

**AIN SHAMS UNIVERSITY**

**FACULTY OF ENGINEERING**

**MECHATRONICS ENGINEERING DEPARTMENT**



**MCT 312: Industrial Automation**

**Project (2): Production Line**

**Team 9**

**Submitted to**

**Dr. Mohammed Ibrahim / Eng. Hesham**

**Submitted By:**

Name	Id
Mohamed Emad Mohamed Hussien Omar	1802245
Mohammed Abdulaziz Farrag Ahmed	1805858
Ali Abdelhakem Mahmod	1805347
Abdelrahman Ayman	1806672
Alaa Elsayed Metwaly	1809361

Totally Integrated Automation Portal

FactoryIO\_Template\_S7-1500\_V15 / 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: connection Function block

%FC9000

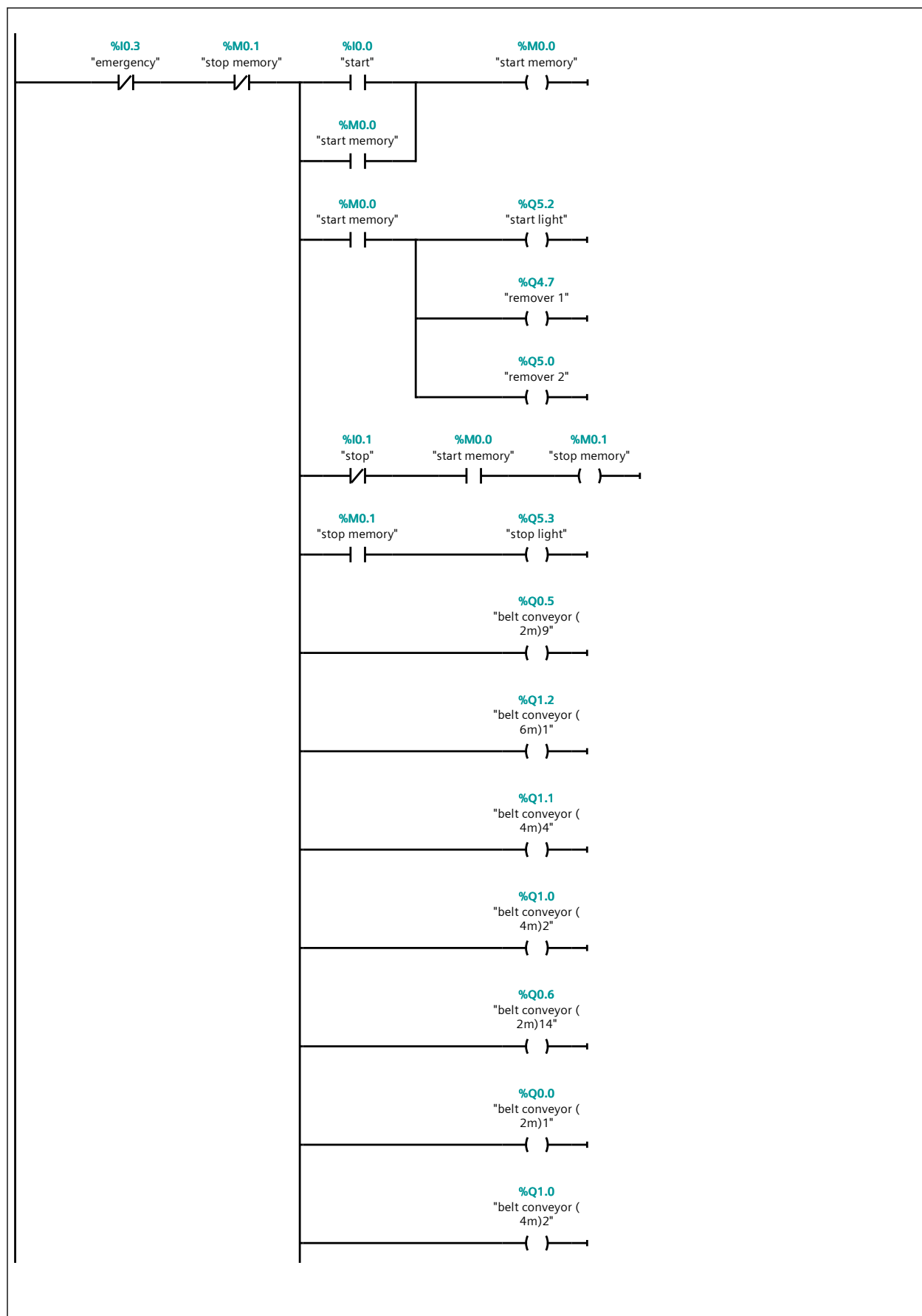
"MHJ-PLC-Lab-Function-S71500"

EN

ENO

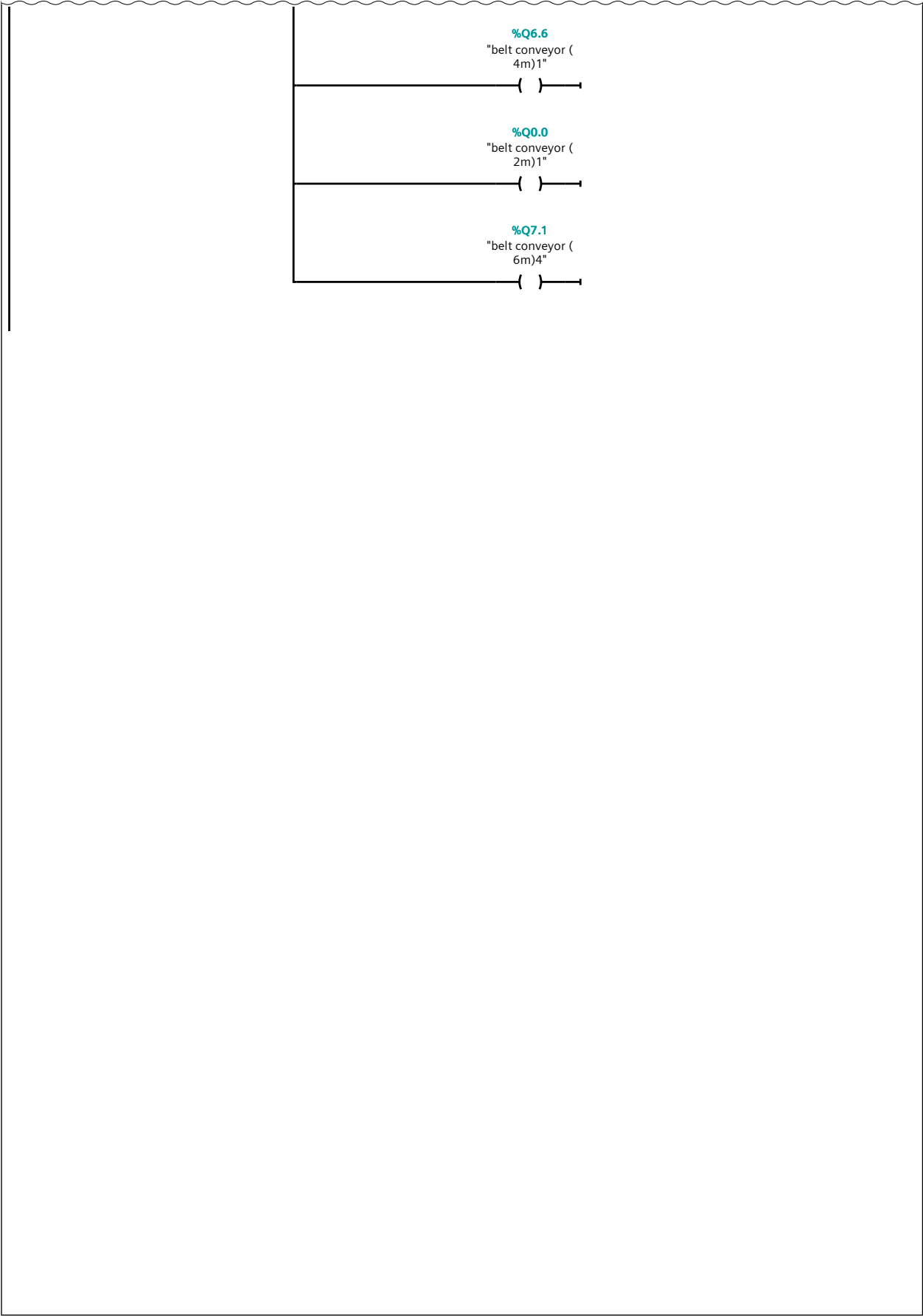
Network 2: system start \ stop

## Network 2: system start \ stop (1.1 / 2.1)



Network 2: system start \ stop (2.1 / 2.1)

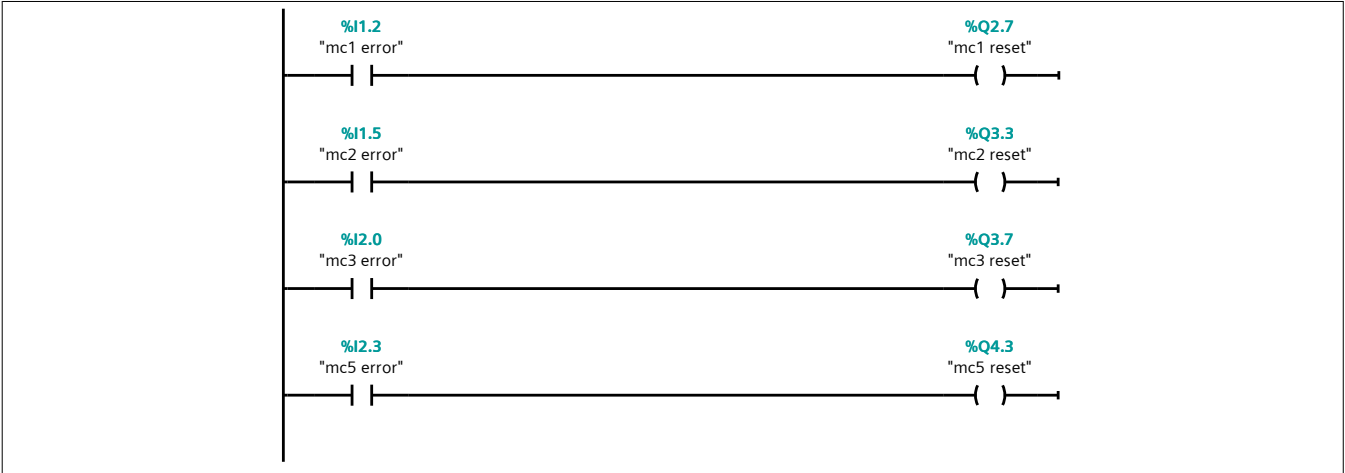
1.1 ( Page1 - 2)



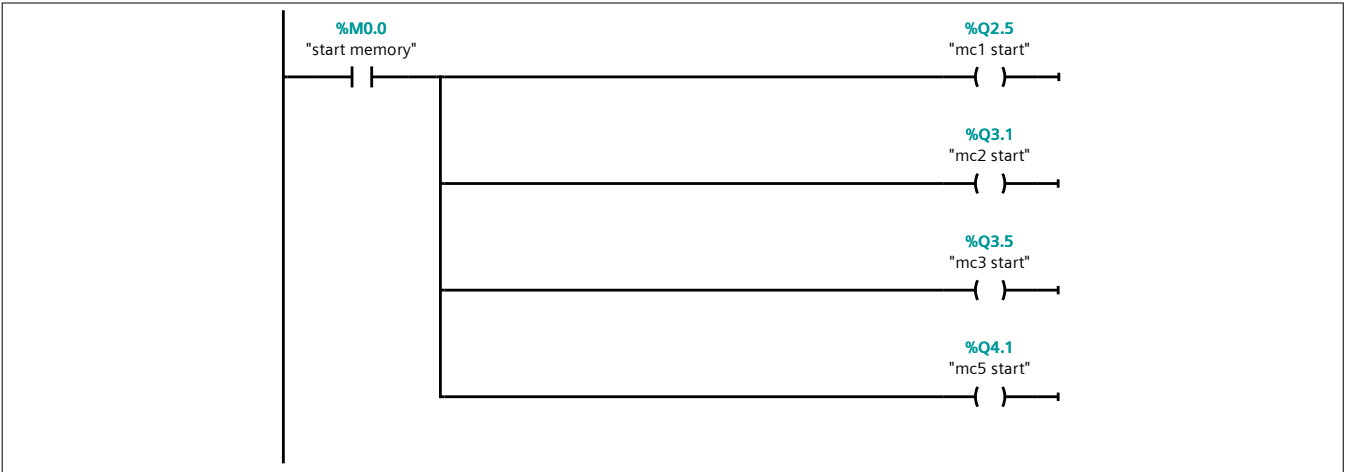
Network 3: system reset



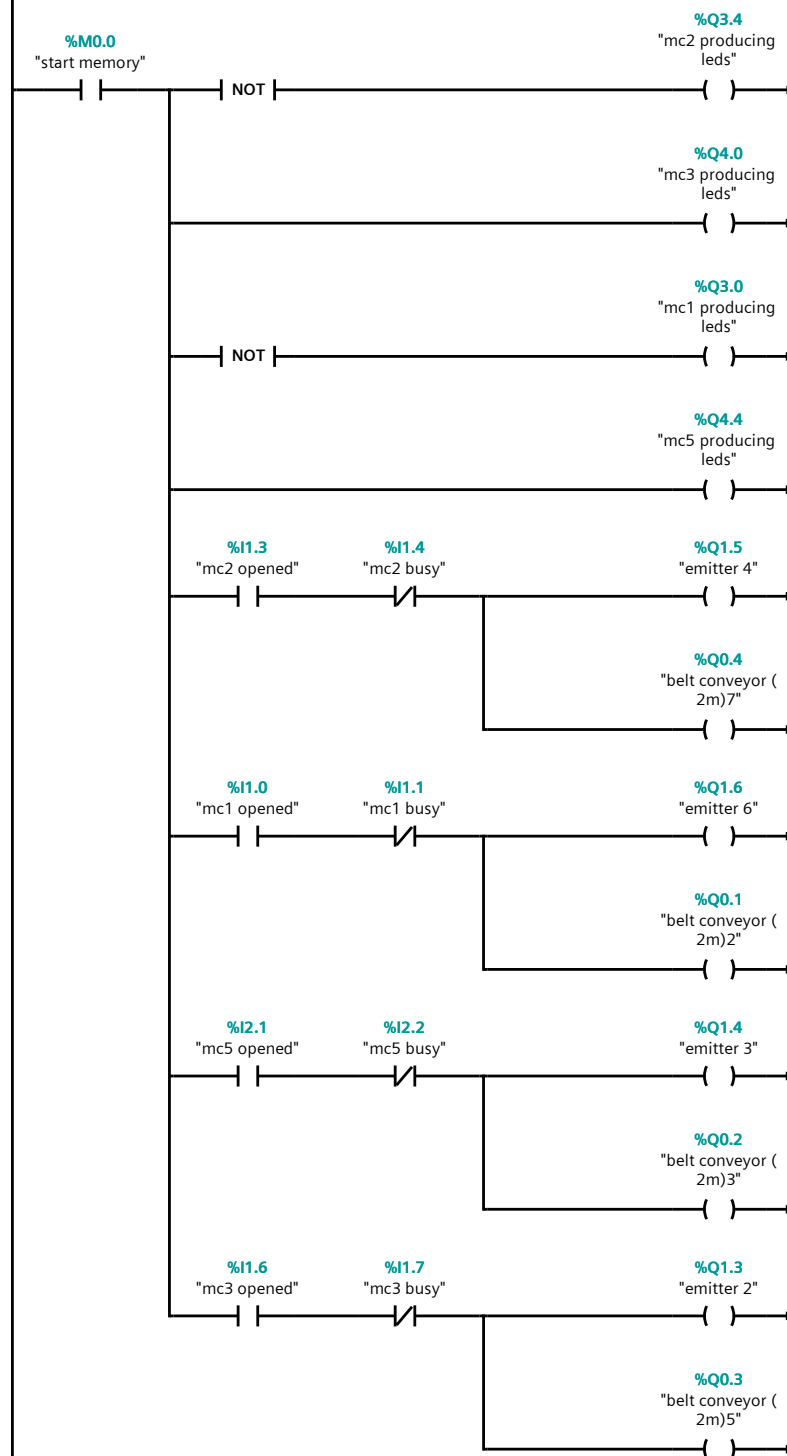
Network 4: reset machining station



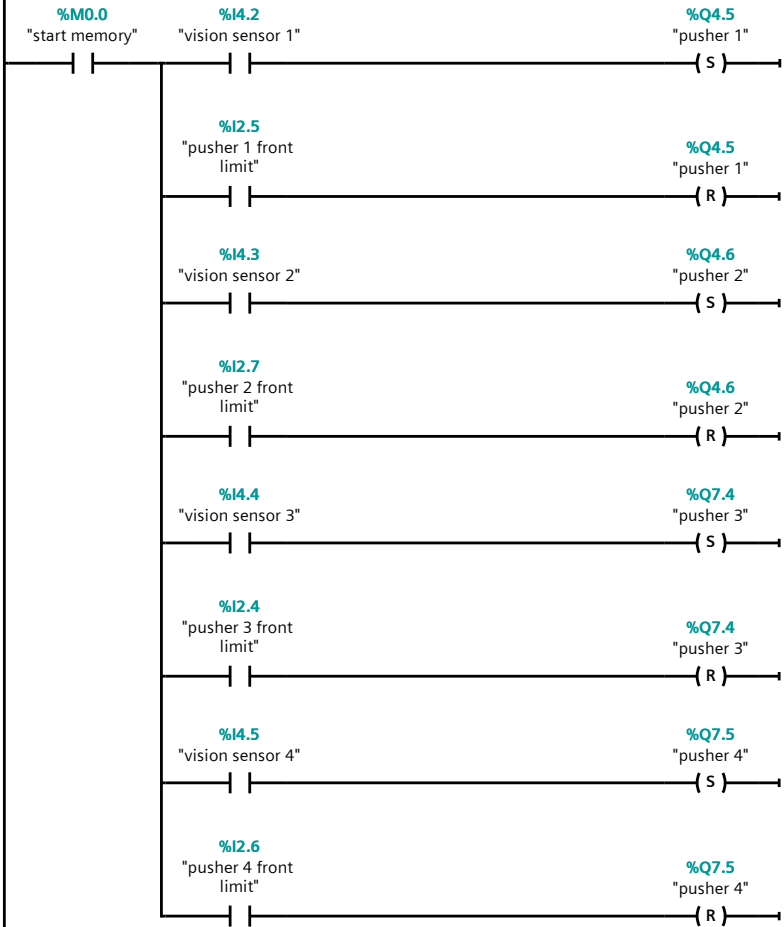
Network 5: start \ stop machining stations



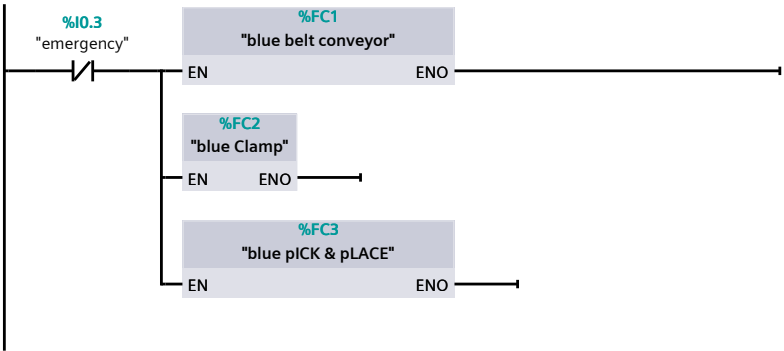
Network 6: feeding and machining



## Network 7: Sorting



Network 8: blue Assembly



Network 9: green assembly





FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program blocks

blue belt conveyor [FC1]

## blue belt conveyor Properties

General	
1	General
2	General
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100	General

<b>Name</b>	blue belt conveyor	<b>Number</b>	1	<b>Type</b>	FC
<b>Language</b>	LAD	<b>Numbering</b>	Automatic		

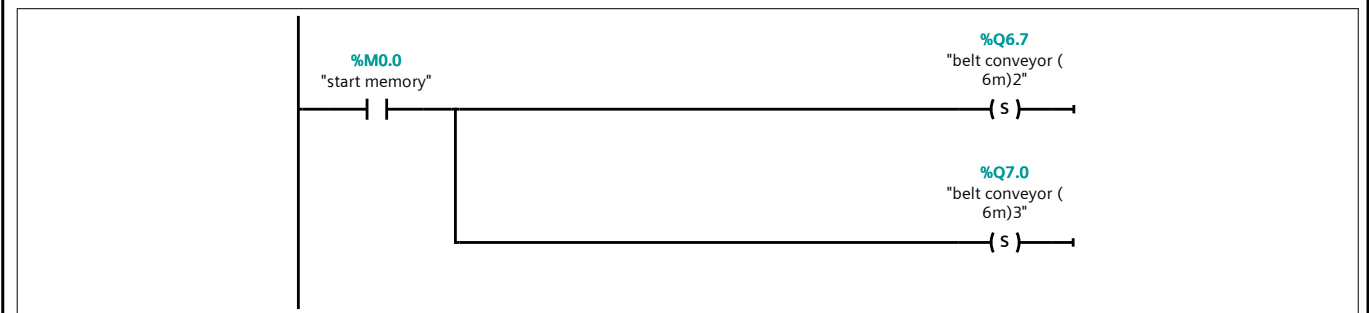
## Information

<b>Title</b>		<b>Author</b>		<b>Comment</b>	
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

blue belt conveyor

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
blue belt conveyor	Void		

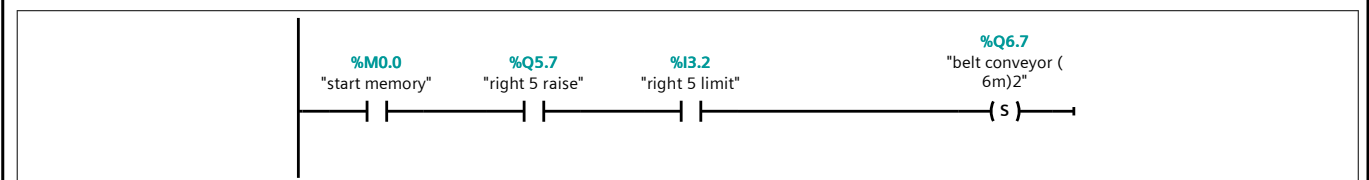
**Network 1:**



**Network 2:**



**Network 3:**



Totally Integrated Automation Portal		
<b>Network 4:</b>		
<div><div><div><div><div>%I4.6</div><div>"diffuser sensor 1"</div></div><div><div>N</div></div><div><div>%M0.2</div><div>"Tag_1"</div></div></div><div><div><div>%Q7.0</div><div>"belt conveyor (6m)3"</div></div><div><div>( R )</div></div></div></div></div>		
<b>Network 5:</b>		
<div><div><div><div><div>%I5.0</div><div>"diffuser sensor 3"</div></div><div><div>N</div></div><div><div>%M0.3</div><div>"Tag_2"</div></div></div><div><div><div>%Q6.7</div><div>"belt conveyor (6m)2"</div></div><div><div>( R )</div></div></div></div></div>		
<b>Network 6:</b>		
<div><div><div><div><div>%I5.0</div><div>"diffuser sensor 3"</div></div><div><div>N</div></div><div><div>%M0.4</div><div>"Tag_3"</div></div></div><div><div><div>%Q5.7</div><div>"right 5 raise"</div></div><div><div>( R )</div></div></div><div><div><div>%Q5.5</div><div>"right 3 raise"</div></div><div><div>( R )</div></div></div></div></div>		
<b>Network 7:</b>		
<div><div><div><div><div>%I5.0</div><div>"diffuser sensor 3"</div></div><div><div>P</div></div><div><div>%M0.5</div><div>"Tag_4"</div></div></div><div><div><div>INC</div><div>UDInt</div><div>EN</div><div>ENO</div></div><div><div>%QD8</div><div>"counter blue"</div></div><div><div>IN/OUT</div></div></div></div></div>		

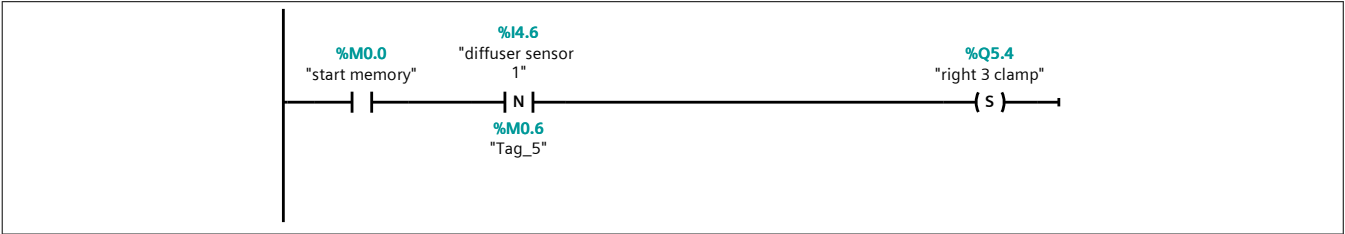
# FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program blocks

## blue Clamp [FC2]

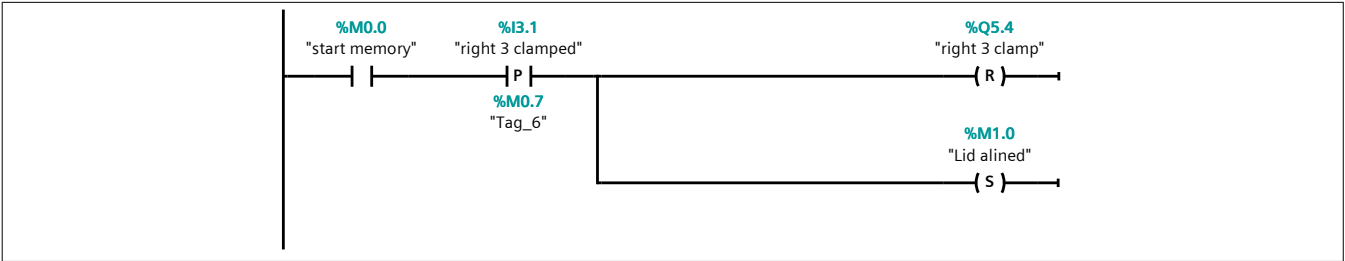
blue Clamp Properties					
General					
Name	blue Clamp	Number	2	Type	FC
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

blue Clamp			
Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
blue Clamp	Void		

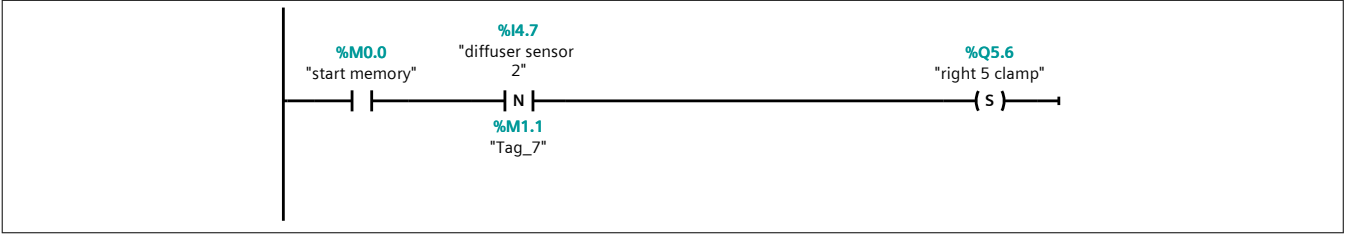
### Network 1:



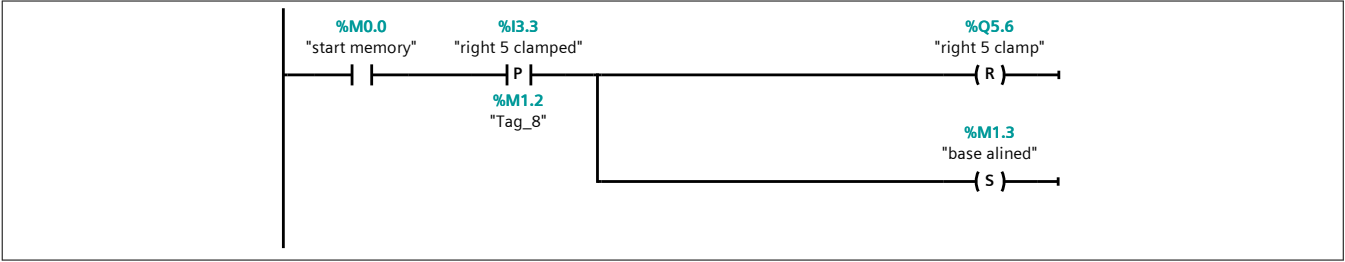
### Network 2:



### Network 3:



**Network 4:**



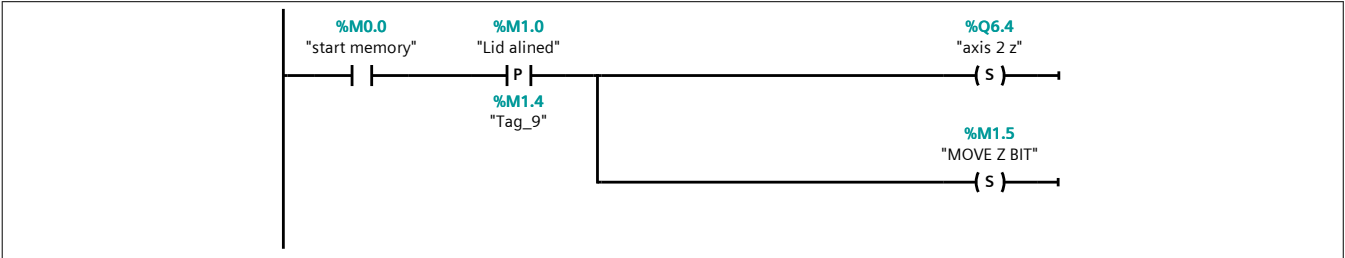
FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program  
blocks

blue pICK & pLACE [FC3]

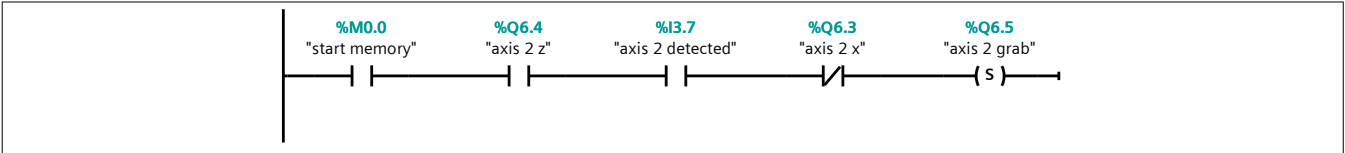
blue pICK & pLACE Properties					
General					
Name	blue pICK & pLACE	Number	3	Type	FC
Language	LAD	Numbering	Automatic		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

blue pICK & pLACE			
Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
blue pICK & pLACE	Void		

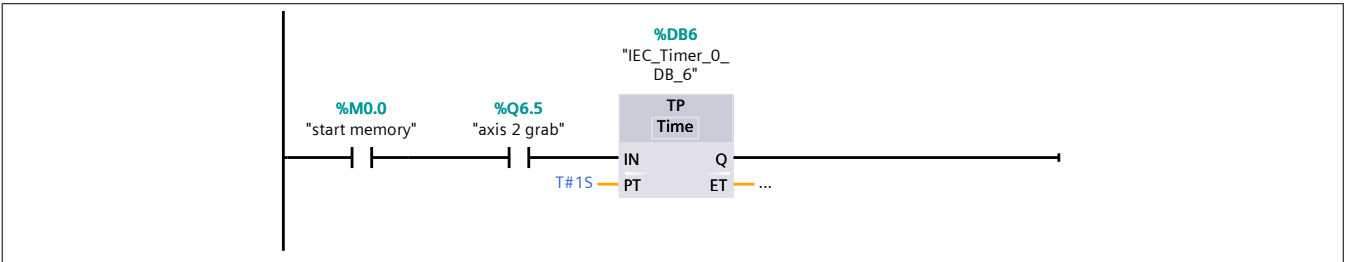
Network 1:



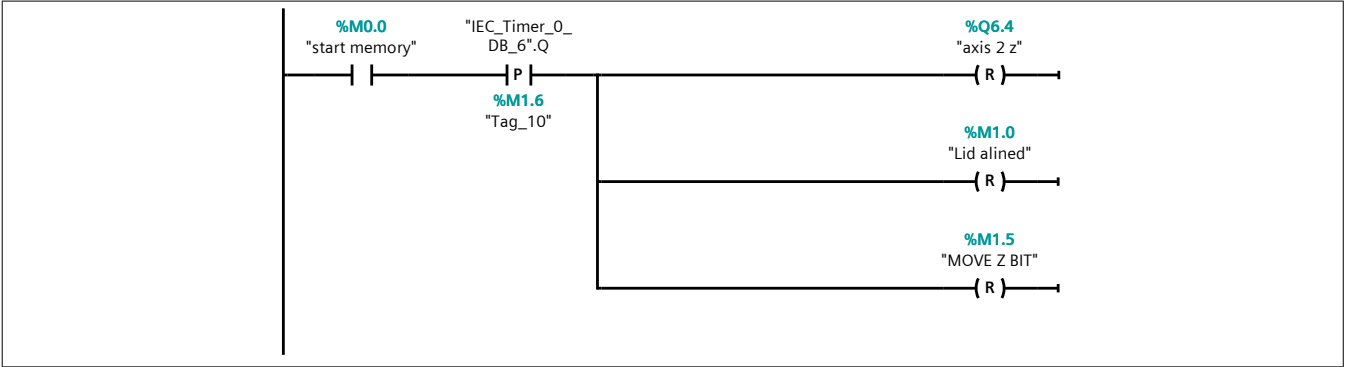
Network 2:



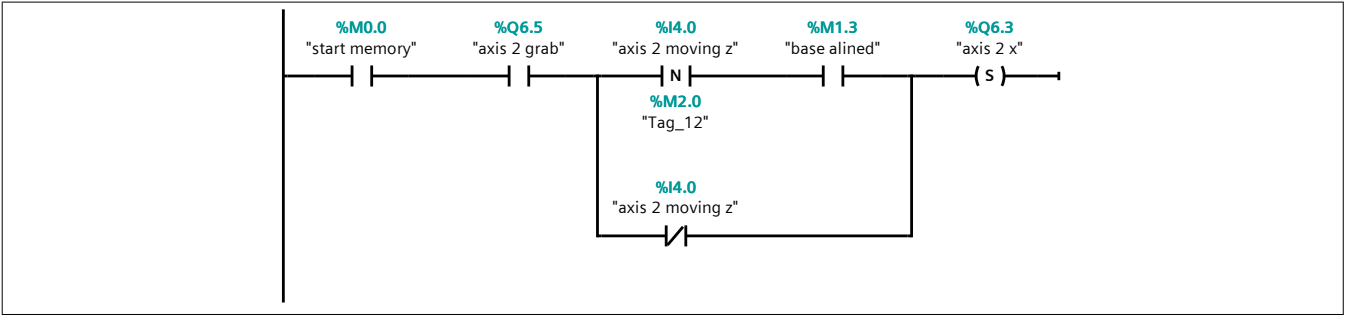
Network 3:



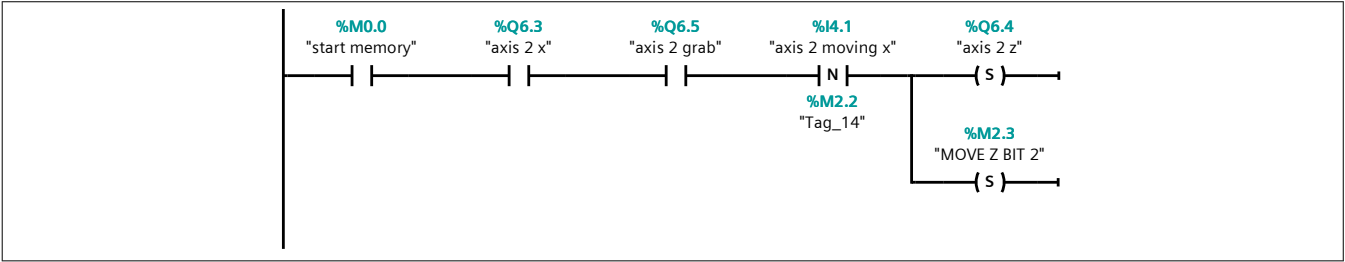
Network 4:



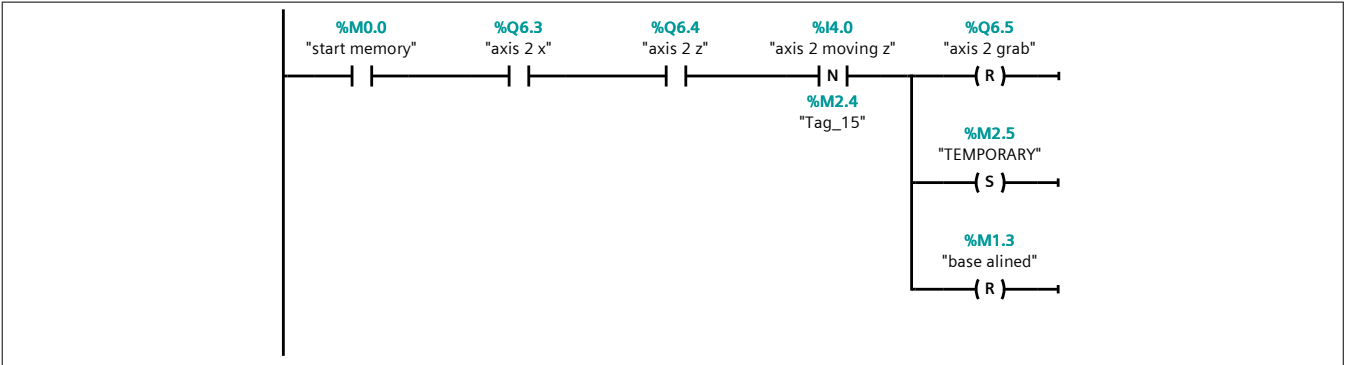
Network 5:



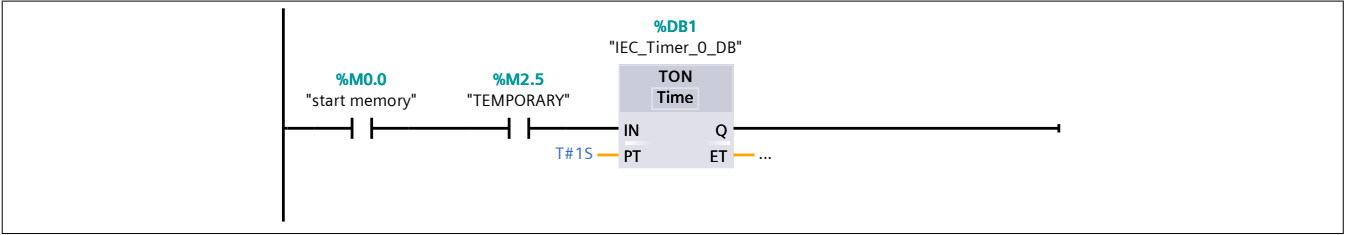
Network 6:



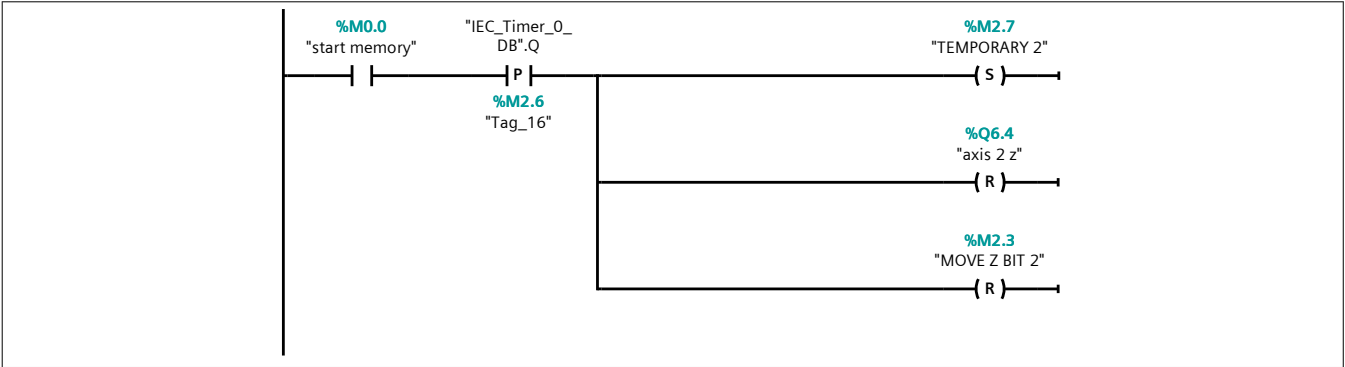
Network 7:



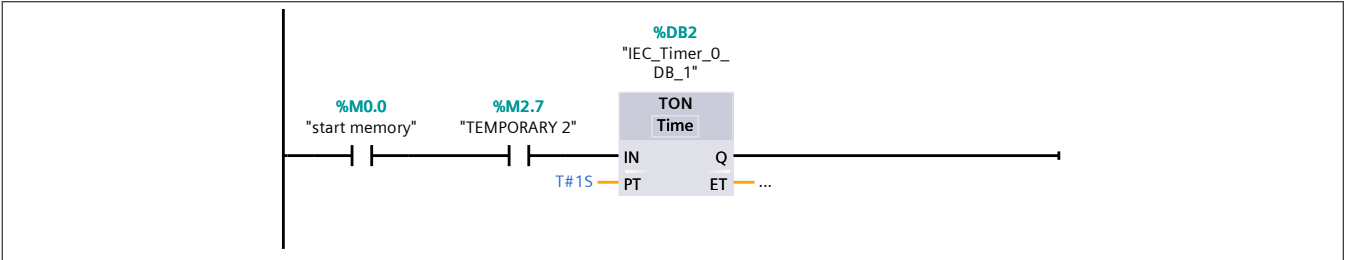
Network 8:



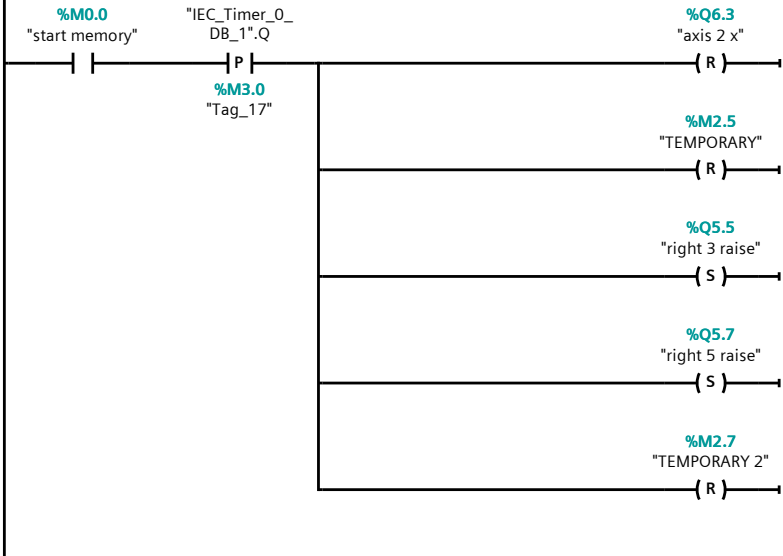
Network 9:



Network 10:



Network 11:





FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program blocks

green belt conveyor [FC4]

## green belt conveyor Properties

General	
1	General
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100	General

<b>Name</b>	green belt conveyor	<b>Number</b>	4	<b>Type</b>	FC
<b>Language</b>	LAD	<b>Numbering</b>	Manual		

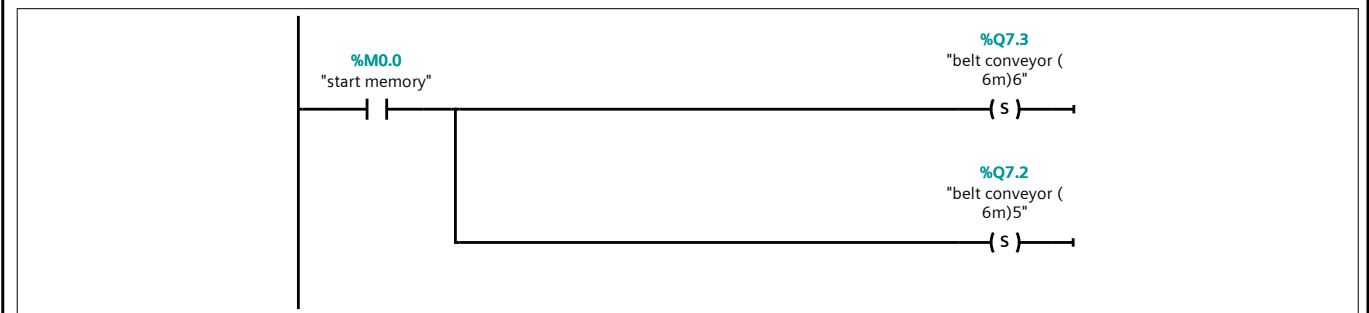
## Information

<b>Title</b>		<b>Author</b>		<b>Comment</b>	
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

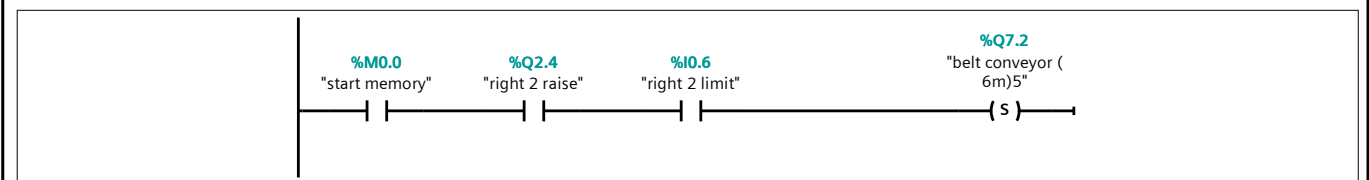
green belt conveyor

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
green belt conveyor	Void		

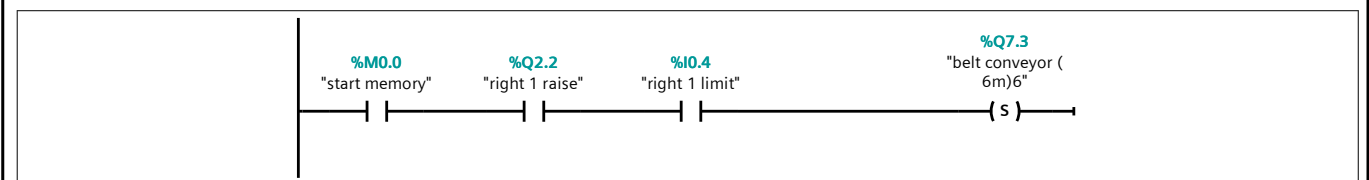
**Network 1:**



**Network 2:**



**Network 3:**



Totally Integrated Automation Portal		
<b>Network 4:</b>		
<div><div><div><div>%I5.1 "diffuser sensor 4"</div><div>N</div><div>%M3.1 "Tag_1(1)"</div></div><div><div>%Q7.2 "belt conveyor (6m)5"</div><div>( R )</div></div></div></div>		
<b>Network 5:</b>		
<div><div><div><div>%I5.2 "diffuser sensor 5"</div><div>N</div><div>%M3.2 "Tag_2(1)"</div></div><div><div>%Q7.3 "belt conveyor (6m)6"</div><div>( R )</div></div></div></div>		
<b>Network 6:</b>		
<div><div><div><div>%I5.3 "diffuser sensor 6"</div><div>N</div><div>%M3.3 "Tag_3(1)"</div></div><div><div><div>%Q2.2 "right 1 raise"</div><div>( R )</div></div><div><div>%Q2.4 "right 2 raise"</div><div>( R )</div></div></div></div></div>		
<b>Network 7:</b>		
<div><div><div><div>%I5.3 "diffuser sensor 6"</div><div>P</div><div>%M3.4 "Tag_4(1)"</div></div><div><div><div>INC UDInt</div><div>EN — ENO</div><div>%QD12 "counter 2" — IN/OUT</div></div></div></div></div>		

FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program blocks

green Clamp [FC5]

## green Clamp Properties

General	
1	General
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100	General

<b>Name</b>	green Clamp	<b>Number</b>	5	<b>Type</b>	FC
<b>Language</b>	LAD	<b>Numbering</b>	Manual		

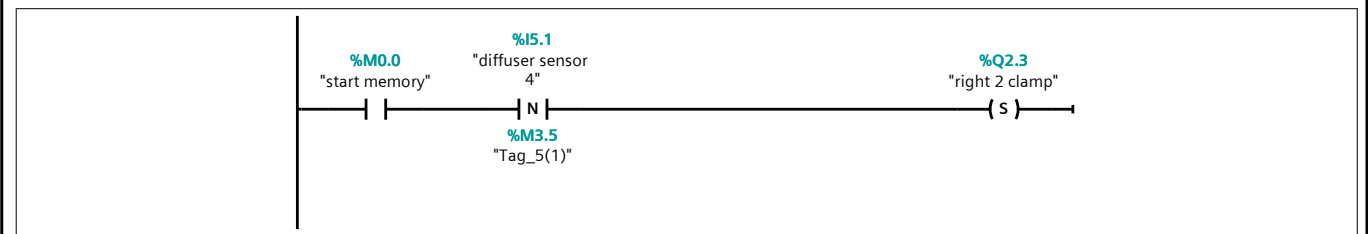
## Information

<b>Title</b>		<b>Author</b>		<b>Comment</b>	
<b>Family</b>		<b>Version</b>	0.1	<b>User-defined ID</b>	

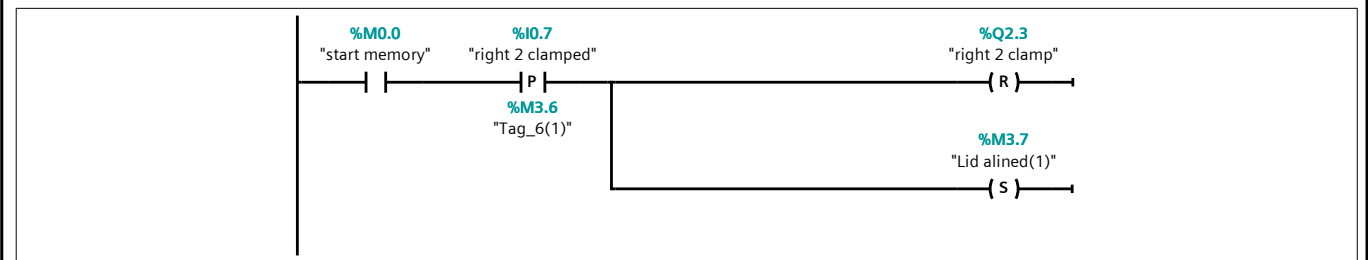
green Clamp

Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
green Clamp	Void		

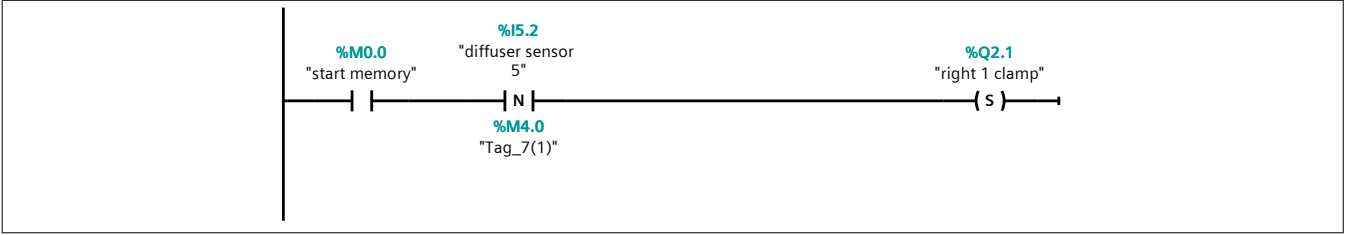
**Network 1:**



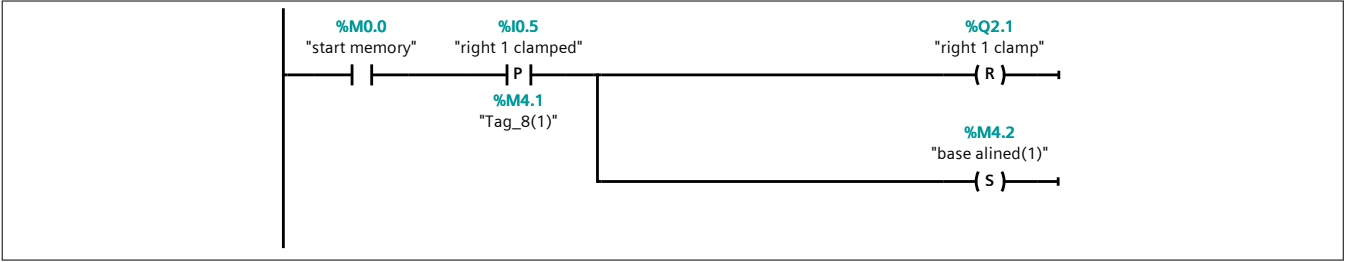
**Network 2:**



**Network 3:**



**Network 4:**



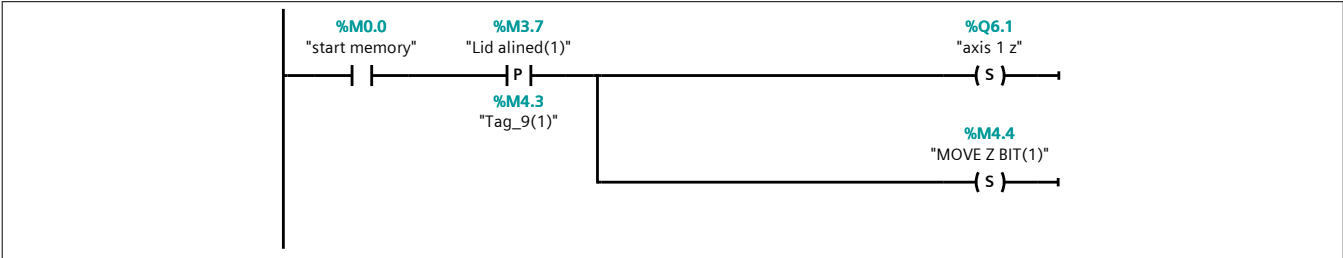
FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN] / Program  
blocks

green pICK & pLACE [FC6]

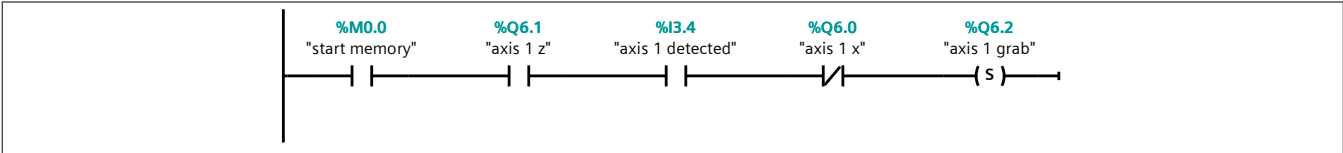
green pICK & pLACE Properties					
General					
Name	green pICK & pLACE	Number	6	Type	FC
Language	LAD	Numbering	Manual		
Information					
Title		Author		Comment	
Family		Version	0.1	User-defined ID	

green pICK & pLACE			
Name	Data type	Default value	Comment
Input			
Output			
InOut			
Temp			
Constant			
▼ Return			
green pICK & pLACE	Void		

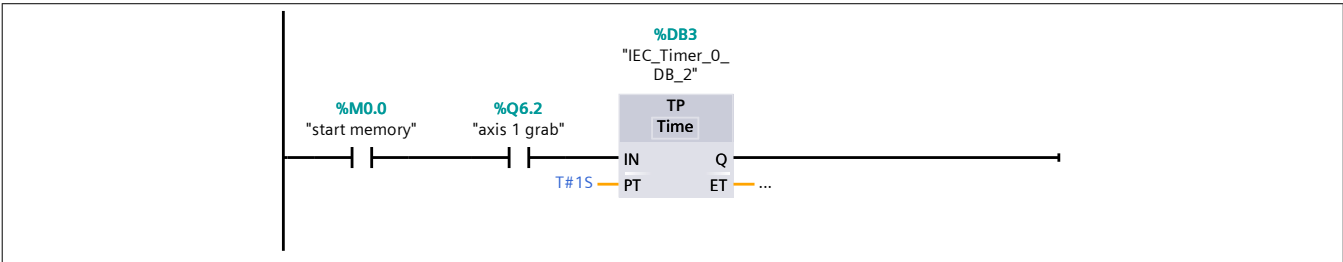
Network 1:



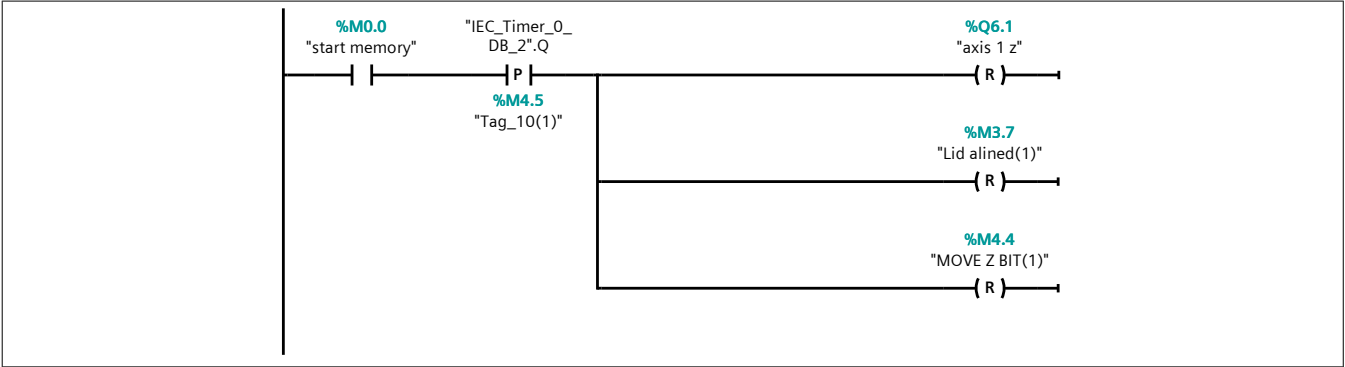
Network 2:



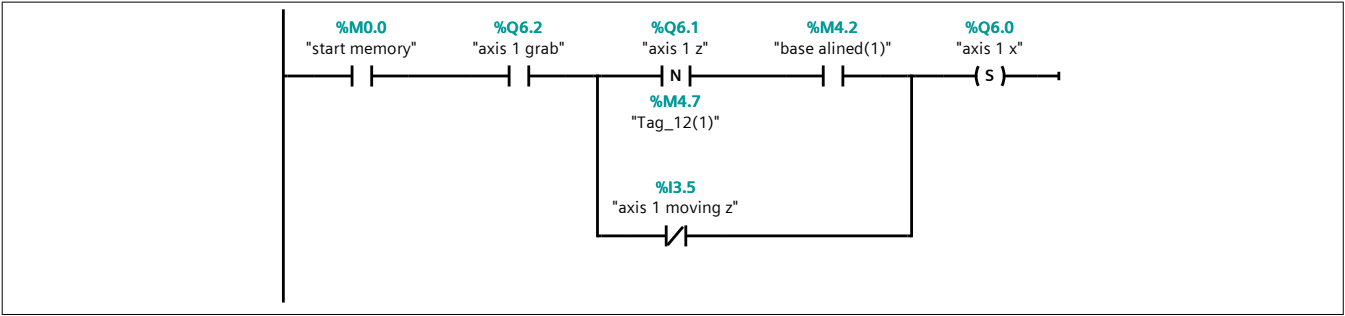
Network 3:



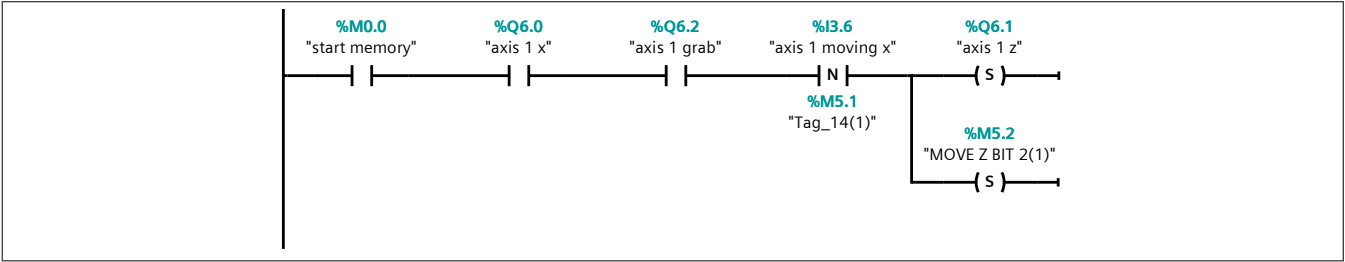
Network 4:



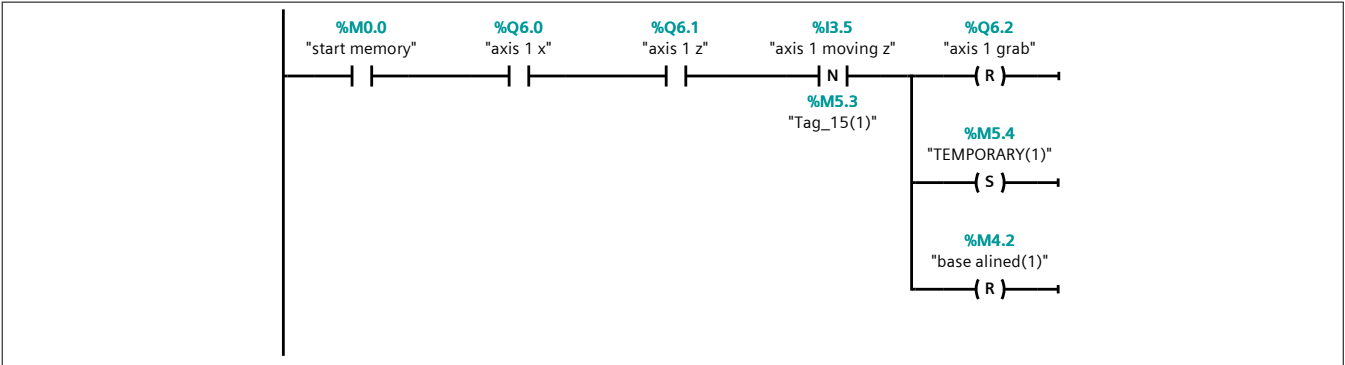
Network 5:



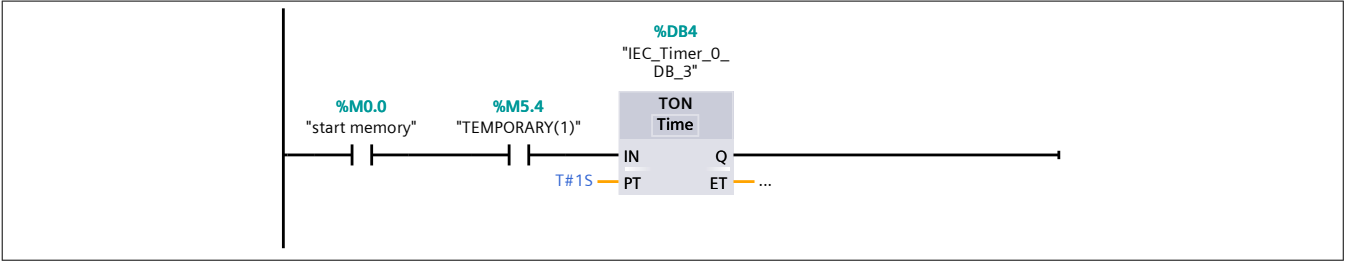
Network 6:



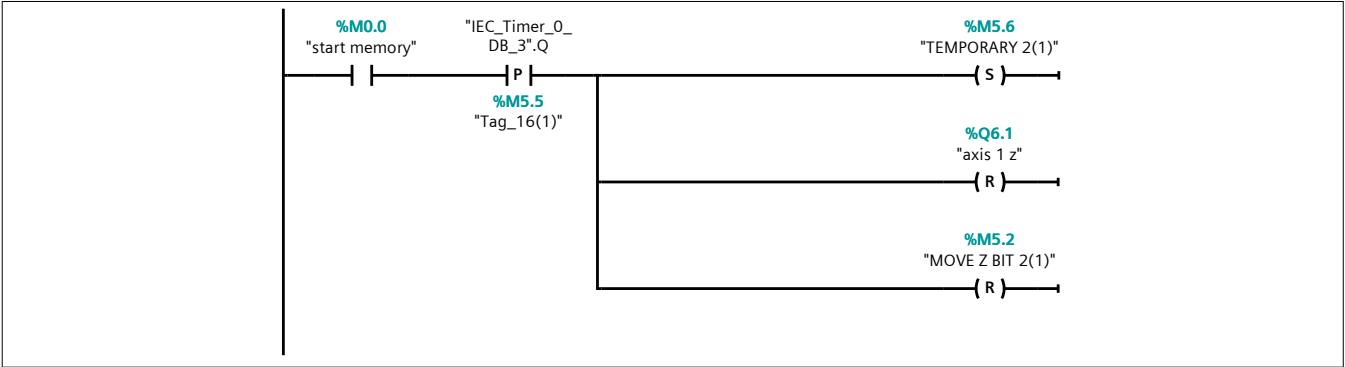
Network 7:



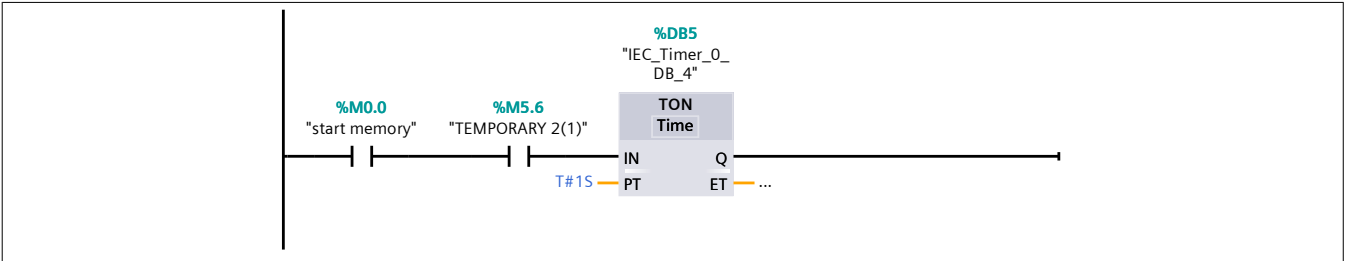
Network 8:



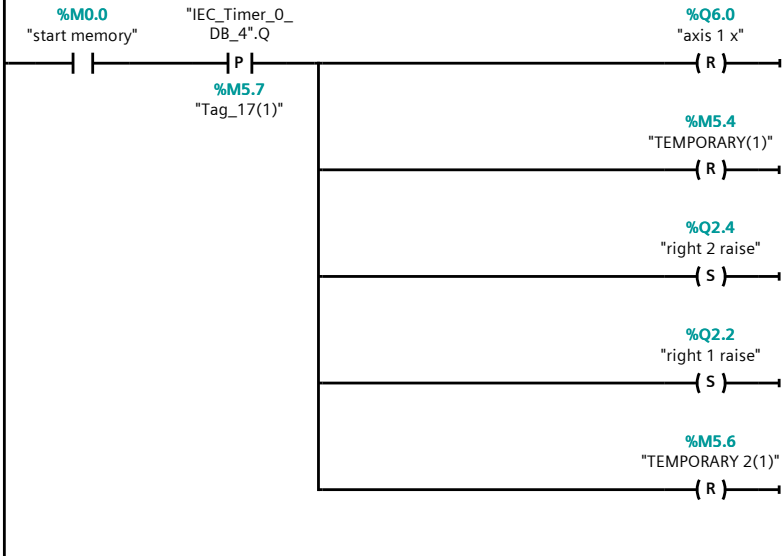
Network 9:



Network 10:








































Network 11:





























































































































## FactoryIO\_Template\_S7-1500\_V15 / PLC\_1 [CPU 1511-1 PN]

## PLC tags

	Name	Data type	Address	Retain	Access- ible from HMI/O PC UA	Writa- ble from HMI/O PC UA	Visi- ble in HMI engi- neer- ing	Supervision	Comment
	start	Bool	%I0.0	False	True	True	True		
	stop	Bool	%I0.1	False	True	True	True		
	reset	Bool	%I0.2	False	True	True	True		
	emergency	Bool	%I0.3	False	True	True	True		
	right 1 limit	Bool	%I0.4	False	True	True	True		
	right 1 clamped	Bool	%I0.5	False	True	True	True		
	right 2 limit	Bool	%I0.6	False	True	True	True		
	right 2 clamped	Bool	%I0.7	False	True	True	True		
	mc1 opened	Bool	%I1.0	False	True	True	True		
	mc1 busy	Bool	%I1.1	False	True	True	True		
	mc1 error	Bool	%I1.2	False	True	True	True		
	mc2 opened	Bool	%I1.3	False	True	True	True		
	mc2 busy	Bool	%I1.4	False	True	True	True		
	mc2 error	Bool	%I1.5	False	True	True	True		
	mc3 opened	Bool	%I1.6	False	True	True	True		
	mc3 busy	Bool	%I1.7	False	True	True	True		
	mc3 error	Bool	%I2.0	False	True	True	True		
	mc5 opened	Bool	%I2.1	False	True	True	True		
	mc5 busy	Bool	%I2.2	False	True	True	True		
	mc5 error	Bool	%I2.3	False	True	True	True		
	pusher 3 front limit	Bool	%I2.4	False	True	True	True		
	pusher 1 front limit	Bool	%I2.5	False	True	True	True		
	pusher 4 front limit	Bool	%I2.6	False	True	True	True		
	pusher 2 front limit	Bool	%I2.7	False	True	True	True		
	right 3 limit	Bool	%I3.0	False	True	True	True		
	right 3 clamped	Bool	%I3.1	False	True	True	True		
	start memory	Bool	%M0.0	False	True	True	True		
	belt conveyor (2m)1	Bool	%Q0.0	False	True	True	True		
	belt conveyor (2m)2	Bool	%Q0.1	False	True	True	True		
	belt conveyor (2m)3	Bool	%Q0.2	False	True	True	True		
	belt conveyor (2m)5	Bool	%Q0.3	False	True	True	True		
	belt conveyor (2m)7	Bool	%Q0.4	False	True	True	True		
	belt conveyor (2m)9	Bool	%Q0.5	False	True	True	True		
	belt conveyor (2m)14	Bool	%Q0.6	False	True	True	True		
	belt conveyor (4m)2	Bool	%Q1.0	False	True	True	True		
	belt conveyor (4m)4	Bool	%Q1.1	False	True	True	True		
	belt conveyor (6m)1	Bool	%Q1.2	False	True	True	True		

Totally Integrated Automation Portal									
	Name	Data type	Address	Retain	Access- ible from HMI/O PC UA	Writa- ble from HMI/O PC UA	Visi- ble in HMI engi- neer- ing	Supervision	Comment
	emitter 2	Bool	%Q1.3	False	True	True	True		
	right 5 limit	Bool	%I3.2	False	True	True	True		
	right 5 clamped	Bool	%I3.3	False	True	True	True		
	axis 1 detected	Bool	%I3.4	False	True	True	True		
	axis 1 moving z	Bool	%I3.5	False	True	True	True		
	axis 1 moving x	Bool	%I3.6	False	True	True	True		
	axis 2 detected	Bool	%I3.7	False	True	True	True		
	axis 2 moving z	Bool	%I4.0	False	True	True	True		
	axis 2 moving x	Bool	%I4.1	False	True	True	True		
	vision sensor 1	Bool	%I4.2	False	True	True	True		
	vision sensor 2	Bool	%I4.3	False	True	True	True		
	vision sensor 3	Bool	%I4.4	False	True	True	True		
	vision sensor 4	Bool	%I4.5	False	True	True	True		
	diffuser sensor 1	Bool	%I4.6	False	True	True	True		
	diffuser sensor 2	Bool	%I4.7	False	True	True	True		
	emitter 3	Bool	%Q1.4	False	True	True	True		
	emitter 4	Bool	%Q1.5	False	True	True	True		
	emitter 6	Bool	%Q1.6	False	True	True	True		
	factory pause	Bool	%Q1.7	False	True	True	True		
	factory reset	Bool	%Q2.0	False	True	True	True		
	right 1 clamp	Bool	%Q2.1	False	True	True	True		
	right 1 raise	Bool	%Q2.2	False	True	True	True		
	right 2 clamp	Bool	%Q2.3	False	True	True	True		
	right 2 raise	Bool	%Q2.4	False	True	True	True		
	mc1 start	Bool	%Q2.5	False	True	True	True		
	mc1 stop	Bool	%Q2.6	False	True	True	True		
	mc1 reset	Bool	%Q2.7	False	True	True	True		
	mc1 producing leds	Bool	%Q3.0	False	True	True	True		
	mc2 start	Bool	%Q3.1	False	True	True	True		
	mc2 stop	Bool	%Q3.2	False	True	True	True		
	mc2 reset	Bool	%Q3.3	False	True	True	True		
	mc2 producing leds	Bool	%Q3.4	False	True	True	True		
	mc3 start	Bool	%Q3.5	False	True	True	True		
	mc3 stop	Bool	%Q3.6	False	True	True	True		
	mc3 reset	Bool	%Q3.7	False	True	True	True		
	mc3 producing leds	Bool	%Q4.0	False	True	True	True		
	mc5 start	Bool	%Q4.1	False	True	True	True		
	mc5 stop	Bool	%Q4.2	False	True	True	True		
	mc5 reset	Bool	%Q4.3	False	True	True	True		
	mc5 producing leds	Bool	%Q4.4	False	True	True	True		
	pusher 1	Bool	%Q4.5	False	True	True	True		

Totally Integrated Automation Portal									
	Name	Data type	Address	Retain	Access- ible from HMI/O PC UA	Writa- ble from HMI/O PC UA	Visi- ble in HMI engi- neer- ing	Supervision	Comment
	pusher 2	Bool	%Q4.6	False	True	True	True		
	remover 1	Bool	%Q4.7	False	True	True	True		
	remover 2	Bool	%Q5.0	False	True	True	True		
	reset light	Bool	%Q5.1	False	True	True	True		
	start light	Bool	%Q5.2	False	True	True	True		
	stop light	Bool	%Q5.3	False	True	True	True		
	right 3 clamp	Bool	%Q5.4	False	True	True	True		
	right 3 raise	Bool	%Q5.5	False	True	True	True		
	right 5 clamp	Bool	%Q5.6	False	True	True	True		
	right 5 raise	Bool	%Q5.7	False	True	True	True		
	axis 1 x	Bool	%Q6.0	False	True	True	True		
	axis 1 z	Bool	%Q6.1	False	True	True	True		
	axis 1 grab	Bool	%Q6.2	False	True	True	True		
	axis 2 x	Bool	%Q6.3	False	True	True	True		
	axis 2 z	Bool	%Q6.4	False	True	True	True		
	axis 2 grab	Bool	%Q6.5	False	True	True	True		
	stop memory	Bool	%M0.1	False	True	True	True		
	diffuser sensor 3	Bool	%I5.0	False	True	True	True		
	diffuser sensor 4	Bool	%I5.1	False	True	True	True		
	diffuser sensor 5	Bool	%I5.2	False	True	True	True		
	diffuser sensor 6	Bool	%I5.3	False	True	True	True		
	belt conveyor (4m)1	Bool	%Q6.6	False	True	True	True		
	belt conveyor (6m)2	Bool	%Q6.7	False	True	True	True		
	belt conveyor (6m)3	Bool	%Q7.0	False	True	True	True		
	belt conveyor (6m)4	Bool	%Q7.1	False	True	True	True		
	belt conveyor (6m)5	Bool	%Q7.2	False	True	True	True		
	belt conveyor (6m)6	Bool	%Q7.3	False	True	True	True		
	pusher 3	Bool	%Q7.4	False	True	True	True		
	pusher 4	Bool	%Q7.5	False	True	True	True		
	counter blue	UDInt	%QD8	False	True	True	True		
	counter green	UDInt	%QD31	False	True	True	True		
	Tag_1	Bool	%M0.2	False	True	True	True		
	Tag_2	Bool	%M0.3	False	True	True	True		
	Tag_3	Bool	%M0.4	False	True	True	True		
	Tag_4	Bool	%M0.5	False	True	True	True		
	Tag_5	Bool	%M0.6	False	True	True	True		
	Tag_6	Bool	%M0.7	False	True	True	True		
	Lid alined	Bool	%M1.0	False	True	True	True		
	Tag_7	Bool	%M1.1	False	True	True	True		
	Tag_8	Bool	%M1.2	False	True	True	True		
	base alined	Bool	%M1.3	False	True	True	True		

Totally Integrated Automation Portal									
	Name	Data type	Address	Retain	Access- ible from HMI/O PC UA	Writa- ble from HMI/O PC UA	Visi- ble in HMI engi- neer- ing	Supervision	Comment
	Tag_9	Bool	%M1.4	False	True	True	True		
	MOVE Z BIT	Bool	%M1.5	False	True	True	True		
	Tag_10	Bool	%M1.6	False	True	True	True		
	Tag_11	Bool	%M1.7	False	True	True	True		
	Tag_12	Bool	%M2.0	False	True	True	True		
	Tag_13	Bool	%M2.1	False	True	True	True		
	Tag_14	Bool	%M2.2	False	True	True	True		
	MOVE Z BIT 2	Bool	%M2.3	False	True	True	True		
	Tag_15	Bool	%M2.4	False	True	True	True		
	TEMPORARY	Bool	%M2.5	False	True	True	True		
	Tag_16	Bool	%M2.6	False	True	True	True		
	TEMPORARY 2	Bool	%M2.7	False	True	True	True		
	Tag_17	Bool	%M3.0	False	True	True	True		
	Tag_1(1)	Bool	%M3.1	False	True	True	True		
	Tag_2(1)	Bool	%M3.2	False	True	True	True		
	Tag_3(1)	Bool	%M3.3	False	True	True	True		
	Tag_4(1)	Bool	%M3.4	False	True	True	True		
	Tag_5(1)	Bool	%M3.5	False	True	True	True		
	Tag_6(1)	Bool	%M3.6	False	True	True	True		
	Lid alined(1)	Bool	%M3.7	False	True	True	True		
	Tag_7(1)	Bool	%M4.0	False	True	True	True		
	Tag_8(1)	Bool	%M4.1	False	True	True	True		
	base alined(1)	Bool	%M4.2	False	True	True	True		
	Tag_9(1)	Bool	%M4.3	False	True	True	True		
	MOVE Z BIT(1)	Bool	%M4.4	False	True	True	True		
	Tag_10(1)	Bool	%M4.5	False	True	True	True		
	Tag_11(1)	Bool	%M4.6	False	True	True	True		
	Tag_12(1)	Bool	%M4.7	False	True	True	True		
	Tag_13(1)	Bool	%M5.0	False	True	True	True		
	Tag_14(1)	Bool	%M5.1	False	True	True	True		
	MOVE Z BIT 2(1)	Bool	%M5.2	False	True	True	True		
	Tag_15(1)	Bool	%M5.3	False	True	True	True		
	TEMPORARY(1)	Bool	%M5.4	False	True	True	True		
	Tag_16(1)	Bool	%M5.5	False	True	True	True		
	TEMPORARY 2(1)	Bool	%M5.6	False	True	True	True		
	Tag_17(1)	Bool	%M5.7	False	True	True	True		
	tag 18	Bool	%M6.0	False	True	True	True		
	counter 2	UDInt	%QD12	False	True	True	True		

**Project file link:**

<https://drive.google.com/drive/folders/18VkJ8n0bBU-NAYwAfMFHcw7FkFVL6UkV?usp=sharing>