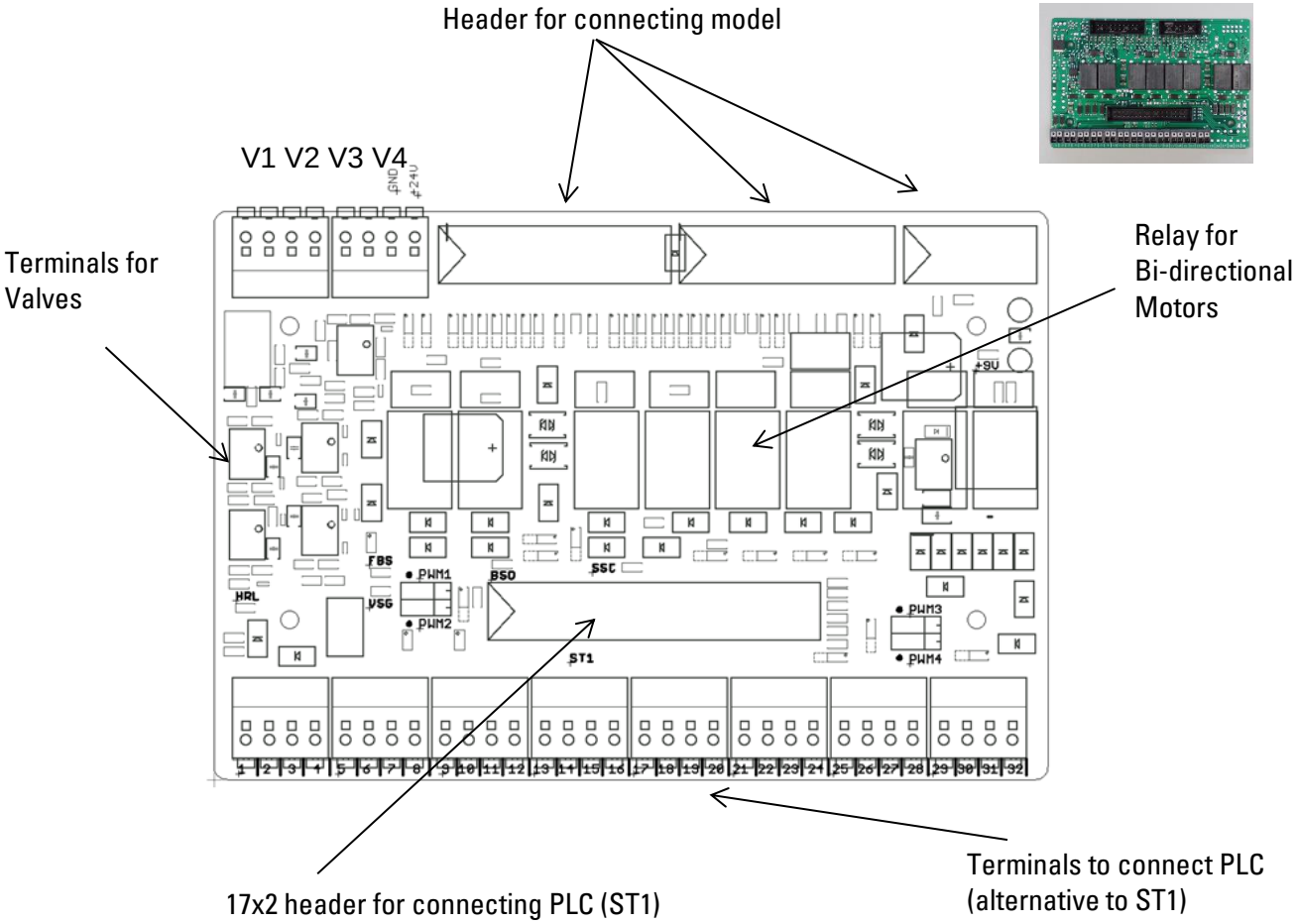
554868
Lernfabrik 4.0 24V
Training Factory Industry 4.0 24V

Systemanforderungen SPS / System requirements PLC

Stromversorgung / Power supply:	**24V / 10A**
Digital-Eingänge / Digital inputs:	**28**
Referenztaster/reference switches:	17
Lichtschranken / light barriers:	11
Zähl-Eingänge / counter inputs:	**14**
Encoder:	7 (14 counter inputs)
Analog-Eingänge / analog inputs:	**2**
Farbsensor / color sensor:	2
Ausgänge / outputs:	**43**
Unidirektionale Motoren / unidirectional motors:	3
Bidirektionale Motoren / bidirectional motors:	12 (24 outputs)
Leuchten / lamps:	5
Kompressoren / compressors:	3
3/2-Wege-Magnetventile / 3/2-way solenoid valves:	8
Ausgänge PWM / outputs PWM (optional)	**11**
Zusätzliche Schnittstellen / additional interfaces	**OPC-UA Server, Router/Switch**

24V adapter board

There is an adapter board on every Factory module for connecting to the PLC; it is structured as follows:

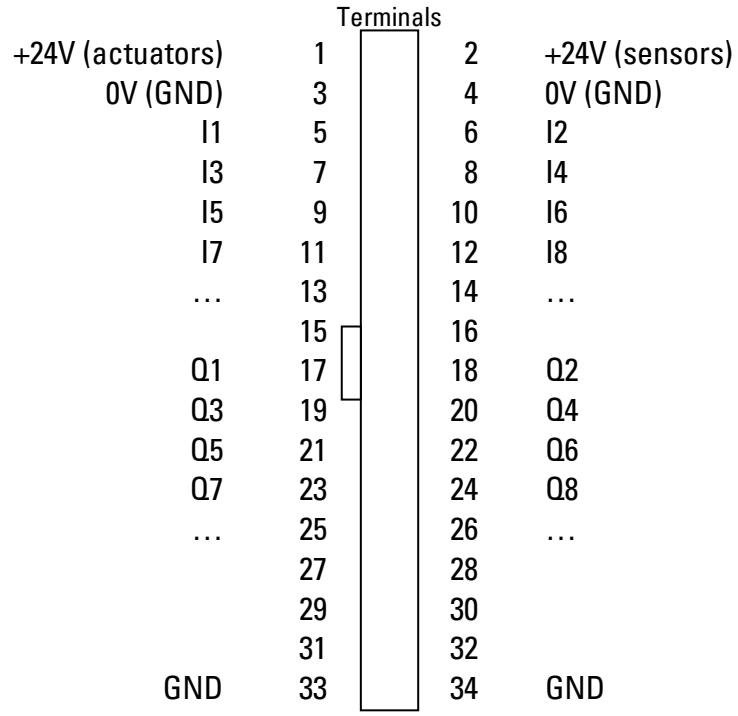


PLC / controller system requirements:

If a different controller besides a PLC SIMATIC S7-1500 is used, such as an Arduino, the following requirements must be fulfilled.

- Interface to the adapter board compatible with 24V
- Maximum cycle time of 10 ms

Assigning the 17x2 header (ST1) for PLC connection:



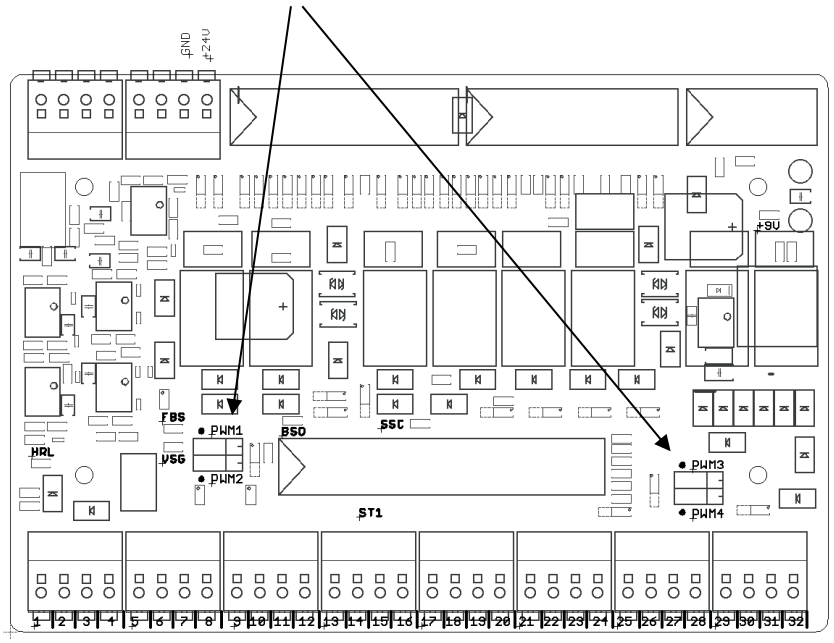
Assigning the adapter boards to the individual stations:

	High-bay warehouse (HBW)	**Vacuum suction Gripper (VGR)**	**Processing Station (MPO)**	**Sorting line (SLD)**	**Sensor station with camera (SSC)**
R1/R2	Conveyor belt	Vertical	Turntable	-	
R3/R4	Horizontal	Horizontal	-	-	Camera height
R5/R6	Vertical	Turntable	Oven pusher	-	Turn camera
R7/R8	Cantilever	-	Gripper	-	
V1	-	-	Vacuum	White ejector	
V2	-	-	Lower	Red ejector	
V3	-	-	Oven door	Blue ejector	
V4	-	Vacuum	Slides	-	
ST (Model)	20 pin	16 pin	20 pin	20 pin	10 pin
ST (Model)	14 pin	10 pin	20 pin	14 pin	14 pin
ST (Model)					10 pin
ST1 (PLC)	34 pin	34 pin	34 pin	34 pin	34 pin

Pulse width modulation:

Bi-directional motors are converted via a relay and can be supplied either via 24V (actuators) or the associated PWM terminal.

The jumpers are on the adapter board

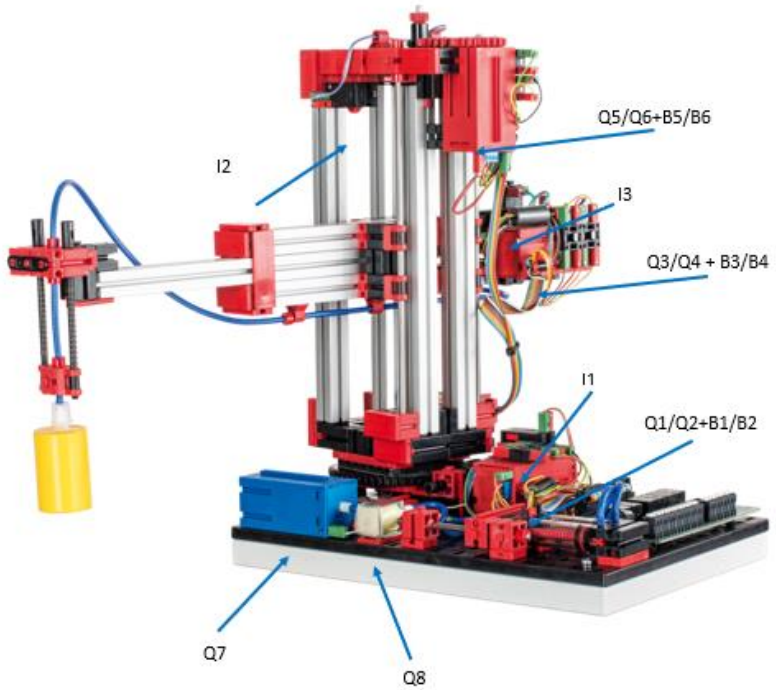


	High-bay warehouse (HBW)	Vacuum suction gripper (VGR)	Processing station (MPO)	Sorting line (SLD)	Sensor station with camera (SSC)
PWM 1	Conveyor belt	Y(Vertical)	Turntable	- not assigned -	- not assigned -
PWM 2	X(Horizontal)	Z(Horizontal)	- not assigned -	- not assigned -	Camera height
PWM 3	Y(Vertical)	X(Turn)	- not assigned -	- not assigned -	Turn camera
PWM 4	Cantilever		Suction (Horizontal)	- not assigned -	- not assigned -

Assigning the PWM jumper:
Jumper left: PWM selected, motor converted via relay and
Supplied with power via the associated PWM terminal
Jumper right: Power supply via +24V (actuators), motor can be converted via a relay

Factory module assignment plans

Assignment plan for the vacuum suction gripper



Terminal no. (ST1)	Function	Designation	Clamp PLC	I/O address S7-1500	Variable name S7-1500
1	Power supply (+) actuators	24V DC			
2	Power supply (+) sensors	24V DC			
3	Power supply (-)	0V			
4	Power supply (-)	0V			
5	Vertical reference switch	I1	DI1.6	%I1.6	IX_VGR_RefSwitchVerticalAxis_I1
6	Horizontal reference switch	I2	DI3.6	%I3.6	IX_VGR_RefSwitchHorizontalAxis_I2
7	Turn reference switch	I3	DI3.7	%I3.7	IX_VGR_RefSwitchRotate_I3
9	Encoder vertical pulse 1	B1	DI6.0	%I6.0	IX_VGR_EncoderVerticalAxisImp1_B1
10	Encoder vertical pulse 2	B2	DI6.4	%I6.4	IX_VGR_EncoderVerticalAxisImp2_B2
11	Encoder horizontal pulse 1	B3	DI6.1	%I6.1	IX_VGR_EncoderHorizontalAxisImp1_B3
12	Encoder horizontal pulse 2	B4	DI6.5	%I6.5	IX_VGR_EncoderHorizontalAxisImp2_B4
13	Turn encoder pulse 1	B5	DI6.2	%I6.2	IX_VGR_EncoderRotateImp1_B5
14	Turn encoder pulse 2	B6	DI6.6	%I6.6	IX_VGR_EncoderRotateImp2_B6
17	Vertical motor up	Q1 (M1)	DO2.0	%Q2.0	QX_VGR_M1_VerticalAxisUp_Q1
18	Vertical motor down	Q2 (M1)	DO2.1	%Q2.1	QX_VGR_M1_VerticalAxisDown_Q2
19	Horizontal motor backwards	Q3 (M2)	DO2.2	%Q2.2	QX_VGR_M2_HorizontalAxisBackward_Q3
20	Horizontal motor forwards	Q4 (M2)	DO2.3	%Q2.3	QX_VGR_M2_HorizontalAxisForward_Q4
21	Turn motor clockwise	Q5 (M3)	DO2.4	%Q2.4	QX_VGR_M3_RotateClockwise_Q5
22	Turn motor anti-clockwise	Q6(M3)	DO2.5	%Q2.5	QX_VGR_M3_RotateCounterclockwise_Q6
23	Compressor	Q7	DO2.6	%Q2.6	QX_VGR_Compressor_Q7
24	Valve vacuum	Q8	DO2.7	%Q2.7	QX_VGR_ValveVacuum_Q8
25	PWM horizontal	PWM (M1)	DO8.0	%QW15	QW_VGR_PWM_Vertical_M1
26	PWM vertical	PWM (M2)	DO8.1	%QW17	QW_VGR_PWM_Horizontal_M2
27	Turn PWM	PWM (M3)	DO8.2	%QW19	QW_VGR_PWM_Rotate_M3

Model wiring

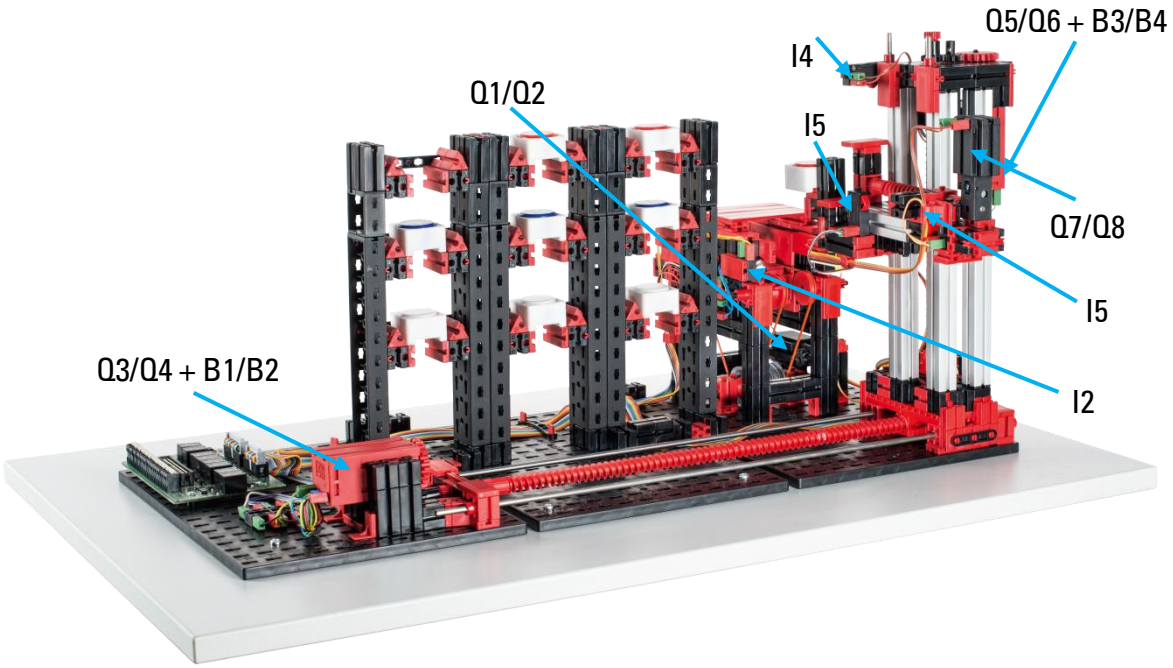
Terminal	Header ST1		Ribbon cable	Sensors + actuators model
17	Vertical up	1		Q1/Q2 (M1)
18	Vertical down	2		
3.4	GND	3		Encoder power supply
2	24V (Sensor)	4		Signal A
9	A	5		Signal B
10	B	6		
5	Reference vertical	7		I1
2	24V	8		
19	Horizontal back	9		Q3/Q4 (M2)
20	Horizontal forward	10		
3.4	GND	11		Encoder power supply
2	24V (Sensor)	12		Signal A
11	A	13		Signal B
12	B	14		
6	Reference horizontal	15		I2
2	24V (Sensor)	16		

	Header ST2			
7	Turn reference	1		I3
2	24V (Sensor)	2		
21	Turn clockwise	3		Q5/Q6 (M3)
22	Turn anti-clockwise	4		
3.4	GND	5		Encoder power supply
2	24V (Sensor)	6		Signal A
13	A	7		Signal B
14	B	8		
3.4	GND	9		Q7 (compressor)
23	Compressor	10		

3.4	Terminal V4		Q8 (Valve vacuum)
24			

red = power supply
yellow = Motor poles reversible via relay

Assignment plan for automated high-bay warehouse (HBW)



Terminal no. (ST1)	Function	Designation	Clamp SPS	I/O address S7-1500	Variable name S7-1500
1	Power supply (+) actuators	24V DC			
2	Power supply (+) sensors	24V DC			
3	Power supply (-)	0V			
4	Power supply (-)	0V			
5	Reference pushbutton horizontal	I1	DI1.0	%I1.0	IX_HBW_RefSwitchHorizontalAxis_I1
6	Light barrier inside	I2	DI1.1	%I1.1	IX_HBW_LightBarrierInside_I2
7	Light barrier outside	I3	DI1.2	%I1.2	IX_HBW_LightBarrierOutside_I3
8	Reference pushbutton vertical	I4	DI1.3	%I1.3	IX_HBW_RefSwitchVerticalAxis_I4
11	Encoder horizontal pulse 1	B1	DI5.1	%I5.1	IX_HBW_EncoderHorizontalAxisImp1_B1
12	Encoder horizontal pulse 2	B2	DI5.5	%I5.5	IX_HBW_EncoderHorizontalAxisImp2_B2
13	Encoder vertical pulse 1	B3	DI5.2	%I5.2	IX_HBW_EncoderVerticalAxisImp1_B3
14	Encoder vertical pulse 2	B4	DI5.6	%I5.6	IX_HBW_EncoderVerticalAxisImp2_B4
15	Reference pushbutton probe arm front	I5	DI1.4	%I1.4	IX_HBW_SwitchCantileverFront_I5
16	Reference pushbutton probe arm rear	I6	DI1.5	%I1.5	IX_HBW_SwitchCantileverBack_I6
17	Conveyor belt motor forwards	Q1 (M1)	DO1.0	%Q1.0	QX_HBW_M1_ConveyorBeltForward_Q1
18	Conveyor belt motor backwards	Q2 (M1)	DO1.1	%Q1.1	QX_HBW_M1_ConveyorBeltBackward_Q2
19	Motor horizontal towards rack	Q3 (M2)	DO1.2	%Q1.2	QX_HBW_M2_HorizontalTowardsRack_Q3
20	Motor horizontal towards conveyor belt	Q4 (M2)	DO1.3	%Q1.3	QX_HBW_M2_HorizontalTowardsConveyorBelt_Q4
21	Vertical motor down	Q5 (M3)	DO1.4	%Q1.4	QX_HBW_M3_VerticalAxisDownward_Q5
22	Vertical motor up	Q6 (M3)	DO1.5	%Q1.5	QX_HBW_M3_VerticalAxisUpward_Q6
23	Cantilever motor forwards	Q7 (M4)	DO1.6	%Q1.6	QX_HBW_M4_CantileverForward_Q7
24	Cantilever motor backwards	Q8 (M4)	DO1.7	%Q1.7	QX_HBW_M4_CantileverBackward_Q8
25	PWM conveyor belt	PWM (M1)	DO7.0	%QW7	QW_HBW_PWM_ConveyorBelt_M1
26	PWM horizontal	PWM (M2)	DO7.1	%QW9	QW_HBW_PWM_HorizontalAxis_M2
27	PWM vertical	PWM (M3)	DO7.2	%QW11	QW_HBW_PWM_VerticalAxis_M3
28	PWM cantilever	PWM (M4)	DO7.3	%QW13	QW_HBW_PWM_Cantilever_M4

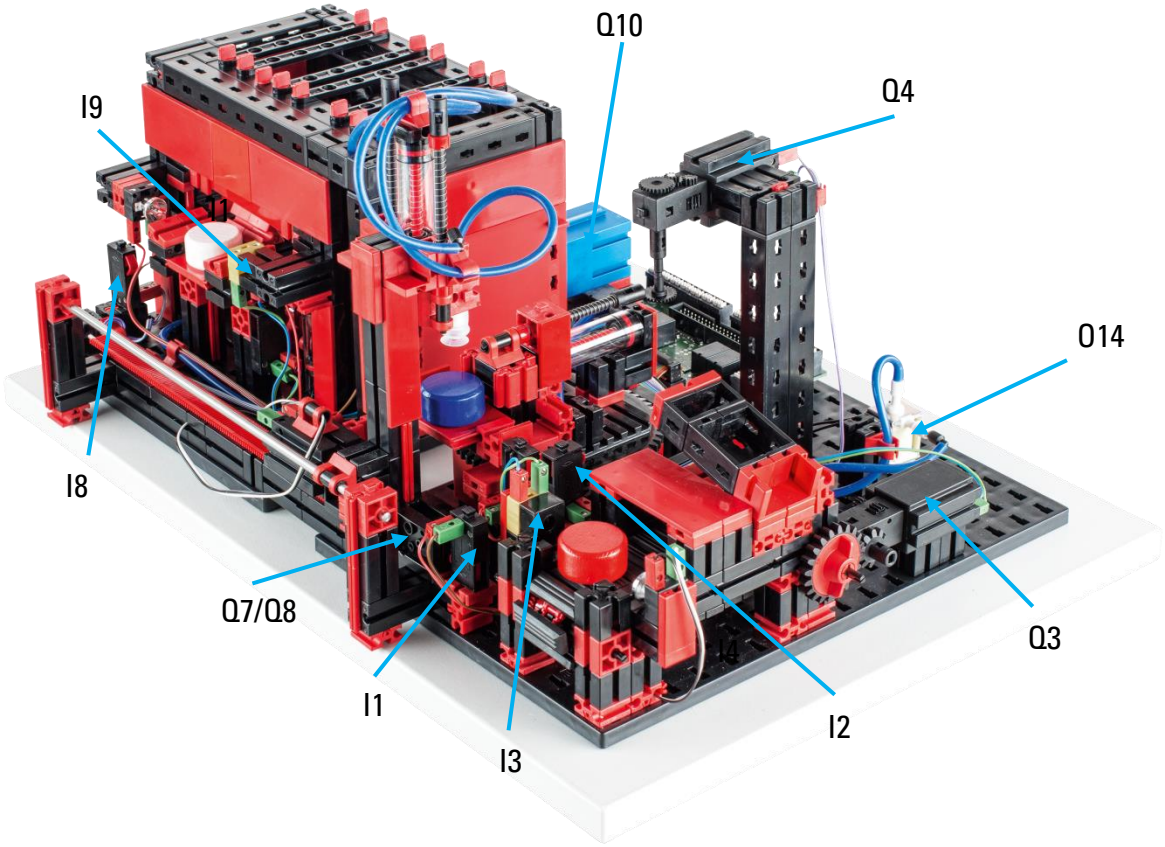
Model wiring

Terminal	Header ST1		Ribbon cable	Sensors + actuators model
5	Reference horizontal	1		I1
2	24V (Sensor)	2		
6	Photo-transistor internal	3		I2
2	24V (Sensor)	4		
7	Photo-transistor external	5		I3
2	24V (Sensor)	6		
17	Conveyor belt forwards	7		Q1/Q2 (M1)
18	Conveyor belt backwards	8		
3.4	GND	9		reserved
2	9V (generated from 24V sensor)	10		
9	reserved	11		
10	reserved	12		
3.4	GND	13		Lights for light barrier
2	24V (Sensor)	14		
19	Motor horizontal towards rack	15		Q3/Q4 (M2)
20	Motor horizontal towards conveyor belt	16		
3.4	GND	17		Horizontal encoder power supply
2	24V (Sensor)	18		
11	A	19		Signal A
12	B	20		Signal B

	Header ST2			
8	Reference pushbutton vertical	1		I4
2	24V (Sensor)	2		
21	Vertical axis down	3		Q6/Q7 (M3)
22	Vertical axis up	4		
3.4	GND	5		Vertical encoder power supply
2	24V (Sensor)	6		
13	A	7		Signal A
14	B	8		Signal B
15	Reference pushbutton probe arm forward	9		I5
2	24V (Sensor)	10		
23	Probe arm forward	11		Q7/Q8 (M4)
24	Probe arm back	12		
16	Reference pushbutton probe arm rear	13		I6
2	24V (Sensor)	14		

red = power supply
yellow = Motor poles reversible via relay

Assignment plan for the multi-processing station with kiln (MPO)



Not shown: Q1, Q2, Q5, Q6, Q9, Q11, Q12, Q13, I4, I5, I6, I7

Terminal no. (ST1)	Function	Designation	Clamp SPS	I/O address S7-1500	Variable name S7-1500
1	Power supply (+) actuators	24V DC			
2	Power supply (+) sensors	24V DC			
3	Power supply (-)	0V			
4	Power supply (-)	0V			
5	Reference switch turntable (suction position)	I1	DI1.7	%I1.7	IX_MPO_RefSwitchTurnTable_PosVac_I1
6	Reference switch turntable (conveyor belt position)	I2	DI2.0	%I2.0	IX_MPO_RefSwitchTurnTable_PosBelt_I2
7	Light barrier end of conveyor belt	I3	DI2.1	%I2.1	IX_MPO_LightBarrierEndOfConBelt_I3
8	Reference switch turntable (saw position)	I4	DI2.2	%I2.2	IX_MPO_RefSwitchTurnTable_PosSaw_I4
9	Reference switch suction (turntable position)	I5	DI2.3	%I2.3	IX_MPO_RefSwitchVac_PosTurnTable_I5
10	Reference switch oven feeder inside	I6	DI2.4	%I2.4	IX_MPO_RefSwitchOvenFeederInside_I6
11	Reference switch oven feeder outside	I7	DI2.5	%I2.5	IX_MPO_RefSwitchOvenFeederOutside_I7
12	Reference switch vacuum (kiln position)	I8	DI2.6	%I2.6	IX_MPO_RefSwitchVac_PosOven_I8
13	Light barrier kiln	I9	DI2.7	%I2.7	IX_MPO_LightBarrierOven_I9
17	Turn motor turntable clockwise	Q1 (M1)	DO3.0	%Q3.0	QX_MPO_M1_TurnTableClockwise_Q1
18	Turn motor slewing ring anti-clockwise	Q2 (M1)	DO3.1	%Q3.1	QX_MPO_M1_TurnTableCounterclockwise_Q2
19	Conveyor belt motor forwards	Q3 (M2)	DO3.2	%Q3.2	QX_MPO_M2_ConveyorBeltForward_Q3
20	Motor saw	Q4 (M3)	DO3.3	%Q3.3	QX_MPO_M3_Saw_Q4
21	Retract oven feeder motor	Q5 (M4)	DO3.4	%Q3.4	QX_MPO_M4_OvenFeederRetract_Q5
22	Extend oven	Q6 (M4)	DO3.5	%Q3.5	QX_MPO_M4_OvenFeederExtend_Q6

	feeder motor				
23	Vacuum towards oven motor	Q7 (M5)	DO3.6	%Q3.6	QX_MPO_M5_VacuumTowardsOven_Q7
24	Vacuum towards turntable motor	Q8 (M5)	DO3.7	%Q3.7	QX_MPO_M5_VacuumTowardsTurnTable_Q8
25	Lamp kiln	Q9	DO4.0	%Q4.0	QX_MPO_LightOven_Q9
26	Compressor	Q10	DO4.1	%Q4.1	QX_MPO_Compressor_Q10
27	Valve vacuum	Q11	DO4.2	%Q4.2	QX_MPO_ValveVacuum_Q11
28	Valve lowering	Q12	DO4.3	%Q4.3	QX_MPO_ValveLowering_Q12
29	Valve kiln door	Q13	DO4.4	%Q4.4	QX_MPO_ValveOvenDoor_Q13
30	Valve feeder	Q14	DO4.5	%Q4.5	QX_MPO_ValveFeeder_Q14
31	PWM turntable	PWM (M1)	DO9.0	%QW23	QW_MPO_PWM_TurnTable_M1
32	PWM vacuum	PWM (M5)	DO9.1	%QW25	QW_MPO_PWM_Vacuum_M5

Model wiring

Terminal	Header ST1		Ribbon cable	Sensors + actuators on model
5	Turntable reference button	1		I1
2	24V (Sensor)	2		
6	Turntable reference button	3		I2
2	24V (Sensor)	4		
7	Light barrier end of conveyor belt	5		I3
2	24V (Sensor)	6		
17	Turn motor turntable clockwise	7		Q1/Q2 (M1)
18	Turn turntable anti-clockwise	8		
3.4	GND	9		
2	24V (Sensor)	10		Light barrier lamp
9	Vacuum reference button	11		I5
2	24V (Sensor)	12		
8	Turntable reference button pos. saw	13		I4
2	24V (Sensor)	14		
3.4	GND	15		Q3 (M2)
19	Conveyor belt	16		
3.4	GND	17		Q4 (M3)
20	Saw	18		
	not assigned	19		
	not assigned	20		

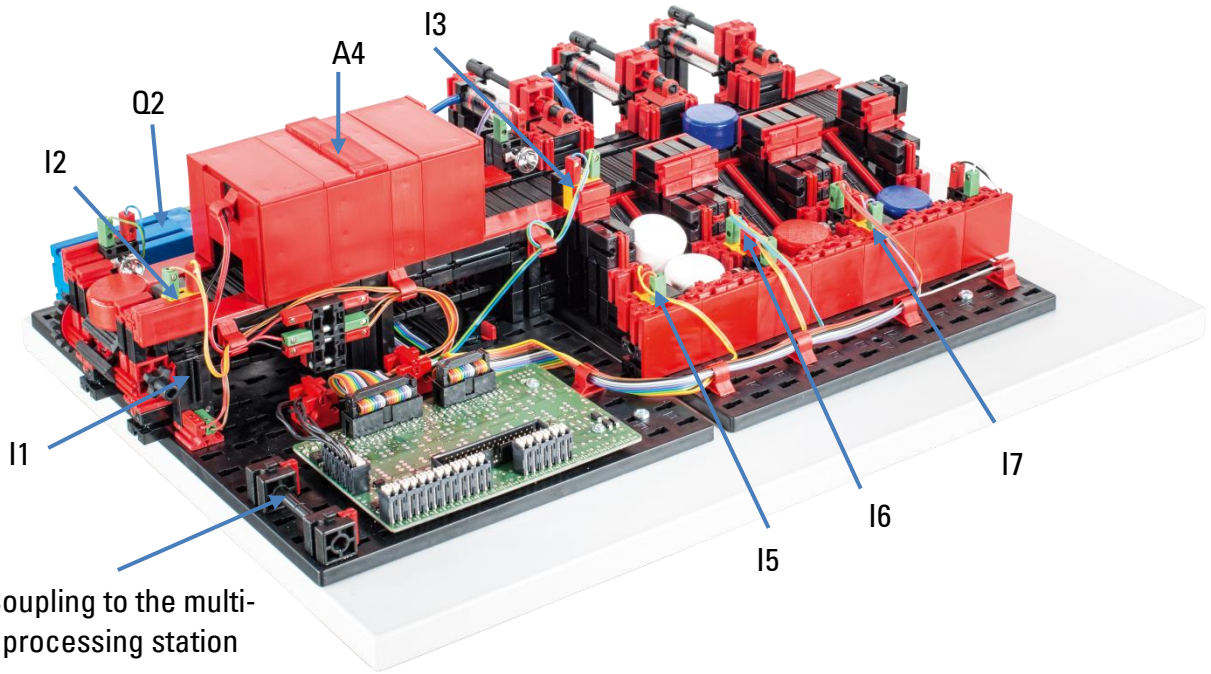
ST2

	not assigned	1		
	not assigned	2		
21	Retract oven feeder	3		Q5/Q6 (M4)
22	Extend oven feeder	4		
10	Oven feeder inside	5		I6
2	24V (Sensor)	6		
11	Oven feeder outside	7		I7
2	24V (Sensor)	8		
12	Vacuum on oven	9		I8
2	24V (Sensor)	10		
23	Vacuum to oven	11		Q7/Q8(M5)
24	Vacuum to turntable	12		
3.4	GND	13		Q9 (oven light
25	Lamp kiln	14		
3.4	GND	15		Q10 (compressor)
26	Compressor	16		
13	Oven light barrier	17		I9
2	24V (Sensor)	18		
3.4	GND	19		Light barrier lamp
2	24V (Sensor)	20		

3.4 27	Terminal V1	Q11 (Valve vacuum)
3.4 28	Terminal V2	Q12 (lower valve)
3.4 29	Terminal V3	Q13 (oven door valve)
3.4 30	Terminal V4	Q14 (feeder valve)

red = power supply
yellow = Motor poles reversible via relay

Assignment plan for the sorting line using colour recognition (SLD)



Not shown: Q1, Q3, Q4, Q5

Terminal no. (ST1)	Function	Designation	Clamp SPS	I/O address S7-1500	Variable name S7-1500
1	Power supply (+) actuators	24V DC			
2	Power supply (+) sensors	24V DC			
3	Power supply (-)	0V			
4	Power supply (-)	0V			
5	Pulse key	I1	DI3.0	%I3.0	IX_SLD_PulseCounter_I1
6	Light barrier input	I2	DI3.1	%I3.1	IX_SLD_LightBarrierInlet_I2
7	Light barrier after colour sensor	I3	DI3.2	%I3.2	IX_SLD_LightBarrierBehindColorSensor_I3
9	Colour sensor	A4 Analogue 0-10VDC	AI1.0	%IW7	IW_SLD_ColorSensor_A4
10	Light barrier white	I5	DI3.3	%I3.3	IX_SLD_LightBarrierWhite_I5
11	Light barrier red	I6	DI3.4	%I3.4	IX_SLD_LightBarrierRed_I6
12	Light barrier blue	I7	DI3.5	%I3.5	IX_SLD_LightBarrierBlue_I7
17	Motor conveyor belt	Q1	DO5.0	%Q5.0	QX_SLD_M1_ConveyorBelt_Q1
18	Compressor	Q2	DO5.1	%Q5.1	QX_SLD_Compressor_Q2
20	Valve first ejector (white)	Q3	DO5.2	%Q5.2	QX_SLD_ValveFirstEjectorWhite_Q3
21	Valve second ejector (red)	Q4	DO5.3	%Q5.3	QX_SLD_ValveSecondEjectorRed_Q4
22	Valve third ejector (blue)	Q5	DO5.4	%Q5.4	QX_SLD_ValveThirdEjectorBlue_Q5

Model wiring

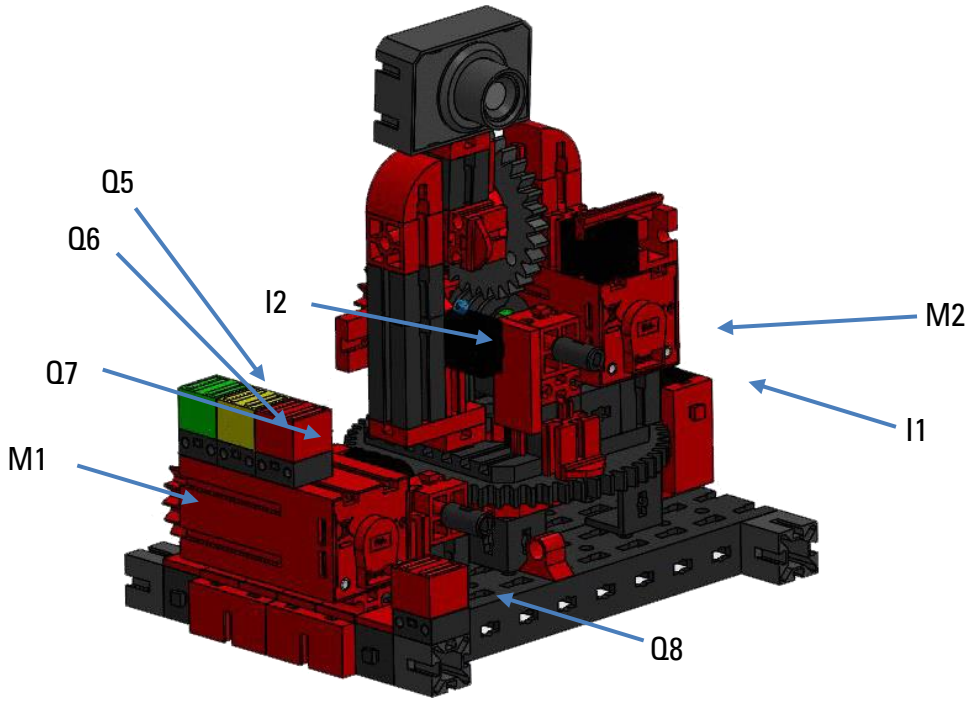
Terminal	Header ST1		Ribbon cable	Sensors + actuators model
5	Pulse key	1		I1
2	24V (Sensor)	2		
6	Light barrier input	3		I2
2	24V (Sensor)	4		
7	Light barrier after colour sensor	5		I3
2	24V (Sensor)	6		
3.4	GND	7		Q2 (compressor)
18	Compressor	8		
3.4	GND	9		Q1 (Conveyor belt)
17	Conveyor belt	10		
3.4	GND	11		Colour sensor (A4)
2	9V (generated from 24V)	12		
9	Colour sensor (0-10V)	13		
	not assigned	14		
3.4	GND	15		Light barrier lamp
2	24V (Sensor)	16		
3.4	GND	17		Light barrier lamp
2	24V (Sensor)	18		
	not assigned	19		
	not assigned	20		

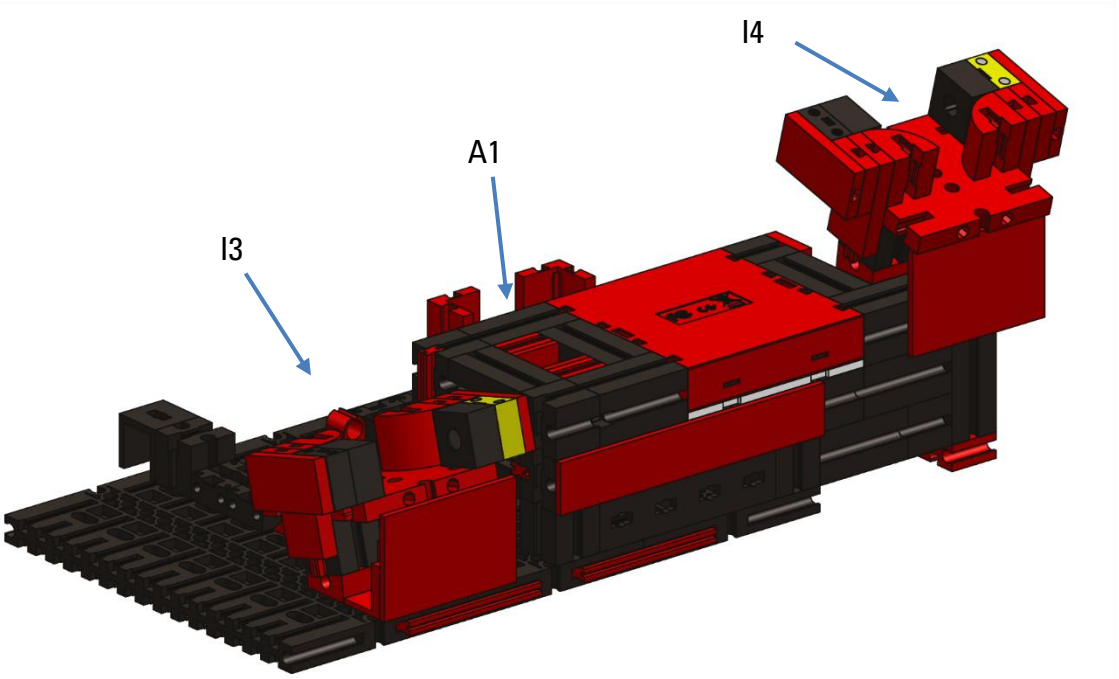
	Header ST2			
	not assigned	1		
	not assigned	2		
10	Light barrier white	3		I5
2	24V (Sensor)	4		
12	Light barrier blue	5		I7
2	24V (Sensor)	6		
11	Light barrier red	7		I6
2	24V (Sensor)	8		
3.4	GND	9		Light barrier lamp
2	24V (Sensor)	10		
3.4	GND	11		Light barrier lamp
2	24V (Sensor)	12		
3.4	GND	13		Light barrier lamp
2	24V (Sensor)	14		

3.4 20	Terminal V1	Q3 (Valve first ejector, white)
3.4 21	Terminal V2	Q4 (Valve second ejector, red)
3.4 22	Terminal V3	Q5 (Valve third ejector, blue)

red = power supply

Assignment plan for sensor station with surveillance camera (SSC)





Environmental sensor Photo-resistor

The NFC reader is connected to the TXT controller via the I²C interface.
The mounted surveillance camera is connected to the TXT Controller via a USB interface.
Data from the environmental sensor and photo-resistor is also read in by the TXT Controller.

TXT-Controller (TxtGatewayPLC)

Terminal no. (ST1)	Function	Designation	Clamp SPS	I/O address S7-1500	Variable name S7-1500
1	Power supply (+) actuators	24V DC			
2	Power supply (+) sensors	24V DC			
3	Power supply (-)	0V			
4	Power supply (-)	0V			
5	Reference switch 1	I1	DI4.0	%I4.0	IX_SSC_RefSwitchVerticalAxis_I1
6	Reference switch 2	I2	DI4.1	%I4.1	IX_SSC_RefSwitchHorizontalAxis_I2
7	Light barrier outsourcing	I3	DI4.2	%I4.3	IX_SSC_LightBarrierStorage_I3
8	Light barrier storage	I4	DI4.3	%I4.2	IX_SSC_LightBarrierOutsourcing_I4
9	Colour sensor	A1 Analogue 0-10VDC	AI1.1	%IW9	IW_SSC_ColorSensor_A1
11	Encoder vertical pulse 1	B1	DI5.3	%I5.3	IX_SSC_EncoderVerticalAxisImp1_B1
12	Encoder vertical pulse 2	B2	DI5.7	%I5.7	IX_SSC_EncoderVerticalAxisImp2_B2
13	Encoder horizontal pulse 1	B3	DI6.3	%I6.3	IX_SSC_EncoderHorizontalAxisImp1_B3
14	Encoder horizontal pulse 2	B4	DI6.7	%I6.7	IX_SSC_EncoderHorizontalAxisImp2_B4
19	Vertical motor up	Q1 (M1)	DO6.0	%Q6.0	QX_SSC_M1_VerticalAxisUp_Q1
20	Vertical motor down	Q2 (M1)	DO6.1	%Q6.1	QX_SSC_M1_VerticalAxisDown_Q2
21	Turn motor anti-clockwise	Q4 (M2)	DO6.2	%Q6.2	QX_SSC_M2_HorizontalAxisCounter clockwise_Q4
22	Turn motor clockwise	Q3 (M2)	DO6.3	%Q6.3	QX_SSC_M2_HorizontalAxisClockwise_Q3
23	LED green	Q5	DO6.4	%Q6.4	QX_SSC_LED_Green_Q5
24	LED yellow	Q6	DO6.5	%Q6.5	QX_SSC_LED_Yellow_Q6
25	LED red	Q7	DO6.6	%Q6.6	QX_SSC_LED_Red_Q7
26	LED red online status	Q8	DO6.7	%Q6.7	QX_SSC_LED_Red_Online_Q8
27	PWM vertical	PWM (M1)	DO9.2	%QW27	QW_SSC_PWM_Vertical_M1
28	PWM cantilever	PWM (M2)	DO9.3	%QW29	QW_SSC_PWM_Horizontal_M2

Model wiring

Stiftleiste ST1

Klemme			Flachbandkabel	Sensoren/Aktoren am Modell
5	Referenz Kamera vertikal	1		I1
2	24V (Sensor)	2		
19	Kamera hoch	3		Q1/Q2 (M1)
20	Kamera runter	4		
3,4	GND	5		Encoder vertikal
2	24V (Sensor)	6		Spannungsversorgung
11	A	7		Signal A
12	B	8		Signal B
6	Referenz Kamera horizontal	9		I2
2	24V (Sensor)	10		

Stiftleiste ST2

21	Kamera links	1		Q3/Q4(M2)
22	Kamera rechts	2		
3,4	GND	3		Encoder horizontal
2	24V (Sensor)	4		Spannungsversorgung
13	A	5		Signal A
14	B	6		Signal B
3,4	GND	7		Q5 LED grün
23	LED grün	8		
3,4	GND	9		Q6 LED gelb
24	LED gelb	10		
3,4	GND	11		Q7 LED rot
25	LED rot	12		
3,4	GND	13		Q8 LED rot (Kamera)
26	LED rot(Kamera)	14		

Stiftleiste ST3

3,4	GND	1		Spannungsversorgung Farbsensor
2	9V (Aus 24V Sensor erzeugt)	2		
7	Lichtschranke Auslagerung	3		I3
2	24V (Sensor)	4		
3,4	GND	5		Lampen für Lichtschranke
2	24V (Sensor)	6		
8	Lichtschranke Einlagerung	7		I4
2	24V (Sensor)	8		
9	Farbsensor	9		I5
	nicht belegt	10		-