Unwind/Rewind Web Guide — Oscillation (Closed Loop) — SCU5

Quick Start Guide

Controller: SCU5

Scan for
interactive guide

What You'll Achieve

After completing this guide, your web oscillates back and forth around a tracked feature — the oscillation rides on top of sensor guiding, staying referenced as the feature moves.

Estimated time: ~30–60 minutes

What You Need

SCU5 · Oscillation (Closed Loop) — What You Need

[ ] SCU5 web-guide controller (SKU 4-100121)

[ ] RLA sized to your roll (floating -TG mount) — see the sizing article under Learn More

[ ] RC-050A regeneration clamp — absorbs the energy the shifting roll drives back into the actuator

[ ] ODC Family infrared sensor on the feature the web oscillates about, sized for your wander range

[ ] Quick Disconnect Sensor Cable - 3m (10 ft) (U2-01975)

[ ] Sensor mounting rail and bracket (SKU 7-020001 for 1 in sensors, SKU 7-020006 for 1.5 in)

[ ] MC QD motor-driver box, high-current (1180/1181/1260 — 24/48 VDC power input; SKU 7-130015/16/17), for the RLA

[ ] 24 V DC Input Power Cable, Length 5 m (21218-5m)

[ ] Motor-communication cable (SKU 21223), driver to controller

[ ] Driver-power cable (SKU 21219) for the high-current driver

[ ] Actuator cordset for the RLA (SKU 21225, T-coded high-current)

[ ] Servo-center proximity sensor (SKU 7-140004)

[ ] High-current driver-power supply (SKU PS-10001, 24/48 VDC) for the RLA driver

[ ] 24 VDC control supply, 5 A minimum (SKU 0-100006)

Prerequisites

[ ] The machine is shut down and locked out per your facility's procedures.

[ ] A 24 VDC supply (5 A minimum) is available at the install location.

[ ] A roll is loaded on the stand, with web ready to thread.

[ ] Keep the SCU5 Sensor and Web Guide Controller User Manual within reach (/documentation/manuals/scu5-sensor-and-web-guide-controller-user-manual-v36n) — you'll use it while commissioning.

1. Install the Web Guide

Install the Roll-2-Roll® Web Guide in two stages: first set up the shifting roll stand — carriage, linear bearings, and the high-thrust actuator — then mount the sensor for your guiding mode.

> **DANGER:** Match the actuator mount to your existing structure — Identify whether your existing carriage uses a fixed (-RF) or floating (-TG) mount before ordering or installing the actuator. Fixed structures take an LHS-RF actuator; floating structures take an LHS-TG, BLA, or RLA sized to the load. Installing a fixed-mount actuator on a floating structure — or a floating-mount actuator on a fixed structure — will damage the actuator.

Install and Align the Roll Stand

- Bolt the roll-stand base to the machine through its base-plate holes.
- Level the stand: set the roll axis parallel to the machine idlers and square to web travel, with no tilt to either side. Check it with a machine square or a tram rod — whichever you have.
- Slide the moving carriage by hand through its full travel on its linear bearings. It should move smoothly end to end with no binding, notching, or stiff spots. If it binds, clean and re-lubricate or replace the linear bearings before you fit the actuator.

Retrofitting an existing stand?

- Reuse your existing roll-stand carriage and linear bearings — the moving structure stays.
- Replace the controls and the actuator: the old actuator and its drive come off, and the Roll-2-Roll controller, sensor, and actuator go on. Before you remove the old actuator, sketch or photograph how it attaches at both ends and note its fully-retracted and fully-extended positions — the new actuator matches that geometry and stroke.
- The rest of the install is identical to a new stand.

Mount the Actuator

- Match the actuator to the stand's mount before you install it: a fixed (-RF) structure takes an LHS-RF actuator — LHS is the only family offered with a fixed mount. A floating (-TG) structure takes a floating-mount actuator sized to the load — RLA for heavy rolls (the unwind/rewind default), BLA for intermediate loads and wide webs needing 6 in of stroke or more, or LHS-TG for small loads.
- Bench-test the actuator before you mount it. Connect its cables to the controller, apply power, and jog it end to end from the operator interface. It should travel smoothly the full stroke. If it doesn't move or it stalls, re-check the cabling and the supply before you commit it to the machine.
- Floating (-TG) mount — connect the front rod eye to the moving carriage and the rear spherical bearing or clevis to the stationary base. Add an anti-rotation feature at the spherical-bearing end so the actuator body can't spin, and let the pins carry the rotation so the actuator self-aligns as the stand moves.
- Fixed (-RF) mount — fasten the mounting plate so the actuator's linear motion is exactly in line with the carriage travel, and apply thread-locker to any fastener screwed directly into the actuator.
- Check the alignment — jog the stand slowly across its full travel and watch it move without struggling or binding. If it fights at any point, loosen the mounts, re-square the actuator to the carriage, and re-check.
- Match the stroke to the stand travel — confirm the actuator's fully-retracted and fully-extended positions coincide

with the carriage's travel extremes, and center the stroke. If the actuator over-travels the stand, reduce the digital stroke length in the controller; if it under-travels, add mechanical stops.

- Install the servo-center proximity sensor (SKU 7-140004) so it switches exactly at mid-stroke — with the stand centered, position it to see metal within 2 mm for one half of the travel and clear space for the other half. Jog through mid-stroke and confirm its LED toggles on and off right at center; the controller uses this transition to find the actuator's home position during commissioning.
- Connect the RC-050A regeneration clamp into the actuator drive circuit as shown in the wiring diagram — a heavy roll decelerating or reversing drives regenerated energy back into the drive, and the clamp dissipates it.

Mount the Motor Driver Box

- Mount the MC QD motor-driver box on the machine, close to the roll stand and actuator. It has its own enclosure, so it does not need to sit inside another cabinet.
- Keep the box within about 10 m of the actuator — that is the reach of the motor-communication cable (SKU 21223) carrying the RS485 link from the controller.
- Mount the 24/48 VDC driver power supply (SKU PS-10001) near the driver box — the high-current driver takes its own supply through the driver-power cable (SKU 21219), separate from the controller's 24 VDC.
- The RC-050A regeneration clamp installs in line between the 24/48 VDC supply and the MC QD driver's power input — supply feeds the clamp, and the clamp feeds the driver, not a side branch off either one.
- The RC-050A clamp is DIN-rail mounted — clip it to the rail next to the 24/48 VDC supply so the in-line run from supply to clamp to driver stays short.

Choose the Sensor Location and Mount the Sensor

- **Unwind stand:** mount the sensor in the first free span downstream of the idler that follows the roll — it has to read the web after the shifting stand has moved it, not before.
- **Rewind stand:** mount the sensor just upstream of the fixed idler ahead of the rewind stand, so it reads the edge before the web winds on. Mount it on the rewind frame itself, not the machine frame — rewind guiding chases the web, and the sensor must move with the stand to hold the relative position between the web and the rewind roll.
- Clamp the sensor bracket to its rail, but don't fully tighten it yet.
- Set the working distance from the sensor face to the web to 5–15 mm (0.2–0.6 in).
- Keep everything at least 150 mm (6 in) behind the web clear in the sensor's view — the camera-style sensor can otherwise pick up background objects.
- Guiding a shiny, metallic, or clear web? Tilt the sensor a few degrees toward the web so its angled light returns to the lens, then re-check the working distance.
- Tighten the bracket.

Pre-Power Mechanical Checks

- Do these with the power off, before you commission. With the actuator mounted, don't force the stand by hand — you can back-drive the actuator.
- Confirm the actuator is mounted in line with the carriage travel and its retracted and extended limits line up with the stand's travel extremes.

Confirm the servo-center proximity sensor is installed and its LED changes state as the carriage passes mid-stroke.

- Confirm the RC-050A regeneration clamp is connected in the actuator drive circuit per the wiring diagram.
- Confirm every cable is routed and strain-relieved, and that nothing is powered yet.

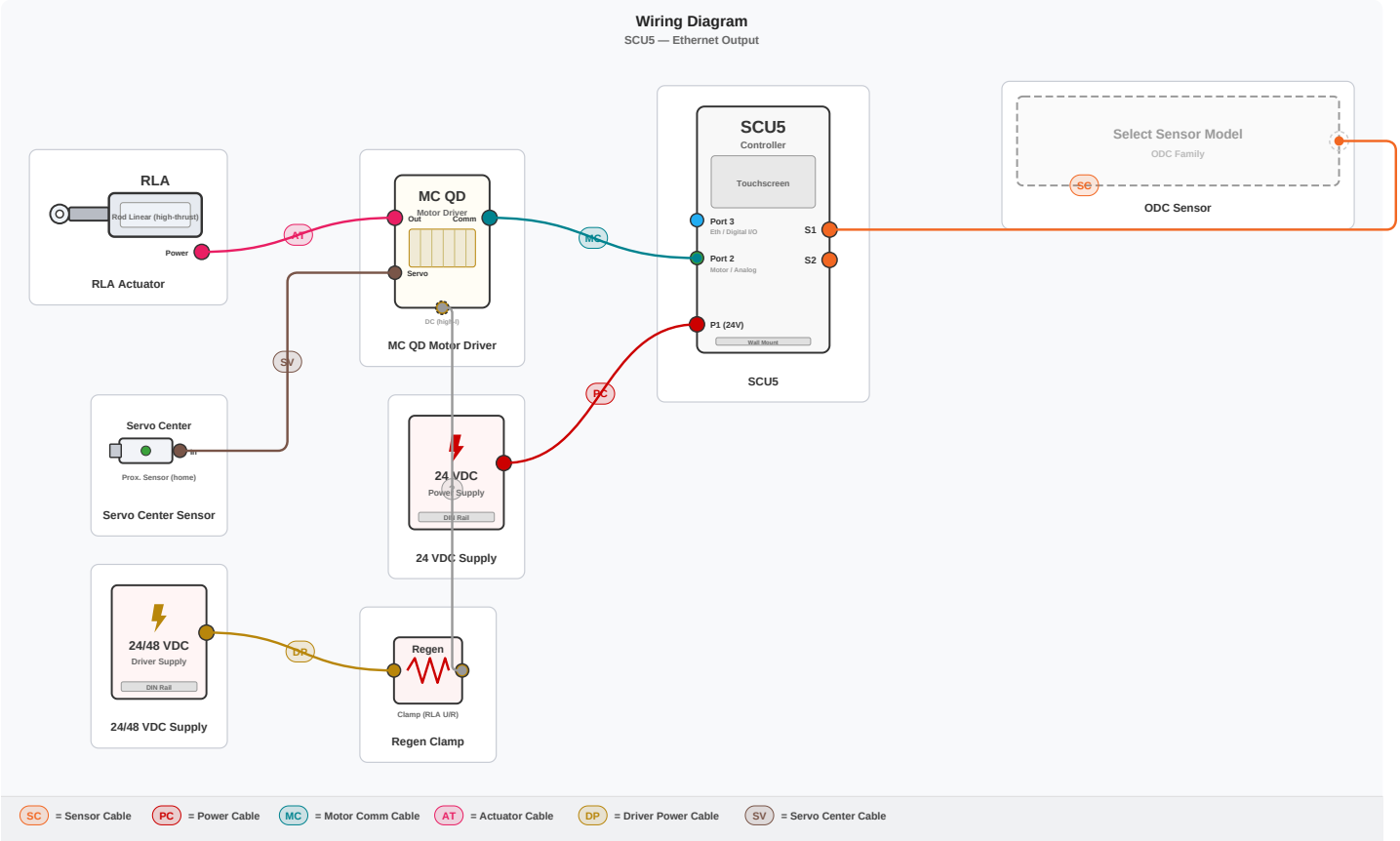
2. Install the Sensor

Install the Sensor — Oscillation (Closed Loop)

- Closed-loop oscillation uses one ODC infrared sensor on the feature the web oscillates about. Mount it as you would for that base mode — edge guiding for an edge, or contrast/line (with the backup roller) for a contrast feature.

3. Wire the System

Wiring Diagram



4. Configure & Verify

Power up the controller and commission the guide, one checked step at a time.

Oscillation (Closed Loop) — Power Up and Commission

Commission closed-loop oscillation — set up guiding first, then oscillate the guide point so the web sweeps about the tracked feature.

1. Power on the controller. If it wakes in Automatic, switch to Manual — every step below runs from Manual.
2. Set up the base guiding first. Set the sensor for your reference — edge sensing for an edge, or contrast sensing plus a taught feature for a line or contrast reference. Set the sensor orientation and check the Web Position Indicator as you would for that mode (dark on the matching side, or a green box on a taught feature). Until the reference is valid, the controller stays interlocked.
3. Check the jog direction. Tap Jog Left, then Jog Right, and watch the roll stand. It should shift the way each button says. If it moves the opposite way, reverse Motor Polarity under Power User ? Actuator ? Motor Polarity, then jog again to confirm.
4. Servo-center the actuator. Tap Servo Center and let the stand travel to its home position (half the actuator stroke each way). If it heads away from home, reverse Servo Center Polarity under Power User ? Actuator ? Servo Center Polarity, then servo-center again.
5. Set the guide point the web should oscillate about. Tap Reset Guide Point to snap it to the feature's current position, or drag the guide-point bar and press Accept.
6. Switch to Automatic and confirm the base guiding holds the web on the guide point and corrects the right way. If it steers away, reverse Error Polarity under Power User ? Controller. Get steady guiding before adding oscillation.
7. Set the oscillation. Turn Oscillation ON, set the type to closed-loop, and set Amplitude as a percent of the sensor range, Speed as a percent of the actuator's top speed, and Dwell as a number of samples.
8. With the guide in Automatic, the guide point now ramps back and forth in a triangle and the stand shifts the roll to follow it, oscillating the web about the moving reference. Watch a few cycles and confirm it stays centered on the feature.
9. Prove the safety hold. The lost-feature inhibit still applies while oscillating — pull the reference out of view and confirm the stand holds. When the web oscillates cleanly about the tracked feature, your closed-loop oscillation is commissioned.

5. PLC Integration

Web guiding controllers support remote command via two routes: Industrial Ethernet PLC remote control, and the DIO option (discrete dry-contact inputs). Both allow a PLC or supervisory system to command guide mode and position without manual touchscreen interaction.

- Route 1 — PLC remote control (C(x) models): send auto mode on/off, jog, servo center, and guide-point commands over Industrial Ethernet (EtherNet/IP, PROFINET, EtherCAT)
- Route 2 — DIO option: discrete dry-contact 24 V NPN inputs for hard-wired remote on/off and mode switching — no Industrial Ethernet required; wired directly from PLC digital outputs or relay contacts
- Both routes can coexist — Ethernet for data and fine control, DIO for hard-wired safety/interlock inputs
- Lock on Lost Edge: when the web edge exits the sensor field of view during edge guiding, actuator motion is inhibited — prevents runaway
- Loss of Contrast Inhibit: for line/contrast guiding, actuator motion is inhibited if contrast is lost until the target feature is re-acquired

Note: The register map, EDS file (EtherNet/IP), and Add-on Instruction (AOI) for Studio 5000 are listed under **Your Products** below — grouped on the product card.

Go Further

Related Quick Start Guides

- **Intermediate Web Guide** — Guide the web mid-machine with an intermediate web guide and LHS actuators
- **Retrofit an Existing Web Guide** — Upgrade a legacy or competitor web guide with Roll-2-Roll sensors and controllers

Need Help?
Email: experts@r2r.tech | Phone: +1-888-290-3215