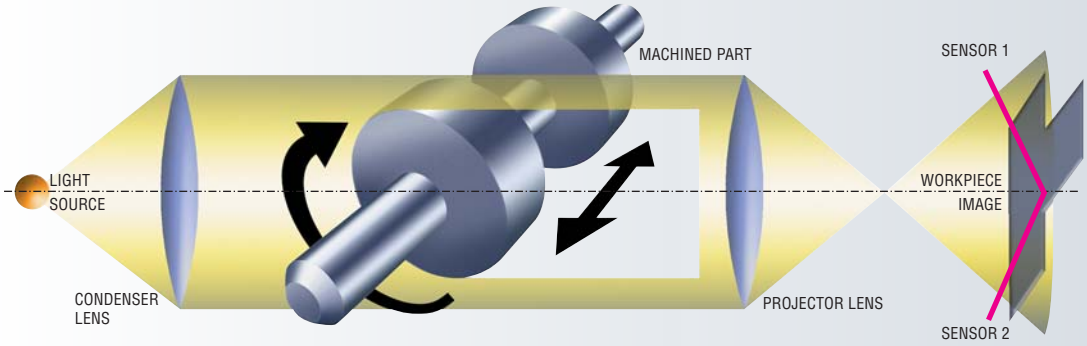
Optical Measurement

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.

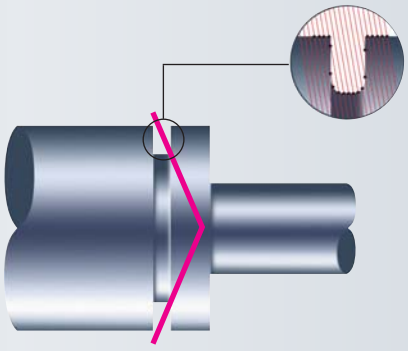
Operating Principle

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° against the part axis, these sensors ensure a precise data capture when inspecting diameters, angles, radii and other geometric part features with parallel or slopped surfaces.

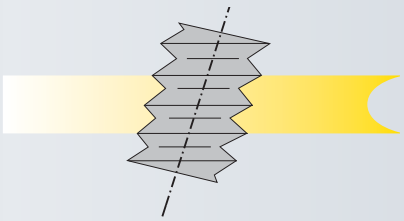


Dynamic Measurement

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

	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*

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.

№	
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.

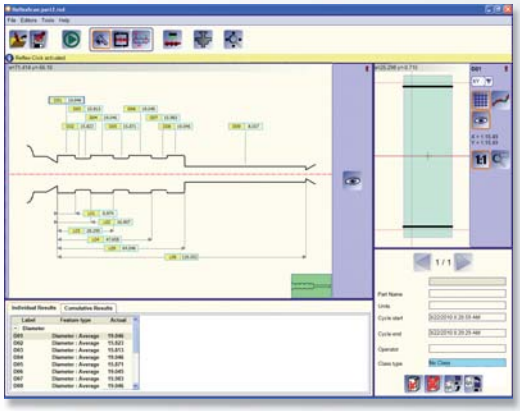
- Diameters
- Lengths
- Radii
- Angles
- Chamfers
- Threads

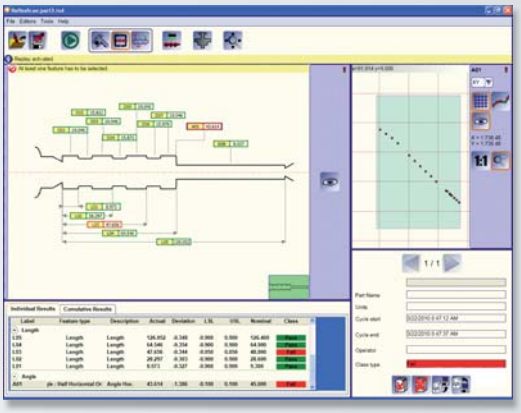
Equipped with a rotation axis available as an option, this machine will let you inspect additional features such as:

- Runout
- Coaxiality
- Across-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: H800 x L640 x P500 mm, H32 x L25 x P20 in
TESA-SCAN 50: H1055 x L800 x P580 mm, H41 x L32 x P23 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

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.

For information on Pro-Measure, see page P-9.

TESA-SCAN 25

TESA-SCAN 50

Technical Data

TESA-SCAN 25	D	L	*D*	*L*
	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*

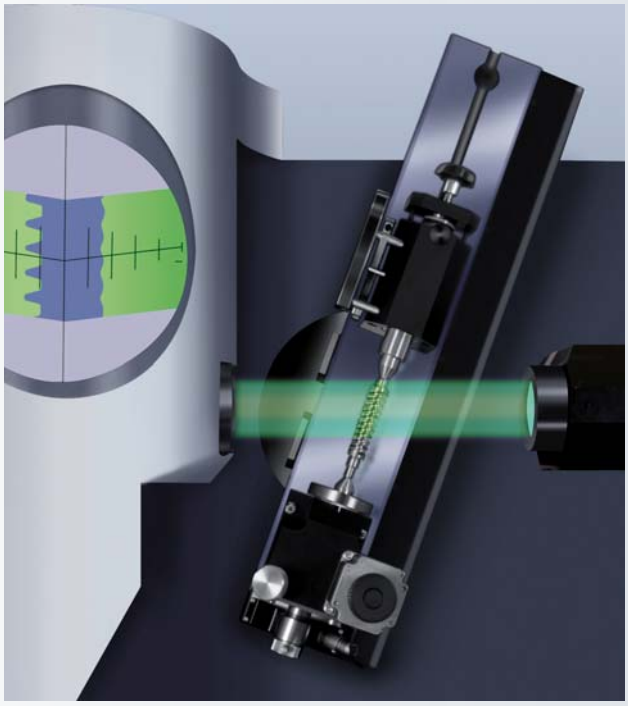
TESA-SCAN 50	D	L	*D*	*L*
	0,5 ÷ 50 mm	275 mm	*0,02 ÷ 1.96 in*	*10.8 in*
	0,0001 mm	0,001 mm	*0.000004 in*	*0.00004 in*
20°C ±1°C	(2 + D/100) µm (D in mm)	(5 + L/100) µm (L in mm)	*(0.08 + D/100)/ 1000 in (D in in)*	*(0.2 + D/100)/ 1000 in (L in in)*
2 σ	1 µm	2,5 µm	*0.00004 in*	*0.0001 in*

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).

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°) .



✓

H1055 x L800 x P580 mm
H41 x L32 x P23 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.

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.

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.

✓

H1455 x L800 x P580 mm
H57 x L32 x P23 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

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

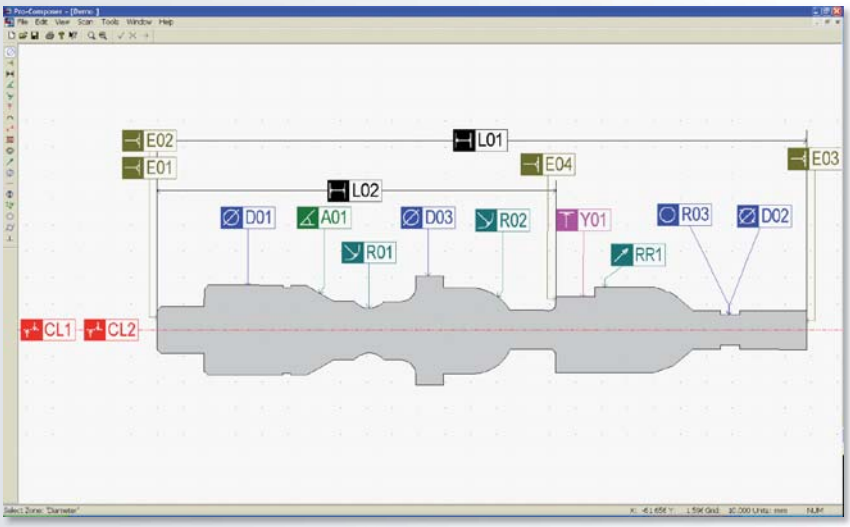
Complex metrology-based applications involving form and shape measurement are easily performed due to a flexible programming.

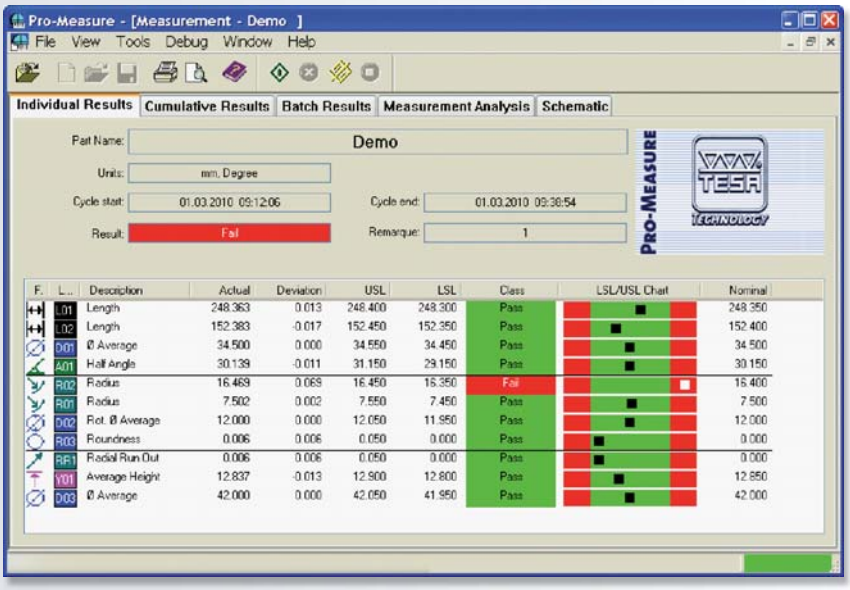
Pro-Measure enables a visual comparison of the true form as captured. This function makes the analysis of any existing manufacturing problems easier. It also provides the operator with the needed assistance when creating part programs. This simple software tool can either be installed directly on the 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.

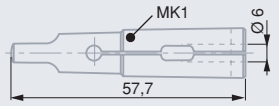
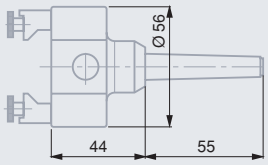
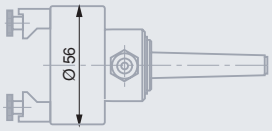
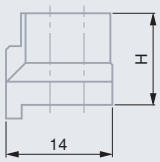
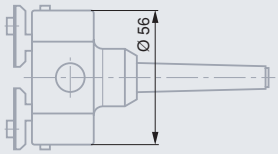
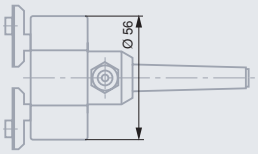
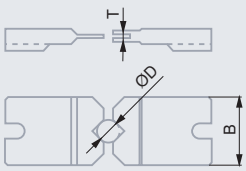
Key Features

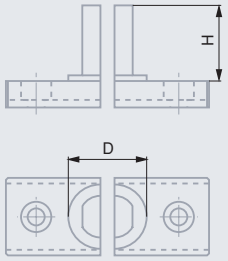
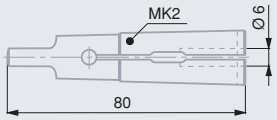
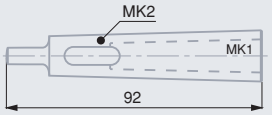
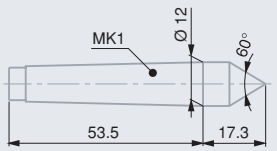
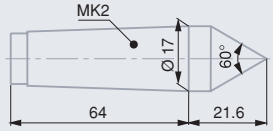
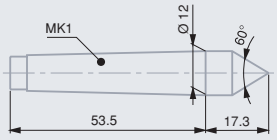
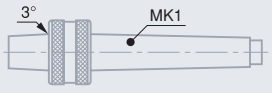
- User-friendly interface for part programming.
- Wide variety of measuring functions.
- Statistical follow up for optimum monitoring of the manufacturing process.
- Full control of multiple levels of use.
- Flexible reporting.

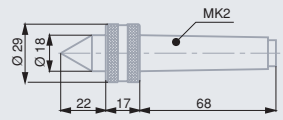
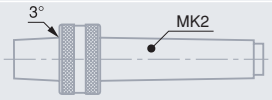
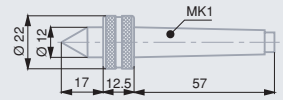
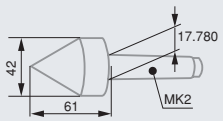
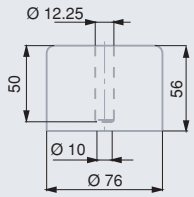
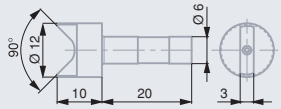
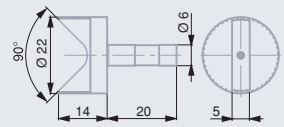
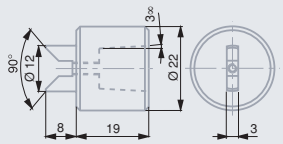
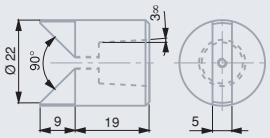
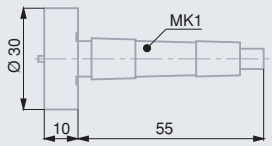
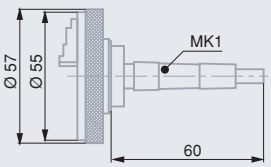
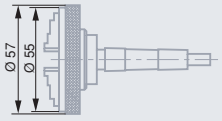


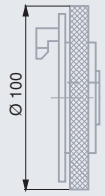
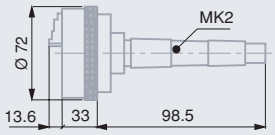
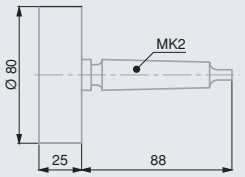
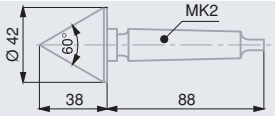
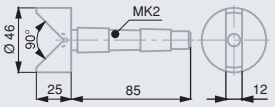
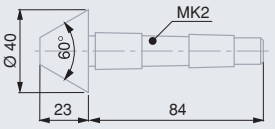
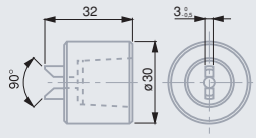
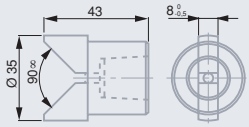
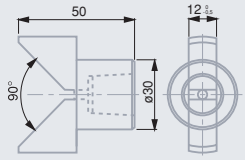
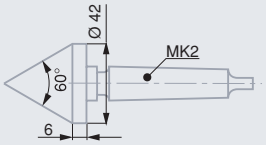


Accessories

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
TL01-0015 D = 4-5 mm H = 6,6 mm **TL01-0016** D = 5-6 mm H = 8,6 mm **TL01-0017** D = 6-8 mm H = 11,5 mm **TL01-0018** D = 8-11 mm H = 17,5 mm **TL01-0019** D = 11-15 mm H = 20 mm **TL01-0020** D = 15-19 mm H = 20,2 mm		For TL01-0007 TL01-0008	–	–	Internal jaws, in pairs
TL01-0022	Set of jaws including: TL01-0015 TL01-0016 TL01-0017 TL01-0018 TL01-0019 TL01-0020	For TL01-0007	–	–	Internal jaws, in pairs
TL01-0026		–	●	–	Centre adapter with a 6 mm dia. coupling bore
TL01-0027		–	●	–	Reduction sleeve, Morse 2 to 1
TL02-0001		●	–	2 items provided with TESA-SCAN 25	Extra male centre, 10 mm
TL02-0002		–	●	2 items provided with TESA-SCAN 50 and TESA-SCAN 52 Reflex-Click	Extra male centre, 17 mm
TL02-0003		●	–	Diamond coated 10 mm	Drive centre
TL02-0016		●	–	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 m	3-jaw chuck, clamping range 1÷15 mm
Z173-2024 **Z173-2025**		– ●	● –	– –	6-jaw chuck , clamping range 0,7÷15 mm

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.

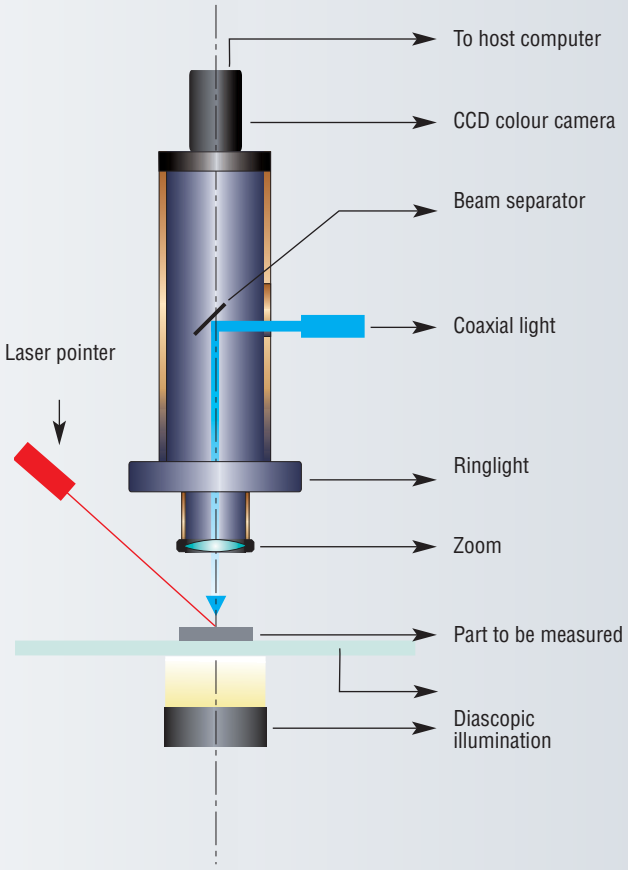
TESA-VISIO OPERATING PRINCIPLE

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

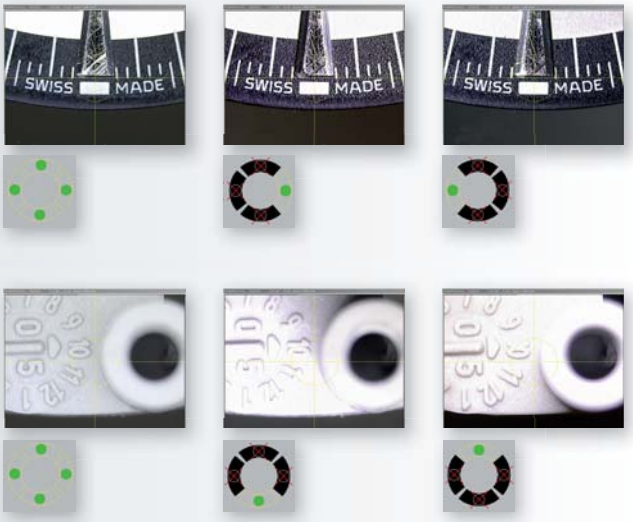
Episcopic illumination

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.

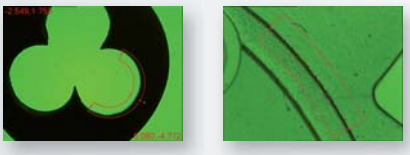
- *On a TESA-VISIO 200 GL, the ringlight is divided into 4 segments of 90°.*
- *On a TESA-VISIO 300 GL, the ringlight includes two circular rows. The outer row is divided into 8 segments of 45° whilst the inner one has 4 segments of 90°.*

Each segment is programmable separately over the software.



Diascopic illumination

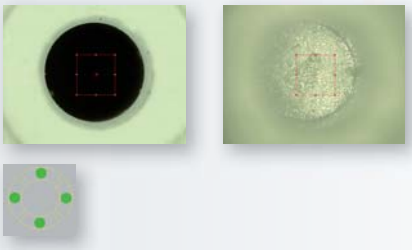
The diascopic illumination, or transmitted light is projected under the part being measured to create a silhouette image of the profile. Also used for the measurements based on transparency.



Illuminated contour

Coaxial light

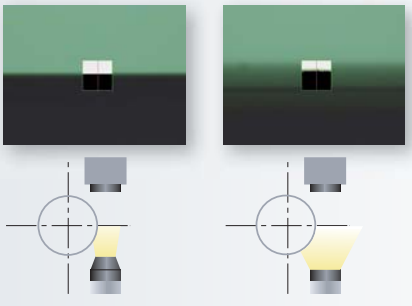
This light is projected from above through the zoom. The collimated light beams produce an illuminated field useful for inspecting blind bores or cylindrical parts.



On the left, the inside of a blind bore cannot be inspeted 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 sharpe 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	6,5 x	–	–	–
Motorised zoom	–	6,5 x	6,5 x 12 x (optional)	6,5 x 12 x (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.

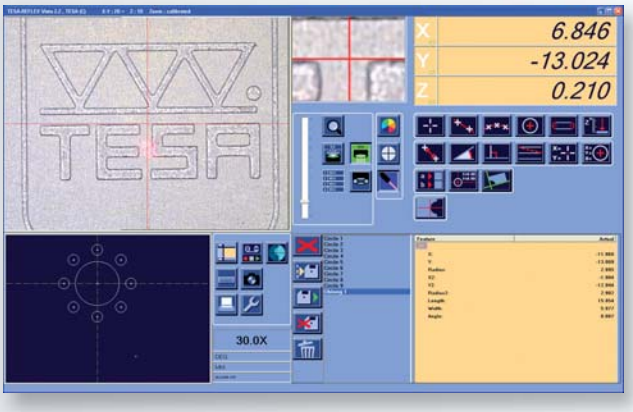
TESA-REFLEX Vista or TESA-REFLEX Vision will measure the highest number of geometrical elements quickly and accurately.

Main Features

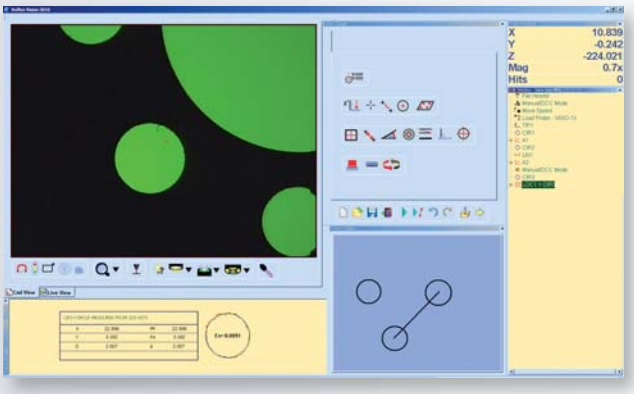
- Intuitive software tools.
- User-friendly, icon-based interface.
- Simple programming.
- Automatic measuring mode.
- On-line help in the Z-axis.
- True three-axis alignment.
- Visual comparison of the part against its CAO file (Compar option available from TESA-REFLEX Vista).

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) µm
MPE_{XY}* (E_{XY}) = (2,9 + 10 L/1000) µm
MPE_Z*/** (E_Z) = (2,9 + 10 L/1000) µm
* 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

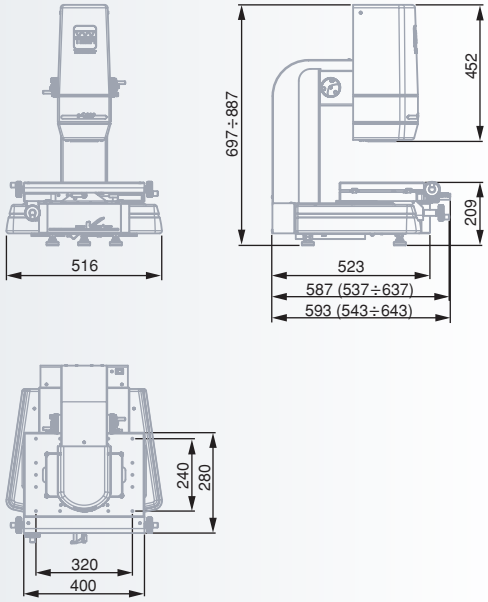
Anodised aluminium

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

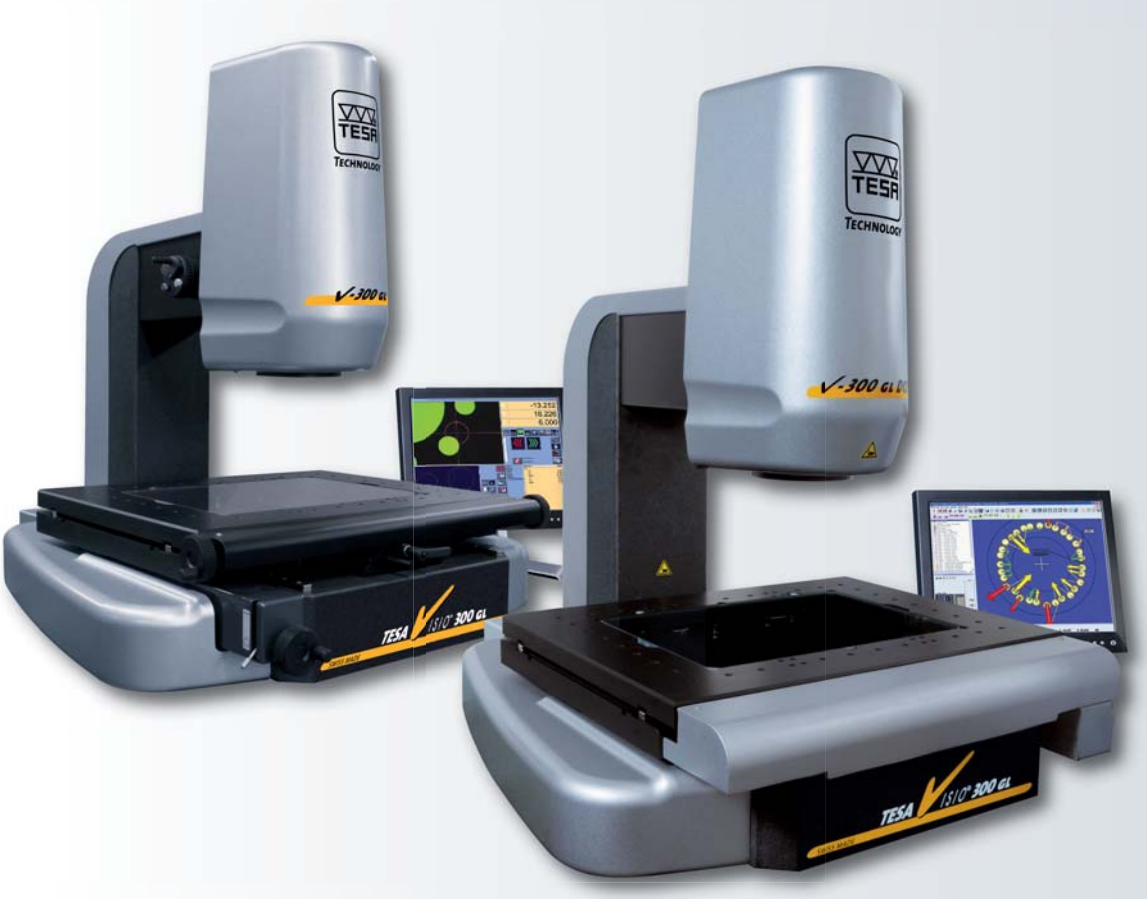


Nº	=	**VISIO 200 GL 06830401** manual	**VISIO 200 GL 06830428** manual
04760079	PC DELL Optiplex	●	●
04760091	Monitor 20”	●	●
055074	Manual zoom, indexable (6,5x)	●	–
051638	Motorised zoom (6,5x)	–	●
054926	Coaxial light	●	●
054925	Ringlight (4 x 90°)	●	●
06860046	TESA-REFLEX Vista software	●	●

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

✓

Rigid granite structure

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) µm
MPE_{XY}* (E_{XY}) = (2,5 + 4 L/1000) µm
MPE_Z*/** (E_Z) = (2,9 + 5 L/1000) µm
Motorised version:
$MPE_{X,Y}$* (E_X, E_Y) = (1,6 + 4 L/1000) µm
MPE_{XY}* (E_{XY}) = (2 + 4 L/1000) µm
MPE_Z*/** (E_Z) = (2,9 + 5 L/1000) µm
* 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

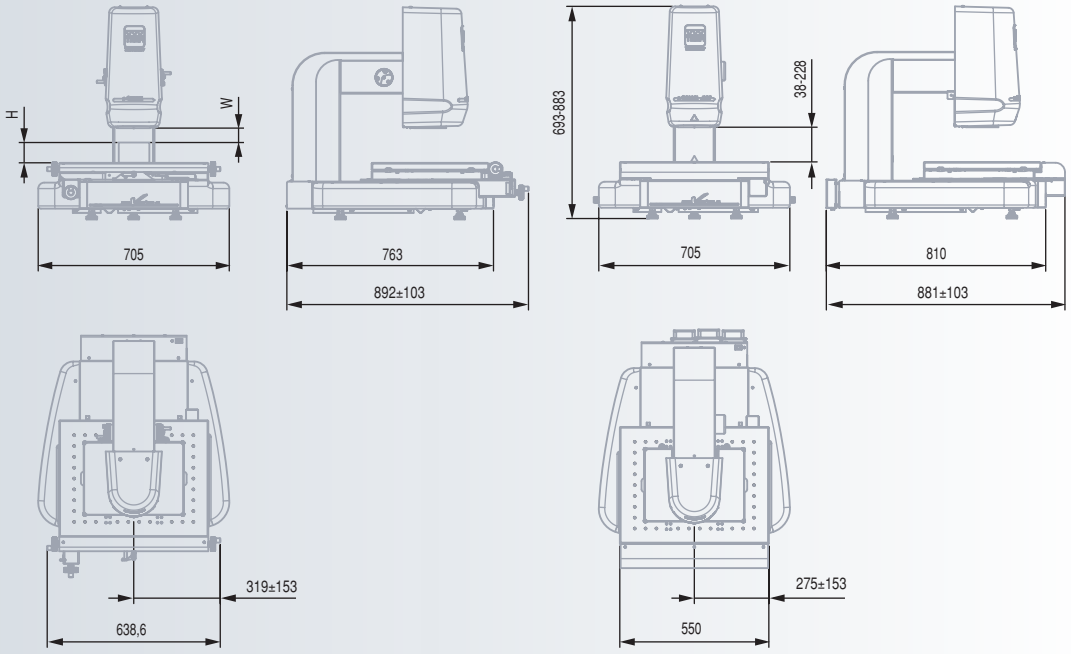
Max. load capacity: 20 kg

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



NO		**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
TESA-VISIO 200 GL	●	●	–	–
TESA-VISIO 300 GL	–	–	●	●
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
Precision				
$MPE_{X, Y}$ (E_X, E_Y) (µm) (L in mm)**	2+10 L/1000	2+10 L/1000	2+4 L/1000	1,6+4 L/1000
MPE_{XY} (EX_Y) (µm) (L in mm)**	2,9+10 L/1000	2,9+10 L/1000	2,5+4 L/1000	2+4 L/1000
MPE_Z (E_Z) (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				
Camera and optics				
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	●	●	●	●
Additional data				
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^2)	–	–	–	640
Velocity in the Z-axis (mm/s)	–	–	–	160
Acceleration in the Z-axis (mm/s^2)	–	–	–	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

		TESA-VISIO	
		200 GL	300 GL
Light illumination			
06860145	Diascopic illumination, parallel	●	●
Optics			
06860323	Motorised zoom, 12x (on the purchase of a vision machine)	–	●
06860315	Zoom upgrade, 6,5x to 12x (machine retrofit)	–	●
06860030	Additional lens, 0,5x for a 6,5x zoom	●	●
06860031	Additional lens, 0,75x for a 6,5x zoom	●	●
06860032	Additional lens, 1x for a 6,5x zoom	●	●
06860033	Additional lens, 2x for a 6,5x zoom	●	●
06860287	Additional lens, 0,5x for a 12x zoom	–	●
06860288	Additional lens, 0,75x for a 12x zoom	–	●
06860289	Additional lens, 1x for a 12x zoom	–	●
06860290	Additional lens, 2x for a 12x zoom	–	●
Additional accessories			
S68900025	Monitor 22" instead of 20"	●	●
06860186	Foot switch for data point acquisition	●	Manual version
04760077	Joystick	–	Motorised version
06860317	Suited case for Visiofix light accessory set	●	●
06860316	Suited case for Visiofix standard accessory set	●	●
06860318	Visiofix accessory set, steel rails 200	●	–
06860320	Visiofix accessory set, steel rails 300	–	●

06860316

06860317

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 ± 0,05% (profile illumination); ± 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 ± 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

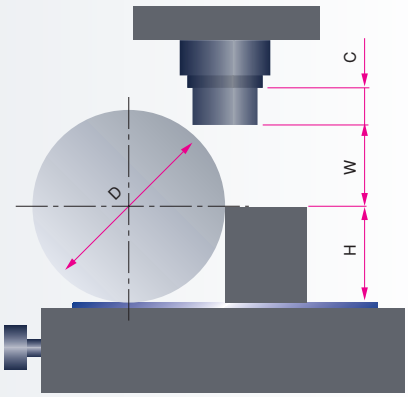
Large Table

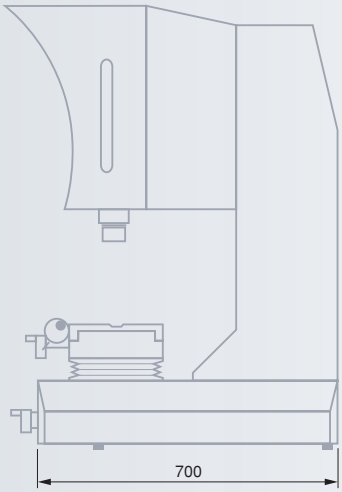
- Anodised aluminium
- Table surface 440 x 282 mm (X/Y)
- Measuring span: 300 x 150 mm (X/Y)
- In one coordinate direction: ± 5,0 + L/20 (L in mm)
- Max. workload capacity 10 kg

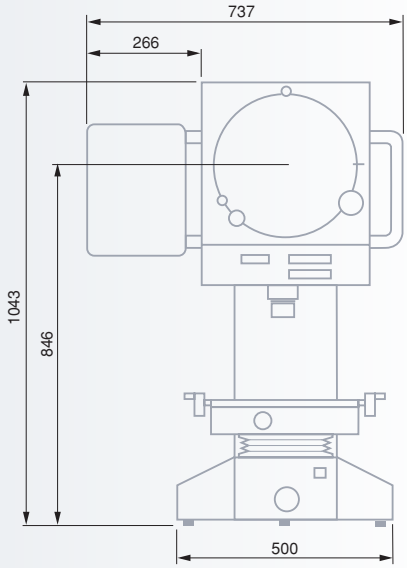
		Base	Measuring Table		Digital Readout / Control Panel		
			X=200 mm Y=100 mm	X=300 mm Y=150 mm	TS100	TS300	TS300E
	№						
TESA-Scope II 300V	**06830041**	●	●	–	●	–	–
TESA-Scope II 300V	**06830042**	●	●	–	–	●	–
TESA-Scope II 300V	**06830043**	●	●	–	–	–	●
	№						
TESA-Scope II 300V Plus	**06830044**	●	–	●	●	–	–
TESA-Scope II 300V Plus	**06830045**	●	–	●	–	●	–
TESA-Scope II 300V Plus	**06830046**	●	–	●	–	–	●

Telecentric Objectives

	10 x	20 x	25 x	31,25 x	50 x	100 x
№	06860001	06860002	06860003	06860004	06860005	06860006
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

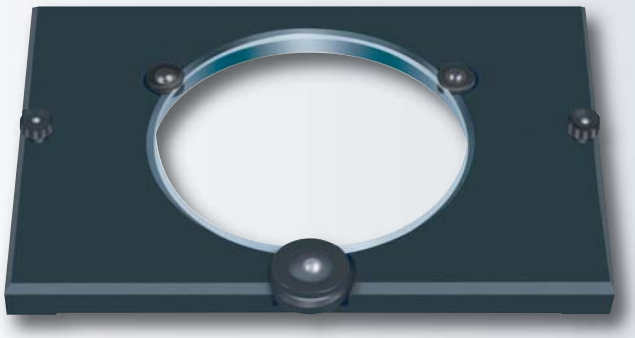




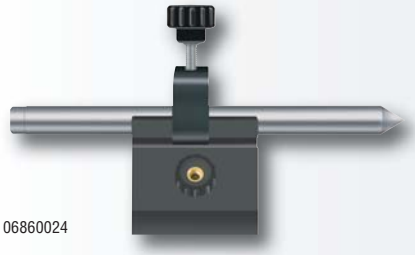


Accessories

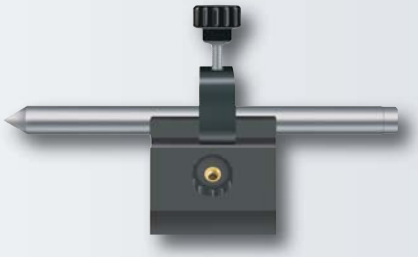
Nº	=
06860015	200 x 100 mm glass plate
06860016	300 x 150 mm glass plate
06860017	300 mm diameter viewing screen with 4 overlay chart clips
06860020	Profile lamp, 24 V – 150 W
06860021	Surface lamp, 24 V – 200 W
06860022	150 mm dia. rotary table. Used with the 200 x 100 mm measuring table.
06860029	150 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

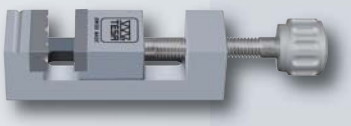


06860022/29



06860024

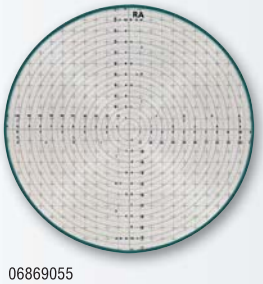




06860025

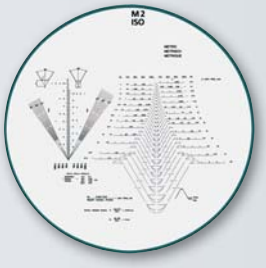
06860061

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 ± 0,05% (profile illumination); ± 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 ± 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

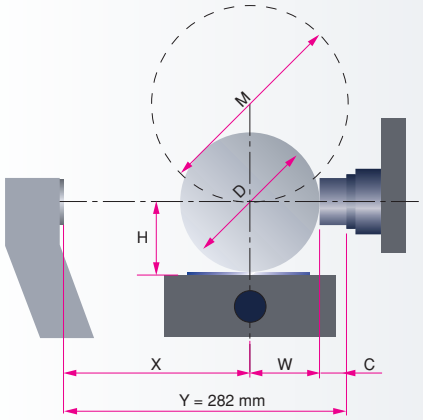
Designed for checking round parts.

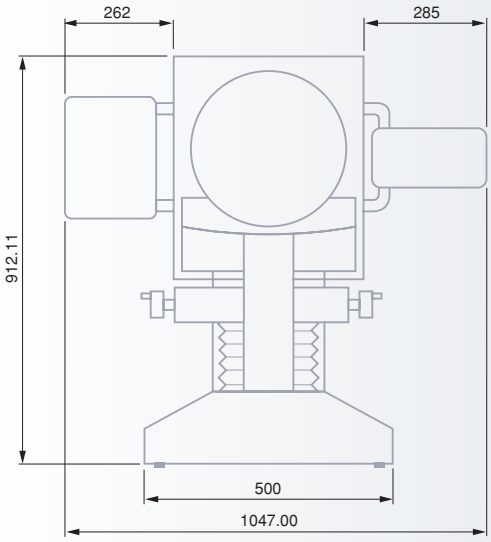
- Profile projectors with horizontal illumination.
- 360° rotary viewing screen in frosted glass, 355 mm diameter. 30°, 60° or 90° crossline reticle along with 4 overlay chart clips.
- Screen rotation with built-in sexagesimal and decimal reading, resolution in minutes – RAZ ABS/INC.
- Profile illumination 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.

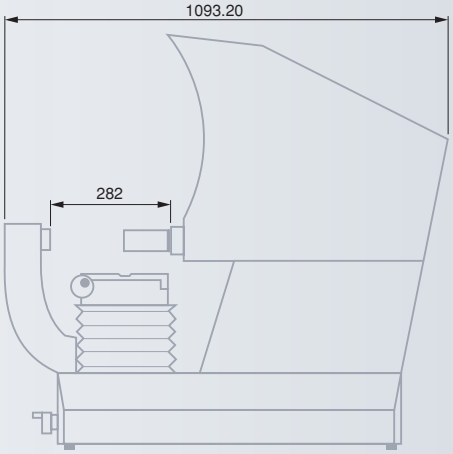
		Base	Measuring table		Digital Readout / Control Panel		
			X=200 mm Y=100 mm	X=300 mm Y=100 mm	TS100	TS300	TS300E
TESA-Scope II 355H	06830051	●	●	–	●	–	–
TESA-Scope II 355H	06830052	●	●	–		●	–
TESA-Scope II 355H	06830053	●	●	–	–	–	●
TESA-Scope II 355H Plus	06830054	●	–	●	●	–	–
TESA-Scope II 355H Plus	06830055	●	–	●	–	●	–
TESA-Scope II 355H Plus	06830056	●	–	●	–	–	●

Telecentric Objectives

	10x	20x	25x	31,25x	50x	100x
	06860001	06860002	06860003	06860004	06860005	06860006
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	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

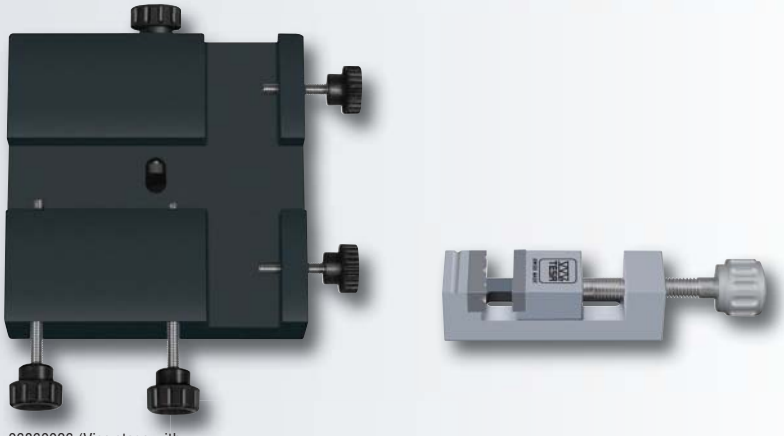
Large Table

- 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

06860018	355 mm dia. viewing screen with 4 overlay chart clips
06860020	Profile lamp, 24 V – 150 W
06860021	Surface lamp 24 V – 200 W
06860024	V-blocks and centres
06860025	Vise stage
06860026	Vise stage with base
06860056	Rotary table for model 355H
06860057	Prism for rotary table N° 06860056
06860058	Vise for rotary table N° 06860056
06860059	Vertical support for glass plate

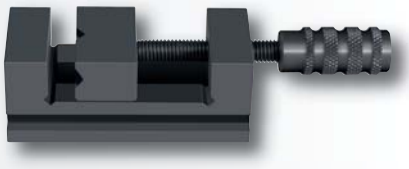
06860024



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.

✓

89 x 118 mm display field with illuminated background

7-decade digit display plus sign for all measured values.

Icon-based User's guidance

RS232

Shipping packaging

№	
06830031	TS-100 Digital readout
06830034	TS-300 Control panel
06830035	TS-300-E Control panel with edge detector

✓

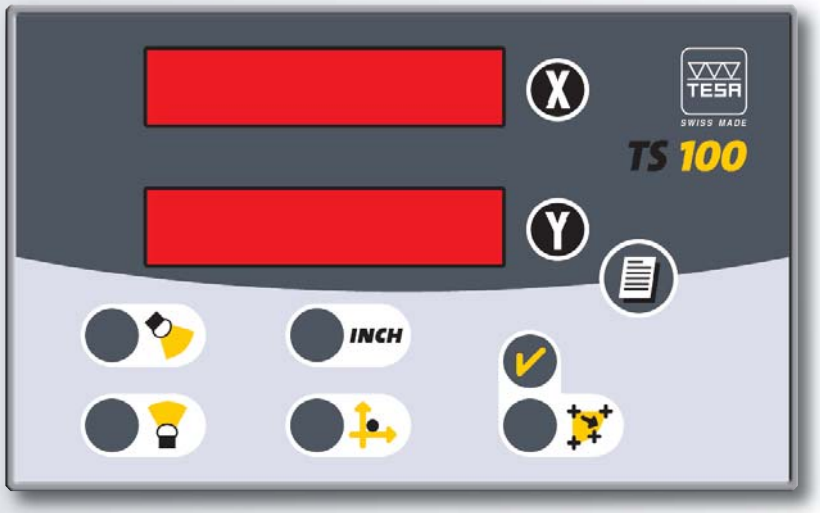
RS232

Model 300V: integrated into the unit.
Models 355H: single unit

Shipping packaging

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

Nº		Clamping range mm
06769007	Set of Brown & Sharpe V-blocks	0,7 ÷ 40
Supplied with:		
	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

20 °C

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

N°	
06869101	BAD PLASTIFORM, 8 double cartridges, 50 ml
06869102	DAV PLASTIFORM, 8 double cartridges, 50 ml
06869119	PLASTIFORM Test Kit BAD 10 double cartridges of 5 ml + 15 mixer-injectors + 2 rings for mould removal
06869120	PLASTIFORM Test Kit DAV 10 double cartridges of 5 ml + 15 mixer-injectors + 2 rings for mould removal
06869118	RGX80 PLASTIFORM S50, 8 double cartridges, 50 ml
06869121	LKAD PLASTIFORM in packs of 2 boxes, 750 g each
06869106	Mixer-injectors in packs of 50
06869107	Mixer-injectors in packs of 100
06869108	Mixer-injectors in packs of 200
06869109	Injector nozzles in packs of 20
06869110	PLASTIN (200 g). Malleable under normal conditions. Used to make «stops» or «retainers» when executing sectorial prints. Reusable.
06869111	Cutter, special with two parallel blades spaced 1 mm apart over a usable length of 60 mm.
06869112	DS 50 injection handle
06869113	DN1 spot remover, aerosol can, 400 ml