

# Lineas® Quartz Sensor

## for Weigh-In-Motion

Type 9195F...

Patent No. US 5,461,924

The Lineas sensor is a quartz sensor to measure the wheel- and axle loads and to determine the vehicle gross weight under rolling traffic conditions.

- Excellent long-term stability
- Wide measuring range: from slow to high-speed
- Very high natural frequency and signal dynamic
- Protected from the intrusion of water (degree of protection IP68)
- Insensitive to temperature changes
- Quick and easy installation
- Adaptive to different pavement characteristics
- Safe mounting into the pavement
- The sensor surface can be ground up to 6 mm in case of pavement deformations

### Description

The Lineas WIM sensor Type 9195F... is a force sensor with quartz elements. It consists of a light metal profile of which quartz disks are fitted under preload.

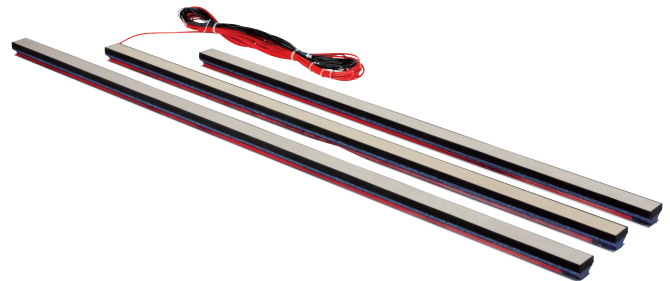
When a force is applied to the sensor surface, the quartz disks yield an electric charge proportional to the applied force through the piezoelectric effect.

The electric charge is converted by a charge amplifier into a proportional voltage which then has to be further processed as required.

The sensor has to be integrated into the road surface and is only for permanent installation.

### Applications

- Traffic data collection (statistics)
- Overload detection
  - Pre selection for static weight controls
  - Automatic (direct) weight enforcement
  - Bridge protection
- Weigh dependent tolling
- Road research
- Pavement management system (PMS)



### Technical Data

#### Sensor

Measuring range wheel load	kN	0 ... 150
At a reference tire contact area (tread length x tread width)	mm	200x320
Max. load-bearing capacity of the sensor surface	N/mm <sup>2</sup>	4,6
Sensitivity, nominal	pC/N	-1,76 ±5 %
Max. sensitivity shift over sensor length	%	<±3
Threshold	N	<0,5
Linearity	%FSO	≤±2
Hysteresis	%FSO	≤2
Cable chunking resistance	N	300
Operating temperature range	°C	-40 ... 80
Temperature coefficient of sensitivity	%/°C	-0,02
Insulation resistance	Ω	>1 · 10 <sup>10</sup>

#### General Data Standard Length

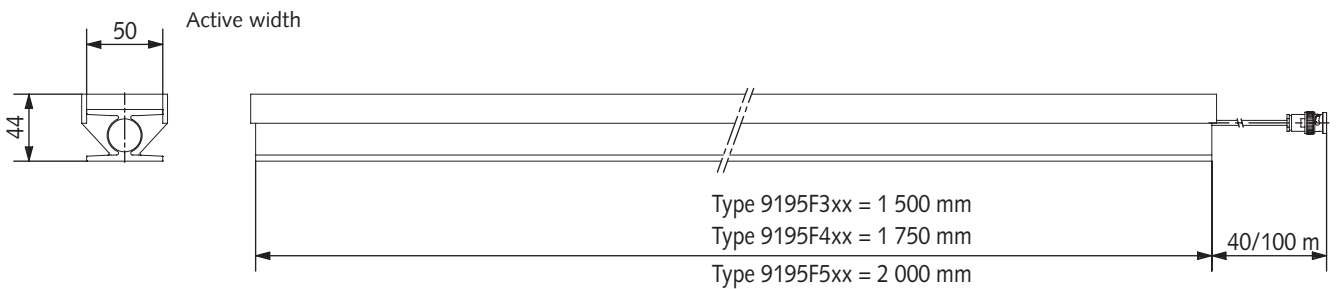
Cable length (Cable Type K02232D01)	m	40/100
Connector		BNC pos.
Capacitance		
F3, F4, F5 with 40 m cable	nF	8 ... 12
F3, F4, F5 with 100 m cable	nF	14 ... 18
Weight		
F3 with 40 m cable	kg	6,1
F3 with 100 m cable	kg	7,6
F4 with 40 m cable	kg	6,8
F4 with 100 m cable	kg	8,3
F5 with 40 m cable	kg	7,6
F5 with 100 m cable	kg	9,1
Degree of protection	EN60529	IP68

**General Data Special Length**

Cable length (Cable Type K02232D01)	m	40/100
Connector		BNC pos.
Capacitance		
F1, F2 with 40 m cable	nF	6
F1, F2 with 100 m cable	nF	12
Weight		
F1 with 40 m cable	kg	4,5
F1 with 100 m cable	kg	5,8
F2 with 40 m cable	kg	3,7
F2 with 100 m cable	kg	5,0
Degree of protection	EN60529	IP68

1 bar = 10<sup>5</sup> Pa = 10<sup>5</sup> N · m<sup>-2</sup> = 1,0197... at = 14,503... psi; 1 psi = 0,06894... bar; 1 g = 9,80665 m á s<sup>-2</sup>; 1 N·m = 0,73756... lbft; 1 g = 0,03527... oz

**Dimensions**

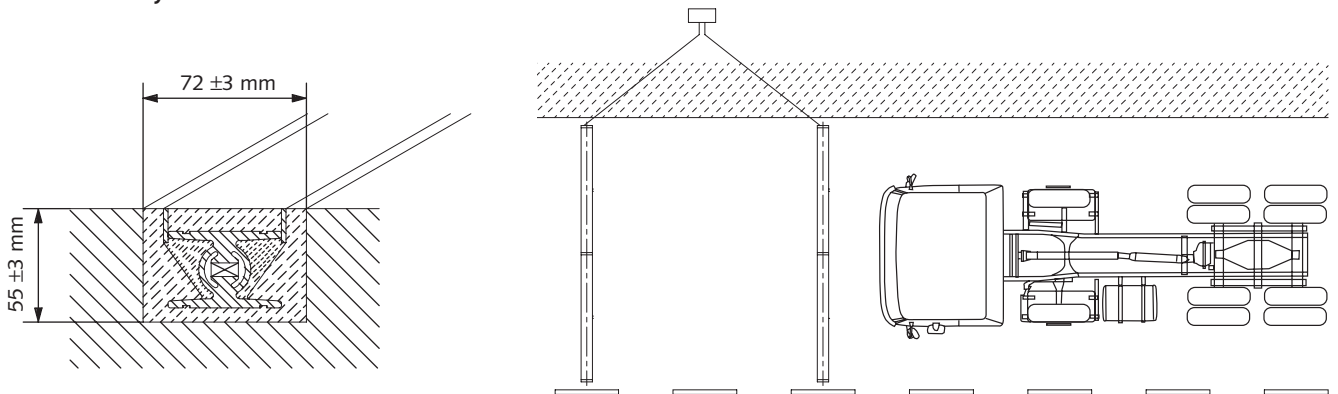


**Installation**

Lineas WIM sensors are easy to install. They are laid into a self hardening Epoxy grout and therefore provide an optimum and consistent mounting in the pavement. They are available in 3 lengths (1,5 m/1,75 m/2 m). Any width of a lane can be covered through a combination of sensor lengths. The Installation Instructions for the Type 9195F... (Doc. No. 9195F\_002-466) describes all relevant steps.

**The installation of Lineas sensors requires the supervision of a Kistler Engineer or an Engineer certified by Kistler.**

**Installation Layout**



9195F\_000-691e-11.08

### Electronics (Charge Amplifier)

To connect to Lineas sensors the following Kistler charge amplifiers are best suited:

- Type 5038A2Y43 in a robust housing (IP65) for 2 channels
- Type 5153A... in a robust housing (IP65) for 9 or 18 channels

These charge amplifiers are not included in the scope of delivery.

Lineas sensors are compatible with different WIM data acquisition systems.

The sensors must be grounded.

### Parallel Connection

Several Lineas sensors which are installed next to each other, can be connected electrically parallel. They can be operated by a common charge amplifier. The charge amplifier Type 5153A... has a parallel connection built in.

The output signal corresponds to the sum of the forces which act simultaneously on all connected sensors. Instead of single tire loads the axle loads can be acquired.

### Accessories Included

- 1 Lineas WIM sensor
- Mounting-kit

### Type/Art. No.

9195F...  
7.070.066

### Optional Accessories

- 1 set of grouting sufficient for one sensor (1,5 ... 2 m)
- Charge amplifiers
- Connection box
- Cables
- Tool kit

### Type/Art. No.

1000A1  
5038.../5153...  
Z18753  
2.610.035  
Z20015

### Ordering Key

#### Standard Sensor Length

1,5 m	3
1,75 m	4
2 m	5

#### Special Sensor Length

1 m	1
0,75 m	2

#### Length of Cable

40 m	1
100 m	2

#### Length of Protection Cable

15 m	1
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Type 9195F

