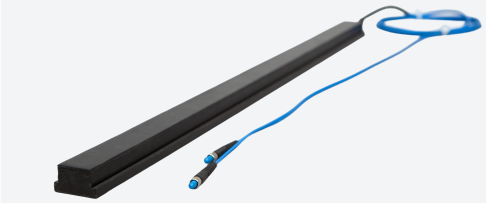
# SL PUR Fiber-Optic Road Sensor

Passive Fiber-Optic Axle Detection, Embedded in the Pavement



## Overview

The SL PUR is a fiber-optic sensing strip embedded directly in the pavement. A fiber-optic element runs the length of the strip, which is set into a slot in the asphalt or concrete and fixed flush with the PUR polyurethane compound. As a wheel passes over it, the strip deforms slightly and reduces the light transmitted through the fiber, and opto-electronic interfaces read that change and convert it into axle-level traffic data.

Because the sensing element is optical and passive, there are no active electronics in the pavement to power or fail, and the measurement is unaffected by the electrical interference around a live roadway. It registers every class of road user, from strollers and bicycles to heavy trucks, at better than 99.99% and independent of light or weather.

Powered by Sensor Line technology, the SL PUR sensor is part of Quarterhill's road-traffic portfolio.

## The Data It Delivers

A single SL PUR installation supports:

- Axle counting
- Vehicle classification
- Speed measurement
- Headway measurement
- Cyclist counting

## Two Sensitivities

The standard SL PUR is tuned for cars, trucks, buses, and motorbikes. The SL PUR-S carries higher sensitivity for mixed traffic that includes bicycles, so one sensor line can capture both motor vehicles and cyclists on the same corridor.

## Accuracy That Holds Its Calibration

The SL PUR detects at better than 99.99% and reads axles cleanly at speeds up to 250 km/h. Its polyurethane body has no moving parts and no material fatigue, so it does not drift or wear the way mechanical sensors do, and it needs no recalibration once installed.

It is rated for a service life of more than 5 years or 10 million axles, backed by a 24-month warranty, and operates from -30 to 85 °C with no humidity limitation.

## Built to Sit in the Road

The sensor is a stiff polyurethane strip, up to 4.5 m long and 21 mm high, with a T-shaped profile that seats and levels quickly during installation. It embeds permanently in asphalt or concrete, held to the correct height with Hanger Bars and locked in with the SL PUR Slot Filler. Insensitive zones at the tip (60 mm) and the feeder joint (130 mm) keep the detection zone clean and well-defined.

## Cabling and Interfaces

A thin fiber-optic feeder cable connects the sensor to the interface, in a standard 2.5 by 5 mm profile or a PE-reinforced 4 by 6.6 mm version for higher pull strength, in runs up to 250 m, terminated with FSMA plastic or reusable metal connectors. The sensor feeds Sensor Line opto-electronic interfaces: the SL MA-110, MA-210, and MA-310 analog units in one, two, and three channels, or the SL MD-220 two-channel digital interface, so several sensors can report to a single processing point.

## Proven in the Field

SL PUR sensors are in service on major roadways and crossings worldwide, including the New York Thruway, the Bosphorus Bridge in Istanbul, the Lahore toll plaza, speed enforcement in Leipzig, and cyclist counting in Brussels. These span tolling, enforcement, and multimodal counting on heavily trafficked infrastructure.

## Technical Specifications

**Performance**

| Specification | Value |
|---|---|
| Detection | Cars, trucks, buses, motorbikes, bicycles, and strollers at better than 99.99%, independent of visibility |
| Applications | Axle counting, vehicle classification, speed, headway, cyclist counting |
| Variants | SL PUR (standard), SL PUR-S (higher sensitivity for bicycles) |
| Operating Temperature | -30°C to 85°C |
| Storage Temperature | -30°C to 85°C |
| Humidity | No limitation |
| Service Life (MTTF) | More than 5 years or 10 million axles |
| Warranty | 24 months |

## Sensor Dimensions & Construction

| Property | Value |
|---|---|
| Sensor Length | Up to 4.5 m |
| Profile | 30 mm wide (top), 38 mm (base), 21 mm high |
| Weight | 1 kg/m |
| Insensitive Zones | Tip: 60 mm; feeder joint: 130 mm |

## Feeder Cable & Connector

| Property | Value |
|---|---|
| Standard Feeder Cable | 2.5 × 5 mm, up to 250 m, 12 g/m |
| Standard Cable Pull Force | Maximum short-term pull: 20 N |
| Standard Cable Bend Radius | Minimum bend radius: 25 mm |
| PE-Reinforced Cable | 4 × 6.6 mm, up to 250 m, 25 g/m |
| PE Cable Pull Force | Maximum short-term pull: 60 N |
| PE Cable Bend Radius | Minimum bend radius: 25 mm |
| Connectors | FSMA plastic or reusable metal |
| Connector Length | 34 mm |
| Maximum Connector Diameter | 8.5 mm |
| Compatible Interfaces | SL MA-110, SL MA-210, SL MA-310 analog (1-, 2-, and 3-channel); SL MD-220 digital (2-channel) |

## Installation

| Property | Value |
|---|---|
| Installation | Embedded in asphalt or concrete with SL Hanger Bars and SL PUR Slot Filler. Install straight and horizontal. Do not bend or twist. |

## Ordering Information

SL PUR sensors are specified as: **SL PUR XXX-Y-ZZ (PE)**

| Code | Description |
|---|---|
| XXX | Sensor length in cm |
| Y | Connector type (1 = plastic FSMA, 2 = reusable metal FSMA) |
| ZZ | Cable length in meters |
| PE | Optional reinforced polyethylene-sheathed sensor cable |

## A Passive Sensor Built for the Long Term

With no moving parts, no in-pavement electronics, and no recalibration to schedule, the SL PUR delivers accurate axle-level data from inside the road surface year after year. Available in two sensitivities and custom lengths, it suits counting, classification, and enforcement installations across asphalt and concrete alike.