VERSABUILT ROBOTICS

Automation System Electrical & I/O Manual VSC 1.0

2026-07-15

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Automation System Manuals are available at https://www.versabuilt.com/resources/
Use the latest available PDF copies and search for topics

Safety Warnings

DANGER: VersaBuilt makes industrial machine tool automation components designed to be operated by trained personnel only. Machine tool automation components may move suddenly and without warning. Serious or fatal crushing injuries can occur from contact with the robot, gripper or vises.

Before deploying VersaBuilt industrial machine tool automation components, a safety risk assessment must be completed in accordance with local, state and/or federal requirements.

VersaBuilt industrial machine tool automation components should only be used by trained operators.

Read and understand the VersaBuilt Automation System Safety Manual before proceeding

Electrical Power

Section 2

Electrical Power

Before connecting electrical power to the system, make sure no person within 6 feet of the robot, gripper, vises, door opener or any other mechanism capable of movement or actuation.

Connect 110 VSC power for the following devices:

- VersaBuilt System Controller (VSC)
- Ethernet switch
- Router
- Robot Controller
- VersaWash Pump (if included)

The following pages show the electrical diagram for 24VDC devices in and controlled by the VSC. 24VDC devices include:

- Pneumatic valves
- VSC Digital Inputs (e.g., sensors, VSC enable, CNC cycle end signal)
- VSC Digital Outputs (e.g., VersaWash on/off)
- VSC Relay Outputs (e.g., CNC Cycle Start, CNC foot pedal, Pallet Ready, Door Interlock)

Electrical Power

Electrical Requirements

Device	Voltage	Full Load Max Amp Draw
Robot	120 VAC 1 phase 50/60 Hz	5
VSC	120 VAC 1 phase 50/60 Hz	1
Ethernet Switch	120 VAC 1 phase 50/60 Hz	1
Router	120 VAC 1 phase 50/60 Hz	1
VersaWash Pump	120 VAC 1 phase 50/60 Hz	2

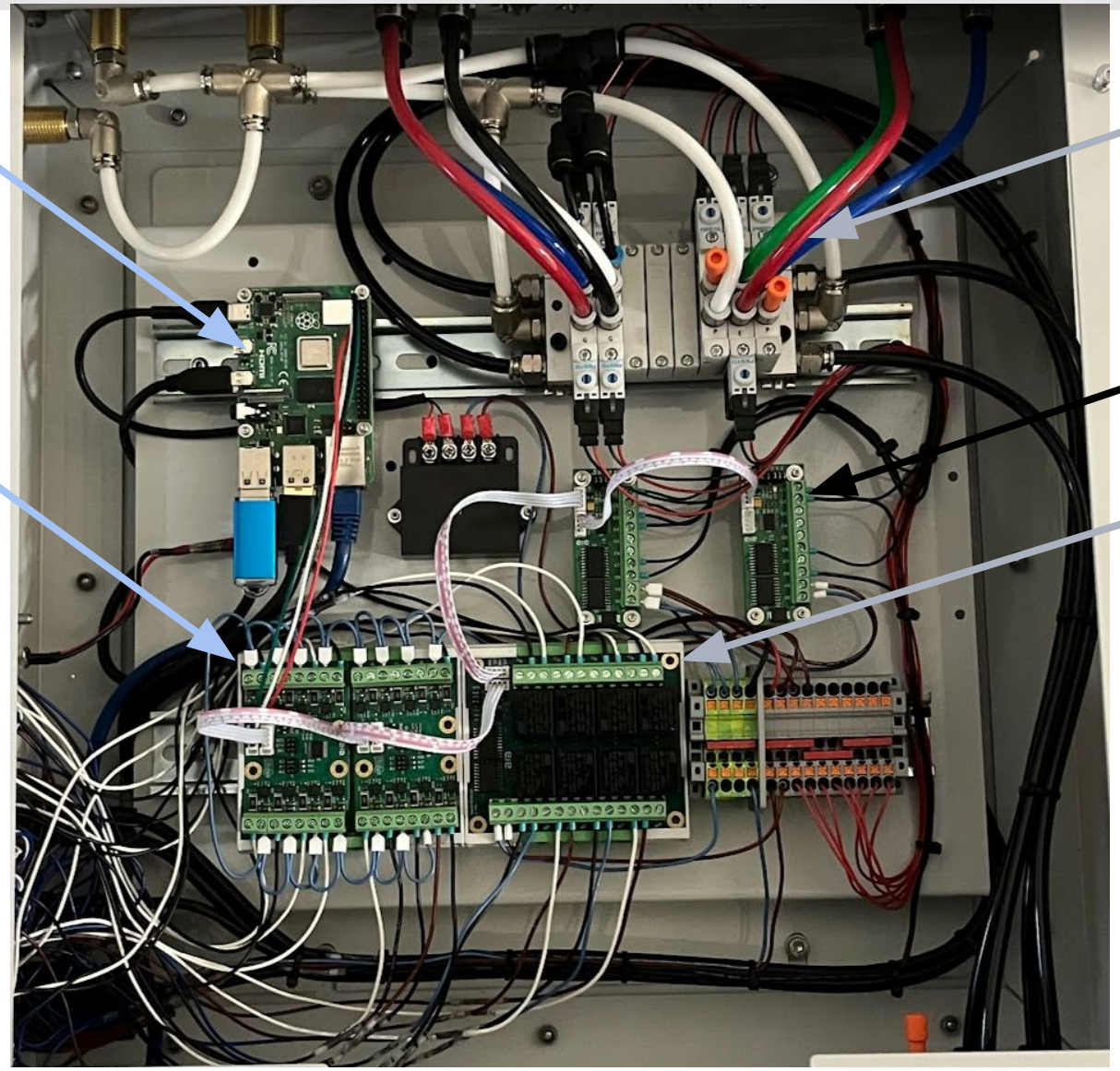
Electrical circuit breaker(s) should be adequately sized for the application. For the above devices a 10A or 15A breaker for all is recommended.

Do not use power from the CNC, as this can cause system interruptions.
Connect automation system components to separate supply.

VSC Layout & Wiring Schematics

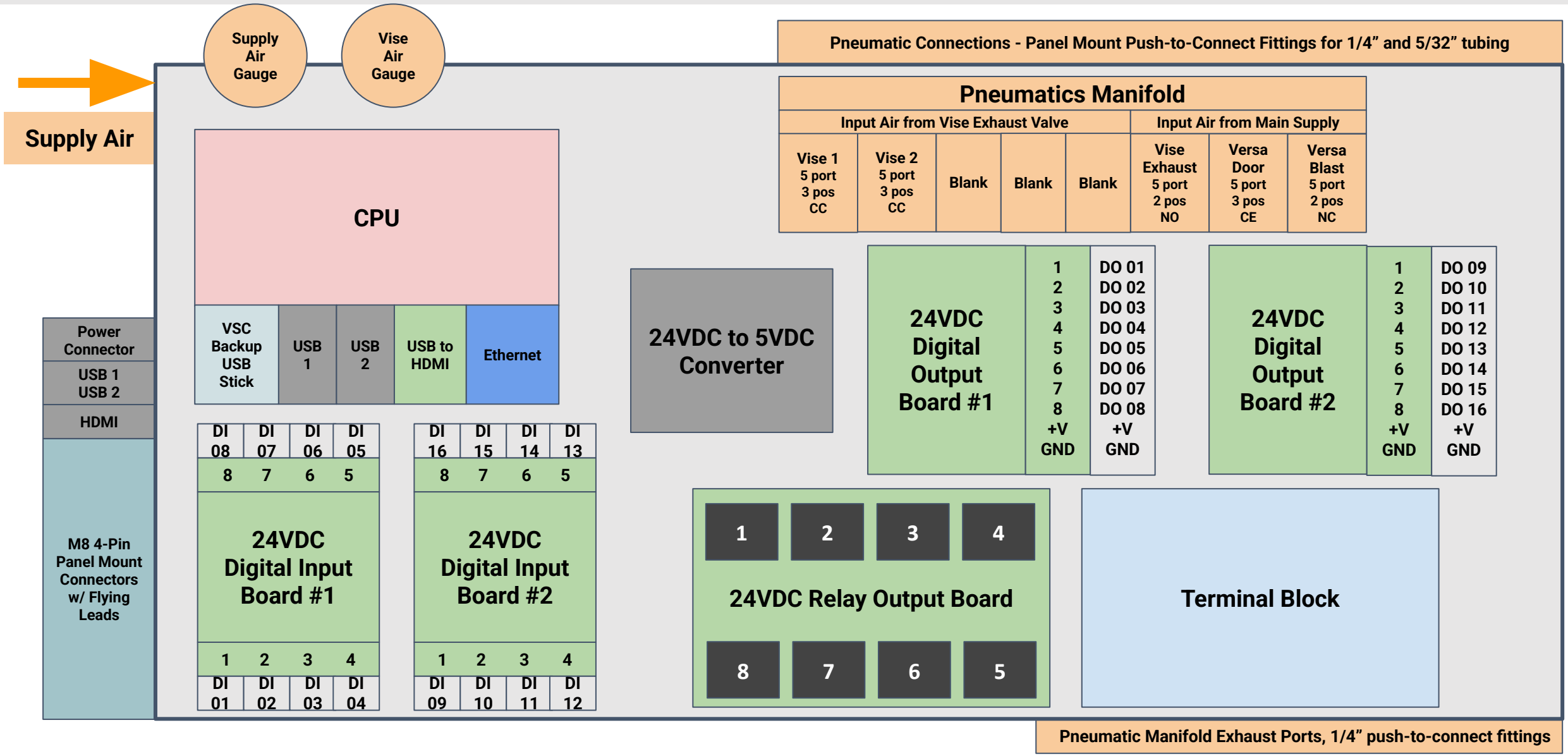
Section 3

VSC Layout



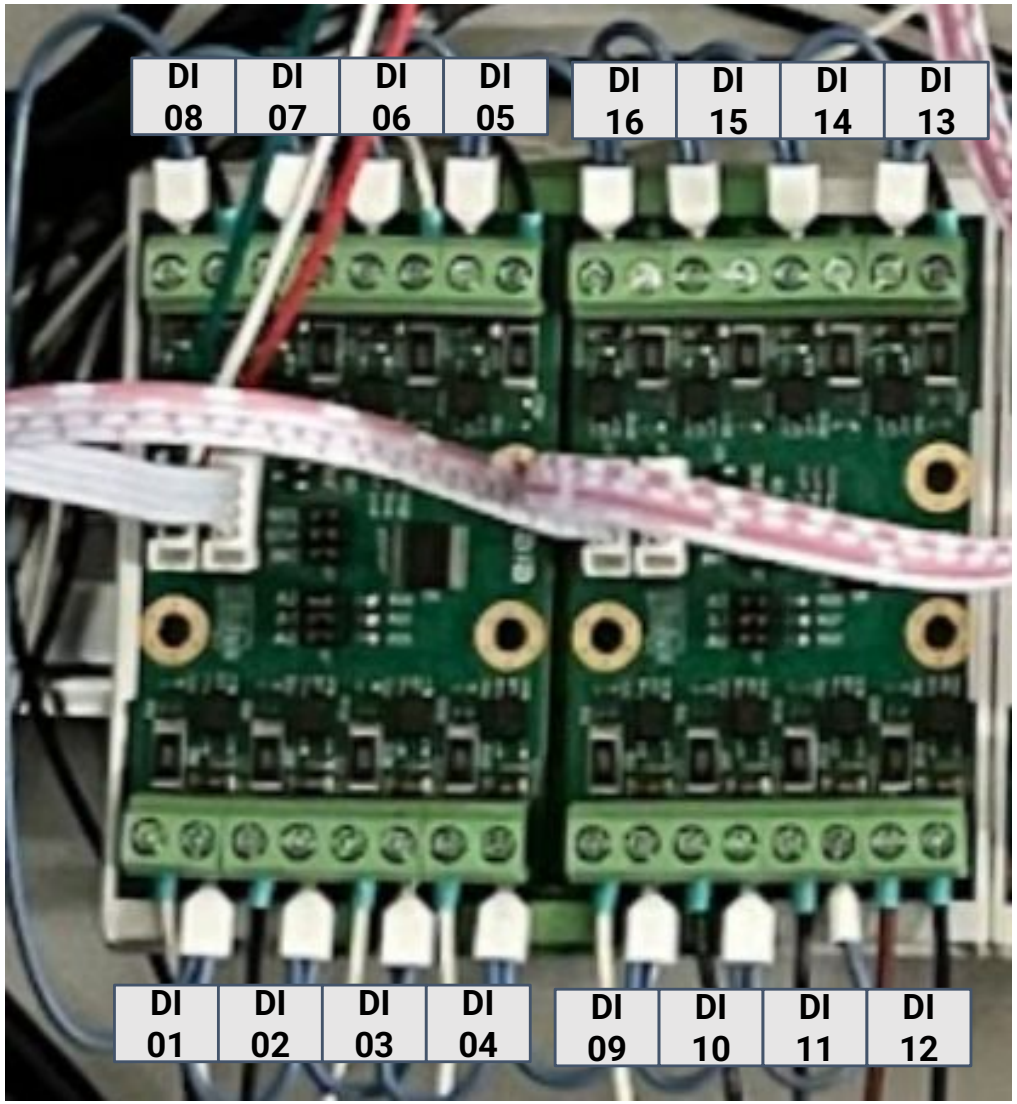
Note:
Gripper valves are housed in the UR Controller

VSC Layout


Supply Air
Supply Air Gauge
Vise Air Gauge
Pneumatic Connections - Panel Mount Push-to-Connect Fittings for 1/4” and 5/32” tubing
Pneumatics Manifold
Input Air from Vise Exhaust Valve
Input Air from Main Supply
Vise 1 5 port 3 pos CC
Vise 2 5 port 3 pos CC
Blank
Blank
Blank
Vise Exhaust 5 port 2 pos NO
Versa Door 5 port 3 pos CE
Versa Blast 5 port 2 pos NC
CPU
VSC Backup USB Stick
USB 1
USB 2
USB to HDMI
Ethernet
Power Connector
USB 1
USB 2
HDMI
M8 4-Pin Panel Mount Connectors w/ Flying Leads
24VDC to 5VDC Converter
24VDC Digital Output Board #1
1 2 3 4 5 6 7 8 +V GND
DO 01 DO 02 DO 03 DO 04 DO 05 DO 06 DO 07 DO 08 +V GND
24VDC Digital Output Board #2
1 2 3 4 5 6 7 8 +V GND
DO 09 DO 10 DO 11 DO 12 DO 13 DO 14 DO 15 DO 16 +V GND
DI 08 DI 07 DI 06 DI 05
8 7 6 5
24VDC Digital Input Board #1
1 2 3 4
DI 01 DI 02 DI 03 DI 04
DI 16 DI 15 DI 14 DI 13
8 7 6 5
24VDC Digital Input Board #2
1 2 3 4
DI 09 DI 10 DI 11 DI 12
1 2 3 4
24VDC Relay Output Board
8 7 6 5
Terminal Block
Pneumatic Manifold Exhaust Ports, 1/4” push-to-connect fittings

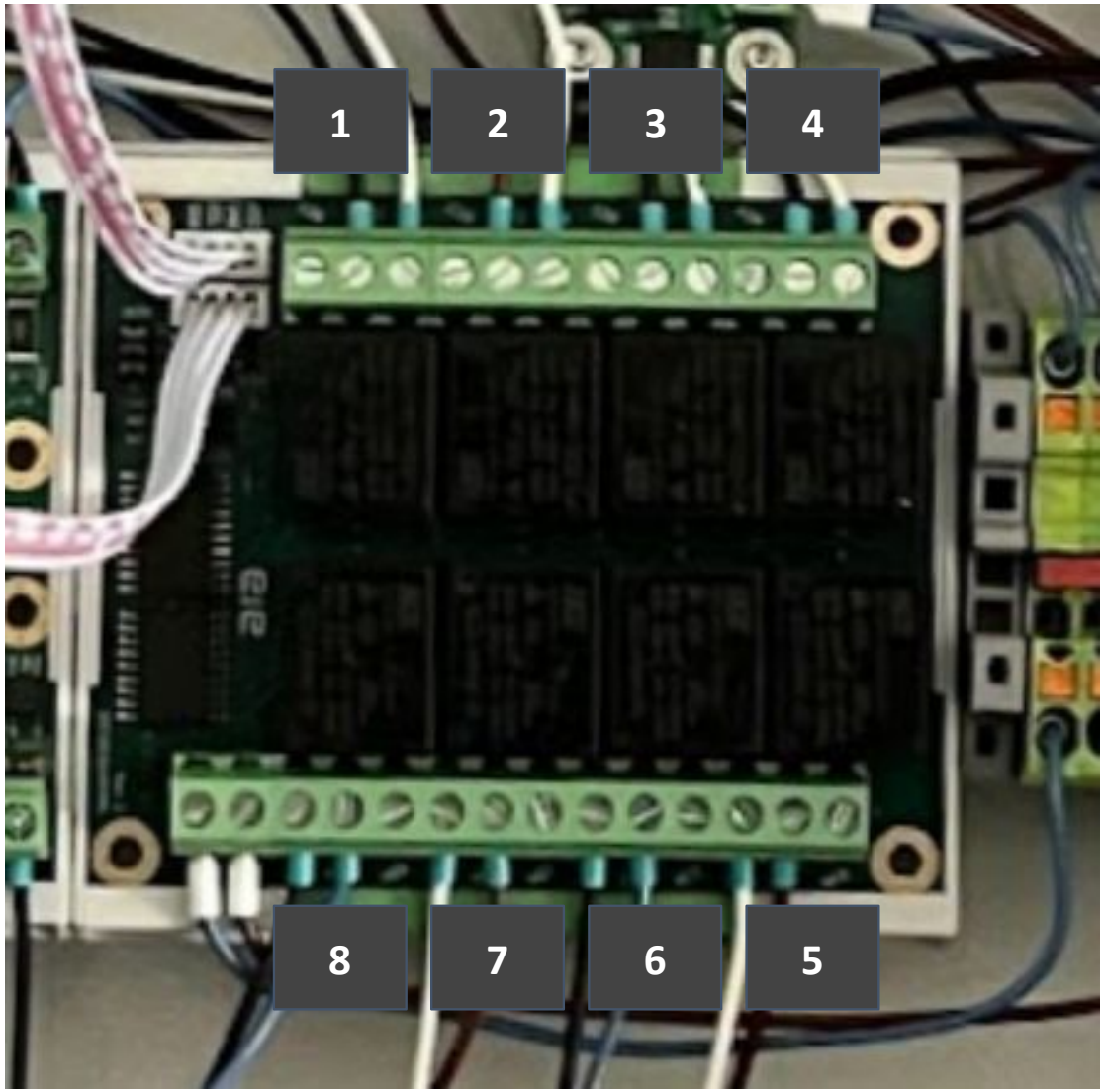
VSC Digital Inputs

DI #	Device	M8 Connector
01	Vise 1 Sensor	A1
02	Vise 2 Sensor	
03	Vise 3 Sensor	A2
04	CNC Door 1 Open Sensor	A3
05	CNC Door 1 Closed Sensor	
06	CNC Door 2 Open Sensor	A4
07	CNC Door 2 Closed Sensor	
08	VSC Enable	B2
09	Door Open Button	B3
10	Door Close Button	
11	Lathe Cycle End #1	B4
12	Robot Lock (optional, 2x VSCs)	B6
13	Pallet Safe Input	A9
14	Unused	-
15	Unused	-
16	Unused	-



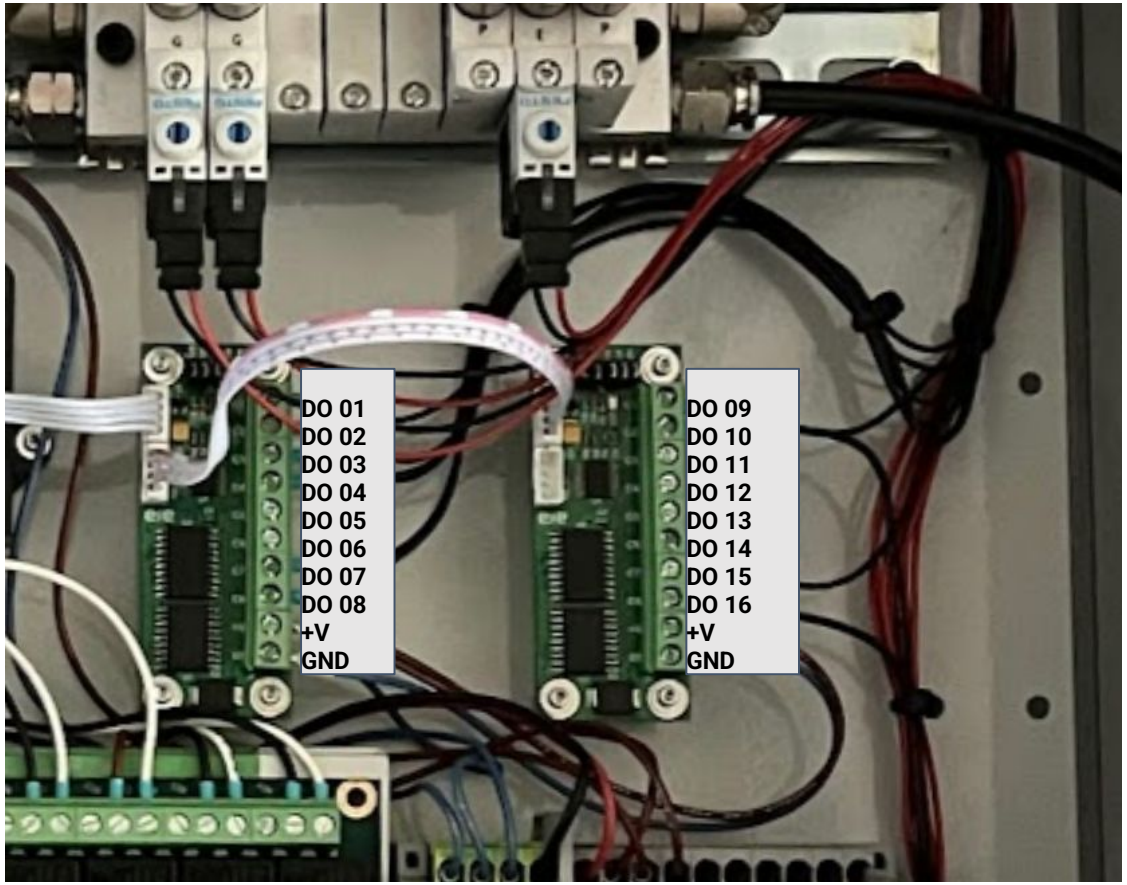
VSC Relay Outputs

Relay #	Device	M8 Connector
1	Cycle Start Lathe 1	B1
2	End of Job Indicator	A8
3	Pallet Ready Output	B8
4	Door Interlock Release	B9
5	CNC Foot Pedal #1 Open / Toggle	A7
6	CNC Foot Pedal #1 Close	
7	CNC Foot Pedal #2 Open / Toggle	B7
8	CNC Foot Pedal #2 Close	



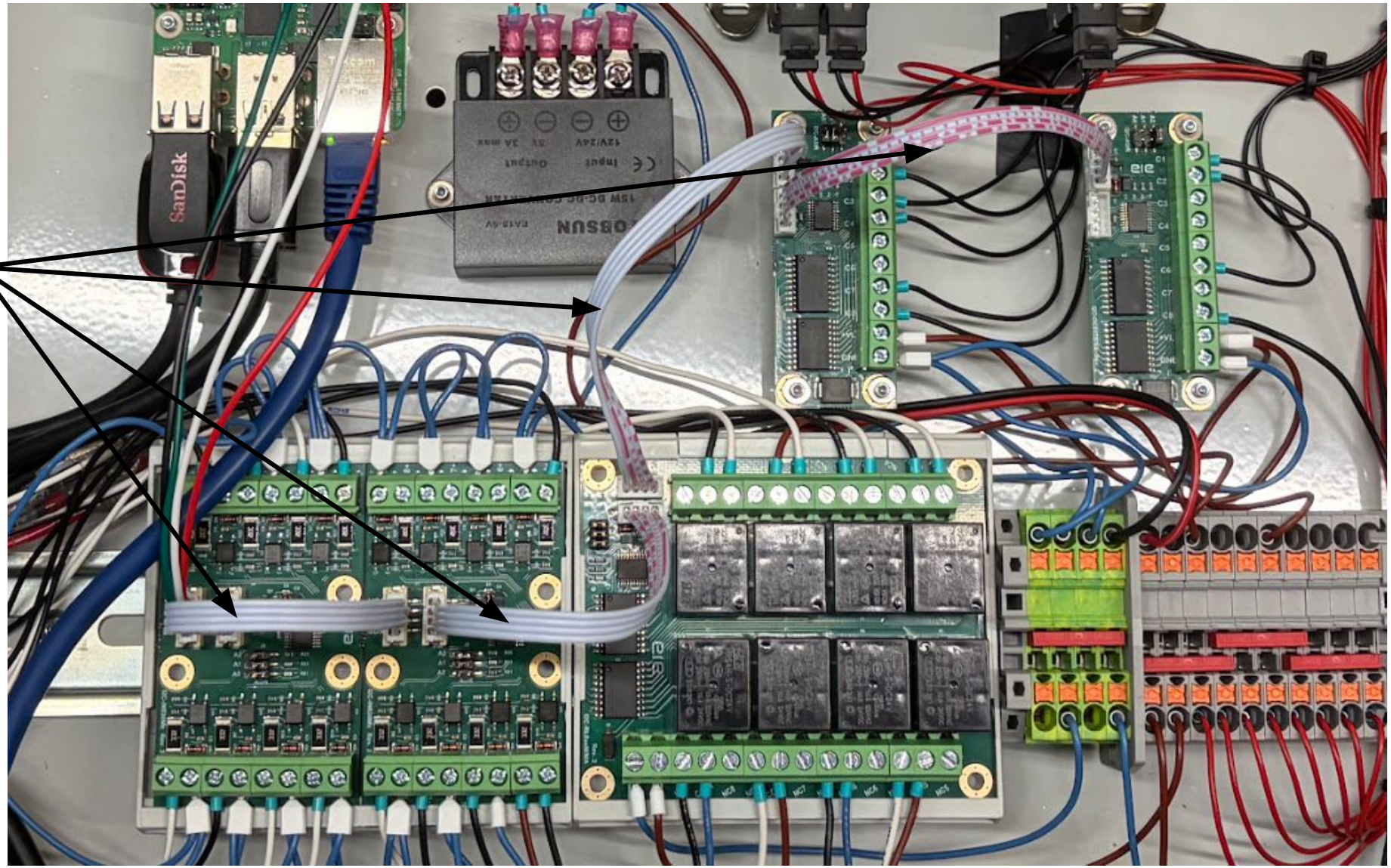
VSC Digital Outputs

DO #	Device	M8 Connector
01	Solenoid Valve #1 - 5/3 Closed Center - Vise 1 Open	-
02	Solenoid Valve #1 - 5/3 Closed Center - Vise 1 Close	-
03	Solenoid Valve #2 - 5/3 Closed Center - Vise 2 Open	-
04	Solenoid Valve #2 - 5/3 Closed Center - Vise 2 Close	-
05	Unused - Reserved for Vise 3 Open Valve *no valve in VSC	-
06	Unused - Reserved for Vise 3 Close Valve *no valve in VSC	-
07	Solenoid Valve #5 - 5/3 Closed Exhaust - CNC #1 - VersaDoor Open	-
08	Solenoid Valve #5 - 5/3 Closed Exhaust - CNC #1 - VersaDoor Close	-
09	Solenoid Valve #6- 5/2 N/C - Gripper VersaBlast	-
10	VersaWash Pump	A5
11	Not used	-
12	Not used - Reserved for Vise 4 Open Valve *no valve in VSC	-
13	Not used - Reserved for Vise 4 Close Valve *no valve in VSC	-
14	Solenoid Valve #4 - 5/2 N/O - Vise Exhaust	-
15	Safety Scanner Bypass	B5
16	Lock Robot	A6



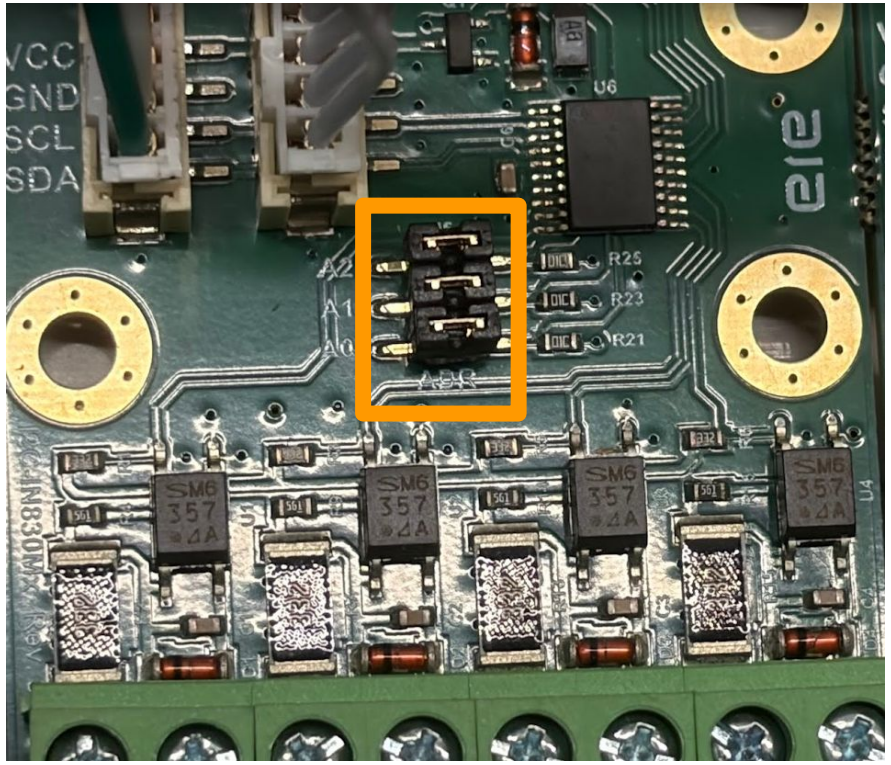
VSC I/O Connectivity & Addressing

Ribbon Cables
Daisy chain connection for power and signals

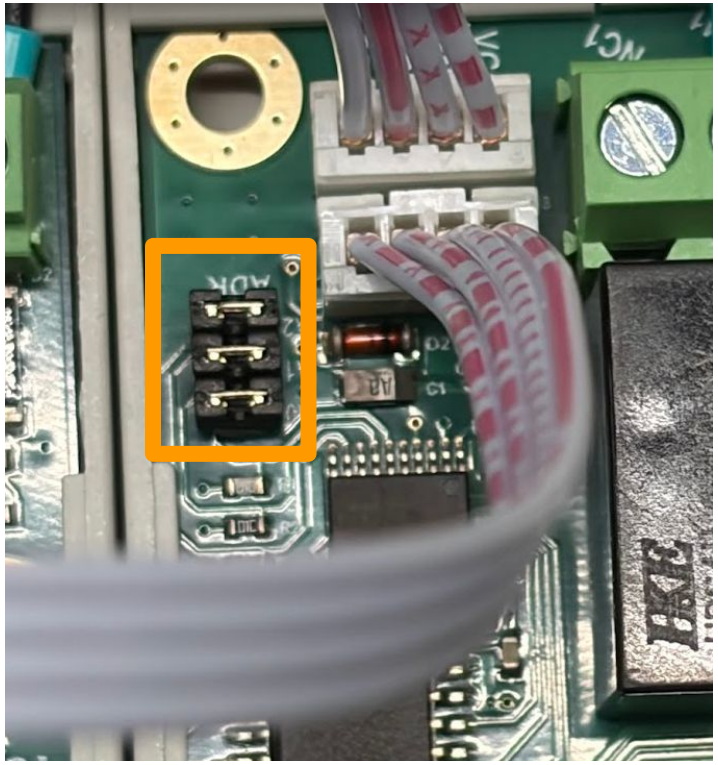


VSC I/O Connectivity & Addressing

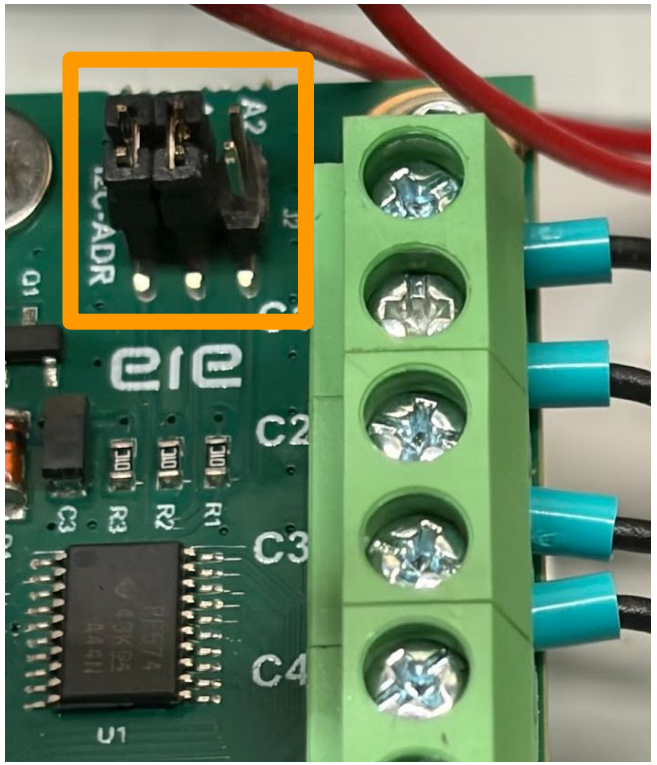
Digital Input Board
Addressing Jumpers
**shown with all 3 jumpers in place*



Relay Board
Addressing Jumpers
**shown with all 3 jumpers in place*



Digital Output Board
Addressing Jumpers
**shown with all 1 jumper removed*



Add or remove with pliers to enable communication

VSC I/O Connectivity & Addressing

IO Board ID	OG	Jumpers (A2, A1, A0)	SCL, SDA, INT	I2C Address
DI 1	I2C-IN830M0	XXX	XX-	32H
DI 2	I2C-IN830M0	XX-	---	33H
DI 1	I2C-IN830MA0	-XX	XX-	60H
DI 2	I2C-IN830MA0	-X-	---	61H
K Relay Board	I2C-RL824MV2	X--	N/A	59
	I2C-RL824MAV2	X--	N/A	59
DO 1	I2C-OC805SA	XXX	---	56H
DO 2	I2C-OC805SA	XX-	---	57H
DO 3	I2C-OC805SA	X-X	---	58H
DO1	I2C-OC805S	X-X	---	
DO2	I2C-OC805S	X--	---	
Relay Board		X--	N/A	35

X= jumper installed

-= jumper removed

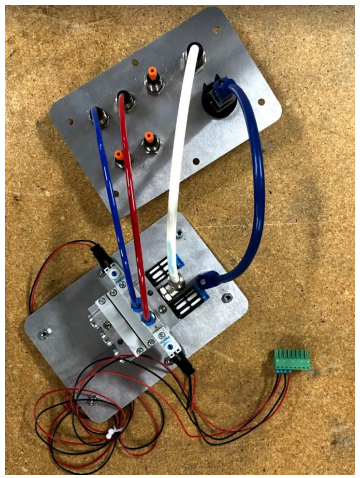
Troubleshooting the correct jumper configuration:

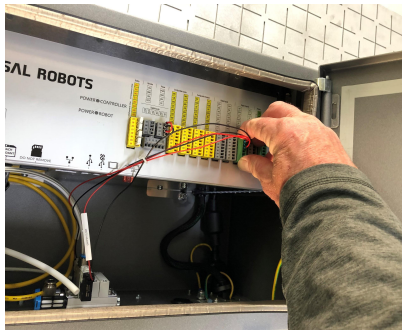
- **Connect to the CPU directly with a monitor and keyboard connected with HDMI and USB to the VSC**
- **Open a Command Terminal:**
  - **i2cli**
  - **open**
  - **scan**
    ****note the numbers shown**
- **Disconnect the ribbon cable from all boards, except DI1**
- **Connect one at a time**
- **Repeat the Command Terminal:**
  - **i2cli**
  - **open**
  - **scan**
  - **Note the numbers one at a time, add remove jumpers if a board address does not appear**

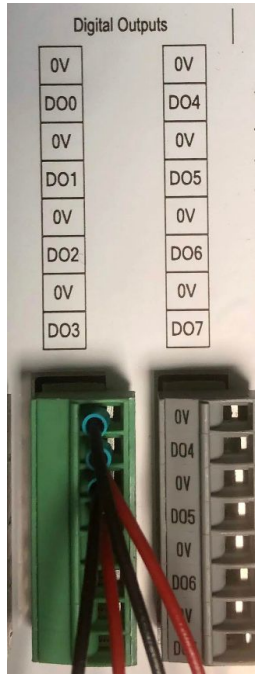
Universal Robot Digital Outputs

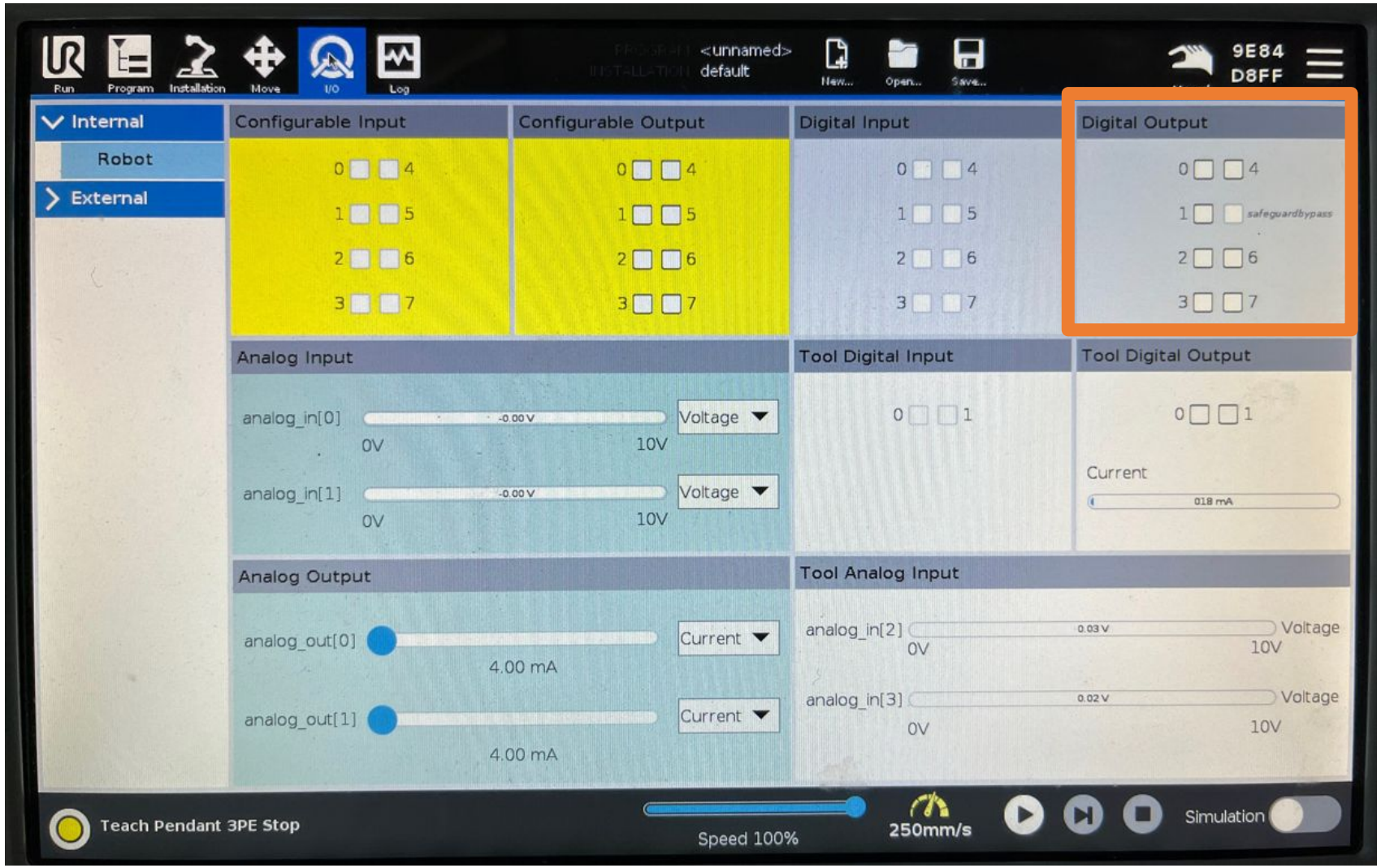
Digital Output I/O for the gripper valves:

- **0 = Gripper 1 open**
- **1 = Gripper 1 close**
- **2 = Gripper 2 open**
- **3 = Gripper 2 close**

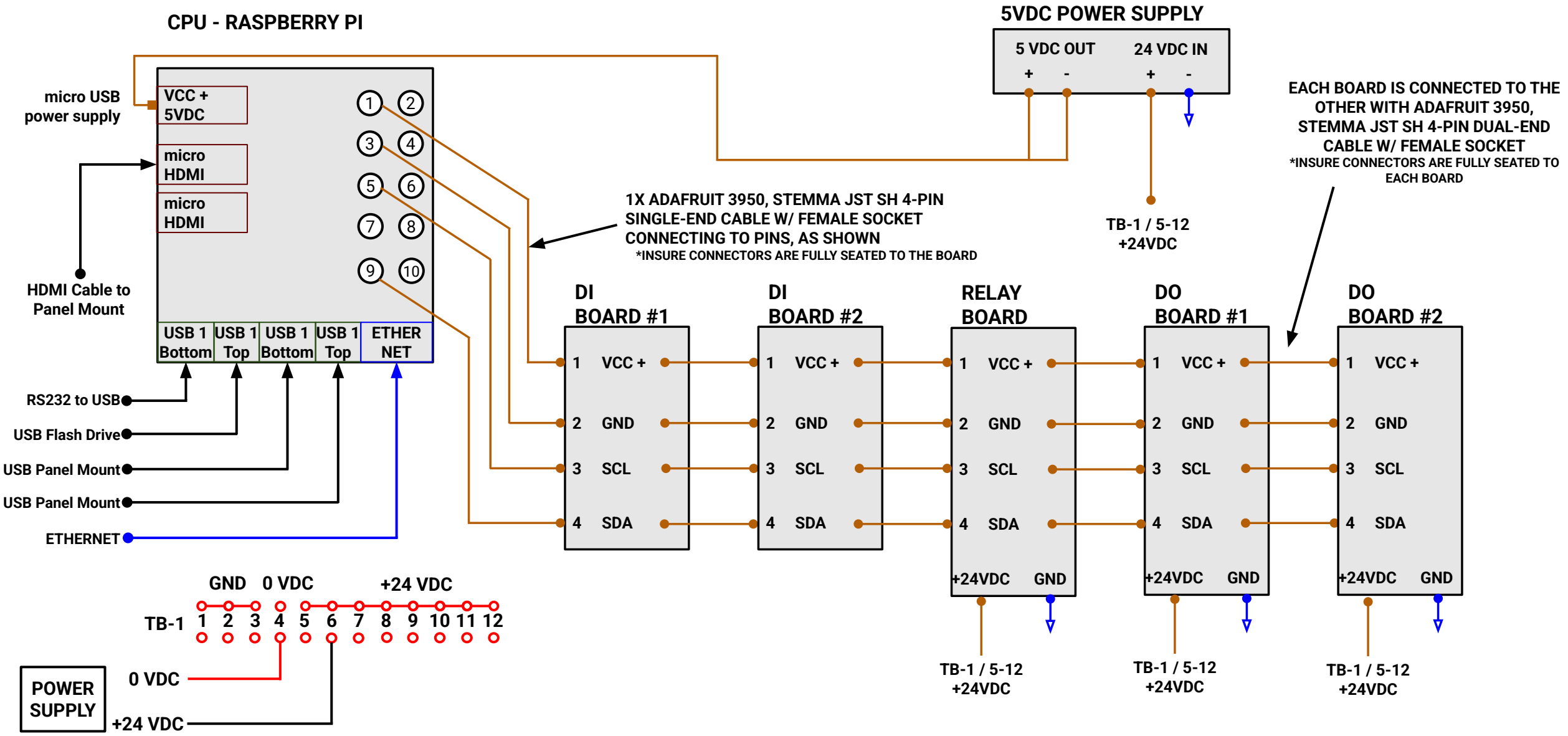




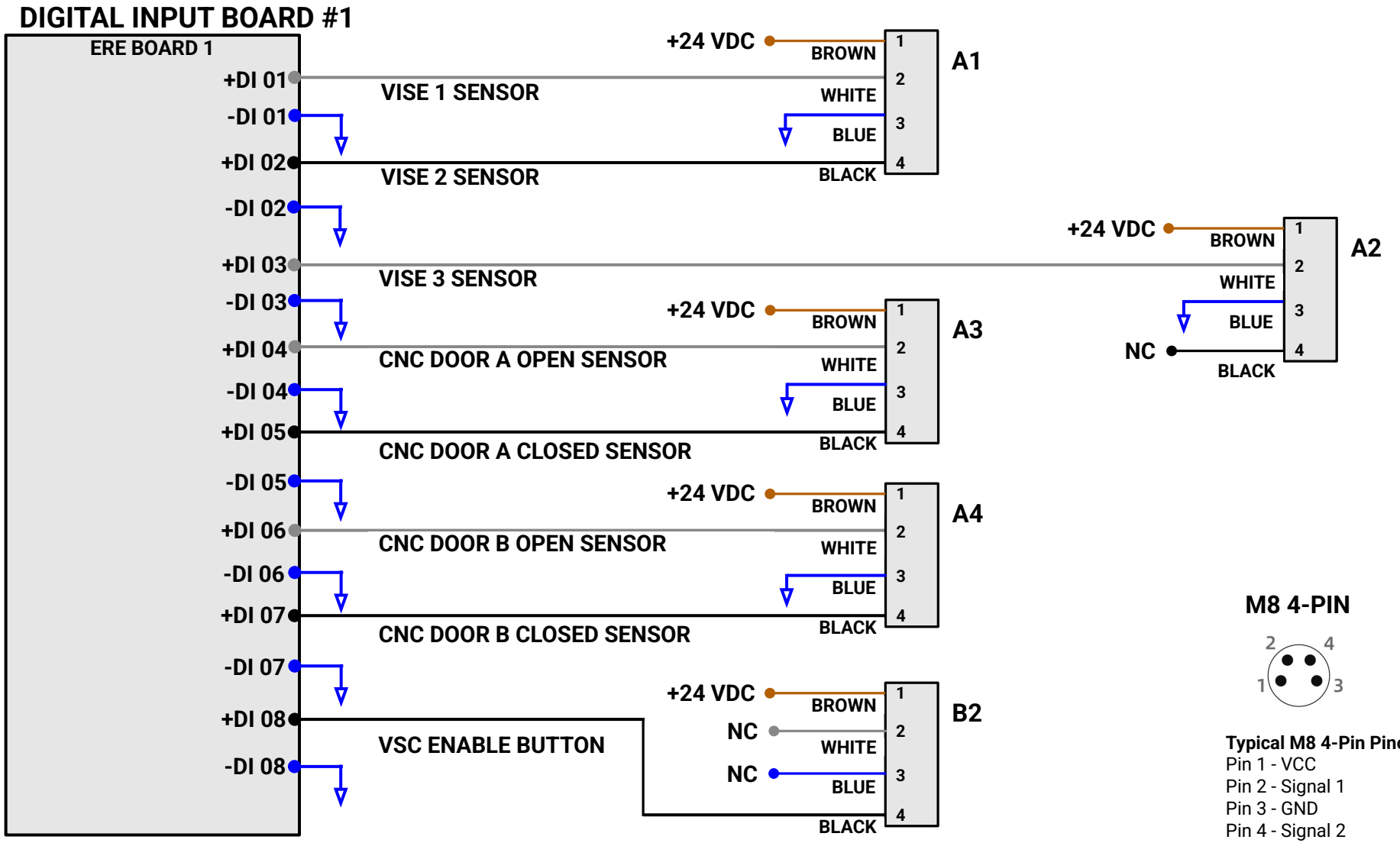




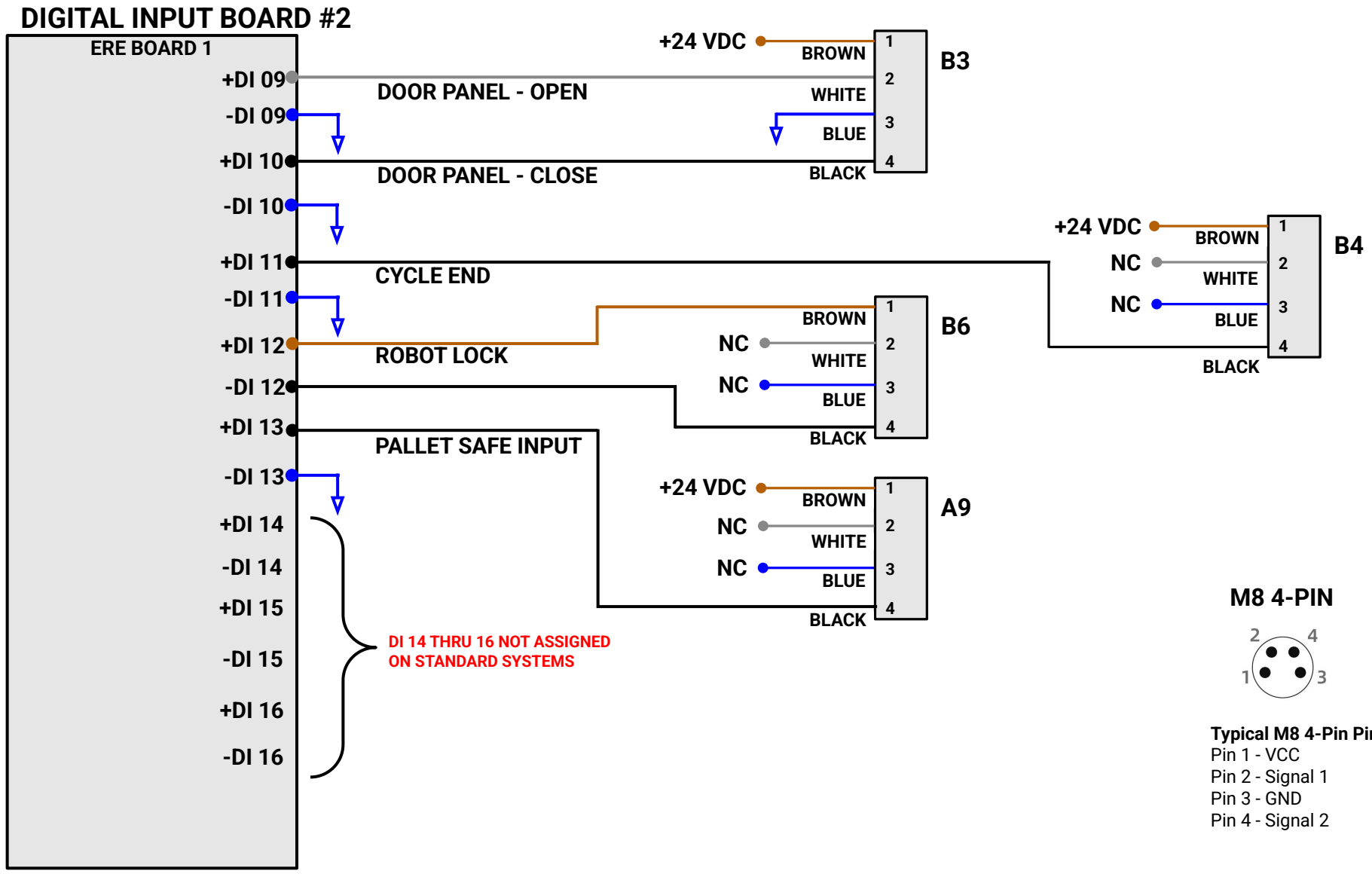
VSC Schematic - Power to CPU and I/O Boards



VSC Schematic - Digital Inputs to M8 Bulkheads



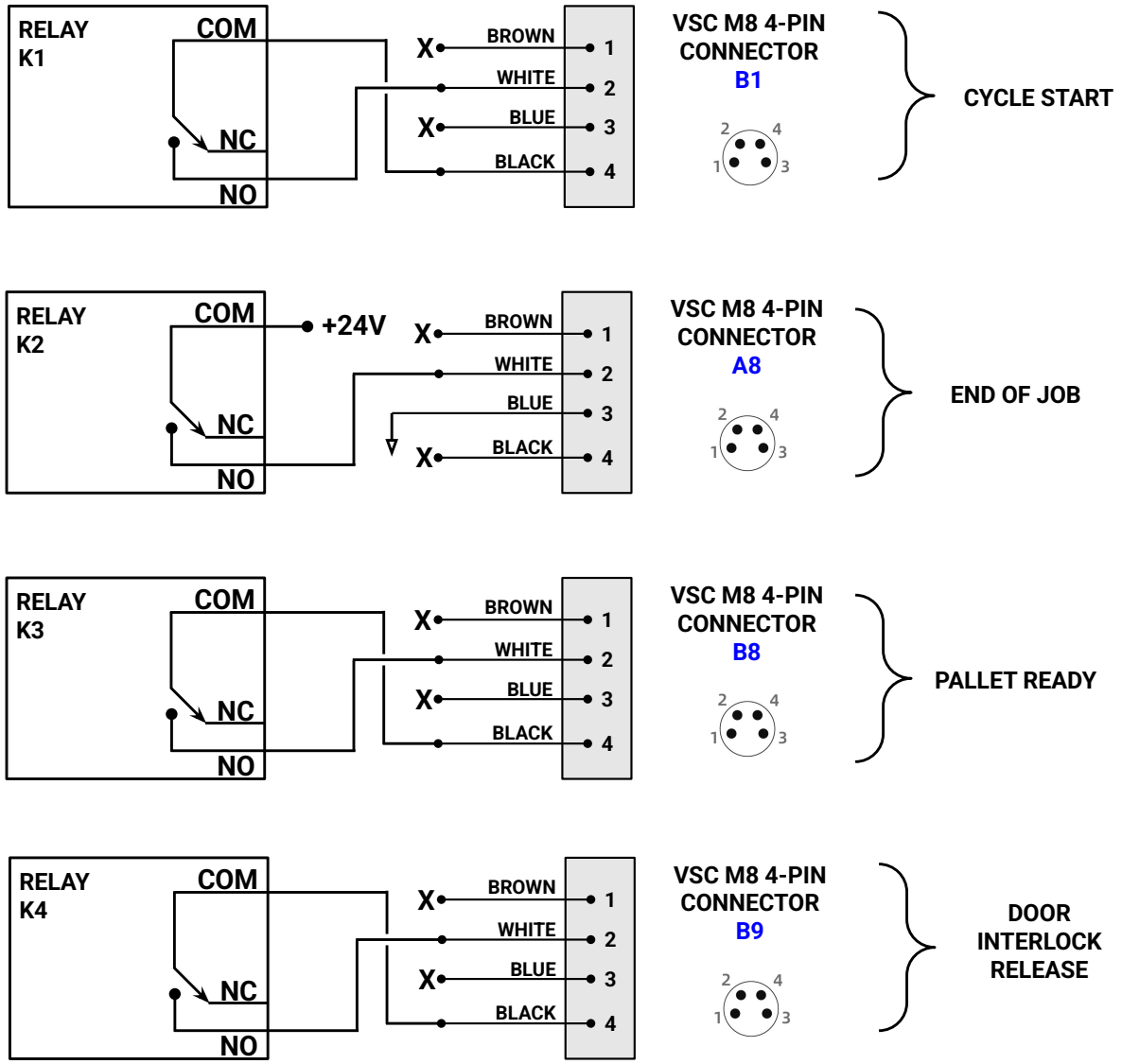
VSC Schematic - Digital Inputs to M8 Bulkheads



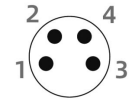
M8 4-PIN

Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

Relay Output Board Wiring to M8 Bulkheads

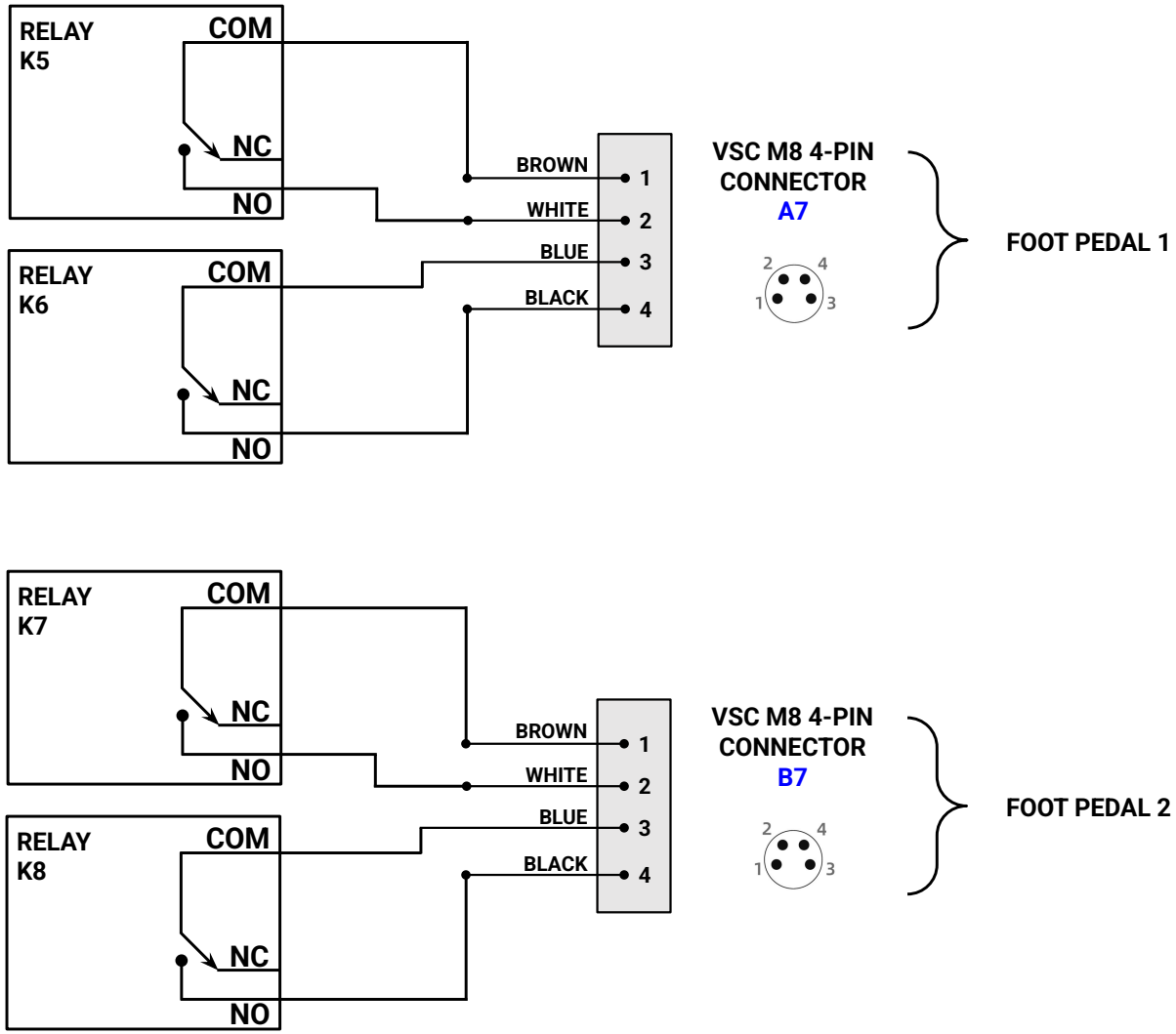


M8 4-PIN

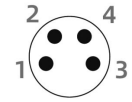


Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

Relay Output Board Wiring to M8 Bulkheads

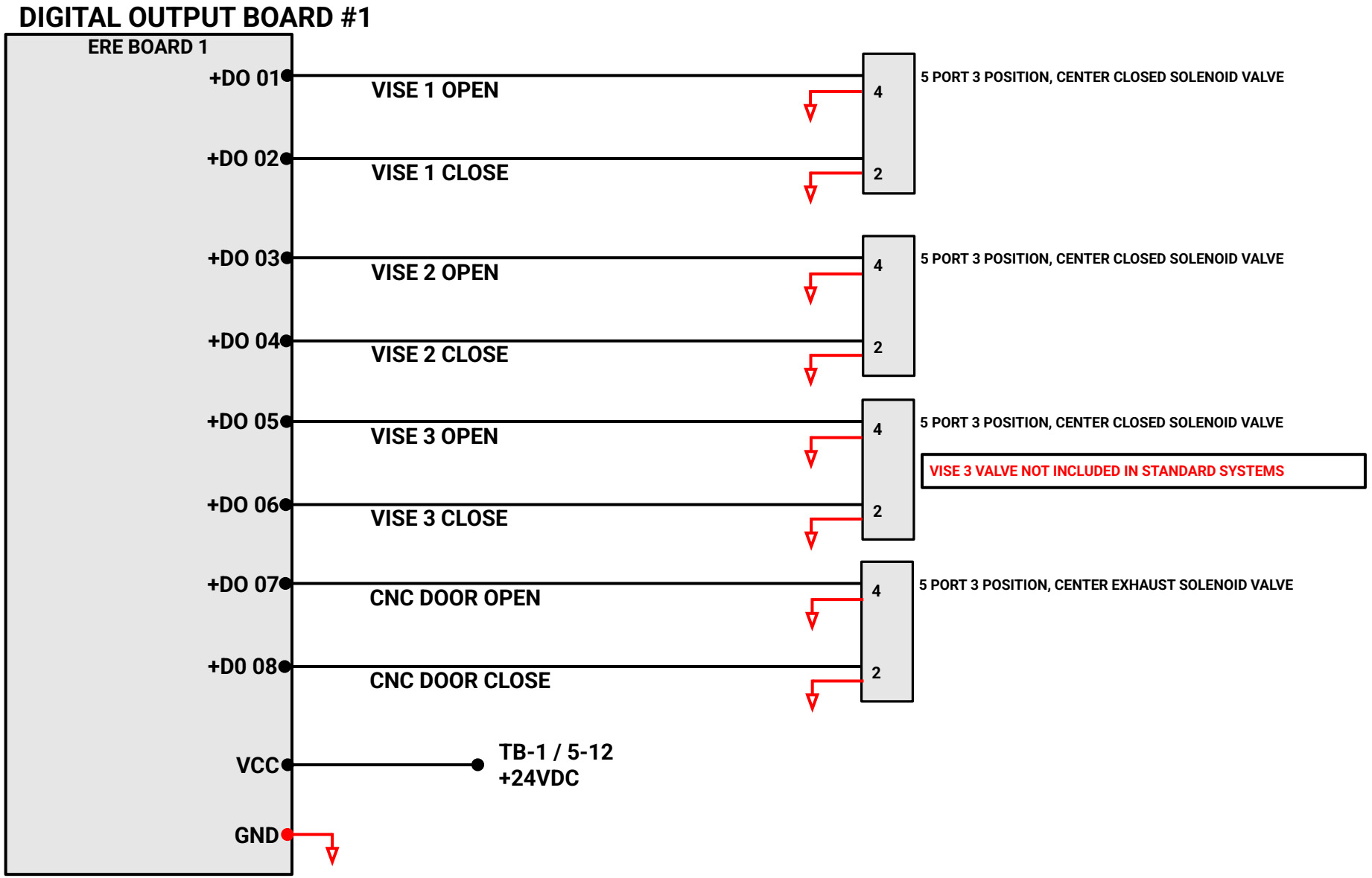


M8 4-PIN

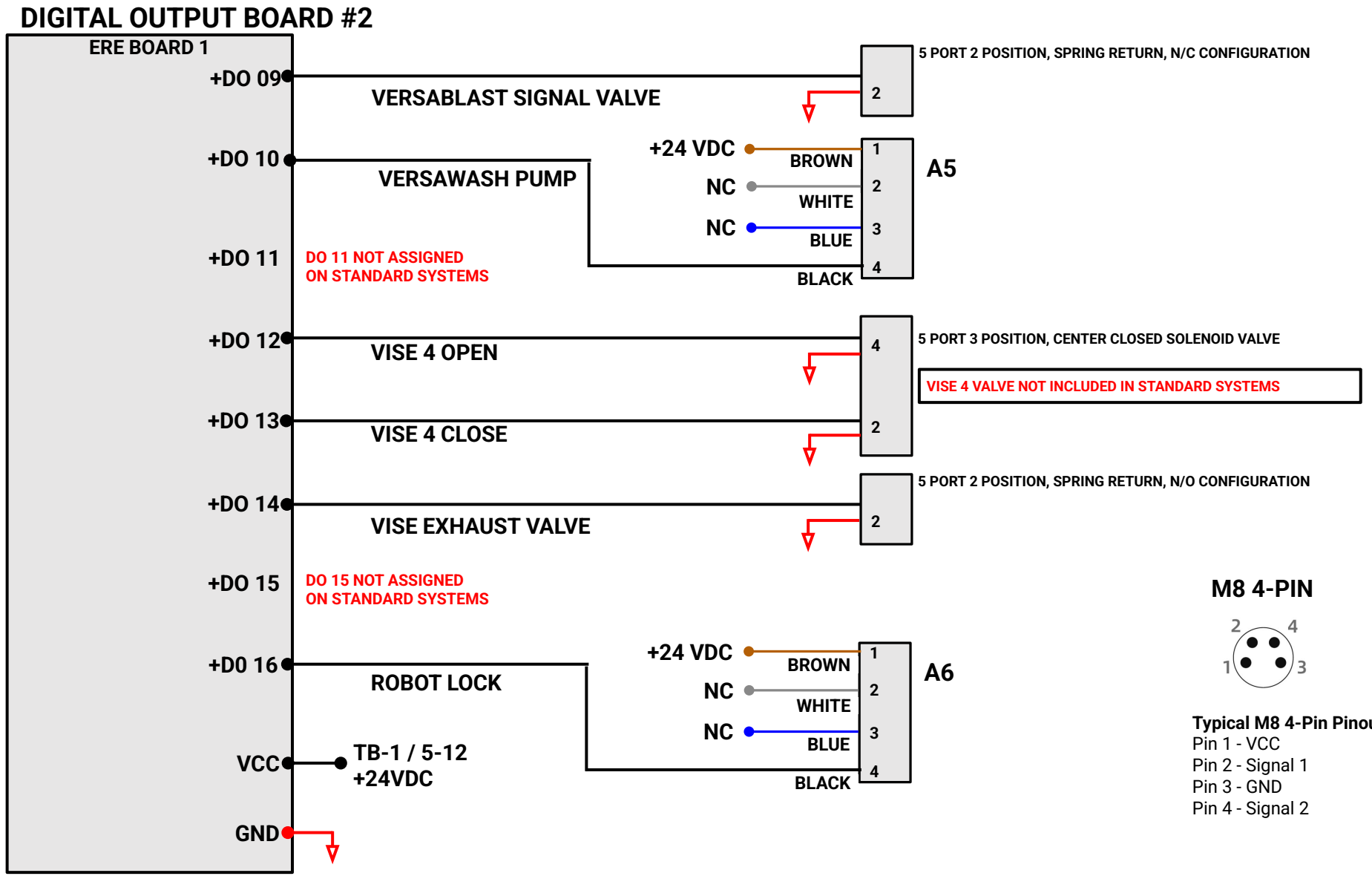


Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

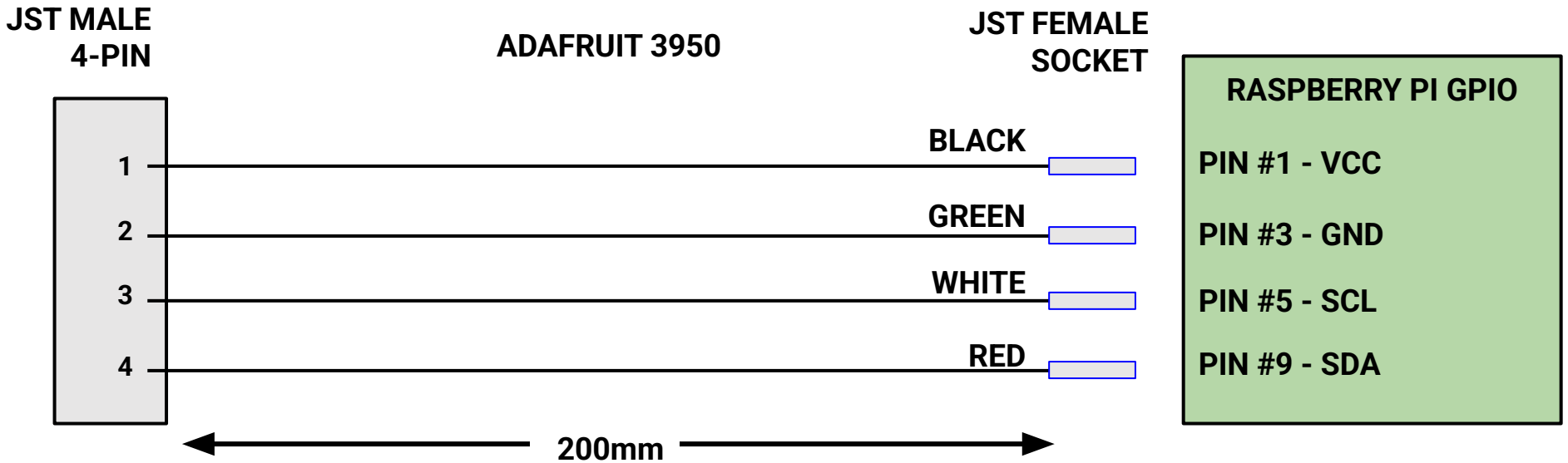
VSC Schematic - Digital Outputs to Valves

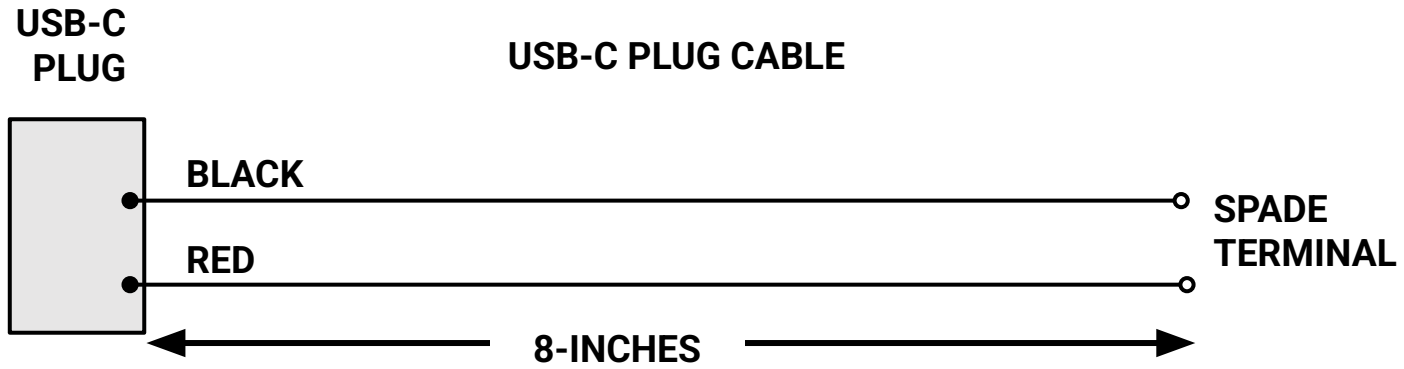


VSC Schematic - Digital Outputs to M8 Bulkheads & Valves



VSC Schematic - Connecting Cables





VSC 1.0 Cable Diagrams

Section 4

VSC 1.0 Cordset Diagram - CNC Buttons

VSC CONNECTIONS:

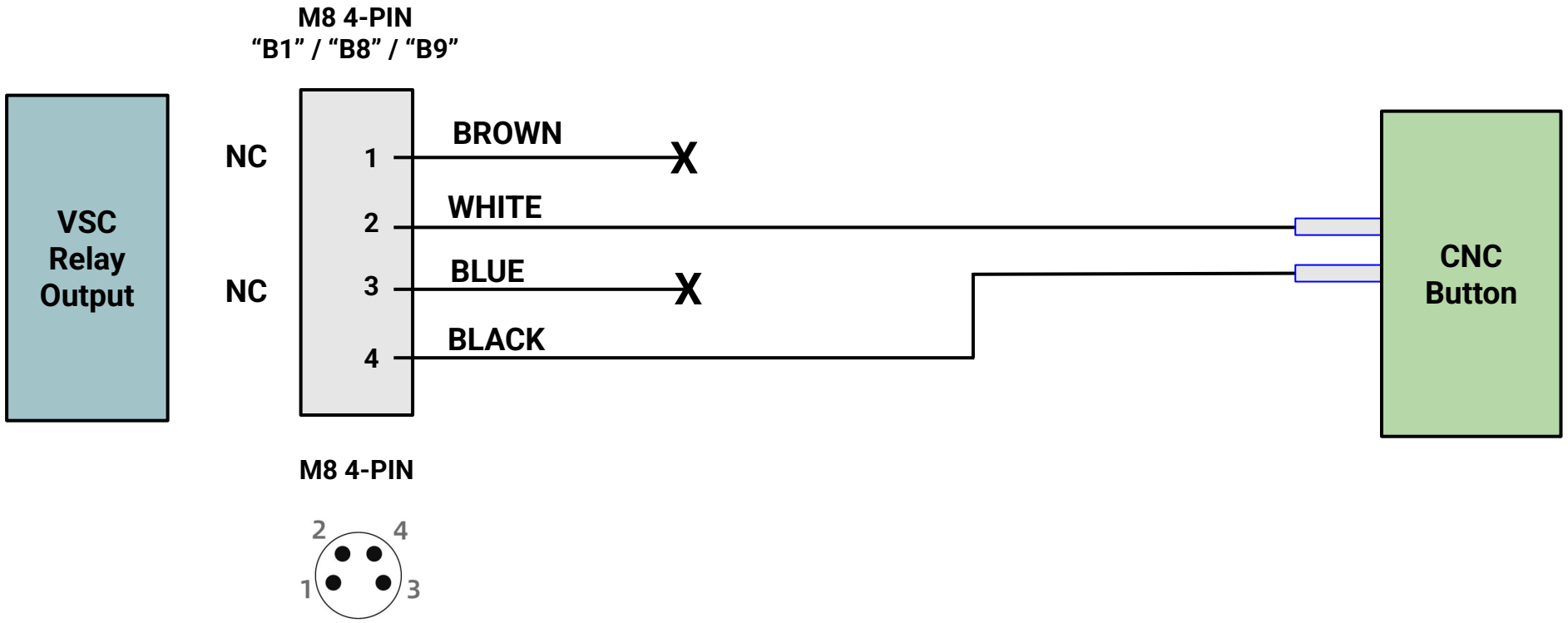
- CYCLE START - M8 4-PIN @ VSC B1
- PALLET READY - M8 4-PIN @ VSC B8
- DOOR INTERLOCK OVERRIDE - M8 4-PIN @ VSC B9

VSC SIGNAL:

- RELAY BOARD OUTPUT

CNC CONNECTIONS:

- FLYING LEADS WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSES THE CIRCUIT, EQUIVALENT TO PRESSING THE BUTTON

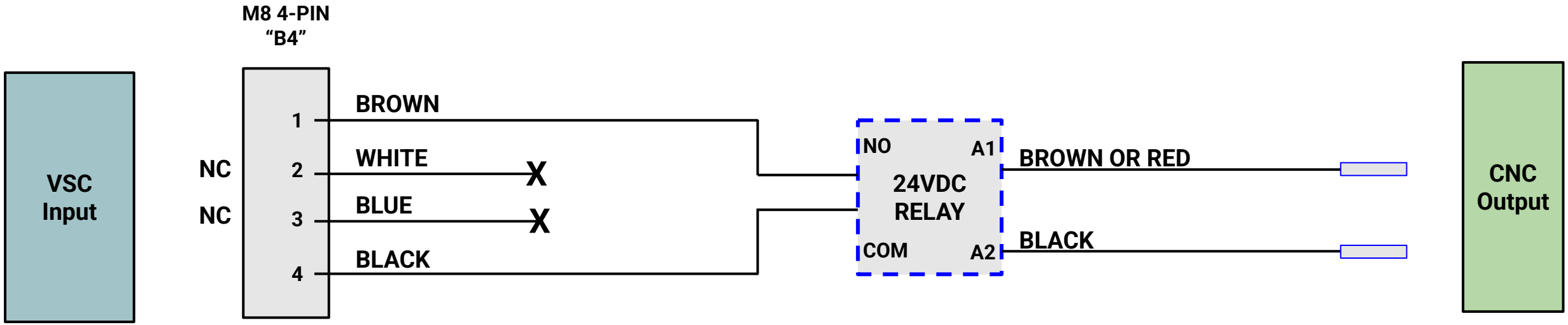


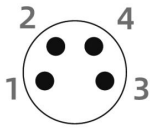
NC = No Connect

VSC 1.0 Cordset Diagram - CNC Cycle End

VSC CONNECTIONS:
- **M8 4-PIN @ VSC B4**

CNC CONNECTIONS:
- **FLYING LEADS TO M-CODE OR OTHER CNC OUTPUT SIGNAL (24VDC) FOR END OF CNC CYCLE**





Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

For CNC 24VDC output signals, a relay is supplied with the VersaBuilt Cycle End cable assembly. To protect the VSC components.

For CNC M-code relay outputs, the supplied relay is not required and the Brown/Black wires from the M8 4-pin cable can be connected directly to the CNC m-code terminals.

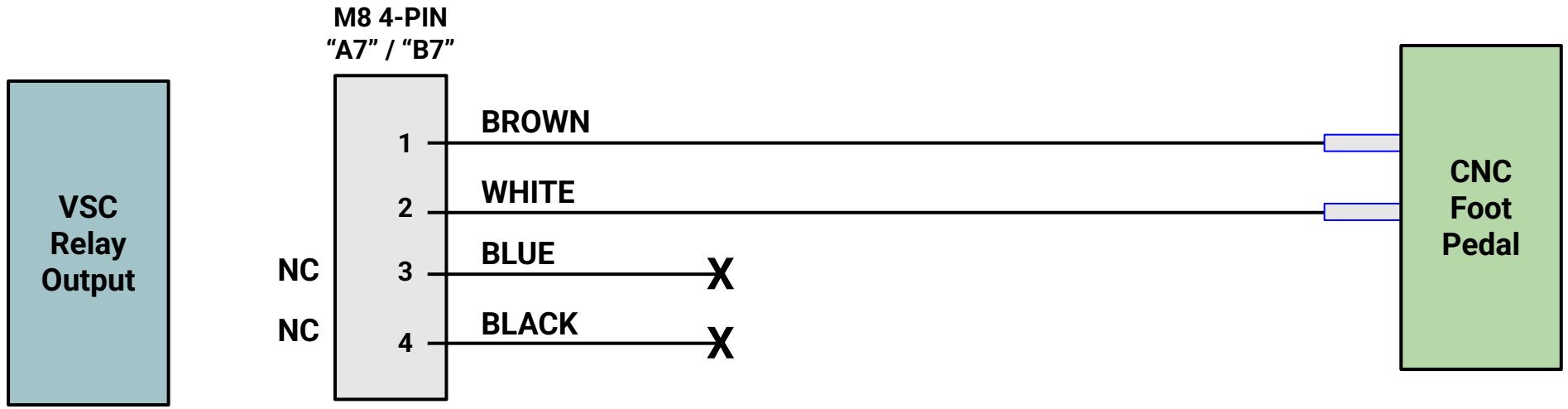
NC = No Connect

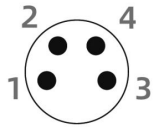
VSC 1.0 Cordset Diagram - Chuck Toggle / Foot Pedal

VSC CONNECTIONS:
- **FOOT PEDAL 1 - M8 4-PIN @ VSC A7**
- **FOOT PEDAL 2 - M8 4-PIN @ VSC B7**

VSC SIGNAL:
- **RELAY BOARD OUTPUT**

CNC CONNECTIONS:
- **FLYING LEADS TO FOOT PEDAL**
- **RELAY OUTPUT CONTACT CLOSURE CLOSES THE CIRCUIT, EQUIVALENT TO PRESSING THE FOOT PEDAL**





Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

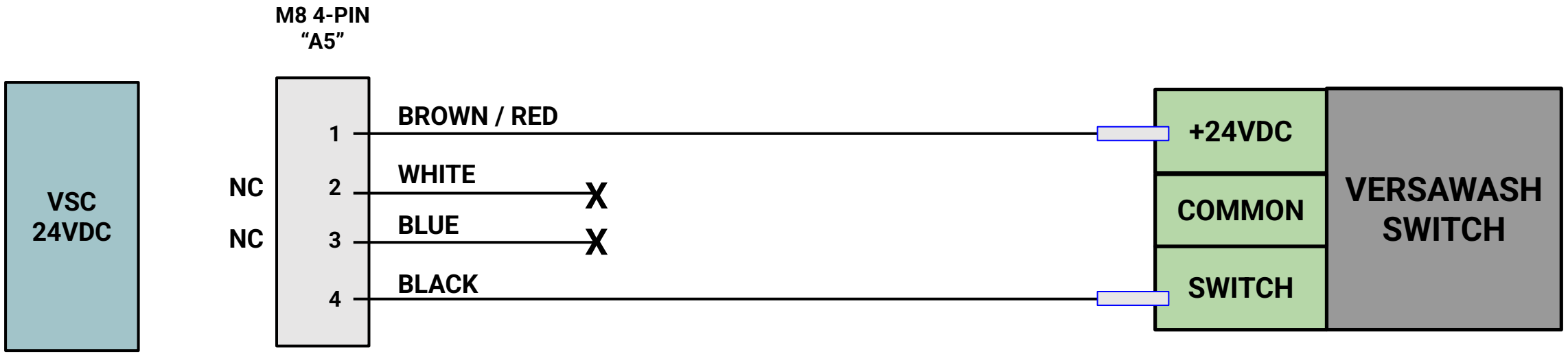
NC = No Connect

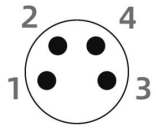
VSC 1.0 Cordset Diagram - VersaWash Signal Cable

VSC CONNECTIONS:
- **M8 4-PIN @ VSC A5**

VSC SIGNAL:
- **24VDC OUTPUT**

CNC CONNECTIONS:
- **FLYING LEADS TO SWITCH**





Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

NC = No Connect

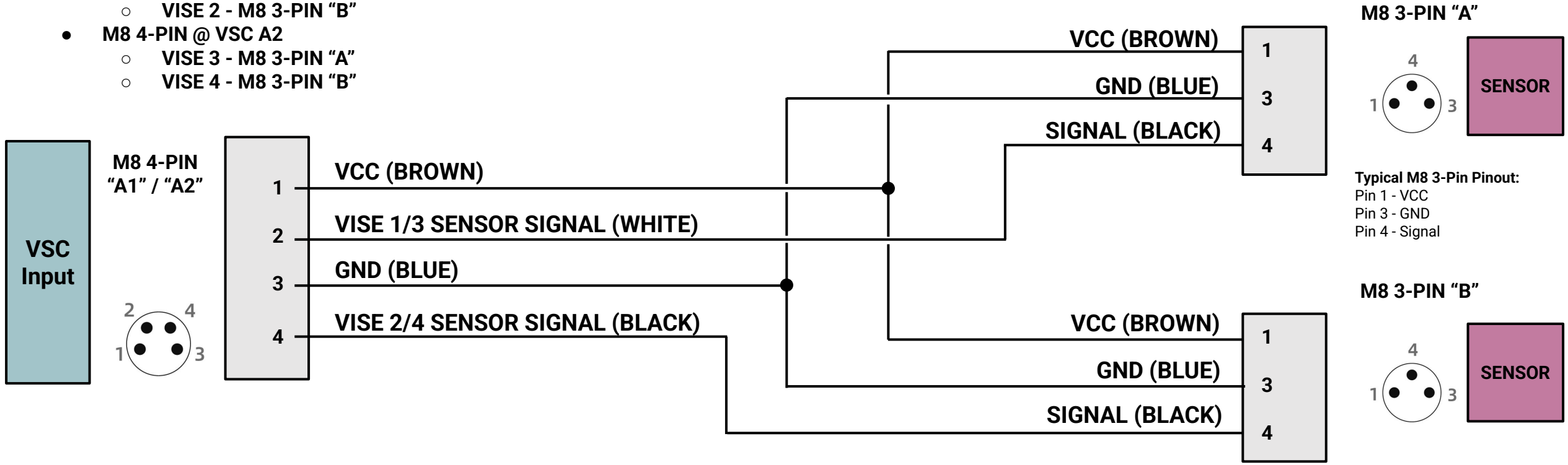
VSC 1.0 Cordset Diagram - Vise Sensor

VSC CONNECTIONS:

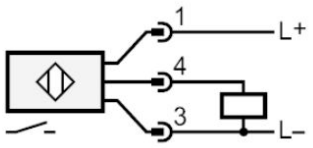
- **M8 4-PIN @ VSC A1**
  - **VISE 1 - M8 3-PIN “A”**
  - **VISE 2 - M8 3-PIN “B”**
- **M8 4-PIN @ VSC A2**
  - **VISE 3 - M8 3-PIN “A”**
  - **VISE 4 - M8 3-PIN “B”**

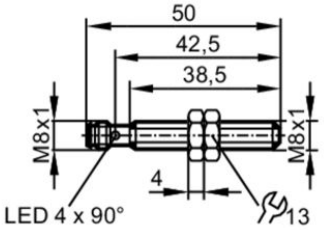
SENSOR CONNECTIONS:

- **M8 3-PIN**



SENSOR = INDUCTIVE FULL-METAL SENSOR (IFM IEC201):





For applications with an odd number of vises, only one signal needs to be provided from the sensor to the VSC. Cable connection options are:

- M8 3-pin cable to a Y-cable or Y-connector, covering or not using one side.
- M8 3-pin cable to flying leads, wired to a M8 4-Pin field wireable connector, connecting the signal to the corresponding pin 2 or pin 4, depending on the application. For example, a Vise 1 only setup, connect the 3-Pin cable signal (Pin 4, Black wire) to Pin #2 on the M8 4-pin field wireable connector & omit a connection to Pin #4.

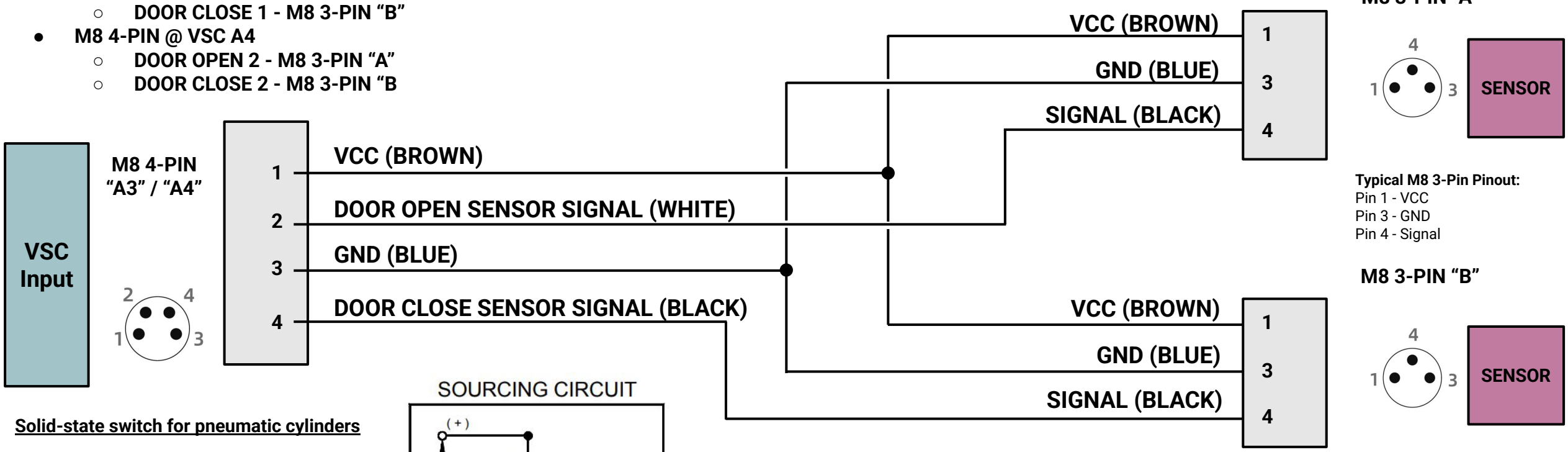
VSC 1.0 Cordset Diagram - Door Sensor

VSC CONNECTIONS:

- **M8 4-PIN @ VSC A3**
  - **DOOR OPEN 1 - M8 3-PIN “A”**
  - **DOOR CLOSE 1 - M8 3-PIN “B”**
- **M8 4-PIN @ VSC A4**
  - **DOOR OPEN 2 - M8 3-PIN “A”**
  - **DOOR CLOSE 2 - M8 3-PIN “B**

SENSOR CONNECTIONS:

- **M8 3-PIN**

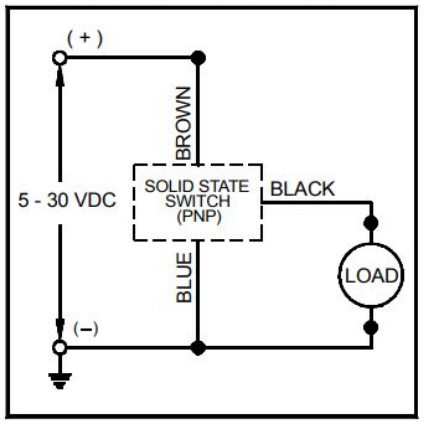


M8 3-PIN “A”

Typical M8 3-Pin Pinout:
Pin 1 - VCC
Pin 3 - GND
Pin 4 - Signal

M8 3-PIN “B”

SOURCING CIRCUIT



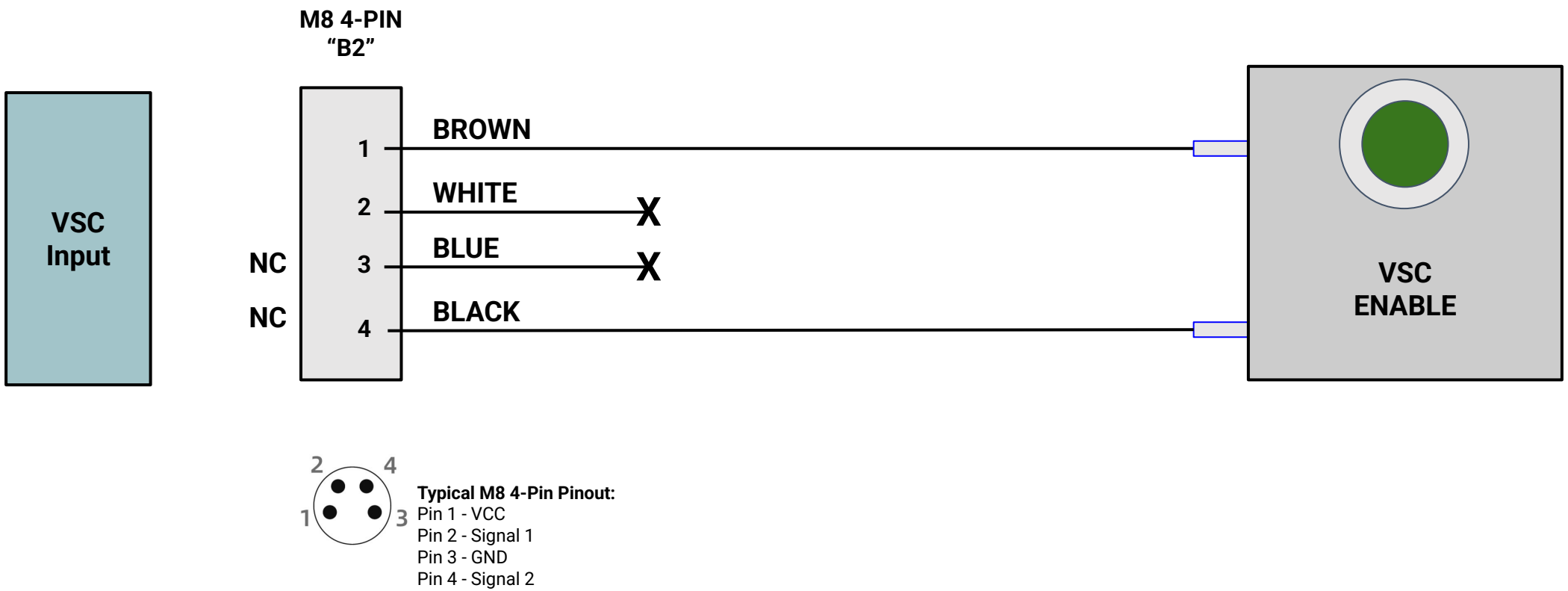
Solid-state switch for pneumatic cylinders

- **American Cylinder** #M36SHP-PT
- **Voltage:** 24V DC
- **Output Type:** PNP (sourcing)
- **Connector:** M8 plug
- **Includes:** LED indicator and band

VSC 1.0 Cordset Diagram - VSC Enable

VSC CONNECTIONS:
- **M8 4-PIN @ VSC B2**

SENSOR CONNECTIONS:
- **WIRED TO MOMENTARY PUSH BUTTON**



Typical M8 4-Pin Pinout:
Pin 1 - VCC
Pin 2 - Signal 1
Pin 3 - GND
Pin 4 - Signal 2

Inputs and Outputs

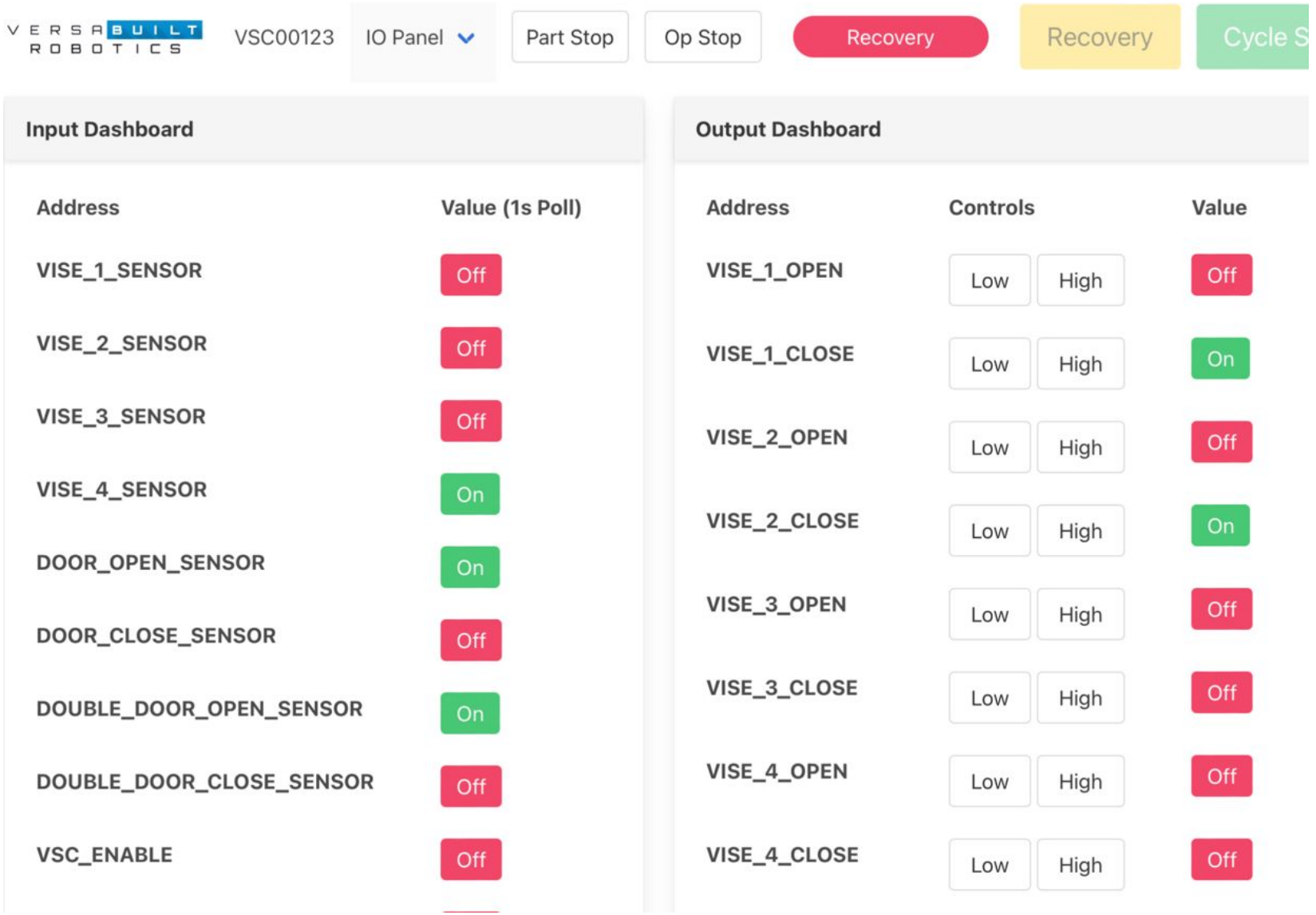
Section 5

Electrical I/O

The following pages summarize the 24VDC electrical inputs and outputs (I/O) of VersaBuilt Automation Systems. I/O testing, troubleshooting and validation can be completed with the VSC user interface I/O Panel page, setting signals high and low. Most devices can also be tested in the Recovery Panel on the Home Page.

Note: Electrical I/O is common across all Mill and Lathe Automation Systems.

VSC I/O Panel Page



VSC I/O Panel Page

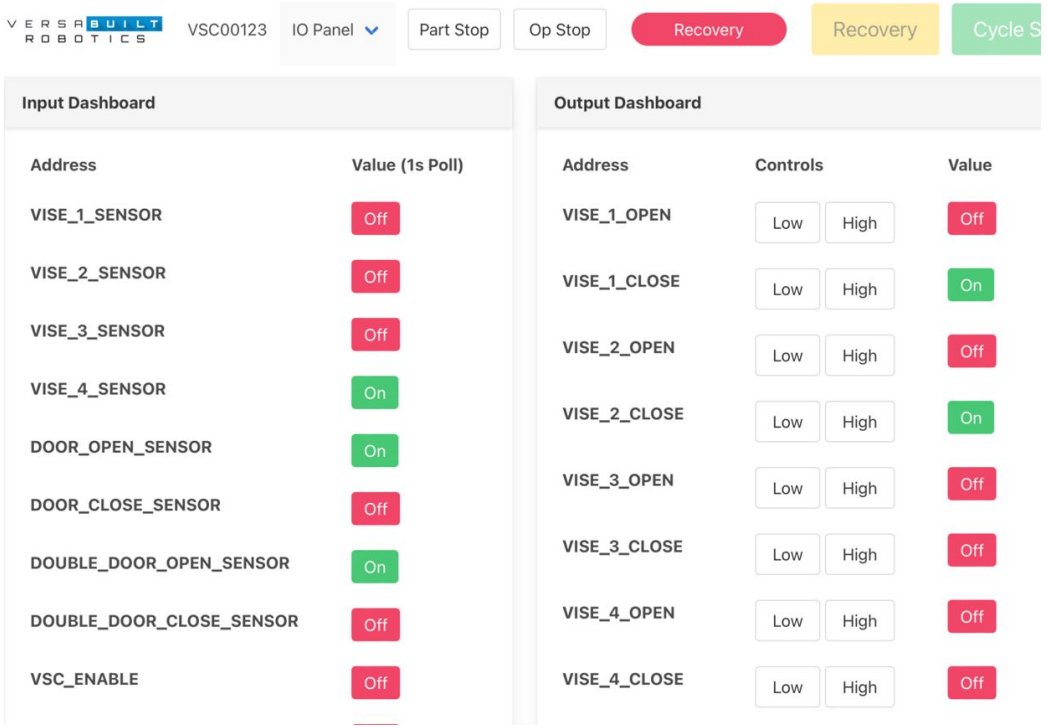
The VSC user interface I/O Panel Page is a dashboard displaying all inputs and outputs configured in the VersaBuilt System Controller.

The dashboard displays high and low settings with buttons to toggle high and low for testing and troubleshooting purposes.

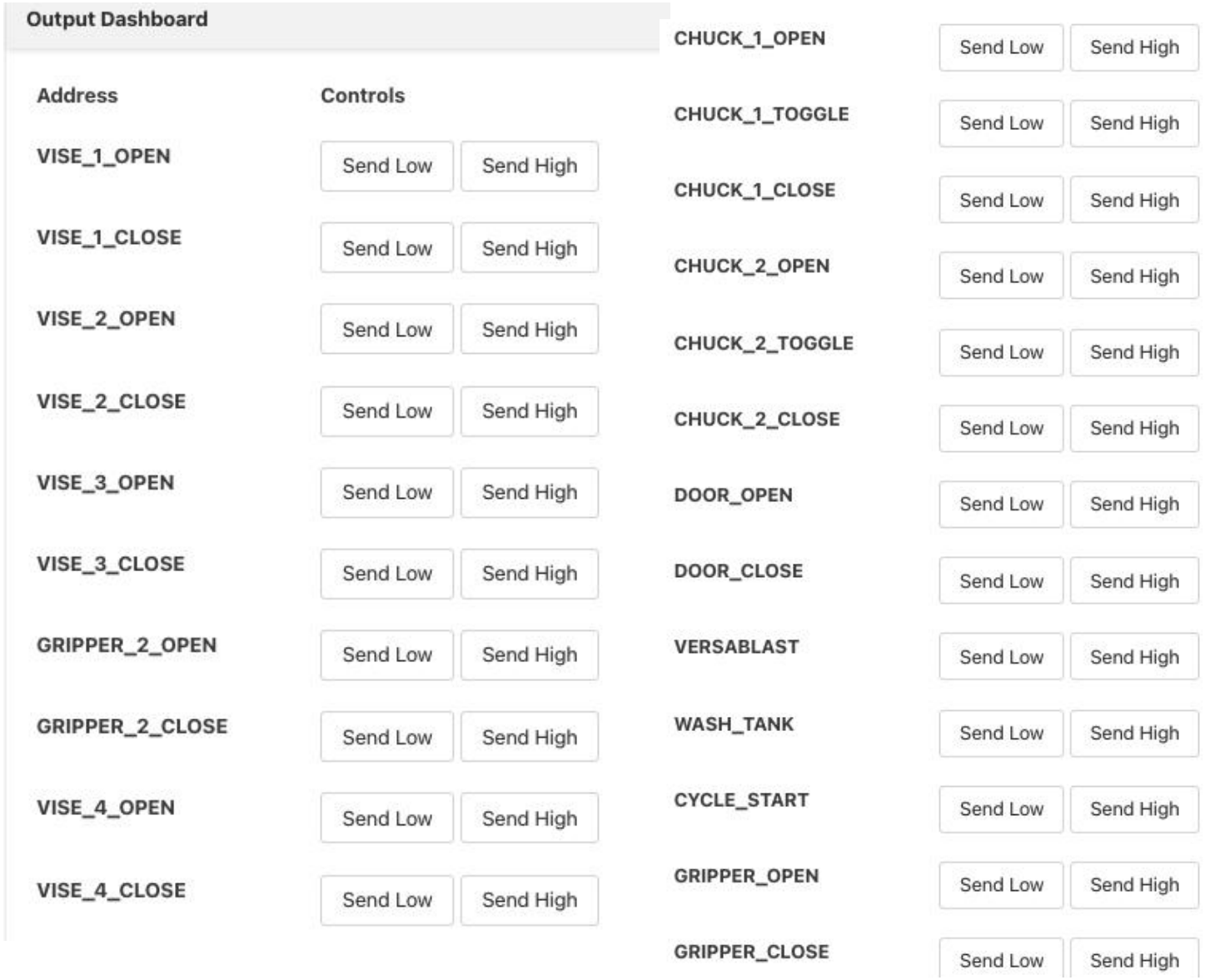
The IO Panel is used to verify the installation and to troubleshoot problems.

- Outputs send signals to devices (Open Chuck, Close Door, etc)
  - Send High - Turns on the signal
  - Send Low - Turns off the signal

- Inputs receive signals from devices (sensors, cycle end from CNC, VSC Enable button, etc.)
  - Off - no signal is received from device
  - On - signal has been received from device



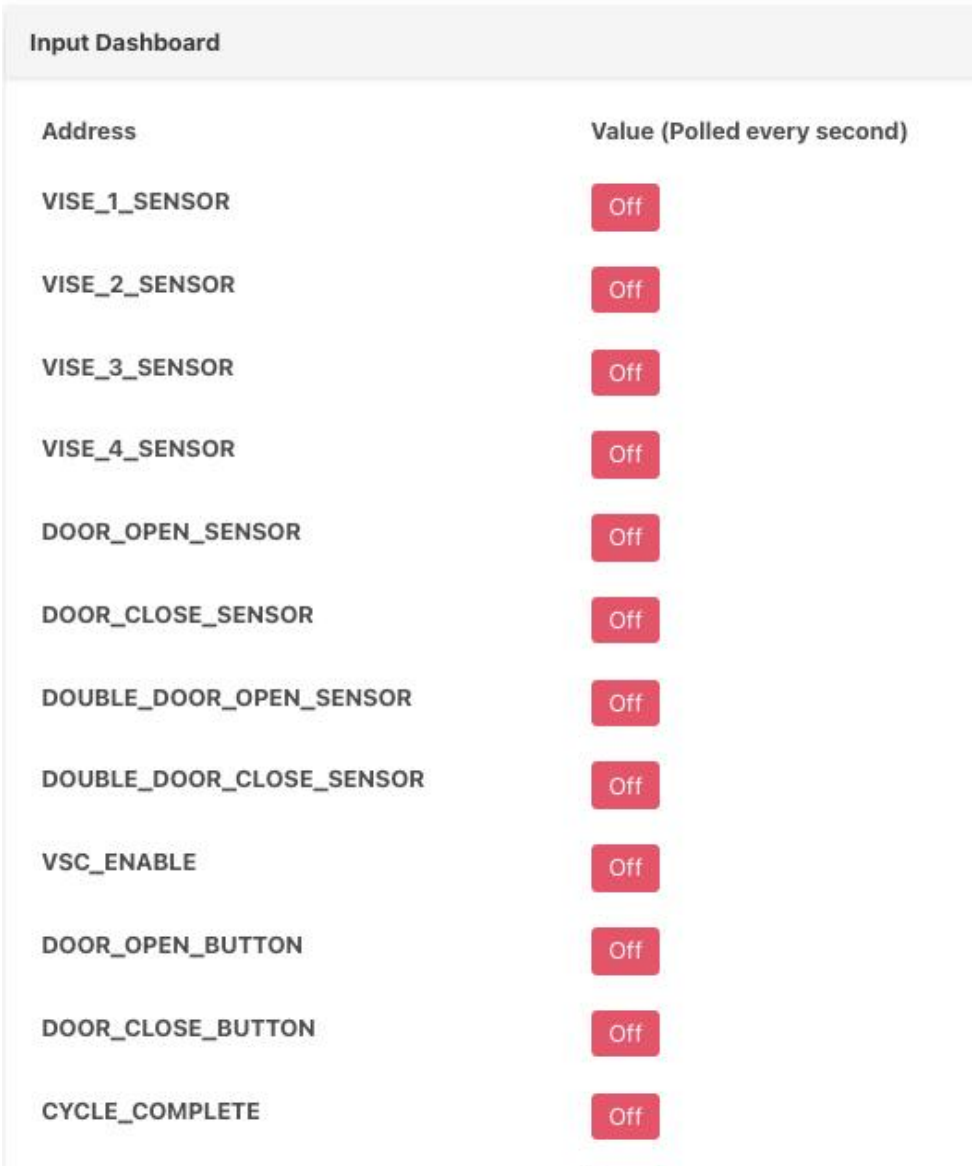
VSC Interface I/O Panel - Output Signals



Example use of I/O panel: Open and Close Vise 1

- Open Vise 1
  - Go to VISE_1_OPEN and select “Send High”
- Verify Vise opened or signal was made
- Remove signal
  - Go to VISE_1_OPEN and select “Send Low”
- Close Vise 1
  - Go to VISE_1_CLOSE and select “Send High”
- Verify Vise closed or signal was made
- Remove signal
  - Go to VISE_1_CLOSE and select “Send Low”

VSC Interface I/O Panel - Input Signals



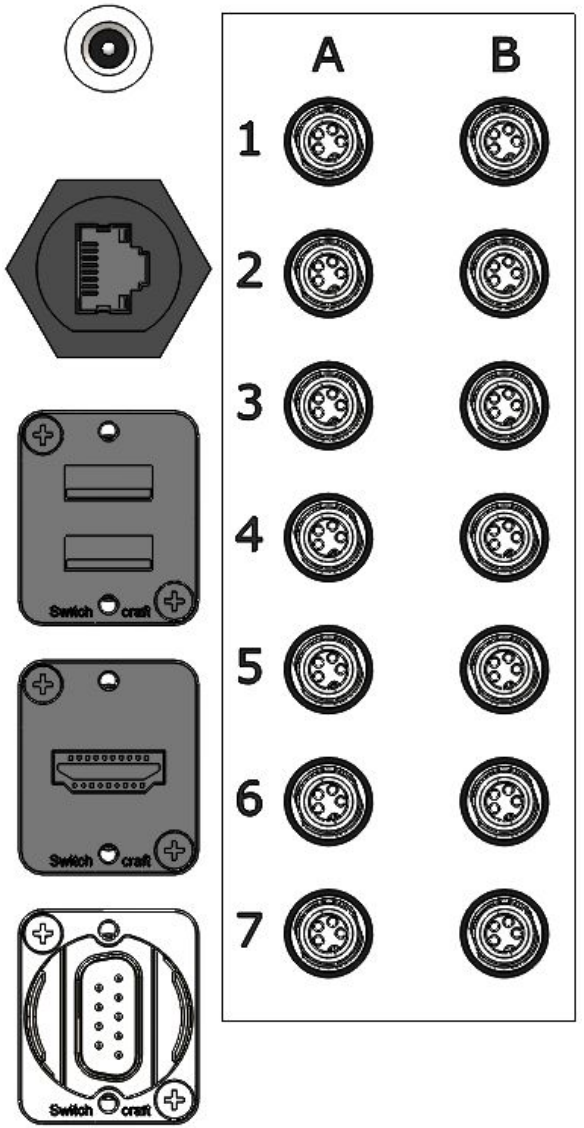
Example use of I/O panel: Checking Door Sensors

- Open CNC Door with VersaDoor
  - Go to DOOR_OPEN and select “Send High”
- Verify Vise opened
- Check that the light on the sensor hardware is illuminated
- Check that the Value on the “DOOR_OPEN_SENSOR” I/O Panel Input Dashboard changed from RED “Off” to GREEN “On”
- Remove signal to Door Opener
  - Go to DOOR_OPEN and select “Send Low”
- Close CNC Door with VersaDoor
  - Go to DOOR_CLOSE and select “Send High”
- Verify Door closed
- Check that the light on the sensor hardware is illuminated
- Check that the Value on the “DOOR_CLOSE_SENSOR” I/O Panel Input Dashboard changed from RED “Off” to GREEN “On”
- Remove signal to Door Opener
  - Go to DOOR_CLOSE and select “Send Low”

VSC Panel Connections (*Legacy S/N thru vsc00187*)

- **Power = 110VAC to 24VDC cord provided with VSC Panel**
- **Ethernet**
- **USB ports 1 and 2 (keyboard, mouse, backup)**
- **HDMI port (monitor)**
- **RS232 DB9 = Serial Port Connection to CNC if Ethernet is not available**

VSC M8	Standard System Device	Signals to VSC
A1	Vise Sensor, Vise 1 and Vise 2	2 Input Signals
A2	Vise Sensor, Vise 3 and Vise 4	2 Input Signals
A3	VersaDoor Sensor, Door 1 Open/Close	1 Input Signal
A4	VersaDoor Sensor, Door 2 Open/Close	2 Input Signals
A5	VersaWash	1 24VDC Output
A6	Dual CNC Communication - Robot Lock	1 24VDC Output
A7	Foot Pedal 1 Toggle	1 Relay Output
B1	CNC Cycle Start	1 Relay Output
B2	VSC Enable Button	1 Input Signal
B3	Door Operator Panel Open/Close	2 Input Signals
B4	CNC Cycle End	1 Input Signal
B5	Open/Not connected	-
B6	Dual CNC Communication - Robot Lock	1 Input Signal
B7	Foot Pedal 2 Toggle	1 Relay Output



***Applies to VSC S/N's thru 00187**

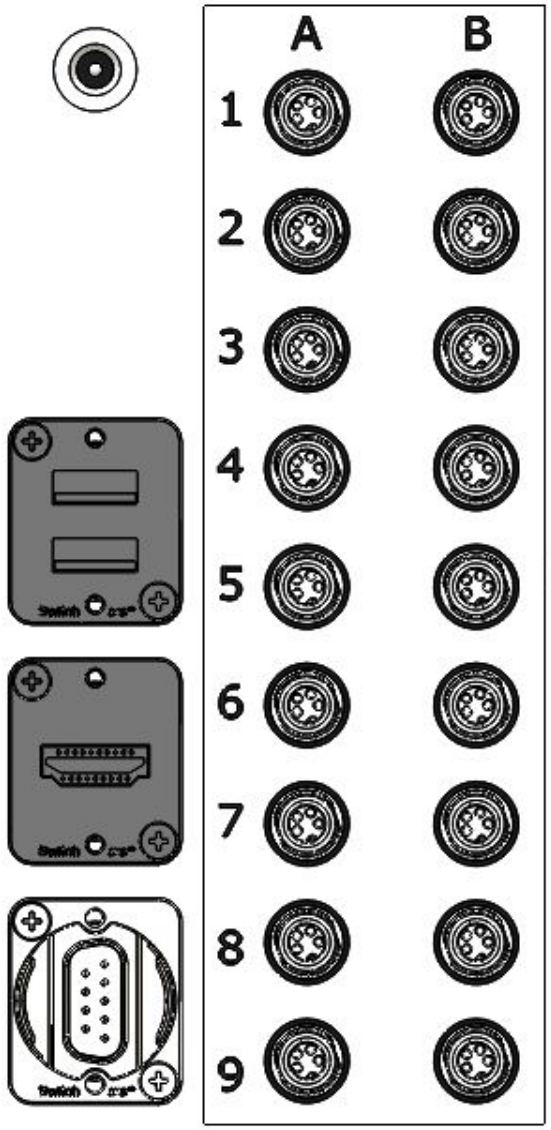
***A2 was wired for Cycle End Command and Vise 3 Sensor on serial numbers VSC00100 thru VSC00107, and VBR serial numbers**

***Legacy LAS - A1 and A2 wired for Chuck 1 and 2 control where A7 and B7 are unused**

VSC 1.0 Panel Connections (*S/N starting vsc00200*)

- **Power = 110VAC to 24VDC cord provided with VSC Panel**
- **USB ports 1 and 2 (keyboard, mouse, backup)**
- **HDMI port (monitor)**
- **RS232 DB9 = Serial Port Connection to CNC if Ethernet is not available**

VSC M8	Standard System Device	Signals to VSC
A1	Vise Sensor, Vise 1 and Vise 2	2 Input Signals
A2	Vise Sensor, Vise 3 and Vise 4	2 Input Signals
A3	VersaDoor Sensor, Door 1 Open/Close	1 Input Signal
A4	VersaDoor Sensor, Door 2 Open/Close	2 Input Signals
A5	VersaWash	1 24VDC Output
A6	Dual CNC Communication - Robot Lock	1 24VDC Output
A7	Foot Pedal 1 Toggle	1 Relay Output
A8	End of Job Indicator (stack light)	1 24VDC Output
A9	Pallet Safe	1 Input Signal
B1	CNC Cycle Start	1 Relay Output
B2	VSC Enable Button	1 Input Signal
B3	Door Operator Panel Open/Close	2 Input Signals
B4	CNC Cycle End	1 Input Signal
B5	Open/Not connected	-
B6	Dual CNC Communication - Robot Lock	1 Input Signal
B7	Foot Pedal 2 Toggle	1 Relay Output
B8	Pallet Ready	1 Relay Output
B9	Door Interlock Release	1 Relay Output



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