

VERSABUILT ROBOTICS



Automation System Safety Manual

Safety Warnings

Validity and Responsibility

The information in this manual does not cover all equipment that can influence the safety of the complete system. The complete system must be designed and installed in accordance with the safety requirements set forth in the standards and regulations of the country where the system is installed. The integrator of VersaBuilt products are responsible for ensuring that the applicable safety laws and regulations in the country concerned are observed and that any significant hazards in the complete application are eliminated. This includes, but is not limited to:

- Performing a risk assessment for the complete system
- Interfacing other machines and additional safety devices if defined by the risk assessment
- Setting up the appropriate safety settings in the software
- Ensuring that the user will not modify any safety measures
- Validating that the total system is designed and installed correctly
- Specifying instructions for use
- Marking the system installation with relevant signs and contact information of the integrator
- Collecting all documentation in a technical file; including the risk assessment and this manual

**Before implementation and use of system, read and understand the Universal Robot manuals.*

Limitation of Liability

Any safety information provided in this manual must not be construed as a warranty, by VersaBuilt, that the system will not cause injury or damage, even if the system complies with all safety instructions.

Safety Warnings

DANGER: The VersaBuilt Automation Systems are industrial machine tools designed to be operated by trained personnel only. Devices within the Automation System may move suddenly and without warning. Serious or fatal crushing injuries can occur from contact with the robot, gripper or vises.

Before deploying the VersaBuilt Automation Systems, a safety risk assessment must be completed in accordance with local, state and/or federal requirements.

The Automation System should only be used by trained operators.

Safety Warnings

The information, materials, and opinions contained in this content are for general information purposes only and are not intended to constitute legal or other professional advice and should not be relied upon on or treated as a substitute for specific advice relevant to particular circumstances.

VersaBuilt makes no warranties, representations or guarantees, whether express or implied, with respect to the contents of this Safety Manual including, without limitation, as to the quality, accuracy, reliability, currency, completeness, or fitness for any particular purpose of such content. To the maximum extent permitted by law, VersaBuilt expressly disclaims any and all liability arising from your use of the System.

This document is is not meant to be a substitute for the content available in the ISO documents. The ISO standards can be found here: <https://www.iso.org/>

UR Robot Safety Settings

DANGER: Do not operate Automation Systems without first reviewing and validating the safety settings for the Robot used in this application.

Running the Automation System without sufficient robot safety limitations may create dangerous conditions for operators that may come into contact with the system.

Specifications

MultiGrip Gripper, Clamping Force

Air Pressure (psi)	Gripper Clamp Force (lbf)	Gripper Clamp Force (Newtons)
20	33	145
30	49	218
40	65	291
50	82	364
60	98	437
70	115	509
80	131	582
90	147	655
100	164	728
110	180	801
120	196	844

Specifications

DuoGrip Gripper 400, Clamping Force

Air Pressure (psi)	Gripper Clamp Force (lbf)	Max Part Weight (lbs.)*
20	9	1.75
30	13	2.60
40	17	3.50
50	22	4.35
60	26	5.25
70	31	6.10
80	35	7.00
90	39	7.85
100	44	8.75
110	48	9.60
120	52	10.50

*Max Part weight assumes friction factor of 0.20.
Clamping force x Friction Factor The friction factor may vary with material and exposure to low friction elements, e.g., coolant.

Specifications

DuoGrip Gripper 2000, Clamping Force

Air Pressure (psi)	Gripper Clamp Force (lbf)	Max Part Weight (lbs.)*
20	48	9.50
30	72	14.30
40	95	19.10
50	119	23.85
60	143	28.60
70	167	33.40
80	191	38.15
90	215	42.90
100	238	47.70
110	262	52.50
120	286	57.00

*Max Part weight assumes friction factor of 0.20.
Clamping force x Friction Factor The friction factor may vary with material and exposure to low friction elements, e.g., coolant.

Specifications

ZPS Gripper Clamping Force - Schunk JGP-P 100-1-AS

Air Pressure (psi)	Gripper Clamp Force* (N)	Gripper Clamp Force* (lbf)
20	250	56
30	375	84
40	501	113
50	626	141
60	751	169
70	876	197
80	1001	225
90	1126	253
94.3 (6.5 Bar) *max rated pressure	1180	265
100	1251	281
110	1376	309

Gripping force is the arithmetic sum of the individual force applied to each jaw

Specifications

MultiGrip Vise 4000, Clamping Force

Air Pressure (psi)	Stated Clamp Force* (lbf)	Expected Gauge Value** (lbf)
20	350	177
30	707	353
40	1060	530
50	1413	707
60	1767	883
70	2120	1060
80	2473	1237
90	2827	1413
100	3180	1590
110	3533	1767
120	3887	1943

**The clamping force shown in the table above is the arithmetic sum of the individual forces, per industry norms (equivalent to Schunk KSP160-LH or OMIL CFP 160*

***Expected gauge force, if clamping on a force gauge, will be ½ of the clamping force *when measuring, introduce vibration to simulate machining*

Specifications

MultiGrip Vise 2000, Clamping Force

Air Pressure (psi)	Stated Clamp Force* (lbf)	Expected Gauge Value** (lbf)
20	187	93
30	374	187
40	561	280
50	748	374
60	935	467
70	1122	561
80	1309	654
90	1496	748
100	1683	841
110	1870	935
120	2057	1028

**The clamping force shown in the table above is the arithmetic sum of the individual forces, per industry norms (equivalent to Schunk KSP100-LH or OMIL CFP 100*

***Expected gauge force, if clamping on a force gauge, will be ½ of the clamping force *when measuring, introduce vibration to simulate machining*

Specifications

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.

Risk Mitigation

VersaBuilt System Controller

The VersaBuilt System Controller includes electronically actuated pneumatic valves for controlling vises, in-CNC air blow-off and optionally a pneumatic door. The VersaBuilt System Controller IOs are not safety rated and may actuate pneumatics unexpectedly. A pneumatic supply valve with lockout provision is provided to remove pneumatic energy from the VersaBuilt System Controller.

Gripper

The VersaBuilt System Controller includes pre-programmed sequences such that when gripping outside the CNC, the default programming commands the gripper to close, then open, then close again to pick up parts. This close/open/close sequence may allow the operator to escape if accidentally clamped by the Gripper. The Gripper is controlled by the Robot IO signals. The pneumatic configuration of the Automation System includes an option to remove pneumatic energy from the gripper using the VersaBuilt System Controller pneumatic supply valve.

MultiGrip Vise

In “Automatic Mode”, the MultiGrip Vises are controlled by the VersaBuilt System Controller. During manual operation of vises, for handloading, the Diverter Valve can be switched to “Manual Mode”, diverting air from the supply to the VersaBuilt System Controller to the Vise Hand Valves mounted to the CNC table. In this configuration, vises can only open or close by way of direct operator access to the hand valves.

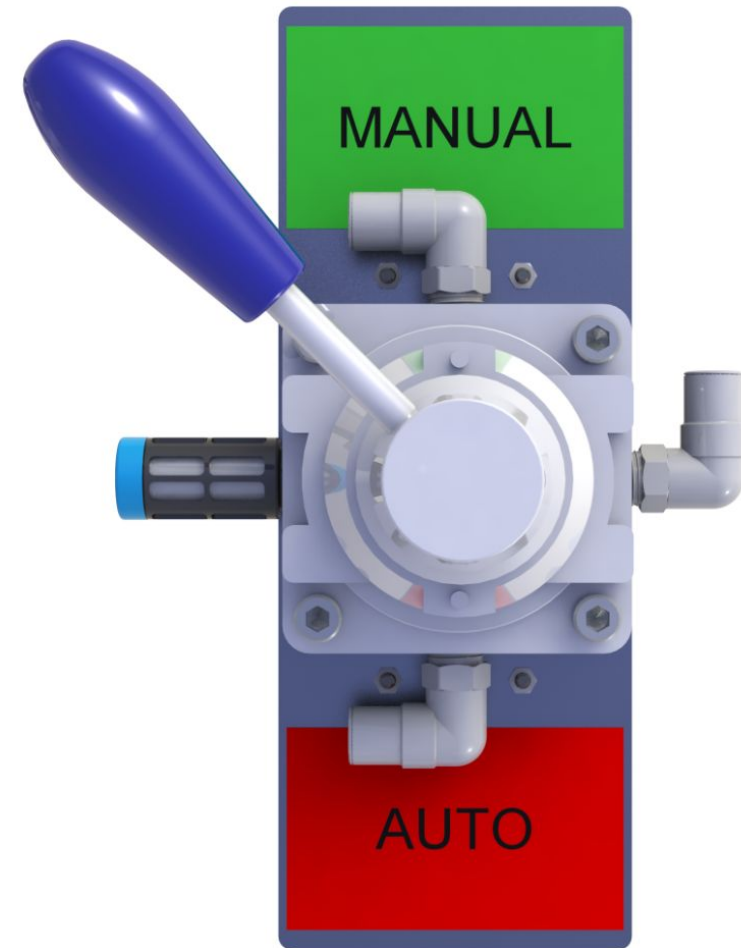
Risk Mitigation

CNC Door Interlock

A CNC Door Interlock is required for the system to operate safely and without risk of damage to equipment and personnel. Insure proper functionality of interlock before installation of automation. Use of VersaBuilt Automation Systems without CNC Door Interlocks is a violation of the Terms and Conditions of Sale.

Safety Warnings

When Mills Automation Systems with air actuated vises are not in use, remove the power to the VersaBuilt System Controller (VSC) and switch the diverter valve to manual mode to prevent accidental automatic actuation of a Vise.



Safety Warnings

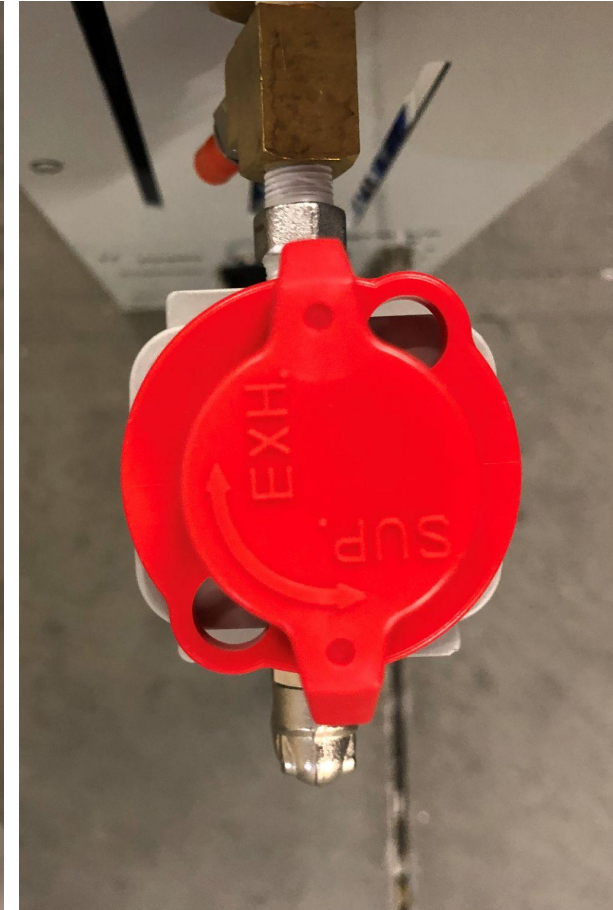
The pneumatic supply valve should be turned to the off position when the system is not in use

Lock-Out-Tag-Out procedure:

In the OFF position, the lock holes will line up in order to allow operator to lock pneumatic supply valve closed. We suggest cycling the vise via hand valves until all compressed air is expressed after closing the valve.



OFF Position



ON Position