

KIR-TRACC

Deformation measuring for THOR-50M

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

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 abdominal compression for use in the THOR-50M (Test device for Human Occupant Restraints 50th Percentile Metric). The sensor can only be used in the THOR in combination with a corresponding mechanical apparatus matched to the measuring position and other measuring sensors.

The measurement of the thorax and abdominal deformation within the scope of an 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.

Sensor Types 55187776/55184532 are characterized by:

- THOR-50M "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"

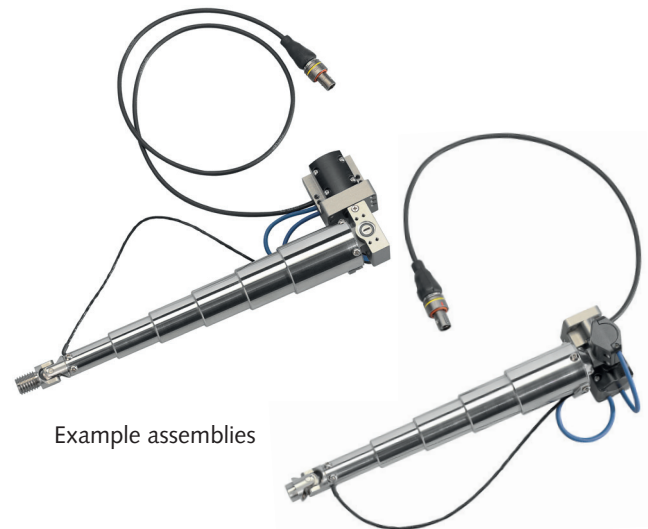
Description

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.

Both the transmitter LED as well as the photodiode are installed

Type TH-472-3550-K,
TH-472-3560-K,
TH-472-3570-K,
TH-472-3580-K,
TH-472-4730-1K,
TH-472-4730-2K



Example assemblies

in a telescoping rod that can be pushed together longitudinally.

Application

The THOR-50M 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, each apparatus accommodates two angle measuring sensors so that the complete units measure the torso deformation together, thereby making the injury parameters determinable.

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

Technical data

Specification		55187776	55184532
		Thorax	Abdomen
Measuring range	mm	90	120
Retraction/withdrawal speed, max.	m/s	50	50
Power supply U_b	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	
Approximation deviation, max.	%	1	1
Shock resistance, max.	g	200	200
Cable length (open cable ends)	m	6	6
Mass	Grams	125	160
Sensitivity of telescopic displacement ¹⁾			
Deviation @ 120 mm (typ.)	%F.S.	-	0.4
Deviation @ 90 mm (typ.)	%F.S.	0.2	0.3
Deviation @ 75 mm (typ.)	%F.S.	0.2	-
Deviation @ 60 mm (typ.)	%F.S.	0.1	0.2
Deviation @ 30 mm (typ.)	%F.S.	0.1	0.1
Deviation (max. %F.S.)	%	1	1
Sensitivity of telescopic deflection ²⁾			
Deviation @ 120 mm (typ.)	%F.S.	-	0.5
Deviation @ 90 mm (typ.)	%F.S.	0.6	0.3
Deviation @ 75 mm (typ.)	%F.S.	0.3	-
Deviation @ 60 mm (typ.)	%F.S.	0.2	0.2
Deviation @ 30 mm (typ.)	%F.S.	0.2	0.1
Deviation (max. %F.S.)	%	1.5	1.5

- 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

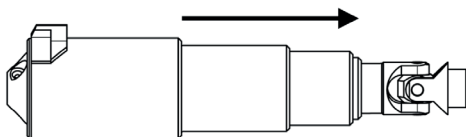


Fig. 1: Pos. 1

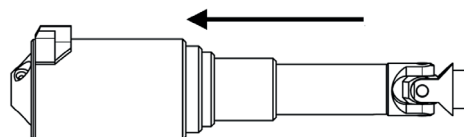


Fig. 2: Pos. 2

- 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

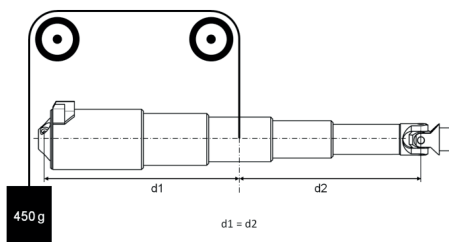


Fig. 3: Diagram of measurement setup for telescopic deflection

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Ordering key

Single sensor	Mat. No.
Single sensor in telescoping rod Thorax KIR-TRACC, 1-dim. length measurement (infrared), 90 mm	55187776
Single sensor in telescoping rod Abdomen KIR-TRACC, 1-dim. length measurement (infrared), 120 mm	55184532

Type TH-472-

THOR-50M assemblies, position

Upper Thorax Left - DTI ³⁾	3550-K
Upper Thorax Right - DTI ³⁾	3560-K
Lower Thorax Left - DTI ³⁾	3570-K
Lower Thorax Right - DTI ³⁾	3580-K
Abdomen Left - DTI ³⁾	4730-1K
Abdomen Right - DTI ³⁾	4730-2K



³⁾ DTI-ready, no DiMOD included, calibration included

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