Exercises

Industrial Data Transport Technologies SS23

Summary of the modules from the Real-Time Manufacturing Module

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The Manufacturing Model for Real-Time Data Processing (Room E13)

Manufacturer: Festo Didactic

Modules:

2x Goods Entrance

2x Goods Output (Sorting)

Transportation

4x Work Stations

Storage

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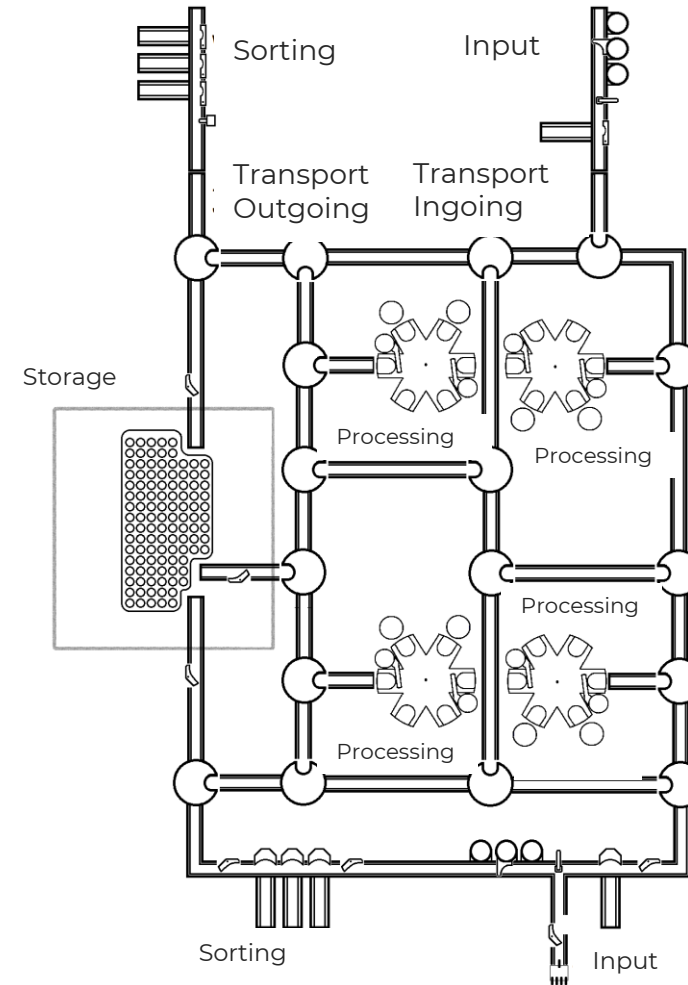
Lab Wifi

SSID: RT_Lab
PW: a*bKzZF98c

Groups

Group A – Module: Transportation Output
Shreya
Niharika

Group B – Module: Input 1
Heiko
Eduardo

Group C – Module: Transportation Input
LJ
Romin
Mobeen

Group D – Module: Storing
Niklas
Jannik

Group E – Module: Input 2
Paco
Agustin

Group F – Module: Workstation 4
Shubham
Hemanth

Group G – Module: Output
Swetha
Gaston

Group H – Module: Workstation 2
Punith
Priyanka

Group I – Module:

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	IP	Starting Address of Input Registers	Starting Address of Output Registers
Distribution Center Input (DZE)	192.168.200.226	8001	8011
Distribution Center Output (DZA)	192.168.200.228	8001	8009
Input (WE)	192.168.200.230	0	8003
Workstation 1 (B1)	192.168.200.231	8001	8003
Workstation 2 (B2)	192.168.200.232	8001	8003
Workstation 3 (B3)	192.168.200.233	8001	8003
Workstation 4 (B4)	192.168.200.234	8001	8003
Transport In (TWE)	192.168.200.235	8001	8018
Transport Out (TWA)	192.168.200.236	8001	8018
Storage (LAG)	192.168.200.237	0	384
Output/Sorting (WA)	192.168.200.238	0	384

Port: 502
Unit Id: 1

Read: FC 03 (Read Holding Registers)

Write: FC 16 (Write Multiple Holding Registers)

Inputs

Bit	Sensor
0	Magazine 1 Pusher retracted
1	Magazine 1 Pusher extended
2	Magazine 1 empty
3	Magazine 2 Pusher retracted
4	Magazine 2 Pusher extended
5	Magazine 2 empty
6	Piece behind Magazine 2
7	Magazine 3 Pusher extended
8	Magazine 3 Pusher extended
9	Magazine 3 empty
10	Ejector retracted
11	Ejector extended
12	Height sensor registered piece
13	Height sensor measured: Piece is ok
14	Slide full
15	Piece in front of Magazine 2

Outputs

Bit	Digital Actuators
0	Retract Magazine 1 Pusher
1	Extend Magazine 1 Pusher
2	Retract Magazine 2 Pusher
3	Extend Magazine 2 Pusher
4	Extend Ejector
5	Retract Magazine 3 Pusher
6	Extend Magazine 3 Pusher
7	Conveyor on

Address	Analog Actuator
0	Height value

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Inputs

Bit	Address	Digital Sensor
0	8002	Conveyor (Side) Piece at end
1	8002	Conveyor (Output) Piece at end
2	8002	Conveyor (Main) Piece at begin
3	8002	Conveyor (Main) Piece between Mag 1+2
4	8002	Conveyor (Main) Piece between Mag 2+3
5	8002	Conveyor (Main) Piece in front of Ejector
6	8002	Seperator (Main) is set
7	8002	Seperator (Main) Piece in front
8	8002	Seperator (Side) is set
9	8002	Seperator (Side) Piece in front
10	8002	Magazine 1 is retracted
11	8002	Magazine 1 is ejected
12	8002	Piece in Magazine 1
13	8002	Magazine 2 is retracted
14	8002	Magazine 2 is ejected
15	8002	Piece in Magazine 2

Bit	Address	Digital Sensor
16	8001	Magazine 3 is retracted
17	8001	Magazine 3 is ejected
18	8001	Piece in Magazine 3
19	8001	Ejector in right position
20	8001	Ejector in left position
21	8001	Ejector in middle position
22	8001	Ejector lock is set
23	8001	Slide full
24	8001	Height sensor: Piece not ok
25	8001	Height sensor: Measurement correct

Address	Analog Sensor
0	Height value

Outputs

Bit	Address	Digital Actuator
0	8012	Stop Conveyor (Main)
1	8012	Slow down Conveyor (Main)
2	8012	Move Conveyor (Main) left
3	8012	Move Conveor (Main) right
4	8012	Turn Conveyor (Side) on
5	8012	Conveyor (Output) backward
6	8012	Conveyor (Output) forward
7	8012	Set Seperator (Main)
8	8012	Set Seperator (Side)
9	8012	Eject Magazine 1
10	8012	Eject Magazine 2
11	8012	Eject Magazine 3
12	8012	Retract Magazine 1
13	8012	Retract Magazine 2
14	8012	Retract Magazine 3
15	8012	Move Ejector right

Bit	Address	Digital Actuator
16	8011	Move Ejector left
17	8011	Activte lock in Ejector (Middle pos)

Address	Analog Actuator
0	Conveyor (Output) Speed

Checker   Drill

Ejector A

2   3

1

Ejector B
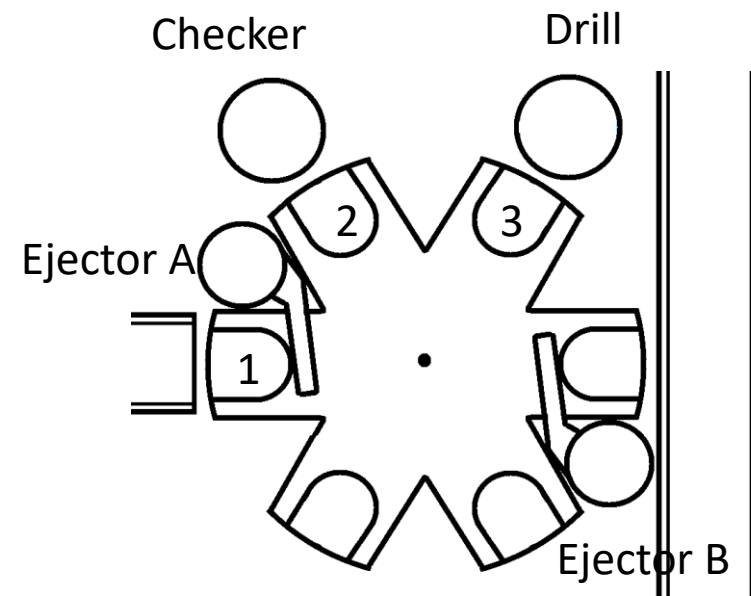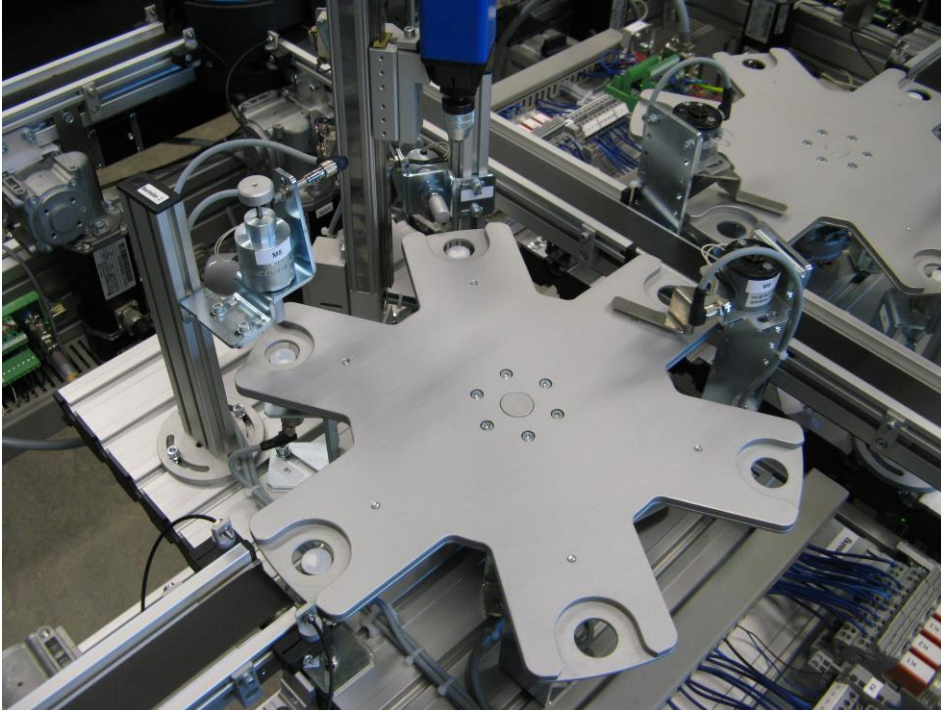
Inputs

Bit	Sensor
0	Piece in Postion 1
1	Piece in Position 3 (Drill)
2	Piece in Position 2 (Checker)
3	Drill up
4	Drill down
5	Turntable in position
6	Checker fully extended (Piece OK)

Outputs

Bit	Actuator
0	Turn drill on
1	Turn turntable*
2	Move drill up
3	Move drill down
4	Lock piece in drill position
5	Extend checker
6	Extend Ejector B
7	Extend Ejector A

*turntable only needs impulse to rotate exactly one position

Ejectors   Stopper
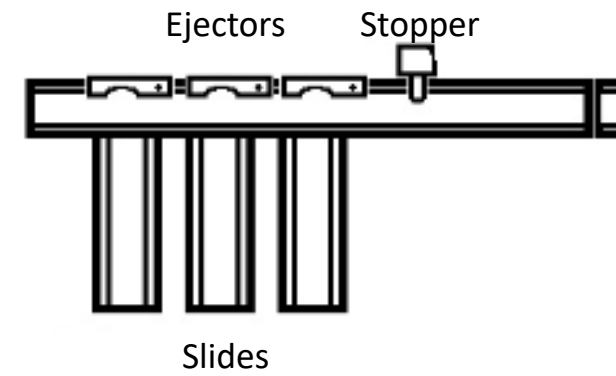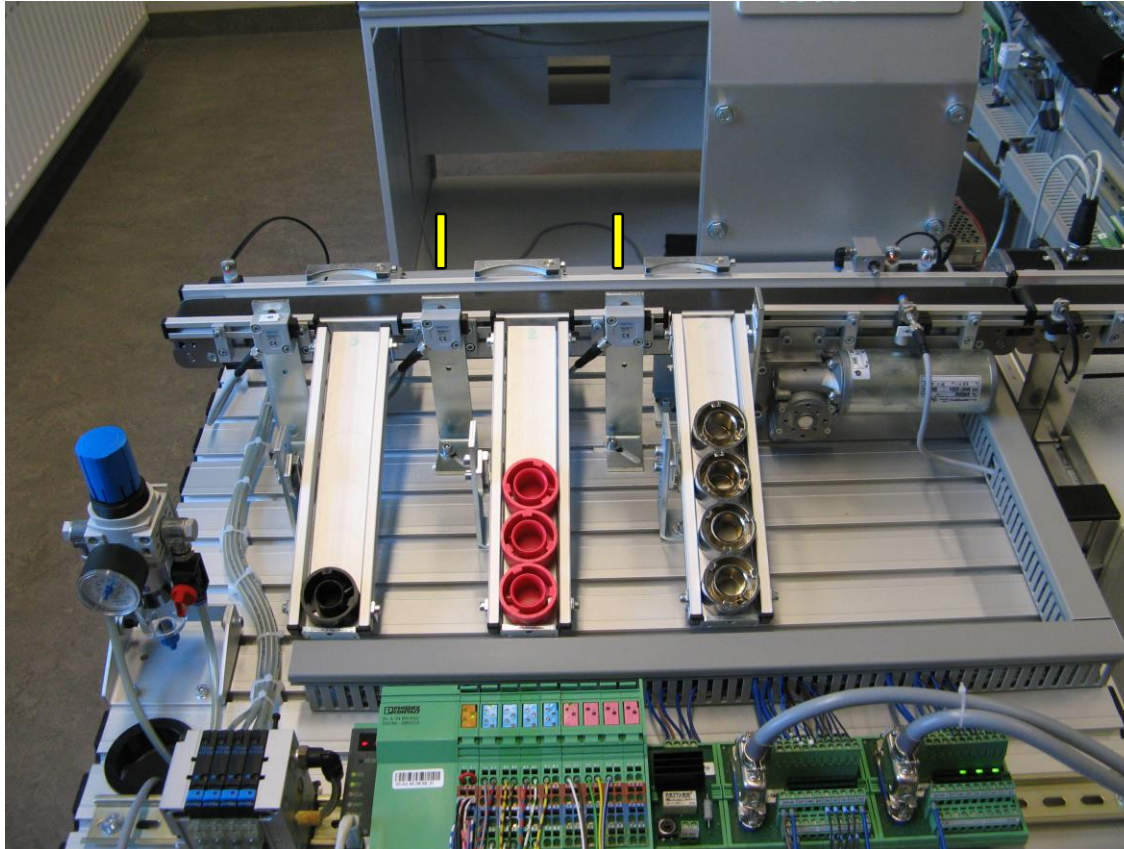
Slides

Inputs

Bit	Sensor
0	Piece arrived
1	Piece is metal
2	Piece is not black
3	Slide 1 full
4	Slide 2 full
5	Slide 3 full
6	Piece reached end of conveyor
7	Ejector 1 retracted
8	Ejector 1 extended
9	Ejector 2 retracted
10	Ejector 2 extended
11	Ejector 3 retracted
12	Ejector 3 extended
13	Piece passed Ejector 1
14	Piece passed Ejector 2

Outputs

Bit	Actuator
0	Switch Conveyor on
1	Extend Ejector 1
2	Extend Ejector 2
3	Extend Ejector 3
4	Open Stopper

Directly addressable positions
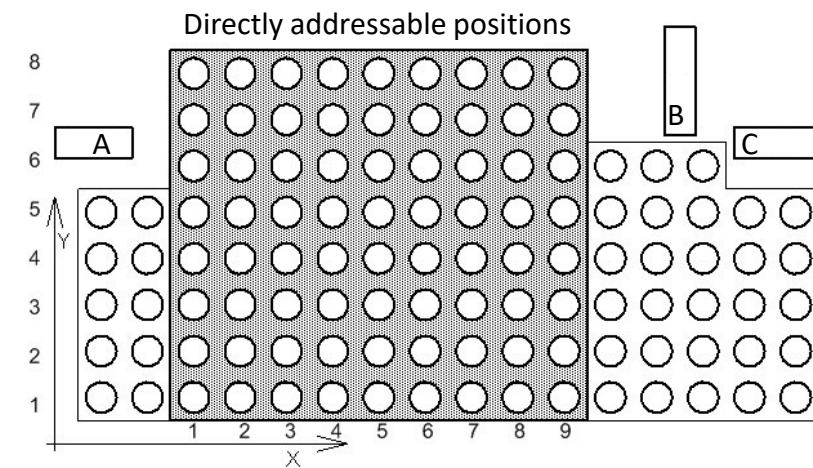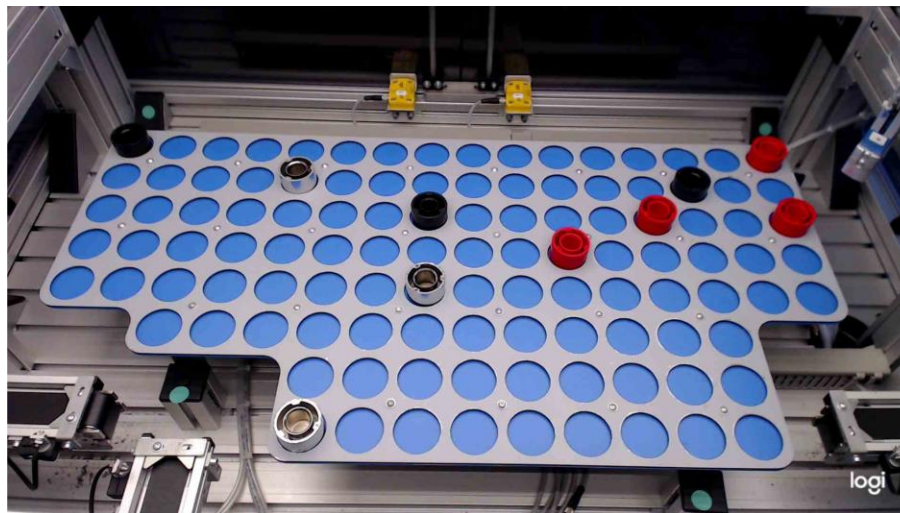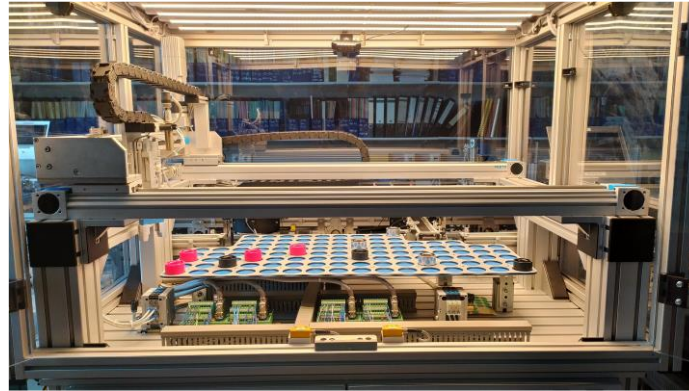
Inputs

Bit	Sensor
0	Movement in x position allowed
1	Movement in x position done
2	Movement in y position allowed
3	Movement in y position done
4	Gripper up
5	Gripper down
6	Gripper open
7	Gripper closed
8	Piece under gripper*
9	Safety door closed

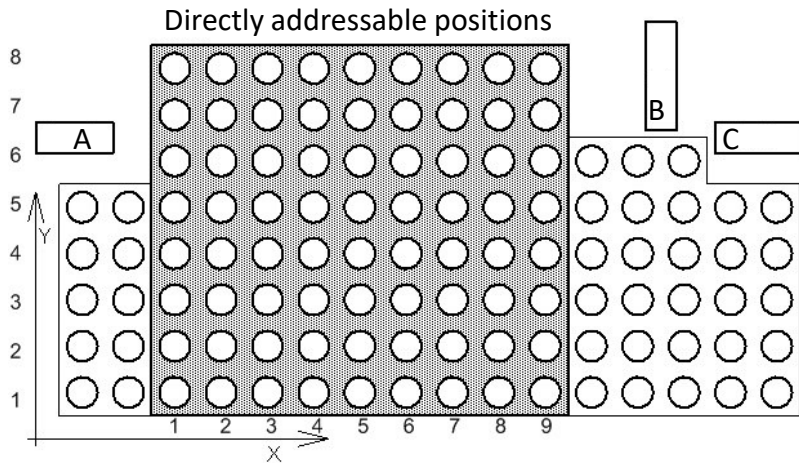*always senses piece one position right of the gripper position

Outputs

Bit	Actuator
0-3	X coordinate**
4	Start movement in x direction
5-8	Y coordinate**
9	Start movement in y direction
10	Move gripper up
11	Move gripper down
12	Open gripper
13	close gripper
14	Allow movement
15	Turn light on

**the coordinates are mapped in 4 bits each, allowing values between 0 and 15
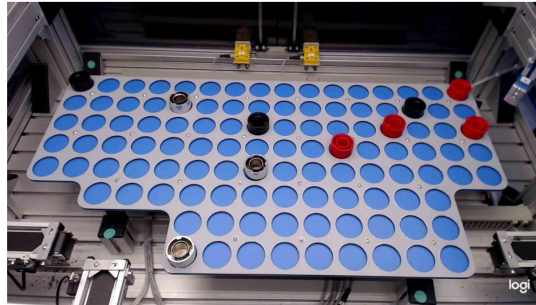
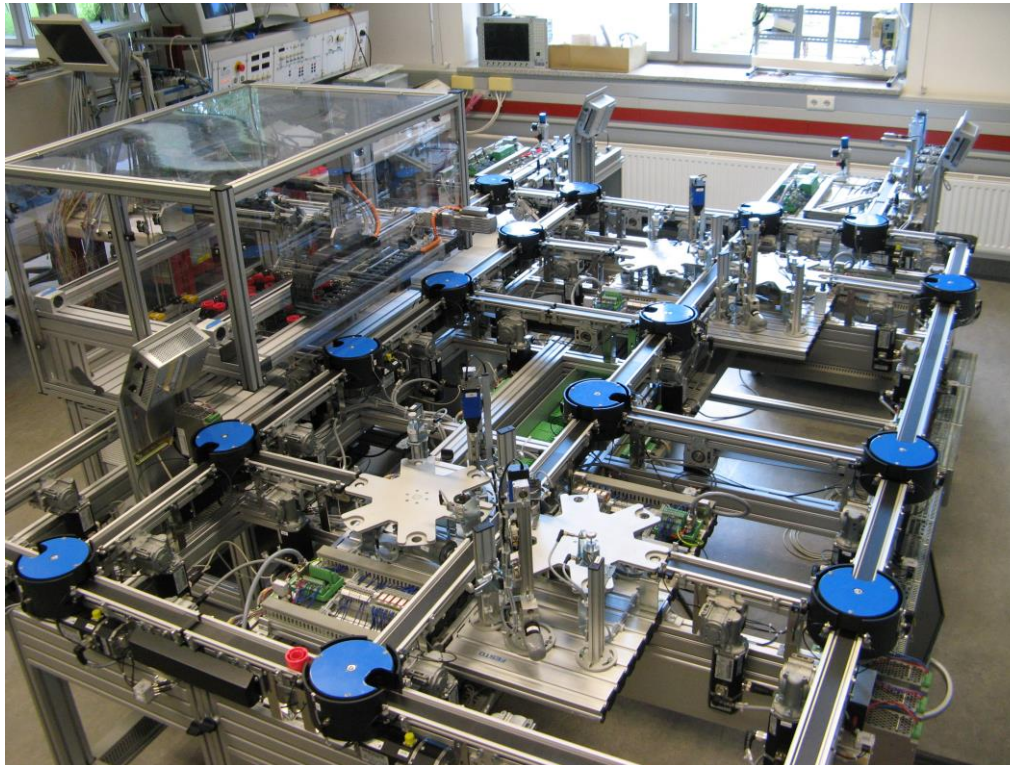| Dec	Function
0	Reference Position of the linear axis
1-9	x/y coordinate
10	Conveyor A
11	Conveyor B
12	Conveyor C
13	-
14	Single Step in positive direction
15	Single Step in negative direction

Bit	Actuator
0-3	X coordinate**
4	Start movement in x direction
5-8	Y coordinate**
9	Start movement in y direction
10	Move gripper up
11	Move gripper down
12	Open gripper
13	close gripper
14	Allow movement
15	Turn light on

Directly addressable positions

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Transport Outgoing   **Transport Ingoing**
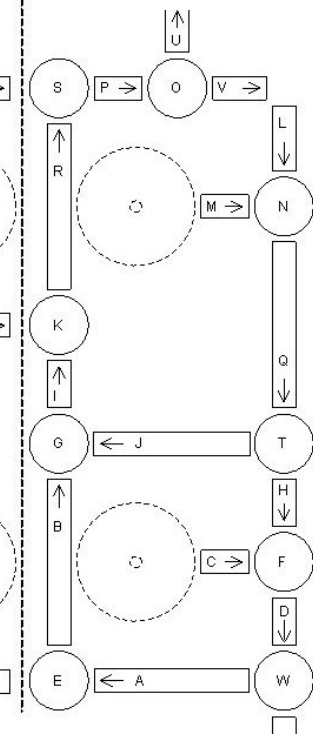
Position 1   Position 2   Position 3

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Sensors

Direction

Front

End
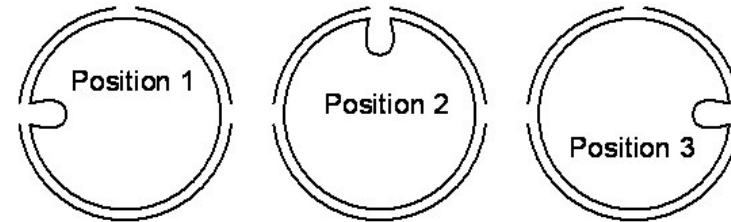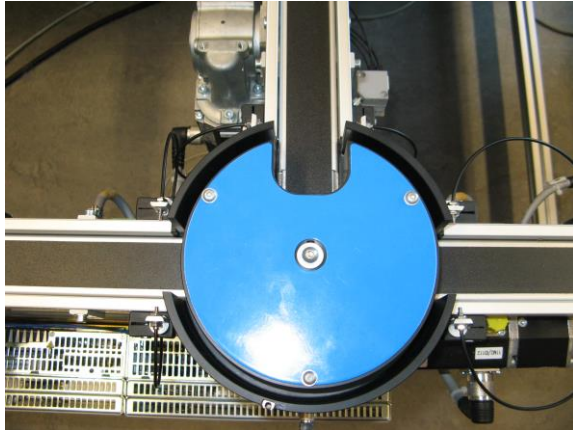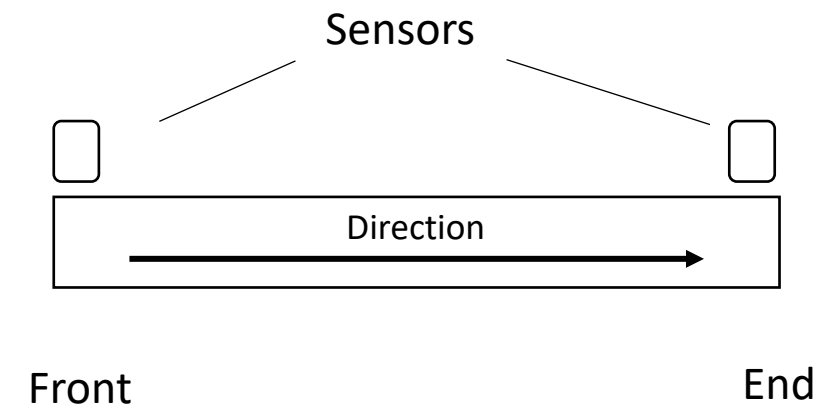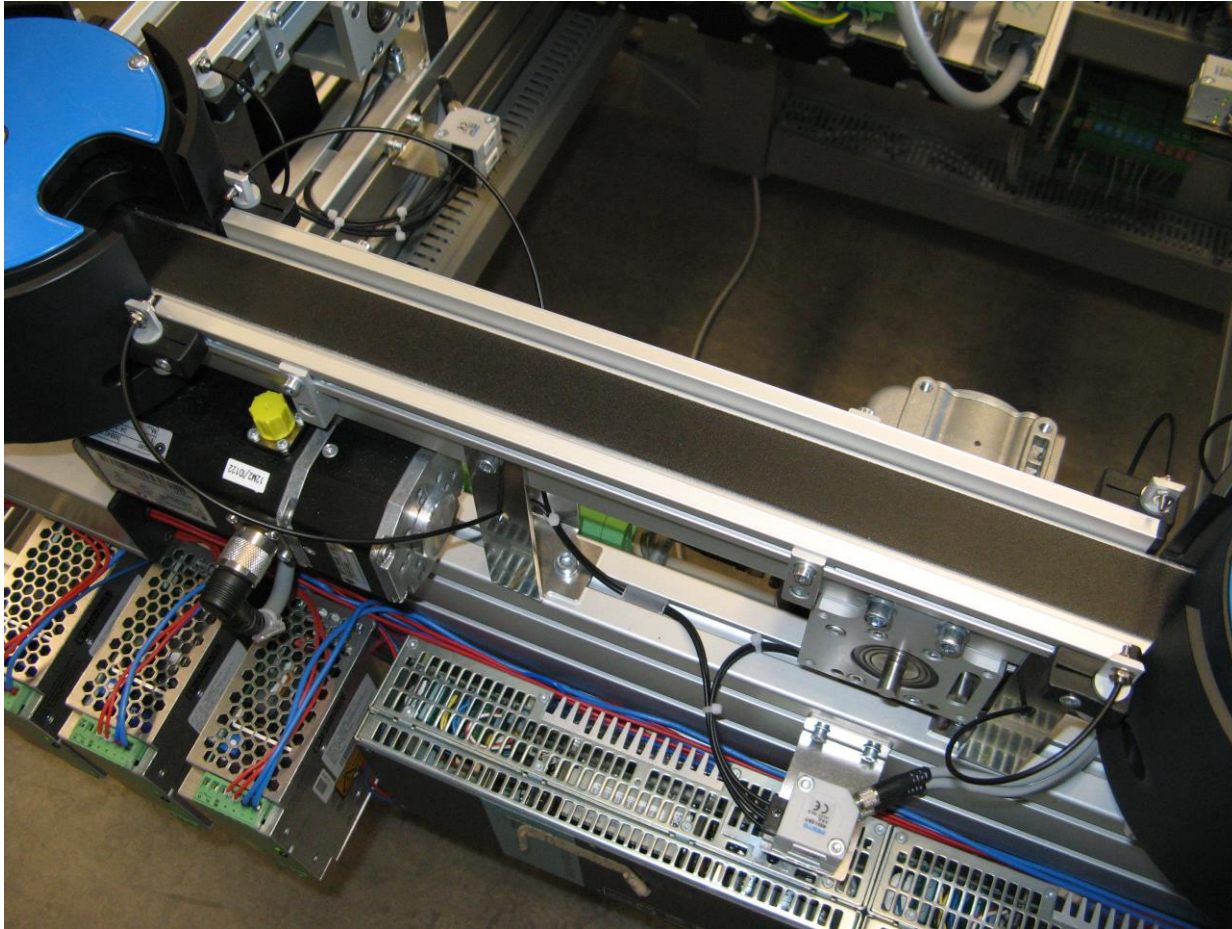
Transport Input
- Conveyors

Actuators

Conveyor	Register	Forward	Backward
A	8019	0	1
B	8019	2	3
C	8019	4	5
D	8019	6	7
H	8018	4	5
I	8018	6	7
J	8018	8	9
L	8018	14	15
M	8021	0	1
P	8021	10	11
Q	8021	12	13
R	8021	14	15
U	8020	8	9
V	8020	10	11

Sensors

Conveyor	Register	Piece at front	Piece at end
A	8002	0	1
B	8002	2	3
C	8002	4	5
D	8002	6	7
H	8001	4	5
I	8001	6	7
J	8001	8	9
L	8001	14	15
M	8004	0	1
P	8004	10	11
Q	8004	12	13
R	8004	14	15
U	8003	8	9
V	8003	10	11

Transport Input - Switches

Switch	Register	Ref.	Pos 1	Pos 2	Pos 3
E	8019	8	9	10	11
F	8019	12	13	14	15
G	8018	0	1	2	3
K	8018	10	11	12	13
N	8021	2	3	4	5
O	8021	6	7	8	9
S	8020	0	1	2	3
T	8020	4	5	6	7
W	8020	12	13	14	15

Actuators

Switch	Register	Pos reached	In movement	Piece in switch
E	8002	8	9	10
F	8002	12	13	14
G	8001	0	1	2
K	8001	10	11	12
N	8004	2	3	4
O	8004	6	7	8
S	8003	0	1	2
T	8003	4	5	6
W	8003	12	13	14

Sensors

Actuators

Separator	Set
1	64
2	67
3	70

Sensors

Separator	Piece behind	Piece in front
1	65	66
2	68	69
3	71	72
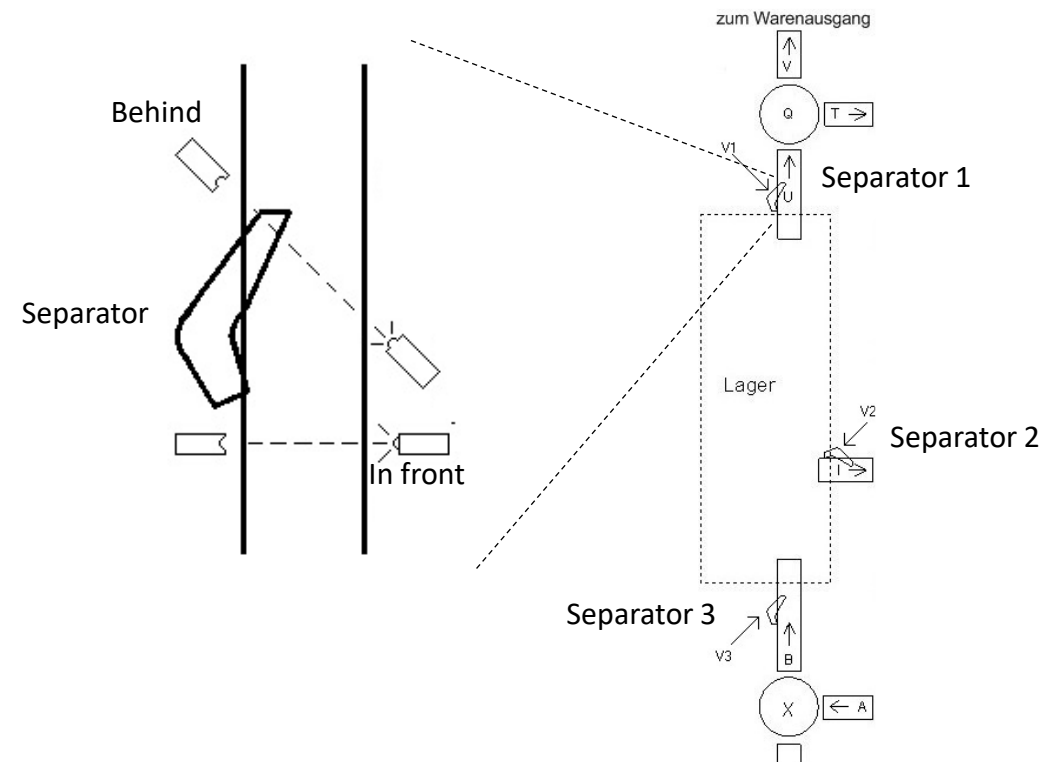
Transport Output
- Conveyors

Actuators

Conveyor	Register	Forward	Backward
A	8019	0	1
B	8019	2	3
D	8019	8	9
E	8019	10	11
G	8018	0	1
H	8018	2	3
I	8018	4	5
K	8018	10	11
L	8018	12	13
N	8021	2	3
O	8021	4	5
P	8021	6	7
T	8020	4	5
U	8020	6	7
V	8020	8	9
W	8020	10	11

Sensors

Conveyor	Register	Piece at front	Piece at end
A	8002	0	1
B	8002	2	3
D	8002	8	9
E	8002	10	11
G	8001	0	1
H	8001	2	3
I	8001	4	5
K	8001	10	11
L	8001	12	13
N	8004	2	3
O	8004	4	5
P	8004	6	7
T	8003	4	5
U	8003	6	7
V	8003	8	9
W	8003	10	11

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Transport Output - Switches

Switch	Register	Ref.	Pos 1	Pos 2	Pos 3
C	8019	4	5	6	7
F	8019	12	13	14	15
J	8018	6	7	8	9
M	8018/8021	14	15	0	1
Q	8021	8	9	10	11
R	8021	12	13	14	15
S	8020	0	1	2	3
X	8020	12	13	14	15

Switch	Register	Pos reached	In movement	Piece in switch
C	8002	4	5	6
F	8002	12	13	14
J	8001	6	7	8
M	8001/8004	14	15	1
Q	8004	8	9	10
R	8004	12	13	14
S	8003	0	1	2
X	8003	12	13	14

Actuators

Sensors