VERSABUILT ROBOTICS

Vertical Mill w/ ZPS

User Interface / Part Configuration Parametric Programming Manual

Software Version 1.2.5 Copyright VersaBuilt 2025
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Table of Contents

1. Safety Warnings
2. Overview of ZPS Mill Automation System
3. General Installation Instructions
4. User Interface & Part Configuration

This manual is a section of the standard automation systems manuals. Latest version of standard manuals can be found on the VersaBuilt website, Resources page: https://www.versabuilt.com/resources/

CAD Models and other resources can also be found on the resources page.

For support, contact VersaBuilt via email at support@versabuilt.com or phone 208-906-0814

Safety Warnings

Section 1

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.

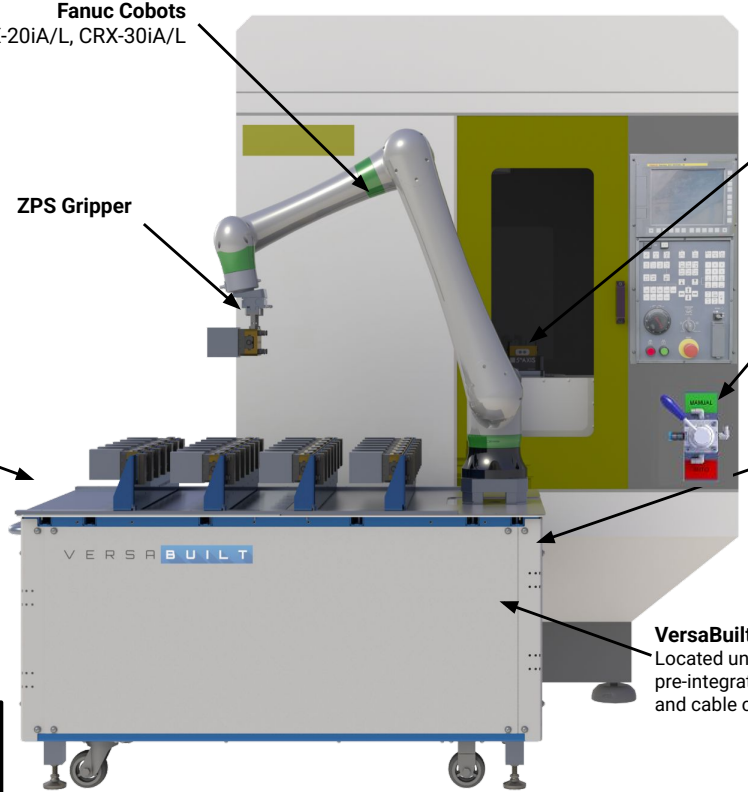
Read and understand the VersaBuilt Automation System Safety Manual before proceeding

Overview

Mill Automation with DuoGrip

Section 2

Mill Automation System w/ ZPS overview



Fanuc Cobots
CRX-10iA/L , CRX-20iA/L, CRX-30iA/L

ZPS Gripper

VersaCart
1300 size options
with ZPS Infeed

ZPS Systems, Vises and Chucks sold separately

Diverter Valve
To switch between Auto and Manual Modes

VSC Enable Button
Enables the system for local control

VersaBuilt System Controller (VSC)
Located under cart - The VSC Includes software for user-interface and pre-integrated parametric programming, I/O, pneumatic valving, tubing and cable connections

Connect to VSC interface with laptop, computer, tablet or smartphone via Wi-Fi or Ethernet, or direct monitor/keyboard/mouse

Refer to the Electrical, I/O, Networking, Pneumatics Manual for tube routing and connection details

Mill Automation System w/ ZPS overview

- VersaBuilt provides standard automation products for CNC Mill and CNC Lathe Automation, with pre-programmed, generalized software interface, “VSC” (Versabuilt System Controller).
- New parts are introduced with the creation of “Configurations”, entering parameters, rather than creating or revising a robot program, i.e., “Parametric Programming”. There is no limit to configurations.
- Systems include pre-programmed robot positions for generalized CNC machine tending, including:
  - Table Home - Robot Positioned over the VersaCart infeed/outfeed, poised to pick or place parts, or pivot to the CNC
  - CNC Home - Robot positioned in front of CNC, poised to move into the CNC, or pivot to the Table Home
  - InCNC Home - Robot positioned inside the CNC, in a neutrally poised position for the Vise or Chuck load/unload moves **calibrated/optimized at installation on the calibration page*
  - For all part processing, the robot moves to these intermediate positions
- Systems include these variations:
  - Gripper Type (MultiGrip, DuoGrip, ZPS)
  - Infeed Type (Lathe, Mill, ZPS, Robot Size, VersaCart Size, Stacked Infeed)
  - Process scripts (pre-programmed sequences available for MultiGrip, DuoGrip, and ZPS). *Custom scripts are available for quote.*

Automatic Payload Calculation:
- **Fanuc CRX Robot Systems will automatically calculate the payload after each pick of a vise or pallet.**
- **After each pick from the infeed, the robot will move to a neutral position above the cart**

Mill Automation System w/ DuoGrip overview

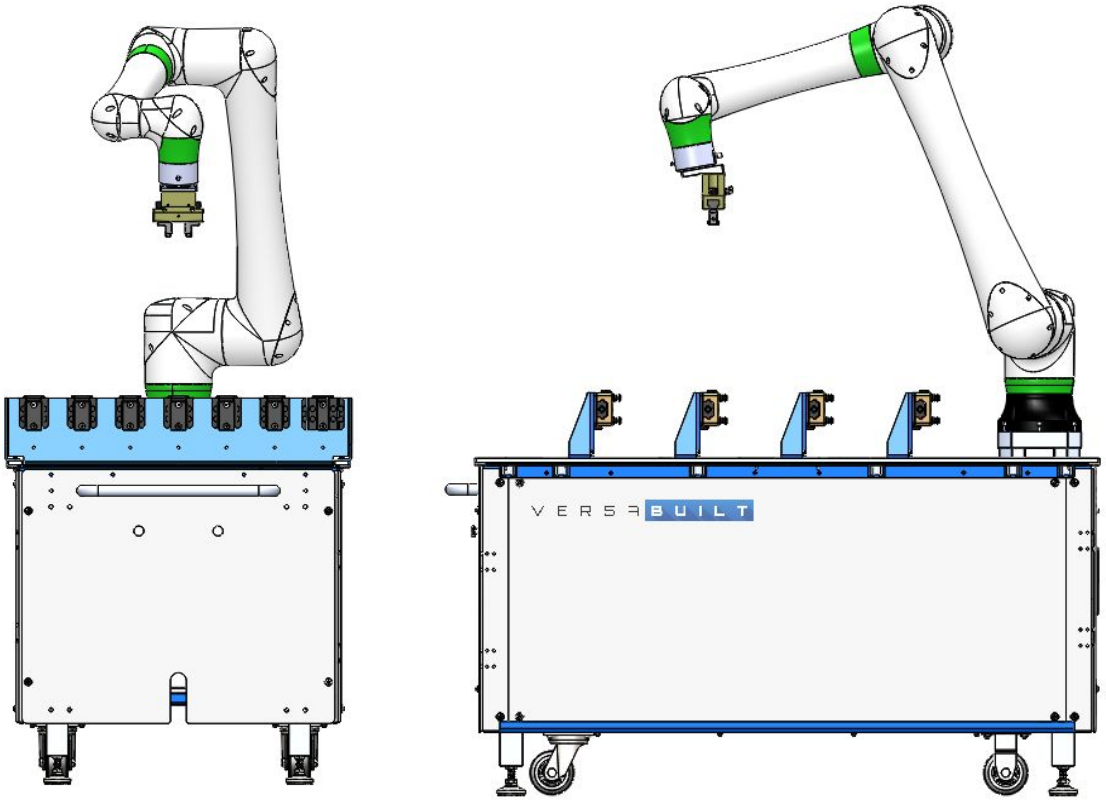
Robot Overhead

i. Total time processing parts where the CNC is not running
   1. First Part load to CNC Program Start
   2. CNC program end to CNC program start for subsequent parts
   3. Last part CNC program end to finished unload and stop

ii. Includes:
   1. Time to open/close CNC door
   2. Chuck or Vise actuation time
   3. Robot motion outside CNC while CNC is waiting
   4. Regripping process for 2Op w/ Regrip with 1 Vise or Single-Spindle Lathe
   5. CNC processes used for automation
      a. Y/Z push to locate the part against a datum or to a precise position
      b. Table Wash & Table Load programs

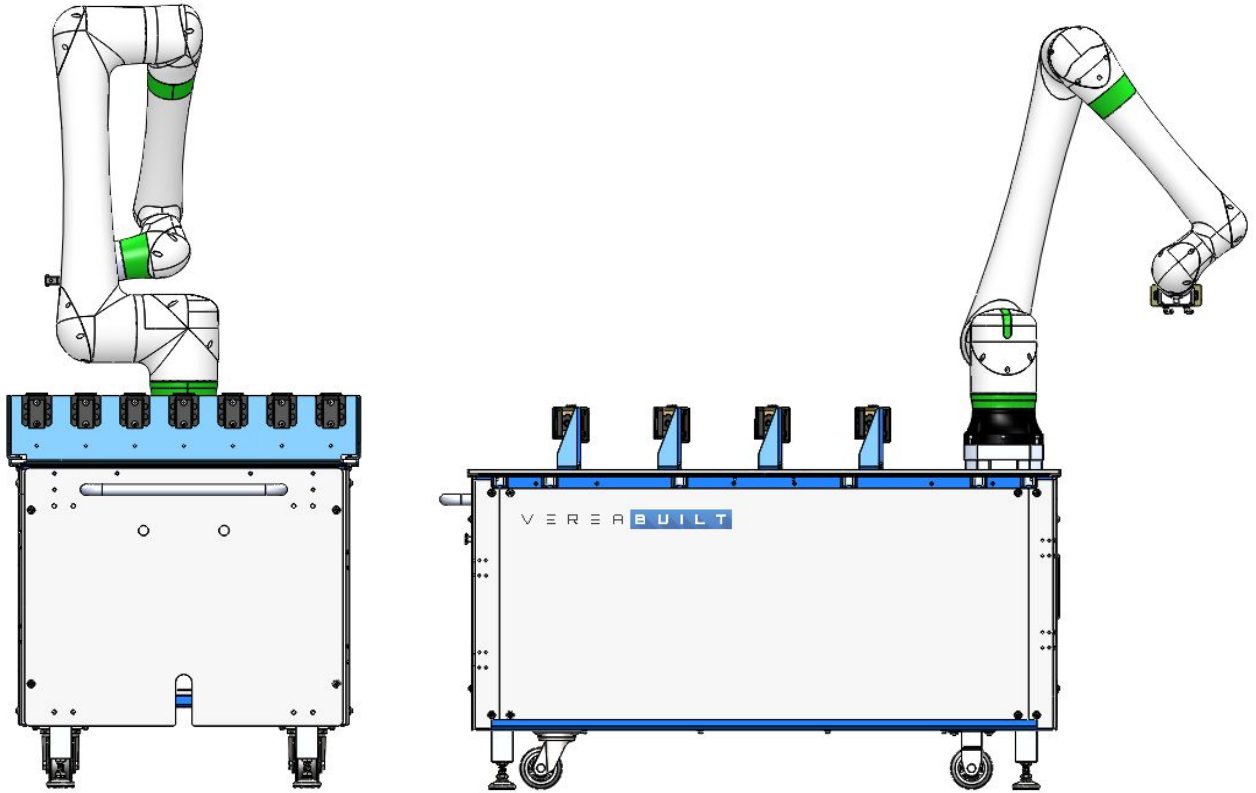
ZPS Table Home

Robot is positioned over the table, in position for pick and place of ZPS Vises to/from the infeed



ZPS CNC Home

Robot is positioned in front of the CNC door, in position for pick and place of ZPS Vises to/from the CNC

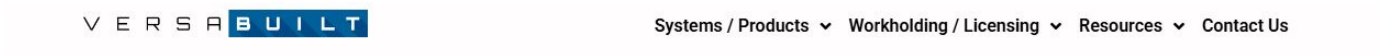


General Installation Instructions

Section 3

General Installation Instructions

Refer to up-to-date Manuals and Installation Checklist at https://www.versabuilt.com/resources/



MANUALS

— Automation System - Installation & U/I Manuals

Installation & U/I Manuals

- Read Me First
- Safety Manual
- Pre-Installation & Install Prep Checklist
- Installation Checklist & Manual Map
- Installation Overview
- VSC User Interface (U/I) Connection Manual
- VSC / CNC Communication Manual
- Calibration Manual
- MultiGrip Mill System U/I Manual
- DuoGrip Mill System U/I Manual
- DuoGrip Lathe System U/I Manual Puck / Shaft

**See sections below for category-specific manuals*

DATA SHEETS & GUIDES

Datasheets

- Mill Automation System w/ MultiGrip
- VBX-160 Upgrade to Mill Automation
- Mill Automation System w/ DuoGrip
- Mill Automation System w/ Zero-Point-Systems
- Lathe Automation System w/DuoGrip
- MultiGrip Vise
- MultiGrip Jaws
- MultiGrip Gripper
- DuoGrip Gripper
- VersaCart
- VersaDoor
- Robot2CNC Basic Edition
- Robot2CNC Advanced Edition

Guides & Tools for Mill and Lathe Systems

- Cycle Time and Infeed Capacity Calculator
- Site Acceptance Test Form (Mill System)
- Site Acceptance Test Form (Lathe System)

Guides & Tools for Build-Your-Own Systems

- CNC Automation Checklist & Guide

General Installation Instructions

Refer to the Calibration Manual for Calibration of:

- **VersaCart ZPS Infeed**
- **Chuck**
- **InCNC position**

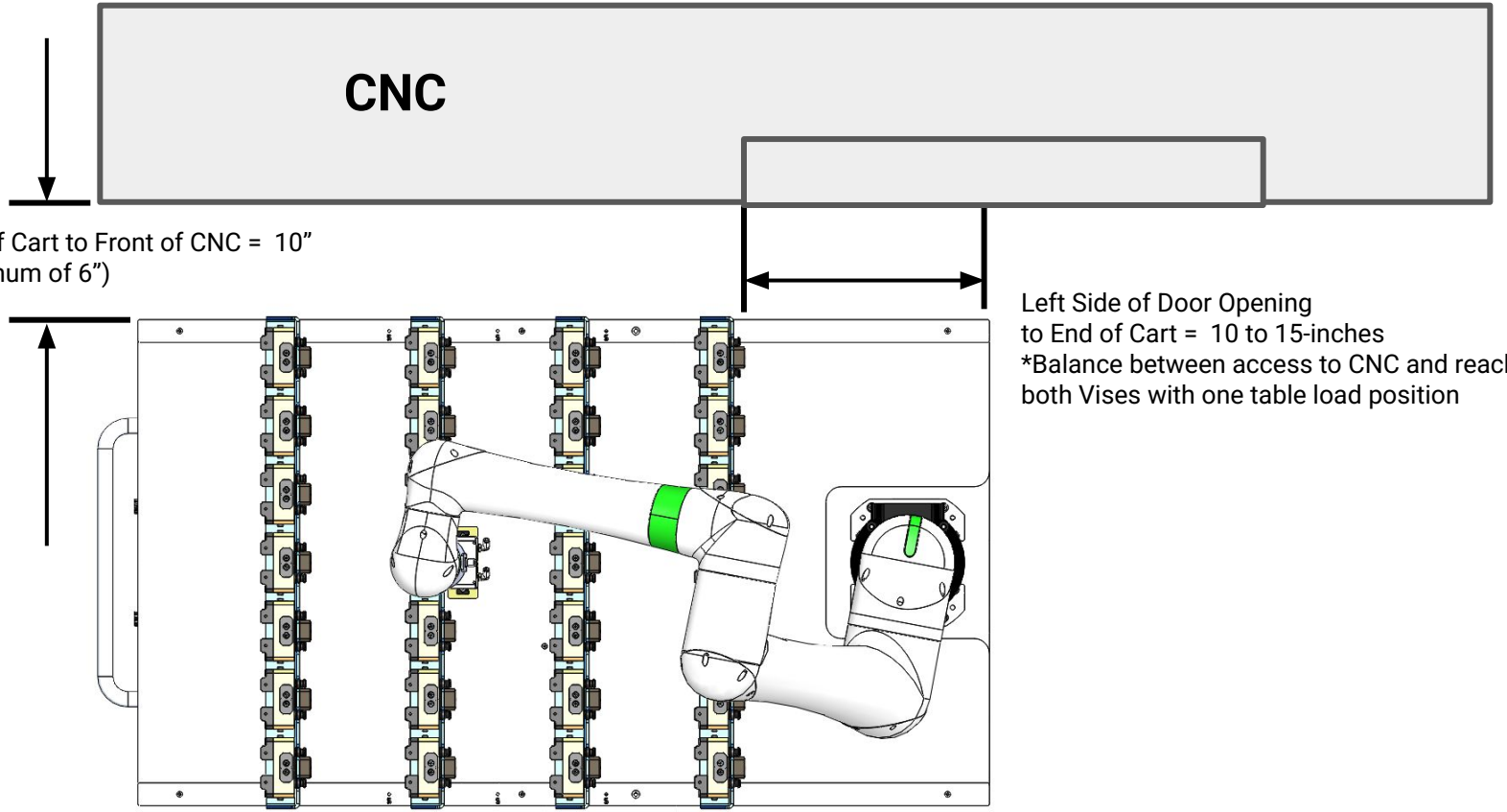
General Installation Instructions

Referencing the Installation Checklist, the following are the steps:

1. Prove out manual process
2. Powerup VSC and Enable Remote Support
3. Configure CNC Connections
    a. VersaBuilt CNC Software (programs 8000 & 9000)
    b. Cycle Start Cable
    c. Ethernet Connections or CNC Cycle End
4. Test Inputs and Outputs (I/O), Configure Settings on VSC
5. Calibration
    a. Infeed *done at VersaBuilt factory, test before re-calibrating
    b. Chuck
6. Configure Parts
    a. Select Process, Enter Parameters
7. Run Parts

***Application specific instructions are shown on the following pages/sections**

General Installation Instructions



Side of Cart to Front of CNC = 10”
(Minimum of 6”)

Left Side of Door Opening
to End of Cart = 10 to 15-inches
*Balance between access to CNC and reach to both Vises with one table load position

User Interface & Part Configuration

Section 4

User Interface (U/I) Screens

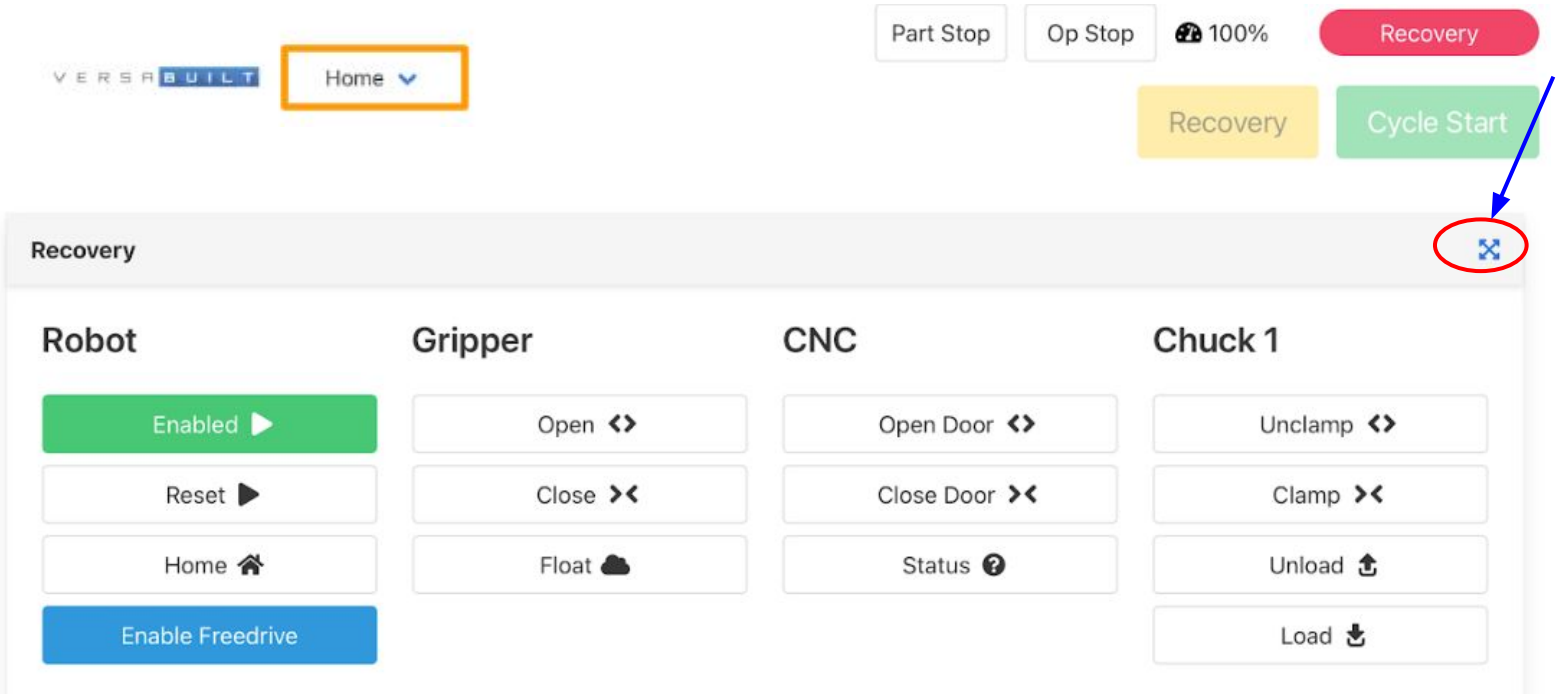
The web-based user-interface has the following screens, selected by a pull-down menu at the top of the screen:

1. Home (Run Jobs and Recover from errors)
2. Configuration (Configuration / Parametric Programming of Parts)
3. System Settings (Customer specific setup of system)
4. Network Settings (options for advanced networking)
5. I/O Panel (testing and troubleshooting of devices with Input and Output signalling)
6. Calibration (Tools for Calibrating VersaCart Infeed, Vise/Chuck, Bin Drop, and testing)
7. About Page (Restarting VSC, Enabling Remote Support, information about software and version)ut

Refer to the “VSC User Interface Connection” Manual for details of each screen

Home Screen (Recovery Mode)

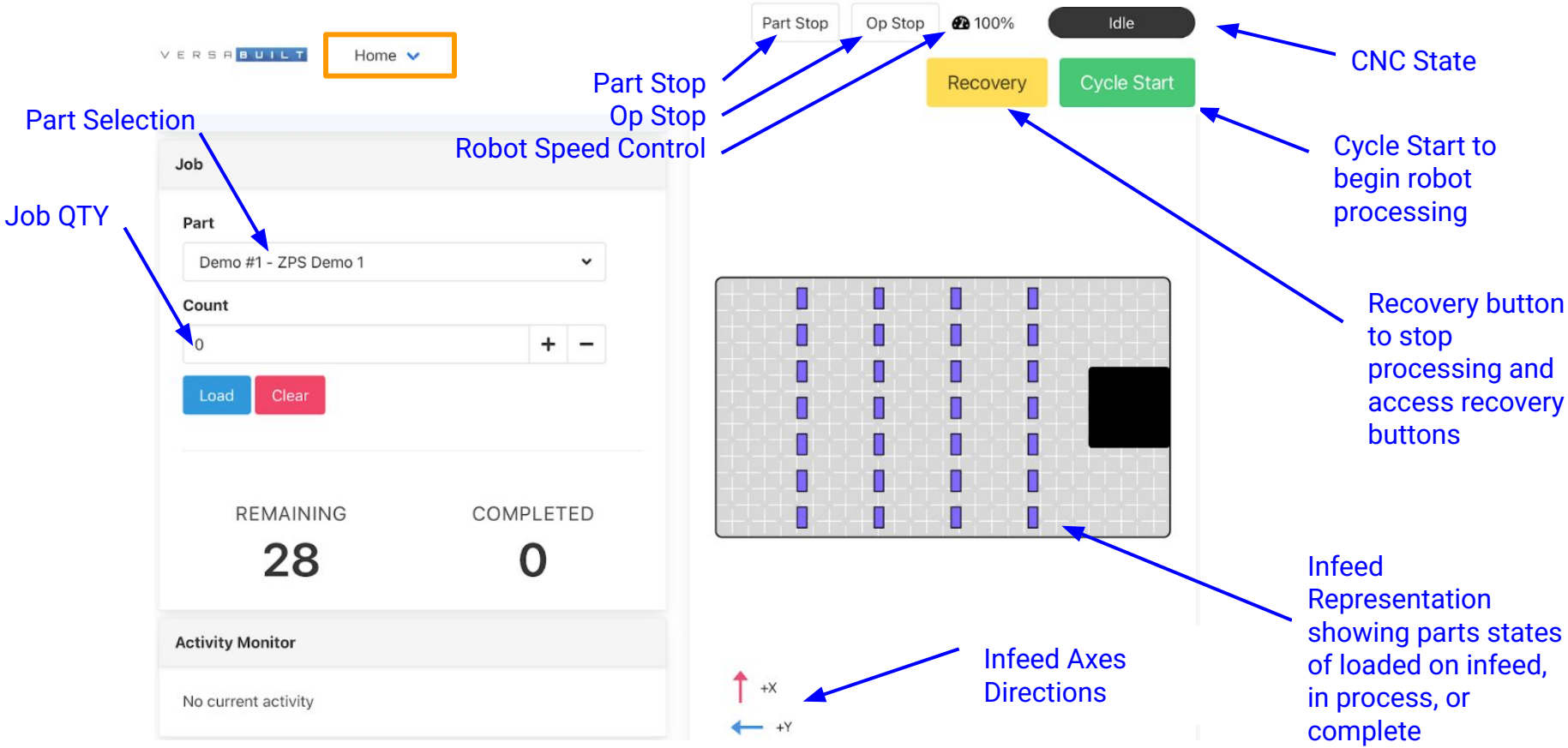
Recovery Panel at the top of the Configuration Page, allowing user to stay on one screen during configuration



Expand button to access more options

*Exhaust for Manual Mode puts the solenoid valves in a neutral position for Chuck clamp and release with the hand valve

Home Screen (Running a Job)



Configuration Screen

The following section includes details for all options available for part configurations. Most common settings are selected by default when adding a new part configuration.

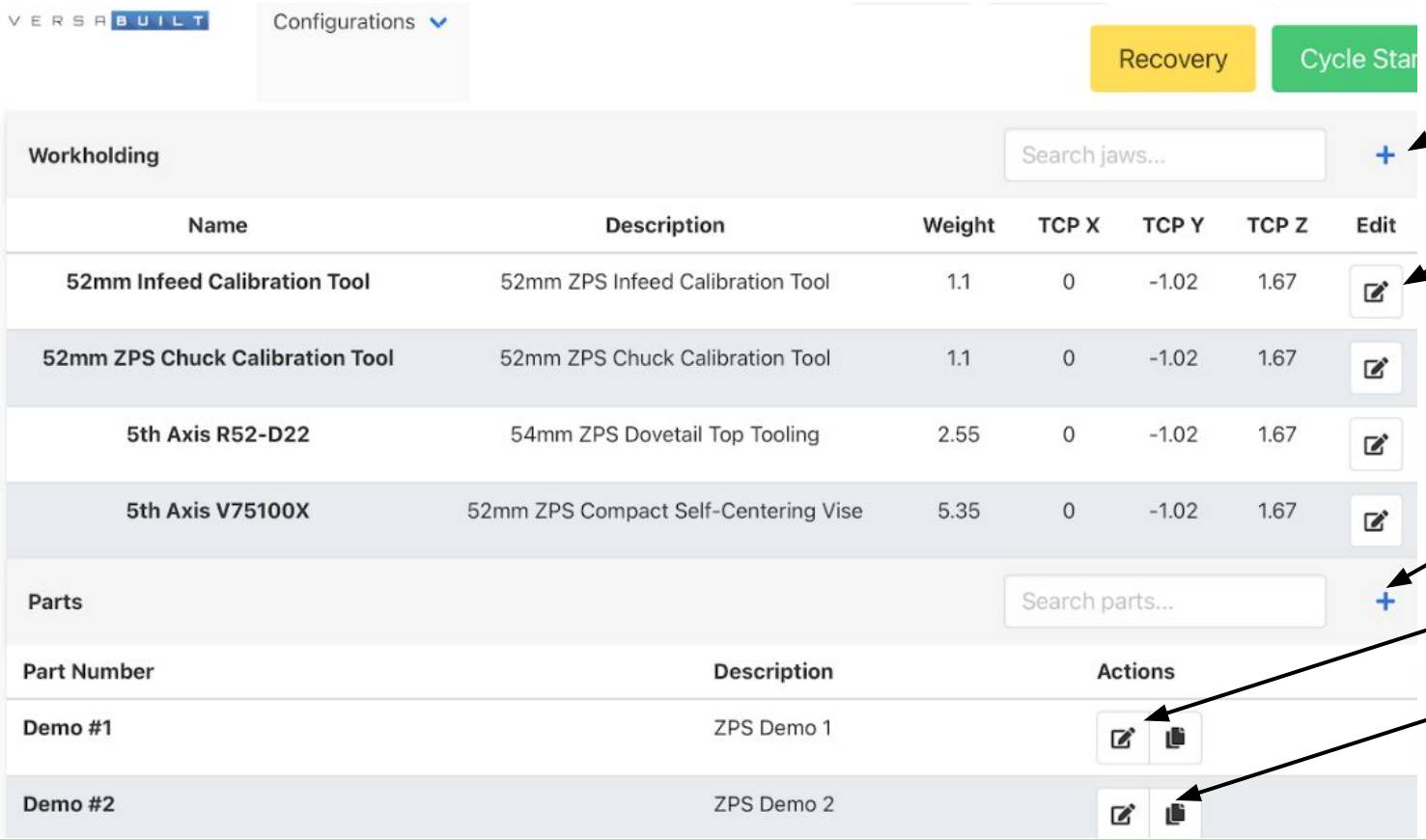
Not all fields are required - use the checkboxes and options best suited for your application. For assistance, please contact support@versabuilt.com

Macro-Enabled CNC Controls (e.g., Haas, Fanuc Focus 2.0) allow CNC programs to be selected from the parameters entered in the part configuration. Each job can run with the “Dispatcher Program” in CNC Memory. Communication for Macro-Enabled controls is via Ethernet or RS232 for legacy CNC’s with Macros-Enabled.

Non-Macro-Enabled CNC Controls utilize a handshake signal between Cycle Start from the Automation System to the CNC and a Cycle End Signal from the CNC to the Automation System (typically an M-Code Relay Output). The CNC program needs to be setup on a per job basis.

Refer to the “VSC / CNC Communication” Manual for details.

Part Configuration - Adding or Editing



Add New Workholding Type

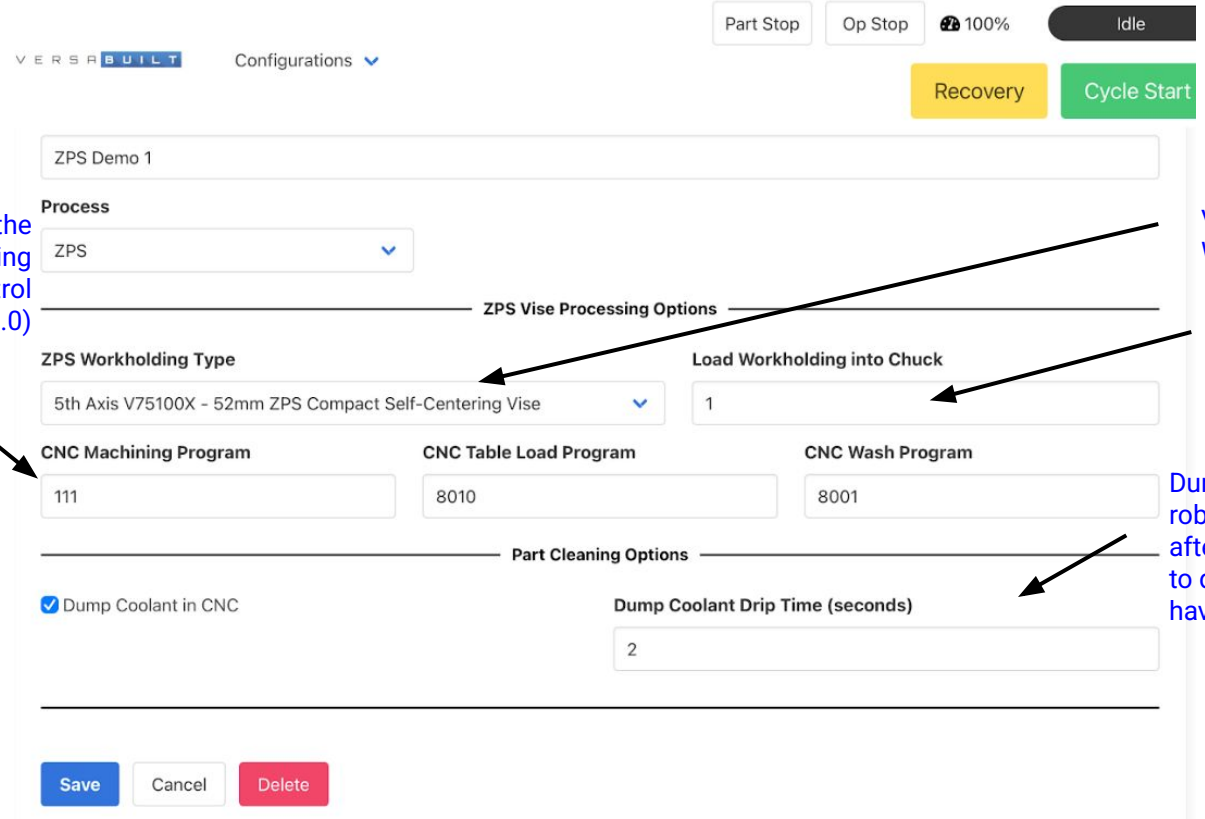
Edit existing Workholding definition

Add New Part Configuration

Edit Existing Part Configuration

Duplicate Existing Part Configuration

Part Configuration - ZPS Parameters



CNC Program selected by the System when using Macro-Enabled CNC Control (e.g., Haas, Fanuc Focus 2.0)

Verify selection of correct Workholding Type

Number of Chucks in CNC that the system will load

Dump Coolant rotates the robot wrist inside the CNC after picking the Vise/Pallet to dump coolant that may have pooled up

Part Processing

ZPS Process - Machining 1Op part to completion, one part at a time.

1. User Setup:
    a. Load Vises/Pallets w/ Material on Infeed
    b. Preps CNC w/ tools and correct program and run state, with CNC Door Open
    c. VSC entry: Clear any errors, Send Robot to a Home Position, Select Job, Enter QTY, and VSC Cycle Start
2. Robot Sequence:
    a. Robot moves from Table Home to picks Vise/Pallet from first/next available slot from Origin (origin is the far left corner of the infeed table, from robots perspective).
        - While picking the part, the CNC moves the table to the calibrated home position (at minimum on the first part)
    b. Robot moves to neutral position for Center of Gravity / Payload calculation, and moves to CNC Home
    c. Robot moves to InCNC Home, then loads Vise/Pallet into the ZPS Receiving Chuck; Chuck Blow-off is enabled when loading and unloading
    d. Robot moves to CNC Home and triggers Door Close* or Cycle Start**
    e. Robot waits at CNC Home for Machining Cycle to Complete
    f. After machining is complete, the CNC table returns to a Table Load position and a Cycle End signal is provided to the robot system
    g. The door opens by the system* or CNC**, and the Robot moves to InCNC Home then unloads the Vise/Pallet, moving from the Chuck back to InCNC Home, then CNC Home, then Table Home, and places the Vise/Pallet back in the original Infeed location.
        - While placing the part in the original infeed position, the CNC Door is closed to start any configured wash program to clear away chips from the Chuck.
    h. Robot moves to Table Home
    i. Sequence restarts until all parts in the job are processed.

*VersaBuilt AutoDoors require a signal to actuate the pneumatic cylinders, then wait for a sensor signal or time defined in settings before triggering Cycle Start
**CNC Factory AutoDoors can be configured to close upon Cycle Start and open upon CNC Cycle End

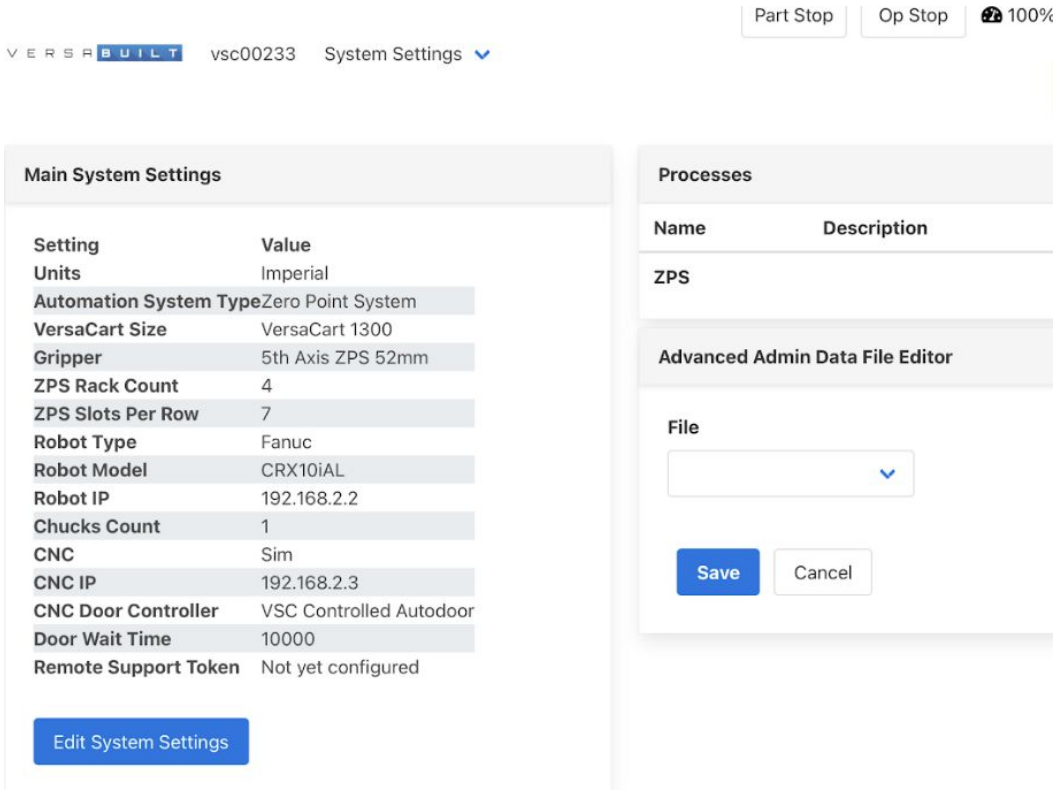
System Settings

Navigate to the Settings Page

Your system is pre-configured by VersaBuilt prior to shipment.

Connect to the VSC and click on the Navigation down arrow in the upper-left corner of the screen and select Settings.

Press the Edit System Settings button at the bottom of the page. Edit the System Settings to confirm the configuration of your system.



System Settings

Name: Enter a name for the the system, this name is displayed at the top of of the VSC home page to easily identify which automation system is being controlled

Units: Choose imperial or metric units to be used in the VSC

Infeed Template: Select based on the infeed type installed in the system

Automation System Type: Zero Point System

ZPS Rack Count: 4, 5, or 6

ZPS Slots per Row: 7 standard (4 to accommodate every other part)

CNC Dispatcher Program: CNC Dispatcher program number, 9000 by default (Haas and Fanuc CNCs only)

Default CNC Wash Program: The default CNC wash program number, 8001 by default

Vises/Chucks: number of CNC vises or chucks installed

Robot: Select the type of robot installed in the system

Robot IP: IP address of the robot, 192.168.2.2 by default

CNC: Select the type of CNC control the VSC is connected to

CNC IP: IP Address of the CNC (not applicable for Haas Legacy or Generic), 192.168.2.3 by default

IO: IO driver for the VSC; typically I2C, Sim can be used for testing purposes

CNC Door Controller: Select one of VSC Controlled Autodoor or CNC Controlled Autodoor **VSC controlled autodoors receives an air or I/O signal from the VSC to open and close. ***CNC Controlled Autodoors must be configured to automatically close on CNC Cycle Start and Open on CNC Cycle End*

CNC Door Wait Time: If Ignore Door Sensors is selected, the amount of time the VSC waits after commanding door movement before it assumes the door motion has completed

Ignore Vise Sensors: If selected, system will not check vise sensors for part load verification

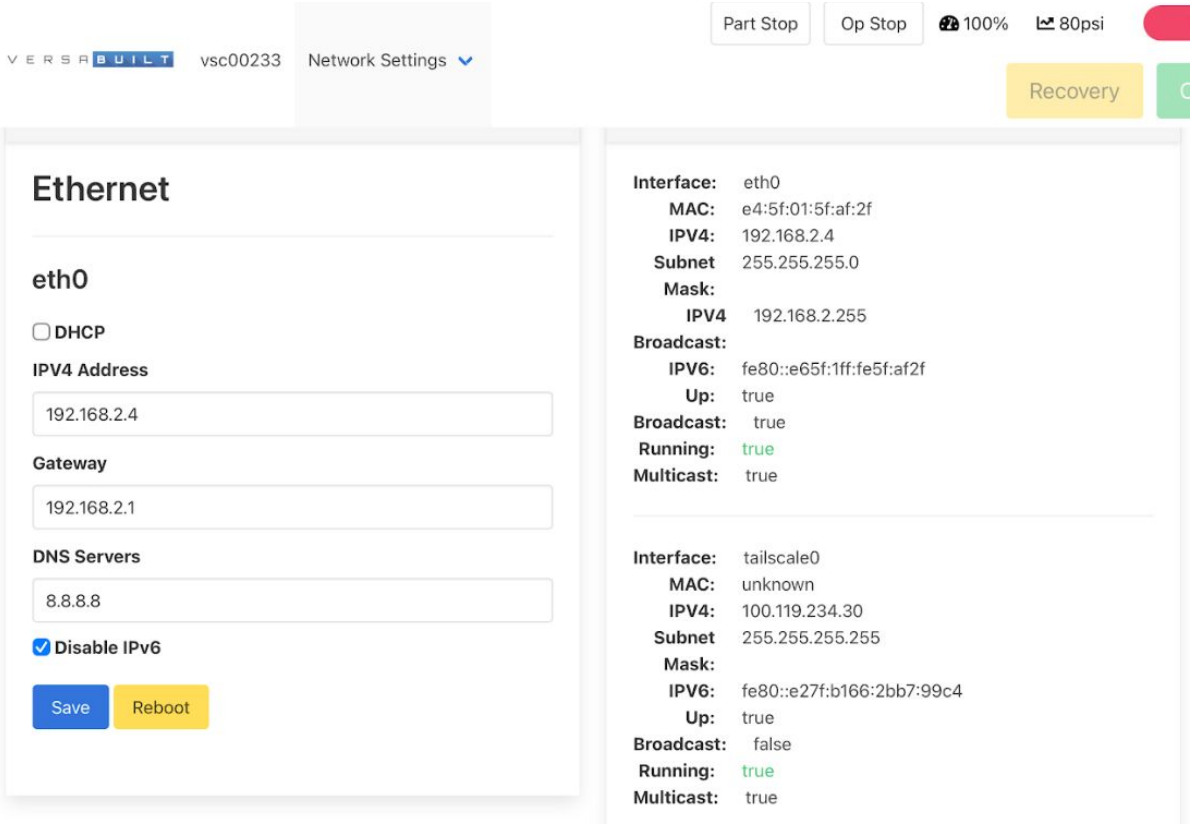
Ignore Door Sensors: If selected, system will not check door sensors

Remote Support Token: Key token used by the VersaBuilt VPN, only edit this if directed by VersaBuilt support

Note:

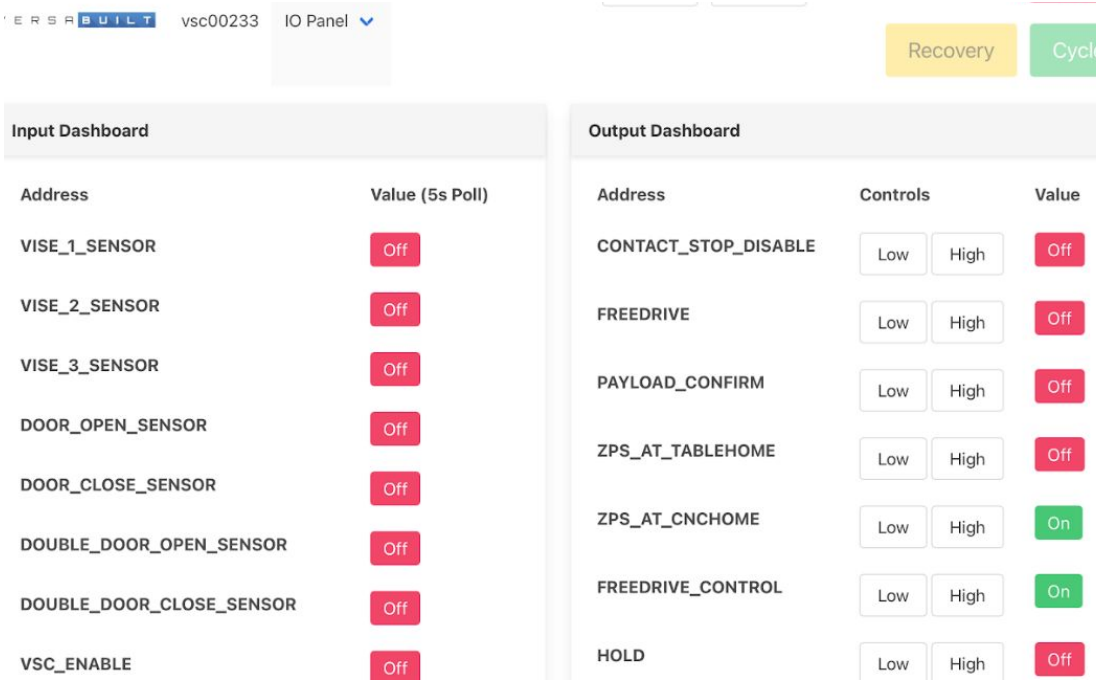
Sim = Simulation when a device is not available or for testing without signals to/from the device

Network Settings



I/O Panel Screen

Inputs:
Off = No Signal Received
On = Signal Received



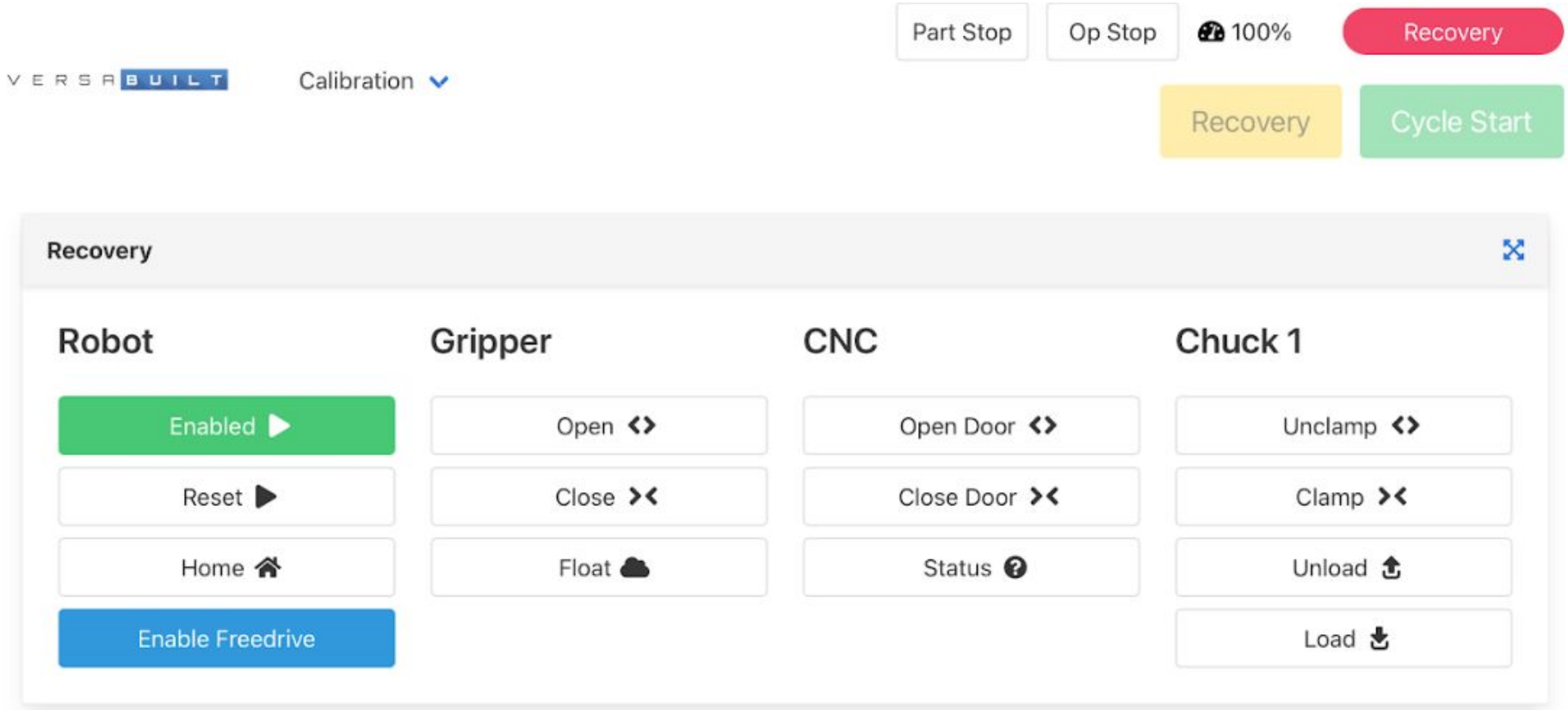
Outputs:
Set Low - Turns off signal
Set High - Turns on signal

Pneumatic Devices:
Set Low - Turns off signal to solenoid valve
Set High - Turns on signal to solenoid valve

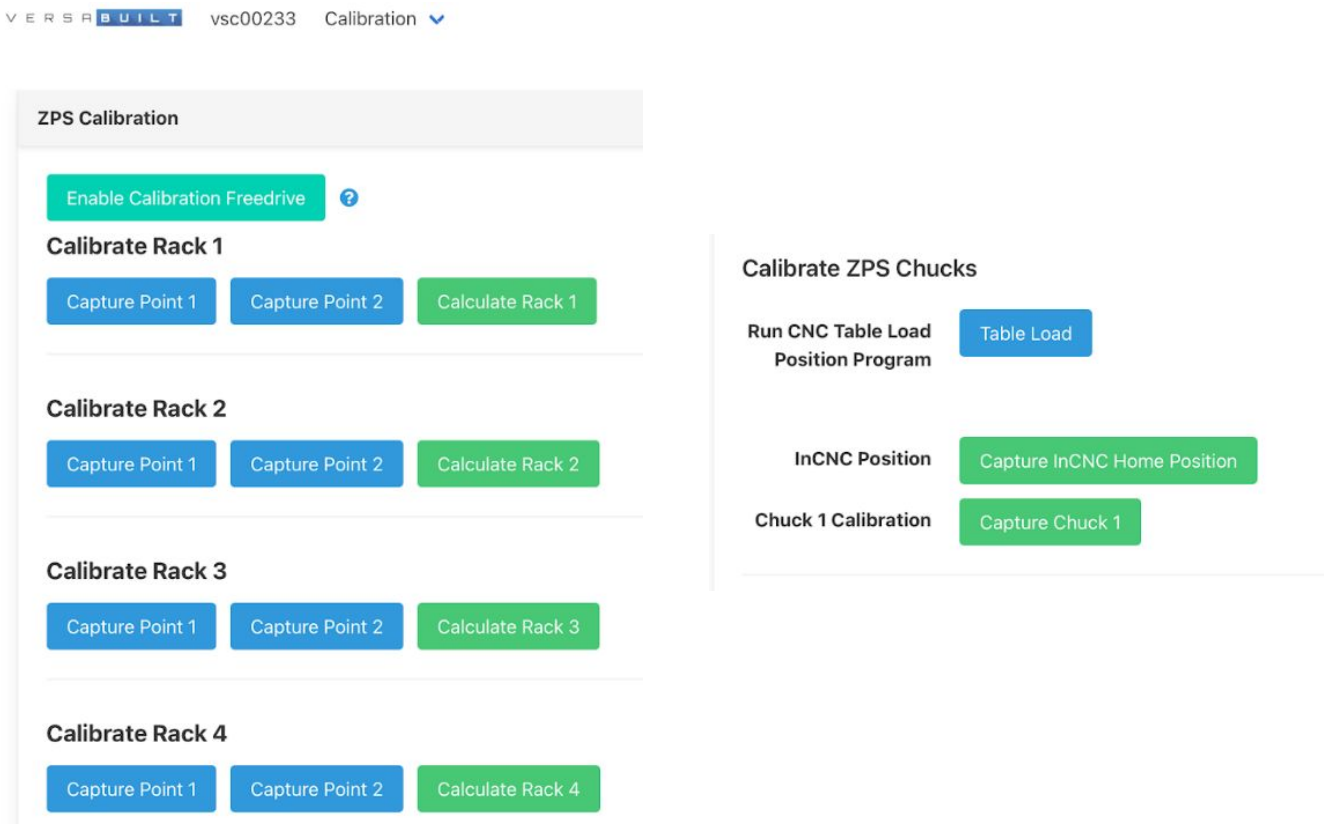
For Chuck blow-off:
Turn On: Set Chuck Blow-off High & confirm Chuck Blow-off Exhaust is set to Low

Turn Off: Set Chuck Blow-off Low & Set Chuck Blow-off Exhaust High

Calibration Screen (Top, Recovery Panel)

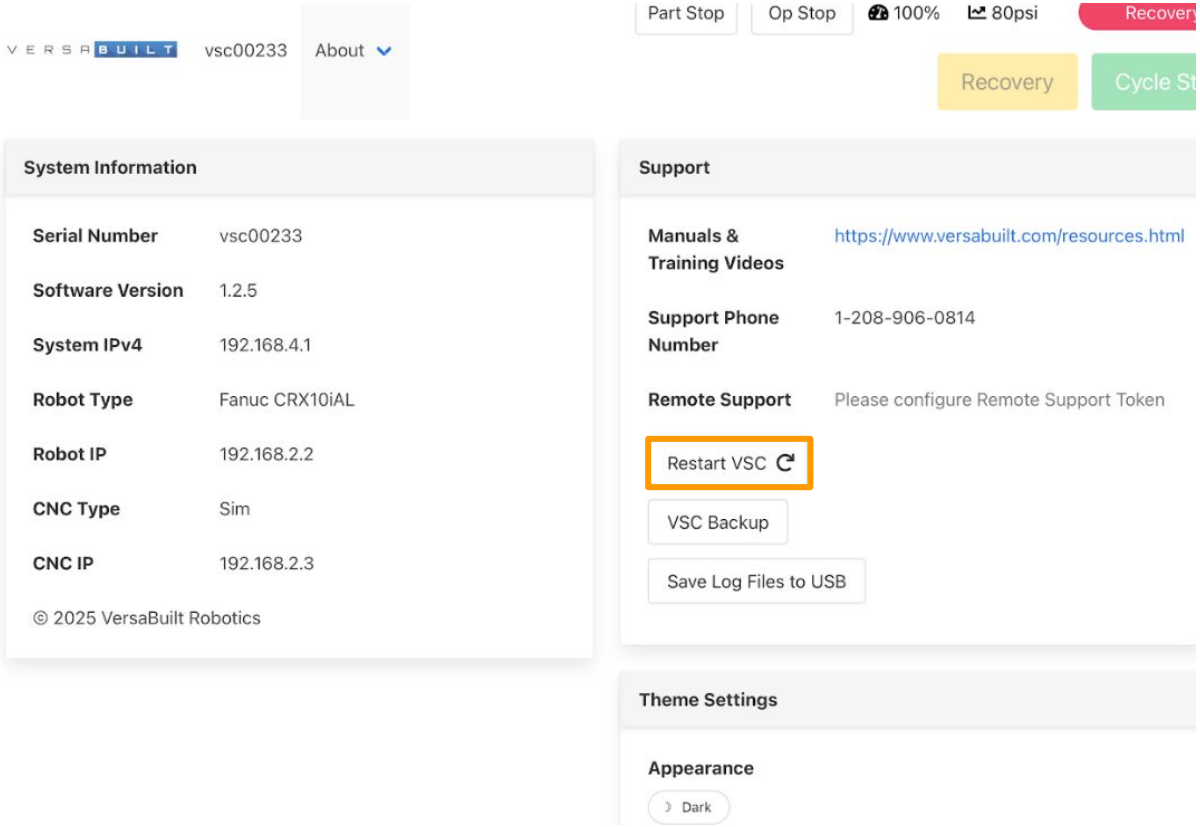


Calibration Screen (ZPS Calibration Section)



Refer to the Calibration Manual for detailed instructions for Calibration processes

About Screen



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