Straightness, angles and inclination measurement

TESA TECHNOLOGY

Irrespective of whether they are spirit or electronic inclinometers, all precision levels are based on the same perfectly reliable reference but also cost-free: The centre of the earth's gravity.

Under the force of gravity, the gas bubble in the liquid or the pendulum inclines itself according to this natural physical principle. The position of the pendulum with respect to the measuring faces of the instrument body can then be measured.

Based on this perfect principle, these instruments offer a great number of measuring applications of high precision. The horizontal and vertical positioning of the measuring faces enable the detection of form errors in the geometrical elements on the workpiece to be measured.
These errors often result from deviations in straightness, flatness, position, parallelism and squareness.

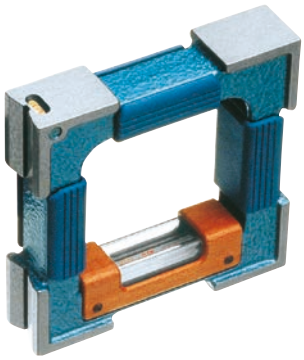
Indication of values may vary depending on the type of level, the values typically displayed are:
- Inclination (mm/m or in/10 in)
- Radian (mrad)
- Decimal angle (12,37°, for example);
- Sexagesimal angle in degrees (°), minutes (') and seconds (") (15° 30' 45" for example)

TESA precision clinometers and levels

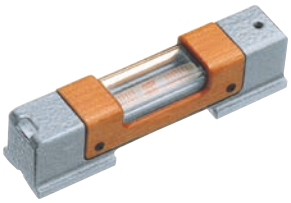
CLINOBEVEL 1 USB digital clinometer

CLINOBEVEL 3 SQUARE digital clinometer

Square spirit level with magnetic inserts



Frame spirit level



Spirit clinometer with angle protractor and micrometer element

MICRO-SQUARE Perpendicularity Gauge

Straightness, angles and inclination measurement

CLINOBEVEL 1 clinometer

• INSTRUMENT
  - Compact, lightweight, and robust
  - Reinforced anodized aluminum casing
  - Large digital display to eliminate interpretation errors
• MEASUREMENT
  - For direct (absolute) or comparative (relative) measurement
  - Measuring range of ± 45° with angle or inclination indication
• DATA MANAGEMENT
  - USB connection to the computer
  - Measurement data transfer using CLINOSOFT software
  - Automatic generation of measurement reports in Microsoft Excel

05330203

Standard	DIN 2276
Measuring range	± 45°
Max. perm. errors	2' + 1 digit
Resolution	0,020 mm/m (5'')
Material	Aluminium anodised
Dimensions	100 x 75 x 35 mm
Measuring face(s)	4 flat measuring faces
Degree of protection	IP65
Display	LCD display
Power supply	1 x 1,5 V, AA, type LRC 6 battery
Data output(s)	USB, RS-485
Function(s)	Automatic shutdown after 8 minutes Absolute zero mode Relative zero mode Display lock Memory for 21 correction values
Autonomy	≈ 150 hours
Units	DEG, mm/m, „/10", „/12", mRad, DEG/min, min/sec, mm/REL, „/REL, A%o, GON
Response time	≈ 1 s
Included in delivery	CLINOBEVEL 1 CLINOSOFT software (as per model) LRC 6 battery USB cable, L = 1,8 m (as per model) User manual Declaration of conformity SCS certificate (as per model)

Clinometers

Article number	Designation
05330203	CLINOBEVEL 1 USB + CLINOSOFT software
05330204	CLINOBEVEL 1 USB
S53220194	CLINOBEVEL 1 USB, 4 magnetic faces + CLINOSOFT software
05330205	CLINOBEVEL 1 USB + certificate SCS

Accessories

Article number	Designation
05360006	External control with cable, L = 2 m
S53300165	USB cable, L = 1,8 m

CLINOBEVEL 3 SQUARE clinometers

• INSTRUMENT
- Cast iron treated against rust
- 4 rectified mesurement faces
- Large-format digital display eliminating any interpretation errors

• MEASUREMENT
- For direct (absolute) or comparative (relative) measurement
- Measuring range of ±60° or ±1° with angle or inclination indication
- Remote measurement via smartphone with its remote display

• DATA MANAGEMENT
- A free application called «CLINOBEVEL 3» allows measurement visualization on a smartphone
- The application enables recording of measurement values in .csv format

05330220

Standard	DIN 2276
Measuring range	± 60° or ± 1°
Max. perm. errors	α = measured value T = 20 °C Model ±60°: 15″ + (0,027 % α) Model ±1°: 1% α
Material	Housing: Cast iron
Dimensions	160 x 160 x 40 mm
Measuring face(s)	V-shaped measuring faces for Ø 30 ÷ 100 mm: top left and lower side Flat measuring faces: top right and upper side
Display	Color LCD screen with high contrast 4 different background colors Various measurement display configurations, such as a bubble level or bar graph
Power supply	2 x 1,5 V, Size C, type LR14 batteries
Data output(s)	USB, RS-485
Function(s)	Display configurations Absolute zero mode Relative zero mode Display lock Configurable alarms when limits are exceeded
Autonomy	25 hours
Units	mm/m, „/10“, „/12“, mRad, mm/REL, „/REL, A%o, %o, DEG, GON
Included in delivery	CLINOBEVEL 3 SQUARE 2x calibration pins for quick calibration (05330220 and 05330222) 2x LR14 1,5 V batteries User manual Declaration of conformity SCS certificate (as per model)

Clinometers

Article number	Designation
05330220	CLINOBEVEL 3 SQUARE, 60°
05330221	CLINOBEVEL 3 SQUARE, 1°
05330222	CLINOBEVEL 3 SQUARE + SCS certificate
05330223	CLINOBEVEL 3 SQUARE + SCS certificate

Accessories

Article number	Designation
S53300166	USB cable, L = 2,5 m

NIVELTRONIC clinometers

• INSTRUMENT
  - Analog display with precision needle galvanometer
  - High zero point stability thanks to the measurement system with pendulum-type inductive sensor
• MEASUREMENT
  - For checking and aligning surfaces vertically or horizontally
  - For measuring slight inclinations

03130060

03130063

Standard	DIN 2276
Measuring range	± 0,15 mm/m or ± 0,75 mm/m
Max. perm. errors	< 0,5 x measuring range: min. 0,001 mm/m, max. 1 % of the measured value ≥ 0,5 x measuring range: max. 1 % of (2 x measured value - 0,5 x total range)
Resolution	0,05 / 0,01 mm/m
Repeatability	1 µm/m
Material	Body: Cast iron Base: Granite (horizontal model)
Dimensions	Base: 150 x 45 mm (03130063), 200 x 45 mm (03130060)
Measuring face(s)	1 flat measuring face (horizontal model) 2 V-shaped measuring faces for Ø 20 ÷ 120 mm (square model)
Display	Analog display and integrated galvanometer
Power supply	4 x 1,5 V, AAA batteries
Units	mm/m
Included in delivery	NIVELTRONIC 4x AAA, 1,5 V batteries Declaration of conformity User manual

Clinometers

Article number	Designation
03130063	NIVELTRONIC electronic clinometer, horizontal version
03130060	NIVELTRONIC electronic clinometer, square version

Accessories

Article number	Designation
03160007	Granit base 200 x 50 mm
03160008	Granit base 250 x 50 mm
03160009	Granit base 500 x 50 mm
03160048	Holder with voltage regulator (4,65 V) and 4 x AAA batteries

Spirit clinometer with angle protractor and micrometer element

05331750

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Resolution	Vial: 0,3 mm/m Micrometric screw: 1 arcmin Main scale: 1°
Material	Base: Hardened, ground steel
Dimensions	150 x 35 x 116 mm
Measuring face(s)	Flat measuring face with V-groove for Ø 17 ÷ 80 mm
Particular characteristic(s)	Longitudinal and cross vials
Included in delivery	Clinometer Declaration of conformity

Article number	Designation
05331750	Spirit clinometer with angle protractor and micrometer element

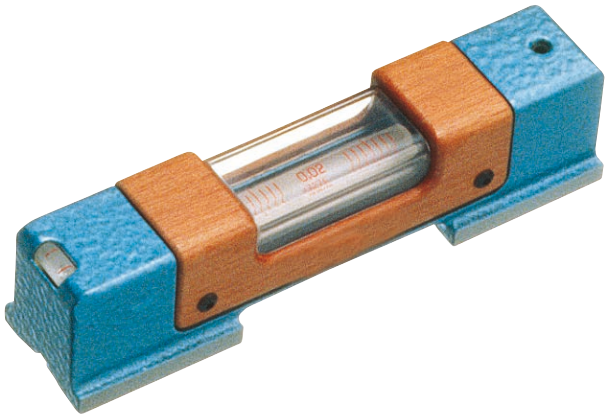
Precision spirit level

05331450

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Resolution	0,02 mm/m
Material	Hardened and ground steel
Dimensions	150 x 45 x 45 mm
Measuring face(s)	V-shaped measuring face for Ø 19 ÷ 108 mm
Function(s)	1 longitudinal vial 1 transverse vial 1 micrometer rotation = +2 mm/m Side thermal insulator
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	For shafts mm	Dimensions mm
05331450	Precision spirit level with micrometric element	0,02	Ø 19 ÷ 120	150 x 45 x 45

Precision spirit level

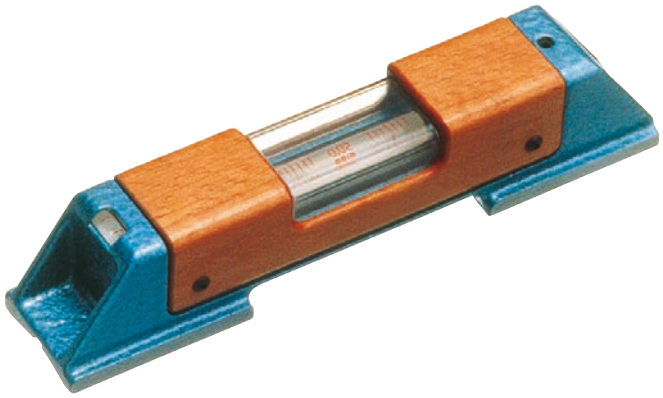


05331050

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Measuring face(s)	Flat and V-shaped measuring faces
Function(s)	1 longitudinal vial 1 transverse vial Side viewing slots Thermal insulation and protection of the vial
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	For shafts mm	Dimensions mm
05331050	Precision spirit level	0,02	Ø 17 ÷ 84	100 x 32 x 35

Precision spirit levels

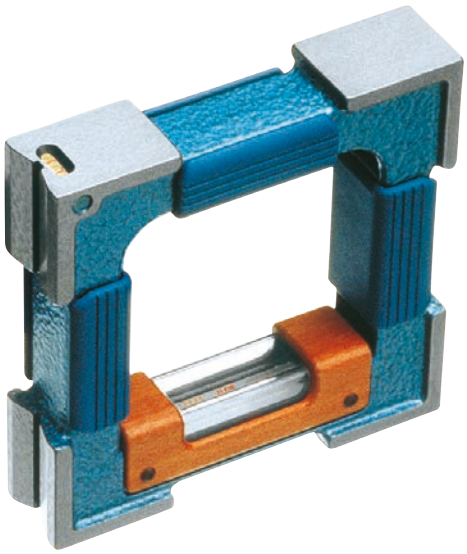


05331054

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Measuring face(s)	Flat and V-shaped measuring faces
Function(s)	1 longitudinal vial 1 transverse vial Side viewing slots Thermal insulation and protection of the vial
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	For shafts mm	Dimensions mm
05331054	Precision spirit level	0,02	Ø 17 ÷ 94	150 x 35 x 38
05331056	Precision spirit level	0,05	Ø 17 ÷ 94	150 x 35 x 38
05331058	Precision spirit level	0,02	Ø 19 ÷ 108	200 x 40 x 42
05331060	Precision spirit level	0,05	Ø 19 ÷ 108	200 x 40 x 42
05331061	Precision spirit level	0,1	Ø 19 ÷ 108	200 x 40 x 42
05331063	Precision spirit level	0,02	Ø 19 ÷ 120	250 x 45 x 42

Precision spirit levels



05331201

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Measuring face(s)	4 flat measuring surfaces: 2 faces with V-groove 2 smooth faces
Function(s)	1 longitudinal vial 1 transverse vial Side viewing slots Thermal insulation and protection of the vial
Perpendicularity	90° measuring surfaces, machined together
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	For shafts mm	Dimensions mm
05331201	Precision spirit level with frame	0,05	Ø 17 ÷ 84	100 x 100 x 32
05331202	Precision spirit level with frame	0,1	Ø 17 ÷ 84	100 x 100 x 32
05331204	Precision spirit level with frame	0,05	Ø 17 ÷ 94	150 x 150 x 35
05331206	Precision spirit level with frame	0,02	Ø 19 ÷ 108	200 x 200 x 40

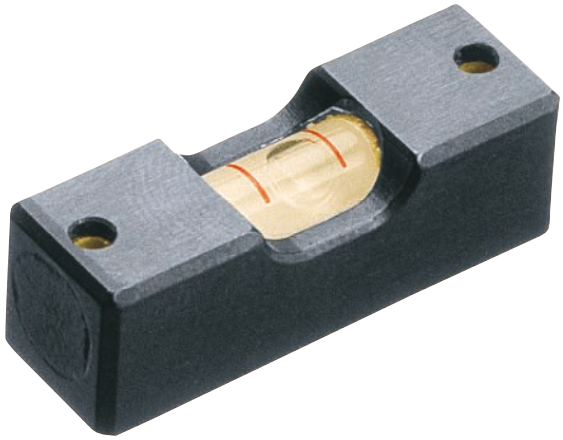
Precision spirit levels

05331000

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Measuring face(s)	2 V-shaped measuring faces for Ø 19 ÷ 108 mm
Function(s)	1 longitudinal vial 1 transverse vial Side viewing slots Thermal insulation and protection of the vial Vertical face with magnetic inserts
Perpendicularity	90° measuring surfaces, machined together
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	Dimensions mm
05331000	Precision spirit level, magnetic square	0,02	150 x 150 x 40
05331002	Precision spirit level, magnetic square	0,05	150 x 150 x 40

Spirit levels to be fixed



05331416

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Function(s)	1 longitudinal vial
Fixing	With 2 screws
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	Dimensions mm
05331402	Spirit level to be fixed	1	50 x 10 x 12
05331406	Spirit level to be fixed	0,3	60 x 12 x 14
05331408	Spirit level to be fixed	0,1	80 x 15 x 18
05331411	Spirit level to be fixed	0,1	100 x 18 x 22

Spirit levels to be fixed

05331500

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Material	Protection in anodized aluminum alloy
Function(s)	1 longitudinal vial 1 transverse vial
Fixing	With 3 screws
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	Dimensions mm
05331500	Spirit level to be fixed	2 ÷ 5	Ø 40 x 11
05331502	Spirit level to be fixed	0,3	Ø 60 x 13

Spirit levels to be fixed

05331550

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Function(s)	1 longitudinal vial 1 transverse vial
Fixing	With 2 screws
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	Dimensions mm
05331550	Spirit level to be fixed	0,1	80 x 65 x 17
05331551	Spirit level to be fixed	0,3	80 x 65 x 17

Spirit levels

05331254

Standard	DIN 877
Max. perm. errors	DIN 2276/1
Measuring face(s)	Flat measuring face
Function(s)	1 longitudinal vial
Included in delivery	Level Declaration of conformity

Article number	Designation	Resolution mm/m	Dimensions mm
05331250	Spirit level	0,1	Ø 16 x 80 x 9
05331254	Spirit level	0,05	Ø 22 x 150 x 11
05331255	Spirit level	0,1	Ø 22 x 150 x 11

TESA MICRO-SQUARE

- MEASUREMENT
  - High precision perpendicularity
  - Quick visualization of the results with the TWIN-T10
- INSTRUMENT
  - Carriage mounted on an ultra-precise guide
  - Easy handling
- USE
  - Perpendicularity measurement for professionals looking for high precision
- ACCESSORIES
  - Probe holder for easy measurement of hard-to-reach interior surfaces
  - Insert for GT31 lever indicator with cylindrical probing surface for line contact
  - Flanged measuring base and mounting bracket included to secure the position of the workpiece. The inside and outside of a square, for example, can be measured quickly and easily.

Resolution	0,1 µm (TWIN-T10)
Included in delivery	Instrument only: MICRO-SQUARE SCS Calibration Certificate Set: MICRO-SQUARE TWIN-T10 display GT31 probe Key SCS calibration certificate

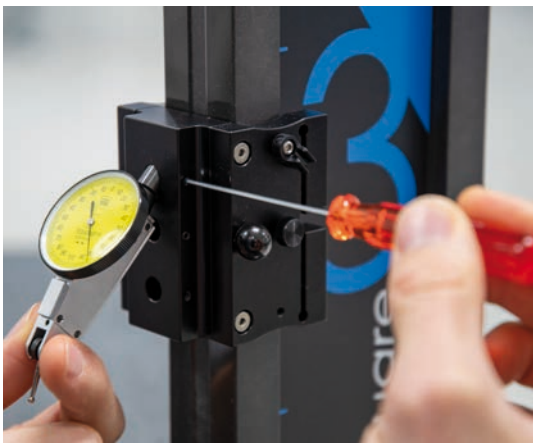
05310400

Perpendicularity measurement

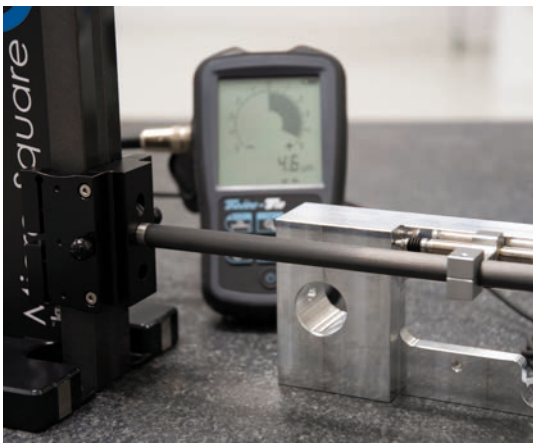
Article number	Designation	Application range mm	Repeatability limit, µm	Max. perm. perp. error, µm
05330400	MICRO-SQUARE 350 set	360	0,5	1,5
05330401	MICRO-SQUARE 600 set	610	0,5	2,4
05310400	MICRO-SQUARE 350	360	0,5	1,5
05310401	MICRO-SQUARE 600	610	0,5	2,4

Accessories

Article number	Designation
05360008	Probe holder, L = 200 mm
05360030	Base square check
03260510	Cylindrical-shaped insert



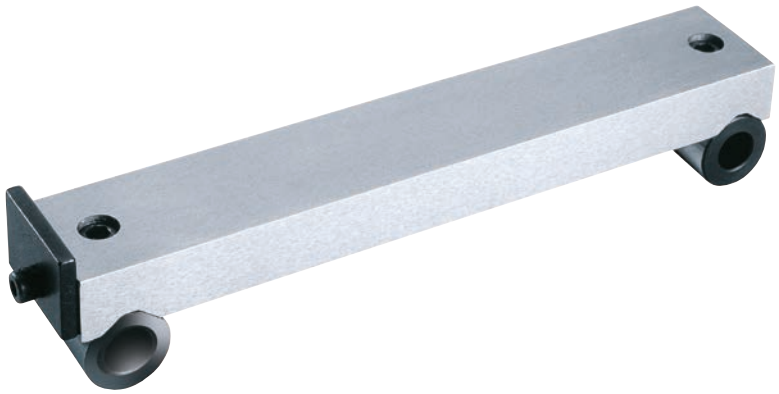
01840105



05360008

Sine bar

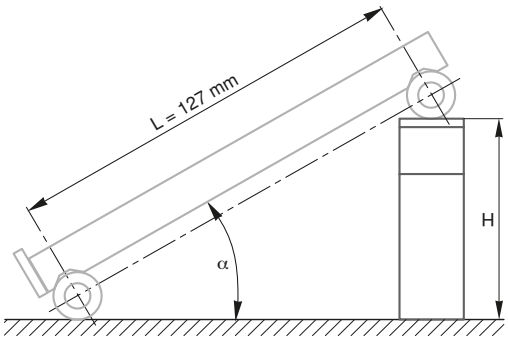
• USE
- Suitable for angles from 0° to 60°
- Sine function for determining the angle based on length dimensions obtained from gauge blocks



06769005

Material	Hardened stainless steel
Straightness	5 µm
Dimensions	Center distance: 127 mm ± 0,004 Body: 123 x 25 mm
Function(s)	Removable front stop

Article number	Designation
06769005	Sine bar



Example for the calculation of an angle
H = height of combination gauge blocks in mm
L = length of sine bar in mm

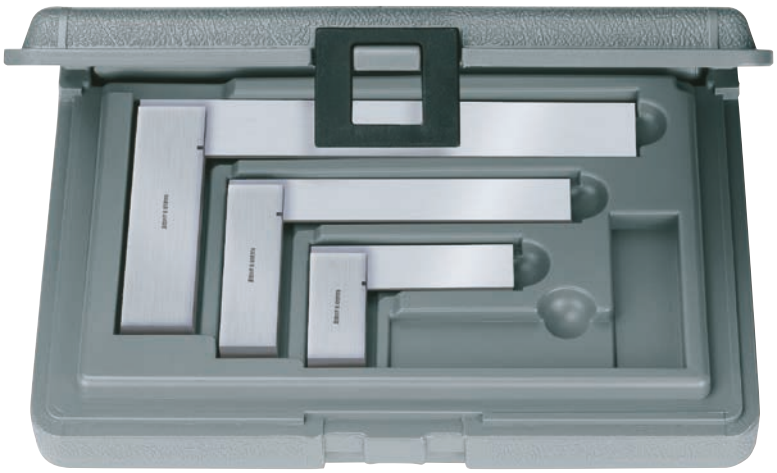
H = L x sin(α)
sin(α) = H/L
α = arcsin(H/L)

Bevelled straight edges

Standard	DIN 874 T2 / NF E 11-104
Material	Hardened steel Hardness ≥ 650 HV 10
Function(s)	1 edge Insulating grip
Included in delivery	Rule Declaration of conformity

Article number	Designation	Dimensions mm	Max. perm. straightness error, µm
0951750002	Bevelled straight edge	75	2
0951750003	Bevelled straight edge	100	2
0951750005	Bevelled straight edge	150	3
0951750006	Bevelled straight edge	200	3
0951750007	Bevelled straight edge	300	3
0951750008	Bevelled straight edge	400	4
0951750009	Bevelled straight edge	500	4

Try squares set



06739001

Standard	Factory standard
Material	Hardened steel
Perpendicularity	16 µm
Included in delivery	1x square: 68 x 45 mm 1x square: 120 x 70 mm 1x square: 175 x 95 mm

Article number	Designation
06739001	Set of 3 try-squares