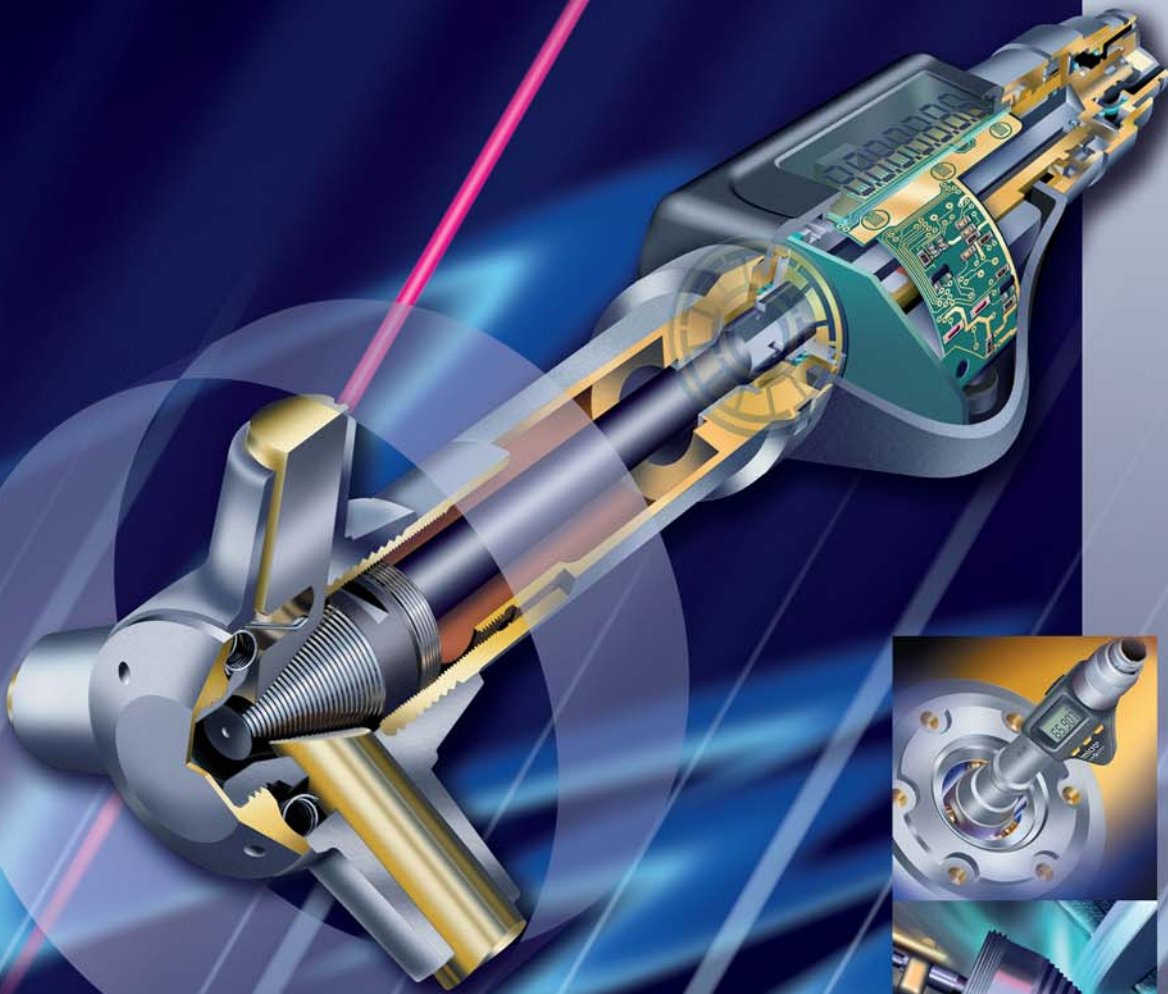


Internal Measurement

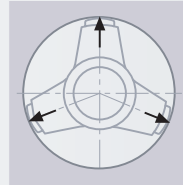


INTERNAL MEASUREMENT AND REQUIREMENTS

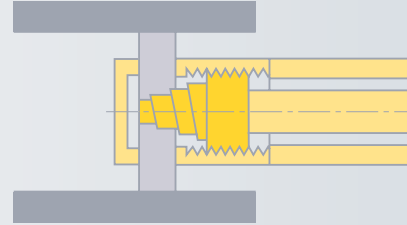
Internal measuring of bores is more demanding than external measurement of workpieces. Not only the tight tolerances given for the measuring job must be respected, but also the measuring components that have a direct influence on the uncertainty of measurement must be designed in such a way that they can enter into the bore to be checked.

Benefit of the 3-Line contact

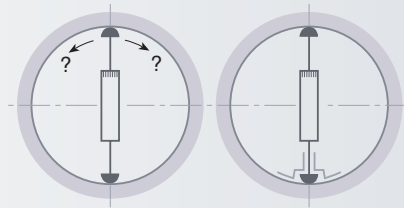
TESA IMICRO, TRI-O-BOR, ALESOMETER, ALESOTEST as well as ETALON INTALOMETER are self-centring and self-aligning internal measuring instruments that make bore measurement reliable independently of the sensitivity of the user.



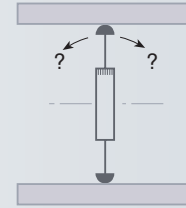
The three measuring bolts are spaced 120° apart, thus providing optimum self-centring.



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



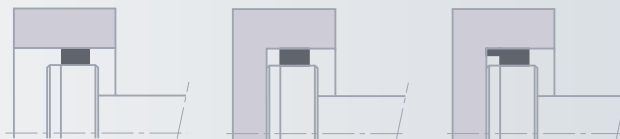
2-point contact measuring instruments are not self-centring. To make bore measurement easier, auxiliary means need additionally be used.



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

A single tool can replace hundreds of plug gauges

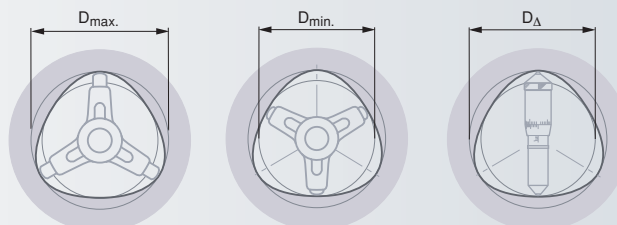
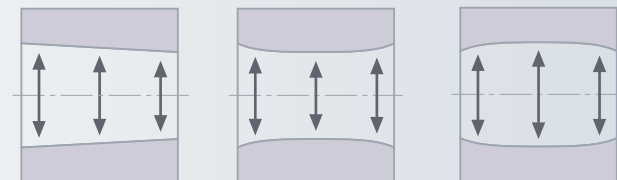
Unlike plug gauges that check only one toleranced size, a single tool can measure many diameters. Depending on the model that is being used, through holes and blind bores along with short centring shoulders can be inspected, reliably.



Establishing form errors

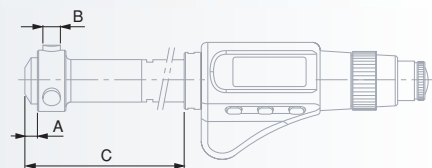
Form errors are established through measurements taken at several points within a bore. Micrometers with 3-line contact determine run-out errors in a triangular way.

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 μ system with Digital Display

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



DIN 863 T4 (Style C1)

0,001 mm
0.0005 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

No	mm		in		μ m		A mm	B mm	C mm
	mm	in	μ m	μ m					
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	5	5	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 N. Suited carrying cases on page C-10.

TESA IMICRO capa μ 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
0.0005 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	Element	Measuring heads	Setting rings	Extensions
06130230 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		
06130231 6 ÷ 12	06130011	06140024 6 ÷ 8	00840101 8	00840001 100
		06140025 8 ÷ 10	00840102 10	
		06140026 10 ÷ 12		
06130232 11 ÷ 20	06130011	06140027 11 ÷ 14	00840103 11	00840301 150
		06140028 14 ÷ 17	00840105 17	
		06140029 17 ÷ 20		
06130233 20 ÷ 40	06130011	06140030 20 ÷ 25	00840106 25	00841100 150
		06140031 25 ÷ 30	00840107 35	
		06140032 30 ÷ 35		
		06140033 35 ÷ 40		
06130234 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		
06130235 100 ÷ 200	06130012	06140040 100 ÷ 125	00840112 125	00842600 150
		06140041 125 ÷ 150	00840113 175	
		06140042 150 ÷ 175		
		06140043 175 ÷ 200		

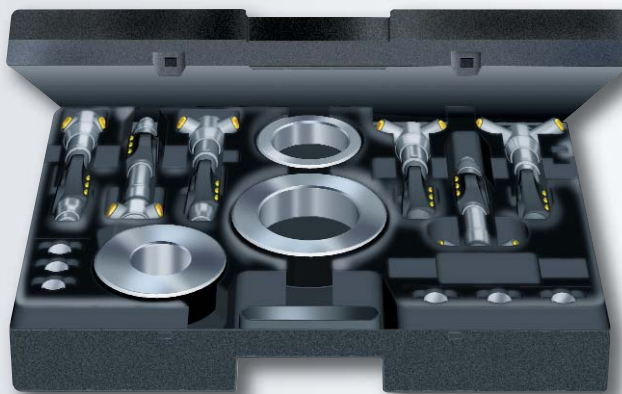
Set composition for the application range from 200 to 300 mm available upon request

Measuring Element	Measuring heads	mm
06130012	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 μ 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
0.0005 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

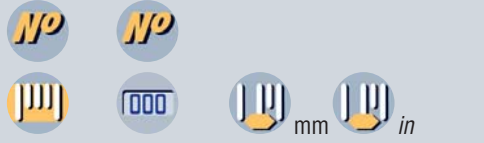
TESA's
calibration
certificate

Declaration
of conformity

Full sets including		Single micrometers		Setting rings		Extensions	
06130220	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				
06130221	6 ÷ 12	06130105	6 ÷ 8	00840101	8	00840001	100
		06130106	8 ÷ 10	00840102	10		
		06130107	10 ÷ 12				
06130222	11 ÷ 20	06130108	11 ÷ 14	00840103	11	00840301	150
		06130109	14 ÷ 17	00840105	17		
		06130110	17 ÷ 20				
06130223	20 ÷ 40	06130111	20 ÷ 25	00840106	25	00841100	150
		06130112	25 ÷ 30	00840107	35		
		06130113	30 ÷ 35				
		06130114	35 ÷ 40				
06130224	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				
06130225	100 ÷ 200	06130120	90 ÷ 100				
		06130121	100 ÷ 125	00840112	125	00842600	150
		06130122	125 ÷ 150	00840113	175		
		06130123	150 ÷ 175				
		06130124	175 ÷ 200				



Moulded Cases for Single Micrometers, Full Sets and Partial Sets



Single micrometers

-	06160002	3,5 ÷ 6,5	0.1377 ÷ 0.2559
-	06160002	6 ÷ 12	0.275 ÷ 0.50
00860007	06160002	11 ÷ 20	0.50 ÷ 0.80
00860011	06160002	20 ÷ 40	0.80 ÷ 1.60
00860015	06160003	40 ÷ 70	1.60 ÷ 2.80
00860016	06160003	70 ÷ 100	2.80 ÷ 4.0
00863013	00863013	100 ÷ 150	4.0 ÷ 6.0
00863014	00863014	150 ÷ 200	6.0 ÷ 8.0
00863016	00863016	200 ÷ 300	8.0 ÷ 12.0

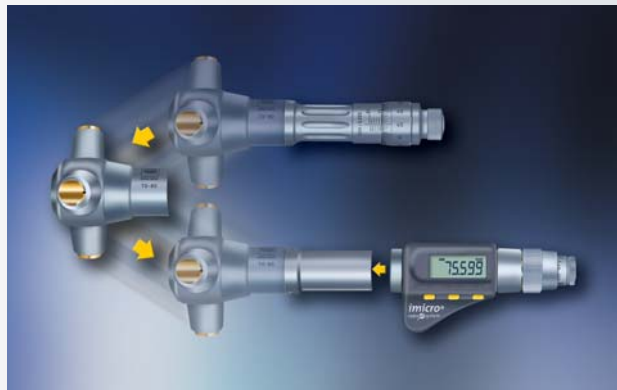


Micrometer Full and partial sets

00863035	06160006	3,5 ÷ 6,5	0.1377 ÷ 0.2559
00863005	06160005	6 ÷ 12	0.275 ÷ 0.500
00860008	06160005	11 ÷ 20	0.500 ÷ 0.800
00860012	06160006	20 ÷ 40	0.800 ÷ 1.60
00860017	06160007	40 ÷ 100	1.60 ÷ 4.0
00863017	00863017	100 ÷ 200	4.0 ÷ 8.0

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 μ system measuring element.



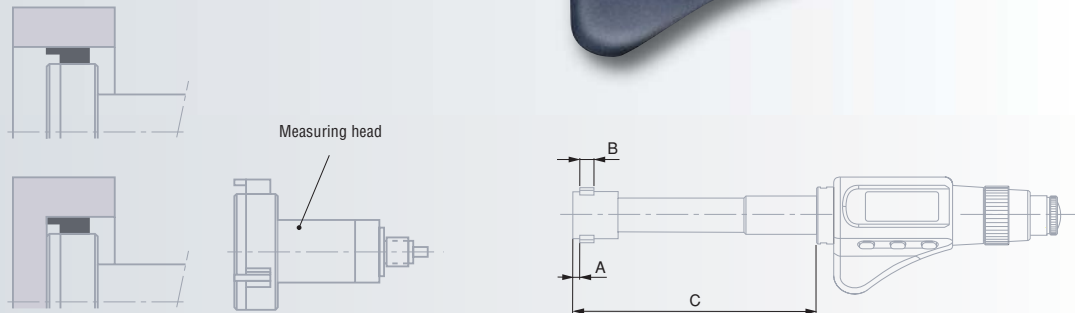
No	No	mm
Capa μ system element	Adapter	Application range
06130011		6 ÷ 100
	06140048	6 ÷ 12
	06140049	11 ÷ 20
	06140050	20 ÷ 40
	06140051	40 ÷ 100

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

TESA ALESOMETER *capa μ* system with Digital Display

Fitted with TESA patented capacitive measuring system

Bore gauges with 3-line contact. All TESA ALESOMETER are specially suited 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	Measuring range		Resolution		Dimensions		
	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	5	5	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 C-14 and C-24, or report to page C-12 for storage cases or to section N 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 measure through bores only – 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 C-11
or C-14 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
06230100	6 ÷ 10	0081720351 0081720353	6 ÷ 8 8 ÷ 10	0081620491	06230020	0211625101	8	06860001
06230110	10 ÷ 20	0081720356 0081720358 0081720360 0081720362	10 ÷ 12,5 12,5 ÷ 15 15 ÷ 17,5 17,5 ÷ 20	0081620492	06230020	0211625102 0211625103	12,5 17,5	06860001
06230111	20 ÷ 40	0081720364 0081720366 0081720368 0081720370	20 ÷ 25 25 ÷ 30 30 ÷ 35 35 ÷ 40	0081620493	06230020	0211625104 0211625105	25 35	06860001
06230112	40 ÷ 100	0081720372 0081720374 0081720376 0081720378 0081720380	40 ÷ 50 50 ÷ 60 60 ÷ 70 70 ÷ 85 85 ÷ 100	0081620494	06230020	0211625106 0211625107 0211625109	45 60 85	0081629525
<i>Set composition for application range from 100 to 300 mm available upon request</i>								
	Measuring heads	Connectors	Measuring element	Setting rings				Storage cases
	0081720382	100 ÷ 125	0081620495	06230020	0211625111	125	00863016	
	0081720384	125 ÷ 150			0211625112	150		
	0081720386	150 ÷ 175			0211625112	150		
	0081720388	175 ÷ 200			0211625113	175		
	0081720390	200 ÷ 225			0211625114	200		
	0081720392	225 ÷ 250			0211625115	225		
	0081720394	250 ÷ 275			0211625116	250		
	0081720396	275 ÷ 300			0211625117	275		

Each storage case can contain a single measuring head only.