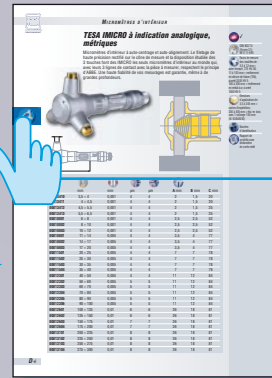


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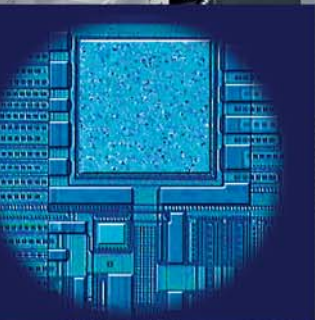
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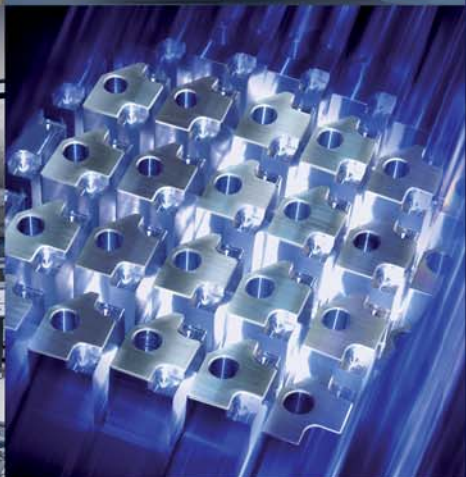
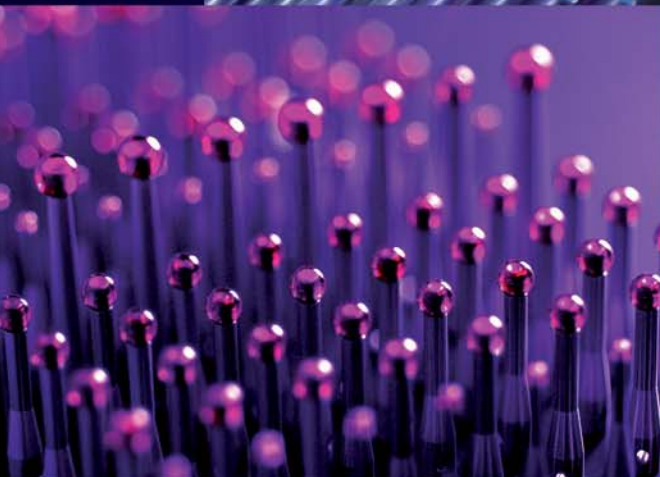
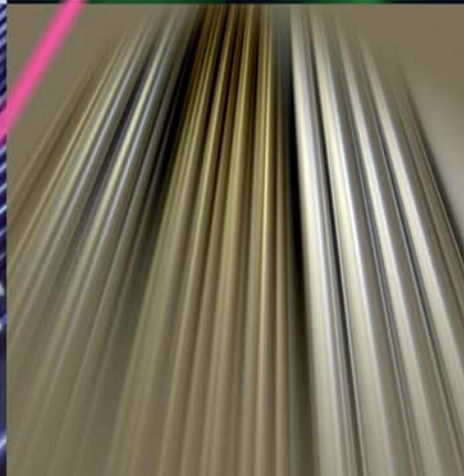
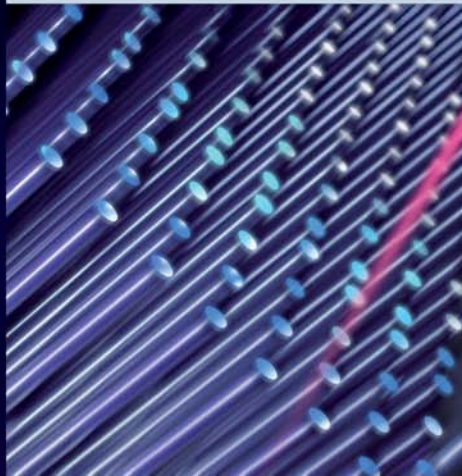
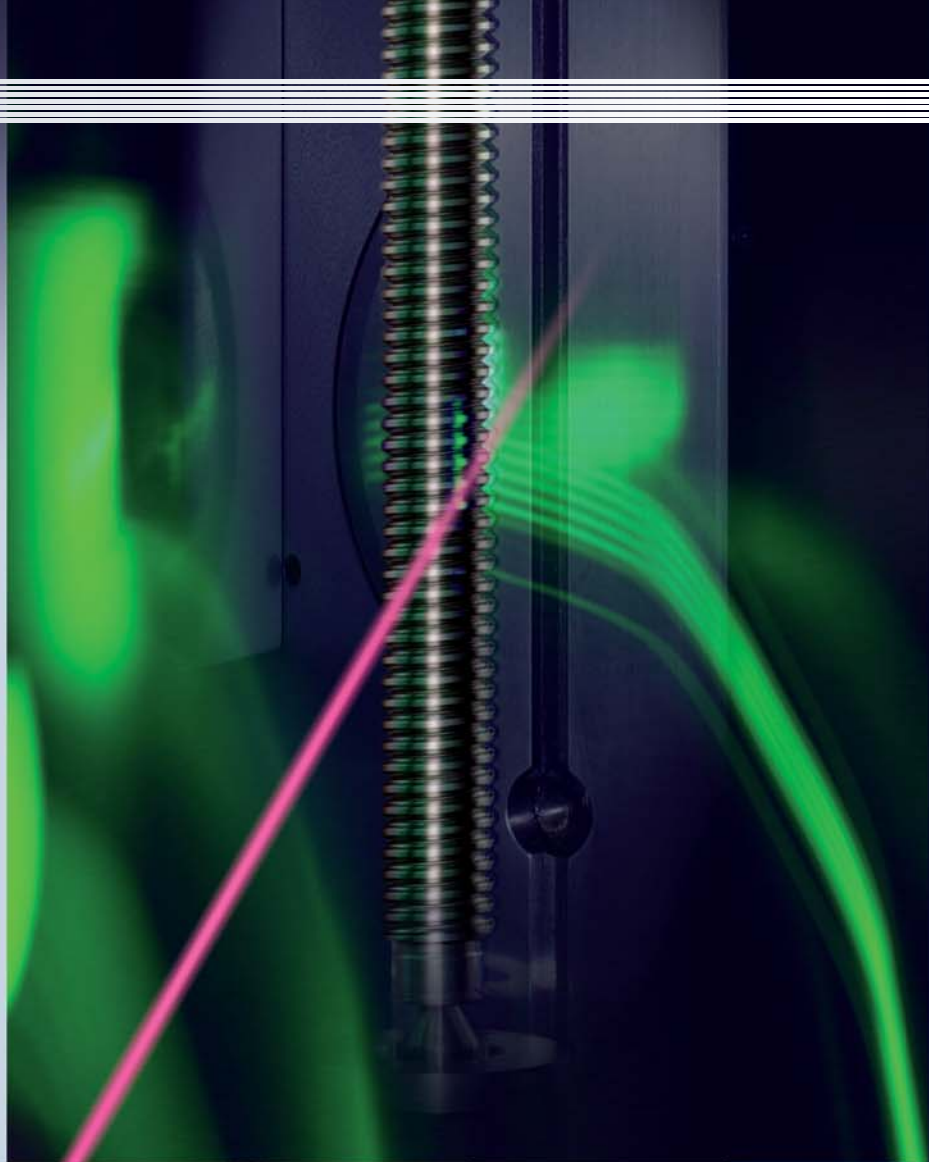






## ***5 good reasons for choosing a TESA's product***

- 1 – Finest raw materials***
- 2 – Guaranteed precision  
throughout  
the measuring range***
- 3 – Latest technology***
- 4 – Individual inspection  
and calibration***
- 5 – Long-term dependability***



*Dear customer,*

*We invite you to browse the pages of this general catalogue, which not only offers a large range of inspection tools from the smallest gauge to the coordinate measuring machine, but also delivers a vast amount of information and advice with regard to dimensional metrology.*

*For this new edition, our engineers have worked towards solving the equation of providing higher performance besides greater ease of use. For comfort of the operator and reliability of the measurements, TESA intends to play a pioneering role in applying this trend seen in other industrial fields, to metrology.*

*Our catalogue from the year 2010 has been deeply modified to make room next to the traditional precision instruments and systems that forged our reputation, to the many innovations that reflect this new direction. You will no doubt find among this diversified range the instrument that fits your needs and meets your most stringent requirements.*

*Because the accuracy of your measurements is your guarantee for quality, our priority is to ensure the reliability of our metrology products, from design to final inspection certificate.*

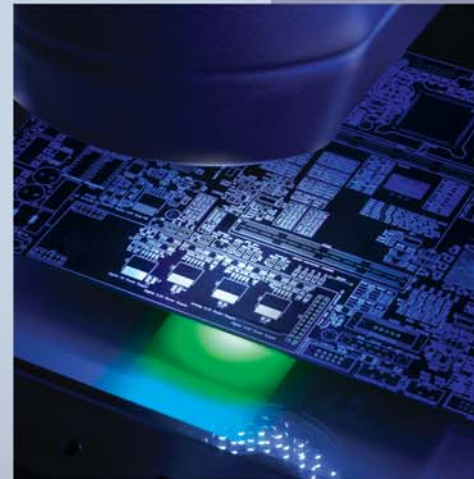
*We thank you for the trust you place in us.*



*Martin Hedman  
General Manager*



*Marcel Bila  
Sales & Marketing  
Director*





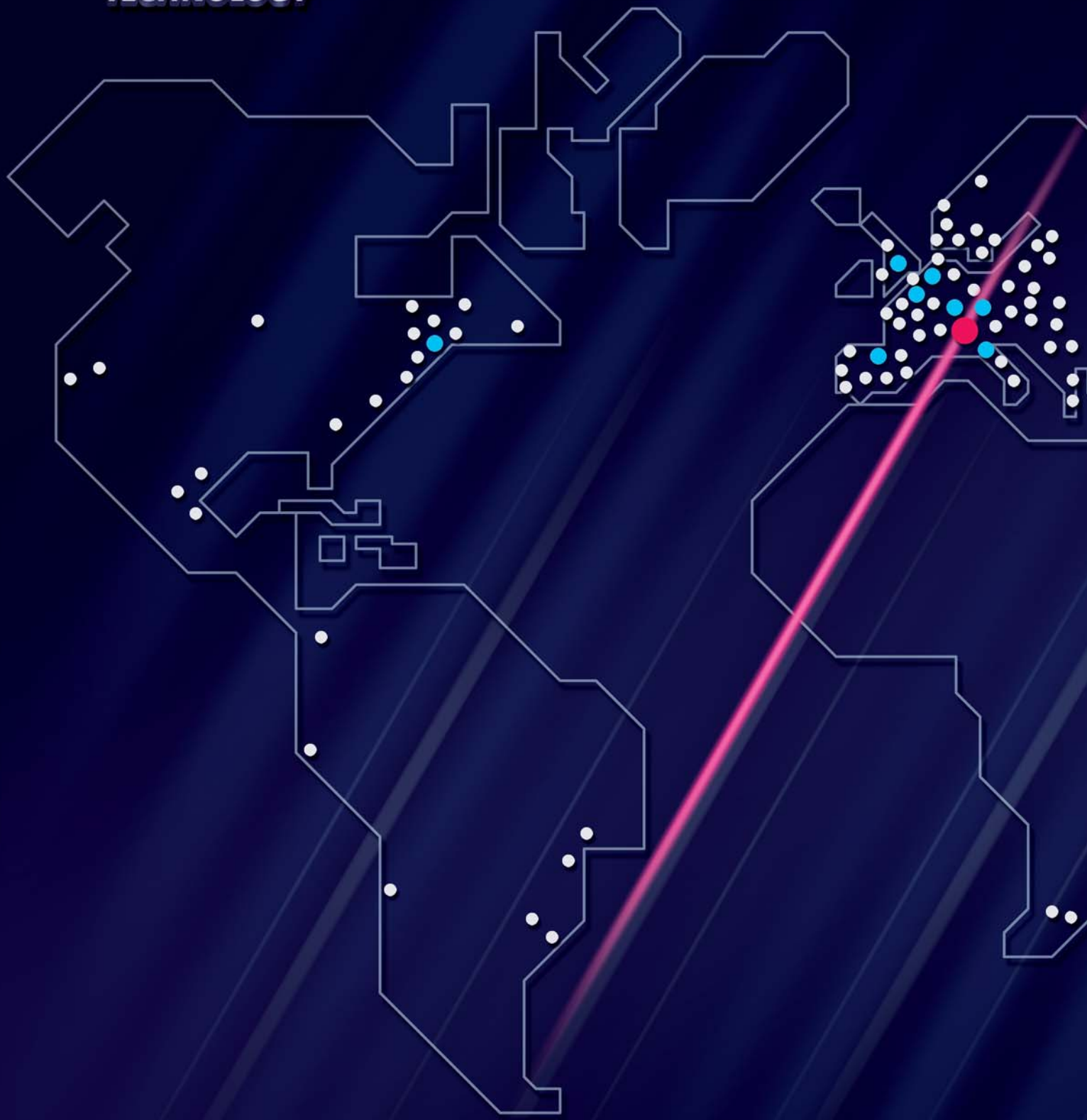


TECHNOLOGY



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  - Accessories P-26
- TESA-SCOPE II 355H and 355H Plus, horizontal models P-27
  - Accessories P-29
- TS-300 and TS-300E control panels P-30
- TS-100 digital readout P-31
- Brown & Sharpe V-blocks and clamps in a set P-32

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- TESA RUGOSURF 10G M-4
  - Technical data for both models M-5
  - Optional probes for both models M-6
  - Matrix printer for both models plus model 90G M-6
  - Other accessories for both models 10 and 10G M-7
- RUGOSURF 90G M-8
  - Technical data M-9
  - Optional probes M-10
  - Other accessories for Rugosurf 90G M-11
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- Bevelled straight edges J-3
- Brown & Sharpe sine bars J-8

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### Setting accessories

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- TPS accessories for  
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- TESA PRINTER SPC  
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for SERVICE SET 2 J-14
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for gauge block comparators L-14
- TESA RUGOSOFT 10  
for Rugosurf 10 and 10G M-7
- Measurement Studio  
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- TESA-REFLEX Scan P-4
- PRO-MEASURE for TESA-SCAN P-9
- TESA-REFLEX Vision P-17
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with longitudinal and cross vials J-17
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with insulating grips and  
side viewing slots J-18
- Precision framed models  
with insulating grips  
and vial protection, also  
with side viewing slots J-18
- Precision magnetic square models,  
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- Precision models  
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not tempered steel J-3
- ROCH flat or try squares,  
accuracy class 0,  
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- ROCH flat or try squares,  
accuracy class 0,  
not tempered steel J-4
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## T-U-V

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0,01 mm reading H-17
- Regular models  
with roller-type inserts H-17
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0,01 mm reading H-18
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0,01 mm reading H-19
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with open inserts when not in use H-20

### Tool sets

- Electronic Micrometer set  
– 3 TESA Micromaster C-3
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– 4 ETALON Basic C-5  
– 4 TESA Isomaster C-6  
– 1 TESA caliper along  
with 1 external micrometer C-30
- Sets of dial test indicator (lever-type)  
– TESATAST G-5  
– INTERAPID G-9

### TRI-O-BOR internal micrometers

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## W-X-Y-Z

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### Work bench accessories

- Hand-held magnifier I-20
- Magnifier with ring light I-20





# Quantities and Units

## International System of Units (SI)

F: *Système international d'unités (SI)*

D: *Internationales Einheitensystem (SI)*

## Derived units (of measurement)

F: *Unités dérivées*

D: *Abgeleitete Einheiten*

Quantity	SI base unit	
	Name	Symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd

Quantity	Unit		Relationship to SI base unit
	Name	Symbol	
plane angle	radian	rad	1 rad = 1 mm 1 rad = 57,295 779 51°
frequency	hertz	Hz	1 Hz = 1 s <sup>-1</sup>
force	newton	N	1 N = 1 m kg s <sup>-2</sup>
pressure	pascal	Pa	1 Pa = 1 m <sup>-1</sup> kg s <sup>-2</sup>
power	watt	W	1 W = 1 m <sup>2</sup> kg s <sup>-3</sup>
electrical potential	volt	V	1 V = 1 m <sup>2</sup> kg s <sup>-3</sup> A <sup>-1</sup>

Unit	Symbol	m	cm	mm	µm	nm
kilometre	km	1 <sup>3</sup> m	1000 m	1 000 000 mm		
<b>Metre</b>	<b>m</b>	<b>1 m</b>	<b>1 m</b>	<b>1 000 mm</b>	<b>1 000 000 µm</b>	
decimetre	dm	10 <sup>-1</sup> m	0,1 m	10 cm	100 mm	100 000 µm
centimetre	cm	10 <sup>-2</sup> m	0,01 m	1 cm	10 mm	10 000 µm
<b>Millimetre</b>	<b>mm</b>	<b>10<sup>-3</sup> m</b>	<b>0,001 m</b>	<b>0,1 cm</b>	<b>1 mm</b>	<b>1 000 µm</b>
tenth millimetre		10 <sup>-4</sup> m	0,000 1 m	0,1 mm	100 µm	100 000 nm
hundredth millimetre		10 <sup>-5</sup> m	0,000 01 m	0,01 mm	10 µm	10 000 nm
<b>Micrometre</b>	<b>µm</b>	<b>10<sup>-6</sup> m</b>	<b>0,000 001 m</b>	<b>0,001 mm</b>	<b>1 µm</b>	<b>1 000 nm</b>
tenth micrometre		10 <sup>-7</sup> m	0,000 000 1 m	0,000 1 mm	0,1 µm	100 nm
hundredth micrometre		10 <sup>-8</sup> m	0,000 000 01 m	0,000 01 mm	0,01 µm	10 nm
<b>Nanometre</b>	<b>nm</b>	<b>10<sup>-9</sup> m</b>	<b>0,000 000 001 m</b>	<b>0,000 001 mm</b>	<b>0,001 µm</b>	<b>1 nm</b>

### Definition of the metre

F: *Définition du mètre – D: Meterdefinition*

«The metre is defined as the distance travelled by light in vacuum during a time of 1/299 792 458 of a second.»

17th General Conference on Weights and Measures, 1983.

### Reference temperature

F: *Température de référence*

D: *Bezugstemperatur*

For measuring instruments and workpieces, ISO R1 assesses this temperature is at 20°C.

The temperature of 20°C is assumed to be valid for any size, material measure, measurement result etc., unless otherwise specified.

### Inspecting

F: *Contrôler – D: Prüfen*

Determining whether a test object complies with specified requirements (e.g. as regards both dimensions and form).

### Measuring

F: *Mesurer – D: Messen*

Obtaining a value (e.g. length value) measured by comparison against a master standard (e.g. material measure).

### Calibrating

F: *Etalonner – D: Kalibrieren*

Establishing the actual deviation of a measuring instrument from desired value.

This is usually done through measurement operations. The result of a calibration is documented in the form of a calibration certificate and can be used later on for adjustment purposes, for instance.

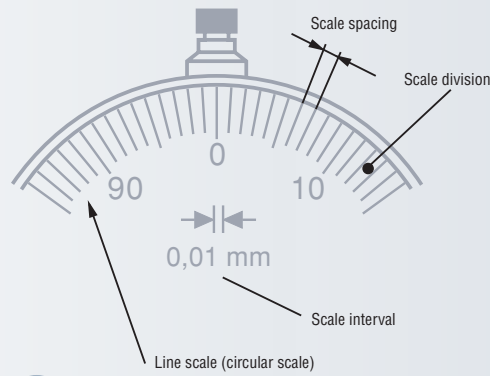
# Indication related definitions

## Indication

*F: Indication – D: Anzeige*

The indication, which provides the information about the measured value, is directly perceptible by human senses. It may be optical, acoustic or based on any other output feature. Displaying devices may either have a digital, analogue or any other special indication.

For material measures, the indication matches displayed value.



## Scale indication

*F: Indication de l'échelle – D: Skalenanzeige*

Scale indication is the readable position of a scale mark.



## Line scale

*F: Echelle à traits – D: Strichskale*

Scale substrat with a number of graduations following one another.



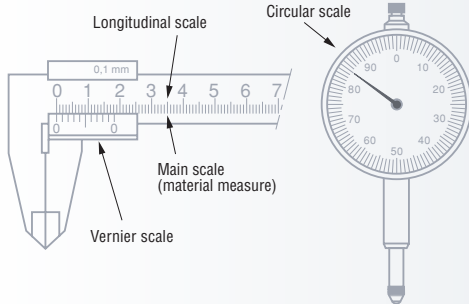
## Scale spacing

*F: Longueur d'une division (d'échelle)*

*D: Teilstrichabstand*

Scale spacing is expressed in length units as the distance between two successive scale marks measured along the same line by a marker (e.g. the end of a pointer).

Line scales



## Scale division

*F: Division d'échelle (échelon) – D: Skalenteil*

Part of a scale between two successive scale marks.



## Scale interval

*F: Echelon, valeur d'une division (d'échelle)*

*D: Skalenteilungswert*

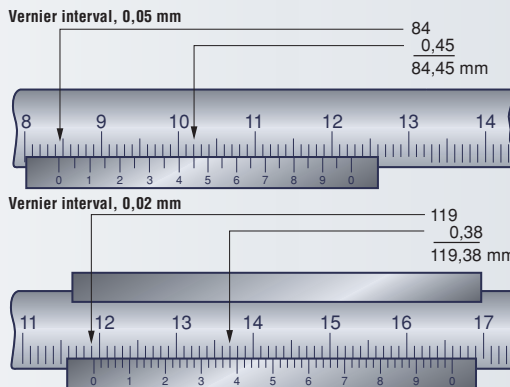
The scale interval is the difference between the values matching two successive scale marks. This characteristic is expressed in the units marked on the scale.



## Vernier interval

*F: Valeur du vernier – D: Noniuswert*

The vernier interval is the alteration of the value of a measurand, which in turn changes the indication by one scale division of the vernier scale.



## Numerical (digital) indication

*F: Indication numérique*

*D: Ziffernanzeige*

The numerical indication is shown in the form of a digit (succession of digits).



## Numerical scale

*F: Echelle numérique – D: Ziffernskale*

A numerical scale is a succession of digits (usually 0 to 9). On a multi-scale, the single numerical scales are arranged side by side in a decimal fraction.

## Numerical division

*F: Pas (échelon) numérique – D: Ziffernschritt*

The numerical division is the difference between two successive digits from their last position on a numerical scale.



## Numerical interval

*F: Valeur du pas (échelon) numérique*

*D: Ziffernschrittwert*

The numerical interval is the alteration by one numerical value of the indication. This characteristic, which matches the scale interval, is expressed in the units of the measurand.



## Metrological Definitions



### Range of indication

*F: Etendue d'indication – D: Anzeigebereich*

The range of indication lies between both highest and smallest display values of a measuring instrument.



### Measuring range

*F: Etendue de mesure – D: Messbereich*

The measuring range of an indicating device is the range within which the measured values cannot exceed the maximum permissible errors.

For tools having several measuring ranges, these errors may vary from a range to another. The measuring range may well be contained within the related whole range of indication.



### Measuring span

*F: Champ de mesure – D: Messspanne*

This span equals the difference between both first and last values of the measuring range as specified.



### Displacement range

*F: Etendue de déplacement – D: Verstellbereich*

Measurand related extent within which the measuring range can be moved.



### Application range

*F: Etendue d'application*

*D: Anwendungsbereich*

The application range is equal to the sum of both displacement and measuring ranges.

#### Note

The first and last values make each range different from one another.

## Measurand

*F: Mesurande – D: Messgröße*

Physical quantity of a measurement. In other words, the measurand is the length or the angle as measured or to be measured.

## Measured value

*F: Valeur mesurée – D: Messwert*

Any measured value expresses the result of a measurement. Therefore, this value is directly associated with the measurand and further allocated to the output feature (e.g. display) of a measuring instrument or device.

A measured value is expressed as the product of both numerical value and unit.

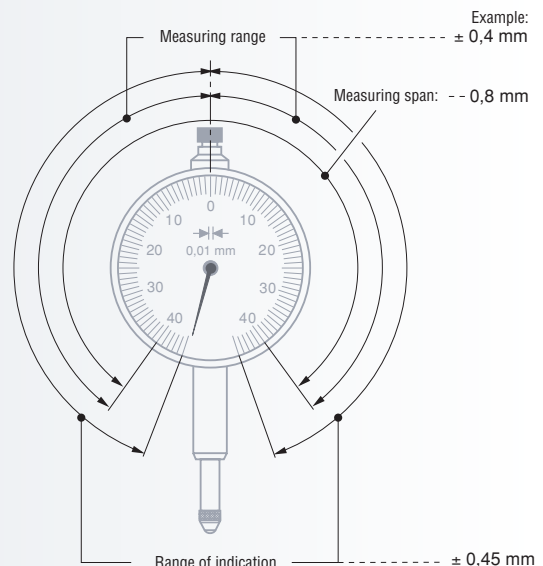
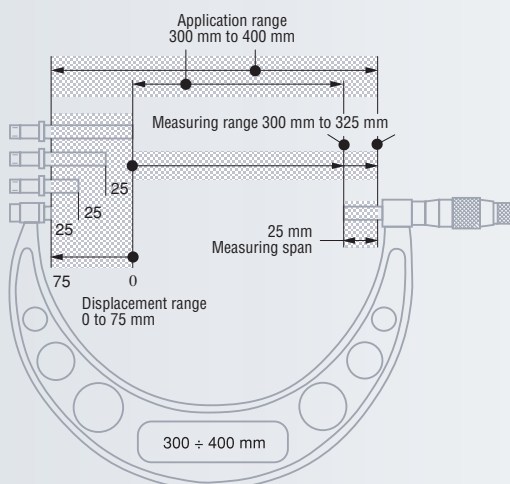
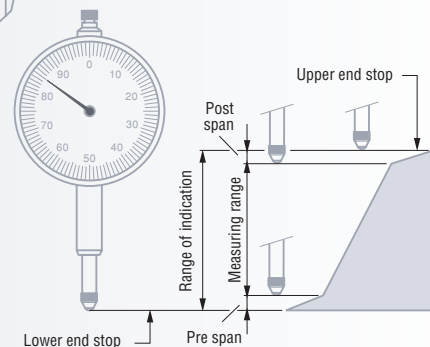
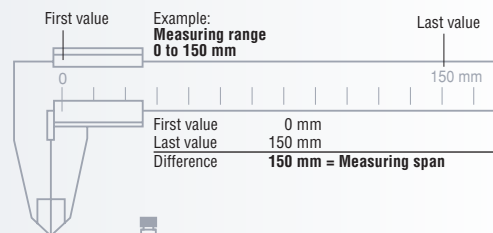
The measured value includes the true value plus the random and systematic errors of the relevant tool.

## Result of measurement

*F: Résultat de mesure – D: Messergebnis*

Product of a measured value once corrected on the basis of the known systematic errors.

This result is further increased by the uncertainty of measurement, which includes the random as well as any unknown systematic error.







### Permissible limits of a metrological characteristic MPL

F: Limites tolérées d'une caractéristique métrologique MPL

D: Grenzwerte eines Messtechnischen Merkmals MPL

Extreme permissible values of a metrological characteristic of a given measuring equipment, according to specifications or standards proper to the manufacturer or others.



### Maximum permissible errors G

F: Erreurs maximales tolérées G

D: Fehlergrenzen G

These errors are assimilated to the «Permissible limits of a metrological characteristic MPL».

Being related to both upper and lower highest deviations of a measuring instrument, they are usually symmetrical in practical metrology and, therefore, stated as single value, without any sign.



### Maximum permissible errors for a metrological characteristic MPE

F: Erreurs maximales tolérées d'une caractéristique métrologique MPE

D: Grenzwerte für Messabweichungen für ein messtechnisches Merkmal MPE

Extreme values of the permissible error for a metrological characteristic of a given measuring equipment, according to specifications or standards proper to the manufacturer or others.



### Deviation span of indication

F: Champ d'erreur d'indication

D: Abweichungsspanne

This deviation span matches the distance from the highest to the lowest point of a coordinate as shown on the relevant diagram. The value obtained is either applicable to whole or the local measuring span or measuring range.

All needed measurements are carried out in one direction (without reversal of the measuring force) - i.e. with upward plunger movement for a dial gauge. For those needed to establish the whole deviation span, they are performed in both directions (with reversal of the measuring force) - i.e. with upward and downward movement of the plunger for a dial gauge.



### Repeatability

F: Fidélité (répétabilité)

D: Wiederholpräzision

Ability of a measuring instrument to repeat the results obtained from the same measurand successively measured in the same direction, also under the same conditions.

Repeatability, which delivers an important information for the assessment of the uncertainty of measurement, is quantitatively expressed as standard deviation of dispersion values.



### Hysteresis

F: Hystérésis

D: (Messwert-) Umkehrspanne

Hysteresis expresses the difference between various indications of a measuring instrument. This value is achieved through measurements of the increasing/decreasing value of a same measurand, taken under the same conditions.

Hysteresis, which is quantitatively stated as standard deviation of value dispersion, can be determined anywhere within the measuring span or range. Its amount can also be obtained from the diagram of the deviation span in its whole.

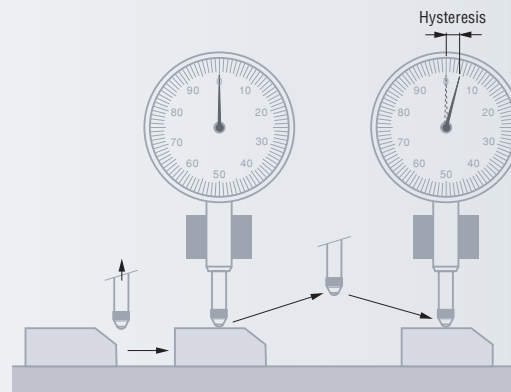
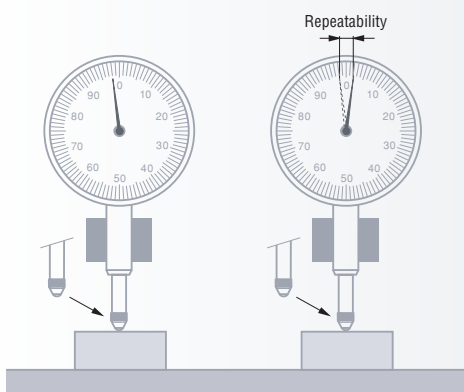


### Repeatability limit

F: Fidélité (répétabilité) limite

D: Wiederholgrenze

Extrem value for repeatability.





# Decision Rules for Proving Conformance or Non-Conformance with Specifications

## Relationship with the uncertainty of measurement

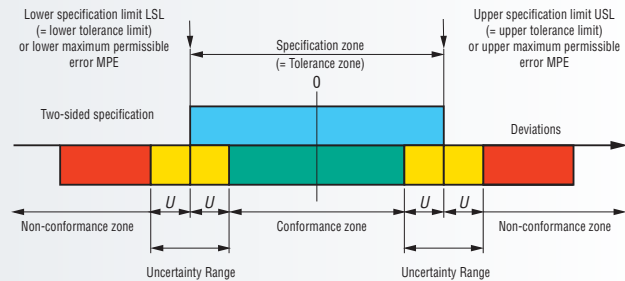
ISO 14253-1, which is a part of «Geometrical Product Specification GPS», provides «Rules for establishing the conformance or non-conformance with specifications». These rules are valid for «Inspection by measurements of work pieces and measuring equipment».

This ISO standard makes allowances for the uncertainty of measurement – or more precisely for the true uncertainty of any measurement whenever the conformance or non-conformance with a given specification must be proved. So, for a workpiece, the specification matches a preset tolerance while being equal to the maximum permissible errors for a metrological characteristic (MPE) for a measuring instrument.

Any given specification is a constant whereas the measurement uncertainty is a variable, which is affected by many components. Therefore, the zone of the conformance or non-conformance zone depends on the size of the effective expanded uncertainty  $U$ .

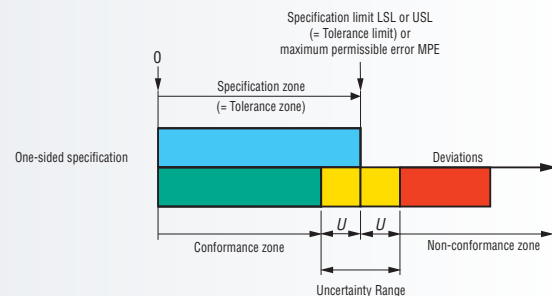
### Rule for proving conformance

Conformance is proved when the **measurement result  $y$  is lying within the specification zone, reduced on either side by the expanded uncertainty  $U$** . Consequently, workpieces or measuring instruments can be accepted as far as their conformance with the specification is proved by the manufacturer (supplier).



### Rule for proving non-conformance

Non-conformance is proved when the **measurement result  $y$  is lying beyond the specification zone, increased on either side by the expanded uncertainty  $U$** . In a such case, the relevant measuring instruments can be rejected if the purchaser (customer) gives evidence of its non-conformance.



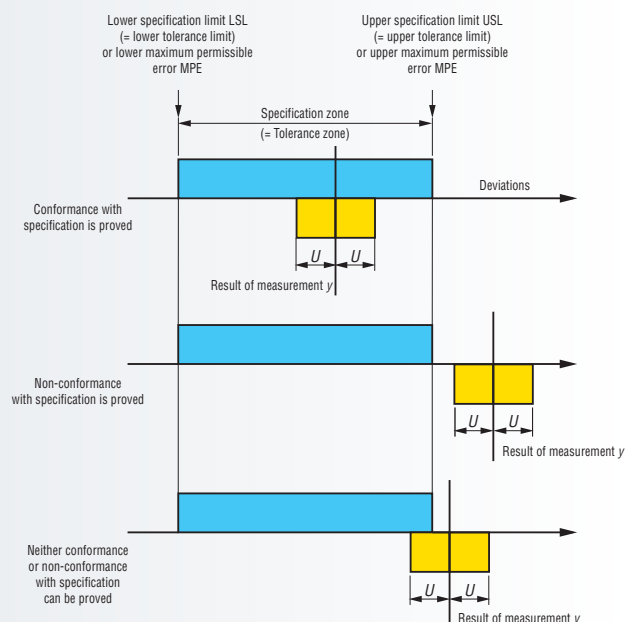
### Conformance or non-conformance can neither be proven

This often happens when the **measurement result  $y$  associated with the expanded uncertainty  $U$  includes either of both LSL and USL specification limits**. As a result, work pieces or measuring instruments can neither be automatically accepted nor rejected.

For such «dead end cases», it is advisable to follow the rule below.

– Repeat all measurements based on a reduced uncertainty, so that conformance or non-conformance can clearly be demonstrated. Usually, proceeding in this way benefit to the party that's able to provide the needed proof.

– Come to a mutual agreement providing the procedure to be applied if such cases arise.

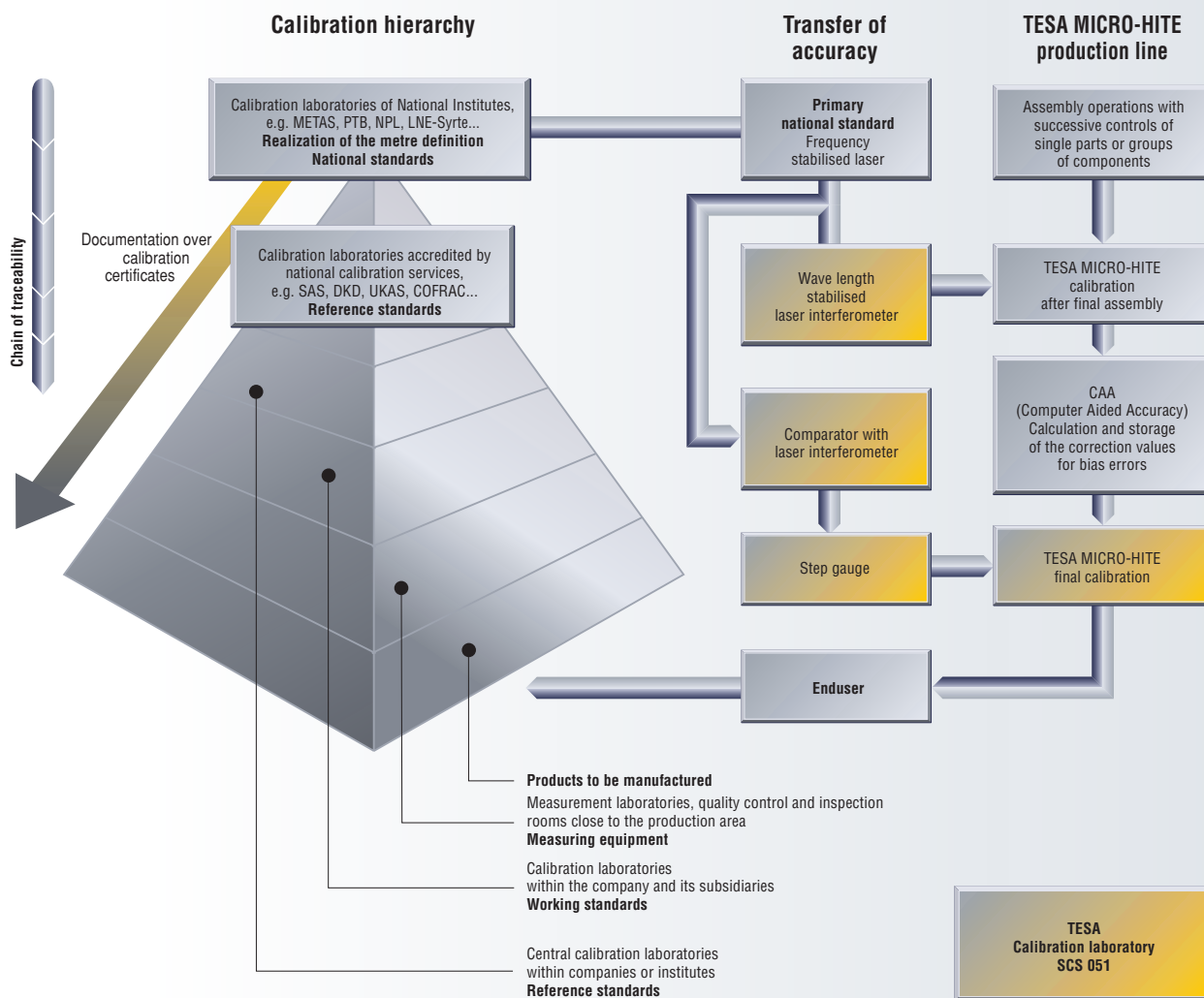


## Traceability to National Standards

All measuring equipment consistently used on our production site are traceable to national standards or reference fixtures through our quality management system.

Traceability is established by recalibration at regular intervals with documentary evidence as specified in the standards.

The illustration that follows shows the hierarchy of calibrations within the chain of traceability. The example set for the transfer of accuracy to our MICRO-HITE height gauges also shows how they are calibrated. Each feature is supplied with a free SCS calibration certificate issued by our laboratory officially accredited by the Swiss Calibration Service.





# Connectivity



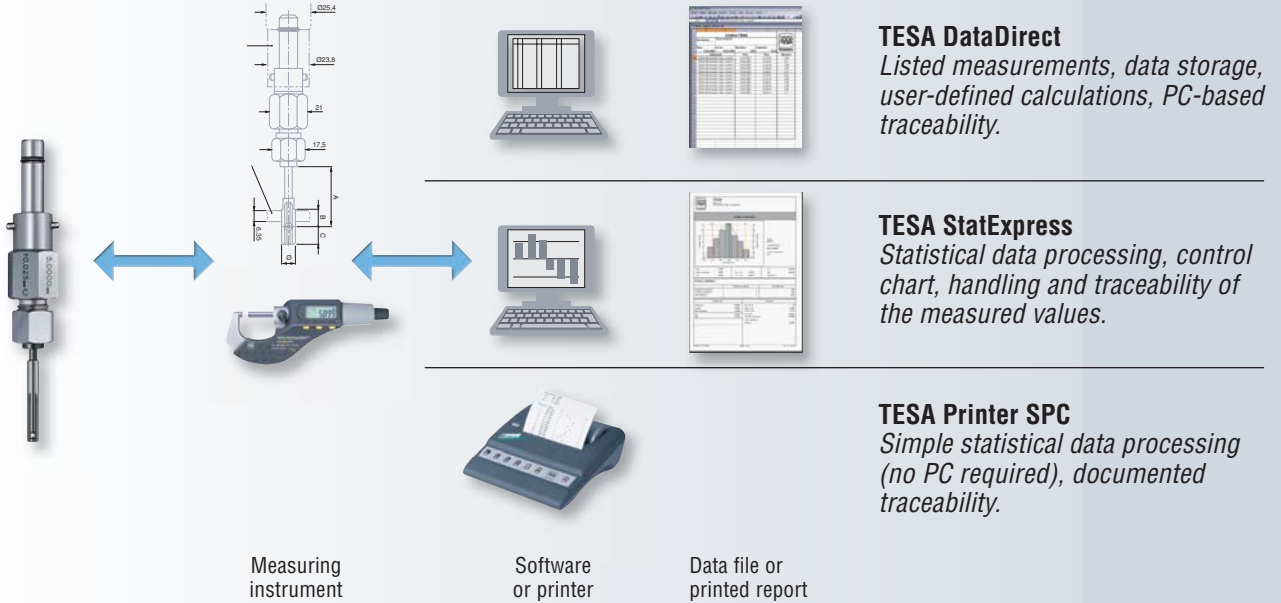
# TESA LINK

Inspection, traceability and cost reduction have a growing significance in all industrial sectors. This involves high quality metrology products, but also a suitable evaluation and further application of the measurements carried out.

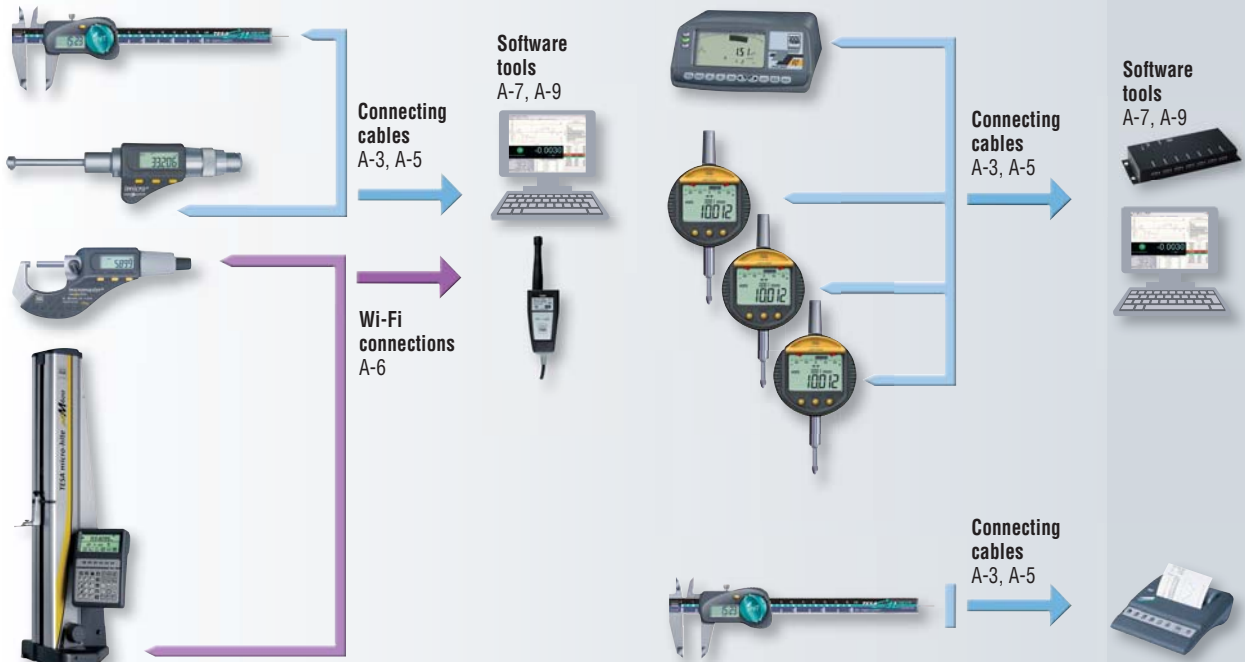
## Manufacturing Inspection

## Evaluation

## Documentation



Besides Software tools, TESA also offers a wide variety of cable links between the precision tool and the computer in order to optimize your manufacturing processes, improve quality and help you originate any document needed for traceability.



## OPTO and Sub-D standard connections

Any cable connection is defined through both connectors fitted at each cable end to link the computer, but mainly the measuring instrument being used.

To achieve highest compatibilities, TESA uses standardized and proven connectors essentially.

### Common systems



TESA Printer SPC



Sub-D 9p/f



Ansley 10p/f



Computer\*



USB



Sub-D 9p/f

\*Some computers are provided with other interfaces or do no longer have a serial port (Sub-D 9p).

## OPTO Connection



RS 232 opto-coupled, monodirectional or bidirectional



The table below contains the cables convenient for precision tools fitted with an OPTO connector, such as TESA-CAL IP67, IP65, INTERAPID Light, TESA Micromaster, TESA Imicro, TESA Alesometer, TESA Digico 10 - 11 - 205 - 305 - 400 - 500 - 600 - 705, TESATRONIC TT20-60-80-90, among others.



N°	=	L in m	System
04761062	Opto-USB DUPLEX Comes with drivers and software in DEMO version on CD.	2	USB
04761046	Opto-RS Simplex For data transfer from handtool t to host computer. Allows a single request only.	2	Sub-D 9p/f Simplex
S47010022	Same as item 04761046, except for the length.	5	
04761049	Opto-RS Duplex avec possibilité d'envoi de Setting commands can be sent to the precision tool.	2	Sub-D 9p/f Duplex
S47010024	Same as item 04761049, except for the length.	5	
04761027	Connecting cable alone	2	w/o connector



## Sub-D Connexion

RS 232, Sub-D 9p/m connector



Connecting cables for the following CMMs or precision handfool:

TESA Micro-Hite, TESA-Hite, TESA  $\mu$ Hite, TESA TG.



			System
<b>04761063</b>	Sub-D USB Comes with drivers and software in DEMO version on CD	2	USB
<b>04761052</b>	Uncrossed cable.	2	Sub-D 9p/f
<b>S47010025</b>	Same as item 04761052, except for the length.	10	Sub-D 9p/f

### USB Accessories

<b>S47120002</b>	<b>USB Adapter</b> Comes with drivers on CD, USB Sub-D connector, 9p/m	0,1
<b>S47120003</b>	<b>Multiplexer, 7 USB ports 2.0</b> Robust steel housing, external powering using a C-type AUX connector, 4 pins. (4 ports for 04761062 and 04761063) <i>Furnished with:</i> DC mains adapter (EU) Connecting cable to PC. Recommended highest number of ports: 49 USB ports connectable on 2 levels.	1,5
<b>04761071</b>	<b>USB Foot Switch</b> Direct connection to any USB port. Takes DataDirect or StatExpress into account when transferring the measured values from all connected measuring tools.	2



S47120002



S47120003



04761071

## Connecting cables and cable adapters

N°		L in m	System	Instrument
04761023	Connecting cable for TT10 – TESA Micro-Hite, versions 10/11/12	2	Sub-D 9p/f	MiniDIN 8p/m
04761024	Connecting cable to matrix printer for TT10 – TESA Micro-Hite, versions 10/11/12	2	Sub-D 25p/m	
04761038	Connecting cable for TESA Digico 1 and 2, also with power outlet	3	Sub-D 25p/f	Special Digico 1-2
S47078588	Connecting cable for TESA Digico 1 and 2 – TESA Printer SPC	2	Ansley 10p/f	
04761060	Connecting cable for TESA Digico 12 – Electronic dial test indicator	2	Sub-D 9p/f	Special Digico 12
03969007	Connecting cable, RS232 serial for TESA-SCOPE – Reflex 1 – Readouts TS100 – 300	3	Sub-D 9p/f	
04761017	Cable adapter		Sub-D 25p/m Sub-D 9p/m	
S47001891	Cable adapter for <b>OPTO simplex</b> used to link DIGIMATIC	0,2	Sub-D 9p/m Ansley 10p/f	
S53300165	Connecting cable for Clinobevel 1	1,8	USB	Special Clinobevel
S53070174	Connecting cable for Clinobevel 2	2,5	Sub-D 9p/f	

### Accessories

N°		L in m	Connectors
04761054	Mains adapter, 100 to 240 VAC 50 to 60 Hz, 6,6 Vdc, 750 mAh (provided w/o mains cable)	2	DC-Jack
04761055	EU cable for mains adapter N° 04761054	1,5	
04761056	US cable for mains adapter N° 04761054	1,5	
04761037	Mains adapter, 230 VAC, 9 Vdc, 22 mAh, 1,8 VA – TESA Digico 1 or 2	2	Special Digico 1-2
04761057	Mains adapter, 110 VAC, 9 Vdc, 22 mAh, 1,8 VA – TESA Digico 1 or 2	2	
04761058	Adapter cable with mini-jack cable entry for hand switch or foot switch		Sub-D 9p/m Sub-D 9p/f
04768000	Hand switch for triggering data transfer – Adapter cable 04761058 – TESA Printer SPC	2	
04768001	Foot switch for triggering data transfer – Adapter cable 04761058 – TESA Printer SPC	2	



047681058



04768000



04768001



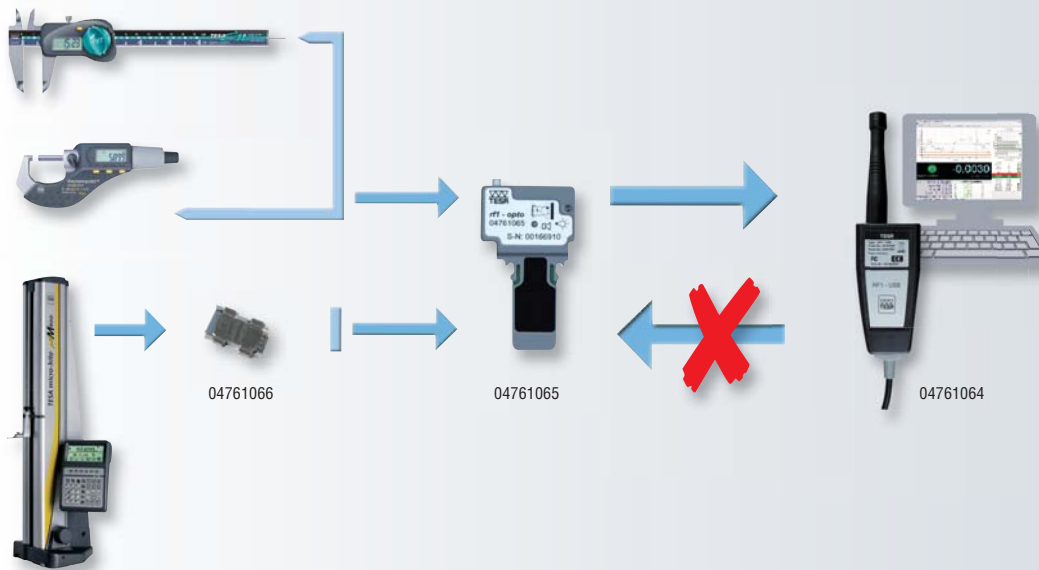
## Wireless Connection

The solution for a freely move. The use of this technology ensures full flexibility and makes the measuring instrument easily traceable owing to a distinct address with acknowledgment.

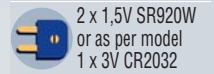


Scale 1:1

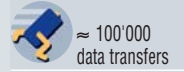
Possible connection of up to 120 precision handtools to a single or several host computers (max. distance 150 m). Where data transmission cannot visually be checked for correctness, the combined acoustic/optical signal lets you get a confirmation that data transfer has occurred, so that no data can be lost.



≤ 150 m



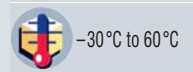
2 x 1,5V SR920W  
or as per model  
1 x 3V CR2032



≈ 100'000  
data transfers



0°C to 50°C



-30°C to 60°C



EN 300 220

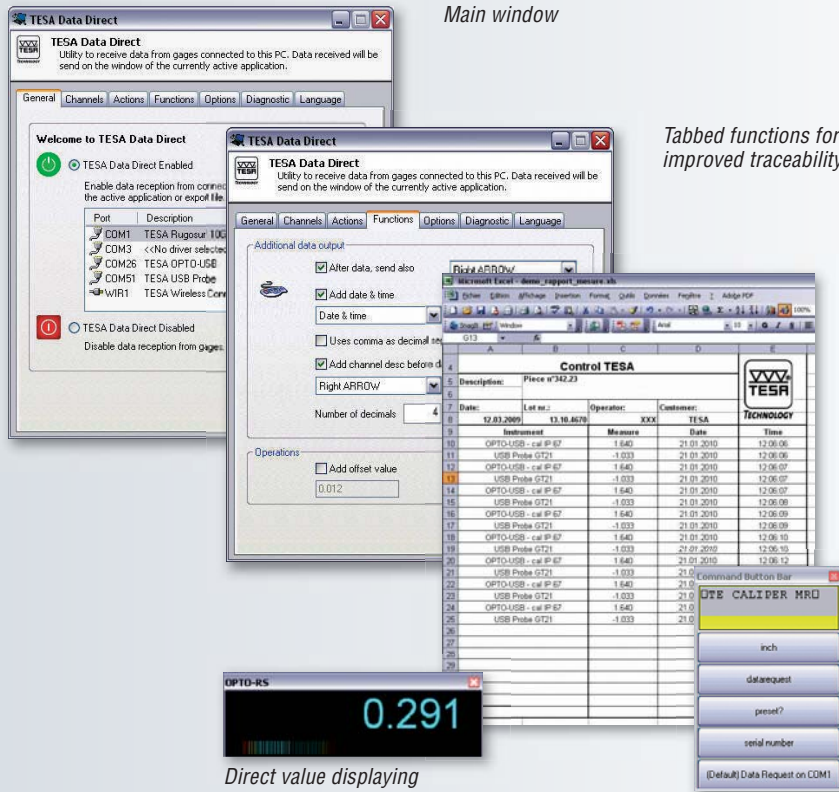
No	Symbol	Interface	Dimensions (mm)	Weight (g)	
04761064	Rf-USB	Receiver, type rf-USB, for host computer, provided with utility for setting purpose (SimKey)	USB	47 x 275 x 30	≈ 175
04761065	Opto-rf1	Transmitter, type rf, for Opto connector (except for TESA Digico and calipers >500 mm)	OPTO	25 x 42 x 12	≈ 8
04761066	Opto - Sub-D	Opto-adapter Sub-D for serial interface (Sub-D)	Sub-D 9p/m	31 x 51 x 17	≈ 10
04761067	RS 232 - rf	Transmitter, type Sub-D, for CMMs along with mains supply	Sub-D 9p/m	47 x 275 x 30	≈ 175
04761068	Digico 12 - rf	Transmitter specially designed for TESA Digico 12 and electronic dial test indicator	Special	35 x 49 x 11	≈ 10
04761069	Opto - rf Digico	Transmitter, type rf, for TESA Digico 205, 305, 400, 500, 600, 705	OPTO	30 x 50 x 11	≈ 8

# DataDirect

This software solution is an easy way to collect and report in real time all measured values taken with nearly any TESA's precision tools featuring an RS 232 data output.

DataDirect is provided with serial input/output drivers specially configured for TESA's products, but also for those purchased from other manufacturers. It works effectively for data transfer to your data sheets, database, statistical modules or any other Windows-based applications.

With this user-friendly software you will be able to create your own reports for the relevant part inspection.



Main window

Tabbed functions for improved traceability

Listed measurements within a third-party software, e.g. MS Excel

User-defined commands

**04981001 TESA DataDirect**

*Software including:*

- CD for installation
- USB dongle
- Instruction manual (PDF)

For information on functionalities and compatibilities, see page A-9.



# StatExpress

This dedicated software lets quality assurance enter into your manufacturing processes in that it makes it possible for your quality-oriented control charts to be conveniently downloaded, reported, swapped and stored.

StartExpress is compatible with all TESA's products – from the caliper up to the CMM or Vision machine. As integrated component, DataDirect provides the needed flexibility for easy data transfer to most of the electronic gauges currently available on the market.

Running StatExpress you will have the ability to create protocols including the measured values obtained from a single or several handtools, assign tolerances, calculate statistics, print out various measurement reports, compute XR control charts, and much more.



Simultaneous measuring of multiple parts.

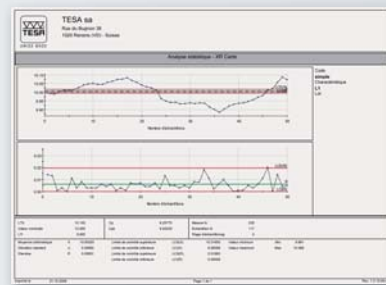
Main window with or without instructions



Detailed report for each measured part features

Code	Dimension	Unit	OK	Probe
D1	1	mm	OK	
D2	1	mm	OK	
D3	1	mm	OK	

Report by measured parts with number of the part series



XR control chart



**04981002 TESA StatExpress**  
Extended programme version

**04981003 TESA StatExpress Light**  
Lightened programme version (see next page)

provided with:

CD for installation – USB dongle – Instruction manual (PDF)

For information on fonctionnalités and compatibilities, report to page A-9.

## TESA Software Tools



This overview shows the main functionalities and compatibilities using a TESA's software for data acquisition and data processing.

Ask your local distributor or visit our web site [www.tesabs.ch](http://www.tesabs.ch) and get access to the free software version available for evaluation.

*Minimum requirements:*

*Pentium 4 or alike – 512 MB RAM – 10 GB HD – Windows XP or 7 (32 bits).*



	 04981001	04981003	04981002
	 DataDirect	StatExpress Light	StatExpress
<b>Compatible instruments and systems</b>			
OPTO-RS / USB	●	●	●
Height gauges (TESA-HITE, MICRO-HITE)	●	●	●
USB probes	●	●	●
Rugosurf 10, 10G, 90G	●	–	●
Micro-Hite 3D Reflex, TS 300	●	–	●
TPS	●	●	●
BPI intelligent probe boxes	–	–	●
Custom made instruments, type RS 232	●	●	●
Instruments from other makers (Mitutoyo, DMX3 - DMX8, Steinwald single 6, etc.)	●	●	●
Wireless TESA systems	●	●	●
<b>Options available</b>			
Export CSV data files	●	●	●
ASCII commands	●	–	–
Dynamic displaying (Direct displaying of the measured value on used monitor - Not available with a wireless system)	●	–	–
TESA DataDirect included	–	–	●
Import CSV data files	–	–	●
Table with all measured values included	–	●	●
XR control chart	–	–	●
Report by measured parts	–	–	●
Report by measured feature	–	●	●
Simultaneous data acquisition	–	–	●
Overall report	–	●	●
Protection according to Users skills level	–	●	●
Inspection report in PDF, HTML or other format.	–	●	●
Setting option for USB type inductive probes, BPI probe boxes. Zero-setting procedure and plausibility test.	–	–	●

## TESA Portable Printer

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



### TESA PRINTER SPC

Can be connected to TESA measuring instruments, but also to those provided with a DIGIMATIC output – Your TESA PRINTER SPC is capable to recognise the plug in tool and will execute the appropriate configuration, automatically.

	«Normal»	«Tolerance»
<b>Statistical features</b>		
Lower limit of size (LSL)	–	●
Upper limit of size (USL)	–	●
Tolerance	–	●
Number of captured values:		
– sampling extent	●	●
– < lowest size	–	●
– > highest size	–	●
– out of tolerances in per-cent	–	●
Lowest list value	●	●
Highest list value	●	●
Value dispersion R	●	●
Arithmetical mean $\bar{x}$	●	●
Standard deviation $\sigma_n, \sigma_{n-1}$	●	●
Process capability $C_p, C_{pk}$	–	●
<b>Graphical Representations</b>		
Position of each single value within the tolerance range (10 classes)	–	●
Histogramme	–	●
<b>Display (luminous LEDs)</b>		
Sorting of each single value with green for <i>Good</i> , yellow for <i>Rework</i> and red for <i>Reject</i>	–	●

- Memory capacity: 9999 single values for one feature per sample.
- Two operating 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 printed out with graphical representations.
- Output of reports with headings to be filled in by the operator.
- Hardcopies printed in preferred language (English, German, French, Italian or Spanish).
- Battery-powered (6 V) printer unit for use on the fly (optional).



Matrix printer using thermal paper roll



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



RS232 for data inputs (9-pin male, trapezoid connector)

DIGIMATIC (Ansley connector, 10-pin)

Connector with mini-jack for remote triggering of data transfer

Mains adapter 100 to 240 Vac, 6,6 Vdc.

Optional accessory: 6 V battery pack, rechargeable

10°C to 40°C

–10°C to 60°C

IP40 (IEC 60529)

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

180x180x84 mm (W x D x H)

0,55 kg

Shipping packaging

Identification number

Declaration of conformity



06430000



TESA PRINTER SPC

Printer with SPC capability, value classification and memory; prints all results with graphical representations using the matrix printer provided with a 110 mm wide thermal paper roll; RS232 interface.

Supplied with the following accessories:

04765013 1 Thermal paper roll, 110 mm in width

04761054 1 Adapter 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

04761055 1 EU adapter cable

Optional accessories

04768035 Battery pack, 6V

04761056 US adapter cable



# Calipers





## THE FAVOURITES

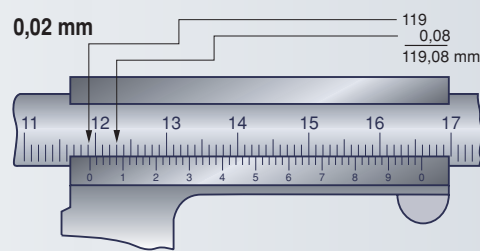
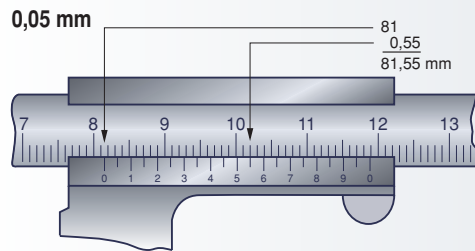
Calipers are the most popular length measuring instruments used worldwide. Owing to their simple construction, ease of handling and quick operation, they are the favourites in dimensional measurement. The wide variety of forms and shapes available with exclusive measuring faces make them the universal hand-held tools.

All calipers of the famous TESA, ETALON, INTERAPID and ROCH brand names are recognised for their superior quality – the guarantee for precise measurement. The flawless guide of the slider on the beam ensures silky-smooth operation while also preventing the measuring jaws from tilting.

The choice of the material with exactly defined heat treatment as well as a robust design result in further distinctive advantages such as wear and corrosion resistance.

For quick and easy reading of your measured values – a condition that's essential in the certainty of any measurement – we offer dial calipers for a comfortable reading or more sophisticated digital models for error-free reading besides regular vernier calipers.

### Vernier Calipers



Chosen length l mm	0,1	0,05 mm	0,02 mm	0,01 mm
	μm	μm	μm	μm
50		50	20	20
100		50	20	20
150		50		
300		50		
400		60	30	30
500		70		
600		80		
700		90		
800		100		
900		110	40	40
1000		120		
1200		140		
1400		160	50	
1600		180		
1800		200	60	
2000		220		

### Max. Permissible Errors

The max. permissible errors (G) are expressed by the equation given below, where the values should be rounded down to two decimal fractions (0,01 mm).

They apply in measurement taken under the same measuring force.

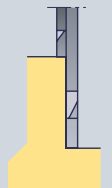
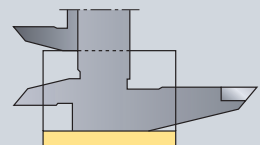
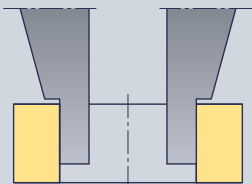
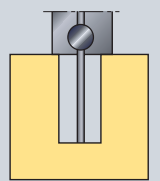
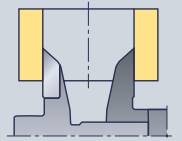
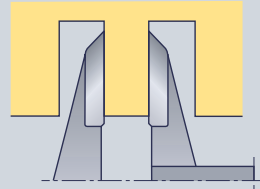
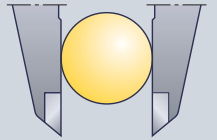
For all other measurements, including those performed with use of the depth foot, the values obtained have to be increased by 20 μm.

Calipers with scale or vernier reading to 0,1 or 0,05 mm:

$$G = (20 + l / 10 \text{ mm}) \mu\text{m} \geq 50 \mu\text{m}$$

Calipers with analogue indication (scale or vernier reading to 0,02 mm) or numerical indication:

$$G = (22 + l / 50 \text{ mm}) \mu\text{m}$$

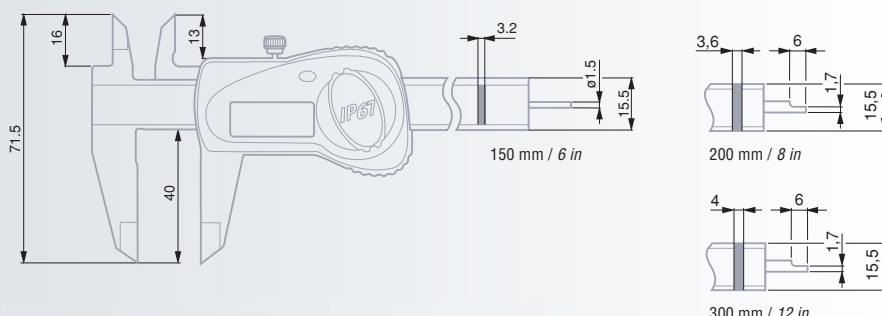
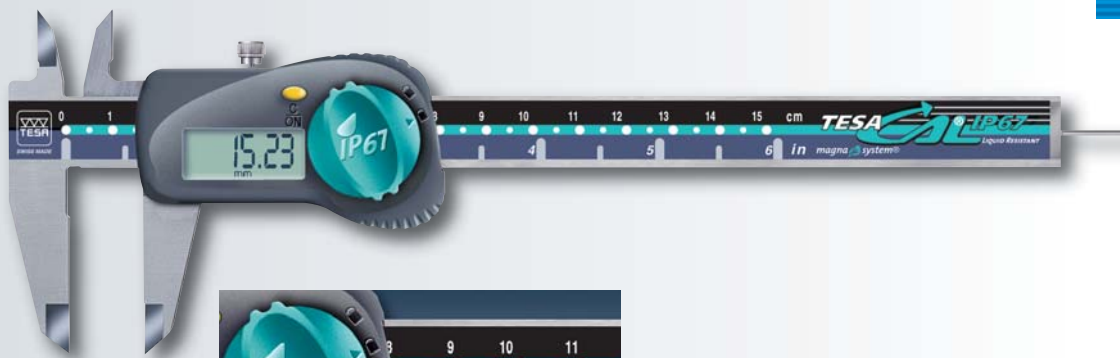


# TESA CAL IP67 magna $\mu$ system

Patented measuring system – TESA magna  $\mu$  system

New electronic caliper – The highest degree of protection ever achieved with hand-held tools of this type – Totally immune to the penetration of liquids and particles of metal.

Magnetic measuring system – a TESA's technology guaranteeing full reliability and accuracy, even in the toughest conditions of use – SWISS MADE.



DIN 862 (Style 1A-ZS)

0,01 mm / 0.0005 in

LCD, 7 mm

Floating zero

Conversion mm / in

≤100 mm = 20  $\mu$ m / >100 mm = 30  $\mu$ m

10  $\mu$ m

Steel scale with incremental divisions, magnetic

> 1,8 m / s

RS232 opto-coupled, mono- and bi-directional

Hardened stainless steel

3V lithium battery, CR 2032

≈ 1,5 a (≈ 2000 h / a)

Idle mode after 10 min, automatic switch off after 2 h.

10°C to 40°C

-10°C to 60°C

100%

IP67 (IEC 60529)

EN 50081-1 / EN 50082-1

Suited plastic case

Identification number

Inspection report with a declaration of conformity



	mm / in	RS232	Thumb roller	A mm	B mm	C mm	g
<b>00530300</b>	150 / 6	–	–	40	16	71,5	140
<b>00530301</b>	150 / 6	–	●	40	16	71,5	140
<b>00530302</b>	200 / 8	–	●	50	20	89,5	200
<b>00530303</b>	300 / 12	–	●	64	22	105,5	270
<b>00530311</b>	150 / 6	●	●	40	16	71,5	140
<b>00530312</b>	200 / 8	●	●	50	20	89,5	200
<b>00530313</b>	300 / 12	●	●	64	22	105,5	270

*Optional Accessories*

<b>01961000</b>	3 V lithium battery, 190 mAh, type CR 2032
<b>00560013</b>	Depth foot for calipers having a 150 mm measuring span (also see on page B-24) For connecting cables, see section A

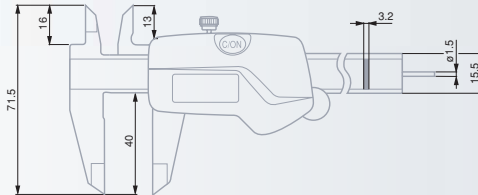
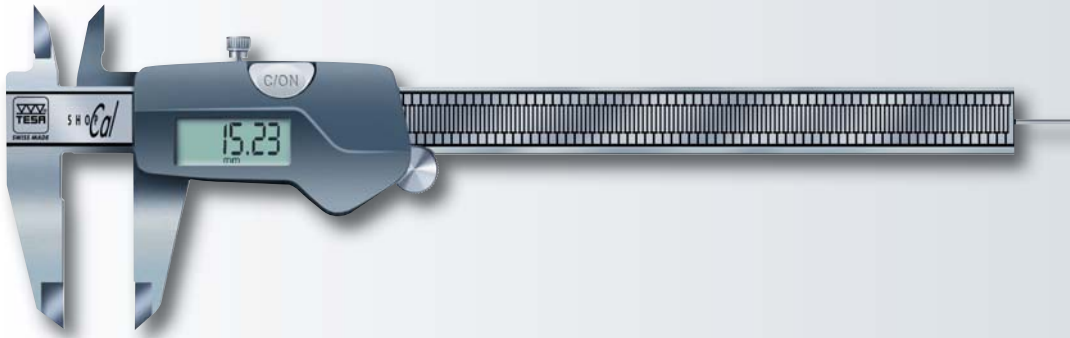


# TESA SHOP-CAL



Patented measuring system – TESA magna  $\mu$  system

- ABSOLUTE or DIFFERENCE measurements
- High quality precision mechanics
- Large LC display
- Easy-to-use
- Best Price/Performance relationship



No	mm / in	Thumb roller	A mm	B mm	C mm	g
00530090	150 / 6	●	40	16	71,5	140
<i>Optional Accessories</i>						
01961000	3 V lithium battery, 190 mAh, type CR 2032					
00560013	Depth foot for calipers having a 150 mm measuring span (also see on page B-24)					

- ✓
- DIN 862 (Style 1AZ)
- 0,01 mm / 0.0005 in
- LCD, 7 mm
- Floating zero
- «ABS» and «DIFF»
- Conversion mm / in
- $\leq 100$  mm = 20  $\mu$ m  
 $> 100$  mm = 30  $\mu$ m
- 10  $\mu$ m
- Capacitive glass scale with incremental divisions
- $> 2$  m / s
- Hardened stainless steel
- 3V lithium battery, CR 2032
- $\approx 2$  a ( $\approx 2000$  h / a)
- Idle mode after 10 min, automatic switch off after 2 h.
- 10°C to 40°C
- 10°C to 60°C
- 80%
- IP40 (IEC 60529)
- EN 50081-1  
EN 50082-1
- Suited plastic case
- No ID Identification number
- Inspection report with a declaration of conformity



DIN 862  
(Style 1AR)

≤100 mm = 20 μm  
>100 mm = 30 μm

Hardened  
stainless steel

32 mm  
diameter  
rotating dial  
with lock

Slider with  
locking screw

Steel gear mechanism,  
hardened  
and ground

Patented  
shockproof  
design

Suited  
plastic case

Identification  
number

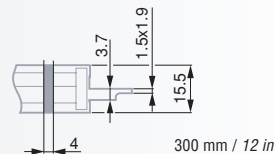
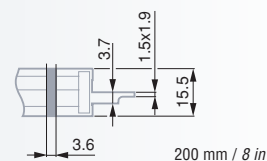
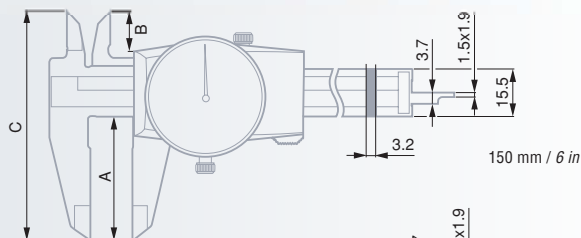
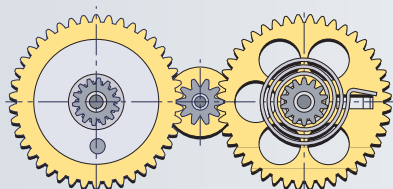
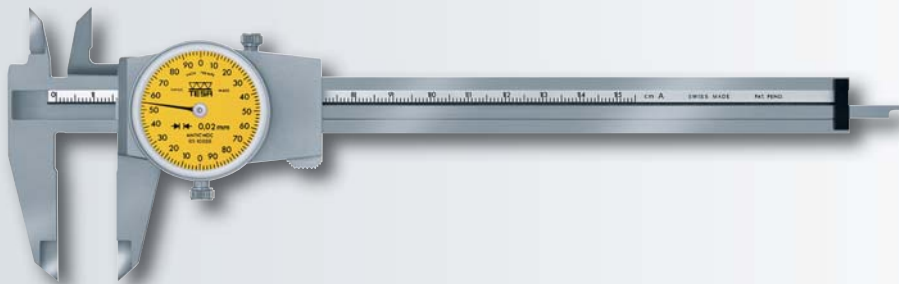
Inspection report  
with a declaration  
of conformity

## Dial Calipers

Rugged construction – High accuracy – Patented shockproof design – Ideal for use in the workshop.

### Models TESA CCMA-M

Easy-to-read dial calipers – Slider with metal dial housing – Models with a 200 or 300 measuring span fitted with a thumb roller.



Thumb roller

	A mm	B mm	C mm
00510008	0 ÷ 150 mm	0,02 mm	2 mm
00520002	0 ÷ 6 in	0,001 in	0.1 in
00510045	0 ÷ 200 mm	0,02 mm	2 mm
00510046	0 ÷ 300 mm	0,02 mm	2 mm

#### Optional Accessory

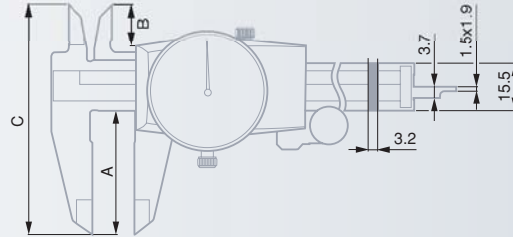
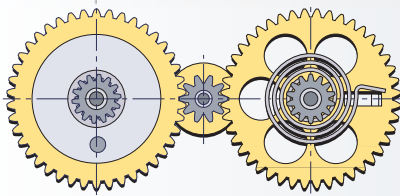
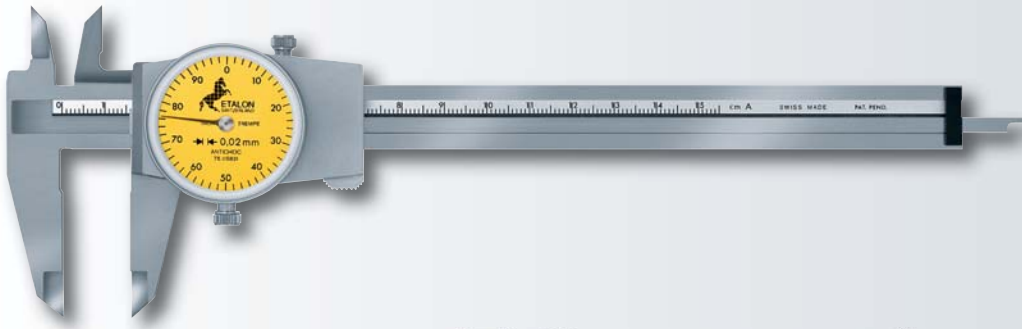
00560013 Depth foot for models 150 mm/6 in (also see page B-24)





## Model ETALON 125

Slider with metal dial housing – 1 mm per pointer revolution.



075115821

0 ÷ 150 mm

0,02 mm

1 mm

without thumb roller

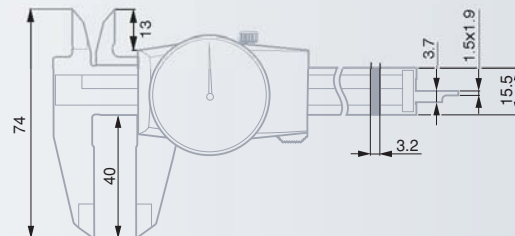
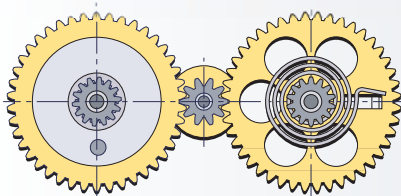
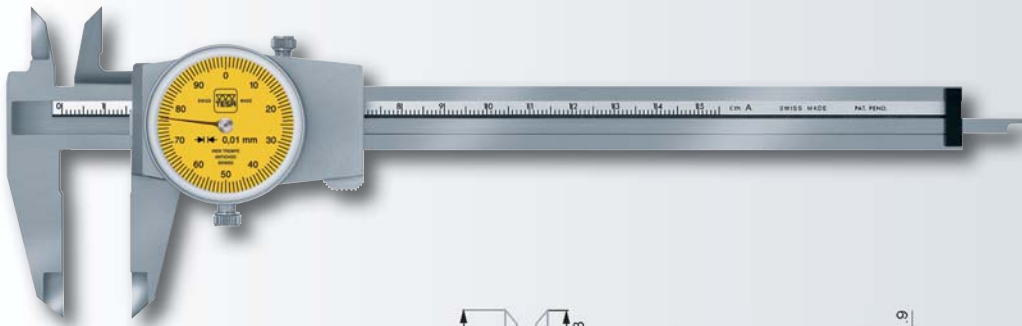
*Optional Accessory*

00560013

Depth foot (also see page B-24)

## Model TESA CCMA-M, 0,01 mm

Slider with metal dial housing – 1 mm per pointer revolution.



00510050

0 ÷ 150 mm

0,01 mm

1 mm

*Optional Accessory*

00560013

Depth foot (also see page B-24)



✓

DIN 862 (Style 1AR)

≤ 100 mm = 20 μm  
> 100 mm = 30 μm

Hardened stainless steel

32 mm diameter rotating dial with lock

Slider with locking screw

Steel gear mechanism, hardened and ground

Patented shockproof design

Suited plastic case

Identification number

Inspection report with a declaration of conformity



✓

DIN 862 (Style 1AR)

≤ 100 mm = 20 μm  
> 100 mm = 30 μm

Hardened stainless steel

32 mm dia. rotating dial with lock

Slider with locking screw

Steel gear, hardened and ground

Patented shockproof design

Suited plastic case

Identification number

Inspection report with a declaration of conformity

### Model TESA CCMA-P

Quick and easy reading – Slider with plastic dial housing.



DIN 862  
(Style 1AR)

≤100 mm = 20 μm  
>100 mm = 30 μm

Hardened stainless steel

32 mm dia. rotating dial with lock

Slider with plastic dial housing plus locking screw

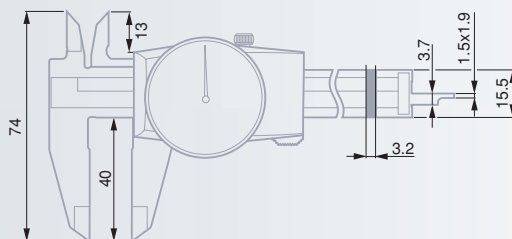
Steel gear, hardened and ground

Patented shockproof design

Suited plastic case

Identification number

Inspection report with a declaration of conformity



00510004	0 ÷ 150 mm	0,02 mm	2 mm
00520001	0 ÷ 6 in	0.001 in	0.1 in

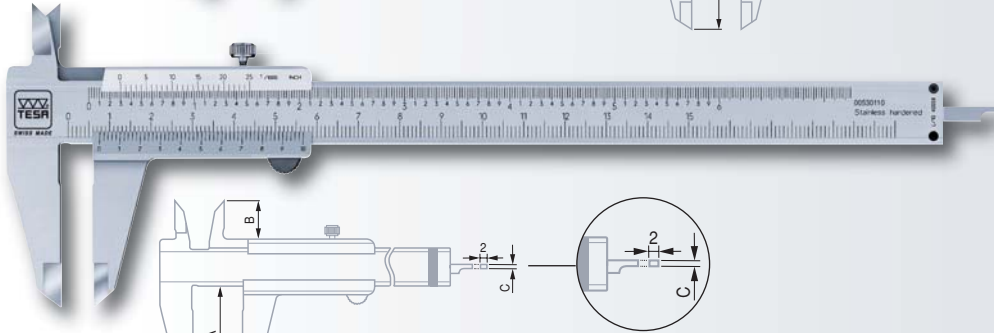
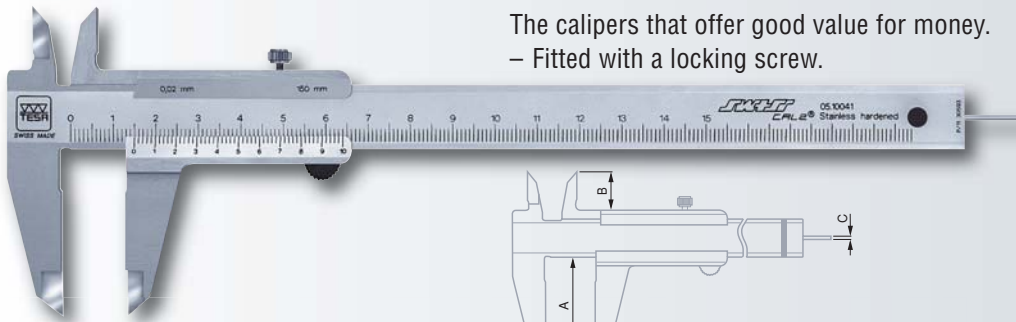
Optional Accessory

00560013	Depth foot (also see page B-24)
----------	---------------------------------



## TESA Calipers with Vernier Reading

The calipers that offer good value for money.  
– Fitted with a locking screw.



DIN 862  
(Style 1AN-2)  
NF E 11-091



Satin-chrome scale  
background;  
main scale  
slightly set back for wear  
protection



Hardened  
stainless steel



Suited  
plastic case



Identification  
number



Inspection report  
with a declaration  
of conformity

No	TESA	mm	mm	in	in	A mm	B mm	C mm
00510041	SWISSCAL 2	0 ÷ 150	0,02	–	–	40	15,5	Ø 1,5
00510047	Standard model	0 ÷ 150	0,05	–	–	40	15,5	Ø 1,5
00530103	Standard model	0 ÷ 150	0,05	0 ÷ 6	1/128	40	15,5	Ø 1,5
00530104	Standard model	0 ÷ 200	0,05	0 ÷ 8	1/128	50	18	1,5 x 2
00530105	Standard model	0 ÷ 300	0,05	0 ÷ 12	1/128	64	22	–
00530110	Standard model	0 ÷ 150	0,02	0 ÷ 6	0.001	40	15,5	Ø 1,5
00530111	Standard model	0 ÷ 200	0,02	0 ÷ 8	0.001	50	18	1,5 x 2
00530112	Standard model	0 ÷ 300	0,02	0 ÷ 12	0.001	64	22	–
00530120	Self-locking model	0 ÷ 150	0,05	0 ÷ 6	1/128	40	15,5	1,5 x 2
00530121	Self-locking model	0 ÷ 150	0,02	0 ÷ 6	0.001	40	15,5	1,5 x 2
00530130	Self-locking model with parallax-free readout	0 ÷ 150	0,05	0 ÷ 6	1/128	40	15,5	1,5 x 2
00530131	Self-locking model with parallax-free readout	0 ÷ 150	0,02	0 ÷ 6	0.001	40	15,5	1,5 x 2

### Optional Accessories

- 00560013 Depth measuring foot (also see page B-24)
- 0051610365 Magnetic magnifying glass, 3x magnification

## Magnetic Magnifying Glass

Can be mounted on calipers and the like for easier vernier reading.



Plastic  
pocket bag



2 permanent  
magnets



0051610365



3x magnification



DIN 862 and factory standard

See table

0,01 mm  
0.0005 in

LCD, 8,5 mm

Floating zero

Display lock

mm / in conversion

Scale with incremental divisions, magnetic

> 1,5 m / s

RS232 opto-coupled, mono- and bi-directional

Hardened steel jaws for external dimensions. Also with TiN coating, thickness to 7 mm. Tungsten carbide inserts for internal dimensions, 5 mm dia. Beam with light alloy hollow section, supported by hardened stainless steel rods.

3V lithium battery, CR 2032

≈ 1,5 a (≈ 3300 h / a)

5°C to 40°C

-10°C to 60°C

IP40 (IEC 60529)

EN 50081-1  
EN 50082-1

Shipping packaging

Identification number

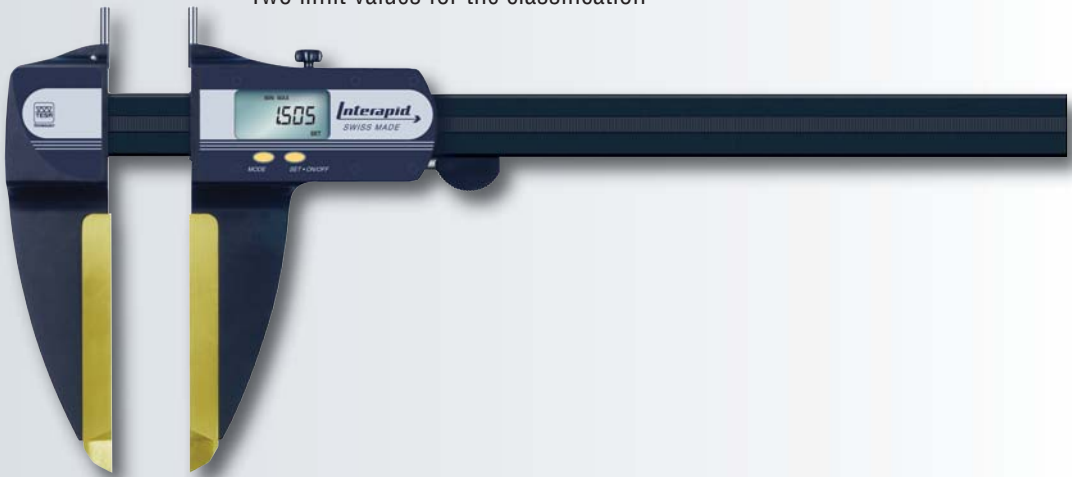
Inspection report for models up to 1500 mm

Declaration of conformity

# INTERAPID Light

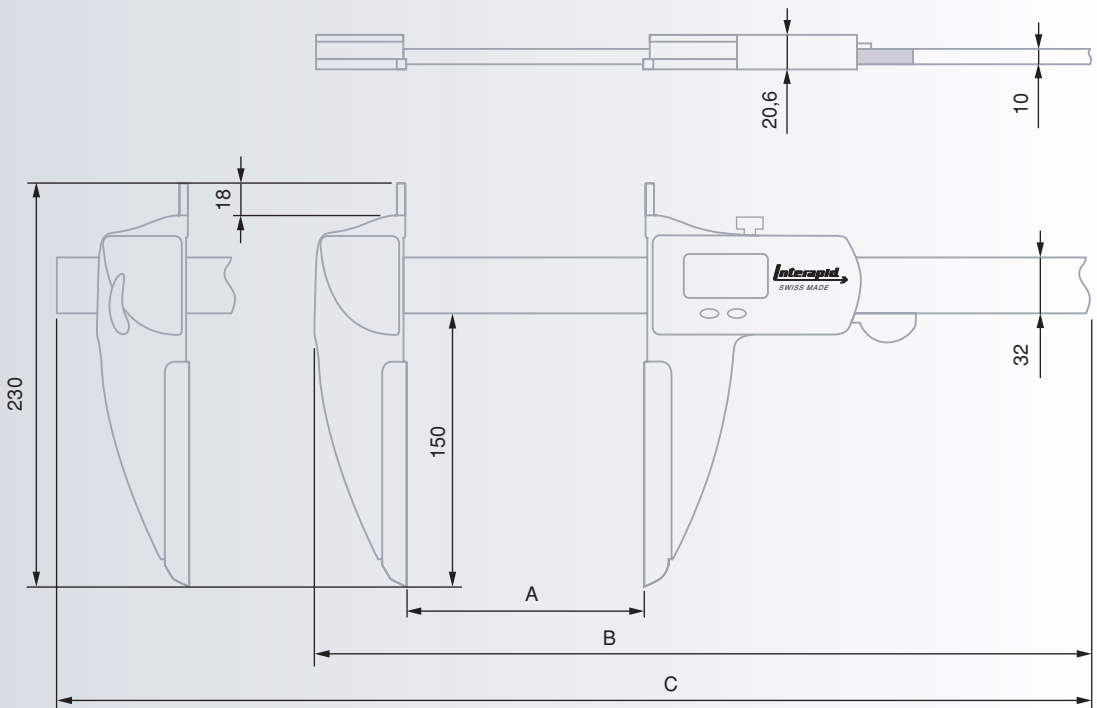
## Measuring functions

- Zero setting
- Metric/Inch conversion
- Hold function for displayed value
- OPTO-RS data transfer, mono- and bi-directional
- Two adjustable points of origin (Ref I / Ref II)
- PRESET function
- MIN/MAX mode
- Two limit values for the classification



No		$\mu\text{m}$	$\mu\text{m}$	$\mu\text{m}$	A mm	B fixed	C movable	kg
00590061	INTERAPID Light 300	30	20	30	330	618	–	1,1
00590062	INTERAPID Light 600	40	20	60	630	918	–	1,3
00590063	INTERAPID Light 1000	60	20	100	1025	–	1306	1,6
00590064	INTERAPID Light 1500	150	20	150	1525	–	1806	2
00590065	INTERAPID Light 2000	250	30	200	2040	–	2306	2,3
00590066	INTERAPID Light 2500	350	30	250	2545	–	2806	2,6
00590067	INTERAPID Light 3000	450	40	300	3050	–	3306	3

Models 300 and 600 mm with a fixed jaw (left), any other model with a movable one.

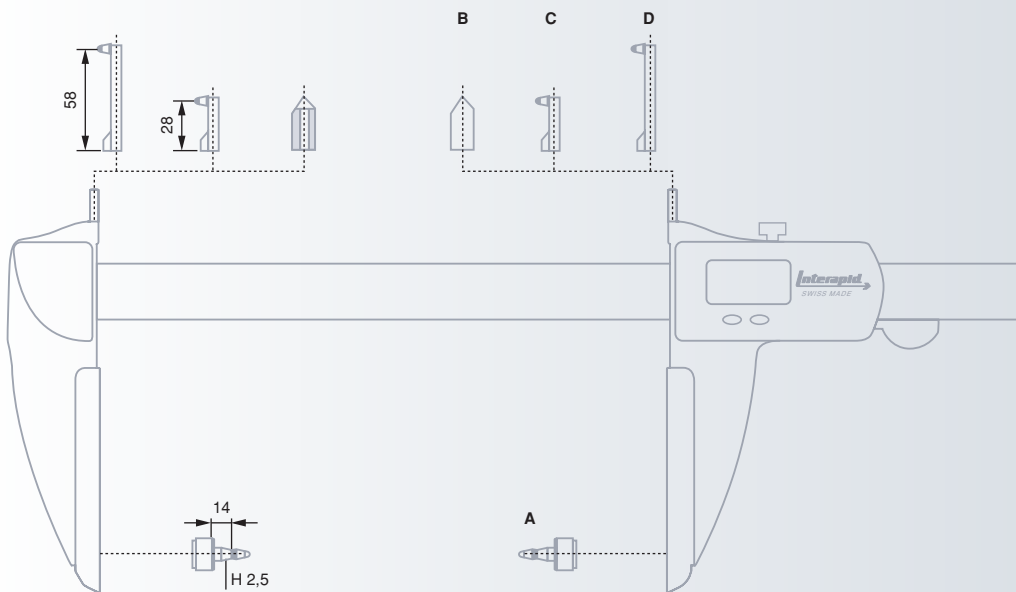




## Standard Accessories



<b>00560095</b>	<b>A</b>	Insert-holder with a M2,5 thread
<b>00560096</b>	<b>B</b>	60° conical steel pin, hardened steel for measuring centre distances >10 mm
<b>00560097</b>	<b>C</b>	Holder for dial gauge inserts used for groove measurement, L = 28 mm
<b>00560098</b>	<b>D</b>	Holder for dial gauge inserts used for groove measurement, L = 58 mm
<b>00560099</b>		Wooden case for INTERAPID Light 300 mm
<b>00560100</b>		Wooden case for INTERAPID Light 600 mm
<b>00560101</b>		Wooden case for INTERAPID Light 1000 mm
<b>00560102</b>		Wooden case for INTERAPID Light 1500 mm
<b>01961000</b>		3V lithium battery, 190 mAh, type CR 2032
For connecting cables, see section A		





DIN 862  
(Style E-ZS/B-ZS)

See table

0,01 mm  
0.0005 in

LCD, 7 mm

Floating zero

Display lock

mm / in  
conversion

See page B-2

Steel scale with  
incremental  
divisions, magnetic

> 1,8 m / s

RS232  
opto-coupled,  
mono- and  
bi-directional

Hardened  
stainless steel

3V lithium  
battery, CR 2032

≈ 1,5 a  
(≈ 2000 h / a)

Idle mode  
after 10 min.,  
automatic switch  
off after 2 h.

10°C to 40°C

-10°C to 60°C

100%

IP67  
(IEC 60529)

EN 50081-1  
EN 50082-1

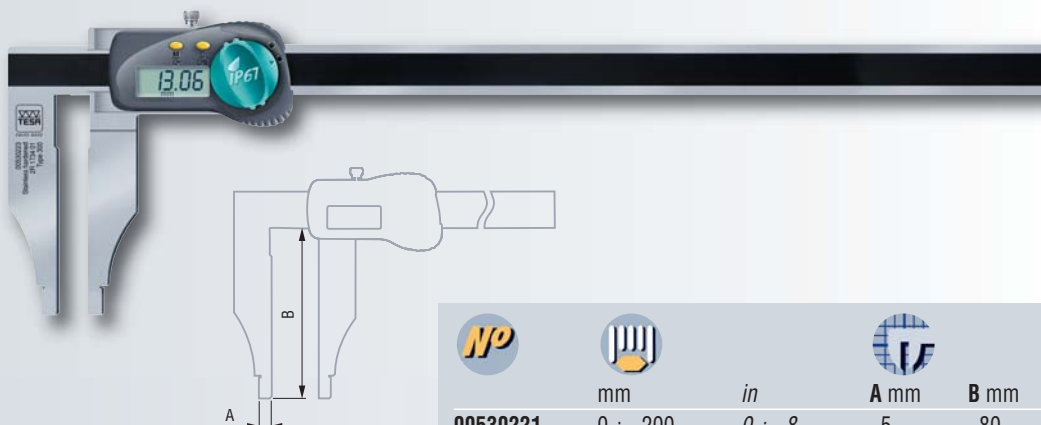
Wooden or  
plastic case  
depending on  
the model

Identification  
number

Inspection  
report with a  
declaration of  
conformity

## TESA IP67

Models with rounded measuring faces  
for internal dimensions



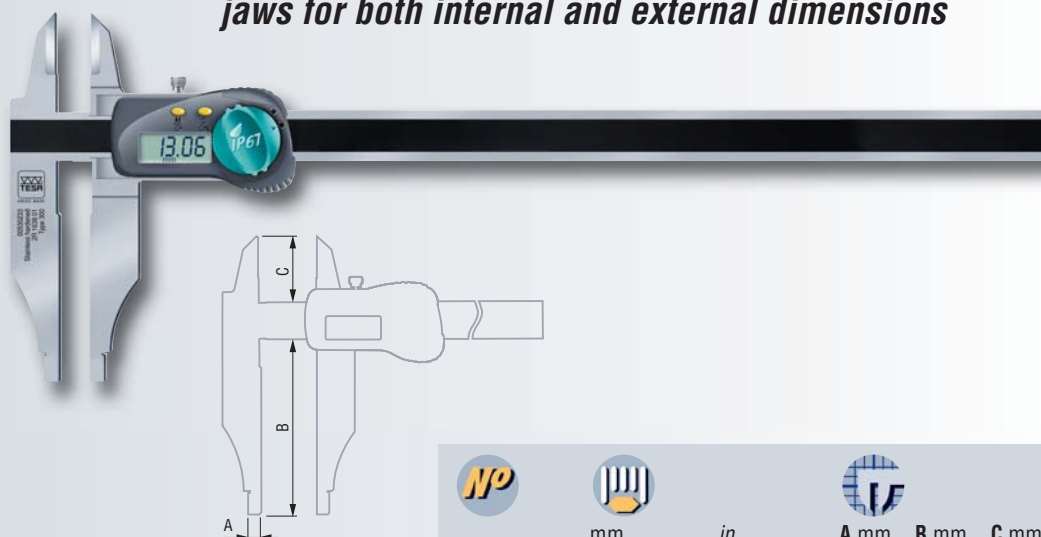
No	mm	in	A mm	B mm
00530221	0 ÷ 200	0 ÷ 8	5	80
00530222	0 ÷ 250	0 ÷ 10	5	80
00530223	0 ÷ 300	0 ÷ 12	5	90
00530224	0 ÷ 500	0 ÷ 20	10	150
00530225	0 ÷ 600	0 ÷ 24	10	150
00530226	0 ÷ 800	0 ÷ 32	10	150
00530227	0 ÷ 1000	0 ÷ 39	10	150

Optional Accessory

01961000	3V lithium battery, 190 mAh, type CR 2032
----------	---

For connecting cables, see section A

Models with rounded measuring faces and knife-edge  
jaws for both internal and external dimensions



No	mm	in	A mm	B mm	C mm
00530231	0 ÷ 200	0 ÷ 8	5	80	30
00530232	0 ÷ 250	0 ÷ 10	5	80	37
00530233	0 ÷ 300	0 ÷ 12	5	90	37
00530234	0 ÷ 500	0 ÷ 20	10	150	60
00530235	0 ÷ 600	0 ÷ 24	10	150	60
00530236	0 ÷ 800	0 ÷ 32	10	150	56
00530237	0 ÷ 1000	0 ÷ 39	10	150	56

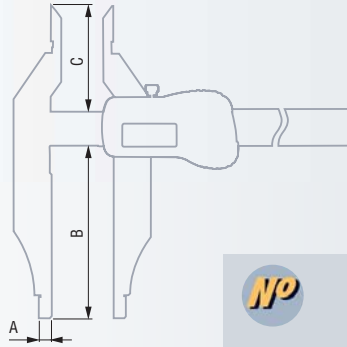
Optional Accessory

01961000	3V lithium battery, 190 mAh, type CR 2032
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For connecting cables, see section A



**Model with rounded measuring faces and knife-edge jaws for internal dimensions**

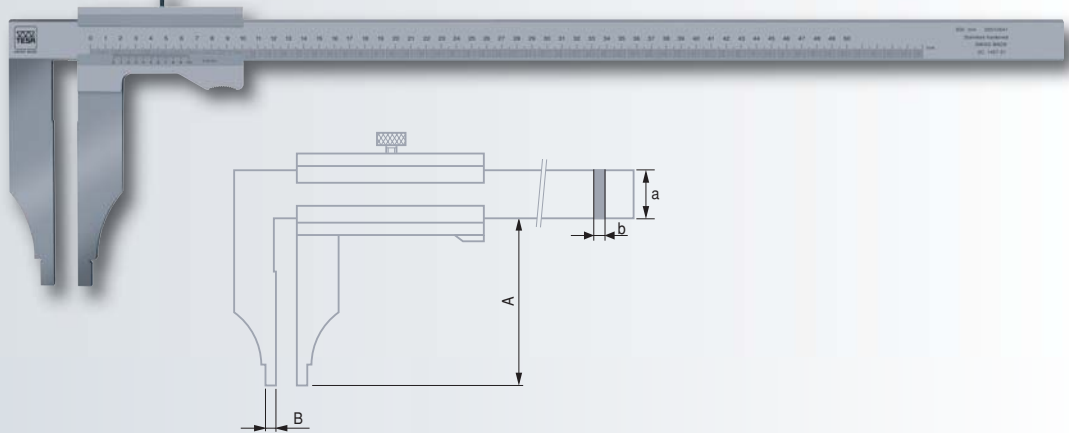


	mm	in	A mm	B mm	C mm
<b>00530230</b>	0 ÷ 250	0 ÷ 10	5	80	54
<i>Optional Accessory</i>					
<b>01961000</b>	3V lithium battery, 190 mAh, type CR 2032 For connecting cables, see section A				

- ✓
- DIN 862 (Style D-ZS)
- 0,01 mm  
0.0005 in
- LCD, 7 mm
- Floating zero
- Display lock
- mm / in conversion
- See page B-2
- Steel scale with incremental divisions, magnetic
- > 1,8 m / s
- RS232 opto-coupled, mono- and bi-directional
- Hardened stainless steel
- 3V lithium battery, CR 2032
- ≈ 1,5 a  
(≈ 2000 h / a)
- Idle mode after 10 min., automatic switch off after 2 h.
- 10°C to 40°C
- 10°C to 60°C
- 100%
- IP67 (IEC 60529)
- EN 50081-1  
EN 50082-1
- Wooden case or plastic case depending on the model
- Identification number
- Inspection report with a declaration of conformity

## Models with rounded measuring faces for internal dimensions

– Without fine adjust device



DIN 862  
(Style EN-2)  
NF E 11-091

Satin-chrome scale  
background;  
main scale  
slightly set back for  
wear protection

See page B-2

Hardened  
stainless steel

Wooden case or  
plastic case  
depending on  
the model

Identification  
number

Inspection report  
with a declaration  
of conformity

No	mm		in		mm		A	B
	mm	mm	in	in	a	b		
00510509*	0 ÷ 200	0,02	–	–	17	3,5	80	5
00530509	0 ÷ 200	0,02	0 ÷ 8	0.001	17	3,5	80	5
00510506	0 ÷ 200	0,05	–	–	17	3,5	80	5
00510511	0 ÷ 250	0,02	–	–	20	4	90	5
00510512	0 ÷ 250	0,05	–	–	20	4	90	5
00510521	0 ÷ 300	0,02	–	–	20	4	90	5
00530521	0 ÷ 300	0,02	0 ÷ 12	0.001	20	4	90	5
00510522	0 ÷ 300	0,05	–	–	20	4	90	5
00510531	0 ÷ 400	0,02	–	–	24,5	5	125	10
00530531	0 ÷ 400	0,02	0 ÷ 15	0.001	24,5	5	125	10
00510541	0 ÷ 500	0,02	–	–	28	6	150	10
00510542	0 ÷ 500	0,05	–	–	28	6	150	10
00510551	0 ÷ 600	0,02	–	–	28	6	150	10

*Optional Accessory*

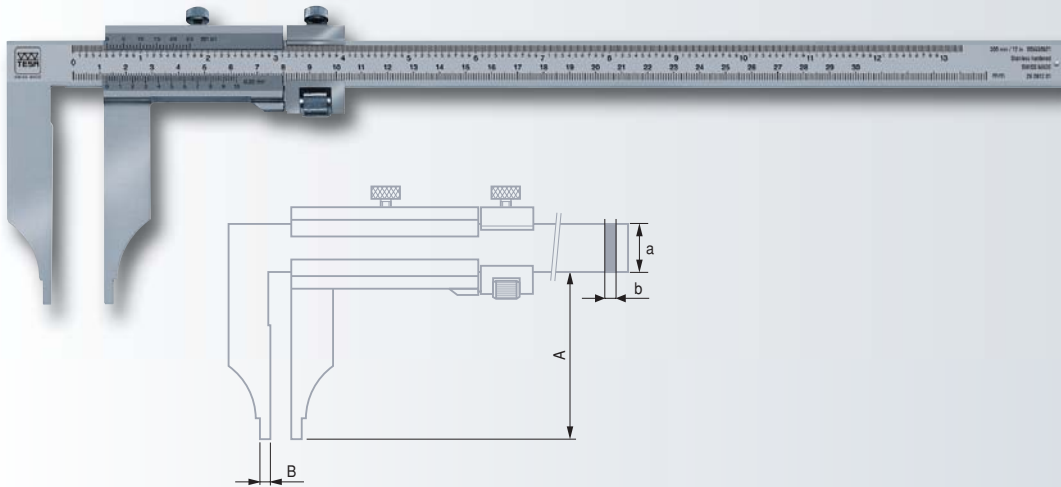
**0051610365** Magnetic magnifying glass, 3x magnification

\* Provided with a stainless steel rule No. 0951750181, 200 mm long.



## Models with rounded measuring faces for internal dimensions

– With fine adjust device



DIN 862  
(Style EN-2F)  
NF E 11-091



Satin-chrome  
scale background;  
main scale  
slightly set back for  
wear protection



See page B-2



Hardened  
stainless steel



Wooden case or  
plastic case  
depending on  
the model



Identification  
number



Inspection report  
with a declaration  
of conformity

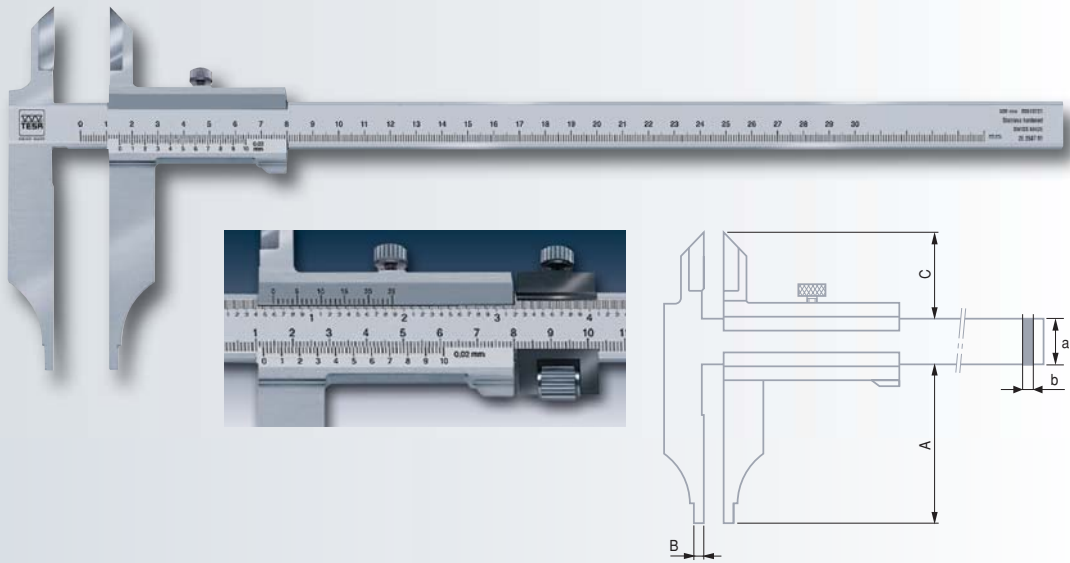
No					mm		A	B
					a	b		
00510601	0 ÷ 200	0,02	–	–	17	3,5	80	5
00510611	0 ÷ 250	0,02	–	–	20	4	90	5
00510621	0 ÷ 300	0,02	–	–	20	4	90	5
00510641	0 ÷ 500	0,02	–	–	28	6	150	10
00510651	0 ÷ 600	0,02	–	–	28	6	150	10
00510661	0 ÷ 800	0,02	–	–	32	8	150	10
00510671	0 ÷ 1000	0,02	–	–	32	8	150	10
00510681	0 ÷ 1500	0,02	–	–	40	8	300	15
00510691	0 ÷ 2000	0,02	–	–	40	8	300	15

*Optional Accessory*

0051610365	Magnetic magnifying glass, 3x magnification
------------	---

## Models with knife-edge jaws and rounded measuring faces for both external and internal dimensions

– With or without fine adjust device



DIN 862  
(Style BN-2)  
NF E 11-091

Satin-chrome  
scale background;  
main scale  
slightly set back for  
wear protection

See page B-2

Hardened  
stainless steel

Wooden case  
or plastic case  
depending on  
the model

Identification  
number

Inspection report  
with a declaration  
of conformity



mm

mm

mm

in

in

a

b

A

B

C

### Without fine adjust device

00510701	0 ÷ 200	0,02	–	–	17	3,5	80	5	30
00530701	0 ÷ 200	0,02	0 ÷ 8	0.001	17	3,5	80	5	30
00510711	0 ÷ 250	0,02	–	–	20	4	80	5	38
00510721	0 ÷ 300	0,02	–	–	20	4	90	5	38
00530721	0 ÷ 300	0,02	0 ÷ 12	0.001	20	4	90	5	38
00510722	0 ÷ 300	0,05	–	–	20	4	90	5	38
00510741	0 ÷ 500	0,02	–	–	28	6	150	10	60
00530741	0 ÷ 500	0,02	0 ÷ 20	0.001	28	6	150	10	60
00510751	0 ÷ 600	0,02	–	–	28	6	150	10	60

### With fine adjust device

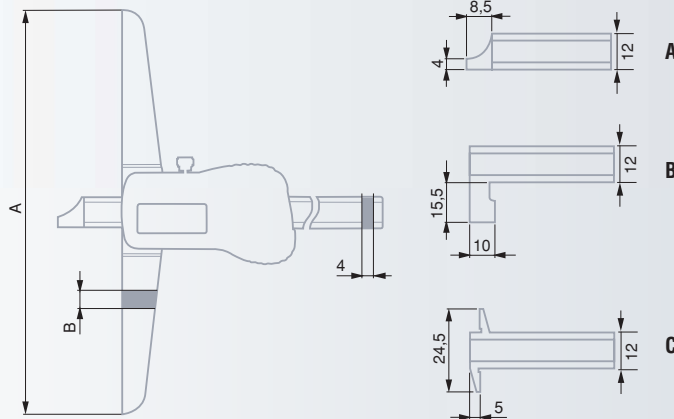
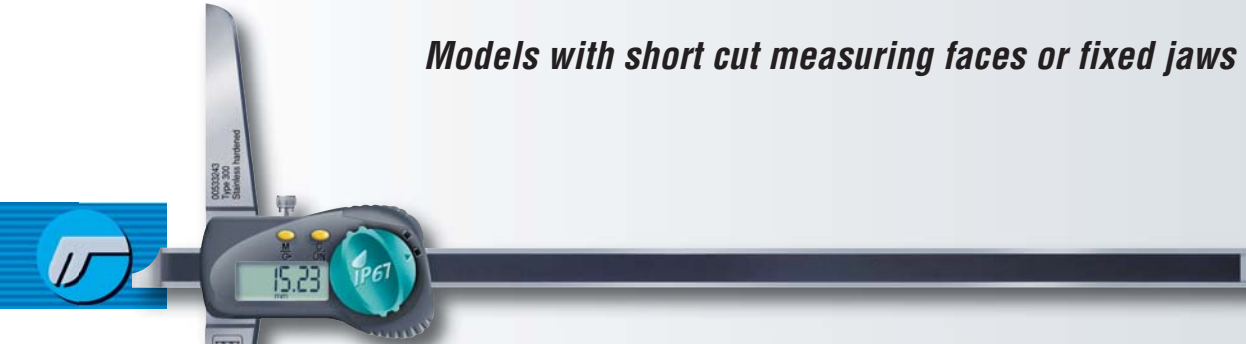
00510801	0 ÷ 200	0,02	–	–	17	3,5	80	5	30
00510821	0 ÷ 300	0,02	–	–	20	4	90	5	38
00530821	0 ÷ 300	0,02	0 ÷ 11	0.001	20	4	90	5	38
00510822	0 ÷ 300	0,05	–	–	20	4	90	5	38
00510841	0 ÷ 500	0,02	–	–	28	6	150	10	60
00530841	0 ÷ 500	0,02	0 ÷ 20	0.001	28	6	150	10	60
00510861	0 ÷ 800	0,02	–	–	32	8	150	10	56
00510871	0 ÷ 1000	0,02	–	–	32	8	150	10	56

### Optional Accessory

0051610365	Magnetic magnifying glass, 3x magnification
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## TESA IP67

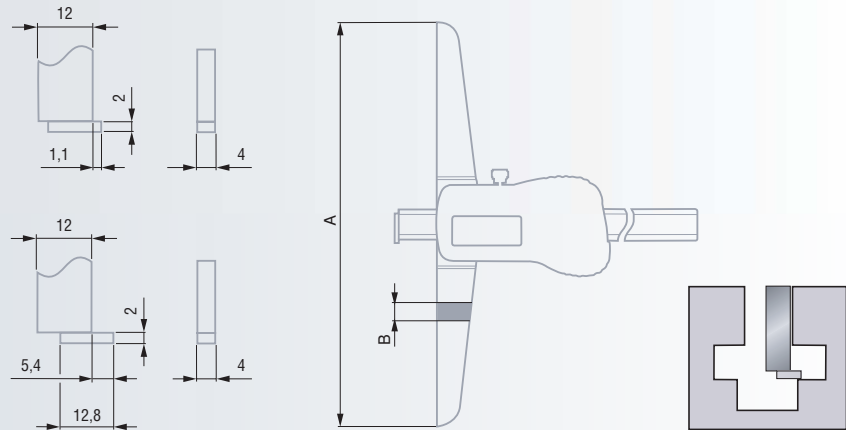
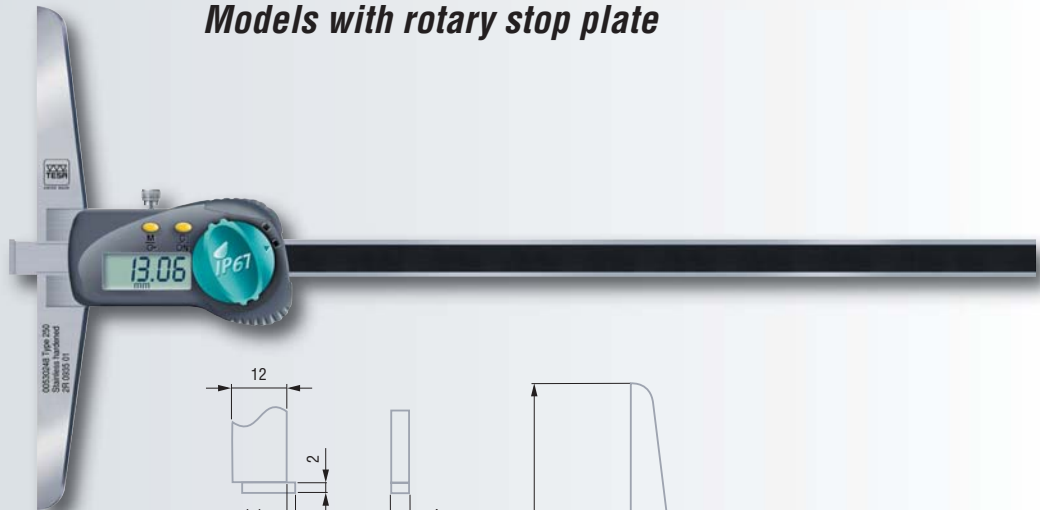
Models with short cut measuring faces or fixed jaws



No	mm		in		A mm	B mm
	mm	in	mm	in		
<b>Models A with a short cut measuring face</b>						
00530241	0 ÷ 200	0 ÷ 8	100	8		
00530242	0 ÷ 250	0 ÷ 10	100	8		
00530243	0 ÷ 300	0 ÷ 12	150	8		
00530244	0 ÷ 500	0 ÷ 20	150	8		
<b>Models B with one fixed jaw</b>						
00530245	0 ÷ 300	0 ÷ 12	150	8		
00530246	0 ÷ 500	0 ÷ 20	150	8		
<b>Models C with two fixed jaws</b>						
00530247	0 ÷ 300	0 ÷ 12	150	8		
<b>Optional Accessories</b>						
	200, 300 or 400 mm removable bridge (see page B-19)					
01961000	3V lithium battery, 190 mAh, type CR 2032 For connecting cables, see section A					

- ✓
- DIN 862 (Style C-ZS)
- See table
- 0,01 mm  
0.0005 in
- LCD, 7 mm
- Floating zero
- Display lock
- mm / in conversion
- See page B-2
- Glass scale with incremental divisions, magnetic
- > 1,8 m / s
- RS232 opto-coupled, mono- and bi-directional
- Hardened stainless steel
- 3V lithium battery, CR 2032
- ≈ 1,5 a  
(≈ 2000 h / a)
- Idle mode after 10 min., automatic switch off after 2 h.
- 10°C to 40°C
- 10°C to 60°C
- 100%
- IP67 (IEC 60529)
- EN 50081-1  
EN 50082-1
- Wooden case or plastic case depending on the model
- Identification number
- Inspection report with a declaration of conformity

Models with rotary stop plate

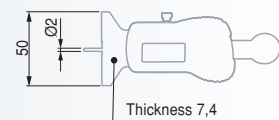


No	mm	in	A mm	B mm
00530248	0 ÷ 250	0 ÷ 10	150	8,5
00530249	0 ÷ 350	0 ÷ 14	150	8,5
00530250	0 ÷ 500	0 ÷ 20	150	8,5

Optional Accessories

	200, 300 or 400 mm removable bridge (also see page B-19)			
01961000	3V lithium battery, 190 mAh, type CR 2032			
	For connecting cables, see section A			

Small-sized caliper with measuring tip



No	mm	in
00530251	0 ÷ 25	0 ÷ 1

Optional Accessory

01961000	3V lithium battery, 190 mAh, type CR 2032	
	For connecting cables, see section A	



DIN 862 (Style C-ZS)

See table

0,01 mm / 0,0005 in

LCD, 7 mm

Floating zero

Display lock

mm / in conversion

See page B-2

Steel scale with incremental divisions, magnetic

> 1,8 m / s

RS232 opto-coupled, mono- and bi-directional

Hardened stainless steel

3V lithium battery, CR 2032

≈ 1,5 a (≈ 2000 h / a)

Idle mode after 10 min, automatic switch off after 2 h.

10°C to 40°C

-10°C to 60°C

100%

IP67 (IEC 60529)

EN 50081-1 / EN 50082-1

Wooden case or plastic case depending on the model

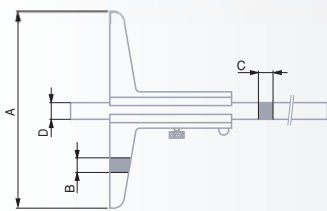
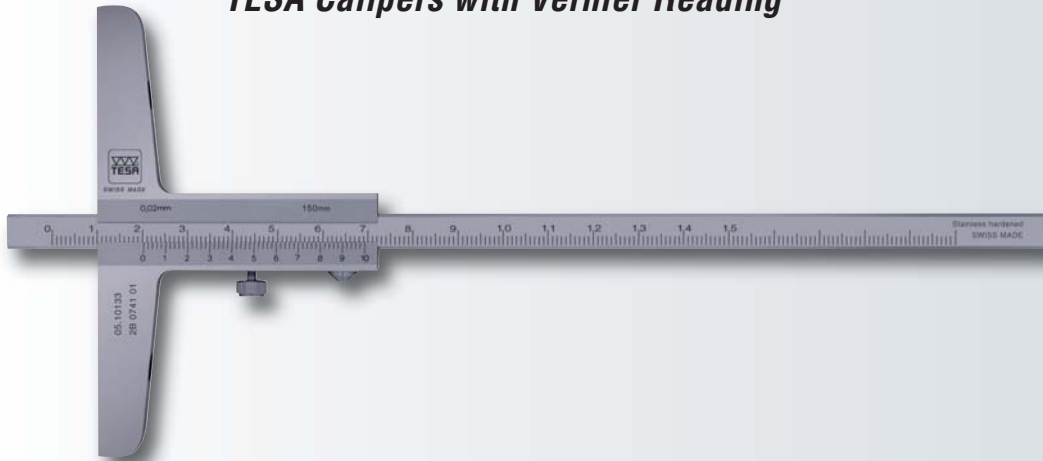
Identification number

Inspection report with a declaration of conformity

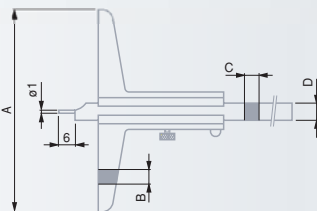




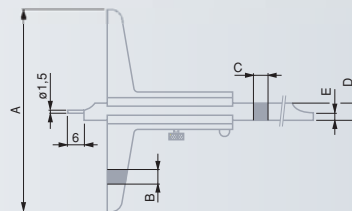
## TESA Calipers with Vernier Reading



A



B



C



DIN 862  
(Style C-2)  
NF E 11-096



Satin-chrome  
scale background;  
main scale  
slightly set back for  
wear protection



See page B-2



Hardened  
stainless steel



Plastic case



Identification  
number



Inspection report  
with a declaration  
of conformity



mm



mm



mm

A

B

C

D

E

### Models A with a flat measuring face

00510133	0 ÷ 150	0,02	100	7,5	3	8	–
00510134	0 ÷ 150	0,05	100	7,5	3	8	–
00510143	0 ÷ 250	0,02	100	7,5	3	8	–
00510144	0 ÷ 250	0,05	100	7,5	3	8	–
00510163	0 ÷ 500	0,02	100	8,5	4	12	–
00510164	0 ÷ 500	0,05	100	8,5	4	12	–
00510173	0 ÷ 600	0,02	150	8,5	4	12	–

### Model B with a steel tip

00510111*	0 ÷ 80	0,02	50	7,5	3	8	–
-----------	--------	------	----	-----	---	---	---

### Models C with both a short cut measuring face and steel tip. Convertible models

00510123	0 ÷ 150	0,02	100	7,5	3	8	3,5
00510124	0 ÷ 150	0,05	100	7,5	3	8	3,5
00510125	0 ÷ 250	0,02	100	7,5	3	8	4
00510126	0 ÷ 250	0,05	100	7,5	3	8	4

### Optional Accessories

0051610365	Magnetic magnifying glass, 3x magnification 200, 300 or 400 mm removable bridge (see page B-19)
------------	--

\* The removable bridges available as an option is not convenient for this model.



DIN 862  
(Style C-2)  
NF E 11-096

Satin-chrome  
scale background;  
main scale  
slightly set back for  
wear protection

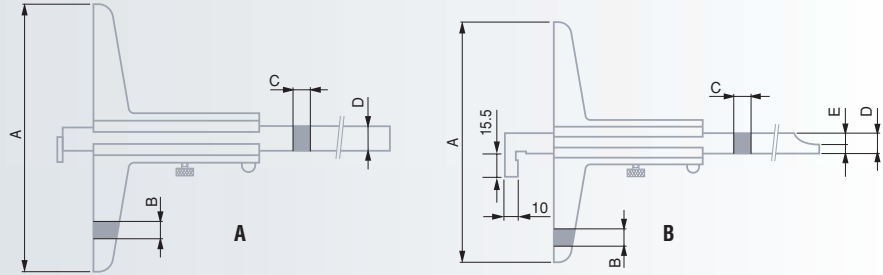
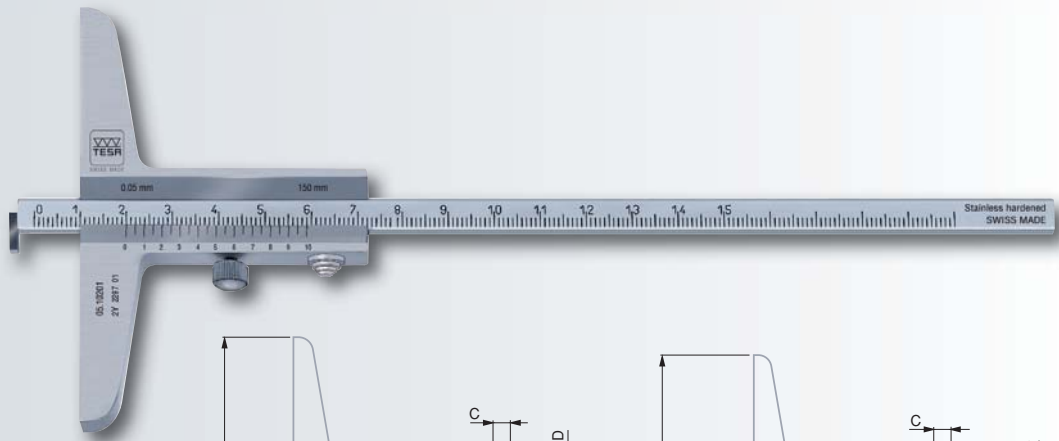
See page B-2

Hardened  
stainless steel

Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity



mm

### Models A with rotary stop plate

	mm	mm	A	B	C	D	E
00510202	0 ÷ 150	0,02	130	8,5	4	12	–
00510201	0 ÷ 150	0,05	130	8,5	4	12	–
00510212	0 ÷ 250	0,02	130	8,5	4	12	–
00510211	0 ÷ 250	0,05	130	8,5	4	12	–
00510222	0 ÷ 500	0,02	130	8,5	4	12	–

### Models B with both a fixed stop plate and short cut measuring face. Convertible models

00510175	0 ÷ 150	0,02	100	7,5	3	8	3,5
00510177	0 ÷ 250	0,02	130	8,5	4	12	4
00510179	0 ÷ 300	0,02	150	8,5	4	12	4
00510181	0 ÷ 500	0,02	150	8,5	4	12	4

### Optional Accessories

0051610365	Magnetic magnifying glass, 3x magnification 200, 300 or 400 mm removable bridge (see the table below)
------------	--

## Removable Bridge



		A mm	B mm	C mm	mm	mm	µm
00560103	Removable bridge	200	8	10	± 0,005	0,02	8
00560104	Removable bridge	300	8	16	± 0,005	0,02	10
00560105	Removable bridge	400	8	16	± 0,005	0,03	10

Each bridge comes with suited attachment.



Factory  
standard

See table

Suited  
carrying case

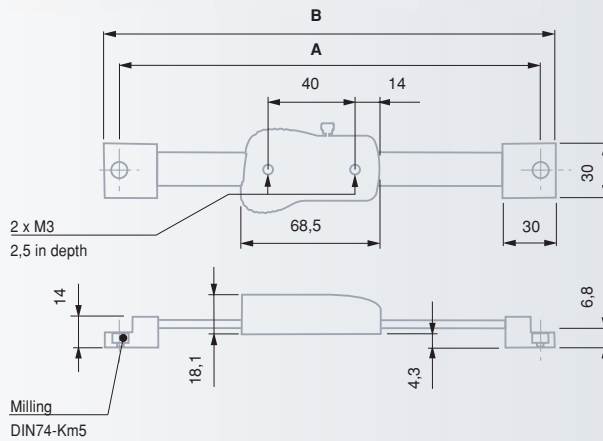
Identification  
number

Inspection report  
with a declaration  
of conformity



## Horizontal or Vertical Scale Unit

Lets you measure and position any assembly on fixtures, presetting devices for tooling or machines. Flexible mounting for use in any position.



No	Scale		A mm	B mm
	mm	in		
00530271	0 ÷ 150	0 ÷ 6	265	278
00530273	0 ÷ 300	0 ÷ 12	415	428
00530274	0 ÷ 600	0 ÷ 24	725	738
00530275	0 ÷ 1000	0 ÷ 40	1135	1148

*Optional Accessory*

01961000	3V lithium battery, 190 mAh, type CR 2032
	For connecting cables, see section A

- ✓
- Factory standard
- See table
- 0,01 mm  
0.0005 in
- LCD, 7 mm
- Floating zero
- Display lock
- mm / in conversion
- See page B-2
- Steel scale with incremental divisions, magnetic
- > 1,8 m / s
- RS232 opto-coupled, mono- and bi-directional
- Hardened stainless steel
- 3V lithium battery, CR 2032
- ≈ 1,5 a  
(≈ 2000 h / a)
- Idle mode after 10 min., automatic switch off after 2 h.
- 10°C to 40°C
- 10°C to 60°C
- 100%
- IP67 (IEC 60529)
- EN 50081-1  
EN 50082-1
- Suited carrying case
- Identification number
- Inspection report with a declaration of conformity



Factory standard

Satin-chrome scale background; main scale slightly set back for wear protection.

Hardened stainless steel

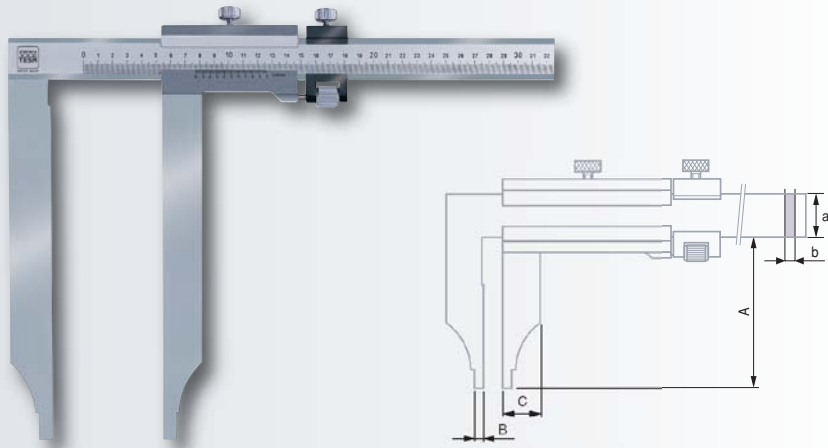
Wooden case

Identification number

Inspection report with a declaration of conformity

## TESA Calipers

– With extra long jaws and fine adjust device



No	mm	mm	mm		A	B	C
			a	b			
00510921	0 ÷ 500	0,02	28	6	250	10	30
00510922	0 ÷ 500	0,05	28	6	250	10	30
00510941	0 ÷ 1000	0,02	32	8	300	10	30
00510942	0 ÷ 1000	0,05	32	8	300	10	30

*Optional Accessory*  
**0051610365** Magnetic magnifying glass, 3x magnification



NF E 11-096

Satin-chrome scale background; main scale slightly set back for wear protection.

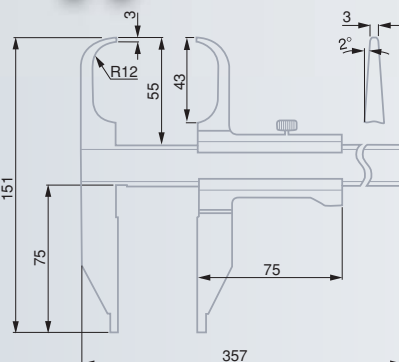
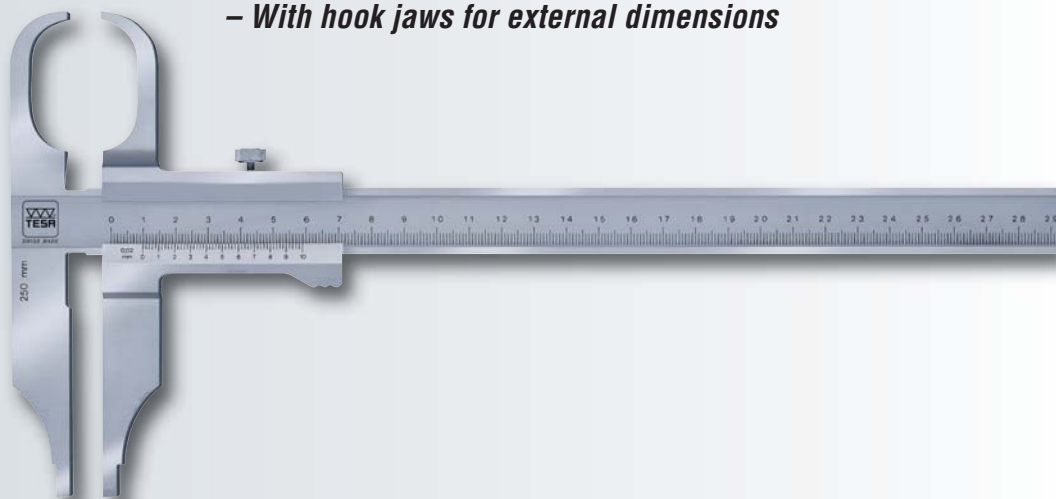
Hardened stainless steel

Wooden case

Identification number

Declaration of conformity

– With hook jaws for external dimensions

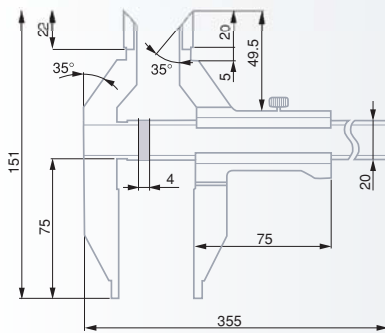
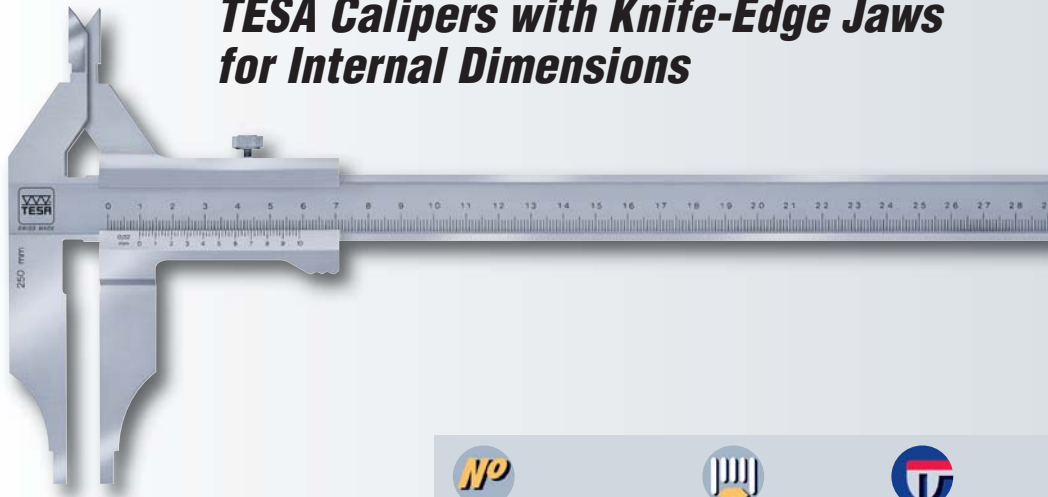


No	mm	mm

*Optional Accessory*  
**0051610365** Magnetic magnifying glass, 3x magnification



## TESA Calipers with Knife-Edge Jaws for Internal Dimensions



00510915



0 ÷ 250



0,02

Optional Accessory

0051610365 Magnetic magnifying glass, 3x magnification



DIN 862 (Style DN-2) NF E 11-091



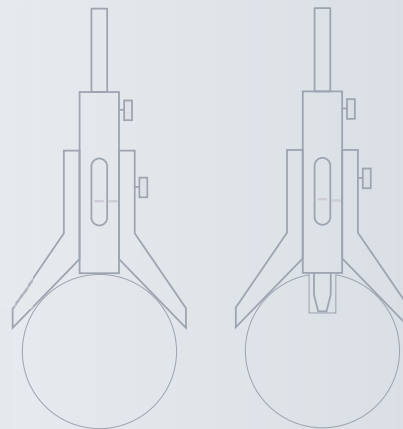
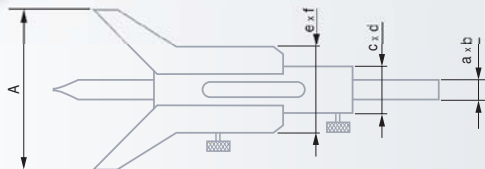
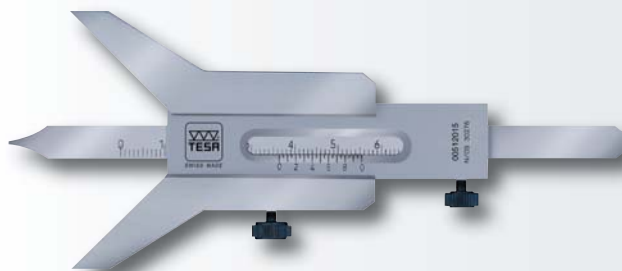
Satin-chrome scale background; main scale slightly set back for wear protection.



Identification number  
Inspection report with a declaration of conformity

## TESA Calipers with Vee Bridge

Made to measure groove and slot depths on cylindrical shafts.



NF E 11-096



Satin-chrome scale background; main scale slightly set back for wear protection.



Identification number  
Inspection report with a declaration of conformity



00512015



5 ÷ 80



0,05



a

mm

b

c

d

e

f

A

00512015 5 ÷ 80 0,05 8 2 18 5 32 10 60

00512016 6 ÷ 120 0,05 8 2 18 5 34 10 90

00512017 7 ÷ 160 0,05 10 2 21,5 5 42 10 120

Optional Accessory

0051610365 Magnetic magnifying glass, 3x magnification



Factory standard

Satin-chrome scale background; main scale slightly set back for wear protection.

Hardened stainless steel

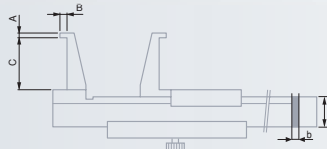
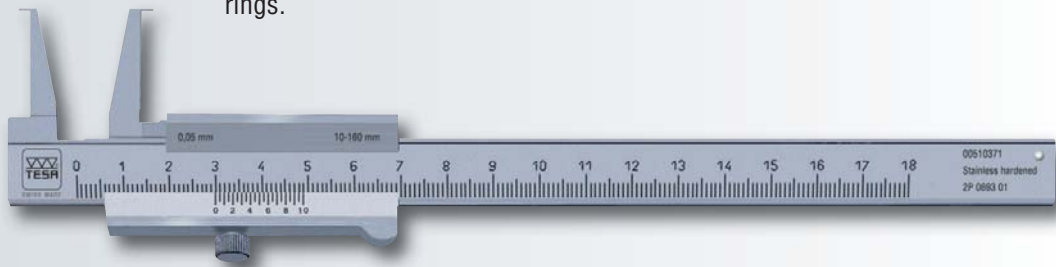
Wooden case

Identification number

Inspection report with a declaration of conformity

## TESA Calipers for Turned Grooves

Specially designed for measuring groove or slot diameters, e.g. on safety rings.



mm

	mm	mm	a	b	A	B	C
00510371	10 ÷ 160	0,05	16	3	0,9	3	25
00510375	20 ÷ 160	0,05	16	3	2	5	40
00510383	26 ÷ 200	0,02	16	3	3	7	60
00510385	26 ÷ 200	0,05	16	3	3	7	60
00510387	30 ÷ 250	0,02	20	4	4	8,5	80
00510393	35 ÷ 300	0,02	20	4	5	10	100

Optional Accessory

0051610365 Magnetic magnifying glass, 3x magnification



Factory standard

Each slider with fine adjust device

Hardened stainless steel. Tungsten carbide coated measuring faces

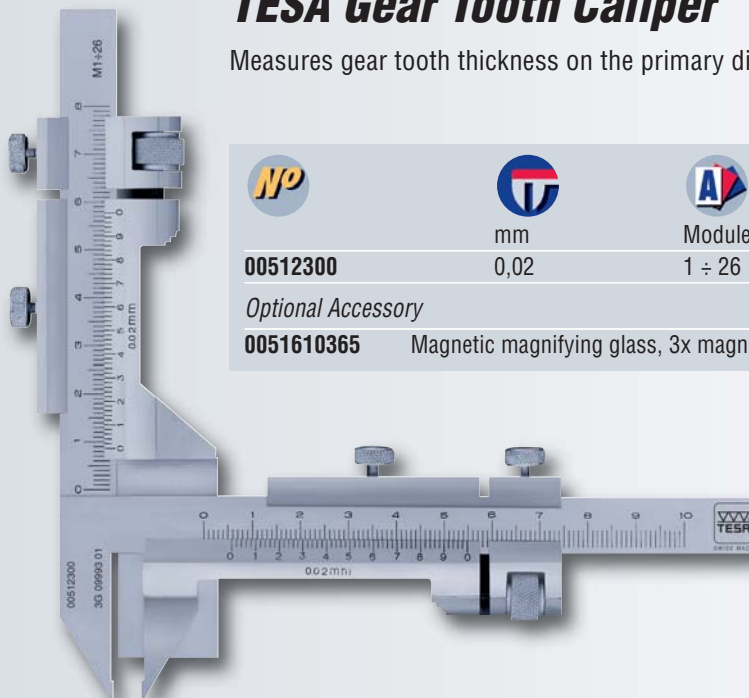
Wooden case

Identification number

Declaration of conformity

## TESA Gear Tooth Caliper

Measures gear tooth thickness on the primary diameter.



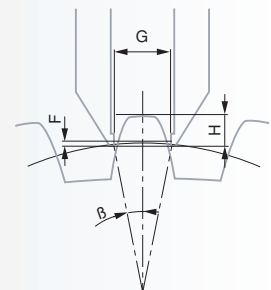
mm

Module

00512300	0,02	1 ÷ 26
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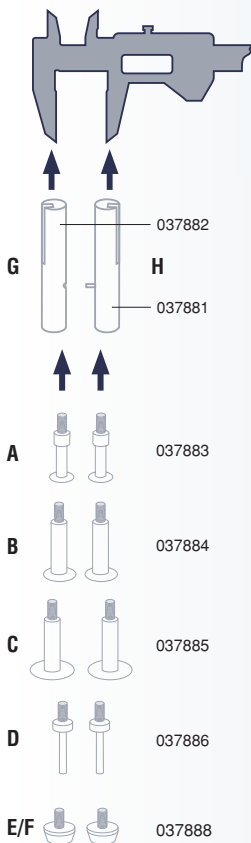
Optional Accessory

0051610365 Magnetic magnifying glass, 3x magnification



## Brown & Sharpe Accessory Sets CENTERLINE

Each set includes practical accessories for measuring undercuts, grooves, slots, centre distances of bores, etc. – Fits all calipers with analogue or digital indication covering the measuring range 0 to 150 mm or 0 to 6 in.



mm

mm

### CENTERLINE Accessory Sets

- 06769001** Full accessory set provided in a custom wooden case
- 06739000** Full accessory set provided in a fitted wooden case including one TESA Shop-Cal mit capa  $\mu$  system (No. 00530090)
- 06769008** Full accessory set in a fitted wooden case. Includes a free space arranging for a caliper covering the measuring range 0 to 150 mm / 0 to 6 in to be stored (must be ordered separately).

### Complete Sets Including:

<b>A</b>	1 Pair of disc-shaped measuring inserts	6	0,8
<b>B</b>	1 Pair of disc-shaped measuring inserts	10	0,8
<b>C</b>	1 Pair of disc-shaped measuring insert	12,5	0,8
<b>D</b>	1 Pair of cylindrical measuring inserts	1,5	9,5
<b>E</b>	1 Pair of cone-shaped measuring inserts	9	60°
<b>F</b>	1 Pair of cone-shaped measuring inserts	12,5	60°
<b>G</b>	1 Insert-holder (left)		
<b>H</b>	1 Insert-holder (right)		
	1 Socket head key		1,2



Steel with black oxide plating



Inserts with M2,5 threaded coupling.

Lowest centre distance of the mounted insert holder: 10 mm.

## Depth Measuring Foot

For use with TESA or ETALON universal calipers with measuring ranges from 0 to 150 mm/0 to 6 in as listed on pages B-3 to B-8.



mm

**00560013**

75 x 6



Factory standard



Hardened stainless steel



Ground measuring face

# External Measurement





# PRECISION MEASUREMENT

Precision measurement requires the use of micrometers. In 1848, the first measuring tool of this type was patented by the French inventor Jean Laurent Palmer as «calibre à vis et à vernier circulaire» (screw calliper with a circular vernier). Today, we continue to make external micrometers with these typical features.

The introduction of the micrometer to the mechanical world came about by the visit of the two american engineers Joseph R. Brown and Lucian Sharpe to the Paris Exhibition in 1867. At that time, their attention was called to the Palmer's invention, which greatly interested them. After some improvements of the Palmer design, the product was manufactured on a large scale and marketed successfully by the two partners.

The story repeated in the past as TESA SA decided to manufacture external micrometers making them the first products produced by the company.

Yet no matter what you measure – internal or external dimensions – all TESA and ETALON micrometers are world-class products in design and quality.





With a very few exceptions (e.g. external micrometers for gear tooth measurements), our micrometers respect the Abbe principle, i.e. the comparator's one (also read in the General Information). Their spindle are ground on modern grinding machines and the profile of the screw is accurately restored with negligible pitch deviations. Such manufacturing conditions are the guarantee for very low measurement uncertainties.

The micrometers of both TESA and ETALON premium brands are robust with ergonomic design.

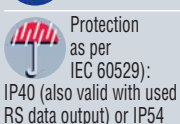
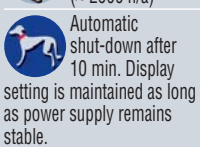
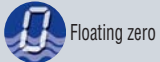
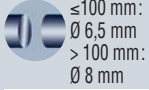
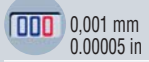
Besides external micrometers in standard or special versions, we also offer micrometer heads, depth micrometers, full micrometer sets as well as a wide number of accessories plus all what you need for your calibrations. Each model provides either an analogue or a digital indication according to the execution. The models with electrical measuring system also include an RS 232 digital interface.



## Max. permissible errors

 Measuring range/mm	 Max. perm. errors*/µm	 Number of interference fringes or rings	 µm
0 ÷ 25	4	6	2
25 ÷ 50	4	6	2
50 ÷ 75	5	10	3
75 ÷ 100	5	10	3
100 ÷ 125	6		3
125 ÷ 150	6		3
150 ÷ 175	7		4
175 ÷ 200	7		4
200 ÷ 225	8		4
225 ÷ 250	8		4
250 ÷ 275	9		5
275 ÷ 300	9		5
300 ÷ 325	10		5
325 ÷ 350	10		5
350 ÷ 375	11		6
375 ÷ 400	11		6
400 ÷ 425	12		6
425 ÷ 450	12		6
450 ÷ 475	13		7
475 ÷ 500	13		7

\* The max. perm. errors include the errors of the measuring element as well as any deviations in flatness and parallelism of the measuring faces plus the errors due to the flexure of the frame.



# TESA MICROMASTER

## Electronic Micrometers with Digital Display



With patented TESA capa μ system

- Measuring span of 30 mm or 25 mm.
- Large easy-to-read digital display.
- Models:
  - EASY with a single function key.
  - IP54 with water spray protection as well as IP54 RS with added RS 232 interface.



### MICROMASTER EASY

<b>06030010</b>	0 ÷ 30	0 ÷ 30	0 ÷ 1.2	0 ÷ 1.2	IP40	–
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### MICROMASTER IP54

<b>06030020</b>	0 ÷ 30	0 ÷ 30	0 ÷ 1.2	0 ÷ 1.2	IP54	–
<b>06030021</b>	25 ÷ 50	23 ÷ 53	1 ÷ 2	0.9 ÷ 2.1	IP54	–
<b>06030022</b>	50 ÷ 75	48 ÷ 78	2 ÷ 3	1.9 ÷ 3.1	IP54	–
<b>06030023</b>	75 ÷ 100	74 ÷ 104	3 ÷ 4	2.9 ÷ 4.1	IP54	–

### MICROMASTER IP54 RS

<b>06030030</b>	0 ÷ 30	0 ÷ 30	0 ÷ 1.2	0 ÷ 1.2	IP54	RS 232
<b>06030031</b>	25 ÷ 50	23 ÷ 53	1 ÷ 2	0.9 ÷ 2.1	IP54	RS 232
<b>06030032</b>	50 ÷ 75	48 ÷ 78	2 ÷ 3	1.9 ÷ 3.1	IP54	RS 232
<b>06030033</b>	75 ÷ 100	74 ÷ 104	3 ÷ 4	2.9 ÷ 4.1	IP54	RS 232
<b>06030071</b>	100 ÷ 125	98 ÷ 127	4 ÷ 5	3.9 ÷ 5.01	IP54	RS 232
<b>06030072</b>	125 ÷ 150	123 ÷ 152	5 ÷ 6	4.9 ÷ 6.01	IP54	RS 232
<b>06030073</b>	150 ÷ 175	149 ÷ 178	6 ÷ 7	5.9 ÷ 7.01	IP54	RS 232
<b>06030074</b>	175 ÷ 200	174 ÷ 203	7 ÷ 8	6.9 ÷ 8.01	IP54	RS 232
<b>06030075</b>	200 ÷ 225	199 ÷ 229	8 ÷ 9	7.9 ÷ 9.01	IP54	RS 232
<b>06030076</b>	225 ÷ 250	224 ÷ 254	9 ÷ 10	8.9 ÷ 10.01	IP54	RS 232
<b>06030077</b>	250 ÷ 275	250 ÷ 279	10 ÷ 11	9.9 ÷ 11.01	IP54	RS 232
<b>06030078</b>	275 ÷ 300	275 ÷ 304	11 ÷ 12	10.9 ÷ 12.01	IP54	RS 232

### MICROMASTER Set



<b>06030029</b>	Micromaster Set IP54 RS	0 ÷ 75
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### Consisting of:



<b>06030030</b>	Micromaster IP54, RS	0 ÷ 30	IP54	RS232
<b>06030031</b>	Micromaster IP54, RS	25 ÷ 50	IP54	RS232
<b>06030032</b>	Micromaster IP54, RS	50 ÷ 75	IP54	RS232
<b>02119021</b>	Setting standard, 50 mm			

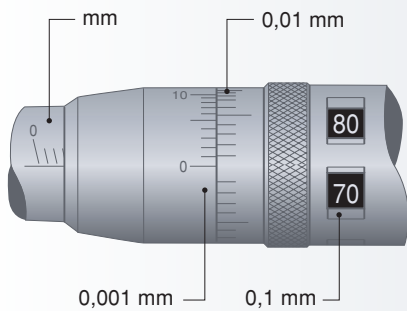
### Optional Accessory

<b>01961000</b>	1 Lithium battery 3 V, 190 mAh, type CR 2032 – Connecting cables etc., see chapter A.
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## TESAMASTER Precision Micrometers with Digital Counter to 0,1 mm

Analogue indication of the full millimetres, hundredths and fractions of hundredth – Accurate, fast reading of the tenths of millimetres – Parallax-free reading of the thousandths of millimetres on vernier.



No	mm	µm	
		µm	µm
00310001	0 ÷ 25	2	1
00310002	25 ÷ 50	2	1,5
00310003	50 ÷ 75	3	1,5
00310004	75 ÷ 100	3	1,5
00310005	100 ÷ 125	4	2
00310006	125 ÷ 150	4	2,5
00310007	150 ÷ 175	5	3
00310008	175 ÷ 200	5	3
00310009	200 ÷ 225	6	3,5
00310010	225 ÷ 250	6	3,5

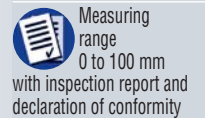
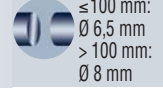
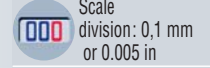
No	in	µm	
		µm	µm
00320001	0 ÷ 1	2	1

## ETALON MICRORAPID 226 with 1 mm Revolution

High precision micrometers – Fast, accurate reading – No reading error of the half millimetres – Barrel with pitch to 1 mm – Thimble with 100 graduations – Vernier reading to 0,001 mm.



No	mm	µm	
		µm	µm
072116406	0 ÷ 25	2	1
072116407	25 ÷ 50	2	1,5
072116408	50 ÷ 75	3	1,5
072116409	75 ÷ 100	3	1,5





DIN 863 T1  
NF E 11-095

0 to 100 mm  
resp. 0 to 4 in  
with vernier

Tungsten carbide  
tipped

≤ 100 mm:  
Ø 6,5 mm,  
> 100 ≤ 200 mm:  
Ø 8 mm

0,5 mm

Max. 10 N

Plastic case

Identification  
number

Measuring  
range  
0 to 100 mm  
with inspection report and  
declaration of conformity

Measuring  
range smaller  
than 100 mm  
with a declaration of  
conformity

## ETALON 260 Standard Models with Analogue Indication

The knurled sleeve only needs to be reversed to render the friction drive built into the thimble inactive.



No	mm	mm	µm	µm
071115887	0 ÷ 25	0,002	2	2
071115888	25 ÷ 50	0,002	2	2
071115889	50 ÷ 75	0,002	3	3
071115890	75 ÷ 100	0,002	3	3
071115891	100 ÷ 125	0,01	4	3
071115892	125 ÷ 150	0,01	4	3
071115893	150 ÷ 175	0,01	5	4
071115894	175 ÷ 200	0,01	5	4

No	in	in	µm	µm
071115899	0 ÷ 1	0.0001	2	2
071115900	1 ÷ 2	0.0001	2	2
071115901	2 ÷ 3	0.0001	3	3
071115902	3 ÷ 4	0.0001	3	3



DIN 863 T1  
NF E 11-095

0,01 mm

Tungsten carbide  
tipped

Ø 6,5 mm

0,5 mm

Max. 10 N

Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity

## ETALON Basic to 0,01 mm



No	mm
00119046	0 ÷ 25
00119047	25 ÷ 50
00119048	50 ÷ 75
00119049	75 ÷ 100

No	mm
00119050	0 ÷ 100

## Set of 4 ETALON Basic to 0,01 mm



## TESA ISOMASTER Standard Models with Analogue Indication

Slanted full millimetres on the barrel are set apart from the straight half millimetres to virtually eliminate reading errors.

The knurled sleeve needs only be reversed to render the friction drive built into the thimble inactive.



No	mm	mm
00110101	0 ÷ 25	0,01
00110102	25 ÷ 50	0,01
00110103	50 ÷ 75	0,01
00110104	75 ÷ 100	0,01
00110105	100 ÷ 125	0,01
00110106	125 ÷ 150	0,01
00110107	150 ÷ 175	0,01
00110108	175 ÷ 200	0,01
00110109	200 ÷ 225	0,01
00110110	225 ÷ 250	0,01
00110111	250 ÷ 275	0,01
00110112	275 ÷ 300	0,01
	<i>in</i>	<i>in</i>
00120101	0 ÷ 1	0.0001

- ✓
- DIN 863 T1  
NF E 11-095
- Tungsten carbide tipped
- ≤ 100 mm:  
Ø 6,5 mm  
> 100 ≤ 300 mm:  
Ø 8 mm
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Measuring range  
0 to 100 mm  
with inspection report and  
declaration of conformity
- Measuring range smaller  
than 100 mm  
with a declaration of  
conformity

## Set of 4 TESA ISOMASTER

Same execution as above.

The models covering the application range 0 to 100 mm provide the quality that you need at competitive prices.



No	mm
00110113	0 ÷ 100

- ✓
- Plastic case



DIN 863 T3  
(Style D16)

0,001 mm  
0.00005 in

Metric/Inch  
conversion

30 mm  
measuring span

0 ≤ 500 mm:  
malleable  
cast iron.  
> 500 ≤ 1000 mm:  
steel tube with insulating  
grips. Max. flexure of the  
frame under a measuring  
force of 10 N: see the table  
opposite

Tungsten carbide  
tipped

Ø 8 mm

0,5 mm

Max. 10 N

LCD, digit height:  
7 mm

RS 232

Additional  
technical data:  
see page C-3

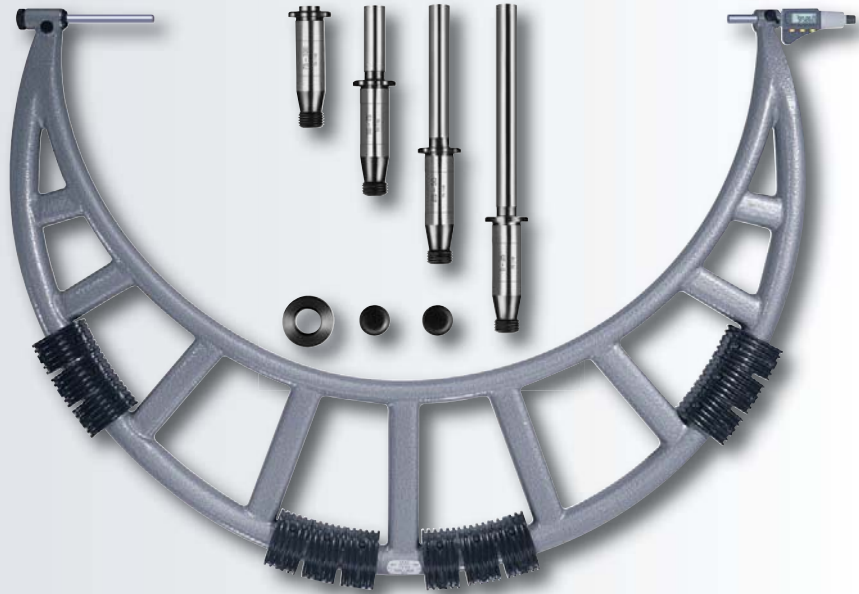
Wooden case

Identification  
number

Inspection report  
with a declaration  
of conformity

## MICROMASTER with interchangeable Anvils

All sets include 4 interchangeable anvils with increasing length in steps of 25 mm. Anvils are adjusted (and numbered) in sets, thus rendering the correction of the indication unnecessary whenever an anvil is exchanged.



No	mm	in	μm	μm
06030047	0 ÷ 100	0 ÷ 3.94	6	3
06030048	100 ÷ 200	3.94 ÷ 7.87	7	4,5
06030049	200 ÷ 300	7.87 ÷ 11.81	8	7
06030050	300 ÷ 400	11.81 ÷ 15.75	9	9
06030051	400 ÷ 500	15.75 ÷ 19.69	10	9
06030052	500 ÷ 600	19.69 ÷ 23.62	11	9
06030053	600 ÷ 700	23.62 ÷ 27.56	12	10
06030054	700 ÷ 800	27.56 ÷ 31.50	13	12
06030055	800 ÷ 900	31.50 ÷ 35.43	14	12
06030056	900 ÷ 1000	35.43 ÷ 39.37	15	16

Measuring range up to 1500 mm also available upon request.

### Dial Gauge Element for MICROMASTER

Can replace the interchangeable anvils on AB series micrometers. Make finding the culmination point easier. Ensures a constant measuring force.

Supplied as standard accessory with the ABY series micrometers.



See next page

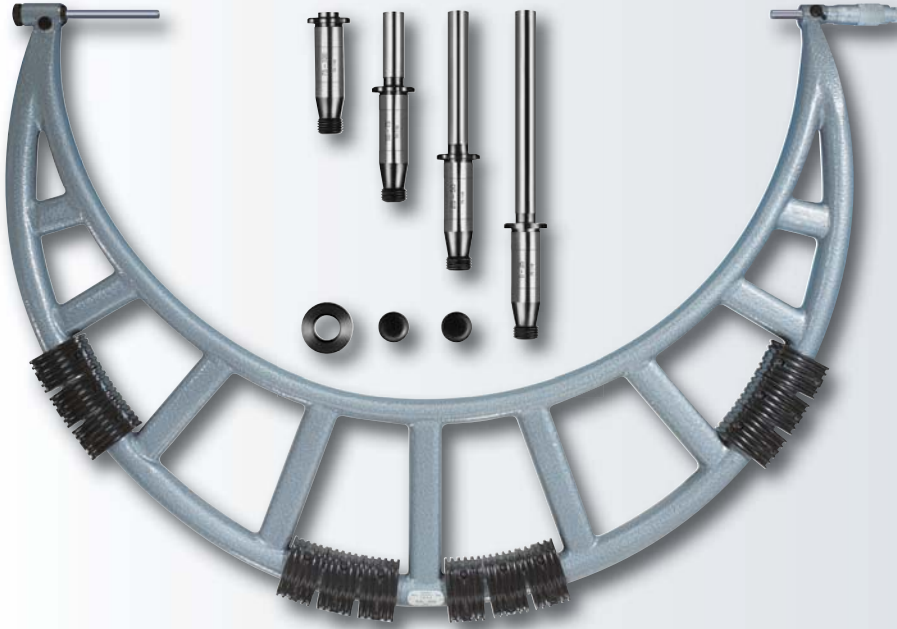
No

00140301



## ISOMASTER AB with interchangeable Anvils

Lightweight, but rugged anvil micrometers. Set No. 00140101 includes 4 interchangeable anvils with increasing length in steps of 25 mm. Anvils are adjusted (and numbered) in pairs, thus rendering any correction of the indication unnecessary whenever an anvil is exchanged.



No	 mm	 $\mu\text{m}$	 $\mu\text{m}$
00111901	0 ÷ 100	6	3
00111902	100 ÷ 200	7	4,5
00111903	200 ÷ 300	8	7
00111904	300 ÷ 400	9	9
00111905	400 ÷ 500	10	9
00111906	500 ÷ 600	11	9
00111907	600 ÷ 700	12	10
00111908	700 ÷ 800	13	12
00111909	800 ÷ 900	14	12
00111910	900 ÷ 1000	15	16












Measuring range up to 1500 mm also available upon request.

### Dial Gauge Element for AB Series Micrometers

Can replace the interchangeable anvils on these micrometers. Make finding the culmination point easier. Ensures a constant measuring force. Supplied as standard accessory with the ABY series micrometers.

**No**  
00140301



-  ✓
-  DIN 863 T3 (Style D16) NF E 11-090
-  0,01 mm
-  0 ≤ 500 mm: malleable cast iron; 500 ≤ 1000 mm: steel tube with insulating grips. Max. flexure of the frame under a measuring force of 10 N: see the table opposite
-  Tungsten carbide tipped
-  8 mm dia.
-  0,5 mm
-  Max. 10 N
-  Wooden case
-  Identification number
-  Declaration of conformity

-  ✓
-  ± 1,5 mm
-  0,01 mm
-  Tungsten carbide tipped
-  8 mm dia.
-  Max. 10 N
-  Meas. element: 11 mm dia., 100 mm long. Dial gauge No. 01410211: 40 mm dial diameter, two-way dial reading.
-  Identification number
-  With dial gauge and clamp
-  Declaration of conformity



DIN 863 T3  
(Style D15)  
NF E 11-090

0,01 mm

0 ≤ 500 mm: malleable cast iron;  
> 500 ≤ 800 mm: steel tube with insulating grips.  
Max. flexure of the frame under a measuring force of 10 N: see the table opposite

Tungsten carbide tipped

8 mm dia.

0,5 mm

Max. 10 N

Dial gauge: see on page C-8

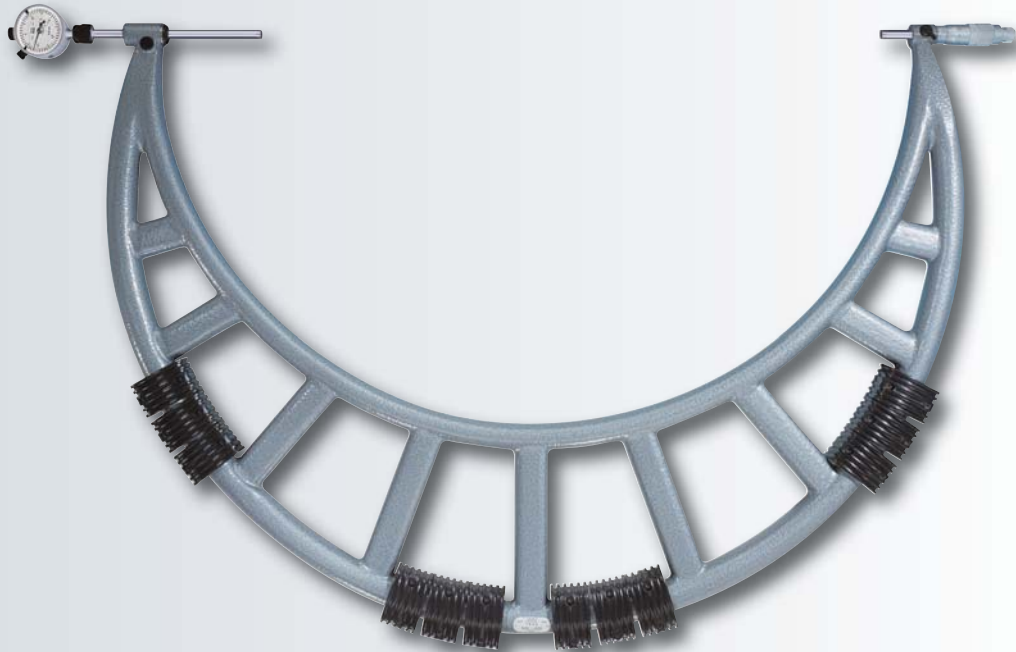
Wooden case

Identification number

Declaration of conformity

## Series ABY ISOMASTER with Adjustable Dial Gauge Element

Similar to the AB series micrometers, but equipped with the adjustable dial gauge element No. 00140301 that helps you to find the culmination point easier with a constant measuring force.



No	mm	μm	μm
00112001	0 ÷ 100	6	3
00112002	100 ÷ 200	7	4,5
00112003	200 ÷ 300	8	7
00112004	300 ÷ 400	9	9
00112005	400 ÷ 500	10	9
00112006	500 ÷ 600	11	9
00112007	600 ÷ 700	12	10
00112008	700 ÷ 800	13	12

Measuring range up to 1500 mm also available upon request.



DIN 863 T3  
(Style D16)  
NF E 11-090

Tungsten carbide tipped

8 mm dia.

Set includes 2 guard plates for the frame as well as 1 clamping nut

Identification number

## Interchangeable Anvils for ABY Series ISOMASTER

Set of 4 interchangeable anvils with increasing length in steps of 25 mm. The anvils are adjusted and numbered in pairs, thus eliminating the need for resetting the indication when exchanging either of them.

Supplied as standard accessories with the AB series micrometers.

No  
00140101

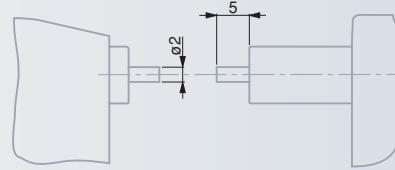




# MICRO-ETALON 225

## Micrometers with a Dial Indicator

Feature a mobile anvil along with a built-in dial indicator – Ideal for comparative measurements on small part series – Nominal dimension is set on the micrometer while deviations are read on the dial indicator – Retractable anvil by means of a push-button – Rotating dial for fine adjustment, also with adjustable tolerance markers.



DIN 863 T3  
(Style D13)

Tungsten carbide tipped

6,5 mm dia.  
Model with small measuring faces:  
2 mm dia., 5 mm long.

0,5 mm

Anvil:  
4,5 to 5,5 N

Micrometer with vernier reading to 0,002 mm.  
Dial indicator: 0,001 mm.

Dial indicator:  $\pm 0,025$  mm

Micrometer: max. perm. error of 2  $\mu$ m.  
Dial indicator: 1  $\mu$ m.

Dial indicator: repeatability limit of 0,5  $\mu$ m.

Plastic case

Declaration of conformity



Dial indicators to 0,001 mm

072108669

072108691

Model with small measuring faces

072108722



mm

0 ÷ 25

25 ÷ 50

0 ÷ 20

## Protective Cover

Made in transparent plastic – Can be mounted on the bezel – Protects the indicator against dust particles and liquids – Prevents both tolerance markers from being accidentally displaced.



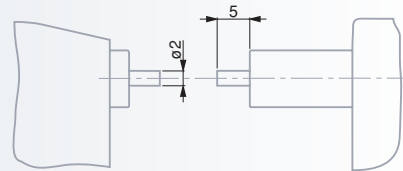
072110978



## ETALON MICROSPEL 280

These micrometers have a mobile anvil along with a 8 mm diameter clamping bore for mounting a sensor with linear action such as the TESA GT 21/22 electronic probe (also refer to section O).

Specially designed for batch inspection of small precision parts.



DIN 863 T3  
(Style D14)  
NF E 11-090

Vernier reading  
to 0,002 mm

Tungsten carbide  
tipped

6,5 mm dia.  
Models  
with small  
measuring faces:  
2 mm dia., 5 mm long.

0,5 mm

Anvil:  
2 up to 8 N,  
adjustable

Meas. element:  
max. perm. error  
of 2 μm

Mobile anvil:  
repeatability  
limit of  
0,5 μm.

Adjustable part  
support (except  
model with small  
measuring faces).

Plastic case

Declaration  
of conformity



mm

072110816 0 ÷ 25

Model with small measuring faces

072110853 0 ÷ 20

### Important

Electronic probe and micrometer stand  
are not part of the delivery scope and  
must be ordered separately.

## Micrometers with Small Measuring Faces

For measuring grooves, feather grooves, splines and other difficult to reach locations – Small measuring faces specially made to check precision workpieces.

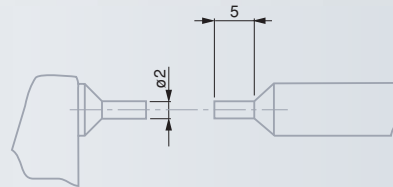
### Models MICROMASTER



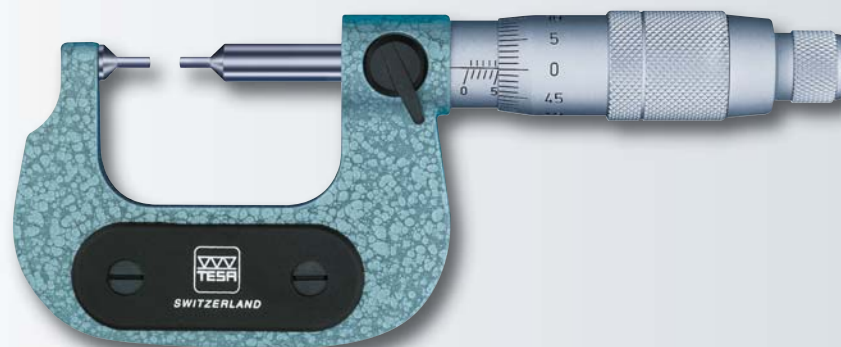
No		
	mm	in
06030034	0 ÷ 30	0 ÷ 1.2
06030035	30 ÷ 60	1.2 ÷ 2.3
06030036	60 ÷ 90	2.3 ÷ 3.5
06030037	90 ÷ 120	3.5 ÷ 4.7

*Optional Accessory*

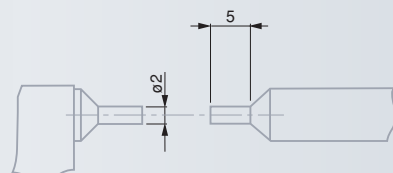
01961000	1 Lithium battery 3 V, 190 mAh, type CR 2032. For information on cables etc., see section A.
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### Models ISOMASTER AD



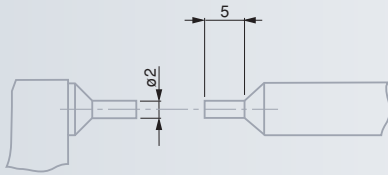
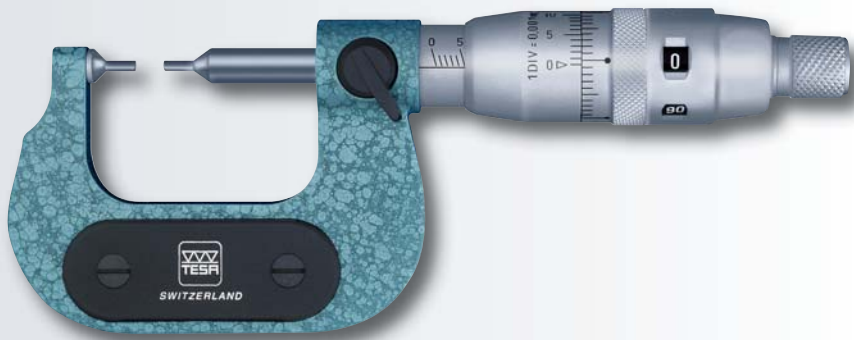
No	
	mm
00210101	0 ÷ 25
00210102	25 ÷ 50



- ✓
- DIN 863 T3 (Style D3)
- 0,001 mm  
0.00005 in
- Metric/Inch conversion
- Fixed measuring faces: tungsten carbide.
- Max. 10 N
- RS 232 interface, opto-coupled.
- Degree of protection (IEC 60529): IP54 or IP40 with use of the digital output
- For additional technical data: see page C-3.
- Plastic case
- Identification number
- Measuring range 0 to 100: with a SCS calibration certificate.
- Measuring range > 100 mm: inspection report with a declaration of conformity.

- ✓
- DIN 863 T3 (Style D3)  
NF E 11-090
- 0,01 mm
- Fixed measuring faces: tungsten carbide.
- Max. 10 N
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

**Model TESAMASTER AD**



00311301	mm 0 ÷ 25



DIN 863 T3  
(Style D3)  
NF E 11-090

Vernier reading  
to 0,001 mm

Scale division  
0,1 mm

Fixed measuring  
faces:  
tungsten carbide

Max. 10 N

Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity



DIN 863 T3  
(Style D3)  
NF E 11-090

0,001 mm.  
Parallax-free  
reading on vernier

100 divisions

Fixed measuring  
faces:  
tungsten carbide.

1 mm

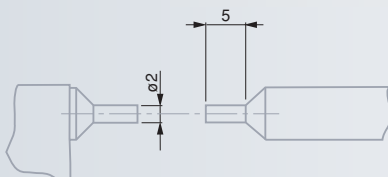
Max. 10 N

Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity

**Model MICRORAPID**



072116410	mm 0 ÷ 20



## Micrometers with One Spherical Measuring Face

Measure wall thickness of tubing.

### Models MICROMASTER



06030079	0 ÷ 30	0 ÷ 1.2
06030080	25 ÷ 50	1 ÷ 2

### Model ETALON



071115940	0 ÷ 25

## Micrometers with Two Spherical Measuring Faces

Rounded Measuring faces on anvil and spindle for measuring concave surfaces of workpieces, e.g. ball-bearing guides or walls of tubing.

### Models MICROMASTER



06030081	0 ÷ 25	0 ÷ 1
06030082	20 ÷ 50	0.8 ÷ 1.9
06030083	45 ÷ 75	1.8 ÷ 2.9
06030084	70 ÷ 100	2.8 ÷ 3.9



DIN 863 T3 (Style D1)

MICROMASTER: 0,001 mm or 0.00005 in

ETALON: 0,002 mm

Anvil: tungsten carbide (MICROMASTER) or titanium carbide hard-coating (ETALON). Tungsten carbide spindle.

Anvil with a 3.5 mm spherical face (MICROMASTER) or a 3.25 mm one (ETALON). Spindle with a flat measuring face.

Max. 10 N

RS 232 on MICROMASTER

Other technical data on MICROMASTER: see page C-3.

Plastic case

Identification number

Inspection report with a declaration of conformity



DIN 863 T3 (Style D1)

0,001 mm 0.00005 in

Tungsten carbide

Spherical, 3,5 mm radius.

Max. 10 N

Additional technical data: see page C-3.

Plastic case

Identification number

Inspection report with a declaration of conformity



DIN 863 T3  
(Style D1)  
NF E 11-090

0,01 mm

Measuring  
faces rounded  
to 3,25 mm

Titanium  
carbide  
coated

for model  
No. 00112106.  
Hardened steel for  
other models.

0,5 mm

Max. 10 N

Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity



Steel ball tip,  
hardened and  
lapped.  
Dull-chrome brass retainer.

### Series AAS ISOMASTER

Rounded measuring faces for checking concave surfaces such as ball-bearing guides and tubing walls.



No

mm

00112106	0 ÷ 25 (TiC)
00110901	0 ÷ 25
00110902	25 ÷ 50
00110903	50 ÷ 75
00110904	75 ÷ 100

### Spherical Element for External Micrometers

Holder with a ball tip that fits on measuring faces having a 6,5 mm diameter – Serve to measure tubing wall thickness or workpieces with concave surfaces and the like.



No

Ball tip

072103522	5 mm
-----------	------

## Micrometers for Soft Materials

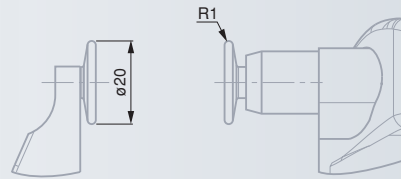
With two large, round-edge measuring faces – Measure the thickness of materials such as paper and plastic sheets, felt, cloth and other soft materials.

### Model MICROMASTER

Non-rotating measuring spindle – Without spindle lock.



06030085	0 ÷ 30	0 ÷ 1.2



### Model ISOMASTER AF



00210301	0 ÷ 25

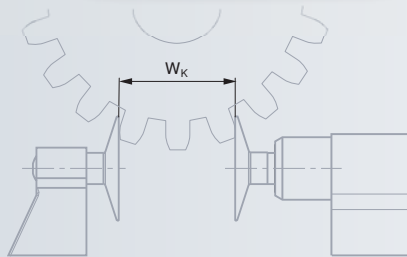
- ✓
  - DIN 863 T3 (Style D6)
  - 0,001 mm  
0.00005 in
  - Metric/Inch conversion
  - Hardened steel
  - Non-rotating, 20 mm dia.
  - Flatness tolerance: 3 µm
  - Tolerance in Parallelism: 6 µm
  - Max. perm. error: 4 µm
  - Max. 10 N
  - RS 232
  - Additional technical data: see page C-3.
  - Plastic case
  - Identification number
  - Inspection report with a declaration of conformity
- 
- ✓
  - DIN 863 T3 (Style D6)
  - 0,01 mm
  - Hardened steel
  - Ø 15 mm
  - Flatness tolerance: 3 µm
  - Tolerance in Parallelism: 6 µm
  - Max. 10 N
  - Plastic case
  - Identification number
  - Inspection report with a declaration of conformity

## Micrometers for Gear Pitch Measurement

Flanges with ring-shaped measuring faces for root tangent lengths  $W_k$  on gear pitches, distance between grooves and slots as well as other hard-to-reach locations.

### Models MICROMASTER

Non-rotating measuring spindle – Without spindle lock.



No	mm	in
06030041	0 ÷ 30	0 ÷ 1.2
06030042	25 ÷ 55	1 ÷ 2.1
06030043	55 ÷ 85	2.1 ÷ 3.35
06030044	85 ÷ 115	3.35 ÷ 4.5

### Models ISOMASTER AE



No	mm
00210201	0 ÷ 25
00210202	25 ÷ 50
00210203	50 ÷ 75
00210204	75 ÷ 100
00210205	100 ÷ 125
00210206	125 ÷ 150

### Micrometers for Gear Tooth Measurement

	Max. perm. error* with partial contact of the measuring face µm	Max. perm. error with full contact of the measuring face (DIN 863-T1) µm	Flatness µm	Parallelism µm	Max. flexure of the frame µm
0 ÷ 30	10	4	2	5	2
25 ÷ 55	10	4	2	5	2
55 ÷ 85	11	5	2	5	3
85 ÷ 115	12	5	2	6	4

\* Disregarding a rim of 1 mm as the measuring faces are being inspected.  
For enhanced accuracy, the micrometer should be calibrated in the position of use.



DIN 863 T3 (Style D7)

0,001 mm  
0.00005 in

Metric/Inch conversion

Hardened steel

Non-rotating spindle ≤ 85 mm: 25 mm dia.  
> 85 ≤ 115 mm: 30 mm dia.

Suitable from module 0,5

Max. 10 N

RS 232

Additional technical data: see page C-3.

Plastic case

Identification number

Inspection report with a declaration of conformity



DIN 863 T3 (Style D7)  
NF E 11-090

0,01 mm

Hardened steel

≤ 100 mm: 25 mm dia.  
> 100 ≤ 150 mm: 32 mm dia.

Suitable from module 0,6

Max. 10 N

Plastic case

Identification number

Inspection report with a declaration of conformity





# MICROMASTER

## with 7 Pairs of Interchangeable Measuring Inserts

Non-rotating spindle – Without spindle lock.

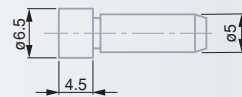


No	mm	in
06030045	0 ÷ 30	0 ÷ 1.2

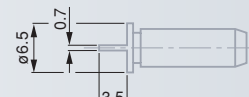
-  ✓
-  0,001 mm  
0.00005 in
-  Metric/Inch conversion
-  Micrometer element with a max. perm. error of 4 µm
-  7,5 mm dia., non-rotating spindle.  
With a fixing bore for a measuring insert.  
Adjustable attachment on anvil for a measuring insert, with lock.
-  Hardened steel
-  Max. 10 N
-  RS 232
-  Additional technical data on page C-3
-  Plastic case
-  Identification number
-  Inspection report with a declaration of conformity

### Components of a Full Micrometer

No	mm	in
<i>Single Micrometer</i>		
06030099	0 ÷ 30	0 ÷ 1.2
<i>Full set of measuring inserts</i>		
00269027		
<i>Includes one pair of the following inserts</i>		
No		mm
00269020	flat	∅ 6,5
00269021	small, flat	∅ 2
00269022	spherical	R = 5
00269023	large, flat	∅ 12
00269024	narrow, flat	0,7
00269025	cone-shaped	∅ 0,3/60°
00269026	knife-edged	0,3/60°
Specially designed measuring faces also available upon request.		



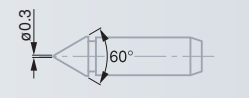
00269020



00269024



00269021



00269025



00269022



00269026



00269023



DIN 863 T3  
(Style D12)  
NF E 11-090

0,01 mm

Hardened steel  
anvil.  
Tungsten carbide  
spindle

5 mm dia.  
on anvil.  
6,5 mm dia.  
on spindle

0,5 mm

Max. 10 N

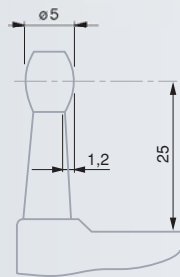
Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity

## ETALON Basic for Tube Wall Thickness Measurement

Barrel-shaped anvil for measuring the tube wall thickness and other curved workpieces.



No



00219066

mm  
0 ÷ 25



Vernier reading  
to 0,002 mm

Hardened steel  
anvils.  
Tungsten carbide  
spindle.

Anvils:  
see drawing.  
Spindle:  
6,5 mm dia.

0,5 mm

Max. 10 N

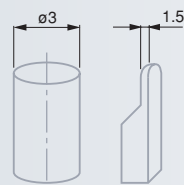
Plastic case

Identification  
number

Inspection report  
with a declaration  
of conformity

## ETALON Basic with Two Interchangeable Anvils

Universal micrometer for assembly – Anvils have either a flat or a cylindrical measuring face.



No



00219067

mm  
0 ÷ 25

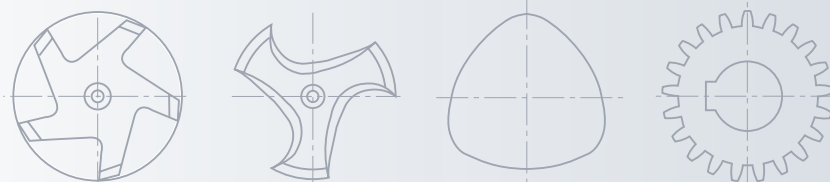
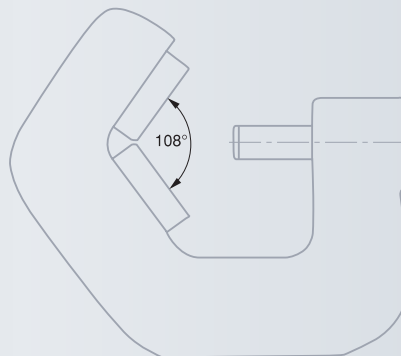
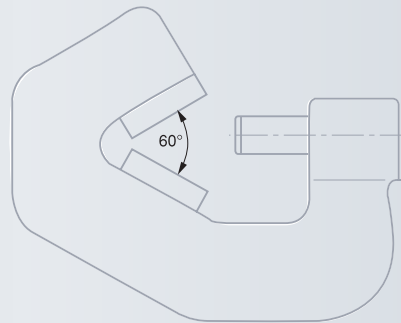
# Micrometers with Prismatic Measuring Faces

Measure test pieces with uneven number of grooves such as milling cutters, taps, drills and spline shafts as well as odd polygons. Determine roundness errors on cylindrical surfaces. Angle of the prism aperture is designed for workpieces having a number of 3 or 5 flutes.

## Models MICROMASTER



No		
	mm	in
<i>3-flute test pieces (60°)</i>		
06030087	1 ÷ 7	0.04 ÷ 0.27
06030088	5 ÷ 20	0.20 ÷ 0.80
06030089	20 ÷ 35	0.80 ÷ 1.38
06030090	35 ÷ 50	1.38 ÷ 1.97
06030091	50 ÷ 65	1.97 ÷ 2.56
06030092	65 ÷ 80	2.56 ÷ 3.15
<i>5-flute test pieces (108°)</i>		
06030093	1 ÷ 7	0.04 ÷ 0.27
06030094	5 ÷ 25	0.20 ÷ 0.98
06030095	25 ÷ 45	0.98 ÷ 1.77
06030096	45 ÷ 65	1.77 ÷ 2.56
06030097	65 ÷ 85	2.56 ÷ 3.35



- ✓
- DIN 863 T3 (Style D 10)
- 0,001 mm  
0.00005 in
- Metric/Inch conversion
- Tungsten carbide tipped
- Angle of the prism aperture:  
60° for 3-flute test pieces or 108° for 5-flute test pieces.
- 0,75 mm for 3-flute test pieces or 0,559 mm for 5-flute test pieces.
- Max. 10 N
- RS 232
- Additional technical data on page C-3
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Models ISOMASTER AS



DIN 863 T3  
(Style D 10)  
NF E 11-090

0,01 mm

Tungsten carbide  
tipped

Angle of the  
prism aperture:  
60° for 3-flute test  
pieces or 108° for 5-flute test  
pieces.

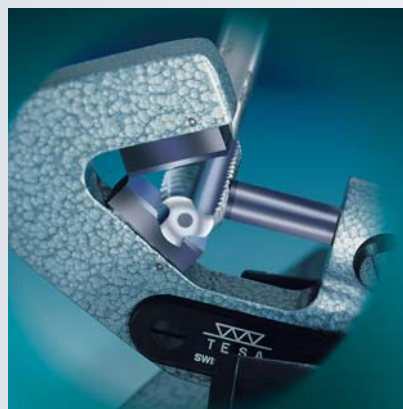
0,75 mm for  
3-flute test pieces  
or 0,559 mm for  
5-flute test pieces.

Max. 10 N

Plastic case

Identification  
number

Declaration  
of conformity



mm

3-flute test pieces (60°)

00410001 1 ÷ 7

00410002 5 ÷ 20

00410003 20 ÷ 35

00410004 35 ÷ 50

00410005 50 ÷ 65

5-flute test pieces (108°)

00410102 5 ÷ 25



Hardened steel

Fitted with plastic  
guard plates from  
nominal dimension  
of 20 mm.  
Actual size engraved  
on the top face

Identification  
number

Declaration  
of conformity

Cylindrical Setting Standards



mm

µm

µm

00440001 5 0,5 -

00440002 20 0,7 1

00440003 25 0,7 1

00440004 35 1 1

00440005 45 1,2 1,5

00440006 50 1,2 1,5

00440007 65 1,5 1,5



## Micrometers for Thread Measurement

Used for pitch diameter inspection – Anvil with adjustable holder for mounting a measuring insert with prismatic faces – Fine screw adjustment and locking device – Spindle has a fixing bore for a cone-shaped measuring insert.

### Models MICROMASTER AC



No	mm		in	
	mm	in	mm	in
06030062	0 ÷ 25	0 ÷ 1		
06030063	25 ÷ 50	1 ÷ 2		
06030064	50 ÷ 75	2 ÷ 3		
06030065	75 ÷ 100	3 ÷ 4		
06030066	100 ÷ 125	4 ÷ 5		
06030067	125 ÷ 150	5 ÷ 6		

**Important**

Measuring Inserts and setting standards must be ordered separately.

### Models ISOMASTER AC



No	mm	
	mm	in
00210001	0 ÷ 25	
00210002	25 ÷ 50	
00210003	50 ÷ 75	
00210004	75 ÷ 100	

**Important**

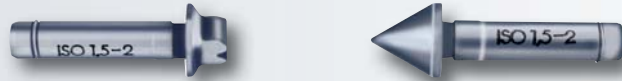
Measuring Inserts and setting standards must be ordered separately.

- ✓
- DIN 863 T3 (Style D18)
- 0,001 mm  
0.00005 in
- Metric/Inch conversion
- 30 mm measuring span
- Max. 10 N
- RS 232
- Additional technical data on page C-3
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

- ✓
- DIN 863 T3 (Style D 18)  
NF E 11-090
- 0,01 mm
- 0,5 mm
- Max. 10 N
- Plastic case
- Identification number
- Declaration of conformity

## Interchangeable Thread Inserts for TESA Micrometers Series AC

With measuring faces specially designed for checking pitch diameters.



Hardened steel

Fixing rod:  
3,5 mm dia.,  
15,5 mm long

Supplied in sets  
or pairs

No	Pitch in mm	No	Threads per in	No	Threads per in
<i>ISO metric threads 60° flank angle</i>		<i>Whitworth threads 55° flank angle</i>		<i>Unified inch-threads UN, UNC, UNF... 60° flank angle</i>	
<b>00240000</b>	0,4 ÷ 0,5	<b>00250100</b>	60 ÷ 48	<b>00250000</b>	64 ÷ 42
<b>00240001</b>	0,5 ÷ 0,6	<b>00250101</b>	48 ÷ 40	<b>00250001</b>	42 ÷ 25
<b>00240002</b>	0,6 ÷ 0,8	<b>00250102</b>	40 ÷ 32	<b>00250002</b>	25 ÷ 17
<b>00240003</b>	0,8 ÷ 1,0	<b>00250103</b>	32 ÷ 24	<b>00250003</b>	17 ÷ 10
<b>00240004</b>	1,0 ÷ 1,25	<b>00250104</b>	24 ÷ 18	<b>00250004</b>	10 ÷ 6.5
<b>00240005</b>	1,25 ÷ 1,5	<b>00250105</b>	18 ÷ 14	<b>00250005</b>	6.5 ÷ 4
<b>00240006</b>	1,5 ÷ 2,0	<b>00250106</b>	14 ÷ 10	<b>00250006</b>	4 ÷ 2.5
<b>00240007</b>	2,0 ÷ 2,5	<b>00250107</b>	10 ÷ 7		
<b>00240008</b>	2,5 ÷ 3,0	<b>00250108</b>	7 ÷ 4.5		
<b>00240009</b>	3,0 ÷ 4,0	<b>00250109</b>	4.5 ÷ 3		
<b>00240010</b>	4,0 ÷ 5,0				
<b>00240011</b>	5,0 ÷ 6,0				
<i>Set of 12 pairs</i>		<i>Set of 10 pairs</i>		<i>Set of 7 pairs</i>	
<b>00240015</b>	0,4 ÷ 6,0	<b>00250115</b>	60 ÷ 3	<b>00250015</b>	64 ÷ 2.5

## Setting Standards for Screw Thread Micrometers



Hardened steel

Insulating  
sleeve marked  
with actual size

No  
Identification  
number

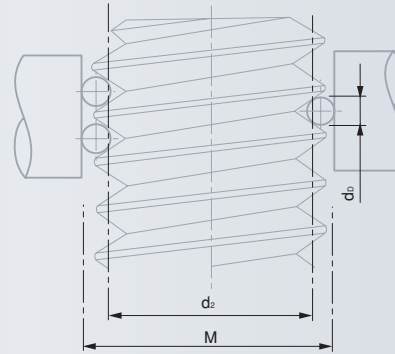
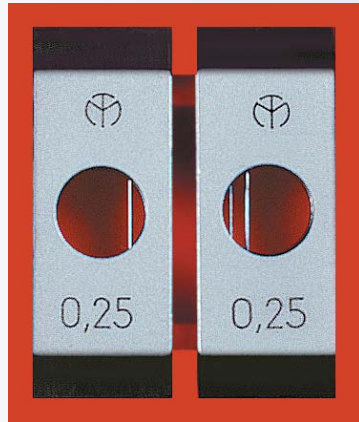
Declaration  
of conformity



No	mm	No	in
<i>60° flank angle</i>			
<b>00240501</b>	25	<b>00250501</b>	1
<b>00240502</b>	50	<b>00250502</b>	2
<b>00240503</b>	75	<b>00250503</b>	3
<b>00240504</b>	100	<b>00250504</b>	4
<b>00240505</b>	125	<b>00250505</b>	5
<i>55° flank angle</i>			
<b>00240601</b>	25		
<b>00240602</b>	50		
<b>00240603</b>	75		

## XB Wires for Screw Threads

For measuring pitch diameter of threads using the three-wire method. Actual flank diameter  $d_2$  can either be determined arithmetically or with the aid of the relevant tables based on the measured actual size  $M$  – Suitable for all standard micrometers with a measuring insert having a 6,5 mm diameter.



Steel wires, hardened



Wires are mounted on holders:

2-wire holder rests on anvil while the single wire holder is used on spindle side



Single pairs are supplied in a plastic box, full set in a wooden case



Declaration of conformity

**No**



Wires diameter

$d_0$  mm



ISO metric threads

Pitch in mm



Whitworth threads

Number of threads per in



Unified inch-threads UN, UNC, UNF ...

Number of threads per in

00240701	0,17	0,25/0,3	–	–
00240702	0,22	0,35	–	72
00240703	0,25	0,4	60	64
00240704	0,29	0,45/0,5	–	56
00240705	0,335	0,6	48/40	48/44
00240706	0,455	0,7 ÷ 0,8	–	32
00240707	0,53	0,9	32/28	28
00240708	0,62	1,0	26/24	24
00240709	0,725	1,25	22 ÷ 19	20
00240710	0,895	1,5	18/16	18/16
00240711	1,10	1,75	14	14/13
00240712	1,35	2,0	12/11	12/11
00240713	1,65	2,5	10/9	10/9
00240714	2,05	3,0/3,5	8/7	8/7
00240715	2,55	4,0/4,5	6	6
00240716	3,20	5,0/5,5	5/4.5	5/4.5

Set of 16 pairs

00240700 0,17 ÷ 3,20

## Micrometer Stands

For micrometers up to 300 mm as well as many other hand-held tools.



**No**

TESA

00160201

ETALON

072110123



Clamp aperture: 16 mm (TESA) or 20 mm (ETALON)

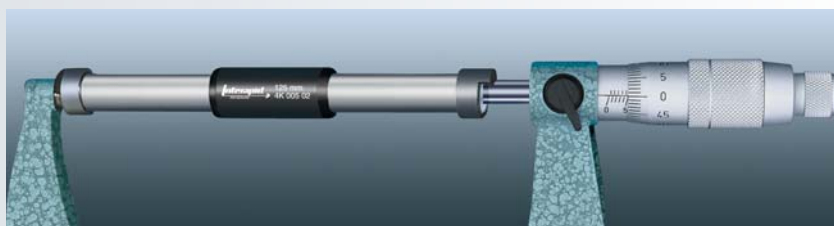


Lacquered cast iron base



Tilt can be locked using a single bolt.

## INTERAPID Setting Standards



Hardened steel



Two flat and parallel measuring faces



Cylindrical gauge block with plastic insulating grip and dull-chrome shaft



With lengths:  
 $\leq 175 \text{ mm} = 10 \text{ mm}$ .  
 $\geq 200 \text{ mm} = 13 \text{ mm}$ .



Max. perm. error over the length:  
 $\pm (1 + L/100) \mu\text{m}$ , L in mm



Identification number



Inspection report with actual measured length



Declaration of conformity

No	mm	No	mm
02140001	25	02140021	525
02140002	50	02140022	550
02140003	75	02140023	575
02140004	100	02140024	600
02140005	125	02140025	625
02140006	150	02140026	650
02140007	175	02140027	675
02140008	200	02140028	700
02140009	225	02140029	725
02140010	250	02140030	750
02140011	275	02140031	775
02140012	300	02140032	800
02140013	325	02140033	825
02140014	350	02140034	850
02140015	375	02140035	875
02140016	400	02140036	900
02140017	425	02140037	925
02140018	450	02140038	950
02140019	475	02140039	975
02140020	500	02140040	1000

### Guide Collars

Make the positioning of INTERAPID setting standards fast and easy.



No	mm	mm
02140103	100 ÷ 175	8
02140108	200 ÷ 1475	8



## ETALON Cylindrical Step Gauges

For display setting and calibration.



072112020

mm

5 ÷ 100

072112021

5 ÷ 150



Alloyed steel, hardened



Diameters in step of 5 mm ( $\leq 50$  mm) or 10 mm ( $> 50$  mm).



Max. perm. errors for nominal diameters:  
 $\leq 80$  mm = 1,5  $\mu$ m  
 $\geq 90 \leq 120$  mm = 2,0  $\mu$ m  
 $\geq 130$  mm = 2,5  $\mu$ m



Mounted on a wooden base. Supplied with dust cover.



Declaration of conformity

## Optical Flats with Two Parallel Faces

Used for examining the flatness and parallelism of the measuring faces on external micrometers as well as other similar measuring instruments. The difference in length of the optical flats within a set matches a quarter or a third of the spindle pitch of 0,5 mm.



31 mm



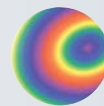
Length tolerance with reference to the nominal dimension:  $\pm 100$   $\mu$ m



Flatness tolerances for optical parallels with lengths:  
 $\leq 27,335$  mm = 0,15  $\mu$ m  
 $\geq 52,00 \div 77,335$  mm = 0,2  $\mu$ m



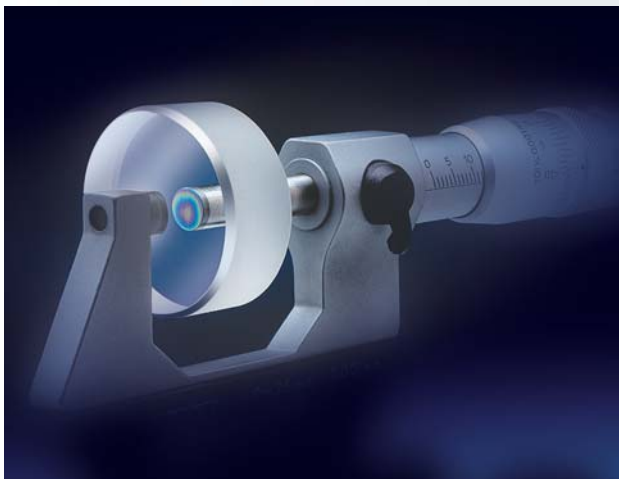
Tolerances in parallelism for optical parallels with lengths:  
 $\leq 27,335$  mm = 0,4  $\mu$ m  
 $\geq 52,00 \div 77,335$  mm = 0,5  $\mu$ m



Each set is supplied in a wooden case



Declaration of conformity



mm

02510001

12,00

02510000

12,00 ÷ 12,375

02510101

27,00

02510100

27,00 ÷ 27,335

02510200

52,00 ÷ 52,335

02510300

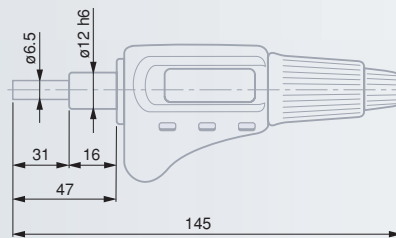
77,00 ÷ 77,335

## Micrometer Heads

Components commonly used for checking the various displacements on measuring fixtures, coordinate tables, microscopes, machines as well as other special appliances. Mounted on the cylindrical coupling shaft.

### Models MICROMASTER

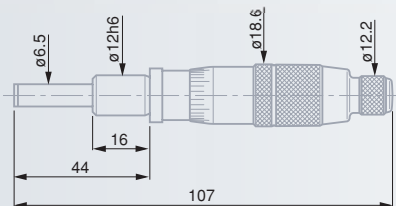
Without spindle lock.



No	mm	mm
06030038	0 ÷ 30	12h6
06030039	30 ÷ 0	12h6
06030040	30 ÷ 0	12h6

### Model ISOMASTER AR

Without spindle lock.

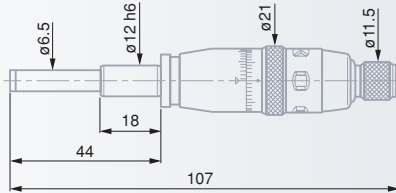


No	mm	mm
00211201	0 ÷ 25	12h6



## Model TESAMASTER AR

Without spindle lock.

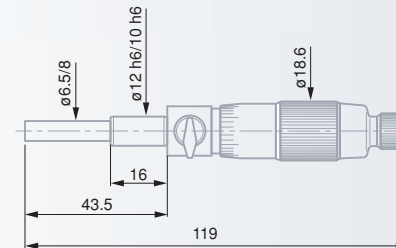


00312301	mm 0 ÷ 25	mm 12h6

- ✓
- DIN 863 T2 (Style E)
- Vernier reading to 0,001 mm
- Scale division to 0,1 mm
- Tungsten carbide tipped
- 6,5 mm dia
- 0,5 mm
- Max. perm. error of 2 µm
- Max. 10 N
- Identification number
- Declaration of conformity

## ETALON 266 Micrometer Heads

With or without spindle lock.



	mm	D mm	mm	Spindle lock
072115942	0 ÷ 25	Ø 6,5	12h6	-
072115943	0 ÷ 25	Ø 8	12h6	●
072116258	0 ÷ 25	Ø 6,5	10h6	●

- ✓
- DIN 863 T2 (Style E)  
NF E 11-090
- Vernier reading to 0,002 mm
- Tungsten carbide tipped
- 0,5 mm
- Max. perm. error of 3 µm
- Identification number
- Declaration of conformity

## Depth Micrometers

With interchangeable measuring rods provided in sets. The rods are adjusted in steps, each with a step length of 30 or 25 mm, thus eliminating the need for a new display setting when rods are exchanged.



DIN 863 T2 (Style T)

0,001 mm  
0.00005 in

Metric/Inch conversion

Non-rotating spindle

Measuring rods with hardened steel ends

3 mm dia. measuring rods

30 mm

RS 232 data output

0,5 mm

Max. perm. error (meas. element): 3 µm

Plastic case

Identification number

Inspection report with a declaration of conformity



DIN 863 T2 (Style T)  
NF E 11-097

0,01 mm

Measuring rods with hardened steel ends

3 mm dia. measuring rods. Measuring face on the base: see table

0,5 mm

Max. perm. error of the measuring element: 3 µm

Plastic case

Identification number

Declaration of conformity

### Models MICROMASTER

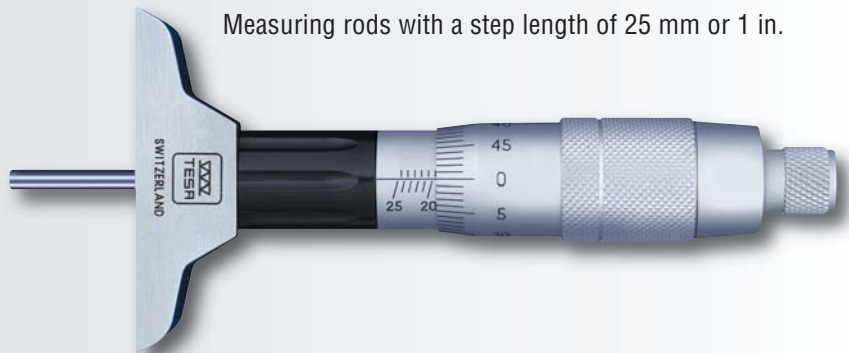
Non-rotating measuring rod. Sets with a step length of 30 mm.



No	mm	in	mm
06030069	0 ÷ 90	0 ÷ 3.5	50 x 15
06030070	0 ÷ 180	0 ÷ 7	100 x 15
<i>Optional Accessories</i>			
06060021	6 pieces rod set	0 ÷ 180 mm	

### Models ISOMASTER AQ

Measuring rods with a step length of 25 mm or 1 in.



No	mm	mm
00211002	0 ÷ 75	50 x 15
00211003	0 ÷ 150	50 x 15
00211004	0 ÷ 75	100 x 15
00211005	0 ÷ 150	100 x 15



# Tool Sets



## TESA Swiss Tool Set



00510033



TESA Swiss Tool Set

Consisting of:



mm



mm

00510041

1 Vernier caliper  
TESA SWISSCAL 2

0 ÷ 150

0,02

00560013

1 Depth foot

00110101

1 External micrometer  
TESA ISOMASTER

0 ÷ 25

0,01

00560031

1 Suited plastic case



### Caliper



DIN 862



Stainless steel,  
hardened



Technical data  
on page B-8

### Depth foot



Stainless steel,  
hardened.



75 x 6 mm  
measuring faces

### Micrometer



DIN 863 T1  
NF E-11095



Tungsten carbide  
tipped



Technical data  
on page C-6

### Additional data



Inspection report  
with a declaration  
of conformity



**Caliper**



DIN 862



Stainless steel, hardened



Technical data on page B-5

**Depth foot**



Stainless steel, hardened



75 x 6 mm measuring face

**Micrometer**



DIN 863 T1  
NF E 11-095



Tungsten carbide tipped



Technical data on page C-6

**Additional data**



Inspection report with a declaration of conformity



**TESA Duo-Set 1**

<b>No</b>	<b>=</b>		
<b>00530020</b>	<b>TESA Duo-Set 1</b>		
<i>Consisting of:</i>			
<b>No</b>	<b>=</b>		
		mm	mm
<b>00510008</b>	1 Dial caliper TESA CCMA-M	0 ÷ 150	0,02
<b>00560013</b>	1 Depth foot		
<b>00110101</b>	1 External micrometer TESA ISOMASTER	0 ÷ 25	0,01
<b>00560031</b>	1 Suited plastic case		



**Caliper**



DIN 862



Stainless steel, hardened



Technical data on page B-5

**Depth foot**



Stainless steel, hardened



75 x 6 mm measuring face

**Micrometer**



DIN 863 T1  
NF E 11-095



Tungsten carbide tipped



Technical data on page C-4

**Additional data**



Inspection report with a declaration of conformity



**TESA Duo-Set 2**

<b>No</b>	<b>=</b>		
<b>00530021</b>	<b>TESA Duo-Set 2</b>		
<i>Consisting of:</i>			
<b>No</b>	<b>=</b>		
		mm	mm
<b>00510008</b>	1 Dial caliper TESA CCMA-M	0 ÷ 150	0,02
<b>00560013</b>	1 Depth foot		
<b>00310001</b>	1 External micrometer TESAMASTER	0 ÷ 25	0,001
<b>00560031</b>	1 Suited plastic case		



**TESA Duo-Set 8**



**00531101 TESA Duo-Set 8**

Consisting of:



mm

mm

<b>00530090</b>	1 Caliper TESA Shop-Cal capa $\mu$ system	0 ÷ 150	0,01
<b>00560013</b>	1 Depth foot		
<b>00110101</b>	1 External micrometer TESA ISOMASTER	0 ÷ 25	0,01
<b>00560031</b>	1 Suited plastic case		



**Caliper**



DIN 862



Stainless steel,  
hardened



Technical data  
on page B-4

**Depth foot**



Stainless steel,  
hardened.



75 x 6 mm  
measuring face

**Micrometer**



DIN 863 T1  
NF E 11-095



Tungsten  
carbide tipped



Technical data  
on page C-6

**Additional data**



Inspection report  
with a declaration  
of conformity



**TESA Duo-Set 9**



**00531102 TESA Duo-Set 9**

Consisting of:



mm

mm

<b>00530090</b>	1 Caliper TESA TESA Shop-Cal capa $\mu$ system	0 ÷ 150	0,01
<b>00560013</b>	1 Depth foot		
<b>00310001</b>	1 External micrometer TESAMASTER	0 ÷ 25	0,001
<b>00560031</b>	1 Suited plastic case		



**Caliper**



DIN 862



Stainless steel,  
hardened



Technical data  
on page B-4

**Depth foot**



Stainless steel,  
hardened



75 x 6 mm  
measuring face

**Micrometer**



DIN 863 T1  
NF E 11-095



Tungsten  
carbide tipped



Technical data  
on page C-4

**Additional data**



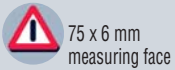
Inspection report  
with a declaration  
of conformity



Caliper



Depth foot



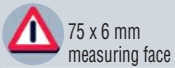
Micrometer



Caliper



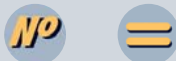
Depth foot



Micrometer



TESA Duo-Set 16



00531007 TESA Duo-Set 16

Consisting of:



mm mm

00530090 1 Caliper  
TESA Shop-Cal capa  $\mu$  system 0 ÷ 150 0,01

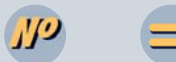
00560013 1 Depth foot

06030010 1 External micrometer  
TESA MICROMASTER EASY 0 ÷ 30 0,001

00560090 1 Suited plastic case

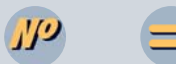


TESA Duo-Set 13



00531004 TESA Duo-Set 13

Consisting of:



mm mm

00530300 1 Caliper  
TESA-Cal IP67 0 ÷ 150 0,01

00560013 1 Depth foot

06030020 1 External micrometer  
TESA MICROMASTER IP54 0 ÷ 30 0,001

00560090 1 Suited plastic case





**TESA Duo-Set 14**

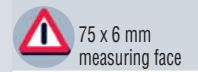
No	=		
00531005	TESA Duo-Set 14		
Consisting of:			
No	=		
00530300	1 Caliper TESA-Cal IP67	0 ÷ 150	0,01
00560013	1 Depth foot		
06030010	1 External micrometer TESA MICROMASTER EASY 0 ÷ 30		0,001
00560090	1 Suited plastic case		



**Caliper**



**Depth foot**



**Micrometer**



**TESA Duo-Set 15**

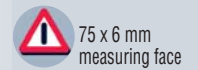
No	=		
00531006	TESA Duo-Set 15		
Consisting of:			
No	=		
00530311	1 Caliper TESA-Cal IP67, RS	0 ÷ 150	0,01
00560013	1 Depth foot		
06030030	1 External micrometer MICROMASTER IP54, RS	0 ÷ 30	0,001
00560090	1 Suited plastic case		



**Caliper**



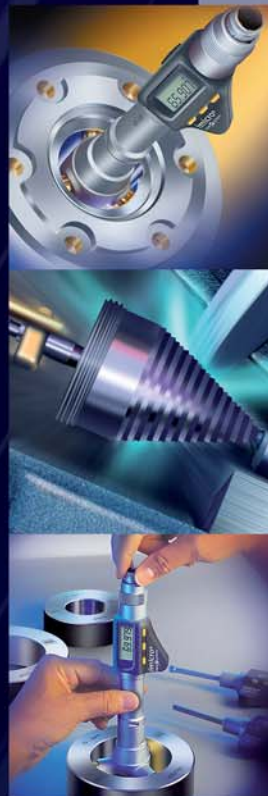
**Depth foot**



**Micrometer**



# Internal Measurement

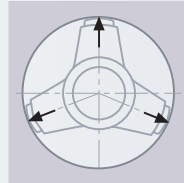


# INTERNAL MEASUREMENT AND REQUIREMENTS

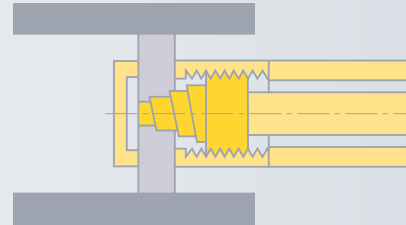
Bore measurement is more demanding than external measurement of workpieces. Besides the tight tolerances specified for the current application, all measuring components having a direct influence on the uncertainty of measurement must be designed in such a way that they can go into the bore to be checked.

## Benefit of the 3-Line contact

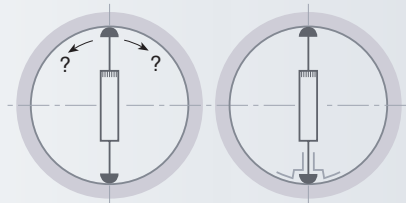
TESA IMICRO, TESA TRI-O-BOR, ALESOMETER as well as ETALON INTALOMETER are self-centring and self-aligning handtools that make bore measurement reliable, regardless of the operator's sensitivity.



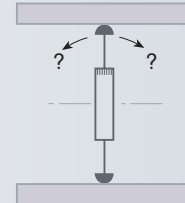
The three measuring bolts are spaced 120° apart, thus providing optimum self-centring.



The measuring bolts with 3-line contact allows the micrometer to align itself parallel to the contact surfaces.



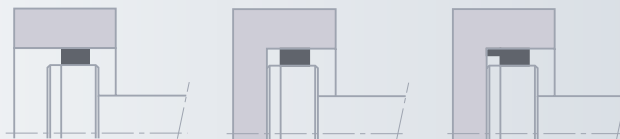
2-point contact measuring instruments are not self-centring. To make bore measurement easier, auxiliary means need additionally be used.



2-point contact does not permit the tool to align itself in relation to the bore axis.

## A single tool can replace hundreds of plug gauges

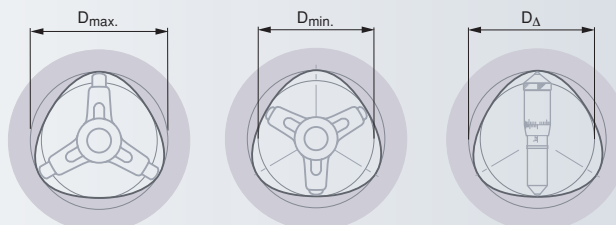
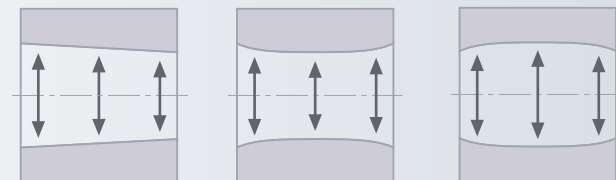
Unlike plug gauges that check only one toleranced size, a single tool can measure many diameters. Depending on the model that is being used, through holes and blind bores along with short centring shoulders can be inspected, reliably.



## Establishing form errors

Form errors are established through measurements taken at several points within a bore. Micrometers with 3-line contact determine run-out errors in a triangular way.

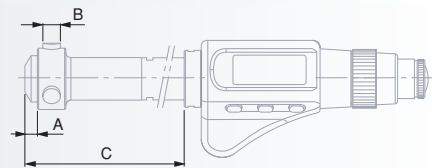
Micrometers with 2-point contact measure medium-size diameters only. They do not allow Users to see what makes diameters measured at various points different.





# TESA IMICRO capa $\mu$ system with Digital Display

A successful combination of the patented TESA capacitive system with the IMICRO unique cone.



DIN 863 T4 (Style C1)

0,001 mm  
0.00005 in

Metric/inch Conversion

LCD, 7 mm digit height

Floating zero

Display lock

Measuring faces for application ranges

3,5 to 12 mm:  
hardened steel (HV30 770)  
11 to 100 mm:  
TiN hard-coating (HV5 2300)  
100 to 300 mm:  
carbide tipped (HV5 1300)

RS 232 opto-coupled, bidirectional

3 V lithium battery

1 to 2 a ( $\approx$  2000 h/a)

Automatic shut down after 10 min.

Display setting is retained as long as power supply remains stable.

10 °C to 40 °C

-10 °C to 60 °C

80%, non condensing



Measuring element IP54 (IEC 60529) or IP40 with active data output

Plastic case

Identification number

TESA's calibration certificate

Declaration of conformity

	mm	in	$\mu$ m	$\mu$ m	A mm	B mm	C mm
06130101	3,5 ÷ 4	0.1377 ÷ 0.1574	4	4	2	1,5	20
06130102	4 ÷ 4,5	0.1574 ÷ 0.1771	4	4	2	1,5	20
06130103	4,5 ÷ 5,5	0.1771 ÷ 0.2165	4	4	2	1,5	25
06130104	5,5 ÷ 6,5	0.2165 ÷ 0.2559	4	4	2	1,5	25
06130105	6 ÷ 8	0.2362 ÷ 0.3150	4	4	2,5	2,5	79
06130106	8 ÷ 10	0.3150 ÷ 0.3970	4	4	2,5	2,5	79
06130107	10 ÷ 12	0.3970 ÷ 0.4724	4	4	2,5	2,5	79
06130108	11 ÷ 14	0.4330 ÷ 0.5512	4	4	3,5	4	93
06130109	14 ÷ 17	0.5512 ÷ 0.6693	4	4	3,5	4	93
06130110	17 ÷ 20	0.6693 ÷ 0.7874	4	4	3,5	4	93
06130111	20 ÷ 25	0.7874 ÷ 0.9843	4	4	7	7	91
06130112	25 ÷ 30	0.9843 ÷ 1.1811	4	4	7	7	91
06130113	30 ÷ 35	1.1811 ÷ 1.3780	4	4	7	7	91
06130114	35 ÷ 40	1.3780 ÷ 1.5748	4	4	7	7	91
06130115	40 ÷ 50	1.5748 ÷ 1.9685	4	4	11	12	104
06130116	50 ÷ 60	1.9685 ÷ 2.3622	5	5	11	12	104
06130117	60 ÷ 70	2.3622 ÷ 2.7560	5	5	11	12	104
06130118	70 ÷ 80	2.7560 ÷ 3.1496	5	5	11	12	104
06130119	80 ÷ 90	3.1496 ÷ 3.5433	5	5	11	12	104
06130120	90 ÷ 100	3.5433 ÷ 3.9370	5	5	11	12	104
06130121	100 ÷ 125	3.9370 ÷ 4.9212	6	6	26	18	100
06130122	125 ÷ 150	4.9212 ÷ 5.9055	6	6	26	18	100
06130123	150 ÷ 175	5.9055 ÷ 6.8897	7	7	26	18	100
06130124	175 ÷ 200	6.8897 ÷ 7.8740	7	7	26	18	100
06130125	200 ÷ 225	7.8740 ÷ 8.8582	8	8	26	18	100
06130126	225 ÷ 250	8.8582 ÷ 9.8425	8	8	26	18	100
06130127	250 ÷ 275	9.8425 ÷ 10.8267	8	8	26	18	100
06130128	275 ÷ 300	10.8267 ÷ 11.8110	8	8	26	18	100

Optional Accessory

01961000 1 Lithium battery - 3 V, 190 mAh, type CR 203

For ordering information on cables etc., see section A. Suited carrying cases on page D-8.



# TESA IMICRO capa $\mu$ system with Digital Display – Partial Sets

A successful combination of the TESA patented capacitive measuring system with the IMICRO unique cone.



- ✓
- DIN 863 T4 (Style C1)
- 0,001 mm  
0.00005 in
- Metric/inch Conversion
- LCD, 7 mm digit height
- Floating zero
- Display lock
- Measuring faces for application ranges  
3,5 to 12 mm: hardened steel (HV30 770)  
11 to 100 mm: TiN hard-coating (HV5 2300)  
100 to 300 mm: carbide tipped (HV5 1300)

Partial sets including	Elements	Measuring heads	Setting rings	Extensions
<b>06130230</b> 3,5 ÷ 6,5	06130010	06140020 3,5 ÷ 4	00843200 4	–
		06140021 4 ÷ 4,5	00843201 5,5	
		06140022 4,5 ÷ 5,5		
		06140023 5,5 ÷ 6,5		
<b>06130231</b> 6 ÷ 12	06130011	06140024 6 ÷ 8	00840101 8	00840001 100
		06140025 8 ÷ 10	00840102 10	
		06140026 10 ÷ 12		
<b>06130232</b> 11 ÷ 20	06130011	06140027 11 ÷ 14	00840103 11	00840301 150
		06140028 14 ÷ 17	00840105 17	
		06140029 17 ÷ 20		
<b>06130233</b> 20 ÷ 40	06130011	06140030 20 ÷ 25	00840106 25	00841100 150
		06140031 25 ÷ 30	00840107 35	
		06140032 30 ÷ 35		
		06140033 35 ÷ 40		
<b>06130234</b> 40 ÷ 100	06130011	06140034 40 ÷ 50	00840108 50	00841800 150
		06140035 50 ÷ 60	00840109 70	
		06140036 60 ÷ 70	00840110 90	
		06140037 70 ÷ 80		
		06140038 80 ÷ 90		
		06140039 90 ÷ 100		
<b>06130235</b> 100 ÷ 200	06130012	06140040 100 ÷ 125	00840112 125	00842600 150
		06140041 125 ÷ 150	00840113 175	
		06140042 150 ÷ 175		
		06140043 175 ÷ 200		

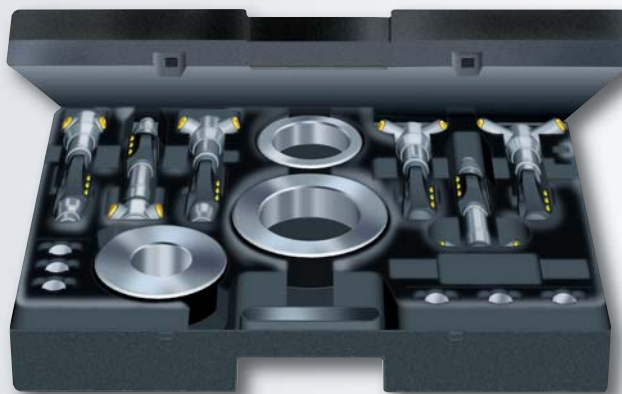
Set composition for the application range from 200 to 300 mm available upon request

Measuring Element	Measuring heads	mm
<b>06130012</b>	06140044	200 ÷ 225
	06140045	225 ÷ 250
	06140046	250 ÷ 275
	06140047	275 ÷ 300

- RS 232 opto-coupled, bidirectional
- 3 V lithium battery
- 1 to 2 a (≈ 2000 h/a)
- Automatic shut down after 10 min.  
Display setting is retained as long as power supply remains stable.
- 10 °C to 40 °C
- 10 °C to 60 °C
- 80%, non condensing
- ✓
- Measuring element IP54 (IEC 60529) or IP40 with active data output
- Plastic case
- Identification number
- TESA's calibration certificate
- Declaration of conformity

# TESA IMICRO capa $\mu$ system with Digital Display – Full Sets

A successful combination of the TESA patented capacitive measuring system with the IMICRO unique cone.



DIN 863 T4  
(Style C1)

0,001 mm  
0.00005 in

Metric/inch  
Conversion

LCD, 7 mm  
digit height

Floating zero

Display lock

Measuring faces  
for application  
ranges

3,5 to 12 mm:  
hardened steel (HV30 770)  
11 to 100 mm:  
TiN hard-coating (HV5 2300)  
100 to 300 mm:  
carbide tipped (HV5 1300)

RS 232  
opto-coupled,  
bidirectional

3 V lithium battery

1 to 2 a  
( $\approx$  2000 h/a)

Automatic  
shut down after  
10 min.

Display setting is retained  
as long as power supply  
remains stable.

10 °C to 40 °C

-10 °C to 60 °C

80%,  
non condensing



Measuring  
element IP54  
(IEC 60529) or  
IP40 with active data  
output

Plastic case

Identification  
number

TESA's  
calibration  
certificate

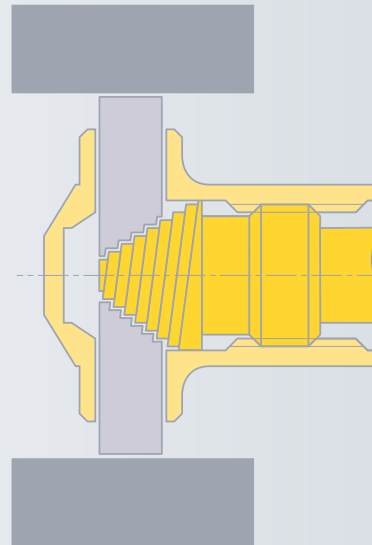
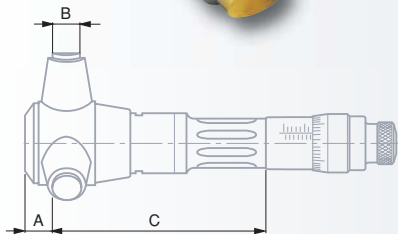
Declaration  
of conformity

Full sets including		Single micrometers		Setting rings		Extensions	
<b>06130220</b>	3,5 ÷ 6,5	06130101	3,5 ÷ 4	00843200	4	–	
		06130102	4 ÷ 4,5	00843201	5,5		
		06130103	4,5 ÷ 5,5				
		06130104	5,5 ÷ 6,5				
<b>06130221</b>	6 ÷ 12	06130105	6 ÷ 8	00840101	8	00840001	100
		06130106	8 ÷ 10	00840102	10		
		06130107	10 ÷ 12				
<b>06130222</b>	11 ÷ 20	06130108	11 ÷ 14	00840103	11	00840301	150
		06130109	14 ÷ 17	00840105	17		
		06130110	17 ÷ 20				
<b>06130223</b>	20 ÷ 40	06130111	20 ÷ 25	00840106	25	00841100	150
		06130112	25 ÷ 30	00840107	35		
		06130113	30 ÷ 35				
		06130114	35 ÷ 40				
<b>06130224</b>	40 ÷ 100	06130115	40 ÷ 50	00840108	50	00841800	150
		06130116	50 ÷ 60	00840109	70		
		06130117	60 ÷ 70	00840110	90		
		06130118	70 ÷ 80				
		06130119	80 ÷ 90				
		06130120	90 ÷ 100				
<b>06130225</b>	100 ÷ 200	06130121	100 ÷ 125	00840112	125	00842600	150
		06130122	125 ÷ 150	00840113	175		
		06130123	150 ÷ 175				
		06130124	175 ÷ 200				



# TESA IMICRO with Analogue Indication – Metric

Self-centring and self-aligning internal micrometers. The high-precision thread machined into the measuring cone, combined with the measuring bolts specially arranged to provide 3-line contact, make them the only micrometers in the world that respect the ABBE principle. Measure depth, reliably.



DIN 863 T4  
(Style C1)  
NF E 11-099



Measuring faces for application ranges from  
3,5 to 12 mm:  
hardened steel (HV30 770)  
11 to 100 mm:  
TiN hard-coating (HV5 2300)  
100 to 300 mm:  
carbide tipped (HV5 1300)



Application ranges from 3,5 to 200 mm in a shipping box  
200 to 300 mm in a wooden case with 1 extension of 150 mm (No. 00842600)



Identification number  
Inspection report with a declaration of conformity

No						A mm	B mm	C mm
	mm	mm	µm	µm				
00813410	3,5 ÷ 4	0,001	4	4		2	1,5	20
00813411	4 ÷ 4,5	0,001	4	4		2	1,5	20
00813412	4,5 ÷ 5,5	0,001	4	4		2	1,5	25
00813413	5,5 ÷ 6,5	0,001	4	4		2	1,5	25
00810001	6 ÷ 8	0,001	4	4		2,5	2,5	52
00810002	8 ÷ 10	0,001	4	4		2,5	2,5	52
00810003	10 ÷ 12	0,001	4	4		2,5	2,5	52
00810801	11 ÷ 14	0,005	4	4		3,5	4	77
00810802	14 ÷ 17	0,005	4	4		3,5	4	77
00810803	17 ÷ 20	0,005	4	4		3,5	4	77
00811501	20 ÷ 25	0,005	4	4		7	7	78
00811502	25 ÷ 30	0,005	4	4		7	7	78
00811503	30 ÷ 35	0,005	4	4		7	7	78
00811504	35 ÷ 40	0,005	4	4		7	7	78
00812301	40 ÷ 50	0,005	4	4		11	12	84
00812302	50 ÷ 60	0,005	5	5		11	12	84
00812303	60 ÷ 70	0,005	5	5		11	12	84
00812304	70 ÷ 80	0,005	5	5		11	12	84
00812305	80 ÷ 90	0,005	5	5		11	12	84
00812306	90 ÷ 100	0,005	5	5		11	12	84
00812601	100 ÷ 125	0,01	6	6		26	18	81
00812602	125 ÷ 150	0,01	6	6		26	18	81
00812603	150 ÷ 175	0,01	7	7		26	18	81
00812604	175 ÷ 200	0,01	7	7		26	18	81
00813101	200 ÷ 225	0,01	8	8		26	18	81
00813102	225 ÷ 250	0,01	8	8		26	18	81
00813103	250 ÷ 275	0,01	8	8		26	18	81
00813104	275 ÷ 300	0,01	8	8		26	18	81

## TESA IMICRO with Analogue Indication – Full Metric Sets



DIN 863 T4  
(Style C1)  
NF E 11-099

Measuring faces  
on models from  
3,5 to 12 mm:  
hardened steel, HV30 770;  
11 to 100 mm: titanium  
nitride (TiN) hard-coating  
to HV5 2300.  
100 to 200 mm: tungsten  
carbide tipped to HV5 1300.

Additional  
technical data:  
see on the  
previous page.  
Setting rings on  
page D-17.

Plastic case  
or suitcase

Identification  
number

Inspection report  
with a declaration  
of conformity

No	A	mm	No	mm	No	mm	No	mm
Full sets including			Single micrometers		Setting rings		Extensions	
<b>00813409</b>	BAE	3,5 ÷ 6,5	00813410	3,5 ÷ 4	00843200	4	–	
			00813411	4 ÷ 4,5	00843201	5,5		
			00813412	4,5 ÷ 5,5				
			00813413	5,5 ÷ 6,5				
<b>00810000</b>	BAF	6 ÷ 12	00810001	6 ÷ 8	00840101	8	00840001	100
			00810002	8 ÷ 10	00840102	10		
			00810003	10 ÷ 12				
<b>00810800</b>	BAG	11 ÷ 20	00810801	11 ÷ 14	00840103	11	00840301	150
			00810802	14 ÷ 17	00840105	17		
			00810803	17 ÷ 20				
<b>00811500</b>	BAH	20 ÷ 40	00811501	20 ÷ 25	00840106	25	00841100	150
			00811502	25 ÷ 30	00840107	35		
			00811503	30 ÷ 35				
			00811504	35 ÷ 40				
<b>00812300</b>	BAJ	40 ÷ 100	00812301	40 ÷ 50	00840108	50	00841800	150
			00812302	50 ÷ 60	00840109	70		
			00812303	60 ÷ 70	00840110	90		
			00812304	70 ÷ 80				
			00812305	80 ÷ 90				
			00812306	90 ÷ 100				
<b>00812600</b>	BAK	100 ÷ 200	00812601	100 ÷ 125	00840112	125	00842600	150
			00812602	125 ÷ 150	00840113	175		
			00812603	150 ÷ 175				
			00812604	175 ÷ 200				



## Accessories for both TESA IMICRO and TESA IMICRO capa $\mu$ system

### Extensions for Deep Hole Measurement



DIN 863 T4 (Style C1)

Nº	mm	mm	Nº	mm	mm
00840001	6 ÷ 12	100	00841800	40 ÷ 100	150
00840301	11 ÷ 20	150	00841801		500
00840302		500	00841802		1000
00841100	20 ÷ 40	150	00842600	100 ÷ 300	150
00841101		500	00842601		500
00841102		1000	00842602		1000

### Centring Devices for TESA IMICRO



Nº	mm	mm
00860001	40 ÷ 100	150
00862601	100 ÷ 200	200



### Moulded Cases for Single Micrometers, Full Sets and Partial Sets

Nº	mm	Nº	mm
<i>Single micrometers</i>			
–	06160002	3,5 ÷ 12	
00860007	06160002	11 ÷ 20	
00860011	06160002	20 ÷ 40	
00860015	06160003	40 ÷ 70	
00860016	06160003	70 ÷ 100	
00863016	00863016	100 ÷ 300	

Nº	mm	Nº	mm
<i>Micrometer sets</i>			
00863035	06160006	3,5 ÷ 6,5	
00863005	06160005	6 ÷ 12	
00860008	06160005	11 ÷ 20	
00860012	06160006	20 ÷ 40	
00860017	06160007	40 ÷ 100	
00863017	00863017	100 ÷ 200	

### IMICRO Adapter

Every TESA IMICRO (SM versions or models with analogue indication) can easily be updated by means of the adapter used for coupling the measuring head with the new capa  $\mu$  system element.



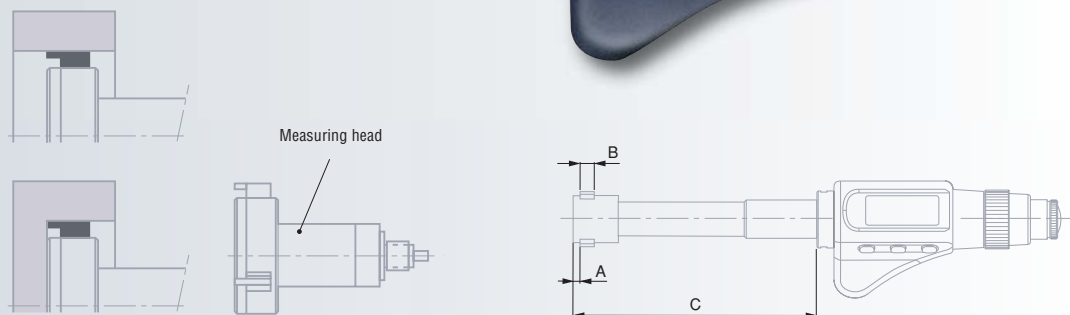
Nº	Nº	mm
<i>Capa <math>\mu</math> system element</i>	<i>Adapter</i>	<i>Application range</i>
06130011		6 ÷ 100
	06140048	6 ÷ 12
	06140049	11 ÷ 20
	06140050	20 ÷ 40
	06140051	40 ÷ 100

**Note:** To ensure accuracy, the micrometer needs to be recalibrated.

# TESA ALESOMETER *capa μ system* with Digital Display

Fitted with a TESA patented capacitive measuring system

Bore gauges with 3-line contact. All TESA ALESOMETER are made to measure through and blind bores as well as short centring shoulders, except for the models covering the application range from 6 to 10 mm.



## Single Bore Gauges, Complete

No	mm		in		μm		μm		
	mm	in	μm	μm	A mm*	B mm	C mm		
06230051	6 ÷ 8	0.2362 ÷ 0.3150	4	4	1,2	3	55		
06230052	8 ÷ 10	0.3150 ÷ 0.3970	4	4	1,2	3	55		
06230023	10 ÷ 12,5	0.3970 ÷ 0.4921	4	4	0,3	6,5	65		
06230024	12,5 ÷ 15	0.4921 ÷ 0.5905	4	4	0,3	6,5	65		
06230025	15 ÷ 17,5	0.5905 ÷ 0.6890	4	4	0,3	6,8	65		
06230026	17,5 ÷ 20	0.6890 ÷ 0.7874	4	4	0,3	6,8	95		
06230027	20 ÷ 25	0.7874 ÷ 0.9843	4	4	0,3	8,5	100		
06230028	25 ÷ 30	0.9843 ÷ 1.1811	4	4	0,3	8,5	100		
06230029	30 ÷ 35	1.1811 ÷ 1.3780	4	4	0,3	8,5	100		
06230030	35 ÷ 40	1.3780 ÷ 1.5748	4	4	0,3	8,5	100		
06230031	40 ÷ 50	1.5748 ÷ 1.9685	4	4	0,3	14,5	140		
06230032	50 ÷ 60	1.9685 ÷ 2.3622	5	5	0,3	14,5	140		
06230033	60 ÷ 70	2.3622 ÷ 2.7560	5	5	0,3	14,5	140		
06230034	70 ÷ 85	2.7560 ÷ 3.3465	5	5	0,3	14,5	140		
06230035	85 ÷ 100	3.3465 ÷ 3.9370	5	5	0,3	14,5	140		
06230036	100 ÷ 125	3.9370 ÷ 4.9212	6	6	0,3	30	175		
06230037	125 ÷ 150	4.9212 ÷ 5.9055	6	6	0,3	30	175		
06230038	150 ÷ 175	5.9055 ÷ 6.8897	7	7	0,3	30	175		
06230039	175 ÷ 200	6.8897 ÷ 7.8740	7	7	0,3	30	175		
06230040	200 ÷ 225	7.8740 ÷ 8.8582	8	8	0,3	30	175		
06230041	225 ÷ 250	8.8582 ÷ 9.8425	8	8	0,3	30	175		
06230042	250 ÷ 275	9.8425 ÷ 10.8267	8	8	0,3	30	175		
06230043	275 ÷ 300	10.8267 ÷ 11.8110	8	8	0,3	30	175		

### Optional Accessory

**01961000** 1 Lithium battery 3 V, 190 mAh, type CR 2032

\* Not applicable for models from 10 mm since the measuring inserts are close to the micrometer front face. For ordering information on setting rings, see both pages D-12 and D-17, or report to page D-10 for storage cases or to section A for connecting cables and the like.



DIN 863 T4, Style C1 for models 6 to 10 mm or style C2 for all other models

0,001 mm / 0.00005 in

Metric/inch conversion

LCD, digit height 7 mm

Floating zero

Display lock

Measuring inserts for application range 6 to 10 mm: steel, hardened to HV30 550. 10 to 300: tungsten carbide tipped, HRC ≥ 70.

RS 232 opto-coupled, bidirectional

3 V lithium battery

1 to 2 a (≈ 2000 h/a)

Automatic shut down after 10 min. Display setting is retained as long as power supply remains stable.

10 °C to 40 °C

-10 °C to 60 °C

80%, non condensing



For the measuring element IP54 (IEC 60529) or IP40 with active data output

≤ 100 mm in a plastic case > 100 mm in a wooden case

Identification number

Inspection report with a declaration of conformity

# TESA ALESOMETER *capa μ* system with Digital Display

## Partial Sets plus Components



Fitted with TESA patented capacitive measuring system

Models that cover the application range from 6 to 10 mm can only measure through bores – All other partial sets also allow blind bores as well as short centring shoulders to be inspected.



DIN 863 T4.  
Style C1  
for models  
6 to 10 mm or C2 for  
all other models



0,001 mm  
0.00005 in



Measuring inserts  
for application  
range  
6 to 10 mm: steel,  
hardened to HV30 550.  
10 to 300: tungsten carbide  
tipped to HRC ≥ 70.



For additional  
technical data,  
see on page D-9  
or D-12 for setting rings.



≤ 100 mm in a  
plastic case,  
> 100 mm in a  
wooden case



Identification  
number



Inspection report  
with a declaration  
of conformity

No	mm	No	mm	No	No	No	mm	No
Partial sets including		Measuring heads		Connectors	Measuring elements	Setting rings		Storage cases
<b>06230100</b>	6 ÷ 10	0081720351	6 ÷ 8	0081620491	06230020	0211625101	8	06260001
		0081720353	8 ÷ 10					
<b>06230110</b>	10 ÷ 20	0081720356	10 ÷ 12,5	0081620492	06230020	0211625102	12,5	06260001
		0081720358	12,5 ÷ 15			0211625103	17,5	
		0081720360	15 ÷ 17,5					
		0081720362	17,5 ÷ 20					
<b>06230111</b>	20 ÷ 40	0081720364	20 ÷ 25	0081620493	06230020	0211625104	25	06260001
		0081720366	25 ÷ 30			0211625105	35	
		0081720368	30 ÷ 35					
		0081720370	35 ÷ 40					
<b>06230112</b>	40 ÷ 100	0081720372	40 ÷ 50	0081620494	06230020	0211625106	45	0081629525
		0081720374	50 ÷ 60			0211625107	60	
		0081720376	60 ÷ 70			0211625109	85	
		0081720378	70 ÷ 85					
		0081720380	85 ÷ 100					
<i>Set composition for application range from 100 to 300 mm available upon request</i>								
		Measuring heads		Connectors	Measuring element	Setting rings		Storage cases
		<b>0081720382</b>	100 ÷ 125	0081620495	06230020	0211625111	125	00863016
		<b>0081720384</b>	125 ÷ 150			0211625112	150	
		<b>0081720386</b>	150 ÷ 175			0211625112	150	
		<b>0081720388</b>	175 ÷ 200			0211625113	175	
		<b>0081720390</b>	200 ÷ 225			0211625114	200	
		<b>0081720392</b>	225 ÷ 250			0211625115	225	
		<b>0081720394</b>	250 ÷ 275			0211625116	250	
		<b>0081720396</b>	275 ÷ 300			0211625117	275	

Each storage case can contain a single measuring head only.



NF E 11-099.  
Type 1  
for models  
6 to 10 mm or type 2 for  
all other models

Measuring inserts  
for application  
range  
6 to 10 mm: steel,  
hardened to HV30 550.  
10 to 300 mm:  
tungsten carbide tipped to  
HRC  $\geq$  70.

Wooden case

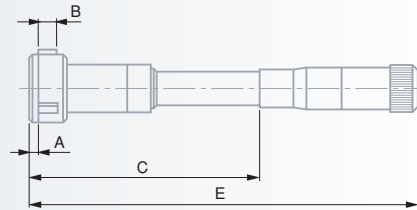
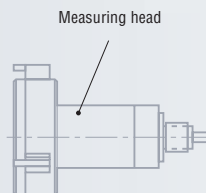
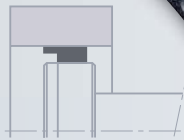
Identification  
number

Declaration  
of conformity

Calibration  
certificate  
upon request

## ROCH ALESOMETER with Analogue Indication, Metric

Bore gauges with 3-line contact. All ROCH ALESOMETER let you measure not only through bores, but also blind bores as well as centring shoulders, except for the models covering the application range 6 to 10 mm.



### Single Bore Gauges, complete

No								
					mm	mm	$\mu$ m	A mm*
0081725001	6 ÷ 8	0,001	4	1,2	3	54,5	107	
0081725003	8 ÷ 10	0,001	4	1,2	3	54,5	107	
0081725006	10 ÷ 12,5	0,001	4	0,3	6,5	64,5	117	
0081725008	12,5 ÷ 15	0,001	4	0,3	6,5	64,5	117	
0081725010	15 ÷ 17,5	0,001	4	0,3	6,8	64,5	117	
0081725012	17,5 ÷ 20	0,001	4	0,3	6,8	64,5	117	
0081725014	20 ÷ 25	0,001	4	0,3	8,5	70	122,5	
0081725016	25 ÷ 30	0,001	4	0,3	8,5	70	122,5	
0081725018	30 ÷ 35	0,001	4	0,3	8,5	70	122,5	
0081725020	35 ÷ 40	0,001	4	0,3	8,5	70	122,5	
0081725022	40 ÷ 50	0,001	4	0,3	14,5	108,7	188,7	
0081725024	50 ÷ 60	0,001	5	0,3	14,5	108,7	188,7	
0081725026	60 ÷ 70	0,001	5	0,3	14,5	108,7	188,7	
0081725028	70 ÷ 85	0,001	5	0,3	14,5	126,7	206,7	
0081725030	85 ÷ 100	0,001	5	0,3	14,5	126,7	206,7	
0081725032	100 ÷ 125	0,01	7	0,3	30	153,7	233,5	
0081725034	125 ÷ 150	0,01	7	0,3	30	153,7	233,5	
0081725036	150 ÷ 175	0,01	8	0,3	30	153,7	233,5	
0081725038	175 ÷ 200	0,01	8	0,3	30	153,7	233,5	
0081725040	200 ÷ 225	0,01	9	0,3	30	153,7	233,5	
0081725042	225 ÷ 250	0,01	9	0,3	30	153,7	233,5	
0081725044	250 ÷ 275	0,01	9	0,3	30	153,7	233,5	
0081725046	275 ÷ 300	0,01	9	0,3	30	153,7	233,5	

\* Not applicable for models from 10 mm since the measuring inserts are close to the micrometer front face.



# ROCH ALESOMETER with Analogue Indication – Full Metric Sets



NF E 11-099.  
Type 1  
for models  
6 to 10 mm or type 2 for  
all other models.



Measuring inserts  
for application  
range  
6 to 10 mm: steel,  
hardened to HV30 550.  
10 to 300 mm:  
tungsten carbide tipped to  
HRC ≥ 70.



For any additional  
data, see  
on page D-11



Wooden case



Identification  
number



Declaration  
of conformity



Calibration  
certificate  
upon request

No	mm	No	mm	No	mm	No	mm
Full sets including		Single bore gauges		Setting rings	Extensions		
0081725063	6 ÷ 10	0081725001	6 ÷ 8	0211625101	8	0081625081	100
		0081725003	8 ÷ 10				
0081725066	10 ÷ 20	0081725006	10 ÷ 12,5	0211625102	12,5	0081625082	100
		0081725008	12,5 ÷ 15	0211625103	17,5		
		0081725010	15 ÷ 17,5				
		0081725012	17,5 ÷ 20				
0081725068	20 ÷ 40	0081725014	20 ÷ 25	0211625104	25	0081625083	150
		0081725016	25 ÷ 30	0211625105	35		
		0081725018	30 ÷ 35				
		0081725020	35 ÷ 40				
0081725070	40 ÷ 100	0081725022	40 ÷ 50	0211625106	45	0081625084	150
		0081725024	50 ÷ 60	0211625107	60		
		0081725026	60 ÷ 70	0211625109	85		
		0081725028	70 ÷ 85				
		0081725030	85 ÷ 100				
0081725072	100 ÷ 150	0081725032	100 ÷ 125	0211625111	125	0081625085	200
		0081725034	125 ÷ 150				

### Extensions



Hardened steel.  
Insulated body  
against hand  
warmth.



Identification  
number



Declaration  
of conformity

### Setting rings



NF E 11-011,  
type A2



Steel, hardened  
to 60 HRC



Bore related  
tolerance  
 $\pm (3 \mu\text{m} + 10 \cdot 10^{-6} \cdot D) \mu\text{m}$



D = Nominal  
diameter in mm  
 $(1 \mu\text{m} + 5 \cdot 10^{-6} \cdot D) \mu\text{m}$



Shipping box



Identification  
number



Calibration  
certificate  
upon request

## Extensions for Depth Increase

No	mm	mm
0081625081	6 ÷ 10	100
0081625082	10 ÷ 20	100
0081625083	20 ÷ 40	150
0081625084	40 ÷ 100	150
0081625085	100 ÷ 300	200

## ROCH Setting Rings

No	mm	No	mm
0211625101	8	0211625110	90
0211625102	12,5	0211625111	125
0211625103	17,5	0211625112	150
0211625104	25	0211625113	175
0211625105	35	0211625114	200
0211625106	45	0211625115	225
0211625107	60	0211625116	250
0211625109	85	0211625117	275

# TESA TRI-O-BOR

Self-centring and self-aligning internal micrometers with 3-line contact with the part being inspected. These micrometers measure trough holes, blind bores and short centring shoulders.



DIN 863 T4  
(Style C2)  
NF E 11-099

0,002 mm

0,01 mm

Tungsten carbide tipped measuring bolts and cone

Supplied with 1 heat insulating sleeve (No. 00940020), 2 keys (No. 00940001), 1 screwdriver (No. 00862801).

Shipping box

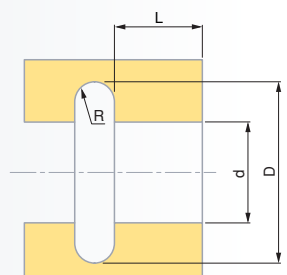
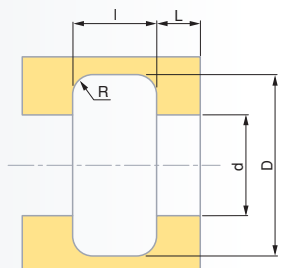
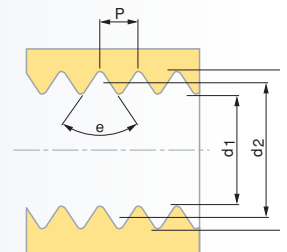
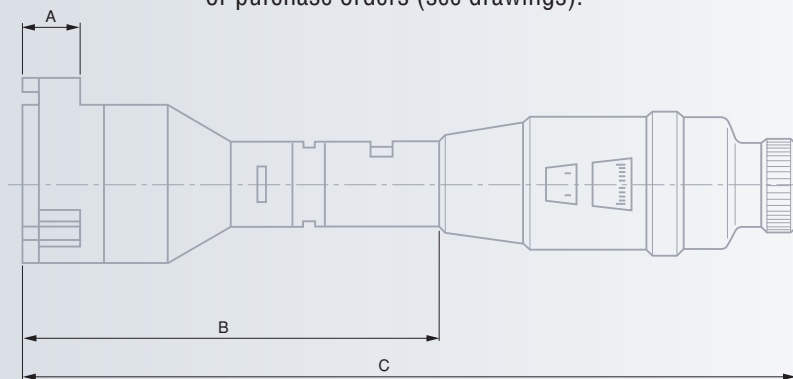
Identification number

Inspection report with a declaration of conformity



## Measuring Bolts with Special Design

Used for ISO metric threads (M16 x 0,5 to M150 x 6), UN, UNC or UNF unified imperial threads (60°) and Whitworth threads (55°). Measuring bolts with special profiles can also be made available. Both the size and type of the thread or the workpiece to be measured must be specified in your inquiries or purchase orders (see drawings).



No	mm	µm	µm	A mm	B mm	C mm
00910005	15 ÷ 20	4	4	6	≥ 66	≤ 132
00910006	20 ÷ 25	4	4	6	≥ 66	≤ 132
00910007	25 ÷ 30	4	4	6	≥ 66	≤ 132
00910405	30 ÷ 40	4	4	10	≥ 70	≤ 138
00910406	40 ÷ 50	4	4	10	≥ 70	≤ 138
00910407	50 ÷ 60	5	5	10	≥ 70	≤ 138
00910705	60 ÷ 70	5	5	18	≥ 78	≤ 147
00910706	70 ÷ 80	5	5	18	≥ 78	≤ 147
00910707	80 ÷ 90	5	5	18	≥ 78	≤ 147
00911105	90 ÷ 100	5	5	18	≥ 78	≤ 147
00911106	100 ÷ 110	6	6	18	≥ 78	≤ 147
00911107	110 ÷ 120	6	6	18	≥ 78	≤ 147

# TESA TRI-O-BOR Full Sets



For technical data, see on page D-13.  
For setting rings, report to page D-17.



Supplied with 1 extension for depth increase (150 mm) No. 00940000, 1 heat insulating sleeve No. 00940020, 2 keys No. 00940001, 1 screwdriver No. 00862801.



Protective case or carrying case



Inspection report with a declaration of conformity

## Metric Executions

No		mm		mm		mm		mm	
Full sets including		Single micrometers		Setting rings		Extensions			
<b>00910004</b>	BSC	15 ÷ 30	00910005	15 ÷ 20	00840104	15	00940000	150	
			00910006	20 ÷ 25	00840105	25			
			00910007	25 ÷ 30					
<b>00910404</b>	BSD	30 ÷ 60	00910405	30 ÷ 40	00840107	35	00940000	150	
			00910406	40 ÷ 50	00840108	50			
			00910407	50 ÷ 60					
<b>00910704</b>	BSF	60 ÷ 90	00910705	60 ÷ 70	00840109	70	00940000	150	
			00910706	70 ÷ 80	00840110	90			
			00910707	80 ÷ 90					
<b>00911104</b>	BSG	90 ÷ 120	00911105	90 ÷ 100	00840110	90	00940000	150	
			00911106	100 ÷ 110	00840111	110			
			00911107	110 ÷ 120					

## TESA TRI-O-BOR Accessories

### Extension for Depth Increase

No	mm
00940000	150



### Protective or Plastic Carrying Cases for TESA TRI-O-BOR

No	No	mm	in
Single micrometers	Full micrometer sets		
00960023	00960024	15 ÷ 30	0.6 ÷ 1.2
00960025	00960026	30 ÷ 60	1.2 ÷ 2.4
00960027	00960028	60 ÷ 90	2.4 ÷ 3.6
00960004	00960008	90 ÷ 120	3.6 ÷ 4.8



# ETALON INTALOMETER 531

Made to check through holes, blind bores and short centring shoulders. All models covering the application range up to 100 mm have sloped bolts extending beyond the front face of the measuring head.



Models from 10 to 100 mm: DIN 863 T4 (Style C2) NF E 11-099

Models from 5 to 100 mm: 0,002 mm

Models 100 to 200 mm with vernier reading: 0,01 mm.

Measuring bolts on models from 5 to 100 mm: hardened steel. 100 to 200 mm: tungsten carbide tipped.

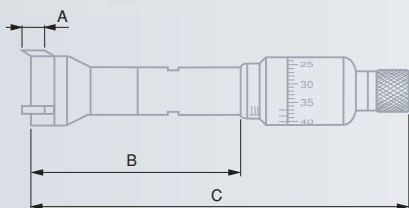
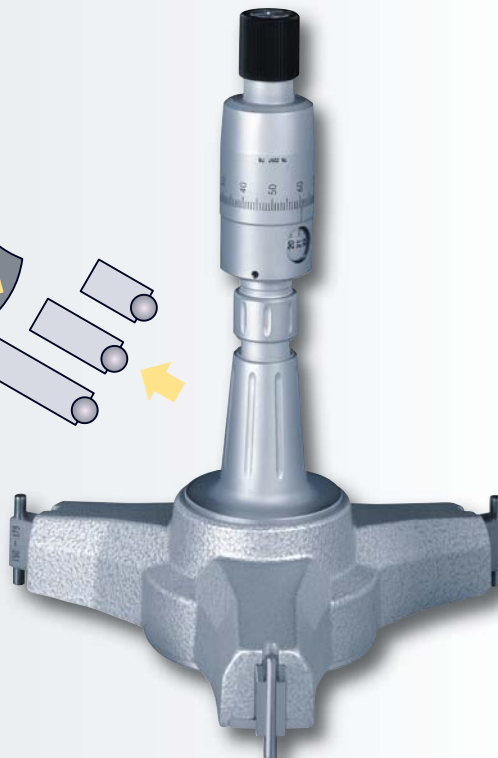
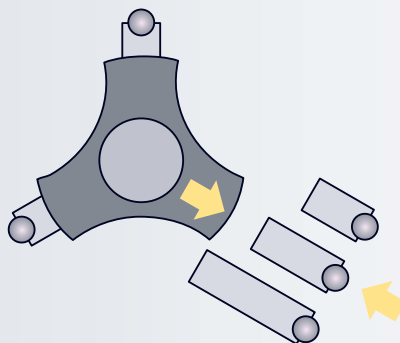
Max. perm. error for models covering the application ranges from 5 to 40 mm = 3 µm  
40 to 100 mm = 4 µm  
100 to 200 mm = 5 µm

Repeatability limit for models covering the application ranges from 5 to 40 mm = 3 µm  
40 to 100 mm = 4 µm  
100 to 200 mm = 5 µm

Protective case or carrying case

Identification number

Inspection report with a declaration of conformity



				<b>A mm</b>	<b>B mm</b>	<b>C mm</b>
078112356	5 ÷ 6	2 x 180°	3	≥ 32	≤ 109	
078112357	6 ÷ 7	2 x 180°	3	≥ 33	≤ 111	
078112358	7 ÷ 8,5	2 x 180°	4	≥ 60	≤ 130	
078112359	8,5 ÷ 10	2 x 180°	4	≥ 72	≤ 133	
078112360	10 ÷ 12,5	3 x 120°	3	≥ 60	≤ 118	
078112361	12,5 ÷ 15	3 x 120°	3	≥ 63	≤ 120	
078112362	15 ÷ 17,5	3 x 120°	3	≥ 65	≤ 122	
078112363	17,5 ÷ 20	3 x 120°	3	≥ 68	≤ 125	
078112364	20 ÷ 25	90°-135°-135°	7	≥ 75	≤ 132	
078112365	25 ÷ 30	90°-135°-135°	7	≥ 80	≤ 138	
078112366	30 ÷ 35	90°-135°-135°	7	≥ 90	≤ 142	
078112367	35 ÷ 40	90°-135°-135°	7	≥ 90	≤ 148	
078112368	40 ÷ 45	90°-135°-135°	10,5	≥ 110	≤ 167	
078112369	45 ÷ 50	90°-135°-135°	10,5	≥ 113	≤ 170	
078112370	50 ÷ 60	90°-135°-135°	15	≥ 123	≤ 187	
078112371	60 ÷ 70	90°-135°-135°	15	≥ 130	≤ 193	
078112372	70 ÷ 85	90°-135°-135°	15	≥ 145	≤ 213	
078112373	85 ÷ 100	90°-135°-135°	15	≥ 155	≤ 224	
078110733	100 ÷ 125	3 x 120°	27	≥ 105	≤ 194	
078110735	125 ÷ 150	3 x 120°	27	≥ 105	≤ 194	
078110737	150 ÷ 175	3 x 120°	27	≥ 105	≤ 194	
078110739	175 ÷ 200	3 x 120°	27	≥ 105	≤ 194	

Measuring range up to 300 mm available upon request.



# ETALON INTALOMETER 531







## Metric Tool Sets



 For technical data, see page D-15. For setting rings, report to page D-17.

 Protective case or carrying case

 Inspection report with a declaration of conformity

								
	mm		mm	mm		mm		mm

Full sets including		Single micrometers		Extensions		Setting rings
<b>078110592</b>	5 ÷ 10	078112356	5 ÷ 6	078103613	100	00840114 6
		078112357	6 ÷ 7			00840115 8,5
		078112358	7 ÷ 8,5			
		078112359	8,5 ÷ 10			
<b>078110594</b>	10 ÷ 20	078112360	10 ÷ 12,5	078103621	150	00840116 12,5
		078112361	12,5 ÷ 15			00840117 17,5
		078112362	15 ÷ 17,5			
		078112363	17,5 ÷ 20			
<b>078110596</b>	20 ÷ 40	078112364	20 ÷ 25	078103624	150	00840106 25
		078112365	25 ÷ 30			00840107 35
		078112366	30 ÷ 35			
		078112367	35 ÷ 40			
<b>078110598</b>	40 ÷ 100	078112368	40 ÷ 45	078104940	150	00843230 45
		078112369	45 ÷ 50			00843239 60
		078112370	50 ÷ 60			00840118 85
		078112371	60 ÷ 70			
		078112372	70 ÷ 85			
		078112373	85 ÷ 100			
Partial sets including		Single micrometers	Measuring bolts		Extensions	
<b>078110749</b>	100 ÷ 150	078110733	078111003*	100 ÷ 125	078104940	150
			078111004	125 ÷ 150		

\* Bolt set provided with the single micrometer No. 078110733.

# TESA Setting Rings and Setting Masters



	mm	µm*	µm**
<i>Setting rings</i>			
<b>00843200</b>	4	1,5	1,5
<b>00843201</b>	5,5	1,5	1,5
<b>00840114</b>	6	1,5	1,5
<b>00840101</b>	8	1,5	1,5
<b>00840115</b>	8,5	1,5	1,5
<b>00840102</b>	10	1,5	1,5
<b>00840103</b>	11	1,5	1,5
<b>00840116</b>	12,5	1,5	1,5
<b>00840104</b>	15	1,5	1,5
<b>00840105</b>	17	1,5	1,5
<b>00840117</b>	17,5	1,5	1,5
<b>00840106</b>	25	1,5	1,5
<b>00840107</b>	35	2	2
<b>00843230</b>	45	2	2
<b>00840108</b>	50	2	2
<b>00843239</b>	60	2	2
<b>00840109</b>	70	2	2
<b>00840118</b>	85	2	2
<b>00840110</b>	90	2	2
<b>00840111</b>	110	2,5	2,5
<b>00840112</b>	125	2,5	2,5
<b>00840113</b>	175	2,5	4
<i>Setting master</i>			
<b>00843101</b>	225, 275	—	6

\* Making no allowance for a rim of 1 mm.

\*\* All listed values are determined through a 2-point measurement taken at half-height of the setting ring. The measuring direction is marked with 2 strokes. The measured actual dimension is engraved on every setting master.



# Measuring Instruments for Large Dimensions





## TESA – THE SPECIALISTS FOR LONG LENGTHS

*Large sizes in mechanical engineering mean dimensions in excess of 500 mm.*

*Besides various measurement procedures like those that apply to large internal or external micrometers with two-point contact, tape rules (wrapping round the outside diameter), V-bases, rotating measuring disks (rolling-contact) and optical systems (triangulation with theodolite), resort is often to make use of simple testing means like fixed gauges (inside caliper gauges), gauge blocks combinations or adjustable telescopic gauges.*

*For large dimensions from 250 mm up to several meters, TESA offers various types of measuring instruments that have long proven their value in practical use.*

*Here's an example of a proportional relationship. With a bore of 1200 H7, the tolerance area matches 0,1 mm. Reducing both values by a factor of 100 would give a manufacturing tolerance as low as 1  $\mu\text{m}$ . Of course, things are not as simple, but this example gives some ideas about the proportions.*

*Whatever the sizes, from a simple distance between two surfaces parallel one another to large diameters, their measurement is always a challenge. Apart from the usual influences, which are proportional to the size whilst adding to your contributions in the uncertainty budget, those due to gravity play a key role in distortion.*





DIN 863 T4  
(Style B)

**Measuring element**

Micrometer and dial gauge to 0,01 mm

Micrometer: 0,1 mm

Micrometer: 25 mm

0,5 mm

Dial gauge: ± 0,22 mm

0,7 to 1 N

8 µm

**Measuring bolts**

Spherical end for measuring in the micrometer axis. All inserts are interchangeable.

Tungsten carbide tipped

**Extensions**

26 mm dia. steel tube with snap-ring system. Also with built-in gauge rods.

Tungsten carbide tipped

One spherical and one flat measuring faces

**Additional data**

Wooden case

Setting standard with identification number

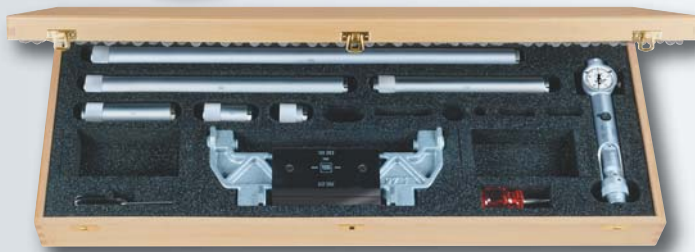
Declaration of conformity

# TESA UNITEST Internal Micrometer

Measures internal dimensions in the micrometer's axis with 2-point contact with the workpiece to be checked – Optional accessories are available for inspecting centring shoulders and blind bores along with auxiliary means for external measuring.

Extensions with built-in gauge rods can be mounted on the measuring element, thus allowing any dimension within the application range to be measured, directly.

Precise, easy-to-handle micrometer – Horizontal or vertical position of use – Constant measuring force – Integrated dial gauge to show you the culmination point.



mm

TESA UNITEST complete set



mm

01110700

int. dimensions 200 ÷ 1400

Consisting of:



mm



mm



µm

01110901	Meas. element for int. dimensions	200 ÷ 225		
01141001	Setting standard for internal/external dimensions	200		
01110801	Extension	25	0,7	
01110802	Extension	50	1	
01110804	Extension	100	1,5	
01110808	Extension	200	2,5	
01110812	Extension	300	3,5	
01110820	Extension	500	5,5	
01160901	Special screwdriver			
01162302	Wooden case for complete set			

**Optional Accessories**

01141101	Extension	1000	10	
01160701	Pair of tungsten carbide tipped measuring bolts for blind bores			
01162301	Auxiliary elements for external measurement			
		Measuring depth:	≤ 10	
01140801	Suspension device, complete	Measuring depth:	≤ 100	

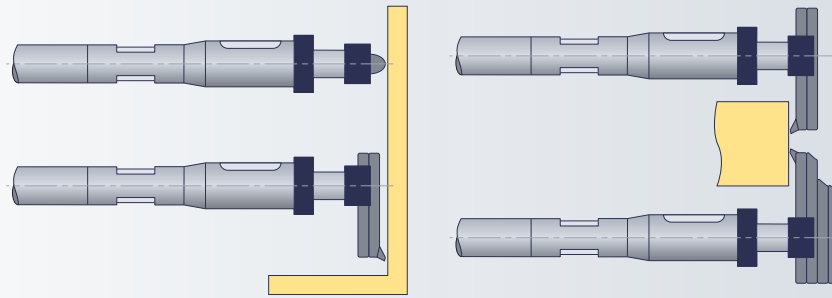


# TESA UNIMASTER Universal Measuring Instrument

Provides the features necessary for direct measurement of specially large internal and external dimensions.

TESA UNIMASTER is similar to internal micrometers with two-point contact with the workpiece being measured. Measures any dimension within the extended application range directly by simply adding the needed extensions with built-in gauge blocks to the measuring element.

Accurate, robust and easy-to-handle – Can be used either vertically or horizontally with a constant measuring force – Incorporates a lever-type dial test indicator that clearly shows the culmination point – Ensures stable measuring owing to both a negligible deflection and thermal protection on each extension.



DIN 863 T4  
(Style B)

**Measuring element**

Micrometer and dial test indicator: 0,01 mm

Micrometer: 25 mm

1 mm

Dial test indicator: ± 0,4 mm

15 to 20 N. Mobile ball-bearing anvil under spring pressure.

Reversible probing direction to allow both internal and external measuring.

5 µm

**Measuring bolts**

Tungsten carbide tipped

- Measuring bolts supplied in pairs:
  - No. 01110203 for internal measuring in the micrometer axis.
  - No. 01110205 for internal/external measuring, meas. depth up to 60 mm from the lower edge of the micrometer.
  - No. 01110208, extra-rigid for external measuring, meas. depth up to 75 mm from the lower edge of the micrometer.

**Extensions**

38 mm dia. diameter steel tube with snap ring system. Built-in gauge rod.

Tungsten carbide tipped

One spherical and one flat measuring faces



**Additional Data**

Wooden case

Measuring element and setting standard with identification number

Declaration of conformity



mm

TESA UNIMASTER complete set



mm

**01110000**

Internal dim. 250 ÷ 1475\*

External dim. 225 ÷ 1450\*

Consisting of:



mm

mm

µm

**01110300**

Measuring element

internal dim. 250 ÷ 275

external dim. 225 ÷ 250

**01110203**

Pair of measuring bolts for internal measuring

**01110205**

Pair of measuring bolts for internal/external measuring, with length to 75

**01110208**

Pair of measuring bolts for extern. measuring, length 100

**01110501**

Setting standard internal dimension 250

external dimension 225

**01110101**

Extension 25 0,7

**01110102**

Extension 50 1

**01110103**

Extension 75 1,2

**01110104**

Extension 100 1,5

**01110105**

Extension 125 1,5

**01110106**

Extension 150 2

**01110112**

Extension 300 3,5

**01110118**

Extension 450 4,5

**01110124**

Extension 600 6,5

**01130001**

Special screwdriver for extensions

**01110401**

Set of suspension accessories (4 brackets together with 4 clamps)

**01112401**

Wooden case for complete set

*Optional Accessories*

**01110140**

Extension 1000 10

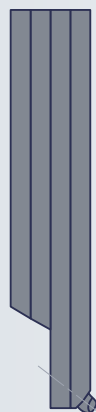
**01162001**

Pair of measuring bolts for internal/external dimensions and grooves Measuring depth ≤ 20 Tungsten carbide inserts Ø 4 x 7

**01160001**

Support roller supplied individually (2 items are needed)

\* Using 3 extensions at the very most.



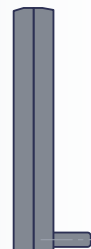
01110208



01110205



01110203



01162001





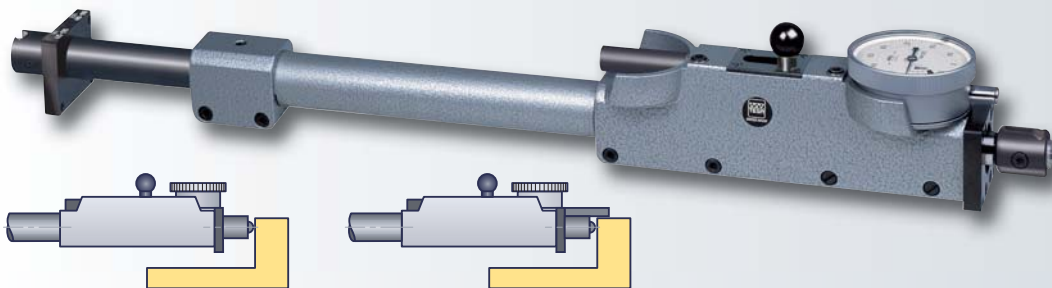
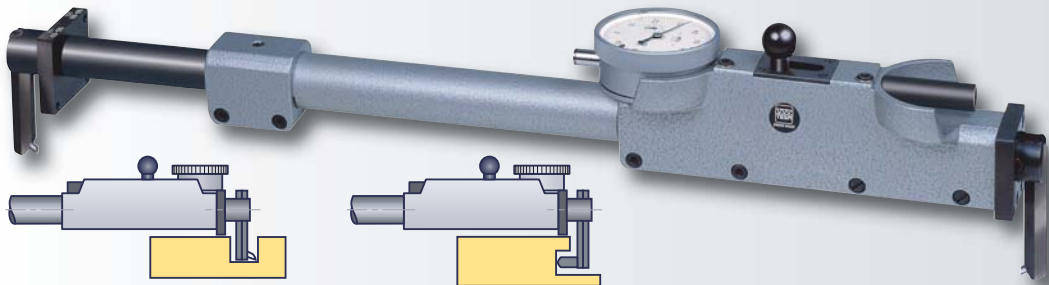
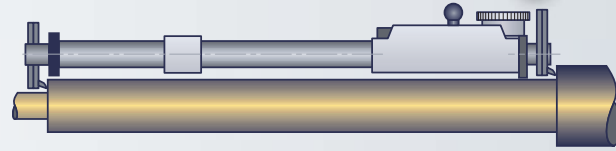
# TESA INOTEST

## Comparative Measuring Instrument

Allows for comparative measurement of large internal or external dimensions.

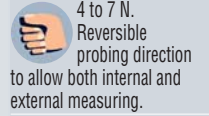
Consists of a measuring element with interchangeable inserts as well as a set of extensions. Since there is no material measure, the indication is set using a separate standard that can either be a gauge block, setting ring or horizontal measuring bench.

Measuring inserts for inspection in the tool axis, or offset inserts – Vertical or horizontal position of use – Integrated dial gauge to show the culmination point – Constant measuring force – Extensions with heat insulating grip.



### Measuring element

- Mobile ball-bearing anvil, 10 mm measuring travel.
- Watertight dial gauges 01470104 and 01480100



### Measuring bolts

- Tungsten carbide tipped
- Measuring bolts supplied in pairs:
  - No. 01131901 for internal measuring in the instrument axis.
  - No. 01131902 for internal/external measurement, measuring depth up to 30 mm from the lower edge of the tool.

### Extensions

- 25 mm dia. steel tube. 19 mm dia. telescopic tube that can be clamped.

### Additional data

- Plastic case
- Dial gauge with serial number
- Dial gauge with inspection report
- Declaration of conformity





mm

TESA INOTEST complete set



mm

01111900

Internal dimensions 275 ÷ 1025

External dimensions 250 ÷ 1010

Consisting of:



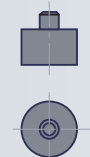
mm

mm

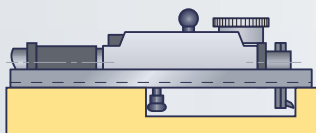
01112301	Measuring element with dial gauge		
01131901	Pair of measuring bolts for internal measuring		
01131902	Pair of measuring bolts for internal/external measuring with length to		
			60
01132001	4 resting rods		Ø 7 x 40
00160101	3 insulating grips (order number for 1 item)		
01112001	Extension	internal dimensions	275 ÷ 335
		external dimensions	250 ÷ 310
01112002	Extension	internal dimensions	325 ÷ 435
		external dimensions	300 ÷ 410
01112003	Extension	internal dimensions	425 ÷ 635
		external dimensions	400 ÷ 610
01112004	Extension	internal dimensions	625 ÷ 1035
		external dimensions	600 ÷ 1010
01162303	Plastic case for complete set		
<i>Optional Accessories</i>			
01141901	Extension for extending the application range by		500
01141902	Extension for extending the application range by		1000
01162001	Pair of tungsten carbide measuring bolts for internal/external dimensions		Ø 4 x 7
01162002	Pair of tungsten carbide measuring bolts for grooves		Ø 4 x 7
01161900	Measuring device for small		
	- internal dimensions 35 ÷ 280		
	- external dimensions 15 ÷ 255		



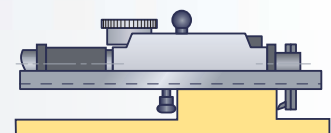
01162001



01131901



01161900



## ETALON 532 Internal Micrometer

This micrometer is designed for measurements with 2-point contact. Extensions with built-in gauge rods can be used to increase the measuring range – Stiff screw coupling.



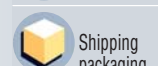
Micrometer element



Extensions



Additional data



Complete sets



072109101 072109107 072109108 072109117 072109128



mm

50 ÷ 170 50 ÷ 290 50 ÷ 530 50 ÷ 1010 50 ÷ 1510

Consisting of:



mm



mm

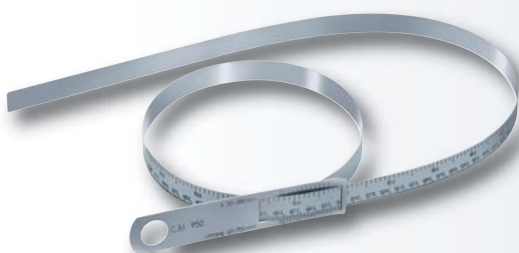


µm

072103576	Micrometer element	50 ÷ 65	3	•	•	•	•	•
072103585	Extension	15	1,5	•	•	•	•	•
072105462	Extension	30	1,5	•	•	•	•	•
072109030	Extension	60	2	•	•	•	•	•
072103586	Extension	120	2		•	•	•	•
072109055	Extension	240	3			•	•	•
072109066	Extension	480	3,5				•	•
072109089	Extension	500	3,5					•

## ROCH Periphery Tapes

Steel tapes with a dual graduation for measuring external circumferences and diameters of cylindrical parts on machines and other fittings – Suitable for malleable parts such as plastic tubing – Used for inspecting tanks or boilers – Also designed for checking steel or concrete pipes, rims, tires etc.



Diameter mm



Circumference mm

0951750222	20 ÷ 300	60 ÷ 950	0,15
0951750223	300 ÷ 700	940 ÷ 2200	0,20
0951750224	700 ÷ 1100	2190 ÷ 3460	0,20
0951750225	1100 ÷ 1500	3450 ÷ 4720	0,25
0951750226	1500 ÷ 1900	4710 ÷ 5980	0,30
0951750227	1900 ÷ 2300	5960 ÷ 7230	0,35



# Electronic indicators, Dial Gauges, Precision Indicators





# EASY-TO-USE AND VERSATILE

As manufacturer of a full range of precision dial gauges for more than 50 years, we are able to provide you with a wide variety of models.

- Electronic indicators featuring a combined analogue/digital indication with the most up-to-date technology.
- Mechanical dial gauges with high-precision movement and smooth pointer revolution, double-action shockproof mechanisms as well as measuring spans up to 100 mm.



## Which Style Do you Need?

- Digital indication provides error-free readout of the measured values as the fractions of the scale divisions need not be estimated, visually.
- Analogue indication has the advantage to change smoothly according to the size of the workpiece feature to be measured. This type of indication is best suited for dynamic measurements, e.g. when determining axial and radial runout errors.
- Electronic indicators provide many additional functions compared to the mechanical models. For more information, also read the pages F-4 to F-11.
- Electronic indicators, precision dial gauges as well as dial test indicators have the capability to measure with the lowest possible hysteresis. Therefore, they are ideally suited for runout inspection where this capability is required.
- In order to significantly reduce the effects of the systematic errors, we recommend to carry out a number of comparative measurements because only the actual size of each related nominal length will be read out. This means that electronic indicators, dial gauges with limited range of indication and precision indicators are best suited for this purpose.
- These hand-held tools also permit to avoid rough reading errors of the metric range.



## Standards and Definitions

From now on, the international ISO 463:2006 standard replaces the national ones dealing with dial gauges. Newly applicable definitions and requirements also imply some changes of the so-called design and metrological characteristics, which could not be entirely reported in this issue.

This standard, which is part of the matrix «Product Specification (GPS) – Dimensional measuring equipment», states the requirements that affect the most significant characteristics mentioned above. Therefore, all values indicated in this catalogue as limit values for the metrological characteristics only are based on internal standards proper to our factory.

### Electronic indicators

#### Precision indicators

Definitions used in this section:



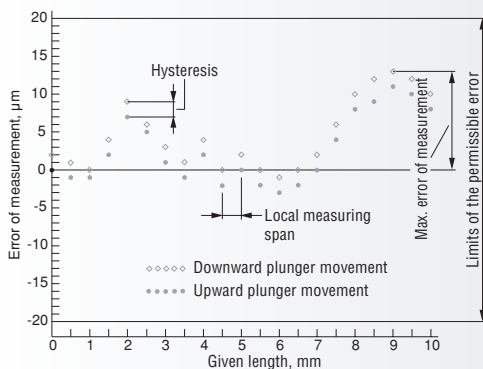
Max. perm. errors in one measuring direction over the whole measuring range within the local measuring range in both measuring directions



Repeatability limit



Max. hysteresis



### Mechanical dial gauges

Definitions used in this section for the maximum permissible errors of a metrological characteristic (MPE):



Deviation span (Error of indication within the measuring range)

Deviation span (error of indication) within the local measuring span

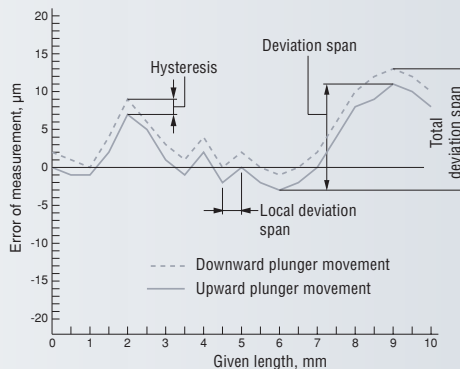
Total deviation span (Error of indication within the measuring range)



Repeatability limit of indication



Hysteresis of indication





# TESA DIGICO 205 and 305

- Dual LC Display.
- Mechanical tolerance marks.
- Dimensions according to DIN 878.

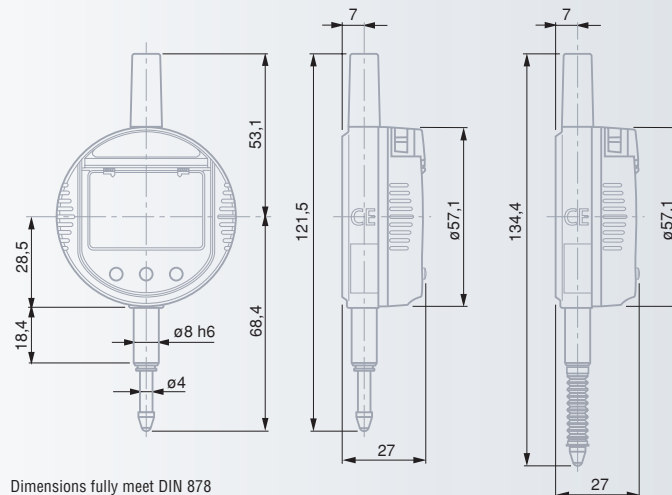
Main functions

ON/Auto OFF – Data output – Counting sense reversal – Keypad lock.



- ✓
- Combined analogue and numerical display
- 6-decade LC display field plus minus sign
- 10 x 5 mm Digit size (H x L)
- Resolution to 0,01 mm = ±0,25 mm  
Resolution to 0,001 mm = ±0,025 mm
- MI or MIE type: metric/inch conversion
- Glass scale with incremental divisions, capacitive
- ≤ 2 m/s
- Full-metal housing with front face in polyamide.  
Stainless steel plunger.  
M2,5 mounting thread for the measuring insert.
- ≤ 2N
- RS232, opto-coupled
- 3V lithium battery, type CR2032
- 1 year to 2 years
- 10°C to 40°C
- 10°C to 60°C
- 80%
- EN 50081-1  
EN 50082-1
- 150 g
- Shipping case including a lithium battery 01961000
- Identification number
- Inspection report with a declaration of conformity

No	=				
<i>TESA DIGICO 205</i>					
<b>01910230</b>	DIGICO 205 M	12,5/-	0,01/-	20	10
<b>01930230</b>	DIGICO 205 MI	12,5/0.5	0,01/0.0005	20	10
<i>TESA DIGICO 305</i>					
<b>01910231</b>	DIGICO 305 M	12,5/-	0,001/-	8	2
<b>01930231</b>	DIGICO 305 MI	12,5/0.5	0,001/0.00005	8	2
<i>TESA DIGICO 305 IP54</i>					
<b>01930232</b>	DIGICO 305 MIE	12,5/0.5	0,001/0.00005	8	2



# TESA DIGICO 400 and 500

- Measuring modes **ABS/REL**.
- Dual LC Display.
- Display rotation through 270°. Same goes for the key functions.
- Mechanical tolerance marks.
- Symbols for both limit values.

### Measuring functions and modes

ON – Auto OFF – PRESET mode – Tolerance mode – Data output – Counting sense reversal – Keypad lock – Metric/Inch units – Full RESET.



Combined analogue and numerical display

6-decade LC display field plus minus sign

10 x 5 mm Digit size (H x L)

Resolution to 0,01 mm = ±0,25 mm  
Resolution to 0,001 mm = ±0,025 mm

MI or MIE type: metric/inch conversion

Glass scale with incremental divisions, capacitive

≤ 2 m/s

Full-metal housing with front face in polyamide.  
Stainless steel plunger.  
M2,5 mounting thread for the measuring insert.

RS232, opto-coupled

3V lithium battery, type CR2032

1 year to 2 years

10°C to 40°C

-10°C to 60°C

80%

EN 50081-1  
EN 50082-1

Shipping case including one lithium battery 01961000

Identification number

Inspection report with a declaration of conformity

NO	=	mm/in	mm/in	µm	µm	N	g
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### TESA DIGICO 400

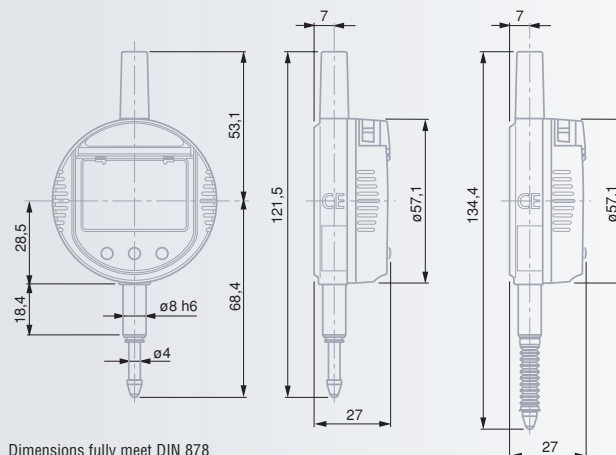
<b>01930240</b>	Digico 405 MI	12,5 / 0.5	0,01 / 0.0005	20	10	< 2	150
<b>01930241</b>	Digico 410 MI	25 / 1	0,01 / 0.0005	20	10	< 2	162

### TESA DIGICO 500

<b>01930250</b>	Digico 505 MI	12,5 / 0.5	0,001 / 0.00005	4	2	< 2	150
<b>01930251</b>	Digico 510 MI	25 / 1	0,001 / 0.00005	5	2	< 2	162

### TESA DIGICO 505 IP54

<b>01930255</b>	Digico 505 MIE	12,5 / 0.5	0,001 / 0.00005	4	2	< 2	150
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Dimensions fully meet DIN 878



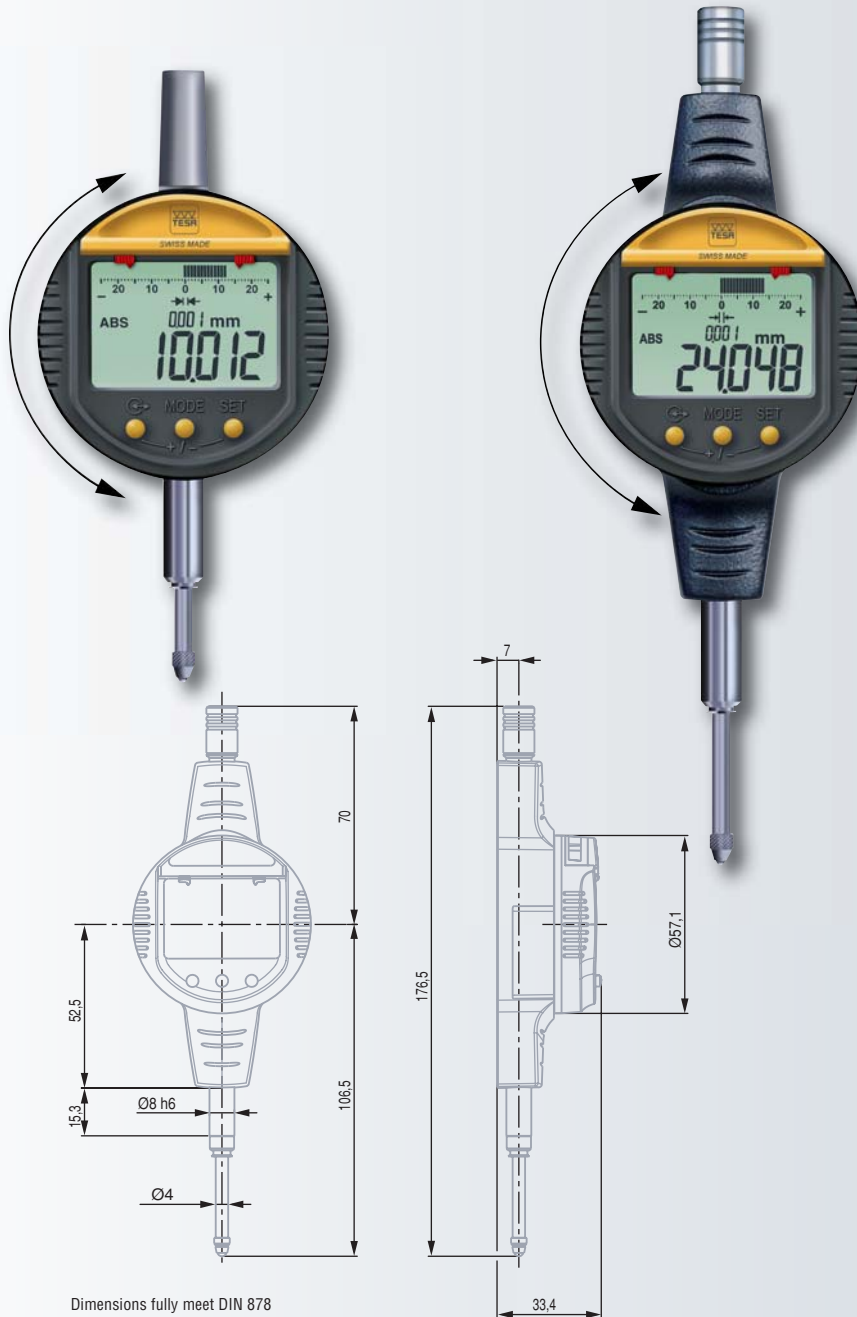


# TESA DIGICO 600

- Measuring modes **ABS/REL**.
- Dual LC Display.
- Display rotation through 270°. Same goes for the key functions.
- Mechanical tolerance marks.
- Symbols for both limit values.

Measuring functions and modes

- ON – Auto OFF – PRESET mode – Tolerance mode – Value storage mode
- Max • Min • Max-Min (TIR) – Data output – Counting sense reversal – Keypad lock – Metric/Inch units – Full RESET.



Dimensions fully meet DIN 878

- ✓
- Combined analogue and numerical display
- 6-decade LC display field plus minus sign
- 10 x 5 mm Digit size (H x L)
- Resolution to 0,01 mm = ±0,25 mm  
Resolution to 0,001 mm = ±0,025 mm
- MI or MIE type with metric/inch conversion
- Glass scale with incremental divisions, capacitive
- ≤ 2 m/s
- Full-metal housing with front face in polyamide. Stainless steel plunger. M2,5 mounting thread for the measuring insert.
- RS232, opto-coupled
- 3V lithium battery, type CR2032
- 1 year to 2 years
- 10°C to 40°C
- 10°C to 60°C
- 80%
- EN 50081-1  
EN 50082-1
- Shipping case including a lithium battery 01961000
- Identification number
- Inspection report with a declaration of conformity

TESA DIGICO 600			mm / in	mm / in	µm	µm	N	g
01930256	Digico 605 MI	12,5 / 0.5	0,001 / 0.00005		4	2	< 2	150
01930257	Digico 610 MI	25 / 1	0,001 / 0.00005		5	2	< 2	162



Combined analogue and numerical display

6-decade LC display field plus minus sign

10 x 5 mm  
Digit size (H x L)

Resolution to 0,01 mm = ±0,25 mm  
Resolution to 0,001 mm = ±0,025 mm

MI or MIE type with metric/inch conversion

Glass scale with incremental divisions, capacitive

≤ 2 m/s

Full-metal housing with front face in polyamide.  
Stainless steel plunger.  
M2,5 mounting thread for the measuring insert.

RS232, opto-coupled

3V lithium battery, type CR2032

1 year to 2 years

10°C to 40°C

-10°C to 60°C

80%

EN 50081-1  
EN 50082-1

Shipping case including a lithium battery  
01961000

Identification number

Inspection report with a declaration of conformity

## TESA DIGICO 705

Use in conjunction with bore gauges with 2-point contact. Allows setting of the dial gauge on the smallest setting ring value.

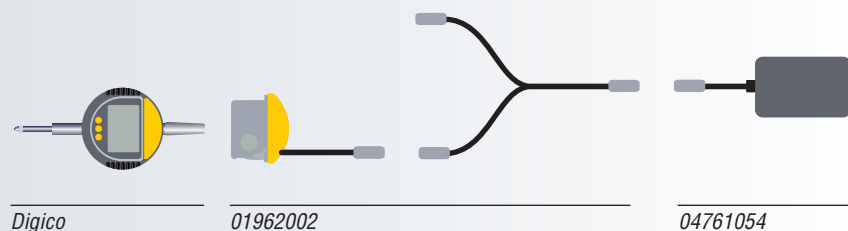
- Same functions as DIGICO 600.



No	=	mm/in	mm/in	µm	µm	N	g
TESA DIGICO 705							
01930258	Digico 705 MI	12,5 / 0.5	0,001 / 0.00005	4	2	< 2	150

### Optional accessories available for all TESA DIGICO 200 to 700

No	=
01961000	Lithium battery, type CR2032, 3V, 190 mAh
01962002	External power supply
04761054	Mains adapter
04761055	Cable EU for mains adapter
04761056	Cable US for mains adapter
	Measuring inserts listed on page F-42
	Backs and retraction devices detailed on page F-45
	For information on connecting cables, refer to chapter A



## TESA DIGICO 1 and 2

Both models are remarkable for their versatile functions, long measuring travel, high accuracy.

- Analogue and digital display; the latter can be displaced for easy reading in any position.
- Zero setting at any point within the measuring span.
- Data input through the keyboard.
- Counting sense reversal.
- Entry of limit values for classification through displayed symbols. Additional green, red or amber coloured background whenever the tool is connected to the mains.
- Value storage through the functions «Highest value», «Lowest value» or «Highest value minus lowest value».



- ✓
- LC display with coloured background
- 6 decades plus minus sign
- 9 x 4,5 mm digit size (H x W)
- See table opposite
- Metric/inch conversion
- 40 mm scale length
- 25 scale divisions
- According to selected tolerances
- 30,4 mm (DIGICO 1) or 60,4 mm (DIGICO 2)
- Incremental glass scale
- Max. 1 m/s for (DIGICO 1) or max. 2 m/s for DIGICO 2
- Plunger guided on a plain bearing  
M2,5 mounting thread for the measuring insert.
- 2 µm for DIGICO 1  
3 µm for DIGICO 2
- 1 µm
- 1 µm
- See table on page F-9
- RS232
- 3,6 V lithium battery or mains adapter



TESA electronic indicators

<b>01930000</b>	DIGICO 1	30	0,001 / 0,01	1.18	0.00005 / 0.0005
<b>01930001</b>	DIGICO 2	60	0,001 / 0,01	3.36	0.00005 / 0.0005

≈ 1000 h with lithium battery

0,002%/°C

10°C to 40°C

-10°C to 50°C



Dial casing of regular models to IP54 (IEC 60529)

290 g (DIGICO 1)  
310 g (DIGICO 2)  
Moved mass through the plunger:  
28 g (DIGICO 1)  
27 g (DIGICO 2)

Supplied in a suited shipping case including 1 lithium battery 01960007 plus 1 lift lever 01960005

Identification number

Inspection report with a declaration of conformity



Measuring force



DIGICO 1

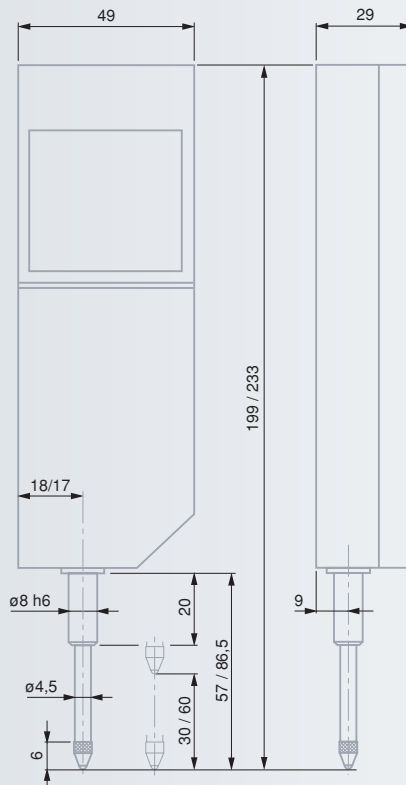
DIGICO 2

Measuring force\*  
close to plunger stop

- bottom 0,85 N ± 0,15 N 0,90 N ± 0,20 N  
- top 1,10 N ± 0,20 N 1,45 N ± 0,25 N

Hysteresis\* 0,10 N 0,15 N

\* Valid with the indicator used vertically, with downward oriented plunger, or in static measurement.

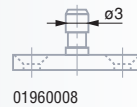


Accessories for TESA DIGICO 1 and 2



<b>04761037</b>	230 V mains adapter, 50 Hz, 9 V, 200 mA, 1,8 VA
<b>04761057</b>	110 V mains adapter
<b>01960007</b>	3,6 V lithium battery, LR6, AA
<b>01960005</b>	Lever for plunger retraction
<b>01960009</b>	Connector for vacuum plunger lift, suitable for DIGICO 1
<b>01960008</b>	Same as above, but for DIGICO 2
<b>01960010</b>	Connector for pneumatic plunger retraction, suitable for DIGICO 1 only
<b>01960011</b>	Adapter for use of the mains adapter together with the switch for triggering data transfer
<b>04768000</b>	Hand switch for triggering data transfer

For information on connecting cables, refer to chapter A





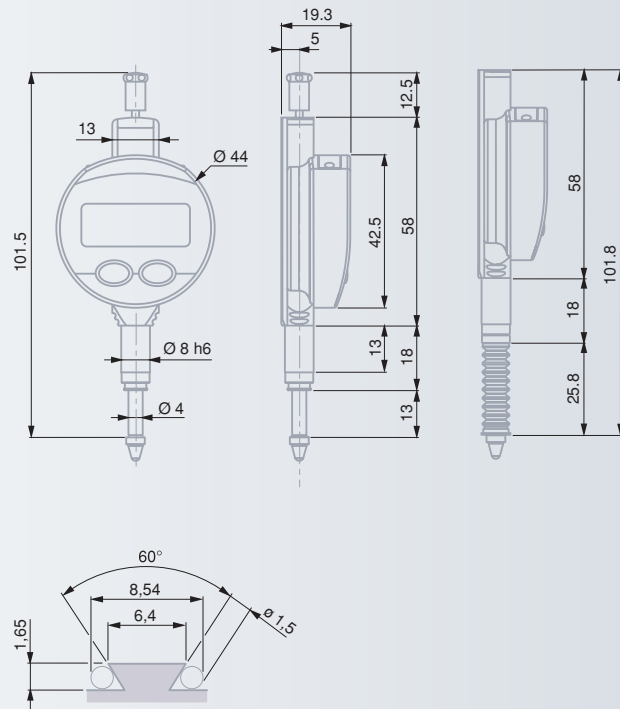
# TESA DIGICO 12

Made to measure in extreme workshop conditions – Water and coolant resistant (IP65) – 44 mm dial diameter – Lets you take advantage of the mechanics combined with digital reading.



## TESA DIGICO 12 – Standard

- 44 mm dial casing diameter.
- Water and coolant resistant (IP65).
- RS 232 SIMPLEX data output combined with external power supply.
- Inductive measuring system, patented.
- Choice between absolute («ABS») and relative («REL») measuring modes.
- Numerical display.
- Possible setting of PRESET value to  $\pm 130$  mm.
- Inverse measuring direction.
- Direct conversion of the metric/inch units.
- Automatic shut down.



- ✓
- 5-digit LC display + sign
- 6 mm digit height
- Zero-setting of display
- 20 µm
- 5 µm
- 0,5 to 0,9 N ( $\pm 0,15$  N)
- Max. 2 m/s
- Number of measurements per second: 7
- Working temperature range: +5°C to +40°C
- 3V lithium battery, type CR 2032
- Battery life > 3500 hours
- RS232
- 70 g
- EN 61326-1
- IP65 (IEC 529)
- Shipping case including 1 lithium battery, type CR 2032 (order No. 01961000).
- Identification number
- Declaration of conformity
- Models 0,01 mm with report. Models 0,001 mm without report.

<i>IP65 indicators with electronic module protected against the penetration of liquids</i>				
<b>01930130</b>	12,5/0.5	0,01	0.0005	IP65
<b>01930132</b>	12,5/0.5	0,001 / 0,01	0.00005 / 0.0005	IP65
<i>IP65 indicators with mechanics and electronics protected against the penetration of liquids</i>				
<b>01930131</b>	12,5/0.5	0,01	0.0005	IP65
<b>01930133</b>	12,5/0.5	0,001 / 0,01	0.00005 / 0.0005	IP65



LCD,  
5 digits + sign

6 mm  
digit height

Zero-setting  
of display

4  $\mu$ m

2  $\mu$ m

0,4 to 0,75 N  
( $\pm 0,15$  N)

Max. 2 m/s

Number of  
measurements  
per second: 9

Working tempera-  
ture range:  
+5°C to +40°C

3V lithium  
battery,  
type CR 2032

Battery life  
> 4000 hours

RS232

70 g

EN 61326-1

IP65 (IEC 529)

1 lithium battery,  
type CR 2032.

Order number:  
01961000.

Identification  
number

Inspection report  
with a declaration  
of conformity

## TESA DIGICO 12 – HP

- High-precision measuring system.
- Water and coolant resistant (IP65).
- Combined analogue/digital display.
- Analogue readout from  $\pm 0,025$  to  $\pm 1,25$  mm.
- NOR/MIN/MAX/MAX-MIN measuring modes.
- 44 mm dial casing diameter.
- RS232 data output, combined with external power supply.
- Inductive measuring system, patented.
- Zero-setting of display.
- Direct conversion of the metric/inch units.
- Automatic shut down. Can also be locked.



mm/in

mm

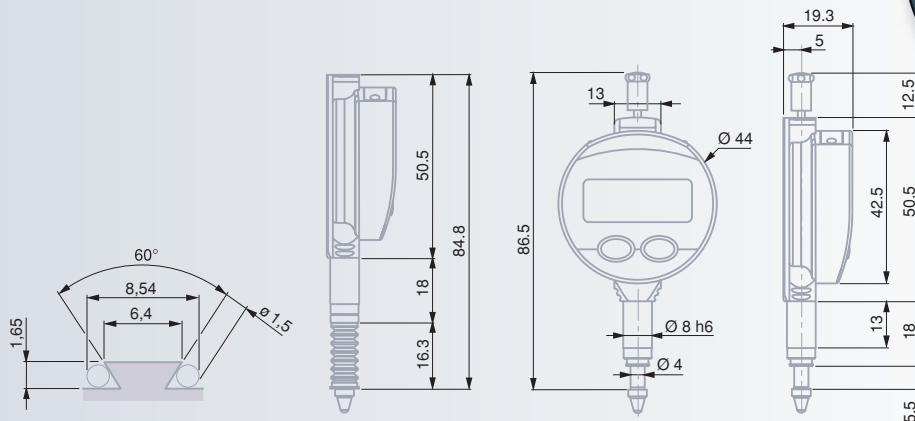
in

*IP65 indicator HP with electronic module protected against the penetration of liquids*

**01930134** 5/0.210 0,001 / 0,01 0.00005 / 0.0005 IP65

*IP65 indicator HP with mechanics and electronics protected against the penetration of liquids*

**01930135** 5/0.210 0,001 / 0,01 0.00005 / 0.0005 IP65



### Accessories



**03238013** Clamping lug

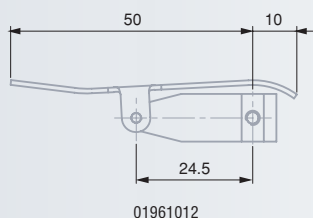
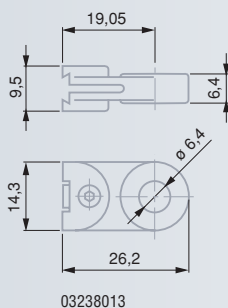
**01961012** Upper lift lever

**01960005** Lower lift lever

**04761060** RS232 connecting cable along with external power supply

**01961000** 3 V lithium battery, type CR 2032, 190 mAh

For information on connecting cables, refer to chapter A

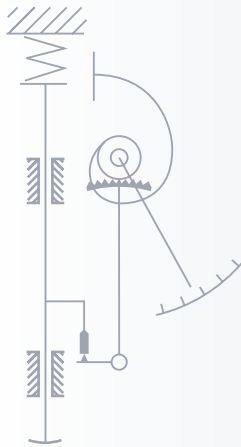


# TESA CARY Microcomparators MCA-8

## The absolute high precision

Specially designed for high precision measurement by comparison (0,8 μm) – Ideal for checking axial and radial runouts with a very low hysteresis (0,3 μm).

- TESA CARY precision mechanism mounted parallel to the measuring axis in compliance with the Abbe principle.
- Streamlined steel case for high rigidity.
- High precision throughout the measuring travel.
- Very low measuring force (from 150 mN).
- Non-rotating dial. Quickly set to zero by moving the pointer with just a thumb grip.
- Low sensitivity to temperature variations.



- ✓
- DIN 879
- Non-rotating dial
- Fine setting when moving the pointer
- Full-metal dial casing. Stainless steel plunger, hardened.
- Adjustable tolerance marks
- M2,5 mounting thread for the measuring insert
- Mounted insert with a 3 mm dia. steel ball tip
- 110 g
- Plastic case
- Identification number
- Inspection report with a declaration of conformity

Range for zero-setting mm

Regular models

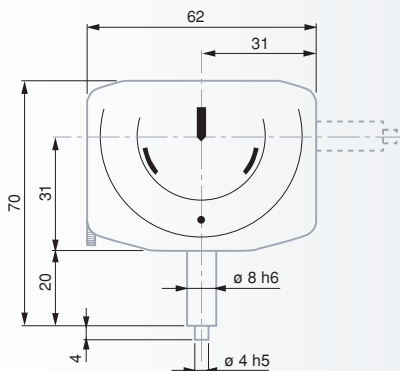
<b>01410423</b>	MCA8-2-500	0,001	0,1	3	500	50 ÷ 0 ÷ 50	± 0,006
<b>01410425</b>	MCA8-2-150	0,001	0,1	3	150	50 ÷ 0 ÷ 50	± 0,006
<b>01410426</b>	MCA8-2-300	0,001	0,1	3	300	50 ÷ 0 ÷ 50	± 0,006

Lateral model

<b>01410424</b>	MCA8-2-L	0,001	0,1	3	500	50 ÷ 0 ÷ 50	± 0,006
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Accessory

**On request** Sealing bellow (to be specified when ordering)



Precision

	0,001 mm
Max. perm. errors, $G_{ges}$	0,8 μm
Repeatability limit, r	0,3 μm
Max. hysteresis, $f_u$	0,3 μm

# ETALON Basic Precision Indicators

## The absolute high precision

Remarkably reliable, even when constantly used for series inspection – Specially made for comparative measurements demanding a very low measurement uncertainty – Measure axial and radial runouts with the lowest hysteresis.

- Shockproof movement with gear-lever transmission and long dead travel.
- Large, non-dazzling dial for easy readout.
- No coarse reading errors as the measuring travel is limited to less than one revolution.
- Fine adjustment and protective knob to prevent unintentional pointer displacement.



DIN 879-1.  
All sizes to  
EN ISO 463

Ball-bearing  
plunger

Full-metal  
dial  
casing.  
Stainless steel plunger,  
hardened.

Adjustable  
tolerance  
marks.  
Coupling thread for the  
lifting cable.  
M2,5 mounting thread for  
the measuring insert.

≈ 1 N

Mounted insert  
with a 3,175 mm  
dia. steel ball tip.  
Also with lifting  
cable.

Suited  
plastic case

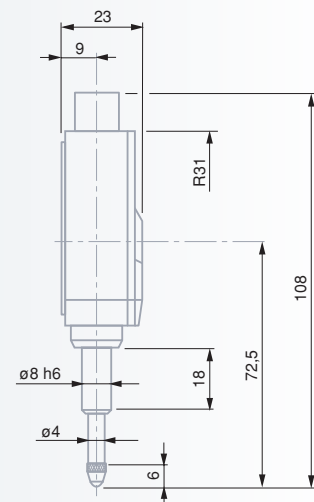
Declaration  
of conformity



<i>Regular model</i>		mm	mm	mm	mm	
<b>01419051</b>		0,001	0,1	3,0	62	● 50 ÷ 0 ÷ 50
<i>Model to IP54, protected against the penetration of liquids</i>						
<b>01419052</b>		0,001	0,1	3,0	62	● 50 ÷ 0 ÷ 50

### Precision

	0,001 mm
	Max. perm. errors in one direction throughout the measuring range, $G_e$
	1 $\mu$ m
	over any local measuring range including 10 scale divisions, $G_l$
	0,7 $\mu$ m
	in both measuring directions throughout the measuring range, $G_{ges}$
	1,2 $\mu$ m
	Repeatability limit, $r_w$
	0,5 $\mu$ m
	Max. hysteresis, $f_h$
	0,5 $\mu$ m





# Precision Dial Gauges

0,1 mm dial readout / 40, 58 or 80 mm dial diameter



EN ISO 463  
Factory standard

0,1 mm

1,1 mm (40 mm dia.)  
1,5 mm (58 mm dia.)  
2,2 mm (80 mm dia.)

Rotating dial

Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.

Without shockproof mechanism

M2,5 mounting thread for the measuring insert

See table opposite

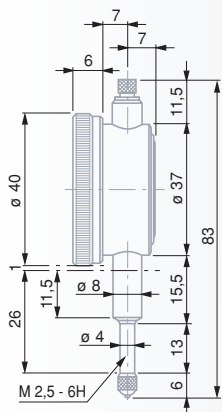
Mounted insert with a 3,175 mm dia. steel ball tip

Suited plastic case

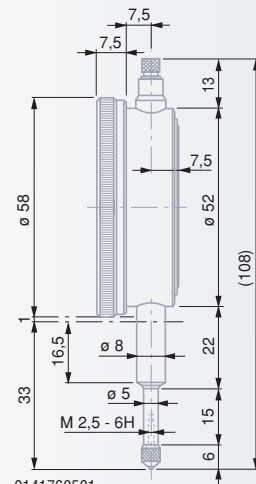
Identification number

Declaration of conformity

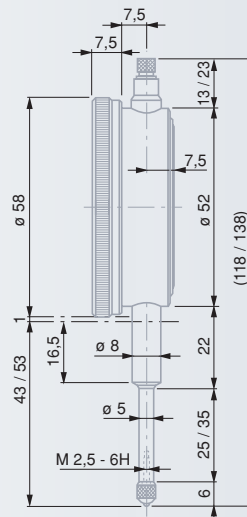
NO	mm	mm	mm	mm	mm	mm	N	
<i>ROCH dial gauges</i>								
0141760500	40	0,1	10	10,5	–	10	0 ÷ 5 ÷ 10	≤ 1,0
0141760501	58	0,1	10	10,5	–	10	0 ÷ 5 ÷ 10	≤ 1,0
0141760502	58	0,1	20	20,5	–	10	0 ÷ 5 ÷ 10	≤ 1,0
0141760503	58	0,1	30	30,5	–	10	0 ÷ 5 ÷ 10	≤ 1,5
0141760513	80	0,1	30	30,5	–	10	0 ÷ 5 ÷ 10	≤ 2,0



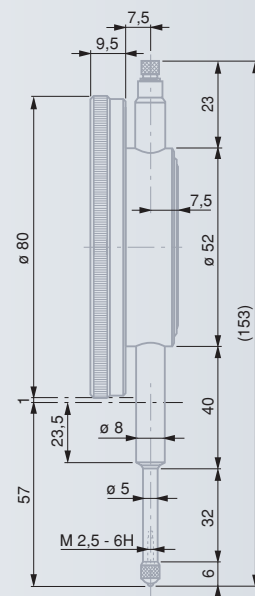
0141760500



0141760501



0141760503  
Similar model:  
0141760502



0141760513

**Maximum permissible errors for a metrological characteristic (MPE)**

0,1 mm	10 mm
Deviation span	40 µm
Deviation span within the local measuring span of 1 mm	25 µm
Total deviation span	55 µm
Repeatability limit	15 µm
Max. hysteresis	15 µm

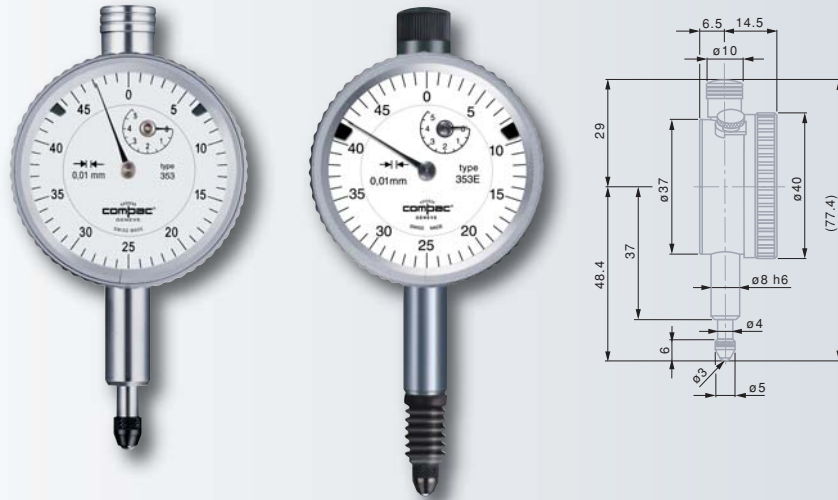


## Precision Dial Gauges

### 0,01 mm dial readout / 40 mm dial diameter

Remarkable for their robustness, these precision dial gauges are essential for the workshop.

- Smooth jewelled movement with rubies.
- Full-metal dial casing.
- Optimum protection against shocks.
- Swiss Made.



- ✓
- EN ISO 463 Factory standard
- 0,01 mm
- 2,2 mm
- Rotating dial
- Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.
- Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.
- 3 mm dia. ball tip, already mounted
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity

<i>COMPAC dial gauge</i>							
<b>353</b>		0,01	5	5,4	●	–	0 ÷ 25 ÷ 50
<i>COMPAC IP54 dial gauge, protected against the penetration of liquids</i>							
<b>353E</b>		0,01	5	5,4	●	–	0 ÷ 25 ÷ 50
<i>COMPAC dial gauge with limited reading range</i>							
<b>353S</b>		0,01	±0,2	3,3	●	–	20 ÷ 0 ÷ 20

### Permissible limits of a metrological characteristic (MPE/MPL)

	±0,2 mm	5 mm
	7 µm	12 µm
	5 µm	6 µm
	9 µm	14 µm
	3 µm	3 µm
	3 µm	3 µm
	≤ 1,4 N	≤ 1,4 N
– Model IP54	–	≤ 2 N

# Precision Dial Gauges

## 0,01 mm dial readout / 40 mm dial diameter

The model 0141760560 is specially advantageous whilst the other model 0141760561 is particularly robust.



EN ISO 463  
Factory standard



0,01 mm



2,2 mm



Rotating dial



Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.

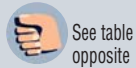


With or without shockproof mechanism



Adjustable tolerance marks.

M2,5 mounting thread for the measuring insert.



See table opposite



Mounted insert with a 3,175 mm dia. steel ball tip



Plastic case or cardboard box



Identification number



Declaration of conformity



mm



mm



mm



mm



N

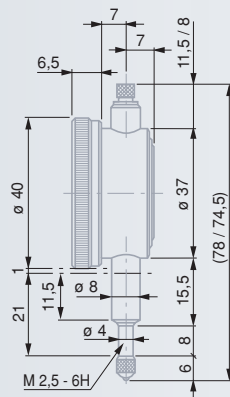
### ROCH dial gauges

<b>0141760560</b>	0,01	3	3,4	–	0,5	0 ÷ 25 ÷ 50*	≤1,4
<b>0141760561</b>	0,01	3	3,4	–	0,5	0 ÷ 25 ÷ 50*	≤1,4

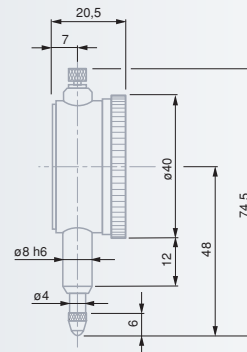
### ETALON dial gauge

<b>01419047</b>	0,01	5		●	0,5	0 ÷ 25 ÷ 50	≈1
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\* With extra red tinted reverse numbering.



0141760561



01419047

### Maximum permissible errors for a metrological characteristic (MPE)

	0,01 mm		3 mm		5 mm
	Deviation span		10 μm		12 μm
	Deviation span within the local measuring span of 0,1 mm		5 μm		6 μm
	Total deviation span		12 μm		–
	Repeatability limit		3 μm		3 μm
	Max. hysteresis		3 μm		–



## Precision Dial Gauges

0,01 mm dial readout / 57 or 58 mm dial diameter



EN ISO 463  
Factory standard

0,01 mm

1,5 mm

Rotating dial.  
Regular models with or without dial lock.

Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.

With or without shockproof mechanism

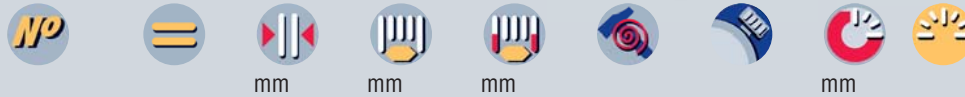
Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.

3 mm dia. ball tip, already mounted

Cardboard box

Identification number

Inspection report with a declaration of conformity



TESA dial gauges

01410610	YR	0,01	10	10,5	●	●	1	0 ÷ 50 ÷ 100
01410611	YR	0,01	10	10,5	●	●	1	0 ÷ 50 ÷ 0
01412310	YE	0,01	10	10,5	-	-	1	0 ÷ 50 ÷ 100

MERCER dial gauges

01416020	250-1	0,01	10	10,5	-	●	1	0 ÷ 50 ÷ 0
01416021	251-1	0,01	10	10,5	-	●	1	0 ÷ 50 ÷ 100

TESA IP54 dial gauges, protected against the penetration of liquids

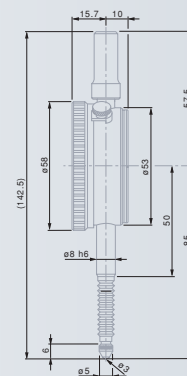
01410721	YR	0,01	10	10,5	●	-	1	0 ÷ 50 ÷ 0
01412411	YE	0,01	10	10,5	-	-	1	0 ÷ 50 ÷ 100

TESA dial gauge with limited reading range

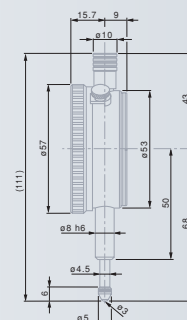
01412211	YE	0,01	± 0,4	4	●	-	1,27	40 ÷ 0 ÷ 40
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### Permissible limits of a metrological characteristic (MPE/MPL)

	± 0,4	10 mm
Deviation span	7 µm	15 µm
Deviation span within the local measuring span 0,10 mm	5 µm	8 µm
Total deviation span	9 µm	17 µm
Repeatability limit	3 µm	3 µm
Max. hysteresis	3 µm	3 µm
Measuring force – Models IP54	≤ 1 N	≤ 1,5 N
	-	≤ 2,2 N



01410721 – 01412411



01410610 – 01410611

# Precision Dial Gauges

0,01 mm dial readout / 58 mm dial diameter



EN ISO 463  
Factory  
standard

0,01 mm

1,5 mm

Rotating dial  
with or without  
dial lock

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

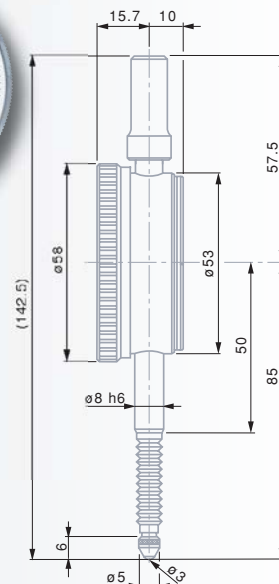
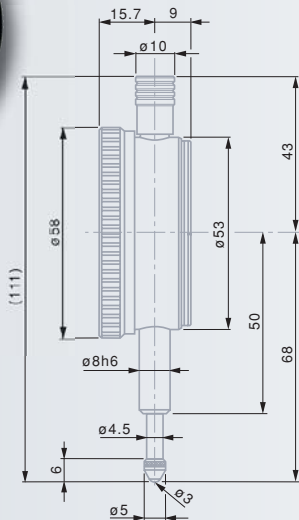
Adjustable toler-  
ance marks. M2,5  
mounting thread  
for the measuring insert.

3 mm dia.  
ball tip, already  
mounted.

Cardboard box

Identification  
number

Inspection report  
with a declaration  
of conformity



COMPAC dial gauges

512K	0,01	10	10,5	–	–	1	0 ÷ 50 ÷ 100
532	0,01	10	10,5	●	–	1	0 ÷ 50 ÷ 100

COMPAC IP 54 dial gauge, protected against the penetration of liquids

532E	0,01	10	10,5	●	–	1	0 ÷ 50 ÷ 100
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COMPAC dial gauges with limited reading range

532S	0,01	± 0,4	4	●	●	1,27	40 ÷ 0 ÷ 40
533S	0,01	± 0,5	4	●	–	1,27	50 ÷ 0 ÷ 50

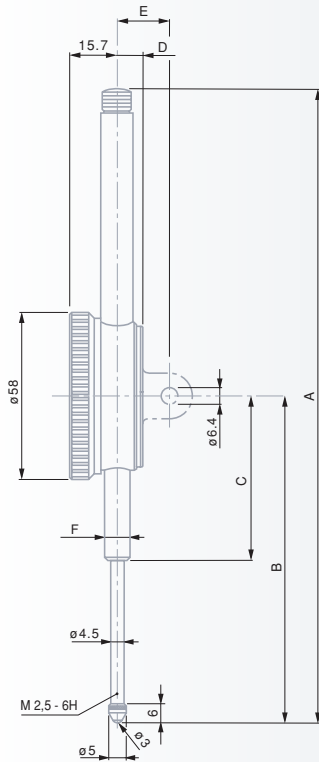
Permissible limits of a metrological characteristic (MPE/MPL)

	±0,4/±0,5 mm	10 mm
Deviation span	7 μm	15 μm
Deviation span within the local measuring span 0,10 mm	5 μm	8 μm
Total deviation span	9 μm	17 μm
Repeatability limit	3 μm	3 μm
Max. hysteresis	3 μm	3 μm
Measuring force – Model IP54	≤ 1 N –	≤ 1,5 N ≤ 2,2 N



## Long Range Precision Dial Gauges

0,01 mm dial readout / 58 mm dial diameter



mm	30 mm	50 mm	100 mm
A	148	228	390
B	88	117,2	211,6
C	50	60	103,6
D	10	9	9
E	20	19	19
F	Ø 8h6	Ø 8h6	Ø 8h6



EN ISO 463  
Factory standard



0,01 mm



1,5 mm



Rotating dial with or without dial lock



Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.



Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.



3 mm dia. ball tip, already mounted.



Cardboard box



Identification number



Inspection report with a declaration of conformity



mm

mm

mm

mm

### COMPAC dial gauges

712	0,01	30	30,5	●	–	1	0 ÷ 50 ÷ 100
722	0,01	50	50,5	●	–	1	0 ÷ 50 ÷ 100
732	0,01	100	100,5	●	–	1	0 ÷ 50 ÷ 100

### MERCER dial gauge

01416039 252-1	0,01	30	30,5	●	●	1	0 ÷ 50 ÷ 100
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### Permissible limits of a metrological characteristic (MPE/MPL)

Deviation span	20 µm	25 µm	30 µm
Total deviation span	25 µm	30 µm	35 µm
Repeatability limit	3 µm	3 µm	3 µm
Max. hysteresis	5 µm	5 µm	8 µm
Measuring force	≤ 2,2 N	≤ 2,5 N	≤ 3,2 N

# Long Range Precision Dial Gauges

0,01 mm dial readout / 58 mm dial diameter

Both models 0141760635 and 0141760636 are particularly profitable.



EN ISO 463  
Factory  
standard

0,01 mm

1,5 mm

Rotating dial

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

With or without  
shockproof  
mechanism

Adjustable  
tolerance  
marks.

Model No. 0141760640  
with fine adjust mounted  
under the protective cap  
for dial reading.

M2.5 mounting thread for  
the measuring insert.

For accuracy,  
see table on  
page F-22

See table  
opposite

Mounted insert  
with a 3,175 mm  
dia. steel ball tip.

Exception:  
Each model No. 0141760631  
has a ruby ball tip.

Plastic case or  
cardboard box

Identification  
number

Declaration  
of conformity



mm



mm



mm



mm



N

*ROCH dial gauges*

<b>0141760631</b>	0,01	10	10,5	—	1	0 ÷ 50 ÷ 100*	≤ 1,4
<b>0141760635</b>	0,01	10	10,5	—	1	0 ÷ 50 ÷ 100*	≤ 1,4
<b>0141760636****</b>	0,01	10	10,5	—	1	0 ÷ 50 ÷ 100*	≤ 1,4
<b>0141760640</b>	0,01	10	10,5	●	1	0 ÷ 50 ÷ 100*	≤ 1,4
<b>0141761213***</b>	0,01	15	15,5	●	1	0 ÷ 50 ÷ 100*	≤ 1,6
<b>0141760651</b>	0,01	30	30,5	—	1	0 ÷ 50 ÷ 100	≤ 1,6
<b>0141760653</b>	0,01	30	30,5	●	1	0 ÷ 50 ÷ 100	≤ 1,6
<b>0141760661</b>	0,01	50	51	—	1	0 ÷ 50 ÷ 100	≤ 2,2
<b>0141760662**</b>	0,01	50	51	—	1	0 ÷ 50 ÷ 100	≤ 2,2
<b>0141760663</b>	0,01	50	51	●	1	0 ÷ 50 ÷ 100	≤ 2,2
<b>0141760671</b>	0,01	80	81	—	1	0 ÷ 50 ÷ 100	≤ 3,0

*ROCH IP54 dial gauge, protected against the penetration of liquids*

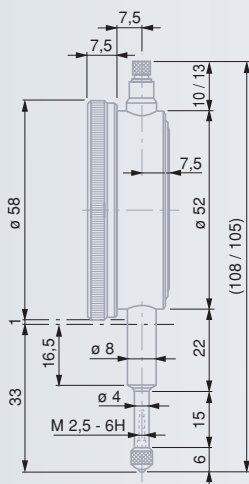
<b>0141760624</b>	0,01	10	10,5	●	1	0 ÷ 50 ÷ 100*	≤ 2
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\* With extra red tinted reverse numbering.

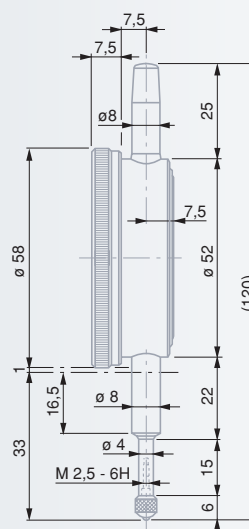
\*\* Counterclockwise numbering.

\*\*\* 60,4 mm dial diameter.

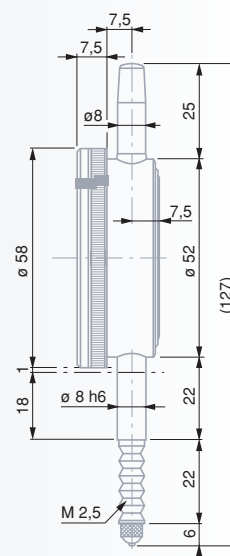
\*\*\*\* With mounted central lug back.



0141760631  
0141760635  
0141760636



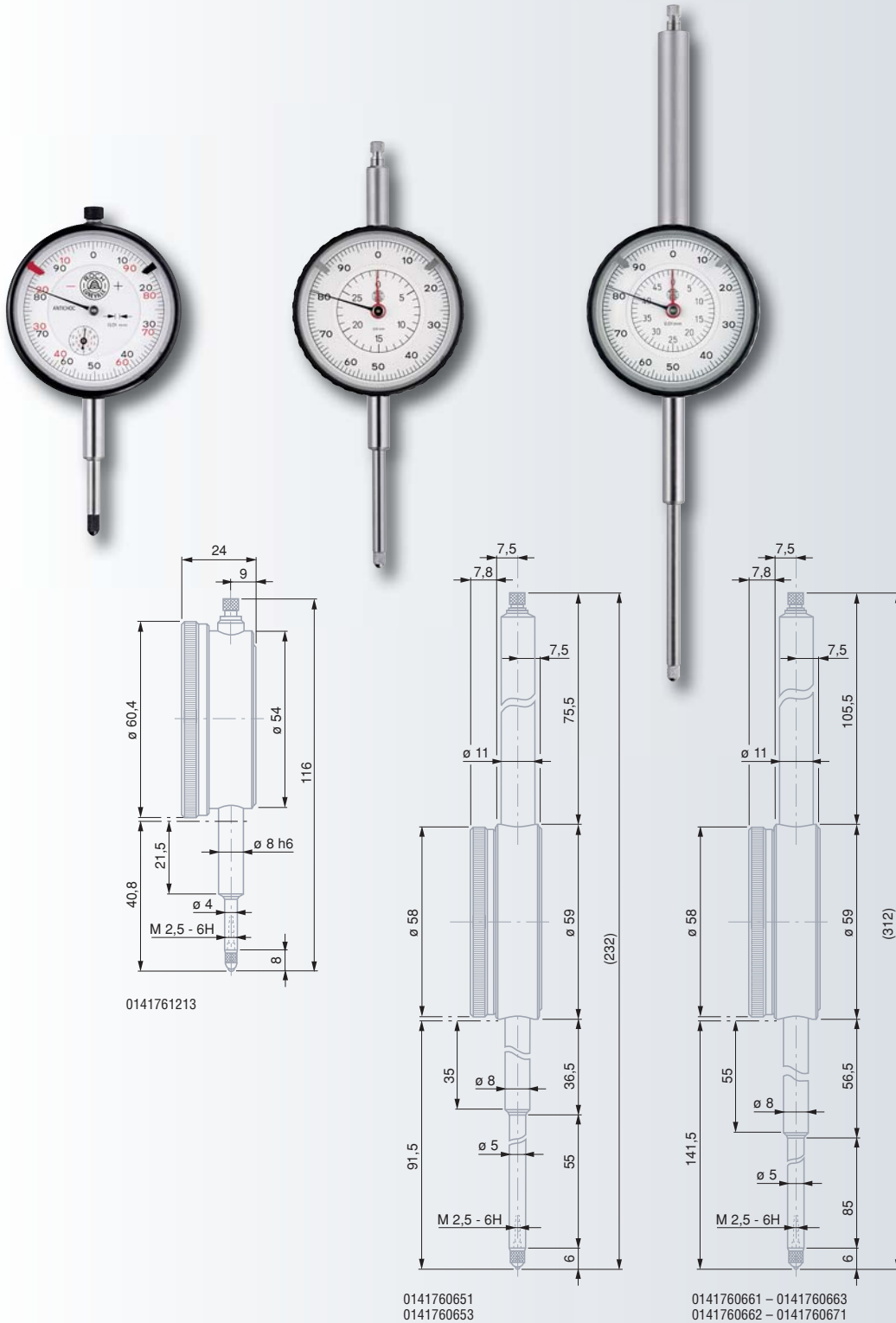
0141760640



0141760624







EN ISO 463  
Factory standard



Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.



Adjustable tolerance marks.  
M2,5 mounting thread for the measuring insert.

In order to eliminate any hysteresis when measuring with the plunger moving downward, this feature has to be coupled on the measuring points, directly.

See table on the previous page F-21

Mounted insert with a 3,175 mm dia. steel ball tip.  
Exception:  
Each model No. 0141761213 has a ruby ball tip

Plastic case or cardboard box

Identification number

Declaration of conformity

## Maximum permissible errors for a metrological characteristic (MPE)

	0,01 mm	10 mm	15 mm	30 mm	50 mm	80 mm
Deviation span	15 µm	20 µm	20 µm	25 µm	30 µm	
Deviation span within the local measuring span of 0,1 mm	5 µm	5 µm	5 µm	5 µm	5 µm	
Repeatability limit	3 µm	3 µm	3 µm	3 µm	3 µm	

# Precision Dial Gauges

0,01 mm dial readout / 58 mm dial diameter

Regular and long range models



EN ISO 463  
Factory  
standard



0,01 mm



1,5 mm



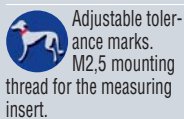
Rotating dial



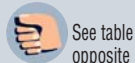
Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.



With or without  
shockproof  
mechanism



Adjustable toler-  
ance marks.  
M2,5 mounting  
thread for the measuring  
insert.



See table  
opposite



Mounted insert  
with a 3,175 mm  
dia. steel ball tip



Plastic case or  
cardboard box



Identification  
number



Declaration  
of conformity



mm



mm



mm



mm



mm



mm



N

### ETALON dial gauges

<b>01419048</b>	0,01	10	58	—	1	0 ÷ 50 ÷ 100	≈ 1
<b>01419049</b>	0,01	30	58	●	1	0 ÷ 50 ÷ 100	1,5 ÷ 2
<b>01419050</b>	0,01	50	58	●	1	0 ÷ 50 ÷ 100	1,5 ÷ 2

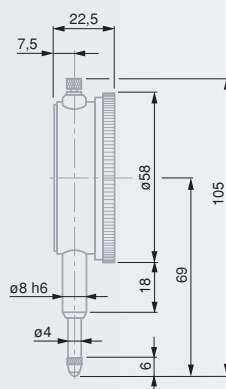
### Plunger retraction device

**01462003** Lift lever

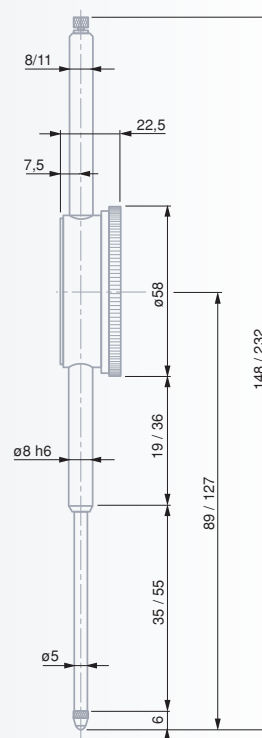
Backs with permanent magnet or central lug, see page F-45.

### Maximum permissible errors for a metrological characteristic (MPE)

	mm	10	30	50
	µm	15	20	25
	µm	8	9	12
	µm	3	3	3



01419048

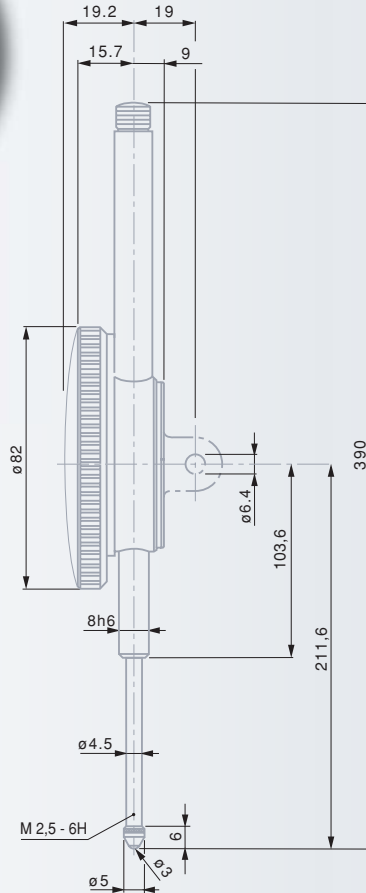
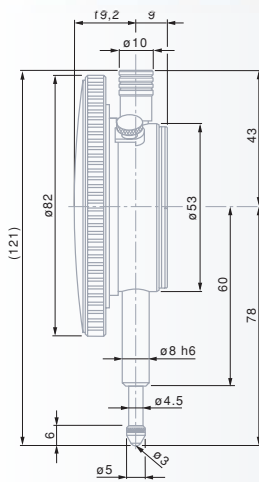


01419049 - 01419050



# Precision Dial Gauges

0,01 mm dial readout / 82 mm dial diameter



EN ISO 463  
Factory standard



0,01 mm



2,3 mm



Rotating dial with or without dial lock



Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.



High performance shock proof system in both directions



Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.



3 mm dia. ball tip, already mounted



Cardboard box



Identification number



Inspection report with a declaration of conformity



mm

mm

mm

mm

TESA dial gauge with dial lock

01410910 YR 0,01 10 10,5 ● 0,1 0 ÷ 50 ÷ 100

TESA dial gauge with a long range

01412014 YE 0,01 100 100,5 ● 1 0 ÷ 50 ÷ 100

## Permissible limits of a metrological characteristic (MPE/MPL)

	10 mm	100 mm
Deviation span	15 µm	30 µm
Deviation span within the local measuring span 0,10 mm	8 µm	–
Total deviation span	17 µm	35 µm
Repeatability limit	3 µm	3 µm
Max. hysteresis	3 µm	8 µm
Measuring force	≤ 1,4 N	≤ 3,2 N

### Precision Dial Gauges

0,01 mm dial readout / 82 mm dial diameter



EN ISO 463  
Factory  
standard

0,01 mm

2,2 mm

Rotating dial  
with or without  
dial lock

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

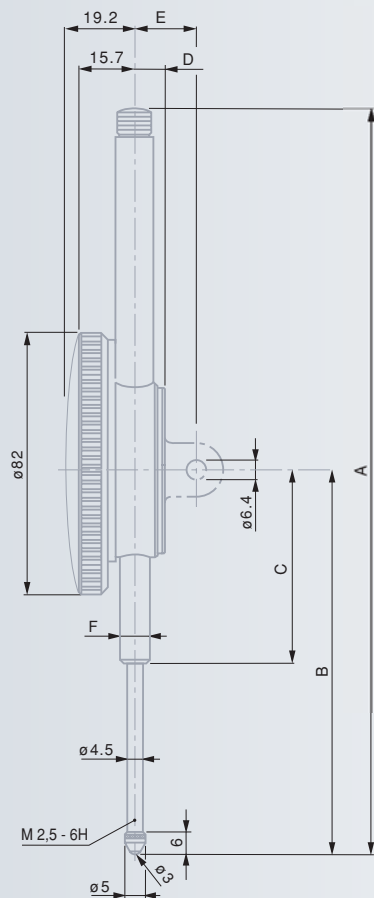
M2,5 thread  
for the  
measuring insert

3 mm dia.  
ball tip, already  
mounted.

Cardboard box

Identification  
number

Inspection report  
with a declaration  
of conformity



mm	30 mm	50 mm	100 mm
<b>A</b>	158	228	390
<b>B</b>	98	117,2	211,6
<b>C</b>	60	60	103,6
<b>D</b>	10	9	9
<b>E</b>	20	19	19
<b>F</b>	Ø 8h6	Ø 8h6	Ø 8h6



mm



mm



mm



mm



COMPAC dial gauges with a long range

<b>712G</b>	0,01	30	30,5	●	—	1	0 ÷ 50 ÷ 100
<b>722G</b>	0,01	50	50,5	●	—	1	0 ÷ 50 ÷ 100
<b>732G</b>	0,01	100	100,5	●	—	1	0 ÷ 50 ÷ 100
<b>732GB</b>	0,01	100	100,5	●	●	1	0 ÷ 50 ÷ 100

Permissible limits of a metrological characteristic (MPE/MPL)

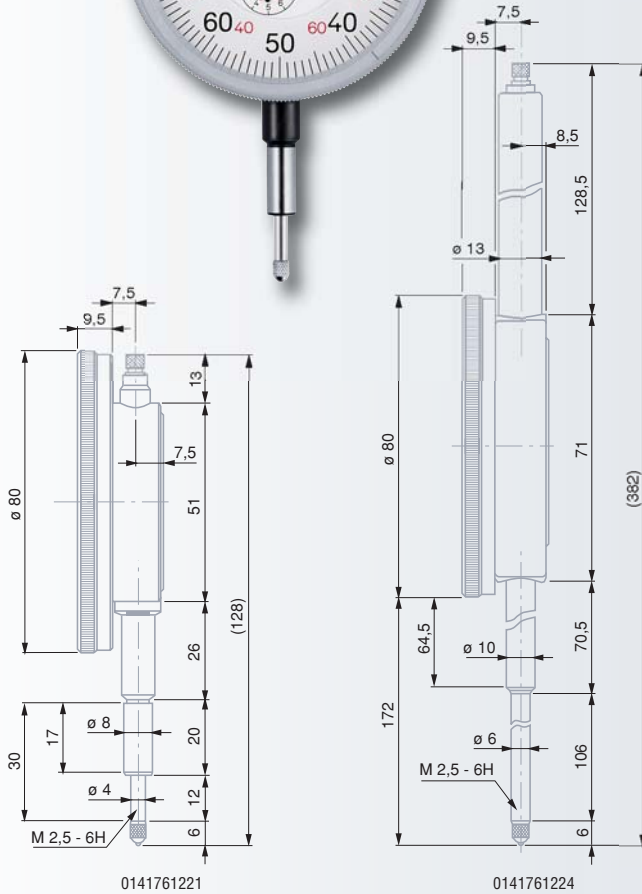
	30 mm	50 mm	100 mm
Deviation span	20 µm	25 µm	30 µm
Total deviation span	25 µm	30 µm	35 µm
Repeatability limit	3 µm	3 µm	3 µm
Max. hysteresis	5 µm	5 µm	8 µm
Measuring force	≤ 2,2 N	≤ 2,5 N	≤ 3,2 N



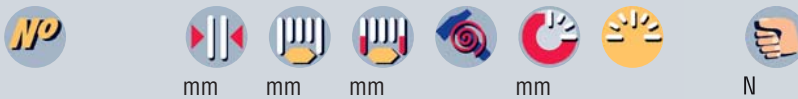


# Precision Dial Gauges

0,01 mm dial readout / 80 mm dial diameter



- EN ISO 463 Factory standard
- 0,01 mm
- 2,2 mm
- Rotating dial
- Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.
- With or without shockproof mechanism
- Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.
- See in the table opposite
- Mounted insert with a 3,175 mm dia. steel ball tip
- Cardboard box
- Identification number
- Declaration of conformity



ROCH dial gauges

<b>0141761221</b>	0,01	10	10,4	-	1	0 ÷ 50 ÷ 100*	≤1,4
<b>0141761224</b>	0,01	100	100,5	-	1	0 ÷ 50 ÷ 100	≤3,5

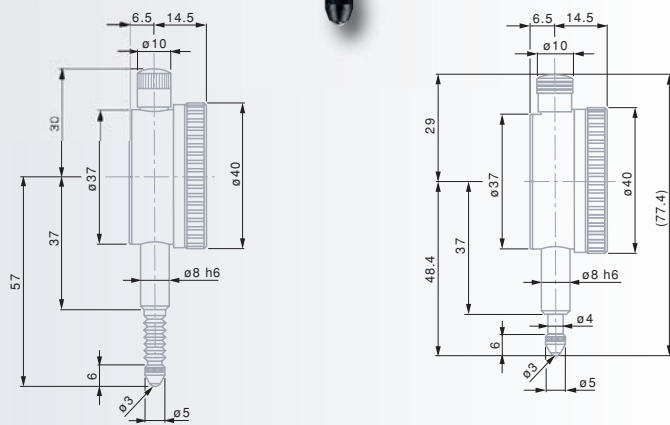
\* With extra red tinted reverse numbering.

Maximum permissible errors for a metrological characteristic (MPE)

	10 mm	100 mm
Deviation span	15 µm	35 µm
Deviation span within the local measuring span of 0,1 mm	5 µm	8 µm
Total deviation span	19 µm	-
Repeatability limit	3 µm	8 µm
Max. hysteresis	3 µm	-

# Precision Dial Gauges

0,002 mm dial readout / 40 mm dial diameter



EN ISO 463  
Factory  
standard

0,002 mm

1,1 mm

Rotating dial

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

Adjustable toler-  
ance marks. M2,5  
mounting thread  
for the measuring insert.

3 mm dia.  
ball tip, already  
mounted

Cardboard box

Identification  
number

Inspection report  
with a declaration  
of conformity



mm



mm



mm



mm



COMPAC dial gauge

<b>355</b>	0,002	3	3,3	●	–	0,2	0 ÷ 10 ÷ 20
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COMPAC dial gauge IP54, protected against the penetration of liquids

<b>355E</b>	0,002	3	3,3	●	–	0,2	0 ÷ 10 ÷ 20
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COMPAC dial gauge with limited reading range

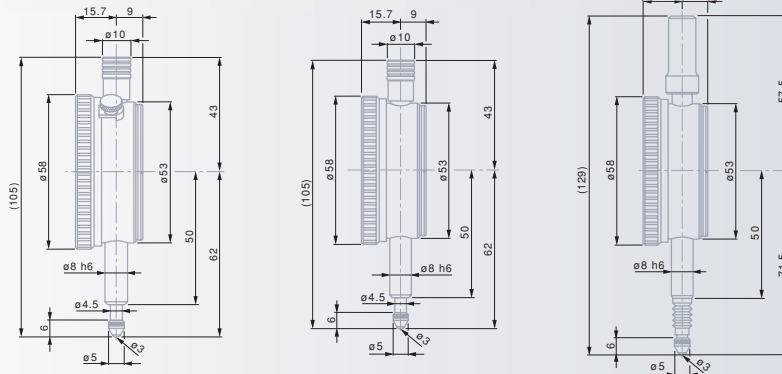
<b>365S</b>	0,002	±0,08	1,5	●	–	0,2	8 ÷ 0 ÷ 8
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Permissible limits of a metrological characteristic (MPE/MPL)

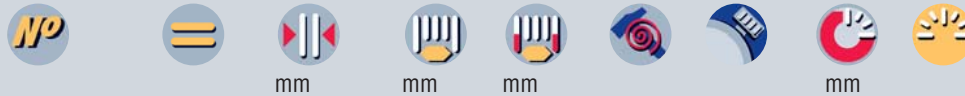
	±0,08 mm	3 mm
Deviation span	2 µm	10 µm
Deviation span within the local measuring span 0,10 mm	2 µm	6 µm
Total deviation span	4 µm	12 µm
Repeatability limit	1 µm	1,5 µm
Max. hysteresis	1 µm	2 µm
Measuring force – Model IP54	≤ 1,4 N –	≤ 1,4 N ≤ 1,7 N

## Precision Dial Gauges

0,002 mm dial readout / 58 mm dial diameter



- ✓
- EN ISO 463  
Factory standard
- 0,002 mm
- 1,5 mm
- Rotating dial with or without dial lock
- Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.
- Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.
- 3 mm dia. ball tip, already mounted.
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity



### MERCER dial gauges

<b>01416034</b>	<b>253-1</b>	0,002	5	5,3	–	●	0,2	0 ÷ 10 ÷ 0
<b>01416035</b>	<b>254-1</b>	0,002	5	5,3	–	●	0,2	0 ÷ 10 ÷ 20

### COMPAC dial gauge

<b>555</b>		0,002	5	5,3	●	–	0,2	0 ÷ 10 ÷ 20
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### COMPAC dial gauge IP54, protected against the penetration of liquids

<b>555E</b>		0,002	5	5,3	●	–	0,2	0 ÷ 10 ÷ 20
-------------	--	-------	---	-----	---	---	-----	-------------

### COMPAC dial gauge with limited reading range

<b>565S</b>		0,002	±0,08	3,3	●	–	0,2	8 ÷ 0 ÷ 8
-------------	--	-------	-------	-----	---	---	-----	-----------

### Permissible limits of a metrological characteristic (MPE/MPL)

Deviation span	±0,08 mm	5 mm
Total deviation span	4 µm	12 µm
Repeatability limit	4 µm	14 µm
Repeatability limit	1 µm	2 µm
Max. hysteresis	1 µm	2 µm
Measuring force – Model IP54	≤ 1,5 N –	≤ 1,5 N ≤ 1,7 N

## Precision Dial Gauges

0,001 mm dial readout / 40 mm dial diameter



EN ISO 463  
Factory  
standard

0,001 mm

1,1 mm

Rotating dial,  
With or without  
dial lock.

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

High performance  
shock proof system  
in both directions

Adjustable toler-  
ance marks. M2,5  
mounting thread  
for the measuring insert.

3 mm dia.  
ball tip, already  
mounted.

Cardboard box

Identification  
number

Inspection report  
with a declaration  
of conformity



### TESA dial gauges

<b>01410010</b>	YR	0,001	1	1,5	●	●	0,1	0 ÷ 50 ÷ 100
<b>01410011</b>	YR	0,001	1	1,5	●	●	0,1	0 ÷ 50 ÷ 0
<b>01412510</b>	YE	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 100

### TESA dial gauges IP54, protected against the penetration of liquids

<b>01410120</b>	YR	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 100
<b>01410121</b>	YR	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 0
<b>01412710</b>	YE	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 100

### COMPAC dial gauge

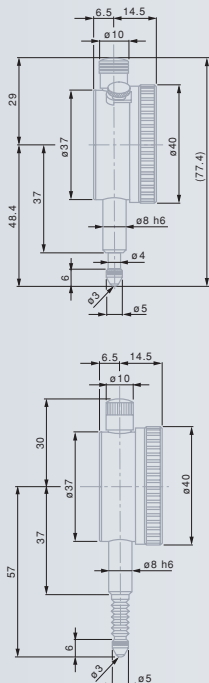
<b>367</b>		0,001	1	1,5	●	–	0,1	0 ÷ 5 ÷ 10
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### COMPAC dial gauge IP54, protected against the penetration of liquids

<b>367E</b>		0,001	1	1,5	●	–	0,1	0 ÷ 5 ÷ 10
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### COMPAC dial gauge with limited reading range

<b>367S</b>		0,001	±0,04	1,5	●	–	0,1	4 ÷ 0 ÷ 4
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### Permissible limits of a metrological characteristic (MPE/MPL)

	±0,04 mm	1 mm
	2 µm	4 µm
	2 µm	4 µm
	4 µm	5 µm
	1 µm	1 µm
	1 µm	1 µm
	≤ 1,4 N	≤ 1,7 N
– Models IP54	–	≤ 2 N







# Precision Dial Gauges

0,001 mm dial readout / 58 mm dial diameter



EN ISO 463  
Factory  
standard

0,001 mm

1,5 mm

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

High performance  
shockproof system  
in both directions

Adjustable toler-  
ance marks. M2,5  
mounting thread  
for the measuring insert.

3 mm dia.  
ball tip, already  
mounted

Cardboard box

Identification  
number

Inspection report  
with a declaration  
of conformity



mm

mm

mm

mm

### TESA dial gauges

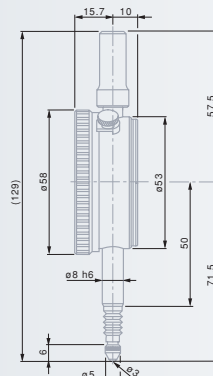
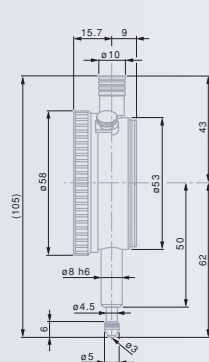
<b>01412511</b>	YE	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 100
<b>01410410</b>	YR	0,001	1	3,3	●	–	0,1	0 ÷ 50 ÷ 100
<b>01410411</b>	YR	0,001	1	3,3	●	–	0,1	0 ÷ 50 ÷ 0
<b>01412611</b>	YE	0,001	5	5,3	●	–	0,2	0 ÷ 100 ÷ 200

### COMPAC dial gauges IP54, protected against the penetration of liquids

<b>01412711</b>	YE	0,001	1	1,5	●	–	0,1	0 ÷ 50 ÷ 100
<b>01410520</b>	YR	0,001	1	3,3	●	–	0,1	0 ÷ 50 ÷ 100

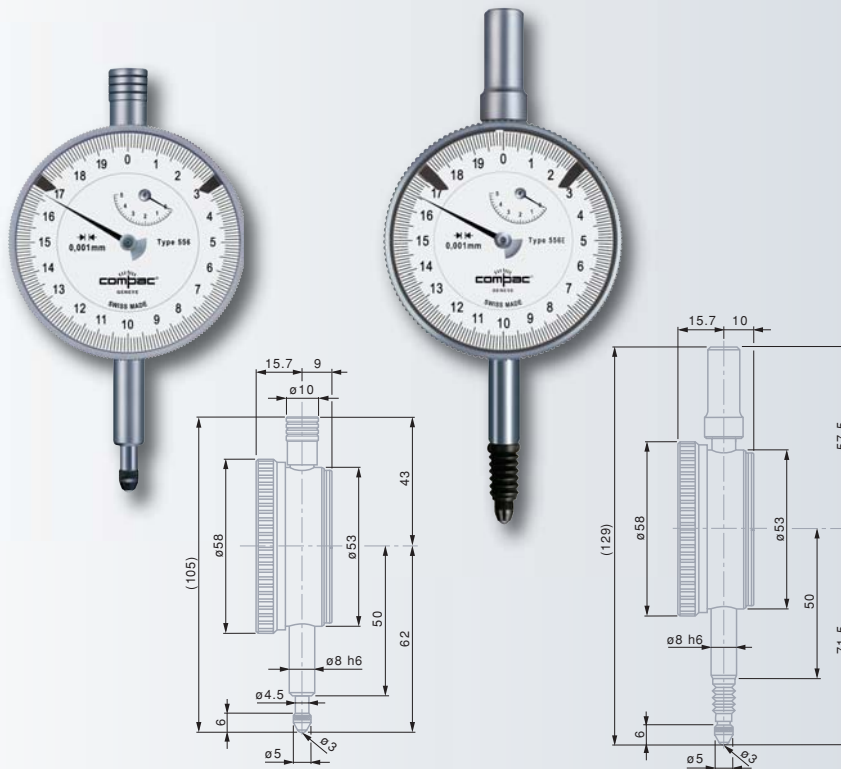
### Permissible limits of a metrological characteristic (MPE/MPL)

	1 mm	5 mm	
	Deviation span	4 µm	12 µm
	Deviation span within the local measuring span 0,10 mm	4 µm	
	Total deviation span	5 µm	14 µm
	Repeatability limit	1 µm	2 µm
	Max. hysteresis	1 µm	2 µm
	Measuring force – Models IP54	≤ 1,7 N –	≤ 1,5 N ≤ 1,7 N

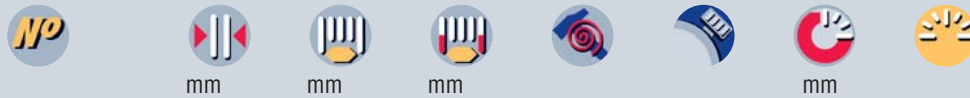


## Precision Dial Gauges

0,001 mm dial readout / 58 mm dial diameter



- ✓
- EN ISO 463  
Factory standard
- 0,001 mm
- 1,5 mm
- Rotating dial
- Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.
- Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.
- 3 mm dia. ball tip, already mounted.
- Cardboard box
- Identification number
- Inspection report with a declaration of conformity



### COMPAC dial gauges

<b>556</b>	0,001	5	5,3	●	–	0,2	0 ÷ 10 ÷ 20
<b>567</b>	0,001	1	3,3	●	–	0,1	0 ÷ 5 ÷ 10

### COMPAC dial gauges IP54, protected against the penetration of liquids

<b>556E</b>	0,001	5	5,3	●	–	0,2	0 ÷ 10 ÷ 20
<b>567E</b>	0,001	1	3,3	●	–	0,1	0 ÷ 5 ÷ 10

### Permissible limits of a metrological characteristic (MPE/MPL)

Deviation span	4 µm	12 µm
Total deviation span	5 µm	14 µm
Repeatability limit	1 µm	2 µm
Max. hysteresis	1 µm	2 µm
Measuring force – Models IP54	≤ 1,5 N ≤ 1,7 N	≤ 1,5 N ≤ 1,7 N

# Precision Dial Gauges

0,001 mm dial readout / 58 mm dial diameter



EN ISO 463  
Factory  
standard

0,001 mm

0,8 mm  
(No. 0141761281,  
0141761282  
and 0141761283)  
1,5 mm (No. 0141761284)

Rotating dial

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

With or without  
shockproof  
mechanism

Adjustable toler-  
ance marks.  
M2,5 mounting  
thread for  
the measuring insert.

For accuracy,  
see the table  
on page F-30

See table  
opposite

Mounted insert  
with a 3,175 mm  
dia. steel ball tip

Suited plastic case

Identification  
number

Declaration  
of conformity

NO	mm	mm	mm	mm	mm	mm	N
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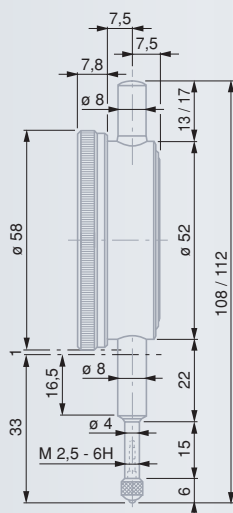
*ROCH dial gauges*

<b>0141761282</b>	58	0,001	1	1,1	—	0,2	0 ÷ 100/0 ÷ 100* ≤ 1,5
<b>0141761283</b>	58	0,001	1	1,1	●	0,2	0 ÷ 100/0 ÷ 100* ≤ 1,5
<b>0141761284</b>	58	0,001	1	1,1	●	0,1	0 ÷ 50 ÷ 100* ≤ 1,5

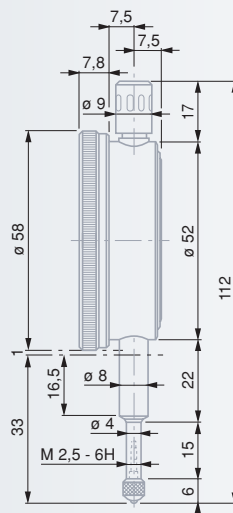
*ROCH dial gauge IP54, protected against the penetration of liquids*

<b>0141761281</b>	58	0,001	1	1,1	●	0,2	0 ÷ 100/0 ÷ 100* ≤ 2,0
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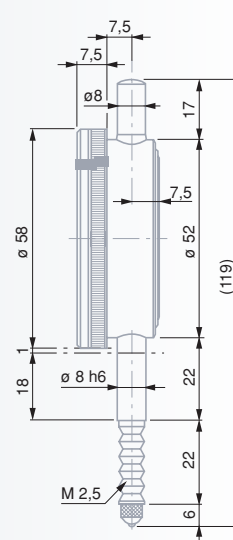
\* With extra red tinted reverse numbering.



0141761282  
0141761283



0141761284



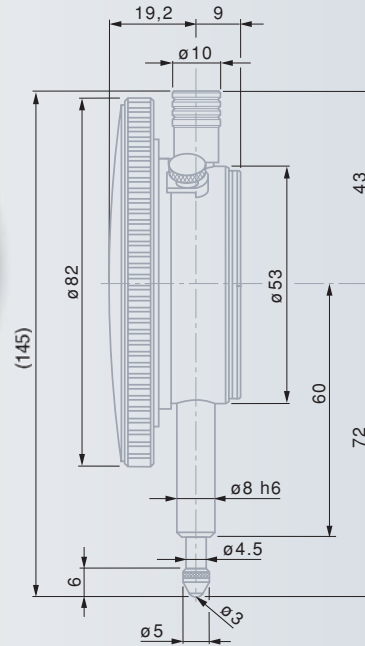
0141761281





# Precision Dial Gauges

0,001 mm dial readout / 82 mm dial diameter



EN ISO 463  
Factory standard



0,001 mm



2,3 mm



Rotating dial.  
With or without dial lock.



Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.



High performance shockproof system in both directions



Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.



3 mm dia. ball tip, already mounted



Cardboard box



Identification number



Inspection report with a declaration of conformity



mm



mm



mm



mm



TESA dial gauges

01410810	YR	0,001	1	3,3	●	●	0,1	0 ÷ 50 ÷ 100
01410811	YR	0,001	1	3,3	●	●	0,1	0 ÷ 50 ÷ 0

COMPAC dial gauge

556G		0,001	5	5,3	●	—	0,2	0 ÷ 10 ÷ 20
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## Permissible limits of a metrological characteristic (MPE/MPL)

	1 mm	5 mm
Deviation span	4 µm	12 µm
Deviation span within the local measuring span 0,10 mm	4 µm	—
Total deviation span	5 µm	14 µm
Repeatability limit	1 µm	2 µm
Max. hysteresis	1 µm	2 µm
Measuring force	≤ 1,7 N	≤ 1,5 N

# Precision Dial Gauges

0.001 in dial readout / 40 or 58 mm dial diameter



Factory standard

0.001 in

2,2 mm

Rotating dial with dial lock

Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.

Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Inspection report with a declaration of conformity

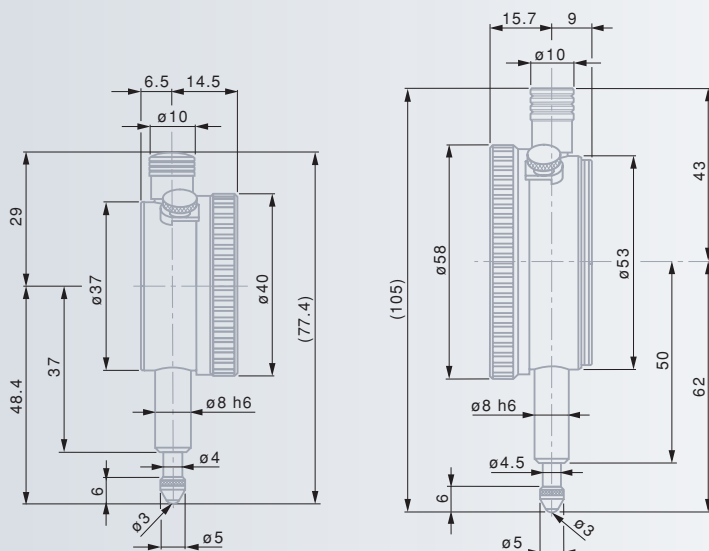


MERCER dial gauges

<b>01426010</b>	<b>181-1</b>	40	0.001	0.200	0.212	—	●	0.1	0 ÷ 50 ÷ 0
<b>01426011</b>	<b>182-1</b>	40	0.001	0.200	0.212	—	●	0.1	0 ÷ 50 ÷ 100
<b>01426026</b>	<b>210-1</b>	58	0.001	0.400	0.420	—	●	0.1	0 ÷ 50 ÷ 0
<b>01426027</b>	<b>211-1</b>	58	0.001	0.400	0.420	—	●	0.1	0 ÷ 50 ÷ 100
<b>01426031</b>	<b>216-1</b>	58	0.001	1	1.2	●	●	0.1	0 ÷ 50 ÷ 100

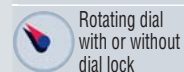
Permissible limits of a metrological characteristic (MPE/MPL)

	0.2 in	0.4 in	1 in
Deviation span	0.0005 in	0.0006 in	0.0008 in
Total deviation span	0.0006 in	0.0007 in	0.001 in
Repeatability limit	0.00015	0.0002	0.00015
Max. hysteresis	0.00015 in	0.0002 in	0.0002 in
Measuring force	≤ 1,4 N	≤ 1,4 N	≤ 2,2 N



## Precision Dial Gauges

0.0005 in dial readout / 40 or 58 mm dial diameter

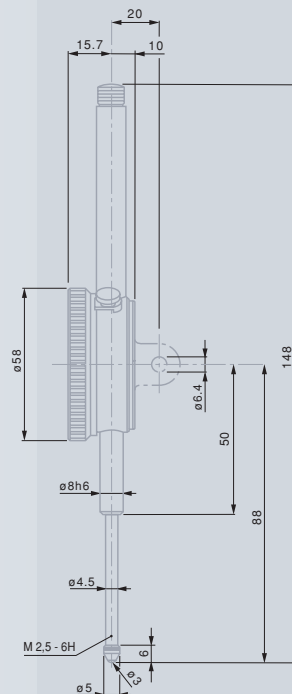
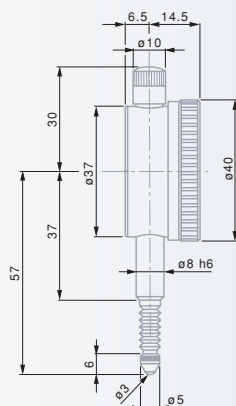


*MERCER dial gauges*

<b>01426012</b>	<b>183-1</b>	40	0.0005	0.200	0.212	●	●	0.05	0 ÷ 25 ÷ 0
<b>01426013</b>	<b>184-1</b>	40	0.0005	0.200	0.212	●	●	0.05	0 ÷ 25 ÷ 50
<b>01426020</b>	<b>212-1</b>	58	0.0005	0.400	0.420	-	●	0.05	0 ÷ 25 ÷ 0
<b>01426021</b>	<b>213-1</b>	58	0.0005	0.400	0.420	-	●	0.05	0 ÷ 25 ÷ 50
<b>01426032</b>	<b>217-1</b>	58	0.0005	1	1.2	●	●	0.05	0 ÷ 25 ÷ 50
<i>COMPAC dial gauge</i>									
<b>354A</b>		40	0.0005	0.200	0.212	●	-	0.02	0 ÷ 10 ÷ 20
<i>COMPAC dial gauge IP54, protected against the penetration of liquids</i>									
<b>354AE</b>		40	0.0005	0.200	0.212	●	-	0.02	0 ÷ 10 ÷ 20

### Permissible limits of a metrological characteristic (MPE/MPL)

	0.2 in	0.4 in	1 in
Deviation span	0.0005 in	0.0006 in	0.0008 in
	0.0006 in	0.0007 in	0.001 in
Repeatability limit	0.00015 in	0.0002 in	0.0015 in
Max. hysteresis	0.00015 in	0.0002 in	0.0002 in
Measuring force - Model IP54	≤ 1,4 N ≤ 1,7 N	≤ 1,4 N -	≤ 2,2 N -



# Precision Dial Gauges

0.0001 in dial readout / 40 or 58 mm dial diameter



Factory standard

0.0001 in

1,1 mm

Rotating dial with or without dial lock

Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.

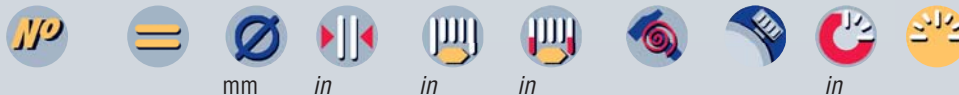
Adjustable tolerance marks. M2,5 mounting thread for the measuring insert.

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Inspection report with a declaration of conformity

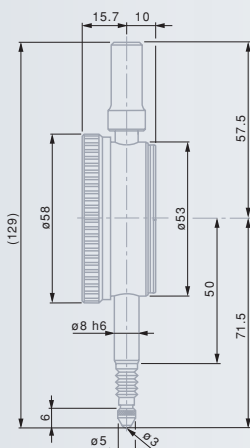


COMPAC dial gauge IP54, protected against the penetration of liquids

<b>355AE</b>	40	0.0001	0.120	0.130	●	-	0.01	0 ÷ 5 ÷ 10
<i>MERCER dial gauges</i>								
<b>01426028 240-1</b>	58	0.0001	0.200	0.210	-	●	0.01	0 ÷ 50 ÷ 0
<b>01426029 241-1</b>	58	0.0001	0.200	0.210	-	●	0.01	0 ÷ 50 ÷ 100

## Maximum permissible errors for a metrological characteristic (MPE)

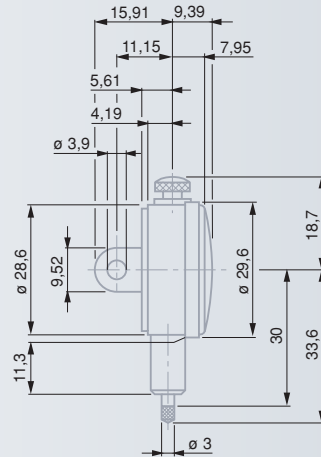
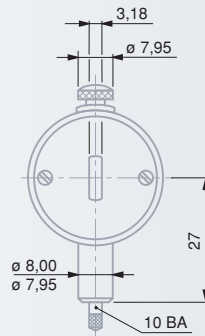
	0.12 in	0.2 in
Deviation span	0.0004	0.0005
Total deviation span	0.0005	0.00055
Repeatability limit	0.00006	0.00006
Max. hysteresis	0.00008	0.00008
Measuring force	≤ 2 N	≤ 2.2 N





## Small Dial Gauges

### MERCER Series 70, 1 1/8 in or 29 mm dial diameter



#### Models to 0.001 or 0.0001 in

No	=	in			in	in	in	N
		in	in	in				
01426050	71	0.001	0.04	0.05	–	0.04	0 ÷ 20 ÷ 0	≤ 1,5
01426051	73	0.0001	0.01	0.05	–	0.01	0 ÷ 5 ÷ 0	≤ 1,5

#### Models to 0,01 or 0,002 mm

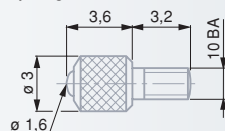
No	=	mm			mm	mm	N	
		mm	mm	mm				
01416050	72	0,01	1	1,2	–	1	0 ÷ 50 ÷ 0	≤ 1,5
01416051	74	0,002	0,2	1,2	–	0,2	0 ÷ 10 ÷ 0	≤ 1,5

#### Permissible limits of a metrological characteristic (MPE/MPL)

	0.001 in	0.0001 in	0,01 mm	0,002 mm
Deviation span	0.0005 in	0.0005 in	10 µm	6 µm
Total deviation span	0.0008 in	0.0007 in	13 µm	9 µm
Repeatability limit	0.0003 in	0.0002 in	3 µm	2 µm
Max. hysteresis	0.0003 in	0.0002 in	3 µm	3 µm

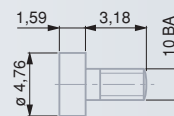
#### Accessories for MERCER dial gauges, series 70

10BA coupling thread



Standard insert with spherical measuring faces.

No		mm
03560072	Steel	1,6
03560073	Carbide	1,6



Measuring insert with a flat measuring face.

No		mm
03560074	Steel	4,76



Factory standard or EN ISO 463 for metric models



See table opposite



2,25 mm or 0,9 mm



Rotating dial



Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.



Without shockproof mechanism



Back with central lug. Measuring insert with a 10BA coupling thread.



See in the table opposite



Mounted insert with a 3 mm dia. steel ball tip



Cardboard box



Identification number



Inspection report with a declaration of conformity

# Dial Gauges with Back Mounted Plunger

0,01 or 0,002 mm dial readout / 40 mm dial diameter



EN ISO 463.  
Factory standard.

Rotating dial

Full-metal dial casing.  
Stainless steel fixing shank and plunger, hardened.

Shockproof system protecting the movement

Adjustable tolerance marks.  
M2,5 mounting thread for the measuring insert.

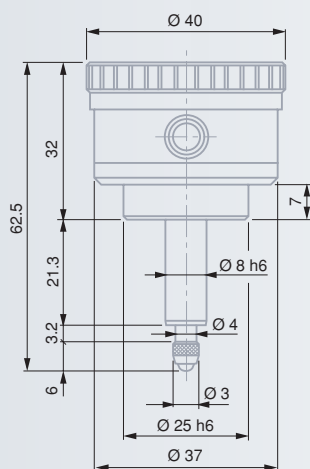
Fastening sleeve with a 8h6 or 25h6 stem diameter.

Mounted insert with a 3 mm ball tip dia.

Cardboard box

Serial number

Inspection report with a declaration of conformity



*COMPAC dial gauges*

	mm	mm	mm	mm	μm	μm	μm	N	
<b>CP 352</b>	0,01	3	3,2	1	0 ÷ 50 ÷ 100	14	3	3	0,9
<b>CP 353</b>	0,01	3	3,2	0,5	0 ÷ 25 ÷ 50	14	3	3	0,9
<b>CP 355</b>	0,002	3	3,2	0,2	0 ÷ 10 ÷ 20	14	2	2,5	0,9

*COMPAC dial gauges with a limited reading range*

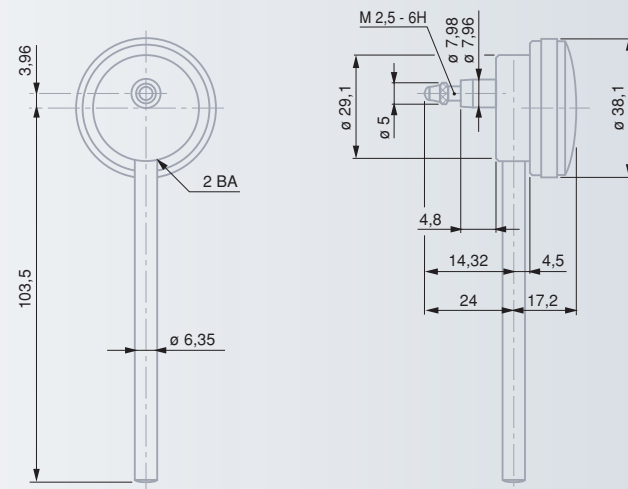
<b>CP 352S</b>	0,01	±0,4	3,2	(1)	40 ÷ 0 ÷ 40	9	3	3	0,9
<b>CP 355S</b>	0,002	±0,08	3,2	(0,2)	8 ÷ 0 ÷ 8	9	2	2,5	0,9

S: Models with a restricted reading range.

Since the pointer travels less than one revolution, all reading errors due to the revolution counter are eliminated.

## Dial Gauges with Back Mounted Plunger

MERCER Serie 90, 38 mm dial diameter



Factory standard or EN ISO 463 for metric models

0.001 in and 0,01 mm

2,4 mm or 1,2 mm

Rotating dial

Full-metal dial casing. Stainless steel fixing shank and plunger, hardened.

Without shockproof mechanism

Measuring insert with a M2,5 thread. Also with a 6,35 mm dia. holding rod that can be unscrewed.

See table opposite

Mounted insert with a 3 mm dia. steel ball tip

Cardboard box

Identification number

Inspection report with a declaration of conformity

### Models to 0,01 mm

No	mm	mm	mm	mm	mm	mm	N
01416060	93	0,01	1	3,5	–	1	0 ÷ 50 ÷ 0 ≤1,5
01416061	94	0,01	1	3,5	–	1	0 ÷ 50 ÷ 100 ≤1,5

### Models to 0.001 in

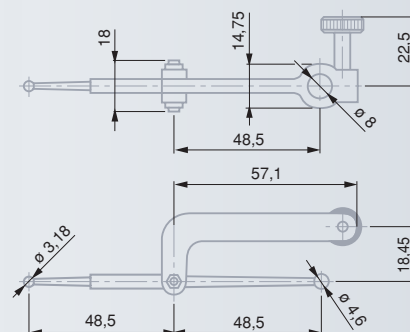
No	in	in	in	in	in	N	
01426060	91	0.001	0.05	0.14	–	0.05	0 ÷ 25 ÷ 0 ≤1,5
01426061	92	0.001	0.05	0.14	–	0.05	0 ÷ 25 ÷ 50 ≤1,5

### Maximum permissible errors for a metrological characteristic (MPE)

	0,01 mm	0.001 in
	25 µm	0.0010 in
	40 µm	0.0015 in
	12 µm	0.0005 in
	12 µm	0.0005 in

### Accessories for MERCER dial gauges, series 90

Swivelling arm	
No	
03560078	1:1



# Dial Gauges with Back Mounted Plunger

0,01 mm dial readout / 40 or 58 mm dial diameter



EN ISO 463  
Factory  
standard

0,01 mm

2,2 mm (Ø 40)  
1,5 mm (Ø 58)

Rotating dial

Full-metal  
dial casing.  
Stainless steel  
fixing shank and plunger,  
hardened.

Without shock-  
proof mechanism

Adjustable toler-  
ance marks.  
M2,5 mounting  
thread for the measuring  
insert.

See table  
opposite

Mounted insert  
with a 3,175 mm  
dia. steel ball tip

Cardboard box

Identification  
number

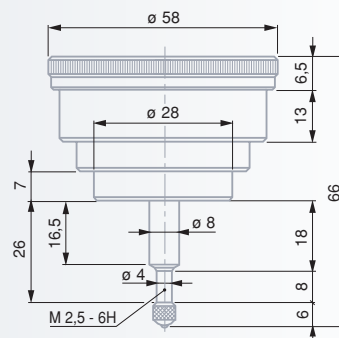
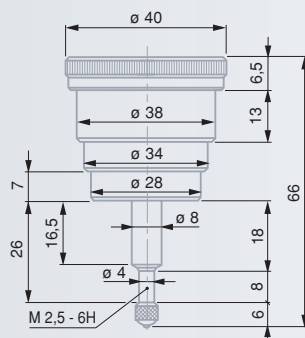
Declaration  
of conformity



ROCH dial gauges

<b>0141760566</b>	40	0,01	3	3,5	–	0,5	0 ÷ 25 ÷ 50*	≤1,2
<b>0141760611</b>	58	0,01	3	3,5	–	1	0 ÷ 50 ÷ 100*	≤1,5

\* With extra red tinted reverse numbering.



Maximum permissible errors for a metrological characteristic (MPE)

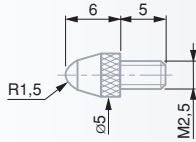
		3 mm
	Deviation span	12 µm
	Deviation span with the local measuring span of 0,1 mm	5 µm
	Total deviation span	15 µm
	Repeatability limit	5 µm
	Max. hysteresis	15 µm





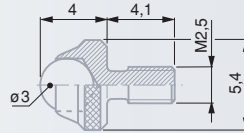
# Measuring Inserts for Dial Gauges, Axial Probes and other Handtools

Executions with a M2,5 coupling thread



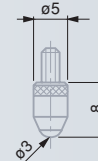
Standard spherical measuring inserts.

No		L mm
03510001	Steel	6
03510002	Carbide	6
03560001	Sapphire	6



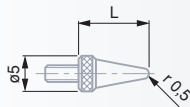
Short spherical measuring insert.

No		L mm
03560007	Carbide	4



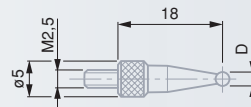
Long spherical measuring inserts.

No		L mm
03560019	Steel	8
03560020	Carbide	8
03560021	Sapphire	8



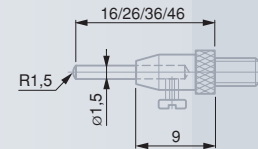
Spherical measuring inserts,  
R = 0,5 mm.

No		L mm
03560035	Steel	5
03560036	Steel	10
03560037	Steel	15
03560038	Steel	20
03560039	Steel	30
03560040	Steel	40



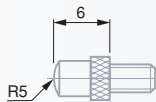
Spherical measuring inserts.

No		mm
03560051	Carbide	1
03560052	Carbide	2
03560053	Carbide	3
03560054	Carbide	4
03560055	Carbide	5
03560056	Carbide	6
03560057	Carbide	7
03560058	Carbide	8
03560059	Carbide	9
03560060	Steel	10
03560061	Steel	11
03560062	Steel	12



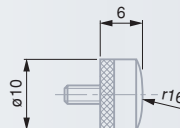
Spherical measuring insert with  
4 interchangeable pins, R = 1,5 mm.

No		L mm
03510201	Steel	16, 26, 36, 46



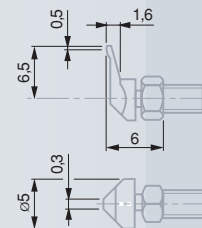
Spherical measuring inserts.

No		R mm
03510101	Steel	5
03510102	Carbide	5



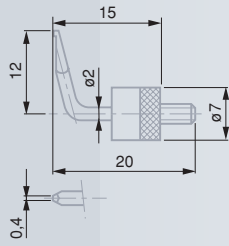
Spherical measuring inserts

No		R mm
03560017	Steel	16
03560018	Carbide	16

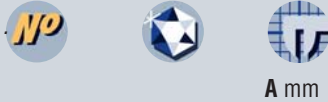


Measuring insert with offset (A)  
contact point and lock nut for radial  
alignment.

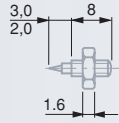
No		A mm
03510401	Steel	6,5



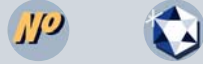
Measuring insert with offset (A) contact point and lock nut for radial alignment.



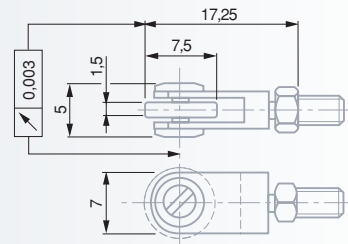
**03560063** Steel 12



Measuring insert with needle contact point.



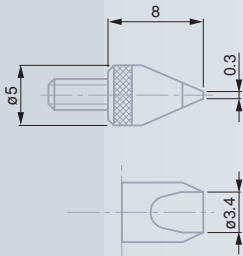
**03560030** Steel



Measuring inserts with ball-bearing rollers. Lock nut for radial alignment.



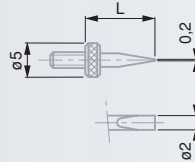
**03560010** Steel cylindrical  
**03560011** Steel ball-shaped



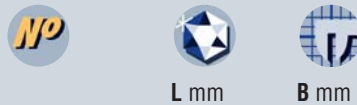
Inserts with a blade-shaped measuring face. Lock nut for radial alignment.



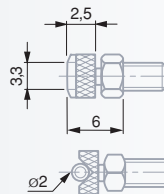
**03560024** Steel 0,3  
**03560025** Carbide 0,3



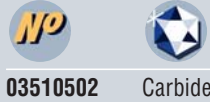
Inserts with a blade-shaped steel face. Lock nut for radial alignment.



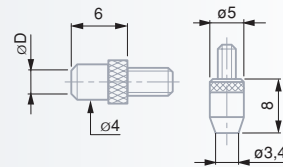
**03560031** 5 0,2  
**03560032** 10 0,2  
**03560033** 15 0,2  
**03560034** 20 0,2



Insert with a cylindrical measuring face. Lock nut for radial alignment.



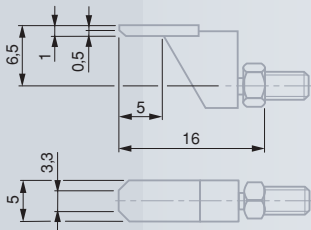
**03510502** Carbide



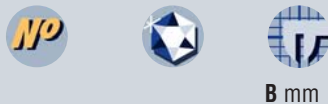
Inserts with a flat measuring face.



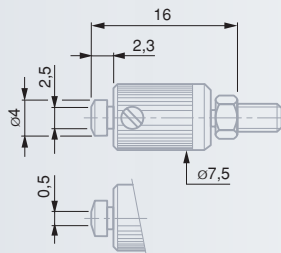
**03510801** Steel 2,5  
**03510802** Carbide 2,5  
**03560022** Steel 3,4  
**03560023** Carbide 3,4



Insert with a narrow, off-centre measuring face. Lock nut for radial alignment.



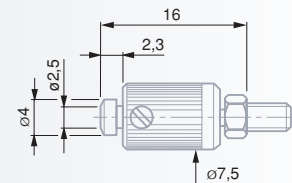
**03510602** Carbide 0,5



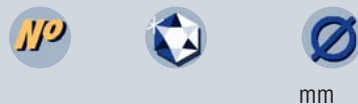
Insert with a narrow, parallel measuring face, adjustable. Lock nut for radial alignment.



**03510702** Carbide 0,5

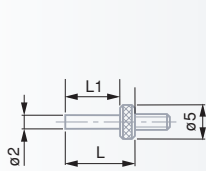


Insert with a flat, parallel measuring face, adjustable. Lock nut for radial alignment.



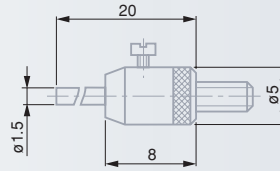
**03510902** Carbide 2,5





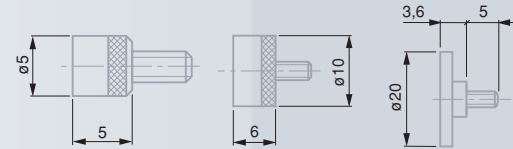
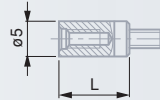
Steel inserts with a flat measuring face.

Nº	L mm	L1 mm	mm
03560026	5	2,8	2
03560027	10	7,8	2
03560028	15	12,8	2
03560029	20	17,8	2



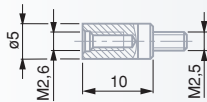
Inserts with a flat measuring face as well as interchangeable pin.

Nº	Material	Pin Length (mm)
03560008	Steel	1,5
03560009	Carbide	1,5



Inserts with a flat measuring face.

Nº	Material	Length (mm)
03560012	Steel	5
03560013	Carbide	5
03560014	Steel	10
03560015	Carbide	10
03560016	Steel	20

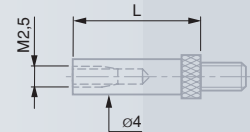


Connectors for measuring inserts.

Nº	Outside	Inside
03560092	M2,5	M2
03560066	M2,5	M2,6
03560067	M2,5	M3
03560064	M2,6	M2,5
03560065	M3	M2,5

Extensions for measuring inserts.

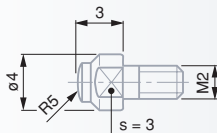
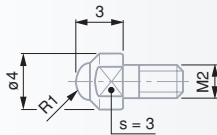
Nº	L mm
03560042	10
03560043	15
03560044	20
03560045	25
03560046	30
03560047	35
03560048	40
03560049	45
03560050	50



Extensions for measuring inserts.

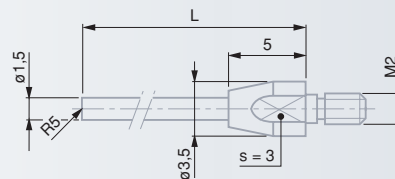
Nº	L mm
03540501	10
03540502	15
03540503	20
03540504	40

## Executions with a M2 Coupling Thread



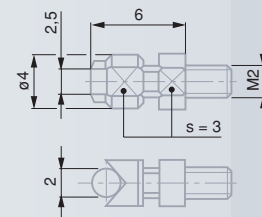
Spherical measuring inserts. M2 thread.

Nº	Material	R mm
03510204	Carbide	R 1
03510103	Carbide	R 5



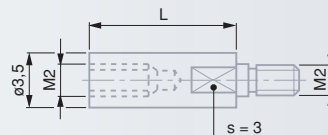
Spherical measuring inserts, R = 5 mm. M2 thread.

Nº	Material	L mm
03510202	Carbide	16
03510203	Carbide	26



Measuring insert with cylindrical measuring face. Lock nut for radial alignment. M2 thread.

Nº	Material
03510503	Carbide



Extensions for measuring inserts, M2.

Nº	L mm
03540505	10
03540506	15



## Devices for Plunger Retraction

Top mounted retraction devices.



mm

<b>03560004</b>	Retraction device	Ø 40
<b>03560005</b>	Retraction device	Ø 58

Each consisting of:

- \_\_\_\_\_ Lift lever
- \_\_\_\_\_ Head screw



Bottom mounted retraction device.



<b>03540104</b>	Retraction device
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Consisting of:

<b>03540101</b>	Lift lever
<b>03540102</b>	Washer



Bottom mounted lift lever.



<b>01960005</b>
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## 90° Angle Probe



<b>03560006</b>	90° angle probe used for the transmission of the plunger movement up to 10 mm. Suited for dial gauges with a 0,01 mm scale division.
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Furnished with:

<b>03560012</b>	Measuring insert with a 5 mm diameter flat face
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## Backs for ROCH or ETALON Dial Gauges



Bezel diameter

Back diameter

Magnetic face

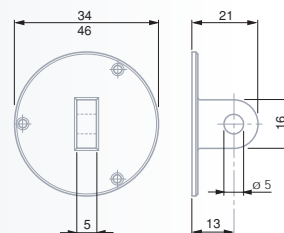
L mm

Central lug backs

<b>01462004</b>	40 mm	34 mm
<b>01462005</b>	58, 60, 80 mm	46 mm

Magnetic back with permanent magnets

<b>01462001</b>	58, 60, 80 mm	46 mm	46 mm	17 mm
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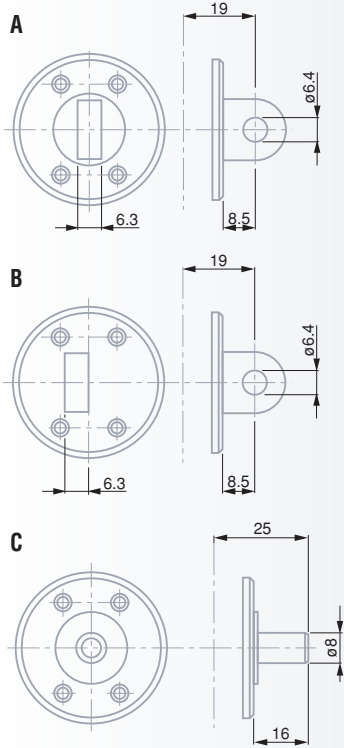
## Backs for dial gauges

**TESA YR, TESA YE, MERCER, COMPAC,  
40, 58 or 82 mm dial diameter**  
**DIGICO 205-705, 58 mm dial diameter**



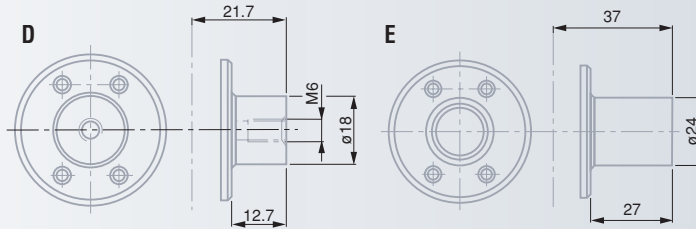
Dull-chrome plated, except for models  
No. 01460010, 01460011, 01460016 and 01460017

Holding force = 150 N



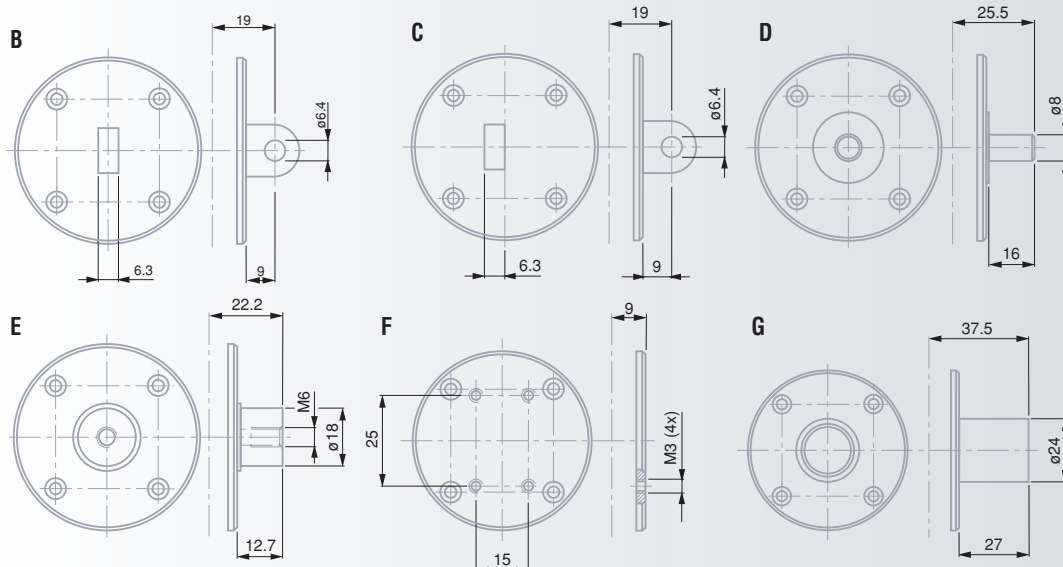
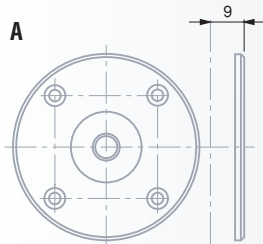
### Executions for dial gauges with a 40 mm dial diameter

No.	Symbol	Description
01460008		A Back with central lug
01460009		B Back with offset lug
01460010		C Back with a 8 mm dia. fixing shank
01460011		D Back with M6 inner thread
01460012		E Back with permanent magnet

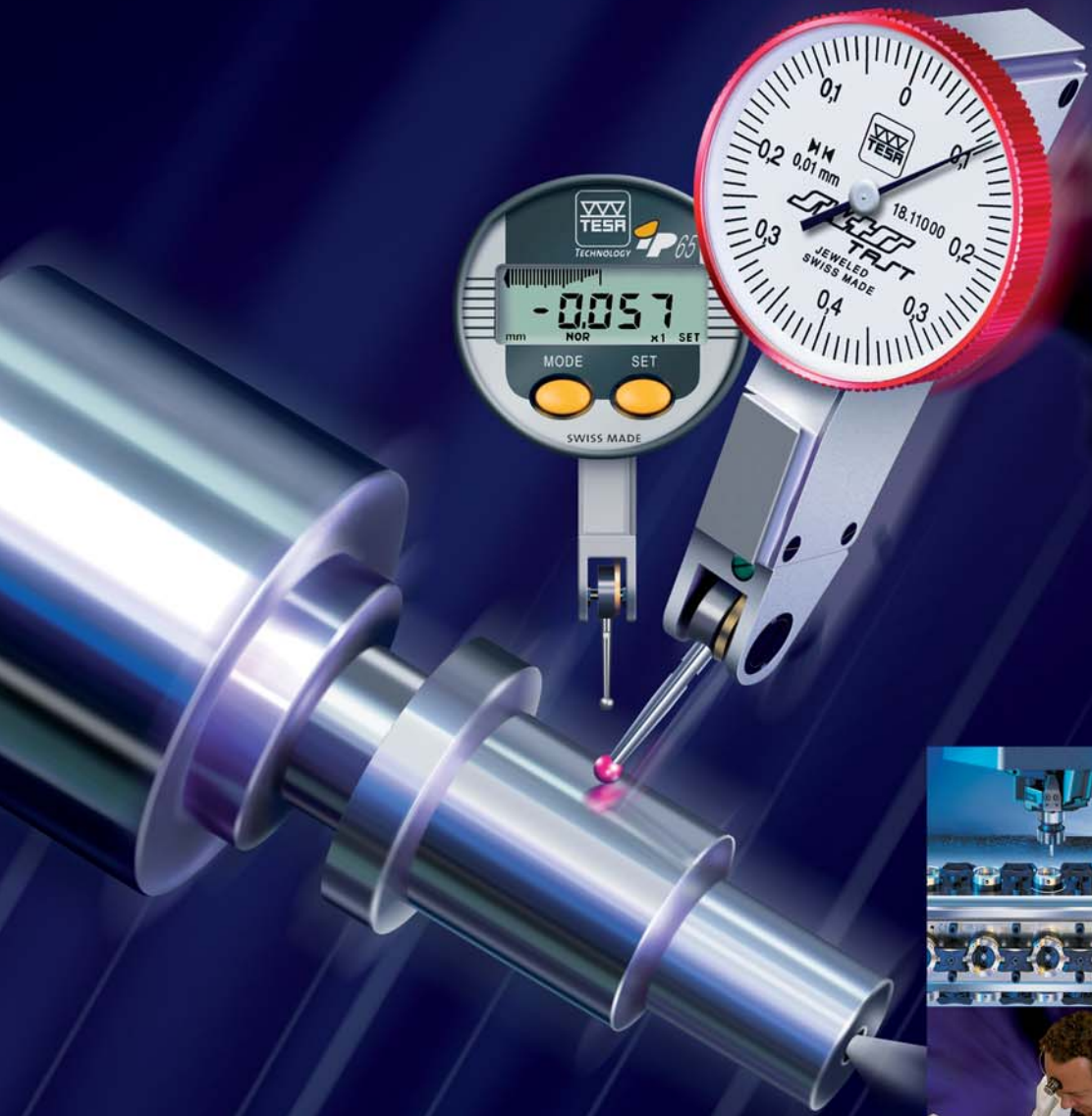


### Executions for dial gauges with a 58 or 82 mm dial diameter

No.	Symbol	Description
01460013		A Flat back
01460014		B Flat back with central lug
01460015		C Flat back with offset lug
01460016		D Back with a 8 mm dia. fixing shank
01460017		E Back with a M6 inner thread
01460018		F Back with 4 clamping bores as per CNOMO French standard
01460019		G Back with permanent magnet



# Dial Test Indicators (Lever-type)

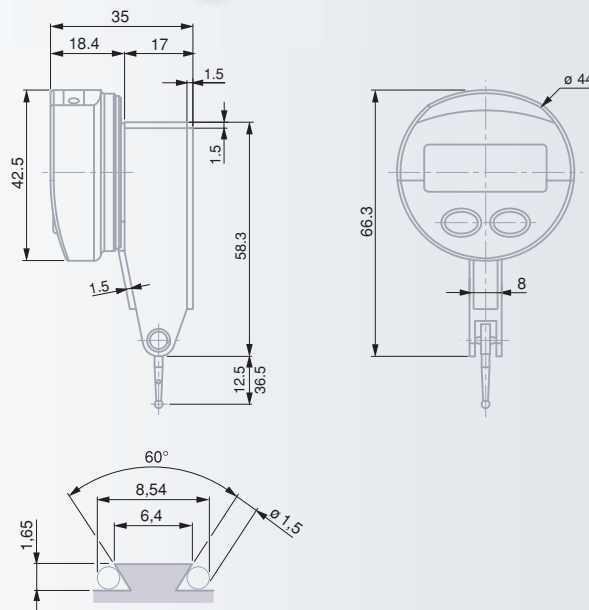


# TESA IP65 Electronic Dial Test Indicators

Provide the advantages of mechanics combined with electronics – All in one.



- Inductive measuring system, patented.
- Analogue and numerical indication.
- Numerical interval to 0,01/0,001 mm.
- Selectable scale division: 10, 20, 50  $\mu\text{m}/1, 2, 5 \mu\text{m}$ .
- Water and coolant resistant (IP65).
- Metric/inch conversion.
- RS 232 data output combined with external power supply.
- Displayed measuring modes (NOR/MIN/MAX/MAX-MIN).
- Automatic shut-down.
- Compatible with all TESATAST accessories.



No	mm	in	mm	Insert mm	N ( $\pm 15\%$ )
01830001	0,01/0,001	0.0005/0.00005	0,8	12,5	0,13
01830002	0,01/0,001	0.0005/0.00005	0,5	36,5	0,07

### Accessories

No	⊞	
01961000	3V lithium battery, 190 mAh, type CR 2032	
04761060	RS 232 connecting cable with external power supply	

Compatible with all TESATAST measuring inserts and accessories

- ✓
- LCD, 5 digits + sign
- Digit height 6 mm
- Resolution to 0,01/0,001 mm; .0005/.00005 in
- Zero-setting
- Max. perm. errors:  
 $f_s = 10 \mu\text{m}$   
 $f_{ps} = 13 \mu\text{m}$   
Pre-span = 0,05 mm
- Repeatability:  
 $f_r = 1 \mu\text{m}$
- Hysteresis:  
 $f_h = 3 \mu\text{m}$
- L = 12,5 mm; max. 0,05 m/s  
L = 36,5 mm; max. 0,15 m/s
- Number of measurements per second: 9
- Operating temperature range: +5°C to +40°C
- 3 V lithium battery, type CR 2032
- > 4000 hours
- RS 232
- 73 g (L = 12,5 mm)  
75 g (L = 36,5 mm)
- EN 61326-1
- Degree of protection IP65 (IEC 529)
- Supplied in a plastic case along with:  
1 Insert with a 2 mm dia. (No. 01860202)  
1 Wrench (No. 01860307)  
1 Mounting rod with a 8 mm dia. (No. 01840105)
- Identification number
- Declaration of conformity



DIN 2270  
NF E 11-053

## TESATAST Dial Test Indicators

These lever-type dial test indicators are especially intended for use on the shop floor or in the inspection room – Ideally suited for comparative measurements on a surface plate, for instance – Determine form, shape and position deviations as well as axial and runout errors.

- Bidirectional measuring with automatic reversal inside the movement.
- Continuous clockwise pointer rotation providing error-free reading.
- Insensitive to magnetic fields.
- Jewelled movement with 7 rubies.
- Ball-bearing lever system with measuring insert swivelling through to 240°.
- Very low measuring force.
- Full-metal construction giving exceptional robustness.
- Monobloc housing with 3 countersunk dovetail attachments.

### Standard Models

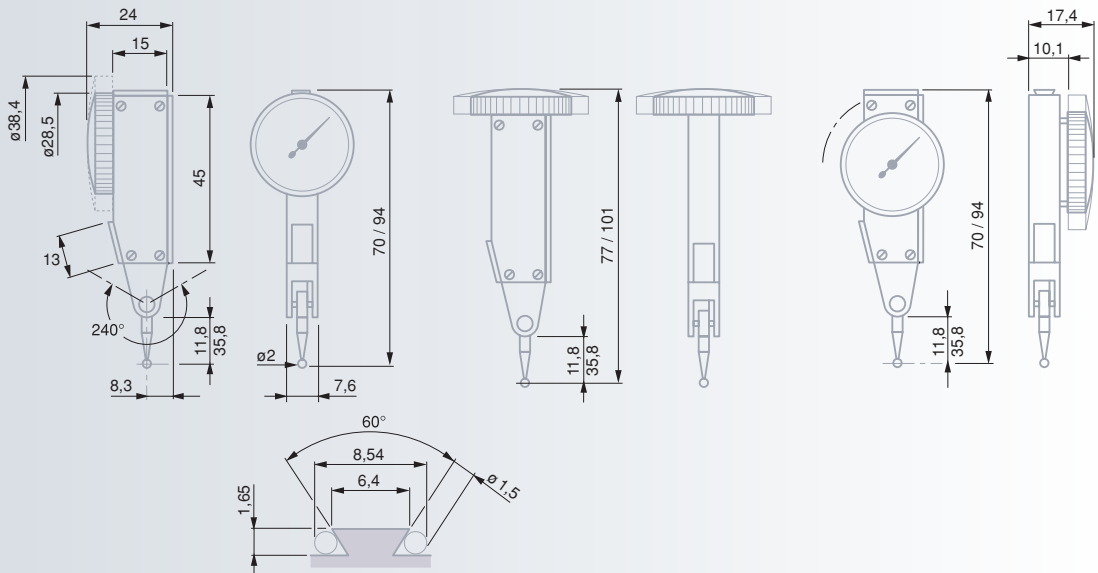
Well-proven dial test indicators with dial face mounted parallel to the insert's axis.

### Perpendicular Models

Dial test indicators with dial face mounted at right angle to the insert's axis.

### Lateral Models

Dial test indicators with dial face mounted parallel to the insert's axis, but on the flat side of the dial housing.



### Permissible limits of a metrological characteristic (MPE/MPL)

		0,02 mm	0,01 mm	0,002 mm
 Deviation span, $f_e$ Deviation span within the local measuring span, $f_l$	0,20 mm	27 $\mu\text{m}$	10 $\mu\text{m}$	2 $\mu\text{m}$
	0,10 mm	12 $\mu\text{m}$	5 $\mu\text{m}$	
	0,02 mm			1 $\mu\text{m}$
	Total deviation span, $f_{ges}$	31 $\mu\text{m}$	13 $\mu\text{m}$	3,5 $\mu\text{m}$
 Repeatability limit, $f_w$		4 $\mu\text{m}$	3 $\mu\text{m}$	1 $\mu\text{m}$
 Max. hysteresis, $f_h$		4 $\mu\text{m}$	3 $\mu\text{m}$	1,5 $\mu\text{m}$
 Measuring force with insert lengths	12,53 mm		0,15 N	0,15 N
	36,53 mm	0,06 N	0,06 N	





### TESATAST Standard Models



	NP	A	mm	Ø	Insert
<b>01810005</b>	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
<b>01810006</b>	0,01	0,8	38	0 ÷ 0,4 ÷ 0	12,53
<b>01810007</b>	0,01	0,5	28	0 ÷ 0,25 ÷ 0	36,53
<b>01810008</b>	0,01	0,5	38	0 ÷ 0,25 ÷ 0	36,53
<b>01810009</b>	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53
<b>01810010</b>	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53
<b>S18001695</b>	0,001	0,2	38	0 ÷ 100 ÷ 0	12,53



	NP	A	in	Ø	Insert
<b>01820006</b>	0.0005	0.030	1.1	0 ÷ 15 ÷ 0	1/2
<b>01820007</b>	0.0005	0.030	1.5	0 ÷ 15 ÷ 0	1/2
<b>01820008</b>	0.0005	0.020	1.1	0 ÷ 10 ÷ 0	1 7/16
<b>01820009</b>	0.0005	0.020	1.5	0 ÷ 10 ÷ 0	1 7/16
<b>01820010</b>	0.001	0.030	1.1	0 ÷ 15 ÷ 0	1/2
<b>01820011</b>	0.0001	0.008	1.1	0 ÷ 4 ÷ 0	1/2
<b>01820012</b>	0.0001	0.008	1.5	0 ÷ 4 ÷ 0	1/2
<b>01820013</b>	0.00005	0.008	1.5	0 ÷ 4 ÷ 0	1/2

### SWISSTAST Standard Models



	NP	A	mm	Ø	Insert
<b>01811000</b>	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
<b>01811001</b>	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53

\* Same technical data as standard models, but equipped with a 2 mm dia. ruby ball tip No. 01860302.

### TESATAST Perpendicular Models



	NP	A	mm	Ø	Insert
<b>01810204</b>	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53
<b>01810205</b>	0,01	0,5	28	0 ÷ 0,25 ÷ 0	36,53
<b>01810304</b>	0,002	0,2	38	0 ÷ 100 ÷ 0	12,53



	NP	A	in	Ø	Insert
<b>01820204</b>	0.0005	0.030	1.1	0 ÷ 15 ÷ 0	1/2
<b>01820304</b>	0.0001	0.008	1.5	0 ÷ 4 ÷ 0	1/2



DIN 2270  
NF E 11-053



Rotating dial



Very low measuring force see table on page G-3



Movement with patented shock proof system



Lever system with friction drive to prevent overload



Accuracy: see table on page G-3



Supplied in a plastic case along with:  
1 Insert with a 2 mm dia.  
1 Wrench (No. 01860307)  
1 Mounting rod with a 8 mm dia. (No. 01840105)



Identification number

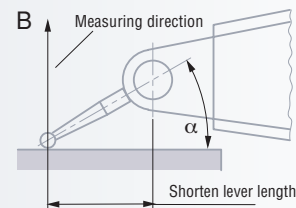
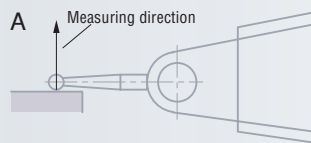


Declaration of conformity



## TESATAST Lateral Models

		mm				
<b>01810011</b>	0,01	0,8	28	0 ÷ 0,4 ÷ 0	12,53	
<b>01810012</b>	0,02	2	38	0 ÷ 1,0 ÷ 0	36,53	
<b>01810013</b>	0,002	0,2	28	0 ÷ 100 ÷ 0	12,53	
		in				
<b>01820014</b>	0.0005	0.030	1.1	0 ÷ 15 ÷ 0	1/2	



### Note on the use of TESATAST dial test indicators

With the measuring insert lying parallel to the workpiece surface (Fig. A), these indicators give true reading due to the amplification factor to 1:1.

In another measuring position (angle  $\alpha$  in Fig. B), the effective lever length changes so that the read value needs to be corrected. With respect to this, also refer to the instruction manual.

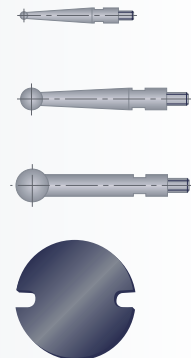


Tungsten carbide or ruby ball tip

M1.4 coupling thread

### Measuring inserts

Carbide ball tips	Ruby ball tips		mm
<b>01860201</b>	<b>01860301</b>	1	12,53
<b>01860202</b>	<b>01860302</b>	2	12,53
<b>01860203</b>	<b>01860303</b>	3	12,53
<b>01860211</b>	<b>01860304</b>	1	36,53
<b>01860212</b>	<b>01860305</b>	2	36,53
<b>01860213</b>	<b>01860309</b>	3	36,53
<b>01860307</b>	Wrench for measuring inserts		



### Note

The original measuring insert mounted on every TESATAST as well as any other insert with same nominal length but having a different ball tip diameter are fully interchangeable.



DIN 2270  
NF E 11-053

Technical data are listed under each single product

Plastic case

Identification number

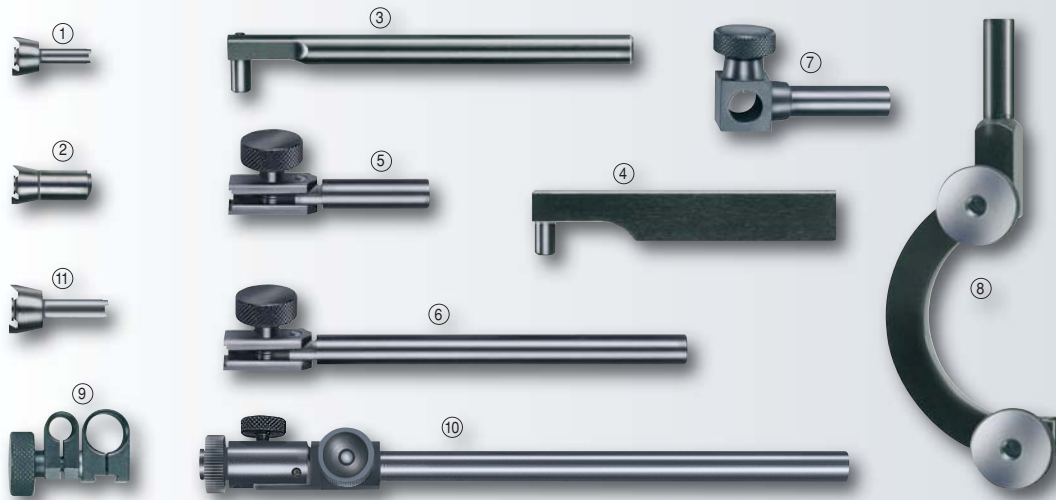
Declaration of conformity

## Indicator Sets with Small Support

<b>01630003</b>	Indicator sets with small support
<i>consisting of:</i>	
<b>01810005</b>	Dial test indicator (lever-type)
<b>01810010</b>	Dial test indicator (lever-type)
<b>01860203</b>	Measuring insert
<b>01840104</b>	Mounting rod
<b>01840105</b>	Mounting rod
<b>01860307</b>	Wrench for measuring inserts
<b>01639007</b>	INTERAPID small support UJ 15



## TESATAST Accessories



N°	=		mm
01840104	①	Mounting rod with dovetail clamp	∅ 4
01840105	②	Mounting rod with dovetail clamp	∅ 8
01840202	③	Mounting rod with cylindrical body and clamping tenon	∅ 8 x 80 ∅ 5,6
01840203	④	Mounting rod with right-angle body and clamping tenon	13 x 6 x 50 ∅ 5,6
01840404	⑤	Short swivel holder with mounting rod and dovetail clamp	∅ 8 x 25
01840405	⑥	Long swivel holder with mounting rod and dovetail clamp	∅ 8 x 90
01840406	⑦	Angle holder with mounting rod Clamping bore	∅ 8 x 25 ∅ 8
01840501	⑧	Centring shoulder for TESATAST Perpendicular with cylindrical rod Clamping point for mounting rod and dovetail clamp	∅ 8 x 25 ∅ 4
01860401	⑨	Dovetail clamp with tightening point	∅ 5,6 ∅ 9,5
01840407	⑩	Long swivel holder with cylindrical rod and dovetail clamp as well as fine setting device	∅ 8 x 125
01860008	⑪	Mounting rod with dovetail clamp	∅ 6

### Sets of Accessories

Consisting of the following components:

N°	mm	01840104	01840105	01840202	01840203	01840404	01840405	01840406	01840501	01860401
01840001*	N° 1	●	●							
01840100**	N° 2			●	●	●	●	●		●
01840703***	N° 3			●	●	●	●	●	●	●

\* Supplied with one single insert No. 01860201, 01860202 and 01860203, one wrench No. 01860307 as well as a suited case No. 01860308.

\*\* Supplied in a suited case No. 01860608.

\*\*\* Supplied in a suited case No. 01860702.

## INTERAPID 312 Dial Test Indicators

Very large measuring span – Ideal for inspecting all significant size variations, e.g. on the surface plate – Measure position, form and shape errors.

- Additional revolution counter for safe reading.
- Bidirectional measuring with automatic reversal inside the movement.
- Thereby pointer rotation is constant.
- Jewelled movement with rubies.
- Ball-bearing lever system with measuring insert swivelling through 210°.
- Full-metal construction giving outstanding robustness.
- Monobloc housing with mounted dovetail attachments as well as a 4 mm swivelling shank.



### Regular Model

Time-tested dial test indicator with dial face mounted parallel to the insert's axis.

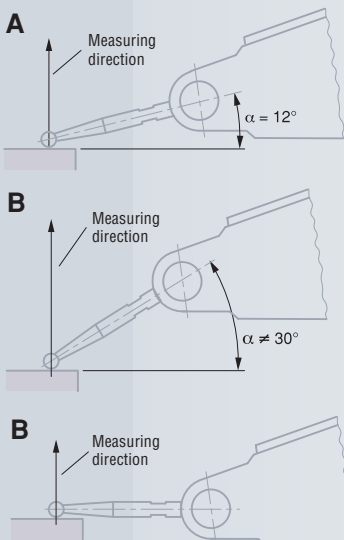
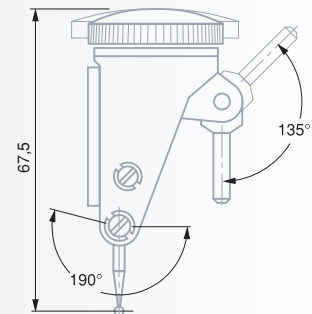
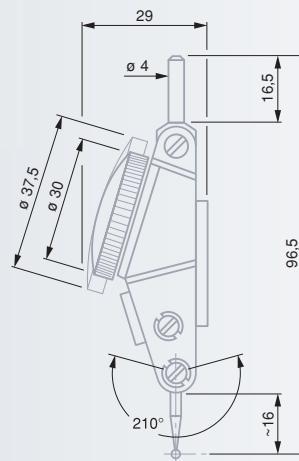
### Perpendicular Model

Dial test indicator with dial face mounted at right angle to insert's axis.

#### Stylus insert with angular position of 12°

All models INTERAPID 312 are designed to give a true reading when the angle between the stylus and the workpiece surface is 12° (Fig. A).

In any other measuring position, including parallel position of the stylus against the workpiece surface, read values have to be corrected accordingly (Fig. B). With regard to this, also read in the instruction manual.



#### Permissible limits of a metrological characteristic (MPE/MPL)

	0,01 mm		0,002 mm	
	Pointer Rev 1	Pointer Rev 2	Pointer Rev 1	Pointer Rev 2
Deviation range, $f_e$	10 $\mu\text{m}$	20 $\mu\text{m}$	4 $\mu\text{m}$	8 $\mu\text{m}$
Total deviation range, $f_{\text{ges}}$	13 $\mu\text{m}$	23 $\mu\text{m}$	6 $\mu\text{m}$	10 $\mu\text{m}$
Repeatability limit, $f_w$	3 $\mu\text{m}$		1 $\mu\text{m}$	
Max. hysteresis, $f_u$	3 $\mu\text{m}$		2 $\mu\text{m}$	
Measuring force	0,12 N		0,25 N	





### INTERRAPID 312 Regular Models

mm				∅		Insert
<b>074111366</b>	0,01	1,6	37,5	0 ÷ 40 ÷ 0		16,5
<b>074111367</b>	0,01	1,6	30	0 ÷ 40 ÷ 0		16,5
<b>074111368</b>	0,002	0,4	37,5	0 ÷ 10 ÷ 0		15,2
<b>074111369</b>	0,002	0,4	30	0 ÷ 10 ÷ 0		15,2
in						
<b>074111370</b>	0.0005	0.060	1.5	0 ÷ 15 ÷ 0		0.65
<b>074111371</b>	0.0005	0.060	1.2	0 ÷ 15 ÷ 0		0.65
<b>074111965</b>	0.0005	0.060	1.5	0 ÷ 15 ÷ 0		2.675
<b>074111374</b>	0.001	0.060	1.2	0 ÷ 15 ÷ 0		0.65
<b>074111372</b>	0.0001	0.016	1.5	0 ÷ 4 ÷ 0		0.65
<b>074111373</b>	0.0001	0.016	1.2	0 ÷ 4 ÷ 0		0.65



Rotating dial

Very low measuring force (see table on page G-7)

Lever system with friction drive to prevent overload

Accuracy: see table on page G-7

Supplied in a plastic case along with:  
1 steel insert with a 2 mm diameter, hardened.  
1 key No. 01860307

Declaration of conformity



### INTERRAPID 312 Perpendicular Models

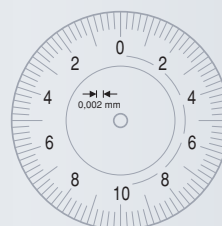
mm				∅		Insert
<b>074111375</b>	0,01	1,6	37,5	0 ÷ 40 ÷ 0		16,5
<b>074111376</b>	0,01	1,6	30	0 ÷ 40 ÷ 0		16,5
in						
<b>074111377</b>	0.0005	0.060	1.5	0 ÷ 15 ÷ 0		0.65
<b>074111378</b>	0.0005	0.060	1.2	0 ÷ 15 ÷ 0		0.65
<b>074111958</b>	0.0005	0.060	1.5	0 ÷ 15 ÷ 0		2.675
<b>074111379</b>	0.001	0.060	1.2	0 ÷ 15 ÷ 0		0.65
<b>074111957</b>	0.0001	0.016	1.5	0 ÷ 4 ÷ 0		0.65



074111366



074111367



074111368



074111369



Technical data as listed under: each single product

Plastic case

Declaration of conformity

## Dial Test Indicator Sets, Complete with Accessories

Each full set consists of:



INTERAPID 312 as listed in the tables below

- 074106331** Rectangular attachment
- 074108942** Reducing sleeve, metric or
- 074108943** Reducing sleeve, inch
- 074106026** Swivel holder, metric or
- 074106931** Swivel holder, inch
- 074111474** Storage case for measuring inserts
- 01860307** Wrench for measuring inserts



### INTERAPID 312 Regular Models



mm	074111366	074111367	074111368	074111369	074106331	074108942	074106026	074111474	01860307
<b>074111502</b>	●				●	●	●	●	●
<b>074111503</b>		●			●	●	●	●	●
<b>074111504</b>			●		●	●	●	●	●
<b>074111505</b>				●	●	●	●	●	●



in	074111370	074111371	074111372	074111373	074106331	074108943	074106931	074111474	01860307
<b>074111508</b>	●				●	●	●	●	●
<b>074111509</b>		●			●	●	●	●	●
<b>074111510</b>			●		●	●	●	●	●
<b>074111511</b>				●	●	●	●	●	●

### INTERAPID 312 Perpendicular Models

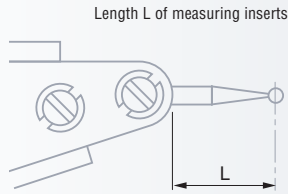


mm	074111375	074111376	074106331	074108942	074106026	074111474	01860307
<b>074111506</b>	●		●	●	●	●	●
<b>074111507</b>		●	●	●	●	●	●



in	074111377	074111378	074106331	074108943	074106931	074111474	01860307
<b>074111513</b>	●		●	●	●	●	●
<b>074111514</b>		●	●	●	●	●	●

### Measuring Inserts for INTERAPID 312



Steel ball tips	Carbide ball tips			L
mm				
<b>074107893</b>	<b>074105993</b>	0,01	2	16,5
<b>074107895</b>	<b>074105994</b>	0,01	1,5	16,5
<b>074107897</b>	<b>074105995</b>	0,01	0,8	16,5
	<b>074106358</b>	0,01	2	36,6*
	<b>074106360</b>	0,01	0,8	36,6*
<b>074110481</b>	<b>074110482</b>	0,002	2	15,2
<b>074110492</b>	<b>074110491</b>	0,002	1,5	15,2
<b>074110493</b>	<b>074110507</b>	0,002	0,8	15,2
	<b>074110494</b>	0,002	2	34*
	<b>074110508</b>	0,002	0,8	34*

in				
<b>074107899</b>	<b>074105996</b>	all**	0.080	0.650
<b>074107901</b>	<b>074105997</b>	all**	0.060	0.650
<b>074107903</b>	<b>074105998</b>	all**	0.031	0.650
	<b>074106361</b>	all**	0.080	1.375*
	<b>074106363</b>	all**	0.031	1.375*
	<b>074111913</b> ***		0.080	2.675
	<b>074111912</b> ****		0.100	2.675

mm/in		
<b>01860307</b>	Wrench for measuring inserts	
<b>074111474</b>	Storage case for measuring inserts	

- \* The length of the used insert changes the amplification factor of the lever system. Therefore, each read value must be doubled.
- \*\* Except for both models No. 074111965 and 074111958.
- \*\*\* Model No. 074111965 only.
- \*\*\*\* Model No. 074111958 only.

#### Note

The original measuring insert mounted on every INTERAPID 312 as well as any other insert with same nominal length but having different ball tip diameters are fully interchangeable.



Ball tips in hardened steel or tungsten carbide



M1,7 coupling thread

### Accessories for INTERAPID 312



		mm
<b>074106331</b>	Rectangular clamping attachment, complete	
<b>01840203</b>	Rectangular attachment with clamp	13 x 6 x 50 Ø 5,6
<b>074108603</b>	Double attachment with clamping point and dovetail	Ø 4
<b>074106026</b>	Swivel holder with clamping points and dovetail	Ø 8 x 133 Ø 4
<b>074108942</b>	Reducing sleeve	Ø 8 / Ø 4



# COMPAC Dial Test Indicators

Essential for the workshop, but also in the inspection room or measuring laboratory – Ideal for comparative measurement on a surface plate – Detect form and position errors – Measure axial and radial runouts, especially.



DIN 2270 and factory standard

Rotating dial

Friction lever system to preventing overload

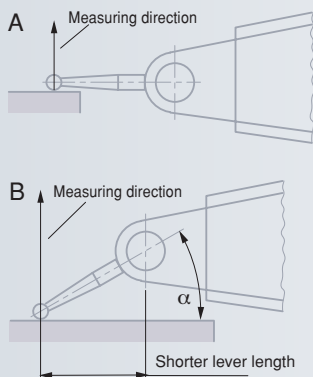
Contact points with tungsten carbide ball tips

Delivery in a suited plastic case

including:  
 1 contact point, 2 mm dia.,  
 1 rigid stem with 8 mm dia.,  
 L = 15 mm, No. 01840107  
 1 rigid stem with 4 mm dia.,  
 L = 15 mm, No. 01840109  
 (except for series 220).

Serial number

Inspection report with a declaration of conformity



### Technical features

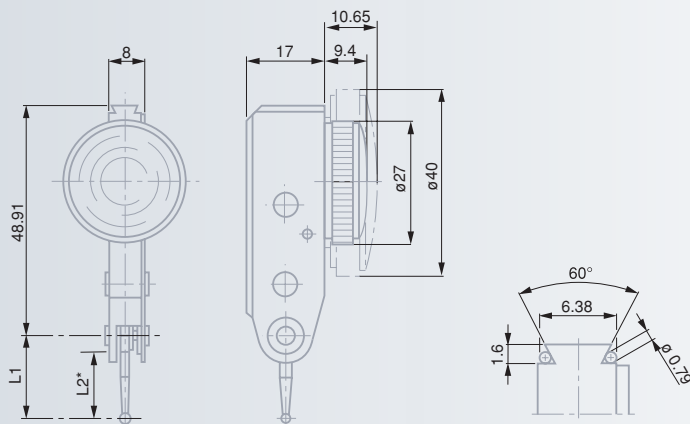
- Long range up to 3 mm.
- Bidirectional measuring, without reversing lever.
- Continuous two-way clockwise rotation of the pointer.
- Swivelling probe through 180°.
- Main pivot on oversized, self-aligning angular bearings.
- Dovetail mounting machined in the indicator body.
- Dull-chrome plated bezel and housing.
- Rotating dial.
- Insensitive to magnetic fields generated in common precision mechanics.

### Note for use of COMPAC dial test indicators

With the measuring insert lying parallel to the workpiece surface (Fig. A), these dial test indicators give true reading due to the amplification factor to 1:1.

In any other measuring position (angle  $\alpha$  in Fig. B), the effective lever length changes so that the read value need be corrected. With respect to this, also read in the instruction manual.

## COMPAC Series 210 – Type Standard



\*L2 see table page G-15



### Metric Reading

	mm	Whole travel mm	Travel/revolution mm	Ø mm		Contact point L1 mm	µm	µm	µm	N
213	0,01	1,5	0,5	27	0÷25÷ 50	18	13	3	3	≤ 0,35
213G	0,01	1,5	0,5	40	0÷25÷ 50	18	13	3	3	≤ 0,35
212L	0,01	3	1	27	0÷50÷100	36	26	3	6	≤ 0,20
212GL	0,01	3	1	40	0÷50÷100	36	26	3	6	≤ 0,20
215	0,002	0,6	0,1	27	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30
215G	0,002	0,6	0,1	40	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30
215GL	0,002	1,2	0,2	40	0÷10÷ 20	36	26	1,5	5	≤ 0,20
216G	0,001	0,6	0,1	40	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30



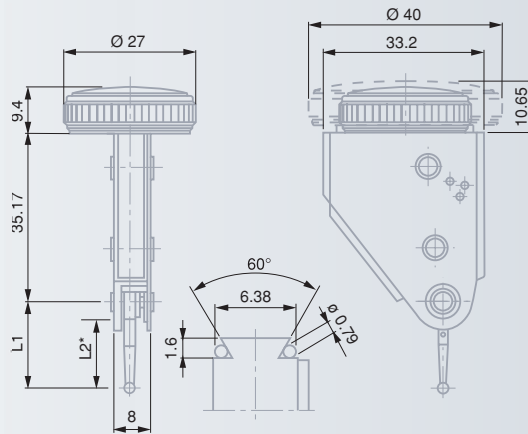


## DIAL TEST INDICATORS (LEVER-TYPE)

### Inch Reading

No										
	in	Whole travel in	Travel/revolution in	Ø in		Contact point L1 in	in	in	in	N
214A	0.0005	0.06	0.02	1.063	0÷10÷20	0.72	0.0005	0.00015	0.00015	≤ 0,35
214GA	0.0005	0.06	0.02	1.575	0÷10÷20	0.72	0.0005	0.00015	0.00015	≤ 0,35
213LA	0.0005	0.12	0.04	1.063	0÷20÷40	1.44	0.001	0.00015	0.00025	≤ 0,20
213GLA	0.0005	0.12	0.04	1.575	0÷20÷40	1.44	0.001	0.00015	0.00025	≤ 0,20
215A	0.0001	0.024	0.004	1.063	0÷20÷40	0.72	0.00005	0.00005	0.0001	≤ 0,30
215GA	0.0001	0.024	0.004	1.575	0÷20÷40	0.72	0.00005	0.00005	0.0001	≤ 0,30

### COMPAC Series 220 – Type Perpendicular



\*L2 see table page G-15

### Metric Reading

No										
	mm	Whole travel mm	Travel/revolution mm	Ø mm		Contact point L1 mm	µm	µm	µm	N
223	0,01	1,5	0,5	27	0÷25÷ 50	18	13	3	3	≤ 0,35
223G	0,01	1,5	0,5	40	0÷25÷ 50	18	13	3	3	≤ 0,35
222L	0,01	3	1	27	0÷50÷100	36	26	3	6	≤ 0,20
222GL	0,01	3	1	40	0÷50÷100	36	26	3	6	≤ 0,20
225	0,002	0,6	0,1	27	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30
225G	0,002	0,6	0,1	40	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30

### Inch Reading

No										
	in	Wole travel in	Travel/revolution in	Ø in		Contact point L1 in	in	in	in	N
224A	0.0005	0.06	0.02	1.063	0÷10÷20	0.72	0.0005	0.00015	0.00015	≤ 0,35
224GA	0.0005	0.06	0.02	1.575	0÷10÷20	0.72	0.0005	0.00015	0.00015	≤ 0,35
223GLA	0.0005	0.12	0.04	1.575	0÷20÷40	1.44	0.001	0.00015	0.00025	≤ 0,20
225GA	0.0001	0.024	0.004	1.575	0÷20÷40	0.72	0.0005	0.00005	0.0001	≤ 0,30

COMPAC Series 230 – Type Parallel



DIN 2270 and factory standard

Rotating dial

Friction lever system to preventing overload

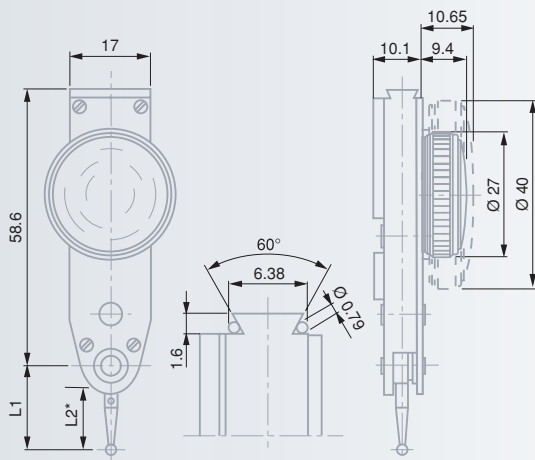
Contact points with tungsten carbide ball tips

Delivery in a suited plastic case

including:  
 1 contact point, 2 mm dia.  
 1 rigid stem with 8 mm dia., L = 15 mm, No. 01840107  
 1 rigid stem with 4 mm dia., L = 15 mm, No. 01840109 (except for series 220).

Serial number

Inspection report with a declaration of conformity



\*L2 see table page G-15



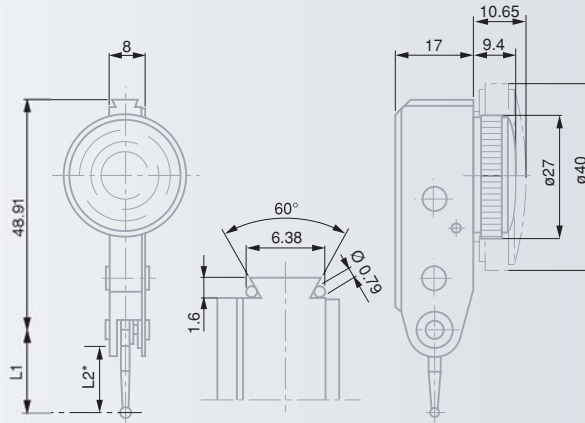
Metric Reading

	mm	Whole travel mm	Travel/revolution mm	Ø mm		Contact point L1 mm	µm	µm	µm	N
<b>233</b>	0,01	1,5	0,5	27	0÷25÷ 50	18	13	3	3	≤ 0,35
<b>233G</b>	0,01	1,5	0,5	40	0÷25÷ 50	18	13	3	3	≤ 0,35
<b>232L</b>	0,01	3	1	27	0÷50÷100	36	26	3	6	≤ 0,20
<b>232GL</b>	0,01	3	1	40	0÷50÷100	36	26	3	6	≤ 0,20
<b>235G</b>	0,002	0,6	0,1	40	0÷ 5÷ 10	18	13	1,5	2,5	≤ 0,30



## COMPAC Series 240 – Reduced Range

One-revolution models



\*L2 see table page G-15



DIN 2270 and factory standard



Rotating dial



Friction lever system to preventing overload



Contact points with tungsten carbide ball tips



Delivery in a suited plastic case including:  
 1 contact point with a 2 mm diameter  
 1 rigid stem with 8 mm dia., L = 15 mm, No. 01840107  
 1 rigid stem with 4 mm dia., L = 15 mm, No. 01840109



Serial number



Inspection report with a declaration of conformity

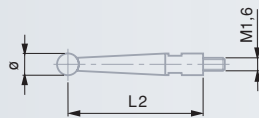
### Metric Reading

No	Whole travel	Ø mm	Contact point L1 mm	µm	µm	µm	N		
mm	mm		mm						
242	0,01	0,8	27	0÷40÷0	18	13	3	≤ 0,25	
242G	0,01	0,8	40	0÷40÷0	18	13	3	≤ 0,25	
243L	0,01	0,5	27	0÷25÷0	45	13	3	≤ 0,10	
243GL	0,01	0,5	40	0÷25÷0	45	13	3	≤ 0,10	
245	0,002	0,2	27	0÷10÷0	18	4	1,5	2	≤ 0,25
245G	0,002	0,2	40	0÷10÷0	18	4	1,5	2	≤ 0,25

### Inch Reading

No	Whole travel	Ø in	Contact point L1 in	in	in	in	N		
in	in		in						
244A	0.0005	0.030	1.063	0÷15÷0	0.6754	0.0005	0.0001	0.00015	≤ 0,25
245A	0.0001	0.008	1.063	0÷ 4÷0	0.7200	0.00015	0.00006	0.00008	≤ 0,25
245GA	0.0001	0.008	1.575	0÷ 4÷0	0.7200	0.00015	0.00006	0.00008	≤ 0,25

Contact Points for COMPAC Dial Test Indicators



Stainless steel with carbide or ruby contact points

M1.6 coupling thread

Original inserts mounted on every indicators as well as any other inserts with same nominal length but having different tip diameters are fully interchangeable.

Metric Models

Carbide ball tips		Ruby ball tips				
No		No		mm	L1 mm	L2 mm
01866014				0,8	18	14,26
01866003	01866026			2	18	14,26
01866021				3	18	14,26
01866016				0,8	36	32,26
01866004	01866027			2	36	32,26
01866023				3	36	32,26
01866015				0,8	45	41,26
01866006	01866028			2	45	41,26
01866022				3	45	41,26

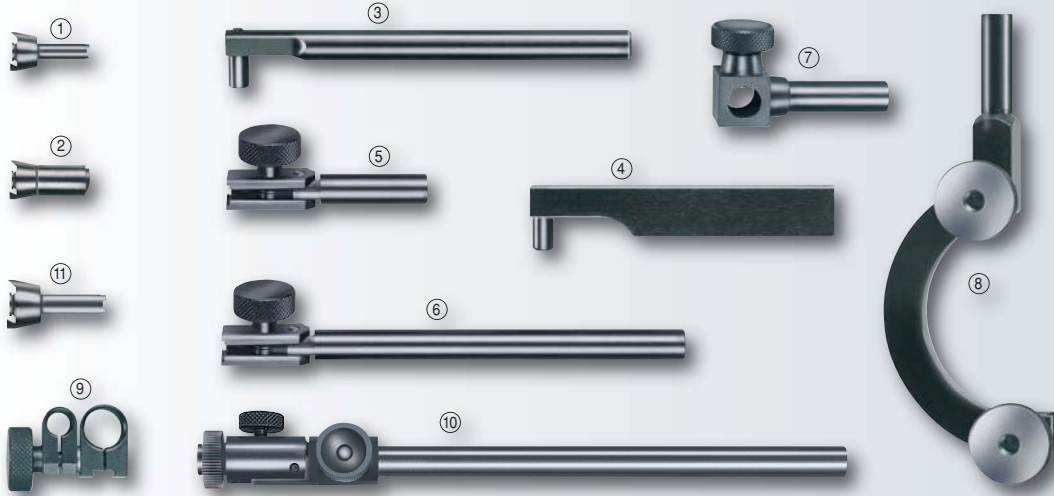
Inch Models

Ruby ball tips				
No		mm	L1 in	L2 in
01866010		0,8	0.6754	0.5278
01866007		2	0.6754	0.5278
01866011		0,8	0.72	0.5724
01866005		2	0.72	0.5724
01866024		0,8	1.44	1.2924
01866009		2	1.44	1.2924
01866025		3	1.44	1.2924
01866008		2	1.8	1.6527

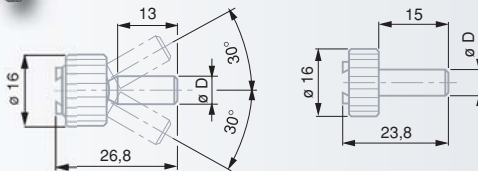




## Accessories for COMPAC Dial Test Indicators



No	=		mm
01840104	①	Fixing shank with dovetail clamp	Ø 4
01840105	②	Fixing shank with dovetail clamp	Ø 8
01840202	③	Cylindrical fixing shank with tightening tenon	Ø 8 x 80 Ø 5,6
01840203	④	Rectangular fixing shank with tightening tenon	13 x Ø 5,6
01840404	⑤	Short swivel holder with cylindrical shank and dovetail grip	Ø 8 x
01840405	⑥	Long swivel holder with cylindrical shank and dovetail grip	Ø 8 x 90
01840406	⑦	Angle holder with cylindrical shank Clamping bore	Ø 8 x 25 Ø 8
01840501	⑧	Centring holder for perpendicular model with cylindrical shank Clamping point for fixing shank and dovetail clamp	Ø 8 x 25 Ø 4
01860401	⑨	Double fixing clamp with clamping point and dovetail clamp	Ø 5,6
01840407	⑩	Long swivel holder, cylindrical shank with dovetail grip. Also with fine setting.	Ø 8 x 125
01860008	⑪	Fixing shank with dovetail clamp	Ø 6



		Stem	Clamping length
SPT	Rotating holder	8 mm	25 mm
SPTA	Rotating holder	1/4 in	1 in
SPTA-3/16	Rotating holder	3/16 in	1 in
SPTA-3/8	Rotating holder	3/8 in	1 in
SPTA-5/16	Rotating holder	5/16 in	1 in

No	=		D
<i>Mounting rods with dovetail grip</i>			
01850106		Fixing shank swivelling through ± 30°	Ø 1/4 in
01850107		Rigid fixing shank	Ø 1/4 in
01840106		Fixing shank swivelling through ± 30°	Ø 8 mm
01840107		Rigid fixing shank	Ø 8 mm
01840108		Fixing shank swivelling through ± 30°	Ø 4 mm
01840109		Rigid fixing shank	Ø 4 mm

# Comparative Measurement



# TESA TPS 300 / 500 / 1000 Motorised Setting Benches

These motorised benches are specially made for display setting as well as for calibrating 2-point shop tools used to measure both internal and external dimensions up to 1000 mm.



- ✓
- 0,001 mm
- Linear 1,5 + L (mm) / 300 µm
- 1 µm
- Holding force 240 N
- 100/240 AC – 1,5 A 50/60 Hz
- RS 232
- +10 to +40°C
- 10 to +40°C
- ✓
- Shipping packaging
- Identification number
- Inspection report
- Declaration of conformity

**Benefit**

A single bench can replace a wide number of setting standards such as gauge blocks or setting rings.

**Technical Data**

		Internal mm/in	External mm/in	mm	kg
02130001	TPS 300	0,1 ÷ 305 (0.04 ÷ 12)	40 ÷ 345 (1.6 ÷ 13.5)	610 x 300 x 270	75
02130002	TPS 500	0,1 ÷ 508 (0.04 ÷ 20)	40 ÷ 548 (1.6 ÷ 21.5)	820 x 300 x 300	90
02130003	TPS 1000	0,1 ÷ 1016 (0.04 ÷ 40)	40 ÷ 1056 (1.6 ÷ 41.5)	1330 x 340 x 340	240
<b>On request</b>	TPS 1500 mm, 2000 mm, 3000 mm				
<i>Provided with the following accessories:</i>					
02160038	Power supply 80 – 240 V, 50 – 60 Hz				
	Rubber feet (3) acting as vibration inhibitors				
02160027	AL300003 adapter mounted on the mobile stop				

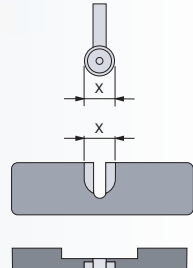
All given maximum permissible errors for a metrological characteristic (MPE) are valid for a temperature of 20° ± 0,5° C and relative humidity of 50 ± 5%.

**Optional Accessories  
For Bore Gauges  
– TESA Veribor**

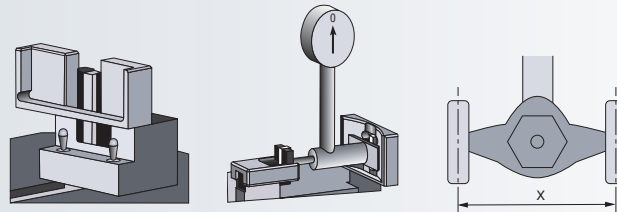


Application range 4,5 ÷ 50 mm

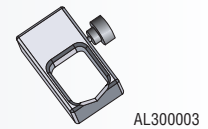
		mm	x
02160020	A7547	4,5 ÷ 6	Ø 4,5
02160021	A7548	6 ÷ 12,5	Ø 5,8
S21050003	A7527	12 ÷ 25	Ø 9,5
02160023	A7559	25 ÷ 50	Ø 17,5



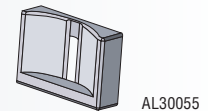
Application range 50 ÷ 550 mm



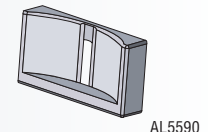
		mm	x
02160024	AL30055	50 ÷ 150	30 ÷ 55
02160025	AL5590	150 ÷ 300	55 ÷ 90
02160026	AL90125	240 ÷ 550	90 ÷ 125
02160043	AL120-170		120 ÷ 170
02160044	AL170-220		170 ÷ 220



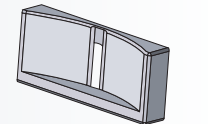
AL300003



AL30055



AL5590

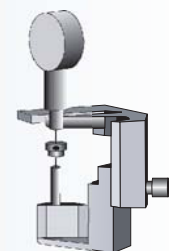


AL90125

Each bench is supplied with AL300003 adapter.

**– TESA YA**

		mm
02160028	A7750-A7751-A7752	6 ÷ 12,5



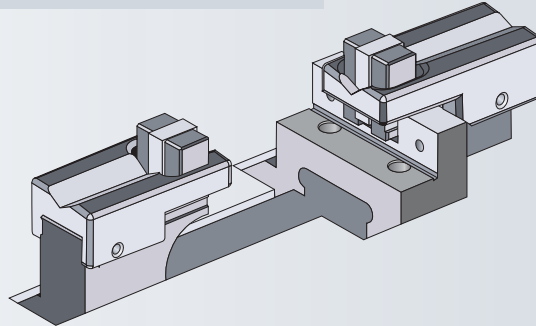


**For IRA 2 and ETALON Caliper Gauges**

*Internal measuring*

			mm
<b>02160030</b>	A300005	10 ÷ 150	

Requires 2 items.

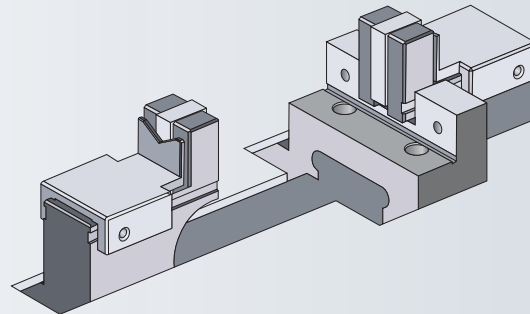


**For ETALON Caliper Gauges**

*External measuring*

			mm
<b>02160029</b>	A300000	40 ÷ 60	

Requires 2 items.

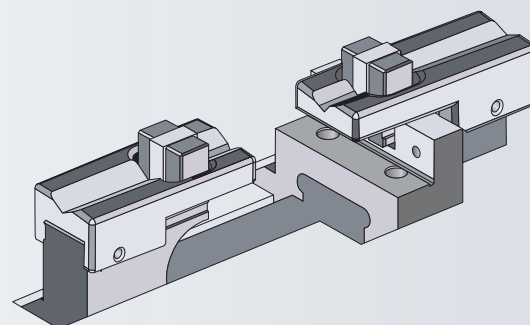


**For TESA INOTEST**

*Comparator gauges with 2-point contact for internal and external measuring*

			mm
<b>02160031</b>	A300004	50 ÷ 1500	

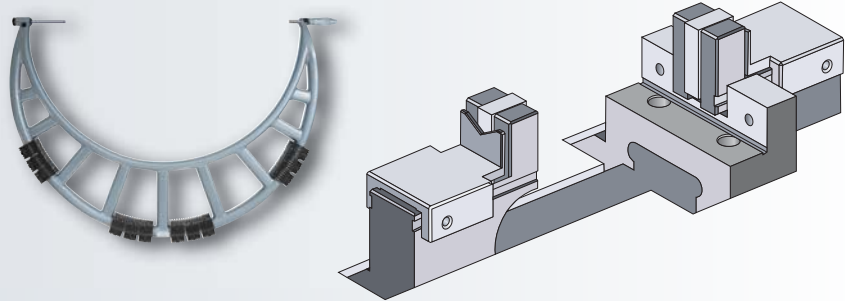
Requires 2 items



**For External Micrometers**

02160029	A300000	40 ÷ 1500 mm

TPS 300 requires 1 item, TPS 500 and 1000 need 2 items.



**For Lever-Type Dial Test Indicators**

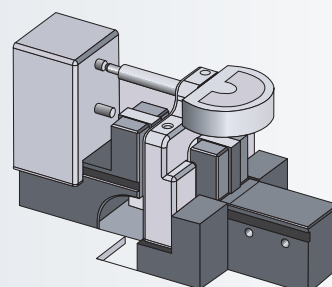
01639007	Measuring support with articulated arm	

For any other shop tool, please ask your local TESA sales representative.



**For Dial Gauges**

02160035	A300001-A300002	10 ÷ 150 mm

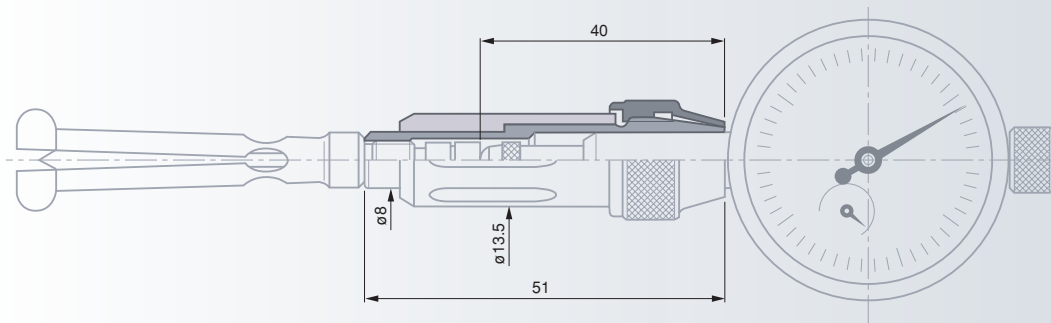
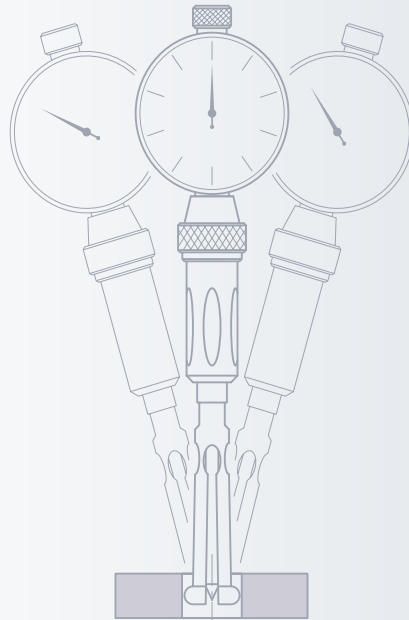


## TESA YA Bore Gauges

Specially designed for small bores from 0,47 up to 12,20 mm – Check bore sizes as well as form and shape errors through 2-point measurements – Excellent repeatability.

These bore gauges have an interchangeable measuring head housing a needle as well as a clamping shank with a 8 mm diameter fixing bore for a dial gauge or any other sensor.

- Probing heads with spherical faces for through bores.
- Probing heads with faces forming a rounded edge on their front face. Used to check blind bores or short centring shoulder.
- Probing heads for deeper bores.



### Handgrip



With mount for shop tools with a 8 h6 dia. clamping shank

### Measuring heads



See tables



See tables



Dull-chrome plated steel, hardened to  $\approx 1000$  HV 25

### Measuring needles



See tables



Steel hardened to  $\approx 800$  HV 25

### Setting rings



Nominal diameter  $\leq 1,5$  mm: with inserted ring in synthetic sapphire,  
 $> 1,5$  mm: steel, hardened to  $\approx 780$  HV 25



Reliability of the engraved size:  $\pm 2s = 1 \mu\text{m}$



1  $\mu\text{m}$

## Complete Sets for Through Holes Measurement



Technical data: see page H-6



Complete set includes: 1 handle

No. 01540201.

Measuring heads, needles and setting rings as shown in the table below.

1 TESA YR dial gauge No. 01410212 (reading to 0,01 mm, 40 mm dial dia.).  
1 Extension for a 10 mm measuring insert with order No. 03540501.



Suited plastic case



Declaration of conformity



mm

<b>01510000</b>	0,47 ÷ 0,97
<b>01510100</b>	0,95 ÷ 2,45
<b>01510200</b>	2,30 ÷ 6,20
<b>01510300</b>	6,00 ÷ 12,20



mm



Measuring depth  
max. mm min. mm



mm

Measuring heads

Needles

Setting rings

Set compositions:

	Measuring heads	Measuring depth max. mm min. mm	Needles	Setting rings	mm
<b>Set 01510000</b>	01540401	0,47 ÷ 0,53 1,5 0,25	01540001	01540601	0,50
	01540402	0,52 ÷ 0,58 1,8 0,27	01540001	01540602	0,55
	01540403	0,57 ÷ 0,67 2,0 0,29	01540002	01540603	0,60
	01540404	0,65 ÷ 0,77 2,5 0,31	01540002	01540604	0,70
	01540405	0,75 ÷ 0,87 2,8 0,33	01540002	01540605	0,80
	01540406	0,85 ÷ 0,97 3,0 0,35	01540002	01540606	0,90
<b>Set 01510100</b>	01540407	0,95 ÷ 1,15 11 0,6	01540003	01540607	1,00
	01540408	1,07 ÷ 1,25 11 0,6	01540003	01540608	1,10
	01540409	1,17 ÷ 1,35 11 0,6	01540003	01540609	1,20
	01540410	1,27 ÷ 1,45 11 0,6	01540003	01540610	1,30
	01540411	1,37 ÷ 1,55 11 0,6	01540003	01540611	1,40
				01540612	1,50
<b>Set 01510200</b>	01540412	1,50 ÷ 1,90 17 0,9	01540004	01540613	1,7
	01540413	1,70 ÷ 2,15 17 0,9	01540004	01540614	2,00
	01540414	2,05 ÷ 2,45 17 0,9	01540004	01540615	2,25
	01540415	2,30 ÷ 2,75 22 1,2	01540005	01540616	2,50
	01540416	2,65 ÷ 3,20 22 1,2	01540005	01540617	3,00
	01540417	3,05 ÷ 3,50 22 1,2	01540005	01540618	3,25
<b>Set 01510300</b>	01540418	3,35 ÷ 3,85 22 1,2	01540005	01540619	3,50
	01540419	3,80 ÷ 4,30 22 1,2	01540005	01540620	4,00
	01540420	4,20 ÷ 5,00 40 2,0	01540006	01540621	4,50
	01540421	4,70 ÷ 5,50 40 2,0	01540006	01540622	5,00
	01540422	5,30 ÷ 6,20 40 2,0	01540006	01540623	5,75
	01540423	6,00 ÷ 6,80 40 2,0	01540006	01540624	6,50
	01540424	6,60 ÷ 7,50 40 2,0	01540006	01540625	7,00
	01540425	7,30 ÷ 8,15 40 2,0	01540006	01540626	7,75
	01540426	8,00 ÷ 8,80 40 2,0	01540006	01540627	8,50
	01540427	8,50 ÷ 9,40 50 2,0	01540006	01540628	9,00
	01540428	9,15 ÷ 10,00 50 2,0	01540006	01540629	9,50
	01540429	9,60 ÷ 10,80 50 3,3	01540007	01540630	10,00
	01540430	10,65 ÷ 12,20 50 3,3	01540007	01540631	11,50





### Complete Sets for Measuring Blind Bores and Short Centring Shoulders



mm

<b>01510400</b>	1,50 ÷ 2,45
<b>01510500</b>	2,30 ÷ 6,20
<b>01510600</b>	6,00 ÷ 12,20



Technical data: see page H-6

Complete set includes: 1 handle

No. 01540201.

Measuring heads, needles and setting rings as shown in the table below.

1 TESA YR dial gauge No. 01410212 (reading to 0,01 mm, 40 mm dial dia.).  
1 Extension for a 10 mm measuring insert with order No. 03540501.



Suited plastic case



Declaration of conformity



mm



Measuring depth  
max. min.  
mm mm



mm

Measuring heads

Needles

Setting rings

Set compositions:

	No	mm	max. mm	min. mm	No	No	mm
<b>Set 01510400</b>	01540501	1,50 ÷ 1,90	17	0,3	01540009	01540613	1,75
	01540502	1,70 ÷ 2,15	17	0,3	01540009	01540614	2,00
	01540503	2,05 ÷ 2,45	17	0,3	01540009	01540615	2,25
<b>Set 01510500</b>	01540504	2,30 ÷ 2,75	22	0,3	01540010	01540616	2,50
	01540505	2,65 ÷ 3,20	22	0,3	01540010	01540617	3,00
	01540506	3,05 ÷ 3,50	22	0,3	01540010	01540618	3,25
	01540507	3,35 ÷ 3,85	22	0,2	01540010	01540619	3,50
	01540508	3,80 ÷ 4,30	22	0,2	01540010	01540620	4,00
	01540509	4,20 ÷ 5,00	40	0,5	01540011	01540621	4,50
	01540510	4,70 ÷ 5,50	40	0,5	01540011	01540622	5,00
	01540511	5,30 ÷ 6,20	40	0,5	01540011	01540623	5,7
<b>Set 01510600</b>	01540512	6,00 ÷ 6,80	40	0,5	01540011	01540624	6,50
	01540513	6,60 ÷ 7,50	40	0,5	01540011	01540625	7,00
	01540514	7,30 ÷ 8,15	40	0,5	01540011	01540626	7,75
	01540515	8,00 ÷ 8,80	40	0,5	01540011	01540627	8,50
	01540516	8,50 ÷ 9,40	50	0,5	01540011	01540628	9,00
	01540517	9,15 ÷ 10,00	50	0,5	01540011	01540629	9,50
	01540518	9,60 ÷ 10,80	50	1,0	01540012	01540630	10,00
	01540519	10,65 ÷ 12,20	50	1,0	01540012	01540631	11,50

### Special Executions

Available upon request:

- Measuring heads with tungsten carbide tipped measuring faces.
- Measuring heads for uncommon inspection job.
- Measuring heads for through holes and deeper bores covering other application ranges.
- Tungsten carbide measuring needles.
- 125, 250, 500, 750 and 1000 mm depth extensions.



Technical data : see page 1-8



Declaration of conformity

## Optional Accessories for TESA YA Bore Gauges

Measuring stand for stationary use.



**01639009**

INTERAPID UA 30 measuring stand

*Must be equipped with:*

**01610201**

UK 25 sliding arm

**01640000**

UAZ 10 depth stop



## TESA VERIBOR Light Bore Gauge

Two-point contact gauge made to measure bores and form errors –  
Self-centring – Can equally be used with a dial gauge, precision indicator  
or any other sensor type having a 8 h6 dia. clamping shaft.



Measuring bolts and anvils in steel, hardened to 60 HRC  $\pm 2$  and 63 HRC  $\pm 3$ , respectively.

Mount for a sensor having a 8h6 dia. clamping shaft

2  $\mu\text{m}$

4  $\mu\text{m}$

Set including 1 single TESA VERIBOR Light plus 1 set of interchangeable fixed inserts covering the whole application range.

Wooden case

Declaration of conformity



No	=			
		mm	Bolt travel, mm	Measuring depth, mm
05710090	TESA Veribor Light	18 ÷ 35	1,30	176
05710091	TESA Veribor Light	35 ÷ 60	1,40	178
05710092	TESA Veribor Light	50 ÷ 150	1,40	178
05710093	TESA Veribor Light	18 ÷ 150	1,30 / 1,40	176 / 178

Dial gauge not included.

## TESA VERIBOR Bore Gauges

Proven construction and high reliability over decades – Able to take 2-point measurements on bores from 4,5 up to 550 mm – Detect form and shape errors – Gauge body with a 8 mm diameter clamping bore for a dial gauge, precision indicator or any other sensor.

- High repeatability through the circular reversing element inside the gauge, virtually free from clearance.
- Gauge body made of invar steel to prevent the measurement results from being affected by hand warmth transfer.
- Centring shoe ensuring a correct alignment of the gauge into the bore to be checked.
- Tungsten carbide ball tips for high resistance to wear.



See tables

Measuring bolts and anvils fitted with tungsten carbide ball tips

Mount for a sensor having a 8 h6 dia. clamping shaft

2  $\mu\text{m}$  (VERIBOR alone)

$\pm 2s = 0,5 \mu\text{m}$  (VERIBOR alone)



### TESA VERIBOR without dial gauge

	mm
05710012	4,5 ÷ 6
05710013	6 ÷ 12,5
05710014	12 ÷ 25
05710015	25 ÷ 50
05710016	50 ÷ 150
05710018	50 ÷ 300
05710017	240 ÷ 550



Set including 1 single TESA VERIBOR Light plus 1 set of interchangeable fixed inserts covering the whole application range.

Wooden case

Declaration of conformity





## TESA VERIBOR with dial gauge

No		No		No		No		mm	
05710054	05710061								4,5 ÷ 6
05710055	05710062								6 ÷ 12,5
05710056	05710063								12 ÷ 25
				05710057	05710064				25 ÷ 50
				05710058	05710065				50 ÷ 150
				05710059	05710066				50 ÷ 300
				05710060	05710067				240 ÷ 550

*Provided with a TESA dial gauge*

No	01412010	01412510	01412310	01412511
mm	40	40	58	58
mm	0,01	0,001	0,01	0,001



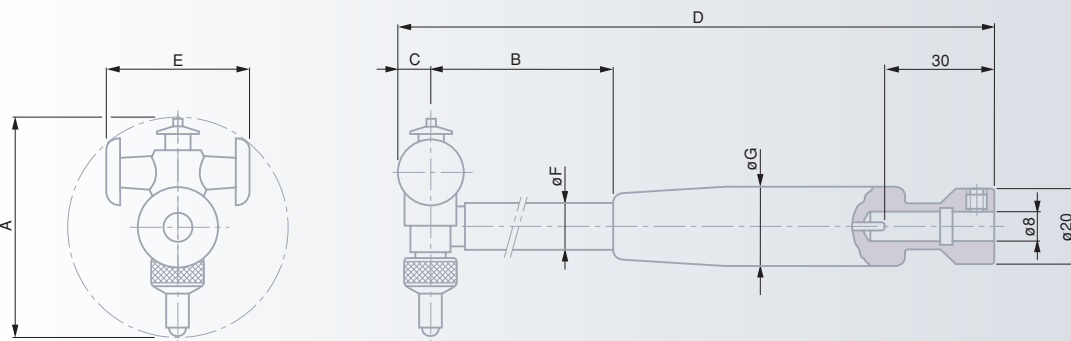
Full set including 1 single TESA VERIBOR Light plus 1 set of interchangeable fixed inserts covering the whole application range, 1 dial gauge as shown in the table opposite, 1 dial gauge guard.



Wooden case



Declaration of conformity



A mm	mm	B mm	C mm	D mm	E mm	F mm	G mm
4,5 ÷ 6	0,35	74	2	138	3,3	3,8	16
6 ÷ 12,5	0,5	93	2,6	156	4,3	4,9	16
12 ÷ 25	0,9	106	4,5	194	7,8	7,9	19
25 ÷ 50	1,3	140	6	228	16	8	19
50 ÷ 150	1,4	173	10	279	36	12	23
50 ÷ 300	1,4	173	10	279	36/66	12	23
240 ÷ 550	1,6	227	14	347	112	18	28

### Special Versions

Available on request:

- TESA VERIBOR for blind bores and centring shoulders.
- TESA VERIBOR elbow-shaped for hard-to-reach bores.
- Handtools for measuring the distance between two plan-parallel surfaces.
- Handtools for inspecting gear pitch diameters.



## Optional Accessories for TESA VERIBOR Bore Gauges

### Set of extensions

For extending the application range of VERIBOR No. 05710016, 05710058 and 05710065 up to 300 mm dia.



mm

**05740001**

Consisting of:

1 Centring shoe

3 Extensions 50 mm



### Depth extensions (not pictured)

To be mounted on each tool shaft from diameters  $\geq 25$  to  $\leq 550$  mm for depth increase (Size B – Drawing on page H-12).



mm

**05760026** 250

**05760027** 500

**05760028** 750

**05760029** 1000

### Dial gauge guard

Protects the dial gauge against shocks. Also prevents the dial from being inadvertently rotated.



mm

**05760012**  $\varnothing 40$

**05760013**  $\varnothing 58$



### Cable holder

Used for the probe cable. To be mounted at the end of the gauge shaft.



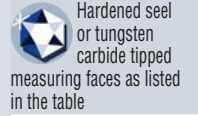
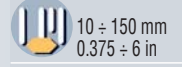
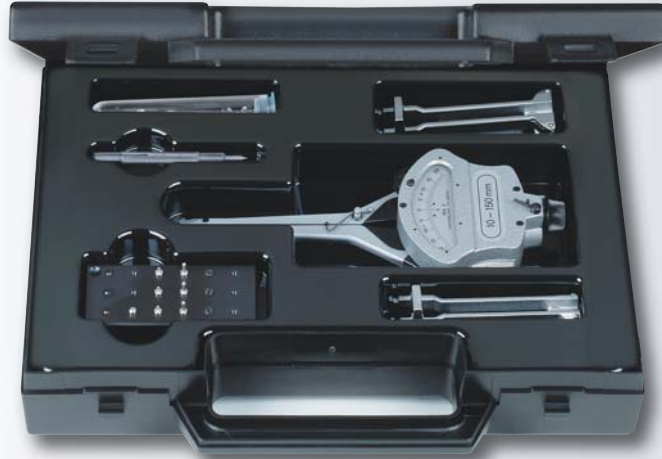
**05760014**



## INTERAPID IRA 2

The finest precision gauge for measuring by comparison – Performs two- or three-point measurement depending on the used accessory – Suitable for verifying through holes, blind bores, grooves, undercuts or slots with plan-parallel faces, among others.

- Wide application range from 10 up to 150 mm.
- Ideal in design, light in weight, easy to handle.
- Built-in indicator to 0,01 mm with fine setting.
- Centring arm for 2-point measurement.



**No**



**No**

mm

in

079105704

**INTERAPID IRA 2**

079108640

*Supplied with the following standard accessories:*

079105667 3 Steel inserts, hardened (order number for 1 item) **079105697**

079105668 3 Short steel inserts, hardened (order number for 1 item) **079105698**

079105669 3 Long steel inserts, hardened (order number for 1 item) **079105699**

079112126 2 Adjustable contact arms for bores  $\geq 6$  mm **079112126**

079110111 1 Small insert holder for 3-point measurement **079110113**

079110110 1 Large insert holder for 3-point measurement **079110112**

079108502 1 Centring arm for bores 15 ÷ 30 mm **079108504**

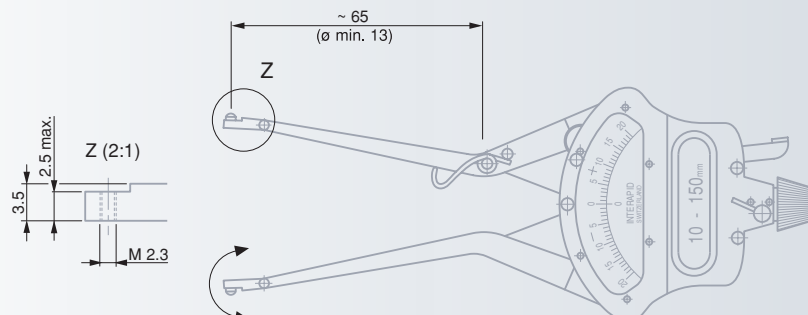
079108503 1 Centring arm for bores 30 ÷ 150 mm **079108505**

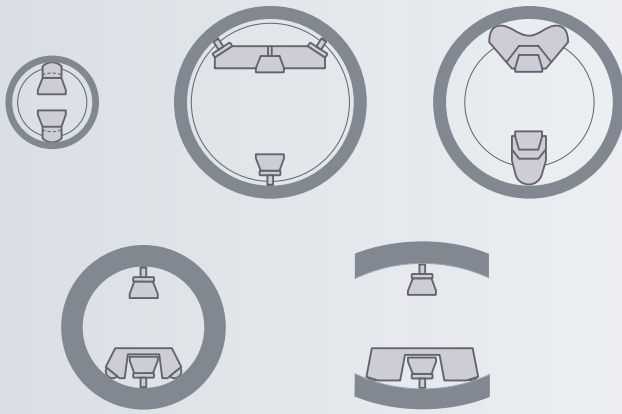
079105694 1 Screwdriver with special design **079105694**

079111401 **INTERAPID IRA 2 md** **079111402**

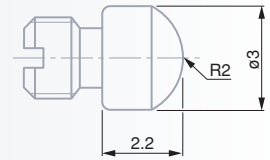
Same as INTERAPID IRA 2, but furnished with the measuring inserts listed below instead of those in steel with order No. 079105667 or 079105697.

079105756 3 Tungsten carbide inserts (order number for 1 item) **079105759**

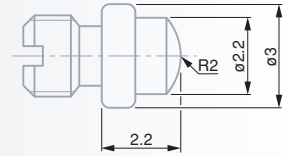




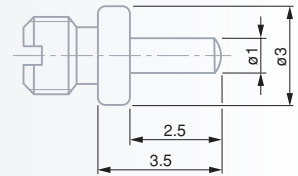
079105667



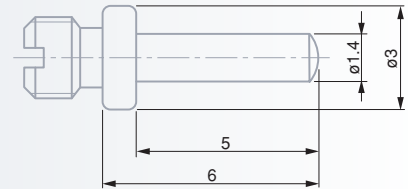
079105756



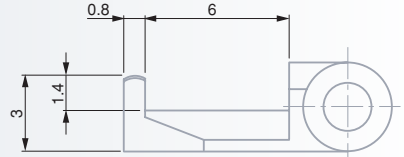
079105668



079105669



079112126



Chrome plated,  
hardened steel

## Optional Accessories

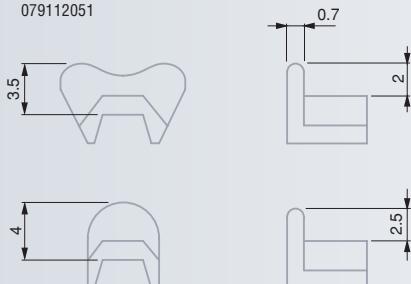


**079112051** Set = 2 small inserts (1-point contact)  
1 small insert (2-point contact)

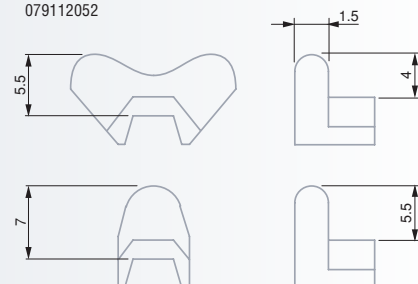
**079112052** Set = 2 large inserts (1-point contact)  
1 large insert (2-point contact)

**079108830** Handle

079112051



079112052

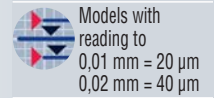
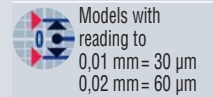




## ETALON Caliper Gauges

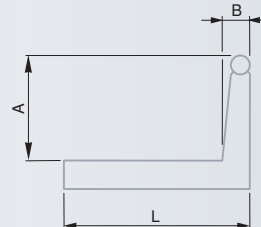
for Internal or External Dimensions –  
Reading to 0,01 or 0,02 mm

Long-lasting precision movement – No gear transmission – Tungsten carbide measuring faces for high wear-resistance – Concentric pointer for sure reading of the millimetres – Lifting lever for the gauge legs.



### External Short Leg Caliper Gauges

No	mm	mm	A mm	B mm	L mm
07919000	0 ÷ 10	0,01	9,3	3,0	39,7



### External Long Leg Caliper Gauges

No	mm	mm	A mm	B mm	L mm
07919009	0 ÷ 20	0,02	9,3	3,0	87



### Internal Short Leg Caliper Gauges

No	mm	mm	A mm	B mm	L mm
07919015	5 ÷ 15	0,01	1,1	1,5	39,7
07919016	10 ÷ 20	0,01	3,3	1,5	39,7
07919017	15 ÷ 25	0,01	4,0	1,8	39,7



### Internal Long Leg Caliper Gauges

No	mm	mm	A mm	B mm	L mm
07919023	10 ÷ 30	0,02	3,3	1,8	87
07919024	20 ÷ 40	0,02	7,0	2,5	87
07919025	30 ÷ 50	0,02	9,75	2,8	87
07919026	40 ÷ 60	0,02	9,75	2,8	87





15 mm throat depth

37 mm dial diameter

10 mm

Non-interchangeable inserts

40 µm (dial gauge)

Suited plastic case

Declaration of conformity



40 mm dial diameter

1 mm

Non-interchangeable, retractable measuring inserts.

0,7 N

15 µm (dial gauge)

Suited plastic case

Declaration of conformity



50 mm throat depth

57 mm dial diameter

1 mm

Non-interchangeable, retractable measuring inserts.

≈ 1,2 N

15 µm (dial gauge)

Cardboard box

Declaration of conformity

## INTERAPID Thickness Gauges

These gauges with a frame are specially made to measure the thickness of plastic parts as well as hard and soft materials such as glass, wood, paper, rubber, metal sheets etc. – All models have a dial that can be rotated for zero setting.



### Small-size models, reading to 0,1 m

With open inserts when not in use

No	mm	mm		mm
074115586	0 ÷ 10	0,1	flat	Ø 6,35
074115587	0 ÷ 10	0,1	flat	Ø 10

### Small-size models, reading to 0,01 mm



No	mm	No	mm	mm	mm	mm	mm
074115629	18	074115633	45	0 ÷ 10	0,01	flat	Ø 6,35
074115630	18	074115634	45	0 ÷ 10	0,01	flat	Ø 10

### Models with roller-type measuring inserts, reading to 0,01 mm



No	mm	mm	Ø mm	Length mm	Side discs
<i>Roller-type inserts</i>					
074115647	0 ÷ 5	0,01	8,4	8,7	●
074115648	0 ÷ 5	0,01	8,4	8,7	—



## Regular Models, reading to 0,01 mm



57 mm  
dial diameter



1 mm



Interchangeable,  
retractable  
measuring  
inserts



≈ 1 N



40 μm  
(dial gauge)



Cardboard box



Declaration  
of conformity



mm  
50



mm  
100



**074115642**



**074115649**



mm

0 ÷ 10



mm

0,01



flat



mm

Ø 30

**074115643**

**074115650**

0 ÷ 10

0,01

flat

Ø 20

**074115644**

**074115651**

0 ÷ 10

0,01

flat

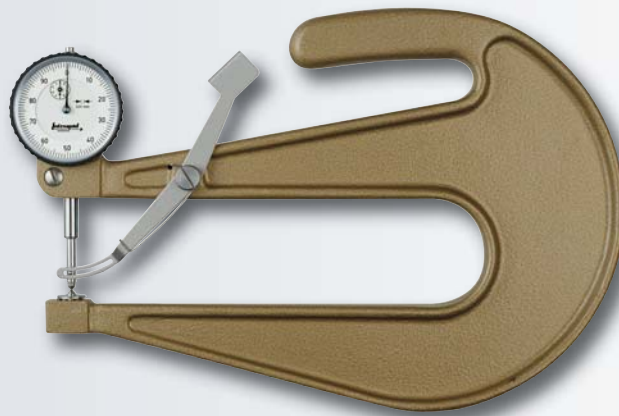
Ø 10

Measuring insert available upon request.



## THICKNESS GAUGES

### Models with deep throat, reading to 0,01 mm



57 mm dial diameter

1 mm

Interchangeable, retractable measuring inserts

≈ 2 N

15 μm (dial gauge)

Cardboard box

Declaration of conformity



mm  
0 ÷ 10



mm  
0 ÷ 30



mm



mm



flat



mm  
Ø 30



Paired inserts

074115654

074115659

0,01

200

flat

Ø 30

074115734

074115655

074115660

0,01

200

flat

Ø 20

074115735



57 mm dial diameter

10 mm

With foot for stationary use

Interchangeable, retractable measuring inserts

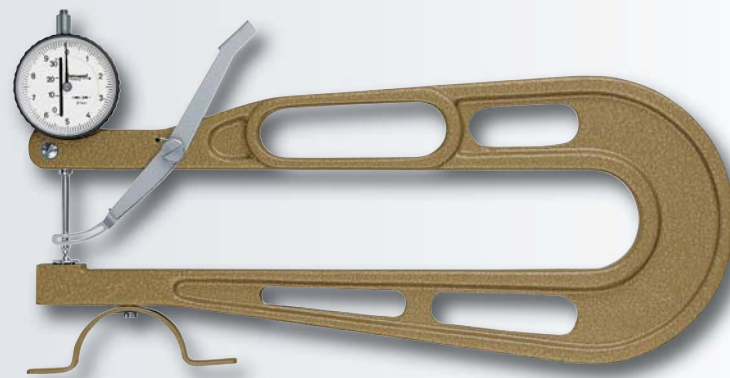
≈ 2 N

40 μm (dial gauge)

Cardboard box

Declaration of conformity

### Models with deeper throat, reading to 0,1 mm



mm  
400



mm



mm



mm



mm



Paired inserts

074115624

0 ÷ 30

0,1

flat

Ø 30

074115734

074115625

0 ÷ 30

0,1

flat

Ø 20

074115735

074115626

0 ÷ 30

0,1

flat

Ø 10

074115731

074115628

0 ÷ 30

0,1

spherical

Ø 5

074115733





Model for laminated plies, reading to 0,001 mm



074115664	0 ÷ 1	0,001	flat	Ø 6,35

- ✓
- 30 mm throat depth. Highly stable frame with heat insulating handle.
- 57 mm dial diameter
- 0,2 mm
- Non-interchangeable, retractable measuring inserts.
- ≈ 2 N
- 5 µm (dial gauge)
- Cardboard box
- Declaration of conformity

Models with reading to 0,1 mm

With open inserts when not in use



- ✓
- 57 mm dial diameter
- 10 mm
- Interchangeable measuring inserts
- 40 µm (dial gauge)
- Cardboard box
- Declaration of conformity

mm	mm	mm	mm	flat	mm	Paired inserts
0 ÷ 20	0 ÷ 30					
074115599	074115604	0,1	50	flat	Ø 30	074115686
074115600	074115605	0,1	50	flat	Ø 20	074115687
074115601	074115606	0,1	50	flat	Ø 10	074115726
074115602	074115607	0,1	50	convex	Ø 10	074115727
074115603	074115608	0,1	50	spherical	Ø 5	074115728

Dial Depth Gauges, Type PF1



Hardened steel

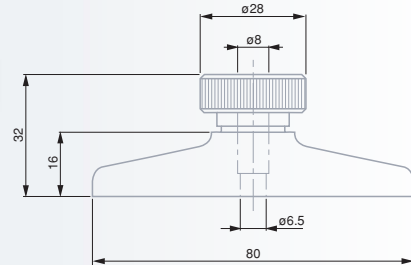
Finely lapped measuring faces.

Mount with clamp for a dial gauge or a probe.

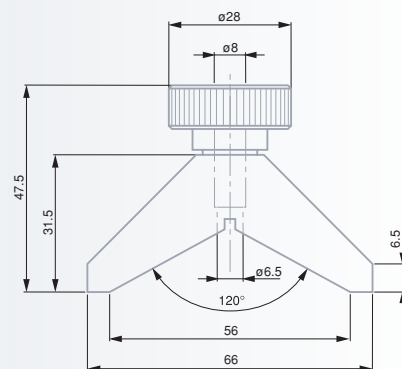
Provided without dial gauge

Cardboard box

Declaration of conformity



No.	Material	mm	Mount mm
01639046	Flat base	80 x 16	Ø 8



No.	Material	mm	Width mm	Mount mm
01639047	V-base	10 ÷ 100	120° 16	Ø 8



# INTERAPID Small Bench SHE.30 or SHE.35

The ideal solution for precise inspection of small part series dedicated to watchmaking and precision mechanics – Fast in measuring and easily adaptable to changes from a workpiece-type to another – Wide choice of measuring inserts specially designed for the broadest variety of metrology applications.



**INTERAPID SHE.30  
for External Dimensions**



0 to 30 mm  
Mobile measuring bolt mounted on a plain bearing, also fitted with a semi-circular releasing disc plate.

**Measuring inserts** supplied in pairs. One is tightened on the measuring bolt, the other on the fixed anvil using one indexing pin with 1 mm dia. and two M1,4 clamping screws.

**Resting table with vertical and lengthwise adjustment facility**  
Table surface area: 24 x 9,5 mm.  
Setting range: 15 mm upright, 14 mm lengthwise.  
With tightening screws.

**Sensor** (must be ordered separately), e.g. dial gauge, electronic or precision indicator, analogue or digital probe with a 8 mm dia. shaft.



Main body in cast iron. Other parts in hardened and ground steel.



Produced by used sensor. The SH.30 model has no spring-loaded measuring force.



Accuracy is usually influenced by the measuring instrument as well as both flatness and parallelism of the measuring faces of used inserts.

**Clamping precision**

Tolerance in flatness of both clamping faces: 0,05 mm.  
Tolerance for the axial position of both indexing pins against bolt axis: 0,05 mm.  
Tolerance for the parallel position of the table surface against bolt axis: 0,05 mm.

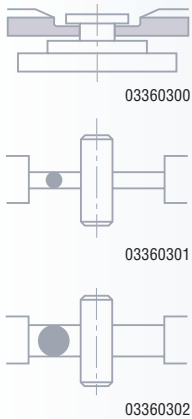
Also see drawing



2,1 kg  
Shipping packaging



Declaration of conformity

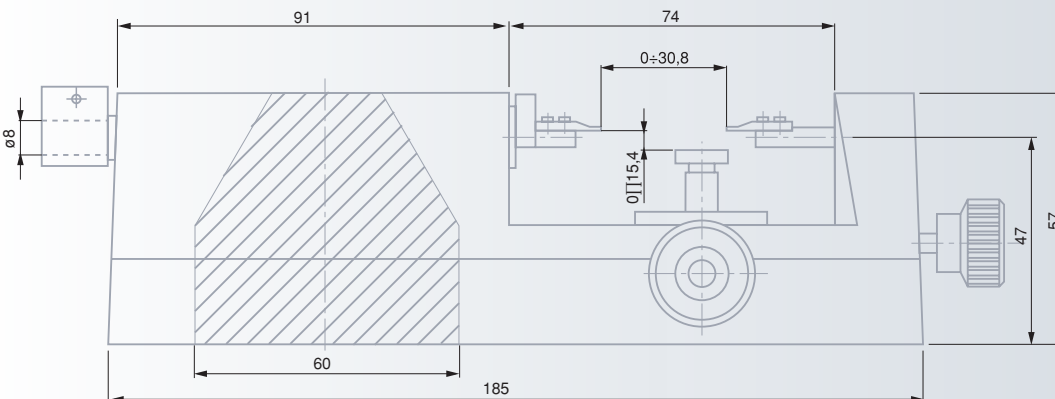
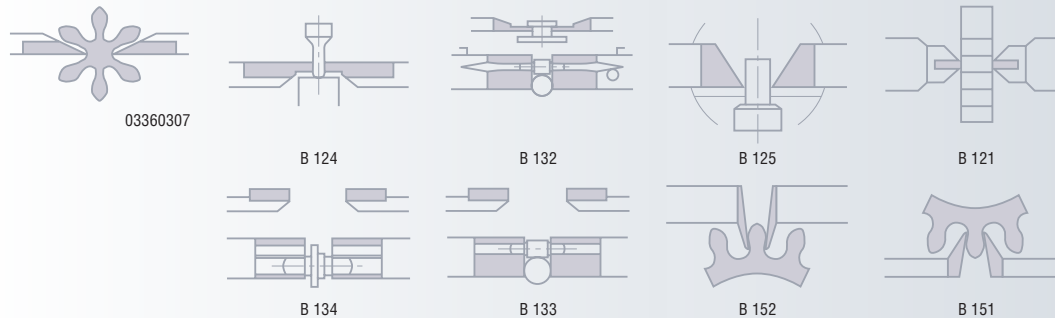


**03330004** INTERAPID small measuring bench SHE.30 for external dimensions, without measuring inserts

*Tungsten carbide tipped measuring inserts available in pairs*

- 03360300** Flat measuring face, 3,5 mm long, 0,4 mm thick
- 03360301** Cylindrical insert with a flat measuring face, 1,2 mm diameter
- 03360302** Cylindrical insert with a flat measuring face, 2 mm diameter
- 03360307** Knife-edged measuring face, 3,5 mm long, 0,05 mm thick, 40°

**Inserts with special design available upon request.**



## INTERAPID SHE.35 for Internal Dimensions



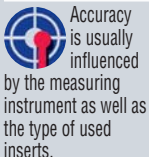
**Measuring inserts** supplied in pairs. Can be exchanged. Provided with a 4 mm dia. fixing shaft.

**Height adjustable resting table**

Table surface area: 40 x 70 mm.  
Setting range: 8 mm.  
1 tightening screw.  
Sensor (must be ordered separately), e.g. dial gauge, electronic or precision indicator, analogue or digital probe with a 8 mm dia. clamping shaft.



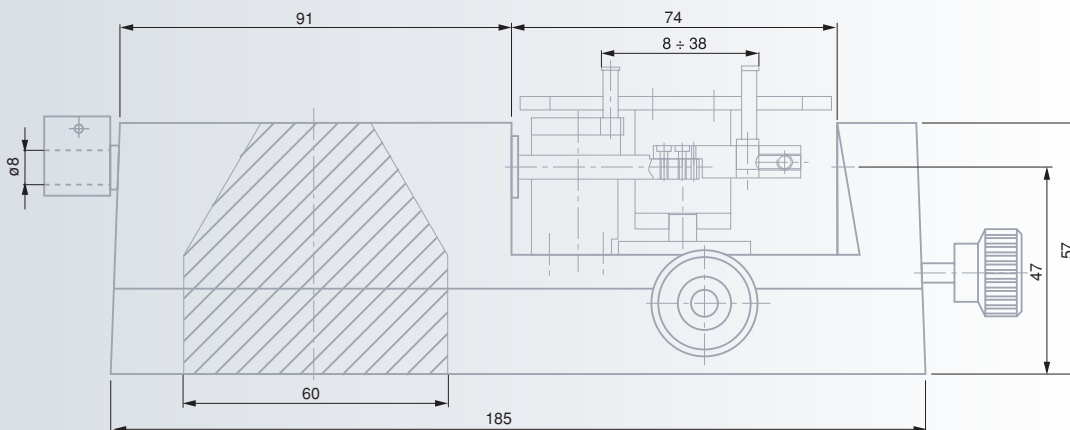
Produced by used sensor. The bench has no spring-loaded measuring force.



**03330006 INTERAPID small bench SHE.35 for internal dimensions, with measuring inserts included.**

8 ÷ 38 mm

Inserts with special design also available on request





## TESA QUICK-CONTROL C2 for Stationary Use

This versatile shop tool allows 2-point measurement of part series using one mobile insert coupled with the sensor plus another fixed one fitted with a clamp for mounting any dial gauge, precision indicator or axial probe having a 8 mm dia. clamping shaft.

- Quick, easy, dependable and precise measurement (repeatability to 2 µm without the use of the sensor).
- Robust construction, easy to mount and to use.
- Adjustable measuring force.
- Measures workpieces with plan-parallel, cone-shaped or cylindrical surfaces, grooves, through holes and blind bores, short centring shoulders and wall thickness. Also serves to check diameters on gear teeth.
- Detects form and positional errors, i.e. roundness, concentricity and coaxiality.



Hardened steel inserts



Lapped measuring faces



2 µm (QUICK-CONTROL alone)



Adjustable from 0 up to 10 N.

Can be reversed from «neutral» to internal or external measuring



Suited plastic case



Identification number



Declaration of conformity

### TESA QUICK-CONTROL 160 C2

Main tool version within the C2 range. Measures mean to small or even very small dimensions (see below for details).



Internal dimensions

External dimensions

<b>03330024</b>	<b>QUICK-CONTROL 160 C2</b>	30 ÷ 120	1.19 ÷ 4.72	0 ÷ 90	0 ÷ 3.54
<i>Provided with the following accessories:</i>					
<b>03360022</b>	1 Steady insert holder, short.				
<b>03360027</b>	1 Pair of long inserts for internal/external diameters, through holes, blind bores, grooves and slots with max. depth to 3,7 mm, max. height to 25 mm.				
<b>03360026</b>	1 additional insert, as above but short. For use instead of the long one when measuring at low height.				
<b>Option 1 – For small dimensions</b>					
<b>03360065</b>	1 Pair of long inserts with a 8 mm dia. clamping shaft, 6 mm dia. probing head.	22 ÷ 120	0.87 ÷ 4.72	0 ÷ 90	0 ÷ 3.54
<b>Option 2 – For smaller dimensions</b>					
<b>03360031</b>	1 Pair of inserts for checking very small bores.	11.5 ÷ 60	0.46 ÷ 2.36	0 ÷ 90	0 ÷ 3.54
<b>03360024</b>	1 Pair of adapters for 5 mm dia. inserts. For use at probing points with a 8 mm dia.				
<b>03360032</b>	1 Pair of raising blocks used to scale down the width of the slot lying in the middle of the upper tool table.				



Hardened steel inserts

Lapped measuring faces

2 µm (QUICK-CONTROL alone)

Adjustable from from 0 up to 10 N.  
Can be reversed from «neutral» to internal or external measuring

Suited plastic case

Identification number

Declaration of conformity

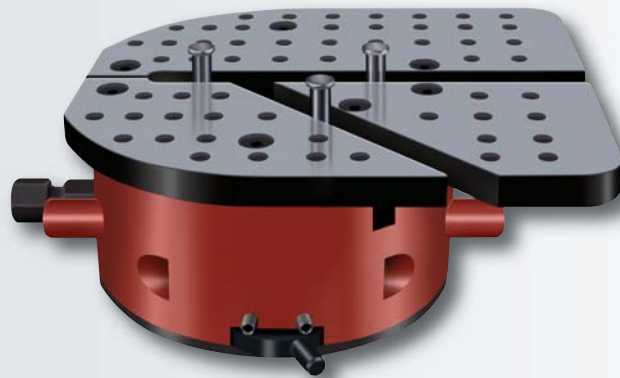
## TESA QUICK-CONTROL C3 for Stationary Use

Having the same features and capabilities as TESA QUICK-CONTROL C2, this model also provides an extra transverse insert.

Both mobile and fitted inserts are used for 2-point measurements. The third one moves transversally, thus enabling a correct positioning of the workpiece, without the need for locating the culmination point. This insert also allows workpiece diameter and form errors to be measured at the same time.

## TESA QUICK-CONTROL 160 C3 AL

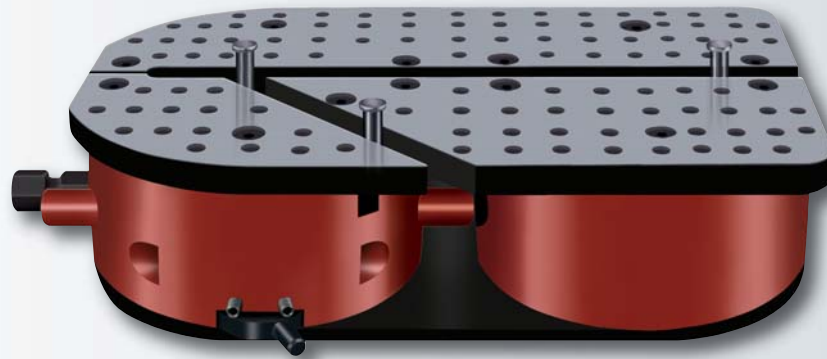
Main version within the C3 tool range for mean to small dimensions.  
With a mounted stop-like insert that can be moved in the 45° V-slot.



№	=	mm		in	
		Internal dimensions		External dimensions	
03330026	QUICK-CONTROL C3 AL	32 ÷ 120	1.26 ÷ 4.72	0 ÷ 90	0 ÷ 3.54
<i>Provided with the following accessories:</i>					
03360067	1 Mobile standard insert, 10 mm dia. spherical probing head				
03360068	Pair of standard inserts for fixed holder, 10 mm dia. spherical probing head, L = 36 mm				
03360069	1 Fixed insert holder				
03360070	1 Fixed stop holder				
<b>Option 1 – For small dimensions</b>					
03360066	3 long inserts with a 8 mm clamping shaft, 6 mm dia. probing head.	25 ÷ 120	0.99 ÷ 4.72	0 ÷ 90	0 ÷ 3.54

### TESA QUICK-CONTROL 160 C3 JS

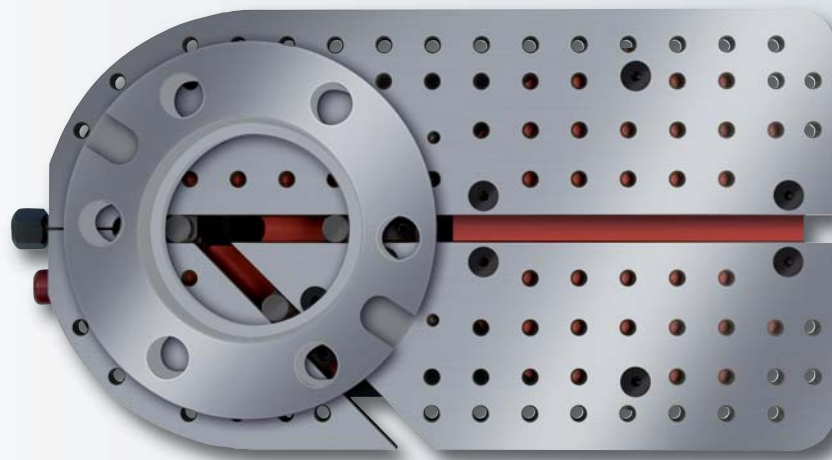
Identical to TESA QUICK-CONTROL 160 C3 AI, but with extended application range.



- ✓
- Hardened steel inserts
- Lapped measuring faces
- 2 µm (QUICK-CONTROL alone)
- Adjustable from 0 up to 10 N. Can be reversed from «neutral» to internal or external measuring
- Suited plastic case
- Identification number
- Declaration of conformity

No	=	Internal dimensions		External dimensions	
		mm	in	mm	in
<b>03330027</b>	<b>QUICK-CONTROL 160 C3 JS</b>				
<i>Provided with the following standard accessories:</i>					
<b>03360067</b>	1 Mobile standard insert, long, 10 mm dia. spherical probing head	32 ÷ 190 (3 points)	1.26 ÷ 7.48 (3 points)	0 ÷ 170 (3 points)	0 ÷ 6.69 (3 points)
		32 ÷ 275 (2 points)	1.26 ÷ 10.8 (2 points)	0 ÷ 245 (2 points)	0 ÷ 9.65 (2 points)
<b>03360068</b>	Pair of standard inserts for fixed stop and support, 10 mm dia. spherical probing head, L = 36 mm				
<b>03360069</b>	1 Fixed insert holder				
<b>03360070</b>	1 Fixed stop holder				

The option 1 for small dimensions can also be used on the model 160 C3 JS.





Hardened steel inserts

Lapped measuring faces

2 µm (QUICK-CONTROL alone)

Adjustable from 0 up to 10 N. Can be reversed from «neutral» to internal or external measuring

Suited plastic case

Identification number

Declaration of conformity



### TESA QUICK-CONTROL 160 C3 90 ST2

Special model for small and very small dimensions. Features a mounted stop-like insert fitted in the 90° V-slot. Also adjustable.



mm

in

mm

in

Internal dimensions

External dimensions

<b>03330028</b>	<b>QUICK-CONTROL 160 C3 90 ST2</b>	10 ÷ 80	0.4 ÷ 3.14	0 ÷ 55	0 ÷ 2.16
-----------------	------------------------------------	---------	------------	--------	----------

Provided with the following standard accessories:

<b>03360072</b>	1 Fixed insert holder for adapter
<b>03360073</b>	1 Fixed insert holder for the third point and adapter
<b>03360074</b>	3 Adapters
<b>03360075</b>	3 Long inserts with as 5 mm dia. shaft
<b>03360067</b>	1 Mobile standard insert, 10 mm dia. probing head
<b>03360068</b>	1 Pair of standard inserts for fixed holder, 10 mm dia. spherical probing head, L = 36 mm



Hardened steel inserts

Lapped measuring faces

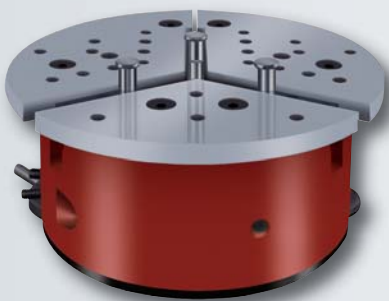
2 µm (QUICK-CONTROL alone)

Adjustable from 0 up to 10 N. Can be reversed from «neutral» to internal or external measuring

Suited plastic case

Identification number

Declaration of conformity



### TESA QUICK-CONTROL 160 C3 120

Measures internal and external dimensions with 2-point contact. Features one mobile and two fixed inserts lying 120° apart. Specially designed for bore measurement. Uses 2 setting rings matching both upper and lower limit values of the tolerated size for display setting and calibration. Recommended sensor: DIGICO 1 precision indicator with order No. 01930000.



Various pairs of inserts and accessories available upon request.



mm

in

mm

in

Internal dimensions

External dimensions

<b>03330029</b>	<b>QUICK-CONTROL 160 C3 120</b>	≥ 25	≥ 0.99	≤ 80	≤ 3.15
-----------------	---------------------------------	------	--------	------	--------

Provided with the following standard accessories:

<b>03360067</b>	1 Mobile standard insert, Ø 10 mm dia. spherical probing head
<b>03360068</b>	1 Pair of standard inserts for fixed holder, 10 mm dia. spherical probing head, L = 36 mm
<b>03360022</b>	2 Fixed insert holders, short





## TESADIA Plug Gauge

Easy-to-handle plug gauge for 2-point or 3-point measurement on cylindrical bores – Ideal for blind bores and short centring shoulders with diameters ranging from 2,98 up to 250 mm.

- Features a built-in probe that can be connected to a TESA's electronic unit, e.g. TESATRONIC or TESA Interface Box BP 880.
- Specially suited for recurrent dimensional inspection of medium and large-sized batches of parts in the shop floor as well as for receiving and final inspection.
- Equipped with a guiding cylinder that renders unnecessary swinging the plug gauge to find the culmination point. Self-centring and self-aligning.



- |                 |                                       |
|-----------------|---------------------------------------|
| <b>05560221</b> | Handle with built-in GT21 axial probe |
| <b>05560228</b> | Handle alone                          |

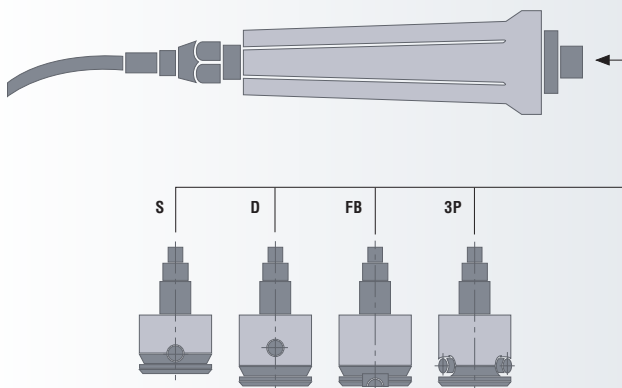


You may ask for a quotation for plug gauges with their own setting rings as well as for the electronic unit.

Specify nominal dimension along with both upper and lower limits of size as well as workpiece material.

### Handle

- With built-in TESA GT 21 axial probe.
- Mechanical device for fine adjustment, stress-relieved probe cable.
- Possible connection of a TESA GT 21 compatible probe from another source.



- S** 2-point plug gauge in standard execution for through holes
- D** 2-point plug gauge with longer guiding cylinder for through holes
- FB** Plug gauge for blind bores
- 3P** 3-point plug gauge for through holes

### Plug Gauge

- Equipped with both a measuring head and guiding cylinder.
- Uses the measuring needle with reversal wedge at one end to transfer the sweeping movement of the measuring insert to the axial probe.
- Houses a guiding cylinder having a special profile for unrestrained introduction of the plug gauge into the bore to be measured. No locking, no tilting.
- Choice of gauging contacts offering optimum adaptation to the parts to be checked, i.e.:
  - tungsten carbide tipped (not suited for non-ferrous metal alloy);
  - hard-chrome plated (partially suited for non-ferrous metal alloy);
  - ruby contacts (suited for non-ferrous metal alloy);
  - diamond contacts (suited for soft light alloy);
  - synthetic contacts (suited for polished surfaces).



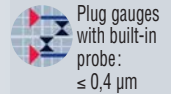
Measuring faces: see opposite



Plug gauges with built-in probe.  
 • 2-point model: 1%  
 • 3-point model: 3%  
 These percentages refer to the measuring span of each plug gauge



Plug gauges with built-in probe.  
 • 2-point model:  $\leq 1 \mu\text{m}$   
 • 3-point model:  $\leq 2 \mu\text{m}$



Plug gauges with built-in probe:  $\leq 0,4 \mu\text{m}$   
 0,3 to 1,2 N according to relevant model



10° C to 35° C  
 -25° C to 55° C



Declaration of conformity

# Measuring Stands and Auxiliary Fixtures



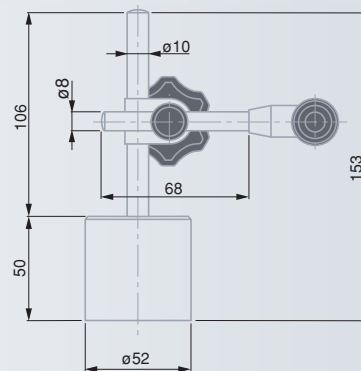
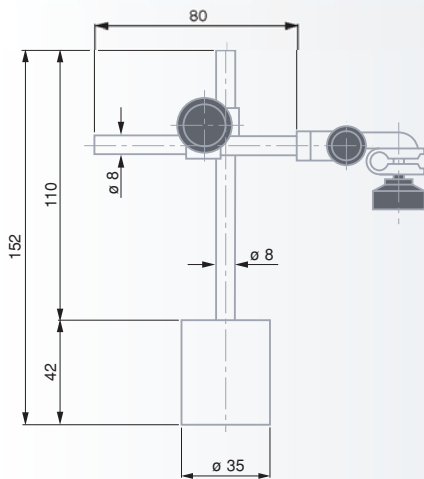
# INTERAPID Small Magnetic Supports

Ideal for dial test indicators (lever-type) or dial gauges having a 40 mm dial diameter – Versatile due to 2 rigid joints and fine adjust option.

## UJ 15 Model



## UJ 15G Model



Rounded base with permanent magnet

Holding force on a flat surface:  
≈ 220 N for UJ 15  
≥ 350 N for UJ 15G

0,47 kg for UJ 15  
0,93 kg for UJ 15G

Supplied without indicator

Suited carrying case

Declaration of conformity

Steel Base Plate  
50 x 80 x 20 mm

0,60 kg



**01639007** INTERAPID small magnetic support UJ15 with a 8 mm diameter clamping bore and dovetail clamp

**01639016** INTERAPID small magnetic support UJ15G with both a 8 mm and 4 mm diameter clamping bore and dovetail clamp

*Accessory*

**01640501** Steel base plate for use of UJ 15 as mobile support





Base has a vee recess and one magnetic flat face with disengageable magnet. Articulations made from duralumin.

Holding force on a flat surface  $\approx 170$  N

Dovetail clamp with a 8 mm diameter clamping bore

0,4 kg

Supplied without indicator

Suited carrying case

Declaration of conformity

## Model with Articulated Arm



mm

**01639025** INTERAPID small magnetic support with articulated arm

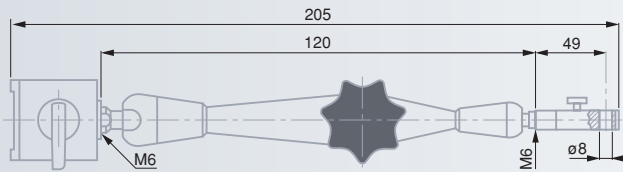
Full length 205

Consisting of:

1 Articulated arm Length 120

1 Dovetail clamp with fine adjustment

1 Magnetic base L x W x H 30 x 30 x 30



Model with a flat base has 2 rounded permanent magnets

72 x 38 x 11 mm for model with a flat base or 72 x 38 x 26 mm for model with a V-base

Holding force:  $\approx 180$  N for the flat base or  $\approx 260$  N for the V-base

Clamp with a 8 mm diameter clamping bore

Supplied without indicator

Suited carrying case

Declaration of conformity

## Magnetic Supports with Flat or V-Base



**01639011** INTERAPID magnetic support with a flat base

**01639012** INTERAPID magnetic support with a V-base



# INTERAPID Magnetic Supports

## Standard Model and Models with Powerful Holding Force



Disengageable magnet. Clamp with a 8 mm dia. clamping bore.

Supplied without indicator

Suited carrying case

Declaration of conformity

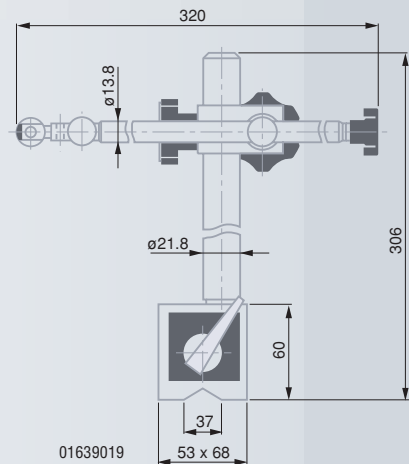
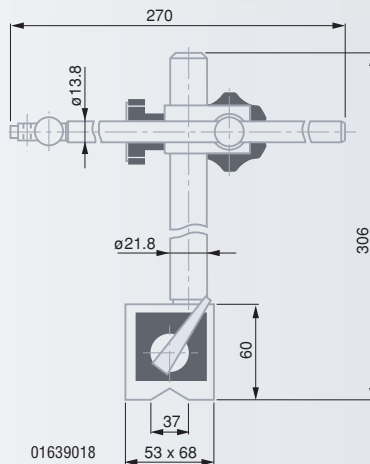
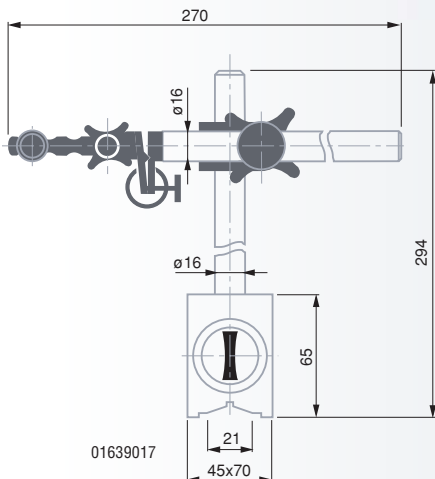
			N	Fine adjust	V-Base for
01639017	Standard model	≈ 600	●	70 ÷ 220	
01639018	Powerful holding force	≈ 1000	—	70 ÷ 220	
01639019	Powerful holding force	≈ 1000	●	70 ÷ 220	



01639017



01639019





Magnetic base has 2 flat faces plus 1 prismatic one. Articulations made from duralumin. Disengageable permanent magnet. Dovetail clamp with a 8 mm diameter clamping bore.

Magnetic base (L x W x H) 60 x 50 x 55 mm

1,45 kg or 1,85 kg

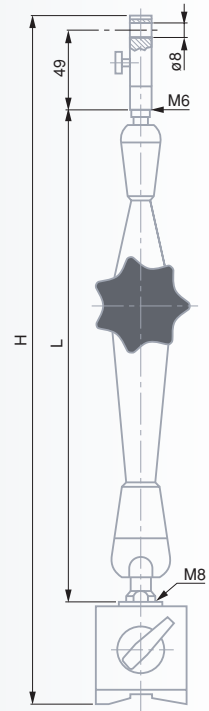
Supplied without indicator

Suited carrying case

Declaration of conformity

### Models with Articulated Arm

Attach simply and securely using a single lobe knob – Solid arm with highly rigid articulations.



No.		H mm	L mm	N	Fine adjust	V-Base for
01639022	Magnetic support	310		≈ 700	●	30 ÷ 150
01639023	Magnetic support	390		≈ 700	●	30 ÷ 150
<i>Consisting of:</i>						
	Articulated arm		200			
	Articulated arm		280			
	Clamp					
	Magnetic base			≈ 700	●	30 ÷ 150



Magnetic base has 2 flat faces plus 1 prismatic one. Disengageable permanent magnet. Full length 350 mm. Dovetail clamp with a 8 mm diameter clamping bore.

Holding force on a flat surface ≈ 1000 N

Supplied without indicator

Suited carrying case

Declaration of conformity

### Model with Flexible Arm

For hard-to-reach locations – Lever controlled arm that holds securely on any surface.

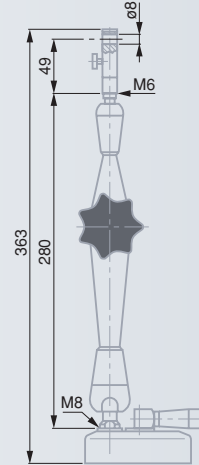


01639020 INTERAPID magnetic support with flexible arm



## INTERAPID Measuring Support with Suction Base

Holds firmly on any plain, flat surface – Clamps easily and reliably over the lobe knob – Provides high rigidity – Free from magnetic fields.



**A** Round suction base in duralumin (88 mm in diameter and 28 mm in height) with a flat face. Articulations in duralumin. Disengageable suction effect using the lever. Dovetail clamp with a 8 mm diameter clamping bore.

**1** 1,1 kg

**2** Supplied without indicator

**3** Suited carrying case

**4** Declaration of conformity



H mm



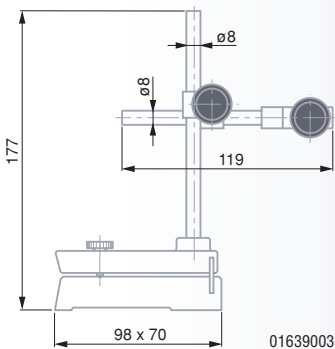
N



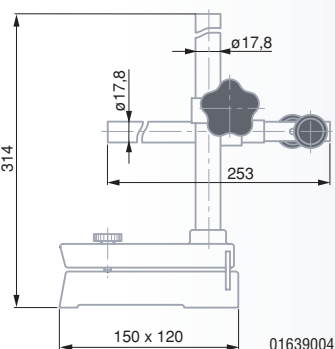
Fine adjust

<b>01639024</b>	Support with suction base	363	280	≈ 400	●
<i>consisting of:</i>					
	Articulated arm		280		
	Clamp				●
	Round suction base			≈ 400	

## INTERAPID Measuring Supports



01639003



01639004



**A** Base with resting front face. Clamp for a 8 mm diameter mounting rod or a dial gauge with lug. Model No. 01639003 with added dovetail clamp

**1** Cast iron base

**2** 1,3 kg or 4,35 kg

**3** Supplied without indicator

**4** Suited carrying case

**5** Declaration of conformity



Used in conjunction with

<b>01639003</b>	INTERAPID small support	Dial test indicators, small dial gauges
<b>01639004</b>	INTERAPID small support	Dial test indicators, dial gauges, precision indicators, electronic probes etc.



Stand with lateral guiding faces. Vertical column that can be moved along the T-slot. Provided with 2 rigid articulations.

Cast iron base

3,3 kg

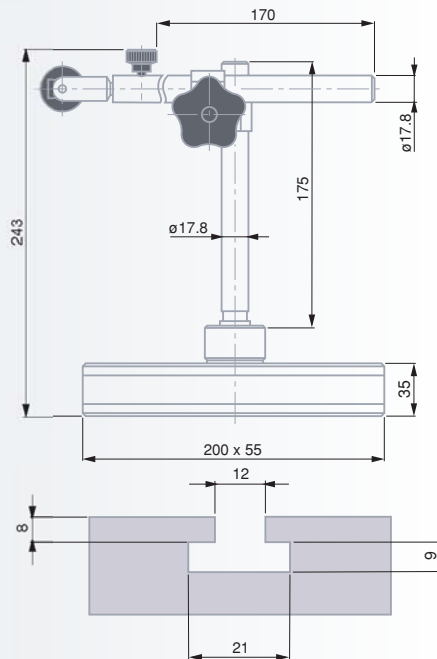
Supplied without indicator

Suited carrying case

Declaration of conformity

## INTERAPID UD 12 Universal Stand

Medium-sized sliding support for dial test indicators (lever-type), dial gauges, electronic probes etc. – With fine adjust option.



No



**01639000** INTERAPID UD 12 universal stand

Furnished with:

**01640100** Clamp with a 8 mm dia. tightening

**01840105** Clamping rod, 8 mm dia., with dovetail recess



Measuring table with ground measuring face. Dismountable column. Measuring arm with a 8 mm dia. tightening.

Cast iron table. Chrome-plated steel column. Spherical graphite cast iron arm.

3 kg

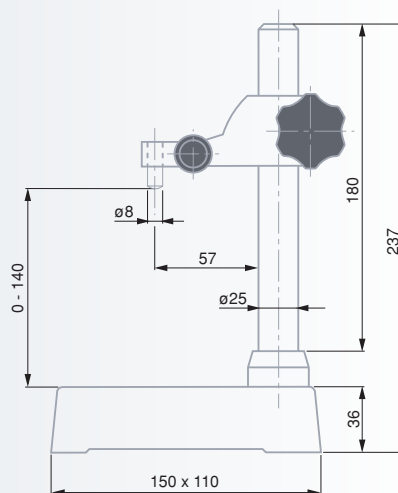
Supplied without indicator

Suited carrying case

Declaration of conformity

## INTERAPID UA 1

Measuring stand without fine adjustment



No



**01639008** INTERAPID UA 1 measuring stand



mm

0 ÷ 140



mm

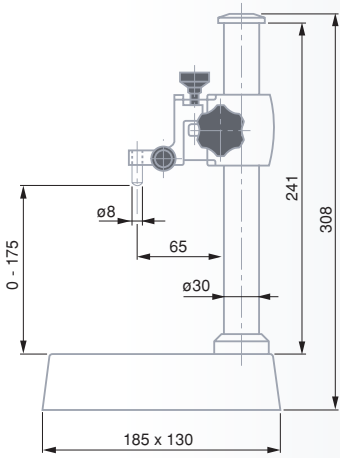
100 x 100





## INTERAPID UA 30

Basic component for mounting specific workpiece attachments for series inspection.



### Basic stand

Ground measuring face. 2 T-slots.

Dismountable column

Cast iron table. Chrome-plated steel column

### Measuring arm

Fine adjustment within a range of 1 mm.

8 mm dia. clamping bore.

### Sliding arm

Floating holder for TESA YA.

Adjustable swinging movement. 13 mm dia. clamping bore. 35, 57 or 80 mm travel length.

Measuring span 60 mm.

### Depth stop plate

Dimensions: 115 x 35 x 3,5 mm. 120° vee recess for diameters ≤ 120 mm. Two tightening screws.

### Additional data

4,85 kg (basic stand). 0,85 kg (measuring arm). 1,75 kg (sliding arm).

Supplied without indicator

Suited carrying case

Declaration of conformity



Measuring arm with a 8 mm dia. clamping bore, without fine adjustment. Measuring span 48 mm

Measuring table and column in hardened steel

2,7 kg

Supplied without indicator

Suited carrying case

Declaration of conformity

No



mm

mm

01639009

INTERAPID UA 30 basic stand (without measuring arm)

0 ÷ 175

125 x 115

### Accessories

01610200

UK 20 measuring arm with fine adjustment

01610201

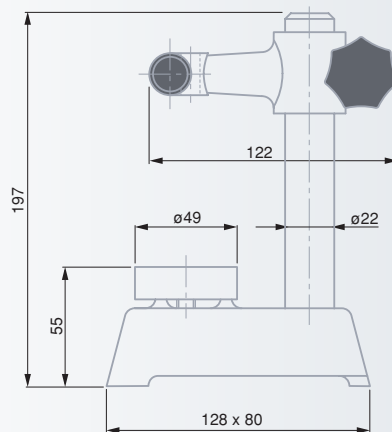
UK 25 sliding arm used in conjunction with TESA YA for stationary bore measurement (also see page H-6)

01640000

UAZ 10 depth stop plate

## INTERAPID Small Measuring Stand

With round steel measuring table.



No



mm

mm

01639006

INTERAPID small measuring stand

0 ÷ 100

Ø 49

# INTERAPID Measuring Stands



**Supports**

**N° 01639035**  
black burnished steel column with a 8 mm dia. clamping bore.

**N° 01639029**  
Chrome-plated column with thread and setting ring for height adjustable measuring arm. 8 mm dia. clamping bore. Measuring face with dust grooves.

**N° 01639030**  
Chrome-plated steel column. Tilting measuring arm with articulation. 4 or 8 mm dia. bore for a dovetail clamp or lug.

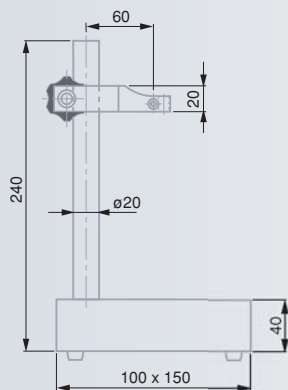
**N° 01639033**  
Chrome-plated steel column. Sliding measuring arm, horizontally. 4 or 8 mm dia. bore for a dovetail clamp or lug.

3 µm as per DIN 876 T1, grade 00.

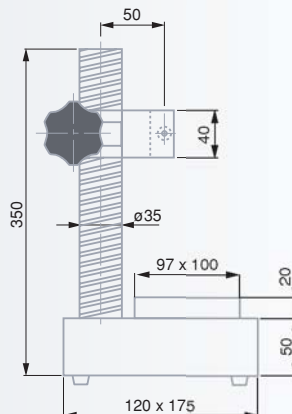
Supplied without indicator

Suited carrying case

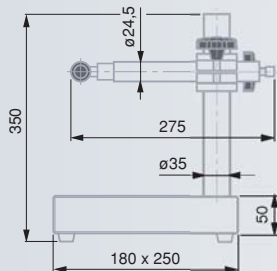
Declaration of conformity



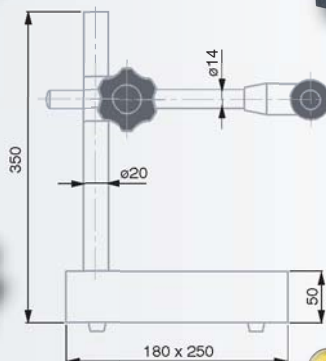
01639035



01639029



01639033



01639030

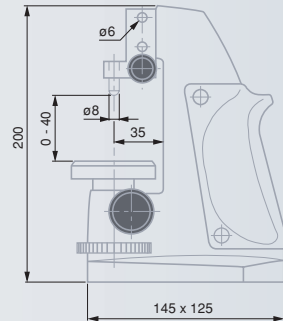


No	Measuring face	Measuring face mm	mm	Fine adjustment	Span mm
01639035	Granite	100 x 115	0 ÷ 170	—	50
01639029	Steel, hardened	100 x 100	0 ÷ 225	●	68,5
01639030	Granite	180 x 205	0 ÷ 240	●	adjustable
01639033	Granite	180 x 200	0 ÷ 260	●	adjustable
	Measuring table	Measuring table mm	Column mm	Column mm	kg
01639035	Granite	100 x 150 x 40	20	200	2,6
01639029	Granite	120 x 175 x 50	35	300	8,1
01639030	Granite	180 x 250 x 50	20	300	8,4
01639033	Granite	180 x 250 x 50	35	300	10,5



# INTERAPID UM 20

Stable stand for measuring small parts accurately.



**A** With a 8 mm dia. tightening plus two 6 mm dia. clamping bores for the UPZ 6 probe-holder. Measuring span 35 mm.

**P** 3 kg (measuring stand alone)

**B** Supplied without indicator

**C** Suited carrying case

**D** Declaration of conformity

### INTERAPID UM 20 measuring stand (without measuring table)

Height adjustable table mount with thread and fine adjustment.  
Clamping groove for UMZ 12 depth stop (No. 01640300)



mm

Fine adjustment  
mm

01639002

0 ÷ 40

15

**UMZ 40 meas. table with dust grooves**  
Hardened steel, lapped measuring face.



mm

01640302

Ø 66 x 12



**UMZ 41 plain measuring table**  
Hardened steel, finish ground measuring face.



mm

01640303

Ø 66 x 12



**UPZ 6 double probe-holder**

8 mm dia. mounting bore for 2 probes.  
Clamped on the measuring stand with  
2 shafts having a 6 mm dia.



Sideways  
mm

01640401

13 ÷ 80



**UMZ 12 depth stop**

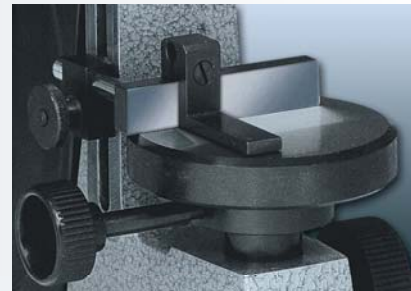
Clamp to be mounted in the T-slot of the  
basic stand. Hardened and ground stop  
plate.



Resting face  
mm

01640300

55 x 11



**UMZ 13 side stop**

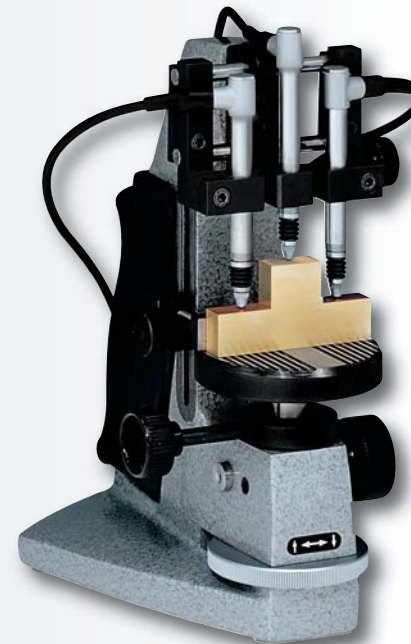
Hardened and ground. For use along  
with UMZ 12.



Resting shoulder  
mm

01640301

31,5 x 10 x 3





## INTERAPID Universal Stands UP

These two universal stands provide different height levels along with a wide range of accessories that serve for setting up a variety of measuring configurations – High-precision components, also highly stable and extremely wear-resistant – Guaranteed lowest measurement uncertainty for the skilled manufacturing shop floor.

Besides dial gauges, precision indicators and dial test indicators (lever-type), both stands enable electronic probes to be mounted, especially to carry out direct, sum or comparative measurement (see section O).



**A** Heavy cast iron base with mounted ground steel column (50 mm dia.). Measuring arm with a 8 mm dia. tightening and 2 mounting bores having a 6 mm dia. for UPZ 6.

Fine adjust control using the protected knob. 1 mm travel length.

Base and measuring arm in cast iron. Dull-chrome plated steel column.

Supplied without indicator

Suited carrying case

Declaration of conformity



### INTERAPID universal stands UP (without measuring table)

Heavy cast iron models. Measuring arm with locking device and brake stop. For additional technical data, see opposite.



mm

kg

01639041

UP 160 measuring stand

0 ÷ 155

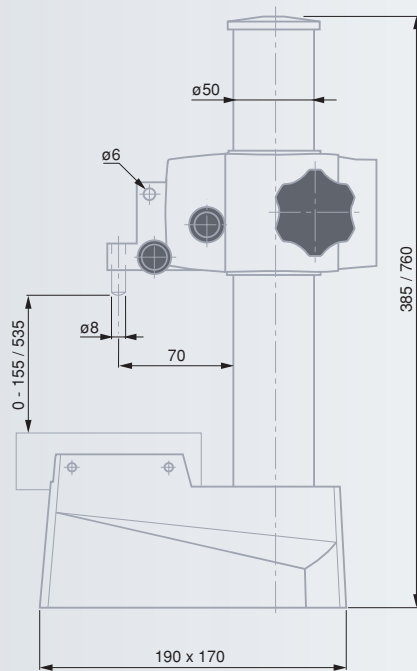
13,5

01639042

UP 200 measuring stand

0 ÷ 535

19



**UPZ 40 standard measuring table**

Hardened steel. Two measuring faces with dust grooves, lapped. One face has a 13 mm wide strip along the centre.



mm

µm

01640405

45 x 95

1



**UPZ 46 A measuring table along with probe-holder**

Feature a 8 mm dia. clamping bore for axial probes. Hardened and lapped measuring face with dust grooves as well as a 13 mm wide strip along the centre.



mm

µm

01640410

45 x 95

1



**UPZ 20 side plates**

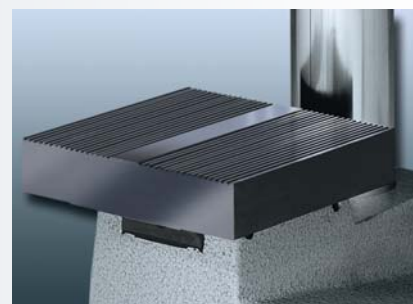
To be mounted sideways on both UPZ 40 and UPZ 46 A measuring tables. Made of black plastic. Supplied in pairs.



Resting face  
mm

01640404

55 x 95



**UPZ 47 large measuring table along with probe-holder**

8 mm dia. clamping bore for axial probes. Hardened and lapped measuring face with dust grooves as well as a 18 mm wide strip along the centre.



mm

µm

01640411

120 x 120

1,5





### UPZ 53 cross beam

For centre and vee supports. Made from cast iron and ground.



Length  
mm

01640416

300



### UPZ 51 centre supports

For axial and radial run-out inspection. Max. distance between points: 155 mm. Feature solid and spring-loaded hollow points, movable lengthwise but also lockable. Used with cross beam UPZ 53. Supplied in pairs.



Height of points  
mm

01640414

50



### UPZ 54 length stop

For use on the cross beam UPZ 53 with UPZ 52 resting blocks. A probe can be mounted instead of the stop rod.



01640417



### UPZ 52 resting blocks

For cylindrical or conical components. Resting plates with tungsten carbide pins, adjustable to the part diameter. Distance between plates matches  $\leq 300$  mm. Used with cross beam UPZ 53. Supplied in pairs.



mm

01640415

$\leq 30$





**UPZ 60 rack and pinion slide**

For vertical adjustment of the measuring arm.



Travel length  
mm

**01640419** 185



**UPZ 15 limit stop**

Mounted with clamp on the column. Hardened, dull-chrome plated.



Stop face  
mm

**01640403** 68 x 20

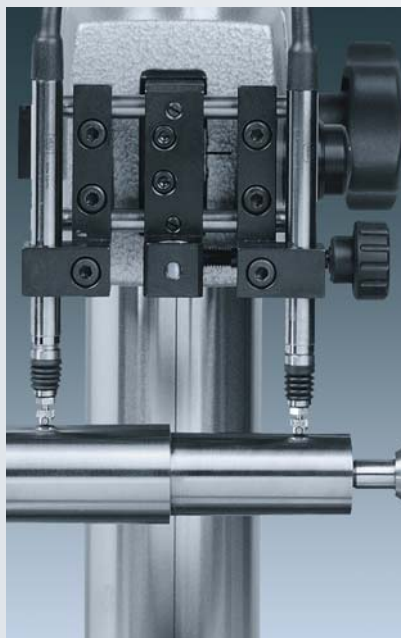
**UPZ 14 stop plate**

For use with limit stop UPZ 15. Hardened, dull-chrome plated.



Vee angle

**01640402** 120°



**UPZ 6 double probe-holder**

Tightening collar, 8 mm dia., for 2 electronic probes. Mounted on the stand by means of 2 shafts having a 6 mm dia.



Lateral  
mm

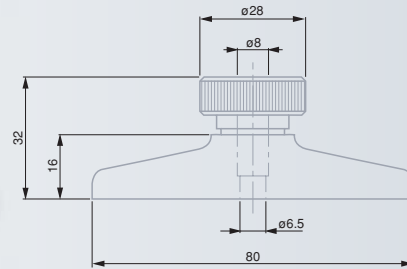
**01640401** 13 ÷ 80





## INTERAPID Depth Feet

### Model with a flat measuring face

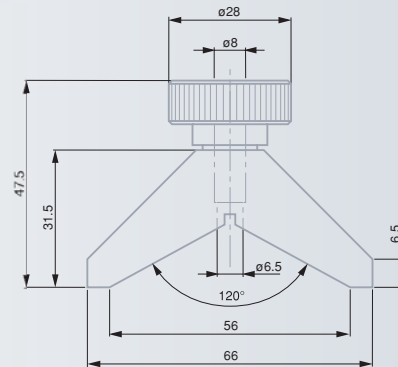


Finish lapped measuring faces. Clamp with lock for mounting a dial gauge or an electronic probe



### Model with a prismatic measuring face

For measuring groove depth on cylindrical shafts. Also for establishing circularity errors etc.



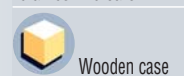
## Brown & Sharpe CENTER FINDER

Practical auxiliary support that helps Users to quickly align the centre of the bores against the spindle axis on a machine tool – Used without clamping shaft can also serve as small magnetic support – Designed for clamping a dial test indicator whether standard or perpendicular.



Center Finder includes the following components:

- cylindrical shank that can be clamped on the chuck of a machine tool.
- powerful permanent magnets.
- swivel joint along with a dovetail collar for clamping a lever-type dial test indicator.



## AUXILIARY FIXTURES

### Brown & Sharpe V-Blocks and Clamps

V-blocks have a frame for clamping cylindrical parts with diameters ranging from 0,7 to 40 mm – To be used for workpiece inspection or machining.

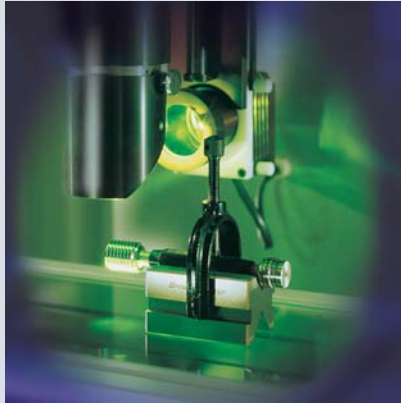


Hardened steel

Ground for both resting and vee faces

Not available as single components

Suited plastic case



No

=

Ø

Clamping range  
mm

**06769007**

Brown & Sharpe V-blocks and clamps

0,7 ÷ 40

Consisting of:

1 Pair of V-blocks

5 ÷ 40

1 Extra V-block

3 ÷ 8

1 Extra V-block

1,5 ÷ 5

5 Extra V-blocks

0,7 ÷ 3,5

2 In-between bridges

2 Large frames

1 Small frame



Each block has 18 through bores with a 9,53 mm dia. as well as 5 M10 threaded bores

Hardened steel, 55 to 60 HRC

7 µm for each pair

2,5 µm for all faces

Supplied with five M10 socket head screws as well as one 8 mm socket wrench

Suited plastic case



### Brown & Sharpe Positioning Block Set

Pair of matched blocks convenient for positioning and holding workpieces or for use as stops on surface plates, metrology set-ups, machine-tools and the like – Blocks are precision ground.

No

=

mm

**06769004**

Brown & Sharpe positioning block set

75 x 50 x 25



## Brown & Sharpe Adjustable Parallels

Available in a set including 6 adjustable parallels – Frequently used as parallel pads, setting standards for handheld tools or plug gauges for checking internal dimensions on parallel surfaces.

Each parallel consists of two tapered parts dovetailed together – Two tightening screws lock parallels to size.



Hardened steel



Supplied along with a PH 1 screwdriver



Plastic bag



Height mm



Length mm

Width mm

**06769010** Set of Brown & Sharpe Engineer's parallels, adjustable

Consisting of:

1 Parallel	10 ÷ 13	44	7
1 Parallel	13 ÷ 17	54	7
1 Parallel	17 ÷ 24	68	7
1 Parallel	24 ÷ 33	90	7
1 Parallel	33 ÷ 44	106	7
1 Parallel	44 ÷ 57	129	7

## ROCH Flexible Steel Rules

Made from stainless steel – Scale divisions to 1 and 0,5 mm.



mm



Width mm

Thickness mm

<b>0951750181</b>	200	13	0,5
<b>0951750182</b>	300	13	0,5
<b>0951750184</b>	500	18	0,5
<b>0951750187</b>	1000	18	0,5
<b>0951750188</b>	1500	18	0,5
<b>0951750189</b>	2000	18	0,5



EG class II



Stainless spring-loaded steel



Suitable carrying case



Declaration of conformity

## ROCH Thickness Gauges



Alloyed steel

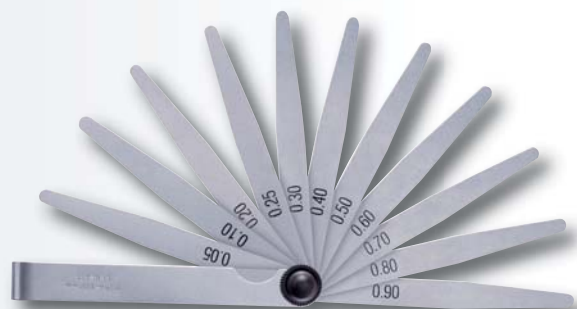
100 mm long blades with max. width of 13 mm

Blades are not supplied individually

Plastic bag

Declaration of conformity

No	Number of blades	Thickness mm	Stepping mm
0951753013	6	0,05 ÷ 0,3	0,05
	7	0,4 ÷ 1,0	0,1
0951753014	20	0,05 ÷ 1,0	0,05
0951753015	21	0,1 ÷ 2,0	0,1+1 x 0,05



## ROCH Radius Gauges

Radius gauges with both concave and convex blades – Designed for visual assessment of radii.



Stainless steel

Blades are not supplied individually

Plastic bag

Declaration of conformity

No	Number of blades	Radii mm	Stepping mm	Radii mm
0951753001	2 x 17	1,0 ÷ 2,75	0,25	0,1
		3,0 ÷ 7,0	0,5	0,1
0951753002	2 x 16	7,5 ÷ 15,0	0,5	0,15
0951753003	2 x 15	15,5 ÷ 19,5	0,5	0,2
		20,0 ÷ 25,0	1,0	0,2



## ROCH Screw Pitch Gauges

60° or 55° flank angles for ISO metric threads or Whitworth threads.



Alloyed steel

Blades are not supplied individually

Plastic bag

Declaration of conformity

No	Flank angle	mm
0951753045	ISO 60°	0,25 0,3 0,35 0,4 0,45 0,5
		0,6 0,7 0,75 0,8 0,9 1,0
		1,25 1,5 1,75 2,0 2,5 3,0
		3,5 4,0 4,5 5,0 5,5 6,0
No	Flank angle	Threads per inch
0951753046	Whitworth 55°	62 60 48 40 36 32 30
		28 26 25 24 22 20 19
		18 16 14 13 12 11 10
		8 7 6 5 4,5 4





## ROCH Hand-Held Magnifier

Folding handle with added small magnifier – Retractable support.



		Large model	Small mode	
<b>No</b>				
	mm		mm	
<b>0951754511</b>	80 x 45	3x	13	10x



Solid plastic



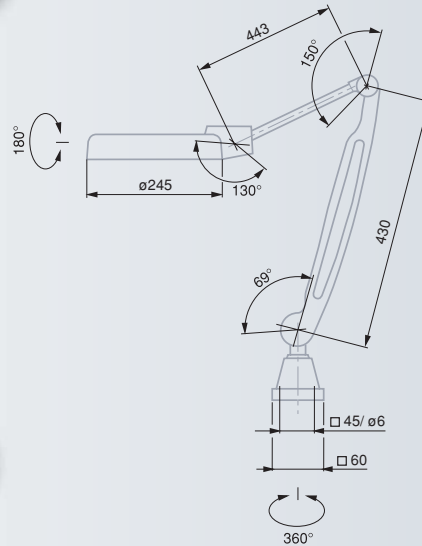
Cardboard box



Declaration of conformity

## ROCH Magnifier with Ring Light

Table model ideal for sampling inspection, small part assembly etc. – Main plus extra magnifier with no distortion – Perfect illumination – Tilting magnifier head to any position – Easy and safe positioning through spring-loaded articulations.



120 mm dia. magnifying glass



Materials: glass with solid plastic for the magnifier head. Sturdy cast iron base.



230 Vac, 50 Hz



Supplied with ring light (22 W)



Suited carrying case



Declaration of conformity

<b>No</b>				
<b>0951754531</b>	Magnifier with ring light	Large model	Small model	
		2x	4x	
<i>Accessory</i>				
<b>0951654531</b>	Spare lamp, 22 W			

# *Straightness, Angle and Inclination Measurement*



## LEVELS BASED ON A NATURAL REFERENCE

Irrespective of their type, all precision levels are based on long-time stabilisation and reliability, but also on a free measuring base – the centre of the earth. Due to the gravitation, the liquid with embedded bubble of gas or the gravity pendulum indicates the horizontal or vertical level based on this natural reference. Electronic inclinometers or spirit levels measure the position of the pendulum compared to the measuring faces fitted on the tool body.

From these perfect conditions, each level offers a wide number of possibilities for accurately measuring to the nearest degree.

The measuring faces lying horizontally and vertically enable any deviation of the geometrical elements being measured on the workpiece to be detected.

These deviations often result from straightness or flatness errors, but also from position errors like those from parallelism or squareness.

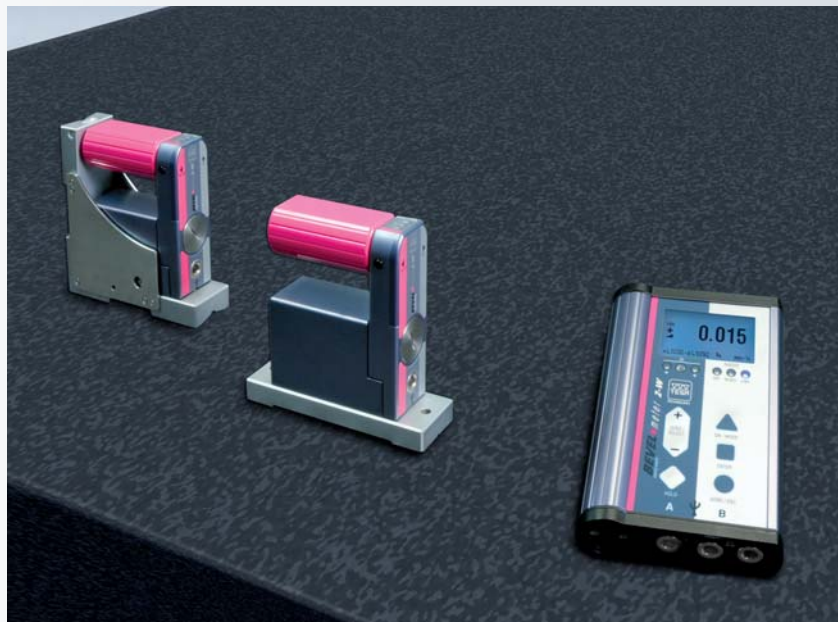
Value reading may vary, depending on the used level-type. Typical value outputs are:

- inclination in mm/m or in/10 in
- radian in mrad
- decimal angle, e.g. 12.37°
- sexagesimal angle in degrees (°), minutes (') and seconds (") – e.g. 15° 30' 45"



Calibration of a try square using ETALON RA.

Electronic dual-function clinometer that uses the difference mode for establishing flatness errors of a granite plate (example).





DIN 874 T2  
NF E 11-104

Hardened steel to  
≥ 650 HV 10

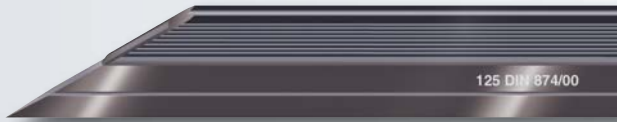
Models with length  
up to 200 mm in a  
plastic bag.  
Models from 300 mm in a  
wooden case.

Declaration  
of conformity

## ROCH Bevelled Straight Edges

Provided with 1 bevelled edge – Also with Heat insulating handle.

	mm	µm
0951750002	75	2
0951750003	100	2
0951750004	125	3
0951750005	150	3
0951750006	200	3
0951750007	300	3
0951750008	400	4
0951750009	500	4
0951750010	600	5
0951750011	750	5



Factory  
standard

Stainless steel  
to 200 HRB  
(not tempered)  
or ≥ 550 HV 30 (tempered)

Accuracy class  
0 or 1

Suited  
carrying case

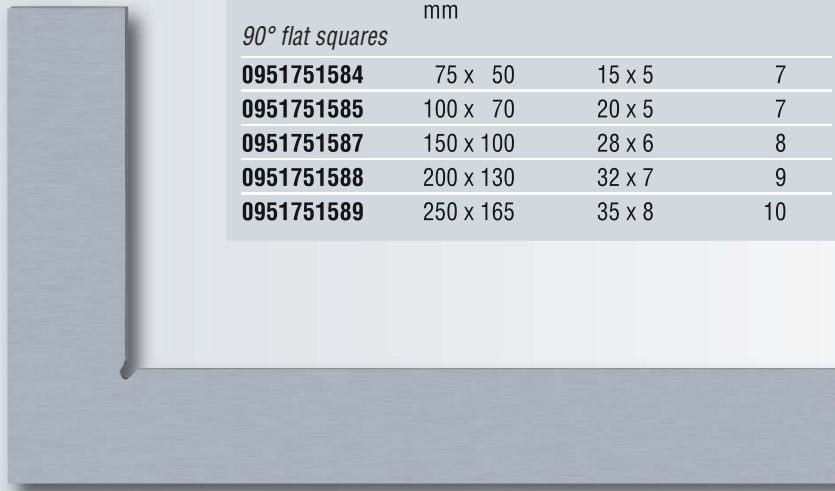
Declaration  
of conformity

## ROCH Flat and Try Squares

Made from stainless steel







Accuracy class 0, not tempered

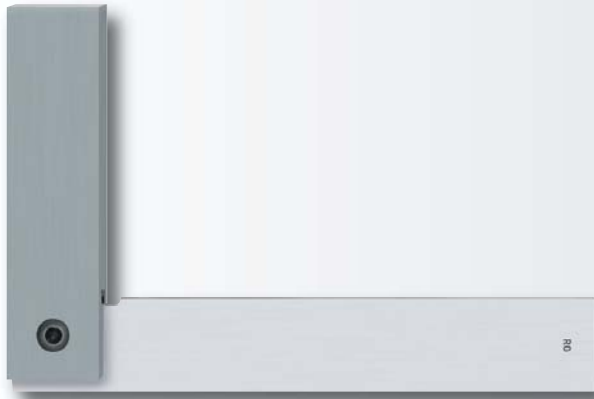
	Length of beams mm	Section mm	µm
<i>90° flat squares</i>			
0951751584	75 x 50	15 x 5	7
0951751585	100 x 70	20 x 5	7
0951751587	150 x 100	28 x 6	8
0951751588	200 x 130	32 x 7	9
0951751589	250 x 165	35 x 8	10










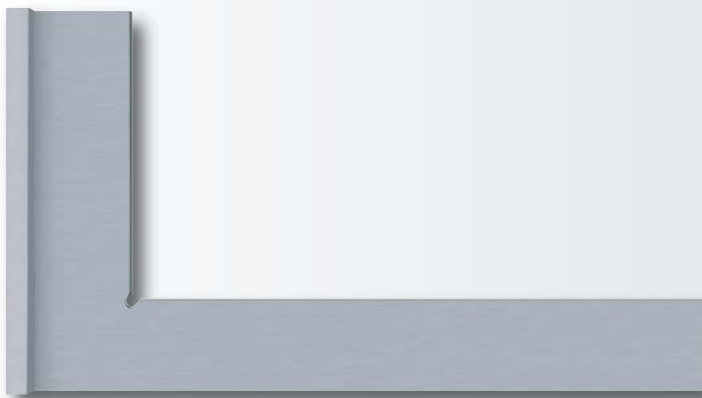
## Accuracy class 0, tempered

						
<i>90° flat squares</i>	<i>90° try squares</i>	Length of beams mm	Flat squares section of beams mm	Try squares section long beam mm	short beam mm	
<b>0951751523</b>	<b>0951751543</b>	50 x 40	15 x 4	16 x 2	14 x 10	7
<b>0951751524</b>	<b>0951751544</b>	75 x 50	15 x 4	18 x 2	14 x 10	7
<b>0951751525</b>	<b>0951751545</b>	100 x 70	20 x 5	18 x 2	16 x 10	7
<b>0951751527</b>	<b>0951751547</b>	150 x 100	30 x 6	22 x 2	20 x 12	8
<b>0951751528</b>	<b>0951751548</b>	200 x 130	30 x 7	26 x 3	24 x 14	9
<b>0951751530</b>	<b>0951751550</b>	300 x 200	40 x 8	32 x 3	30 x 18	11



## Accuracy class 1, not tempered

				
<i>90° flat squares</i>	<i>90° try squares</i>	Length of beams mm	Section mm	µm
<b>0951751564</b>	<b>0951751604</b>	75 x 50	15 x 5	14
<b>0951751565</b>	<b>0951751605</b>	100 x 70	20 x 5	15
<b>0951751567</b>	<b>0951751607</b>	150 x 100	28 x 6	18
<b>0951751568</b>	<b>0951751608</b>	200 x 130	32 x 7	20
<b>0951751569</b>	<b>0951751609</b>	250 x 165	35 x 8	23
<b>0951751570</b>	<b>0951751610</b>	300 x 200	40 x 8	25
<b>0951751572</b>	<b>0951751612</b>	500 x 330	50 x 10	35
<b>0951751574</b>	<b>0951751614</b>	750 x 500	60 x 12	43
<b>0951751575</b>	<b>0951751615</b>	1000 x 660	70 x 14	60





Factory standard

Hardened steel

Suited plastic case

## Brown & Sharpe Try Square Set



06739001

Brown & Sharpe Try Square Set



Consisting of:

1 Try square	68 x 45	16
1 Try square	120 x 70	16
1 Try square	175 x 95	16



DIN 875  
NF E 11-103

Stainless steel  
hardened to  
≥ 550 HV 30



Accuracy  
class 00



Suited  
carrying case



Declaration  
of conformity



## ROCH Bevelled Edge Squares

Made from stainless steel, hardened



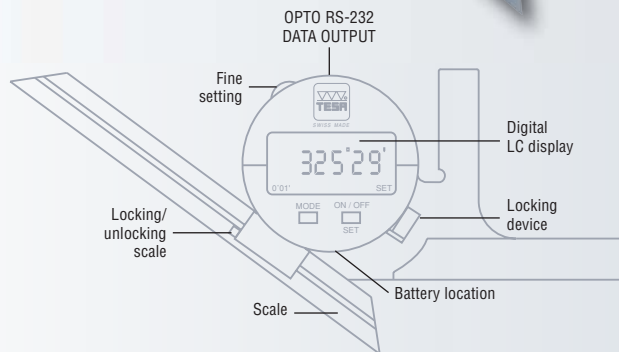
90° flat squares

	Length of beams mm	Section of beams mm	µm
0951751533	50 x 40	14 x 4,5	3
0951751534	75 x 50	16 x 4	3
0951751535	100 x 70	20 x 5	3
0951751537	150 x 100	28 x 6	4
0951751538	200 x 130	30 x 7	4



## TESA Angle Protractor with Numerical Indication

- Decimal or sexagesimal large LC display
- 2 measuring directions
- Fine setting
- Locking device
- Scales - 200 300 or 500 mm



LCD, 5 digits + sign

Measuring ranges: 1 x 360°, 2 x 180°, 4 x 90°

Digit height: 8,5 mm

Resolution: 0,01° or 1 minute of arc (0°01')

Preset to 0° or 180°

Max. perm. error: 4 minutes of arc

Max. perm. rotation speed: 1080°/s

IP51 (IEC 529)

+5 °C to + 40 °C

3V lithium battery, type CR 2032

Battery life > 3000 hours

RS 232, opto-coupled

Stainless steel body, hardened

410 g



Wooden case

Serial number

Declaration of conformity

**No**



**00630010**

TESA angle protractor with numerical indication. Provided with a regular scale, 200 mm long.

### Accessories

**00660004** Scale, 200 mm

**00660005** Scale, 300 mm

**00660006** Scale, 500 mm

**00660007** Extra base with one flat plus one prismatic measuring faces for small angles

**00660008** Edge square for sharp angles

**01961000** 3V lithium battery, type CR 2032, 190 mAh

For information on connecting cables etc., see section A.



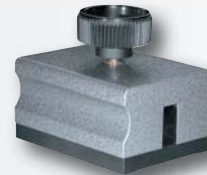
00660007



00660008

## TESA EAC Angle Protractors with Dial

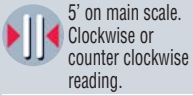
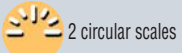
Circular scale with pointer – Easy, reliable readout of both the main and auxiliary scales – Very low hysteresis – Precision movement mechanism with compensation of play.



00610102



00610101



Scale length  
mm

<b>00630001</b>	4 x 90°	200
<b>00630002</b>	4 x 90°	300

*Optional accessories*



mm

<b>00660002</b>	Scale	200
<b>00660003</b>	Scale	300
<b>00610101</b>	Auxiliary scale for acute angles up to 15°	
<b>00610102</b>	Cast iron base with steel bottom surface, hardened	



## ETALON 436 Angle Protractor with Vernier



Scale  
mm

Auxiliary  
scale

<b>076115566</b>	4 x 90°	200	–
<b>076115567</b>	4 x 90°	300	–
<b>076116009</b>	4 x 90°	200	●
<b>076116010</b>	4 x 90°	300	●

*Optional Accessories (as shown above)*



mm

<b>00660002</b>	Scale	200
<b>00660003</b>	Scale	300
<b>00610101</b>	Auxiliary scale for acute angles up to 15°	
<b>00610102</b>	Cast iron base with steel bottom surface, hardened	
<b>00610103</b>	Magnifying glass	





## Brown & Sharpe Angle Protractor Combination

Commonly used as bevelled protractor, ruler, scale, try square, depth and centre gauge as well as spirit level.



**Nº**

**=**

**06719000 Brown & Sharpe Angle Protractor Combination**

Consisting of:

- 1 Ruler graduated in millimetres, 300 mm long
- 1 Protractor head with 2 x 90° graduations
- 1 Centre head
- 1 Square head with hardened steel scriber



Hardened steel, wear protected measuring faces



Suited plastic case

## Brown & Sharpe Sine Bar

Suited for setting ranges from 0 to 60° – Sine function for establishing the angle that needs to be set on the basis of the length dimensions obtained from parallel gauge blocks.



**Nº**

**|||**

**mm**

Centre distance mm

mm

**06769005**

127 ± 0,004

123 x 25



5 µm



Hardened steel



Removable front stop



Cardboard box



Declaration of conformity



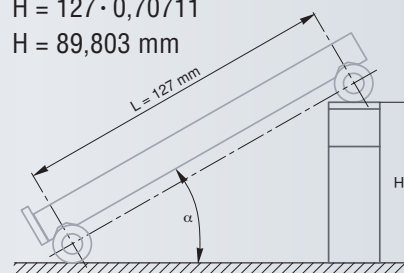
*Calculating a 45° setting angle (example)*

Gauge block combination H

$$H = l \cdot \sin \alpha$$

$$H = 127 \cdot 0,70711$$

$$H = 89,803 \text{ mm}$$





Angle standard made of fine-grained granite

Max. perm. error for squareness and straightness applies to the whole measuring range (carriage travel).

Valid for a theoretical line drawn symmetrically to the lateral guiding faces, at a distance of about 60 mm from the one in front of the angle standard.

ETALON RA only (without value sensor): 0,2 µm

Temperature stabilisation at < 0,1°C

Needed pressure: > 5 bar  
Air consumption: < 20 l / min

Dimensions (L x W x H):  
ETALON RA 500  
250 x 80 x 634 mm  
ETALON RA 700  
250 x 80 x 884 mm

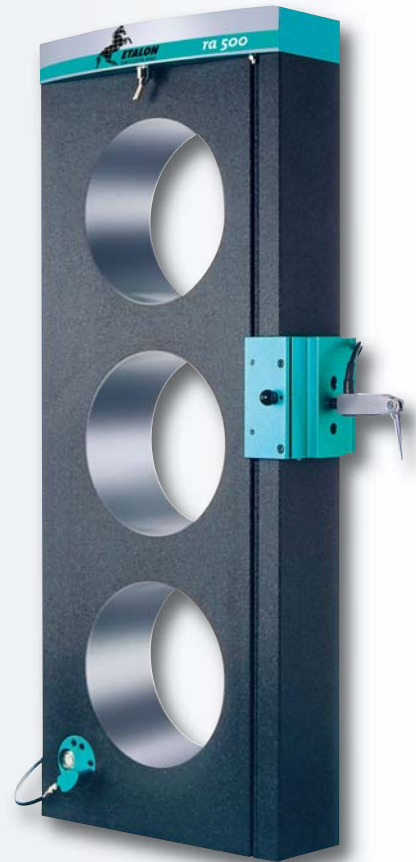
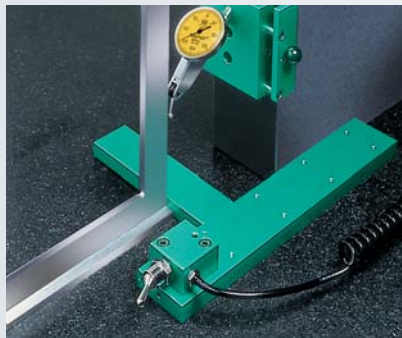
Suited carrying case

SCS calibration certificate

## ETALON RA for Squareness Measurement

High-precision measuring instruments for determining squareness, straightness and parallelism errors – Perfect for use in the inspection laboratory as on the shop floor.

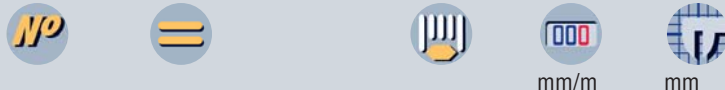
- Angle and straightness standards are made of natural granite with finely lapped measuring faces.
- Patented, hand moved carriage that attaches by vacuum on the guiding face of the angular standard. The grid potential thus obtained enables the carriage to be guided free of play.
- Base face on air bearing for easy displacement of the reference angle on the surface plate, practically without wear and tear.
- Helpful optional accessories to make measuring easy.



No	=	mm	Frontal µm	Lateral µm	µm	kg
05319201	ETALON RA 500	500	1,2	5	1,2	26
05319202	ETALON RA 700	700	1,5	7	1,5	37
<i>Optional Accessories</i>						
05360007	Auxiliary vacuum square for mounting either a flat or a try square at right angle on the ETALON RA front face.					
05360008	Probe holder with a 8 mm dia. clamp for inspecting the angle lying inside a flat or a try square and the like.					
05360009	Air filter unit (oil and water collector)					
05360011	Wooden case for safe storage of ETALON RA 500					
05360012	Wooden case for safe storage of ETALON RA 700					

# TESA ClinoBEVEL 1 Electronic Inclinometer

User-friendly, versatile inclinometer made to measure the amount of tilt using either of both direct and differential modes – Measuring range  $\pm 45^\circ$  with clear display of any measured angles or slopes – Reinforced aluminium housing and latest electronics – Large LC display for error free read-out.



**05330203** TESA ClinoBEVEL 1 USB  $\pm 45^\circ$   $\geq 0,02$  mm/m mm

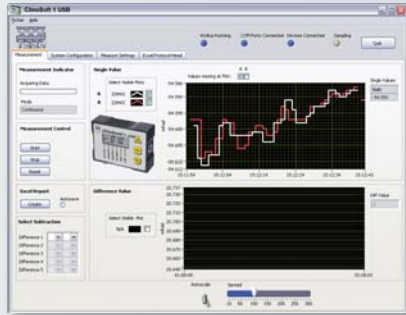
Supplied with:  
ClinoSOFT Software plus USB cable to host computer

Optional Accessories  
**04768002** 4 Batteries, type LRC 6, AA, 1,5 V)  
**05360006** Cable with switch for value acquisition (2 m long)  
**05360014** Remote switch for value acquisition (range 10 to 15 m)

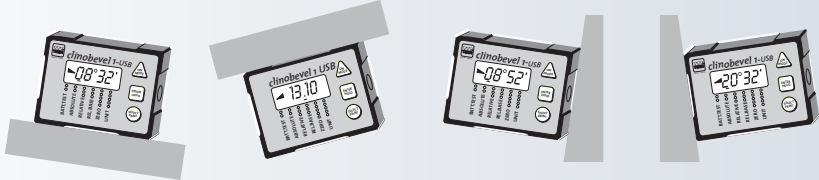
Numerous measuring applications, including comparative measurement of two parallel surfaces by means of two inclinometers. Inspection reports are also automatically generated under Microsoft EXCEL.



Measuring functions available: A ; B ; A+B ; A-B



ClinoBEVEL 1 USB can be used on any of its four faces.



- ✓
- DIN 2276 Part 2 (Form D)
- LC display
- Angle**  
Decimal or sexagesimal
- Inclination**  
mm/m, in/10 or 12 in, mm or in/basis length, radian (mrad) and the like
- Capacitive measuring system with gravity pendulum
- Anodised light alloy
- Flat face 4 x 90°
- 2' + 1 numerical interval
- 21 storable correction values (high accuracy)
- Response time  $\approx 1$  s
- Display lock
- RS 485, asynchronous, 7 bits, 2 stop bits, no parity, 9600 bauds
- 1,5 V battery, type LRC 6, AA
- $\approx 150$  hours
- Automatic shut down after 8 min
- 0 to 40 °C
- 20 to 70 °C
- IP65 (IEC 60529)
- EN 50081-1 / -2  
EN 50082-1 / -2
- 100 x 75 x 35 mm
- 0,52 kg
- Plastic case
- Identification number
- Inspection report with a declaration of conformity





DIN 2276  
Part 2  
(Form D)

LC display

**Angle**  
Decimal or sexagesimal

**Inclination**  
mm/m, in/10 or 12 in, mm  
or in/basis length, radian  
(mrad) and the like

Capacitive measuring system with gravity pendulum

Rust inhibiting housing

2 flat measuring faces with V-slot for diameters from 17 to 94 mm

5" +0,07% based on measured value

Response time: < 5 s

RS 232

2 batteries 1,5 V, type LRC 6, AA

40 to 60 hours

150x150x35 mm

3 kg

Automatic shut down after 8 min

0 to 40 °C

-20 to 70 °C

IP65 (IEC 60529)

EN 50081-1 / -2  
EN 50082-1 / -2

Plastic case

Identification number

Declaration of conformity

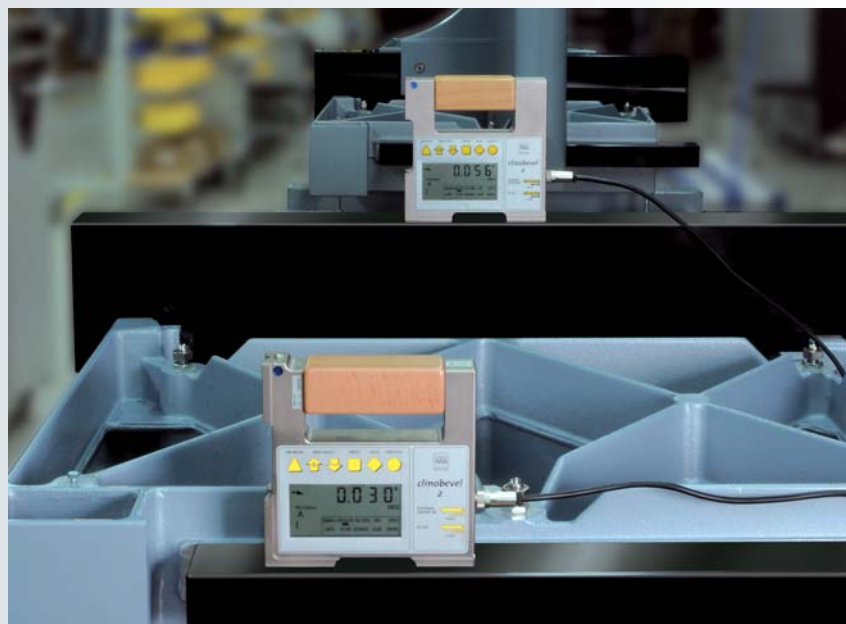
## TESA ClinoBEVEL 2 Electronic Inclinometer

World-class model – Tilting range  $\pm 45^\circ$  with inclination or angle units clearly displayed – Integrated temperature compensation – Microprocessor-based auxiliaries allowing both display and tool setting – Dual data output for comparative measurements etc.



No	=	mm	mm
<b>05330202</b>	TESA ClinoBEVEL 2	$\pm 45^\circ$	$\geq 5''$
<b>Optional Accessories</b>			
<b>04768002</b>	4 Batteries, type LRC 6, AA, 1,5 V		
<b>05360004</b>	Cable for connecting two Clinobevel 2, length 2,50 m		
<b>S53070174</b>	RS885 connecting cable Sub-D 9p/f to PC		

ClinoBEVEL 2 can be used on either of its both reference faces, but also linked to a second inclinometer. Use of a PC is unnecessary.





## TESA MICROBEVEL 1

These electronic inclinometers measure slightly inclined surfaces, precisely – e.g when inspecting flatness of a surface plate or the geometry of a machine – Specially suited for use in rough surrounding conditions.

			Basis length mm	Width mm		mm/m		kg
05330003	Horizontal model	110	45	0,01 or 0,001	1,8			
05330004	Horizontal model	150	45	0,01 or 0,001	2,1			
05330005	Square model	150	45	0,01 or 0,001	3,1			

Models with numerical interval to 0,05 or 0,005 mm/m available on request

*Optional Accessories*

04768002 4 Batteries, type LRC 6, AA, 1,5 V



- ✓
- DIN 2276 Part 2 (Style D)
- LCD (see table)
- See table
- Fully encapsulated measuring system with gravity pendulum
- Cast iron base, chromium plated side faces, varnished light alloy housing
- 2 flat measuring faces with V-slot for diameters from 20 to 120 mm
- See table below
- Response time < 3 s
- 1 mV per unit (100 kΩ)
- 1,5 V battery, type LRC 6, AA
- 100 to 140 hours
- Automatic shut down after 55 min
- 0 to 40°C
- 20 to 70°C
- ≤ 0,1%/°C based on the measuring range at 20 ±5°C
- As in above table, incl. suited case
- EN 50081-1 / -2 EN 50082-1 / -2
- Plastic case
- Identification number
- Declaration of conformity

				G = mm/m	G = mm/m
Range	mm/m	mm/m	mm	≤ 5 mm/m	> 5 mm/m
1	± 20	± 5	0,01	G = 1% of measured value plus at least 0,01 mm/m	G = 0,01 mm/m
Range	mm/m	mm/m	mm	≤ 1 mm/m	> 1 mm/m
2	± 2	± 2	0,001	G = 1% of measured value plus at least 0,001 mm/m	G = 1% of (2x measured value - 1)



**BEVELtronic 2**

1 flat measuring face and 1 perpendicular face with a V-slot for diameters from 20 to 120 mm

**BEVELmeter 2**

LCD

Response time  $\leq 3$  s

RS232

33 à 40h

Automatic shut down after 8 min

**SERVICE SET 2**

0°C to 40°C

-20°C to 70°C

< 95%

EN 50081-1 / EN 50082-1

Plastic case

Identification number

Declaration of conformity

# Inclinometer Sets for TESA SERVICE SET 2

Two distinct sets are available : TESA SERVICE SET 2-C operating with cables only, and TESA SERVICE SET 2-W allowing for data transfer either through cables or using the wireless operating mode.

Possible connection of a separate BEVELmeter 2 display unit to each BEVELtronic 2 for comparative measurement.



TESA SERVICE SET 2-W

TESA SERVICE SET 2-C

			mm/m	µm/m	Arcsec	< 0,5 full scale	> 0,5 full scale
<b>05330304</b>	TESA SERVICE SET 2-C	± 10	1	0,2	*	**	**
<b>05330305</b>	TESA SERVICE SET 2-C	± 50	5	1	*	**	**
<b>05330310</b>	TESA SERVICE SET 2-W	± 10	1	0,2	*	**	**
<b>05330311</b>	TESA SERVICE SET 2-W	± 50	5	1	*	**	**

*Each kit consists of the following:*

- 1 BEVELtronic 2 – Horizontal model
- 1 BEVELtronic 2 – Square model
- 1 BEVELmeter 2, numerical interval to 0,001 or 0,005 mm/m
- 2 Single cables BEVELtronic 2 to BEVELmeter (2,5 m in length for each)
- 1 Infrared remote control
- 7 Alkaline batteries, type LR14 1,5V, C
- 2 Alkaline batteries, type LR03 1,5V, AA

\* Maximum 1% of measured value + minimum 1 digit  
 \*\* Maximum 1% of (2x measured value less 0,5x full scale value)

**Additional Data**

	Basis length mm	Width mm
BEVELtronic 2 – Horizontal model	150	45
BEVELtronic 2 – Square model	150	45
		kg
		1,6
		1,7

Made for highly accurate difference measurements taken, for example, on granite plates or guiding rails or for checking the straightness.



# TESA BEVELSOFT for SERVICE SET 2

The software that allows for geometry and flatness measurements. TESA BEVELSOFT is specially designed for checking surfaces, but also for viewing any changes that need be made. Icon-driven menus besides a wide choice of languages available make it simple for the operator to quickly create full inspection reports.



Standards:  
DIN 876, JIS,  
GGG-P-463c,  
BS 817, ISO 8512



Minimum requirements for the computer:

- Microsoft Windows 98 / NT / 2000 / XP / 7
- Pentium III
- 128 MB RAM
- Graphics card, 800 x 600 pixels
- CD-Rom
- 50 MB free space on hard disk



## 05360015 TESA BEVELSOFT

Consisting of:

CD containing instructions for installation and TESA BEVELsoft programme  
USB dongle

Connecting cable BEVELmeter 2/PC along with 2 extra outlets and connector RS485 Sub-D 9-pin/f connector, length 2,5 m

Power supply, 24 V

Hand switch with cable for value acquisition, length 2,5 m

### Measuring functions



Straight line

Twisted line



Parallellism

2 or 3 lines

Twisted parallellism

2 ou 3 lines



Perpendicularity

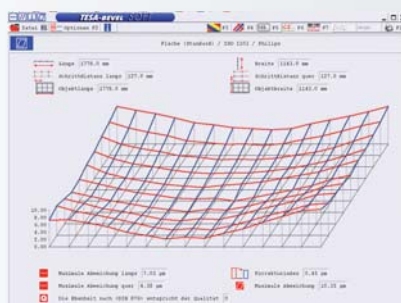
Various references



Flatness

Standard and U-Jack

Partial flatness



Measurement of a large granite plate



Measurement of a granite plate according to U-Jack



DIN 2276  
Part 2  
(Style D)

See table

See table

Inductive measuring system with gravity pendulum

Cast iron body.  
Horizontal model with granite base.

Horizontal model with a flat measuring face. Square model with 2 flat faces having a V-slot for diameters from 20 to 120 mm

0,005 mm / m  
+ 1% of the measured value

0,001 mm / m

$\approx \pm 0,2$  V  
Impedance  
4,5 k $\Omega$

10 to 30°C

-20 to 60°C

EN 50081-1 / -2  
EN 50082-1 / -2

Wooden case

Identification number

Declaration of conformity

## TESA NIVELTRONIC Electronic Levels

Most popular electronic levels with a solid cast iron body used for checking and levelling horizontal and vertical surfaces – Also suitable for accurate measurement of small angles, especially while inspecting surface flatness of granite plates.



		Basis length mm	Width mm	mm/m	kg
<b>03130063</b>	Horizontal model	150	45	0,05 / 0,01	6,0**
<b>03130060</b>	Square model	200	45	0,05 / 0,01	6,5**
<i>Optional Accessories</i>					
<b>03160007</b>	Granite base*	200	50		1,0
<b>03160008</b>	Granite base*	250	50		1,5
<b>03160009</b>	Granite base*	500	50		6,0
<b>03160048</b>	Holder with built-in voltage regulator (4,65 V) plus 1 battery-set as below				
<b>04761059</b>	1 Set = 4 spare batteries, type LR 03, AAA, 1,5 V				
* For horizontal model    ** Along with a wooden case					



Range	mm/m	"	mm/m	"
1	$\pm 0,75$	$\pm 150''$	0,05	10''
2	$\pm 0,15$	$\pm 30''$	0,01	2''





# TESA Spirit Levels



DIN 877



See table



DIN 2276 Part 1



No. 05331350 to No. 05331352 in a wooden case, others models in cardboard boxes



Declaration of conformity



mm/m



mm



For shafts  
mm

**Model A** Spirit levels with a prismatic measuring face, Ω-shaped

<b>05331650</b>	1,0	100 x 30 x 35	17 ÷ 80
<b>05331651</b>	0,3	100 x 30 x 35	17 ÷ 80

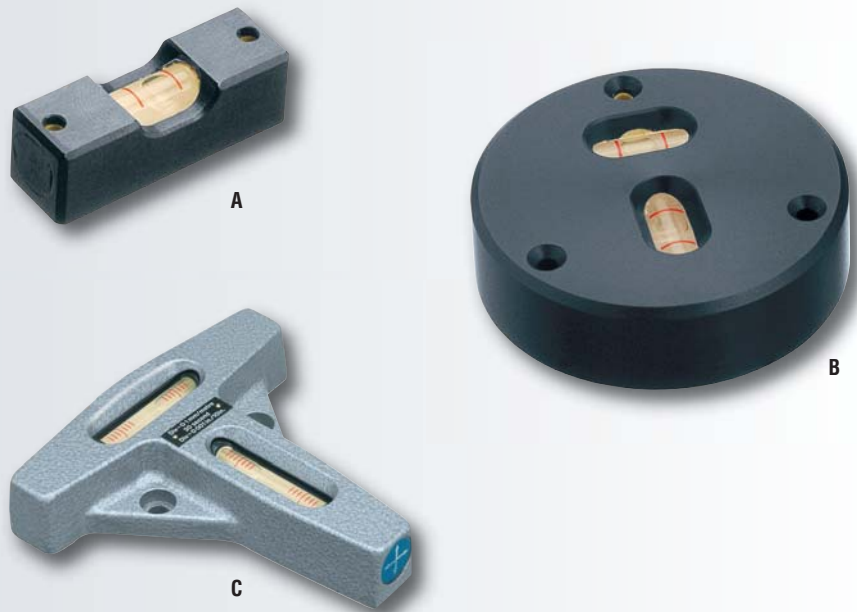
**Model B** Tubular spirit levels with a flat measuring face

<b>05331250</b>	0,1	80 x 9, Ø 16	
<b>05331251</b>	0,3	80 x 9, Ø 16	
<b>05331252</b>	0,1	100 x 10, Ø 20	
<b>05331254</b>	0,05	150 x 11, Ø 22	
<b>05331255</b>	0,1	150 x 11, Ø 22	
<b>05331256</b>	0,3	150 x 11, Ø 22	
<b>05331257</b>	0,05	200 x 12, Ø 22	
<b>05331258</b>	0,1	200 x 12, Ø 22	

**Model C** Spirit levels for transmission shafts with side viewing slots

<b>05331350</b>	0,05	100 x 30 x 35	17 ÷ 80
<b>05331351</b>	0,3	100 x 30 x 35	17 ÷ 80
<b>05331352</b>	0,1	200 x 30 x 35	17 ÷ 80

# TESA Screw-On Spirit Levels



<b>Model A</b>	<i>Screw-on spirit levels with a longitudinal vial</i>				
<b>05331400</b>		2 ÷ 5	30 x 10		10
<b>05331401</b>		2 ÷ 5	40 x 10		11
<b>05331402</b>		1,0	50 x 10		12
<b>05331404</b>		1,0	60 x 12		14
<b>05331406</b>		0,3	60 x 12		14
<b>05331407</b>		2 ÷ 5	80 x 15		18
<b>05331408</b>		0,1	80 x 15		18
<b>05331410</b>		1,0	100 x 18		22
<b>05331411</b>		0,1	100 x 18		22
<b>Model B</b>	<i>Circular screw-on spirit levels with both a longitudinal and cross vials</i>				
<b>05331500</b>		2 ÷ 5		40	11
<b>05331502</b>		0,3		60	13
<b>Model C</b>	<i>T-shaped screw-on spirit levels with both a longitudinal and cross vials</i>				
<b>05331550</b>		0,1	80 x 65		17
<b>05331551</b>		0,3	80 x 65		17
<b>05331552</b>		0,02	150 x 147		30

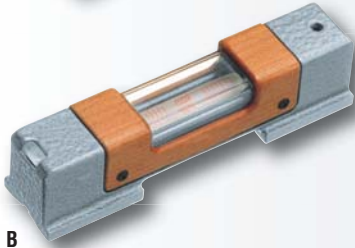


## TESA Precision Spirit Levels

Used for checking and aligning flat or cylindrical surfaces in the horizontal position.



A



B



C



mm/m

mm

For shafts  
mm

*Precision spirit level with insulating pad*

<b>05331600</b>	0,05	100 x 45 x 35	19 ÷ 120	A
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*Precision spirit levels with insulating grip and vial protection, side viewing slots*

<b>05331050</b>	0,02	100 x 32 x 35	17 ÷ 84	B
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<b>05331051</b>	0,1	100 x 32 x 35	17 ÷ 84	B
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<b>05331052</b>	0,3	100 x 32 x 35	17 ÷ 84	B
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<b>05331054</b>	0,02	150 x 35 x 38	17 ÷ 94	C
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<b>05331056</b>	0,05	150 x 35 x 38	17 ÷ 94	C
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<b>05331057</b>	0,1	150 x 35 x 38	17 ÷ 94	C
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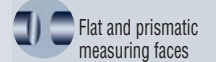
<b>05331058</b>	0,02	200 x 40 x 42	19 ÷ 108	C
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<b>05331059</b>	0,04	200 x 40 x 42	19 ÷ 108	C
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<b>05331061</b>	0,1	200 x 40 x 42	19 ÷ 108	C
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<b>05331063</b>	0,02	250 x 45 x 42	19 ÷ 120	C
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<b>05331065</b>	0,05	300 x 50 x 42	22 ÷ 135	C
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## TESA Precision Spirit Levels with a Frame

For checking and levelling flat or cylindrical surfaces in both horizontal and vertical positions – Insulating grips and vial protection – Side viewing slots.



mm/m

mm

For shafts  
mm

<b>05331201</b>	0,05	100 x 100 x 32	17 ÷ 84
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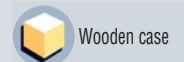
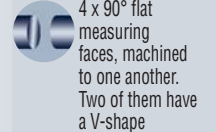
<b>05331202</b>	0,1	100 x 100 x 32	17 ÷ 84
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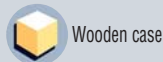
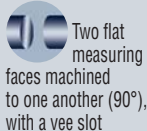
<b>05331204</b>	0,05	150 x 150 x 35	17 ÷ 94
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<b>05331206</b>	0,02	200 x 200 x 40	19 ÷ 108
-----------------	------	----------------	----------

<b>05331208</b>	0,05	200 x 200 x 40	19 ÷ 108
-----------------	------	----------------	----------

<b>05331210</b>	0,05	250 x 250 x 45	19 ÷ 120
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## TESA Precision Spirit Levels Magnetic Square Models

For inspecting and levelling flat or cylindrical surfaces in both horizontal and vertical positions – Attach magnetically on such surfaces – Fitted with insulating handle.

No	mm/m	mm	For shafts mm
05331000	0,02	150 x 150 x 40	19 ÷ 108
05331001	0,04	150 x 150 x 40	19 ÷ 108
05331002	0,05	150 x 150 x 40	19 ÷ 108



## TESA Precision Spirit Level with Micrometer Element

For checking surface flatness and slopes – With insulating pads.

No	mm/m	mm	For shafts mm
05331450	0,02	150 x 45 x 45	19 ÷ 120



## TESA Protractor Spirit Inclinator

No	Vial	mm	For shafts mm
05331300	4 x 90° 1°	7 ÷ 17'	180 x 75 x 22 15 ÷ 55





## TESA Protractor Spirit Inclinometers



Factory standard



Longitudinal and cross level vials

### Square model



90° flat measuring faces with added V-slot, machined to one another.

### Model with a frame

Four 90° measuring faces, machined to one another. Two of them have a V-slot.



Wooden case



Declaration of conformity



Vernier



Vial



mm



For shafts  
mm

Square model with fine setting for the pivoting vial

<b>05331150</b>	90°	10'	1'	150 x 150 x 40	19 ÷ 108
-----------------	-----	-----	----	----------------	----------

Model with frame and fine setting for the rotating vial

<b>05331700</b>	2 x 180°	3'	1'	150 x 150 x 40	19 ÷ 108
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## TESA Spirit Clinometer with Micrometer Element



DIN 877



Longitudinal and cross level vials



Hardened and ground base



Flat and prismatic measuring faces



DIN 2276 part 1



Wooden case



Declaration of conformity



Micrometer  
element



Vial



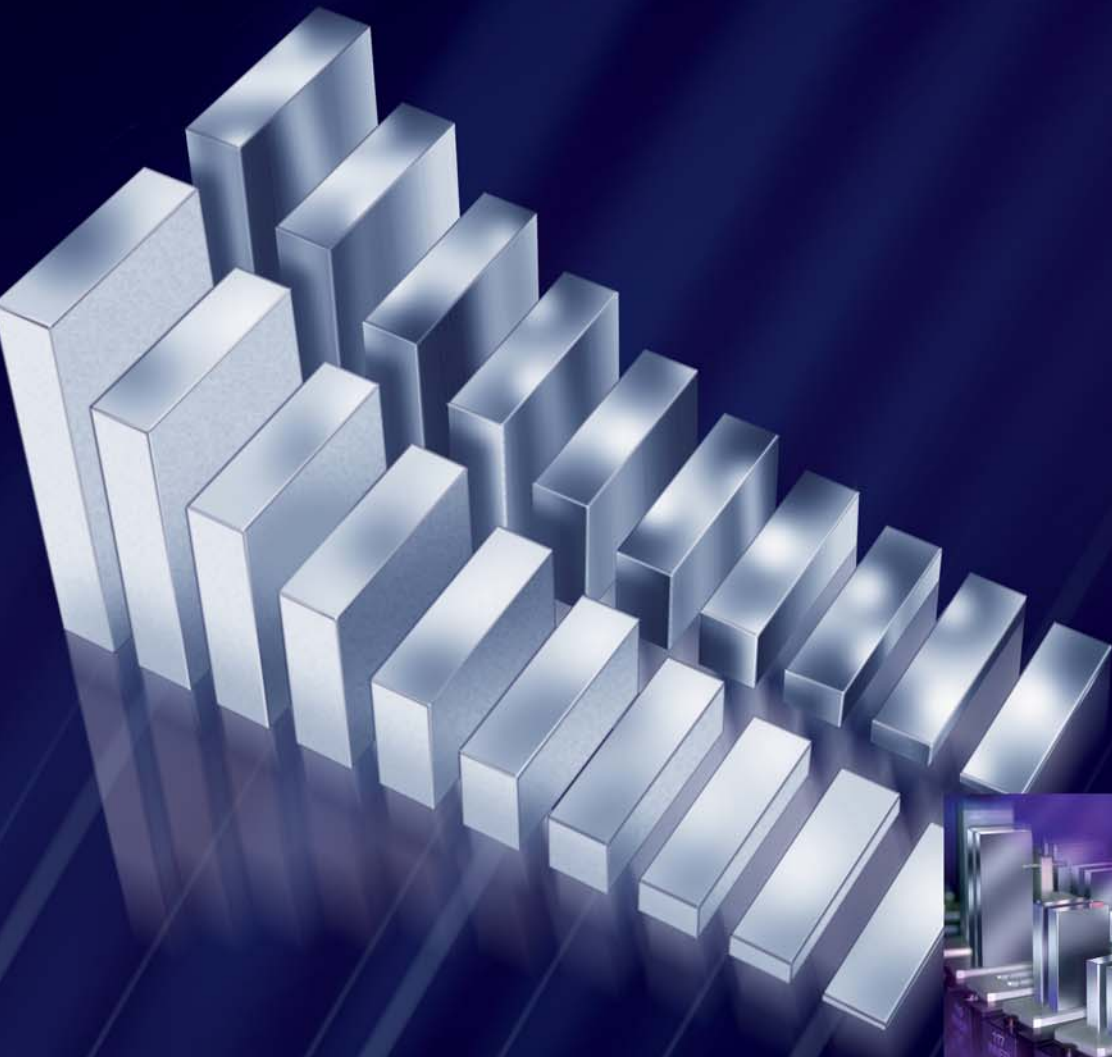
mm



For shafts  
mm

<b>05331750</b>	2 x 180°	1'	1'	150 x 35 x 116	17 ÷ 80
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# Length and Angle Standards



# PURCHASING GAUGE BLOCKS CALLS FOR CONFIDENCE

The high accuracy of TESA's gauge blocks is the result of years of experience in producing and making use of these products.

- Use of high quality raw materials and appropriate heat treatment, thus guaranteeing a durable shape and dimensional stability of the gauge blocks over years.
- Very low deviations in flatness and parallelism of the measuring faces, resulting in highly accurate gauges.
- Unique flat lapping polish as well as edge rounding techniques, leading to superior wringability.
- Proper serial number marked on each gauge block.



## ISO 3650

Gauge blocks with metric nominal lengths conform to ISO 3650:1998. This international standard is based on the ones published either in a region, e.g. the European standard EN ISO 3650:1998 or in a country, e.g. the Swiss standard SN EN ISO 3650, German standard DIN EN ISO 3650 or French standard NF EN ISO 3650.

Gauge blocks with imperial nominal lengths comply with BS 4311 - Part 1. Compared to earlier standards, ISO 3650:1998 includes the following main changes:

- Withdrawal of the accuracy grade 00 (see «Which grade do you need»).
- Introduction of requirements as regards the uncertainty of measurement in relation to the declaration of conformance of the product according to ISO 14253-1:1998.
- Review of some definitions and shortened form of terms according to normative references that are currently applicable (see drawing).



## Which Material Do You Need?

### Steel

Steel gauge blocks have proven their reliability for more than hundred years. This raw material remains the most commonly accepted for length standards.

Steel gauge blocks provide high resistance to wear associated with a good property to adhere to other gauge blocks. However, steel must be protected against corrosion. Provided gauge blocks made from this material are properly handled, they will remain reliable for many years. TESA steel gauge blocks have the following key features:

- Highly alloyed steel
- Hardness guaranteed to 800 HV
- Artificially aged for optimum form and dimensional stability
- Coefficient of thermal expansion:  $(11,5 \pm 1,0) \times 10^{-6} K^{-1}$

### Tungsten Carbide

Gauge blocks in tungsten carbide are 10 times as much resistant as steel gauges. They are intended for frequent use, also where superior wringing quality is required. TESA tungsten carbide gauge blocks provide:

- Hardness guaranteed to 1400 HV
- Coefficient of thermal expansion:  $(4,23 \pm 0,1) \times 10^{-6} K^{-1}$

### Ceramic

Ceramic gauge blocks are extremely resistant to wear and scratches. Due to the properties of this material, any minor damage is unlikely to affect the wringability of their measuring faces. Being corrosion resistant, these gauge blocks are insensitive to sweaty hands, among others.

Manufactured from stabilised zirconia, TESA ceramic gauge blocks have the following key features:

- Non-magnetizable
- Hardness guaranteed to 1400 HV
- Coefficient of thermal expansion:  $(9,7 \pm 0,8) \times 10^{-6} K^{-1}$



## Which Grade Do You Need?

### Grade 2

These gauge blocks are commonly used as «**Working Standards**» in inspection rooms within the production to set and calibrate measuring instruments and other equipment as well as to inspect tools, fixtures and machines.

### Grade 1

Gauge blocks of this class are mainly used as «**Working Standards**» to set and calibrate plug gauges and measuring instruments in measuring rooms or inspection areas within the production.

### Grade 0

These gauge blocks are designated for use as «**Company Standards**» in calibration laboratories or environmentally controlled inspection room to set and calibrate plug gauges as well as measuring equipment.

### Calibration grade K

Gauge blocks of this tolerance class are intended for use as «**Reference Standards**» in metrology oriented laboratories of National Institutes, precision measuring rooms and other laboratories of National Calibration Services, whether officially accredited or not. They should be used as masters to calibrate gauge blocks, length standards of same accuracy and measuring instruments as well.

### Grade 00

The new standard ISO 3650 does no longer take this accuracy grade into consideration as the uncertainties of measurement achieved with the procedure applied for calibration usually lead to a disparity against specified tolerances.

The rules to the expression of uncertainty of measurement for proving the conformance or non conformance of the product with the specification, as stated in the standard ISO 14253-1:1998, have dictated the decision to withdraw the accuracy grade 00.

A wide experience in practical use of gauge blocks has proven that gauges of the calibration class K could easily replace those of the earlier accuracy grade 00. As a result, gauge blocks of grade 00 are no longer available.

## Certificate of Calibration and Traceability

All set compositions from TESA are supplied with a certificate of calibration issued by the accredited calibration laboratory of a national calibration service. This service can either be the Swiss calibration service (SCS), British calibration service (UKAS) or Comité Français d'Accréditation (COFRAC) depending on the manufacturer.

Accreditation is the authentic assurance of the skills of the calibration laboratories as well as of the full traceability to national standards that conform with the International System of Units (SI). And this for any reference standard or measuring equipment being used.

Owing to a multilateral agreement (MLA), any certificates of calibration issued by the members of the European Cooperation for Accreditation of Laboratories (EA) is internationally accepted.

## Deliveries

TESA gauge blocks can be delivered individually or in full sets with nominal lengths as listed in this section. Additional gauge sets and lengths can be made available upon request. Since individual gauge blocks could no be listed in their whole here, any inquiry or purchase order should specify:

- desired nominal length
- chosen material
- calibration grade or any other grade





## Limit Deviations and Tolerances



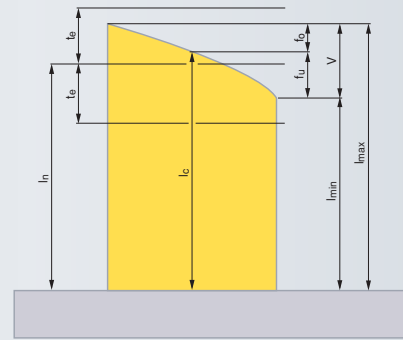
Limit deviations  $t_e$



Tolerances  $t_v$



Flatness tolerance  $t_r$



Nominal length  $l_n$ . Central length  $l_c$ .  
Variation  $v$  with  $t_o$  and  $t_u$ .  
Limit deviations  $t_e$  at any point, proceeding from the nominal length.

Nominal length	Calibration grade and other grades			
	K	0	1	2
mm	$\mu\text{m}$	$\mu\text{m}$	$\mu\text{m}$	$\mu\text{m}$
$0,5 \leq l_n \leq 150$	0,05	0,1	0,15	0,25
$150 < l_n \leq 500$	0,1	0,15	0,18	0,25
$500 < l_n \leq 1000$	0,15	0,18	0,2	0,25

Nominal length	Calibration grade K		Grade 0		Grade 1		Grade 2	
	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length	Limit deviation of length at any point from nominal length	Tolerance for the variation in length

### Limit deviations and tolerances according to ISO 3650

mm	$\pm t_e$ $\mu\text{m}$	$t_v$ $\mu\text{m}$	$\pm t_e$ $\mu\text{m}$	$t_v$ $\mu\text{m}$	$\pm t_e$ $\mu\text{m}$	$t_v$ $\mu\text{m}$	$\pm t_e$ $\mu\text{m}$	$t_v$ $\mu\text{m}$
$0,5 \geq l_n \leq 10$	0,2	0,05	0,12	0,1	0,2	0,16	0,45	0,3
$10 < l_n \leq 25$	0,3	0,05	0,14	0,1	0,3	0,16	0,6	0,3
$25 < l_n \leq 50$	0,4	0,06	0,2	0,1	0,4	0,18	0,8	0,3
$50 < l_n \leq 75$	0,5	0,06	0,25	0,12	0,5	0,18	1	0,35
$75 < l_n \leq 100$	0,6	0,07	0,3	0,12	0,6	0,2	1,2	0,35
$100 < l_n \leq 150$	0,8	0,08	0,4	0,14	0,8	0,2	1,6	0,4
$150 < l_n \leq 200$	1	0,09	0,5	0,16	1	0,25	2	0,4
$200 < l_n \leq 250$	1,2	0,1	0,6	0,16	1,2	0,25	2,4	0,45
$250 < l_n \leq 300$	1,4	0,1	0,7	0,18	1,4	0,25	2,8	0,5
$300 < l_n \leq 400$	1,8	0,12	0,9	0,2	1,8	0,3	3,6	0,5
$400 < l_n \leq 500$	2,2	0,14	1,1	0,25	2,2	0,35	4,4	0,6
$500 < l_n \leq 600$	2,6	0,16	1,3	0,25	2,6	0,4	5,0	0,7
$600 < l_n \leq 700$	3	0,18	1,5	0,3	3	0,45	6,0	0,7
$700 < l_n \leq 800$	3,4	0,2	1,7	0,3	3,4	0,5	6,5	0,8
$800 < l_n \leq 900$	3,8	0,2	1,9	0,35	3,8	0,5	7,5	0,9
$900 < l_n \leq 1000$	4,2	0,25	2,0	0,4	4,2	0,6	8	1

### Limit deviations and tolerances according to BS 4311, Part 1:1993

$l_n$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$
$l_n \leq 0,4$	5	2	5	4	10	6	20	12
$0,4 < l_n \leq 1$	6	2	6	4	12	6	25	12
$1 < l_n \leq 2$	8	3	8	4	15	7	30	12
$2 < l_n \leq 3$	10	3	10	5	20	7	40	14
$3 < l_n \leq 4$	12	3	12	5	25	8	50	14

### Limit deviations and tolerances according to factory standard for gauge blocks over 4 in

$l_n$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$	$\pm t_e$ $\mu\text{in}$	$t_v$ $\mu\text{in}$
$4 < l_n \leq 6$	31	3	15	5	31	8	63	16
$6 < l_n \leq 8$	40	3	20	6	40	10	79	16
$8 < l_n \leq 10$	47	4	23	6	47	10	95	18
$10 < l_n \leq 12$	55	4	28	7	55	10	110	20
$12 < l_n \leq 16$	70	5	35	8	70	12	140	20
$16 < l_n \leq 20$	87	5	43	10	87	14	174	24

# TESA Gauge Block Set, metric

## Nominal lengths 1 to 100 mm



Steel:  
highly alloyed,  
wear resistant.  
Tungsten carbide:  
wear resistant and stable.  
Ceramic:  
stabilised zirconia,  
extremely resistant  
to wear  
and scratches



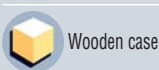
Steel:  
(11,5 ± 1,0) x  
10<sup>-6</sup> K<sup>-1</sup>  
Tungsten carbide:  
(4,23 ± 0,1) x 10<sup>-6</sup> K<sup>-1</sup>  
Ceramic:  
(9,7 ± 0,8) x 10<sup>-6</sup> K<sup>-1</sup>



Limit deviations  
to on page K-4



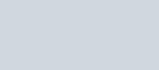
Tolerances to  
on page K-4



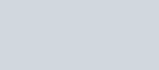
See page K-4



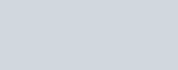
Supplied  
individually  
or in sets



Wooden case



Identification  
number



Steel gauges to  
all grades with  
DKD certificate.  
Carbide or ceramic gauges  
to all grades with UKAS  
certificate



Steel



Carbide



Ceramic



Set compositions



mm



Steps

mm



Pieces

### 32-Piece Set – M32

0651516027	0651526027	0651536027	K	1,005		1
0651515027	0651525027	0651535027	0	1,01 ÷ 1,09	0,01	9
0651511027	0651521027	0651531027	1	1,1 ÷ 1,9	0,1	9
0651512028	0651522027	0651532027	2	1,0 ÷ 9,0	1,0	9
				10, 20, 30, 60		4

### 47-Piece Set – M47

0651516021	0651526021	0651536021	K	1,005		1
0651515021	0651525021	0651535021	0	1,01 ÷ 1,09	0,01	9
0651511021	0651521021	0651531021	1	1,1 ÷ 1,9	0,1	9
0651512021	0651522021	0651532021	2	1,0 ÷ 24,0	1,0	24
				25 ÷ 100	25	4

### 88-Piece Set – M88

0651516014	0651526014	0651536014	K	1,0005		1
0651515014	0651525014	0651535014	0	1,001 ÷ 1,009	0,001	9
0651511014	0651521014	0651531014	1	1,01 ÷ 1,49	0,01	49
0651512014	0651522014	0651532014	2	0,5 ÷ 9,5	0,5	19
				10 ÷ 100	10	10

### 112-Piece Set – M112

0651516012	0651526012	0651536012	K	1,0005		1
0651515012	0651525012	0651535012	0	1,001 ÷ 1,009	0,001	9
0651511012	0651521012	0651531012	1	1,01 ÷ 1,49	0,01	49
0651512012	0651522012	0651532012	2	0,5 ÷ 24,5	0,5	49
				25 ÷ 100	25	4

### 122-Piece Set – M122

0651516011	0651526011	0651536011	K	1,0005		1
0651515011	0651525011	0651535011	0	1,001 ÷ 1,009	0,001	9
0651511011	0651521011	0651531011	1	1,01 ÷ 1,49	0,01	49
0651512011	0651522011	0651532011	2	1,6 ÷ 1,9	0,1	4
				0,5 ÷ 24,5	0,5	49
				30 ÷ 100	10	8
				25, 75		2



## TESA Maintenance Kit



Full set in a wooden case



**Nº**

**=**

**0652500450** TESA maintenance kit for gauge blocks

Supplied with the following items:

**Nº**

**=**

<b>0652500452</b>	1 Arkansas stone
<b>0652500453</b>	1 Soft tipped tweezers
<b>0652500454</b>	1 Pneumatic vacuum pen
<b>0652500455</b>	1 Nanofibre cleaning cloth
<b>0652500456</b>	1 Pair of cotton gloves
<b>0652500457</b>	1 Acid-free solvent
<b>0652500458</b>	1 Box with protective grease
<b>02530050</b>	1 Optical flat, 50 mm dia.
<b>0652500460</b>	1 Solvent container
<b>0652500461</b>	1 Dust remover
<b>0652500462</b>	1 Dust-brush
<b>0652500463</b>	1 Bottle of super-fine, acid-free oil
<b>0652500451</b>	1 Wooden case





Diameter and thickness as shown in table

Optical flats with 2 flat measuring faces. No guaranty can be given for parallelism.

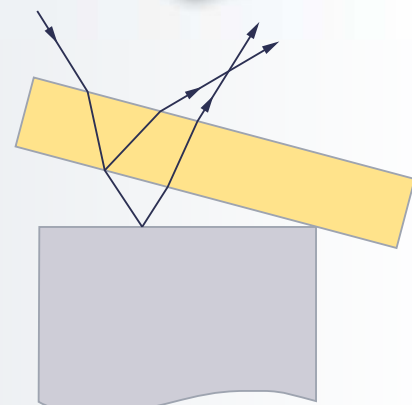
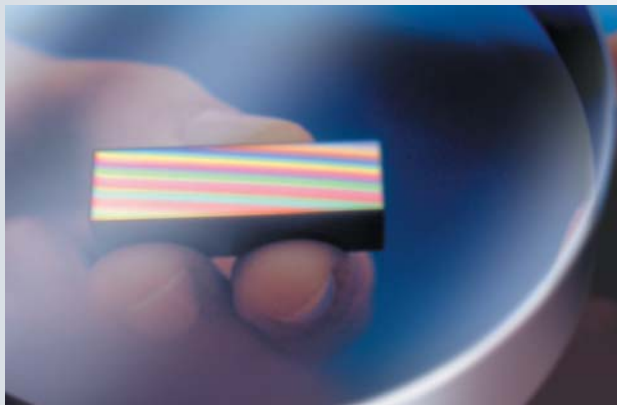
Wooden case

Declaration of conformity

## TESA Optical flats

Used for examining flatness and wringability of gauge blocks or any other test pieces having flat faces with same high grade of accuracy.

	mm	mm	μm
02530050	50	15	0,125
02530075	75	20	0,125



Case in lacquered wood

406 x 406 x 355 mm (W x D x H)

Light source: 35 W sodium lamp, 89% monochromatic, colour yellow, wavelength 0,575 μm

See table

Surface plate in hardened steel

Surface plate: 0,5 μm

Surface plate: 2,5 μm

Suited carrying case

## TESA Monochromatic Light Unit

For use with optical flats or optical parallels to measure both the flatness and parallelism of the measuring faces by interferometry.

Monochromatic light source providing high-contrast interference fringes. This light unit uses a single wavelength so that bright/light fringes only are visible.

The light source at the rear of the case also permits a visual examination, e.g. with the aid of a knife-edge or bevelled straight edge. .

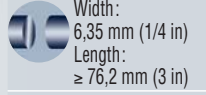
0652500422	210 ÷ 230
<i>Accessories</i>	
0651570269	200 mm dia. surface plate. Lapped and polished measuring face
0652500424	Spare lamp (sodium)





## Brown & Sharpe Angle Gauges

For setting and calibration purposes – Smallest step to 15' (1/4°).



Hardened steel

30"

Width: 6,35 mm (1/4 in)  
Length: ≥ 76,2 mm (3 in)

Suited plastic case



Set composition

06769002

1 Set = 12 precision squares

15'	30'	1°	2°	3°	4°
5°	10°	15°	20°	25°	30°





Special steel, hardened

$(11,5 \pm 1,0) \times 10^{-6} \text{ K}^{-1}$

Max. perm. deviation from the nominal size: 20  $\mu\text{m}$  or 0.0008 in.  
Uniformity of size within a set of three balls having the same nominal size: 1  $\mu\text{m}$  or 0.00004 in

$\pm 0,5 \mu\text{m}$  or  $\pm 0.00002$  in

Full set or set including three balls of same nominal size

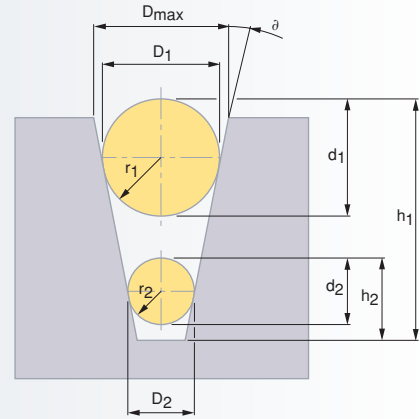
Wooden case

UKAS calibration certificate

## Steel Balls

Steel balls are used to measure internal tapers and the like.

### TESA Steel Balls



mm		mm	Step mm	Pieces/ Nominal size	Total pieces
<b>0651500950</b>	Steel ball set	1 ÷ 25	1	3	75
<b>0651500951</b>	Steel ball set	1,5 ÷ 12,5	1	3	36



Special steel, hardened

3  $\mu\text{m}$

Not available individually

Plastic case

## Brown & Sharpe Steel Balls



mm		mm	Step mm	Pieces/ Nominal size	Total pieces
<b>06769009</b>	Steel ball set	1 ÷ 25	1	2	50



## Plug Gauges

The best and quickest method for inspecting bores with small diameters.

### TESA CARY plug gauges with diameters from 0,050 up to 0,300 mm

#### Type TDH

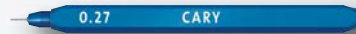
Due to their small size, these plug gauges are best handled using tweezers.



mm	STANDARD ±0,4 µm		ETALON ±0,15 µm	
	Step 2 µm	1 µm	Step 2 µm	1 µm
0,050 ÷ 0,080	<b>CJ1D1S2</b>	<b>CJ1D1S0</b>	<b>CJ1D1E2</b>	<b>CJ1D1E0</b>
0,081 ÷ 0,309	<b>CJ1D2S2</b>	<b>CJ1D2S0</b>	<b>CJ1D2E2</b>	<b>CJ1D2E0</b>

#### Type TLH

This type is identical to the TDH one, but with a 30 mm long handle.



mm	STANDARD ± 0,4 µm		ETALON ± 0,15 µm	
	Step 2 µm	1 µm	Step 2 µm	1 µm
0,050 ÷ 0,080	<b>CJ1L1S2</b>	<b>CJ1L1S0</b>	<b>CJ1L1E2</b>	<b>CJ1L1E0</b>
0,081 ÷ 0,309	<b>CJ1L2S2</b>	<b>CJ1L2S0</b>	<b>CJ1L2E2</b>	<b>CJ1L2E0</b>

#### Type TLH-5 or TLH-10 with a length of 5 or 10 mm

mm	STANDARD ± 0,5 µm		ETALON ± 0,2 µm	
	Step 2 µm	1 µm	Step 2 µm	1 µm
TLH-5	<b>CJ1L5S2</b>	<b>CJ1L5S0</b>	<b>CJ1L5E2</b>	<b>CJ1L5E0</b>
TLH-10	<b>CJ1L10S2</b>	<b>CJ1L10S0</b>	<b>CJ1L10E2</b>	<b>CJ1L10E0</b>



EN ISO 1938  
Factory standard



Light alloy, coloured handle  
with engraved nominal diameter



Accuracy:  
STANDARD (blue handle) ± 0,4 µm.  
ETALON (yellow handle) ± 0,15 µm



Inspection report available on request

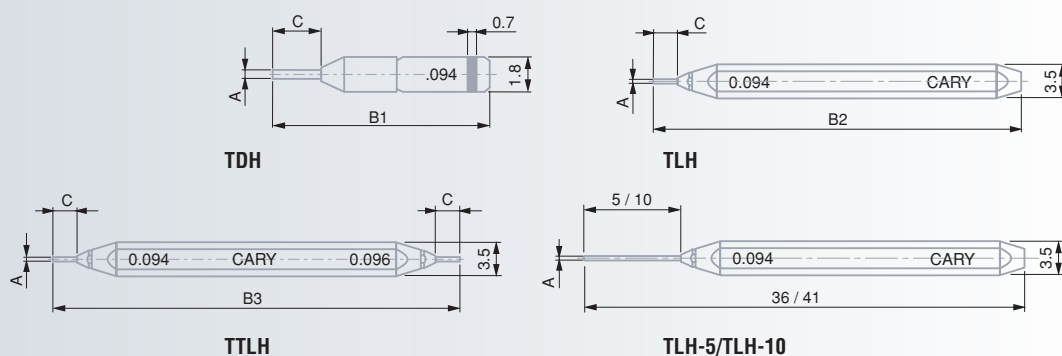


## Type TTLH

Double-ended plug gauges consisting of two TDH-type plug gauges.



		STANDARD $\pm 0,4 \mu\text{m}$		ETALON $\pm 0,15 \mu\text{m}$
		Step 2 $\mu\text{m}$		Step 2 $\mu\text{m}$
		1 $\mu\text{m}$		1 $\mu\text{m}$
		0,050 ÷ 0,080		0,050 ÷ 0,080
		–		–
		<b>CJ1LL1S0</b>		<b>CJ1LL1E0</b>
		0,081 ÷ 0,309		0,081 ÷ 0,309
		–		–
		<b>CJ2LL2S0</b>		<b>CJ1LL2E0</b>



### TDH/TLH/TTLH gauge sizes

		B1 mm	B2 mm	B3 mm	C mm
0,050 ÷ 0,100		10,3	31,8	33,6	0,8
0,100 ÷ 0,150		10,5	32	34	1,0
0,150 ÷ 0,200		10,7	32,2	34,2	1,2
0,200 ÷ 0,250		10,9	32,4	34,4	1,4
0,250 ÷ 0,300		11,1	32,6	34,6	1,6

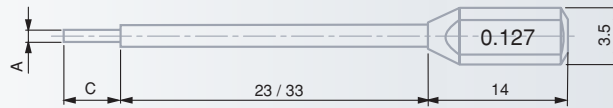
### Standard accessories

<b>CJ1ED25N</b>	ED25N	Wooden case for 25 TDH plug gauges
<b>CJ1EL25N</b>	EL25N	Wooden case for 25 TLH plug gauges
<b>CJ1XDL</b>	XDL	Plastic case for TDH/TLH/TXH plug gauges





### Type TZH for deep bores with diameters from 0,050 up to 0,300 mm



These plug gauges are mounted on holders for checking hard-to-reach bores.

When ordering, please specify:

- plug gauge diameter (0,050 to 0,300 mm)
- desired quality (STANDARD or ETALON)
- holder length (23 or 33 mm)

### TESA CARY steel plug gauges with diameters from 0,3 up to 10 mm

#### Type TXH

Single-ended steel plug gauges (1 item).



mm	STANDARD			ETALON		
	Step 10 µm	2 µm	1 µm	Step 10 µm	2 µm	1 µm
0,300 ÷ 1,509	CJ1X1S10	CJ1X1S2	CJ1X1S0	CJ1X1E10	CJ1X1E2	CJ1X1E0
1,510 ÷ 3,509	CJ1X2S10	CJ1X2S2	CJ1X2S0	CJ1X2E10	CJ1X2E2	CJ1X2E0
3,510 ÷ 10,000	CJ1X3S10	–	CJ1X3S0	CJ1X3E10	–	CJ1X3E0



EN ISO 1938  
Factory standard



Light alloy,  
coloured  
handle  
with engraved nominal  
diameter

Accuracy:  
STANDARD (blue  
handle) ± 0,4 µm  
for diameters 0,3 ÷ 3 mm or  
± 0,5 µm for diameters  
3 ÷ 10 mm. ETALON (yellow  
handle) ± 0,25 µm for diam-  
eters 0,3 ÷ 3 mm or ± 0,3 µm  
for diameters 3 ÷ 10 mm.

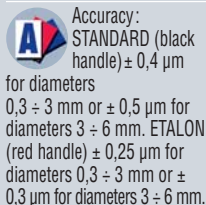
Inspection  
report available  
on request

#### Type TTXH

Steel plug gauges, type GO/NOT GO (2 items)



mm	STANDARD	ETALON
	Step 1 µm	Step 1 µm
0,300 ÷ 1,509	CJ1XX1S0	CJ1XX1E0
1,510 ÷ 3,509	CJ1XX2S0	CJ1XX2E0
3,510 ÷ 6,509	CJ1XX3S0	CJ1XX3E0
6,510 ÷ 10,000	CJ1XX4S0	CJ1XX4E0



# TESA CARY tungsten carbide plug gauges with diameters from 0,3 up to 6 mm

## Type TCH

Single-ended tungsten carbide plug gauges (1 item)



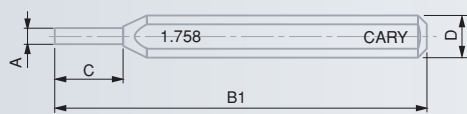
mm	STANDARD	ETALON	
	Step 10 µm	1 µm	Step 10 µm
0,300 ÷ 1,509	<b>CJ1C1S10</b>	<b>CJ1C1S0</b>	<b>CJ1C1E10</b>
1,510 ÷ 3,509	<b>CJ1C2S10</b>	<b>CJ1C2S0</b>	<b>CJ1C2E10</b>
3,510 ÷ 6,000	<b>CJ1C3S10</b>	<b>CJ1C3S0</b>	<b>CJ1C3E10</b>

## Type TTCH

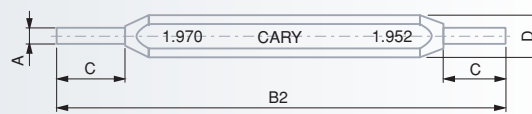
Tungsten carbide plug gauges, type GO/NO GO (2 items)



mm	STANDARD	ETALON
	Step 1 µm	Step 1 µm
0,300 ÷ 1,509	<b>CJ1CC1S0</b>	<b>CJ1CC1E0</b>
1,510 ÷ 3,509	<b>CJ1CC2S0</b>	<b>CJ1CC2E0</b>
3,510 ÷ 6,000	<b>CJ1CC3S0</b>	<b>CJ1CC3E0</b>



TXH/TCH



TTXH/TTCH

### Plug gauge sizes

A mm	B1 mm	B2 mm	C mm	D mm
0,30 ÷ 0,50	38	41	3	3,5
0,50 ÷ 1,00	39	43	4	3,5
1,00 ÷ 1,50	40	45	5	3,5
1,50 ÷ 2,00	46	52	6	5
2,00 ÷ 2,50	47	54	7	5
2,50 ÷ 3,00	48	56	8	5
3,00 ÷ 3,50	49	58	9	5
3,50 ÷ 4,00	60	70	10	8
4,00 ÷ 5,00	61	72	11	8
5,00 ÷ 10,0	62	74	12	8

### Standard accessories

NO	A	=
<b>CJ1PTXK</b>	PTXK	Suited case for 50 plug gauges Ø 0,300 ÷ 1,509 mm
<b>CJ1MTXK</b>	MTXK	Suited case for 50 plug gauges Ø 1,510 ÷ 3,509 mm
<b>CJ1GTXK</b>	GTXK	Suited case for 50 plug gauges Ø 3,510 ÷ 10,00 mm



## LTXH-type precision steel pins with diameters from 0,30 up to 10 mm

These steel pins can be made available without handle upon request.

When ordering, please specify:

- pin diameter (0,30 to 10 mm)
- desired quality (STANDARD or ETALON)

## PNH-type wires with handle for checking threads. wire diameters from 0,10 up to 10 mm



mm	STANDARD	ETALON
	Step 10 µm	Step 10 µm
0,10 ÷ 0,15	<b>CJ1N1S</b>	<b>CJ1N1E</b>
0,16 ÷ 0,50	<b>CJ1N2S</b>	<b>CJ1N2E</b>
0,51 ÷ 4,00	<b>CJ1N3S</b>	<b>CJ1N3E</b>
4,01 ÷ 10,00	<b>CJ1N4S</b>	<b>CJ1N4E</b>



EN ISO 1938



Hardened steel,  
ground and lapped



Aluminium,  
coloured  
handle with  
engraved nominal  
diameter



Accuracy:  
STANDARD (blue  
handle) ± 0,8 µm  
for diameters 0,1 ÷ 10 mm.  
ETALON (yellow handle)  
± 0,3 µm for diameters  
0,1 ÷ 6 mm or ± 0,5 µm for  
diameters 6 ÷ 10 mm.



Inspection  
report available  
on request



PNH

### Plug gauge sizes

A mm	B mm	C mm	D mm	E mm
0,10 ÷ 0,15	20	9,5	1,8	0,9
0,16 ÷ 0,30	32	9,5	1,8	0,9
0,31 ÷ 1,10	32	14	3,5	1,5
1,11 ÷ 10,00	32	14	5	2

### Standard accessories

<b>CJ1N50</b>	Suited clear box for 50 PNH thread wires
<b>CJ1N3</b>	Carrying tube for 3 PNH thread wires
<b>CJ1NGC</b>	Box engraving for each diameter
<b>CJ1NLSM</b>	Thread wire alone, without handle

## Ring Gauges

Designed for inspecting cylindrical components such as pivots or axles – Used to determine external diameters.



EN ISO 1938  
Factory standard



Inserted into a light alloy, blue coloured ring for easier handling. Also with engraved nominal diameter.

Ø 0,15 ÷ 3 mm:  
± 0,6 µm  
Ø 3 ÷ 4,999 mm:  
± 0,75 µm

Inspection report from 2 mm available on request

### TESA CARY steel ring gauges with diameters from 0,151 up to 5 mm



Type BAH	1 Steel ring gauge	
Type BIMHa	2 BAH steel ring gauges mounted in pairs on plates for use as GO/NOT GO type gauges	
	BAH	
	BIMHa	
	Step 1 µm	Step 1 µm
0,151 ÷ 1,500	<b>CJ1B2A</b>	<b>CJ1B2IA</b>
1,501 ÷ 2,500	<b>CJ1B3A</b>	<b>CJ1B3IA</b>
2,501 ÷ 4,000	<b>CJ1B4A</b>	<b>CJ1B4IA</b>
4,001 ÷ 4,999	<b>CJ1B5A</b>	<b>CJ1B5IA</b>



EN ISO 1938  
Factory standard



Inserted into a black coloured, light alloy ring for easier handling. Also with engraved nominal diameter of the ring

Ø 0,060 ÷ 3 mm:  
± 0,6 µm  
Ø 3 ÷ 4,999 mm:  
± 0,75 µm

Inspection report from 2 mm available on request

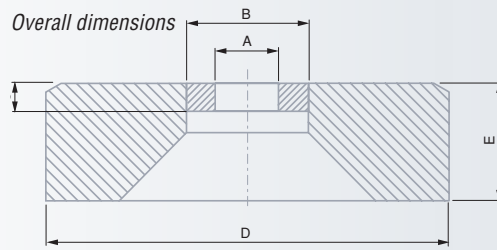
### TESA CARY carbide ring gauges with diameters from 0,060 up to 5 mm



Type BCH	1 Carbide ring gauge	
Type BIMHm	2 BCH carbide ring gauges mounted in pairs on plates for use as GO/NOT GO type gauges	
	BCH	
	BIMHm	
	Step 1 µm	Step 1 µm
0,060 ÷ 0,150	<b>CJ1B1C</b>	<b>CJ1B1IM</b>
0,151 ÷ 1,500	<b>CJ1B2C</b>	<b>CJ1B2IM</b>
1,501 ÷ 2,500	<b>CJ1B3C</b>	<b>CJ1B3IM</b>
2,501 ÷ 4,000	<b>CJ1B4C</b>	<b>CJ1B4IM</b>
4,001 ÷ 4,999	<b>CJ1B5C</b>	<b>CJ1B5IM</b>







A mm	Ring gauges				Outer rings	
	B mm		C mm		D mm	E mm
	BAH	BCH	BAH	BCH		
0,060 ÷ 0,50	1,4	1,8	0,35	0,5	8	2,5
0,50 ÷ 0,75	1,8	1,8	0,5	0,5	8	2,5
0,75 ÷ 1,25	2,4	2,4	0,75	0,75	8	2,5
1,25 ÷ 1,50	3	3	0,9	0,9	8	2,5
1,50 ÷ 2,50	5	5	1,5	1,5	12	4
2,50 ÷ 4,00	8	8	2,4	2,4	16	5,5
4,00 ÷ 5,00	10	10	3	3	20	7

### Standard accessories

NP	≡	∅ A mm
<b>CJ1CEB3</b>	Suited case for 3 rings	0,06 ÷ 1,50
<b>CJ1CEB4</b>	Suited case for 4 rings	0,06 ÷ 1,50
<b>CJ1EB12</b>	Suited case for 12 rings	0,06 ÷ 1,50
<b>CJ1CB40</b>	Suited case for 12 rings	1,50 ÷ 2,50
<b>CJ1CB24</b>	Suited case for 24 rings	2,50 ÷ 4,00
<b>CJ1CB18</b>	Suited case for 12 rings	4,00 ÷ 5,00
<b>CJ1280,21.010A</b>	Aluminium resting plate for 2 rings	0,06 ÷ 1,50
<b>CJ1280,21.011A</b>	Aluminium resting plate for 2 rings	1,51 ÷ 2,50
<b>CJ1280,21.012A</b>	Aluminium resting plate for 2 rings	2,51 ÷ 4,00
<b>CJ1280,21.013A</b>	Aluminium resting plate for 2 rings	4,01 ÷ 5,00
<b>CJ1BAA</b>	Bearing ring (one item for each ring gauge)	

## TESA CARY steel ring gauges with diameters from 5 up to 30 mm



Type BOMa	1 Steel ring gauge	
Type BBOMa	2 BOMa steel ring gauges mounted in pairs on plates for use as GO/NOT GO type gauges	
∅ mm	BOMa	BBOMa
	Step 1 µm	Step 1 µm
5,00 ÷ 9,99	<b>CJ1BOA1</b>	<b>CJ1BBA1</b>
10,00 ÷ 11,99	<b>CJ1BOA2</b>	<b>CJ1BBA2</b>
12,00 ÷ 13,99	<b>CJ1BOA3</b>	<b>CJ1BBA3</b>
14,00 ÷ 15,99	<b>CJ1BOA4</b>	<b>CJ1BBA4</b>
16,00 ÷ 17,99	<b>CJ1BOA5</b>	<b>CJ1BBA5</b>
18,00 ÷ 19,99	<b>CJ1BOA6</b>	<b>CJ1BBA6</b>
20,00 ÷ 22,99	<b>CJ1BOA7</b>	<b>CJ1BBA7</b>
23,00 ÷ 25,99	<b>CJ1BOA8</b>	<b>CJ1BBA8</b>
26,00 ÷ 29,99	<b>CJ1BOA9</b>	<b>CJ1BBA9</b>



Inserted into a light alloy, grey coloured ring for easier handling. Also with engraved nominal diameter.

5 ÷ 10 mm dia.: ± 1,25 µm  
10 ÷ 18 mm dia.: ± 1,5 µm  
18 ÷ 29,99 mm dia.: ± 2 µm

Inspection report available on request

# TESA CARY tungsten carbide ring gauges with diameters from 5 up to 30 mm



EN ISO 1938  
Factory standard

Tungsten carbide

Inserted into a light alloy, black coloured ring for easier handling. Also with engraved nominal diameter.

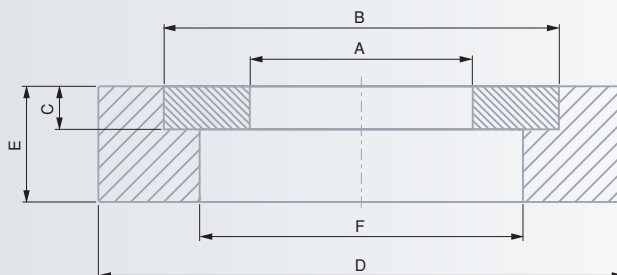
Ø 5 ÷ 10 mm: ± 1,25 µm  
Ø 10 ÷ 18 mm: ± 1,5 µm  
Ø 18 ÷ 29,99 mm: ± 2 µm

Better quality upon request (Q5)  
5 ÷ 10 mm dia.: ± 1 µm  
10 ÷ 18 mm dia.: ± 1,2 µm  
18 ÷ 29,99 mm dia.: ± 1,5 µm

Inspection report available on request

Type BOMm	1 Tungsten carbide ring gauge	
Type BBOMm	2 BOMm carbide ring gauges mounted in pairs on plates for use as GO/NOT GO plug gauges	
BOMm	BOMm	BBOMm
mm	Step 1 µm	Step 1 µm
5,00 ÷ 9,99	<b>CJ1BOM1</b>	<b>CJ1BBM1</b>
10,00 ÷ 11,99	<b>CJ1BOM2</b>	<b>CJ1BBM2</b>
12,00 ÷ 13,99	<b>CJ1BOM3</b>	<b>CJ1BBM3</b>
14,00 ÷ 15,99	<b>CJ1BOM4</b>	<b>CJ1BBM4</b>
16,00 ÷ 17,99	<b>CJ1BOM5</b>	<b>CJ1BBM5</b>
18,00 ÷ 19,99	<b>CJ1BOM6</b>	<b>CJ1BBM6</b>
20,00 ÷ 22,99	<b>CJ1BOM7</b>	<b>CJ1BBM7</b>
23,00 ÷ 25,99	<b>CJ1BOM8</b>	<b>CJ1BBM8</b>
26,00 ÷ 29,99	<b>CJ1BOM9</b>	<b>CJ1BBM9</b>

Overall dimensions



	Ring gauges		Outer rings		
	B mm	C mm	D mm	E mm	F mm
A mm					
5 ÷ 10	18	2	30	4	10,5
10 ÷ 14	24	2,5	38	5	15
14 ÷ 18	30	3	46	6	19
18 ÷ 24	38	3,5	56	8	25
24 ÷ 30	46	4	68	8	31

Standard Accessory



**CJ1BBA**



Bearing ring (one item for each ring gauge)





# Calibration Equipment





# CONFIDENCE IS NOT ENOUGH...

Control of inspection and measuring equipment is an element of the quality management that is more important than ever before. The introduction of the ISO 9000 family of international standards has led to major changes in this field as well. Among other things, ISO 9001 specifies that:

«all inspection and measuring equipment that can affect product quality must be identified, calibrated and adjusted at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to internationally or nationally recognised standards».

This standard also states that the supplier shall:  
«ensure that the inspection and measuring equipment is capable of the necessary accuracy and precision».

## A Big Choice

TESA can provide you with the most varied means specifically suited for inspection and calibration of standards, handtools and plug gauges. Some of them are described in the various sections of this catalogue, especially:



- Gauge blocks
- Setting rings
- Steel balls
- Cylindrical setting standards with outside diameters
- Optical flats
- Plan parallel optical flats
- Electronic levels for both straightness and flatness measurement
- Instruments for both squareness and perpendicularity measurement
- Calibration equipment for length measuring devices fitted with inductive probes

This section is devoted to the measuring equipment that serve to calibrate other such inspection means. But, they can also be used for high-accuracy measurement of precision parts.



The precision tool that was first developed for calibrating gauge blocks is an improved external micrometer manufactured early in the 20th century by Brown & Sharpe for the inventor of the gauge set compositions, C.E. Johansson.

## Gauge Block Calibration

In the hierarchical chain of dimensional transfers that can be traced to the metre length unit, the gauge blocks hold a key position. And this makes them the most important material measures used in metrology.

The transference of the length unit, based on specific wavelengths of light, to gauge blocks is achieved in the first instance by a fundamental interferential measurement. From the gauge blocks measured in this way, the lengths are transferred to other gauge blocks by hierarchical measurements.

# TESA Gauge Block Comparators – General Overview

TESA offer two models operating based on to two different measurement procedures.

- TESA UPD measures gauges blocks directly over a measuring span of 25 mm/1 in.
- TESA UPC is used for comparative measurement of gauge blocks having a same nominal length.

<b>TESA Gauge Block Comparators</b>		<b>UPD</b>	<b>UPC</b>
<b>Measuring procedures</b>			
	<b>Direct measurement</b>		
	<ul style="list-style-type: none"> <li>• Length comparison with a variation in nominal length up to 25 mm</li> <li>• Number of reference gauge blocks required for calibrating a 122-piece set: 9 blocks</li> <li>• Number of gauges blocks required for calibrating the comparator: 9 blocks + 6 pairs of blocks</li> </ul>		● ● ●
	<b>Comparative measurement</b>		
	<ul style="list-style-type: none"> <li>• Comparison of gauge blocks of same nominal length</li> <li>• Number of reference gauge blocks required for calibrating a 122-piece set: 122 blocks</li> <li>• Number of gauge blocks required for calibrating the comparator: 6 pairs</li> </ul>		● ● ●
			● ● ●
<b>Errors of measurement</b>			
For details about the information below, refer to both pages L-8 and L-10			
<b>Repeatability limit</b>	0,015 µm	●	●
	0,025 µm		●
<b>Uncertainty of measurement</b>	$U = \pm (0,05 + 0,5 \cdot L) \mu\text{m}$ L in m	●	●
	$U = \pm (0,10 + 1,0 \cdot L) \mu\text{m}$		●
<b>Application ranges</b>			
	Nominal lengths	0,5 to 100 mm/0.02 to 4.0 in	●
		0,5 to 500 mm/0.02 to 20 in	▲
<b>Measuring span</b>			
	25 mm/1 in		●
<b>Sensors for capturing length dimensions</b>			
	• Two axial probes in sum measurement	●	●
	• Digital system, opto-electronic with incremental divisions	●	
	• Analogue measuring system, both electric and inductive		●
	• Inductive analogue system, electric		
	– electro-motorised	●	
	– under the spring force		●
	• Measuring bolt retraction		
– electro-motorised	●		
– by vacuum		●	
<b>Template systems (see page L-5)</b>			
	• Single template system	●	●
	• Dual template system	●	○
<b>Handling of gauge blocks with nominal lengths up to 10 mm approx.</b>			
Suction loader used in conjunction with the electric vacuum pump			
		○	○
<b>TESA UPT temperature device</b>			
	Includes 4 thermal sensors (4-wire type) which measure the electric resistance	●	○
<b>TESA software programme for value processing</b>			
	• TESA UP, WINDOWS 98, 2000, NT, XP	●	●

▲ Available upon request ○ Recommended option



## TESA UPD Gauge Block Comparator with a 25 mm Measuring Span

- Direct measurement of gauge blocks with a variation in nominal length of up to 25 mm or 1 in.
  - Allows the number of required reference gauge blocks to be reduced by nearly 80%.
- Typical comparative measurement of gauge blocks having a same nominal length.
  - Enables lower measurement uncertainties to be achieved due to weaker influences of the systematic errors.
- Equipped with HEIDENHAIN high-precision incremental probes.
- Templates with a new concept for positioning the gauge blocks.
  - Single or dual template system to provide optimum ease of handling of the gauge blocks
- Integrated device for most accurate temperature acquisition.
- On-line transfer of both measured length and temperature values.
- Computer-aided data processing with all needed corrections included.



### General



EN ISO 3650



For gauge blocks with nominal lengths from 0,5 mm to 100 mm / 0.02 in to 4 in



Measuring procedures: direct and comparative measurements through the transference of the length of a reference gauge block to the gauge block to be measured.

In **direct measurement**, the nominal length of the two gauge blocks to be compared may vary up to the size of the measuring span, i.e. 25 mm.

In **comparative measurement**, comparison is always based on two gauge blocks of same nominal length.

### Measuring configuration

Two probes with mechanical contact with the measuring face to be probed are connected in sum measurement (function +A+B).

### Measuring points

On the reference gauge block: at the centre of the measuring face (point R). On the gauge block to be measured: at the centre (point 1) as well as the four corners of the measuring face, each lying 2 mm away from the adjacent faces (points 2 to 5). The central length  $l_c$  is determined by probing both points R and 1.

For establishing lengths at any point, the measurements shall be carried out at points R plus 1 to 5.

The variation in length  $v$  is obtained from measurements taken at points 1 to 5.



Shipping packaging



Identification number



Calibration certificate from the supplier for the comparator or the Swiss Calibration Service for the temperature device.



### New Technical Concept through Direct Measurement

Two mutually opposed aligned probes connected in sum measurement (+A+B) also check thin gauge blocks reliably as the upper sensor A is able to capture lengths up to 25 mm. Displacement of the measuring bolt and activation of the measuring force are both electro-motorised.

PT 100 platinum resistances let you capture the temperature of the two gauge blocks as well as the measuring table and support.

The TESA UP software programme processes length and temperature values as measured while executing and controlling your measurement cycles simultaneously.



**TESA UPD – The flexible concept that provides distinctive metrological features with substantial savings**

**Direct Measurement**

- Permits over 90% of a 122-piece set to be checked using the same reference gauge block. All nominal lengths of the full gauge set being contained within 0,5 and 25 mm, the measuring span is therefore not exceeded.
- Allows the reference gauge set to be reduced by nearly 80% against the ones needed until now.
- Provides substantial savings in the gauge block supply and recalibration through reduced set compositions.
- Enables direct measurement of gauge blocks that cannot be compared with other existing gauge blocks due to their unusual nominal lengths.



**Comparative Measurement**

- Allows the gauge blocks of same nominal lengths to be measured by comparison as usual.
- Enhances the measuring conditions, thus permitting all measurements to be taken with a lower uncertainty.
- Reduces the number of systematic errors through limited length related influences of both the upper probe A and the gauge block to be compared.

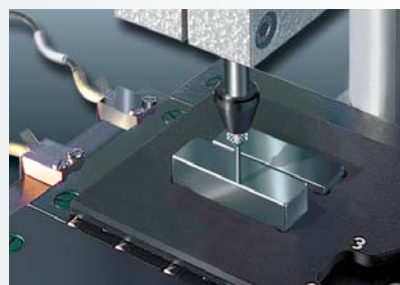
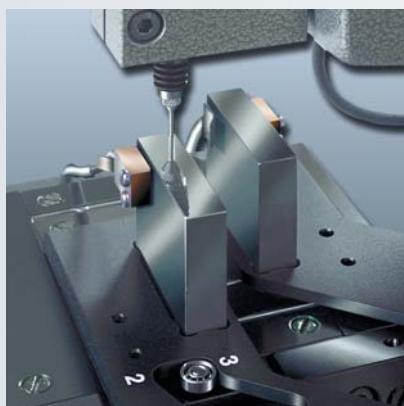


**TESA dual template system that protects expensive reference gauge blocks (patented)**

- Simultaneous use of two templates allows you to release your reference gauges until their handling becomes necessary.
- This system makes it possible for you to save time and money.
- During the measurement cycles on a routine basis, the travel length of the reference gauges over the measuring table is reduced by nearly 70%. This contributes to significantly lower the risks of damaging and wearing the measuring faces.
- The double protection of your reference gauges leads to significant cost savings by reducing the need for:
  - recalibration
  - restoring the measuring faces
  - replacing worn or damaged reference gauge blocks
  - long downtime while extending the life of your full reference gauge sets.

**Single Template System**

- With this system, your reference gauge blocks along with those to be calibrated are moved together during the measurement cycles.

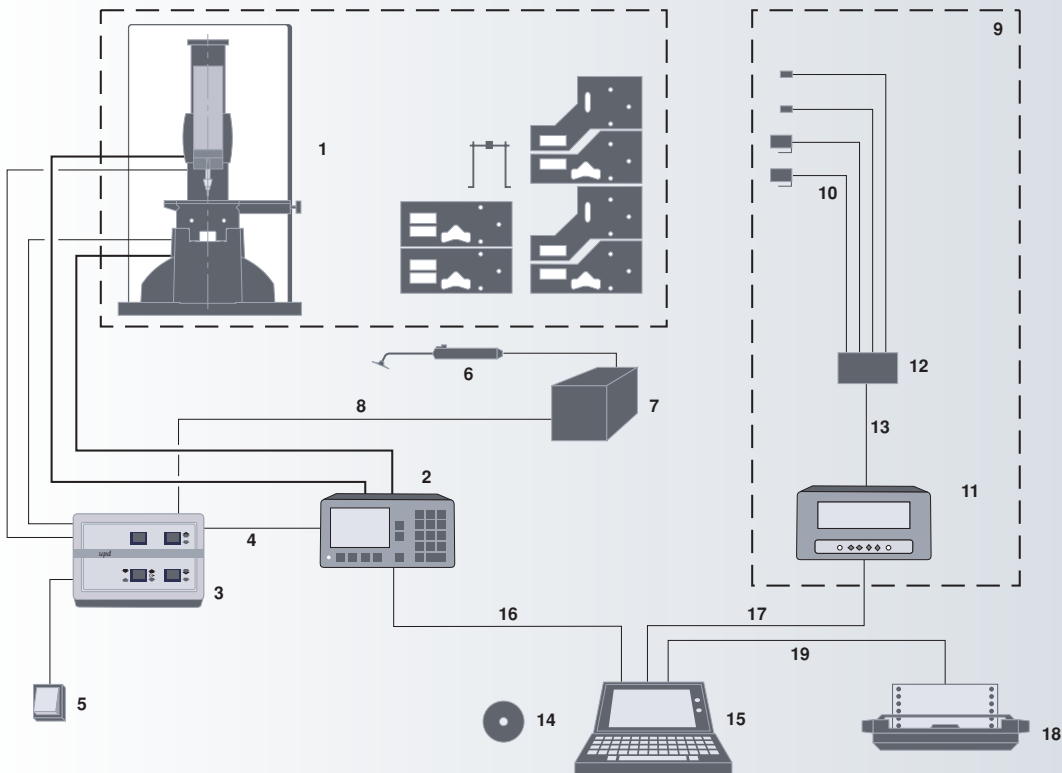




## TESA UPD Delivery Programme – Three Ordering Variations

№	Symbol	Description	●	●	●
05930005		TESA UPD gauge block comparator with temperature device*			●
05930004		TESA UPD gauge block comparator without temperature device*			●
S59300102		TESA UPD gauge block comparator, complete* with temperature device, TESA UP software programme for value processing, PC (standard), printer	●		
<i>Key components</i>					
1	05930008	1 TESA UPD mechanical part	●	●	●
2	05960016	1 HEIDENHAIN computing counter ND 287 featuring 2 probe inputs	●	●	●
3	05960013	1 Control panel	●	●	●
4	05960014	1 Connecting cable for control panel to ND 287 computing counter	●	●	●
5	04768001	1 Foot switch	●	●	●
6	01660011	1 Suction loader	●		●
7	03260433	1 Electrical vacuum pump with external control, 230 Vac, 50 Hz	●		●
8	05960028	1 Connecting cable for electric vacuum pump to control panel	●		●
9	05930011	1 TESA UPT temperature device, complete	●		●
14	05960025	1 TESA UP software programme for value processing	●		
15	S59070014	1 Computer. For minimum requirements, refer to page L-14	●		
16	03969007	1 Connecting cable for ND 287 counter to host computer	●		
17	05960026	1 Connecting cable for temperature device to host computer	●		
18	S59070012	1 Laser printer, colour	●		
19	S59070013	1 Connecting cable for host computer to printer	●		

\* Special execution for 110 Vac, 60 Hz also available on request.



### Measuring stand

Heavy construction with toothed rack guide plus hand wheel for setting the measuring arm. Fixing bores (16 and 3 mm dia, resp.) for upper probe A plus one temperature sensor No. 05960010

Main body in cast iron. Hardened steel column, dull-chrome plated and ground.

### Special table

Solid measuring table fitted with 6 cylindrical pins so as to ensure and protect each handled gauge block.

3 mm diameter clamping bore for one temperature sensor No. 05960010 as well as retaining plate mounted laterally on the table for both sensors 05960008 and 05960009 fitted with clip.

Steel, hardened. Tungsten carbide pins, cylindrical.

### Positioning device for gauge blocks

Single and dual template systems to shift the gauge blocks to selected measuring points. For more details on both systems, report to the previous page.

### Sensors for length measurements

Two HEIDENHAIN axial probes, opto-electronic with electro-motorised bolt activation.

ZERODUR® glass ceramic with incremental divisions



Dividing periods 4 µm

25 mm / 1 in for upper probe A. 1 mm for lower probe B.


Measuring bolt on a plain bearing

1,0 N for upper probe A. 0,63 N for lower probe B.

## TESA UPD System Components

-  Measuring bolt in invar steel
-  Tungsten carbide tip with a spherical measuring face, R = 20 mm

**Computing counter**  
HEIDENHAIN up and down computing counter ND 287 provided with two probe inputs


 TFT type, 9-decade display plus sign. Also with auxiliary display for activated functions.


 Signal division  $\leq 400x$

 0,5 to 0,002  $\mu\text{m}$   
0,02 to 0.0000001 in

 14 mm


 21 keys available for digit input as well as operating functions

 Sum measurement with both probes set to +A+B. Linear correction of systematic errors. PRESET function for digit entry. 2 programmable datum points.

 RS 232 and V.24

 100 to 240 Vac (-15% to 10%), 50 to 60 Hz

 0°C to 45°C


 -30°C to 70°C



 75%, non-condensing

 Die-cast aluminium housing

 IP40 (IEC 60529)

 EN 55022, Class B

 211x112x209 mm (W x H x D)

		
1	<b>05930008</b>	<b>TESA UPD Mechanical Part</b> <i>Consisting of:</i>
	05930009	1 Measuring stand with toothed rack guide. Manually operated for setting the measuring arm. Attachment has a 16 mm dia. fixing bore for the upper probe.
	05960015	1 Solid measuring table in special version Made from hardened steel and fitted with 6 tungsten carbide cylindrical pins for safe positioning of the gauge blocks. Provide high protection and wear resistance to the gauge blocks over many years. Threaded bores for clamping the lower probe. Prepared for the integration of the temperature sensor (see below).
	05960029	1 Positioning device provided with a single or dual template system Interchangeable templates to shift the gauge blocks from a given measuring point to another delivered as follows: 1 Pair for gauge blocks having a 9 x 30 mm cross-section. Consists of 1 template No. 05960019 for the reference gauge blocks plus 1 template No. 05960020 for the gauge blocks to be calibrated. 1 Pair for gauge blocks having a 9 x 35 mm cross-section. Consists of 1 template No. 05960021 for the reference blocks plus 1 template No. 05960022 for the blocks to be calibrated. Also with added support to prevent the blocks from tilting. 1 Template No. 05960023 for reference blocks and those to be calibrated (9x30 mm) Template No. 05960024 for the reference blocks and those to be calibrated having a 9 x 35 mm cross-section. Also with added support to prevent the gauge blocks from tilting.
	05930010	1 System for value acquisition with electro-motorised bolt activation. <i>Consisting of:</i> 1 Upper probe A, type HEIDENHAIN CT 25 (No. 05930006). Measuring span 25 mm/1 in. Measuring force 1,0 N. Fitted with probe insert No. 03510003. 1 Lower probe B, type HEIDENHAIN special (No. 05930007). Measuring span 1 mm. Measuring force 0,63 N. Fitted with probe insert No. 03510003.
	01660031	1 Setting piece for probe alignment
	01640420	1 Heat protection shield, 250 x 380 mm
	01660001	1 Pair of grip pliers for safe handling of gauge blocks
	01660030	1 Dust cover
2	<b>05960016</b>	<b>HEIDENHAIN Computing Counter ND 287</b> Up and down computing counter with LCD color monitor consisting of: 1 counter 05969029 + 1 card 05960040, each with a single entry - i.e. 2 probe entries along with 1 RS 232 data output, 100 to 240 Vac, 50 to 60 Hz.
3	<b>05960013</b>	<b>Control Panel</b> With touch keys for electro-motorised activation of the measuring bolt as well as for triggering data transfer.
4	<b>05960014</b>	<b>Connecting Cable</b> For control panel No. 05960013 to HEIDENHAIN computing counter ND 287 No. 05960016.
5	<b>04768001</b>	<b>Foot Switch</b> For fine displacement of the measuring bolt as well as data transfer.
6	<b>01660011</b>	<b>Pneumatic Suction Loader</b> For safe and easy handling of the gauge blocks with nominal length up to 10 mm. To be connected to the vacuum pump.
7	<b>03260433</b> <b>S32070030</b>	<b>Electrical Vacuum Pump with External Control</b> For the connection of the suction loader No. 01660011. Execution 230 Vac, 50 Hz Execution 110 Vac, 60 Hz
8	<b>05960028</b>	<b>Connecting Cable</b> For vacuum pump to control panel No. 05960013.

*continued next page*



9	<b>05930011</b>	<b>TESA UPT temperature device for TESA Gauge Block Comparators</b> Fully calibrated for the measuring ranges from 19 °C up to 24 °C with a numerical interval to 0,001 °C. Supplied with a calibration certificate issued by the Swiss Calibration Service (SCS). Uncertainty of measurement achieved during calibration $U = \pm 0,03^{\circ}\text{C}$ .  <i>Consisting of:</i>
10	05960018	1 Set of 4 temperature sensors PT 100 platinum resistances giving exceptional long-term stability while drifts are kept to a minimum over years of use. This set includes the following single sensors: 1 Temperature sensor with clamp R for reference gauge blocks having nominal lengths from about 14 mm, No. 05960009 1 Temperature sensor with clamp P for gauge blocks to be calibrated having nominal lengths from about 14 mm, No. 05960008. 2 Temperature sensors to be mounted on the measuring stand or the table. PT 100 diameter: 3 g8 mm, 10 mm long. Order number 05960010 for 1 item.
11	05960038	1 FLUKE 1529 temperature measuring unit Precision thermometer including a switch for the measuring points. With use of the PT 100 platinum resistances, provides 4 measuring channels with a 0,001°C numerical interval. RS 232 or IEEE 488 data output, 115 or 230 Vac for 50 or 60 Hz.
12	05960012	1 Adapter For connecting up to 4 temperature sensors
13	05960011	1 Connecting cable For adapter N° 05960012 to temperature unit N° 05960038.
14	<b>05960025</b>	<b>TESA UP Software Programme for Value Processing</b> Running under WINDOWS 98, 2000, NT or XP. Software package including 1 CD-ROM along with 1 Hardkey. 10 languages available for function menus. For more details, see page L-14.
15	<b>S59070014</b>	<b>Computer</b> Available upon request.
16	<b>03969007</b>	<b>Connecting cable</b> For serial data transmission from HEIDENHAIN ND 287 to host computer (2 connectors 9-pin/female).
17	<b>05960026</b>	<b>Connecting cable</b> For serial data transmission from temperature device to host computer (9-pin/male and 9-pin/female).
18	<b>S59070012</b>	<b>Laser printer, colour</b> Upright A4 format. USB interface.
19	<b>S59070013</b>	<b>Connecting cable</b> For USB data transmission from host computer to printer

### Temperature Sensors

4 PT 100 platinum resistances, 4-wire type

### Temperature Device

Multiple-channel precision thermometer. Also equipped with a switch for the measuring points.

Procedure: 4-wire resistance measurement with continuous value acquisition through connected sensors. PT 100 linearisation according to EN 60751.

Alphanumeric LC display with background lighting

0,001°C

°C, °F or K

8 mm

6 keys available for the functions

RS 232 and IEEE 488

115 ±10% Vac or 230 ±10% Vac, for 50 and 60 pHz

5°C to 40°C

-25°C to 60°C

75%, non-condensing

EN 61010, EN 50081, EN 50082 and EN 55011

191 x 102 x 208 mm (W x H x D)

### Errors of Measurement

Provided all metrological conditions are met, the reliability of the comparator used for direct measurement of steel gauge blocks is expressed as follows:

Repeatability limit (with no influence of external temperature): 0,015 µm

Uncertainty of measurement:  $U = \pm (0,05 + 0,5 \cdot L) \mu\text{m} (L \text{ in m})$

Condition requires the use of reference standards whose measurement uncertainty is equal to

$U \leq \pm 0,015 \mu\text{m}$   
for the comparator

$U \leq \pm (0,02 + 0,2 \cdot L) \mu\text{m} (L \text{ in m})$   
for the gauge blocks

General



EN ISO 3650

For gauge blocks ranging from 0,5 mm to 100 mm or 0.02 in to 4 in

**Comparative measurement procedure**  
with transference of the length of a reference gauge block to the gauge block being measured.

**Measuring configuration**  
2 probes connected in sum measurement (function +A+B) with mechanical contact with the measuring face.

**Measuring points**  
On the reference gauge block: at the centre of the measuring face (point R).  
On the gauge block to be measured: at the centre (point 1) as well as the 4 corners of the measuring face, each lying 2 mm away from the adjacent faces (points 2 to 5).

Central length  $l_c$  is defined by probing both points R and 1. Establishing lengths at any point requires measurements to be taken at points R plus 1 to 5.

Variation in length  $v$  is the result of measurements taken at points 1 to 5.

# TESA UPC Gauge Block Comparator for Comparative Measurement

- Measures gauge blocks of same nominal length by comparison.
- Comes with the new template system for positioning the gauge blocks.
  - Single or dual template system for optimum ease of gauge handling.
- Features TESA high-precision inductive probes.
- Allows ultra-precise temperature measurement, integrated.
- Transfers on-line all measured length and temperature values.
- Executes computer-aided data processing with all needed correction values included.
- Performs calibrations that meet the requirements of both ISO standards and EA guidelines (EAL – European cooperation for Accreditation of Laboratories).
- Includes an execution for greater accuracy along with a calibration certificate (optional).

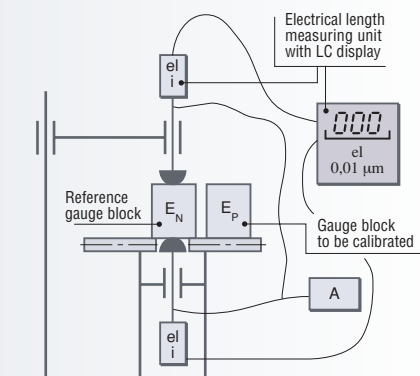


*TESA UPC is specially designed for the calibration – or dimensional inspection – of gauge blocks with nominal lengths ranging from 0,5 to 100 mm. The configuration, which consists of two probes aligned opposite one another, associated with both the concept and quality of the measuring system provides full guarantee for an extra low uncertainty of measurement.*

*Although TESA UPC is mainly intended for manufacturers and end-users of gauge blocks, this comparator is also widely used in nationally accredited laboratories.*

*If specified, TESA can also provide the temperature device available as an option. This device has 4 PT100 platinum resistances, each capturing the temperature of the two gauge blocks along with that of both the measuring table and the support.*

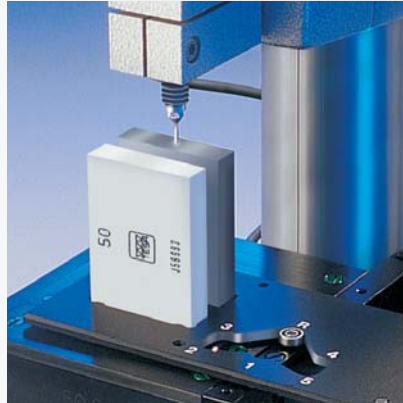
*Computer-aided data processing lets you carry out any calibration most reliably and rationally – for sure.*





## Single Template System

- With this system, your reference gauge blocks along with those to be calibrated are moved all together throughout the measurement cycle.



### Errors of Measurement

Provided all the metrological conditions are met, the reliability of the two standard executions No. 05930000 and 05930002 is expressed as follows:



Repeatability limit (with no effect due to external temperature): 0,025 µm



Measurement uncertainty\*  
 $U = \pm (0,10 + 1,0 \cdot L) \mu\text{m}$  (L in m)



Condition involves the use of reference standards (see pages L-14 and L-15) whose uncertainty is as follows:

$U \leq \pm 0,030 \mu\text{m}$   
 when calibrating the comparator

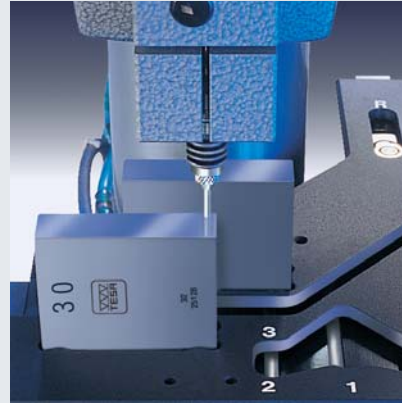
$U \leq \pm (0,05 + 0,5 \cdot L) \mu\text{m}$  (L in m)  
 when calibrating the gauge blocks

\* Applicable to steel gauge blocks

## Dual Template System

(TESA Patent)

- The use of two templates instead of a single one allows you to leave your reference gauge blocks aside until their handling becomes necessary.



Provided all the metrological conditions are met, the reliability of both executions No. 05930001 and 05930003 along with the option for greater accuracy (No. 01690021) is expressed as follows:



Repeatability limit (with no effect due to external temperature): 0,015 µm



Measurement uncertainty\*  
 $U = \pm (0,05 + 0,5 \cdot L) \mu\text{m}$  (L en m)



Condition involves the use of reference standards (see pages L-14 and L-15) whose uncertainty is as follows:

$U \leq \pm 0,015 \mu\text{m}$   
 when calibrating the comparator

$U \leq \pm (0,02 + 0,2 \cdot L) \mu\text{m}$  (L in m)  
 when calibrating the gauge blocks

\* Applicable to steel gauge blocks

### Measuring stand



Heavy construction with toothed rack guide plus handwheel for coarse setting of the measuring arm. Encapsulated attachment plus device for extra-fine setting of upper probe A. 3 mm dia. fixing bore for one temperature sensor No. 05960010.



Main body in cast iron. Column in hardened steel, dull-chrome plated and ground.

### Special table



Solid measuring table fitted with 6 cylindrical pins to ensure and protect the gauge blocks as they are being handled. 3 mm dia. clamping bore for one temperature sensor No. 05960010 as well as retaining plate mounted laterally on the table for both sensors No. 05960008 and 05960009 with clip.



Hardened steel. Tungsten carbide cylindrical pins.

### Positioning device



Single and dual template systems to shift the blocks to predefined measuring point.

For further details on both template systems, report to page L-5 as well as to System components on page L-12.

### Sensors for length values



2 TESA GT 22-spec. inductive probes with pneumatic retraction of the measuring bolt. Electrical adjustment through resistances fitted on each probe



$\pm 150 \mu\text{m}$  measuring travel



Upper probe A  $\approx 1\text{N}$ , lower probe B  $\approx 0,63\text{N}$



Tungsten carbide insert with spherical measuring face, R = 20 mm





## TESA UPC System Components

1	<b>01610401</b>	<b>TESA UPC mechanical part provided with single template system</b> Prepared for mounting the TESA UPT temperature device <i>Consisting of:</i>
	01630004	1 Measuring stand with toothed rack guide Manually operated for coarse setting of the measuring arm. Encapsulated attachment and device allowing extra-fine setting of the upper probe.
	05960031	1 Special solid measuring table Made from hardened steel and fitted with 6 carbide cylindrical pins for a safe positioning. Provides high protection and wear resistance to the gauge blocks over years. Adjustable attachment for lower probe B. Prepared for the integration of the temperature sensors.
	05960032	1 Single template system Used to shift the gauge blocks from a given point to another. Interchangeable templates No. 01660045 (for gauge blocks 9 x 30 mm) and No. 01660046 (for gauge blocks 9 x 35 mm). Also with added support to prevent them from tilting.
	03230045	1 Sensor system for value acquisition consisting of: – Upper probe A, GT 22-spec. No. 03290075. Measuring force to 1 N. Fitted with the measuring insert No. 03510003. – Lower probe B, GT 22-spec. No. 03290076. Measuring force to 0,63 N. Fitted with the measuring insert No. 03510003. – Air pipe system
	01660031	1 Setting piece for probe alignment
	01640420	1 Heat protection shield, 250 x 380 mm in size.
	01660001	1 Pair of grip pliers for safe handling of gauge blocks
	01660030	1 Dust cover
1a	<b>05960030</b>	<b>TESA UPC mechanical part provided with the single and dual template system</b> Prepared for mounting the TESA UPT temperature device <i>Includes the same components as described under the first item above, except for:</i>
	05960029	1 Single and dual template system for positioning the gauge blocks including: 1 Pair of templates for gauge blocks 9 x 30 mm with 1 item No. 05960019 for the reference blocks and 1 item No. 05960020 for the gauge blocks to be calibrated. 1 Pair of templates for gauge blocks 9 x 35 mm with 1 item No. 05960021 for the reference blocks and 1 item No. 05960022 for the gauge blocks to be calibrated. Also with added support to prevent tilting. 1 Template No. 05960023 for the reference blocks and those to be calibrated, 9x30 mm. 1 Template No. 05960024 for the reference blocks and those to be calibrated, 9x35 mm Also with added support to prevent the gauges tilting.
2	<b>03260401</b>	<b>Pneumatic retraction of the measuring bolt</b> Manually operated
3	<b>03260432</b>	<b>Electric vacuum pump with foot switch</b> For retracting the measuring bolt of each probe. Also used to plug the hand-operated pneumatic suction loader No. 01660011, 230 V.
4	<b>03260433</b>	<b>Electrical vacuum pump with external control</b> Connected to the measuring unit TT90 No. 044430012. Used for the retraction of the measuring bolt of each probe. Also used to plug the suction loader No. 01660011, 230 V.
5	<b>01660011</b>	<b>Pneumatic suction loader</b> For safe, easy handling of gauge blocks with nominal lengths up to 10 mm. Connected to the electric vacuum pump No. 03260432 or No. 03260433.
6	<b>04430012</b>	<b>TESATRONIC length measuring instrument TT90</b> For a detailed description, see chapter O.

0°C to 60°C

-10°C to 70°C

80%, non-condensing

 Battery charger 100 to 240 V, 50 to 60 Hz.  
Nominal output voltage: 7,3 V

### Electric vacuum pump

No. 03260432 or 03260433 = 230 Vac, 50 Hz

### Temperature device

See page L-8

### Additional data

 ≈ 23 kg (comparator complete, but without computer).  
≈ 4 kg (temperature device)

Shipping packaging

Each execution with the option for greater accuracy is provided with serial number

In-house calibration certificate for the version with greater accuracy or declaration of conformity for the standard version.

Temperature device with SCS certificate.

### Electric vacuum pump in special version

With external control as for No. 03260433, except:

110 Vac, 60 Hz

S32070030


**05960039 Set of TESA UPC accessories**

*consisting of:*

Components as listed under items 7, 8 and 9 below.

7	<b>04761049 Opto-RS cable, bidirectional</b>	For serial data transfer.
8	<b>04760087 Opto-RS interface</b>	For Opto-RS cable to RS 232 PC port.
9	<b>04761070 Connecting cable</b>	For electronic unit TT90 (No. 04430012) to vacuum pump (No. 03260433)
10	<b>04768000 Hand switch</b>	Used for triggering any movement of the measuring bolt along with data transfer from TESATRONIC TT90 (No. 04430012) to host computer. Direct connection to the electronic unit.
11	<b>01690021 Option for greater accuracy and calibration certificate</b>	Consists of TESA UPC (mechanical part No. 01610401 together with TESATRONIC TT90 specially adjusted and calibrated. All key components are marked with serial number.
12	<b>05930011 TESA UPT temperature device for TESA gauge block comparators</b>	Fully calibrated for the measuring ranges from 19°C up to 24°C with a numerical interval to 0,001°C. Supplied with a calibration certificate issued by the Swiss Calibration Service (SCS). Uncertainty of measurement achieved during calibration $U = \pm 0,03$ °C. Used in association with TESA UP software programme for value processing. <i>Consisting of:</i>
	05960018	1 Set of 4 temperature sensors
	05960038	1 FLUKE 1529 temperature device
	05960012	1 Adapter
	05960011	1 Connecting cable For a detailed description, refer page L-15.
13	<b>05960025 TESA UP software programme for value processing</b>	Running under <b>WINDOWS 98, 2000, NT or XP</b> <ul style="list-style-type: none"> <li>For details on the programme related features, report to page L-14.</li> </ul>
14	<b>S59070014 Computer</b>	Available upon request. For minimum requirements, see page L-14.
15	<b>S59070012 Laser Printer, colour</b>	Upright A4 format. USB interface.
16	<b>S59070013 Connecting cable</b>	For USB data transmission between host computer to printer.

#### Hardware



All hardware components listed opposite (items 14 to 16) can be purchased locally. Should you wish to, we may also provide you with a quotation on request.

TESA cannot assure the UP system will operate properly when run on a network. Therefore, we recommend to inquire about a technical information before purchasing your own equipment.





## TESA UP Software Programme for Value Processing

Suitable for both TESA gauge block comparators UPD and UPC as well as for comparators from other manufacturers.

- Choice of 10 languages.
- On-line processing of length and temperature values as transferred.
- Measurement cycles and result outputs according to EN ISO 3650.
- Flexible architecture for optimum adaptation to specific User's needs.
- Possible entry of limit values and accuracy grades peculiar to Users.
- Surveillance of value dispersion or value drift throughout length and temperature measurements.
- Automatic execution of all relevant corrections. The programme makes allowances for actual sizes of the reference standards, flattening due to different materials used (steel, tungsten carbide, ceramic), compensation of temperature variations with reference to 20°C according to the varying coefficients of linear expansion – as typical examples.
- Assignment of gauge blocks to their relevant grade.
- Possible storage of gauge block set related data.
- Inch or metric value processing.
- Calibration certificate in various versions.



05960025

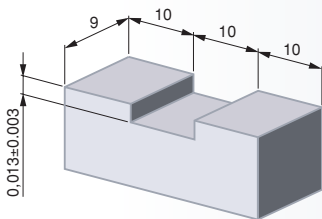


TESA UP software programme for gauge block calibration

Running under WINDOWS 98, 2000, NT, XP

Software package including:

1 CD-ROM plus 1 USB protective Hard-key



## Gauge Blocks for the Calibration of Comparators

To calibrate both TESA gauge block comparators UPD and UPC, we recommend the use of the gauge block set described hereafter. The 9-piece set listed on page L-15 is additionally required for calibrating TESA UPD.

### Set Composition Including 11 Gauge Blocks

Each pair is in full compliance with:

- EAL-G21 – Calibration of Gauge Block Comparators – European cooperation for Accreditation of Laboratories
- DKD-R 4-1 – Guidelines of the German Calibration Service (DKD) for the calibration of gauge block comparators.



µm

Set of 11 gauge blocks for calibrating each comparator

Set composition as listed in the chart opposite. Supplied with:

<b>S59110152</b>	Calibration certificate issued by the Physikalisch Technische Bundesanstalt (PTB) ± 0,015
<b>S59110489</b>	Calibration certificate issued by a laboratory accredited by the German calibration service (DKD) ± 0,030

Full tungsten carbide set also available on request



Pairs No	Nominal length	
	A mm	B mm
1	0,5	0,5
2	1,0	1,005
3	1,0	1,01
4	4,0	4,0
5	100,0	100,0
6	6,0	6,0*

\* Special bridge-shaped gauge blocks (see drawing) used for establishing the measuring deviations of lower probe B.



EN ISO 3650



Metric/Inch units

Minimum profile requirements for the computer needed to run the TESA UP software programme



Personal Computer

- Configuration without heat source to avoid disturbing the ambient temperature at the measurement spot.
- Operating system: Windows 98, 2000, NT or XP
- Processor: 650 MHz
- 1 Hard disc (6 GB)
- RAM capacity: 64 MB
- CD-ROM drive (24x)
- RS 232 serial port  
1 for length values  
1 for temperature values
- USB port



EN ISO 3650



Special high-alloy steel,

wear resistant and stable. Exception: 6 mm special carbide gauge blocks.



Class K



The given expanded uncertainty

k = 3 refers to the difference of central length of both gauge blocks A and B forming the pairs 1 to 5 as well as to the deviations  $f_1$  and  $f_2$  from the central length of gauge blocks forming both pairs 2 and 3. No need to calibrate those of pair No. 6.



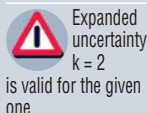
Wooden case



Identification number



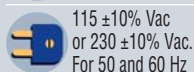
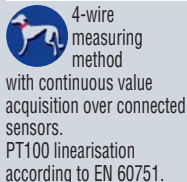
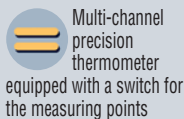
PTB or DKD calibration certificate



**Temperature Sensors**



**Temperature Device**



Additional technical data listed on page L-8

## Additional Gauge Block Set for the Calibration of TESA UPD

To achieve the lowest uncertainty of measurement, we recommend the use of reference standards of grade K, which are measured directly by interferometry and come along with a calibration certificate. And this, irrespective of any other requirement such as the ambient conditions.



**9-piece gauge set for the calibration of TESA UPD**

Set composition as listed in table opposite. Supplied with:

<b>S59300103</b>	Calibration certificate issued by the laboratory of a national institute of metrology Metas (Switzerland)	$\pm(0,02+0,2 \cdot L) \mu\text{m}$ L in m	Measuring method: direct interferometry
<b>S59300107</b>	PTB (Germany)		
<b>S59300104</b>	Calibration certificate issued by a laboratory officially accredited SCS	$\pm(0,05+0,5 \cdot L) \mu\text{m}$ L in m	Measuring method: by comparison



Set Composition (mm)  
1 5 10 15 20 25 50 75 100



Steel



Accuracy grade K

Other set compositions or carbide gauge blocks also available on request.

## TESA UPT Temperature Devices



**05930011**

**TESA UPT temperature device for TESA Gauge Block Comparators**

Fully calibrated for the measuring ranges from 19°C up to 24°C with a numerical interval to 0,001 °C. Supplied with a calibration certificate issued by the Swiss Calibration Service (SCS). Uncertainty of measurement achieved during calibration  $U = \pm 0,03^\circ\text{C}$ .

Consisting of:

**05960018**

1 Set of 4 temperature sensors

PT100 platinum resistances giving exceptional long-term stability while drifts are kept to a minimum over years of use.

This set includes the following sensors:

- 1 Temperature sensor with clamp R for reference gauge blocks having nominal lengths from about 14 mm, No. 05960009.
- 1 Temperature sensor with clamp P for gauge blocks to be calibrated having nominal lengths from about 14 mm, No. 05960008
- 2 Temperature sensors mounted on the measuring stand or the table. PT 100 sensors. 3 g8 in diameter, 10 mm long. Order number for a single item: 05960010.

**05960038**

1 FLUKE 1529 measuring unit for temperature

Precision thermometer including a switch for the measuring points.

With use of the PT 100 platinum resistances, provides 4 measuring channels with a 0,001 °C numerical interval. RS 232 or IEEE 488 data output. 115 or 230 Vac for 50 or 60 Hz.

**05960012**

1 Adapter. Allows up to 4 temperature sensors to be connected.

**05960011**

1 Connecting cable

For adapter No 05960012 to measuring unit No 05960038.

**05960026**

**Connecting cable**

For serial data transfer from temperature device to computer, 9-pin/m and 9-pin/f connector.



## ETALON POLO Horizontal Measuring Bench

A giant for small sizes – Specially designed for the control of measuring and test equipment in compliance with ISO 9000.

- Application range from 0 up to 100 mm for external dimensions or 2,5 up to 110 mm for internal dimensions – 50 mm measuring span.
- Resolution to 0,001 or 0,0001 mm – Metric/Inch conversion.
- Maximum permissible error of 0,5  $\mu\text{m}$ .
- Measuring force from 0 to 4 N.
- Comes with a calibration certificate issued by the supplier.



Shipping packaging



Identification number



In-house calibration certificate



### Calibration of Standards

- Cylindrical test pins
- Setting standards with cylindrical, plane-parallel measuring faces
- Threaded reference gauges (calibrated using the 3-wire method)
- Setting masters
- Setting rings

### Calibration of Plug Gauges

- Limit plug gauges
- Plug gauges «GO»
- Plug gauges «NOT GO»
- Plain plug gauges
- Ring gauges «GO»
- Ring gauges «NOT GO»
- Threaded plug gauges



**ETALON POLO**  
Measuring Bench



0 to 100 mm for external dimensions  
• 10 to 110 mm with standard accessories

• 2,5 to 110 mm with optional accessories



50 mm measuring span



Max. perm. error within the measuring span:  
0,5 µm with standard accessories



0,1 µm



0 to 4 N



Opto-electronic measuring system with incremental glass scale, type LIF – HEIDENHAIN



8,0 · 10<sup>-5</sup> /°C



Tilting range of the floating table ± 0,5°



See on drawing  
• shortest distance A = 0 mm  
• longest distance A = 11,5 mm



19,0 kg net net  
(main part alone, without table)  
2,8 kg net (floating table)  
2,1 kg net (fixed table)



10°C to 40°C



-10°C to 40°C



EN 50081-1  
EN 50082-2  
EN 61000-4-2  
EN 61000-4-4



**Calibration of Hand-Held Tools**

- Dial gauges
- Precision indicators
- Dial test indicators (lever-type)
- Electronic probes



**ETALON POLO with Floating Resting Table**



**05939001 ETALON POLO measuring bench with floating resting table and HEIDENHAIN computing counter ND 287 included.**

*Consists of the following main components:*

**05919002 1 Main part**

Application range 0 to 100 mm for external dimensions or 10 to 110 mm for internal dimensions (with standard accessories). 50 mm measuring span.

Base plate with measuring unit and mounting block for the fixed measuring stops fitted with a stop pin; measuring unit equipped with a spindle as well as opto-electronic system featuring an incremental glass scale. Stop pin and spindle have both a mounting bore for a 6,5 mm dia. measuring insert; attachment for the stops and measuring device allowing the table to be moved vertically, and then tilted for inside measurements. Also with adjust system for the measuring force.

**05969024 1 Pair of standard measuring inserts for external dimensions**

With a 6,5 mm dia. tungsten carbide flat face, already mounted.

**05969015 1 Floating resting table**

Already mounted, also interchangeable. Used for positioning parts in the measuring direction when inspecting internal dimensions. Includes a stainless steel plate, hardened and ground, mounted on ball bearings. 200 x 100 mm table surface area, also with mount for the limit stops.

**05969029 1 HEIDENHAIN computing counter ND 287**

Up/down counter with LCD color display. Switchable from metric to inch. Captures both extreme values with output of the difference between these values. Value classification capability. RS 232 data output.

*Supplied with the following standard accessories:*

**05969020 1 Pair of standard inserts for internal dimensions from 10 mm**

Stainless steel measuring face, hardened and ground. Ball tip section R = 2,5 mm. M4 locking screw.

**05969030 1 Dust cover**





## ETALON POLO with Fixed Resting Table



**05939000 ETALON POLO measuring bench with fixed resting table and HEIDENHAIN computing counter ND 287 included**

*Consists of the following components:*

- 05919002 1 Main part**  
As described on the previous page.
- 05969024 1 Pair of standard measuring inserts for external dimensions**  
With a 6,5 mm dia. carbide flat measuring face, already mounted.
- 05969014 1 Fixed resting table**  
Already mounted, also interchangeable. Used for internal measurements. Includes a stainless steel base plate, hardened and ground. Table surface 200 x 100 mm. Also with stop clamp for positioning the workpiece.
- 05969029 1 HEIDENHAIN computing counter ND 287**  
Up/down counter with LCD color display. Switchable from metric to inch. Captures extreme values with output of the difference between both. Value classification capability. RS 232 data output.

*Supplied with the following standard accessories:*

- 05969016 1 Single pair of standard inserts for internal dimensions from 10 mm**
- 05969030 1 Dust cover**

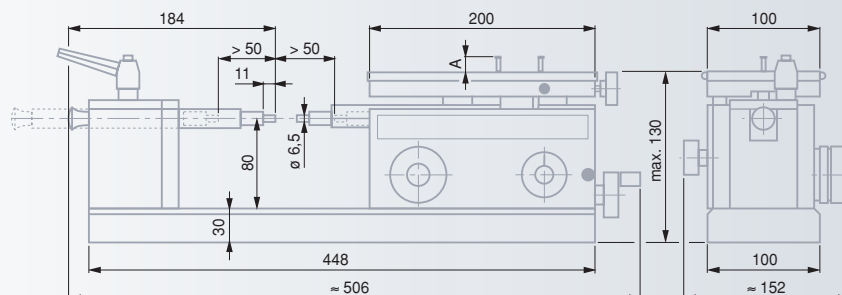
### Workpiece Inspection

#### External dimensions

- Stepped shafts
- Cutting tools
- Cylindrical pins
- Ball tips
- Grooves
- Short centring shoulders
- Threads (measured according to the 3-wire method)

#### Internal dimensions

- Through bores
- Blind bores
- Centring grooves
- Slots
- Sliding guides



### HEIDENHAIN ND 287 Computing Counter



Up/down counter for inner data processing and output



TFT display screen, 9-decade plus sign. Auxiliary display for active functions.



0,001 and 0,0001 mm or 0.0001 and 0.00001 in



14 mm



RS 232



0°C to 45°C



-30°C to 70°C



75%



100 to 240 Vac (-15% to +10%), 50 to 60 Hz



211 x 112 x 209 mm (L x H x D)



≈ 2,5 kg



IP40 (IEC 60529)



Noise acuteness to grade 4 (VDE 0843, Parts 2 and 4)



EN 55022, class B



### Standard Accessories

Available according to the model supplied.

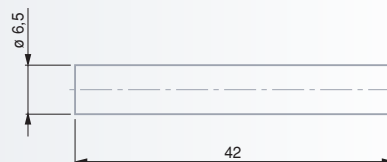


- 05969024** 1 Pair of standard measuring inserts for external dimensions  
6,5 mm dia. carbide inserts with a flat face
- Standard measuring inserts for internal dimensions from 10 mm**  
5 mm dia. inserts with stainless steel measuring face, hardened. M4 locking screw.
- 05969020** 1 Pair of inserts for use with the floating table  
No. 05960015, H = 20 mm.
- 05969016** 1 Pair of inserts for use with the fixed table  
No. 05969014, H = 12,5 mm.

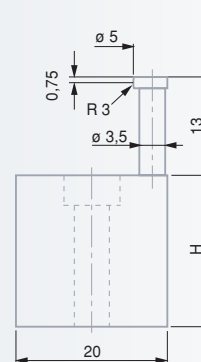
### Optional Accessories



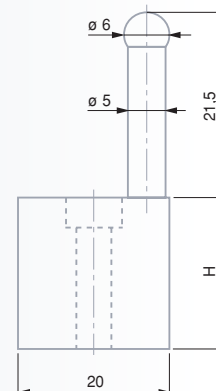
- Measuring inserts for internal measurement using the floating resting table**  
Height H = 20 mm. M4 locking screw.
- 05969021** 1 Pair for internal dimensions from 2,5 mm  
Barrel-shaped inserts with a 1,2 mm dia. carbide ball tip.
- 05969023** 1 Pair for internal dimensions from 5 mm  
Fitted with a 1,5 mm dia. carbide ball tip.
- 05969022** 1 Pair for internal dimensions from 13 mm  
Fitted with a 6 mm dia. carbide ball tip.
- Measuring inserts for internal measurements using the fixed resting table**  
Height H = 12,5 mm. M4 locking screw.
- 05969017** 1 Pair for internal dimensions from 2,5 mm  
Barrel-shaped inserts, with a 1,2 mm dia. carbide ball tip.
- 05969019** 1 Pair for internal dimensions from 5 mm  
Fitted with a 1,5 mm dia. carbide ball tip.
- 05969018** 1 Pair for internal dimensions from 13 mm  
Fitted with a 6 mm dia. carbide ball tip.
- 05969028** 1 Pair for external dimensions  
Tungsten carbide flat measuring face, D = 2 mm.
- 05969027** 1 Pair for external dimensions  
Tungsten carbide flat measuring face, D = 8 mm.
- Attachments for the measuring inserts**  
05969025 with mounting thread G = M2,5  
05969026 with mounting thread G = 1/48 in
- Inserts with special design** available on request  
Inserts with M2,5 thread, see pages F-42 to F-44.
- Wires** for thread measurement, see page C-24.



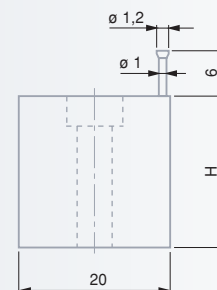
05969024



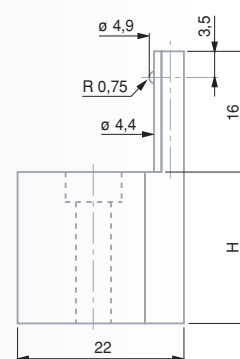
05969016-20



05969018-22



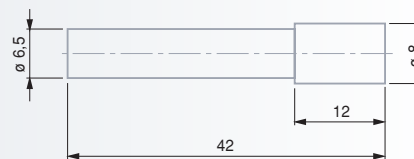
05969017-21



05969019-23



05969028



05969027



05969025/26



- 05969000** Bench stand with swivelling plate  
For raising the measuring bench from horizontal to vertical position. Accommodates a clamp lever. Length (upright): 295 mm, mass ≈ 20 kg.





05969002

05969001



05969003

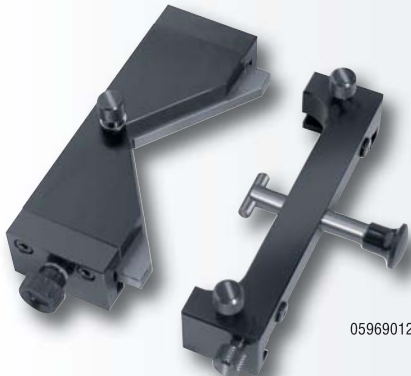


05969034



05969005

05969007/8



05969012



05969010



**05969001**

**Base for the computing counter**

For heightening the HEIDENHAIN computing counter ND 287 up to 380 mm, mass 5,2 kg.

**Intermediate resting block**

Features a 10 mm dia. mounting bore for:

- resting table No. 05969003
- Holder No. 05969004 for a dial test indicator (lever-type)

**Supporting plate**

Used for external measurement. 60 x 60 mm surface area with recesses. Hardened, ground steel. Also with a 10 mm dia. fixing pin.

**05969034**

**Floating resting table**

Used for external measurement on oblong parts up to 60 mm in diameter; centres, L=160 mm; movable positioning fixture for parts having varying lengths, 3 freedom degrees.

*Consisting of:*

**05969032**

Resting table with centres

**05969033**

Vise support for cylindrical test pins

**05969005**

**Intermediate resting block**

Used in conjunction with the floating mount device No. 05969013.

**05969012**

**Centring device**

Allows to search for the transverse culmination point against the measuring direction. Used with either of both fixed or floating table No. 05969014 or 05969015. Prismatic stop adjustable transversely, max. diameter 110 mm. Counterpressure piece finished with cylindrical stop pins.

**Clamping rods**

For clamping the instruments that need be calibrated such as dial gauges or precision indicators.

**05969010**

For fixing shafts with a 8 mm dia.

**05969011**

$\frac{3}{8}$  in dia.

**05969004**

**Holder**

**for a dial test indicator (lever-type)**

Provided with 2 dovetail clamps, TESASTAST-type or in compliance with BS 2795:1981.

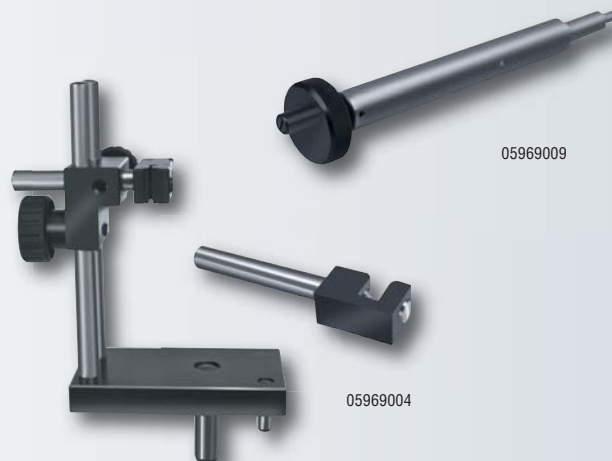
**05969009**

**Spindle for calibrating dial gauges, dial test indicators and the like**

Setting range = 50 mm,  
Spindle rotation = 0,5 mm



Shipping packaging



05969009

05969004

# Surface Roughness Testing





### Roughness Parameters Commonly Used in Short

#### Mean roughness $R_a$ (ISO 4287, DIN 4768)

The mean roughness  $R_a$  matches the arithmetical mean of the absolute values related to the profile deviation  $y$  within the reference length  $l$ .

#### Max. profile valley depth $R_{max}$ (DIN 4768)

The max. profile valley depth  $R_{max}$  counts for the most significant single roughness depths  $Z_i$  within the total length  $l_m$ .

According to ISO 4288 and DIN 4287 - Part 1, this parameter is also specified as  $R_y \max$ .

#### Mean roughness depth $R_z$ DIN (DIN 4768)

The mean roughness depth  $R_z$  is the arithmetical mean of single roughness depths of successive sampling lengths  $l_e$ .

According to ISO 4287 and DIN 4762, the parameter  $R_z$  DIN is also specified as  $R_y5$ .

Since  $R_z$  changes its name in both DIN 4768 and ISO 4287, this parameter is also specified as  $R_z$  DIN or  $R_z$  ISO.

If the parameter  $R_z$  is measured according to DIN, it is generally admitted that the extreme value specified by ISO is matched providing that  $R_z$  ISO does not exceed  $R_z$  DIN.

### Use of Roughness Comparison Specimens

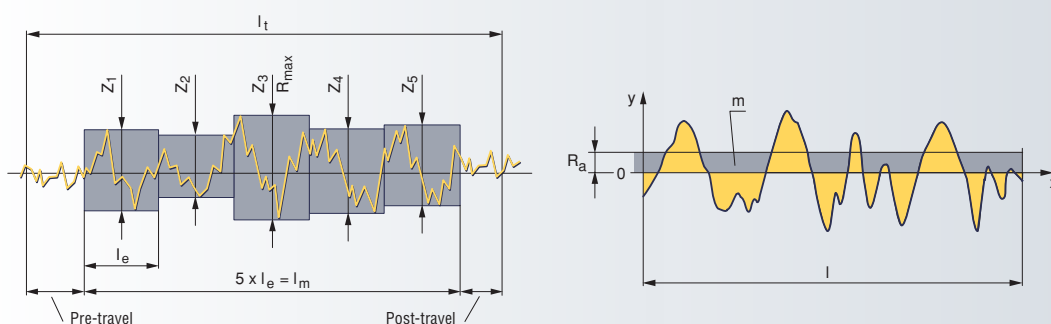
These specimens used for testing any surface finish quality have long proven their value in praxis.

They serve for touch and/or sight comparisons with the surface of work pieces that are produced using the same manufacturing process. Condition is that materials have to be comparable.

When comparing the workpiece surface against the specimen, roughness is not quantitatively expressed. The assessment of the extent to which the surface finish of both is alike can only be subjective.

Sight comparison requires optimum light source angle. For small surfaces, the use of a magnifying glass with up to 8x magnification is recommended.

Touch comparison is made using the finger nail or a small cooper piece like a coin, for instance.



## TESA RUGOSURF 10 Roughness Gauge

Robust, versatile and compact gauge unit designed for inspecting any work piece surface finish and capturing roughness parameter values – Wide variety of probes for the most varied applications – Possible tolerancing of each parameter available.

- Interchangeable probe, swivelling through to 90° to let you measure even in hard-to-reach recesses.
- Extended autonomy. Can equally be connected to the mains adapter or the battery pack for direct use on a machine-tool.
- Value storage, output or transfer to a PC of up to max. 100 measured values).
- USB data output for full use and further storage of the measurement results.
- Automatic idle mode if the gauge is left unused for 40 seconds. Preserve the battery pack.
- Fast and easy analysis of the results obtained from the measured parameters with assigned tolerances.



USB

ISO 3274 (Cl.1)

10°C to 40°C

-10°C to +50°C

122 x 53 x 81 mm  
(gauge unit alone)

590 g



Suited  
plastic case

Declaration  
of conformity



06930010



TESA RUGOSURF roughness gauge 10

delivered with the following standard accessories:

Roughness standard, nominal value  $R_a = 2,97 \mu\text{m} / 117 \mu\text{in}$

Rechargeable battery 8,4 V, 170 mAh, NiMH in PP3 format

Standard probe, type **SB10**

Battery charger

Adapter for universal stand, 8 mm diameter

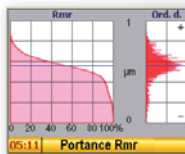
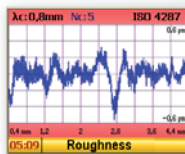
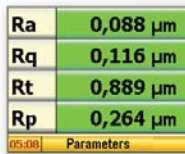
Positioning support



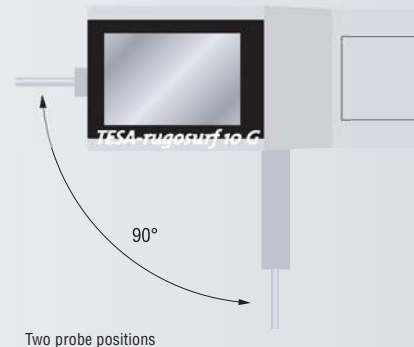
# TESA RUGOSURF Roughness Gauge 10G

Portable, versatile gauge unit with compact design, well suited for receiving inspection or for use in the production area or the measurement laboratory.

Measures roughness parameters according to ISO 4287:1997/ JIS B0601:2001, DIN and ISO 12085:1998 (MOTIF or CNOMO).



- TFT graphic display for optimum visual representation of any measured parameters and workpiece profiles, size to 2".
- Direct displaying of all measured values and computed profiles.
- 31 roughness parameters available.
- Wide autonomy through mains adapter or battery pack.
- Output, storage or transfer to a PC of the results obtained from a number of measurements as high as 999.
- Possible tolerancing of all parameter values.
- Multilingual menu options.
- USB data output enabling a direct connection to the printer unit or a conventional PC equipped with RUGOSOFT 10 (both are optional).





**06930011 TESA RUGOSURF roughness gauge 10G**

*Delivered with the following standard accessories:*

- Roughness standard, nominal value Ra = 2,97 µm / 117 µin
- Rechargeable battery 7,2 V, 300 mAh, NiMH in PP3 format
- Standard probe, type **SB10**
- Battery charger
- Adapter for universal stand, 8 mm diameter
- Positioning support

**Technical Data**

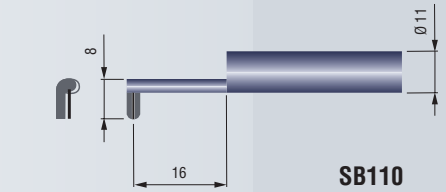
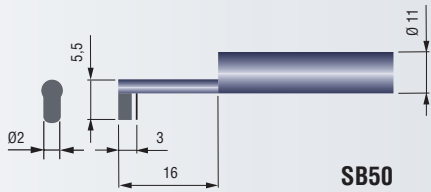
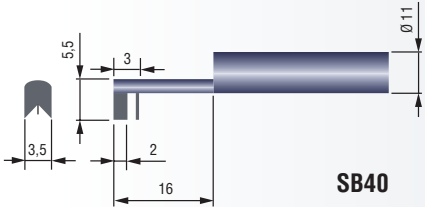
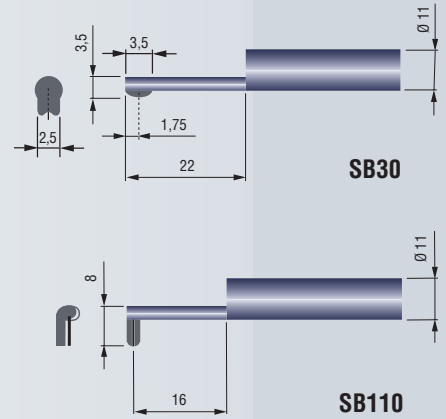
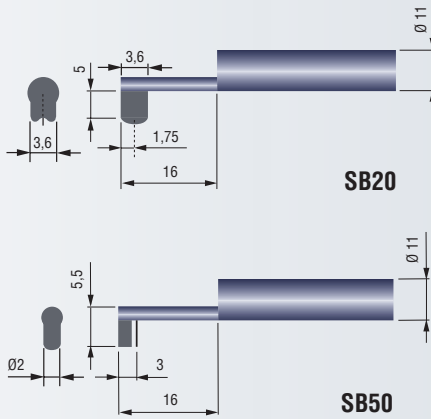
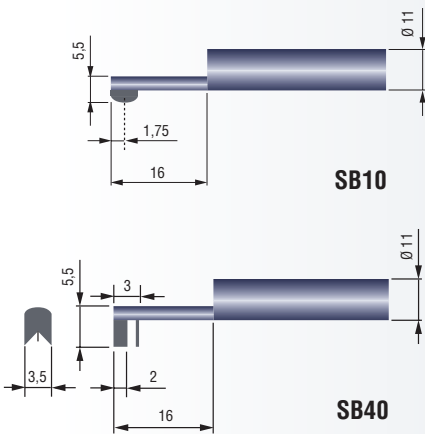
	 <b>06930010</b>	<b>06930011</b>
	 <b>RUGOSURF 10</b>	<b>RUGOSURF 10G</b>
Display	LCD, 2 lines of 16 characters	TFT colour display, 2" in size
Roughness parameters	according to ISO 4287-1997/JIS B0601 / ASME B46-2002 Ra - Rq (RMS) - Rt - Rz - Rc - Rsm according to ISO 12085 (CNOMO) Pt - R - Rx - AR	according to ISO 4287-1997/JIS B0601:2001 ASME B46-2002 Ra - Rq (RMS) - Rt - Rz - Rp - Rc - Rv - Rsm - Rδc - Pa - Pq - Pt - Pp - Pc - Pv - Psm - Pδc according to PrEN 10049 RPC - PPC according to ISO 13565 Rk - Rpk - Rvk - Mr1 - Mr2 according to DIN 4776 Rmax according to DB N31007 R3z - R3zm according to ISO 12085 (CNOMO) Pt - R - Rx - AR
Measuring span		
X-axis	16 mm (0.63 in)	16 mm (0.63 in)
Z-axis	160 µm (6300 µin)	300 µm (11810 µin)
Unit system	mm / in	mm / in
Range of indication	Ra 0 ÷ 40 µm (0 ÷ 1575 µin) Rt 0,05 ÷ 160 µm (0 ÷ 6300 µin)	Ra 0 ÷ 75 µm (0 ÷ 2952 µin) Rt 0,05 ÷ 300 µm (0 ÷ 11810 µin)
Resolution	0,01 µm (0.1 µin)	0,001 µm (0.01 µin)
Cut-off length	0,25-0,8-2,5 mm (0.01-0.03-0.1 inch)	0,25-0,8-2,5 mm (0.01-0.03-0.1 inch)
Numerical filter	Gaussian as per ISO 11562	Gauss as per ISO 11562
Traversing length $l_t$	(number of cut-offs + 1) x $\lambda_c$	(number of cut-offs + 1) x $\lambda_c$
Cut-off $l_c$	number of cut-offs x $\lambda_c$	number of cut-offs x $\lambda_c$
Number of selectable cut-offs	1 to 5	1 to 10 cut-offs of 0,25 and 0,8 mm 1 to 5 cut-offs of 2,5 mm
Probing speed	1 mm/s	1 mm/s
Reverse speed	2 mm/s	2 mm/s
Keypad	4-key, membrane type key pad, protected against dust particles and liquids	4-key, membrane type key pad protected against dust particles and liquids
Probe	Inductive probe	Inductive probe
Stylus	90° diamond tip	90° diamond tip
Tip radius	5 µm	5 µm
Measuring force	0,75 mN (ISO 3274)	0,75 mN (ISO 3274)
Languages	English, French, German, Spanish, Italian, Portuguese	English, French, German, Spanish, Italian, Portuguese
Memory capacity	max. 100 measured values	max. 999 measured values
Power supply	Battery pack, 8,4 V – 170 mAh	Battery pack, 7,2V – 300 mAh
Power consumption	max. 3 VA at 220 V	max. 6,5 VA at 220 V
Overall dimensions	122 x 53 x 81 mm (gauge unit alone)	122 x 53 x 75 mm (gauge unit alone)
Weight	590 g	590 g



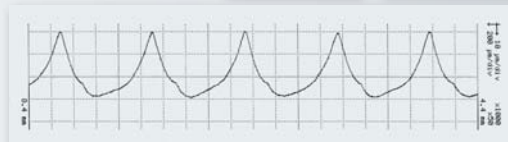
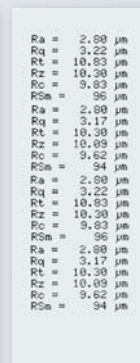


## Optional Probes

N°	Icon	Probe Description
06960036	SB10	Standard probe for surfaces and bores, internal/external diameters of >10 mm.
06960037	SB20	Probe for grooves, max. depth 5 mm.
06960038	SB30	Probe for small bores from 4 mm dia.
06960039	SB40	Probe with V-skid for cables with external diameter of >1 mm.
06960040	SB50	Probe with front mounted contact skid for concave surfaces. Ideal for 90° measurement.
06960056		Probe extension, 100 mm long (1 single item).
06960057	SB110	Probe for concave or convex surfaces, smaller tip radius to 5 mm.



## Matrix Printer



N°	Icon	Item Description
06960033	Matrix printer, 24 columns	
<i>Provided along with:</i>		
		Rechargeable battery pack
		Connecting cable to RUGOSURF 10/10G/90G
06960043		Inked ribbon fort printer (3 items)
06960044		Paper rolls, 57 mm wide (10 units)

# RUGOSOFT 10 Software



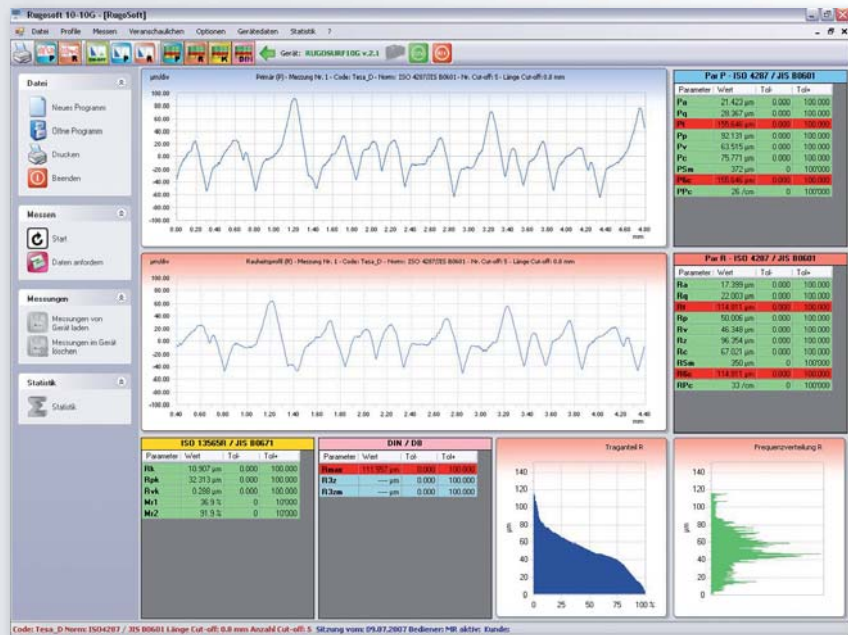
**06960034 Rugosoft 10 software**

Provided along with:

CD with all instructions for installation, 6 languages available

Instruction manual plus on-line help (included on the CD)

USB cable, L = 1,80 m



## Additional Accessories



**06960035** Support with granite base, 400 x 250 mm

**06960041** Roughness standard, nominal value Ra = 2,97 µm / 117 µin

**06960042** Remote control

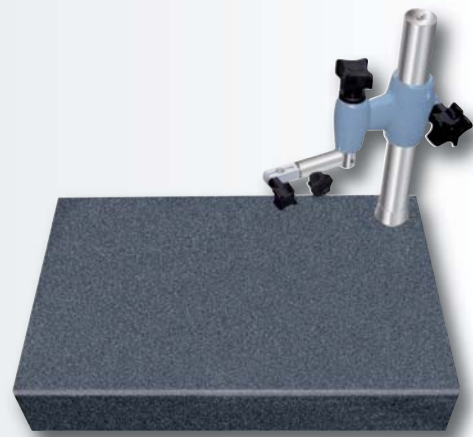
**06960045** Battery pack for powering Rugosurf 10G

**06960046** Mains adapter, 100 to 240 Vac / 50 to 60 Hz

**06960047** Suited plastic case for both Rugosurf 10 and 10G

**06960059** Double connector for external power switch and printer

**06960063** Battery pack for Rugosurf 10



06960035





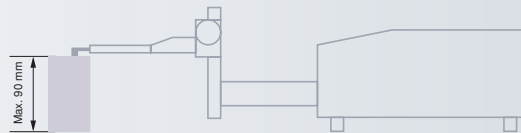
## TESA RUGOSURF Roughness Tester 90G

Small-size, versatile roughness tester providing maximum ease of use – Ideally suited for high-precision measurements on the shop floor or in the inspection laboratory.

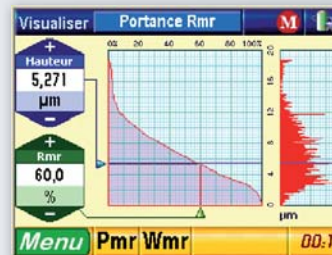
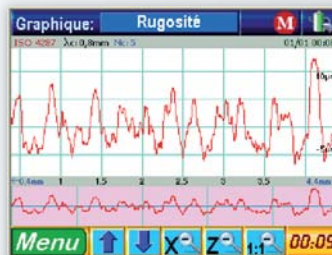
- Measures roughness parameters according to ISO 4287, 12085 (CNOMO), 13565, DIN 4776, JIS B0601:2001 and ASME B46-2002.
- Tactile TFT colour display with size to 3,5".
- Three function keys.
- Graphical interface.
- Direct displaying of all measured values and computed profiles.
- Measuring span to 50 mm/2 in (X-axis) or 1000  $\mu\text{m}/39370 \mu\text{in}$  (Z-axis).
- Interchangeable probe, with or without contact skid.
- Possible input of tolerances.
- USB digital output for data transfer to a PC running TESA Measurement Studio (this software is available as an option).
- Measures up to 90 mm vertically without the need for a special support.
- Profile measurement up to 2 mm (optional accessory).



USB



Visualiser	Paramètres	M	
Ra	2,927 $\mu\text{m}$	R $\delta$ c	18,793 $\mu\text{m}$
Rq	3,529 $\mu\text{m}$	R $r_{\text{max}}$ 1 0,0%	R $r_{\text{max}}$ 2 100,0%
Rt	18,783 $\mu\text{m}$	RP $c_{(1,0)}$	36 /cm
Rz	13,182 $\mu\text{m}$	Pa	4,338 $\mu\text{m}$
Rp	7,681 $\mu\text{m}$	Pq	5,763 $\mu\text{m}$
Rv	5,501 $\mu\text{m}$	Pt	34,086 $\mu\text{m}$
Rc	9,627 $\mu\text{m}$	Pp	20,840 $\mu\text{m}$
RSm	249 $\mu\text{m}$	Pv	13,246 $\mu\text{m}$
		Pc	10,464 $\mu\text{m}$



06930012



TESA RUGOSURF roughness gauge 90G

Supplied with the following standard accessories:

Roughness standard, Ra = 2,97  $\mu\text{m}$  / 117  $\mu\text{in}$

Rechargeable built-in battery, 12 V



**SB60/10** standard probe, with or without contact skid

Two-position probe holder  
 – Locked for probe without skid  
 – Unlocked for probe with skid

Guiding column, setting range up to 90 mm

Battery charger, 100 to 240V, 50/60 Hz

## Technical data

	<b>06930012</b>
	<b>RUGOSURF 90G</b>
Display	Tactile TFT colour display, size 3,5" Resolution 320 x 240 pixels, 256 colours
Roughness parameters	according to ISO 4287:1997/JIS B0601:2001 / ASME B46-2002 Ra – Rq – Rt – Rz – Rp – Rv – Rc – RSm – Rδc Pa – Pq – Pt – Pp – Pv – Pc – PSm – Pδc Wa – Wq – Wt – Wz – Wp – Wv – Wc – WSm – Wδc according to ISO 13565 Rk – Rpk – Rvk – Mr1 – Mr2 according to PrEN 10049 PPc – RPC- WPC according to DIN 4776 Rmax according to DB N31007 R3z – R3zm according to ISO 12085 (CNOMO) Pt – R – AR – Rx – Wte – AW – Wx – Rke – Rpke – Rvke – W – Mrle – Mr2e
Measuring span	
X-axis	50 mm
Z-axis	1000 µm
System of units	mm / in
Resolution	0,001 µm (0.01 µin)
Cut-offs	0,08 - 0,25 - 0,8 - 2,5 - 8 mm
Numerical filter	Type Gaussian as per ISO 11562
Traversing length $l_t$	(number of cut-offs + 1) x $\lambda_c$
Cut-off $l_c$	number of cut-offs x $\lambda_c$
Probing speed	0,5 mm/s – 1 mm/s
Number of selectable cut-offs	1 up to 19 cut-offs of 0,08; 0,25; 0,8; 2,5 mm 1 up to 5 cut-offs of 8 mm
Keypad	Three-key, membrane-type keypad protected against dust particles and liquids
Probing system	inductive probe
Probe tip	90° diamond tip
Tip radius	5 µm
Measuring force	0,75 mN (ISO 3274)
Available languages	English, French, German, Spanish, Italian, Portuguese
Memory capacity	≈ 60 000 measurements
Autonomy	≈ 2 000 measurements / ≈ 10 hours
Power supply	12V integrated Battery pack – Battery charger 100 to 240 Vac, 50/60 Hz
Power consumption	max. 20 VA at 220 V
Overall dimensions	270 x 140 x 90 mm (gauge unit alone)
Weight	3 kg



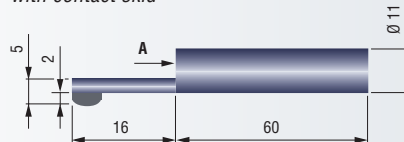


Optional probes (90° diamond tip with a tip radius to 5 µm, unless otherwise specified)

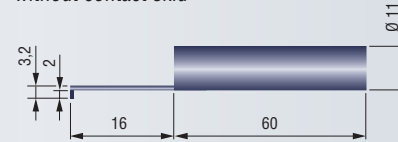
Part No.	Model	Description
06960049	SB60/10	<b>Probe with contact skid</b> For surfaces and bores with external diameter over 10 mm or internal diameter smaller than 6 mm.
		<b>Probe without contact skid</b> For surfaces and small bores with diameter from Ø 4 mm.
06960067	SB60/10	Same as 06960049, but with a diamond tip, R=2 µm.
06960050	SB20 P	Probe for grooves, max. depth 5 mm.
06960051	SB30 P	Probe for small bores from Ø 4 mm.
06960052	SB40 P	Probe with V-skid for cables with external diameter over 1 mm.
06960053	SB50 P	Probe with contact skid for concave surfaces. Ideal for 90° measurement.
06960054	SB120P	Probe for grooves, max. depth 20 mm.
06960058	SB120S	Probe without skid for grooves, max. depth 15 mm.
06960061	SB60-D2	Probe for small bores with diameter from 2 mm, L = 30 mm.

### SB60/10 Probe

with contact skid



without contact skid

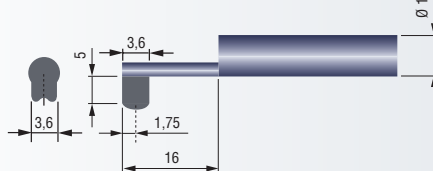


**A** Undo both screws on the front face to remove the skid. Once done, use the probe very carefully for any further measurement (see Fig. 1).

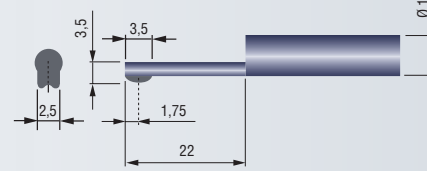


Fig. 1

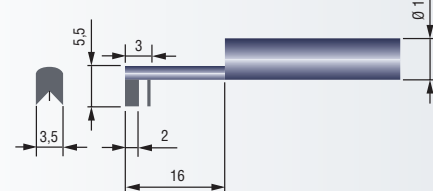
### SB20P Probe



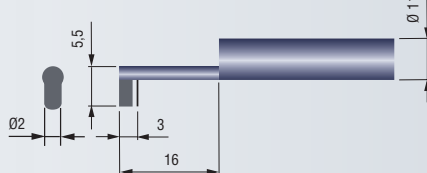
### SB30P Probe



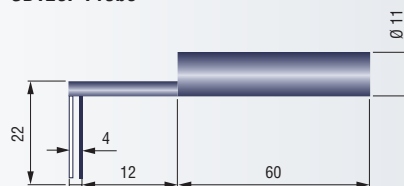
### SB40P Probe



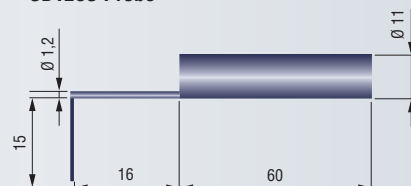
### SB50P Probe



### SB120P Probe



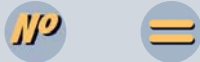
### SB120S Probe



### SB60-D2 Probe



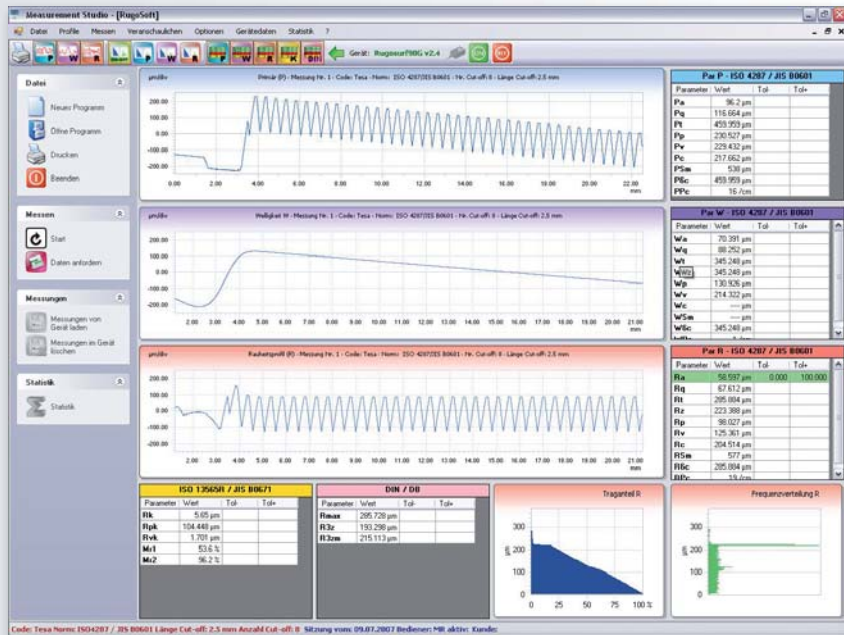
# Measurement Studio Software



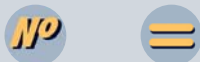
**06960048** TESA Measurement Studio Software

provided with:

- Instructions for installation, 6 languages available on the CD
- Instruction manual plus Online Help (also available on the CD)
- USB connecting cable, L = 1,80 m



## Additional Accessories



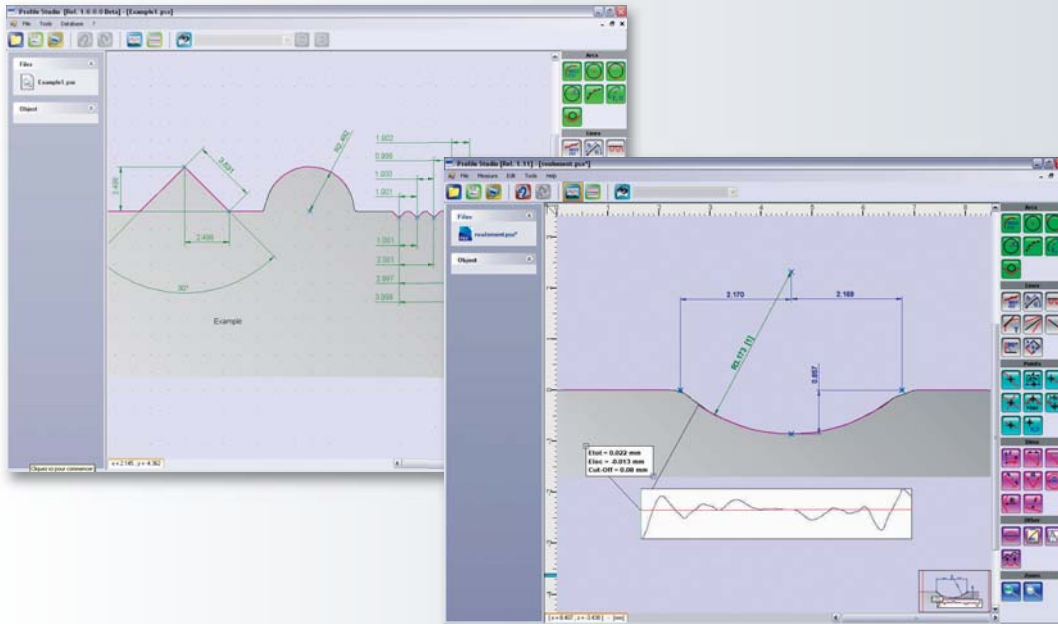
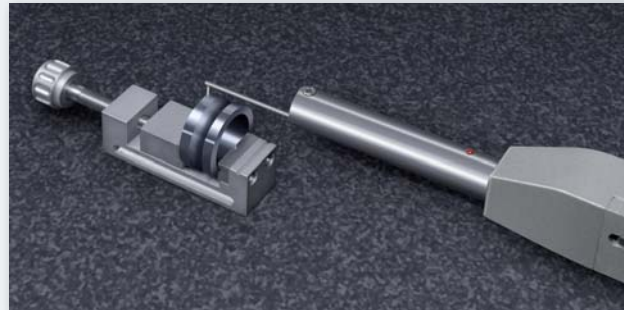
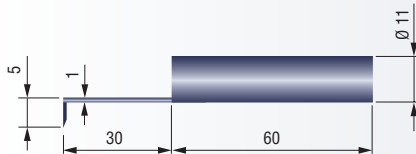
- 06960041** Roughness standard, Ra = 2,97 µm / 117 µin
- 06960064** Roughness standard, Ra = 0,1 µm
- 06960065** Roughness standard, Ra = 0,5 µm
- 06960066** Roughness standard, Ra = 1 µm
- 06960055** Support with granite base, 630 x 400 mm. Height adjustment over 200 mm

For printer and remote control, see both pages M-6 and M-7.



## OPTIONAL PROFILE MEASUREMENT

Fitted with a probe with special design, your Rugosurf 90G changes into a profile gauge. Simple and accurate, this tool used in connection with its proper software can measure any length, radius or arc of circle on any parts. Sometimes, checking these features is just impossible.



- Z = 2 mm  
X = 50 mm
- Z = 0,1 µm  
X = 0,4 ÷ 4 µm  
depending on measured length
- Z = 3,5 + 0,75 \* H µm,  
\*H in mm  
X = 3,5 + L/10 µm,  
L = distance in mm
- 1 mm/s
- 70° (upward probe)  
85° (downward probe)

Fast, easy setting and evaluation of achieved results. Each relevant dimension can be input upon recognition of the part geometry feature (a point, straight line or arc of circle). Both the rotation and symmetry of the profile being checked let it be conveniently aligned.

The use of a measured profile for the evaluation of a new measurement makes all operations easier. Each needed handling is automatically reproduced.

All measurement results, including detailed user-defined reports, are checked at a glance based on specified tolerances.



**06960100 Profile Set 2 mm**

*Supplied with:*

- 06960102** SB 2000 probe
- 06960103** Setting standard (along with inspection report)
- 06960101** Profile Studio multilingual software (EN/FR/DE/EN/IT/ES/PT)  
USB connecting cable, L = 1,80 m



ISO 2632  
Parts 1 and 2

Rust-resistant  
nickel

Specimens  
for roughness  
comparison  
cannot be used as reference  
ones. Therefore, they are  
not suitable for calibrating  
surface roughness testers.

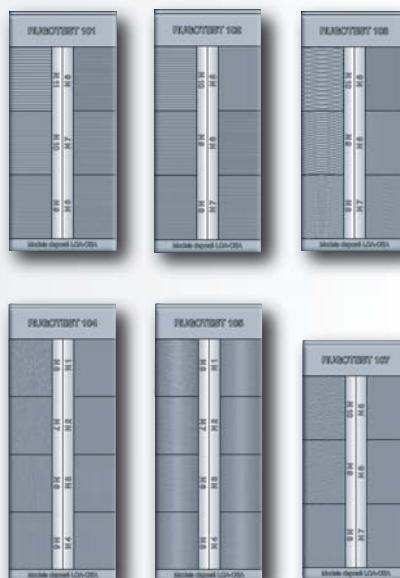
Leather case

# RUGOTEST Roughness Comparison Specimens

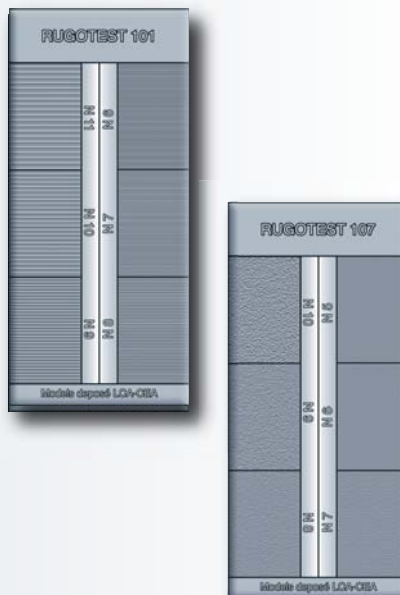
For touch and/or sight comparisons of the workpiece surface finish.

## Sets of roughness specimens for single machining methods according to ISO roughness parameters

No	RUGOTEST	RUGO-TEST	Number of single specimens	ISO roughness parameters
<b>081112346 RUGOTEST A4</b>				
<i>Consisting of the following single specimens:</i>				
081112053	Metal working	1	27	N2 ÷ N10
081112054	Hand grinding	2	6	N6 ÷ N11
081112055	Shot blasting	3	18	N6 ÷ N11
081112056	Hand filing	4	6	N6 ÷ N8
<b>081112345 RUGOTEST A6</b>				
<i>Consisting of the following single specimens:</i>				
081112058	Planing	101	6	N6 ÷ N11
081112059	Turning	102	6	N5 ÷ N10
081112060	Face milling	103	6	N5 ÷ N10
081112061	Surface grinding	104	8	N1 ÷ N8
081112062	Circular grinding	105	8	N1 ÷ N8
081112063	Spark erosion	107	6	N5 ÷ N10

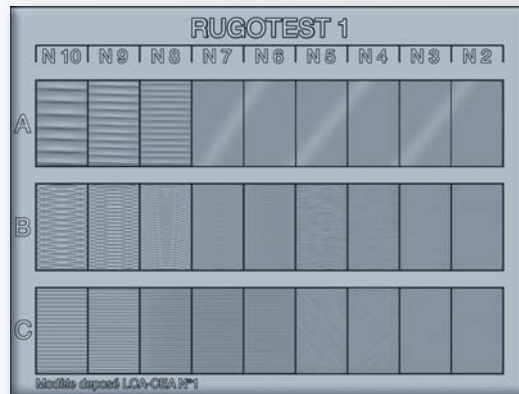


No	RUGOTEST	mm	g
081112053	1	135 x 105	160
081112054	2	120 x 90	160
081112055	3	120 x 90	190
081112056	4	120 x 90	160
081112057	5	120 x 90	200
081112058	101	110 x 50	110
081112059	102	110 x 50	105
081112060	103	110 x 50	110
081112061	104	130 x 50	125
081112062	105	130 x 50	130
081112063	107	110 x 50	110
081112344	12	127 x 27	60
081112346	A4	330 x 250	710
081112345	A6	330 x 250	780





## Specimens for individual machining methods according to ISO roughness parameters



ISO roughness parameters				N0	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11
Mean roughness value Ra	$\mu\text{m}$			0,0125	0,025	0,05	0,1	0,2	0,4	0,8	1,6	3,2	6,3	12,5	25
	$\mu\text{in}$			0.5	1	2	4	8	16	32	63	125	250	500	1000
Mean roughness value Rz iso	$\mu\text{m} / \mu\text{in}$			These values are changing depending on the machining method used.											
<b>Nº</b>	<b>=</b>	<b>RUGO-TEST No.</b>	<b>Number of single-specimens</b>												
<b>081112053</b>	<b>Metal working</b>	<b>1</b>	<b>27</b>												
	Side milling		3									•	•	•	
	Face milling		5							•	•	•	•	•	
	Turning/Planing		5							•	•	•	•	•	
	Grinding		6			•	•	•	•						
	Lapping		4			•	•	•	•						
	Finish grinding/Honing		4		•	•	•	•							
<b>081112054</b>	<b>Hand grinding</b>	<b>2</b>	<b>6</b>							•	•	•	•	•	•
<b>081112055</b>	<b>Shot blasting</b>	<b>3</b>	<b>18</b>												
	Blasting grains														
	– spherical	coarse	3										•	•	•
		fine	6							•	•	•	•	•	•
	– angular	coarse	3										•	•	•
		fine	6							•	•	•	•	•	•
<b>081112056</b>	<b>Hand filing</b>	<b>4</b>	<b>6</b>												
	– straight		3							•	•	•			
	– intersected		3							•	•	•			
<b>081112057</b>	<b>Hand polishing</b>	<b>5</b>	<b>10</b>												
	Surface shape														
	– cylindrical		5		•	•	•	•	•						
	– plane		5		•	•	•	•	•						
<b>081112058</b>	<b>Planing</b>	<b>101</b>	<b>6</b>							•	•	•	•	•	•
<b>081112059</b>	<b>Turning</b>	<b>102</b>	<b>6</b>						•	•	•	•	•	•	•
<b>081112060</b>	<b>Face milling</b>	<b>103</b>	<b>6</b>						•	•	•	•	•	•	•
<b>081112061</b>	<b>Plane grinding</b>	<b>104</b>	<b>8</b>		•	•	•	•	•	•	•	•			
<b>081112062</b>	<b>Circular grinding</b>	<b>105</b>	<b>8</b>		•	•	•	•	•	•	•	•			
<b>081112063</b>	<b>Spark erosion</b>	<b>107</b>	<b>6</b>						•	•	•	•	•	•	•

## Specimens according to Charmille roughness parameters (VDI 3400)

Charmille roughness parameters				12	15	18	21	24	27	30	33	36	39	42	45
Mean roughness Ra	$\mu\text{m}$			0,40	0,56	0,80	1,12	1,60	2,24	3,15	4,5	6,3	9,0	12,5	18,0
<b>Nº</b>	<b>=</b>		<b>Number of single specimens</b>												
<b>081112344</b>	<b>Spark erosion</b>		<b>12</b>	•	•	•	•	•	•	•	•	•	•	•	•

# Height Gauges





# Made To Measure in the Course of the Manufacturing Process

Height gauges are single-axis handtools made to measure on a surface plate, preferably in granite. The TESA-μHITE version being offered to you in this section clearly shows that combining a surface plate with any height gauge can create a whole measuring system.

Providing the needed versatility, they are well suited for dimensional inspection directly on a machine or a group of machines, usually during the various setting and sampling operations throughout the whole manufacturing process. They are specially made for checking parts that are difficult to machine due to their critical sizes.

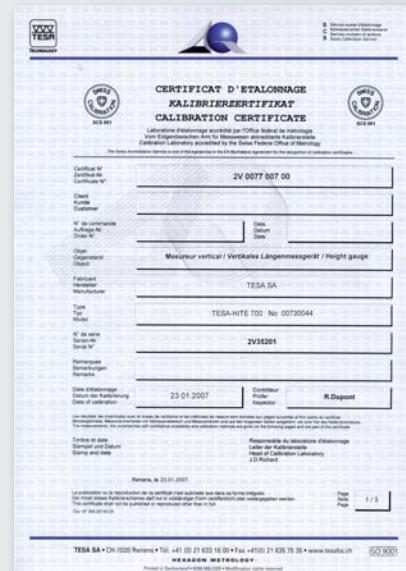
TESA-HITE or TESA MICRO-HITE, whether manually operated or motor-driven, do not require any special skills. Nearly everyone working in the workshop can use them easily.

## SCS Calibration Certificate

The newly implemented TESA-HITE and TESA MICRO-HITE production line now also includes its own temperature-controlled laboratory recently certified by the Swiss Accreditation Service, so that each height gauge comes with a SCS calibration certificate provided free of charge. The negligible temperature variation ( $20^{\circ}\text{C} \pm 0,1^{\circ}$ ) along with the use of high-precision step gauges allow the lowest uncertainty of measurement to be achieved during the calibration process.

- As a first step, all values needed for automatic compensation for the systematic errors of the finished height gauge through Computer Aided Accuracy (CAA) are captured.
- Once conveniently calculated, each single compensation value is then stored in the tool memory so as to allow the correction of the measured values during calibration, automatically.
- Finally, the relevant calibration certificate is issued based on the values obtained during a new series of measurements taken at another measuring point, also equipped with step gauges.

The applied calibration procedure together with the SCS based certification ensure that every TESA height gauge is traceable to national standards.



# Height Measurement – One of TESA's Strengths

TESA offer the largest range of height gauges for reliable one or two-dimensional measurements. En-Users can choose the convenient model according to the requirements of their metrology applications, but also to their financial resources. This wide range goes from the simple height and scribing gauge to the motorised vertical column suitable for high-precision measurements in two coordinate directions.



Height Gauge Models	Details on page	$\mu\text{m}$ (L in m)	Accessory Std (mm)	Accessory Spec. (mm)	Measuring capabilities						
					1D	$\varnothing$	$\perp$	$\sphericalangle$	2D		Moto-rised
TESA-HITE Magna	N-4	8	870	1095	●	●	–	–	–	–	–
TESA-HITE	N-7	2,5+4L	870	1095	●	●	●	–	–	–	–
TESA -HITE plus M	N-10	2,5+3L	860	1085	●	●	●	●	●	●	●
TESA MICRO-HITE	N-12	2+3L	1075	1300	●	●	●	●	●	–	–
TESA MICRO-HITE plus M	N-16	2+1,5L	1075	1300	●	●	●	●	●	●	●
TESA- $\mu$ HITE	N-21	1/2	160	360	●	●	–	–	–	–	●
TESA- $\mu$ HITE + Power Panel Plus M	N-25	1/2	160	360	●	●	–	●	●	●	●
ETALON height and scribing gauges	N-30	40	1000	–	●	–	–	–	–	–	–





## TESA-HITE magna 400 and 700

### Made to withstand severe workshop conditions

Emanating from a well-proven TESA technology, both TESA-HITE magna 400 and 700 are equipped with the patented TESA magna  $\mu$  system. They are designed to remain unaffected even in the toughest conditions (water and oil splashing, dust particles).

They have exceptional features that make them indispensable for the workshop while also offering the most favourable price-performance relationship. Robust and dependable, their modern design provides the highest resistance for use close to the production area.

Each height gauge is battery-powered and serve to measure height or step dimensions, diameters, centre-to-centre distance of bores or grooves, width of nuts, and much more.



- Wide application range, two sizes available with measuring span to 415 mm / 16 in or 715 mm / 28 in, respectively.
- Electronics totally protected against oil and water splashing or dust particles (IP65).
- Control panel with numerical display to 0,001/0,005/0,01 mm or 0,0001/0.0002/0.001 in.
- Dynamic probing of the workpiece with a constant measuring force.
- Easiness, high reliability when checking bores or shafts using TESA's unique device for automatic detection of the culmination point – patented.
- Acoustic signal to acknowledge value capture, also conveniently programmable.
- Ability to measure parallelism errors.
- TESA's magnetic system, guaranteeing correct operating even in harsh workshop conditions – patented.
- Large LC display, also with symbols for the measuring functions.
- Zero-setting anywhere within the measuring range.
- PRESET function for entering any given value.
- Metric/inch conversion.
- RS 232 data output.
- SCS calibration certificate provided with each height gauge.

- ✓
- Factory standard
- 83 x 49 mm LC display. 7-decade plus minus sign. Also with graphical symbols for all active functions.
- 0,001/0,005/0,01 mm or 0.0001/0.0002/0.001 in
- 12 mm
- Metric/Inch conversion
- Measuring span, application range and precision: see relevant table on page N-5.
- Nickel plated gauge base (chemical coating)
- Magnetic scale
- (12  $\pm$  1,5) x 10<sup>-6</sup> K<sup>-1</sup>
- Probing head mounted on a ball-bearing, hand wheel for head displacement, fine setting. Head drive carriage can be locked.
- 500 mm/s  
20 in/s
- 1,5  $\pm$  0,5 N (at switch point)
- RS 232
- Rechargeable batteries, 6V
- $\approx$  60 h
- 10°C to 40°C
- 10°C to 60°C
- 100%
- IP55 or IP65 for both electronics and measuring system (IEC 60529)
- See table on page N-5
- EN 61326, Class B (with disconnected charger)
- Shipping packaging



**No** Identification number

Declaration of conformity

**SCS** SCS calibration certificate

## TESA-HITE magna 400 / 700



**00730047** **TESA-HITE magna 400 height gauge**  
Measuring span 415 mm / 16 in  
Application range 0 ÷ 570 mm / 0 ÷ 22 in

**00730059** **TESA-HITE magna 700 height gauge**  
Measuring span of 715 mm / 28 in  
Application range of 0 ÷ 870 mm / 0 ÷ 34 in

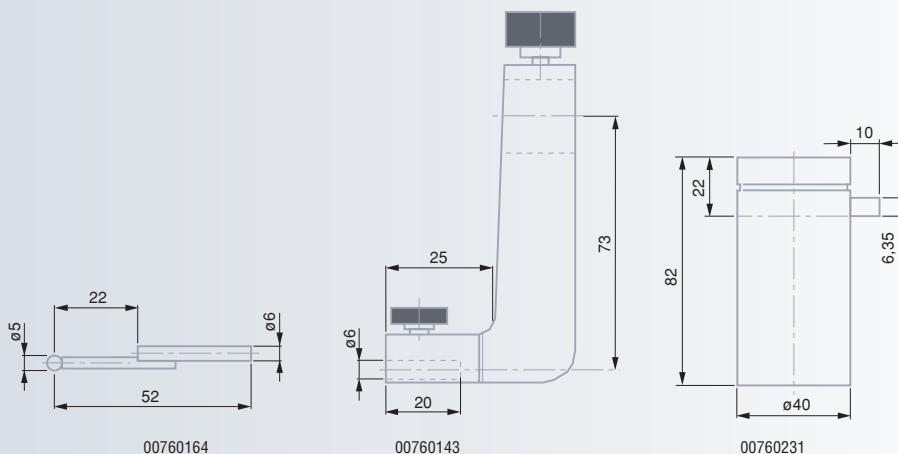
*Each height gauge is supplied with the following standard accessories:*

- 00760143** 1 Standard probe insert holder
- 00760164** 1 Standard probe insert with a 5 mm dia. tungsten carbide ball tip
- 00760231** 1 Master piece for establishing the probe constant, nominal dimension to 6,350 mm / 0.250 in
- 00760157** 1 Rechargeable battery, 6V
- 04761054** 1 Mains adapter, 100 ÷ 240 Vac / 50 ÷ 60Hz
- 04761055** 1 Cable EU for mains adapter
- 04761056** 1 Cable US for mains adapter

### Technical Data

	TESA-HITE magna		
		400	700
	mm in	415 16	715 28
	mm in	0 ÷ 570 0 ÷ 22	0 ÷ 870 0 ÷ 34
	mm in	0 ÷ 625 0 ÷ 24	0 ÷ 925 0 ÷ 36
	mm in	0 ÷ 795 0 ÷ 31	0 ÷ 1095 0 ÷ 43
	µm in	< 8 < 0.0003	< 8 < 0.0003
		on flat surfaces: 2δ = < 3 µm / < 0.00015 in into bores: 2δ = < 5 µm / < 0.00020 in	
	kg	15	18

### Standard Accessories for TESA-HITE magna 400 / 700



## Optional Accessories for TESA-HITE magna 400 / 700

**Nº**

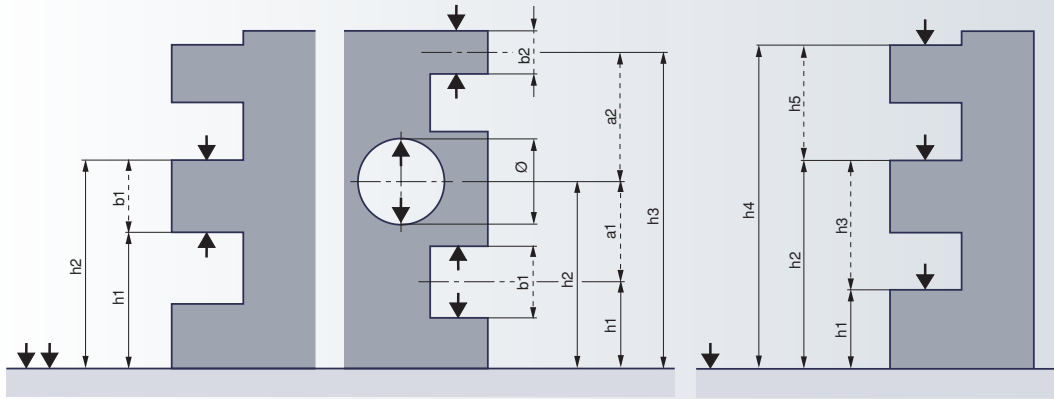


**04761052** RS 232 connecting cable for PC and TESA PRINTER SPC

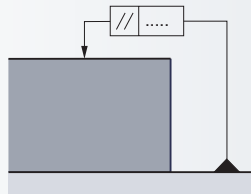
**04761063** Connecting cable Sub-D 9pin and USB for PC

Additional accessories: see page N-27

### One-Dimensional Measurement



### Measurement of Parallelism

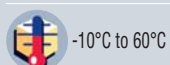
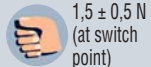
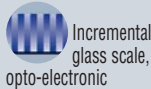
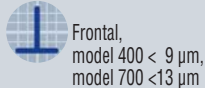
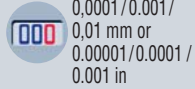
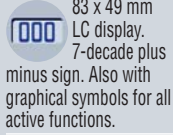


## TESA-HITE 400 / 700

### Precision in motion

The two TESA-HITE 400 and 700 height gauges are fitted with the patented, opto-electronic TESA's measuring system with incremental glass scale. Due to their robust and reliable construction, they are ideally suited for dimensional inspection on the shop floor.

Full autonomy is ensured through battery power. Each model allows height or step dimensions, diameters, centre-to-centre distances, groove width and the like to be accurately measured. Excellent price/performance ratio.



- Wide application range, two sizes available with measuring span of 415 mm / 16 in or 715 mm / 28 in, respectively.
- Integrated air-bearing for easy displacement across the granite plate.
- Electronics totally protected against oil and water splashing, dust particles (IP65).
- Control panel with numerical display to 0,0001 / 0,001 / 0,01 mm or 0,00001 / 0,0001 / 0,001 in.
- Dynamic probing of the workpiece with a constant measuring force.
- Easiness, high reliability when checking bores or shafts using TESA's unique device for automatic detection of the culmination point – patented.
- Acoustic signal to acknowledge value capture, also conveniently programmable.
- Ability to measure any deviation in parallelism.
- Possible use of a digital sensor for determining perpendicularity errors with stated angle of the linear regression line.
- Patented TESA's opto-electronic system. Long-lasting stability of the glass scale for unbroken high accuracy.
- Large LC display with symbols for the measuring functions.
- Zero-setting anywhere within the measuring range.
- PRESET function for entering any given value.
- Metric/inch conversion.
- RS 232 data output.
- SCS calibration certificate provided with each height gauge.





## TESA-HITE 400/700



**00730043 TESA-HITE 400 height gauge**  
Measuring span 415 mm / 16 in  
Application range 0 ÷ 570 mm / 0 ÷ 22 in

**00730044 TESA-HITE 700 height gauge**  
Measuring span 715 mm / 28 in  
Application range 0 ÷ 870 mm / 0 ÷ 34 in

Each height gauge is supplied with the following standard accessories:

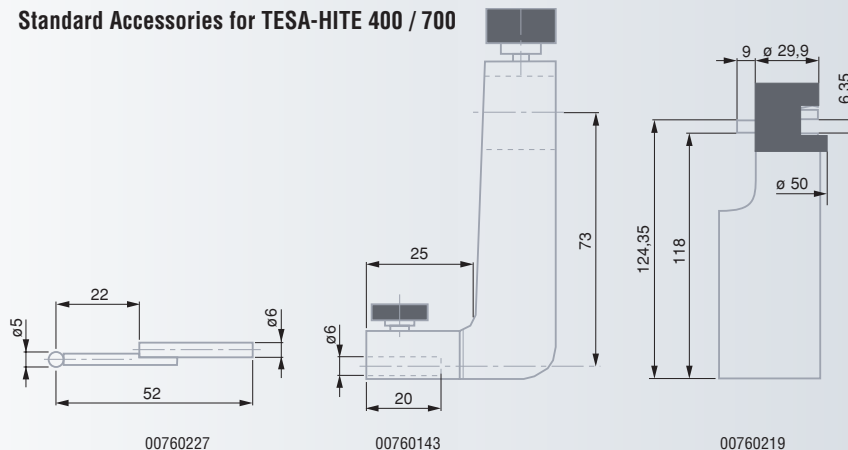
- 00760143** 1 Standard probe insert holder
- 00760227** 1 Standard probe insert with shank and 5 mm dia. ball tip in tungsten carbide
- 00760219** 1 Master piece for establishing the probe constant, nominal dimension to 6,350 mm / 0.2500 in
- 00760226** 1 Electric pump for creating the air-cushion beneath the gauge base, already mounted
- 00760157** 1 Rechargeable battery, 6 V
- 04761054** 1 Mains adapter, 100 ÷ 240 Vac/50 ÷ 60 Hz
- 04761055** 1 Cable EU for mains adapter
- 04761056** 1 Cable US for mains adapter

- See table opposite
- EN 61326, Class B (with disconnected charger)
- Shipping packaging
- Identification number
- Declaration of conformity
- SCS calibration certificate

### Technical data

			TESA-HITE 400	TESA-HITE 700
		mm in	415 16	715 28
	With standard accessory	mm in	0 ÷ 570 0 ÷ 22	0 ÷ 870 0 ÷ 34
	With probe insert holder No. 00760057	mm in	0 ÷ 625 0 ÷ 24	0 ÷ 925 0 ÷ 36
	With probe insert holder No. S07001622	mm in	0 ÷ 795 0 ÷ 31	0 ÷ 1095 0 ÷ 43
	With standard accessory	µm in	(2,5+4•L) µm (L in m) (0.0001+0.000004•L) in (L in in)	
	With standard accessory		on flat surfaces: 2δ = <2 µm / <0.0001 in into bores: 2δ = <3 µm / <0.00015 in	
	Frontal, mechanical	µm in	9 0.00035	13 0.0005
		kg	27	32

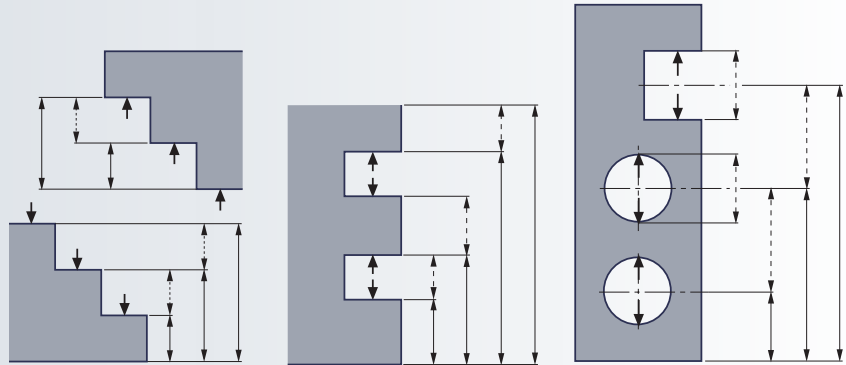
### Standard Accessories for TESA-HITE 400 / 700



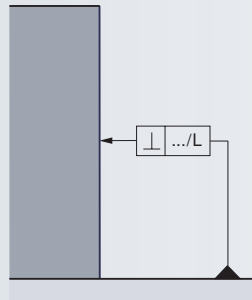
## Standard Accessories for TESA-HITE 400 / 700

No	=
04760070	RS port. Used to connect a digital sensor for perpendicularity measurement
04761052	RS 232 connecting cable for PC and TESA PRINTER SPC
04761063	Connecting cable Sub-D 9pin and USB for PC Additional accessories : see page N-27

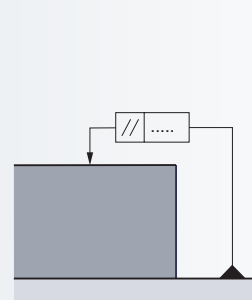
### One-Dimensional Measurement



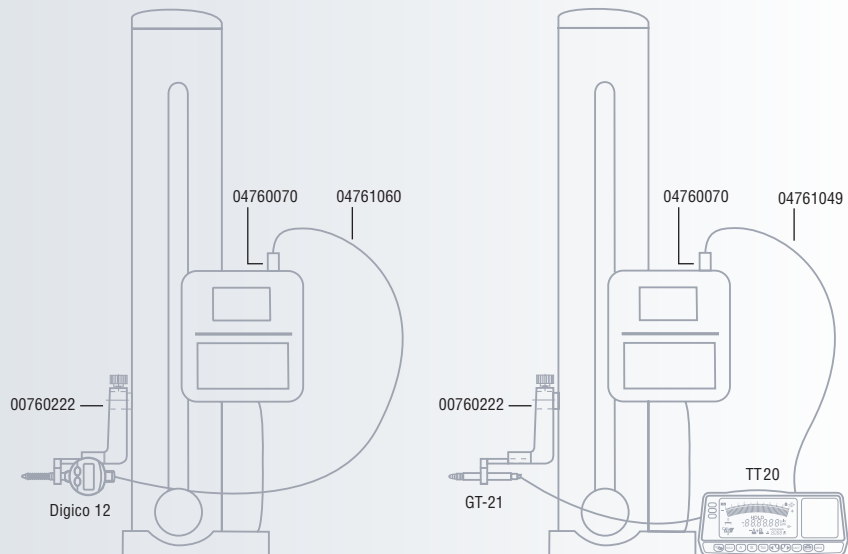
### Perpendicularity Measurement



### Parallelism Measurement



### Configuration for Perpendicularity Measurement



# TESA-HITE plus M 400 / 700

## Precision in Motion – Motorised Version

The added value of the motorised TESA-HITE plus M 400 / 700 is not only noticeable in their technical features, but also in their ease of use. Combine with the programming function, this solution is ideal for recurrent measurements in the shop floor environment. Advanced functions allow for complex calculations such as those required for two-axis or perpendicularity measurement. These height gauges with outstanding features offer the most attractive price/performance relationship, making them indispensable for the workshop.



- Wide application range.
- Electronics entirely protected from the penetration of liquids and dust particles.
- Integrated air cushion, mounted control panel.
- Easy, intuitive use of the rotary power control.
- Provide all the measuring functions of a dedicated motorised column, including height, diameter, distance, parallelism, perpendicularity, straightness, angle and 2D measurement besides programming, automatic probing cycles, statistical value processing.
- TESA's patented measuring system, opto-electronic.
- Probe insert holder and inserts compatible with those of TESA MICRO-HITE.
- SCS calibration certificate attached to each height gauge.



Factory standard



Dual LC display, 128 x 63 mm in size.

- Upper display field for length values (7 segments/sign). Also with symbols for the functions.

- Lower full dot display field for perpendicularity and straightness along with symbols for all operator-controlled function keys.

7segment display plus minus sign for the measured values.



0,0001 / 0,001 / 0,01 mm or 0,00001 / 0,0001 / 0,001 in



Main display with a size to 12,7 x 6,4 mm or 6,3 x 4,2 mm for auxiliary display.



Metric/Inch conversion



Air bearing for easy displacement on the granite plate.

For measuring span, application range and precision: see the table on page N-11. 30 function keys available on the keyboard.



Rugged nickel plated gauge base having 3 resting points, finely lapped.



Frontal for models 400 = < 8  $\mu$ m 700 = < 12  $\mu$ m



Incremental glass scale, opto-electronic data capture



(12  $\pm$  1,5) x 10<sup>-6</sup> K<sup>-1</sup>



Measuring head mounted on a ball-bearing. Electro-motorised head displacement at varying speeds from 7,5 up to 40 mm/s. Manual displacement:  $\leq$  600 mm/s. Automatic value acquisition with a constant measuring force.



1 N. Coupled servomotor for triggering the measuring force.



RS 232



Rechargeable batteries, 6V

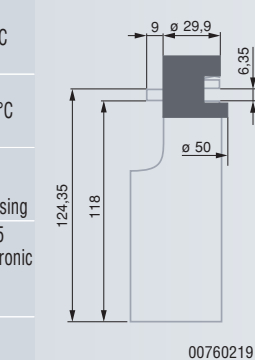
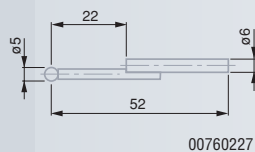
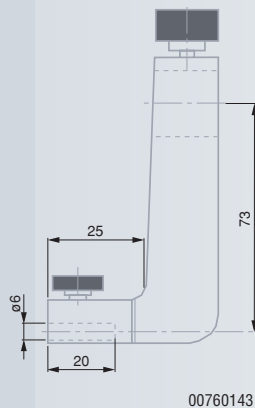


$\approx$  60 h, full charging takes 8 hours





Standard accessories for  
TESA-HITE plus M 400 / 700



- 10°C to 40°C
- 10°C to 60°C
- 80%, non-condensing IP40 or IP65 for the electronic cabinet (IEC 60529)
- See table opposite
- EN 61326, class B (with disconnected battery charger)
- Shipping packaging
- Identification number
- Declaration of conformity
- SCS calibration certificate

## TESA-HITE plus M 400/700



- 00730045** TESA-HITE plus M 400 height gauge  
Measuring span 405 mm / 16 in  
Application range 0 to 560 mm / 0 to 22 in
- 00730046** TESA-HITE plus M 700 height gauge  
Measuring span 755 mm / 27 in  
Application range 0 to 860 mm / 0 to 33 in
- 00730057** TESA-HITE plus M 400 height gauge with built-in printer  
Same as N° 00730045, but with a built-in matrix printer for results output.
- 00730058** TESA-HITE plus M 700 height gauge with built-in printer  
Same as N° 00730046, but with a built-in matrix printer for results output.

Each height gauge is supplied with the following standard accessories:

- 00760143** 1 Probe insert holder
- 00760227** 1 Standard probe insert with shank and 5 mm dia. ball tip in tungsten carbide
- 00760219** 1 Master piece for establishing the probe constant, nominal dimension: 6,350 mm / 0.2500 in
- 00760226** 1 Electric pump for creating the air cushion under the height gauge base, already mounted
- 00760157** 1 Rechargeable battery, 6V
- 00761054** 1 Mains adapter, 100 ÷ 240 Vac / 50 ÷ 60 Hz
- 00761055** 1 Cable EU for mains adapter
- 00761056** 1 Cable US for mains adapter

## Technical Data

		TESA-HITE plus M 400	TESA-HITE plus M 700
		405 16	705 27
	mm in		
With standard accessory	mm in	0 ÷ 560 0 ÷ 22	0 ÷ 860 0 ÷ 33
With probe insert holder N° 00760057	mm in	0 ÷ 615 0 ÷ 24	0 ÷ 915 0 ÷ 35
With probe insert holder N° S07001622	mm in	0 ÷ 785 0 ÷ 31	0 ÷ 1085 0 ÷ 42
With standard accessory	µm in	(0.0001+0.000003 • L) in ( L in in)	
With standard accessory		on flat surfaces: 2δ = < 1 µm / < 0.00005 in into bores: 2δ = < 2 µm / < 0.0001 in	
Frontal, mechanical	µm in	8 0.00031	12 0.00047
	kg	27	32

## Optional Accessories for TESA-HITE plus M 400 / 700



- 04760070** RS port. Used to connect a digital sensor for perpendicularity measurement
  - 04761052** RS 232 connecting cable for PC and TESA PRINTER SPC
  - 04761063** Connecting cable with Sub-D connector 9-pin – USB type for PC
  - 04765008** Thermal paper roll, 57 mm wide
- For additional accessories, report to page N-27





# TESA MICRO-HITE 350 / 600 / 900

The metrology-based reference for the workshop



Stand-alone design – Made to measure any size in the form of internal, external, height, depth, step and distance dimensions of geometric part features having either a flat, parallel or cylindrical surface.

Automatic capture of the culmination point on bores or shafts – Dynamic probing with memory functions «max.», «min.» plus «max.-min.»

The TESA IG-13 digital probe lets you also measure any deviation from perpendicularity, straightness and parallelism as well as runout errors with result output according to ISO 1101.

- State-of-the-art concept associated with a high-quality design is the fruit of years of experience in the manufacture of electronic height gauges.
- Ideal for dimensional inspection close to the manufacturing cell. No cumbersome cables to clutter up the working area.
- Fast, simple and reliable probing of the workpiece or holes, especially.
- 3 main gauges available with either a 365, 615 or 920 mm measuring span.
- Numerical display to 0,0005, 0,001, 0,01 and 0,1 mm, or equivalent inch units.
- Extremely accurate measuring of deviations from length, straightness and perpendicularity due to the automatic correction of the bias errors through CAA (Computer Aided Accuracy).
- Coefficient of linear expansion identical to steel ( $11,5 \times 10^{-6} \text{ K}^{-1}$ ).

- POWER PANEL for value processing and output with interactive display to guide the operator.
- No manual calculation.
- 99 workpiece oriented measurement cycles, programmable. Each cycle includes a number of 64 features with related limits of size.
- Built-in printer for result output or possible use of an external printer unit to get a hard-copy in A4 format.
- RS 232 data output.
- Every height gauge comes with a SCS calibration certificate.

TESA MICRO-HITE 350 / 600 / 900 main gauges



Factory standard

Measuring span, application range and accuracy as stated on page N-14

Rugged nickel plated base with bottom face including 3 resting points finely lapped

Air cushion usable for easy move of the height gauge over the surface plate, if so.

Frontal, model 350 < 7µm, model 600 < 9µm, model 900 < 11µm

Incremental glass scale with reference point, dividing period of 20 µm. Opto-electronic value capture (TESA patent).

$11,5 \times 10^{-6} \text{ K}^{-1}$

Probing head mounted on a ball-bearing and moved by means of both knurled hand wheel and crank. Head drive system can be locked. Fine adjust device can also be additionally mounted (available as an option). Automatic value capture with a constant measuring force. Visual and acoustic signal for acknowledgment

300 mm/s  
12 in/s












$1,6 \pm 0,25 \text{ N}$   
(at switch point for value capture)

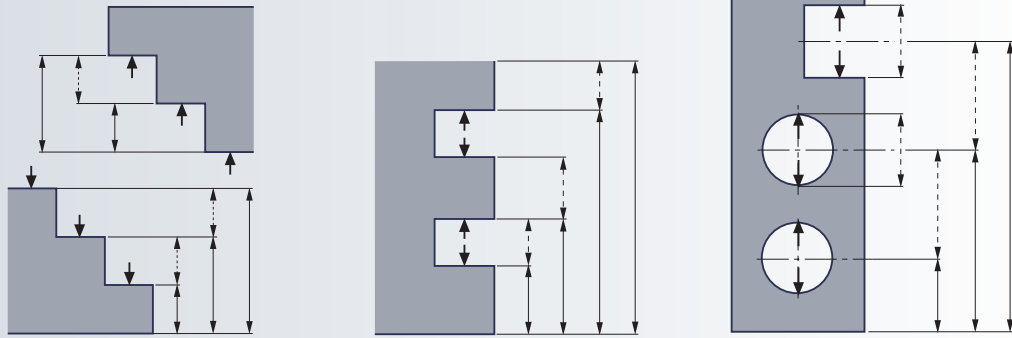
RS 232,  
opto-electronic

Continued next page

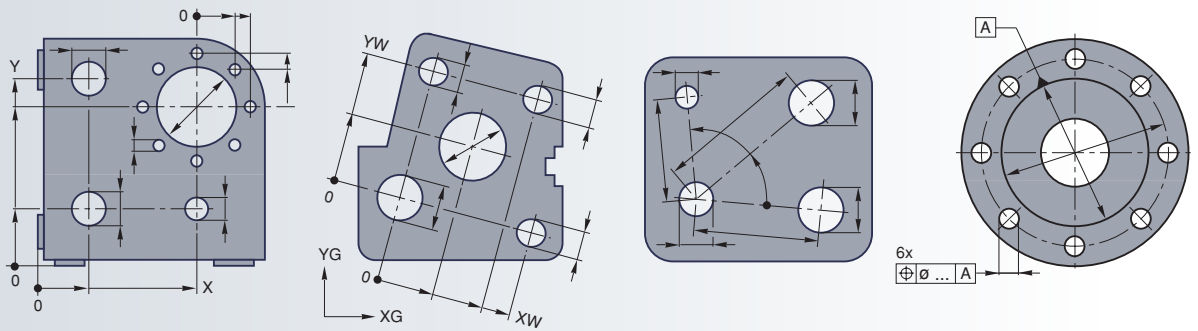


## TESA MICRO-HITE – Efficient and Powerful One-Dimensional Measurement

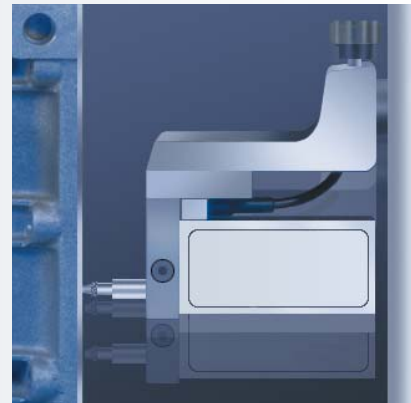
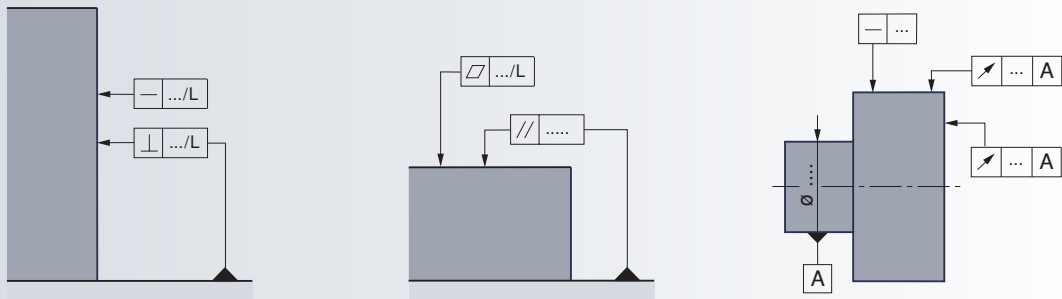
-  Rechargeable batteries, 6 V, 3,0 Ah or mains adapter
-  ≈ 12 hours for one battery pack; ≈ 2 hours for the pump used to form the air cushion
-  10°C to 40°C
-  -10°C to 60°C
-  80% non-condensing
-  IP40 (IEC 60529)
-  EN 61326-1, Class B (with disconnected charger)
-  Net weight (w/o panel nor battery pack)  
Main gauges  
350: 33 kg  
600: 38 kg  
900: 45 kg
-  Shipping packaging
-  Identification number
-  SCS calibration certificate



## Two-Dimensional Measurement



## Programme functions for the detection of form and position errors with use of a TESA IG-13 digital probe



TESA IG-13



## TESA MICRO-HITE 350 / 600 / 900 Height Gauge Sets



Nº	Symbol	Model	Symbol
00730033	TESA MICRO-HITE height gauge set	350	
00730034	TESA MICRO-HITE height gauge set	600	
00730035	TESA MICRO-HITE height gauge set	900	

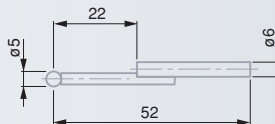
Each gauge set includes the following components, control panel excluded:

00730021	1 TESA MICRO-HITE 350 main gauge	●		
00730022	1 TESA MICRO-HITE 600 main gauge		●	
00730023	1 TESA MICRO-HITE 900 main gauge			●
00760143	1 Standard probe insert holder	●	●	●
00760227	1 Standard probe insert with shank and 5 mm dia. ball tip in tungsten carbide	●	●	●
00760150	1 Master piece for establishing the probe constant, nominal dimension 20,0000 mm/0.78740 in	●	●	●
00760142	1 Electric pump for creating the air-cushion beneath the gauge base, already mounted	●	●	●
00760141	1 Battery pack	●	●	●
04761054	1 Mains adapter, 100 to 240 Vac/50 to 60 Hz	●	●	●
04761055	1 Cable EU for mains adapter	●	●	●
00760151	1 Dust cover for TESA MICRO-HITE 350	●		
00760152	1 Dust cover for TESA MICRO-HITE 600		●	
00760153	1 Dust cover for TESA MICRO-HITE 900			●

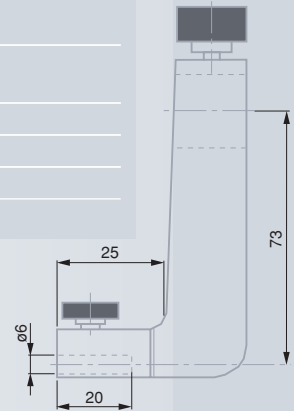
Optional Accessories for TESA MICRO-HITE 350 / 600 / 900

00760144	Add-on fine adjust device for extra fine movement of the measuring head, complete
00760157	Spare battery pack No. 00760141
04761056	Cable US for mains adapter
04761023	RS 232 connecting for PC and TESA PRINTER SPC

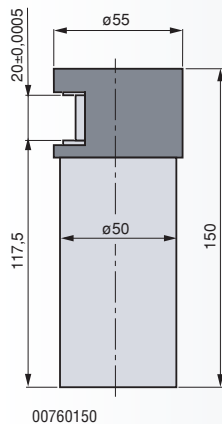
For additional accessories, see pages N-20 and N-27.



00760227



00760143



00760150

### Technical Data

Symbol	Models	350	600	900	
		mm	365	615	920
		in	14	24	36
	With standard accessory	mm	0 ÷ 520	0 ÷ 770	0 ÷ 1075
		in	0 ÷ 20	0 ÷ 30	0 ÷ 42
	With probe insert holder No. 00760057	mm	0 ÷ 575	0 ÷ 825	0 ÷ 1130
		in	0 ÷ 22	0 ÷ 32	0 ÷ 44
	With probe insert holder No. S07001622	mm	0 ÷ 745	0 ÷ 995	0 ÷ 1300
		in	0 ÷ 29	0 ÷ 39	0 ÷ 51
	With standard accessory	(2 + 3 • L) µm (0.0001 + 0.000003 • L) in			
	With standard accessory	2δ = ≤ 1 µm / ≤ 0.00005 in			
	Frontal, mechanical	µm	7	9	11
		in	0.00028	0.00035	0.00043
	Frontal and lateral using TESA IG-13	µm	6	8	10
		in	0.00024	0.00031	0.00039

## POWER PANEL



Dual LC display, 128 x 63 mm in size.

- Upper display field for length values (7-segment/sign). Also with symbols for the functions.
- Lower full dot display field for perpendicularity and straightness along with symbols for all operator-controlled function keys.

7-decade display plus minus sign for the measured values.

12,7 x 6,4 mm main display, 6,3 x 4,2 mm auxiliary display.

See opposite

Metric/Inch conversion

Floating zero

PRESET function for entering a given value.

Continuous displaying.

Manual or automatic triggering of data transfer.

Output of predefined inspection reports with headings in 5 languages plus A4 format using an external printer unit.

Via TESA MICRO-HITE

IP40 (IEC 60529)



## Control Panel for TESA MICRO-HITE 350 / 600 / 900



00760163



TESA POWER PANEL

Includes a dedicated programme for measuring in 1 and 2 coordinate directions with geometric combination of the measured values. Lets you measure perpendicularity, straightness and squareness. Provides 99 workpiece oriented measurement cycles including 64 features with related limits of size, programmable. Memory capacity for 2500 measured values. Statistical data processing (SPC). Result output via the built-in matrix printer or in A4 format using an external printer unit.

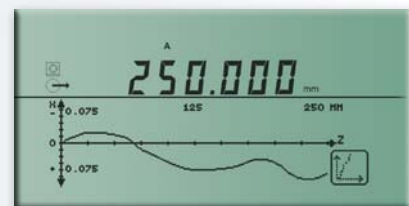
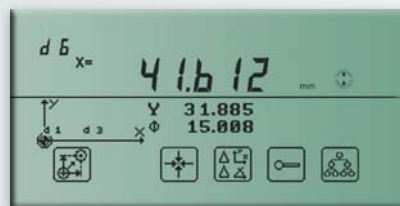


0,0005 / 0,001 / 0,01 / 0,1 mm  
0,00002 / 0,0001 / 0,001 / 0,01 / 0,1 in

Accessory for TESA POWER PANEL

04765008

Thermal paper roll, 57 mm wide





# TESA MICRO-HITE plus M 350 / 600 / 900

*Speed of the manual vertical column combined with the precision of the motorised one*



All TESA MICRO-HITE plus M height gauges are unique in that they have exceptional metrological capabilities and can be used intuitively with ease. The revolutionary rotary power control combines the speed of the manual concept with the precision of the motorised one.

With their robust and stand-alone design, these electronic height gauges are optimally suited for use on the shop floor as in the inspection laboratory.

Measure lengths in the form of internal, external, height, depth or distance dimensions of geometrical part features having either a plane, parallel or cylindrical surface, whether in one or two coordinate directions – Determine the position of bores in two coordinate directions with output in both polar and Cartesian (rectangular) coordinates – Mechanically adjusted at our plant based on a patented TESA's method used to verify the correct position of the guiding column against the gauge base. This method allows form and position error to be easily and quickly detected by means of a lever-type dial indicator – Check deviations from straightness or parallelism according to ISO 1101 when used in conjunction with TESA IG-13 linked to the Power panel plus M.

- Modular design descending from the successful TESA MICRO-HITE dynasty. Also equipped with the unique rotary power control located close to the rugged base. This feature serves for guiding the column that moves on a cushion of air, commanding fast motion of the probe insert and triggering all main measuring functions. Its intuitive use allows accurate, easy handling of the column. A simple rotation causes the measuring head to move rapidly, approach the contact point quickly or slowly, probe upward or downward or execute bore measurement.
- Available in three different sizes with a measuring span of 365, 615 or 920 mm.
- Choice between two control panels for value processing and output.
- Metric and inch LC display with a resolution to 0,0001 and 0,001 mm, or inch equivalent.
- Autonomous run through batteries. No cumbersome cable.
- Built-in air bearing for easy displacement over the surface plate.
- Motorised measuring head for fast, accurate probing at each contact point with a constant measuring force.
- TESA  $\mu$  system for matchless reliability and simplicity.
- High precision through CAA (Computer Aided Accuracy). All correction values stored in the memory still add to the mechanical precision.
- Coefficient of linear expansion matching that of steel ( $11,5 \times 10^{-6} \text{ K}^{-1}$ ).
- RS 232 data output.
- SCS calibration certificate delivered with every height gauge.

TESA MICRO-HITE plus M main height gauges 350 / 600 / 900



Factory standard



Measuring span, application range and accuracy as stated on page N-18



Rugged nickel plated gauge base having 3 resting points, finely lapped



Built-in air-bearing for easy move of the column over the surface plate



Frontal, for models 350 < 5  $\mu\text{m}$  600 < 7  $\mu\text{m}$  900 < 9  $\mu\text{m}$



Incremental glass scale with datum point, 20  $\mu\text{m}$  grating division. Opto-electronic data acquisition (TESA patent).



Measuring head mounted on a ball-bearing. Motorised head displacement at a varying speed from 7,5 up to 40 mm/s. Manual displacement:  $\leq 600 \text{ mm/s}$ . Automatic value capture with a constant measuring force.



$11,5 \times 10^{-6} \text{ K}^{-1}$



1 N Coupled for triggering the measuring force

Continued next page



# TESA MICRO-HITE plus M

Unrivalled Power, Performances, Ease of use

Rechargeable batteries 6 V, 3,0 Ah or mains adapter 100 to 240 Vac/50 to 60 Hz

≈ 12 hours after full recharging (8 hours)

10 °C to 40 °C

-10 °C to 60 °C

80% non-condensing

IP40 (IEC 60529)

EN 61326-1, Class B (with disconnected charger)

Net weight (w/o control panel nor battery pack)  
main part 350 = 33 kg, 600 = 38 kg, 900 = 45 kg

Shipping packaging

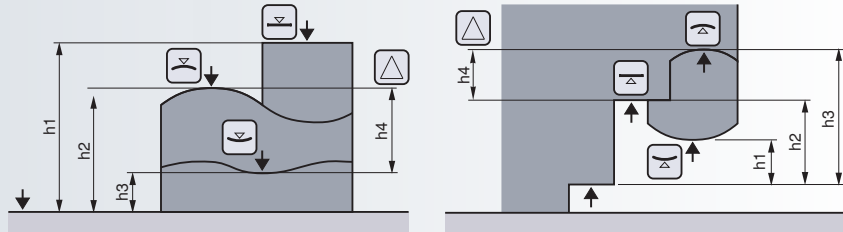
Identification number

Declaration of conformity

SCS calibration certificate

## Measurement without change of the probe direction

Probe constant excluded

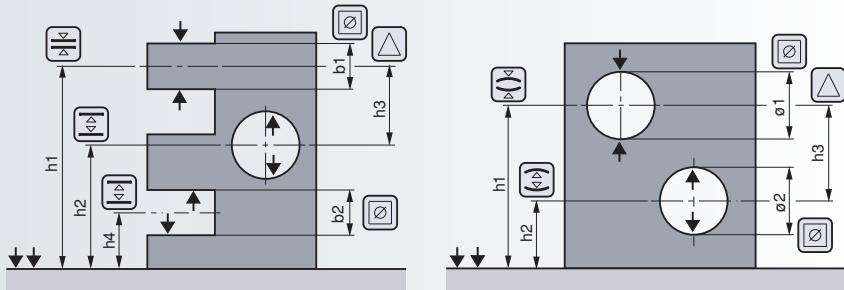


## Measurement with change of the probe direction

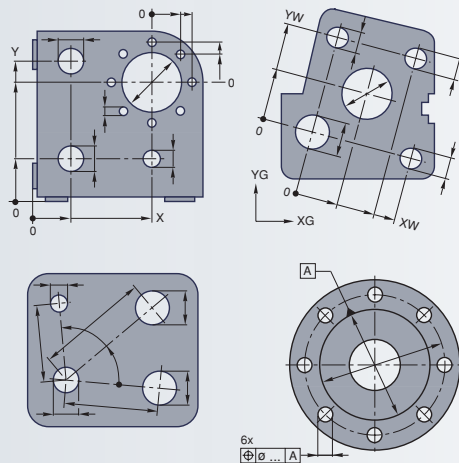
Probe constant included

– Disregarding the culmination point

– Considering the culmination point



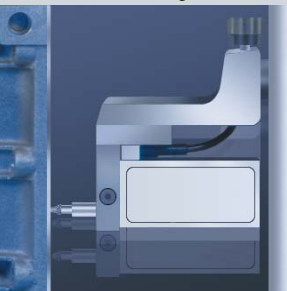
## Two-Dimensional Measurement



TESA μ System

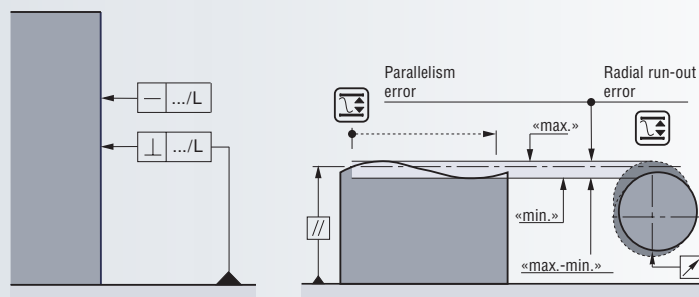


⊥ using TESATAST



⊥ using TESA IG-13

## Measurement of Form and Position Errors



## TESA MICRO-HITE plus M Height Gauge Sets 350 / 600 / 900



Nº		
00730063	TESA MICRO-HITE plus M height gauge set	350
00730064	TESA MICRO-HITE plus M height gauge set	600
00730065	TESA MICRO-HITE plus M height gauge set	900

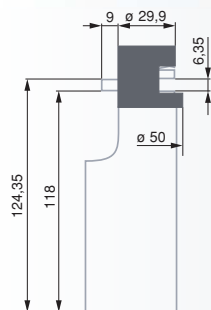
Each gauge set includes the following components, control panel excluded:

00730060	1 TESA MICRO-HITE plus M main gauge	●		
00730061	1 TESA MICRO-HITE plus M main gauge		●	
00730062	1 TESA MICRO-HITE plus M main gauge			●
00760143	1 Standard probe insert holder	●	●	●
00760227	1 Standard probe insert with shank and 5 mm dia. ball tip in tungsten carbide	●	●	●
00760219	1 Master piece with nominal dimension 6,350 mm/0.2500 in	●	●	●
00760142	1 Electric pump for creating the air cushion beneath the gauge base	●	●	●
00760141	1 Battery pack	●	●	●
04761054	1 Mains adapter, 100 to 240 Vac/50 to 60 Hz	●	●	●
04761055	1 Cable EU for mains adapter	●	●	●
04761056	1 Cable US for mains adapter	●	●	●
00760151	1 Dust cover for Model 350	●		
00760152	1 Dust cover for Model 600		●	
00760153	1 Dust cover for Model 900			●

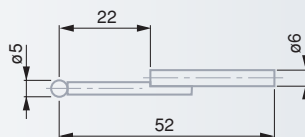
Optional Accessories for TESA MICRO-HITE plus M 350 / 600 / 900

00760157	Spare battery for battery pack No. 00760141
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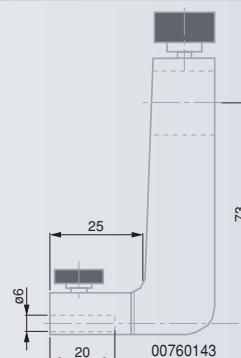
For additional accessories, report to both pages N-20 and N-27



00760219



00760227



00760143

### Technical Data

Models		350	600	900	
		mm	365	615	920
		in	14	24	36
With standard accessory		mm	0 ÷ 520	0 ÷ 770	0 ÷ 1075
		in	0 ÷ 20	0 ÷ 30	0 ÷ 42
With probe insert holder No. 00760057		mm	0 ÷ 575	0 ÷ 825	0 ÷ 1130
		in	0 ÷ 22	0 ÷ 32	0 ÷ 44
With probe insert holder No. S07001622		mm	0 ÷ 745	0 ÷ 995	0 ÷ 1300
		in	0 ÷ 29	0 ÷ 39	0 ÷ 51
With standard accessory			$(2 + 1,5 \cdot L) \mu\text{m}$ $(0.0001 + 0.0000015 \cdot L) \text{ in}$		$(L \text{ in m})$ $(L \text{ in in})$
With standard accessory			on flat surfaces: $2\delta = \leq 0,5 \mu\text{m} / \leq 0.000025 \text{ in}$ into bores: $2\delta = \leq 1 \mu\text{m} / \leq 0.00005 \text{ in}$		
Frontal, mechanical		$\mu\text{m}$	5	7	9
Frontal and lateral using TESA IG-13		in	0.00020	0.00028	0.00035

POWER PANEL plus M



LC dual display, 128 x 63 mm in size.

- Length measurement: 7-segment/digit upper display field for values plus symbols for the functions.
- Straightness or perpendicularity measurement: display field for values plus symbols (function keys). Operator controlled operations (full dot display).

Measured values: 7-decade display plus minus sign.

12,7 x 6,4 mm main display, 6,3 x 4,2 or 3,8 x 2,9 mm auxiliary display

Keypad with 42 softkeys

See opposite

Metric/Inch conversion

PRESET function for entering a given value.

Acoustic signal.

Manual or automatic triggering of data transfer.

Output of predefined reports with headings in 5 languages (plus a programmable one) using an external printer unit (A4 format).

Bidirectional RS 232, optoelectronic and Centronics

Via TESA MICRO-HITE plus M

IP50 (IEC 60529)



Declaration of conformity

# Control Panels for TESA MICRO-HITE plus M 350 / 600 / 900



00760221



## TESA POWER PANEL plus M

Includes a part programme for one or two-dimensional measurement.

- Captures flatness, parallelism and run-out deviations.
- Measures any deviation in perpendicularity or straightness.
- Executes angle measurement.
- Allows for value input through the keypad and digital value sensor.
- Enables automatic programming of the measurement cycles in Teach-in mode. Up to 9999 features distributed in several part programmes (each including max. 999 values) can be stored in the memory.
- Memory capacity for up to 25 000 measured values.
- Provides SPC capability with output of mean value, range, standard deviation, histogram, comparison nominal value/actual value, number of out-of-tolerance values, control limits, control charts.
- Prints reports in A4 format with related tables and graphics. Creates tailor-made headings to suit Users' needs.



0,0001 / 0,001 / 0,01 mm  
0.00001 / 0.0001 / 0.001 in

00760220

## TESA POWER PANEL plus M with built-in printer

Identical to item N° 00760221, but with integrated matrix printer for result output.

### Optional Accessories for TESA Power Panel plus M

- 04761052 RS 232 connecting cable for PC and TESA PRINTER SPC
- 04761063 USB connecting cable for PC
- 04765008 Thermal paper roll, 57 mm wide

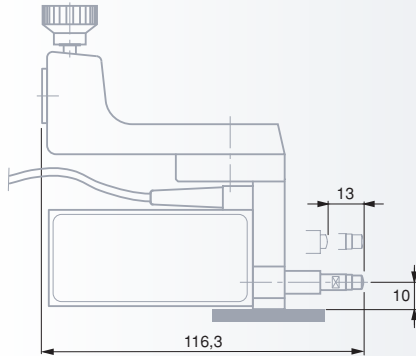




## Optional Accessories for TESA MICRO-HITE 350 / 600 / 900 TESA MICRO-HITE plus M 350 / 600 / 900 equipped with Power Panel plus M

For additional optional accessories, see on page N-27.

### Optional Accessories



**00760140** TESA IG-13 probe set

Consisting of:

**00760139** 1 TESA IG-13 digital probe



13 mm / 0.51 in



1  $\mu\text{m}$



0,45 N at zero  
0,75 N at stop

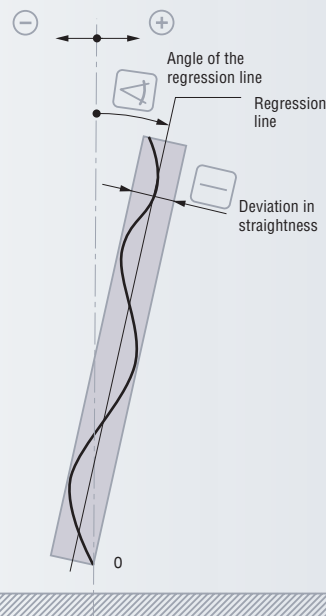
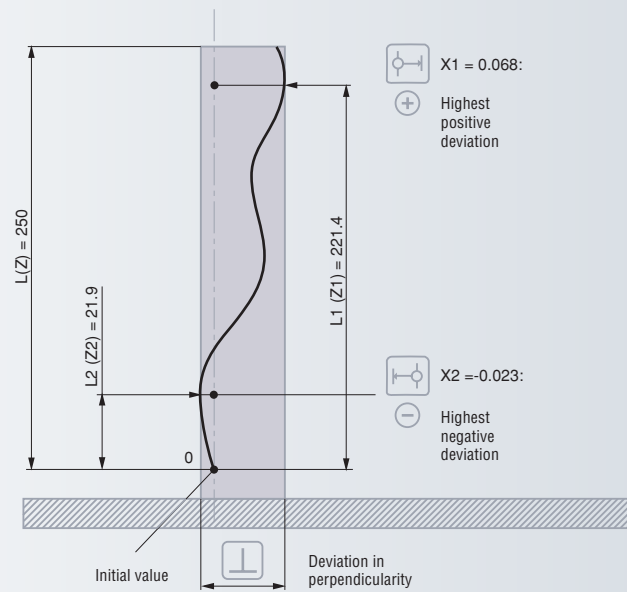
**00760138** 1 TESA IG-13 attachment

Accessories:

**01960005** Lift lever for the measuring bolt

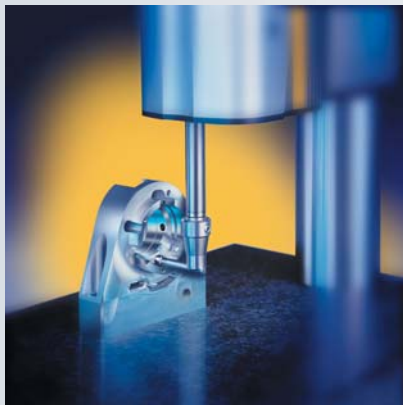
**03540501** 10 mm long extension for the probe insert

**04761047** Connecting cable IG-13/Power Panel plus M (1 m)



# TESA- $\mu$ HITE Height Gauge

The solution for the most varied metrology applications



Factory standard

100 mm/4 in

0 to 160 mm  
0 to 6.3 in

0,001 mm and  
0,0001 mm or  
0,0001 in and  
0,00001 in

Max. perm.  
error G: see  
table page N-23

Repeatability  
limit r: see  
table page N-23

**Support**

Granite measuring table; dull-chrome plated steel column, hardened and ground.

200x300x50 mm measuring table (L x D x H)  
50 x 300 mm dia. column.

Finish lapped

Accuracy grade 00 according to DIN 876, Part 1

**TESA- $\mu$ HITE value sensor**

Incremental glass scale with opto-electronic value capture.  
Grating period: 20  $\mu$ m

$11,5 \times 10^{-6} \text{ K}^{-1}$

Electro-motorised gauge head displacement; can also be moved manually.

0,001 mm or 0,0001 in numerical interval = 10 mm/s; 0,0001 mm or 0,00001 in = 5 mm/s, fast displacement = 30 mm/s

6 mm dia. x 10 mm long clamp for the meas. insert

0,63  $\pm$  0,1 N or 1  $\pm$  0,1 N, switchable.

Electromotorised activation.

Via control panel

Compact design with measuring stand included – Sensor equipped with a system for coaxial measuring according to the Abbe principle or using an offset probe relative to the gauge axis.

Measures internal, external, height, depth, step and distance dimensions on geometric elements having either a flat, parallel or cylindrical surface – Automatic detection of the culminating point on bores or shafts – Dynamic probing with memory functions «max.», «min.» and «max.-min.».

The whole system provides the best solution for measuring straightness, flatness and parallelism or inspecting axial and radial runouts depending on the chosen tool configuration.

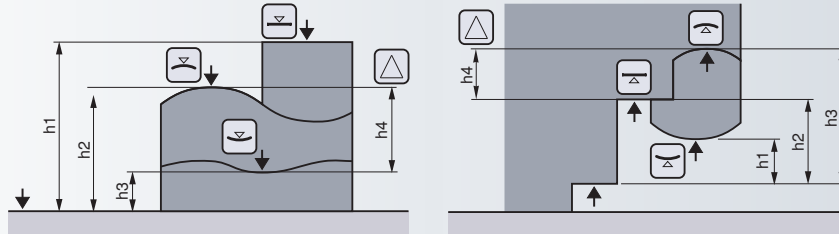
- Ideal for workpiece inspection close to the production area.
- 100 mm measuring span.
- 0,001 mm and 0,0001 mm or 0,0001 in and 0,00001 in scales intervals.
- Max. perm. error as low as 2  $\mu$ m (or 1  $\mu$ m when checking coaxiality).
- Integrated temperature sensor so that the coefficient of linear expansion of each gauge unit matches that of steel ( $11,5 \times 10^{-6} \text{ K}^{-1}$ ).
- Motorised measuring head for fast probing at each point.
- Automatic value capture, controlled over the stability of the measuring force, but also all measured values.
- Constant measuring force through the motor-driven actuator. Switchable.
- No manual calculation needed.
- RS 232 data output with direct connection to TESA PRINTER SPC.
- Memory capacity for 99 single values.



# TESA-μHITE Capabilities

## Measurement without change of the probe direction

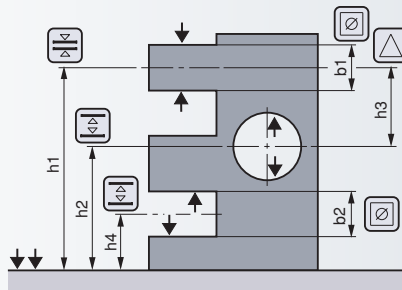
Probe constant excluded



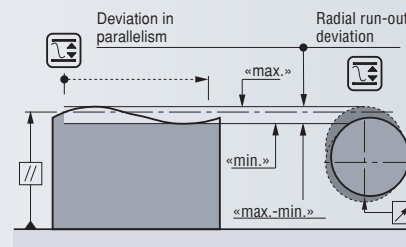
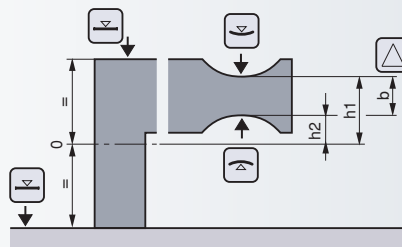
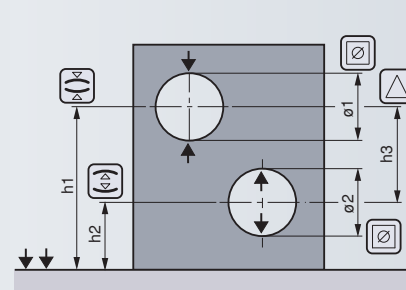
## Measurement with change of the probe direction

Probe constant included

- Disregarding the culmination point



- Considering the culmination point



### Control Panel

67 x 33 mm LC display.  
Alphanumerical display:  
3-line display 7segment/ digit) plus symbols.  
Display for measured values:  
7-decade display plus minus sign.  
Auxiliary display 1 or 2:  
7 or 4 digits.

10 x 4,9 mm (value display),  
7,5 x 3,7 or  
5 x 2,5 mm (auxiliary display 1 or 2),

Metric/Inch Conversion

Keyboard with 20 softkeys

PRESET function for entering any given value.  
Acoustic signal.  
7 languages available for report headings

RS 232, opto-electronic and bidirectional

Mains adapter 100 to 240 Vac / 50 to 60 Hz / 6,6 Vdc / 750 mA (order N° 04761054)

### Additional Data

5°C to 40°C

-10°C to 60°C

80% non-condensing

See drawings

16,2 kg net (support N° 00760203).  
2,6 kg net (TESA-μHITE N° 00730050).  
1,45 kg net (control panel N° 00760204 with cable N° 00760191)

IP50 (IEC 60529)

EN 61326-1, Class B

Shipping packaging

Identification number

SCS calibration certificate

Declaration of conformity

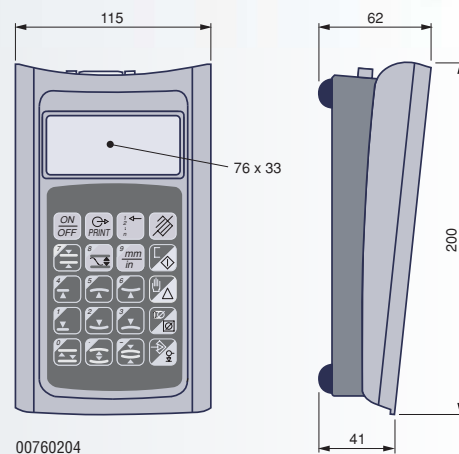
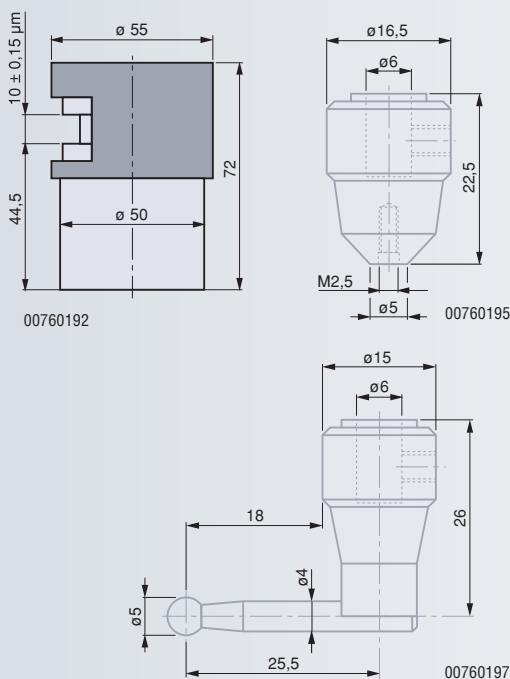
<b>00730049</b>	<b>TESA-μHITE height gauge</b>	0 ÷ 160	0 ÷ 6.3		
<i>Provided with the following components:</i>					
<b>00760203</b>	<b>1 TESA measuring support</b> , granite measuring table, size 200 x 300 x 50 mm				
<b>00730054</b>	<b>1 TESA-μHITE electronic length unit</b>				
<i>Also included:</i>					
<b>00730050</b>	1 TESA-μHITE value sensor	100		4	
<b>00760204</b>	1 Control panel. To be connected to TESA-μHITE.		0,001 0,0001		0.0001 0.00001
<b>00760191</b>	1 Connecting cable for TESA-μHITE to control panel				
<b>00760195</b>	1 Probe insert holder, axial with a M2,5 thread				
<b>03510002</b>	1 Probe insert with a 3 mm dia. tungsten carbide ball tip				
<b>00760197</b>	1 Probe insert with a 5 mm dia. tungsten carbide ball tip, offset				
<b>00760192</b>	1 Master piece for establishing the probe constant, nominal dimension 10 mm/0.39370				
<b>04761054</b>	1 Mains adapter, 100 to 240 Vac/50 to 60 Hz				
<b>04761055</b>	1 Cable EU for mains adapter				
<b>04761056</b>	1 Cable US for mains adapter				
<b>038407</b>	1 Suited plastic case				

For additional accessories, see page N-26.

## Accuracy

	μm	in	μm	in	μm	in
Insert's position relative to the axis of the measuring bolt						
coaxial	1,0	0.00005	0,5	0.00002		
offset	2,0	0.0001	1,0	0.00004		

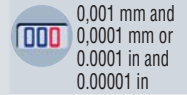
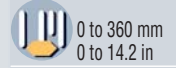
Applicable with used standard accessory.



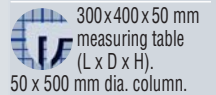


## TESA-μHITE

Extended application range up to 360 mm



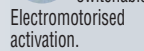
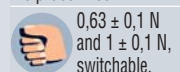
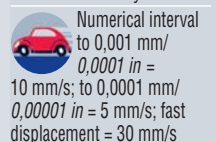
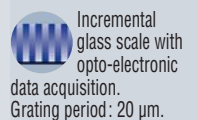
### Support



2,6 kg net (TESA-μHite N° 00730050)  
1,45 kg net (control panel N° 00760204 with cable N° 00760191)



### TESA-μHITE value sensor



N°



mm 0 ÷ 360 in 0 ÷ 14.2

### TESA-μHITE height gauge with extended application range

Provided with the following components (must be ordered under 2 positions)

**S07600163** 1 TESA measuring support, granite measuring table, overall dimensions 300 x 400 x 50 mm. The guiding column has a 50 x 500 mm diameter.

**00730054** 1 TESA-μHITE electronic length measuring unit

Also included:

N°



	mm	mm	in	in
00730050	1	TESA-μHITE value sensor	100	4
00760204	1	Control panel, connected to TESA-μHITE.	0,001 0,0001	0.0001 0.00001

**00760191** 1 Cable for connecting TESA-μHITE to control panel

**00760195** 1 Probe insert holder, axial with a M2,5 thread

**03510002** 1 Probe insert with a 3 mm dia. tungsten carbide ball tip

**00760197** 1 Probe insert with a 5 mm dia. tungsten carbide ball tip, offset

**00760192** 1 Master piece for establishing the probe constant, nominal dimension 10 mm/0.39370

**04761054** 1 Mains adapter, 100 to 240 Vac/50 to 60 Hz

**04761055** 1 Cable EU for mains adapter

**04761056** 1 Cable US for mains adapter

**038407** 1 Suited plastic case

Additional accessories, see page N-26.





Factory standard

100 mm/4 in

0 to 160 mm/  
0 to 6.3 in

0,001 mm and  
0,0001 mm or  
0,0001 in and  
0,00001 in

Max. perm.  
error G: see  
table page N-23

Repeatability  
limit r: see  
table page N-23

**Support**

Granite measuring table; dull-chrome plated steel column, hardened and ground.

200x300x50 mm measuring table (L x D x H). 50 x 300 mm dia. column.

Finish lapped

16,2 kg net (support N° 00760203)  
2,6 kg net (TESA-µHite N° 00730050)

Accuracy grade 00 according to DIN 876, Part 1

**TESA-µHITE value sensor**

Incremental glass scale with opto-electronic data acquisition. Grating period: 20 µm.

11,5 x 10<sup>-6</sup> K<sup>-1</sup>

Electro-motorised gauge head displacement; can also be moved manually.

0,001 mm/0,0001 in = 10 mm/s; to 0,0001 mm/0,00001 in = 5 mm/s; fast displacement = 30 mm/s

6 mm dia. x 10 mm long attachment for the measuring insert

0,63 ± 0,1 N and 1 ± 0,1 N, switchable. Electromotorised activation.

Via control panel

# TESA-µHITE

## Strong, user-friendly with Power Panel plus M

Capable to operate using all TESA POWER PANEL plus M measuring functions, those for perpendicularity measurement excepted (more details on both pages N-17 and N-19).



**TESA-µHITE height gauge, plus M version**

mm 0 ÷ 160 in 0 ÷ 6.3

Provided with the following components (must be ordered under 3 positions):

- 00760203** 1 TESA measuring support, granite table, 200 x 300 x 50 mm (large-size support No. S07600163 can alternately also be used)
- 00760221** 1 POWER PANEL plus M Related features listed on page N-19 (can alternately also be used with host printer No. 00760220)
- S07010288** 1 TESA-µHITE electronic length measuring unit, without control panel

Also included:



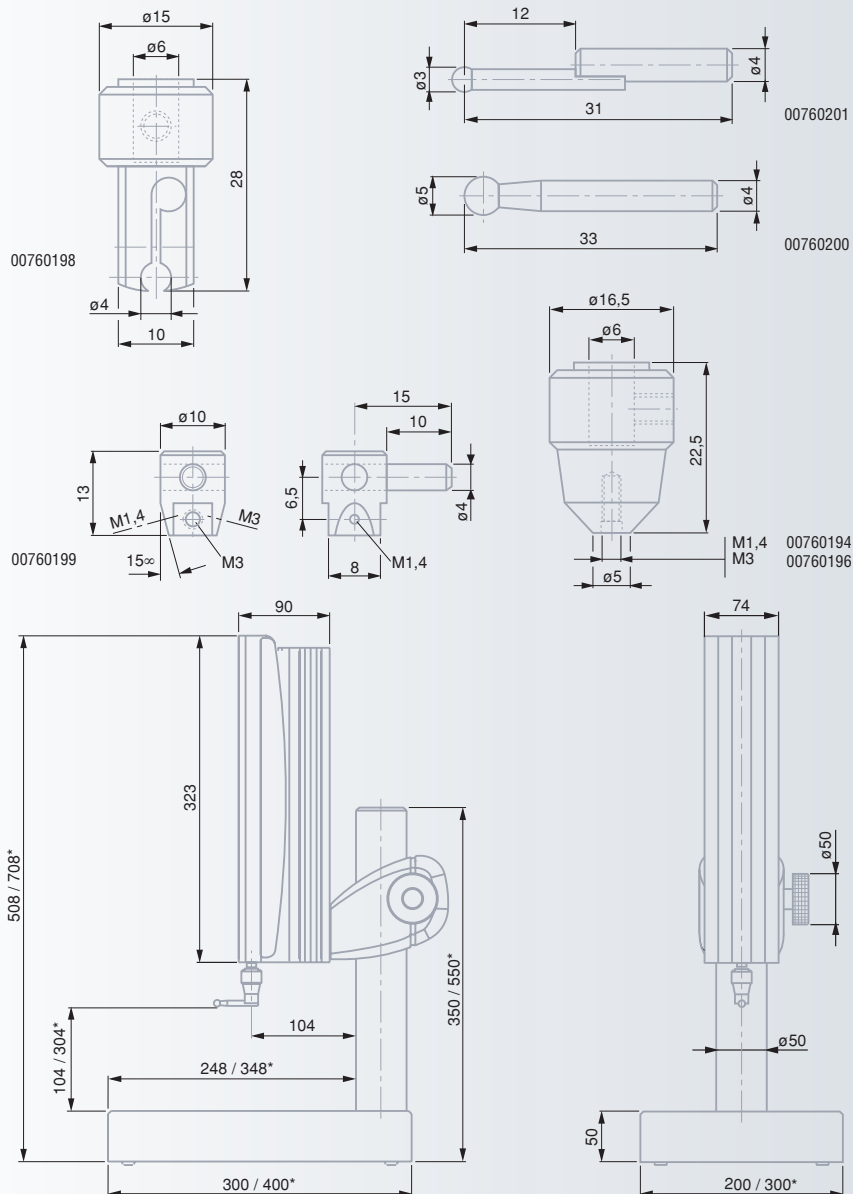
- 00730050** 1 TESA-µHITE value sensor
- 00760191** 1 Cable for connecting TESA-µHITE to control panel
- 00760195** 1 Probe insert holder, axial for probe inserts with a M2,5 thread
- 03510002** 1 Probe insert with a 3 mm dia. tungsten carbide ball tip
- 00760197** 1 Probe insert with a 5 mm dia. tungsten carbide ball tip, offset
- 00760192** 1 Master piece for establishing the probe constant, nominal dimension 10 mm/0.39370
- 04761054** 1 Mains adapter 100 to 240 Vac/50 to 60 Hz
- 04761055** 1 Cable EU for mains adapter
- 04761056** 1 Cable US for mains adapter
- 038407** 1 Suited plastic case

For additional accessories, see page N-26.  
For measuring applications, see page N-17.



## Optional Accessories

<b>00760186</b>	Set of special probe inserts (see page N-29).
<b>00760194</b>	Axial probe holder for probe inserts with a M1,4 thread.
<b>00760196</b>	Axial probe holder for probe inserts with a M3 thread
<b>00760198</b>	Radial probe holder with a 4 mm dia. mounting bore.
<b>00760199</b>	Universal probe insert holder with a 4 mm dia. clamping shank (used in conjunction with radial probe holder No. 00760198). M1,4 plus M3 threads (2 x 2) for the probe inserts.
<b>00760200</b>	Probe insert with a 5 mm dia. tungsten carbide ball tip. Also with a 4 mm dia. fixing rod for use with radial probe holder No. 00760198.
<b>00760201</b>	Probe insert with a 3 mm dia. tungsten carbide ball tip. Also with a 4 mm dia. fixing rod for use with radial probe holder No. 00760198.
<b>04768001</b>	Foot switch for triggering data transfer or letting a measuring function be repeated.
<b>00760207</b>	Swivel support for control panel
<b>00760202</b>	Spare batteries for control panel N° 00760204, 6 Vdc/1,2 Ah.
<b>00761052</b>	RS 232 connecting cable for PC and TESA PRINTER SPC
<b>00761063</b>	Sub-D connector 9-pin – USB type for PC

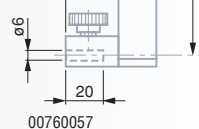
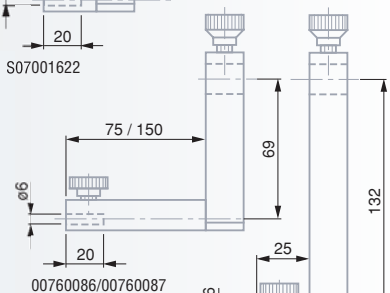
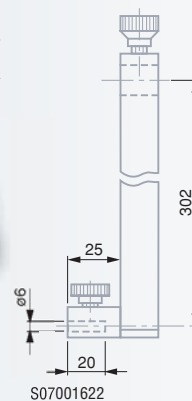
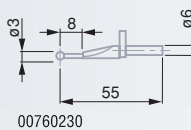
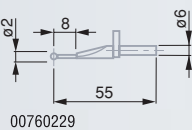
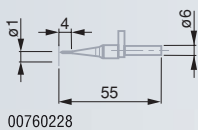
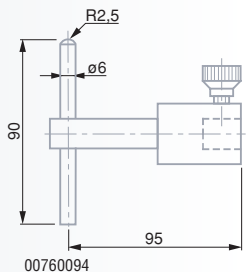
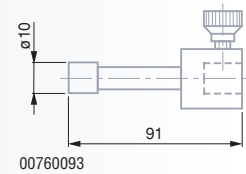
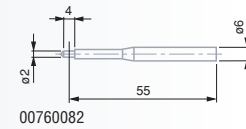
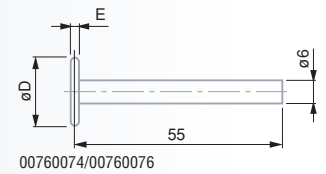
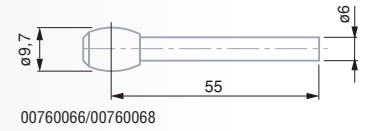
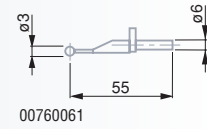
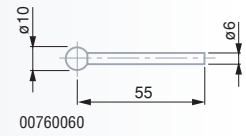


\* With measuring support No. S07600163



## Optional Accessories for TESA MICRO-HITE plus M 350 / 600 / 900 TESA MICRO-HITE 350 / 600 / 900 TESA-HITE 400 / 700 – TESA-HITE plus M 400 / 700 TESA-HITE magna 400 / 700

No	=	
00760173	Partial accessory set	●
00760148	Full accessory set	●
<i>Supplied in a suited plastic case with the following items:</i>		
00760061	1 Probe insert with a 3 mm dia. carbide ball tip	● ●
00760060	1 Probe insert with a 3 mm dia. carbide ball tip	● ●
Probe inserts with carbide, barrel-shaped measuring faces for cylindrical bores as well as for determining the position of metric inside threads (or similar).		
00760066	1 item with a 2,2 mm diameter (for M3 to M16 threads)	●
00760067	1 item with a 4,5 mm diameter (for M6 to M48 threads)	●
00760068	1 item with a 9,7 mm diameter for M12 to M150 threads)	●
Probe inserts with a carbide disc tip for grooves, slots, centring shoulders etc.		
00760074	1 Item, E = 1 mm / 4,5 mm diameter	●
00760075	1 Item, E = 2 mm / 14 mm diameter	●
00760076	1 Item, E = 3 mm / 19 mm diameter	●
00760082	1 2 mm dia. probe insert with a small cyl. carbide face	●
00760093	1 Probe insert with a cylindrical, tungsten carbide measuring face (10 mm dia., 12 mm long). Stainless steel body, hardened.	● ●
Probe insert holder for depth increase		
00760086	1 Item for depth up to 110 mm (L = 75 mm)	●
00760087	1 Item for depth up to 185 mm (L = 150 mm)	●
00760057	1 Probe insert holder for extending the application range	●
00760094	1 Probe insert with a stainless steel shank, hardened. Also with one flat and one spherical carbide measuring face. Interchangeable shank.	● ●
Probe inserts with shank and ball tip in tungsten carbide		
00760228	1 Item with a 1 mm tip diameter	● ●
00760229	1 Item with a 2 mm tip diameter	● ●
00760230	1 item with a 3 mm tip diameter	● ●
S07001622	Probe insert holder for extending the range of application	● ●





**No**

**=**

**00760096** 1 Holder for TESATAST probe inserts with a M1,4 thread or any other ones with a M2,5 thread.

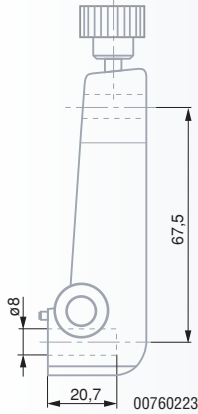
TESATAST probe inserts, carbide ball tip, M1,4 thread

**01860201** 1 Item with a 1 mm probe tip diameter

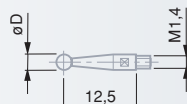
**01860202** 1 Item with a 2 mm probe tip diameter

**01860203** 1 Item with a 3 mm probe tip diameter

**01860307** 1 Wrench



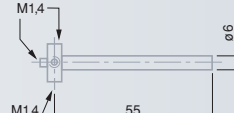
01860307



01860201/01860203



00760096



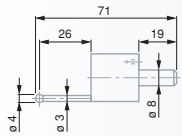
### Optional accessories for use with insert holder No. 00760223

**No**

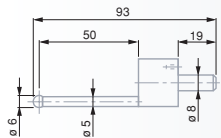
**=**

**00760223** Holder for use with any probe insert listed below

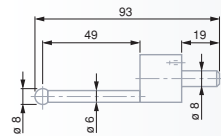
**0071684825** Probe insert with a 6 mm dia. tungsten carbide ball tip



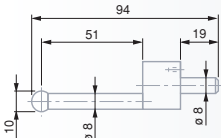
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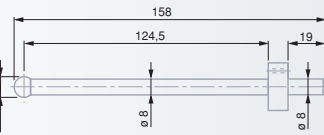
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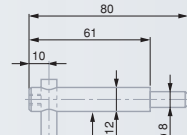
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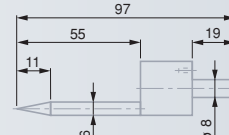
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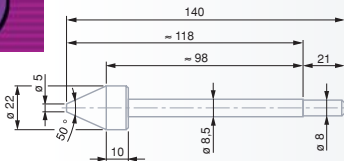
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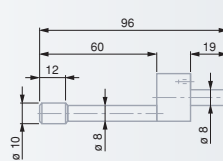
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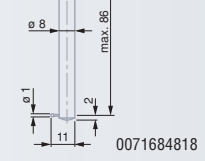
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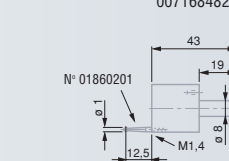
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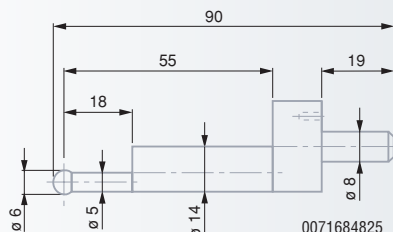
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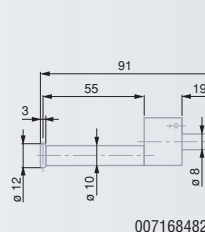
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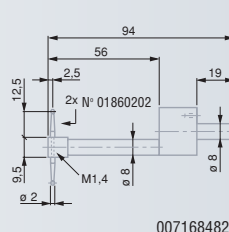
0071684825



0071684826



0071684827



0071684828



Factory standard



Shipping packaging



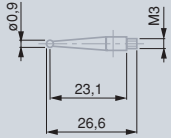
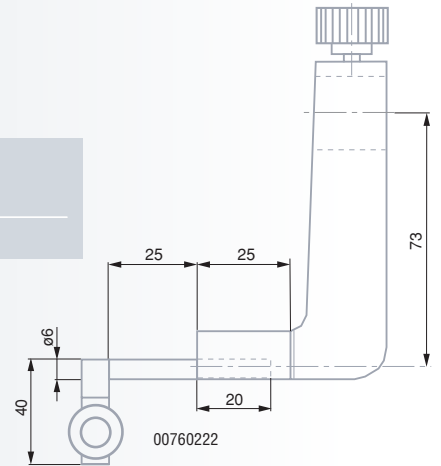


## Accessories for measuring perpendicularity by means of a dial test indicator

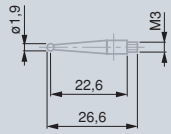
(Used with TESA MICRO-HITE plus M, TESA MICRO-HITE, TESA-HITE 400/700 and TESA-HITE plus M 400/700)



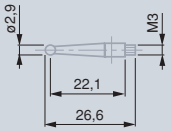
**00760222** Probe insert holder for a dial test indicator (lever-type)



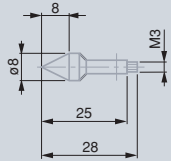
00760180



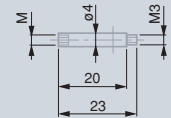
00760181



00760182



00760183



00760184/00760185

### Optional Accessories



**00760175** Set of probe inserts for TESA-HITE, TESA-HITE plus M, TESA-HITE magna, MICRO-HITE and MICRO-HITE plus M ●

**00760186** Set of probe inserts for TESA-μHITE ●

*Provided in a suited plastic case including:*

**00760177** 1 Probe insert holder ●

**00760187** 1 Probe insert holder ●

**00760178** 1 Hardened steel rod for grooves, centring shoulders, blind bores etc., angled through 8° ● ●

**00760179** 1 Tungsten carbide cylindrical rod for depth measurement ● ●

Probe inserts, each with hardened steel ball tip

**00760180** 1 Item with a 0,9 mm tip diameter ● ●

**00760181** 1 Item with a 1,9 mm tip diameter ● ●

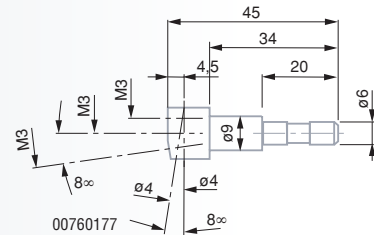
**00760182** 1 Item with a 2,9 mm diameter ● ●

**00760183** 1 Hardened steel probe insert with a cone-shaped measuring face, 8 mm diameter ● ●

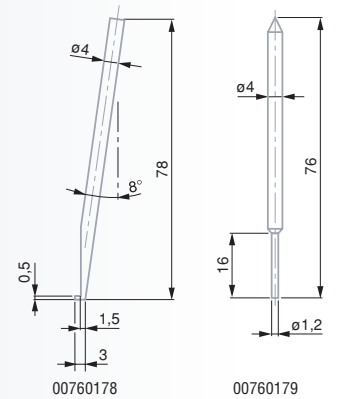
Extensions, 20 mm

**00760184** 1 Extension with a M3 thread for M3 ● ●

**00760185** 1 Extension with a M3 thread for M2,5 ● ●

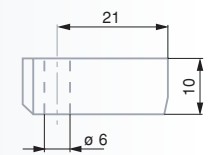


00760177

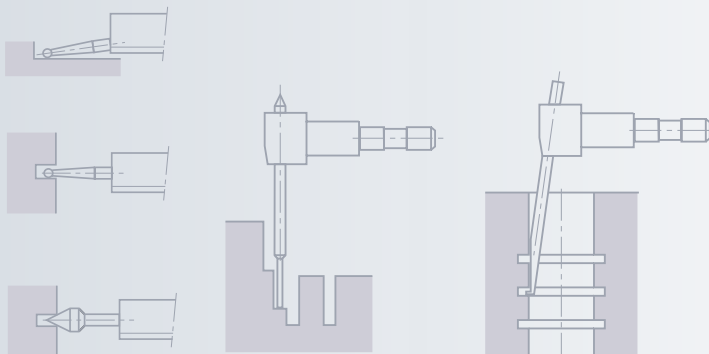


00760178

00760179

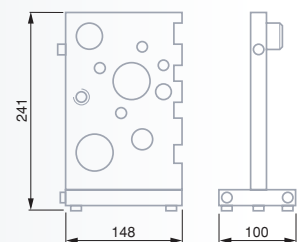


00760187



**00760124** Practice piece

For one or two-dimensional measurements. Also for measuring straightness, perpendicularity and parallelism errors. Each User's manual POWER PANEL and POWER PANEL plus M includes some examples of programmed measurement cycles.



00760124



## ETALON Height and Scribing Gauges with Digital Display

Electronic height and scribing gauges

- Resolution to 0,01 mm/0.005 in
- RS 232 interface

	Size	mm	in	Column mm	Base (L x H x W) mm	
<i>ETALON height and scribing gauges with digital display</i>						
<b>07739001</b>	300	0 ÷ 300	0 ÷ 12	25 x 6	60 x 40 x 100	
<b>07739002</b>	600	0 ÷ 600	0 ÷ 24	30 x 12	110 x 50 x 160	
<b>07739003</b>	1000	0 ÷ 1000	0 ÷ 40	30 x 12	110 x 50 x 160	

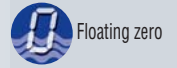


### Optional Accessories

		Suitable for models	Length mm
<b>07769001</b>	Scriber	300	65
<b>07769003</b>	Scriber	600, 1000	75
Holder for a dial gauge, axial probe, dial test indicator (lever-type) etc., 8 mm dia. fixing bore.			
<b>07769005</b>	Can be mounted instead of the scriber		
<b>07769006</b>	Rotating and tilting version with a 8 mm dia. shank		

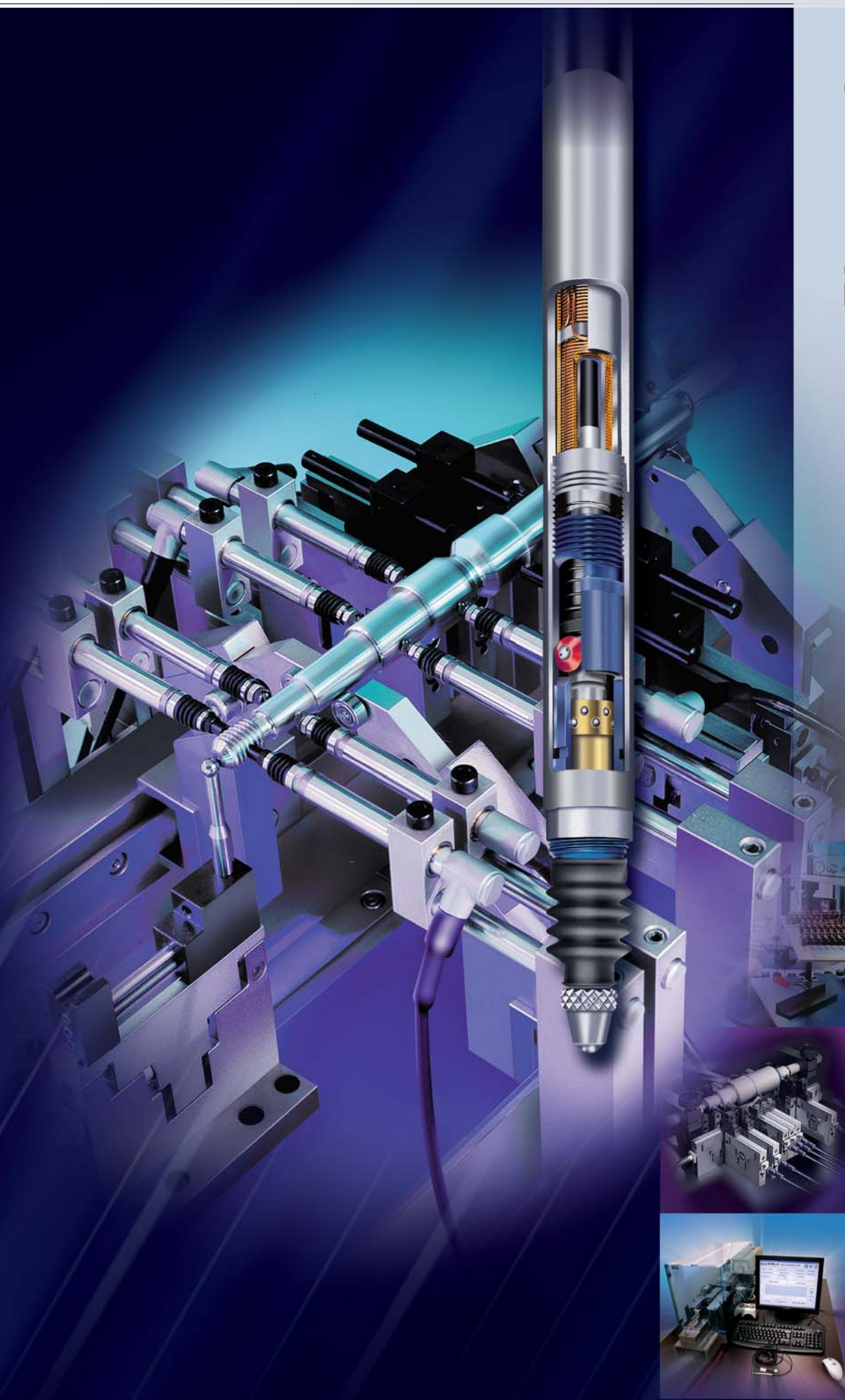


Also with back mounted clamping holder having a 8 mm diameter. Slider with locking screw and fine adjust device. Base has a ground face with dust grooves. Top face also ground.





# Electronic Length Measuring Equipment





# TESA LENGTH MEASURING EQUIPMENT 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 known as **half-bridge probes** – operate according to the electrical principle. They do not require any special setting.

Electronic probes that are used in conjunction with measuring instruments from other manufacturers work partly on the basis of a differential transformer. These probes are known as LVDT (Linear Variable Differential Transformer) probes. TESA also offer a full range of this kind of probes which, however, need to be fitted with a convenient socket and further adapted, accordingly.

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

## Countless Measuring Capabilities

All TESA electronic probes can either be used with hand-held tools, whether internal or external, or in conjunction with other typical measuring devices and supports.

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 as well as any other equipment for in-process inspection – thus allowing to spare many assembly components.

With a very few exceptions, these probes perform comparative measurement, 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 nearly equal to the measurand.
- Random errors are also significantly reduced as display setting and all subsequent measurements are usually made under the same conditions.
- TESA provide measuring instruments equipped with an analogue and/or digital display, depending on their type.

## Internal Data Processing

The measurement signals are processed differently, depending on the measuring application.

## Mathematical Data Processing

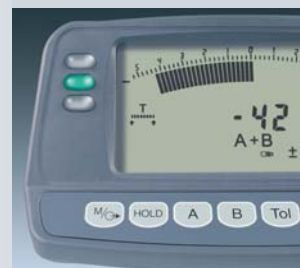
Signal processing can equally be made with positive or negative polarity signs. The use of a single probe enables single measurement of internal or external dimensions while the combination of the signals of two probes produces either a «sum measurement» or a «difference measurement».

## Value Storage

Provides the needed safety 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

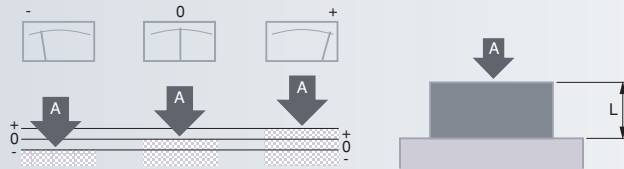
Uses limit deviations to classify the measured values while producing additional control signals usable through a remote unit.



# MEASURING FUNCTIONS – OVERVIEW

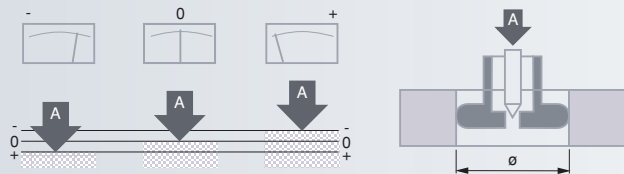
## Single measurements with positive polarity sign (+A)

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



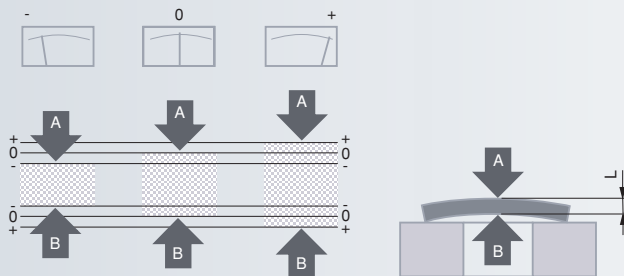
## Single measurements with negative polarity sign (-A)

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



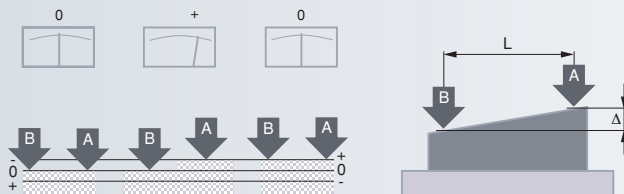
## Sum measurements with positive polarity signs (+A +B)

Measuring external dimensions regardless of form and position errors.

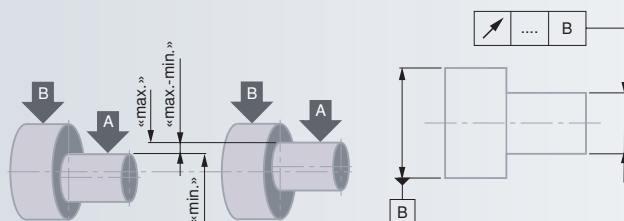


## Difference measurements with opposite polarity signs (+A -B)

Performing step, cone and inclination measurements.



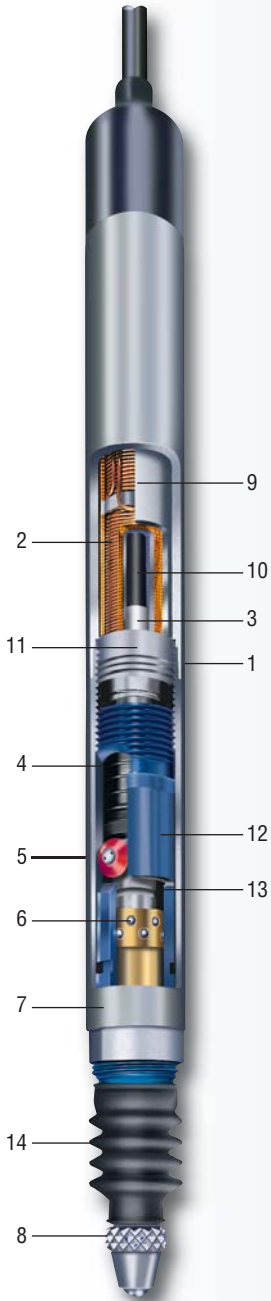
Establishing form and position errors such as runout errors with use of the memory function «max.-min.» as shown in this example.



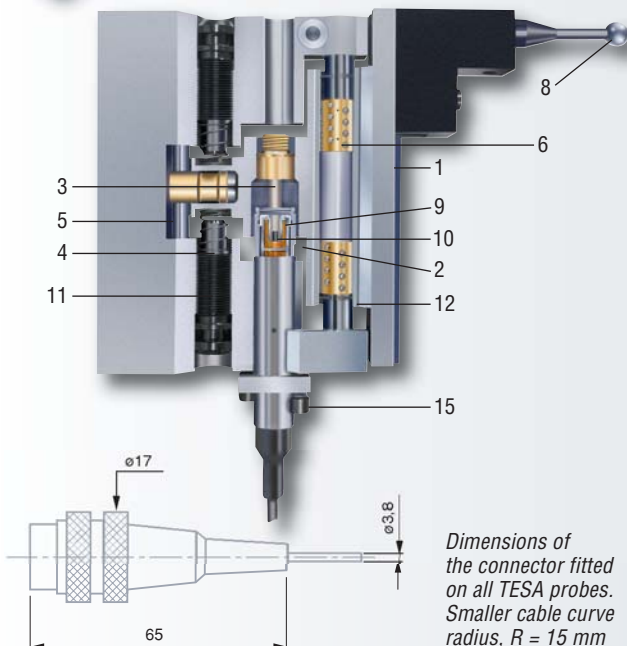
## TESA Electronic Probes at the Forefront in Precision Measurement

TESA is a leading designer, manufacturer and user of inductive probes for more than 40 years. Its 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-bearings 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 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 device is used.
- Electronic signal amplification produces excellent repeatability and low hysteresis.
- Resolution is as high as 0,01  $\mu\text{m}$ .



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



Dimensions of the connector fitted on all TESA probes. Smaller cable curve radius,  $R = 15 \text{ mm}$

### Sensitivity of standard half-bridge probes used in conjunction with TESA electronic probes

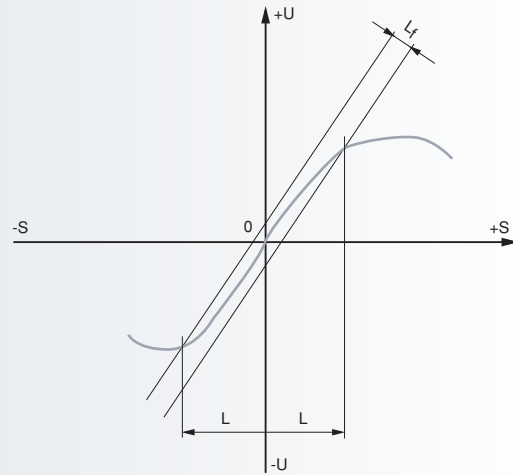
All given values are valid for the following reference conditions:

• Drive voltage	3 V
• Drive frequency	13 kHz
• Adjustment load	2 k $\Omega$
For any probe type	73,75
except probe series:	
• GT 61/62	29,5
• GT 61S/62S	7,375
• FMS 130/132	49,17



## Operating Principle

All TESA electronic probes (value sensors) work based 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 position of the ferromagnetic core. When symmetrically positioned - 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, causes the inductance to change. 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 a digital transformation. Unambiguous assessment of the measurand (at bolt position) to the signal (displayed value) is the main characteristic of analogue value acquisition. One of its distinct advantages lies in the value primarily displayed, which will be reproduced in the event of a power cut (switch-off or power failure).

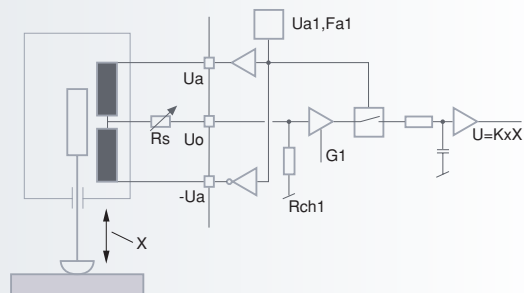


- Inductive measuring
- s Travel
- U Output current
- 0 Electrical zero
- L Linearity range
- Lf Linearity error

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

## TESA Standard Half-Bridge Probes for TESA Electronic Equipment

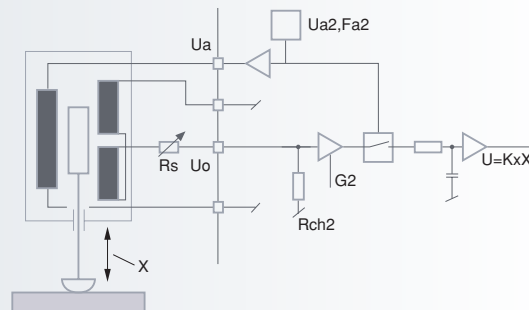
These probes have two serial coils with middle output mounted side by side, which are energized by a sinusoidal alternation at 13 kHz. Both are linked together to a Wheatstone bridge over an additional half-bridge.



Wiring plan of half-bridge probes

## TESA LVDT Probes

These probes are based on a Linear Variable Differential Transformer (LVDT). They have three coils, i.e. one primary coil being energized 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. Available upon request



Wiring plan of LVDT probes

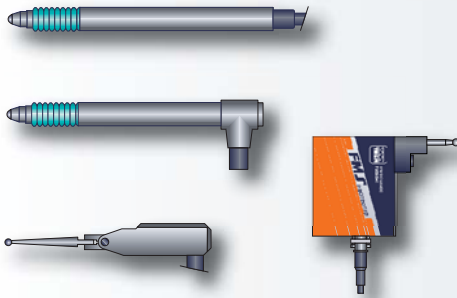
## Compatible Probes

Upon request, all TESA's probes can be made available with a data output compatible with any electronic equipment from other makers.





## TESA Half-Bridge Probes



Full probe range.  
See pages 0-8 to 0-13.



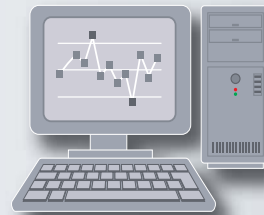
### TESA BPI interface box

Modular system for connecting up to 64 TESA half-bridge probes.  
Setting and operating the system requires the use of a host computer.  
See pages 0-48 to 0-49.

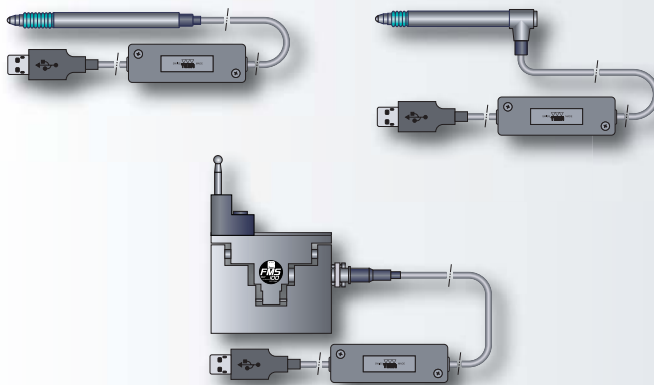


### Display unit with 2 connected probes TESATRONIC

Measurements and value display with value classification.  
See pages 0-42 to 0-47.



## TESA USB Probes

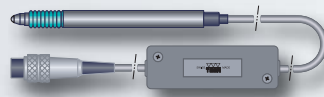


### Direct connection to host computer

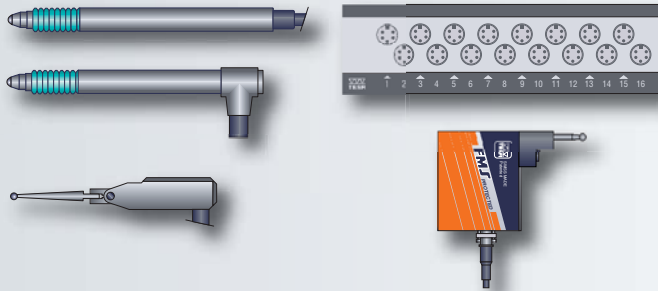
Easy-to-use and effective for single accurate and multi-gauging devices.  
See pages 0-14 to 0-15.



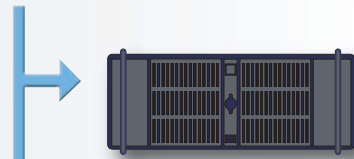
## TESA DC Probes



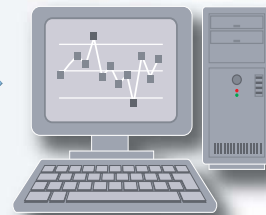
DC probes.  
See page O-16.



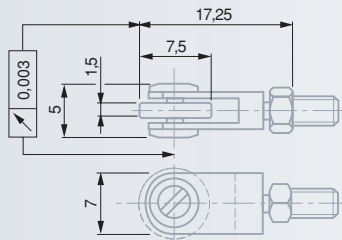
Interface boxes for TESA half-bridge probes. Analogue data output as for DC probes.  
See page O-50.



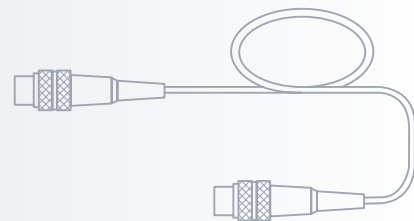
SPC or computer with analog board.



## TESA Accessories



Accessories for TESA's probes.  
See pages O-34 to O-41.



## TESA Software Tools



Software tools for data capture and data analysis (settings, measurements, inspection reports).  
See chapter A – Connectivity



## TESA Standard Probes – Overview



















### 8 mm diameter axial probes with ball-bearing measuring bolt

						Measuring bolt retraction		Sealing bellows	
			Measuring range (mm)	mm	Cable exit				
<i>Standard probes</i>									
	03210904	GT 21	± 2	4,3	axial	mechanical		Nitrile	
	03210924	GT 22	± 2	4,3	radial	by vacuum		Nitrile	
	03230057	GTL 21	± 2	4,3	axial	mechanical		Viton	
	03230072	GTL 211	± 2	4,3	axial	by vacuum		Viton	
	03230056	GTL 22	± 2	4,3	radial	by vacuum		Viton	
<i>Standard high-precision probes</i>									
	03230036	GT 21HP	± 0,2	4,3	axial	mechanical		Nitrile	
	03230021	GT 22HP	± 0,2	4,3	radial	by vacuum		Nitrile	
<i>Standard long-travel probes</i>									
	03230027	GT 27	± 2	10,3	axial	mechanical		Viton	
	03230073	GT 271	± 2	10,3	axial	by vacuum		Viton	
	03230026	GT 28	± 2	10,3	radial	by vacuum		Viton	
<i>Probes with extended measuring range</i>									
	03230041	GT 61	± 5	10,3	axial	mechanical		Viton	
	03230074	GT 611	± 5	10,3	axial	by vacuum		Viton	
	03230042	GT 62	± 5	10,3	radial	by vacuum		Viton	
<b>...with activation of the measuring bolt by pneumatic pressure</b>									
						Pressure (bar)		Sealing bellows	
			Measuring range (mm)	mm	Cable exit	nominal	maximum		
<i>Standard probes</i>									
	03230060	GTL 212	± 1,5	3,2	axial	0,7	1,0	Viton	
	03230054	GTL 222	± 1,5	3,2	radial	0,7	1,0	Viton	
	03230067	GTL 212-A	± 1,5	3,2	axial	0,25	6,0	none	
	03230063	GTL 222-A	± 1,5	3,2	radial	0,25	6,0	none	
<i>Long-travel probes</i>									
	03230061	GT 272	± 2	10,3	axial	1,1	1,5	Viton	
	03230053	GT 282	± 2	10,3	radial	1,1	1,5	Viton	
	03230068	GT 272-A	± 2	10,3	axial	1,0	6,0	none	
	03230069	GT 282-A	± 2	10,3	radial	1,0	6,0	none	
<i>Probes with extended measuring range</i>									
	03230062	GT 612	± 5	10,3	axial	1,1	1,5	Viton	
	03230055	GT 622	± 5	10,3	radial	1,1	1,5	Viton	
	03230070	GT 612-A	± 5	10,3	axial	1,0	6,0	none	
	03230071	GT 622-A	± 5	10,3	radial	1,0	6,0	none	

# ELECTRONIC LENGTH MEASURING EQUIPMENT - ANALOGUE



\*\* Nominal value of the measuring force at electrical zero, max. deviation  $\pm 25\%$ .  
 \*\*\* Highest mechanical frequency valid for the final value of the measuring range, amplified by 10%.  
 \*\*\*\* Linearity related max. permissible errors.

 N**	 Moving mass (g)	 Frequency limit Hz***	 Dismountable	 $\mu\text{m}$	 (L in mm) $\mu\text{m}^{****}$	 $^{\circ}\text{C}$	 IEC 60529	
0,63	6	60	●	0,01	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-17
0,63	6	60	●	0,01	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-18
0,63	6	60	●	0,01	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP65	0-17
0,63	6	60	●	0,01	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP65	0-17
0,63	6	60	●	0,01	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP65	0-18
0,63	6	60	—	0,01	$0,07 + 0,4 \cdot L$	$10 \div 40$	IP64	0-17
0,63	6	60	—	0,01	$0,07 + 0,4 \cdot L$	$10 \div 40$	IP64	0-18
0,63	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-19
0,63	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-19
0,63	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-19
0,9	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP65	0-20
0,9	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP65	0-20
0,9	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP65	0-20
 N**	 Moving mass (g)	 Frequency limit Hz***	 Dismountable	 $\mu\text{m}$	 (L in mm) $\mu\text{m}^{****}$	 $^{\circ}\text{C}$	 IEC 60529	
1,2	6	60	●	0,015	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP65	0-21
1,2	6	60	●	0,015	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP65	0-21
0,2	6	60	●	0,015	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP50	0-21
0,2	6	60	●	0,015	$0,2 + 2,4 \cdot L^2$	$-10 \div 65$	IP50	0-21
1,0	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-22
1,0	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP65	0-22
0,85	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-22
0,85	8	60	●	0,05	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-22
2,0	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP65	0-23
2,0	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP65	0-23
1,0	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP50	0-23
1,0	8	60	●	0,05	$1 + 4 \cdot L$	$-10 \div 65$	IP50	0-23





**Miniature axial probes, 8 mm dia. probe housing**

			Measuring range mm	mm	Cable exit		Measuring bolt retraction	Sealing bellows
<i>Measuring bolt hanging from diaphragm springs</i>								
	<b>03230001</b>	<b>GT 41</b>	± 0,3	0,7	axial		without	Nitrile
	<b>03230002</b>	<b>GT 42</b>	± 0,3	0,7	radial		vacuum	Nitrile
<i>Measuring bolt mounted on a plain bearing</i>								
	<b>03230035</b>	<b>GT 43</b>	± 1	2,1	axial		mechanical	Viton
	<b>03230017</b>	<b>GT 44</b>	± 1	2,1	radial		vacuum	Viton





**Axial probes with measuring bolt mounted on a ball-bearing, with no brand name**

			Measuring range mm	mm	Cable exit		Measuring bolt retraction	Sealing bellows
<i>Standard probes</i>								
	<b>03230490</b>	<b>490</b>	± 1,5	4,3	axial/radial		mechanical	Viton
<i>Standard probes with short body</i>								
	<b>96410012</b>	<b>410</b>	± 1	2,5	axial/radial		mechanical	Nitrile
<i>Standard probes with short body, 6 mm dia. fixing shank</i>								
	<b>96160013</b>	<b>160</b>	± 1	3,3	axial		mechanical	Viton
<i>Miniature probes, 8 mm dia. fixing shank</i>								
	<b>96430029</b>	<b>430</b>	± 0,5	1,25	axial		mechanical	Nitrile
	<b>96441041</b>	<b>451</b>	± 0,5	2,1	radial		vacuum	Nitrile

**Lever probes**

			Measuring range mm	mm	Cable exit		Measuring bolt retraction	Sealing bellows
	<b>96420004</b>	<b>420</b>	± 0,15	0,525	parallel		without	none
	<b>96499007</b>	<b>499</b>	± 0,5	1,2	parallel		without	none



 N**	 Moving mass g	 Frequency limit Hz***	Dismountable	 $\mu\text{m}$	 (L in mm) $\mu\text{m}^{****}$	 °C	 IEC 60529	
--	---	---	--------------	---	--	---	---	---

0,63	2	60	–	0,01	$0,2 + 5 \cdot L^2$	-10 ÷ 65	IP65	0-24
------	---	----	---	------	---------------------	----------	------	------

0,63	2	60	–	0,01	$0,2 + 5 \cdot L^2$	-10 ÷ 65	IP65	0-24
------	---	----	---	------	---------------------	----------	------	------

0,4	2	60	–	0,1	$0,2 + 5 \cdot L^2$	5 ÷ 65	IP65	0-24
-----	---	----	---	-----	---------------------	--------	------	------

0,4	2	60	–	0,1	$0,2 + 5 \cdot L^2$	5 ÷ 65	IP65	0-24
-----	---	----	---	-----	---------------------	--------	------	------

 N**	 Moving mass g	 Frequency limit Hz***	Dismountable	 $\mu\text{m}$	 %****	 °C	 IEC 60529	
--	---	---	--------------	---	---	---	---	---





0,63	6	60	●	0,02	0,2	-10 ÷ 65	IP65	0-25
------	---	----	---	------	-----	----------	------	------

0,6	3,1	58	–	0,1	0,2	0 ÷ 60	IP62	0-26
-----	-----	----	---	-----	-----	--------	------	------

0,6	2,5	60	–	0,1	0,2	0 ÷ 60	IP62	0-27
-----	-----	----	---	-----	-----	--------	------	------

0,75	1,9	60	–	0,1	0,2	0 ÷ 60	IP62	0-27
------	-----	----	---	-----	-----	--------	------	------

0,6	3	60	–	0,1	0,2	0 ÷ 60	IP62	0-27
-----	---	----	---	-----	-----	--------	------	------

 N**	 Moving mass g	 Frequency limit Hz***	Dismountable	 $\mu\text{m}$	 %****	 °C	 IEC 60529	
--	---	---	--------------	---	---	---	---	---

1,8	2,5	10	–	0,5	0,3	0 ÷ 60	IP40	0-28
-----	-----	----	---	-----	-----	--------	------	------

0,02 ÷ 0,2	10,6	10	–	0,25	0,6	0 ÷ 60	IP40	0-28
------------	------	----	---	------	-----	--------	------	------

\*\* Nominal value of the measuring force at electrical zero, max. deviation  $\pm 25\%$ .  
 \*\*\* Highest m mechanical frequency valid for the final value of the measuring range, amplified by 10%.  
 \*\*\*\* Linearity related max. permissible errors.



## TESA probe with inclinable lever

	No.	Model	Measuring range (mm)	mm	Cable exit	Measuring bolt retraction
	03210802	GT 31	± 0,3	0,7	angled	without

## TESA universal probes

	No.	Model	Measuring range (mm)	mm	Cable exit	Measuring bolt retraction (accessory)

### Standard probes

	03230019	FMS 100	± 2	5,8	parallel	air pressure
	03230028	FMS 102	± 2	5,8	angled	air pressure

	03230049	FMS 130	± 2,9	5,8	parallel	air pressure
	03230050	FMS 132	± 2,9	5,8	angled	air pressure

### Probes «FMS Protected»

	03230037	FMS 100-P	± 2	5,8	parallel	air pressure
	03230038	FMS 102-P	± 2	5,8	angled	air pressure

	03230051	FMS 130-P	± 2,9	5,8	parallel	air pressure
	03230052	FMS 132-P	± 2,9	5,8	angled	air pressure

\* Position against the measuring direction

 N**	 Moving mass (g)	 Frequency limit Hz***	 Dismountable	 $\mu\text{m}$	 (L in mm) $\mu\text{m}^{****}$	 °C	 IEC 60529	
0,1	12	25	–	0,1	$0,2 + 50 \cdot L^2$	$5 \div 60$	IP40	0-29
 N/mm	 Moving mass (g)	 Frequency limit Hz***	 Dismountable	 $\mu\text{m}$	 (L in mm) $\mu\text{m}^{****}$	 °C	 IEC 60529	
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-31
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-32
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-31
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP50	0-32
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP54	0-31
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP54	0-32
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP54	0-31
2	110	25	●	0,5	$0,2 + 3 \cdot L^3$	$-10 \div 65$	IP54	0-32

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

\*\*\* Highest mechanical frequency valid for the final value of the measuring range, amplified by 10%.

\*\*\*\* Linearity related max. permissible errors.



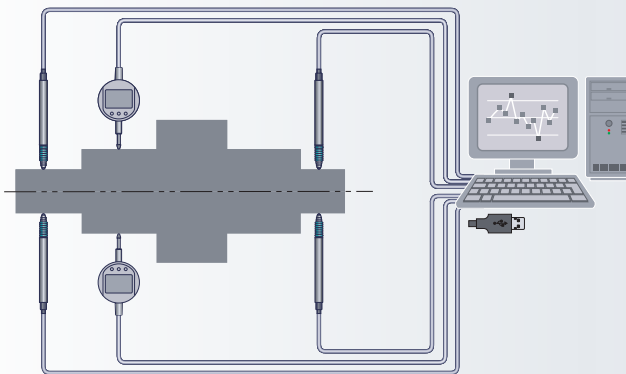


# TESA PROBES WITH DIRECT USB CONNECTION

*New generation of TESA's USB probes for a surprising ease of use*

*These probes can be directly connected to your host computer over the widely known USB interfaces. The highest number of connectable probes depends on the USB ports available. Since interface boxes or cards are no longer necessary, the use of a USB multiplexer provides Users with a flexible and affordable solution.*

*Each probe will be identified as a standard peripheral device, using an RS232 protocol for communicating. Electronics is optimized, thus guaranteeing high accuracy throughout the measuring range. Making use of this technology will allow you to fit and combine your inspection means according to given requirements for precision and probe travel.*



*Most of the software tools available for data processing are able to process the values obtained from the measurements taken in static multigauging. The USB technologie is convenient for these devices besides complex metrology applications, but also for simple gauging operations where high precision is critical.*



*Software for data acquisition and data processing.  
See chapter A – Connectivity*

*TESA's probes available in the USB version and Half-bridge probes have the same dimensions. Their range of standard accessories is also identical.*





DIN 32876 Part 1

See table

Any position of use

Distance between stops and electrical zero can not be set.  
Cable length: 2,9 m.

0,1 µm

USB 2.0 RS 232, virtual

20 ±0,5°C

-10°C to 40°C

80%

IP65 as per IEC 60529  
IP50 for GT222-A  
GT622-A  
FMS 100-102

Shipping packaging

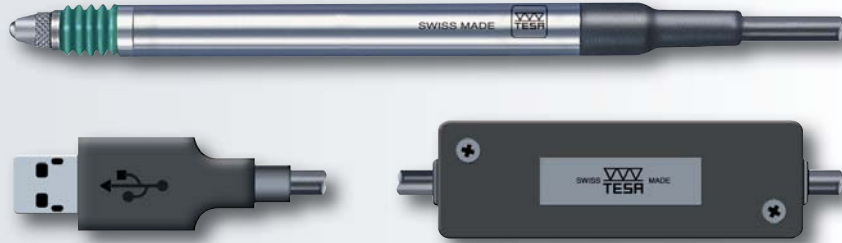
Identification number

Inspection report with a declaration of conformity

## TESA USB Probes

Probes for use with a USB interface.

- Easy and quick connection to the USB port. Data transmission uses a virtual port along with any RS 232 protocol.



		Measuring range (mm)	Bolt retraction	Sealing bellow
03230200	GTL 21 USB	+/- 2	mechanical	Viton
03230201	GTL 22 USB	+/- 2	mechanical	Viton
03230202	GTL 222 USB	+/- 1,5	air pressure	Viton
03230203	GTL 222-A USB	+/- 1,5	air pressure	-
03230204	GT 61 USB	+/- 5	mechanical	Viton
03230205	GT 62 USB	+/- 5	vacuum	Viton
03230206	GT 622 USB	+/- 5	air pressure	Viton
03230207	GT 622-A USB	+/- 5	air pressure	-
03230208	FMS 100 USB	+/- 2	air pressure	-
03230209	FMS 102 USB	+/- 2	air pressure	-

	Mechanical displacement	Precision (µm)	µm	Standard execution	Technical data sheets
GTL 21 USB	4,3	1,2	<0,1	0-17	03200587
GTL 22 USB	4,3	1,2	<0,1	0-18	03200588
GTL 222 USB	3,1	1,2	<0,1	0-21	03200589
GTL 222-A USB	3,1	1,2	<0,1	0-21	03200590
GT 61 USB	10,3	3	<0,24	0-20	03200591
GT 62 USB	10,3	3	<0,24	0-20	03200592
GT 622 USB	10,3	3	<0,24	0-23	03200593
GT 622-A USB	10,3	3	<0,24	0-23	03200594
FMS 100 USB	5,8	1,2	<0,1	0-31	03200597
FMS 102 USB	5,8	1,2	<0,1	0-32	03200597

Data acquisition on the PC: 20 to 80 ms depending on used mode – No synchronisation in dynamic measurement.

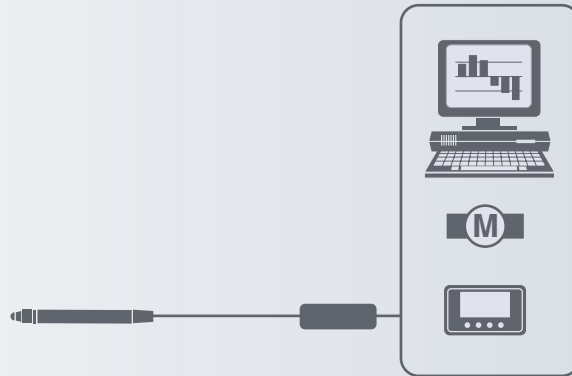
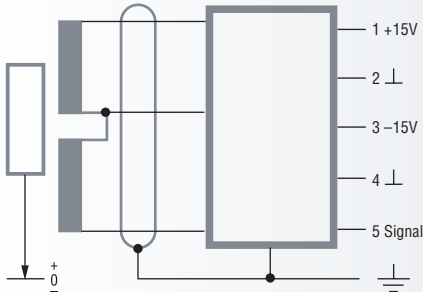
Note: – Adapter for standard probe to USB interface, see page 0-50.  
– Advised limite of amount; 49 probes on 2 Hub levels.



## TESA DC Probes

Provided with a DC output for direct connection to a host computer or a peripheral fitted with an analogue input.

### Operating principle



DIN 32876 Part 1



See table



Any position of use



Drive voltage: ±15 V

Consumption: 15 mA  
Adjustment load: > 1 kΩ  
Sensitivity: see table



See table



See table



Additional data: see standard probes

		Measuring range (mm)	Output voltage V	Sensitivity V/mm	µm	(L in mm) µm*	Technical data sheets
<i>Standard probes</i>							
<b>03230059</b>	<b>GTL 21 DC</b>	± 2	± 2	1	0,1	0,2 + 3,5 · L <sup>2</sup>	03200396
<b>03230058</b>	<b>GTL 22 DC</b>	± 2	± 2	1	0,1	0,2 + 3,5 · L <sup>2</sup>	03200397
<i>Probes with extended measuring range</i>							
<b>03230086</b>	<b>GT 61 DC</b>	± 5	± 5	1	0,1	1 + 4 · L	03200519
<b>03230087</b>	<b>GT 62 DC</b>	± 5	± 5	1	0,1	1 + 4 · L	03200520
<i>Miniature probes with measuring bolt hanging from a diaphragm spring</i>							
<b>03230082</b>	<b>GT 41 DC</b>	± 0,3	± 0,3	1	0,1	0,2 + 5 · L <sup>3</sup>	03200516
<i>Miniature probes with measuring bolt mounted on a plain bearing</i>							
<b>03230085</b>	<b>GT 44 DC</b>	± 1	± 1	1	0,1	0,2 + 5 · L <sup>3</sup>	03200518
<i>Probes with inclinable lever</i>							
<b>03230081</b>	<b>GT 31 DC</b>	± 0,3	± 0,3	1	0,1	0,2 + 50 · L <sup>2</sup>	03200484

\* Linearity related max. permissible errors.

Note: Other existing probe types and versions are available on request (2 V/mm, 5 V/mm, 10 V/mm or 0 to + 10 V; max. output voltage 10 V).

# TESA Axial Probes

## Standard Probes

Universal probes for common but constraining applications.

- 8 mm diameter probe housing. Can be clamped over its entire length.
- Measuring bolt mounted on a ball bearing.
- 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.
- LVDT probes compatible with measuring equipment from other makers available on request.



DIN 32876 Part 1

See in the table

Any position of use

8 mm dia. fixing shank. Ball-bearing measuring bolt.

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

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

2 m long cable. DIN 45322 5-pin connector.

Nickel-plated housing. Stainless steel measuring bolt, hardened.

Sealing bellows made from resistant nitrile or high-resistance elastomer (Viton)

Moved mass 6 g

13 kHz (± 5%) drive frequency.

Highest mechanical frequency to 60 Hz.

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

20 ± 0,5°C

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

80%

IP65 (IEC 60529), IP64 for GT 21 HP

Shipping packaging

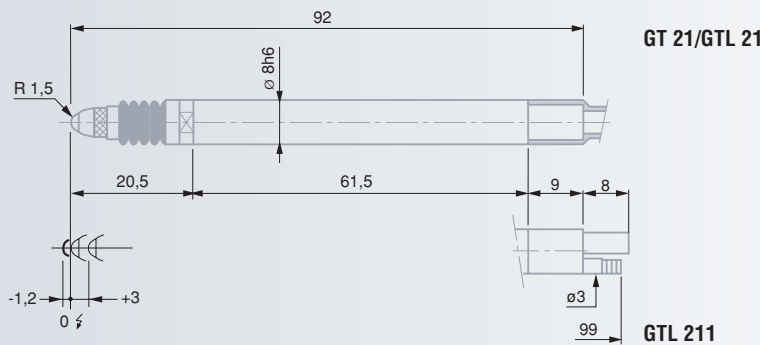
Identification number

Inspection report with a declaration of conformity

### GT 21 and GTL 21 probes with axial cable exit

		Measuring range (mm)	N*	Bolt retraction	Sealing bellows
<i>Standard probes</i>					
<b>03210904</b>	<b>GT 21</b>	± 2	0,63	mechanical	nitrile
<b>03210905</b>	<b>GT 21</b>	± 2	1,0	mechanical	nitrile
<b>03210906</b>	<b>GT 21</b>	± 2	1,6	mechanical	nitrile
<b>03210907</b>	<b>GT 21</b>	± 2	2,5	mechanical	nitrile
<b>03210908</b>	<b>GT 21</b>	± 2	4,0	mechanical	nitrile
<b>03230057</b>	<b>GTL 21</b>	± 2	0,63	mechanical	nitrile
<b>03230072</b>	<b>GTL 211</b>	± 2	0,63	vacuum	Viton
<i>High-precision standard probes</i>					
<b>03230036</b>	<b>GT 21 HP</b>	± 0,2	0,63	mechanical	nitrile

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



	mm	µm	µm	µm***	Technical data sheets			
	Lower stop of the measuring bolt**, adjustable from... to		mm	mm	mm	mm	mm	
<b>GT 21</b>	-2,2	0,1	-1,2	4,3	0,01	0,02	0,2 + 3 · L <sup>3</sup>	03200249
<b>GTL 21</b>	-2,2	0,1	-1,2	4,3	0,01	0,02	0,2 + 2,4 · L <sup>2</sup>	03200391
<b>GTL 211</b>	-2,2	0,1	-1,2	4,3	0,01	0,02	0,2 + 2,4 · L <sup>2</sup>	03200435
<b>GT 21 HP</b>	-2,2	0,1	-1,2	4,3	0,01	0,01	0,07 + 0,4 · L	03200264

\*\* Distance from electrical zero. \*\*\* Linearity related max. perm. errors (L in mm).





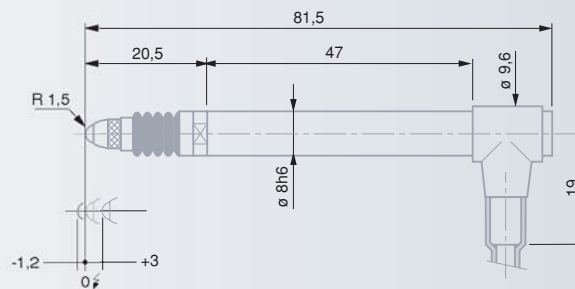
## GT 22 and GTL 22 probes with radial cable exit

No		=		Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellows
<i>Standard probes</i>							
03210924	GT 22	± 2	0,63	vacuum	nitrile		
03210921	GT 22	± 2	0,16	vacuum	nitrile		
03210922	GT 22	± 2	0,25	vacuum	nitrile		
03210923	GT 22	± 2	0,4	vacuum	nitrile		
03210925	GT 22	± 2	1,0	mechanical	nitrile		
03210926	GT 22	± 2	1,6	mechanical	nitrile		
03210927	GT 22	± 2	2,5	mechanical	nitrile		
03210928	GT 22	± 2	4,0	mechanical	nitrile		
03230056	GTL 22	± 2	0,63	vacuum	Viton		
03230076	GTL 22	± 2	1	vacuum	Viton		
<i>High-precision standard probes</i>							
03230021	GT 22 HP	± 0,2	0,63	vacuum	nitrile		

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



GT 22/GTL 22



DIN 32876 Part 1



See in the table



Any position of use



8 mm dia. fixing shank. Ball-bearing measuring bolt.

Distance from electrical zero of both stops is either adjustable (downward) or depends on the position of the lower stop (upward).

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

2 m long cable. DIN 45322 5-pin connector.



Nickel-plated housing. Stainless steel measuring bolt, hardened.

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



Moved mass 6 g



13 kHz (± 5%) drive frequency.

Highest mechanical frequency to 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 22 HP



80%



IP65 (IEC 60529) or IP64 for GT 22 HP



Shipping packaging



Identification number



Inspection report with a declaration of conformity



Lower stop of the measuring bolt\*\*, adjustable from... to ex-factory mm mm mm

	mm	mm	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 <sup>3</sup>	03200250
GTL 22	-2,2	0,1	-1,2	4,3	0,01	0,02	0,2 + 2,4 · L <sup>2</sup>	03200392
GT 22 HP	-2,2	0,1	-1,2	4,3	0,01	0,01	0,07 + 0,4 · L	03200265

\*\* Distance from electrical zero. \*\*\* Linearity related max. perm. errors. (L in mm).



DIN 32876 Part 1

See in the tables

Any position of use

8 mm dia. fixing shank. Ball-bearing measuring bolt.

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

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

2 m long cable. Standard probes with a 5-pin DIN 45322 connector.

Nickel-plated housing. Stainless steel measuring bolt, hardened.

Viton bellows in high-resistance elastomer

Moving mass 8 g

13 kHz (± 5%) drive frequency. Highest mechanical frequency to 60 Hz.

0,15 µm/ °C

20 ± 0,5 °C

-10°C to 65°C

80%

IP65 (IEC 60529)

Shipping packaging

Identification number

Inspection report with a declaration of conformity

# TESA Axial Probes with Long Retraction Travel

## Standard Probes

Universal inductive probes for common applications, especially those using multigauging devices.

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

LVDT probes compatible with measuring equipment from other makers also available on request.

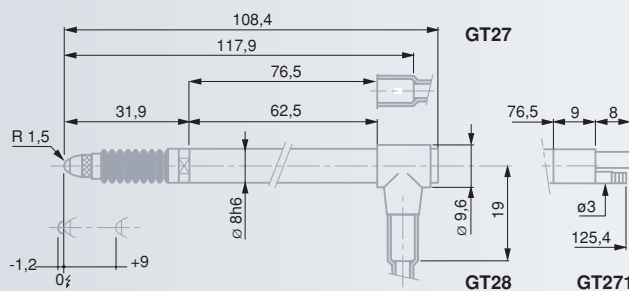
### GT 27 probes with axial cable exit

<i>Standard probes</i>						
<b>03230027</b>	<b>GT 27</b>	± 2	0,63	mechanical	Viton	
<b>03230073</b>	<b>GT 271</b>	± 2	0,63	vacuum	Viton	

### GT 28 probes with radial cable exit

<i>Standard probes</i>						
<b>03230026</b>	<b>GT 28</b>	± 2	0,63	vacuum	Viton	

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



	Lower stop of the measuring bolt**, adjustable from... to ex-factory	mm	mm	µm	µm	µm	µm ***	Technical data sheets
<b>GT 27</b>	-2,2 0,1	-1,2	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200251	
<b>GT 271</b>	-2,2 0,1	-1,2	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200436	
<b>GT 28</b>	-2,2 0,1	-1,2	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200252	

\*\* Distance from electrical zero. \*\*\* Linearity related max. perm. errors (L in mm).



# TESA Axial Probes with Extended Measuring Range

## Standard Probes

Designed for long travels and low resolutions – Specially suited for use on multigauging devices.

- Correction factor applied to get the true value is 2,5x (10x for the S probe version).

LVDT probes compatible with measuring equipment from other makers also available on request.

### GT 61 probes with axial cable exit

			Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellows
<i>Standard probes</i>						
03230041	GT 61	± 5	0,9	mechanical	Viton	
S32070041	GT 61S	± 5	0,9	mechanical	Viton	
03230074	GT 611	± 5	0,9	vacuum	Viton	

### GT 62 probes with radial cable exit

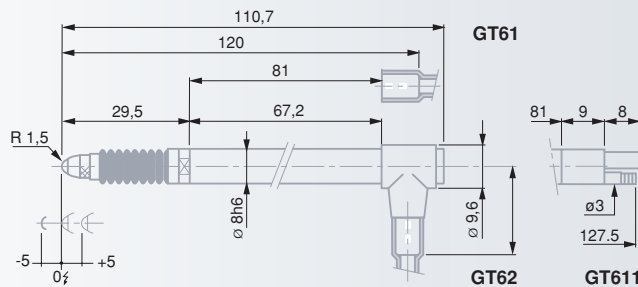
			Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellows
<i>Standard probes</i>						
03230042	GT 62	± 5	0,9	vacuum	Viton	
S32070042	GT 62S	± 5	0,9	vacuum	Viton	
S32080861	GT62	± 5	0,16	mechanical	none	

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



GT 62

GT 61



Both lower and upper stops are fixed.

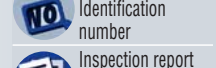
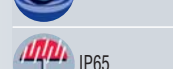
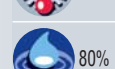
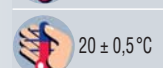
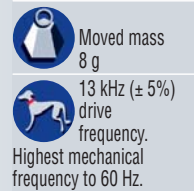
Interchangeable measuring insert with a 3 mm dia. tungsten carbide ball tip. M2,5 thread.

2 m long cable.

5-pin DIN 45322 connector.



Moved mass 8 g



Measuring bolt stops\*\*  
lower stop (mm) upper stop (mm)

	mm	µm	µm	µm***	Technical data sheets
GT 61	-5,1 5,2	10,3	0,05	0,05	1 + 4 · L 03200294
GT 611	-5,1 5,2	10,3	0,05	0,05	1 + 4 · L 03200437
GT 62	-5,1 5,2	10,3	0,05	0,05	1 + 4 · L 03200295

\*\* Distance from electrical zero. \*\*\* Linearity related max. perm. errors (L in mm).

# TESA Axial Probes with Measuring Bolt Activation by Pneumatic Pressure

## Standard Probes

These probes are intended for use with measuring devices providing full or half-assisted inspection routines.

LVDT probes compatible with measuring equipment from other makers also available on request.



DIN 32876 Part 1

See in the tables

Any position of use

8 mm dia. fixing shank. Ball-bearing measuring bolt.

Both lower and upper stops are fixed.

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

2 m long cable.

Standard probes with a 5-pin DIN 45322 connector.

Nickel-plated housing.

Stainless steel measuring bolt, hardened.

Viton bellows in high-resistance elastomer

Moved mass 6 g

13 kHz ( $\pm 5\%$ ) drive frequency.

Highest mechanical frequency to 60 Hz.

0,2  $\mu\text{m}/^\circ\text{C}$

20  $\pm 0,5$   $^\circ\text{C}$

-10 $^\circ\text{C}$  to 65 $^\circ\text{C}$

80%

IP65 (IEC 60529) or IP50 for GTL 212-A and GTL 222-A

Shipping packaging

Identification number

Inspection report with a declaration of conformity

### GT 212 probes with axial cable exit

No	Measuring range (mm)	N*	Measuring bolt activation	Sealing bellows
<i>Standard probes</i>				
03230060	GTL 212	$\pm 1,5$	1,2	▼ ▲ Viton
03230067	GTL 212-A	$\pm 1,5$	0,2	▼ ▲ none

### GT 222 probes with radial cable exit

No	Measuring range (mm)	N*	Measuring bolt activation	Sealing bellows
<i>Standard probes</i>				
03230054	GTL 222	$\pm 1,5$	1,2	▼ ▲ Viton
03230063	GTL 222-A	$\pm 1,5$	0,2	▼ ▲ none

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

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

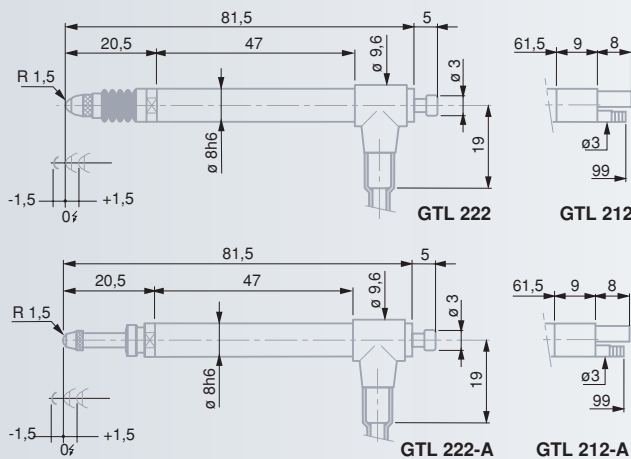
▲ Upward movement of the measuring bolt activated under the spring force only.



GTL 222



GTL 212-A



	Air pressure (bar)	mm	$\mu\text{m}$	$\mu\text{m}$	$\mu\text{m}^{***}$	Technical data sheets	
	nominal	maximum					
GTL 212	0,7	1,0	3,2	0,015	0,02	0,2 + 2,4 · L <sup>2</sup>	03200413
GTL 212-A	0,25	6,0	3,2	0,015	0,02	0,2 + 2,4 · L <sup>2</sup>	03200430
GTL 222	0,7	1,0	3,2	0,015	0,02	0,2 + 2,4 · L <sup>2</sup>	03200393
GTL 222-A	0,25	6,0	3,2	0,015	0,02	0,2 + 2,4 · L <sup>2</sup>	03200422

\*\*\* Linearity related max. perm. errors (L in mm).





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

## Standard Probes

Made for use with measuring devices providing full or half-assisted inspection routines.

LVDT probes compatible with measuring equipment from other makers also available on request.



GT 282

GT 272-A

### GT 272 probes with axial cable exit

		Measuring range (mm)	Upper travel (mm)*	N**	Measuring bolt activation	Sealing below		
<i>Standard probes</i>								
03230061	GT 272	± 2	8,1	1,0	▼ ▲	Viton		
03230068	GT 272-A	± 2	8,1	0,85	▼ ▲	none		

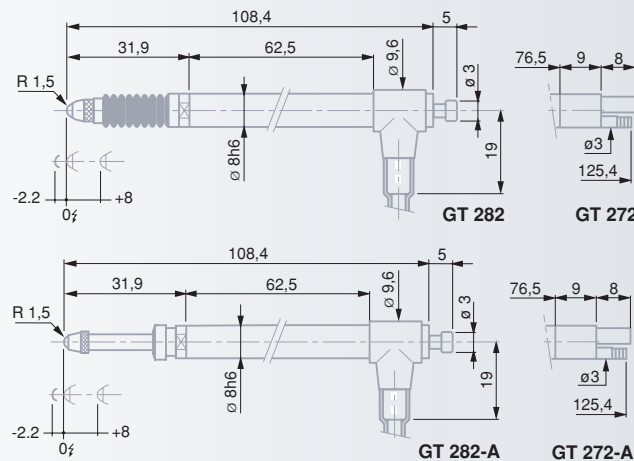
### GT 282 probes with radial cable exit

		Measuring range (mm)	Upper travel (mm)*	N**	Measuring bolt activation	Sealing below		
<i>Standard probes</i>								
03230053	GT 282	± 2	8,1	1,0	▼ ▲	Viton		
03230069	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 only.



GT 272-A

GT 282-A

	Air pressure (bar) nominal	Air pressure (bar) maximum	mm	µm	µm	µm***	Technical data sheets
GT 272	1,1	1,5	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200414
GT 272-A	1,0	6,0	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200431
GT 282	1,1	1,5	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200390
GT 282-A	1,0	6,0	10,3	0,05	0,05	0,2 + 3 · L <sup>3</sup>	03200432

\*\*\* Linearity related max. permissible errors (L in mm).



DIN 32876 Part 1

See in tables

Any position of use

8 mm dia. fixing shank. Ball-bearing measuring bolt. Both lower and upper stops are fixed.

Interchangeable insert with a 3 mm dia. carbide ball tip. M2,5 thread. 2 m long cable. 5-pin DIN 45322 connector.

Nickel-plated housing. Stainless steel measuring bolt, hardened.

Viton bellows in high-resistance elastomer

Moved mass 8 g

13 kHz (±5%) drive frequency. Highest mechanical frequency to 60 Hz.

0,15 µm/°C

20 ± 0,5°C

-10°C to 65°C

80%

IP65 (IEC 60529) or IP50 for GT 272-A plus GT 282-A

Shipping packaging

Identification number

Inspection report with a declaration of conformity



DIN 32876 Part 1

See in tables

Any position of use

8 mm dia. fixing shank. Ball-bearing

measuring bolt. Both lower and upper stops are fixed.

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

Cable length: 2 m. 5-pin DIN 45322 connector.

Nickel-plated housing. Stainless steel measuring bolt, hardened.

Viton bellows in high-resistance elastomer

Moved mass 8 g

13 kHz (± 5%) drive frequency. Highest mechanical frequency 60 Hz.

0,09 µm/ °C

20 ± 0,5°C

-10°C to 65°C

80%

IP65 (IEC 60529) or IP50 for GT 612-A plus GT 622-A

Shipping packaging

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 full or half-assisted inspection routines.

LVDT probes compatible with measuring equipment from other makers also available on request.

### GT 612 probes with axial cable exit

		Measuring range (mm)	N*	Measuring bolt activation		Sealing bellow
<i>Standard probes</i>						
03230062	GT 612	± 5	2,0	▼	▲	Viton
03230070	GT 612-A	± 5	1,0	▼	▲	none

### GT 622 probes with radial cable exit

		Measuring range (mm)	N*	Measuring bolt activation		Sealing bellow
<i>Standard probes</i>						
03230055	GT 622	± 5	2,0	▼	▲	Viton
03230071	GT 622-A	± 5	1,0	▼	▲	none

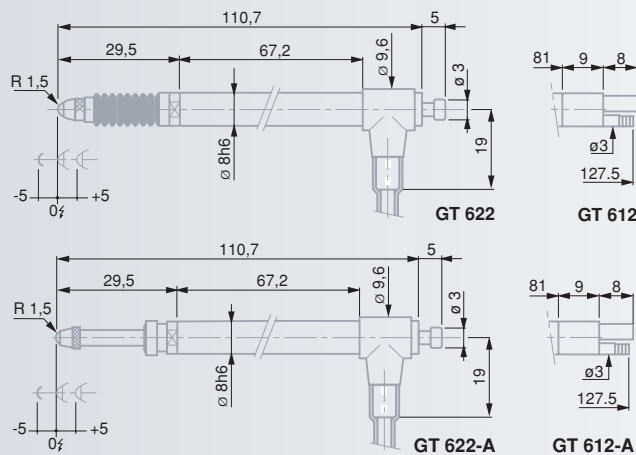
\* Nominal value at electrical zero, max. ± 25%. Valid in upright assembly position with downward oriented measuring bolt, as well as in static measuring.  
 ▼ Downward movement of the measuring bolt activated by pneumatic pressure.  
 ▲ Upward movement of the measuring bolt activated under the spring force only.



GT 622



GT 612-A



	Air pressure (bar)		mm	µm	µm	µm**	Technical data sheets	
	nominal	maximum						
GT 612	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	03200415	
GT 612-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	03200433	
GT 622	1,1	1,5	10,3	0,05	0,05	1 + 4 · L	03200394	
GT 622-A	1,0	6,0	10,3	0,05	0,05	1 + 4 · L	03200434	

\*\* Linearity related max. permissible 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 on measuring heads for bore measurement and the like.



GT 41 GT 43

### GT 41 and GT 43 probes with axial cable exit

			Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellows
<i>Measuring bolt hanging from a diaphragm spring</i>						
03230001	GT 41	± 0,3	0,63	without	nitrile	
<i>Measuring bolt mounted on a plain bearing</i>						
03230035	GT 43	± 1	0,4	mechanical	Viton	

### GT 42 and GT 44 probes with radial cable exit

			Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellows
<i>Measuring bolt hanging from a diaphragm spring</i>						
03230002	GT 42	± 0,3	0,63	vacuum	nitrile	
<i>Measuring bolt mounted on a plain bearing</i>						
03230017	GT 44	± 1	0,4	vacuum	Viton	

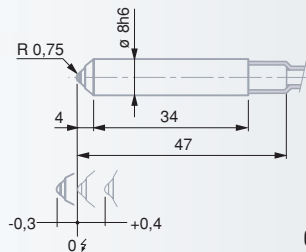
\* Nominal value at electrical zero, max. ±25%. Valid in upright assembly position with downward oriented measuring bolt, as well as in static measuring.



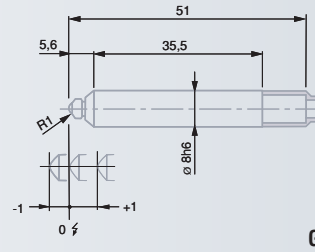
GT 42



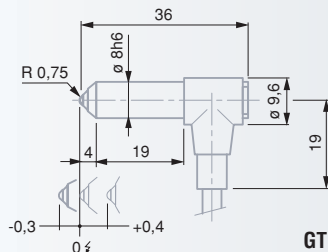
GT 44



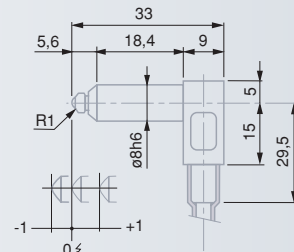
GT 41



GT 43



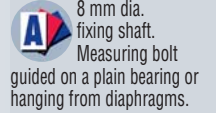
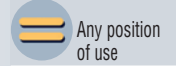
GT 42



GT 44

	Measuring bolt stops**	mm	µm	µm	µm***	Technical data sheets	
	lower (mm)	upper (mm)					
GT 41	-0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L <sup>2</sup>	03200258
GT 43	-1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L <sup>2</sup>	03200260
GT 42	-0,3	0,4	0,7	0,01	0,01	0,2 + 5 · L <sup>2</sup>	03200259
GT 44	-1,05	1,05	2,1	0,1	0,15	0,2 + 5 · L <sup>2</sup>	03200261

\*\* Distance from electrical zero. \*\*\* Linearity related max perm. errors (L in mm).



Both lower and upper stops are fixed.

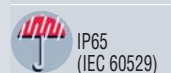
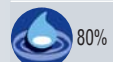
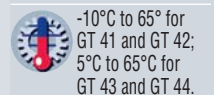
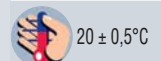
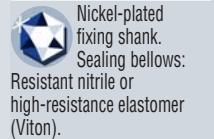
GT 41 or GT 42 with a fixed measuring insert; spherical carbide measuring face, R = 0,75 mm.

GT 43 or GT 44 with a selectable measuring insert; spherical carbide face, R = 1 mm.

M2 coupling thread.

Cable length: 2 m.

5-pin DIN 45322 connector.



# TESA Axial Probes – Serie 490

Probes with no brand name for TESA's electronic equipment

Universal probes to suit common but constraining applications.

- 8 mm diameter probe body that can be clamped over its entire length.
- Measuring bolt mounted on a ball-bearing.
- Probe body made in steel, nickel-plated.
- Degree of protection to IP65.
- Flexible axial cable exit fitted with a steel spring to prevent the cable from breaking.

Other probes compatible with measuring equipment from other makers also available on request.



DIN 32876 Part 1

See in tables

Axial probes usable in any position

8 mm body diameter. Measuring bolt mounted on a ball-bearing.

Adjustable distance between both lower stop and electrical zero.

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

Cable length: 2 m.

DIN 45322 connector.

Nickel-plated body. Steel measuring bolt, hardened.

Sealing bellow: high-resistance elastomer (Viton)

Moved mass 6 g

Force increase 0,2 N/mm

Highest mechanical frequency to 60 Hz

0,2 µm/ °C

-10°C to 65°C

-20°C to 65°C

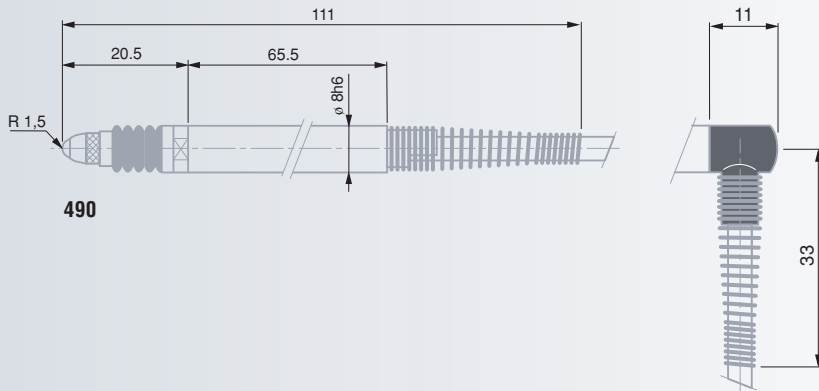
IP65 (IEC 60529)

Shipping packaging

Identification number

	Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellow
<i>Probe series 490 with axial/radial** cable exit</i>				
<b>03230490</b>	± 1,5	0,63	mechanical	Viton

\* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid in upright assembly position with downward oriented measuring bolt, as well as in static measuring. Also available upon request: Probes 410 with measuring force to 0,4, 1,0, 1,6, 2,5 or 4 N.  
 \*\* Using the right angle adaptor that came with the probe.



	Lower stop of the measuring bolt***, adjustable from... to... ex-factory							
	mm	mm	mm					
<b>490</b>	<b>TESA</b>	-2	0	-1,7	4,3	0,02	0,2	03200456

\*\*\* Distance from electrical zero.  
 \*\*\*\* Linearity related max. perm. errors within the measuring span of 3 mm (measuring range ±1,5 mm).





# Axial Probes with Short Body – Serie 410

## Probes for TESA's electronic equipment

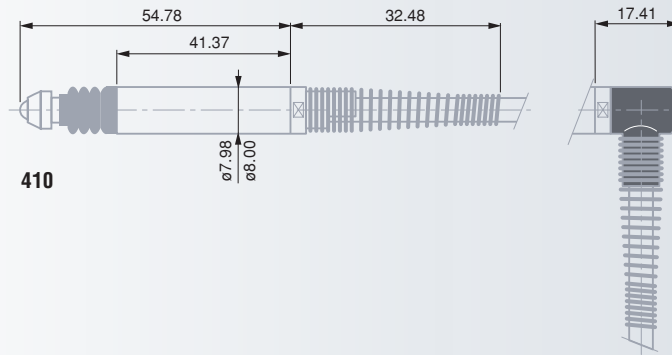
Universal probes for common but constraining applications.

- 8 mm diameter probe body that can be clamped over its entire length.
- Ball bearing measuring bolt.
- Hardened steel body, hard-chrome plated.
- Degree of protection to IP62.
- Flexible axial cable exit fitted with a steel spring to prevent the cable from breaking.

Other probes compatible with measuring equipment from other makers also available on request.



	Measuring range (mm)	N*	Measuring bolt retraction	Sealing bellow
<i>Probe series 410 with axial/radial cable exit**</i>				
<b>96410012</b>	± 1	0,6	mechanical	nitrile
* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid in upright assembly position, with downward oriented measuring bolt, as well as in static measuring. Also available upon request: Probes 410 with measuring force to 1,0 or 1,6 N.				
** Using the right angle adaptor that came with the probe.				



- ✓
- DIN 32876 Part 1
- See in tables
- Axial probes usable in any position
- 8 mm body diameter. Measuring bolt mounted on a ball-bearing.
- Adjustable distance between both lower stop and electrical zero.
- Interchangeable probe insert with a M2,5 mounting thread. 3 mm dia. tungsten carbide ball tip.
- Cable length: 2 m.
- DIN 45322 connector.
- Hardened steel probe body, hard-chrome plated.
- Stainless steel bolt, hardened.
- Sealing bellow: resistant nitrile
- Moved mass 3,1 g
- Force increase 0,15 N/mm
- Highest mechanical frequency to 60 Hz
- 0,025 μm/°C
- 0°C to 65°C
- 40°C to 65°C
- IP62 (IEC 60529)
- Shipping packaging
- Identification number

Lower stop of the measuring bolt***, adjustable from... to... ex-factory			mm	μm	%****	Technical data sheet	
<b>410</b>	<b>TESA</b>	-1,2    0	-1,08	2,5	0,1	0,2	F96410012
*** Distance from electrical zero.							
**** Linearity related max. perm. errors; within the measuring span of 2 mm (measuring range ±1 mm).							

## Axial Probes with Short Body – Series 160, 430 and 451

### Probes for TESA's electronic equipment

Their compact size and robust construction make them the ideal probes for a frequent use.

- 8 mm diameter probe body (6 mm for probe series 160) that can be clamped over its entire length.
- Chrome-plated, hardened steel body. Ball-bearing probe insert.

Other probes compatible with measuring equipment from other makers also available on request.



DIN 32876 Part 1

See in tables

Axial probes usable in any position

6 and 8 mm probe housing diameters for both series 160 and 430/45, resp.

Ball-bearing measuring bolt.

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

Interchangeable probe insert. M2 thread for series 160 or M2,5 for both series 430 and 451

3 mm dia. tungsten carbide ball tip.

2 m long cable.

DIN 45322 connector.

Hardened steel probe body, chrome plated.

Measuring bolt in stainless steel, hardened.

Sealing bellows in resistant nitrile or high-resistance elastomer (Viton).

Moved mass 2,5 g (series 160) 1,9 g (series 430) 3,0 g (series 451)

Force increase to 0,3 N/mm (series 160), 0,25 N/mm (series 430) or 0,15 N/mm (series 451)

Highest mechanical frequency to 60 Hz

0,025  $\mu\text{m}/^\circ\text{C}$

0°C to 60°C

-40°C to 60°C

IP62 (IEC 60529)

Shipping packaging

Identification number



Sealing bellows

Measuring range mm

N\*

Measuring bolt retraction

#### Series 160 – Probes with short body, axial cable exit

**96160013** ± 1 0,6 ± 0,15 mechanical Viton

#### Series 430 – Miniature probes with axial cable exit

**96430029** ± 0,5 0,75 ± 0,2 mechanical nitrile

#### Series 451 – Miniature probes with radial cable exit

**96441041** ± 0,5 0,6 ± 0,15 mechanical nitrile

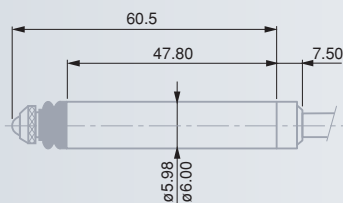
\* Nominal value at electrical zero; max. deviation ± 0,15 N. Valid in upright assembly position with downward oriented measuring bolt, as well as in static measuring.



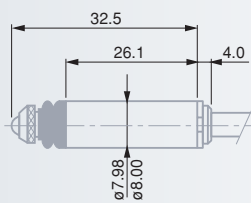
451

430

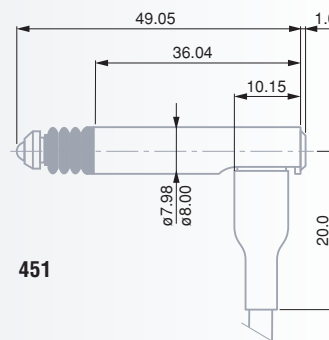
160



160



430



451



Lower stop of the measuring bolt\*\*, adjustable from... to ex-factory mm mm mm

		from... mm	to mm	ex-factory mm	mm	µm	%***	Technical data sheets
<b>160</b>	<b>TESA</b>	-1,2	0	-1,08	3,3	0,1	0,2	F96160013
<b>430</b>	<b>TESA</b>	-0,7	0	-0,58	1,25	0,2	0,2	F96430029
<b>451</b>	<b>TESA</b>	—	—	-0,58	2,1	0,1	0,2	F96441041

\*\* Distance from electrical zero.

\*\*\* Linearity related max. perm. errors; within either of both measuring spans of 2 mm (measuring range ±1 mm) and 1 mm (measuring range ±0,5 mm).



# Lever Probes – Series 420 and 499

## Probes for TESA's electronic equipment

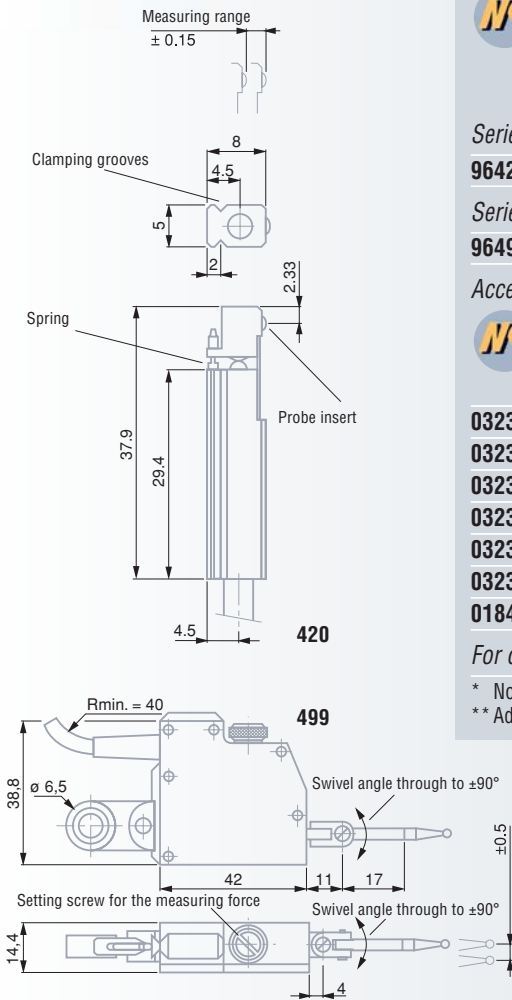
### Probe series 420

- Very short body that can be recessed into a fixture or a plug gauge.
- Probe insert mounted on leaf springs.

### Probe series 499

- Parallel guiding of the measuring bolt moving in both probing directions.
- Interchangeable probe insert. Any of those having a varying length can equally be used with no influence on the leverage.
- Used where probes with measuring bolt moving lengthwise cannot easily be handled.
- Without switch-over feature for the probing direction.

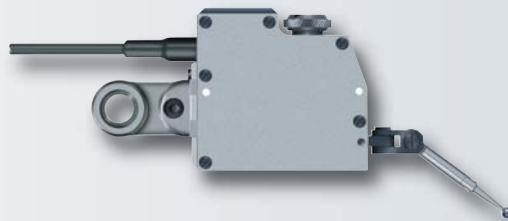
Other probes compatible with measuring equipment from other makers also available on request.



No	Measuring range (mm)	N*	Accessories for probe series 499			
			No	mm	mm	mm
<b>Series 420 – Miniature lever probes</b>						
<b>96420004</b>	± 0,15	1,8 ± 0,4				
<b>Series 499 – Lever probes with parallel guiding</b>						
<b>96499007</b>	± 0,5	0,02 ÷ 0,2**				
<b>Accessories for probe series 499</b>						
<b>03238401</b>	Measuring insert	0,8	carbide	12,3		
<b>03238402</b>	Measuring insert	1,6	carbide	12,3		
<b>03238403</b>	Measuring insert	3,2	carbide	12,3		
<b>03238411</b>	Measuring insert	0,8	carbide	37,7		
<b>03238412</b>	Measuring insert	1,6	carbide	37,7		
<b>03238413</b>	Measuring insert	3,2	carbide	37,7		
<b>01840105</b>	Cylindrical clamp	8				

For other clamping items, report to page G-6.

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



		Lower stop of the measuring insert***, adjustable from... to ex-factory			mm	µm	%****	Technical data sheets
		mm	mm	mm				
<b>420</b>	<b>TESA</b>	—	—	-0,225	0,525	0,5	0,3	F96420004
<b>499</b>	<b>TESA</b>	0,6	0	0,6	1,2	0,25	0,6	F96499007

\*\*\* Distance from electrical zero.  
\*\*\*\* Linearity related max. perm. errors; within either of both measuring spans of 0,3 mm (measuring range ±0,15 mm) and 1 mm (measuring range ±0,5 mm).

- ✓
- DIN 32876 Part 1
- See in tables
- Any position of use
- Series 420 with a clamping groove.
- Leaf-spring mounted articulation.
- Series 499: 2 dovetails with mounting lug or clamping rod. Probe insert on a leaf-spring bearing. 2 x 90° friction clutches for smooth displacement of the probe insert. Triple protection against damages in both probing directions.

- Series 499 with Interchangeable insert fitted with a 10 BA coupling thread. 2 m long cable. DIN 45322 connector.
- Stainless steel probe body, hardened (series 420). Dull-chrome plated housing (series 499).
- Tungsten carbide ball tip
- Moved mass 2,5 g (series 420) or 10,6 g (series 499)
- Force increase: 0,2 N/mm (420) 0,25 N/mm (499)
- Highest mechanical frequency 10 Hz
- 0,025 µm/ °C for series 420 or 0,25 µm/ °C for series 49

- 0°C to 60°C
- 40°C to 60°C
- IP40 (IEC 60529)
- Series 499 along with a 3,2 mm dia. probe insert (No. 03238403) plus lug (No. 03238013)

- Shipping packaging
- Identification number

## TESA GT 31 Lever Probes

Models with inclinable probe insert for measuring in two directions – Well suited for use where probes with measuring bolt moving lengthwise can not be conveniently operated.

- Ball-bearing balanced lever.
- Interchangeable probe insert fitted with a tungsten carbide ball tip, inclinable through to 180°.
- Automatic reversal of the probing direction while that 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

Any position of use

2 dovetail attachments. Both lower and upper stops are fixed.

Probe inserts with removable stainless steel shaft. Also with a 2 mm carbide ball tip.

For all other inserts, see under optional accessories on next pages.

2 m long cable.

5-pin DIN 45322 connector.

All-metal housing, matt-chromium finish

Moved mass 12 g

13 kHz (± 5%) drive frequency. Highest mechanical frequency to 25 Hz

20 ± 0,5°C

5°C to 60°C

80%

IP40 (IEC 60529)

Equipped with a 2 mm dia. probe insert (No. 03260410) plus a 8 mm dia. fixing shaft No. 01840105.

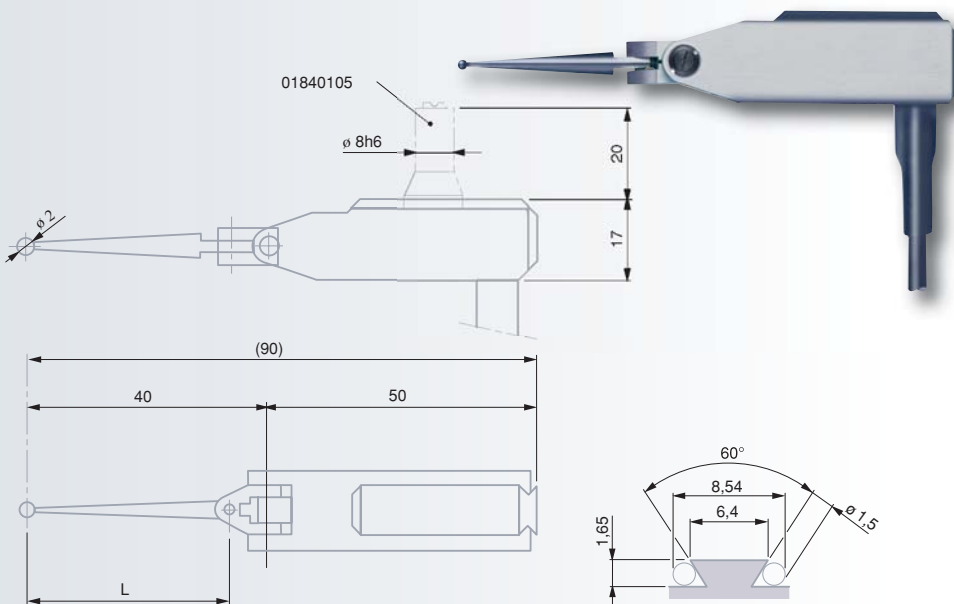
Shipping packaging

Identification number

Declaration of conformity

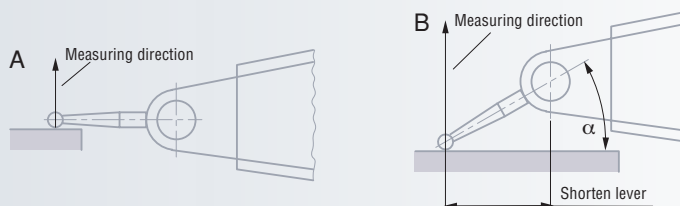
No	GT 31	Measuring range (mm)	N*
03210802	GT 31	± 0,3	0,1 (standard)
03210801	GT 31	± 0,3	0,02
03210803	GT 31	± 0,3	0,2

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



mm	µm	µm	µm*	Technical data sheet	
GT 31	0,7	0,1	0,25	0,2 + 50 · L <sup>2</sup>	03200266

\* Linearity related max permissible error (L in mm).



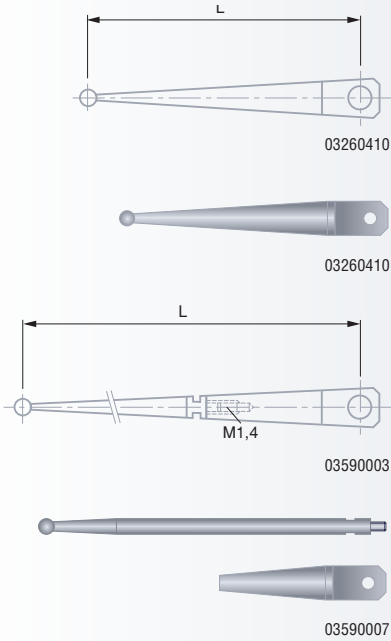
### Note

With the insert lying parallel to the workpiece surface (Fig. A), the leverage matches 1:1. Therefore, no correction of the measured values is needed.

Any other position (angle  $\alpha$ , Fig. B) will change the effective lever length, so that 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 Probes GT 31



Probe inserts



Ball tip  
mm

Lever –  
amplification

Length  
L in mm

Standard probes with a one-piece shaft

<b>03260402</b>	1	1 : 1	32
<b>03260410</b>	2	1 : 1	32
<b>03260403</b>	3	1 : 1	32

Special probes with a two-piece shaft

<b>03590002</b>	1	1 : 1	32
<b>03590003</b>	2	1 : 1	32
<b>03590004</b>	3	1 : 1	32
<b>03590005</b>	4	1 : 1	32

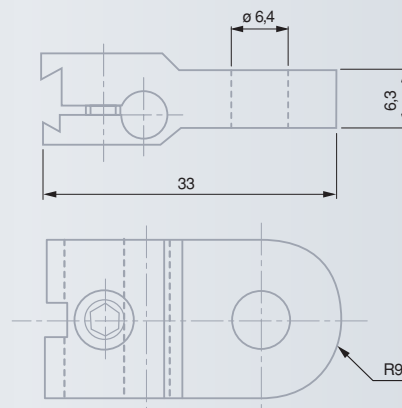
<b>03590006</b>	1	1 : 2	72
<b>03590007</b>	2	1 : 2	72
<b>03590008</b>	3	1 : 2	72
<b>03590009</b>	4	1 : 2	72



**03240100**

**Fixing brackets**

Features both a dovetail and cylindrical bore.



03240100



# TESA Probes with Parallel Guiding

## Standard or protected FMS probes

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

- Long-life probes featuring a small-size, rugged design.
- Modular construction to eliminate the need for many assembly components.
- Ball-bearing probe displacement.
- Direction of the probing force and probe retraction depending on used accessory.
- Wide variety of measuring inserts and supports for optimum adaptation to your measuring job.

Other probes compatible with measuring equipment from other makers also available on request.



DIN 32876 Part 1

See tables

Any position of use

4 coupling threads M6. Linear

ball-bearing guiding with fixed stops.

Insert holder attachment with dovetail.

Cable length: 2 m.

5-pin connector including a feature matching DIN 45322 for signal adjustment.

Hardened steel probe body, nickel-plated

Moved mass: 110 g

13 kHz (± 5%) drive frequency. Up to 25 Hz mechanical frequency.

-0,14 µm/°C

20 ± 0,5°C

-10°C à 65°C

80%

IP50 for standard probes or IP54 for protected probes (IEC 60529)

Shipping packaging

Identification number

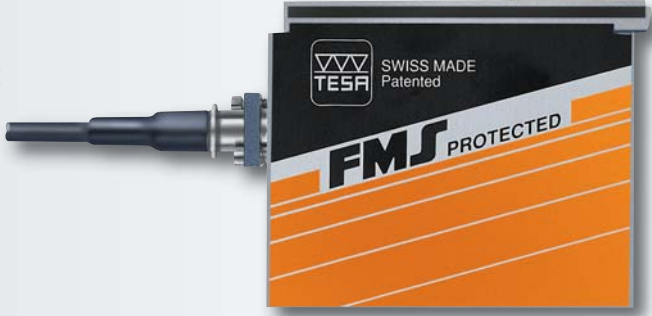
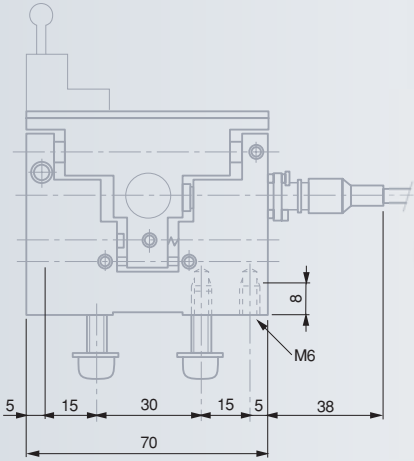
Inspection report with a declaration of conformity

### FMS probes with parallel cable exit

		Measuring range (mm)	N*	Measuring bolt retraction (accessory)

Standard probes				
03230019	FMS 100	± 2	2	air pressure
03230049	FMS 130	± 2,9	2	air pressure
Probes «FMS protected»				
03230037	FMS 100-P	± 2	2	air pressure
03230051	FMS 130-P	± 2,9	2	air pressure

\* Nominal value at electrical zero; max. deviation ± 25%. Valid for probing movement exerted horizontally or in static measuring.



		Mechanical stop**	mm	µm	µm	µm	µm***	Technical data sheets
		lower mm						
		upper mm						
FMS 100	-2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200253	
FMS 100-P	-2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200283	
FMS 130	-2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200342	
FMS 130-P	-2,9	2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200344	

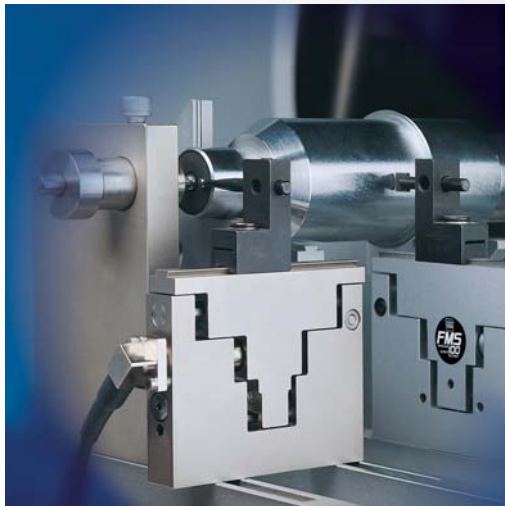
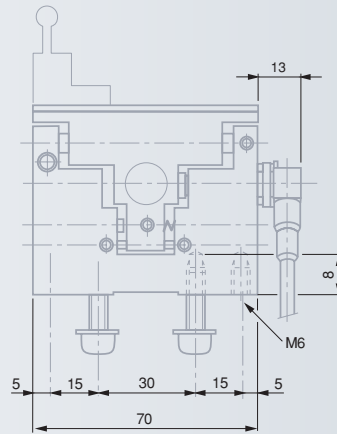
\*\* Distance from electrical zero. \*\*\* Linearity related max. perm. errors (L in mm).



## FMS probes with angled cable exit

		Measuring range (mm)	N*	Measuring bolt retraction (accessory)
<i>Standard probes</i>				
<b>03230028</b>	<b>FMS 102</b>	± 2	2	air pressure
<b>03230050</b>	<b>FMS 132</b>	± 2,9	2	air pressure
<i>Probes «FMS protected»</i>				
<b>03230038</b>	<b>FMS 102-P</b>	± 2	2	air pressure
<b>03230052</b>	<b>FMS 132-P</b>	± 2,9	2	air pressure

\* Nominal value at electrical zero; max. deviation ±25%. Valid for probing movement exerted horizontally or in static measuring.



- ✓
- DIN 32876 Part 1
- See in tables
- Any position of use
- 4 coupling threads M6. Linear
- ball-bearing guiding with fixed stops.
- Insert holder attachment with dovetail.
- Cable length: 2 m.
- 5-pin connector including a feature matching DIN 45322 for signal adjustment.
- Hardened steel probe body, nickel-plated
- Moved mass 110 g
- 13 kHz (± 5%) drive frequency.
- Highest mechanical frequency to 25 Hz
- 0,15 µm/°C
- 20 ± 0,5 °C
- 10 °C to 65 °C
- 80%
- IP50 for standard probes or IP54 for protected probes (IEC 60529)
- Shipping packaging
- Identification number
- Inspection report with a declaration of conformity

		Mechanical stop** lower mm    upper mm	mm	µm	µm	µm***	Technical data sheets
<b>FMS 102</b>		-2,9    2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200254
<b>FMS 102-P</b>		-2,9    2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200289
<b>FMS 132</b>		-2,9    2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200343
<b>FMS 132-P</b>		-2,9    2,9	5,8	0,5	0,5	0,2 + 3 · L <sup>3</sup>	03200345

\*\* Distance from electrical zero.    \*\*\* Linearity related max. perm. errors (L in mm).

## Configuration and Use of TESA FMS Probes

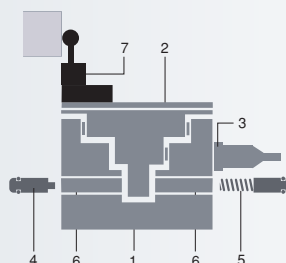
The following examples provide you with a number of possibilities to activate and retract the measuring insert during your measurement cycles.

### Example A

- Moving the probe insert toward the part to be inspected using the measuring force produced through the compression spring.
- No insert's retraction.

#### Effect

The insert remains into position. Exchanging parts is made with mechanical contact of the probe under the measuring force.



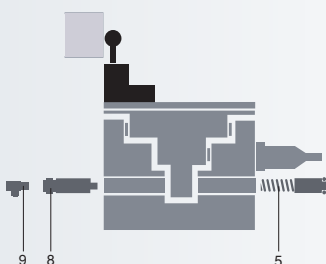
- 1 Fixed probe body
- 2 Moving probe body
- 3 Measuring element with fine adjust
- 4 Adjustable stop
- 5 Spring set for the measuring force
- 6 Mounting bores
- 7 Holder for the probe insert

### Example B

- Moving the probe insert toward the part to be inspected using the measuring force produced through the compression spring.
- Insert's retraction by pneumatic pressure.

#### Effect

Exchanging parts is made with no mechanical contact of the probe.



- 5 Spring set for the measuring force
- 8 Pneumatic jack, No. 03260440
- 9 Connector (No. 024388, page 0-41)

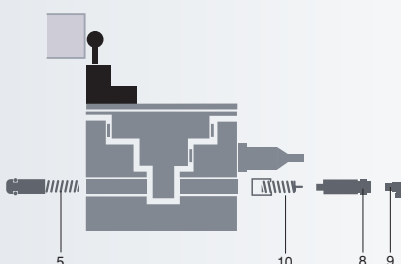
### Example C

- 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.

#### Effect

Exchanging parts is made with no mechanical contact of the probe, thus providing absolute security since the probe insert retract itself due to a lack of air pressure.

This configuration is also applied where 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. 03260440
- 9 Connector (No. 024388, page 0-41)
- 10 Auxiliary spring-loaded element, No. 03260445



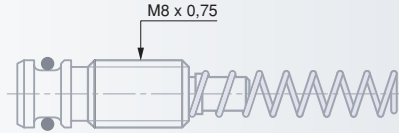
The force of the spring set (5) must be equivalent to the force of the auxiliary spring-loaded element (10).





## Accessories for TESA FMS Probes

### Spring set for the measuring force



### Spring set for the measuring force

Examples A to C  
Item 5

	N	
<b>03260448</b>	2,0	nickel-plated
<b>03260449</b>	0,4	red
<b>03260450</b>	0,63	yellow
<b>03260451</b>	1,0	green
<b>03260452</b>	1,6	blue
<b>03260453</b>	2,5	brown
	4,0	black

\* Provided with FMS probes



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



### Accessories for Pneumatic Activation of the Mobile Probe Body



**03260440**

#### Pneumatic jack

Operates the mobile probe body. Force under a pressure of 4 bars = 11 N

Examples B and C  
Item 8

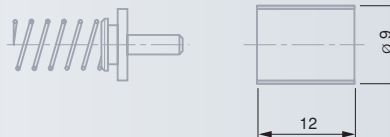
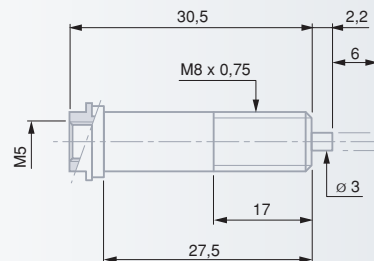
### Auxiliary spring-loaded element

Example C  
Item 10



N

<b>03260441</b>	0,4	red
<b>03260442</b>	0,63	yellow
<b>03260443</b>	1,0	green
<b>03260444</b>	1,6	blue
<b>03260445</b>	2,0	nickel-plated
<b>03260446</b>	2,5	brown
<b>03260447</b>	4,0	black



### Probe Insert Holder with Fine Adjustment

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



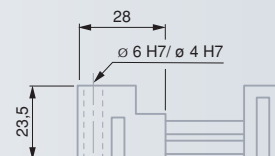
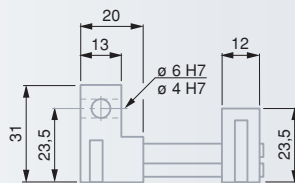
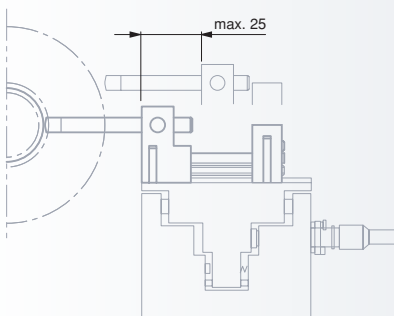
Width of the insert holder. 12 mm



### Mounting bores for probe inserts



	mm	Number	Position	mm
<b>02630053</b>	4	2	horizontal	25
<b>02630055</b>	4	1	vertical	25
<b>02630052</b>	6	2	horizontal	25
<b>02630054</b>	6	1	vertical	25



02630052/53

02630054/55



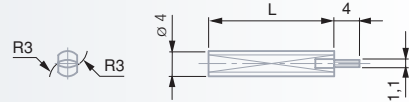
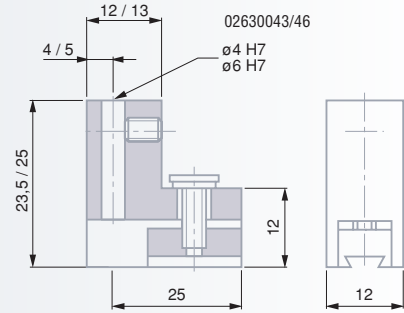
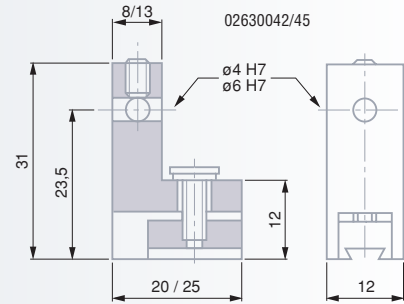


### Fixed probe insert holder

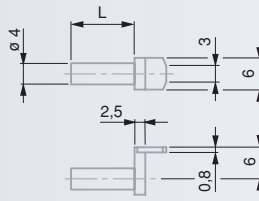
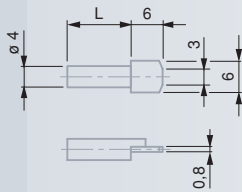
Mounting bores for probe inserts



	mm	Number	Position
<b>02630042</b>	4	2	horizontal
<b>02630043</b>	4	1	vertical
<b>02630045</b>	6	2	horizontal
<b>02630046</b>	6	1	vertical



### Probe inserts with a 4 mm diameter mounting shaft



Centred probe inserts with a flat, right-angle measuring face



		L mm
<b>02660066</b>	Carbide	12
<b>02660068</b>	Carbide	25

Off-centre probe inserts with a flat, right-angle measuring face

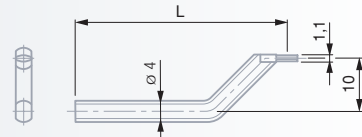
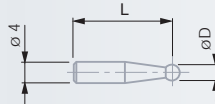
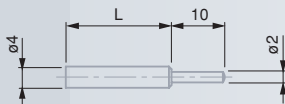


		L mm
<b>02660067</b>	Carbide	12
<b>02660069</b>	Carbide	25

Centred probe inserts with 2 cylindrical measuring faces



		L mm
<b>02660070</b>	Carbide	20
<b>02660071</b>	Carbide	40
<b>02660072</b>	Carbide	60



Probe inserts with a 2 mm dia. contact pin with spherical measuring face



		L mm
<b>02660073</b>	Carbide	20
<b>02660074</b>	Carbide	40
<b>02660075</b>	Carbide	60

Inserts with a tungsten carbide ball tip

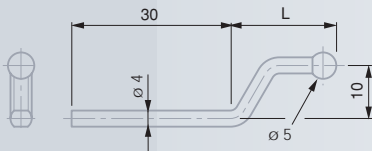


	mm	L mm
<b>02660076</b>	3	20
<b>02660077</b>	3	40
<b>02660078</b>	3	60
<b>02660079</b>	5	20
<b>02660080</b>	5	40
<b>02660081</b>	5	60

Off-centre probe inserts with 2 cylindrical measuring faces



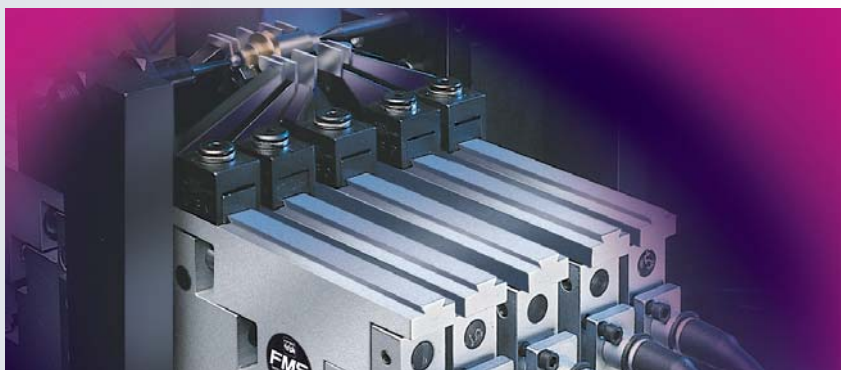
		L mm
<b>02660082</b>	Carbide	40
<b>02660083</b>	Carbide	60



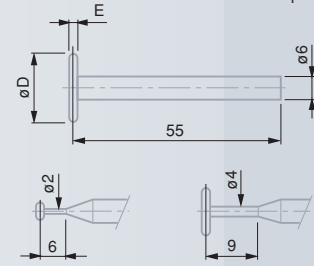
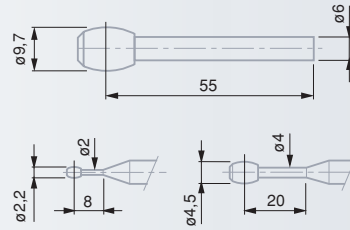
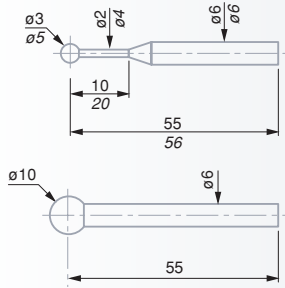
Off-centre probe inserts with a tungsten carbide ball tip



	mm	L mm
<b>02660084</b>	5	20
<b>02660085</b>	5	33
<b>02660086</b>	5	48



Probe inserts with a 6 mm diameter mounting shaft



Probe inserts with a carbide ball tip



mm

00760058	3
00760059	5
00760060	10

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



mm

For threads

00760066	2,2	M3 ÷ M16
00760067	4,5	M6 ÷ M48
00760068	9,7	M12 ÷ M150

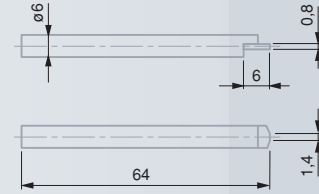
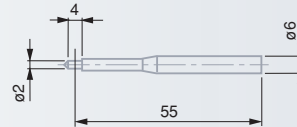
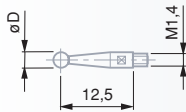
Probe inserts with a tungsten carbide disc for grooves, nuts, centering shoulders etc.



mm

E mm

00760074	4,5	1
00760075	14	2
00760076	19	3



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



D mm

L mm

01860201	1	12,53
01860202	2	12,53
01860203	3	12,53

01860307 Wrench

Probe insert with small cylindrical measuring face



mm

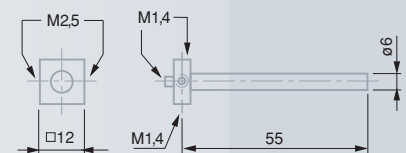
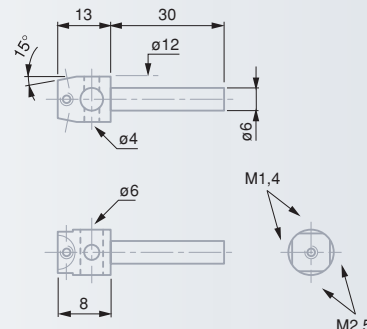
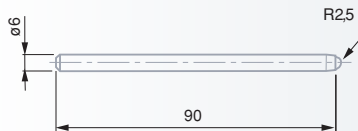
00760082	Carbide	2
----------	---------	---

Centred probe insert with a small flat, right angle measuring face



mm

S26074380	Carbide	64
-----------	---------	----



Probe inserts with one flat and one spherical measuring faces



mm

025589	Carbide	64
--------	---------	----

Universal probe insert holder specially designed for various types of clamps



S26074372	1 x $\phi$ 4 mm
	1 x $\phi$ 6 mm
	2 M1,4 threads
	2 M2,5 threads

Universal probe insert holder with 2 mounting threads



00760096	M1,4; M2,5
----------	------------



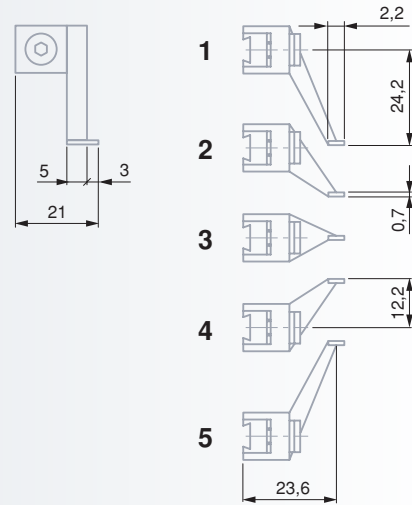
### Probe inserts with offset measuring face

Probe inserts with a flat, right-angle measuring face in tungsten carbide, whether centred or offset



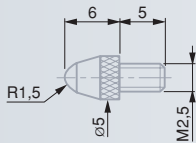
As shown opposite

02630047	1
02630048	2
02630049	3
02630050	4
02630051	5



### Measuring Inserts for Axial Probes, Dial Gauges and the Like

Models with a M2,5 mounting thread

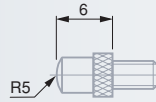


Standard probe inserts with a ball tip



L mm

03510001	Steel	6
03510002	Carbide	6

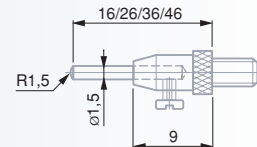


Probe inserts with a spherical measuring face



R mm

03510101	Steel	5
03510102	Carbide	5

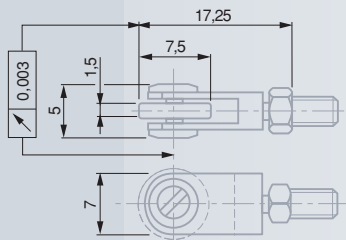


Probe insert with 4 interchangeable steel pins. Spherical face, R = 1,5 mm



L mm

03510201	Steel	16, 26, 36, 46
----------	-------	----------------

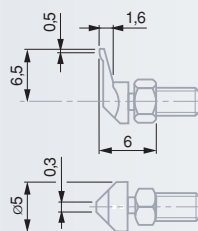


Probe inserts with a ball-bearing steel roller. Counternut for radial alignment.



Shape

03560010	Steel	cylindrical
03560011	Steel	domed

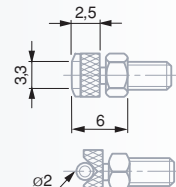


Off-centre probe insert (A) with pointed measuring face. Counternut for radial alignment.



A mm

03510401	Steel	6,5
----------	-------	-----



Probe insert with cylindrical measuring face. Counternut for radial alignment.

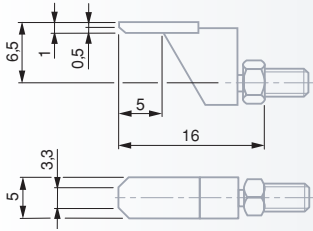


Carbide

03510502	Carbide
----------	---------



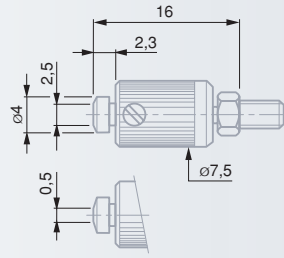




Offset probe insert with a narrow measuring face. Counternut for radial alignment.



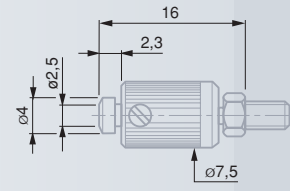
**03510602** Carbide 0,5



Probe insert with a narrow measuring face, parallel adjustable. Counternut for radial alignment.



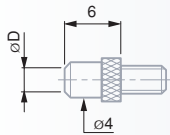
**03510702** Carbide 0,5



Probe insert with a flat measuring face, parallel adjustable. Counternut for radial alignment.



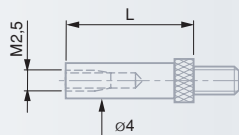
**03510902** Carbide 2,5



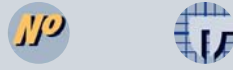
Probe inserts with a flat measuring face



<b>03510801</b>	Steel	2,5
<b>03510802</b>	Carbide	2,5
<b>03560022</b>	Steel	3,4
<b>03560023</b>	Carbide	3,4



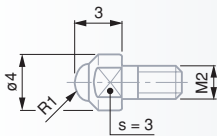
Extensions for probe inserts



<b>03540501</b>	10
<b>03540502</b>	15
<b>03540503</b>	20
<b>03540504</b>	40

Additional probe inserts as well as extensions with M2,5 coupling thread as listed on the pages F-42 to F-44.

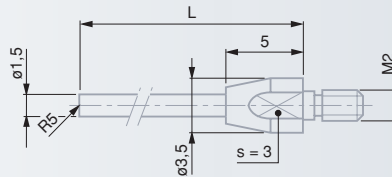
**Probe Inserts with a M2 Coupling Thread for GT 43 and GT 44 Miniature Probes as well as Probes with Short Body, Series 160**



Probe inserts with spherical measuring face. Also with a M2 thread.



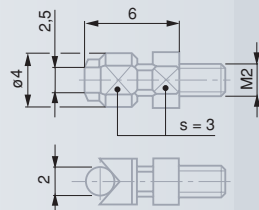
<b>03510204</b>	Carbide	R 1
<b>03510103</b>	Carbide	R 5



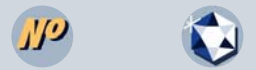
Probe inserts with a spherical measuring face (R5). Also with a M2 thread.



<b>03510202</b>	Carbide	16
<b>03510203</b>	Carbide	26

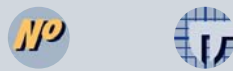


Probe insert with cylindrical measuring face. Counternut for radial alignment. M2 thread.

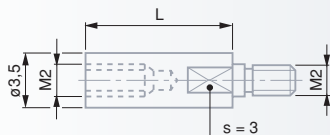


**03510503** Carbide

Extensions for inserts with a M2 thread



<b>03540505</b>	10
<b>03540506</b>	15





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

Plastic sleeve marked with force related data

Shipping packaging



## Accessories for TESA Probes

### Spring Sets for Axial Probes

No	N
<i>Probes GT 22 and GTL 22</i>	
<b>03260419</b>	0,16
<b>03260420</b>	0,25
<b>03260421</b>	0,40
<i>Probes GT 21, GT 22, GTL 21, GTL 211, GTL 22 plus probe series 490</i>	
<b>03260457</b>	0,63
<b>03260422</b>	1,0
<b>03260423</b>	1,6
<b>03260424</b>	2,5
<b>03260425</b>	4,0

No	N
<i>Probes GT 27, GT 271 and GT 28</i>	
<b>03260458</b>	0,63
<b>03260459</b>	1,0
<b>03260460</b>	1,6
<b>03260461</b>	2,5
<i>Probes GT 61, GT 611 and GT 62</i>	
<b>03260483</b>	0,8
<b>03260463</b>	1,0
<b>03260464</b>	1,6
<b>03260465</b>	2,5



Nitrile: resistant synthetic sealing for normal use.

Viton: high-resistance synthetic sealing used where probes are permanently exposed to cooling and lubricating agents.

Safety rings plus washer.

Shipping packaging



### Spare Bellows for Axial Probes

Complete set with safety ring and washer

No		No	
<i>Probes GT 21, GT 22, GTL 21, GTL 211, GTL 22 plus probe series 490</i>		<i>Probes GT 27, GT 271, GT 28, GT 61, GT 611 plus probe series GT 62</i>	
<b>03260468</b>	nitrile	<b>03260491</b>	Viton
<b>03260470</b>	Viton	<i>Probes GT 272, GT 282, GT 612, GT 622</i>	
<i>Probes GTL 212 and GTL 222</i>		<b>03260490</b>	Viton

Bellows supplied individually

<i>Probes GT 43 and GT 44</i>	
<b>037608</b>	Viton

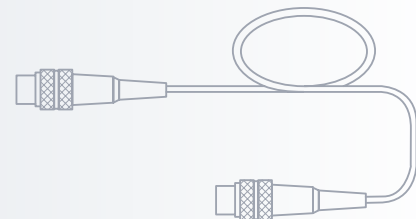


For high accuracy requirements, we recommend to adjust each part of your measuring equipment all together

Shipping packaging

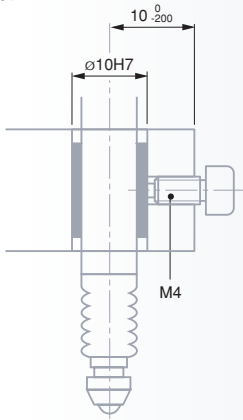
### Extension cable

No	m
<b>03240201</b>	1
<b>03240202</b>	2
<b>03240203</b>	3
Other cable lengths available on request	



### Clamping Elements for Axial Probes

Provided with 3 clamping faces – Prevent the metrology properties of the guiding system from being altered due to possible distortion.

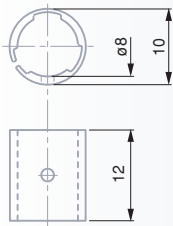
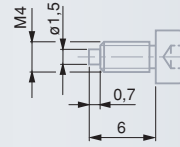


VKD clamp screw

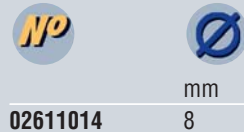


02611013

M4

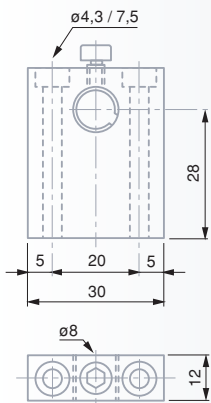


VKE clamp

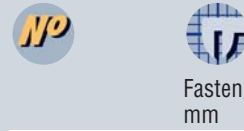


02611014

mm  
8

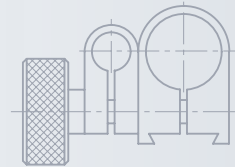


Clamp collar

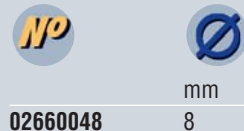


01860401

Fastening points  
mm  
5,6 or 9,5 in diame-  
ter with dovetail



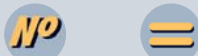
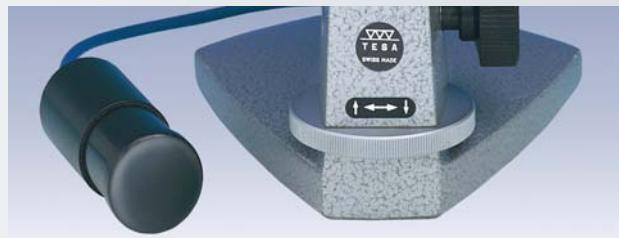
VDE clamps with fastening sleeve and screw included



02660048

mm  
8

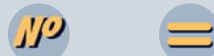
### Manually Operated Devices for Retracting the Measuring Bolt



03540104 Mechanical retraction device

Consisting of:

- 03540101 1 Lift lever
- 03540102 1 Washer



03260401 Pneumatic retraction device

Suited for probes GT 22, 271, 28, 42, 44, 611, 62 – GTL 211, 22

Consisting of:

- 03540405 1 Hand-operated vacuum pump
- 03540405 1 Air tube, 4,7 mm in diameter, 1 m long



All dimensions shown in the drawing must be respected



Shipping packaging



Shipping packaging





✓  
Suited for 20 probes GT 22, 42 and 44 series or max. 10 probes GT 28 and 62.

230 V, 50 Hz



Shipping packaging



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

Needed pressure: 1 to 7 bars

190 x 170 x 310 mm

3,5 kg



Shipping packaging

## Electropneumatic Systems for Activating the Measuring Bolt

### Electropneumatic vacuum pump

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



**03260432** Operated via the mains powered foot switch

**03260433** Externally controlled

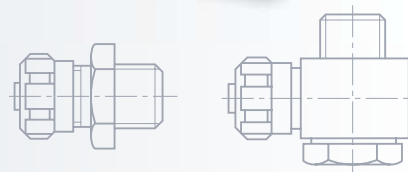
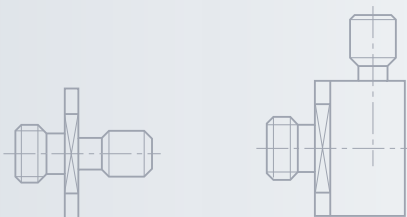


### FMS-C electropneumatic vacuum pump

Uses vacuum or air pressure; allows simultaneous connection of up to 30 TESA probes. Ideal for use with FMS probes with parallel guiding.



**03260486** Controlled electrically through a TESA's electronic unit or manually



### Air tube connectors for TESA probes GT 22, 271, 28, 42, 44, 611, 62 – GTL 211, 22

M4 coupling threads; suited for a 4,7 / 2 mm dia. air pipe (No. 03540405)



Connector type

**03560000** straight

**03560002** angled

### Air tube connectors for TESA FMS probes

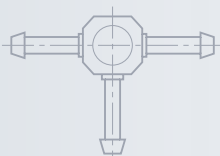
M5 coupling threads; suited for a 4,7 / 2 mm dia. air pipe (No. 03540405)



Connector type

**026522** straight

**024388** angled



### Connecting T-piece



For air pipe diameter  
Ø 4,7 / Ø 2 mm  
(N° 03540405)

**03540403**

### Vacuum release delay valve

For controlling the lowering speed of axial probes



For air pipe diameter  
Ø 4,7 / Ø 2 mm  
(N° 03540405)

**03540404**





## TESATRONIC Length Measuring Instruments – General Overview

Dedicated compact units having either an analogue or a numerical display – Usually applied in association with precision handtools or on stationary devices for shop floor inspection and maintenance, but also in the measuring room.



TESATRONIC	TT 10	TT 20	TT 60	TT 80	TT 90	TTA 20
	04430008	04430009	04430010	04430011	04430012	04430003
Number of probe inputs – Automatic recognition	1 —	2 ●	2 ●	2 ●	2 ●	2 —
Number of measuring ranges – Lowest value – Highest value – Zoom function (5x) – Automatic conversion	3 ± 5 µm ± 500 µm ● ●	7 ± 5 µm ± 5000 µm — ●	7 ± 5 µm ± 5000 µm — ●	9 ± 0,5 µm ± 5000 µm — ●	9 / 6 ± 0,5 µm ± 5000 / ± 100 µm — ●	6 ± 3 µm ± 1000 µm — —
Digital display	—	●	●	●	●	—
Numerical interval – lowest value 0,1 µm – highest value 10 µm	—	0,1 µm 0,1 µm	0,1 µm 0,1 µm	0,01 µm 0,01 µm	0,01 / 0,001 µm 0,01 / 0,001 µm	— —
Analogue display	—	●	●	●	●	●
Scale value – lowest value 0,1 µm – highest value 10 µm	—	0,2 µm 200 µm	0,2 µm 200 µm	0,02 µm 200 µm	0,02 µm 200 / 10 µm	0,1 µm 50 µm
Metric/Inch unit systems	—	●	●	●	●	●
Value classification – Number of classes – Signal outputs	—	● 3 ●	● > 42 ●	● > 42 ●	● / – > 42 / – ● / –	● 3 ●
Memory	—	—	●	●	●	—
Digital output	—	RS232	RS232	RS232	RS232	—
Analogue output	—	—	●	●	●	●
Power supply	Batteries	Adapter	Adapter	Adapter	Adapter	Mains

## TESATRONIC TT 10

Pocket-sized, battery-operated electronic unit for use on the move – Perfect 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/digital indication providing easy reading.
- LCD, pointerless display 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 through to digital technology.
- Signal input for one probe.
- Opto-coupled RS 232 compatible digital output.



DIN 32876 Part 1

66 x 57 mm  
LC display

9 x 4,5 mm

Response time of display  $\leq$  100 ms.  
Hold time  $\geq$  100 ms

Zero drift\*  $\leq \pm 0,005\%$  / °C.  
Frequency limit of display based on the signal input: 10 Hz

Max. indication error\*: 2%

$\pm 1$  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:  $\approx 7$  mW/3,5 V

Self-controlled voltage fluctuation.

Drive voltage of the probe: 0,7 V

Drive frequency:  $13 \pm 0,65$  kHz

0 °C to 60 °C

-10 °C to 70 °C

80%, with no condensation

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  
(incl. batteries)

Shipping packaging

Identification number

Declaration of conformity

\* With reference to 20°C as well as a relative humidity of  $\leq 50\%$ .



04430008



TESATRONIC TT 10

Electronic measuring unit with both analogue and numerical display; 3 measuring ranges, switchable from metric to inch; 1 probe input; RS 232 data output.

Provided with following accessories:

04768002 3 batteries, 1,5 V, type LRC 6, AA

04460007 1 Visual template for value classification

### Measuring ranges with numerical intervals

	Zoom function	Used for	$\mu\text{m}$	$\mu\text{m}$	in	in
1	without 5x	measuring setting	$\pm 500$ $\pm 100$	10 2	$\pm 0.025$ $\pm 0.005$	0.0005 0.0001
2	without 5x	measuring setting	$\pm 50$ $\pm 10$	1 0,2	$\pm 0.0025$ $\pm 0.0005$	0.00005 0.00001
3	without	measuring	$\pm 5$	0,1	$\pm 0.00025$	0.000005



## TESATRONIC TT 20, TT 60, TT 80 and TT 90

Feature 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 – Two 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 bargraph.
- All measuring functions are 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 over 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, bidirectional.
- Power supply through mains adapter.

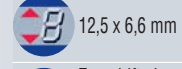
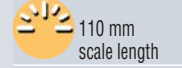


### TESATRONIC TT 60

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

- Memory for retaining extreme values «max.», «min.», «max.-min.» along with mean value obtained from «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 or 40 good classes.
- Remote signal processing using the analogue output.

### TESATRONIC TT 20, TT 60, TT 80, TT 90



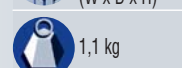
No drift for registered values.



Consumption: 2 W

Self-controlled voltage fluctuation.

Drive voltage of the probe: 3 V



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



- Shipping packaging
- Identification number
- Declaration of conformity

**Additional data on TESATRONIC TT 20**

- Response time\* of analogue display with pointer and digital display:  $\leq 80$  ms.
- Holding time of digital display: 80 ms
- Frequency limit for all displays with reference to the signal input: 12,5 Hz
- Limit value\* for analogue display:  $\leq 2\%$ .
- Digital display and output:  $\leq 0,3\%$
- Dive frequency  $13 \pm 0,65$  kHz

**Additional data on TESATRONIC TT 60**

- Response time\* of analogue display with pointer and digital display:  $\leq 80$  ms.
- Holding time of digital display: 80 ms.
- Response time of analogue signal output with reference to the analogue display:  $\leq 30$  ms.
- Response time of the LEDs used for value classification:  $\leq 80$  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 or 100 Hz for the memory
- Limit value\* for analogue display:  $\leq 2\%$ .
- Digital display, analogue and digital outputs:  $\leq 0,3\%$
- Voltage range:  $\pm 2$  V up to  $\pm 10$  V

\* With reference to 20°C as well as a relative humidity of  $\leq 50\%$ .



<b>04430009</b>	<b>TESATRONIC TT 20</b> Electronic length measuring unit with both analogue and digital display; 7 measuring ranges, switchable from metric to inch; value classification with 1 good class; signal output through contact relay; 2 probe inputs; RS 232 data output.
<b>04430010</b>	<b>TESATRONIC TT 60</b> 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.
<i>Delivery includes the following items:</i>	
<b>04761054</b>	1 Mains adapter, 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA
<b>04761055</b>	1 Adapter cable EU
<i>Optional accessory</i>	
Adapter for 5, 10, 20 or 40 classes available on request	



*Measuring ranges along with scale divisions or numerical intervals (TESATRONIC TT 20 and TT 60)*

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





## TESATRONIC TT 80 / TT 90

High resolution electronic units – Combined analogue/digital display – Two probe inputs for single, sum and difference measurements.

Both models have the same features as TESATRONIC TT 20 besides additional ones, i.e.:

- 9 measuring ranges with numerical interval to 0,01  $\mu\text{m}$  or 0.000001 in.
- Memory for storing each extreme value «max.», «min.», «max. minus min.» plus the mean of both values «max.» and «min.».
- Dynamic measurement with acquisition of more than 10 single values per second.
- Value classification with output signals through contact relay for 5, 10, 20 or 40 good classes.
- Remote signal processing through the analogue output.

The specifications of the switchable TESATRONIC TT 90 are identical to those of the TT 80 model or the UPC mode, except for the following added features:

- 6 measuring ranges with numerical interval to 0,001  $\mu\text{m}$  or 0.5  $\mu\text{in}$ .
- Output for the control of the bolt retraction.
- Selectable waiting period for temperature stabilisation between the measurement cycles.
- RS data output for all values to the micron.



04430011

**TESATRONIC TT 80**

High-resolution electronic length measuring unit featuring a combined analogue/digital display. RS 232 interface with analogue output.

04430012

**TESATRONIC TT 90**

Same as the TT 80 model, except for the specific UPC mode providing improved resolution and additional external controls.

*Furnished with:*

**04761054** 1 Mains adapter, 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

**04761055** 1 Mains adapter EU

*Optional accessories*

Adapter for 5, 10, 20 or 40 good classes available on request.  
Accessories for UPC applications, see page L-11.

Output current:  $\leq 2 \text{ mA}$   
Permissible adjustment load:  $\geq 5 \text{ k}\Omega$   
Residual ripple (with probe at zero point):  $\leq 1 \text{ mV}$   
Reference voltage level: analogue earth 0 V



Drive frequency: 13  $\pm 0,65 \text{ kHz}$

### Additional data on the two TESATRONIC TT 80/TT 90



Response time of the analogue/digital display as well as the classification LEDs:  $\leq 100 \text{ ms}$

Holding time of digital display: 100 ms

Response time of the signal of analogue output with reference to analogue display:  $\leq 30 \text{ ms}$



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



Limit values\*: 2% for analogue display

0,15% for digital display  
0,3% for analogue output  
0,15% for digital output



Voltage range:  $\pm 2 \text{ V}$  to  $\pm 10 \text{ V}$

Output current:  $\leq 2 \text{ mA}$   
Permissible adjustment load:  $\geq 5 \text{ k}\Omega$

Residual ripple (with probe at zero point):  $\leq 1 \text{ mV}$

Reference voltage level: analogue earth 0 V



Drive frequency: 13 kHz  $\pm 0,5\%$

\* With reference to 20°C as well as a relative humidity of  $\leq 50\%$ .

### Measuring ranges with scale divisions or numerical intervals

TT 80 / TT 90			TT 90 switched to the UPC mode		
$\mu\text{m} / \text{in}$	$\mu\text{m} / \mu\text{in}$	$\mu\text{m} / \mu\text{in}$	$\mu\text{m} / \text{in}$	$\mu\text{m} / \mu\text{in}$	$\mu\text{m} / \text{in}$
$\pm 5000 / \pm 0.200$	0,01 / 1	200 / 0.010			
$\pm 2000 / \pm 0.100$	0,01 / 1	100 / 0.005			
$\pm 500 / \pm 0.020$	0,01 / 1	20 / 0.001			
$\pm 200 / \pm 0.010$	0,01 / 1	10 / 0.0005	$\pm 100 / \pm 0.005$	0,001 / 0.5	10 / 0.0005
$\pm 50 / \pm 0.002$	0,01 / 1	2 / 0.0001	$\pm 50 / \pm 0.002$	0,001 / 0.5	2 / 0.0001
$\pm 20 / \pm 0.001$	0,01 / 1	1 / 0.00005	$\pm 20 / \pm 0.001$	0,001 / 0.5	1 / 0.00005
$\pm 5 / \pm 0.0002$	0,01 / 1	0,2 / 0.00001	$\pm 5 / \pm 0.0002$	0,001 / 0.5	0,2 / 0.00001
$\pm 2 / \pm 0.0001$	0,01 / 1	0,1 / 0.000005	$\pm 2 / \pm 0.0001$	0,001 / 0.5	0,1 / 0.000005
$\pm 0,5 / \pm 0.00002$	0,01 / 1	0,02 / 0.000001	$\pm 0,5 / \pm 0.00002$	0,001 / 0.5	0,02 / 0.000001

## TESATRONIC TTA 20

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

- Easy-to-read analogue display with mirror strip in order 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 all correction values.
- LEDs for signalling the relevant quality class with green for «Good», yellow for «Rework» and red for «Scrap».
- Potentiometer for setting limit deviations.
- Polarity selector switch for the classification signals (internal or external dimensions).
- Switch for locking or unlocking a displayed value.
- Analogue output for the connection of a remote displaying or scribing unit.



DIN 32876  
Part 1

≈ 100 mm  
scale length

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

Zero drift\*  
≤ ± 0,005%/°C  
Frequency limit\*:  
1 Hz (display)  
50 Hz (analogue output)  
30 Hz (value classification)

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

Negligible for  
display or 5%  
for 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  
probe:  
1,5 V<sub>eff</sub> –10% to 5%

Drive frequency:  
13 ± 0,65 kHz

0°C to 50°C

–10°C to 70°C

IP40  
(IEC 60529)

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

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

3,4 kg

Shipping  
packaging

Identification  
number

Declaration  
of conformity

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



04430003

TESATRONIC TTA 20

Electronic length measuring unit with analogue display; 6 measuring ranges; switchable from metric to inch; value classification with 1 good class; signal output through contact relay; 2 probe inputs.

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

**03160015** Mains cable fitted with SEV connector, 3-wire cable type, 2 m long

**03160016** Mains cable fitted with VDE connector, 3-wire cable type, 2 m long

**03160017** Mains cable without connector, 3-wire cable type, 2 m long

Optional accessory

**04460004** 15-pin connector for the analogue output and classification signal

### Measuring ranges and scale divisions

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



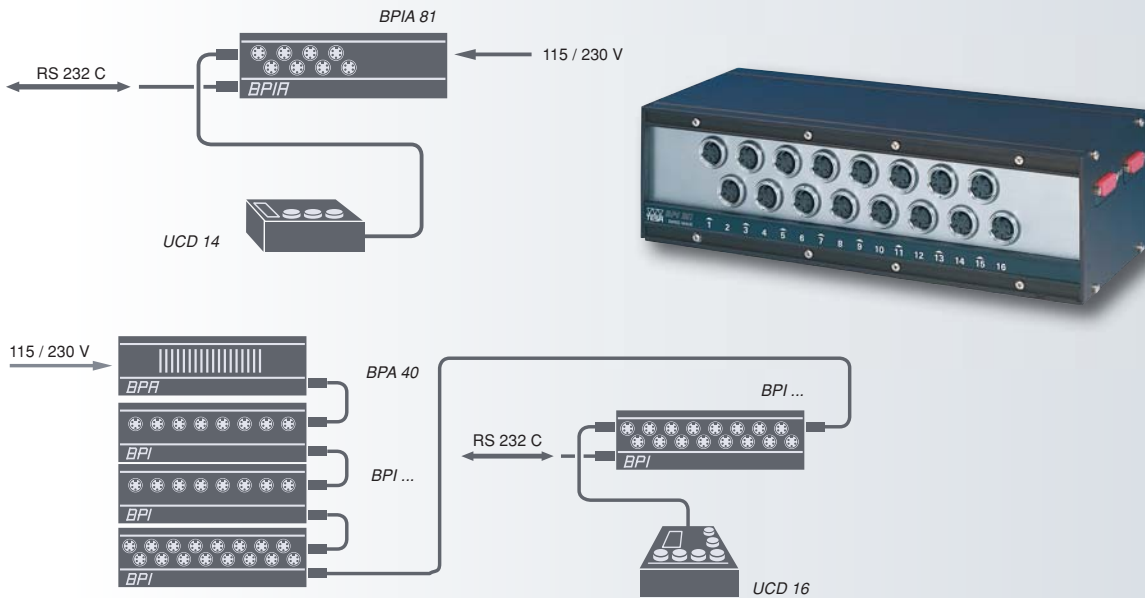
## TESA Probe Interface Boxes

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 – All models are key components for multigauging fixtures applied in centralised process control.

### BPI Series

Signal inputs – TESA standard probes (half-bridge)  
 Signal outputs – RS 232 digital outputs

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



RS232

2 mm, 0,2 mm

1 µm, 0,1 µm

± 0,3% with reference to each measuring span

7 ms per probe or 0,2 ms per probe for BPI 88

Housing cases in anodized aluminium except for stackable BPIA 81

0°C to 40°C

-10°C to 70°C

95%, non-condensing

IP51 (IEC 60529)

EN 50081-1  
EN 50082-2

Shipping packaging

Identification number

Declaration of conformity



Number of probe inputs








Number of control inputs/outputs  
Integrated power supply





Code	Model	Number of probe inputs	Number of control inputs/outputs	Integrated power supply
05030004	<b>BPIA 81</b> Probe interface box	8	6/8	●
05030002	<b>BPI 161</b> Probe interface box	16	6/8	—
05030003	<b>BPI 88</b> Probe interface box with quick signal processing in both static and dynamic measuring	8*	6/8	—
05031000	<b>BPA 40</b> Power unit for 1 up to 4 interfaces BPI 161 and BPI 88			

\* Each measurement signal includes a demodulator.



					
	Number of inputs/ outputs		Power supply	mm	kg
<b>BPIA 81</b>	6 / 8		220 ÷ 240 Vac, 100 ÷ 120 Vac, 50 ÷ 60 Hz, 25 VA	94 x 322 x 134	2,5
<b>BPI 161</b>	6 / 8		Via BPA 40	94 x 322 x 134	2,1
<b>BPI 88</b>	6 / 8		Via BPA 40	94 x 322 x 134	2,1
<b>BPA 40</b>			115 ÷ 230 Vac ± 20%, 50 ÷ 60 Hz, 140 VA	94 x 322 x 134	2,4

Accessories for BPI series

				
			mm	Number of pins
<b>04866009</b>	<b>BSF 10</b>	Stacking set for BPI 88 and BPI 161 interface boxes		
<b>05061001</b>	<b>BSF 20</b>	Stacking set for both BPA 40 and BPIA 81 power units		
<b>Connecting cables</b>				
<b>05060007</b>		BPI – BPI	0,3	
<b>05060008</b>			2	
<b>05060003</b>		BPI – PC	2	25 / 9
<b>05060002</b>			5	25 / 9





### USB Interface

Allows for a quick and easy connection to any TESA's standard probe to a USB port.

- Signal inputs – TESA standard probes (Half-bridge)
- Signal outputs – digital



No						
03260500	USB-Adapter	± 2 mm	73,75	0,3% ± 0,1 µm*	Zero drift	± 0,01%/°C*
03260501	USB-Adapter	± 5 mm	29,5	0,3% ± 0,1 µm*		± 0,01%/°C*

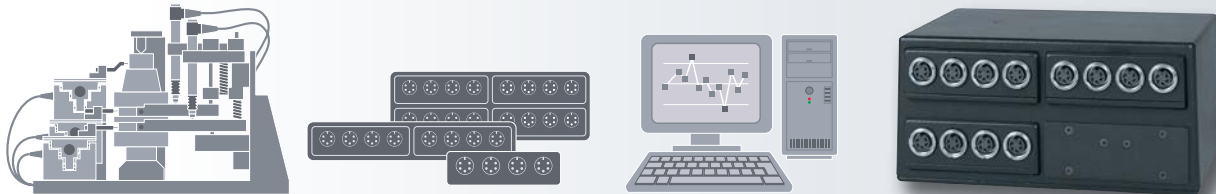
\* With reference to the temperature of 20°C and relative humidity of ≤ 50%.

Note: Total deviation must include that of both the standard probe and adapter.

### M4P-2 series

- Signal inputs – TESA standard probes (Half-bridge)
- Signal outputs – analogue

- System for connecting 32 TESA standard probes
- Can be linked to a PC through the A/D transducer



No				
			mm	kg
S48001721	M4P-2	Probe interface	36 x 100 x 120	0,6
		<ul style="list-style-type: none"> <li>• 4 probe inputs with a demodulator included</li> <li>• Sensitivity: 73,75 mV/V/mm</li> <li>• Analogue outputs: ± 1 V/mm, ± 2,5 V/mm, ± 5 V/mm and ± 10 V/mm</li> </ul>		
S48001722	R2M-1	Rack housing including 2 M4P-2 probe interfaces	55 x 212 x 144	0,9
		• 2 x 4 = 8 probe inputs		
S48001723	R4M-1	Rack housing including 4 M4P-2 probe interfaces	160 x 212 x 144	1,2
		• 4 x 4 = 16 probe inputs		
S48001724	MA4-2	Power unit	85 x 222 x 146	1,1
		<ul style="list-style-type: none"> <li>• 230 ± 10% Vac, 50 Hz</li> <li>• Output voltage: ± 15 V for 32 probes</li> </ul>		
S48001731	MA4-2	Power unit	85 x 222 x 146	1,1
		<ul style="list-style-type: none"> <li>• 110 ± 10% Vac, 60 Hz</li> <li>• Output voltage: ± 15 V for 32 probes</li> </ul>		
<i>Accessories</i>				
S48001725	CB37-1	Connection cable to host computer, 2 m long. Provided with two connectors, 37-pin male/female		

- ✓
- DIN 32876 Part 1
- See table
- Any position of use
- Distance between both stops and electrical zero can not be set. Cable length: 1,2 m.
- 0,1 µm
- USB 2.0 RS232, virtual
- 2 Veff 13 kHz ± 0,5%
- 20 ± 0,5°C
- 10°C to 40°C
- 80%
- IP51 (IEC 60529)
- Shipping packaging
- Identification number
- ✓
- ±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% (non-condensing)
- IP50 (IEC 60529)
- Shipping packaging

**TESATRONIC TT90**  
Electronic unit



Technical data and details: see page O-46

## Calibration devices

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

### Calibration of TESA inductive probes

The regular system consists of the following components:

- 1 TESATRONIC TT90 length measuring instrument (N° 04430012).
- 1 Set of calibration probes No. S41077249 with nominal values of  $\pm 0 \mu\text{m}$ ,  $\pm 100 \mu\text{m}$  and  $\pm 1000 \mu\text{m}$ .
- 1 Measuring support such as INTERAPID UP 160 (No. 01639041) equipped with the UPZ 40 measuring table (No. 01640405).
- 1 Set of gauge blocks, accurate to calibration grade K (see section K).
- 1 Precision digital voltmeter, min. 5 1/2 digits.



04430012



TESATRONIC TT90 length measuring instrument (see page O-46)

### Calibration probes



73,75 mV/mm dummy probes (half-bridge).

Suited for equipment having the following features:  
Frequency to  $13 \pm 0,65 \text{ kHz}$ .  
Voltage  $3 \pm 0,015 \text{ Veff}$  (2 symmetrical voltages of 1,5 Veff).  
Impedance:

$\leq 0,2 \Omega$  (output) or  $2000 \Omega$ , (input).



Input impedance  $970 \pm 50 \Omega$  (13 kHz) or  $2150 \pm 50 \Omega$  (standard 0  $\mu\text{m}$ )

Phase at 13 kHz:  $71 \pm 2^\circ$ .

Input resistance:  $100 \pm 5 \Omega$ .

Output impedance at 13 kHz:  $1000 \pm 2 \Omega$ .

Phase at 13 kHz:  $0,2^\circ$



$\pm 3 \text{ ppm}/^\circ\text{C}$ .  
Ageing:  $\pm 30 \text{ ppm/a}$



$20 \pm 0,5^\circ\text{C}$ , stabilisation time = 8 h



$10^\circ\text{C}$  to  $35^\circ\text{C}$



$-10^\circ\text{C}$  to  $70^\circ\text{C}$



Calibration: 40% to 60%.  
Operating: 20% to 80%.

Storage: 5% to 95%.  
Non-condensing.



18 mm dia.,  
118 mm long



$\approx 45 \text{ g}$



IP40 (IEC 60529)



Inspection report

### Calibration of measuring instruments

Calibration probes available as single or in sets



	$\mu\text{m}$	Marked with
<b>S41078077</b>	$\pm 0$	03270700
<b>S41078079</b>	$\pm 3$	03270704
<b>S41078228</b>	$\pm 100$	03270701
<b>S41078230</b>	$\pm 190$	03270717
<b>S41078087</b>	$\pm 300$	03270707
<b>S41078332</b>	$\pm 500$	03270716
<b>S41078751</b>	$\pm 1000$	03270702
<b>S41078752</b>	$\pm 1900$	03270719



Set of 3 calibrating standards

<b>S41077249</b>	$\pm 0$	$\pm 100$	$\pm 1000$
------------------	---------	-----------	------------

Set for calibrating TESATRONIC

<b>S41078654</b>	$\pm 190$	$\pm 1900$
------------------	-----------	------------

### Calibration Probes

Also called «Dummy Probes», these probes serve as resistance dividers producing a given length dimension, electrically simulated with high accuracy.

The whole system provides both positive and negative values. All those given in the table are matching nominal values.

These products, which have been adequately calibrated, come with an inspection report that shows the values (actual values) as measured during calibration with related uncertainty of measurement.

Their connection to the instrument replaces that of a regular probe.

Calibration and setting operations, if needed, are subject to a number of criteria that must be respected.

For a further information with regard to this, refer to the instruction manual or ask for our specialists.

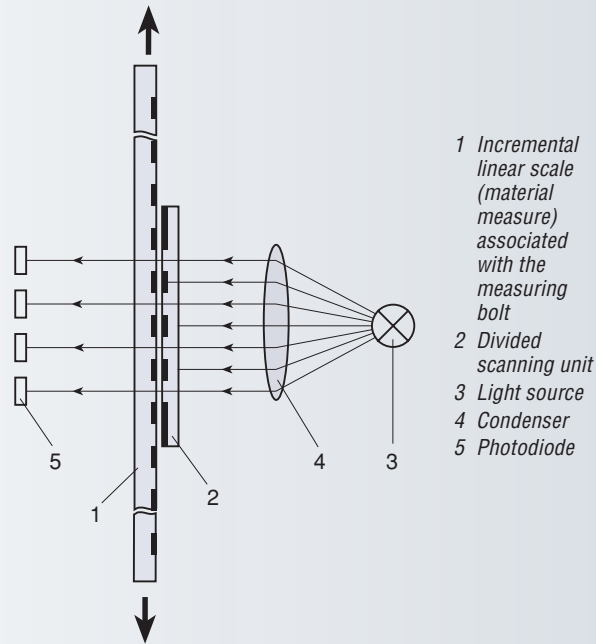


### The way they work

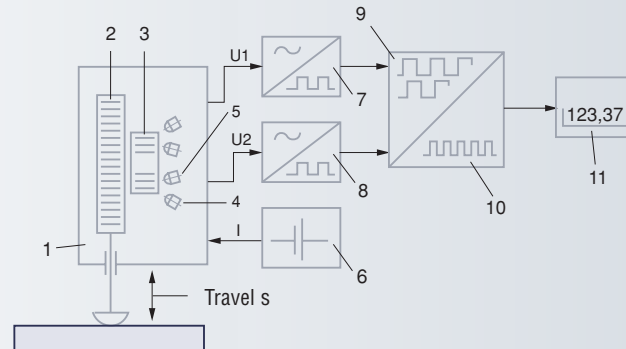
All electronic length measuring systems shown in this part of our catalogue work on the basis of value sensors in the form of digital probes with axial displacement. These probes generate the digital capture of measured physical quantities (i.e. measurands), which are changing as the incremental linear scale lying in front of the scanning unit and fitted with a reticle is moved. Divisions on both features are identical. The opto-electronic detection of these changes uses 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 each individual increment. The distance from line to line or blank to blank is the dividing period, e.g. 20 µm or 40 µm.

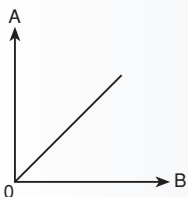
As the gratings of both the scale and reticle are moved in relation to one another, the opaque divisions on the scanning reticle are covered alternately by the lines and blanks on the linear scale, which serves as material measure. This provides a bright/dark information, which is then converted into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



- 1 Incremental linear scale (material measure) associated with the measuring bolt
- 2 Divided scanning unit
- 3 Light source
- 4 Condenser
- 5 Photodiode



- 1 Probe housing
- 2 Linear scale divided into increments
- 3 Divided reticle
- 4 Light source
- 5 Photodiodes
- 6 Power supply
- 7 Conversion of U1 signal
- 8 Conversion of U2 signal
- 9 Signal scanning
- 10 Multiple evaluation of the signal (interpolation) plus direction discriminator
- 11 Numerical display



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



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 maker with dividing periods of 10 µm = 0,0002 instead of 0,0005 mm or of 2 µm = 0,0001 instead of 0,0005 mm

9 x 4,5 mm

According to chosen tolerance range

40 mm scale length

25

20 keys available for entering values and selecting functions. Power supply 5 Vdc (measuring system).

Output: ±5 ±1% Vdc depending on selected tolerance range.

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

Output impedance: < 100 Ω

Resolution: 12 bits

RS232, bidirectional

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

10 °C to 40 °C

-10 °C to 50 °C

80%

IP40 (IEC 60529)

Continued on next page

## TESA TG Digital Measuring System

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



### TESA TG - C10 Computing Counter



04630004

**TESA TG - C10 computing counter**

Up/down computing counter with numerical display\*, resolution to 0,001 and 0,0005 mm or 0,00001 in. Features 1 probe input. Also with value classification and value storage capabilities. RS232 data output.

04630009

**TESA TG - C10 computing counter (HEIDENHAIN)**

Same execution as above, but compatible with HEIDENHAIN probe MT-1201/2501 only\*.

Each unit is supplied with the following accessories:

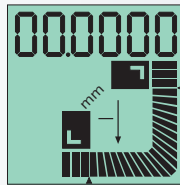
**04761054** 1 mains adapter 100 to 240 Vac, 50 to 60 Hz, 6,6 Vdc, 750 mA

**04761055** 1 EU adapter cable

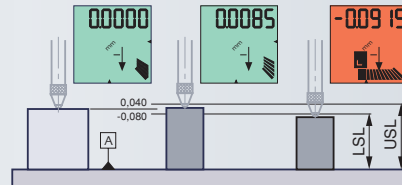
\* Compatible with equivalent HEIDENHAIN probes with same connector shape and signal.



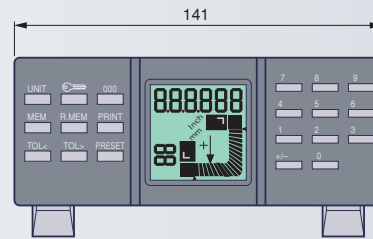
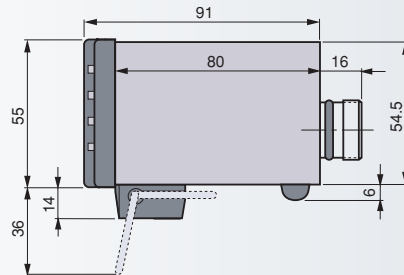
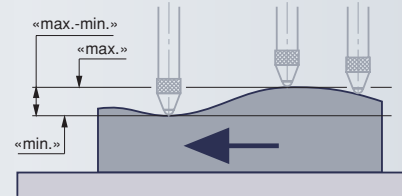




Input of the lower and upper specification limits (LSL and USL)



Digital capture of both extreme values «max.» and «min.» along with the difference between «max.-min.» in dynamic measurement



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

TG - C10:  
≈ 650 g

Shipping packaging

Identification number

Declaration of conformity



## TESA TG 30 and TG 60 Digital Probes



### Digital Probes\*

Axial probes with incremental glass scale

**04630006** **TESA TG 30**  
30 mm measuring span

**04630007** **TESA TG 60**  
60 mm measuring span

Each probe is supplied with the following item:

**01960005** 1 Retract lever for the measuring bolt

\* Compatible with equivalent HEIDENHAIN probes with same connector shape and signal.

### TG probes



- DIN 32876 Part 2
- Axial probe usable in any position. Measuring bolt guided on a plain bearing.
- Probe insert with M2,5 mounting thread.
- Measuring bolt retraction:
  - mechanical retraction, see under standard accessories
  - pneumatic retraction, see table
- 4,3 mm dia. x 3 m cable.
- Max. cable extension 10 m.

Incremental glass scale

0,002%/°C

10°C to 40°C

-10°C to 50°C

80%, non-condensing

IP54\* (IEC 60529)  
\*probe housing only

5 ± 10% Vdc

Output signal ± 11 µApp, sinusoidal

Shipping packaging

Identification number

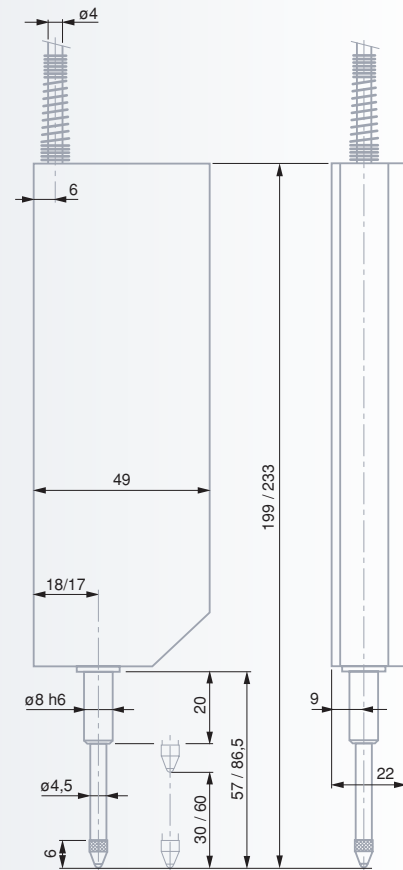
Inspection report

Declaration of conformity

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

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

\*\* TG 60 cannot be used with compressed air.



### Optional accessories



#### Connectors for lifting the measuring bolt by vacuum

**01960009** Suitable for TESA TG 30 (No. 04630006)

**01960008** Suitable for TESA TG 60 (No. 04630007)

#### Connector for lifting the measuring bolt by air pressure

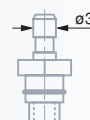
**01960010** Suitable for TESA TG 30 (No. 04630006)



01960009



01960008



01960010





# Optical Measurement



Software interface showing measurement data and graphs.

Coordinates: X: 10.839, Y: -0.242, Z: -224.021, Mag: 0.7x, Hits: 0

Individual Results

Label	Feature type	Description	Actual	Deviation	LSL	USL	Nominal
<b>Diameter</b>							
D01	Diameter - Average	Average @ 30.524	0.524	-0.100	0.700	26.500	
D02	Diameter - Average	Average @ 30.791	0.291	-0.100	0.500	29.900	
D03	Diameter - Average	Average @ 29.805	-0.015	-0.100	0.500	29.900	
D04	Diameter - Average	Average @ 25.179	-0.021	-0.100	0.500	25.200	
D05	Diameter - Average	Average @ 23.673	-0.025	-0.100	0.500	23.700	
D06	Diameter - Average	Average @ 12.532	-0.065	-0.100	0.500	12.600	
<b>Length</b>							





# FAST ROUND PART INSPECTION

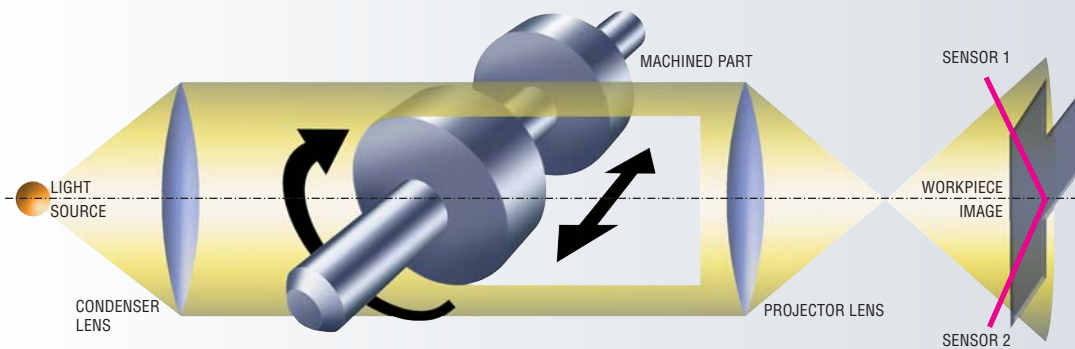
The whole TESA-SCAN family offers a complete solution for round part inspection. Various systems such as those used on profile projectors or measuring microscopes have been integrated into a single unit. This range of TESA's products are designed to measure round parts with diameters from 0,25 up to 52 mm and can be as long as 500 mm.



## Operating Principle

All TESA-SCAN incorporate high-resolution CCD linear sensors that combine lines of 14 000 pixels (equivalent to a 200 megapixels CCD camera). As the part profile is projected, these sensors, which are capable to detect the slightest changes at pixel level, act as a light sensitive ruler.

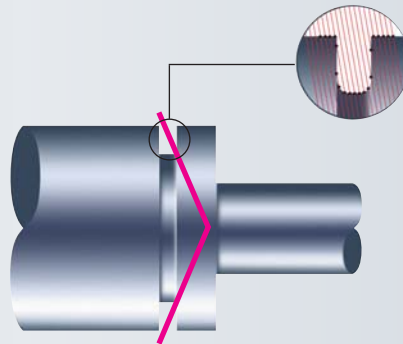
The part is scanned using a parallel green light. The part image is then projected onto the linear sensors, which get all needed information for analysis of the part geometry.



## 2D Measurement

The part profile is obtained from a scanning method applied along the part axis. Both diameter and length of the part are measured simultaneously, thus producing a 2D video image.

One of the main characteristics of the TESA's concept lies in the slanted position of the linear sensors. With an angle to  $7,5^\circ$  against the part axis, these sensors ensure a precise data capture when inspecting diameters, angles, radii and other geometric part features with parallel or sloped surfaces.

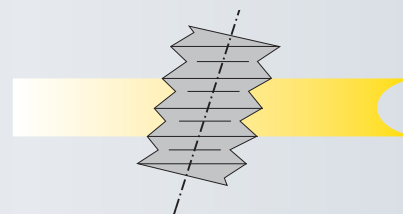


## Dynamic Measurement

Rotation during the inspection process allows for a peripheral examination of the part geometry and contour, each being captured at high speed and high accuracy.

## Thread Measurement

External threads are an important feature of round parts, and their measurement is an intensive labour operation. A true thread profile can be obtained from any TESA-SCAN.



## TESA-SCAN 52 REFLEX-Click

This model includes the ultimate power of all TESA-SCAN machines, offering high technological performances combined with unmatched ease of use and exceptional price/quality relationship.

Thanks to the added functionality for automatic recognition of the parts to be measured, the REFLEX-Click mode allows them to be quickly and reliably inspected with a single click. The colour coded classification of the measured values enables the analysis of the measurement results at a glance, rendering part inspection especially easy to execute.

Another unique function available in the REFLEX-Click mode is the ability to measure lengths and diameters speedily, making the machine ideally suited for use on the shop floor.



H x L x D  
840 x 1000 x  
435 mm or  
33 x 39,5 x 17 in

0,5 s for  
lengths and  
diameters

Performances:  
see page P-4

24 VDC

10 to 40°C

< 80%



103 kg

Max. workpiece  
size (D x L):  
100 x 300 mm.  
Max. workpiece weight: 4 kg.

< 70 dB (A)

Shipping packaging

Inspection report  
with a declaration  
of conformity



Performances  
are based on  
the results obtained  
from clean, ground  
components  
measured at 20°C.  
They may be  
affected by the  
component shape  
and surface finish.

	D	L	D	L
	0,5 ÷ 52 mm	300 mm	0,02 ÷ 2.0 in	11.8 in
	0,0001 mm	0,0005 mm	0.000004 in	0.00002 in
20°C ± 1°C	(2 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	(0.08 + D/100)/ 1000 in (D in in)	(0.2 + L/100)/ 1000 in (L in in)
2 σ	1 µm	2,5 µm	0.00004 in	0.0001 in



**02430090** TESA-SCAN 52 REFLEX-Click (Ø 52 x 300 mm). Measuring machine including 2 male centres TL02-0001. Supplied with PC, mouse, US keyboard, **Windows XP Multilingual** operating system, 20-inch TFT monitor.

**02430091** TESA-SCAN 52 REFLEX-Click with rotary headstock



## TESA-REFLEX Scan Software

The TESA-REFLEX family has expanded through the addition of the Scan version provided with intuitive graphical interface. The use of the Composer mode allows complex measurements of geometrical part features such as those listed below to be carried out in a simple way.

- Diameters
- Lengths
- Radii
- Angles
- Chamfers
- Threads

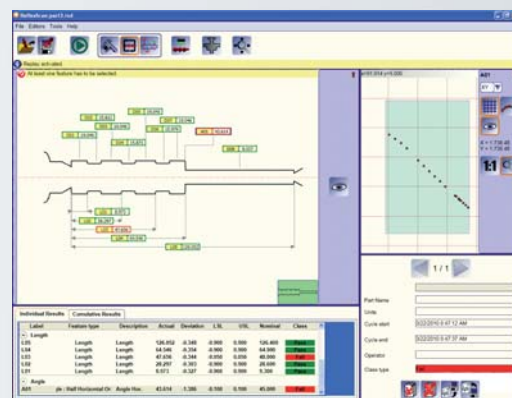
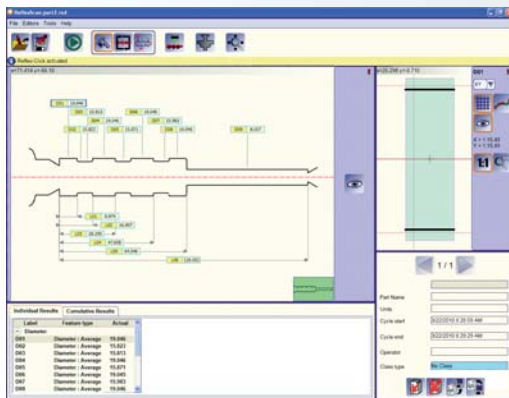
Equipped with a rotation axis available as an option, this machine will let you inspect additional features such as:

- Runout
- Coaxiality
- Cross-flats



### Key Features

- Automatic measurement of lengths and diameters using the REFLEX-Click function.
- Automatic recognition of the parts being measured or the programmes used.
- Intelligent detection of the relevant measurement zones.
- Management of the operator and programming modes.
- Value storage.
- Dynamic displaying of the measurement results.
- Flexible reporting.





TESA-SCAN 25:  
H 800 x L 640 x  
P 500 mm,  
H 32 x L 25 x P 20 in  
TESA-SCAN 50:  
H 1055 x L 800 x  
P 580 mm,  
H 41 x L 32 x P 23 in

Diameter : 0,5 s  
Length : 0,5 s

Performances:  
see page P-8

100/110-  
220/240 VAC  
50/60 Hz

10 to 35°C  
50 to 95°F

< 80%



TESA-SCAN 25:  
67 kg, 148 lbs  
TESA-SCAN 50:  
130 kg, 290 lbs

Max. workpiece  
size (D x L):  
59 x 270 mm;  
100 x 290 mm.

Max. workpiece weight:  
2 kg; 4 kg.

< 70 dB (A)

Shipping packaging

Inspection report  
with a declaration  
of conformity

## TESA-SCAN 25

## TESA-SCAN 50



### Technical Data

	D	L	D	L
<b>TESA-SCAN 25</b>				
	0,25 ÷ 25 mm	200 mm	0,01 ÷ 1.0 in	8.0 in
	0,0001 mm	0,001 mm	0.000004 in	0.00004 in
20°C ± 1°C	(1,5 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	(0.06 + D/100)/ 1000 in (D in in)	(0.2 + D/100)/ 1000 in (L in in)
2 σ	1 µm	2,5 µm	0.00004 in	0.0001 in

	D	L	D	L
<b>TESA-SCAN 50</b>				
	0,5 ÷ 50 mm	275 mm	0,02 ÷ 1.96 in	10.8 in
	0,0001 mm	0,001 mm	0.000004 in	0.00004 in
20°C ± 1°C	(2 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	(0.08 + D/100)/ 1000 in (D in in)	(0.2 + D/100)/ 1000 in (L in in)
2 σ	1 µm	2,5 µm	0.00004 in	0.0001 in



02430000

**TESA-SCAN 25** (Ø 25 x 200 mm). Measuring machine with part rotation, including 1 rotary headstock, 1 tailstock, 2 male centres TL02-0001.  
Supplied with PC, mouse, **Windows XP Multilingual** operating system, 20-inch TFT monitor, US keyboard, Pro-Measure software with User's manual E-F-D on a CD (order No. 02460011).

02430010

**TESA-SCAN 50** (Ø 50 x 275 mm). Measuring machine with part rotation, main part including 1 rotary headstock, 1 tailstock, 2 male centres TL02-0002.  
Supplied with PC, mouse, **Windows XP Multilingual** operating system, 20-inch TFT monitor, US keyboard, Pro-Measure software with User's manual E-F-D on a CD (order No. 02460011).

For information  
on Pro-Measure,  
see page P-9.

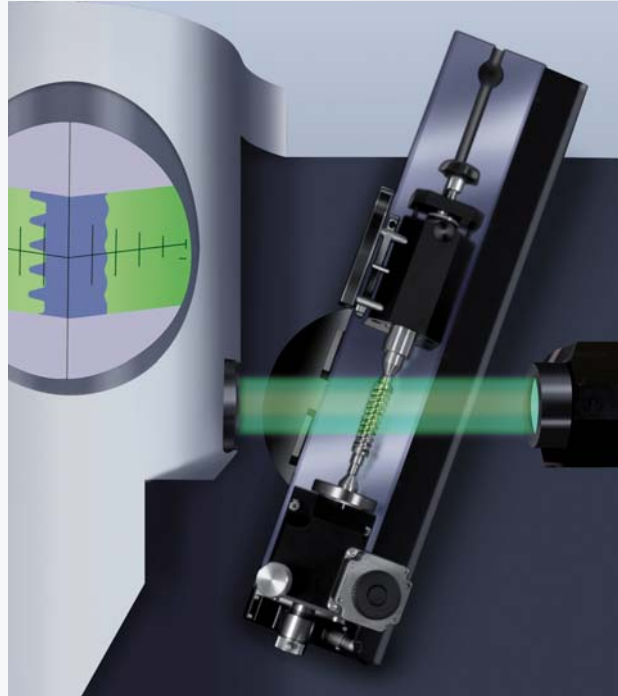




# TESA-SCAN 50 CE Plus

Measuring capacity: D = 50 mm, L = 275 mm

Equipped with slewing mechanism for thread measurement through advanced functions (slide tilted through 30°) .



- ✓
- H 1055 x L 800 x P 580 mm  
H 41 x L 32 x P 23 in
- Diameter : 0,5 s  
Length : 0,5 s
- Performances: see page P-8
- 100/110-220/240 VAC  
50/60 Hz
- 10 to 35°C  
50 to 95°F
- < 80%
- ✓
- 140 kg, 310 lbs
- Max. workpiece size (D x L):  
100 x 290 mm.  
Max. workpiece weight: 4 kg.
- < 70 dB (A)
- Shipping packaging
- Inspection report with a declaration of conformity

## Technical Data

	D	L	D	L
	0.5 ÷ 50 mm	275 mm	0,02 ÷ 1.96 in	10.8 in
Tilting for thread measurement	max. 30°			
	0,0001 mm	0,001 mm	0.000004 in	0.00004 in
20°C ± 1°C	(2 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	(0.08 + D/100)/ 1000 in (D in in)	(0.2 + D/100)/ 1000 in (L in in)
2 σ	1 µm	2,5 µm	0.00004 in	0.0001 in

Performances are based on the results obtained from clean, ground components measured at 20°C. They may be affected by the component shape and surface finish.

**No**

**=**

02430030

**TESA-SCAN 50 CE Plus** (Ø 50 x 275 mm). Measuring machine with part rotation and slewing mechanism for thread measurement. Main part including 1 rotary headstock, 1 tailstock, 2 male centres TL02-0002.  
Supplied with PC, mouse, **Windows XP Multilingual** operating system, 20-inch TFT monitor, US keyboard, Pro-Measure software with User's manual E-F-D on a CD (order No. 02460011).

For information on Pro-Measure, see page P-9.



H 1455 x L 800 x P 580 mm  
H 57 x L 32 x P 23 in

Diameter : 0,5 s  
Length : 0,5 s

Performances :  
see page P-8

100/110-  
220/240 VAC  
50/60 Hz

10 to 35 °C  
50 to 95 °F

10 to 80%



180 kg, 398 lbs

Max. workpiece  
size (D x L):  
100 x 515 mm.  
Max. workpiece weight: 6 kg

< 70 dB (A)

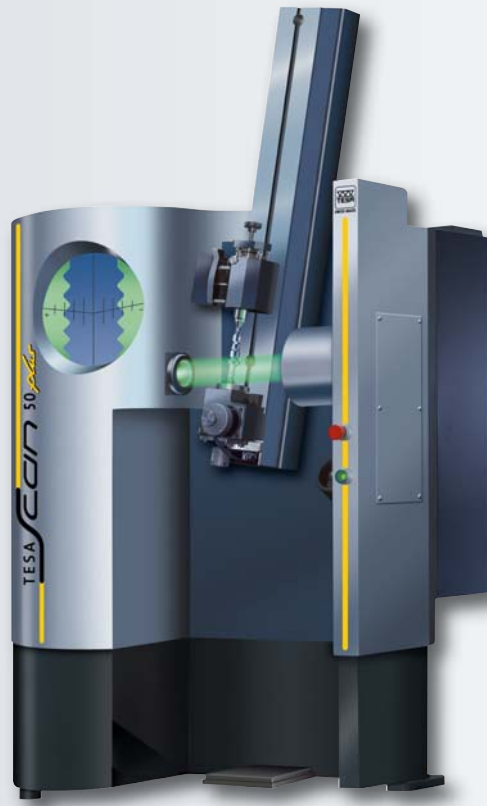
Shipping packaging

Inspection report  
with a declaration  
of conformity

## TESA-SCAN 50 Plus

Measuring volume: D = 50 mm, L = 500 mm

Equipped with a slewing mechanism acting on the slide for thread measurement through advanced functions.



### Technical Data

	D	L	D	L
	0,5 ÷ 50 mm	500 mm	0,02 ÷ 1.96 in	19.7 in
Tilting for thread measurement	max. 15°			
	0,0001 mm	0,001 mm	0.000004 in	0.00004 in
20°C ± 1°C	(2 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	(0.08 + D/100)/ 1000 in (D in in)	(0.2 + D/100)/ 1000 in (L in in)
2 σ	1 µm	2,5 µm	0.00004 in	0.0001 in

Performances are based on the results obtained from clean, ground components measured at 20 °C. They may be affected by the component shape and surface finish.



02430040

**TESA-SCAN 50 Plus** (Ø 50 x 500 mm). Measuring machine with part rotation and slewing mechanism for thread measurement. Main part including 1 rotary headstock, 1 tailstock, 2 male centres TL02-0002.

Supplied with PC, mouse, **Windows XP Multilingual** operating system, 20-inch TFT monitor, US keyboard, Pro-Measure software with User's manual E-F-D on a CD (order No. 02460011).

For information on Pro-Measure, see page P-9.



## Performances

(Valid for the TESA-SCAN 25 or TESA-SCAN 50 product range)

### Static measurement

Diameters, lengths, intersection points, gauge diameters, radii, angles etc.

Two-axes workpiece alignment – Creating a workpiece axis based on two datum diameters.

### Dynamic measurement

Concentricity – Parallel or interrupted diameters, tapers, parallel thread profiles or on maxi form.

Runout – Plain or interrupted diameters.

Diameters with rotation, ovality, max, min and average diameters of plain or interrupted diameters.

Hexagon – Across-flats, symmetry of flats to axis, max. dimension across corners.

Section analysis with rotation – Longest and shortest section of radii, angular location.

Three-axes workpiece alignment – Creating a workpiece axis with reference to plain diameters or thread lengths.

### Thread measurement – With no mechanical slewing – Main Features (TESA-SCAN 25 or TESA-SCAN 50)

- Parallel, vee-shaped threads
  - Major diameter
  - Flank diameter
  - Flank angle
  - Pitch
- Taper threads
  - Pitch
  - Flank angle
  - Included taper angle
  - Gauge length
  - Usable thread length
  - Pitch diameter
  - Major diameter
  - Conicity on diameter

### Thread and worm thread measurement – With mechanical slewing – Main Features (TESA-SCAN 50 CE plus or TESA-SCAN 50 plus)

- Parallel threads
  - Major diameter
  - Flank diameter
  - Pitch
  - Minor diameter
  - Flank angle
  - Root radius
  - Crest radius
  - Circularity
  - Lead error
- Taper threads
  - Pitch diameter
  - Major diameter
  - Minor diameter
  - Taper
  - Crest diameter
- Double-threads, parallel
  - Major and minor diameters
  - Half pitch
  - Flank angle
  - Crest radius
  - Root radius
- Worm threads (on request)
  - Pitch
  - Major and minor diameters
  - Over Wire diameter
  - Tooth thickness
  - Pressure angle
  - Addendum
  - Dedendum
  - Thread depth
  - Runout
- Ball screws (on request)
  - Pitch
  - Lead error
  - Over wire diameter



## Pro-Measure Software

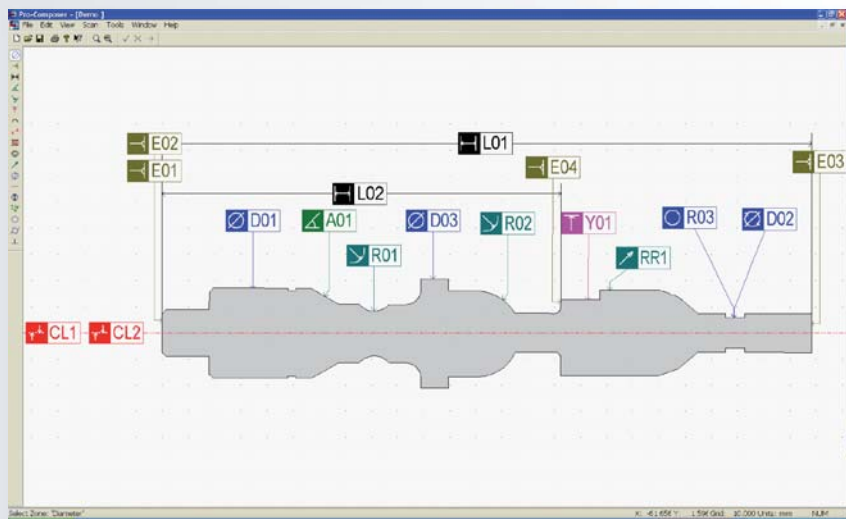
Complex metrology-based applications involving form and shape measurement are easily performed due to a flexible programming.

Pro-Measure enables a visual comparison of the true form as captured. This function makes the analysis of any existing manufacturing problems easier. It also provides the operator with the needed assistance when creating part programs. This simple software tool can either be installed directly on the PC coupled with the machine or networked to a workstation enabling a part program to be prepared off-line.

Pro-Measure uses the graphic representation of the part profile, created by scanning the part or importing the required geometry from a CAD file. A library of icons, each representing a geometric function, guides the user throughout the part programming sequence. Tolerance and setting values for cylindrical parts or threads can be retrieved from a database of international standards in order to be entered, accordingly.

### Key Features

- User-friendly interface for part programming.
- Wide variety of measuring functions.
- Statistical follow up for optimum monitoring of the manufacturing process.
- Full control of multiple levels of use.
- Flexible reporting.



Pro-Measure - [Measurement - Demo]

File View Tools Debug Window Help

Individual Results Cumulative Results Batch Results Measurement Analysis Schematic

Part Name: Demo

Units: mm, Degree

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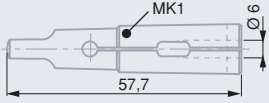
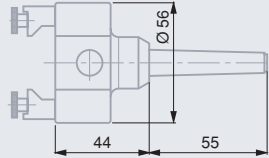
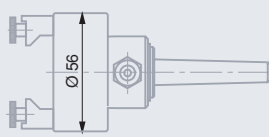
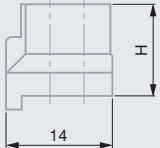
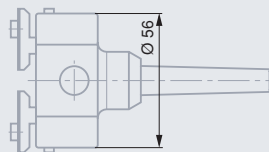
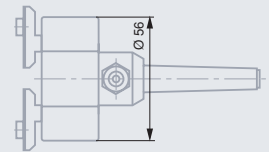
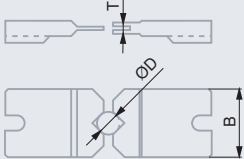
Result: **Fail** Remark: 1

F.	L.	Description	Actual	Deviation	USL	LSL	Class	LSL/USL Chart	Nominal
+	L01	Length	248.363	0.013	248.400	248.300	Pass	■	248.350
+	L02	Length	152.383	-0.017	152.450	152.350	Pass	■	152.400
⊙	D01	Ø Average	34.500	0.000	34.550	34.450	Pass	■	34.500
∠	A01	Half Angle	30.139	-0.011	31.150	29.150	Pass	■	30.150
⊙	R02	Radius	16.469	0.068	16.450	16.350	Fail	■	16.400
⊙	R01	Radius	7.502	0.002	7.550	7.450	Pass	■	7.500
⊙	D02	Rot. Ø Average	12.000	0.000	12.050	11.950	Pass	■	12.000
⊙	R03	Roundness	0.006	0.006	0.050	0.000	Pass	■	0.000
⊙	RR1	Radial Run Out	0.006	0.006	0.050	0.000	Pass	■	0.000
T	Y01	Average Height	12.837	-0.013	12.900	12.800	Pass	■	12.850
⊙	D03	Ø Average	42.000	0.000	42.050	41.950	Pass	■	42.000





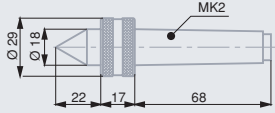
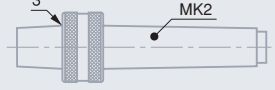
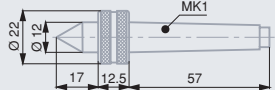
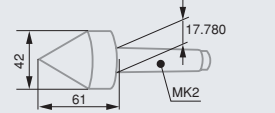
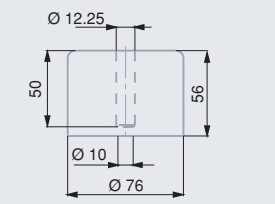
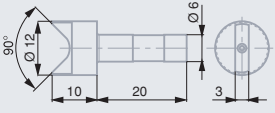
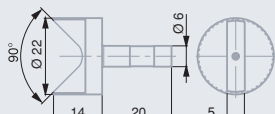
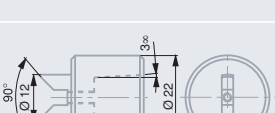
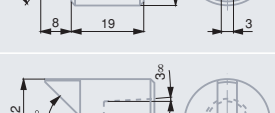

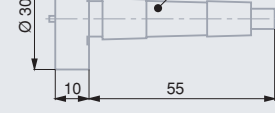
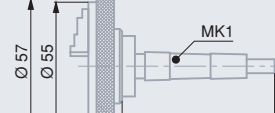
Accessories

Order Number		Morse 1 TESA-SCAN 25	Morse 2 TESA-SCAN 50 TESA-SCAN 52 REFLEX-Click	Notes	Description
TL01-0002		●	–	–	Centre adapter with a 6 mm dia. coupling bore
TL01-0003		●	● Requires TL01-0027	External clamping for manual use	Two-jaw gripper
TL01-0004		●	● Requires TL01-0027	External clamping for use with air pressure	Two-jaw gripper
TL01-0005 H = 18 TL01-0006 H = 22		For TL01-0003 TL01-0004	–	–	Raising blocks for external jaws, in pairs
TL01-0007		●	● Requires TL01-0027	Internal clamping for manual use	Two-jaw gripper
TL01-0008		●	● Requires TL01-0027	Internal clamping for use with air pressure	Two-jaw gripper
TL01-0009 0÷6 mm T = 1,5 TL01-0010 0÷6 mm T = 3 TL01-0011 6÷12 mm T = 3 TL01-0012 12÷18 mm T = 6 TL01-0013 18÷24 mm T = 9 TL01-0038 0÷6 mm T = 6 TL01-0039 0÷6 mm T = 15 TL01-0040 6÷12 mm T = 15		For TL01-0003 TL01-0004	–	–	External jaws, in pairs
TL01-0021	Set of jaws including: TL01-0009 TL01-0010 TL01-0011 TL01-0012 TL01-0013	For TL01-0003 TL01-0004	–	–	External jaws, in pairs



Order Number		Morse 1 TESA-SCAN 25	Morse 2 TESA-SCAN 50 TESA-SCAN 52 REFLEX-Click	Notes	Description
<b>TL01-0015</b> D = 4-5 mm H = 6,6 mm <b>TL01-0016</b> D = 5-6 mm H = 8,6 mm <b>TL01-0017</b> D = 6-8 mm H = 11,5 mm <b>TL01-0018</b> D = 8-11 mm H = 17,5 mm <b>TL01-0019</b> D = 11-15 mm H = 20 mm <b>TL01-0020</b> D = 15-19 mm H = 20,2 mm		For TL01-0007 TL01-0008	—	—	Internal jaws, in pairs
<b>TL01-0022</b>	Set of jaws including: TL01-0015 TL01-0016 TL01-0017 TL01-0018 TL01-0019 TL01-0020	For TL01-0007	—	—	Internal jaws, in pairs
<b>TL01-0026</b>		—	●	—	Centre adapter with a 6 mm dia. coupling bore
<b>TL01-0027</b>		—	●	—	Reduction sleeve, Morse 2 to 1
<b>TL02-0001</b>		●	—	2 items provided with TESA-SCAN 25	Extra male centre, 10 mm
<b>TL02-0002</b>		—	●	2 items provided with TESA-SCAN 50 and TESA-SCAN 52 Reflex-Click	Extra male centre, 17 mm
<b>TL02-0003</b>		●	—	Diamond coated 10 mm	Drive centre
<b>TL02-0016</b>		●	—	For added sleeves Z173- 0922/0923	Rotation centre with a B12 male taper plus a Morse 1 taper shank



Order Number		Morse 1 TESA-SCAN 25	Morse 2 TESA-SCAN 50 TESA-SCAN 52 REFLEX-Click	Notes	Description
TL02-0017		—	●	—	Rotation centre, Morse 2
TL02-0018		—	●	—	Rotation centre with a B12 male taper plus a Morse 1 shank
TL02-0019		●	—	—	Rotation centre, Morse 1
TL02-0021		—	●	—	Rotation centre, Morse 2
Z173-0908		For TL01-0003 TL01-0004 TL01-0007 TL01-0008	—	Ensures stable positioning for mounting jaws	Vertical support
Z173-0920		● Requires TL01-0002	● Requires TL01-0026	—	Female centre, 10 mm dia.
Z173-0921		● Requires TL01-0002	● Requires TL01-0026	—	Female centre, 20 mm dia.
Z173-0922		● Requires TL02-0016	—	—	Female centre, 10 mm dia. Also with internal B12 taper
Z173-0923		● Requires TL02-0016	—	—	Female centre, 10 mm dia. Also with internal B12 taper
Z173-0961		●	—	—	Platten, 30 mm dia.
Z173-2020		●	● Requires TL01-0027	Clamping capacity: outside 1÷15 mm inside 11÷26 mm	3-jaw chuck, clamping range 1÷15 mm
Z173-2024		—	●	—	6-jaw chuck, clamping range 0,7÷15 mm
Z173-2025		●	—	—	

Order Number		Morse 1 TESA-SCAN 25	Morse 2 TESA-SCAN 50 TESA-SCAN 52 REFLEX-Click	Notes	Description
Z178-2009		-	●	Used to drive components between fixed centres. Directly fitted on the headstock.	Drive mechanism
Z178-2020		-	●	Clamping capacity: outside 2÷50 mm inside 23÷50 mm	3-jaw chuck with Morse 2 taper shank, clamping range 2÷50 mm
Z178-2025		-	●	-	Platten, 80 mm dia. Also with a Morse 2 taper shank
Z178-2026		-	●	Diamond coated	Drive centre, Ø 40 mm. Also with a Morse 2 taper shank
Z178-0607		-	●	-	Female centre, 40 mm dia. Also with a Morse 2 taper shank
Z178-0610		-	●	-	Male centre, 15÷40 mm dia. Also with a Morse 2 taper shank
Z178-0940		-	● Requires TL02-0018	-	Female centre, 10 mm dia., Also with a B12 internal taper
Z178-0941		-	● Requires TL02-0018	-	Female centre, 10 mm dia., Also with a B12 internal taper
Z178-0942		-	● Requires TL02-0018	-	Female centre, 10 mm dia., Also with a B12 internal taper
Z178-3028		-	●	-	Drive centre, 42 mm dia. max.





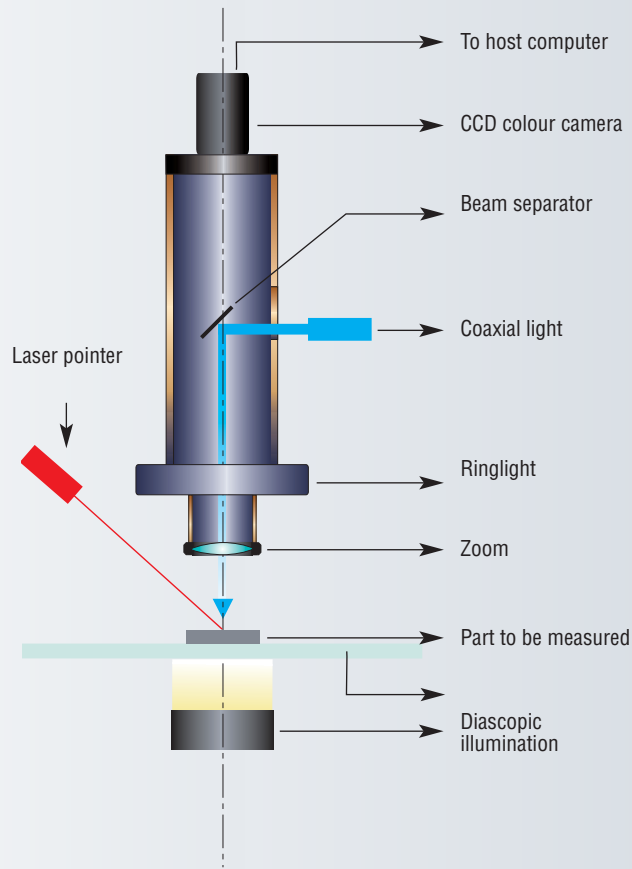
# TESA-VISIO OPERATING PRINCIPLE

The Vision technology consists in inspecting a test object lying on a glass plate support by means of an optical system fitted with a camera besides additional zoom-like lenses. Since this technology is based on image analysis, light illumination of the part being inspected is crucial.

For this reason, three different light illuminations will be used:

- **Diascopic illumination** mounted under the glass plate, making it possible for the user to view the part profile.
- **Ringlight** for a detailed visualisation of the upper surface of the part being checked.
- **Coaxial light** to view inside a blind bore or a cavity or to measure cylindrical parts in upright position.

The laser pointer serves for locating, at a glance, the measurement area on the part lying in the object field of the camera. Using beam separators, the coaxial light can pass through the zoom.



## Different Light Illuminations

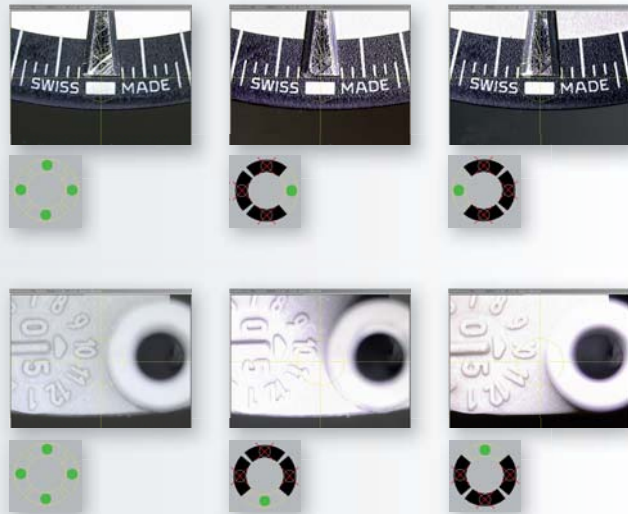
### Episcopic illumination

The episcopic illumination, or incident light is particularly useful for inspecting part features such as millings, bores, chamfers and rounded edges.

This type of illumination may vary, according to the chosen machine version.

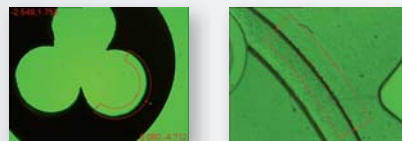
- On a TESA-VISIO 200 GL, the ringlight is divided into 4 segments of 90°.
- On a TESA-VISIO 300 GL, the ringlight includes two circular rows. The outer row is divided into 8 segments of 45° whilst the inner one has 4 segments of 90°.

Each segment is programmable separately over the software.



### Diascopic illumination

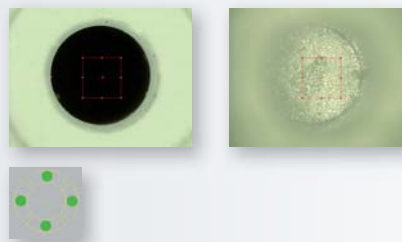
The diascopic illumination, or transmitted light is projected under the part being measured to create a silhouette image of the profile. Also used for the measurements based on transparency.



Illuminated contour

### Coaxial light

This light is projected from above through the zoom. The collimated light beams produce an illuminated field useful for inspecting blind bores or cylindrical parts.

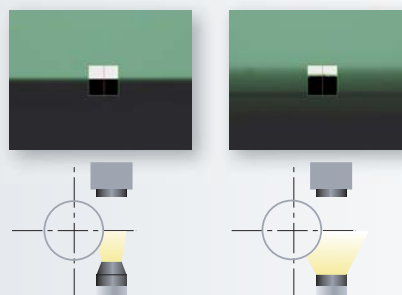


On the left, the inside of a blind bore cannot be inspected using the ringlight.

### Parallel diascopic illumination

This illumination is projected from the bottom, using a special lens to create parallel light rays.

With this type of illumination, multiple light reflections can virtually be eliminated. This results in sharp edges when checking round parts.



Visualisation with parallel diascopic illumination

Visualisation without parallel diascopic illumination



# TESA-VISIO – THE VISION MACHINES FROM TESA FOR PRECISE OPTICAL MEASURING

The TESA-VISIO GL family provides Users with a full range of vision machines designed to meet their needs, from the simple inspection job to the sophisticated metrology application.

With a 200 x 100 mm measuring table, the manual TESA-VISIO 200 GL will fulfil the expectations of modern workshops.

Solidly built with a granite structure, TESA-VISIO 300 GL is worth investing in. This version has a 300 x 200 mm measuring table, and can either be operated manually or using the servomotors (DCC).



## Main Features

- Compact, ergonomic design – Fruit of a thorough mechanical investigation.
- Machine base and column in granite – Ensure superior stability.
- TESA's patented system for optical reading.
- Intuitive, user-friendly Software tools made easily accessible.

### TESA-VISIO sales programme



Machine version	200 GL	200 GL	300 GL	300 GL
Order number	06830401	06830428	06830601	06830634
Displacements	manual	manual	manual	motorised
Manual zoom, indexable	6,5x	–	–	–
Motorised zoom	–	6,5x	6,5x 12x (optional)	6,5x 12x (optional)
Software	TESA-REFLEX Vista	TESA-REFLEX Vista	TESA-REFLEX Vista	TESA-REFLEX Vision
Ringlight	4 x 90°	4 x 90°	4 x 90° + 8 x 45°	4 x 90° + 8 x 45°
Coaxial light	●	●	●	●





## Two TESA-REFLEX programme versions

*These two versions do not derogate from the rule to be the reference for simplicity, making the TESA-REFLEX software different. Easy to learn and to understand - it takes only a few hours - each version provides the reliability needed for visual part inspection.*

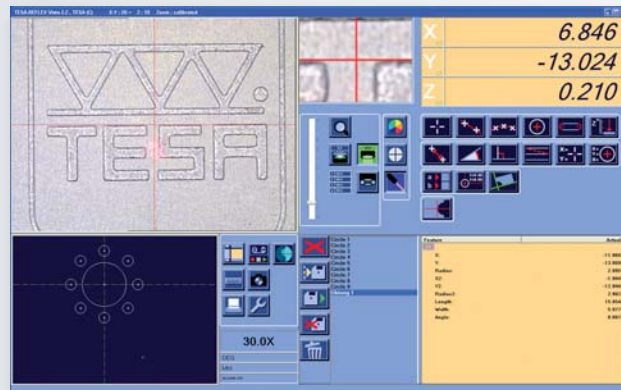
TESA-REFLEX Vista or TESA-REFLEX Vision will measure the highest number of geometrical elements quickly and accurately.

### Main Features

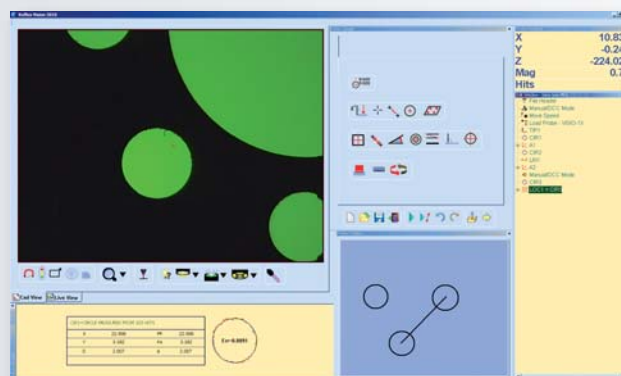
- Intuitive software tools.
- User-friendly, icon-based interface.
- Simple programming.
- Automatic measuring mode.
- On-line help in the Z-axis.
- True three-axis alignment.
- Visual comparison of the part against its CAO file  
(Compar option available from TESA-REFLEX Vista).

The following two versions are supplied according to used machine type:

- TESA-REFLEX Vista for manual vision machines.
- TESA-REFLEX Vision for DCC vision machines.



TESA-REFLEX Vista



TESA-REFLEX Vision

### Sales Programme



06860046

TESA-REFLEX Vista

06860187

Compar option for TESA-REFLEX Vista

06860380

TESA-REFLEX Vision





The ambitious TESA's programme initiated some years ago with the development of a full range of machines for non-contact measurement has resulted in a growing demand for systems capable to measure forms and shapes or soft materials where mechanical probing is just impossible. To meet this demand, the latest hand-operated TESA-VISIO 200 GL has been made smaller, but with no compromise on the metrological performances. Equipped with the TESA-REFLEX Vista programme version, learned in less than one day, this machine is the perfect multi-tasking, multi-users tool for part inspection.



### Main Features

- **Exceptional Quality/Price ratio**

Each machine has been specially designed for highest quality standard and accuracy.

- **Optics**

Available with a manual indexable zoom or a motorised zoom for greater comfort. Also provided with a CCD colour camera.

- **Light illuminations**

All light sources are fitted with LEDs producing a cold light, also long-lasting.

- Diascopic illumination for checking profiles as well as for transparency-based measurements.
- Ringlight (4 x 90°) for millings, bores, chamfers and round edges.
- Coaxial light for blind bores and cylindrical parts.

Each light source can be set separately over the software.

- **Swiss mechanics**

Granite structure to ensure the rigidity and stability required for any high-precision measuring system.

### Basic machine



Rigid granite structure



Opto-electronic measuring systems with incremental glass scales, resolution to 0,05 µm



$MPE_{x,y}^* (E_x, E_y) = (2 + 10 L/1000) \mu m$   
 $MPE_{xy}^* (E_{xy}) = (2,9 + 10 L/1000) \mu m$   
 $MPE_z^{*/**} (E_z) = (2,9 + 10 L/1000) \mu m$   
 \* L in mm

\*\* Mechanical precision with no displacement in X-Y



Measuring volume (X/Y/Z):  
200 x 100 x 150 mm



Display resolution:  
0,001 mm



Manual



10°C to 40°C



20°C ±1°C



80%, non-condensing



115 to 230 Vac ±10%;  
50 to 60 Hz



98 kg



Calibration certificate



Declaration of conformity



Delivered fully assembled



Shipping packaging (W x D x H):  
800 x 1200 x 1100 mm



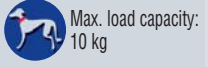
Measuring table



Anodised aluminium



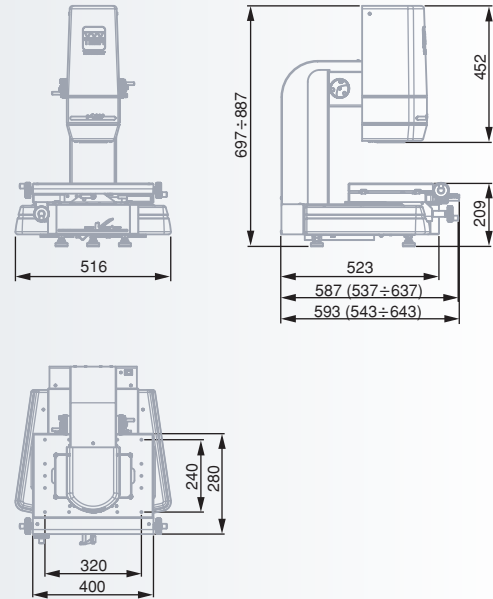
Table surface (X/Y):  
400 x 280 mm



Max. load capacity:  
10 kg

Indicative values for a 20-inch monitor with a 6,5x magnification (0,7x to 4,5x), also with additional lens

Order number	06860030	06860031	none	06860032	06860033
Lenses	0,5x	0,75x	–	1,5x	2x
Magnification	20 ÷ 70	26 ÷ 105	40 ÷ 140	60 ÷ 210	80 ÷ 280
Working distance (W) in mm	150	100	60	30	20
Max. height (H) in mm	0 ÷ 60	0 ÷ 120	0 ÷ 150	0 ÷ 180	15 ÷ 195
Max. field of view in mm	9,8 x 7,3	7,2 x 5,4	4,9 x 3,6	3,2 x 2,4	2,4 x 1,8
Min. field of view in mm	2,8 x 2,1	1,8 x 1,3	1,4 x 1	0,9 x 0,7	0,7 x 0,5



<b>04760079</b>	PC DELL Optiplex	●	●
<b>04760091</b>	Monitor 20"	●	●
<b>055074</b>	Manual zoom, indexable (6,5x)	●	–
<b>051638</b>	Motorised zoom (6,5x)	–	●
<b>054926</b>	Coaxial light	●	●
<b>054925</b>	Ringlight (4 x 90°)	●	●
<b>06860046</b>	TESA-REFLEX Vista software	●	●

VISIO 200 GL  
06830401  
manual

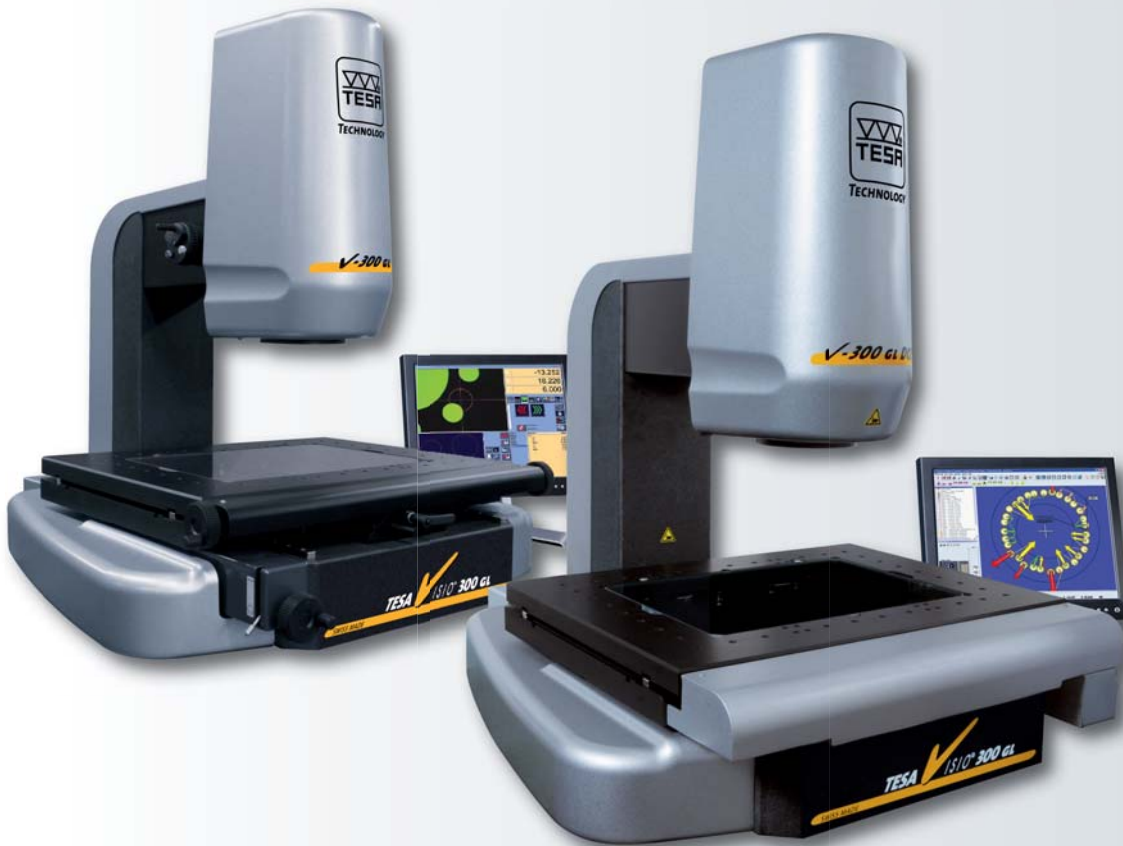
VISIO 200 GL  
06830428  
manual



## TESA-VISIO 300 GL

The TESA-VISIO 300 GL reflects the expertise from TESA in vision machines. Besides a compact and ergonomic design, this version provides a 300 x 200 x 150 mm measuring volume that covers a large part of the demands from industry in this specific field.

Available in two distinct models for manual or motorised operations, the TESA-VISIO 300 GL offer to demanding metrologists all the functionalities they need for occasional or part series inspection. All hand-operated machine versions running the user-friendly TESA-REFLEX Vista are made for multi-tasking and multi-users operations. Running TESA-REFLEX Vision, your measurements will be rapidly and easily executed.



### Main Features

- **Optics**

Includes a motorised zoom along with a CCD colour camera as standard equipment.

All light sources are fitted with LEDs producing a cold light, also long-lasting.

- Diascopic illumination for checking profiles as well as for transparency-based measurements.
- Ringlight (4 x 90° + 8 x 45°) for millings, bores, chamfers and round edges.
- Coaxial light for blind bores and cylindrical parts.

Each light source can be set separately over the software.

- **Swiss mechanics**

Granite structure to ensure the rigidity and stability required for any high-precision measuring system.

### Basic machine



Opto-electronic measuring systems with incremental glass scales, resolution to 0,05 µm



Manual version:  
 $MPE_{x,y}^* (E_x, E_y) = (2 + 4 L/1000) \mu m$

$MPE_{xy}^* (E_{xy}) = (2,5 + 4 L/1000) \mu m$

$MPE_z^{***} (E_z) = (2,9 + 5 L/1000) \mu m$

Motorised version:  
 $MPE_{x,y}^* (E_x, E_y) = (1,6 + 4 L/1000) \mu m$

$MPE_{xy}^* (E_{xy}) = (2 + 4 L/1000) \mu m$

$MPE_z^{***} (E_z) = (2,9 + 5 L/1000) \mu m$

\* L in mm

\*\* Mechanical precision



Measuring volume (X/Y/Z):  
 300 x 200 x 150 mm



Display resolution:  
 0,001 mm



10°C to 40°C



20°C ± 1°C



80%, non-condensing



115 to 230 Vac ± 10%;  
 50 to 60 Hz



170 kg



Calibration certificate



Declaration of conformity



Delivered fully assembled



Shipping packaging (W x D x H):  
 1630 x 1140 x 1360 mm



Measuring table



Anodised aluminium

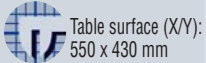
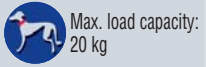


Table surface (X/Y):  
550 x 430 mm



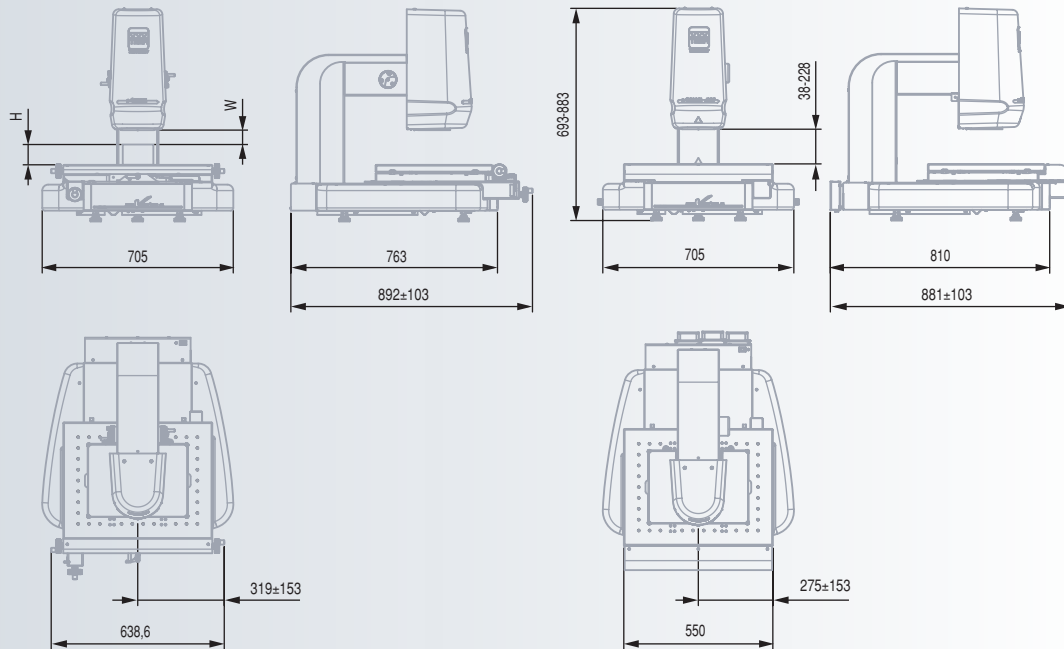
Max. load capacity:  
20 kg

Indicative values for a 20-inch monitor with a 6,5x magnification (0,7x to 4,5x), also with additional lens

Order numbers	06860030	06860031	none	06860032	06860033
Lenses	0,5x	0,75x	–	1,5x	2x
Magnifications	20 ÷ 70	26 ÷ 105	40 ÷ 140	60 ÷ 210	80 ÷ 280
Working distance (W) in mm	150	100	60	30	20
Max. height (H) in mm	0 ÷ 60	0 ÷ 120	0 ÷ 150	0 ÷ 180	15 ÷ 190
Max. field of view in mm	9,8 x 7,3	7,2 x 5,4	4,9 x 3,6	3,2 x 2,4	2,4 x 1,8
Max. field of view in mm	2,8 x 2,1	1,8 x 1,3	1,4 x 1	0,9 x 0,7	0,7 x 0,5

Indicative values for a 20-inch monitor with a 12x magnification (0,58x to 7x), also with additional lens


Order numbers	06860287	06860288	none	06860289	06860290
Lenses	0,5x	0,75x	–	1,5x	2x
Magnifications	19 ÷ 190	25 ÷ 276	33 ÷ 367	50 ÷ 550	67 ÷ 74
Working distance (W) in mm	150	95	65	40	25
Max. height (H) in mm	0 ÷ 60	0 ÷ 120	0 ÷ 150	0 ÷ 180	15 ÷ 190
Max. field of view in mm	16 x 12	10,8 x 8	8,1 x 6,1	5,4 x 4	4 x 3
Max. field of view in mm	1,4 x 1	1 x 0,7	0,75 x 0,55	0,5 x 0,36	0,37 x 0,27



			VISIO 300 GL 06830601 manual	VISIO 300 GL 06830634 motorised
04760079	PC DELL Optiplex	●	●	–
04760053	PC DELL Precision	–	–	●
04760091	Monitor 20"	●	●	●
06860049	Motorised zoom (6,5x) + coaxial light	●	●	●
06860158	Ringlight, 4 x 90° + 8 x 45°	●	●	●
06860380	TESA-REFLEX Vision software	–	–	●
06860046	TESA-REFLEX Vista software	●	●	–





	06830401	06830428	06830601	06830634
				
<b>TESA-VISIO 200 GL</b>	●	●	–	–
<b>TESA-VISIO 300 GL</b>	–	–	●	●
Displacements	manual	manual	manual	motorised
TESA-REFLEX Vista	●	●	●	–
TESA-REFLEX Vision	–	–	–	●
Measuring volume X/Y/Z (mm)	200x100x150	200x100x150	300x200x150	300x200x150
Encoder resolution X/Y/Z (µm)	0,05	0,05	0,05	0,05
Joystick controlled servomotors in the 3 coordinate axes	–	–	–	●
Machine base and column in granite	●	●	●	●
Fine adjustment in the Z-axis	●	●	●	–
X/Y measuring table in anodised aluminium (mm)	400x280	400x280	550x430	550x430
Thickness of the glass plate (mm)	10	10	10	10
Stage with possible resting attachment and removable glass plate	●	●	●	●
Max. load capacity (kg)	10	10	20	20
<i>Precision</i>				
MPE <sub>X,Y</sub> (E <sub>X</sub> , E <sub>Y</sub> ) (µm) (L in mm)**	2+10 L/1000	2+10 L/1000	2+4 L/1000	1,6+4 L/1000
MPE <sub>XY</sub> (E <sub>XY</sub> ) (µm) (L in mm)**	2,9+10 L/1000	2,9+10 L/1000	2,5+4 L/1000	2+4 L/1000
MPE <sub>Z</sub> (E <sub>Z</sub> ) (µm) (L in mm)*/**	2,9+10 L/1000	2,9+10 L/1000	2,9+5 L/1000	2,9+5 L/1000
* Mechanical precision ** m ≤ 5 Kg				
<i>Camera and optics</i>				
CCD colour camera, 752 x 582 pixels	●	●	●	●
Manual zooms, indexable, 6,5x	●	–	–	–
Motorised zoom, 6,5x	–	●	●	●
Motorised zoom, 12x	–	–	Optional	Optional
Diascopic illumination, green LED	●	●	●	●
Diascopic illumination, parallel	Optional	Optional	Optional	Optional
Coaxial light	●	●	●	●
Segmented ringlight, (4 x 90°), white LEDs	●	●	–	–
Segmented ringlight, (4 x 90° + 8 x 45°), white LEDs	–	–	●	●
Laser pointer	●	●	●	●
<i>Additional data</i>				
Weight (machine alone) (kg)	98	98	170	170
Velocity in both XY coordinate axes (mm/s)	–	–	–	160
Acceleration in both XY coordinate axes (mm/s <sup>2</sup> )	–	–	–	640
Velocity in the Z-axis (mm/s)	–	–	–	160
Acceleration in the Z-axis (mm/s <sup>2</sup> )	–	–	–	500
Power supply	100 ÷ 240 V ± 10% 50 ÷ 60 Hz 5 ÷ 12V, continuous	100 ÷ 240 V ± 10% 50 ÷ 60 Hz 5 ÷ 12V, continuous	100 ÷ 240 V ± 10% 50 ÷ 60 Hz 5 ÷ 12V, continuous	110 ÷ 240 V ± 10% 50 ÷ 60 Hz 24 V, continuous
Masse (machine alone) (W x D x H) (in mm)	800x1200x1100	800x1200x1100	1630x1140x1360	1630x1140x1360
Reference temperature	20°C ± 1°C	20°C ± 1°C	20°C ± 1°C	20°C ± 1°C
Operating temperature range	10°C ÷ 40°C	10°C ÷ 40°C	10°C ÷ 40°C	10°C ÷ 40°C
Relative humidity (non-condensing)	≤ 80%	≤ 80%	≤ 80%	≤ 80%



Optional accessories

No	=	TESA-VISIO	
		200 GL	300 GL
<i>Light illumination</i>			
<b>06860145</b>	Diascopic illumination, parallel	●	●
<i>Optics</i>			
<b>06860323</b>	Motorised zoom, 12x (on the purchase of a vision machine)	–	●
<b>06860315</b>	Zoom upgrade, 6,5x to 12x (machine retrofit)	–	●
<b>06860030</b>	Additional lens, 0,5x for a 6,5x zoom	●	●
<b>06860031</b>	Additional lens, 0,75x for a 6,5x zoom	●	●
<b>06860032</b>	Additional lens, 1x for a 6,5x zoom	●	●
<b>06860033</b>	Additional lens, 2x for a 6,5x zoom	●	●
<b>06860287</b>	Additional lens, 0,5x for a 12x zoom	–	●
<b>06860288</b>	Additional lens, 0,75x for a 12x zoom	–	●
<b>06860289</b>	Additional lens, 1x for a 12x zoom	–	●
<b>06860290</b>	Additional lens, 2x for a 12x zoom	–	●
<i>Additional accessories</i>			
<b>S68900025</b>	Monitor 22" instead of 20"	●	●
<b>06860186</b>	Foot switch for data point acquisition	●	Manual version
<b>04760077</b>	Joystick	–	Motorised version
<b>06860317</b>	Suited case for Visiofix light accessory set	●	●
<b>06860316</b>	Suited case for Visiofix standard accessory set	●	●
<b>06860318</b>	Visiofix accessory set, steel rails 200	●	–
<b>06860320</b>	Visiofix accessory set, steel rails 300	–	●



06860317



06860316





















## TESA-SCOPE II 300V or 300V Plus

Perfect for checking parts with flat surfaces or any other component used in precision mechanics.



- Profile projectors with vertical illumination.
- 360° rotary viewing screen in frosted glass, 300 mm diameter. 30°, 60° or 90° crossline reticle along with 4 overlay chart clips.
- Screen rotation with built-in sexagesimal and decimal reading, resolution in minutes – RAZ ABS/INC.
- Profile illumination with green filter included. Enhances image contrast, makes the measurement easier, reduces all effects due to the operator.
- Surface illumination through adjustable fibre optic for a perfect image projection.
- Save Lamp system for automatic shut down of the lamps whenever the projector remains unused for several minutes (thus increasing the life of the lamps by 5).
- Objectives with bayonet mount for quick exchange.
- Coordinate table equipped with incremental glass scales, opto-electronic. Resolution to 0,001 mm.
- Measuring span:
  - 200 x 100 for standard model
  - 300 x 150 for model **Plus**
  - X-axis fitted with a clutch mechanism for fast displacement.
  - Control handle for left hand and right hand operator (X-axis motion).
  - Workload capacity up to 10 kg.
- Lateral paper sheet holder.

### Main Part

-  ✓
-  Heavy duty all steel structure
-  Measuring system with incremental glass, scale, opto-electronic. Resolution 0,001 mm.
-  Optics precision  $\pm 0,05\%$  (profile illumination);  $\pm 0,10\%$  (surface illumination).
-  Resolution 0,001 mm
-  Profile illumination: 24 V / 150 W bulb. Also with thermal filter included. Surface illumination: adjustable fibre optic, 24 V / 200 W bulb. Also with thermal filter included.
-  10°C to 40°C
-  19°C to 21°C
-  80%, non-condensing
-  115 to 230 Vac  $\pm 10\%$ ; 50 to 60 Hz
-  110 kg
-  IP40
-  IEC 61010  
EN 60204  
EN 61326-1
-  Serial number
-  TESA Inspection report
-  Declaration of conformity
-  Provided fully mounted, but without objective (must be ordered separately).
-  Shipping packaging



Small Table

- Anodised aluminium
- Table surface 350 x 210 mm (X/Y)
- Measuring span: 200 x 100 mm (X/Y)
- In one coordinate direction: (4,5 + L/40) µm ≤ 8 µm (L in mm)
- Max. workload capacity 10 kg

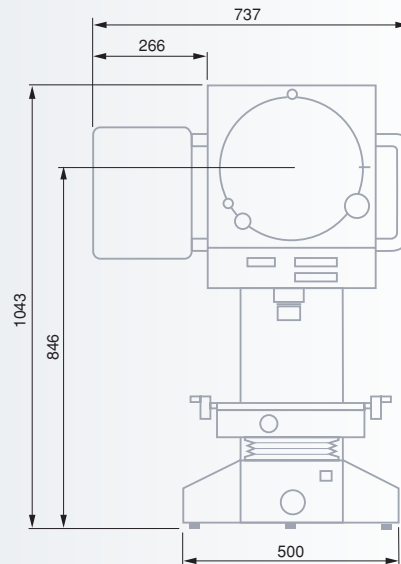
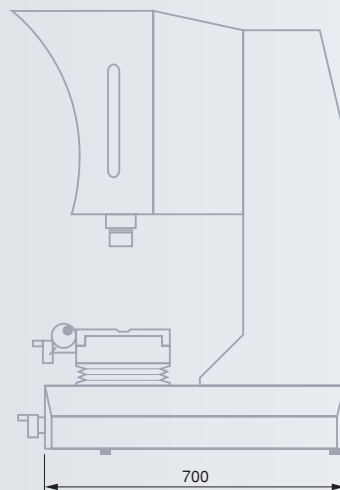
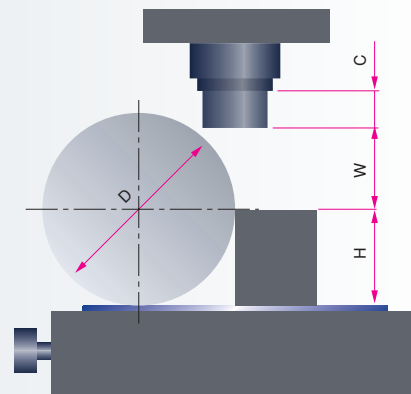
Large Table

- Anodised aluminium
- Table surface 440 x 282 mm (X/Y)
- Measuring span: 300 x 150 mm (X/Y)
- In one coordinate direction: ± 5,0 + L/20 (L in mm)
- Max. workload capacity 10 kg

	Base	Measuring Table		Digital Readout / Control Panel		
		X=200 mm Y=100 mm	X=300 mm Y=150 mm	TS100	TS300	TS300E
<b>TESA-Scope II 300V</b>	<b>06830041</b>	●	●	●	-	-
<b>TESA-Scope II 300V</b>	<b>06830042</b>	●	●	-	●	-
<b>TESA-Scope II 300V</b>	<b>06830043</b>	●	●	-	-	●
<b>TESA-Scope II 300V Plus</b>	<b>06830044</b>	●	-	●	-	-
<b>TESA-Scope II 300V Plus</b>	<b>06830045</b>	●	-	-	●	-
<b>TESA-Scope II 300V Plus</b>	<b>06830046</b>	●	-	-	-	●

Telecentric Objectives

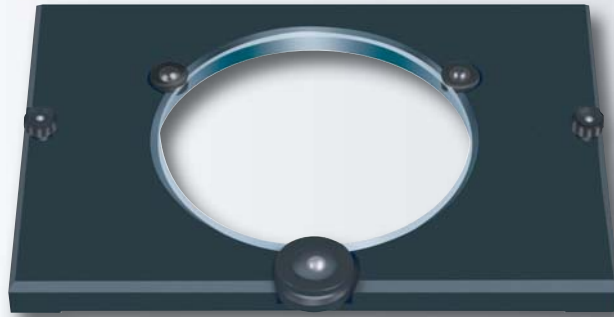
	10x	20x	25x	31,25x	50x	100x
	<b>06860001</b>	<b>06860002</b>	<b>06860003</b>	<b>06860004</b>	<b>06860005</b>	<b>06860006</b>
Object-field	30 mm	15 mm	12 mm	9,6 mm	6 mm	3 mm
working distance (W)	80 mm	82 mm	70 mm	56 mm	53 mm	43 mm
Maximum height (H)	83 mm	83 mm	83 mm	83 mm	83 mm	83 mm
Maximum Diameter (D)	166 mm	166 mm	166 mm	166 mm	166 mm	166 mm
Objective length (C)	37 mm	35 mm	47 mm	61 mm	64 mm	74 mm



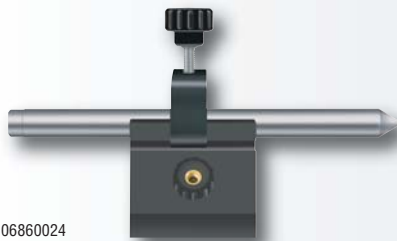


## Accessories

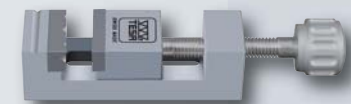
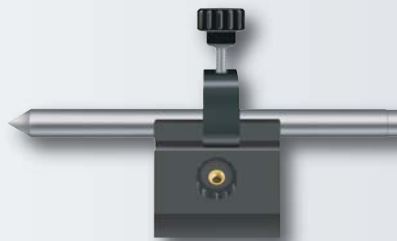
N <sup>o</sup>	=
06860015	200 x 100 mm glass plate
06860016	300 x 150 mm glass plate
06860017	300 mm diameter viewing screen with 4 overlay chart clips
06860020	Profile lamp, 24 V – 150 W
06860021	Surface lamp, 24 V – 200 W
06860022	150 mm dia. rotary table. Used with the 200 x 100 mm measuring table.
06860029	150 mm dia. rotary table. Used with the 300 x 150 mm measuring table.
06860024	V-blocks and centres
06860025	Vise stage
06860027	TESA practice piece
06860060	90 mm rotary table. Used with the 200 x 100 mm measuring table.
06860061	90 mm rotary table. Used with the 300 x 150 mm measuring table.
06869055	Measuring foil, type RA, for radius, circle, bending radius
06869056	Measuring foil, type PO, for radius and angle
06869057	Measuring foil, type ISO M2, for thread measurement



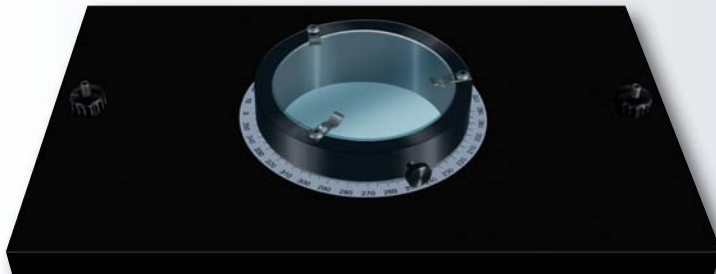
06860022/29



06860024



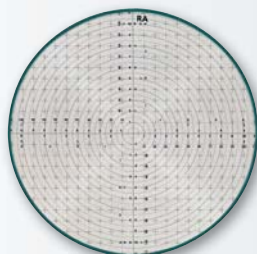
06860025



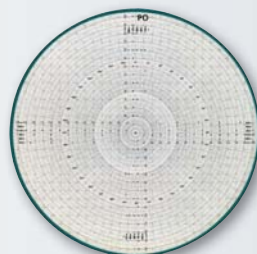
06860061



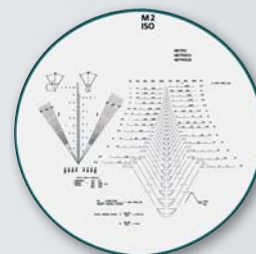
06860060



06869055



06869056



06869057



Main Part



Heavy duty all steel structure



Measuring system with incremental glass, scale, opto-electronic. Resolution 0,001 mm.



Optics precision  $\pm 0,05\%$  (profile illumination);  $\pm 0,10\%$  (surface illumination).



Focusing 80 mm



Resolution 0,001 mm



Profile illumination: 24 V / 150 W bulb. Also with thermal filter included. Surface illumination: adjustable fibre optic, 24 V / 200 W bulb. Also with thermal filter included.



10°C to 40°C



19°C to 21°C



80%, non-condensing



115 to 230 Vac  $\pm 10\%$ ; 50 to 60 Hz



110 kg



IP40



IEC 61010  
EN 60204  
EN 61326-1



Serial number



TESA Inspection report



Declaration of conformity



Provided fully mounted, but w/o objective (must be ordered separately)



Shipping packaging

## TESA-SCOPE II 355H or 355H Plus

Designed for checking round parts.



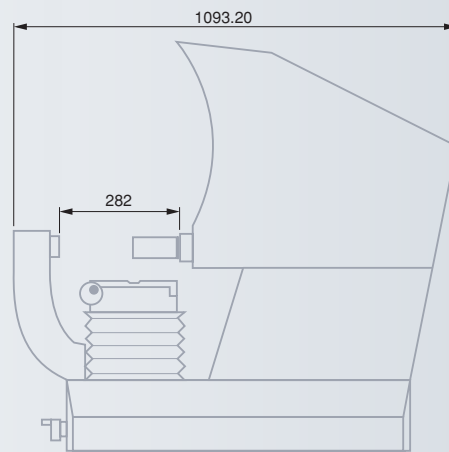
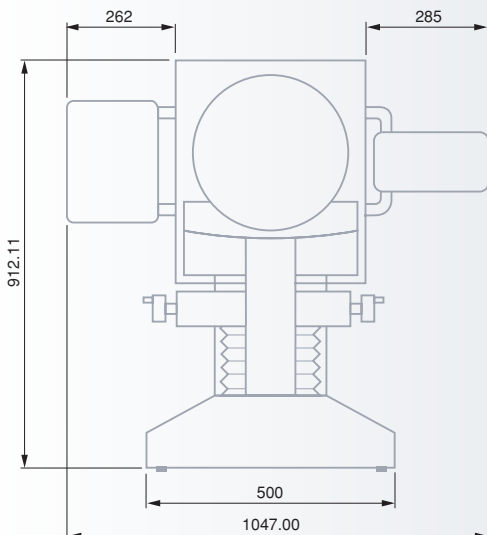
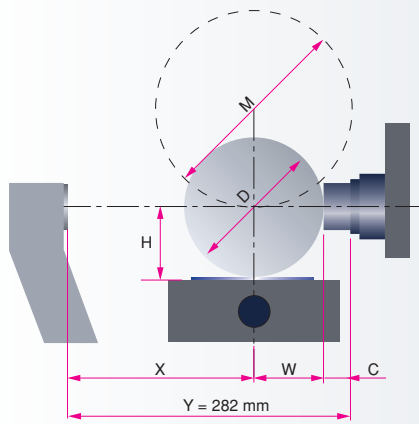
- Profile projectors with horizontal illumination.
- 360° rotary viewing screen in frosted glass, 355 mm diameter. 30°, 60° or 90° crossline reticle along with 4 overlay chart clips.
- Screen rotation with built-in sexagesimal and decimal reading, resolution in minutes – RAZ ABS/INC.
- Profile illumination with green filter included. Enhances image contrast, makes the measurement easier, reduces all effects due to the operator.
- Surface illumination through adjustable fibre optic for a perfect image projection.
- Save Lamp system for automatic shut down of the lamps whenever the projector remains unused for several minutes (thus increasing the life of the lamps by 5).
- Objectives with bayonet mount for quick exchange.
- Coordinate table equipped with incremental glass scales, opto-electronic. Resolution to 0,001 mm. Measuring span:
  - 200 x 100 for the standard model
  - 300 x 100 for the model **Plus**
  - X-axis fitted with a clutch mechanism for fast displacement.
  - Control handle for left hand and right hand operator (X-axis motion).
  - Workload capacity up to 10 kg with no loss of accuracy.
- Lateral paper sheet holder.



	Base	Measuring table		Digital Readout / Control Panel		
		X=200 mm Y=100 mm	X=300 mm Y=100 mm	TS100	TS300	TS300E
TESA-Scope II 355H	06830051	●	●	–	●	–
TESA-Scope II 355H	06830052	●	●	–	●	–
TESA-Scope II 355H	06830053	●	●	–	–	●
TESA-Scope II 355H Plus	06830054	●	–	●	●	–
TESA-Scope II 355H Plus	06830055	●	–	●	–	●
TESA-Scope II 355H Plus	06830056	●	–	●	–	●

## Telecentric Objectives

	10x	20x	25x	31,25x	50x	100x
<b>06860001</b>	<b>06860001</b>	<b>06860002</b>	<b>06860003</b>	<b>06860004</b>	<b>06860005</b>	<b>06860006</b>
Object-field	35 mm	17,5 mm	14 mm	11,2 mm	7 mm	3,5 mm
working distance (W)	80 mm	82 mm	70 mm	56 mm	53 mm	43 mm
Maximum height (H)	100 mm	100 mm	100 mm	100 mm	100 mm	100 mm
Maximum diameter (D)	200 mm	200 mm	200 mm <td 200 mm	200 mm	200 mm	
Objective length (C)	37 mm	35 mm	47 mm	61 mm	64 mm	74 mm
Max. width of component X=Y-(W+C)	165 mm	165 mm	165 mm	165 mm	165 mm	165 mm



## Small Table

- Anodized aluminium
- Table surface  
350 x 100 mm  
(X/Y)
- Measuring span  
200 x 100 mm  
(X/Y)
- In one coordinate  
direction:  
(4,5 + L/40) µm  
≤ 8 µm (L in mm)
- Max.  
workload capacity  
10 kg

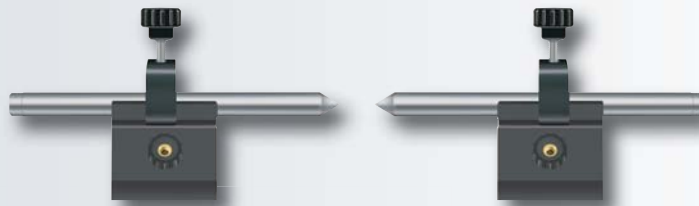
## Large Table

- Anodized aluminium
- Table surface  
440 x 100 mm  
(X/Y)
- Measuring span  
300 x 100 mm  
(X/Y)
- In one coordinate  
direction:  
± 5,0 + L/20  
(L in mm)
- Max.  
workload capacity  
10 kg

Accessories



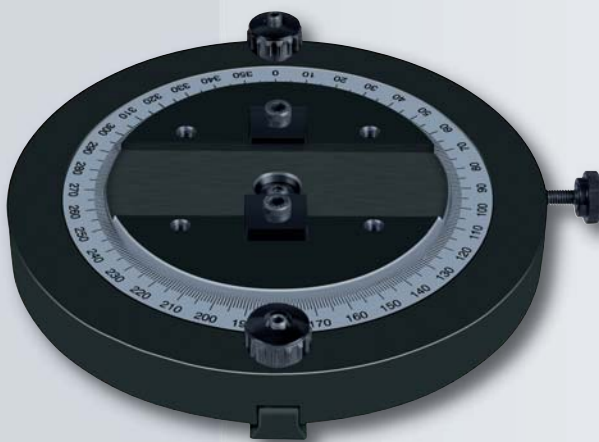
<b>06860018</b>	355 mm dia. viewing screen with 4 overlay chart clips
<b>06860020</b>	Profile lamp, 24 V – 150 W
<b>06860021</b>	Surface lamp 24 V – 200 W
<b>06860024</b>	V-blocks and centres
<b>06860025</b>	Vise stage
<b>06860026</b>	Vise stage with base
<b>06860056</b>	Rotary table for model 355H
<b>06860057</b>	Prism for rotary table N° 06860056
<b>06860058</b>	Vise for rotary table N° 06860056
<b>06860059</b>	Vertical support for glass plate



06860024



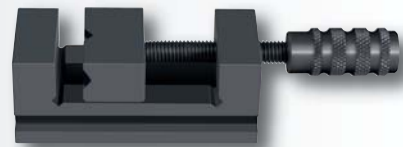
06860026 (Vise stage with base 06860025)



06860056



06860057



06860058



06860059





## TS-300 or TS-300E Control Panel

Each unit is able to run TESA-REFLEX 2D – The Reference in terms of simplicity and reliability.

- Geometric form elements
  - Point – Line – Circle
- Measuring functions
  - Alignment – Input of reference values – Translation – Rotation
- Construction features
  - Intersection – Bolt hole circle – Line
- Result output
  - Data transfer through the RS232 output
  - Possible conversion into DXF format
  - Statistical data processing etc.



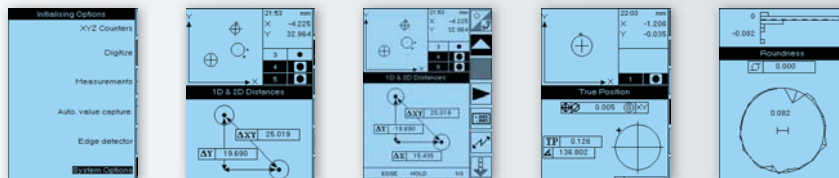
**A** 89 x 118 mm display field with illuminated background

**000** 7-decade digit display plus sign for all measured values.

Icon-based User's guidance

RS232

Shipping packaging



- |                 |   |
|-----------------|---|
| <b>06830031</b> | TS-100 Digital readout                    |
| <b>06830034</b> | TS-300 Control panel                      |
| <b>06830035</b> | TS-300-E Control panel with edge detector |



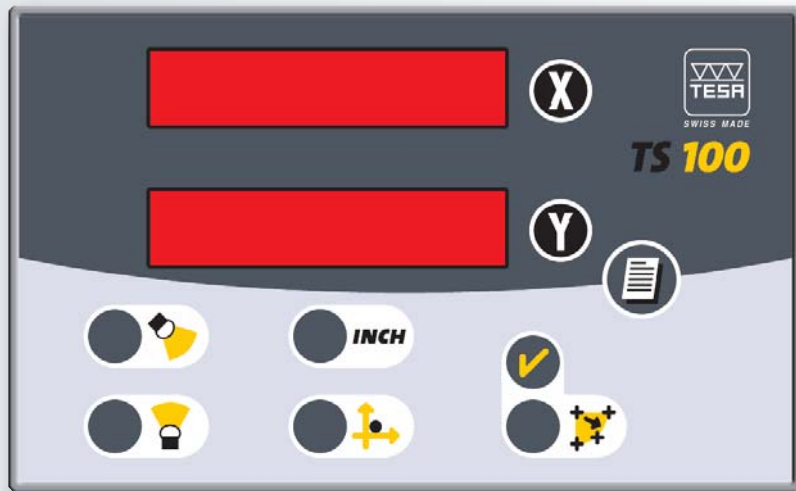


Models 355H:  
single unit



## TS-100 Digital Readout

- Numerical display (X/Y axes)
- Resolution to 0,001 mm
- Inch/metric conversion
- Separate zeroing of display in both X/Y-axes
- ABS/INC measuring mode
- Linear correction of scaling errors (X/Y-axes)
- Control option for both profile and surface illumination
- RS232 digital output (SPC Printer)



### Measuring functions

- **Diameter** 3 to 10 data points
- **Radius** 3 to 10 data points
- **Centre distance** Centre-to-centre distance of the last measured feature (radius or diameter)
- **Auto Enter** Automatic value acquisition



## Brown & Sharpe V-Blocks and Clamps

V-Blocks have a frame for clamping cylindrical parts with diameters ranging from 0,7 to 40 mm– Used for workpiece inspection or machining.



Hardened steel



Ground resting faces and vee faces



Not available as single items

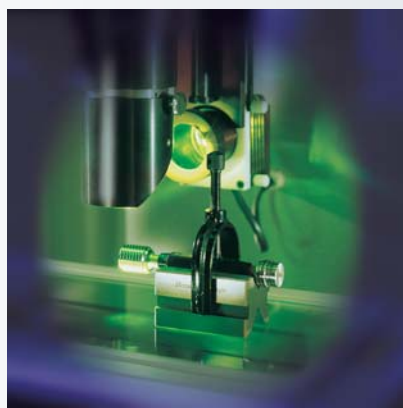


Suited plastic case



Clamping range  
mm

<b>06769007</b>	Set of Brown & Sharpe V-blocks	0,7 ÷ 40
<i>Supplied with:</i>		
	1 Pair of V-blocks	5 ÷ 40
	1 Extra V-block	3 ÷ 8
	1 Extra V-block	1,5 ÷ 5
	5 Extra V-blocks	0,7 ÷ 3,5
	2 In-between bridges	
	2 Large frames	
	1 Small frame	





Components with additives free from chlorine, fluorine or sulfur. Being non-toxic and non-polluting can be used with no special restriction



Polymerization will not occur below 10 °C

Shrinking: less than 1 µm/mm after removal of the mould  
Stability: physical properties allow to produce prints which do not deteriorate with time. They will neither be affected by surroundings – hence usable as master standards.

# PLASTIFORM

Non Destructive Control through Print Molding



The products «PLASTIFORM Soft» allow print molding of complex internal machined parts, which can then be viewed and checked using an optical, non-contact measuring equipment.

The products «PLASTIFORM with Additives» consist of two components, which have to be mixed in equal proportion to ensure a proper polymerization.

The test object to be reproduced by print molding must be perfectly clean as well as non-greasy before applying Plastiform.



## 06869122 PLASTIFORM full case

Consisting of:

- 1 DS50 injection handle
- 1 Cutter, special with two parallel blades
- 1 PLASTIN (200 g)
- 50 Mixer-Injectors
- 10 Injector end pieces
- 1 DN1 spot remover, 400 ml
- 21 Rings for mould removal
- 3 PLASTIFORM BAD 50 ml
- 3 PLASTIFORM DAV 50 ml
- 2 PLASTIFORM RGX80 50 ml



## Properties

	BAD ●	DAV ●	RGX80 ●	LKAD ●
Consistency (max 15)	Fluid (2)	Fluid (4,5)	Pasty	Malleable
Hardness (shore A)	50	20	80	70
Cut using the dual-blade cutter	easy	uneasy	easy	easy
Check				
– with contact	●	–	●	●
– without contact	●	●	●	●
– Roughness	–	–	●	–
Elasticity	flexible	highly flexible	rigid	rigid





## BAD ●

Fluid consistency best suited for moulding internal and full prints of small and medium sizes. Medium elasticity (10% of the core) allows prints to be removed in most cases. Reproduces the finest details and can be used for indirect inspection of the surface finish by sight comparison with use of master roughness specimens. Easily cut with the special cutter.

## DAV ●

Fluid consistency best suited for moulding internal and full prints of small and medium sizes. High elasticity (20% of the core) allows hard prints to be removed such as large re-entrant angle, groove, complex internal shape. Reproduces fine details. Uneasy to cut with a cutter. Print will be preferably checked as a whole.

## RGX80 ●

RGX80 is the hardest product of the cartridge range. Pasty consistency best suited for moulding whole internal prints having varying sizes. Weak stretching property and elasticity make it appropriate for easily removable moulding prints.

## LKAD ●

Malleable consistency best suited for moulding internal, external and sectorial prints of small and medium sizes. Applied by hand. Low elasticity (from 1 to 2% of the core) makes it convenient for moulding prints that are removed with ease. Also appropriate for prints held mechanically if desired. Easily cut with the cutter.



## Accessories



<b>06869101</b>	BAD PLASTIFORM, 8 double cartridges, 50 ml
<b>06869102</b>	DAV PLASTIFORM, 8 double cartridges, 50 ml
<b>06869119</b>	PLASTIFORM Test Kit BAD 10 double cartridges of 5 ml + 15 mixer-injectors + 2 rings for mould removal
<b>06869120</b>	PLASTIFORM Test Kit DAV 10 double cartridges of 5 ml + 15 mixer-injectors + 2 rings for mould removal
<b>06869118</b>	RGX80 PLASTIFORM S50, 8 double cartridges, 50 ml
<b>06869121</b>	LKAD PLASTIFORM in packs of 2 boxes, 750 g each
<b>06869106</b>	Mixer-injectors in packs of 50
<b>06869107</b>	Mixer-injectors in packs of 100
<b>06869108</b>	Mixer-injectors in packs of 200
<b>06869109</b>	Injector nozzles in packs of 20
<b>06869110</b>	PLASTIN (200 g). Malleable under normal conditions. Used to make «stops» or «retainers» when executing sectorial prints. Reusable.
<b>06869111</b>	Cutter, special with two parallel blades spaced 1 mm apart over a usable length of 60 mm.
<b>06869112</b>	DS 50 injection handle
<b>06869113</b>	DN1 spot remover, aerosol can, 400 ml

# Coordinate Measuring Machines





# TESA MICRO-HITE 3D – THE WAY TO ACCESS 3D MEASUREMENT

Made to provide Users with absolute ease of use, the TESA MICRO-HITE 3D fills up opportunely the free space between the common gauge and the sophisticated CMM. This measuring machine with remarkable capabilities is best used in industrial applications where dimensional conformity of workpieces either produced as single parts or in small to medium part series requires due approval.

Featuring a modern, yet time-tested design, the machine is based on high quality raw materials and components, thus ensuring its long-term reliability. Being able to identify the shape of the part feature being measured, the intuitive TESA-REFLEX software is easily learn, taking a few hours only.

Launched six years ago, the manual version continues to be a success since then. Three additional versions have been made available meanwhile, all equipped with the TESA-REFLEX software:

- **Standard** machine version with manual displacement.
- **Remote Control** version with manual or motorised displacement.
- **Recorder** version with manual and/or automatic reproduction of part programmes.



## Common Features

- CMM with moving bridge; light alloy machine base; granite measuring table.
- 22 air bearings ensuring frictionless motion.
- Triangular-shaped bridge guaranteeing high stability.
- TESA's patented opto-electronic measuring system based on incremental glass scales.



	MH3D 454	MH3D 474	MH3D 454 Remote Control	MH3D 474 Remote Control	MH3D 454 Recorder
Fine adjust device	●	●	●	●	–
Displacement	Manual	Manual	Manual/Motorised	Manual/Motorised	Manual/Automated
Measuring volume (mm)	460 x 510 x 420	460 x 710 x 420	460 x 510 x 420	460 x 710 x 420	440 x 490 x 390
MPE <sub>E</sub> (µm) (L in mm)	3 + 4 L/1000	3 + 4 L/1000	3 + 4 L/1000	3 + 4 L/1000	Manual: 3 + 4 L/1000 Auto: 2,5 + 3,9 L/1000
Overall dimensions (machine) L x P x H (mm)	970 x 930 x 1620	970 x 1130 x 1660	970 x 930 x 1700	970 x 1130 x 1730	1030 x 1100 x 1680
Shipping box L x P x H (cm)	115 x 110 x 220	140 x 158 x 220	135 x 135 x 220	140 x 158 x 220	135 x 135 x 220
Gross weight (kg)	300	445	300	445	350
Net weight (kg) incl. granite table	210	315	210	315	225
Software	TESA-REFLEX MH3D	TESA-REFLEX MH3D	TESA-REFLEX MH3D	TESA-REFLEX MH3D	TESA-REFLEX Recorder
Remote control	–	–	●	●	Optional
Warranty	1 year	1 year	1 year	1 year	1 year
Maintenance agreement	On request	On request	On request	On request	On request







## TWO PROGRAMME VERSIONS

The TESA-REFLEX software is the reference for user-friendliness and reliability. Easy and quick to learn and to run, it lets Users choose between a large number of options:

- Several modes: measuring, scanning, pass-through.
- Summon and save part programmes.
- Qualification of several probe positions.
- Different ways to save the measurement results: USB stick, RS232 digital output or printer.
- Automated operation (TESA-REFLEX Recorder only).

Two software versions are available, depending on the used CMM:

- **TESA-REFLEX MH3D** for the Micro-Hite 3D.
- **TESA-REFLEX Recorder** for the Micro-Hite 3D Recorder.



## THREE MANUALLY OPERATED PROBE HEADS

All TESA CMM's can accept 3 different manual probe heads to offer the solution that meets each User's need. Each probe head is available from the TESASTAR dedicated programme that also includes a full range of touch-trigger probes besides high precision SWISS MADE accessories fitting any type of CNC hand-operated measuring machines.

(For a detailed information on these probe heads, see page Q-10).



TESASTAR

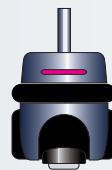


TESASTAR-i

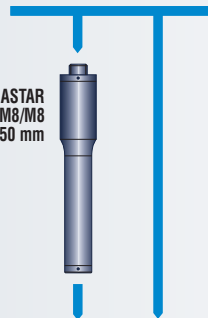


TESASTAR-i M8

TESASTAR-i M8



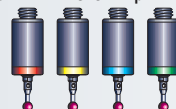
TESASTAR  
M8/M8  
50 mm



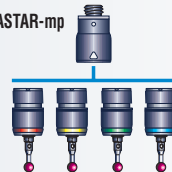
TESASTAR-rp



TESASTAR-p



TESASTAR-mp



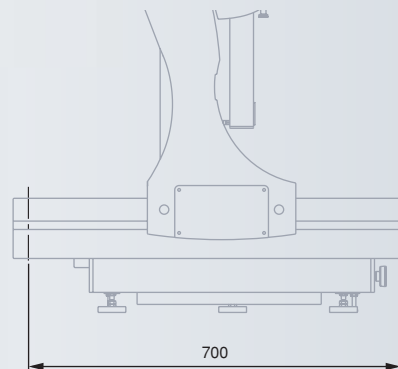
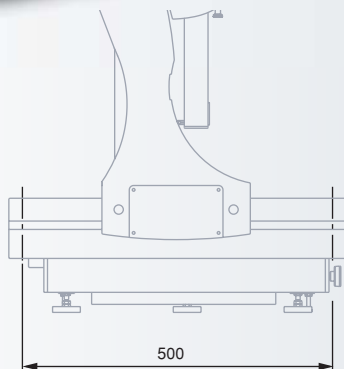


# TESA Micro-Hite 3D manual Machine Version 454 or 474

- Fast and easy workpiece alignment.
- Point-to-point part probing or manual scanning.
- ZMouse for significant time savings.
- Fine adjust device.
- TESA-REFLEX MH3D software.

## Main Features

- Three probe heads are available:
  - TESASTAR with adjustable trigger force
  - Indexable TESASTAR-i
  - Indexable TESASTAR-i M8 with matching coupling thread (optional)



### General

- ✓
- EN ISO 10360-2
- CMM with moving bridge.
- Measuring systems along with air bearing guiding in the three axes.
- Measuring volume (X/Y/Z):  
Machine version 454 460 x 510 x 420 mm  
Machine version 474 460 x 710 x 420 mm
- TESA-REFLEX MH3D:  
0,001 mm or 0.00001 in
- Manual or motorised (RC version only)
- Light alloy machine base; measuring table in granite.
- Opto-electronic measuring systems based on incremental glass scales
- 0,039 µm (system)
- Manual version: 760 mm/sec.  
RC version: 1 µm/pas, 10 or 20 mm/sec.
- TESA-REFLEX MH3D Control Panel**
- 154 x 116 mm display field with illuminated background
- 7-decade display (digits) plus sign for the measured values. Icon-based graphic User's interface .
- RS232
- $MPE_E^* = (3 + 4 L/1000) \mu m$   
 $MPE_P = 3 \mu m$   
\* L in mm



**Workpiece-oriented features**

Overall dimensions: (W x D x H):  
 Machine version 454  
 600 x 750 x 430 mm  
 Machine version 474  
 600 x 990 x 430 mm

Maximum weight:  
 Versions 454: 227 kg  
 Versions 474: 200 kg

**CMM-oriented features**

Mass (W x D x H):  
 Machine version 454, manual  
 970 x 930 x 1620 mm  
 Machine version 474, manual  
 970 x 1130 x 1660 mm  
 Machine version 474, RC  
 970 x 930 x 1700 mm  
 Machine version 474, RC  
 970 x 1130 x 1730 mm

Net weight:  
 Versions 454/474  
 = 210/315 kg (granite tables included).  
 Tables alone: 99/120 kg.  
 Gross weight: 300/445 kg.

Air pressure:  
 3,9 bars  
 (60 à 120 psi).  
 Air absorption:  
 60 NI/min.

115 to 230 Vac  
 ± 10%,  
 50 to 60 Hz

20° ±1°C

13°C to 35°C



Shipping box (W x D x H):  
 Version 454, manual  
 1100 x 1150 x 2200 mm  
 Version 454, RC  
 1350 x 1350 x 2200 mm  
 Versions 474, manual + RC  
 1580 x 1400 x 2200 mm

Inspection report

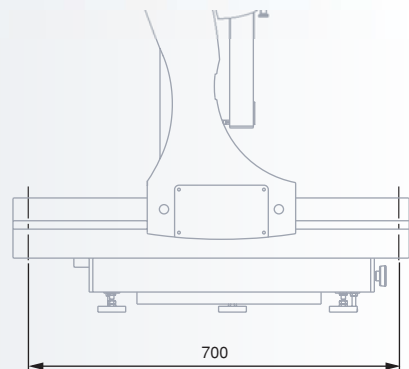
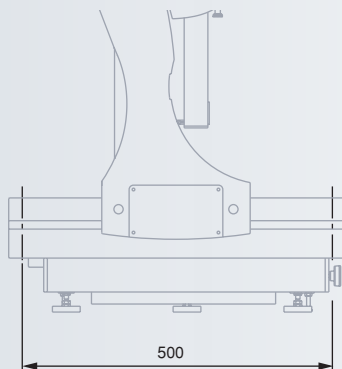
# TESA Micro-Hite 3D 454 or 474, Remote Control Machine Version

A well-timed addition to the existing range of TESA small CMMs for exact positioning on small workpieces having a complex shape – Three servo-motors individually controlled over a joystick ensure a correct displacement in each coordinate axis with a positioning accuracy down to the micron – Manual displacement through the fine adjust option – Value acquisition through a single button – Specially recommended for those vision based applications using a CCD camera.



**Main Features**

- Motorised displacement in the three axes X/Y/Z at a selectable speed of 1 µm/step, 10 mm/sec. or 20 mm/sec.
- Manual displacement in the three coordinate axes at the speed of 760 mm/sec.
- Fine adjust device.
- TESASTAR-i probe head, indexable.
- TESA Reflex software learned in a few hours.
- Joystick with integrated ZMouse.



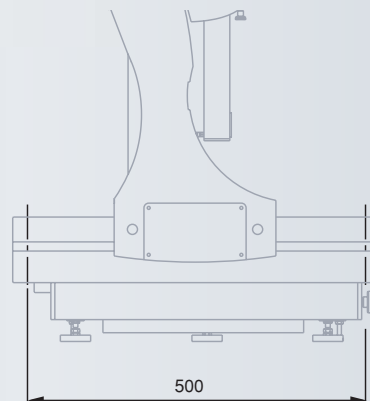
## TESA Micro-Hite 3D 454, Recorder Machine Version

The Recorder coordinate measuring machine is the latest development in the whole range of small TESA MICRO-HITE 3D. An added functionality makes it possible for the operator to control the servomotors in the three coordinate axes, but also to reproduce a programme sequence of the machine displacements in the automatic mode. Each displacement can either be operated manually or using the joystick. No preliminary programming is needed.

Through the evolution of their manual CMM, TESA provide today a flexible and user-friendly machine version for hand-operated and/or automated measurements.

### Main Features

- Fast and easy workpiece alignment.
- Point-to-point part probing or manual scanning.
- ZMouse for significant time savings.
- Manual displacement in the 3 coordinate axes.
- Automatic reproduction of the manual machine displacement.
- Displacement speed in automatic mode: 200 mm/sec.
- TESA-REFLEX Recorder application software.
- TESASTAR-i indexable probe head.



### General



EN ISO 10360-2



CMM with moving bridge.  
Measuring systems along with air bearing guiding in the three axes.



Measuring volume (X/Y/Z):  
440 x 490 x 390 mm



TESA-REFLEX Recorder:  
0,001 mm or 0.00001 in



Manual probing movements.  
Manual or motorised execution of a part programme.



Light alloy machine base; granite measuring table.



Opto-electronic measuring systems based on incremental glass scales



0,039  $\mu\text{m}$  (system)



Manual version: 760 mm/sec.  
Motorised version: 200 mm/sec.

### TESA-REFLEX Recorder Control Panel



154 x 116 mm display field with illuminated background



7-decade display (digits) plus sign for the measured values.  
Icon-based graphical User interface.



RS232



Manual mode:  
 $MPE_E^* = (3 + 4 L/1000) \mu\text{m}$

$MPE_p = 3 \mu\text{m}$

Motorised mode:

$MPE_E^* = (2,5 + 3,9 L/1000) \mu\text{m}$

$MPE_p = 2 \mu\text{m}$

\* L in mm

Additional technical Data on the page opposite.

**Workpiece-oriented features**

Overall dimensions: (W x D x H): 600 x 750 x 430 mm

Maximum weight: 227 kg

**CMM-oriented features**

Mass (W x P x H): 1030 x 1100 x 1680 mm

Net weight: 225 kg (granite table included).  
Table alone: 99 kg.  
Gross weight: 350 kg

Air pressure: 3,9 bars (60 à 120 psi).  
Air absorption: 60 NI/min.

115 to 230 Vac ±10%, 50 to 60 Hz.  
Air absorption: 0,3 to 0,7 A

20°C ±1°C

13°C to 35°C



Shipping box (W x D x H): 1350 x 1350 x 2200 mm

Inspection report

EN ISO 10360-2

**Sales programme**

	Machine version	03939042		03939242		03939043		03939243		03939120		03939122		03939169	
		MH3D F	MH3D F	MH3D Fi	MH3D Fi	MH3D RC	MH3D RC	MH3D RC	MH3D RC	MH3D Recorder	MH3D Recorder				
	Machine type	454	474	454	474	454	474	454	474	454	474	454	474	454	474
<i>Consisting of:</i>															
	Fine adjust device	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>03939020</b>	TESASTAR probe head	●	●	—	—	—	—	—	—	—	—	—	—	—	—
<b>03939030</b>	TESASTAR-i probe head	—	—	●	●	●	●	●	●	●	●	●	●	●	●
<b>03969040</b>	M3 probe styli kit	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>03960381</b>	TESA REFLEX MH3D Control panel plus software	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>03960303</b>	TESA REFLEX Recorder Control panel plus software	—	—	—	—	—	—	—	—	—	—	—	—	—	●
<b>03969011</b>	Reference sphere	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>82-703-1</b>	Granite table	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>049746</b>	Air filter and regulator	●	●	●	●	●	●	●	●	●	●	●	●	●	●
<b>052283</b>	Joystick (RC version)	—	—	—	—	—	—	●	●	●	●	—	—	—	—
<b>M1604.6011</b>	Joystick (Recorder version)	●	—	—	—	—	—	—	—	—	—	—	—	—	—
<b>01962003</b>	USB-Stick	●	●	●	●	●	●	●	●	●	●	●	●	●	●

**Optional Accessories for Manual CMMs**

No	Description
<b>03939020</b>	TESASTAR probe head
<b>03939030</b>	TESASTAR-i probe head
<b>03939031</b>	TESASTAR-i M8 probe head
<b>03969009</b>	ReflexScan software
<b>03969007</b>	RS232 connecting cable
<b>03960309</b>	RS232 adapter cable for TESA-REFLEX Recorder control panel
<b>03969001</b>	Cabinet with top mounted table
<b>03939170</b>	TESASTAR-mp touch-trigger probe LF, 0,055 N, L = 10 mm
<b>03939171</b>	TESASTAR-mp touch-trigger probe SF, 0,08 N, L = 10 mm
<b>03939172</b>	TESASTAR-mp touch-trigger probe MF, 0,10 N, L = 25 mm
<b>03939173</b>	TESASTAR-mp touch-trigger probe EF, 0,10 N, L = 50 mm
<b>03939174</b>	TESASTAR-mp probe body
<b>03960175</b>	Air saver
<b>03939210</b>	TESASTAR-mp probe kit (2 TESASTAR-mp probes, type SF + 1 TESASTAR-mp probe body)
<b>82-1631</b>	TESA practice piece
<b>03969095</b>	Hexagon practice piece
<b>03969003</b>	Dust cover
<b>03969040</b>	M3 styli kit
<b>03960223</b>	Camera kit with cross line generator included
<b>03969047</b>	Straight probe, Ø 6,35 mm





## TESA MULTI-GAGE

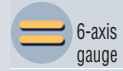
Portable 6-axis gauge that offers a flexible solution for multi-axis inspection. Expanding money in this versatile, high accuracy gauge is rapidly profitable. The TESA MULTI-GAGE is well suited for checking complex workpieces. No need to be an expert in metrology. Its software is easy to learn and to understand.

### Main Features

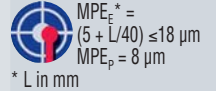
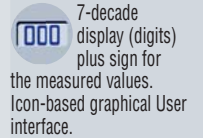
- No special on-site installation needed.
- Easy to use, quick to learn.
- Intuitive operation.
- Modular design with many interchangeable accessories.



### General



### TESA-REFLEX MULTI-GAGE control panel



Additional technical Data on opposite page.



03820000



TESA MULTIGAGE

Furnished with:

03862000 TESA-REFLEX MULTI-GAGE control panel and software


03860068 Straight probe in stainless steel, Ø 15 mm

03860069 Straight probe with a ruby ball tip, Ø 6 mm



03860032 Reference sphere with calibration certificate, Ø 25,4 mm



## Gauge-oriented additional features

-  12,85 kg
-  100 to 240 Vac  
50 to 60 Hz  
1,5 A max.
-  3 h
-  20°C ±3,3°C
-  0°C to 50°C
-  -30°C to +70°C
-  ≤ 80%,  
non-condensing
-  ✓
-  Travel case  
(L x D x H):  
1000 x 850 x 600 mm
-  Inspection report

## Accessories for TESA MULTI-GAGE

	
<b>03860067</b>	TTP probe holder, already programmed for use with a M2 probe stylus fitted with a ruby ball tip, L = 20 mm, 3 mm dia.
<b>03860068</b>	Straight reference probe, steel ball tip, L = 50 mm, 15 mm dia.
<b>03860069</b>	Straight probe, ruby ball tip, L = 50 mm, 6 mm dia.
<b>03860070</b>	Straight probe, ruby ball tip, L = 50 mm, 3 mm dia.
<b>03860096</b>	Straight probe, ruby ball tip, L = 50 mm, 2 mm dia.
<b>050667</b>	TKJ tightening key
<b>03860036</b>	Probe kit
<b>03939350</b>	TESASTAR-rp touch-trigger probe
<b>03939072</b>	TESASTAR-p touch trigger probe MF
<b>03860051</b>	Magnet set (3 items)
<b>03860049</b>	WiFi option



All probe heads and touch trigger probes from the TESASTAR range, compatible with the TESA-VISIO vision machines, TESA MICRO-HITE CMMs and TESA MULTI-GAGE 6-axis gauge are shown on the pages that follow.

For a further information on the full range, including every motorised probe head and the automatic probe changer for CNC measuring machines, see in the catalogue containing all HEXAGON Metrology Sensors or visit our website at [www.tesastar.com](http://www.tesastar.com).



03939020

### TESASTAR Probe Head

Ideally suited for use on small-sized coordinate measuring machines – Its excellent price/performance relationship is a contributing factor for this compact and cost-effective probe head with adjustable trigger force.

#### Key Features

- High-precision probe head with adjustable triggering force.
- Tilting in one coordinate direction.



03939030

### TESASTAR-i and TESASTAR-i M8 Probe Heads

Each model emanates from the latest TESASTAR concept based on a probe head coupled with a touch trigger probe. Their indexing by increment of 15° in two coordinate axes makes it possible for the stylus to be redirected in a number of positions as high as 168. Touch triggering is generated by the built-in sensor with a repeatability guaranteeing highly accurate measurements. The operator is constantly informed about the angular probe position. Also with single-handed release.

TESASTAR-i M8 can be fitted with any type of accessories featuring a M8 coupling thread, especially:

- every TESASTAR-mp for quick swapping of the probe modules;
- the TESASTAR-rp for measuring applications requiring the use of long styli up to 100 mm;
- the probe extension with a length 50 mm.



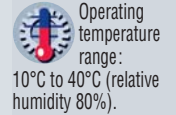
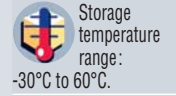
03939031

#### Main Features

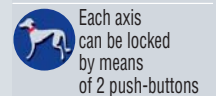
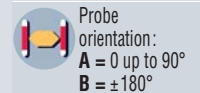
- High-precision, indexable probe head.
- Touch probe with adjustable triggering force.
- Excellent positional repeatability. No need for in-between requalification.
- Indexing capability through to 168 positions by increment of 15°.
- Clearly visible indexation.

### TESASTAR, TESASTAR-i, TESASTAR-m Probe Heads

No								
		Unidirectional	µm				Positions	Positioning
03939020	TESASTAR	≤ 0,75	–	0,1 ÷ 0,3 N	M3	–	–	manual
03939030	TESASTAR-i	≤ 0,35	≤ 1,5	0,1 ÷ 0,3 N	M3	15°	168	manual
03939031	TESASTAR-i M8	–	≤ 1,5	–	M8	15°	168	manual



#### TESASTAR-i





TESASTAR-p  
M2 thread  
TESASTAR-rp  
M3 thread

TESASTAR-p  
13,2 mm  
TESASTAR-rp  
25 mm

TESASTAR-p  
L = 26,3 mm  
TESASTAR-rp  
L = 41 mm

5 directions  
±X, ±Y, +Z

TESASTAR-p  
9,5 g  
TESASTAR-rp  
43 g

600 µA  
(external supply)

Free  
stylus  
travel:  
X/Y ±14°, Z + 4 mm  
(TESASTAR-p)  
X/Y ±22°, Z + 5,5 mm  
(TESASTAR-rp)

IP50

10°C to 40°C

-10°C to 70°C

Shipping  
box

Inspection  
report with  
a declaration  
of conformity

[www.tesastar.com](http://www.tesastar.com)

## TESASTAR-p Touch Trigger Probes For Probe Heads

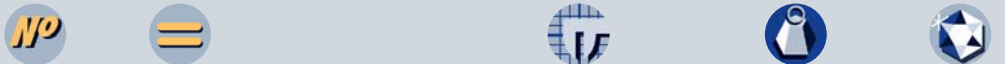
Consist of a small-size module with integrated probe and touch force triggered in 5 directions – M8 thread for coupling any existing probe head, whether manually operated or motor driven – Four models available with a trigger force varying from 0,05 up to 0,10 N.



<b>03939070</b>	TESASTAR-p LF – Low Force	0,055 N, L = 10 mm	Red	0,35 µm
<b>03939071</b>	TESASTAR-p SF – Standard Force	0,08 N, L = 10 mm	Yellow	0,35 µm
<b>03939072</b>	TESASTAR-p MF – Medium Force	0,10 N, L = 25 mm	Green	0,5 µm
<b>03939073</b>	TESASTAR-p EF – Extended Force	0,10 N, L = 50 mm	Blue	0,65 µm
<b>03939074</b>	Probe kit = 4 items			

Styli not included in the delivery scope

### Probe Extension



Probe extension with a M8 thread

<b>03969065</b>	TESASTAR M8	50 mm	25 g	ALU
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## TESASTAR-rp Robust Probe For Probe Heads

TESASTAR-rp is a complete, robust and precise touch trigger probe, which can be used on any manual or motorised CMM as well as in any manufacturing environment, even the most hostile. Adjustable triggering force for optimum efficiency according to chosen configuration for the stylus. This force also allows for the use of styli whose weight and length are above normal.



<b>03939350</b>	TESASTAR-rp	Unidirectional µm ≤ 0,35	0,1÷0,3 N	Styli length mm ≤ 100
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## TESASTAR-mp Magnetic Probes For Probe Heads

These touch trigger probes include two main parts, i.e. the stylus and the probe body. The isostatic and magnetic system coupling both parts provides a positioning repeatability that let the probe be changed either manually or automatically, without the need for requalification for the stylus.

Four models of the same size, but with a varying triggering force for optimum adaptation to the widest number of metrology applications are available.

TESASTAR-mp can be directed in 5 directions ( $\pm X$ ,  $\pm Y$ ,  $+Z$ ), no matter what the used model is.



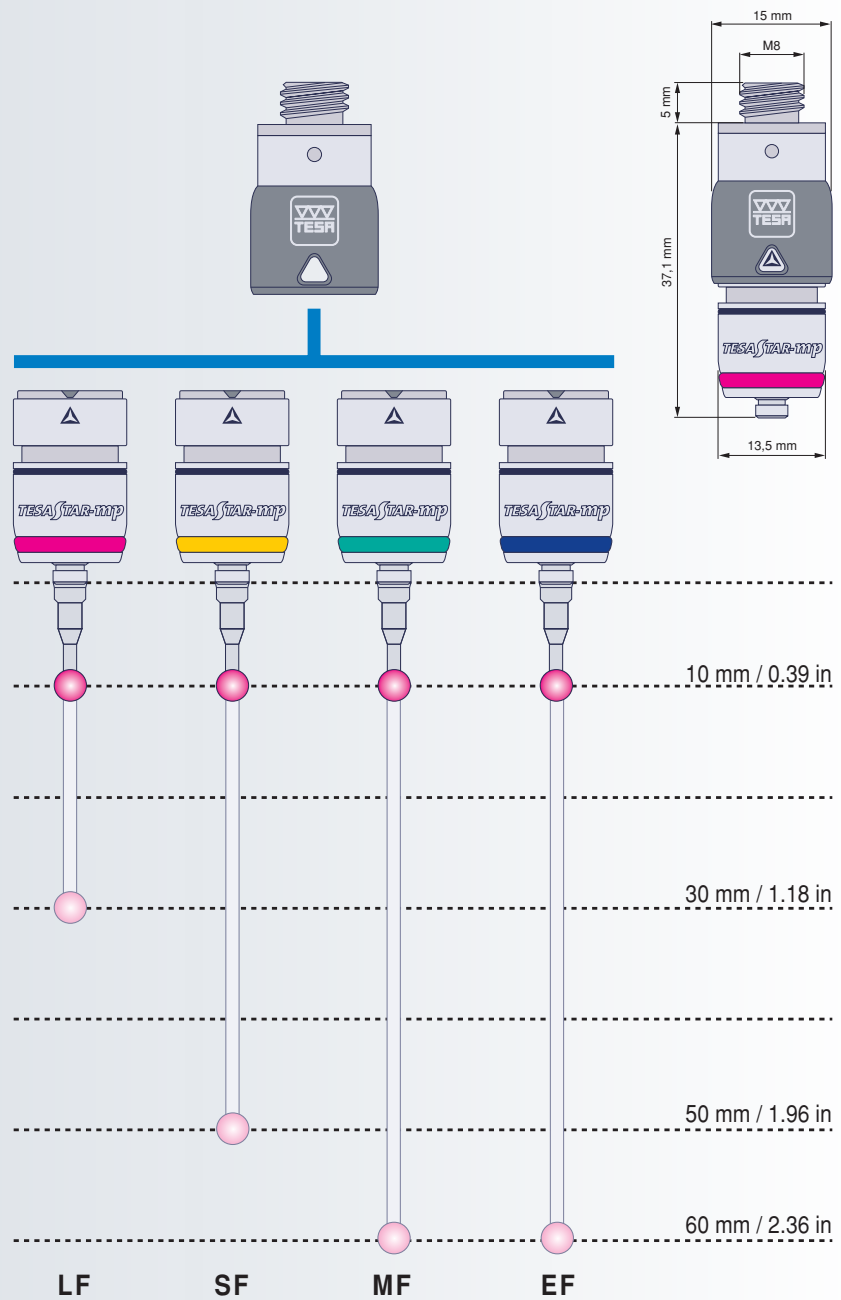
- ✓
- M8 (probe body) or M2 (stylus) coupling threads
- 15 mm
- 37,1 mm in length
- 5 directions  $\pm X$ ,  $\pm Y$ ,  $+Z$
- 13,6 g (probe body) 11 g (stylus)
- 600  $\mu A$  (external supply)
- Stylus tilting through  $X/Y \pm 14^\circ$ ,  $Z + 4$  mm
- Triggering force: 10N
- IP30
- $10^\circ C$  to  $40^\circ C$
- $-30^\circ C$  to  $60^\circ C$
- Shipping packaging
- Inspection report with a declaration of conformity
- [www.tesastar.com](http://www.tesastar.com)

03939170	TESASTAR-mp LF – Low Force	0,055 N, L = 10 mm	Red	0,35 $\mu m$
03939171	TESASTAR-mp SF – Standard Force	0,08 N, L = 10 mm	Yellow	0,35 $\mu m$
03939172	TESASTAR-mp MF – Medium Force	0,10 N, L = 25 mm	Green	0,5 $\mu m$
03939173	TESASTAR-mp EF – Extended Force	0,10 N, L = 50 mm	Blue	0,65 $\mu m$
03939174	TESASTAR-mp probe body			
03939175	Kit of 4 touch trigger probes (LF, SF, MF, EF) plus 1 TESASTAR-mp probe body			



Probe Kits

<b>03939210</b>	Probe kit including 2 items (SF, SF) + 1 TESASTAR-mp probe body
<b>03939211</b>	Probe kit including 2 items (SF, MF) + 1 TESASTAR-mp probe body
<b>03939212</b>	Probe kit including 2 items (SF, EF) + 1 TESASTAR-mp probe body
<b>03939213</b>	Probe kit including 2 items (MF, MF) + 1 TESASTAR-mp probe body
<b>03939214</b>	Probe kit including 2 items (EF, MF) + 1 TESASTAR-mp probe body
<b>03939215</b>	Probe kit including 2 items (EF, EF) + 1 TESASTAR-mp probe body
<b>03939216</b>	LF-type probe + 1 TESASTAR-mp probe body
<b>03939217</b>	SF-type probe + 1 TESASTAR-mp probe body
<b>03939218</b>	MF-type probe + 1 TESASTAR-mp probe body
<b>03939219</b>	EF-type probe + 1 TESASTAR-mp probe body



## Probe styli for probe heads



No	=	Relevant drawing	mm			g	Probe shaft	
			A	Ø	L			B
<b>1 M2 coupling thread, L = 10 mm</b>								
03969201	Stylus with ruby ball tip, 1 mm dia.	1	M2	1	10	4,5	0,3	Stainl.steel
03969202	Stylus with ruby ball tip, 2 mm dia.	1	M2	2	10	6	0,3	Stainl.steel
03969203	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	10	7,5	0,4	Stainl.steel
03969204	Stylus with ruby ball tip, 4 mm dia.	1	M2	4	10	10	0,5	Stainl.steel
03969205	Stylus with ruby ball tip, 5 mm dia.	1	M2	5	10	10	0,7	Stainl.steel
03969206	Stylus with ruby ball tip, 6 mm dia.	1	M2	6	10	10	1	Stainl.steel
03969208	Stylus with ruby ball tip, 8 mm dia.	1	M2	8	11	11	1,5	Stainl.steel
03969225	Stylus with ruby ball tip, 2,5 mm dia.	1	M2	2,5	10	6	0,3	Stainl.steel
03969268	Stylus with ruby ball tip, 0,3 mm dia.	1	M2	0,3	10	2	0,3	Carbide
03969267	Stylus with ruby ball tip, 0,7 mm dia.	1	M2	0,7	10	4	0,3	Carbide
03969220	Stylus with ruby ball tip, 0,5 mm dia.	1	M2	0,5	10	3	0,3	Carbide
<b>1 M2 coupling thread, L = 20 mm</b>								
03969212	Stylus with ruby ball tip, 2 mm dia.	1	M2	2	20	14	0,5	Stainl.steel
03969213	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	20	17	0,5	Stainl.steel
03969214	Stylus with ruby ball tip, 4 mm dia.	1	M2	4	20	20,2	0,8	Stainl.steel
03969226	Stylus with ruby ball tip, 2,5 mm dia.	1	M2	2,5	20	14	0,4	Carbide
03969272	Stylus with ruby ball tip, 1,5 mm dia.	1	M2	1,5	20	12,5	0,5	Carbide
03969271	Stylus with ruby ball tip, 1 mm dia.	1	M2	1	20	12,5	0,41	Carbide
03969269	Stylus with ruby ball tip, 0,5 mm dia.	1	M2	0,5	20	7	0,48	Carbide
03969221	Stylus with ruby ball tip, 1 mm dia.	1	M2	1	20	7	0,6	Carbide
03969222	Stylus with ruby ball tip, 2 mm dia.	1	M2	2	20	15	0,45	Carbide
<b>1 M2 coupling thread, L = 30 mm</b>								
03969259	Stylus with ruby ball tip, 12 mm dia.	1	M2	1	27	20,5	0,4	Carbide
03969262	Stylus with ruby ball tip, 2 mm dia.	1	M2	2	30	25	0,99	Carbide
03969263	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	30	25	1,49	Carbide
03969261	Stylus with ruby ball tip, 1,5 mm dia.	1	M2	1,5	30	25	0,58	Carbide
03969286	Stylus with ruby ball tip, 6 mm dia.	2	M2	6	30	30	0,96	Carbon
<b>1 M2 coupling thread, L = 40 mm</b>								
03969282	Stylus with ruby ball tip, 2 mm dia.	1	M2	2	40	35	1,29	Carbide
03969283	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	40	35	1,97	Carbide
03969284	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	40	35	2,04	Carbide
<b>1 M2 coupling thread, L = 50 mm</b>								
03969293	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	50	42,5	2,44	Carbide
03969294	Stylus with ruby ball tip, 4 mm dia.	1	M2	4	50	42,5	2,52	Carbide
03969295	Stylus with ruby ball tip, 5 mm dia.	1	M2	5	50	42,5	3,75	Carbide
03969223	Stylus with ruby ball tip, 3 mm dia.	1	M2	3	50	42,5	0,83	Ceramic
03969224	Stylus with ruby ball tip, 4 mm dia.	1	M2	4	50	42,5	0,91	Ceramic
03969260	Stylus with ruby ball tip, 4 mm dia.	2	M2	4	50	3	1	Carbon
03969276	Stylus with ruby ball tip, 6 mm dia.	2	M2	6	50	50	1,2	Carbon
03969220	Stylus with ruby ball tip, 5 mm dia.	1	M2	0,5	10	3	0,3	Carbide
<b>1 M3 coupling thread, L = 10 mm</b>								
03969324	Stylus with ruby ball tip, 3 mm dia.	–	M3	3	10	–	–	Stainl.steel
03969326	Stylus with ruby ball tip, 6 mm dia.	–	M3	6	10	–	–	Stainl.steel
<b>1 M3 coupling thread, L = 21 mm</b>								
03969301	Stylus with ruby ball tip, 1 mm dia.	1	M3	1	21	4	1,1	Stainl.steel
03969302	Stylus with ruby ball tip, 2 mm dia.	1	M3	2	21	8	1,1	Stainl.steel
03969303	Stylus with ruby ball tip, 3 mm dia.	1	M3	3	21	12	1,1	Stainl.steel
03969304	Stylus with ruby ball tip, 4 mm dia.	1	M3	4	21	17	1,4	Stainl.steel
03969305	Stylus with ruby ball tip, 5 mm dia.	1	M3	5	21	21	1,55	Stainl.steel
03969310	Stylus with ruby ball tip, 0,5 mm dia.	1	M3	0,5	21	3	1,1	Carbide
03969312	Stylus with ruby ball tip, 2 mm dia.	1	M3	2	21	15	0,8	Carbide
03969332	Stylus with ruby ball tip, 2,5 mm dia.	1	M3	2,5	21	12,5	1,3	Carbide

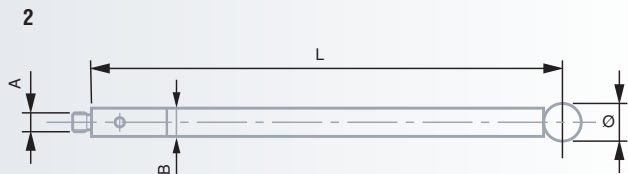
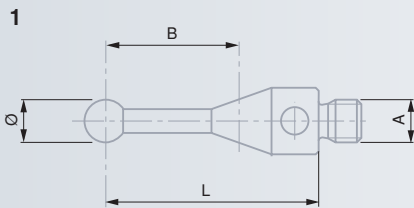




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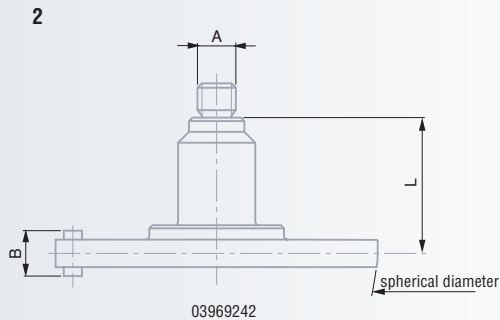
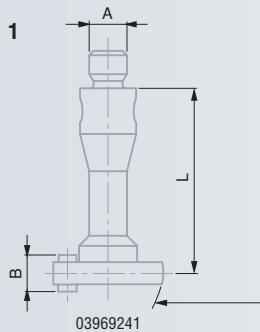
Probe styli for probe heads

No	=	Relevant drawing	mm				g	Probe shaft
			A	Ø	L	B		
<b>1 M3 coupling thread, L = 40 mm</b>								
03969343	Stylus with ruby ball tip, 3 mm dia. 1	M3	3	40	32,5	2,3	Carbide	
<b>1 M3 coupling thread, L = 50 mm</b>								
03969353	Stylus with ruby ball tip, 3 mm dia. 1	M3	3	50	42,5	2,78	Carbide	
<b>1 M4 coupling thread, L = 20 mm</b>								
03969402	Stylus with ruby ball tip, 2 mm dia. 1	M4	2	19	8	2,3	Stainl. steel	
<b>1 M4 coupling thread, L = 50 mm</b>								
03969408	Stylus with ruby ball tip, 8 mm dia. 1	M4	8	50	-	5,4	Ceramic	
<b>1 M4 coupling thread, L = 100 mm</b>								
03969418	Stylus with ruby ball tip, 8 mm dia. 1	M4	8	100	-	7	Ceramic	



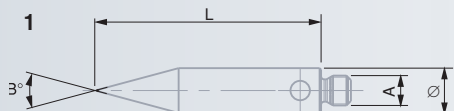
Probe styli with a probe disc

No	=	Relevant drawing	mm				g	Probe shaft
			A	Ø	L	B		
<b>1 M2 coupling thread,</b>								
03969241	Stylus with ruby ball tip, 6 mm dia. 1	M2	6	10	2	0,6	Stainl. steel	
03969242	Stylus with ruby ball tip, 18 mm dia. 1	M2	18	7,55	2,5	3,1	Carbide	
03969243	Stylus with ruby ball tip, 18 mm dia. 2	M2	18	3,7	3	2,7	Stainl. steel	



Pointer probe styli

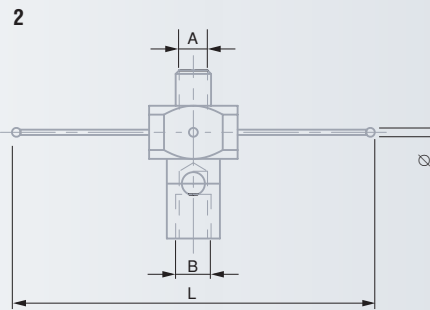
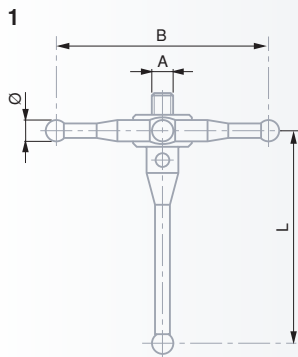
No	=	Relevant drawing	mm				g	Probe shaft
			A	Ø	L	B°		
<b>1 M2 coupling thread, L = 30 mm</b>								
03969200	Stylus with ruby ball tip, 6 mm dia. 1	M2	3	15	30	0,7	Stainl. steel	
03969141	Stylus with ruby ball tip, 18 mm dia. 1	M2	1,4	10	30	1	Carbide	





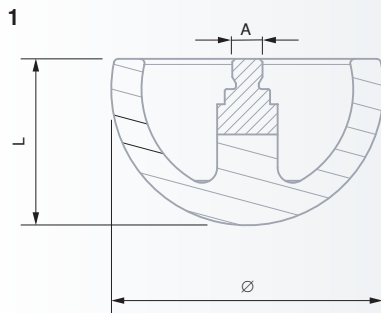
Star probe styli

№	=	Drawing	mm				g	Probe shaft
			A	∅	L	B		
<b>1 M2 coupling thread, 5-way probe styli</b>								
03969081		1	M2	2	18	20	1,3	Stainl. steel
03969055		1	M2	2	20	20	1,5	Stainl. steel
03969082		1	M2	2	18	30	1,7	Stainl. steel
03969056		1	M2	2	20	30	1,8	Stainl. steel
<b>1 M2 coupling thread, 4-way probe stylus</b>								
03969210		2	M2	0,5	20	M2	0,7	Stainl. steel
<b>1 M3 coupling thread, 5-way probe styli</b>								
03969083		1	M2	2	18	20	2,2	Stainl. steel
03969057		1	M2	2	20	20	2,2	Stainl. steel
03969084		1	M2	2	18	30	2,5	Stainl. steel
03969058		1	M2	2	20	30	2,5	Stainl. steel



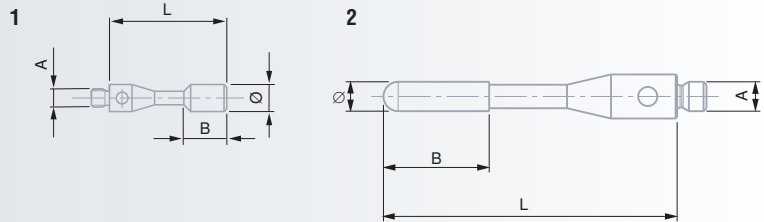
Hollow ball probe styli

№	=	Relevant drawing	mm				g	Probe shaft
			A	∅	L	B		
03969218	M2 coupling thread	1	M2	18	11	–	3,3	Ceramic
03969330	M3 coupling thread	1	M3	30	17	–	13	Ceramic



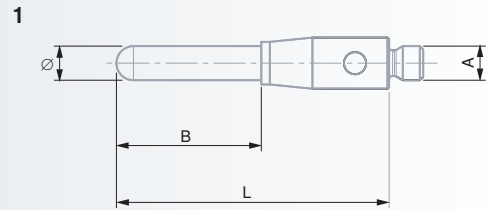
Cylindrical probe styli

№	=	Relevant drawing	mm				g	Probe shaft
			A	∅	L	B		
03969253	M2 coupling thread	1	M2	3	13	4	0,5	Stainl. steel
03969251	M2 coupling thread	1	M2	1,5	11	1,5	0,3	Stainl. steel
03969252	M2 coupling thread	1	M2	3	13	3,8	0,6	Stainl. steel
03969292	M2 coupling thread	2	M2	2	20	7,2	0,5	Carbide



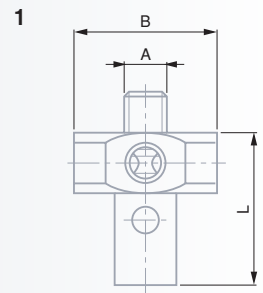
Parallel probe styli

№	=	Relevant drawing	mm				g	Probe shaft
			A	∅	L	B		
03969277	M2 coupling thread	1	M2	0,5	15,3	7,8	0,3	Carbide
03969278	M2 coupling thread	1	M2	1	35,5	29,8	0,7	Carbide
03969279	M2 coupling thread	1	M2	2	16	8,5	0,8	Carbide
03969280	M2 coupling thread	1	M2	2	40	32	2	Carbide
03969281	M2 coupling thread	1	M2	3	22,5	-	2	Carbide



Cross-shaped probe styli

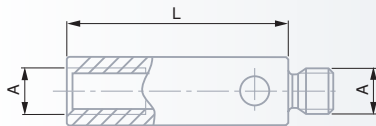
№	=	Relevant drawing	mm				g	Probe shaft
			A	∅	L	B		
03969054	M2 coupling thread, 5-way stylus	1	M2	-	7,5	7	1,1	Stainl. steel
03969046	M3 coupling thread, 5-way stylus	1	M3	-	13	10	3,7	Stainl. steel



## Probe extensions

№	=	Relevant drawing	mm			g	Probe shaft	
			A	Ø	L			
<b>1 M2 coupling thread</b>								
03969231		1	M2	–	10	–	0,5	Stainl. steel
03969232		1	M2	–	20	–	1	Stainl. steel
03969233		1	M2	–	30	–	1,6	Stainl. steel
03969230		1	M2	3	5	–	–	Stainl. steel
03969234		1	M2	3	40	–	1,8	Stainl. steel
03969247		1	M2	3	50	–	1,51	Ceramic
03969246		1	M2	3	40	–	1,22	Ceramic
03969238		1	M2	3	50	–	1	Carbon
03969239		1	M2	3	70	–	1,3	Carbon
03969240		1	M2	3	90	–	1,5	Carbon
03969270		1	M2	3	40	–	0,9	Carbon
<b>1 M3 coupling thread</b>								
03969044		1	M3	–	10	–	0,8	Stainl. steel
03969245		1	M3	–	20	–	1,8	Stainl. steel
03969320		1	M3	–	35	–	2,9	Stainl. steel
<b>1 M4 coupling thread</b>								
03969401		2	M4	7	30	–	5,1	Ceramic

1

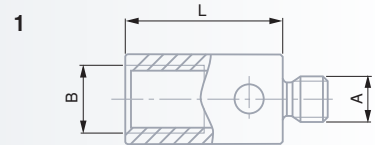


2



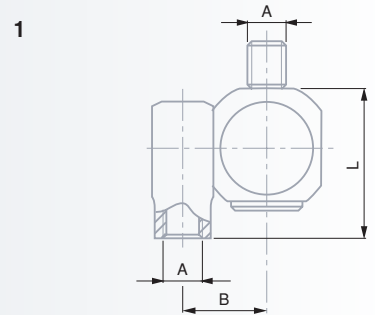
Adapters

№	=	Relevant drawing	mm		L	B	g	Probe shaft
			A	∅				
03969061	M2-M3 coupling thread,	1	M2	-	7	M3	0,5	Stainl. steel
03969062	M3-M2 coupling thread	1	M3	-	5	M2	0,5	Stainl. steel
03969403	M4-M3 coupling thread	1	M4	-	9	M3	1,4	Stainl. steel



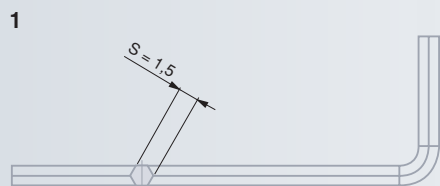
Articulations

№	=	Relevant drawing	mm		L	B	g	Probe shaft
			A	∅				
03969059	M2 coupling thread	1	M2	-	8	4,5	1,7	Stainl. steel
03969060	M3 coupling thread	1	M3	-	12	6	3,8	Stainl. steel





Additional accessories

№	=	Relevant drawing
042086	Socket head key, 1,5 mm	1
047866	Tightening key for styli, M2-M3	2
050697	Tightening key for carbon-fibre styli	3





## Styli Kits

		Probe Styli Kit 8 – M2 03969086	Probe Styli Kit 3 – M2 03969063	Probe Styli Kit 1 – M2 03969075
042086	Socket head key, 1,5 mm	–	1	–
047866	Tightening key for probe styli	2	2	2
049652	Tightening key	2	–	–
050697	Tightening key	2	–	–
03969044	M3 probe extension, L = 10 mm	–	–	–
03969045	M3 probe extension, L = 20 mm	–	–	–
03969046	5-way cross-shaped stylus, M3	–	–	–
03969047	Fixed probe, 6,35 mm dia.	–	–	–
03969054	5-way cross-shaped stylus, M2	1	–	1
03969081	5-way star probe stylus, M2	–	–	1
03969082	5-way star probe stylus, M2	1	1	–
03969059	Articulation, M2	–	1	–
03969065	M8 probe extension, L = 50 mm	–	–	–
03969066	M8 probe extension, L = 100 mm	–	–	–
03969067	M8 probe extension, L = 200 mm	–	–	–
03969078	Storage case for accessories	–	1	1
03969079	Storage case for accessories	–	–	–
03969085	Storage case for accessories	1	–	–
03969201	M2 probe stylus with a ruby ball tip, 1 mm dia.	–	1	2
03969202	M2 probe stylus with a ruby ball tip, 2 mm dia.	1	1	4
03969203	M2 probe stylus with a ruby ball tip, 3 mm dia.	–	1	2
03969204	M2 probe stylus with a ruby ball tip, 4 mm dia.	1	–	1
03969206	M2 probe stylus with a ruby ball tip, 6 mm dia.	–	–	1
03969212	M2 probe stylus with a ruby ball tip, 2 mm dia.	2	1	2
03969213	M2 probe stylus with a ruby ball tip, 3 mm dia.	2	1	2
03969214	M2 probe stylus with a ruby ball tip, 4 mm dia.	–	–	1
03969221	M2 carbide probe stylus with a ruby ball tip, 1 mm dia.	1	–	–
03969230	M2 probe extension, L = 5 mm	–	–	2
03969231	M2 probe extension, L = 10 mm	1	2	2
03969232	M2 probe extension, L = 20 mm	1	–	2
03969233	M2 probe extension, L = 30 mm	–	–	2
03969241	M2 probe stylus with a probe disc, 6 mm dia., L = 10 mm	–	1	–
03969242	M2 probe stylus with a probe disc, 18 mm dia., L = 7,55 mm	–	–	1
03969253	Cylindrical probe stylus	–	–	1
03969260	M2 carbon probe stylus with a ruby ball tip L = 50 mm	1	–	–
03969270	M2 carbon probe extension L = 40 mm	1	–	–
03969302	M3 probe stylus with a ruby ball tip, 2 mm dia.	–	–	–
03969303	M3 probe stylus with a ruby ball tip, 2 mm dia.	–	–	–
03969304	M3 probe stylus with a ruby ball tip, 2 mm dia.	–	–	–



Probe Styli Kit 7 – M2 03969076	Probe Extension Kit 03969077	Probe Accessory Kit TESASTAR 03969040	Probe Accessory Kit TESASTAR 03969101	Probe Styli Kit – M2 TESASTAR-m 03969087	Probe Styli Kit – M3 03969102
1	-	-	-	-	-
2	-	-	-	-	-
-	2	-	-	-	-
-	-	-	-	-	-
-	-	1	1	-	1
-	-	1	1	-	1
-	-	1	1	-	1
-	-	1	-	-	-
1	-	-	-	-	-
-	-	-	-	-	-
1	-	-	-	-	-
1	-	-	-	-	-
-	1	-	-	-	-
-	1	-	-	-	-
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-	-	-	-	-	-
2	-	-	-	1	-
6	-	-	-	1	-
2	-	-	-	1	-
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1	-	-	-	-	-
-	-	-	-	-	-
2	-	-	-	1	-
1	-	-	-	1	-
-	-	-	-	1	-
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-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	1	1	-	1
-	-	1	1	-	1
-	-	1	1	-	1



03969076



# TRADEMARKS REGISTERED IN SWITZERLAND AND OTHER COUNTRIES



TECHNOLOGY

**CARY**

SWISS

**compac**<sup>®</sup>

**Interapid**  
SWITZERLAND



- TESA
- TESA fig.
- CAPA  $\mu$  SYSTEM fig.
- CARY
- COMPAC
- COMPAC fig.
- COMPAC GENEVE fig.
- COMPACLOG
- DIAMASTER
- DIGICO
- DIGIT-CAL
- DIGITMASTER
- ETALON fig.
- ETALON SWITZERLAND fig.
- IMICRO
- INOTEST
- INTERAPID
- INTERAPID fig.
- ISOMASTER
- JUNIOR fig.
- MAGNA  $\mu$  SYSTEM fig.
- MESOBOR
- MICRO-HITE

- MICROMASTER
- $\mu$ HITE fig.
- POPCAL
- ROCH FRANCE fig.
- RUGOSURF fig.
- SHOP-CAL
- STANDARD GAGE fig.
- TESA DUOTAST
- TESA EAGLE fig.
- TESA-HITE
- TESA MEMO-HITE
- TESA MICRO-HITE
- TESA MULTI-GAGE
- TESA-REFLEX
- TESA STAT
- TESA SWISS SET
- TESA SWISSCAL
- TESA SWISSDIAL
- TESA SWISSLINE
- TESA SWISSTAST
- TESA-CAL
- TESADIA
- TESADIGIT

- TESAMASTER
- TESA- $\mu$ HITE fig.
- TESANORM fig.
- TESASCAN
- TESA-SCOPE
- TESASET
- TESASTAR
- TESASTAR fig.
- TESA-SWISSMASTER fig.
- TESATAST
- TESATEST
- TESATRONIC
- TESATRONIC MULTILINE
- TESA-VISIO
- TRI-O-BOR
- TRIOMATIC
- UNIMASTER
- UNITEST
- UNITEST fig.
- VALIDATOR fig.
- VERIBOR

# TRADEMARKS REGISTERED IN VARIOUS COUNTRIES

- ALESOMETRE
- ALESOTEST
- DURA-CAL

- ETALON
- JUNIOR
- MERCER

- MICROMASTER
- ROCTEST
- TESA DIGITMASTER



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# LEXICON OF PICTOGRAMS



TESA Design SWISS MADE	Height of signs/digits	Diameter	Maximum relative humidity
TESA Design – Product from the European Community	Analogue/numerical indication	Thread pitch	Degree of protection
TESA Design – Product produced outside Europe	Material measure Measuring system	Material Hardness	Electromagnetic compatibility
Product from the European Community	Capacitive measuring system «capa μ system», patented	Measuring force	Mass
Product produced outside Europe	Magnetic measuring system «magna μ system», patented	Shockproof design	Included in scope of supply
Order number	Units of measurement	Maximum displacement speed	Packaging
Standard	Metric/inch conversion	Product designation	Identification number
Measuring range Measuring span	Maximum permissible errors Limit deviations	Execution	Declaration of conformity
Range of indication Max. plunger travel	Deviation span of indication	Special features	Inspection report
Displacement range	Repeatability limit	Notes	Inspection report with a declaration of conformity
Application range	Hysteresis	Function mode	SCS calibration certificate
Analogue indication Longitudinal scale	Maximum permissible straightness error	Floating zero	Certificate of another type
Upper vernier	Maximum permissible flatness error	Blocking of display	Page
Lower vernier	Maximum permissible roundness error	Locking of display	Centred lug back
Circular scale	Maximum permissible parallelism error	Digital interface	Centred revolution counter
Dial	Maximum permissible cylindricity error	Analogue interface	Reverse numbering or +left
mm or in/revolution	Maximum permissible perpendicularity error	Control functions	Dial locking knob
Number of scale divisions	Maximum permissible runout error	Power supply	TESA
Scale spacing	Quality grade	Autonomy	MERCER
Scale interval	Uncertainty of measurement Accuracy	Coefficient of linear expansion	ETALON
Resolution Magnification	Frame	Working temperature range	ROCH
Numerical scale	Measuring face or faces	Operating temperature range	COMPAC
Numerical interval	Dimensions	Storage temperature range	HEXAGON