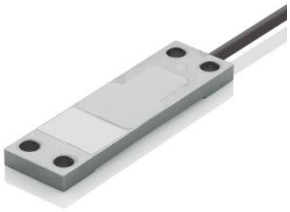
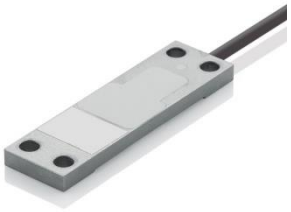
Strain sensor with mV/V-output (strain gauge measuring bridge)

Models

X-103-S05	X-103-S10	X-103-S15	X-103-S30
Flat dimensions for 0…250 µm/m	**With M12-plug for 0…250 µm/m**	**Flat dimensions for 0…250 µm/m**	**For 0…250 µm/m with very high sensitivity**
			
89 x 26 x 6.5 mm, 4x M6, 0…250 µm/m, +0.5 mV/V	93 x 25 x 14 mm, 4x M6, 0…250 µm/m, +1.0 mV/V	89 x 26 x 6.5 mm, 4x M6, 0…250 µm/m, + 1.5 mV/V	89 x 26 x 6.5 mm, 4x M6, 0…250 µm/m, +3 mV/V

Characteristics

- Very flat design with only 6.5 mm height
- Very high sensitivity and resolution
- Strain sensor with mV/V-output (DMS measuring bridge)
- For static and dynamic applications
- For force, weight and deformation measurements
- Measuring very small strains in rigid structures

Application

Surface strain sensor X-103 monitors the strain between its two mounting screws and amplifies this mechanically. In this way the strain is concentrated in the measuring area and can therefore be measured using a resistive strain gauge bridge.

These strain sensors are used if the mV/V-signal of a DMS measuring bridge is used if more than one strain sensor should be connected in parallel. This is the case for weight measurements and for force measurement at several tie-bars of a press. The strain sensor will generate a proportional DMS bridge signal (mV/V) depending on the stress of the structure.

An extremely solid steel housing, combined with IP65 protection guarantees trouble-free operation, even under harsh and rugged environment conditions.

Ordering code

Description	Measuring range	Bridge resistance	Output signal	Connection	Specification
X-103-S05	0…250 µm/m	1000 Ohm	+0.5 mV/V	Cable Connection	Page 3
X-103-S10	0…250 µm/m	350 Ohm	+1.0 mV/V	M12-Connection	Page 4
X-103-S15	0…250 µm/m	350 Ohm	+1.5 mV/V	Cable Connection	Page 5
X-103-S30	0…250 µm/m	2…5 kOhm	+3 mV/V	Cable Connection	Page 6

Strain sensor X-103-S05

89 x 26 x 6.5 mm, 4x M6, 0…250 µm/m, +0.5 mV/V

Specifications

Performance	
Measuring range	0…250 µm/m
Sensitivity	+0.5 mV/V
Deviation sensitivity	± 5 %
Linearity	≤ 0.5 % from full-scale
Hysteresis	≤ 0.5 % from full-scale
Repeatability of reinstallation	Typ. 1 %, max 2 %
Zero signal unmounted	± 0.1 mV/V

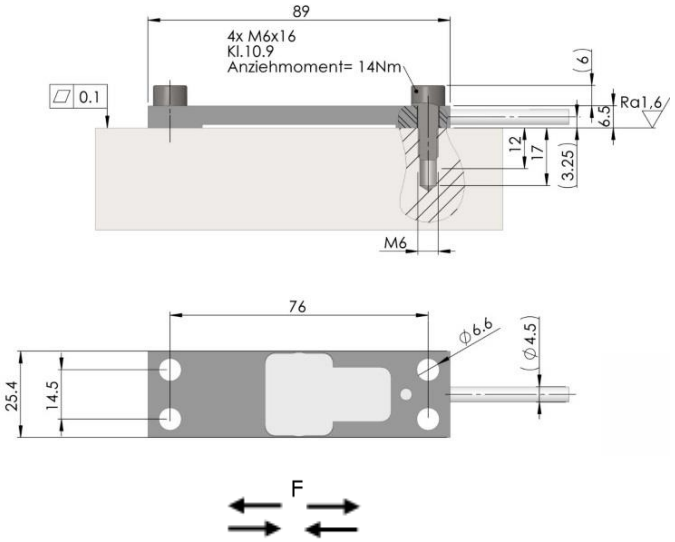
Electrical data	
Power supply	2…15 VDC
Output signal at full scale	+0.5 mV/V
DMS bridge resistance	1000 Ohm

Materials	
Housing	Steel (TC 11.6 ppm / °C)
Cable	PVC (grey)

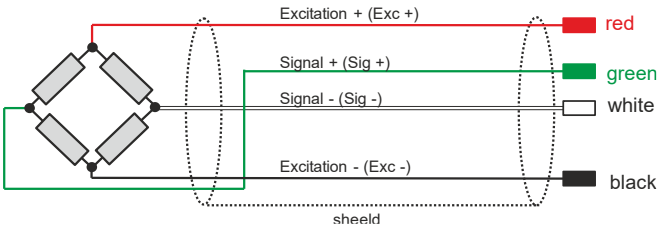
Mechanical data	
Overload	150 % from full-scale
Life endurance alternating 50 % load	10^7 cycles
Cable length	1 m
Connector-type	Open leads, plugs on request

Environmental data	
Ambient temperature	-10…65 °C
Protection rate	IP 65

Mechanical dimensions



Wiring



Ordering information

This strain sensor is delivered without mounting screws.

For detailed ordering information, please see page 2.

Options:

- CON: Cable connector at the free end
- LEN: Customer specific cable length

Strain sensor X-103-S10 with M12 plug

93 x 25 x 14 mm, 4x M6, 0…250 µm/m, +1 mV/V

Specifications

Performance	
Measuring range	0…250 µm/m
Sensitivity	+1 mV/V
Deviation sensitivity	± 2 % from full-scale
Linearity	≤ 1.5 % from full-scale
Hysteresis	≤ 0.7 % from full-scale
Repeatability of reinstallation	Typ. 1 %, max 2 %
Zero signal unmounted	± 0.1 mV/V

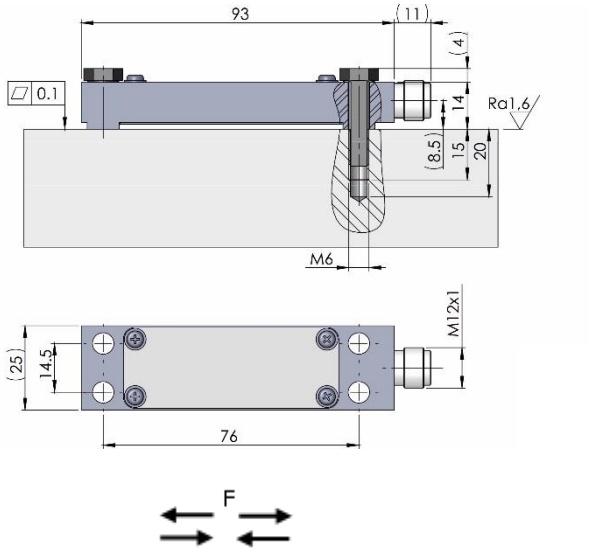
Electrical data	
Power supply	2…15 VDC
Output signal at full scale	+1 mV/V
DMS bridge resistance	350 Ohm

Materials	
Housing	Steel (TC 11.6 ppm / °C)

Mechanical data	
Overload	120 % of full scale
Life endurance alternating 50 % load	10^7 cycles
Connector-type	M12, 5 pole

Environmental data	
Ambient temperature	-10…65 °C
Protection rate	IP 64

Mechanical dimensions



Wiring

Pin assignment	Function	Sensor label
PIN 1	Excitation +	Exc+
PIN 2	Signal +	Sig+
PIN 3	Signal -	Sig-
PIN 4	Excitation -	Exc-
PIN 5	Not connectec	NC

Ordering information

This strain sensor is delivered without mounting screws.

For detailed ordering information, please see page 2.

Strain sensor X-103-S15

89 x 26 x 6.5 mm, 4x M6, 0…250 µm/m, +1.5 mV/V

Specifications

Performance	
Measuring range	0…250 µm/m
Sensitivity	+1.5 mV/V
Deviation sensitivity	± 2 %
Linearity	≤ 0.5 % from full-scale
Hysteresis	≤ 0.5 % from full-scale
Repeatability of reinstallation	Typ. 1 %, max 2 %
Zero signal unmounted	± 0.1 mV/V

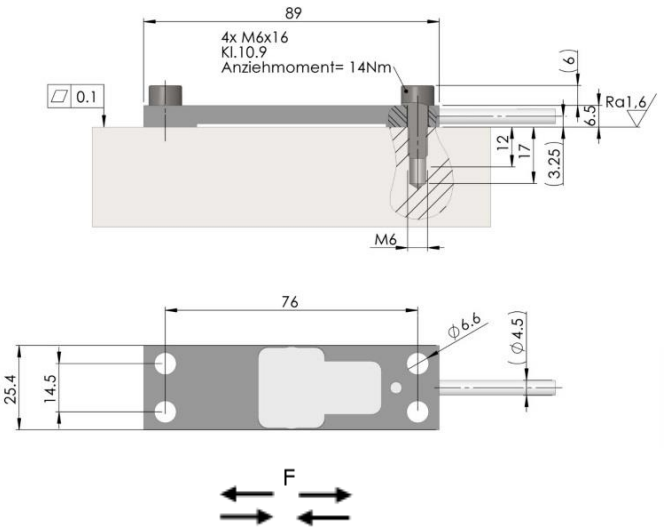
Electrical data	
Power supply	2…15 VDC
Output signal at full scale	+1.5 mV/V
DMS bridge resistance	350 Ohm

Materials	
Housing	Steel (TC 11.6 ppm / °C)
Cable	PVC (grey)

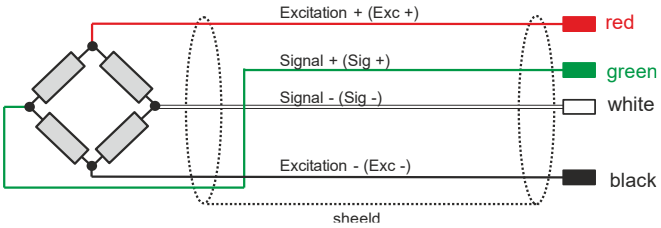
Mechanical data	
Overload	150 % from full-scale
Life endurance alternating 50 % load	10^7 cycles
Cable length	1.0 m
Connector-type	Open leads, plugs on request

Environmental data	
Ambient temperature	-10…65 °C
Protection rate	IP 65

Mechanical dimensions



Wiring



Ordering information

This strain sensor is delivered without mounting screws.

For detailed ordering information, please see page 2.

Options:

- CON: Cable connector at the free end
- LEN: Customer specific cable length

Strain sensor X-103-S30 with high sensitivity

89 x 26 x 6.5 mm, 4x M6, 0...250 µm/m, +3 mV/V

Specifications

Performance	
Measuring range	0...250 µm/m
Sensitivity	+3 mV/V
Deviation sensitivity	± 5 % from full-scale
Linearity	≤ 1.5 % from full-scale
Hysteresis	≤ 0.7 % from full-scale
Repeatability of reinstallation	Typ. 1 %, max 2 %
Zero signal unmounted	± 0.1 mV/V

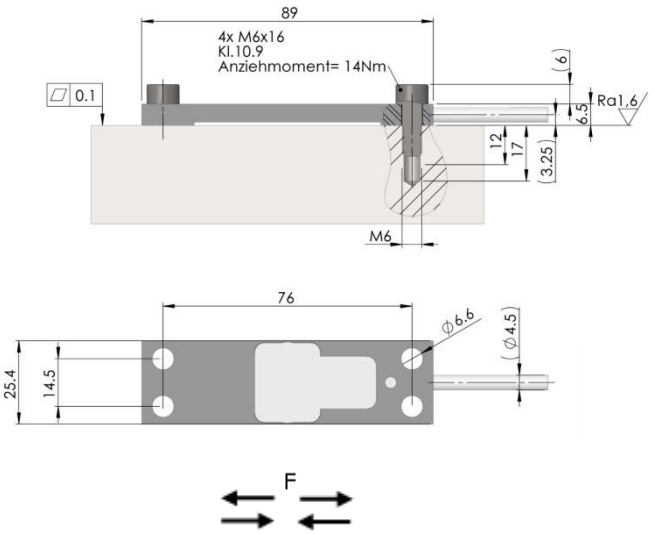
Electrical data	
Power supply	2...15 VDC
Output signal at full scale	+3 mV/V
DMS bridge resistance	2...5 kOhm

Materials	
Housing	Steel (TC 11.6 ppm / °C)
Cable	PVC (grey)

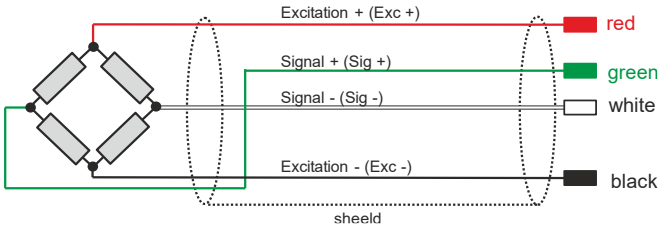
Mechanical data	
Overload	150 % from full-scale
Life endurance alternating 50 % load	10^7 cycles
Cable length	1.0 m
Connector-type	Open leads, plugs on request

Environmental data	
Ambient temperature	-10...65 °C
Protection rate	IP 65

Mechanical dimensions



Wiring



Ordering information

This strain sensor is delivered without mounting screws.

For detailed ordering information, please see page 2.

Options:

- CON: Cable connector at the free end
- LEN: Customer specific cable length

Zero reset / adjustment

The zero adjustment at the strain sensors with DMS bridge output signal (mV/V) is done at the subsequent amplifier. Two options of amplifiers are available: One for static applications and one for dynamic applications.
For dynamic applications, a digital input for automatic zero-point adjustments is offered.
For static applications, the zero point can be adjusted manually by DIP switches and by a potentiometer for fine tuning.

Mounting instructions

The strain sensors should be mounted on machined surfaces N9 with a flatness to within 0,5 mm. Use the following parameter for tighten the socket screws:

	Screws	Tightening torque at strength class 10.9	Tightening torque at strength class 12.9
X-103	4x M6	14 Nm	18 Nm

Definition of accuracy

The accuracy includes the following parameters:

1. Linearity and hysteresis
   The linearity and hysteresis specifies the measuring error in reference to the ideal BFSL curve. The maximum measuring error is stated in reference to the full scale value. This means that an accuracy of 0.5 % FS at a strain sensor with a measuring range of 0…250 µm/m correspondents to a measuring error of only 1.25 µm/m.

1. Sensitivity
   The DMS sensors have sensitivities which are specified in reference to the measuring range. The sensitivity can have a small deviation from sensor to sensor. For this reason, the deviation of sensitivity is specififed for each sensor type.

2. Repeatability of reinstallation
   The force closure between strain sensor and the structure it is applied to does vary slighlty from installation to installation. As a consequence, the zero point and span is minimally moving form installation to installation. But the zero-point and the span can be easily recalibrated by the input for the zero-offset adjustment and by a recalibration with known process parameters. This eliminates a measuring error due to the reinstallation. In case that a recalibration is not possible in the application, the maximum error of reinstallation is specified within the data sheets.