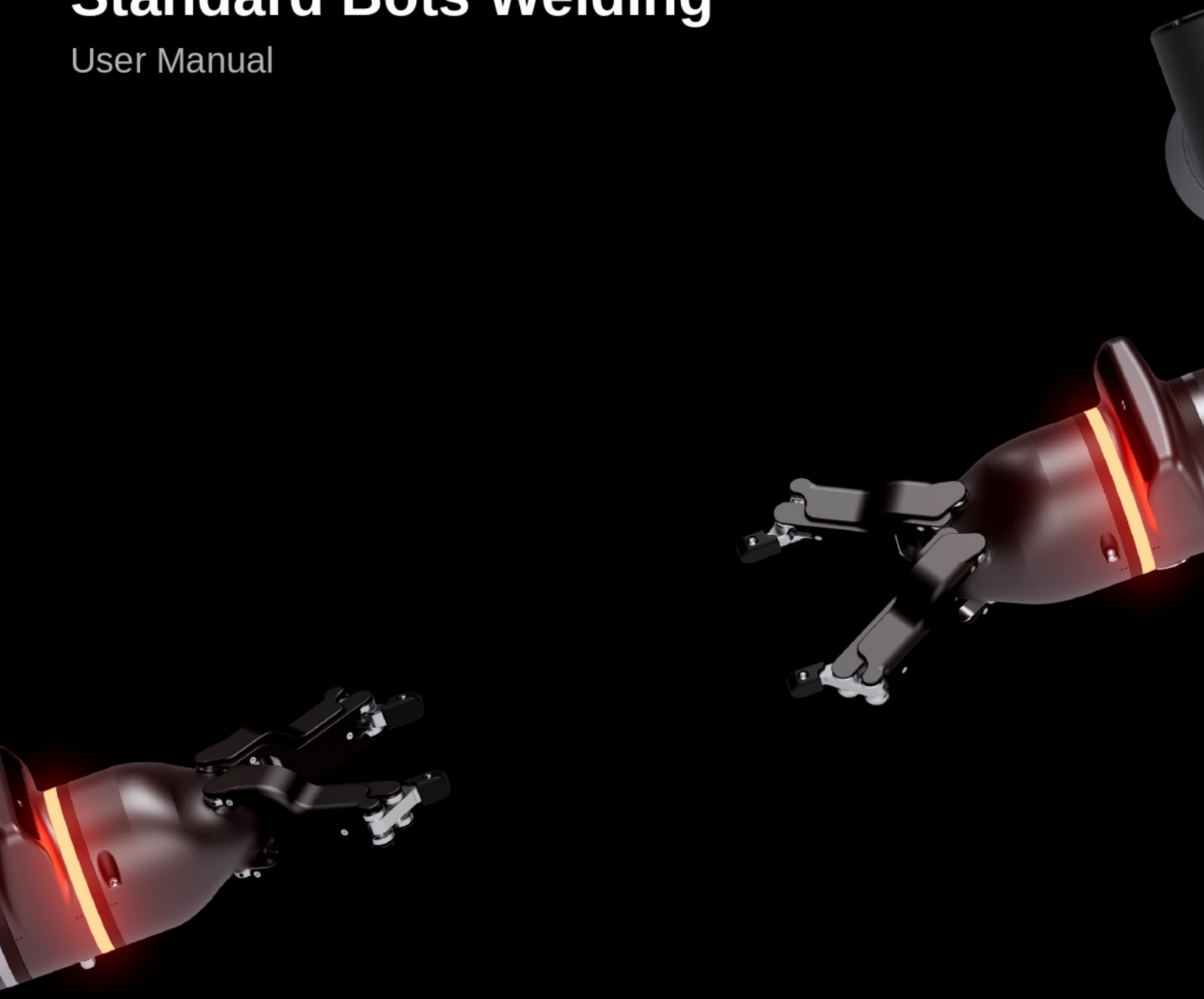
Standard Bots Welding

User Manual



STANDARD BOTS

Welding Use and Installation Manual

Standard Bots

Revised May 15, 2026

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1 Introduction

1.1 Welcome

Welcome to the Standard Bots RO2 Welding System Manual.

This guide covers everything you need to set up and operate a robotic MIG welding cell using the Standard Bots RO2 and the Miller Auto DeltaWeld™ 350 Basic power source. Whether you're an integrator building a cell from scratch or an operator getting a system up and running, this manual is designed to walk you through the process from start to finish.

The RO2 and Auto DeltaWeld 350 communicate over Modbus TCP, and all I/O mapping between the two systems comes preconfigured. That means your job is to make the physical connections, set IP addresses, activate the connection, and start welding.

If you ever need help along the way, we're here to assist.

1.2 System Overview

The complete welding system consists of the following components:

Power Source & Wire Feed

- **Miller Auto DeltaWeld™ 350 Basic** — the welding power source, rated at 350A at 60% duty cycle. Supports MIG, Accu-Pulse, RMD, Versa-Pulse, HD MIG, and Profile Pulse processes. Communicates with the RO2 via Modbus TCP over Ethernet.

- **Auto DeltaWeld Basic Fixed Wire Drive** — mounts to the robot or a fixed position near the cell. Feeds welding wire to the torch at speeds up to 780 ipm.

- **ArcConnect™ Cable (90 Degree)** — connects the wire drive to the power source, carrying both power and high-speed communication signals.

- **Auto DeltaWeld Base and Spool Support** — provides a stable mounting platform for the wire spool.

- **Cover, Spool 12 in. Assembly LH** — protects the wire spool from contamination and damage.

Torch & Consumables

- **Tregaskiss RA1 Cobot MIG Gun** — robotic MIG torch designed for collaborative robot applications.
- **Gun Mount Assembly (45 Degree)** — mounts the torch to the RO2 tool flange at a 45° angle.
- **KUKA Insulating Disc** — provides electrical insulation between the torch mount and the robot arm.
- **Nozzle 5/8 in. Bore, 1/8 in. Recess** — standard nozzle for the RA1 torch.
- **Acculock Robotic Diffuser Slip** — gas diffuser for the torch assembly.
- **0.035 Acculock Contact Tips** — replaceable contact tips sized for 0.035 in. welding wire.

Wire & Drive Components

- **Kit, Drive Roll .035/.045 V-Groove 4 Roll** — drive rolls for feeding 0.035 in. or 0.045 in. solid wire.
- **E70S-6 .035 x 33 lb. Spool** — ER70S-6 mild steel welding wire, 0.035 in. diameter.

Work Connection

- **Kit, Industrial MIG 4/0** — work cable and clamp for connecting the welding circuit to the workpiece.

Robot

- **Standard Bots RO2** — the collaborative robot arm and control box. Refer to the RO2 User Manual for full robot documentation.

1.3 Contacting Support

Standard Bots (Robot & Integration)

- Email: support@standardbots.com
- Phone: 1-888-9-ROBOTS

Miller Electric (Welding Equipment)

- Phone: 866-931-9730 (US and Canada)
- International: 920-735-4554
- Web: MillerWelds.com

1.4 Related Documentation

This manual focuses on integrating the welding system with the RO2. For topics outside that scope, refer to:

- **Standard Bots RO2 User Manual** — robot assembly, safety settings, software overview, routines, and maintenance.
- **Miller Auto DeltaWeld 350 Owner's Manual** — detailed electrical diagrams, internal maintenance, advanced power source configuration, and full fault code reference.
- **Tregaskiss RA1 Documentation** — torch maintenance, liner replacement, and consumable specifications.

2 Welding & Equipment Safety

2.1 General Welding Hazards

Welding involves serious hazards that can cause injury or death if proper precautions are not followed. Before operating this system, make sure all personnel working in or around the welding cell understand the following risks.

Electric Shock — The welding circuit is electrically live whenever the power source output is on. In MIG welding, the wire, wire drive, and all metal parts in contact with the welding wire are energized. Never touch live electrical parts. Always disconnect input power before performing any maintenance on the power source or wire drive.

Arc Radiation — The welding arc produces intense ultraviolet and infrared radiation that can burn skin and cause permanent eye damage. Never look at the arc without proper eye protection. Even brief unprotected exposure can cause "arc flash" — a painful burn to the surface of the eye.

Fumes & Gases — Welding generates fumes and gases that are hazardous to health. Ensure adequate ventilation in the welding area. If welding in an enclosed or confined space, use forced ventilation or a supplied-air respirator. Review the Safety Data Sheet (SDS) for the welding wire and shielding gas being used.

Fire & Explosion — Sparks and spatter from welding can travel significant distances and ignite flammable materials. Remove all flammable materials from the welding area or shield them with fire-resistant covers. Never weld on containers that have held flammable substances unless they have been properly cleaned and purged. Keep a fire extinguisher rated for Class ABC fires within reach of the welding cell.

Burns — The workpiece, torch, and surrounding fixtures remain extremely hot during and after welding. Allow parts to cool before handling, and always wear appropriate gloves when working near recently welded components.

Noise — Depending on the welding process, wire feed speed, and shielding gas, the arc may produce significant noise. Hearing protection may be required depending on the environment.

2.2 Personal Protective Equipment (PPE)

All personnel operating or working near the welding cell must wear the following:

- **Welding helmet** with auto-darkening lens rated to a minimum of Shade 10 (Shade 11—13 recommended for higher amperages).
- **Safety glasses** with side shields, worn under the welding helmet.
- **Flame-resistant clothing** — long sleeves, full-length pants, and a welding jacket or FR coveralls. No synthetic fabrics.
- **Welding gloves** — leather gauntlet-style gloves rated for MIG welding.
- **Steel-toed boots** — leather, fully enclosed. No canvas or mesh shoes.
- **Hearing protection** — if the environment exceeds 85 dB.

2.3 Workspace Requirements

Ventilation — The welding area must have adequate airflow to remove fumes and gases from the operator's breathing zone. Use local exhaust ventilation (a fume extraction arm or hood) positioned near the weld zone whenever possible. If welding indoors without local extraction, ensure the room has general mechanical ventilation.

Fire Prevention — Maintain a minimum 35-foot (10 m) clearance from flammable materials, or use fire-resistant barriers (welding curtains or screens). A Class ABC fire extinguisher must be accessible within the immediate work area. Inspect the area for flammable materials before each shift.

Welding Screens — Use welding curtains or screens around the cell to protect bystanders from arc radiation. Screens should be rated for welding use and positioned to block line-of-sight to the arc from all accessible angles.

Flooring — The floor in the welding area should be dry and non-flammable. Concrete is ideal. Avoid welding on or near painted, coated, or oiled surfaces that could ignite or release fumes.

Grounding — The workpiece, welding table, and fixture must be properly grounded. The work clamp from the Industrial MIG 4/0 kit must make clean, direct metal-to-metal contact with the workpiece or fixture. Poor grounding causes erratic arcs, increased spatter, and potential shock hazards.

Electrical — The Auto DeltaWeld 350 requires either 208/230/460V three-phase or 230V single-phase input power at 60 Hz. Verify that the facility circuit breaker and wiring are rated for the power source's input current requirements. Refer to the Miller owner's manual for detailed electrical specifications.

2.4 Robot-Specific Welding Safety

Robotic welding introduces hazards beyond those of manual welding. The robot does not inherently know when a person has entered the work area, and the welding torch is live and in motion during operation.

Risk Assessment — Before operating the welding cell, a comprehensive risk assessment must be completed in accordance with ISO 10218-2 and ISO/TS 15066. The risk assessment should evaluate the complete cell, including the robot, welding equipment, fixtures, workpiece, and any ancillary equipment. The risk assessment determines what safety devices (light curtains, area scanners, safety-rated fencing) and robot safety settings (speed limits, force limits) are required.

Torch Hazard — The welding torch is both an electrical hazard (live welding circuit) and a thermal hazard (hot nozzle, spatter buildup). Treat the torch as energized and hot whenever the power source is on, even if no welding is actively taking place.

Unattended Operation — Never leave a running welding routine unattended unless the cell has been fully safeguarded per the risk assessment. If the cell is safeguarded, ensure all safety devices are functional before starting the routine.

Protective Stops — The RO2's collision detection and protective stop features remain active during welding. If the robot detects an unexpected force or collision, it will stop and the weld arc will extinguish. Refer to the RO2 User Manual, Chapter 4, for details on configuring safety settings.

Payload Configuration — The combined weight of the torch, gun mount, insulating disc, and wire drive (if arm-mounted) must be entered as the robot's payload mass in the RO2 safety settings. Incorrect payload configuration affects the robot's collision detection sensitivity and braking performance.

2.5 Emergency Procedures

E-Stop — Pressing any E-stop button in the cell (robot E-stop on the control box or any cell-level E-stop wired into the RO2's safety I/O) will immediately stop the robot and cut power to the welding arc. The power source output is disabled when the E-stop is active.

Recovery After E-Stop:

1. Identify and resolve the cause of the E-stop.
2. Reset the E-stop button.
3. On the RO2 interface, reset the E-stop condition and unbrake the robot.
4. Jog the robot away from the workpiece if needed before resuming.
5. Inspect the weld and workpiece before restarting the routine.

In Case of Fire — Use the Class ABC fire extinguisher to suppress any fire. Do not use water on an electrical fire. Disconnect input power to the welding system if it is safe to do so.

In Case of Electric Shock — Do not touch the person if they are still in contact with the energized circuit. Disconnect power immediately. Call emergency services. Begin CPR if the person is unresponsive and not breathing.

In Case of Arc Eye (Flash Burn) — If a person has been exposed to the welding arc without proper eye protection, they may experience symptoms (pain, tearing, sensitivity to light) within several hours. Seek medical attention.

3 System Installation

3.1 What's in the Box

Before you begin installation, verify that all of the following components are present and undamaged:

Item	Description
Miller Auto DeltaWeld™ 350 Basic	Welding power source (115 lb / 52.2 kg)
Auto DeltaWeld Basic Fixed Wire Drive	Wire feeder (16.6 lb / 7.5 kg)
ArcConnect™ Cable, 90 Degree	Connects wire drive to power source
Auto DeltaWeld Base and Spool Support	Mounting base for wire spool
Cover, Spool 12 in. Assembly LH	Spool protection cover
Kit, Industrial MIG 4/0	Work cable and clamp
Tregaskiss RA1 Cobot MIG Gun	Robotic MIG torch
Gun Mount Assembly, 45 Degree	Torch-to-robot mounting bracket
KUKA Insulating Disc	Electrical isolation disc
Nozzle 5/8 in. Bore, 1/8 in. Recess	Torch nozzle
Acculock Robotic Diffuser Slip	Gas diffuser
0.035 Acculock Contact Tips	Contact tips for 0.035 in. wire
Kit, Drive Roll .035/.045 V-Groove 4 Roll	Drive rolls for solid wire
E70S-6 .035 x 33 lb. Spool	Welding wire spool

If any items are missing or damaged, contact Standard Bots support before proceeding.

Items you need to supply:

- Shielding gas (typically 75/25 Ar/CO_2 for mild steel with ER70S-6 wire) and a regulator with flowmeter.
- Appropriate input power connection (208/230/460V three-phase or 230V single-phase, 60 Hz).
- Ethernet cable if the included 6.7 ft (2 m) cable is not long enough. Miller offers industrial-grade shielded cables: Part 300734 (9.8 ft / 3 m) or Part 300736 (32.8 ft / 10 m).

- Welding table or fixture appropriate for your application.
- Safety equipment for the cell (screens, curtains, fire extinguisher, etc.) as determined by your risk assessment.

3.2 Power Source Placement

Position the Auto DeltaWeld 350 on a flat, stable surface within cable reach of both the robot and the facility power outlet. The power source weighs 115 lb (52.2 kg) — use proper lifting techniques or a hoist.

Keep the following in mind when choosing a location:

- Allow at least 12 inches of clearance on all sides for airflow. The DeltaWeld uses Wind Tunnel Technology™ and Fan-On-Demand™ cooling that pulls air through the unit. Restricted airflow can cause thermal overload.
- Position the power source where it won't be hit by sparks, spatter, or grinding debris.
- Ensure the operator can see the status LED lights on the front of the unit from outside the cell.
- Keep the power source dry. Do not install outdoors or in areas exposed to rain, standing water, or excessive condensation.

Dimensions: 18.55 in. H × 15.35 in. W × 29.15 in. D (471 × 390 × 740 mm).

Mounting: The bottom of the power source has a bolt pattern with mounting holes at 14 in. × 21 in. and 23.5 in. spacing. Refer to the Miller owner's manual for the detailed mounting drawing.

3.3 Input Power Connection

WARNING — Only a qualified electrician should connect the power source to facility power.

The Auto DeltaWeld 350 accepts the following input power configurations:

- 208V / 230V / 460V, three-phase, 60 Hz
- 230V, single-phase, 60 Hz

Verify that the facility breaker and wiring meet the input current requirements listed in the Miller owner's manual for your specific voltage configuration. Ensure the unit is properly grounded per local electrical codes.

After connecting input power, verify correct operation by powering on the unit and confirming the status LED lights illuminate on the front panel.

3.4 Wire Drive Installation

The Auto DeltaWeld Basic Fixed Wire Drive mounts either to the robot arm or to a fixed position near the welding cell.

Mounting the Wire Drive

1. Select a mounting location that minimizes the torch cable length between the wire drive and the torch. Shorter cable runs improve wire feeding performance.

2. Attach the wire drive using the five 1/4”-20 threaded holes on the bottom of the unit. Mounting dimensions are 7.5 in. × 6 in. with a 3.75 in. × 3 in. inner pattern.

3. Install the base and spool support, then mount the wire spool. Attach the spool cover to protect the wire from contamination.

Installing Drive Rolls

1. Open the drive assembly by pushing down the pressure knobs.

2. Install the .035/.045 V-Groove drive rolls from the included kit. The V-groove profile is designed for solid wire like the ER70S-6 included with the system.

3. Verify the correct groove is facing the wire path if using the dual-size reversible rolls.

4. Close the drive assembly and set the drive roll tension. Start with light tension and increase only as needed — excessive tension can deform the wire and cause feeding problems.

Feeding the Wire

1. Cut the end of the wire at a sharp angle to ease feeding.

2. Feed the wire through the inlet guide, through the drive rolls, and into the torch liner.

3. Run the wire through until it extends approximately 1/2 in. (13 mm) past the contact tip.

Connecting the ArcConnect Cable

1. Route the 90-degree ArcConnect cable from the wire drive to the power source.

2. Connect the cable to the ArcConnect port on the rear of the DeltaWeld 350. Ensure the connector is fully seated and locked.

3. Connect the other end to the wire drive motor. This cable carries both drive motor power and high-speed communication between the power source and wire drive.

3.5 Torch Installation & Cable Routing

Mounting the Torch to the RO2

1. Attach the KUKA Insulating Disc to the RO2 tool flange. This disc electrically isolates the torch from the robot arm, which is critical for preventing welding current from traveling through the robot's joints and bearings.

WARNING — Do not skip the insulating disc. Operating without it can damage the robot.

2. Attach the Gun Mount Assembly (45 Degree) to the insulating disc.

3. Mount the Tregaskiss RA1 Cobot MIG Gun to the gun mount assembly. Tighten all fasteners securely.

4. Install the Acculock Robotic Diffuser Slip, nozzle (5/8 in. bore, 1/8 in. recess), and a 0.035 Acculock contact tip.

Cable Routing

Route the torch cable along the robot arm, securing it with cable ties or the cable management system. Follow these guidelines:

- Avoid sharp bends in the cable — maintain a minimum bend radius as specified in the Tregaskiss documentation.

- Leave enough slack at each robot joint to allow full range of motion without pulling or pinching the cable.

- Jog the robot through its expected range of motion after routing the cable to verify there are no snag points, excessive tension, or pinch hazards.

- Keep the torch cable separated from any other cables on the robot arm to avoid interference.

3.6 Work Cable Connection

Connect the work cable and clamp from the Industrial MIG 4/0 kit:

1. Attach one end of the work cable to the work terminal on the rear of the DeltaWeld 350 power

source. Tighten the lug connection securely.

2. Attach the work clamp to the workpiece or welding fixture. The clamp must make clean, bare metal-to-metal contact — remove any paint, rust, scale, or coatings from the clamping area.

3. Route the work cable so it does not create a trip hazard and is not in the path of the robot's motion.

A poor work connection is one of the most common causes of erratic arc behavior and excessive spatter. If you're experiencing weld quality issues, always check the work connection first.

3.7 Shielding Gas Setup

1. Secure the shielding gas cylinder to a wall, cart, or cylinder stand with a chain or strap. Never leave a gas cylinder freestanding.

2. Attach a regulator with a flowmeter to the cylinder.

3. Connect the gas hose from the regulator to the gas inlet on the rear of the DeltaWeld 350 power source.

4. Open the cylinder valve slowly and set the flow rate. A typical starting point for MIG welding mild steel with ER70S-6 wire and 75/25 Ar/CO_2 is 25—35 CFH (30-35 cfh). Adjust based on joint type, torch angle, and environmental conditions (increase flow in drafty areas).

5. Check all connections for leaks using a soapy water solution.

Gas Selection: The shielding gas depends on the welding process and base material. For general-purpose MIG welding of mild steel with ER70S-6 wire, 75% Argon / 25% CO_2 (C25) is the most common choice. 80% Argon / 20% CO_2 (C20) will allow use of the pulse process. Refer to the Miller process selection guide in Appendix B for recommendations by process type.

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4 Connection Setup

4.1 Overview

The Auto DeltaWeld 350 and the RO2 communicate over Modbus TCP using a standard Ethernet connection. All Modbus register mapping between the two systems is preconfigured — you do not need to manually map any registers or configure data tables.

The setup process is straightforward:

1. Make the physical Ethernet connection.
2. Set the IP addresses so both devices are on the same subnet.
3. Activate the Modbus TCP connection on the RO2 side.

4.2 Physical Ethernet Connection

Connect an Ethernet cable between the Auto DeltaWeld 350 and the RO2 control box.

The DeltaWeld 350 has an industrial M12 Ethernet connector on the rear panel. The system ships with a 6.7 ft (2 m) Ethernet cable with an M12 connector on one end and a standard RJ45 connector on the other. Plug the M12 end into the power source and the RJ45 end into the Ethernet port on the RO2 control box.

If you need a longer cable, Miller offers industrial-grade shielded Ethernet cables in 9.8 ft (Part 300734) and 32.8 ft (Part 300736) lengths. These cables are rated for the electrical noise and environmental conditions typical of a welding cell. Standard office-grade Ethernet cables are not recommended.

Note: Make sure the Ethernet cable is routed away from welding cables and power cables to minimize electromagnetic interference.

4.3 Setting the IP Address on the DeltaWeld 350

The DeltaWeld 350 has a built-in web interface that you access from a PC to configure network settings.

1. Connect a PC directly to the DeltaWeld's Ethernet port (Front port) using an Ethernet cable.

2. Set the PC's network adapter to a static IP on the same subnet as the DeltaWeld's default address (255.255.0.0). Miller's default Front Ethernet port IP address is 169.253.1.32. Refer to the Miller owner's manual for additional details.

3. Open a web browser on the PC and navigate to the DeltaWeld's IP address.

4. In the web interface, navigate to the network configuration page.

5. Set a static IP address for the DeltaWeld on the same subnet you plan to use for the RO2. For example, if the RO2 is at 192.168.1.10, set the DeltaWeld to 192.168.1.20.

6. Confirm that **Modbus TCP** is enabled.

7. Save the settings.

Record the IP address you've assigned — you'll need it when configuring the RO2 in the next step.

4.4 Setting the IP Address on the RO2

1. On the Standard Bots tablet, navigate to Network.

2. Verify the RO2's IP address is on the same subnet as the DeltaWeld 350. If it isn't, update the IP address so both devices share the same subnet (e.g., 192.168.1.X with a subnet mask of 255.255.0.0). Follow picture example for default settings

3. Save the network settings if any changes were made.

If the RO2 and DeltaWeld are on different subnets, they will not be able to communicate.

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[Ethernet Settings] (src/images/Ethernet_Settings.PNG)

4.5 Verifying the Connection

Once the connection is activated, verify that data is flowing between the two devices:

- **DeltaWeld Status LEDs:** The communication status LED on the front of the power source should indicate an active connection. Refer to the Miller manual for the specific LED behavior.

- **RO2 Ethernet connection:** The Ethernet port will have a checkmark next to the Ethernet setting.

If the connection is not established, refer to Section 7.1 (Connection Issues) for troubleshooting steps. A power cycle of both may be needed to establish first connection.

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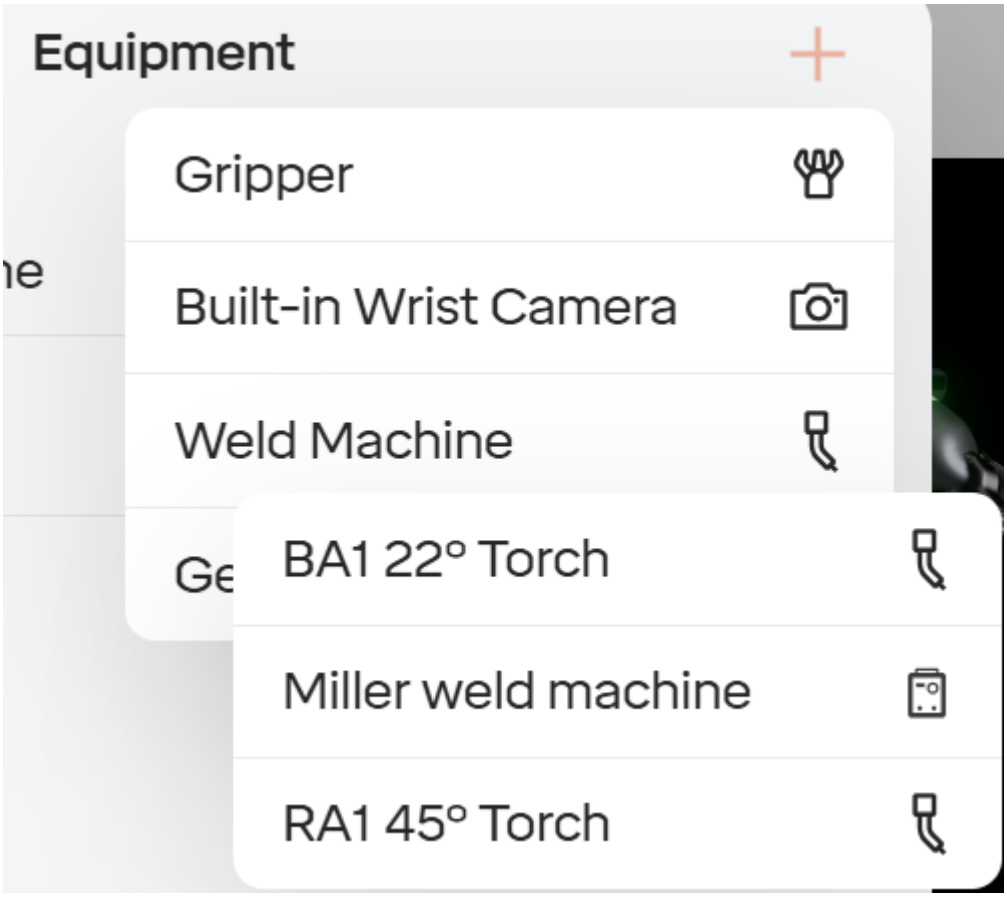
5 Equipment Setup in the GUI

5.1 Adding the Welder as Equipment

After the Modbus TCP connection is active, you need to configure the welding system within the Standard Bots software.

1. Navigate to the **Equipment** page on the RO2 interface.
2. Click the + button.
3. Select the Weld Machine tab.
4. First select the Torch based on the Degree torch that was purchased. 45 degrees is the standard torch.
5. Save the Configuration.
6. Navigate back to the add page and select the Weld Machine tab again and this time select miller weld machine.
7. Type in the IP address of the Miller welder (default is 192.168.1.51).
8. Save the configuration.


Equipment
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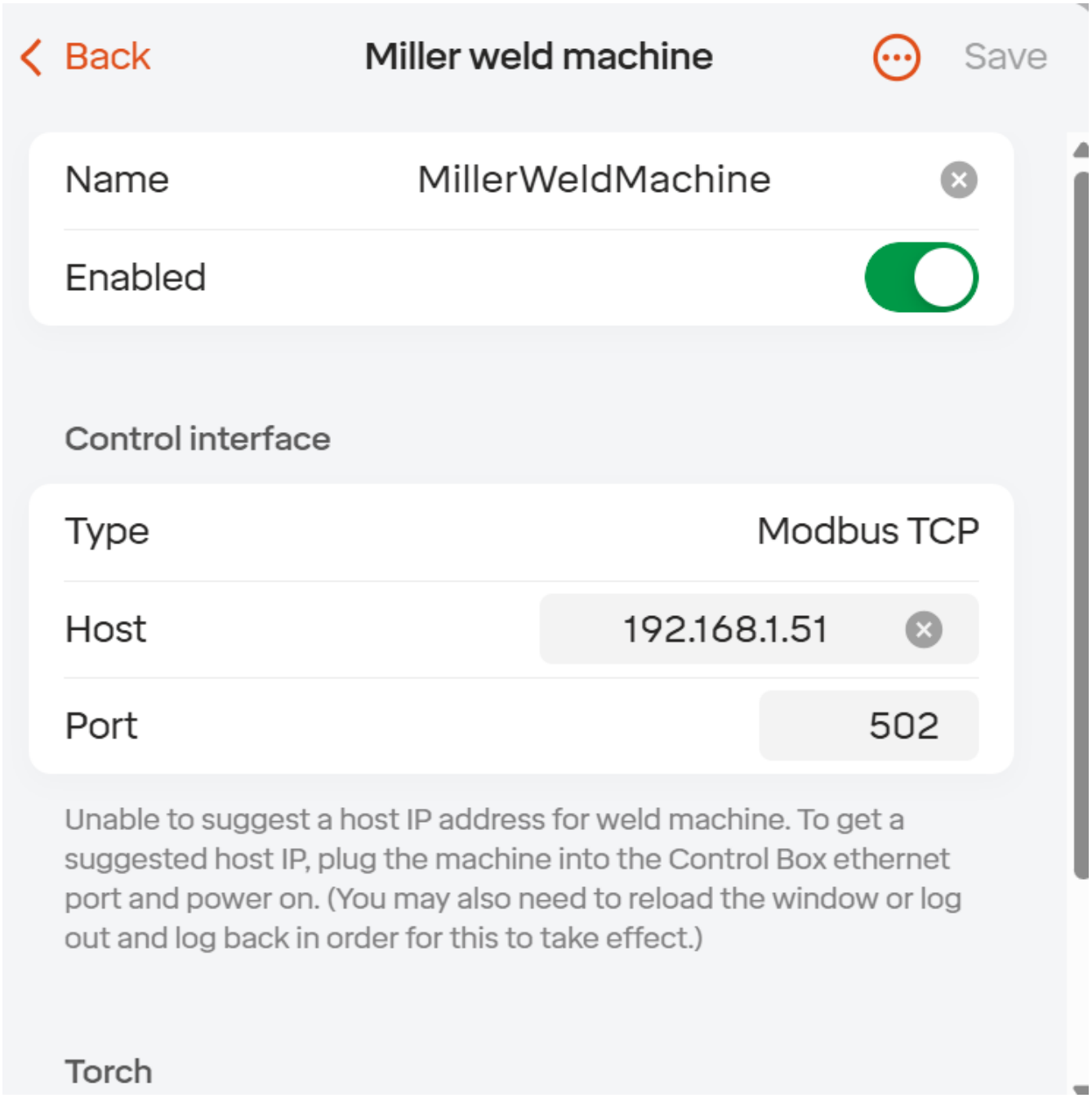
Built-in Wrist Camera
Weld Machine
BA1 22° Torch
Miller weld machine
RA1 45° Torch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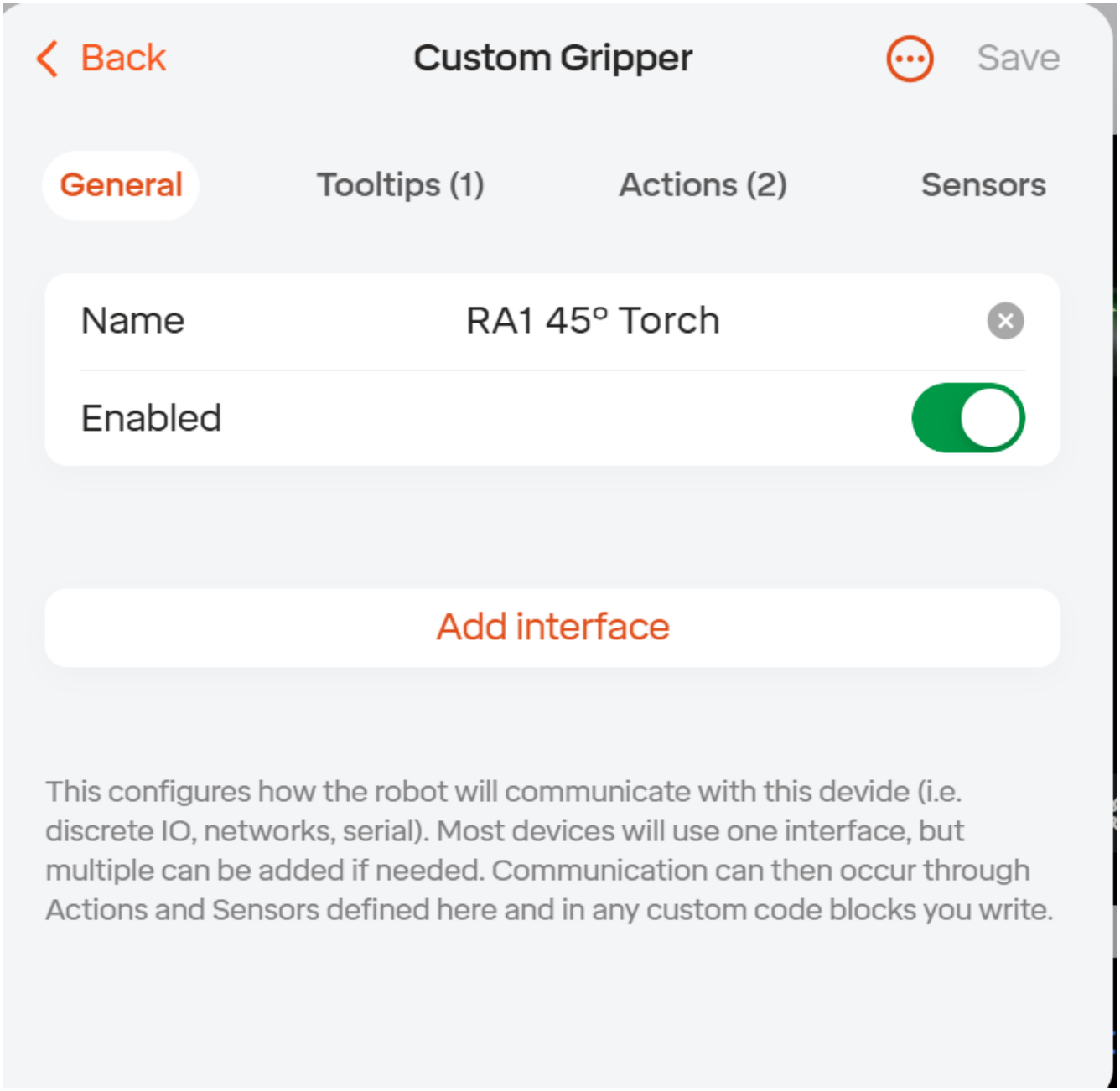
Torch



5.2 Configuring the Weld Process

The Auto DeltaWeld 350 supports multiple welding processes. Select the process that best matches your application:

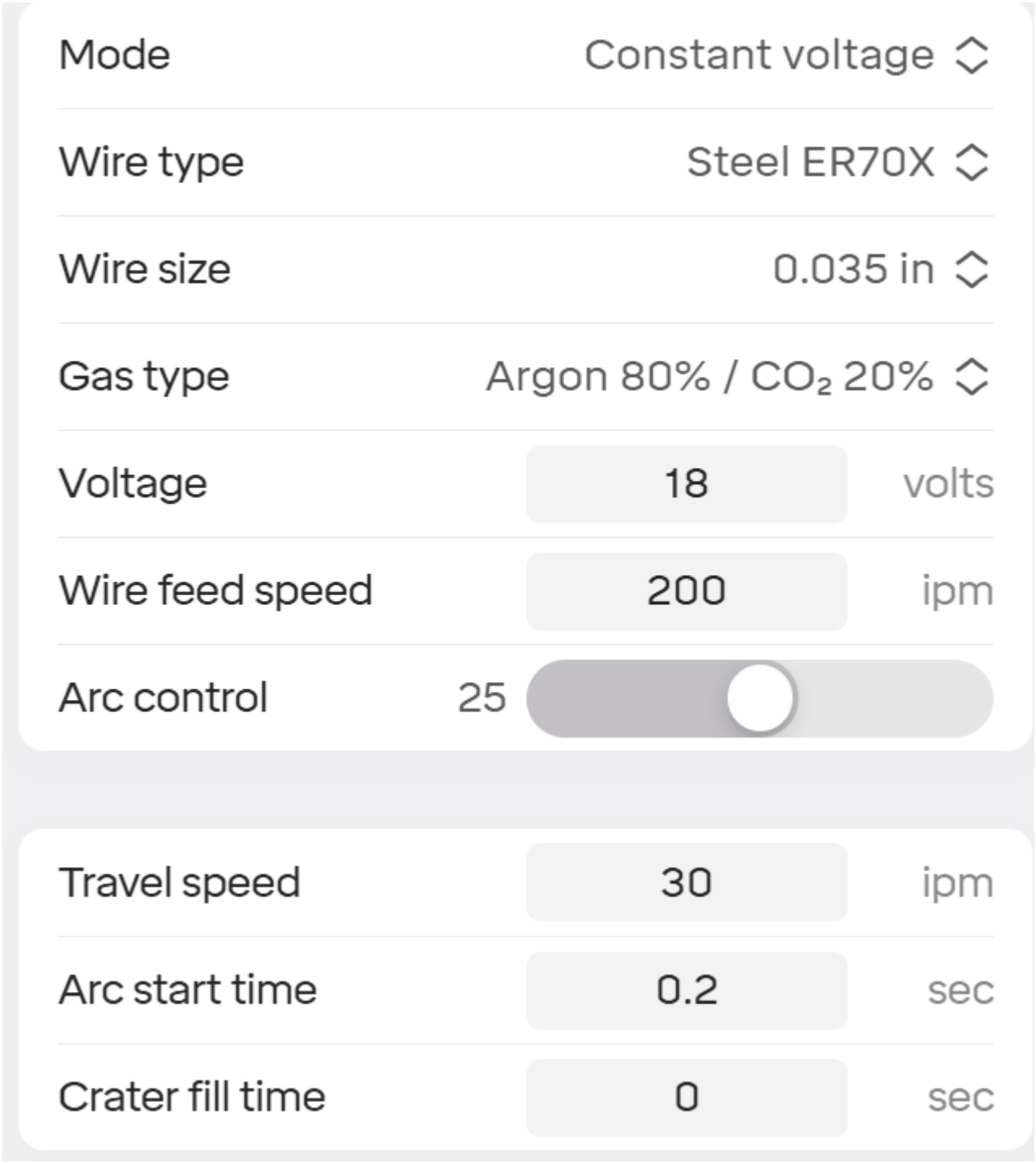
- **MIG (GMAW)** — Standard short-circuit and spray transfer MIG. Good general-purpose option. Lower spatter than traditional MIG power sources.

- **Accu-Pulse (GMAW-P)** — Pulsed MIG. The most versatile process for industrial applications. Works in all positions on materials 16 gauge (1.6 mm) and thicker. This is a strong default choice for most applications.

Select your desired process in the RO2 equipment configuration panel. The system ships with a default weld setting that is functional for basic MIG welding, but you will need to adjust parameters for your specific material, wire, gas, and joint configuration.

5.3 Setting Weld Parameters

Weld Parameters will be set per weld in the process tab of the weld step.



- **Wire Feed Speed (WFS)** — Controls the amperage. Higher WFS = higher amps = more heat and penetration. Starting points vary by material thickness and process.

- **Voltage** — Controls arc length. Higher voltage = longer arc = wider, flatter bead. Lower voltage = shorter arc = narrower, more convex bead.

- **Arc Input (Pulse)** — Fine-tunes the voltage relative to the synergic setting. A trim of 0 is nominal. Values above 0 increase voltage; below 0 decrease it. Not all processes use this parameter.

- **Arc Control** — Adjusts the arc characteristics (softer or stiffer arc) depending on the selected process. 25 is the nominal number. Not all processes use this parameter.

- **Travel Speed —** How fast the weld moves in IPM

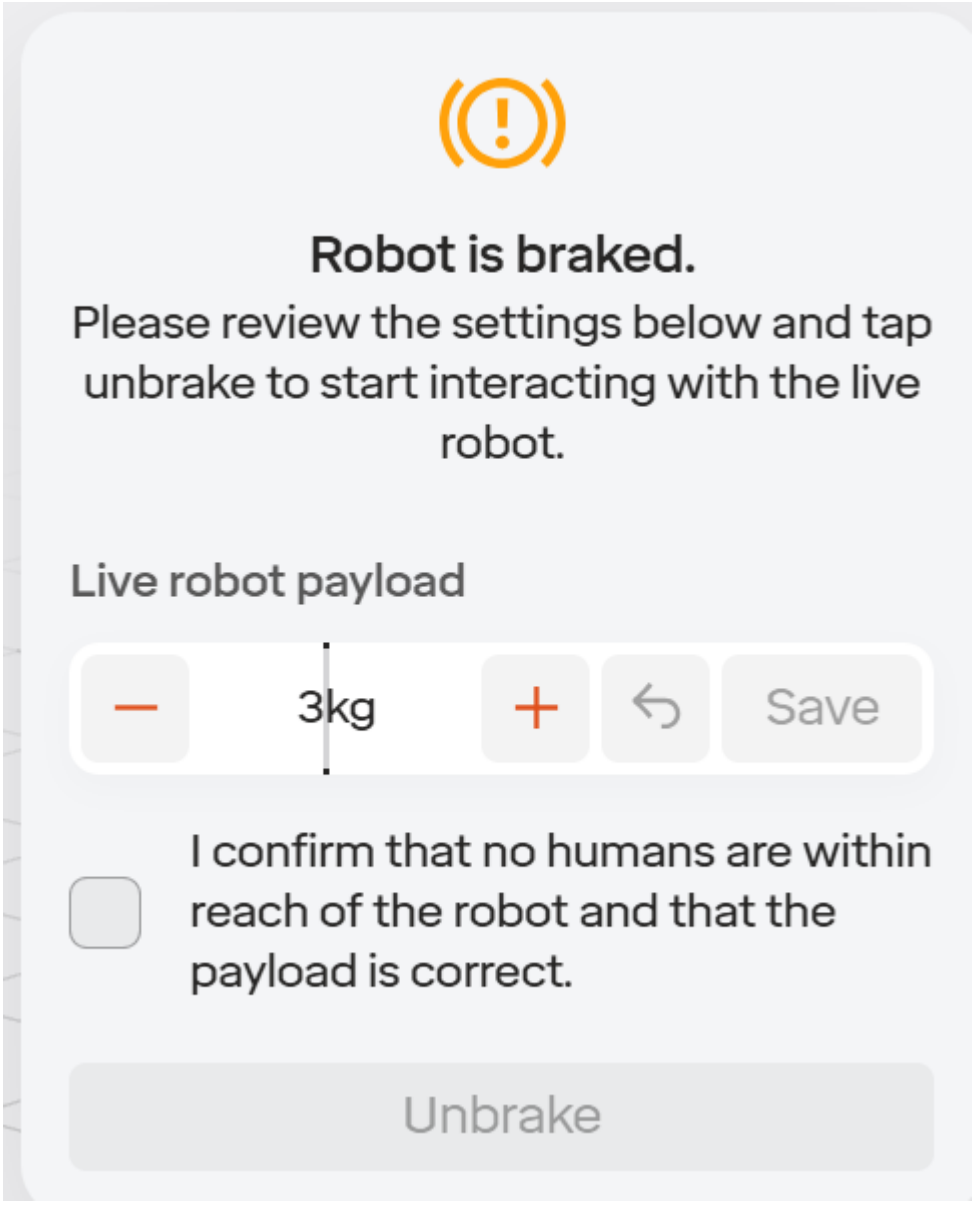
- **Arc Start Time/Crater Fill Time —** Amount of movement delay at the start and end of the arc respectively.

These parameters are sent to the DeltaWeld via Modbus — you don't need to touch the power source directly.

5.4 Payload & Safety Configuration

The combined weight of the torch assembly, gun mount, insulating disc, and any arm-mounted components must be set as the robot's payload in the RO2 safety settings.

On the move tab you will be prompted to add a payload to the tool **3KG is recommended.**



Incorrect payload settings affect the robot's collision detection sensitivity, braking distance, and overall safety performance. Always verify this setting before running a welding routine.

6 Weld Programming

6.1 Overview

Weld programming on the RO2 is done in the Routine Editor. A welding routine combines robot motion with weld commands to move the torch along a defined path while controlling the welding arc.

The entire weld sequence — including approach moves, arc start, weld path, arc stop, and retract — is built as a series of steps in a single routine.

For a detailed guide on programming the RO2 please refer to help.standardbots.com

6.2 Teaching Weld Paths

Use the RO2's jog controls to move the torch to each position along the weld path and save waypoints. When teaching weld positions, pay attention to the following:

Torch Angle — The angle of the torch relative to the joint affects penetration, bead profile, and spatter. For most fillet welds, a 45° work angle bisecting the joint with a 5–10° push (forehand) travel angle is a good starting point.

Contact-Tip-to-Work Distance (CTWD) — This is the distance from the end of the contact tip to the workpiece surface. Maintaining consistent CTWD is one of the most important factors in robotic weld quality. For the Auto DeltaWeld 350 with 0.035 in. wire, a typical CTWD is 1/2 in. to 5/8 in. (13–16 mm). Inconsistent CTWD causes variation in amperage, penetration, and bead appearance.

Travel Speed — The speed at which the torch moves along the joint. This is set in the move step within the routine. Too fast results in undercut and lack of fusion. Too slow results in excessive buildup or burn-through. Optimal travel speed depends on material thickness, process, and parameters — start with the recommended values for your selected process and adjust based on results.

Approach and Retract — Always program an approach move that brings the torch to the weld start position from a safe clearance point, and a retract move that pulls the torch away from the workpiece after the weld ends. This prevents collisions with fixtures and protects the weld crater.

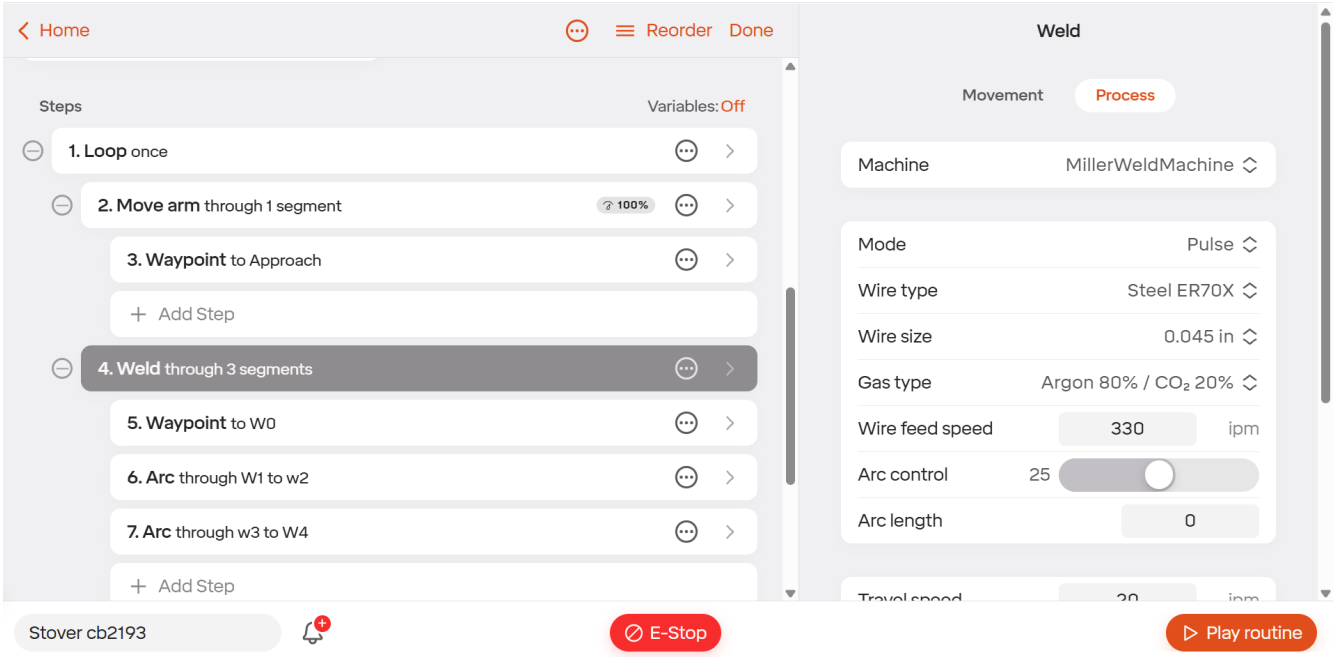
6.3 Weld Routine Structure

A typical welding routine follows this sequence:

1. **Move Arm** — The first move arm command will contain the waypoints for both home and an approach position to the weld.

2. **Weld** — The system initiates the weld: shielding gas pre-flow begins, then the arc is struck and wire feeding starts. The weld schedule determines the process and parameters. This step will contain all movement in the weld start point to end point. This will also stop the welding process once the last position has been reached.

3. **Move Arm** — This step will move the arm away from the weld safely and either move to the next weld or to a safe home position.



For multi-seam parts, this sequence repeats for each weld joint. Use the Routine Editor to add additional weld sequences within the same routine.

6.4 Weave Patterns

For wider weld beads or to improve sidewall fusion on larger joints, you can program a weave pattern. A weave oscillates the torch side-to-side as it travels along the joint.

If the RO2 supports configurable weave parameters, the following settings are typically available:

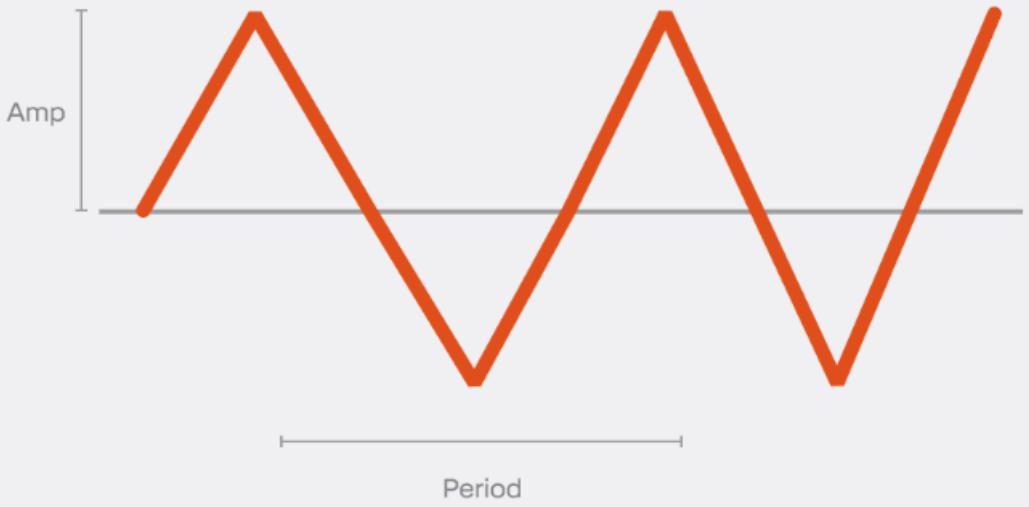
- **Amplitude** — The total side-to-side distance of the oscillation.

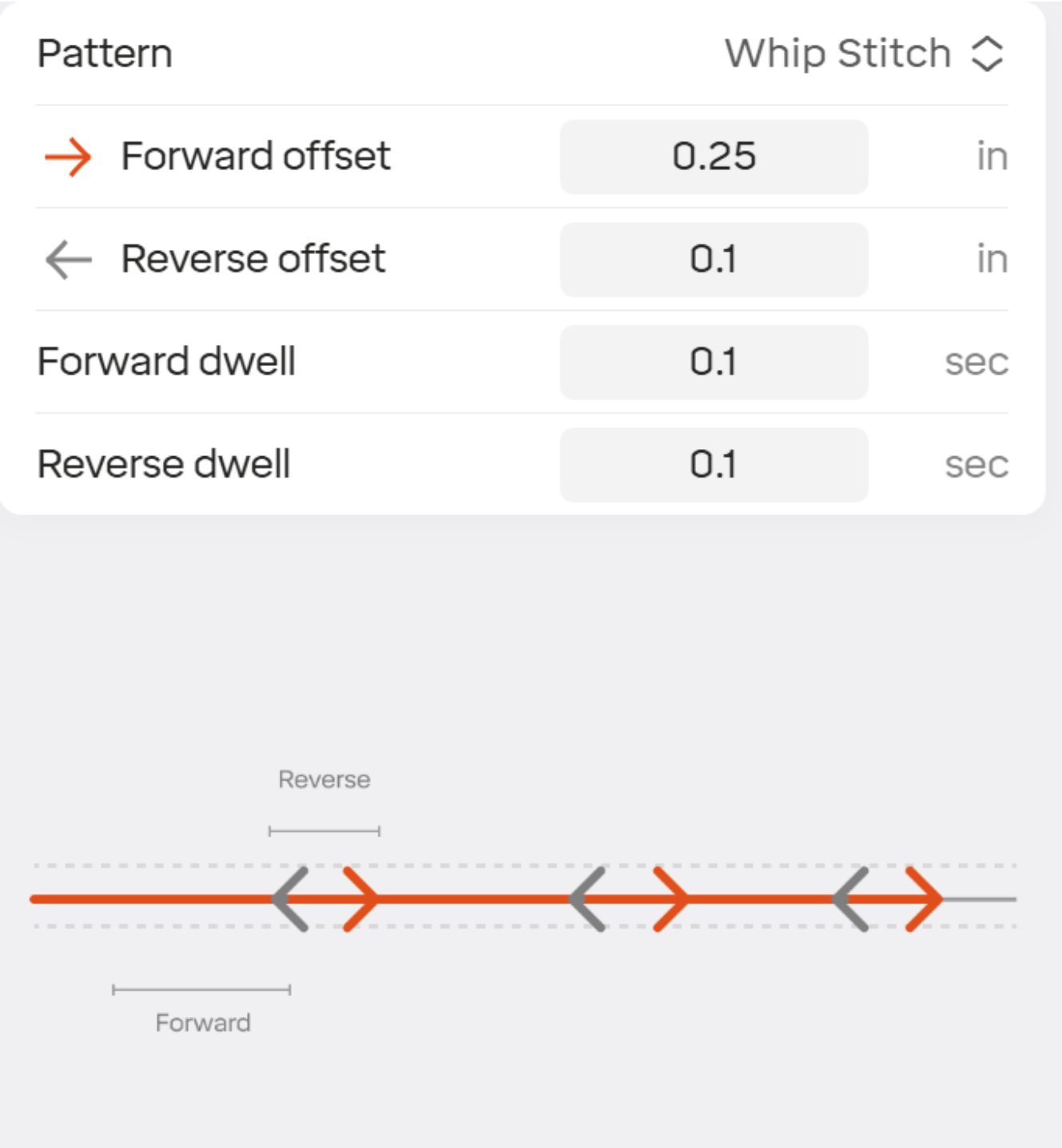
- **Period** — How many oscillation cycles per unit of travel distance.
- **Dwell Time** — A pause at each side of the weave to allow the weld pool to wet into the sidewall.

Weld

Weaving

Weaving enabled		
Pattern	Zigzag	
Period	5	mm
Amplitude	3	mm
Dwell left	0.1	sec
Dwell right	0.1	sec



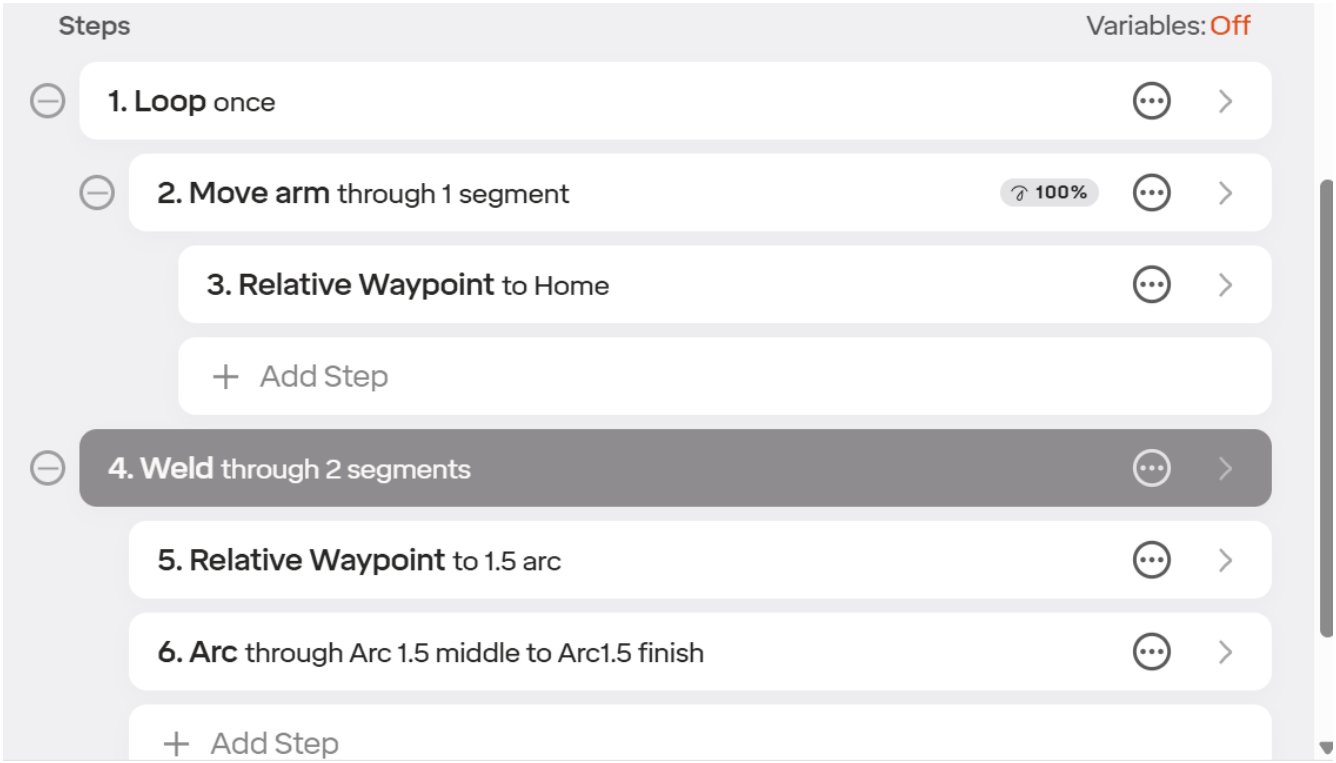


Start with a narrow weave and increase width as needed. Excessive weave width can cause undercut or a convex bead profile.

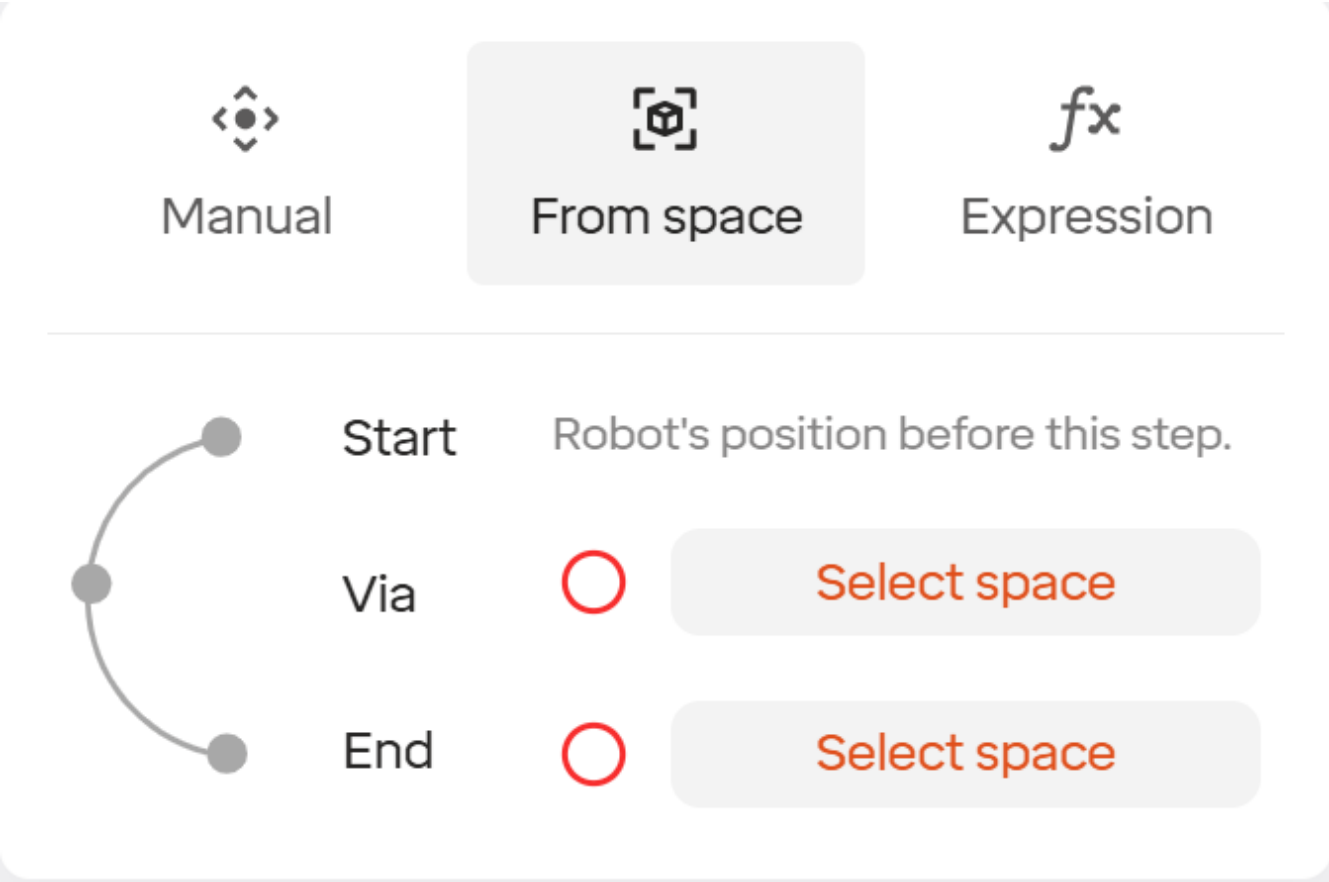
6.5 Circular Patterns and Arcs

When programming circular or weld joints with radiuses, we will make use of the “Arcs” tool instead of waypoints in the Weld move tab. An important distinction is that the weld step will always start with a

waypoint to ensure the first weld position is in a straight line.



After the first waypoint, select the Arc command for the following points. Use the via and end positions for the following weld positions and add more arc commands as needed.



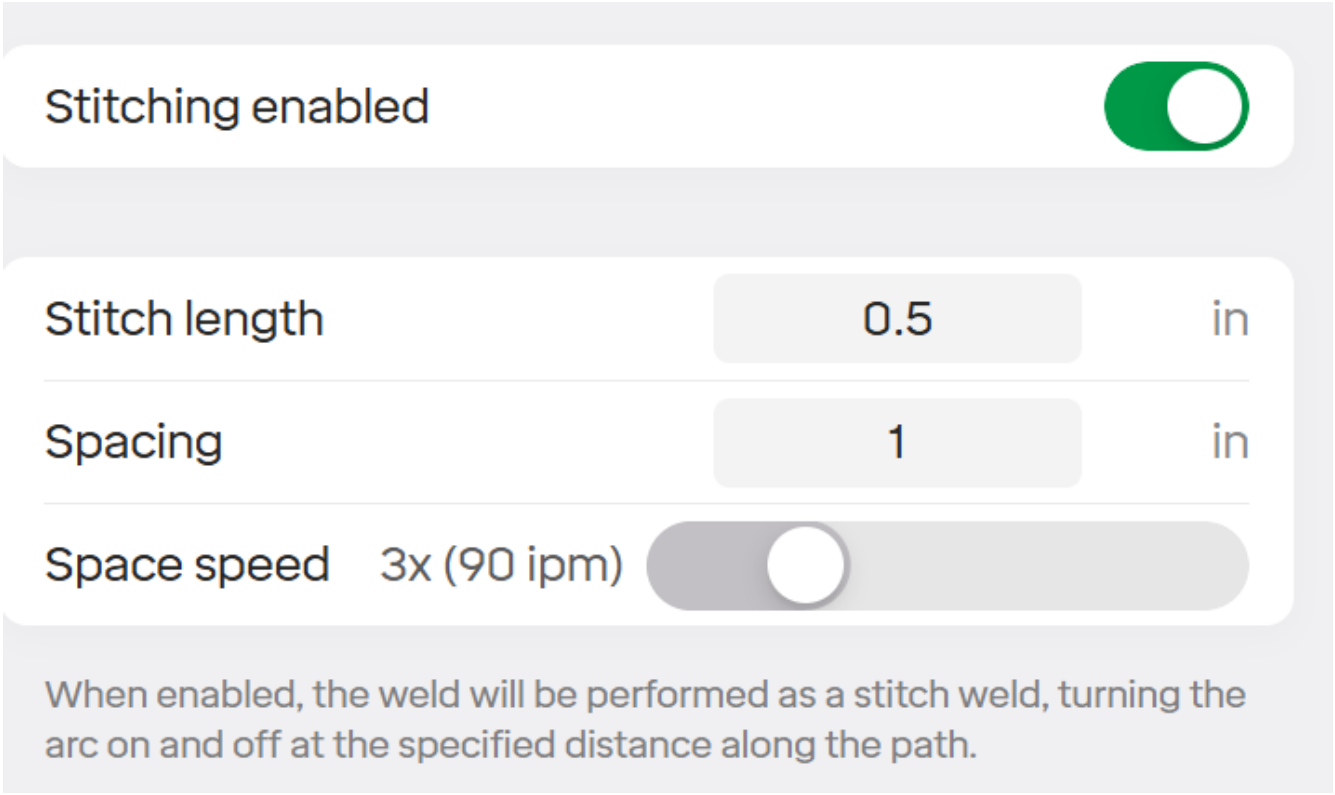
Best practices: When programming around a pipe it is recommended to look at the part like a clock and program waypoints at 12, 3, 6, 9 and then 12 again to make sure you get a proper circular rotation. Programming points too close together can cause motion planning problems.

[Circular Patterns - Pipe Programming][image13]

6.6 Stitching

Stitching is for making short welds with specific spacing in a straight line. To implement, simply program a point at the beginning and end of the weld and then activate the stitching command.

- **Stitch Length**— The total length of each weld.
- **Spacing** — Space from end to start of the next weld.
- **Space Speed** — Travel speed between welds



6.7 Running & Testing a Weld Program

Before welding a production part, always verify your routine:

Dry Run — Run the routine at reduced speed without welding to verify the robot path, torch clearances, and absence of collisions. Use the speed override to slow the robot down during the first run.

First Article — Once the dry run looks good, run the full weld on a test piece. Inspect the weld for proper bead profile, penetration (destructive test or bend test on the test piece if required), spatter level, and overall appearance.

Fine-Tuning — Adjust wire feed speed, voltage, travel speed, torch angle, and CTWD based on the first article results. Small changes make a big difference — adjust one parameter at a time.

Appendix A — Auto DeltaWeld 350 Quick Specs

Spec	Value
Welding Processes	MIG (GMAW), Flux-Cored (FCAW), Metal-Cored (GMAW-C), Accu-Pulse (GMAW-P), RMD, Versa-Pulse, HD MIG, Profile Pulse
Rated Output (3-Phase)	300 A at 29 VDC, 100% / 350 A at 31.5 VDC, 60% / 425 A at 35.25 VDC, 30%
Rated Output (1-Phase)	225 A at 25.25 VDC, 100% / 250 A at 26.5 VDC, 60%
Output Range	10—38 V
Input Power	208/230/460V 3-phase, 60 Hz or 230V 1-phase, 60 Hz
Wire Feed Speed	50—780 ipm (1.3—19.8 m/min)
Wire Diameter Capacity	.023—5/64 in. (0.6—2.0 mm)
Communication	Modbus TCP and EtherNet/IP
Auxiliary Power	115V, 15A
Net Weight (Power Source)	115 lb (52.2 kg)
Dimensions (Power Source)	18.55 in. H × 15.35 in. W × 29.15 in. D
Net Weight (Fixed Wire Drive)	16.6 lb (7.5 kg)

Appendix B - FAQ

Below is a list of common questions and answers for the Standard Bots system

Q: Do you need to have the robot connected to the internet to use the robot?

A: No, the robot can run on a local network or simply with a single ethernet cable connected between the robot and a PC or tablet. If the robot is not online it will still operate without issue, however remote diagnostics and automatic updates will not be available.

Q: Do you need to have the Ipad connected to the robot to run a program?

A: No, the Ipad is only needed for setting the Network setting for the robot. Once the robot is connected to the network, you can use the Ipad to control the robot or a computer using Google Chrome or by using the 24V External Control Interface.

Q: How do I connect the robot to the network?

A: The robot can be connected to the network by going to the robot menu in the Ipad application and selecting the network icon. From there you can select the network you want to connect to and enter the password.

Q: How do I access my robot from a computer?

A: If the robot is on the internet: You can access the robot from a computer by entering the robot name into the address bar of Google Chrome. You will then be prompted to enter the password for the robot. This will be cbXXXX.sb.app where XXXX is the last 4 digits of the controller serial number. This number can be found inside of the controller door.

If the robot is not on the internet: Use the Ipad application to find the ip address of the robot. Then, in the broswer of a computer on the same local network of the robot type in the robot ip address port 3000 as shwon in the ipad application. Example: 192.168.110.20:3000.

Q: How do I access the network settings after initial setup?

A: To access the network settings of the robot, for example if you want to set a static IP address, use the Standard Bots application on the tablet. If you are already logged into the robot: In the User Interface

on the tablet go to the Move Robot view. Go to the robot name menu in the bottom left and select "Logout". You will now be back to the tablet application main screen. On the left side you can select your robot. Once selected, the network settings will be on the right side.

Q: How do I connect my robot to a tablet or PC directly?

A: You will need an ethernet cable to go between the robot ethernet port and your pc or tablet. You may also need a usb c to ethernet or similar adapter.

If you are simply using a wire, there will not be a router to give both devices an IP address. This means you will need to set the address manually, and set them on the same subnet.

Using the Standard Bots application on the tablet, set an IP address on the wired port of the robot under the network settings in the application. Then set a static address on the pc or tablet. Generally the address follows the format of 192.168.x.y. x would be the subnet, and both the robot and pc or tablet need to have the same number for x. Y would be unique for each device. Ex, the robot could be 192.168.110.5 and the pc or tablet could be 192.168.110.6.

Then on the pc or tablet go to the robot address you assigned in a browser tab. The format is generally 192.168.x.y:3000.

Q: Why is an axis direction grayed when the robot is not fully extended?

A: When the robot has one or more joints that are at their limit, this can prevent the robot from moving in a certain direction in the XYZ plane. The robot does not need to be fully extended in one direction to cause this. It is simple to fix, go to your move joints tab, then rotate the joint that is at it's motion limit (the joint that is maxed out in the positive or negative direction). Once done the robot should be able to move with more freedom.

Q: How do I connect my robot to a tablet or PC without setting static IP address and wires but not have the robot on the internet?

A: You can setup a simple local network for the robot using a standard wireless router. You will need to purchase a wireless router. Ensure it is not just an access point, as an access point will not assign IP addresses.

Setup a standard wireless network on the router. Do not connect the router to your LAN or internet. Connect the tablet to the wireless network. Use the iPad application to connect the robot to the new wireless network. In the tablet, check the network status for the robot Ip address, which will be in the format xxx.xxx.xxx.xxx:3000. Any device on your new wireless network can access the robot using this address. The cbxxxx.sb.app link will not work if the robot is not online.

Q: Which end effectors work with the RO1?

A: The following tools are supported directly in the Standard Bots interface:

DH Robotics AG-105-145 Linkage Tool

DH Robotics CGI-100-170 Centric Tool

DH Robotics PGC-300-60 Parallel Tool

Onrobot 2FG7 Parallel Tool

Onrobot 2FG14 Parallel Tool

Onrobot 3FG15 3 Finger Centric Tool

Onrobot Dual Changer

Schunk EGU

Schnunk EGK

Standard Bots also supports any tools that are discrete IO driven, including Onrobot tools that are not listed above through the use of the OnRobot Compute Box.

Currently, Robotiq tools are not supported as they cannot be controlled over discrete IO.

Q: How do I change which tool I want to use on the RO1?

A: To change which tool is on the robot, go to the robot menu (has the robot name in an oval) and go to equipment. You can then add or delete tools.

Q: Which protocols does the RO1 support?

A: Currently, the RO1 supports 24V discrete IO and Modbus TCP. There is also a REST API, a python SDK and typescript API.

Q: What are the power requirements of the RO1?

A: The control box requires 90 ~ 264VAC, 47-63Hz. The robot draws less than 15 amps at 120V.

Q: How do I get started with a new RO1?

A: Please start the included iPad, open the Standard Bots application, and follow the instructions.

Q: What is the payload capacity of the RO1?

A: Depending on speeds and move types, the RO1 can carry up to 18 kg.

Q: What is the maximum speed of the RO1?

A: The RO1 joints can move up to 435 degrees / second.

Q: What is the maximum reach of the RO1?

A: 1.3 Meters

Q: What is the bolt pattern at the end of the arm?

A: ISO 50mm pattern. The pattern follows the standard and has 4 m6 bolts on a 50mm circle.

Q: How do I move a routine to a different robot?

A: Open the routine you would like to copy in the first robot. Select the ... menu, and select "schema". Copy the text in the window. Open up the second robot and create a routine. Again select the ... menu and "schema". Copy the text into the window, rename the routine and select "create routine".

Q: How do I import a model into the environment?

A: To import a model, go to the Move Robot view and go to the space area. The icon is in the bottom right of the view and looks like a square. In this view select the "+" to add an item, and select "Object". The UI will tell you which file formats are supported.

Q: How do I get a Developer API Token?

A: The developer API token and setting can be found in the robot menu. Go to the Move Robot page, click on the robot name, settings, Configure developer API.

Q: My robot says it is online but I cannot access it?

A:

1. Check the device you are accessing the robot from (Ipad, PC) is on the same network as the robot.
2. Check that the network the robot is connected to does not have a "splash" page you need to log into. This is often the case with guest networks. The robot does not support web based logins like this.

Q: I imported a model as an object but I cannot see it?

A:

- Try changing the scale. The import is in Meters. Often you must convert to meters by setting the scale to .001.
- Check that the file is valid

Q: How do I get the robot back into the box or case?

A:

1. Ensure all tools are disconnected and that the robot has sufficient space to move
2. Power on the robot
3. Go to the Move Robot page of the interface (where you jog the robot)
4. Click on the robot name menu (where the speed is)
5. Go to Settings
6. Go to Box Robot
7. Hold the Prepare Robot For Shipping button down to bring the robot to the box position.

Q: What should I do if I forget my robot's passcode/PIN?

A: Please reach out to Standard Bots at live-support@standardbots.com. Be sure to provide the serial number of your robot controller (e.g., cbXXXX), which you can find inside the controller door.

Q: Why are the safety settings greyed out, and how do I unlock them?

A: The safety settings will appear greyed out until access is unlocked. To unlock them, click the padlock icon labeled "Unlock" in the top-right corner of the safety settings pop-up window. You will then be prompted to enter your passcode. Once the correct passcode is entered, the safety settings for the RO1 will become editable. Don't forget to click "Apply Settings" and confirm the changes to ensure they take effect..

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