

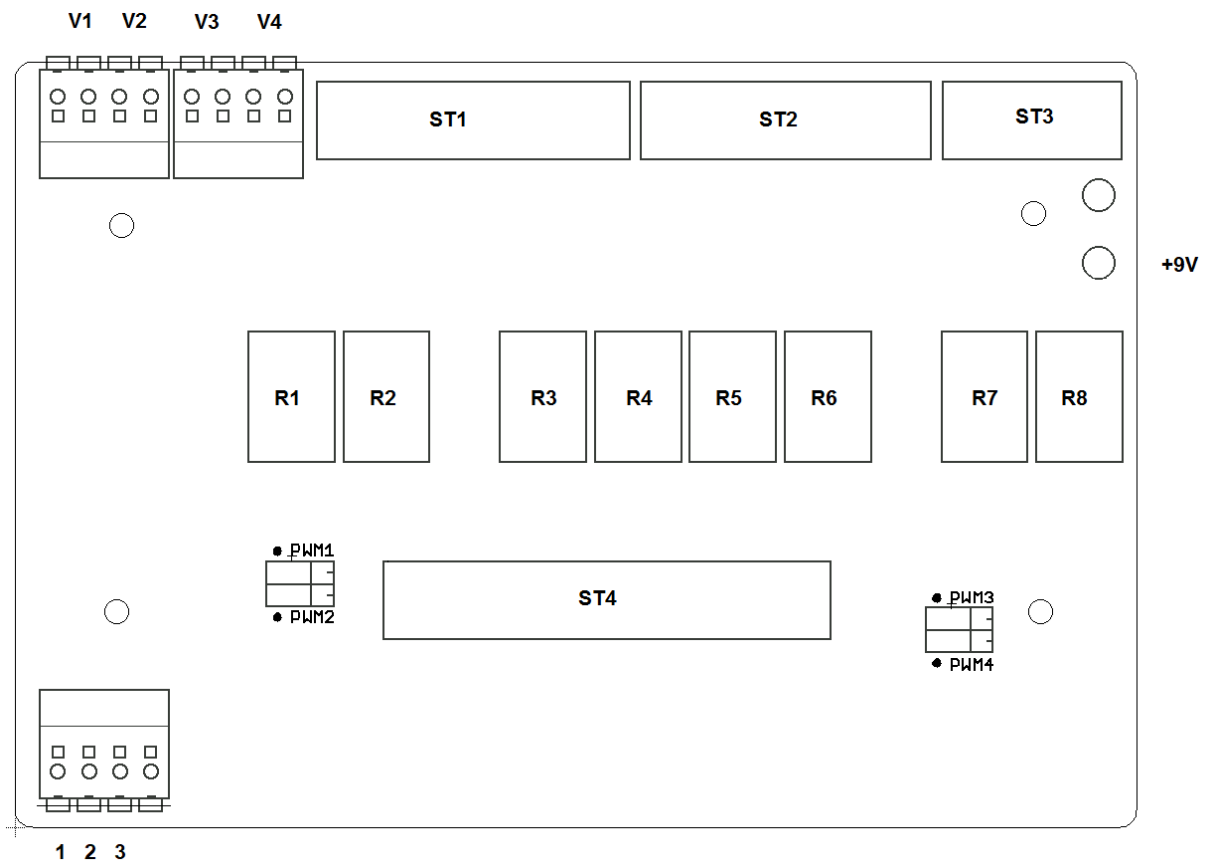
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Version: 09-2024

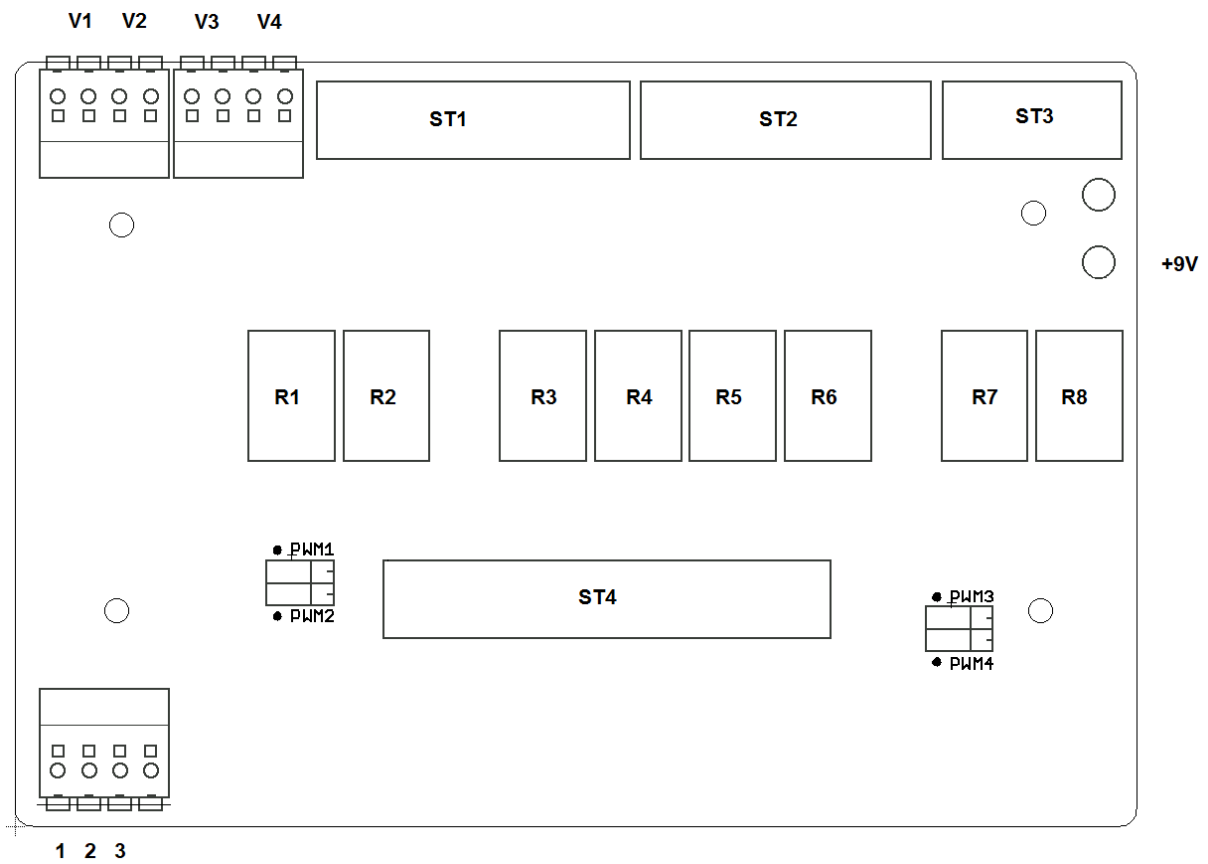
Assignment plans

Overview



	High-bay warehouse		Milling station / Drilling station	Quality assurance with AI	Delivery and Pickup Station	Hardening Furnace
	Robot	Warehouse				
R1/R2	Suction cup up/down	X	Conveyor belt	X	X	Suction cup forward / backward
R3/R4	X	Horizontal	Suction cup forward / backward	Suction cup forward / backward	Up/down	X
R5/R6	Turning	Vertical	X	Conveyor belt	Left/right	X
R7/R8	X	Slider	X	X	X	X
V1	X	X	X	X	X	Vacuum
V2	X	X	Suction cup up/down	X	X	Suction cup up/down
V3	X	X	Vacuum	Suction cup up/down	X	Door
V4	Vacuum	X	X	Vacuum	X	X
ST1	10-pin.	10-pin.	16-pin.	10-pin.	10-pin.	14-pol.
ST2	14-pin.	14-pin.	10-pin.	14-pin.	14-pin.	10-pol.
ST3	X	X	X	X	10-pin.	X
R = Relay, V = Valves, ST = Connection for ribbon cable						

High-bay warehouse



Board 1: Bearing
ST1

not used	1		
not used	2		
Horizontal axis left/right	3		Q1/Q2(M1)
	4		PWM:Q7
GND	5		Encoder power supply
24V(sensor)	6		
Encocder left/right	7		B1/B2
	8		
not used	9		
not used	10		

ST2

Button Ref. up/down	1		I1
24V(sensor)	2		
Vertical axis up/down	3		Q3/Q4(M2) PWM:Q8
	4		
GND	5		Encoder power supply
24V(sensor)	6		
Encocder up/down	7		B3/B4
	8		
Front RBG button	9		I2
24V(sensor)	10		
RBG forward/backward	11		Q5/Q6(M3) PWM:Q9
	12		
RBG rear	13		I3
24V(sensor)	14		

* RBG: storage and retrieval machine

Terminal V1		not used
Terminal V2		not used
Terminal V3		not used
Terminal V4		not used

ST4		PLC S7-1215 (with extension module)	
1			
2			
3			
4			
5			
6			
7			
8	Ref.vertical	I1	Dla.0
9			
10			
11	Horizontal encoder: A	B1	Dla.1
12	Horizontal encoder: B	B2	Dla.2
13	Vertical encoder: A	B3	Dla.3
14	Encoder vertical: B	B4	Dla.4
15	RBG front	I2	Dla.5
16	RBG rear	I3	Dla.6
17			
18			
19	Horizontal axis to the shelf	Q1	DQa.0
20	Horizontal axis to the robot	Q2	DQa.1
21	Vertical axis down	Q3	DQa.2
22	Vertical axis up	Q4	DQa.3
23	RBG before	Q5	DQa.4
24	RBG back	Q6	DQa.5
25			
26	PWM horizontal	Q7	DQa.6
27	PWM vertical	Q8	DQa.7
28	PWM RBG	Q9	Ext DQa.6
29			
30			
31			
32			
33			
34			

* RBG: storage and retrieval machine

Board 2: Robot

ST1

Top button (suction cup)	1		I4
24V(sensor)	2		
Center button (suction cup)	3		I5
24V(sensor)	4		
Bottom button (suction cup)	5		I6
24V(sensor)	6		
Suction cup up/down	7		Q10/Q11(M4) PWM:Q17
	8		
not used	9		
not used	10		

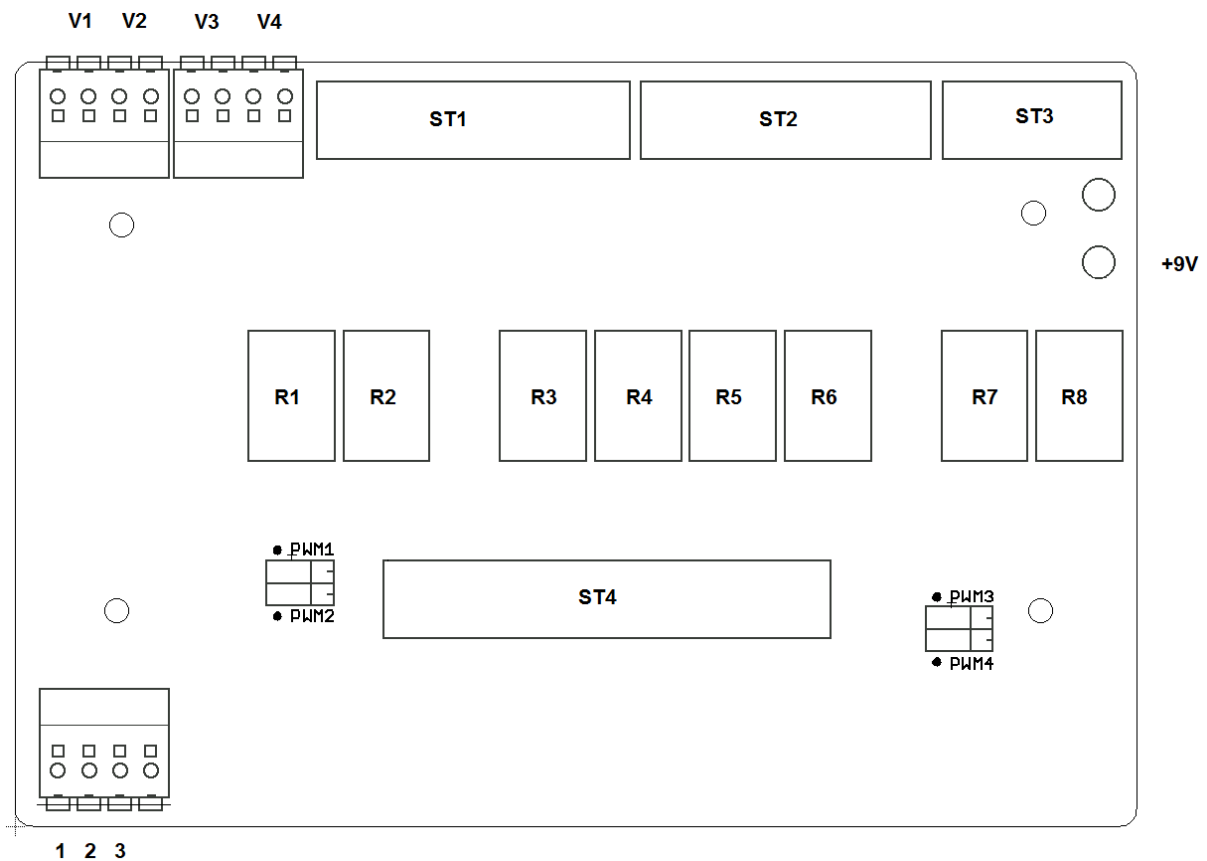
ST2

Push-button Ref. rotary axis	1		I7
24V(sensor)	2		
Rotation left/right	3		Q12/Q13(M5) PWM:Q16
	4		
GND	5		Encoder power supply
24V(sensor)	6		
Encocder left/right	7		B5/B6
	8		
Button ref. horizontal	9		I8
24V(sensor)	10		
GND	11		LED centering
24V(sensor)	12		
GND	13		Q15
Compressor	14		

Terminal V1		not used
Terminal V2		not used
Terminal V3		not used
Terminal V4		Q14 (valve) Vacuum

ST4		PLC S7-1215 (with extension module)	
1			
2			
3			
4			
5	Suction cup top	I4	Dla.7
6	Suction cup center	I5	Dlb.0
7	Suction cup bottom	I6	Dlb.1
8	Ref. rotation	I7	Dlb.2
9			
10			
11			
12			
13	Encoder rotation A	B5	Dlb.3
14	Encoder rotation B	B6	Dlb.4
15	Ref. horizontal	I8	Dlb.5
16			
17	Suction cup high	Q10	Ext DQa.0
18	Suction cup down	Q11	Ext DQa.1
19			
20			
21	Rotation left	Q12	Ext DQa.2
22	Turn right	Q13	Ext DQa.3
23			
24	Valve (vacuum)	Q14	Ext DQa.4
25	Compressor	Q15	Ext DQa.5
26			
27	PWM rotation	Q16	DQb.0
28			
29			
30			
31	PWM suction cup up/down	Q17	DQb.1
32			
33			
34			

Drilling station & milling station



ST1

Light barrier input	1		I1
24V(sensor)	2		
Light barrier processing	3		I2
24V(sensor)	4		
Suction cup button inside	5		I3
24V(sensor)	6		
Tape in	7		Q1/Q2 (M1)
Band out	8		PWM:Q9
not used	9		
not used	10		
GND	11		LED centering
24V(sensor)	12		
External suction cup button	13		I4
24V(sensor)	14		
Clean suction cup	15		Q3/Q4(M2)
Suction cup out	16		PWM:Q10

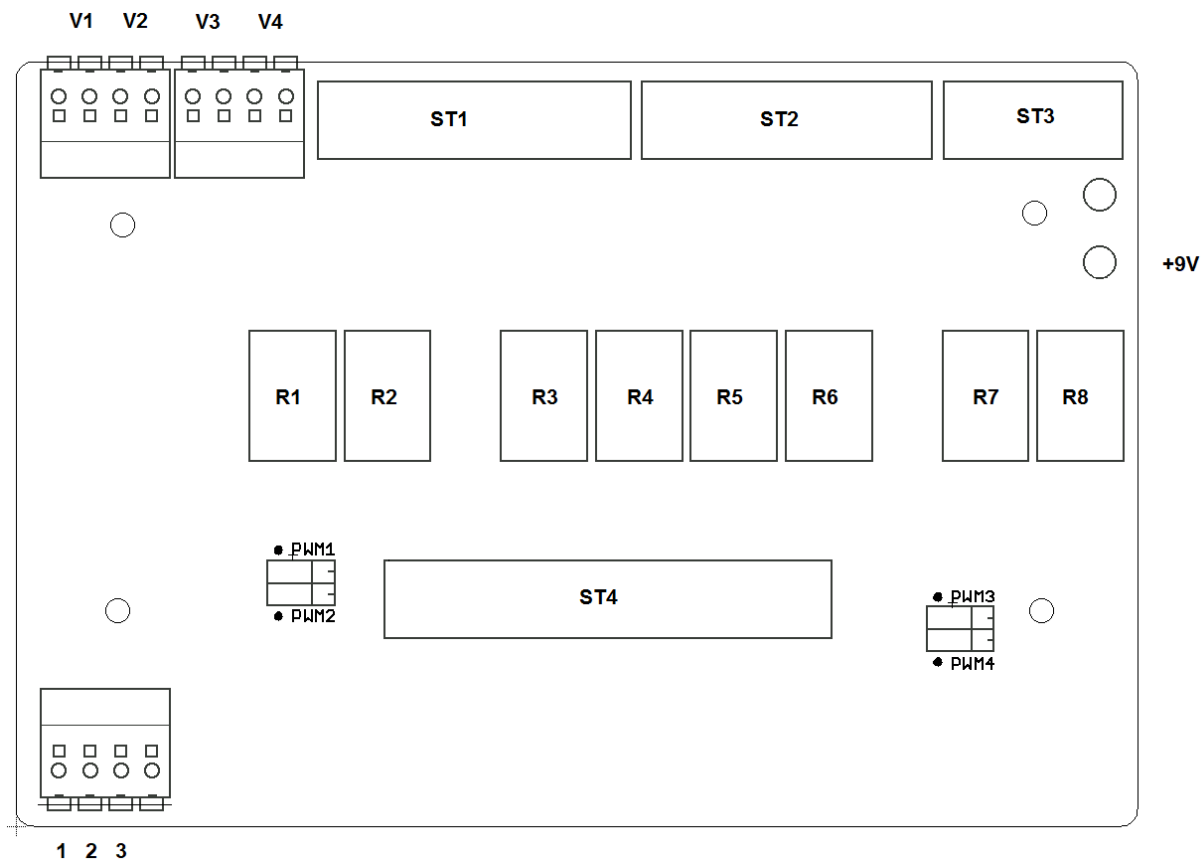
ST2

GND	1		Q7
Compressor	2		
GND	3		Q8
Drill / router	4		
GND	5		LED light barrier
24V(sensor)	6		
GND	7		LED light barrier
24V(sensor)	8		
not used	9		
not used	10		

Terminal V1		not used
Terminal V2		Q5 (valve) Suction cup up/down
Terminal V3		Q6 (valve) Vacuum
Terminal V4		not used

ST4 (connection cable to the PLC)		PLC S7-1215	
1			
2			
3			
4			
5	Light barrier input	I1	Dla.0
6	Light barrier processing	I2	Dla.1
7	Suction cup inside	I3	Dla.2
8	Suction cup outside	I4	Dla.3
9			
10			
11			
12			
13			
14			
15			
16			
17	Tape in	Q1	DQa.0
18	Band out	Q2	DQa.1
19	Clean suction cup	Q3	DQa.2
20	Suction cup out	Q4	DQa.3
21	Valve: Suction cup up/down	Q5	DQa.4
22	Valve: Vacuum	Q6	DQa.5
23	Compressor	Q7	DQa.6
24	Milling machine	Q8	DQa.7
25	PWM band	Q9	DQb.0
26	PWM suction cup	Q10	DQb.1
27			
28			
29			
30			
31			
32			
33			
34			

Quality assurance with AI



ST1

External suction cup button	1		I3
24V(sensor)	2		
Suction cup button inside	3		I2
24V(sensor)	4		
Suction cup in/out	5		Q1/Q2(M1) PWM:Q7
	6		
GND	7		LED light barrier
24V(sensor)	8		
not used	9		
not used	10		

ST2

Light barrier input	1		I1
24V(sensor)	2		
Belt in/out	3		Q3/Q4(M2)
	4		PWM:Q8
GND	5		Encoder power supply
24V(sensor)	6		
Encoder tape	7		B1/B2
	8		
GND	9		Q5
Compressor	10		
GND	11		Q6
Reserve	12		
GND	13		LED centering
24V(sensor)	14		

Terminal V1		not used
Terminal V2		not used
Terminal V3		Q9 (valve) Suction cup up/down
Terminal V4		Q10 (valve) Vacuum

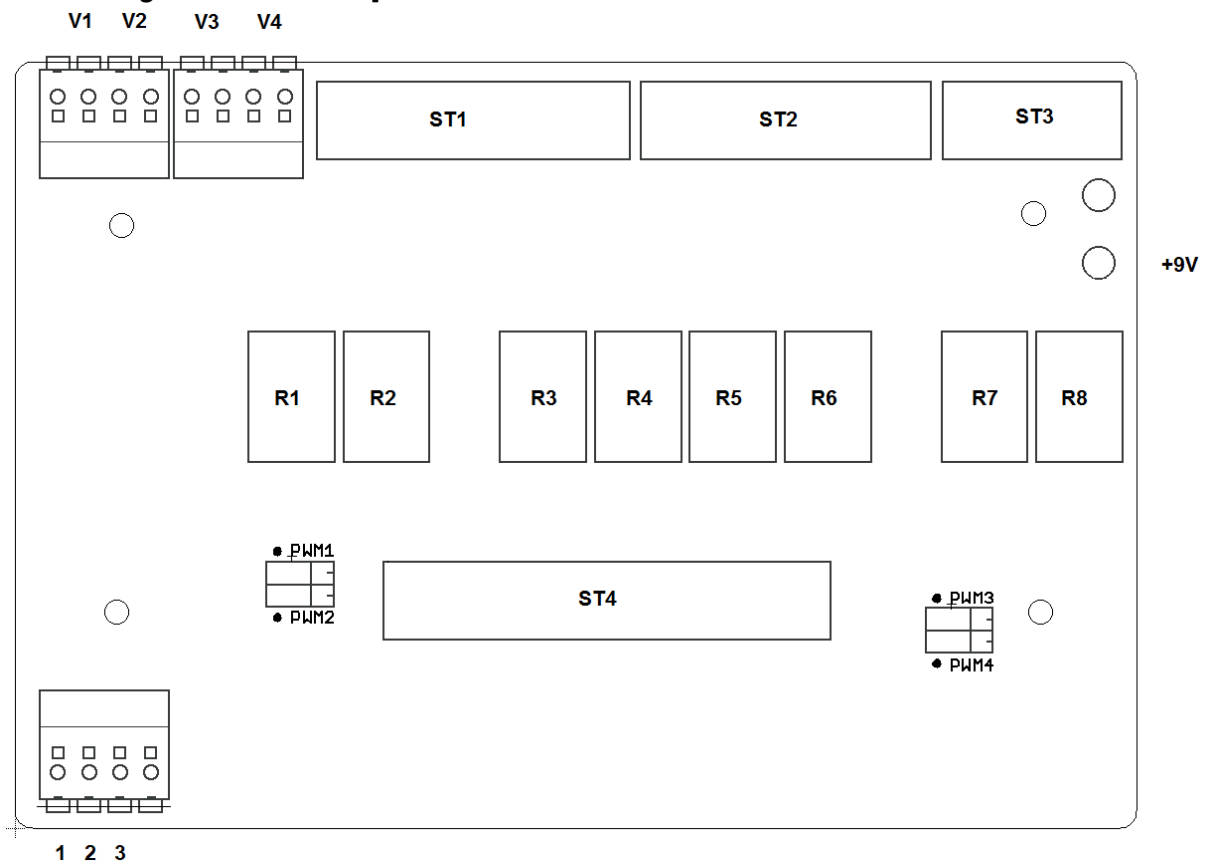
	Cable color	TXT4.0	Plug color
Power supply TXT (+9V)		GND IN	
		+9V IN	
Camera lighting		GND	
		O4	

ST4 (connection cable to the PLC)

PLC
S7-1215

1			
2			
3			
4			
5			
6			
7	Light barrier input	I1	Dla.0
8	Suction cup inside	I2	Dla.1
9	Suction cup outside	I3	Dla.2
10			
11			
12			
13	Encoder A	B1	Dla.3
14	Encoder B	B2	Dla.4
15			
16			
17			
18			
19	Clean suction cup	Q1	DQa.0
20	Suction cup out	Q2	DQa.1
21	Tape in	Q3	DQa.2
22	Band out	Q4	DQa.3
23	Compressor	Q5	DQa.4
24	Reserve	Q6	DQa.5
25			
26			
27	PWM suction cup	Q7	DQa.6
28	PWM band	Q8	DQa.7
29	Suction cup valve up/down	Q9	DQb.0
30	Vacuum valve	Q10	DQb.1
31			
32			
33			
34			

Delivery and Pickup Station



ST1

Button ref. camera up/down	1		I1
24V(sensor)	2		
Camera up/down	3		Q1/Q2(M1)
	4		PWM:Q9
GND	5		Encoder power supply
24V(sensor)	6		
Encocder up/down	7		B1/B2
	8		
Button ref. camera left/right	9		I2
24V(sensor)	10		

ST2

Camera left/right	1		Q3/Q4(M2) PWM:Q10
	2		
GND	3		Encoder power supply
24V(sensor)	4		
Encocder left/right	5		B3/B4
	6		
GND	7		Q5
LED green	8		
GND	9		Q6
LED yellow	10		
GND	11		Q7
LED red	12		
GND	13		Q8
LED red (online)	14		

ST3

GND	1		
not used	2		
Light barrier retrieval	3		I3
24V(sensor)	4		
GND	5		LED light barrier
24V(sensor)	6		
Light barrier storage	7		I4
24V(sensor)	8		
Color sensor (analog)	9		A1
not used	10		

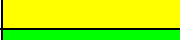
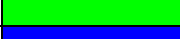
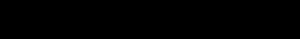
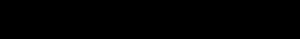
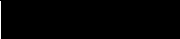
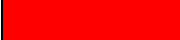
Terminal V1		not used
Terminal V2		not used
Terminal V3		not used
Terminal V4		not used

ST4

1			
2			
3			
4			
5	Ref. camera up/down	I1	Dla.0
6	Ref. camera left/right	I2	Dla.1
7	Light barrier retrieval	I3	Dla.2
8	Light barrier storage	I4	Dla.3
9	Color sensor	A1	Al.0
10			
11	Encoder A (up/down)	B1	Dla.4
12	Encoder B (up/down)	B2	Dla.5
13	Encoder A (left/right)	B3	Dla.6
14	Encoder B (left/right)	B4	Dla.7
15			
16			
17			
18			
19	Camera up	Q1	DQa.0
20	Camera down	Q2	DQa.1
21	Camera left	Q3	DQa.2
22	Camera right	Q4	DQa.3
23	LED green	Q5	DQa.4
24	LED yellow	Q6	DQa.5
25	LED red	Q7	DQa.6
26	LED red(Online)	Q8	DQa.7
27	PWM up/down	Q9	DQb.0
28	PWM left/right	Q10	DQb.1
29			
30			
31			
32			
33			
34			

6-axis robot wiring (9V)

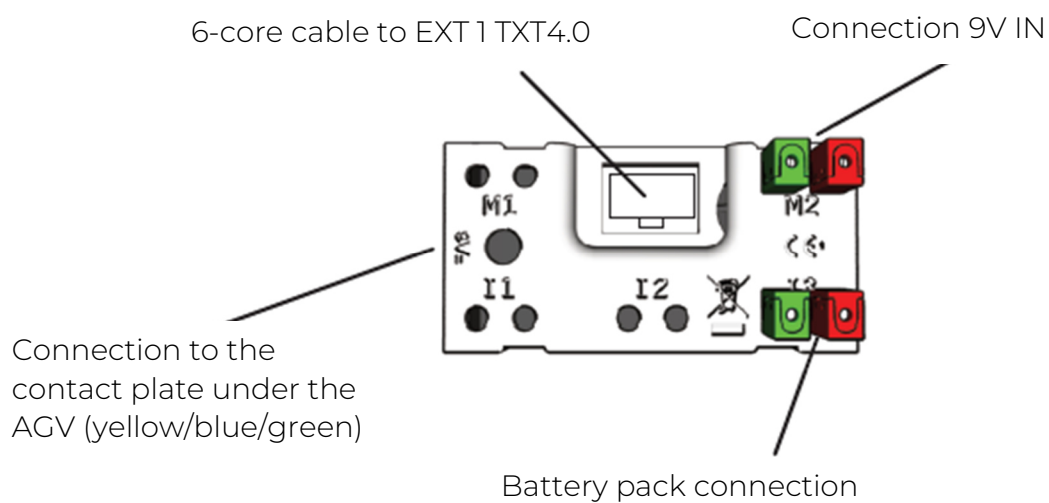
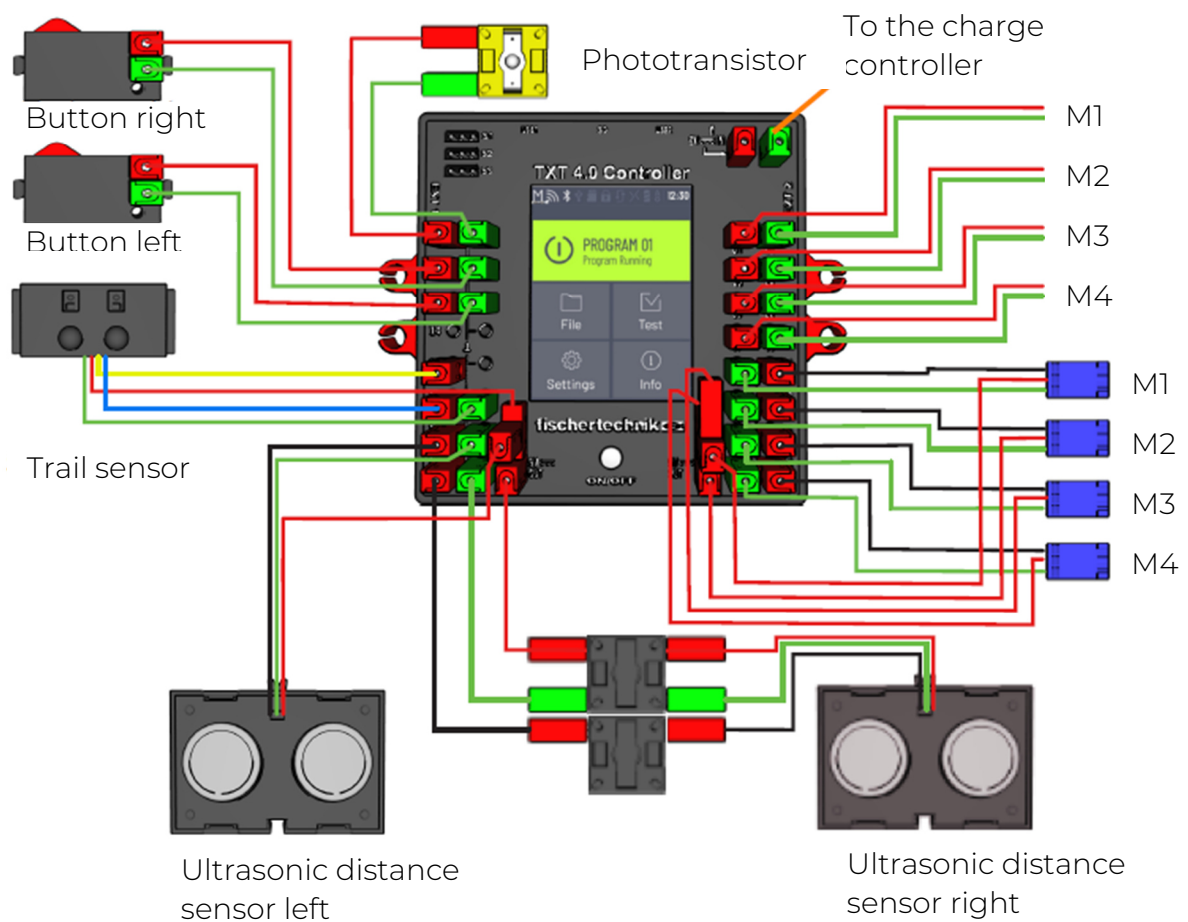
	Cable 1: 10-core					Extension (encoder)
		Cable color	TXT4.0	Plug color		Cable color
Encoder GND	1		GND			
Encoder +9V	2		+9V			
not used	3					
Encoder signal	4		C1			
Motor axis 1	5		O2			
	6		O1			
Axis 1 reference button	7		GND			
	8		I1			
Compressor	9		GND			
	10		O7			

	Cable 2: 14-core					
		Cable color	TXT4.0	Plug color		
Reference button axis 2	1		GND			
	2		I2			
Motor axis 2	3		O4			Extension (encoder)
	4		O3			Cable color
Encoder GND	5		GND			
Encoder +9V	6		+9V			
Encoder signal (axis 2)	7		C2			
Encoder signal (axis 3)	8		C3			
Encoder GND	9		GND			
Encoder +9V	10		+9V			
Motor axis 3	11		O6			
	12		O5			
Axis 3 reference button	13		GND			
	14		I3			

		Cable color	TXT4.0	Plug color
Valve			GND	
			O8	
Color sensor power supply			GND	
			+9V	
Light sensor			GND	
			I4	

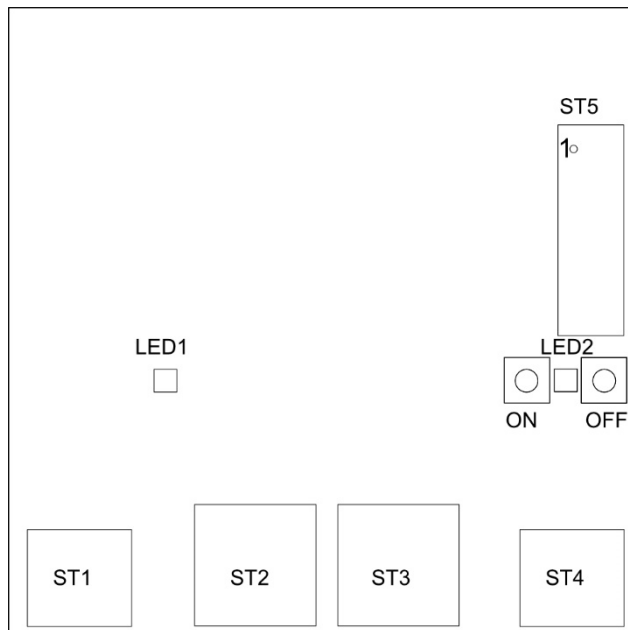
		Cable color	TXT4.0
Servo axis 4			S1
Servo axis 5			S2
Servo axis 6			S3
NFC reader (I ² C)		6-wire	EXT1
Environmental sensor		6-wire	EXT2

AGV (9V) / Add On AGV (9V)



Power / LAN board - Standard

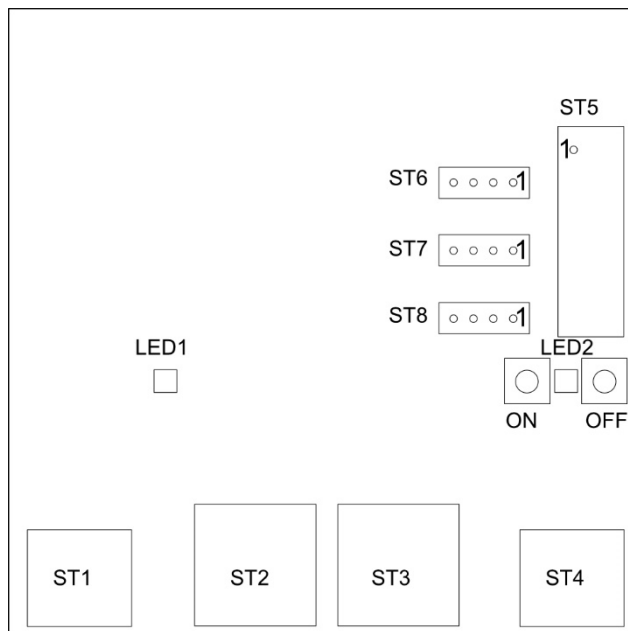
High-bay warehouse, milling station, drilling station, quality assurance with AI



LED1		
	green	Supply voltage is present, polarity correct
	red	Supply voltage polarity is incorrect (+/- reversed)
LED2		
	blue	Supply voltage for PLC is switched on
	red	Supply voltage for PLC is switched off
ST1		Supply voltage connection (ST1 and ST4 are bridged)
ST4		
ST2		Network connection (goes to switch)
ST3		Network connection (goes to switch)

ST5		SPS supply
Pin		
1		+ 24V
2		Mass
3		Mass
4		Mass
5		Mass
6		Mass
7		+ 24V
8		Mass
9		+ 24V
10		Mass
11		+ 24V
12		+ 24V
13		Mass
14		+ 24V
15		+ 24V
16		Mass

Power / LAN board - Goods input / output

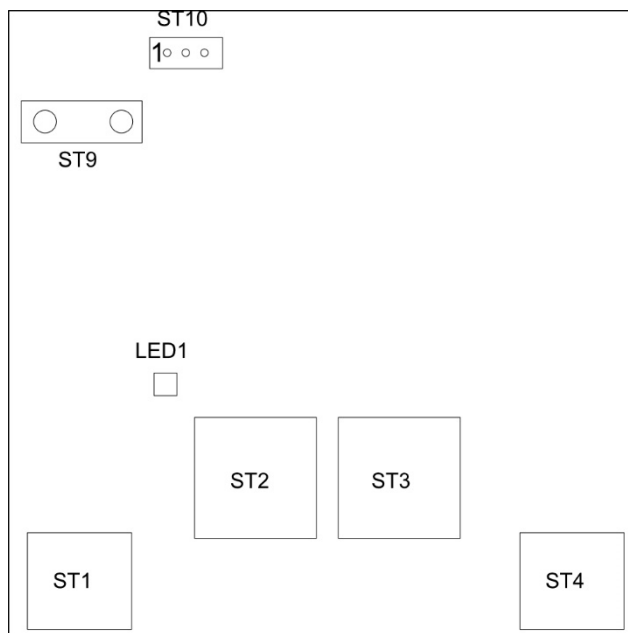


LED1		
	green	Supply voltage is present, polarity correct
	red	Supply voltage polarity is incorrect (+/- reversed)
LED2		
	blue	Supply voltage for PLC is switched on
	red	Supply voltage for PLC is switched off
ST1		Supply voltage connection (ST1 and ST4 are bridged)
ST4		
ST2		Network connection (goes to switch)
ST3		Network connection (goes to switch)

ST5		SPS supply
Pin		
1		+ 24V
2		Mass
3		Mass
4		Mass
5		Mass
6		Mass
7		+ 24V
8		Mass
9		+ 24V
10		Mass
11		+ 24V
12		+ 24V
13		Mass
14		+ 24V
15		+ 24V
16		Mass

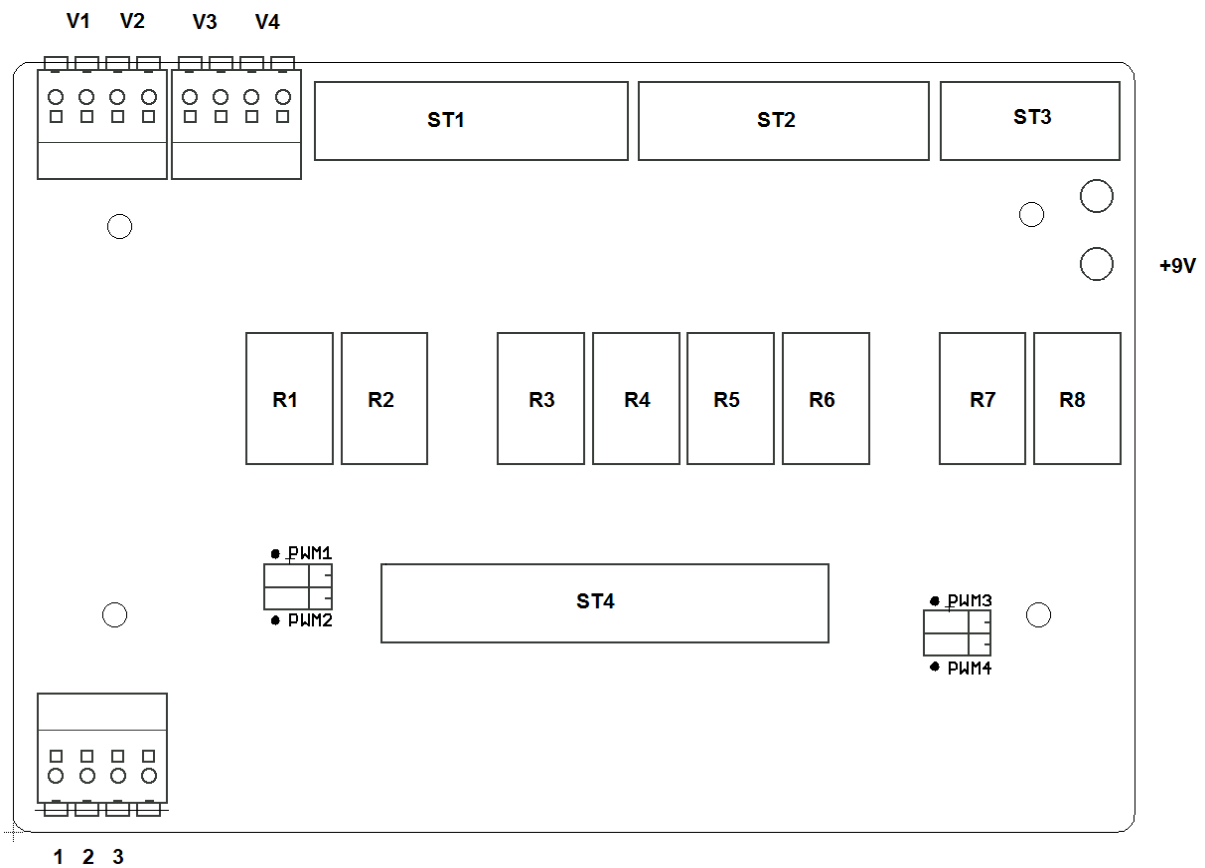
ST6		Supply TXT / Switch / Router
	1	+9 Volt
	2	+5 Volt
	3	GND
	4	GND
ST7		Supply TXT / Switch / Router
	1	+9 Volt
	2	+5 Volt
	3	GND
	4	GND
ST8		Supply TXT / Switch / Router
	1	+9 Volt
	2	+5 Volt
	3	GND
	4	GND

Power / LAN board - Charging station



LED1		
	green	Supply voltage is present, polarity correct
	red	Supply voltage polarity is incorrect (+/- reversed)
ST1		Supply voltage connection (ST1 and ST4 are bridged)
ST4		
ST2		Network connection (ST2+ST3 bridged)
ST3		Network connection (ST2+ST3 bridged)
ST9		Charger connection
ST10		Supply charging plate for AGVs
	1	+ charger
	2	- Charger
	3	+9V for TXT in the FTS during charging

Add On Annealing Furnace



ST1

Front suction button	1		I1
24V(Sensor)	2		
Rear suction button	3		I2
24V(Sensor)	4		
Light barrier entrance	5		I3
24V(Sensor)	6		
Suction cup back	7		Q1/Q2 (M1)
Suction cup forward	8		PWM:Q10
GND	9		LED Centering
24V(Sensor)	10		
Pushbutton furnace slide outside	11		I5
24V(Sensor)	12		
Pushbutton furnace slide inside	13		I4
24V(Sensor)	14		

ST2

GND	1		Q3
Valve Annealing furnace gate Valve back	2		

GND	3		Q4
Valve furnace gate forward	4		
GND	5		Q5
Compressor	6		
GND	7		Q6
LED furnace	8		
not used	9		
not used	10		

Clamp V1		Q7 (Valve) Vacuum
Clamp V2		Q8 (Valve) Suction down
Clamp V3		Q9 (Valve) Annealing furnace door
Clamp V4		not used

ST4 (Connection cable to PLC) PLC S7-1215

1			
2			
3			
4			
5	Suction cup forward	I1	Dla.0
6	Suction cup back	I2	Dla.1
7	Light barrier	I3	Dla.2
8	Annealing furnace slide inside	I4	Dla.3
9	Annealing furnace slide outside	I5	Dla.4
10			
11			
12			
13			
14			
15			
16			
17	Suction cup forward	Q1	DQa.0
18	Suction cup backward	Q2	DQa.1

19			
20			
21			
22			
23	Annealing furnace slide backward	Q3	DQa.2
24	Annealing furnace slide forward	Q4	DQa.3
25	Compressor	Q5	DQa.4
26	LED furnace	Q6	DQa.5
27	Vacuum	Q7	DQa.6
28	Suction cup down	Q8	DQa.7
29	Annealing furnace door	Q9	DQb.0
30			
31	PWM Suction cup in/out	Q10	DQb.1
32			
33			
34			