



Startup Manual



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The documentation, best practices, and recommendations provided by READY Robotics do NOT constitute safety advice. Products sold through READY Robotics are not by themselves a fully integrated workcell. As required in ISO 10218-2, READY Robotics strongly recommends performing a complete risk assessment of the integrated workcell per ISO 12100. You may wish to use the methodology found in the ANSI/RIA TR R15.306 Task-based Risk Assessment Methodology.

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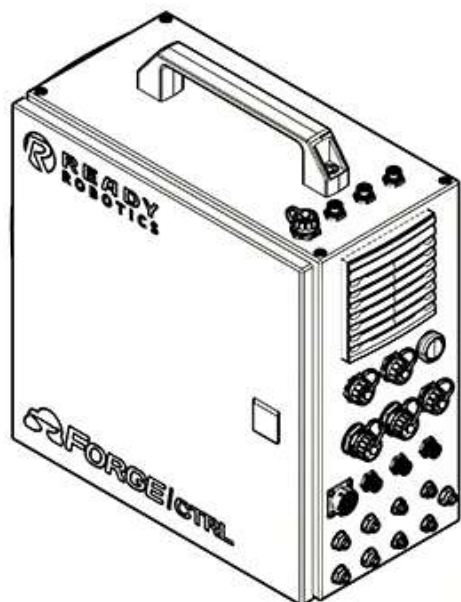
Version

Version	Release Date	Change Log
1.0	8/5/2020	Initial Release

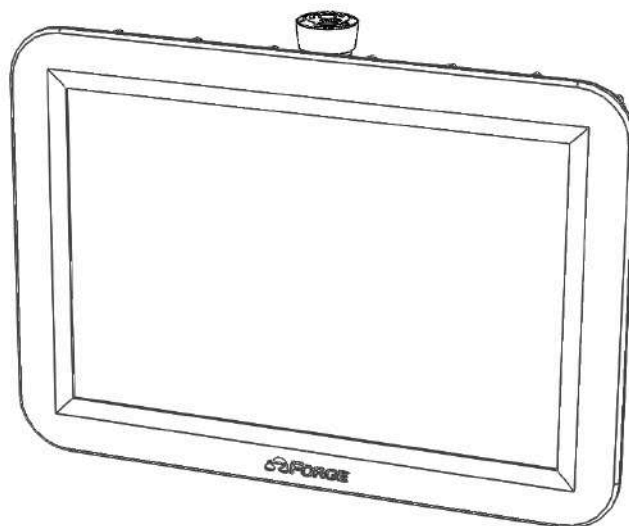
Introduction

Forge/Ctrl is an industrial, IP54-rated computer running Forge/OS. This product allows the user to interface with multiple brands of robots, machine tools, PLCs, vision systems, force sensors and other peripherals using a standard set of I/O interfaces including pneumatics and fieldbus connectors.

Overview of the System



Forge/Ctrl



READY Pendant

Element	Description
Forge/Ctrl	The hardware which has an industrial computer with the necessary interfaces to automate a workcell.
Forge/OS	The operating system designed by READY which runs applications that assist in automating the workcell.
READY Pendant	The Human-Machine Interface (HMI) for Forge/OS and Task Canvas.
Task Canvas	The application which assists the user in programming a robot for automation running on Forge/OS.

Technical Specifications

Power Requirements	
Voltage Input	120VAC
Current	15A
Typical Power Consumption	50W Idle, 300W Max (Does not include external AC Load)
Power Output	
NEMA 5-15r	120VAC, 10A (Monitor or Universal Robot Power Only) Short Circuit and Overcurrent Protection: 10A Circuit Breaker
4-Pole M12 Connector	12VDC, 4A (Monitor Power Only) Electronic Short Circuit and Overcurrent Protection
PLC Module (Through PLC Breakout Box ONLY)	24VDC, 2.5A Total. (Combined Between 24V Power Pins and All Outputs) Electronic Short Circuit and Overcurrent Protection
PLC Inputs (Through PLC Breakout Box ONLY)	
Quantity, Type	8x, Sinking
Rated Voltage	24VDC at 4mA, nominal
Continuous Permissible Voltage	30VDC, max.
Logic 1 Signal (min)	15VDC at 2.5mA
Logic 0 Signal (max)	5VDC at 1mA
Max. Cable Length (meters)	500m Shielded, 300m unshielded
PLC Outputs (Through PLC Breakout Box ONLY)	
Quantity, Type	8x, Solid State - MOSFET (Sourcing)

Current (max.)	0.5 A
Surge Current	8A for 100ms
Inductive clamp voltage	L+ -48 V DC, 1 W dissipation. External Suppression must be used for most inductive coils
Max. cable length (meters)	500m Shielded, 150m unshielded
Air Requirements	
Main Air Input	90-100 psi Installing an Air Filter is Highly Recommended to Increase System Life
Air Input Quality	Dry air with a 5µm Particle Filter
Air Output 4mm	4x 4mm Push-to-Connect Fitting
Air Output 6mm	4x 6mm Push-to-Connect Fitting
Environmental	
IP Classification	IP 54
Max Operating Temperature	45 degrees C (113 F)
Min Operating Temperature	0 degrees C (32 F)
Weight	19 kg (41.8 lbs)
Dimensions (enclosure only)	400 x 400 x 210 mm (15.75 x 15.75 x 8.25 in)
Connectivity	
Ethernet	2x LAN Ports 1x WAN Port
USB	2x USB Type A Ports

Forge/Ctrl Components

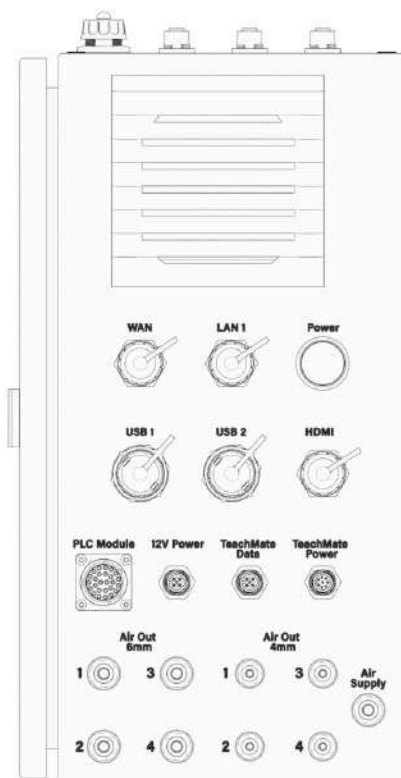
Left Side



Interfaces of the Forge/Ctrl on the Left Side

Element	Description
120V 15A Power	NEMA 5-15r which supplies 120VAC at 15A and can be used for a monitor or supplying power to Universal Robot products.
Power Disconnect	Switch to safely energize and de-energize the Forge/Ctrl and its peripherals.
Power Cable	NEMA 5-15 Plug to supply power to the Forge/Ctrl and its connected peripherals.
Air Input	Industrial Quick Disconnect Plug to supply air to the Forge/Ctrl.
Exhaust	Push-to-Connect Fitting for the internal solenoids of the Forge/Ctrl.

Right Side

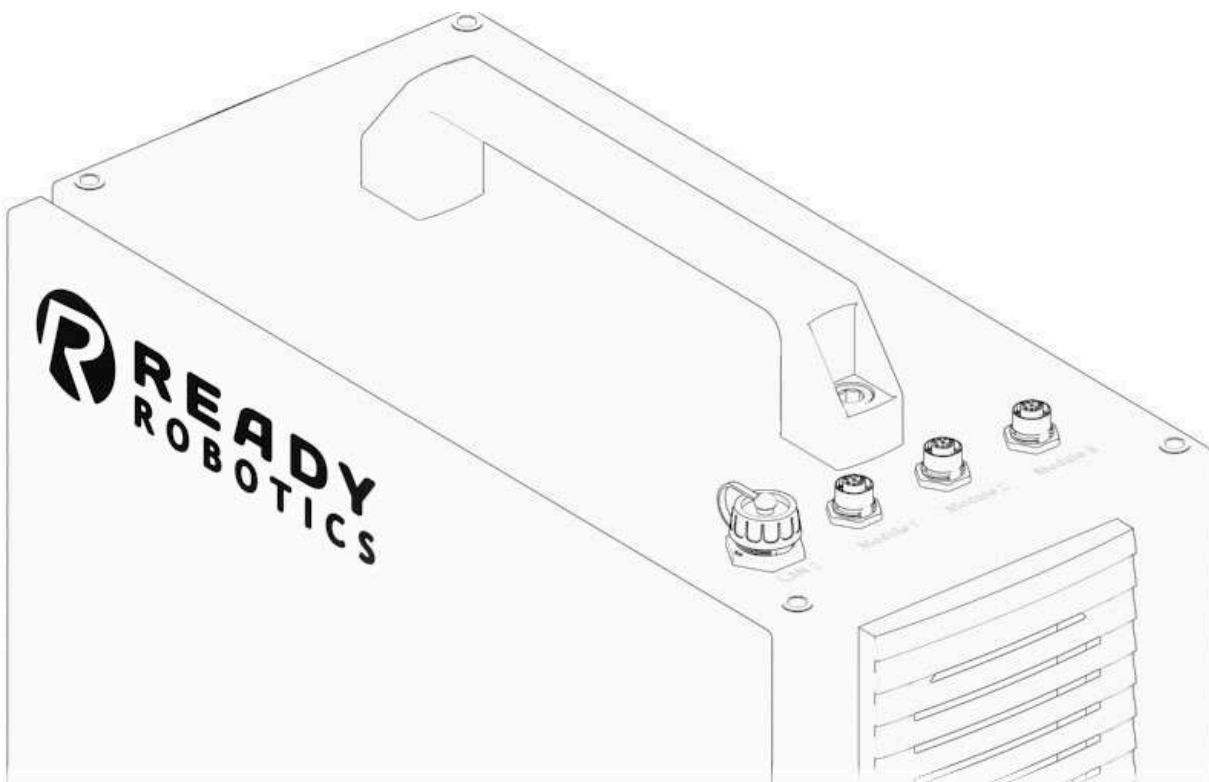


Interfaces on the Right Side of the Forge/Ctrl

Element	Description
WAN, LAN 1, LAN 2	Ethernet Ports to connect the Forge/Ctrl to the internet. Note: LAN 2 is located on the Top Side of the Forge/Ctrl
Power Button	Push Button to turn ON or turn OFF the Forge/Ctrl. The button lights up to indicate the state of the Forge/Ctrl.
USB 1, USB 2	USB Type A Ports.
HDMI	HDMI Port to connect to the READY Pendant.
PLC Module	26-Pin Amphenol Connector to connect to READY's PLC Breakout Box.
TeachMate	M12 Connectors for the cables used to connect to the READY's TeachMate.

Element	Description
Data TeachMate Power	
Air Out 4mm	Push-to-Connect Fitting for 4mm Air Hose.
Air Out 6mm	Push-to-Connect Fitting for 6mm Air Hose.

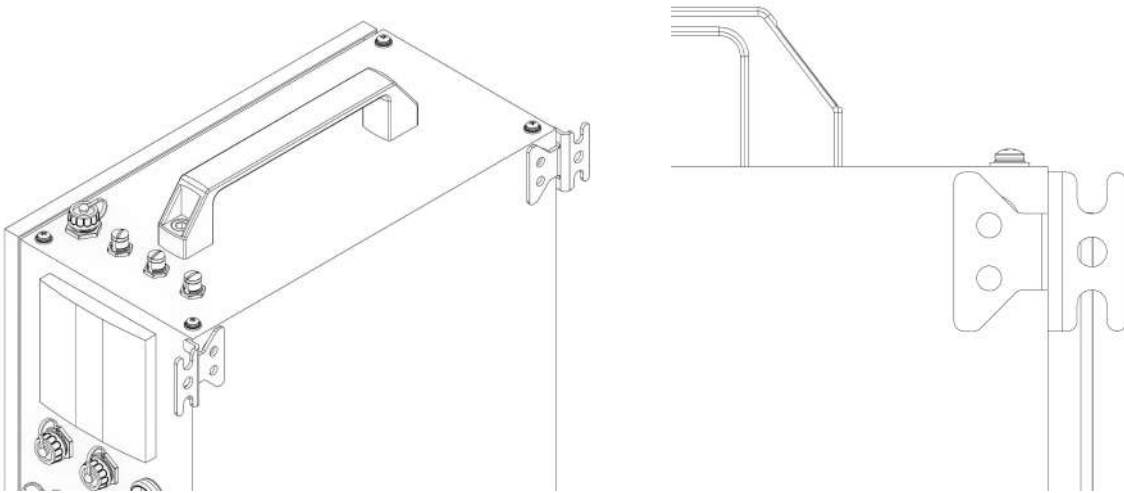
Top Side



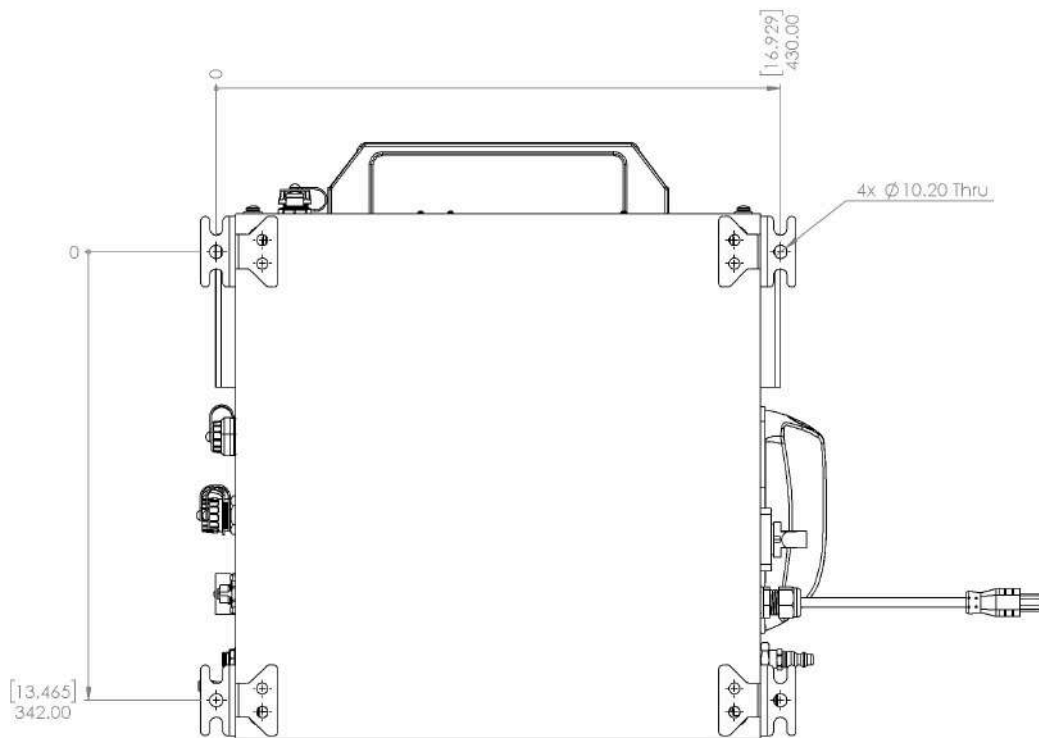
Interfaces on Top of the Forge/Ctrl

Element	Description
LAN 2	Ethernet port to connect the Forge/Ctrl to the internet.
Module 1, 2, 3	M12 Connectors customizable by READY.

Mounting the Forge/Ctrl



The Forge/Ctrl may come equipped with a set of Mounting Feet. Use them to mount the Forge/Ctrl to your desired location.



Units: [in] mm

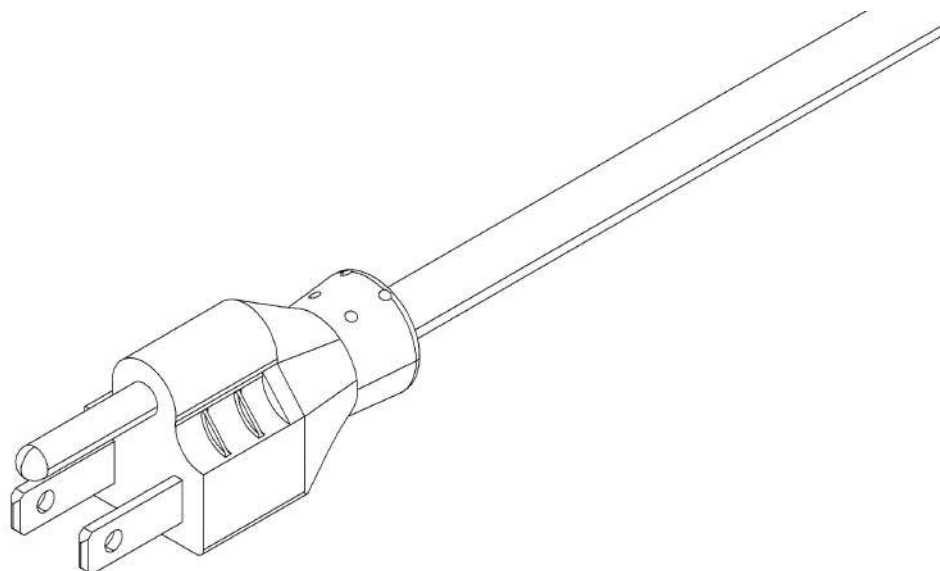
Connecting the Forge/Ctrl to Power

There is a NEMA 5-15 Power Cable connected to the left side of the Forge/Ctrl.

Power Requirements	
Voltage	120VAC
Current	15A
Typical Consumption	50W Idle, 300W Max (Does not include external AC Load)

IMPORTANT: Do not disconnect the power while the system is on. Removing air from the system will prevent certain peripherals and end effectors from working properly.

- 1 Locate the Power Cable connected to the Forge/Ctrl.



- 2 Plug the Power Cable into a 120VAC Outlet.

Connecting the Forge/Ctrl to Air

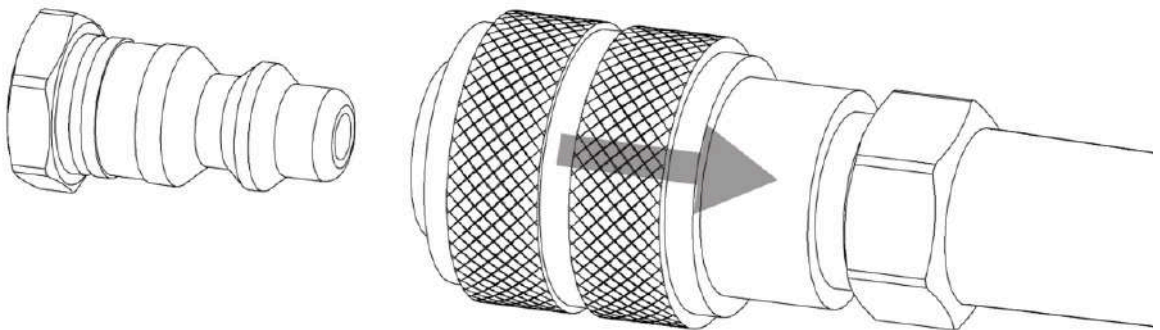
There is a Quick Disconnect Plug on the left side of the Forge/Ctrl that is connected to the internal solenoids.

Air Requirements

Main Air Input	90-100 psi
	Installing an Air Filter is Highly Recommended to Increase System Life
Air Input Quality	Dry air with a 5µm Particle Filter
Connectivity	Industrial Quick Disconnect
Coupling Size	1/4
Plug Tip Length	3/16"
Plug Tip Diameter	5/16"

IMPORTANT: Do not disconnect the air supply while the system is on. Removing air from the system will prevent certain peripherals and end effectors from working properly.

1 To connect shop air to the system, pull back on the outer cylinder of the socket.



2 Connect the quick disconnects together and then release the outer cylinder to secure the connection.

Startup

The Forge/Ctrl will be used in tandem with the robot controller to automate your robot and workcell. READY is working towards being Robot Agnostic however, connecting to multiple robots is not as simple. Work with READY to have the correct instructions to connect your robot and robot controller to the Forge/Ctrl.

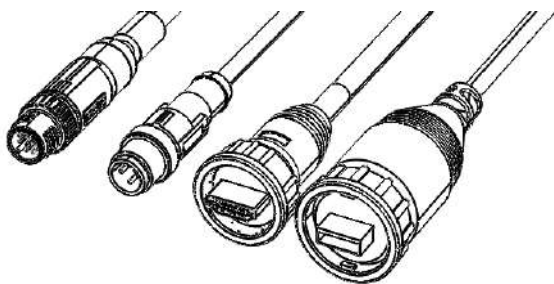
The following procedure is a generic set of instructions and requires supplemental instructions to have an operational workcell.

1. Prepare the robot controller to connect to the Forge/Ctrl
2. Connect the robot controller to the Forge/Ctrl
3. Setup the Forge/Ctrl Initiate Initial Configuration on the READY Pendant
4. Complete remaining robot controller setup
5. Complete Initial Configuration on the READY Pendant
6. Hardware Configuration on the READY Pendant

After going through this process, you will be ready to automate your workcell.

Note: Contact READY to retrieve the instructions to connect to your robot and robot controller.

Connecting the READY Pendant



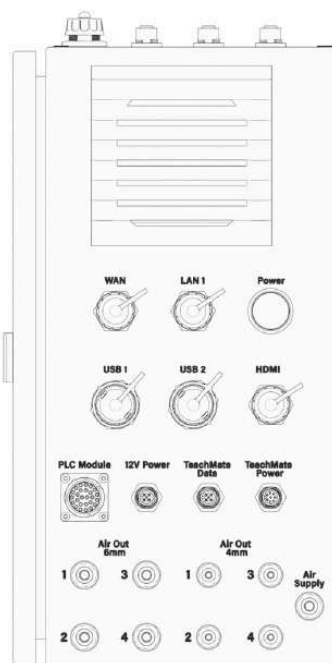
- 1 Connect the READY Pendant USB cable to the port on the Forge/Ctrl labeled "USB 2".
- 2 Connect the READY Pendant HDMI cable to the port on the Forge/Ctrl labeled "HDMI".
- 3 Connect the READY Pendant M12 4-Pos Power Cable to the port on the Forge/Ctrl labeled "12V Power".
- 4 The connection of the remaining M12 Connector is dependent on the robot controller and its safety circuit.

Turning ON the Forge/Ctrl

- 1 On the left side of the Forge/Ctrl, turn the Power Disconnect Switch clockwise to the ON position.



2 On the right side of the Forge/Ctrl, press the Power Button.



Forge/OS

Forge/OS

Forge/OS is the READY operating system on which you can program and execute applications for a variety of robot and automation systems. Forge/OS includes applications for creating robot tasks, manually configuring and controlling attached devices, and communicating job information from an automated cell to help track productivity.

Applications

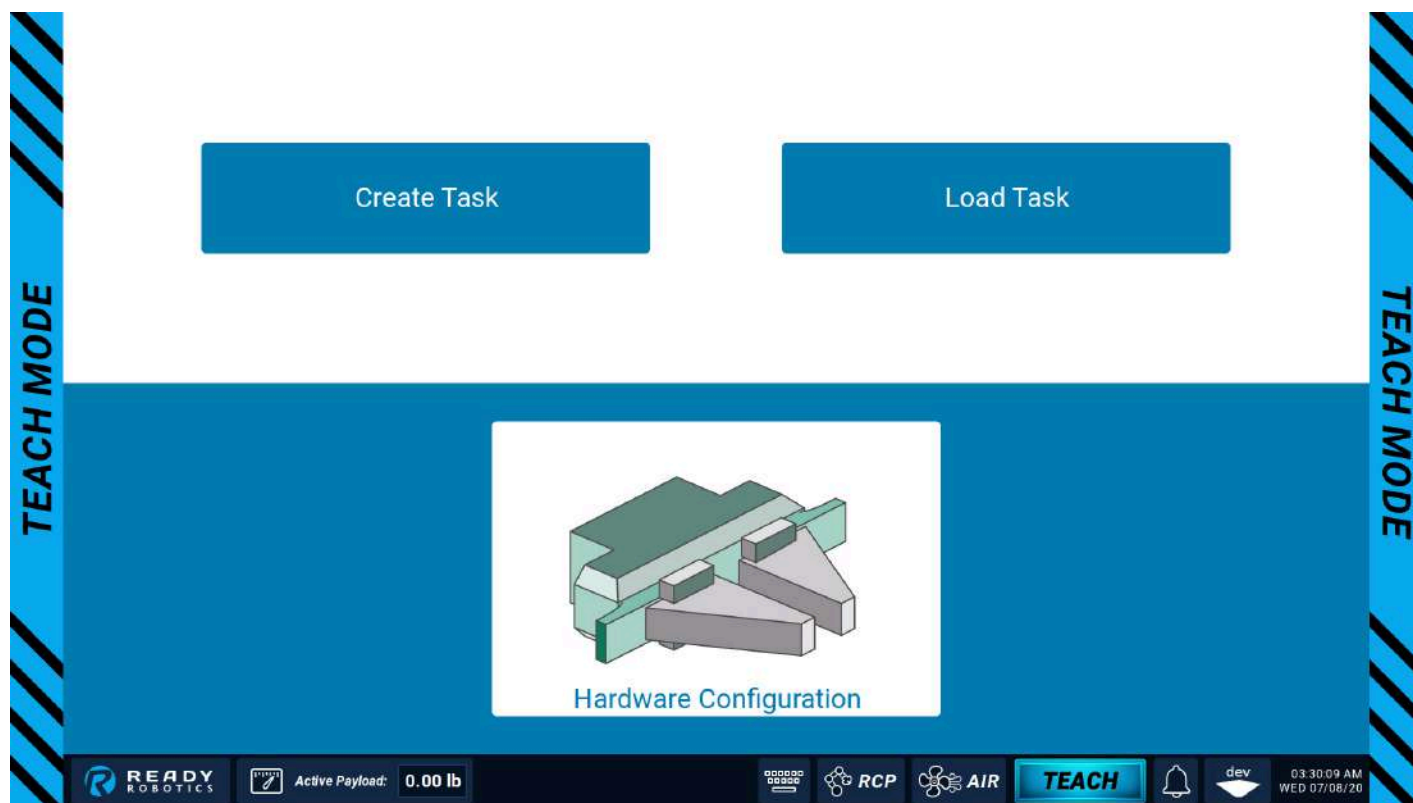
Forge/OS has two native applications for configuring and controlling your automation equipment. Hardware Configuration enables you to select and modify attached devices and will open when you first power on your system. TaskCanvas is where you can assemble the blocks and flowchart that create an executable task for all of the devices you configured in Hardware Configuration.

The first time you boot up a Forge/OS system you will go through the Initial Configuration process to set up basic system settings, the attached robot arm, and peripherals specific to the arm. For information about the Initial Configuration of your Forge/OS system, see the Initial Configuration chapter.

Whenever you start Forge/OS after completing Initial Configuration, you will begin at Hardware Configuration. For information about setting up tools and devices, see the Hardware Configuration chapter.

Home Screen

The home screen is the landing screen outside of Forge/OS applications.



Tap Create Task to access TaskCanvas with a new task.

Tap Load Task to access the Current Tasks screen and view the saved tasks on your system.

The Status Bars on the left and right edges of the screen display the current mode of the Forge system.

The Control Suite across the bottom of the screen gives you access to System Settings and manual controls for the robot and attached devices.

System Modes

The current mode of the Forge system is indicated by the status bars on the left and right edges of the screen. If you have a TeachMate, it will also indicate the current mode with the colored LED.

TEACH MODE

RUN MODE

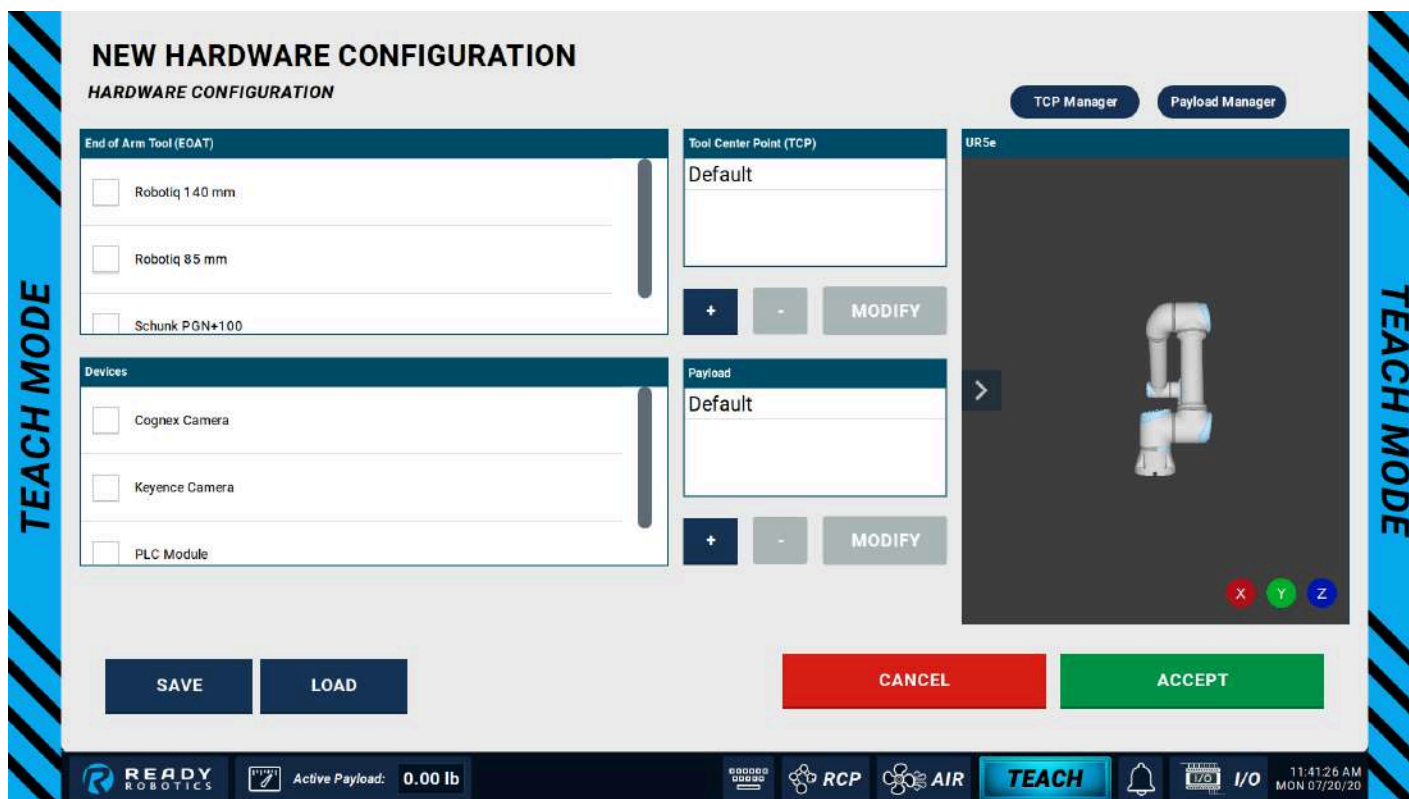
ROBOT WARNING

ROBOT ERROR

- Teach mode is for programming tasks and executing task actions at safe speed. In Teach mode, you can Step blocks on the TaskCanvas and move the robot arm at a reduced speed. You can also manually control attached devices and pneumatic ports.
- Run mode is for executing TaskCanvas tasks at full speed. Depending on your hardware and safety configuration, all safety devices must be active and functional to enter Run mode.
- Robot Warning mode is a programming mode during which you cannot move the robot arm. You can access manual controls for certain devices in robot warning mode and you can still program all block types in TaskCanvas. On Universal Robots arm, Robot Warning is also triggered by the robot arm's Protective Stop mode.
- Robot Error indicates that something is wrong with the Forge/OS system, robot arm, or attached devices. You cannot execute any functions in Robot Error and will have limited functionality in some applications, such as Hardware Configuration.
- (Universal Robots arms only) Guide mode allows you to move the robot arm by hand. When the arm is in Guide mode, you will have the same motion control as when holding the Teach button on the back of the UR pendant.

Hardware Configuration

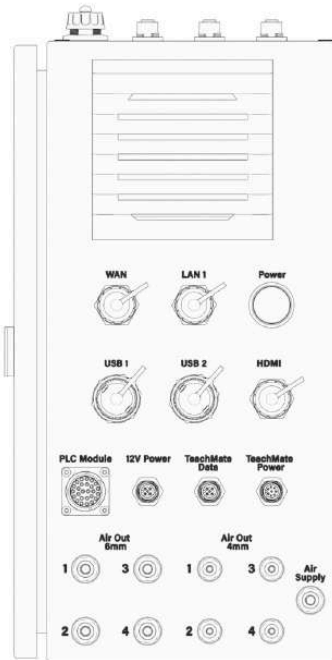
The Hardware Configuration defines the tools and devices attached to your Forge system. Throughout Forge/OS, different screens will present you with options for controlling only the tools and devices that are configured in the Hardware Configuration, limiting available controls to those relevant to your hardware and hiding those which are not. The options available in this application may differ depending on your robot manufacturer and model and the information you entered when configuring your Forge system for the first time.



Element	Description
Save	Save the current configuration to the Forge system. All parameters, including tools, devices, TCPs, and Payloads, will be saved to the configuration.
Load	View, load, and delete existing configurations
Add Device	Create, modify, and add a custom device to the configuration.
Accept	Apply the configuration to the Forge system.
Cancel	Cancel any changes and revert to the previous settings.

Turning OFF the Forge/Ctrl

- 1 On the right side of the Forge/Ctrl, press the Power Button.



- 2 On the READY Pendant, select SHUTDOWN.
- 3 Wait until the READY Pendant is powered down and the green light on the Power Button is OFF.
- 4 On the left side of the Forge/Ctrl, turn the Power Disconnect Switch counterclockwise.

