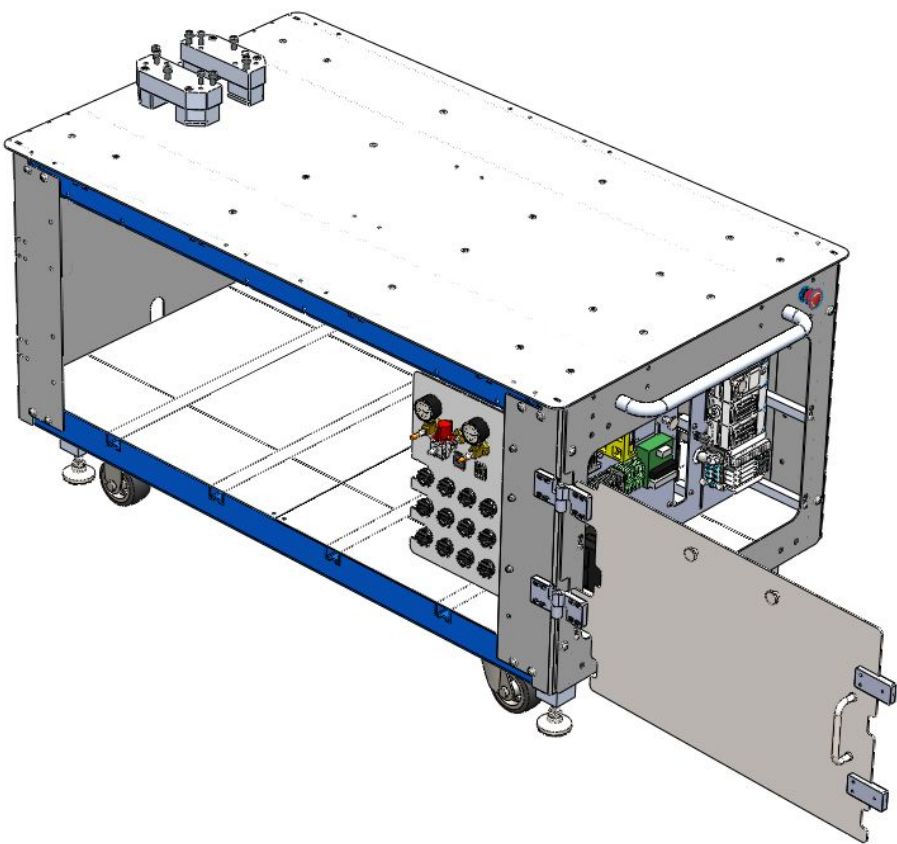


VERSABUILT ROBOTICS



Automation System Electrical, I/O, Network, and Pneumatics Manual

**Available for Fanuc CRX robots*

VSC 2.0

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2026-04-21

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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 110vac 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 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, Including:	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 *MultiGrip Systems only	120 VAC 1 phase 50/60 Hz	2

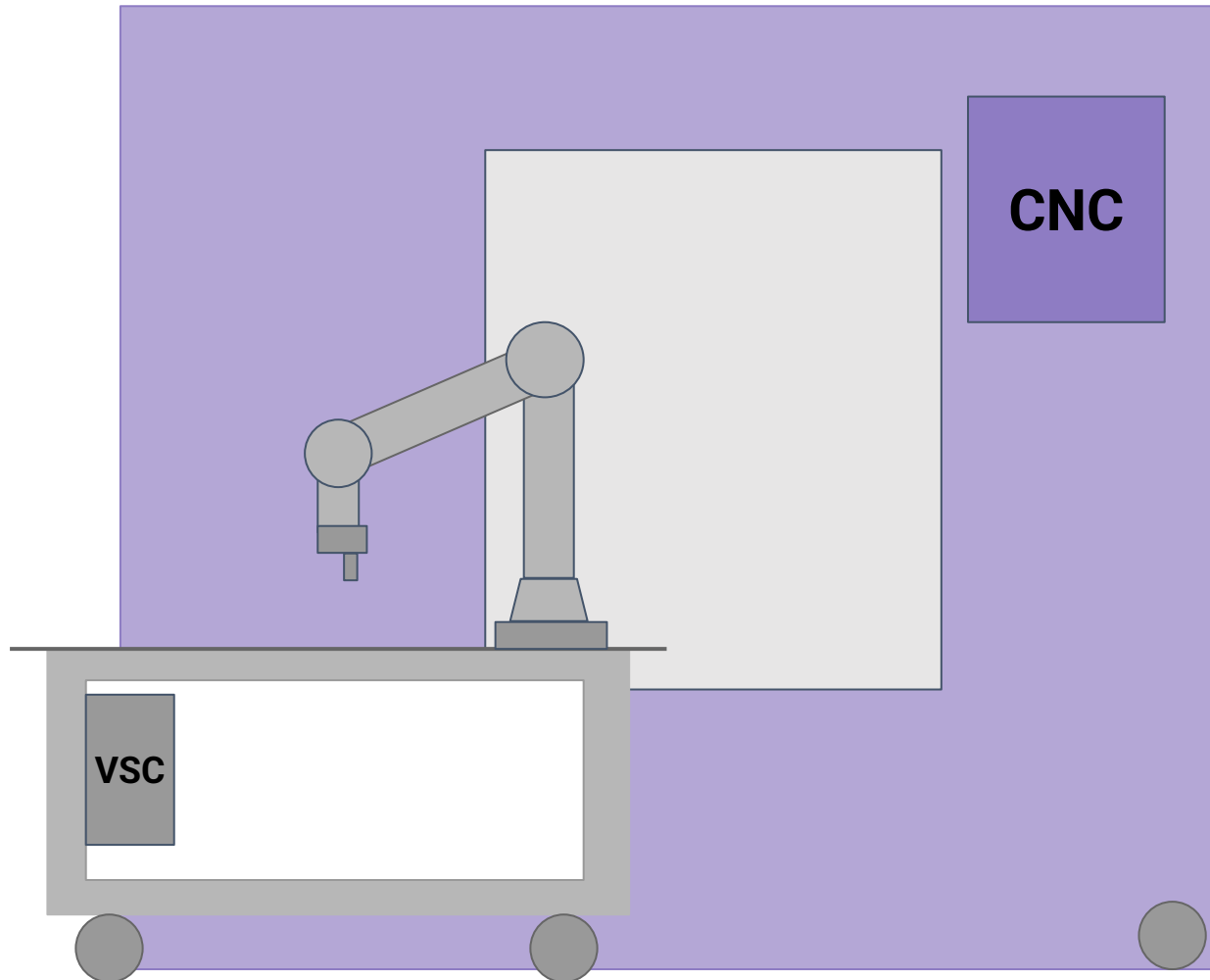
Electrical circuit breaker(s) should be adequately sized for the application. For the above devices a 10A or 15A breaker for all is recommended.

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

VSC 2.0 Layout / Electrical & I/O

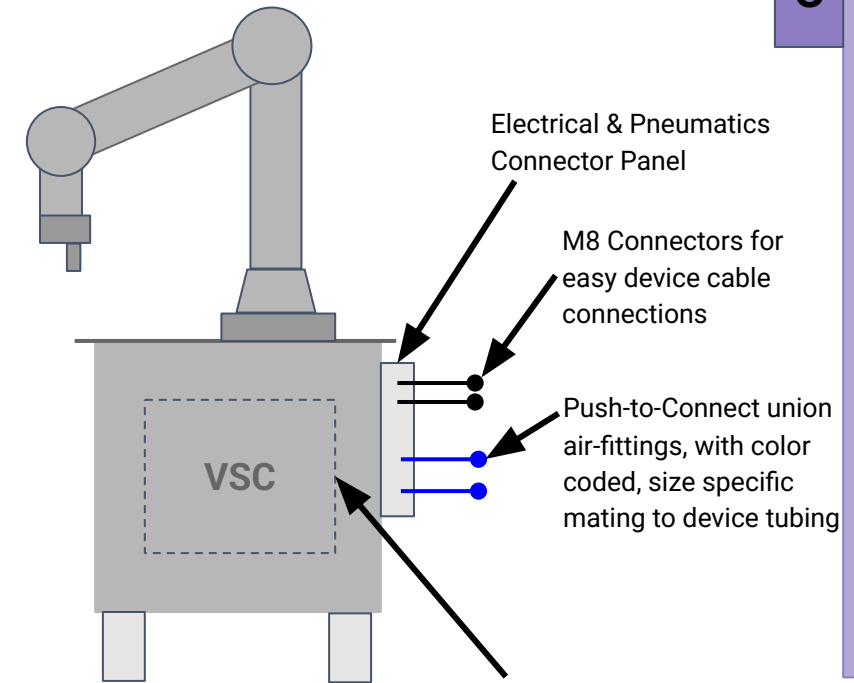
Section 3

VSC 2.0 Components & Layout



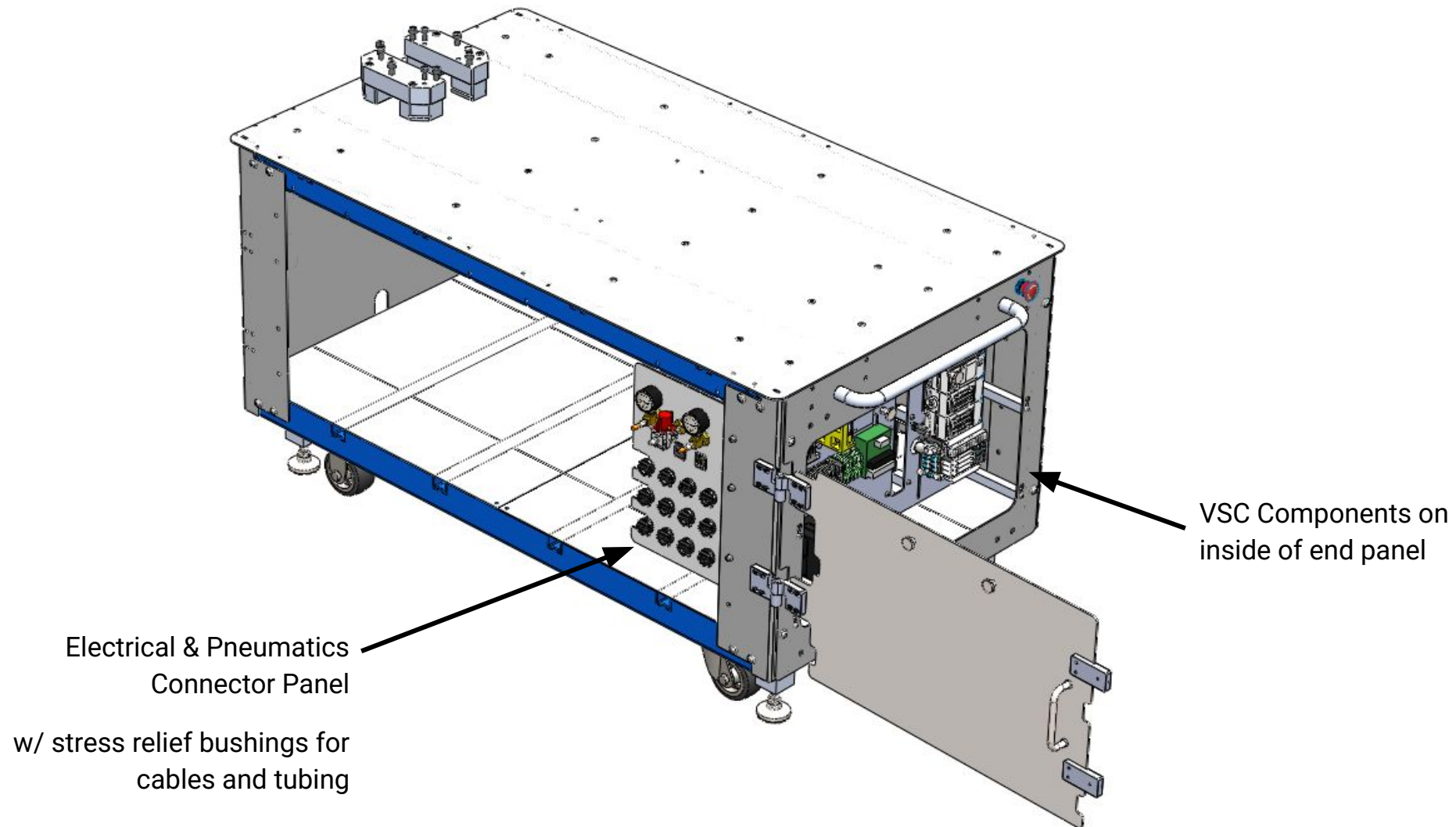
FRONT VIEW

VSC 2.0 is integrated with the VersaCart, with components mounted **under the cart** top surface and a connector panel **between the CNC & VersaCart**

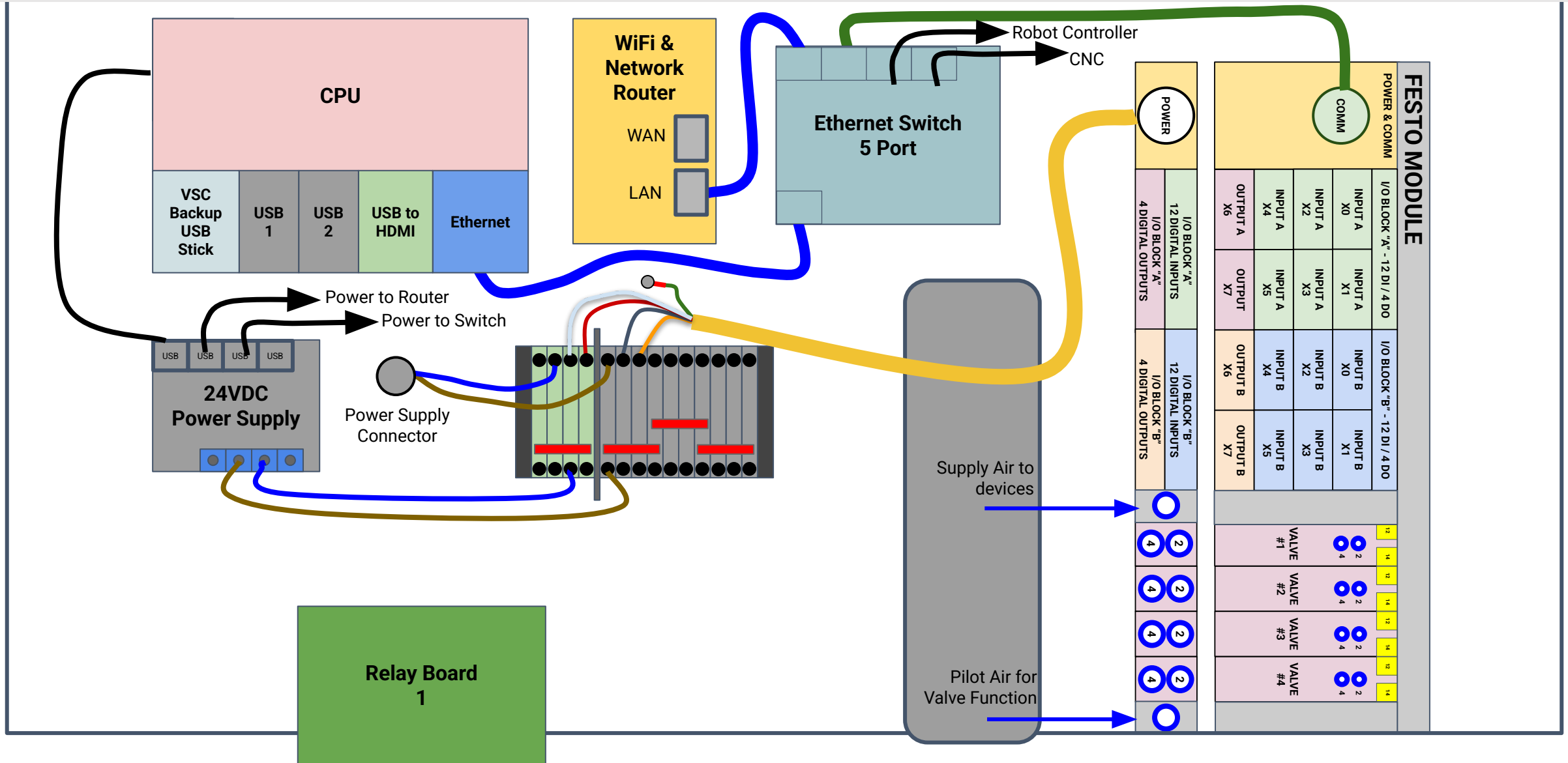


SIDE VIEW

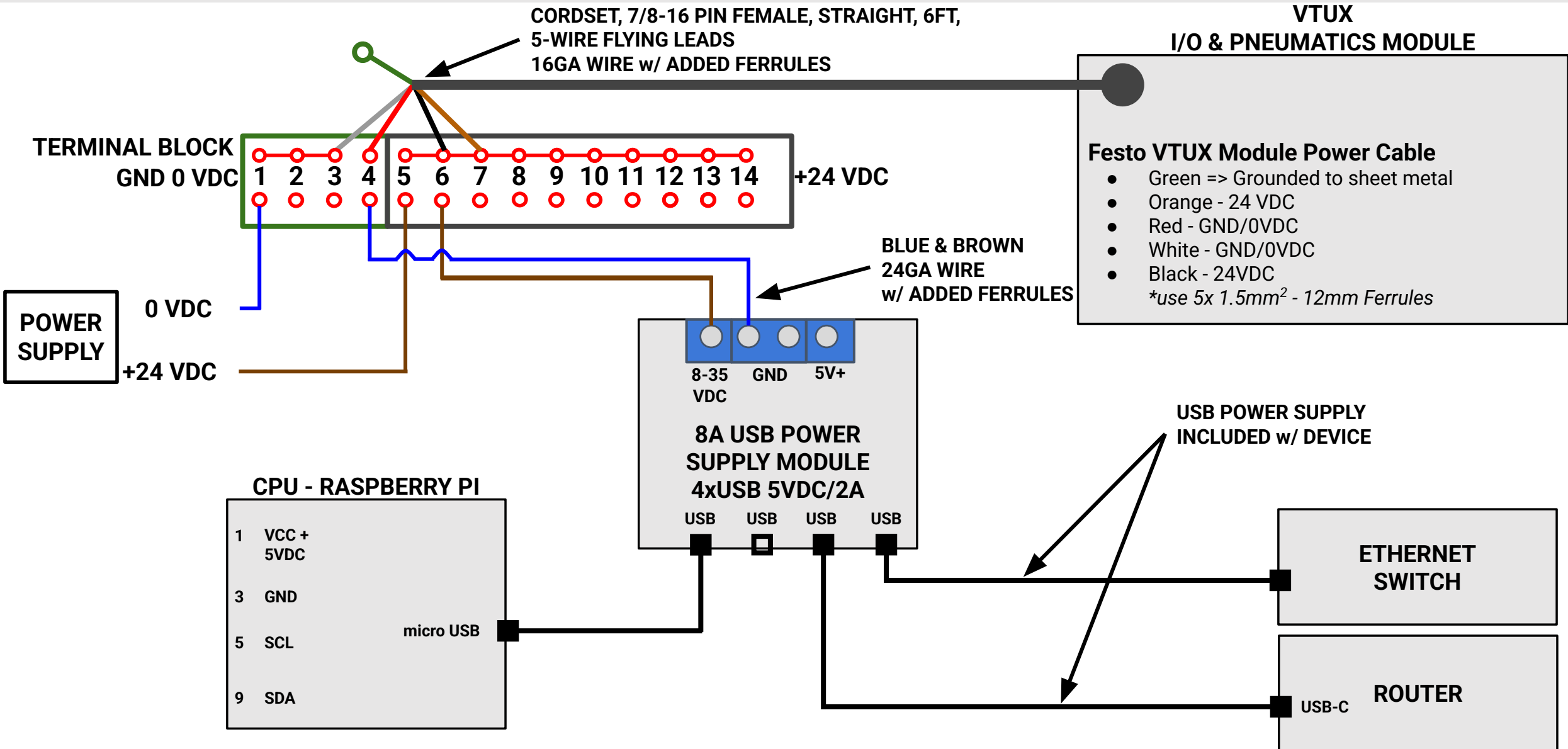
VSC 2.0 Components & Layout



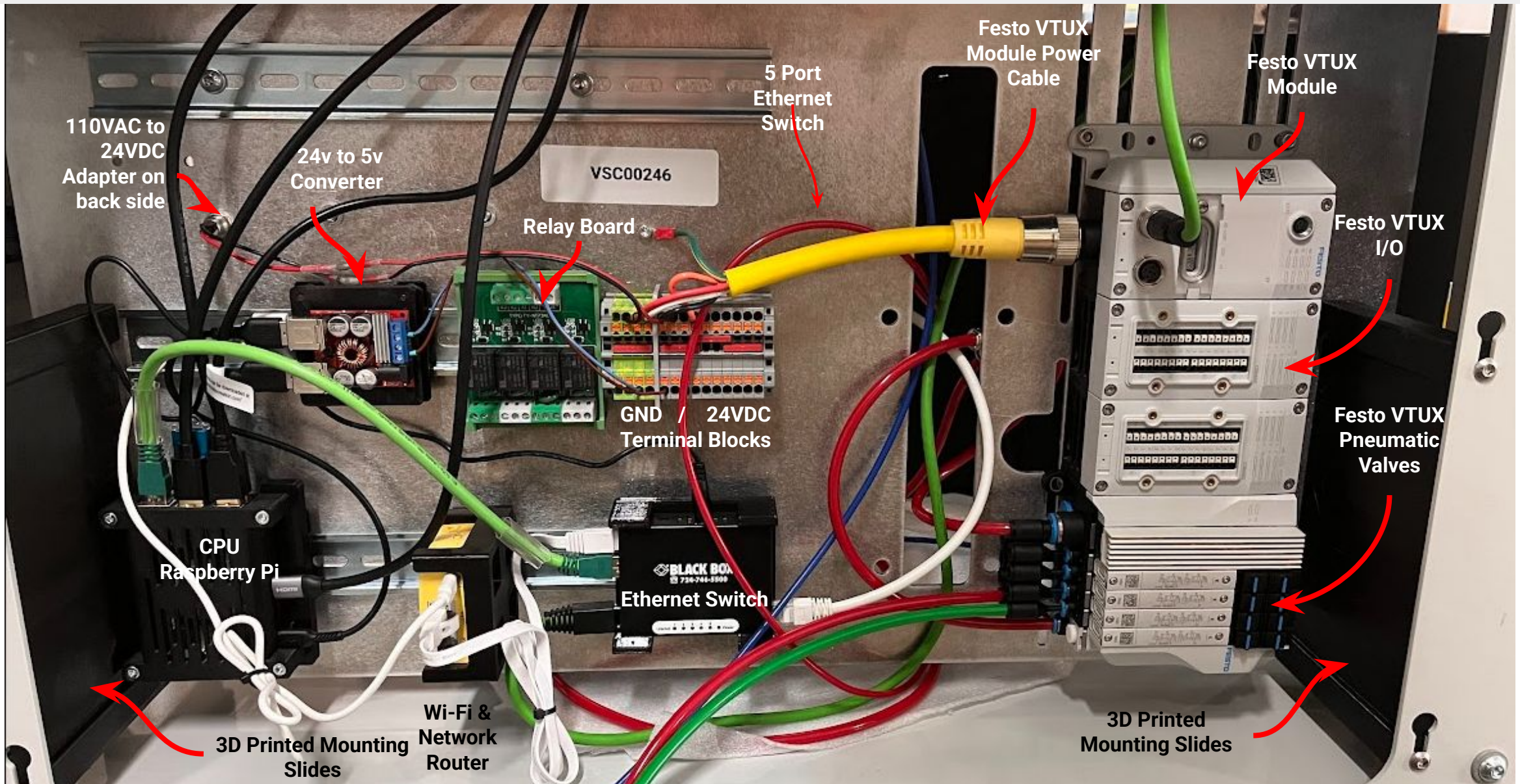
VSC 2.0 Components - Under VersaCart (vsc00245+)



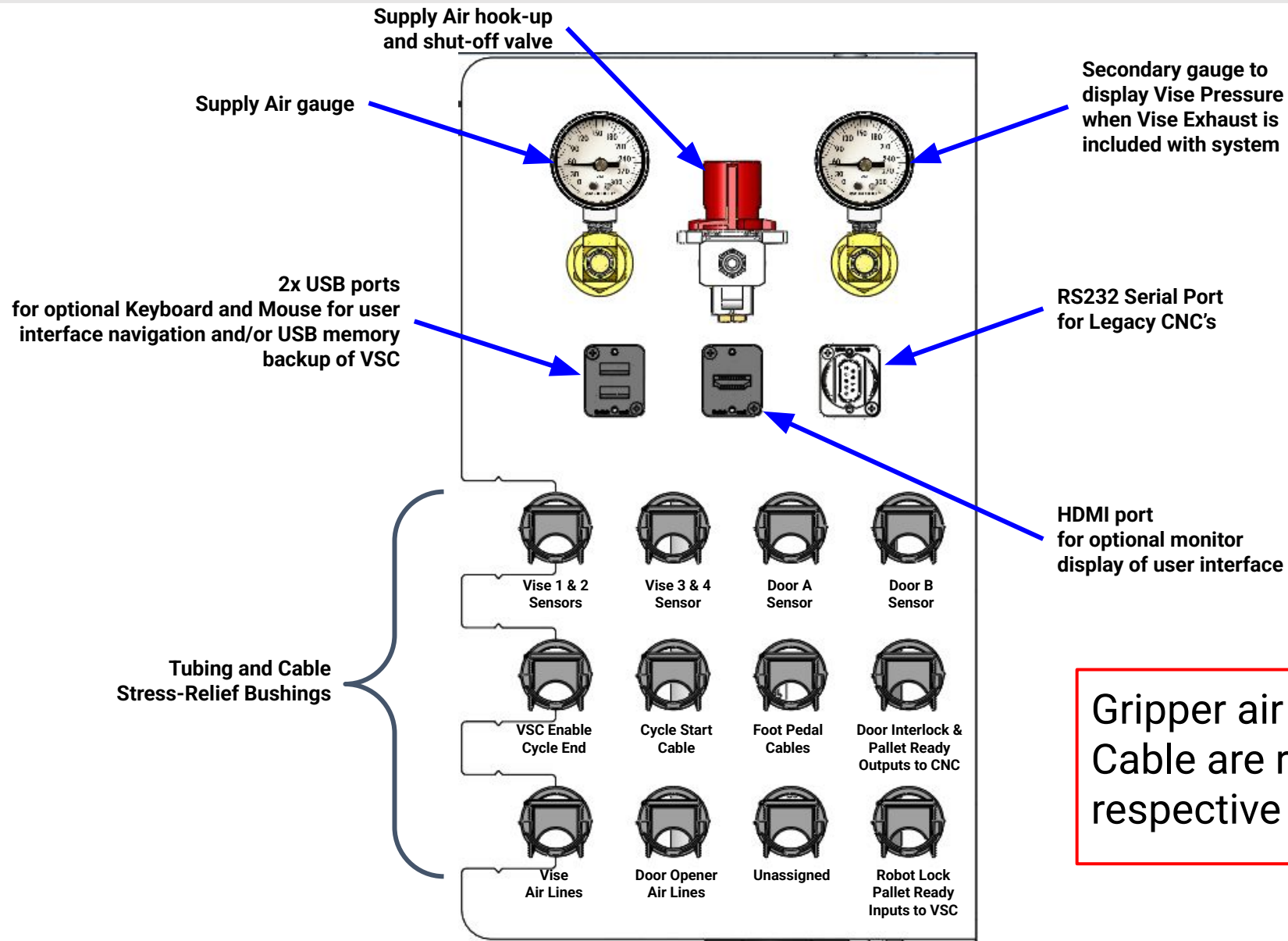
VSC 2.0 - Power Diagram (vsc00245+)



VSC 2.0 Components - Under VersaCart (vsc00245+)



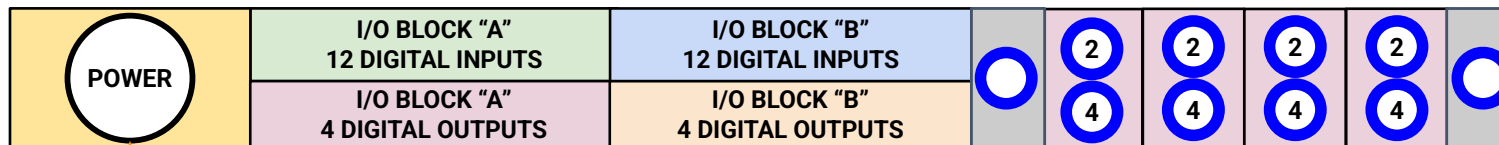
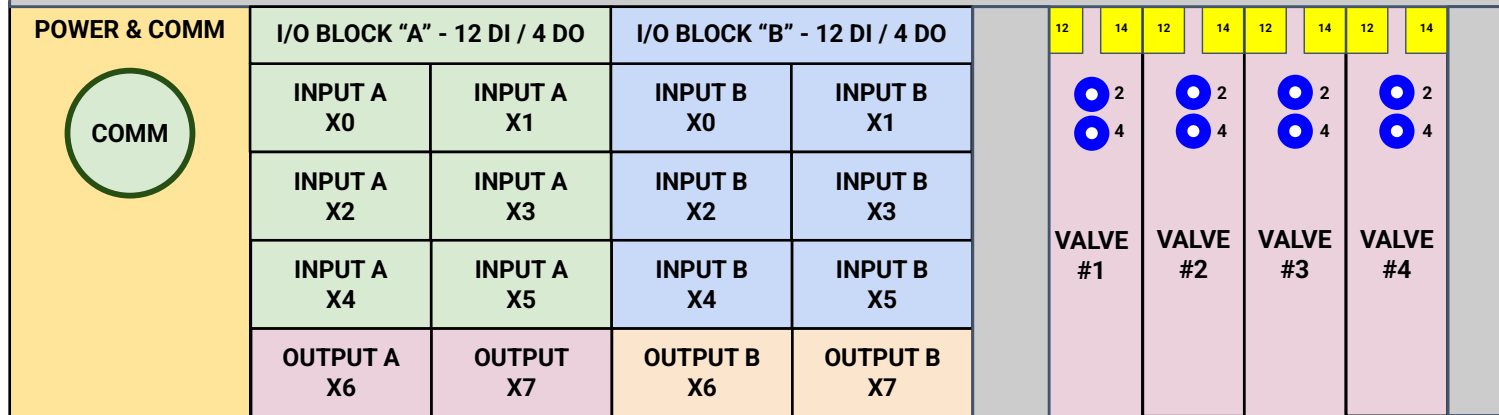
VSC 2.0 Components - Connector Panel (vsc00245+)



Gripper air lines and VersaWash Cable are routed directly to their respective devices from the VSC

VSC 2.0 Components - VTUX Module

FESTO MODULE



Supply Air to devices

Pilot Air for Valve Function

Festo Module Power Cable (ZP-S1-5FP-2M)

- Green => Grounded via bolt on sheet metal
- Orange - 24 VDC
- Red - GND/0VDC
- White - GND/0VDC
- Black - 24VDC

INPUT SLICE DETAIL

X#		.0	24VDC
		.1	0 V DC Ground
		.2	COM 1 Even Numbered Input (0 or 2)
		.3	COM 2 Odd Numbered Input (1 or 3)

OUTPUT SLICE DETAIL

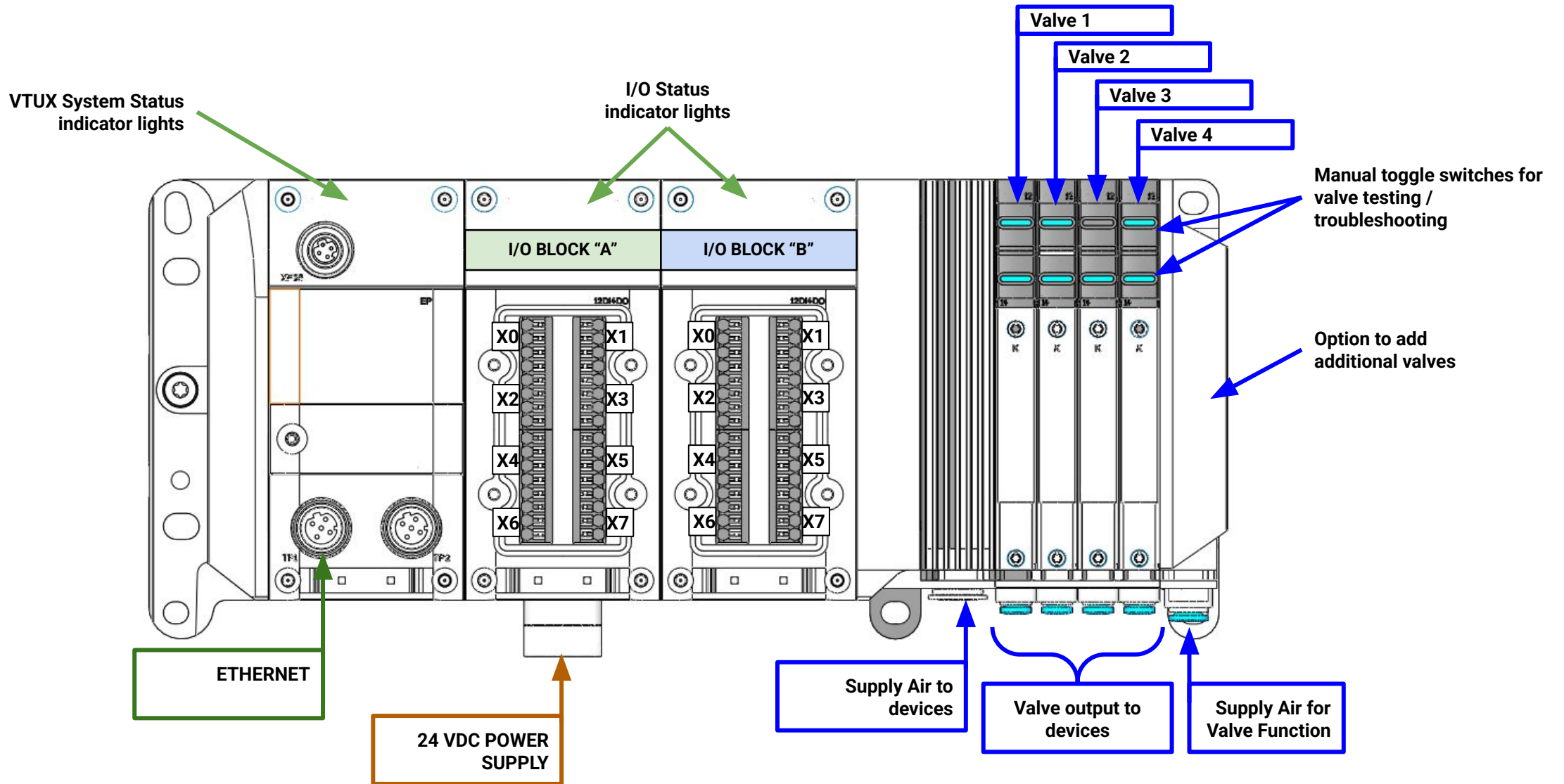
X#		.0	Output 0 on X6 / Output 2 on X7
		.1	0V DC Load Supply Ground
		.2	Output 1 on X6 / Output 3 on X7
		.3	FE Spliced and Grounded via bolt on sheet metal

Conductor Connection
Push-to-connect

PIN #

Press to
release
conductor

VSC 2.0 Components - VTUX Module



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

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

Input Dashboard

Address	Value (1s Poll)
WISE_1_SENSOR	Off
WISE_2_SENSOR	Off
WISE_3_SENSOR	Off
WISE_4_SENSOR	On
DOOR_OPEN_SENSOR	On
DOOR_CLOSE_SENSOR	Off
DOUBLE_DOOR_OPEN_SENSOR	On
DOUBLE_DOOR_CLOSE_SENSOR	Off
VSC_ENABLE	Off

Output Dashboard

Address	Controls	Value
WISE_1_OPEN	Low High	Off
WISE_1_CLOSE	Low High	On
WISE_2_OPEN	Low High	Off
WISE_2_CLOSE	Low High	On
WISE_3_OPEN	Low High	Off
WISE_3_CLOSE	Low High	Off
WISE_4_OPEN	Low High	Off
WISE_4_CLOSE	Low High	Off

VSC I/O Panel Page

V E R S A BUILT
R O B O T I C S

VSC00123

IO Panel

Part Stop

Op Stop

Recovery

Recovery

Cycle S

Input Dashboard

Address	Value (1s Poll)
WISE_1_SENSOR	Off
WISE_2_SENSOR	Off
WISE_3_SENSOR	Off
WISE_4_SENSOR	On
DOOR_OPEN_SENSOR	On
DOOR_CLOSE_SENSOR	Off
DOUBLE_DOOR_OPEN_SENSOR	On
DOUBLE_DOOR_CLOSE_SENSOR	Off
VSC_ENABLE	Off

Output Dashboard

Address	Controls	Value
WISE_1_OPEN	LowHigh	Off
WISE_1_CLOSE	LowHigh	On
WISE_2_OPEN	LowHigh	Off
WISE_2_CLOSE	LowHigh	On
WISE_3_OPEN	LowHigh	Off
WISE_3_CLOSE	LowHigh	Off
WISE_4_OPEN	LowHigh	Off
WISE_4_CLOSE	LowHigh	Off

Section 5: Inputs and Outputs

[Return to Table of Contents](#)

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VSC Interface I/O Panel - Output Signals

Output Dashboard

Address

Controls

WISE_1_OPEN

Send Low

Send High

WISE_1_CLOSE

Send Low

Send High

WISE_2_OPEN

Send Low

Send High

WISE_2_CLOSE

Send Low

Send High

WISE_3_OPEN

Send Low

Send High

WISE_3_CLOSE

Send Low

Send High

GRIPPER_2_OPEN

Send Low

Send High

GRIPPER_2_CLOSE

Send Low

Send High

WISE_4_OPEN

Send Low

Send High

WISE_4_CLOSE

Send Low

Send High

CHUCK_1_OPEN

Send Low

Send High

CHUCK_1_TOGGLE

Send Low

Send High

CHUCK_1_CLOSE

Send Low

Send High

CHUCK_2_OPEN

Send Low

Send High

CHUCK_2_TOGGLE

Send Low

Send High

CHUCK_2_CLOSE

Send Low

Send High

DOOR_OPEN

Send Low

Send High

DOOR_CLOSE

Send Low

Send High

VERSABLAST

Send Low

Send High

WASH_TANK

Send Low

Send High

CYCLE_START

Send Low

Send High

GRIPPER_OPEN

Send Low

Send High

GRIPPER_CLOSE

Send Low

Send High

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

- Open Vise 1
 - Go to WISE_1_OPEN and select "Send High"
- Verify Vise opened or signal was made
- Remove signal
 - Go to WISE_1_OPEN and select "Send Low"
- Close Vise 1
 - Go to WISE_1_CLOSE and select "Send High"
- Verify Vise closed or signal was made
- Remove signal
 - Go to WISE_1_CLOSE and select "Send Low"

VSC Interface I/O Panel - Input Signals

Input Dashboard	
Address	Value (Polled every second)
WISE_1_SENSOR	Off
WISE_2_SENSOR	Off
WISE_3_SENSOR	Off
WISE_4_SENSOR	Off
DOOR_OPEN_SENSOR	Off
DOOR_CLOSE_SENSOR	Off
DOUBLE_DOOR_OPEN_SENSOR	Off
DOUBLE_DOOR_CLOSE_SENSOR	Off
VSC_ENABLE	Off
DOOR_OPEN_BUTTON	Off
DOOR_CLOSE_BUTTON	Off
CYCLE_COMPLETE	Off

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"

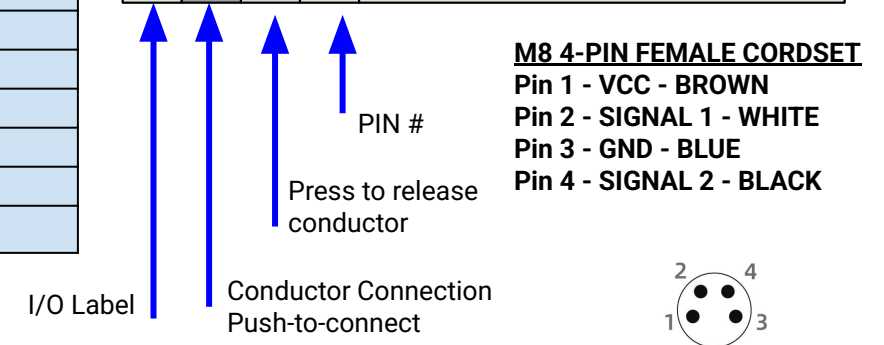
VSC 2.0 I/O Input Assignments (vsc00245+)

I/O ADDRESS	I/O BLOCK	I/O LABEL	Signal	Wiring to Device	System Device
"A" X0-01	A	X0	COM 1	M8 3-Pin to Sensor	Vise 1 Part Present Sensor
"A" X0-23	A	X0	COM 2	M8 3-Pin to Sensor	Vise 2 Part Present Sensor
"A" X1-01	A	X1	COM 1	M8 3-Pin to Sensor	Vise 3 Part Present Sensor
"A" X1-23	A	X1	COM 2	M8 3-Pin to Sensor	Vise 4 Part Present Sensor
"A" X2-01	A	X2	COM 1	M8 3-Pin to Sensor	VersaDoor A Open Sensor
"A" X2-23	A	X2	COM 2	M8 3-Pin to Sensor	VersaDoor A Close Sensor
"A" X3-01	A	X3	COM 1	M8 3-Pin to Sensor	VersaDoor B Open Sensor
"A" X3-23	A	X3	COM 2	M8 3-Pin to Sensor	VersaDoor B Close Sensor
"A" X4-01	A	X4	COM 1	M8 3-Pin to Momentary	VSC Enable Button
"A" X4-23	A	X4	COM 2	M8 3-Pin to Relay, to CNC	CNC Cycle End
"A" X5-01	A	X5	COM 1	M8 3-Pin to 2nd VSC	Robot Lock <i>*optional for dual tending</i>
"A" X5-23	A	X5	COM 2	M8 3-Pin to CNC	CNC Pallet Safe Input <i>*optional</i>
"B" X0-01	B	X0	COM 1	Unassigned	Unassigned
"B" X0-23	B	X0	COM 2	Unassigned	Unassigned
"B" X1-01	B	X1	COM 1	Unassigned	Unassigned
"B" X1-23	B	X1	COM 2	Unassigned	Unassigned
"B" X2-01	B	X2	COM 1	Unassigned	Unassigned
"B" X2-23	B	X2	COM 2	Unassigned	Unassigned
"B" X3-01	B	X3	COM 1	Unassigned	Unassigned
"B" X3-23	B	X3	COM 2	Unassigned	Unassigned
"B" X4-01	B	X4	COM 1	Unassigned	Unassigned
"B" X4-23	B	X4	COM 2	Unassigned	Unassigned
"B" X5-01	B	X5	COM 1	Unassigned	Unassigned
"B" X5-23	B	X5	COM 2	Unassigned	Unassigned

I/O BLOCK "A" - 12 DI / 4 DO		I/O BLOCK "B" - 12 DI / 4 DO	
INPUT A X0	INPUT A X1	INPUT B X0	INPUT B X1
INPUT A X2	INPUT A X3	INPUT B X2	INPUT B X3
INPUT A X4	INPUT A X5	INPUT B X4	INPUT B X5
OUTPUT A X6	OUTPUT X7	OUTPUT B X6	OUTPUT B 7

INPUT SLICE DETAIL

X#		.0	24VDC
		.1	0 V DC Ground
		.2	COM 1 Even Numbered Input (0 or 2)
		.3	COM 2 Odd Numbered Input (1 or 3)



Input Block Name = "Slice A or B - I/O Label - COM" *01 = COM 1, 23 = COM 2

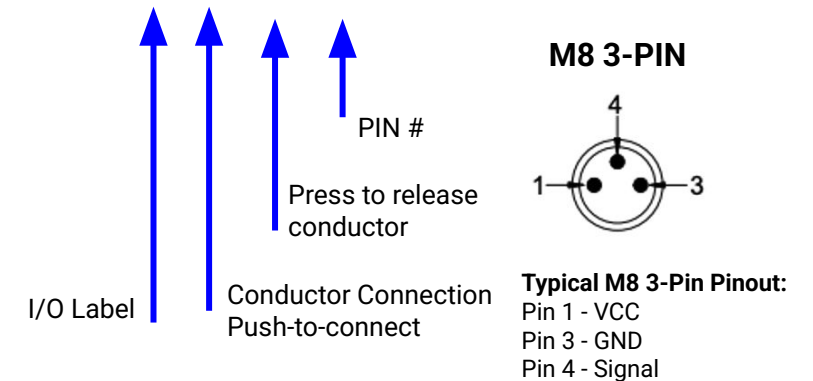
VSC 2.0 Output Assignments (vsc00245+)

I/O ADDRESS	I/O BLOCK	Pin	Signal Connection	System Device	VSC Signal Type
"A" X6-01	A	.0	Relay - 2 Wire	CNC Cycle Start	24VDC Output to Relay Output
"A" X6-12	A	.2	Relay - 2 Wire	VersaWash Pump on/off signal	24VDC Output to Relay Output
"A" X7-01	A	.0	Relay - 2 Wire	CNC Chuck Open/Toggle Signal 1	24VDC Output to Relay Output
"A" X7-12	A	.2	Relay - 2 Wire	CNC Chuck Open/Toggle Signal 2	24VDC Output to Relay Output
"B" X6-01	B	.0	Relay - 2 Wire	CNC Door Interlock Release <i>*optional</i>	24VDC Output to Relay Output
"B" X6-12	B	.2	Relay - 2 Wire	CNC Pallet Ready Button <i>*optional</i>	24VDC Output to Relay Output
"B" X7-01	B	.0	NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED
"B" X7-12	B	.2	NOT ASSIGNED	NOT ASSIGNED	NOT ASSIGNED

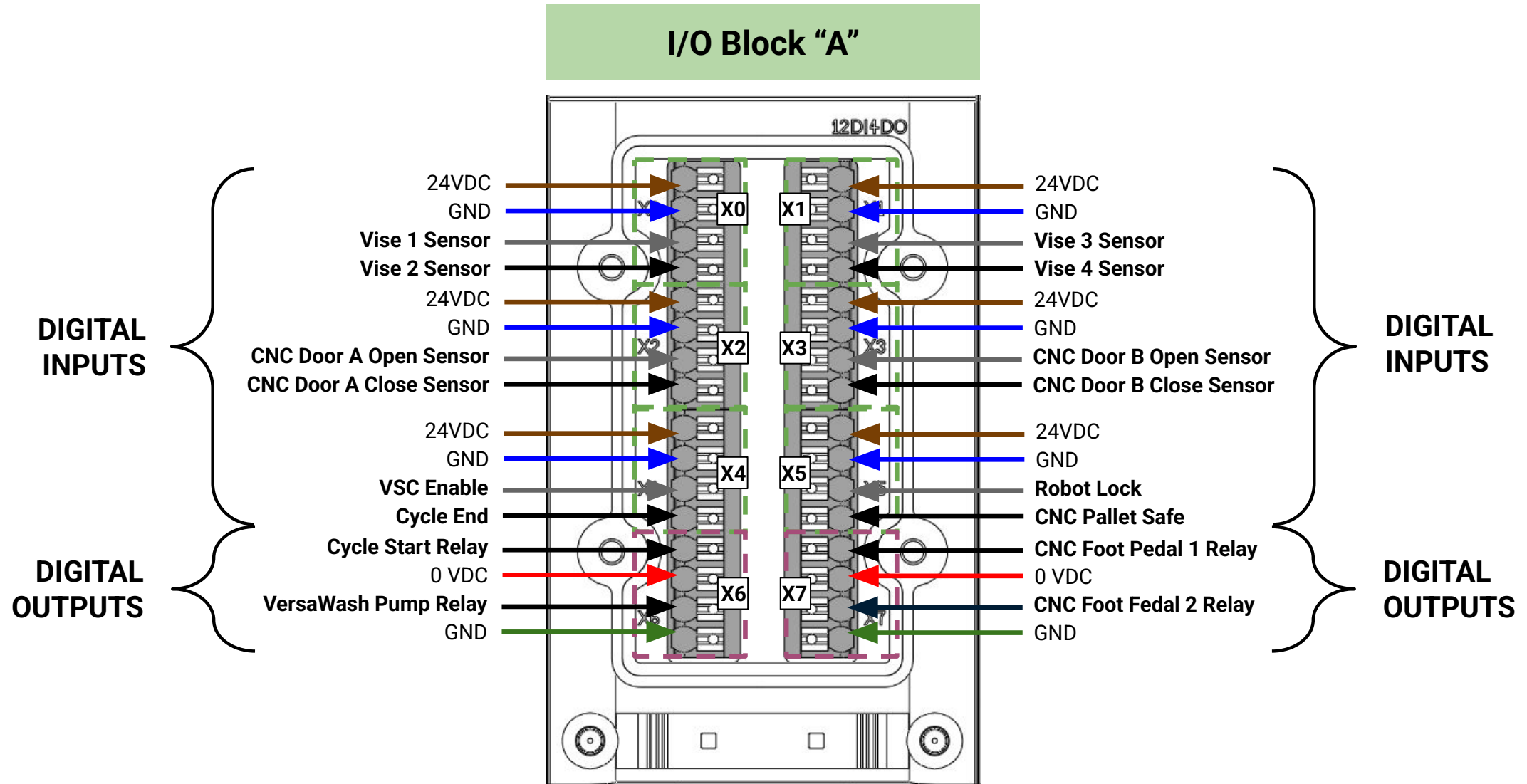
I/O BLOCK "A" - 12 DI / 4 DO		I/O BLOCK "B" - 12 DI / 4 DO	
INPUT A X0	INPUT A X1	INPUT B X0	INPUT B X1
INPUT A X2	INPUT A X3	INPUT B X2	INPUT B X3
INPUT A X4	INPUT A X5	INPUT B X4	INPUT B X5
OUTPUT A X6	OUTPUT X7	OUTPUT B X6	OUTPUT B 7

OUTPUT SLICE DETAIL

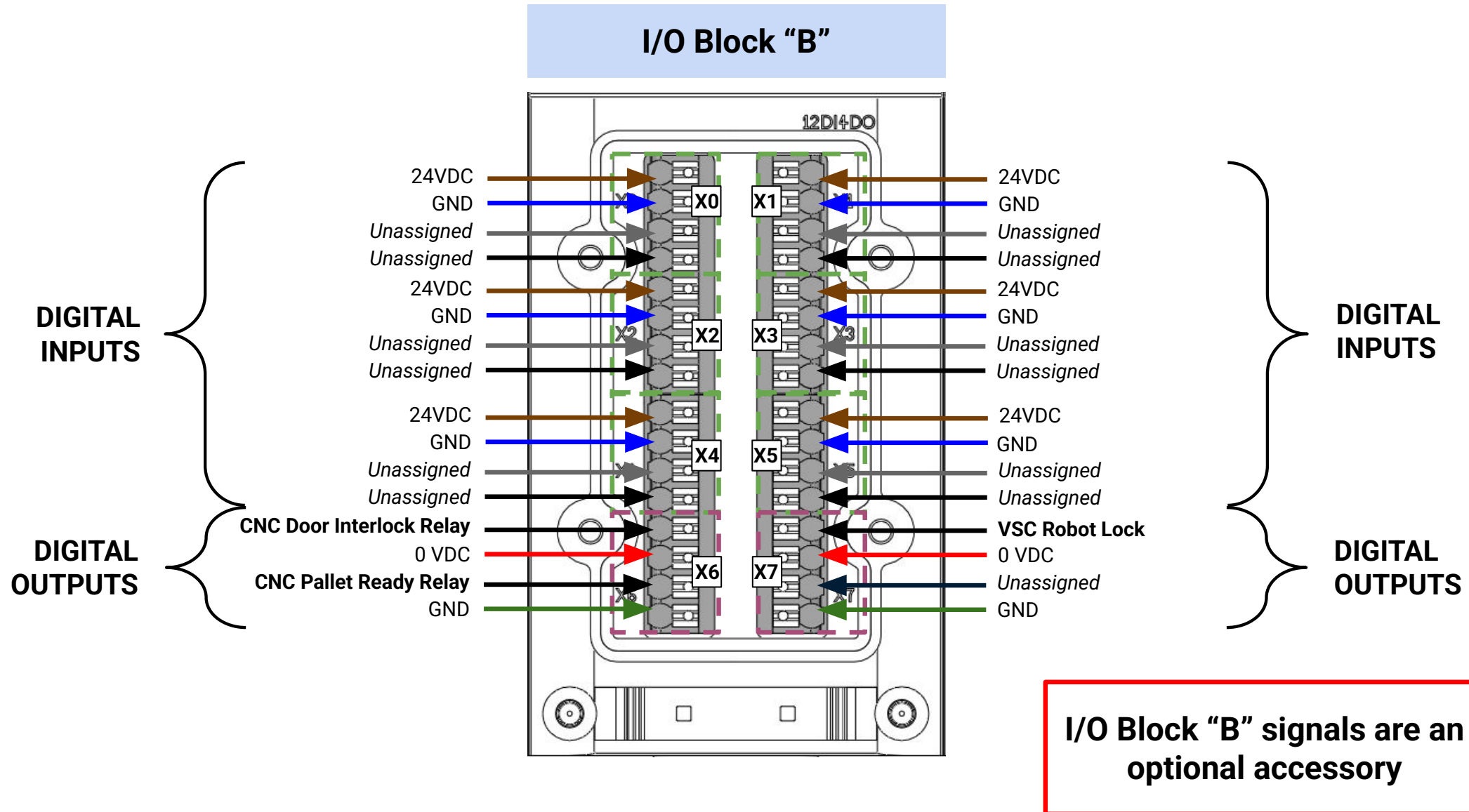
X#			.0	Output 0 on X6 / Output 2 on X7
			.1	0V DC Load Supply Ground
			.2	Output 1 on X6 / Output 3 on X7
			.3	FE Spliced and Grounded via bolt on sheet metal



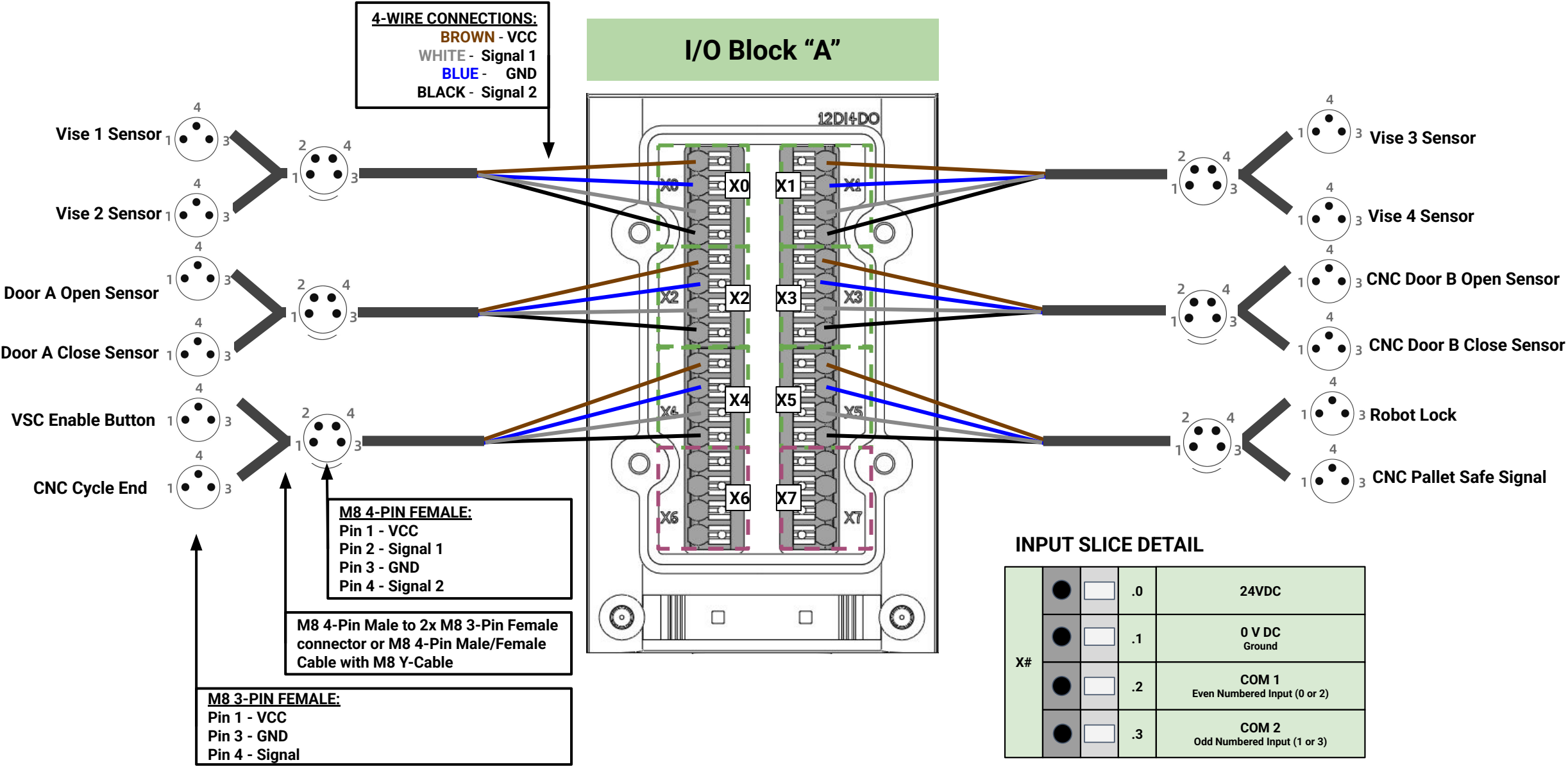
VSC 2.0 Components - VTUX Module I/O



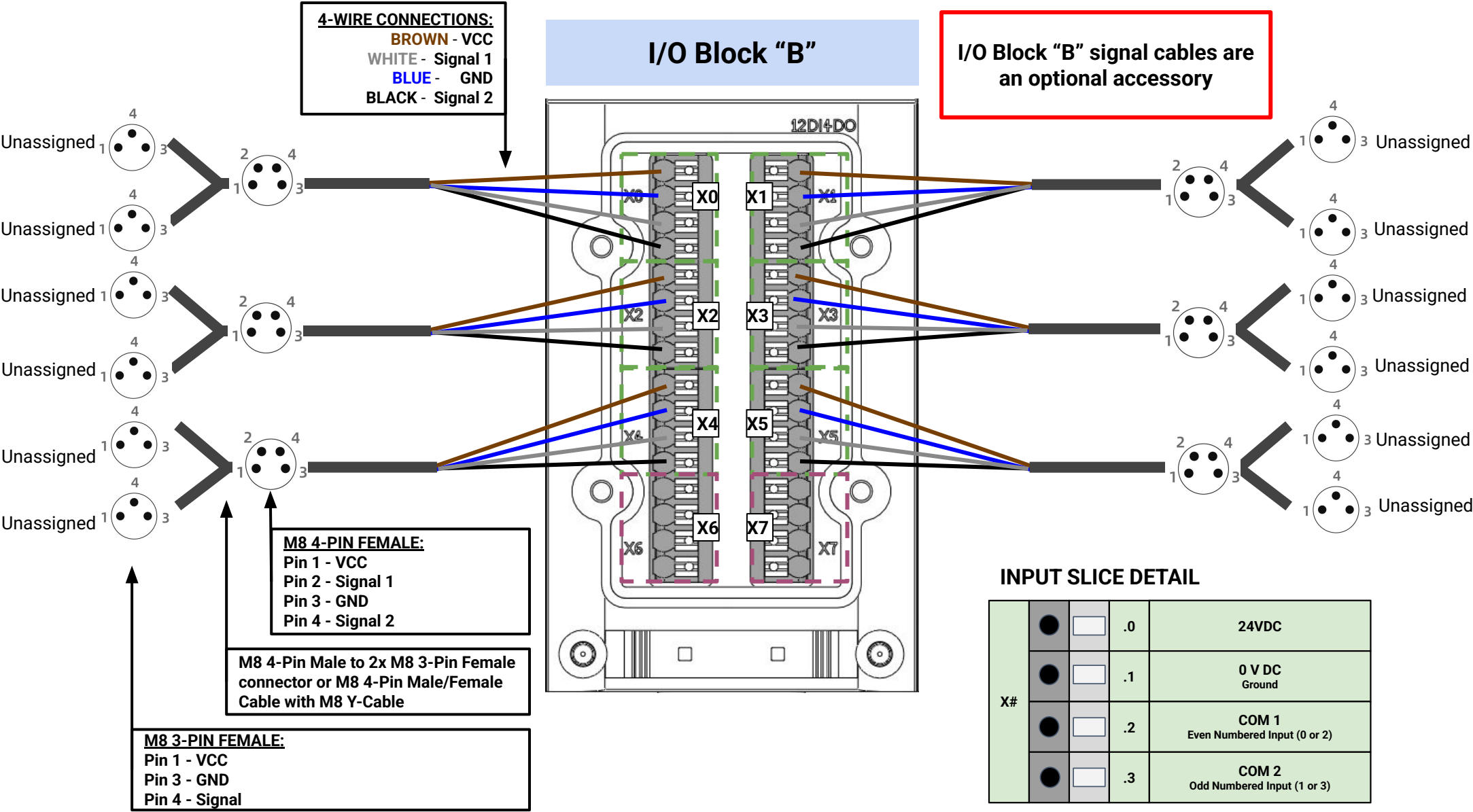
VSC 2.0 Components - VTUX Module I/O



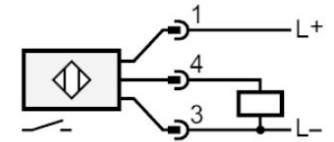
VSC 2.0 Inputs from Devices (vsc00245+)



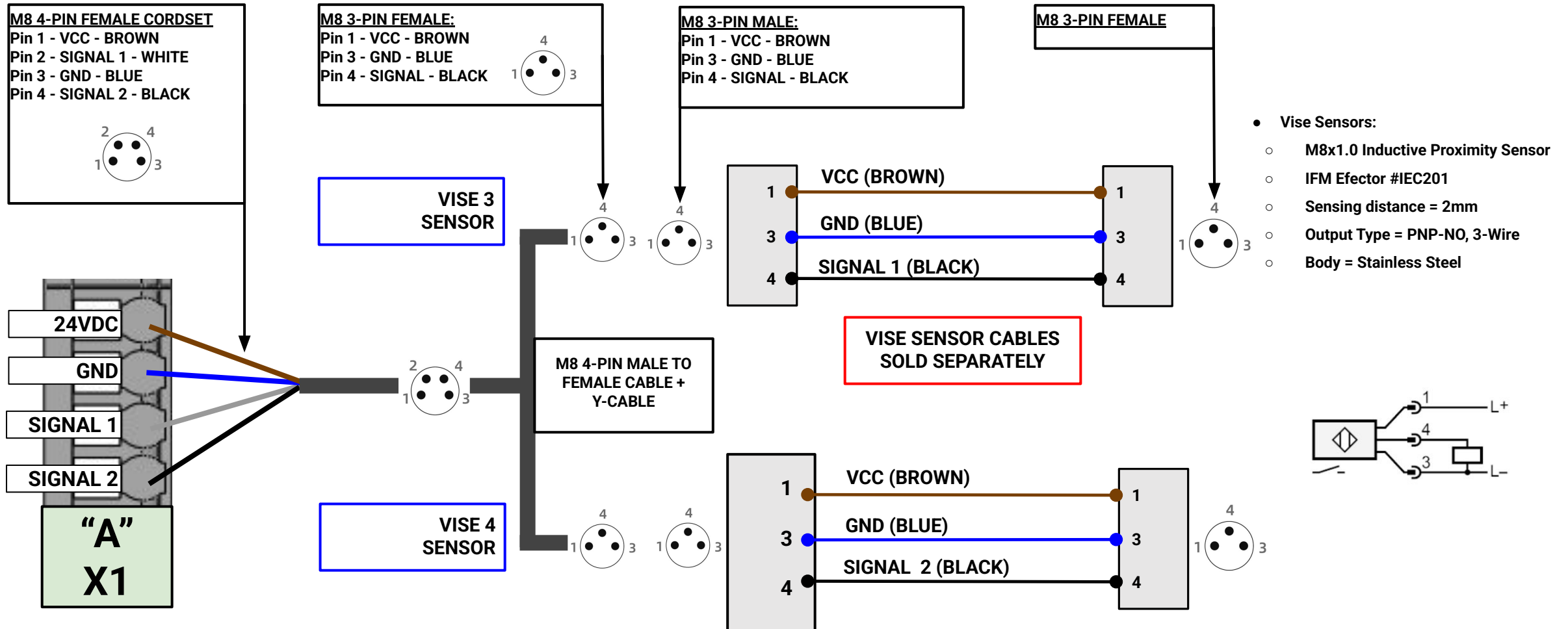
VSC 2.0 Inputs from Devices (vsc00245+)



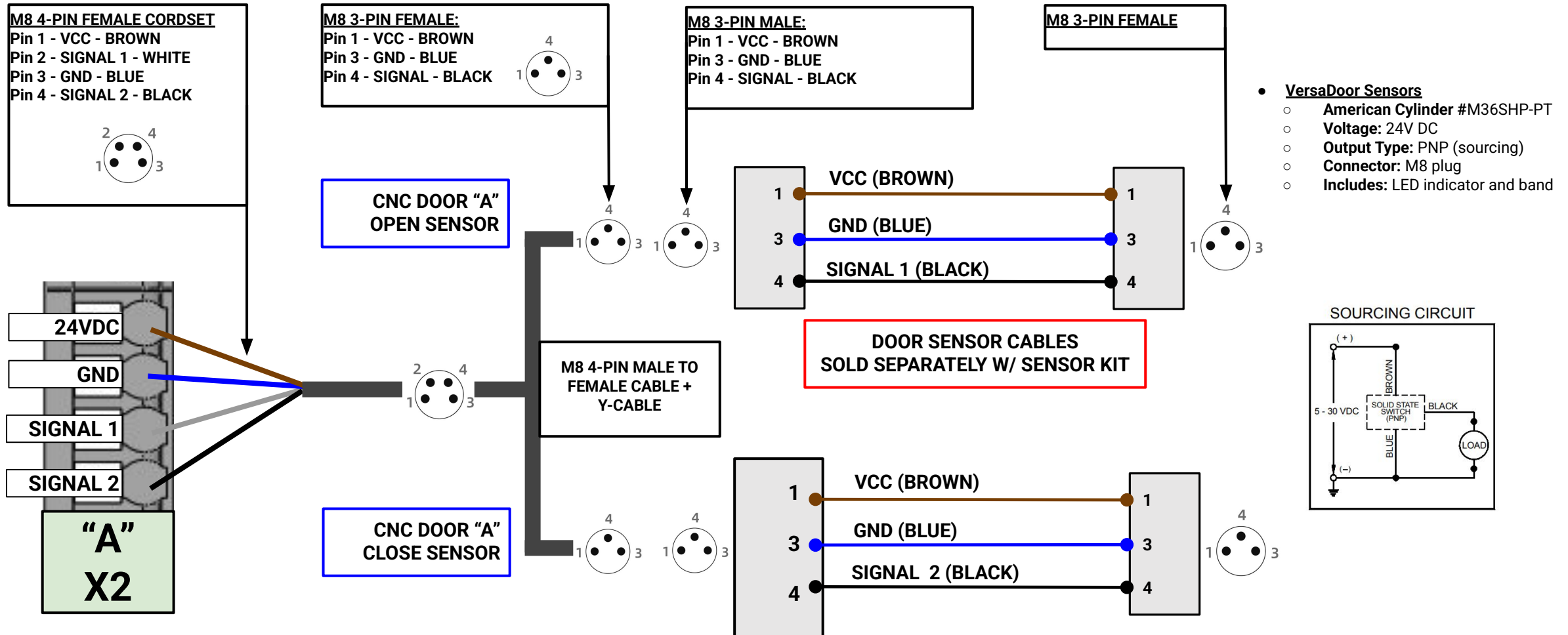
VSC Input



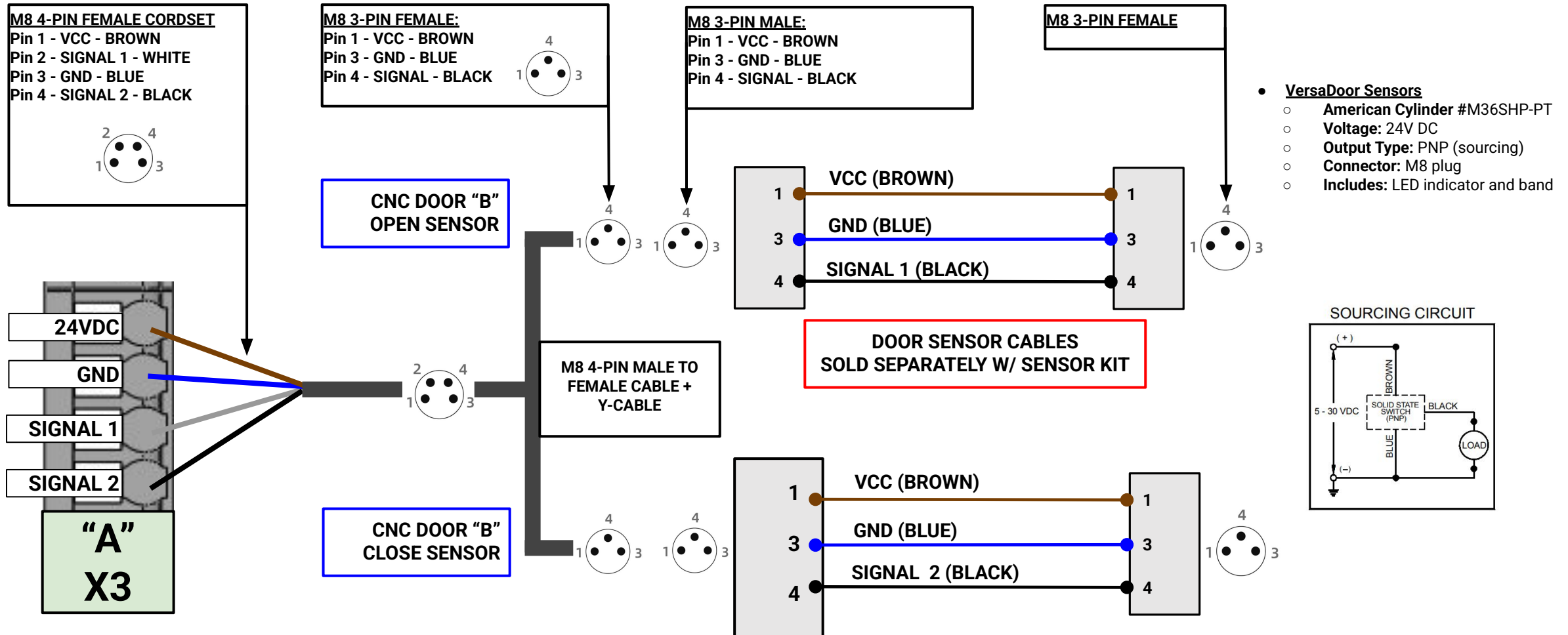
Input Devices - Vise 3 & Vise 4 Sensors



Input Devices - Door A Open & Close Sensors

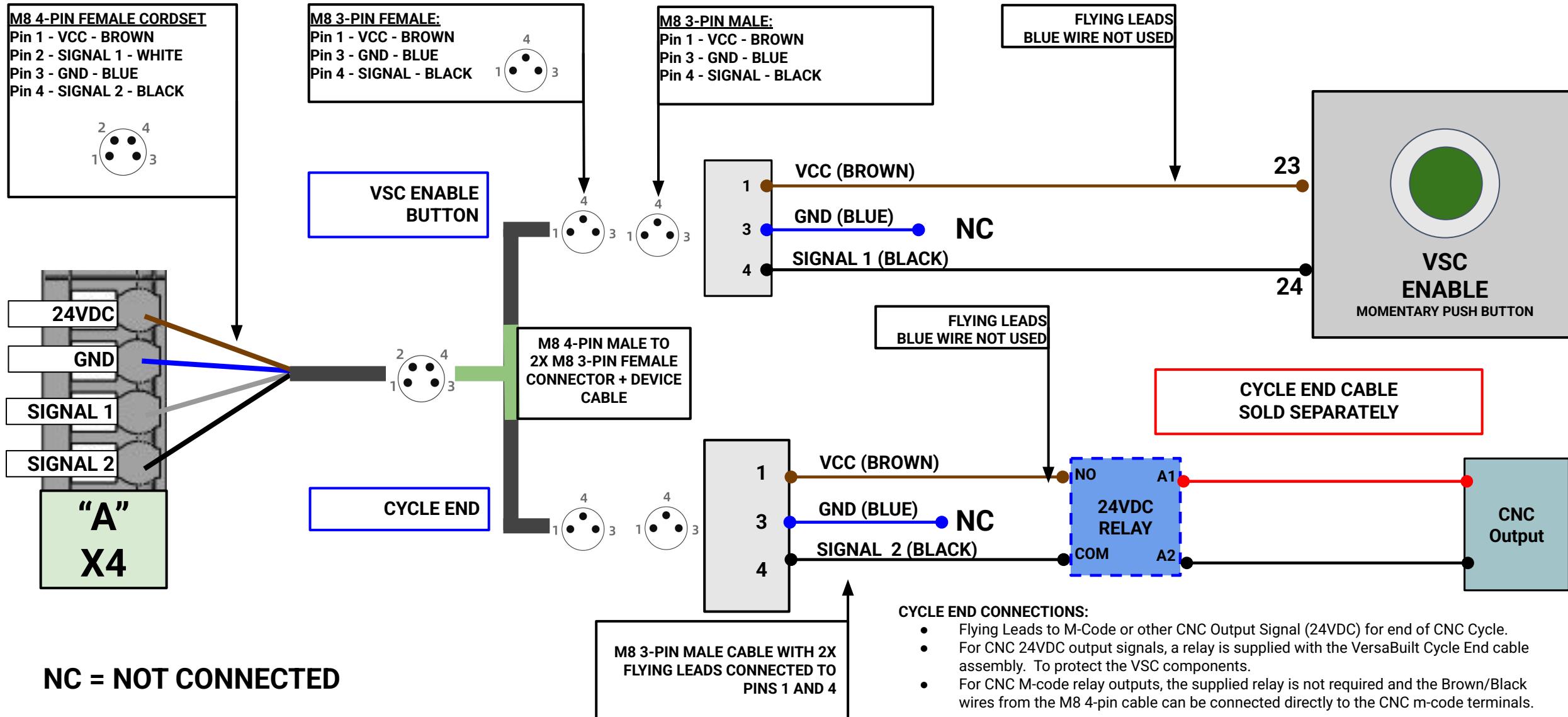


Input Devices - Door B Open & Close Sensors

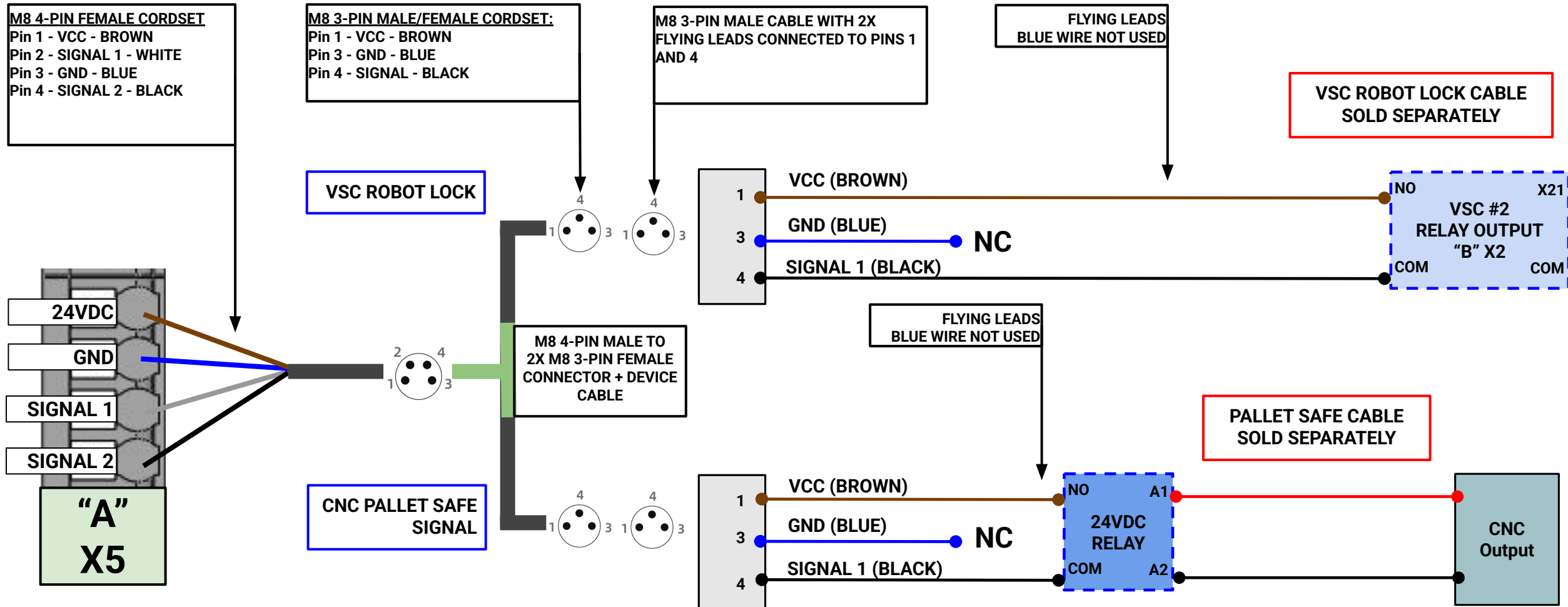


NC = NOT CONNECTED

Input Devices - VSC Enable Button & Cycle End



Input Devices - CNC Cycle End / Robot Lock

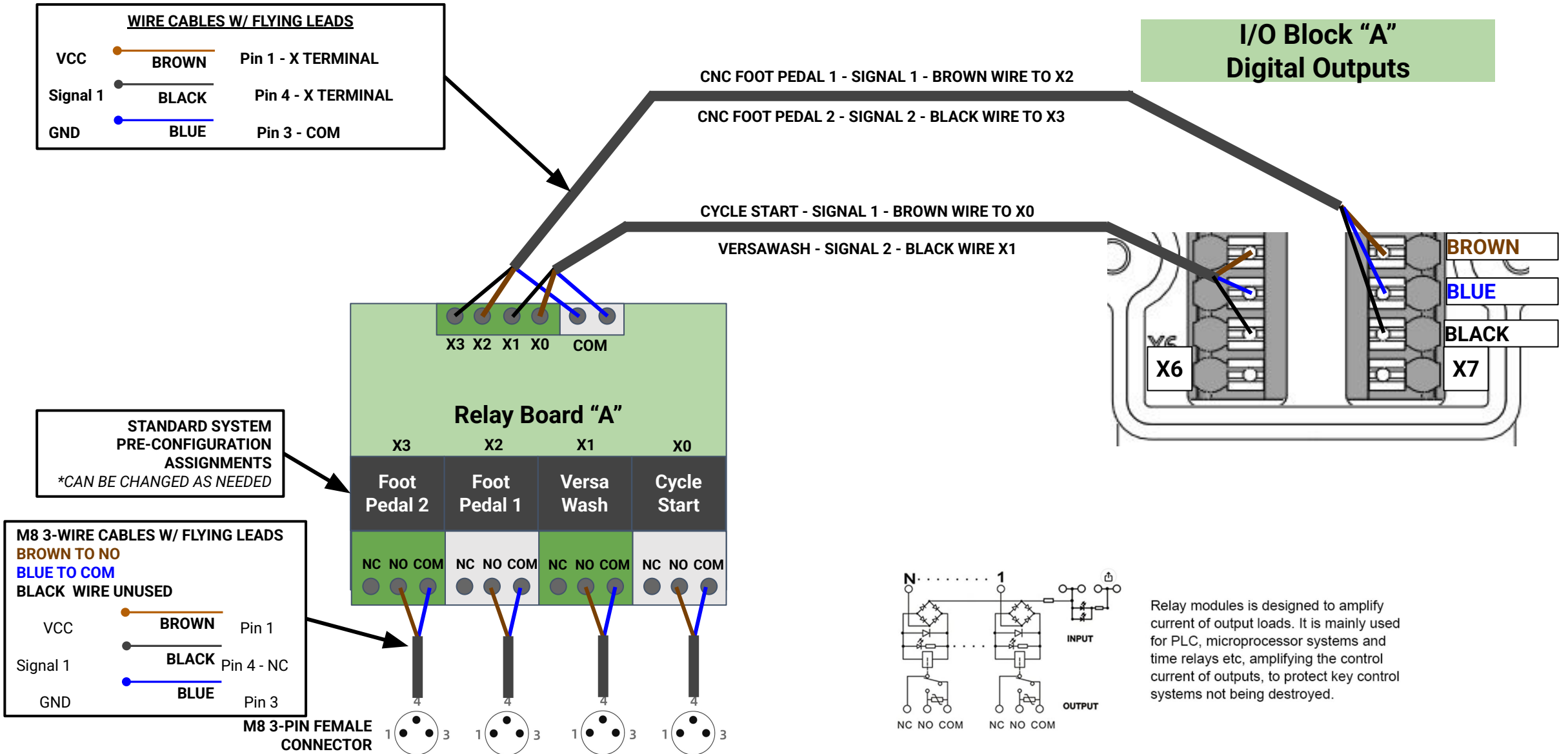


NC = NOT CONNECTED

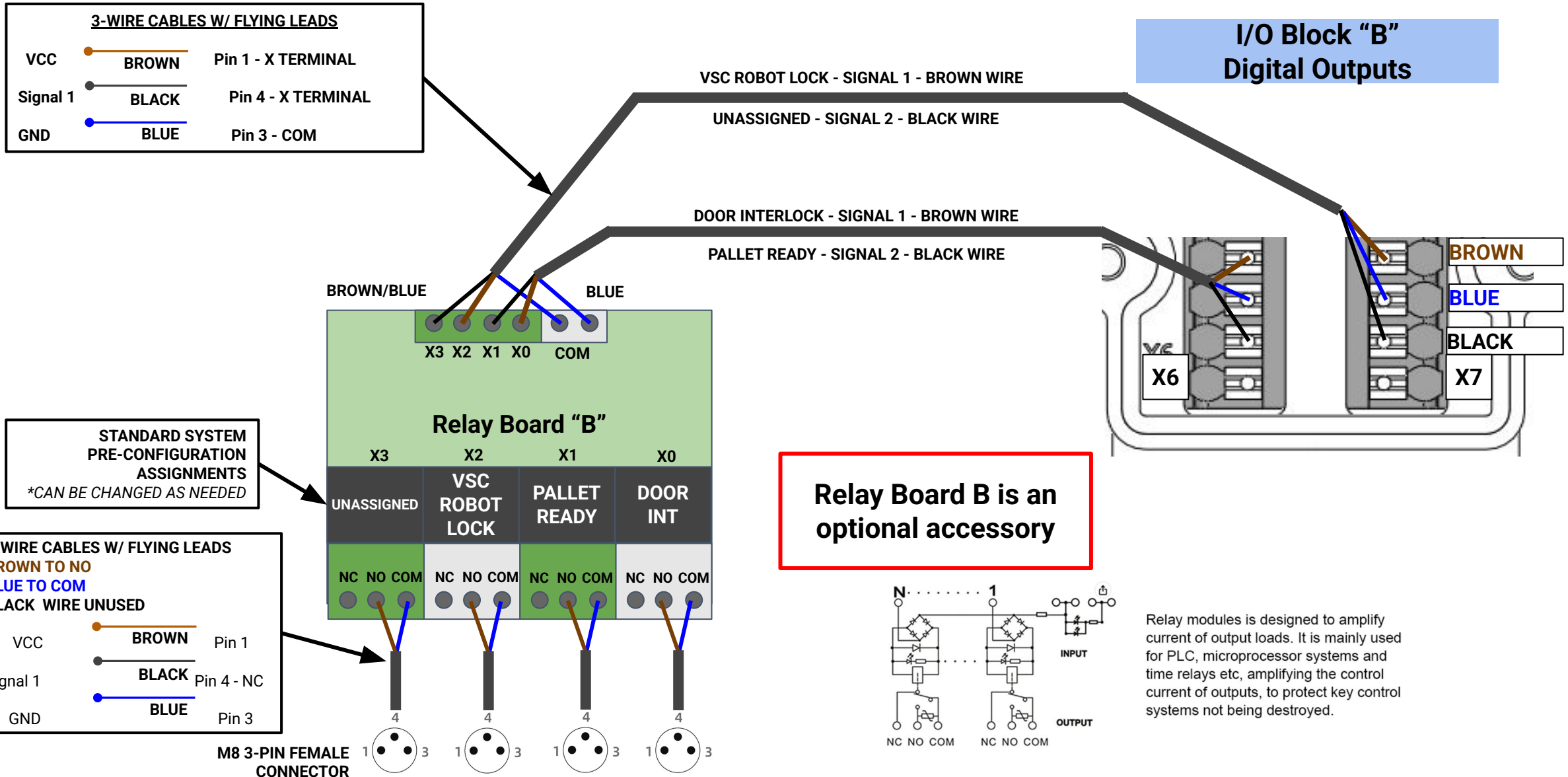
PALLET READY SIGNAL CONNECTIONS:

- Flying Leads to M-Code or other CNC Output Signal (24VDC) for end of CNC Cycle.
- 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.

VSC 2.0 Outputs to Relays (vsc00245+)



VSC 2.0 Outputs to Relays (vsc00245+)



Cordset Diagram - Cycle Start Button

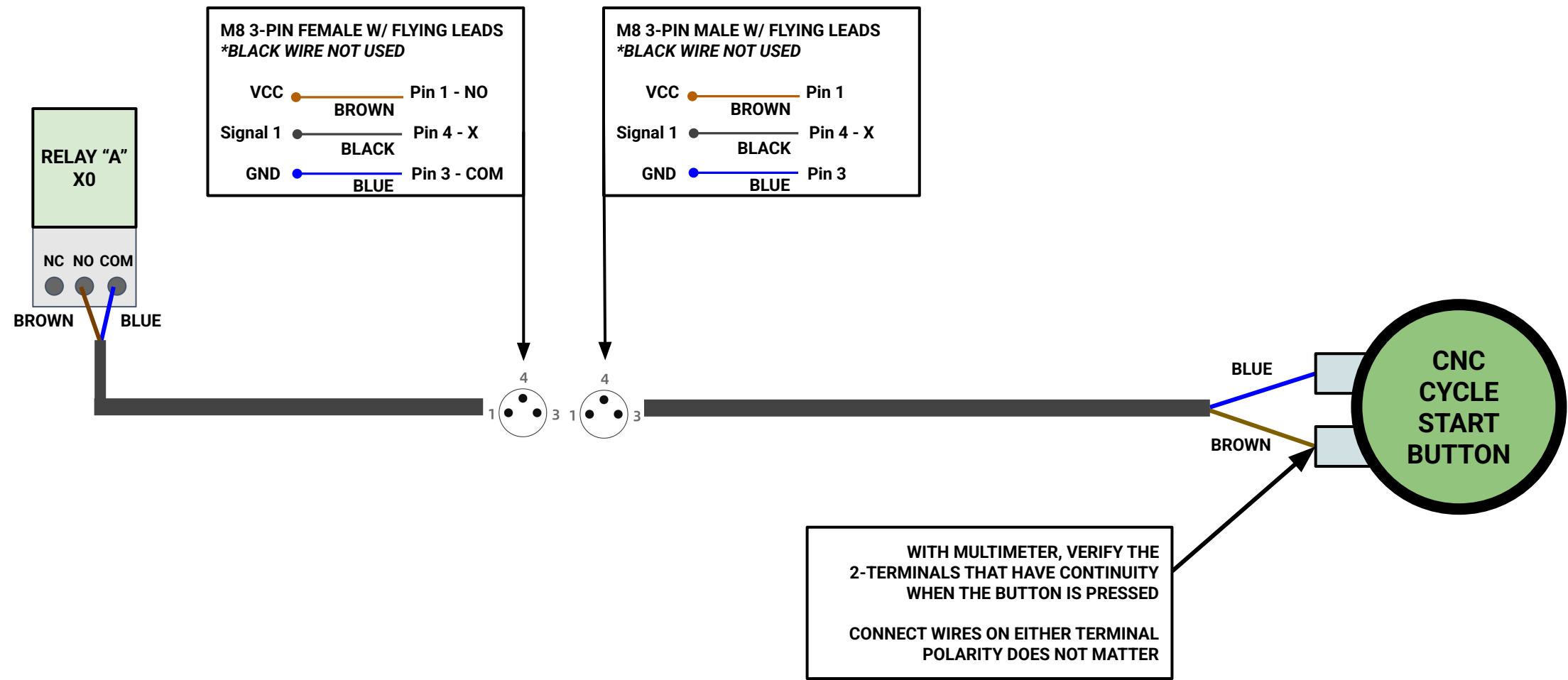
VSC CONNECTIONS:

- CYCLE START - DIGITAL OUTPUT "A" X6 .0/.1 TO RELAY "A" X0

NOTE: X = NOT CONNECTED

CNC CONNECTIONS:

- 2-WIRE CABLE WITH FLYING LEADS ON BOTH ENDS, WITH ONE END WIRED INTO THE VSC RELAY BOARD, OTHER END WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSES THE CIRCUIT, EQUIVALENT TO PRESSING THE BUTTON



Cordset Diagram - VersaWash Pump

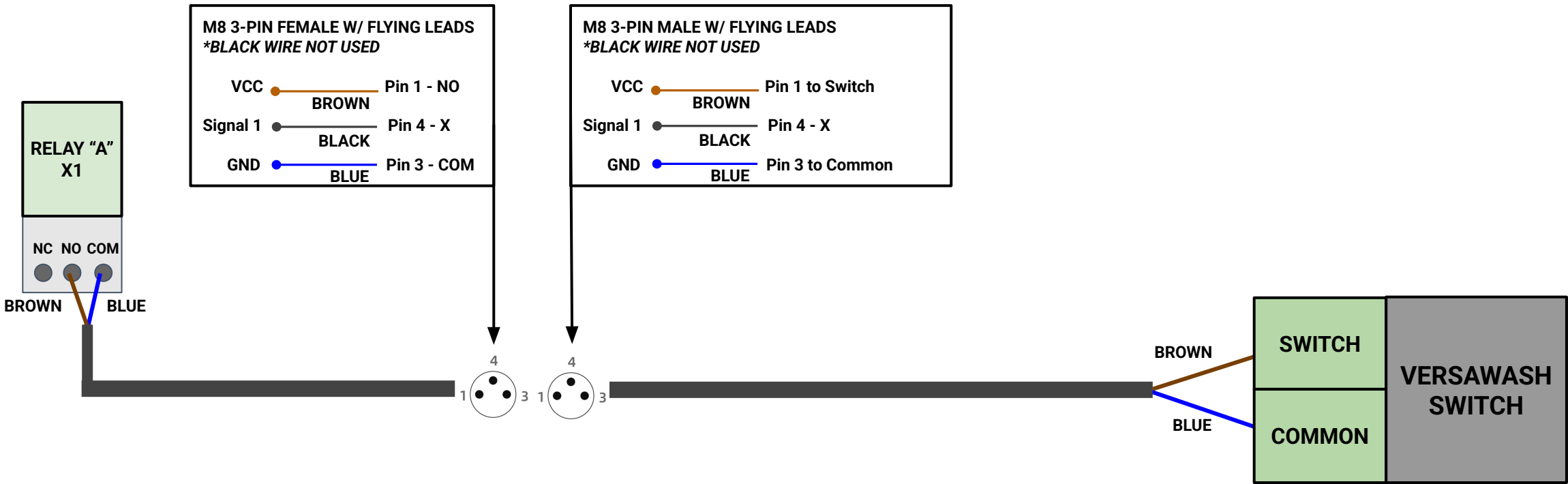
VSC CONNECTIONS:

- VERSAWASH PUMP - DIGITAL OUTPUT "A" X6 .0/.1 TO RELAY "A" X1

NOTE: X = NOT CONNECTED

CNC CONNECTIONS:

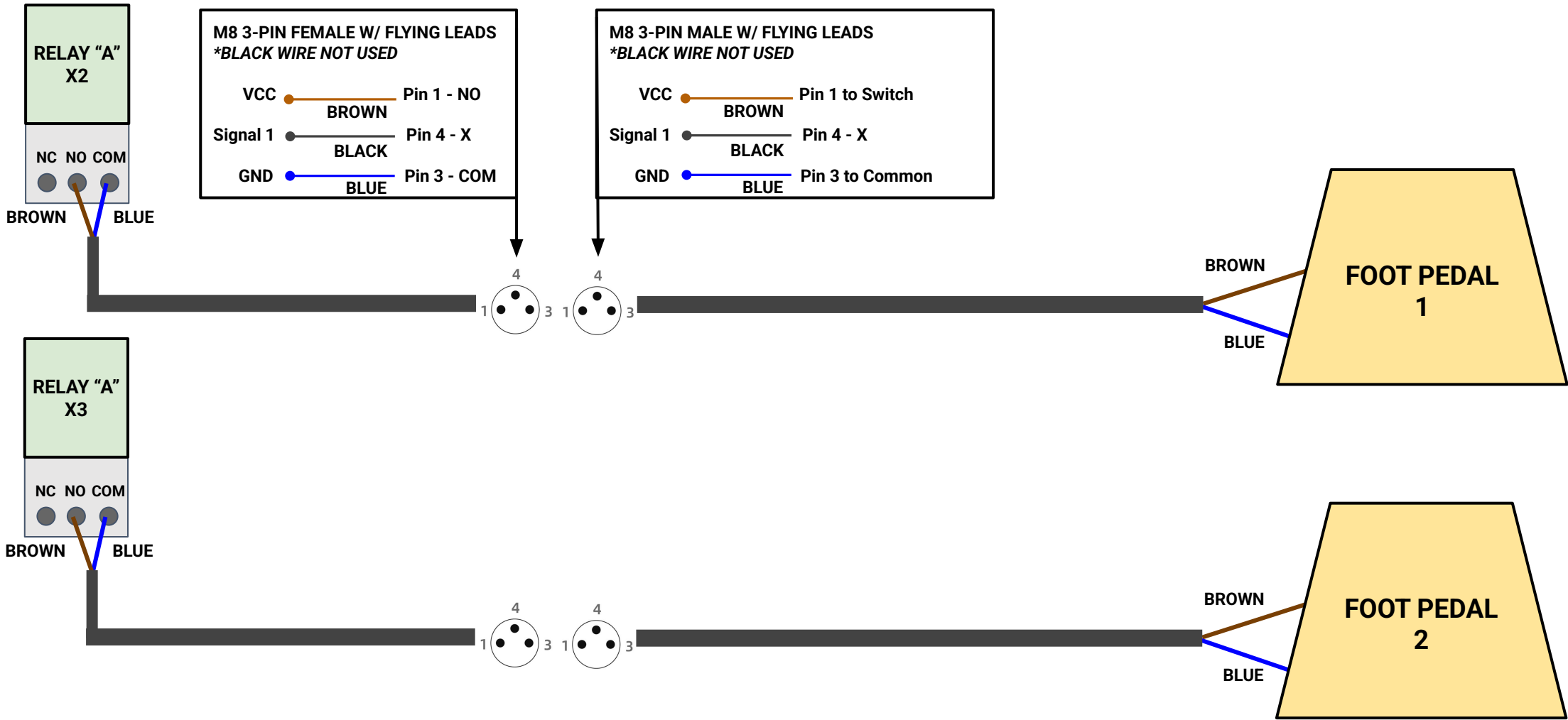
- 2-WIRE CABLE WITH FLYING LEADS ON BOTH ENDS, WITH ONE END WIRED INTO THE VSC RELAY BOARD, OTHER END WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSES THE CIRCUIT, EQUIVALENT TO PRESSING THE BUTTON



VSC CONNECTIONS:

- FOOT PEDAL 1 - DIGITAL OUTPUT "A" X7 .0/.1 TO VSC RELAY "A" X2
- FOOT PEDAL 2 - DIGITAL OUTPUT "A" X7 .2/.1 TO VSC RELAY "A" X3

NOTE: NC = NO CONNECTION



CNC CONNECTIONS:

- 2-WIRE CABLE WITH FLYING LEADS ON BOTH ENDS, WITH ONE END WIRED INTO RELAY BOARD, OTHER END WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSES THE CIRCUIT, EQUIVALENT TO PRESSING THE PEDAL

VSC 2.0 E-Stop Diagram

Section 4

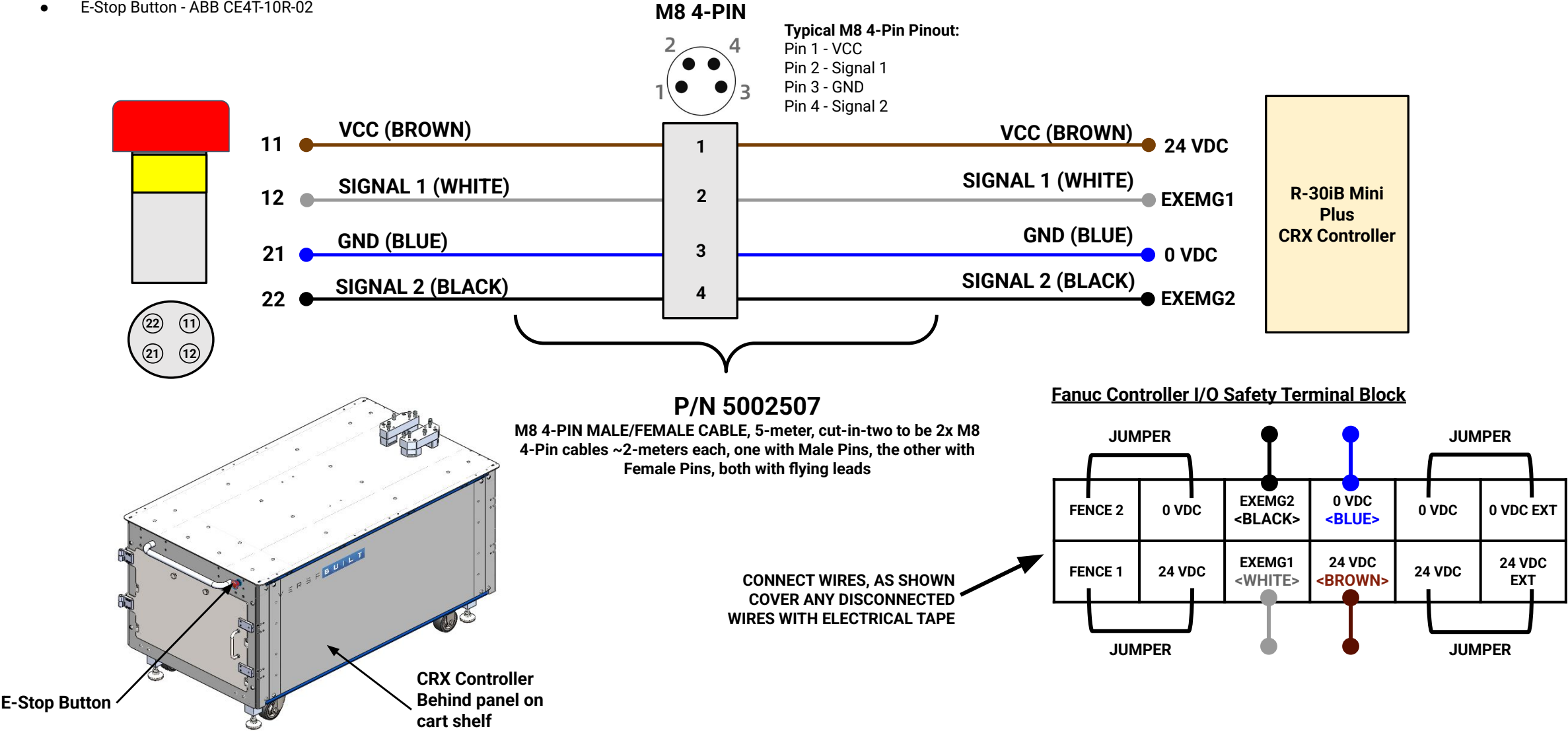
Cordset Diagram - E-Stop

DEVICES:

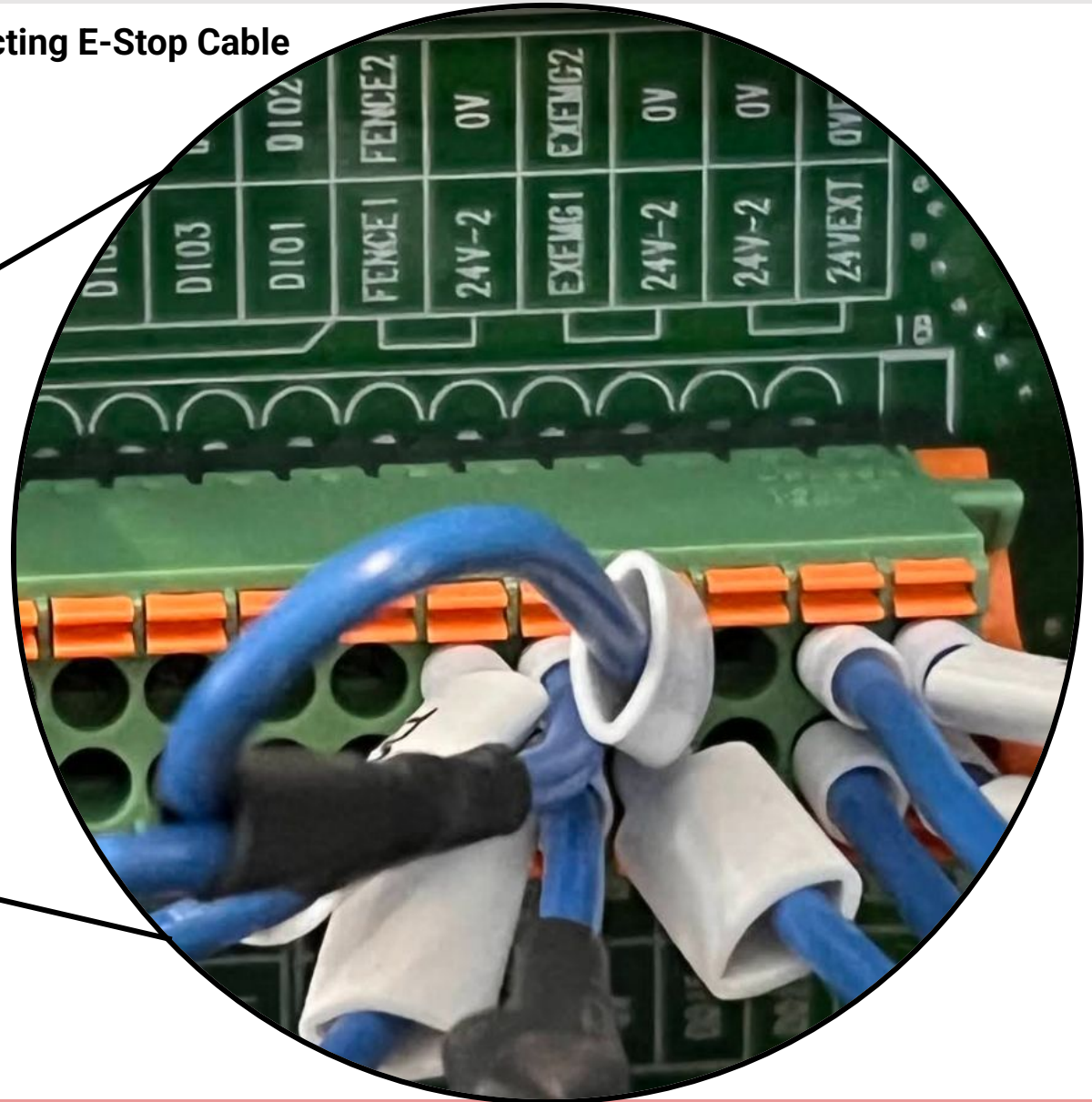
- R-30iB Mini Plus - External E-Stop Connection
- E-Stop Button - ABB CE4T-10R-02

CABLE CONNECTIONS:

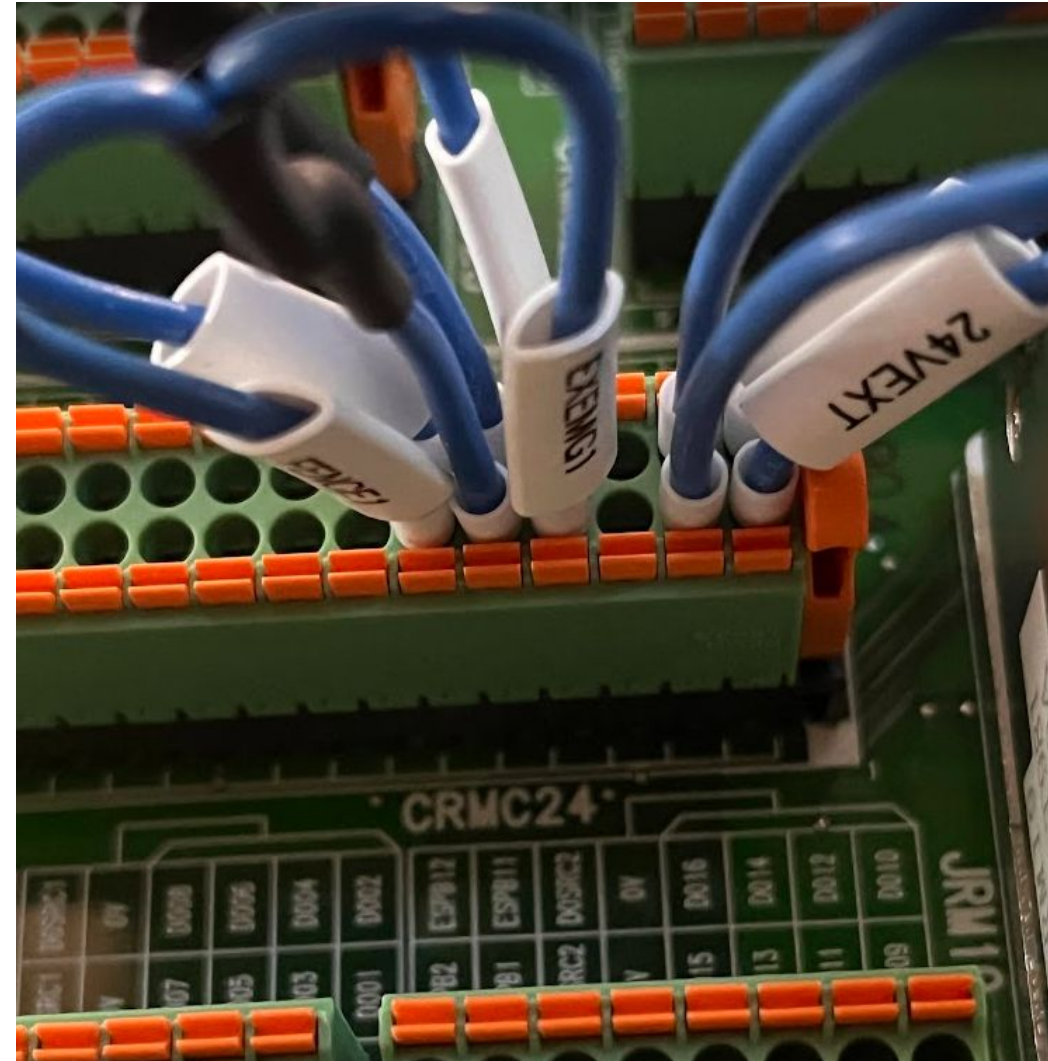
- 2X M8 4-PIN CORDSETS W/ FLYING LEADS (1 w/ M8 4-pin male, 1 w/ M8 4-Pin female)



R-30iB Mini Plus CRX Controller

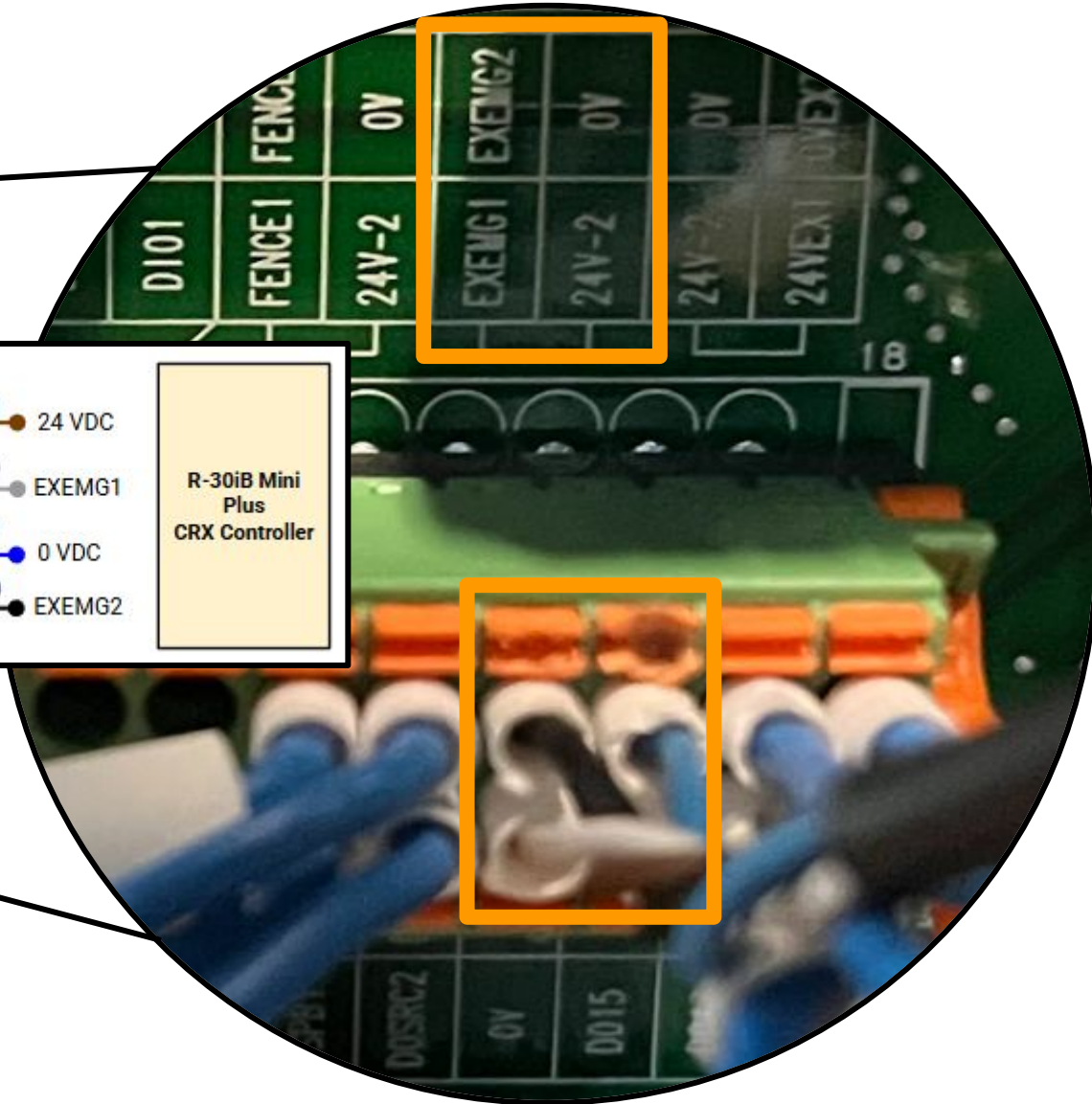
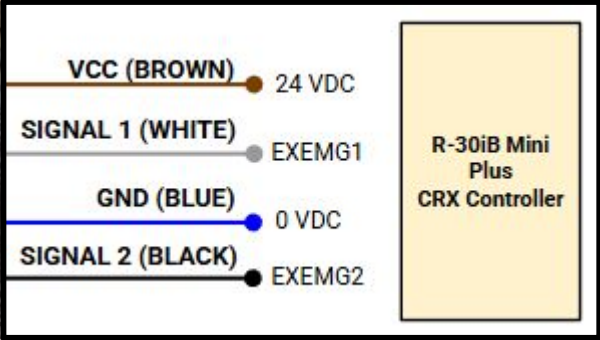
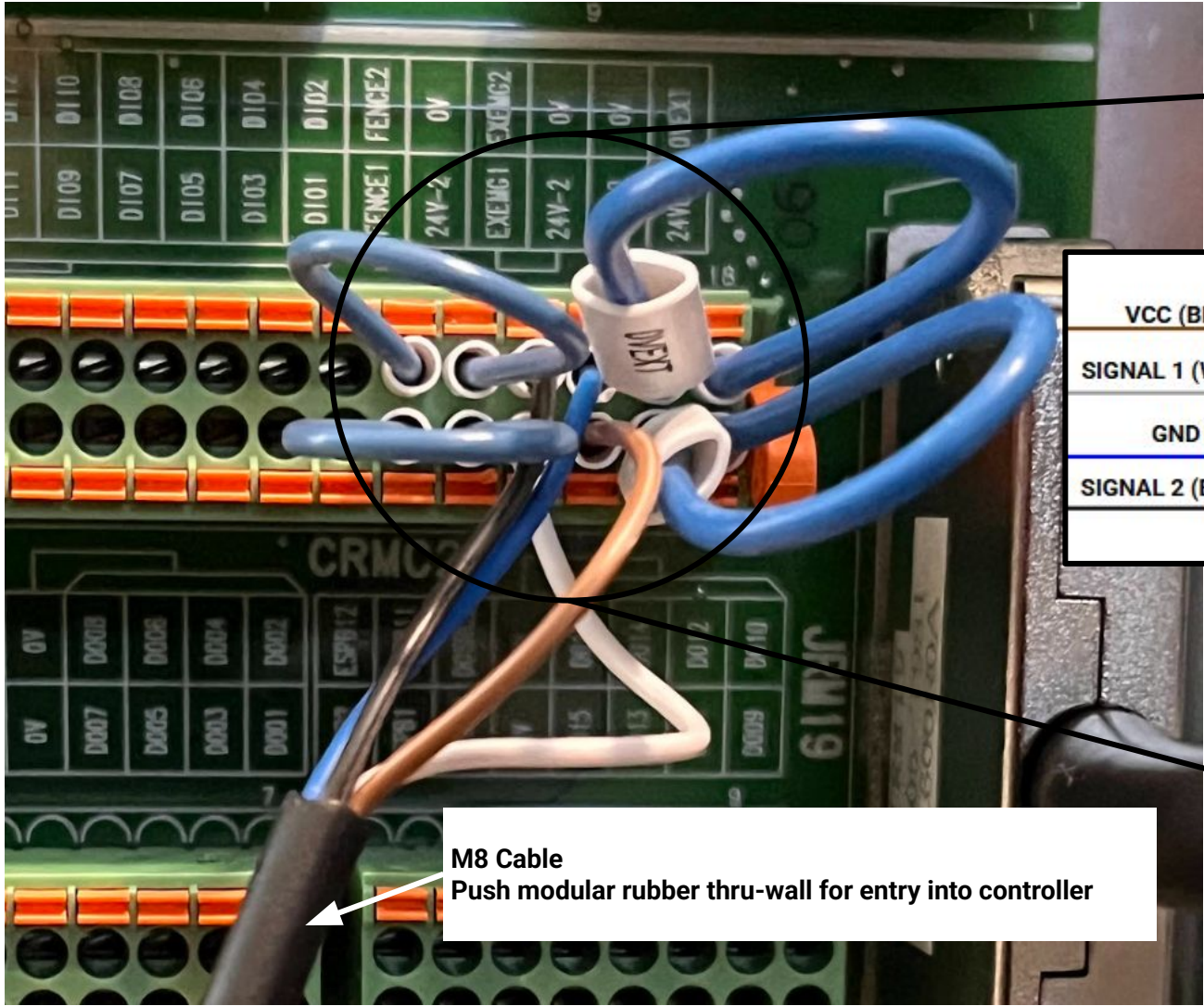


R-30iB Mini Plus CRX Controller



Cordset Diagram - E-Stop

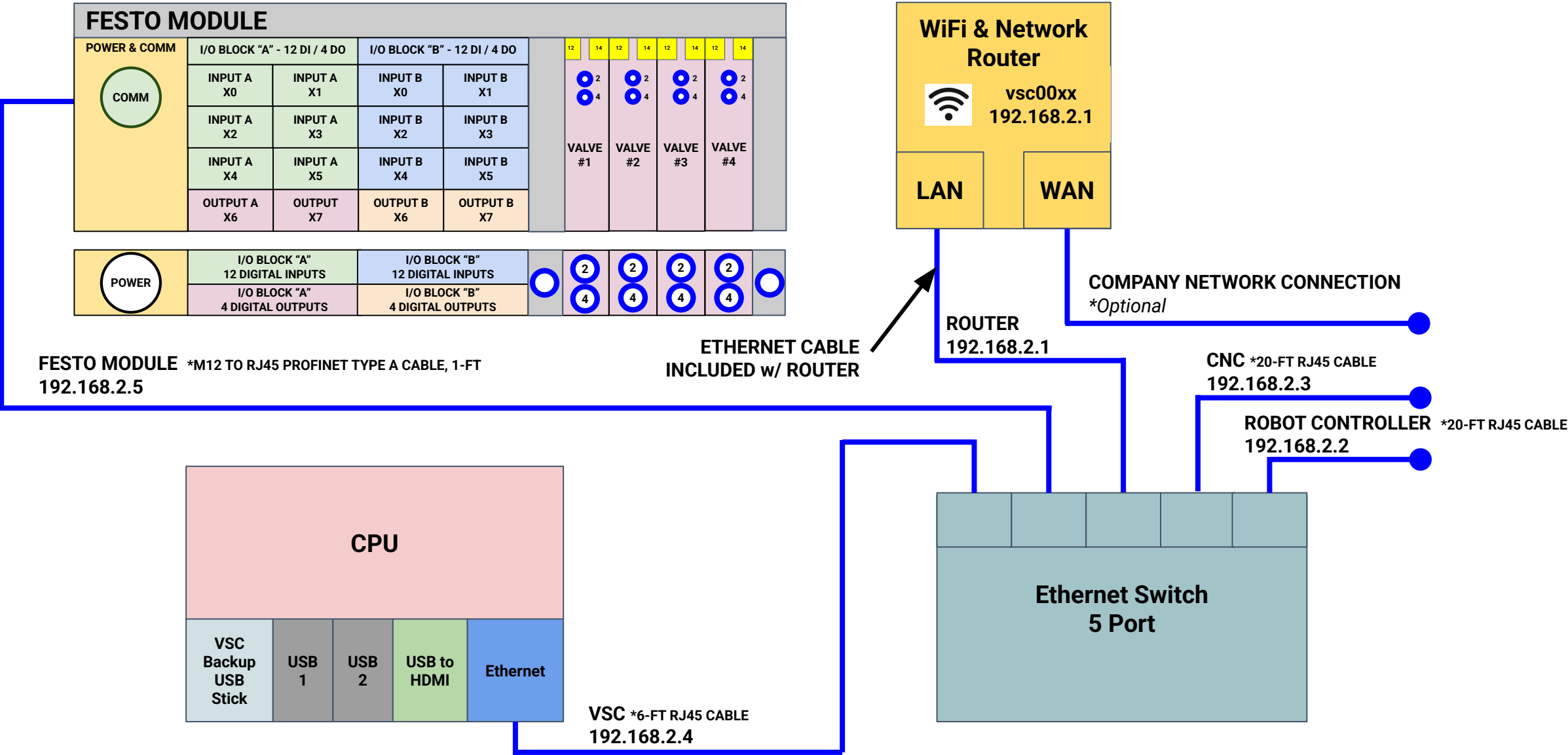
Inside Controller - Shown AFTER connecting E-Stop Cable



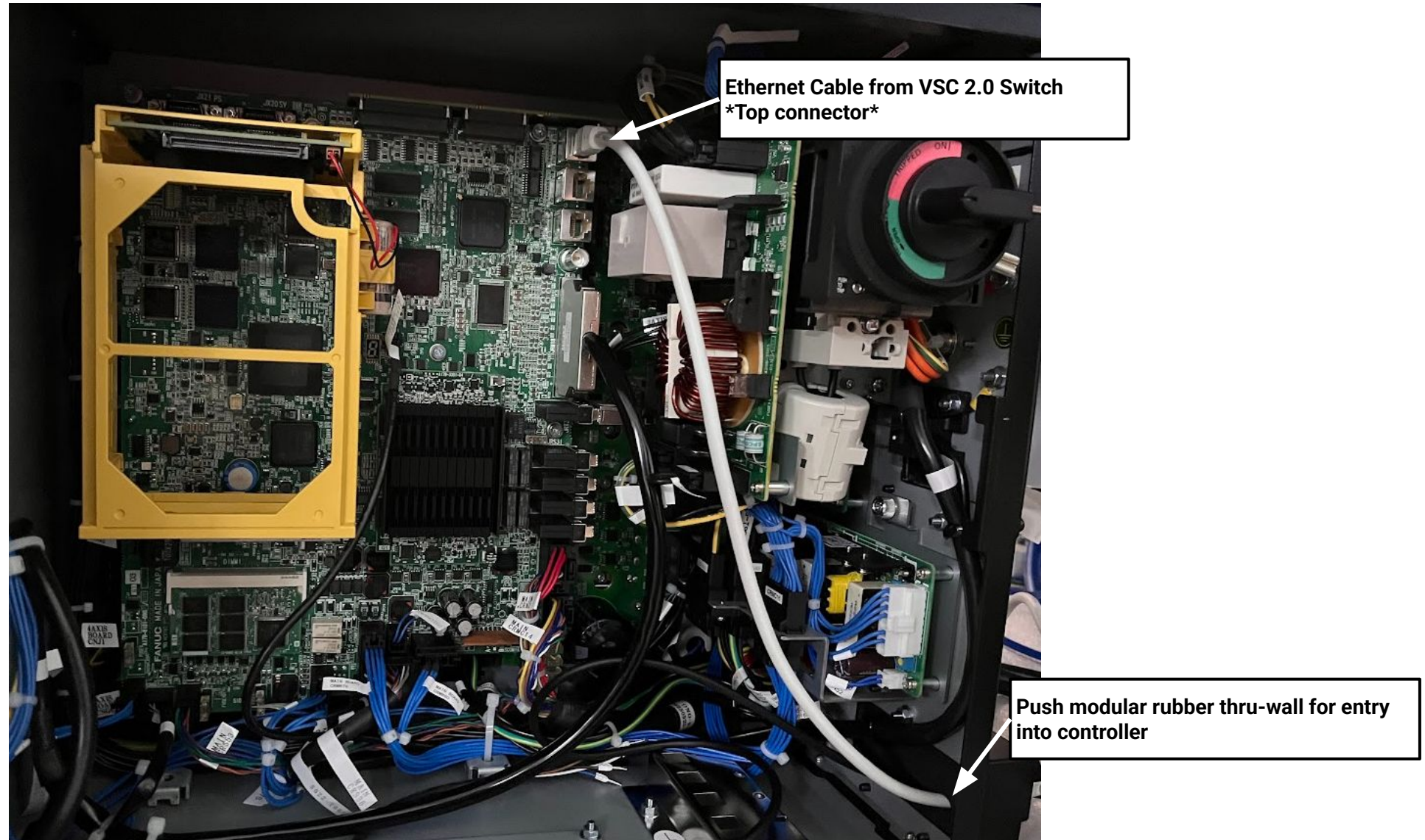
VSC 2.0 Networking

Section 5

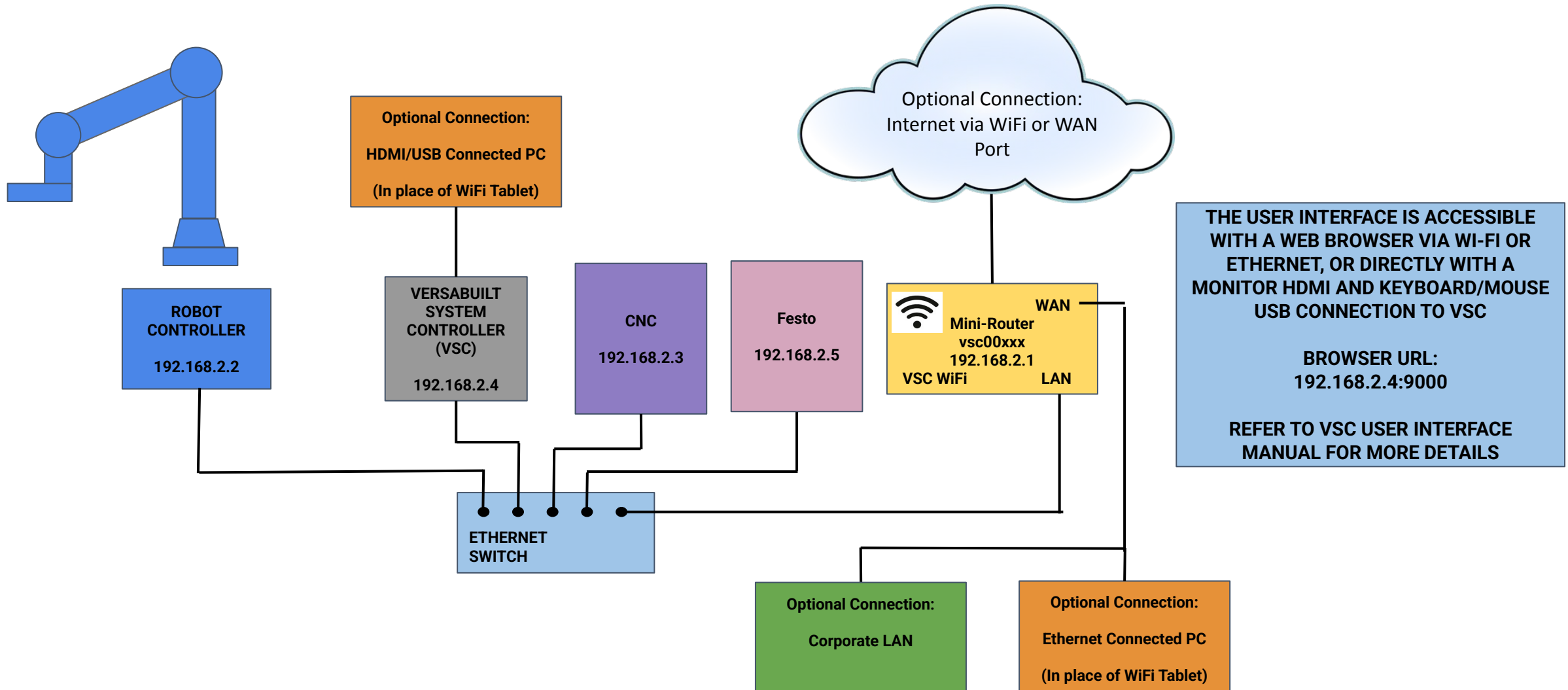
VSC 2.0 Network Connections



Fanuc CRX Controller Ethernet Connection



VSC 2.0 Network Diagram



VSC 2.0 Pneumatics

Section 6

Energizing the Pneumatics

- Before connecting to Supply Air
 - Make sure no person is in contact with the Gripper, Vises, or VersaDoor as it may move suddenly when energized.
 - Verify connections match provided diagrams and schematics in this manual
 - Refer to the Safety Manual for completion of your Risk Assessment
 - **Verify air prep:** The main air supply should be less than 115 psi and conditioned air that meets ISO 8573-1:2010 [7:4:4] standard. Note: Maximum system air consumption is 15-20 SCFM. * *Air Prep equipment (Filter, Moisture Separator, Regulator) is sold separately from systems.*
- Automation System check:
 - All air fittings are “push-to-connect” (PTC), allowing quick and easy connectivity
 - If a VersaBuilt AutoDoor is included, close the CNC door
 - Keep hands/body clear of any actuator (Gripper, Vise/Chuck/Workholding, VersaDoor, VersaBlast, etc.)
 - Start by connecting the Diverter Valve in the Green “Manual” position
 - Connect Supply Air to the system
 - Use hand valves to actuate the vises
 - Check for leaks, loose connections and fix as needed
 - When ready to test automatic tools, switch the Diverter Valve to the Red “Auto” position.
 - Tests device pneumatics with the I/O Panel or Recovery panels

Tubing and Fittings

All air fittings are “push-to-connect” (PTC), allowing quick and easy connectivity

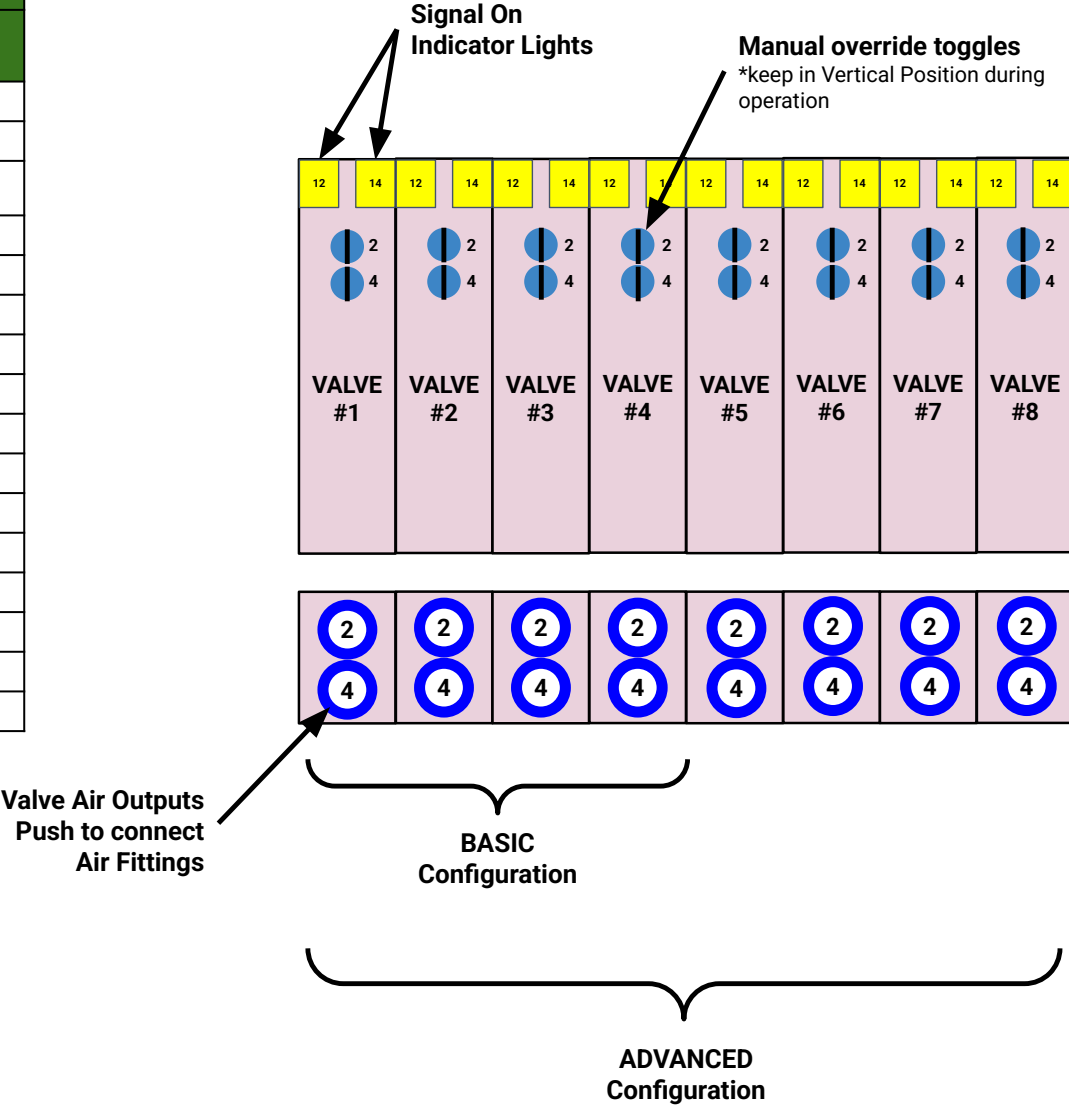
Incoming Air is the main air supply and should be less than 115 psi and conditioned air that meets **ISO 8573-1:2010 [7:4:4]** standard.

Maximum system air consumption is 15-20 SCFM.

Connect Supply Air after all devices are connected, then check for leaks or poor connections

Pneumatic Connections - Manifold

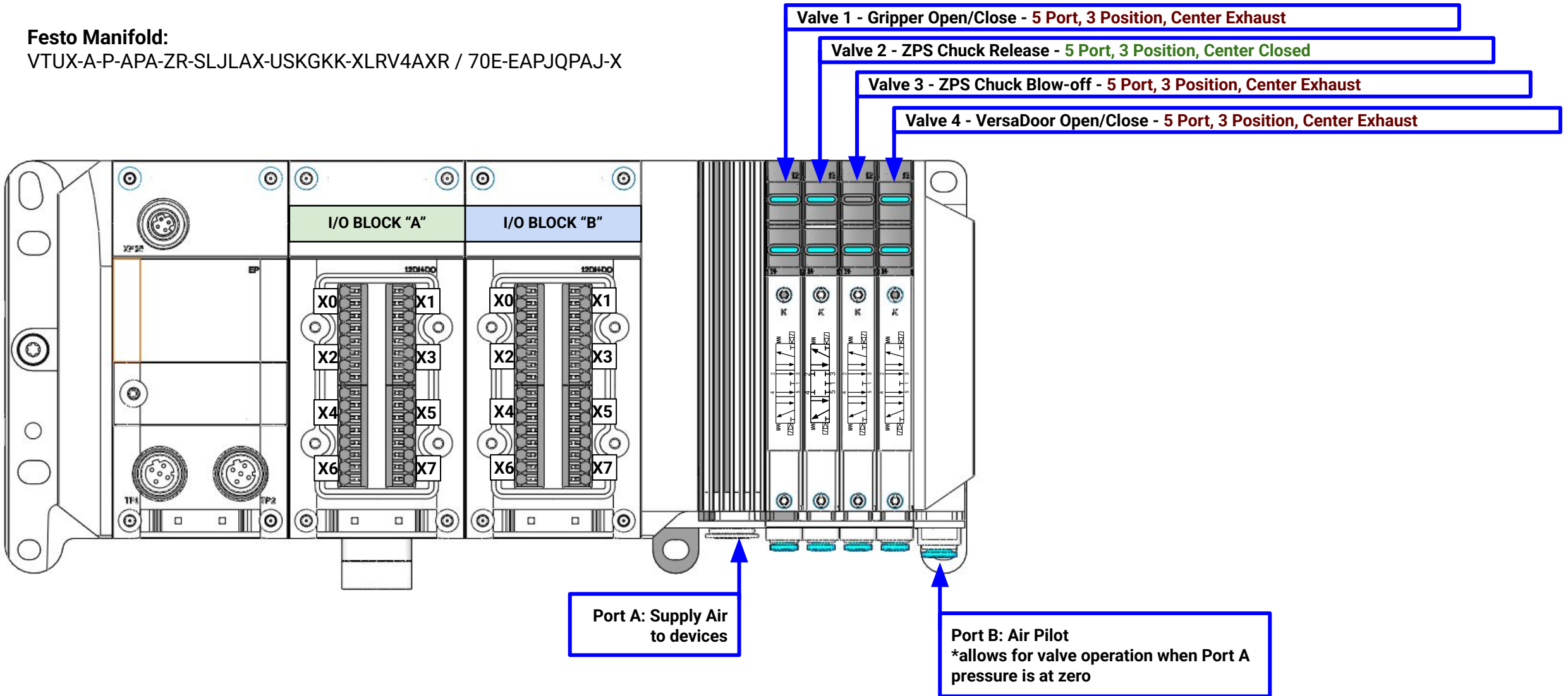
Festo Valve Configuration			1	2
VSC Valve	Port	Fanuc Address	BASIC	ADVANCED
Valve 1	4	137	Gripper Close	Gripper 1 Close
	2	138	Gripper Open	Gripper 1 Open
Valve 2	4	139	ZPS Chuck Clamp	Gripper 2 Close
	2	140	ZPS Chuck Release	Gripper 2 Open
Valve 3	4	141	ZPS Chuck Blow Exhaust	Vise Exhaust <i>*plugged</i>
	2	142	ZPS Chuck Blow On	Vise Pressurized
Valve 4	4	143	VersaDoor Close	VersaDoor Close
	2	144	VersaDoor Open	VersaDoor Open
Valve 5	4	145	Not Used	Vise 1 Close
	2	146	Not Used	Vise 1 Open
Valve 6	4	147	Not Used	Vise 2 Close
	2	148	Not Used	Vise 2 Open
Valve 7	4	149	Not Used	Vise 3 Close
	2	150	Not Used	Vise 3 Open
Valve 8	4	151	Not Used	VersaBlast <i>*air pilot line</i>
	2	152	Not Used	VersaBlast <i>*plugged</i>



Festo Unit #1 - Basic Valve Layout (ZPS Mill)

Festo Manifold:

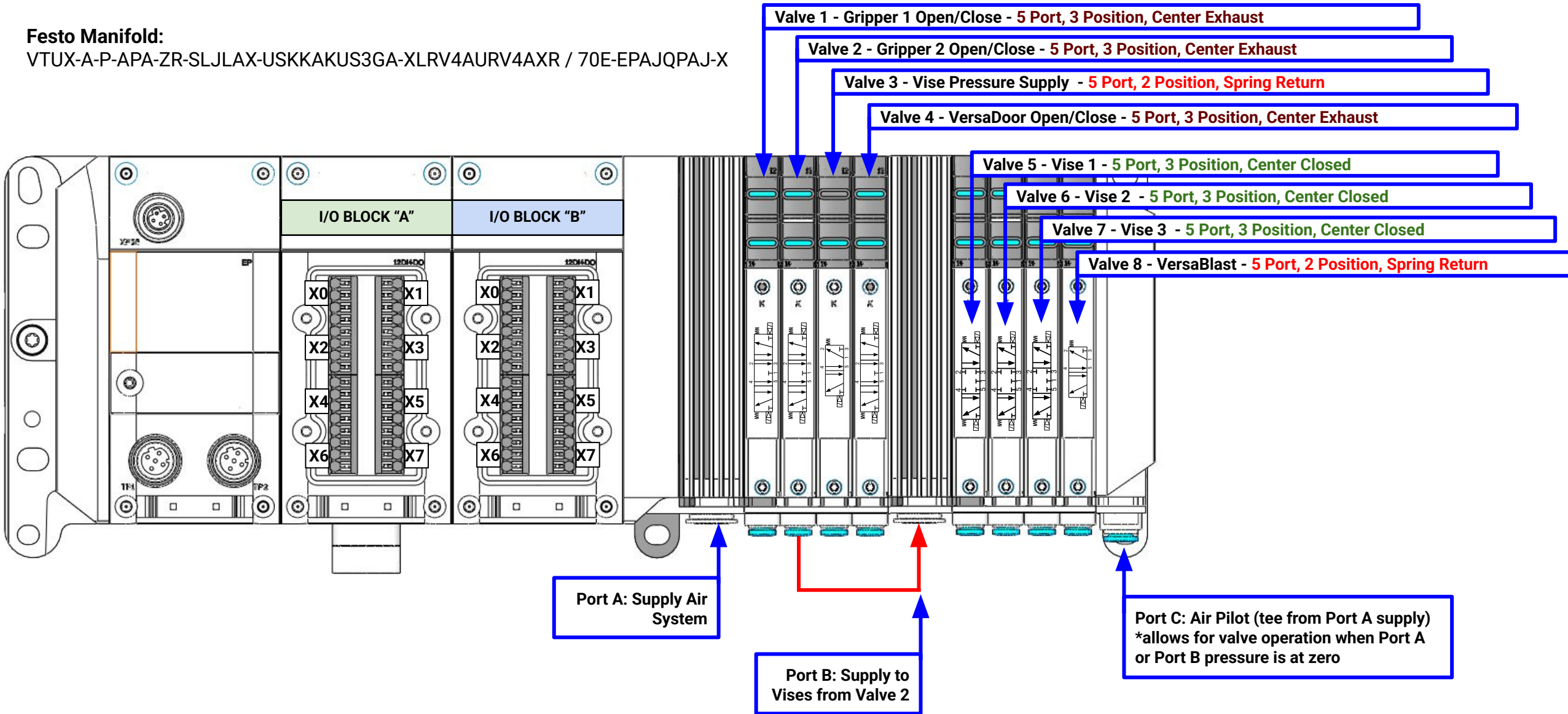
VTUX-A-P-APA-ZR-SLJLAX-USKGKK-XLRV4AXR / 70E-EAPJQPAJ-X



Festo Unit #2 - Advanced Valve Layout (MultiGrip / DuoGrip)

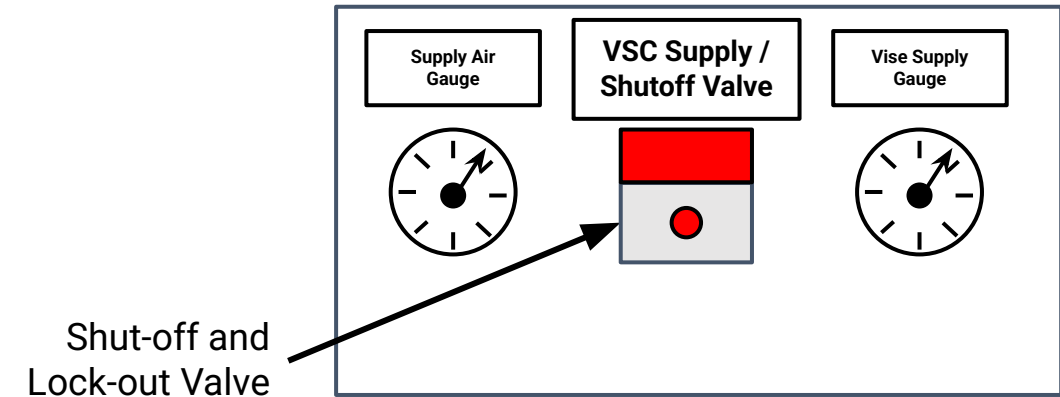
Festo Manifold:

VTUX-A-P-APA-ZR-SLJLAX-USKKAKUS3GA-XLRV4AURV4AXR / 70E-EPAJQPAJ-X

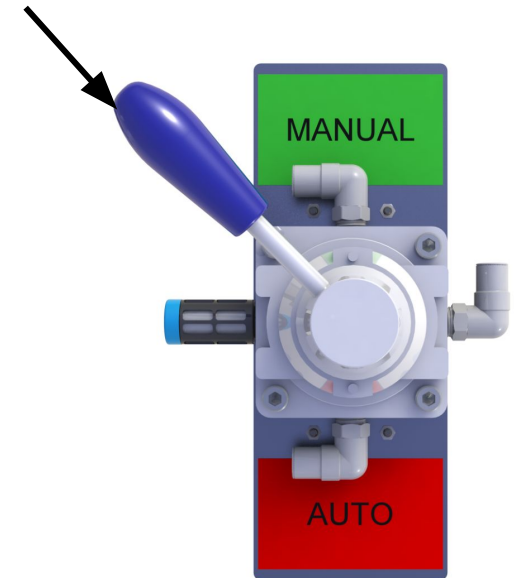


Diverter Valve and Shut-off Valve

- The Shut-off Valve comes standard with all systems, for supply, exhaust and system lock-out.
- The Diverter (Manual/Auto) Valve provides the user with the ability to shut off air to the 24VDC Solenoid valves used in automatic operation in the VSC, diverting air to manual valves in the CNC for hand loading. This is included with systems using pneumatic actuating workholding.
- To switch between Auto and Manual modes, depress the button on the valve handle and position to the labeled ends of the valve assembly
- When in Manual mode, the VSC Supply Air Gauge will be at 0 psi, after one or two manual actuations of devices, with all pressure on the automatic side relieved.
- To lock out or prevent supply of air to components, exhaust, test, verify pressure removal, and lock-out with the Red Shut-off Valve



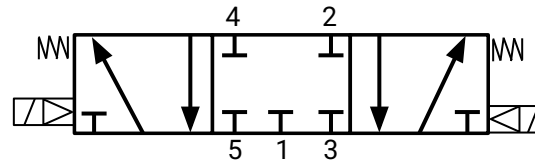
Diverter Valve



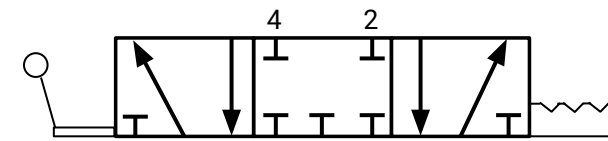
VSC Pneumatics - Valve Types

Valve Types:

1. Vise / ZPS Chuck Valves



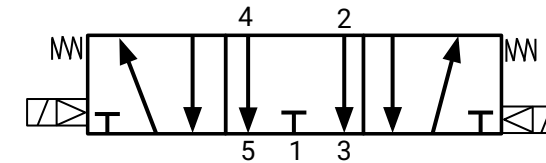
5 Port, 3 Position, Center Closed
Dual 24VDC Solenoid Valves



5 Port, 3 Position, Center Closed
Hand Valves

Air is held / trapped with
valve in Center position
(w/o 24VDC signals or
center handle position)

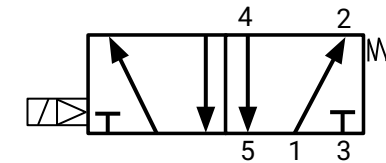
2. Gripper & VersaDoor Valves



5 Port, 3 Position, Center Exhaust
Dual 24VDC Solenoid Valve

Air is exhausted w/o
24VDC signals

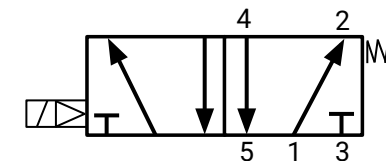
3. Vise Exhaust Valve



5 Port, 2 Position, Spring Return
Single 24VDC Solenoid Valve

Configured for Normally
Open supply air to vise
valves

4. VersaBlast Signal Valve



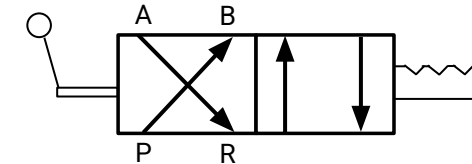
5 Port, 2 Position, Spring Return
Single 24VDC Solenoid Valve

Configured for Normally
Closed, signalling
VersaBlast on with Air
Pilot Signal to High Flow
Valve

VSC Pneumatics - Valve Types

Valve Types:

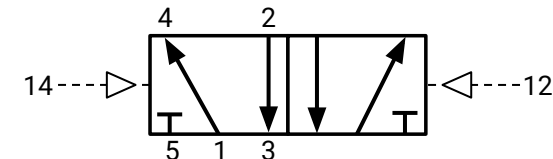
5. Diverter Valve



4 Port, 2 Position
Hand Valve

Switch between "AUTO"
and "MANUAL" model

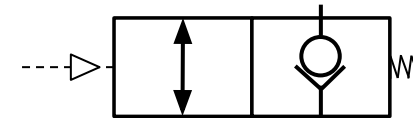
6. Air Pilot Valves



5 Port, 2 Position
Air Piloted Valve

Enables high pressure or
hold position w/o 24VDC
Signal

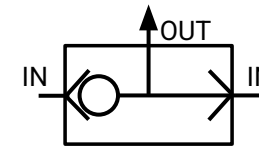
7. Pilot Operated Check Valves



Pilot Operated Check Valve

Holds pressure in device
without pilot air

8. Shuttle Valves



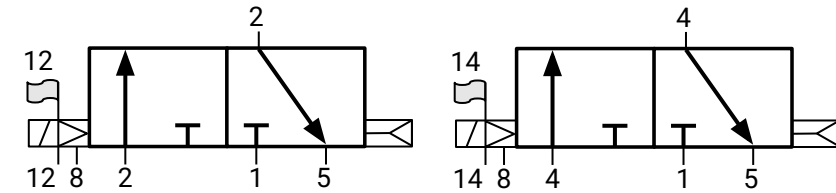
Shuttle Valve

Two Input lines, supplying
the greater of the two
pressures to the output

VSC Pneumatics - Valve Types

Valve Types:

9. Double Acting Valve



2x 3 Port, 2 Position
Dual 24VDC Solenoid Valve

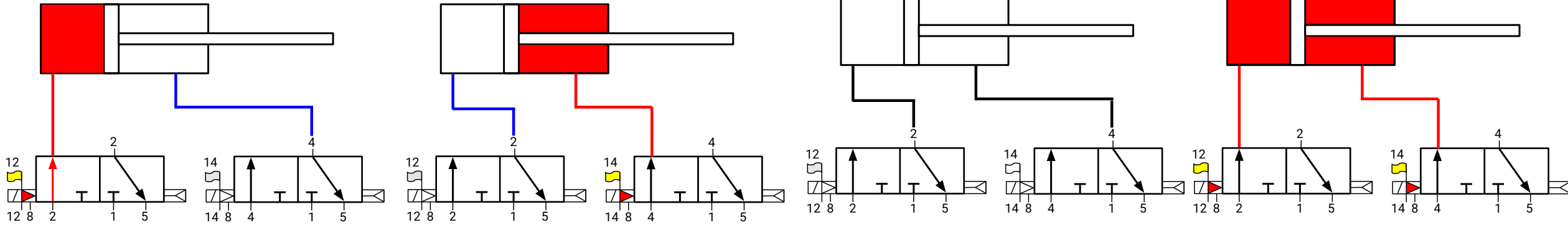
Alternate Actuator Valve
allowing for pressure on
both sides of the piston or
pressure relief on both
sides of the piston
*Used as "Center Exhaust"
valve in Festo Manifolds

Actuator Extend

Actuator Retract

No Signal - Actuator Float

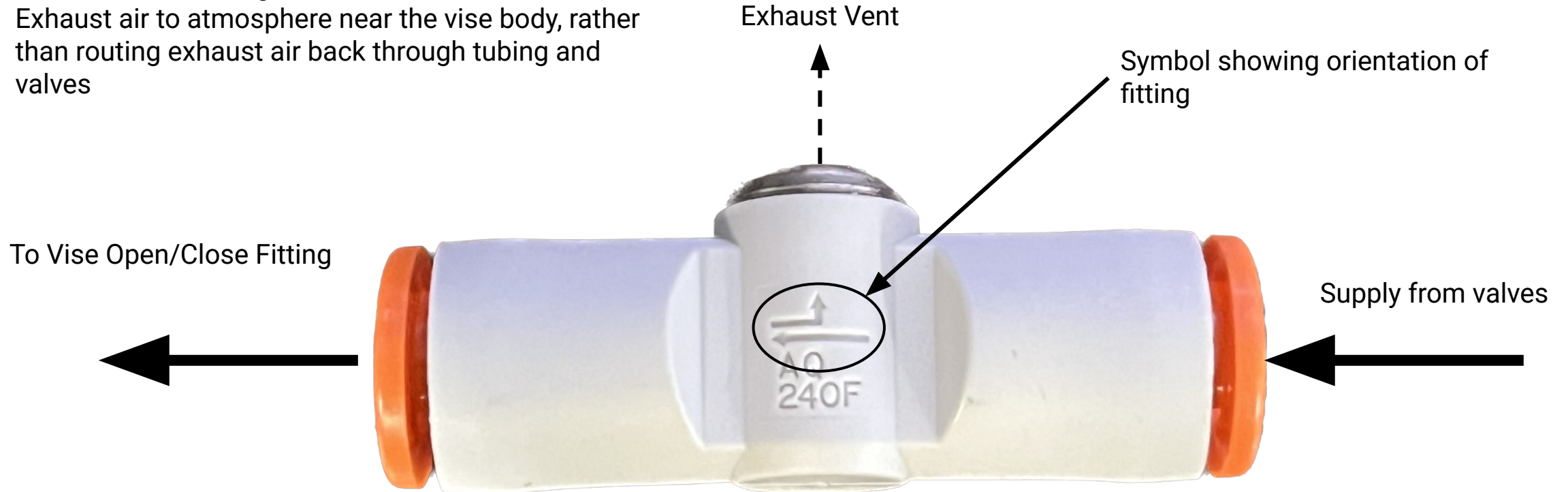
Dual Signal



Quick-Exhaust Fittings

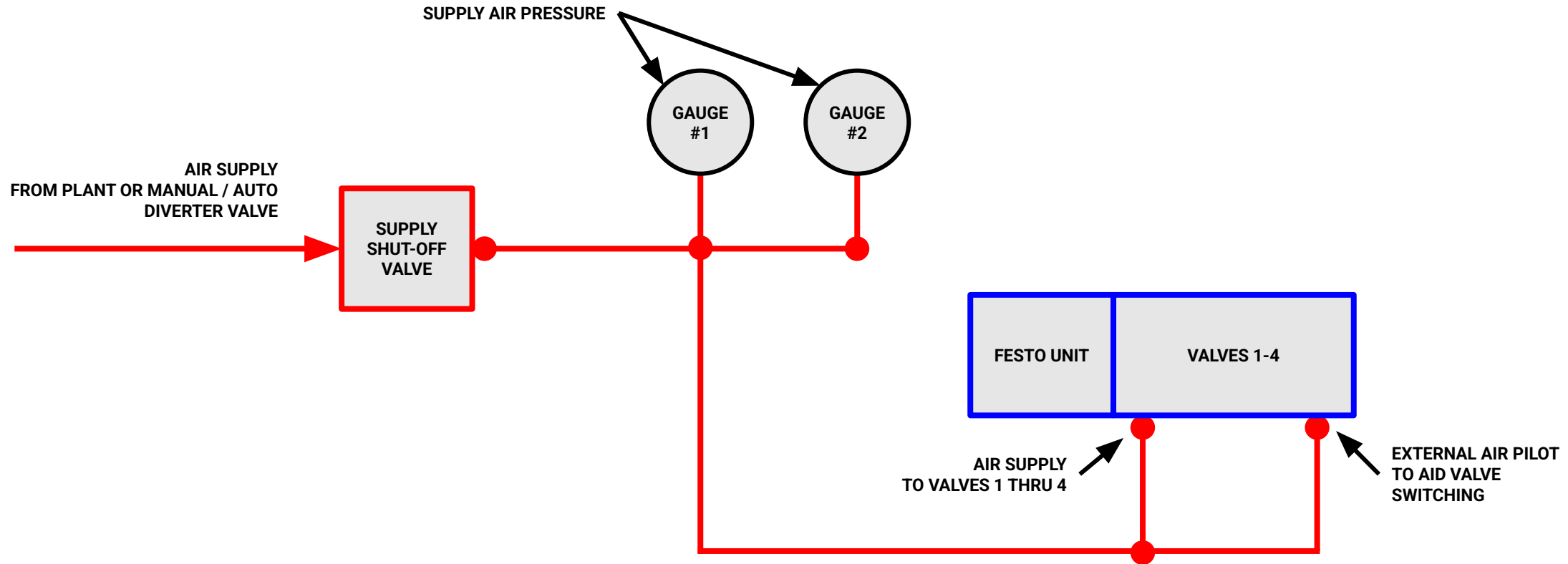
Quick-Exhaust Fitting:

Exhaust air to atmosphere near the vise body, rather than routing exhaust air back through tubing and valves

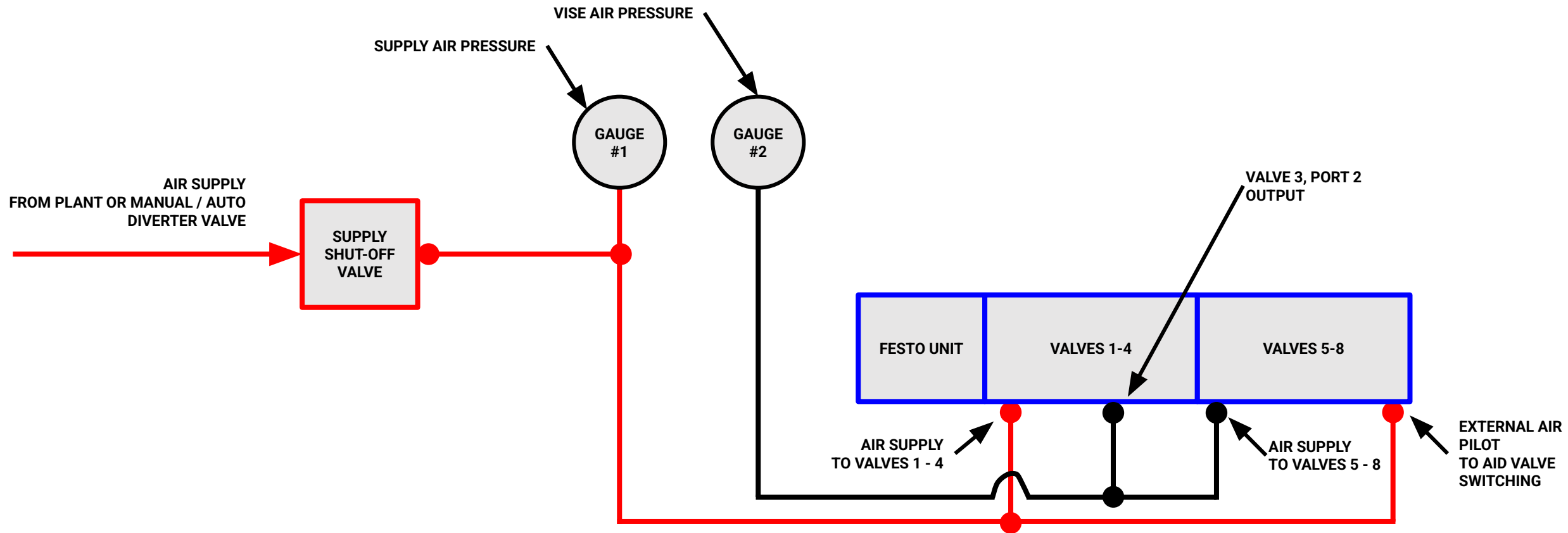


Quick-exhaust increases the speed of vise actuation and reduces complexity of exhaust air routing through devices

Basic Festo Pneumatics Supply & Gauges



Advanced Festo Pneumatics Supply & Gauges

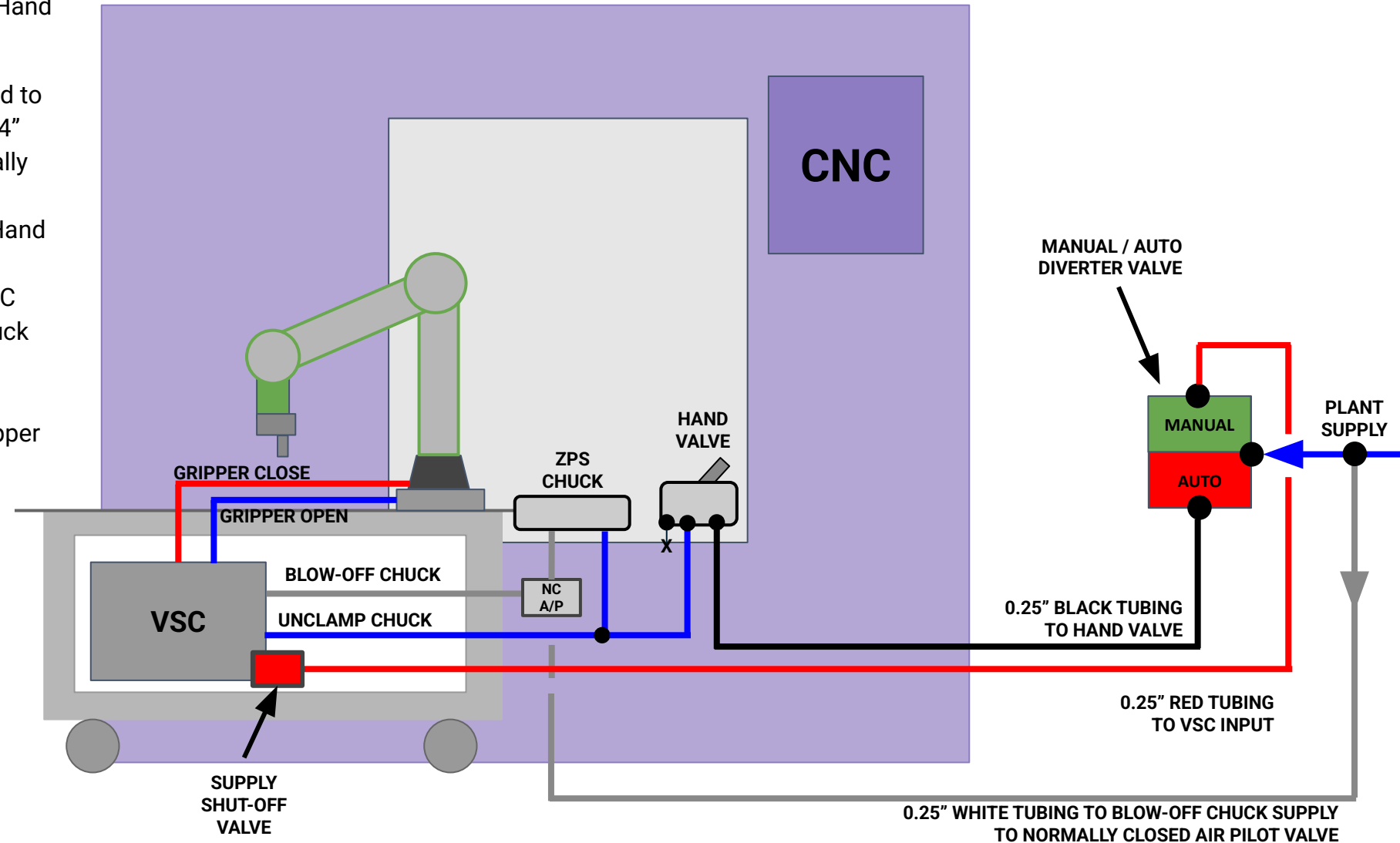
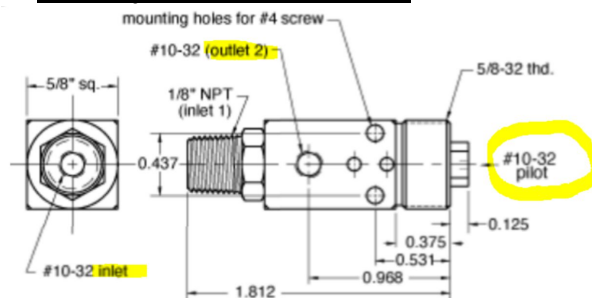


ZPS Mill System Pneumatics w/ VSC Actuating Chuck

The figure to the right page shows supply air to devices in the ZPS Automation System with Hand Valves for manual operation

- 1/2" Blue tubing from Plant Supply tee'd to 1/4" Blue Tubing to Diverter Valve & 1/4" White Tubing to Chuck Blow-off Normally Closed Air Pilot Valve
- 1/4" Black line from Diverter Valve to Hand Valve inside CNC
- 1/4" Red line from Diverter Valve to VSC
- 2x 5/32" air lines from VSC to ZPS Chuck
 - Blue = Unclamp
 - White = Blow-off Pilot Signal
- 2x 5/32" air lines from VSC to ZPS Gripper
 - Blue = Open
 - Red = Close

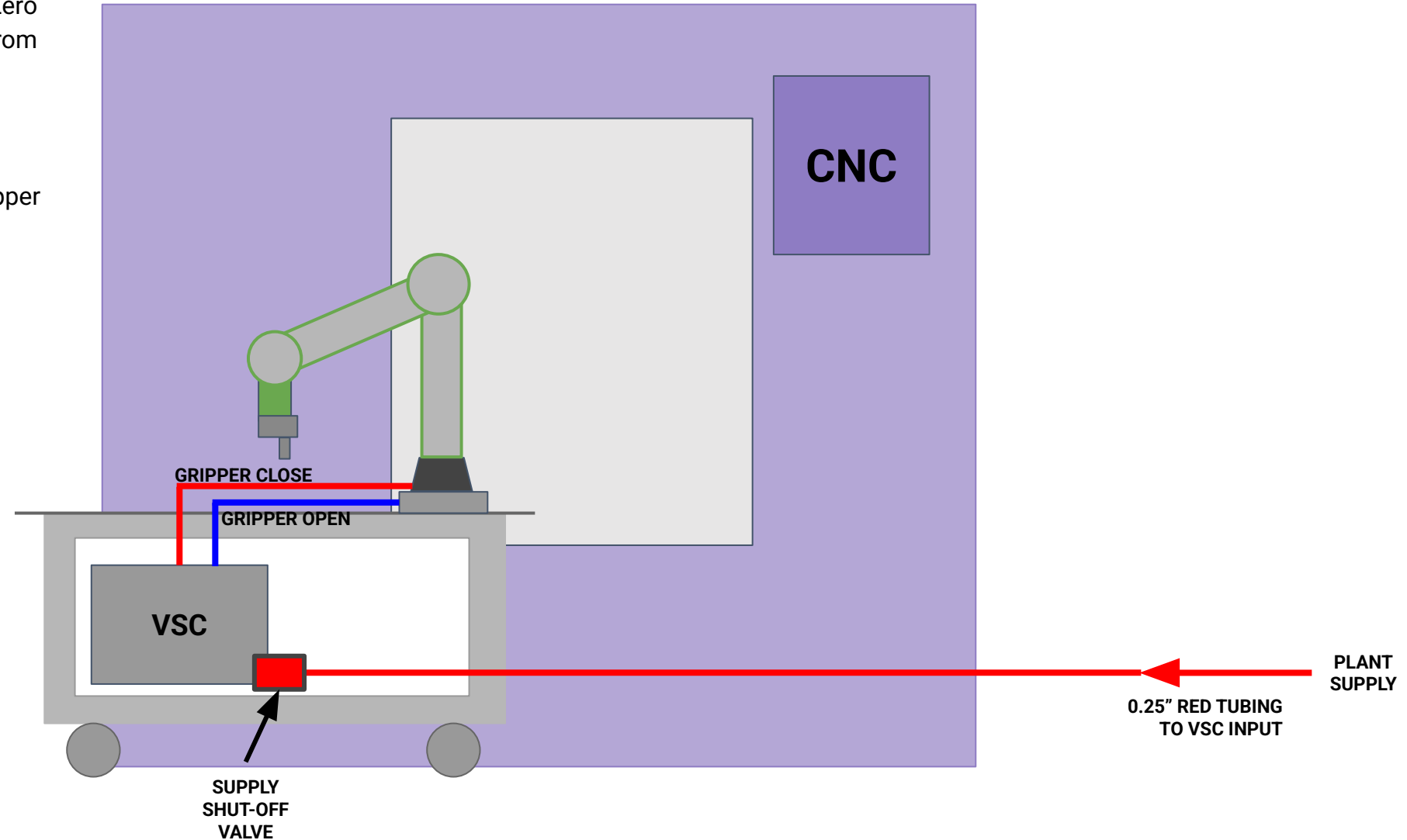
Normally Closed Air Pilot Valve



ZPS Mill System Pneumatics w/o VSC Actuating Chuck

The figure to the right page shows supply air to devices in the ZPS Automation System with Zero Point seating completed without air signals from the VSC (e.g., Haas Zero Point with M-Code controlled pneumatics).

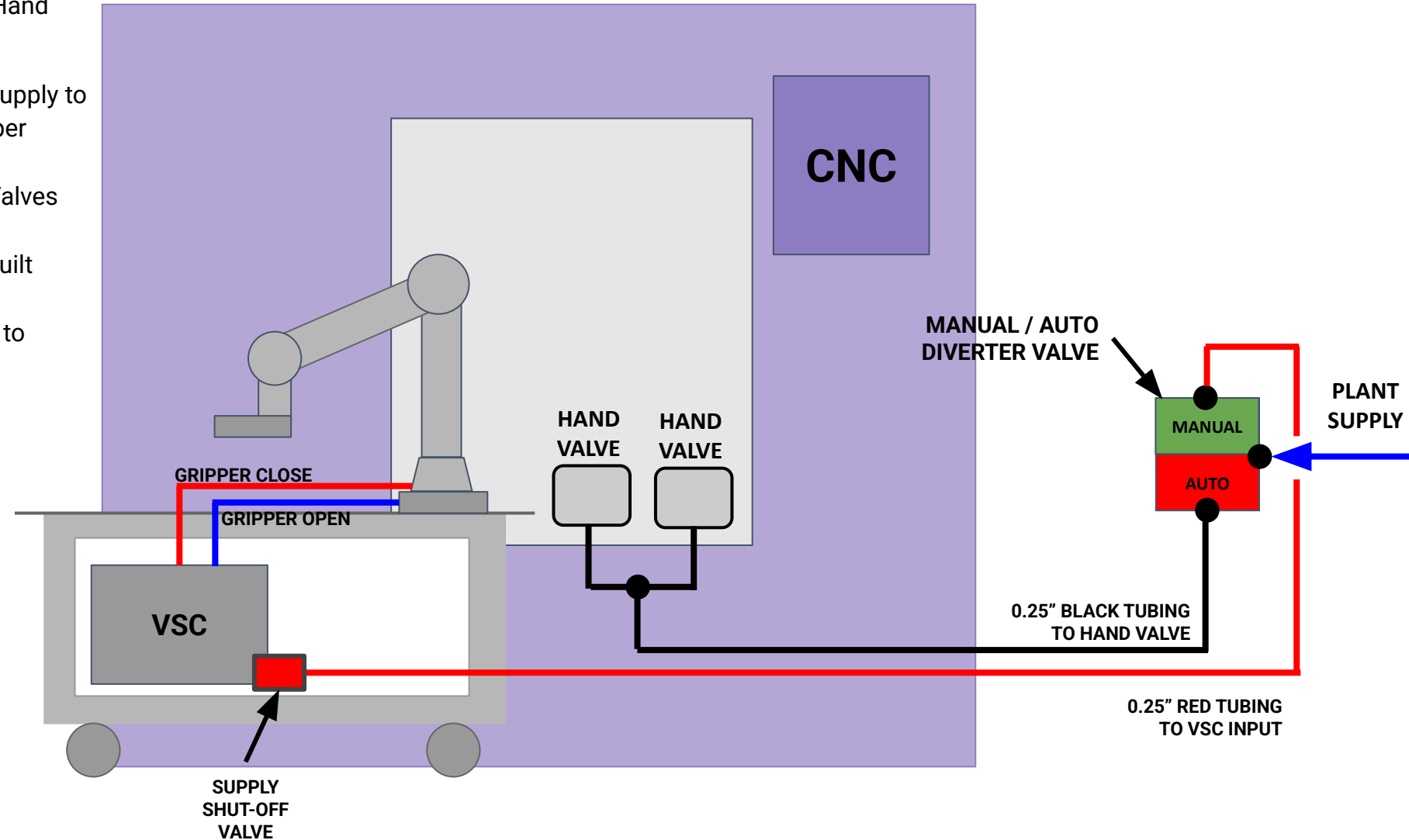
- 1/4" Red line from Supply to VSC
- 2x 5/32" air lines from VSC to ZPS Gripper
 - Blue = Open
 - Red = Close



MultiGrip Mill System Pneumatics

The figure to the right page shows supply air to devices in the Automation System with Vise Hand Valves

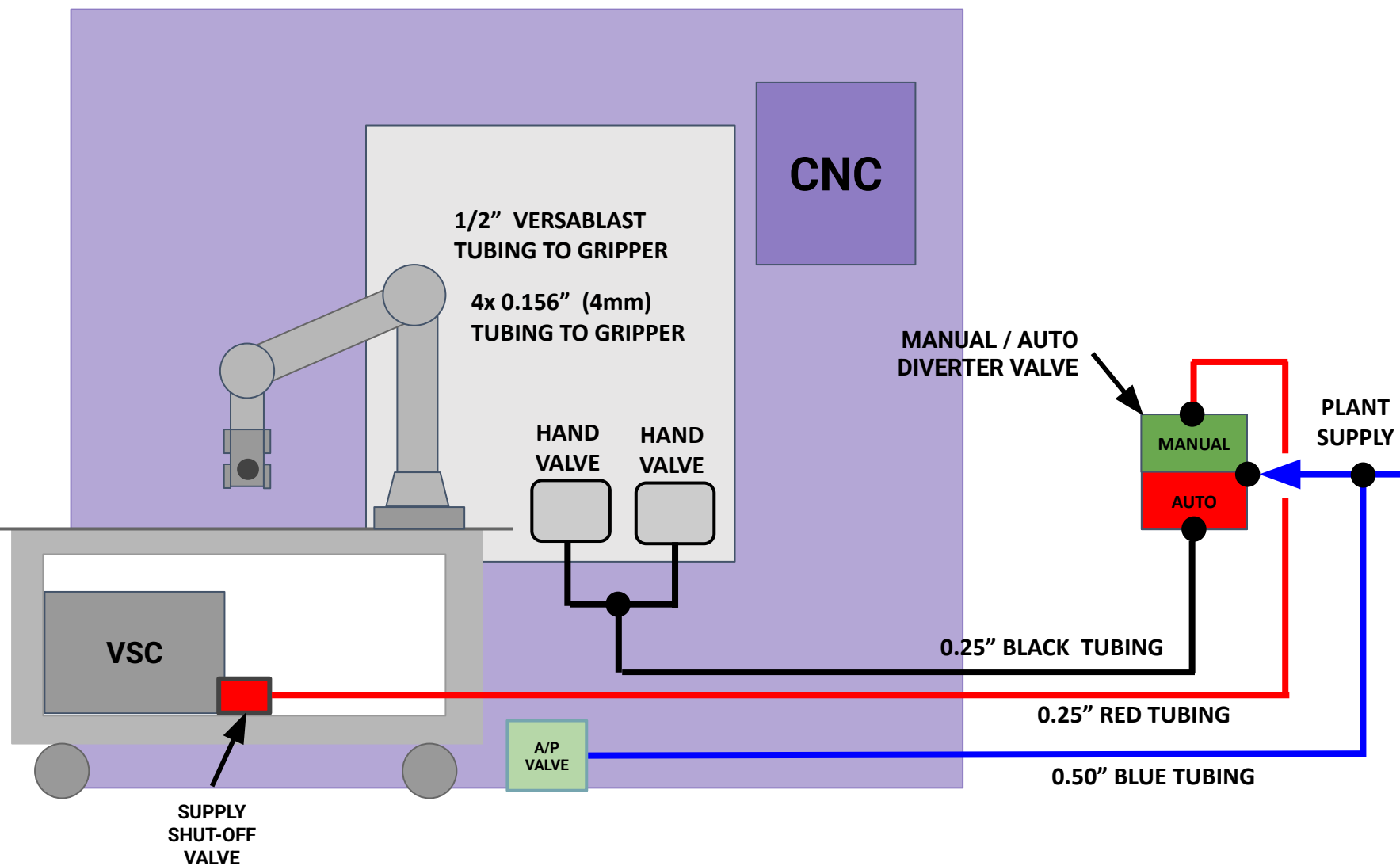
- 1/2" tubing to 1/4" tubing from Plant Supply to Diverter Valve & UR Controller for Gripper Valve supply
- 1/4" line from Diverter Valve to Hand Valves inside CNC*
- 1/4" line from Diverter Valve to VersaBuilt System Controller (VSC)
- 2x 5/32" air lines from robot controller to MultiGrip Gripper



DuoGrip Mill System Pneumatics

The figure to the right shows supply air to devices in the Mill Automation System with DuoGrip.

- 1/2" Blue supply to Tee Fitting with 1/4" line to Diverter Valve and 1/2" line to VersaBlast A/P valve.
- 1/4" Red tubing from Diverter Valve to the VSC
- 1/4" Black line from Diverter Valve to Vise Hand Valves (if included)
- 4x 5/32" lines from VSC to DuoGrip Gripper
- 1x 1/2" to 1/4" line from the VSC VersaBlast Valve to the VersaBlast Air Amplifier on the Gripper body.
- 1x 1/2" to 1/4" line from the A/P valve to the Air Amplifier on the Gripper
- 5/32" lines from robot controller to Vises, if included



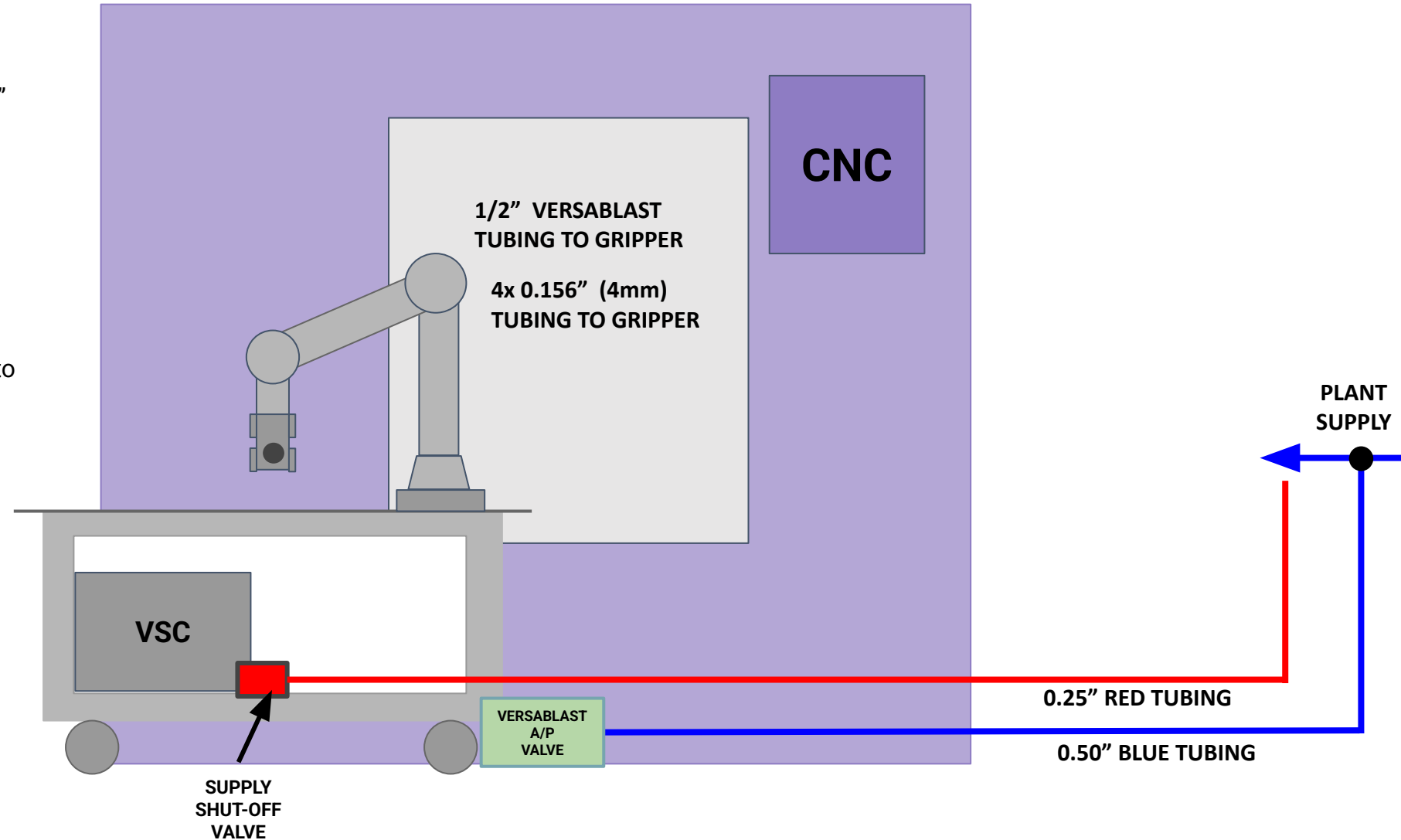
Notes:

- Vises and hand valves sold separately
- VersaBlast diagram shown on the following pages

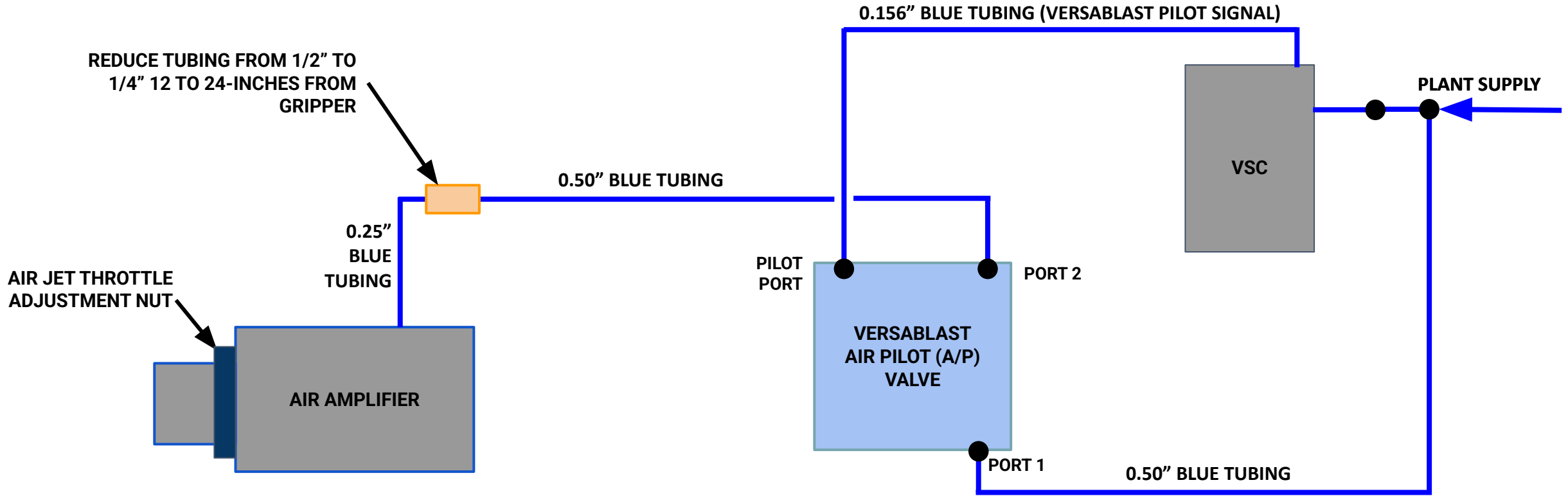
DuoGrip Lathe System Pneumatics

The figure to the right shows supply air to devices in the Mill Automation System with DuoGrip.

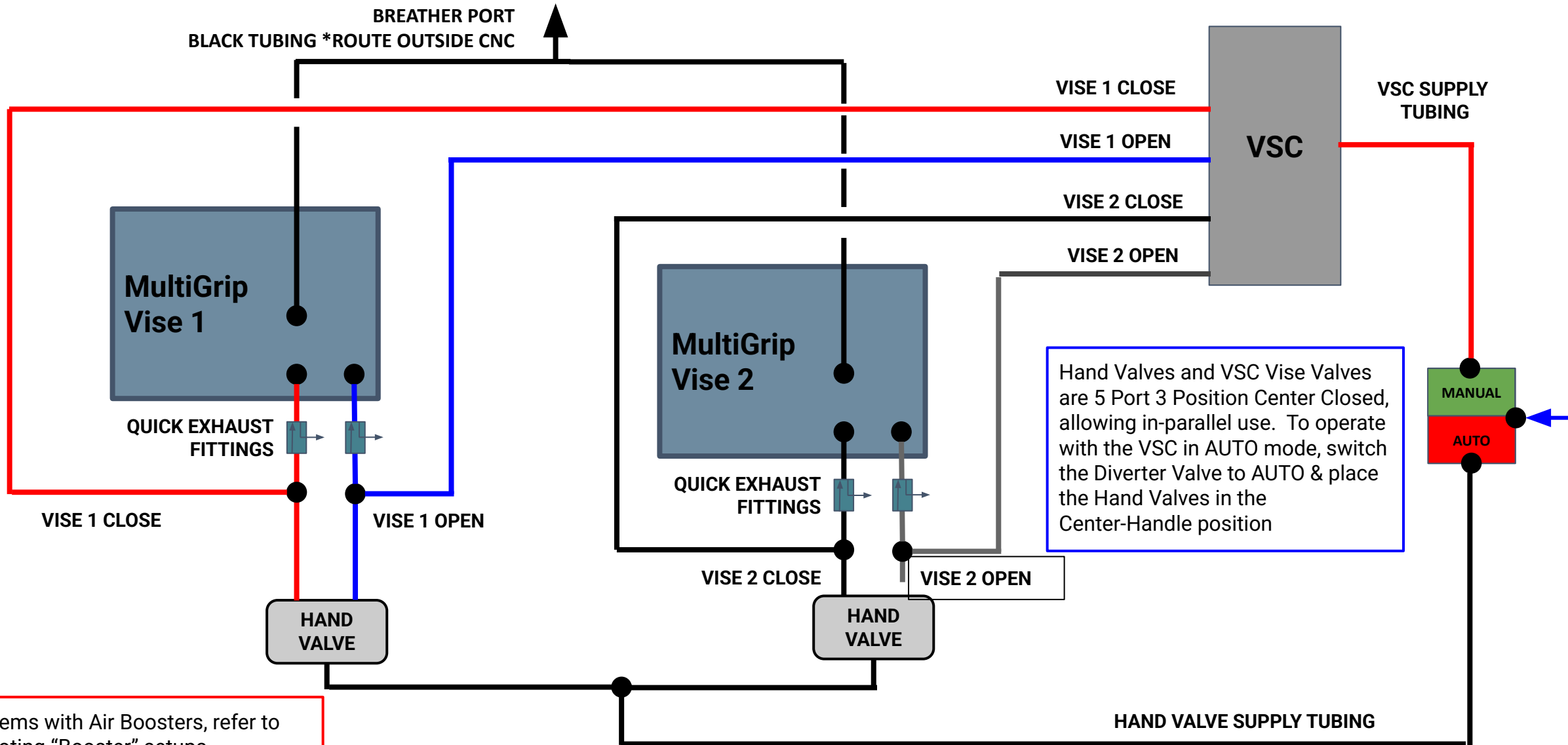
- 1/2" Blue supply to Tee Fitting with 1/4" line to VSC and 1/2" line to VersaBlast A/P valve.
- 4x 5/32" lines from VSC to DuoGrip Gripper
- 1x 1/2" to 1/4" line from the VSC VersaBlast Valve to the VersaBlast Air Amplifier on the Gripper body.
- 1x 1/2" to 1/4" line from the A/P valve to the Air Amplifier on the Gripper
- 5/32" lines from robot controller to Visers, if included



VersaBlast Pneumatics



MultiGrip Vise Tube Routing - 2x Vises

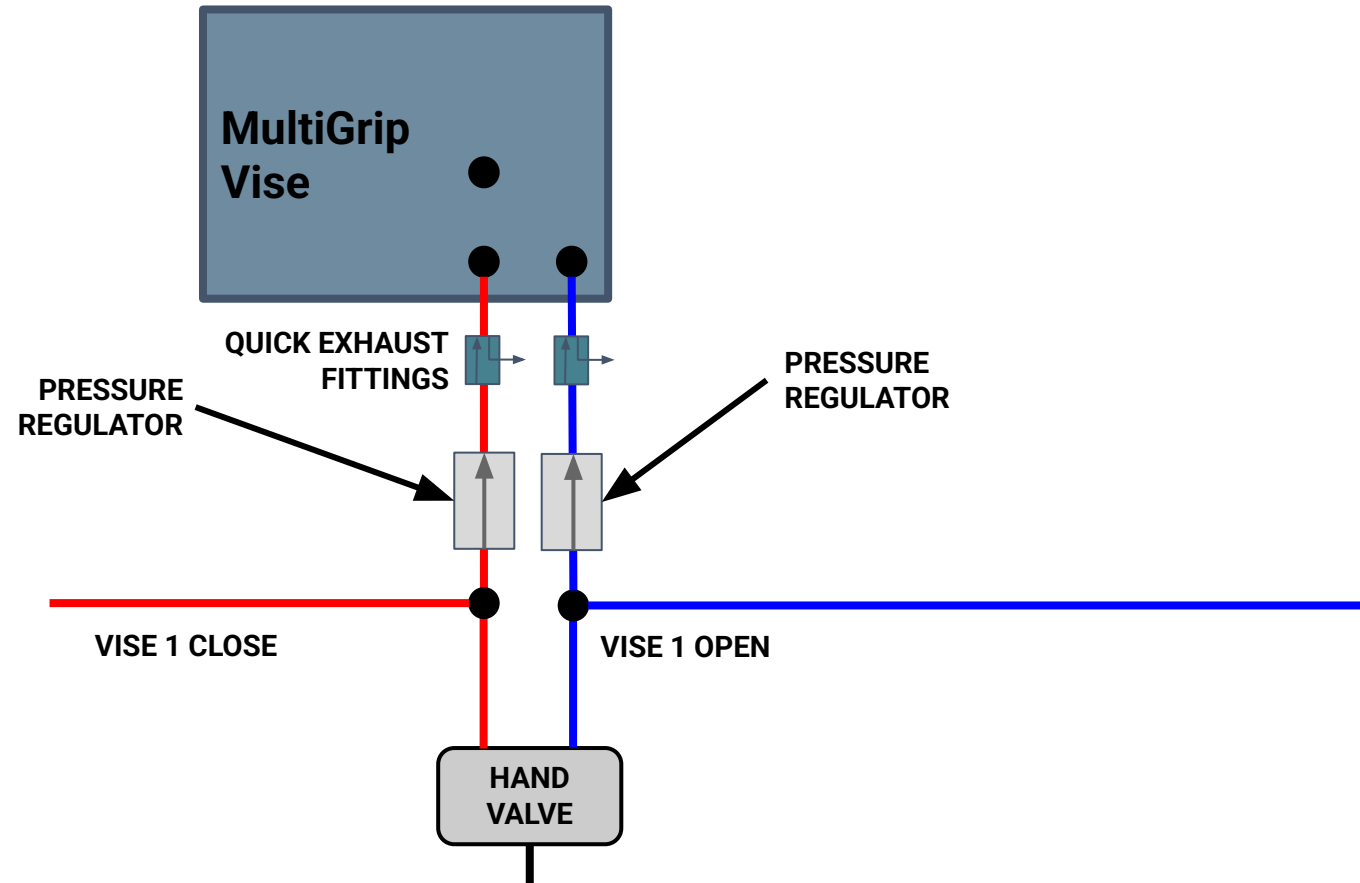


For systems with Air Boosters, refer to pages noting "Booster" setups

Vises - Adding Manual Pressure Regulators

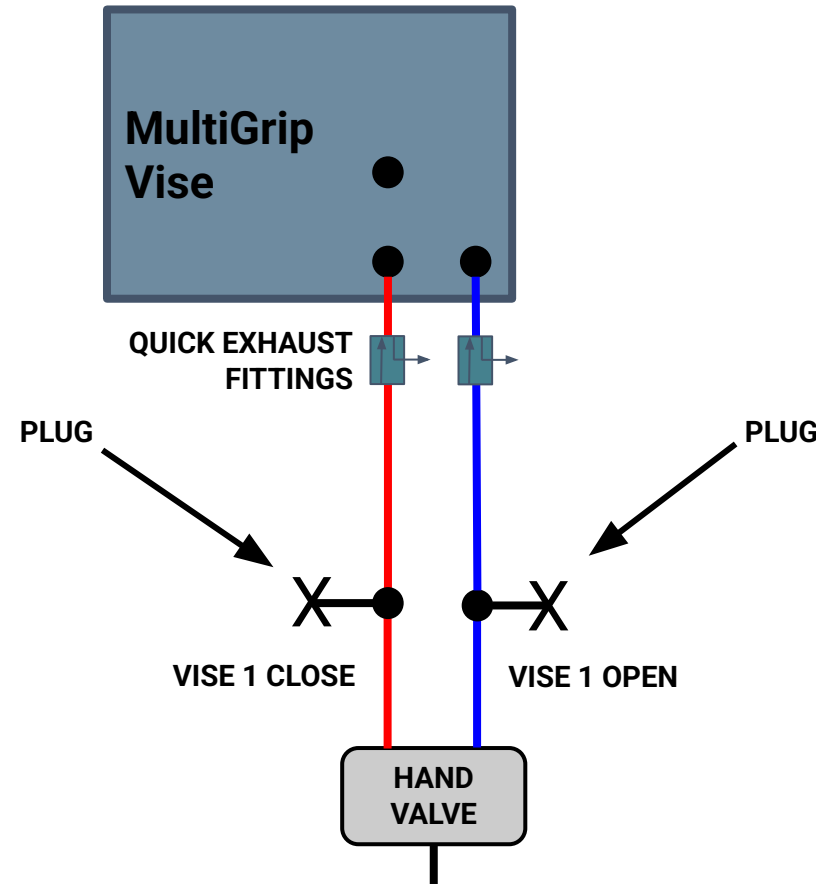
When adding a Manual Pressure Regulator, insert device between:

- T-Fitting connecting air lines from the VSC & the Hand Valve
- AND
- Quick Exhaust Fittings



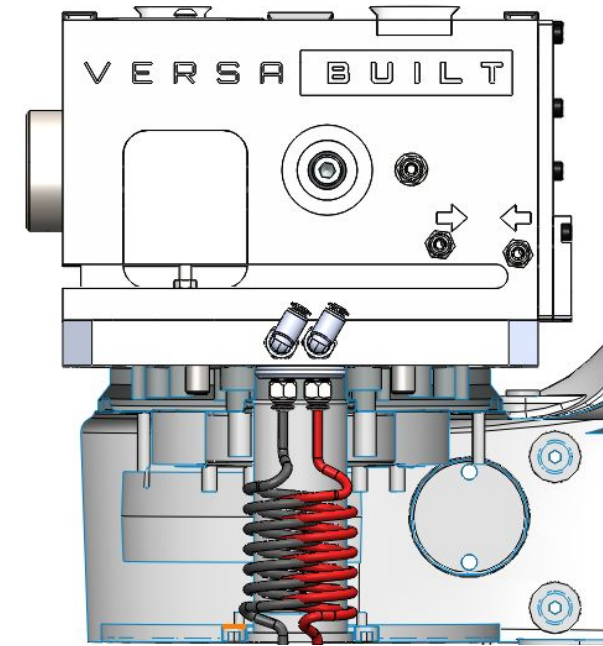
Vises - Manual Operation before VSC installation

When setting up for manual prove-out, without the VSC air-lines connected, add or keep the provided push-to-connect plug on the VSC side of the T-Fitting between the hand valve and the Quick Exhaust Fittings



4th and 5th Axis Rotary - Tube Routing

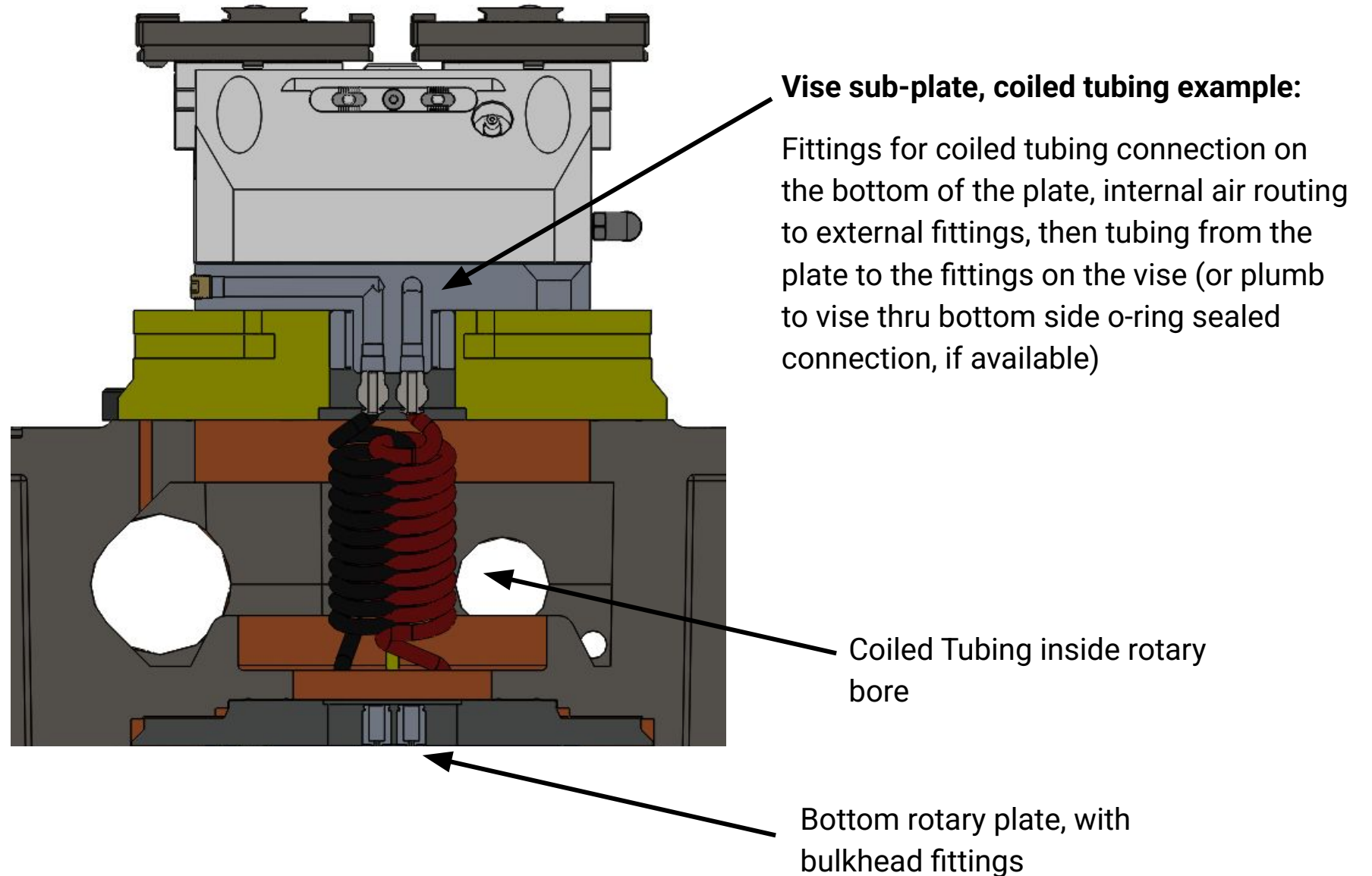
- There are 2 options for vise tube routing with 4th and 5th Axis Rotary setups
 - Rotary Union
 - Coiled Tubing with Axes Limits
- Rotary Union:
 - If available or standard with the rotary, a 2 port rotary union can make the routing of air to the vise simple. Minimum of 2 ports are needed for MultiGrip Vises. A rotary union also allows for continuous axes rotation.
 - Typically, a custom vise adapter plate from the vise to the platter, with tubing connections is required.
- Coiled Tubing:
 - With a bottom rotary plate, with bulkhead fittings and vise adapter to the platter, coiled tubing can be connected inside the rotary bore and accommodate non-continuous rotation.
 - Revise the CNC settings to limit the axes to 720° of rotation.



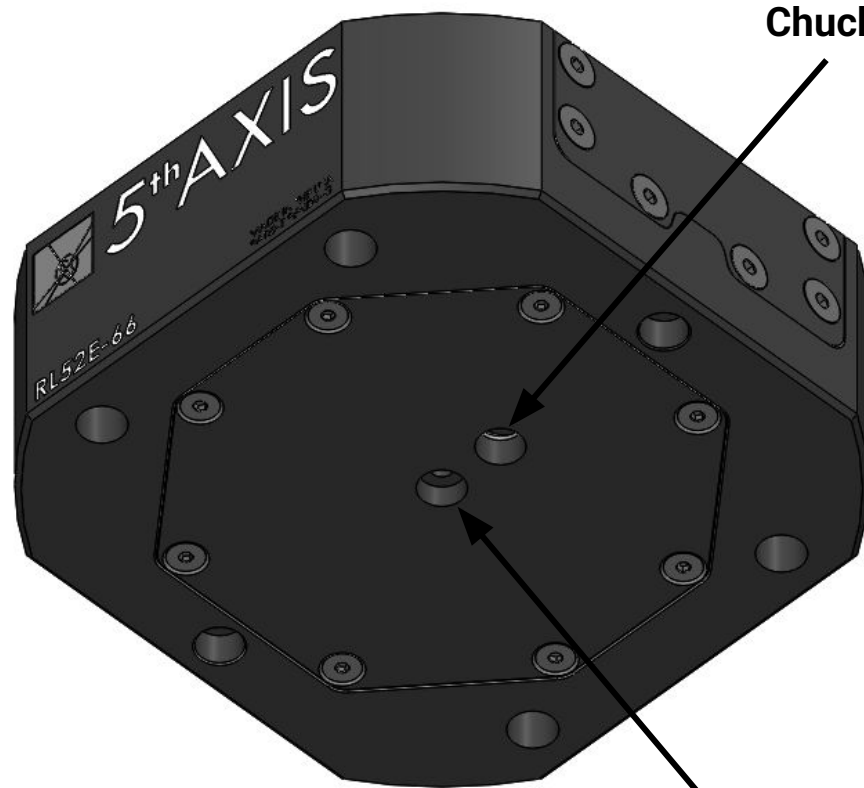
Coiled Tubing Example

Haas CNC Settings - [312 – Min User Travel Limit C](#)

4th and 5th Axis Rotary - Coiled Tubing Example

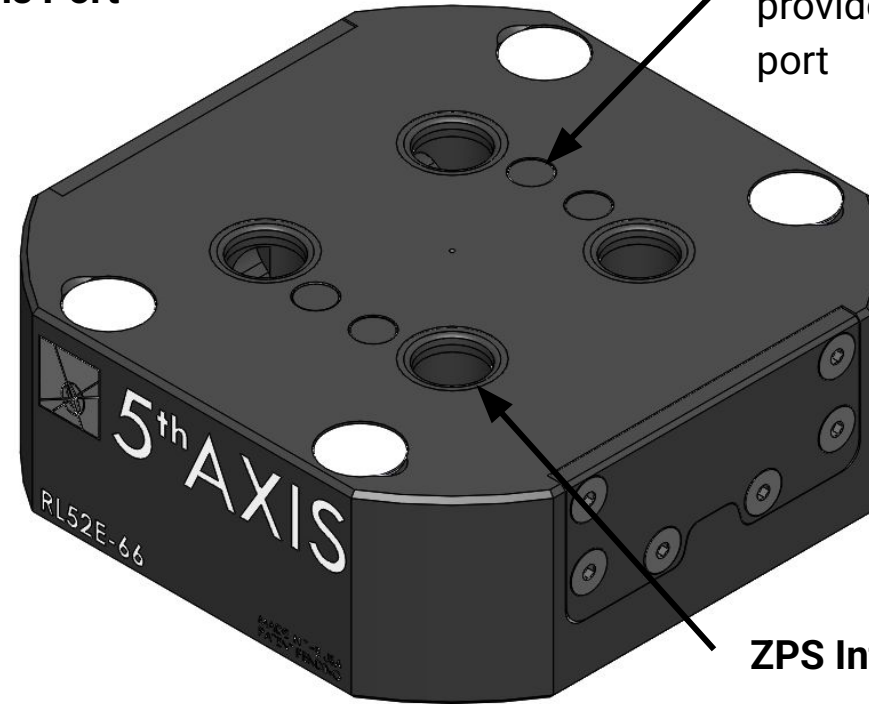


52mm 5th Axis ZPS Chuck



Chuck Release Pins Port

Chuck Blow-off Port



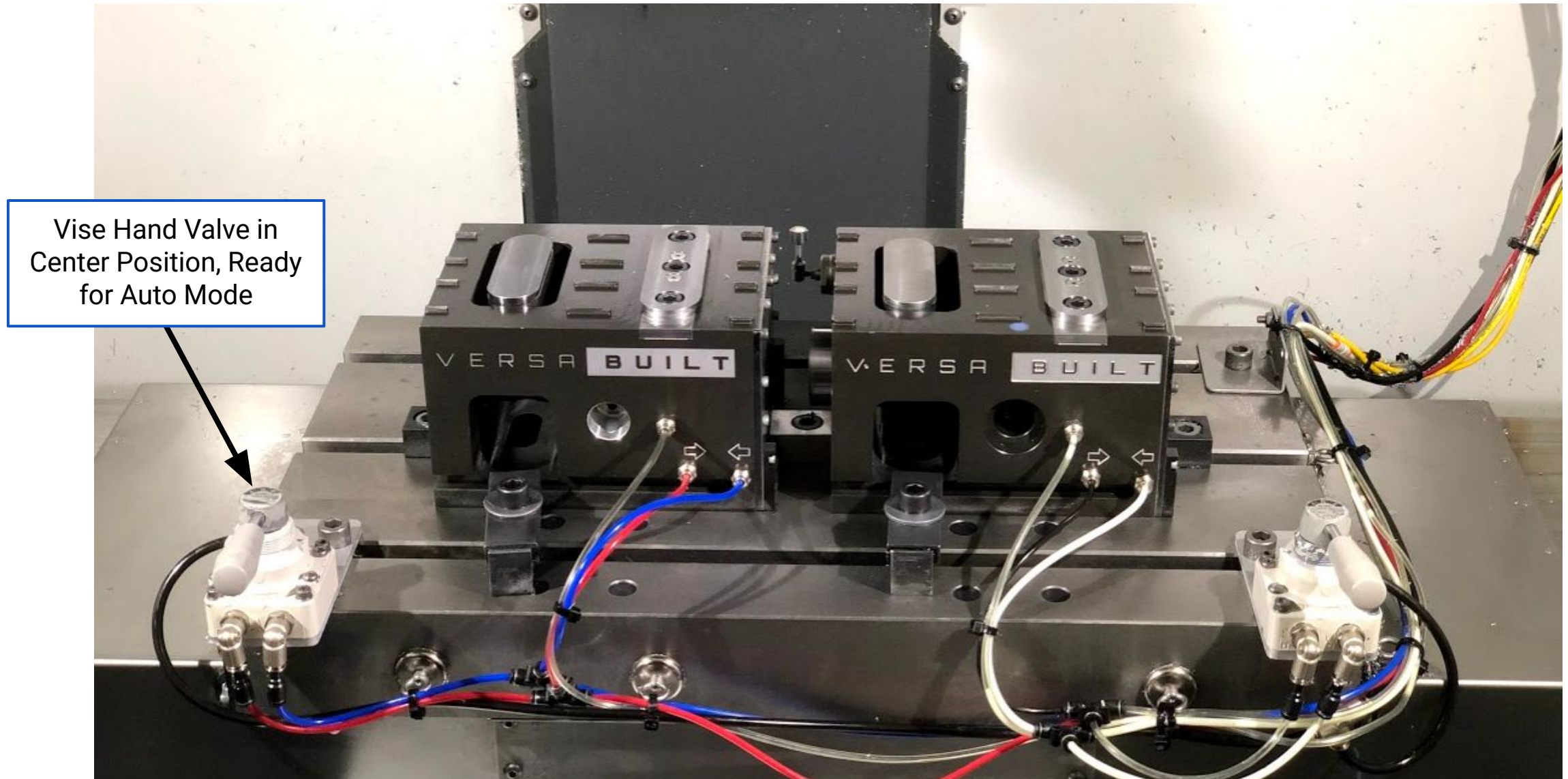
Chuck Release Pins

Pins lift up when air is provided to the Chuck Release port

ZPS Interface & Blow-off

Mating feature for ZPS Pin pull-down. When air is provided to the Chuck Blow-off port, air is blown out of these features

Vise Air & Cable Routing In/Out of CNC



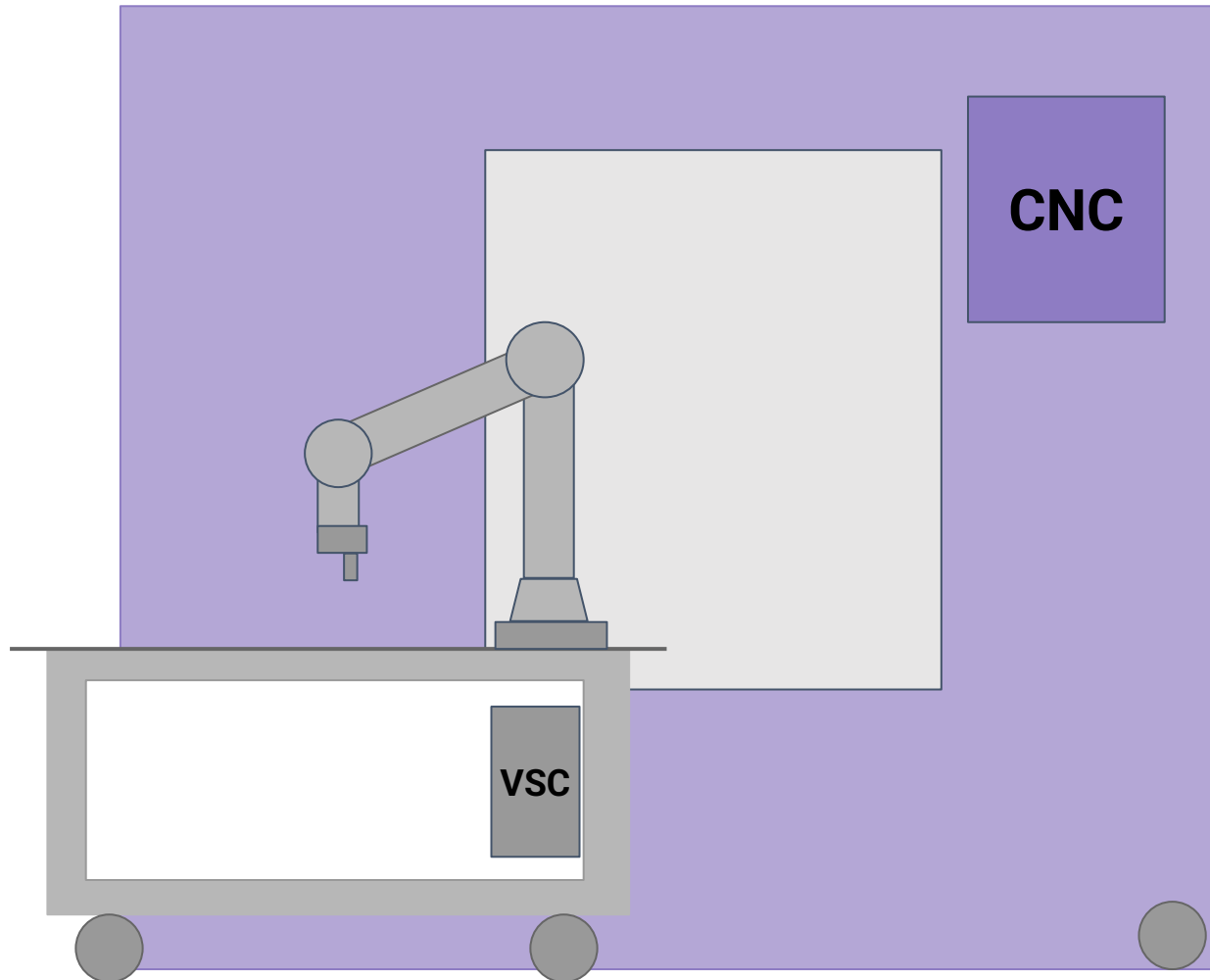
Appendix A - Legacy VSC 2.0 Details

Appendix A

Appendix A.1 - VSC00233

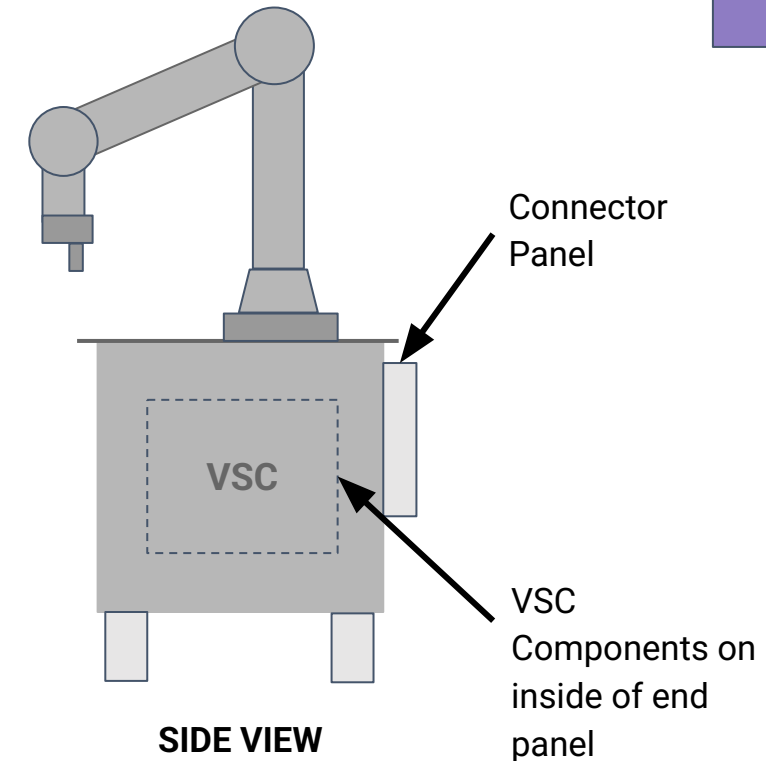
Appendix A.1

VSC00233 - VSC 2.0 Components & Layout



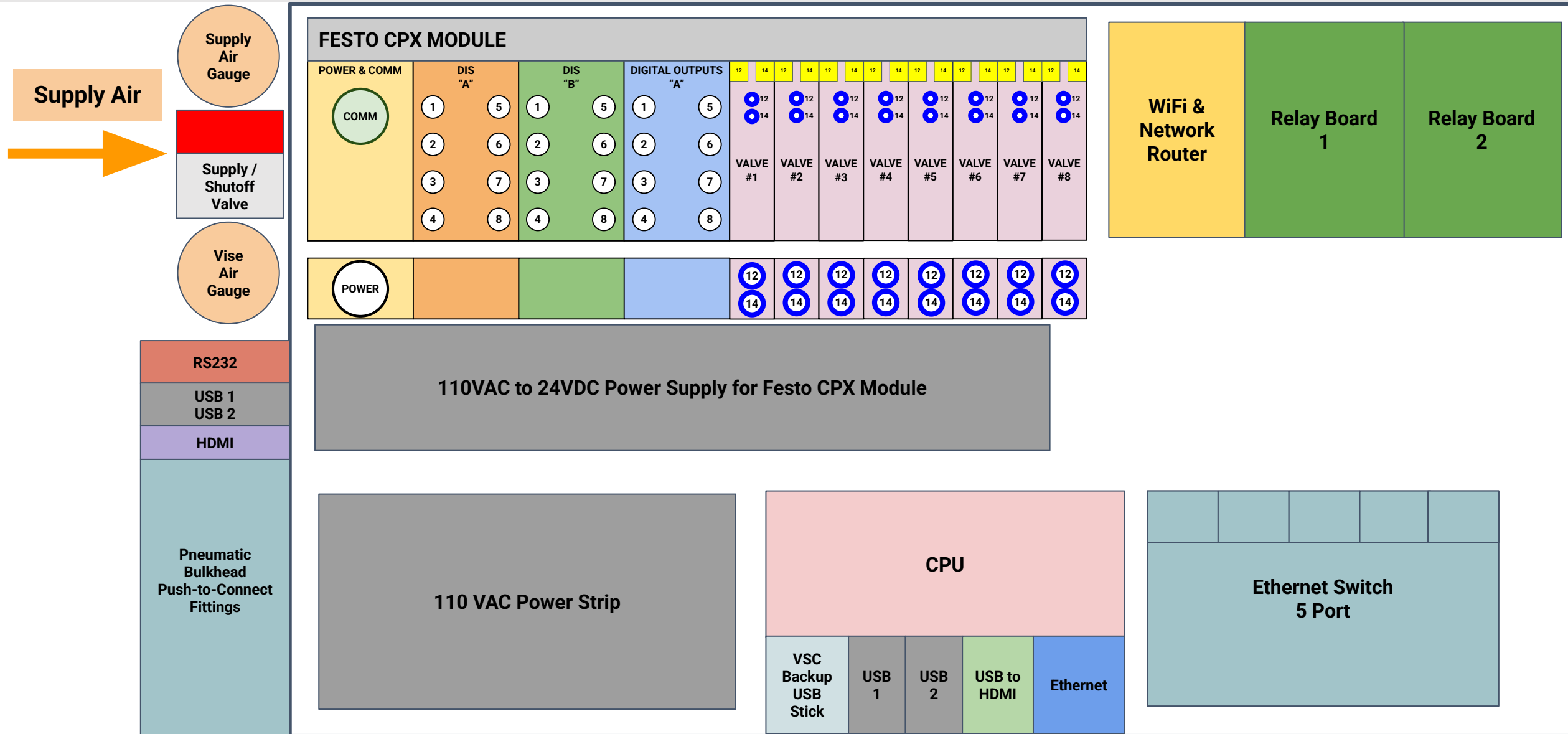
FRONT VIEW

VSC 2.0 is integrated with the VersaCart, with components mounted **under the cart** top surface and a connector panel **between the CNC & VersaCart**

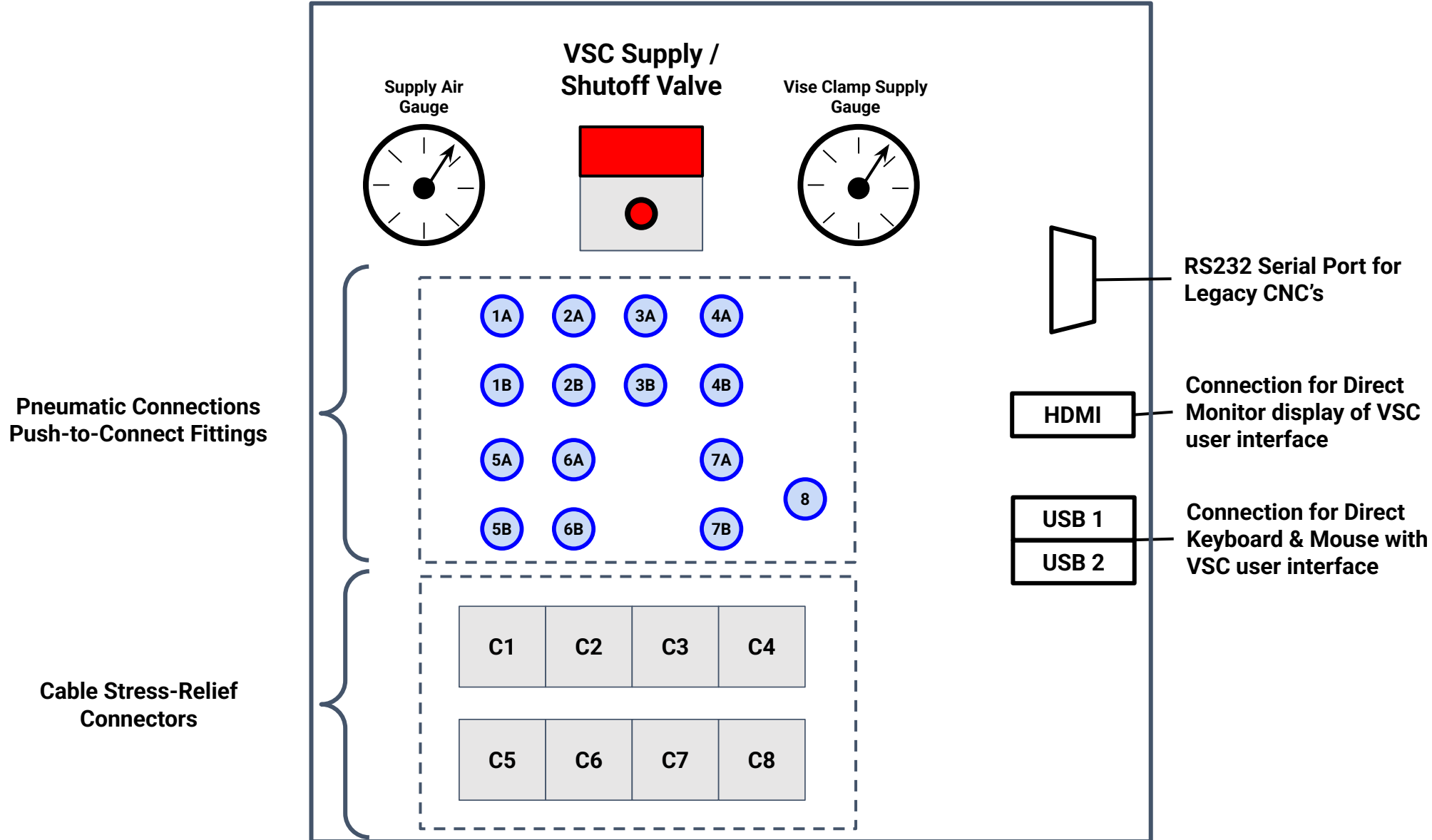


SIDE VIEW

VSC 2.0 Components - Under VersaCart (vsc00233)



VSC 2.0 Components - Connector Panel (vsc00233)



VSC 2.0 I/O Connections (vsc00233)

MANIFOLD M8	System Device Connection	VSC Signal Type
DI A1	Vise 1 Part Present Sensor	1 Input Signal
DI A2	Vise 2 Part Present Sensor	1 Input Signal
DI A3	Vise 3 Part Present Sensor	1 Input Signal
DI A4	VersaDoor A Open Sensor	1 Input Signal
DI A5	VersaDoor A Close Sensor	1 Input Signal
DI A6	VersaDoor B Open Sensor	1 Input Signal
DI A7	VersaDoor B Close Sensor	1 Input Signal
DI A8	VSC Enable Button	1 Input Signal
DI B1	CNC Cycle End	1 Input Signal
DI B2	Robot Lock <i>*optional for dual tending</i>	1 Input Signal
DI B3	CNC Pallet Safe Input <i>*optional</i>	1 Input Signal
DI B4	<i>Not used</i>	1 Input Signal
DI B5	<i>Not used</i>	1 Input Signal
DI B6	<i>Not used</i>	1 Input Signal
DI B7	<i>Not used</i>	1 Input Signal
DI B8	<i>Not used</i>	1 Input Signal
Digital Output A1	CNC Cycle Start	24VDC Output to Relay Output
Digital Output A2	VSC Stack Light <i>*optional</i>	24VDC Output
Digital Output A3	VersaWash Pump on/off signal	24VDC Output
Digital Output A4	CNC Door Interlock Release <i>*optional</i>	24VDC Output to Relay Output
Digital Output A5	CNC Chuck Open/Toggle Signal 1	24VDC Output to Relay Output
Digital Output A6	CNC Chuck Close Signal 1 <i>*optional</i>	24VDC Output to Relay Output
Digital Output A7	CNC Chuck Open/Toggle Signal 2	24VDC Output to Relay Output
Digital Output A8	CNC Chuck Close Signal 2 <i>*optional</i>	24VDC Output to Relay Output

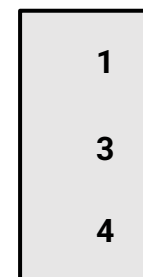
FESTO CPX MODULE					
DIGITAL INPUTS "A"		DIGITAL INPUTS "B"		DIGITAL OUTPUTS "A"	
1	5	1	5	1	5
2	6	2	6	2	6
3	7	3	7	3	7
4	8	4	8	4	8

VSC 2.0 Input Connections (vsc00233)

M8 #	Device Assignment	Fanuc Address
DI A1	Vise 1 Part Present Sensor	
DI A2	Vise 2 Part Present Sensor	
DI A3	Vise 3 Part Present Sensor	
DI A4	VersaDoor A Open Sensor	
DI A5	VersaDoor A Close Sensor	
DI A6	VersaDoor B Open Sensor	
DI A7	VersaDoor B Close Sensor	
DI A8	VSC Enable Button	
DI B1	CNC Cycle End	
DI B2	Robot Lock <i>*optional for dual tending</i>	
DI B3	CNC Pallet Safe Input <i>*optional</i>	
DI B4	<i>Not used</i>	
DI B5	<i>Not used</i>	
DI B6	<i>Not used</i>	
DI B7	<i>Not used</i>	
DI B8	<i>Not used</i>	

FESTO MODULE

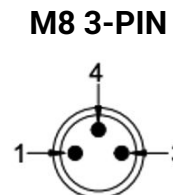
M8 3-PIN



BLACK

X

RED



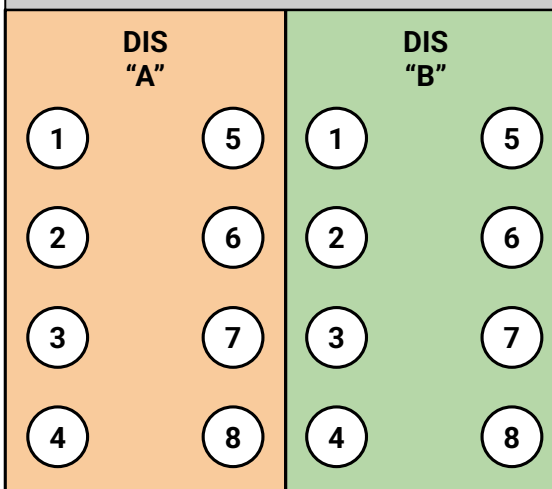
Typical M8 3-Pin Pinout:

Pin 1 - VCC

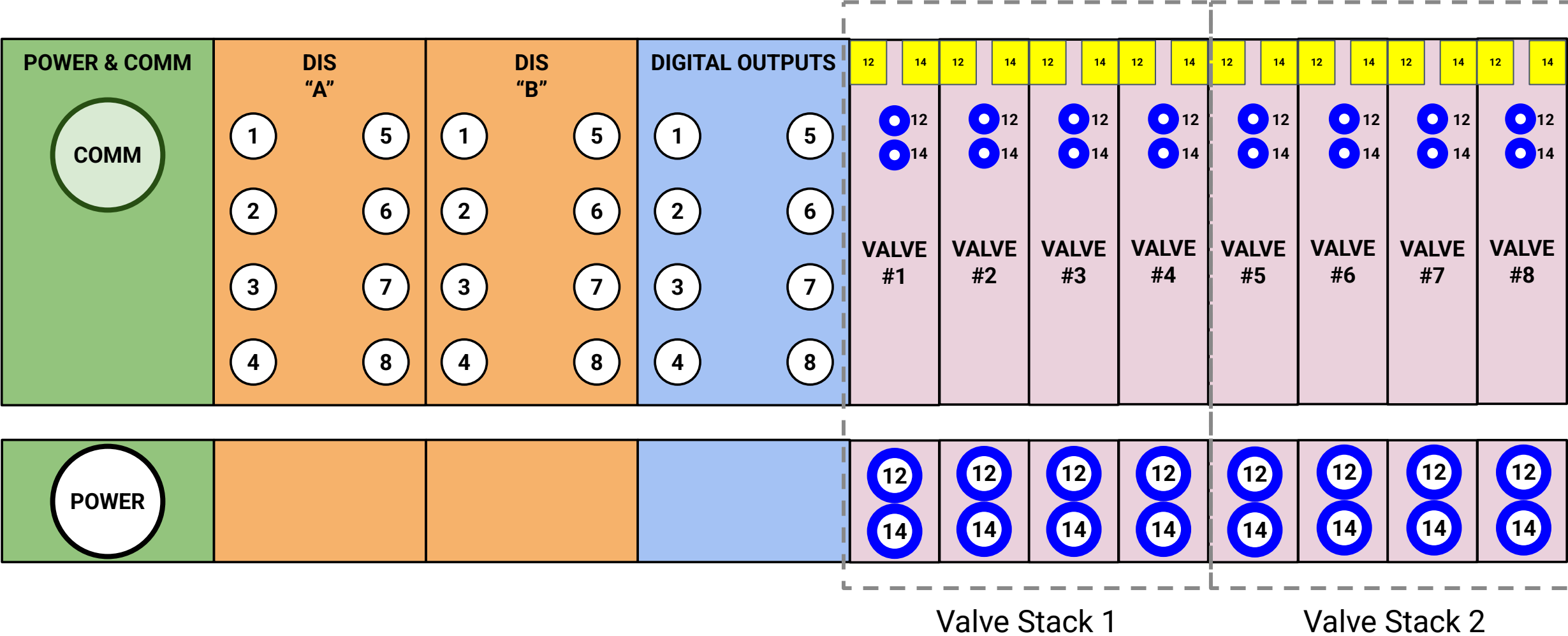
Pin 3 - GND

Pin 4 - Signal

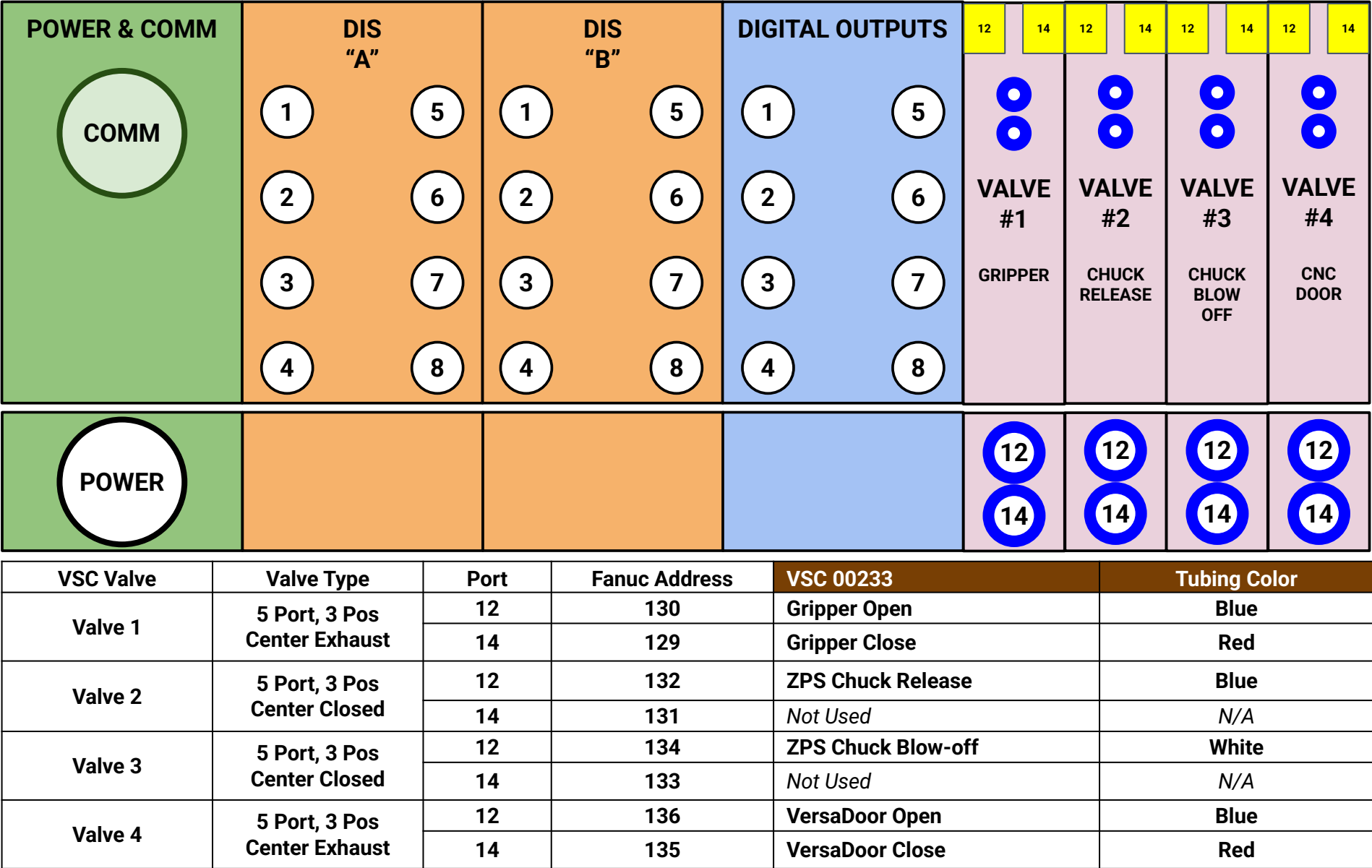
FESTO CPX MODULE



VSC 2.0 Valve Manifold

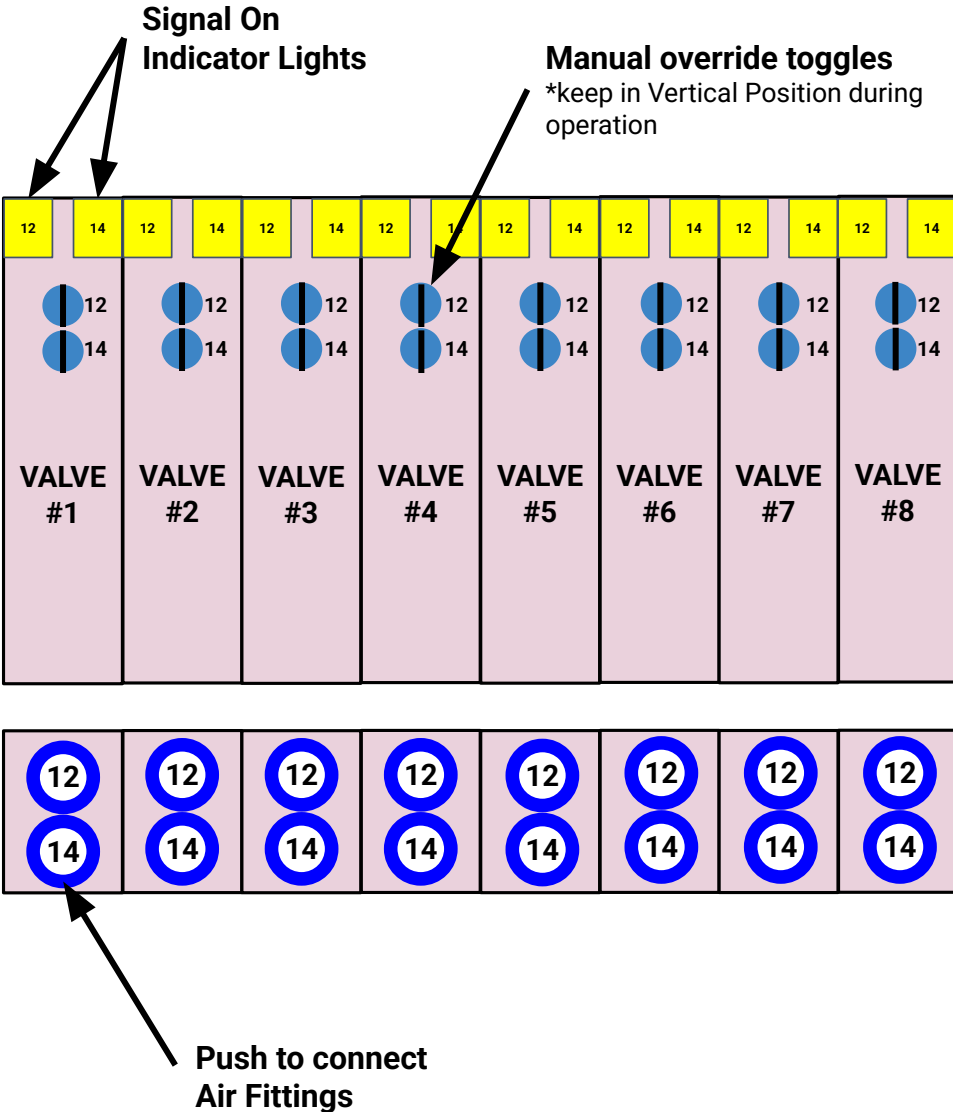


VSC 2.0 ZPS Manifold for VSC #00233

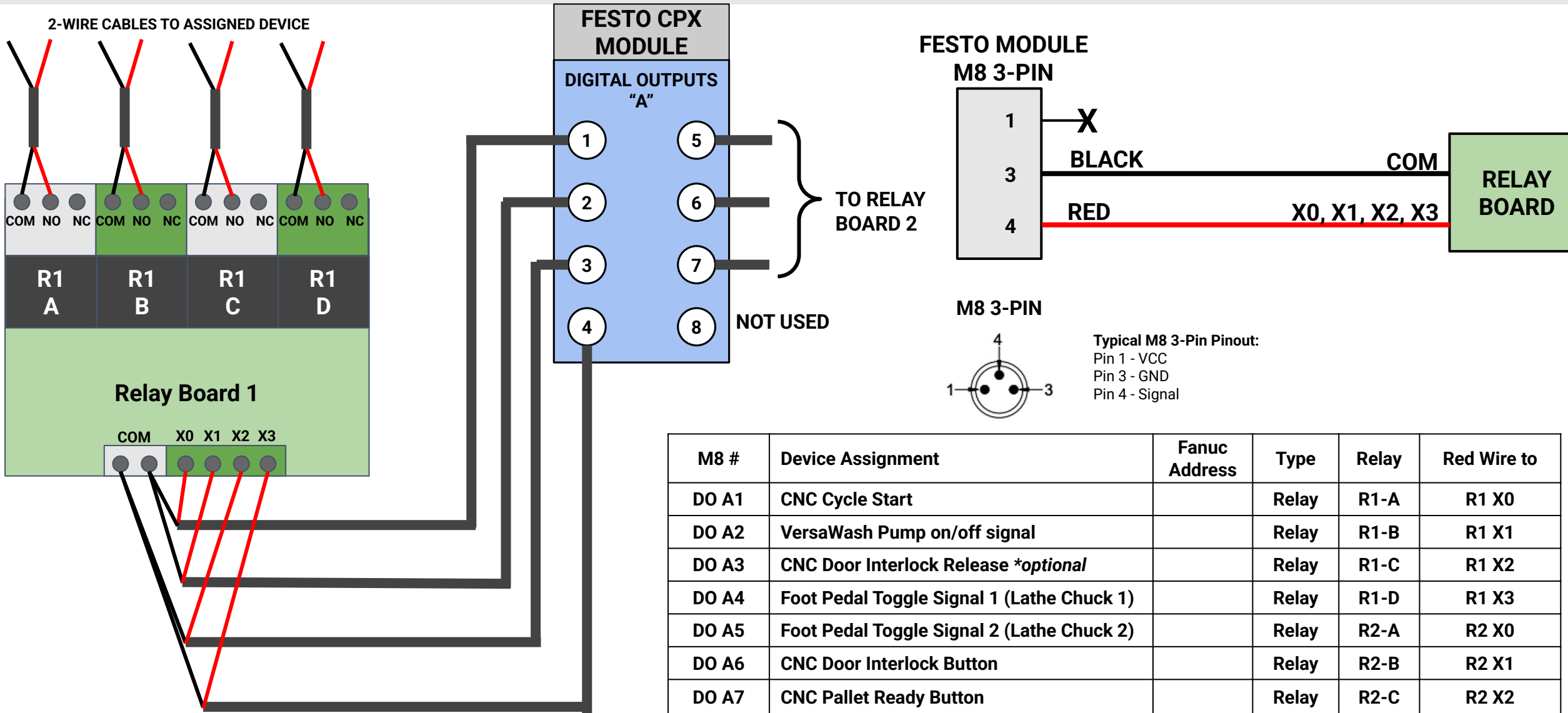


Pneumatic Connections - Manifold

VSC Valve	Port	Fanuc Address	ZPS Mill System	MultiGrip Mill System	DuoGrip Mill System	DuoGrip Lathe System
Valve 1	12	130	Gripper Open	Vise 1 Open	Vise 1 Open	Not Used
	14	129	Gripper Close	Vise 1 Close	Vise 1 Close	Not Used
Valve 2	12	132	ZPS Chuck Release	Vise 2 Open	Vise 2 Open	Not Used
	14	131	ZPS Chuck Release Exhaust	Vise 2 Close	Vise 2 Close	Not Used
Valve 3	12	134	ZPS Chuck Blow-off	Vise 3 Open	Vise 3 Open	Not Used
	14	133	ZPS Chuck Blow-off Exhaust	Vise 3 Close	Vise 3 Close	Not Used
Valve 4	12	136	VersaDoor Open	Vise 4 Open	Vise 4 Open	Not Used
	14	135	VersaDoor Close	Vise 4 Close	Vise 4 Close	Not Used
Valve 5	12		Not Used	Gripper Open	Gripper 1 Open	Gripper 1 Open
	14		Not Used	Gripper Close	Gripper 1 Close	Gripper 1 Close
Valve 6	12		Not Used	Not Used	Gripper 2 Open	Gripper 2 Open
	14		Not Used	Not Used	Gripper 2 Close	Gripper 2 Close
Valve 7	12		Not Used	VersaDoor Open	VersaDoor Open	VersaDoor Open
	14		Not Used	VersaDoor Close	VersaDoor Close	VersaDoor Close
Valve 8	12		Not Used	Not Used	VersaBlast	VersaBlast
	14		Not Used	Not Used	Plugged	Plugged

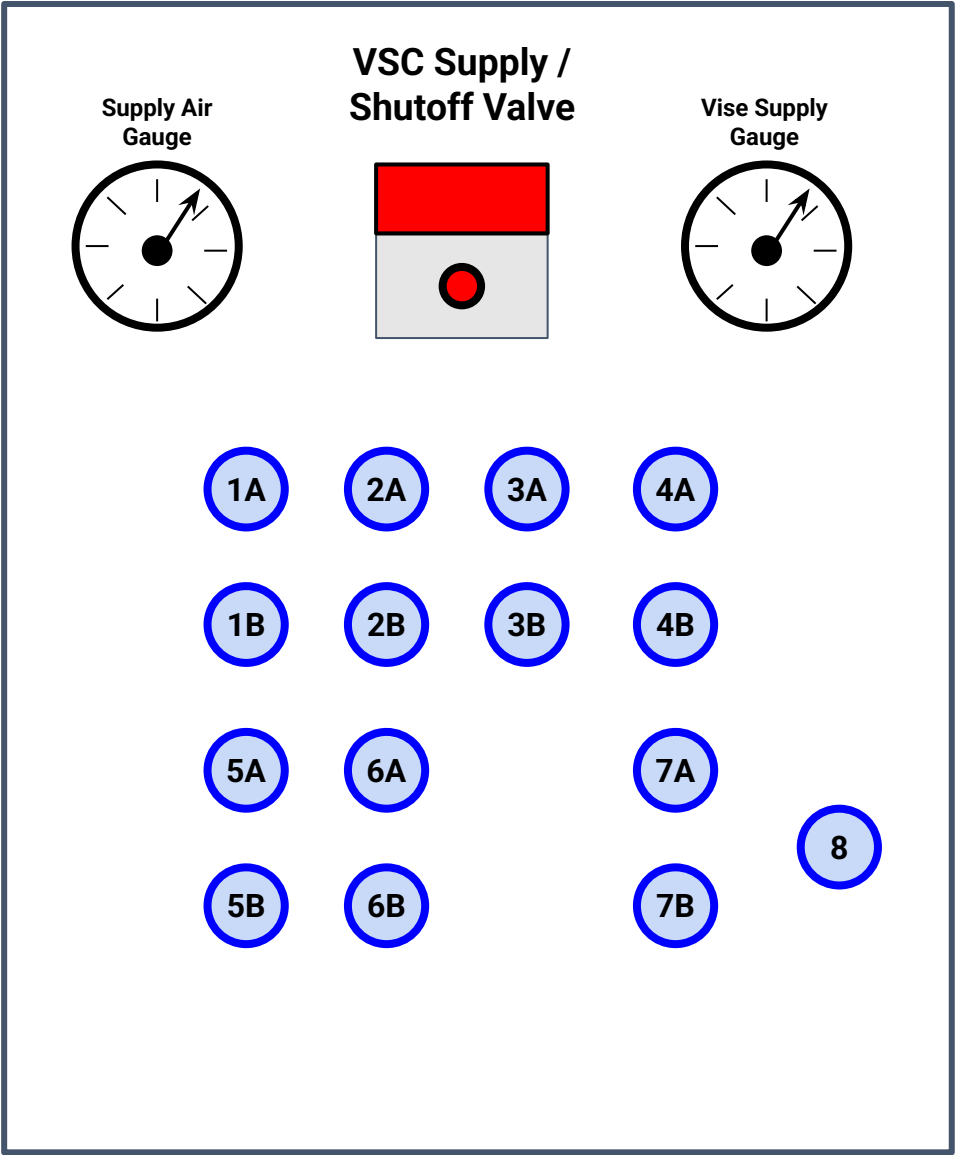


VSC 2.0 Output Connections (vsc00233)



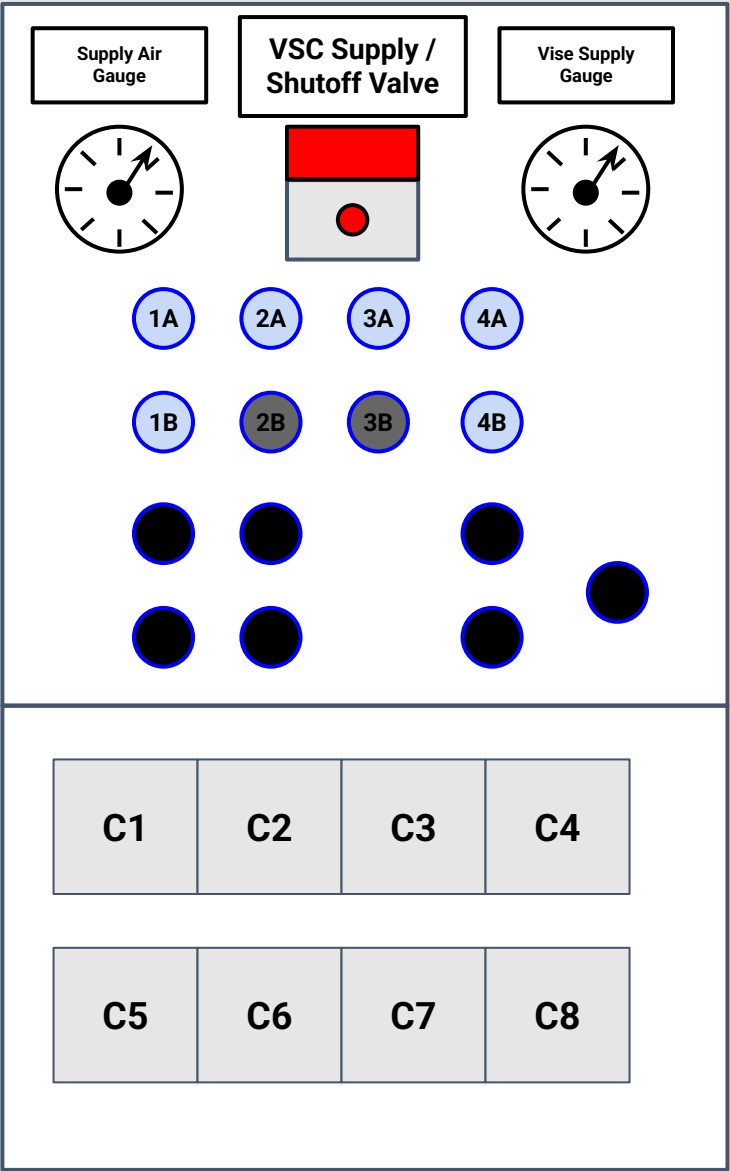
Pneumatic Connections - Side Panel

Side Panel	ZPS Mill System	MultiGrip Mill System	DuoGrip Mill System	DuoGrip Lathe System
1A	Gripper Open	Vise 1 Open	Vise 1 Open	Not Used
1B	Gripper Close	Vise 1 Close	Vise 1 Close	Not Used
2A	ZPS Chuck Release	Vise 2 Open	Vise 2 Open	Not Used
2B	Not Used	Vise 2 Close	Vise 2 Close	Not Used
3A	ZPS Chuck Blow-off	Vise 3 Open	Vise 3 Open	Not Used
3B	Not Used	Vise 3 Close	Vise 3 Close	Not Used
4A	VersaDoor Open	Vise 4 Open	Vise 4 Open	Not Used
4B	VersaDoor Close	Vise 4 Close	Vise 4 Close	Not Used
5A	Not Used	Gripper Open	Gripper 1 Open	Gripper 1 Open
5B	Not Used	Gripper Close	Gripper 1 Close	Gripper 1 Close
6A	Not Used	Not Used	Gripper 2 Open	Gripper 2 Open
6B	Not Used	Not Used	Gripper 2 Close	Gripper 2 Close
7A	Not Used	VersaDoor Open	VersaDoor Open	VersaDoor Open
7B	Not Used	VersaDoor Close	VersaDoor Close	VersaDoor Close
8	Not Used	Not Used	VersaBlast	VersaBlast



Pneumatic & Cable Connections (vsc00233)

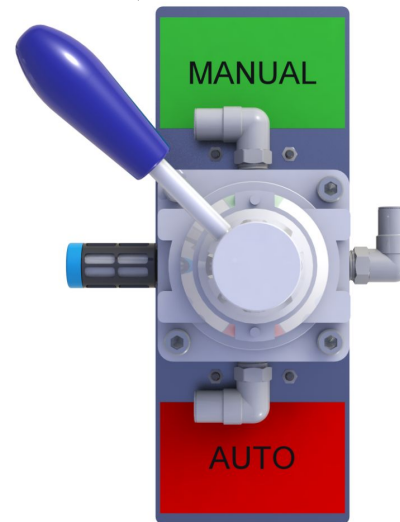
No.	Connection	Function
1A	5/32" Blue Tubing	Gripper Open
1B	5/32" Red Tubing	Gripper Close
2A	5/32" Blue Tubing	ZPS Chuck Release
2B	Plugged	Not Used
3A	5/32" White Tubing	ZPS Chuck Blow-off
3B	Plugged	Not Used
4A	1/4" Blue Tubing	VersaDoor Open
4B	1/4" Red Tubing	VersaDoor Close
5A	Not Used	Not Used
5B	Not Used	Not Used
6A	Not Used	Not Used
6B	Not Used	Not Used
7A	Not Used	Not Used
7B	Not Used	Not Used
8	Not Used	Not Used
C1	Cable	Cycle Start
C2	Cable	Cycle End
C3	Not Used	VSC Enable Button
C4	Cable	Door Sensors
C5	Not Used	Not Used
C6	Not Used	Not Used
C7	Not Used	Not Used
C8	Not Used	Not Used



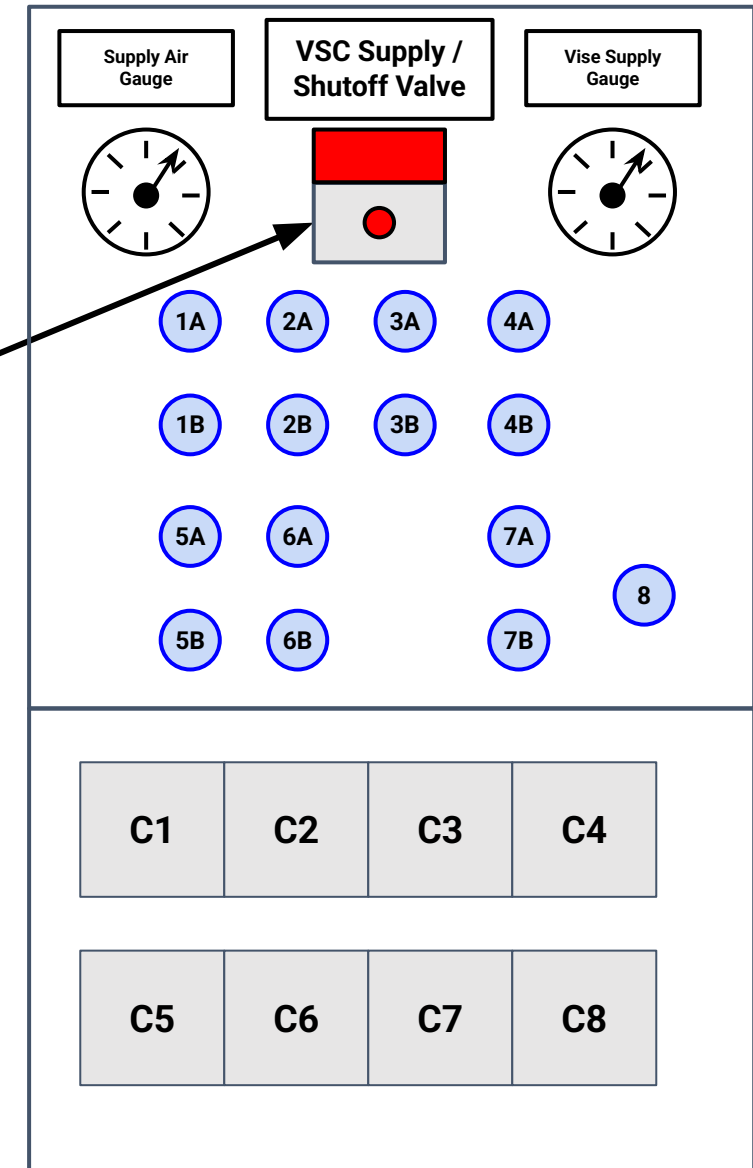
Diverter Valve and Shut-off Valve

- The Diverter (Manual/Auto) Valve provides the user with the ability to shut off air to the 24VDC Solenoid valves used in automatic operation in the VSC, diverting air to manual valves in the CNC for hand loading
- To switch between Auto and Manual modes, depress the button on the valve handle and position to the labeled ends of the valve assembly
- When in Manual mode, the VSC Supply Air Gauge will be at 0 psi, after one or two manual actuations of devices, with all pressure on the automatic side relieved.
- To lock out or prevent supply of air to components, exhaust, test, verify pressure removal, and lock-out with the Red Shut-off Valve

Diverter Valve



Shut-off and Lock-out Valve



Cordset Diagram - CNC Buttons

VSC Relay Output

VSC CONNECTIONS:

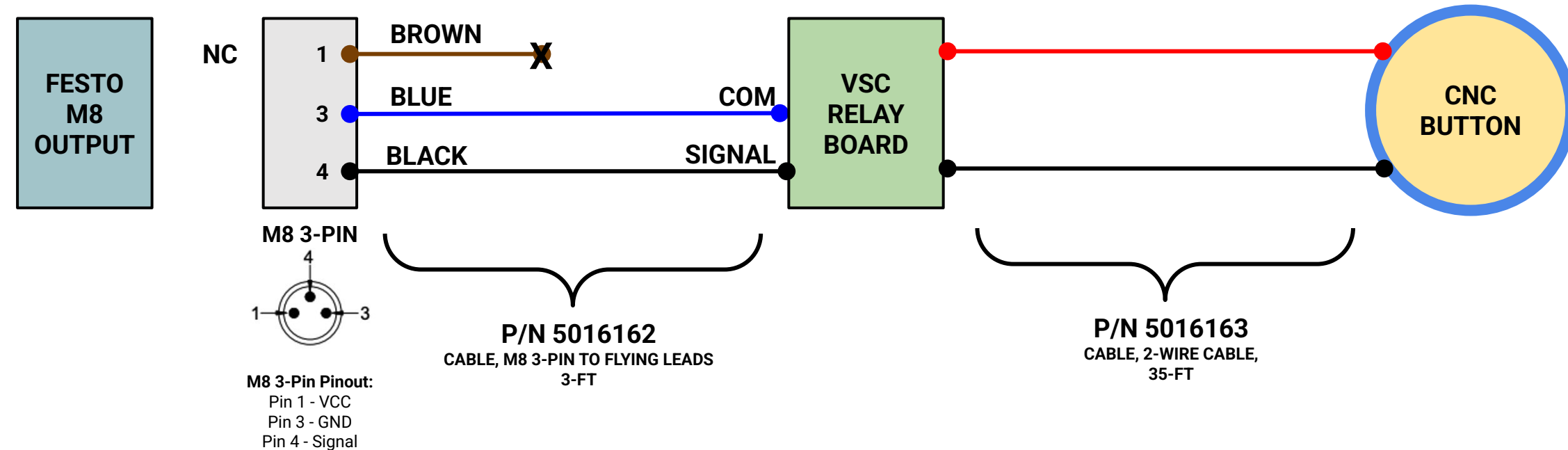
- CYCLE START - M8 3-PIN @ DIGITAL OUTPUT **A1** TO VSC RELAY **R1**
- DOOR INTERLOCK OVERRIDE - M8 3-PIN @ DIGITAL OUTPUT **A4** TO VSC RELAY **R2**

VSC SIGNAL TO CNC:

- RELAY BOARD OUTPUT

CNC CONNECTIONS:

- 2-WIRE CABLE WITH FLYING LEADS ON BOTH ENDS, WITH ONE END WIRED INTO RELAY BOARD, OTHER END WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSSES THE CIRCUIT, EQUIVALENT TO PRESSING THE BUTTON



Cordset Diagram - CNC Foot Pedals Toggle

VSC Relay Output

VSC CONNECTIONS:

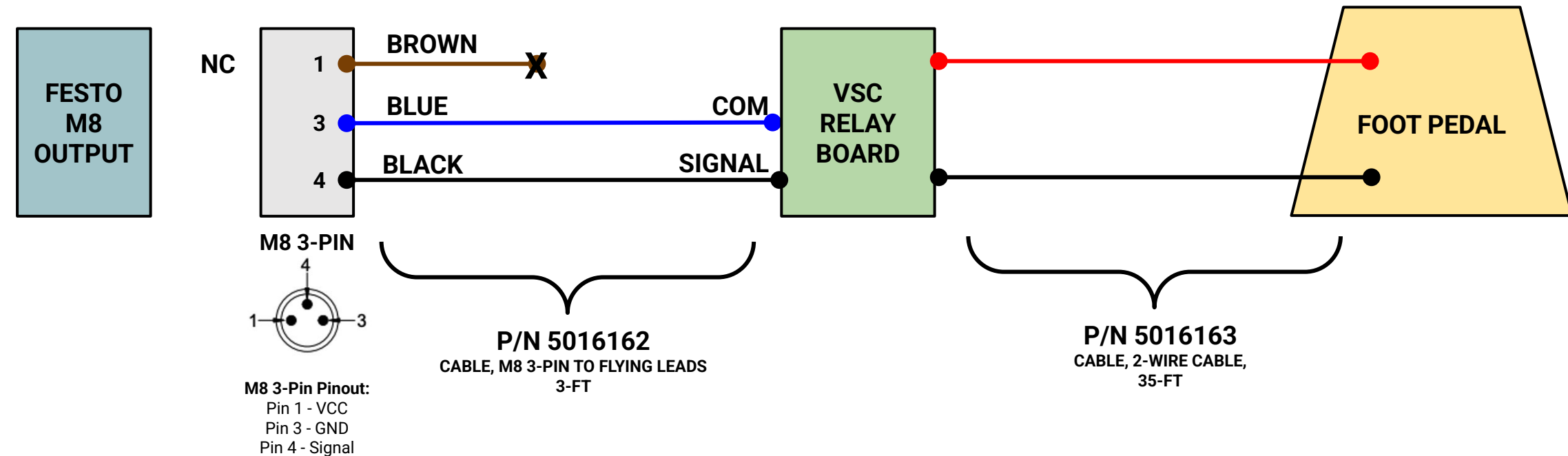
- FOOT PEDAL TOGGLE 1 - M8 3-PIN @ DIGITAL OUTPUT **A5** TO VSC RELAY **R1**
- FOOT PEDAL TOGGLE 2 - M8 3-PIN @ DIGITAL OUTPUT **A7** TO VSC RELAY **R6**

VSC SIGNAL TO CNC:

- RELAY BOARD OUTPUT

CNC CONNECTIONS:

- 2-WIRE CABLE WITH FLYING LEADS ON BOTH ENDS, WITH ONE END WIRED INTO RELAY BOARD, OTHER END WIRED INTO BUTTON CONTACTS
- RELAY OUTPUT CONTACT CLOSURE CLOSSES THE CIRCUIT, EQUIVALENT TO PRESSING THE BUTTON



NC = No Connect

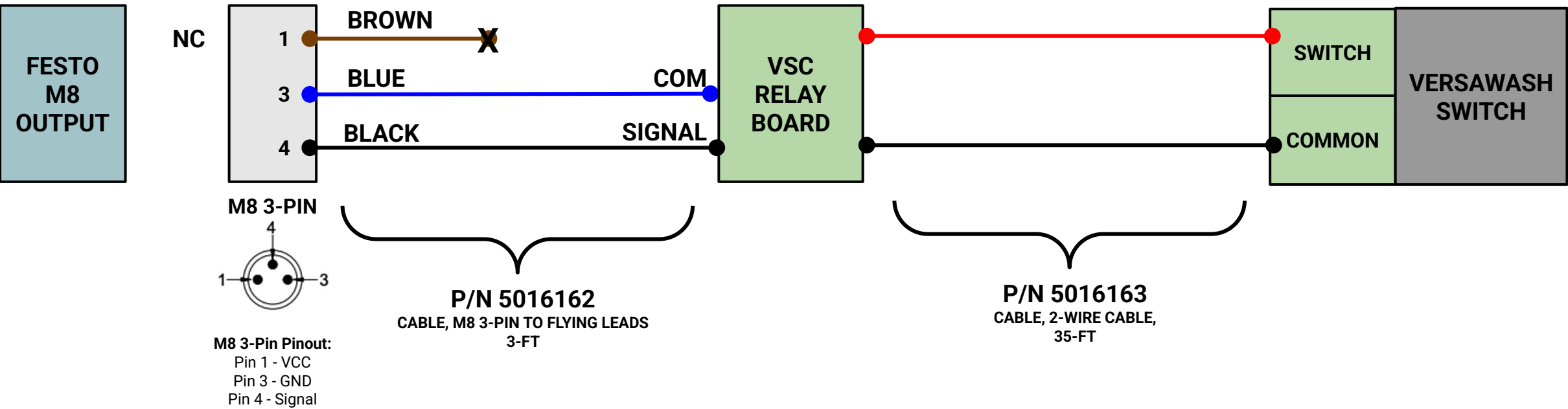
Cordset Diagram - VersaWash (MultiGrip only) VSC Relay Output

VSC CONNECTIONS:

- VERSAWASH - M8 3-PIN @ DIGITAL OUTPUT **A3** TO VSC RELAY **R5**

VSC SIGNAL TO DEVICE:

- RELAY BOARD OUTPUT



NC = No Connect

Cordset Diagram - Stack Light Cable (optional)

VSC CONNECTIONS:

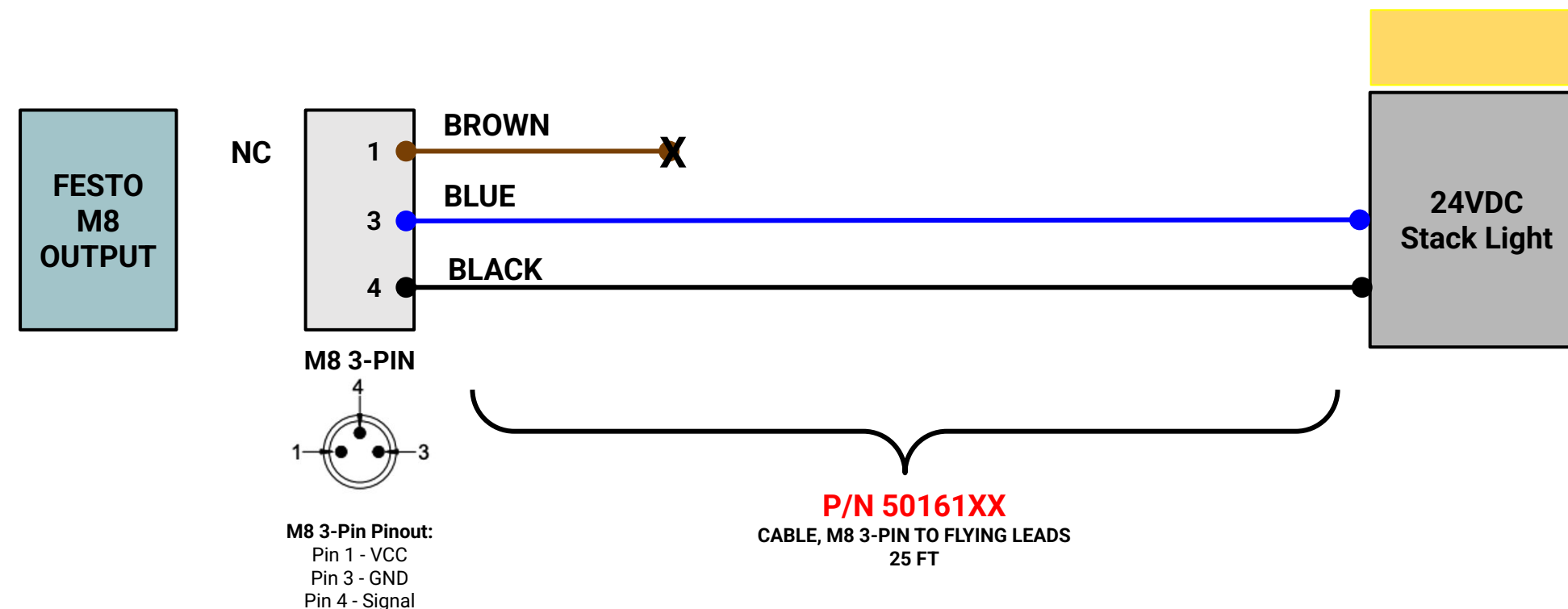
- STACK LIGHT - M8 3-PIN @ DIGITAL OUTPUT **A2** TO STACK LIGHT

VSC SIGNAL:

- 24VDC OUTPUT

CNC CONNECTIONS:

- FLYING LEADS TO DEVICE



NC = No Connect

Cordset Diagram - VSC Enable

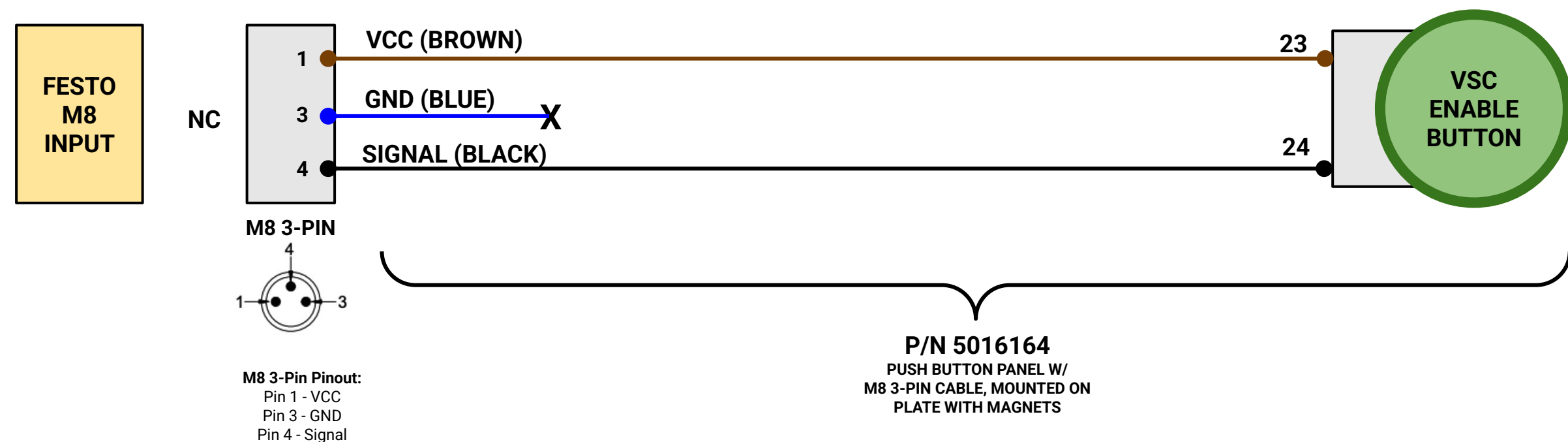
VSC Input

VSC CONNECTIONS:

- VSC ENABLE BUTTON - M8 3-PIN @ DI A8

SENSOR CONNECTIONS:

- M8 3-PIN



NC = No Connect

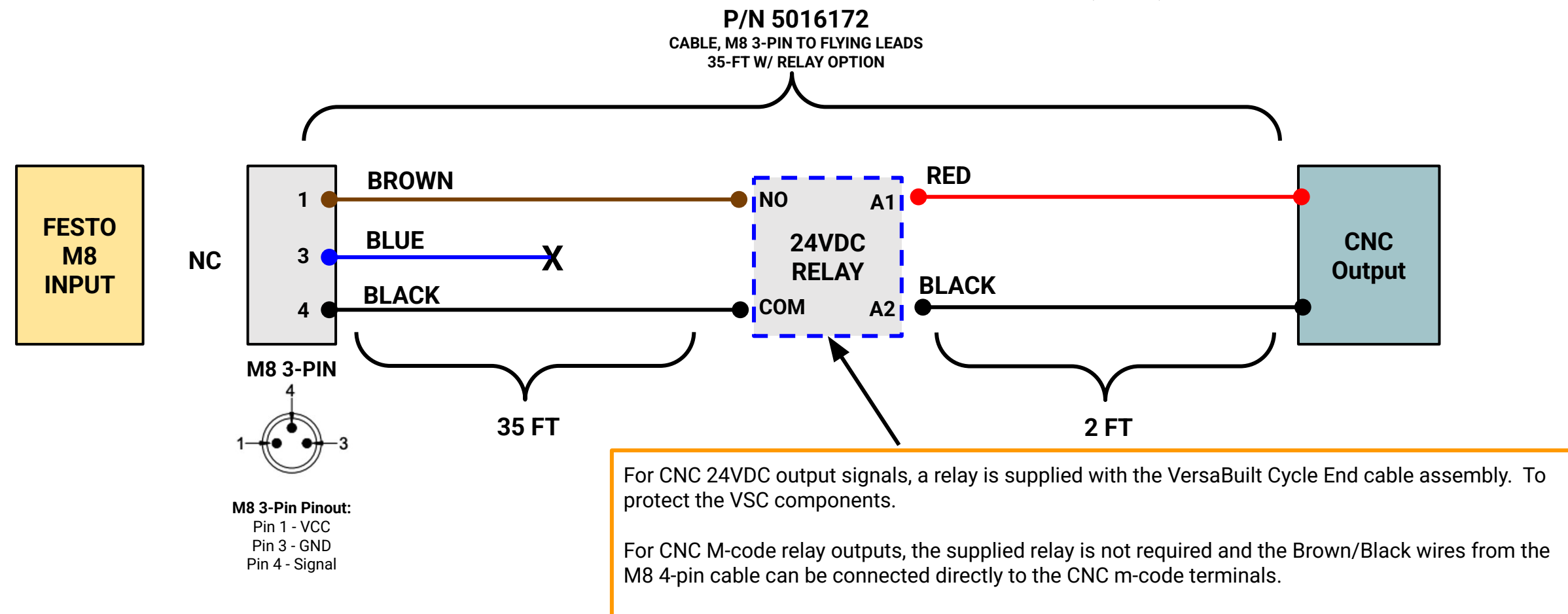
Cordset Diagram - CNC Cycle End

VSC CONNECTIONS:

- CYCLE END - M8 3-PIN @ DI **B1** TO CNC OUTPUT SIGNAL (M-CODE OR OTHER)

CNC CONNECTIONS:

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



NC = No Connect

Cordset Diagram - Vise Sensor

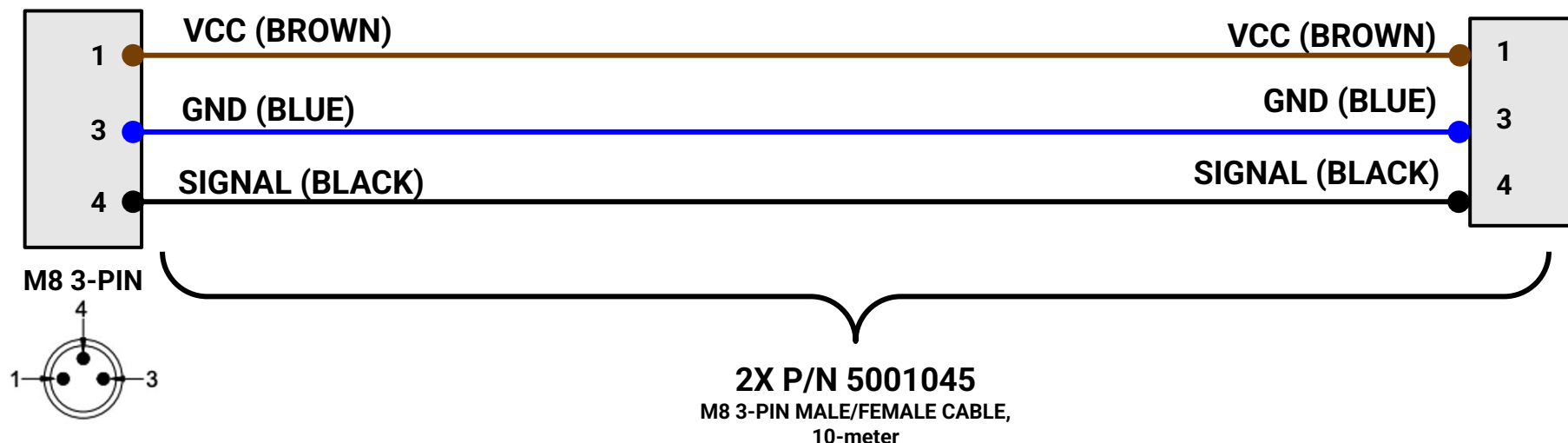
VSC CONNECTIONS:

- VISE 1 SENSOR - M8 3-PIN @ DI A1
- VISE 2 SENSOR - M8 3-PIN @ DI A2
- VISE 3 SENSOR - M8 3-PIN @ DI A3

SENSOR CONNECTIONS:

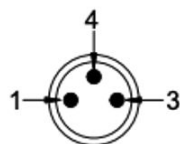
- M8 3-PIN

FESTO
M8
INPUT

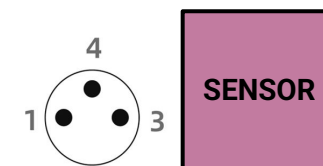


M8 3-Pin Pinout:

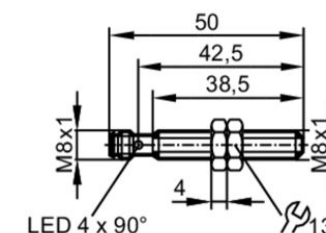
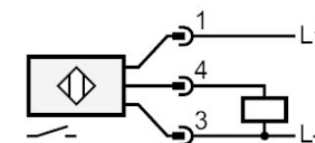
Pin 1 - VCC
Pin 3 - GND
Pin 4 - Signal



M8 3-PIN



- M8x1.0 Inductive Proximity Sensor
- IFM Efector #IEC201
- Sensing distance = 2mm
- Output Type = PNP-NO, 3-Wire
- Body = Stainless Steel



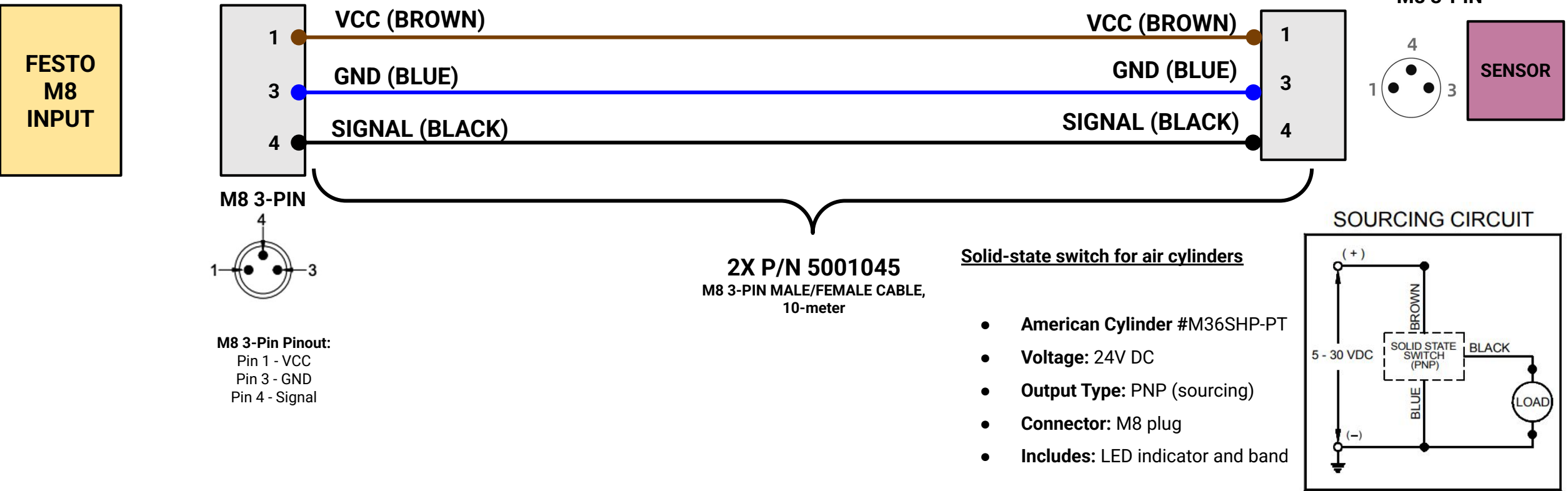
Cordset Diagram - Door Sensor

VSC CONNECTIONS:

- DOOR A OPEN SENSOR - M8 3-PIN @ DI A4
- DOOR A CLOSED SENSOR - M8 3-PIN @ DI A5
- DOOR B OPEN SENSOR - M8 3-PIN @ DI A6
- DOOR B CLOSED SENSOR - M8 3-PIN @ DI A7

SENSOR CONNECTIONS:

- M8 3-PIN



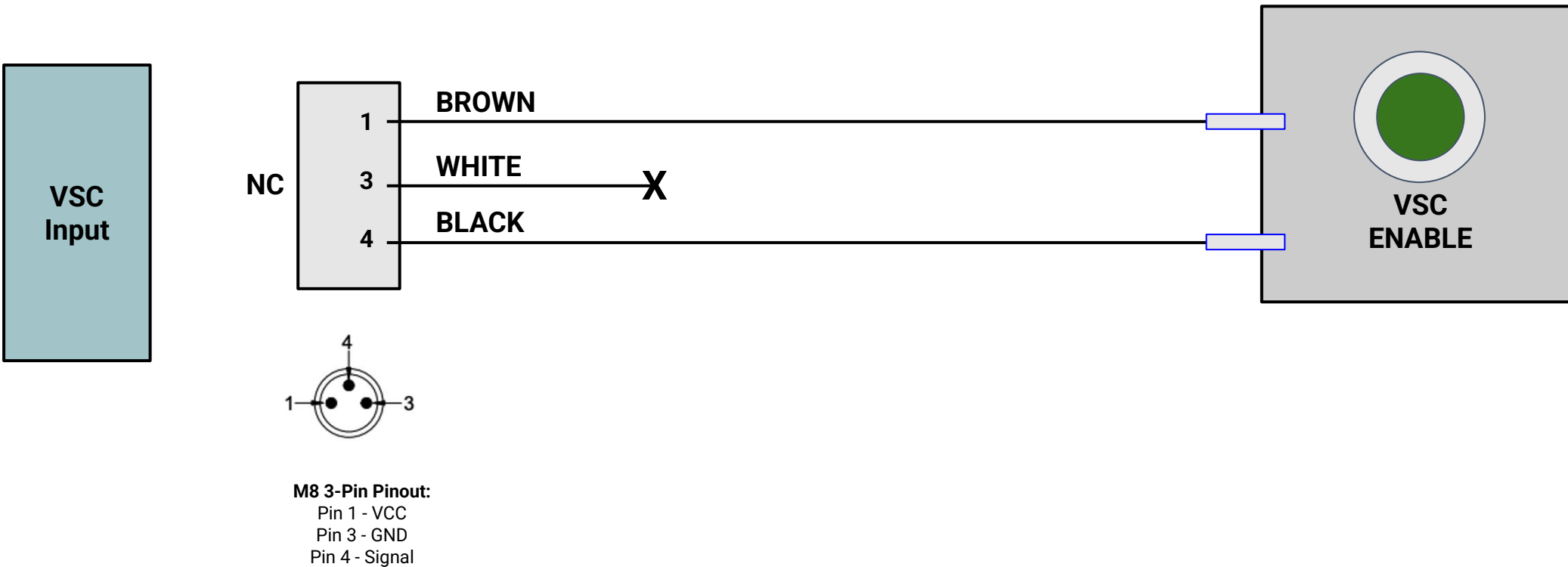
Cordset Diagram - VSC Enable

VSC CONNECTIONS:

- M8 3-PIN @ VSC B1

SENSOR CONNECTIONS:

- WIRED TO MOMENTARY PUSH BUTTON



VERSABUILT ROBOTICS

VSC 2.0 24VDC Output Connections

