# Position Measurement — Industrial Ethernet — SCU5

Quick Start Guide

**Controller:** SCU5 | **Output:** Industrial Ethernet

Scan for
interactive guide

## What You'll Achieve

After completing this guide, wired to your SCU5 C(x)D controller with position data available over Industrial Ethernet for your PLC.

**Estimated time:** ~1–2 hours

## What You Need

### SCU5 Ethernet

- [ ] ODC Family sensor — select size based on expected wander + 10% safety factor
- [ ] SCU5 C(x)D controller (x = E for EtherNet/IP, P for PROFINET, EC for EtherCAT)
- [ ] Quick Disconnect Sensor Cable - 3m (10 ft) (U2-01975)
- [ ] 24 V DC Input Power Cable, Length 5 m (21218-5m)
- [ ] M12 to RJ45S, Shielded Cable - 9.8ft/3m (21222-3m)
- [ ] 24 VDC power supply

> **Which controller variant?** Choose protocol matching your PLC: C(E)D = EtherNet/IP, C(P)D = PROFINET, C(EC)D = EtherCAT. The C(x)D+ variant adds analog output alongside Ethernet.

### Prerequisites

- [ ] Machine accessible and safe to work on
- [ ] 24 VDC power available at the installation location
- [ ] For Ethernet paths: Ethernet network ready (switch port available)

## 1. Install the Sensor

Mounting differs based on measurement type.

### Edge & Centerline

- Mount in free span between two rollers (web unsupported)
- Web edge must be at least 10 mm from the edge of the sensor sensing range
- Mount closer to one roller to minimize web flutter
- Web plane must be parallel to sensor length axis
- For centerline: sensor must see both edges (or use dual sensors for wide webs)

### Contrast/Line

- Mount facing web on a backup roller (web must be supported)
- Use a dark/matte roller surface to prevent false contrast readings
- Do not move the sensor after teaching
- Standoff consistency is critical — distance stability matters more than absolute distance

**Light source:**
*edge:* Infrared (IR) — default for edge and centerline on most materials
*contrast:* White light — for visible color contrast. UV for fluorescent marks only.

**Sensor size selection:** Choose sensor wide enough for maximum expected wander + 10% safety factor. For centerline, sensor must be wider than the web. For contrast/line, sensor only needs to see the tracked feature.

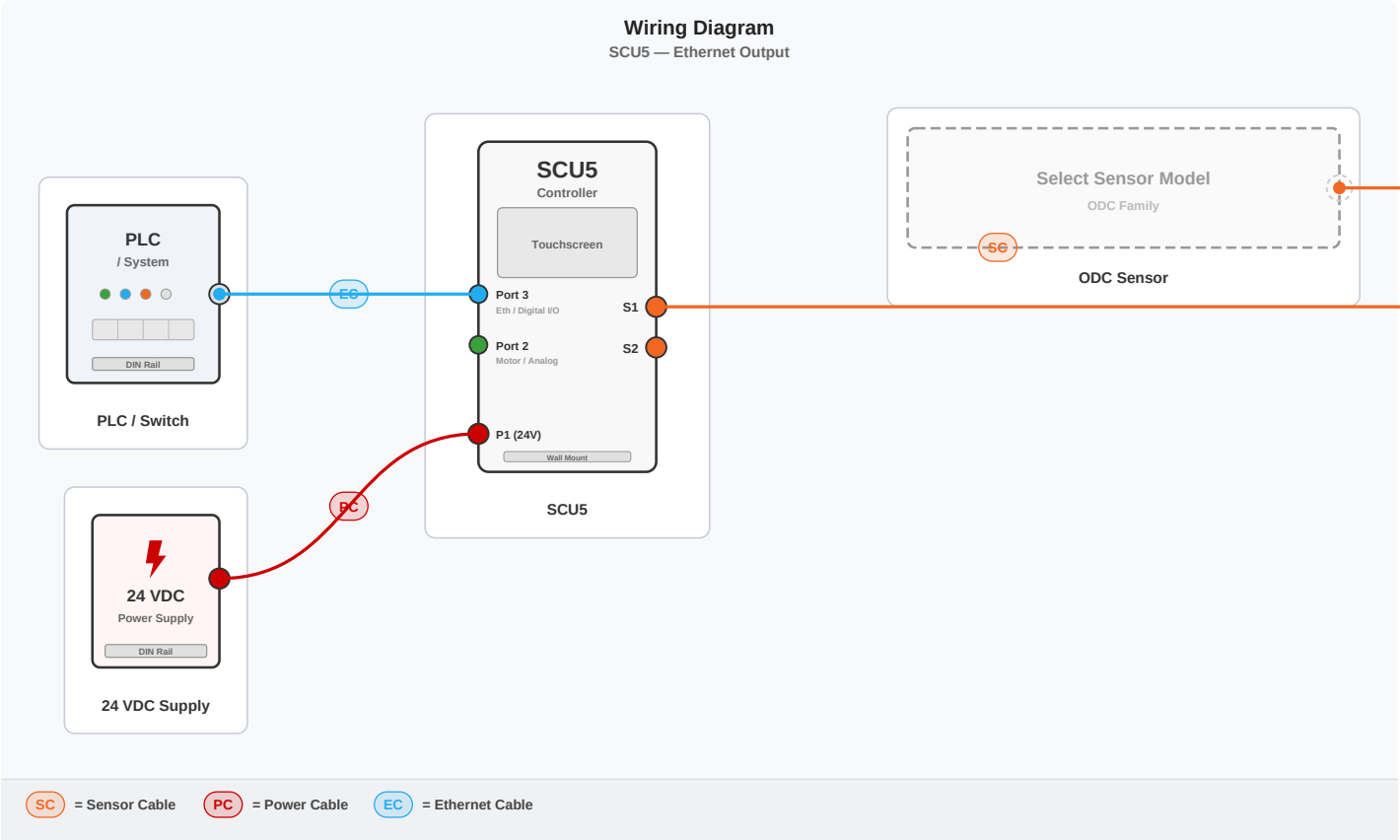
## 2. Wire the System

Same sensor wiring as analog, plus Ethernet cable.

1. Sensor: Connect Quick Disconnect Sensor Cable (U2-01975) from ODC Family sensor to SCU5 port S1
2. Power: Connect 24 V DC Input Power Cable (21218-5m) to SCU5 port P1
3. Ethernet: Connect M12 to RJ45S, Shielded Cable (21222-3m) from SCU5 Port 3 to PLC or network switch

> The SCU5 C(x)D+ variant also provides analog output on Port 2 — both outputs work simultaneously.

### Wiring Diagram



## 3. Configure & Verify

All three measurement types use the same sensor hardware. The type is selected in the controller configuration.

### Edge Position

Tracks one physical edge (left or right) of the web.

1. Connect sensor and power on — edge position appears immediately
2. Set the sensor's electronic orientation (left or right) to match its physical orientation with respect to the web. When set correctly, the web appears as a white rectangle on the controller display with one black region: the left region is black when tracking the left edge, the right region when tracking the right edge.
3. For analog: select edge type (left/right/center/width) and output range
4. For Ethernet: position is immediately available in registers

> **What success looks like:** The Web Detect Indicator — the green square at the bottom-left of the SCU5 or SCU6x display — turns green (it lights when the controller sees a valid edge or a valid taught contrast); quality factor > 10; stable position value tracking web movement.

### Centerline Position

Tracks the midpoint between both edges — absorbs width variation. In center mode the sensor sees both edges, so the web appears as a white rectangle on the controller display with black regions on both the left and the right.

1. For analog: select "center" as the analog output mode
2. For Ethernet: read left and right edge positions, compute centerline in PLC as (left + right) / 2
3. For dual sensors (wide web): mount both with the same camera orientation, then set their electronic orientation so one sensor tracks the left edge and the other tracks the right edge, and combine the two in the PLC

> There is no dedicated centerline register over Ethernet. The PLC computes the average.

> **What success looks like:** Both edges detected, centerline stays stable even as web width fluctuates.

### Contrast/Line Position

Tracks a printed line, coating edge, or color boundary on the web surface.

#### Teaching Process

1. Select the contrast sub-mode matching your application
2. Position the web with the target feature in the sensor field of view on the backup roller
3. On the touchscreen, navigate to the target feature in the real-time sensor image
4. Select the correct edge/feature and confirm with a button press
5. Teaching happens in one scan cycle (near-instant)

**Teaching time:** 30 seconds to 2 minutes including navigation

#### Contrast Sub-Modes

| Mode | Tracks |
|---|---|
| **Line Contrast** | Centerline of a line/stripe |
| **Left Contrast** | Left edge of a contrast transition |
| **Right Contrast** | Right edge of a contrast transition |
| **Double Contrast** | Edge between two specific colors |

> **What success looks like:** Green indicator = feature found and tracked. Grey = feature lost. Position tracks the feature smoothly.

### Common Configuration Mistakes

- No backup roller — web flutter corrupts pattern matching
- Teaching on the wrong feature
- Tolerance too tight (intermittent loss) or too loose (false matches)
- Ambient light interference
- Forgetting to re-teach after material change

### Troubleshooting

| Symptom | Likely Cause | Fix |
|---|---|---|
| The web position bar on the SCU5 display is completely white (single-sensor setup). | The sensor's electronic orientation does not match its physical orientation with respect to the web. | Change the sensor's electronic orientation (left ? right or vice versa) so it matches the sensor's physical orientation with respect to the web. Set correctly, the web shows as a white rectangle with the left region black when tracking the left edge, or the right region black when tracking the right edge. |
| The web position bar on the SCU5 display is completely white (dual-sensor setup). | One or both sensors' electronic orientation does not match their physical orientation with respect to the web. | Configure each sensor so its electronic orientation matches its physical orientation with respect to the web — one sensor tracking the left edge, the other the right. |

## 4. PLC Integration

Position, quality factor, fault status, and coverage are exchanged in a single cyclic frame over Industrial Ethernet.

- Position units are pixels, not mm. Convert using your sensor's pixel resolution: position_mm = position_pixels × resolution, where resolution is 0.0635 mm or 0.127 mm per pixel depending on the sensor model.
- Rockwell AOI handles conversion automatically and exposes _mm fields
- Update rate: 50 Hz (20 ms) fixed — not configurable over Ethernet
- Quality factor > 10 = valid reading

**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

- **Web Width Measurement** — Measure total web width using the same sensor
- **Multiple Web Width Measurement** — Measure multiple strips simultaneously (SCU6x only)
- **Intermediate Web Guide** — Add web guiding using position measurement as the feedback
- **Splice Detection** — Add splice detection alongside position measurement

**Need Help?**
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