0	2	4	6	8	10	12	14	16

Distributing Station Hardware Identification					
Components	**Functions**	**Part number**	**Manufacturer**	**ıput, Output, hardwar**	**Station**
Reed magnetic proximity sensor (T-slot)	Cylinder slide retracted position	150855	Festo	Input (I0)	Stack Magazine Module
Reed magnetic proximity sensor (T-slot)	Cylinder slide advanced position	150855		Input (I1)	
PNP Optoelectronic sensor (Fibre-optic cable)	Parts in Magazine stack	165358		Input (I2)	
Fibre-optic device		165327			
Optoelectronic sensor (Fibre-optic cable)	Parts Exit Conveyor	165360		Input (I3)	Conveyor Module
Fibre-optic device		165327			
Double-acting cylinder (with elastic cushioning rings in the end positions)	Transfer part to conveyor	19182	Festo	Output (O0)	Conveyor Module
Gear motor (24VDC)	Conveyor Forward Motor	374133		Output (O1)	

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0	2	4	6	8	10	12	14	16

Distributing Station

Steps	Start-up Requistes
1	No workpiece at the beginning of the conveyor
2	Magazine filled with workpieces

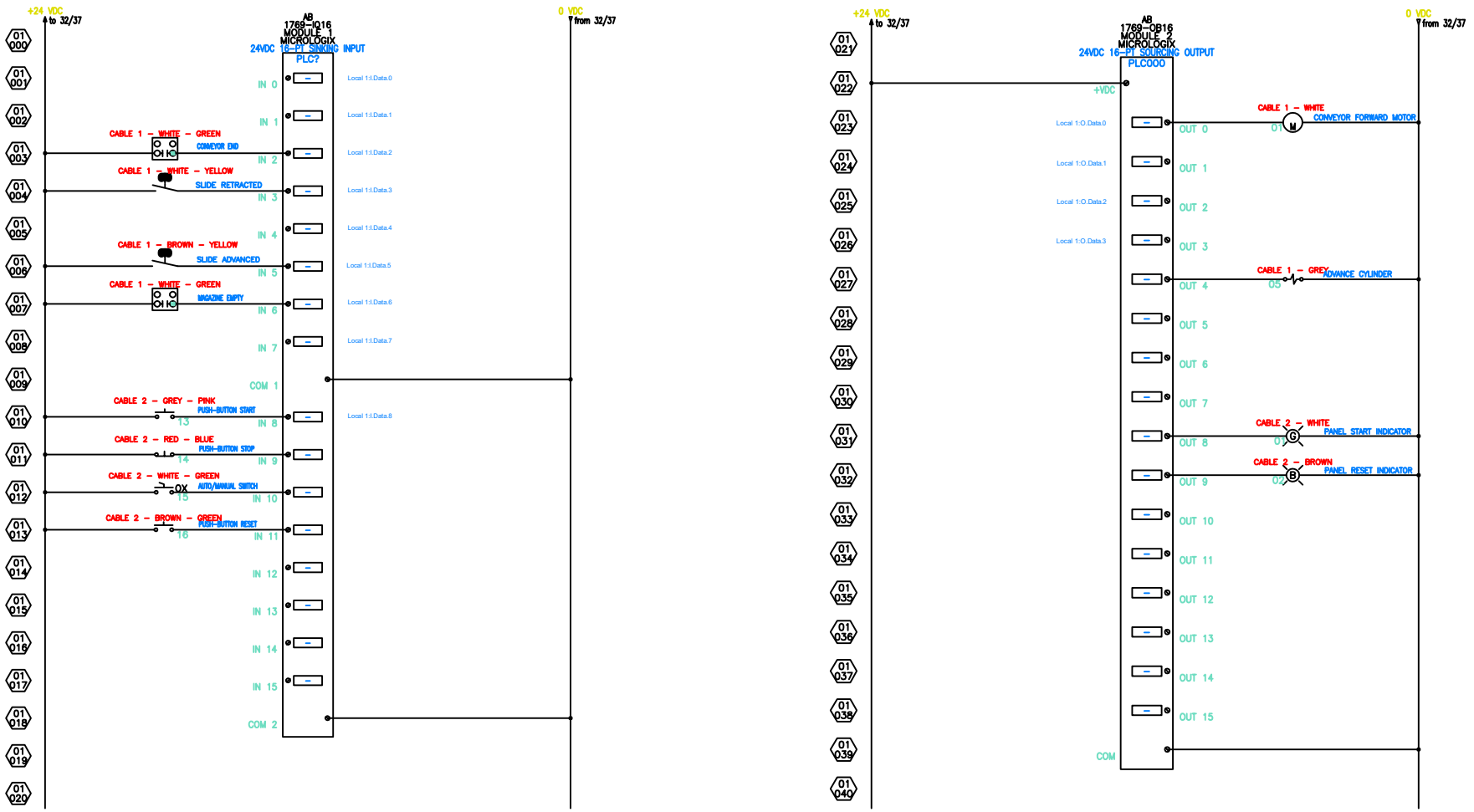
Steps	Initial settings
1	Ejector cylinder retracted
2	Conveyor motor off

Steps	Sequence
1	Reset may blink to request operator to reset by turning the key to manual to and press Reset button
	Start button is blinking awaiting for operator to start the station.
	At anytime, you may stop the operation by pressing the Stop button
2	Work piece is placed on to magazine stack
3	Workpiece detected by the magazine optoelectronic sensor and when reed switch in retracted positon
4	Cylinder push to workpiece to conveyor belt
5	Cylinder retract back as it hits the reed switch in advanced position
	At the same, conveyor motor will turn on to transfer workpiece
6	As the workpiece get passed the end conveyor sensor, it will continue moving for 2 seconds and shut off conveyor motor

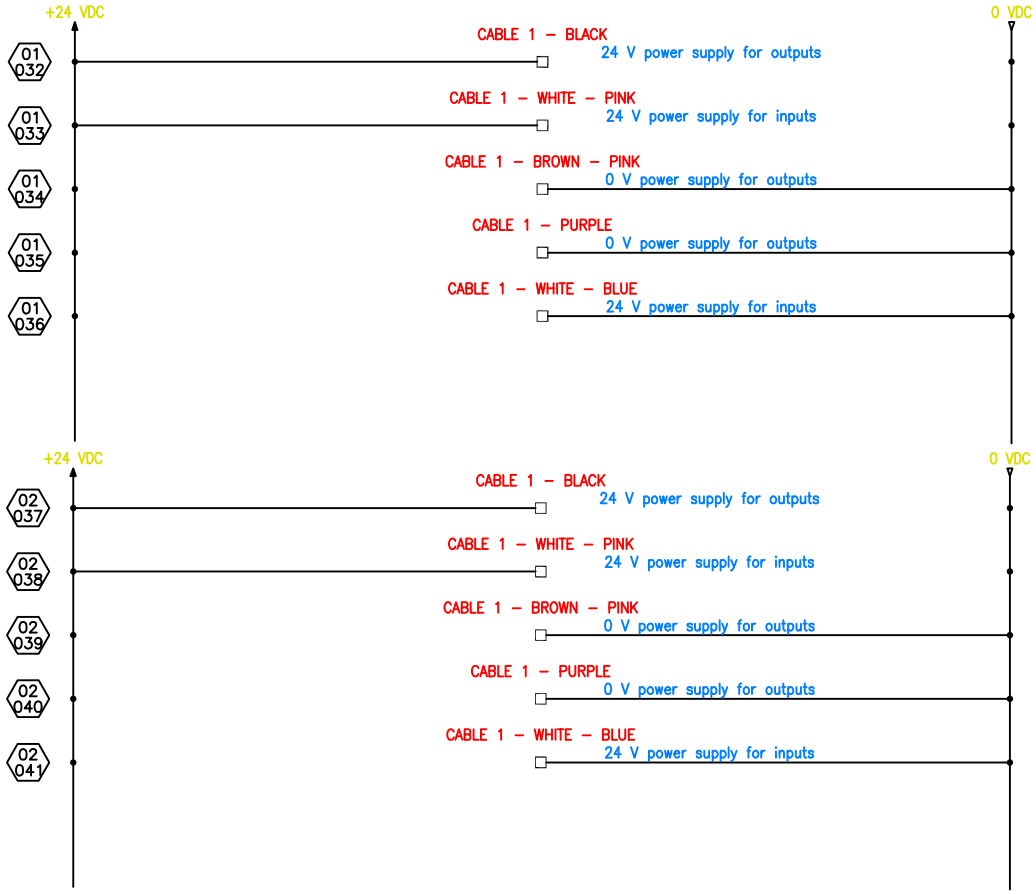
0	2	4	6	8	10	12	14	16

Distributing Station

Step no.	Device used	Logical requirement	Instruction address	Instructions
1	Reset station ,Reset button	TRUE	Local:1:I.Data.11, IN_BIT.7	XIC
	Reset status, Reset Indicator	TRUE	Local:1:O.Data.9, OUT_BIT.3	OTE
	Auto/Manual Switch	TRUE	Local:1:I.Data.10, IN_BIT.6	XIC
	Start station, Start button	TRUE	Local:1:I.Data.8, IN_BIT.4	XIC
	Start status, Start Indicator	TRUE	Local:1:O.Data.8, OUT_BIT.2	OTE
	Stop station, Stop button	FALSE	Local:1:I.Data.9, IN_BIT.5	XIC, XIO
2	None	None	None	None
3	Optoelectronic sensor, Magazine empty	TRUE	Local:1:I.Data.6, IN_BIT.2	XIC, OTE
	Reed Switch, Slide Retracted	TRUE	Local:1:I.Data.4, IN_BIT.0	XIC, OTE
4	Double-acting cylinder, Advance Slide	TRUE	Local:1:O.Data.4, OUT_BIT.0	XIC, OTE
5	Double-acting cylinder, Advance Slide	FALSE		
	Reed Switch, Slide Advanced	TRUE	Local:1:I.Data.5, IN_BIT.1	XIC, OTE
	24 VDC Motor, Conveyor Forward	TRUE	Local:1:O.Data.0, OUT_BIT.1	XIC, OTE
6	Optoelectronic sensor, Conveyor End	TRUE	Local:1:I.Data.2, IN_BIT.3	XIC, OTE
	24 VDC Motor, Conveyor Forward	FALSE	Local:1:O.Data.0, OUT_BIT.1	XIO, OTE



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Distributing Station
Updated	29/04/2021			STATION	Pg. 04
Drw-No	001				last: 23



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Distributing Station	
Updated	29/04/2021			STATION		Pg. 05
Drw-No	001					last: 23

0	2	4	6	8	10	12	14	16

Separating Station Hardware Identification

Components	Functions	Part number	Manufacturer	Input, Output, hardware	Station
PNP Optoelectronic sensor (Fibre-optic cable)	Parts available (enter conveyor)	165358	Festo	Input (I0)	Conveyor #1 Module
Fibre-optic device		165327			
PNP Optoelectronic sensor (Fibre-optic cable)	Parts at stopper	165358		Input (I1)	
Fibre-optic device		165327			
Optoelectronic sensor (Fibre-optic cable)	Parts Exit Conveyor #1	165360		Input (I2)	
Fibre-optic device		165327			
Optoelectronic sensor (Distance sensor)	Parts measurement (open or closed top)	537757		Input (I3)	
PNP Proximity sensor	Sorting gate position	150371		Input (I4)	
Optoelectronic sensor (Fibre-optic cable)	Parts Exit Conveyor #2	165360		Input (I5)	Conveyor #2 Module
Fibre-optic device		165327			
Gear motor (24VDC)	Conveyor #1 Forward Motor	374133	Festo	Output (O0)	Conveyor #1 Module
Semi-rotary drive (180 deg)	Parts Separator	175827		Output (O1)	
Single-acting cylinder (Short stroke)	Parts Stopper	188083		Output (O2)	
Gear motor (24VDC)	Conveyor #2 Forward Motor	374134		Output (O3)	Conveyor #2 Module

0	2	4	6	8	10	12	14	16

Separating Station

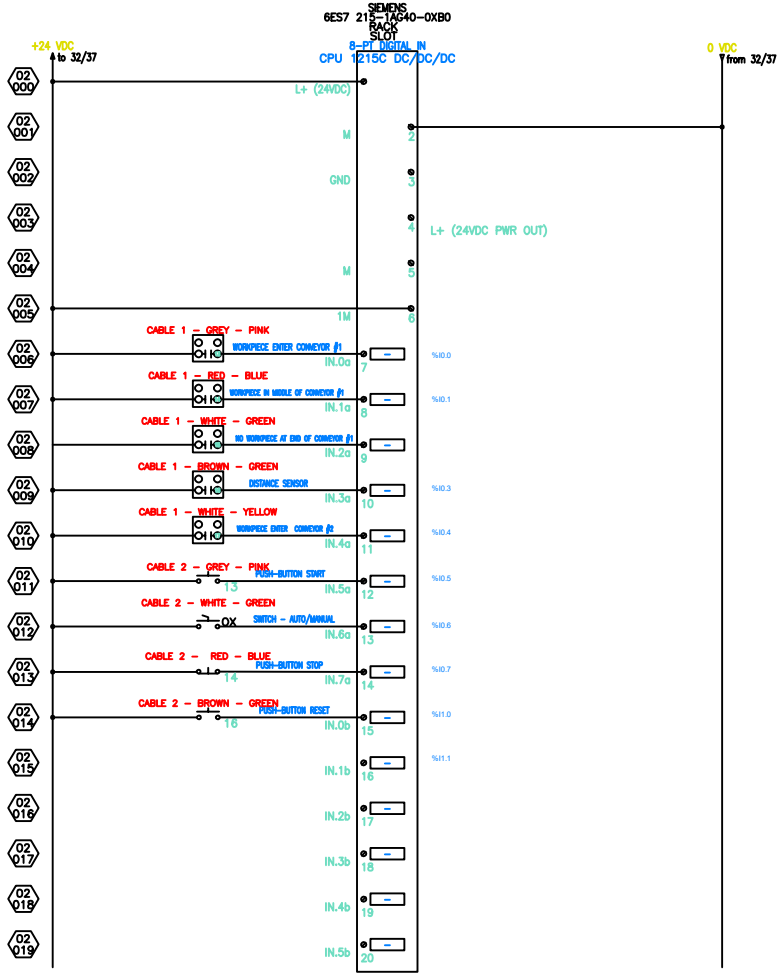
Step no.	Start-up Requistes
1	No workpiece at the beginning of the conveyor

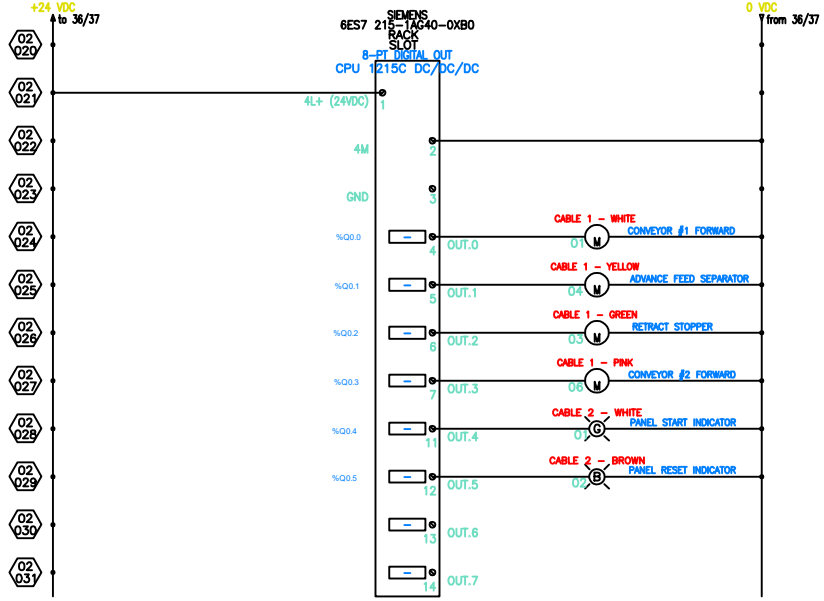
Step no.	Initial settings
1	Conveyor motor off
2	Stopper advanced
3	Separator retracted

Step no.	Operation step
1	Reset may required by turning the key to manual to and press Reset button
	Start button is blinking awaiting for operator to start the station.
	At anytime, you may stop the operation by pressing the Stop button
2	Work piece is placed on conveyor belt by hand
3	The starting optoelectronic sensor detect the workpiece to turn on conveyor #1
4	Workpiece will move to an optoelectronic sensor in front of the stopper and shut off the conveyor #1
5	At the same time, distance sensor mounted on the top measure whether the workpiece has open or closed top
6	If the workpiece has closed top, it will retract the stopper and conveyor #1 turns on
6	If the workpiece has open top, it will retract the stopper, turns on conveyor #1, extend separator and also turns on conveyor #2
7	Workpiece will move through conveyor #1 until it gets detect by ending optoelectronic sensor
7	As workpiece move through conveyor #2, it will get detect by conveyor #2 ending sensor
8	It will then turns off conveyor #1 and extend the stopper after it passed the sensor
8	It will then turns off conveyor #1 and #2 and retracted stopper and separator after it passed the sensor

Separating Station

Step no.	Device used	Logical requirement	Instruction address	Instructions
1	Reset station ,Reset button	TRUE	%I1.0, %M1.0	XIC
	Reset status, Reset Indicator	TRUE	%Q0.5, %M2.5	OTE
	Auto/Manual Switch	TRUE	%I0.7, %M0.7	XIC
	Start station, Start button	TRUE	%I0.5, %M0.4	XIC
	Start status, Start Indicator	TRUE	%Q0.4, %M2.4	OTE
	Stop station, Stop button	FALSE	%I0.6, %M0.6	XIC, XIO
2	None	None	None	None
3	Conveyor #1 Starting, Optoelectronic sensor	TRUE	%I0.0, %M0.0	XIC, OTE
	Conveyor #1 Forward, 24 VDC Motor	TRUE	%O0.0, %M2.0	XIC, OTE
4	Conveyor #1 at Stopper, Optoelectronic sensor	TRUE	%I0.1, %M0.1	XIC, XIO, OTE
	Conveyor #1 Forward, 24 VDC Motor	FALSE		
5	Part Type Detection, Distance sensor	TRUE	%I0.3, %M0.3	XIC, OTE
6	Closed Top	FALSE		XIO
	Retract Stopper, Double acting cylinder	TRUE	%Q0.1, %M0.1	XIC, OTE
	Timer On Delay	TRUE	%DB2	XIC, OTE
	Conveyor #1 Forward, 24 VDC Motor	TRUE	%O0.0, %M2.0	XIC, OTE
7	Conveyor #1 Ending, Optoelectronic sensor	TRUE	%I0.2, %M0.2	XIC, OTE
8	Conveyor #1 Forward, 24 VDC Motor	FALSE	%O0.0, %M2.0	XIO, OTE
	Retract Stopper, Double acting cylinder	FALSE	%Q0.1, %M0.1	XIO, OTE





Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Separating Station
Updated	29/04/2021			STATION	Pg. 09
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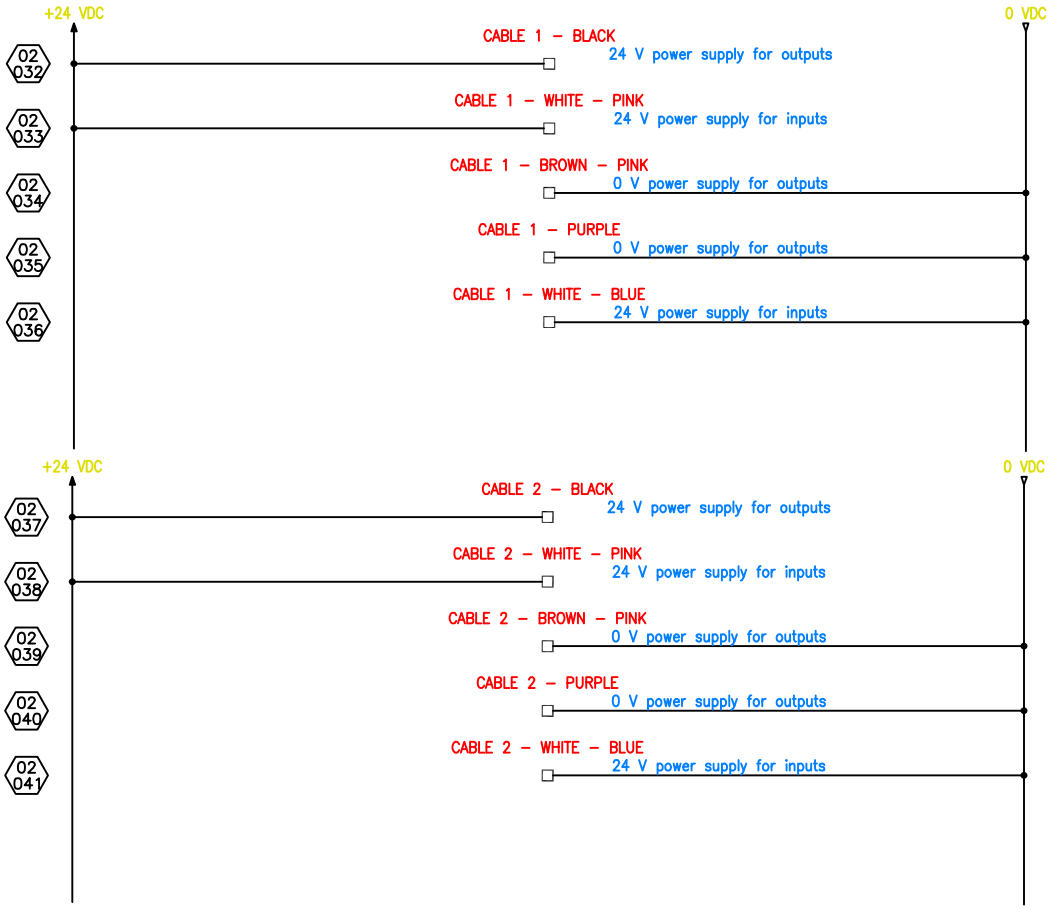


Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Separating Station
Updated	29/04/2021			STATION	Pg. 10
Drw-No	001				last: 23

Robot Station Hardware Identification					
Components	**Functions**	**Part number**	**Manufacturer**	**Input, Output, hardware**	**Station**
PNP Optoelectronic sensor (Diffuse sensor with fibre optic cables)	Puck Enter Station	165358	Festo	Input (I1)	Robot Handling Module
Fibre-optic device		165327			
Reed magnetic proximity sensor (T-slot)	Cap Cylinder Retracted	N/A	Festo	Input (I12)	Robot Assembly Module
Reed magnetic proximity sensor (T-slot)	Cap Cylinder Extracted	N/A	Festo	Input (I13)	
PNP Optoelectronic sensor (Diffuse sensor with fibre optic cables)	Cap Present	N/A	Festo	Input (I15)	
Pneumatic Double-acting cylinder	Extract Cylinder Cap Magazine	N/A	Festo	Output (O12)	

0	2	4	6	8	10	12	14	16

Robot Station

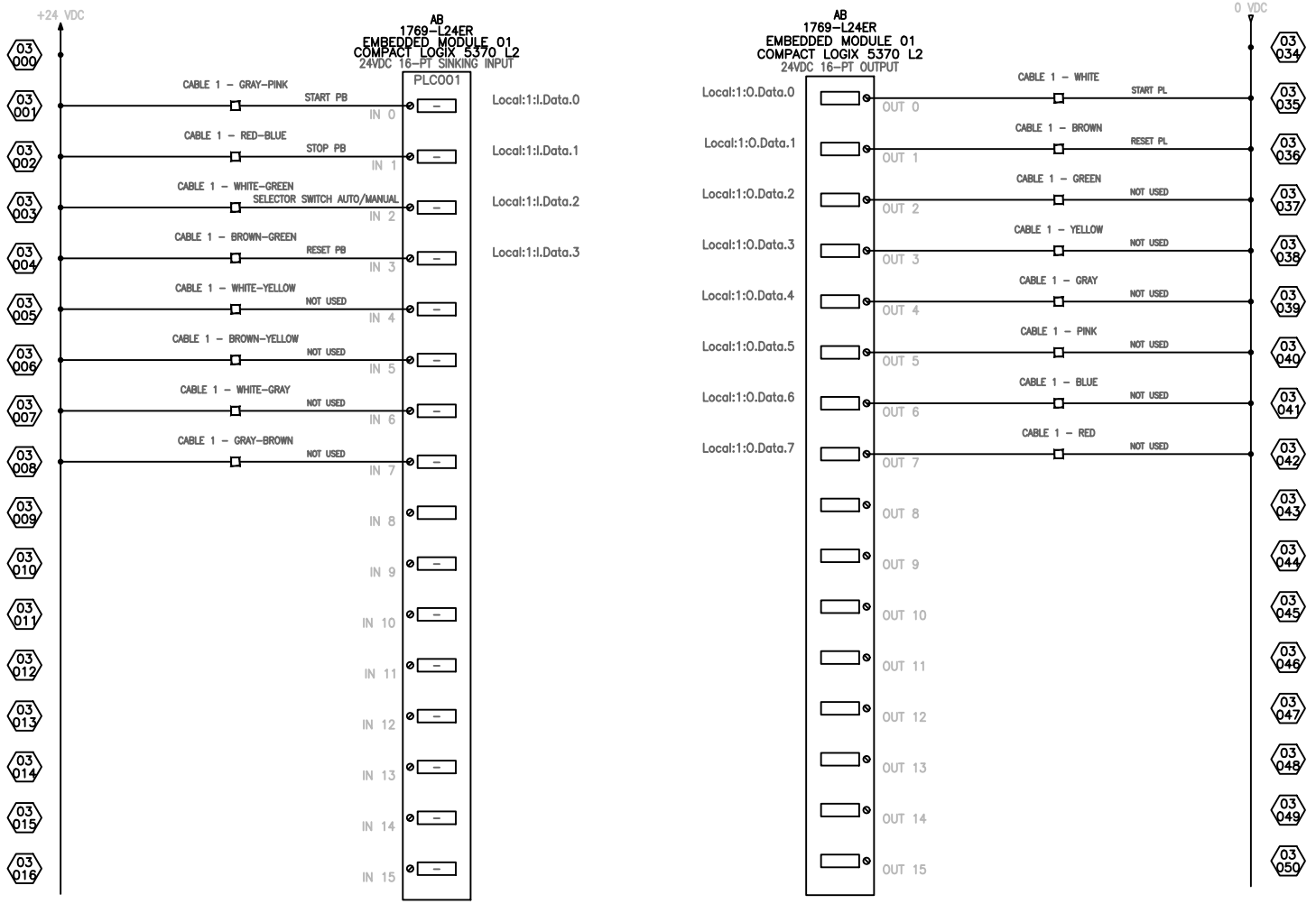
Steps	Start-up Requistes
1	No workpiece at the retainer
2	Cap magazine filled and no caps at transfer position

Steps	Initial settings
1	Robot in Home position
2	Ejector cap cylinder retracted
3	Gripper open

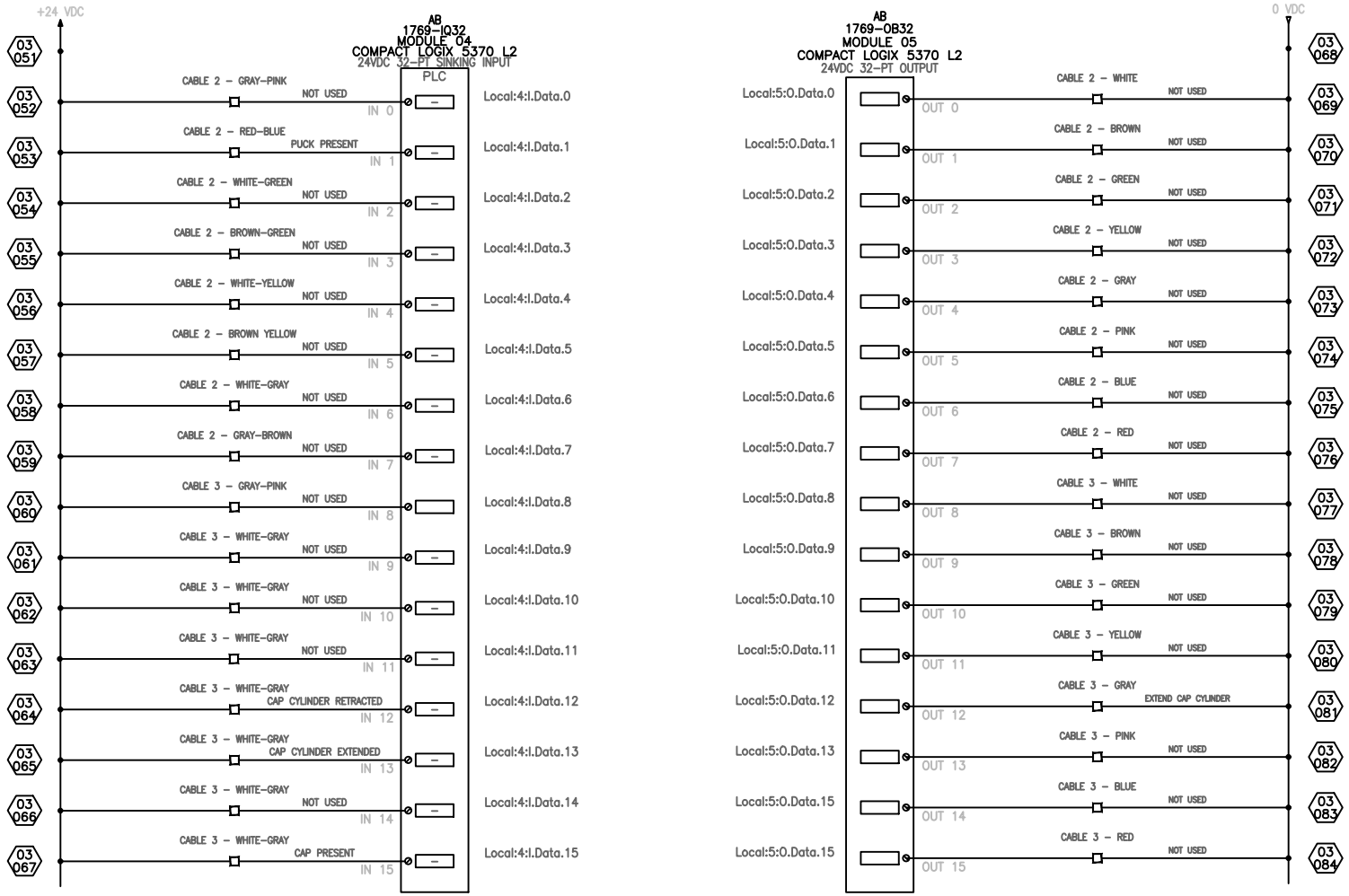
Steps	Sequence
1	Reset blink to request operator to reset station by turning the key to manual and press Reset button
	Start button is blinking awaiting for operator to start the station.
	At anytime, you may stop the operation by pressing the Stop button
2	Cap is pushed out from magazine
3	Work piece enter the retainer, detected by optoelectronic sensor
4	Robot start after detection of workpiece in retainer
	Robot grap workpiece, move to assembly base and release workpiece
	Robot move and grab cap, insert it into workpiece
	Robot grap the full workpiece and release in the ramp to the next station

0	2	4	6	8	10	12	14	16

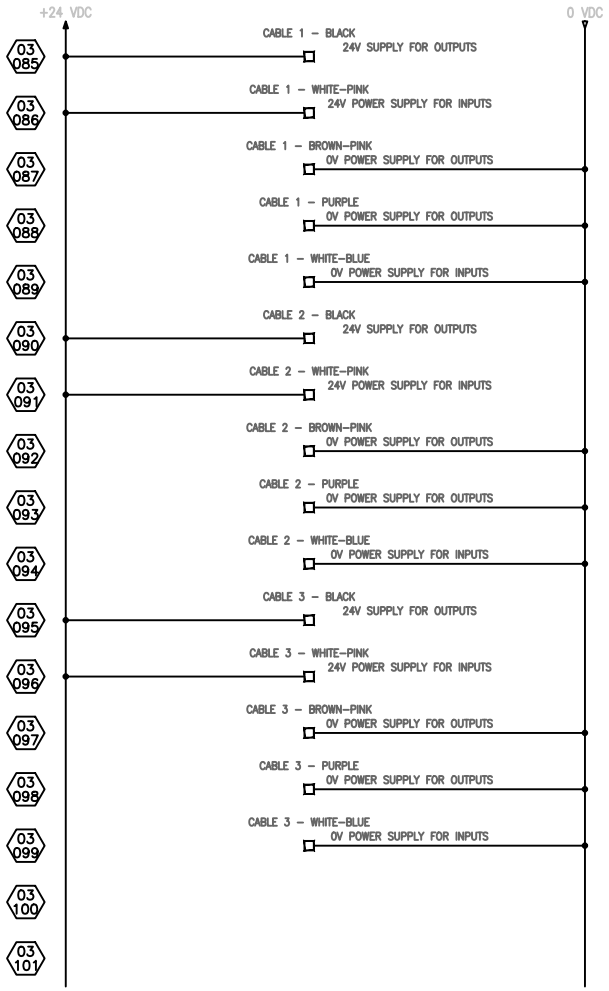
Robot Station				
Step no.	**Device used**	**Logical requirement**	**Instruction address**	**Instructions**
1	Reset station ,Reset button	TRUE	Local:1:I.Data.3, RI01.3	XIC
	Reset status, Reset Indicator	TRUE	Local:1:O.Data.1, RO01.1	OTE
	Auto/Manual Switch	TRUE	Local:1:I.Data.2, RI01.2	XIC
	Start station, Start button	TRUE	Local:1:I.Data.0, RI01.0	XIC
	Start status, Start Indicator	TRUE	Local:1:O.Data.0, RO01.0	OTE
	Stop station, Stop button	FALSE	Local:1:I.Data.1, RI01.1	XIC, XIO
2	Cap Cylinder Sensor, Retracted	TRUE	Local:4:I.Data.12, RI01.5	XIC
	Cap Cylinder, Extend	TRUE	Local:5:O.Data.12, RO01.2	OTE
	Cap Sensor, Present	TRUE	Local:4:I.Data.15, RI01.7	XIC
3	Optoelectronic sensor, Workpice present	TRUE	Local:4:I.Data.1, RI01.4	XIC
4	Robot, Start program	TRUE	BIT.0, URO.Bit.Registers[0]	XIC, OTE

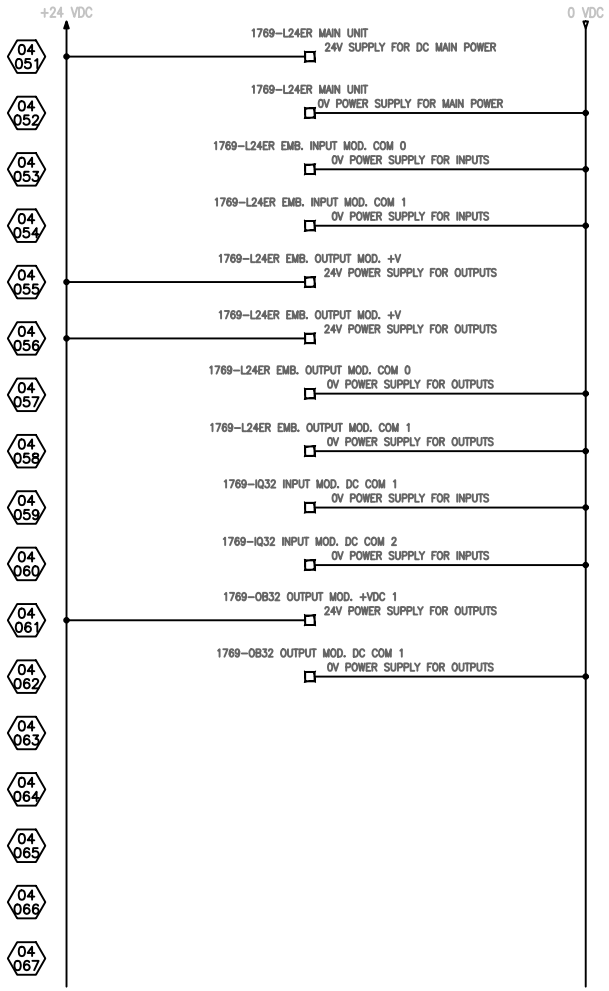


Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Robot Station
Updated	29/04/2021			STATION	Pg. 14
Drw-No	001				last: 23



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Robot Station
Updated	29/04/2021			STATION	Pg. 15
Drw-No	001				last: 23





Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Robot Station
Updated	29/04/2021			STATION	Pg. 16
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0	2	4	6	8	10	12	14	16

Storage Station V2 Hardware Identification					
Components	**Functions**	**Part number**	**Manufacturer**	**Input, Output, hardware**	**Station**
PNP Optoelectronic sensor (diffuse sensor with fibre optic cable)	Workpiece at beginnng of conveyor	165358	Festo	Input (I7)	Conveyor Module
Fibre-optic device		165327			
PNP Optoelectronic sensor (diffuse sensor with fibre optic cable)	Workpiece at middle of conveyor	165358		Input (I8)	
Fibre-optic device		165327			
PNP Optoelectronic sensor (Through-beam sensor with fibre optic cable)	No workpiece at end of conveyor	165360		Input (I9)	
Fibre-optic device		165327			
Optoelectronic sensor (fork light barrier)	Workpiece detected - Black	553563		Input (I10)	Detection Module
PNP Optoelectronic sensor (diffuse sensor with fibre optic cable)	Workpiece not black - Red	165358		Input (I11)	
Fibre-optic device		165327			
PNP Inductive proximity sensor	Workpiece metallic - Silver	150395		Input (I12)	
Gear motor (24 VDC)	Conveyor belt forward	374133	Festo	Output (O8)	Conveyor Module
Gear motor (24 VDC)	Conveyor belt reverse	374133	Festo	Output (O9)	

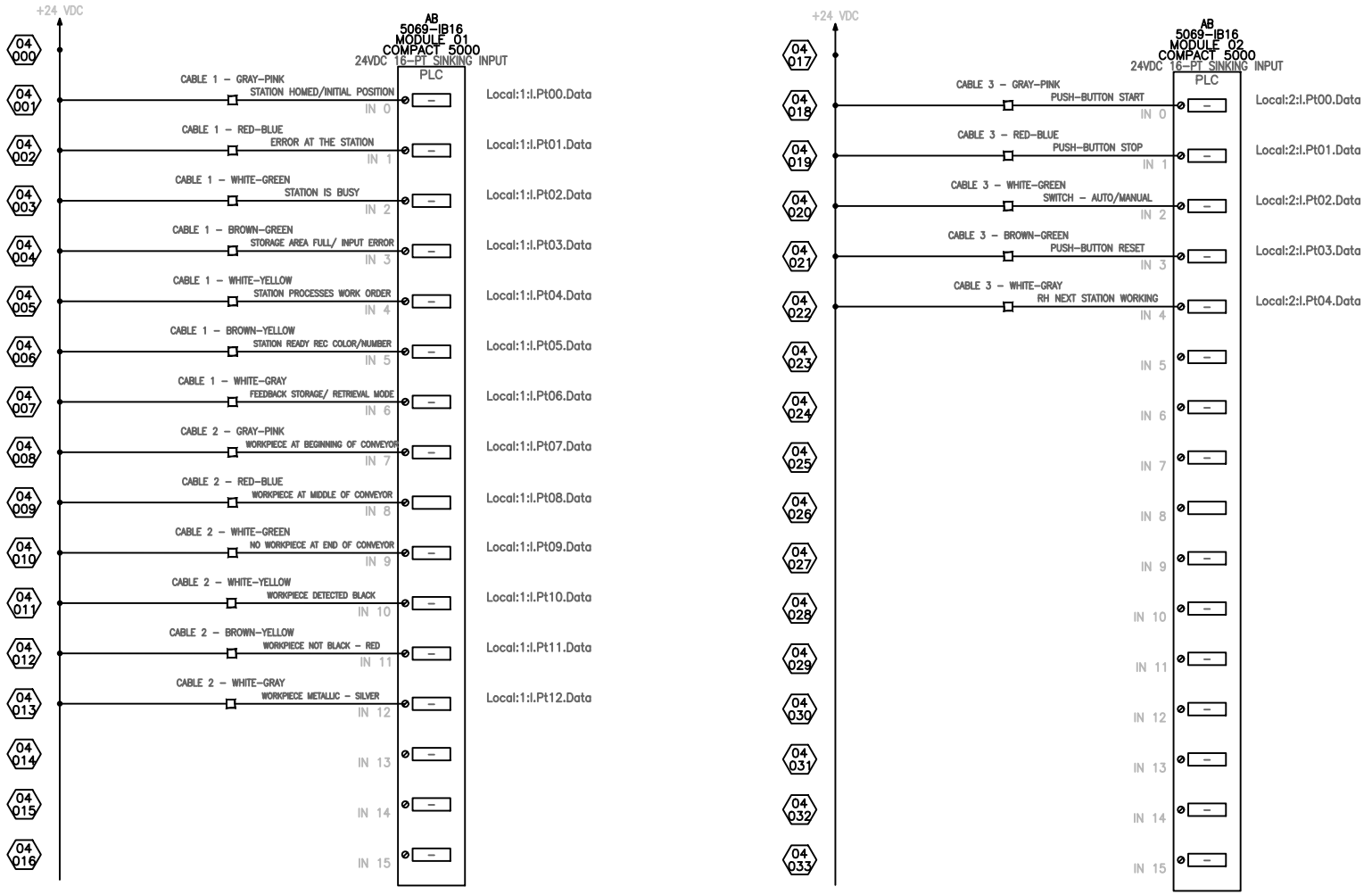
Storage Station	
Steps	**Start-up Requistes**
1	No workpiece in the holding unit
2	1 empty location in the storage area

Steps	**Initial settings**
1	Gantry and gripper's spindle axis in start/home position
2	Gripper open

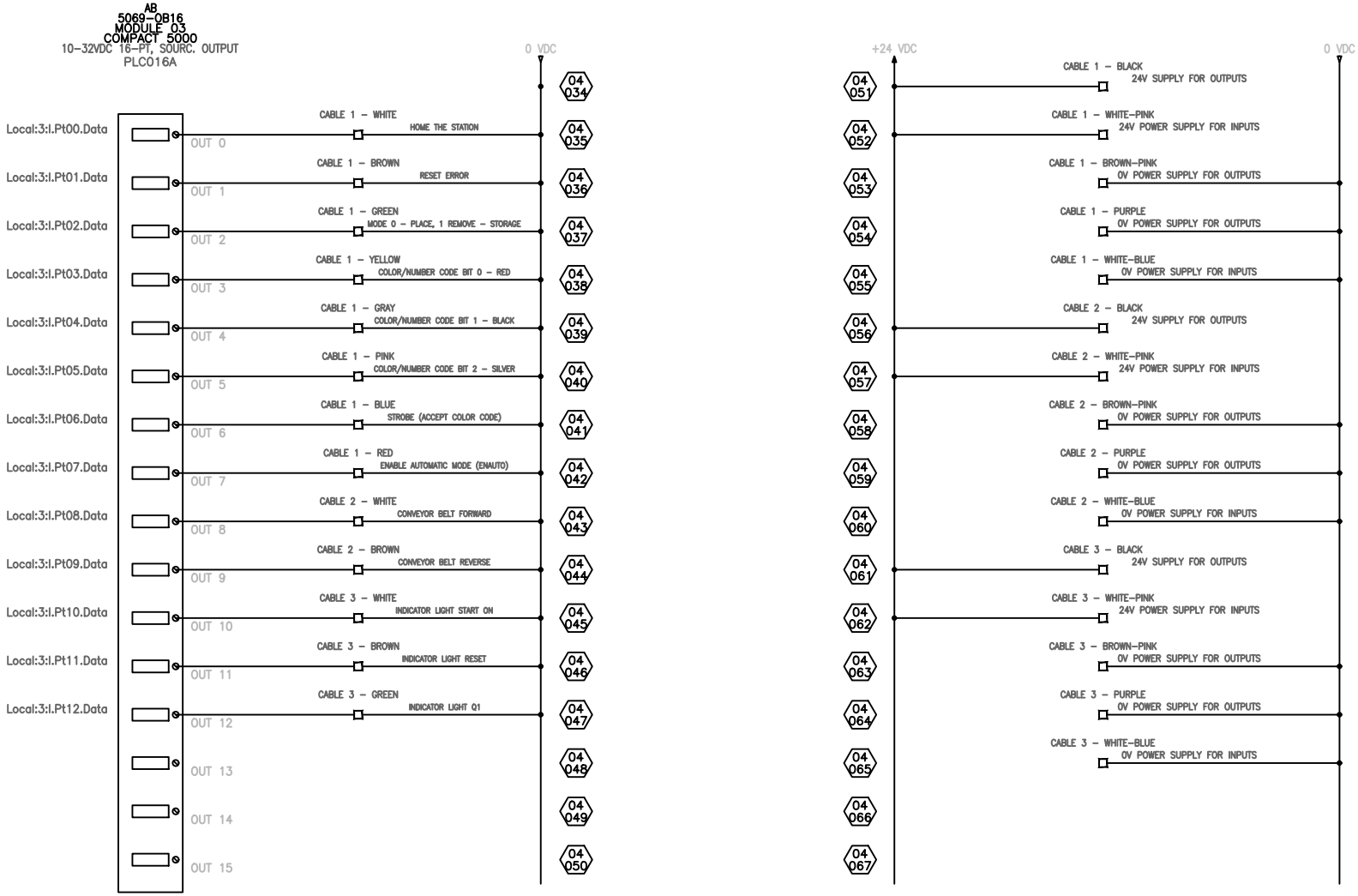
Steps	**Sequence**
1	Reset blink, to reset station to home position by turning pressing the Reset button
	Start button is blinking awaiting for operator to start the station
	At anytime, you may stop the operation by pressing the Stop button
2	A workpiece enter the station and a diffuse sensor at the conveyor start detects the presence of workpieces
	The detection module detects the color of the workpieces.
3	Workpiece reaches middle of conveyor (pick position) and is detected by the sensor.
	The gantry and the spindle axis move to the pick position on the middle of the conveyor belt.
4	Gripper is closed.
5	Based on the detected color the workpiece move into an empty location on the color assigned shelve.
6	Gripper is open
7	The Gantry and the spindle axis return to the start/home position.

Storage Station

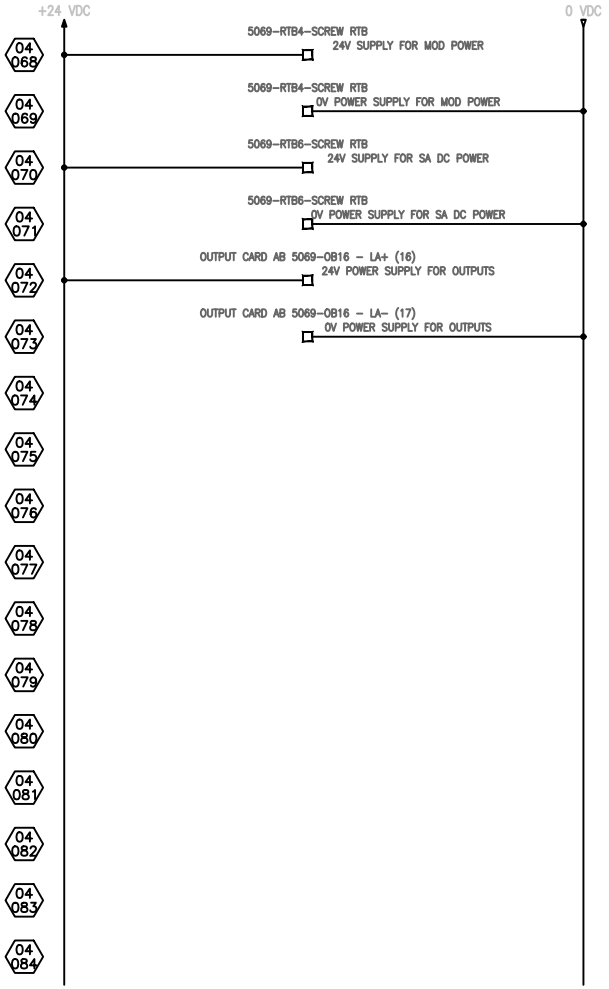
Step no.	Device used	Logical requirement	Instruction address	Instructions
1	Reset station ,Reset button	TRUE	Local:2:I.Pt03.Data, CCI01.3	XIC
	Reset status, Reset Indicator	TRUE	Local:3:O.Pt11.Data, CCO01.1	OTE
	Storage/Retrieve Mode Switch	TRUE	Local:2:I.Pt02.Data, CCI01.2	XIC
	Start station, Start button	TRUE	Local:2:I.Pt00.Data, CCI01.0	XIC
	Start status, Start Indicator	TRUE	Local:3:O.Pt10.Data, CCO01.0	OTE
	Stop station, Stop button	FALSE	Local:2:I.Pt01.Data, CCI01.1	XIC, XIO
	Station/Gantry Home position	TRUE	Local:1:I.Pt00.Data, SI01.0	XIC
	Home the station	TRUE	Local:3:O.Pt00.Data, SO01.0	OTE
	Error at the Station	TRUE	Local:1:I.Pt01.Data, SI01.1	XIC
	Reset error	TRUE	Local:3:O.Pt01.Data, SO01.1	OTE
	Station is Busy	TRUE	Local:1:I.Pt02.Data, SI01.2	XIC
	Storage area full / Input error	TRUE	Local:1:I.Pt03.Data, SI01.3	XIC
	Feedback storage / retrieval mode active (0 = storage, 1 = retrieval)	TRUE	Local:1:I.Pt06.Data, SI01.6	XIC
	Mode 0 = place in storage, Mode 1 = remove from storage	TRUE	Local:3:O.Pt02.Data, SO01.2	OTE
2	Workpiece at beginning of conveyor	TRUE	Local:1:I.Pt07.Data, SI01.7	XIC
	Conveyor belt forward	TRUE	Local:3:O.Pt08.Data, SO01.8	OTE
	Station ready to receive color/number code	TRUE	Local:1:I.Pt05.Data, SI01.5	XIC
	Workpiece detected - Black	TRUE	Local:1:I.Pt10.Data, SI01.10	XIC
	Color/number code, bit 1 - Black	TRUE	Local:3:O.Pt04.Data, SO01.4	OTE
	Workpiece not black - Red	TRUE	Local:1:I.Pt11.Data, SI01.11	XIC
	Color/number code, bit 0 - Red	TRUE	Local:3:O.Pt03.Data, SO01.3	OTE
	Workpiece metallic - Silver	TRUE	Local:1:I.Pt12.Data, SI01.12	XIC
	Color/number code, bit 2 - Silver	TRUE	Local:3:O.Pt05.Data, SO01.5	OTE
3	Workpiece at middle of conveyor	TRUE	Local:1:I.Pt08.Data, SI01.8	XIC
	Strobe (accept color code)	TRUE	Local:3:O.Pt06.Data, SO01.6	OTE
4, 5, 6 and 7	Process embedded station PLC dedicated to command gantry position and spindle axis.	-	-	-



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Storage Station V2
Updated	29/04/2021			STATION	Pg. 20
Drw-No	001				last: 23



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Storage Station V2
Updated	29/04/2021			STATION	Pg. 21
Drw-No	001				last: 23



Created	03/20/2021	Dalton Miyabara Hangsihak Sin	H&D ELECTRICAL INC.	MPS-D	Storage Station V2		
Updated	29/04/2021			STATION		Pg. 22	
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0	2	4	6	8	10	12	14	16

Check List			
Step N.	**Station Name**	**Function**	**Check**
1	Distribution	Reset may blink to request operator to reset by turning the key to manual to and press Reset button	Yes
2	Distribution	Start button is blinking awaiting for operator to start the station.	Yes
3	Distribution	At anytime, you may stop the operation by pressing the Stop button	Yes
4	Distribution	Work piece is placed on to magazine stack	Yes
5	Distribution	Workpiece detected by the magazine optoelectronic sensor and when reed switch in retracted positon	Yes
6	Distribution	Cylinder push to workpiece to conveyor belt	Yes
7	Distribution	Cylinder retract back as it hits the reed switch in advanced position	Yes
8	Distribution	At the same, conveyor motor will turn on to transfer workpiece	Yes
9	Distribution	As the workpiece get passed the end conveyor sensor, it will continue moving for 2 seconds and shut off conveyor motor	Yes
10	Separating	Reset may required by turning the key to manual to and press Reset button	Yes
11	Separating	Start button is blinking awaiting for operator to start the station.	Yes
12	Separating	At anytime, you may stop the operation by pressing the Stop button	Yes
13	Separating	Work piece is placed on conveyor belt by another station	Yes
14	Separating	The starting optoelectronic sensor detect the workpiece to turn on conveyor #1	Yes
15	Separating	Workpiece will move to an optoelectronic sensor in front of the stopper and shut off the conveyor #1	Yes
16	Separating	At the same time, distance sensor mounted on the top measure whether the workpiece has open or closed top	Yes
17	Separating	If the workpiece has closed top, it will retract the stopper and conveyor #1 turns on	Yes
18	Separating	If the workpiece has open top, it will retract the stopper, turns on conveyor #1, extend separator and also turns on conveyor #2	Yes
19	Separating	Workpiece will move through conveyor #1 until it gets detect by ending optoelectronic sensor	Yes
20	Separating	As workpiece move through conveyor #2, it will get detect by conveyor #2 ending sensor	Yes
21	Separating	It will then turns off conveyor #1 and extend the stopper after it passed the sensor	Yes
22	Separating	It will then turns off conveyor #1 and #2 and retracted stopper and separator after it passed the sensor	Yes
23	Separating	Reset blink to request operator to reset station by turning the key to manual and press Reset button	Yes
24	Robot	Start button is blinking awaiting for operator to start the station.	Yes
25	Robot	At anytime, you may stop the operation by pressing the Stop button	Yes
26	Robot	Cap is pushed out from magazine	Yes
27	Robot	Work piece enter the retainer, detected by optoelectronic sensor	Yes
28	Robot	Robot start after detection of workpiece in retainer	Yes
29	Robot	Robot grap workpiece, move to assembly base and release workpiece	Yes
30	Robot	Robot move and grab cap, insert it into workpiece	Yes
31	Robot	Robot grap the full workpiece and release in the ramp to the next station	Yes
32	Storage	Reset blink, to reset station to home position by turning pressing the Reset button	Yes
33	Storage	Start button is blinking awaiting for operator to start the station	Yes
34	Storage	At anytime, you may stop the operation by pressing the Stop button	Yes
35	Storage	A workpiece enter the station and a diffuse sensor at the conveyor start detects the presence of workpieces	Yes
36	Storage	The detection module detects the color of the workpieces.	Yes
37	Storage	Workpiece reaches middle of conveyor (pick position) and is detected by the sensor.	Yes
38	Storage	The gantry and the spindle axis move to the pick position on the middle of the conveyor belt.	No
39	Storage	Gripper is closed.	No
40	Storage	Based on the detected color the workpiece move into an empty location on the color assigned shelve.	No
41	Storage	Gripper is open	No
42	Storage	The Gantry and the spindle axis return to the start/home position.	Yes