



SL FORPS Fiber-Optic Rail Sensor

One Fiber-Optic Sensing Platform,
Sized for Every Rail Profile



Overview

Rail operators need accurate, continuous insight into axle loads, wheel condition, train speed, and track response to improve safety, maintenance planning, and asset life.

The SL FORPS fiber-optic rail sensor replaces the standard intermediate rail pad to measure vertical wheel loads while capturing vibration and shock across a wide frequency range. Because the sensing element is embedded inside the rail pad, it collects data without requiring additional trackside hardware. Powered by Sensor Line technology, SL FORPS is available in profile-specific variants for rail systems ranging from secondary lines to high-speed networks.

Measurement From Inside the Rail Pad

SL FORPS installs as a direct replacement for the intermediate rail pad. An embedded fiber-optic sensing element measures the load transferred through the rail and converts changes in light transmission into data for downstream analysis.

Because sensing is optical rather than electrical, the system is immune to electromagnetic interference, making it well suited for electrified rail environments.

One Sensor, a Wide Range of Diagnostics

A single SL FORPS installation supports multiple monitoring applications, including:

- Axle load & weigh-in-motion
- Vibration & shock analysis
- Flat-wheel detection
- Track-bed condition analysis
- Axle & wagon counting
- Speed & direction detection
- Train-length detection

Multiple monitoring functions can be consolidated into a single sensing point, reducing the need for separate trackside systems.

Installs Without
Cutting or
Modifying
the Track

The SL FORPS is designed to go in quickly and in nearly any weather, without mechanical processing of the rail or sleeper. Because it takes the place of the intermediate pad, there is no need to drill, cut, or otherwise alter existing track components, which helps keep track possession time and installation cost down. The sensor is available for all common rail systems, so it can be matched to existing infrastructure rather than requiring changes to it.

Built for Every
Rail Network

By integrating sensing directly into the rail pad, SL FORPS provides accurate load, speed, and condition data without adding trackside complexity. Available for every common rail profile, it delivers a consistent platform for track monitoring, rolling-stock diagnostics, and long-term infrastructure management.

Matched to Your Rail Profile

Sensor Type	Dimensions	Rail Type
SL FORPS S 49	165 × 125 × 7 mm	Lighter S49, S54, and S41 profiles on secondary, regional, and legacy lines
SL FORPS UIC 54	165 × 140 × 7 mm	UIC54 profile common on conventional main lines
SL FORPS UIC 60	165 × 150 × 7 mm	UIC60, S64, and R65 rail on heavy-traffic main lines
SL FORPS UIC 60 HS	220 × 150 × 9 mm	For UIC60 HS rail on high-speed lines, with a higher 250 kN wheel-load rating

Interfaces That
Turn Light
Into Data

The sensor pairs with opto-electronic interface units that digitize its signal for analysis. The SL XD-1100 provides a single-channel digital interface, while the SL MX-210 series offers multi-channel interfaces in two-, three-, and four-channel configurations, allowing several sensors to feed a single processing point.

Proven on Rail
Networks
Worldwide

SL FORPS sensors are deployed across a range of demanding rail environments, including the Marmaray rail crossing and the Ankara-Istanbul line in Turkey, the high-speed lines between Madrid and Barcelona and between Madrid and Seville in Spain, the Barcelona-Figueras main line, the Madrid metro, and tram infrastructure in Poland. These installations span heavy-haul, high-speed, metro, and light-rail conditions.

Technical Specifications

Performance

Specification	Value
Maximum train speed	Up to 500 km/h
Maximum wheel load	150 kN (S49, UIC54, UIC60); 250 kN (UIC60 HS)
Minimum detectable load	1 kN
Average life (MTTF)	>5 years
Operating temperature	-30°C to 85°C
Storage temperature	-30°C to 85°C
Humidity	Up to 100%
Protection rating	IP67 (excluding fiber-optic connectors)

Sensor Dimensions & Weight

Model	Dimensions	Weight
SL FORPS S 49	165 × 125 × 7 mm	200 g
SL FORPS UIC 54	165 × 140 × 7 mm	220 g
SL FORPS UIC 60	165 × 150 × 7 mm	240 g
SL FORPS UIC 60 HS	220 × 150 × 9 mm	350 g

Fiber-Optic Cable

Property	Value
Outer diameter	10 mm
Length	Up to 40 m (20 m with temperature sensor option)
Weight	135 g/m
Maximum short-term pull tension	50 N
Minimum bending radius	50 mm
Protective cover	Metal spiral

Connector

Property	Value
Construction	Plastic FSMA
Length	34 mm
Maximum diameter	8.5 mm

Ordering Information

SL FORPS sensors are specified as: **SL FORPS X-Y-ZZ(T)**

Code	Description
X	Rail type
Y	Connector type (1 = plastic FSMA, 2 = reusable metal FSMA)
ZZ	Cable length in meters (10 m standard)
(T)	Optional integrated analog temperature sensor

One Platform, Every Part of the Network

By building measurement into the rail pad itself, the SL FORPS gives rail operators a durable, low-maintenance source of load, speed, and condition data without adding complexity to the track. Powered by Sensor Line technology and available in a variant for every common rail profile, it provides a single, consistent foundation for track monitoring, rolling-stock diagnostics, and long-term infrastructure planning across the whole network.