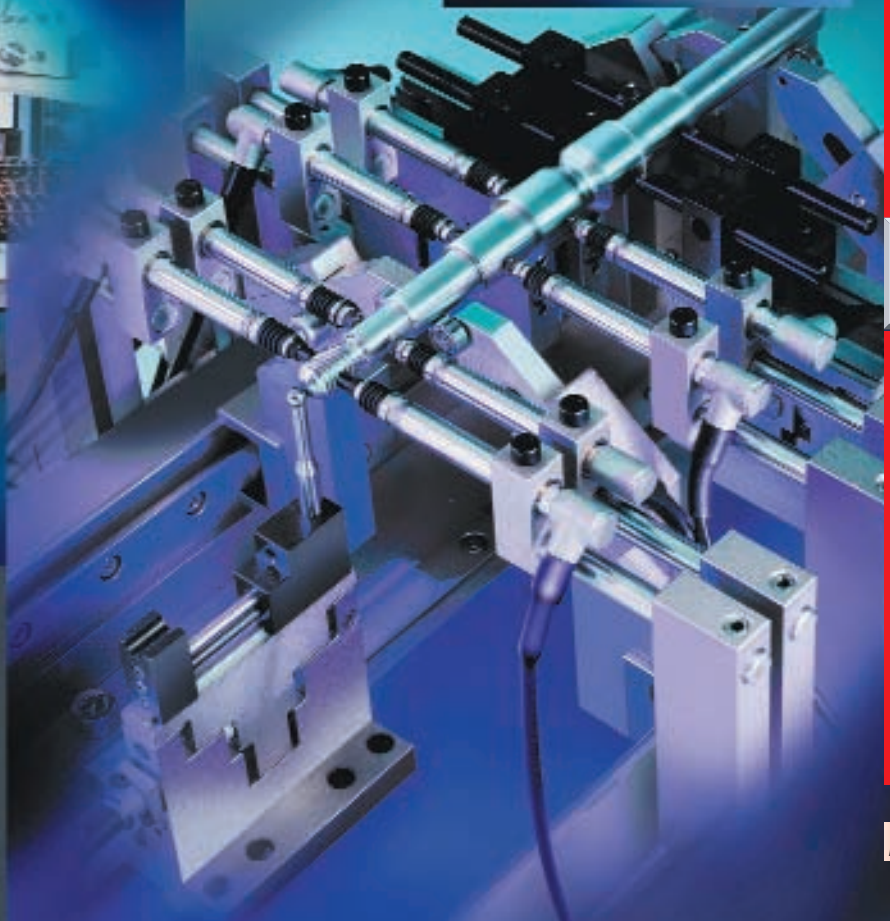
Electronic Length Measuring Equipments



TESA® Length Measuring Equipments with Inductive Probes

*TESA offers a complete family of value sensors (electronic probes) as well as dedicated measuring instruments for the most demanding applications. Our **standard probes -** also called **half-bridge probes** - operate on the electrical principle. They do not need be specifically adjusted.*

*Electronic probes that are used with the measuring instruments from other manufacturers operate partially on the basis of a differential transformer. These are **LVDT** type probes (Linear Variable Differential Transformer). TESA also offer a full range of this kind of probes which, however, need to be fitted with an appropriate socket and further adapted accordingly.*

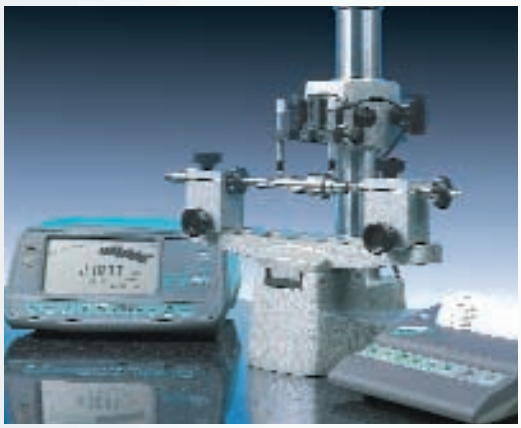
For more details on TESA half-bridge and LVDT inductive probes, read the information that follows.

Countless Measuring Capabilities

All TESA electronic probes can either be used with hand-held internal and external measuring instruments or in conjunction with measuring stands and other typical measuring devices. TESA can supply such executions as axial probes with linear displacement of the measuring bolt, angled probes with inclinable lever or probes with parallel guiding that are specially designed for multigauging devices and other equipment for in-process inspection - thus allowing to spare a great deal of assembly components.

With a very few exceptions, these probes perform «comparative measurements», essentially. Based on a master standard, which can either be a gauge block, a setting ring or any other workpiece accepted as such, a number of sizes are compared on the test piece.

- *All measurements are taken with high accuracy. The bias errors usually count for very little in the uncertainty budget since the comparison is made between two values of a measurand that are close to one another.*
- *Random errors are also significantly reduced as display setting and all subsequent measurements are usually made in the same conditions.*
- *TESA measuring instruments are provided with an analogue and/or digital display depending on their type.*



Instrument based Processing

Processing the measurement signals is performed differently according to the measuring application.

Mathematical Signal Processing

Signal processing can equally be made with «positive» or «negative» polarity signs. The use of one single probe enable «single measurement» of internal or external dimensions while the combination of the signals of two probes produces either a «sum measurement» or a «difference measurement».

Value Storage

Provides security for your dynamic measurement cycles. The smallest or highest value as well as the difference between both values are some of the part features that are questioned when capturing form and position errors.

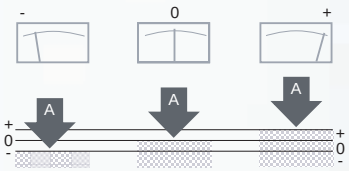
Value Classification

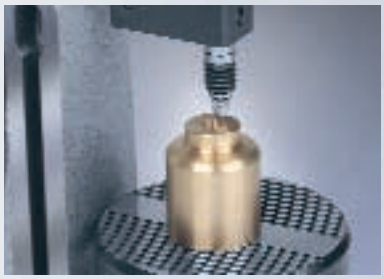
Uses limit deviations to classify the measured values while producing additional control signals usable through a remote unit.

General Overview of the Measuring Functions

Single measurements with positive polarity sign (+A)

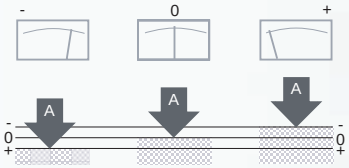
Measuring external dimensions with use of a measuring stand, snap gauge etc.

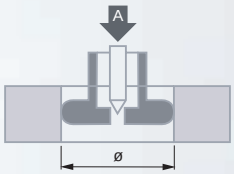




Single measurements with negative polarity sign (-A)

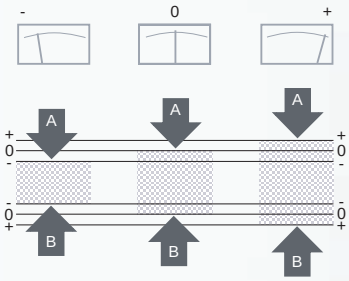
Inspecting with change of the polarity sign. Display will show a low value for a small bore or a high value for a large diameter.

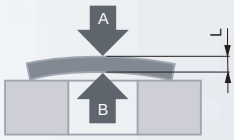




Sum measurements with positive polarity signs (+A +B)

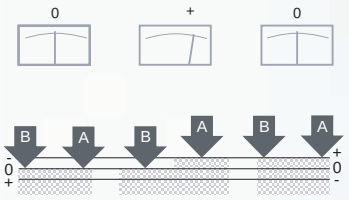
Measuring external dimensions regardless of the form and position errors.

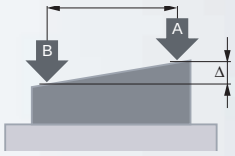




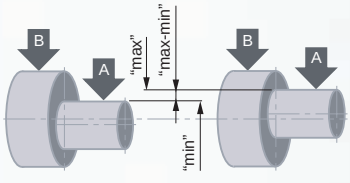
Difference measurements with opposite polarity signs (+A -B)

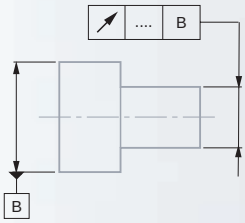
Performing step, cone and inclination measurements.

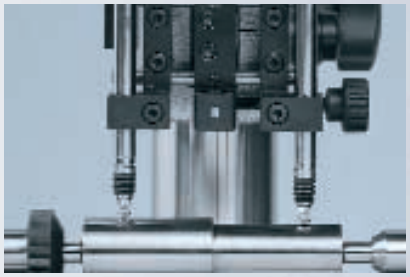


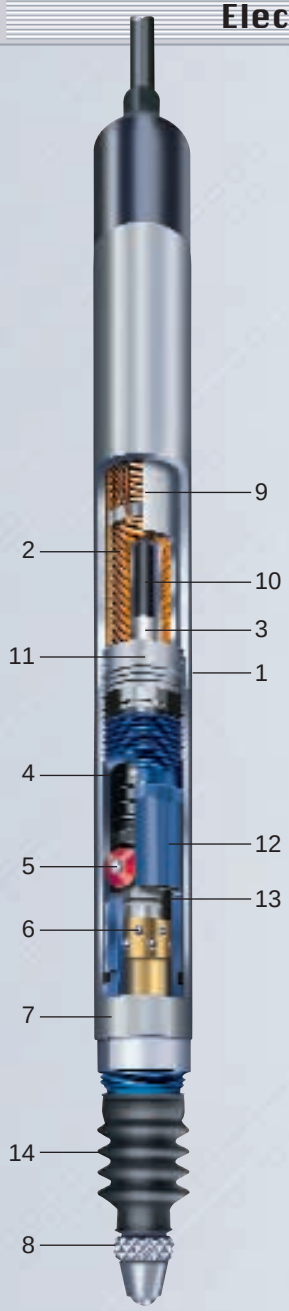


Establishing form and position errors such as runout errors with use of the memory function «max»-«min» as shown in the example.







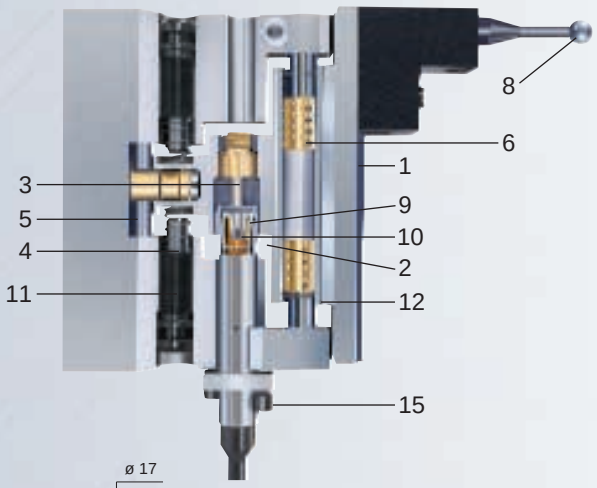


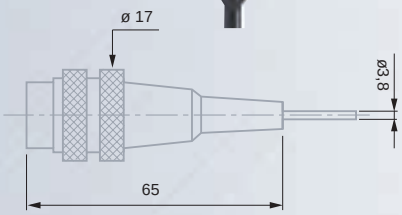
TESA Electronic Probes at the Forefront in Precision Measurement

TESA is a leading designer, manufacturer and user of inductive probes for more than 40 years. TESA high precision electronic probes are made to withstand the stresses sustained in the production environment where they can be constantly used for series inspection. But, these probes are also designed for high accuracy measurements such as those performed in gauge block calibration, for instance.

- *All electronic probes are mounted on ball bearings, except for miniature axial probes.*
- *Ball-bearing measuring bolts are virtually insensitive to radial forces.*
- *Probe guide system is efficiently protected against the penetration of solid and liquid contaminants by sealing rubber bellows. In normal conditions of use, nitrile elastomer rubber bellows are sufficient. For applications where the probes remain permanently in contact with cooling and lubricating agents, we would recommend the use of Viton rubber bellows.*
- *Sealing bellows ensure full airtightness so that the measuring bolt is retracted by throwing off the air contained in the probe. This provides optimum protection of the guiding system as no mechanical means is used.*
- *Electronic signal amplification with no use of any other mechanical component produces excellent repeatability and low hysteresis.*
- *Maximum resolution: 0,01 µm*

1 Mounting stem or probe housing
2 Coil system
3 Item mounted between both the ferro-magnetic core and measuring bolt for the correction of the varying coefficients of thermal expansion
4 Force compression spring
5 Anti-rotation guidance
6 Ball cage
7 Setting element for limiting the bolt travel
8 Measuring insert
9 In-between tube being part of the coil system
10 Ferromagnetic core
11 Force spring stop
12 Ball-bearing guide tube
13 Measuring bolt
14 Sealing rubber bellow
15 Mechanical device for zero-setting





Dimensions of the connector fitted to all TESA probes (minimum cable curve radius R = 15 mm).

Probe sensitivity

All stated values are valid for the following reference conditions:

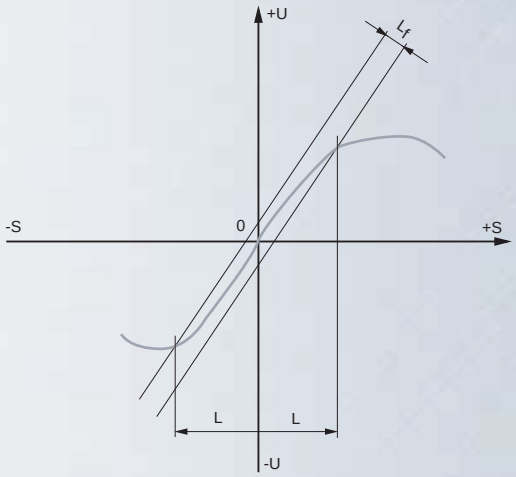
- Drive voltage 3 V
- Drive frequency 13 kHz
- Adjustment load 2 kΩ

	mV / V / mm
All types	73,75
Except for the probe series	
• GT 61 / 62	29,5
• FMS 130 / 132	49,17
LVDT probes	see both pages L-10 and L-11

Functioning Principle

All TESA electronic probes (value sensors) work on the inductive principle with mechanical contact of the workpiece. They are fitted with a coil system inducing an alternating output voltage that depends on the the position of the ferromagnetic core. With a symmetric position, i.e. at electrical zero, no voltage is impressed. A move of the core, which may be attached to the measuring bolt while the measurand is being taken, leads to a change in the inductance. This change generates a signal that is amplified and rectified before being displayed and further output. Depending on the instrument type, the analogue signal will be shown on a voltmeter or a numerical display after its digital transformation.

Unambiguous assessment of the measurand (at bolt position) to the signal (displayed value) is the main characteristic of the analogue value acquisition. One of its distinct advantages is that the value primarily displayed will be reproduced in the event of a power cut (switch-off or power failure).



Inductive probe related main parameters

s travel
U output current
0 electrical zero
L linearity range
L_f linearity error

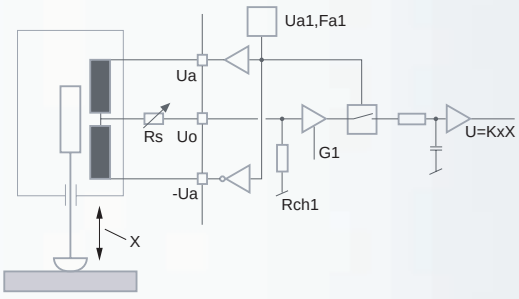
The linearity range L , which is the range within which the max. perm. errors are contained, is equal to the measuring range. All max. perm. errors are limiting values given for linearity errors.

Standard TESA Half-Bridge Probes for use with TESA Measuring Instruments

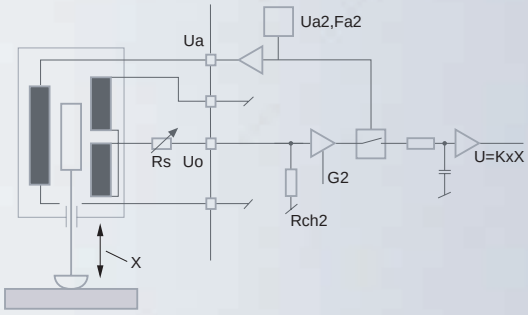
These probes have two serial coils with middle output mounted side by side and energised by a sinusoidal alternation at 3 kHz. Both are linked together to a Wheatstone bridge over an additional half-bridge.

TESA LVDT Probes

These probes are based on a Linear Variable Differential Transformer (LVDT). They have three coils: one primary coil, which is is energised by a sinusoidal alternation at 5 kHz, and two secondary coils, connected in opposite phase, which generate the output current proportional to the measuring travel.



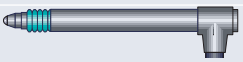
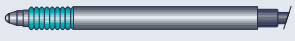
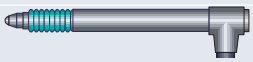
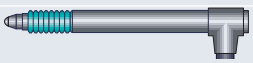
Wiring plan of half-bridge probes



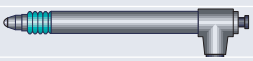
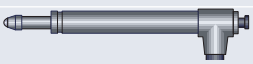
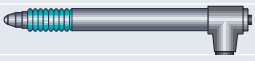
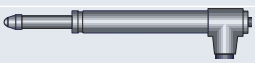
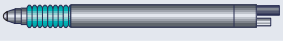
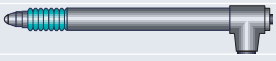
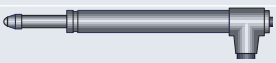
Wiring plan of LVDT probes

Standard TESA® Electronic Probes - Overview

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

	N°		Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Standard probes							
	32.10904	GT 21	± 2	4,3	axial	mechanical	Nitrile
	32.10924	GT 22	± 2	4,3	radial	by vacuum	Nitrile
	32.30057	GTL 21	± 2	4,3	axial	mechanical	Viton
	32.30072	GTL 211	± 2	4,3	axial	by vacuum	Viton
	32.30056	GTL 22	± 2	4,3	radial	by vacuum	Viton
Standard high-precision probes							
	32.30036	GT 21HP	± 0,2	4,3	axial	mechanical	Nitrile
	32.30021	GT 22HP	± 0,2	4,3	radial	by vacuum	Nitrile
Standard long-travel probes							
	32.30027	GT 27	± 2	10,3	axial	mechanical	Viton
	32.30073	GT 271	± 2	10,3	axial	by vacuum	Viton
	32.30026	GT 28	± 2	10,3	radial	by vacuum	Viton
Probes with extended measuring ranges							
	32.30041	GT 61	± 5	10,3	axial	mechanical	Viton
	32.30074	GT 611	± 5	10,3	axial	by vacuum	Viton
	32.30042	GT 62	± 5	10,3	radial	by vacuum	Viton

... with Activation of the Measuring Bolt by Pneumatic Pressure

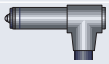
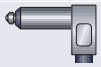
	N°		Measuring range mm	mm	Cable exit	Pressure (bar) Nomi-nal	Maxi-mum	Sealing bellows
Standard probes								
	32.30060	GTL 212	± 1,5	3,2	axial	0,7	1,0	Viton
	32.30054	GTL 222	± 1,5	3,2	radial	0,7	1,0	Viton
	32.30067	GTL 212-A	± 1,5	3,2	axial	0,25	6,0	none
	32.30063	GTL 222-A	± 1,5	3,2	radial	0,25	6,0	none
Long-travel probes								
	32.30061	GT 272	± 2	10,3	axial	1,1	1,5	Viton
	32.30053	GT 282	± 2	10,3	radial	1,1	1,5	Viton
	32.30068	GT 272-A	± 2	10,3	axial	1,0	6,0	none
	32.30069	GT 282-A	± 2	10,3	radial	1,0	6,0	none
Probes with extended measuring ranges								
	32.30062	GT 612	± 5	10,3	axial	1,1	1,5	Viton
	32.30055	GT 622	± 5	10,3	radial	1,1	1,5	Viton
	32.30070	GT 612-A	± 5	10,3	axial	1,0	6,0	none
	32.30071	GT 622-A	± 5	10,3	radial	1,0	6,0	none

** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.
*** Mechanical frequency limit valid for the final value of the measuring range with an amplitude of 10 %.
**** Max. perm. errors applicable to the linearity errors

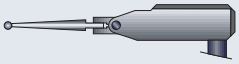
N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,63	6	60	yes	0,01	0,02	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	yes	0,01	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,63	6	60	no	0,01	0,01	$0,07 + 0,4 \cdot L$	10 to 40	IP64
0,63	6	60	no	0,01	0,01	$0,07 + 0,4 \cdot L$	10 to 40	IP64
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,63	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
0,9	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
1,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
1,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP65
0,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP50
0,2	6	60	yes	0,015	0,02	$0,2 + 2,4 \cdot L^2$	- 10 to 65	IP50
1,0	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
1,0	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP65
0,85	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
0,85	8	60	yes	0,05	0,05	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
2,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP65
1,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP50
1,0	8	60	yes	0,05	0,05	$1 + 4 \cdot L$	- 10 to 65	IP50

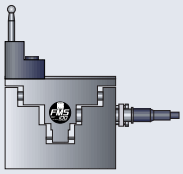
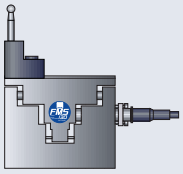
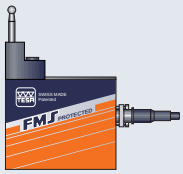
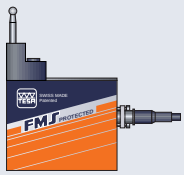
8 mm Diameter Miniature Probes

			Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragm springs							
	32.30001	GT 41	± 0,3	0,7	axial	none	Nitrile
	32.30002	GT 42	± 0,3	0,7	radial	by vacuum	Nitrile
Measuring bolt guided on plain bearings							
	32.30035	GT 43	± 1	2,1	axial	mechanical	Viton
	32.30017	GT 44	± 1	2,1	radial	by vacuum	Viton

Lever Type Probes

			Measuring range mm	mm	Cable exit
	32.10802	GT 31	± 0,3	0,7	angled

Probes with Parallel Guiding

			Measuring range mm	mm	Cable exit *	Insert retraction (accessory)
Standard probes						
	32.30019	FMS 100	± 2	5,8	parallel	by air pressure
	32.30028	FMS 102	± 2	5,8	angled	by air pressure
	32.30049	FMS 130	± 2,9	5,8	parallel	by air pressure
	32.30050	FMS 132	± 2,9	5,8	angled	by air pressure
Probes «FMS protected»						
	32.30037	FMS 100-P	± 2	5,8	parallel	by air pressure
	32.30038	FMS 102-P	± 2	5,8	angled	by air pressure
	32.30051	FMS 130-P	± 2,9	5,8	parallel	by air pressure
	32.30052	FMS 132-P	± 2,9	5,8	angled	by air pressure

* Position in relation to the measuring movement

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,63	2	60	no	0,01	0,01	$0,2 + 5 \cdot L^2$	- 10 to 65	IP65
0,63	2	60	no	0,01	0,01	$0,2 + 5 \cdot L^2$	- 10 to 65	IP65
0,4	2	60	no	0,1	0,15	$0,2 + 5 \cdot L^2$	5 to 65	IP65
0,4	2	60	no	0,1	0,15	$0,2 + 5 \cdot L^2$	5 to 65	IP65

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
0,1	12	25	no	0,1	0,25	$0,2 + 50 \cdot L^2$	- 10 to 50	IP40

N **	Moving mass g	Frequency limit Hz ***	Dismountable	µm	µm	(L in mm) µm ****	°C	IEC 60529
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP50
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54
2	110	25	yes	0,5	0,5	$0,2 + 3 \cdot L^3$	- 10 to 65	IP54

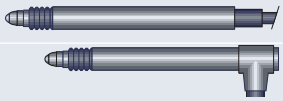
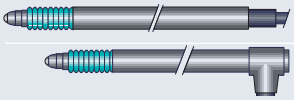
** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.

*** Mechanical frequency limit valid for the final value of the measuring range with an amplitude of 10 %.

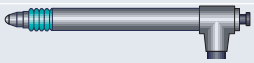
**** Max. perm. errors applicable to the linearity errors.

TESA® LVDT Probes - General Overview

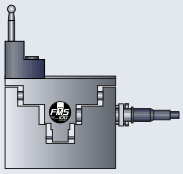
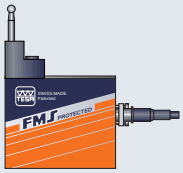
LVDT Axial Probes with a 8 mm Diameter and Ball-Bearing Measuring Bolt

	No		Measuring range mm	mm	Cable exit	Bolt retraction	Sealing bellows
Standard probes							
	32.30029	GT 21 LVDT	± 1,5	4,3	axial	mechanical	Nitrile
	32.30030	GT 22 LVDT	± 1,5	4,3	radial	by vacuum	Nitrile
Standard long-travel probes							
	32.30031	GT 27 LVDT	± 1,5	10,3	axial	mechanical	Viton
	32.30032	GT 28 LVDT	± 1,5	10,3	radial	by vacuum	Viton
Probes with extended measuring range							
	32.30046	GT 61 LVDT	± 5	10,3	axial	mechanical	Viton
	32.30048	GT 62 LVDT	± 5	10,3	radial	by vacuum	Viton

... with activation of the Measuring Bolt by Pneumatic Pressure

	No		Measuring range mm	mm	Cable exit	Pressure (bar) Nominal	Pressure (bar) Maximum	Sealing bellows
	S32020269	GT 222 LVDT	± 1,5	3,2	radial	0,7	1,0	Viton

LVDT probes with Parallel Guiding

	No		Measuring range mm	mm	Cable exit *	Insert retraction (accessory)
Standard probes						
	32.30033	FMS 100 LVDT	± 1,5	5,8	parallel	by air pressure
	32.30034	FMS 102 LVDT	± 1,5	5,8	angled	by air pressure
Probes «FMS protected»						
	32.30039	FMS 100-P LVDT	± 1,5	5,8	parallel	by air pressure
	32.30040	FMS 102-P LVDT	± 1,5	5,8	angled	by air pressure

* Position in relation to the measuring movement

N **	Drive voltage Drive frequency Adjustment load	Sensitivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	10 to 65	IP65
0,63	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	10 to 65	IP65
0,9	3 V / 5 kHz / 100 kΩ	98	0,2	0,2	0,3	- 10 to 65	IP65
0,9	3 V / 5 kHz / 100 kΩ	98	0,2	0,2	0,3	- 10 to 65	IP65

N **	Drive voltage Drive frequency Adjustment load	Sensitivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
1,2	3 V / 5 kHz / 100 kΩ	150	0,15	0,15	0,2	- 10 to 65	IP65

N **	Drive voltage Drive frequency Adjustment load	Sensivity mV / V / mm	µm	µm	% ***	°C	IEC 60529
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP50
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP50
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP54
2	3 V / 5 kHz / 100 kΩ	150	0,5	0,5	0,25	- 10 to 65	IP54

** Nominal value of the measuring force at electrical zero, max. deviation ± 25 %.

*** Max. perm. errors given as % for linearity errors refer to each relevant measuring span (= difference between both first and last values of the measuring range). For max. perm. errors expressed in µm, see the information provided with each LVDT probe on the following pages.

Note : For technical data, report to TESA standard probes.

Compatibility of TESA® Probes with Electronic Equipments from Other Makers

	N°	32.90119	32.90120	32.90121	32.90122	32.90123	32.90124
ETAMIC (ZCB)	=	GT 21	GT 22	GT 27	GT 28	FMS 100	FMS 102
	N°	32.90143	32.90144	32.90145	32.90146		
MAHR	=	GT 21	GT 22	GT 212	GT 222		
	N°	32.90149	32.90150				
MARPOSS	=	GT 21	GT 22				

TESA® DC Axial Probes

Provided with a direct current output for connection to a computer or any other unit fitted with an analogue input.

N°	=	Measuring range / mm	N *	Cable exit
32.30059	GT 21 DC	± 2	0,63	axial
32.30058	GT 22 DC	± 2	0,63	radial

* Nominal value at electrical zero; max. deviation ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as for static measuring.

Also available upon request:

N°	32.80358	32.80315	32.80302	32.80692	32.80721
=	GT 27 DC ± 10 V	GT 28 DC	GT 31 DC	GT 41 DC	GT 43 DC
N°	32.80569	32.20402	32.80729	32.80661	32.20214
=	GT 44 DC ± 5 V	GT 61 DC	GTL 222 DC ± 10 V	GT 272 DC	GT 622 DC
N°	32.01487	32.80524	32.30497	32.80361	
=	FMS 100 DC	FMS 102 DC	FMS 132 DC ±10 V	FMS 100 DC-IP54	

Other existing versions: 2 V / mm, 5 V / mm and 10 V / mm; max. output voltage 10 V.

GT 21 DC and GT 22 DC electronic probes

✓

DIN 32676 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Drive voltage: ± 10 to ± 15 V
Consumption: 15 mA
Adjustment load: > 1 kΩ
Sensitivity: 1 V / mm

0,1 µm

0,15 µm

Max. perm. error of 15 µm relative to a 4 mm measuring span (measuring range ± 2 mm)

Other technical data listed on pages L-13 and L-14

Technical data sheets
GT 21 DC: 32.00396
GT 22 DC: 32.00397

✓

DIN 32876 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length : 2 m

5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Sealing bellows: resistant Nitrile or high-resistance Viton (elastomer)

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C, GTL 21 and GTL 211: 0,2 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C GT 21 HP: 10 °C to 40 °C

80 %

Protection IP65 (IEC 60529), GT 21 HP: IP64

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes

Standard and LVDT Probes

Universal probes for common but constraining applications.

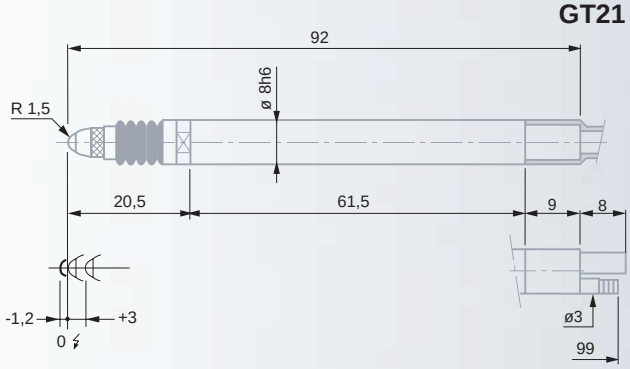
- *8 mm dia. probe housing. Can be clamped over its entire length.*
- *Measuring bolt mounted on ball bearings.*
- *Both the probe housing and ball-bearing guide are separate from one another so that the measuring bolt moves easily even if the probe is not clamped appropriately.*
- *Degree of protection IP65 according to IEC 60529.*
- *Wide range of accessories including measuring inserts, spring sets, etc.*

GT 21 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.10904	**GT 21**	± 2	0,63	mechanical	Nitrile
32.10905	**GT 21**	± 2	1,0	mechanical	Nitrile
32.10906	**GT 21**	± 2	1,6	mechanical	Nitrile
32.10907	**GT 21**	± 2	2,5	mechanical	Nitrile
32.10908	**GT 21**	± 2	4,0	mechanical	Nitrile
32.30057	**GTL 21**	± 2	0,63	mechanical	Nitrile
32.30072	**GTL 211**	± 2	0,63	by vacuum	Viton
High-Precision probes					
32.30036	**GT 21 HP**	± 0,2	0,63	mechanical	Nitrile
LVDT probes					
32.30029	**GT 21 LVDT**	± 1,5	0,63	mechanical	Nitrile

* Nominal value at electrical zero, max. ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

GT21



GTL211

		Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 21		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 3 \cdot L^3$	32.00249
GTL 21		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 2,4 \cdot L^2$	32.00391
GTL 211		- 2,2	0,1	- 1,2	4,3	0,01	0,02	$0,2 + 2,4 \cdot L^2$	32.00435
GT 21 HP		- 2,2	0,1	- 1,2	4,3	0,01	0,01	$0,07 + 0,4 \cdot L$	32.00264
GT 21 LVDT		- 2,2	0,1	- 1,7	4,3	0,15	0,15	4,5 ****	32.00228

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

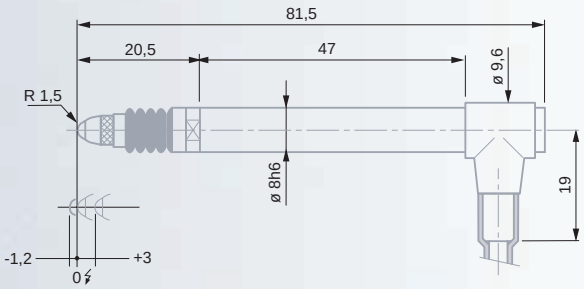
**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

GT 22 Probes with Radial Cable Exit

		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.10924	**GT 22**	± 2	0,63	by vacuum	Nitrile
32.10921	**GT 22**	± 2	0,16	by vacuum	Nitrile
32.10922	**GT 22**	± 2	0,25	by vacuum	Nitrile
32.10923	**GT 22**	± 2	0,4	by vacuum	Nitrile
32.10925	**GT 22**	± 2	1,0	mechanical	Nitrile
32.10926	**GT 22**	± 2	1,6	mechanical	Nitrile
32.10927	**GT 22**	± 2	2,5	mechanical	Nitrile
32.10928	**GT 22**	± 2	4,0	mechanical	Nitrile
32.30056	**GTL 22**	± 2	0,63	by vacuum	Nitrile
High-Precision probes					
32.30021	**GT 22 HP**	± 0,2	0,63	by vacuum	Nitrile
LVDT probes					
32.30030	**GT 22 LVDT**	± 1,5	0,63	mechanical	Nitrile

* Nominal value at electrical zero, max. ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

GT22



	Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 22	- 2,2	0,1	- 1,2	4,3	0,01	0,02	0,2 + 3 · L^3	32.00250
GTL 22	- 2,2	0,1	- 1,2	4,3	0,01	0,02	0,2 + 2,4 · L^2	32.00392
GT 22 HP	- 2,2	0,1	- 1,2	4,3	0,01	0,01	0,07 + 0,4 · L	32.00265
GT 22 LVDT	- 2,2	0,1	- 1,7	4,3	0,15	0,15	4,5 ****	32.00229

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

✓

DIN 32876 Part 1

See in the table

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length: 2 m

5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Sealing bellows: resistant Nitrile or high-resistance Viton (elastomer)

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C or 0,2 µm / °C for GTL 22

20 ± 0,5 °C

-10 °C to 65 °C. 10 °C to 40 °C for GT 21 HP.

80 %

Protection IP65 (IEC 60529), GT 21 HP: IP64

Transport packing

Identification number

Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Distance from electrical zero of both stops is either adjustable (lower stop) or depending on the position of the latter (upper stop).

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread

Cable length : 2 m

Standard probes with a 5-pin plug DIN 45322, LVDT without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes with Long Retraction Travel

Standard and LVDT Probes

Universal inductive probes for common applications, especially with multigauging devices.

- *Long retraction travel to prevent the probe from being damaged.*

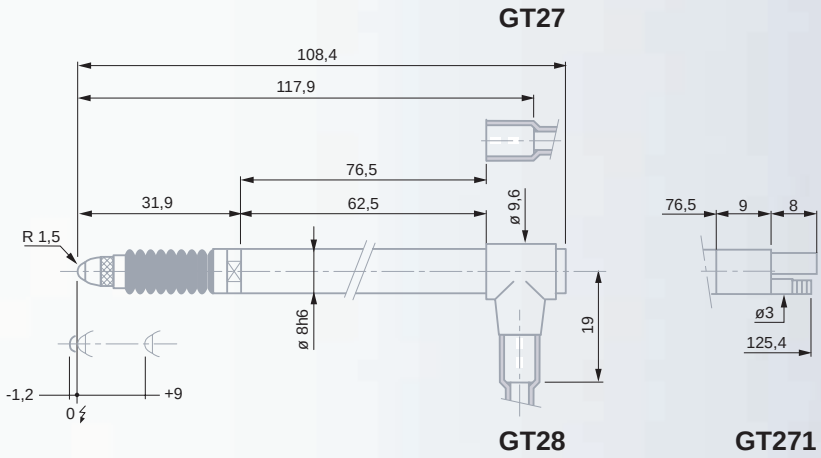
GT 27 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30027	**GT 27**	± 2	0,63	mechanical	Viton
32.30073	**GT 271**	± 2	0,63	by vacuum	Viton
LVDT probes					
32.30031	**GT 27 LVDT**	± 1,5	0,63	mechanical	Viton

GT 28 Probes with Radial Cable Exit

No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30026	**GT 28**	± 2	0,63	Vakuum	Viton
LVDT probes					
32.30032	**GT 28 LVDT**	± 1,5	0,63	Vakuum	Viton

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.



	Lower stop of the measuring bolt **, adjustable from… mm	to mm	ex-factory mm	mm	µm	µm	µm ***	Technical data sheets
GT 27	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00251
GT 271	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00436
GT 28	- 2,2	0,1	- 1,2	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00252
GT 27 LVDT	- 2,2	0,1	- 1,7	10,3	0,15	0,15	4,5 ****	32.00245
GT 28 LVDT	- 2,2	0,1	- 1,7	10,3	0,15	0,15	4,5 ****	32.00246

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

TESA® Axial Probes with Long Measuring Range

Standard and LVDT Probes

Probes designed for long measuring travels and low resolutions – Specially suited for multigauging systems.

- *Correction factor 2,5 times to obtain the true values.*

GT 61 Probes with Axial Cable Exit

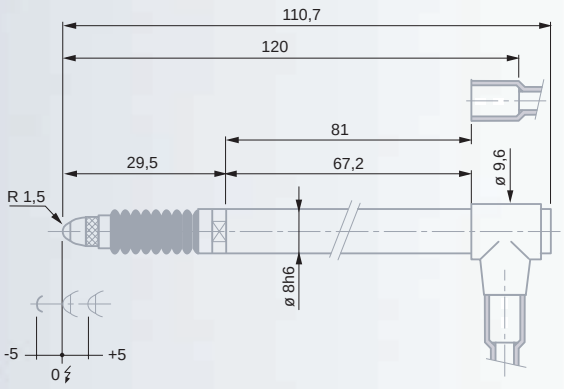
No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30041	**GT 61**	± 5	0,9	mechanical	Viton
32.30074	**GT 611**	± 5	0,9	by vacuum	Viton
LVDT probes					
32.30046	**GT 61 LVDT**	± 5	0,9	mechanical	Viton

GT 62 Probes with Radial Cable Exit

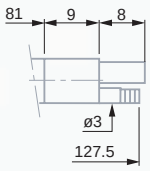
No		Measuring range / mm	N *	Bolt retraction	Sealing bellows
Standard probes					
32.30042	**GT 62**	± 5	0,9	Vakuum	Viton
LVDT probes					
32.30048	**GT 62 LVDT**	± 5	0,9	Vakuum	Viton

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

GT61



GT62



GT611

	Bolt endstops ** upper stop mm	lower stop mm	mm	µm	µm	µm ***	Technical data sheets
GT 61	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00294
GT 611	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00437
GT 62	- 5,1	5,2	10,3	0,05	0,05	1 + 4 · L	32.00295
GT 61 LVDT	- 5,1	5,2	10,3	0,2	0,2	20 ****	32.00337
GT 62 LVDT	- 5,1	5,2	10,3	0,2	0,2	20 ****	32.00339

** Distance from electrical zero
*** Max perm. errors applicable to the linearity errors (L in mm).
**** With reference to the 10 mm measuring span (measuring range ± 5 mm).

✓
DIN 32876 Part 1
See in the tables
Axial probes usable in any position
Signal combinations with probes having a standard resolution may require your attention to needed correction
8 mm dia. fixing shank
Ball-bearing measuring bolt
Both lower and upper bolt endstops are fixed
Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread.
Cable length: 2 m
5-pin plug DIN 45322. LVDT without plug.
Nickel-plated housing
Stainless steel measuring bolt, hardened.
Viton rubber bellows: high-resistance elastomer
Moving mass: 8 g
Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.
Mechanical frequency limit: 60 Hz
0,09 µm / °C, GT 61 LVDT and GT 62 LVDT: 0,16 µm / °C
20 ± 0,5 °C
-10 °C to 65 °C
80 %
Protection IP65 (IEC 60529)
Transport packing
Identification number
Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread.

Cable length : 2 m

Standard probes with a 5-pin plug DIN 45322. LVDT probes without plug.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 6 g

Drive frequency 13 kHz (± 5 %). For LVDT probes, see on pages L-10 and L-11.

Mechanical frequency limit: 60 Hz

0,2 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 212-A and GTL 222-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Axial Probes with Measuring Bolt Activation by Pneumatic Pressure

Standard and LVDT Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.

GTL 212 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Meas. bolt activation		Sealing bellows
Standard probes						
32.30060	**GTL 212**	± 1,5	1,2	▼	▲	Viton
32.30067	**GTL 212-A**	± 1,5	0,2	▼	▲	none

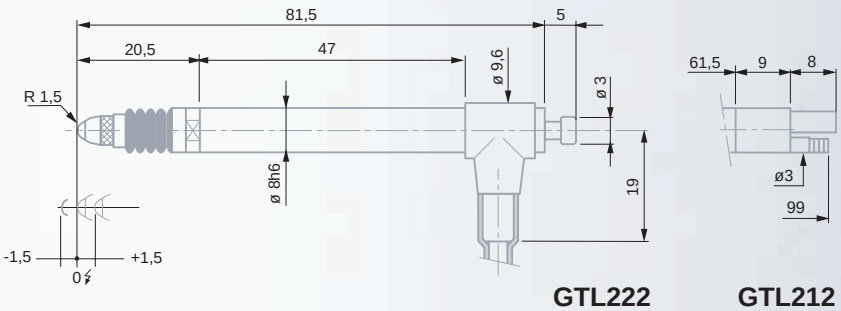
GTL 222 Probes with Radial Cable Exit

No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30054	**GTL 222**	± 1,5	1,2	▼	▲	Viton
32.30063	**GTL 222-A**	± 1,5	0,2	▼	▲	none
LVDT probes						
S32020269	**GT 222 LVDT**	± 1,5	1,2	▼	▲	Viton

* Nominal value at electrical zero; max. deviation ± 25 %. Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.



GTL222

GTL212

	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GTL 212	0,7	1,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00413
GTL 212-A	0,25	6,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00430
GTL 222	0,7	1,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00393
GTL 222-A	0,25	6,0	3,2	0,015	0,02	$0,2 + 2,4 \cdot L^2$	32.00422
GT 222 LVDT	0,7	1,0	3,2	0,15	0,15	4,5 ****	

*** Max. perm. errors applicable to the linearity errors (L in mm).

**** With reference to the 3 mm measuring span (measuring range ± 1,5 mm).

TESA® Long-Travel Probes with Measuring Bolt Activation by Pneumatic Pressure

Standard Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.

GT 272 Probes with Axial Cable Exit

		Meas. range mm	Upper travel mm *	N **	Measuring bolt activation		Sealing bellows
Standard probes							
32.30061	**GT 272**	± 2	8,1	1,0	▼	▲	Viton
32.30068	**GT 272-A**	± 2	8,1	0,85	▼	▲	none

GT 282 Probes with Radial Cable Exit

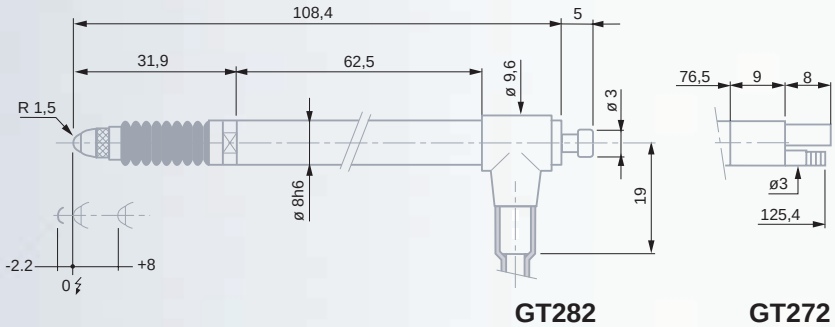
		Meas. range mm	Upper travel mm *	N **	Measuring bolt activation		Sealing bellows
Standard probes							
32.30053	**GT 282**	± 2	8,1	1,0	▼	▲	Viton
32.30069	**GT 282-A**	± 2	8,1	0,85	▼	▲	none

* Travel from the electrical zero up to the upper stop.

* Nominal value at electrical zero; max. deviation ± 25 %.
Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.



	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GT 272	1,1	1,5	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00414
GT 272-A	1,0	6,0	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00431
GT 282	1,1	1,5	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00390
GT 282-A	1,0	6,0	10,3	0,05	0,05	$0,2 + 3 \cdot L^3$	32.00432

*** Max perm. errors applicable to the linearity errors (L in mm).

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

5-pin plug DIN 45322.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 8 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 272-A and GT 282-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shank

Ball-bearing measuring bolt

Both lower and upper bolt endstops are fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

5-pin plug DIN 45322.

Nickel-plated housing

Stainless steel measuring bolt, hardened.

Viton rubber bellows: high-resistance elastomer

Moving mass: 8 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,09 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP65 (IEC 60529), GTL 612-A and GT 622-A: IP50

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Probes with Extended Measuring Range and Bolt Activation by Pneumatic Pressure

Standard Probes

Probes intended for use with measuring devices providing fully or half-assisted inspection routines.

GT 612 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30062	**GT 612**	± 5	2,0	▼	▲	Viton
32.30070	**GT 612-A**	± 5	1,0	▼	▲	none

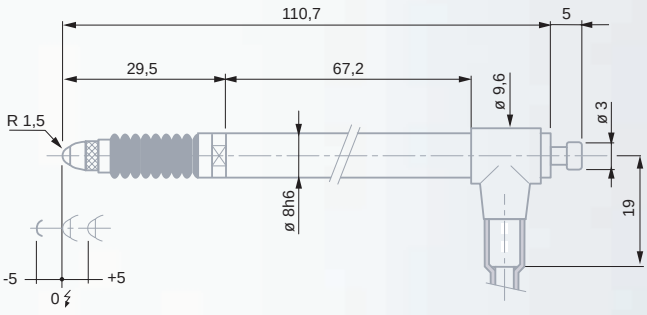
GT 622 Probes with Radial Cable Exit

No		Measuring range / mm	N *	Measuring bolt activation		Sealing bellows
Standard probes						
32.30055	**GT 622**	± 5	2,0	▼	▲	Viton
32.30071	**GT 622-A**	± 5	1,0	▼	▲	none

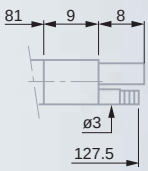
** Nominal value at electrical zero; max. deviation ± 25 %. Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by pneumatic pressure.

▲ Upward movement of the measuring bolt activated under the spring force alone.



GT622



GT612

	Pressure (bar) Nominal	Maximum	mm	µm	µm	µm ***	Technical data sheets
GT 612	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	32.00415
GT 612-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	32.00433
GT 622	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	32.00394
GT 622-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	32.00434

*** Max perm. errors applicable to the linearity errors (L in mm).

TESA® Axial Miniature Probes

Standard Probes

Compact probes specially designed for use where there's no room for longer probes – Possible assembly of measuring heads, etc.

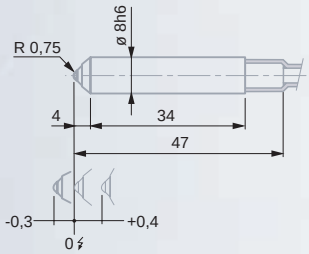
GT 41 and GT 43 Probes with Axial Cable Exit

No		Measuring range / mm	N *	Meas. bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragms					
32.30001	**GT 41**	± 0,3	0,63	none	Nitrile
Measuring bolt guided on a plain bearing					
32.30035	**GT 43**	± 1	0,4	mechanical	Viton

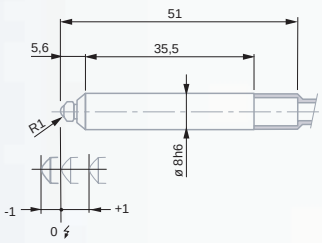
GT 42 and GT 44 Probes with Radial Cable Exit

No		Measuring range / mm	N *	Meas. bolt retraction	Sealing bellows
Measuring bolt hanging from diaphragms					
32.30002	**GT 42**	± 0,3	0,63	Vakuum	Nitrile
Measuring bolt guided on a plain bearing					
32.30017	**GT 44**	± 1	0,4	by vacuum	Viton

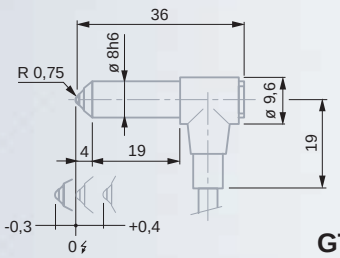
* Nominal value at electrical zero; max. deviation ± 25 %.
Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring.



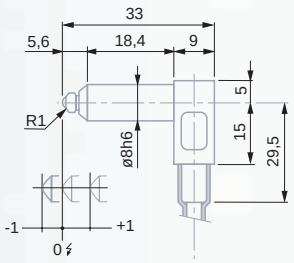
GT41



GT43



GT42



GT44

	Meas. bolt endstops: ** lower stop mm	upper stop mm	mm	µm	µm	µm ***	Technical data sheets
GT 41	- 0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L²	32.00258
GT 43	- 1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L²	32.00260
GT 42	- 0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L²	32.00259
GT 44	- 1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L²	32.00261

** Distance from electrical zero

*** Max perm. errors applicable to the linearity errors (L in mm).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm dia. fixing shaft

Measuring bolt guided on a plain bearing or hanging from diaphragms

Both lower and upper bolt endstops are fixed

GT 41 or GT 42 with a fixed measuring insert; spherical carbide measuring face, R 0,75 mm. GT 43 or GT 44 with a selectable measuring insert; spherical carbide measuring face, R 1 mm. M2 thread.

Cable length: 2 m

5-pin plug DIN 45322

Nickel-plated fixing shank

Resistant nitrile rubber bellow or Viton rubber bellow with high-resistance elastomer

Moving mass: 2 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 60 Hz

0,1 µm / °C

20 ± 0,5 °C

GT 41 and GT 42: -10 °C to 65 °C, GT 43 and GT 44: 5 °C to 65 °C

80 %

Protection IP65 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® GT 31 Lever Type Probes

Probes with inclinable insert for measuring in two directions – Ideally suited for use where probes with axial displacement of the measuring bolt are found awkward to use.

- *Ball-bearing balanced lever.*
- *Interchangeable measuring insert fitted with a tungsten carbide ball tip and inclinable through 180 °.*
- *Automatic reversal of the probing direction while the direction of the indication remains unchanged.*
- *Protected against shocks by 2 safety clutches.*
- *One-piece housing provided with 2 dovetails.*

✓

DIN 32876 Part 1

± 0,3 mm

Lever probe usable in any position

2 dovetail attachments

Both lower and upper bolt endstops are fixed

Selectable measuring inserts, stainless steel shank fitted with a 2 mm carbide ball tip.
For all other inserts, see under optional accessories on the next pages.

Cable length: 2 m

5-pin plug DIN 45322

All-metal housing with matt-chromium finish

Moving mass: 12 g

Drive frequency 13 kHz (± 5 %)

Mechanical frequency limit: 25 Hz

20 ± 0,5 °C

5 °C to 60 °C

80 %

Protection IP40 (IEC 60529)

Equipped with one 2 mm dia. insert No. 32.60410, . and one 8 mm dia. fixing shank No. 18.40105

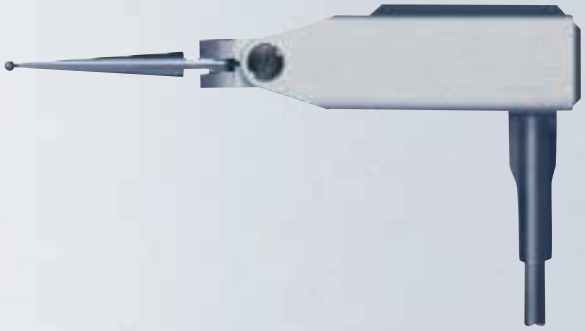
Transport packing

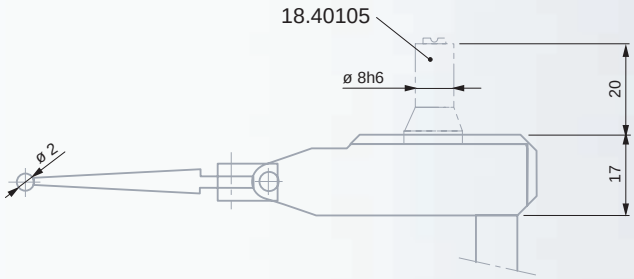
Identification number

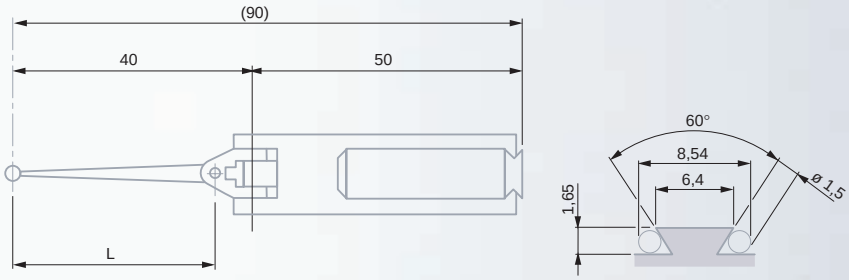
Inspection report with a declaration of conformity

No		Measuring range / mm	N *
32.10802	**GT 31**	± 0,3	**0,1** (Standard)
32.10801	**GT 31**	± 0,3	**0,02**
32.10803	**GT 31**	± 0,3	**0,2**

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with both probe housing and lever lying horizontally as well as in static measuring.

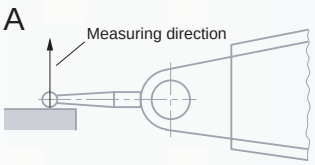


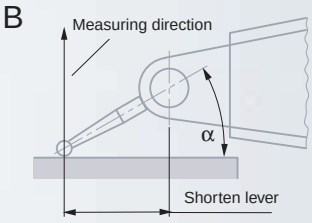




	mm	µm	µm	µm **	Technical data sheets
GT 31	0,7	0,1	0,25	0,2 + 50 · L^2	32.00266

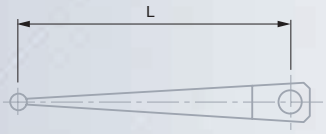
** Max perm. errors applicable to the linearity errors (L in mm).



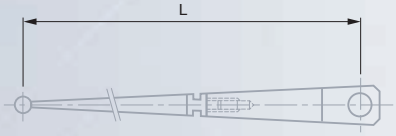


Note:
If the measuring insert is lying parallel to the workpiece surface (Fig. A), the leverage is 1:1 so that the values as measured need not be corrected.
Any other position (angle α in Fig. B) will change the effective length of the lever. Therefore, all read values must be corrected. With regard to this, also report to the instructions for use that came with your electronic probes.

Accessories for TESA® GT 31 Probe Series



32.60410



35.90003

32.60410

35.90003

35.90007

35.90001

35.90014

Measuring Inserts

		Ball tip mm	Lever amplification	Length L mm
Standard one-piece probe shank				
32.60402		1	1 : 1	32
32.60410		2	1 : 1	32
32.60403		3	1 : 1	32
Special two-piece probe shank				
35.90002		1	1 : 1	32
35.90003		2	1 : 1	32
35.90004		3	1 : 1	32
35.90005		4	1 : 1	32
35.90006		1	1 : 2	72
35.90007		2	1 : 2	72
35.90008		3	1 : 2	72
35.90009		4	1 : 2	72
35.90010		1	1 : 3	112
35.90001		2	1 : 3	112
35.90011		3	1 : 3	112
35.90012		4	1 : 3	112
35.90013		1	1 : $\sqrt{10}$	118,49
35.90014		2	1 : $\sqrt{10}$	118,49
35.90015		3	1 : $\sqrt{10}$	118,49
35.90016		4	1 : $\sqrt{10}$	118,49

Swiss Made ✓

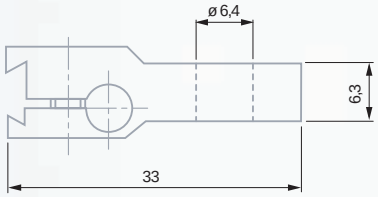
Stainless steel insert holder with a tungsten carbide ball tip

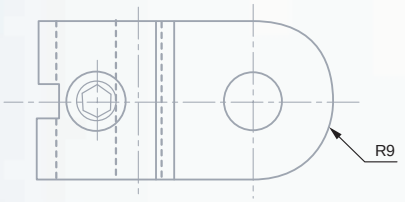
Transport packing

32.40100	**Fixing brackets** With dovetail and cylindrical bore
32.60414	**Correction cable for the probe constant** Used for the electrical correction to zero of the probe constant using the measuring insert fitted with a 1 mm dia. ball tip

Swiss Made ✓

Transport packing





32.40100

✓

DIN 32876 Part 1

See in the tables

Probes with linear action usable in any position

4 fixing threads M6

Linear ball-bearing guiding with fixed stops

Insert holder attachment with dovetail

Cable length: 2 m

Standard and protected probes with a 5-pin plug DIN 45322 integrating a setting element for the signals. LVDT probes have no plug and no adjust item.

Hardened steel probe body, nickel-plated

Moving mass: 110 g

Drive frequency 13 kHz (± 5 %). Not for LVDT probes.

LVDT probes: Drive voltage: 3V Drive frequency: 5 kHz Adjustment load: 100 kΩ Sensitivity: 150 mV / V / mm

Mechanical frequency limit: 25 Hz

- 0,14 µm / °C. LVDT probes: 0,15 µm / °C

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP50. Protected probes: IP54 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

TESA® Probes with Parallel Guiding

Standard, Protected and LVDT Probes

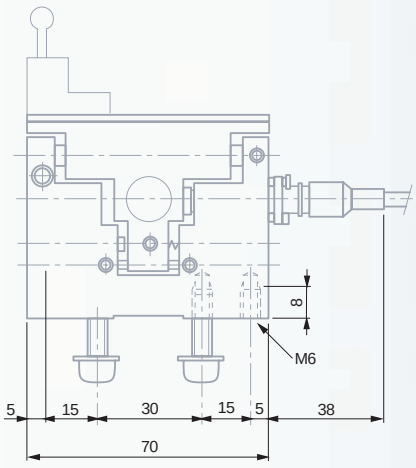
Universal probes for multigauging devices. Let you capture the values measured on machines and other fixtures for in-process inspection.

- *Long-life probes featuring a rugged compact design.*
- *Modular construction to eliminate the need for many assembly components.*
- *Ball-bearing probing movements.*
- *Sense of the measuring force as well as probe retraction according to the accessory used.*
- *Wide choice of measuring inserts and supports for optimum adaptation to your measuring work.*

FMS Probes with Parallel Cable Exit

		Measuring range mm	N *	Insert retraction (accessory)
Standard probes				
32.30019	**FMS 100**	± 2	2	by air pressure
32.30049	**FMS 130**	± 2,9	2	by air pressure
Probes «FMS protected»				
32.30037	**FMS 100-P**	± 2	2	by air pressure
32.30051	**FMS 130-P**	± 2,9	2	by air pressure
LVDT probes				
32.30033	**FMS 100 LVDT**	± 1,5	2	by air pressure
32.30039	**FMS 100 P-LVDT**	± 1,5	2	by air pressure

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with probing movement exerted horizontally as well as in static measuring.



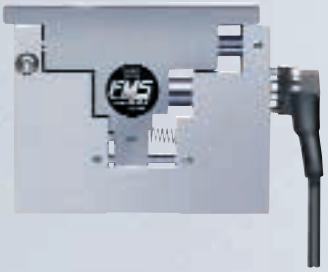
	Mech. stop: ** lower mm	upper mm	mm	µm	µm	µm***	Technical data sheets
FMS 100	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00253
FMS 100-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00283
FMS 130	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00342
FMS 130-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00344
FMS 100 LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00247
FMS 100-P LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00290

** Distance from electrical zero

*** Max. perm. errors applicable for linearity errors (L in mm)

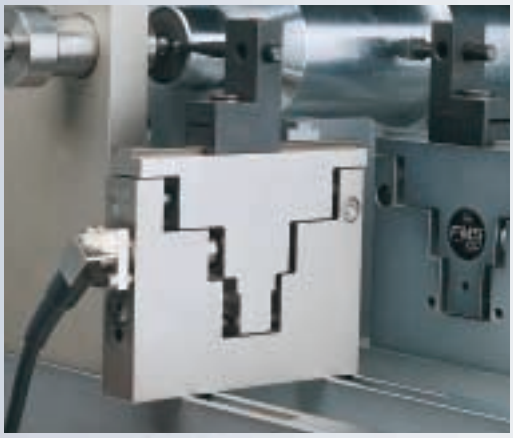
**** With reference to the 4 mm measuring span (measuring range ± 2 mm) or 5,8 mm (± 2,9 mm).

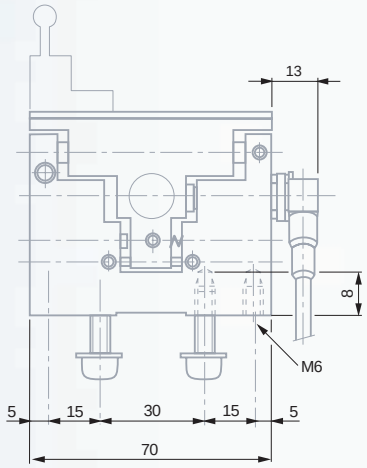
FMS Probes with Angled Cable Exit



		Measuring range mm	N *	Insert retraction (accessory)
Standard probes				
32.30028	**FMS 102**	± 2	2	air pressure
32.30050	**FMS 132**	± 2,9	2	air pressure
Probes «FMS protected»				
32.30038	**FMS 102-P**	± 2	2	air pressure
32.30052	**FMS 132-P**	± 2,9	2	air pressure
LVDT probes				
32.30034	**FMS 102 LVDT**	± 1,5	2	air pressure
32.30040	**FMS 102 P-LVDT**	± 1,5	2	air pressure

* Nominal value at electrical zero; max. deviation ± 25 %. Valid with probing movement exerted horizontally as well as in static measuring.





	Mechanical stops ** lower mm	upper mm	mm	µm	µm	µm***	Technical data sheets
FMS 102	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00254
FMS 102-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00289
FMS 132	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00343
FMS 132-P	- 2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L³	32.00345
FMS 102 LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00248
FMS 102-P LVDT	- 2,9	2,9	5,8	0,5	0,5	4,5 ****	32.00291

** Distance from electrical zero. *** Max. perm. errors applicable for linearity errors (L in mm)

**** With reference to the 4 mm measuring span (measuring range ± 2 mm) or 5,8 mm (± 2,9 mm).

✓

DIN 32876 Part 1

See in the tables

Probes with linear action usable in any position

4 coupling threads M6

Linear ball-bearing guiding with fixed stops

Insert holder attachment with dovetail

Cable length: 2 m

Standard and FMS protected probes with a 5-pin plug DIN 45322 integrating a calibration element for the signals. LVDT probes have no plug and no adjust item.

Hardened steel probe body, nickel-plated

Moving mass: 110 g

Carrier frequency 13 kHz (± 5 %). Not for LVDT probes.

LVDT probes:
Drive voltage: 3V
Drive frequency: 5 kHz
Adjustment load: 100 kΩ
Sensitivity:
150 mV / V / mm

Mechanical frequency limit:
25 Hz

- 0,15 µm / °C.

20 ± 0,5 °C

-10 °C to 65 °C

80 %

Protection IP50. Probes «FMS protected»: IP54 (IEC 60529)

Transport packing

Identification number

Inspection report with a declaration of conformity

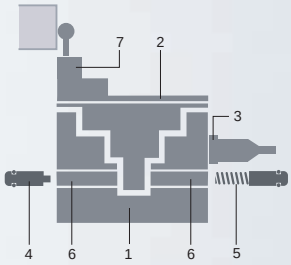
Configuration and Use of the TESA® FMS Probes

The following examples provide you with a number of possibilities to activate and retract the measuring insert during your measurement cycles.

Example A

- *Activating the measuring Insert towards the part to be inspected using the measuring force produce by the compression spring.*
- *No insert's retraction.*

Result:
The measuring insert remains into position. Exchange of the part is made with mechanical contact with the probe under the measuring force.

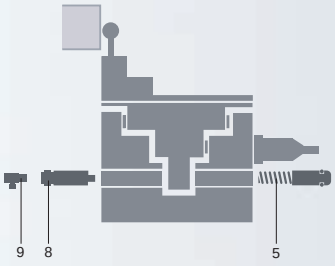


1 Fixed probe body
2 Moving probe body
3 Measuring element with fine adjustment
4 Adjustable stop
5 Spring set for the measuring force
6 Fixing bores
7 Holder for the measuring insert

Example B

- *Activating the measuring insert towards the part to be inspected using the measuring force produced by the compression spring.*
- *Insert's retraction by pneumatic pressure.*

Result:
Exchange of the part is made with no mechanical contact with the probe.



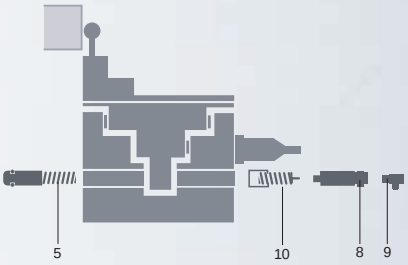
5 Spring set for the measuring force
8 Pneumatic jack No. 32.6400
9 Pressure connector (024388 on page L-33)

Example C

- *Activating the measuring insert towards the part to be inspected by air pressure using the measuring force produced by the compression spring.*
- *Insert's retraction by disabling the pneumatic pressure.*

Result:
Exchange of the part is made with no mechanical contact with the probe providing absolute security through the automatic retraction of the measuring insert a pressureless condition.

This configuration is also applied when there is no room on the left side for the pneumatic jack as shown in the example B.

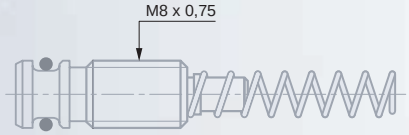


5 Spring set for the measuring force
8 Pneumatic jack No. 32.60440
9 Pressure connector (024388 on page L-33)
10 Auxiliary spring-loaded element No. 32.60445

The force of the spring set (5) must be equivalent to the force of the auxiliary spring-loaded element (10).

Accessories for TESA® FMS Pobes

Spring sets for the measuring force



Spring sets
Item 5 in the examples A to C

No	N	
*	2,0	Nickel-plated
32.60448	0,4	Red
32.60449	0,63	Yellow
32.60450	1,0	Green
32.60451	1,6	Blue
32.60452	2,5	Brown
32.60453	4,0	Black

* Supplied with FMS probes

Swiss Made ✓

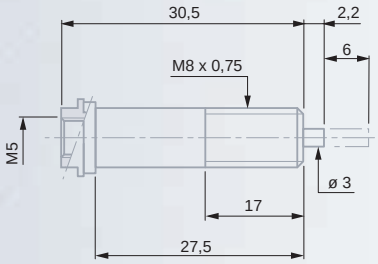
All values given in the table for the measuring force are nominal values at the electrical zero; max. deviation ± 25 %. Valid for the probing movements exerted horizontally as well as in static measuring.

Transport packing

Accessories for Pneumatic Activation of the Moving Probe Body

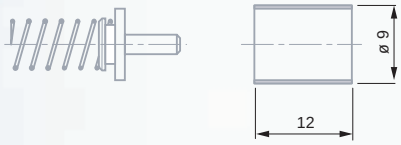
No	
32.60440	**Pneumatic jack** Activates the moving probe body. Force under a pressure of 4 bars: 11 N.

Item 8 in both examples B and C.



Auxiliary spring-loaded element
Item 10 in the example C

No	N	
32.60441	0,4	Red
32.60442	0,63	Yellow
32.60443	1,0	Green
32.60444	1,6	Blue
32.60445	2,0	Nickel-plated
32.60446	2,5	Brown
32.60447	4,0	Black



Insert Holder with Fine Adjustment

Helps you to set the probe – Setting and locking screws remain accessible even with several probes mounted side by side.

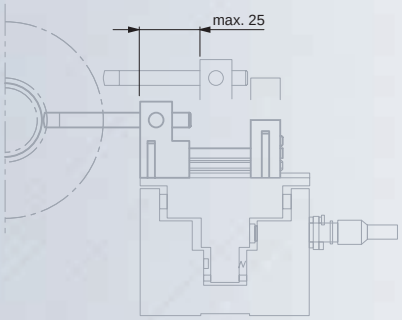
Swiss Made ✓

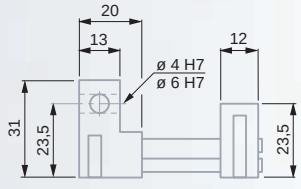
Width of the insert holder: 12 mm

Transport packing

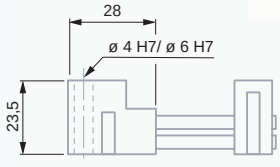
Mounting bores for the measuring insert

No	ø mm	Number	Position	mm
26.30053	4	2	Horizontal	25
26.30055	4	1	Vertical	25
26.30052	6	2	Horizontal	25
26.30054	6	1	Vertical	25





26.30052/53



26.30054/55

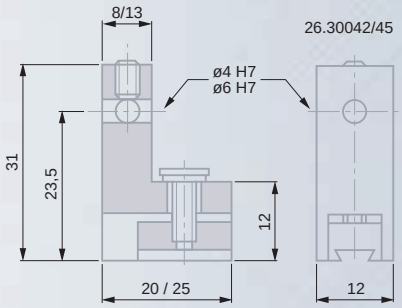
SWISS MADE

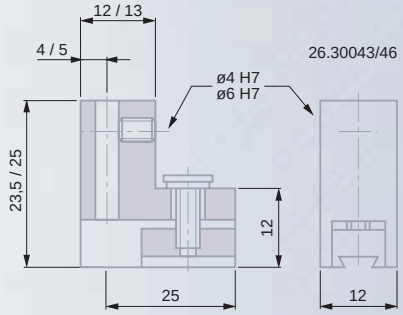
Transport packing

Fixed insert holders

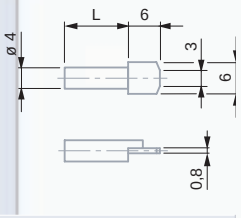
With mounting bores for the inserts

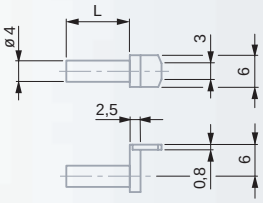
No	mm	Number	Position
26.30042	4	2	Horizontal
26.30043	4	1	Vertical
26.30045	6	2	Horizontal
26.30046	6	1	Vertical

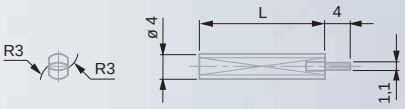




Inserts with a 4 mm diameter fixing shaft







Centred insert with a narrow flat measuring face.

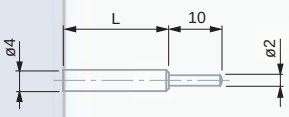
No		Lmm
26.60066	Carbide	12
26.60068	Carbide	25

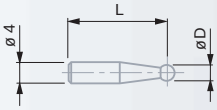
Off-centre inserts with a narrow flat measuring face.

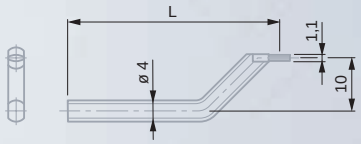
No		Lmm
26.60067	Carbide	12
26.60069	Carbide	25

Centred inserts with 2 cylindrical meas uring faces.

No		Lmm
26.60070	Carbide	20
26.60071	Carbide	40
26.60072	Carbide	60







Inserts with a 2 mm dia. contact pin with spherical measuring face.

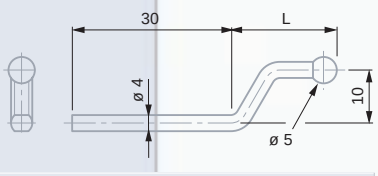
No		Lmm
26.60073	Carbide	20
26.60074	Carbide	40
26.60075	Carbide	60

Inserts with a tungsten carbide ball tip.

No	mm	Lmm
26.60076	3	20
26.60077	3	40
26.60078	3	60
26.60079	5	20
26.60080	5	40
26.60081	5	60

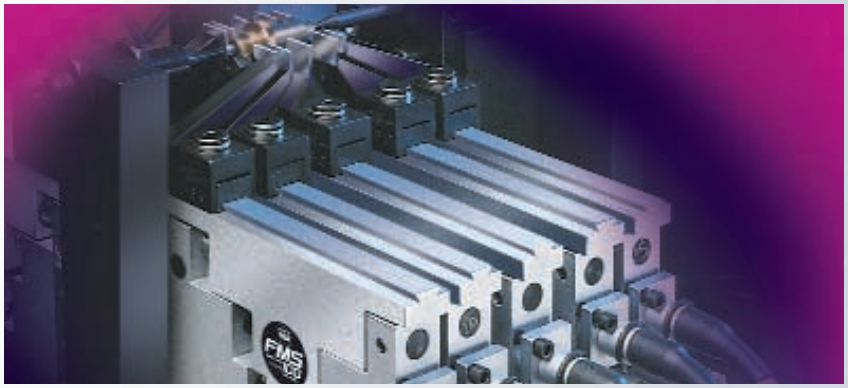
Off-centre inserts with 2 cylindrical measuring faces.

No		Lmm
26.60082	Carbide	40
26.60083	Carbide	60



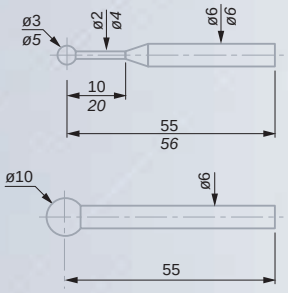
Off-centre inserts with a tungsten carbide ball tip.

No	mm	Lmm
26.60084	5	20
26.60085	5	33
26.60086	5	48



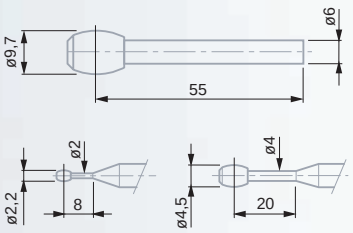
Inserts with a 6 mm diameter fixing shaft

Transport packing



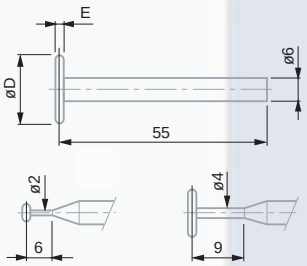
Inserts with a tungsten carbide ball tip.

No	mm
07.60058	3
07.60059	5
07.60060	10



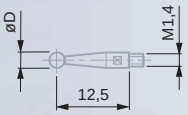
Inserts with a barrel-shaped measuring face for cylindrical bores. Also serve for determining the position of internal threads.

No	mm	For threads
07.60066	2,2	M3 ÷ M16
07.60067	4,5	M6 ÷ M48
07.60068	9,7	M12 ÷ M150



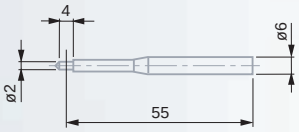
Inserts with a tungsten carbide disc for grooves, nuts, centering shoulders etc.

No	mm	Emm
07.60074	4,5	1
07.60075	14	2
07.60076	19	3



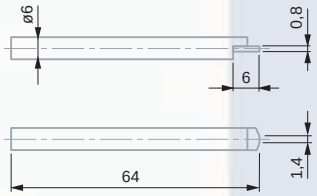
TESATAST inserts with a tungsten carbide ball tip. M1,4 mounting thread.

No	Dmm	Lmm
18.60201	1	12,53
18.60202	2	12,53
18.60203	3	12,53
18.60307	Key	



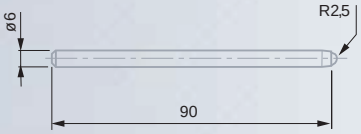
Insert with a small cylindrical measuring face.

No		mm
07.60082	Carbide	2



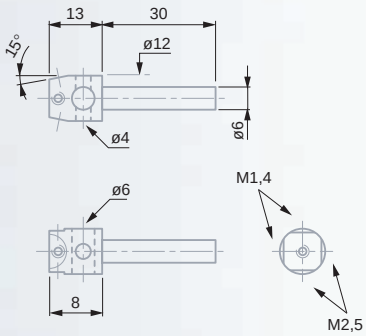
Centred insert with a small flat measuring face.

No		Lmm
S26074380	Carbide	64



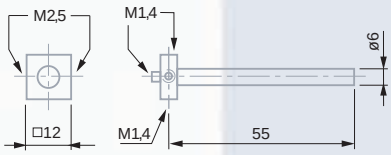
Insert with one flat and one spherical measuring faces.

No		Lmm
025589	Carbide	64



Universal insert holder provided with the following mounting facilities:

No	
S26074372	1 x 4 mm dia. 1 x 6 mm dia. 2 x M1,4 threads 2 x M2,5 threads



Universal insert holder with 2 mounting threads.

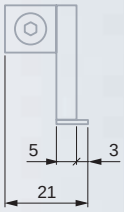
No	
07.60096	M1,4 and M2,5

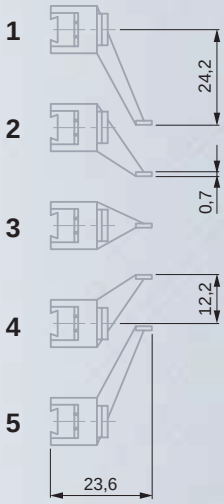
Inserts with offset measuring faces

Transport packing

Inserts with offset small and flat measuring faces.

No	As shown in the drawing
26.30047	1
26.30048	2
26.30049	3
26.30050	4
26.30051	5

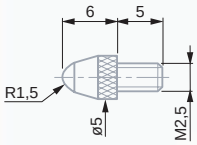




Transport packing

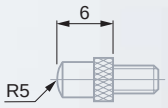
Measuring Inserts for TESA® Axial Probes, Dial Gauges and others

Inserts fitted with a M2,5 Coupling Thread



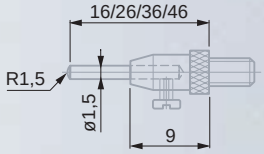
Standard inserts with a spherical measuring face.

No		Lmm
35.10001	Steel	6
35.10002	Carbide	6



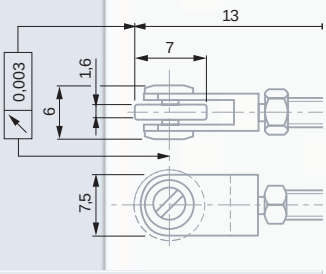
Insert with a with spherical measuring face.

No		Rmm
35.10101	Steel	5
35.10102	Carbide	5



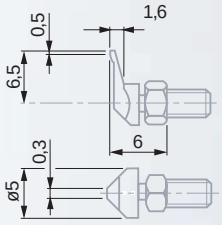
Inserts with 4 interchangeable steel pins, spherical measuring face R = 1,5 mm

No		Lmm
35.10201	Steel	16, 26, 36, 46



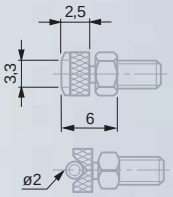
Inserts a with ball-bearing steel roller. Counternut for radial alignment.

No		Shape
35.60010	Steel	Cylindrical
35.60011	Steel	Domed



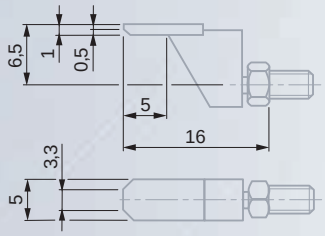
Insert with offset contact point (A). Counternut for radial alignment.

No		Amm
35.10401	Steel	6,5



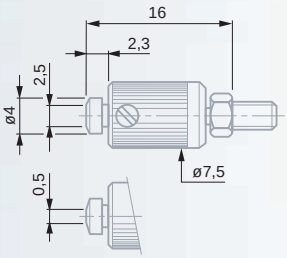
Insert with cylindrical measuring face. Counternut for radial alignment.

No	
35.10502	Carbide



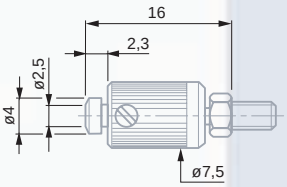
Off-centre insert with narrow measuring face.
Counternut for radial alignment.

No		B mm
35.10602	Carbide	0,5



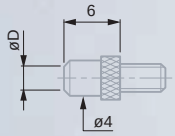
Insert with narrow measuring face.
Adjustable parallelism. Counternut for radial alignment.

No		B mm
35.10702	Carbide	0,5



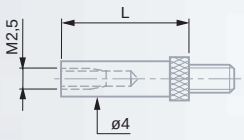
Insert with flat measuring face.
Adjust-able parallelism. Counternut for radial alignment.

No		⌀ mm
35.10902	Carbide	2,5



Inserts with a flat measuring face.

No		⌀ D mm
35.10801	Steel	2,5
35.10802	Carbide	2,5
35.60022	Steel	3,4
35.60023	Carbide	3,4

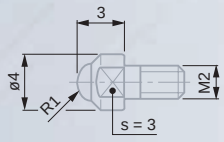


Extensions for the measuring inserts

No	L mm
35.40501	10
35.40502	15
35.40503	20
35.40504	40

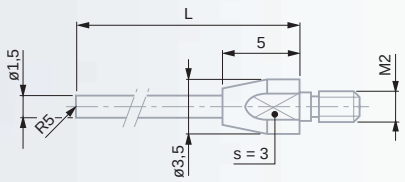
Additional measuring inserts and extensions with M2,5 coupling thread are listed on pages E-42 to E-44.

Measuring Inserts with a M2 Coupling Thread for GT 43 and GT 44 Axial Miniature Probes



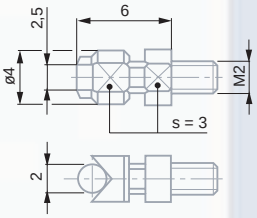
Inserts with a spherical measuring face.
M2 thread.

No		mm
35.10204	Carbide	R 1
35.10103	Carbide	R 5



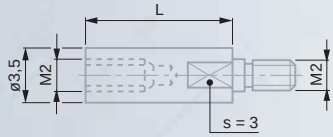
Inserts with a spherical measuring face, R 5. M2 thread.

No		L mm
35.10202	Carbide	16
35.10203	Carbide	26



Insert with a cylindrical measuring face.
Counternut for radial alignment.
M2 thread.

No	
35.10503	Carbide



Extensions for measuring inserts with M2 thread.

No	L mm
35.40505	10
35.40506	15

Variety of Accessories for TESA® Electronic Probes

Measuring Force Spring Sets for Axial Probes

All values given in the table for the measuring force are nominal values at electrical zero; max. deviation ± 25 %. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

Force related information marked on the plastic sleeve

Transport packing

No	N
GT 22 probe series	
32.60419	0,16
32.60420	0,25
32.60421	0,40
GT 21 and GT 22 probe series	
32.60422	1,0
32.60423	1,6
32.60424	2,5
32.60425	4,0

No	N
GT 27 and GT 28 probe series	
32.60458	0,63
32.60459	1,0
32.60460	1,6
32.60461	2,5
GT 61 and GT 62 probe series	
32.60483	0,8
32.60463	1,0
32.60464	1,6
32.60465	2,5

Spare Bellows for Axial Probes

Nitrile: resistant synthetic rubber for normal use

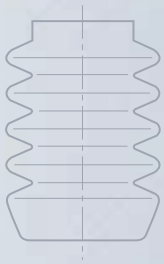
Viton: high-resistance synthetic rubber used where probes are constantly in contact with cooling and lubricating agents.

Safety rings and washer

Transport packing

No	
GT 21 and GT 22 probe series	
32.60468	Nitrile
32.60470	Viton
GTL 212 and GTL 222 probe series	
32.60489	Viton
GT 43 and GT 44 probe series	
028845	Nitrile
037608	Viton

No	
GT 27, GT 28, GT 61 and GT 62 probe series	
32.60491	Viton
GT 272, GT 282, GT 612 and GT 622 probe series	
32.60490	Viton



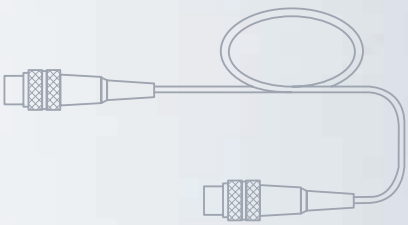
Extension Cables

For high accuracy requirements, we recommend to adjust all parts of your measuring equipment together.

Transport packing

No	m
32.40201	1
32.40202	2
32.40203	3

Other cable lengths available on request

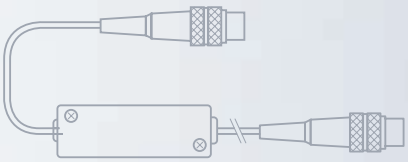


Attenuator Cables

Mounted between the probe and the electronic device

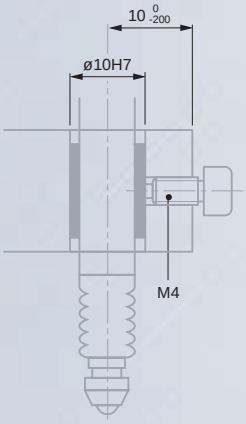
Transport packing

No	Factor	m
32.60415	1 : 2	0,3
32.60416	1 : 3	0,3
32.60417	$1 : \sqrt{10}$	0,3
32.60418	1 : 10	0,3



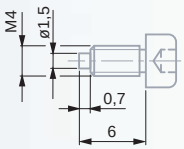
Clamping Elements for Axial Probes

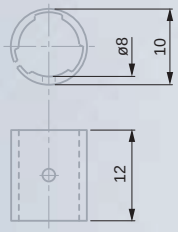
Provided with 3 clamping faces – To make sure all the metrology properties of the guiding system will not be disturbed by the clamps.



VKD clamp screw

26.11013	M4



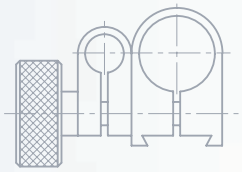


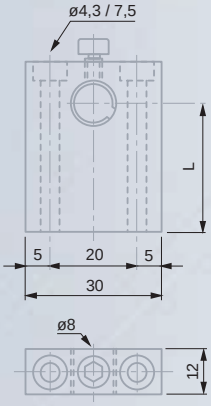
VKE clamp

26.11014	8

Clamp Collar

18.60401	5,6 or 9,5 diam. and dovetail





VDE clamps with fastening sleeve and screw

26.60048	8	28
26.60049	8	37

SWISS MADE ✓

All dimensions shown in the drawing must be respected

Transport packing

Manually Operated Devices for Retracting the Measuring Bolt

35.40104	**Mechanical retraction device**
consisting of:	
35.40101	1 Lift lever
35.40102	1 Washer

32.60401	**Pneumatic retraction device** Suited for the probe series GT 22 / 28 / 42 / 44 and 62
consisting of:	
	1 Manual vacuum pump
35.40405	1 4 mm dia. air tube, 1 m.

SWISS MADE ✓

Transport packing

MERCER Inductive Probes

For Mercer and TESA® Electronic Equipments or Those from Other Manufacturers

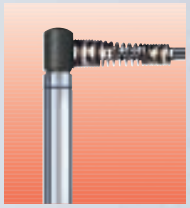
All electronic probes of the MERCER range are solidly built. Their enhanced longevity make them most suitable for constraining applications in the production area.

- *Ball-bearing guidance provides each axial probe with the capability to perform thousands of cycles without any sign of wear.*
- *Rubber bellows protect the guiding system against the penetration of liquids and solid contaminants.*

Principle

*The **MERCER probes** (transducers) work like any **TESA standard probe** fitted with two induction coils, also called **half-bridge** probes. For more details, report to the information on page L-5.*

The use of the right angle adaptor supplied with each probe with axial cable exit allows full deflection of the cable sideways.

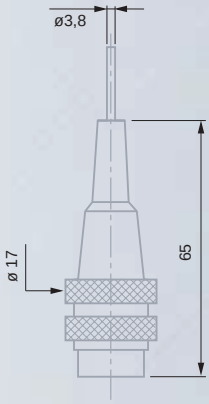


Probe sensitivity

Reference conditions:				
• Drive voltage:	< 5 V rms		< 5 V rms	
• Drive frequency	5 kHz		13 kHz	
• Adjustment load:	10 kΩ		2 kΩ	
	mV/V/mm	mA_{rms}*	mV/V/mm	mA_{rms}**
410	50 ± 0,5	4,5	73,75 ± 0,5	3,5
411	50 ± 0,5	8,2	73,75 ± 0,5	3,5
490 / 491	50 ± 0,5	4,3	73,75 ± 0,5	2
510	50 ± 0,5	5,0	49,17 ± 0,5	2,2
500 / 501	5 ± 0,5	10,0	7,375 ± 0,5	4,3
460	50 ± 0,5	4,5	73,75 ± 0,5	2,9
492	50 ± 0,5	4,3	73,75 ± 0,5	2
160	50 ± 0,5	7,8	73,75 ± 0,5	3,3
430	50 ± 0,5	6,0	73,75 ± 0,5	2,5
451	50 ± 0,5	7,2	73,75 ± 0,5	3,0
420	50 ± 0,5	8,2	73,73 ± 0,5	8,0
499	50 ± 0,5	6,0	73,75 ± 0,5	4,5

* Power consumption at 5 kHz / 2,7 V_{rms}

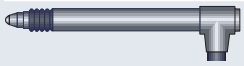
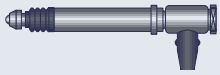
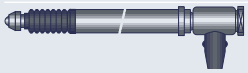
** at 13 kHz / 5 V_{rms}



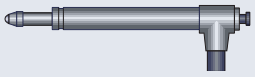
Dimensions of the DIN 45322 / 5x240 °/ M18x0,75 connector fitted to all MERCER/TESA probes.
Unless otherwise specified, the cable curve radius must be at least R = 40 mm.

MERCER Probes for MERCER and TESA® Electronic Equipments - General Overview

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard probes						
	32.36490 32.30490*	490	± 1,5	4,3	axial / radial	mechanical
	32.36491 32.30491*	491	± 1,5	4,3	radial	by vacuum
Standard probes with short body						
	96410010 96410012*	410	± 1	2,5	axial / radial	mechanical
	96411011 96411014*	411	± 1	2,5	adial	by vacuum
Standard long-travel probes						
	96510017 96510013*	510	± 2,5	5,3	axial / radial	mechanical
	96500010 96500015*	500	± 5	11,5	axial / radial	mechanical
	96500013 96500025*	501	± 5	11,5	radial	by vacuum
Axial probes without guidance of the measuring bolt						
	96460011 96460014*	460	± 1,5		axial / radial	

... with Measuring Bolt Activated by Pneumatic Pressure

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard Probes						
	32.36492 32.30492*	492	± 1,5	4,3	radial	0,25 6

Axial Probes with Short Body and Ball-Bearing Measuring Bolt

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
Standard probes with a 6 mm body diameter						
	96160011 96160013*	160	± 1	3,3	axial	mechanisch
Miniature probes with a 8 mm body diameter						
	96430028 96430029*	430	± 0,5	1,25	axial	mechanical
	96441015 96441041*	451	± 0,5	2,1	radial	mechanical

Lever probes

	MERCER TESA*		Measuring range mm	mm	Cable exit	Measuring bolt retraction
	96420001 96420004*	420	± 0,2	0,525	parallel	without
	96499004 96499007*	499	± 0,5	1,2	parallel	without

* Nominal value of the measuring force at electrical zero.
** Nominal value of the measuring force at electrical zero with pressure at 0,25 bar.
*** Mechanical frequency limit valid for the final value of the measuring range amplified by 10 %.
**** Max. perm. errors applicable to the linearity errors contained within each relevant measuring span.

Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
Viton	0,63	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP65
Viton	0,63	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP65
nitrile	0,6	3,1	58	0,1	0,2	0 to 60	IP62
Viton	0,6	3,1	58	0,1	0,2	0 to 60	IP65
Viton	1,3	4	60	0,1	0,2	0 to 60	IP62
Viton	1,5	6,8	45	0,1	0,2	0 to 60	IP62
Viton	0,23	6,8	45	0,1	0,2	0 to 60	IP65
none	–	3,4	–	–	0,15	0 to 60	IP40

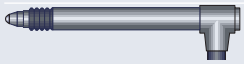
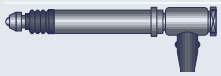
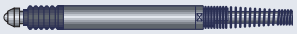
Sealing bellows	N **	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
none	0,2	4	60	0,02	0,15 (MERCER) 0,2 (TESA)	- 10 to 65	IP50

Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
Viton	0,6	2,5	60	0,1	0,2	0 to 60	IP62
nitrile	0,75	1,9	60	0,1	0,2	0 to 60	IP62
nitrile	0,6	3	60	0,1	0,2	0 to 60	IP62

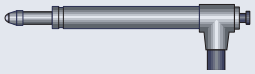
Sealing bellows	N *	Moving mass g	Frequency limit Hz ***	µm	% ****	°C	IEC 60529
none	1,8	2,5	10	0,5	0,3	0 to 60	IP40
none	0,02 ÷ 0,2	10,6	10	0,25	0,6	0 to 60	IP40

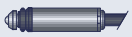
MERCER Probe Series Compatible with Electronic Equipments from Other Manufacturers

8 mm Diameter Axial Probes with Ball-Bearing Measuring Bolt

		Measuring range mm	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
Standard probes							
	490	± 1,5	96490101	96490041	96498003	96490034	96490136
	491	± 1,5	96491101	96491121	96491111	96491131	96491136
Standard probes with short body							
	410	± 1	96410101	96410018	96410111	96410033	96410136
	411	± 1	96411101	96411121	96411111	96411131	96411136
Standard long-travel probes							
	510	± 2,5	96510101	96510121	96510111	96510131	96510136
	500	± 5	96500101	96500121	96500111	96500131	96500040 S / 10
	501	± 5	96501101	96501121	96501111	96501131	96501136
Axial probes without guidance of the measuring bolt							
	460	± 1,5	96460101	96460121	96460111	96460131	96460136
Standard probes with pneumatic retraction of the measuring bolt							
	492	± 1,5	96400101	96400121	96400111	96400131	96400136

Probes with Short Body and Ball-Bearing Measuring Bolt



	Measuring range mm	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
Standard probes with a 6 mm body diameter						
 160	± 1	96160101	96160121	96160111	96160169	96160136
Miniature probes with a 8 mm body diameter						
 430	± 0,5	96430101	96430024	96430111	96430131	96430136
 451	± 0,5	96441101	96441070	96441054	96441131	96441136

Lever Probes

		Measuring range	ETAMIC (ZDB) LVDT	MACHSIZE Half-bridge	MAHR Half-bridge	MARPOSS LVDT	MARPOSS Half-bridge
	420	± 0,2	96420101	96420121	96420003	96420131	96420136
	499	± 0,5	96499101	96499121	96499111	96499020	96499136

For technical features on each probe series, report to the following pages.

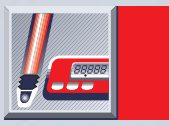
METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96499006	96490053* 80 DIN5x180°	96498005	96498025	96498007	96498028	96490045	96490031	96490211
96491016	96491151	96491021	96491036	96491020	96491032	96491041	96491047	96491211
96410031	96410074		96410037	96410171		96410093	96410044	96410211
96411141	96411151		96411161	96411171		96411181	96411201	96411211
96510141	96510151		96510161	96510171		96510181	96510018	96510211
96500045 S / 10	96500151		96500161	96500171		96500181	96500201	96500211
96500046 S / 10	96501151		96501161	96501171		96501181	96501201	96500053
96460141	96460151		96460161	96460171		96460181	96460201	96460211
96400044	96400067 DIN5x180°	96400039	96400042	96400040	96400036	96400056	96400201	96400211

METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96160141	96160151		96160161	96160171		96160015	96160021	96160211
96430030	96430027 DIN5x180°		96430161	96430171		96430181	96430033	96430211
96441032	96441073* 80	96441055	96441056	96441058	96441045	96441093	96441077	96441211

METEM Half-bridge	MOORE LVDT	NOVIBRA Half-bridge **	PMS METRO Half-bridge	PRETEC Half-bridge	RMP Systems	SIGMA Half-bridge	SOLARTRON Half-bridge	SOLARTRON LVDT
96420006	96420016	96420005	96420013	96420007		96420011	96420012	96420211
96499141	96499151		96499161	96499018		96499010	96499201	96499211

* Half-bridge

** Half-bridge in special version



MERCER Axial Probes - 490 and 491 Series

For MERCER and TESA® Electronic Equipments

Universal probes to suit common but constraining applications.

- *8 mm body diameter that may be clamped over its entire length.*
- *Measuring bolt mounted on a ball-bearing.*
- *Probe body made in steel and nickel plated.*
- *Degree of protection IP65 as per IEC 60529.*
- *490 series provided with a flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*

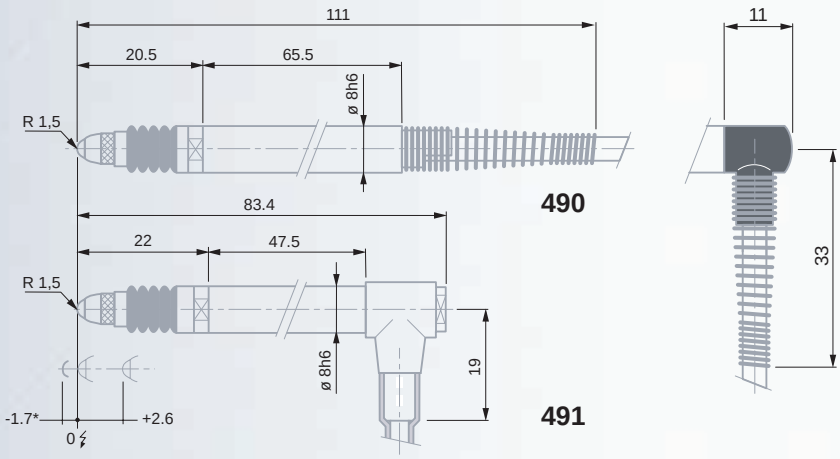
		Measring range mm	N *	Measuring bolt retraction	Sealing bellows
*490 Series with axial/radial cable exit***					
32.36490	**32.30490**	± 1,5	0,63	mechanical	Viton
491 Series with radial cable exit					
32.36491	**32.30491**	± 1,5	0,63	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring. Also available on request: probes with measuring force of 0,4, 1,0, 1,6, 2,5 or 4 N.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
490	**MERCER**	- 2	0	- 1,7	4,3	0,02	0,15	32.00450
490	**TESA**	- 2	0	- 1,7	4,3	0,02	0,2	32.00456
491	**MERCER**	- 2	0	- 1,7	4,3	0,02	0,15	32.00454
491	**TESA**	- 2	0	- 1,7	4,3	0,02	0,2	32.00457

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the measuring span of 3 mm (measuring range ±1,5 mm).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Adjustable distance between both the lower stop and electrical zero.

Interchangeable measuring insert with M2,5 thread. 3 mm dia. carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Nickel plated body

Steel measuring bolt, hardened.

Viton rubber bellow with high-resistance elastomer

Moving mass: 4 g

Force increase: 0,2 N/mm

Mechanical frequency limit: 60 Hz

0,2 µm / °C

- 10 °C to 65 °C

-20 °C to 65 °C

IP65 (IEC 60529)

Transport packing

Identification number

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Adjustable distance between both the lower stop and electrical zero.

Interchangeable measuring insert with a M2,5 thread. 3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated.

Stainless steel measuring bolt, hardened.

Rubber bellows: resistant nitrile or Viton with high-resistance elastomer

Moving mass: 3,1 g (410 series) or 3,2 g (411 series)

Force increase: 0,15 N/mm

Mechanical frequency limit: 60 Hz

0,025 µm / °C

0 °C to 65 °C

-40 °C to 65 °C

IP62 (410 series) IP 65 (411 series) as per IEC 60529

Transport packing

Identification number

MERCER Axial Probes with Short Body Length - 410 and 411 Series

For MERCER and TESA® Electronic Equipments

Universal probes for common but constraining applications.

- *8 mm body diameter that may be clamped over its entire length.*
- *Measuring bolt mounted in a ball-bearing.*
- *Hardened steel body, hard chrome plated.*
- *Degree of protection IP62 (410 series) or IP65 (411 series) as per IEC 60529.*
- *490 series provided with a flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*

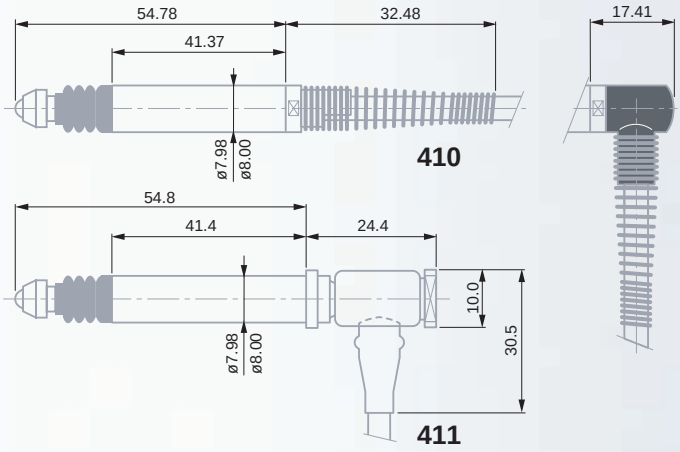
		Measuring range mm	N *	Measuring bolt retraction	Sealing bellow
*410 Series with axial/radial cable exit***					
96410010	**96410012**	± 1	0,6	mechanical	nitrile
411 Series with radial cable exit					
96411011	**96411014**	± 1	0,6	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring. Also available on request: 410 probe series with measuring force of 0,1 or 1,6 N.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from... mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
410	**MERCER**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96410010
410	**TESA**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96410012
411	**MERCER**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96411011
411	**TESA**	- 1,2	0	- 1,08	2,5	0,1	0,2	F96411014

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors within a 2 mm measuring span (measuring range ± 1 mm).

MERCER Axial Probes with Long Travel - 510, 500 and 501 Series

For MERCER and TESA® Electronic Equipments

Universal probes for multigauging dedicated devices used in standard applications.

- *Long travel to ensure optimum protection of the probe.*
- *Probes compatible with those from other makers (page L-36).*

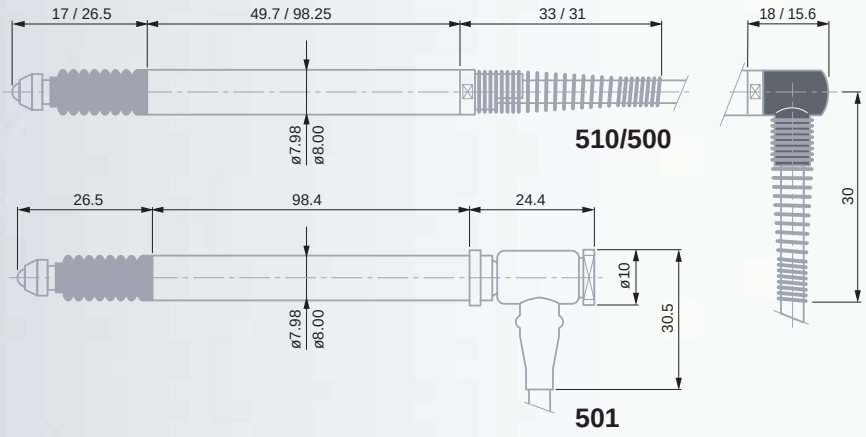
		Measuring range mm	N *	Measuring bolt retraction	Sealing bellows
*510 Series with axial/radial cable exit***					
96510017	**96510013**	± 2,5	1,3 ± 0,3	mechanical	Viton
*500 Series with axial/radial cable exit***					
96500010	**96500015**	± 5	1,5 ± 0,3	mechanical	Viton
501 Series with radial cable exit					
96500013	**96500025**	± 5	0,23 ± 0,06	by vacuum	Viton

Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Retraction devices	
– hand operated	L-32
– electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

** With use of the right angle adaptor that came with the probe.



		Lower stop of the measuring bolt***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
510	**MERCER**	- 2,8	0	- 2,6	5,3	0,1	0,2	F96510017
510	**TESA**	- 2,8	0	- 2,6	5,3	0,1	0,2	F96510013
500	**MERCER**	–	–	- 5,25	11,5	0,1	0,2	F96500010
500	**TESA**	–	–	- 5,25	11,5	0,1	0,2	F96500015
501	**MERCER**	–	–	- 5,25	11,5	0,1	0,2	F96500013
501	**TESA**	–	–	- 5,25	11,5	0,1	0,2	F96500025

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the 5 mm or 10 mm measuring span (measuring range ± 2,5 mm or ± 5 mm, respectively).

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Ball-bearing meas. bolt

Distance between both stops and electrical zero: adjustable for 510 series (lower stop only) or fixed for 500 and 501 series.

Interchangeable measuring insert with a M2,5 thread. 3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated.

Hardened steel measuring bolt

Viton rubber bellows with high-resistance elastomer

Moving mass:
3,8 g (MERCER 510)
4,2 g (TESA 510)
6,8 g (500 and 501)

Force increase:
0,4 N/mm (510 series)
0,15 N/mm (500 series)
0,03 N/mm (501 series)

Mechanical frequency limit:
60 Hz (510 series)
45 Hz (500/501 series)

0,025 µm / °C

0 °C to 60 °C

-40 °C to 60 °C

IP62 (510/500 series) or IP 65 (501 series) as per IEC 60529

Transport packing

Identification number

✓

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

8 mm diameter cylindrical body $^{0}/_{-20}$ µm, 8 mm long. for coupling the measuring bolt.

Cable length: 2 m

Plug type: DIN 45322

Steel body, hardened and hard chrome plated

Moving mass: 3,4 g

0 °C to 60 °C

-40 °C to 60 °C

IP40 (IEC 60529)

Transport packing

Identification number

MERCER Axial Probes without guidance of the measuring bolt - 460 Series

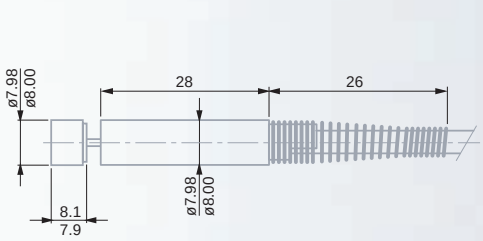
For MERCER and TESA® Electronic Equipments

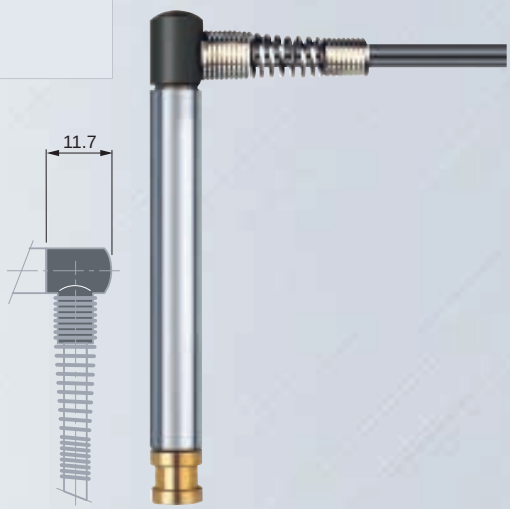
Specially designed for assembly on measuring instruments and other gauging devices – Suitable for capturing any displacement on machines or fixtures used for in-process inspection.

- *Open type transducers with measuring bolt mechanically coupled.*
- *8 mm body diameter that may be clamped over its entire length. Made in hardened steel and hard chrome plated.*
- *Flexible axial cable exit with steel spring to prevent the cable from breaking.*
- *Probes compatible with those from other makers (page L-36).*

		Measuring range / mm	Sealing bellows
*460 Series with axial/radial cable exit**			
96460011	**96460014**	± 1,5	none

* With use of the right angle adaptor that came with the probe.





460

		% *	Technical data sheets
460	**MERCER**	0,15	F96460011
460	**TESA**	0,15	F96460014

* Max. perm. errors for linearity errors contained within the measuring span of 3 mm (measuring range ± 1,5 mm).

MERCER Axial Probes with Air Activation of the Measuring Bolt - 492 Series

For MERCER and TESA® Electronic Equipments

Designed for use in measuring devices providing fully or half-assisted inspection routines.

- *8 mm body diameter that may be clamped over its entire length. Made in steel and nickel plated.*
- *Probes compatible with those from other makers (page L-36).*

		Measuring bolt mm	N *	Meauring bolt activation	Sealing bellows
492 Series with radial cable exit					
32.36492	**32.30492**	± 1,5	0,2	▼ ▲	none

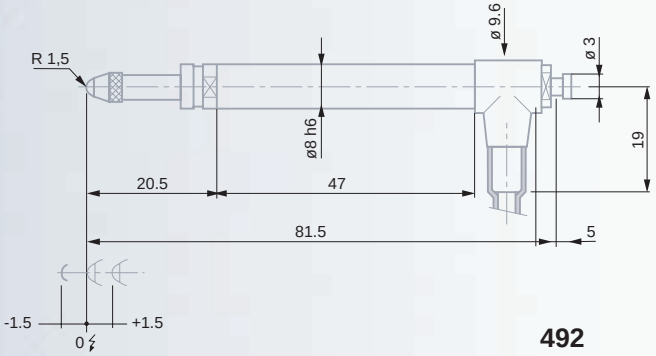
Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 to L-30
Retraction devices	
electro-pneumatically operated	L-47

* Nominal value at electrical zero; max. deviation ± 25 %. Valid at a pressure of 0,25 bar with use of the probe in upright assembly position, with downward oriented measuring insert, as well as in static measuring.

▼ Downward movement of the measuring bolt activated by air pressure.

▲ Upward movement of the measuring bolt activated under the spring force only.



492

		Lower stop of the measuring bolt ** mm	mm	µm	% ***	Technical data sheets
492	**MERCER**	- 1,7 ± 0,1	4,3	0,02	0,15	32.00455
492	**TESA**	- 1,7 ± 0,1	4,3	0,02	0,2	32.00458

** Fixed distance from electrical zero.

*** Max. perm. errors for linearity errors contained within the 3 mm measuring span (measuring range ± 1,5 mm).

✓ SWISS MADE

DIN 32876 Part 1

See in the tables

Axial probes usable in any position

8 mm body diameter

Measuring bolt mounted on a ball-bearing

Distance between both stops and the electrical zero is fixed

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Cable length: 2 m

Plug type: DIN 45322

Steel body, nickel plated.

Measuring bolt in hardened steel

Moving mass: 4 g

Force increase: 0,045 N/mm

Mechanical frequency limit: 60 Hz

Air pressure: 0,25 bar (nominal) 6 bar (maximum) Air filter capacity: <5 µm

Air pressure: 60 %

0,2 µm / °C

-10 °C to 65 °C

-20 °C to 65 °C

IP50 (IEC 60529)

Transport packing

Identification number

MERCER Probes with Short Body - 160, 430 and 451 Series

For MERCER and TESA® Electronic Equipments

Their compact size and robust construction make them perfect for a frequent use.

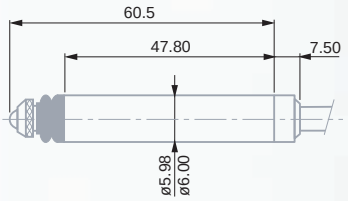
- *8 mm body diameter that may be clamped over its entire length.*
- *Hardened steel, nickel plated body. Ball-bearing measuring insert.*
- *Probes compatible with those from other makers (page L-36).*

		Measuring range mm	N *	Measuring bolt retraction	Sealing bellows
160 Series - Probes with short body length and axial cable exit					
96160011	**96160013**	± 1	0,6 ± 0,15	mechanical	Viton
430 Series - Miniature probes with axial cable exit					
96430028	**96430029**	± 0,5	0,75 ± 0,2	mechanical	nitrile
451 Series - Miniature probes with radial cable exit					
96441015	**96441041**	± 0,5	0,6 ± 0,15	mechanical	nitrile

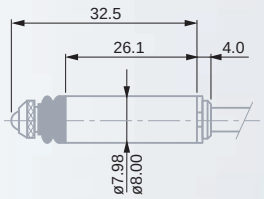
Accessories

	Page
Measuring inserts	E-24 to E-26, L-29 and L-30
Hand operated retraction devices	L-32

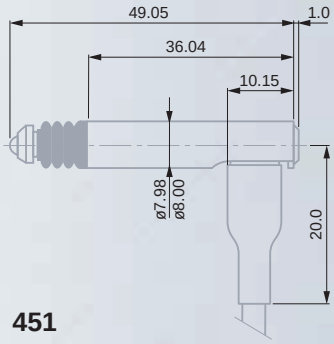
* Nominal value at electrical zero. Valid for upright assembly position, with downward oriented measuring insert, as well as in static measuring.



160



430



451

		Lower stop of the measuring bolt ***: adjustable from... mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
160	**MERCER**	- 1,2	0	- 1,08	3,3	0,1	0,2	F96160011
160	**TESA**	- 1,2	0	- 1,08	3,3	0,1	0,2	F96160013
430	**MERCER**	- 0,7	0	- 0,58	1,25	0,2	0,2	F96430028
430	**TESA**	- 0,7	0	- 0,58	1,25	0,2	0,2	F96430029
451	**MERCER**	–	–	- 0,58	2,1	0,1	0,2	F96441015
451	**TESA**	–	–	- 0,58	2,1	0,1	0,2	F96441041

*** Distance from electrical zero.

**** Max. perm. errors for linearity errors contained within the 2 mm or 1 mm measuring span (measuring range ± 1 mm or ± 0,5 mm, respectively).

- ✓
- DIN 32876 Part 1
- See in the tables
- Axial probes usable in any position
- 8 mm body diameter

Ball-bearing measuring bolt

Distance between both stops and electrical zero is either adjustable (lower stop only, 160 series) or fixed (451series).

Interchangeable insert

M2 thread (160 series) M2,5 thread (430 and 451 series)

3 mm dia. tungsten carbide ball tip.

Cable length: 2 m

Plug type: DIN 45322

- Steel body, hardened and chrome plated.

Measuring bolt in stainless steel, hardened.

Rubber bellows: resistant nitrile or Viton with high-resistance elastomer

- Mobile mass: 2,5 g (160 series) 1,9 g (430 series) 3,0 g (451series)
- Force increase: 0,3 N/mm (160 series) 0,25 N/mm (430 series) 0,15 N/mm (451 series)
- Mechanical frequency limit: 60 Hz
- 0,025 µm / °C
- 0 °C to 60 °C
- -40 °C to 60 °C
- IP62 (IEC 60529)
- Transport packing
- Identification number

MERCER Lever Probes - 420 and 499 Series

For MERCER and TESA® Electronic Equipments

420 Series

- *Very small body that can be recessed into a fixture or a plug gauge.*
- *Measuring insert mounted on leaf springs.*

499 Series

- *Parallel guiding of the measuring bolt that can be moved in both probing directions.*
- *Interchangeable measuring insert that may be replaced by other inserts having varying lengths with no influence on the leverage.*
- *Ideal where parallel motion of the measuring bolt is needed.*
- *Without switch-over feature for the probing direction.*

Probes compatible with those from other makers (page L-36).

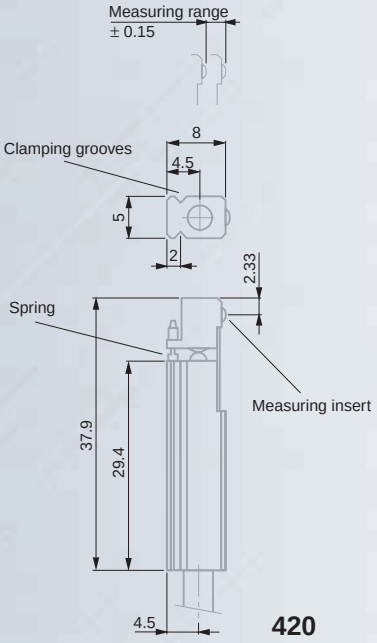
		Measuring range / mm	N *
420 Series - Miniature lever probes			
96420001	**96420004**	± 0,15	1,8 ± 0,4
499 Series - Lever probes with parallel guidance			
96499004	**96499007**	± 0,5	0,02 ÷ 0,2 **

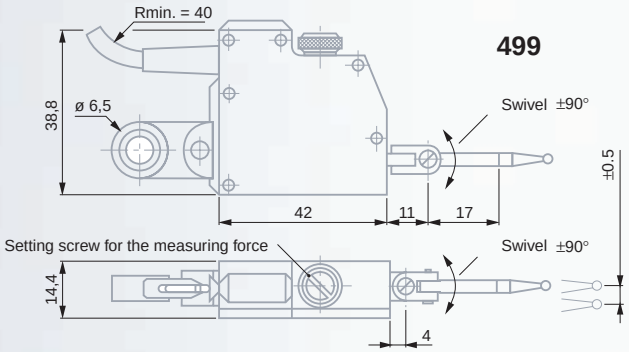
Accessories for MERCER 499 Series

		mm		mm
32.38401	Insert	0,8	Hard. steel	12,3
32.38402	Insert	1,6	Hard. steel	12,3
32.38403	Insert	3,2	Hard. steel	12,3
32.38411	Insert	0,8	Hard. steel	37,7
32.38412	Insert	1,6	Hard. steel	37,7
32.38413	Insert	3,2	Hard. steel	37,7
18.40105	Cylindr. clamp	8		

For other clamping items, report to page E-32.

* Nominal values at electrical zero. Valid in static measuring.
** Adjustable with both the probe housing and lever lying horizontally.





		(Lower) stop of the measuring bolt ***: adjustable from… mm	to mm	ex-factory mm	mm	µm	% ****	Technical data sheets
420	**MERCER**	–	–	- 0,225	0,525	0,5	0,3	F96420001
420	**TESA**	–	–	- 0,225	0,525	0,5	0,3	F96420004
499	**MERCER**	0,6	0	0,6	1,2	0,25	0,6	F96499004
499	**TESA**	0,6	0	0,6	1,2	0,25	0,6	F96499007

*** Distance from electrical zero.
**** Max. perm. errors for llinearity errors contained within the 0,3 mm or 1 mm measuring span (measuring range ± 0,15 mm or ± 0,5 mm, respectively.).

SWISS MADE ✓

DIN 32876 Part 1

See in the tables

Lever probes usable in any position

420 series with a clamping groove. Articulation mounted on leaf-springs.

499 series 2 dovetails with fixing lug or clamping rod. Parallel motion leaf-springs. Smooth motion of the insert through 2 x 90 ° friction clutches.

Triple protection against damage in both probing directions.

499 series Interchangeable insert fitted with a M2 thread

Cable length: 2 m

Plug type: DIN 45322

Stainless steel body, hardened (420 series)

Dull-chrome plated housing (499 series)

Tungsten carbide ball tip

Moving mass: 2,5g (420 series) 10,6 g (499 series)

Force increase: 0,2 N/mm (420) 0,25 N/mm (499)

Mech. frequency limit: 10 Hz

420 series: 0,025 µm / °C, 499 series: 0,25 µm / °C

0 °C to 60 °C

-40 °C to 60 °C

IP40 (IEC 60529)

499 series: with a 3,2 mm dia. insert (No 32.38403) and lug (No 32.38013).

Transport packing

Identification number

TESANORM® Assembly Components

Small coordinate tables with accessories used for measuring centre distances of bores or for similar applications – Mounted on roller-bearings for free move in one or two axes – Available in two sizes – Provided with probe holders, etc.

- *Model 42 x 42 mm with a 3 mm travel, for bore diameters from 0,2 to 26 mm.*
- *Model 62 x 62 mm with a 6 mm travel, for bore diameters from 26 to 100 mm.*

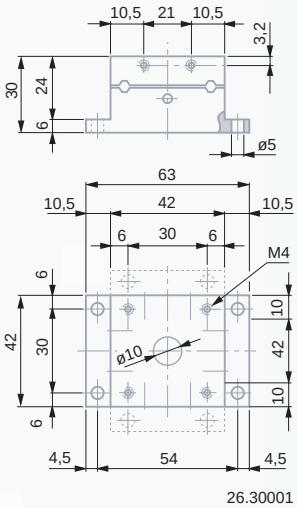
Swiss made ✓

Hardened and ground steel

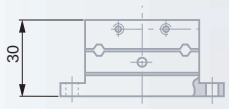
Transport packing

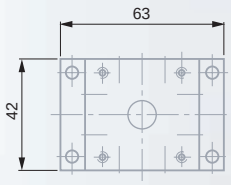
42 x 42 mm coordinate tables

26.30001	**VMA**	Coordinate table for 1 axis - 3 mm travel
26.30005	**VOA**	Coordinate for 2 axes - 3 mm travel
26.30003	**VLA**	Holder for centring heads
26.60004	**VQA**	Centring head
26.60005	**VQB**	Centring head
26.60041	**VUA**	Holder for measuring heads

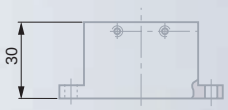


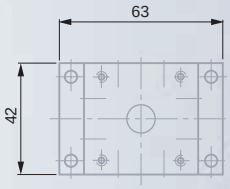
26.30001



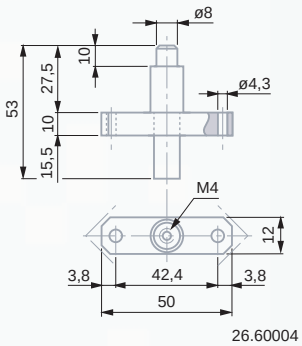


26.30005

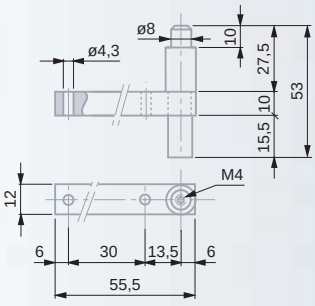




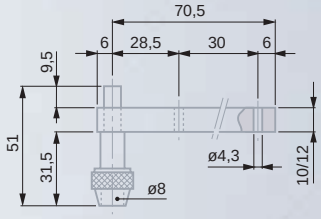
26.30003



26.60004



26.60005

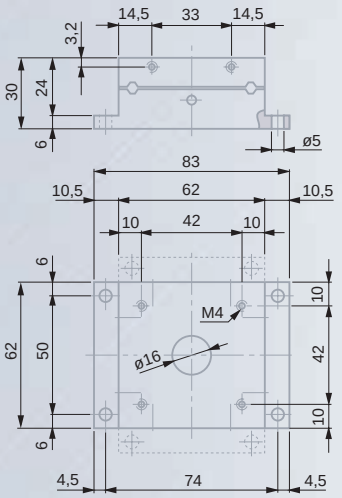


26.60041

62 x 62 mm coordinate tables

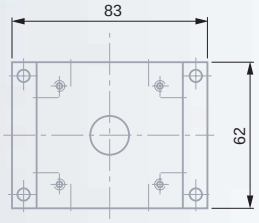
26.30002	**VNA**	Coordinate table for 1 axis - 6 mm travel
26.30006	**VPA**	Coordinate table for 2 axes - 6 mm travel
26.30004	**VLB**	Holder for centring heads
26.60006	**VRA**	Centring head
26.60007	**VRB**	Centring head
26.60042	**VUB**	Holder for measuring head

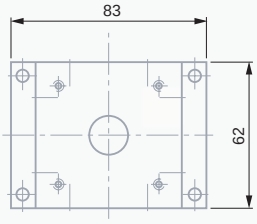
26.30002



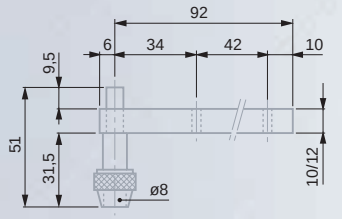
26.30006

26.30004

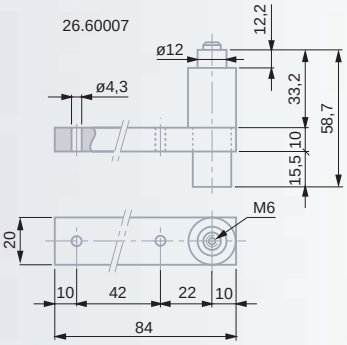




26.60042



26.60007



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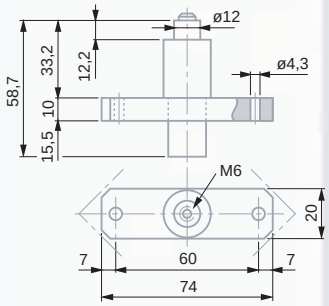


SWISS MADE ✓

Hardened and ground steel

Transport packing

Centring cones for VQA / VQB centring heads

N°	A	∅ mm
26.60008	VSA	0,2 ÷ 0,7
26.60009	VSB	0,7 ÷ 1,2
26.60010	VSC	1,2 ÷ 1,7
26.60011	VSD	1,7 ÷ 2,2
26.60012	VSE	2,2 ÷ 2,7
26.60013	VSF	2,7 ÷ 3,2
26.60014	VSG	3,2 ÷ 3,7
26.60015	VSH	3,7 ÷ 4,2
26.60016	VSJ	4,2 ÷ 4,7
26.60017	VSK	4,7 ÷ 5,2
26.60018	VSL	5,2 ÷ 5,7
26.60019	VSM	5,7 ÷ 6,2
26.60020	VSN	6,2 ÷ 6,7
26.60021	VSO	6,7 ÷ 7,2
26.60022	VSP	7,2 ÷ 7,7
26.60023	VSQ	7,7 ÷ 8,2
26.60024	VSR	8,2 ÷ 8,7
26.60025	VSS	8,7 ÷ 9,2
26.60026	VST	9,2 ÷ 9,7
26.60027	VSU	9,7 ÷ 10,2

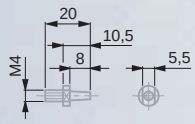
Centring cones for VRA / VRB centring heads

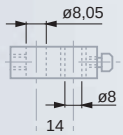
N°	A	∅ mm
26.60028	VTA	10,2 ÷ 11,8
26.60029	VTB	11,8 ÷ 14,2
26.60030	VTC	14,2 ÷ 16,2
26.60031	VTD	16,2 ÷ 18,2
26.60032	VTE	18,2 ÷ 20,2
26.60033	VTF	20,2 ÷ 22,2
26.60034	VTG	22,2 ÷ 24,2
26.60035	VTH	24,2 ÷ 26,2
26.60036	VTJ	26,2 ÷ 28,2
26.60037	VTK	28,2 ÷ 30,2
26.60038	VTL	30,2 ÷ 32,2
26.60039	VTM	32,2 ÷ 34,2
26.60040	VTN	34,2 ÷ 36,2
26.60050	VTO	36,2 ÷ 38,2
26.60051	VTP	38,2 ÷ 40,2
26.60052	VTQ	40,2 ÷ 42,2
26.60053	VTR	42,2 ÷ 44,2
26.60054	VTS	44,2 ÷ 46,2
26.60055	VTT	46,2 ÷ 48,2
26.60056	VTU	48,2 ÷ 50,2

Probe holders and accessories

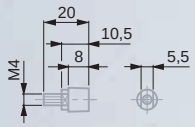
N°	A	=	= L mm
26.30016	VDA	Probe holder	
26.30017	VDB	Probe holder	
26.30018	VDC	Probe holder	
26.60047	VDD	Probe holder	
26.60048	VDE	Probe holder	28
26.60049			37
26.60044	VFB	Spring support	
26.11010	VKF	Spring	29
26.11011			45
26.11001	VKA	Axes	50
26.11002			75
26.11003			100
26.11004			125
26.11005			150
26.11006			175
26.11007			200
26.30020	VEB	Meas. stops	35
26.30021			60
26.30022			110
26.30023			160

26.60008/17



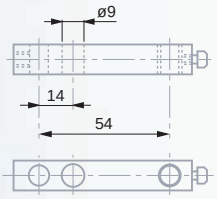


26.60018/27

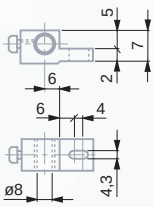


26.30016

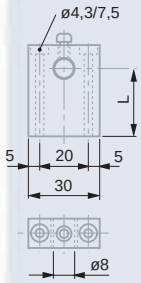
26.30017



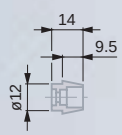
26.30018

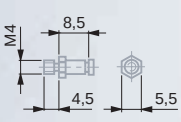


26.60047

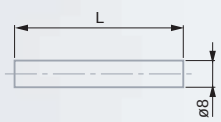


26.60028/56

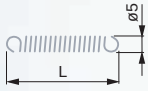




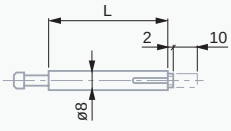
26.60044



26.11001/7



26.11010/11



26.30020/23

26.60048/49

Electropneumatic Systems for Activating the Measuring Bolt

✓

Suited for 20 probes from the GT 22 / 42 / 44 and 52 probe series

GT 28 and 62 probe series: max. 10 probes

230 V, 50 Hz

✓

Transport packing

Electropneumatic vacuum pump

For lifting up to 20 measuring bolts simultaneously with a measuring force of up to 0,63 N

No	
32.60431	Operated via the built-in push-button or 24 V relay
32.60432	Operated via the mains powered foot switch

✓

230 ± 10 % V switchable to 115 ± 10 % V

Needed pressure: 1 to 7 bars

190 x 170 x 310 mm

3,5 kg

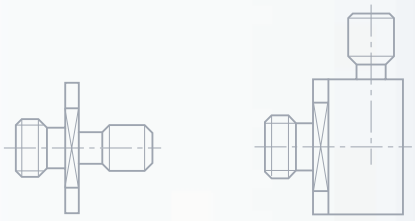
✓

Transport packing

FMS C electropneumatic vacuum pump

Uses vacuum or air pressure; simultaneous connection of up to 30 TESA probes; ideal for use with FMS probes.

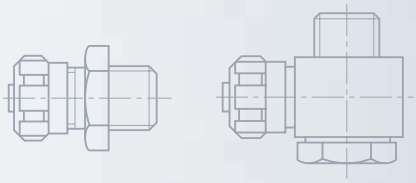
No	
32.60486	Controlled electrically via the TESA's electronic instrument or manually



Air tube connectors for TESA GT 22 / 28 / 42 / 44 and 62 probe series

M4 coupling thread; suited for a 4 / 2 mm dia. air pipe (No. 35.40405).

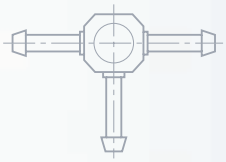
No	Connector type
35.60000	straight
35.60002	angled



Air tube connectors for TESA FMS probes

M5 coupling thread; suited for a 4 / 2 mm dia. air pipe (No. 35.40405).

No	Connector type
026522	straight
024388	angled



Connecting T-piece

No	For air pipe
35.40403	4 / 2 mm dia. (No. 35.40405)

Vacuum release delay valve

For controlling the lowering speed of axial probes.

No	For air pipe
35.40404	4 / 2 mm dia. (No. 35.40405)

TESATRONIC® Length Measuring Instruments - General Overview

Dedicated compact units having either an analogue or a numerical display – Used in association with hand-held measuring instruments or on stationary devices for shop floor inspection and maintenance as well as in the measuring room.

TESATRONIC		TT 10	TT 20	TT 60	TT 80	TTA 20
		44.30008	44.30009	44.30010	44.30011	44.30003
Probe input	number	1	2	2	2	2
	automatic recognition	no	yes	yes	yes	no
Measuring range	number	3	7	7	9	6
	minimum	± 5 µm	± 5 µm	± 5 µm	± 0,5 µm	± 3 µm
	maximum	± 500 µm	± 5000 µm	± 5000 µm	± 5000 µm	± 1000 µm
	Zoom function (5x)	yes	no	no	no	no
	automatic switching	yes	yes	yes	yes	no
Numerical display		yes	yes	yes	yes	no
Numerical interval	minimum	0,1 µm	0,1 µm	0,1 µm	0,01 µm	
	maximum	10 µm	0,1 µm	0,1 µm	0,01 µm	
Analogue display		yes	yes	yes	yes	yes
Scale interval	minimum	0,1 µm	0,2 µm	0,2 µm	0,02 µm	0,1 µm
	maximum	10 µm	200 µm	200 µm	200 µm	50 µm
Metric / inch units		yes	yes	yes	yes	yes
Value classification		no	yes	yes	yes	yes
	number of classes		3	up to 42	up to 42	3
	signal outputs		yes	yes	yes	yes
Memory		no	no	yes	yes	no
Digital output		RS 232	RS 232	RS 232	RS 232	no
Analogue output		no	no	yes	yes	yes
Power supply		Batteries	Mains adapter	Mains adapter	Mains adapter	Mains power

✓

DIN 32876 Part 1

66 x 57 mm LC display field

9 x 4,5 mm

Response time of display ≤ 100 ms.
Hold time ≥ 100 ms.

Zero drift* ≤ ± 0,005 % / °C

Frequency limit of display with reference to signal input: 10 Hz

Max. display error *: 2 %

± 1 numerical interval

Opto-coupled RS 232 compatible output

3,5 V to 4,5 V, 3 batteries type LRC 6, 1,5 V, AA.

Power consumption: ≈ 7 mW / 3,5 V

Self-controlled voltage fluctuation

Drive voltage of the probe: 0,7 V

Drive frequency: 13 ± 0,65 kHz

0 °C to 60 °C

- 10 °C to 70 °C

80 %, with no condensation

Protection IP42 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

95 x 170 x 68 mm (W x D x H)

490 g (with batteries)

Transport packing

Identification number

Declaration of conformity

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

TESATRONIC® TT 10
Electronic Length Measuring Instrument

Pocket-sized, battery-operated electronic instrument for use on the move – Ideally suited for your measurement tasks on the surface plate, in the inspection room right next to the production floor or directly on the machine – Provides full portability where there's no room for cumbersome power cable.

- *Simple-to-use function keys used in conjunction with the combined analogue/numerical indication providing easy reading.*
- *LCD, pointerless display field for high repeatability and negligible hysteresis.*
- *3 measuring ranges, switchable manually or automatically depending on the size of the measured value.*
- *Metric and inch conversion.*
- *Additional signal amplification (5x) for easy display setting.*
- *Quick zero-setting thanks to digital technology.*
- *Signal input for one probe.*
- *RS 232 compatible digital output, opto-coupled.*

No	=
44.30008	**TESATRONIC TT 10** Electronic measuring instrument with analogue and numerical display; 3 measuring ranges switchable from metric to inch; 1 probe input; RS 232 output.

Provided with the following accessories:

47.68002	3 Batteries, 1,5 V, type LRC 6, AA.
44.60007	1 Visual template for value classification.

Measuring ranges and numerical interval

	Zoom function	Used for	µm	µm	in	in
1	without	measuring	± 500	10	± 0.025	0.0005
	5x	setting	± 100	2	± 0.005	0.0001
2	without	measuring	± 50	1	± 0.0025	0.00005
	5x	setting	± 10	0,2	± 0.0005	0.00001
3	without	measuring	± 5	0,1	± 0.00025	0.000005

TESATRONIC® TT 20, TT 60 and TT 80 Electronic Length Measuring Instruments

Feature the most advanced technology – Provide functional reliability – Simple to use – Essential for shop floor inspection or in the measurement laboratory.

TESATRONIC® TT 20

Includes a combined analogue/numerical display – 2 probe inputs for single, sum or difference measurements.

- *Large LC display for error-free reading.*
- *Better repeatability and negligible hysteresis as the analogue display has no mechanical pointer.*
- *Choice between pointer or bar graph.*
- *All measuring functions readable on the LC display.*
- *7 measuring ranges selectable manually or automatically according to the size of the measured value.*
- *Direct conversion from metric to inch units.*
- *Zeroing with just one touch button for each measuring channel.*
- *Setting of tolerances through the keyboard.*
- *3 quality classes displayed through LEDs with control signal outputs.*
- *Lockable display for step by step measurement routines.*
- *Automatic recognition of the connected TESA's probe with direct adaptation of the measurement signals to the right output (only for TESA probes made in 1997 or later).*
- *Opto-coupled RS 232 output, bi-directional.*
- *Power supply through mains adapter.*

TESATRONIC® TT 60

Same features as model TESATRONIC TT 20, but with added functions that include:

- *Memory for retaining extreme values «max», «min», «max - min» as well as the mean value of «max» minus «min».*
- *Dynamic measurement with acquisition of more than 100 single values/s.*
- *Value classification with output signals through contact relay for 5, 10, 20 and 40 good classes.*
- *Remote signal processing using the analogue output.*

TESATRONIC TT 20, TT 60 and TT 80

✓

DIN 32876 Part 1

126 x 62 mm LC display

110 mm scale length

50 scale divisions

2,2 mm

6-decade display plus minus sign

12,5 x 6,6 mm

Zero drift and drift of the signal amplification*: ≤ ± 0,005 % / °C

No drift for the registered values

± 1 numerical interval

RS 232 opto-coupled output

6,5 Vdc up to 7,3 Vdc

Consumption: 2 W

Self-controlled voltage fluctuation

Drive voltage of the probe: 3 V

0 °C to 60 °C

-10 °C to 70 °C

80 %, with no condensation

Resistant plastic

Protection: IP 54 (IEC 60529) for the front face only.

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

255 x 235 x 120 mm (BxTxH)

1,1 kg

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

Transport packing

Identification number

Declaration of conformity

Additional data on TESATRONIC TT 20

Response time* of analogue display with pointer and digital display: ≤ 80 ms

Holding time of digital display: ≤ 10 ms

Frequency limit for all displays with reference to the signal input: 12,5 Hz

Limiting value for analogue display as well as digital display and output*: 0,3 %

Dirve frequency 13 ± 0,65 kHz

Additional data on TESATRONIC TT 60

Response time* of analogue display with pointer and digital display: ≤ 80 ms

Holding time of digital display: 80 ms

Response time of analogue display with bar graphs, classification LEDs as well as analogue output: ≤ 30 ms

Response time** of the memory: ≤ 10 ms

Frequency limit for all displays with reference to the signal input: 12,5 Hz

Frequency limit with reference to the signal input: 20 Hz for the analogue output
100 Hz for the memory

Limiting value for analogue display as well as digital display and output*: 0,3 %

Voltage range: ± 2 V up to ± 10 V

* with reference to 20 °C as well as a relative humidity of ≤ 50 %

** with reference to the analogue output signal

44.30009	**TESATRONIC TT 20** Electronic length measuring instrument with analogue and numerical display; 7 measuring ranges switchable from metric to inch; value classification with 1 good class and signal output through contact relay; 2 probe inputs; RS 232 output.
44.30010	**TESATRONIC TT 60** Same features as model TT 20, but with added memory; dynamic measuring and signal output through contact relay for 5, 10, 20 or 40 good classes; analogue output.

Delivery includes the following items:

47.61054	1 Mains adapter, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA.
47.61055	1 Mains cable EU

Optional Accessory:

Adapter for 5, 10, 20 or 40 classes available on request.

Measuring ranges with scale divisions or numerical intervals (TESATRONIC TT 20 and TT60)

µm	µm	µm	*in*	*in*	*in*
± 5000	0,1	200	*± 0.200*	*0.000005*	*0.01*
± 2000	0,1	100	*± 0.100*	*0.000005*	*0.005*
± 500	0,1	20	*± 0.02*	*0.000005*	*0.001*
± 200	0,1	10	*± 0.01*	*0.000005*	*0.0005*
± 50	0,1	2	*± 0.002*	*0.000005*	*0.0001*
± 20	0,1	1	*± 0.001*	*0.000005*	*0.00005*
± 5	0,1	0,2	*± 0.0002*	*0.000005*	*0.00001*

TESATRONIC® TT 80

High-resolution measuring instrument – Fitted with a combined analogue/ digital display – Provided with 2 probe inputs for single, sum and difference measurements.

Same features as TESATRONIC TT 20 but with the following added functions:

- *9 measuring ranges with numerical interval to 0,01 µm or 0.000001 in.*
- *Memory for extreme values «max», «min» and «max» - «min» as well as mean of «max» and «min».*
- *Dynamic measurement with acquisition of more than 10 single values / s.*
- *Value classification with output signals through contact relay for 5, 10, 20 and 40 good classes.*
- *Remote signal processing using the analogue output.*

44.30011 **TESATRONIC TT 80**
High-resolution electronic length measuring instrument provided with a combined analogue/digital display, 9 measuring ranges switchable from metric to inch, value classification with 1 good class and signals output through contact relay for 5, 10, 20 or 40 good classes, memory, dynamic measuring capability, 2 probe inputs, RS 232 interface as well as analogue output.

Delivered with the following accessories:

47.61054 1 Mains adapter - 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

47.61055 1 Mains cable EU

Optional Accessories

Adapter for 5, 10, 20 or 40 classes available on request.

Measuring ranges with scale divisions or numerical intervals (TESATRONIC TT 80)

µm	µm	µm	*in*	*in*	*in*
± 5000	0,01	200	*± 0.200*	*0.000001*	*0.01*
± 2000	0,01	100	*± 0.100*	*0.000001*	*0.005*
± 500	0,01	20	*± 0.02*	*0.000001*	*0.001*
± 200	0,01	10	*± 0.01*	*0.000001*	*0.0005*
± 50	0,01	2	*± 0.002*	*0.000001*	*0.0001*
± 20	0,01	1	*± 0.001*	*0.000001*	*0.00005*
± 5	0,01	0,2	*± 0.0002*	*0.000001*	*0.00001*
± 2	0,01	0,1	*± 0.0001*	*0.000001*	*0.000005*
± 0,5	0,01	0,02	*± 0.00002*	*0.000001*	*0.000001*

Output current: ≤ 2 mA.
Permissible adjustment load: ≥ 5 kΩ.
Residual ripple(with probe at zero point): ≤ 1 mV
Reference voltage level: analogue earth 0 V

Drive frequency: 13 ± 0,65 kHz

Additional data on TESATRONIC TT 80

Response time of the analogue/ digital display, classification LEDs as well as both digital and analogue outputs: ≤ 100 ms

Holding time of digital display: 100 ms

Response time ** of the memory: ≤ 100 ms

Frequency limit for all types of display as well as the memory with reference to the signal input: 10 Hz

Limiting values * :
2 % for analogue display
0,15 for digital display
0,3 % for analogue output
0,15 % for digital output

Voltage range: ± 2 V to ± 10 V
Output current: ≤ 2 mA
Permissible adjustment load: ≥ 5 kΩ
Residual ripple (with probe at zero point): ≤ 1 mV
Reference voltage level: analogue earth 0 V

Drive frequency: 13 kHz ± 0,5 %

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

** with reference to the analogue output signal

✓

DIN 32876 Part 1

≈ 100 mm scale length

Response time: ≤ 1 s (display), 20 ms (analogue output), 10 ms (output signal of the classification).

Zero drift* ≤ ± 0,005 % / °C

Frequency limit * display: 1 Hz analogue output 50 Hz classification: 30 Hz

Limiting value*: 1,5 % (display), 0,3 % (analogue output).

Negligible (display) or 5 % (classification signals).

Voltage ± 1V, output current ≤ 3 mA, perm. adjustment load ≥ 2 kΩ, residual ripple (at zero) ≤ 1 mV. Reference voltage level: analogue earth (0 V).

230 or 115 V - 10 % to 20 %, 50 to 60 Hz.

Power consumption: ≤ 20 VA

Drive voltage of the probe: 1,5 V_{eff} -10 % to 5 %

Drive frequency: 13 ± 0,65 kHz

0 °C to 50 °C

- 10 °C to 70 °C

Protection IP40 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-2

258 x 190 x 158 mm (W x D x H)

3,4 kg

Transport packing

Identification number

Declaration of conformity

* with reference to 20 °C as well as a relative humidity of ≤ 50 %.

TESATRONIC® TTA 20 Electronic Length Measuring Instrument

Compact design with analogue indication and value classification facility – Aluminium housing for harsh shop floor environment – Easy to handle.

- *Easy-to-read analogue display with mirror strip to avoid parallax error.*
- *6 measuring ranges.*
- *Metric / Inch conversion.*
- *Easy display setting through electrical zero.*
- *2 probe inputs for single, sum or difference measurements.*
- *1 auxiliary signal input, e.g. for the correction values.*
- *LEDs for signalling the relevant quality class with green for «Good», yellow for «Rework» and red for «Scrap».*
- *Potentiometer for setting the limit deviations.*
- *Polarity selector switch for the classification signals (internal and external dimensions).*
- *Switch for locking or unlocking a displayed value.*
- *Analogue output for the connection of a remote displaying or scribing unit.*

44.30003	**TESATRONIC TTA 20** Electronic length measuring instrument with analogue display; 6 measuring ranges; switchable from metric to inch; value classification with 1 good class and signal output through contact relay; 2 probe inputs.

Supplied with one of the following cables depending on the country where goods are to be delivered (must be specified when ordering):

31.60015	Mains cable fitted with SEV connector, 3-wire cable type, 2 m long.
31.60016	Mains cable fitted with VDE connector, 3-wire cable type, 2 m long.
31.60017	Mains cable without connector, 3-wire cable type, 2 m long.

Optional Accessory

44.60004	15-pin connector for both analogue output and classification signal output.

Measuring ranges and scale intervals

µm	µm	*in*	*in*
± 1000	50	*± 0.1*	*0.005*
± 300	10	*± 0.03*	*0.001*
± 100	5	*± 0.01*	*0.0005*
± 30	1	*± 0.003*	*0.0001*
± 10	0,5	*± 0.001*	*0.00005*
± 3	0,1	*± 0.0003*	*0.00001*

TESA® TT 300 and MERCER EL 300 Electronic Length Measuring Instruments

The best choice for series inspection – Instantaneous measuring and displaying through tricolour signals – Value classification with green, amber and red – High contrast diode chain offering fast and sure reading even at a great distance – Alpha numeric display providing detailed measurement results – Vast range of programmable functions – Digital and analogue interfaces – Signal outputs for the control functions.

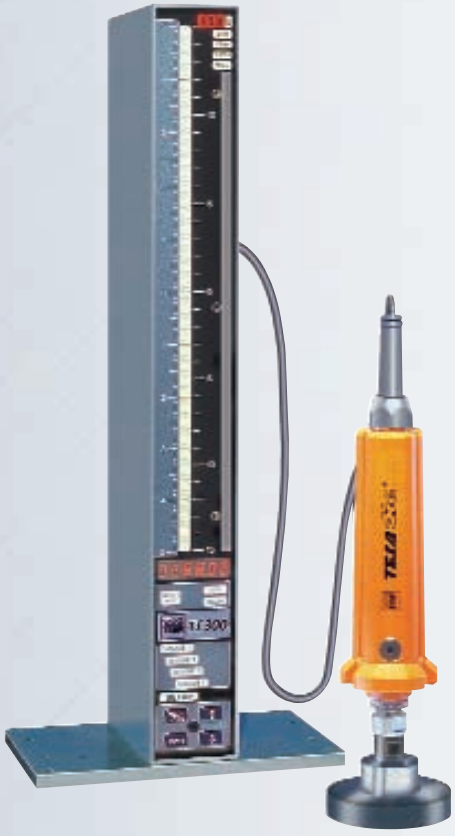
- *Possible use of 2 or 4 electronic probes or measuring units with built-in probe such as TESADIA plug gauges.*
- *Choice of 6 measuring ranges either self set or selected by the user.*
- *PRESET facility enabling values such as the nominal or actual size of setting standards to be entered.*
- *Signal combinations in sum or difference measurements, programmable.*
- *Added features such as selectable digital filters used for the displayed values, programmable as well.*

Executions with memory for one single inspection characteristic

- *Used for both static and dynamic measuring.*
- *Computing functions «max», «min», «max» minus «min» as well as mean of «max» and «min» for value storage.*
- *Value classification with one good class and possible entry of tolerances and control limits.*

Executions for multi-gauging with four inspection characteristics

- *Automatic switch-over and recognition or manual switching from one measuring point to another (4 points maximum).*
- *Value classification with 1 good class and possible entry of tolerances and control limits for each single characteristic.*



Executions with possible classification of up to 30 good classes for one inspection characteristic

- *Input of a desired number of good classes along with both LSL and USL specification limits that relate to the entire tolerance range.*

✓

DIN 32876 Part 1

Analogue and digital display as shown in the table

✓

Automatic or selectable display range based on the size of the tolerance field with enabled classification.

254 mm long

100 bar LEDs, each being 1,75 mm wide, 5 mm long.

Alpha numeric, red-colour LED display with 6 signs (7 segments per sign)

7 x 3,2 mm (H x W)

Classification through the colour LEDs of the analogue display based on the four size limits previously entered.

2 or 4 probe inputs according to the column type along with 2 DC signal inputs.

Signal polarity: positive (+) and negative (-)

Besides single measurement, the combination of the signals in sum or difference measurement is also possible.

Amplification factors of the signal inputs: 0,01 ... 99,99

Response time of the analogue and digital display and outputs with classification included: ≤ 100 ms with a max. error of < 0,1 % for any other measuring deviations.

Max. perm. error of digital display with reference to 20 °C with a relative humidity of ≤ 50 %: 0,5 %

Zero drift: < 0,004 % / °C
Drift of the signal amplification: < 0,008 % / °C

RS 232

Sensitivity of analogue input and output: 1,525 V / mm, Voltage: ≤ ± 5 V, Output current: ≤ 3 mA, Adjustment load: ≥ 2 kΩ

100 to 250 Vac, 47 to 60 Hz

Power consumption: 5,5 VA

0 °C to 50 °C

- 10 °C to 70 °C

80 %,with no condensation

Painted aluminium housing with acrylic front plate. Integrated keypad with touch buttons.

Protection IP 50 (IEC 60529)

EN 50081-2, EN 50082-2

45 mm in width, 370 mm in height, 102,5 mm in depth, column base and rear-mounted connectors not included.

0,65 kg

Provided with base and two M3 x 6 tightening screws for safe positioning of the instrument

Transport packing

Identification number

Declaration of conformity

TESA TT 300 and MERCER EL 300 Electronic Measuring Instruments
With analogue and digital display, 6 measuring ranges, metric/inch selection, classification with tolerances and control limits, analogue as well as RS 232 digital ouputs.

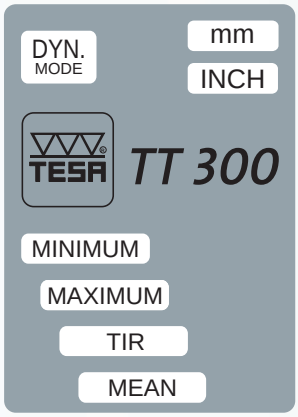
		Number of signal inputs Probe	DC
Executions with memory for one single inspection characteristic			
40.30002	**40.36002**	2	2
40.30004	**40.36004**	4	–
Executions for multi-gauging with four inspection characteristics			
40.30012	**40.36012**	2	2
40.30014	**40.36014**	4	–
Executions with possible classification of up to 30 good classes for one inspection characteristic			
40.30022	**40.36022**	2	2
40.30024	**40.36024**	4	–

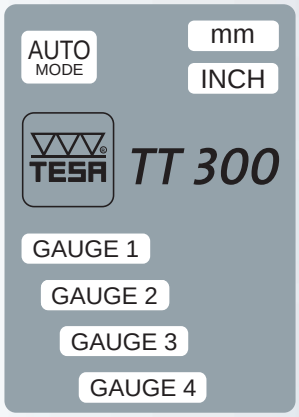
Supplied with either of the following cables depending on the country where goods are to be delivered (must be specified when ordering):

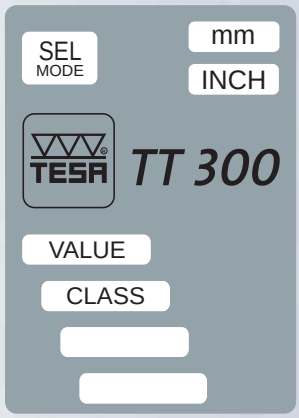
31.60015	Mains cable fitted with SEV connector, 3-wire cable type, 2 m long.
31.60016	Mains cable fitted with VDE connector, 3-wire cable type, 2 m long.
31.60017	Mains cable without connector, 3-wire cable type, 2 m long.

Optional Accessories

S40040021	Open Collector Adapter, low level. Consists of a plug-in module with open collector output and built-in suppression diodes for inductive load.
S40040022	Open Emitter Adapter, high level. Consists of a plug-in module with open collector outputs for positive output voltages.
S40040023	Hand switch
S40040024	Foot switch, degree of protection IP 32 (IEC 60529)
S40040025	Foot switch, degree of protection IP 65 (IEC 60529)







Displaying and measuring ranges with scale divisions or numerical intervals.

µm	µm	µm	*in*	*in*	*in*	*in*
± 1500	30	1 and 0,1	*± 0.1500*	*± 0.0590*	*0.0030*	*0.0001 and 0.00001*
± 500	10	1 and 0,1	*± 0.0500*	*± 0.0500*	*0.0010*	*0.0001 and 0.00001*
± 150	3	1 and 0,1	*± 0.0150*	*± 0.0150*	*0.0003*	*0.0001 and 0.00001*
± 50	1	1 and 0,1	*± 0.0050*	*± 0.0050*	*0.0001*	*0.0001 and 0.00001*
± 15	0,3	1 and 0,1	*± 0.0015*	*± 0.0015*	*0.00003*	*0.0001 and 0.00001*
± 5	0,1	1 and 0,1	*± 0.0005*	*± 0.0005*	*0.00001*	*0.0001 and 0.00001*

TESA® Portable Data Printer

Intelligent printer designed for the inspection of finished parts or incoming goods – Provides SPC statistics and prints the results with graphical representations.

TESA® PRINTER SPC

Can be connected to TESA measuring instruments as well as those provided with a DIGIMATIC output – TESA PRINTER SPC is able to recognise the connected instrument and will execute an automatic configuration.

	«Normal»	«Tolerance»
Statistical Features		
Lower limit of size (LSL)	–	●
Upper limit of size (USL)	–	●
Tolerance	–	●
Number of captured values		
– sampling extent	●	●
– < lowest size	–	●
– > highest size	–	●
– Part out of tolerance given as % –	●	
Lowest list value	●	●
Highest list value	●	●
Value dispersion R	●	●
Arithmetical mean $\bar{x}$	●	●
Standard deviation σ_n, σ_{n-1}	●	●
Process capability Cp, Cpk	–	●
Graphical Representations		
Position of each single value within the tolerance range (10 classes)	–	●
Histogramme	–	●
LEDs Display		
Sorting of each single value with green for *Good*, yellow for *Rework* and red for *Reject*	–	●

- *Memory capacity: 9999 single values for one feature per sample.*
- *Two function modes «Normal» and «Tolerance».*
- *Limits of size quickly set on the display of the connected instrument with subsequent transfer to TESA PRINTER SPC.*
- *Output of statistical values that are further printed with graphical representations.*
- *Printing of report headings that will be completed by the operator.*
- *Hard copies printed in a preferred language (English, German, French, Italian or Spanish).*
- *Self-contained, battery-powered printer unit for use on the fly (optional).*

✓

Matrix printer for printing on a thermal paper roll

Paper width: 110 mm
Print mode: 40 signs / line

RS 232
Data inputs (9-pin male trapezoid input)
DIGIMATIC (10-pin Ansley input)
Connector with mini-jack for the remote trigger of data transfer

Mains adaptor 230 Vac, 7,3 Vdc
Optional accessory: 6 V battery pack, rechargeable

10 °C to 40 °C

- 10 °C to 60 °C

Protection IP40 (IEC 60529)

EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2

180 x 180 x 84 mm (W x D x H)

0,55 kg

Transport packing

Identification number

Declaration of conformity

64.30000	**TESA PRINTER SPC** Printer with memory, SPC statistics and value classification; prints the results with graphical representations using the matrix printer provided with a 110 mm wide thermal paper roll; RS 232 interface.

Delivery includes:

47.65013	1 Thermal paper roll, 110 mm wide.
47.61054	1 Mains adapter, 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA.
47.61055	1 Mains cable EU

Optional Accessories

47.68035	6 V battery pack, rechargeable.
47.61056	Mains cable US

For cable ordering information etc., see section L.

TESA® MEMOPRINT Printer

Stand-alone, cableless printer unit for value storage and output – With data transfer capability.

- *Up to 2000 measured values can be retained in the memory that can be sub-divided into 99 distinct files.*
- *Supplied with a matrix printer that uses a thermal paper roll (57 mm wide).*
- *Made to print report headings that will be completed by the operator.*

✓

Matrix printer for printing on thermal paper

57 mm wide paper roll

100 signs / s

RS 232, bidirectional

Connector with mini-jack for the remote trigger of data transfer

Battery pack rechargeable via the mains adapter, 230 Vac, 4,8 Vdc, 0,5 Ah.

95 x 175 x 75 mm (W x D x H)

0,53 kg

Transport packing

Identification number

Declaration of conformity

64.60000	**TESA MEMOPRINT** Matrix printer with memory for printing on thermal paper. Fitted with an RS 232 interface, bi-directional.

supplied with:

47.65008	1 Thermal paper roll, 57 mm in width.
47.61035	1 Mains adapter, 230 Vac, 4,8 Vdc.

For ordering information on connecting cable and others, refer to section L.

TESAMODUL Electronic Modular System

System made up of self-contained units allowing any number of task oriented configurations – Specifically designed for multi-gauging applications as well as for use on process control devices – Housings are made of synthetic material that allows their combination or assembly in standard 19 in racks.

- *Stackable units provided with a number of functions that include powering capability, signal amplification and combination, value displaying, value storage and classification, channel switcher, among others.*
- *Dedicated system for high measuring speeds.*
- *Possible modification or extension of the overall assembly.*
- *Plastic housings reinforced with glass fibre to stand up workshop conditions.*

✓

Technical data along with a full description on each module and their possible combination available on request

Transport packing

Identification number

Declaration of conformity

TESAMODUL Assembly Units

Each unit comes preassembled into a synthetic housing with one rack included.

No			Module width in mm
41.30095	122	500 mA power supply module	80
41.30103	321	250 mA power supply module with analogue display	160
41.30094	372	500 mA power supply module with numerical display	160
41.30002	403	Measuring module with 2 probe inputs	80
41.30097	425	Measuring module with 3 probe inputs	40
41.30102	521	Klassiereinheit für 3 Klassen	40
41.30104	525	Programmable classification and display module	40
41.30107	526	Integral classification module - 3 classes 40	
41.30108	527	Interface module for automatic operating	40
41.30098	621	Measuring module with 2 probe inputs	40
41.30099	671	Measuring module with analogue memory and 2 probe inputs	40
S41074159	872	Decoder for unit 525	80
41.60025		Do-it 1 module	40
41.60027		Do-it 2 module	80
41.60029		Do-it 4 module	160

✓ Technical data along with a full description on each module and their possible combination available on request

Transport packing

Identification number

Declaration of conformity

TESAMODUL Lenth Measuring Instrument, complete

Supplied already mounted, ready-for-use.

41.30100		**TESAMODUL** **Electronic length measuring instrument**
consisting of:		
41.30094	372	Power supply module with numerical display
41.30002	403	Measuring module with 2 probe inputs
41.90190		**TESAMODUL** **Electronic length measuring instrument**
consisting of:		
41.30094	372	Power supply unit with numerical display
S41077235	404	Measuring module with 2 probe inputs

Interfacing Plug-in Boards

41.60076	RS 232 plug-in board RS 232 compatible digital output, opto-coupled.
41.60067	Plug-in board with BCD output
41.60071	Socket for BCD plug-in board

For ordering information on cables and others, see section L.

Assembly components

		Number of sockets	Housing width in mm
	Preassembled plastic housings for rack assembly		
41.60002	Housing for 1 module	0	45
41.60003	Housing for 2 modules	0	85
41.60004	Housing for 4 modules	0	165
41.60034	Housing for 1 module	1	45
41.60035	Housing for 2 modules	1	85
41.60036	Housing for 4 modules	1	165
41.60037	Housing for 4 modules	2	165
41.60005	2 Side plates with additional accessories		
41.60042	4 Joiners for 2 housing rows		
41.60011	Special screwdriver		
41.60020	3 Prop feet for tilting the instrument		
41.60001	19 in metal pull-rack		
41.60018	Cover plate for 1 module		
41.60019	Cover plate for 2 modules		
41.60038	Single 2-plug cable - 34-wire cable type		
41.60039	Double 2-plug cable - 34-wire cable type each		
41.60008	Control cable fitted with 1 molex socket - 15-wire cable type		
41.40001	Contact key for racks supplied earlier		
41.60068	Contact key for new rack assembly		

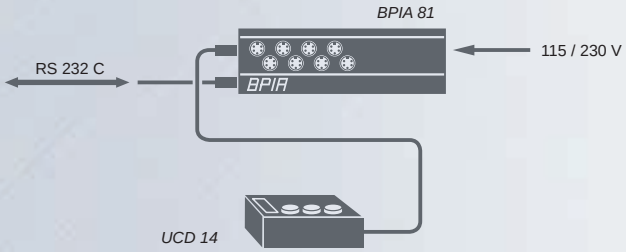
TESA® Probe Interface Boxes

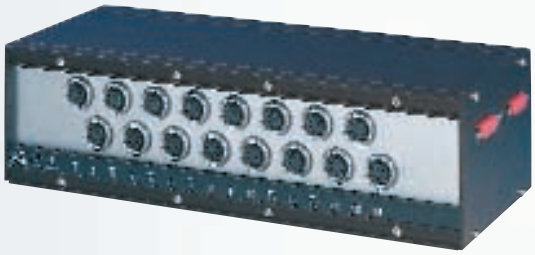
Modular system that consists of three basic models acting as probe interfaces for the preparation and further transmission of the measurement signals to a computer, whether in their digital or analogue form – Models are all key components for multigauging fixtures applied in centralised process control.

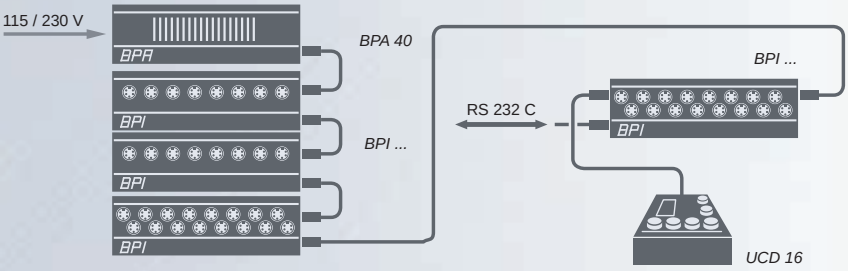
BPI Series

Signal inputs: Standard TESA probes (half-bridge)
Signal outputs: RS 232, digital

- Direct connection to the computer's serial port.
- Programmable functions owing to integrated microprocessor.
- Possible connection of up to 64 probes for optimum adaptation to your measuring applications.
- High functional reliability and precision.
- Total immunity to negative environmental effects, e.g. electrical interferences, liquid and solid contaminants.







✓
RS 232
2 mm and 0,2 mm
1 µm and 0,1 µm
± 0,3 % with reference to each measuring span
7 ms / probe or 0,2 ms / probe for BPI 88
Housings in anodized aluminium except for stackable BPIA 81
0 °C to 40 °C
- 10 °C to 70 °C
95 %, with no condensation
Protection IP51 (IEC 60529)
EN 50081-1 EN 50082-2
Transport packing
Identification number
Declaration of conformity

No		Number of probe inputs	Number of inputs/ outputs	Integrated power supply
50.30004	**BPIA 81** Probe interface box	8	6 / 8	●
50.30007	**BPIA 81-N** Probe interface box	8	1 / –	●
50.30001	**BPI 81** Probe interface box	8	6 / 8	–
50.30002	**BPI 161** Probe interface box	16	6 / 8	–
50.30003	**BPI 88** Probe interface box with quick signal processing in dynamic and static measuring	8 *	6 / 8	–
50.31000	**BPA 40** Power supply unit for 1 up to 4 probe boxes BPI 81, BPI 161 and BPI 88			

* Each measurement signal uses a separate demodulator.

	Number of inputs/ outputs	Power supply	mm	kg
BPIA 81	6 / 8	220 ÷ 240 Vac, 100 ÷ 120 Vac, 50 ÷ 60 Hz, 25 VA	94 x 322 x 134	2,5
BPIA 81-N	1 / –	230 Vac $^{+10}/_{-15}$ %, 115 Vac $^{+15}/_{-25}$ %, 50 ÷ 60 Hz	97 x 320 x 155	3
BPI 81	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPI 161	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPI 88	6 / 8	via BPA 40	94 x 322 x 134	2,1
BPA 40		115 ÷ 230 Vac ± 20 %, 50 ÷ 60 Hz, 140 VA	94 x 322 x 134	2,4

Accessories for BPI Series

50.33000	**BAP 10**	Extension for digital outputs with positive logic
48.66009	**BSF 10**	Stacking set for BPI 81, BPI 88 and BPI 161
50.61001	**BSF 20**	Stacking set for BPA 40 and BPIA 81

		m	Number of pins
	Connecting cables		
50.60007	BPI – BPI	0,3	
50.60008		2	
50.60003	BPI – PC	2	25 / 9
50.60002		5	25 / 9
50.60004		10	25 / 9
50.60005	BPI – PC	2	25 / 25
50.60001		5	25 / 25
50.60006		10	25 / 25

✓

Highly resistant synthetic housings

Cable length: 3 m

UCD 16: 125 x 160 x 205 mm
UCD 14: 75 x 200 x 120 mm

UCD 16: 1,3 kg
UCD 14: 1,1 kg

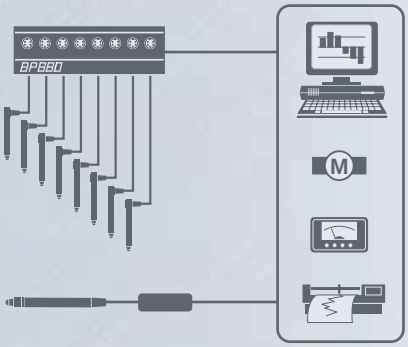
UCD 14: Protection IP65 (IEC 60529)

S50078033	**UCD 16**	Remote control unit for 4 electronic equipments; functions: Start 1 to 4, cancellation and plausibility test; 3 lamps for the value classification.
50.62000	**UCD 14**	Remote control unit for 1 electronic equipment; functions: Start / Stop plus cancellation; 5 lamps for value classification.

BP 880 Series

Signal inputs: *Standard TESA probes (half-bridge)*
Signal outputs: *Analogue signals*

- *Allow the connection of up to 8 probes.*

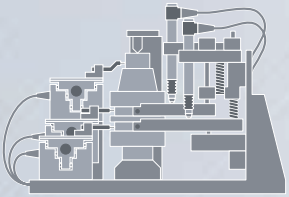


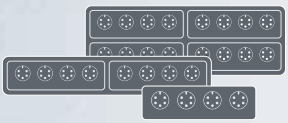
No		Number of probe inputs
48.90001	**BP 880** Probe interface with multiplex output	8
48.90002	**BP 880-Z** Probe interface with multiplex output and zeroing card	8
48.90000	**BP 880-SP** Probe interface for enhanced accuracy also with zeroing board	8
Accessory		
48.66009	**BSF 10** Stacking set for interfacing units	

Series M4P-2

Signal inputs: *TESA standard half-bridge probes*
Signal outputs: *Analogue signals*

- *System for the connection of 32 TESA standard probes*
- *Possible link to a PC through an A / D transducer*





No		mm	kg
S48001721	**M4P-2** Probe interface • 4 probe inputs with separate demodulation • Sensitivity: 73,75 mV / V / mm • Analogue outputs: ± 1 V / mm, ± 2,5 V / mm, ± 5 V / mm and ± 10 V / mm	36 x 100 x 120	0,6
S48001722	**R2M-1** Rack housings for 2 M4P-2 • 2 x 4 = 8 probe inputs	55 x 212 x 144	0,9
S48001723	**R4M-1** Rack housings for 4 M4P-2 • 4 x 4 = 16 probe inputs	160 x 212 x 144	1,2
S48001724	**MA4-1** Power supply unit • 230 ± 10 % Vac, 50 Hz • Output current: ± 15 V with up to 32 probes	55 x 212 x 144	1,1
Accessories			
S48001725	**CB37-1** Cable for connecting a PC 2 m long, two 37-pin male/female trapezoid sockets.		
S48001728	**A-SPC-1** Set for data capture consisting of: 1 A / D transducer for PC-AT, 12 bits, 16 single pin inputs or 8 differential inputs, 40 kHz reader frequency. 1 TESA BLA-11 / AD software 1 Connecting cable CB37-1 (No. S48.1725)		

✓
± 10 V with reference to the measuring range
± 0,3 % or ± 0,025 % for BP 880-SP (each refers to the measuring span)
≤ ± 250 ppm / °C
BP 880-SP: ≤ ± 100 ppm / °C
± 15 Vdc ± 5 %, ≤ ± 250 mA
15 °C to 40 °C
- 10 °C to 70 °C
30 % to 80 % (no condensation)
Protection IP50 (IEC 60529)
EN 50081-1
EN 50082-2
322 x 134 x 93,5 mm
≈ 2 kg
Transport packing
Identification number
Declaration of conformity

✓
M4P-2
± 0,5 % with reference to the measuring span
≤ ± 100 ppm / °C, stability at zero: ≤ ± 0,2 µm / °C
± 10 to ± 15 Vdc, 60 mA
15 °C to 40 °C
- 10 °C to 70 °C
30 % to 80 % (no condensation)
Protection IP50 (IEC 60529)
Transport packing

ETALON® ET-1 Electronic Length Measuring Instrument

Features integrated axial probes – Ergonomically designed – With value acquisition and displaying all in one.

- *Superslim units with just 12 mm in width – Well suited for use onto hard-to-get-at places, e.g. on multi-gauging devices.*
- *Equipped with a combined numerical and analogue display.*
- *Display unit swivelling through 100 °.*
- *Resolution to 0,001 mm.*
- *Analogue display comprising 21 LED bars.*
- *Three-coloured display for value classification.*
- *Measuring range to ± 1 mm.*
- *RS 232 output.*

✓

DIN 32876 Part 1

Analogue and numerical display

± 1,000 mm or ± 0.040 in

0,001 mm or 0.00005 in

± 0,01 / ± 0,02 / ± 0,05 / ± 0,1 / ± 0,25 / ± 0,5 and ± 1,0 mm
± 0.0005 / ± 0.001 / ± 0.0025 / ± 0.005 / ± 0.01 / ± 0.025 and ± 0.04 in

7 x 5, 8-sign dot matrix rotating through 180 °, coloured green.

3,7 x 2,1 mm (H x W)

52 mm long with programmable display orientation

21 bar LED display, each 1,75 x 5 mm (W x L)

Self-adjust resolution according to the size of the tolerance field used with active value classification or the selected measuring range

Value classification based on 2 tolerance limits with use of the bar LED analogue display (green, red and amber)

Signal polarity signs: positive (+) or negative (-). Multiplication factor: + 0,01 ... + 1,00 ... + 2,00 - 0,01 ... - 1,0 ... - 2,00

Max. perm. error 5 µm + 1 % from the measured value

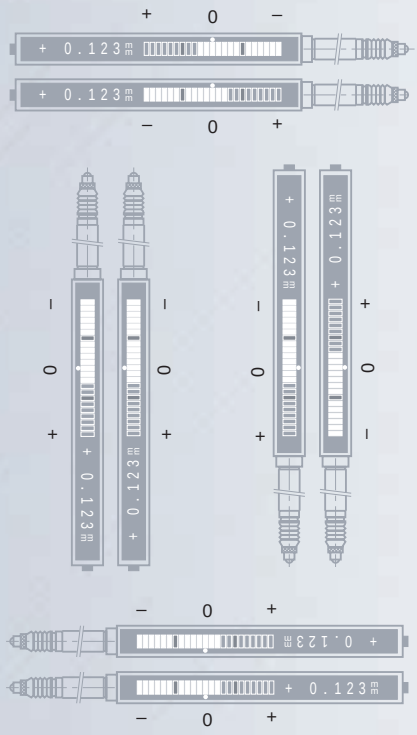
1 µm or 0.00005 in

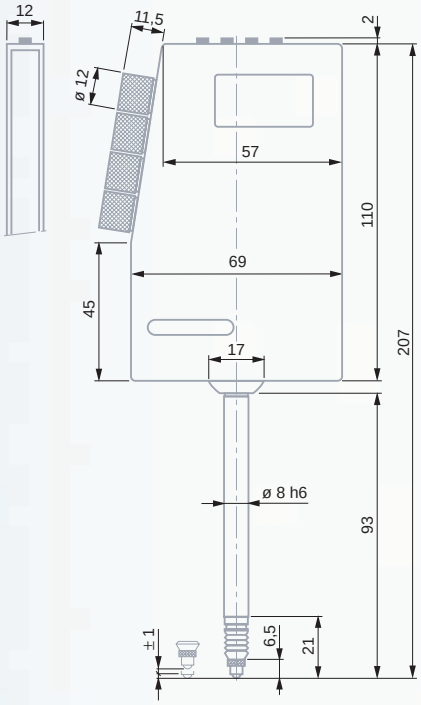
No			
46.39001	**ETALON ET-1 electronic length measuring instrument** Consists of an axial inductive probe and integrated numerical/analogue display, 0,001 mm or. 0.00005 in numerical interval; able to perform value classification; RS 232 output, without mains adapter.		
	Mains adapter For powering up to 3 ETALON ET-1		
46.39002	**A3 - EU**	230 Vac, 50 Hz, 19,1 VA	7,5 Vdc, 870 mA, 6,5 VA
46.39003	**A3 - UK**	230 Vac, 50 Hz, 19,1 VA	7,5 Vdc, 870 mA
46.39004	**A3 - USA**	120 Vac, 60 Hz, 18,3 VA	7,5 Vdc, 900 mA
	Cables For powering one ETALON ET-1 to the other		
46.39005	**AC - 15**	150 mm long	
46.39006	**AC - 30**	300 mm long	
46.39007	**AC - 60**	600 mm long	
46.39008	**ET-PC2 connecting cable** RS 232 cable for ETALON ET-1 to TESA PRINTER SPC (No. 64.30000) or a PC / AT computer (9-pin female connector)		
46.39009	**Hook wrench** For setting the measuring bolt travel.		

- *Superslim form*
  Value capture and displaying provided in a measuring unit that is just 12 mm wide also permits complex multigauging fixtures to be mounted in compact assembly.

- *Display unit and axial probe can be titled through ± 50 ° to each other to allow display reading in the most favourable position.*

- *Possible orientation of the combined numerical/analogue display*





Axial probe

With mechanical contact, swivelling through ± 50 ° relative to the instrument axis

Measuring bolt guided on a plain bearing and protected by a rubber below

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread.

Measuring travel of 3 mm with upper and adjustable lower stops at a distance of 1,5 mm max. from electrical zero.

Hardened steel measuring bolt

Fixing shank with a 8 h6 dia.

0,8 N *
Force increase*: 0,8 N / mm

Mechanical frequency limit: 30 Hz ± 30 %

0,25 µm / °C

General

RS 232

7 to 9 Vdc, 220 mA

5 °C to 40 °C

- 40 °C to 50 °C

Operating and storage: 95 %

Protection IP50 (IEC 60529)

89/336/EWG of 3.5.1989, 91/31/EWG of 28.4.92, 93/68/EWG of 22.7.93

235 g

Transport packing

Identification number

In-house calibration certificate

* Valid for upright assembly position, with downward oriented measuring bolt, as well as in static measuring.

Precision TESAMODUL

✓

Technical data and other details available on request

Calibrating Standards

✓

Simulate half-bridge probes with 73,75 mV / V / mm

Suited for
Frequency: 13 ± 0,65 kHz
Voltage: 3 ± 0,015 V_{eff}
(2 symmetrical voltages of 1,5 V_{eff})
Impedance:
≤ 0,2 Ω (output)
or
2000 Ω,(input)

Input impedance at 13 kHz:
970 ± 50 Ω; normal:
0 µm: 2150 ± 50 Ω
Phase of input impedance at 13 kHz:
71 ± 2 °
Input resistance:
100 ± 5 Ω
Output impedance at 13 kHz: 1000 ± 2 Ω
Phase of output impedance at 13 kHz:
0,2 °

± 3 ppm / °C ageing:
± 30 ppm / a

20 ± 0,5 °C, stabilisation time: 8 h

10 °C to 35 °C

- 10 °C to 70 °C

Calibration:
40 % to 60 %.
Operating: 20 % to 80 %.
Storage: 5 % to 95 %.
With no condensation.

18 mm dia., 118 mm long

≈ 45 g

Protection IP40 (IEC 60529)

Inspection report

Calibration devices

Designed for calibrating and adjusting TESA length measuring equipments fitted with standard TESA inductive probes (half-bridge probes).

Calibration of TESA Inductive Probes

The regular system consists of the following components:

- *1 Precision TESAMODUL No. S41077248.*
- *1 Set of calibrating standards No. S41077249 with nominal values of ± 0 µm, ± 100 µm and ± 1000 µm.*
- *1 Measuring support such as the INTERAPID UP 160 (No. 16.39041) equipped with the UPZ 40 measuring table (No. 16.40405).*
- *1 Set of gauge blocks accurate to the calibration grade K (see section I).*
- *1 Precision digital voltmeter, min. 5 1/2 digits.*

No	
S41077248	**Precision TESAMODUL**
consisting of:	
	1 Measuring unit 429
41.30095	1 Power supply unit 122 - 500 mA

Calibration of Measuring Instruments

Calibrating standards available as single item or in sets.

No	µm	*in*	Marked with
S41078077	± 0		32.70700
S41078078		*± 0*	32.70708
S41078079	± 3		32.70704
S41078231	± 5		32.70714
S41078080	(± 7,62)	*± 0.0003*	32.70709
S41078081	± 10		32.70705
S41078229	± 19		32.70720
S41078082	(± 25,4)	*± 0.001*	32.70710
S41078083	± 30		32.70706
S41078331	± 50		32.70715
S41078084	(± 76,2)	*± 0.003*	32.70711
S41078228	± 100		32.70701
S41078230	± 190		32.70717
S41078086	(± 254)	*± 0.01*	32.70712
S41078087	± 300		32.70707
S41078332	± 500		32.70716
S41078088	(± 762)	*± 0.03*	32.70713
S41078751	± 1000		32.70702
S41078752	± 1900		32.70719

Calibrating Standards

Also called «Dummy Probes», they serve as resistance dividers. Each standard produces a given length dimension simulated electrically with high accuracy. The system provides both positive and negative values. Those given in the table are all nominal values.

These products are calibrated and come with proper inspection report that shows the values as measured (actual values) with their related uncertainty of measurement.

The calibrating standard will be connected to the instrument instead of the regular probe. Calibration and adjustment of the measuring instrument - if needed - are subject to a number of criteria that must be respected. For a further information with regard to this, refer to your instruction manual or ask our specialists.

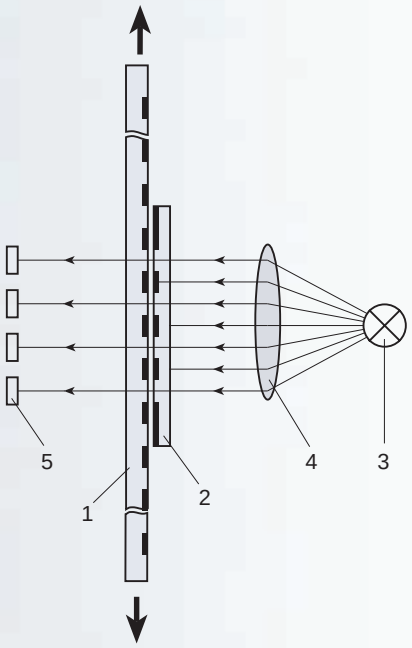
No	µm	µm	µm
Set of 3 calibrating standards			
S41078227	± 3	± 30	± 300
S41077249	± 0	± 100	± 1000
S41000429	± 30	± 300	± 1000
Set for calibrating TESATRONIC			
S41078654	± 190	± 1900	
S41078612	Cable for analogue output		

The way they work

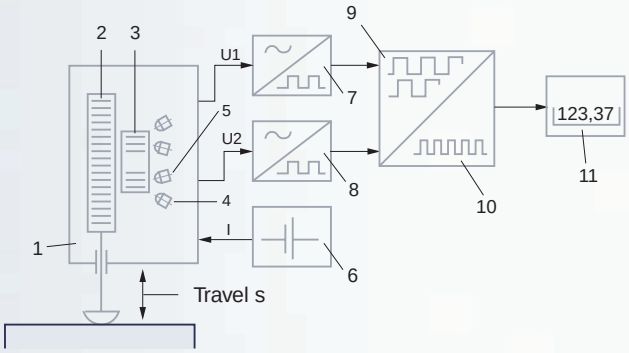
All electronic length measuring systems shown in this part of our catalogue work on the basis of value sensors in the form of digital probes with axial displacement. These probes generate the digital capture of the measurands (measured sizes), which are changing as the incremental linear scale lying in front of the scanning unit fitted with a reticle is moved. Divisions on both features are identical. The opto-electronic detection of these changes uses the transmitted light.

Optical material measures are made up of quality glass gratings with a number of divisions distributed over the entire length. These divisions consist alternately of lines and blanks, which represent the individual increments. The distance from line to line or blank to blank is the dividing period, e.g. 20 µm or 40 µm.

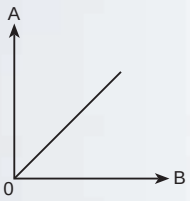
As the gratings of both the scale and reticule are moved in relation to one another, the opaque divisions on the scanning reticle are covered alternately by the lines and blanks on the linear scale (i.e material meassure). This provides a bright/dark information, which is then converted into electrical signals. After their analogue/ digital conversion, these signals are shown on the up/down computing counter as the sum of counting impulses equal to the amount of the measurand changes. So as to increase the resolution that results from the dividing periods, the probe signals are split by electronic means (interpolation).



1 Incremental linear scale (material measure) associated with the measuring bolt
2 Divided scanning unit
3 Light source
4 Condensor
5 Photo diode



1 Probe housing
2 Linear scale divided into increments
3 Divided reticle
4 Light source
5 Photodiodes
6 Power supply
7 Conversion of signal U_1
8 Conversion of signal U_2
9 Signal scanning
10 Multiplied evaluation of the signal (interpolation) and direction discrimator
11 Numerical display



Typical linearity where digital capture of the measurands is based on incremental linear scales.
A Counting impulses
B Travel

TESA® TG Digital Measuring System

Ideal for long measuring travels – Incremental probes with either a 30 mm or 60 mm measuring span – Numerical display to 0,001 mm or 0,0005 mm – Analogue display with illuminated colour background for value classification – Value storage ability – PRESET function - To name just a few.

TG Computing Counter

✓

DIN 32876 Part 2

Up/down counter with one probe input

LC display with illuminated colour background for value classification with green, amber and red. 37 x 37 mm display size.

6 decades plus minus sign.

0,001 mm and 0,0005 mm or 0.00001 in

For probes from another brand : 0,0002 instead of 0,0005 mm if dividing periods are 10 µm or 0,0001 instead of 0,0005 mm if they are 2 µm.

9 x 4,5 mm

According to the selected tolerance range

Scale length: 40 mm

25

20 keys available for entering values and selecting functions

Power supply: 5 Vdc (measuring system).

Output: ± 5 ± 1 % Vdc according to the selected tolerance range

Max. excess voltage: 25 % in relation to ± 5 Vdc

Output impedance: < 100 Ω

Resolution: 12 bits

RS 232, bidirectional

Power supply: 7 Vdc. Power consumption: 0,3 A.

Continued on next page

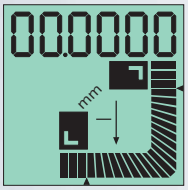
TESA® Computing Counters TG - C 10 and TG - C 11

46.30004	**TESA TG - C 10 Computing Counter**	Up/down computing counter with numerical display*, 0,001 and 0,0005 mm or 0.00001 in numerical intervals. Features 1 probe input, value classification and value storage capabilities, RS 232 interface.
46.30008	**TESA TG - C 11 Assembly Unit**	Same execution as above, but to be mounted*. 138 x 52 mm cross section.

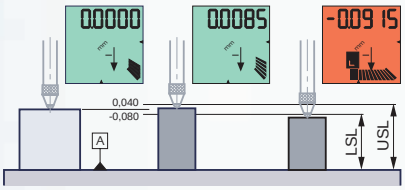
Each unit is supplied with the following item:

47.61054	1 Mains adapter, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

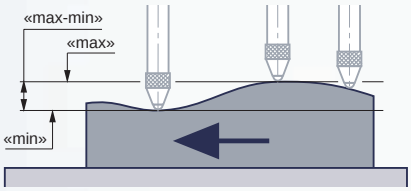
* Compatible with the probes from HEIDENHAIN or from any other brand providing the shape of both the signal and connector is alike.

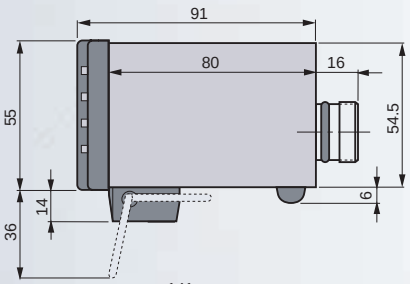


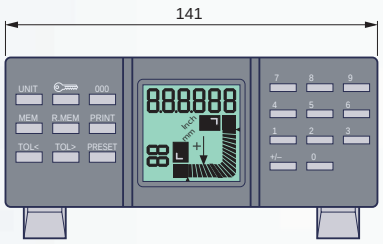
Input of both lower and upper specification limits (LSL and USL)

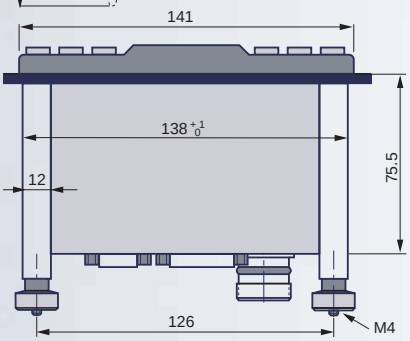


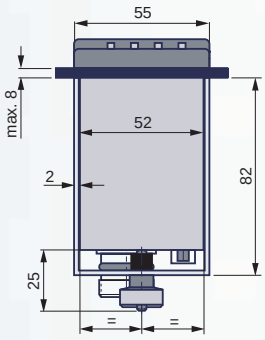
Digital capture of both extrem values «max» and «min» as well as difference «max - min» in dynamic measurement











10 °C to 40 °C

- 10 °C to 50 °C

80 %

Protection (IEC 60529):
TG - C 10: IP40
TG - C 11: IP54*
* valid for the front face

EN 50081-1, EN 50081-2, EN 50082-2

TG - C 10: ≈ 650 g
TG - C 11: ≈ 500 g

Transport packing

Identification number

Declaration of conformity

TESA® Digital Probes TG 30 and TG 60

	Digital Probes*
	Axial probes with incremental glass scale
46.30006	**TESA TG 30** with a 30 mm measuring span
S46060525	**TESA TG 30** with a 30 mm measuring span as well as rubber bellow
46.30007	**TESA TG 60** with a 60 mm measuring span
Each probe is supplied with:	
19.60005	1 Retract lever for the measuring bolt

* Compatible with the probes from HEIDENHAIN or from any other brand whose signal and connector shape is alike.

TG probe

SWISS MADE ✓

DIN 32876 Part 2

Axial probe used in any position

Measuring bolt guided on a plain bearing

M2,5 thread for the measuring insert

Bolt displacement:
- mechanical retraction device: see under standard accessories
- pneumatic retraction: see table

Cable: 4,3 mm dia. x 3 m.
Max. cable extension: 10 m.

Incremental glass scale

0,002 % / °C

10 °C to 40 °C

- 10 °C to 50 °C

80 %, with no condensation

Protection: IP54* (IEC 60529)
* probe housing only

Power supply:
5 ± 10 % Vdc

Output signal
± 11 μA_{pp}
Sinusoidal signal form

Transport packing

Identification number

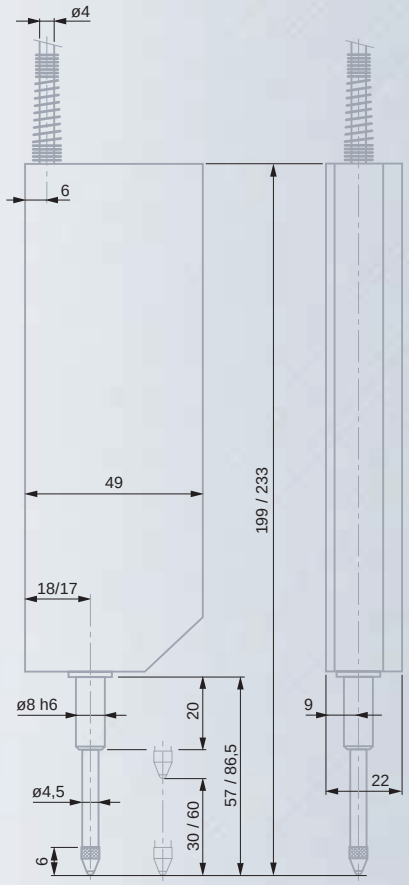
Inspection report

Declaration of conformity

TESA electronic probes		TG 30	TG 60
	mm	30	60
	mm	30,4	60,4
Dividing and signal periods	µm	20	40
	µm	1,0	2,0
	µm	1,0	1,0
	µm	1,0	1,0
Close to			
– lower bolt endstop*	N	0,85	0,90
	N	± 0,15	± 0,20
– upper bolt endstop*	N	1,10	1,45
	N	± 0,20	± 0,25
Force hysteresis*	N	0,1	0,15
Force hysteresis*	N	2,0	2,0
Pneumatic bolt retraction by vacuum or air pressure.			
Position of use:			**
– vertical	bar	0,55 - 0,70	0,60 - 0,75
– horizontal	bar	0,42 - 0,57	0,52 - 0,67
– vertical (in suspension)	bar	0,30 - 0,45	0,45 - 0,60
	m / s	1,4	2,0
	g	350	365
Moved mass	g	28	27

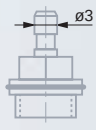
* Applicable with the probe used in vertical position, with downwards oriented measuring bolt, as well as in static measuring.

** TG 60 cannot be used with air pressure.

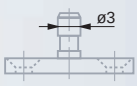


Optional Accessories

No		
	Connectors for vacuum lift of the measuring bolt	
19.60009	Suitable for TESA TG 30 (order No. 46.30006)	
19.60008	Suitable for TESA TG 60 (order No. 46.30007)	
	Air pressure actuator	
19.60010	Suitable for TESA TG 30 (order No. 46.30006)	



19.60009



19.60008

19.60010

ETALON® EG Digital Measuring System

Uses incremental probes having either a 13 mm or 30 mm measuring span – Numerical display to 0,001 mm or 0.00004 – Measures using one or two probes – Performs sum and differential measurements – Includes PRESET function – Allows value classification and value storage – Usable as built-in unit.

ETALON® Computing Counter EG - C 60

46.39000	**ETALON Computing Counter EG - C 60** Up/down computing counter with numerical display, 0,001 or 0.00004 in numerical intervals. Features 2 probe inputs. Value classification and value storage capabilities. RS 232 digital output. Usable as built-in unit.

Supplied with:

47.61054	1 Mains adaptor, 110 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

EG - C 60
Computing counter

✓

DIN 32876 Part 2

Up/down computing counter with 2 probe inputs for EG - 10 and EG - 30

Luminous diodes (LEDs)

7-segment per sign, red colour.

6 decades plus minus sign.

0,001 mm or 0.00004 in

14 mm high
9 mm wide

Waterproof keypad

Single, sum and differential measurements as illustrated in the examples

Value classification based on both upper and lower specification limits previously entered (LSL and USL) as well as result displaying through luminous colour diodes

Value storage and HOLD function as illustrated

RS 232, opto-electronic

Relay controlled output signal for value classification. Max. perm. load: 30 Vdc, 1 A. Duration of the switching signal: ≤ 30 ms

Switching input signal for the functions HOLD, START and ZERO-SET

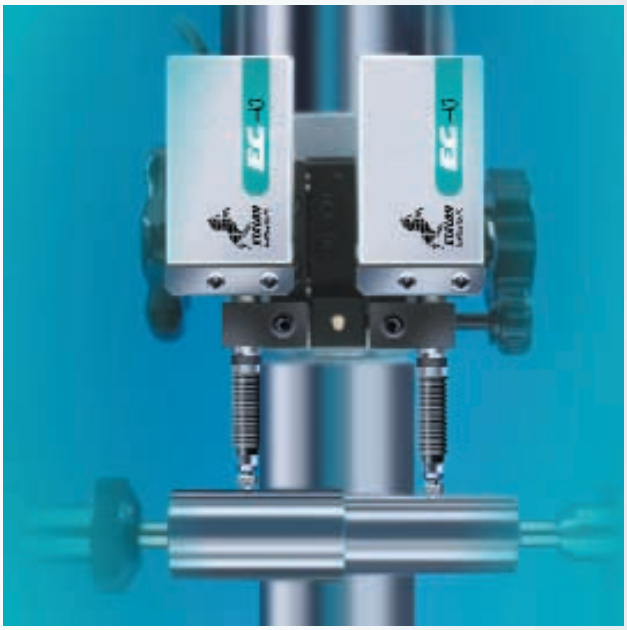
SUB-D connector, 15-pole female

Power supply: 6 Vdc. Power consumption: ≤ 0,7 A

0 °C to 55 °C

ETALON® EG - 10 and EG - 30 Digital Probes

	Digital probes Axial probes with incremental glass scale protected against the penetration of liquids
46.19000	**ETALON EG - 10** with a 13 mm measuring span
46.19001	**ETALON EG - 30** with a 30 mm measuring span



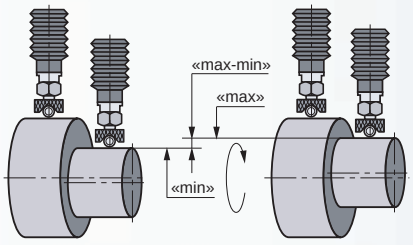
- 10 °C to 70 °C
- Operating and storage: 80 %
- Protection (IEC 60529): IP40. Front face: IP 54
- EN 50011:1991, group 1, class A, EN 50082-2:1995, 89/336/EWG of 3.5.89
- Opening for mounting EG - C 60: 161 $_0$ / $^{+0,5}$ mm wide 81 $_0$ / $^{+0,5}$ mm high
- ≈ 1,5 kg
- Transport packing
- Identification number
- Declaration of conformity

EG - 10 and EG - 30 axial probes

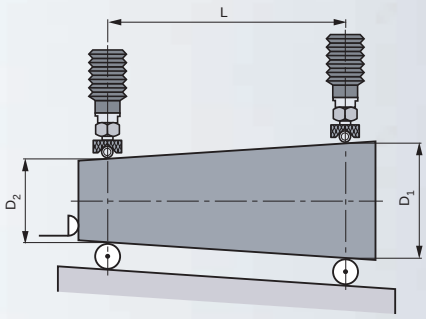
- ✓
- DIN 32876 Part 2
- Use of probes in any position
- Measuring bolt guided on a plain bearing. Rubber bellow for protection.
- M2,5 thread for the measuring insert
- For the mechanical or pneumatic retraction of the measuring bolt, see under optional accessories.
- 4 mm dia. x 1,9 m cable. Max. extension: 30 m.
- Incremental glass scale. Signal periods: 1 µm. 1 reference point.
- 0,6 m / s

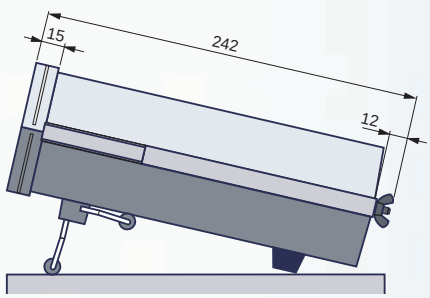
Continued on next page

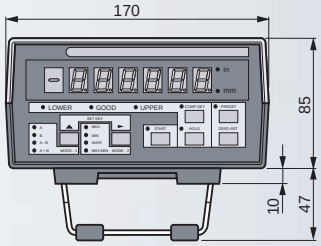
Differential measurements for detecting run-out errors (extrem values «max - min»)

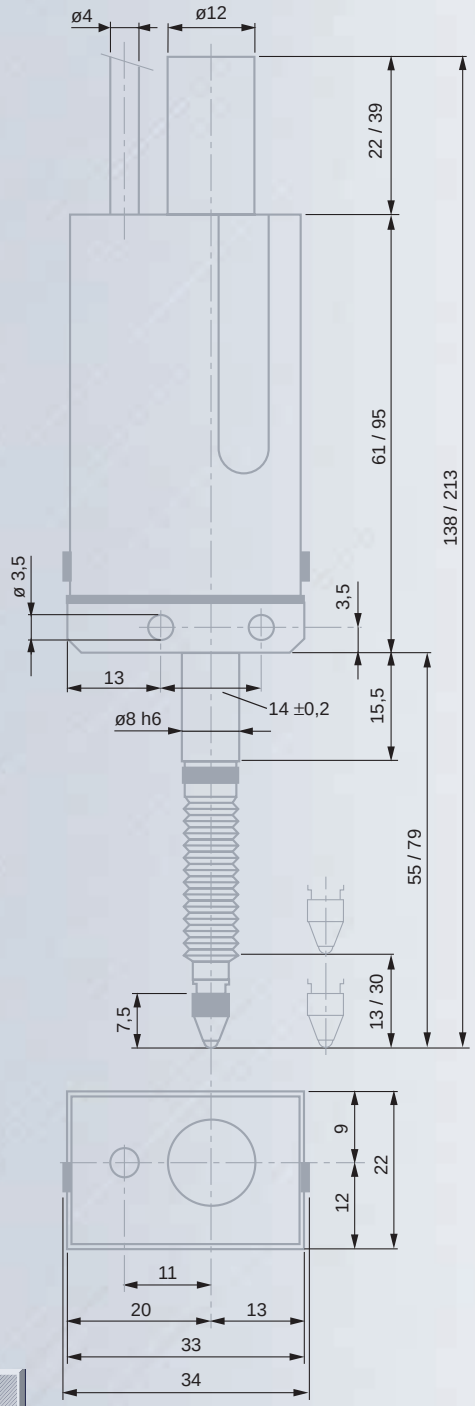


Differential measurements using 2 probes for inspecting cones and inclinations.









ETALON axial probes		EG - 10	EG - 30
	mm	13	30
	µm*	1,0	1,5
	µm*	0,6	0,6
	µm*	1,0	1,5
	N*	≤ 1,5	≤ 2,0
Force increase	N / mm*	0,0284	0,0188
Force hysteresis	N*	0,1	0,2
Max. transverse force	N	1,0	1,0
	g	230	260
Moved mass	g	20	30

* Applicable with the probe used in vertical position, with downwards oriented, measuring bolt as well as in static measuring.

Optional Accessories

19.60005	**Lift lever for bolt retraction**
	Pneumatic retraction device To be connected to air pressure. For technical data, see on the right side
46.19002	**AA - 6100** convenient for EG - 10
46.19003	**AA - 6101** convenient for EG - 30

Each consisting of:

1 Connector (M8) – 1 Pneumatic jack – 1 Pressure reducing valve – 1 Setting screw

8,5 µm / °C

10 °C to 40 °C

- 10 °C to 55 °C

75 %, with no condensation

Shock resistance to ≤ 980 m / s^2. Vibration resistance to 98 m / s^2

Protection: IP64 (IEC 60529)

Power supply 4,5 to 6,0 Vdc. Power consumption ≤ 100 mA

Transport packing

Identification number

In-house calibration certificate

Declaration of conformity

Pneumatic bolt retraction

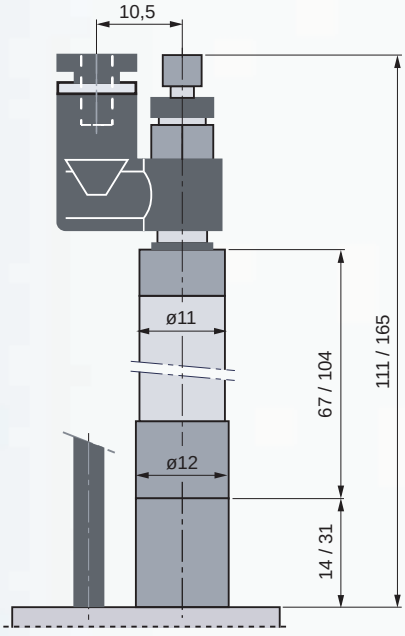
✓

Operating pressure range: 2,5 to 7 bar. Max. perm. pressure: 9 bar.

Retraction range:
0 to 13 mm
AA - 6100 (EG - 10)
0 to 30 mm
AA - 6101 (EG - 30)
Probe life:
5 millions travels

40 g (AA - 6100)
50 g (AA - 6101)

Transport packing



Connecting Cables and Accessories for Data Transfer

Plug-in Chart

Instrument Type \ Peripherals	Personal Computer 9-pin	Personal Computer 25-pin	TESA PRINTER SPC	RS 232 Printer	TESA MEMOPRINT	Gage Port NT 2 and NT 4	ROCH Interface MULTI - 4V	Cable w/o connector
TESA DIGIT-CAL «capa µ system» TESA MICROMASTER «capa µ system» TESA IMICRO «capa µ system» TESA ALESOMETER «capa µ system» TESA DIGICO 20	1 7		1 7			31	1 7	5
TESA DIGIT-CAL ETALON callipers ETALON depth callipers ETALON digital scale units TESA DIGICO 10 / 11 / MIN/MAX ETALON height and scribing gauges	1		1			31	1	5
TESA-DIGIT TESA IMICRO SM TESA TRIOMATIC			12			12		
TESA DIGICO 1 / 2	6+19	6	13			13	6+19*	
TESA RUGOSURF	8		8				8 *	
TESA MICRO-HITE 100 TESA-µHITE	9		9				9	
TESA MICRO-HITE, models 10 / 11	3		3	4	10	32	3	
TESA-HITE plus	1		1			31	1	5
TESA-HITE	7		7				7	
ETALON and ROCH CAPAX 2000	15	16					15 *	
TESATRONIC TT 10	3		3	4		32	3	
TESATRONIC TT 20 / TT 60 / TT 80	1 7		1 7			31	1 7	5
TESATRONIC TTD 20 / TTD 60 TESAMODUL	3		3	4		32	3	
ETALON ET-1	2		2					
TESA TG	9		9				9	
ETALON EG	3		3				3	

* Requires also the use of the cable No. 981680274 (see page L-76).

			Number of pins	Type		Number of pins	Type	m	
Connecting cables									
1	**47.61046**	Special, opto			Sub-D	9	f	2	
2	**46.39008**	Special			Sub-D	9	f	2	Type ET-1-PC
3	**47.61023**	MiniDIN	8	m	Sub-D	9	f	2	
4	**47.61024**	MiniDIN	8	m	Sub-D	25	m	2	
5	**47.61027**	Special, opto			without			2	
6	**47.61038**	Special			Sub-D	25	f	2	With socket
7	**47.61049**	Special, opto			Sub-D	9	f	2	Bi-directional
8	**47.61051**	Special			Sub-D	9	f	1	
9	**47.61052**	Sub-D	9	m	Sub-D	9	f	2	
10	**47.65008**								
11	**53.60004**	Special	8	m	Special	8	m	2,5	RS 485
12	**60.60002**	Special			Ansley	10	f	2	
13	**S47078588**	Special			Ansley	10	f	2	
14	**S53001564**	Special			Sub-D	25	f	2	
15	**981680037**	Special			Sub-D	9	f	2	
16	**981680035**	Special			Sub-D	25	f	2	
17	**981680089**	Special			Special,opto			2	*
18	**981686113**	Special			Sub-D			2	Centronics **
Adapter for cables									
19	**47.61017**	Sub-D	25	m	Sub-D	9	f		
20	**47.61019**	Sub-D	25	m	Sub-D	25	m		
21	**53.60005**	Special	8	f	Sub-D	9	f	for No. 53.60004 RS 485 to RS 232	

Additional Accessories			
22	**47.61037**	Mains adapter, 230 Vac, 9 V, 200 mA, 1,8 VA	TESA DIGICO 1 / 2
23	**47.61054**	Mains adapter, 110 to 240 Vac, 50to 60 Hz, 6,6 Vdc, 750 mA	Universal
24	**47.61055**	Mains cable EU for adapter No. 47.61054	
25	**47.61056**	Mains cable USA for adapter No. 47.61054	
26	**47.61057**	Mains adapter, 110 Vac	TESA DIGICO 1 / 2
27	**47.68000**	Hand switch for triggering data transfer	
28	**47.68001**	Foot switch for triggering data transfer	
29	**47.61058**	9-pin / 9-pin adapter for connecting either of the hand or foot switch	
30	**981680040**	Foot switch for triggering data transfer to the control panel used in conjunction with the ETALON or ROCH CAPAX 2000 height gauge	

* For the connection of instruments with opto-coupled RS 232 interface to the control panel used with ETALON or ROCH CAPAX 2000 height gauge

** Connecting cable for parallel data transfer from CAPAX 2000 control panel to printer with Centronics interface

Other connecting cables and accessories available on request.

Connecting Cables for Electronic Inclinometers

Transport packing

No	Cables for connecting:		Number of pins	Type	Number of pins	Type
53.60004	TESA ClinoBEVEL 1	RS 485	Special 8	m	Special 8	m
53.60004 **53.60005**	TESA ClinoBEVEL 1	RS 232 (RS 485) Adapter	Special 8 Special 8	m f	Special 8 Sub-D 9	m f
On request	TESA ClinoBEVEL 2	RS 232	Special 8	m	Sub-D 9	f
On request	TESA MICROBEVEL 1	RS 485	Special 6	m	Special 8	m
On request **53.60005**	TESA MICROBEVEL 1	RS 232 (RS 485) Adapter	Special 6 Special 8	m f	Special 8 Sub-D 9	m f
On request	TESA BEVELmeter 1	RS 232	Special 8	m	Sub-D 9	f

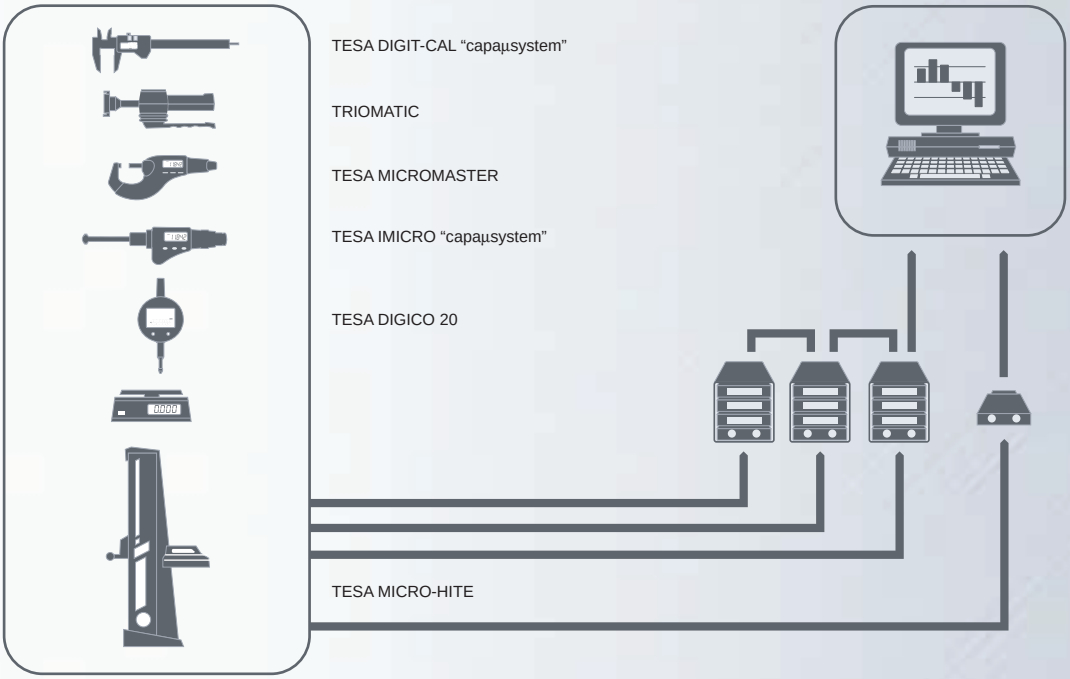
GagePort Interfacing Modules

Used to link 2 or 4 measuring instruments fitted with an RS 232 output to the interface of a PC, for example.

Transport packing

	No		Number of measuring instruments
Interfacing Modules			
	S49078420	**NT 2**	2
	S49078488	**NT 4**	4

	No		Number of pins	Type		Number of pins	Type	m
Connecting Cables								
31	**47.61029**	Special, opto			Ansley	10	f	2
32	**47.61022**	MiniDIN 8		m	Ansley	10	f	2



ROCH Interface MULTI - 4V

Allows a direct connection of up to 4 measuring instruments fitted with a RS 232 digital output such as length measuring instruments, pressure gauges, dynamometers, scales and the like – Up to 10 MULTI - 4V can be linked together, thus enabling up to 40 measuring instruments to be connected to the RS 232 output of a computer unit such as a PC for data processing.

- *Serial port for both mono and bidirectional data transfer – RS 232 standard or opto-coupled.*
- *Automatic recognition of the connected instrument.*
- *Data transfer triggered to the connected instrument directly or using either the hand or the foot switch.*

✓

Robust sheet steel case

Mains adapter: 220 Vac, 12 Vdc, 200 mA

Transport packing

983780020	**ROCH Interface MULTI - 4V** 4 Ports RS 232 on input side (Sub-D, 9-pin / f) 1 Port RS 232 on output side (Sub-D, 9-pin / m) Provided with mains adapter.
Accessories	
981680037	Cable for connecting ETALON and ROCH CAPAX 2000 to the ROCH Interface MULTI - 4V. Requires the use of the cable No. 981680274 (see hereafter).
S470785088F	Cable for connecting TESA DIGICO 1 to a number of 2 ROCH Interface MULTI - 4V
981680275	Cable for linking 2 Interfaces MULTI - 4V. Connector for 4 hand or foot switches for triggering data transfer
981680279	Adapter cable for MITUTOYO devices. Connectors: Ansley, 10-pin.
981680274	Adapter cable for pressure gauges, dynamometers, scales por instruments of another type provided with an RS 232 digital output. Connector: Sub-D 9-pin.
	Cables with a Sub-D connector (9-pin / f) for connecting one ROCH Interface MULTI - 4V to a PC.
981680276	2 m in length
981680277	5 m in length
981680278	10 m in length

Hand or foot switches for data transfer as well as other connecting cables are listed on both pages L-73 and L-74.