

# Lower Tibia Load Cell

## Four-axial, Five-axial

Type M55204A...,  
M55204B...,  
M55205A...,  
M55205B...

Type M5520... is designed to measure forces and moments in the lower tibia of the crash test dummies HIII-5 % (HF), HIII-50 % (H3) and HIII-95 % (HM). The sensor is available with four or five axes.

- Axes: four ( $F_x, F_z, M_x, M_y$ ) or five ( $F_x, F_y, F_z, M_x, M_y$ )
- UPS module available
- MICRODAU® available
- Low linearity error and hysteresis error
- Kistler system cabling
- Polarities according to SAE J211/1

### Description

The load cell is made of elements on which forces and moments are transmitted. The mechanical deformation element, applied with strain gage, serves for mechanical electrical deformation. The forces and moments to be measured create mechanical stretches and buckling in the gaging member. In order to avoid linearity errors, the deformation paths are constructively held small (high stiffness). Thus a proportional behavior is realized.



Type M55204A...

Type M55204B...

The force and moment proportional resistance variations are measured by a Wheatstone-type bridge circuit. The load cell is available with UPS module which is integrated in an external housing in the wiring or in the connector. Customized cable lengths and connectors with specific pin assignments are optionally available.

### Technical Data

Axial Data		$F_x$	$F_y^{1)}$	$F_z$	$M_x$	$M_y$
Measuring range	kN	11	11	11		
	N·m				400	400
Bridge output voltage (typ.)	mV/V	2,0	2,0	1,0	2,8	2,8
Sensitivity (typ.)	$\mu\text{V}/\text{V}/\text{kN}$	180	180	90		
	$\mu\text{V}/\text{V}/\text{N}\cdot\text{m}$				7,0	7,0
Bridge resistance	$\Omega$	700 <sup>2)</sup>	700 <sup>2)</sup>	700	350	350
Ultimate load, static	%	150	150	150	150	150

### General Data

Supply voltage <sup>3)</sup>	VDC	2,5 ... 15
Insulation resistance <sup>4)</sup>	G $\Omega$	>10
Operating temperature range	°C	-20 ... 80
Storage temperature range	°C	-30 ... 90
Amplitude non-linearity (typ.)	%	<1
Hysteresis (typ.)	%	<1
Channel cross talk	%	<5
Bridge zero output (typ. / max.)	mV/V	0,01 / 0,03
Weight, without cable	grams	490

All specifications are typical at 25 °C and rated at 10 V sensor supply voltage, unless otherwise specified.

<sup>1)</sup> Only five-axial version

<sup>2)</sup> Five-axial LC: up to serial number 0004606001 (up to year of construction 2015) the bridge resistance of the load cells is 350  $\Omega$  ( $F_x, F_y$ ). Please mind the first calibration!

Four-axial LC: up to serial number 0004605991 (up to year of construction 2015) the bridge resistance of the load cells is 350  $\Omega$  ( $F_x$ ). Please mind the first calibration!

<sup>3)</sup> With UPS module 9 ... 12 VDC

<sup>4)</sup> All wires to load cell housing, measured with 500 VDC

### Application

The load cell is directly assembled at the designated location in the dummy and provides important information about the loads on the human body occurring during a crash test. The measuring location lower tibia is typically used together with the measuring location upper tibia (Type M5521...). If tibia load cells are mounted in a dummy both the tibia bone and the knee of the dummy must be replaced. The items are:

	Type
Tibia bone	M55000ASM00Q0001
Knee as bone	M55110AJM00Q0001
Knee as load cell	M55112AJM...

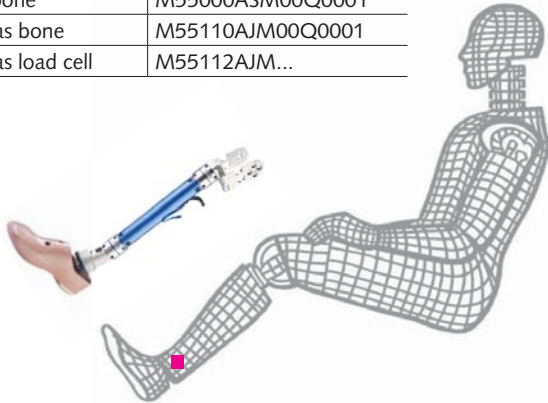


Fig. 1: Instrumented leg and dummy application

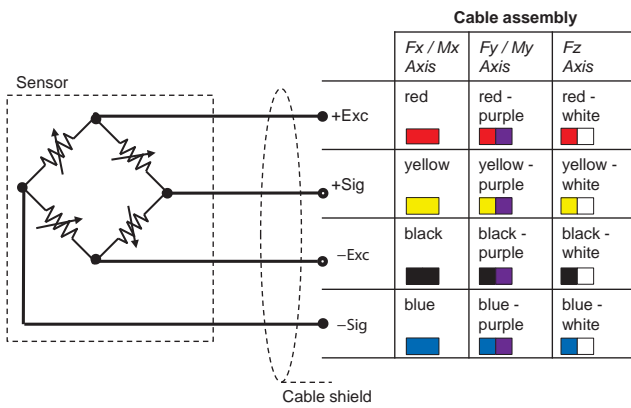


Fig. 2: Cable assembly

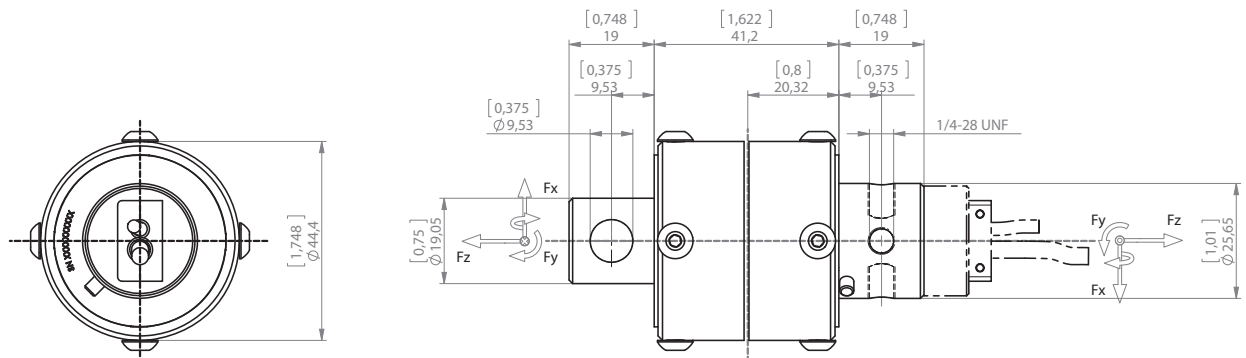


Fig. 3: Dimensions in mm

### Included Accessories

- Mounting screws, imperial 1/4-28 UNF, 4 units

### Type No.

on request

### Optional Accessories

- Add. label, customized
- UPS module
- Add. shunt

### Type No.

M015KABID  
on request  
on request

### Ordering Key

#### Design

Four axes:	
Standard	4ARM
Mech. prepared for MICRODAU®	4BRM
Five axes:	
Standard	5ARM
Mech. prepared for MICRODAU®	5BRM

#### Cable Length before Electronics

0 cm	00
<10 cm (digit x 1 cm)	C#
10 cm ... 9,9 m (digit x 10 cm)	##
10 m ... 90 m (digit x 10 m)	D#

#### Additional Electronics

Sensor detail, as per type declaration force-moment TP-650-2	#
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#### Cable Length after Electronics

0 cm	00
<10 cm (digit x 1 cm)	C#
10 cm ... 9,9 m (digit x 10 cm)	##
10 m ... 90 m (digit x 10 m)	D#

#### Connector

Conn. type, as per TP-600	#-
Conn. assignment, as per TP-600	-#

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