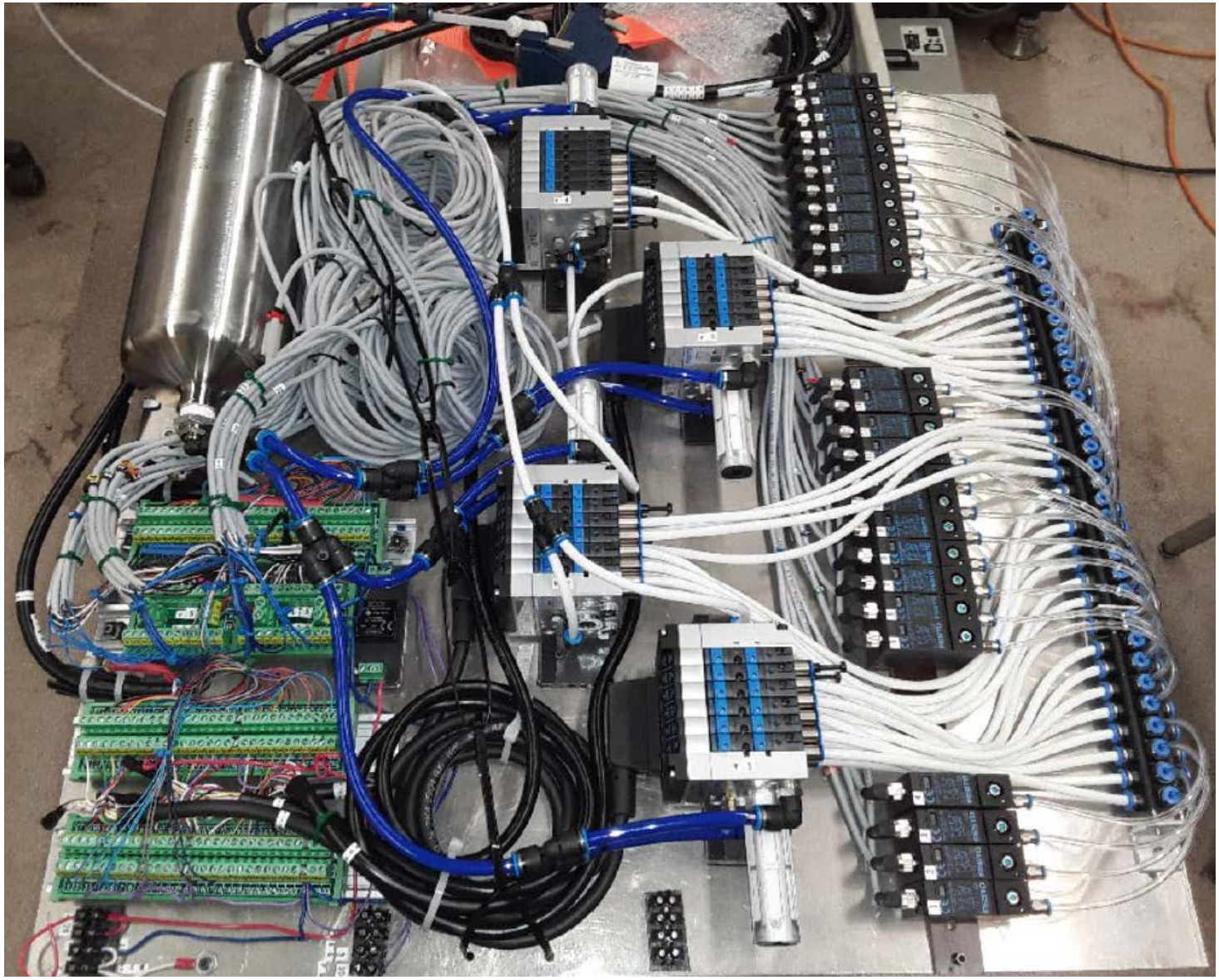
Valves and Sensors electric connection

TTU

09/14/20

Vacuum board with Valve Manifolds (V1, V2, V3, V4) and Vacuum Sensors (26) assembled



Vacuum Valve Manifolds (V1, V2, V3, V4) and Vacuum Sensors (26) Connection

NI9403 cable

Vac. Sensors p.4

Vac. Sensors p.1&2

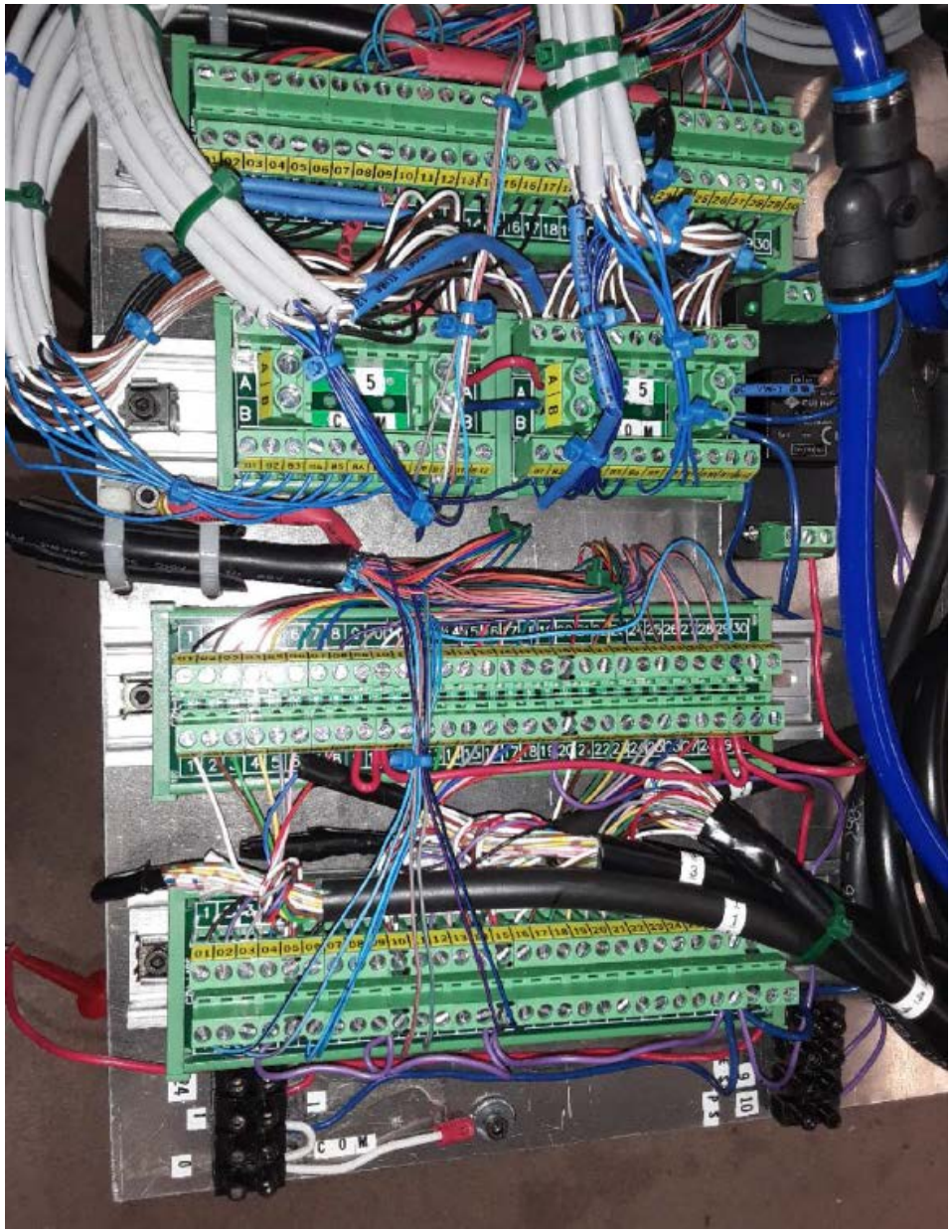
Vac. Sensors p.3

NI9476 cable

Valves 1-8 of V1,V2,V3

Valves 9-12 of V1,V2,V3
Valves 1-12 of V4

NI9476 cable 30,31,32,33,34 ,35,36,37



TERMINAL 3-1

TERMINAL 3-2

TERMINAL A

TERMINAL B

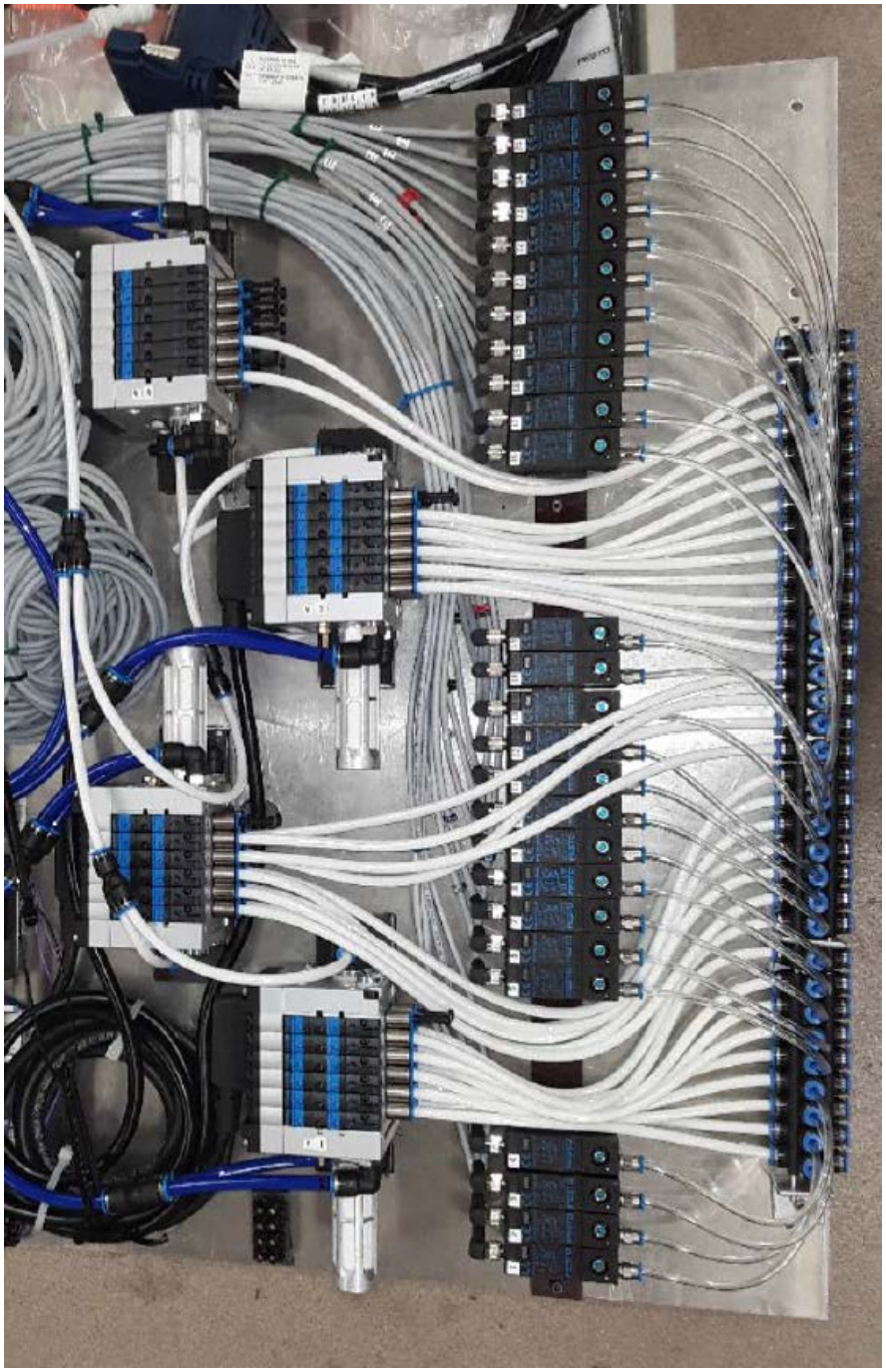
← Power Supply +5V

TERMINAL 1-1

TERMINAL 1-2

TERMINAL 2-1

TERMINAL 2-2



Tee fitting	Valve #	Vacuum Sensor #	Vac Tubes Connection
1	V1-1	S1	Vac Sensor Tray 1
2	V1-2	S2	Vac Base Plate Tray 1
3	V1-3	S3	Vac Sensor 1
4	V1-4	S4	Vac Sensor 2
5	V1-5	S5	Vac Base Plate 1
6	V1-6	S6	Vac Base Plate 2
7	V1-7	S7	Vac Pickup Tool 1
8	V1-8	S8	Vac Pickup Tool 2
9	V1-9	S9	Vac Gantry Head Tool 1
10	V1-10	S10	Vac Gantry Head Tool 2
11	V2-1	S11	Vac Sensor Tray 2
12	V2-2	S12	Vac Base Plate Tray 2
13	V2-3	S13	Vac Sensor 3
14	V2-4	S14	Vac Sensor 4
15	V2-5	S15	Vac Base Plate 3
16	V2-6	S16	Vac Base Plate 4
17	V2-7	S17	Vac Pickup Tool 3
18	V2-8	S18	Vac Pickup Tool 4
19	V2-9		Vac Gantry Head Tool 1
20	V2-10		Vac Gantry Head Tool 2
21	V3-1	S19	Vac Sensor Tray 3
22	V3-2	S20	Vac Base Plate Tray 3
23	V3-3	S21	Vac Sensor 5
24	V3-4	S22	Vac Sensor 6
25	V3-5	S23	Vac Base Plate 5
26	V3-6	S24	Vac Base Plate 6
27	V3-7	S25	Vac Pickup Tool 5
28	V3-8	S26	Vac Pickup Tool 6
29	V3-9		Vac Gantry Head Tool 1
30	V3-10		Vac Gantry Head Tool 2
31	V4-1		Vac Gantry Head Tool 1
32	V4-2		Vac Gantry Head Tool 2
33			

Vacuum Valve Manifolds Connection

TERM. 1-1	Cable	TERM. 1-2
	NI9476	
1	1	V1-1
2	2	V1-2
3	3	V1-3
4	4	V1-4
5	5	V1-5
6	6	V1-6
7	7	V1-7
8	8	V1-8
9	9	24V
10	10	24V
11	11	V2-1
12	12	V2-1
13	13	V2-3
14	14	V2-4
15	15	V2-5
16	16	V2-6
17	17	V2-7
18	18	V2-8
19	19	B
20	20	V3-1
21	21	V3-2
22	22	V3-3
23	23	V3-4
24	24	V3-5
25	25	V3-6
26	26	V3-7
27	27	V3-8
28	28	24V
29	29	24V
30		

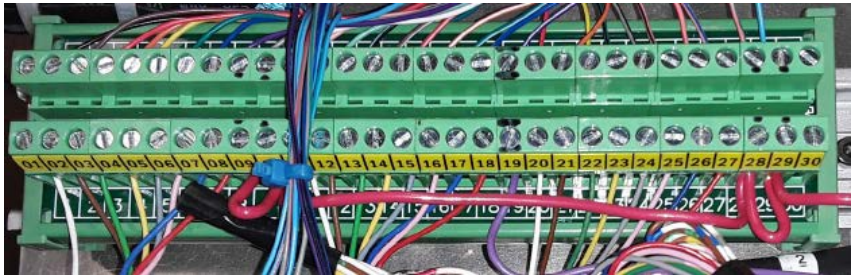
NI9476 PINS:

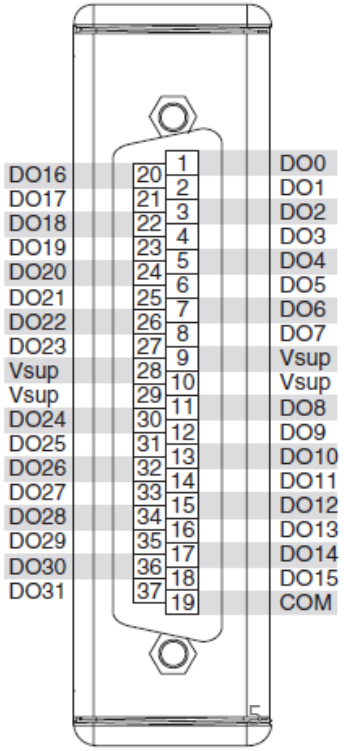
	V1	V2	V3
VacSTray	1(T1)	11(T11)	20(T20)
VacBPTray	2(T2)	12 (T12)	21(T21)
VacS1	3(T3)	13(T13)	22(T22)
VacS2	4(T4)	14(T14)	23(T23)
VacBP1	5(T5)	15(T15)	24(T24)
VacBP2	6(T6)	16(T16)	25(T25)
VacPT1	7(T7)	17(T17)	26(T26)
VacPT2	8(T8)	18(T18)	27(T27)

COM 19(T19)

+24V 9,10,28,29(T9, T10, T28, T29)

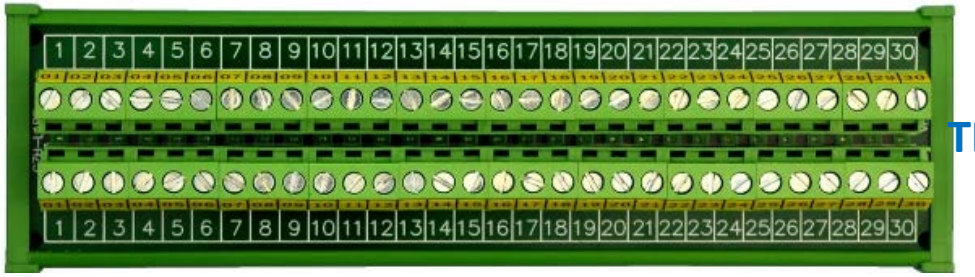
TERMINAL 1





TERM. 2-1		TERM. 2-2
	V1,V2,V3,V4	NI9476
1	V1-9	30
2	V1-10	31
3	V1-11	
4	V1-12	
5	23,24,25	B
6	V2-0	32
7	V2-10	33
8	V2-11	
9	V2-12	
10	23,24,25	B
11	V3-9	34
12	V3-10	35
13	V3-11	
14	V3-12	
15	23,24,25	B
16	V4-1	36
17		
18	V4-2	37
19		
20	V4-3	
21		
22	V4-4	
23		
24	V4-5	
25		
26	V4-6	
27		
28	23,24,25	B
29		
30		

Cable NI 9476 **Valves 1-8**



TERMINAL 1

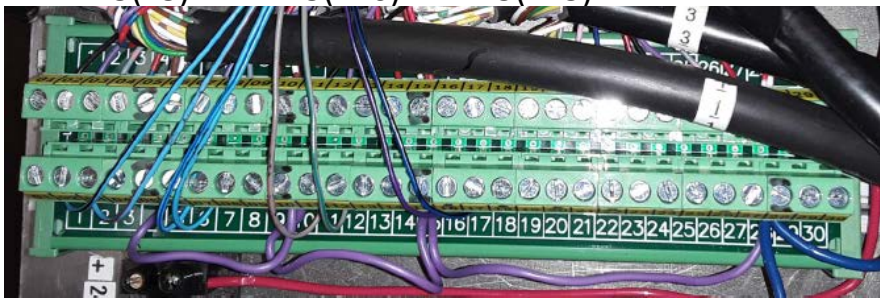
Cable V1 **Cable V2** **Cable V3** **V4: Valves 1-6**

Cable V4
TERMINAL 2

Valves 9-12

Terminal PINS:

	V1	V2	V3		V4
Valve 9	30(T1)	32(T6)	34(T11)	V4-1:	36(T16)
Valve 10	31(T2)	33(T7)	35(T12)	V4-2:	37(T18)
Valve 11	(T3)	(T8)	(T13)	V4-3:	(T20)
Valve 12	(T4)	(T9)	(T14)	V4-4:	(T22)
COM	23(T5)	23(T10)	23(T15)	V4-5:	(T24)
COM	**24(T5)**	**24(T10)**	**24(T15)**	V4-6:	(T26)
COM	25(T5)	25(T10)	25(T15)		



Vacuum Sensors Connection

TERM. 3-1		TERM. 3-2
	NI9403	
1	1	S1
2	2	S2
3	3	S3
4	4	S4
5	5	S5
6	6	S6
7	7	S7
8	8	S8
9	36	PSTOP
10	37	ESTOP
11	11	S9
12	12	S10
13	13	S11
14	14	S12
15	15	S13
16	16	S14
17	17	S15
18	18	S16
19	RSVD	
20	20	S17
21	21	S18
22	22	S19
23	23	S20
24	24	S21
25	25	S22
26	26	S23
27	27	S24
28	30	S25
29	31	S26
30	32	

NI9403 PINS:

1(s1)	11(s9)	20(s17)	30(s25) T28
2(s2)	12(s10)	21(s18)	31(s26) T29
3(s3)	13(s11)	22(s19)	32 T30
4(s4)	14(s12)	23(s20)	33
5(s5)	15(s13)	24(s21)	34
6(s6)	16(s14)	25(s22	35
7(s7)	17(s15)	26(s23)	36(t9-Prog. Stop)
8(s8)	18(s16)	27(s24)	37(t10-Emerg.Stop)

9, 10 –B 19 - RSVO

28,29-B

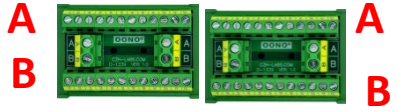
T9 –PS -5k – 5V (A) (T9)

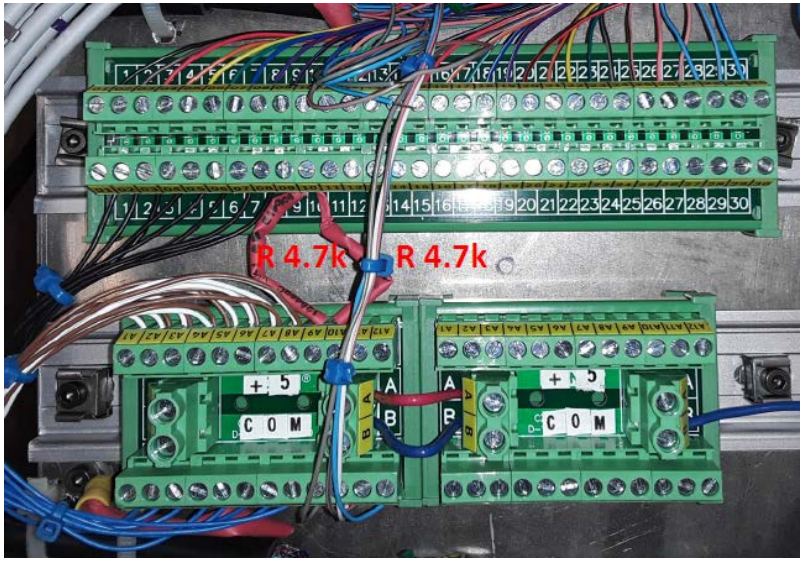
T10 -ES – 5k -5V (A) (T10)

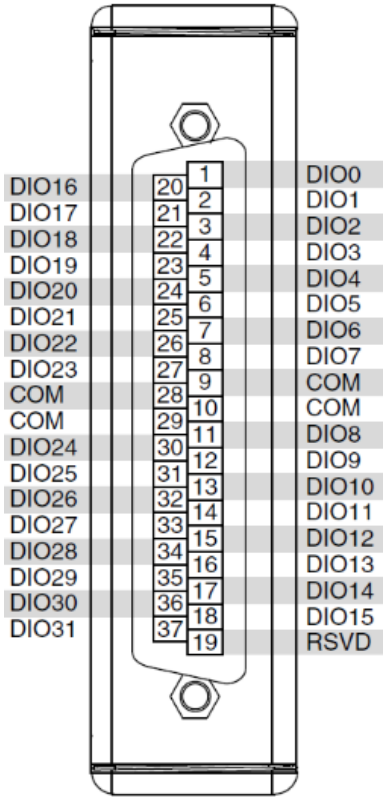
COM 9, 10, 28, 29 (B)

A - +5V (w1)

B – COM (w3)

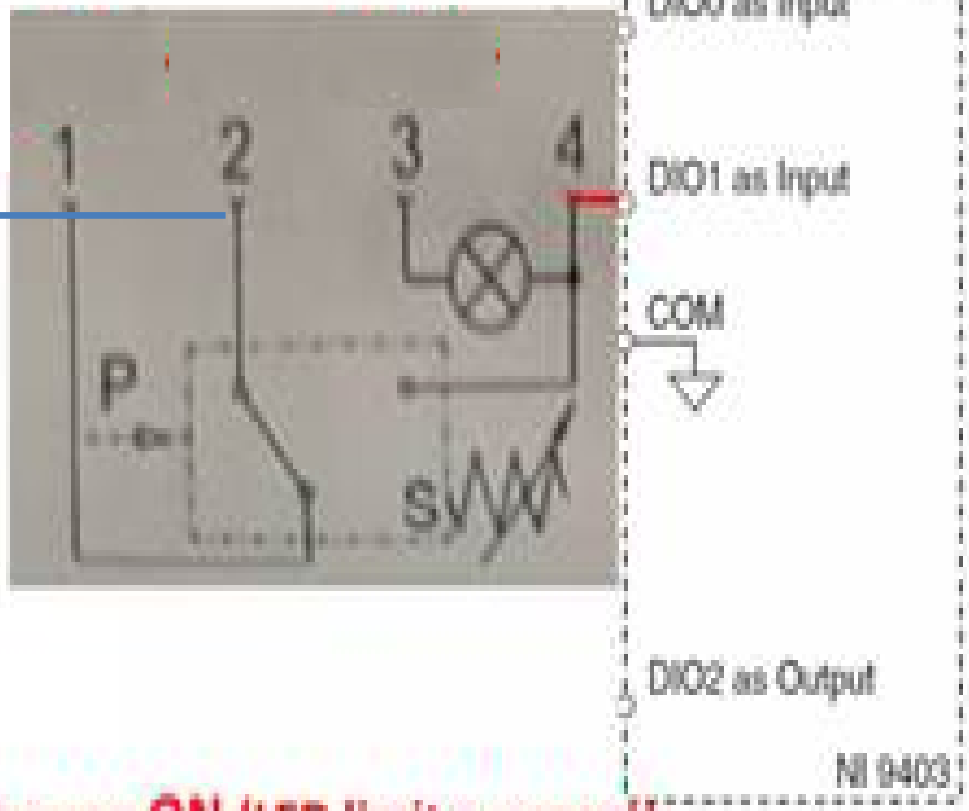






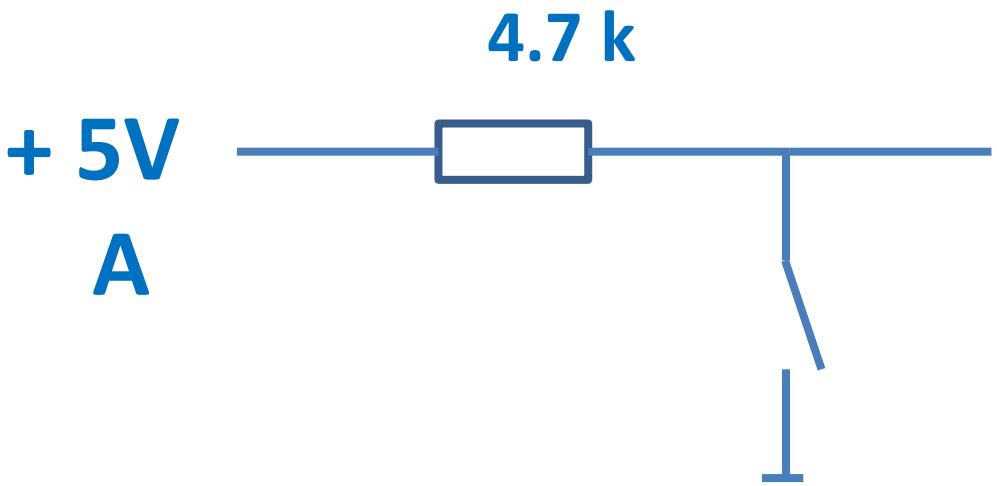
COM

+ 5 12 Ohm



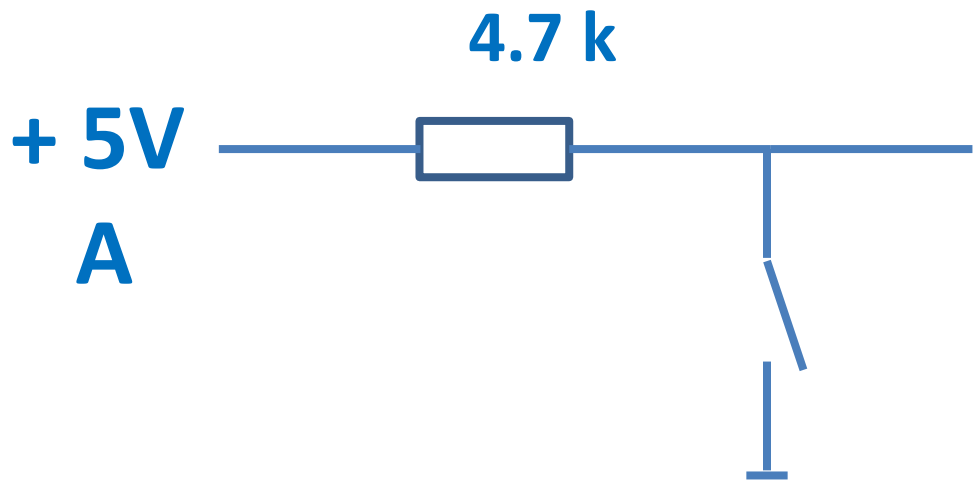
1 – BRAUN + 5V
2 – WHITE + 5V
3 – BLUE - COM
4 – BLACK - OUT

+5V input if vacuum ON (LED limit a current)
0V input if vacuum OFF



CN 36, T9 (Term.3-2)

Program Brake

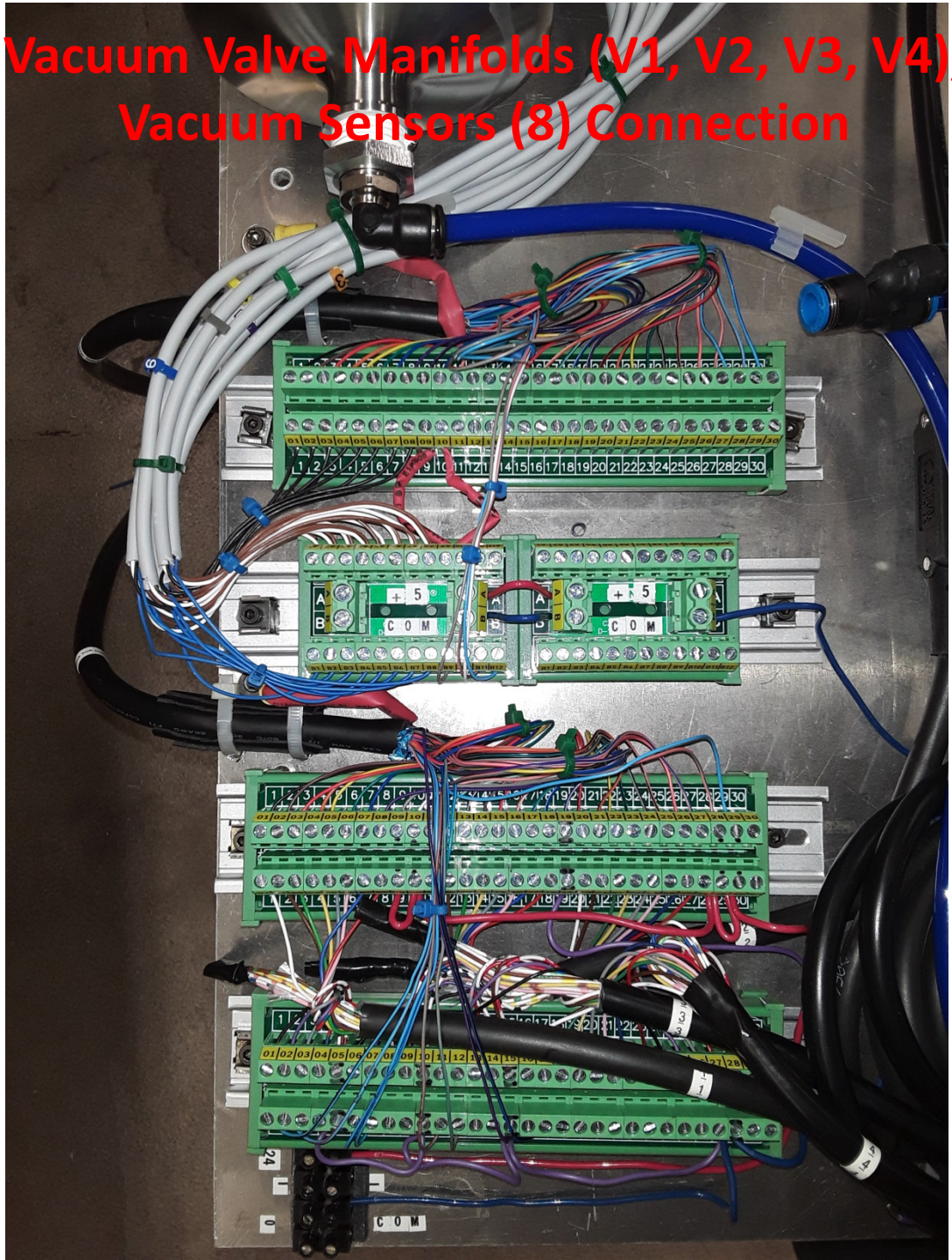


CN 37, T10 (Term.3-2)

Emergency Brake

?

Vacuum Valve Manifolds (V1, V2, V3, V4), Vacuum Sensors (8) Connection



NI9403 cable

Vac. Sensors 4

Vac. Sensors 1&2

Vac. Sensors 3

NI9476 cable

Valves 1-8 of V1,V2,V3

Valves 9-12 of V1,V2,V3
Valves 1-12 of V4

NI9476 cable 30,31,32,33,34 ,35,36,37

TERMINAL 3-1

TERMINAL 3-2

TERMINAL A

TERMINAL B

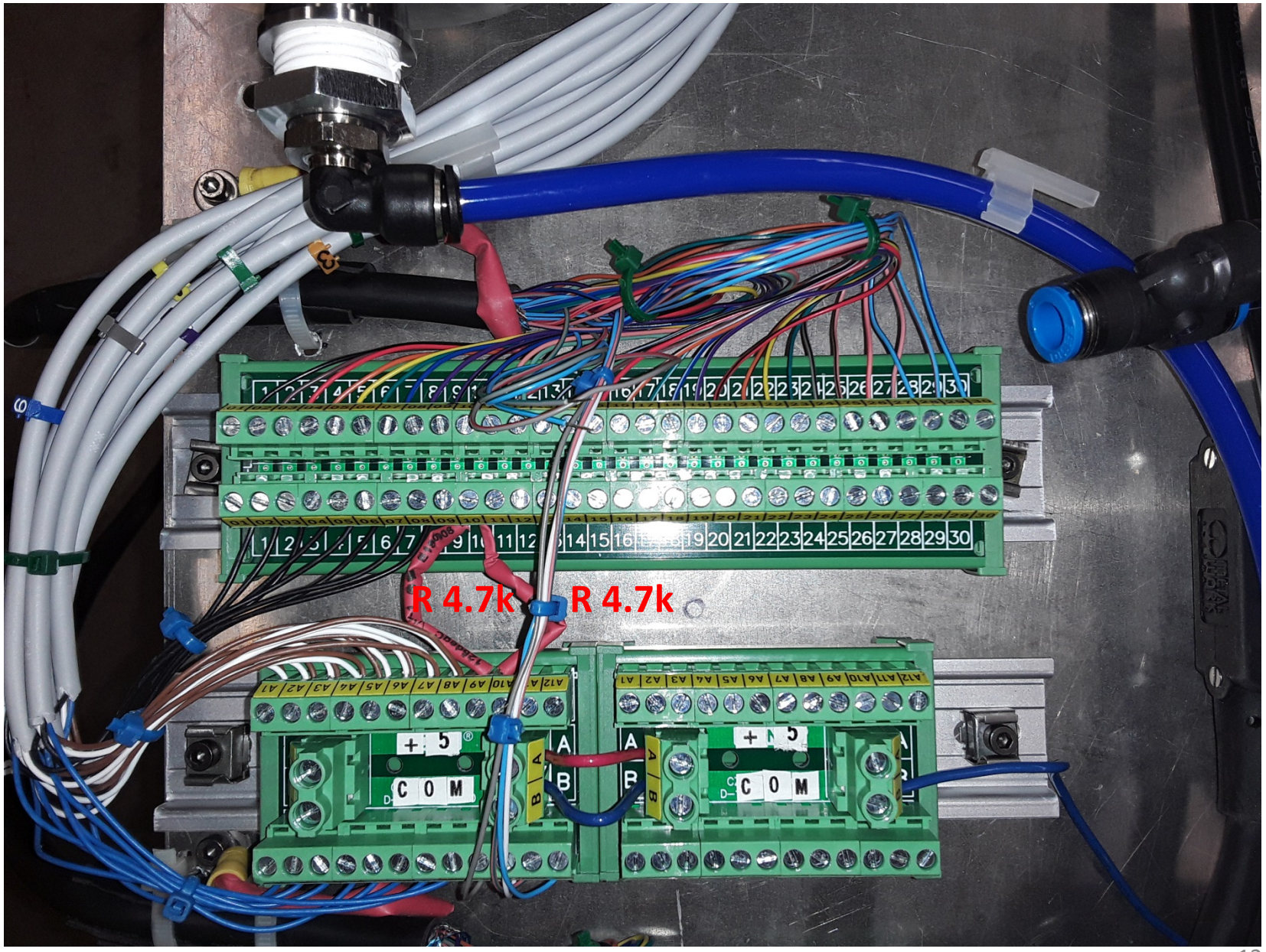
TERMINAL 1-1

TERMINAL 1-2

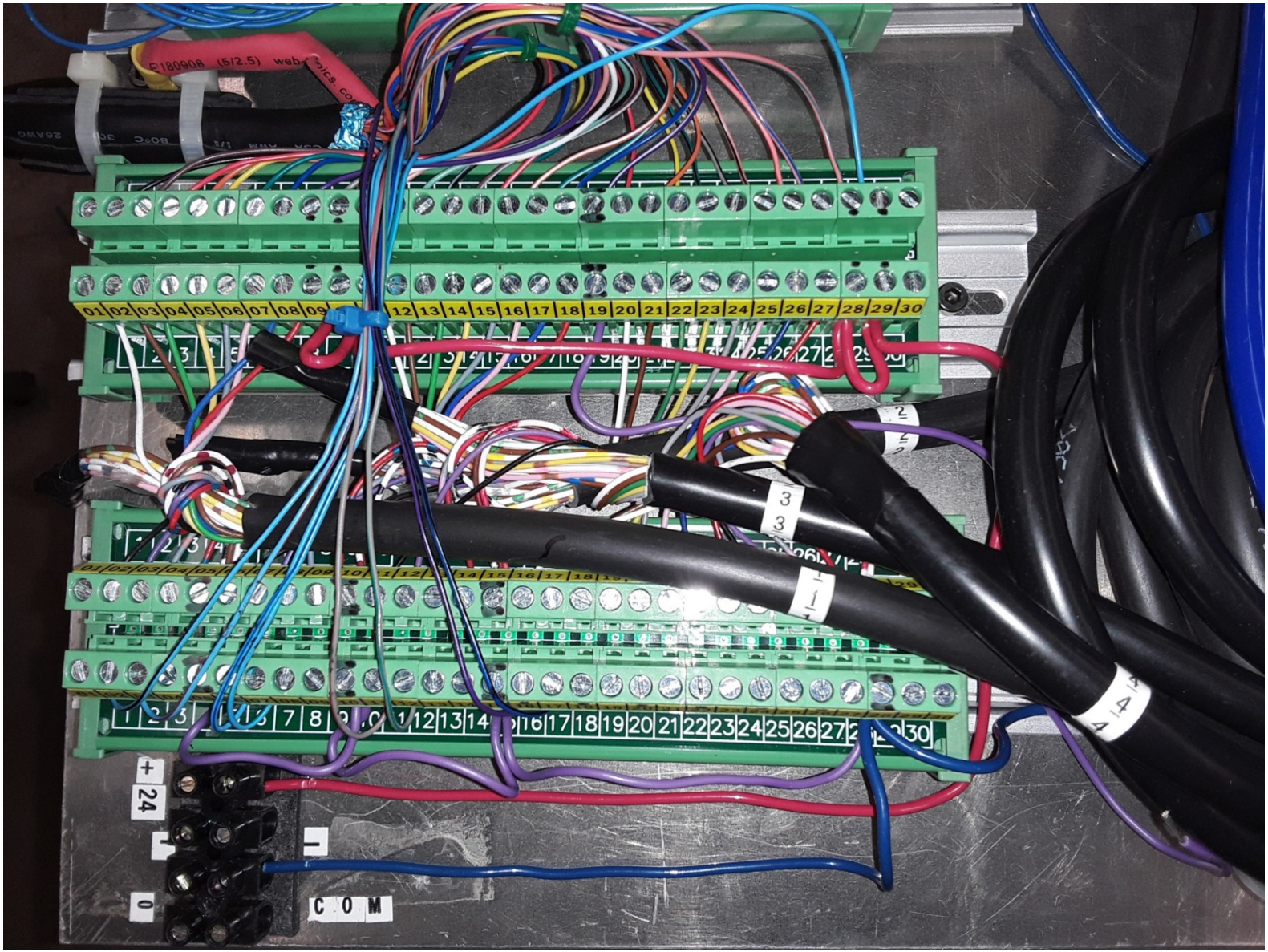
TERMINAL 2-1

TERMINAL 2-2

Vacuum Sensors (8) Connection

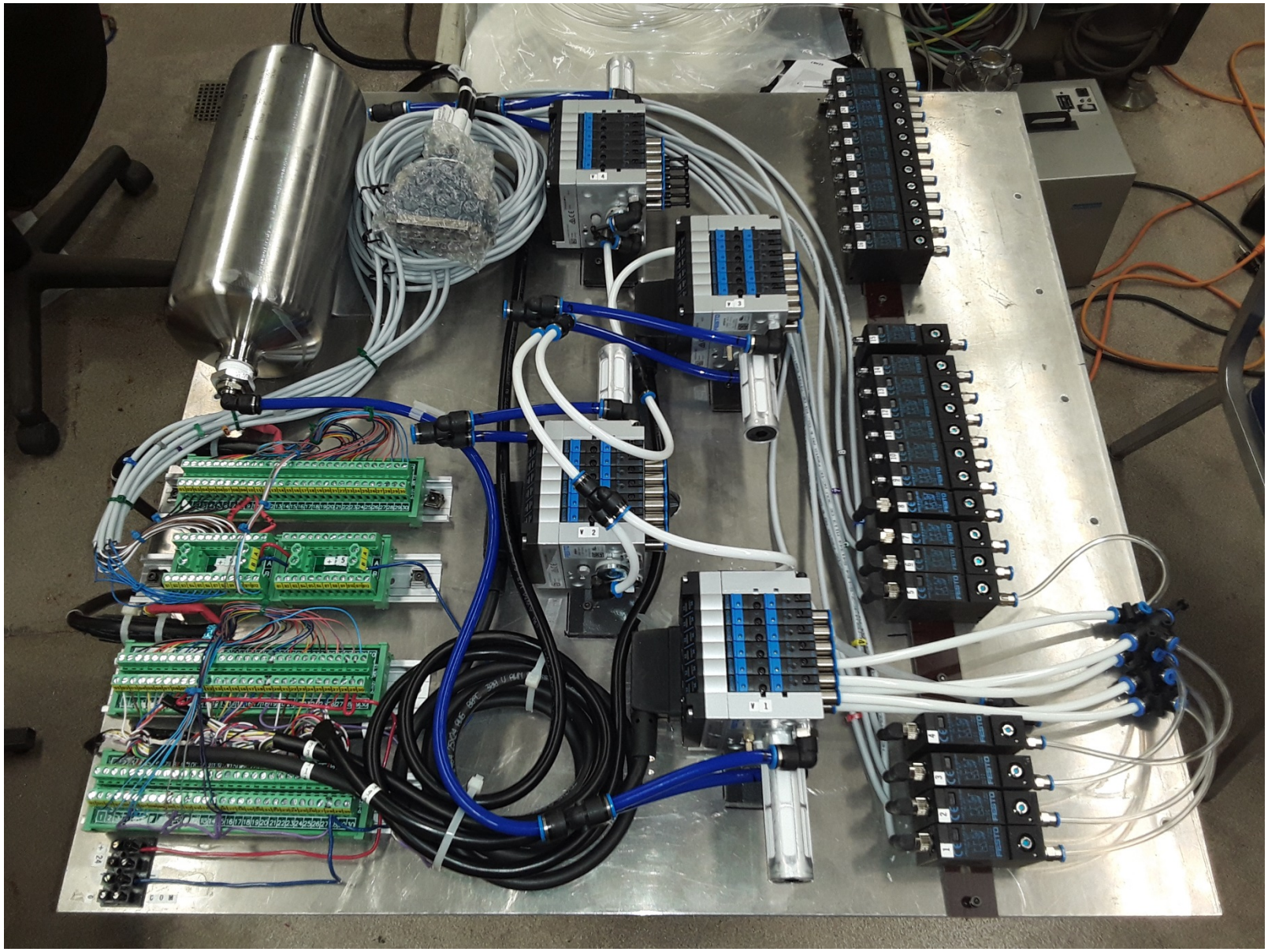


Vacuum Valve Manifolds Connection

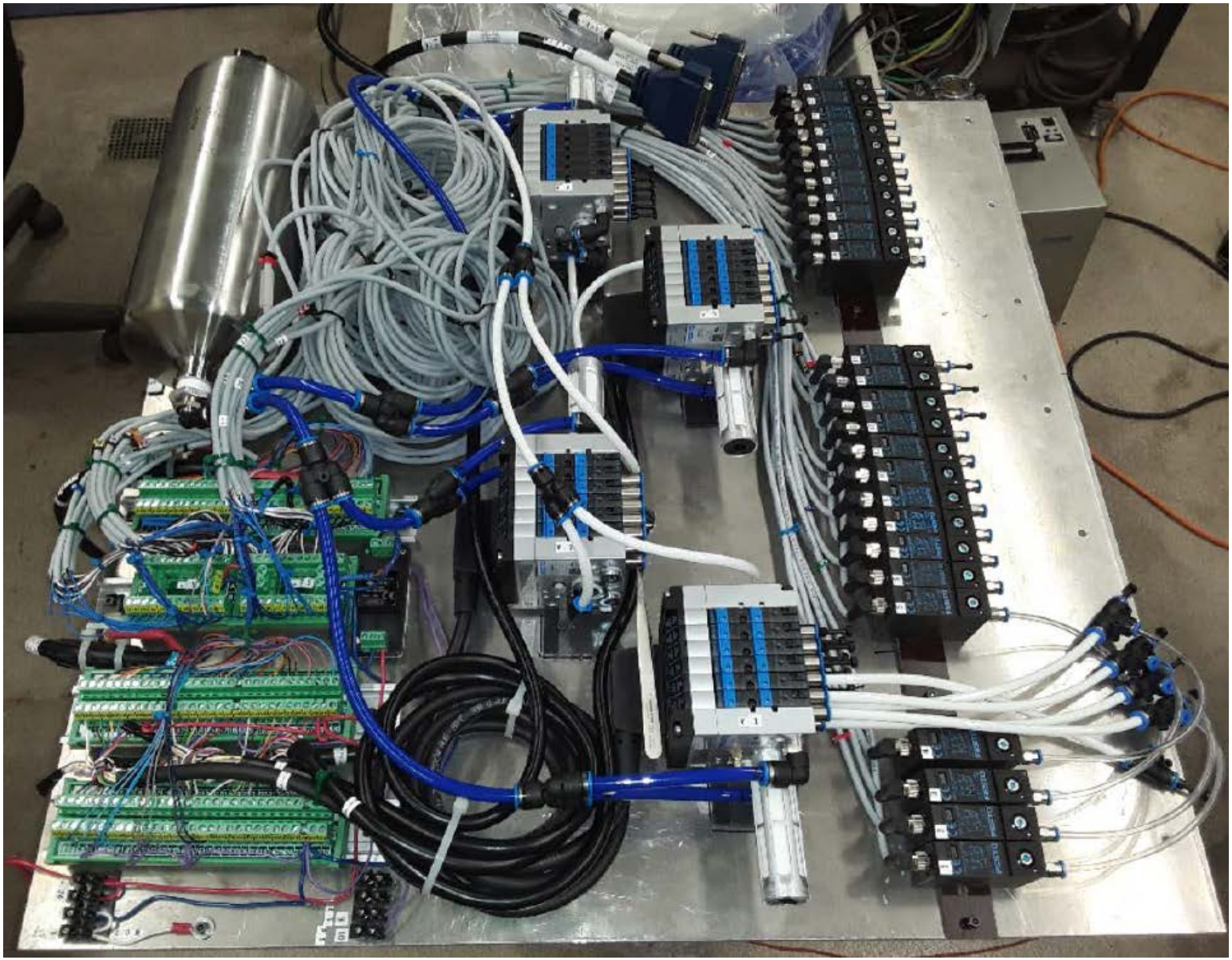


Valve manifold CVP10-GE-MP-6 type with ordering configuration 10P-10-6A-MP-N-Z-6C

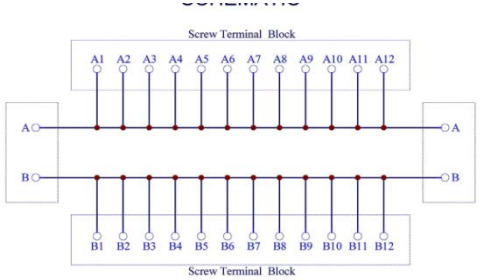
Vacuum board with Valve Manifolds (V1, V2, V3, V4) and Vacuum Sensors (8)



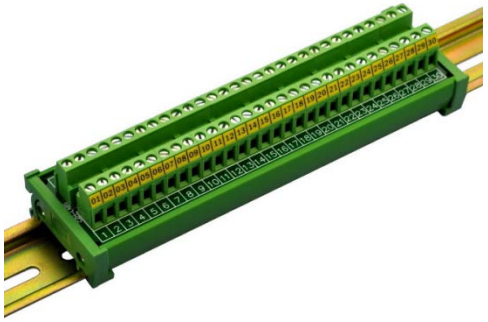
Vacuum board with Valve Manifolds (V1, V2, V3, V4) and Vacuum Sensors (26)

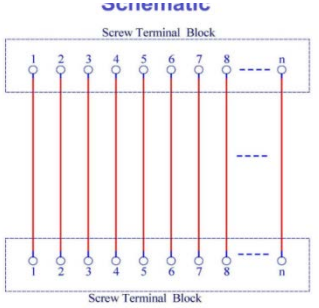


OONO DIN Rail Mount 30A/300V 2x12 Position Screw Terminal Block Distribution Module.



Electronics-Salon DIN Rail Mount 30 Position 24A / 400V Screw Terminal Block Distribution Module.



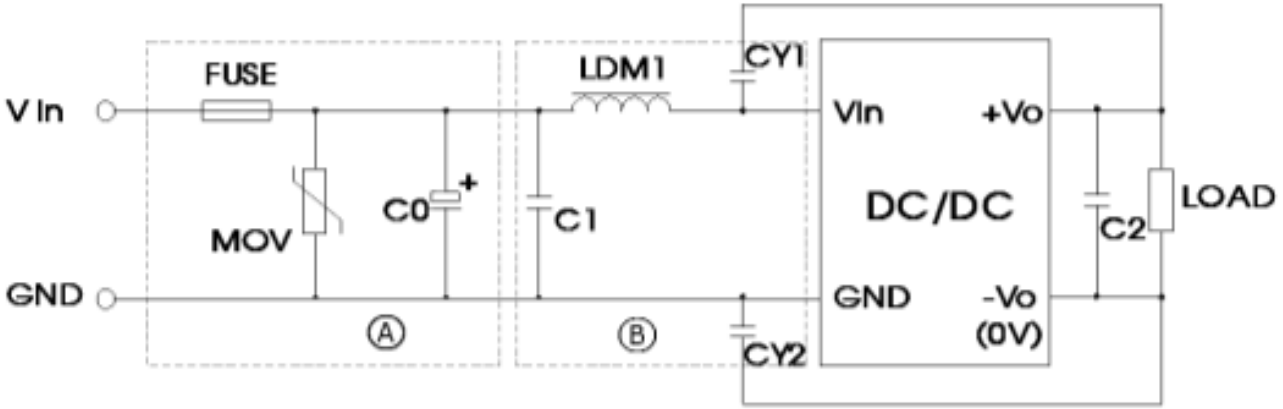


Electronics-Salon DIN Rail Mount 30 Position 24A / 400V Screw Terminal Block Distribution Module.
https://www.amazon.com/gp/product/B07BF87FJ5?ref=ppx_pt2_dt_b_prod_image

OONO DIN Rail Mount 30A/300V 2x12 Position Screw Terminal Block Distribution Module.
https://www.amazon.com/gp/product/B081XVX2JX?ref=ppx_pt2_dt_b_prod_image

20 Pieces DIN Rail Slotted Aluminum RoHS 8" Inches Long 35mm Wide 7.5mm High
https://www.amazon.com/gp/product/B01JH2RZWC?ref=ppx_pt2_dt_b_prod_image

PDQE10-Q24-S5-T, Module
DC-DC 24VIN 1-Out 5V 2A
10W 6-Pin Tray



RoHS c UL us CE

MODEL	input voltage typ (Vdc)	input voltage range (Vdc)	output voltage (Vdc)	output current min (mA)	output current max (mA)	output power max (W)	ripple & noise[1] max (mVp-p)	efficiency[2] typ (%)
PDQE10-Q24-S3	24	9~36	3.3	0	2400	7.92	80	79
PDQE10-Q24-S5	24	9~36	5	0	2000	10	80	83

https://www.mouser.com/ProductDetail/CUI-Inc/PDQE10-Q24-S5-DIN?qs=w%2Fv1CP2dgqqjfvp71%2FP3MA%3D%3D

MEAN WELL

15W Single Output DC-DC Converter

SD-15 series

- Features :
  - 2:1 wide input range
  - Protections:Short circuit/Over load /voltage
  - Built-in EMI filter, low ripple noise
  - 100% full load burn-in test
  - Low cost
  - High reliability
  - 2 years warranty

SPECIFICATION

MODEL		SD-15A-05	SD-15B-05	SD-15C-05	SD-15A-12	SD-15B-12	SD-15C-12	SD-15A-24	SD-15B-24	SD-15C-24
OUTPUT	DC VOLTAGE	5V			12V			24V		
	RATED CURRENT	3A			1.25A			0.625A		
	CURRENT RANGE	0 ~ 3A			0 ~ 1.25A			0 ~ 0.625A		
	RATED POWER	15W			15W			15W		
	RIPPLE & NOISE (max.) Note.2	100mVp-p			120mVp-p			150mVp-p		
	VOLTAGE ADJ.RANGE	4.75~5.5VDC			10.8~13.2VDC			21.6~26.4VDC		
	VOLTAGE TOLERANCE Note.3	±2.0%			±1.0%			±1.0%		
	LINE REGULATION	±0.5%			±0.3%			±0.2%		
	LOAD REGULATION	±0.5%			±0.3%			±0.2%		
	SETUP, RISE ,HOLD UP TIME	2.5s, 25ms,--- 12VDC/24VDC/48VDC at full load								
INPUT	VOLTAGE RANGE	A: 9.2 ~18VDC		B:18 ~ 36VDC			C:36~72VDC			
	EFFICIENCY(Typ.)	68%	76%	75%	72%	76%	79%	70%	77%	78%
	DC CURRENT(Typ.)	1.9A/12VDC		0.9A/24VDC		0.45A/48VDC				
PROTECTION	OVER LOAD	105 ~ 160% rated output power								
		Protection type : Hiccup mode, recovers automatically after fault condition is removed								
	OVER VOLTAGE	5.75 ~ 6.75V			13.8 ~ 16.2V			27.6 ~ 32.4V		
		Protection type : Shut off o/p voltage, clamping by zener diode								
ENVIRONMENT	WORKING TEMP.	-10 ~ +60℃ (Refer to "Derating Curve")								
	WORKING HUMIDITY	20 ~ 90% RH non-condensing								
	STORAGE TEMP., HUMIDITY	-20 ~ +85℃, 10 ~ 95% RH								
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)								
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min.each along X, Y, Z axes								
SAFETY & EMC (Note 4)	SAFETY STANDARDS	EAC TP TC 004 approved								
	WITHSTAND VOLTAGE	I/P-O/P:1.5KVAC I/P-FG:1KVAC O/P-FG:0.5KVAC								
	ISOLATION RESISTANCE	I/P-O/P,I/P-FG,O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH								
	EMC EMISSION	Compliance to EN55032(CISPR32), EAC TP TC 020								
	EMC IMMUNITY	Compliance to EN61000-4-2,3,4,6,8, EN55024, light industry level, criteria A, EAC TP TC 020								
OTHERS	MTBF	644.2K hrs min.(SD-15A) 652.5K hrs min.(SD-15B) 653.5K Hrs min.(SD-15C) MIL-HDBK-217F (25℃)								
	DIMENSION	78*51*28mm (L*W*H)								
	PACKING	0.18Kg,60 PCS/11.8Kg								

https://www.mouser.com/ProductDetail/MEAN-WELL/SD-15B-05?qs=jVZN1Oke4BxRm1AABATZ6A%3D%3D

The vacuum board components:

Three CPV10-VI valve manifolds (36 valves), (10/8/8 used)
Three 25 pin cables for the valve manifolds (13x3=39 wires)
The 26 vacuum sensors
The 26 cable 4 pin for vacuum sensors (26x4= 64 wires)
The 26 push in T- 6mm and 4 mm adapters
Air Reservoir 2L, Festo CRVZS-2

The NI Modules board:

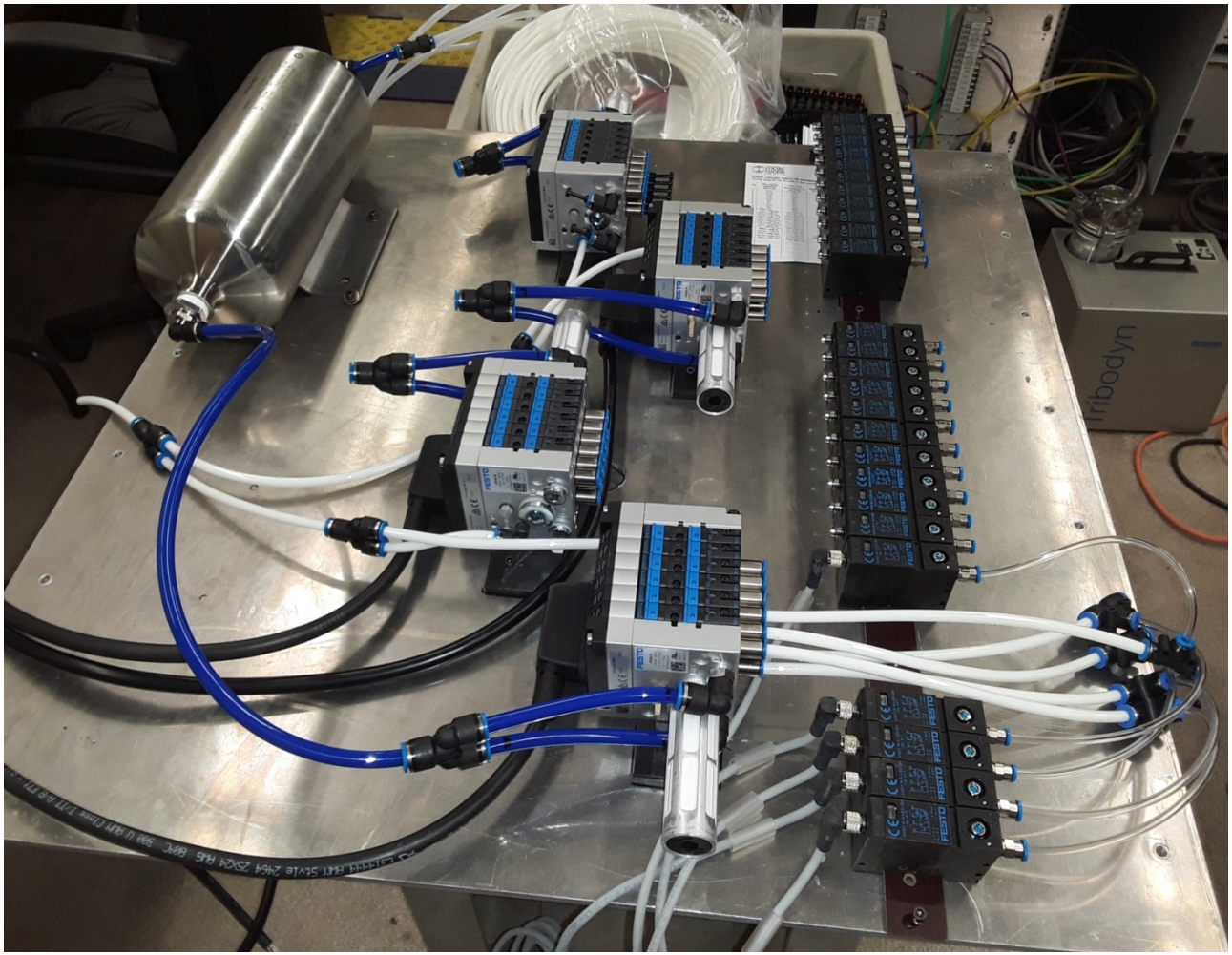
NI 9476 unit for the 26 valves voltage supply (24V)
Cable 37 pin for NI 9476 (27 wires)
NI 9403 unit for the 26 vacuum sensor connection
Cable 37 pin for NI 9403 (27 wires)
Gantry Head 2 switches stop board
Power supply 24V for the 26 vacuum valves
Power supply 5V for the 26 vacuum sensors.

NI 9403:

Number of channels 32 digital input/output channels
Module output current 64 mA maximum (for all 32 channels)

A current for LED of the vacuum sensor at 5V is 1.78 mA
One output channel 5V may be used for one vacuum sensor only.
Probably the 10 sensors will be used simultaneously - ~ 20 mA total current.

It will be easier to organize the electric connections if extremal power supply of 5V is used for all 26 vacuum sensors.


FESTO