

Faculty of Engineering Ain Shams University
International credit hours education program (ICHEP)
Mechatronics senior 1



Automation – Major Task 2

MCT313

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Full production line system

1.0. INTRODUCTION

This report offers a comprehensive overview of a fully integrated production line, meticulously designed and simulated using TIA Portal and Factory I/O. The production line encompasses a spectrum of sophisticated machinery, including a Pick and Place Robot, a CNC Machine, a Sorting Station, and an Assembly Robot. Each component plays a pivotal role in the seamless operation of the manufacturing process, aimed at optimizing efficiency, accuracy, and productivity.

Through the utilization of TIA Portal, an advanced engineering framework, and Factory I/O, a powerful simulation software, this report explores the intricate interplay between digital design and real-world application. By simulating the production line in a virtual environment, engineers can anticipate potential challenges, fine-tune operational parameters, and refine automation strategies before deployment in the physical realm.

The integration of diverse elements within the production line underscores the complexity of modern manufacturing systems. From the precise movements of the Pick and Place Robot to the intricacies of CNC machining and the intricately choreographed actions of the Assembly Robot, every facet of the process is meticulously orchestrated to achieve optimal performance.

Throughout this report, we delve into the specific functionalities of each component, examining their individual contributions to the overall workflow and elucidating the synergies that exist between them. Additionally, we explore the benefits of employing TIA Portal and Factory I/O in the development and optimization of such production lines, highlighting their role in driving innovation and enhancing operational efficiency.

By elucidating the inner workings of this fully realized production line, this report aims to provide valuable insights into the evolving landscape of industrial automation, offering practical guidance for engineers and stakeholders seeking to harness the transformative potential of advanced manufacturing technologies.

2.0. OBJECTIVE

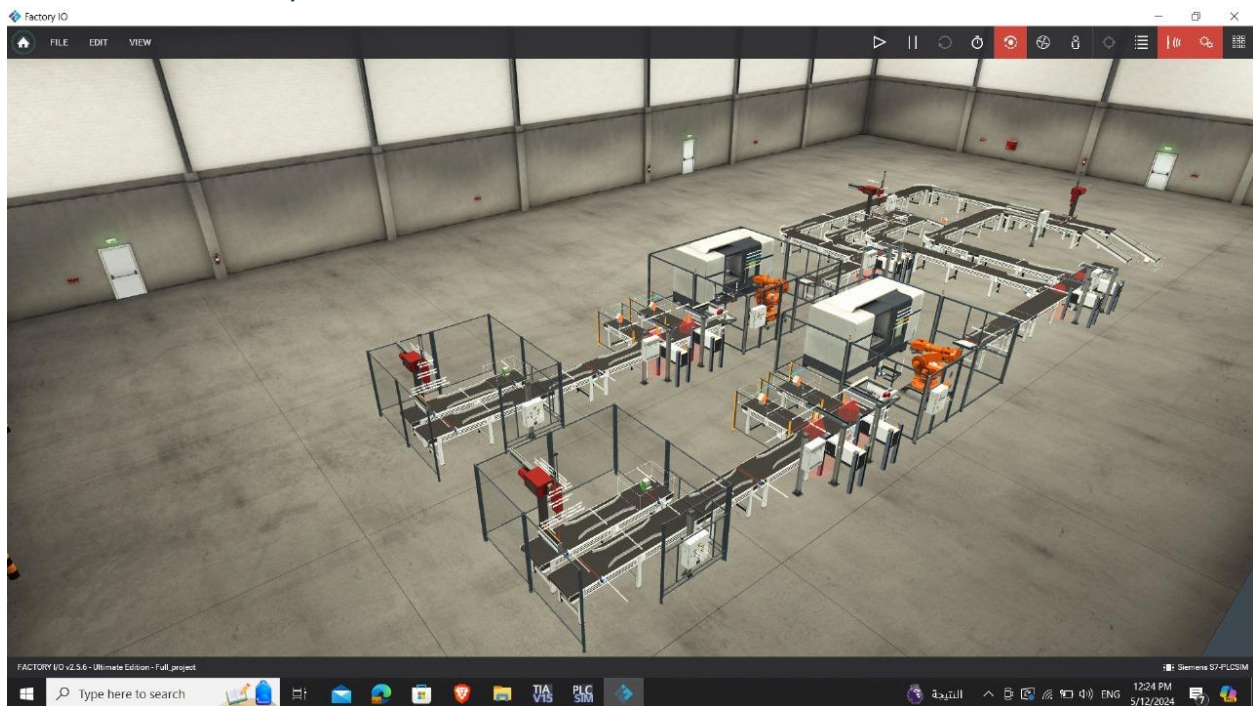
In groups of 3 students each, you are required to:

- Design a full functioning production line on a simulation platform (ex. FACTORY I/O)
- Use Siemens TIA portal software in order to control the simulated production line while incorporating the studied functions in the design process of such application.
- Design a suitable HMI module in order to monitor and visualize the various states of the simulated production line and supply supervisory control commands
- Utilize field-related alarms for the detection of hardware and sequence faults.

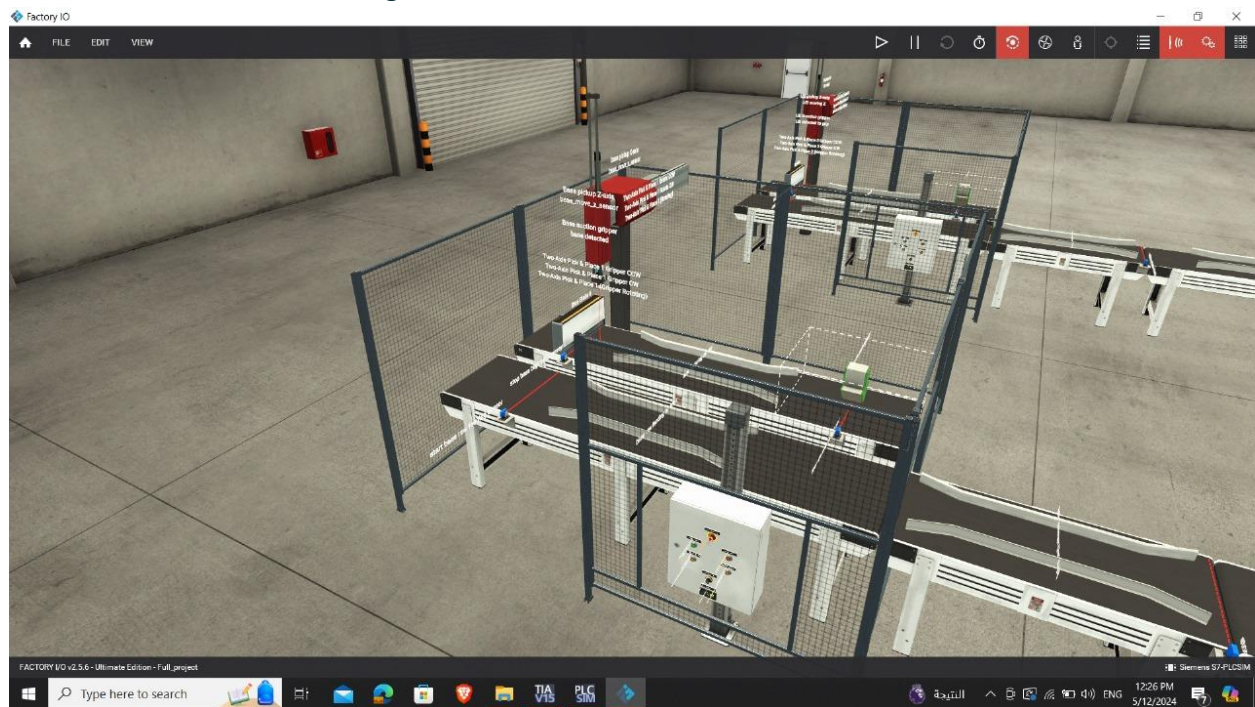
The mentioned production line performs the tasks of machining, sorting and assembly starting from raw materials to finished assembled products.

3.0. SIMULATION

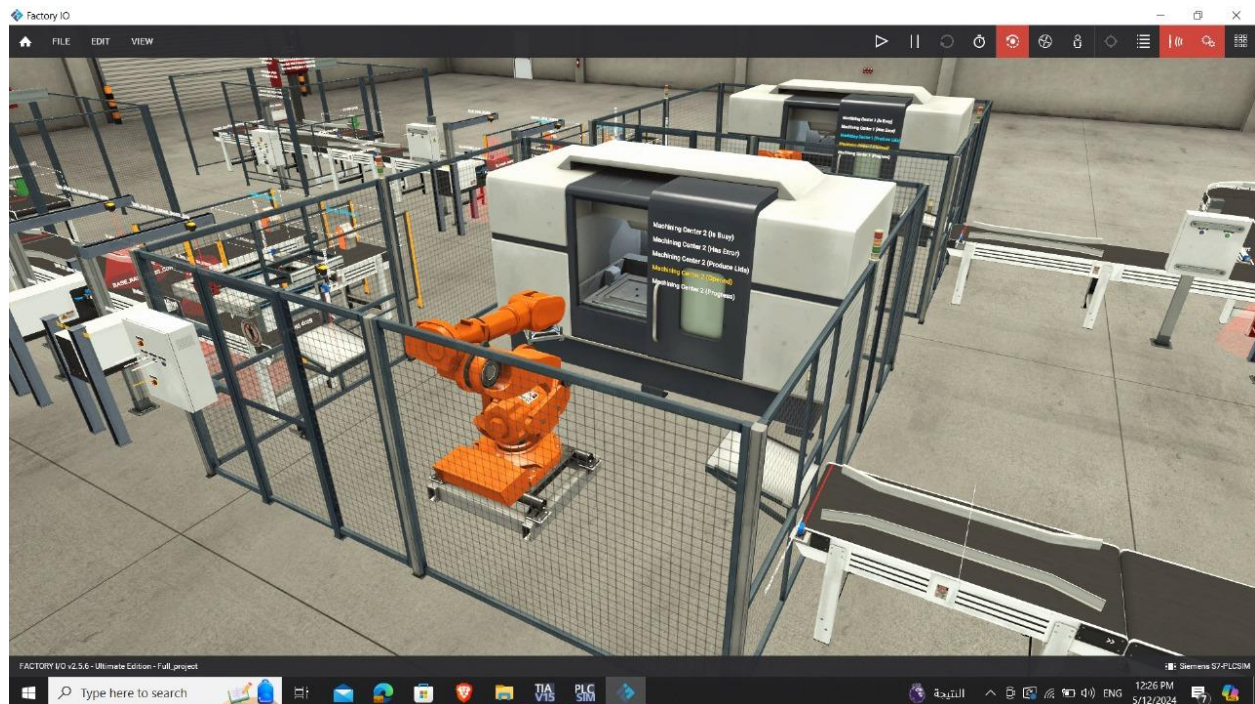
3.1. Factory I/O



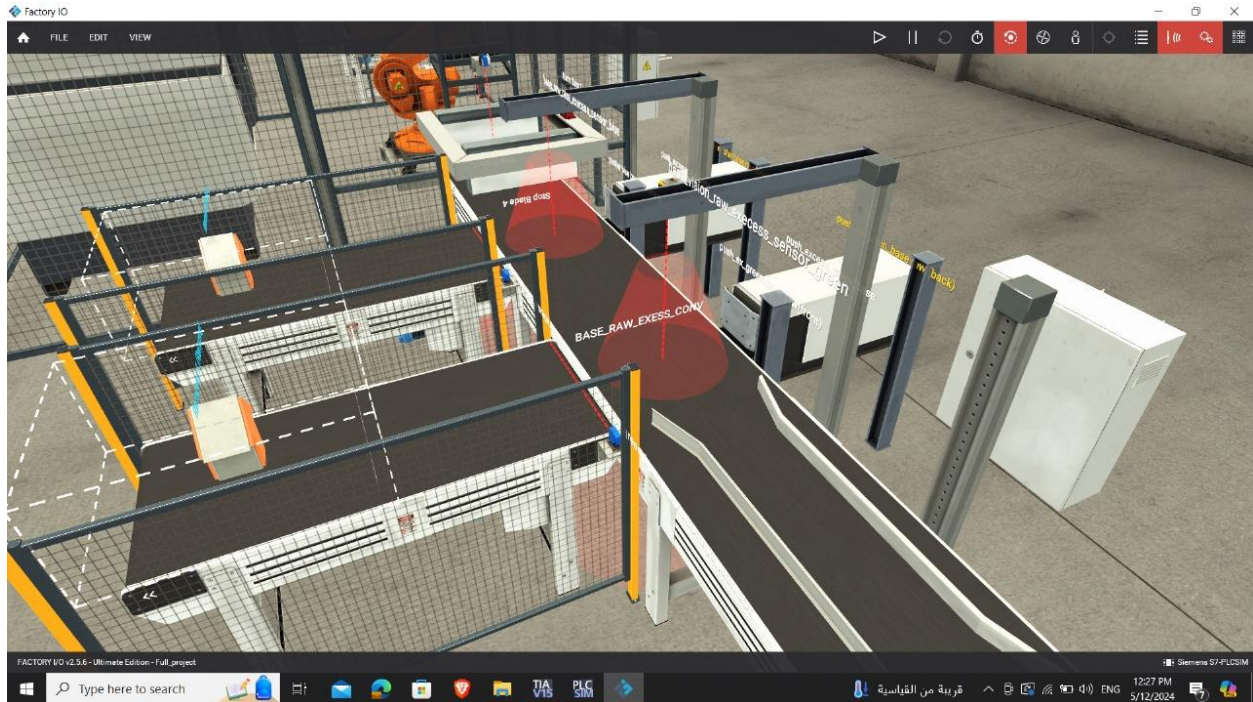
3.1.1. Feeding station



3.1.2. CNC machine

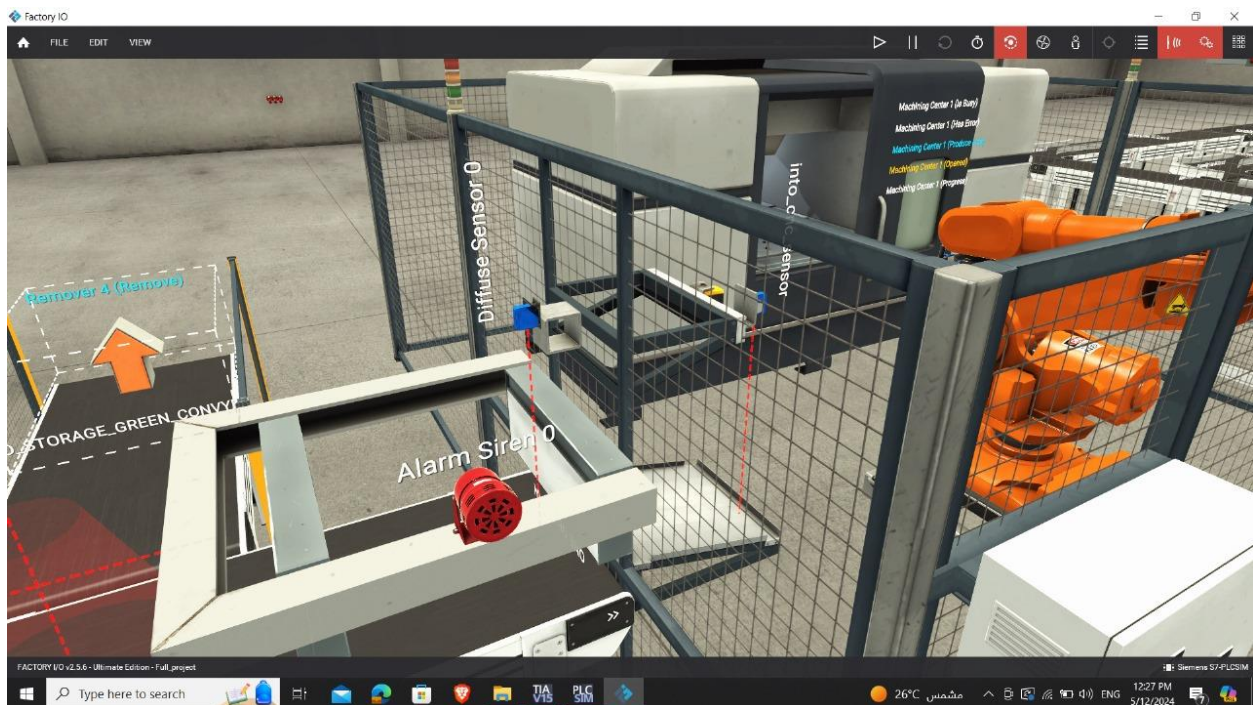


3.1.5. Remove excess products

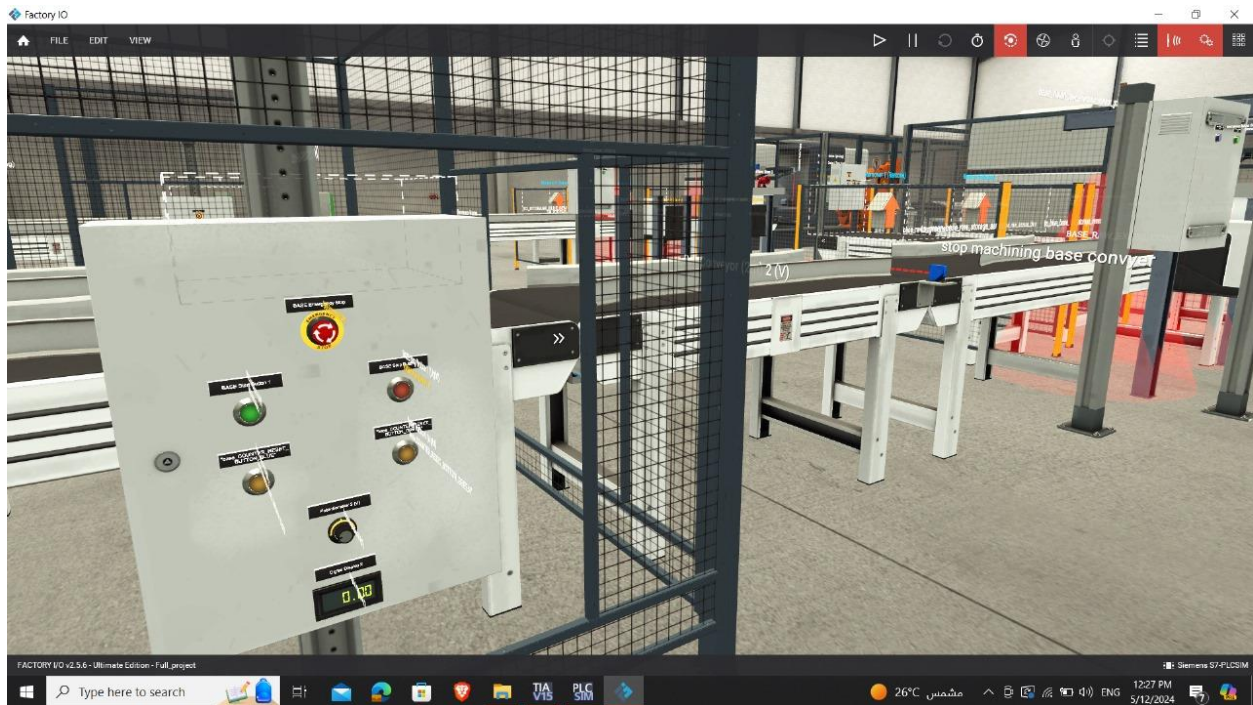


3.1.6. Warning alarm

- This warning alarm turned on when product stuck on conveyor and can't go to CNC machine



3.1.7. Conveyor speed control



- This Control panel that controls assembly conveyor speed and the light on the top turned on as indication when we collect the desired number of products



4.0. TIA PORTAL

The screenshot displays the Siemens TIA Portal interface for a project named "full production line". The main window shows the "Main (OB1)" program block. The ladder logic is organized into three networks:

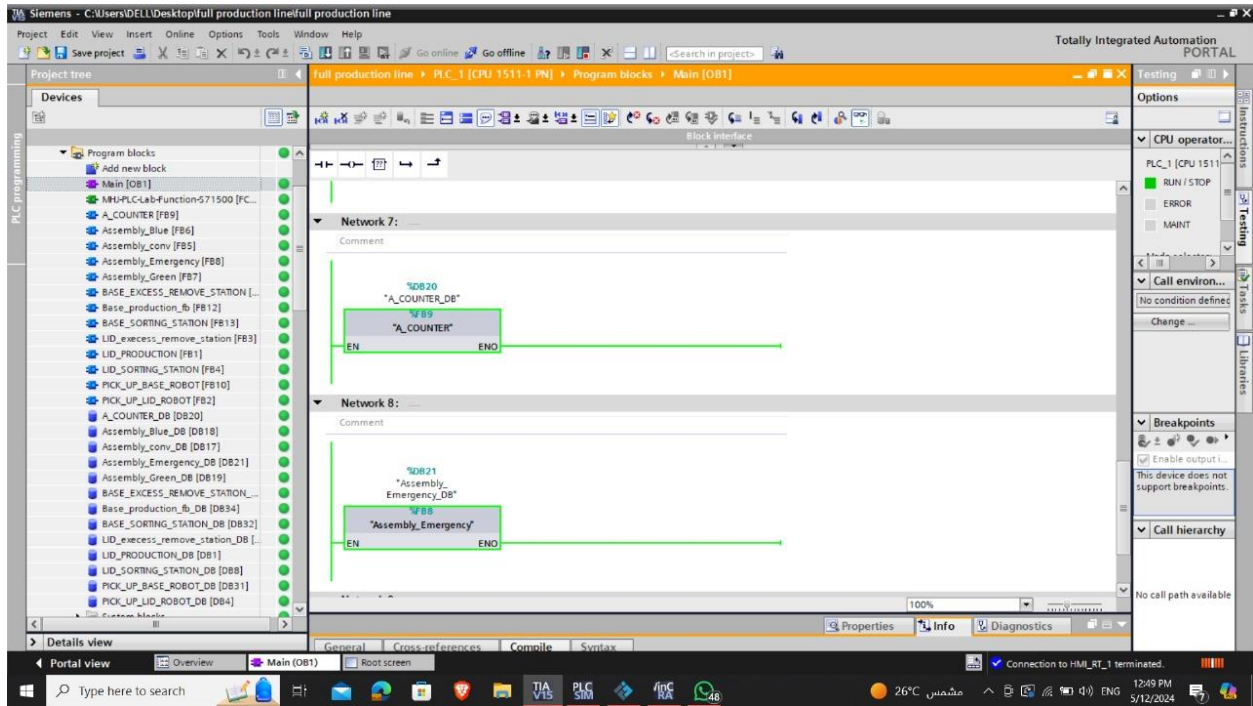
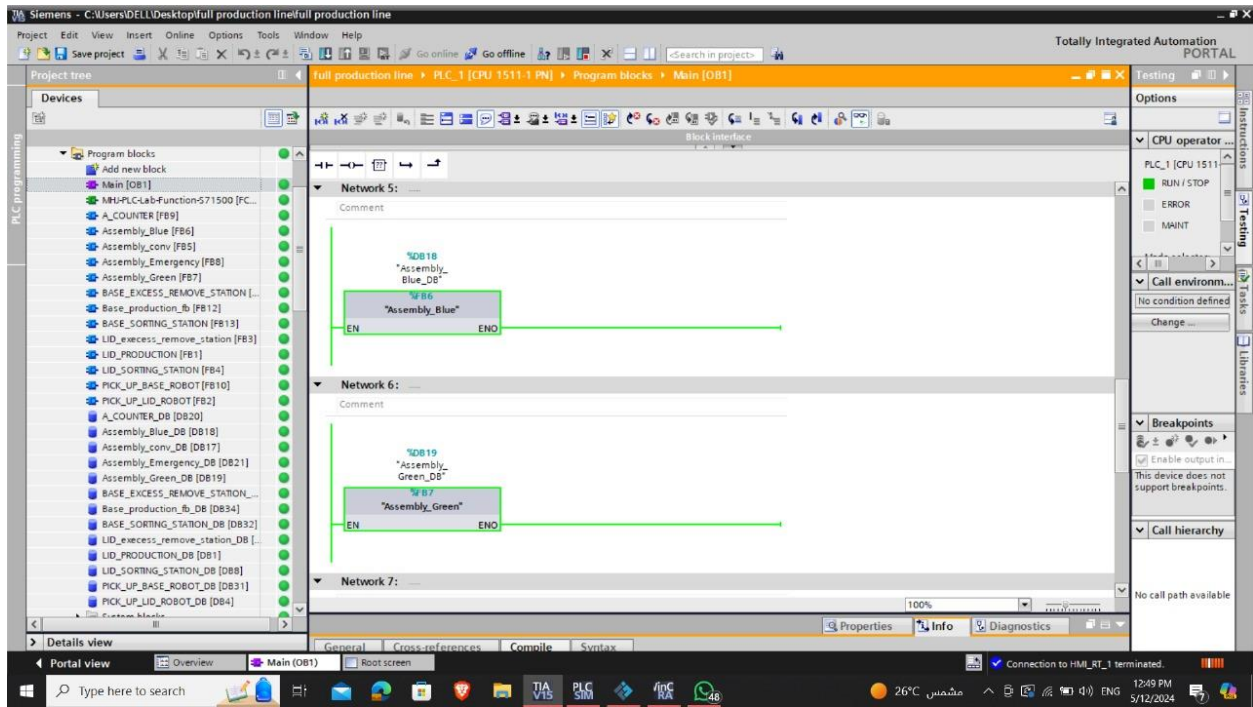
- Network 1:** Contains a call to the function block "MHU-PLC-Lab-Function-571500" with input EN and output ENO.
- Network 2:** Contains a call to the function block "LID_PRODUCTION" with input EN and output ENO.
- Network 3:** Is currently empty.

The left sidebar shows the "Project tree" with a list of program blocks, including "Main (OB1)", "MHU-PLC-Lab-Function-571500", and various data blocks (DBs). The right sidebar shows the "Options" panel for the CPU operator, with settings for "RUN / STOP", "ERROR", and "MAINT".

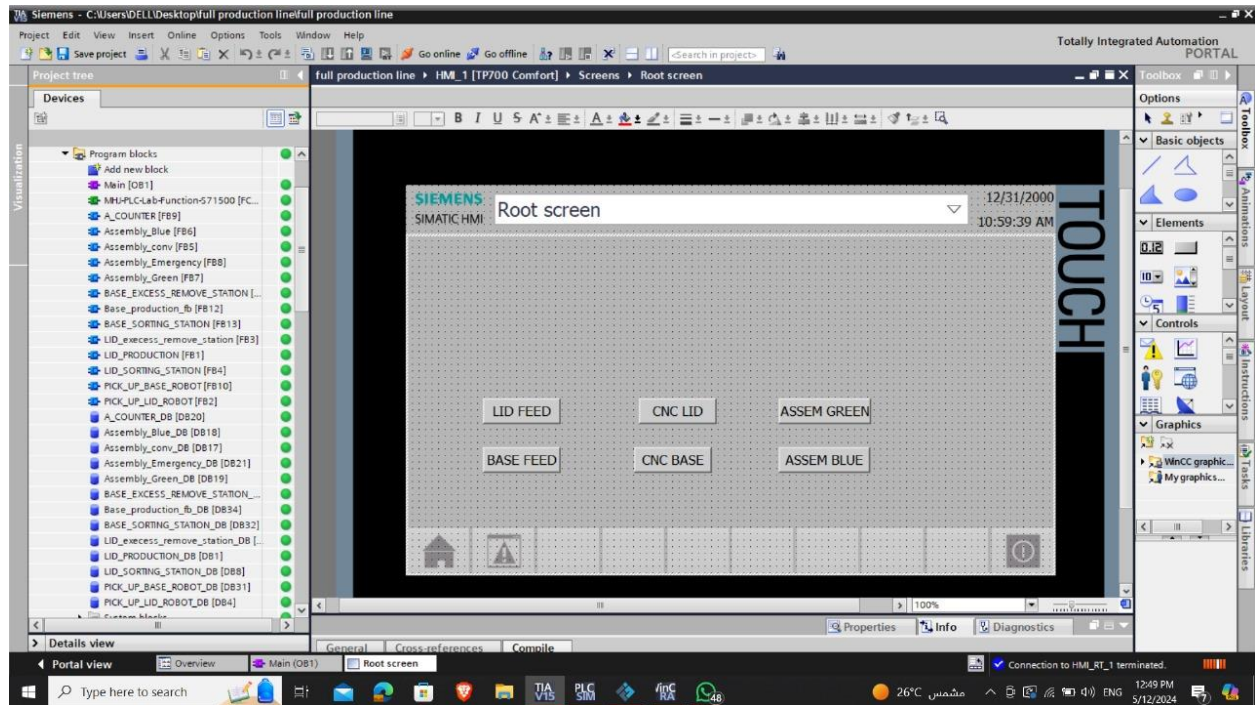
The screenshot displays the Siemens TIA Portal interface for the same project. The main window shows the "Main (OB1)" program block. The ladder logic is organized into four networks:

- Network 3:** Contains a call to the function block "Base_production_fb" with input EN and output ENO.
- Network 4:** Contains a call to the function block "Assembly_conv" with input EN and output ENO.

The left sidebar shows the "Project tree" with a list of program blocks, including "Main (OB1)", "MHU-PLC-Lab-Function-571500", and various data blocks (DBs). The right sidebar shows the "Options" panel for the CPU operator, with settings for "RUN / STOP", "ERROR", and "MAINT".

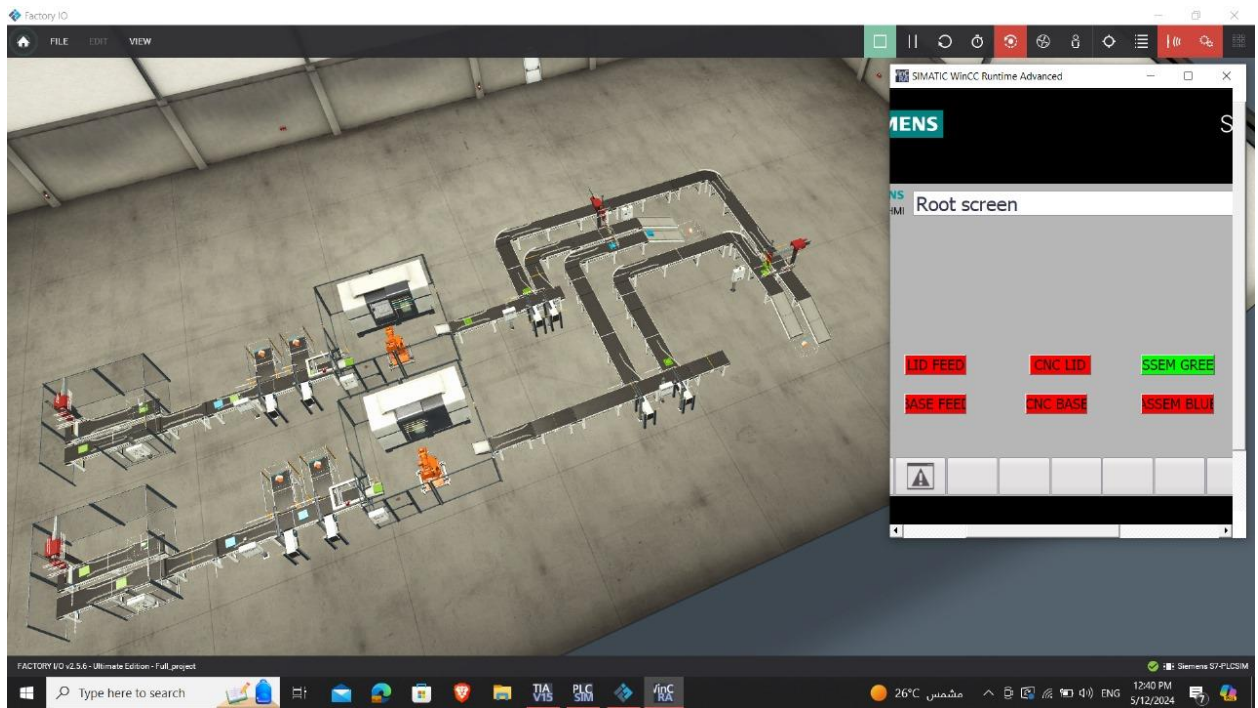
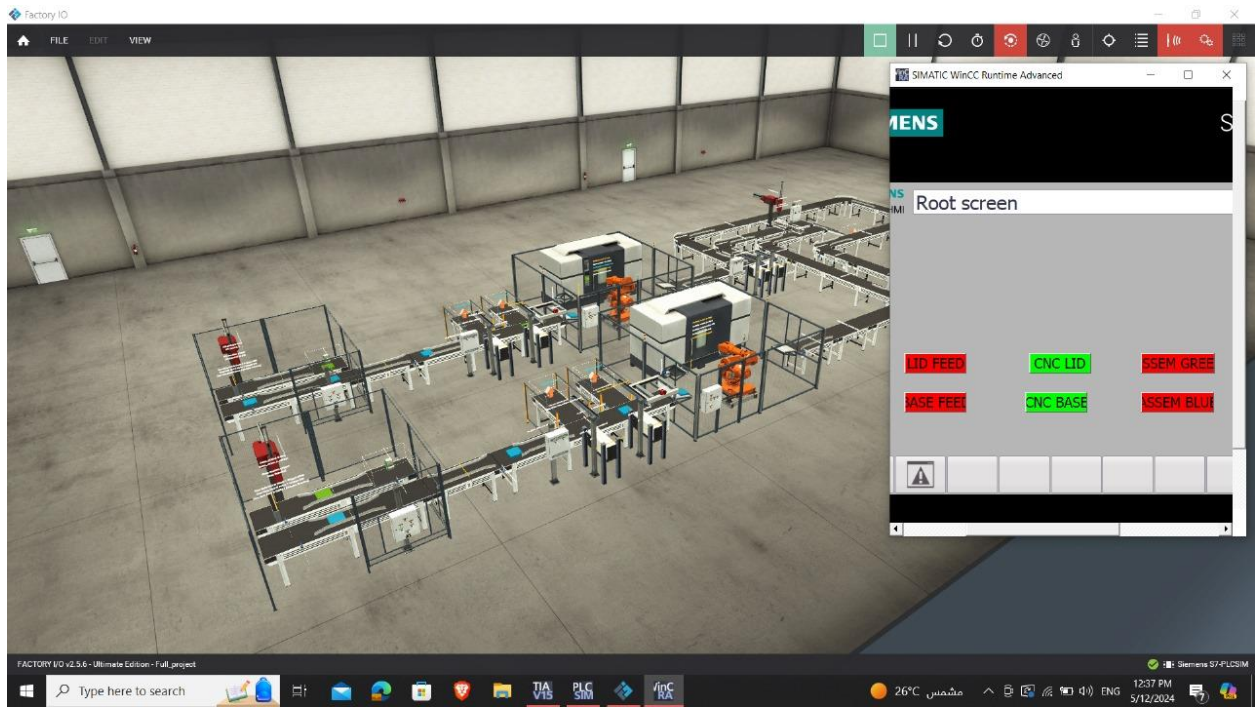


4.1. HMI



5.0. SIMULATION ON







6.0. DRIVE LINK

https://drive.google.com/drive/folders/1sitQrSa1rtfIVeYHHvGgFQ9XMLrEQeal?usp=drive_link

- this link include:
- TIA portal file
- factory i/o file
- simulation video

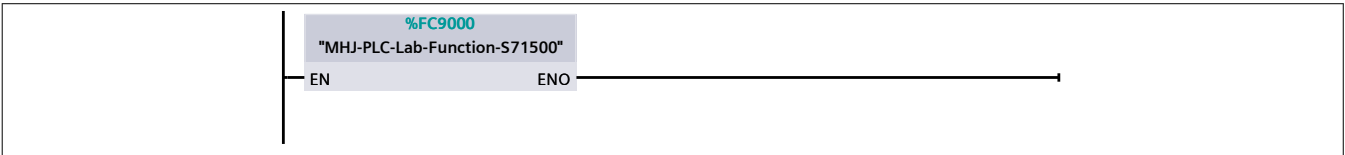
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Main [OB1]

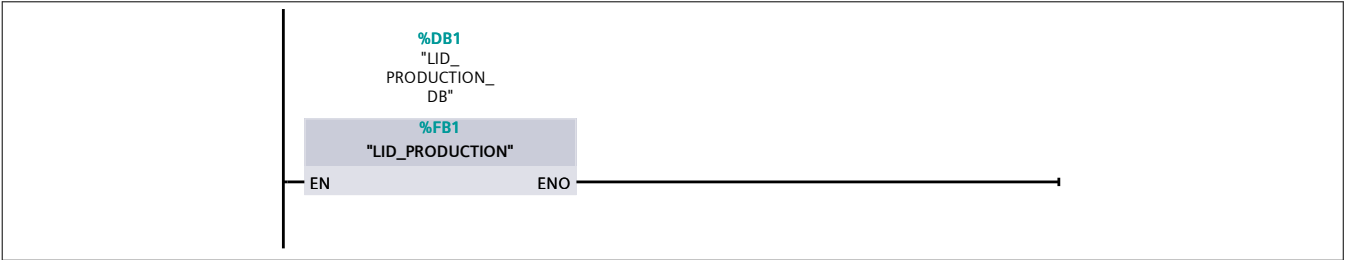
Main Properties					
General					
Name	Main	Number	1	Type	OB
Language	LAD	Numbering	Manual		
Information					
Title	"Main Program Sweep (Cycle)"	Author		Comment	
Family		Version	0.1	User-defined ID	

Main				
Name	Data type	Offset	Default value	Comment
▼ Temp				
OB1_EV_CLASS	Byte	0.0		Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1)
OB1_SCAN_1	Byte	1.0		1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1)
OB1_PRIORITY	Byte	2.0		Priority of OB Execution
OB1_OB_NUMBR	Byte	3.0		1 (Organization block 1, OB1)
OB1_RESERVED_1	Byte	4.0		Reserved for system
OB1_RESERVED_2	Byte	5.0		Reserved for system
OB1_PREV_CYCLE	Int	6.0		Cycle time of previous OB1 scan (milliseconds)
OB1_MIN_CYCLE	Int	8.0		Minimum cycle time of OB1 (milliseconds)
OB1_MAX_CYCLE	Int	10.0		Maximum cycle time of OB1 (milliseconds)
OB1_DATE_TIME	Date_And_Time	12.0		Date and time OB1 started
Constant				

Network 1:



Network 2:



Network 3:

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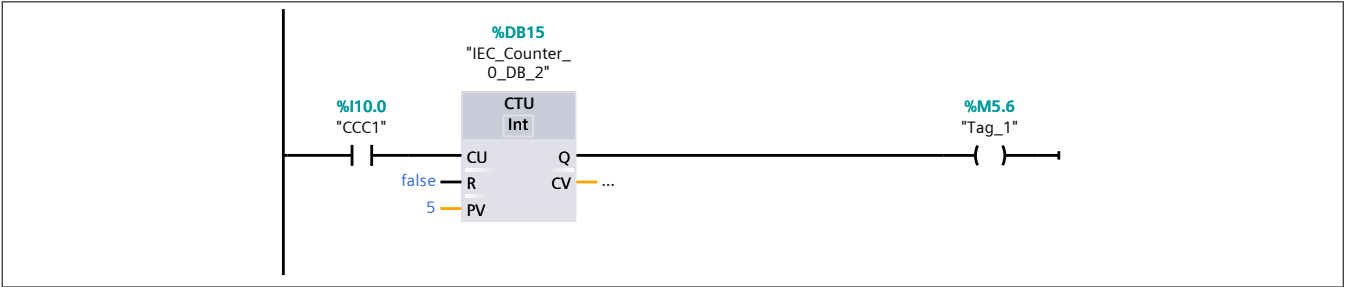
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

A_COUNTER [FB9]

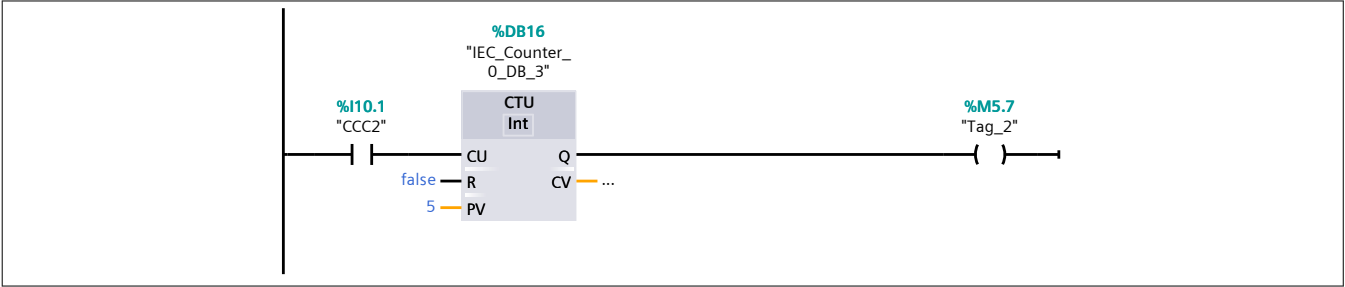
A_COUNTER Properties					
General					
Name	A_COUNTER	Number	9	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

A_COUNTER									
Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble from HM I/O PC UA	Visible in HMI engi- neering	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

Network 1:

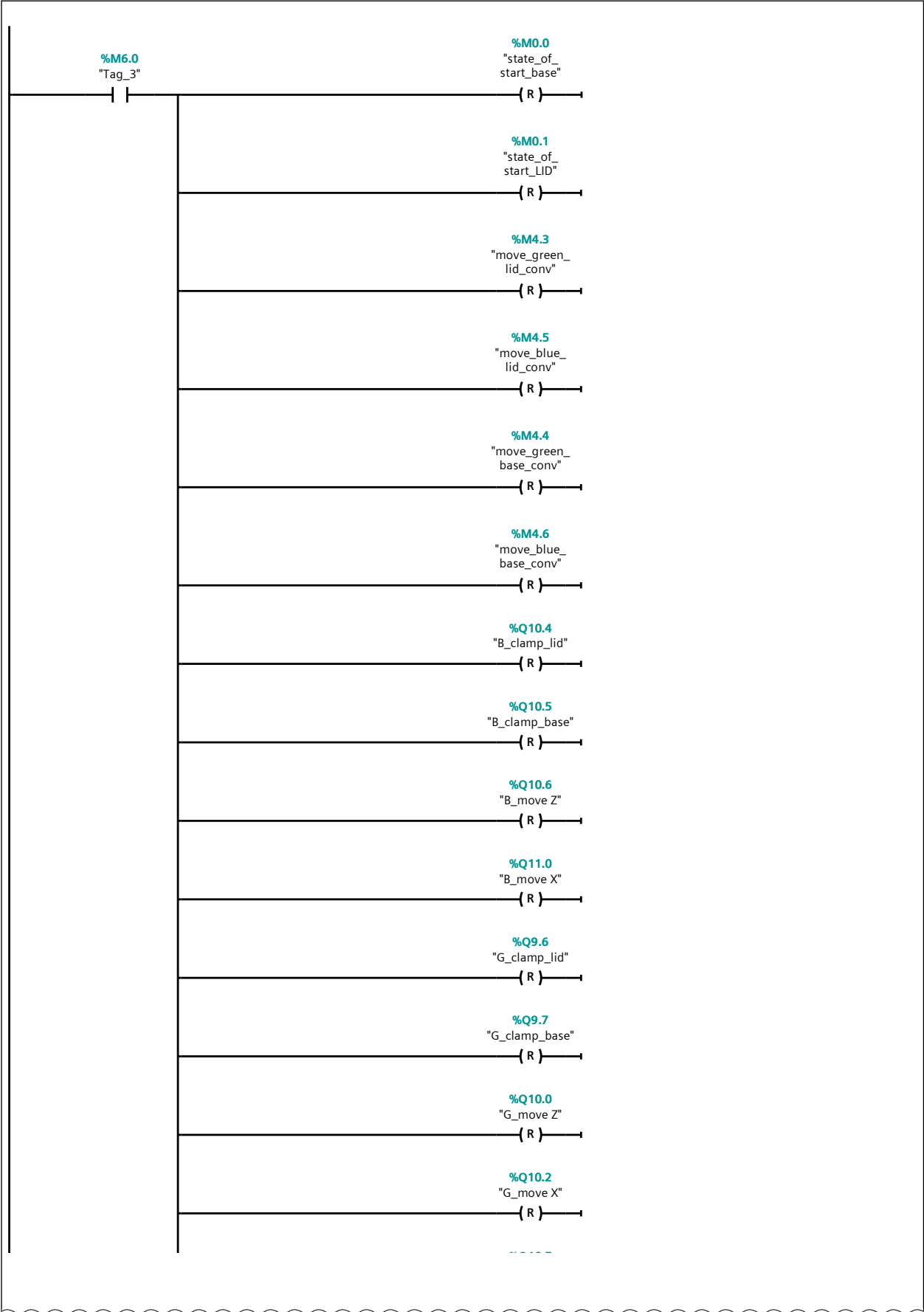


Network 2:



Totally Integrated Automation Portal		
<div>Network 3:</div> <div><div><div><div>%M5.7 "Tag_2"</div><div></div></div><div><div></div><div></div></div><div><div>%M6.1 "Tag_4"</div><div>{ S }</div></div></div></div>		
<div>Network 4:</div> <div><div><div><div>%M5.6 "Tag_1"</div><div></div></div><div><div></div><div></div></div><div><div>%M6.2 "Tag_5"</div><div>{ S }</div></div></div></div>		
<div>Network 5:</div> <div><div><div><div>%M6.2 "Tag_5"</div><div></div></div><div><div></div><div></div></div><div><div>%M6.1 "Tag_4"</div><div></div></div><div><div></div><div></div></div><div><div>%M6.0 "Tag_3"</div><div>{ S }</div></div></div></div>		
<div>Network 6:</div>		

Network 6: (1.1 / 2.1)



Network 6: (2.1 / 2.1)

1.1 (Page1 - 3)

%Q10.7

"B_grab"

(R)

%Q10.1

"G_grab"

(R)

%M6.5

"Tag_8"

()

Network 7:

Timing diagram for Network 7 showing three data bursts:

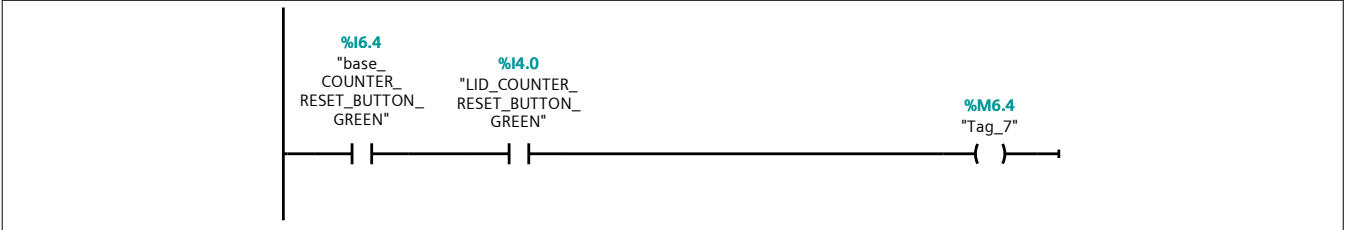
- Burst 1:** Labeled **%I6.3**, containing the data: "base_", COUNTER_, RESET_BUTTON_, BLUE".
- Burst 2:** Labeled **%I3.5**, containing the data: "LID_COUNTER_", RESET_BUTTON_, BLUE".
- Burst 3:** Labeled **%M6.3**, containing the data: "Tag_6".



Network 8:

Diagram illustrating the sequence of operations for Network 8:

- Operation 1: `base_COUNTER_RESET_BUTTON_GREEN` (6.4)
- Operation 2: `LID_COUNTER_RESET_BUTTON_GREEN` (4.0)
- Operation 3: `Tag_7` (6.4)



full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Assembly_Blue [FB6]

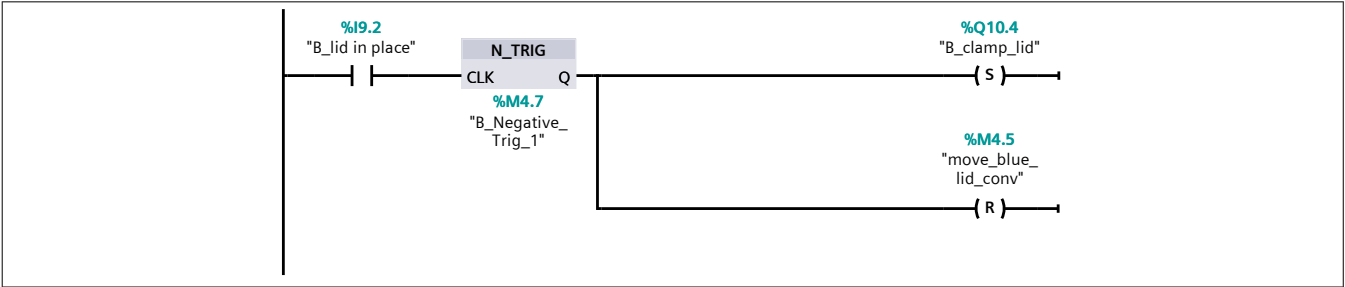
Assembly_Blue Properties

General					
Name	Assembly_Blue	Number	6	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

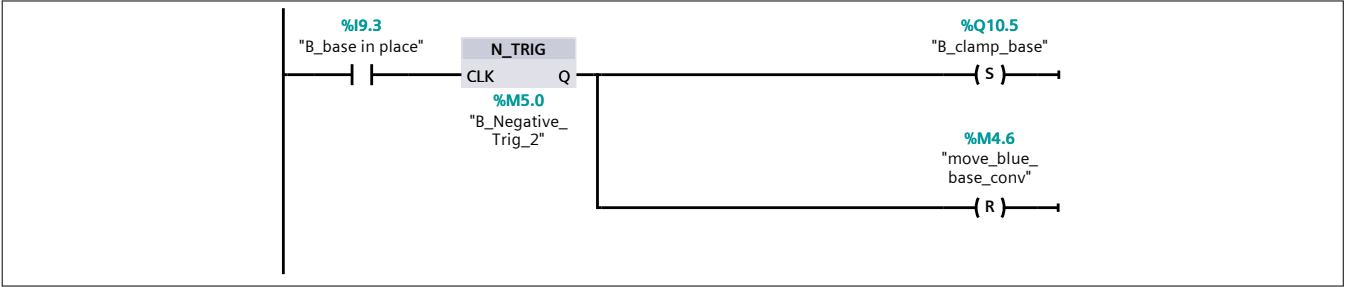
Assembly_Blue

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble eng- ineer- ing HM I/O PC UA	Visible in HMI	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

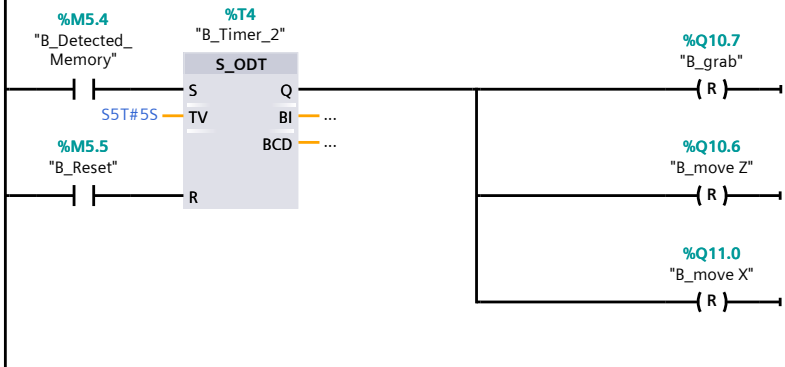
Network 1:



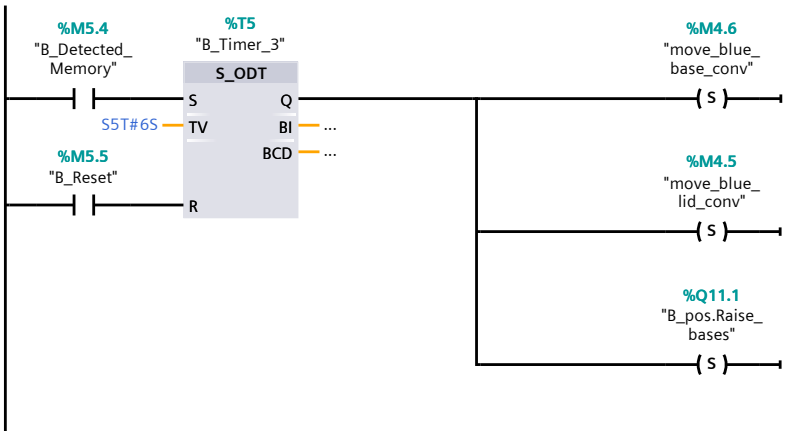
Network 2:



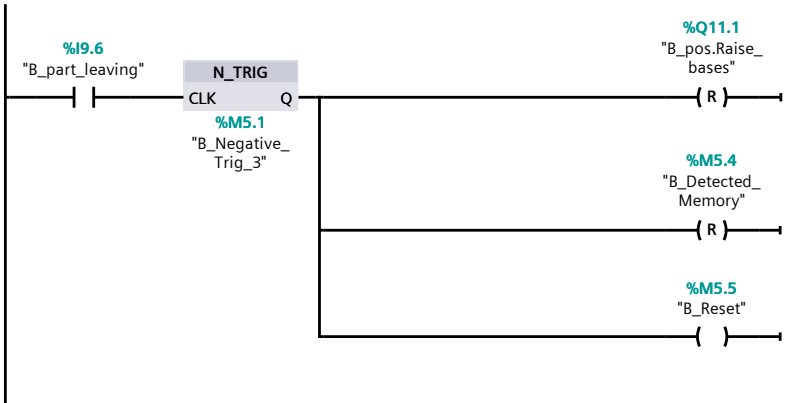
Totally Integrated Automation Portal		
Network 3:		
<div><div></div><div><div><div><div>%I9.4 "B_lid_clamped"</div></div><div><div>%I9.5 "B_base_clamped"</div></div></div><div><div><div>%Q10.6 "B_move Z"</div><div>%Q10.7 "B_grab"</div></div></div></div></div>		
Network 4:		
<div><div></div><div><div><div><div>%I9.7 "B_item_detect"</div></div><div><div>%Q10.4 "B_clamp_lid"</div><div>%Q10.5 "B_clamp_base"</div><div>%Q10.6 "B_move Z"</div><div>%Q11.0 "B_move X"</div><div>%M5.4 "B_Detected_Memory"</div></div></div></div></div>		
Network 5:		
<div><div></div><div><div><div><div><div>%M5.4 "B_Detected_Memory"</div><div>%M5.5 "B_Reset"</div></div><div><div>%T3 "B_Timer_1"</div><div>S_ODT S TV BCD</div><div><div>%Q10.6 "B_move Z"</div></div></div></div></div></div></div>		
Network 6:		



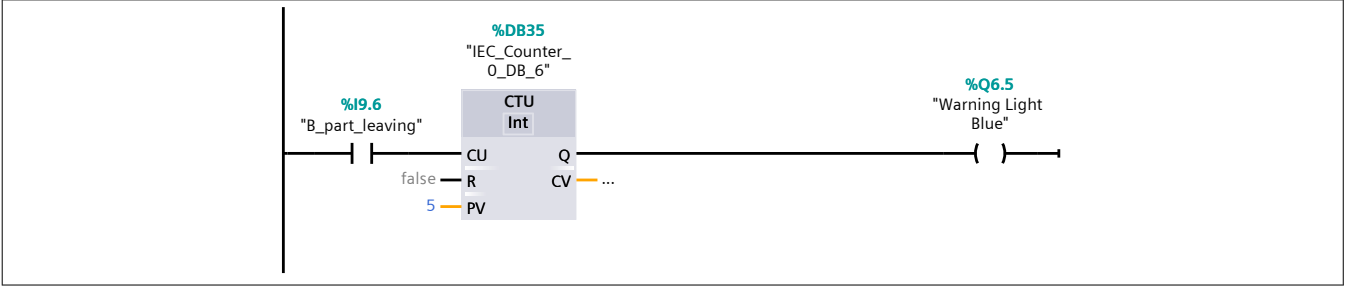
Network 7:



Network 8:



Network 9:



full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Assembly_conv [FB5]

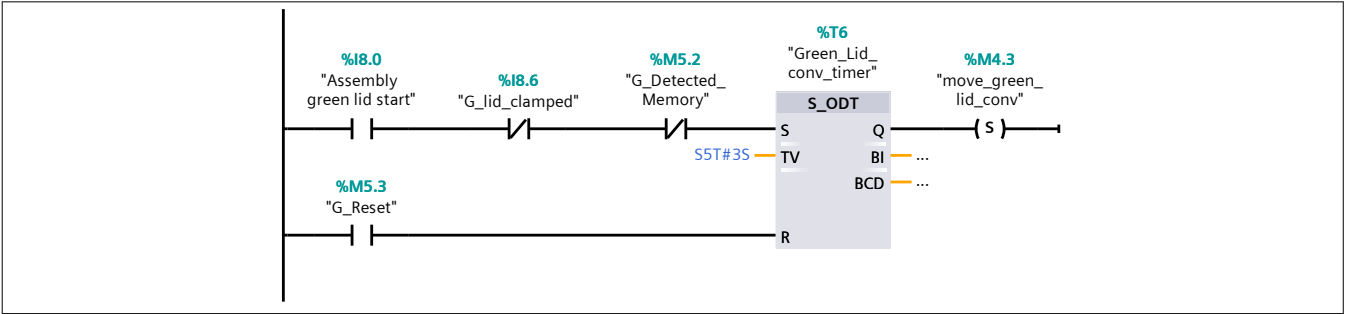
Assembly_conv Properties

General					
Name	Assembly_conv	Number	5	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

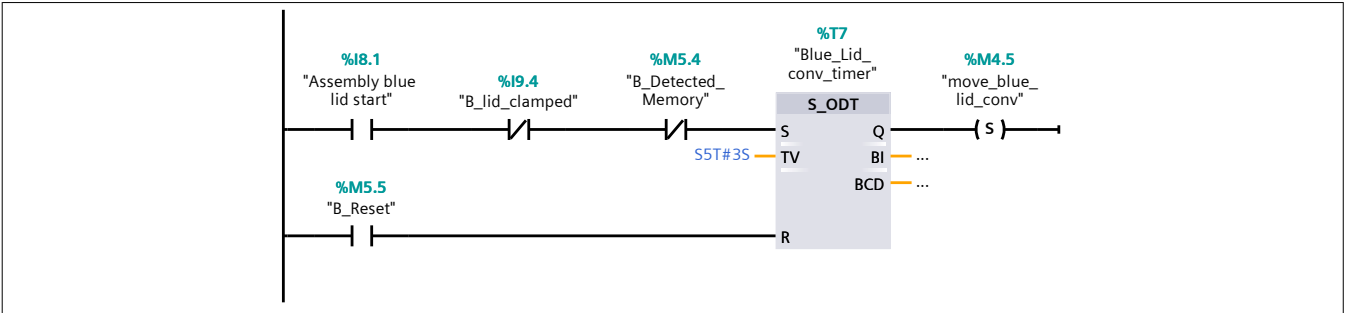
Assembly_conv

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble from HM I/O PC UA	Visible in HMI engi- neering	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

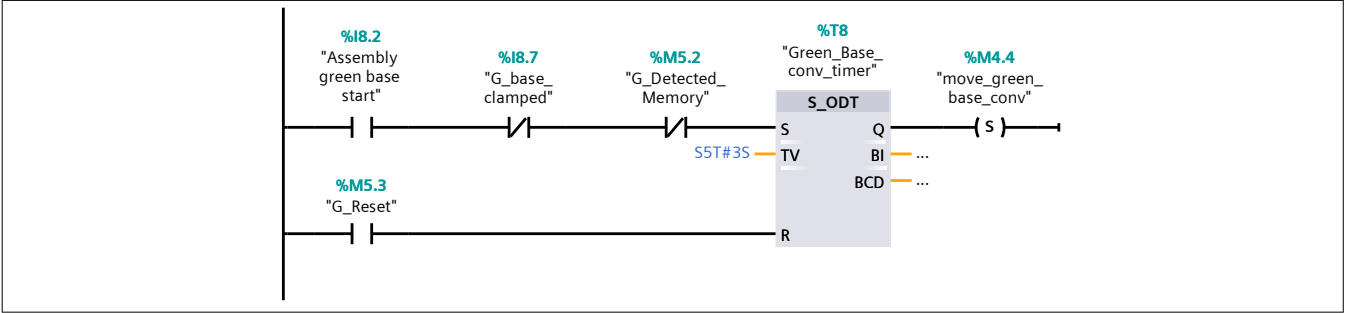
Network 1:



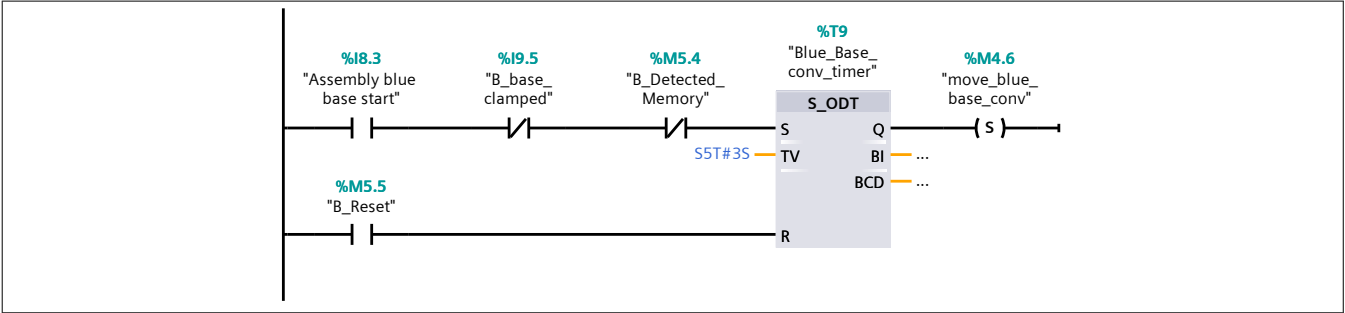
Network 2:



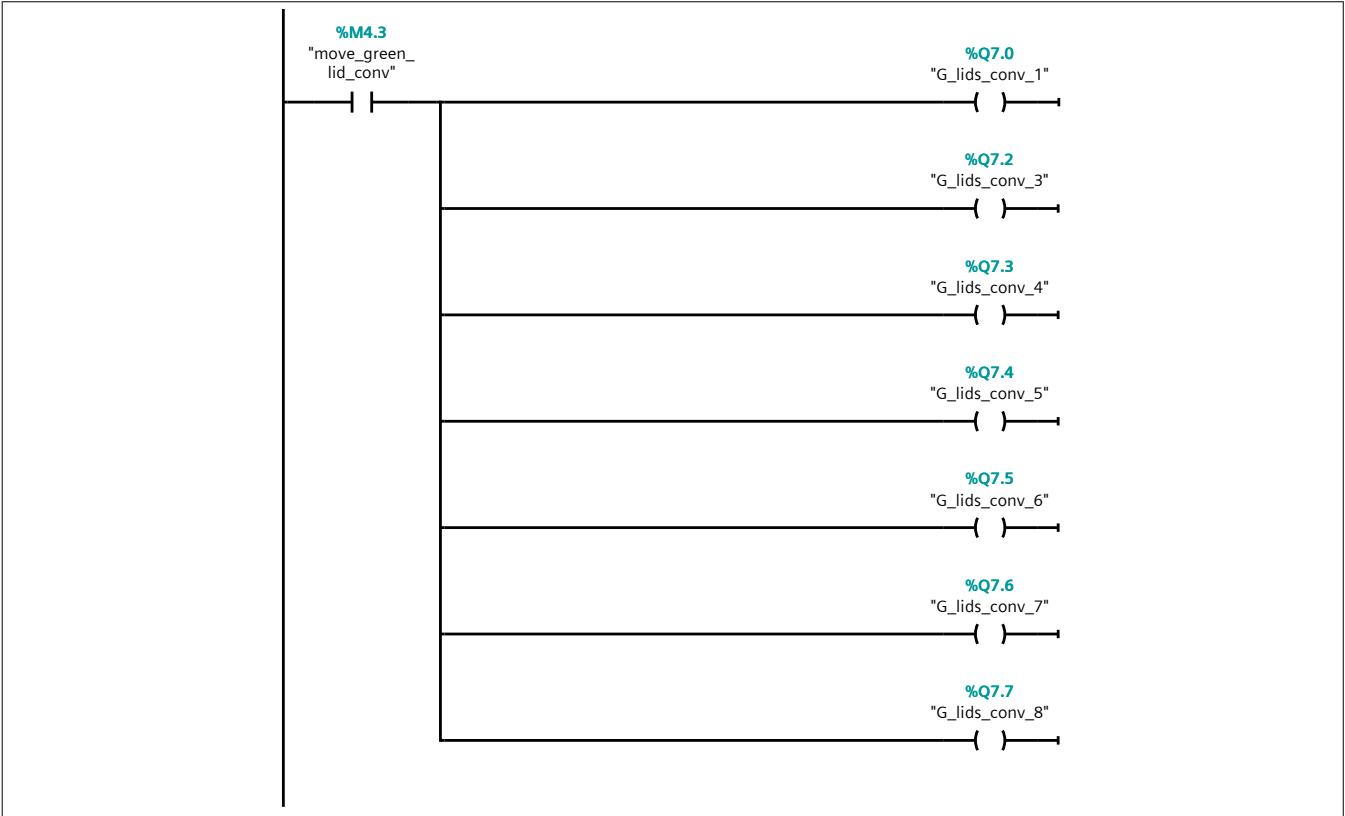
Network 3:



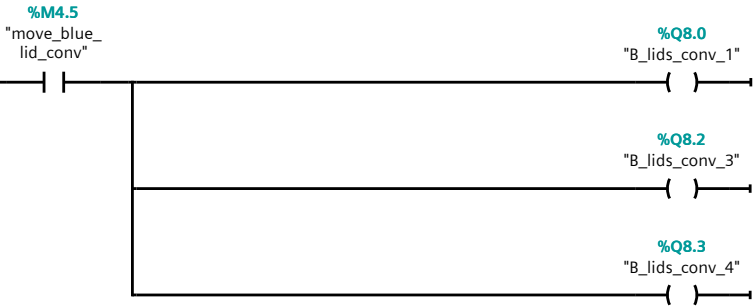
Network 4:



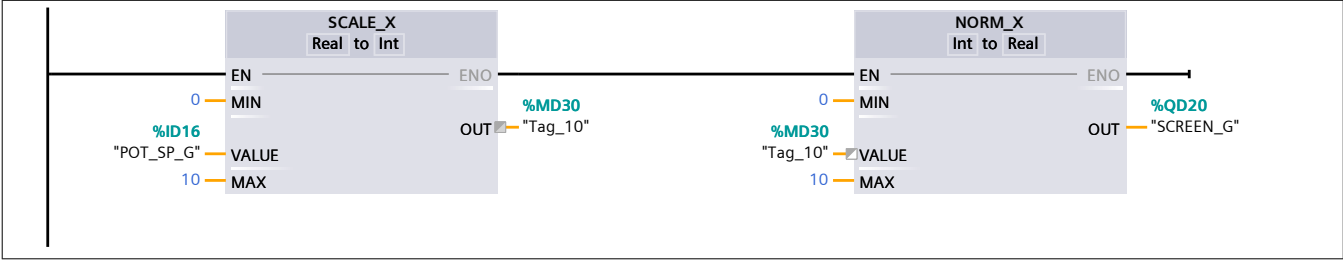
Network 5:



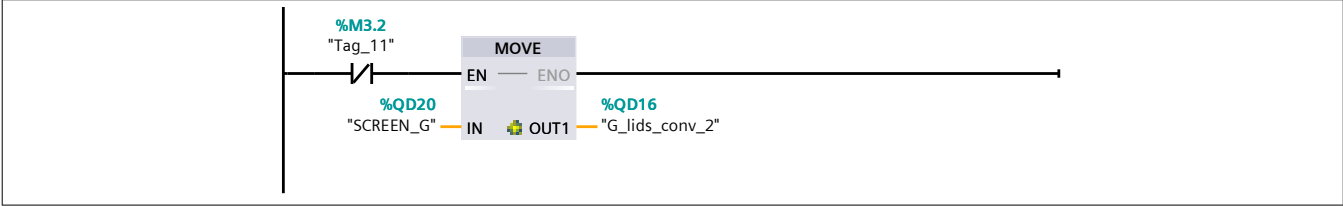
Totally Integrated Automation Portal		
<div>Network 6:</div> <div><div></div><div><div><div>%M4.4 "move_green_base_conv"</div><div><div></div><div></div></div><div><div>%Q8.4 "G_base_conv_1"</div><div></div></div><div><div>%Q8.5 "G_base_conv_2"</div><div></div></div><div><div>%Q8.6 "G_base_conv_3"</div><div></div></div><div><div>%Q8.7 "G_base_conv_4"</div><div></div></div><div><div>%Q9.0 "G_base_conv_5"</div><div></div></div><div><div>%Q9.1 "G_base_conv_6"</div><div></div></div></div></div></div> <div>Network 7:</div> <div><div></div><div><div><div>%M4.6 "move_blue_base_conv"</div><div><div></div><div></div></div><div><div>%Q9.2 "B_base_conv_1"</div><div></div></div><div><div>%Q9.3 "B_base_conv_2"</div><div></div></div><div><div>%Q9.4 "B_base_conv_3"</div><div></div></div><div><div>%Q9.5 "B_base_conv_4"</div><div></div></div></div></div></div> <div>Network 8:</div>		



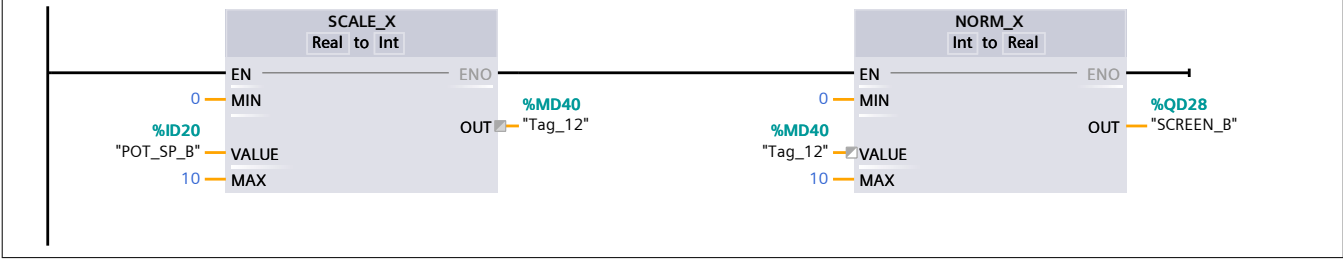
Network 9:



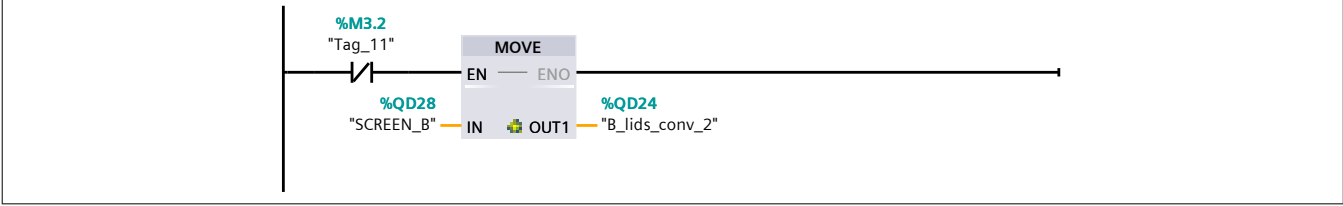
Network 10:



Network 11:



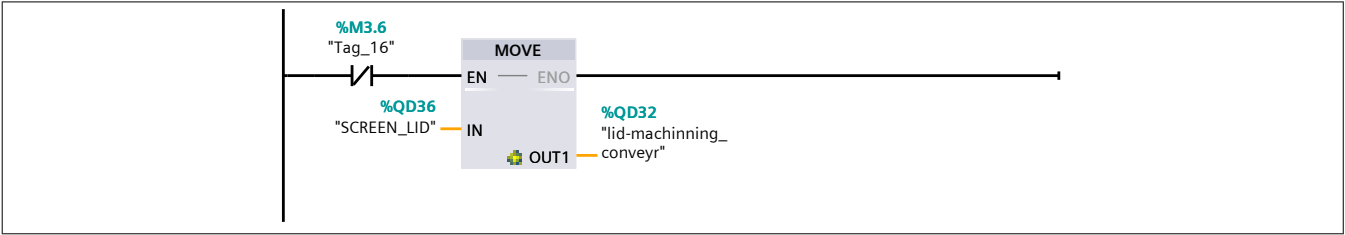
Network 12:



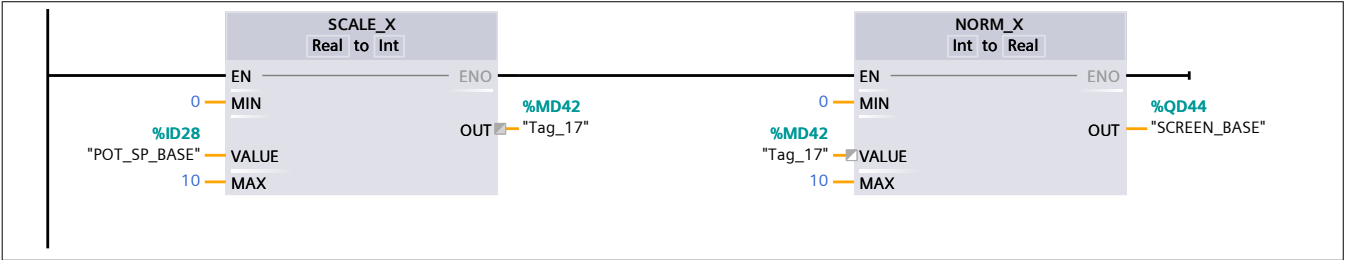
Network 13:



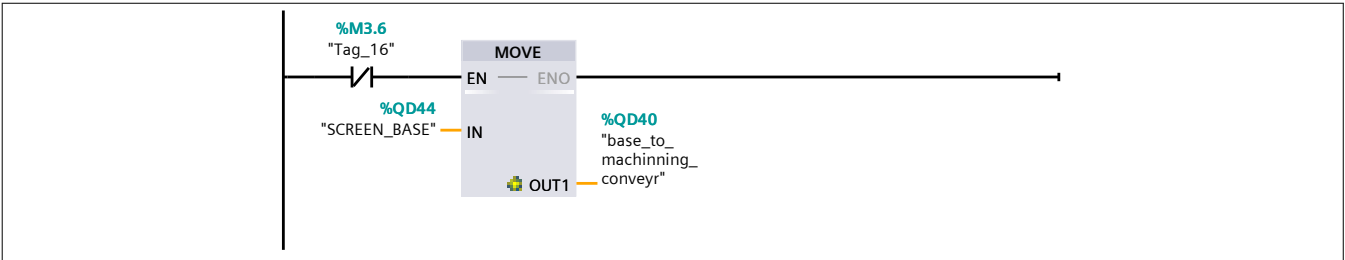
Network 14:



Network 15:



Network 16:



Totally Integrated Automation Portal		
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full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Assembly_Emergency [FB8]

Assembly_Emergency Properties

General

Name	Assembly_Emergency	Number	8	Type	FB
Language	LAD	Numbering	Automatic		

Information

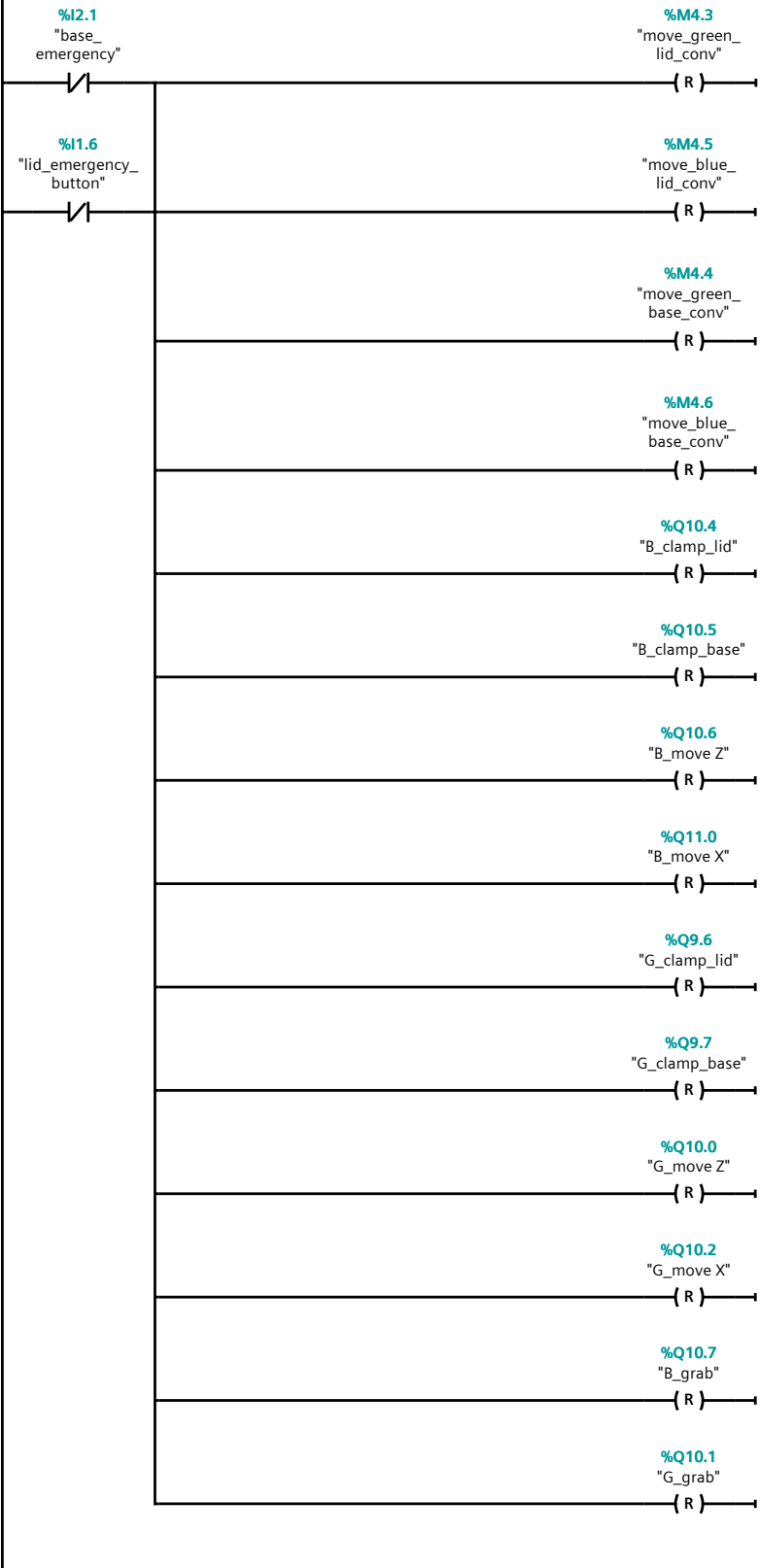
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

Assembly_Emergency

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble fro m HM I/O PC UA	Visible in HMI	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

Network 1:

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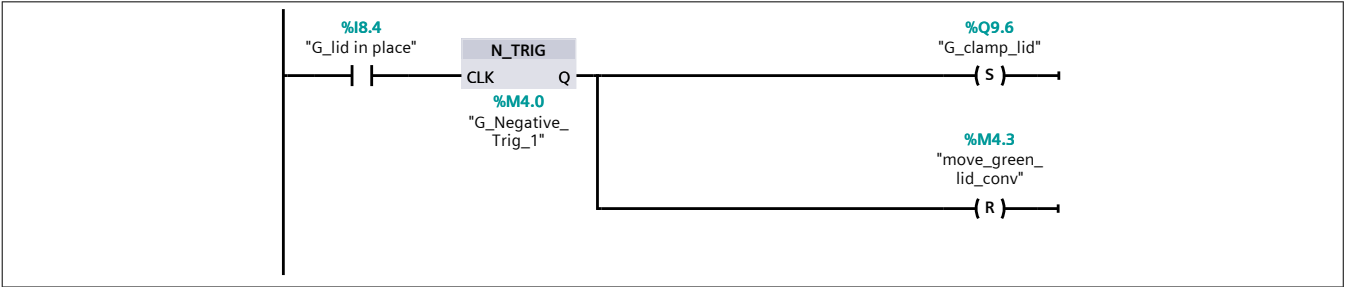
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Assembly_Green [FB7]

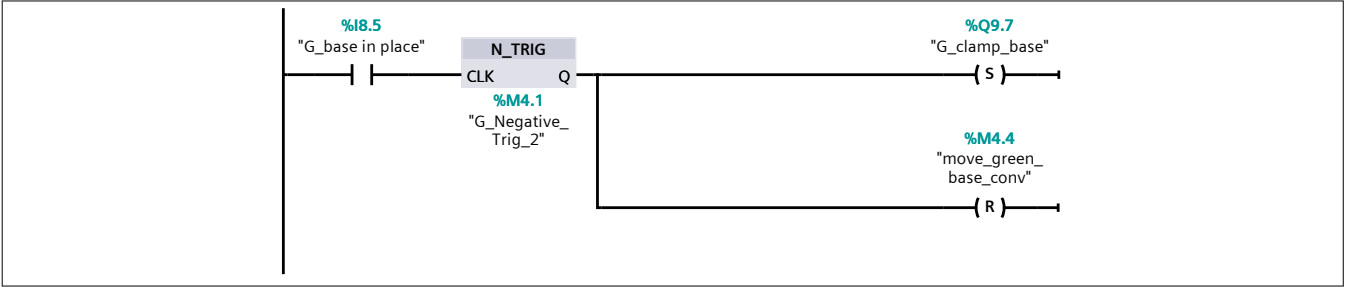
Assembly_Green Properties					
General					
Name	Assembly_Green	Number	7	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

Assembly_Green									
Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble eng- ineer- ing HM I/O PC UA	Visible in HMI	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

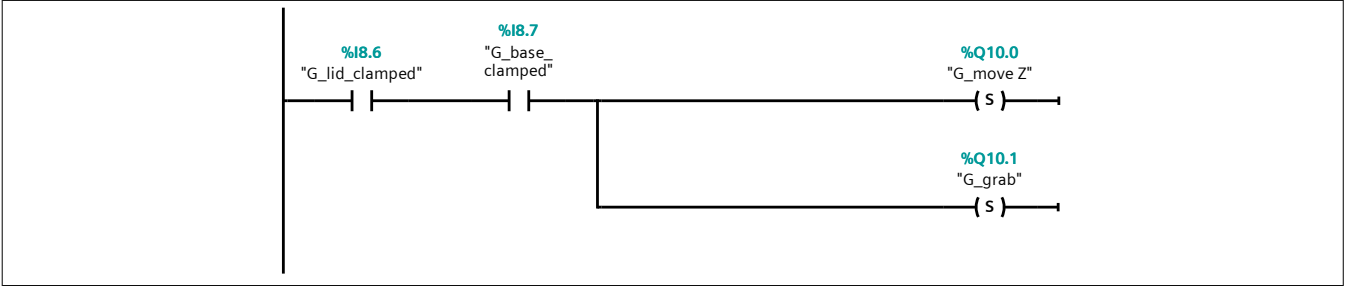
Network 1:



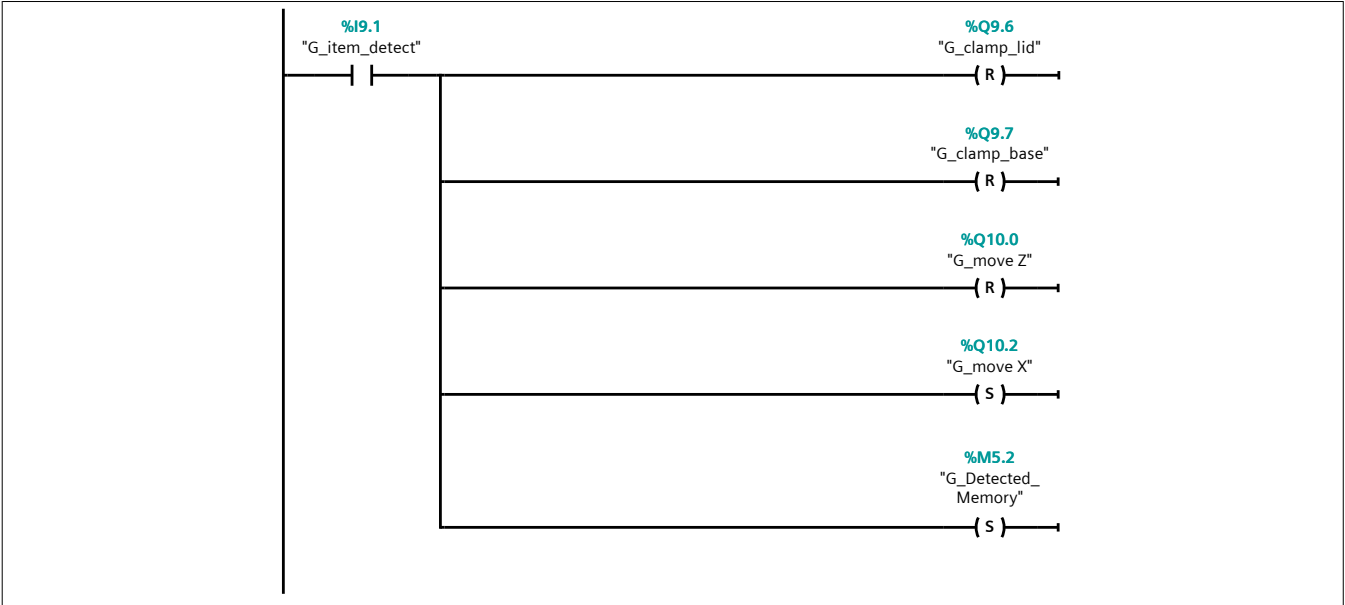
Network 2:



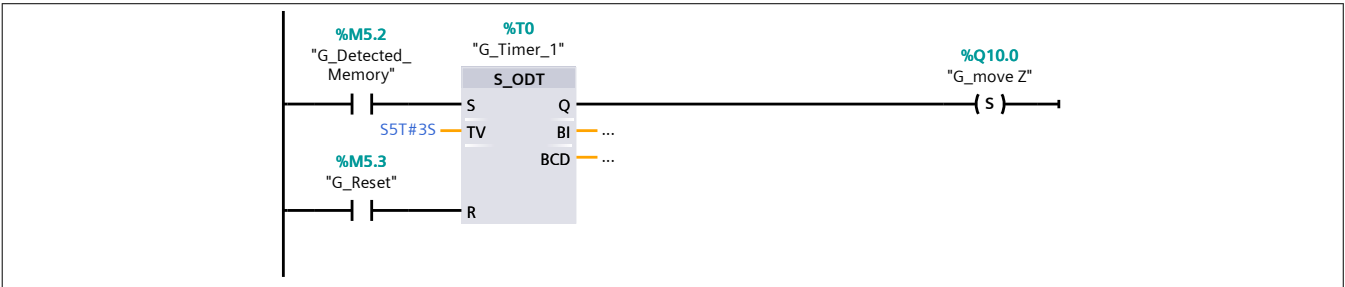
Network 3:



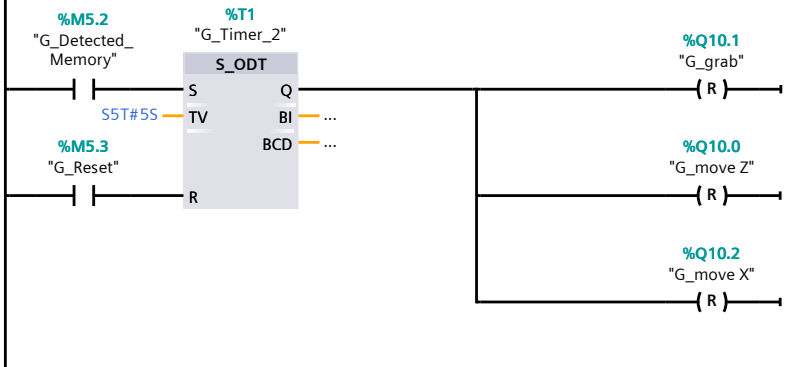
Network 4:



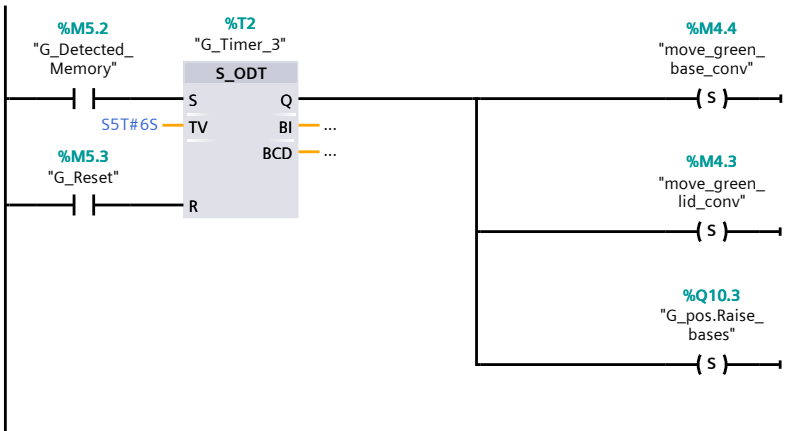
Network 5:



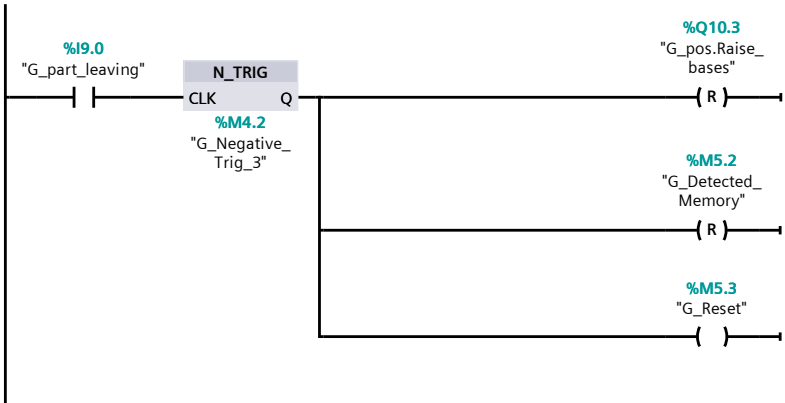
Network 6:



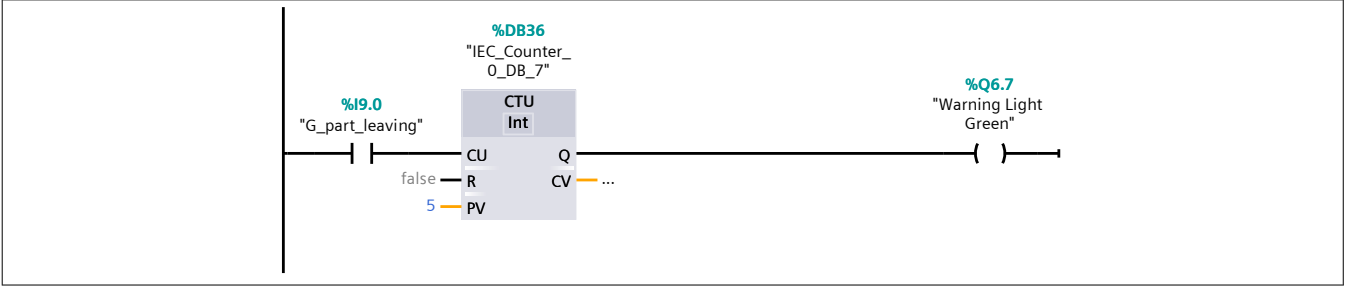
Network 7:



Network 8:



Network 9:



full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

BASE_EXCESS_REMOVE_STATION [FB11]

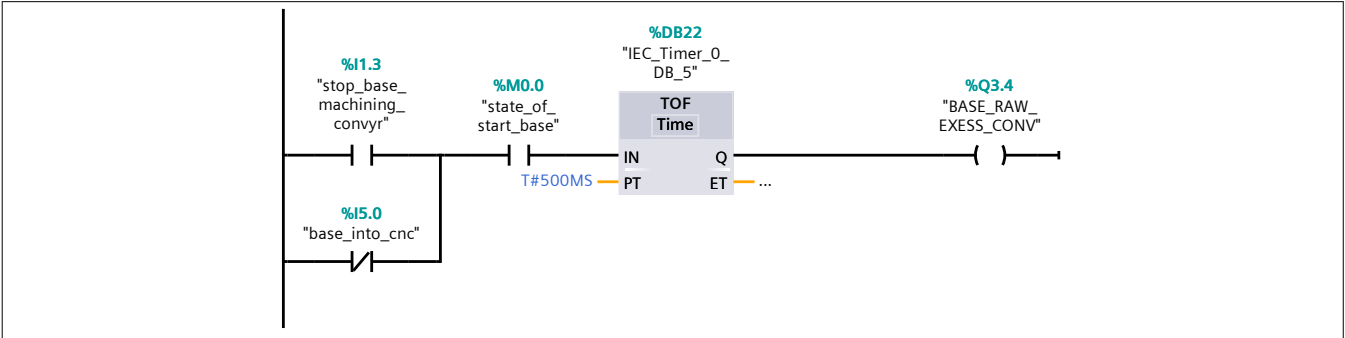
BASE_EXCESS_REMOVE_STATION Properties

General					
Name	BASE_EXCESS_REMOVE_STATION	Number	11	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

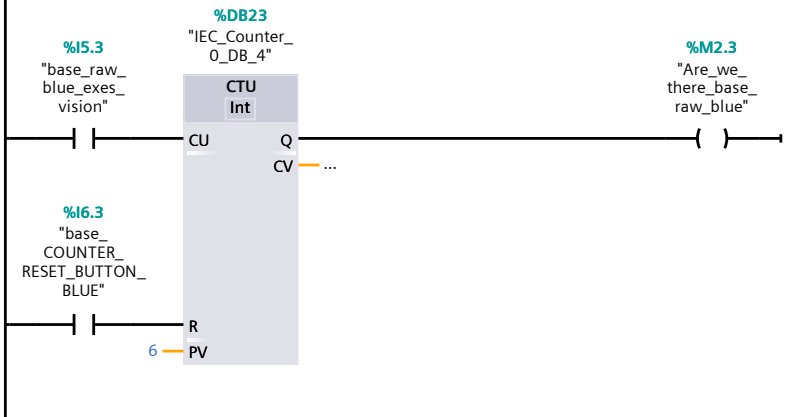
BASE_EXCESS_REMOVE_STATION

Name	Data type	Default value	Retain	Accessible from HMI/OP C UA	Writable from HMI/OP C UA	Visible in HMI engineering	Set-point	Supervision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

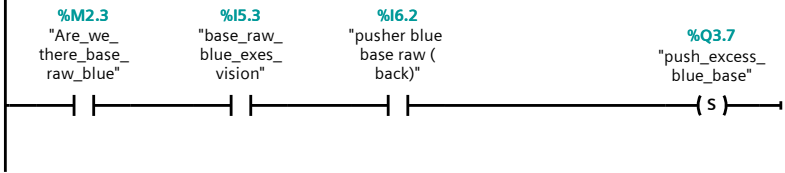
Network 1: LID_BELT_EXCESS_CONVEYOR_HANDLER



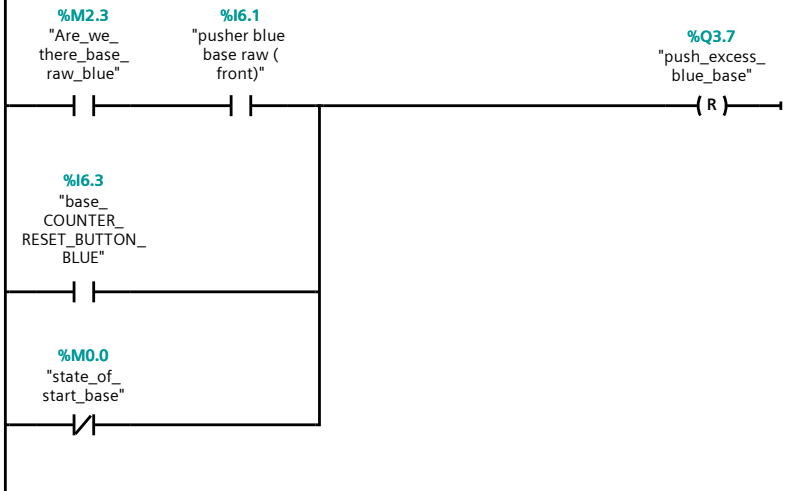
Network 2: COUNTING NUMBER OF BLUE MATERIAL



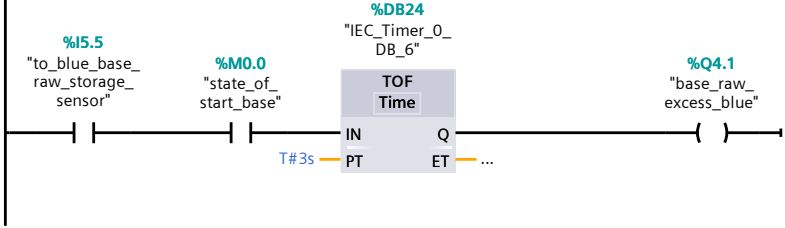
Network 3: PUSH_FORWARD_EXCESS_BLUE



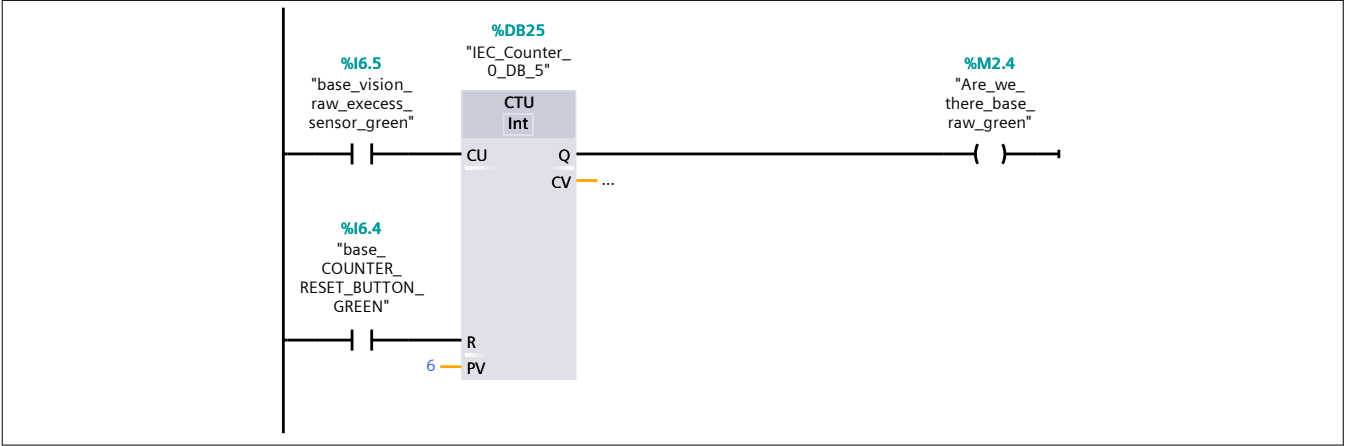
Network 4: PUSH_RETURN_EXECESS_BLUE



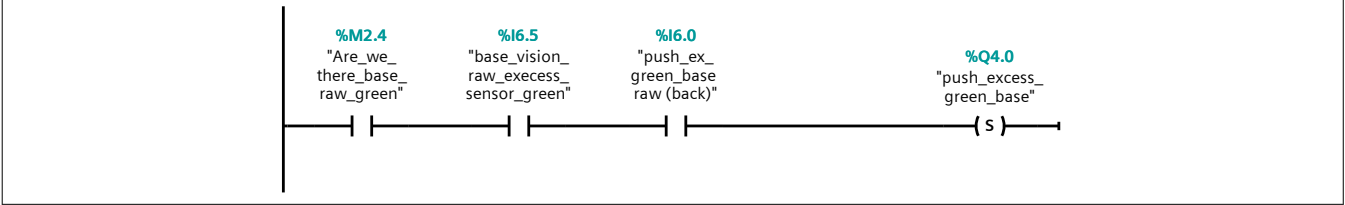
Network 5: RETURN_EXCESS_BLUE_TO_STORAGE



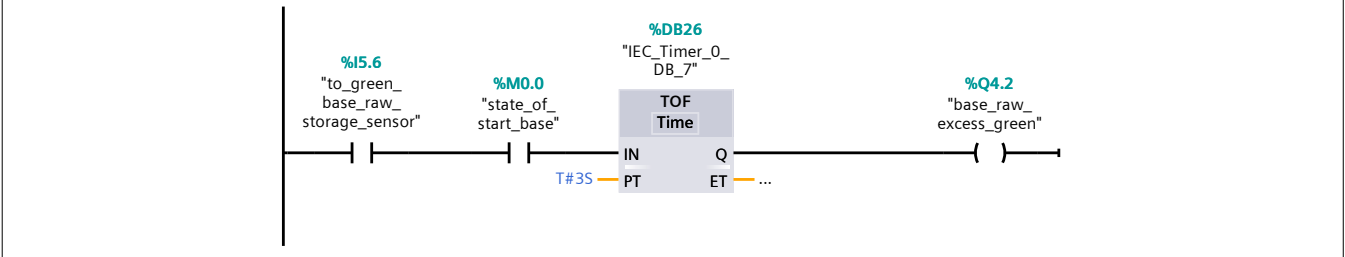
Network 6: COUNTING NUMBER OF GREEN MATERIAL



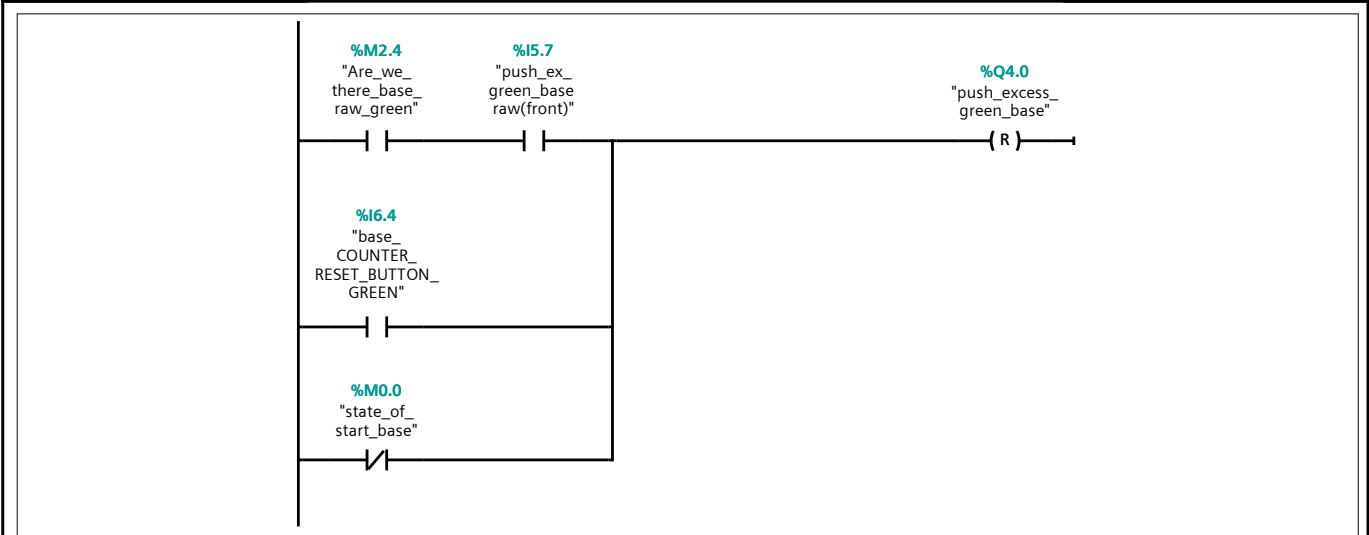
Network 7: PUSH_FORWARD_ECESS_GREEN



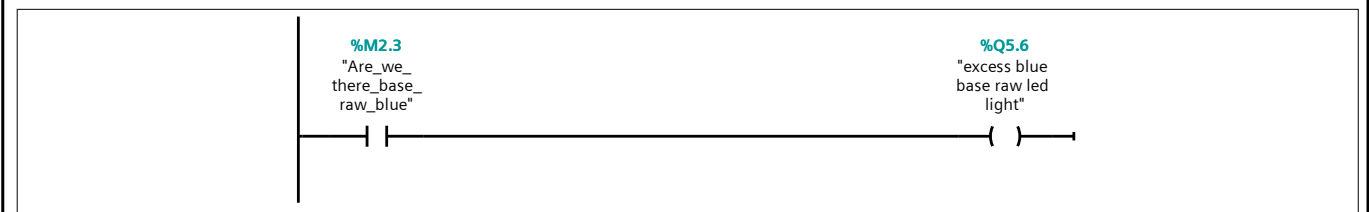
Network 8: RETURN_EXCESS_GREEN_TO_STORAGE



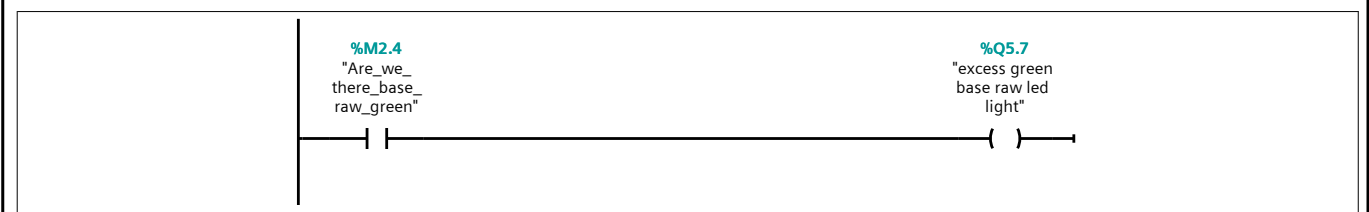
Network 9: OUSH_RETURN_GREEN



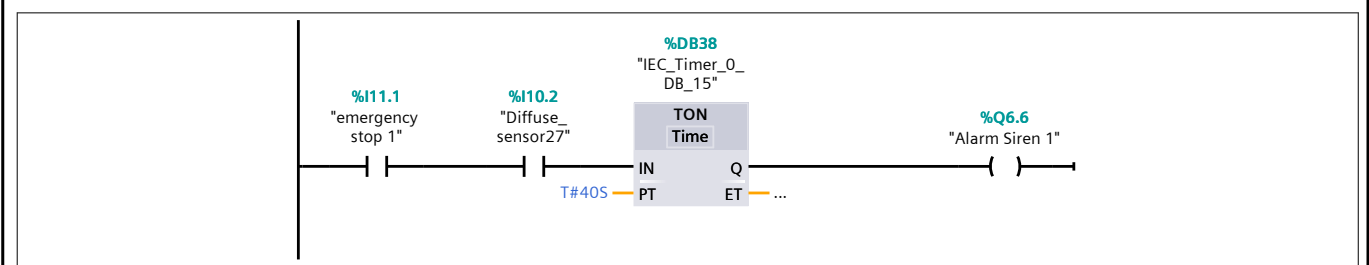
Network 10: EXCESS BLUE LIGHT



Network 11:



Network 12:



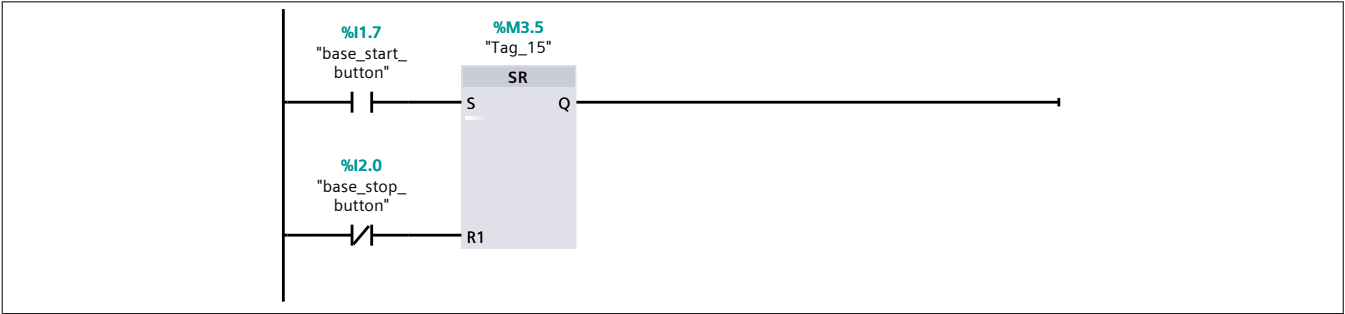
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

Base_production_fb [FB12]

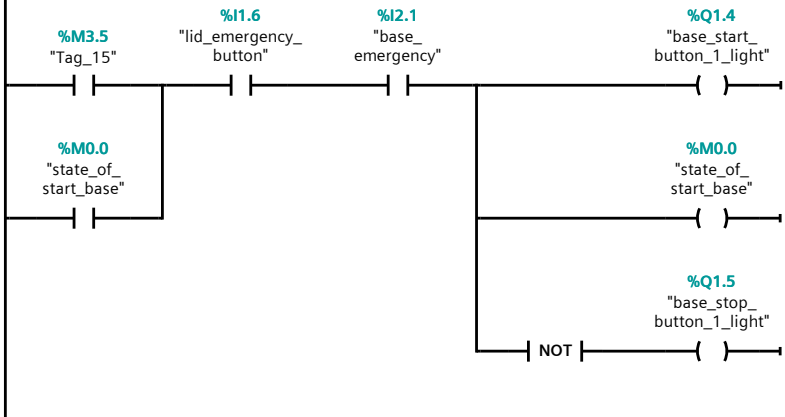
Base_production_fb Properties					
General					
Name	Base_production_fb	Number	12	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

Base_production_fb									
Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble eng- ineer- ing HM I/O PC UA	Visible in HMI	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

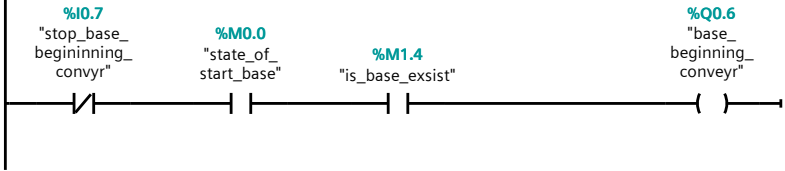
Network 1:



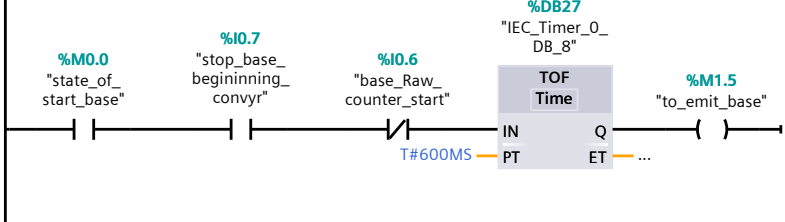
Network 2: base_production_station



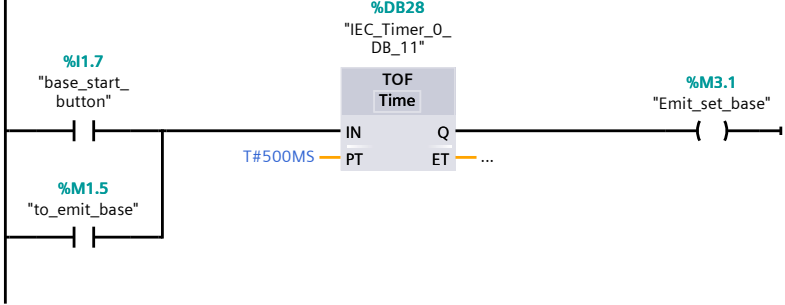
Network 3: base_begin_conveyor



Network 4: emit_base_handler



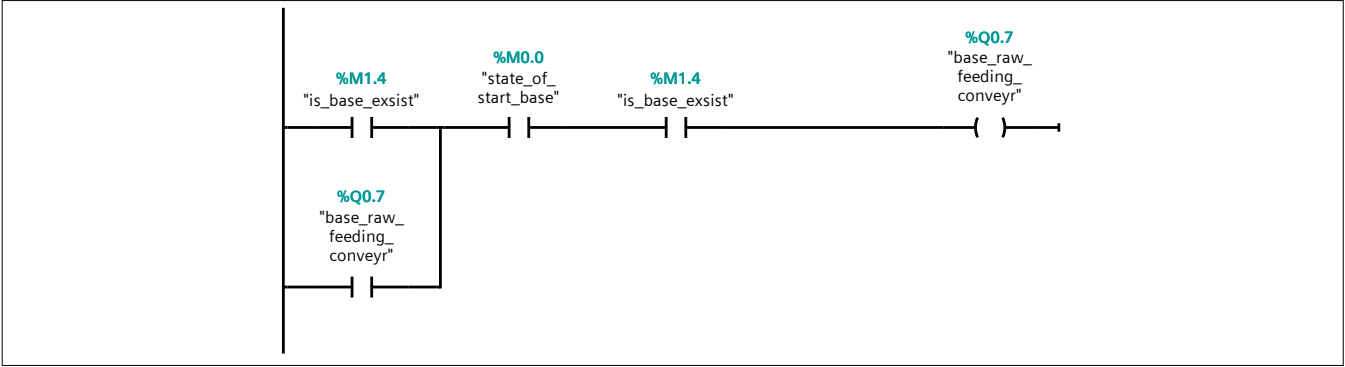
Network 5: EMITTING_BASE



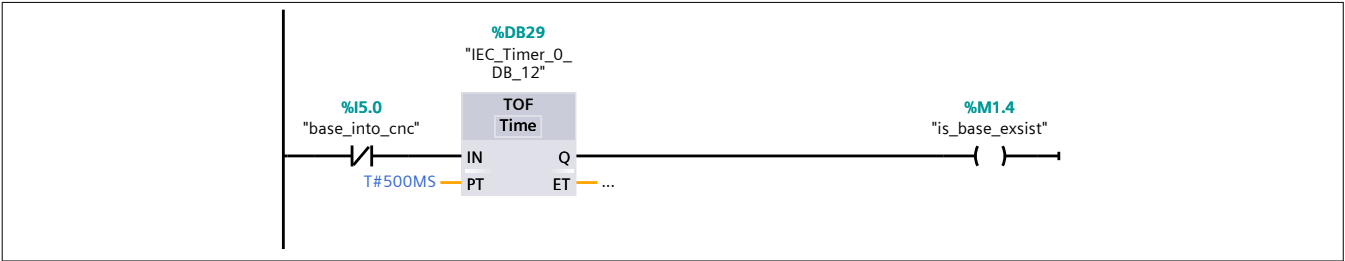
Network 6: EMIT_EMERGENCY_HANDLER_BASE



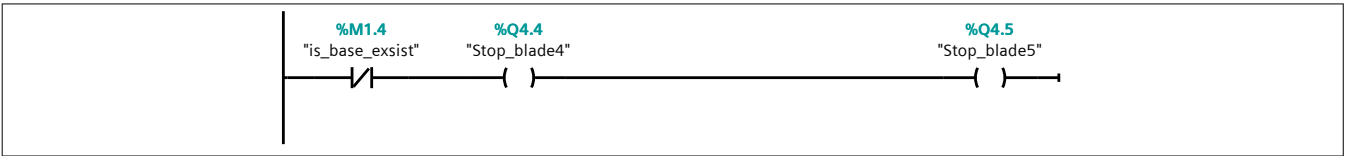
Network 7: FEEDING_CONVEYOR_HANDLER_BASE



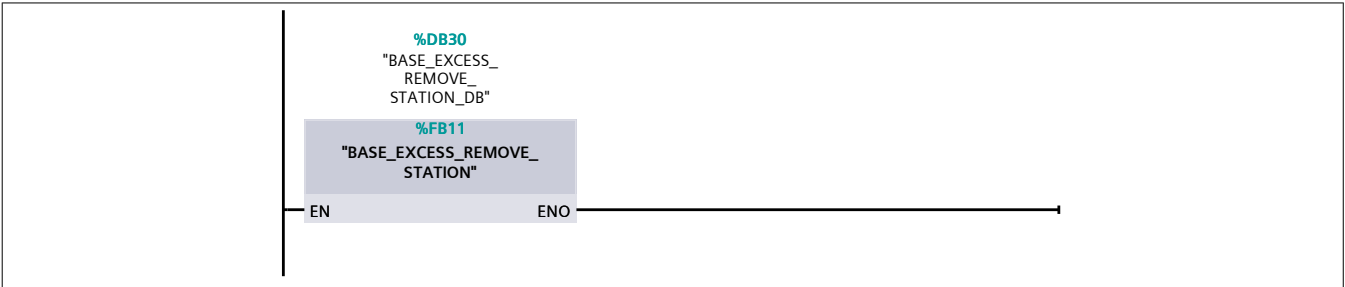
Network 8: BASE_RAW_INT0_CNC



Network 9: BASE_KEEP_DISTANCE



Network 10: BASE_EXCESS

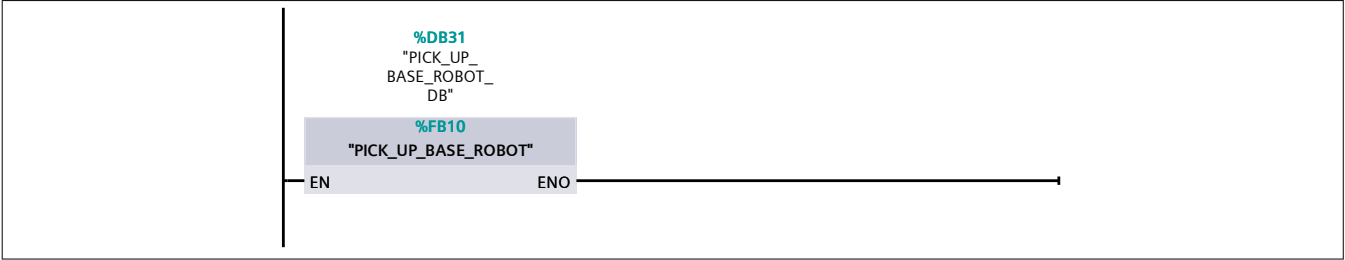


Network 11: CNC_BASE

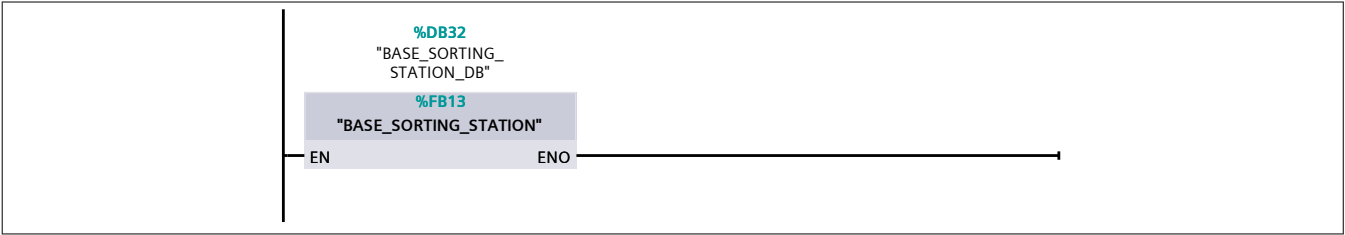
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Network 12: PICK_AND_PLACE_BASE



Network 13: BASE SORTING



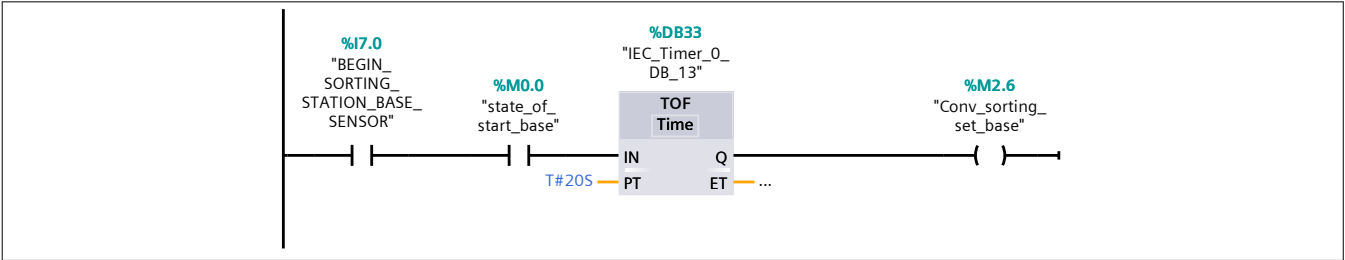
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

BASE_SORTING_STATION [FB13]

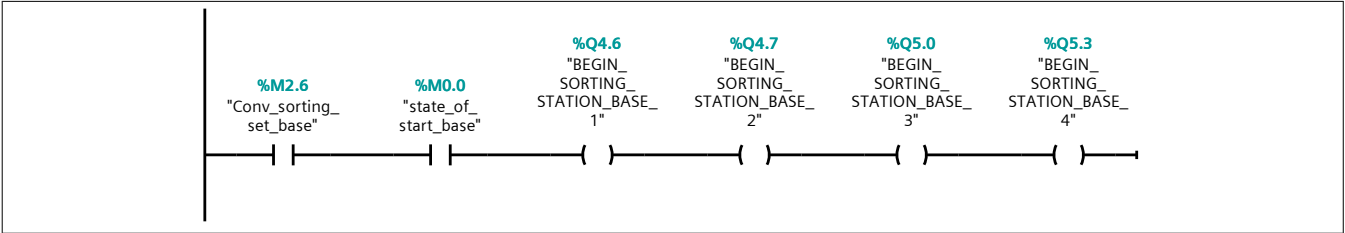
BASE_SORTING_STATION Properties					
General					
Name	BASE_SORTING_STATION	Number	13	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

BASE_SORTING_STATION									
Name	Data type	Default value	Retain	Access-ible from HMI/OP C UA	Wri-ta-ble from HM I/O PC UA	Visible in HMI engi-neering	Set-point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

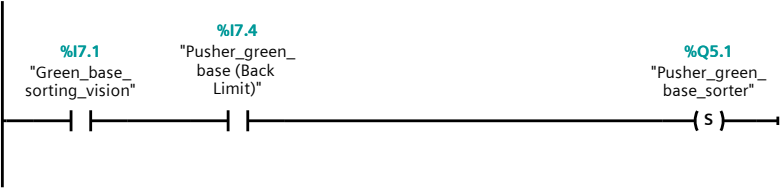
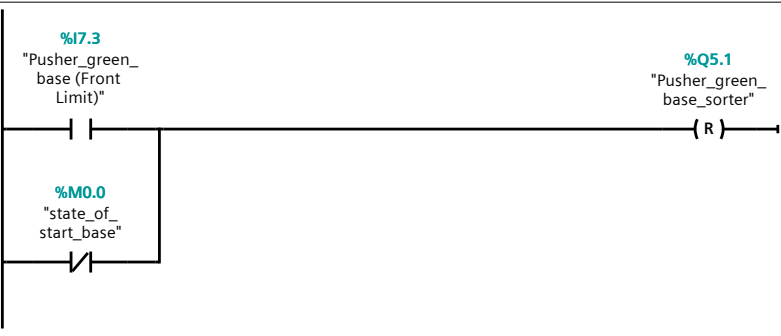

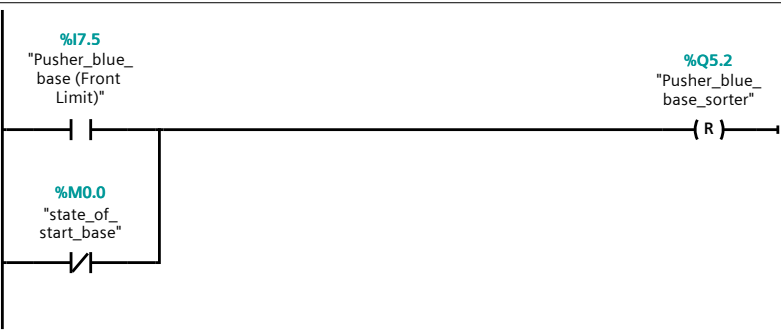
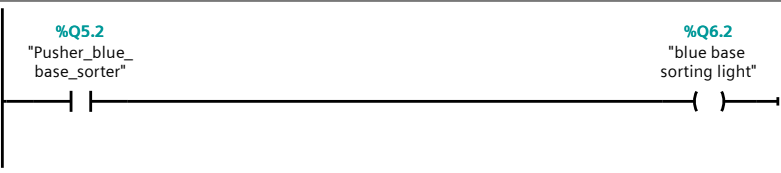
Network 1: BEGIN SORTING CONVEYOR



Network 2: CONV BASE SORTING HANDLE



Network 3: GREEN BASE PUSH FRONT

Totally Integrated Automation Portal		
	 <p>Ladder logic for Network 3: GREEN PUSH. It consists of a single rungs with three normally open contacts in series. The first contact is labeled %I7.1 "Green_base_sorting_vision". The second contact is labeled %I7.4 "Pusher_green_base (Back Limit)". The third contact is labeled %Q5.1 "Pusher_green_base_sorter". The rung ends with a set coil (S) for %Q5.1.</p>	
Network 4: GREEN PUSHER SORTING RETURN		
	 <p>Ladder logic for Network 4: GREEN PUSHER SORTING RETURN. It consists of a single rungs with two parallel branches. The top branch has a normally open contact labeled %I7.3 "Pusher_green_base (Front Limit)". The bottom branch has a normally closed contact labeled %M0.0 "state_of_start_base". Both branches lead to a reset coil (R) for %Q5.1 "Pusher_green_base_sorter".</p>	
Network 5: BLUE PUSHER SORTING PUSH		
	 <p>Ladder logic for Network 5: BLUE PUSHER SORTING PUSH. It consists of a single rungs with three normally open contacts in series. The first contact is labeled %I7.2 "Blue_base_sorting_vision". The second contact is labeled %I7.6 "Pusher_blue_base (Back Limit)". The third contact is labeled %Q5.2 "Pusher_blue_base_sorter". The rung ends with a set coil (S) for %Q5.2.</p>	
Network 6: BLUE PUSHER SORTING RETURN		
	 <p>Ladder logic for Network 6: BLUE PUSHER SORTING RETURN. It consists of a single rungs with two parallel branches. The top branch has a normally open contact labeled %I7.5 "Pusher_blue_base (Front Limit)". The bottom branch has a normally closed contact labeled %M0.0 "state_of_start_base". Both branches lead to a reset coil (R) for %Q5.2 "Pusher_blue_base_sorter".</p>	
Network 7: LIGHT BLUE		
	 <p>Ladder logic for Network 7: LIGHT BLUE. It consists of a single rungs with two normally open contacts in series. The first contact is labeled %Q5.2 "Pusher_blue_base_sorter". The second contact is labeled %Q6.2 "blue base sorting light". The rung ends with a set coil (S) for %Q6.2.</p>	

Totally Integrated Automation Portal		
Network 8: LIGHT GREEN		
<div><div><div><div><div></div><div><div><div>%Q5.1 "Pusher_green_base_sorter"</div></div></div><div><div><div>%Q6.3 "green base sorting light"</div></div></div></div><div></div></div></div></div>		

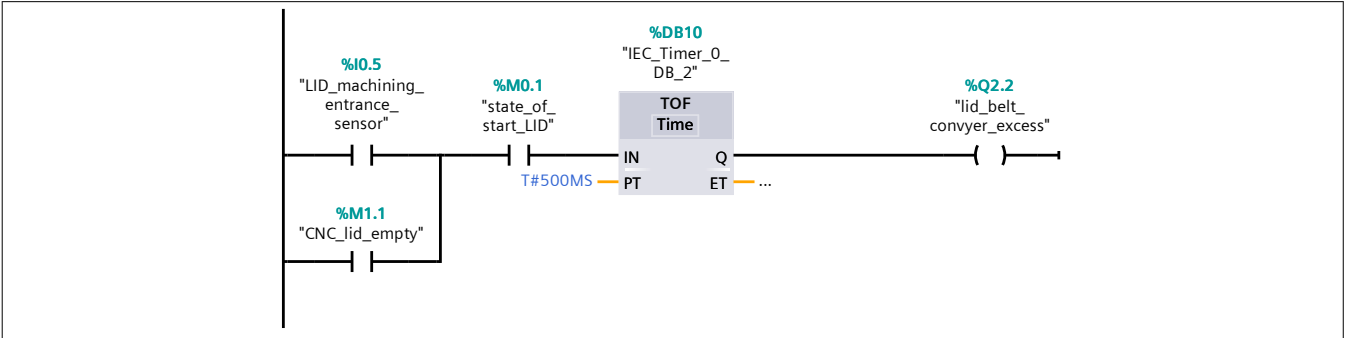
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

LID_execess_remove_station [FB3]

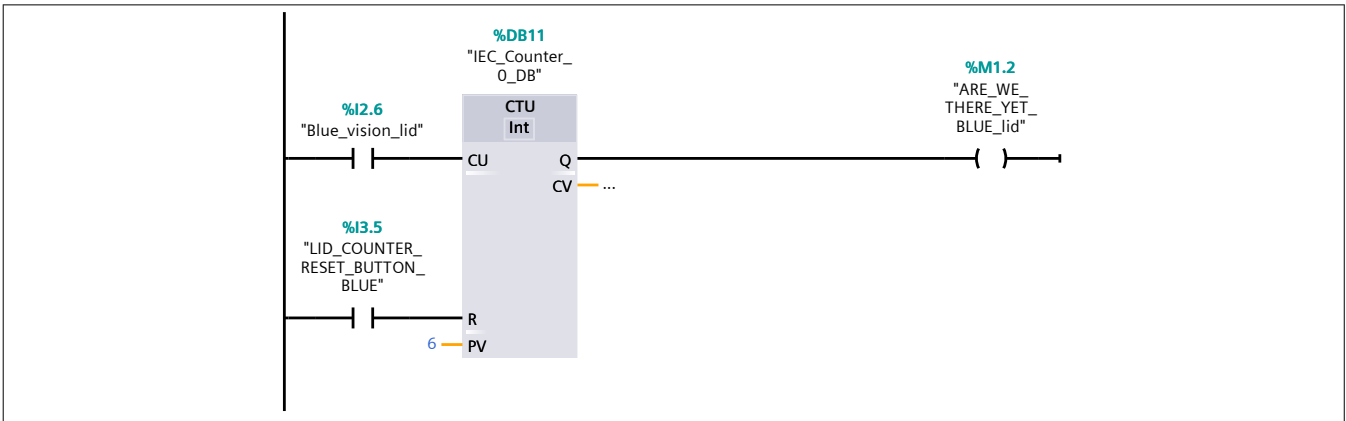
LID_execess_remove_station Properties					
General					
Name	LID_execess_remove_station	Number	3	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

LID_execess_remove_station									
Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble from HM I/O PC UA	Visible in HMI engi- neer- ing	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

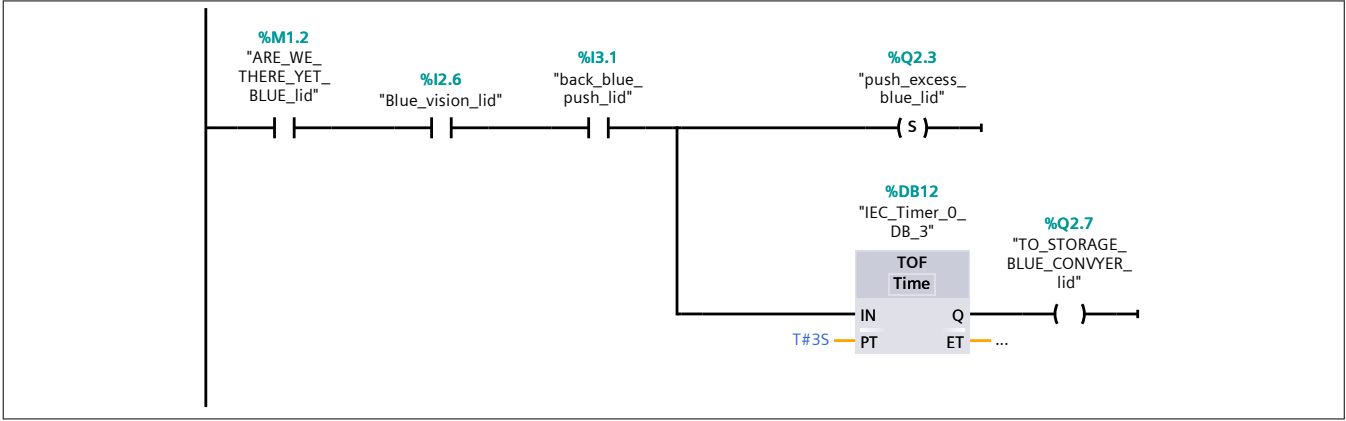
Network 1: LID_BELT_EXECESS_CONVEYOR_HANDLER



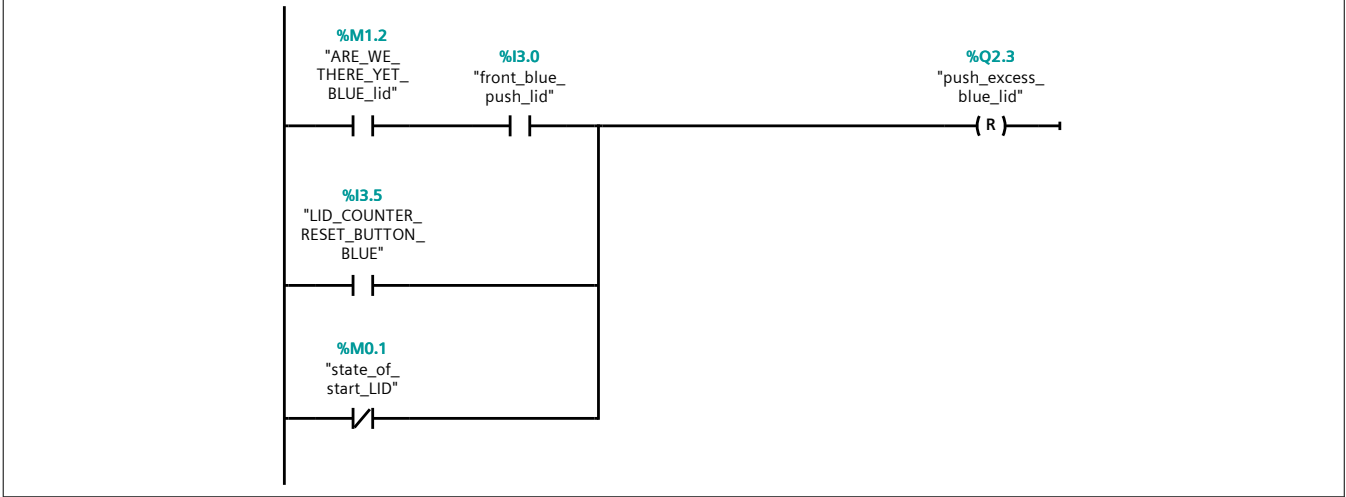
Network 2: COUNTING NUMBER OF BLUE MATERIAL OF EXECES



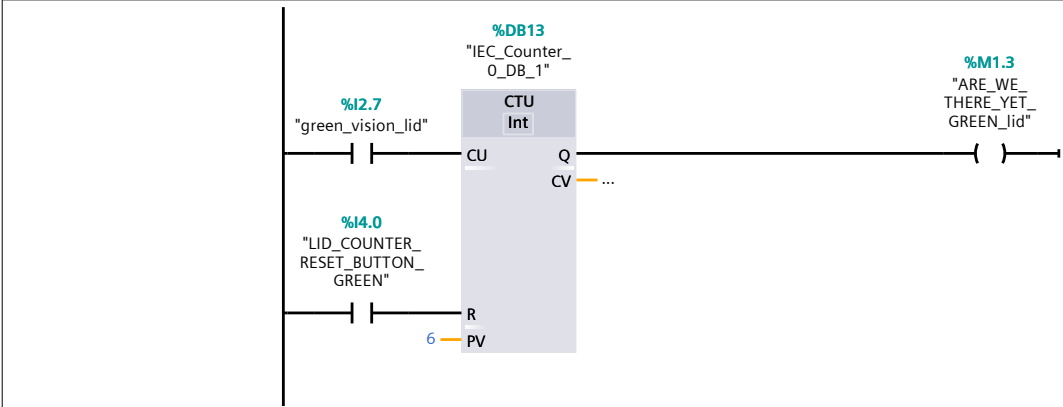
Network 3: PUSH_FORWARD_EXECESS_BLUE



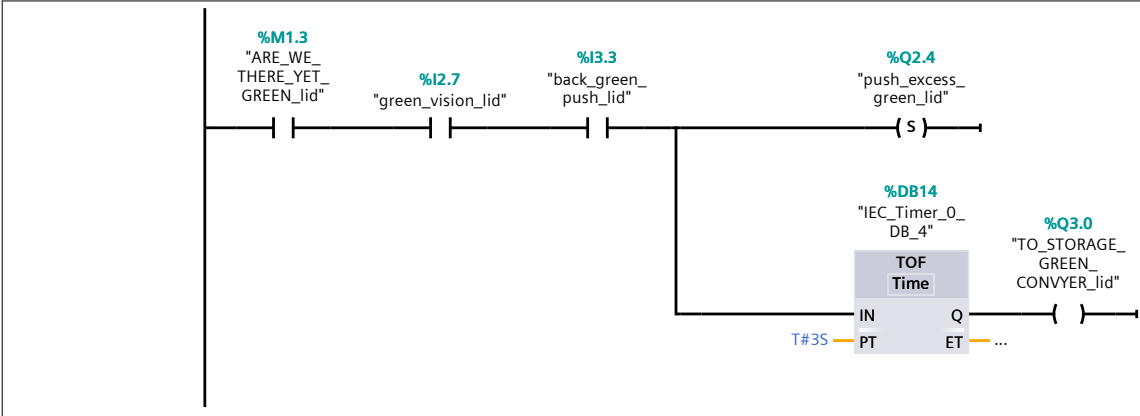
Network 4: PUSH_RETURN_EXECESS_BLUE



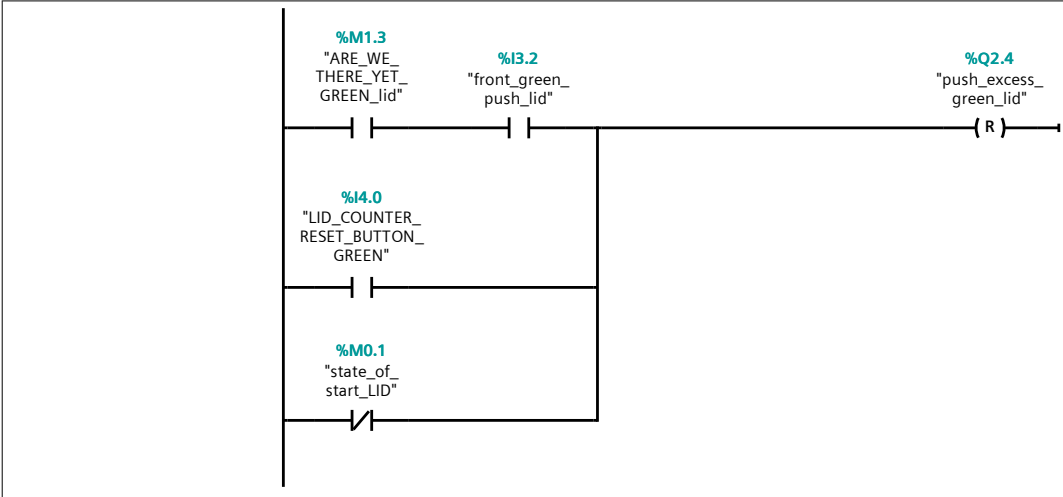
Network 5: COUNTING_NUMBER_OF_GREEN



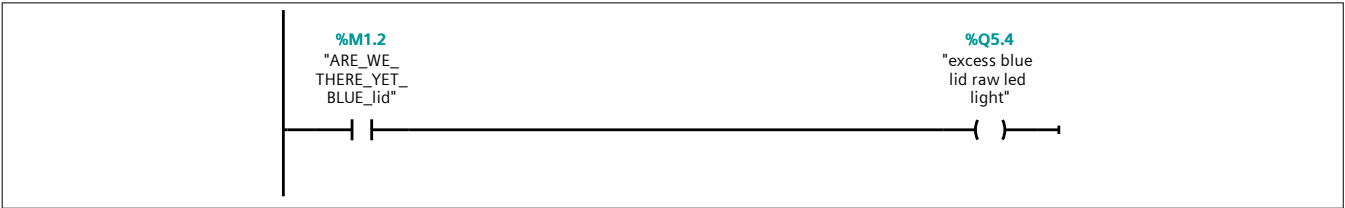
Network 6: PUSH_FORWARD_EXCESS_GREEN



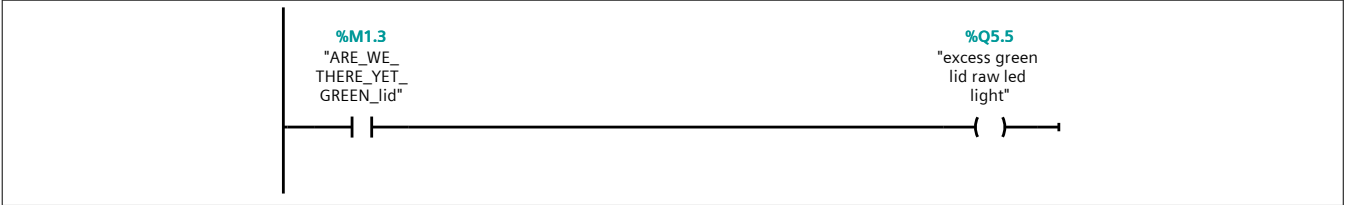
Network 7: PUSH_RETURN_GREEN



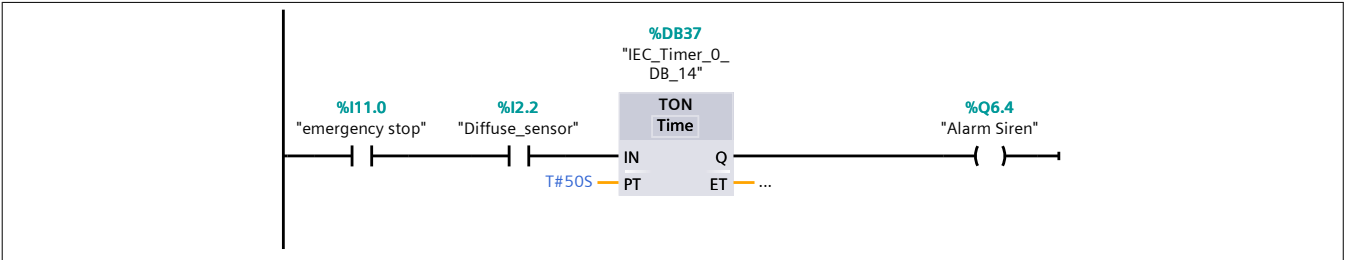
Network 8: LIGHT_BLUE_IF_REACHED



Network 9: LIGHT_GREEN_IF_REACHED



Network 10:



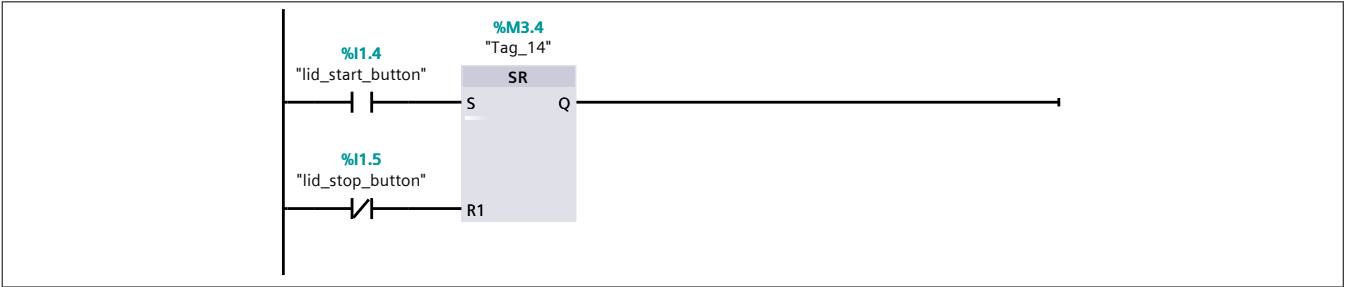
full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

LID_PRODUCTION [FB1]

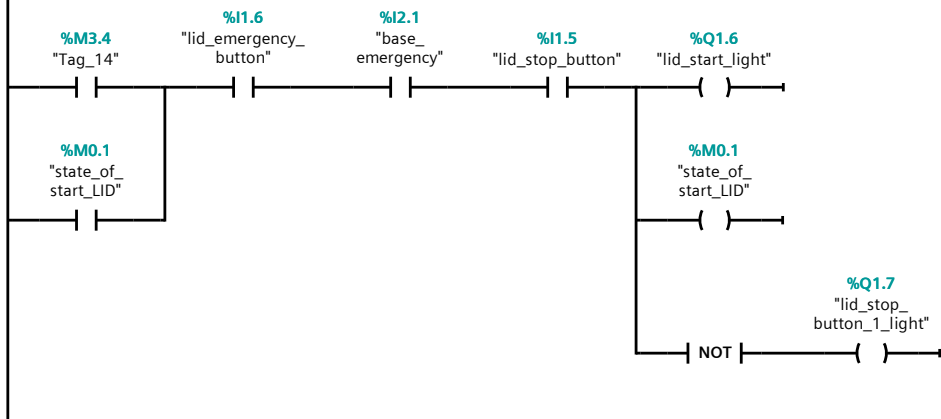
LID_PRODUCTION Properties					
General					
Name	LID_PRODUCTION	Number	1	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

LID_PRODUCTION									
Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble eng- neer- ing HM I/O PC UA	Visible in HMI	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

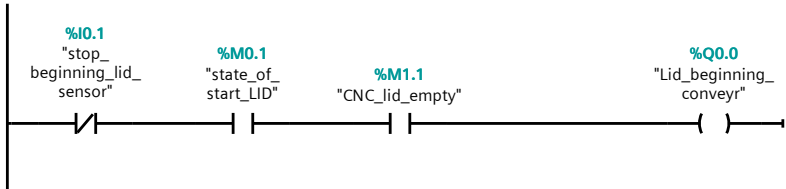
Network 1:



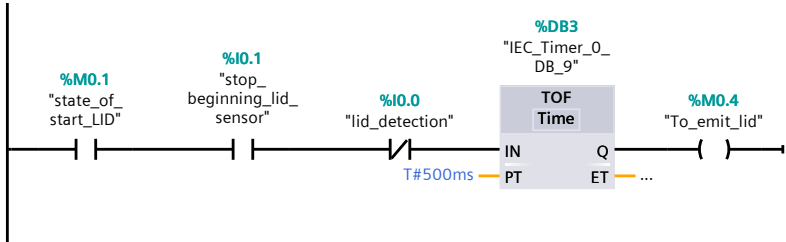
Network 2: LID STARTING GANDLE



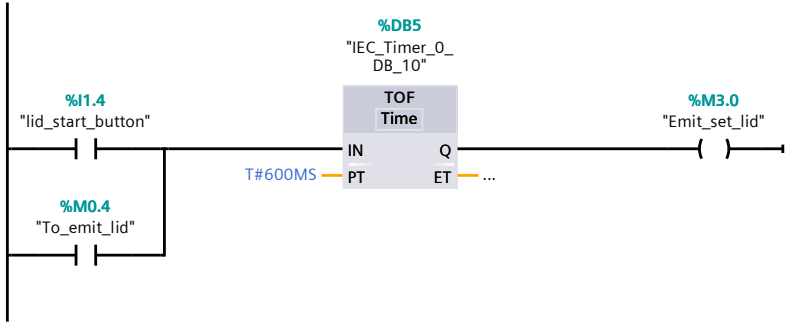
Network 3: LID_BEGINNING CONVEYOR



Network 4: LID_EMITTER_HANDLER

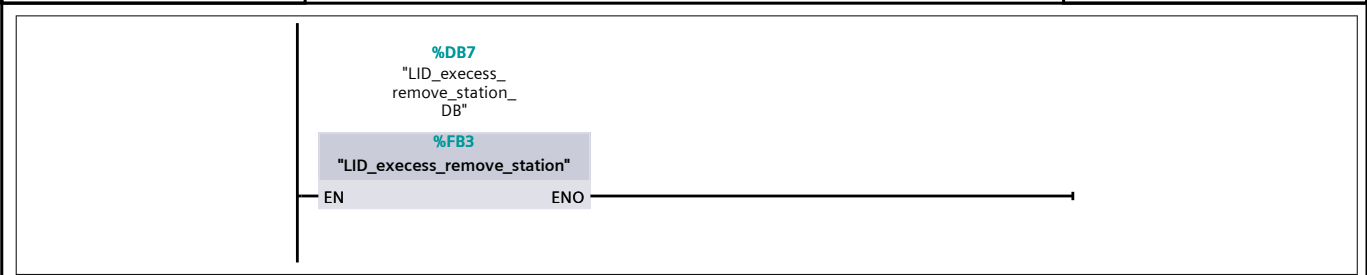


Network 5: FIRST LID TO EMIT

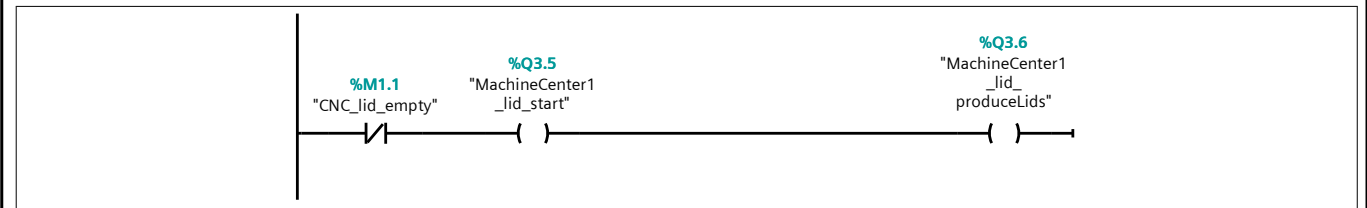


Network 6: EMIT EMERGENCY HANDLE LID

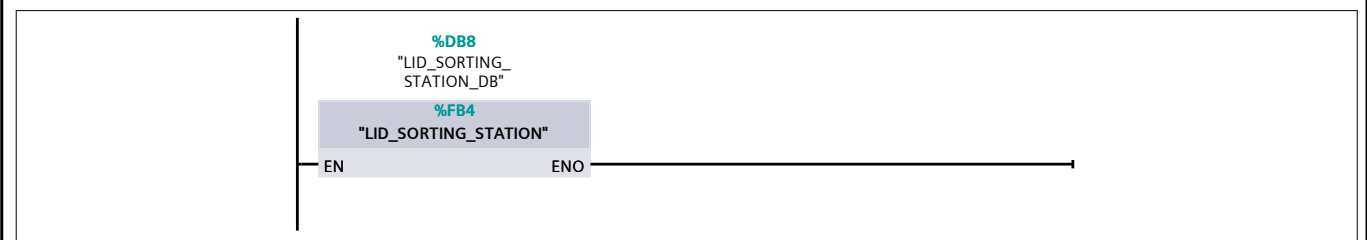
Totally Integrated Automation Portal		
<div><div><div><div><div><div></div><div><div><div>%M3.0 "Emit_set_lid"</div></div><div><div><div>%M0.1 "state_of_start_LID"</div></div></div><div><div><div>%Q2.1 "lid_raw_emit"</div></div></div></div></div></div></div></div></div>		
Network 7: LID_PICKUP_ROBOT		
<div><div><div><div><div><div></div><div><div><div>%DB4 "PICK_UP_LID_ROBOT_DB"</div></div><div><div><div>%FB2 "PICK_UP_LID_ROBOT"</div></div></div></div></div></div></div><div>EN</div><div>ENO</div></div></div>		
Network 8: FEEDING_CONVEYOR_HANDLER_LID		
<div><div><div><div><div><div></div><div><div><div>%M1.1 "CNC_lid_empty"</div></div><div><div><div>%M0.1 "state_of_start_LID"</div></div></div><div><div><div>%Q0.1 "lid_feeding_conveyr"</div></div></div></div></div></div></div></div></div>		
Network 9:		
<div><div><div><div><div><div></div><div><div><div>%DB6 "IEC_Timer_0_DB"</div></div><div><div><div>%M1.1 "CNC_lid_empty"</div></div></div></div></div></div><div><div><div>%I3.4 "into_cnc_lid_sensor"</div></div><div><div><div>TOF Time</div></div><div><div><div>T#500MS PT</div></div><div><div><div>Q</div></div><div><div><div>ET</div></div><div>...</div></div></div></div></div></div></div></div></div>		
Network 10: LID_KEEP_DISTANCE		
<div><div><div><div><div><div></div><div><div><div>%M1.1 "CNC_lid_empty"</div></div><div><div><div>%Q2.6 "KEEP_DISTANCE"</div></div></div><div><div><div>%Q2.5 "ONE_OBJECT_IN"</div></div></div></div></div></div></div></div></div>		
Network 11: LID_execcess_station		



Network 12: CNC



Network 13:



full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

LID_SORTING_STATION [FB4]

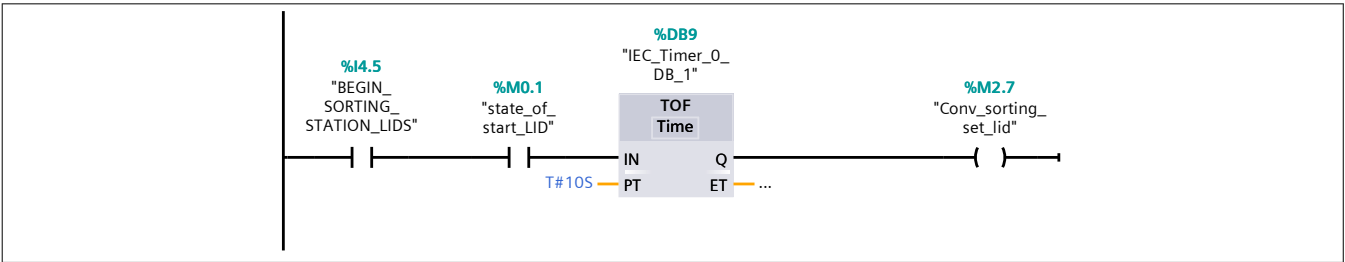
LID_SORTING_STATION Properties

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

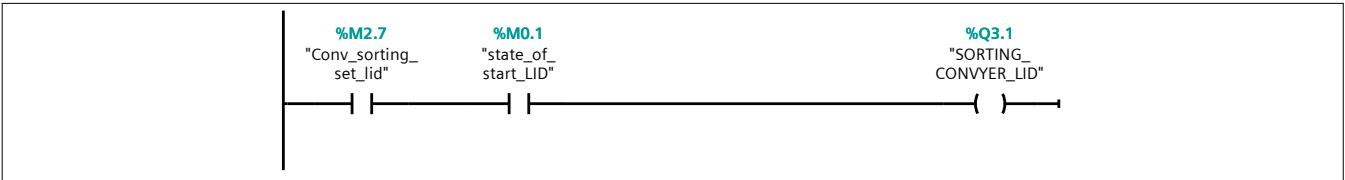
LID_SORTING_STATION

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble fro m HM I/O PC UA	Visible in HMI engi- neer- ing	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

Network 1: BEGIN SORTING CONVEYOR



Network 2:



Network 3: GREEN LID PUSH FRONT

Totally Integrated Automation Portal		
	<div><div><div><div><div>%I4.7</div><div>"GREEN_LID_VISION_SORTING"</div></div><div><div>%I4.2</div><div>"GREEN_LID_PUSHER_SORTING(BACK LIMIT)"</div></div><div><div>%Q3.2</div><div>"GREEN_LID_PUSHER_SORTING"</div></div></div><div><div></div><div></div><div></div><div>(S)</div></div></div></div>	
Network 4: GREEN PUSHER SORTING RETURN		
	<div><div><div><div><div>%I4.1</div><div>"GREEN_LID_PUSHER_SORTING(FRONT LIMIT)"</div></div><div><div>%M0.1</div><div>"state_of_start_LID"</div></div></div><div><div></div><div></div><div></div><div>(R)</div></div></div></div>	
Network 5: BLUE PUSHER SORTING PUSH		
	<div><div><div><div><div>%I4.6</div><div>"BLUE_LID_VISION_SORTING"</div></div><div><div>%I4.4</div><div>"BLUE_LID_PUSHER_SORTING(BACK LIMIT)"</div></div><div><div>%Q3.3</div><div>"BLUE_LID_PUSHER_SORTING"</div></div></div><div><div></div><div></div><div></div><div>(S)</div></div></div></div>	
Network 6: BLUE_PUSHER_SORTING_RETURN		
	<div><div><div><div><div>%I4.3</div><div>"BLUE_LID_PUSHER_SORTING(FRONT LIMIT)"</div></div><div><div>%M0.1</div><div>"state_of_start_LID"</div></div></div><div><div></div><div></div><div></div><div>(R)</div></div></div></div>	
Network 7: GREEN LID IF BLUE		

Totally Integrated Automation Portal		
<div><div></div><div><div><div>%Q3.2 "GREEN_LID_ PUSHER_ SORTING"</div><div></div><div>%Q6.1 "green lid sorting light"</div></div></div></div>		
<div>Network 8: BLUE LID</div> <div><div></div><div><div><div>%Q3.3 "BLUE_LID_ PUSHER_ SORTING"</div><div></div><div>%Q6.0 "blue lid sorting light"</div></div></div></div>		

full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

PICK_UP_BASE_ROBOT [FB10]

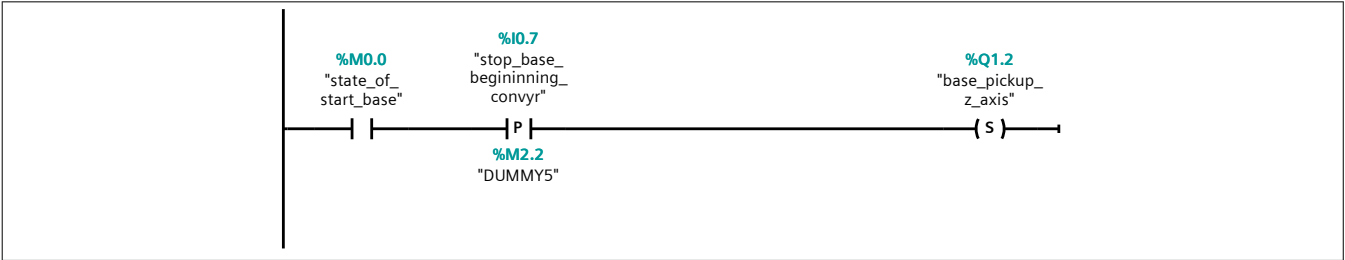
PICK_UP_BASE_ROBOT Properties

General					
Name	PICK_UP_BASE_ROBOT	Number	10	Type	FB
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

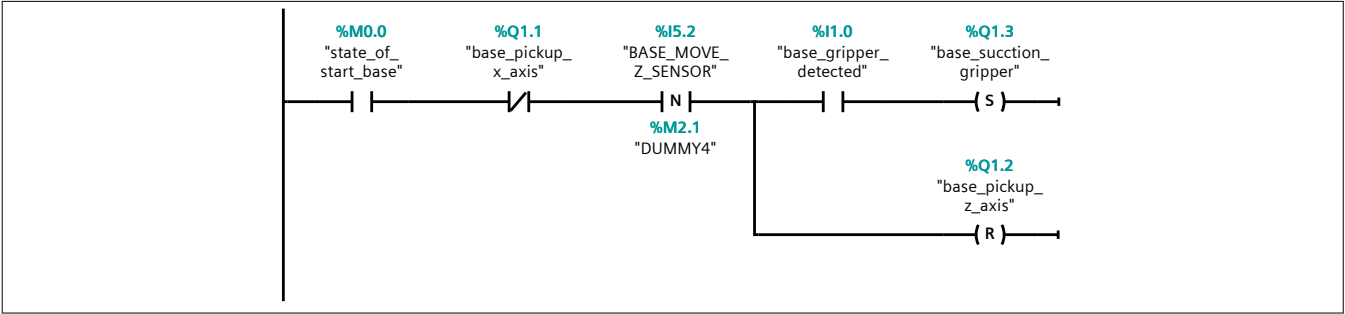
PICK_UP_BASE_ROBOT

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble from HM I/O PC UA	Visible in HMI engi- neer- ing	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

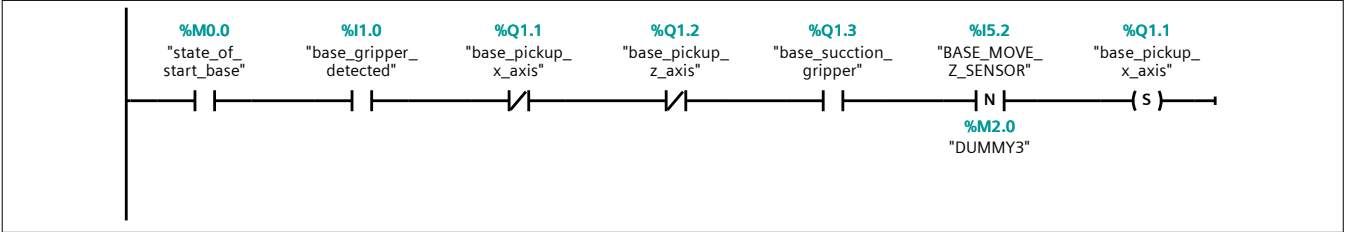
Network 1: BASE_PICKUP_ROBOT_LOWEING_Z_AXIS



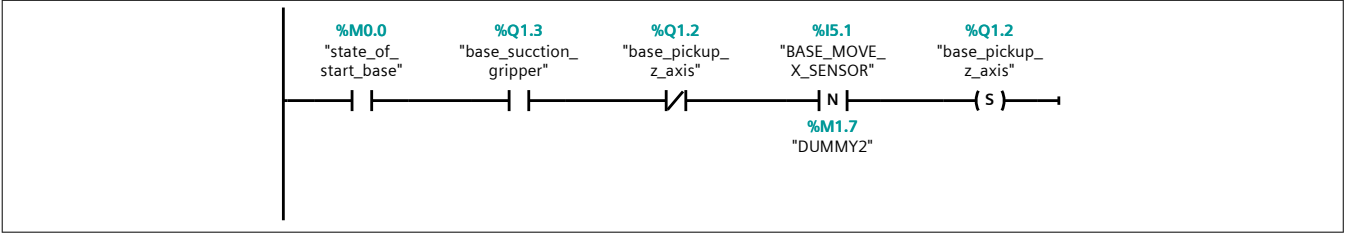
Network 2: BASE_PICKUP_OPERATE_SUCTION



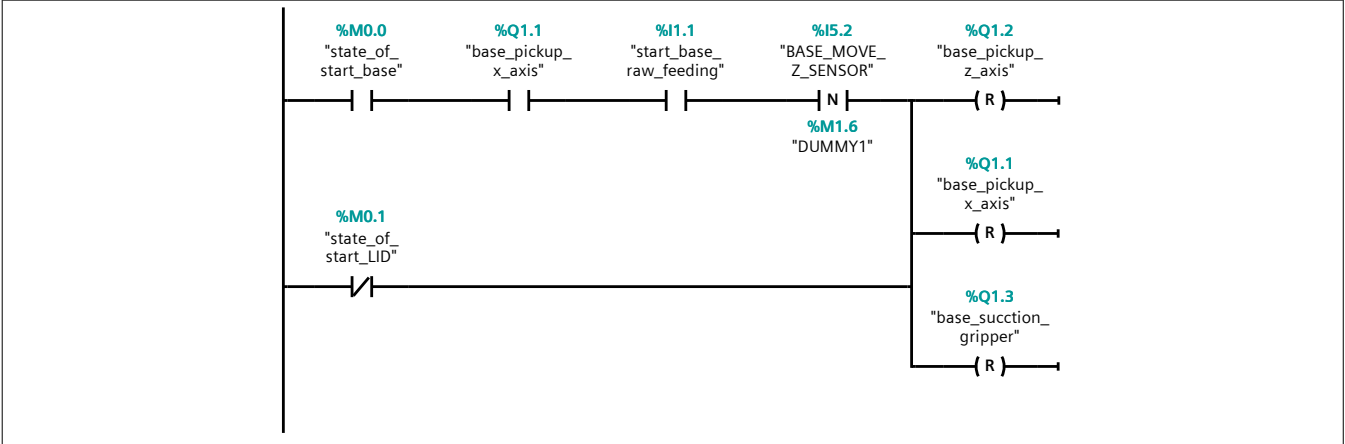
Network 3: PICK_UP_BASE_GO_TO_FEEDING



Network 4: LID_PICK_UP_LOWERING_Z_AXIS_IN_FEEDING



Network 5: LID_RETURN_TO_ORIGIN_PICKUP



full production line / PLC_1 [CPU 1511-1 PN] / Program blocks

PICK_UP_LID_ROBOT [FB2]

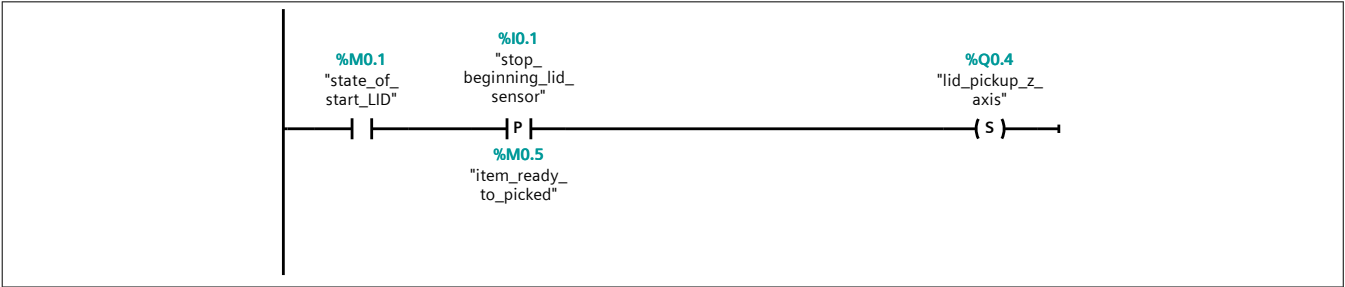
PICK_UP_LID_ROBOT Properties

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

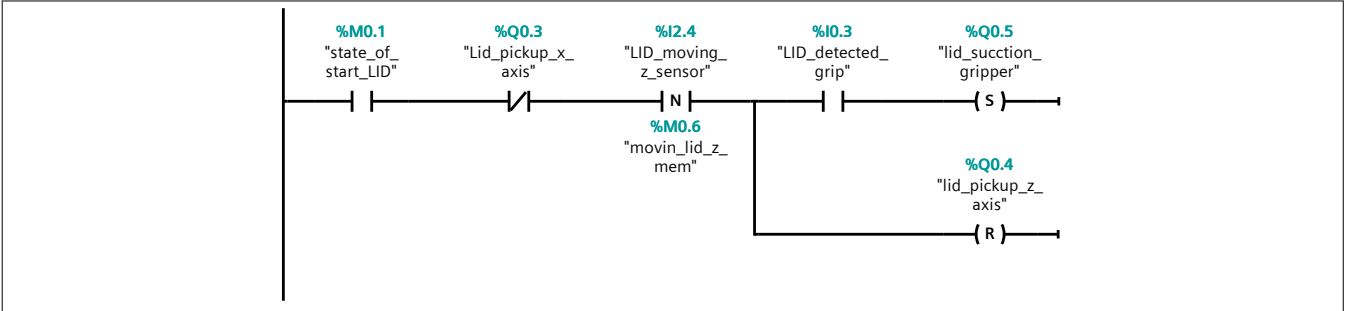
PICK_UP_LID_ROBOT

Name	Data type	Default value	Retain	Access- ible from HMI/OP C UA	Wri- ta- ble from HM I/O PC UA	Visible in HMI engi- neer- ing	Set- point	Super- vision	Comment
Input									
Output									
InOut									
Static									
Temp									
Constant									

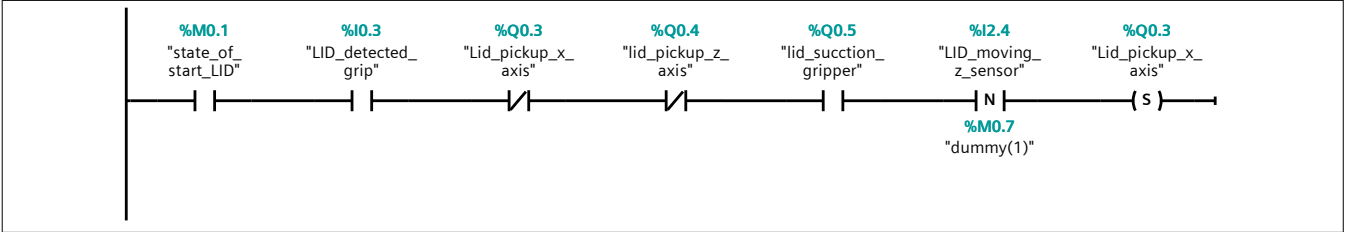
Network 1:



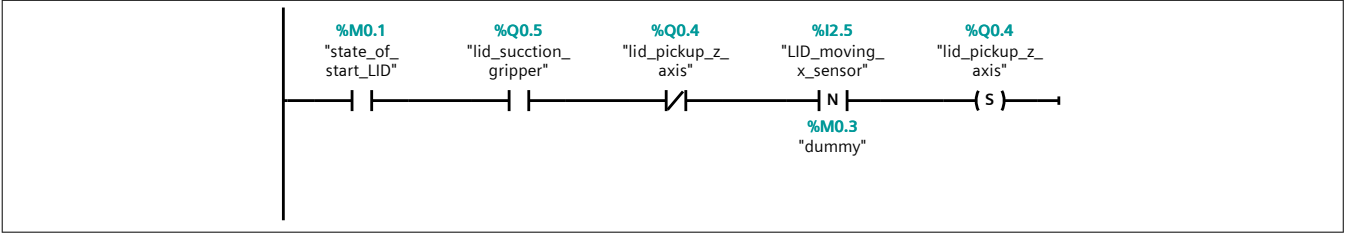
Network 2:



Network 3: PICK_UP_LID_GO_TO_FEEDING



Network 4: LID_PICK_UP_LOWERING_Z_AXIS_IN_FEEDING



Network 5: LID_RETURN_TO_ORIGIN_PICKUP

