	15	23
								-	-	-
								14	22	31

**Reference projects** **Details view** **Properties** **Info** **Diagnostics**

**Portal view** **Overview** **Sorting Plant...** **Project Sorting Plant Control opened.**

Project tree      Sorting Plant Control > Sorting Plant Controller [CPU 1516F-3 PN/DP] > PLC tags > Sorting Plant Tags [15]

Devices   Plant objects

Sorting Plant Tags

	Name	Data type	Address	Comment
1	csLightSensorCube_Detected	Bool	%I0.0	0: cube workpiece not detected; 1: cube workpiece detected by the light sensor
2	csLightSensorCylinder_Detected	Bool	%I0.1	0: cylinder workpiece not detected; 1: cylinder workpiece detected by the light sensor
3	csLightSensorWorkpiece_Detected	Bool	%I0.2	0: light sensor did not detect a workpiece, 1: light sensor detected a workpiece
4	csLimitSwitchCylinderNotExtended_Activated	Bool	%I0.3	0: the cylinder is fully extended; 1: the cylinder is not fully extended
5	csLimitSwitchCylinderRetracted_Activated	Bool	%I0.4	0: the cylinder is not fully retracted; 1: the cylinder is fully retracted
6	osWorkpieceCylinder_SetActive	Bool	%Q0.0	0: cylinder workpiece are not produced; 1: cylinder workpiece are produced
7	osWorkpieceCube_SetActive	Bool	%Q0.1	0: cube workpiece are not produced; 1: cube workpiece are produced
8	pcCylinderHeadRetract_SetActive	Bool	%Q0.2	0: do not retract push cylinder; 1: retract push cylinder
9	pcCylinderHeadExtend_SetActive	Bool	%Q0.3	0: do not extend push cylinder; 1: extend push cylinder
10	scConveyorLongConstSpeed_SetActive	Bool	%Q0.4	0: do not move the long conveyor at constant speed; 1: move the long conveyor at constant speed
11	scConveyorLongVarSpeed_SetActive	Bool	%Q0.5	0: do not move the long conveyor at variable speed; 1: move the long conveyor at variable speed
12	scConveyorShortConstSpeed_SetActive	Bool	%Q0.6	0: do not move the short conveyor at constant speed; 1: move the short conveyor at constant speed
13	scConveyorShortVarSpeed_SetActive	Bool	%Q0.7	0: do not move the short conveyor at variable speed; 1: move the short conveyor at variable speed
14	scConveyorLongVarSpeed_SetSpeed	Real	%QD64	variable velocity for long conveyor belt in m/s
15	scConveyorShortVarSpeed_SetSpeed	Real	%QD68	variable velocity for short conveyor belt in m/s
16	<Add new>			

Tags   User constants

Tasks   Libraries   Add-ins

Properties   Info   Diagnostics

Portal view   Overview   Sorting Plant...   Details view   Project Sorting Plant Control opened.

**PLC programming**

**Project tree**

**Devices**   **Plant objects**

**Control\_HMI**

	Name	Data type	Start value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
1	Static			<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2	toHMI	Struct		<input checked="" type="checkbox"/>	<input type="checkbox"/>					
3	resetStatus	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
4	numWorkpieces	USInt	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
5	numCylinders	USInt	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
6	numCubes	USInt	0	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
7	Error	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
8	ErrorID	Word	16#0	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
9	fromHMI	Struct		<input checked="" type="checkbox"/>	<input type="checkbox"/>					
10	resetSimulation	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
11	generateWorkpieces	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
12	cylinderCommand	Struct		<input checked="" type="checkbox"/>	<input type="checkbox"/>					
13	extendCylinder	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
14	retractCylinder	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
15	shortConveyor	Struct		<input checked="" type="checkbox"/>	<input type="checkbox"/>					
16	constSpeedControl	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
17	varSpeedControl	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
18	varSpeedPercentage	Real	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	% value				
19	longConveyor	Struct		<input checked="" type="checkbox"/>	<input type="checkbox"/>					
20	constSpeedControl	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
21	varSpeedControl	Bool	false	<input checked="" type="checkbox"/>	<input type="checkbox"/>					
22	varSpeedPercentage	Real	0.0	<input checked="" type="checkbox"/>	<input type="checkbox"/>	% value				

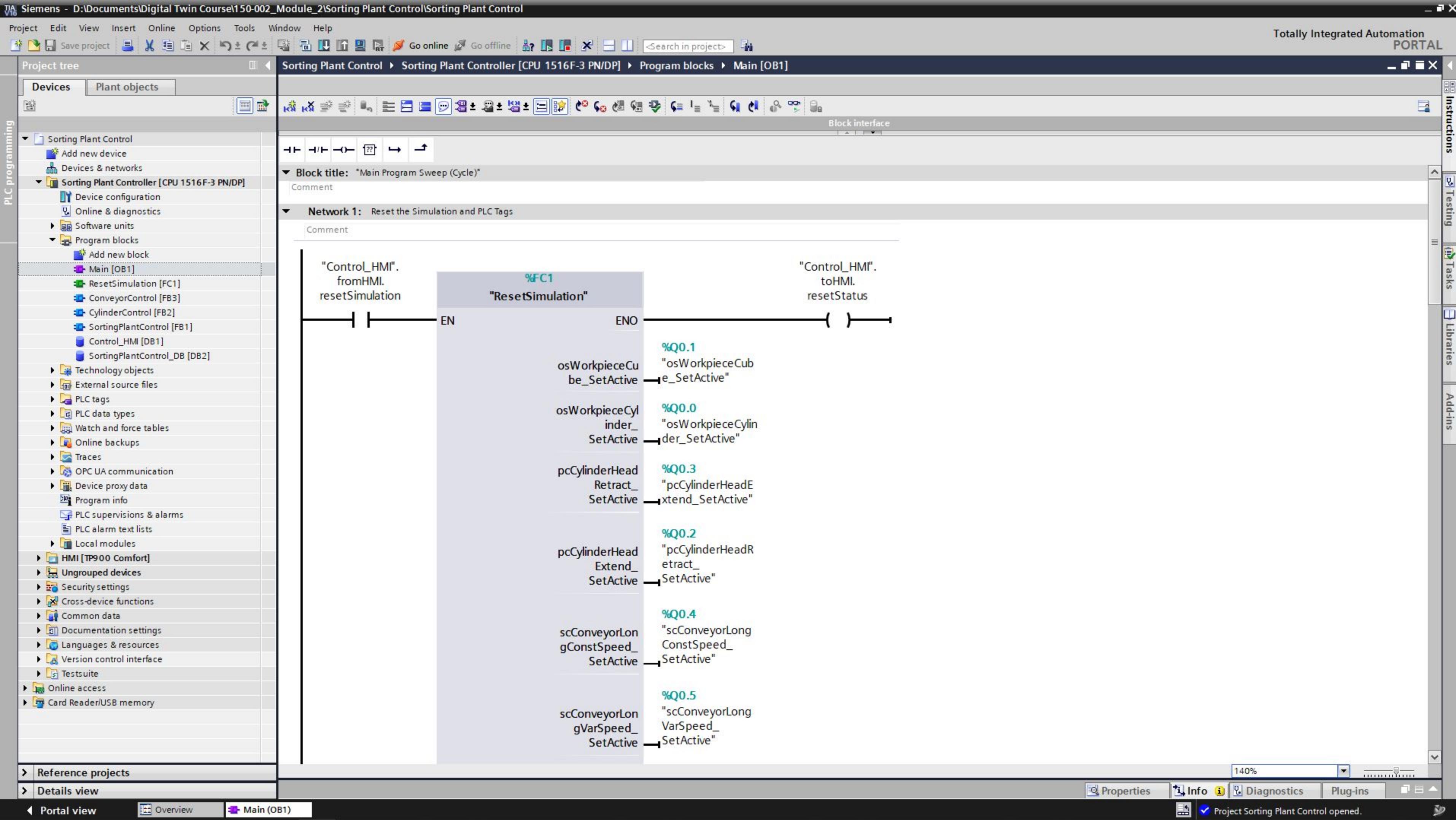
**Reference projects**

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**Portal view**   **Overview**   **Main (OB1)**   **SortingPlant...**   **Control\_HMI ...**

**Project Sorting Plant Control opened.**



VI6 Siemens - D:\Documents\Digital Twin Course\150-002\_Module\_2\Sorting Plant Control\Sorting Plant Control

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Totally Integrated Automation PORTAL

PLC programming

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Instructions Testing Tasks Libraries Add-ins

Sorting Plant Control > Sorting Plant Controller [CPU 1516F-3 PN/DP] > Program blocks > Main [OB1]

Block interface

scConveyorLongConstSpeed\_SetActive "scConveyorLongConstSpeed\_SetActive"

%Q0.5  
scConveyorLongVarSpeed\_SetActive "scConveyorLongVarSpeed\_SetActive"

%Q0.6  
scConveyorShortConstSpeed\_SetActive "scConveyorShortConstSpeed\_SetActive"

%Q0.7  
scConveyorShortVarSpeed\_SetActive "scConveyorShortVarSpeed\_SetActive"

%QD64  
scConveyorLongVarSpeed\_SetSpeed "scConveyorLongVarSpeed\_SetSpeed"

%QD68  
scConveyorShortVarSpeed\_SetSpeed "scConveyorShortVarSpeed\_SetSpeed"

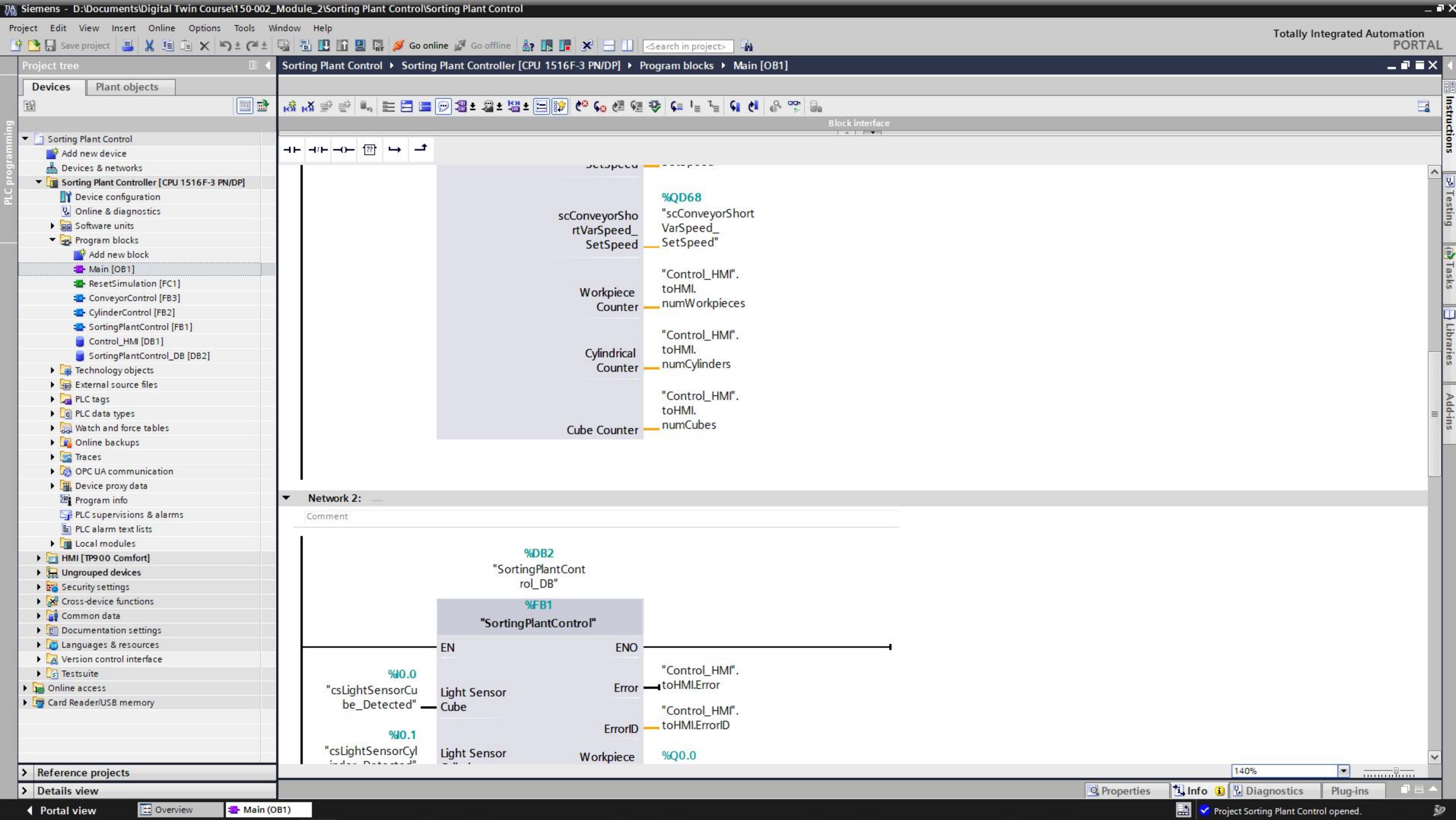
Workpiece Counter "Control\_HMI".toHMI.numWorkpieces

Cylindrical Counter "Control\_HMI".toHMI.numCylinders

"Control\_HMI".

140%

Project Sorting Plant Control opened.



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Reference projects

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Block interface

%DB2  
"SortingPlantCont  
rol\_DB"

%FB1  
"SortingPlantControl"

EN	ENO	Error	ErrorID	%Q0.0	%Q0.1	%Q0.2	%Q0.3	%Q0.4	%Q0.5
"csLightSensorCu be_Detected"	Light Sensor Cube			"osWorkpieceCylin der_SetActive"	"osWorkpieceCub e_SetActive"	"pcCylinderHeadR etract_SetActive"	"pcCylinderHeadE xtend_SetActive"	"scConveyorLong ConstSpeed_SetActive"	"scConveyorLong"
"csLightSensorCyl inder_Detected"	Light Sensor Cylinder	Workpiece Cylinder Generation							
"csLightSensorWo rkpiece_ Detected"	Light Sensor Workpiece	Workpiece Cube Generation							
"csLimitSwitchCyli nderNotExtended _Activated"	Limit Switch Cylinder NotExtended		Cylinder Retract						
"csLimitSwitchCyli nderRetracted_ Activated"	Limit Switch Cylinder Retracted		Cylinder Extend						
"Control_HMI". fromHMI. cylinderCommand .extendCylinder	Cylinder Extend Command	Conveyor Long Const Speed							
	"Control_HMI".	Conveyor							

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Sorting Plant Control > Sorting Plant Controller [CPU 1516F-3 PN/DP] > Program blocks > Main [OB1]

Block interface

UnderRetracted\_Activated" Cylinder Retracted Cylinder Extend xtend\_SetACTIVE %Q0.4 "scConveyorLong ConstSpeed\_SetActive"

"Control\_HMI". fromHMI. cylinderCommand extendCylinder Cylinder Extend Command Conveyor Long Const Speed %Q0.5 "scConveyorLong VarSpeed\_SetActive"

"Control\_HMI". fromHMI. cylinderCommand retractCylinder Cylinder Retract Command Conveyor Long Var Speed %QD64 "scConveyorLong VarSpeed\_SetSpeed"

"Control\_HMI". fromHMI. longConveyor. constSpeedController Long Conveyor Constant Speed Command Conveyor Long Var Speed Setpoint %Q0.6 "scConveyorShort ConstSpeed\_SetActive"

"Control\_HMI". fromHMI. longConveyor. varSpeedControl Long Conveyor Var Speed Command Conveyor Short Const Speed %Q0.7 "scConveyorShort VarSpeed\_SetActive"

"Control\_HMI". fromHMI. longConveyor. varSpeedPercent age Long Conveyor Var Speed Percentage Conveyor Short Var Speed %QD68 "scConveyorShort VarSpeed\_SetSpeed"

"Control\_HMI". fromHMI. shortConveyor. constSpeedController Short Conveyor Constant Speed Command Total Workpiece Count Set Cylinder "Control\_HMI". toHMI. numWorkpieces "Control\_HMI". toHMI.

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Project Sorting Plant Control opened.

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Sorting Plant Control > Sorting Plant Controller [CPU 1516F-3 PN/DP] > Program blocks > Main [OB1]

Command

- Conveyor Short Var Speed "scConveyorShort VarSpeed\_SetActive"
- Long Conveyor Var Speed Percentage %QD68 "scConveyorShort VarSpeed\_SetSpeed"
- Conveyor Long Short Speed Setpoint Total Workpiece Count Set "Control\_HMI". toHMI. numWorkpieces
- Short Conveyor Constant Speed Command Cylinder Count Set "Control\_HMI". toHMI. numCylinders
- Short Conveyor Var Speed Command Cube Count Set "Control\_HMI". toHMI. numCubes
- Short Conveyor Var Speed Percentage
- Generate Workpieces
- Total Workpiece Counter Value "Control\_HMI". toHMI. numWorkpieces
- Cylinder Counter Value "Control\_HMI". toHMI. numCylinders

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Sorting Plant Control Controller [CPU 1516F-3 PN/DP] Program blocks Main [OB1]

Block interface

Setpoint "Control\_HMI".fromHMI.shortConveyor constSpeedContr ol

Short Conveyor Constant Speed Command

Total Workpiece Count Set

"Control\_HMI".toHMI.numWorkpieces

"Control\_HMI".SetSpeed

Setpoint "Control\_HMI".fromHMI.shortConveyor varSpeedControl

Short Conveyor Var Speed Command

Cylinder Count Set

"Control\_HMI".toHMI.numCylinders

"Control\_HMI".numCylinders

Setpoint "Control\_HMI".fromHMI.shortConveyor varSpeedPercent age

Short Conveyor Var Speed Percentage

Cube Count Set

"Control\_HMI".toHMI.numCubes

"Control\_HMI".numCubes

Setpoint "Control\_HMI".fromHMI.generateWorkpie ces

Generate Workpieces

Total Workpiece Counter Value

"Control\_HMI".toHMI.numWorkpieces

"Control\_HMI".numWorkpieces

Setpoint "Control\_HMI".fromHMI.numCylinders

Cylinder Counter Value

"Control\_HMI".toHMI.numCylinders

"Control\_HMI".numCylinders

Setpoint "Control\_HMI".fromHMI.numCubes

Cube Counter Value

"Control\_HMI".toHMI.numCubes

"Control\_HMI".numCubes

Instructions Testing Tasks Libraries Add-ins

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Project Sorting Plant Control opened.

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**Details view**

**Sorting Plant Control** > **Sorting Plant Controller [CPU 1516F-3 PN/DP]** > **Program blocks** > **ResetSimulation [FC1]**

**ResetSimulation**

	Name	Data type	Default value	Comment
1	Input			
2	<Add new>			
3	Output			
4	osWorkpieceCube_SetActive	Bool		
5	osWorkpieceCylinder_SetActive	Bool		
6	pcCylinderHeadRetract_SetActive	Bool		
7	pcCylinderHeadExtend_SetActive	Bool		
8	scConveyorLongConstSpeed_SetActive	Bool		
9	scConveyorLongVarSpeed_SetActive	Bool		
10	scConveyorShortConstSpeed_SetActive	Bool		
11	scConveyorShortVarSpeed_SetActive	Bool		
12	scConveyorLongVarSpeed_SetSpeed	Real		
13	scConveyorShortVarSpeed_SetSpeed	Real		
14	Workpiece Counter	USInt		
15	Cylindrical Counter	USInt		
16	Cube Counter	USInt		
17	InOut			
18	<Add new>			
19	Temp			
20	<Add new>			
21	Constant			
22	<Add new>			
23	Return			
24	ResetSimulation	Void		

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**Portal view**   **Overview**   **Main (OB1)**   **ResetSimula...**

**Project Sorting Plant Control opened.**

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Reference projects

Details view

Block interface

Block title: ....

Comment

Network 1: Reset PLC Tags and Counter

Comment

```
#osWorkpieceCylinder_SetActive
(R)

#osWorkpieceCube_SetActive
(R)

#pcCylinderHeadRetract_SetActive
(R)

#pcCylinderHeadExtend_SetActive
(R)

#scConveyorLongConstSpeed_SetActive
(R)

#scConveyorLongVarSpeed_SetActive
(R)
```

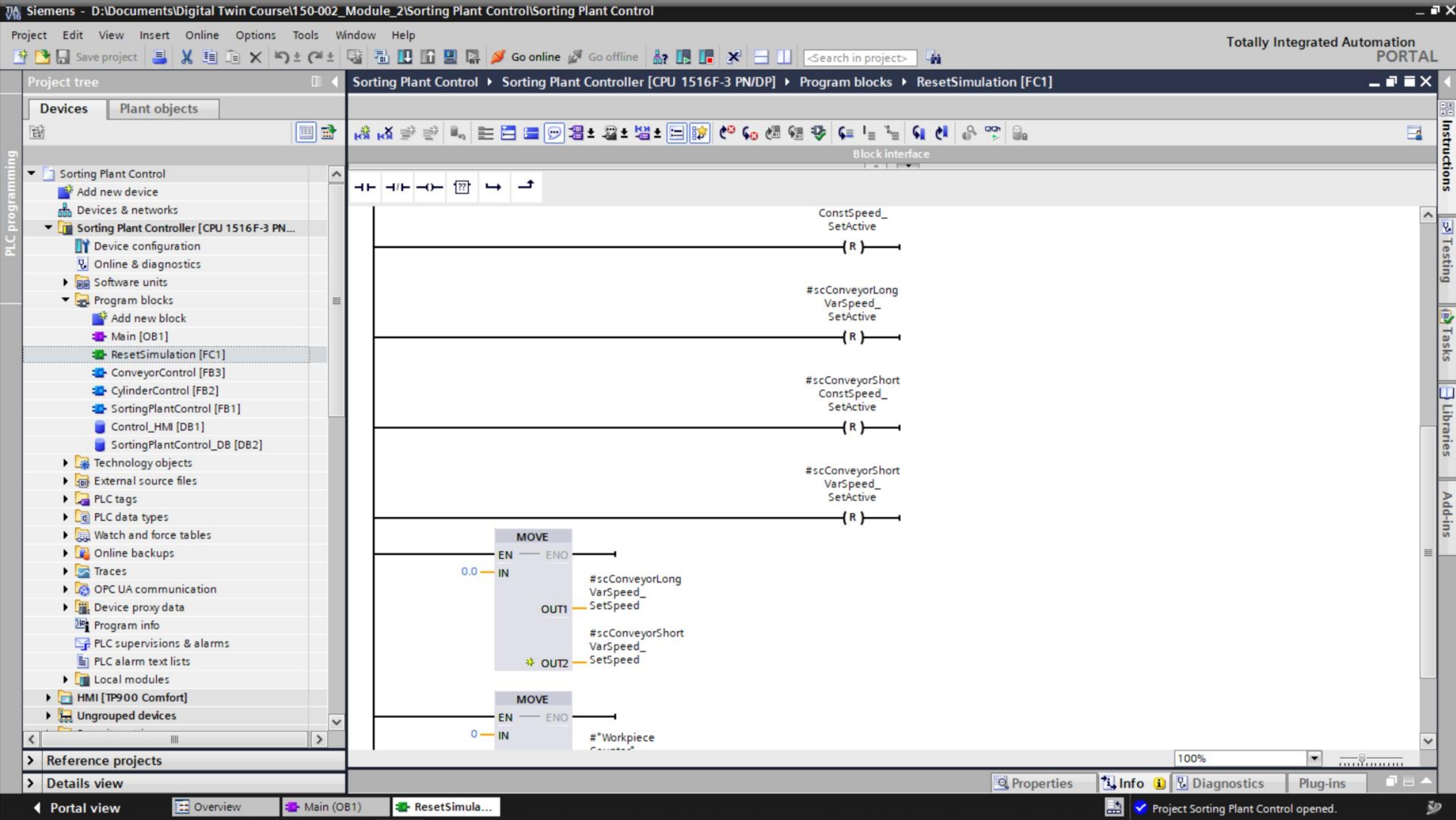
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100%

Project Sorting Plant Control opened.



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Block interface

Instructions Testing Tasks Libraries Add-ins

ResetSimulation [FC1]

```
MAIN [OB1]
    ResetSimulation [FC1]
        SCENE #scConveyorShort ConstSpeed_SetActive
        SCENE #scConveyorShort VarSpeed_SetActive
        MOVE
            EN 0.0
            IN #scConveyorLong VarSpeed_SetSpeed
            OUT1 #scConveyorShort VarSpeed_SetSpeed
            OUT2 * OUT2
        MOVE
            EN 0
            IN #"Workpiece Counter"
            OUT1 #"Cylindrical Counter"
            OUT2 #"Cube Counter"
```

Properties Info Diagnostics Plug-ins

Portal view Overview Main (OB1) ResetSimula...

Project Sorting Plant Control opened.

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    - ResetSimulation [FC1]**
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Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
1 Input									
2 Light Sensor Cube	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
3 Light Sensor Cylinder	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
4 Light Sensor Workpiece	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
5 Limit Switch Cylinder NotExtended	Bool	false	Non... <input type="button" value="▼"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
6 Limit Switch Cylinder Retracted	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
7 Cylinder Extend Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
8 Cylinder Retract Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
9 Long Conveyor Constant Speed Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
10 Long Conveyor Var Speed Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
11 Long Conveyor Var Speed Percentage	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
12 Short Conveyor Constant Speed Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
13 Short Conveyor Var Speed Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
14 Short Conveyor Var Speed Percentage	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
15 Generate Workpieces	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
16 Total Workpiece Counter Value	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
17 Cylinder Counter Value	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
18 Cube Counter Value	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
19 Output									
20 Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
21 ErrorID	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
22 Workpiece Cylinder Generation	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
23 Workpiece Cube Generation	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
24 Cylinder Retract	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
25 Cylinder Extend	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
26 Conveyor Long Const Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
27 Conveyor Long Var Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
28 Conveyor Long Var Speed Setpoint	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
29 Conveyor Short Const Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
30 Conveyor Short Var Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
31 Conveyor Long Short Speed Setpoint	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

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Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
19 Output									
20 Error	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
21 ErrorID	Word	16#0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
22 Workpiece Cylinder Generation	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
23 Workpiece Cube Generation	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
24 Cylinder Retract	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
25 Cylinder Extend	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
26 Conveyor Long Const Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
27 Conveyor Long Var Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
28 Conveyor Long Var Speed Setpoint	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
29 Conveyor Short Const Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
30 Conveyor Short Var Speed	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
31 Conveyor Long Short Speed Setpoint	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
32 Total Workpiece Count Set	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
33 Cylinder Count Set	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
34 Cube Count Set	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
35 InOut				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
36 <Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
37 Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
38 CylinderControl_Instance	"Cylinder...			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
39 ShortConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
40 LongConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
41 upCounter_Workpiece	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
42 lightSensorWorkpieceFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
43 lightSensorCubeFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
44 upCounter_Cube	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
45 lightSensorCylinderFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
46 upCounter_Cylinder	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
47 waitTime	Time	T#0ms	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			in ms
48 startWaitTimer	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
49 onTimer_Waitfunction	TON_TIME		Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

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Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
34 Cube Count Set	USInt	0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
35 InOut				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
36 <Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
37 Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
38 CylinderControl_Instance	"Cylinde...			<input checked="" type="checkbox"/>					
39 ShortConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>					
40 LongConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>					
41 upCounter_Workpiece	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
42 lightSensorWorkpieceFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
43 lightSensorCubeFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
44 upCounter_Cube	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
45 lightSensorCylinderFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
46 upCounter_Cylinder	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
47 waitTime	Time	T#0ms	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	in ms
48 startWaitTimer	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
49 onTimer_Waitfunction	TON_TIME		Non-retain	<input checked="" type="checkbox"/>					
50 cylinderInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
51 shortConvInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
52 longConvInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
53 Temp				<input type="checkbox"/>					
54 shortConvFault	Bool			<input type="checkbox"/>					
55 longConvFault	Bool			<input type="checkbox"/>					
56 cylFault	Bool			<input type="checkbox"/>					
57 waitTimeCalc	UDInt			<input type="checkbox"/>					
58 performEject	Bool			<input type="checkbox"/>					
59 Constant				<input type="checkbox"/>					
60 constantMaxSpeed	Real	0.05		<input type="checkbox"/>	max speed in m/s for constant speed m...				
61 varMaxSpeed	Real	0.15		<input type="checkbox"/>	max speed in m/s for variable speed mod...				
62 optimumEjectDistance	Real	0.02		<input type="checkbox"/>	optimal distance for ejection in m. In thi...				

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Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
37 Static				<input checked="" type="checkbox"/>					
38 ▶ CylinderControl_Instance	"Cylinde...			<input checked="" type="checkbox"/>					
39 ▶ ShortConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>					
40 ▶ LongConveyorControl_Instance	"Convey...			<input checked="" type="checkbox"/>					
41 ▶ upCounter_Workpiece	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
42 ▶ lightSensorWorkpieceFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
43 ▶ lightSensorCubeFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
44 ▶ upCounter_Cube	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
45 ▶ lightSensorCylinderFALLEdge	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
46 ▶ upCounter_Cylinder	CTU_USI...		Non-retain	<input checked="" type="checkbox"/>					
47 ▶ waitTime	Time	T#0ms	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	in ms
48 ▶ startWaitTimer	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
49 ▶ onTimer_Waitfunction	TON_TIME		Non-retain	<input checked="" type="checkbox"/>					
50 ▶ cylinderInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
51 ▶ shortConvInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
52 ▶ longConvInterlock	Bool	false	Non-retain	<input type="checkbox"/>					
53 Temp				<input type="checkbox"/>					
54 ▶ shortConvFault	Bool			<input type="checkbox"/>					
55 ▶ longConvFault	Bool			<input type="checkbox"/>					
56 ▶ cylFault	Bool			<input type="checkbox"/>					
57 ▶ waitTimeCalc	UDInt			<input type="checkbox"/>					
58 ▶ performEject	Bool			<input type="checkbox"/>					
59 Constant				<input type="checkbox"/>					
60 ▶ constantMaxSpeed	Real	0.05		<input type="checkbox"/>	max speed in m/s for constant speed mode				
61 ▶ varMaxSpeed	Real	0.15		<input type="checkbox"/>	max speed in m/s for variable speed mode				
62 ▶ optimumEjectDistance	Real	0.02		<input type="checkbox"/>	optimal distance for ejection in m. In this case 2.				

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**Sorting Plant Control Control\_HMI [DB1]**

**Sorting Plant Controller [CPU 1516F-3 PN/DP]**

**Program blocks**

**SortingPlantControl [FB1]**

**Block interface**

**Block title:** ....

**Comment**

**Network 1: Generate workpieces when triggered from HMI**

**Comment**

```

    graph TD
        N1((#Generate Workpieces)) --- N1_Condition["#Limit Switch Cylinder Retracted"]
        N1_Condition --- N1_End["{ }"]
        N2((#Workpiece Cube Generation)) --- N2_End["{ }"]
        N3((#Workpiece Cylinder Generation)) --- N3_End["{ }"]
    
```

**Network 2: Calculate Wait time**

Multiply time by 1000 to convert from seconds to milliseconds. Later convert it to the Time format in T#ms

```

    graph TD
        N2_Condition["#Conveyor Long Const Speed"] --- N2_Condition
        N2_Condition --- N2_End["{ }"]
        N3((#Workpiece Cylinder Generation)) --- N3_End["{ }"]
        N4((#Workpiece Cube Generation)) --- N4_End["{ }"]
    
```

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**Generation\***

**Network 2: Calculate Wait time**

Multiply time by 1000 to convert from seconds to milliseconds. Later convert it to the Time format in T#ms

```

    graph TD
        Start(( )) --> N2[Network 2: Calculate Wait time]
        N2 -- "Multiply time by 1000 to convert from seconds to milliseconds. Later convert it to the Time format in T#ms" --> Calc1[CALCULATE Real]
        Calc1 -- "EN: #Conveyor Long Const Speed" --> IN1_1["#optimumEjectDistance: 0.02"]
        Calc1 -- "EN: #Conveyor Long Const Speed" --> IN2_1["#constantMaxSpeed: 0.05"]
        Calc1 -- "EN: #Conveyor Long Const Speed" --> IN3_1["1000.0"]
        Calc1 -- EN --> OUT1["OUT := (IN1 / IN2) * IN3"]
        Calc1 -- ENO --> WaitTimeCalc1["#waitTimeCalc"]
        Calc2[CALCULATE Real] -- "EN: #Conveyor Long Var Speed" --> IN1_2["#optimumEjectDistance: 0.02"]
        Calc2 -- "EN: #Conveyor Long Var Speed" --> IN2_2["#constantMaxSpeed: 0.05"]
        Calc2 -- EN --> OUT2["OUT := (IN1 / IN2) * IN3"]
        Calc2 -- ENO --> WaitTimeCalc2["#waitTimeCalc"]
        WaitTimeCalc1 -- "#waitTimeCalc" --> TConv[T_CONV UDInt TO Time]
        WaitTimeCalc2 -- "#waitTimeCalc" --> TConv
        TConv -- "UDInt TO Time" --> OUT2["OUT: #waitTime"]
    
```

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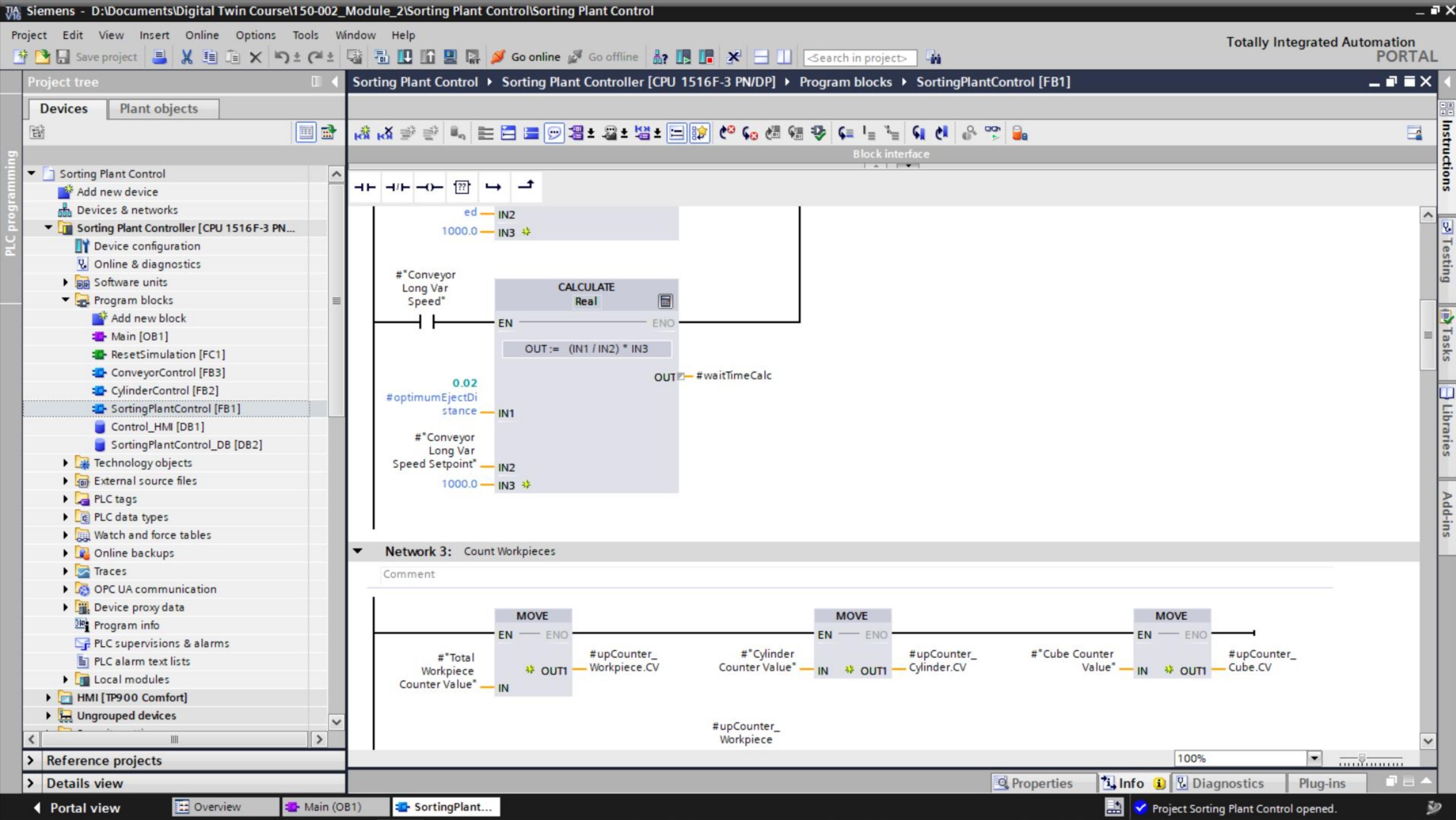
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**Block interface**

#~Conveyor  
Long Var  
Speed Setpoint\* — IN2  
1000.0 — IN3 \*

**Network 3: Count Workpieces**

Comment:

```

    graph LR
        N1["#shortConvInterlock"] --- N1_N["N"]
        N1_N --- L1["#lightSensorWorkpieceFALLEdge"]
        L1 --- C1["CTU USInt"]
        C1 --- Q1["Q"]
        C1 --- R1["R"]
        C1 --- PV1["PV"]
        PV1 --- CV1["CV"]
        CV1 --- T1["#Total Workpiece Counter Value"]
        T1 --- OUT1["* OUT1"]
        OUT1 --- M1["MOVE"]
        M1 --- EN1["EN"]
        M1 --- ENO1["ENO"]
        EN1 --- T1
        ENO1 --- OUT1

        N2["#longConvInterlock"] --- N2_N["N"]
        N2_N --- L2["#lightSensorCubeFALLEdge"]
        L2 --- C2["CTU USInt"]
        C2 --- Q2["Q"]
        C2 --- R2["R"]
        C2 --- PV2["PV"]
        PV2 --- CV2["CV"]
        CV2 --- T2["#Cube Counter Value"]
        T2 --- OUT2["* OUT1"]
        OUT2 --- M2["MOVE"]
        M2 --- EN2["EN"]
        M2 --- ENO2["ENO"]
        EN2 --- T2
        ENO2 --- OUT2
    
```

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**Sorting Plant Control** > **Sorting Plant Controller [CPU 1516F-3 PN/DP]** > **Program blocks** > **SortingPlantControl [FB1]**

**Block interface**

```

    graph TD
        StartWaitTimer((startWaitTimer)) --- Contact1[N]
        Contact1 --- Timer1[CTU USInt]
        Timer1 --- Q1[Q]
        Timer1 --- R1[false]
        Timer1 --- PV1[0]
        Timer1 --- CV1[CV]
        Timer1 --- TotalWorkpieceCountSet1["#Total Workpiece Count Set"]
        Timer1 --- Label1["#upCounter_Workpiece"]

        StartWaitTimer --- Contact2[N]
        Contact2 --- Timer2[CTU USInt]
        Timer2 --- Q2[Q]
        Timer2 --- R2[false]
        Timer2 --- PV2[0]
        Timer2 --- CV2[CV]
        Timer2 --- CubeCountSet2["#Cube Count Set"]
        Timer2 --- Label2["#upCounter_Cube"]

        StartWaitTimer --- Contact3[N]
        Contact3 --- Timer3[CTU USInt]
        Timer3 --- Q3[Q]
        Timer3 --- R3[false]
        Timer3 --- PV3[0]
        Timer3 --- CV3[CV]
        Timer3 --- CylinderCountSet3["#Cylinder Count Set"]
        Timer3 --- Label3["#upCounter_Cylinder"]

        Timer1 --- StartWaitTimer((startWaitTimer))
        Timer2 --- StartWaitTimer
        Timer3 --- StartWaitTimer
    
```

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Project Sorting Plant Control opened.

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**Sorting Plant Control Controller [CPU 1516F-3 PN/DP] > Program blocks > SortingPlantControl [FB1]**

**Block interface**

```

    TON
    IN: startWaitTimer
    PT: waitTime
    Q: performEject
  
```

**Network 4:** onTimer\_Waitfunction

**Network 5: Control Pneumatic Cylinder**

**Properties**   **Info**   **Diagnostics**   **Plug-ins**

100%

Portal view   Overview   Main (OB1)   SortingPlant...

Project Sorting Plant Control opened.

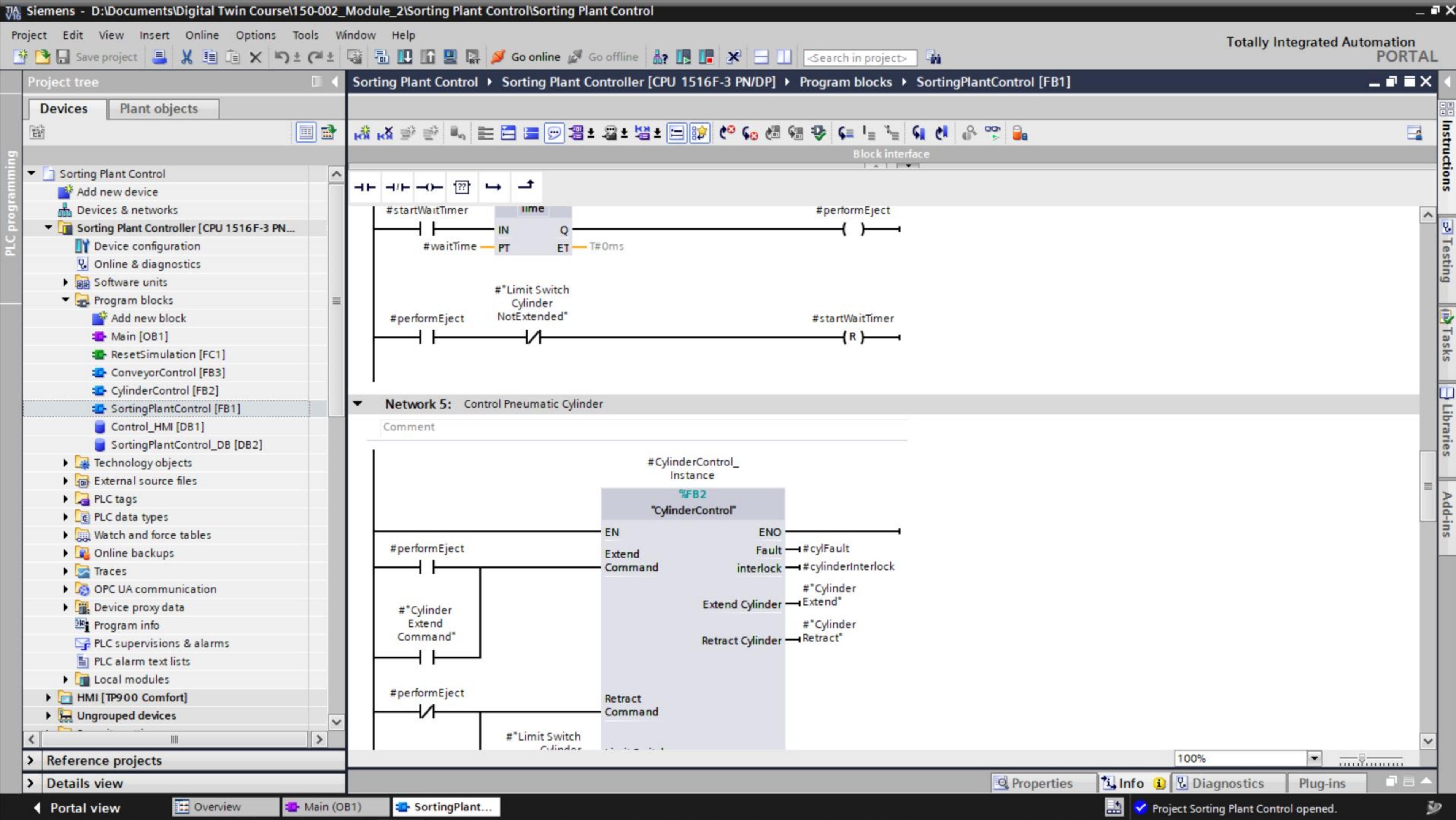
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**Sorting Plant Control** > **Sorting Plant Controller [CPU 1516F-3 PN/DP]** > **Program blocks** > **SortingPlantControl [FB1]**

**Block interface**

**Network 6: Short Conveyor Control**

**Comment:** #ShortConveyorControl\_Instance

**#FB3 "ConveyorControl"**

**EN**: #cylinderInterlock

**ENO**: #shortConvFault

**Fault**: #shortConvInterlock

**Execute**: #Short Conveyor Constant Speed Command

**Interlock**: #Conveyor Short Const Speed

**Constant Speed Control**: #Short Conveyor Var Speed Command

**Constant Speed Mode**: #Conveyor Short Var Speed

**Variable Speed Control**: #Conveyor

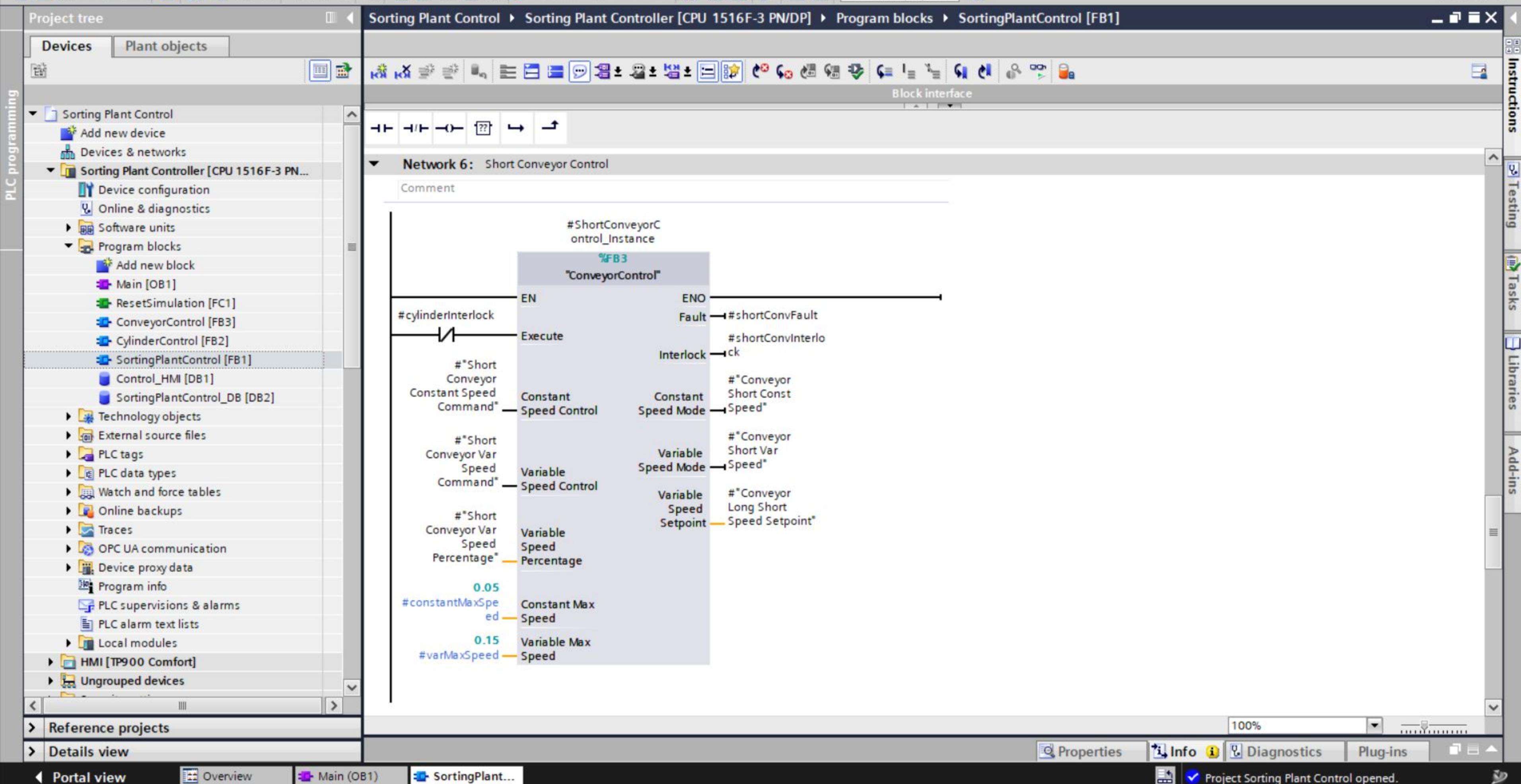
**Variable Speed Mode**: #Conveyor

**Variable**: #Conveyor

**Properties** **Info** **Diagnostics** **Plug-ins**

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Portal view Overview Main (OB1) SortingPlant... Project Sorting Plant Control opened.



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  - Program blocks**

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**Block interface**

**Network 7: Long Conveyor Control**

**Comment:** #LongConveyorCo ntrol\_Instance

**%FB3 "ConveyorControl"**

**EN**: #cylinderInterlock

**ENO**: #longConvFault

**Fault**: #longConvInterlo ck

**Execute**: #Long Conveyor Constant Speed Command

**Interlock**: #Conveyor Long Const Speed

**Constant Speed Control**: #Long Conveyor Var Speed Command

**Constant Speed Mode**: #Conveyor Long Var Speed

**Variable Speed Control**: #Long Conveyor Var Speed Percentage

**Variable Speed Setpoint**: #Conveyor Long Var Speed Setpoint

**Variable Speed Percentage**: 0.05

**Constant Max Speed**: #constantMaxSpe ed

**Variable Max Speed**: #varMaxSpeed

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**Network 8: Trigger Fault**

**Comment:**

```

#cylFault      MOVE      #Error
EN -- ENO
16#8610 -- IN * OUT1 -- #ErrorID

#shortConvFault      MOVE
EN -- ENO
16#8620 -- IN * OUT1 -- #ErrorID

#longConvFault      MOVE
EN -- ENO
16#8630 -- IN * OUT1 -- #ErrorID

#Error      MOVE
EN -- ENO
16#8600 -- IN * OUT1 -- #ErrorID

```

**Properties**   **Info**   **Diagnostics**   **Plug-ins**

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**Sorting Plant Control** > **Sorting Plant Controller [CPU 1516F-3 PN/DP]** > **Program blocks** > **CylinderControl [FB2]**

**CylinderControl**

	Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
1	Input				<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
2	Extend Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
3	Retract Command	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
4	Limit Switch Not Extended	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
5	Limit Switch Retracted	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
6	Output				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
7	Fault	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
8	interlock	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
9	Extend Cylinder	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
10	Retract Cylinder	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
11	InOut				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
12	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
13	Static				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
14	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
15	Temp				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
16	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
17	Constant				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
18	<Add new>				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

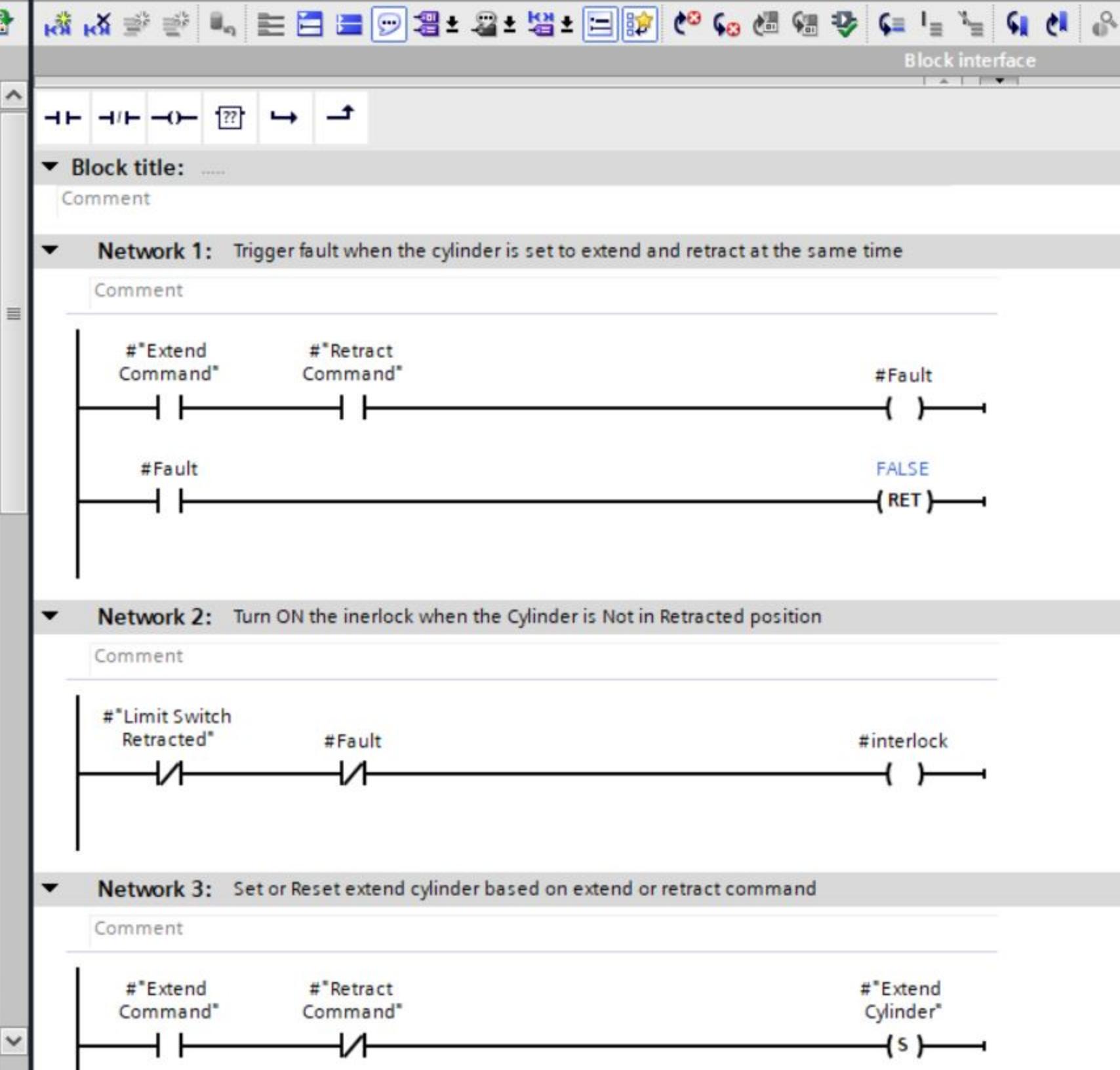
**Program**

Properties   Info   Diagnostics   Plug-ins

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    - Add new block
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    - CylinderControl [FB2]**
    - SortingPlantControl [FB1]
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**Block interface**

**Network 2:** Turn ON the interlock when the Cylinder is Not in Retracted position

Comment: #**"Limit Switch Retracted"**   #**Fault**   #**interlock**

```

    graph LR
        A["#Limit Switch Retracted"] --- B["#Fault"]
        B --- C["#interlock"]
    
```

**Network 3:** Set or Reset extend cylinder based on extend or retract command

Comment: #**"Extend Command"**   #**"Retract Command"**   #**"Extend Cylinder"**

```

    graph LR
        A["#Extend Command"] --- B["#Retract Command"]
        B --- C["#Extend Cylinder"]
    
```

Comment: #**"Retract Command"**   #**"Extend Command"**   #**"Extend Cylinder"**

```

    graph LR
        A["#Retract Command"] --- B["#Extend Command"]
        B --- C["#Extend Cylinder"]
    
```

**Network 4:** Set retract to true when Cylinder is not extended

Comment: #**"Extend Cylinder"**   #**"Retract Cylinder"**

```

    graph LR
        A["#Extend Cylinder"] --- B["#Retract Cylinder"]
        B --- C["#Retract Cylinder"]
    
```

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100%   Portal view   Overview   Main (OB1)   SortingPlant...   CylinderCont...   Project Sorting Plant Control opened.

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**ConveyorControl**

Name	Data type	Default value	Retain	Accessible f...	Writ...	Visible in ...	Setpoint	Supervis...	Comment
1 Input									
2 Execute	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
3 Constant Speed Control	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
4 Variable Speed Control	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
5 Variable Speed Percentage	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
6 Constant Max Speed	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
7 Variable Max Speed	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
8 Output									
9 Fault	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
10 Interlock	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
11 Constant Speed Mode	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
12 Variable Speed Mode	Bool	false	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
13 Variable Speed Setpoint	Real	0.0	Non-retain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
14 InOut									
15 <Add new>									
16 Static									
17 <Add new>									
18 Temp									
19 varSpeedSetpoint	Real								
20 Constant									
21 <Add new>									

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**Block interface**

**Block title:** ....

**Comment:**

**Network 1: Fault**

Trigger a fault if the conveyor is controlled both by constant and variable mode

```

    graph TD
        C1["#Constant Speed Control"] --- S1["#Variable Speed Control"]
        S1 --- C2["#Fault"]
        C2 --- C3["#Fault"]
        C3 --- C4["#RET"]
    
```

**Network 2: Interlock**

Set the interlock to true when conveyor is moving with constant or variable speed to indicate the conveyor is moving

```

    graph TD
        C1["#Constant Speed Mode"] --- S1["#Fault"]
        S1 --- C2["#Interlock"]
        C2 --- C3["#RET"]
        C4["#Variable Speed Mode"] --- C5["#Variable Speed Setpoint >= Real 0.0"]
        C5 --- C6["#Interlock"]
    
```

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**ConveyorControl [FB3]**

**Block interface**

**Network 2: Interlock**

Set the interlock to true when conveyor is moving with constant or variable speed to indicate the conveyor is moving

**Network 3: Variable or Constant mode**

Comment:

**Properties**   **Info**   **Diagnostics**   **Plug-ins**

100%   **Portal view**   **Overview**   **Main (OB1)**   **SortingPlant...**   **ConveyorCo...**

Project Sorting Plant Control opened.

Siemens - D:\Documents\Digital Twin Course\150-002\_Module\_2\Sorting Plant Control\Sorting Plant Control

TIA V16 Project Edit View Insert Online Options Tools Window Help

Save project Go online Go offline Search in project

Totally Integrated Automation PORTAL

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Network 3: Variable or Constant mode

Comment:

```
graph TD
    A["#Execute"] --- B["#\"Constant Speed Control\""]
    A --- C["#\"Variable Speed Control\""]
    A --- D["#\"Variable Speed Mode\""]
    A --- E["#\"Constant Speed Mode\""]
    B --- F["#\"Variable Speed Control\""]
    B --- G["#\"Constant Speed Control\""]
    B --- H["#\"Constant Speed Mode\""]
    B --- I["#\"Variable Speed Mode\""]
```

Network 4: Var Speed Set Speed Calculation

If moving at constant speed, set var speed setpoint to 0.0 If moving at variable speed, set speed to input speed if less than max speed or else set max speed.

#Constant Speed Mode

MOVE

EN — ENO

0.0 — IN

\* OUT1 — Speed Setpoint

#Variable Speed Mode

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**Block interface**

**Network 4: Var Speed Set Speed Calculation**

If moving at constant speed, set var speed setpoint to 0.0 If moving at variable speed, set speed to input speed if less than max speed or else set max speed.

```

Network 4: Var Speed Set Speed Calculation
If moving at constant speed, set var speed setpoint to 0.0 If moving at variable speed, set speed to input speed if less than max speed or else set max speed.

#Constant Speed Mode
MOVE
EN -- ENO
0.0 -- IN
#Variable Speed Setpoint* -- OUT1

#Variable Speed Mode
CALCULATE
Real
EN -- ENO
OUT := (IN1 / IN2) * IN3
IN1 -- #Variable Speed Percentage
IN2 -- 100.0
IN3 -- #Variable Max Speed

#varSpeedSetpoint
MOVE
EN -- ENO
#varSpeedSetpoint -- IN
#Variable Max Speed -- OUT1
#varSpeedSetpoint -- IN
#Variable Max Speed -- OUT1

#varSpeedSetpoint
MOVE
EN -- ENO
#varSpeedSetpoint -- IN
#Variable Max Speed -- OUT1
#varSpeedSetpoint -- IN
#Variable Max Speed -- OUT1

```

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**Reference projects**

**Details view**

**Sorting Plant Control > HMI [TP900 Comfort]**

**Topology view** **Network view** **Device view**

**HMI [TP900 Comfort]**

**HMI**

**HMI\_CP\_1 [PROFINET Interface]**

**Properties** **Info** **Diagnostics**

**General** **IO tags** **System constants** **Texts**

**Ethernet addresses**

**Interface networked with**

Subnet: PN/IE\_1 **Add new subnet**

**IP protocol**

Set IP address in the project

IP address: 192 . 168 . 0 . 2

Subnet mask: 255 . 255 . 255 . 0

Use router

**Hardware catalog** **Device data** **Online tools** **Tasks** **Libraries** **Add-ins**

**Portal view** **Overview** **HMI** **Project Sorting Plant Control opened.**

**Project tree**

- Devices
- Plant objects

**Devices & networks**

- Sorting Plant Control
  - Add new device
  - Devices & networks
  - Sorting Plant Controller [CPU 1516F-3 PN/DP]
  - HMI [TP900 Comfort]
    - Device configuration
    - Online & diagnostics
    - Runtime settings
    - Screens
    - Screen management
    - HMI tags
    - Connections
    - HMI alarms
    - Recipes
    - Historical data
    - Scripts
    - Scheduled tasks
    - Cycles
    - Reports
    - Text and graphic lists
    - User administration
  - Ungrouped devices
  - Security settings
  - Cross-device functions
  - Common data
  - Documentation settings
  - Languages & resources
  - Version control interface
  - Testsuite
  - Online access
  - Card Reader/USB memory
- Reference projects
- Details view

**Sorting Plant Control > Devices & networks**

Network Connections HMI connection

**HMI [TP900 Comfort]**

Properties Info Diagnostics

General		IO tags	System constants	Texts								
<ul style="list-style-type: none"> <li>General</li> <li>PROFINETInterface [X1]</li> <li>MPI/DP Interface [X2]</li> </ul>												
<ul style="list-style-type: none"> <li>Information</li> </ul>												
<b>General</b> <table border="1"> <tr> <td>Name:</td> <td>HMI</td> </tr> <tr> <td>Device/application type:</td> <td>TP900 Comfort</td> </tr> <tr> <td>Author:</td> <td>Admin</td> </tr> <tr> <td>Comment:</td> <td></td> </tr> </table>					Name:	HMI	Device/application type:	TP900 Comfort	Author:	Admin	Comment:	
Name:	HMI											
Device/application type:	TP900 Comfort											
Author:	Admin											
Comment:												
<b>Catalog information</b>												

**Hardware catalog**

Network data

Online tools

Tasks

Libraries

Add-ins

Portal view Overview Devices & ne...

Project Sorting Plant Control opened.

**Project tree**

**Devices** **Plant objects**

**Visualization**

- Sorting Plant Control
  - Add new device
  - Devices & networks
  - Sorting Plant Controller [CPU 1516F-3 PN...]
  - HMI [TP900 Comfort]
    - Device configuration
    - Online & diagnostics
    - Runtime settings
    - Screens
      - Add new screen
      - 10\_Startscreen
      - 20\_Messages
      - 30\_Diagnostics
      - 40\_Settings
    - Screen management
    - HMI tags
    - Connections
    - HMI alarms
    - Recipes
    - Historical data
    - Scripts
    - Scheduled tasks
    - Cycles
    - Reports
    - Text and graphic lists
    - User administration
  - Ungrouped devices
  - Security settings
  - Cross-device functions
  - Common data
  - Documentation settings

**Sorting Plant Control** > HMI [TP900 Comfort] > Screens > 10\_Startscreen

**Toolbox**

**Animations**

**Layout**

**Instructions**

**Tasks**

**Libraries**

**Add-ins**

**Properties** **Info** **Diagnostics** **Plug-ins**

**100%**

**SIEMENS** **SIMATIC HMI** **TOUCH**

**Sorting Plant**

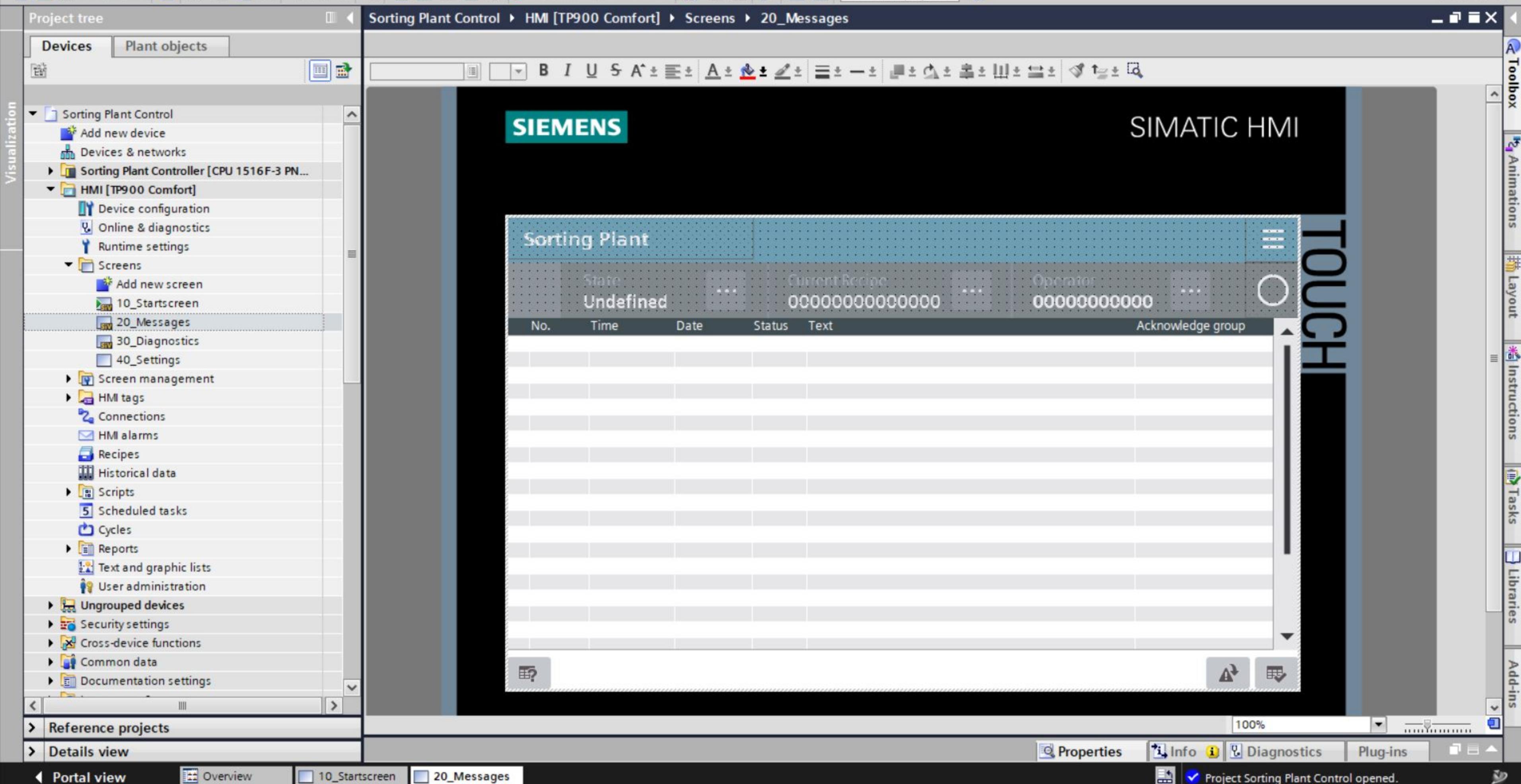
Short Conveyor		Piece Count	Light Sensors
Constant	Variable	Workpieces 00000	Workpiece
Speed: 000.00 %	0.00000 m/s	Cylindrical 00000	Cylinder
Long Conveyor		Cube 00000	Cube
Constant	Variable	Simulation	
Speed: 000.00 %	0.00000 m/s	Status	Reset
Workpiece Generation		Error	Error ID 0000
		Cylinder Extended	Cylinder Retracted
		Activate	

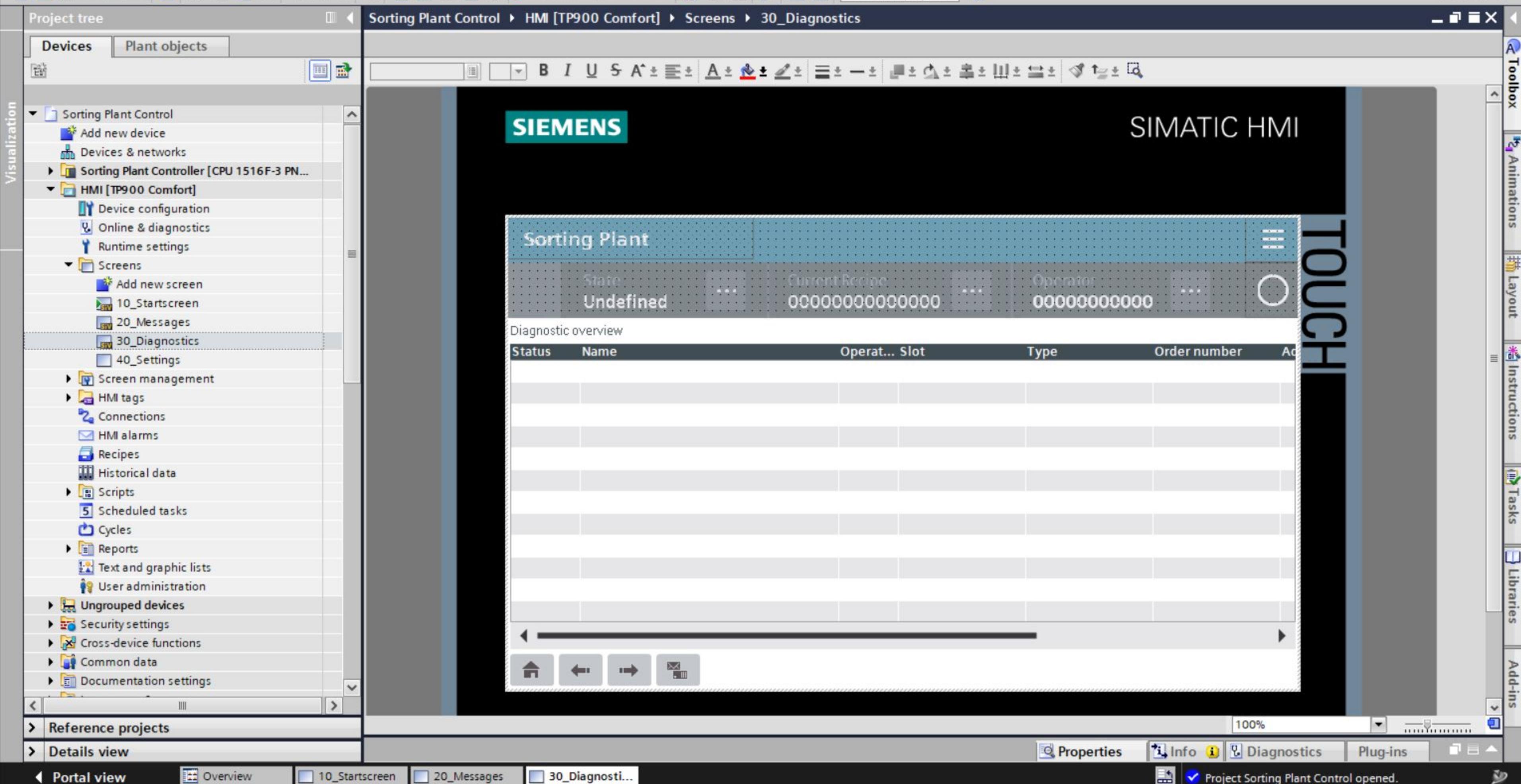
**Reference projects**

**Details view**

**Portal view** **Overview** **10\_Startscreen**

**Project Sorting Plant Control opened.**





Project tree      Sorting Plant Control > HMI [TP900 Comfort] > Screens > 40\_Settings

Devices Plant objects

Visualization

SIEMENS SIMATIC HMI TOUCH

Sorting Plant

State: Undefined Current Recipe: 000000000000 Operator: 0000000000

Display Brightness: 

Project tree (continued):

- Sorting Plant Control
  - Add new device
  - Devices & networks
  - Sorting Plant Controller [CPU 1516F-3 PN...]
  - HMI [TP900 Comfort]
    - Device configuration
    - Online & diagnostics
    - Runtime settings
    - Screens
      - Add new screen
      - 10\_Startscreen
      - 20\_Messages
      - 30\_Diagnostics
      - 40\_Settings
    - Screen management
    - HMI tags
    - Connections
    - HMI alarms
    - Recipes
    - Historical data
    - Scripts
    - Scheduled tasks
    - Cycles
    - Reports
    - Text and graphic lists
    - User administration
  - Ungrouped devices
  - Security settings
  - Cross-device functions
  - Common data
  - Documentation settings

Reference projects

Details view

Properties Info Diagnostics Plug-ins

Portal view Overview 10\_Startscreen 20\_Messages 30\_Diagnostics 40\_Settings

Project Sorting Plant Control opened.

Toolbox Animations Layout Instructions Tasks Libraries Add-ins

**Project tree**

**Devices** **Plant objects**

**PLC\_DB**

Name	Data type	Connection	PLC name	PLC tag	Acquisition cycle	Logged	So...
Control_HMI_fromHMI_cylinderCommand_extendCylinder	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.cylinderCommand.extendCylinder	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_cylinderCommand_retractCylinder	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.cylinderCommand.retractCylinder	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_generateWorkpieces	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.generateWorkpieces	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_longConveyor_constSpeedControl	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.longConveyor.constSpeedControl	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_longConveyor_varSpeedControl	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.longConveyor.varSpeedControl	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_longConveyor_varSpeedPercentage	Real	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.longConveyor.varSpeedPercentage	100 ms	<input type="checkbox"/>	% ...
Control_HMI_fromHMI_resetSimulation	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.resetSimulation	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_shortConveyor_constSpeedControl	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.shortConveyor.constSpeedControl	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_shortConveyor_varSpeedControl	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.shortConveyor.varSpeedControl	100 ms	<input type="checkbox"/>	
Control_HMI_fromHMI_shortConveyor_varSpeedPercentage	Real	HMI_Con...	Sorting Plant Controller	Control_HMI.fromHMI.shortConveyor.varSpeedPercentage	100 ms	<input type="checkbox"/>	% ...
Control_HMI_toHMI_Error	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.Error	100 ms	<input type="checkbox"/>	
Control_HMI_toHMI_ErrorID	Word	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.ErrorID	100 ms	<input type="checkbox"/>	
Control_HMI_toHMI_numCubes	USInt	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.numCubes	100 ms	<input type="checkbox"/>	
Control_HMI_toHMI_numCylinders	USInt	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.numCylinders	100 ms	<input type="checkbox"/>	
Control_HMI_toHMI_numWorkpieces	USInt	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.numWorkpieces	100 ms	<input type="checkbox"/>	
Control_HMI_toHMI_resetStatus	Bool	HMI_Con...	Sorting Plant Controller	Control_HMI.toHMI.resetStatus	100 ms	<input type="checkbox"/>	
<Add new>							

**Visualization**

**Details view**

**Properties** **Info** **Diagnostics**

**Portal view** **Overview** **PLC\_DB**

**Project Sorting Plant Control opened.**

**Project tree**

**Devices** **Plant objects**

**PLC\_Tags**

Name	Data type	Connection	PLC name	PLC tag	Acquisition cycle	Source comment
csLightSensorCube_Detected	Bool	HMI_Connectio...	Sorting Plant Controller	csLightSensorCube_Dete...	100 ms	0: cube workpiece not detected; 1: cube work...
csLightSensorCylinder_Detected	Bool	HMI_Connectio...	Sorting Plant Controller	csLightSensorCylinder_D...	100 ms	0: cylinder workpiece not detected; 1: cylind...
csLightSensorWorkpiece_Detected	Bool	HMI_Connectio...	Sorting Plant Controller	csLightSensorWorkpiece...	100 ms	0: light sensor did not detect a workpiece, 1: 1...
csLimitSwitchCylinderNotExtended_Activated	Bool	HMI_Connectio...	Sorting Plant Controller	csLimitSwitchCylinderNo...	100 ms	0: the cylinder is fully extended; 1: the cylind...
csLimitSwitchCylinderRetracted_Activated	Bool	HMI_Connectio...	Sorting Plant Controller	csLimitSwitchCylinderRet...	100 ms	0: the cylinder is not fully retracted; 1: the cyl...
osWorkpieceCube_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	osWorkpieceCube_SetAc...	100 ms	0: cube workpiece are not produced; 1: cube ...
osWorkpieceCylinder_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	osWorkpieceCylinder_Set...	100 ms	0: cylinder workpiece are not produced; 1: cyl...
pcCylinderHeadExtend_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	pcCylinderHeadExtend_S...	100 ms	0: do not extend push cylinder; 1: extend pus...
pcCylinderHeadRetract_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	pcCylinderHeadRetract_S...	100 ms	0: do not retract push cylinder; 1: retract pus...
scConveyorLongConstSpeed_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	scConveyorLongConstSp...	100 ms	0: do not move the long conveyor at constan...
scConveyorLongVarSpeed_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	scConveyorLongVarSpee...	100 ms	0: do not move the long conveyor at variable ...
scConveyorLongVarSpeed_SetSpeed	Real	HMI_Connectio...	Sorting Plant Controller	scConveyorLongVarSpee...	100 ms	variable velocity for long conveyor belt in m/s
scConveyorShortConstSpeed_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	scConveyorShortConstSp...	100 ms	0: do not move the short conveyor at constan...
scConveyorShortVarSpeed_SetActive	Bool	HMI_Connectio...	Sorting Plant Controller	scConveyorShortVarSpee...	100 ms	0: do not move the short conveyor at variable..
scConveyorShortVarSpeed_SetSpeed	Real	HMI_Connectio...	Sorting Plant Controller	scConveyorShortVarSpee...	100 ms	variable velocity for short conveyor belt in m/s

<Add new>

**Visualization**

**Libraries**

**Add-ins**

**Properties** **Info** **Diagnostics**

**Portal view** **Overview** **PLC\_DB** **PLC\_Tags**

**Project Sorting Plant Control opened.**