

Problem Statement

Product Sorting

Products of three different lengths on a conveyor belt are to be measured and sorted. There is just one product at a time on the band. See Figure 4.32. Just as a product has passed FC1, measuring is performed using two other photocells, FC2 and FC3:

- FC2 is logically low: short product
- FC2 and not FC3 is logically high: medium long product
- Both FC2 and FC3 logically high: long product

The conveyor has two velocities, normal and low, in addition, to reverse, controlled by three different signals. When measuring the product length, the belt moves at normal velocity.

Short product: The product is transported forward to photocell FC4. Then the conveyor speed drops to low, and when the product reaches FC5, the conveyor is stopped. The product is then pushed off the conveyor belt by a pneumatic piston.

The end positions of the piston are detected by two sensors, G1 and G2. When the piston has returned to its rear position, the cycle ends.

















Medium product: The product continues forward to photocell FC5, which marks the end of the cycle. (It is assumed that the product falls off the belt before a new product passes

FC1.)

Long product: The conveyor stops for 2 seconds and is then reversed. When the product again passes FC1 (on the return), the conveyor shall continue in the backward direction in a further 5 seconds. It is then assumed that the product has dropped off the conveyor belt and the cycle ends.

task3_stateMachine / PLC_1 [CPU 314C-2 DP] / PLC tags

Default tag table [16]

PLC tags									
	Name	Data type	Address	Retain	Access- sible from HMI/O PC UA/W eb API	Writa- ble from HMI/O PC UA/W eb API	Visi- ble in HMI engi- neer- ing	Supervision	Comment
	start	Bool	%I0.0		True	True	True		
	FC1	Bool	%I0.1		True	True	True		
	FC2	Bool	%I0.2		True	True	True		
	FC3	Bool	%I0.3		True	True	True		
	FC4	Bool	%I0.4		True	True	True		
	FC5	Bool	%I0.5		True	True	True		
	Normal_motor	Bool	%Q0.0		True	True	True		
	Low_speed_motor	Bool	%Q0.1		True	True	True		
	Reverse_motor	Bool	%Q0.2		True	True	True		
	Piston	Bool	%Q0.3		True	True	True		
	G1	Bool	%I0.6		True	True	True		
	G2	Bool	%I0.7		True	True	True		
	flag1	Bool	%M4.0		True	True	True		
	flag2	Bool	%M4.1		True	True	True		
	flag3	Bool	%M4.2		True	True	True		
	flag4	Bool	%M4.3		True	True	True		

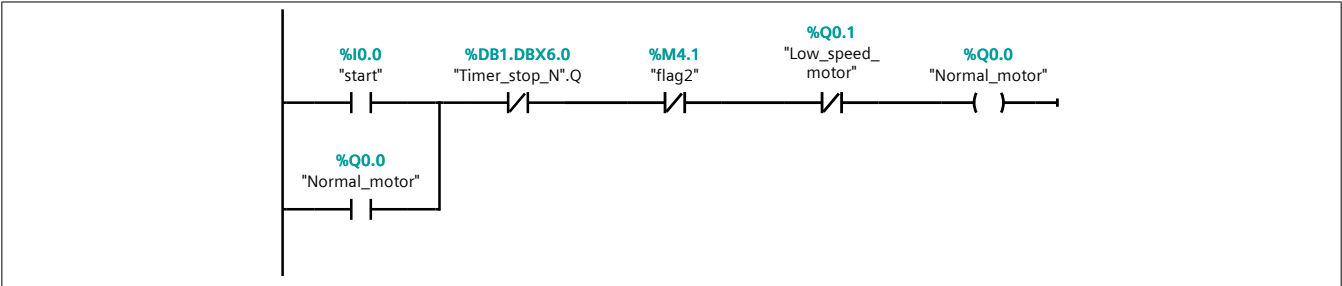
task3_stateMachine / PLC_1 [CPU 314C-2 DP] / Program blocks

Main [OB1]


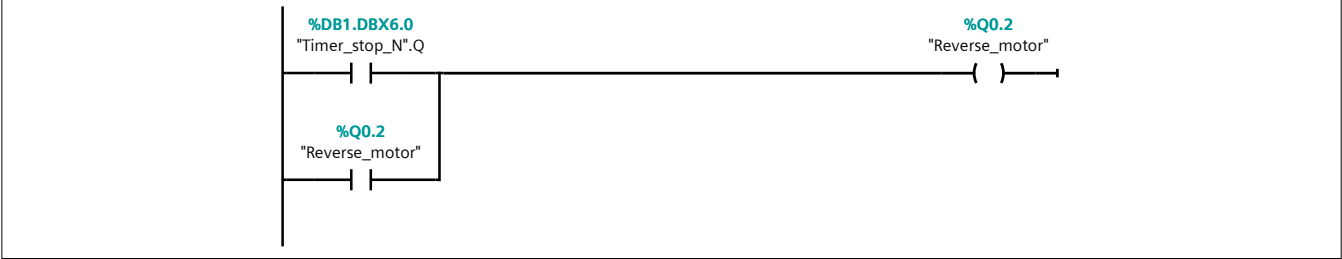
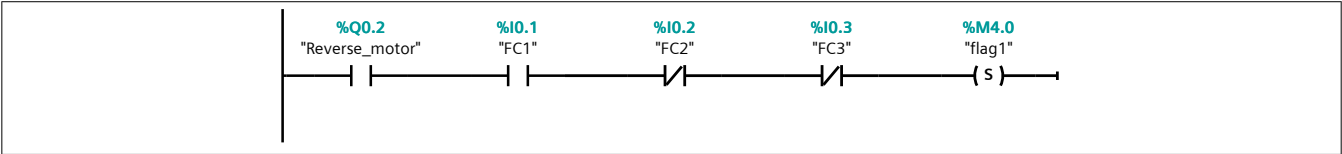
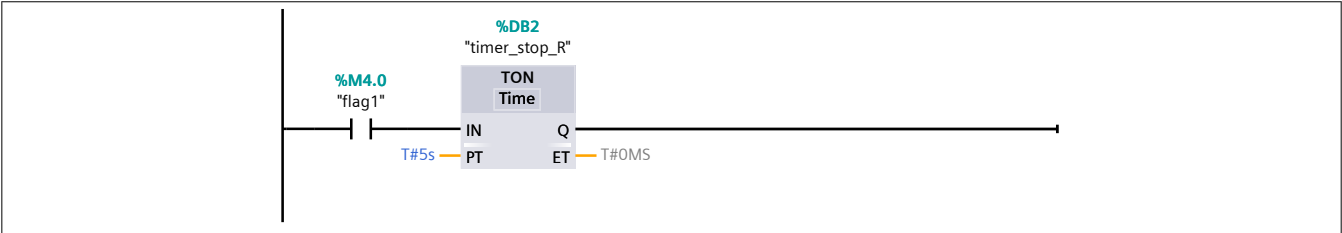
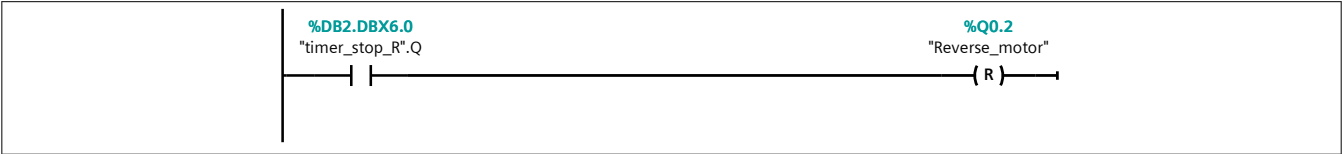
Main Properties					
General					
Name	Main	Number	1	Type	OB
Language	LAD	Numbering	Manual		
Information					
Title	"Main Program Sweep (Cycle)"	Author		Comment	
Family		Version	0.1	User-defined ID	

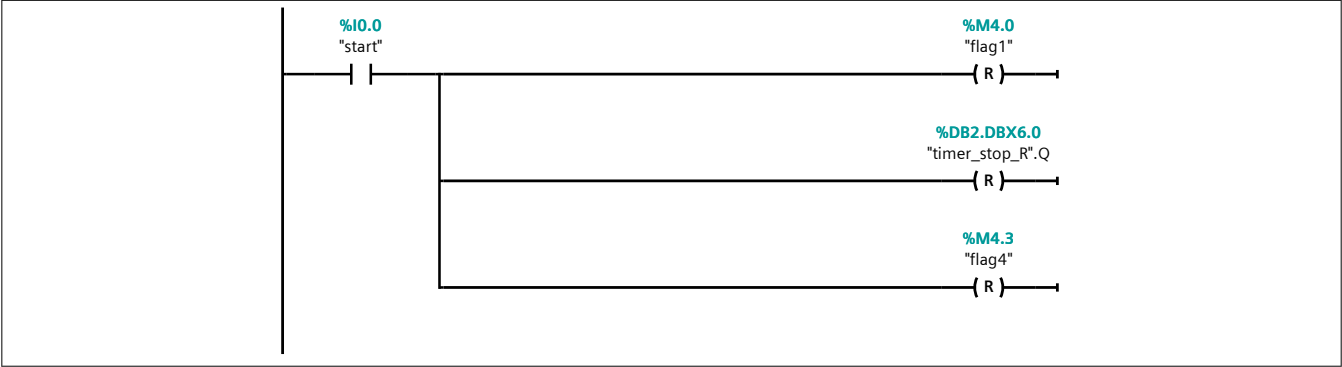
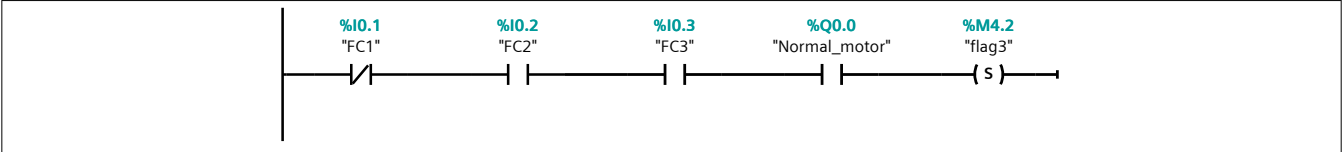
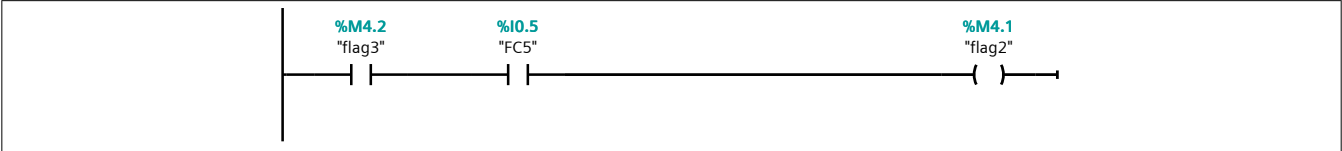
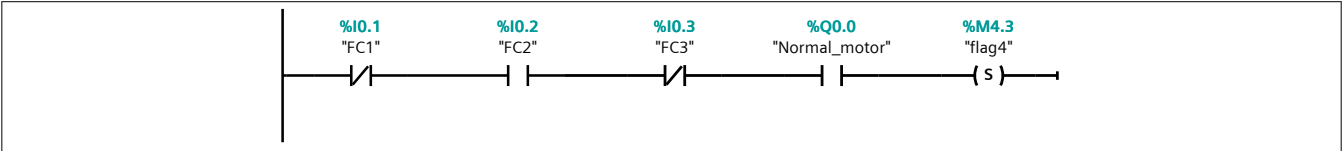
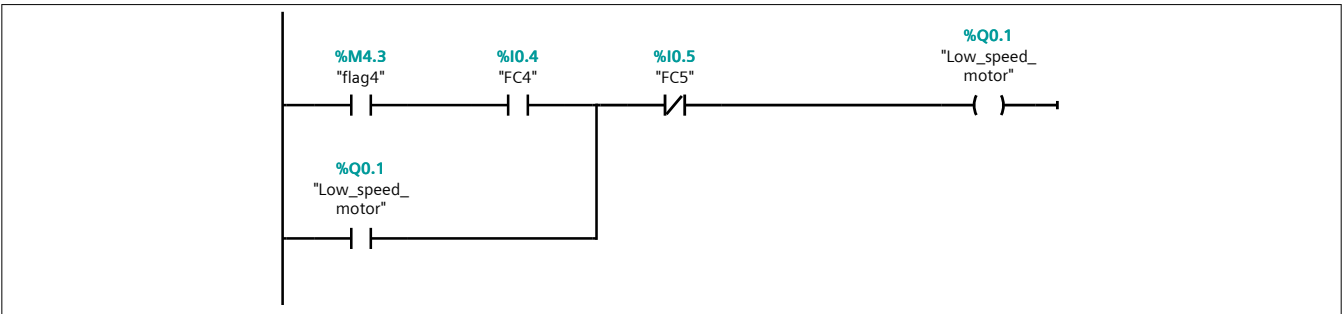
Main				
Name	Data type	Offset	Default value	Comment
▼ Temp				
OB1_EV_CLASS	Byte	0.0		Bits 0-3 = 1 (Coming event), Bits 4-7 = 1 (Event class 1)
OB1_SCAN_1	Byte	1.0		1 (Cold restart scan 1 of OB 1), 3 (Scan 2-n of OB 1)
OB1_PRIORITY	Byte	2.0		Priority of OB Execution
OB1_OB_NUMBR	Byte	3.0		1 (Organization 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_Ti me	12.0		Date and time OB1 started
Constant				

Network 1: starts conveyor normally



Network 2: This rung is active if the 3 sensors are high, which dictates a long object on the conveyor belt.

Totally Integrated Automation Portal		
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Network 3: After 2 seconds the reverse motor starts and the normal motor stops.		
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Network 4: Sets a coil which is used to start a timer which in turn turns off the reverse motor.		
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Network 5: Timer to turn of the reverse motor		
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Network 6: Timer Output turns off the reverse motor.		
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Network 7: start button resets timer and flag1		

Totally Integrated Automation Portal		
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<p>Network 8: This Rung identifies a medium size object on the conveyor</p>		
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<p>Network 9: with the meduim size object, pressing and FC5 being activated a coil which turns off the belt</p>		
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<p>Network 10: In this Rung the small size object is dictated and a coil is activated</p>		
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<p>Network 11: Machine to run at low speed if conditions are meet</p>		
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<p>Network 12:</p>		

