Welcome to the webinar on “How to get the most out of TEDS (Transducer Electronic Data Sheets)”

The

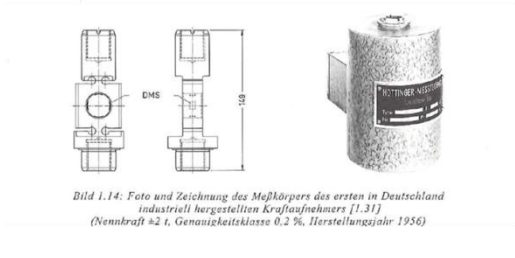

Bild 1.14: Foto und Zeichnung des Meßkörpers des ersten in Deutschland industriell hergestellten Kraftaufnehmers [1.31]
(Nennkraft ±2 t, Genauigkeitsklasse 0,2 %, Herstellungsjahr 1956)

WEBINAR

Organisational Information

- To enable **audio,** activate your PC **speakers** or connect **headphones** to your PC.
- All participants' **microphones** are **muted** during the webinar.
- If you have any questions, please use the '**Questions and answers**' window.

- Questions will be answered **at the end** of the presentation.
- We will **email the presentation** to you after the webinar.
- Moreover, the webinar is being **recorded** and will soon be made available on our website.

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Presenter

- Thomas Kleckers
- Joined HBM in 1992 (Strain Gauge Development)
- 2008 Product Manager Force Sensors
- Education: Study of Phyiscis at University of Applied Sciences Duisburg

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Product Manager Force Sensors

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Agenda

1. TEDS Basics
2. Sensor characteristics and TEDS
3. Different classes of TEDS
4. Plug and play solutions

TEDS Basics

Fundamental procedure of a measurement:

1. Mounting of the measurement devices
2. Set up of the instrument
3. Measure
4. Post process jobs

1. Set up of the instrument…..
   in case of strain gauge based sensors you need to type into your software:

- Rated output
- Supply voltage
- Serial number
- Capacity
- Correct filter
- Shunts….

- Professional personal required
- Mistakes may occur in any case
- Time consuming

TEDS Basics

TEDS means „Transducer Electronic Data Sheet“

- A very small printed circuit board is integrated in the sensor.
- The sensor characteristics are stored on a chip on this PCB.
- *If the sensor is connected to a DAQ system with TEDS functionality, the setup of the instrument is done automatically.*

NO professional personal required
NO Mistakes may occur in any case
NOT Time consuming

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TEDS Basics

Production lines:

- Replacement of a sensor is easy
- No special sensor knowledge required

Testing:

- No typing errors
- Time Saving process
- Sensors used under conditions of calibration

TEDS Basics

IEEE 1451.4 – The Standard defines the way that the information is stored in the memory chip

History

➔ HBM joined the working group from the start (together with other leading manufacturers)

➔ Officially valid since May 2004

Content of the IEEE 1451.4

How to connect a TEDS
Data structure of a TEDS

Sensor characteristics and TEDS

All relevant data are organized in so called templates.

The first bits are the „Basic TEDS“

- Manufactor ID
- Sensor Series
- Version Letter
- Version Number
- Seriennummer des Sensors

0X001f

0X001f = HBM

```
IEEE1451dot4 Manufacturer List Fi
TDL_Version_Number 2
Version 2
0x0001, Unknown manufacturer
0x0011, Bruel &amp;amp; Kjaer
0x0012, The Modal Shop, Inc.
0x0013, Kistler Instrument Corpora
0x0014, Macro Sensors
0x0015, Wilcoxon Research
0x0016, Endevco Corporation
0x0017, PCB Piezotronics, Inc.
0x0018, G.R.A.S. Sound &amp;amp; Vibra
0x0019, Larson Davis
0x001A, Key Transducers, Inc.
0x001B, Oceana Sensor Technologies
0x001C, Entek IRD
0x001D, Scitefair International, I
0x001E, National Instruments
0x001F, HBM
0x0020, TEAC
0x0021, RION CO.
```


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Sensor characteristics and TEDS

The first bits are the „Basic TEDS“

- Manufactor ID
- Sensor Series
- Version Letter
- Version Number
- Seriennummer des Sensors

0X0088

0x0088 = U10M

```
0x0086,*,*="U3"
0x0087,*,*="U5"
0x0093,*,*="U9B"
0x009e,*,*="U9C"
0x0098,*,*="U93"
0x0088,*,*="U10M"
0x0094,*,*="U10-E"
0x009c,*,*="U10S"
0x009a,*,*="U15"
0x0095,*,*="C2"
0x008b,*,*="C4"
0x0082,*,*="C6A"
0x0081,*,*="C9B"
0x009f,*,*="C9C"
0x008c,*,*="C18"
0x0084,*,*="S2"
0x0085,*,*="S9"
0x009d,*,*="S9M"
0x008e,*,*="Z4A"
0x008f,*,*="Z30"
0x0099,*,*="Z30A"
0x0091,*,*="TOP-Z30"
0x009b,*,*="TOP-Z30A"
0x0092,*,*="TOP-Z4A"
0x0096,*,*="KD"
0x0097,*,*="KDB"
0x0090,*,*="STZ"
0x0083,*,*="KMR"
0x0089,*,*="SLB700"
0x008a,*,*="DD1"
```


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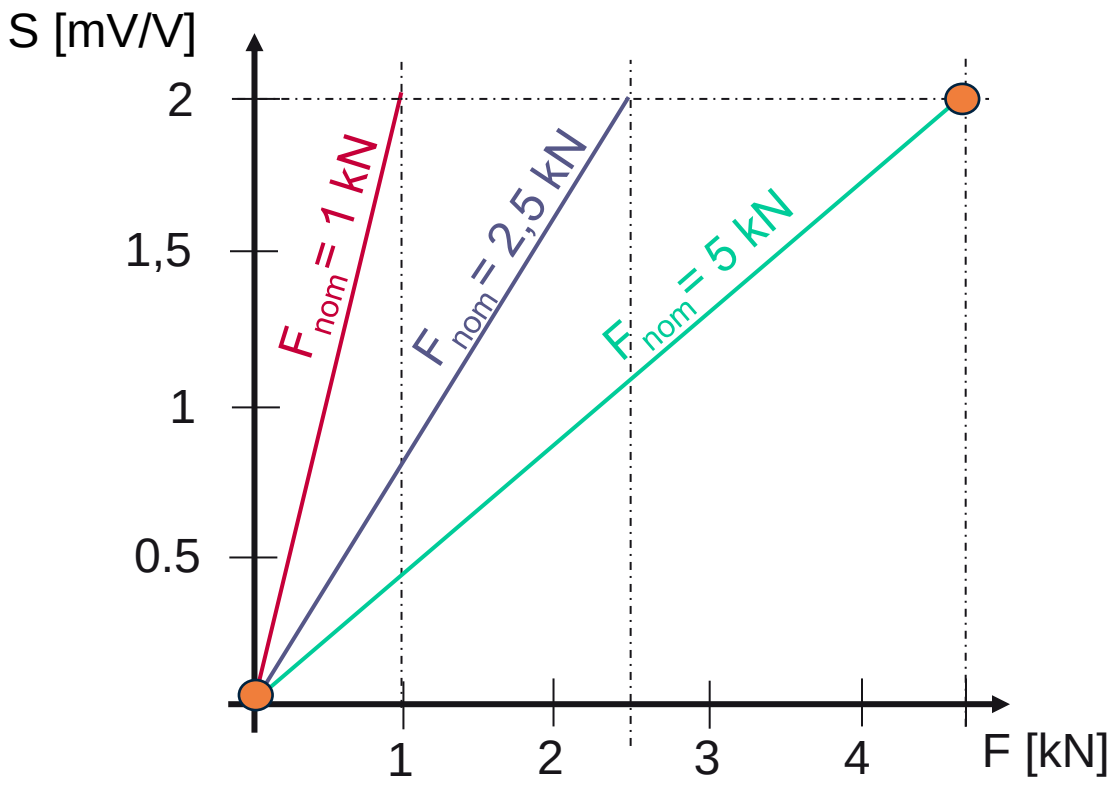
Sensor characteristics and TEDS

Template ID	Name
25	Accelerometer & Force
26	Charge Amplifier (Acceleration)
27	Microphones
28	Microphones with amplifiers
29	Capacitive Microphones
30	High Level output Sensors
31	Current Loop Sensor
32	Resistance Sensors
33	Bridge Sensors
34	LVDT / RVDT
35	Strain Gauges
36	Thermocouple
37	Resistance Temperature Detectors
38	Thermistor
39	Potentiometer
43	Charge Amplifier (Force)
41	Calibration Curve (Polynominal)

Sensor characteristics and TEDS



0 kN = 0 mV/V
5 kN = 2.01221 mV/V

Content of a TEDS
(in Case of a load cell)

- Input range of the load cell
- Electrical output
- Supply voltage
- Calibration date
- Calibration Initials

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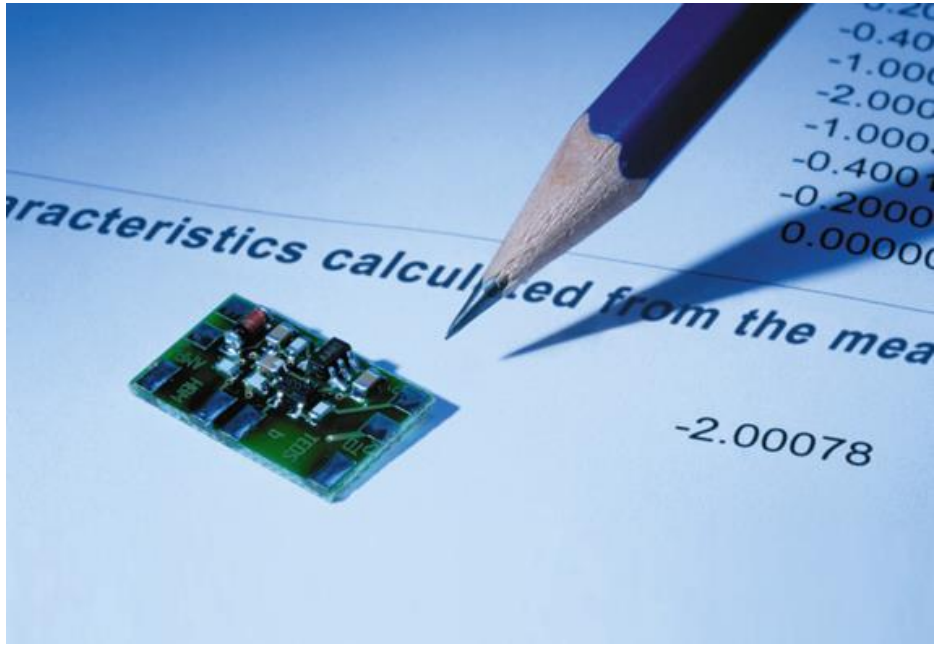
Different classes of TEDS

Hardware: Wiring of the TEDS chip



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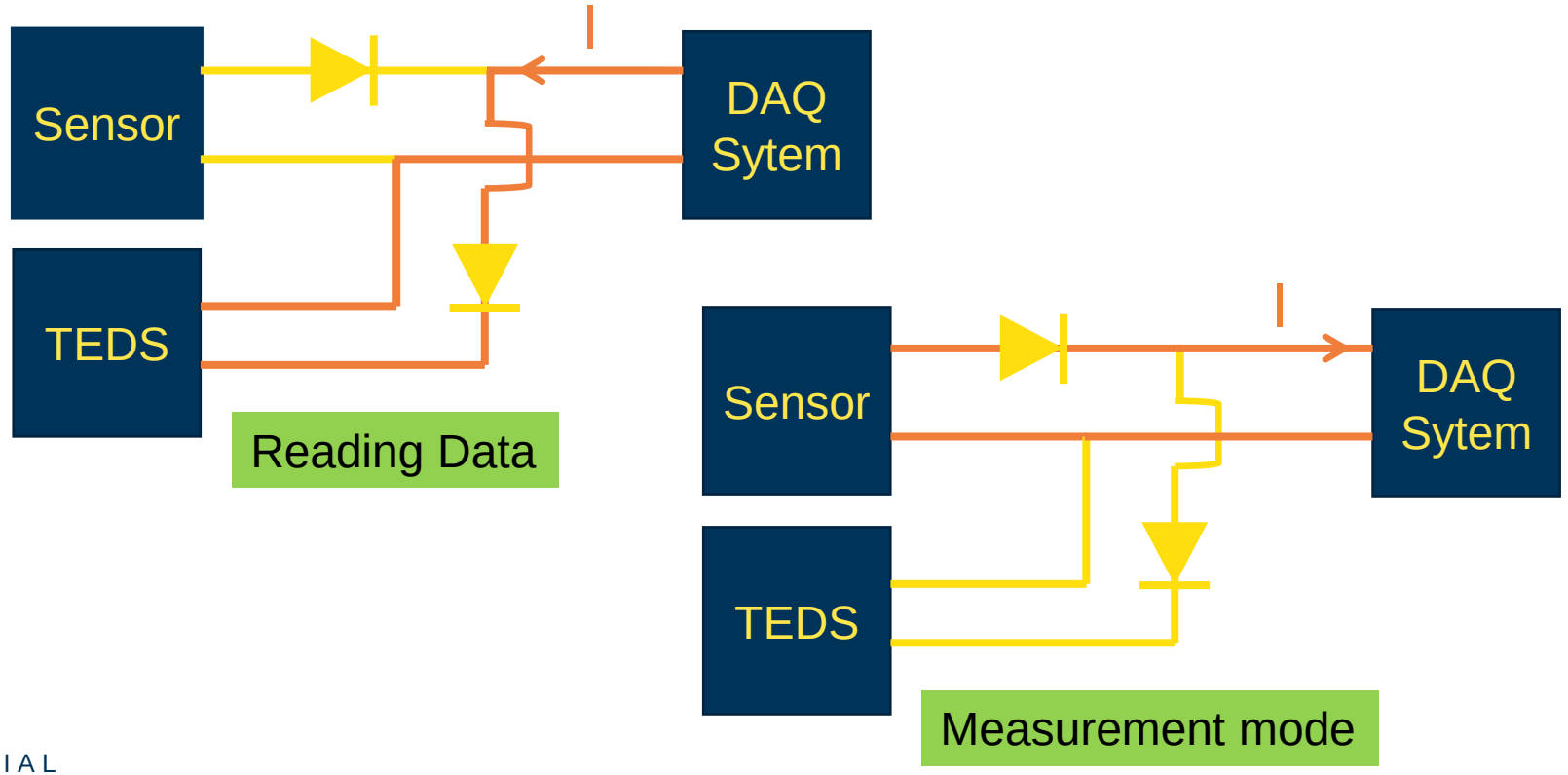
Different classes of TEDS

The two ways of TEDS connection given in the IEEE1451.4:

Class 1 Sensors:

The sensor lines are used for both: Data Transfer and measurement



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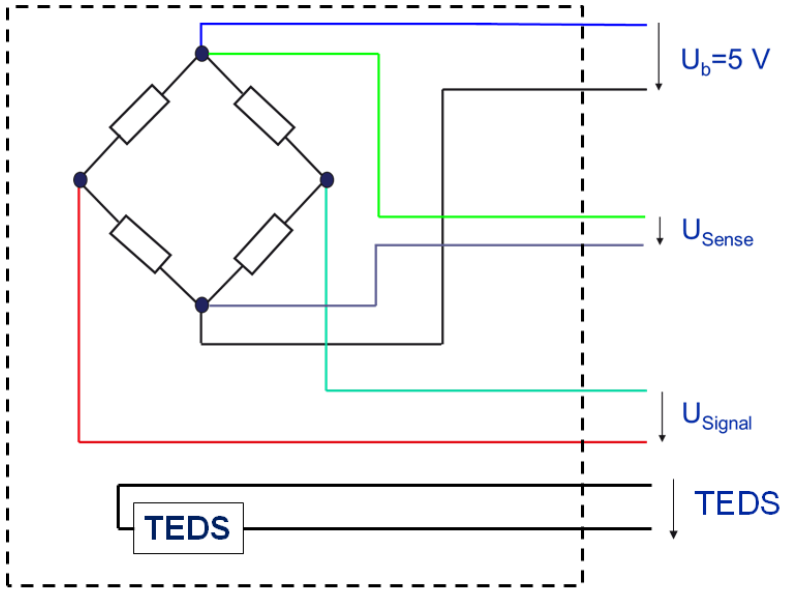
Different classes of TEDS

The two ways of TEDS connection given in the IEEE1451.4:

Class 2 Sensors:

Reading of TEDS data and measurement modes are independent from each other



Reading Data & Measurement at the same time!

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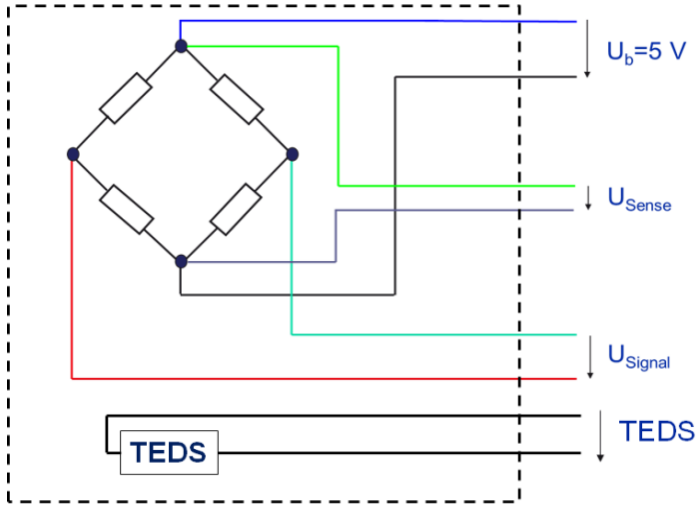
Different classes of TEDS

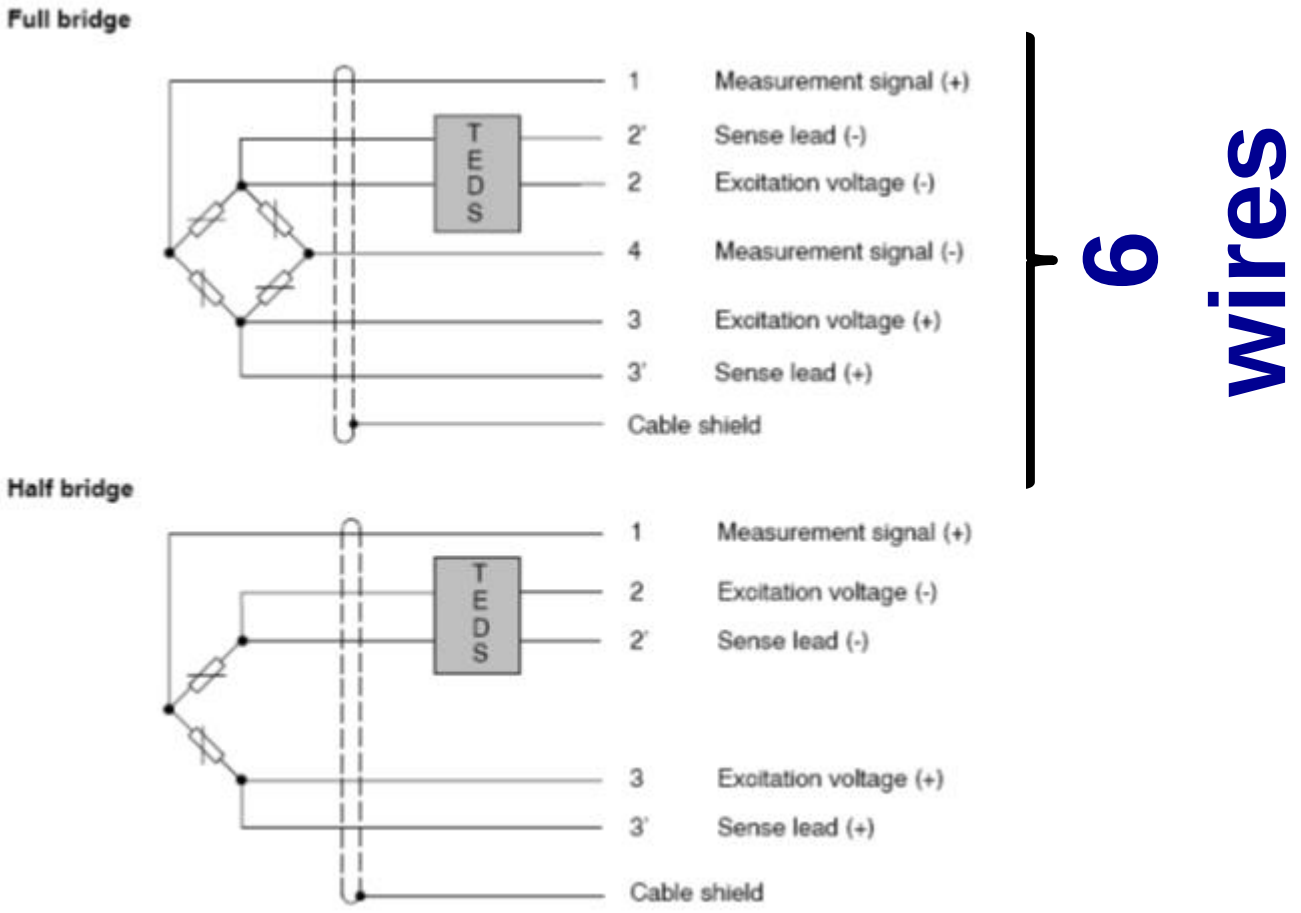


Class 2 Bridge Sensors need **eight** wires

- Infrastructure of production lines and test rigs is normally **six** wire for load cells.
- Requirement for cables to be used for bridge sensors are pretty challenging. Very good solutions are available for six wire connection.

Different classes of TEDS

Solution in the upcoming Standard: Class “3” Bridge Sensors



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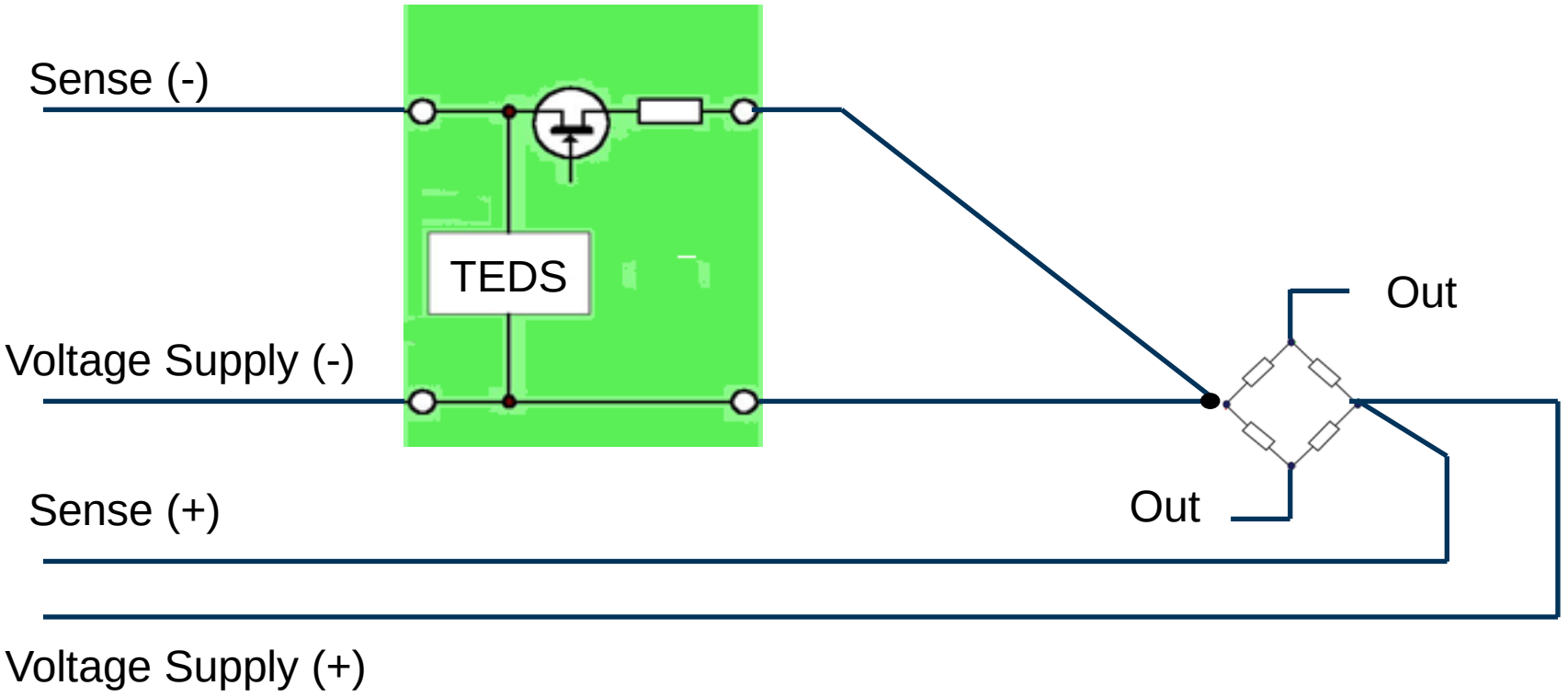
Different classes of TEDS



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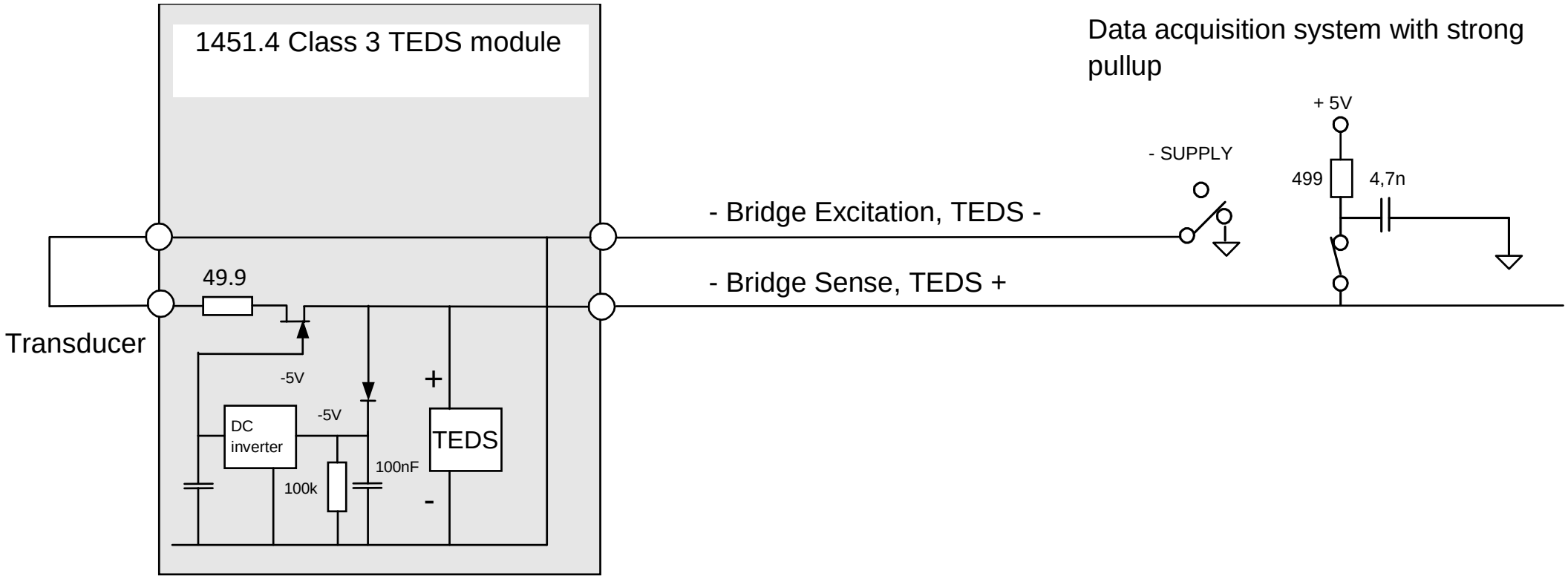
Different classes of TEDS

Zero – Wire TEDS module: HBM Draft



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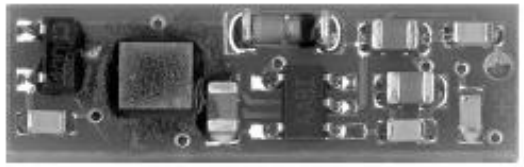
Plug and play solutions

Solution 1: Integration in a sensor

- **The TEDS has to be mechanically connected to the Sensor!**



PCB for TEDS integration into a sensor.

U10

U93

Z30a

Very best solution, as plugs at the sensor can be used.

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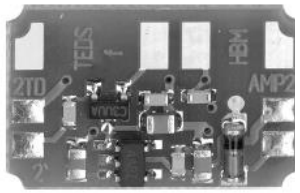
Plug and play solutions

Solution 2: Integration in the plug

- **The TEDS has to be mechanically connected to the Sensor!**



PCB for TEDS integration in a connector

S9M

S2M

For sensors with small dimensions.

U9C & C9C

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Plug and play solutions

C10 versions and order numbers

Preferred version, available at short notice

The order numbers for preferred types are 1_C10/...,
the order numbers for customer specific versions are K-U10M....

Code	Measuring range	Order No.
2k50	2.5 kN	1-C10/2.5kN
5k00	5 kN	1-C10/5kN
10k0	10 kN	1-C10/10kN
25k0	25 kN	1-C10/25kN
50k0	50 kN	1-C10/50kN
100k	100 kN	1-C10/100kN
250k	250 kN	1-C10/250kN
500k	500 kN	1-C10/500kN
1M00	1 MN	1-C10/1MN

Number of measuring bridges	Characteristic value	Calibration	Transducer identification	Mechanical design	Plug protection	Electrical connection Bridge A	Electrical connection Bridge B
Single bridge **SB**	Not adjusted **D**	100 % **1**	Without TEDS **S**	With adapter **W**	Without **U**	Bayonet connector **B**	
Double bridge **DB**	Adjusted **J**	50% **5**	With TEDS **T**	Without adapter **D**	With **P**	Threaded connector **G**	
						Fixed cable, 6 m **K**	
						Fixed cable, 15 m **V**	

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Plug and play solutions

Versions and ordering numbers

Code	Measuring range	Ordering number
500N	500 N	1-U2B/500N
001K	1 kN	1-U2B/1KN
002K	2 kN	1-U2B/2KN
005K	5 kN	1-U2B/5KN
010K	10 kN	1-U2B/10KN
020K	20 kN	1-U2B/20KN
050K	50 kN	1-U2B/50KN
100K	100 kN	1-U2B/100KN
200K	200 kN	1-U2B/200KN

The ordering numbers shown in gray are preferred types and can be delivered rapidly. All preferred types come with free ends and without TEDS transducer identification. The example below describes a U2B with a capacity of 50 kN, 12 m connection cable, fitted SUB-HD plug for connection to the QuantumX amplifier and TEDS transducer identification chip.

Cable length	Plug version	Transducer identification
3 m **03M0**	Free ends **Y**	With TEDS **T**
6 m **06M0**	15-pin Sub-D plug **F**	Without TEDS **S**
12 m **12M0**	Plug MS3106PEMV **N**	
20 m **20M0**	Plug 15-pin Sub-D **Q**	
30 m **30M0**	RJ45 plug, 8-pin, EMC shielded **E**	

K-U2B-	050K-	12M0	F	T

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Plug and play solutions

Versions and ordering numbers

Code	Measuring range	Ordering number
0050	50 N	1-U9C/50N
0100	100 N	1-U9C/100N
0200	200 N	1-U9C/200N
00K5	0.5 kN	1-U9C/0.5KN
01k0	1 kN	1-U9C/1KN
02k0	2 kN	1-U9C/2kN
05k0	5 kN	1-U9C/5kN
10k0	10 kN	1-U9C/10kN
20k0	20 kN	1-U9C/20KN
50k0	50 kN	1-U9C/50KN

The ordering numbers shown in gray are preferred types, they can be delivered rapidly. All force transducers with 1.5 m cable, open ends and without TEDS.

The order no. for the preferred types is 1-U9C...

The order no. for customer-specific designs is K-U9C-...

The ordering number example **K–U9C–05k0–12m0–F–T** shown further below refers to a: U9C, 5 kN nominal (rated) force with 12 m cable, 15-pin Sub-D connector and TEDS

	Cable length	Plug version	Transducer identification
	1.5 m **01m5**	Free ends **Y**	With TEDS **T**
	3 m **03m0**	15-pin Sub-D connector **F**	Without TEDS **S**
	5 m **05m0**	MS3106PEMV connector **N**	
	6 m **06m0**	15-pin Sub-HD connector **Q**	
	7 m **07m0**		
	12 m **12m0**		
K-U9C- **05k0-**		**12m0-**	**F-**	**T**

All cable lengths can be combined with all plugs.

TEDS can only be ordered in conjunction with a plug option. It is not possible to combine TEDS and free cable ends.

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Plug and play solutions

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Additional information

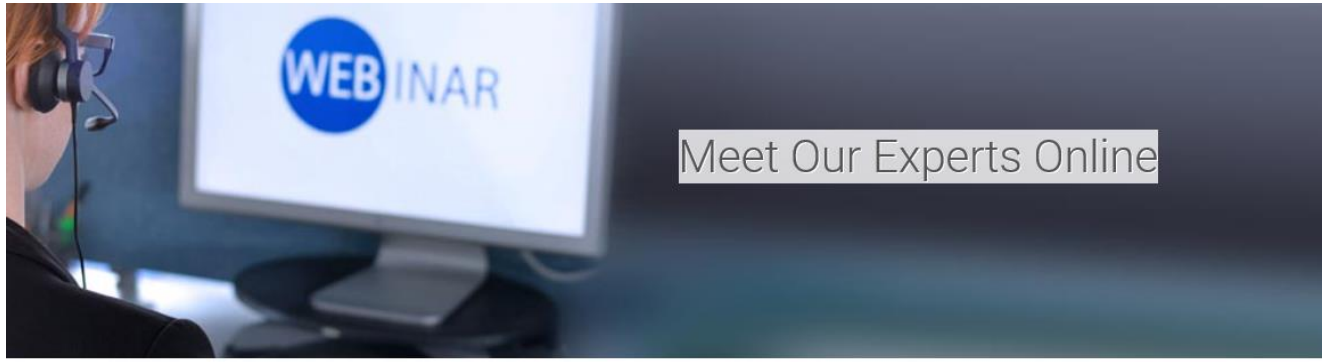
More information on Force Measurement can be found on our website:

- **www.hbm.com/force**

Additional information

Find all upcoming webinar dates here:

- **www.hbm.com/webinar**



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North America - Eastern Time (ET)

Introduction to Strain Gauges

Tuesday, April 7, 2020 2:00 PM ET

This webinar will provide an introduction to the theory and practical installation and use of strain gauges.

Read more

15-Minute Lunch & Learn: Electric Power Testing

Europe - Central European Time (CET)

Back EMF Measurements for End of Line Motor Validation

Tuesday, April 21, 2020 2:00 PM ET

Tuesday, April 21, 2020 3:00 PM CET

This webinar will discuss using back emf measurements to characterize and validate motors at the end of an assembly line.

Read more

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Any questions?

- If you have any questions, please do not hesitate to contact us: webinar@hbm.com
- Or email the presenter directly: thomas.kleckers@hbm.com

Thank You

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