

## KIR-TRACC

### Deformation measuring for WS-50

Single-axis length measuring sensors for use in anthropomorphic test devices (ATD) of Type WS-50.

The KIR-TRACC (Kistler Infra Red – Telescoping Rod for Assessment of Chest Compression) is a length measuring sensor for the determination of the thorax or shoulder/rip compression for use in the WS-50 (Worldwide Harmonized Side Impact Dummy). The sensor can only be used in the WS-50 in combination with a corresponding mechanical apparatus matched to the measuring position and other measuring sensors.

The measurement of the thorax and shoulder/rip deformation within the scope of a side impact accident simulation is performed for the purpose of evaluating the occupant safety of vehicles during the entire product development, legally required tests, new vehicle assessment programs and consumer tests.

The sensor Type 55232909 is characterized by:

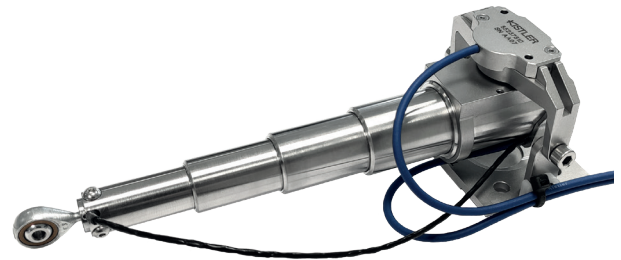
- WS-50 "ready"
- Stress-free length measurement at up to 50 m/s
- Compact size and long-lasting design
- Tight production tolerances for low lateral sensitivity
- Output signal: polynomial of the third degree
- Standardized receiver for simple calibration and installation
- DTI "ready"

#### Description

The operating principle of the Kistler IR-TRACC is based on a photo-optical procedure that is described in GM research paper RND-8832, June 4, 1998. Light in the infrared range is emitted by an infrared (IR) LED with high luminance and radiation intensity, received by an opposing photodiode with high luminance sensitivity and congruent spectral sensitivity. The radiant power measured by the photodiode is electrically converted to current, which is inversely proportional to the square of the distance from the LED to the photodiode.

The current thereby produced is further processed such that the signal at the output of the sensor can be converted by means of a polynomial approximation to the change of distance and, thus, to the change in length in the torso deformation zone.

Type WS-50-0367-2K,  
 WS-50-0367-3K,  
 WS-50-0368-2K,  
 WS-50-0368-3K



Both the transmitter LED as well as the photodiode are installed in a telescoping rod that can be pushed together longitudinally.

#### Application

The WS-50 ATD is equipped with a total of six KIR-TRACCs in the thorax and abdominal region. For this purpose, the sensors are mounted in an apparatus tailored to the measuring position (contained in assemblies). In addition to the KIR-TRACC's own length measurement, each apparatus accommodates one or two angle measuring sensors, depending on whether you choose the 2D or 3D variant, so that the complete units measure the torso deformation together, thereby making the injury parameters determinable.

The combination of the pieces of angular change information with the longitudinal displacement of the KIR-TRACC allows the deformation behavior to be clearly determined in space or level via the position of the front part of the measuring system.

## Technical data

Length measuring		55232909	
Specification		Thorax	Shoulder
Measuring range	mm	90	90
Retraction/withdrawal speed, max.	m/s	50	50
Power supply U <sub>b</sub>	V	5	5
Current consumption, max. (typ.)	mA	35 (26)	35 (26)
Operating temperature range	°C	15 ... 40	15 ... 40
Sensor output, max. (typ.)	mV	350 (300)	350 (300)
Output format		Cubic polynomial	Cubic polynomial
Approximation deviation, max.	%	1	1
Shock resistance, max.	g	200	200
Cable length (open cable ends)	m	6	6
Mass	Grams	125	125
Sensitivity of telescopic displacement <sup>1)</sup>			
Deviation @ 120 mm (typ.)	%F.S.	-	-
Deviation @ 90 mm (typ.)	%F.S.	0.2	0.2
Deviation @ 75 mm (typ.)	%F.S.	0.2	0.2
Deviation @ 60 mm (typ.)	%F.S.	0.1	0.1
Deviation @ 30 mm (typ.)	%F.S.	0.1	0.1
Deviation (max. %F.S.)	%	1	1
Sensitivity of telescopic deflection <sup>2)</sup>			
Deviation @ 120 mm (typ.)	%F.S.	-	-
Deviation @ 90 mm (typ.)	%F.S.	0.6	0.6
Deviation @ 75 mm (typ.)	%F.S.	0.3	0.3
Deviation @ 60 mm (typ.)	%F.S.	0.2	0.2
Deviation @ 30 mm (typ.)	%F.S.	0.2	0.2
Deviation (max. %F.S.)	%	1.5	1.5
Angle measuring			
Rotation X axis	ANX <sub>up</sub> <sup>3)</sup>	deg.	26
Rotation X axis	ANX <sub>down</sub> <sup>3)</sup>	deg.	70
Rotation Z axis	ANZ <sup>4)</sup>	deg.	±45

- 1) Description:
- Rigid suspension at both fastening points
  - Pos. 1: Telescopic elements for displacement at the narrower end
  - Pos. 2: Telescopic elements for displacement at the wider end
  - Sensitivity results from the signal difference during telescopic displacement

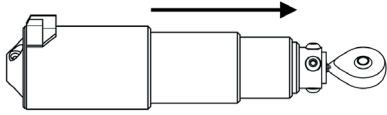


Fig. 1: Pos. 1

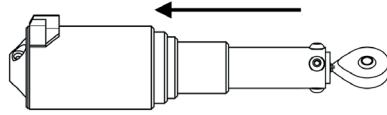


Fig. 2: Pos. 2

- 2) Description
- Rigid suspension at both fastening points
  - Telescopic deflection through a weight acting at the middle (450 gram)
  - Sensitivity results from the signal difference during telescopic deflection

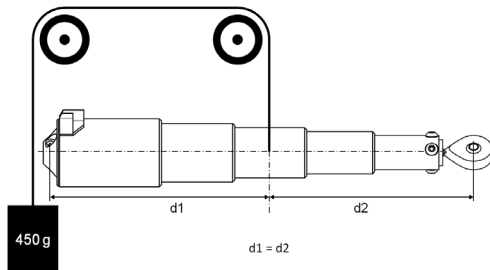


Fig. 3: Diagram of measurement setup for telescopic deflection

- 3) Description: rotation X axis

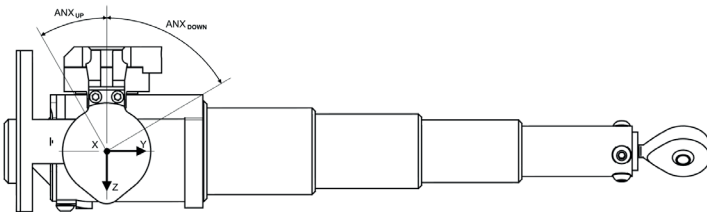


Fig. 4: Angle measuring: rotation X axis

- 4) Description: rotation Z axis

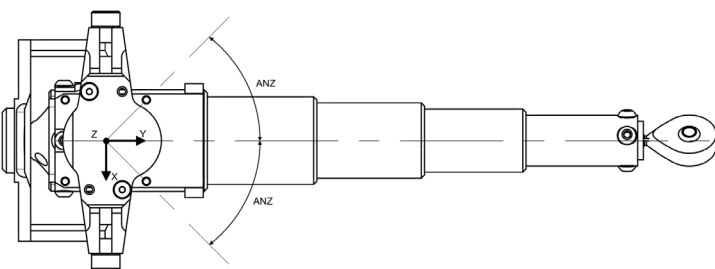


Fig. 5: Angle measuring: rotation Z axis

WS-50-03x\_003-528e-06.20

**Ordering key**

**Single sensor**

**Mat. No.**

Single sensor in telescoping rod Shoulder and Thorax Deformation KIR-TRACC, 1-dim. length measurement (infrared), 90 mm 55232909

Type WS-50-

**WS-50 assemblies, position**

Thorax 2D - DTI <sup>5)</sup>	0367-2K	↑
Thorax 3D - DTI <sup>5)</sup>	0367-3K	
Shoulder 2D - DTI <sup>5)</sup>	0368-2K	
Shoulder 3D - DTI <sup>5)</sup>	0368-3K	

<sup>5)</sup> DTI-ready, no DiMOD included, calibration included