Splice Detection — Industrial Ethernet — 1DC Series

Quick Start Guide

Controller: 1DC Series | **Output:** Industrial Ethernet

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What You'll Achieve

After completing this guide, your splice detection system will be installed, wired, and configured to automatically detect splices on your moving web — with detection events accessible from your PLC over Industrial Ethernet.

Estimated time: ~1 hour

What You Need

- [ ] 1DC Series sensor — any sensing range, select based on web width coverage needed
- [ ] 24 V DC Input Power Cable for SCU6x or 1DC - 5m (21218x-5m)
- [ ] M8 to RJ45S, Shielded Cable - 5m (1407354)
- [ ] 24 VDC power supply

Prerequisites

- [ ] 24 VDC power available at the installation location
- [ ] Web line accessible for sensor mounting
- [ ] Sensor position planned: cross-machine direction at a stable web plane
- [ ] For Ethernet paths: network available (PLC or network switch)
- [ ] For Digital Output path: stacklight, buzzer, or PLC digital input wired and ready

1. Install the Sensor

Mount the sensor in the cross-machine direction so the field of view spans the web width. This is identical to web width measurement and inspection mounting.

Key Mounting Rules

1. Standoff distance: 15–25 mm from the web surface (standard working distance) — closer is better
2. Stable web plane: mount over a roller or between closely-spaced rollers
3. Reaction distance: mount far enough upstream for the machine to react before the splice arrives
4. Any sensing range works — select based on web width coverage needed

> **Light source:** Infrared (IR) is the default and recommended light source for splice detection.

Troubleshooting

Symptom	Likely Cause	Fix
Optical Response Signal 1 reads too low even with the LED brightness set to 100%.	The sensor is mounted too far from the web.	Move the sensor closer to the web, within the recommended installation/standoff distance, until the Optical Response Signal 1 comes up into range.
Optical Response Signal 1 reads too high no matter how low the LED brightness is set.	The sensor is mounted too close to the web.	Move the sensor a little farther from the web, within the recommended installation/standoff distance, to bring the Optical Response Signal 1 back into range.
Splice detector reports false positives — it triggers too much when no actual splice is present.	The sensor is mounted in a web span that flutters or vibrates out of plane, so the changing web-to-sensor distance reads like a splice.	Mount the sensor in a stable span where the web is not fluttering, and install it close to a roller to minimize out-of-plane web movement (web plane change).

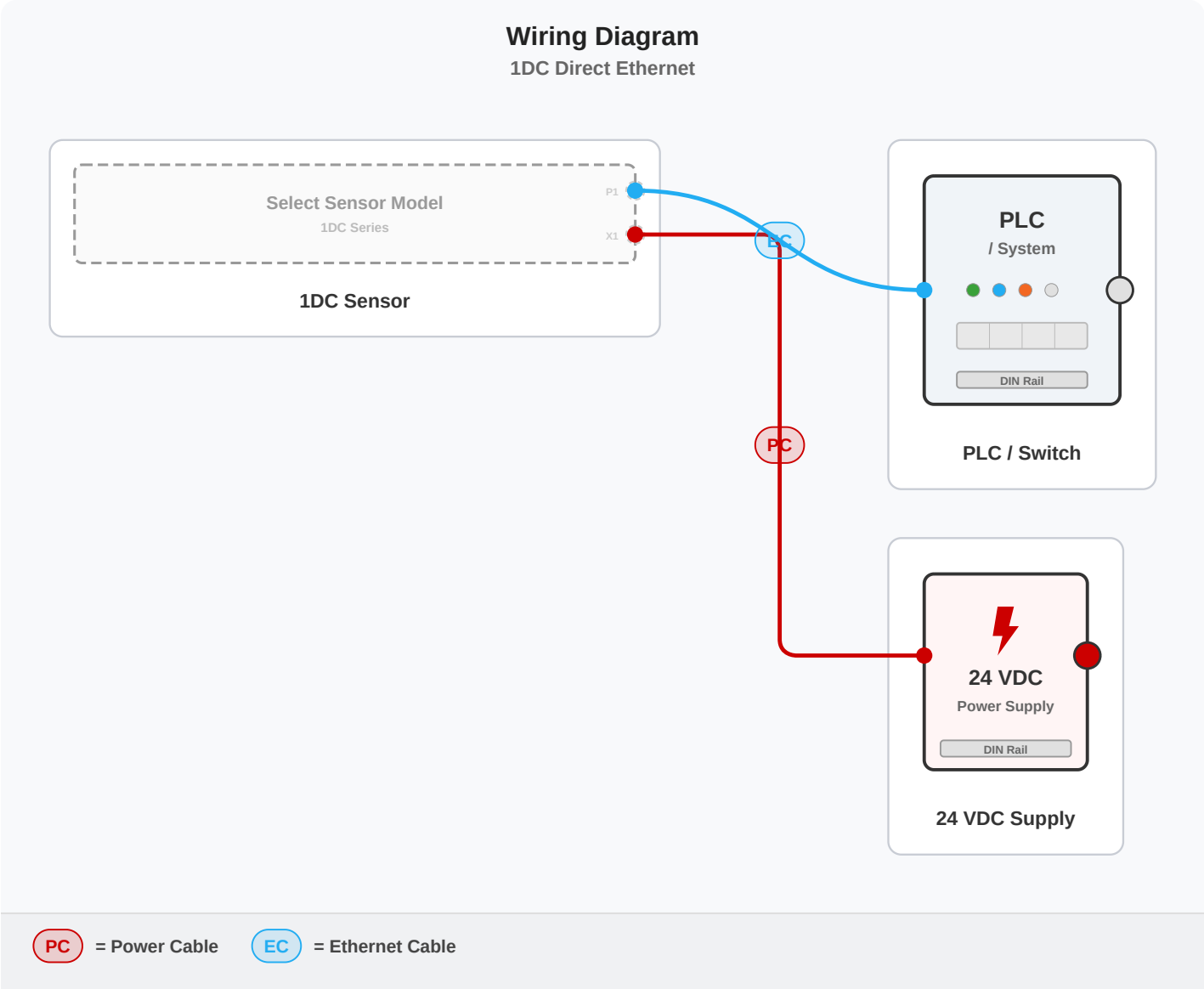
2. Wire the System

The 1DC Series requires only two connections.

1. Power: Connect 24 V DC Input Power Cable for SCU6x or 1DC (21218x-5m) to 1DC port X1
2. Ethernet: Connect M8 to RJ45S, Shielded Cable (1407354) from 1DC port P1 to PLC or network switch

> No sensor cable needed — the 1DC has a built-in controller. Keyed connectors prevent mis-wiring.

Wiring Diagram



3. Configure & Verify

Splice detection watches the image from the camera for changes in material properties caused by a splice, picked up through the sensor's optical response signals. Tune its sensitivity and hold time so every splice registers cleanly at your PLC.

1. Start with Optical Response Signal 1 only. For a plain, single-color web with no printing or coating, disable Optical Response Signal 2 and Optical Response Signal 3 — Signal 1 alone detects the splice.
2. Adjust the gain for splice detection: raise the Optical Response Signal 1 gain as high as it will go, and if detection drops out, lower it slowly until splices trigger reliably.
3. For webs with printing, coating, or more texture, enable Optical Response Signal 2 and Optical Response Signal 3 as well, then tune the gain on all three the same way — the gain behaves identically for every signal.

Configuration Parameters

Setting	Default	Range	Description
Gain	2.0	~1.0–3.0+	Sensitivity threshold for splice detection — lower is more sensitive.
Hold Time (ms)	1000	20–60,000	How long "splice detected" stays active. The valid range starts at 20 ms, but set it to at least 100 ms (? 2× your PLC scan cycle) so the PLC reliably catches every event.

> **What success looks like:** Splice detected flag goes active, splice count increments, display/app shows the detection event, PLC register updates.

Troubleshooting

Symptom	Likely Cause	Fix
Splice detector does not trigger at all — no splice events register even when a real splice passes the sensor.	The sensor image is saturated, so the camera cannot tell the splice apart from the web. Most often the LED brightness is set too high; it can also happen when web reflection is too low (too little light returns to the sensor). Assumes the sensor is already at the correct standoff distance.	Adjust the LED brightness so the Optical Response Signal 1 reads ~100–180 (out of saturation); if needed, mount the sensor at the correct standoff distance. Either restores a discernible difference between the web and the splice so detection triggers.
Splice detector triggers too much — false or excessive splice events on a web with no actual splice.	Optical Response Signal 1 gain is set too low.	Increase the Optical Response Signal 1 gain as high as possible; if detection then drops out, lower the gain slowly until it triggers reliably. For a non-printed, uniform web with no printed features, also disable the Optical Response Signal 2 and Optical Response Signal 3 altogether. On the SCU6x, configure these Optical Response Signal settings per sensor.
Splice detector triggers too much on a printed web.	On a printed web, Optical Response Signal 1 alone cannot tell the splice apart from the printed features.	Enable Optical Response Signal 2 and Optical Response Signal 3 as well. Start with all three signals enabled, then raise the gain on all of them until detection is reliable.

4. PLC Integration

Splice detection provides a binary detected/not-detected signal. The PLC reads the status flag and counts.

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** — Splice detection can run simultaneously with web width measurement on the same hardware
- **Position Measurement** — Edge position measurement uses the same sensor installation

Need Help?
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